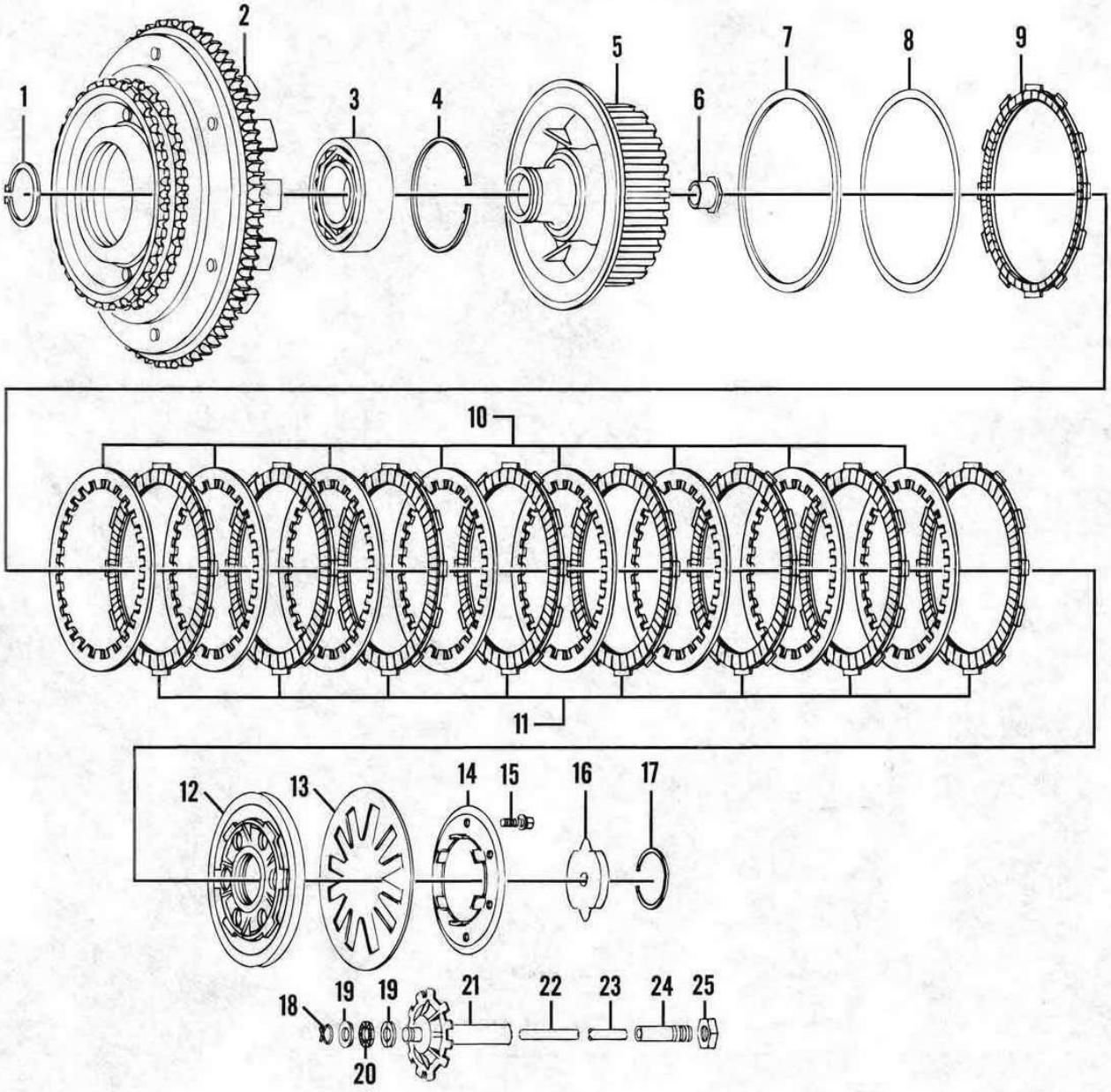
93

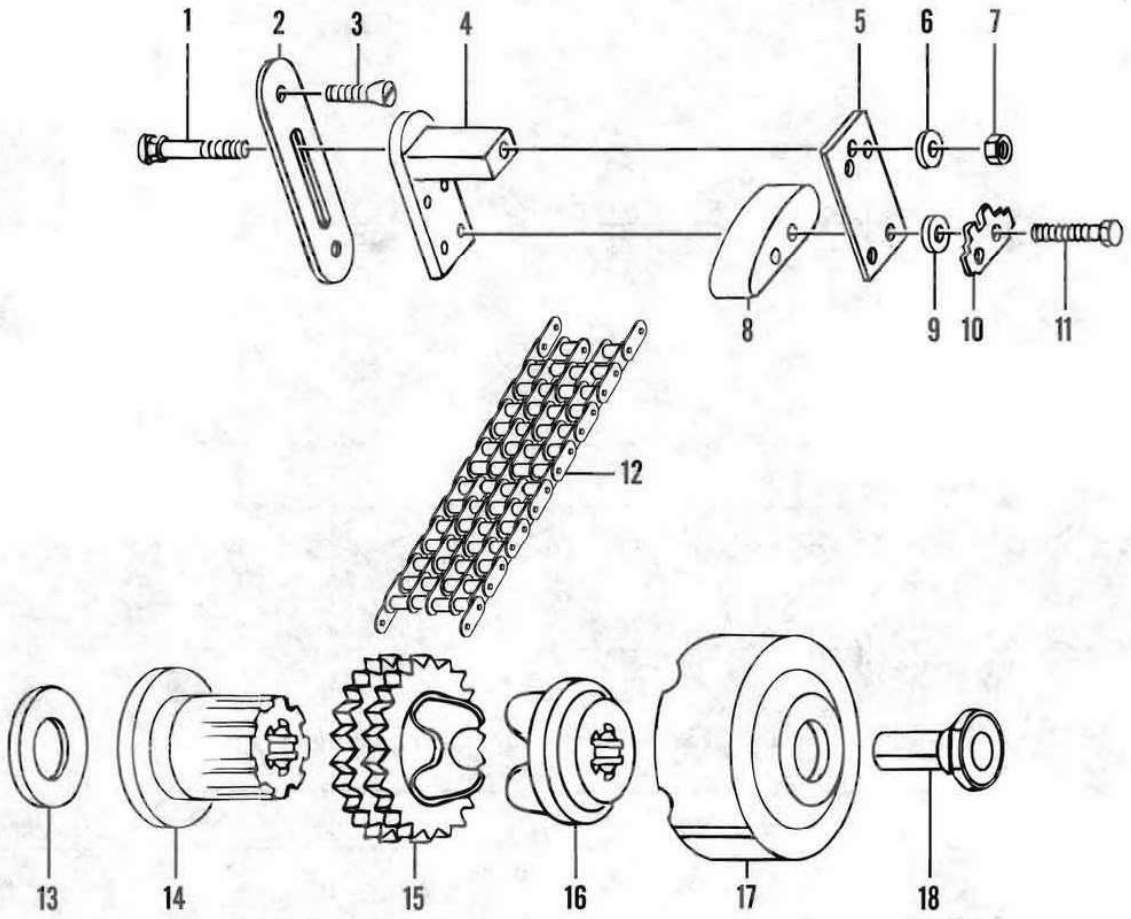
WET CLUTCH (1998-1999 MODELS)



1. Snap ring
2. Clutch shell and sprocket
3. Bearing
4. Snap ring
5. Clutch hub
6. Clutch nut
7. Diaphragm spring seat
8. Diaphragm spring
9. Friction disc B
10. Clutch plates
11. Friction disc A
12. Pressure plate
13. Diaphragm spring
14. Diaphragm spring retainer
15. Bolt
16. Release plate
17. Snap ring
18. Snap ring
19. Thrust washer
20. Radial bearing
21. Oil slinger
22. Pushrod (right side)
23. Pushrod (right side)
24. Pushrod (left side)
25. Locknut

94

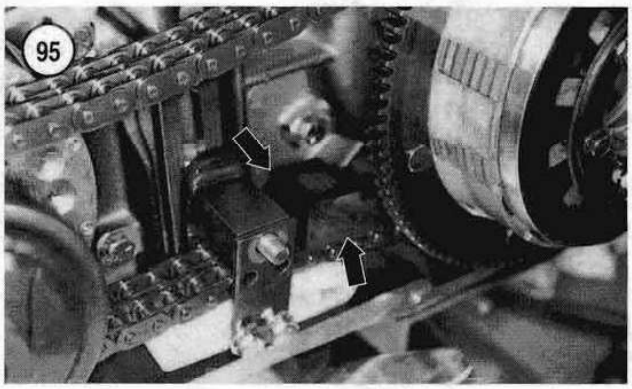
COMPENSATING SPROCKET



1. Bolt
2. Anchor plate
3. Screw
4. Chain tensioner
5. Plate
6. Washer
7. Nut
8. Tensioner pad
9. Washer
10. Lockwasher
11. Bolt
12. Primary drive chain
13. Spacer
14. Shaft extension
15. Compensating sprocket
16. Sliding cam
17. Cover assembly with springs*
18. Nut*

*Spacer between No. 17 and No. 18 for 1999 models not shown.

95



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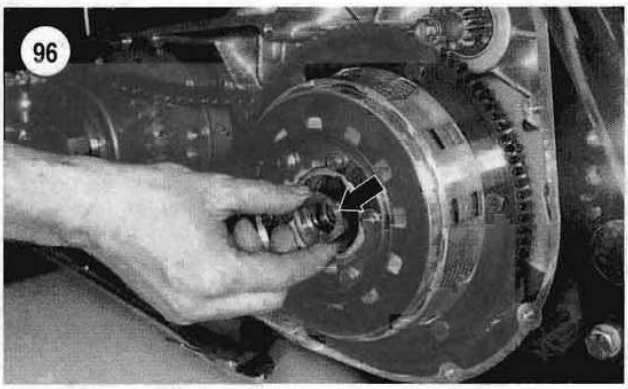

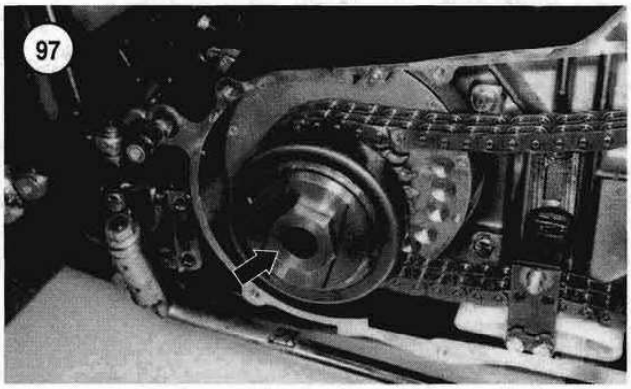
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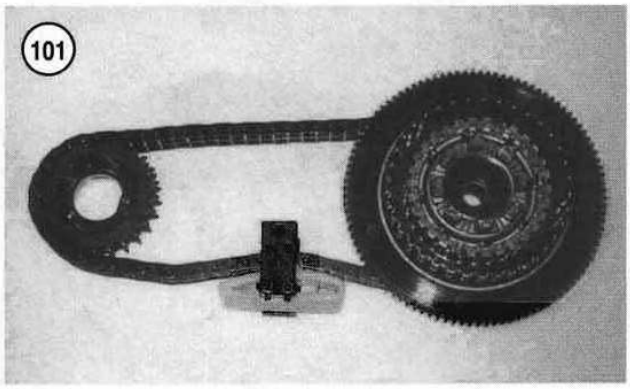
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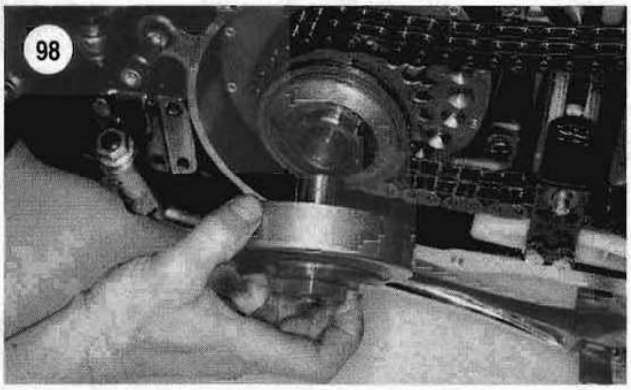
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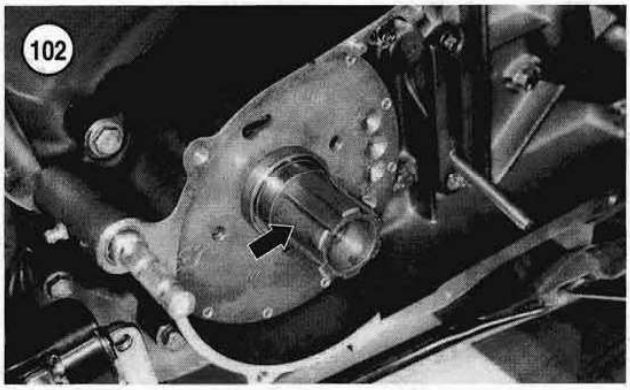
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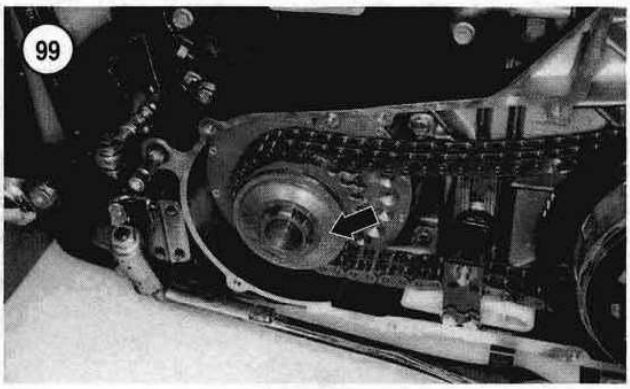
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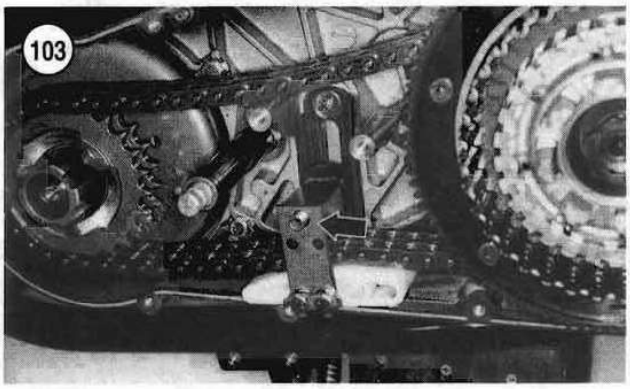
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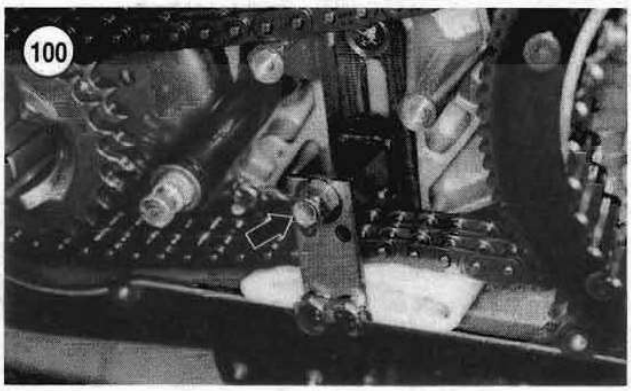
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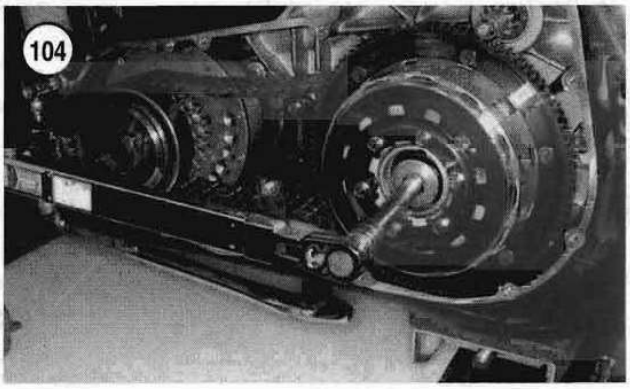
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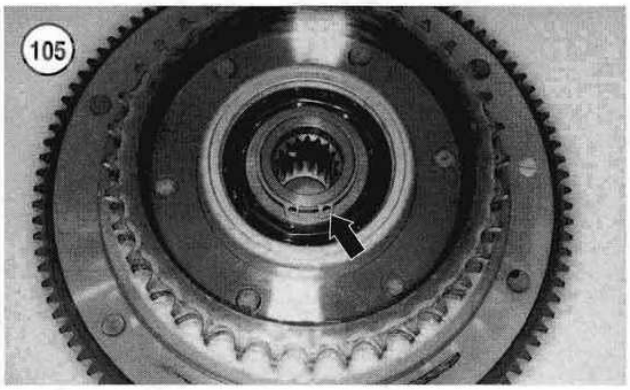
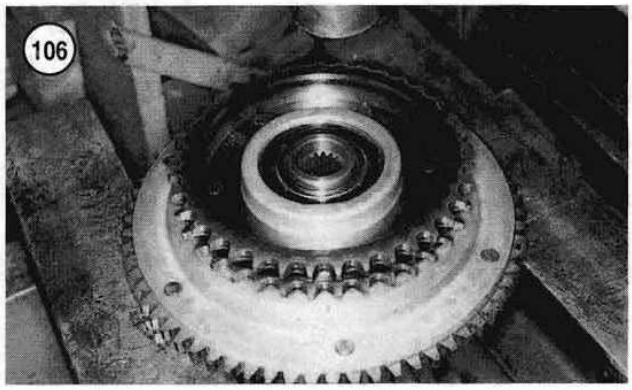
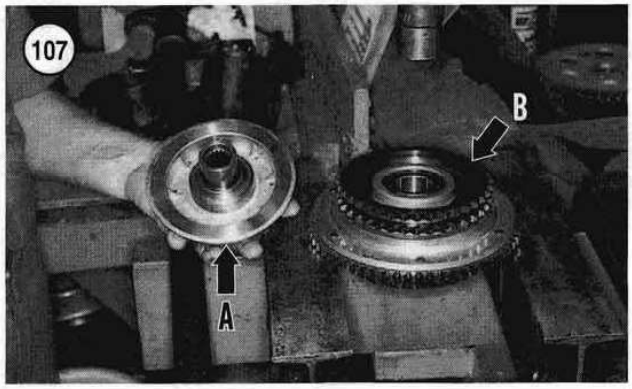




