TRANSMISSION SECTION

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

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.

AUTOMATIC TRANSMISSION

5AT

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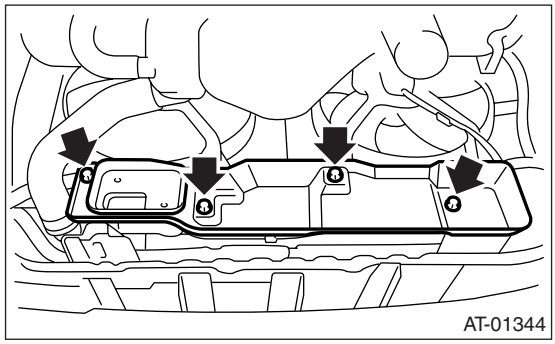
21.ATF Cooler Pipe & Hose

A: REMOVAL

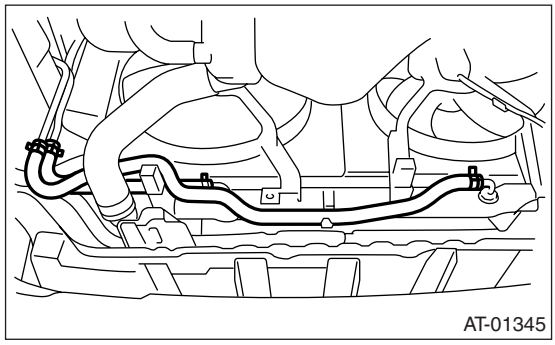
1. EXCEPT FOR ATF COOLER MODEL WITH WARMER FUNCTION

1) Set the vehicle on a lift.
2) Remove the battery.
3) Lift-up the vehicle.
4) Remove the under cover.
5) Remove the radiator under cover.



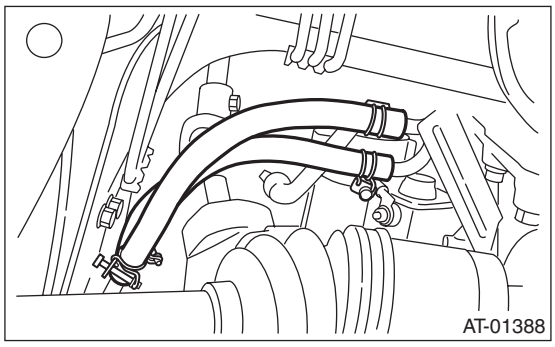
6) Disconnect the ATF cooler hose from radiator.

NOTE:
• Do not use a screwdriver or other pointed tools.
• When hard to remove the hose, wrap the hose with cloth to prevent from damaging, and then turn with pliers and pull out with hand straightly.

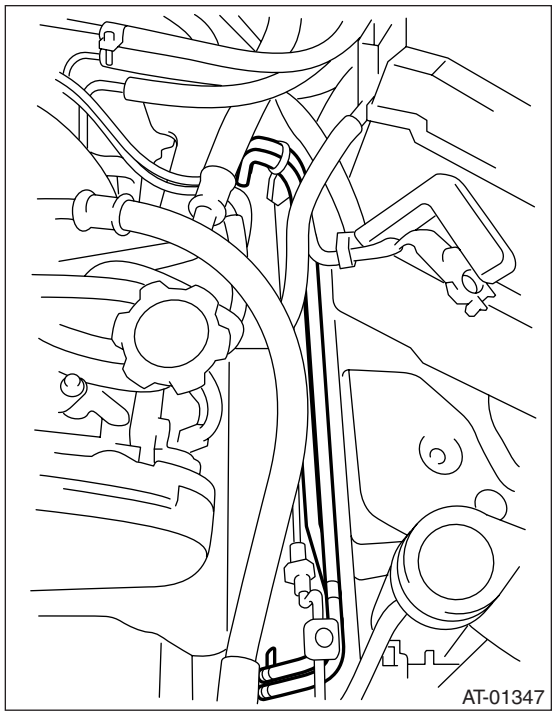


7) Disconnect the ATF cooler hoses from pipes.

NOTE:
• Do not use a screwdriver or other pointed tools.
• When hard to remove the hose, wrap the hose with cloth to prevent from damaging, and then turn with pliers and pull out with hand straightly.

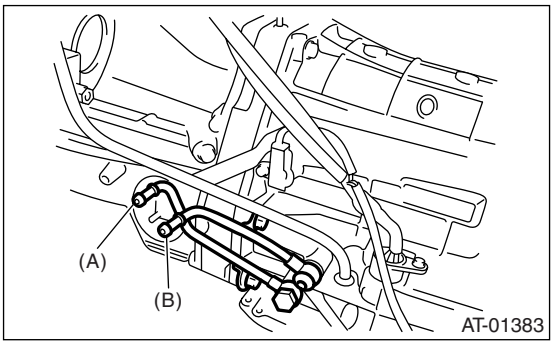


8) Disconnect the ATF cooler pipe from frame.



9) Remove the oil cooler inlet and outlet pipes.

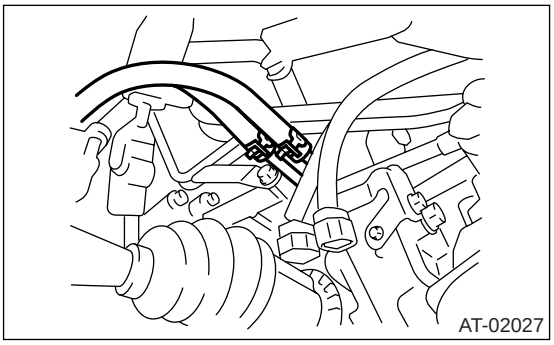
NOTE:
When disconnecting the outlet pipe, be careful not to lose the ball and spring used with retaining screw.



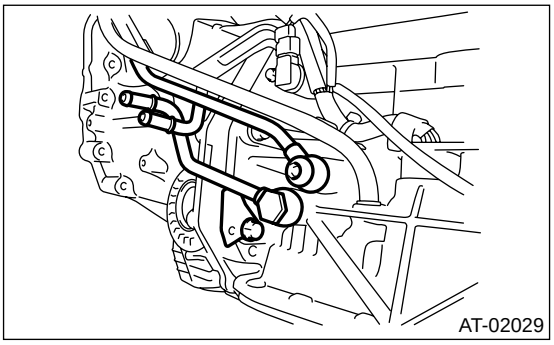
(A) Outlet pipe
(B) Inlet pipe

2. ATF COOLER MODEL WITH WARMER FUNCTION

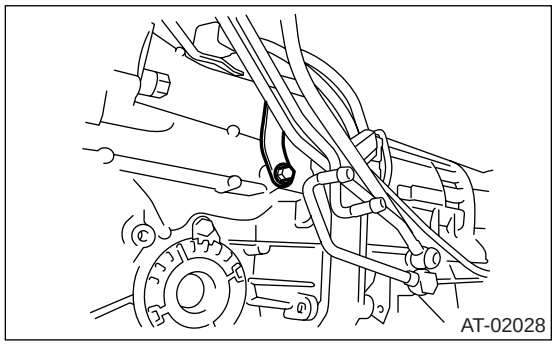
1) Lift-up the vehicle.
2) Remove the front exhaust pipe.
<Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
3) Disconnect the inlet and outlet hoses of the ATF cooler pipe from oil cooler pipe.



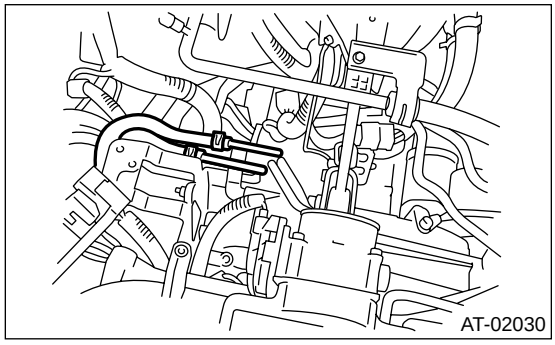
4) Remove the union screw of oil cooler inlet and outlet pipes.



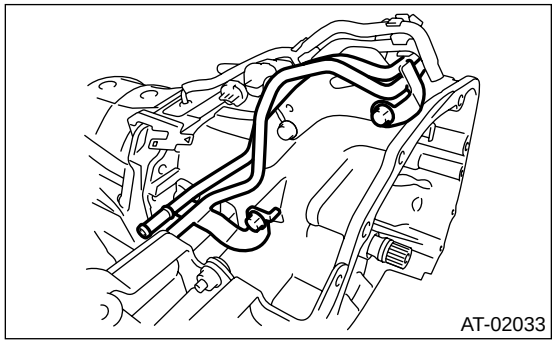
5) Remove the pipe securing bolts on the side of transmission.



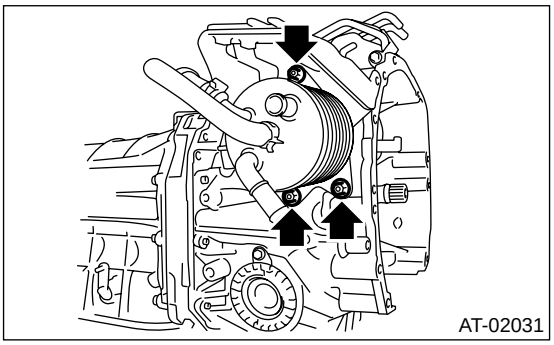
6) Lower the vehicle.
7) Remove the air intake chamber.
<Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
8) Remove the resonator chamber.
<Ref. to IN(H6DO)-9, REMOVAL, Resonator Chamber.>
9) Remove the oil charge pipe. <Ref. to 5AT-70, REMOVAL, Oil Charge Pipe.>
10) Disconnect the ATF cooler hoses and pipes.



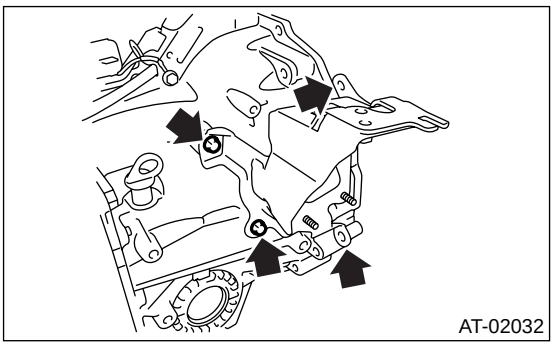
11) Remove the pitching stopper bracket securing bolt and bolt on the side of transmission, and then remove ATF cooler pipe.



12) Remove the ATF cooler from the installation bracket as necessary.



13) Remove the ATF cooler bracket from transmission body as necessary.

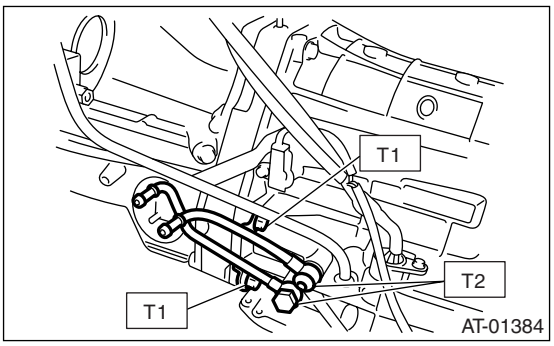


B: INSTALLATION

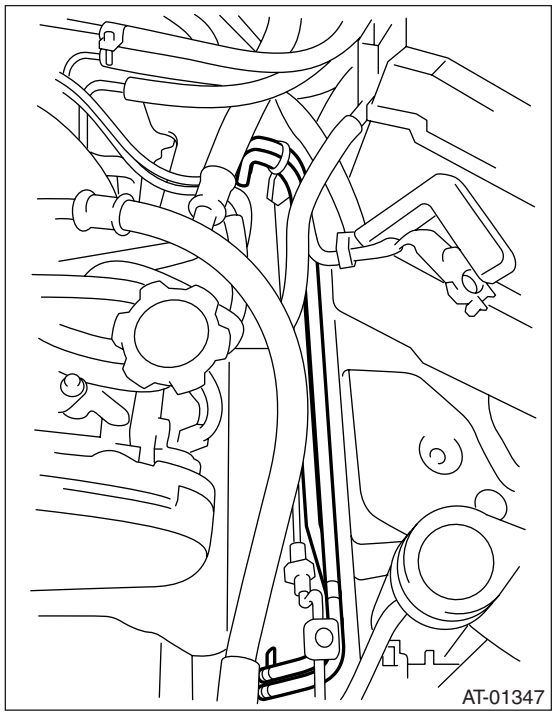
1. EXCEPT FOR ATF COOLER MODEL WITH WARMER FUNCTION

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

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.1 ft-lb)
T2: 44 N·m (4.5 kgf-m, 32.5 ft-lb)

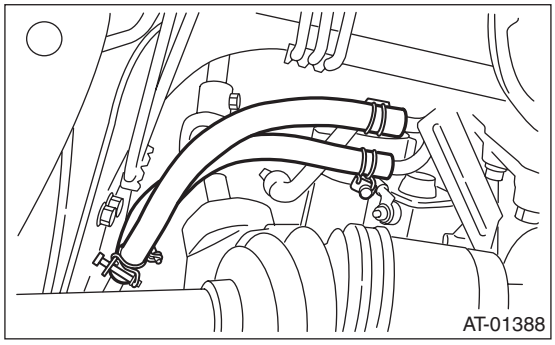


2) Install the ATF cooler pipe to frame.



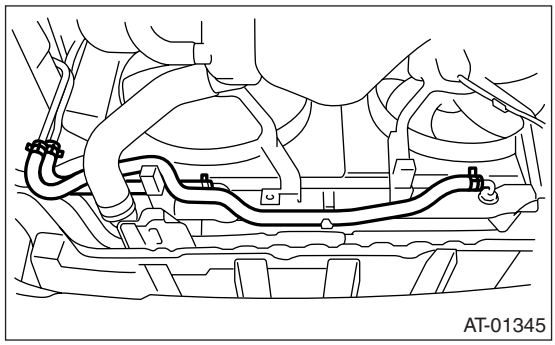
3) Connect the ATF cooler hose to pipe on the transmission side.

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

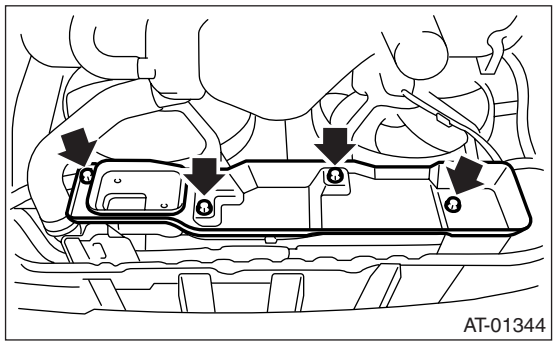


4) Connect the ATF cooler hose to pipe on radiator side.

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


AT-01345

5) Install the radiator under cover.
Tightening torque:
4.9 N·m (0.5 kgf-m, 3.6 ft-lb)


AT-01344

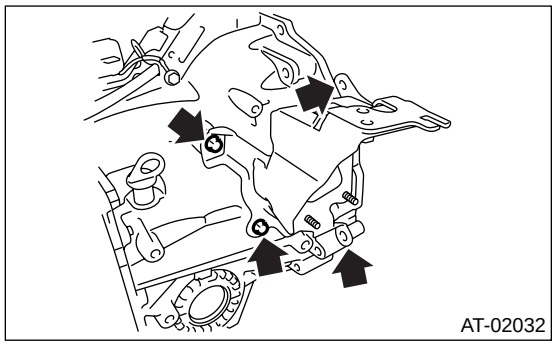
6) Install the under cover.
7) Install the battery.
8) Fill ATF. <Ref. to 5AT-27, Automatic Transmission Fluid.>

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

2. ATF COOLER MODEL WITH WARMER FUNCTION

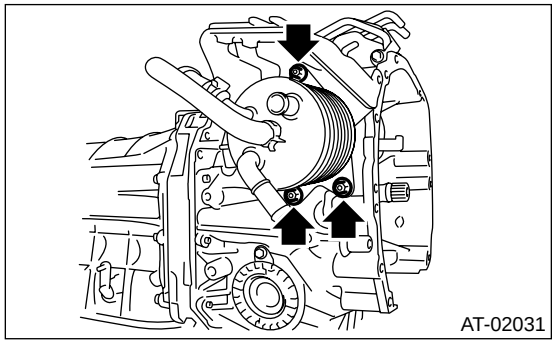
1) Install the ATF cooler bracket if it is removed from transmission body.

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

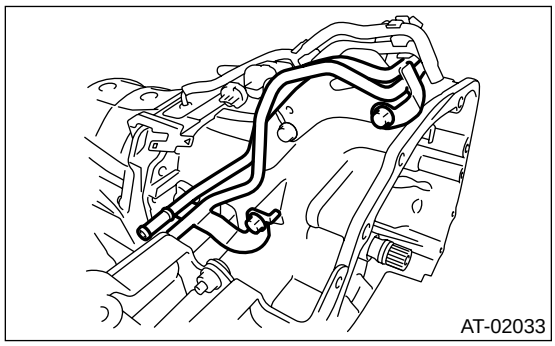

AT-02032

2) Install the ATF cooler if it is removed from installation bracket.

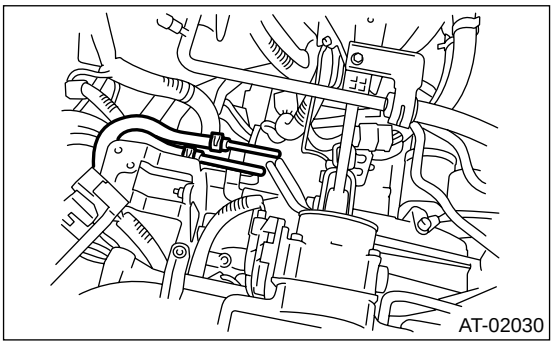
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)


AT-02031

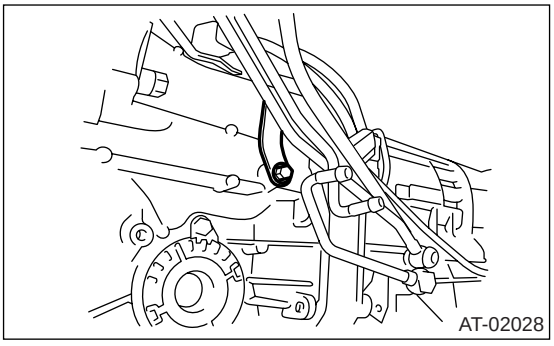
3) Install the pitching stopper securing bracket and bolt on the side of transmission.


AT-02033

4) Install the ATF cooler hoses and pipes.

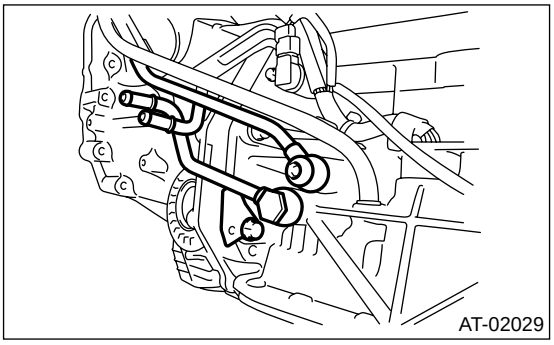


5) Connect the engine harness connectors, and then install the engine hanger rear.
6) Install the oil charge pipe. <Ref. to 5AT-70, INSTALLATION, Oil Charge Pipe.>
7) Install the resonator chamber.
<Ref. to IN(H6DO)-9, INSTALLATION, Resonator Chamber.>
8) Install the air intake chamber.
<Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>
9) Lift-up the vehicle.
10) Install the pipe securing bolts on the side of transmission.

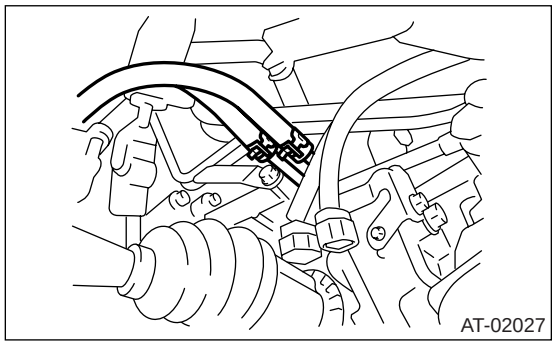


11) Install the union screw of oil cooler inlet and outlet pipes.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.1 ft-lb)
T2: 44 N·m (4.5 kgf-m, 32.5 ft-lb)



12) Install the inlet and outlet pipes of the ATF oil cooler hose to oil cooler pipe.



