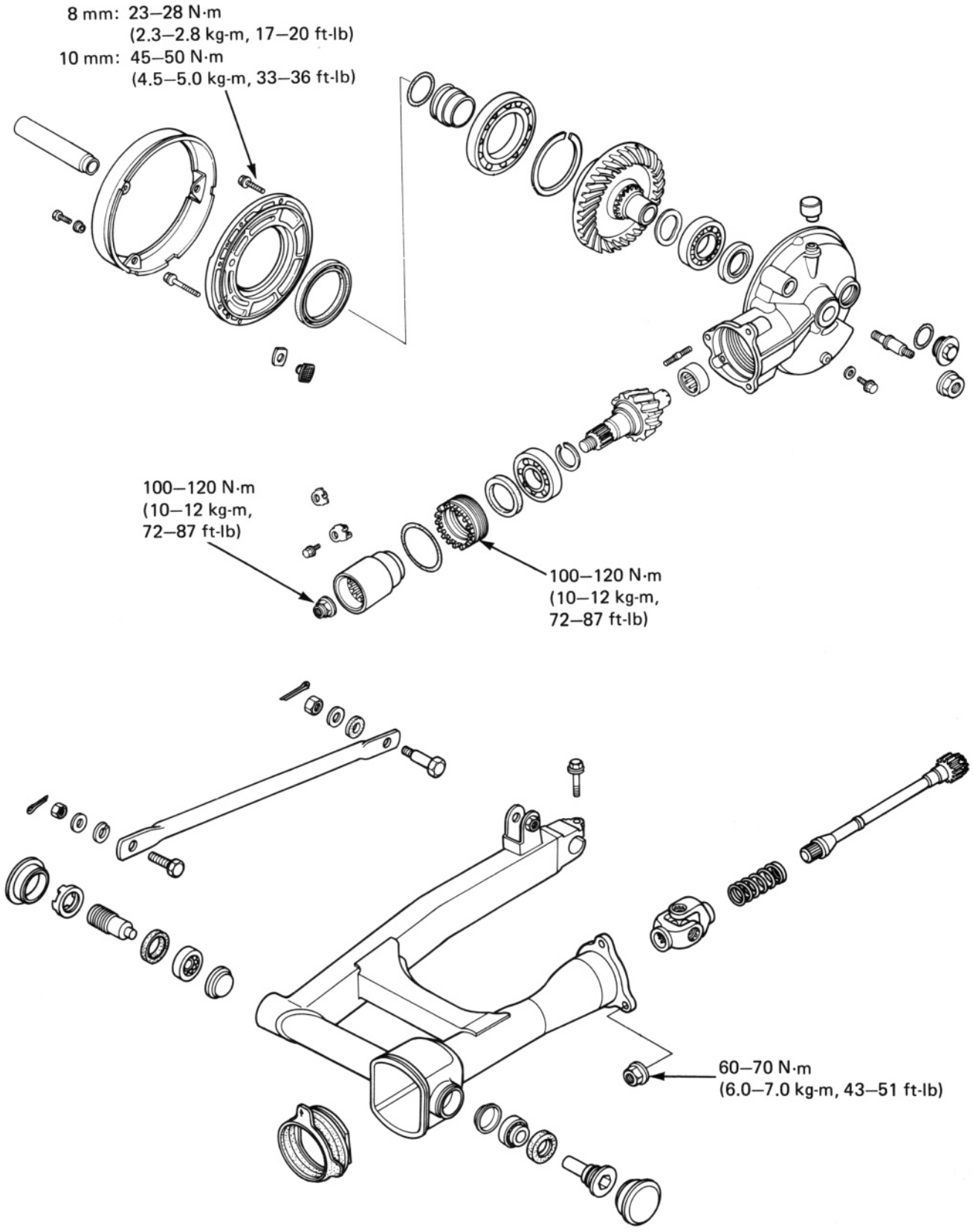

8 mm: 23–28 N·m
(2.3–2.8 kg-m, 17–20 ft-lb)
10 mm: 45–50 N·m
(4.5–5.0 kg-m, 33–36 ft-lb)
100–120 N·m
(10–12 kg-m,
72–87 ft-lb)
100–120 N·m
(10–12 kg-m,
72–87 ft-lb)
60–70 N·m
(6.0–7.0 kg-m, 43–51 ft-lb)

14. DRIVE TRAIN

SERVICE INFORMATION

GENERAL

- The final drive gear assembly must be removed together with the drive shaft.
- Replace all oil seals and O-rings whenever the final drive gear assembly is disassembled.
- Check tooth contact pattern and gear backlash when the bearing, gear set and/or gear case has been replace.
- When using the lock nut wrench, use a deflecting beam type torque wrench 355–510 mm's (14–20 inches) long. The lock nut wrench increases the torque wrench's leverage, so the torque wrench reading will be less than the torque actually applied to the lock nut. The specification given is the actual torque applied to the lock nut, not the reading on the torque wrench when used with the lock nut wrench what the torque wrench scale reading should be given with the actual torque specification.

SPECIFICATIONS

		STANDARD	SERVICE LIMIT
Final gear oil	Capacity	170 cc (5.8 ozs)	—
	Recommended oil	Hypoid-gear oil API, GL–5 Above 5°C/41°F SAE #90 Below 5°C/41°F SAE #80	—
Gear backlash		0.08–0.18 mm (0.003–0.007 in)	0.30 mm (0.012 in)
Gear assembly preload		0.2–0.3 N·m (2–3 kg-m, 1.7–2.6 in-lb)	—

TORQUE VALUES

Pinion bearing retainer	100–120 N·m (10–12 kg-m, 72–87 ft-lb)
Pinion nut	100–120 N·m (10–12 kg-m, 72–87 ft-lb)
Gear case cover bolt 10 mm	45–50 N·m (4.5–5.0 kg-m, 33–36 ft-lb)
8 mm	23–28 N·m (2.3–2.8 kg-m, 17–20 ft-lb)
Final gear case attaching nut	60–70 N·m (6.0–7.0 kg-m, 43–51 ft-lb)

TOOLS

Special

Attachment	07945–3330300
Attachment	07947–6340201
Lock nut wrench, 30/64 mm	07916–MB00000 or 07910–MA10100
Pinion puller	07931–4630200 and 07931–MB00000 or 07935–MB00000
Pinion joint holder	07924–ME90000
Driver	07931–4630300 or 07947–3710101 and 07746–0010200
O-ring guide	07973–4630200
Bearing remover, 35 mm	07936–3710400

Common

Driver	07749–0010000
Attachment, 42 x 47 mm	07746–0010300
Attachment, 52 x 55 mm	07746–0010400
Attachment, 32 x 35 mm	07746–0010100
Pilot, 30 mm	07746–0040700
Driver C	07746–0030100 } or Driver 07945–3710200
Attachment, 25 mm I.D.	07746–0030200 }

TROUBLESHOOTING

Excessive noise

1. Worn or scored ring gear shaft and driven flange.
2. Scored driven flange and wheel hub.
3. Worn or scored drive pinion and splines.
4. Worn pinion and ring gears.
5. Excessive backlash between pinion and ring gear.
6. Oil level too low.

Oil leak

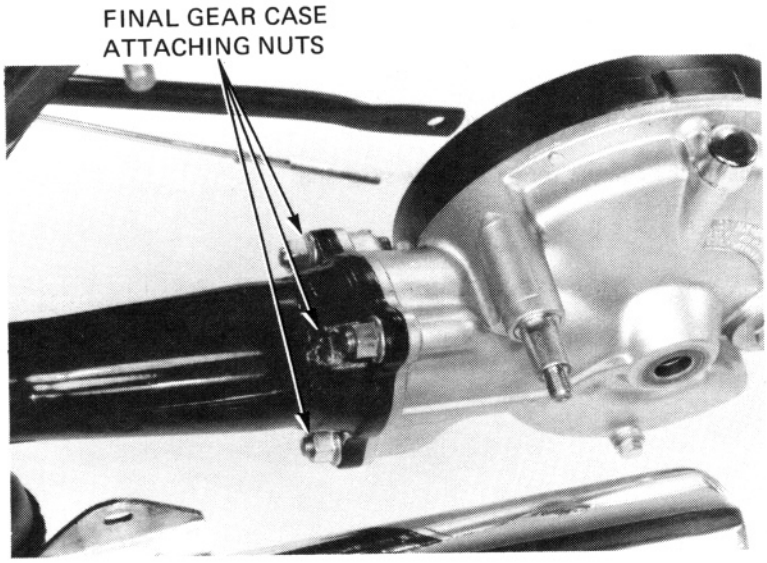
1. Clogged breather.
2. Oil level too high.
3. Seals damaged.

FINAL DRIVE REMOVAL

Place the motorcycle on its center stand. Drain the final gear oil (page 2-11) and remove the rear wheel (page 16-3).

Remove the left shock absorber (page 16-10).

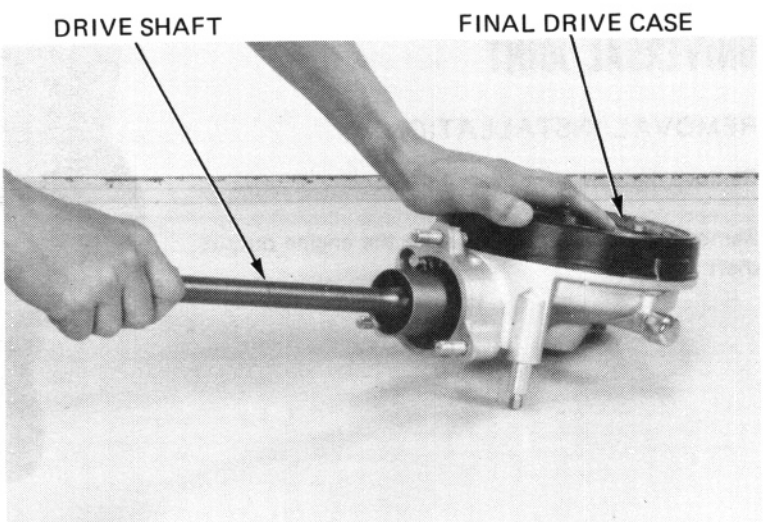
Remove the final gear case attaching nuts and remove the gear case from the swingarm.