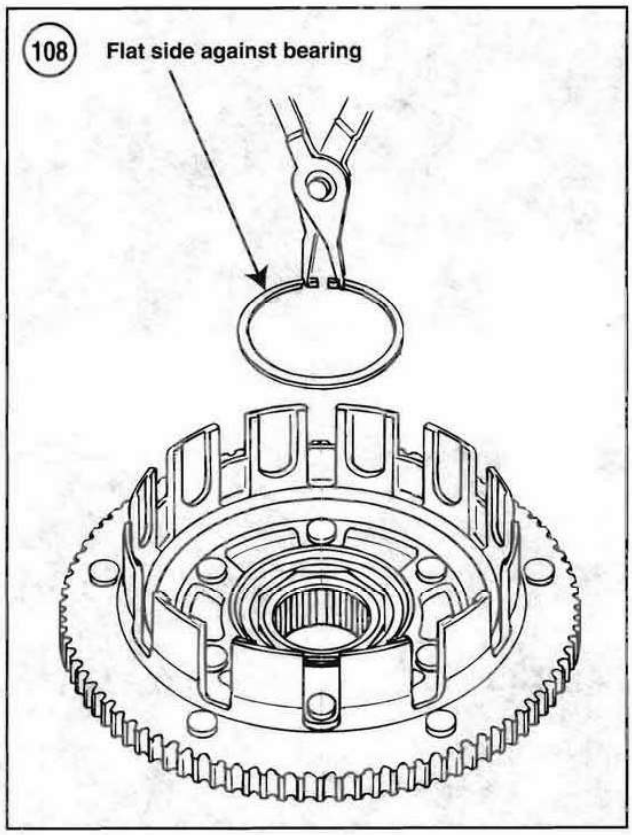
1. Remove the clutch as described in this chapter. Remove the clutch shell assembly from the primary drive chain.
2. Remove the snap ring (**Figure 105**) from the clutch hub groove.
3. Position the clutch hub and shell with the primary chain sprocket side *facing up*.
4. Support the clutch hub and clutch shell in a press (**Figure 106**).
5. Place a suitable size arbor in the clutch hub surface and press the clutch hub (A, **Figure 107**) out of the bearing.
6. Remove the clutch shell from the press (B, **Figure 107**).
7. On the inner surface of the clutch shell, remove the bearing retaining snap ring (**Figure 108**) from the groove in the middle of the clutch shell.

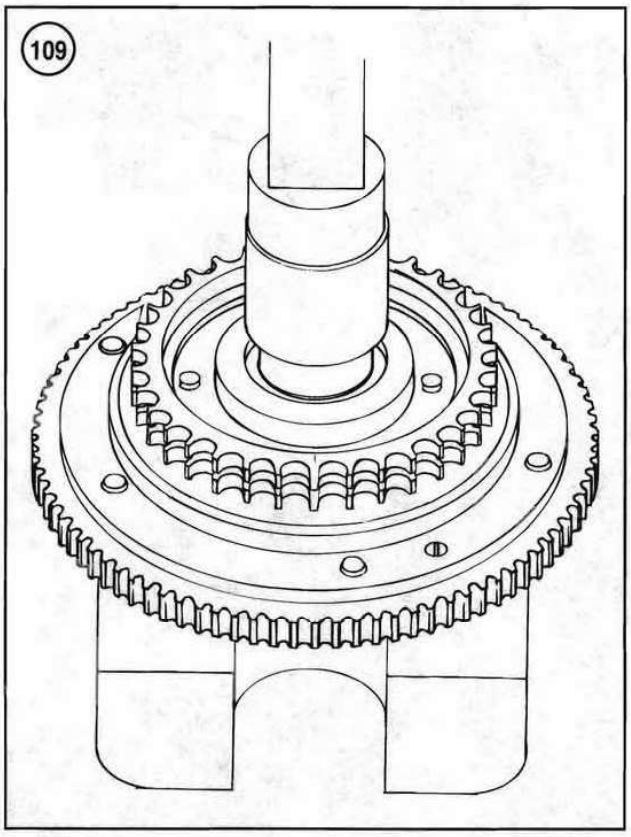


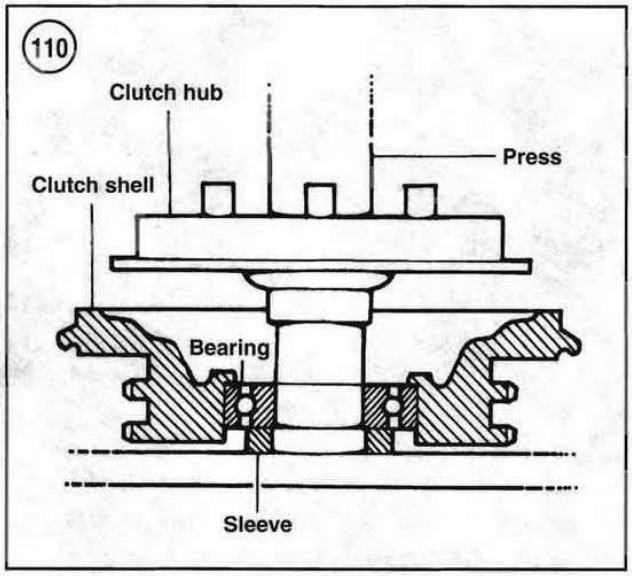
CAUTION

Press the bearing out from the primary chain sprocket side of the clutch shell. The bearing bore has a shoulder on the primary chain side.

8. Support the clutch shell in the press with the primary chain sprocket side *facing up*.
9. Place a suitable size arbor on the bearing inner race and press the bearing out of the clutch shell (**Figure 109**).
10. Thoroughly clean the clutch hub and shell in solvent and dry with compressed air.
11. Inspect the bearing bore in the clutch shell for damage or burrs. Clean off any burrs that would interfere with new bearing installation.
12. Support the clutch shell in the press with the primary chain sprocket side *facing down*.
13. Apply chaincase lubricant to the clutch shell bearing receptacle and to the outer surface of the bearing.
14. Align the bearing with the clutch shell receptacle.
15. Place a suitable size arbor on the bearing outer race and slowly press the bearing into the clutch shell until it

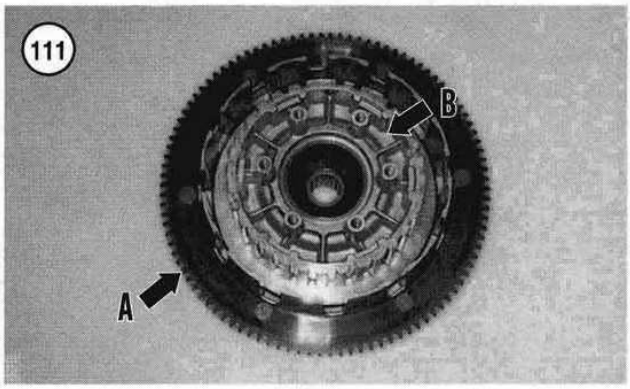






bottoms on the lower shoulder. Press only on the outer bearing race. Applying force to the bearing inner race will damage the bearing. Refer to *Bearing Replacement* in Chapter One for additional information.

16. Position the new snap ring with the flat side against the bearing and install the snap ring into the clutch shell groove (**Figure 108**). Make sure the snap ring is seated correctly in the clutch shell groove.



17. Press the clutch hub into the clutch shell as follows:

CAUTION

Failure to support the inner bearing race properly will cause bearing and clutch shell damage.

a. Place the clutch shell in a press. Support the inner bearing race with a sleeve as shown in **Figure 110**.
b. Align the clutch hub with the bearing and slowly press the clutch hub into the bearing until the clutch hub shoulder seats against the bearing inner race.
c. Install a *new* snap ring (**Figure 105**) into the clutch hub. Make sure the snap ring is seated correctly in the clutch hub groove.

18. After completing assembly, hold the clutch shell (A, **Figure 111**) and rotate the clutch hub (B) by hand. The shell must turn smoothly with no roughness or binding. If the clutch shell binds or turns roughly, the bearing was installed incorrectly. Repeat this procedure until this problem is corrected.

Inspection

The clutch shell is a subassembly consisting of the clutch shell, the clutch hub, the bearing and two snap rings.

1. Remove the clutch shell as described in this chapter.
2. Hold the clutch shell and rotate the clutch hub by hand. The bearing is damaged if the clutch hub binds or turns roughly.
3. Check the sprocket (A, **Figure 112**) and the starter ring gear (B) on the clutch shell for cracks, deep scoring, excessive wear or heat discoloration.
4. If the sprocket or the ring gear are worn or damaged, replace the clutch shell. If the primary chain sprocket is

worn, also check the primary chain and the compensating sprocket as described in this chapter.

5. Inspect the clutch hub for the following conditions:
   a. The clutch plate teeth slide in the clutch hub splines (A, **Figure 113**). Inspect the splines for rough spots, grooves or other damage. Repair minor damage with a file or oil stone. If the damage is severe, replace the clutch hub.
   b. Inspect the clutch hub inner splines (**Figure 114**) for galling, severe wear or other damage. Repair minor damage with a fine-cut file. If damage is severe, replace the clutch hub.
   c. Inspect the bolt towers and threads (B, **Figure 113**) for thread damage or cracks at the base of the tower. Repair thread damage with the correctly sized metric tap. If the tower(s) is cracked or damaged, replace the clutch hub.
6. Check the clutch shell. The friction disc tangs slide in the clutch housing grooves (C, **Figure 113**). Inspect the grooves for cracks or galling. Repair minor damage with a file. If the damage is severe, replace the clutch housing.
7. If the clutch hub, the clutch shell or the bearing is damaged, replace it as described in the following procedure.

PRIMARY CHAIN AND GUIDE

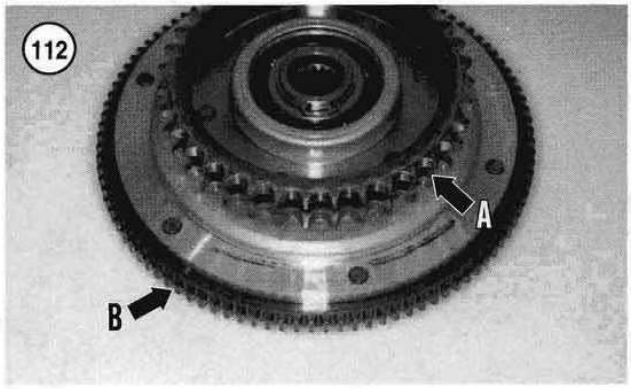
Removal/Inspection/Installation

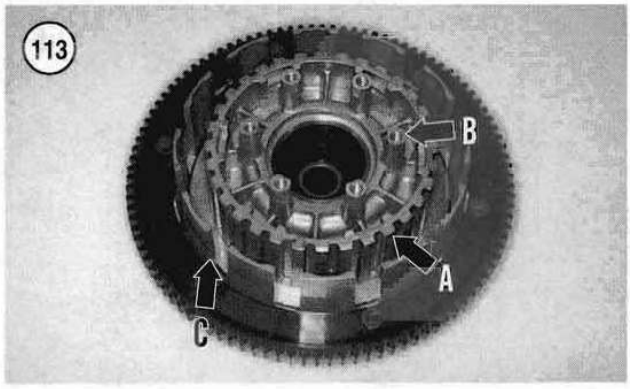
1. Remove the primary chain as described under the *Clutch, Compensating Sprocket and Primary Drive Chain Removal and Installation* procedure in this chapter.
2. Clean the primary chain in solvent and dry thoroughly.
3. Inspect the primary chain (A, **Figure 115**) for excessive wear, cracks or other damage. If the chain is worn or damaged, check both the compensating sprocket (B, **Figure 115**) and the clutch shell-driven sprocket (C) for wear or damage. Replace parts as necessary.

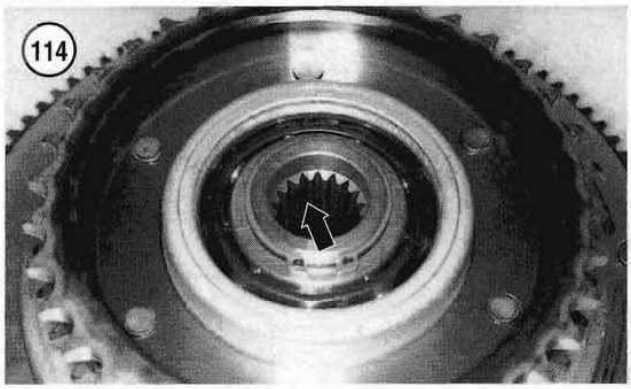
NOTE

If the primary chain is near the end of its adjustment level, or if no more adjustment is available, and the adjusting guide is not worn or damaged, the primary chain is excessively worn. Service specifications for chain wear are not available.

4. Inspect the adjusting guide for cracks, severe wear or other damage. Replace the adjusting shoe if necessary.



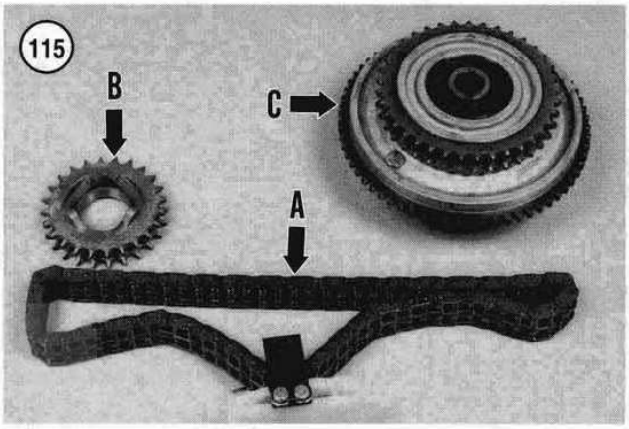


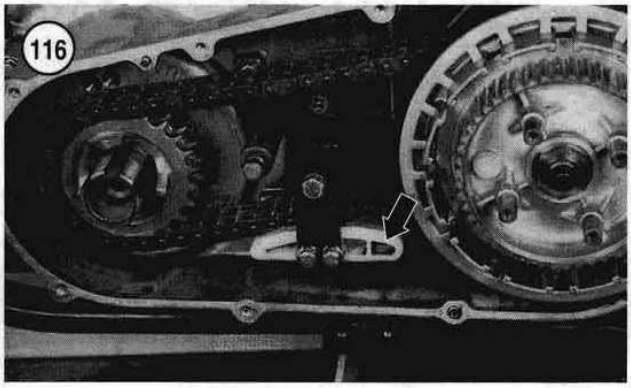


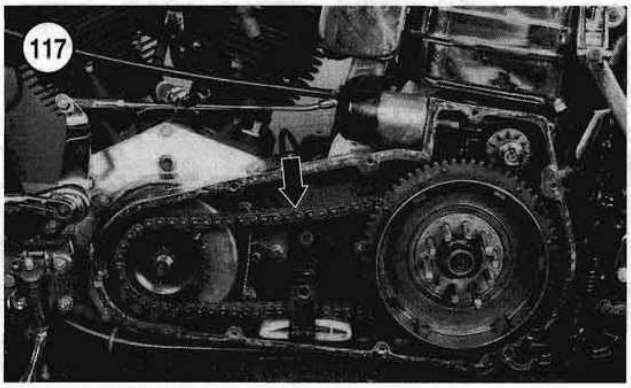
Adjustment Shoe Replacement

If the primary chain cannot be adjusted properly and the adjustment shoe (**Figure 116**) appears worn, replace it as follows.

1. Remove the primary chaincase outer cover as described under clutch removal in this chapter.
2. Remove the top shoe bracket bolt and remove the bracket.
3. Pry back the locking tabs and remove the adjusting shoe mounting bolts. Remove the old adjusting shoe and







install a new one. Lock the new adjusting shoe in place by bending the lockwasher tabs over the mounting bolts.

4. Adjust the primary chain as described in Chapter Three.
5. Install the primary chaincase outer cover as described under the *Clutch Inspection* in this chapter.

Alignment

The compensating sprocket is aligned with the clutch sprocket by a spacer placed between the alternator rotor and the shaft extension (**Figure 94**). The same spacer should be reinstalled any time the compensating sprocket is removed. However, if the primary chain is wearing on one side, or if new clutch components were installed that could affect alignment, perform the following.

