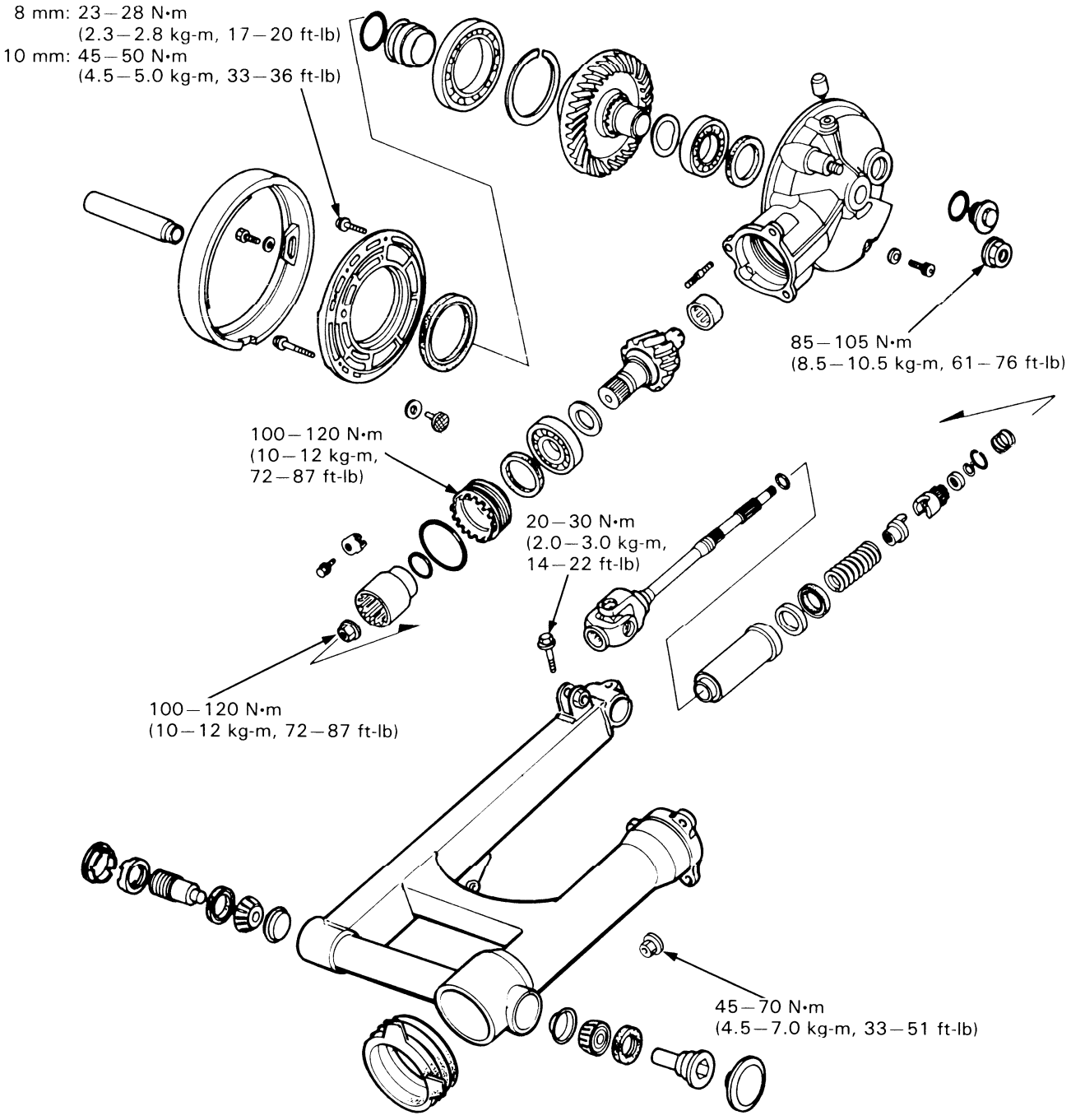

8 mm: 23—28 N•m
(2.3—2.8 kg-m, 17—20 ft-lb)
10 mm: 45—50 N•m
(4.5—5.0 kg-m, 33—36 ft-lb)
85—105 N•m
(8.5—10.5 kg-m, 61—76 ft-lb)
100—120 N•m
(10—12 kg-m,
72—87 ft-lb)
20—30 N•m
(2.0—3.0 kg-m,
14—22 ft-lb)
100—120 N•m
(10—12 kg-m, 72—87 ft-lb)
45—70 N•m
(4.5—7.0 kg-m, 33—51 ft-lb)

12. FINAL DRIVE

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 have been replaced.

SPECIFICATIONS

		STANDARD	SERVICE LIMIT
Final gear oil	Capacity	150 cc (5.1 ozs) after disassembly	—
	Recommended oil	Hypoid-gear oil SAE #80	—
Gear backlash		0.05—0.15 mm (0.002—0.006 in)	0.3 mm (0.012 in)
Gear assembly preload		2—4 N·m (0.2—0.4 kg-m, 17—35 in-lb)	—
Damper case oil capacity		50 cc (1.7 oz)	—
Damper cam spring free length		65 mm (2.6 in)	63 mm (2.5 in)

TORQUE VALUES

Pinion bearing retainer	100—120 N·m (10.0—12.0 kg-m, 72—87 ft-lb)
Pinion nut	100—120 N·m (10.0—12.0 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	45—70 N·m (4.5—7.0 kg-m, 33—51 ft-lb)

TOOLS

Special

Shock absorber compressor attachment A	07964—MB00100
Shock absorber compressor attachment C	07964—MB00300
Attachment	07945—3330300
Attachment	07945—3330100
Retainer B wrench	07910—ME80000
Pinion puller	07931—4630200 and 07931—MB00000 or 07935—MB00000
Pinion joint holder	07926—ME90000
Driver	07949—3710001
Bearing attachment puller/driver	07934—MB00000

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
Attachment, 37 x 40 mm	07746—0010200
Pilot, 30 mm	07746—0040700
Driver C	07746—0030100 or Driver 07945—3710200
Attachment, 25 mm I.D.	07746—0030200
Shock absorber compressor	07959—3290001

TROUBLESHOOTING

Excessive noise

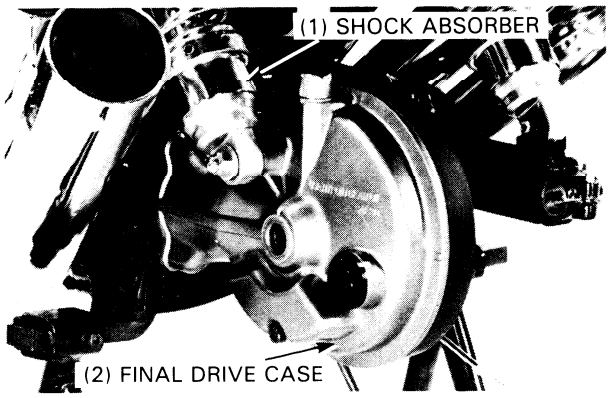
- Worn or scored ring gear shaft and driven flange
- Scored drive flange and wheel hub
- Worn or scored drive pinion and splines
- Worn pinion and ring gears
- Excessive backlash between pinion and ring gear
- Low oil level

Oil leak

- Clogged breather
- High oil level
- Damaged seals

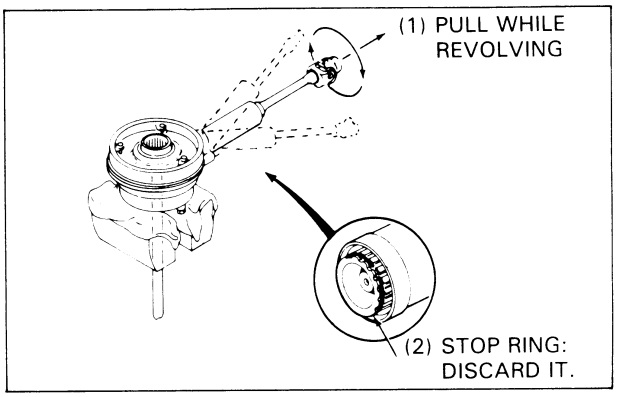
FINAL DRIVE REMOVAL

Place a jack or support brock under the engine, to raise the rear wheel off the ground.
Drain the final gear oil (page 2-10) and remove the rear wheel (page 14-3).
Remove the left shock absorber (page 14-11).
Place an oil drain pan under the gear case and swing arm mating surfaces to catch any damper cam oil that may leak out during removal of the gear case.
Remove the final gear case attaching nuts and remove the gear case from the swing arm.



