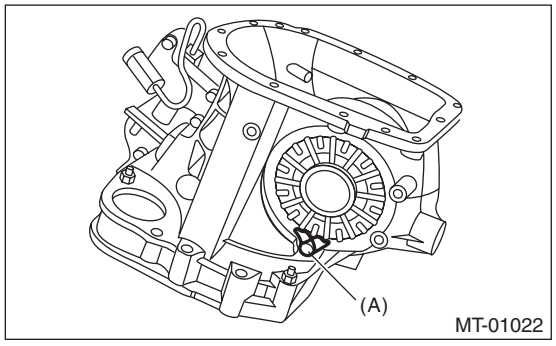
23.Front Differential Assembly

A: REMOVAL

1) Remove the manual transmission assembly from the vehicle. <Ref. to 6MT-33, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-38, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, REMOVAL, Oil Pipe.> <Ref. to 6MT-43, REMOVAL, Neutral Position Switch.> <Ref. to 6MT-41, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-45, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-57, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-59, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-60, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-64, REMOVAL, Transmission Case.>
9) Remove the individual gear assemblies. <Ref. to 6MT-69, REMOVAL, Main Shaft Assembly.>
10) Remove the drive pinion shaft assembly. <Ref. to 6MT-95, REMOVAL, Drive Pinion Shaft Assembly.>
11) Remove the lock plates on both sides.

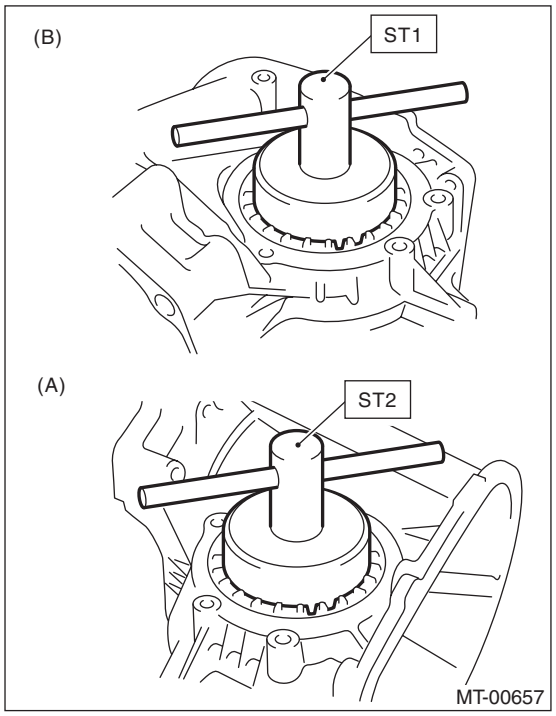


(A) Lock plate

12) Remove the differential side retainers on both sides using the ST.

ST1	18630AA010	WRENCH COMPL RETAINER (RH SIDE)
ST2	18630AA000	WRENCH ASSY (LH SIDE)

NOTE:
- Be careful not to damage the section where the clutch case retainer will be attached.
- WRENCH ASSY (499787000) can also be used.



(A) LH side
(B) RH side

13) Remove the front differential.

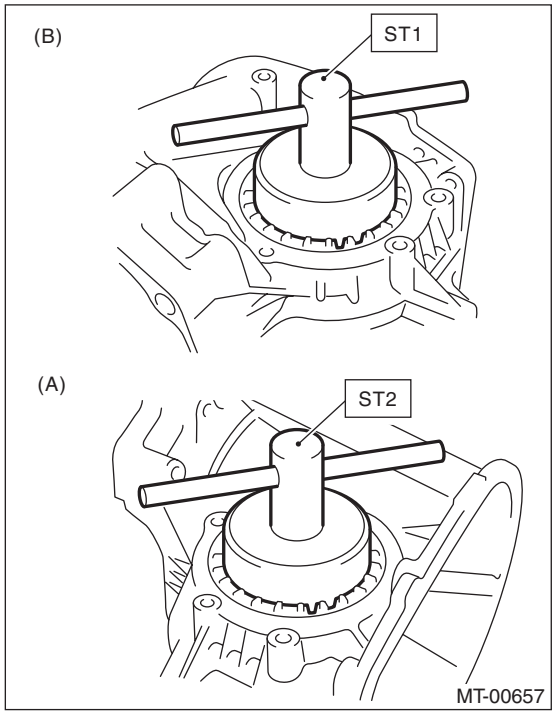
B: INSTALLATION

1) Install the differential assembly to the clutch housing.
2) Apply gear oil to the screw threads of the side retainer.
3) Remove the O-rings on both sides of the side retainer.

4) Install the differential side retainers to both sides, using the ST.