13) Install the front exhaust pipe.
<Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>

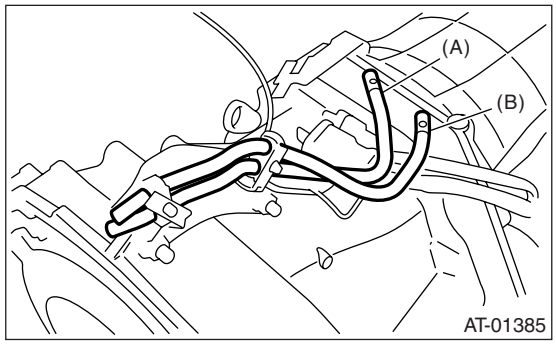
C: INSPECTION

Repair or replace any defective hoses, pipes, clamps, and washers found from the inspection below.
1) Check for ATF leaks in joints between the transmission, radiator, pipes, and hoses.
2) Check for deformed clamps.
3) Lightly bend the hose and check for cracks in the surface and other damages.
4) Pinch the hose with your fingers and check for poor elasticity. Also check for poor elasticity in the parts where the clamp was installed by pressing with your fingernail.
5) Check for peeling, cracks, and deformation at the tip of the hose.
6) Check the ATF cooler for cracks or deformation. (ATF cooler model with warmer function)

22.Air Breather Hose

A: REMOVAL

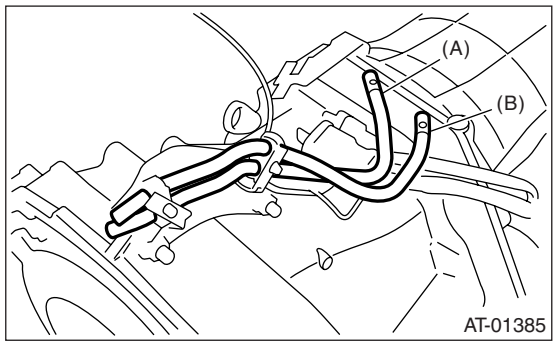
1) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
2) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
3) Disconnect the air breather hose.



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump cover)

B: INSTALLATION

1) Connect the air breather hose.



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump cover)

2) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
3) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>

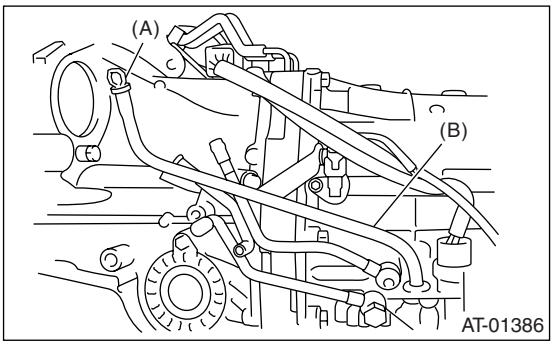
C: INSPECTION

Make sure the hose is not cracked or clogged.

23.Oil Charge Pipe

A: REMOVAL

1) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
2) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
3) Remove the oil charge pipe, and then remove the O-ring from flange side.

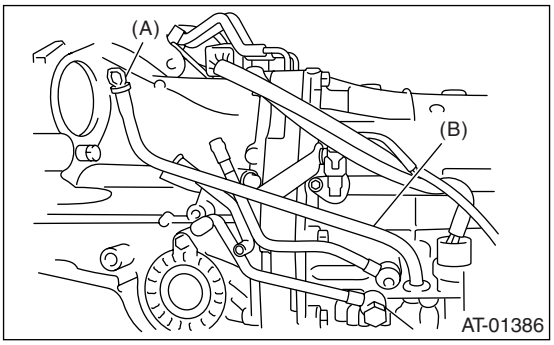


(A) Oil level gauge
(B) Oil charge pipe

B: INSTALLATION

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

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)



(A) Oil level gauge
(B) Oil charge pipe

2) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
3) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>

C: INSPECTION

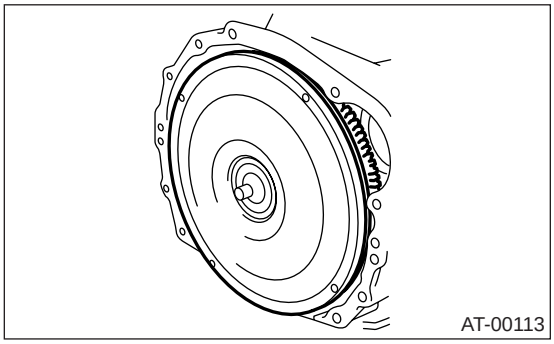
Make sure the oil charge pipe is not deformed or damaged.

24.Torque Converter Assembly

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter and oil pump shaft horizontally.

NOTE:
• Be sure not to scratch the inside of bush in oil pump shaft.
• Be careful that the oil pump shaft may drawn out simultaneously.



3) Remove the oil pump shaft from torque converter as necessary.

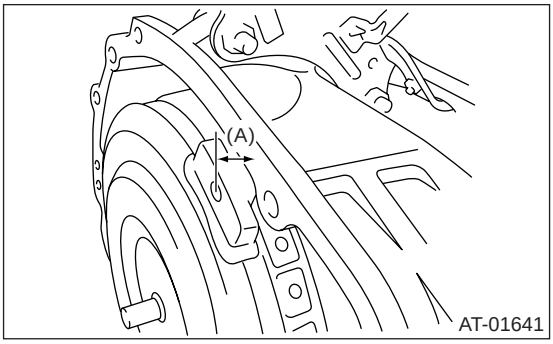
B: INSTALLATION

1) When the oil pump shaft is removed, install the shaft to torque converter.

NOTE:
Make sure the clip is firmly inserted.

2) Install the oil pump shaft to torque converter, and then make sure that the clip is secured on groove.
3) Apply ATF to the revolution and sliding surface oil pump shaft.
4) Holding the torque converter assembly by hand, lightly rotate the torque converter assembly to engage the oil pump rotor.
5) Check the protruding dimension of the torque converter assembly.

Dimension A:
Less than 8 mm (0.31 in)



(A) Dimension A

6) Install the transmission assembly into the vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

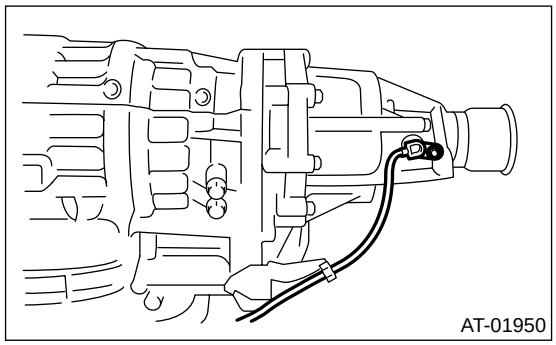
C: INSPECTION

Make sure the ring gear and protrusion of torque converter end are not deformed or damaged.

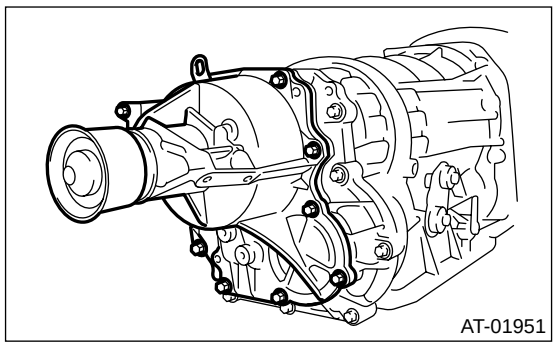
25.Extension Case & Intermediate Case

A: REMOVAL

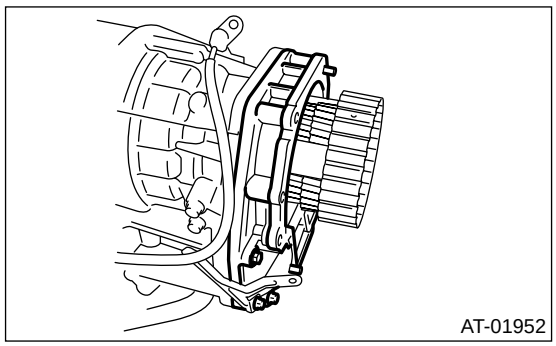
1) Remove the transmission assembly.
<Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor.


AT-01950

3) Separate the extension case and intermediate case.


AT-01951

4) Separate the intermediate case and transmission main case.

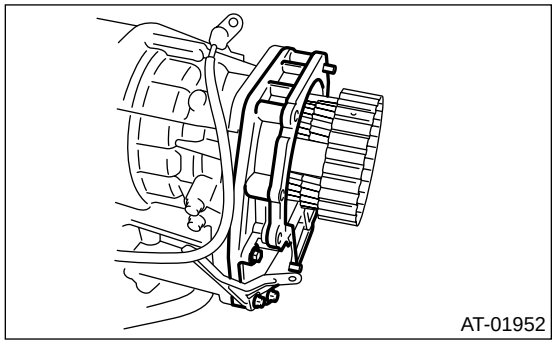

AT-01952

B: INSTALLATION

1) Secure the intermediate case to transmission main case.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

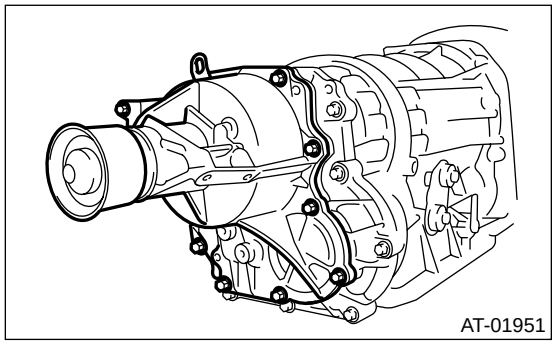
NOTE:
Use a new gasket.


AT-01952

2) Attach the selected reduction driven gear shim to end surface of reduction driven gear with vaseline. <Ref. to 5AT-79, ADJUSTMENT, Reduction Driven Gear.>
3) Install the extension case to intermediate case.

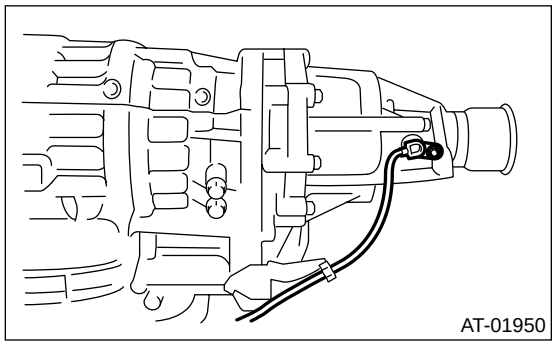
NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)


AT-01951

4) Install the rear vehicle speed sensor.

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


AT-01950

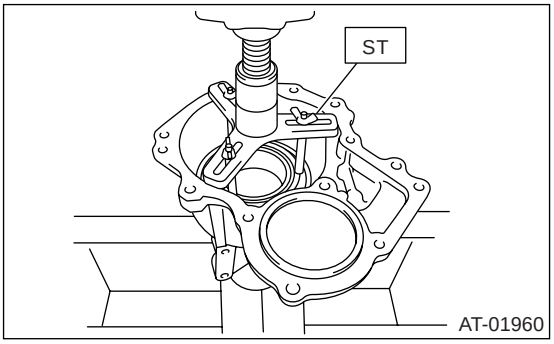
5) Install the transmission assembly.
<Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

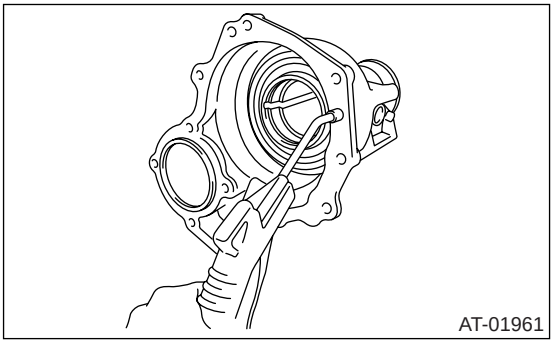
1) Take out the transfer clutch and multi-plate clutch hub assembly by lightly tapping the end of rear drive shaft.

NOTE:
Be careful not to damage the oil seal of extension.

2) Remove snap ring using ST and press.
ST 18762AA000 COMPRESSOR SPECIAL TOOL



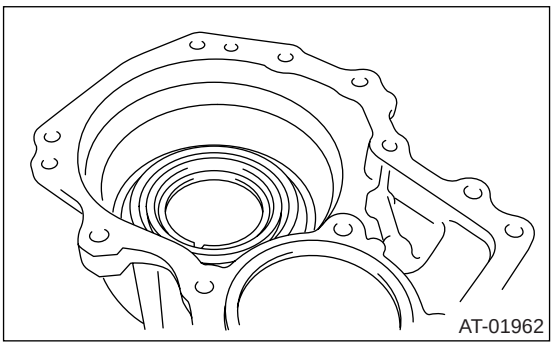
3) Supply compressed air to remove the clutch piston.



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

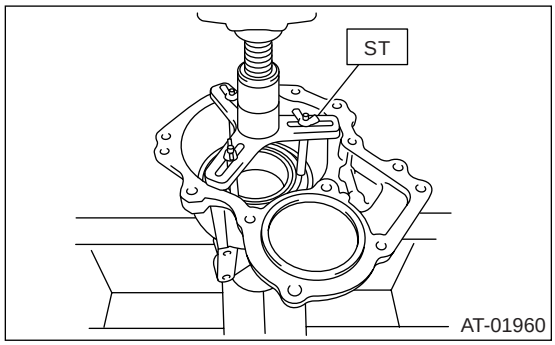
D: ASSEMBLY

1) Press-fit new oil seal using ST and press.
ST 498057300 INSTALLER
2) Press-fit the dust cover.
3) Insert the multi-plate clutch, drive plate, driven plate and spring retainer.



(A) Spring retainer
(B) Multi-plate clutch (LSD) piston assembly

4) Using the ST and compressor, install the snap ring.
ST 18762AA000 COMPRESSOR SPECIAL TOOL



5) Install the transfer clutch. <Ref. to 5AT-74, INSTALLATION, Transfer Clutch.>

NOTE:
For 3-transfer clutch model, make sure the press plate is included.

6) Install the multi-plate hub assembly.

E: INSPECTION

- Use compressed air to make sure the extension case routes are not clogged and not leaks.
- Measure the extension end play and adjust it to within specifications.

<Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>

26.Transfer Clutch

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case, and then remove the transfer clutch. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.> <Ref. to 5AT-73, DISASSEMBLY, Extension Case & Intermediate Case.>

B: INSTALLATION

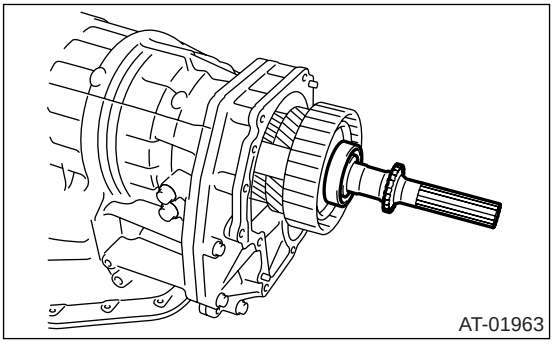
1) Select the rear drive shaft shim. <Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>
2) Select the driven plate No. 3. <Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>
3) Install the extension case and intermediate case. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>
4) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

- Inspect the drive plate facing for wear and damage.
- Inspect the snap ring for wear; return spring for permanent distortion, breakage and deformation.
- Check that the D-ring is not damaged.
- Inspect the extension end play and adjust it to within specifications. <Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>

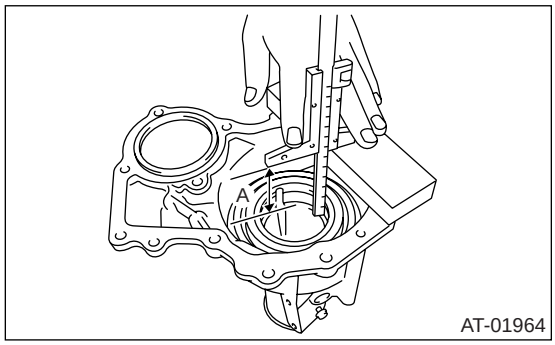
D: ADJUSTMENT

1) Insert the rear drive shaft into the reduction drive gear and center differential assembly.


AT-01963

2) Using the ST, measure the depth “A”, which is from mating surface of extension case to ball bearing outer ring contact surface.

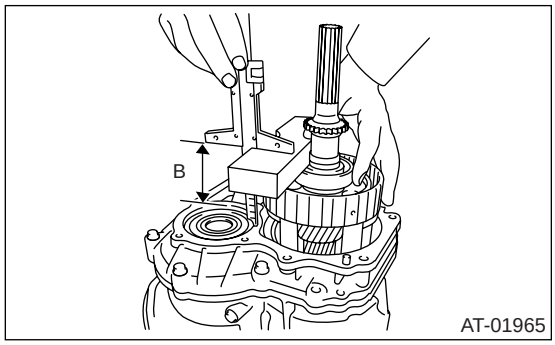
ST 398643600 GAUGE



AT-01964

A Measured value

3) Using the ST, measure the height “B” from the intermediate case mating surface to ball bearing outer ring contact surface.
ST 398643600 GAUGE



AT-01965

B Measured value

4) Calculation formula:
When clearances are 0.05 mm (0.0020 in):
T (mm) = A – (B – 0.28) – 0.05
[T (in) = A – (B – 0.011) – 0.0020]
When clearances are 0.25 mm (0.0098 in):
T (mm) = A – (B – 0.28) – 0.25
[T (in) = A – (B – 0.011) – 0.0098]
A: Depth from end of extension case to ball bearing outer ring contact surface
B: Height from end of intermediate case to ball bearing outer ring contact surface
T: Shim thickness
0.05 — 0.25 mm (0.0020 — 0.0098 in)

NOTE:
Calculation formula for “T” is applied when measuring using ST (398643600 GAUGE). When not using ST, apply following.
When clearances are 0.05 mm (0.0020 in):
T (mm) = (A – α) – ((B – β) – 0.28) – 0.05
[T (in) = (A – α) – ((B – β) – 0.011) – 0.0020]
When clearances are 0.25 mm (0.0098 in):
T (mm) = (A – α) – ((B – β) – 0.28) – 0.25
[T (in) = (A – α) – ((B – β) – 0.011) – 0.0098]

T: Shim thickness
A: Depth from end of extension case to ball bearing outer ring contact surface
B: Height from end of intermediate case to ball bearing outer ring contact surface
α: Collar thickness used when measuring “A”
β: Collar thickness used when measuring “B”
0.28 (0.011): Gasket thickness (Unit mm (in))

Adjustment shim	
Part Number	Thickness mm (in)
33281AA040	0.2 (0.008)
33281AA050	0.5 (0.020)
33281AA060	0.3 (0.012)

27.Multi-Plate Clutch

A: REMOVAL

Remove the multi-plate clutch following the same instructions as for the extension case. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.>

B: INSTALLATION

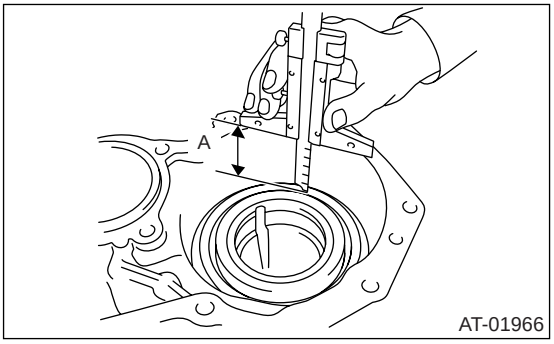
Install the multi-plate clutch following the same instructions as for the extension case. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>

C: INSPECTION

- Inspect the drive plate facing for wear and damage.
- Inspect the snap ring for wear; return spring for permanent distortion, breakage and deformation.
- Inspect the damage for D-ring.
- Measure the multi-plate clutch clearance and adjust it within specification. <Ref. to 5AT-76, ADJUSTMENT, Multi-Plate Clutch.>

D: ADJUSTMENT

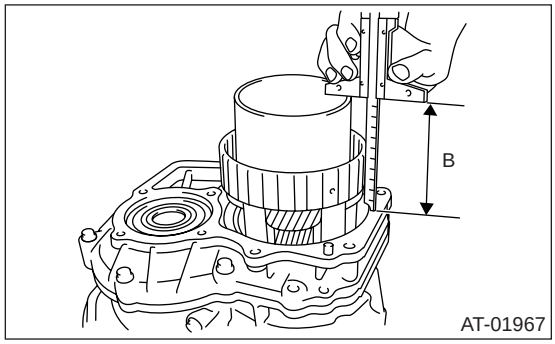
1) Remove drive plate and driven plate from center differential carrier.
2) Measure the depth “A” from mating surface of extension case to multi-plate clutch (LSD) piston.



A Measured value

3) Using the ST, measure the height “B” from intermediate case mating surface to end of center differential clutch drum, and then subtract the thickness of ST gauge (50 mm (1.97 in)) from measured value.
ST 378744300 GAUGE

NOTE:
Measure with driven plate No. 3 removed.



