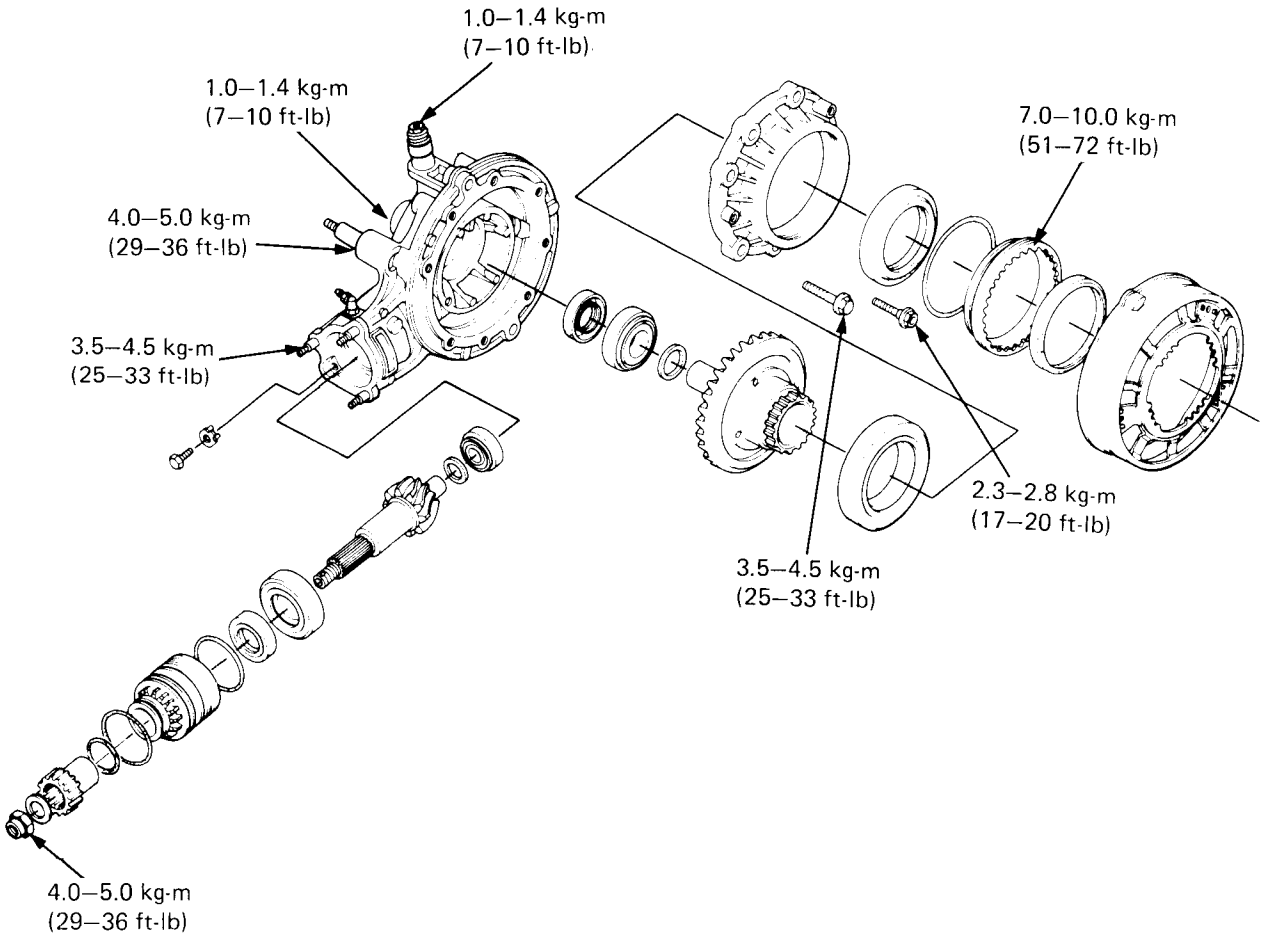

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16. FINAL DRIVE

SERVICE INFORMATION

GENERAL INSTRUCTIONS

The final drive gear assembly must be removed for:

- Backlash inspection
- Oil seal and O-ring replacement

Replace all oil seals and O-rings whenever the final drive gear assembly is disassembled.

TOOLS

Special	
Retainer wrench	07910–3710000
Final gear case base	07965–4630100 – Not available in U.S.A.
Retainer wrench B	07910–4630100
Pinion gear dis/assembly tool	07931–4630200
Oil seal remover	07948–4630100 – Not available in U.S.A.
Dis/assembly tool A	07965–3710100
Dis/assembly tool B	07965–4630300 – Not available in U.S.A.
Gear center guide	07965–4630500 – Not available in U.S.A.
Oil seal guide	07973–4630100
O-ring guide	07973–4630200
Preload inspection tool	07924–3710000
Oil seal driver attachment	07946–6920100 – Not available in U.S.A. or 07945–3330100
Bearing driver attachment	07946–9370100
Common	
Bearing driver handle A	07749–0010000 or 07949–6110000
Pilot 20 mm	07746–0040400

SPECIFICATIONS

		Standard	Service Limit
Final gear oil	capacity	140–160 cc (4.7–5.4 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		9.0–11.5 kg-cm (7.8–10.0 in-lb)	————
Pinion gear preload		5–6 kg-cm (4.3–5.2 in-lb)	————

TORQUE VALUES

Final gear case cover 10 mm bolt :	3.5–4.5 kg-m (25–33 ft-lb)
8 mm bolt :	2.3–2.8 kg-m (17–20 ft-lb)
Final gear case nut	3.5–4.5 kg-m (25–33 ft-lb)
Rear shock absorbers	3.0–4.0 kg-m (22–29 ft-lb)
Drain bolt	1.0–1.4 kg-m (7–10 ft-lb)
Filler cap	1.0–1.4 kg-m (7–10 ft-lb)
Pinion shaft nut	4.0–5.0 kg-m (29–36 ft-lb)
Rear axle nut	8.0–10.0 kg-m (58–72 ft-lb)
Axle pinch bolt	2.4–2.9 kg-m (17–21 ft-lb)

TROUBLESHOOTING

Rear Wheel Will Not Rotate Freely

1. Rear brake dragging
2. Damaged wheel bearing
3. Damaged ring and pinion gear bearings
4. Bent rear axle
5. Bent swingarm
6. Excessive final gear assembly preload

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 hub breather
2. Oil level too high
3. Seals damaged

