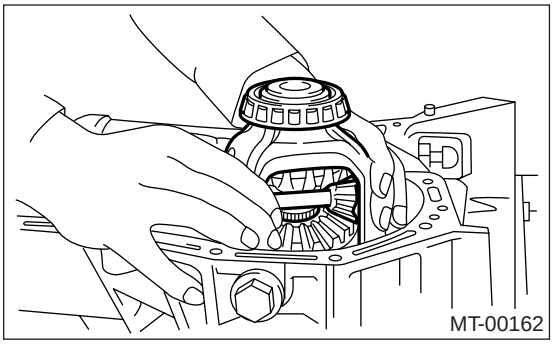
17.Front Differential Assembly

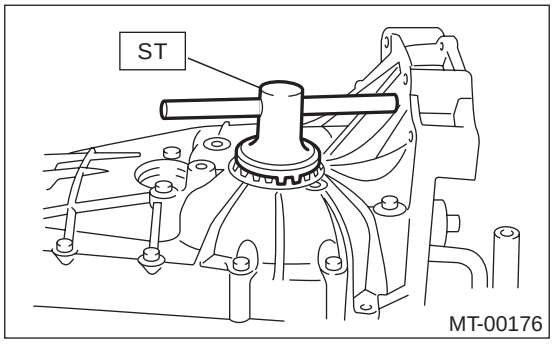
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
2) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove transmission case. <Ref. to MT-50, REMOVAL, Transmission Case.>
4) Removes drive pinion shaft assembly. Remove transfer case with extension case assembly. <Ref. to MT-59, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove main shaft assembly.
Single-range model:
<Ref. to MT-53, REMOVAL, Main Shaft Assembly for Single-Range.>
6) Remove differential assembly.

NOTE:
• Be careful not to confuse right and left roller bearing outer races.
• Be careful not to damage retainer oil seal.



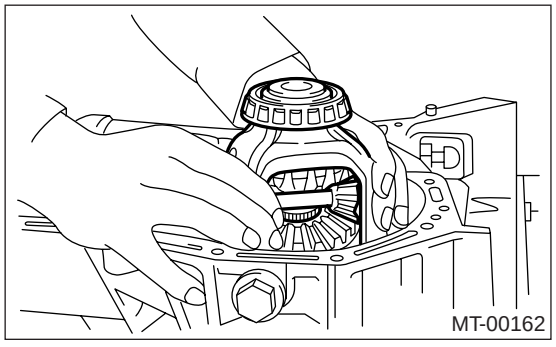
7) Remove differential side retainers using ST.
ST 499787000 WRENCH ASSY



8) Remove bearing outer race from transmission case.

B: INSTALLATION

1) Install bearing outer race into transmission case.
2) Install differential side retainers using ST.
ST 499787000 WRENCH ASSY
3) Install differential assembly.
Wrap the left and right splines sections of axle shaft with vinyl tape to prevent scratches.
Be careful not to fold the sealing lip of oil seal.



4) Install main shaft assembly.
Single-range model:
<Ref. to MT-53, INSTALLATION, Main Shaft Assembly for Single-Range.>
5) Install drive pinion assembly. <Ref. to MT-59, INSTALLATION, Drive Pinion Shaft Assembly.>
6) Install transmission case. <Ref. to MT-51, INSTALLATION, Transmission Case.>
7) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
8) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

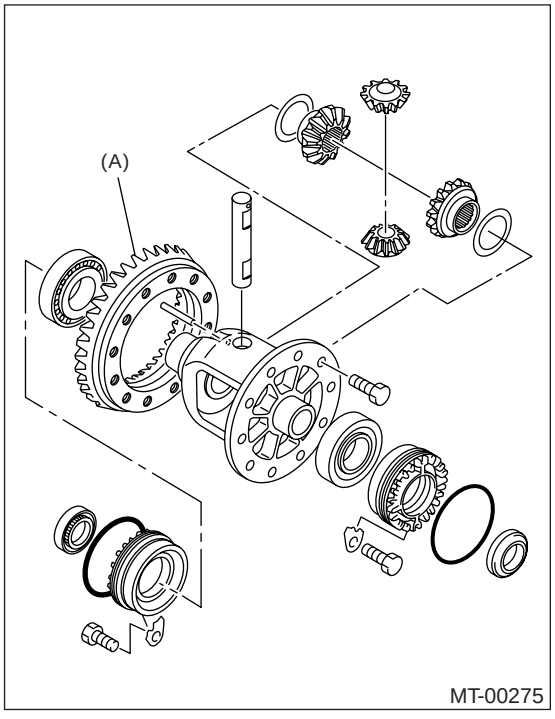
C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Remove right and left snap rings from differential, and then remove two axle drive shafts.