Dry clutch models

1. Remove the primary chaincase outer cover as described under *Clutch Removal* in this chapter.
2. Check and adjust the primary chain tension as described in Chapter Three.
3. Push the primary chain toward the engine as far as it will go at the sprockets as shown in **Figure 117**. This pushes the chain clearance to the inside of the sprockets.
4. Place a straightedge across the primary cover gasket surface near the engine compensating sprocket and measure the distance from the chain-link side plates to the straightedge. Record this measurement.
5. Repeat Step 4 by measuring the distance at the clutch sprocket.
6. The difference between Step 4 and Step 5 should be within 0.030 in. (0.76 mm). If the clearance exceeds 0.030 in. (0.76 mm), replace the spacer (13, **Figure 94**) with a suitably sized spacer.

Wet clutch models

1. Remove the primary chaincase outer cover as described in this chapter.
2. Adjust the primary chain tension so the chain is snug against both the compensating sprocket and clutch shell sprocket.
3. Push the primary chain toward the engine and transmission (at both sprockets) as far as it will go.
4. Place a straightedge across the primary chain side plates as close to the compensating sprocket as possible.
5. Close to the compensating sprocket, measure the distance from the chain-link side plates to the primary chaincase housing gasket surface (**Figure 118**). Record the measurement.
6. Repeat Steps 4 and 5 with the end of the straightedge as close to the clutch sprocket as possible (**Figure 119**). Record the measurement.
7. The difference between the two measurements must be within 0.030 in. (0.76 mm) of each other. If the difference exceeds this amount, replace the spacer (**Figure 120**) with a suitably sized spacer. Refer to **Table 3** and **Table 4** for spacer thickness.

8. To replace the spacer, perform the *Clutch, Compensating Sprocket and Primary Drive Chain Removal and Installation* procedure in this chapter.
9. Install the primary chaincase outer cover as described in this chapter.
10. Check and adjust the primary chain tension as described in Chapter Three.

COMPENSATING SPROCKET INSPECTION

Refer to **Figure 121**.

1. Remove the compensating sprocket assembly as described in this chapter.
2. Clean all parts in solvent and dry with compressed air.
3. Check the cam surfaces (**Figure 122**) for cracks, deep scoring or wear.
4. Check the compensating sprocket gear teeth (**Figure 123**) for cracks or wear.

NOTE

If the compensating sprocket teeth are worn, also check the primary chain and the clutch shell gear teeth for wear.

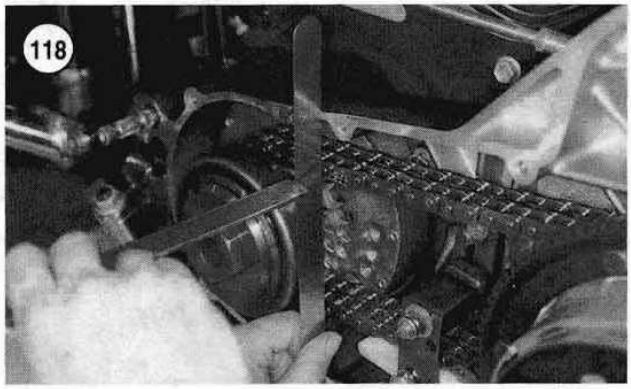
5. Check the compensating sprocket inner bushing (**Figure 124**) for wear.
6. Check the sliding cam inner splines (**Figure 125**) for wear.
7. Check the shaft extension splines for wear or galling.
8. Check the cover (**Figure 126**) for damage.
9. Inspect the inner threads (**Figure 127**) of the nut for damage.
10. If any of these components were replaced, check the primary chain alignment as described in this chapter.

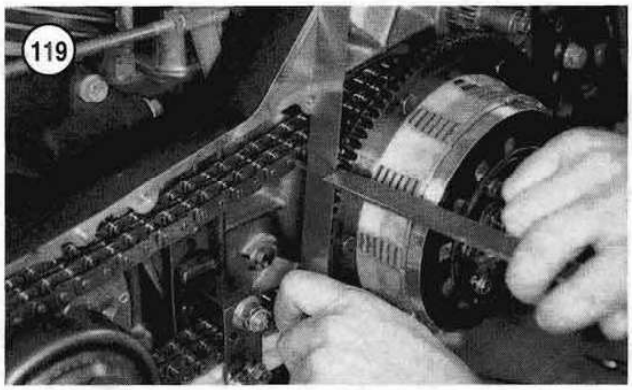
PRIMARY CHAINCASE (1984-1988 MODELS)

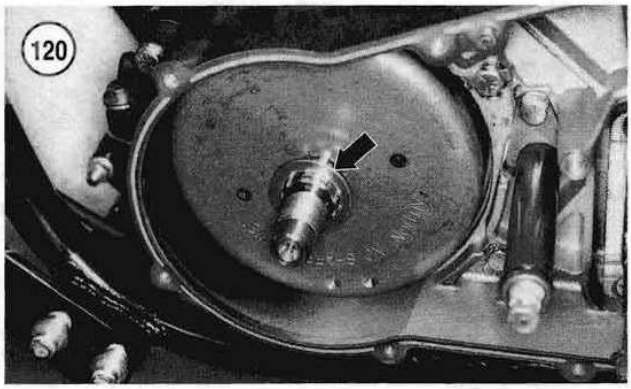
The primary chaincase houses the compensating sprocket assembly, primary chain, chain adjuster and clutch.

Removal (FXWG, FXSB and FXEF Models)

1. Remove the clutch, primary chain and compensating sprocket as described in this chapter.
2. Remove the solenoid and plunger as described in Chapter Nine.



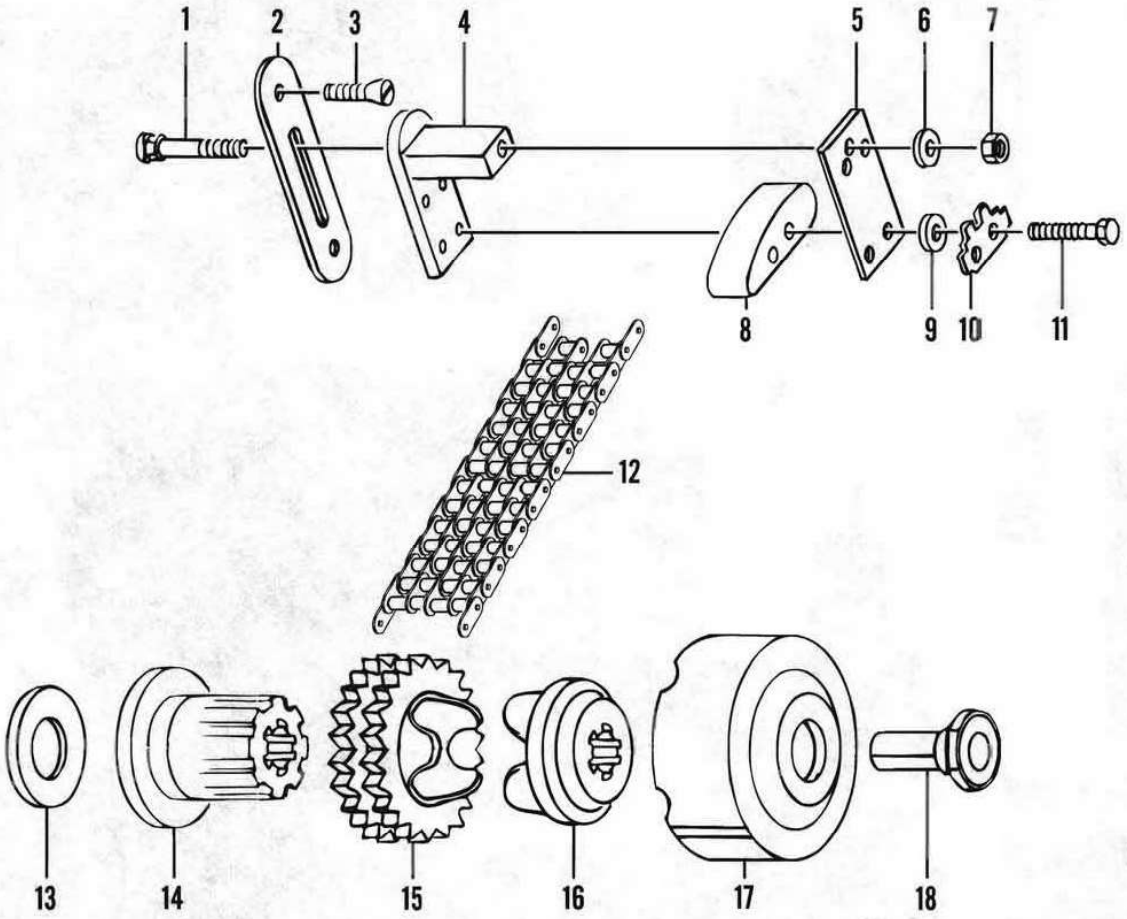




3. Remove the electric starter drive housing as described in this chapter.
4. Loosen the lower engine-to-frame mounting bolts and nuts.
5. Loosen the transmission-to-frame mounting bolts and nuts.
6. Remove the primary chaincase-to-transmission bolts.
7. On models so equipped, remove the two upper bolts (A, **Figure 128**) at the rear of the housing. Then remove the two lower bolts (B, **Figure 128**) from behind the case (not shown).

(121)

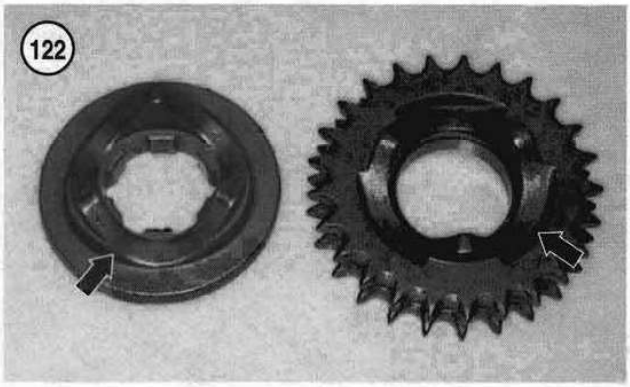
COMPENSATING SPROCKET



1. Bolt
2. Anchor plate
3. Screw
4. Chain tensioner
5. Plate
6. Washer
7. Nut
8. Tensioner pad
9. Washer
10. Lockwasher
11. Bolt
12. Primary drive chain
13. Spacer
14. Shaft extension
15. Compensating sprocket
16. Sliding cam
17. Cover assembly with springs*
18. Nut*

*Spacer between No. 17 and No. 18 for 1999 models not shown.

(122)



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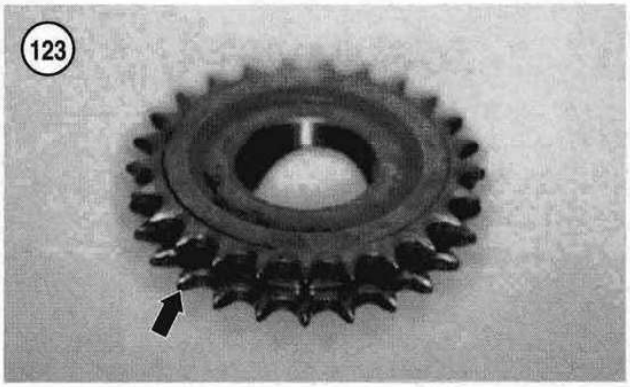
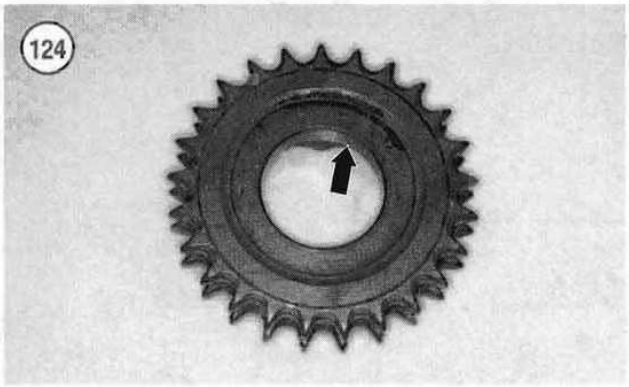
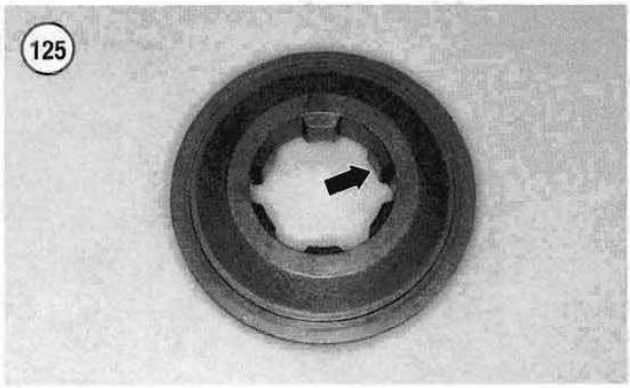


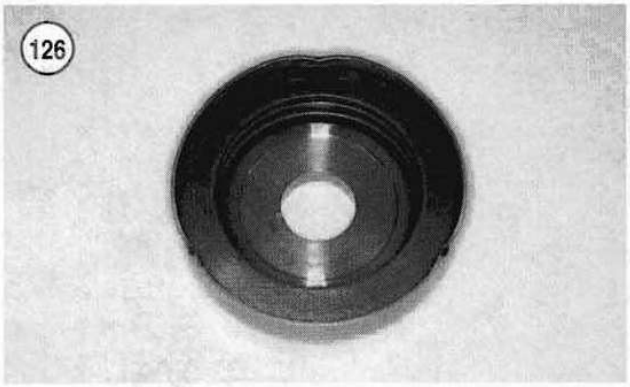




8. Remove the primary housing-to-engine case bolts. See **Figure 129** or **Figure 130**.

9. Pull the primary chaincase (**Figure 131**) away from the engine and remove it.

10. Inspect the primary chaincase assembly as described in this chapter.

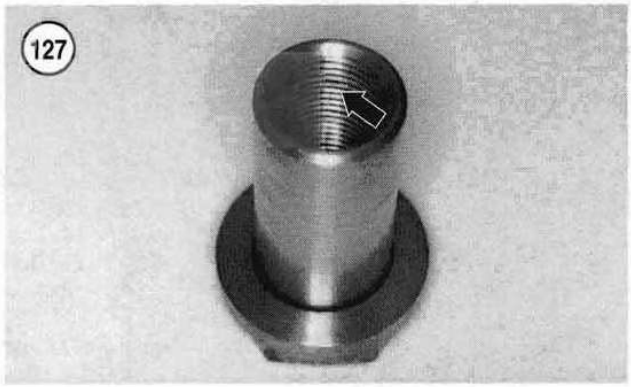


Installation (FXWG, FXSB and FXEF Models)

1. Replace the alternator O-ring (**Figure 132**) if worn or damaged.

NOTE

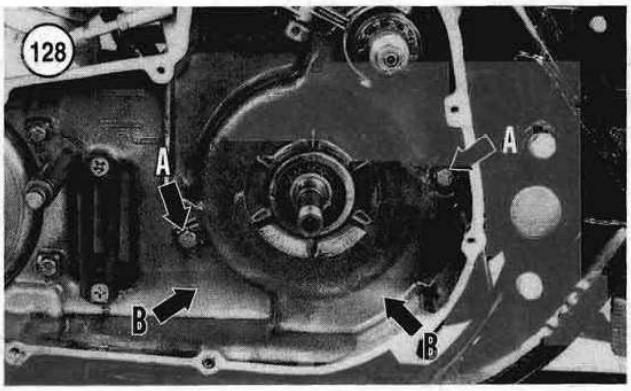
Wipe the inner chaincase oil seal lip with chaincase oil before installing the chaincase in Step 2. When installing the chaincase, work the oil seal carefully along the mainshaft to prevent damage.



2. Carefully align the chaincase with the mainshaft and slide the chaincase onto the mainshaft.

CAUTION

The following procedures should be followed to make sure that the transmission is properly aligned with the engine. Improper alignment could cause chain and transmission failure.

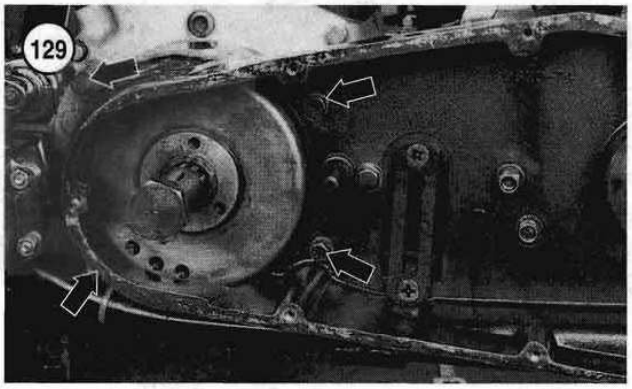


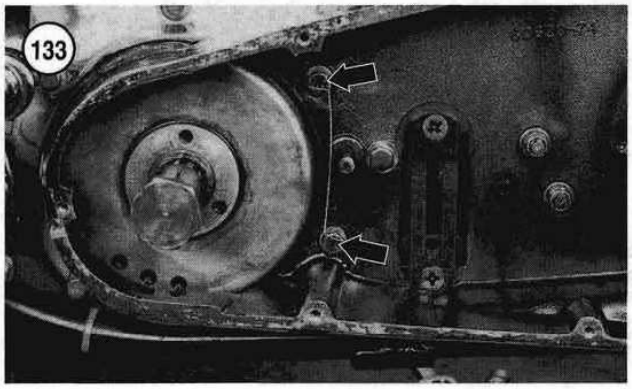
3. Loosen the engine and transmission frame mounting fasteners if they were not loosened during removal.