B Measured value

4) Calculation formula:
When clearances are 0.2 mm (0.008 in):
T (mm) = A – (B – 0.28) – 0.2
[T (in) = A – (B – 0.011) – 0.008]
When clearances are 0.6 mm (0.024 in):
T (mm) = A – (B – 0.28) – 0.6
[T (in) = A – (B – 0.011) – 0.024]

NOTE:
- Calculation formula for “T” is applied when measuring using ST (398643600 GAUGE, 398744300 GAUGE). When not using ST, apply following.

When clearances are 0.2 mm (0.008 in):
T (mm) = A – (B – α – 0.28) – 0.2
[T (in) = A – (B – α – 0.011) – 0.008]
When clearances are 0.6 mm (0.024 in):
T (mm) = A – (B – α – 0.28) – 0.6
[T (in) = A – (B – α – 0.011) – 0.024]
T: Thickness of driven plate No. 3
A: Measure the depth from mating surface of extension case to multi-plate clutch (LSD) piston
B: Height from end of intermediate case to center differential clutch drum
α: Collar thickness used when measuring “B”
0.28 (0.011): Gasket thickness (Unit mm (in))

- Measure multi-plate clutch (LSD) driven and drive plate thickness to find the clearance between measurement value and “T”.

Standard value:
0.2 — 0.6 mm (0.008 — 0.024 in)

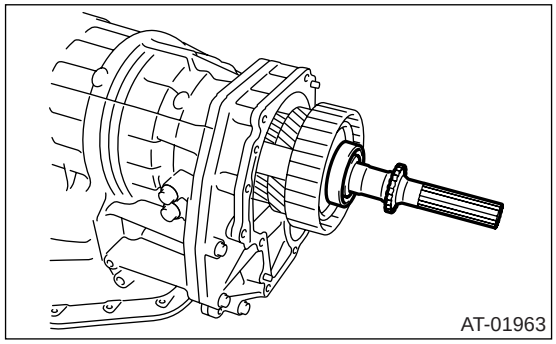
If outside the standard value, replace the plate set (drive and driven plate) and select the driven plate No. 3 to bring clearance within the standard value.

Driven plate No. 3	
Part Number	Thickness mm (in)
31589AA041	1.6 (0.063)
31589AA050	2.0 (0.079)
31589AA060	2.4 (0.094)
31589AA070	2.8 (0.110)

28.Rear Drive Shaft

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor, and then remove the extension case. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.>
3) Pull out the rear drive shaft from center differential assembly.



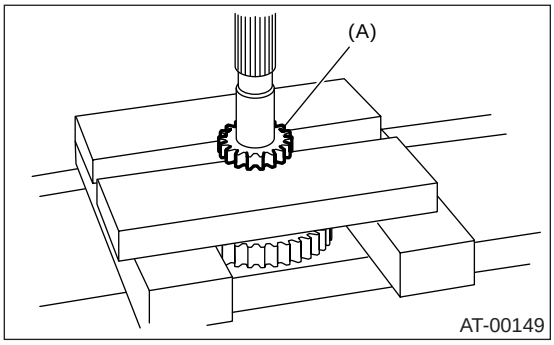
4) Remove the drive plate and driven plate.

B: INSTALLATION

1) Select the appropriate shim. <Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>
2) Install drive plate and driven plate.
3) Insert the rear drive shaft into the center differential assembly.
4) Combine the extension case, and then install the rear vehicle speed sensor. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>
5) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

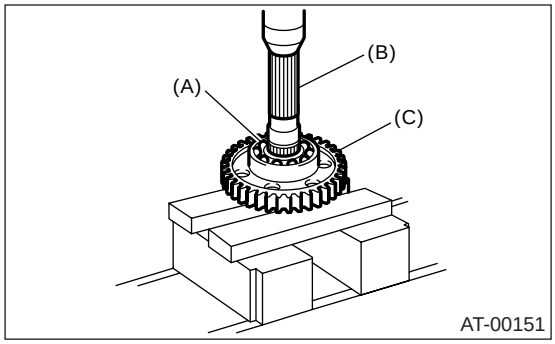
C: DISASSEMBLY

1) Using a press, remove the revolution gear.



(A) Revolution gear

2) Using a press, remove the front and rear side ball bearings, and clutch hub.

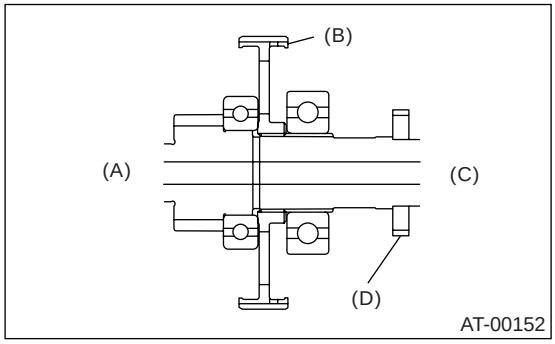


(A) Rear ball bearing
(B) Rear drive shaft
(C) Clutch hub

D: ASSEMBLY

Assemble in the reverse order of disassembly.

NOTE:
• Use new ball bearings and revolution gear.
• Make sure the clutch hub is oriented in the correct direction.



(A) Front side
(B) Clutch hub
(C) Rear side
(D) Revolution gear

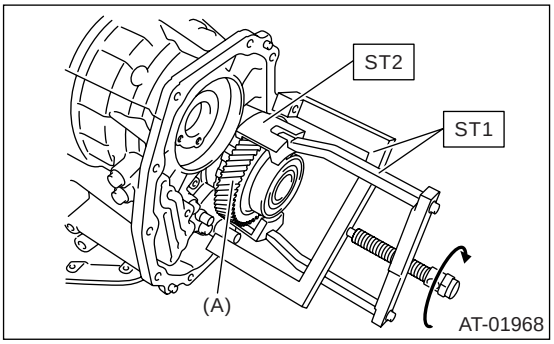
E: INSPECTION

• Check each parts for holes, damages or other foreign matters.
• Inspect the extension end play and adjust it to within specifications. <Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>

29.Reduction Driven Gear

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor, and then separate the extension case and intermediate case from transmission case. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.>
3) Remove the center differential carrier. <Ref. to 5AT-80, REMOVAL, Center Differential Carrier.>
4) Set the select lever to “P” range.
5) Using the ST1 and ST2, extract the reduction driven gear.
ST1 499737100 PULLER SET
ST2 18680AA000 GEAR HOLDER



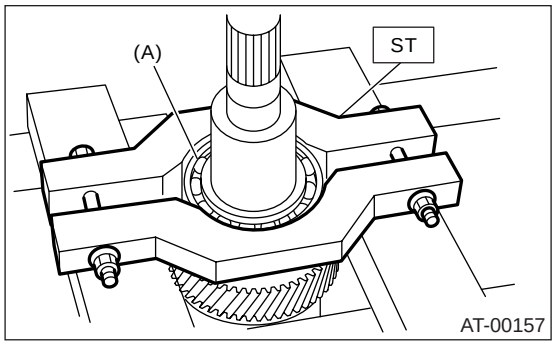
(A) Reduction driven gear

B: INSTALLATION

1) Set the select lever to “P” range.
2) Use a plastic hammer to install reduction driven gear assembly.
3) Select the reduction gear shim. <Ref. to 5AT-79, ADJUSTMENT, Reduction Driven Gear.>
4) Connect the transmission case, extension case and intermediate case, and install the rear wheel speed sensor. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>
5) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

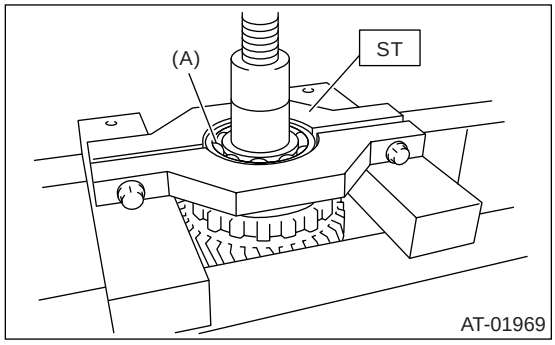
C: DISASSEMBLY

1) Remove the ball bearing from reduction driven gear using ST.
ST 498077310 REMOVER



(A) Ball bearing

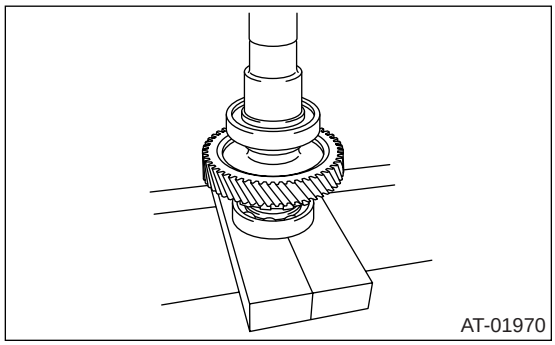
2) Remove the ball bearing on reverse side with the same procedure in step 1).



3) Remove the snap ring from reduction driven gear.

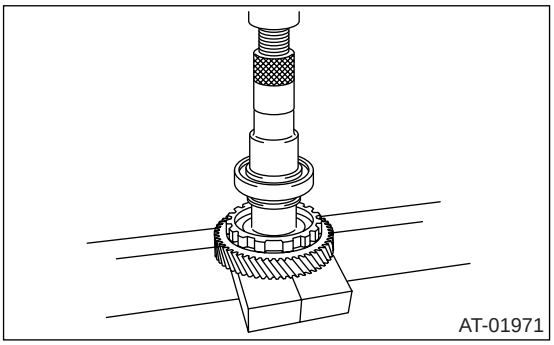
D: ASSEMBLY

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



(A) Ball bearing

3) Install the ball bearing on reverse side with the same procedure in step 2).

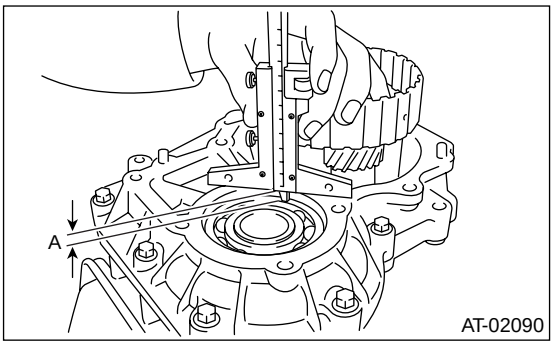


E: INSPECTION

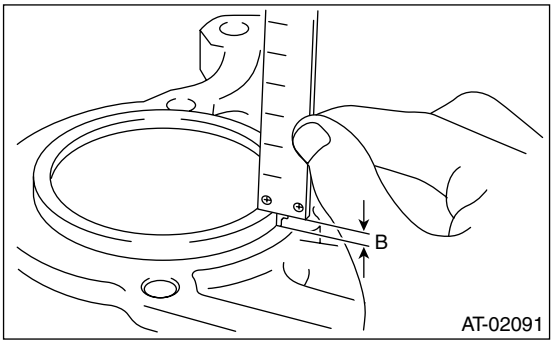
Make sure the ball bearing and gear are not deformed or damaged.

F: ADJUSTMENT

1) Using depth gauge, measure depth “A” from mating surface of extension case to ball bearing on rear end of reduction driven gear.



2) Using a depth gauge, measure the height “B” from mating surface of extension case to ball bearing inside low part of extension case.



3) Calculation formula:

Select the ball bearing from the table to adjust clearances within 0.05 — 0.25 mm (0.0020 — 0.098 in).

When clearances are 0.05 mm (0.0020 in):

T (mm) = A – B + 0.23

[T (in) = A – B + 0.0091]

When clearances are 0.25 mm (0.0098 in):

T (mm) = A – B + 0.03

[T (in) = A – B +0.0011]

T: Shim clearance

A: Depth from mating surface of extension case to ball bearing outer ring end surface

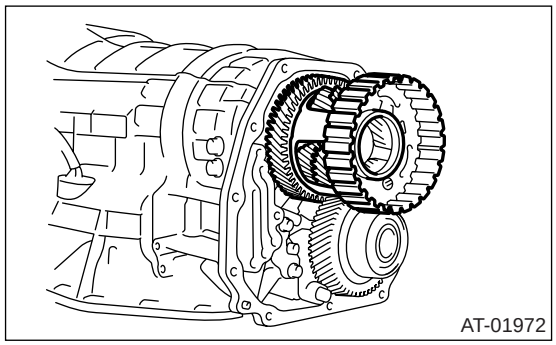
B: Height from mating surface of extension case to ball bearing inside low part

Reduction gear shim	
Part Number	Thickness mm (in)
31288AA030	0.2 (0.008)
31288AA050	0.5 (0.020)
31288AA060	0.3 (0.012)

30.Center Differential Carrier

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear wheel speed sensor, and separate the extension case and intermediate case from transmission case. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.>
3) Pull out the rear drive shaft. <Ref. to 5AT-77, REMOVAL, Rear Drive Shaft.>
4) Pull out the center differential carrier assembly.

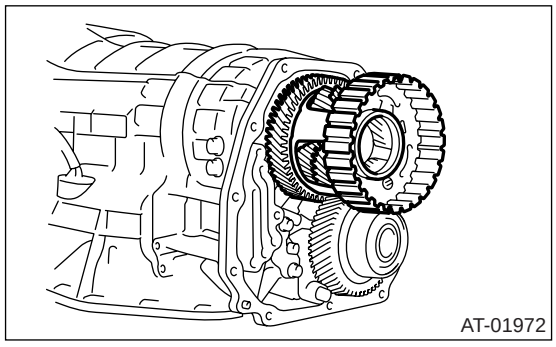

AT-01972

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

B: INSTALLATION

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

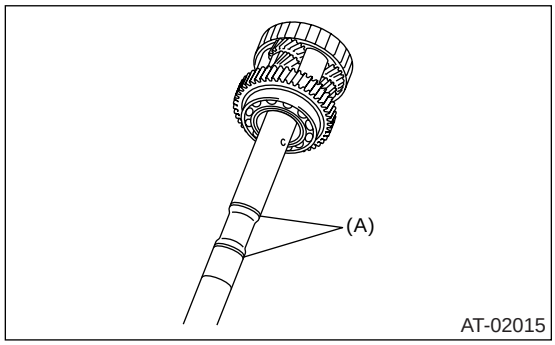
NOTE:
Press-fit it to the bottom of bearing shoulder completely.


AT-01972

2) Insert the rear drive shaft. <Ref. to 5AT-77, INSTALLATION, Rear Drive Shaft.>
3) Connect the transmission case, extension case and intermediate case, and install the rear wheel speed sensor. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>
4) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

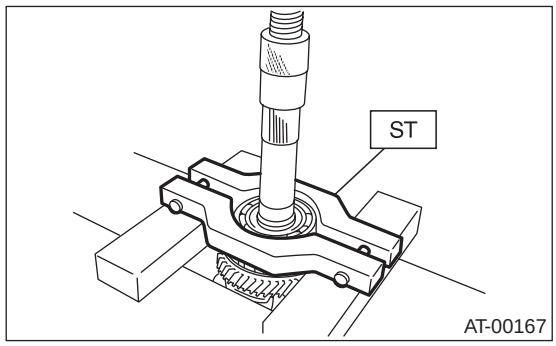
1) Remove the seal ring.



AT-02015

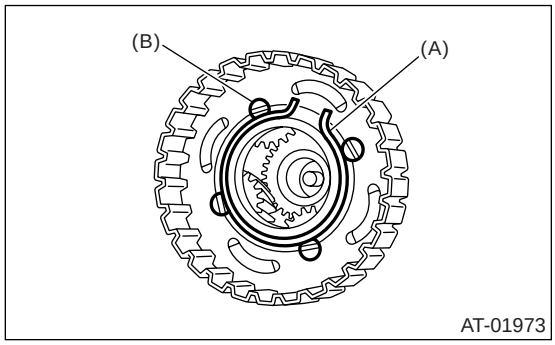
(A) Seal ring

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



AT-00167

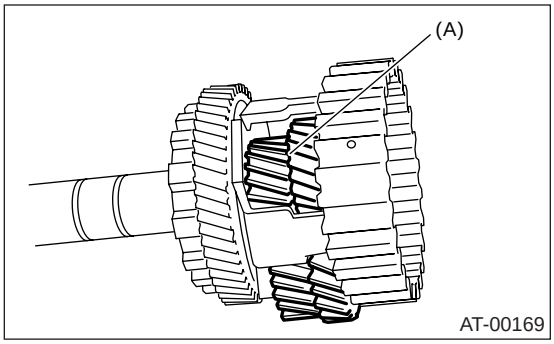
3) Remove the snap ring, and pull out the shaft from center differential assembly.



AT-01973

(A) Snap ring
(B) Shaft

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

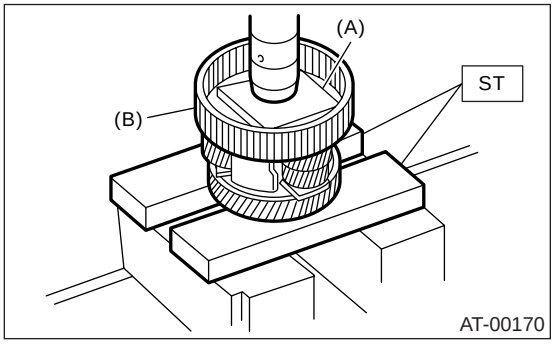


(A) Pinion gear

5) Pull out the intermediate shaft and thrust bearing.

D: ASSEMBLY

1) Install the thrust washer onto intermediate shaft.
2) Install the thrust bearing onto intermediate shaft.
3) Install the pinion gears and washers.
4) Insert the shaft into the center differential assembly.
5) Install the snap ring.
6) Using a press, install a new ball bearing into the center differential assembly.
ST 498077000 REMOVER



(A) Plate
(B) Center differential carrier

7) Apply vaseline onto the seal ring outer surface and shaft grooves.
8) Install a new seal rings.

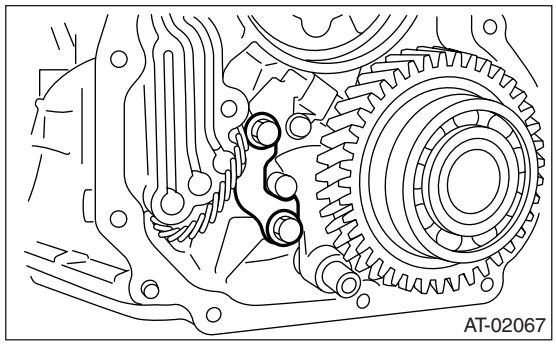
E: INSPECTION

• Check each parts for holes, damages or other foreign matters.
• Inspect the extension end play and adjust it to within specifications. <Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>

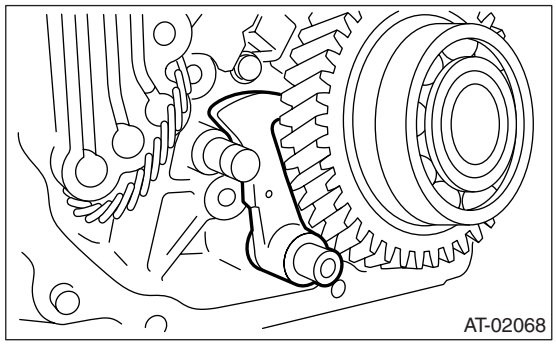
31.Parking Pawl

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case and intermediate case. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.>
3) Remove the center differential carrier. <Ref. to 5AT-80, REMOVAL, Center Differential Carrier.>
4) Remove the parking support actuator.

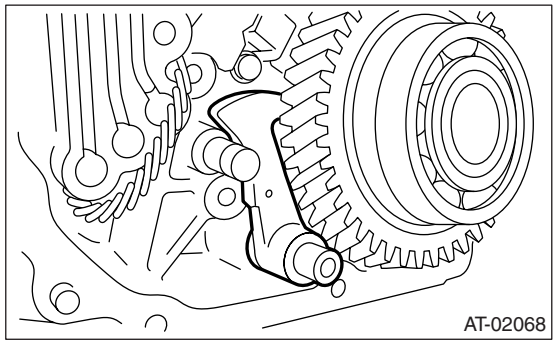


5) Remove the parking pawl, parking pawl shaft and return spring.

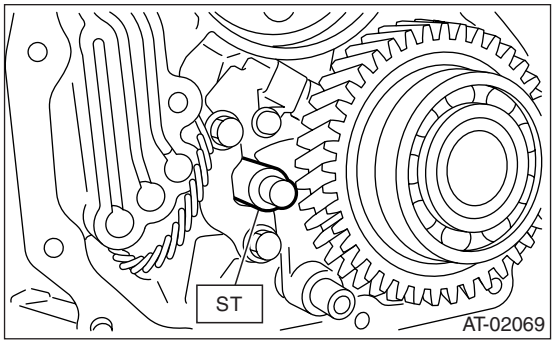


B: INSTALLATION

1) Set the transmission to “N” range.
2) Install the parking pawl, parking pawl shaft and return spring.