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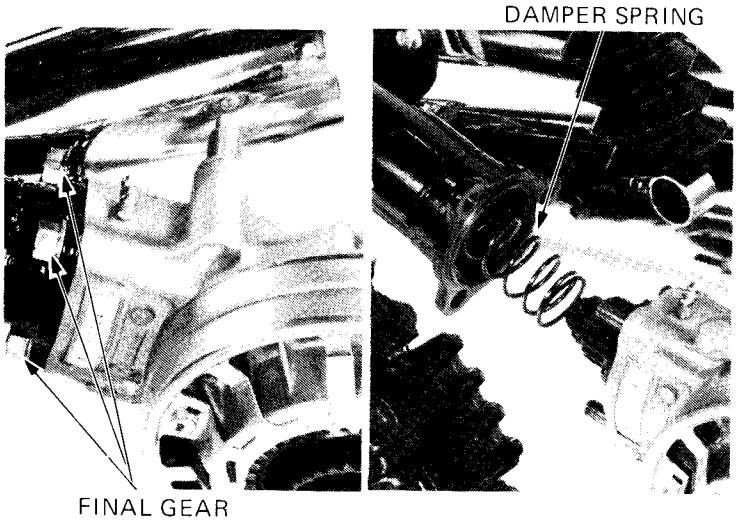
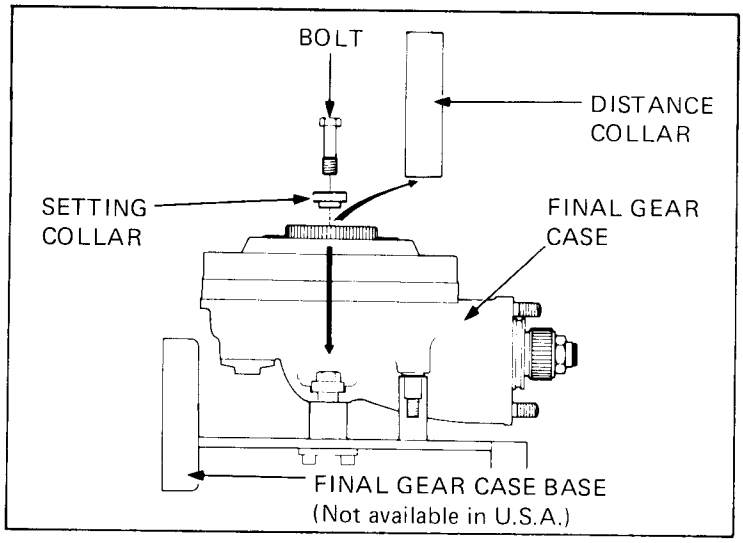
FINAL GEAR CASE REMOVAL

Place the motorcycle on its center stand.
Remove the rear wheel (page 15-2).
Remove the shock absorber from the gear case.
Remove the gear case attaching nuts.
Remove the final gear case assembly and damper spring.
Drain the final gear oil if disassembling the gear case.



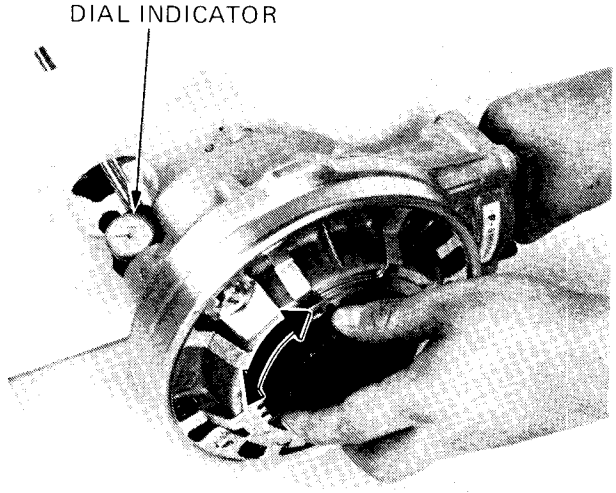
BACKLASH INSPECTION

Remove the distance collar.



Remove the oil filler cap.
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.

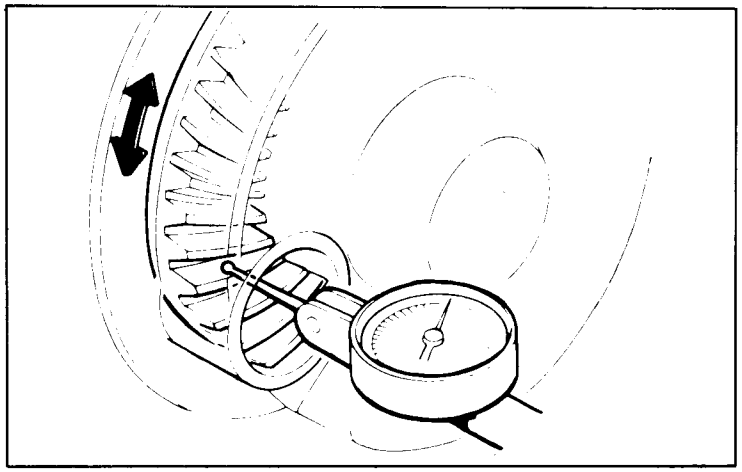
STANDARD: 0.08–0.18 mm (0.003–0.007 in)
SERVICE LIMIT: 0.30 mm (0.02 in)



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: 0.1 mm (0.004 in)

If backlash is excessive, check the final gear assembly preload (page 16-13).
If preload is correct, the final driven gear case assembly needs replacement.



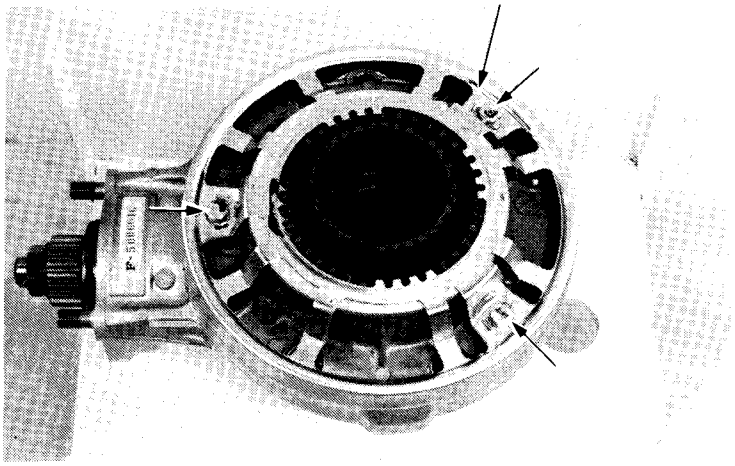
OIL SEAL REMOVAL/INSTALLATION

NOTE

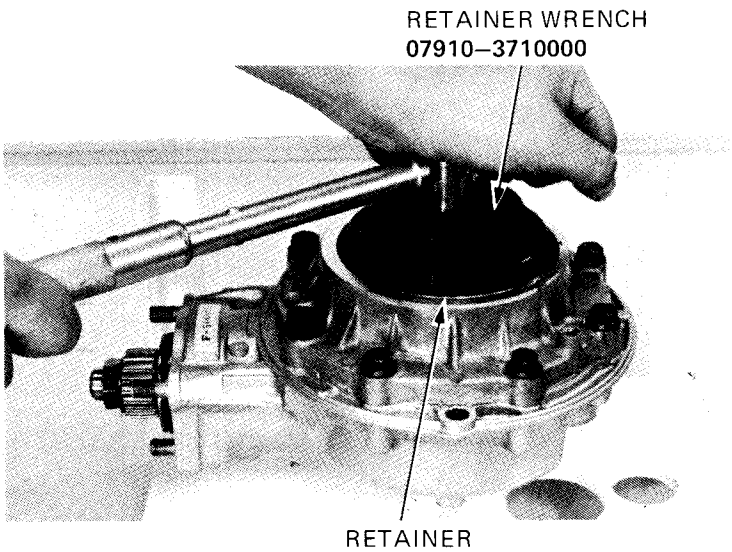
Replace all final gear case oil seals and O-rings whenever the case is disassembled.

RING GEAR BEARING RETAINER

Remove the final gear case assembly from the motorcycle (page 16-3).
Remove the distance collar.
Straighten the dust guard plate lock washer tabs and remove the dust guard plate.



Remove the ring gear bearing preload retainer with the RETAINER WRENCH.
Remove the O-ring.