NOTE

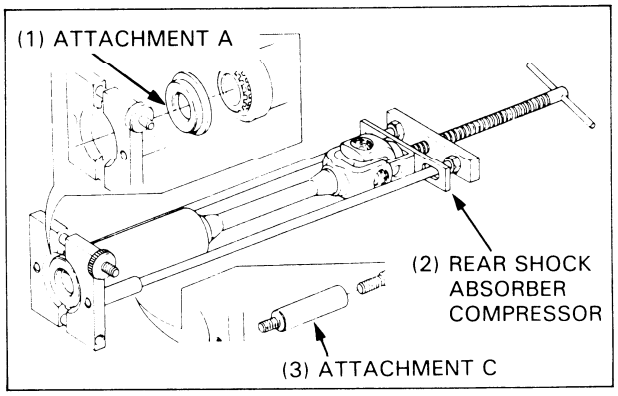
- If the drive shaft comes out with the final gear case, it indicates that the damper cam is equipped with a stop ring. The stop ring was used for production line assembly purposes. See below for instructions on removing the drive shaft.



DRIVE SHAFT

REMOVAL

If the drive shaft remained in the swingarm when the final gear case was removed, then simply pull it out of the swingarm.
If the drive shaft came out of the swingarm attached to the final gear case when it was removed, then the damper cam is probably equipped with a stop ring as described above.
Remove the drive shaft from the final gear case as described below.



Insert the axle through the gear case and secure the case in the vise with soft jaws or shop rags by clamping the axle. Place the shock mount between the jaws for stability.
Place an oil drain pan under the damper case to catch the damper oil that will spill out.
Separate the damper unit from the gear case by gently revolving the damper in a circular motion while tugging slightly.
After separation, remove the stop ring from the damper cam. The stop ring is not needed for reassembly, so it can be discarded.

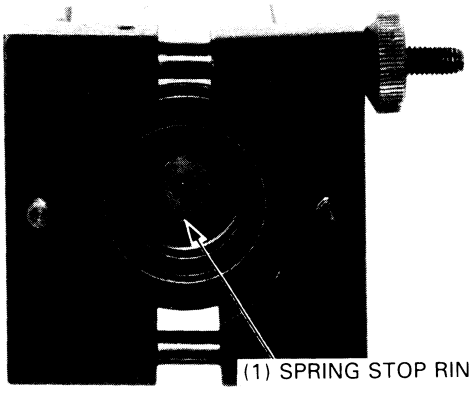
NOTE

- The circular motion is necessary to compress the stop ring on the damper cam. The stop ring prevents the damper from being pulled straight off.

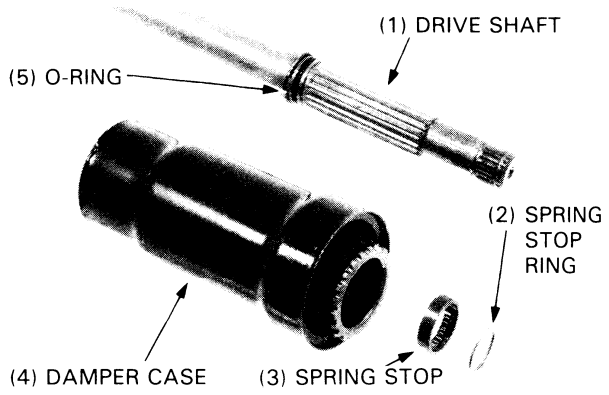
DISASSEMBLY

Compress the drive shaft with the rear shock absorber compressor and attachment tools.

Remove the spring stop ring and spring stop from the drive shaft.



Remove the compressor, then remove the damper case assembly from the drive shaft.
Remove the O-ring from the drive shaft.

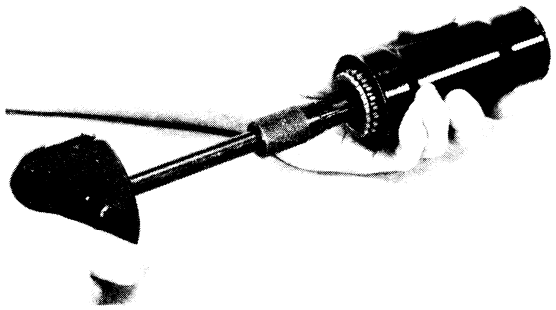


Using a weight, bearing remover set as a set, hook the bearing remover set on the oil seal guide.

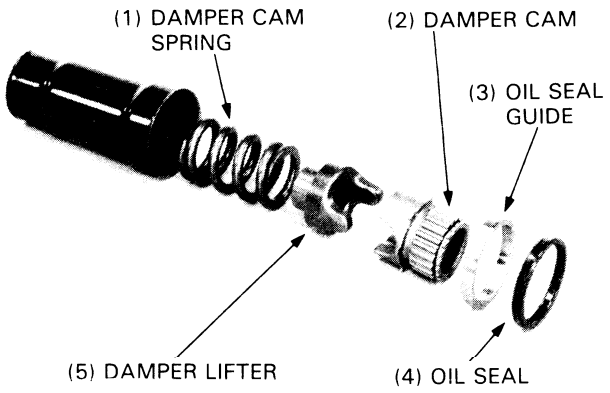
Pull out the oil seal and oil seal guide from the damper case.

NOTE

- Replace the oil seal with a new one on reassembly.



Remove the damper cam spring damper lifter and cam from the damper case.
Check the damper lifter and cam for wear or damage.



Measure the damper cam spring free length.

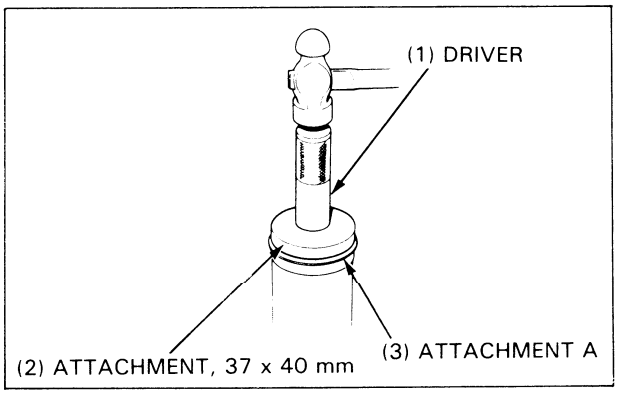
SERVICE LIMIT: 63 mm (2.5 in)

ASSEMBLY

Install the damper cam spring, damper lefter and damper cam into the damper case.
Drive the oil seal guide and oil seal in with the driver and attachment.