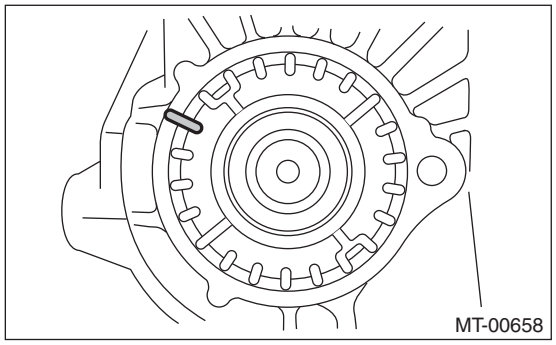
ST1 18630AA010 WRENCH COMPL RETAINER (RH SIDE)
ST2 18630AA000 WRENCH ASSY (LH SIDE)

NOTE:
- Be careful not to damage the oil seal.
- WRENCH ASSY (499787000) can also be used.



(A) LH side
(B) RH side

5) Inspect and adjust the hypoid gear backlash. <Ref. to 6MT-107, HYPOID GEAR BACKLASH, INSPECTION, Front Differential Assembly.>
6) Inspect and adjust the tooth contact. <Ref. to 6MT-98, ADJUSTMENT, Drive Pinion Shaft Assembly.>
7) Mark the mating positions of the left and right side retainers and the clutch housing.



8) Remove the differential side retainers from both sides.

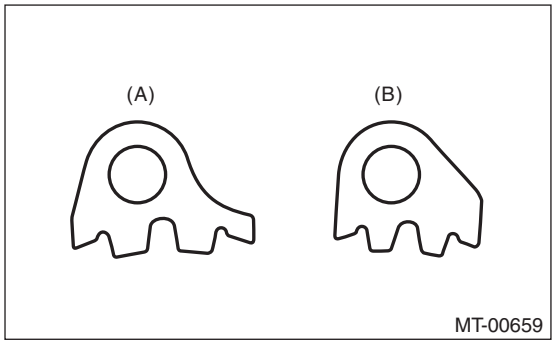
NOTE:
When removing the side retainer, record how many times it was turned to remove.
9) Install the O-ring to the side retainers on both sides.

NOTE:
Always use a new O-ring.
10) Attach the differential side retainers to both sides.

NOTE:
When attaching, turn the side retainer the same number of turns it took to remove, and align the marks.
11) Install the lock plate.

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

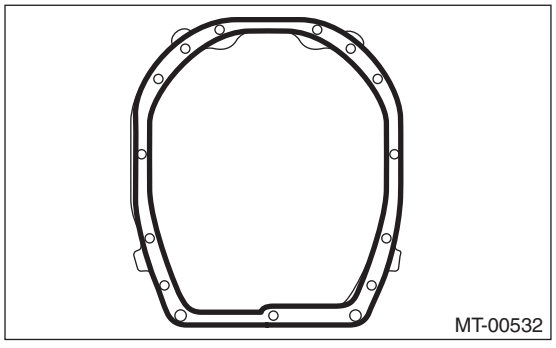
NOTE:
Be careful not to confuse the left and right side lock plates.



(A) LH
(B) RH

12) Remove any remaining liquid gasket from the clutch housing and adapter plate.
13) Apply liquid gasket to the clutch housing.

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



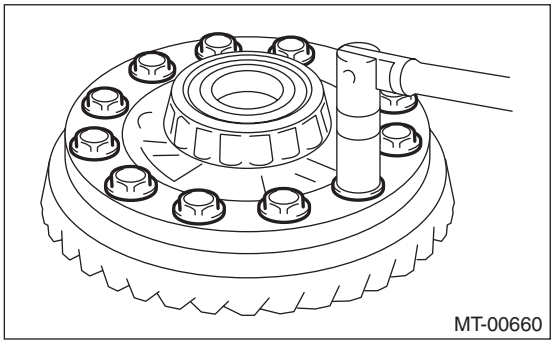
14) Install the drive pinion shaft assembly. <Ref. to 6MT-95, INSTALLATION, Drive Pinion Shaft Assembly.>

15) Install the individual gear assemblies all at once. <Ref. to 6MT-70, INSTALLATION, Main Shaft Assembly.>
16) Install the transmission case. <Ref. to 6MT-65, INSTALLATION, Transmission Case.>
17) Install the oil pump. <Ref. to 6MT-62, INSTALLATION, Oil Pump.>
18) Install the center differential. <Ref. to 6MT-59, INSTALLATION, Center Differential.>
19) Install the transfer driven gear. <Ref. to 6MT-57, INSTALLATION, Transfer Driven Gear.>
20) Install the extension case. <Ref. to 6MT-45, INSTALLATION, Extension Case.>
21) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-40, INSTALLATION, Oil Pipe.> <Ref. to 6MT-43, INSTALLATION, Neutral Position Switch.> <Ref. to 6MT-41, INSTALLATION, Back-up Light Switch.>
22) Install the manual transmission assembly to the vehicle. <Ref. to 6MT-35, INSTALLATION, Manual Transmission Assembly.>