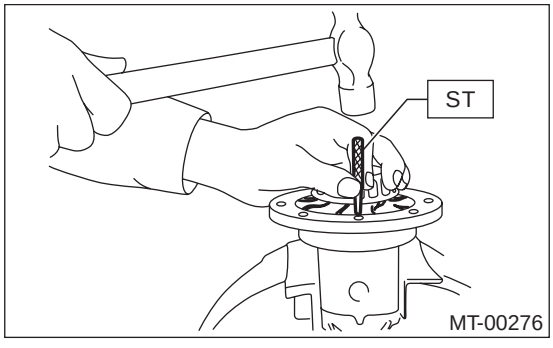
NOTE:
During reassembly, reinstall each axle drive shaft in the same place from which it was removed.

2) Loosen twelve bolts and remove hypoid driven gear.

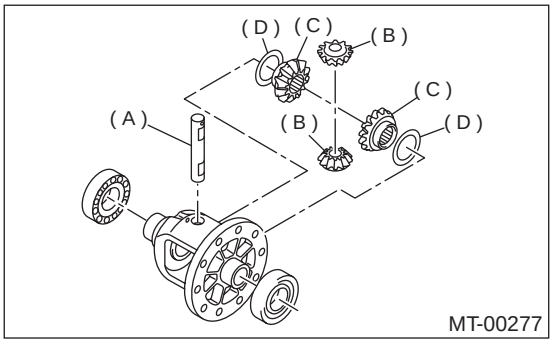


(A) Hypoid driven gear

3) Drive out straight pin from differential assembly toward hypoid driven gear.
ST 899904100 REMOVER

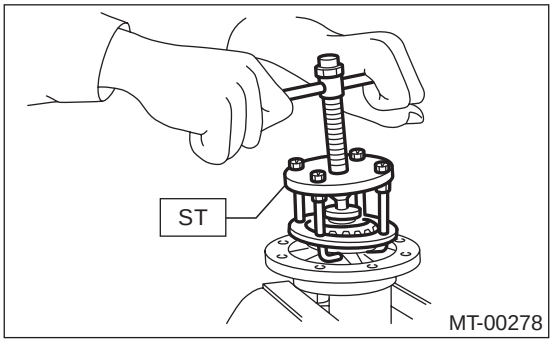


4) Pull out pinion shaft, and remove differential bevel pinion and gear and washer.



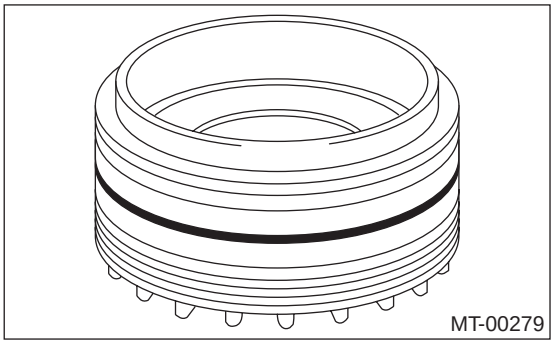
(A) Pinion shaft
(B) Bevel pinion
(C) Bevel gear
(D) Washer

5) Remove roller bearing using ST.
ST 899524100 PULLER SET

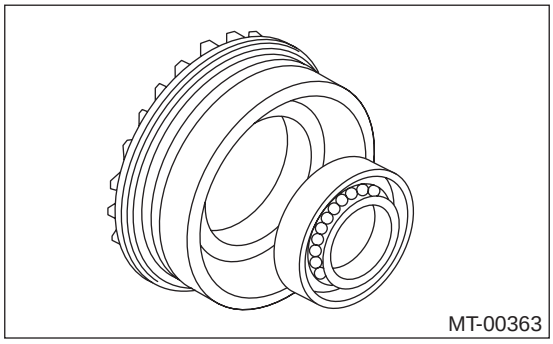


2. SIDE RETAINER

1) Remove O-ring.



2) Remove oil seal.

