

FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

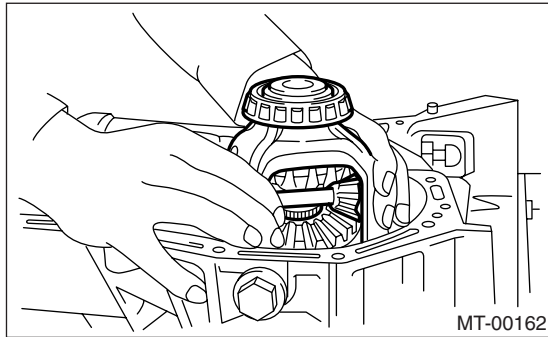
18. Front Differential Assembly

A: REMOVAL

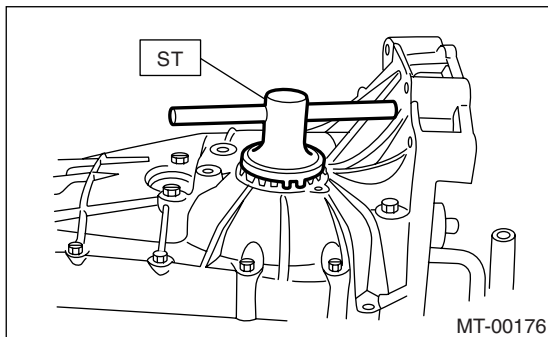
- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-28, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-42, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-54, REMOVAL, Transmission Case.>
- 4) Remove the drive pinion shaft assembly. <Ref. to 5MT-63, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly. <Ref. to 5MT-57, REMOVAL, Main Shaft Assembly (Single-Range).>
- 6) Remove the differential assembly.

NOTE:

- Be careful not to confuse the right and left roller bearing outer races.
- Be careful not to damage the retainer oil seal.



- 7) Remove the differential side retainers using ST. ST 499787000 WRENCH ASSY



- 8) Remove the bearing outer race from transmission case. ST 398527700 PULLER ASSY

B: INSTALLATION

- 1) Insert the bearing outer race to transmission case.

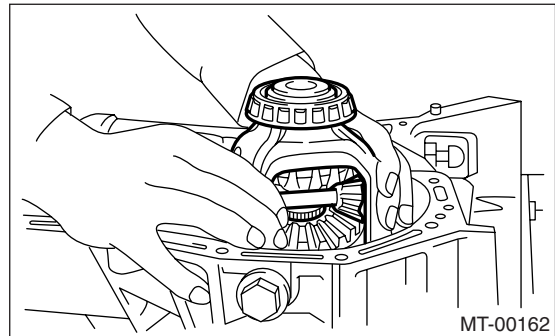
NOTE:

Apply the transmission gear oil to outer surface of bearing outer race.

- 2) Install the differential side retainers using ST. ST 499787000 WRENCH ASSY
- 3) Install the differential assembly.

NOTE:

- Be careful not to fold the sealing lip of oil seal.
- Wrap the right and left spline sections of axle shaft with vinyl tape to prevent scratches.



- 4) Install the main shaft assembly. <Ref. to 5MT-57, INSTALLATION.>
- 5) Install the drive pinion assembly. <Ref. to 5MT-57, INSTALLATION, Main Shaft Assembly (Single-Range).>
- 6) Install the transmission case. <Ref. to 5MT-54, INSTALLATION, Transmission Case.>
- 7) Install the transfer case with extension case assembly. <Ref. to 5MT-42, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 8) Install the manual transmission assembly to vehicle. <Ref. to 5MT-31, INSTALLATION, Manual Transmission Assembly.>

