

TRANSMISSION SECTION

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

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

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

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

CONTROL SYSTEMS**CS****AUTOMATIC TRANSMISSION****4AT****AUTOMATIC TRANSMISSION
(DIAGNOSTICS)****4AT(diag)****MANUAL TRANSMISSION AND
DIFFERENTIAL****5MT****MANUAL TRANSMISSION AND
DIFFERENTIAL****6MT****MANUAL TRANSMISSION AND
DIFFERENTIAL (DIAGNOSTICS)****6MT(diag)****CLUTCH SYSTEM****CL**

AUTOMATIC TRANSMISSION

4AT

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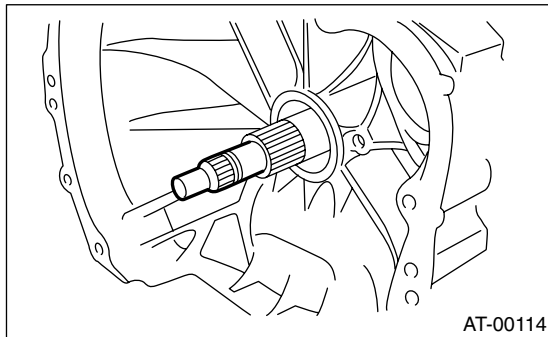
Drive Pinion Shaft

AUTOMATIC TRANSMISSION

37. Drive Pinion Shaft

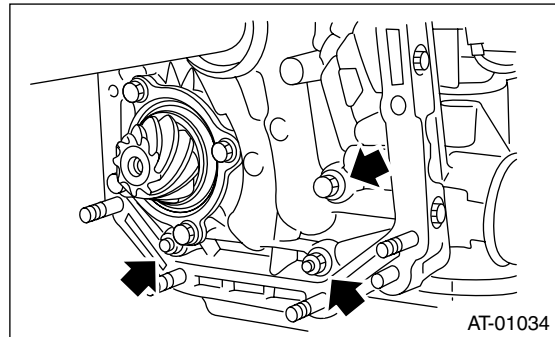
A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to 4AT-79, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch connector from stay.
- 6) Disconnect the air breather hose. <Ref. to 4AT-77, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charge pipe. <Ref. to 4AT-78, REMOVAL, Oil Charge Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-75, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of converter case and transmission case sections <Ref. to 4AT-100, REMOVAL, Converter Case.>
- 10) Separate transmission case and extension case sections. <Ref. to 4AT-81, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. (MPT model) <Ref. to 4AT-95, REMOVAL, Reduction Drive Gear.>
- 12) Remove the center differential carrier. (VTD model) <Ref. to 4AT-97, REMOVAL, Center Differential Carrier.>
- 13) Remove the reduction driven gear. <Ref. to 4AT-93, REMOVAL, Reduction Driven Gear.>

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



B: INSTALLATION

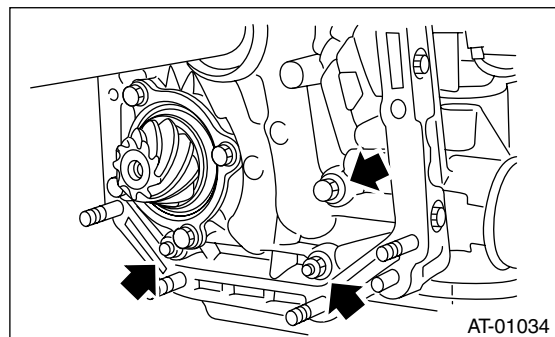
- 1) Assemble the drive pinion assembly to the oil pump housing.

NOTE:

- Pay attention not to bend the shim.
- Pay attention not to press the pinion into housing bore.

Tightening torque:

40 N·m (4.0 kgf-m, 30 ft-lb)

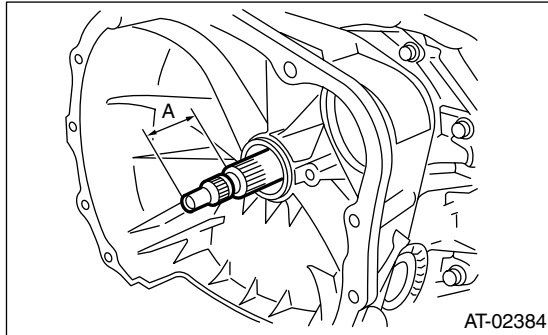


- 2) Combine the torque converter case with the transmission case. <Ref. to 4AT-100, INSTALLATION, Converter Case.>
- 3) Install the reduction driven gear. <Ref. to 4AT-93, INSTALLATION, Reduction Driven Gear.>
- 4) Install the reduction drive gear. (MPT model) <Ref. to 4AT-95, INSTALLATION, Reduction Drive Gear.>
- 5) Install the center differential carrier. (VTD model) <Ref. to 4AT-97, INSTALLATION, Center Differential Carrier.>
- 6) Combine the extension case with the transmission case, and install vehicle speed sensor 1 (rear). <Ref. to 4AT-81, INSTALLATION, Extension Case.>
- 7) Insert inhibitor switch and transmission connector into stay.

- 8) Install the oil cooler inlet and outlet pipes. <Ref. to 4AT-76, INSTALLATION, ATF Cooler Pipe and Hose.>
- 9) Install the oil charge pipe with O-ring.
- 10) Insert the input shaft while turning lightly by hand and verify the protrusion amount.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)

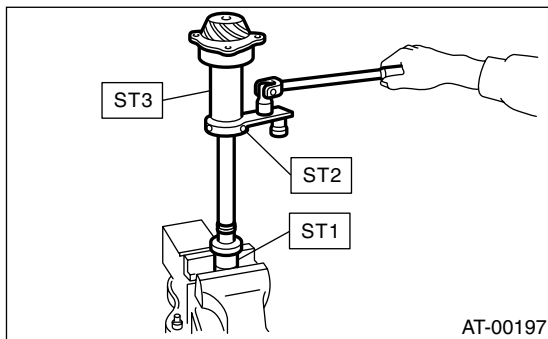


- 11) Install the torque converter clutch assembly. <Ref. to 4AT-79, INSTALLATION, Torque Converter Clutch Assembly.>
- 12) Install the transmission assembly to vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

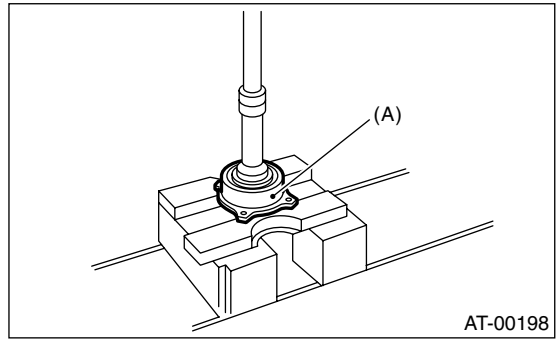
- 1) Straighten the staked portion of the lock nut, and remove the lock nut while locking the rear spline portion of the shaft with ST1 and ST2. Then pull off the drive pinion collar.

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



- 2) Remove the O-ring.

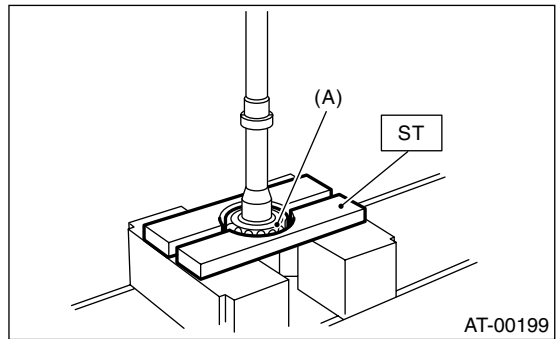
- 3) Using a press, separate the rear roller bearing and outer race from the shaft.



(A) Outer race

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

ST 498517000 REPLACER

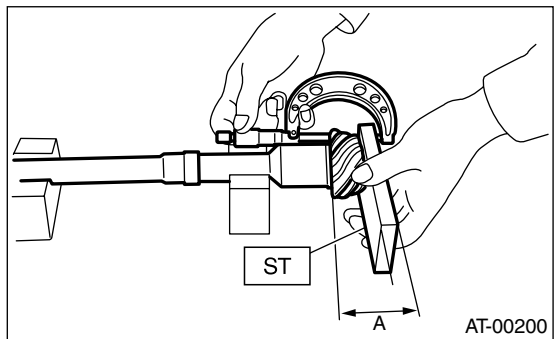


(A) Front roller bearing

D: ASSEMBLY

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

ST 398643600 GAUGE



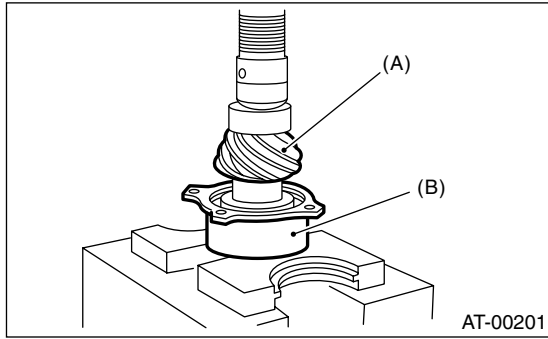
- 2) Using a press, force-fit a new roller bearing in position.

Drive Pinion Shaft

AUTOMATIC TRANSMISSION

NOTE:

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



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

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

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

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

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

T1: 116 N·m (11.8 kgf·m, 85.3 ft·lb)

[Required torque setting]

T2: Tightening torque

L1: ST2 length 0.072 m (2.83 in)

L2: Torque wrench length

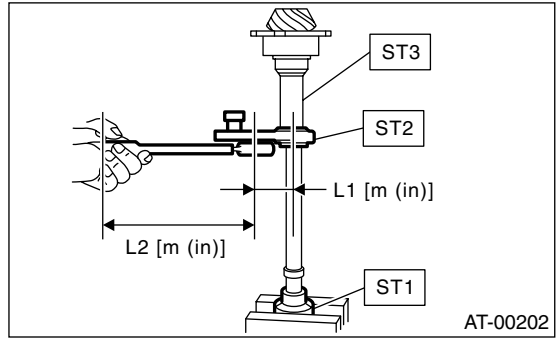
Example:

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

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

NOTE:

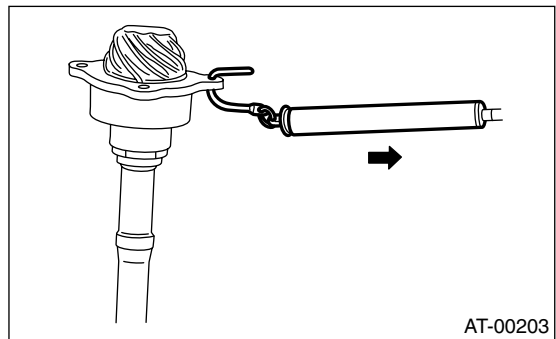
Install ST2 to torque wrench as straight as possible.



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

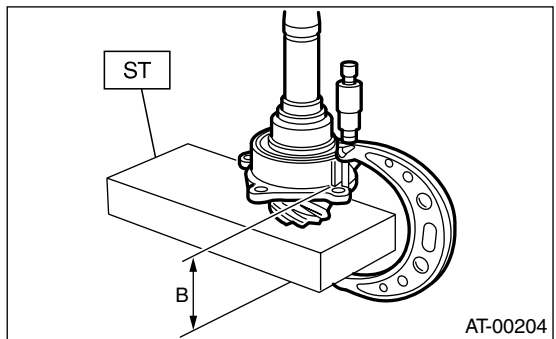
Starting torque:

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



7) Stake the lock nut securely at two places.

8) Measure dimension "B" of the drive pinion shaft.
ST 398643600 GAUGE



9) The thickness "t" (mm) of the drive pinion shim.
 $t = 6.5 \pm 0.0625 - (B - A)$

10) Select three or less shims from following table.

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

E: INSPECTION

- Make sure that all component parts are free of harmful cuts, gouges, and other faults.
- Adjust the teeth alignment. <Ref. to 4AT-111, ADJUSTMENT, Drive Pinion Shaft.>

F: ADJUSTMENT

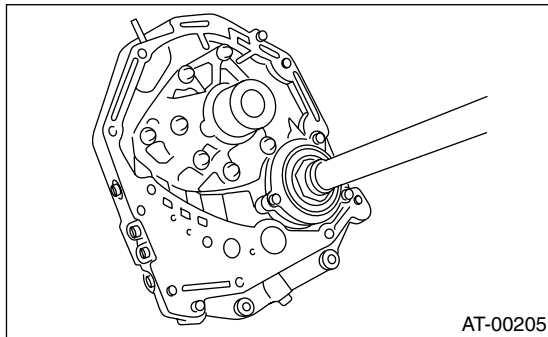
- 1) Thoroughly remove the liquid gasket from the case mating surface beforehand.
- 2) Install the oil pump housing assembly to the converter case, and secure evenly by tightening four bolts.

NOTE:

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

Tightening torque:

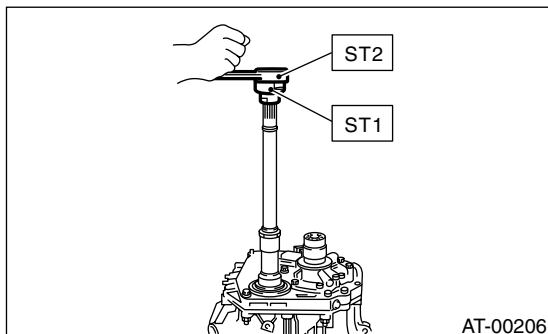
41 N·m (4.2 kgf·m, 30.4 ft·lb)



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

ST1 498937110 HOLDER

ST2 499787700 WRENCH



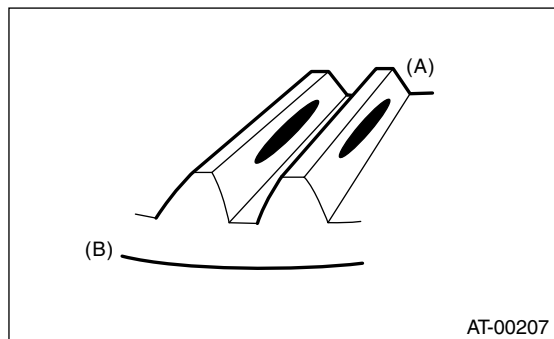
4) Adjust the backlash between drive pinion and crown gear. <Ref. to 4AT-118, ADJUSTMENT, Front Differential.>

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

If tooth contact is improper, readjust the backlash or shim thickness. <Ref. to 4AT-118, ADJUSTMENT, Front Differential.>

- 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.]



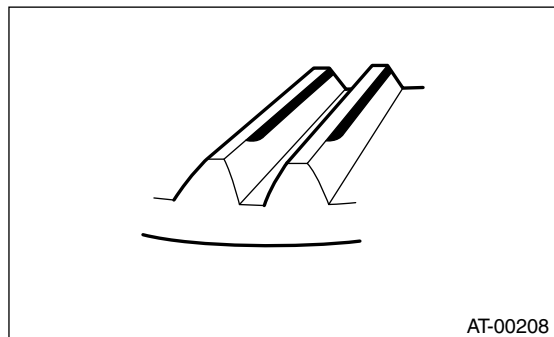
(A) Toe side

(B) Heel side

- Face contact

Checking item: Backlash is too large.

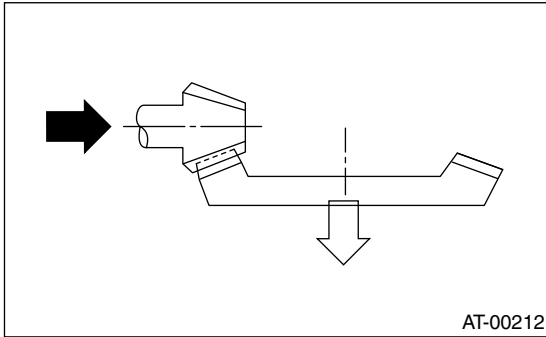
Contact pattern



Drive Pinion Shaft

AUTOMATIC TRANSMISSION

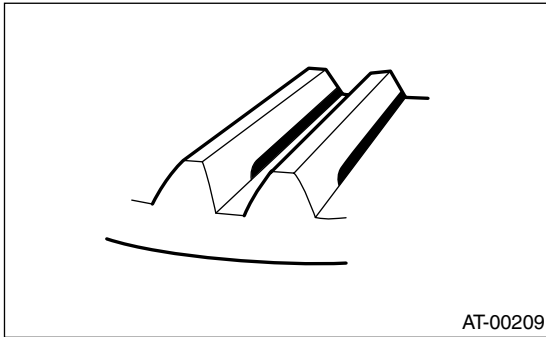
Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.