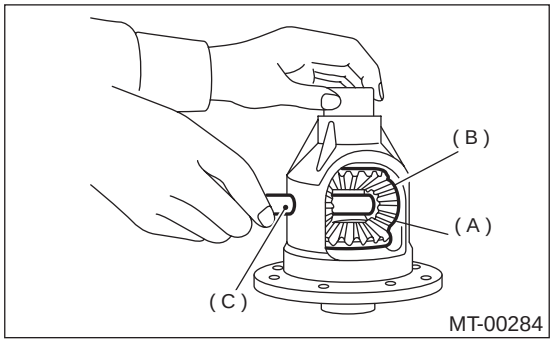


D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

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

NOTE:
Face the chamfered side of washer toward gear.



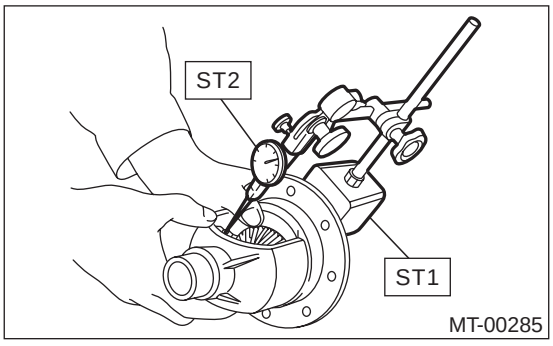
(A) Bevel pinion
(B) Bevel gear
(C) Pinion shaft

2) Measure backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it. <Ref. to MT-72, 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

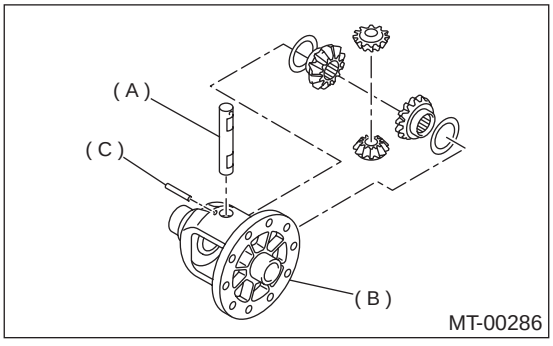
Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



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

NOTE:
Lock straight pin after installing.

ST 899904100 REMOVER

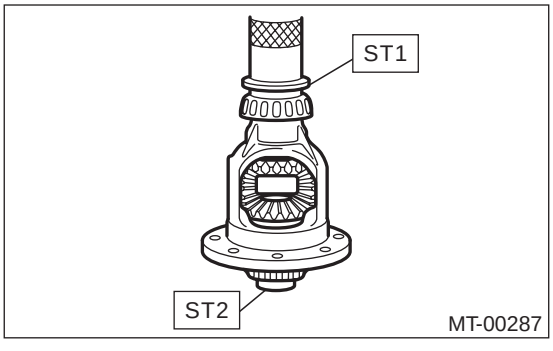


(A) Pinion shaft
(B) Differential case
(C) Straight pin

4) Install roller bearing to differential case.

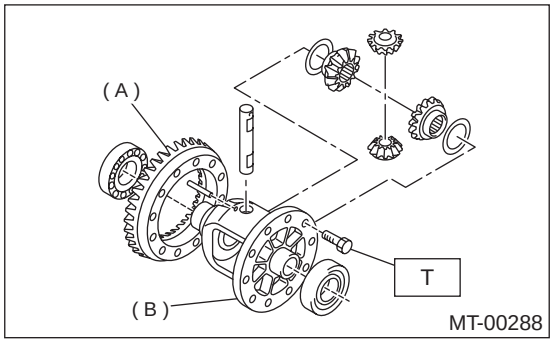
NOTE:
• Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
• Be careful because roller bearing outer races are used as a set.

ST1 499277100 BUSHING 1-2 INSTALLER
ST2 398497701 ADAPTER



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

Tightening torque:
T: 62 N·m (6.3 kgf-m, 45.6 ft-lb)

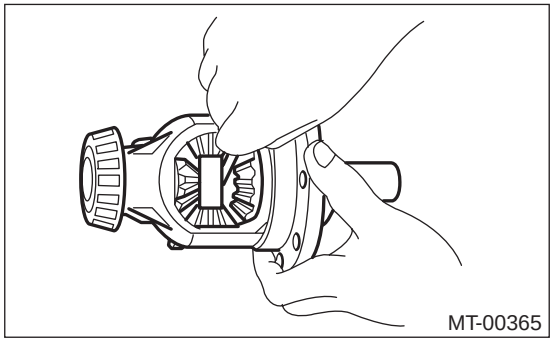


(A) Hypoid driven gear
(B) Differential case

6) Position drive axle shaft in differential case and hold it outer snap ring (289). Using a thickness gauge, confirm whether clearance between the shaft and case is within specifications.