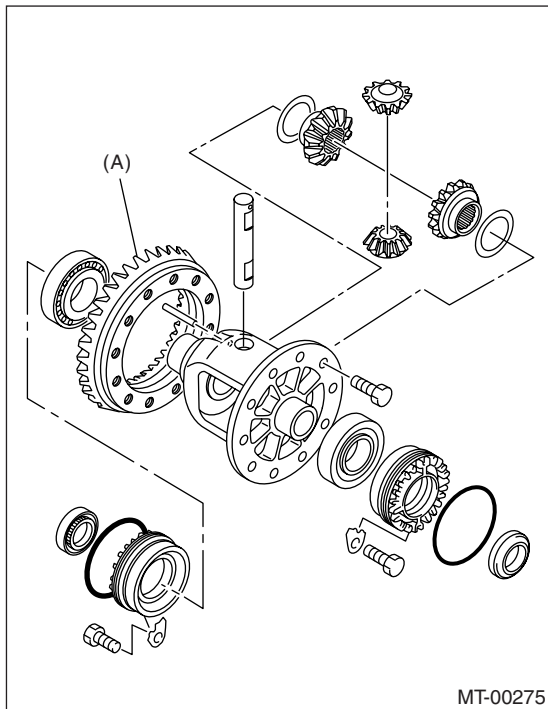
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C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

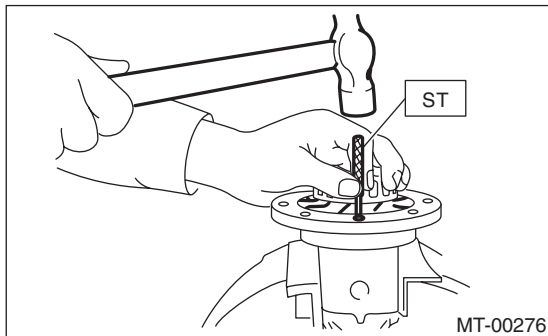
1) Loosen the twelve bolts and remove the hypoid driven gear.



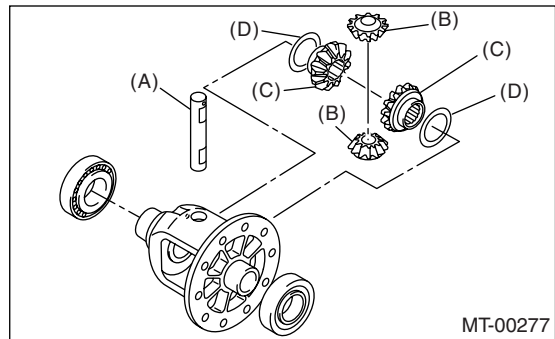
(A) Hypoid driven gear

2) Drive out the straight pin from differential assembly toward hypoid driven gear.

ST 899904100 REMOVER

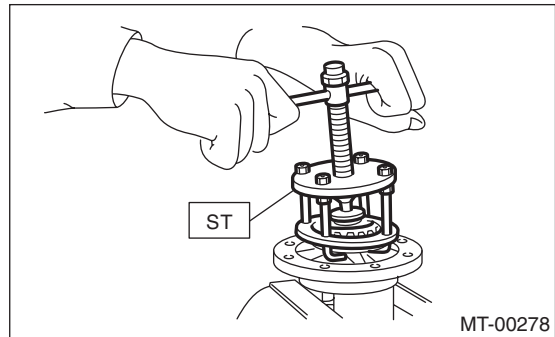


3) Pull out the pinion shaft, and remove the differential bevel pinion and gear and washer.



- (A) Pinion shaft
- (B) Differential bevel pinion
- (C) Differential bevel gear
- (D) Washer

4) Remove the roller bearing using ST.
ST 899524100 PULLER SET

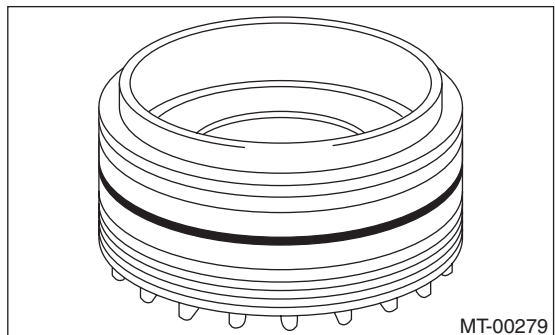


2. SIDE RETAINER

NOTE:

Replace the oil seal and O-ring after adjustment of drive pinion gear backlash and tooth contact.

1) Remove the O-ring.