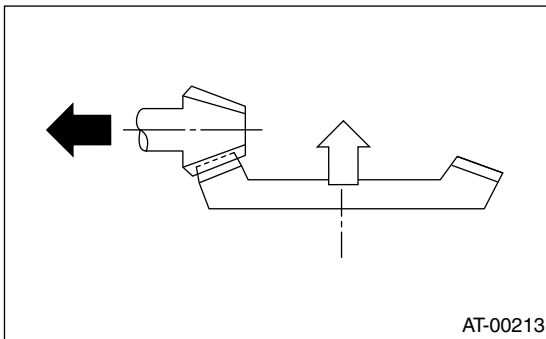
- Flank contact

Checking item: Backlash is too small.

Contact pattern



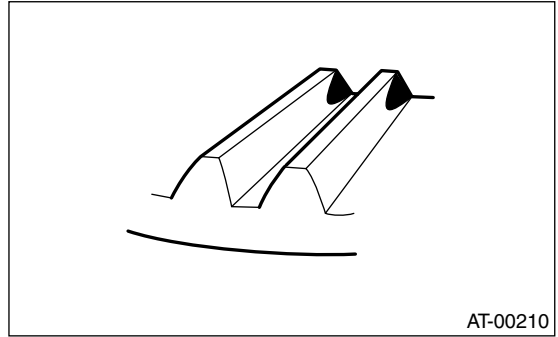
Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.



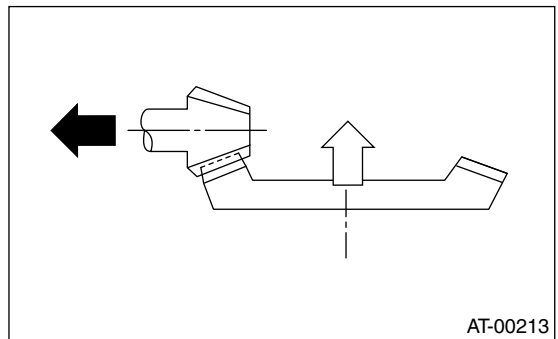
- Toe contact (Inside end contact)

Checking item: Contact areas is small.

Contact pattern



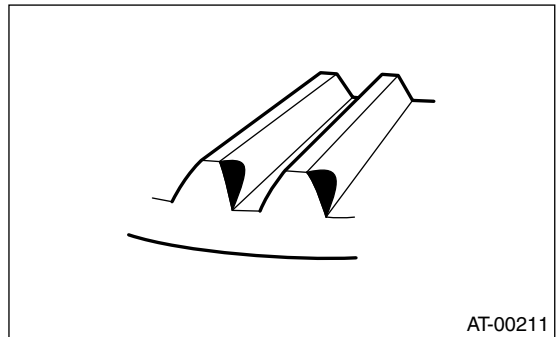
Corrective action: Decrease thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.



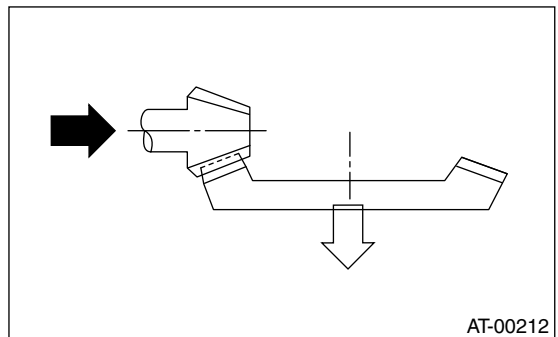
- Heel contact (Outside end contact)

Checking item: Contact areas is small.

Contact pattern



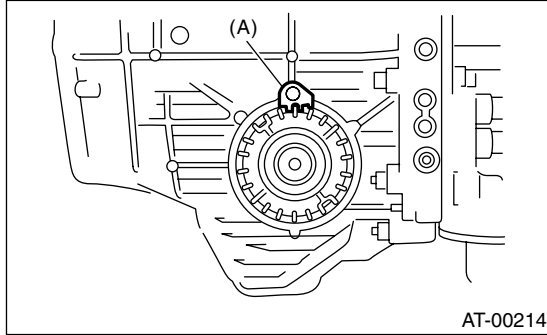
Corrective action: Increase thickness of drive pinion height adjusting shim in order to move drive pinion close to crown gear.



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

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)

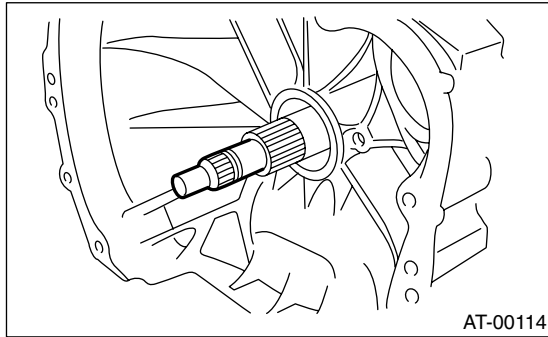


(A) Lock plate

38. Front Differential

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to 4AT-79, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch from stay.
- 6) Remove the oil charge pipe. <Ref. to 4AT-78, REMOVAL, Oil Charge Pipe.>
- 7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-75, REMOVAL, ATF Cooler Pipe and Hose.>
- 8) Separation of converter case and transmission case. <Ref. to 4AT-100, REMOVAL, Converter Case.>
- 9) Remove the seal pipe.
- 10) Remove the differential side retainer with ST.

NOTE:

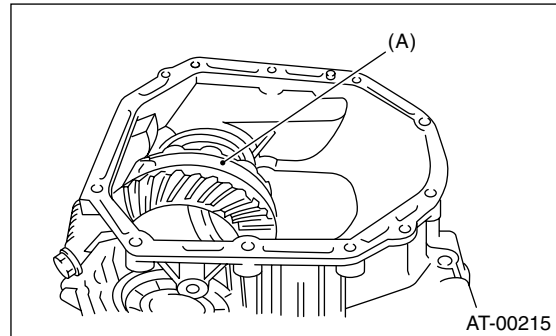
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the converter case.

ST 499787000 WRENCH ASSY

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

B: INSTALLATION

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

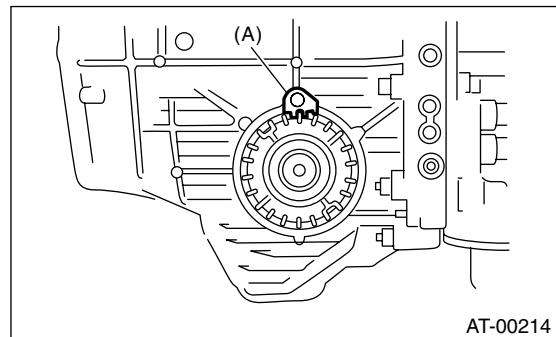


(A) Differential assembly

- 2) Install the O-rings from left and right side retainer.
- 3) Using ST, install the side retainers. <Ref. to 4AT-114, REMOVAL, Front Differential.>
ST 499787000 WRENCH ASSY
- 4) Adjust the front differential backlash. <Ref. to 4AT-118, ADJUSTMENT, Front Differential.>
- 5) Install the lock plate.

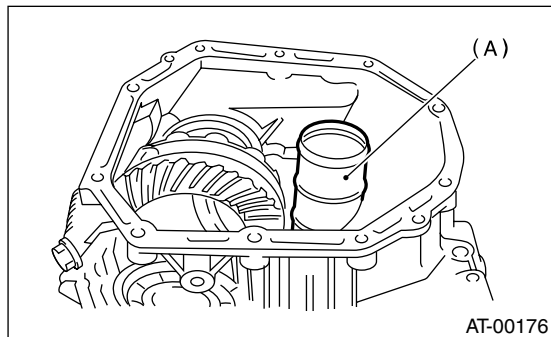
Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Lock plate

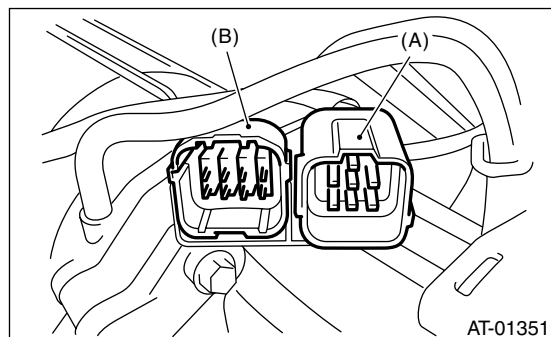
6) Install the new seal pipe to the converter case.



(A) Seal pipe

7) Install the converter case to transmission case. <Ref. to 4AT-100, INSTALLATION, Converter Case.>

8) Insert inhibitor switch and transmission connector into stay.



(A) Transmission harness
(B) Inhibitor switch harness

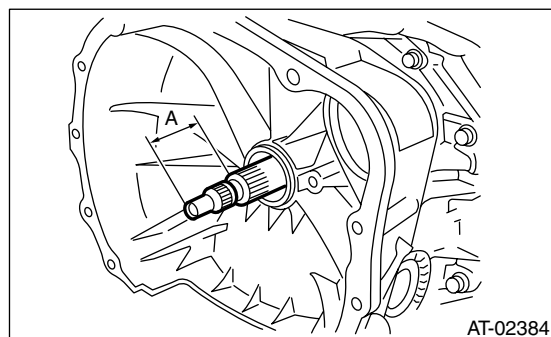
9) Install oil cooler pipes. <Ref. to 4AT-76, INSTALLATION, ATF Cooler Pipe and Hose.>

10) Install the oil charge pipe with O-ring <Ref. to 4AT-78, INSTALLATION, Oil Charge Pipe.>

11) Insert the input shaft while turning lightly by hand and verify the protrusion amount.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



12) Install the torque converter clutch assembly. <Ref. to 4AT-79, INSTALLATION, Torque Converter Clutch Assembly.>

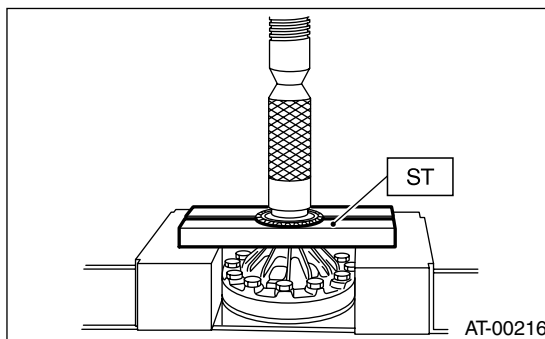
13) Install the transmission assembly to the vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

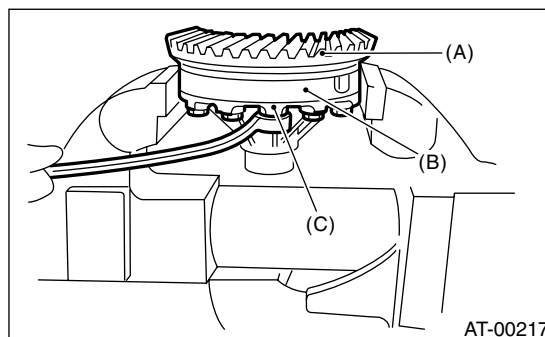
1. DIFFERENTIAL CASE ASSEMBLY

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

ST 498077000 REMOVER



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

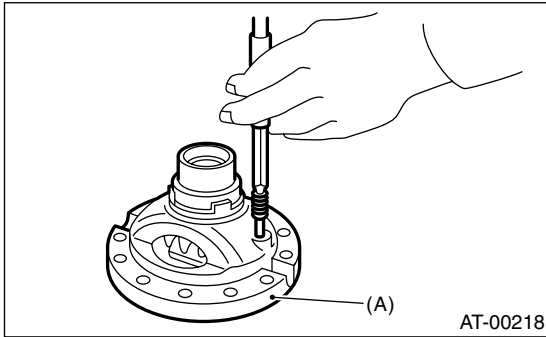


(A) Crown gear
(B) Differential case (RH)
(C) Differential case (LH)

Front Differential

AUTOMATIC TRANSMISSION

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



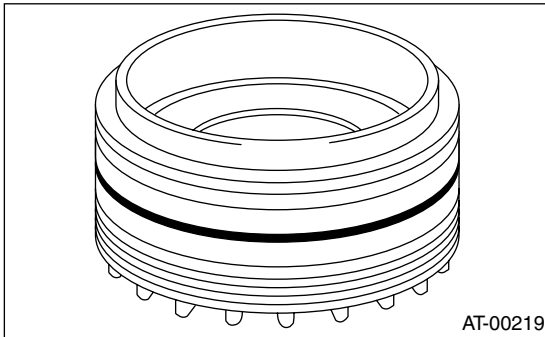
(A) Differential case (RH)

2. SIDE RETAINER

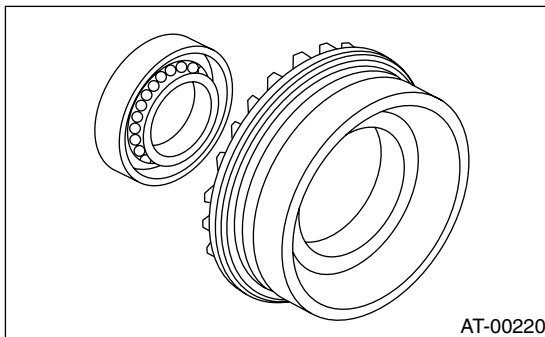
NOTE:

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

1) Remove O-ring.

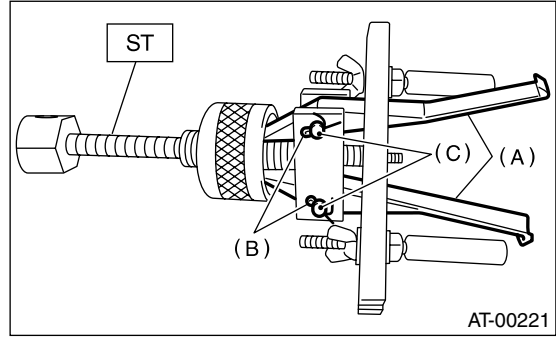


2) Remove oil seal.



3) Take out either split pin, remove claw.

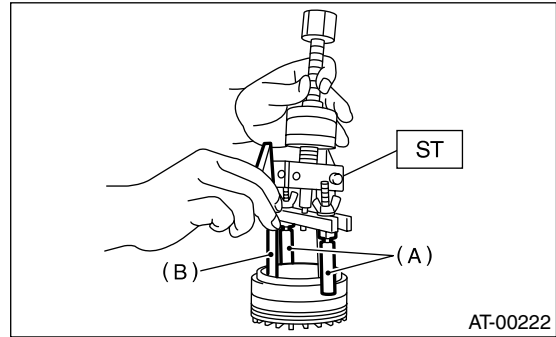
ST 398527700 PULLER ASSY



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

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

ST 398527700 PULLER ASSY



(A) Shaft
(B) Claw

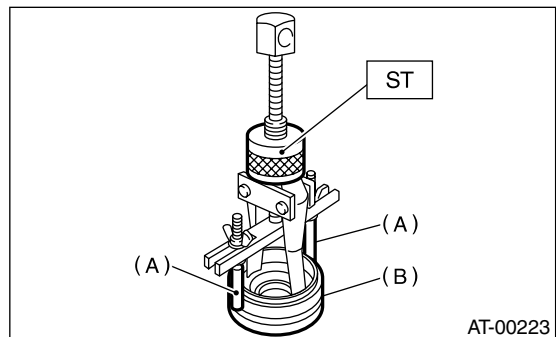
5) Return removed claw to the original position, and install pin and split pin.

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

ST 398527700 PULLER ASSY

NOTE:

Replace bearing inner and outer races as a single unit.