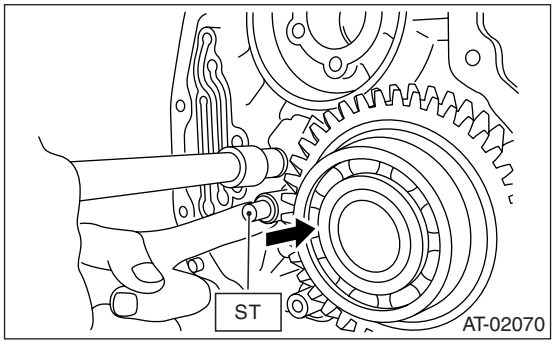
3) Temporarily secure the parking support actuator.
4) Set the ST between parking pawl and parking support actuator.
ST 18679AA000 ADJUSTER



5) Tighten the securing bolts while pressing parking support actuator with finger.

Tightening torque:
10±2 N·m (1.0±0.2 kgf-m, 7.4±1.5 ft-lb)

CAUTION:
Press the reduction driven gear and parking pawl in bottom condition.

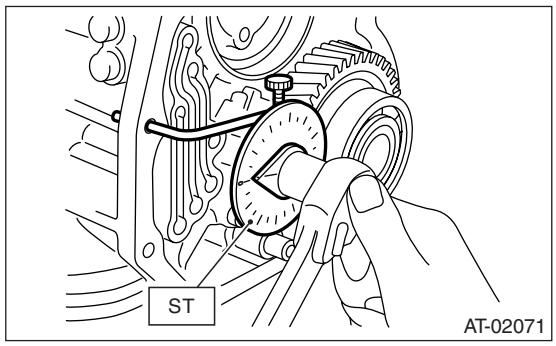


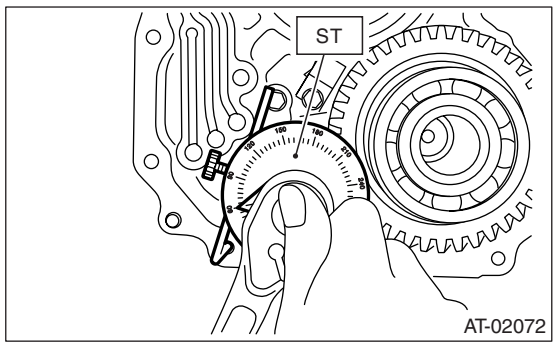
6) Using the ST, tighten the bolts which tightened in step 4) with specified angle.

Tightening angle:
18°±2°

ST 18554AA000 ANGLE GAUGE

NOTE:
Do not use extension as much as possible.





7) Install the center differential carrier. <Ref. to 5AT-80, INSTALLATION, Center Differential Carrier.>
8) Install the extension case and intermediate case. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>
9) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

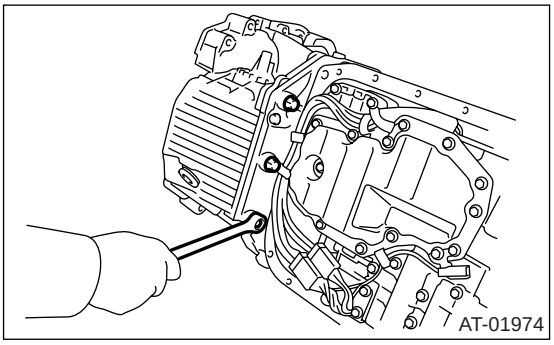
C: INSPECTION

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

32.Converter Case

A: REMOVAL

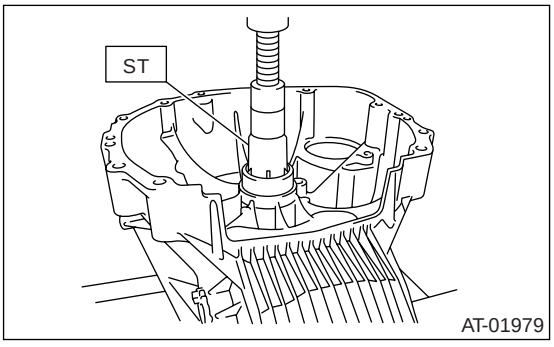
1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the torque converter assembly. <Ref. to 5AT-71, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the turbine speed sensor 1. <Ref. to 5AT-57, REMOVAL, Turbine speed sensor 1.>
5) Remove the oil charge pipe. <Ref. to 5AT-70, REMOVAL, Oil Charge Pipe.>
6) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-60, REMOVAL, ATF Filter.>
7) Remove the converter case aligning bolt.
8) Lay along the transmission body, and then remove the oil pan.
9) Remove the three converter case aligning bolts (TORX®).
ST 18676AA020 TORX® WRENCH



10) Separate the converter case by lightly tapping with plastic hammer.
11) Remove the differential assembly. <Ref. to 5AT-94, REMOVAL, Front Differential.>
12) Remove the oil seal from converter case.

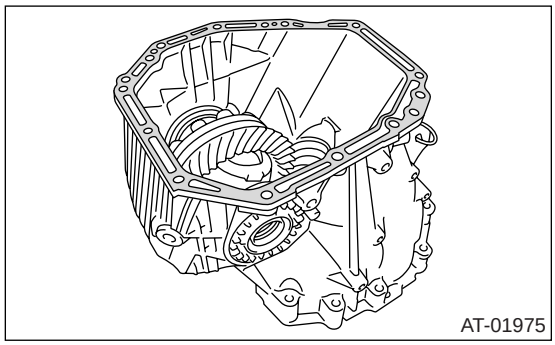
B: INSTALLATION

1) Check the appearance of each component and clean them.
2) Press-fit the oil seal to converter case using ST.
ST 499587100 OIL SEAL INSTALLER



3) Install the differential assembly to case. <Ref. to 5AT-94, INSTALLATION, Front Differential.>
4) Install the left and right side retainers. <Ref. to 5AT-97, ADJUSTMENT, Front Differential.>
5) Apply proper amount of liquid gasket to the entire matching surface of converter case.

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

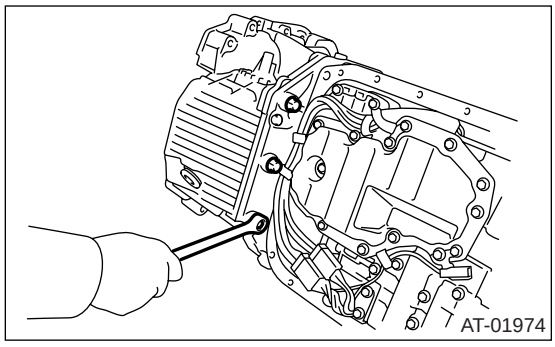


6) Install the converter case assembly without damaging bushing and oil seal.

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

7) Install the three converter case aligning bolts (TORX®).
ST 18676AA020 TORX® WRENCH

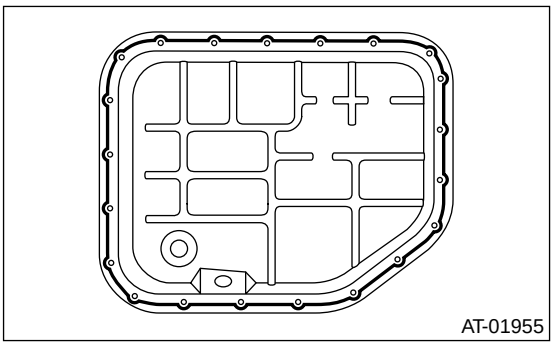
Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



8) Apply proper amount of liquid gasket to the entire oil pan mating surface, and then install it.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)



9) Install the transmission harness connector to the stay.
10) Install the air breather hose. <Ref. to 5AT-69, INSTALLATION, Air Breather Hose.>
11) Install the ATF filter pipe. <Ref. to 5AT-60, INSTALLATION, ATF Filter.>
12) Install the oil charge pipe with O-ring.<Ref. to 5AT-70, INSTALLATION, Oil Charge Pipe.>
13) Install the torque converter assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
14) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

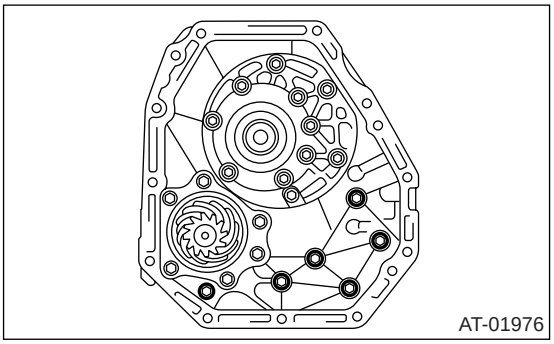
C: INSPECTION

Measure the backlash, and then adjust it within specification. <Ref. to 5AT-91, ADJUSTMENT, Drive Pinion Shaft Assembly.>

33.Oil Pump Cover

A: REMOVAL

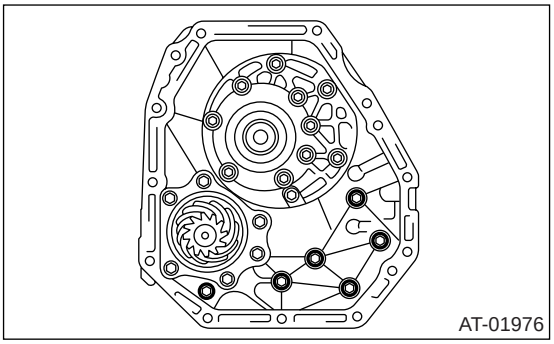
1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-71, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the oil charge pipe. <Ref. to 5AT-70, REMOVAL, Oil Charge Pipe.>
5) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-60, REMOVAL, ATF Filter.>
6) Separate the converter case and transmission case part. <Ref. to 5AT-84, REMOVAL, Converter Case.>
7) Remove the oil pump cover aligning bolt, and then separate it from the AT main case by lightly tapping with plastic hammer.



B: INSTALLATION

1) Secure the oil pump cover.

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

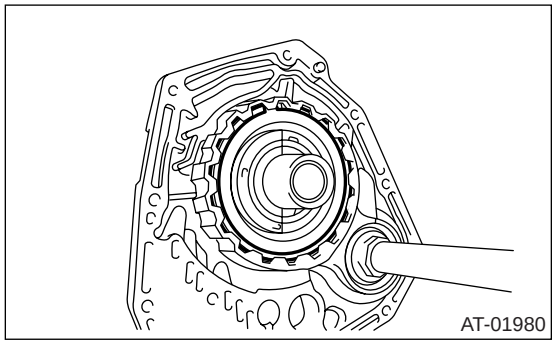


2) Install the converter case assembly into transmission case assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
3) Install the transmission harness connector to the stay.
4) Install the ATF filter pipe. <Ref. to 5AT-60, INSTALLATION, ATF Filter.>
5) Install the oil charge pipe with O-ring. <Ref. to 5AT-70, INSTALLATION, Oil Charge Pipe.>
6) Install the torque converter assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
7) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

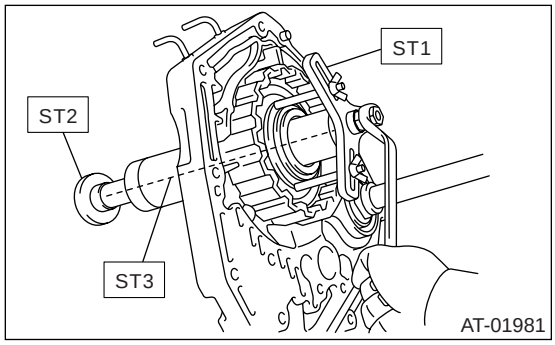
1. FRONT BRAKE

1) Remove the snap ring.

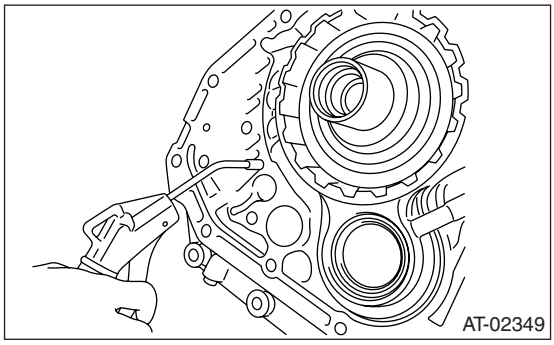


2) Remove the retainer plate, drive plate and driven plate.
3) Remove the snap ring using ST1, ST2 and ST3.

ST1	18762AA000	COMPRESSOR SPECIAL TOOL
ST2	18765AA000	COMPRESSOR SUPPORT
ST3	18763AA000	COMPRESSOR SHAFT



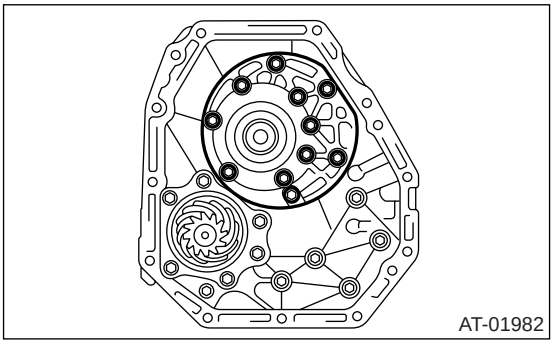
4) Remove the retainer and return spring.
5) Remove the front brake piston by blowing compressed air.



6) Remove the D-ring from front brake piston.

2. OIL PUMP

1) Take out the oil pump housing.



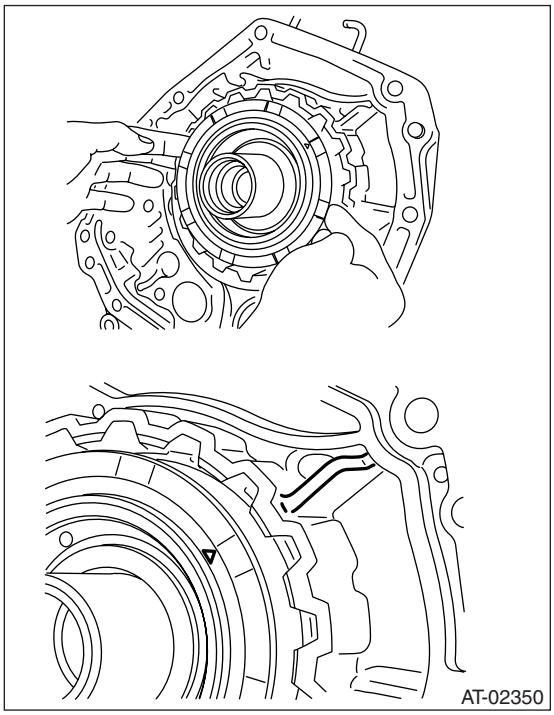
2) Take out the oil pump body.

D: ASSEMBLY

1. FRONT BRAKE

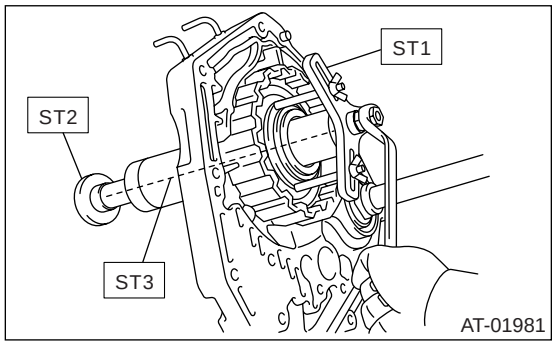
1) Apply ATF to D-ring, and then install it to the front brake piston.
2) Install the front brake piston to oil pump cover.

NOTE:
Install by aligning the "▲" mark on front brake piston surface with the oil pump cover rib.



3) Install the retainer and return spring.
4) Install the front brake piston assembly using ST1, ST2 and ST3.

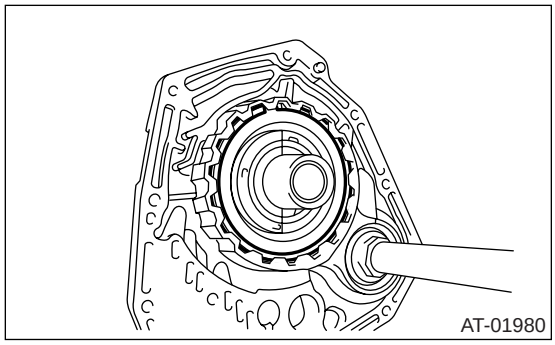
ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT
ST3 18763AA000 COMPRESSOR SHAFT



5) Install the genuine driven plate instead of retainer plate, temporarily assemble the drive plate and driven plate.

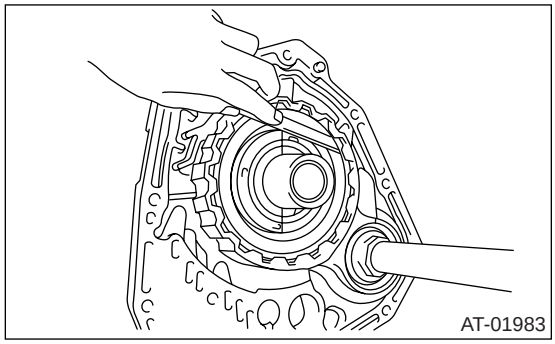
ST 31536AA290 DRIVEN PLATE

6) Install the snap ring.



7) Measure the clearance between retainer plate and snap ring, and then select a suitable retainer plate from table.

Front brake clearance standard value:
0.7 — 1.1 mm (0.028 — 0.043 in)



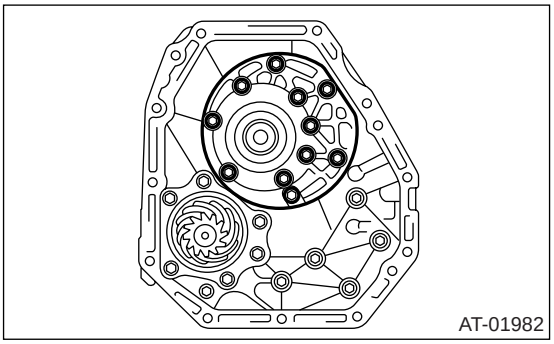
Front brake retainer plate	
Part Number	Thickness mm (in)
31567AB130	3.4 (0.134)
31567AB140	3.6 (0.142)
31567AB150	3.8 (0.150)
31567AB160	4.0 (0.157)

8) Remove the snap ring, replace the drive plate which used in measurement of clearance with retainer plate, and then reassemble.

2. OIL PUMP

1) Apply ATF to oil pump assembly, and then install it to oil pump housing.
2) Install the O-ring to oil pump cover.
3) Install the oil pump housing to oil pump housing cover.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



E: INSPECTION

1. FRONT BRAKE

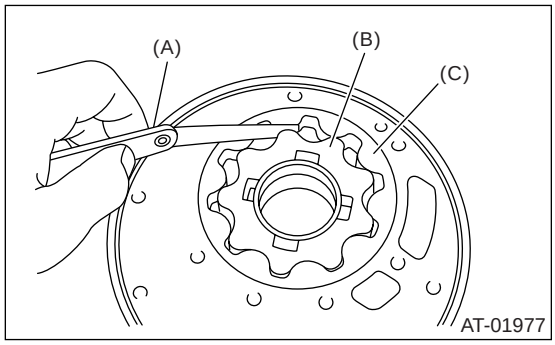
Check the following items:
- Drive plate facing for wear and damage
- Snap ring for wear, return spring for damage, and retainer for damage
- Piston for damage
- D-ring for damage

2. OIL PUMP

Check the following items:
- Oil pump cover and oil seal for breakage or damage
- Oil pump body for scratch or damage

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

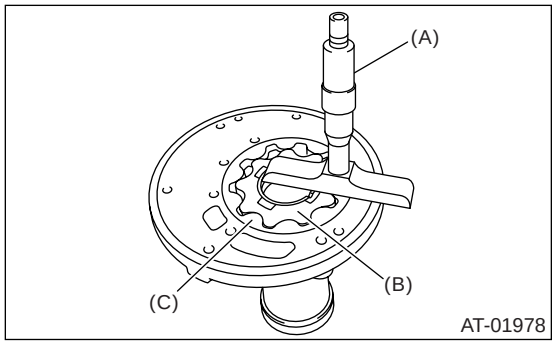
Tip clearance:
0.02 — 0.15 mm (0.0008 — 0.0059 in)



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

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

Side clearance:
0.02 — 0.045 mm (0.0008 — 0.0018 in)



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

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

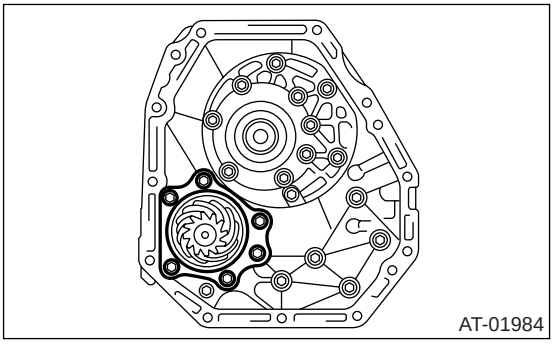
Oil pump rotor ASSY	
Part Number	Thickness mm (in)
15008AA130	11.37 — 11.38 (0.4476 — 0.4480)
15008AA140	11.38 — 11.39 (0.4480 — 0.4484)
15008AA150	11.39 — 11.40 (0.4484 — 0.4488)

Measure the total end play and adjust it within specifications. <Ref. to 5AT-106, ADJUSTMENT, AT Main Case.>

34.Drive Pinion Shaft Assembly

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-71, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Disconnect the air breather hose. <Ref. to 5AT-69, REMOVAL, Air Breather Hose.>
5) Remove the oil charge pipe. <Ref. to 5AT-70, REMOVAL, Oil Charge Pipe.>
6) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-60, REMOVAL, ATF Filter.>
7) Separate the converter case and transmission case part. <Ref. to 5AT-84, REMOVAL, Converter Case.>
8) Remove the drive pinion shaft mounting bolt, and then remove the drive shaft assembly from oil pump cover.