TOOLS:

DRIVER	**07749—0010000**
ATTACHMENT 37 x 40 mm	**07746—0010200**
ATTACHMENT A	**07964—MB00100**



Fill the damper case with the recommended type and amount of lubricant.

RECOMMENDED OIL: HYPOID GEAR OIL SAE #80
OIL CAPACITY: 50 cc (1.7 oz)

Assemble the remaining parts in the reverse order of disassembly.

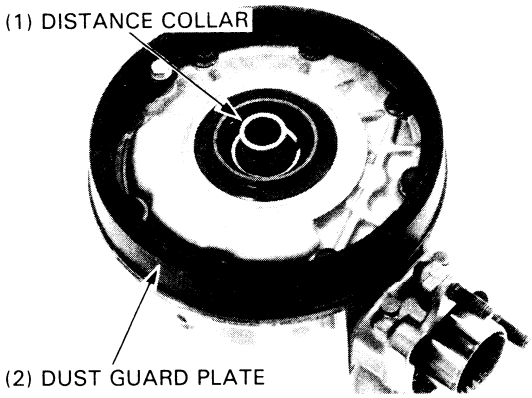
NOTE

- Replace the O-ring and oil seal with new ones when reassembling the drive shaft. Do not reinstall the stop ring that was used for production line purposes only.

FINAL DRIVE GEAR

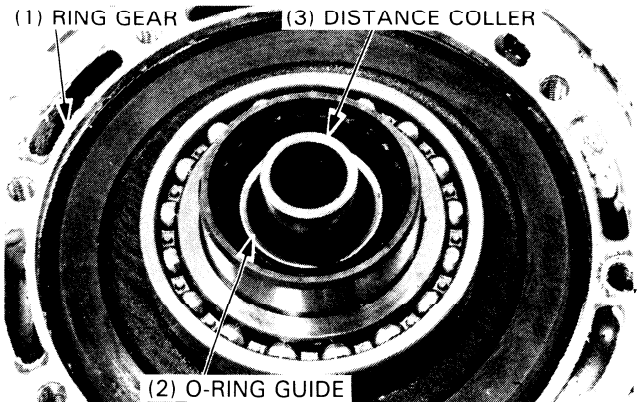
RING GEAR REMOVAL

Remove the dust guard plate.



Remove the eight case cover bolts and cover. If the ring gear stays in the cover, do the following:
Support the ring gear case cover with the Ring Gear Puller Attachment, 07947—6340201. Separate the ring gear from the case cover by tapping the cover with a soft hammer.
The oil seal will come out with the ring gear if the tool is used, remove and discard it.

Remove the distance collar, then remove the ring gear from final drive case.
Remove the O-ring guide by tapping it from the opposite side.

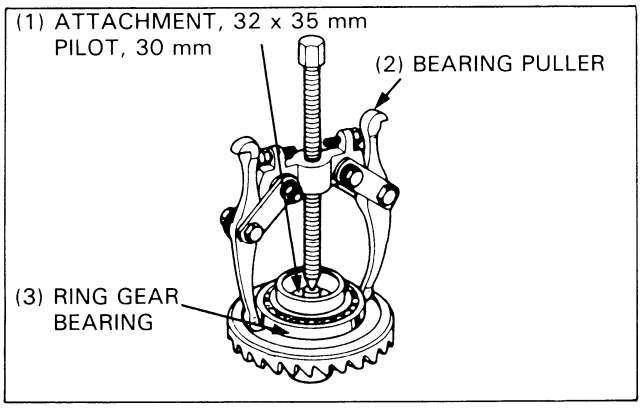


RING GEAR BEARING REMOVAL

Remove the ring gear bearing and gear adjusting spacer.

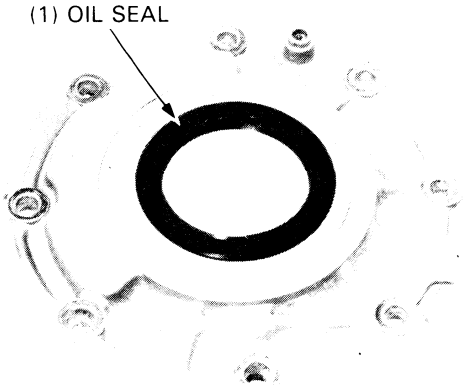
TOOLS:

BEARING PULLER	**(COMMERCIALLY AVAILABLE)**
ATTACHMENT, 32 x 35 mm	**07746–0010100**
PILOT, 30 mm	**07746–0040700**



CASE COVER OIL SEAL REPLACEMENT

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



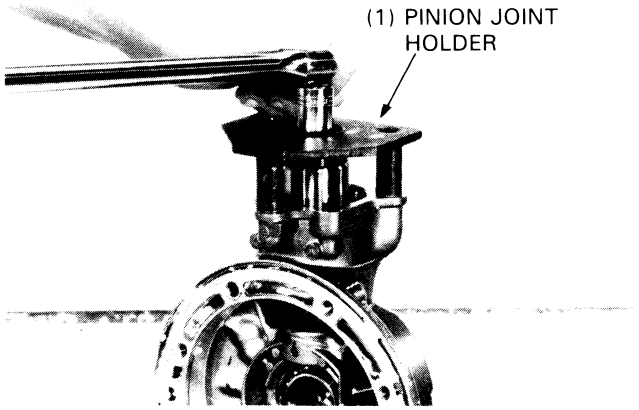
PINION GEAR REMOVAL

Place the final gear case in a viss with soft jaws or shop towel.

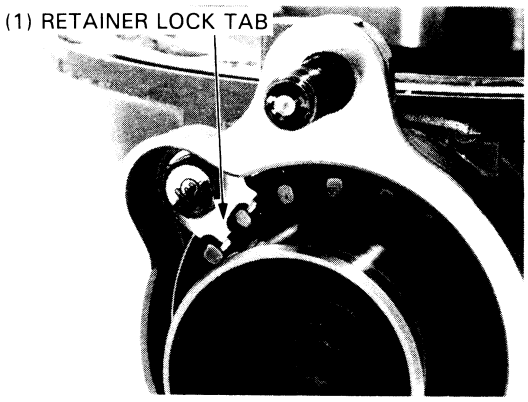
Unstake the pinion shaft nut.
Install the pinion joint holder onto the pinion joint and remove the pinion shaft nut.
Remove the tool and pinion joint.

TOOL:

PINION JOINT HOLDER	**07926–ME900000**

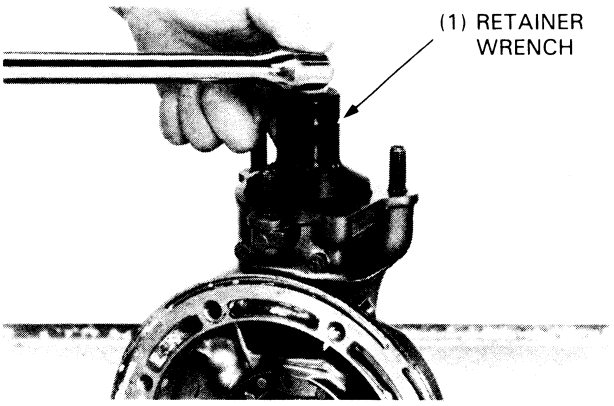


Remove the retainer lock tab.