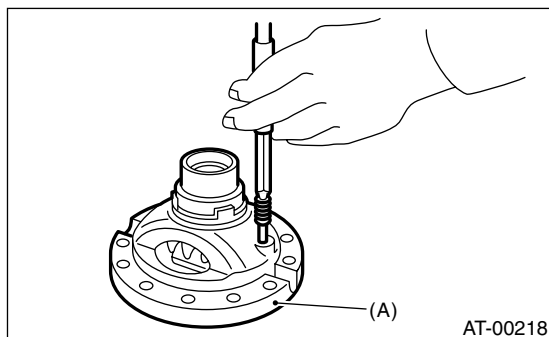


(A) Shaft
(B) Side retainer

D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

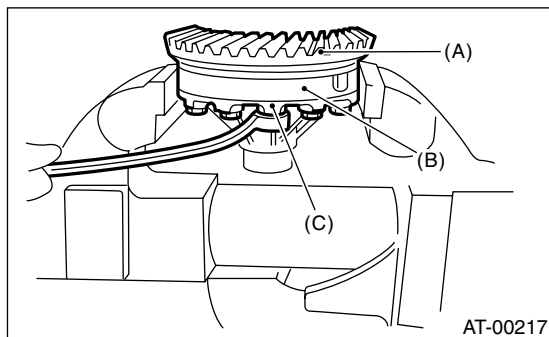
- 1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft.
- 2) Install straight pin from reverse direction.



(A) Differential case (RH)

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

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



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

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

Part No. 38415AA070 AXLE SHAFT

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

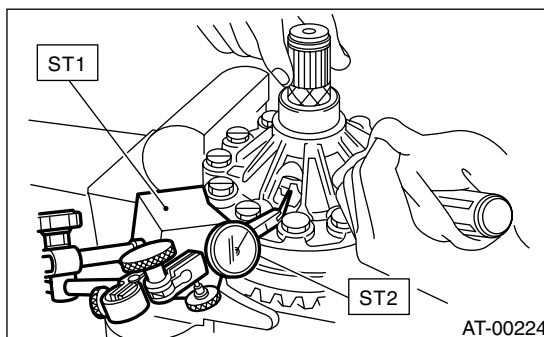
ST1 498247001 MAGNET BASE
 ST2 498247100 DIAL GAUGE

NOTE:

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

Standard value:

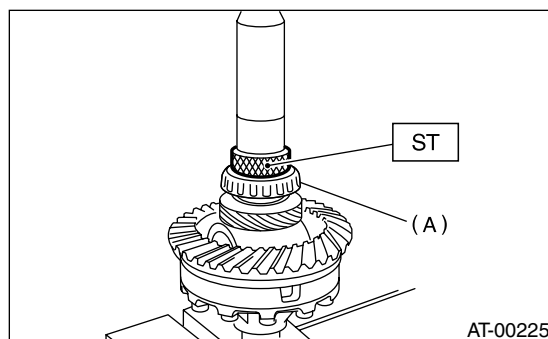
0.13 — 0.18 mm (0.0051 — 0.0071 in)



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

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

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



(A) Taper roller bearing

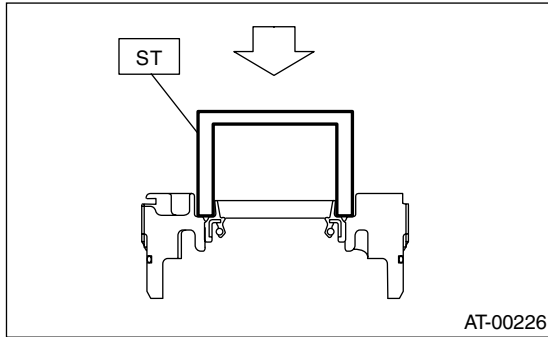
2. SIDE RETAINER

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

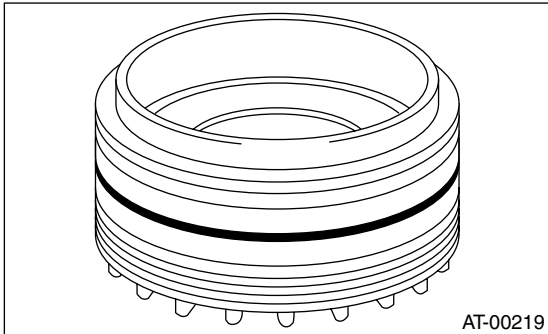
Front Differential

AUTOMATIC TRANSMISSION

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



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



E: INSPECTION

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

<Ref. to 4AT-118, ADJUSTMENT, Front Differential.>

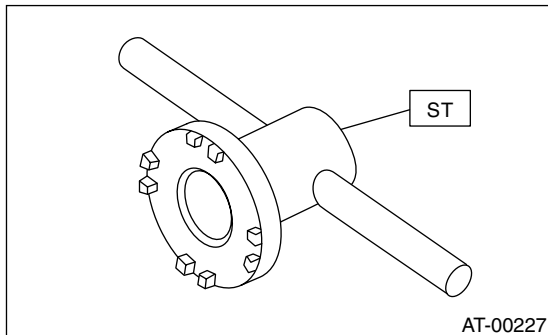
F: ADJUSTMENT

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

NOTE:

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

ST 499787000 WRENCH ASSY



2) Remove the oil pump housing.
3) Thoroughly remove the liquid gasket from the case mating surface beforehand.

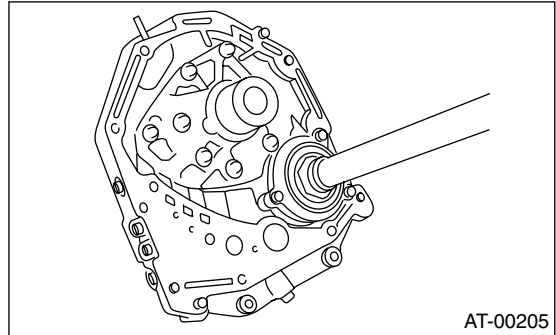
4) Install the oil pump housing assembly to the converter case, and secure evenly by tightening four bolts.

NOTE:

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

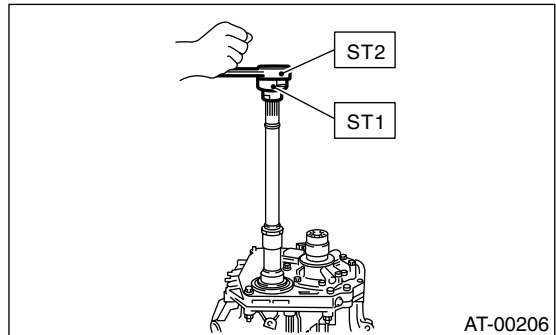
Tightening torque:

41 N·m (4.2 kgf·m, 30.4 ft·lb)

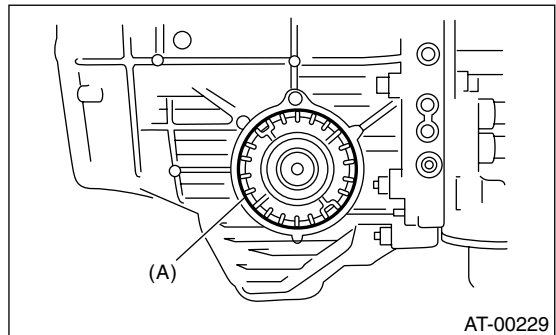


5) Rotate the drive pinion several times with ST1 and ST2.

ST1 498937110 HOLDER
ST2 499787700 WRENCH



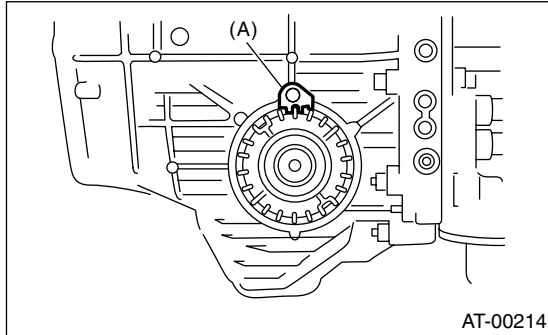
6) Tighten the LH retainer until contact is felt while rotating the shaft. Then loosen the RH retainer. Keep tightening the LH retainer and loosening the RH retainer until the pinion shaft can no longer be turned. This is the "zero" state.



(A) Retainer

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

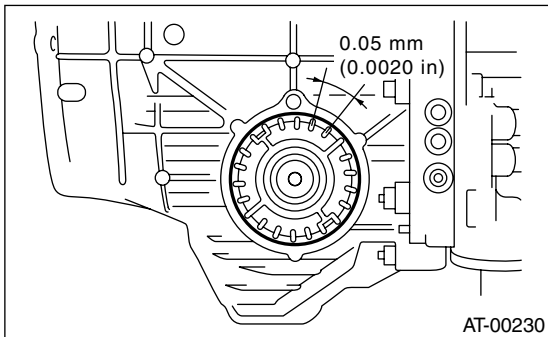
9) Adjust the tooth contact between front differential and drive shaft. <Ref. to 4AT-111, ADJUSTMENT, Drive Pinion Shaft.>



(A) Lock plate

NOTE:

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

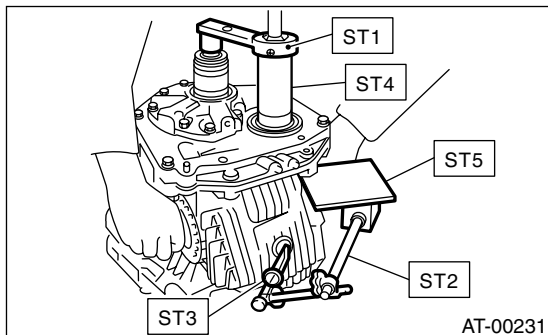


8) Turn the drive pinion several rotations with ST1 and check to see if the backlash is within the standard value with ST2, ST3, ST4 and ST5.

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

Backlash:

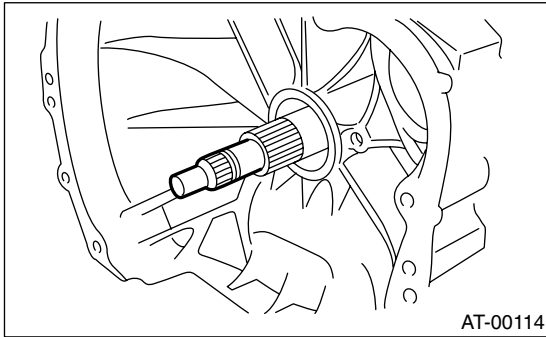
0.13 — 0.18 mm (0.0051 — 0.0071 in)



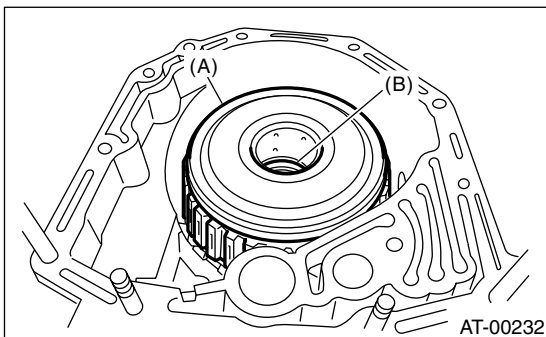
39.AT Transmission Main Case

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to 4AT-79, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.

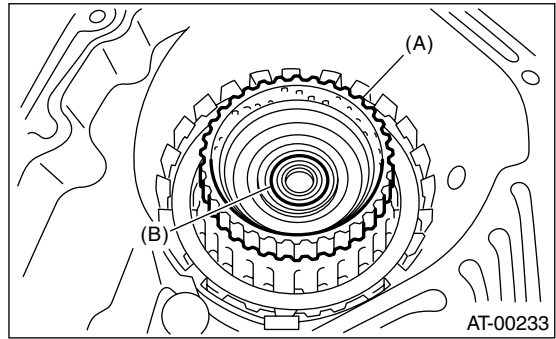


- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch connector from stay.
- 6) Disconnect the air breather hose.
- 7) Remove the oil charge pipe. <Ref. to 4AT-78, REMOVAL, Oil Charge Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-75, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of converter case and transmission case. <Ref. to 4AT-100, REMOVAL, Converter Case.>
- 10) Remove the oil pump housing. <Ref. to 4AT-102, REMOVAL, Oil Pump Housing.>
- 11) Take out the high clutch, thrust needle bearing and reverse clutch assembly.



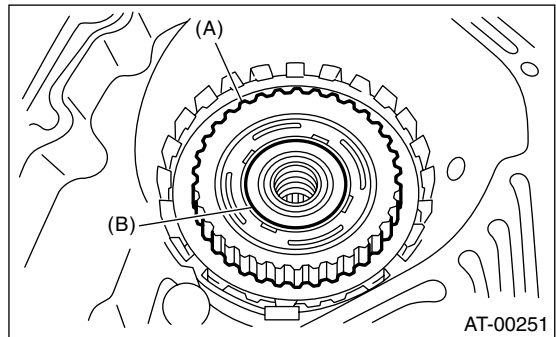
- (A) High clutch and reverse clutch assembly
- (B) Thrust needle bearing

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



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

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

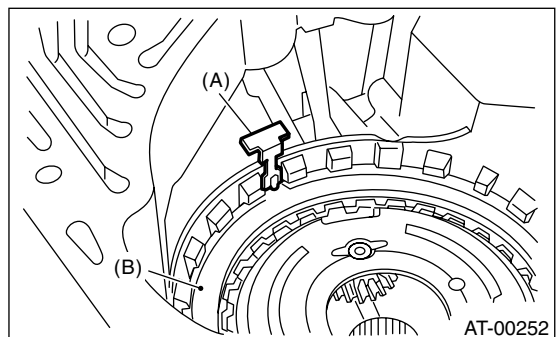


- (A) Front sun gear
- (B) Thrust needle bearing

- 14) Pull out leaf spring without folding.

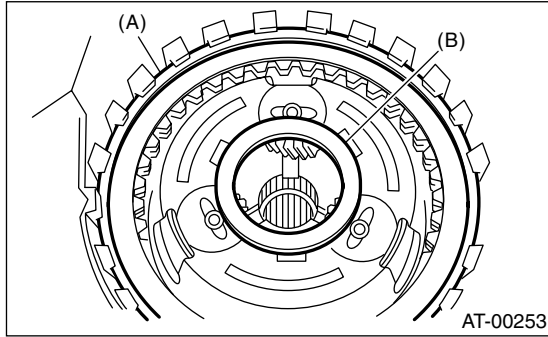
NOTE:

Remove it while pressing down on lower leaf spring.



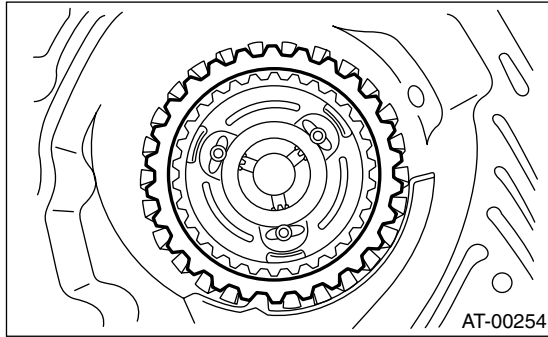
- (A) Leaf spring
- (B) Retaining plate

15) Remove snap ring and thrust needle bearing.

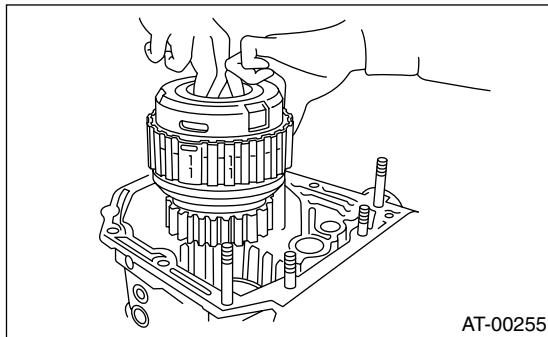


- (A) Snap ring
- (B) Thrust needle bearing

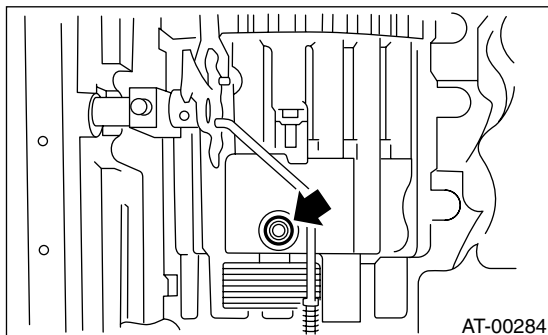
16) Take out retaining plate, drive plate and driven plate of 2-4 brake.