DRIVE SHAFT

REMOVAL

Separate the drive shaft from the gear case by gently revolving the shaft in a circular motion while tugging slightly.

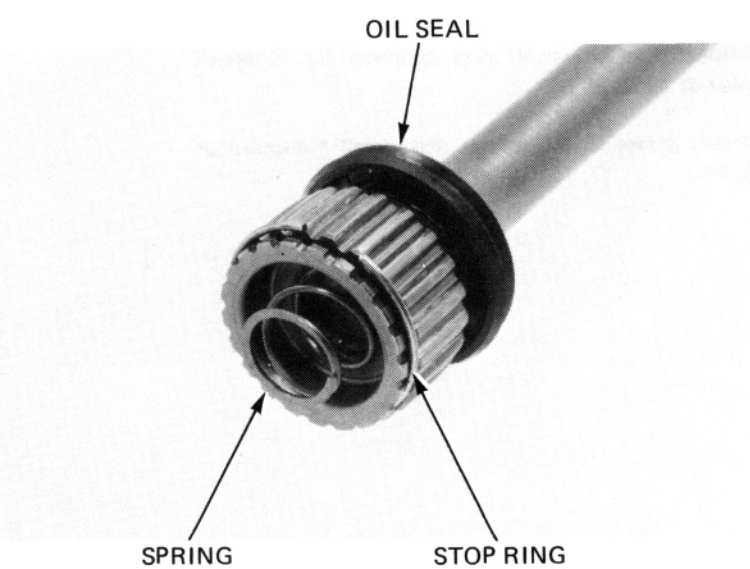


DISASSEMBLY

Remove the spring, oil seal and stop ring from the drive shaft.

NOTE:

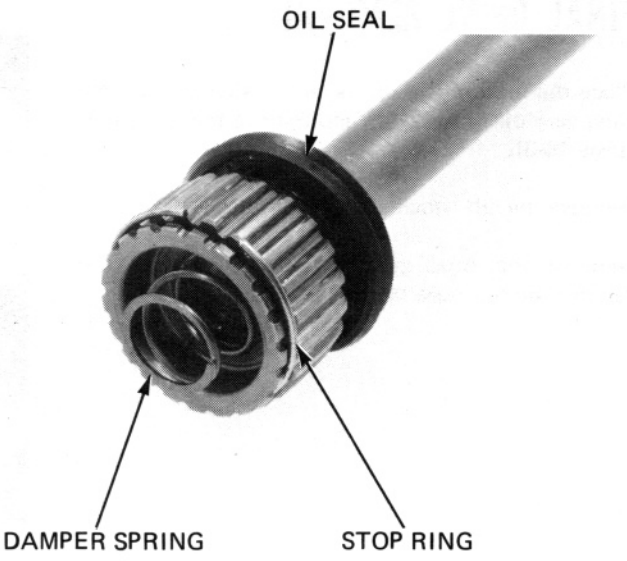
> Replace the oil seal with a new one if it is removed.



ASSEMBLY

Place a new oil seal over the drive shaft.

Install the damper spring and new stop ring.

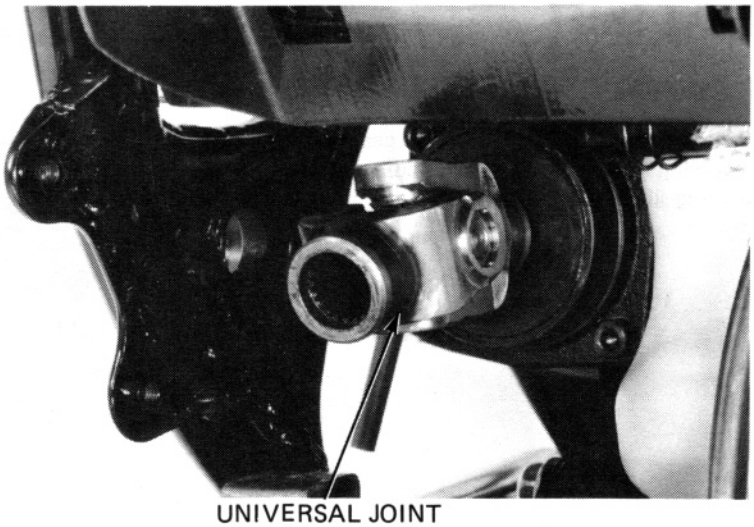


UNIVERSAL JOINT

REMOVAL/INSTALLATION

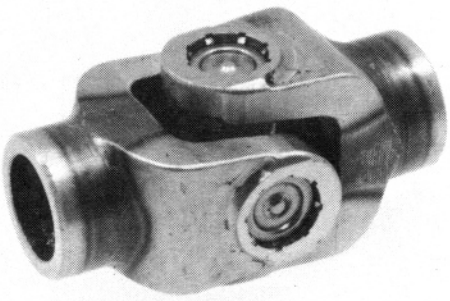
Remove the swingarm (page 16-13).

Remove the universal joint from the engine output shaft.



Inspect the universal joint bearings for excessive play or damage.

Apply grease to the splines and install the universal joint.

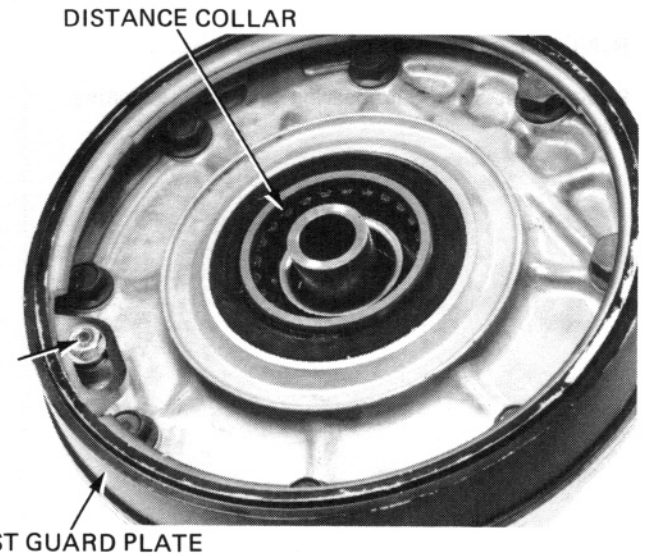


FINAL DRIVE GEAR

RING GEAR REMOVAL

Remove the distance collar.

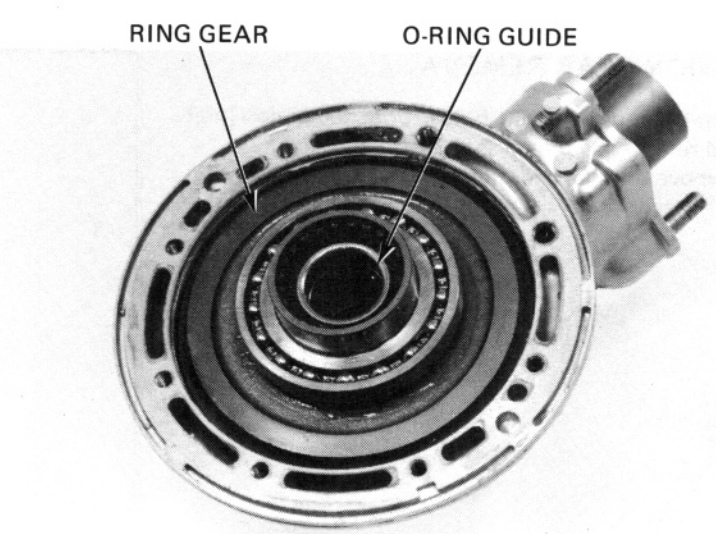
Remove the dust guard plate bolts. Remove the dust guard plate by turning it clockwise.



Remove the eight case cover bolts and cover. If the ring gear stays in the cover, do the following:
Place the cover in a press with the ring gear down. Make sure the cover is secrely supported.
Press the ring gear out of the cover with driver 07749–0010000 and attachment 07746–0010100.

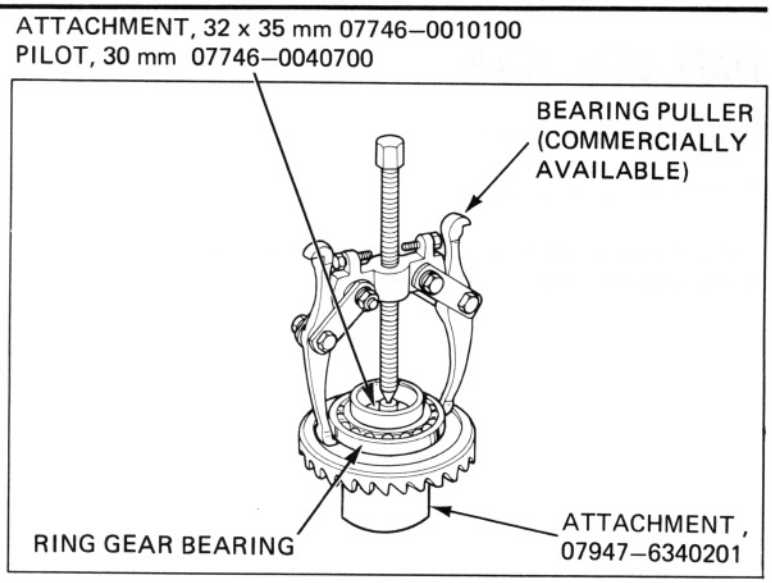
Remove the ring gear from the final drive case.