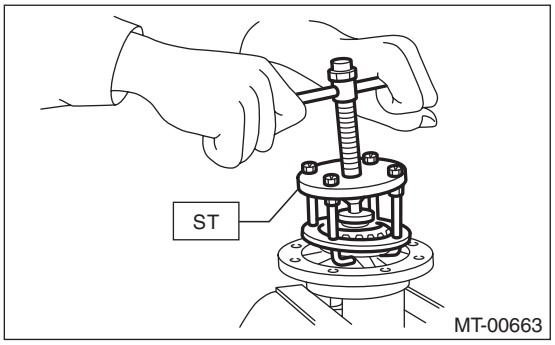
C: DISASSEMBLY

1. DIFFERENTIAL CASE

1) Fix the differential assembly on a vice, and remove the hypoid driven gear.

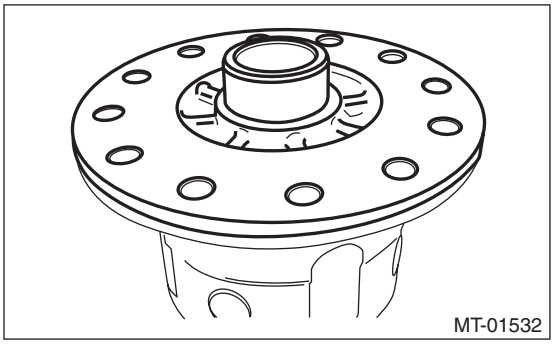

MT-00660

2) Remove the side bearing of the hypoid driven gear using the ST.
ST 399527700 PULLER SET

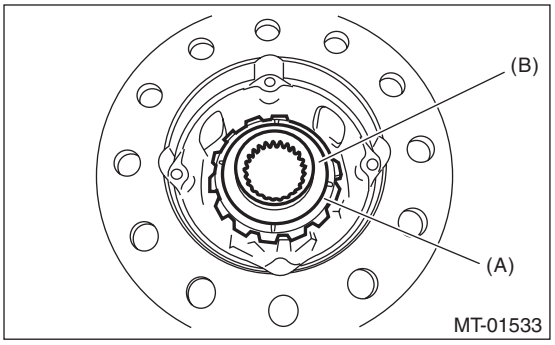


MT-00663

3) Remove the differential case LH.


MT-01532

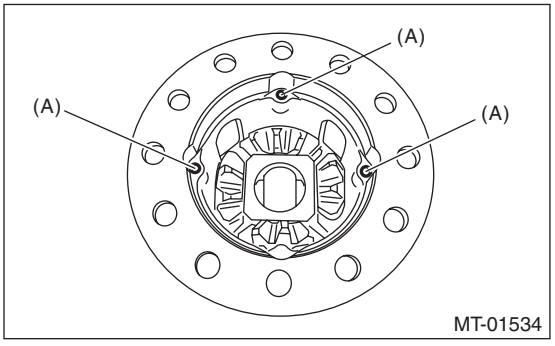
4) Remove the differential bevel gear and washer.



MT-01533

(A) Differential bevel gear
(B) Washer

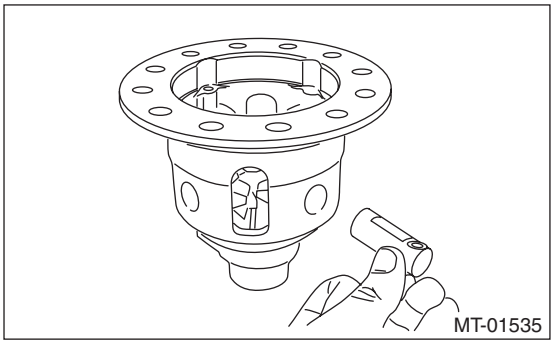
5) Using a manet tool, etc., remove 3 straight pins.



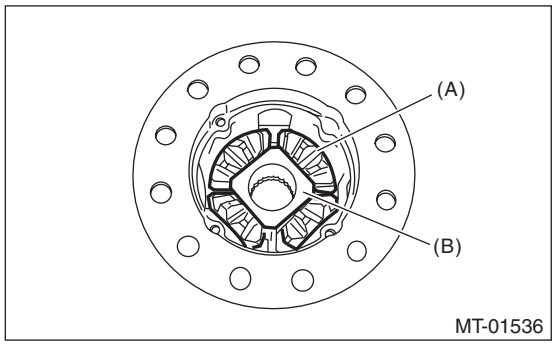
MT-01534

(A) Straight pin

6) Remove 3 pinion shafts.