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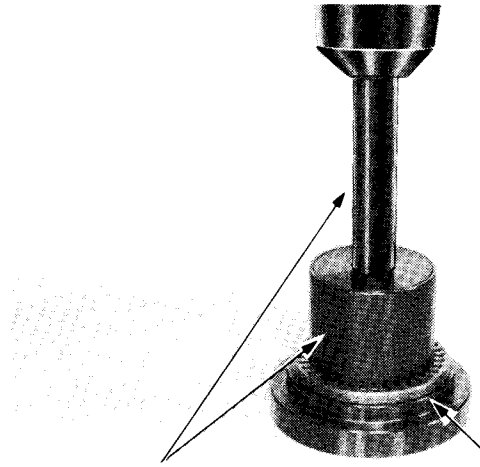
Remove the dust and oil seals from the retainer with a press and special tools.

NOTE

Place the dis/assembly tool B with its deep bore facing down.



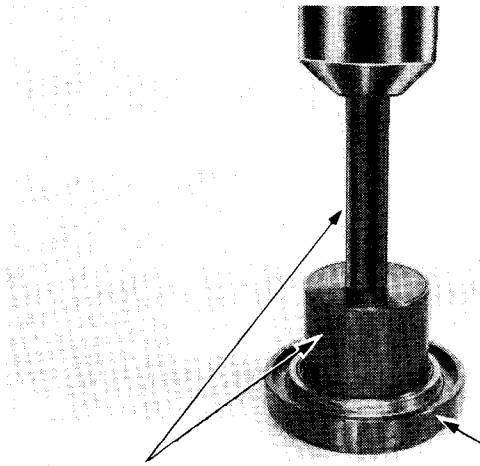
DIS/ASSEMBLY TOOL A (2 Pcs.)
07965–3710100

DIS/ASSEMBLY TOOL B
07965–4630300
(Not available in U.S.A.)

Coat both new seals outer edges with gear oil. Press the new seals into the ring gear bearing preload retainer.

NOTE

Place the dis/assembly tool B with its deep bore facing up.



DIS/ASSEMBLY TOOL A (2 Pcs.)
07965–3710100

DIS/ASSEMBLY TOOL B
07965–4630300
(Not available in U.S.A.)

Coat the new O-ring with gear oil and install it.
Install the ring gear bearing retainer being careful not to fold or damage the oil seal lips.

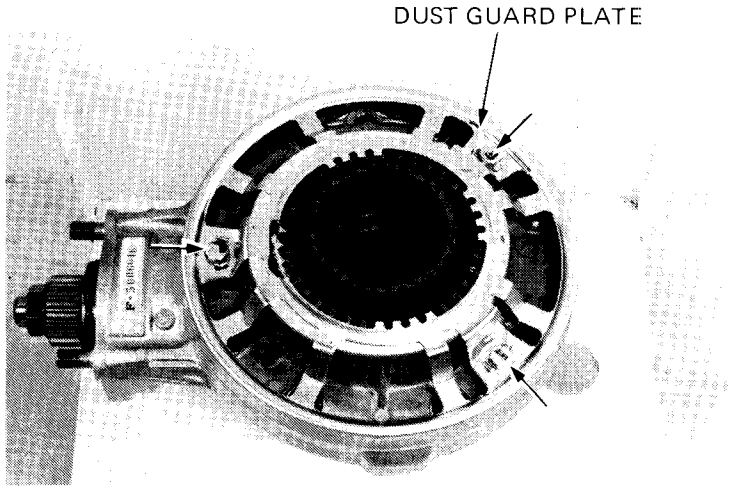
NOTE

After installing the ring gear bearing preload retainer, do the following:
- Final gear assembly preload check (page 16-13).
- Backlash inspection (page 16-3).

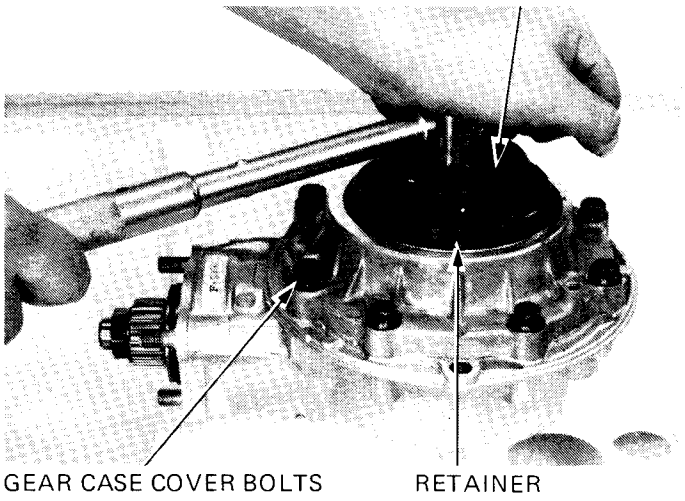
GEAR CASE

Remove the final gear case assembly from the motorcycle (page 16-3).
Remove the distance collar.

Straighten the dust guard plate lock washer tabs and remove the dust guard plate.



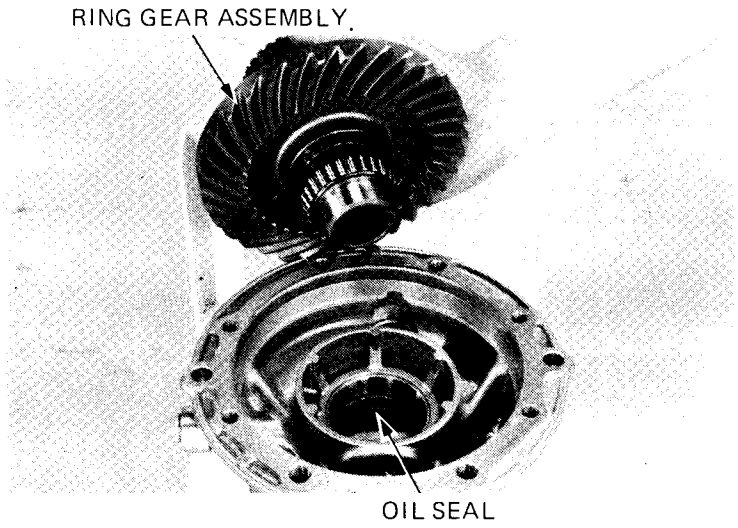
Loosen the ring gear bearing preload retainer 5 notches with the RETAINER WRENCH.
Remove the eight gear case bolts.
Lift the gear case cover from the final gear case.



Remove the ring gear assembly.

NOTE

Use care when removing the ring gear as the oil seal spring band is easily turned inside out.



Remove the oil seal from the gear case.

CAUTION:

Be careful not to damage the case during seal removal.

