

Front Differential Assembly

MANUAL TRANSMISSION AND DIFFERENTIAL

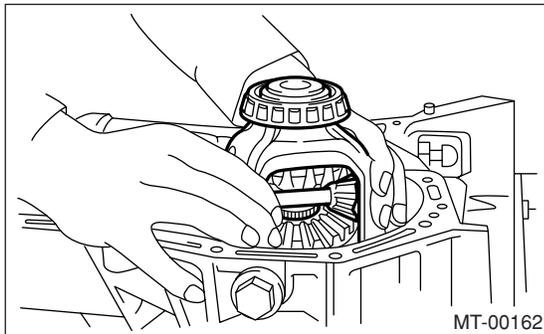
17. Front Differential Assembly

A: REMOVAL

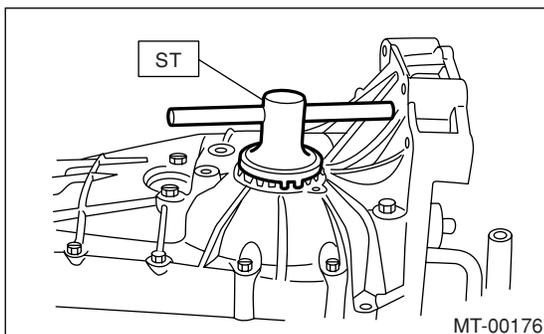
- 1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-25, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to 5MT-37, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the transmission case. <Ref. to 5MT-49, REMOVAL, Transmission Case.>
- 4) Removes the drive pinion shaft assembly. <Ref. to 5MT-57, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove the main shaft assembly. <Ref. to 5MT-52, REMOVAL, Main Shaft Assembly for Single-Range.>
- 6) Remove the differential assembly.

NOTE:

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



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

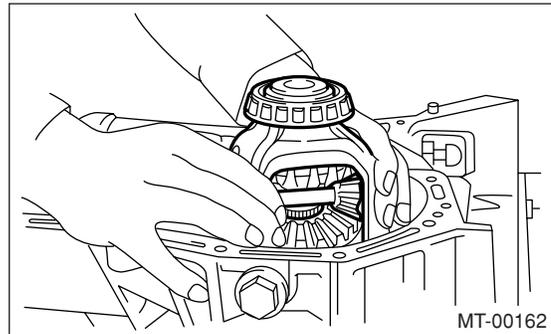


B: INSTALLATION

- 1) Install the differential side retainers using ST.
ST 499787000 WRENCH ASSY
- 2) Install the bearing outer race on transmission case.
- 3) Install the differential assembly.

NOTE:

Be careful not to fold the sealing lip of oil seal.



- 4) Install the main shaft assembly. <Ref. to 5MT-52, INSTALLATION, Main Shaft Assembly for Single-Range.>
- 5) Install the drive pinion assembly. <Ref. to 5MT-57, INSTALLATION, Drive Pinion Shaft Assembly.>
- 6) Install the transmission case. <Ref. to 5MT-49, INSTALLATION, Transmission Case.>
- 7) Install the transfer case with extension case assembly. <Ref. to 5MT-37, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 8) Install the manual transmission assembly into vehicle. <Ref. to 5MT-27, INSTALLATION, Manual Transmission Assembly.>

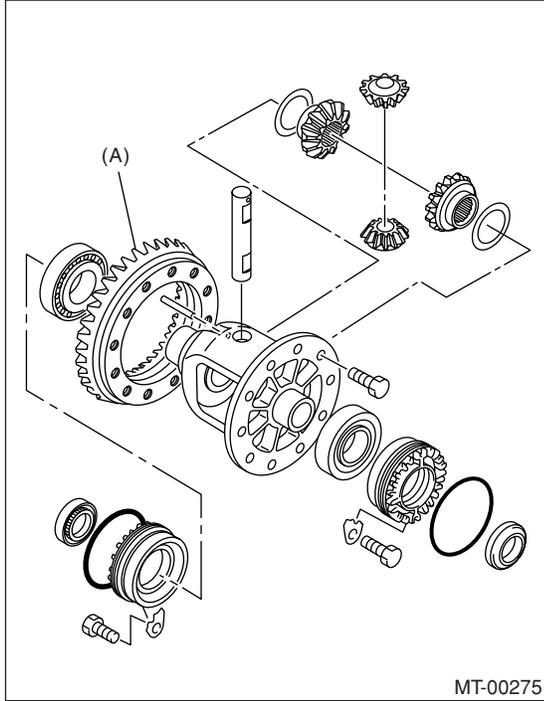
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C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