Remove the O-ring guide by tapping it from the opposite side.



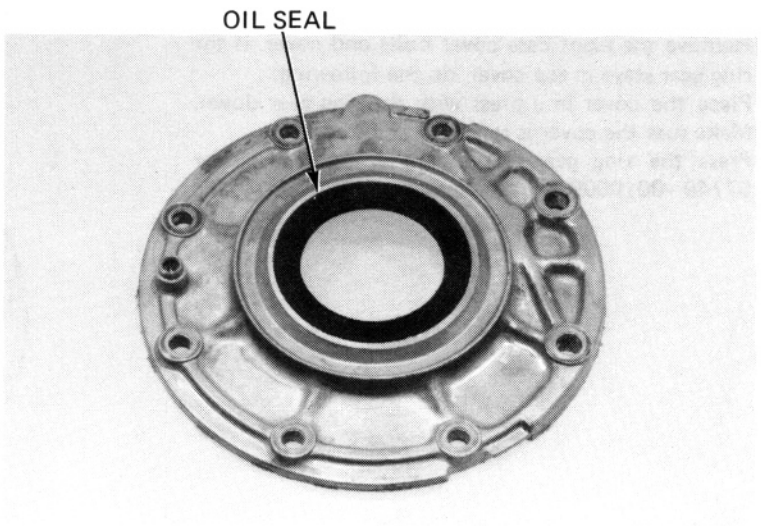
RING GEAR BEARING REMOVAL

Remove the ring gear bearing and gear adjusting spacer.



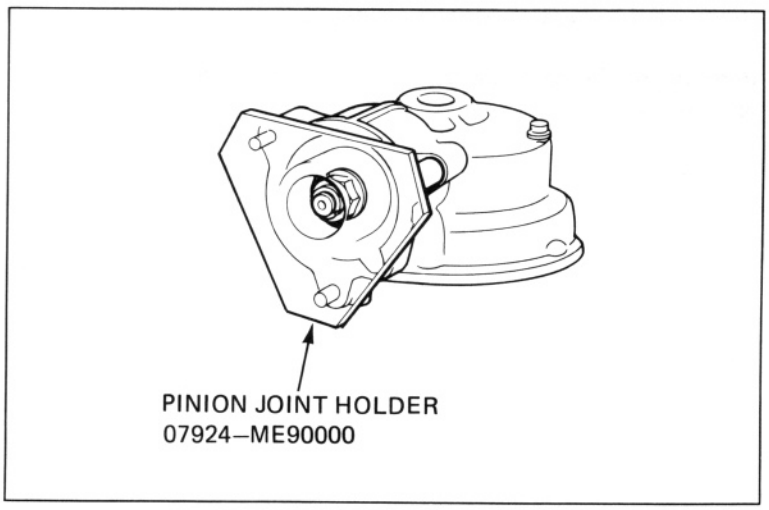
CASE COVER OIL SEAL REPLACEMENT

Remove the oil seal from the case cover and press in a new oil seal.

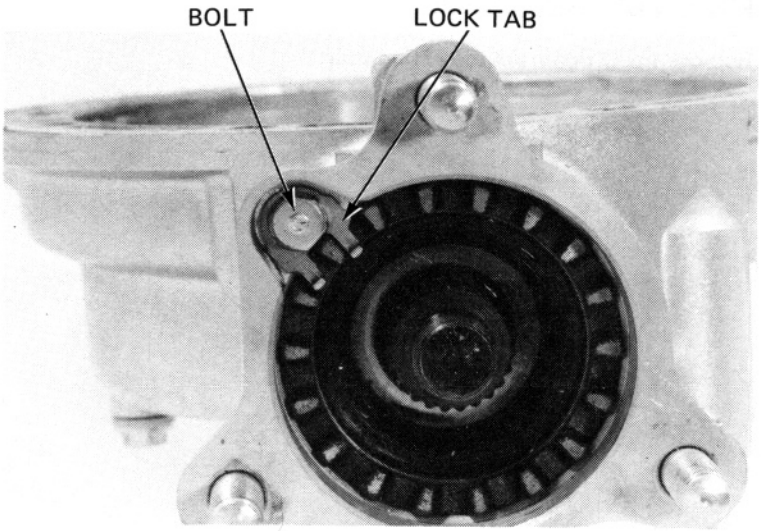


PINION GEAR REMOVAL

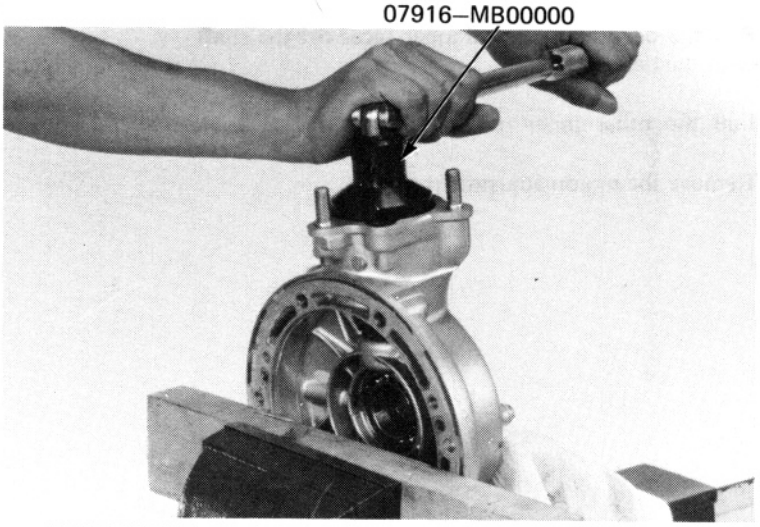
Install the pinion joint holder onto the pinion joint and remove the pinion shaft nut.
Remove the tool and pinion joint.



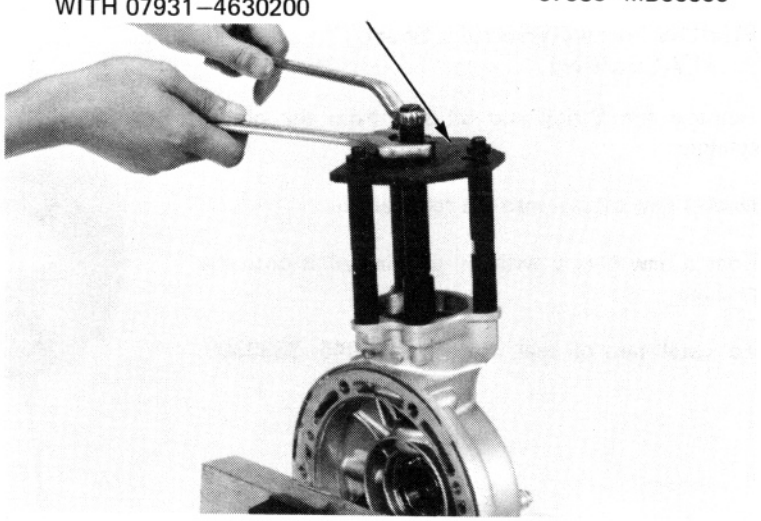
Remove the retainer lock tab.



Remove the pinion retainer with the pinion retainer wrench.

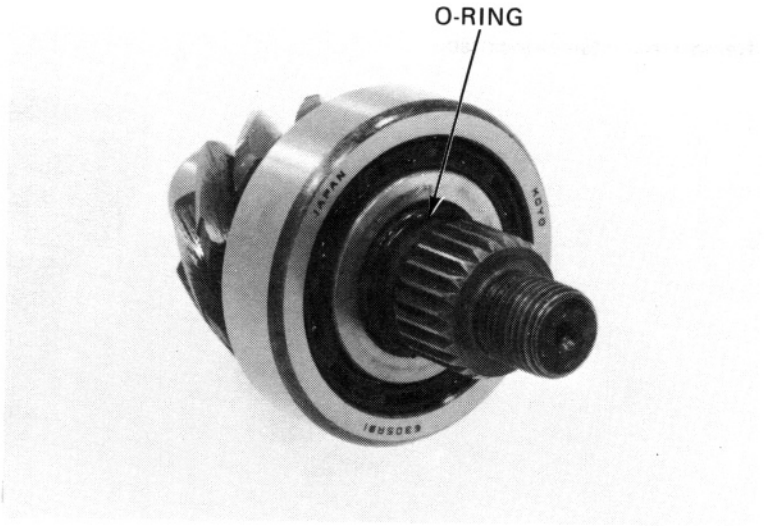


Pull the pinion assembly off with the pinion puller.



PINION BEARING REMOVAL

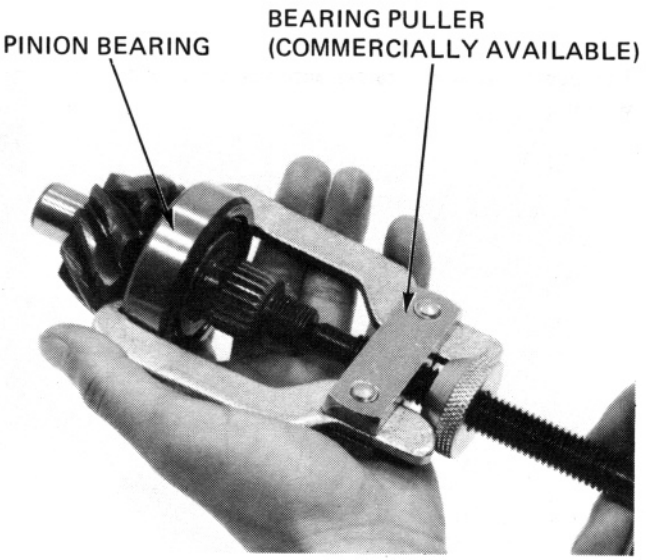
Remove the O-ring from the pinion shaft.