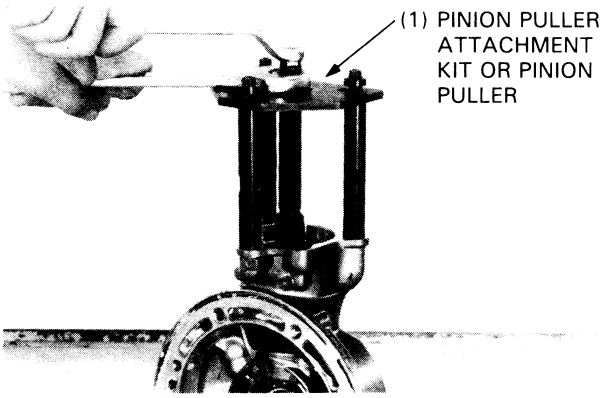
Remove the pinion retainer with the pinion retainer wrench.

TOOL:
RETAINER WRENCH **07910—ME80000**



Pull off the pinion assembly with the pinion puller.

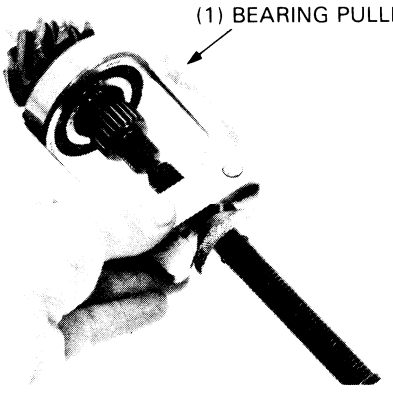
TOOL:
PINION PULLER ATTACHMENT KIT or PINION PULLER
07935—MB00000



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.

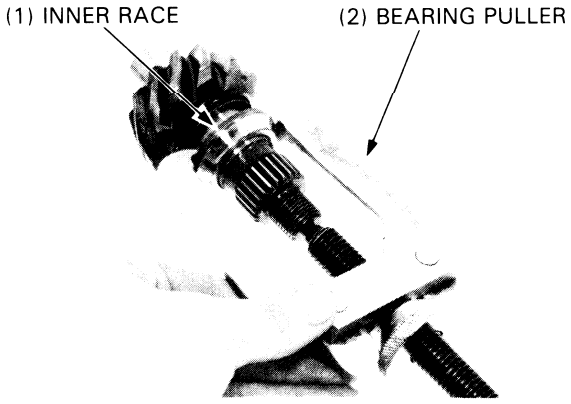
TOOL:
BEARING PULLER **(COMMERCIALLY AVAILABLE)**



Pull the other inner race off with the bearing puller.
Remove the pinion adjustment spacer.

TOOL:

BEARING PULLER	**(COMMERCIALLY AVAILABLE)**

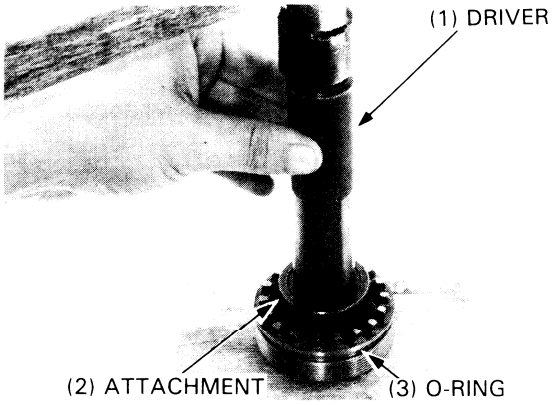


PINION RETAINER OIL SEAL REPLACEMENT

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

TOOLS:

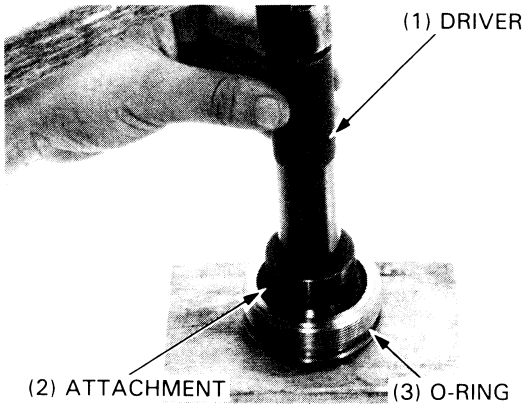
DRIVER	**07749–0010000**
ATTACHMENT	**07495–3330100**



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

TOOLS:

DRIVER	**07749–0010000**
ATTACHMENT	**07495–3330100**



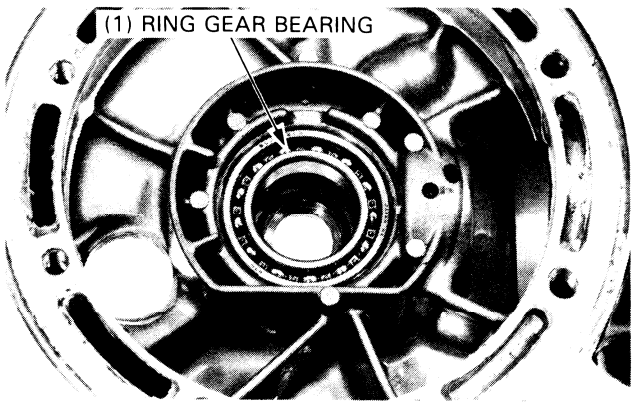
CASE BEARING AND OIL SEAL REPLACEMENT

Heat the gear case to 80°C (176°F).

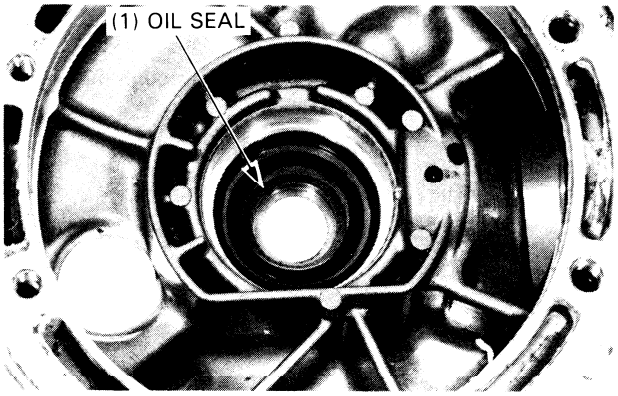
WARNING

- *Always wear gloves when handling the heated gear case.*

Ring gear bearing
Tap the gear case with a plastic hammer and remove the ring gear bearing.



Remove the ring gear shaft oil seal.

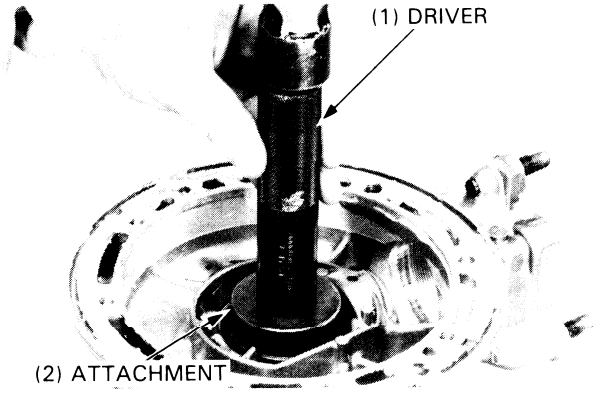


Drive a new oil seal into the case, using the driver (07749–0010000) and attachment (07945–3330300).

TOOLS:

DRIVER	**07749–0010000**
ATTACHMENT	**07945–3330300**

Drive a new ring gear bearing.