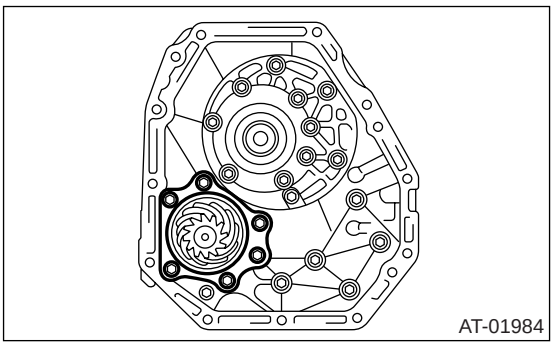
9) Remove the oil pump cover from AT main case. <Ref. to 5AT-86, Oil Pump Cover.>

B: INSTALLATION

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

NOTE:
Be careful not to bend the shim.

Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb)

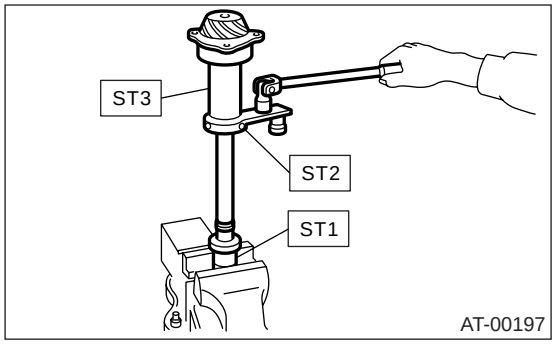


2) Adjust the tooth contact between drive pinion shaft assembly and front differential side gear. <Ref. to 5AT-91, ADJUSTMENT, Drive Pinion Shaft Assembly.>
3) Combine the converter case with transmission case. <Ref. to 5AT-84, INSTALLATION, Converter Case.>
4) Install the transmission harness connector to the stay.
5) Install the ATF filter pipe. <Ref. to 5AT-60, INSTALLATION, ATF Filter.>
6) Install the oil charge pipe with O-ring.
7) Install the torque converter assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
8) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

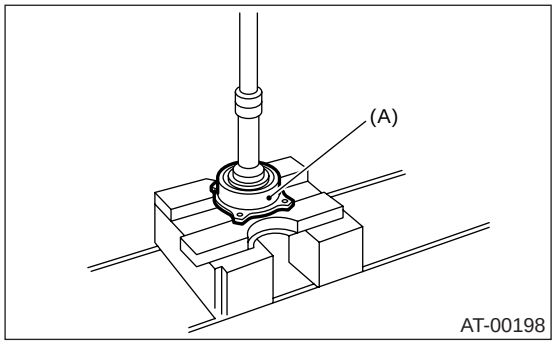
C: DISASSEMBLY

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

ST1	18667AA010	HOLDER
ST2	499787700	WRENCH
ST3	499787500	ADAPTER



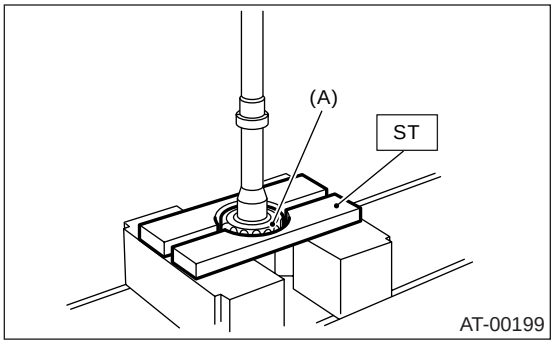
2) Remove the O-ring.
3) Separate the rear roller bearing and outer race from the shaft using press.



(A) Outer race

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

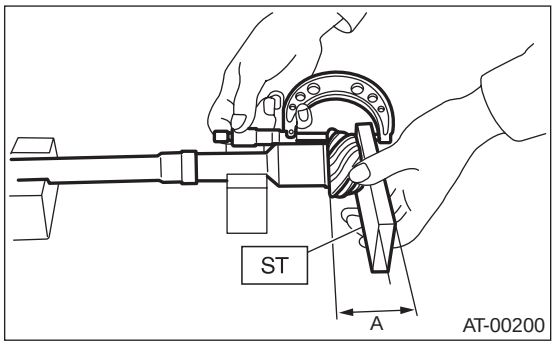
ST 498517000 REPLACER



(A) Front roller bearing

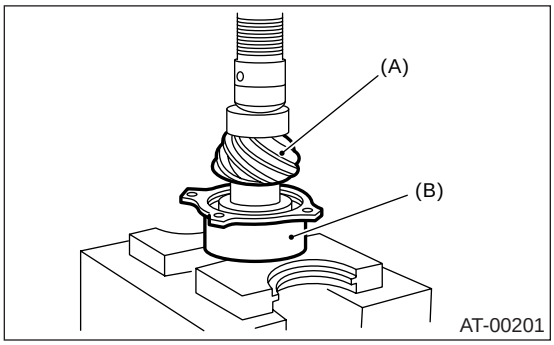
D: ASSEMBLY

1) Measure the dimension “A” of drive pinion shaft.
ST 398643600 GAUGE



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

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



(A) Drive pinion shaft
(B) Roller bearing

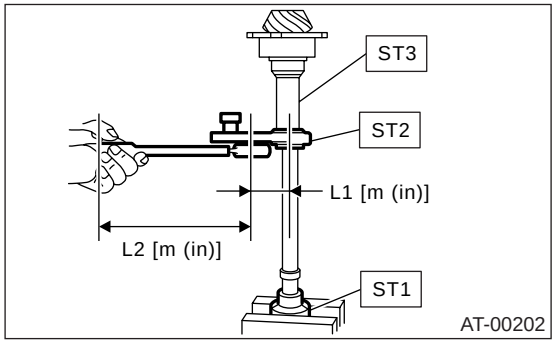
3) After fitting a new O-ring to the shaft, attach the drive pinion collar to shaft.
4) Install the lock washer to drive pinion shaft in proper direction.
5) Tighten new lock nuts using ST1, ST2 and ST3.
Calculate the lock washer and lock nut specifications using following formula.
$T2 = L2/(L1 + L2) \times T1$

T1: 116 N·m (11.8 kgf-m, 85.3 ft-lb)
[Required torque setting]
T2: Tightening torque
L1: ST2 length 0.072 m (2.83 in)
L2: Torque wrench length
Example:

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

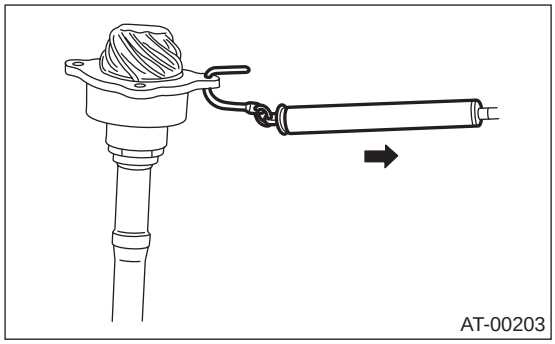
ST1 18667AA010 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

NOTE:
Install the ST2 to torque wrench as straight as possible.



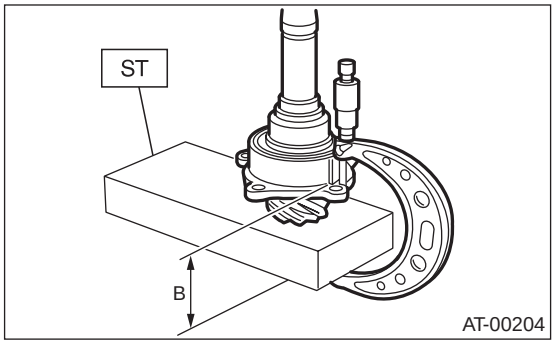
6) Measure the starting torque of bearing. Make sure the starting torque is within the specified range. If the torque is not within specified range, replace the roller bearing.

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



7) Stake the caulking of lock nut at two points.
8) Measure the dimension “B” of drive pinion shaft.

ST 398643600 GAUGE



9) Calculate the thickness “t” (mm) of drive pinion shim.
$t = 6.5 \pm 0.0625 - (B - A)$
10) Select three or less shims from following table.

Drive pinion shim	
Part Number	Thickness mm (in)
31451AA180	0.150 (0.0059)
31451AA190	0.175 (0.0069)
31451AA200	0.200 (0.0079)
31451AA210	0.225 (0.0089)
31451AA220	0.250 (0.0098)
31451AA230	0.275 (0.0108)

E: INSPECTION

• Make sure that all component parts are free of scratch, hole and other faults.
• Adjust the teeth alignment. <Ref. to 5AT-91, ADJUSTMENT, Drive Pinion Shaft Assembly.>

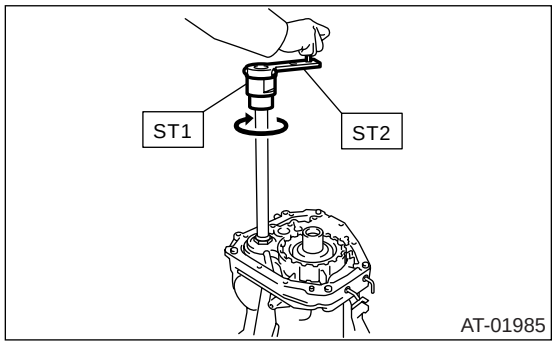
F: ADJUSTMENT

1) Remove the liquid gasket completely from mating surfaces.
2) Install the converter case to oil pump cover, and secure them with tightening four bolts evenly.

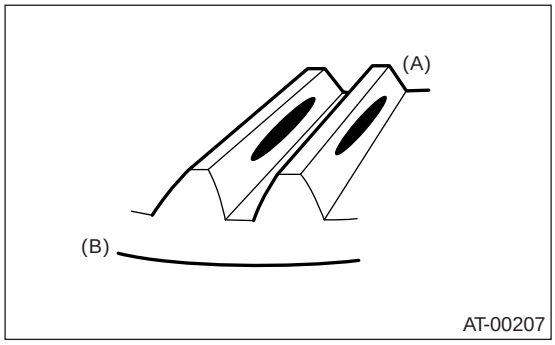
NOTE:
Use an old gasket or aluminum washer so as not to damage the mating surface of housing.

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 18667AA010 HOLDER
ST2 499787700 WRENCH

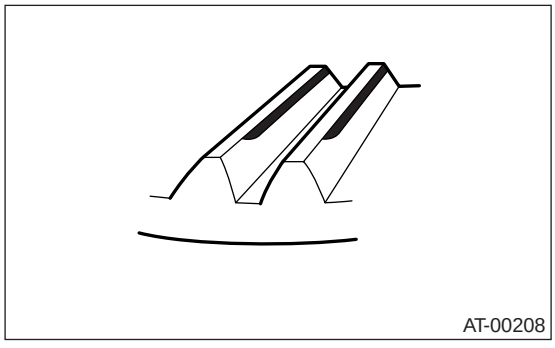


4) Adjust the backlash between drive pinion and hypoid driven gear. <Ref. to 5AT-97, ADJUSTMENT, Front Differential.>
5) Apply red lead evenly to the surfaces of three or four teeth on hypoid driven gear. Rotate the drive pinion in the leftward and rightward for several times. Remove the oil pump cover, and check the tooth contact pattern.
If the tooth contact is improper, readjust the backlash or shim thickness. <Ref. to 5AT-97, 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.]

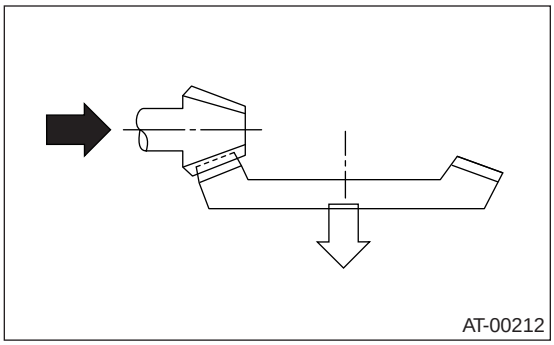


(A) Toe side
(B) Heel side

• Face contact
Checking item: Backlash is too large.
Contact pattern

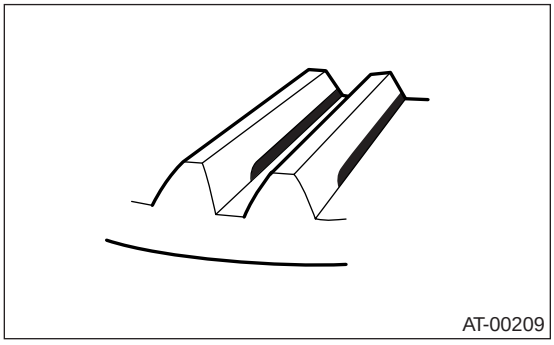


Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to hypoid driven gear.

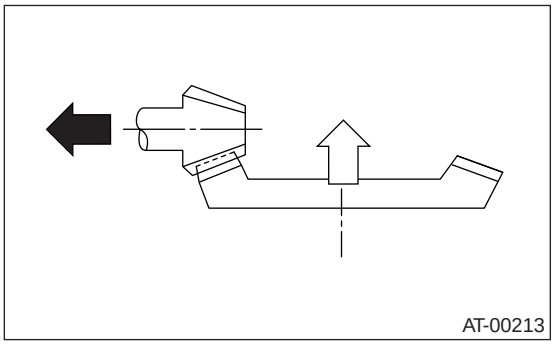


- Flank contact

Checking item: Backlash is too small.
Contact pattern

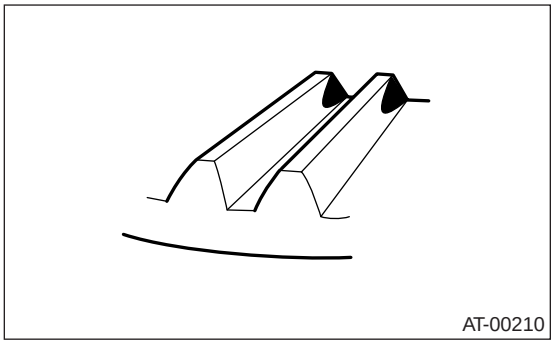


Corrective action: Reduce thickness of drive pinion height adjusting shim in order to bring drive pinion away from hypoid driven gear.

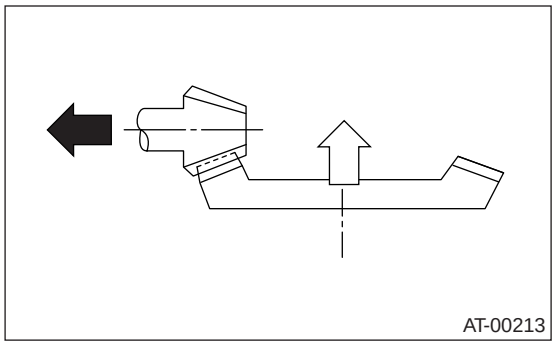


- Toe contact (inside end contact)

Checking item: Contact areas are too small
Contact pattern

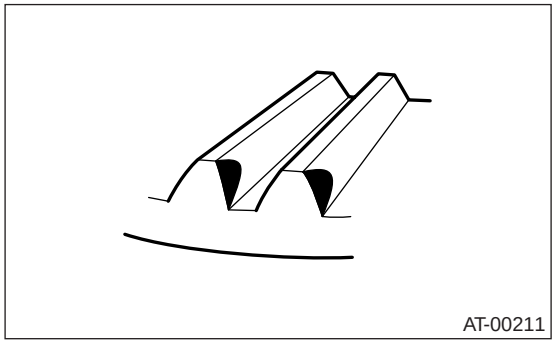


Corrective action: Reduce thickness of drive pinion height adjusting shim in order to bring drive pinion away from hypoid driven gear.

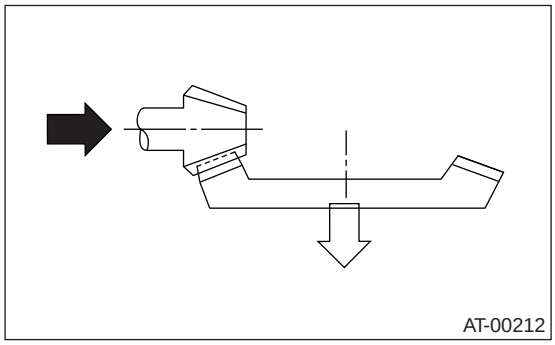


- Heel contact (outside end contact)

Checking item: Contact areas are too small
Contact pattern

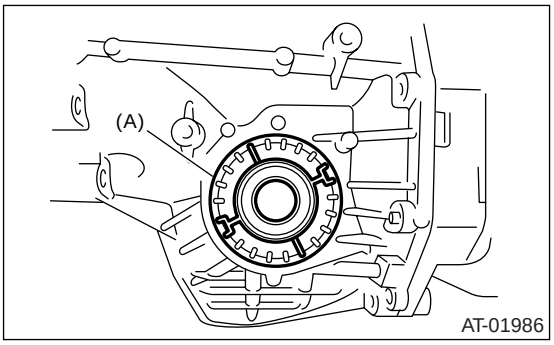


Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to hypoid driven gear.



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. Tighten the lock plate with specified torque.

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



(A) Lock plate

35.Front Differential

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-71, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the oil charge pipe. <Ref. to 5AT-70, REMOVAL, Oil Charge Pipe.>
5) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-60, REMOVAL, ATF Filter.>
6) Separate the converter case and transmission case. <Ref. to 5AT-84, REMOVAL, Converter Case.>
7) Remove the differential side retainers using ST.

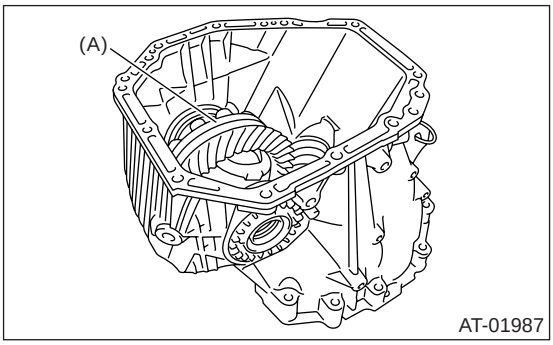
NOTE:
Hold the differential case assembly by hand to avoid damaging the retainer mounting hole of converter case.

ST 18630AA010 WRENCH COMPL RETAINER

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

B: INSTALLATION

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



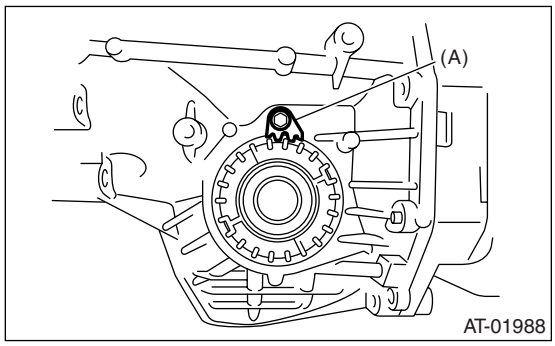
(A) Differential ASSY

2) Install the O-ring to left and right side retainer.
3) Install the side retainers using ST. <Ref. to 5AT-94, REMOVAL, Front Differential.>

ST 18630AA010 WRENCH COMPL RETAINER

4) Adjust the front differential backlash. <Ref. to 5AT-97, ADJUSTMENT, Front Differential.>
5) Install the lock plate.