Pull the bearing outer and inner races off the shaft with the bearing puller.

Pull the other inner race off with the same tool.

Remove the pinion adjustment spacer.



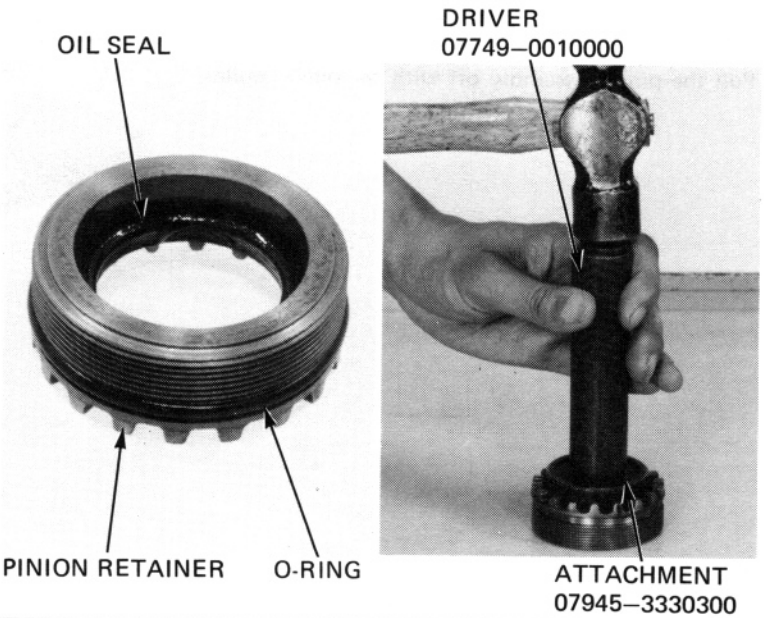
PINION RETAINER OIL SEAL REPLACEMENT

Remove the O-ring and oil seal from the pinion retainer.

Drive a new oil seal into the retainer.

Coat a new O-ring with oil and install it onto the retainer.

To install new oil seal, use driver 07945–3330300.



CASE BEARING AND OIL SEAL REPLACEMENT

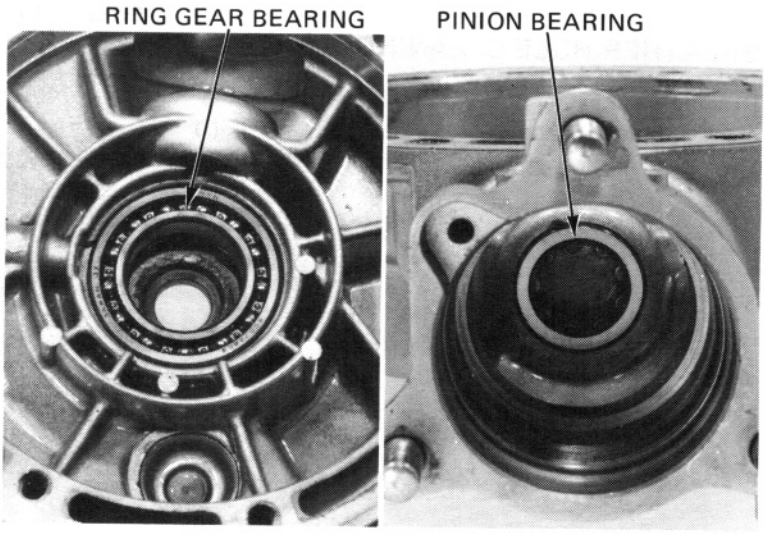
Heat the gear case 80°C (176°F). Tap the gear case with a plastic hammer and remove the ring gear and pinion bearings.

WARNING

Always wear gloves when handling the gear case after it has been heated.

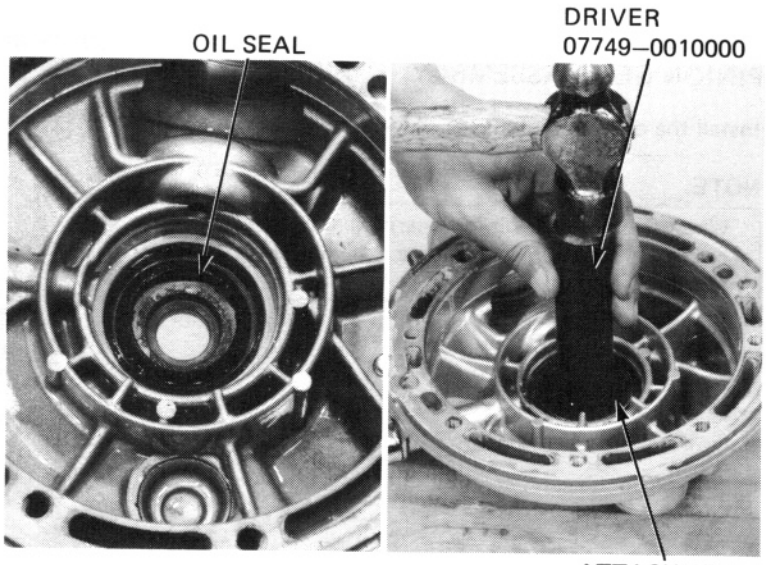
NOTE:

Use bearing remover, 35 mm, 07936–3710400 to remove ring gear case bearing.

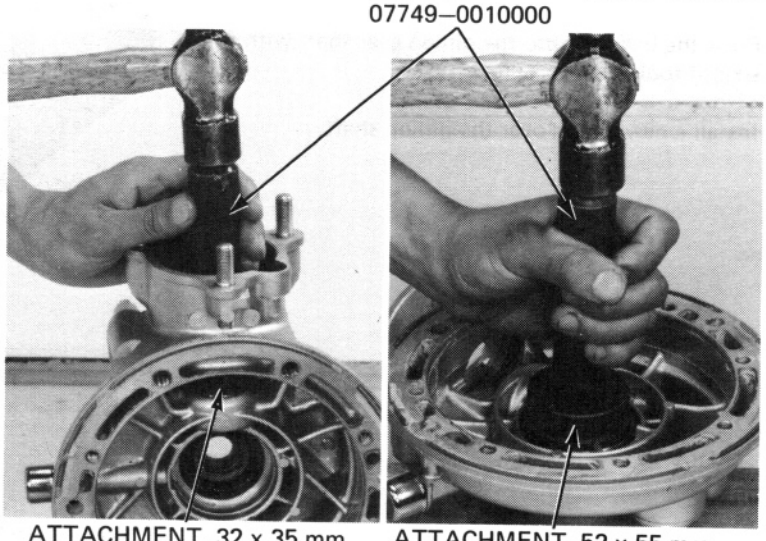


Remove the ring gear shaft oil seal.

Drive a new oil seal into the case, using the special tools.

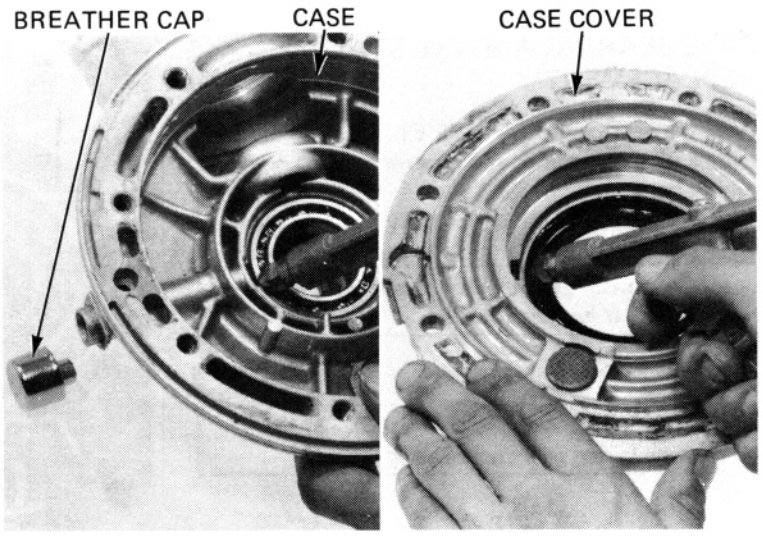


Drive new pinion and ring gear bearings into the case.



BREATHER HOLE CLEANING

Remove the breather hole cap and blow through the breather hole with compressed air.

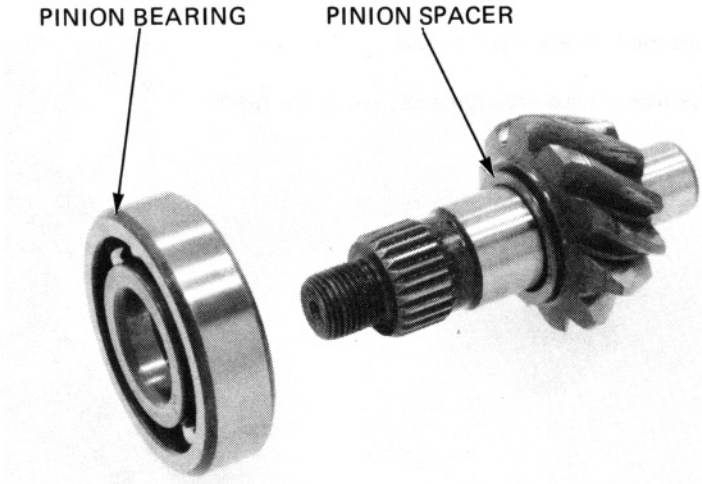


PINION GEAR ASSEMBLY

Install the original pinion gear spacer.