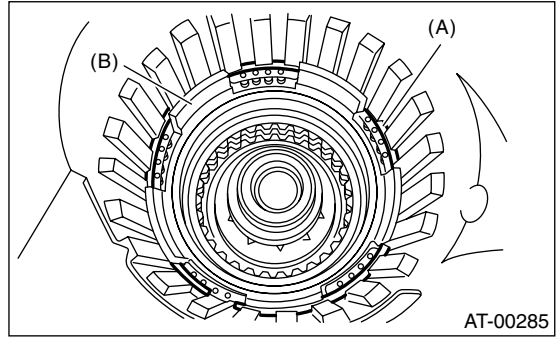
17) Take out the thrust needle bearing, planetary gear assembly and the low clutch assembly.



18) Remove 2-4 brake seal.

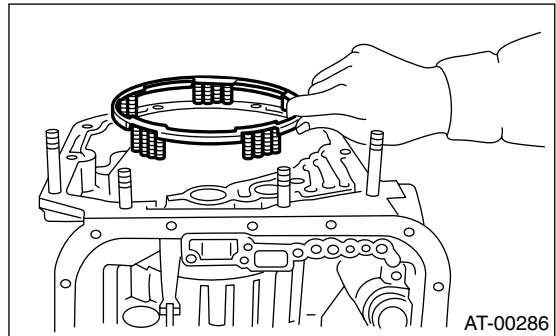


19) Remove snap ring.

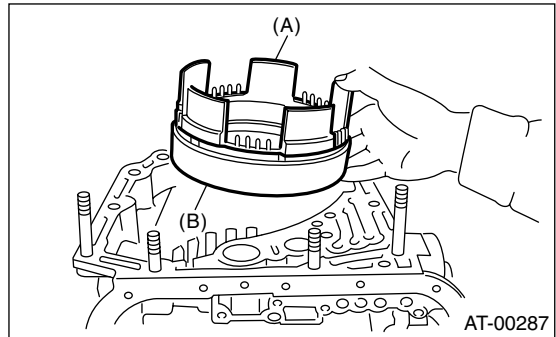


- (A) Snap ring
- (B) 2-4 brake piston

20) Take out 2-4 brake return spring.



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

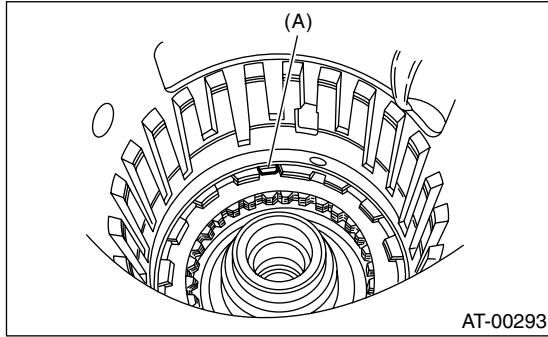


- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

AT Transmission Main Case

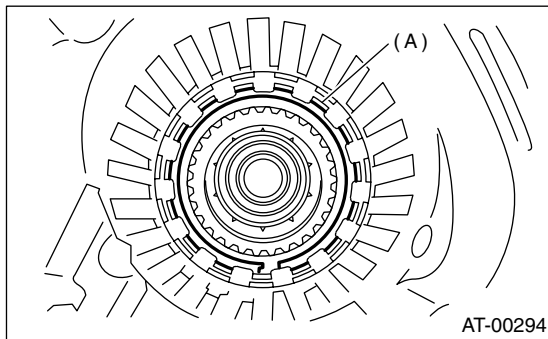
AUTOMATIC TRANSMISSION

22) Pull out the leaf spring without folding.



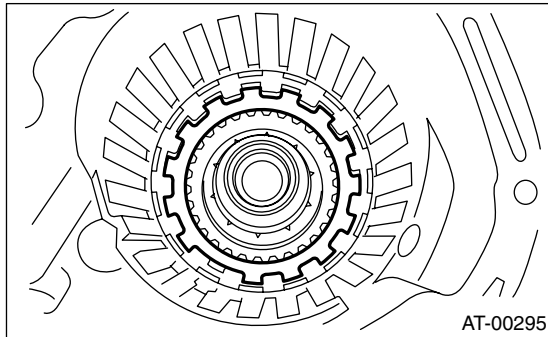
(A) Leaf spring

23) Remove snap ring.

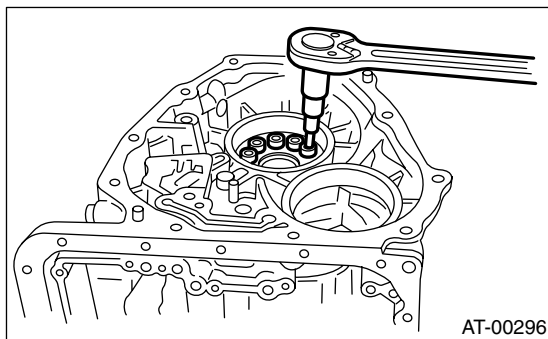


(A) Snap ring

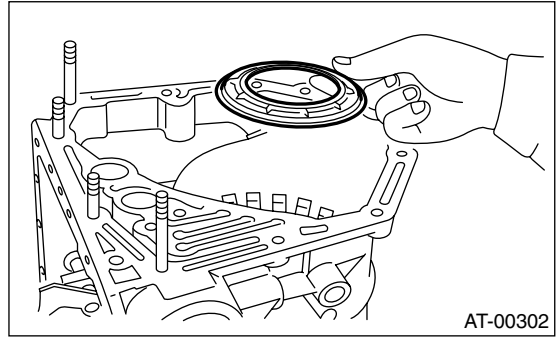
24) Take out retaining plate, drive plate, driven plate and dish plate.



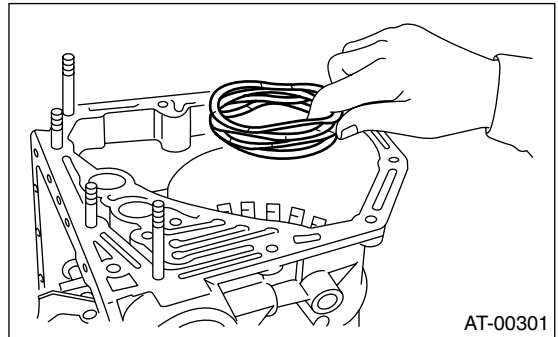
25) Turn the transmission case upside down, and then take out the socket bolts while holding the one-way clutch inner race with hand.



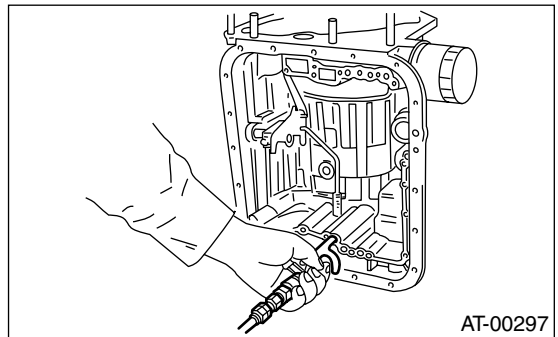
26) Take out the spring retainer.



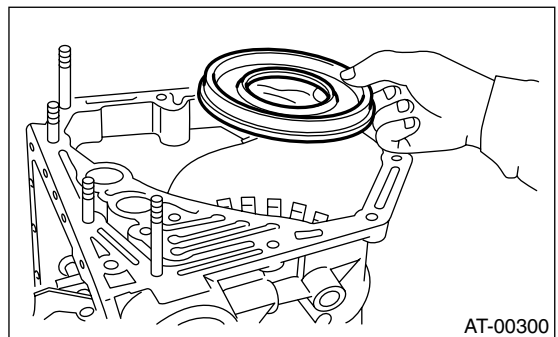
27) Take out the return spring.



28) Apply compressed air.



29) Take out the low & reverse piston.

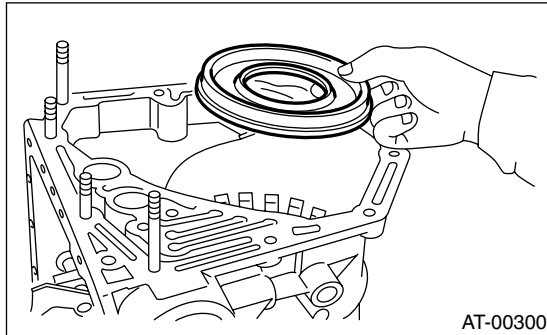


B: INSTALLATION

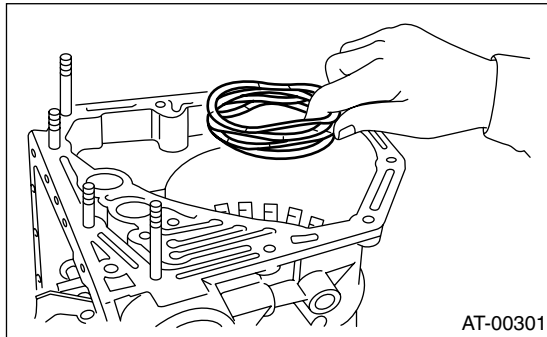
1) Install the low and reverse piston without tilting.

NOTE:

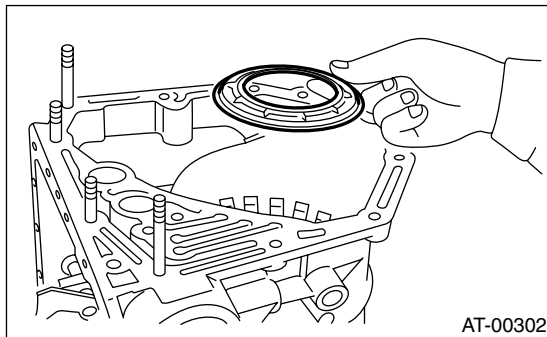
Be careful not to damage the lip seal.



2) Install return spring.



3) Install spring retainer.

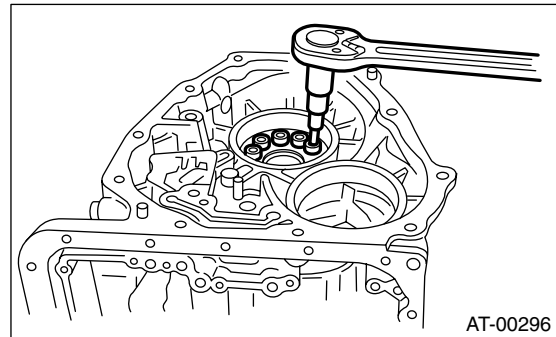


4) Install the one-way clutch inner race, spring retainer and return spring.

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

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



6) Place the front side of transmission body up.

7) Install thrust needle bearing.

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

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

NOTE:

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

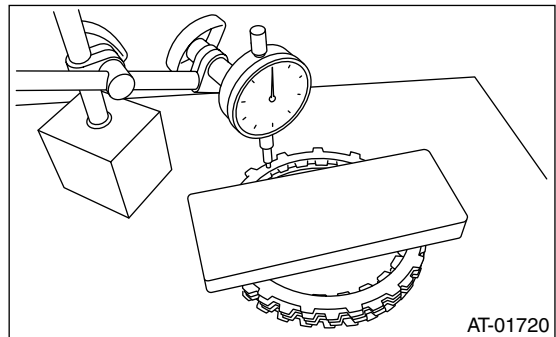
10) Scale and record the weight "Z" of a flat board which will be put on plates.

NOTE:

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

- Use a flat board of its weight less than 83 N (8.5 kgf, 18.7 lb).

11) Put the flat board on retaining plate.



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

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

N: Value indicated on push/pull gauge

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

Z: Flat board weight

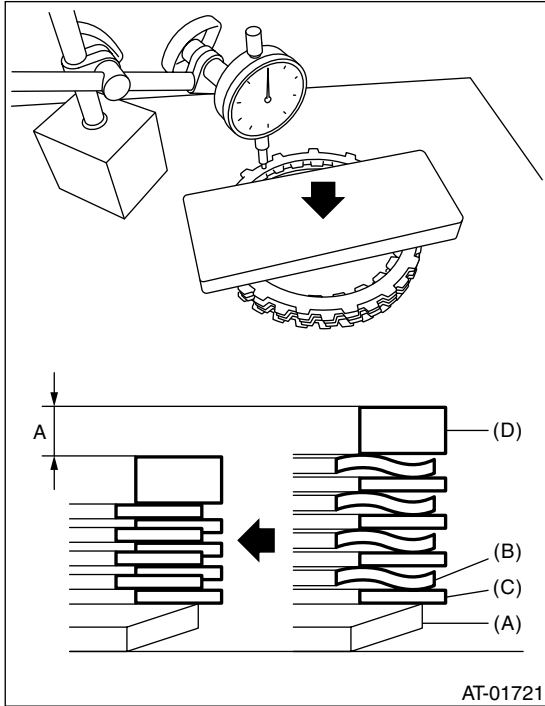
13) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height A. Make more than three measurements at even distance and take the average value.

AT Transmission Main Case

AUTOMATIC TRANSMISSION

NOTE:

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

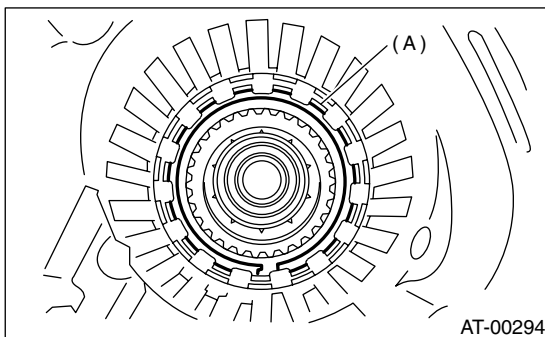


- (A) Dish plate
- (B) Driven plate
- (C) Drive plate
- (D) Retaining plate

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

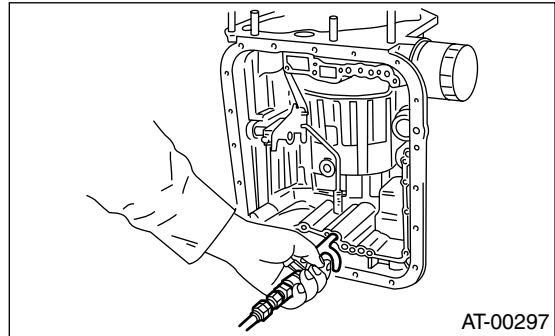
NOTE:

Pay attention to the orientation of dish plate.



- (A) Snap ring

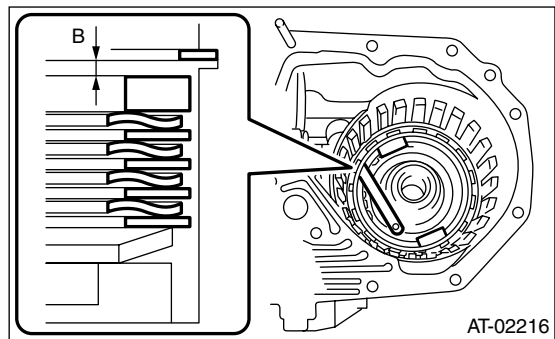
15) Apply compressed air intermittently to check for operation.