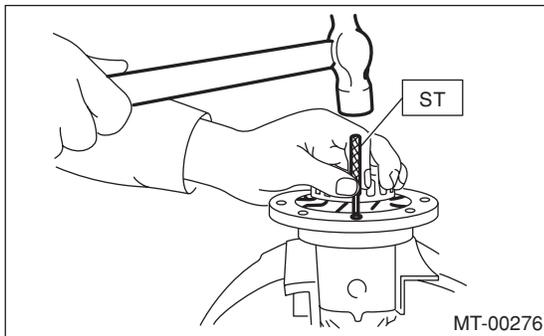
1) Loosen the twelve bolts and remove hypoid driven gear.



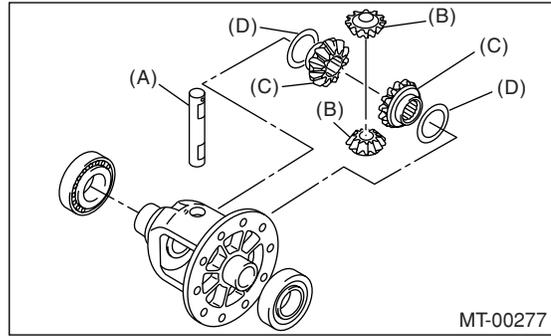
(A) Hypoid driven gear

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

ST 899904100 REMOVER

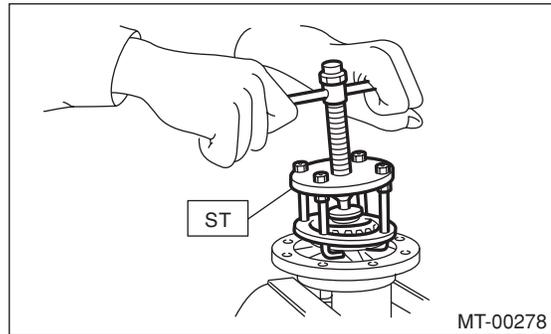


3) Pull out the pinion shaft, and remove the differential bevel pinion, bevel gear and washer.



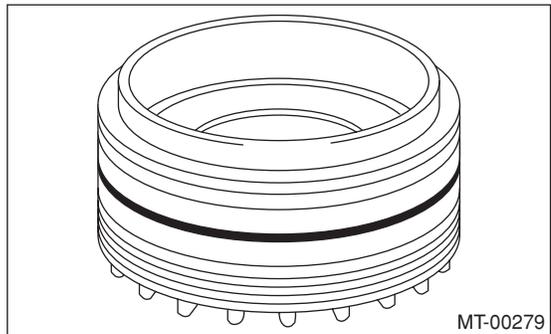
(A) Pinion shaft
(B) Bevel pinion
(C) Bevel gear
(D) Washer

4) Using the ST, remove the roller bearing.
ST 899524100 PULLER SET



2. SIDE RETAINER

1) Remove the O-ring.



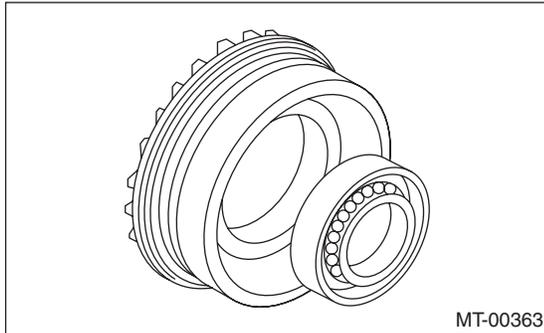
2) Remove the oil seal.

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NOTE:

Do not reuse the oil seal. Replace with a new oil seal.