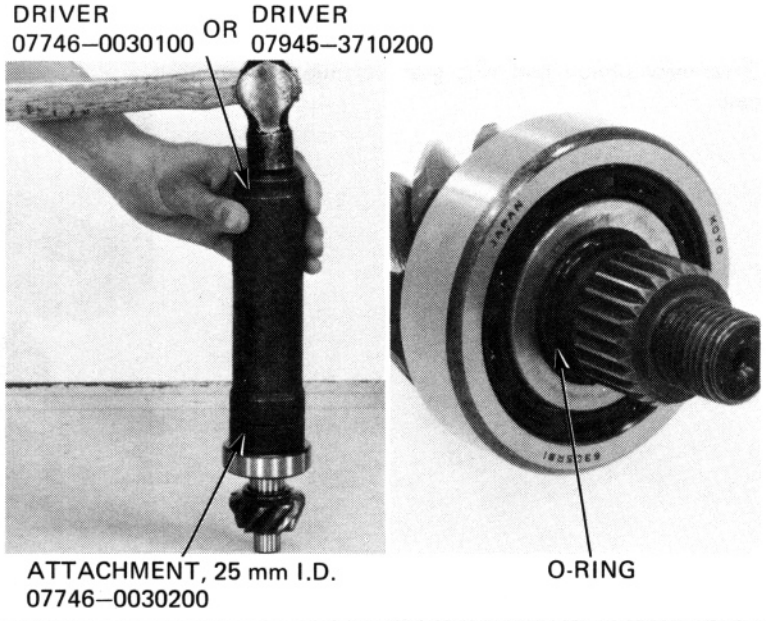
NOTE:

> When the gear set, pinion bearing and/or gear case has been replaced, use a 2.0 mm thick spacer.



Press the bearing onto the pinion gear shaft with the special tools shown.

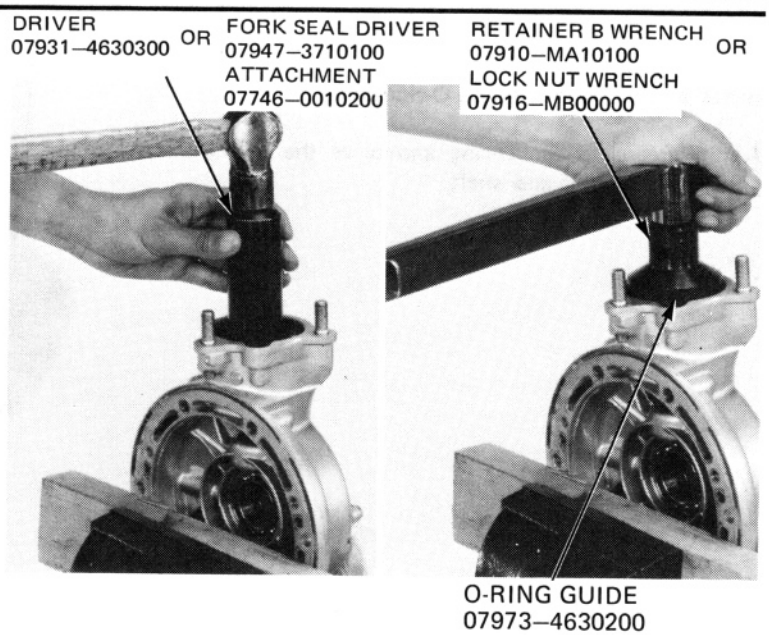
Install a new O-ring over the pinion shaft.



Place the pinion assembly into the gear housing. Drive the pinion assembly into the gear case until pinion retainer threads can engage with the case threads.
Apply gear oil to the O-ring and threads on the pinion retainer. Install the O-ring guide tool.

Screw in the pinion retainer to press the pinion bearing in place, then tighten it to the specified torque.

TORQUE:
100–120 N·m (10–12 kg-m, 72–87 ft-lb)



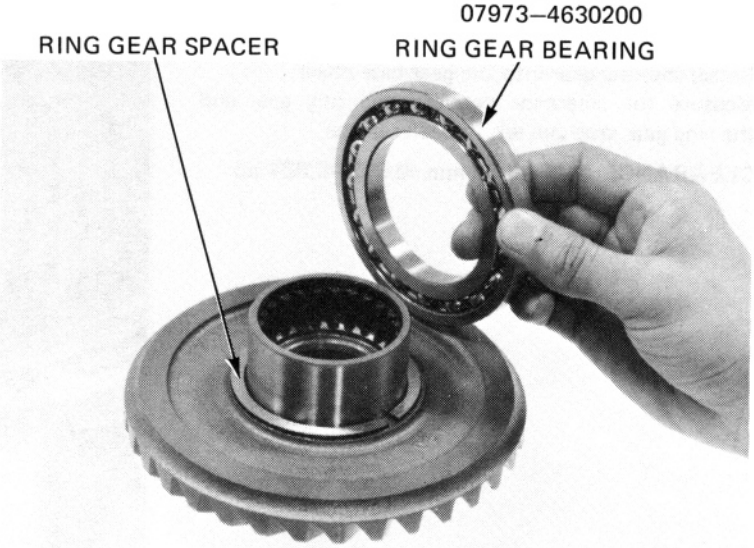
RING GEAR ASSEMBLY

Install the original spacer onto the ring gear.

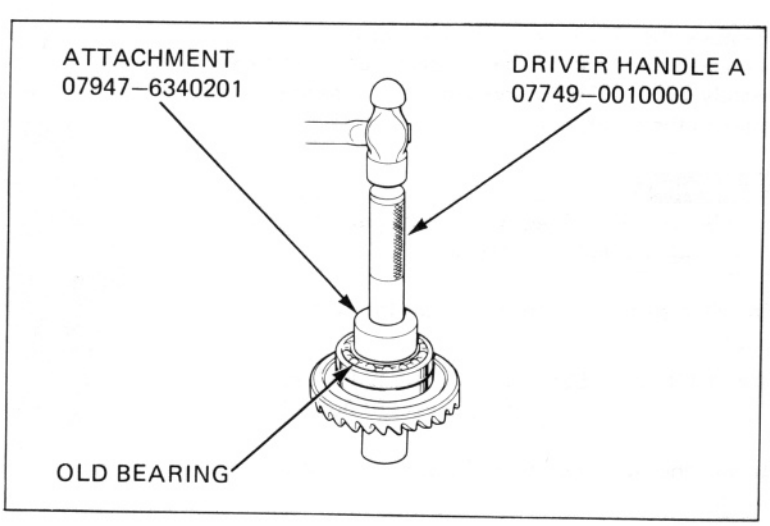
NOTE:

> If the gear set, pinion bearing, ring gear bearing and/or gear case is replaced, install a 2.0 mm thick spacer.

Place the ring gear bearing over the ring gear shaft.

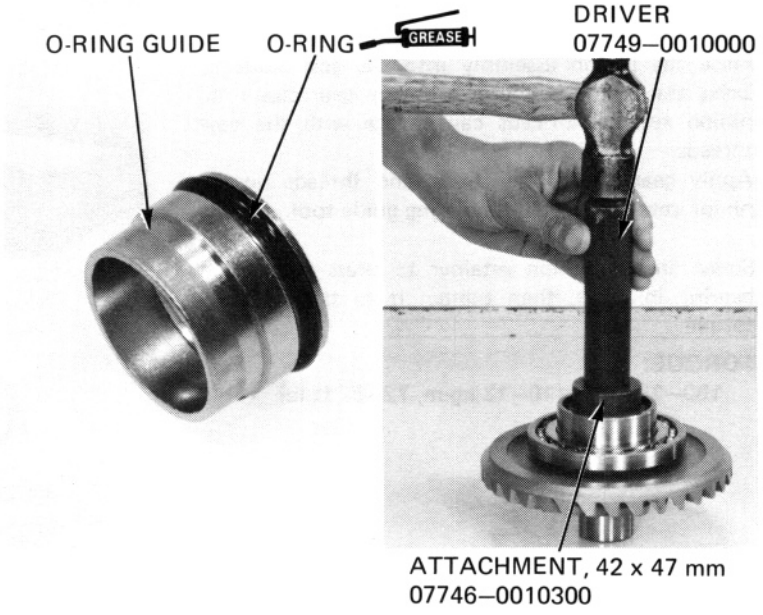


Place a new ring gear bearing on the ring gear shaft. Place the old bearing on top of it. Then, drive the new bearing onto the shaft with the old bearing and attachment. Then remove the old bearing.



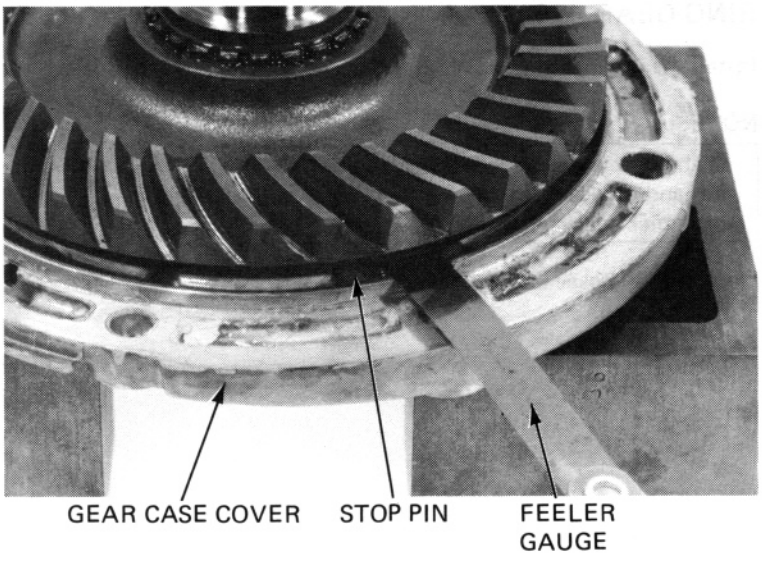
Install a new O-ring onto the O-ring guide.