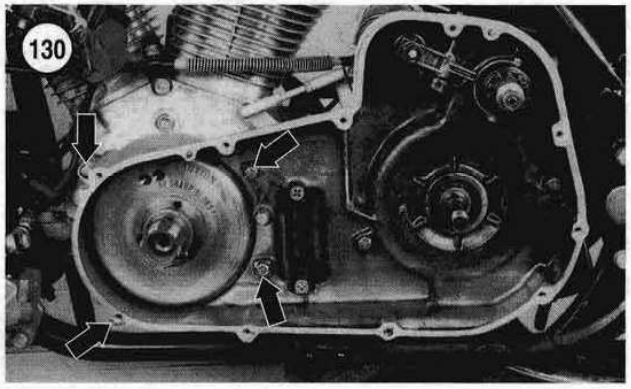
4. Install the primary chaincase-to-transmission mounting bolts finger-tight.

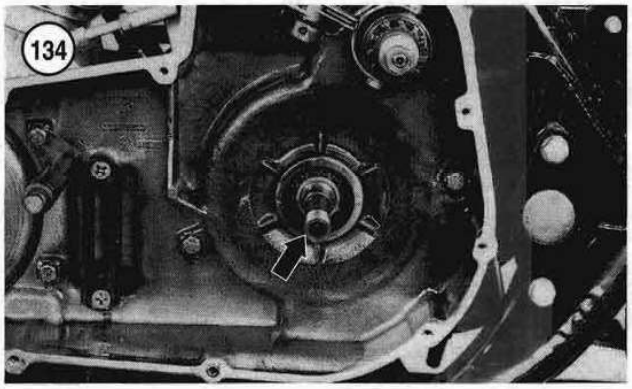
NOTE

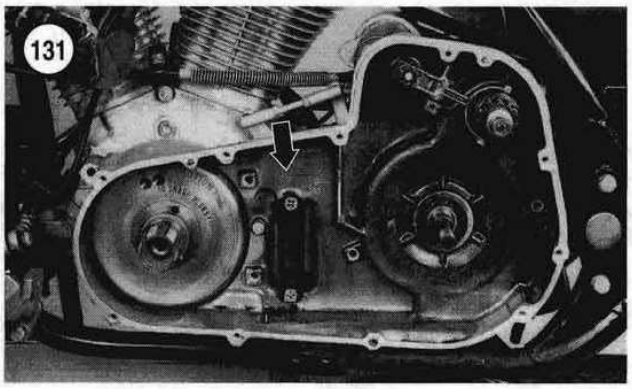
*Install into the rear engine mounting holes the two primary chaincase-to-engine mounting bolts (**Figure 133**) with the drilled heads.*

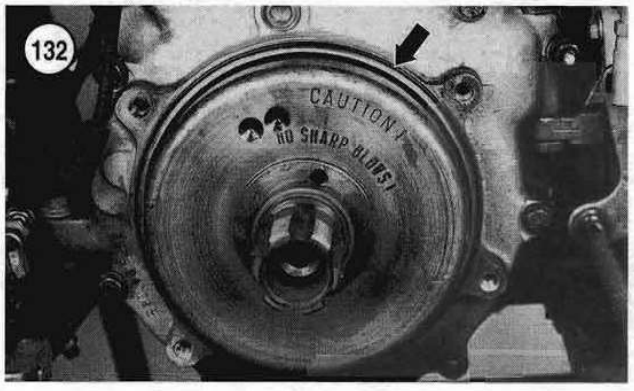












5. Install the primary chaincase-to-engine mounting bolts finger-tight (**Figure 129**). Then tighten to 18-22 ft.-lb. (24-30 N•m).

6. Align the primary case with the transmission housing.

NOTE

*Before tightening the primary chaincase-to-transmission bolts, check the bolts for binding by screwing them in and out by hand. Likewise, check the mainshaft (**Figure 134**) for binding by turning it by hand. If the bolts or mainshaft show any sign of binding, the primary chaincase must be repositioned where it mounts on the transmission. If necessary, loosen the primary case-to-engine mounting bolts and start over. When there is no apparent binding when the engine mounting bolts are tight, proceed to Step 8.*

7. Tighten the primary chaincase-to-transmission mounting bolts to 18-22 ft.-lb. (24-30 N•m). Bend the lockwasher tab over the bolt head to lock it.

8. Tighten the lower engine-to-frame mounting bolts and nuts to 35-38 ft.-lb. (47-52 N•m).

9. Tighten the transmission-to-frame mounting bolts to 35-38 ft.-lb. (47-52 N•m).

NOTE

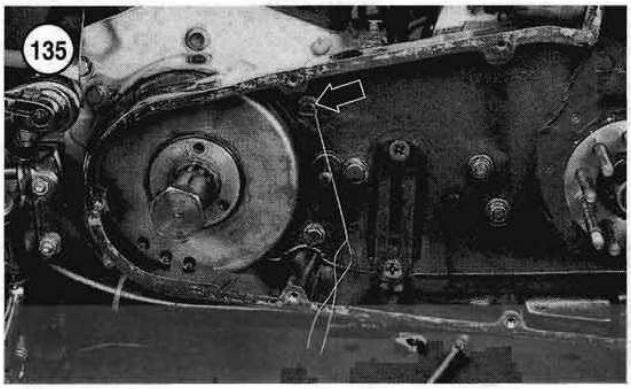
*Recheck that the mainshaft (**Figure 134**) turns freely with no sign of binding.*

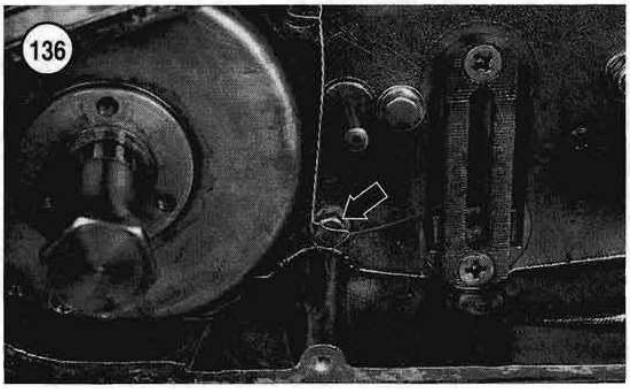
10. Safety wire the rear primary chaincase-to-engine bolts as shown in **Figure 135** and **Figure 136**.

CAUTION

*Always install safety wire so that it tightens the bolt. **Figure 137** shows the correct way to safety-wire two bolts by the double-twist method. Always use stainless steel wire approved for safety wiring.*

11. Install the starter and starter drive housing as described in this chapter.
12. Install the solenoid and plunger as described in Chapter Nine.
13. Install the clutch, engine compensating sprocket, chain adjuster, primary chain and primary chaincase cover as described in this chapter.



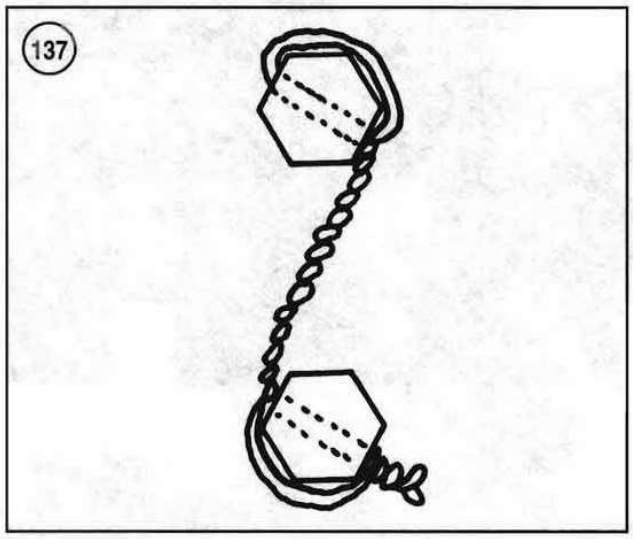


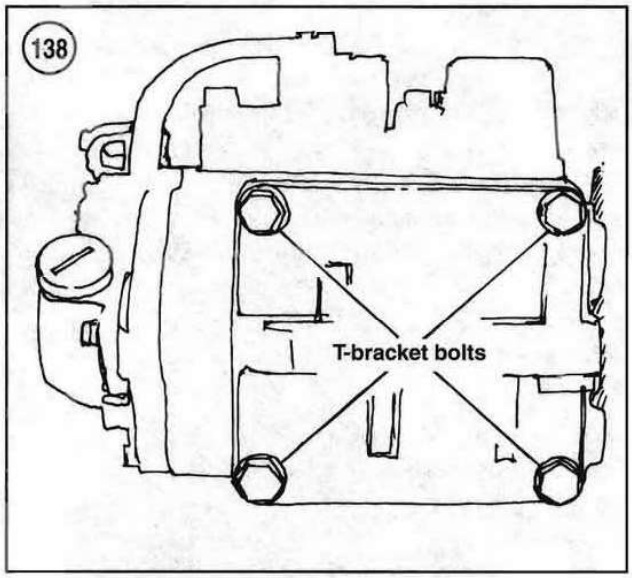
Removal (1984-1988 FXR, FLH and FLT Series Models)

1. Remove the clutch, primary chain and compensating sprocket as described under *Clutch Removal* in this chapter.
2. Remove the solenoid and plunger as described in Chapter Nine.
3. Remove the starter and starter drive housing as described in this chapter.
4. On 1984 models, use the Rear Chain Boot Remover tool (Harley-Davidson part No. HD-97101-81). Remove the screws securing the chain boot to the primary chaincase.
5. On early 1984 models, perform the following:
   a. Label the vent hoses before disconnecting them in the following steps.
   b. Disconnect the chain oil hose at the oil pump.
   c. Locate the T-fitting next to the oil pump with two vent hoses. Disconnect the crankcase and oil pump vent hoses from the T-fitting.
6. Cut any safety wire from the two engine case bolts. Refer to **Figure 135** and **Figure 136**.
7. Remove the primary chaincase-to-transmission bolts.
8. On models so equipped, remove the two bolts (A, **Figure 128**) at the rear of the housing. Then remove the two lower bolts (B, **Figure 128**) from behind the case (not shown).
9. Remove the primary housing-to-engine case bolts. See **Figure 129** or **Figure 130**.
10. On early 1984 models, pull the primary chaincase out slightly and disconnect the remaining vent hose from the rear of the primary case.
11. On all models, rotate the primary chaincase clockwise on the mainshaft and remove it.
12. On 1985-1988 models, pull the primary chaincase away from the engine and remove it (**Figure 131**).
13. Inspect the primary chaincase assembly as described in this chapter.

Installation (1984-1988 FXR, FLH and FLT Series Models)

1. Replace the alternator O-ring (**Figure 132**) if worn or damaged.
2. On models where the mainshaft bearing is not held in place with snap rings, wipe the outer bearing surface with Loctite Retaining Compound No. 601 and install the bearing into the primary chaincase. On later models, install the bearing and secure it with the two snap rings.
3. On early models, install a *new* inner chaincase gasket.
4. Carefully align the chaincase with the mainshaft and slide the chaincase partially onto the mainshaft.





NOTE

Refer to the marks made on the vent hoses prior to disassembly in Step 5 of ***Removal****.*

5. On early 1984 models, perform the following:
   a. Connect the vent hose removed in Step 10 to the rear of the primary chaincase.
   b. Connect the oil return hose to the fitting on the bottom/rear of the primary housing. Then route the chain oiler and vent hoses between the engine and transmission housings.
   c. Connect the chain oil hose to the fitting on the oil pump.
   d. Connect the vent hoses from the oil tank and oil pump to the fitting on the primary vent hose.

CAUTION

The following procedures should be followed to make sure that the transmission is properly aligned with the engine. Improper alignment could cause chain and transmission failure.

6. Install the inner primary chaincase to transmission bolts and lock tabs and tighten to the following:
   a. Tighten the 3/8-in. bolts to 21-27 ft.-lb. (29-37 N•m).
   b. Tighten the 5/16-in. bolts to 13-16 ft.-lb. (18-22 N•m).
7. After tightening bolts, check that the mainshaft (**Figure 134**) turns freely. When mainshaft is turning properly, bend the lock tabs over the bolt heads to lock the bolts.
8. Install the chaincase to engine mounting bolts finger-tight.

9A. On 1984-1986 models, loosen the four engine T-bracket-to-transmission bolts (**Figure 138**).

9B. On 1987-1988 models, loosen the two engine-to-transmission 3/8-in. bolts.

10. Tighten the chaincase-to-engine bolts to 16-18 ft.-lb. (22-24 N•m).
11. On 1984 models, safety wire the two inner bolts. See **Figure 135** and **Figure 136**.

NOTE

Always install safety wire so that it tightens the bolt. ***Figure 137*** *shows how to safety-wire two bolts by the double-twist method. Always use stainless steel wire approved for safety wiring.*

12A. On 1984-1986 models, tighten the four engine T-bracket-to-transmission bolts to 13-16 ft.-lb. (18-22 N•m).

12B. On 1987-1988 models, tighten the two engine-to-transmission 3/8-in. bolts to 35-38 ft.-lb. (47-52 N•m).

13. Install the starter and starter drive housing as described in this chapter.
14. Install the solenoid as described in this chapter.
15. Coat the rear chain boots and the chaincase and transmission case mating surfaces with 3M 750 Silicone Sealant. Install the housing bolts and tighten securely in a crisscross pattern.
16. Install the clutch, primary chain and compensating sprocket as described in this chapter.
17. On dry clutch models, perform the *Primary Housing Vacuum Check (Early 1984 Models with Dry Clutch)* in this section.

Primary Housing Vacuum Check (Early 1984 Models with Dry Clutch)

The primary housing must be checked for air tightness after assembly.

1. Remove one of the clutch inspection cover screws (**Figure 139**) and thread the vacuum gauge (part No. HD 96950-68) or an equivalent into the screw hole.
2. Start the engine and allow it to idle. The vacuum gauge should read 9 in. of water vacuum (minimum).
3. Locate the 3/8-in. (9.5 mm) vent hose connected between the chaincase and the T connector. Pinch this hose closed and increase engine idle speed to 1500 rpm. The vacuum gauge should now read 25 in. of water vacuum.
4. If the vacuum gauge shows a lower reading, there is an air leak into the primary housing.
5. Pinch all of the oil lines running to the primary housing. Pinch the hoses as close to the housing as possible.

CAUTION

Do not apply more than 10 psi (0.7 kg/cm^2) of compressed air into the primary housing.

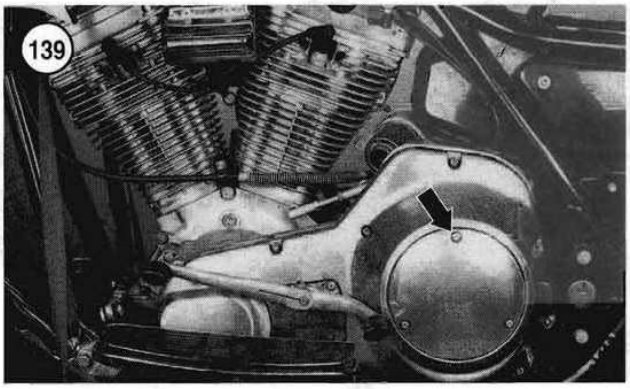
6. Pressurize the housing with 10 psi (0.7 kg/cm^2) of compressed air. Now listen for air leaks at the following locations:
   a. All O-ring and gasket surfaces.
   b. All hose and oil seal fittings.
   c. Starter drive and solenoid mounting areas.
   d. Timing inspection hole.
   e. Transmission filler hole.
   f. Along the primary chaincase housing and cover (possible cracks or casting defects).
7. Leaking areas must be repaired before putting the motorcycle back into service.
8. Install the clutch inspection cover screw and tighten securely.

PRIMARY CHAINCASE (1989-1998 MODELS)

Removal (1989-1998 FXR, FLH and FLT Series Models)

Refer to **Figure 140**.

1. Disconnect the negative battery cable from the battery.
2. Remove the shift lever assembly as described under *Shifter Assembly* in Chapter Six.
3. Remove the primary chaincase outer cover as described in this chapter.
4. Remove the compensating sprocket, primary chain and clutch assembly as described in this chapter.
5. Remove the starter as described in Chapter Nine.



6. Pry the lockwasher tabs away from the five inner primary housing bolts (**Figure 141**). Loosen the five bolts.
7. Loosen the front two inner housing bolts with flat washers (**Figure 142**).
8. Remove all seven bolts securing the inner housing to the engine and the transmission. Discard the five lockwashers. New ones must be installed.
9. On all models except 1993-1998 FLH and FLT series models, remove the lower chaincase-to-transmission bolts and washers from behind the transmission housing (**Figure 143**). Move the ground strap out of the way.
10. Remove the starter jackshaft assembly from the inner housing as described in this chapter.
11. Tap the inner primary housing loose.
12. Remove the inner housing from the engine, transmission and gearshift shaft.
13. Remove the O-ring (**Figure 144**) from the engine crankcase shoulder.
14. Inspect the inner housing as described in this chapter.