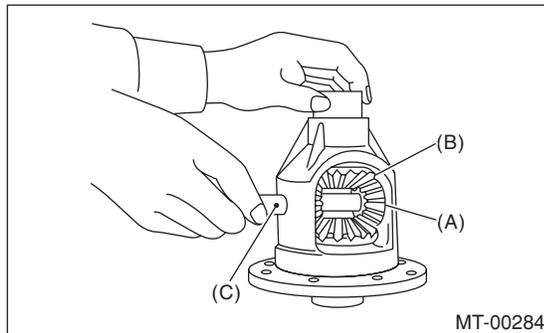
D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

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

NOTE:

Face the chamfered side of washer toward gear.



- (A) Bevel pinion
- (B) Bevel gear
- (C) Pinion shaft

2) Measure the backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust. <Ref. to 5MT-69, ADJUSTMENT, Front Differential Assembly.>

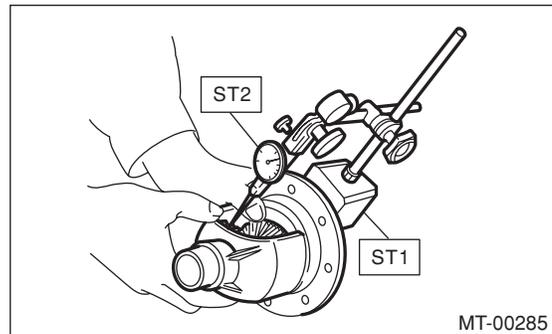
NOTE:

Be sure the pinion gear teeth 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)

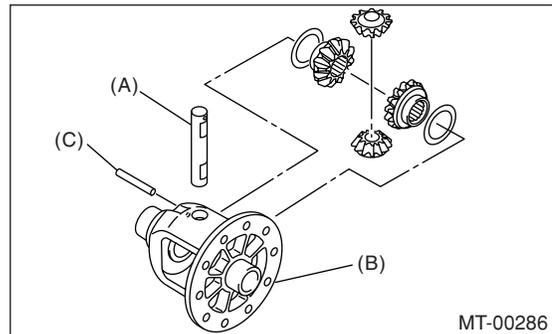


3) Align the pinion shaft and differential case at their holes, and drive the straight pin into holes from the hypoid driven gear side, using ST.

NOTE:

Lock the straight pin after installing.

ST 899904100 REMOVER



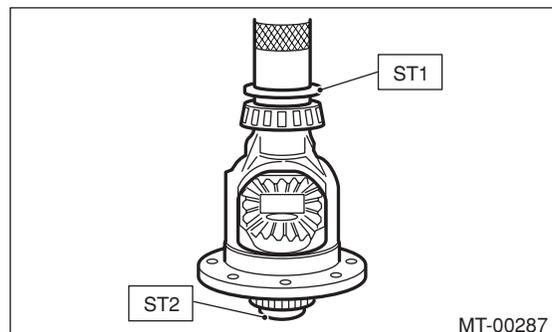
- (A) Pinion shaft
- (B) Differential case
- (C) Straight pin

4) Install the roller bearing to differential case.

NOTE:

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Be careful because the roller bearing outer races are used as a set.

ST1 499277100 BUSHING 1-2 INSTALLER
ST2 398497701 ADAPTER



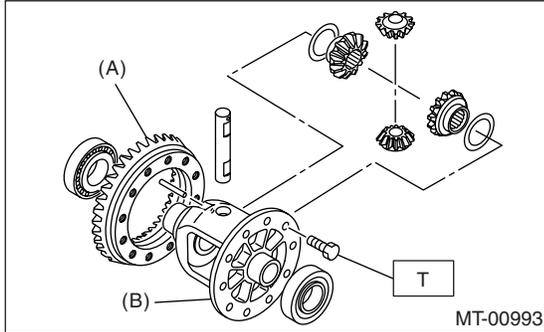
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5) Install the hypoid driven gear to differential case using twelve bolts.