NOTE:
If it is not within specificaitons, replace snap ring with a suitable one.

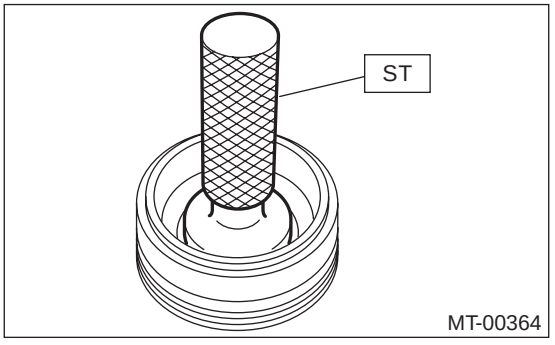
Clearance:
0 — 0.25 mm (0 — 0.0098 in)



Snap ring (Outer-28)	
Part No.	Thickness mm (in)
805028011	1.05 (0.0413)
804018012	1.20 (0.0472)

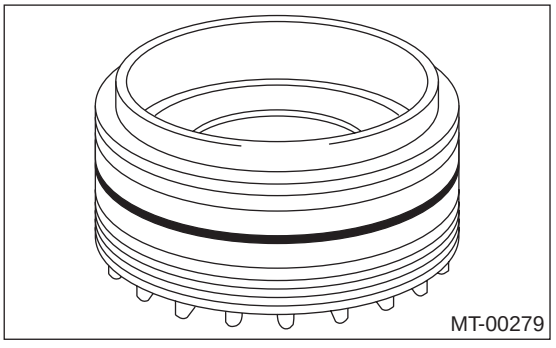
2. SIDE RETAINER

1) Install new oil seal.
ST 49979700 INSTALLER



2) Install new O-ring.

NOTE:
Do not stretch or damage O-ring.



E: INSPECTION

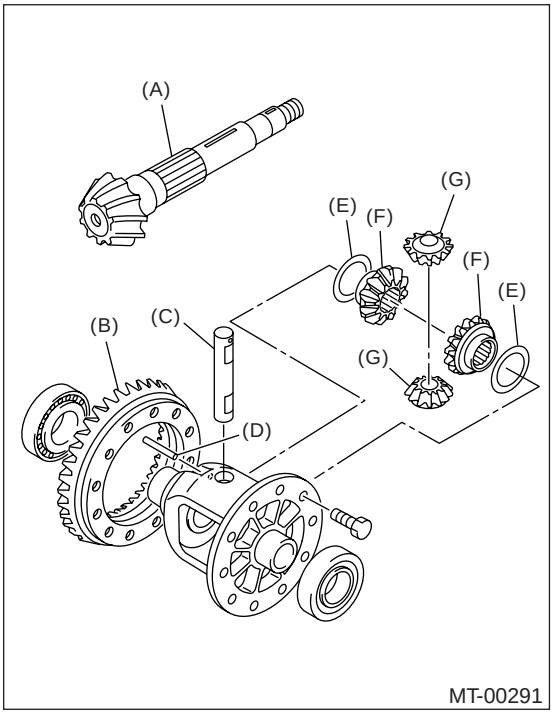
Repair or replace the differential gear in the following cases:

• 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) Snap ring
(I) Roller bearing
(J) Differential case

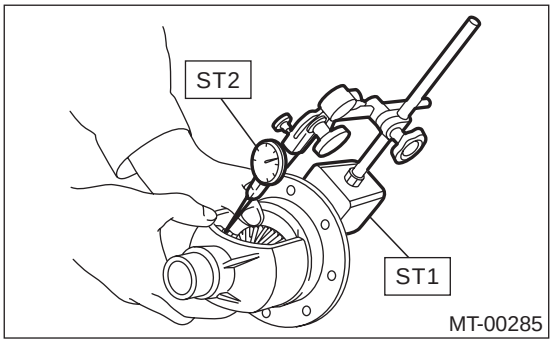
1. BEVEL PINION GEAR BACKLASH

Measure backlash between 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)