MT-01535

7) Remove differential bevel pinion and pinion shaft joint.

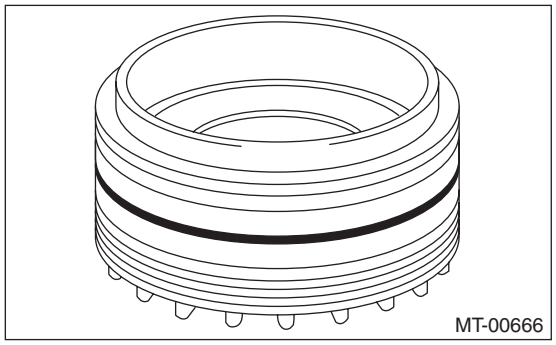


(A) Differential bevel pinion
(B) Pinion shaft joint

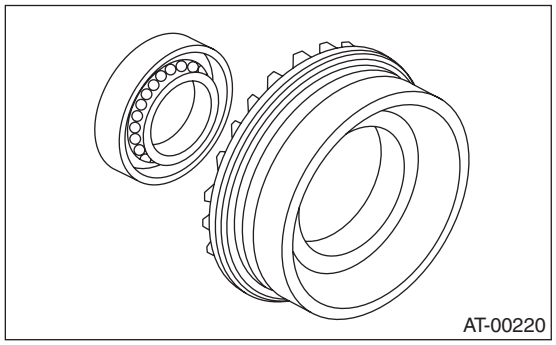
8) Remove the differential bevel gear and washer.

2. SIDE RETAINER

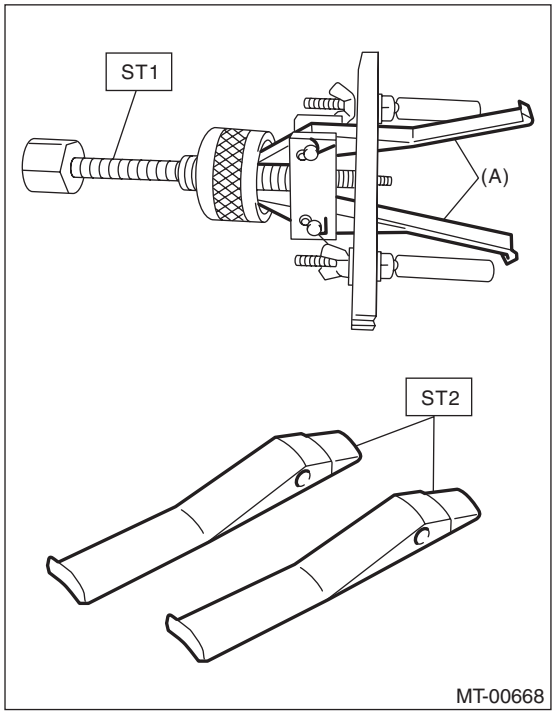
1) Remove the O-ring.



2) Remove the oil seal.

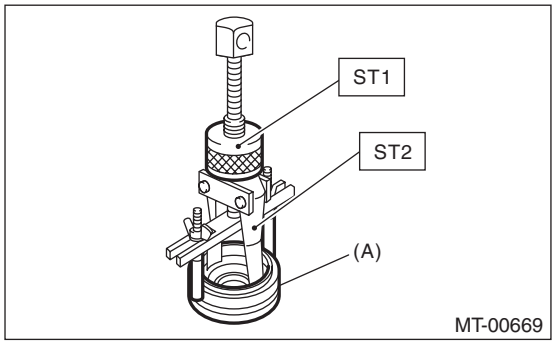


3) Remove the claw of ST1, and attach the claw of ST2.
ST1 398527700 PULLER ASSY
ST2 18760AA000 CLAW



(A) CLAW

4) Remove the bearing outer race from the side retainer, using the ST.
ST1 398527700 PULLER ASSY
ST2 18760AA000 CLAW