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

NOTE:

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



17) Piston stroke calculation

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

$$T = A + B$$

T: Piston stroke

A: Collapse amount of drive plate

B: Clearance between retaining plate and snap ring

1.6 L and 2.0 SOHC model

Initial standard:

1.85 — 2.35 mm (0.073 — 0.093 in)

Limit thickness:

2.65 mm (0.104 in)

2.5 L SOHC model

Initial standard:

2.40 — 2.90 mm (0.094 — 0.114 in)

Limit thickness:

3.60 mm (0.142 in)

2.0 L DOHC Turbo model

Initial standard:

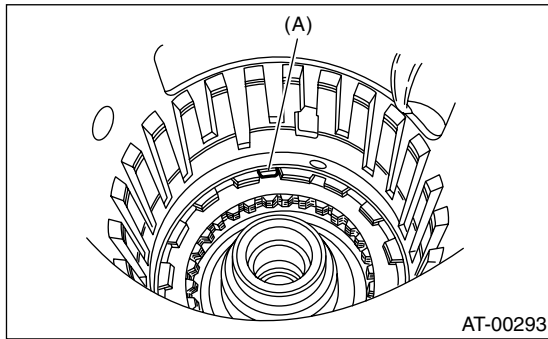
2.70 — 3.20 mm (0.106 — 0.126 in)

Limit thickness:

3.90 mm (0.154 in)

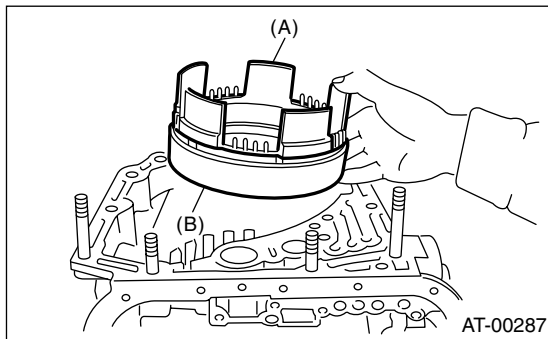
Retaining plates	
Part No.	Thickness mm (in)
31667AA320	4.1 (0.161)
31667AA420	3.8 (0.150)
31667AA330	4.4 (0.173)
31667AA340	4.7 (0.185)
31667AA350	5.0 (0.197)
31667AA360	5.3 (0.209)
31667AA370	5.6 (0.220)
31667AA380	5.9 (0.232)

18) Install the low & reverse brake leaf spring.



(A) Leaf spring

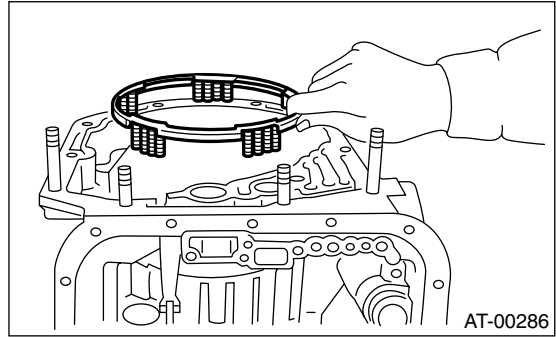
19) Install the 2-4 brake piston and 2-4 brake retainer by aligning hole of 2-4 brake retainer and hole of transmission case.



(A) 2-4 brake piston

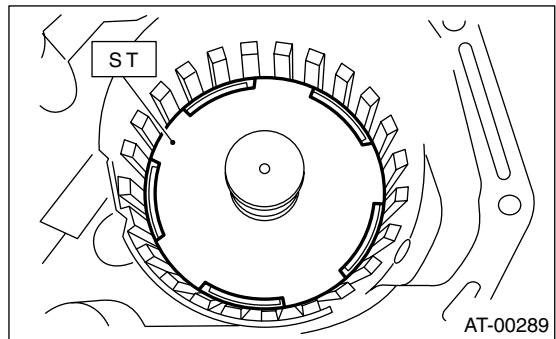
(B) 2-4 brake piston retainer

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



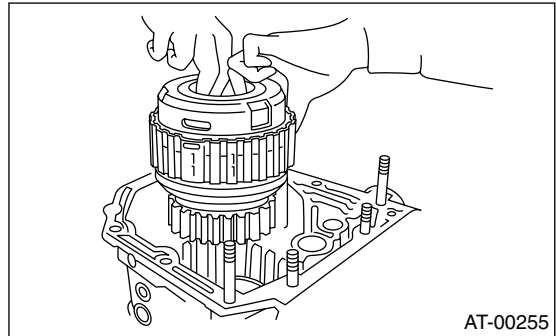
21) Position snap ring in transmission. Using ST, press the snap ring into place.

ST 498677100 COMPRESSOR



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

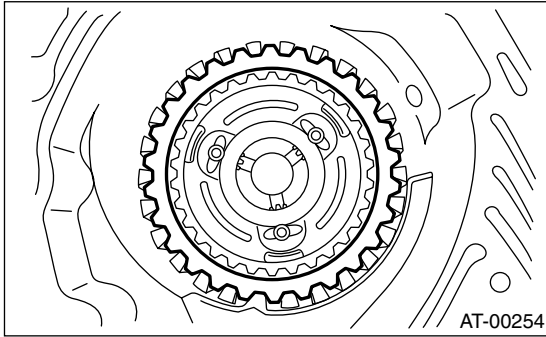
Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring.



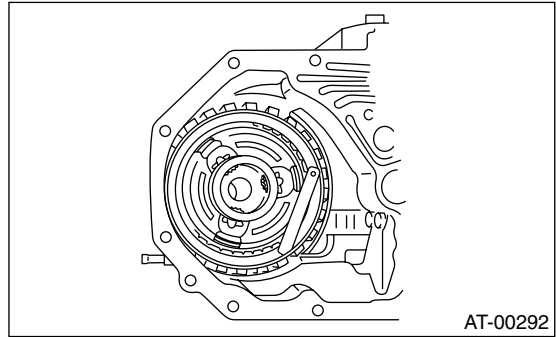
AT Transmission Main Case

AUTOMATIC TRANSMISSION

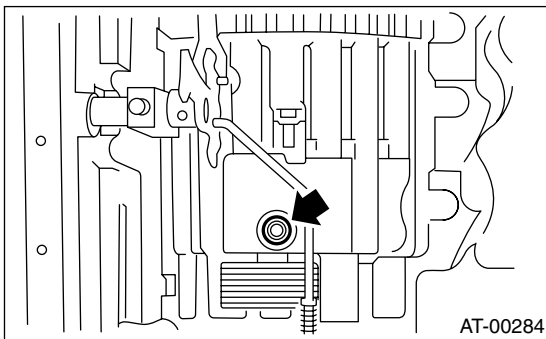
23) Install pressure plate, drive plate, driven plate, retaining plate and snap ring.



Limit thickness:
1.5 mm (0.059 in)

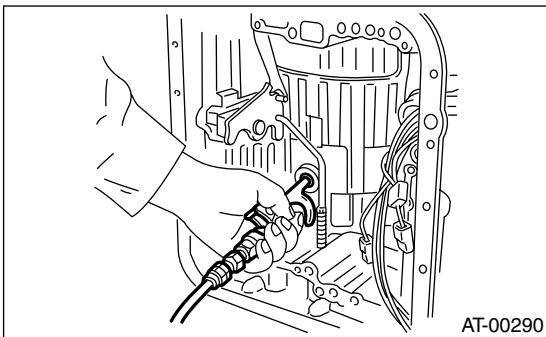


24) Install a new 2-4 brake oil seal to transmission case.

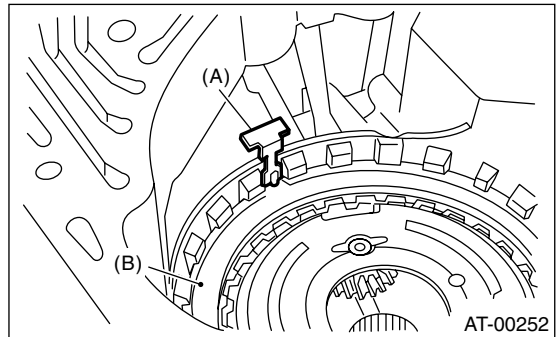


Retaining plates	
Part No.	Thickness mm (in)
31567AA612	5.6 (0.220)
31567AA622	5.8 (0.228)
31567AA632	6.0 (0.236)
31567AA642	6.2 (0.244)
31567AA652	6.4 (0.252)
31567AA662	6.6 (0.260)

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



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



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

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

NOTE:

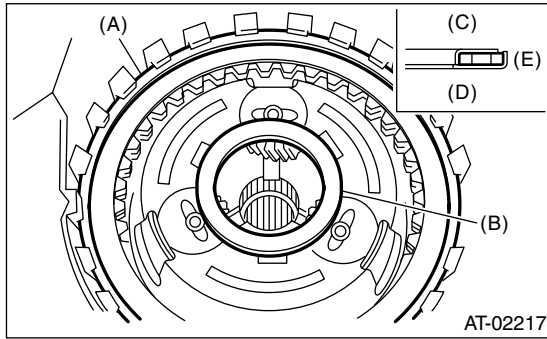
Select a retaining plate with a suitable value from the following table, so that the clearance becomes the standard value.

If it exceeds the service limit, replace the drive plate with a new one and adjust it within the specification.

Initial standard:

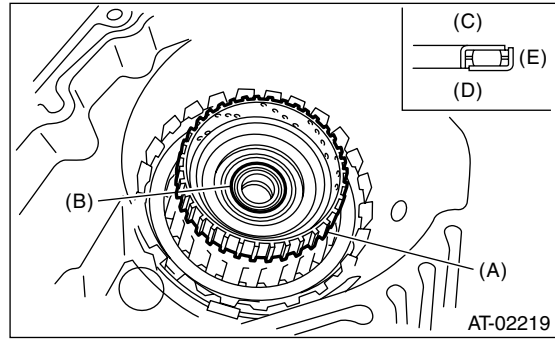
0.8 — 1.2 mm (0.031 — 0.047 in)

28) Install thrust needle bearing in the correct direction.



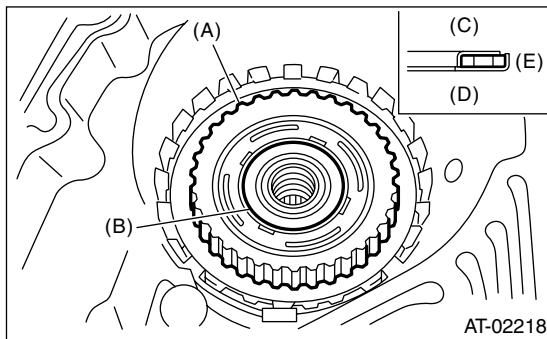
- (A) Snap ring
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

31) Install the thrust needle bearing in proper direction.



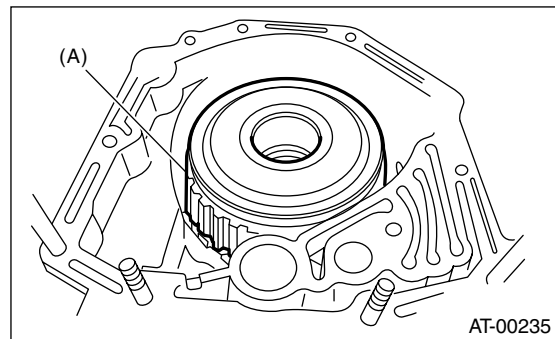
- (A) High clutch hub
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

29) Install front sun gear and thrust needle bearing.



- (A) Front sun gear
- (B) Thrust needle bearing
- (C) Clutch hub side
- (D) Front sun gear side
- (E) Outside

32) Install the high clutch assembly.



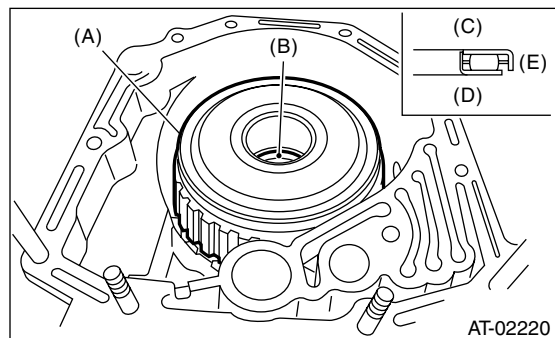
- (A) High clutch and reverse clutch assembly

33) Adjust total end play. <Ref. to 4AT-106, ADJUSTMENT, Oil Pump Housing.>

34) Install the thrust needle bearing in proper direction.

30) Install the high clutch hub.

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

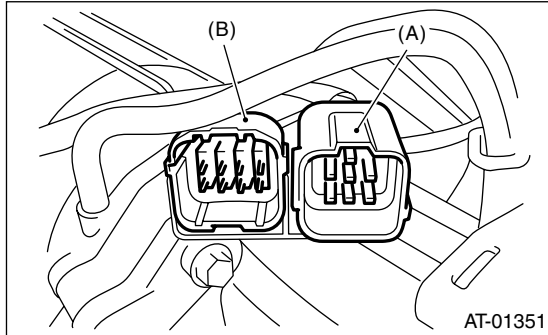


- (A) High clutch and reverse clutch ASSY
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

AT Transmission Main Case

AUTOMATIC TRANSMISSION

- 35) Install the oil pump housing assembly.
- 36) Install the converter case assembly to the transmission case assembly. <Ref. to 4AT-100, INSTALLATION, Converter Case.>
- 37) Insert inhibitor switch and transmission connector into stay.
- 38) Install air breather hose. <Ref. to 4AT-77, INSTALLATION, Air Breather Hose.>

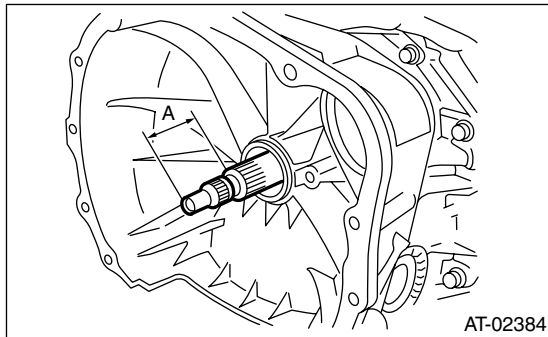


- (A) Transmission harness
- (B) Inhibitor switch harness

- 39) Install oil cooler pipes. <Ref. to 4AT-76, INSTALLATION, ATF Cooler Pipe and Hose.>
- 40) Install the oil charge pipe with O-ring. <Ref. to 4AT-78, INSTALLATION, Oil Charge Pipe.>
- 41) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)

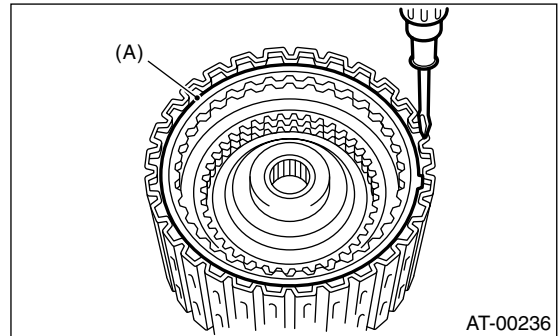


- 42) Install the torque converter clutch assembly. <Ref. to 4AT-79, INSTALLATION, Torque Converter Clutch Assembly.>
- 43) Install the transmission assembly to the vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

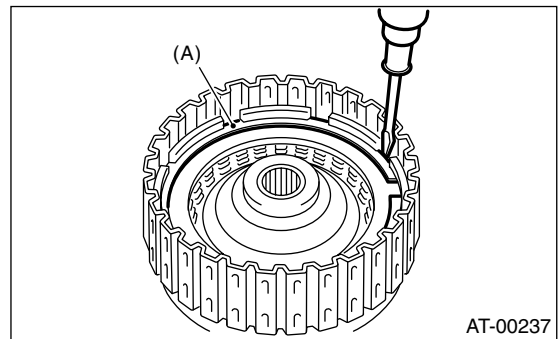
1. HIGH CLUTCH, REVERSE CLUTCH

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



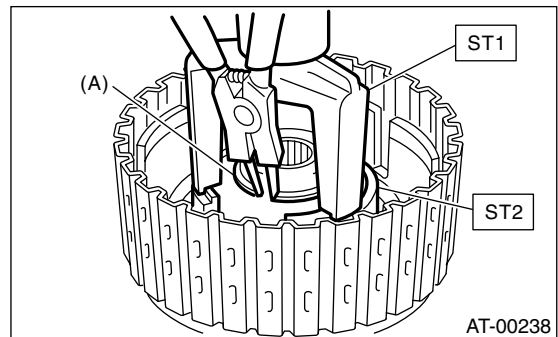
(A) Snap ring

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



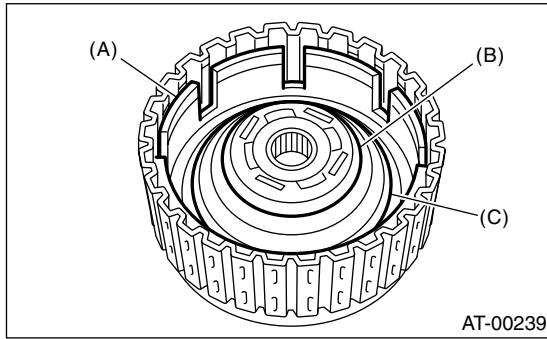
(A) Snap ring

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



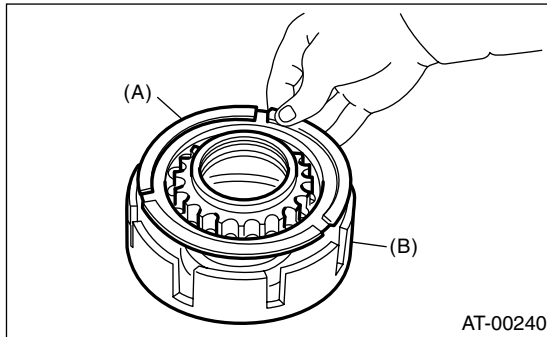
(A) Snap ring

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



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

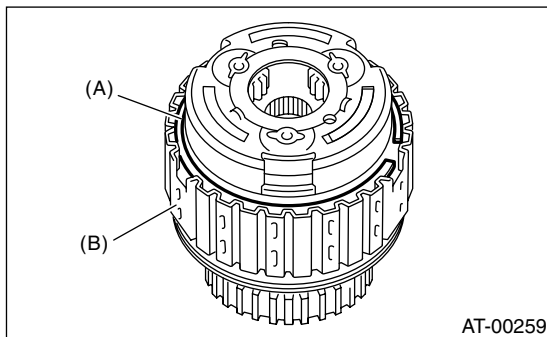
5) Remove seal rings and lip seal from high clutch piston and reverse clutch piston.