Installation (1989-1992 FXR, FLH and FLT Series Models)

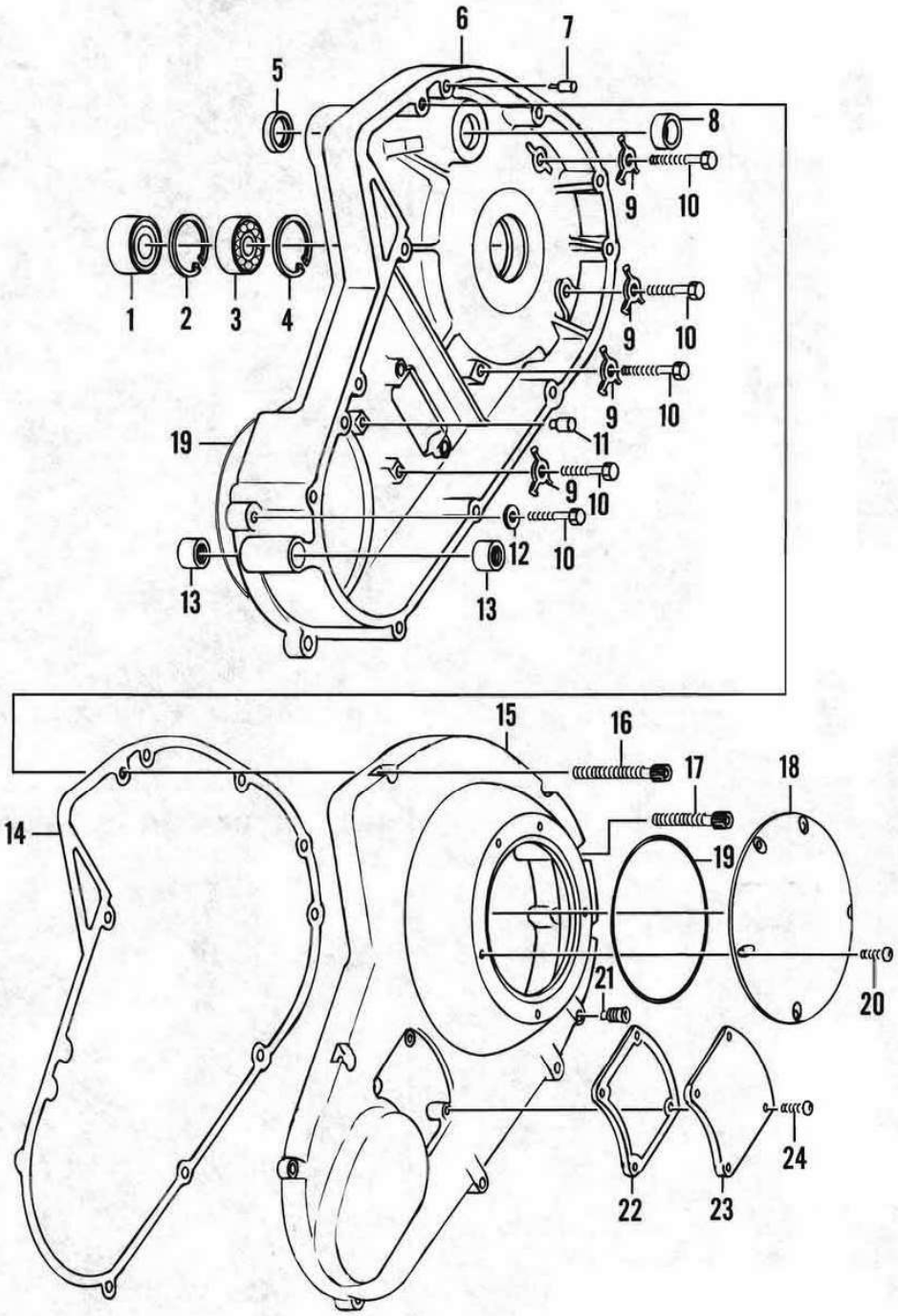
1. Replace the alternator O-ring (**Figure 144**) if worn or damaged.

CAUTION

Wipe the inner chaincase oil seal lip with chaincase oil before installing the chaincase in Step 2. When installing the chaincase, work the oil seal carefully along the mainshaft so that it will not be damaged. Wrap the mainshaft splines with tape to protect the inner chaincase oil seal when installing it over the mainshaft.

(140)

PRIMARY CHAINCASE



1. Bearing
2. Outer snap ring
3. Bearing
4. Inner snap ring
5. Oil seal
6. Housing
7. Dowel pin
8. Oil seal
9. Captive washer
10. Bolt
11. Dowel pin
12. Washer
13. Bushing
14. Gasket
15. Outer cover
16. Bolt
17. Bolt
18. Clutch cover
19. O-ring
20. Screw
21. Drain screw
22. Gasket
23. Inspection cover
24. Screw

2. Carefully align the chaincase with the mainshaft and slide the chaincase onto the mainshaft.

CAUTION

The following procedures must be followed to make sure that the transmission is properly aligned with the engine. Improper alignment could cause chain and transmission failure.

3. Install the primary chaincase-to-transmission mounting bolts finger-tight.

4. Install the bolt, *new* lockwasher, ground cable and lockwasher onto the back of the transmission housing as shown in **Figure 143**. Tighten finger-tight.

5. Tighten bolts installed in Steps 3 and 4 to 13-16 ft.-lb. (18-22 N•m). After tightening the bolts, make sure that the mainshaft turns freely.

NOTE

Recheck that the alternator O-ring is still in position.

6. Install the chaincase-to-engine mounting bolts and lockwashers. Tighten bolts finger-tight.

7. Loosen the two engine-to-transmission 3/8-in. mounting bolts (**Figure 143**).

8. Tighten the chaincase-to-engine mounting bolts to 16-18 ft.-lb. (22-24 N•m).

9. Tighten the two engine-to-transmission 3/8-in. mounting bolts (loosened in Step 7) to 35-38 ft.-lb. (47-52 N•m).

10. Check that the mainshaft turns freely. If the mainshaft binds or turns roughly, loosen the bolts tightened in Steps 8 and 9 and retighten them.

11. Bend the lockwasher tab over the bolt heads to lock them in place.

12. Install the starter as described in Chapter Nine.

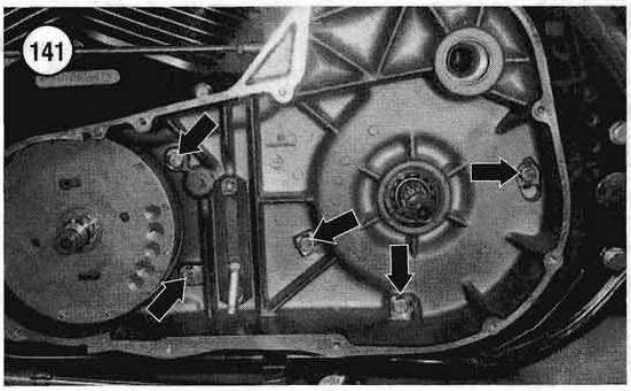
13. Install the starter jackshaft as described in this chapter.

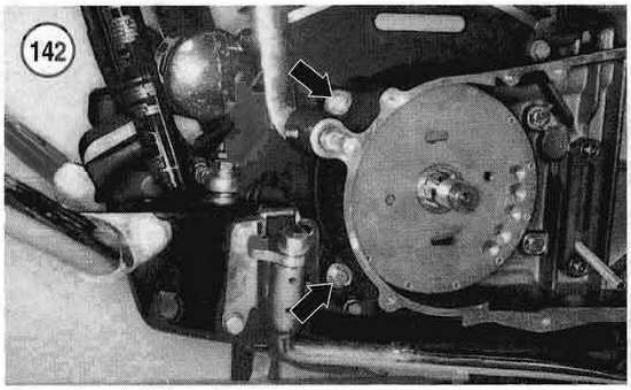
14. Install the clutch, engine compensating sprocket, chain adjuster, primary chain and primary chaincase cover as described in this chapter.

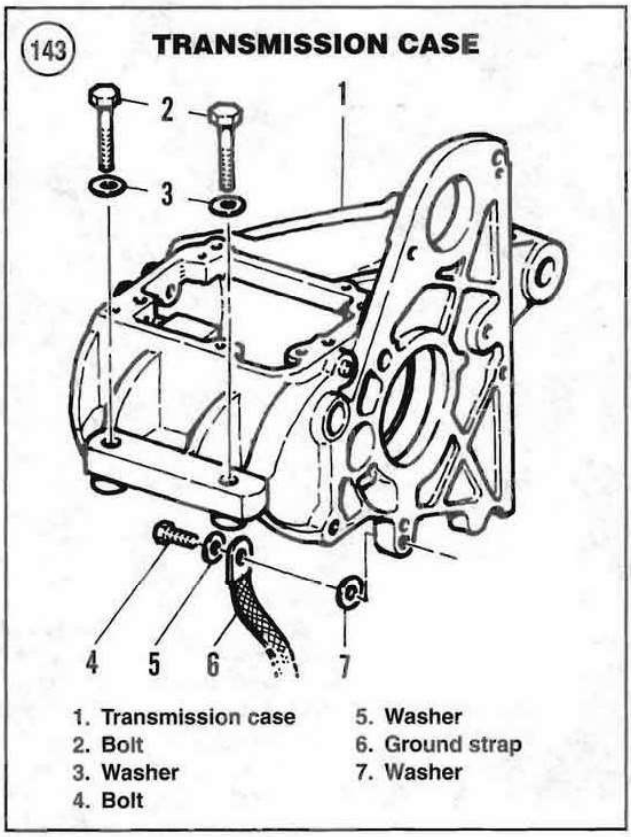
Installation (1993-1998 FXR, FLH and FLT Series Models)

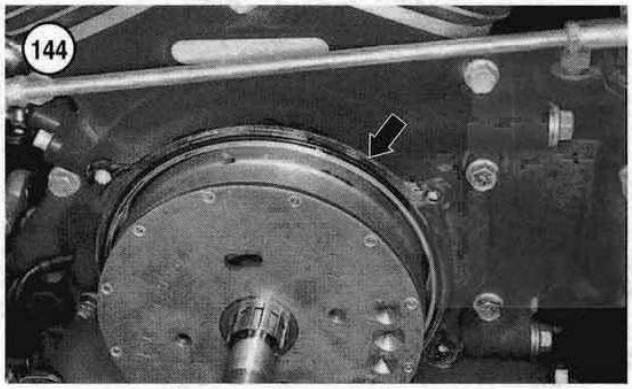
1. Thoroughly clean the *outer surface* of the five bolt holes of the inner cover. Apply a light coat of RTV sealant to the inner surfaces.

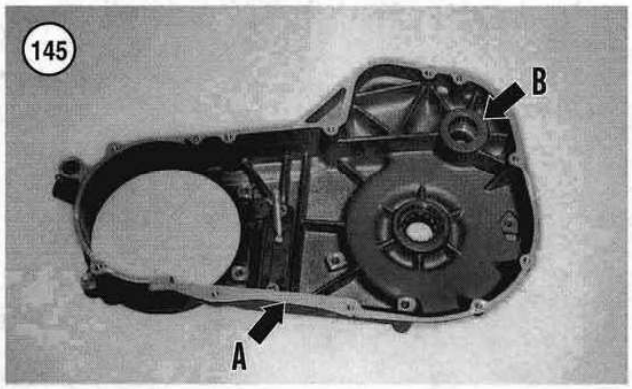
2. Install the *new* O-ring (**Figure 144**) onto the engine crankcase shoulder.











3. To prevent the transmission mainshaft splines from damaging the inner cover oil seal, wrap the mainshaft splines with tape.
4. If removed, install the drive belt prior to installing the inner housing.
5. Align the inner housing with the engine and transmission and install it over the gearshift lever shaft. Push the inner housing on until it stops.
6. Apply a bead of RTV sealant to the threads of the five mounting bolts that are used with the lockwashers.
7. Install the five inner housing bolts (**Figure 141**) and *new* lockwashers.
8. Install the front two inner housing bolts with flat washers (**Figure 142**).
9. Tighten the inner housing bolts in the following order:
   a. Tighten the four inner housing-to-engine mounting bolts to 18-21 ft.-lb. (24-28 N•m).
   b. Bend the lockwasher tabs against the two rear bolt heads.
10. Tighten the three inner housing-to-transmission mounting bolts to 18-21 ft.-lb. (24-28 N•m). Bend the lockwasher tabs against the three bolt heads.
11. Install the starter jackshaft as described in this chapter.
12. Install the starter as described in Chapter Nine.
13. Install the compensating sprocket, primary chain and clutch assembly as described in this chapter.
14. Install the primary chaincase outer cover as described in this chapter.
15. Connect the negative battery cable.

CHAINCASE INSPECTION (ALL MODELS)

Early Models with Dry Clutch

1. Clean the primary chaincase in solvent and dry thoroughly with compressed air.
2. Check the gasket surface on both sides of the housing for cracks or other damage.
3. Check the primary chaincase bearing. Turn the bearing inner race by hand. The bearing should turn smoothly with no roughness. To replace the bearing perform the following:

NOTE
The bearing is held in position with a chemical locking compound.

   a. Remove the bearing. Refer to Chapter One.
   b. Thoroughly clean the bearing mounting area in the case to remove all chemical residue.
   c. Apply Loctite Retaining Compound No. 601 to the bearing outer surface and press the bearing into the housing. Refer to Chapter One.

NOTE
Follow the manufacturer's cure time before reassembling the primary housing.

Late Models with Wet Clutch

1. Remove all gasket residue from the inner housing gasket surfaces (A, **Figure 145**).
2. Clean the inner housing in solvent and dry thoroughly.
3. Check the inner housing (A, **Figure 146**) for cracks or other damage.
4. Check the starter jackshaft oil seal for excessive wear or damage. To replace the oil seal, perform the following:
   a. Note the direction the oil seal lip faces in the housing.
   b. Pry the oil seal out of the inner primary housing.
   c. Pack the new oil seal lips with grease.
   d. Carefully drive the *new* oil seal into the housing until it seats against the housing shoulder.

5A. On 1989 models, inspect the starter jackshaft bushing (B, **Figure 145**) for wear, cracks or other damage. To replace the bushing, perform the following:

a. Remove the bushing with a suitable driver or press. Then press the new bushing into the housing so that it is flush or within 0.010 in. (0.25 mm) below its mounting boss.
b. To replace the oil seal, first drive the oil seal and scraper out of the housing and discard both parts. Install a *new* seal to the dimensions shown in **Figure 147**.The oil scraper is no longer used.

5B. On 1990-1998 models, check the starter jackshaft bushing and oil seal for damage. If worn or damaged, remove the oil seal and bushing and discard them both. Install *new* parts to the dimensions shown in **Figure 147**.

6. Inspect the shift lever bushings (**Figure 148**) for wear, cracks or other damage. To replace the bushing, perform the following:
a. Remove the bushing with a blind bearing removal tool. Refer to Chapter One.
b. Clean the bushing bore in the housing.
c. Press in the *new* bushing until its outer surface is flush or within 0.030 in. (0.76 mm) below the edge of the bushing bore.
d. Repeat for the other bushing.

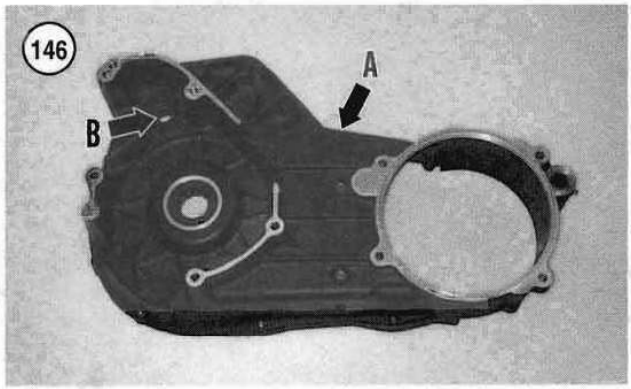
7. Turn the bearing inner race (**Figure 149**) by hand. The bearing should turn smoothly with no roughness. Replace the bearing as follows:
a. Remove the oil seal (**Figure 150**) as described in Step 7.
b. Remove the inner and outer bearing snap rings.
c. Support the inner primary housing and press the bearing out.
d. Install the outer snap ring (clutch side). Make sure the snap ring is correctly seated in the groove.

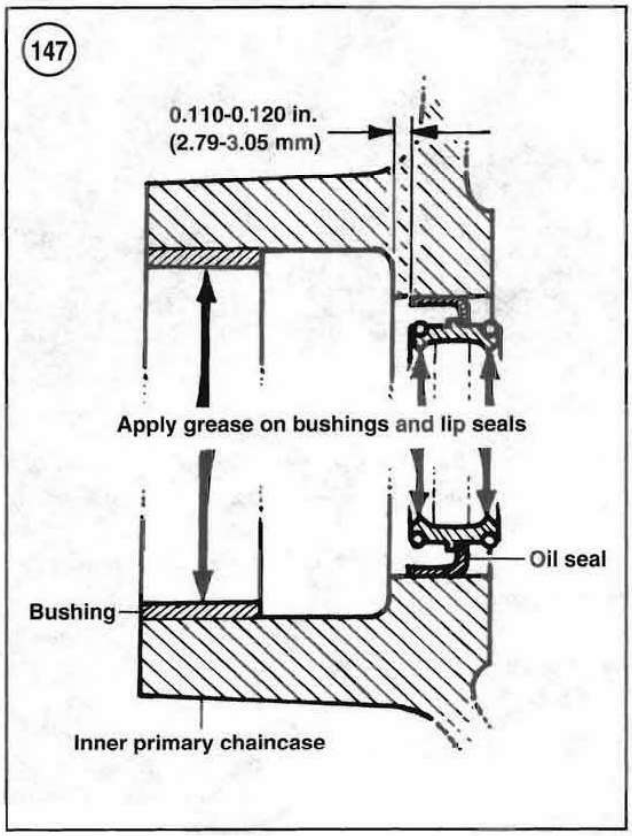
CAUTION

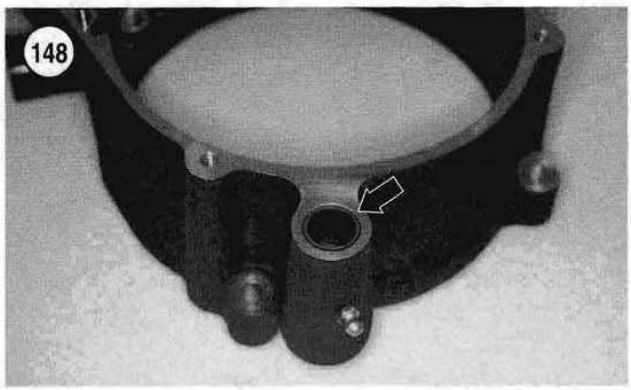
When pressing the bearing into the housing, support the outer snap ring. The force required to press the bearing into the inner primary housing can force the snap ring out of its groove and damage the housing.