Tightening torque:

T: 62 N·m (6.3 kgf-m, 45.6 ft-lb)

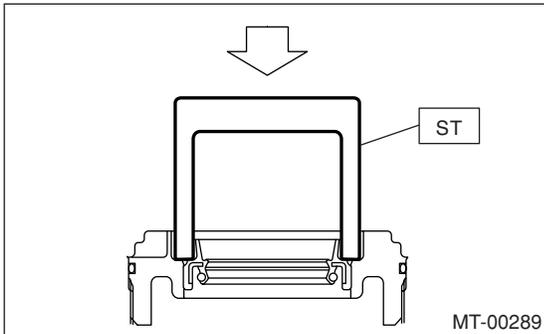


- (A) Hypoid driven gear
- (B) Differential case

2. SIDE RETAINER

1) Install a new oil seal.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



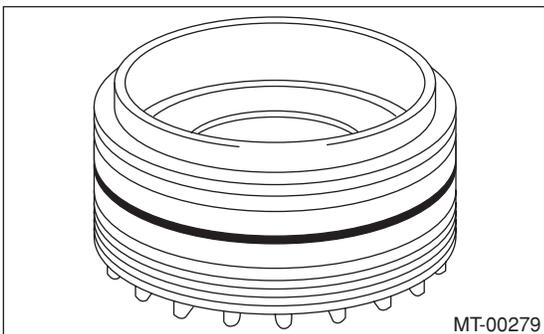
NOTE:

- For press-fitting of oil seal to retainer, make tapping with plastic hammer etc.
- Do not use press.

2) Install a new O-ring.

NOTE:

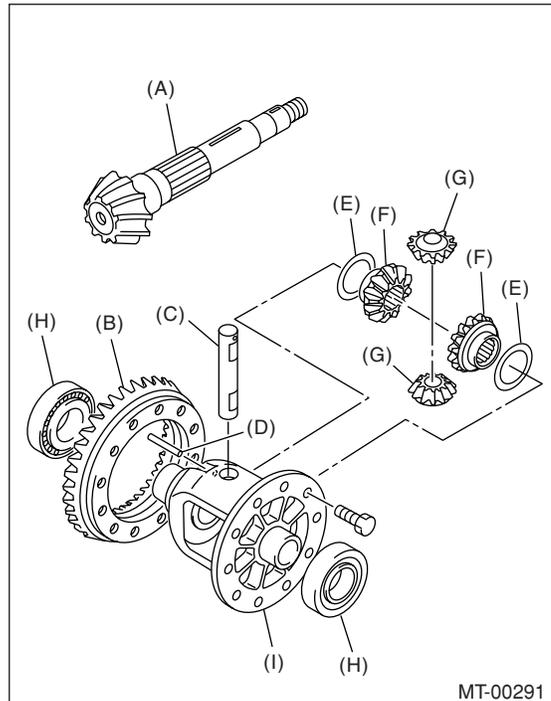
Do not stretch or damage the O-ring.



E: INSPECTION

Repair or replace the differential gear in following cases:

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



- (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

1. BEVEL PINION GEAR BACKLASH

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

NOTE:

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

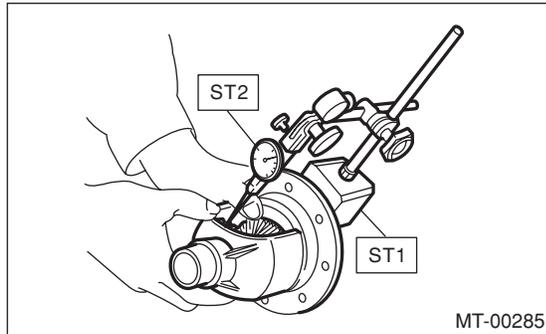
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

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Standard backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)



2. HYPOID GEAR BACKLASH

1) 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 on the right corner and check the backlash.

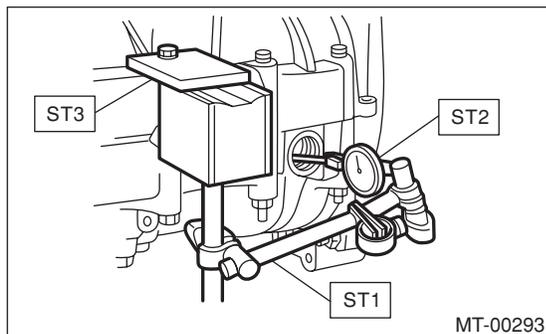
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE
ST3 498255400 PLATE

2) Install the SUBARU genuine axle shafts to both side, rotate in the inversion direction so that the gauge contact with the tooth surface and read the dial gauge.