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

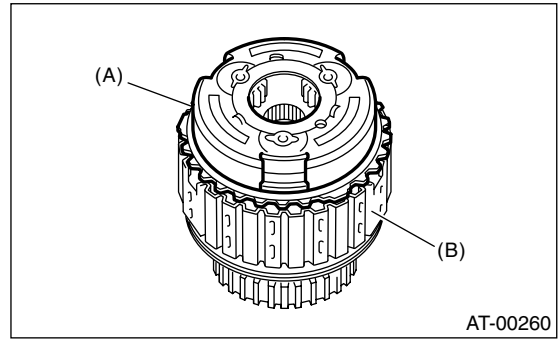
2. PLANETARY GEAR, LOW CLUTCH

1) Remove snap ring from the low clutch drum.



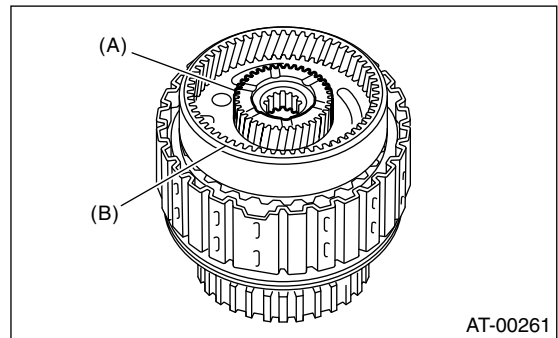
- (A) Snap ring
- (B) Low clutch drum

2) Take out front planetary carrier.



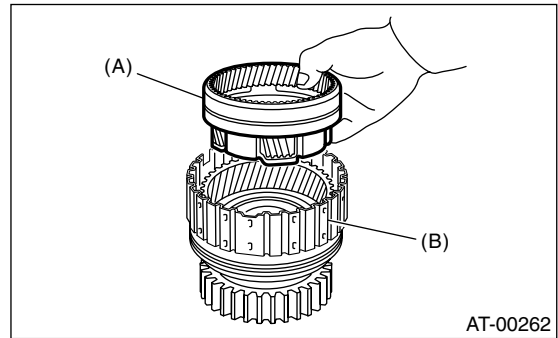
- (A) Front planetary carrier
- (B) Low clutch drum

3) Take out rear sun gear.



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

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

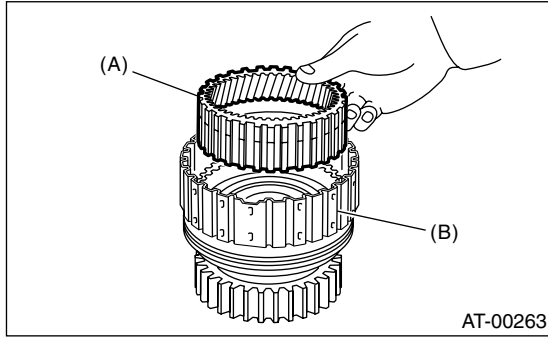


- (A) Rear planetary carrier
- (B) Low clutch drum

AT Transmission Main Case

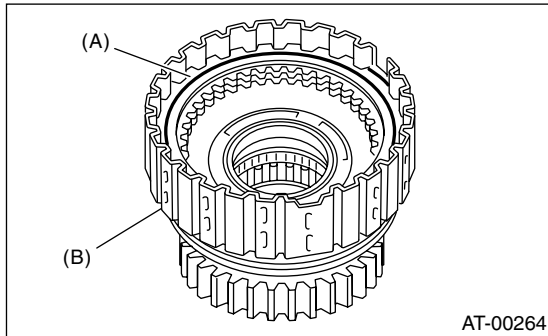
AUTOMATIC TRANSMISSION

5) Take out rear internal gear.



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

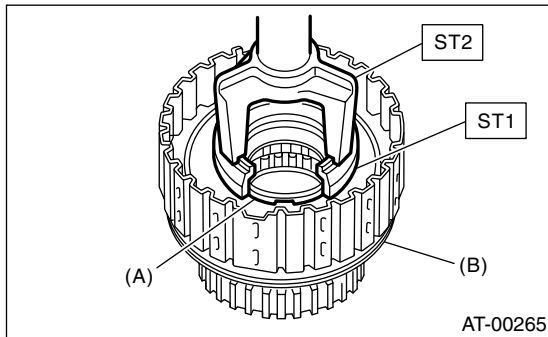
6) Remove the snap ring from the low clutch drum.



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

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

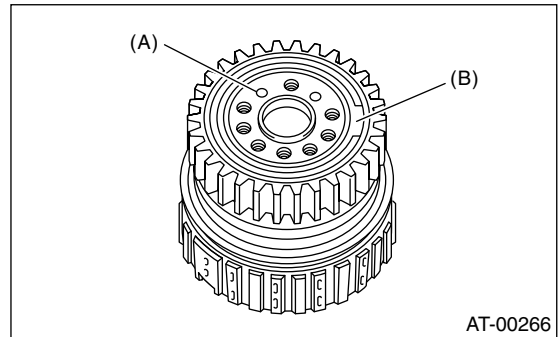
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



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

8) Remove one-way clutch. <Ref. to 4AT-120, REMOVAL, AT Transmission Main Case.>

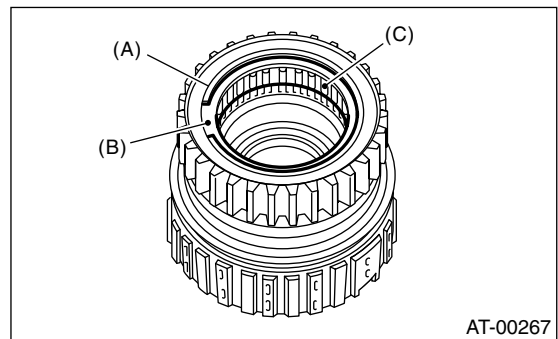
9) Install the one-way clutch inner race to the low clutch drum, and apply compressed air to remove the low clutch piston.



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

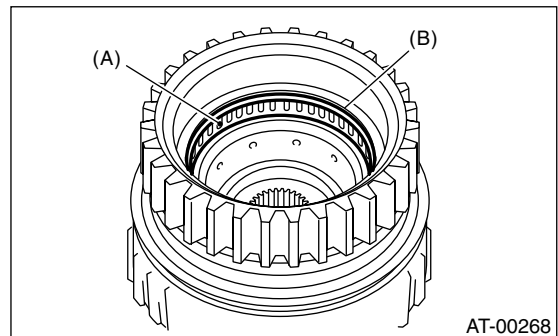
10) Remove the one-way clutch inner race.

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



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

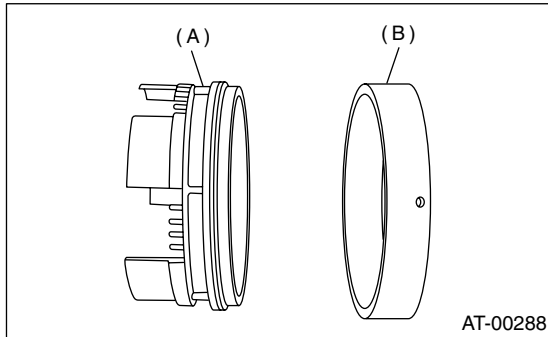
12) Remove the needle bearing after taking out the snap ring.



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

3. 2-4 BRAKE

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

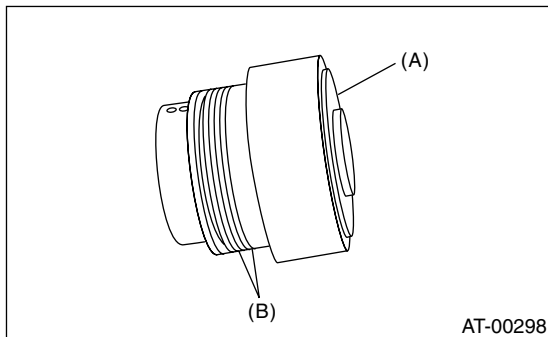


- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

2) Remove the D-ring from 2-4 brake piston.

4. ONE-WAY CLUTCH INNER RACE

1) Remove seal rings.

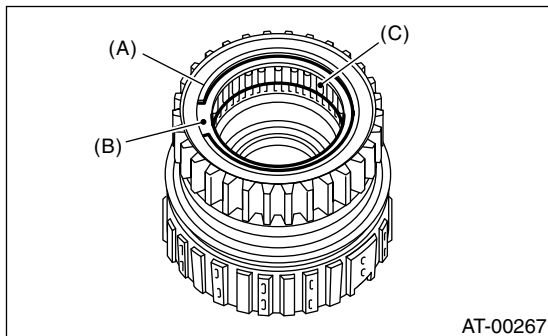


- (A) One way clutch inner race
- (B) Seal rings

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

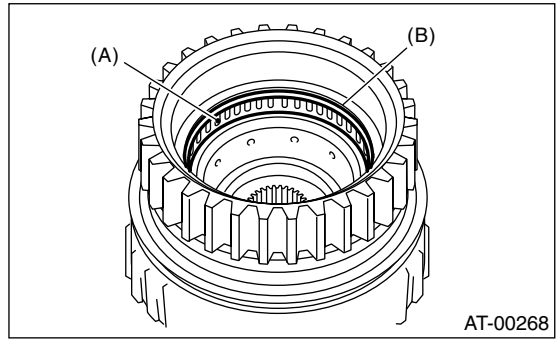
5. ONE-WAY CLUTCH OUTER RACE

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



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

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



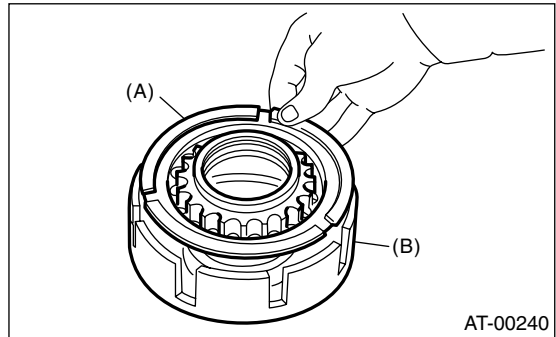
- (A) Needle bearing
- (B) Snap ring

D: ASSEMBLY

1. HIGH CLUTCH, REVERSE CLUTCH

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

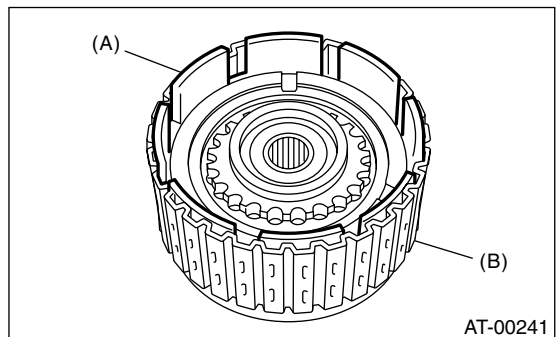
2) Install high clutch piston to reverse clutch piston.



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

3) Install reverse clutch to high clutch drum.

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

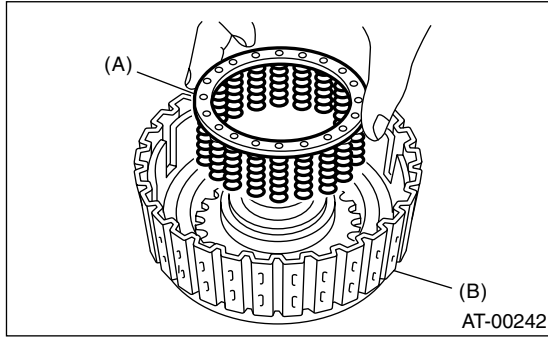


- (A) Reverse clutch piston
- (B) High clutch drum

AT Transmission Main Case

AUTOMATIC TRANSMISSION

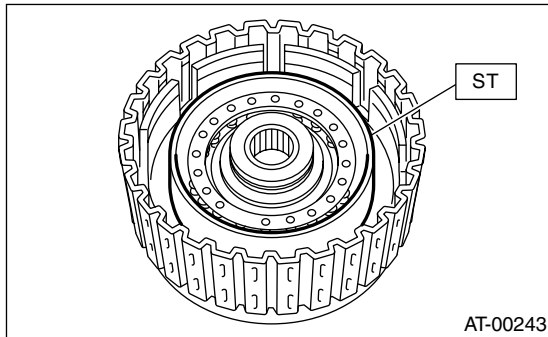
4) Install spring retainer to high clutch piston.



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

5) Install ST to high clutch piston.

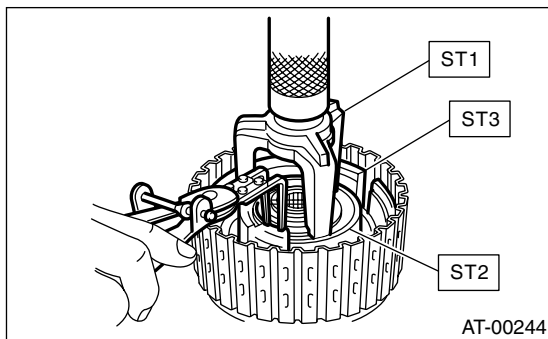
ST 498437000 HIGH CLUTCH PISTON GAUGE



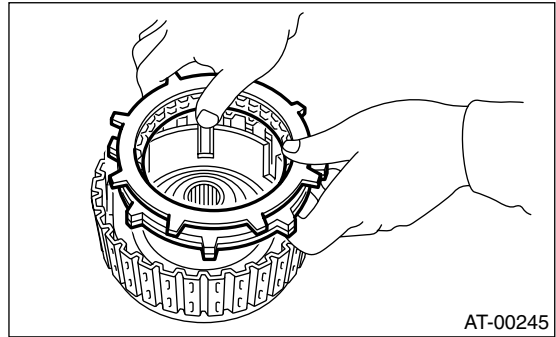
6) Avoid folding the high clutch piston seal, when installing the cover to high clutch piston.

7) Using ST1 and ST2, install snap ring.