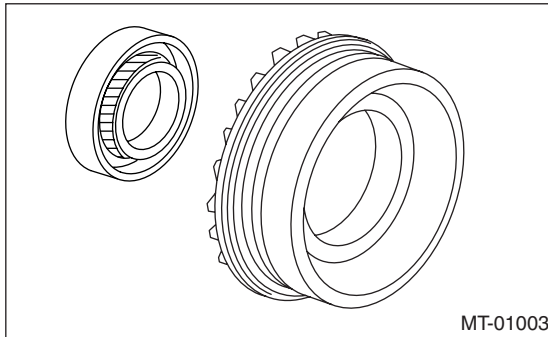
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2) Remove the oil seal.

NOTE:

- Remove the oil seal using a flat tip screwdriver
- Do not reuse the oil seal. Prepare a new oil seal.



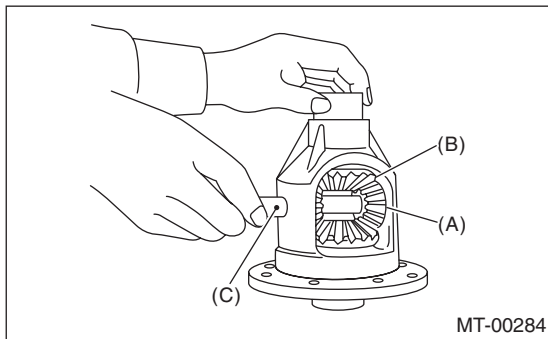
D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Install the differential bevel gear and bevel pinion together with washers, and insert pinion shaft.

NOTE:

Face the chamfered side of washer toward gear.



- (A) Differential bevel pinion
- (B) Differential bevel gear
- (C) Pinion shaft

2) Measure the backlash between differential bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it. <Ref. to 5MT-75, ADJUSTMENT, Front Differential Assembly.>

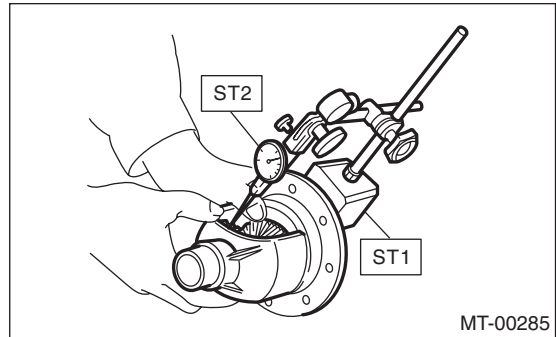
NOTE:

Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

- ST1 498247001 MAGNET BASE
- ST2 498247100 DIAL GAUGE

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

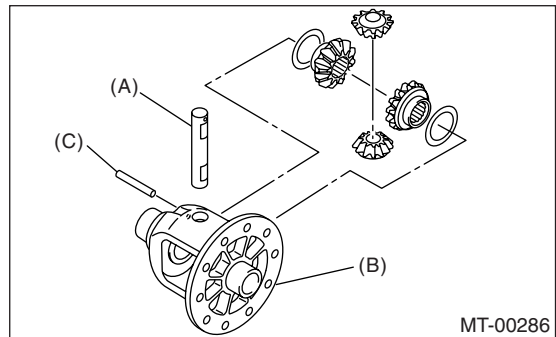


3) Align the pinion shaft and differential case at their holes, and drive the straight pin into holes from the hypoid driven gear side, using ST.

NOTE:

Lock the straight pin after installing.

ST 899904100 REMOVER



- (A) Pinion shaft
- (B) Differential case
- (C) Straight pin

4) Install the roller bearing to differential case.

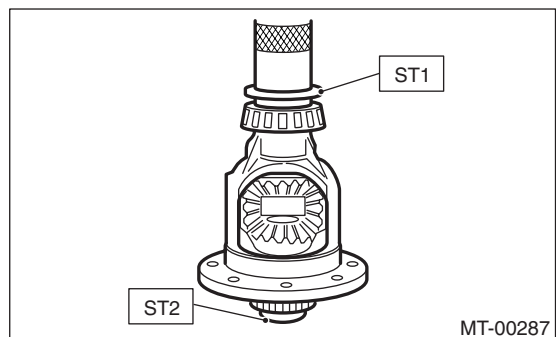
CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

Be careful because the roller bearing outer races are used as a set.