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



(A) Lock plate

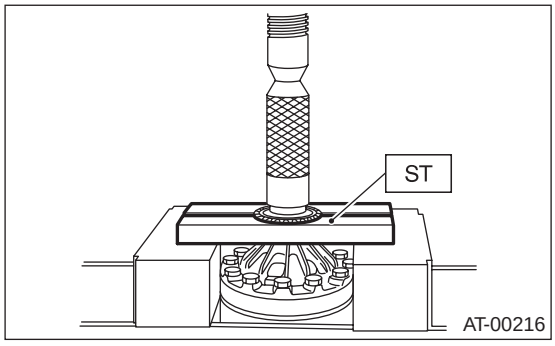
6) Install the converter case to transmission case. <Ref. to 5AT-84, INSTALLATION, Converter Case.>
7) Install the transmission harness connector to the stay.
8) Install the ATF filter pipe. <Ref. to 5AT-60, INSTALLATION, ATF Filter.>
9) Install the oil charge pipe with a O-ring. <Ref. to 5AT-70, INSTALLATION, Oil Charge Pipe.>
10) Install the torque converter assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
11) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

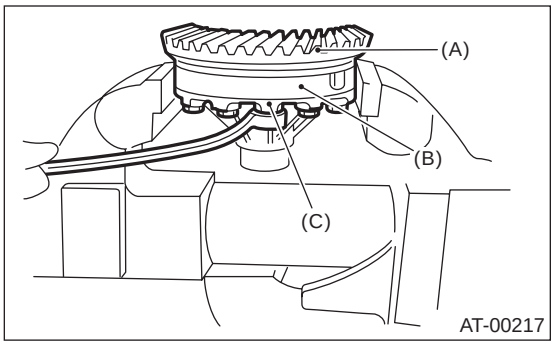
1. DIFFERENTIAL CASE ASSEMBLY

1) Remove the taper roller bearing using ST and press.

ST 498077000 REMOVER

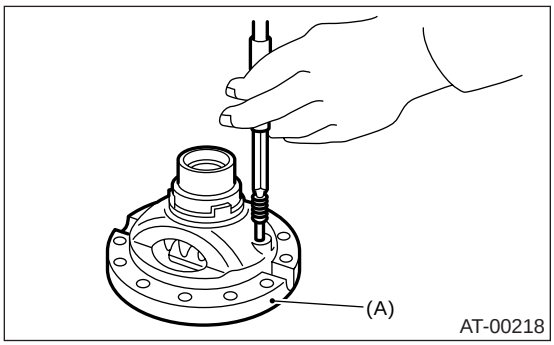


2) Secure the case in a vise and remove the hypoid driven gear tightening bolts, then separate the hypoid driven gear case (RH) and case (LH).



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

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

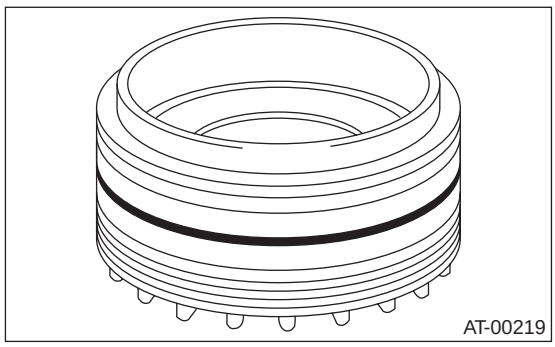


(A) Differential case (RH)

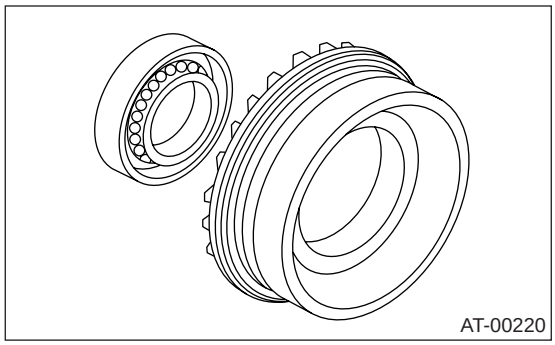
2. SIDE RETAINER

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

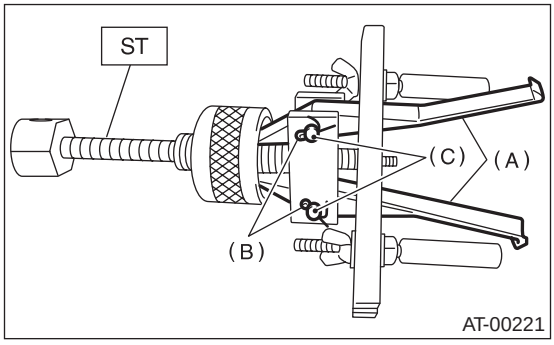
1) Remove the O-ring.



2) Remove the oil seal.

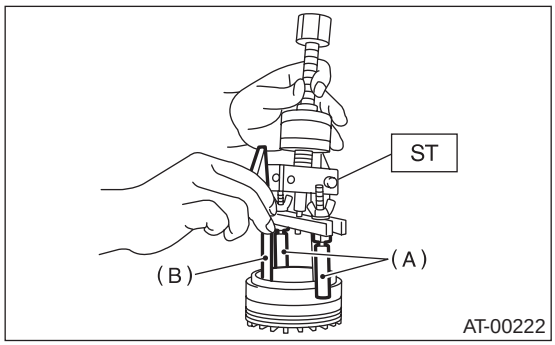


3) Remove the split pin, and then remove the claw.
ST 398527700 PULLER ASSY



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

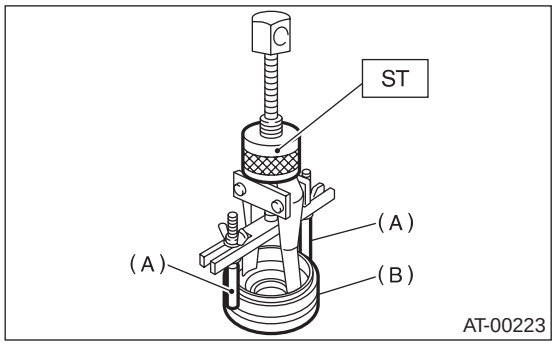
4) Attach two claws to the outer race, and set the ST to side retainer.
ST 398527700 PULLER ASSY



(A) Shaft
(B) Claw

5) Restore the removed claws to original position, and install the pin and split pin.
6) Hold the shaft of ST to avoid removing from side retainer, and then remove the bearing outer race.
ST 398527700 PULLER ASSY

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

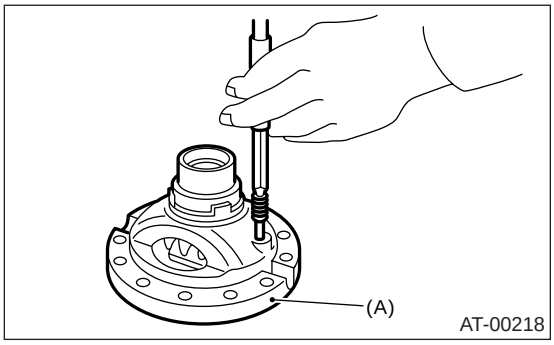


(A) Shaft
(B) Side retainer

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.

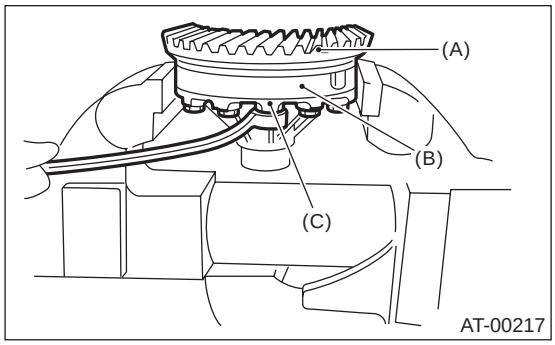


(A) Differential case (RH)

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) Install the SUBARU genuine axle shaft to differential case.

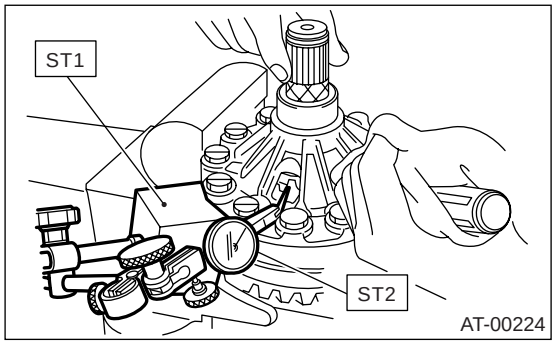
Parts No. 38415AA070 AXLE SHAFT

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

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

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

Standard value:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



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

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

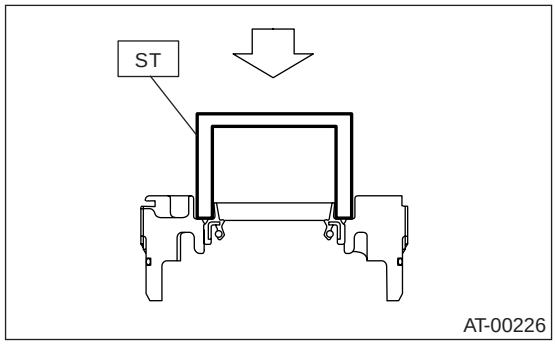
6) Using the ST, install the taper roller bearing.
ST 398487700 DRIFT

2. SIDE RETAINER

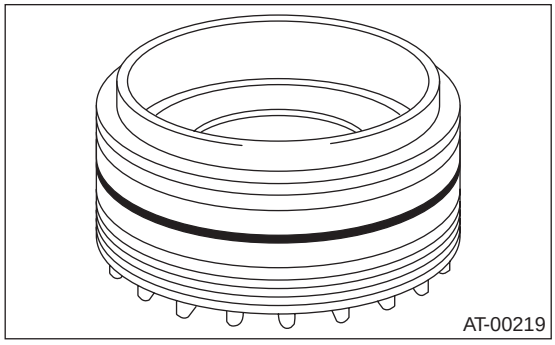
NOTE:
Install the oil seal and O-ring of side retainer after the adjustment of backlash and tooth contact.

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

NOTE:
Apply oil to the oil seal lips.



3) Install a new O-ring.



E: INSPECTION

- Check each component for scratches, damage and other faults.
- Measure the backlash, and then adjust it within specification.

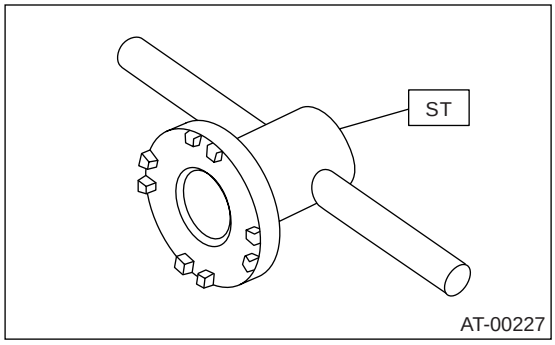
<Ref. to 5AT-97, ADJUSTMENT, Front Differential.>

F: ADJUSTMENT

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

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

ST 18630AA010 WRENCH ASSY

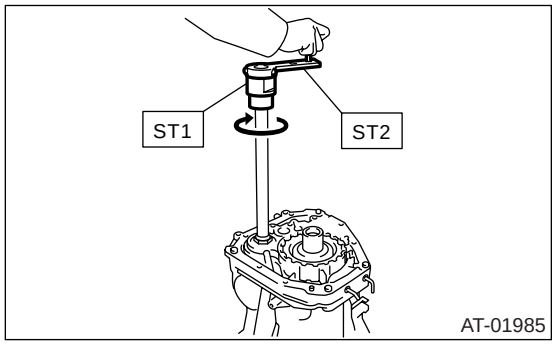


2) Remove the oil pump cover.
3) Remove the liquid gasket from the mating surface completely.
4) Install the oil pump cover to converter case, and secure them with tightening four bolts evenly.

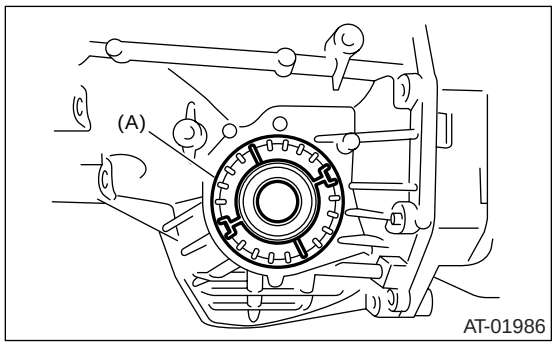
NOTE:
Use an old gasket or aluminum washer so as not to damage the mating surface of housing.

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

5) Rotate the drive pinion ten times or more using ST1 and ST2.
ST1 18667AA010 HOLDER
ST2 499787700 WRENCH

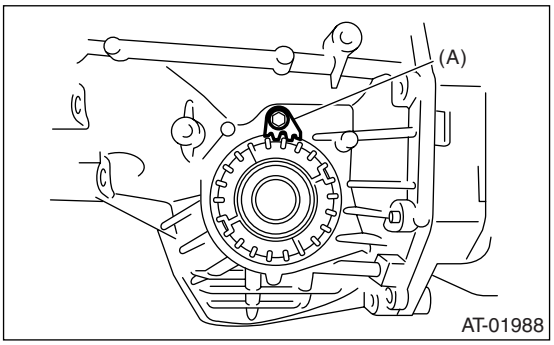


6) Tighten the retainer LH until contact is felt while rotating the shaft. Then loosen the retainer RH. Keep tightening the retainer LH, and loosening the retainer RH until the pinion shaft cannot be turned. This is the “zero” state.



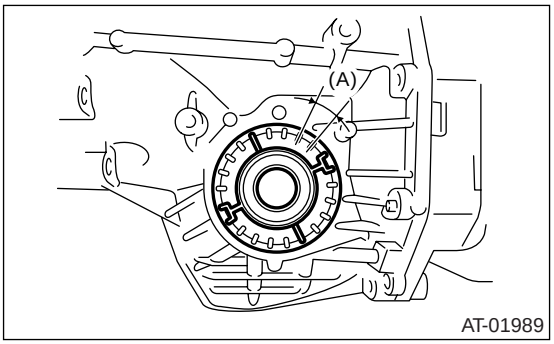
(A) Retainer

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



(A) Lock plate

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



(A) 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)

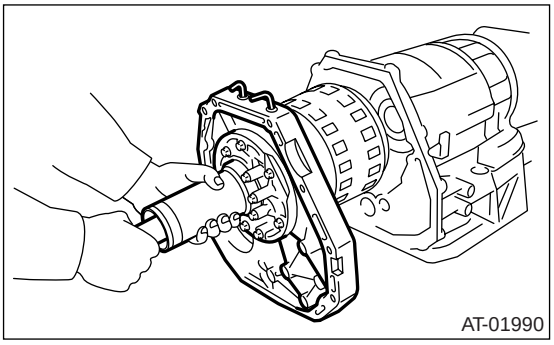
9) Adjust the tooth contact between front differential and drive shaft. <Ref. to 5AT-91, ADJUSTMENT, Drive Pinion Shaft Assembly.>

36.AT Main Case

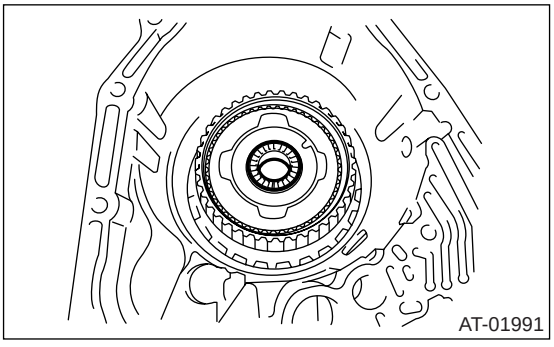
A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-71, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Disconnect the air breather hose.
5) Remove the oil charge pipe. <Ref. to 5AT-70, REMOVAL, Oil Charge Pipe.>
6) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-60, REMOVAL, ATF Filter.>
7) Remove the extension case and intermediate case. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.>
8) Remove the center differential carrier. <Ref. to 5AT-80, REMOVAL, Center Differential Carrier.>
9) Remove the reduction driven gear. <Ref. to 5AT-78, REMOVAL, Reduction Driven Gear.>
10) Separate the converter case and transmission case. <Ref. to 5AT-84, REMOVAL, Converter Case.>
11) Remove the control valve body. <Ref. to 5AT-58, REMOVAL, Control Valve Body.>
12) Remove the oil pump cover.
<Ref. to 5AT-86, REMOVAL, Oil Pump Cover.>

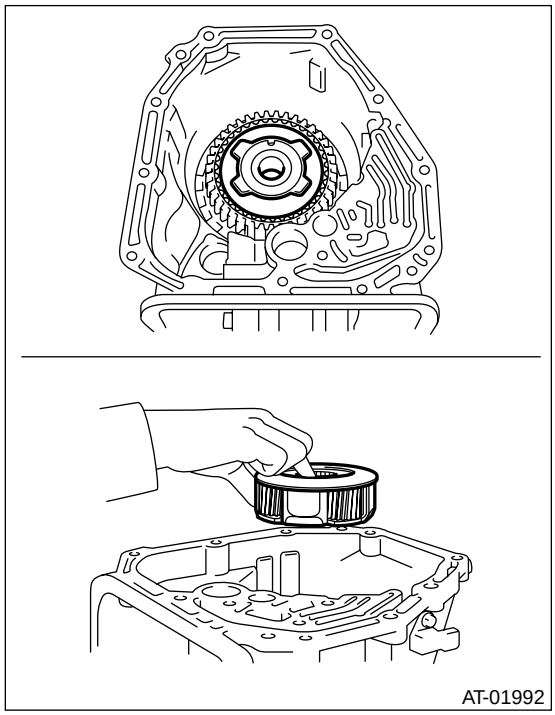
NOTE:
The input clutch pack assembly and front sun gear assembly are also removed together.


AT-01990

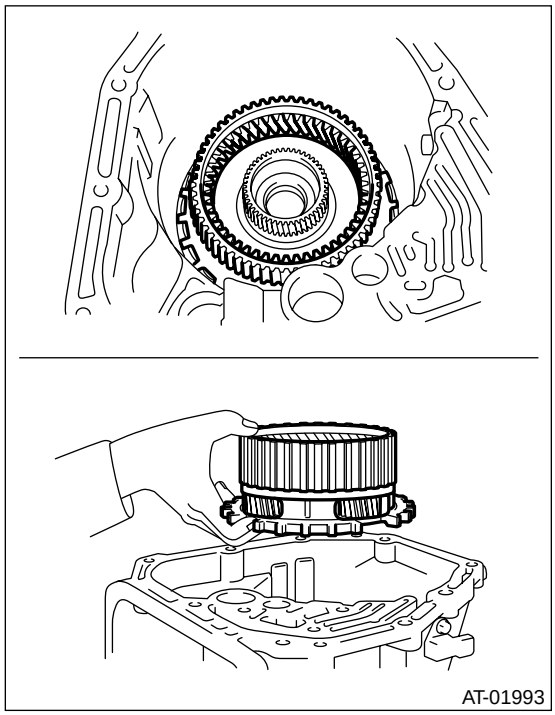
13) Remove the needle bearing of the mid carrier assembly.


AT-01991

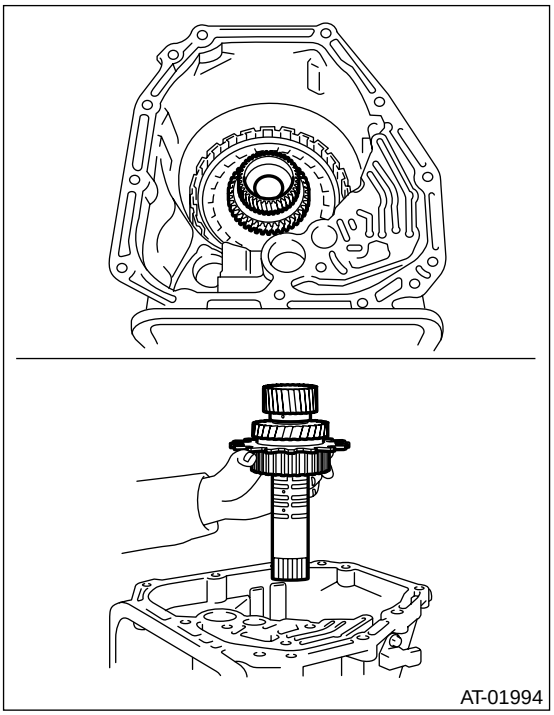
14) Remove the mid carrier assembly.


AT-01992

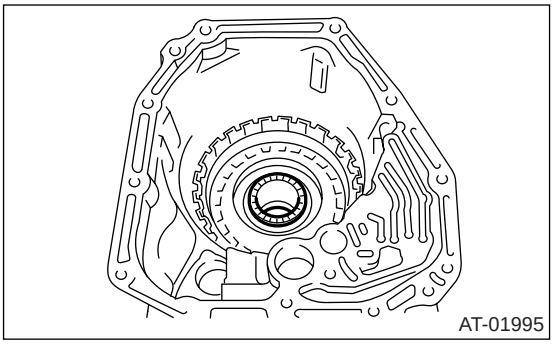
15) Remove the rear carrier assembly.