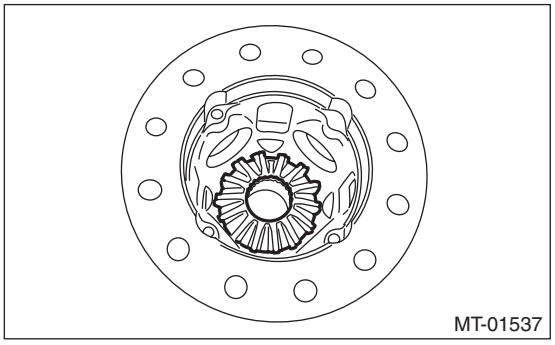
(A) Side retainer

D: ASSEMBLY

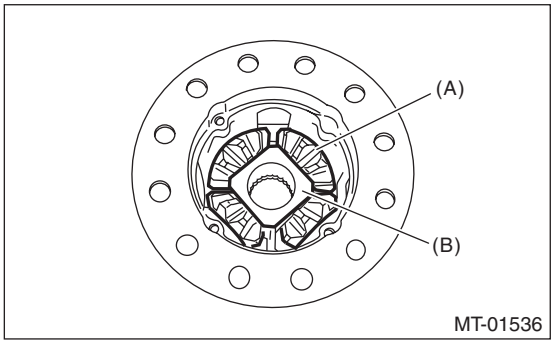
1. DIFFERENTIAL CASE

1) Install differential bevel gear and washer to the differential case RH.

NOTE:
Face the chamfered side of washer toward gear.

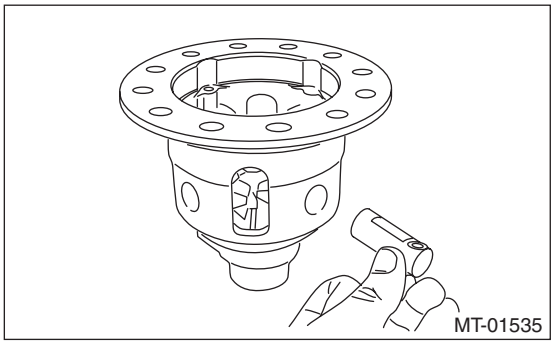


2) Install differential bevel pinion and pinion shaft joint.



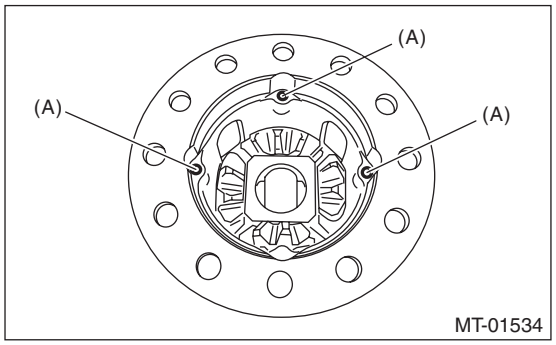
(A) Differential bevel pinion
(B) Pinion shaft joint

3) Install 3 pinion shafts.



4) Install 3 straight pins.

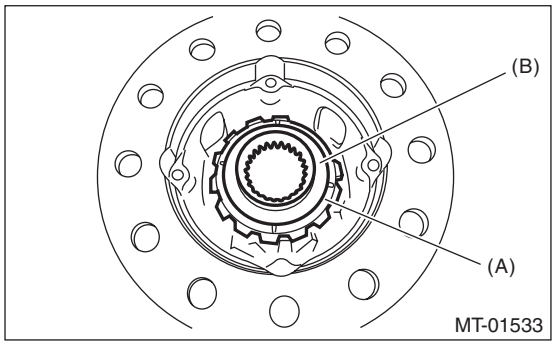
NOTE:
Make sure the straight pins are inserted completely.



(A) Straight pin

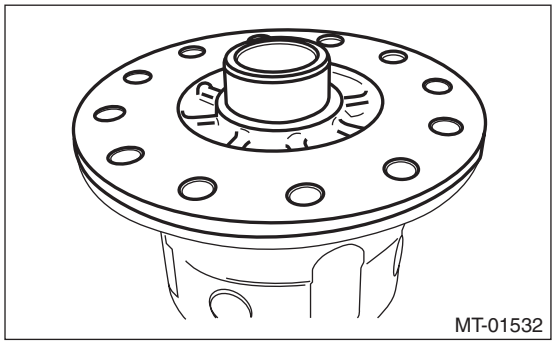
5) Attach the differential bevel gear and washer.

NOTE:
Face the chamfered side of washer toward gear.



(A) Differential bevel gear
(B) Washer

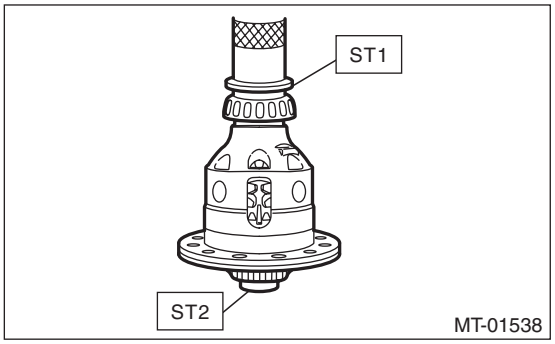
6) Install the differential case LH.