- ST1 499277100 BUSH 1-2 INSTALLER
- ST2 398497701 ADAPTER



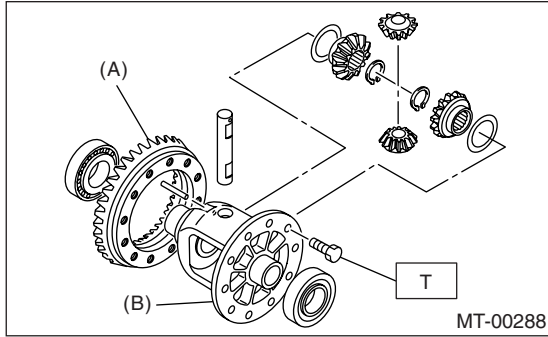
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5) Install the hypoid driven gear to differential case using twelve bolts.

Tightening torque:

T: 62 N·m (6.3 kgf·m, 45.6 ft·lb)



- (A) Hypoid driven gear
- (B) Differential case

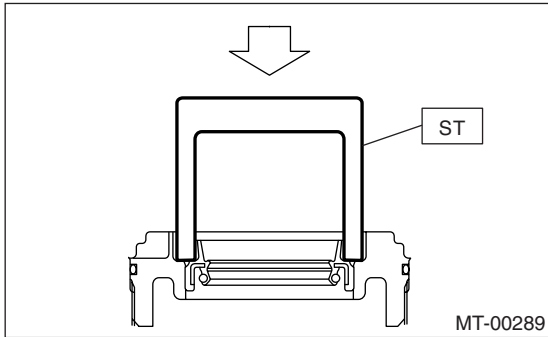
2. SIDE RETAINER

1) Install a new oil seal.

ST 18675AA000 DIFFERENTIAL OIL SEAL INSTALLER

NOTE:

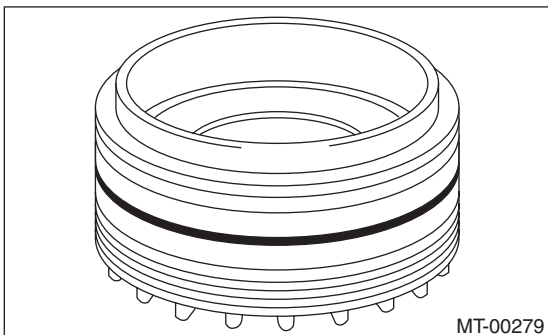
- When pressing fit the oil seal to side retainer, tap it to press fit using a plastic hammer.
- Do not use the press.



2) Install a new O-ring.

NOTE:

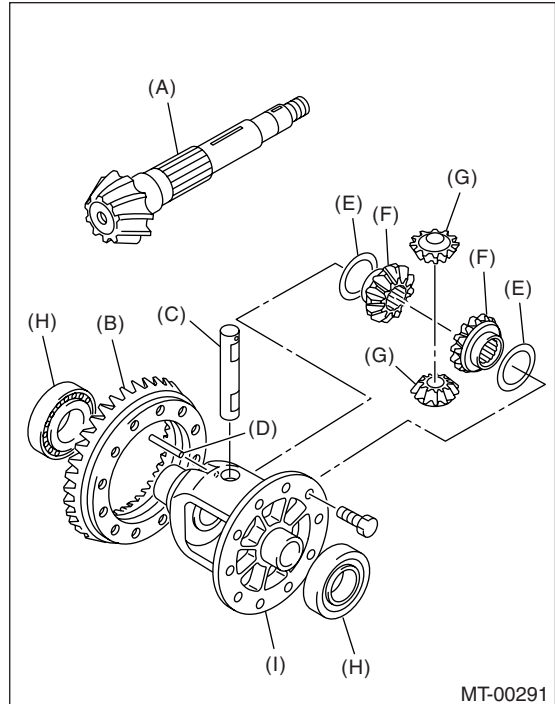
Do not stretch or damage the O-ring.