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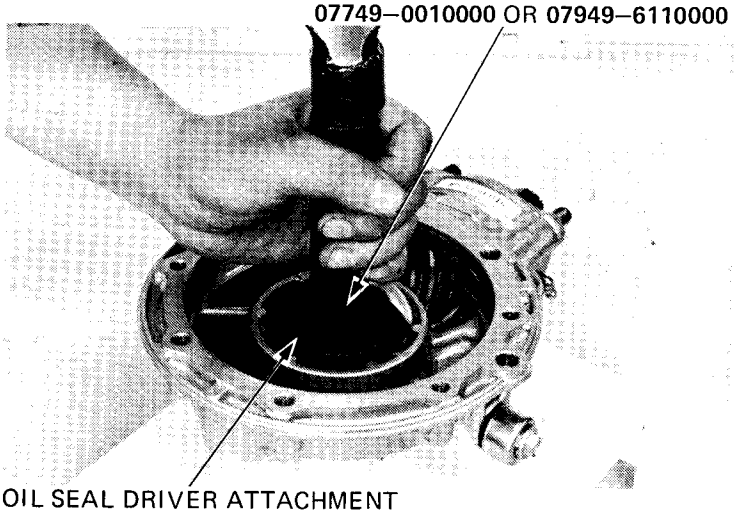
Coat the new oil seal with gear oil.
Install the oil seal squarely into the case being careful not to damage the bearing race.

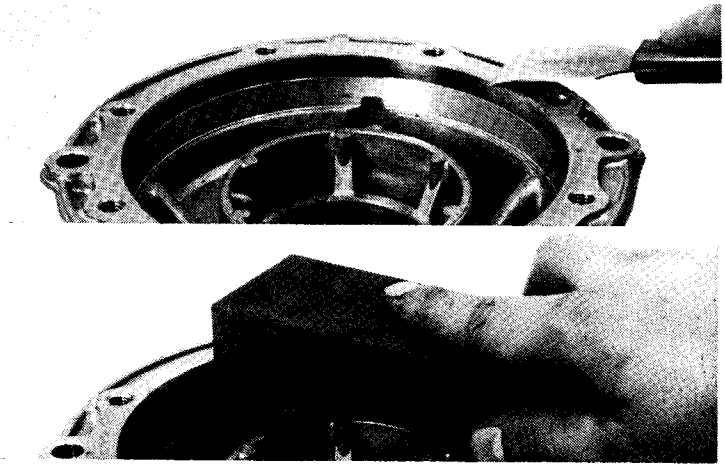


Remove the old sealant from the gear case and cover surfaces.

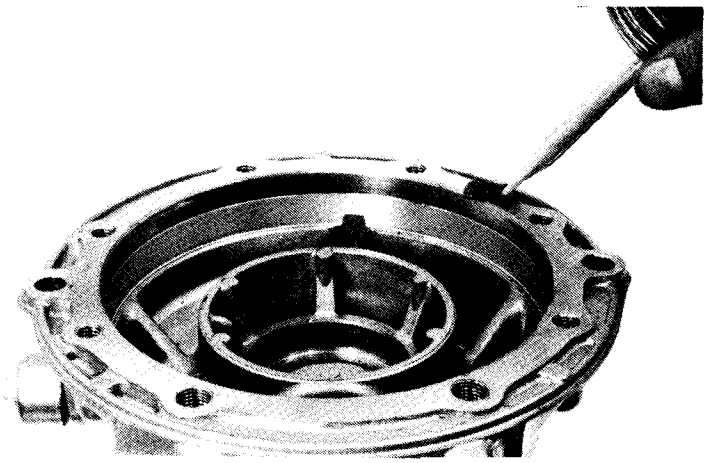
NOTE

- Keep the gear case clean.
- Be careful not to damage the gear case and cover mating surfaces.

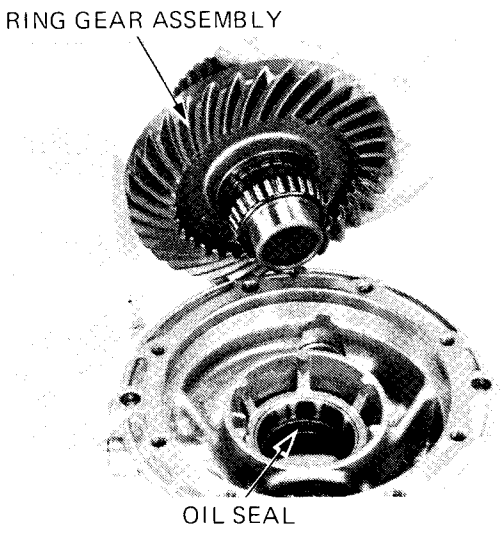
Clean the gear case and cover mating surfaces with an oil stone.



Apply a liquid sealant to the gear case and cover mating surfaces.



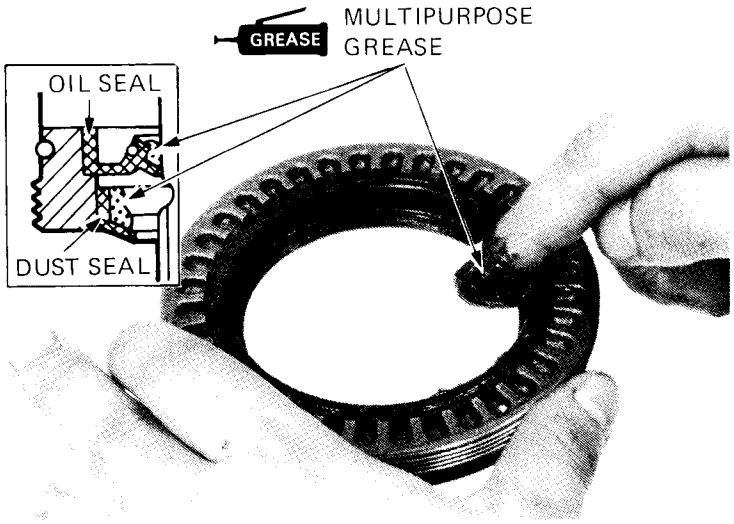
Coat the gear case oil seal lips with gear oil. Install the ring gear assembly, being careful not to damage or fold the oil seal lips.



Fill the ring gear bearing retainer oil and dust seals with MULTIPURPOSE NLGI No. 2 grease (MoS_2-additive).

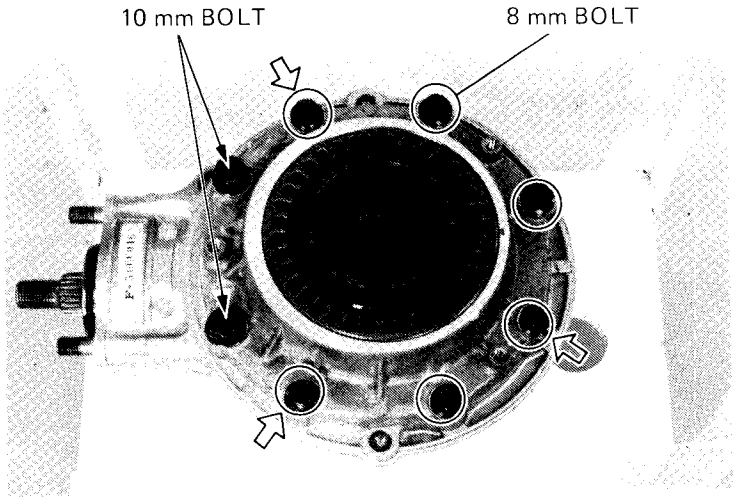
NOTE

Lithium-based MULTIPURPOSE grease with MoS_2-additive as follows:
- MOLYKOTE BR2-S manufactured by Dow Corning, U.S.A.
- MULTIPURPOSE M-2 manufactured by Mitsubishi Oil, Japan
- Other Lubricants of equivalent quality



Place the gear case cover onto the final gear case.
Insert the gear case cover bolts, positioning the three bolts with the symbol " ⇧ " in the photo at the locations shown. Alternately tighten these bolts with the symbol " ⇧ " until the gear case cover touches the gear case. Tighten all eight bolts in a crisscross pattern.