Part No. 38415AA100AXLE SHAFT

Backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)



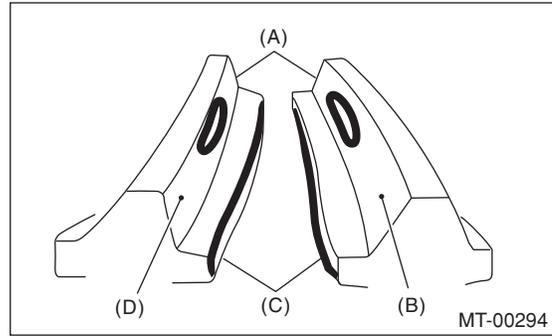
NOTE:

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

3. TOOTH CONTACT OF HYPOID GEAR

Check 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-69, 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-65, REMOVAL, Front Differential Assembly.>

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

Washer	
Part Number	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 standard value is obtained.

Backlash:

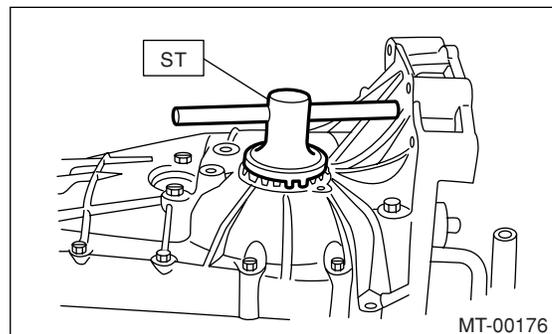
Standard

0.13 — 0.18 mm (0.0051 — 0.0071 in)

2. HYPOID GEAR BACKLASH

Adjust the backlash by turning holder in the right side case.

ST 499787000 WRENCH ASSY

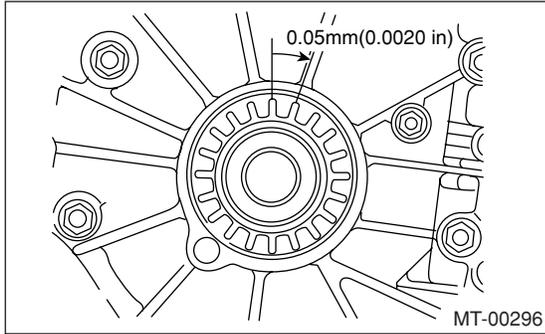


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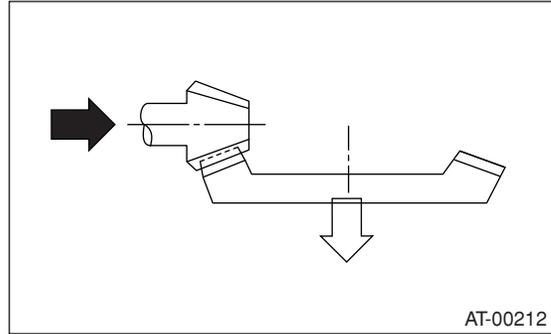
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NOTE:

Each time the side retainer rotates one notch, backlash changes by 0.05 mm (0.0020 in).



Corrective action: Reduce thickness of pinion height adjusting washer in order to bring drive pinion closer to driven gear.

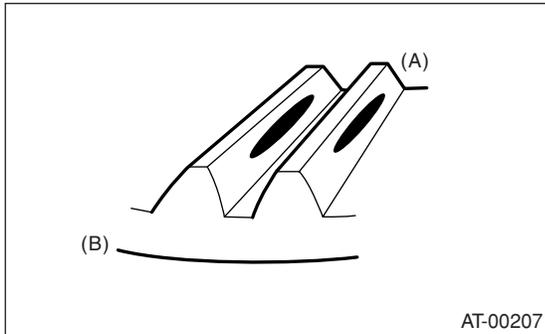


3. TOOTH CONTACT OF HYPOID GEAR

- 1) Adjust until correct teeth contact is obtained.
- 2) Check tooth contact as follows.