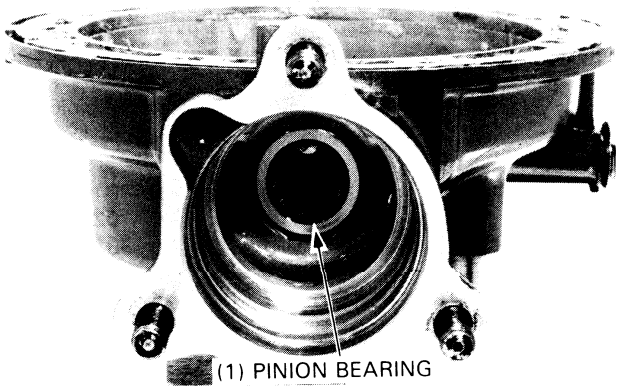


TOOLS:

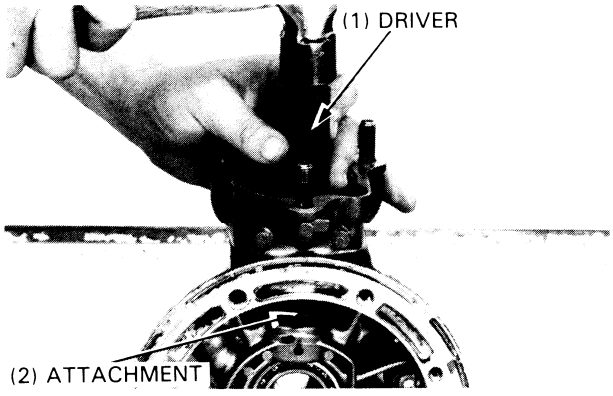
DRIVER	**07749–0010000**
ATTACHMENT, 52 x 55 mm	**07746–0010400**

Pinion bearing

Top the gear case with a plastic hammer and remove the pinion bearing.



Drive a new pinion bearing.

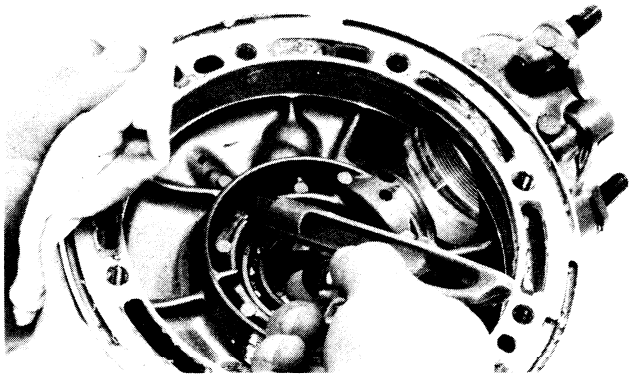


TOOLS:

DRIVER	**07494–3710001**
ATTACHMENT, 32 x 35 mm	**07746–0010100**

BREATHER HOLD CLEANING

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

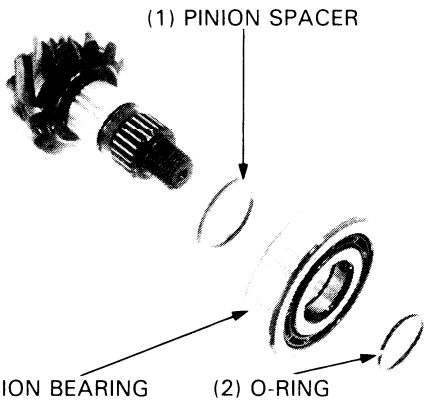


PINION GEAR ASSEMBLY

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.

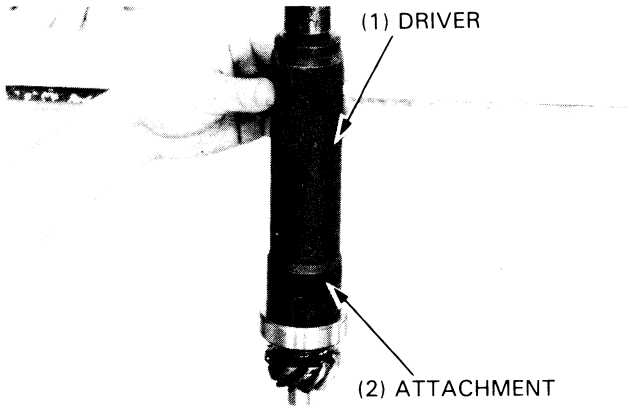


Drive the pinion gear bearing onto the pinion gear using the special tool.

Apply gear oil to the O-ring and threadstet on the pinion gear.

TOOLS:

DRIVER	**07746—0030100 or 07945—3710200**
ATTACHMENT, 25 mm	**07746—0030200**

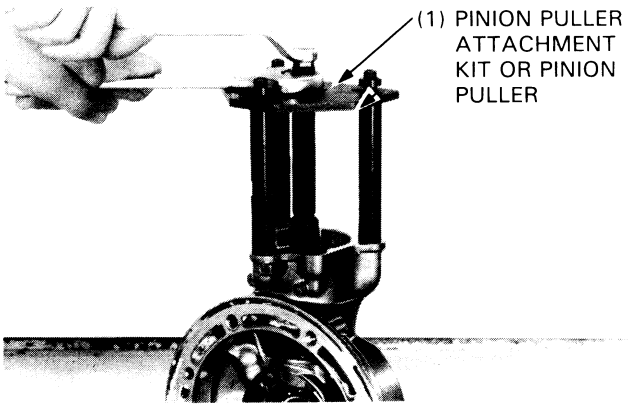


Place the final gear case in a viss with soft jows or shop towel.

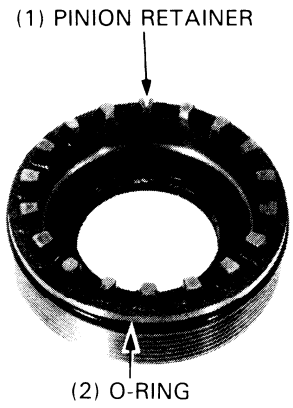
Press the pinion assembly into the gear housing with the pinion puller.

TOOL:

PINION PULLER ATTACHMENT KIT or PINION PULLER 07935—MB00000



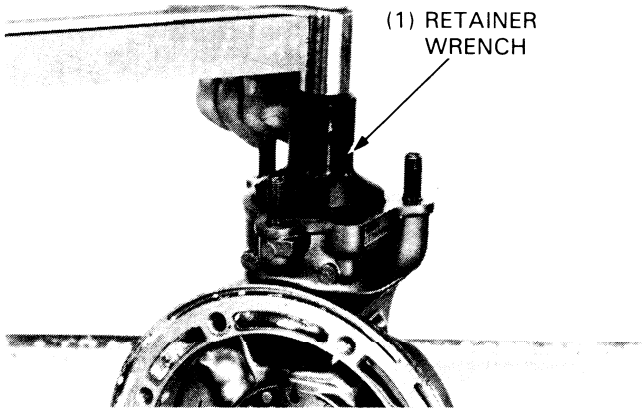
Apply gear oil to the O-ring and threads on the pinion retainer.



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

TOOL:
PINION RETAINER WRENCH

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



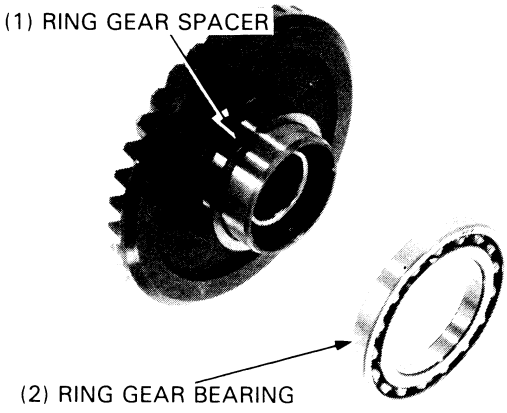
RING GEAR ASSEMBLY

Install the original spacer onto the ring gear.