E: INSPECTION

Repair or replace the differential gear in the following cases:

- The hypoid drive gear and drive pinion shaft tooth surface are damaged, excessively worn, or seized.
- The roller bearing on the drive pinion shaft has a worn or damaged roller path.
- There is damage, wear, or seizure of the differential bevel pinion, differential bevel gear, washer, pinion shaft, and straight pin.
- The differential case has worn or damaged sliding surfaces.



- (A) Drive pinion shaft
- (B) Hypoid driven gear
- (C) Pinion shaft
- (D) Straight pin
- (E) Washer
- (F) Differential bevel gear
- (G) Differential bevel pinion
- (H) Roller bearing
- (I) Differential case

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1. BEVEL PINION GEAR BACKLASH

Measure the backlash between differential bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it.

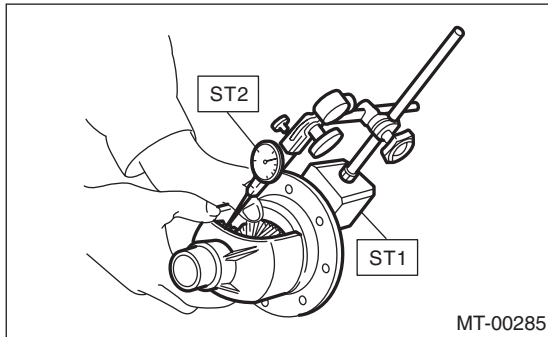
NOTE:

Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



2. HYPOID GEAR BACKLASH

1) Insert the axle shaft which is SUBARU genuine parts to both sides of side retainer hole.

Part No. 38415AA090 AXLE SHAFT

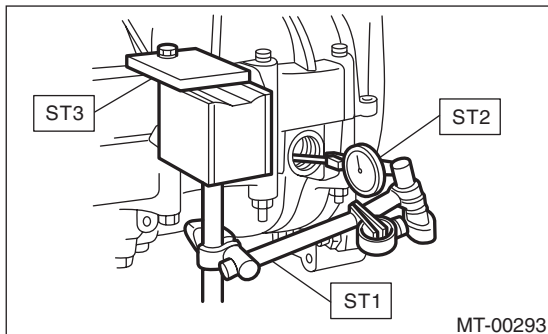
2) Set the ST1, ST2 and ST3. Insert the needle through transmission oil drain plug hole so that the needle comes in contact with the tooth surface at a right angle.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE
ST3 498255400 PLATE

3) Move clockwise and counter clockwise to contact tooth, and then read the value of dial gauge runout.

Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

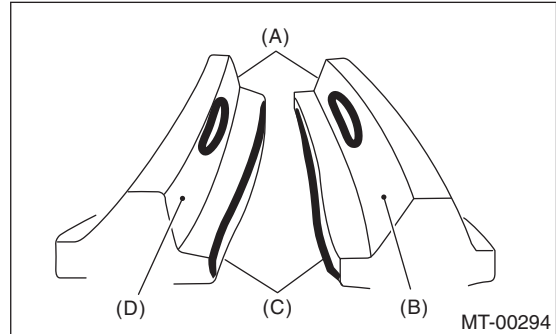


4) If the backlash is outside specified range, adjust it by turning the holder in right side case.

3. TOOTH CONTACT OF HYPOID GEAR

Check the tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on hypoid gear, and judge whether face contact is correct. If it is inaccurate, make adjustment. <Ref. to 5MT-75, ADJUSTMENT, Front Differential Assembly.>

- Tooth contact is correct.



- (A) Toe
- (B) Coast side
- (C) Heel
- (D) Drive side

F: ADJUSTMENT

1. BEVEL PINION GEAR BACKLASH

1) Disassemble the front differential. <Ref. to 5MT-71, REMOVAL, Front Differential Assembly.>

2) Select a different washer from the table and install.

Washer	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

3) Adjust until the specified value is obtained.