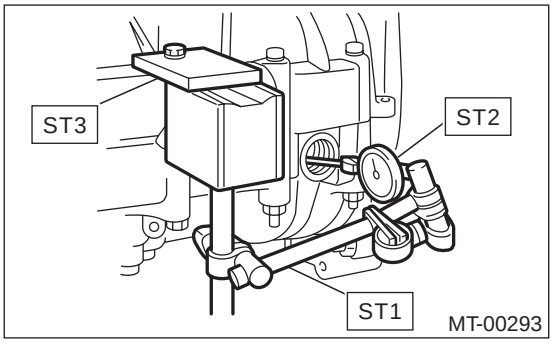


2. HYPOID GEAR BACKLASH

Set 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 and check the backlash.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE
ST3 498255400 PLATE

Backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

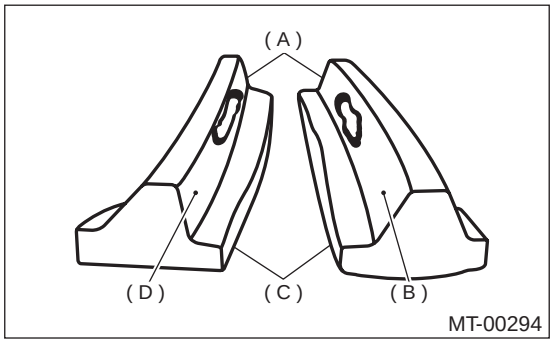


NOTE:
If backlash is outside specified range, adjust it by turning holder in right side case.

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 MT-72, 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 MT-67, REMOVAL, Front Differential Assembly.>
2) Select a different washer from the table and install.

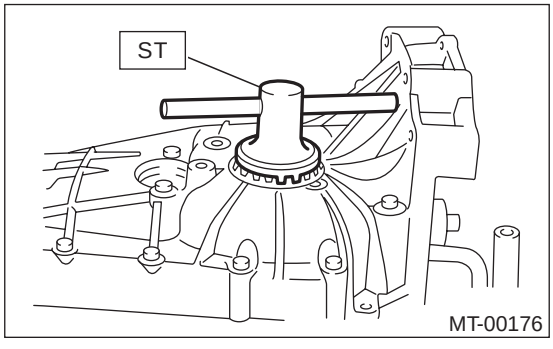
Washer	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

3) Adjust until the specified value is obtained.

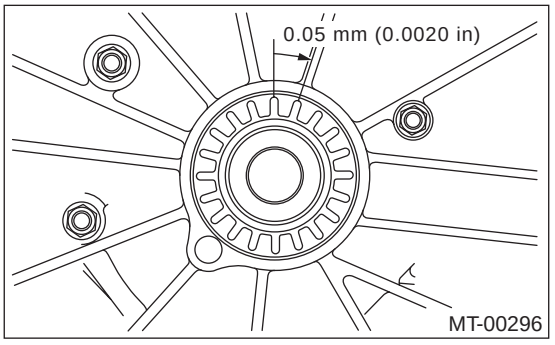
Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

2. HYPOID GEAR BACKLASH

Adjust backlash by turning 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).

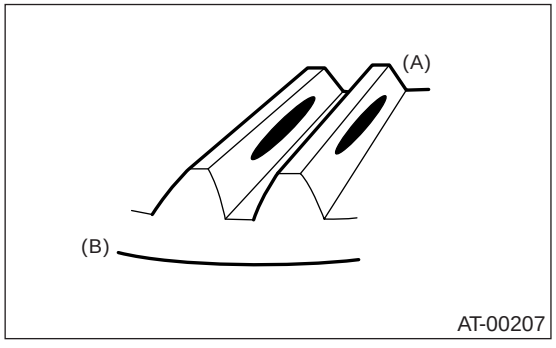


3. TOOTH CONTACT OF HYPOID GEAR

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

• Tooth contact

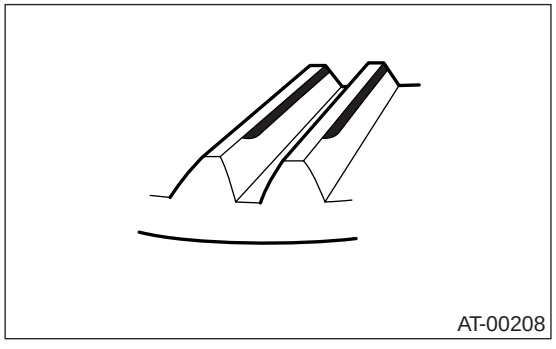
Checking item:Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]