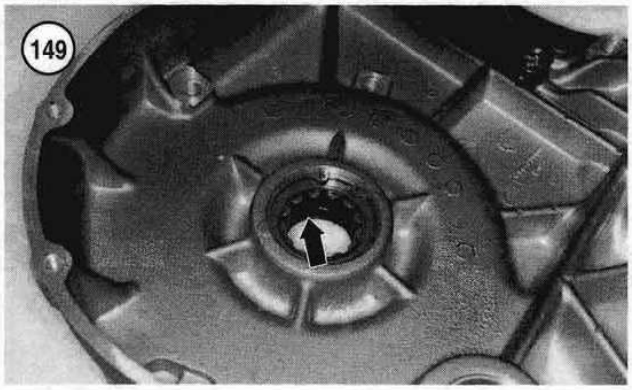
e. Support the inner housing and outer snap ring.
f. Press the bearing into the inner housing until it seats against the snap ring.
g. Install the inner snap ring. Make sure the snap ring is seated correctly in the groove.
h. Install a *new* oil seal as described in Step 8.

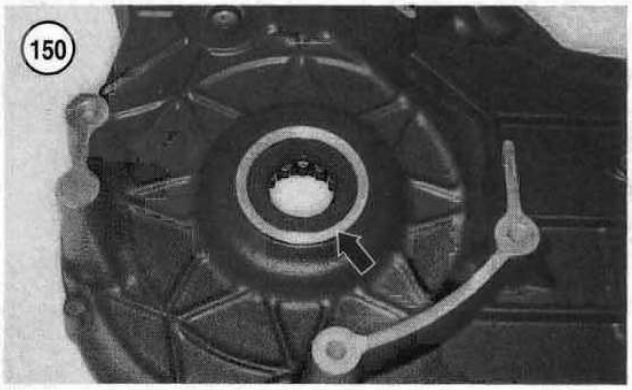
8. Inspect the inner primary cover oil seal (**Figure 150**) for excessive wear, tearing or other damage. To replace the oil seal, perform the following:
a. Remove the oil seal with a wide-blade screwdriver.
b. Clean the oil seal bore.
c. Pack the oil seal lip with a waterproof bearing grease.

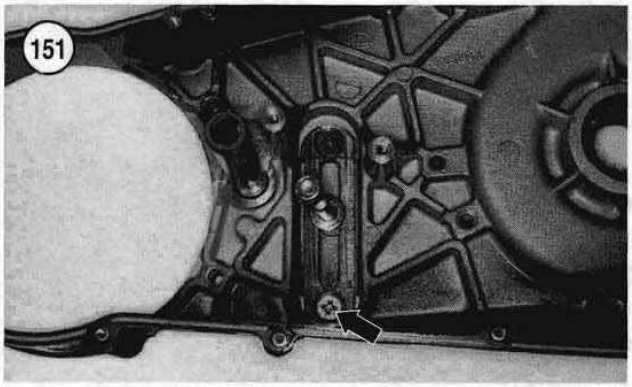












d. Position the oil seal with its closed side facing out. Press in the *new* oil seal until its outer surface is flush with the edge of the bearing bore.

9. Check the primary chain adjuster rack screws (**Figure 151**) for looseness. Tighten the screws, if necessary.

ELECTRIC STARTER DRIVE (1984-1988 FLT, FLH AND FXR MODELS)

Refer to **Figure 152**.

Removal

1. Disconnect the negative battery cable from the battery.
2. Remove the primary chaincase cover as described in this chapter.
3. Remove the starter solenoid as described in Chapter Nine.
4. Remove the thrust washer and remove the starter shaft.
5. Remove the hex plug, shaft and shifter arm.

Installation

1. Assemble the pinion gear and shaft assembly as described under *Inspection*.
2. Install the starter shaft assembly and the thrust washer.
3. If the shifter arm was removed, lightly grease the pivot shaft with high-temperature grease.
4. Install the shifter arm pivot shaft and hex plug.
5. Install the starter solenoid as described in Chapter Nine.
6. Install the starter and starter shaft housing as described in Chapter Nine.
7. Install the primary chaincase cover as described in this chapter.

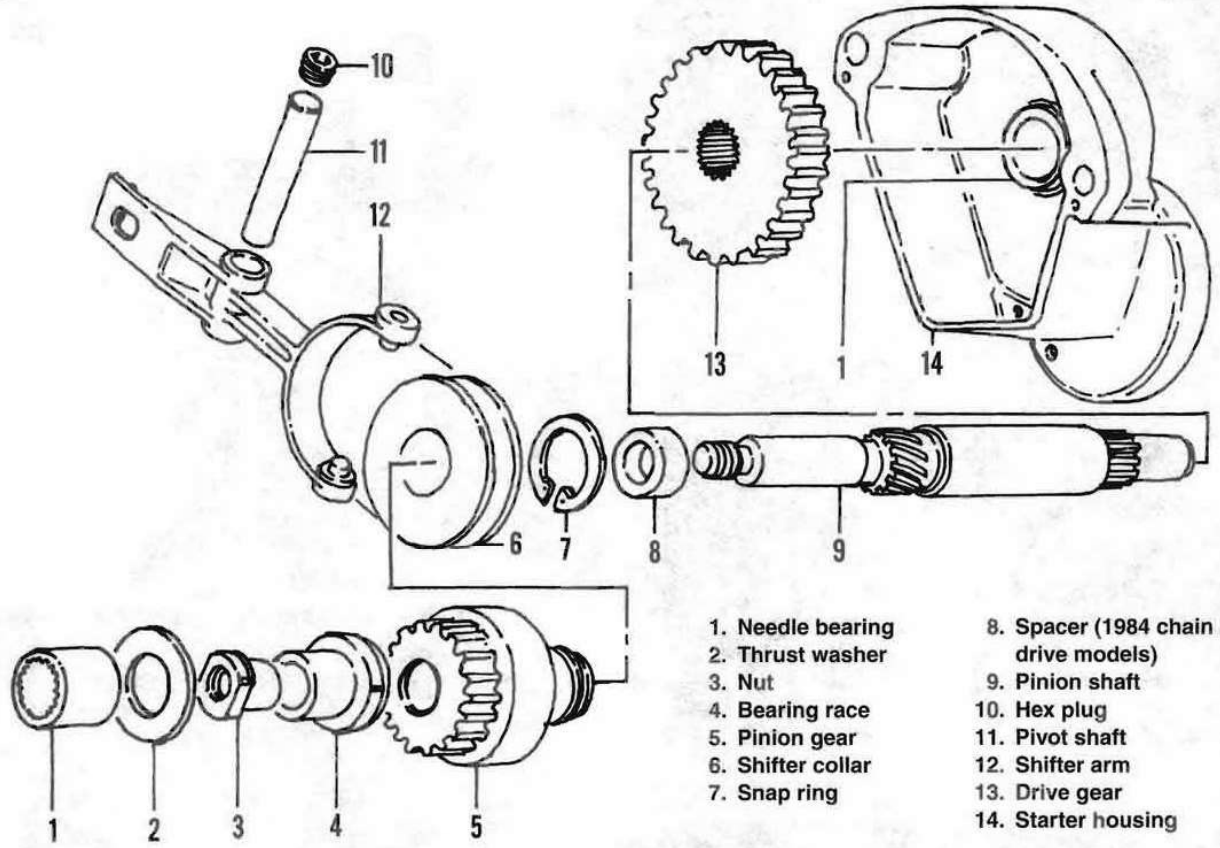
Inspection

1. Check the pinion gear for worn, chipped or broken teeth. Replace the gear if necessary.
2. Check pinion gear operation by attempting to turn the gear in both directions. It should only rotate in one direction.
3. Check the needle bearings in the cover and starter housing for wear or damage. Rotate the bearings by hand. The bearing should turn smoothly with no roughness. To replace the bearings, refer to Chapter One.
4. Lubricate the needle bearings with high-temperature grease.
5. To disassemble the pinion gear shaft assembly, perform the following:
   a. Secure the pinion shaft in a vise with soft jaws.

NOTE
The pinion shaft nut has left-hand threads. Turn the nut ***clockwise*** *to loosen it.*

   b. Turn the pinion shaft nut *clockwise* and remove it.
   c. Remove the bearing race.
   d. Remove the pinion gear and collar as one assembly. If necessary, remove the snap ring and separate them.
   e. On chain drive models, remove the spacer.

(152) **STARTER DRIVE (1984-1988 FXR, FLH AND FLT SERIES MODELS)**



1. Needle bearing
2. Thrust washer
3. Nut
4. Bearing race
5. Pinion gear
6. Shifter collar
7. Snap ring
8. Spacer (1984 chain drive models)
9. Pinion shaft
10. Hex plug
11. Pivot shaft
12. Shifter arm
13. Drive gear
14. Starter housing

f. Inspect the components as described in this section.

6. Reverse Step 5 and assemble the pinion gear and shaft assembly, while noting the following:
   a. Lubricate all parts with high-temperature grease.
   b. Install the bearing race so that its lip faces against the pinion gear.
   c. Tighten the pinion shaft nut securely.

ELECTRIC STARTER DRIVE (1985 CHAIN DRIVE FXWG, FXSB AND FXEF MODELS)

Refer to **Figure 153**.

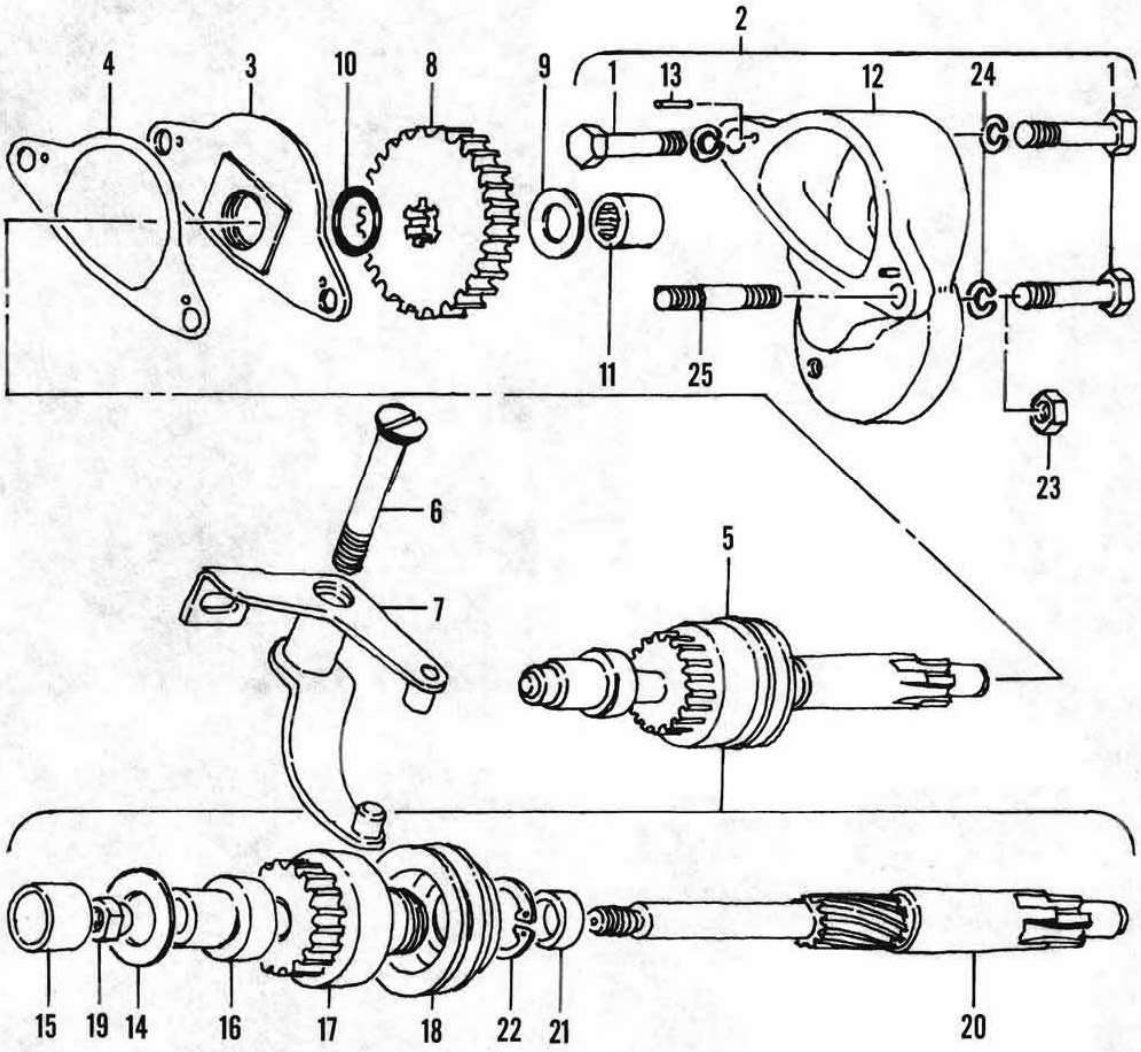
Removal

1. Disconnect the negative battery cable from the battery.
2. Remove the starter as described in Chapter Nine.
3. Remove the primary chaincase cover as described in this chapter.
4. Remove the mounting bolts, or threaded studs, nuts and lockwashers securing the drive gear housing. Remove the drive gear housing.
5. Remove the oil deflector, gasket and O-ring.
6. Working from the left side, disengage the shifter lever fingers from the shifter collar. Then remove the pinion gear and shaft assembly.
7. To remove the shifter lever, perform the following:
   a. Remove the battery and battery carrier.
   b. Remove the oil tank mounting brackets.
   c. Remove the starter solenoid as described in Chapter Nine.
   d. Remove the shifter lever screw and remove the shifter lever.

Installation

1. If disassembled, assemble the pinion gear and shaft assembly as described under *Inspection* in this section.
2. Install the pinion shaft assembly. Engage the shifter lever fingers with the shifter collar drum.

(153) STARTER DRIVE (1985 CHAIN DRIVE FXWG, FXSB AND FXEF MODELS)



1. Bolt
2. Drive gear housing assembly
3. Oil deflector
4. Gasket
5. Pinion gear and shaft assembly
6. Shifter lever screw
7. Shifter lever
8. Drive gear
9. Thrust washer
10. O-ring
11. Bearing (in drive gear housing)
12. Drive gear housing
13. Locating pin
14. Thrust washer
15. Bearing (in primary cover)
16. Pinion shaft collar
17. Pinion gear
18. Shifter collar
19. Pinion shaft nut (left-hand thread)
20. Pinion shaft
21. Spacer
22. Snap ring
23. Nut
24. Lockwasher
25. Stud

3. Install the shifter lever assembly into the inner primary chaincase. Lubricate the shifter lever screw with high-temperature grease and install it through the shifter lever. Tighten the screw securely.
4. Install the drive gear housing and drive gear (**Figure 154**). Install the mounting bolts, or threaded studs, nuts and lockwashers and tighten securely.
5. Install a *new* O-ring in the oil deflector and make sure it is seated correctly.
6. Install the oil deflector into the drive gear housing.
7. Install a *new* gasket on the oil deflector.
8. Install the primary chaincase cover as described in this chapter.
9. Install the solenoid and starter as described in Chapter Nine.
10. Install the battery and the oil tank mounting brackets.

Inspection

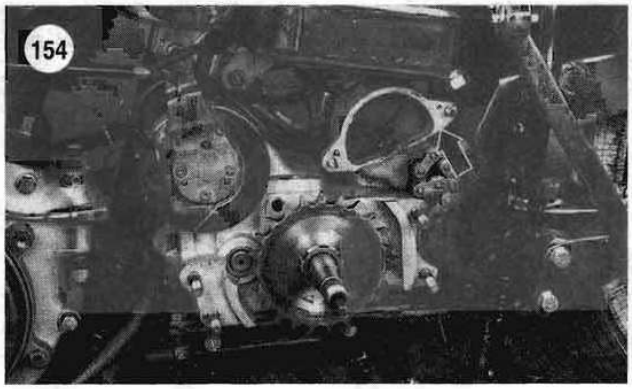
1. Check the drive gear for worn, chipped or broken teeth. Replace the gear if necessary.

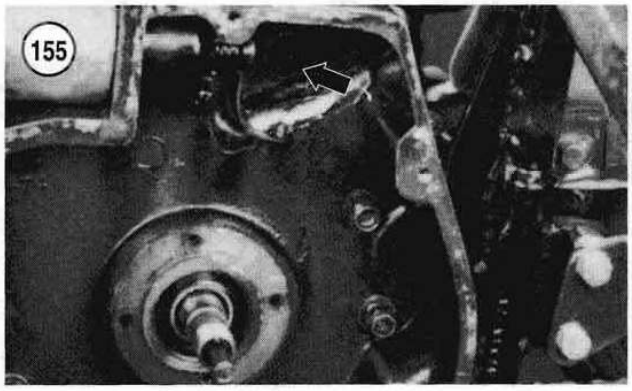
NOTE
If the drive gear is worn, check the starter gear for wear or damage.