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

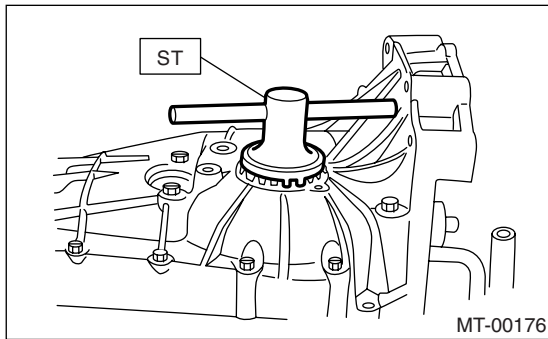
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2. HYPOID GEAR BACKLASH

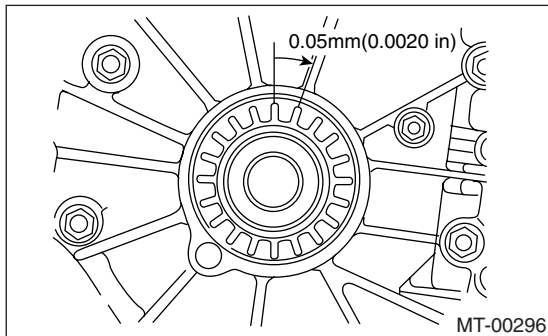
Adjust backlash by turning the holder in right side case.

ST 499787000 WRENCH ASSY



NOTE:

Each time holder rotates one tooth, backlash changes by 0.05 mm (0.020 in).

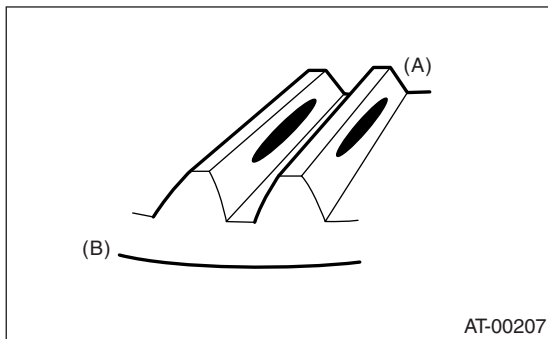


3. TOOTH CONTACT OF HYPOID GEAR

- 1) Adjust until the teeth contact is correct.
- 2) Check and adjust the teeth contact with following table.

- 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.]

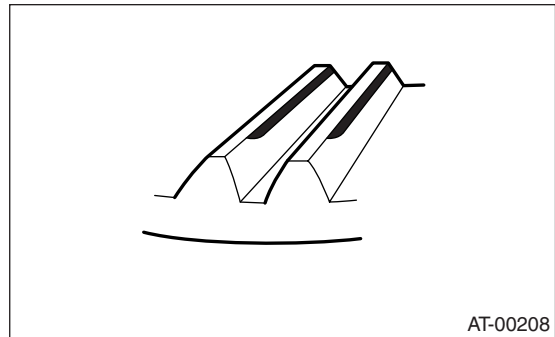


- (A) Toe side
- (B) Heel side

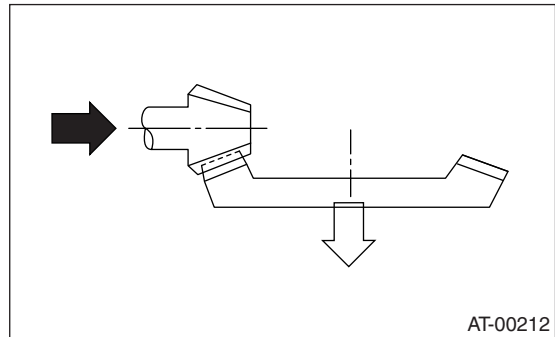
- Face contact

Checking item: Backlash is too large.