- Tooth contact

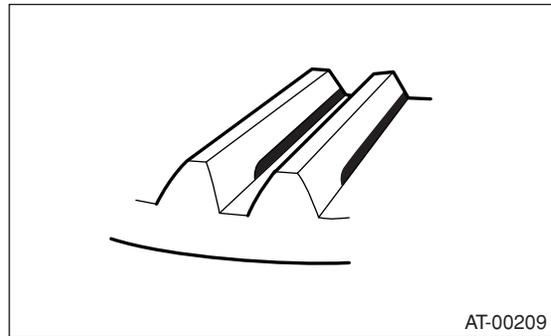
Checking item: Tooth contact pattern is slightly shifted to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]



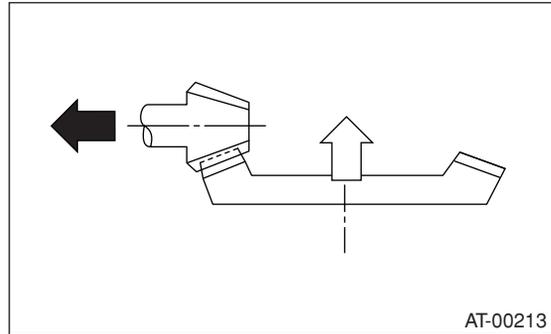
- (A) Toe side
- (B) Heel side

- Flank contact

Checking item: Backlash is too small.
Contact pattern

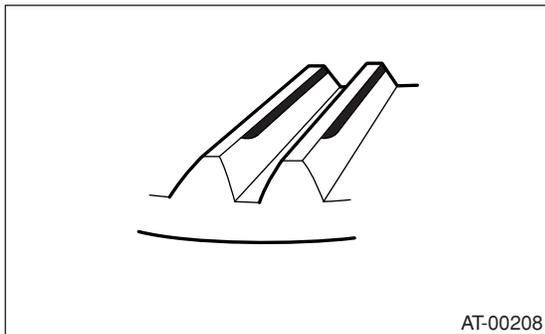


Corrective action: Increase thickness of pinion height adjusting washer in order to bring drive pinion away from driven gear.



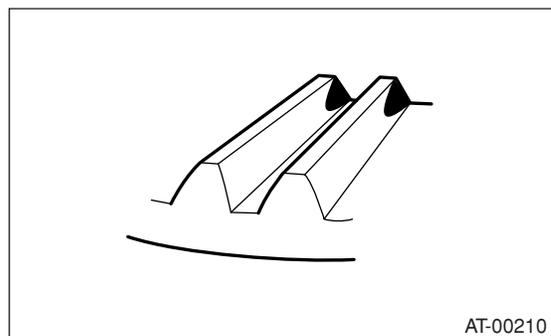
- Face contact

Checking item: Backlash is too large.
Contact pattern



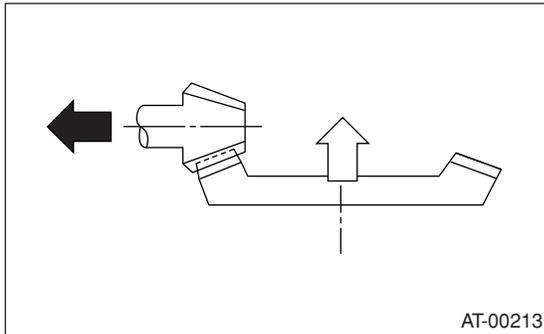
- Toe contact (inside end contact)

Checking item: Contact area is small.
Contact pattern



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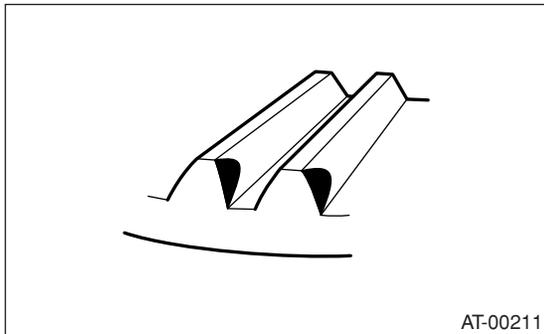
Corrective action: Increase thickness of pinion height adjusting washer in order to bring drive pinion closer to driven gear.



- Heel contact (outside end contact)

Checking item: Contact area is small.

Contact pattern



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