Apply grease to the O-ring and drive the O-ring guide onto the ring gear shaft.



Install the ring gear into the gear case cover.
Measure the clearance between the ring gear and the ring gear stop pin with a feeler gauge.

CLEARANCE: 0.30–0.60 mm (0.012–0.024 in)



Remove the ring gear. If the clearance exceeds the service limit, heat the gear case cover to approximately 80°C (176°F) and remove the stop pin by tapping the cover.

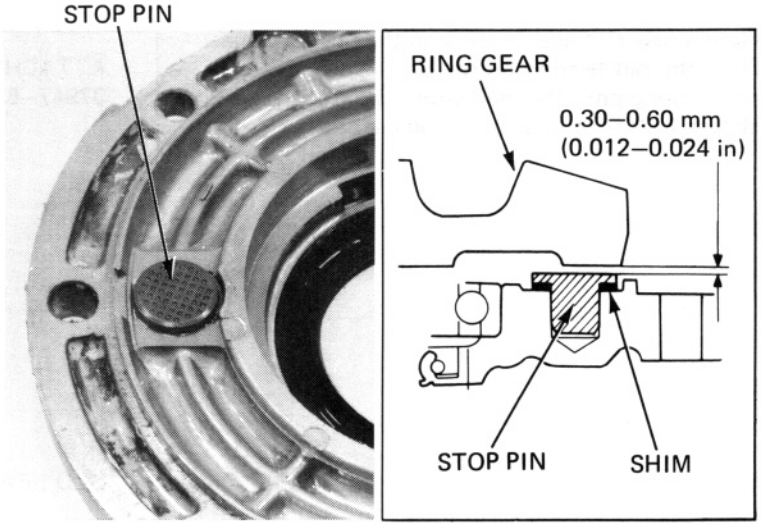
WARNING

Always wear gloves when handling the gear case after it has been heated.

Install a stop pin shim to obtain the correct clearance.

SHIM THICKNESS: **A: 0.10 mm (0.004 in)**
B: 0.15 mm (0.006 in)

Install the shim and drive the stop pin into the case cover.

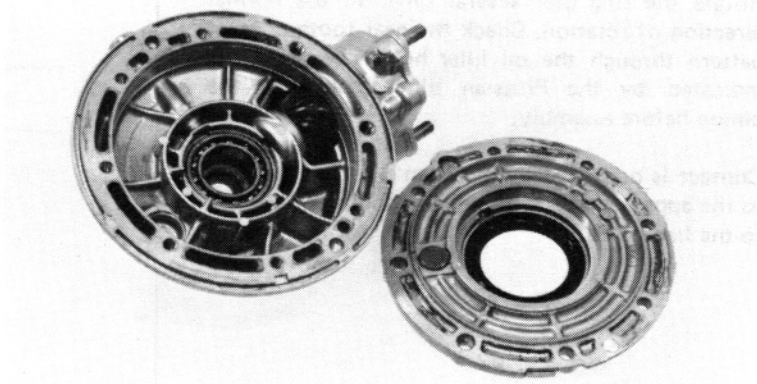


Clean all sealing material off the mating surfaces of the gear case and cover.

NOTE:

- Keep dust and dirt out of the gear case.
- Be careful not to damage the mating surfaces.

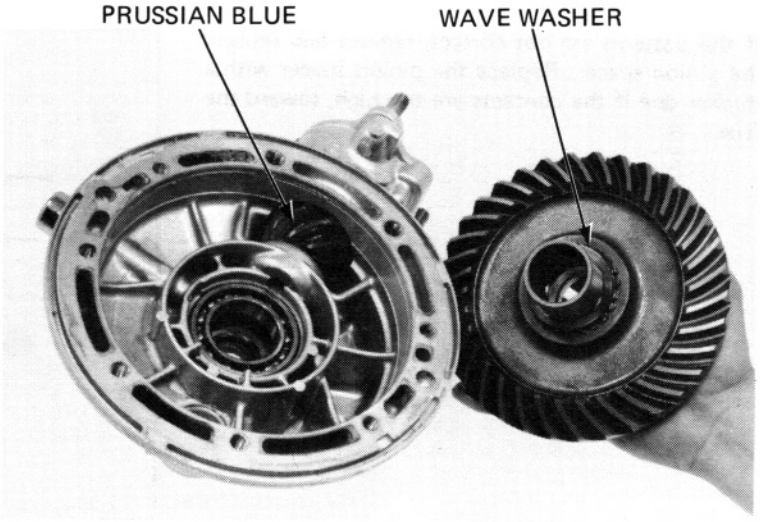
Apply liquid sealant to the mating surface of the gear case cover.



GEAR TOOTH CONTACT PATTERN CHECK

Apply a thin coat of Prussian Blue to the pinion gear teeth for a gear tooth contact pattern check. Place the wave washer and ring gear into the gear case.

Apply gear oil to the lip of the oil seal on the gear case cover and install the gear case cover.

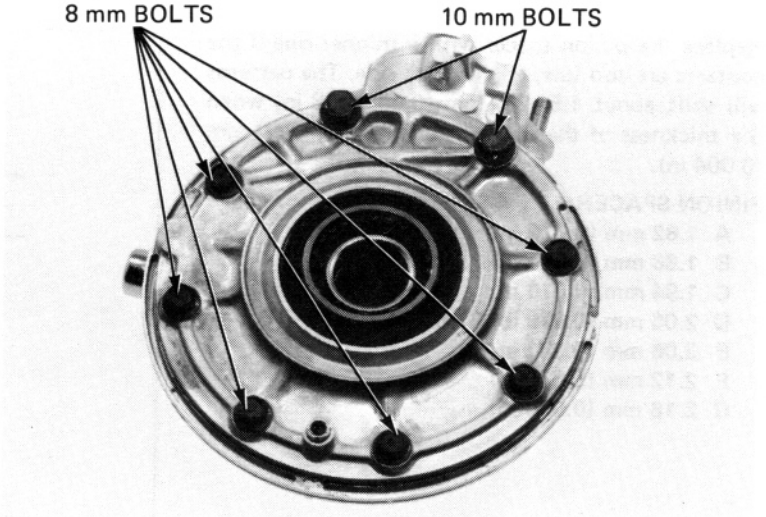


Tighten the cover bolts in 2–3 steps until the cover evenly touches the gear case, then tighten the 8 mm bolts to the specified torque in a crisscross pattern in two or more steps.

TORQUE: 23–28 N·m (2.3–2.8 kg-m, 17–20 ft-lb)

Then tighten the 10 mm bolts.

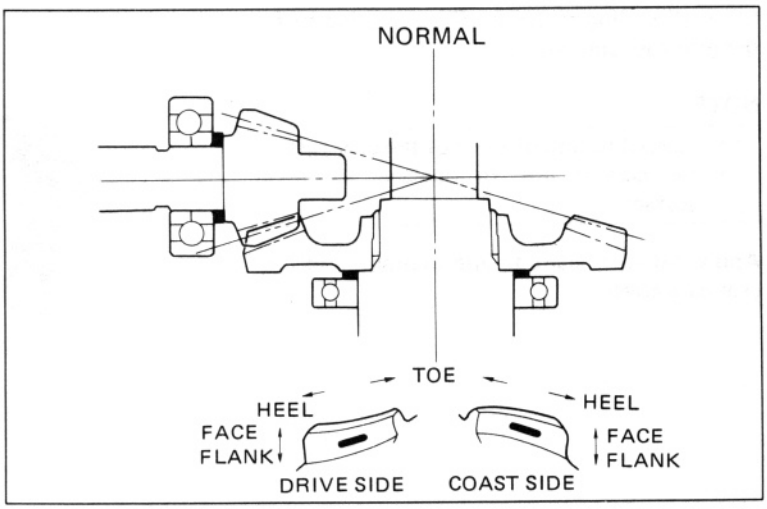
TORQUE: 40–50 N·m (4.5–5.0 kg-m, 33–36 ft-lb)



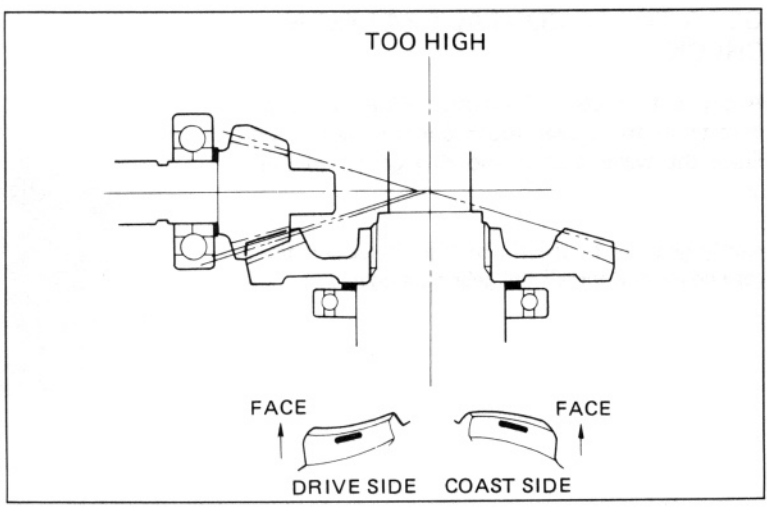
Remove the oil filler cap from the final gear case.