AT-01993

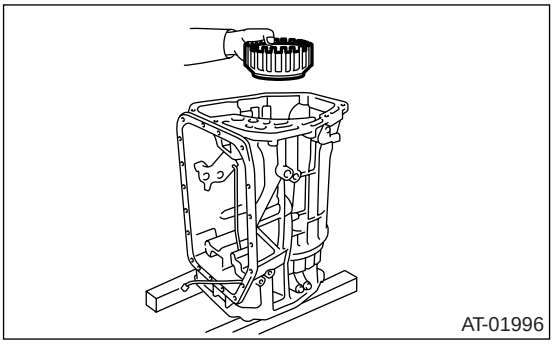
16) Remove the mid & rear sun gear assembly.



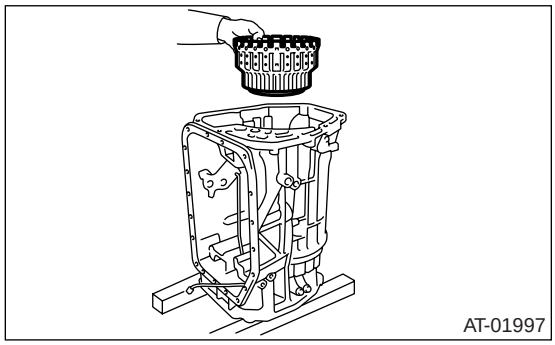
17) Remove the thrust needle bearing of high & low reverse clutch.



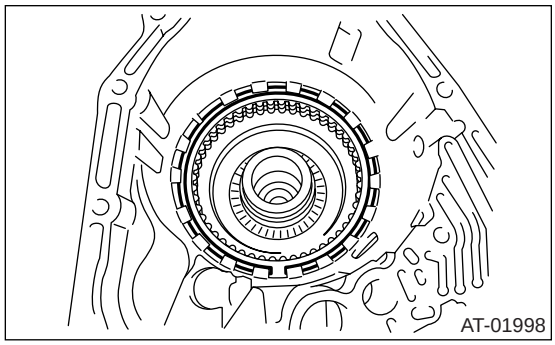
18) Remove the high & low reverse clutch assembly.



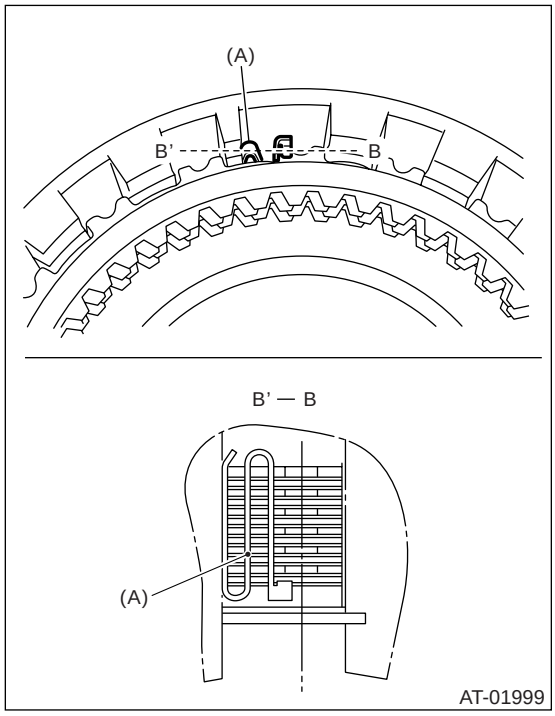
19) Remove the direct clutch assembly.



20) Remove the snap ring of reverse brake.



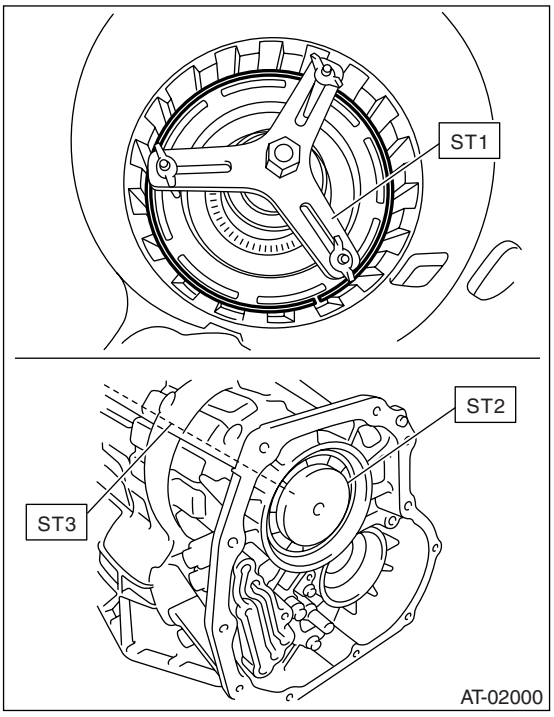
21) Remove the retaining plate.
22) Remove the leaf spring.



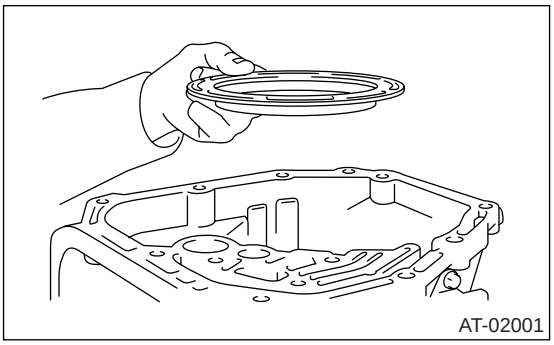
(A) Leaf spring

23) Take out the drive plate, driven plate and dish plate.
24) Remove the snap ring of the spring retainer of reverse brake.

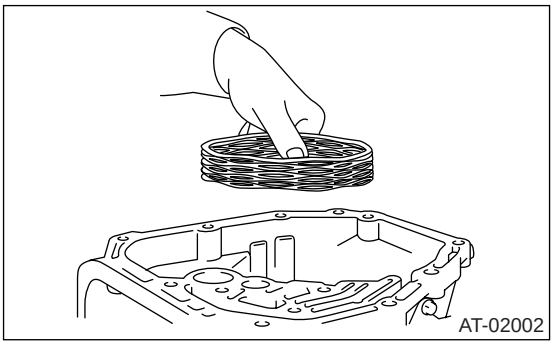
ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT
ST3 18763AA000 COMPRESSOR SHAFT



25) Remove the spring retainer.

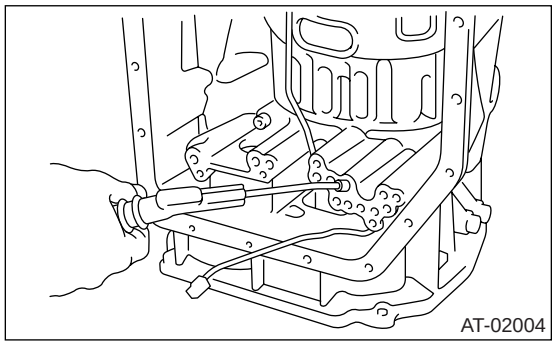


26) Remove the return spring.

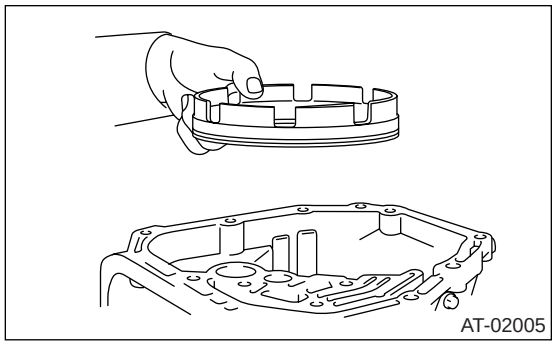


27) Remove the snap ring of reverse brake piston.
ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT
ST3 18763AA000 COMPRESSOR SHAFT

28) Apply compressed air.



29) Remove the reverse brake piston.



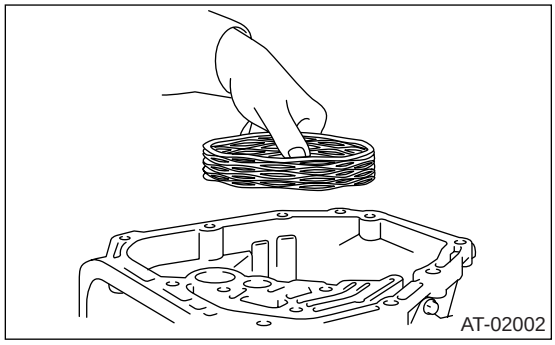
B: INSTALLATION

1) Install the reverse brake piston.

NOTE:
Apply ATF onto the piston sliding surface.

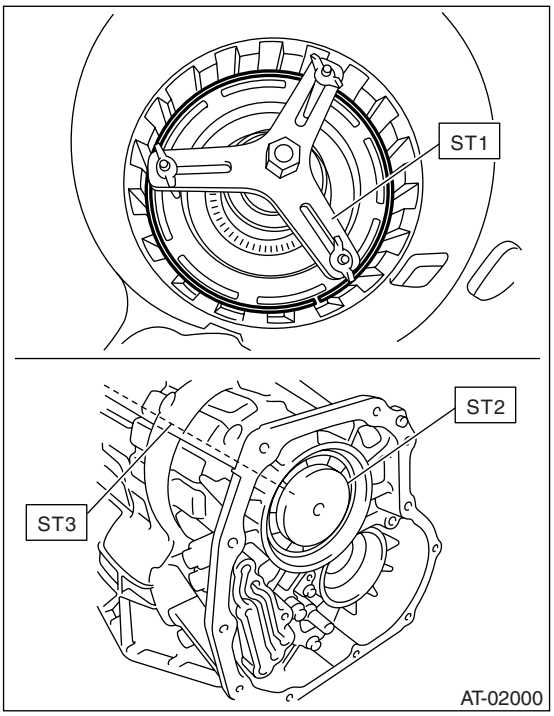
ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT
ST3 18763AA000 COMPRESSOR SHAFT

2) Install the return spring.



3) Install the spring retainer and snap ring.
ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT

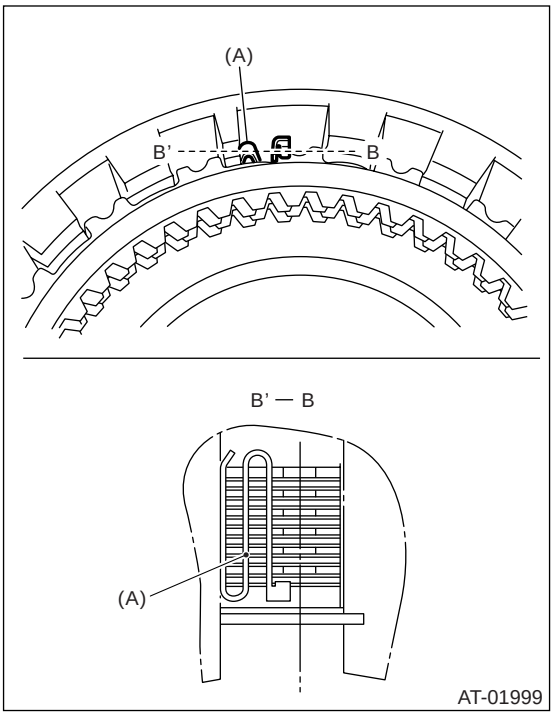
ST3 18763AA000 COMPRESSOR SHAFT



4) Install the dish plate.

NOTE:
When installing, make sure that the identification mark is facing the front side of transmission.

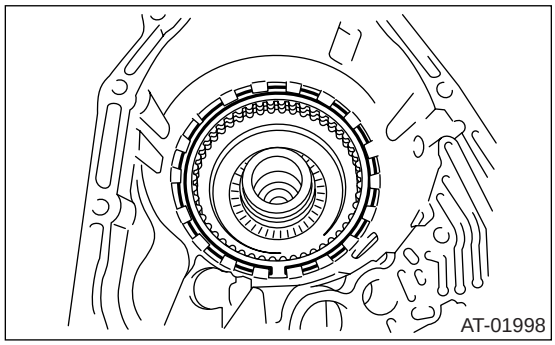
5) Install the drive plate and driven plate.
6) Install the leaf spring.



(A) Leaf spring

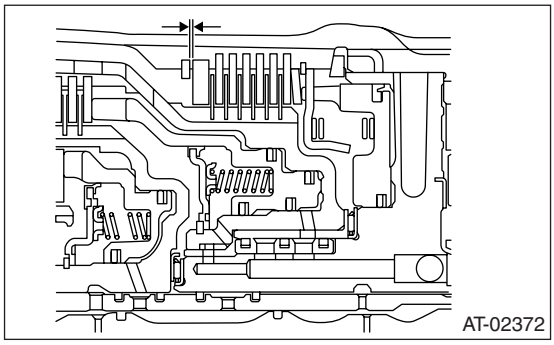
7) Install the retaining plate.

8) Install the snap ring of reverse brake.



9) Perform the clearance check of reverse brake.
(1) Measure the clearance between retainer plate and snap ring using thickness gauge.

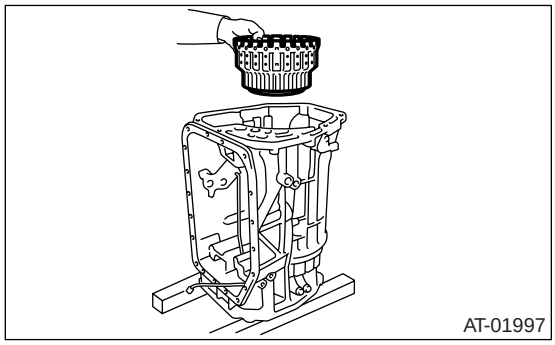
Standard value:
0.7 — 1.1 mm (0.028 — 0.043 in)



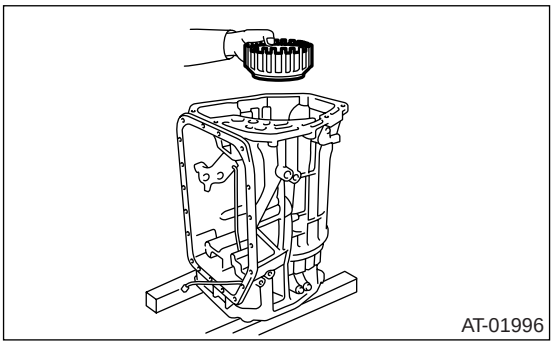
(2) If the clearance is out of specification, select a suitable retainer plate from following table and assemble it.

Retainer plate	
Part Number	Thickness mm (in)
31567AB100	4.2 (0.165)
31567AB170	4.4 (0.173)
31567AB180	4.6 (0.181)
31567AB190	4.8 (0.189)
31567AB200	5.0 (0.197)

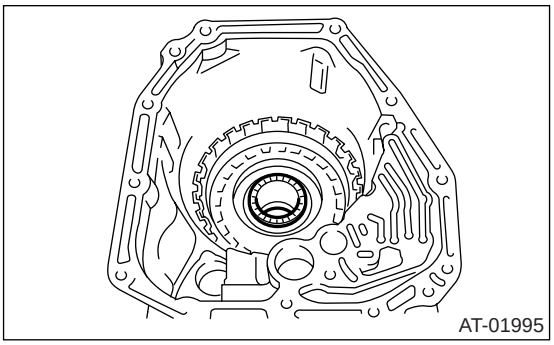
10) Install the direct clutch assembly.



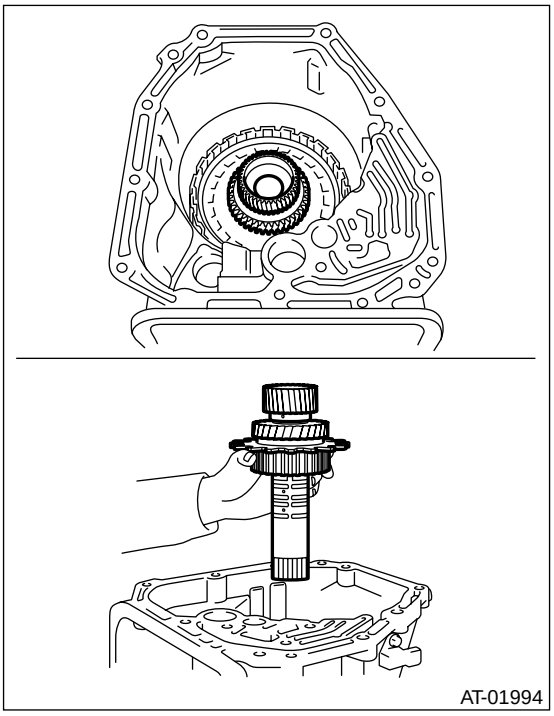
11) Install the high & low reverse clutch assembly.



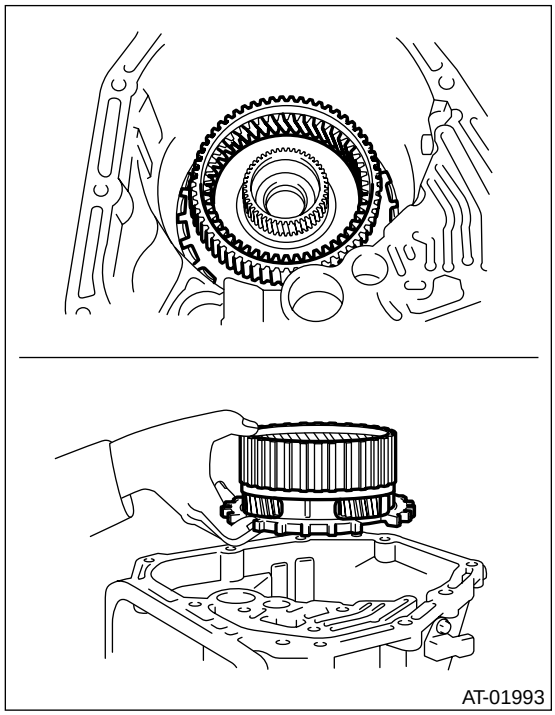
12) Install the thrust needle bearing of high & low reverse clutch.



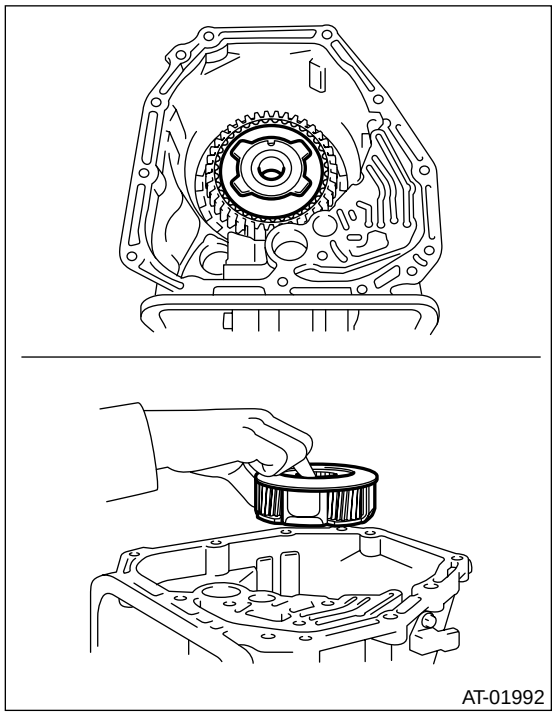
13) Install the middle & rear sun gear assembly.



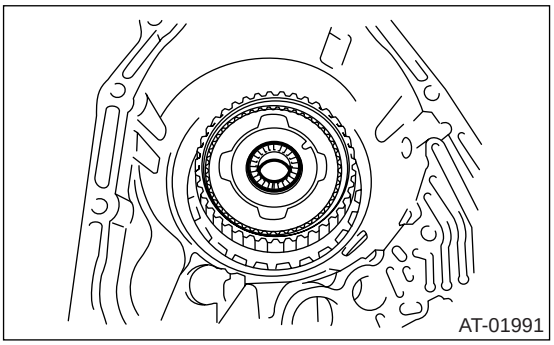
14) Install the rear carrier assembly.



15) Install the middle carrier assembly.

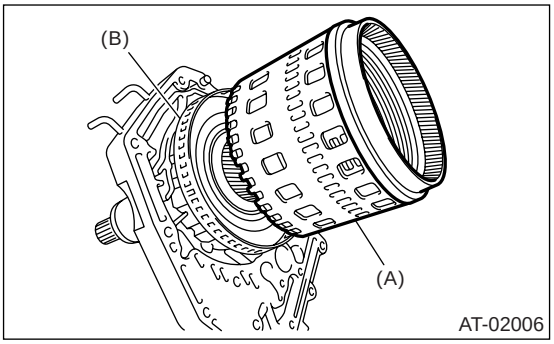


16) Install the thrust needle bearing of middle carrier assembly.



17) Measure the total end play, and select the bearing. <Ref. to 5AT-106, ADJUSTMENT, AT Main Case.>

18) Install the impact clutch pack assembly to oil pump cover.