7) Use the ST to attach bearing inner laces of differential cases RH and LH.
ST1 398437700 INSTALLER
ST2 398497701 SEATS

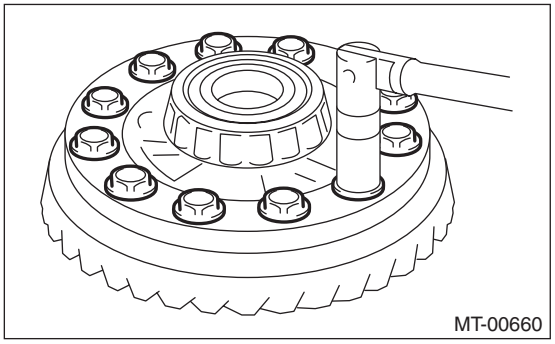
CAUTION:
Do not apply pressure in excess of 20 kN (2.0 ton, 2.2 US ton, 2.0 Imp ton).

NOTE:
Always replace inner races and outer races as a set.



8) Attach the hypoid driven gear to the differential case.

Tightening torque:
69 N·m (7.0 kgf-m, 50.9 ft-lb)

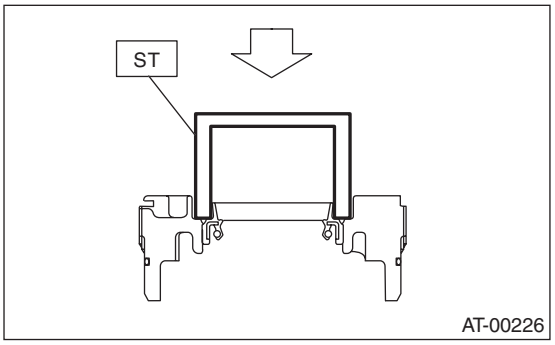


9) Inspect the backlash of the bevel pinion gear. <Ref. to 6MT-107, BEVEL PINION GEAR BACKLASH, INSPECTION, Front Differential Assembly.>

2. SIDE RETAINER

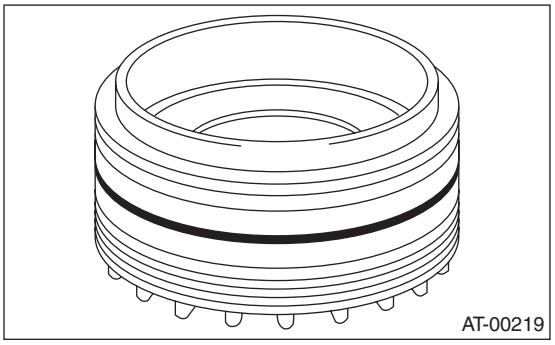
NOTE:
Install the oil seal and O-ring of side retainer after the adjustment of backlash and tooth contact.
1) Install the bearing outer race to side retainer.
2) Using the ST, install the oil seal.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:
- Use a new oil seal.
- Apply oil to the oil seal lips.



3) Install the O-ring.

NOTE:
Use new O-rings.



E: INSPECTION

Repair or replace the differential in the following cases:
- If gears are damaged, seized, or are excessively worn.
- If differential case sliding surfaces are damaged, seized, or are excessively worn.
- If there is damage, rust or wear in the bearings or bearing locations.
- If the bearing does not rotate smoothly or an abnormal noise is emitted when turning.

1. BEVEL PINION GEAR BACKLASH

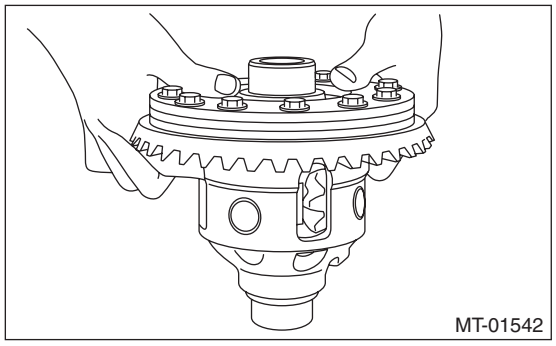
Measure the backlash of the differential bevel pinion. If backlash is not within standard value, install a suitable washer to adjust. <Ref. to 6MT-108, ADJUSTMENT, Front Differential Assembly.>

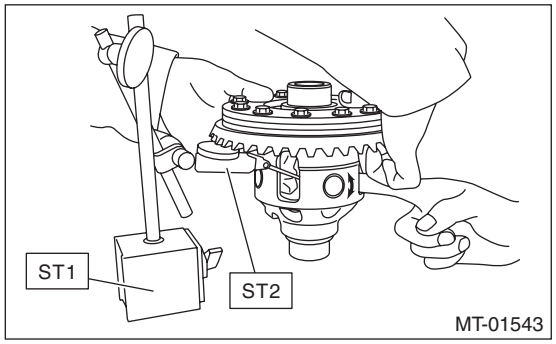
CAUTION:
When measuring the backlash, hold the differential assembly in upright position.