TORQUE:
8 mm bolts: 2.3–2.8 kg-m (17–20 ft-lb)
10 mm bolts: 3.5–4.5 kg-m (25–33 ft-lb)



NOTE

After installing the gear case cover, do the following:
- Final gear assembly preload check (page 16-13).
- Backlash inspection (page 16-3).

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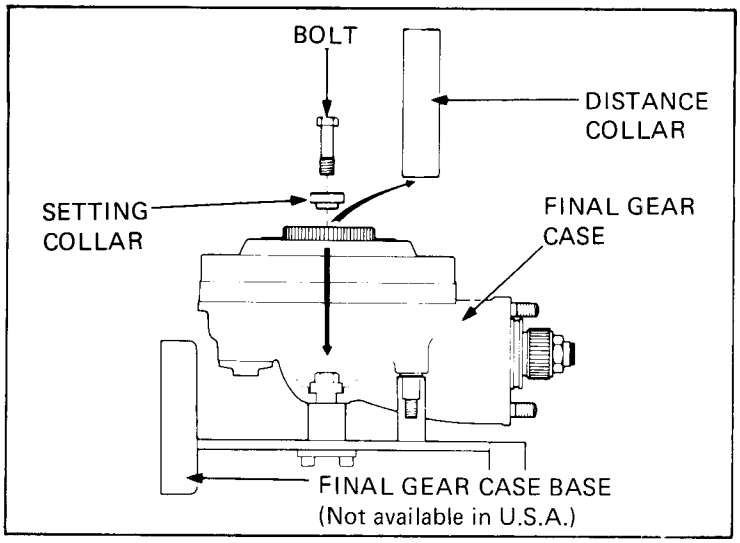
PINION GEAR RETAINER

Remove the final gear case assembly from the motorcycle (page 16-3).
Remove the distance collar.



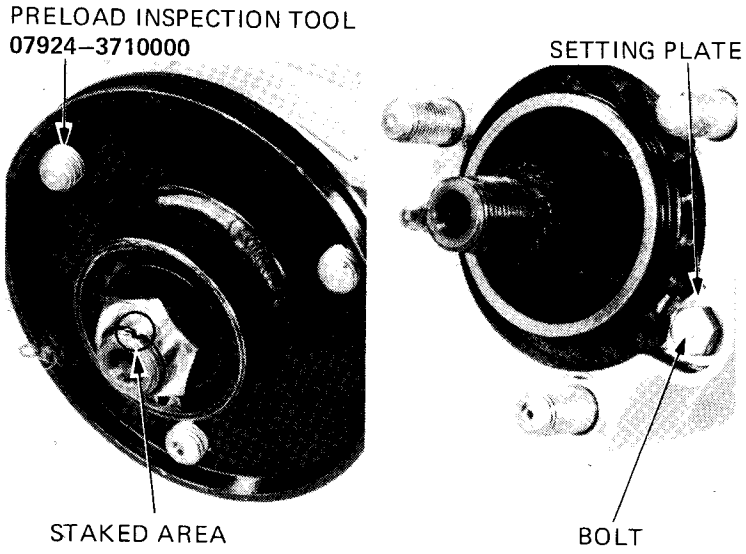
Install the preload inspection tool onto the pinion shaft.
Remove the pinion shaft nut and washer.

NOTE

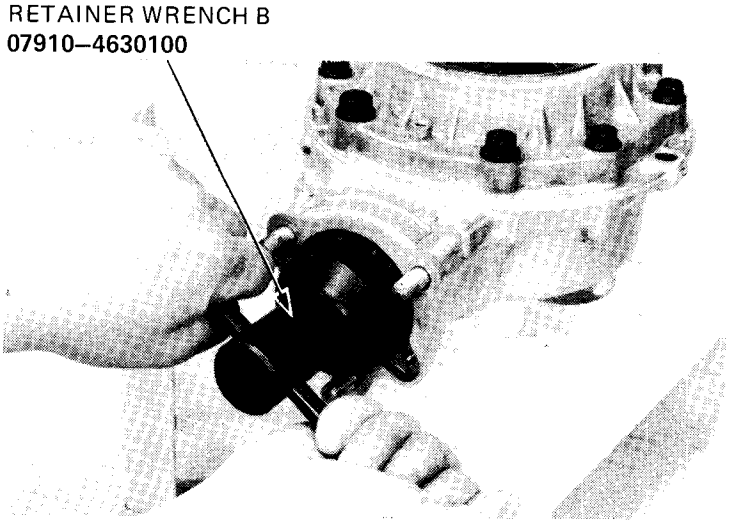
The nut can be removed without grinding off the staked areas.

Remove the inspection tool and pinion joint.

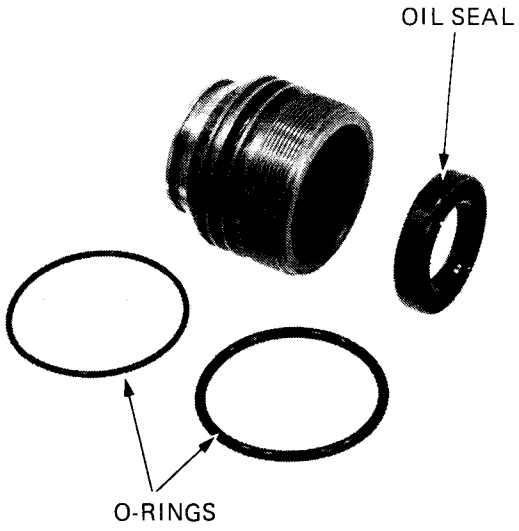
Remove the retainer setting plate.



Remove the pinion retainer with the pinion gear retainer wrench.



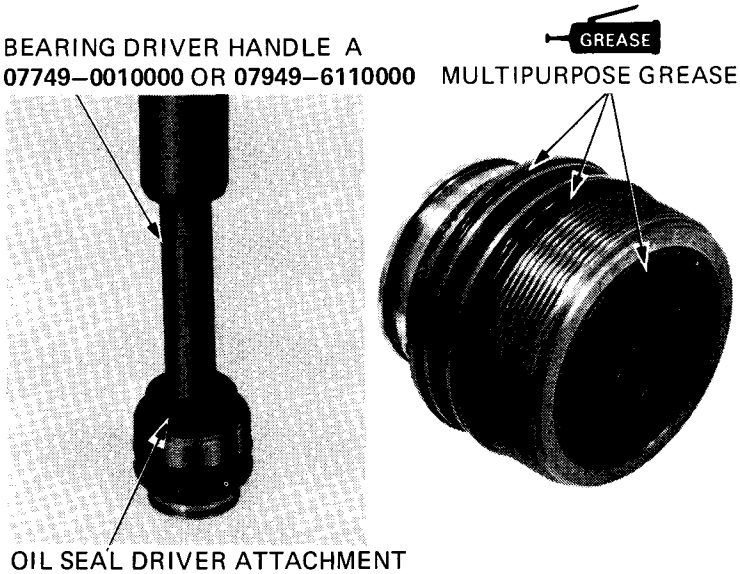
Remove the retainer O-rings and oil seal.