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

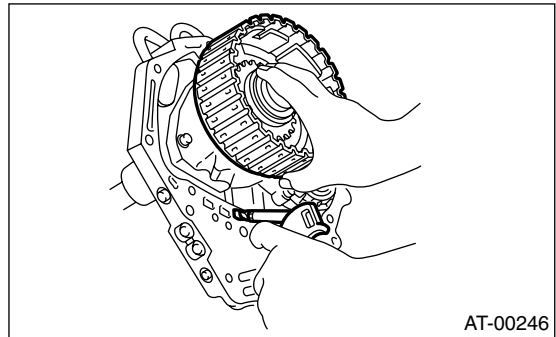


8) Install the thickest driven plate to piston side, and then install the driven plate, drive plate, retaining plate to high clutch drum.



9) Install snap ring to high clutch drum.

10) Apply compressed air intermittently to check for operation.



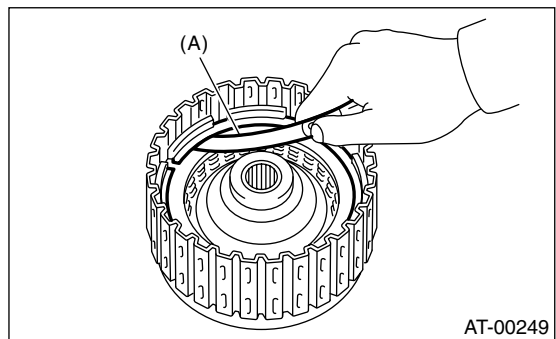
11) Measure the clearance between the retaining plate and snap ring (High clutch). At this time, do not press down retaining plate.

Initial standard:

0.8 — 1.1 mm (0.031 — 0.043 in)

Limit thickness:

1.5 mm (0.059 in)



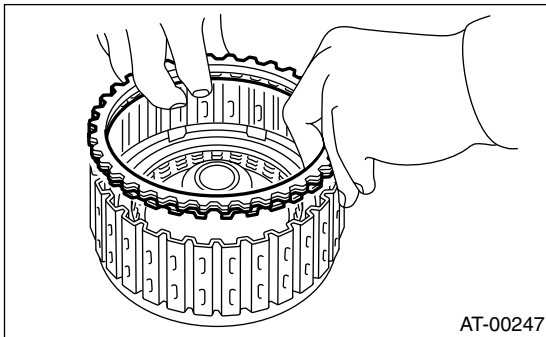
(A) Thickness gauge

If specified tolerance limits are exceeded, select a suitable high clutch retaining plate. If it exceeds the service limit, replace the drive plate with new one and adjust it within the specification.

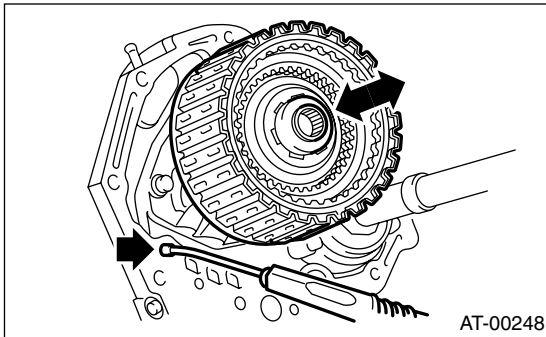
High clutch retaining plate	
Part No.	Thickness mm (in)
31567AA710	4.7 (0.185)
31567AA720	4.8 (0.189)
31567AA730	4.9 (0.193)
31567AA740	5.0 (0.197)
31567AA670	5.1 (0.201)
31567AA680	5.2 (0.205)
31567AA690	5.3 (0.209)
31567AA700	5.4 (0.213)

12) Selection of reverse clutch retaining plate.

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



- (2) Apply compressed air intermittently to check for operation.

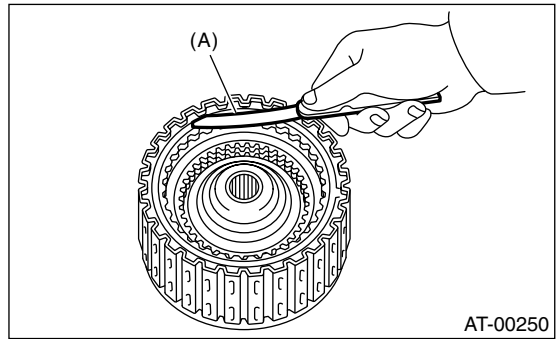


- (3) Measure the clearance between the retaining plate and snap ring (Reverse clutch). At this time, do not press down retaining plate.

Initial standard:

0.5 — 0.8 mm (0.020 — 0.031 in)

Limit thickness:
1.2 mm (0.047 in)



(A) Thickness gauge

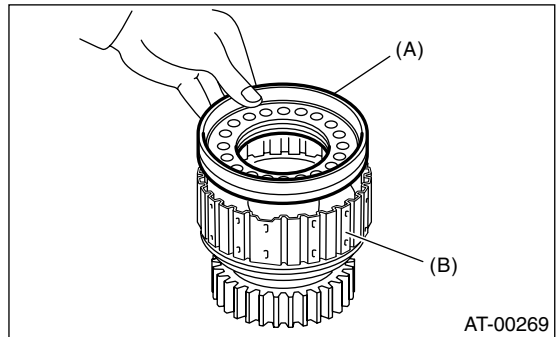
If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.

If it exceeds the service limit, replace the drive plate with new one and adjust it within the specification.

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

2. PLANETARY GEAR, LOW CLUTCH

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



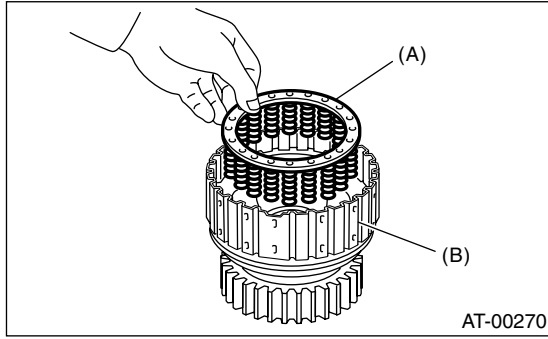
(A) Low clutch piston

(B) Low clutch drum

AT Transmission Main Case

AUTOMATIC TRANSMISSION

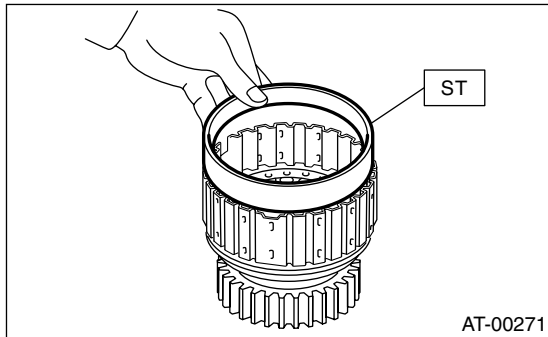
3) Install spring retainer to low clutch piston.



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

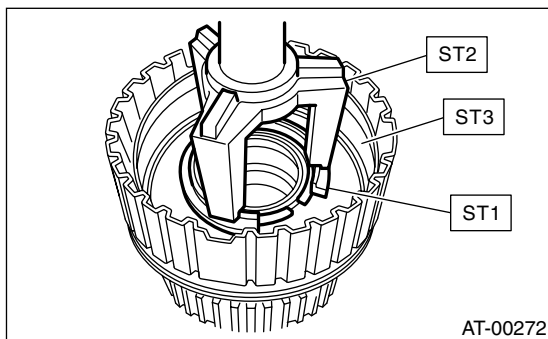
4) Install ST to low clutch drum.

ST 498437100 LOW CLUTCH PISTON GUIDE

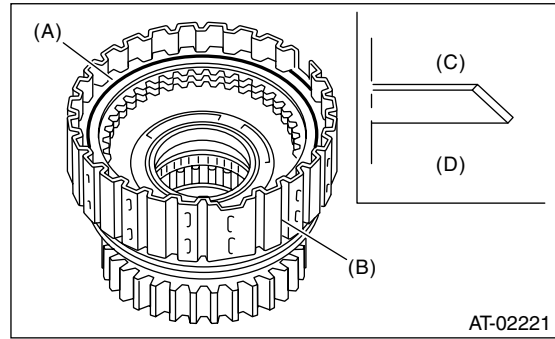


5) Set the cover on the piston with a press using ST1 and ST2, and attach the snap ring. At this time, be careful not to fold cover seal during installation.

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



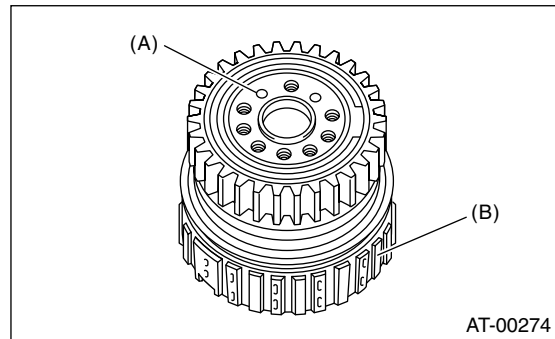
6) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring.



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

7) Check the low clutch for operation.

- (1) Remove one-way clutch. <Ref. to 4AT-120, REMOVAL, AT Transmission Main Case.>
- (2) Set the one-way clutch inner race, and apply compressed air for checking.



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

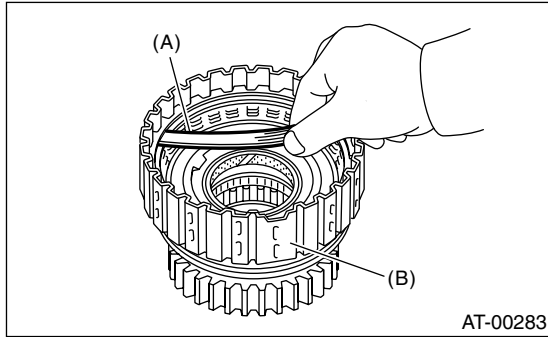
8) Checking low clutch clearance.

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

Initial standard:

0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:
1.6 mm (0.063 in)



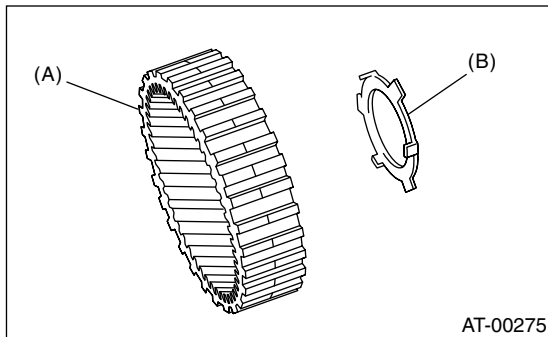
- (A) Thickness gauge
- (B) Low clutch drum

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

If it exceeds the service limit, replace the drive plate with new one and adjust it within the specification.

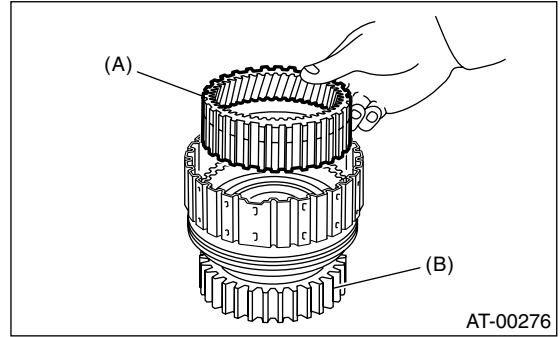
Available retaining plates	
Part No.	Thickness mm (in)
31567AA830	3.8 (0.150)
31567AA840	4.0 (0.157)
31567AA850	4.2 (0.165)
31567AA860	4.4 (0.173)
31567AA870	4.6 (0.181)

9) Install washer to rear internal gear.



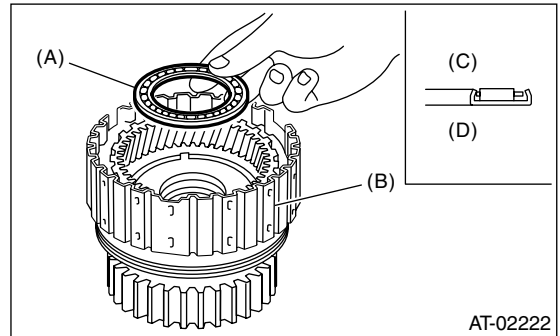
- (A) Rear internal gear
- (B) Washer

10) Install rear internal gear.



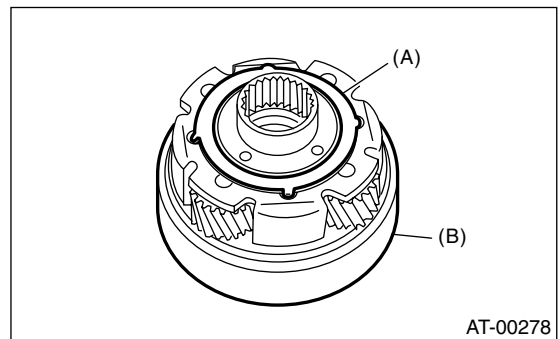
- (A) Rear internal gear
- (B) Low clutch drum

11) Install thrust needle bearing in the correct direction.



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

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

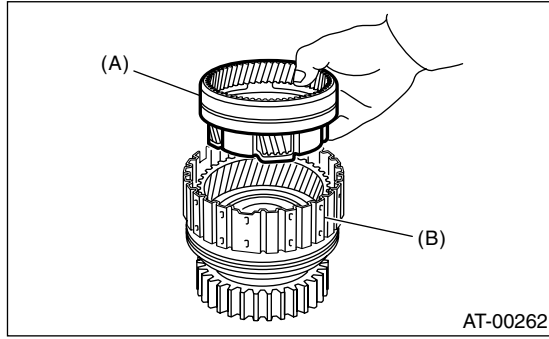


- (A) Washer
- (B) Rear planetary carrier

AT Transmission Main Case

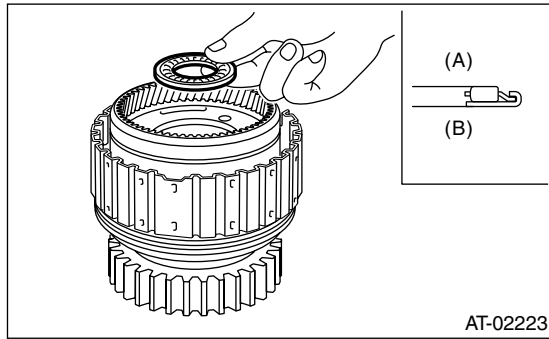
AUTOMATIC TRANSMISSION

13) Install rear planetary carrier to low clutch drum.

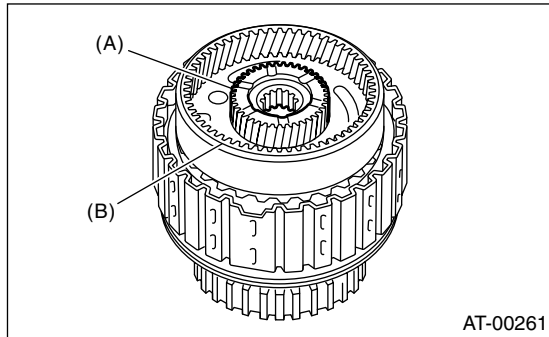


- (A) Rear planetary carrier
- (B) Low clutch drum

14) Install thrust needle bearing in the correct direction.

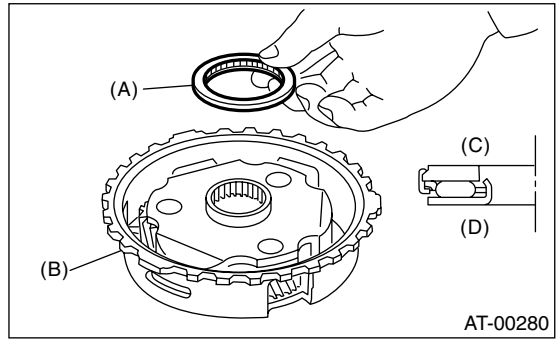


15) Install the rear sun gear in proper direction.



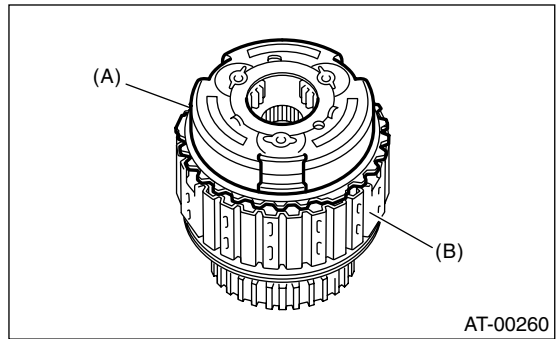
- (A) Rear sun gear
- (B) Rear planetary carrier

16) Install the thrust needle bearing in proper direction.