NOTE:
• It is recommended that backlash be measured by 2 people. One person should push the differential bevel gear upward (differential case LH side), and the other person measure the backlash.
• Before measuring backlash, turn so that the gears will settle in their individual locations.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Standard backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)


MT-01542



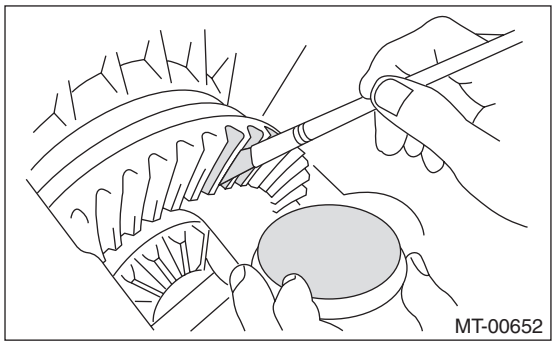
MT-01543

2. HYPOID GEAR BACKLASH

Inspect the hypoid gear backlash. Adjust if out of standard. <Ref. to 6MT-108, HYPOID GEAR BACKLASH, ADJUSTMENT, Front Differential Assembly.>

3. TOOTH CONTACT OF HYPOID GEAR

1) Check that the hypoid gear backlash is within the standard value. Adjust if out of standard. <Ref. to 6MT-108, HYPOID GEAR BACKLASH, ADJUSTMENT, Front Differential Assembly.>
2) Apply a thin uniform coat of red lead on the surfaces of 3 or 4 hypoid driven gear teeth.


MT-00652

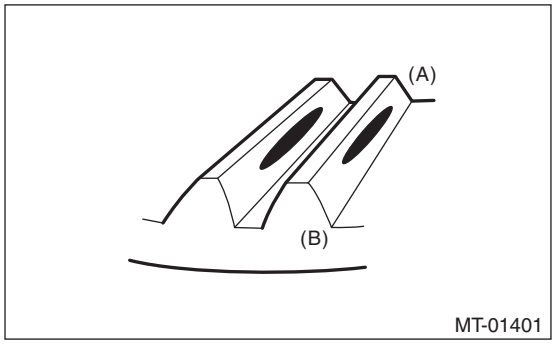
3) Attach the drive pinion shaft assembly, and affix with 4 bolts.

NOTE:
Use old gaskets and washers to prevent the mating surfaces of the housing from becoming damaged.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

4) Turn the drive pinion shaft to the left and right for several turns.
5) Remove the drive pinion shaft assembly, and inspect the mating condition of the teeth. If tooth contact is not correct, perform adjustment. <Ref. to 6MT-98, ADJUSTMENT, Drive Pinion Shaft Assembly.>
• Correct tooth contact

NOTE:
In a no load condition, the tooth contact from the center to the toe side is 50-60% (While driving, the tooth contact will shift towards the heel side.).



MT-01401

(A) Toe side
(B) Heel side

F: ADJUSTMENT

1. BEVEL PINION GEAR BACKLASH

1) Measure the backlash of the bevel pinion gear. <Ref. to 6MT-107, BEVEL PINION GEAR BACKLASH, INSPECTION, Front Differential Assembly.>
2) Disassemble the differential case. <Ref. to 6MT-103, DIFFERENTIAL CASE, DISASSEMBLY, Front Differential Assembly.>
3) Select a washer from the following table, and assemble the differential case. <Ref. to 6MT-105, DIFFERENTIAL CASE, ASSEMBLY, Front Differential Assembly.>

NOTE:
If the backlash is excessive, select a thicker washer. If the backlash is too small, select a thinner washer.