Contact pattern



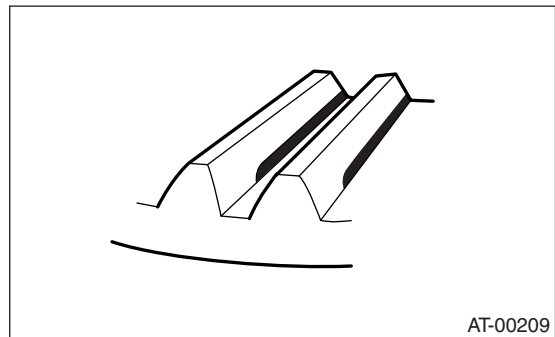
Corrective action: Reduce thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.



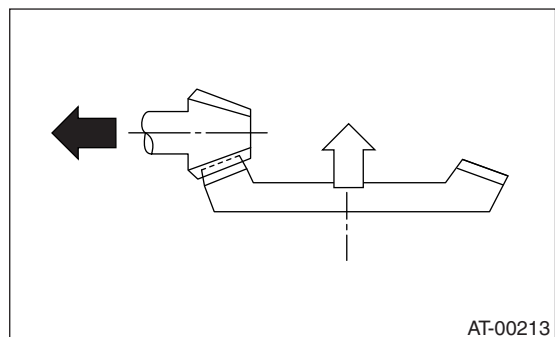
- Flank contact

Checking item: Backlash is too small.

Contact pattern



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



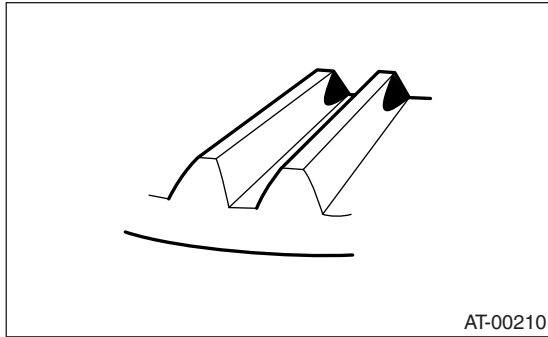
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- Toe contact (Inside end contact)

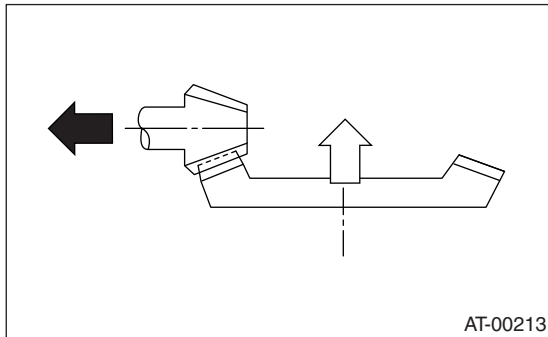
Checking item: Contact areas is small.

Contact pattern



AT-00210

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

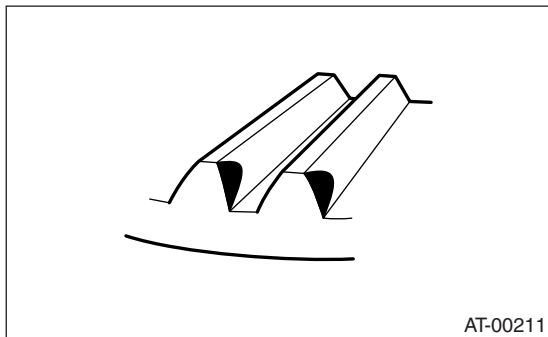


AT-00213

- Heel contact (Outside end contact)

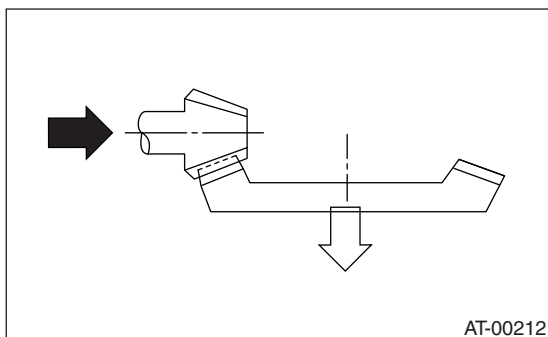
Checking item: Contact areas is small.

Contact pattern



AT-00211

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



AT-00212