NOTE

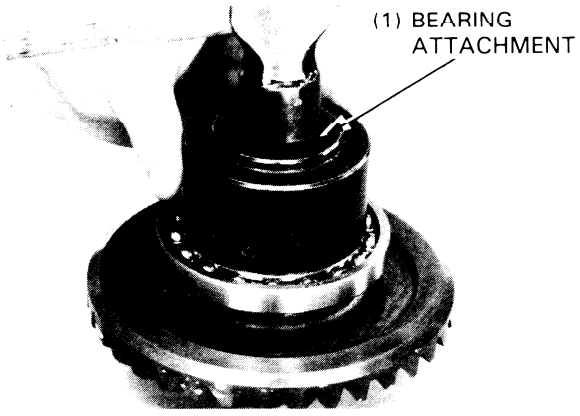
- If the gear set, pinion bearing, ring gear bearing and/or gear case are replaced, install a 2.0 mm thick spacer.

Place the ring gear bearing over the ring gear shift.

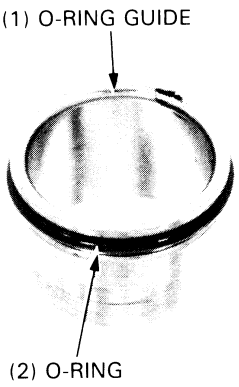


Place a new ring gear bearing on the ring gear shaft.
Place the old bearing on top of it.
Drive the new bearing onto the shaft with the old bearing and attachment. Then remove the old bearing.

TOOL:
BEARING ATTACHMENT 07935—MB00000



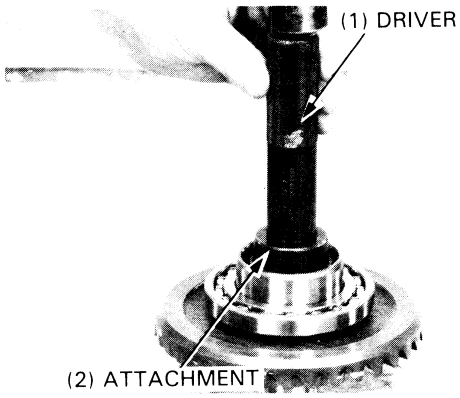
Install a new O-ring on the O-ring guide, and apply grease to the O-ring.



Drive the O-ring guide onto the ring gear shaft.

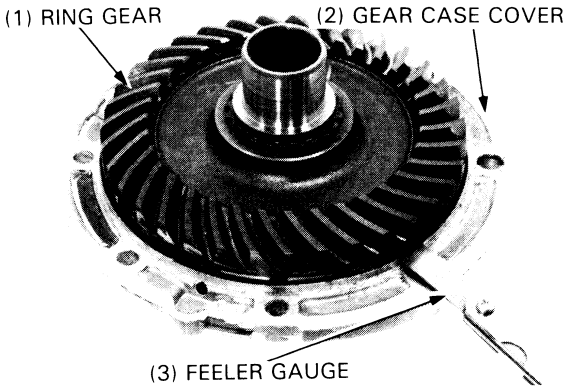
TOOLS:

DRIVER	**07749—0010000**
ATTACHMENT, 42 x 47 mm	**07746—0010300**



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 limit, heat the gear case cover to approximately 80°C (176°F) and remove the sotp pin by tapping the cover.

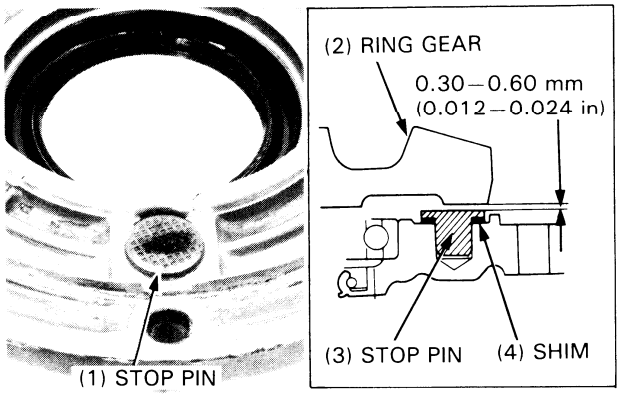
WARNING

- *Always wear gloves when handling the heated gear case.*

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)

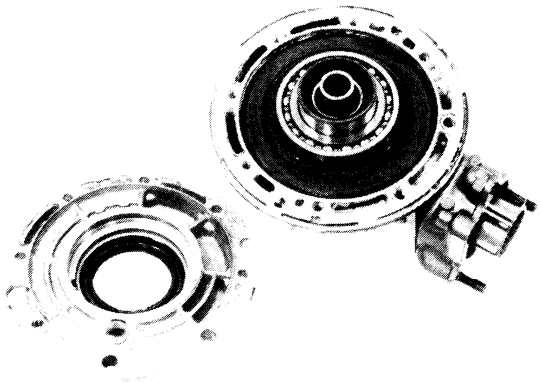
Install the shim and drive the stop pin into the case cover.



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

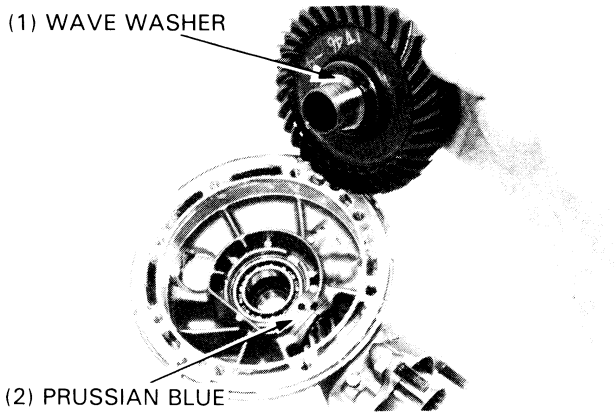
NOTE

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



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.

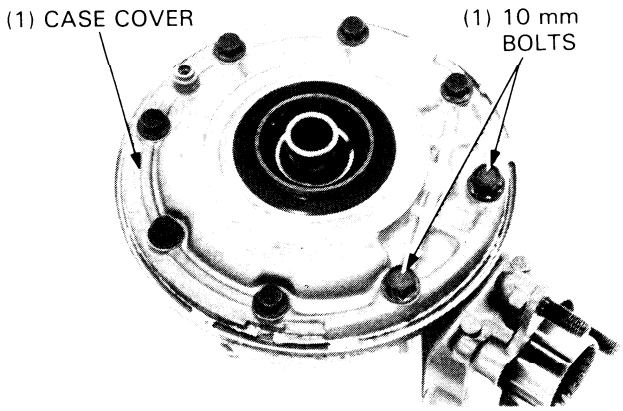


Tighten the cover bolts in 2–3 steps until the cover evenly touches the gear case, then tighten the 8 mm bolts to the specified torque in a crisscross pattern in two or more steps.