2. Check the drive gear thrust washer for damage or cupping. Replace the washer if necessary.
3. Check the drive gear housing needle bearing for wear or damage. Rotate the bearings by hand. The bearing should turn smoothly with no roughness. To replace the bearings, refer to Chapter One.
4. Lubricate the needle bearing with high-temperature grease.
5. Install the drive gear and thrust washer in the drive housing.
6. Inspect the pinion gear needle bearing (**Figure 155**) in the primary cover. Rotate the bearings by hand. The bearing should turn smoothly with no roughness. To replace the bearings, refer to Chapter One.
7. Inspect the bearing surface of the pinion shaft collar. If the bearing or collar is worn, replace it as described in Chapter One.
8. Check the pinion gear for worn, chipped or broken teeth. Replace the gear if necessary.

NOTE
If the pinion gear is worn, check the clutch ring gear as described in this chapter.

9. Check the shifter collar groove and the shifter lever fingers for wear. Replace both parts if either is worn.



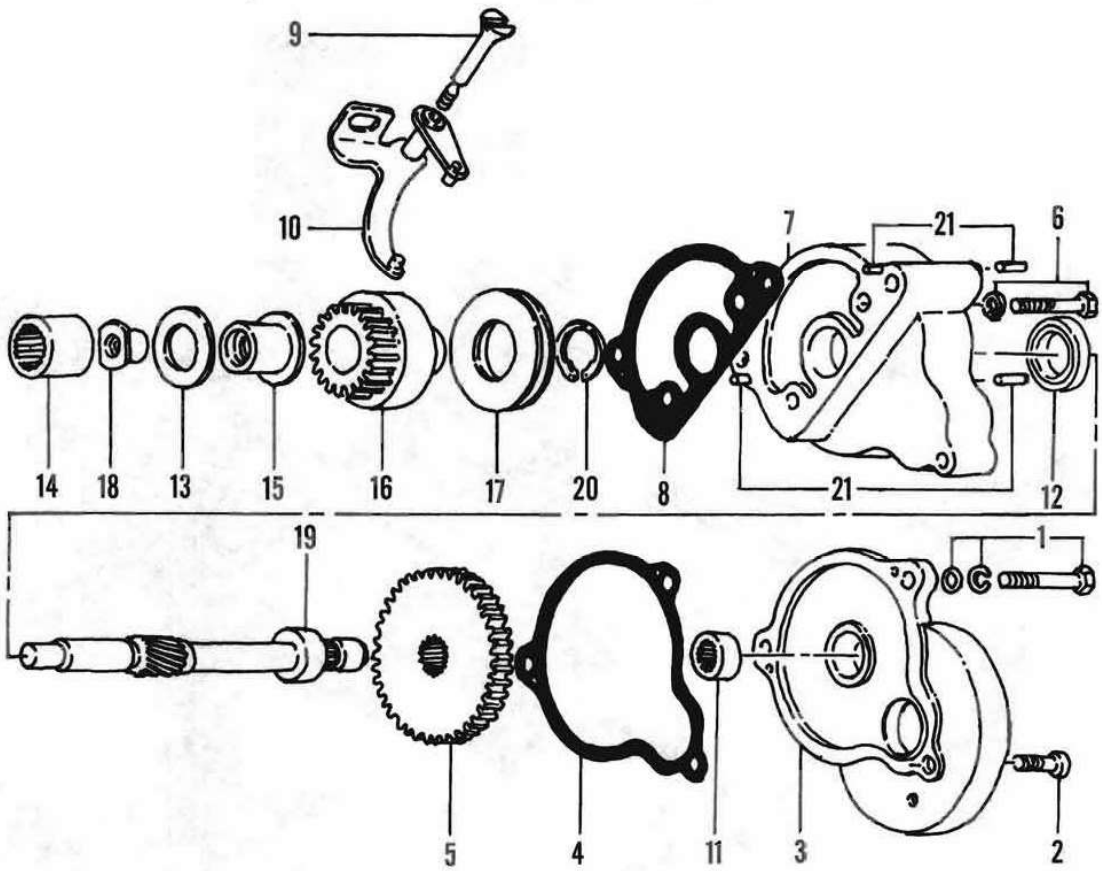


10. To disassemble the pinion gear shaft assembly, perform the following:
    a. Secure the pinion shaft in a vise with soft jaws.

NOTE
The pinion shaft nut has left-hand threads. Turn the nut ***clockwise*** *to loosen it.*

    b. Loosen and remove the pinion shaft nut.
    c. Remove the washer and pinion shaft collar from the pinion shaft.
    d. Remove the slide pinion gear and shifter collar as one unit from the pinion shaft.
    e. Remove the spacer from the pinion shaft.
    f. If necessary, remove the snap ring and separate the pinion gear and shifter collar.
    g. Inspect components as described in this section.
11. Reverse Step 10, and assemble the pinion gear and shaft assembly.
12. Inspect all parts for wear and damage as described in this procedure. Replace parts as necessary.
13. Lubricate all parts with high-temperature grease.

(156) **STARTER DRIVE (1985-1986 BELT DRIVE FXWG, FXSB AND FXEF MODELS)**



1. Bolt, lockwasher and washer
2. Allen head bolt
3. Outer drive gear housing half
4. Gasket
5. Drive gear
6. Bolt and lockwasher
7. Inner drive gear housing half
8. Gasket
9. Shifter lever screw
10. Shifter lever
11. Bearing (in outer drive gear housing)
12. Seal (inner drive gear housing)
13. Thrust washer
14. Bearing (in outer primary cover)
15. Pinion shaft collar
16. Pinion gear
17. Shifter collar
18. Pinion shaft nut (left-hand thread)
19. Pinion shaft (1985)
20. Snap ring
21. Locating pins

ELECTRIC STARTER DRIVE (1985-1986 BELT DRIVE FXWG, FXSB AND FXEF MODELS)

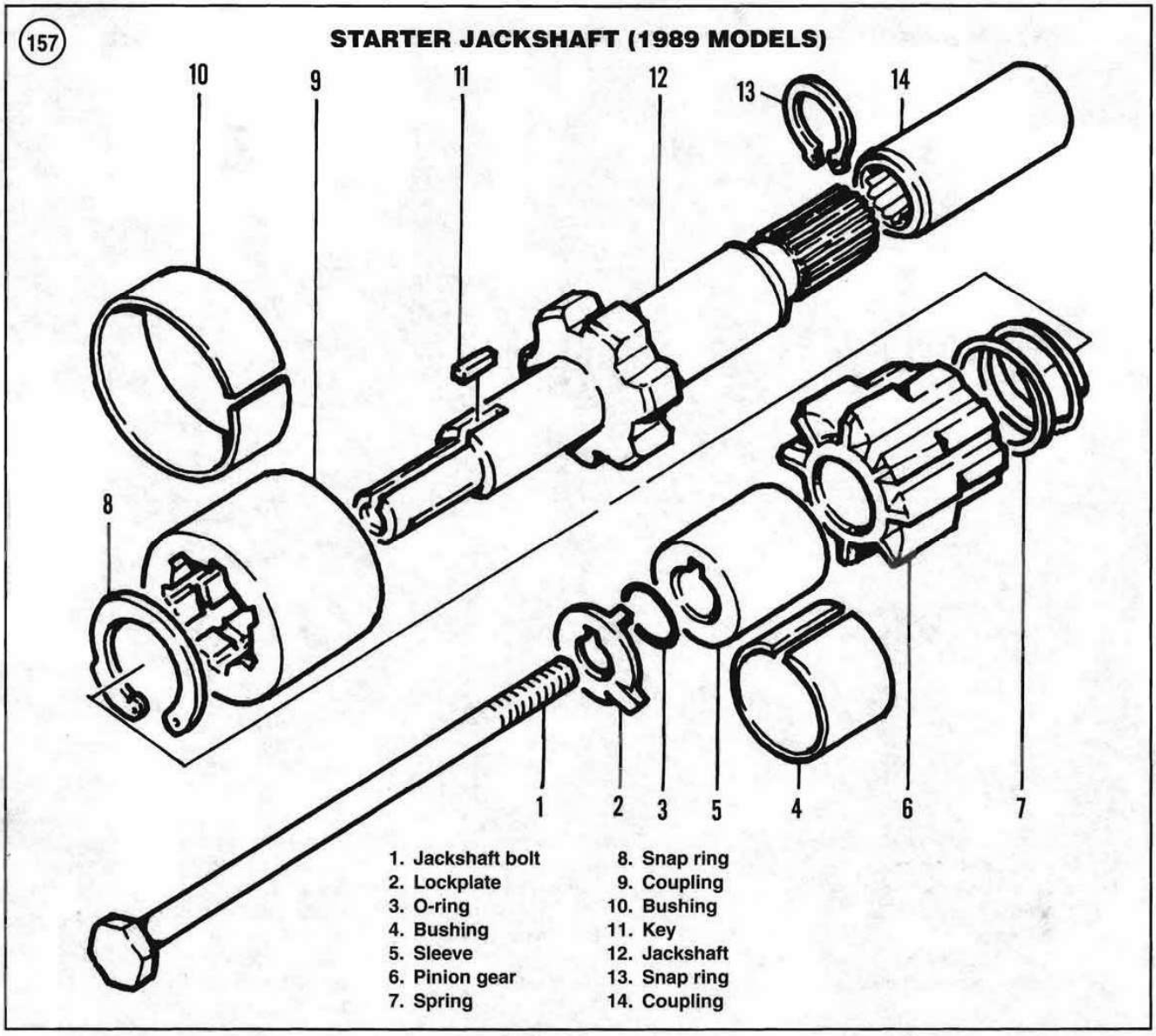
Refer to **Figure 156**.

Removal

1. Disconnect the negative battery cable from the battery.
2. Remove the starter as described in Chapter Nine.
3. Remove the primary chaincase cover as described in this chapter.
4. Remove the outer drive gear housing bolts and the Allen screw.
5. Remove the outer drive housing, gasket and drive gear.
6. Remove the inner drive housing bolts and remove the housing, and gasket.
7. Working from the left side, disengage the shifter lever fingers from the shifter collar. Then remove the pinion gear and shaft assembly.
8. Remove the solenoid as described in Chapter Nine and the shifter lever screw to remove the shifter lever.

Installation

1. Assemble the pinion gear and shaft assembly as described under *Inspection*.



2. Install the shifter lever assembly into the inner primary case. Lubricate the shifter lever screw with high-temperature grease and install it through the shifter lever. Securely tighten the screw.

3. Install the pinion shaft assembly. Engage the shifter lever fingers with the shifter collar.

4. Use ThreeBond 1104 to hold a new gasket onto the inner drive gear housing.

5. Install the inner drive gear housing over the pinion shaft assembly and install onto the primary case. Install the mounting bolts and tighten securely.

6. Lubricate the drive gear with high-temperature grease and slide it onto the pinion shaft.

7. Use ThreeBond 1104 to hold a new gasket onto the outer drive gear housing. Then install the housing and securely tighten the mounting bolts and the Allen screw.

8. Install the starter as described in Chapter Nine.

9. Wipe the thrust washer with grease and slide it onto the pinion shaft collar.

10. Install the primary cover as described in this chapter.

11. Install the solenoid as described in Chapter Nine.

Inspection

1. Check the drive gear for worn, chipped or broken teeth. Replace the gear if necessary.

NOTE

If the drive gear is worn, check the starter gear.

2. Inspect the inner drive gear housing seal for wear or damage. If necessary, remove the seal by prying it out of the housing with a screwdriver. Install the new seal with a large socket placed on the outside seal surface. Install the seal with the lip side facing toward the drive gear.
3. Grasp the locating pins on both sides of the inner drive gear housing. The pins should be tight. If not, check the pin locations to make sure the housing is not cracked.
4. Check the inner drive gear housing needle bearing for wear or damage. Rotate the bearing by hand and check for noise, roughness or looseness. If the bearing condition is doubtful, replace it. Replace the bearing with a press.
5. Lubricate the needle bearings with high-temperature grease.
6. Inspect the pinion gear needle bearing installed in the outer drive gear housing as described in Step 4. Also check the pinion shaft collar bearing surface. If the bearing or collar is worn, replace them both. Replace the bearing as described in Step 4.
7. Check the pinion gear for worn, chipped or broken teeth. Replace the gear if necessary.

NOTE

If the pinion gear is worn, check the clutch ring gear as described in this chapter.

8. Check the shifter collar groove and the shifter lever fingers for wear. Replace both parts if any one part is worn.
9. To disassemble the pinion gear shaft assembly, perform the following:
   a. Secure the pinion shaft in a vise with soft jaws.

NOTE

*The pinion shaft nut has left-hand threads. Turn the nut **clockwise** to loosen it.*

   b. Loosen and remove the pinion shaft nut.
   c. Remove the washer and pinion shaft collar.
   d. Remove the slide pinion gear and shifter collar as one unit.
   e. If necessary, remove the snap ring and separate the pinion gear and shifter collar.
   f. Inspect components as described in this section.
10. Assemble the pinion gear and shaft assembly by reversing Step 9. Note the following:
   a. Inspect all parts for wear and damage as described in this procedure. Replace parts as necessary.
   b. Install a *new* snap ring.
   c. Lubricate all parts with high-temperature grease.

STARTER JACKSHAFT (1989-1998 MODELS)

NOTE

The 1989 starter jackshaft assembly is not interchangeable with 1990-1998 models.

Removal/Disassembly (1989 Models)

Refer to **Figure 157**.

1. Disconnect the negative battery cable from the battery.
2. Remove the primary chaincase cover as described in this chapter.
3. Remove the clutch as described in this chapter.
4. Remove the starter-to-jackshaft coupling if it did not come off with the starter.
5. Pry the lockplate tab away from the jackshaft bolt. Then hold the pinion gear and loosen the jackshaft bolt. Withdraw the jackshaft bolt, lockplate and O-ring from the jackshaft.
6. Slide the jackshaft assembly out of the primary housing.
7. Disassemble the jackshaft as follows:
   a. Slide the sleeve off of the jackshaft and remove the key from the jackshaft if it did not come off with the sleeve.
   b. Remove the pinion gear.
   c. Slide the coupling off the jackshaft. Then remove the spring from inside the coupling. If necessary, remove the snap ring from inside the coupling.
   d. If necessary, remove the snap ring from the jackshaft.
8. Clean and inspect the starter jackshaft assembly as described in this chapter.

Assembly/Installation (1989 Models)

NOTE

Before installing the coupling in Step 4, note the snap ring installed inside the coupling. The coupling side with the snap ring closest to the end slides over the jackshaft.

1. Install the *new* snap ring onto the jackshaft, if previously removed.
2. Install the *new* snap ring into the coupling.
3. Place the spring inside the coupling and slide the coupling onto the jackshaft.

NOTE

Make sure that the side of the coupling with the snap ring faces toward the starter after installing it. If the coupling is reversed, the

pinion gear cannot engage the clutch ring gear.

4. Position the pinion gear with the small outer diameter end going on first and slide the pinion gear onto the jackshaft.
5. Install the key in the jackshaft keyway. Make sure it is correctly seated in the groove.
6. Align the keyway in the sleeve with the key and slide the sleeve onto the jackshaft.
7. Slide the lockplate and O-ring onto the jackshaft bolt. Then insert the jackshaft bolt into the jackshaft.

CAUTION

The inner lockplate tab must be installed in the jackshaft keyway. The lockplate serves two purposes; it prevents the key from sliding out of the sleeve and locks the jackshaft bolt to prevent it from backing out of the jackshaft. Always install a ***new*** *lockplate.*

8. Align the inner tab on the lockplate with the keyway in the sleeve. Then tighten the bolt finger-tight.
9. Slide the jackshaft-to-starter coupling onto the other end of the jackshaft.
10. Slide the jackshaft into the primary chaincase with the pinion gear facing outward. Make sure the coupling engages the starter motor shaft as the jackshaft assembly is installed.
11. Hold the pinion gear and tighten the jackshaft bolt to 80-106 in.-lb. (9-12 N•m). Bend the lockplate tab against the jackshaft bolt head to lock it. If the lockplate tab does not align with one of the bolt head flats, tighten the bolt until the two parts align with each other; do not loosen the bolt to align the tab.
12. Install the clutch as described in this chapter.
13. Install the primary chaincase cover as described in this chapter.
14. Connect the negative battery cable.

Removal (1990-1998 Models)

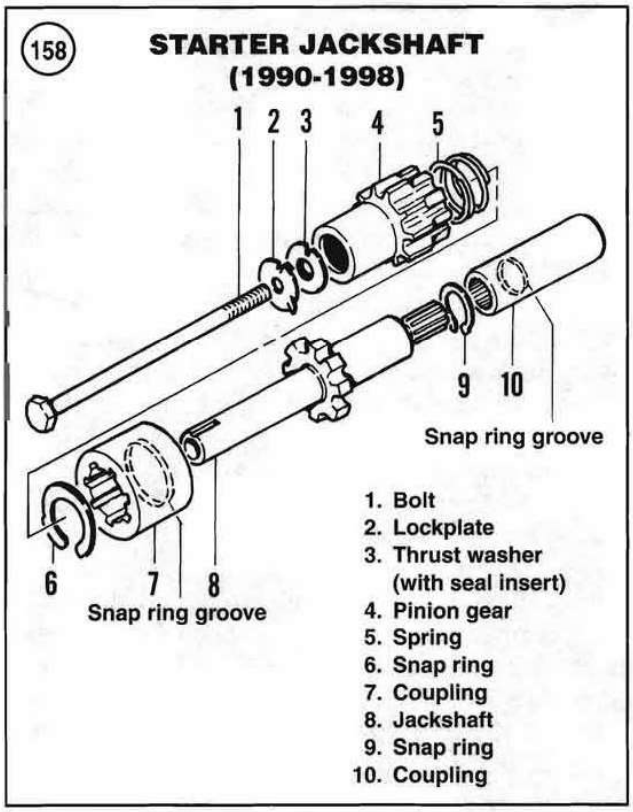
Refer to **Figure 158**.