Rotate the ring gear several times in the normal direction of rotation. Check the gear tooth contact pattern through the oil filler hole. The pattern is indicated by the Prussian Blue applied to the pinion before assembly.

Contact is normal if the Prussian Blue is transfered to the approximate center of each tooth and slightly to the flank side.



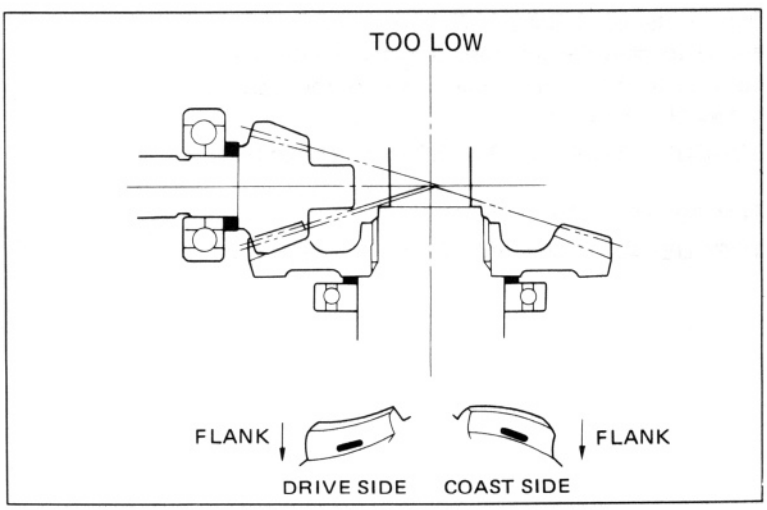
If the patterns are not correct, remove and replace the pinion spacer. Replace the pinion spacer with a thicker one if the contacts are too high, toward the face.



Replace the pinion spacer with a thinner one if the contacts are too low, to the flank side. The patterns will shift about 1.5–2.0 mm (0.06–0.08 in) when the thickness of the spacer is changed by 0.10 mm (0.004 in).

PINION SPACER:

- **A 1.82 mm (0.072 in)**
- **B 1.88 mm (0.074 in)**
- **C 1.94 mm (0.076 in)**
- **D 2.00 mm (0.079 in) Standard**
- **E 2.06 mm (0.081 in)**
- **F 2.12 mm (0.084 in)**
- **G 2.18 mm (0.086 in)**

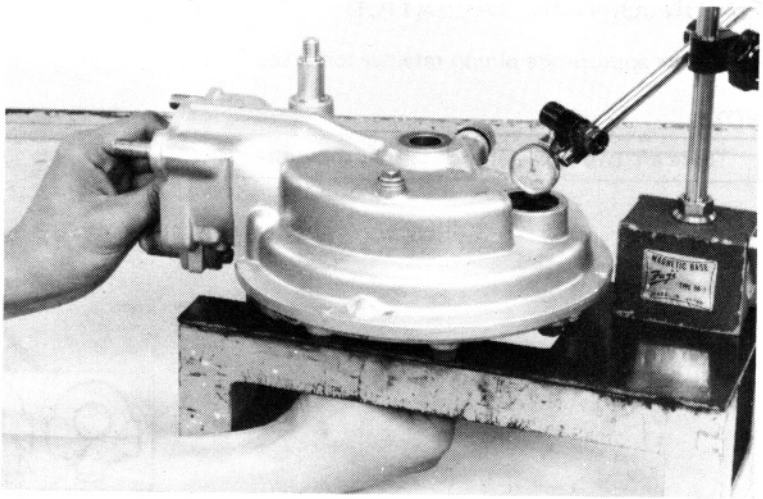


BACKLASH INSPECTION

Remove the oil filler cap.

Set the final gear assembly into a jig or stand to hold it steady. Set a horizontal type dial indicator on the ring gear, through the oil filler hole.
Hold the pinion gear spline by hand. Rotate the ring gear by hand until gear slack is taken up. Turn the ring gear back and forth to read backlash.

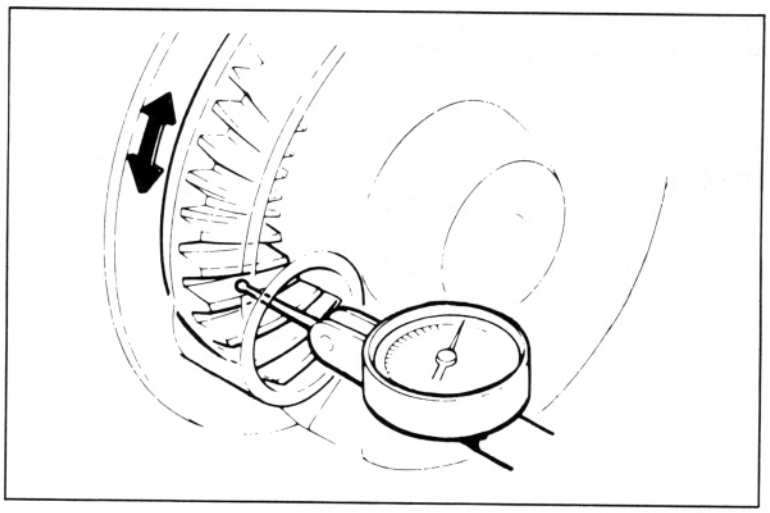
STANDARD: 0.08–0.18 mm (0.003–0.007 in)
SERVICE LIMIT: 0.30 mm (0.02 in)



Remove the dial indicator. Turn the ring gear 120° and measure backlash. Repeat this procedure once more.

Compare the difference of the three measurements.

DIFFERENCE OF MEASUREMENT
SERVICE LIMIT: 0.10 mm (0.004 in)



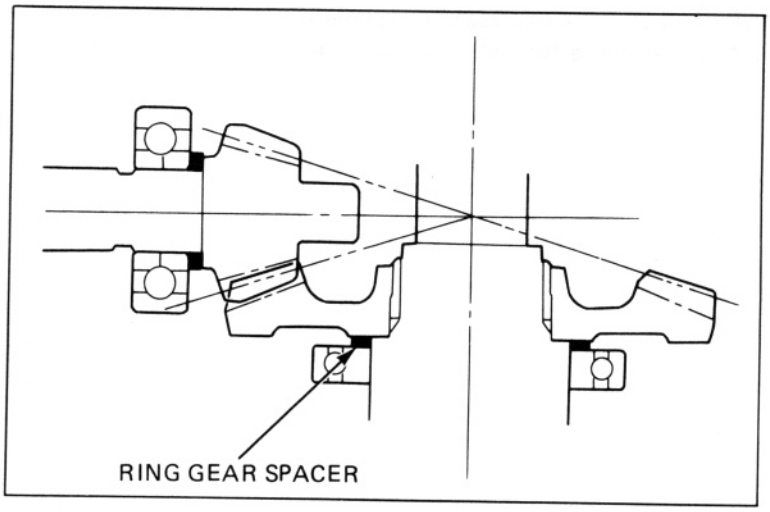
If the difference in measurements exceeds the limit, it indicates that the bearing is not installed squarely. Inspect the bearings and reinstall if necessary.

If backlash is too small, replace the ring gear spacer with a thinner one.

Backlash is changed by about 0.06–0.07 mm (0.002–0.003 in) when thickness of the spacer is changed by 0.10 mm (0.004 in).

RING GEAR SPACER:

- **A 1.82 mm (0.072 in)**
- **B 1.88 mm (0.074 in)**
- **C 1.94 mm (0.076 in)**
- **D 2.00 mm (0.079 in) Standard**
- **E 2.06 mm (0.081 in)**
- **F 2.12 mm (0.084 in)**
- **G 2.18 mm (0.086 in)**
- **H 2.24 mm (0.088 in)**
- **I 2.30 mm (0.091 in)**

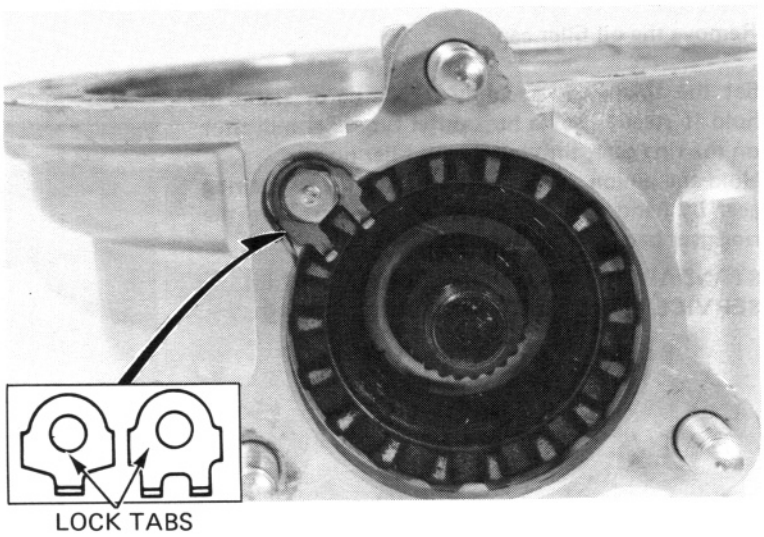


PINION JOINT INSTALLATION

Install the appropriate pinion retainer lock tab.

NOTE:

There are two types of lock tabs as shown.