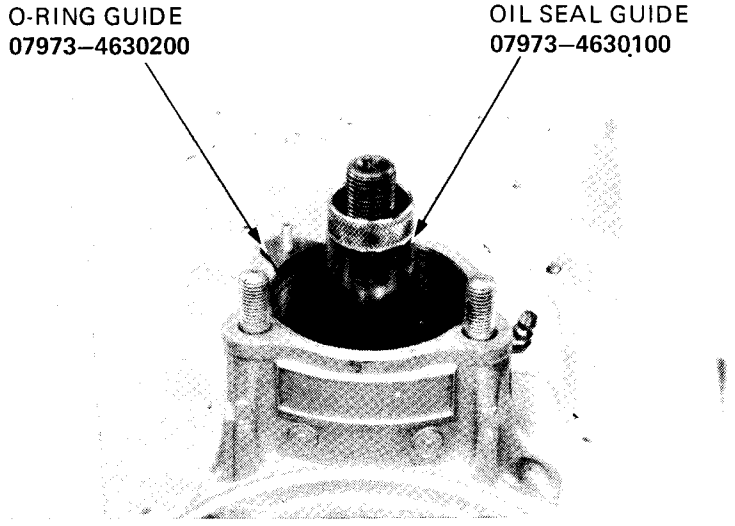
Coat the new O-rings with MULTIPURPOSE NLGI No. 2 grease (MoS_2 -additive) and install them onto the retainer.

Fill the new oil seal groove with MULTIPURPOSE NLGI No. 2 grease (MoS_2 -additive).

Install the oil seal into the retainer with the oil seal driver.



Set the o-ring guide into the gear case cutout. Install the oil seal guide over the pinion shaft.



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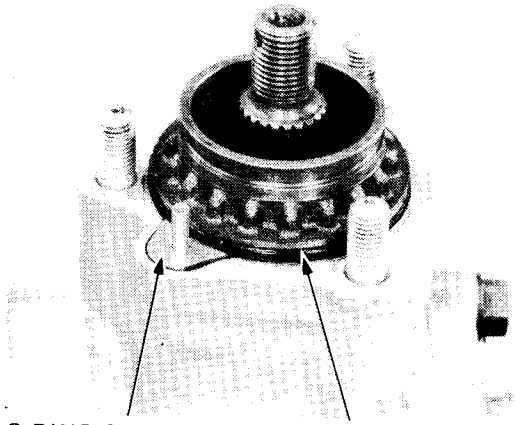
Push the retainer into place with the retainer wrench until the oil seal guide is contacted.

CAUTION:

- *Be careful not to damage the O-rings.*
- *The retainer has extra fine threads, and it is very easy to crossthread.*

Remove the oil seal and O-ring guides when retainer B seats against the bearing outer.

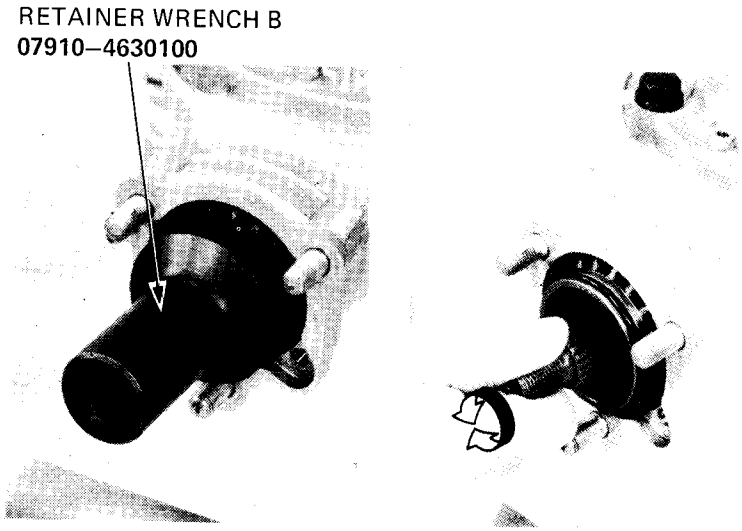


Thread the retainer into the case by hand. Turn the pinion shaft intermittently. Stop tightening the retainer when pinion shaft rotating resistance is felt.
Do not overtighten the retainer.

NOTE

- If the retainer is overtightened, it will cause excessive preload.
- A high amount of drag is normal because of the O-rings.

Check the pinion gear preload (below).



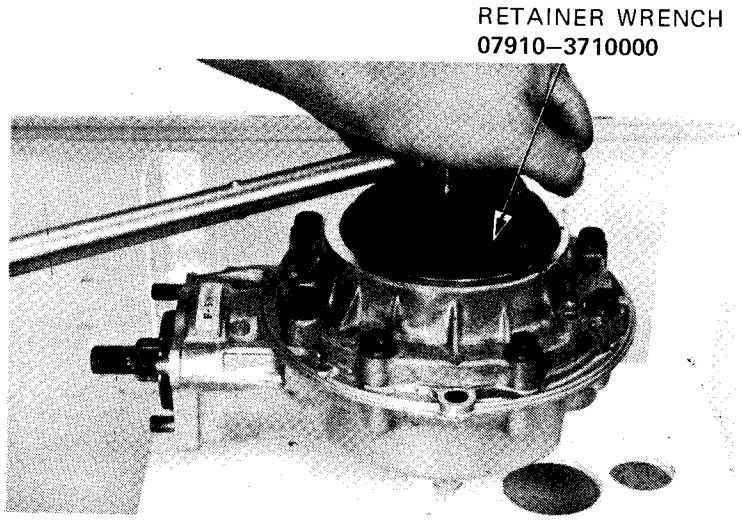
PRELOAD ADJUSTMENT

PINION GEAR RETAINER

NOTE

Use this procedure whenever the pinion gear retainer is removed.

Remove the dust guard plate.
Remove the ring gear assembly (page 16-5, 16-6).



Install the preload inspection tool onto the pinion gear shaft.

Wind the wire around the tool groove and attach a spring scale. Measure the preload force needed to turn the pinion shaft in the normal direction of rotation.

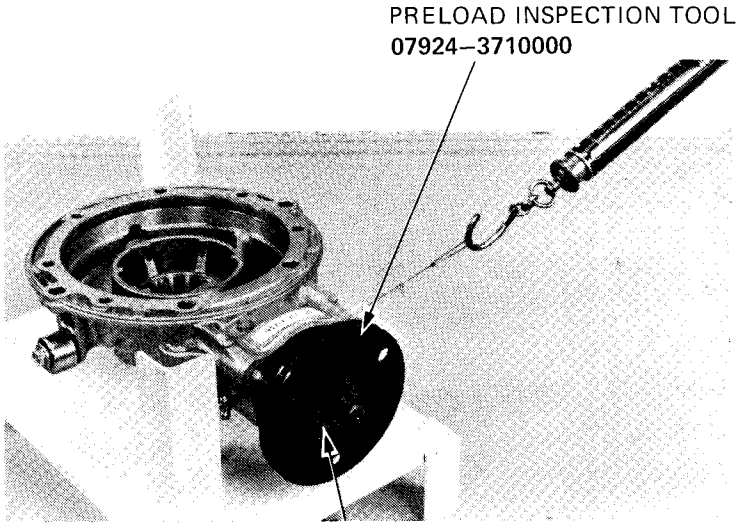
PRELOAD: Pinion gear
1,000–1,200 g (2.2–2.7 lb)
5.0–6.0 kg-cm (4.3–5.2 in-lb)

Rotate the pinion shaft 50-60 turns if measurements are not even.