Washer	
Part No.	Thickness mm (in)
803038021	0.950 (0.0374)
803038022	1.000 (0.0394)
803038023	1.050 (0.0413)
803038024	0.900 (0.0354)
803038025	1.100 (0.0433)

2. HYPOID GEAR BACKLASH

1) Attach the RH and LH side retainers.
ST1 18630AA010 WRENCH COMPL RETAINER (RH SIDE)
ST2 18630AA000 WRENCH ASSY (LH SIDE)

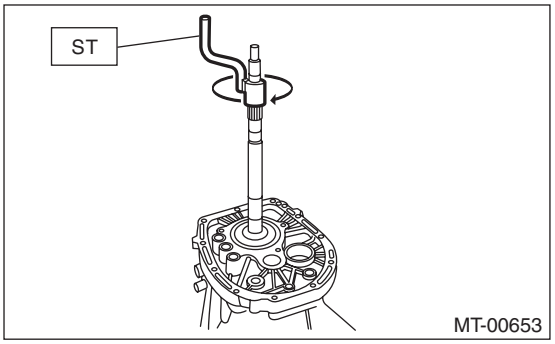
NOTE:
• Twist in the RH side retainer a little further than the LH side.
• WRENCH ASSY (499787000) can also be used.
2) Attach the drive pinion shaft assembly, and affix with 4 bolts.

NOTE:
Use old gaskets and washers to prevent the mating surfaces of the housing from becoming damaged.

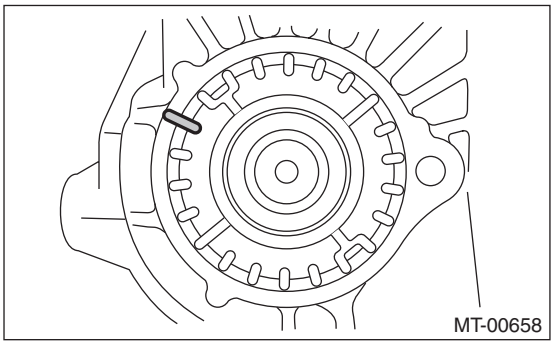
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

3) Using the ST, twist in the side retainer LH until it just contacts the drive pinion and hypoid driven gear. Loosen side retainer RH.
ST1 18630AA010 WRENCH COMPL RETAINER (RH SIDE)
ST2 18630AA000 WRENCH ASSY (LH SIDE)

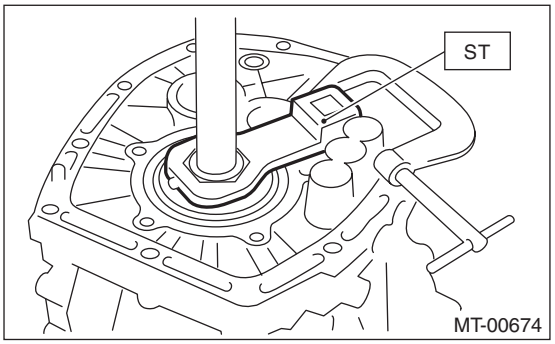
NOTE:
WRENCH ASSEMBLY (499787000) can also be used.
4) Use the ST to turn the drive pinion shaft a few times.
ST 18631AA000 HANDLE



5) Repeat steps 3) and 4) until side retainer LH does not turn anymore. For side retainer RH, twist in until the inner race and outer race just comes into contact. This is the “zero” backlash state.
6) Mark the mating positions of the left and right side retainers and the clutch housing.

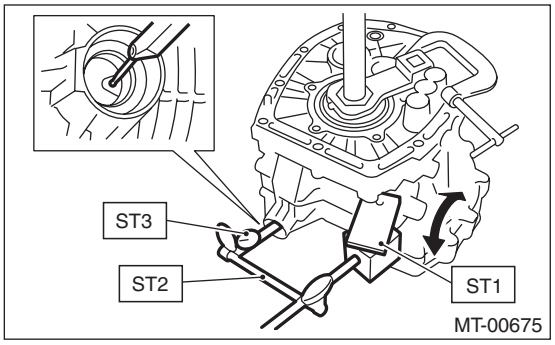


7) Turn the back side retainer LH by 3 notches, and screw in the side retainer RH by 3 notches.
8) Use the ST to fix the drive pinion shaft in place.
ST 18621AA000 ADAPTER WRENCH



9) Install the SUBARU genuine axle shaft to the front differential left and right sides.
Part No. 38415AA000AXLE SHAFT
10) After turning the drive pinion shaft several turns, use the ST to measure the hypoid gear backlash.
ST1 498255400 PLATE
ST2 498247001 MAGNET BASE
ST3 498247100 DIAL GAUGE

Hypoid gear backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



11) If the backlash is out of specified range, turn the right and left side retainers to adjust.
12) Turn the RH side retainer by 1.75 notches or more.

3. TOOTH CONTACT OF HYPOID GEAR

Regarding teeth contact conditions, refer to the drive pinion section. <Ref. to 6MT-107, TOOTH CONTACT OF HYPOID GEAR, INSPECTION, Front Differential Assembly.>