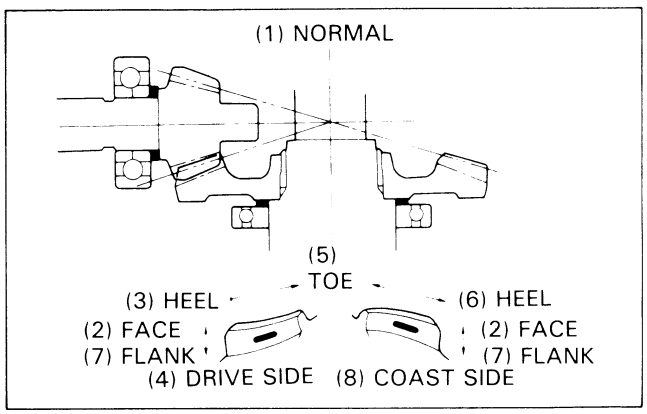
TORQUE: 23–28 N·m (2.3–2.8 kg-m, 17–20 ft-lb)

Next tighten the 10 mm bolts.

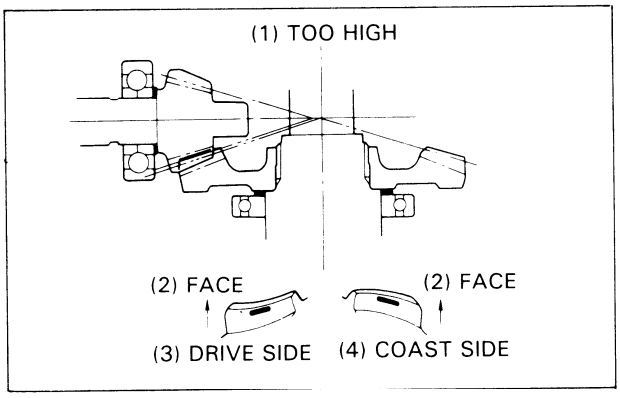
TORQUE: 45–50 N·m (4.5–5.0 kg-m, 33–36 ft-lb)



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 transferred to the approximate center of each tooth and slightly to the face flank side.

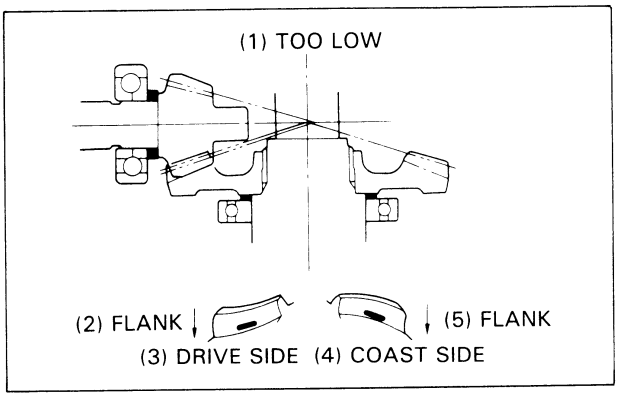


If the patterns are not correct, remove and replace the pinion spacer.
Replace the pinion spacer with a thicker one if the contacts are too high.



Replace the pinion spacer with a thinner one if the contacts are too low.
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).

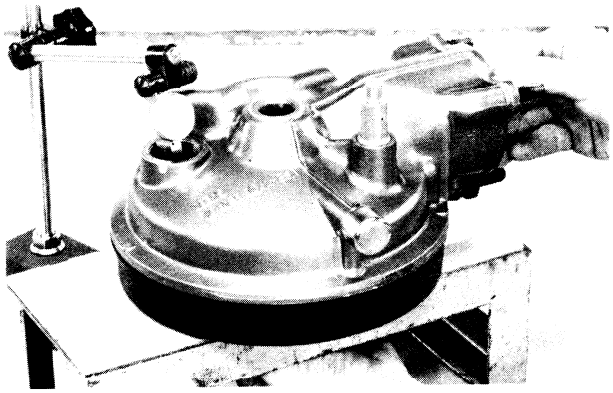
PINION SPACER:
- **A: 1.82 mm (0.072 in)**
- **B: 1.88 mm (0.074 in)**
- **C: 1.94 mm (0.076 in)**
- **D: 2.00 mm (0.079 in) Standard**
- **E: 2.06 mm (0.081 in)**
- **F: 2.12 mm (0.084 in)**
- **G: 2.18 mm (0.086 in)**



BACKLASH INSPECTION

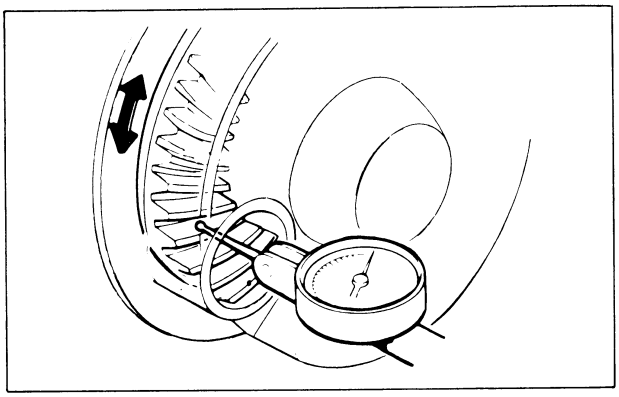
Remove the oil filler cap.
Set the final gear assembly into a jig or stand to hold it steady.
Set a horizontal type dial indicator on the ring gear, through the oil filler hole.
Hold the pinion gear spline by hand.
Rotate the ring gear by hand until slack is taken up.
Turn the ring gear back and forth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

STANDARD: 0.05—0.15 mm (0.002—0.006 in)
SERVICE LIMIT: 0.30 mm (0.012 in)

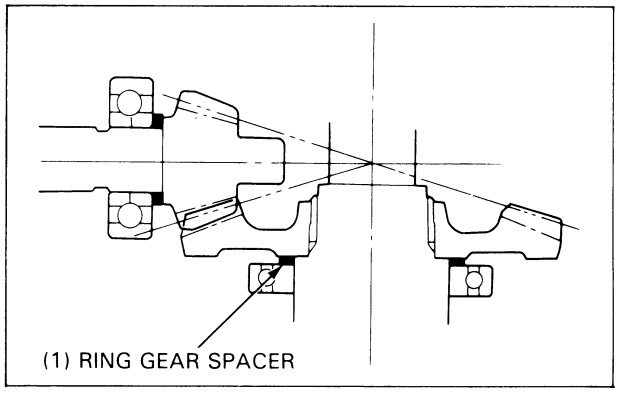


Remove the dial indicator. Turn the ring gear 120° and measure backlash. Repeat this procedure once more.
Compare the difference of the three measurements.

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



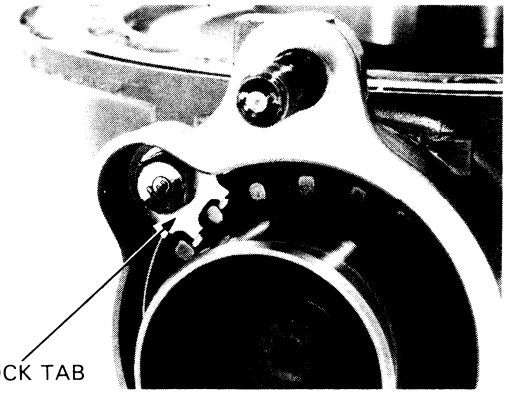
If the difference in measurements exceeds the limit, it indicates that the bearing is not installed squarely.
Inspect the bearings and reinstall if necessary.
If backlash is excessive, replace the ring gear spacer with a thicker one.
If the backlash is too small, replace the ring gear spacer with a thinner 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

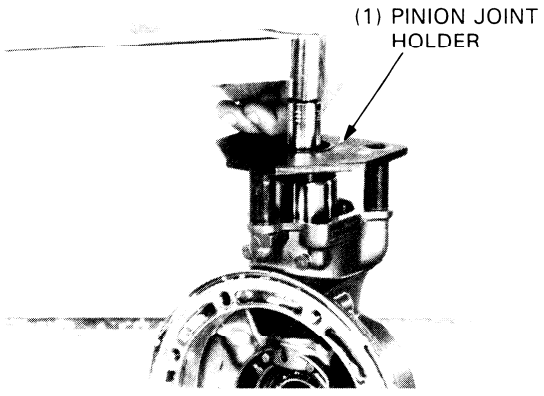
Install the appropriate pinion retainer lock tab.