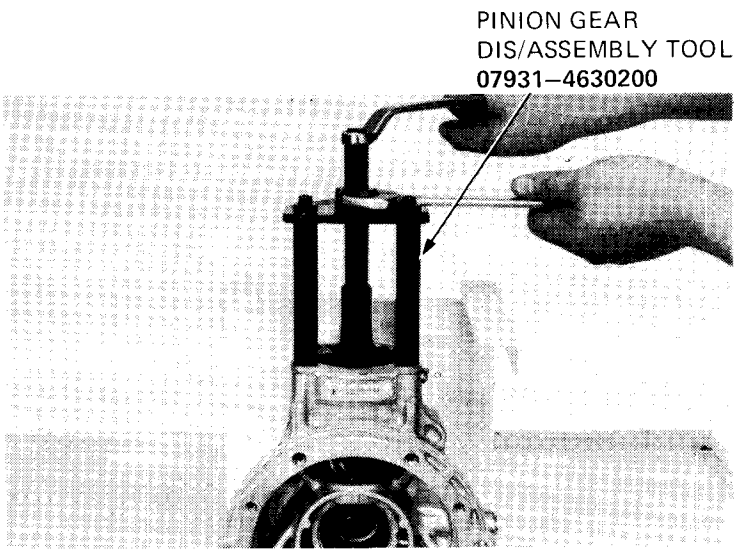
NOTE

Force required to begin movement may exceed preload specifications.

Tighten the retainer to increase preload.



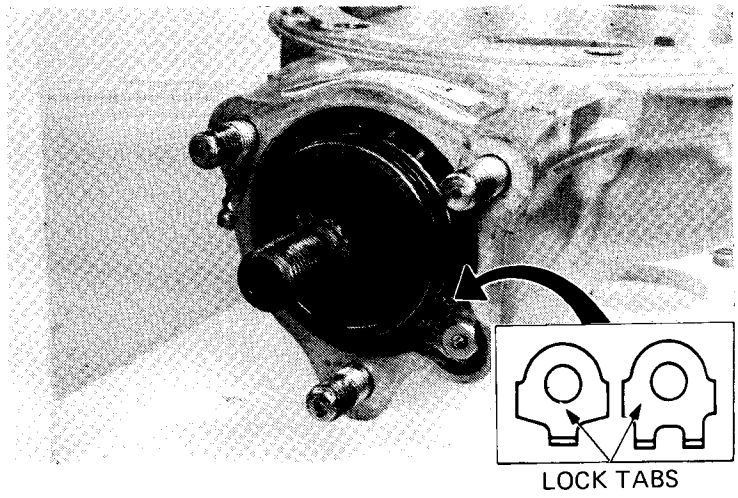
Loosen the retainer and pull up on the pinion shaft with the special tool, if preload is excessive.



After adjustment, install the proper retainer lock tab. There are two types.

Install the ring gear assembly (page 16-7, 16-8).

Check the final gear assembly preload (page 16-13).



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RING GEAR RETAINER

NOTE

Use this procedure whenever the ring gear bearing retainer is removed, or if final gear assembly preload is being checked.

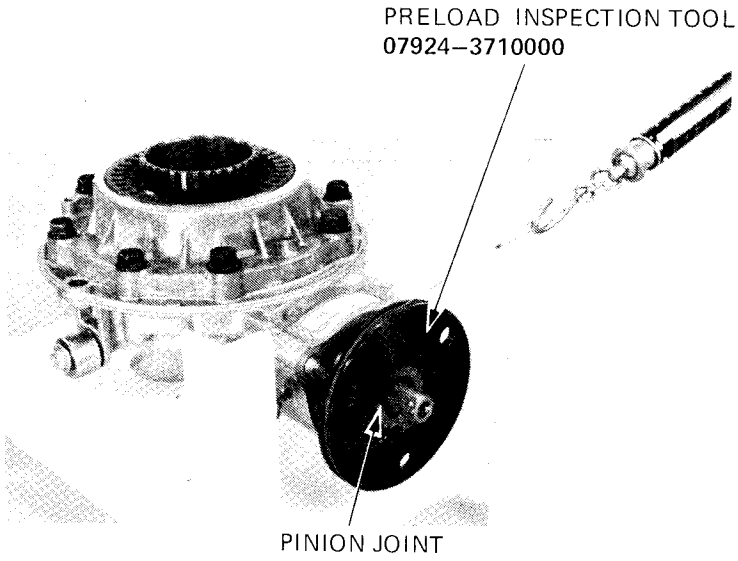
Install the preload inspection tool onto the pinion gear shaft.
Wind the wire around the tool groove and attach a spring scale. Measure the preload force needed to turn the pinion shaft in the normal direction of rotation.

PRELOAD:
1,800–2,300 g (4–5 lb)
(9.0–11.5 kg-cm, 7.8–10.0 in-lb)

NOTE

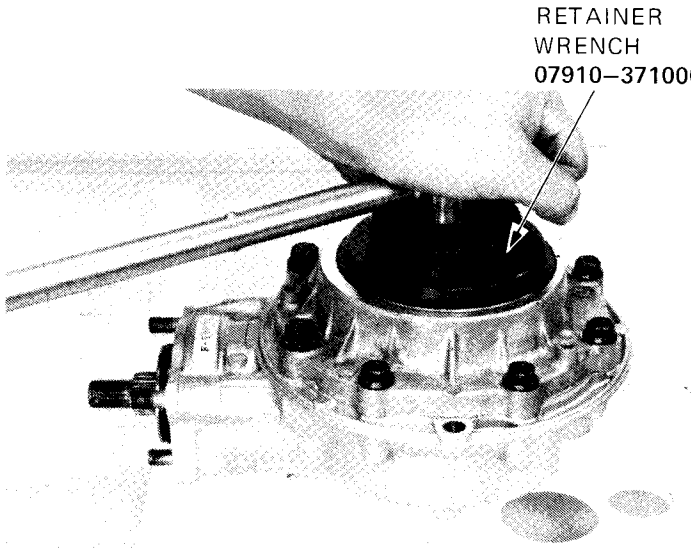
Force required to begin pinion movement may exceed preload specifications.

Remove the dust guard plate, if adjustment is necessary.



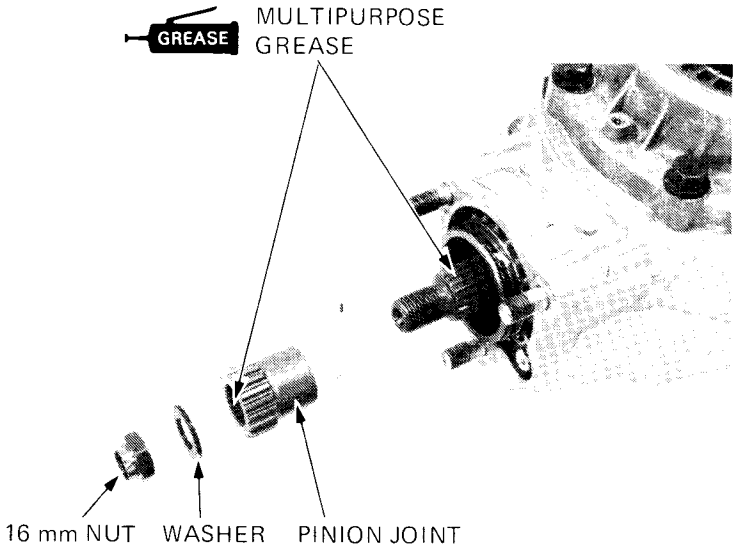
Tighten or loosen the ring gear retainer as required to obtain the correct preload.