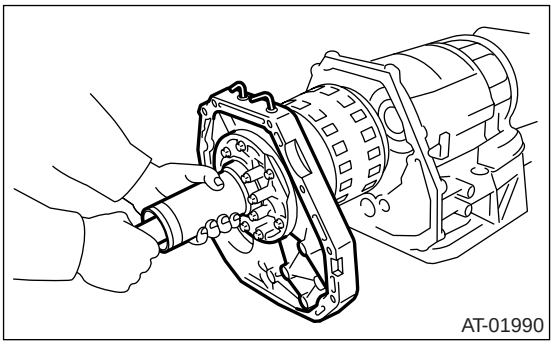
(A) Impact clutch pack ASSY
(B) Front sun gear ASSY

19) Turn the transmission sideways.

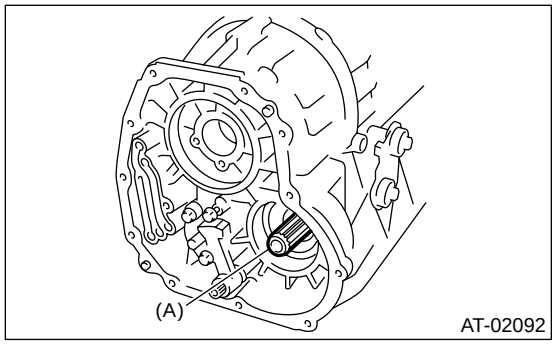
20) Install the oil pump cover.

(1) Apply ATF to the O-ring of input clutch shaft.

(2) Install the oil pump cover to AT main case while supporting the input clutch shaft and oil pump housing by hand.



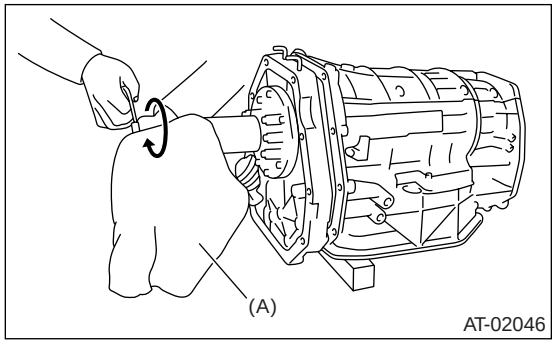
(3) Make sure the rear end of drive pinion shaft is engaged to the spline of reduction driven gear.



(A) Drive pinion shaft

(4) Using a cloth, protect the input clutch shaft and rotate to engage the spline of input clutch and rear carrier using pliers.

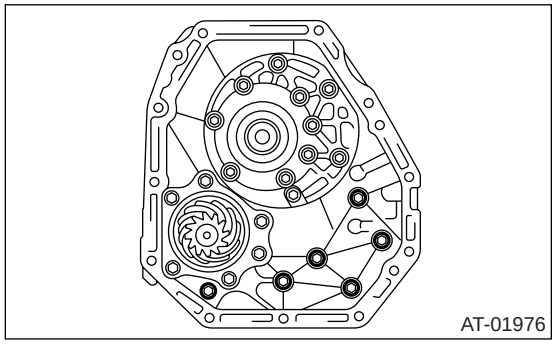
NOTE:
Work with pressing oil pump cover.



(A) Cloth

(5) Combine the oil pump cover with transmission main case.

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



21) Install the center differential carrier. <Ref. to 5AT-80, INSTALLATION, Center Differential Carrier.>

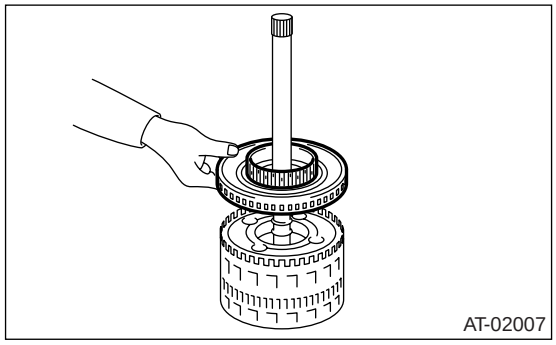
22) Install the reduction driven gear. <Ref. to 5AT-78, INSTALLATION, Reduction Driven Gear.>

23) Install the extension case and intermediate case. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>
24) Install the control valve body. <Ref. to 5AT-58, INSTALLATION, Control Valve Body.>
25) Install the converter case assembly into transmission case assembly. <Ref. to 5AT-84, INSTALLATION, Converter Case.>
26) Install the air breather hose. <Ref. to 5AT-69, INSTALLATION, Air Breather Hose.>
27) Install the ATF filter pipe. <Ref. to 5AT-60, INSTALLATION, ATF Filter.>
28) Install the oil charge pipe with O-ring. <Ref. to 5AT-70, INSTALLATION, Oil Charge Pipe.>
29) Install the torque converter assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
30) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

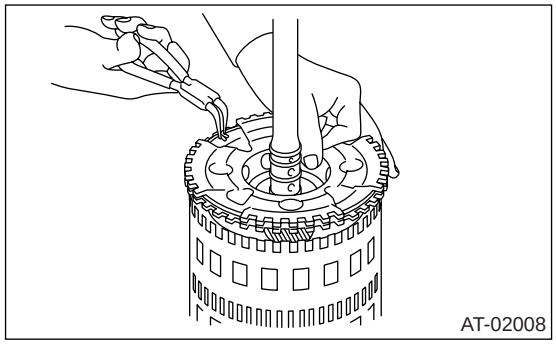
C: DISASSEMBLY

1. INPUT CLUTCH PACK ASSY

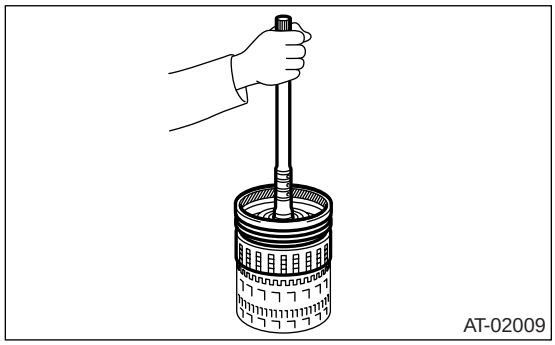
1) Remove the front sun gear.


AT-02007

2) Remove the snap ring, and then remove the front carrier.


AT-02008

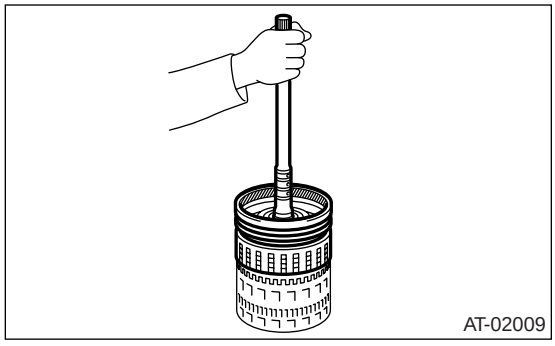
3) Remove the input clutch assembly from rear internal gear.


AT-02009

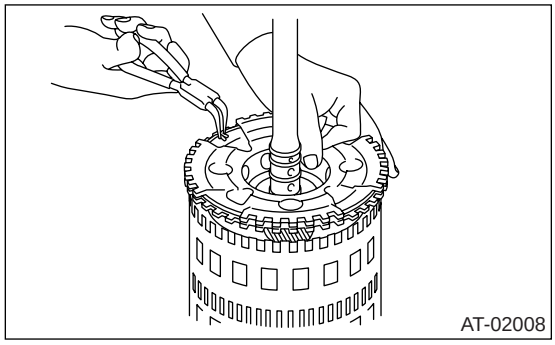
D: ASSEMBLY

1. INPUT CLUTCH PACK ASSY

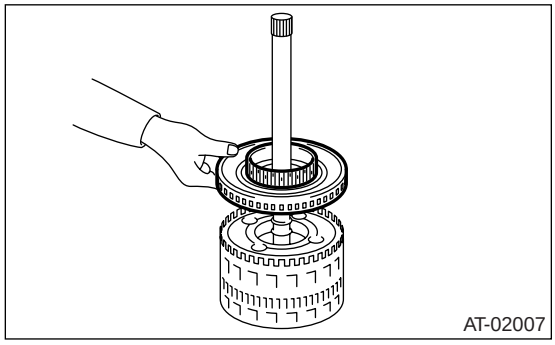
1) Assemble the input clutch assembly to rear internal gear.


AT-02009

2) Install the front carrier, and then install the snap ring.


AT-02008

3) Install the front sun gear.


AT-02007

E: INSPECTION

1. FRONT, MIDDLE & REAR PLANETARY CARRIER ASSY

Inspect the followings:
• Visually inspect the tooth surface of planetary gear, and replace with new one if damaged, broken or excessively worn.
• Inspect the planetary carrier body for damage or brakeage.

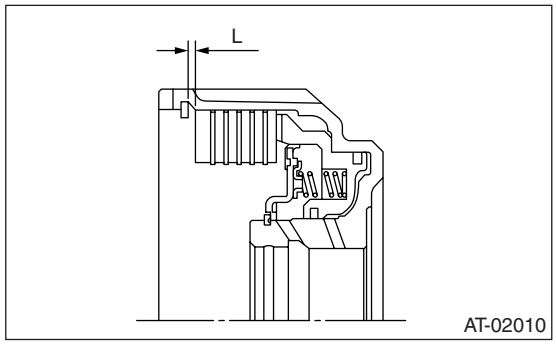
2. INPUT CLUTCH

Check for damage of drive plate, driven plate and snap ring, and replace them as input clutch assembly if damaged.

3. HIGH & LOW REVERSE CLUTCH ASSEMBLY

Check the clearance of high & low reverse clutch.
Measure the clearance “L” between snap ring and retaining plate using thickness gauge. If the measured value is out of specification, replace them as high & low reverse clutch assembly.

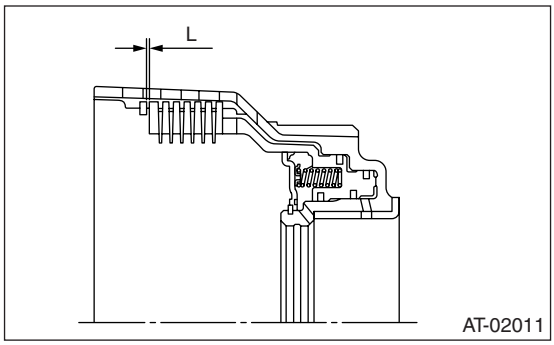
Standard value:
1.8 — 2.2 mm (0.070 — 0.087 in)



4. DIRECT CLUTCH ASSEMBLY

Check the clearance of direct clutch.
Measure the clearance “L” between snap ring and retaining plate using thickness gauge. If the measured value is out of specification, replace them as direct clutch assembly.

Standard value:
0.6 — 0.8 mm (0.024 — 0.031 in)

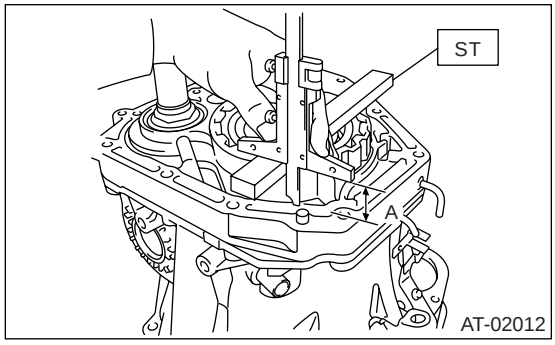


5. REVERSE BRAKE

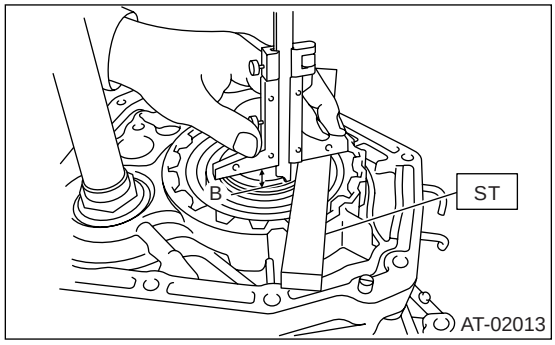
Check the following items:
• Drive plate facing for wear and damage
• Snap ring for wear, return spring for breakage, and spring retainer for deformation
• Lip seal and D-ring for damage
• Piston operation

F: ADJUSTMENT

1) Using the ST, measure the height “A” from AT main case mating surface to convex surface of oil pump cover.
ST 499575400 GAUGE

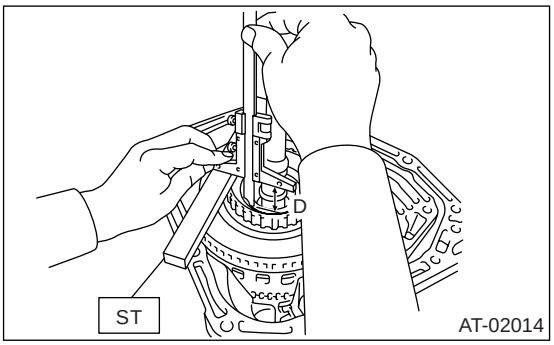


2) Using the ST, measure the depth “B” from the convex surface of oil pump cover to thrust bearing transferring surface.
ST 499575400 GAUGE



3) Calculate the measured value on step 1) and 2), and then set the calculated value as “C”
Calculation formula: C = A − B

4) Using the ST, measure the depth “D” from AT main case mating surface to thrust bearing transferring surface of front sun gear.
ST 499575400 GAUGE



5) Set the value as “E” which subtract the thickness of ST GAUGE from measured value on step 4).
Calculation formula: E (mm) = D – 15
[E (in) = D – 0.59]
6) Calculation formula:
Select a thrust bearing from the table to adjust clearance within 0.25 — 0.55 mm (0.0098 — 0.022 in).
When clearances are 0.25 mm (0.0098 in):
T (mm) = E – C + 0.03
[T (in) = E – C + 0.0012]
When clearances are 0.55 mm (0.022 in):
T (mm) = E – C – 0.27
[T (in) = E – C – 0.012]

T: Thrust bearing clearance
C: Distance from oil pump cover mating surface to rear end of oil pump cover
E: Depth from mating surface of AT main case to bearing surface of front sun gear

Example:
When the A is 39.50 mm (1.56 in), B is going to be 16.20 mm (0.64 in), so the C would be 23.30 mm (0.92 in) by calculation.
When the D is 41.90 mm (1.65 in), subtract the thickness of ST GAUGE from D, and then the value E would be 26.90 mm (1.06 in).
Calculation when clearance is 0.25 mm (0.0098 in)
T (mm) = 26.90 – 23.30 + 0.03 = 3.63
[T (in) = 1.059 – 0.917 + 0.0012 = 0.143]
Calculation formula when clearances are 0.55 mm (0.022 in)
T (mm) = 26.90 – 23.30 – 0.27 = 3.33
[T (in) = 1.059 – 0.917 – 0.012 = 0.131]

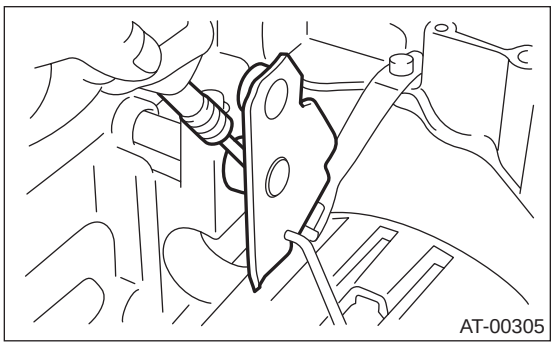
According to the calculation, the value “T” would be 3.33 — 3.63 mm (0.131 — 0.143 in), therefore select the thrust bearing with the thickness of 3.4 mm (0.134 in) or 3.6 mm (0.142 in) thrust bearing from the table.

NOTE:
Calculation formula for “T” is applied when measuring using ST (499575400 GAUGE). In the calculation without using ST, insert the thickness of collar to calculate value “E” on step 5).

37.Transmission Control Device

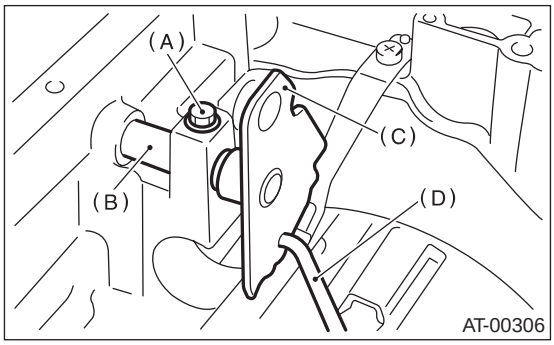
A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-71, REMOVAL, Torque Converter Assembly.>
3) Lift-up the lever on rear side of transmission harness connector, and then disconnect it from stay.
4) Disconnect the air breather hose. <Ref. to 5AT-69, REMOVAL, Air Breather Hose.>
5) Wrap vinyl tape around the nipple attached to the air breather hose.
6) Remove the pitching stopper bracket.
7) Remove the control valve body assembly. <Ref. to 5AT-58, REMOVAL, Control Valve Body.>
8) Pull out the straight pin of manual plate.



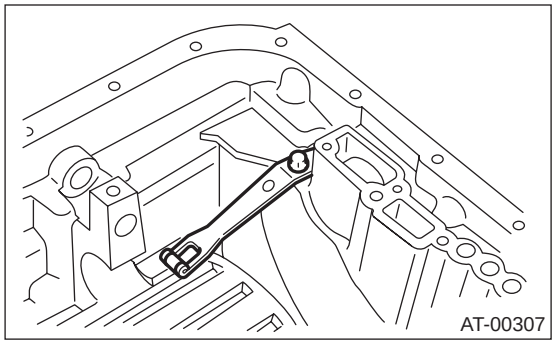
9) Remove the bolts securing select lever, and then remove the select lever, manual plate and parking rod.

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



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

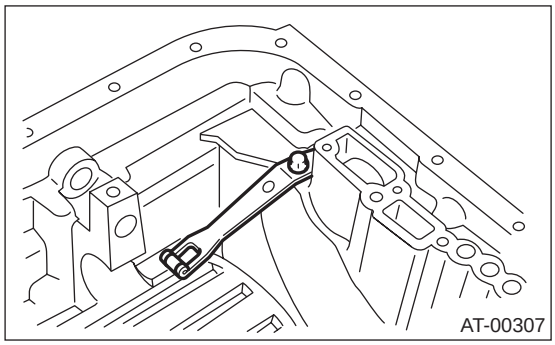
10) Remove the detention spring.



B: INSTALLATION

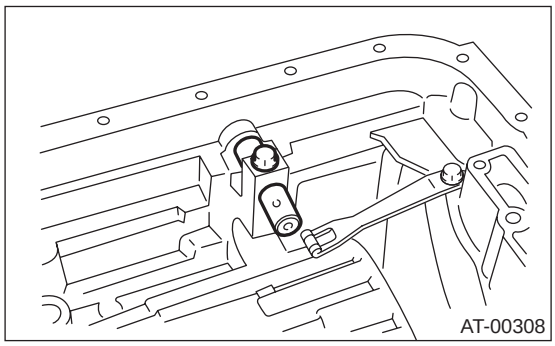
1) Install the detention spring to transmission case.

Tightening torque:
6 N·m (0.6 kgf-m, 4.3 ft-lb)

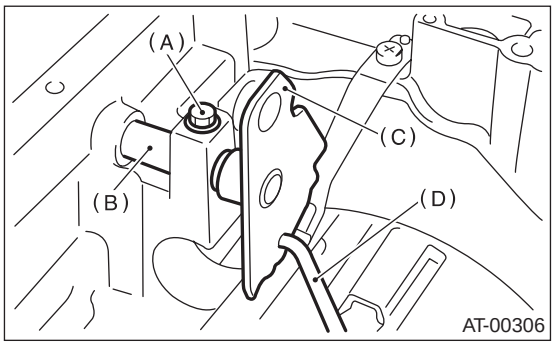


2) Insert the select lever, and then tighten the bolt.

Tightening torque:
6 N·m (0.6 kgf-m, 4.3 ft-lb)

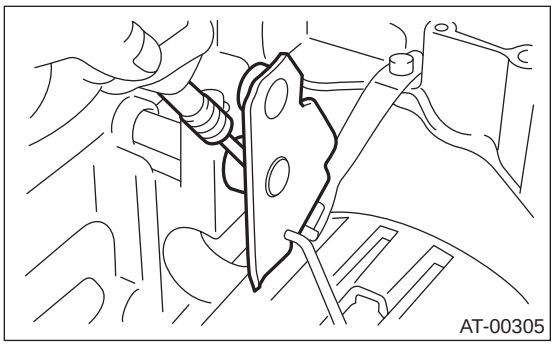


3) Insert the manual plate and parking rod.



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

4) Insert the spring pin to manual plate.



5) Install the oil pan and control valve assembly. <Ref. to 5AT-58, INSTALLATION, Control Valve Body.>
6) Install the pitching stopper bracket.

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

7) Insert the transmission connector to the stay.
8) Install the air breather hose.<Ref. to 5AT-69, INSTALLATION, Air Breather Hose.>
9) Install the torque converter assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
10) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

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