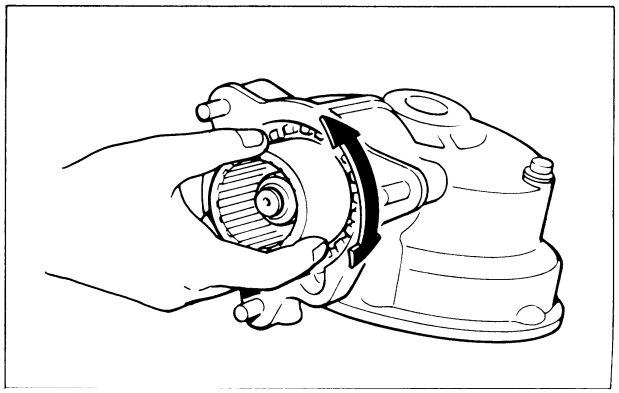
Place the final gear case in a viss with soft jaws or shop towel.
Apply gear oil to the oil seal lip surface and install the pinion joint.
Install the pinion joint holder too and tighten the pinion nut.

TORQUE: 100—120 N·m (10.0—12.0 kg-m, 72—87 ft-lb)

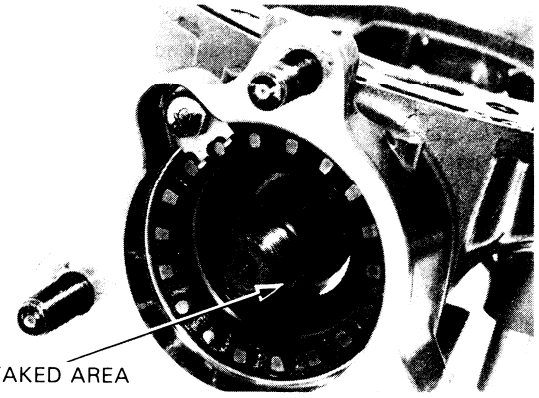
Remove the pinion joint holder tool.



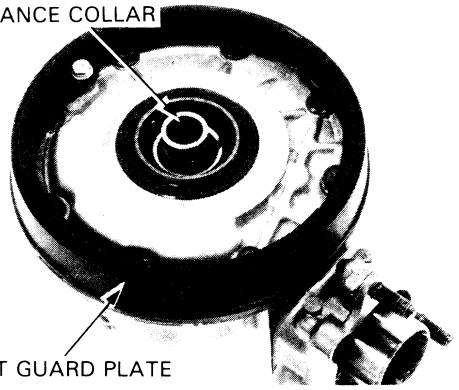
Make sure that the gear assembly rotates smoothly without binding by turning the pinion joint.



Stake the pinion nut to a minimum depth of 1 mm (0.04 in) into the hole in the pinion shaft.
Be careful not to damage the pinion shaft threads.



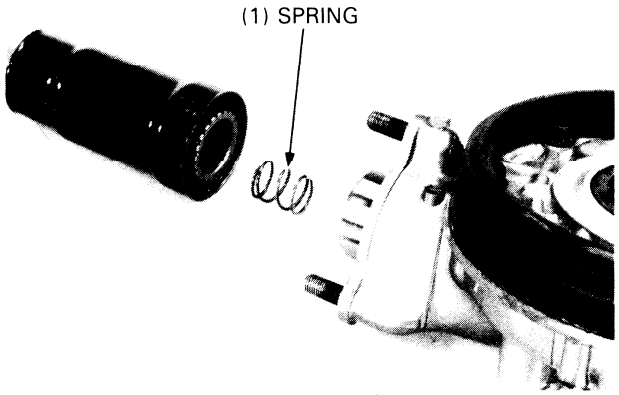
Install the dust guard plate and torque the bolts.
Install the distance collar.



Turn the pinion joint so that the hole is pointing straight up.
Keep the damper case vertical and install the final drive gear case over the damper cam.

NOTE

- Do not reinstall a stop ring onto the damper cam even if it was equipped with one. It is not needed for reassembly.
- Be careful not to damage the damper case oil seal during assembly.
- Do not let the gear case separate from the damper case or the oil will spill out.
- Damper oil will leak out of the hole in the pinion joint during assembly of the damper case and final drive, if the hole is not kept straight up.



Make sure the U-joint is in line with the drive shaft.
Then insert the drive shaft into the swing arm aligning its splines with the output shaft splines. Keep the gear case and damper case together or damper oil will leak out.

Attach the gear case onto the swing arm with the three attaching nuts. To ease axle installation, do not tighten the gear case nuts until after the axle is installed.

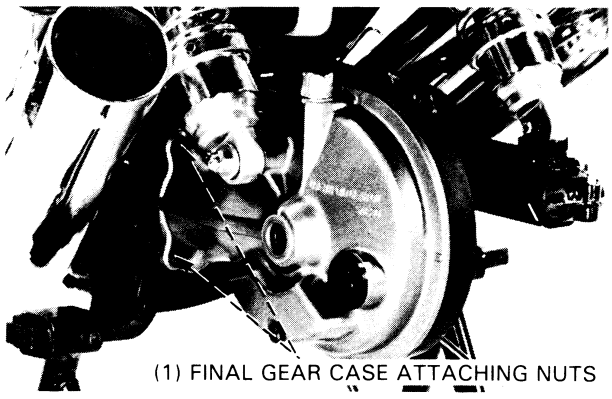
Install the rear wheel (page 14-6).

Tighten the axle nut.

TORQUE: 85—105 N·m (8.5—10.5 kg-m, 61—76 ft-lb)

Tighten the three final gear case attaching nuts.

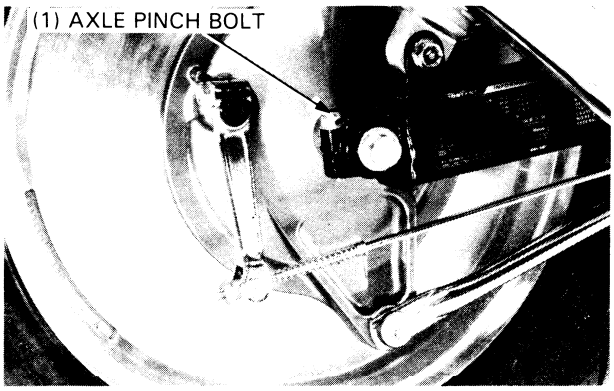
TORQUE: 45—70 N·m (4.5—7.0 kg-m, 33—51 ft-lb)



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 14-13).



Make sure that the drain bolt is tightened.

Remove the oil filler cap and pour in the specified amount of recommended oil.

RECOMMENDED OIL: Hypoid gear oil SAE #80

OIL CAPACITY:
150 cc (5.1 oz) at disassembly
130 cc (4.4 oz) after draining