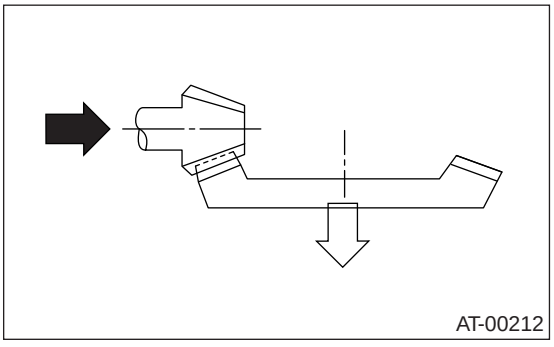
(A) Toe side
(B) Heel side

• Face contact

Checking item: Backlash is too large.
Contact pattern

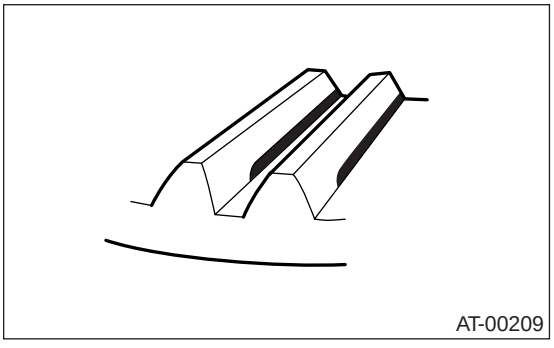


Corrective action:Decrease thickness of drive pin-ion shim in order to bring drive pinion close to crown gear.

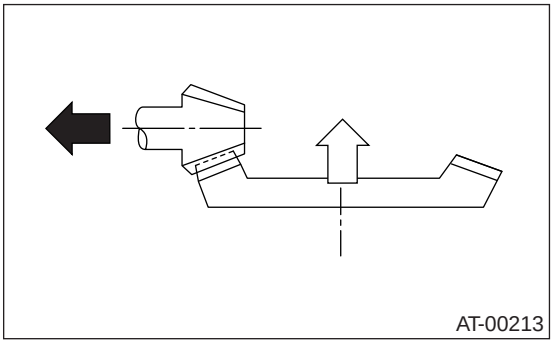


- Flank contact

Checking item: Backlash is too small.
Contact pattern

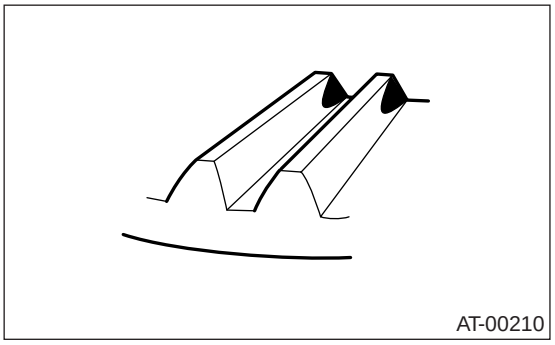


Corrective action:Increase thickness of drive pinion shim in order to move drive pinion away from crown gear.

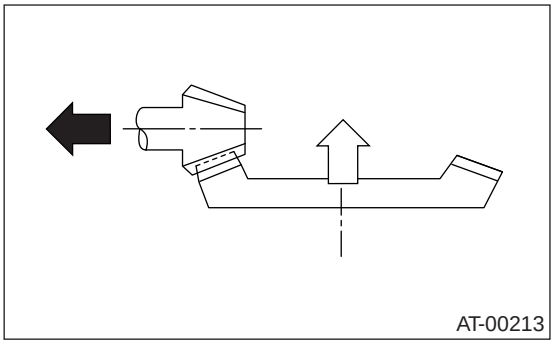


- Toe contact (Inside end contact)

Checking item: Contact areas is small.
Contact pattern

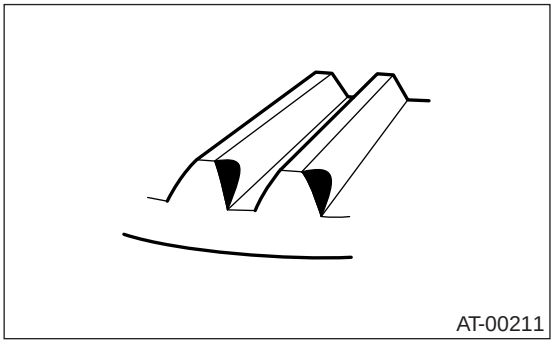


Corrective action:Increase thickness of drive pinion shim in order to bring drive pin-ion close to crown gear.



- Heel contact (Outside end contact)

Checking item: Contact areas is small.
Contact pattern



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