Remove the preload inspection tool.



Apply MULTIPURPOSE NLGI No. 2 grease (MoS_2-additive) to the pinion shaft and inside of the pinion joint.

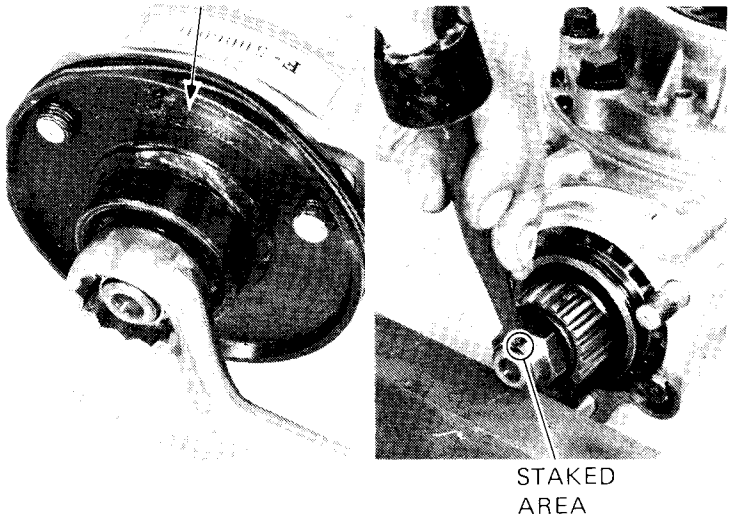
Install the pinion joint, washer and 16 mm nut.



Install the PRELOAD INSPECTION TOOL to holde the pinion shaft, and tighten the 16 mm nut.

TORQUE: 4.0–5.0 kg-m (29–36 ft-lb)

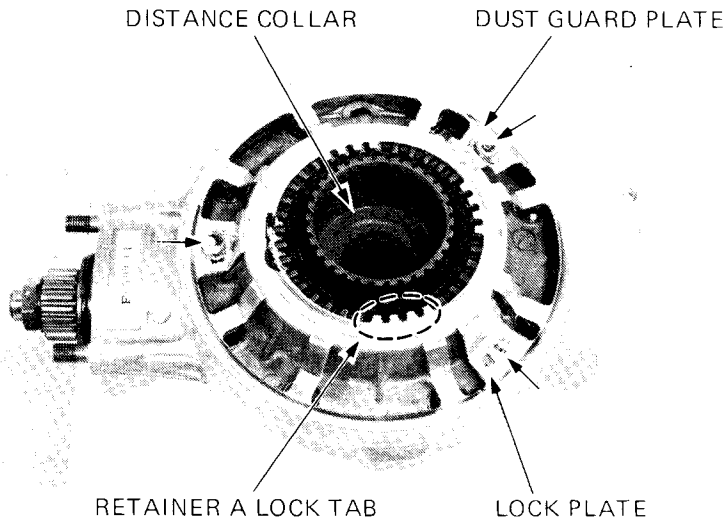
Stake the 16 mm nut to a minimum depth of 1 mm (0.04 in) at the two locations. Be careful not to damage the pinion shaft threads.



Install the dust guard plate and bend the three lock tabs up.

Bend one of the bearing retainer lock tabs down.

Remove the final gear case from the base, and insert the distance collar.



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FINAL GEAR CASE INSTALLATION

Apply MULTIPURPOSE NLGI No. 2 grease (MoS_2-additive) to the drive and pinion shaft splines. Install the damper spring.

Be sure the special O-ring is on the pinion gear retainer and install the gear case on the swingarm loosely.

NOTE

Do not tighten the gear case nuts until after the rear axle is inserted.

Apply MULTIPURPOSE NLGI No. 2 grease (MoS_2-additive) to the final driven gear's inner surface and splines. Apply grease to the final driven gear flange splines.

Coat the rear axle with multipurpose grease and install the rear wheel (page 15-8). Do not tighten the axle at this time.

Tighten the final gear case nuts.

TORQUE: 3.5–4.5 kg-m (25–33 ft-lb)

Tighten the rear axle.

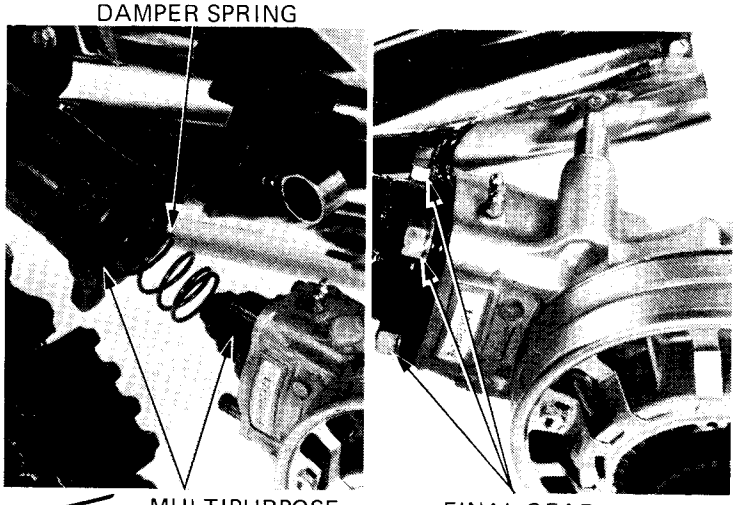
TORQUE: 8.0–10.0 kg-m (58–72 ft-lb)

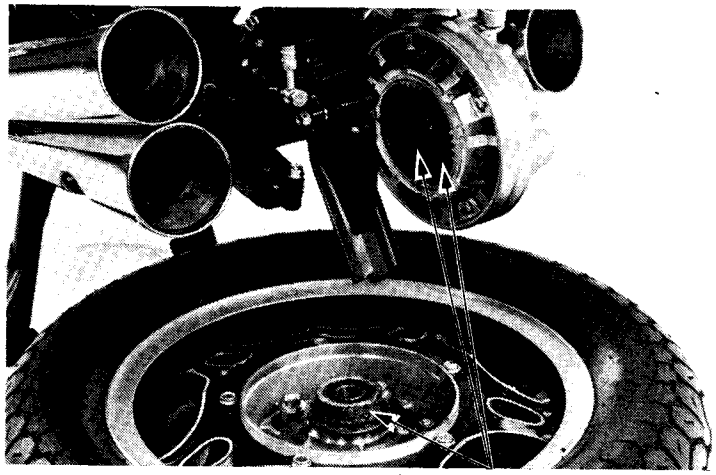
Tighten the axle pinch bolt.

TORQUE: 2.4–2.9 kg-m (17–21 ft-lb)

Install the rear shock absorbers.

TORQUE: 3.0–4.0 kg-m (22–29 ft-lb)





Apply MULTIPURPOSE NLGI No. 2 grease (MoS_2-additive) to the drive shaft joint grease fitting.

QUANTITY: 90 g approx. (at disassembly)

Make sure the final drive gear case drain bolt is tight.

Remove the oil filler cap.

Add the recommended lubricant until it reaches the filler neck threads.

RECOMMENDED OIL: HYPOID GEAR OIL API, GL–5

Above 5°C/41°F: SAE #90
Below 5°C/41°F: SAE #80
OIL CAPACITY: 140–160 cc (4.7–5.4 oz)