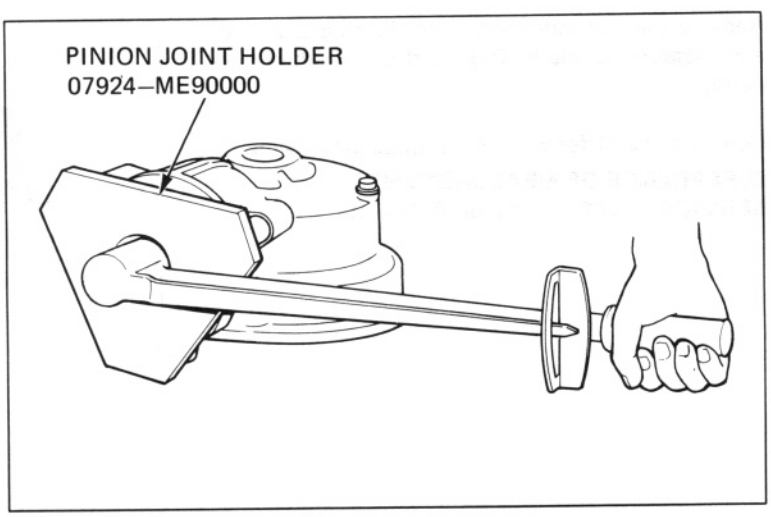


Apply gear oil to the oil seal lip contact surface of the pinion joint and install the pinion joint.

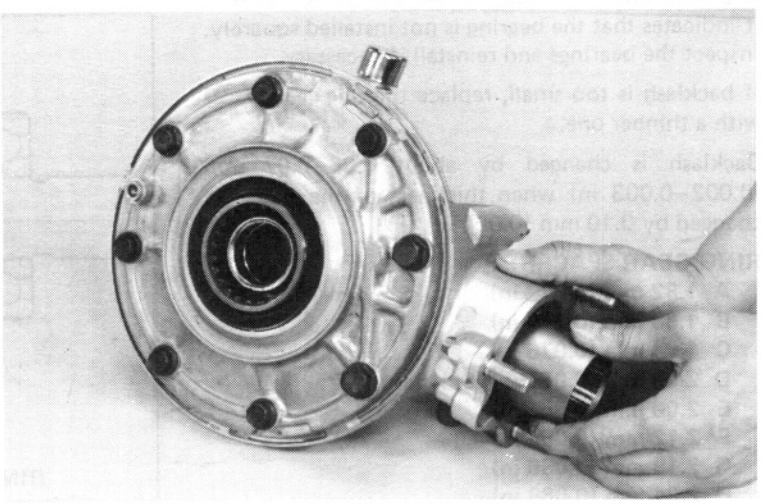
Install the pinion joint holder tool and tighten the pinion nut.

TORQUE:
100–120 N·m (10–12 kg-m, 72–87 ft-lb)

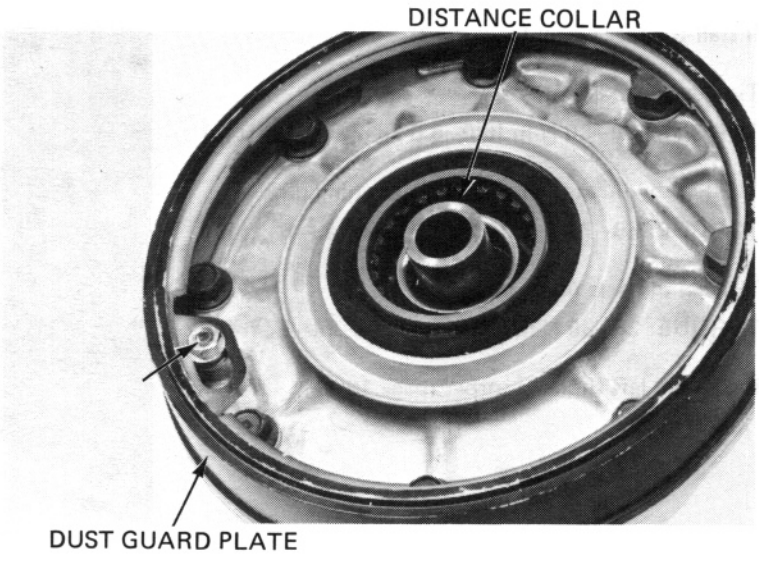
Remove the pinion joint holder tool.



Make sure that the gear assembly rotates smoothly without binding by turning the pinion joint.



Install the dust guard plate and torque the bolt. Install the distance collar.



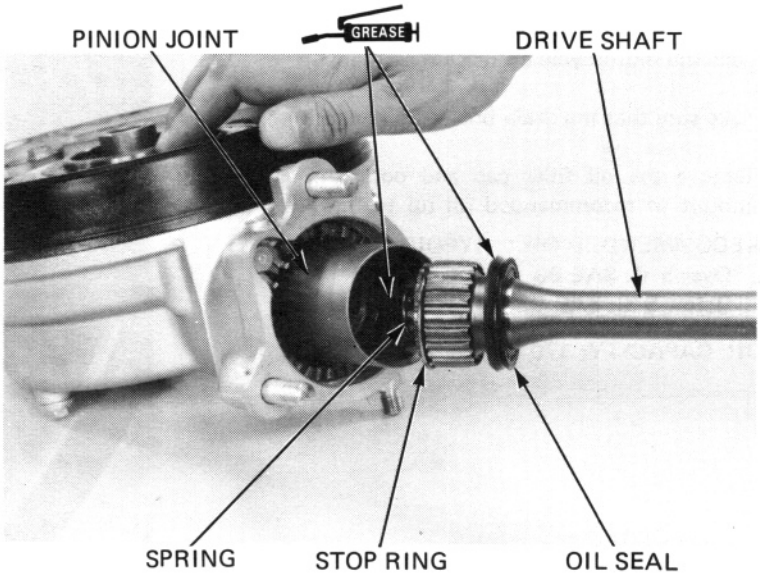
FINAL DRIVE INSTALLATION

Apply grease to the pinion joint splines and drive shaft oil seal.

Insert the drive shaft into the pinion joint until the stop ring seats in the pinion joint spline grooves.

NOTE:

- Make sure that the stop ring is seated properly by pulling on the drive shaft lightly.
- Be careful not to damage the drive shaft oil seal.

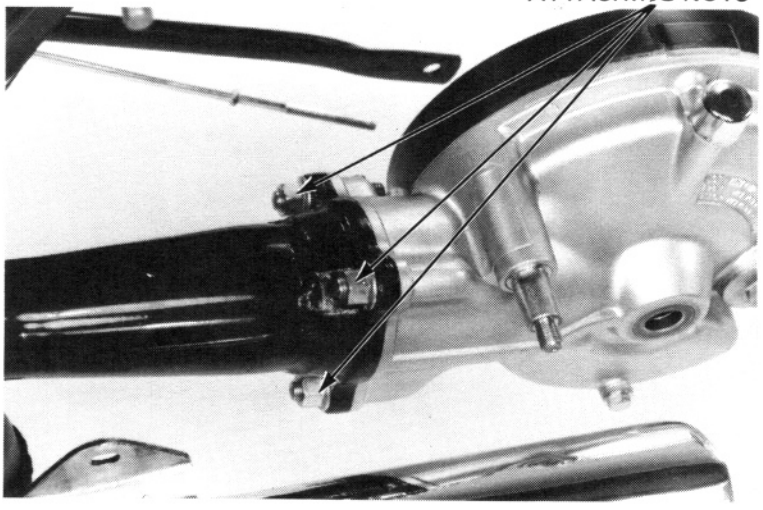


Insert the drive shaft assembly into the swingarm and align its splines with the universal joint.

Attach the gear case onto the swingarm loosely.

NOTE:

To ease axle installation, do not tighten the gear case nuts until after the axle is installed.



Install the rear wheel (page 16-7).

Tighten the axle nut.

TORQUE: 60–80 N·m (6.0–8.0 kg-m, 44–58 ft-lb)

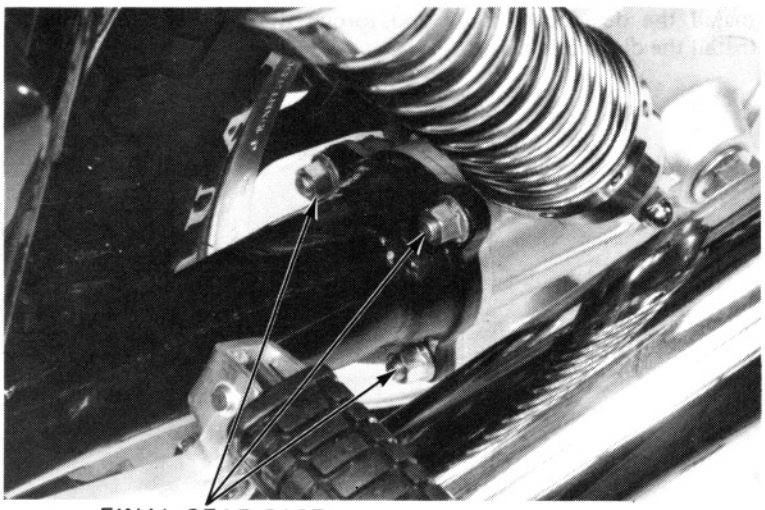
Tighten the three final gear case attaching nuts.

TORQUE: 60–70 N·m (6.0–7.0 kg-m, 43–51 ft-lb)

Tighten the axle pinch bolt.

TORQUE: 20–30 N·m (2.0–3.0 kg-m, 14–22 ft-lb)

Install the left shock absorber (page 16-12).



FINAL GEAR CASE
ATTACHING NUTS

Place the motorcycle on its center stand.

Make sure that the drain bolt is tightened.

Remove the oil filler cap and pour the specified amount of recommended oil up to the filler neck.

RECOMMENDED OIL: HYPOID GEAR OIL
Over 5°C: SAE 90
Below 5°C: SAE 80

OIL CAPACITY: 170 cc (5.8 oz)