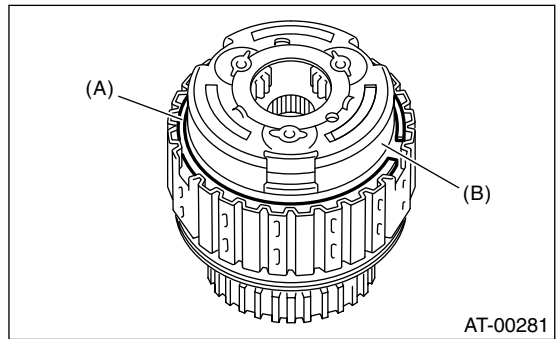
- (A) Thrust needle bearing
- (B) Front planetary carrier
- (C) Rear sun gear side
- (D) Front planetary carrier side

17) Install front planetary carrier to low clutch drum.



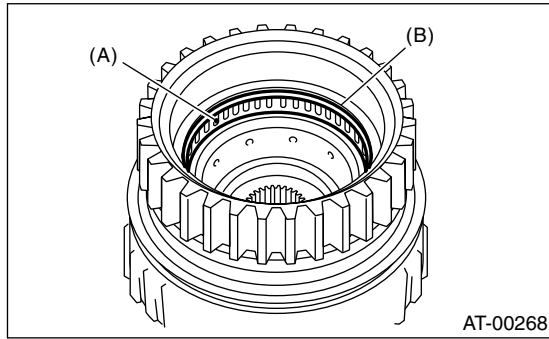
- (A) Front planetary carrier
- (B) Low clutch drum

18) Install snap ring to low clutch drum.



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

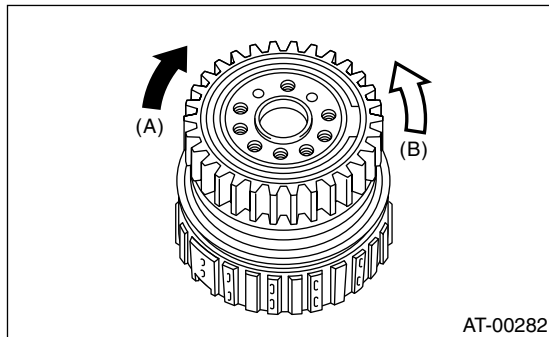
19) Install the needle bearing, and secure with the snap ring.



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

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

21) Set the inner race. Make sure that the clutch is locked in the clockwise direction and free in the counterclockwise direction.

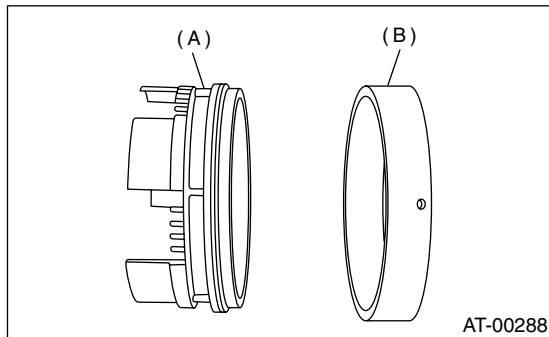


- (A) Locked
- (B) Free

3. 2-4 BRAKE

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

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

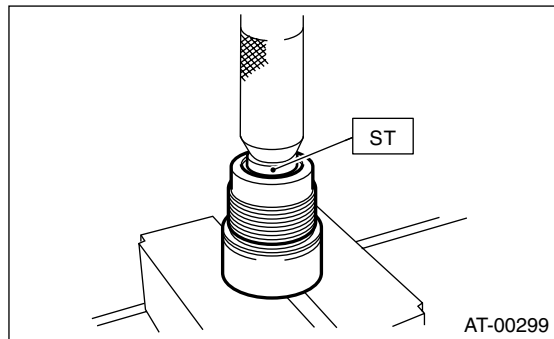


- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

4. ONE-WAY CLUTCH INNER RACE

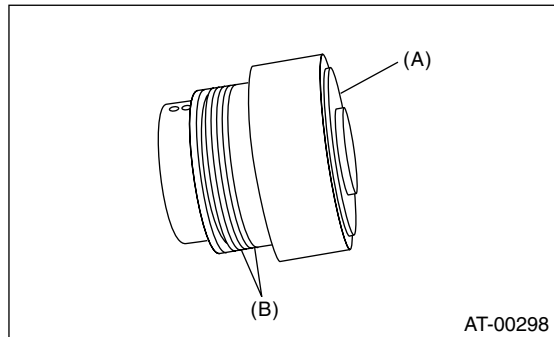
1) Using a press and ST, install the needle bearing to the inner race.

ST 398497701 INSTALLER



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

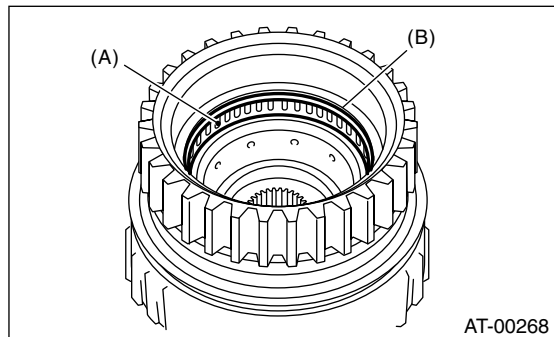
3) Install two seal rings to one-way clutch inner race.



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

5. ONE-WAY CLUTCH OUTER RACE

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



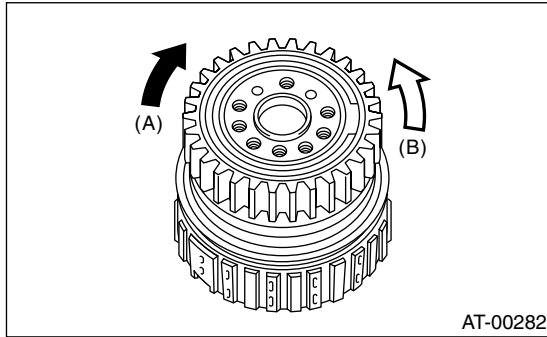
- (A) Needle bearing
- (B) Snap ring

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

AT Transmission Main Case

AUTOMATIC TRANSMISSION

3) Set the inner race. Make sure that the clutch is locked in the clockwise direction and free in the counterclockwise direction.



- (A) Locked
(B) Free

E: INSPECTION

1. HIGH CLUTCH AND REVERSE CLUTCH

Inspect the following items.

- Drive plate facing for wear and damage
- Discoloration of driven plate (burnt color)
- Snap ring for wear, return spring for setting and breakage, and snap ring retainer for deformation
- Lip seal and D-ring for damage
- Piston and drum check ball for operation
- Adjust total end play. <Ref. to 4AT-106, ADJUSTMENT, Oil Pump Housing.>

2. PLANETARY GEAR AND LOW CLUTCH

Inspect the following items.

- Drive plate facing for wear and damage
- Discoloration of driven plate (burnt color)
- Snap ring for wear, return spring for breakage or setting, and spring retainer for deformation
- Lip seal and D-ring for damage
- Piston check ball for operation
- Measure the total end play and adjust to within specifications.
<Ref. to 4AT-106, ADJUSTMENT, Oil Pump Housing.>

3. 2-4 BRAKE

Inspect the following items.

- Drive plate facing for wear and damage
- Discoloration of driven plate (burnt color)
- Snap ring for wear and spring retainer for deformation
- Lip seal and D-ring for damage
- Measure the total end play and adjust to within specifications. <Ref. to 4AT-106, ADJUSTMENT, Oil Pump Housing.>

4. ONE-WAY CLUTCH

- Make sure the snap ring is not worn and the seal rings are not damaged.
- Measure the total end play and adjust to within specifications. <Ref. to 4AT-106, ADJUSTMENT, Oil Pump Housing.>

5. LOW AND REVERSE BRAKE

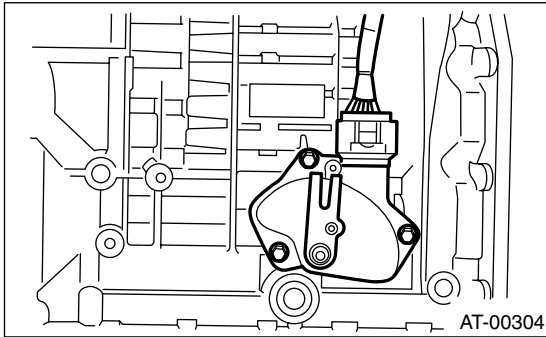
Check for the following.

- Drive plate facing for wear or damage
- Discoloration of driven plate (burnt color)
- Snap ring for wear and spring retainer for deformation

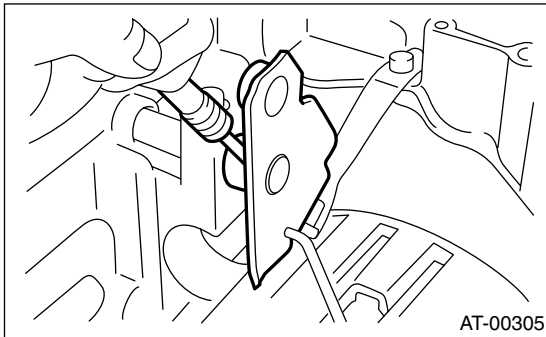
40. Transmission Control Device

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to 4AT-79, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.
- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect the air breather hoses. <Ref. to 4AT-77, REMOVAL, Air Breather Hose.>
- 6) Disconnect inhibitor switch connector from stay.
- 7) Wrap vinyl tape around the nipple attached to the air breather hose.
- 8) Remove pitching stopper bracket.
- 9) Remove the inhibitor switch.



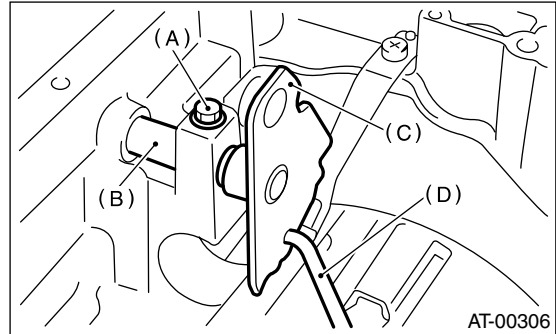
- 10) Remove control valve body assembly. <Ref. to 4AT-62, REMOVAL, Control Valve Body.>
- 11) Pull off the straight pin of manual plate.



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

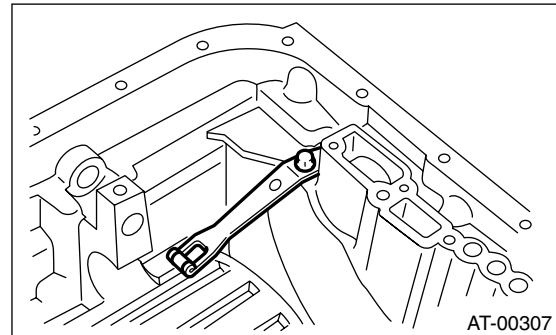
NOTE:

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



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

- 13) Remove the detention spring.

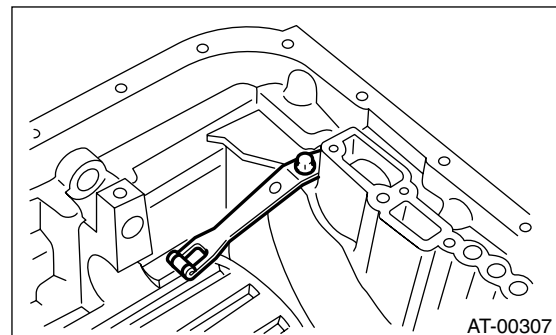


B: INSTALLATION

- 1) Install detention spring to transmission case.

Tightening torque:

6 N·m (0.6 kgf-m, 4.3 ft-lb)



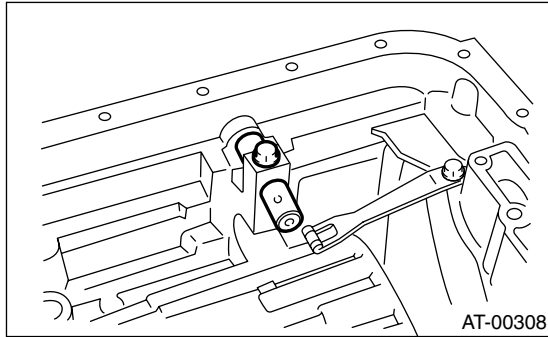
Transmission Control Device

AUTOMATIC TRANSMISSION

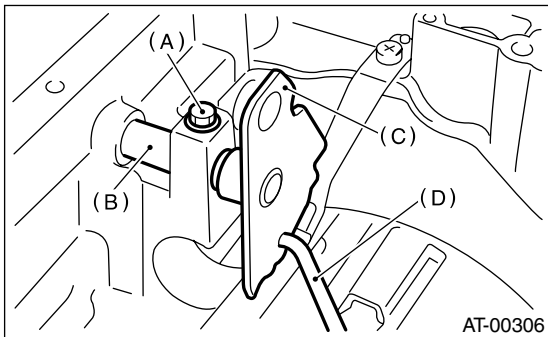
2) Insert range select lever, and tighten bolt.

Tightening torque:

6 N·m (0.6 kgf·m, 4.3 ft-lb)

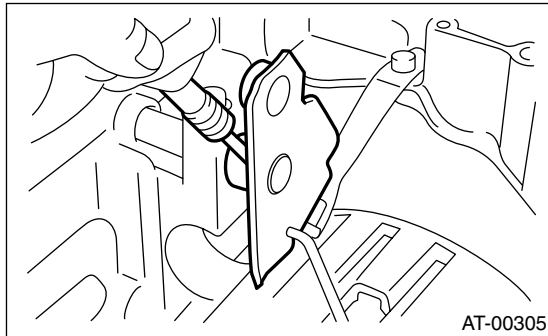


3) Insert manual plate and parking rod.



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

4) Insert spring pin to manual plate.



5) Install control valve assembly and oil pan. <Ref. to 4AT-62, INSTALLATION, Control Valve Body.>

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

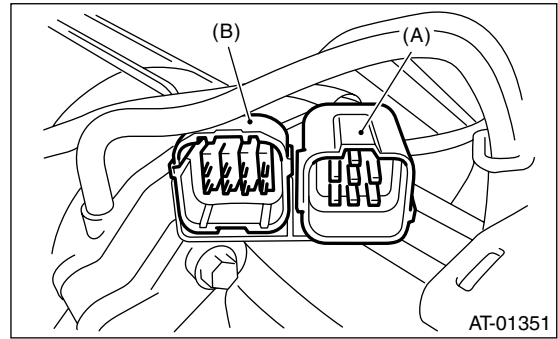
7) Install pitching stopper bracket.

Tightening torque:

41 N·m (4.2 kgf·m, 30.4 ft-lb)

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

9) Insert inhibitor switch and transmission connector into stay.



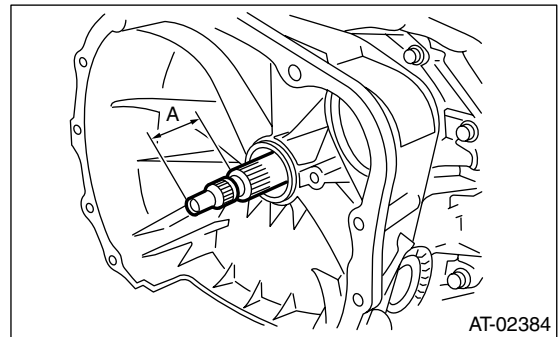
- (A) Transmission harness
- (B) Inhibitor switch harness

10) Install air breather hose. <Ref. to 4AT-77, INSTALLATION, Air Breather Hose.>

11) Insert the input shaft while turning lightly by hand and verify the protrusion amount.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



12) Install the torque converter clutch assembly. <Ref. to 4AT-79, INSTALLATION, Torque Converter Clutch Assembly.>

13) Install the transmission assembly to 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.