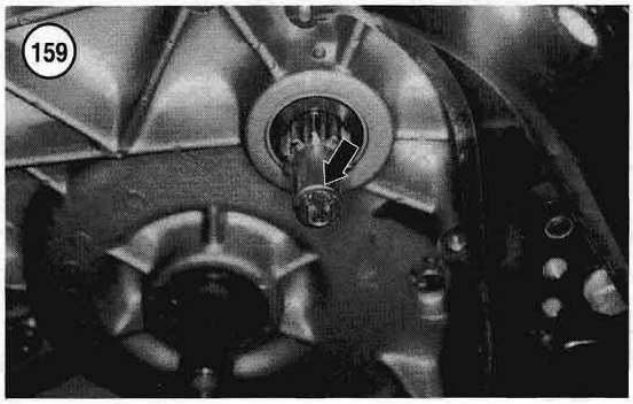
1. Disconnect the negative battery cable from the battery.
2. Remove the primary chaincase outer cover as described in this chapter.

NOTE

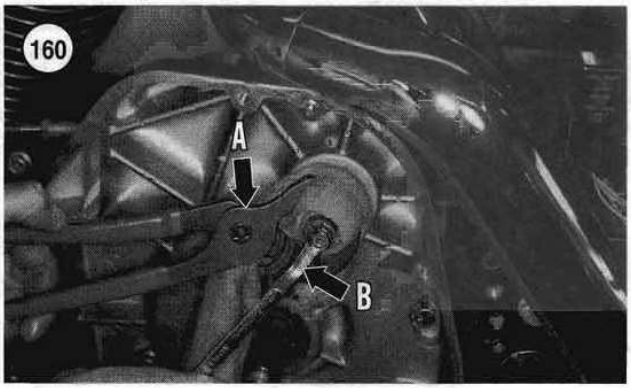
If only removing parts 1-5 listed in ***Figure 158****, do not perform Step 3.*

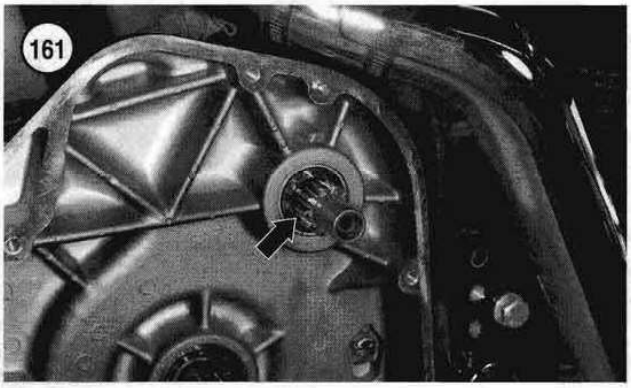
3. Remove the clutch assembly as described in this chapter.

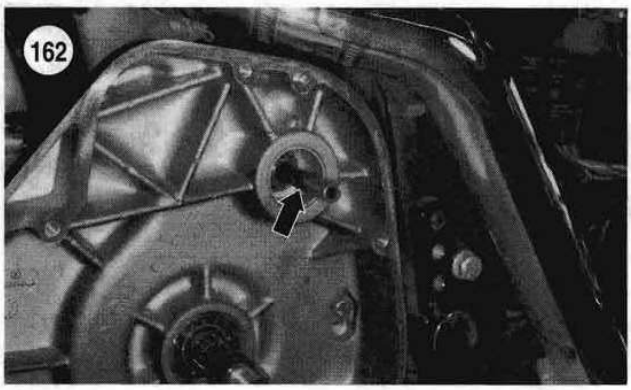


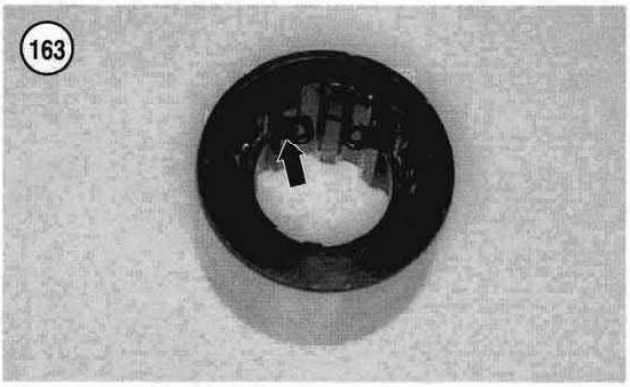


4. Straighten the tab on the lockplate (**Figure 159**).
5. Wrap the pinion gear with a cloth to protect the finish. Then secure it with pliers (A, **Figure 160**).
6. Loosen and remove the bolt (B, **Figure 160**), lockplate, thrust washer and O-ring (1990-1992 models) from the starter jackshaft assembly and the end of the starter motor.
7. Remove the pinion gear (**Figure 161**) and spring from the jackshaft.
8. Remove the outer coupling from the chaincase inner housing.









CAUTION

On 1994-1998 models, if the starter is not removed prior to removing the output shaft coupling and snap ring, the primary chaincase oil seal will be damaged when the jackshaft is withdrawn.

9A. On 1990-1993 models, remove the jackshaft assembly and the inner coupling from the chaincase inner housing.

9B. On 1994-1998 models, perform the following:

a. Remove the starter as described in Chapter Nine.
b. Remove the output shaft coupling and snap ring from the starter motor output shaft.
c. Withdraw the jackshaft from the chaincase inner housing.

10. Clean and inspect the starter jackshaft assembly as described in this chapter.

Installation (1990-1998 Models)

1A. On 1990-1993 models, install the jackshaft and the inner output shaft coupling into the chaincase inner housing. Push it in until it stops.

CAUTION

On 1994-1998 models, the inner coupling must ***not*** *be installed on the jackshaft before installing the jackshaft into the chaincase inner housing. If installed, it will damage the inner housing oil seal.*

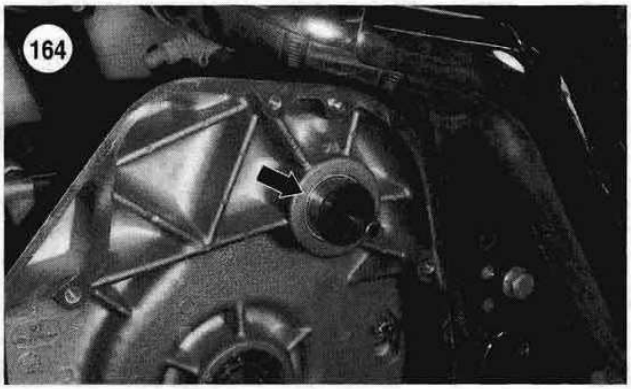
1B. On 1994-1998 models, perform the following:

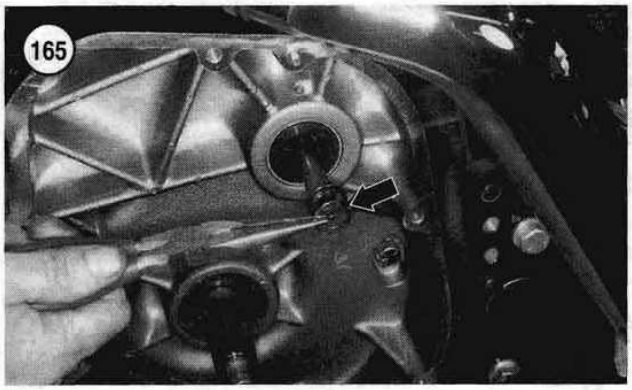
a. Install the output shaft coupling and snap ring onto the starter output shaft.
b. Install the starter as described in Chapter Nine.
c. Install the jackshaft into the chaincase inner housing (**Figure 162**) *without* the output shaft coupling in place. Push it in until it stops.

NOTE

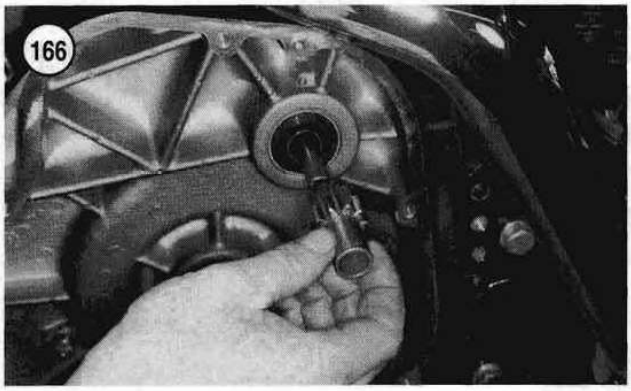
*Before installing the outer coupling in Step 2, note the location of the snap ring (**Figure 163**) within the outer coupling. The outer coupling side with the snap ring closest to its end slides over the jackshaft.*

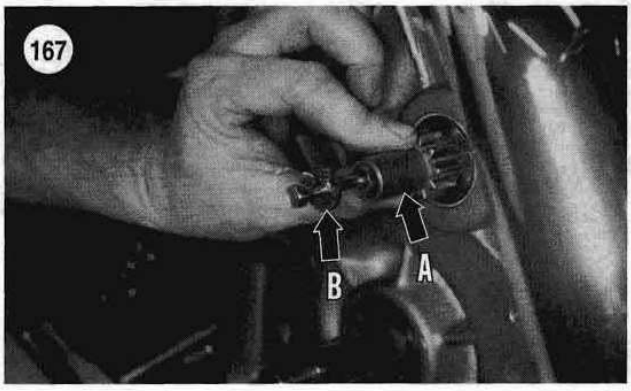
2. Position the outer coupling with the snap ring closest to its end slides going in first. Install the outer coupling over the jackshaft and into the housing bushing (**Figure 164**). Push it in until it bottoms.
3. Install the spring (**Figure 165**) onto the jackshaft.
4. Install the pinion gear (**Figure 166**) onto the jackshaft. Push it in until it bottoms.

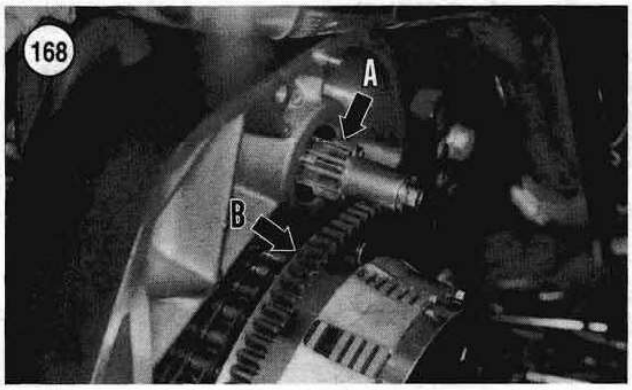




5. Push in on the pinion gear (A, **Figure 167**) and install the bolt, lockplate and thrust washer (B) onto the jackshaft.
6. Push the assembly on until it bottoms.
7. Align the lockplate tab with the thrust washer. Then insert the tab into the notch in the end of the jackshaft.
8. Screw the bolt into the starter output shaft by hand.
9. Wrap the pinion gear with a cloth to protect the finish. Then secure it with pliers (A, **Figure 160**).
10. Tighten the bolt (B, **Figure 160**) onto the starter motor to 80-106 in.-lb. (9-12 N•m). Bend the outer lockplate tab against the bolt head (**Figure 159**).
11. To make sure that are components have been installed correctly, perform the following:
    a. Install the clutch shell onto the transmission mainshaft.
    b. With the starter not engaged, the pinion gear (A, **Figure 168**) must not engage the clutch shell gear (B).
    c. To check for proper engagement, pull out on the pinion gear and engage it with the clutch shell gear. Then rotate the clutch shell in either direction and make sure the pinion gear rotated with it.
    d. If engagement is incorrect, remove the clutch shell and correct the problem.
    e. Remove the clutch shell.
12. Install the clutch assembly as described in this chapter.
13. Install the primary chaincase outer cover as described in this chapter.
14. Connect the negative battery cable.

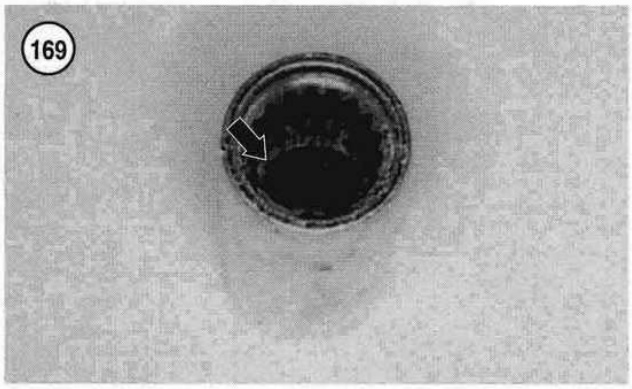


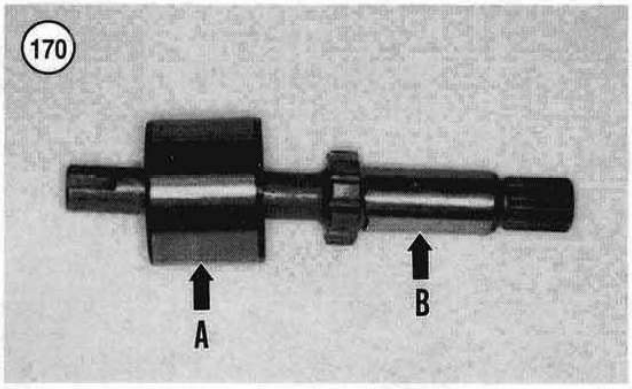


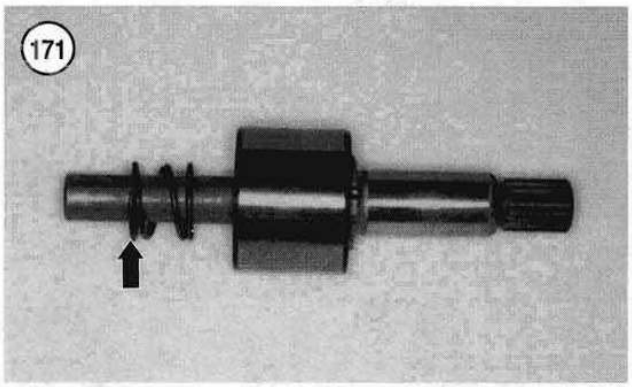


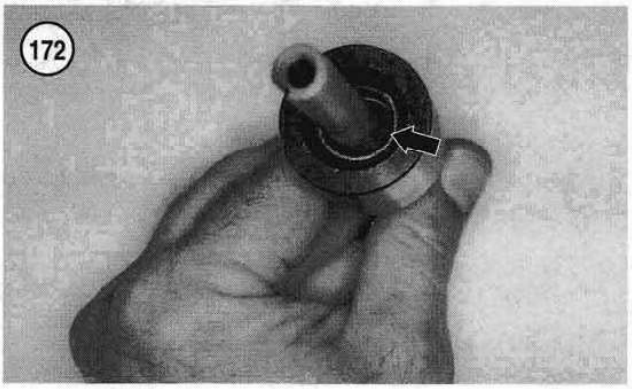
Inspection (All Models)

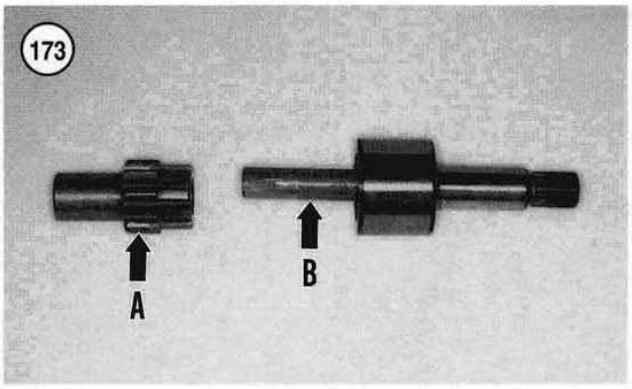
1. Clean all jackshaft components thoroughly in solvent. Dry with compressed air.
2. Check the snap ring in each coupling (**Figure 163** and **Figure 169**). Replace any loose or damaged snap rings.

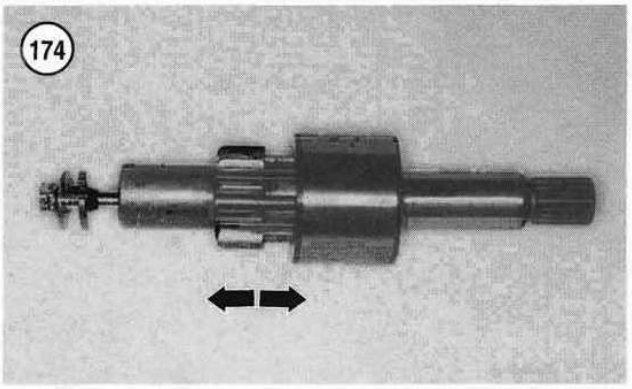




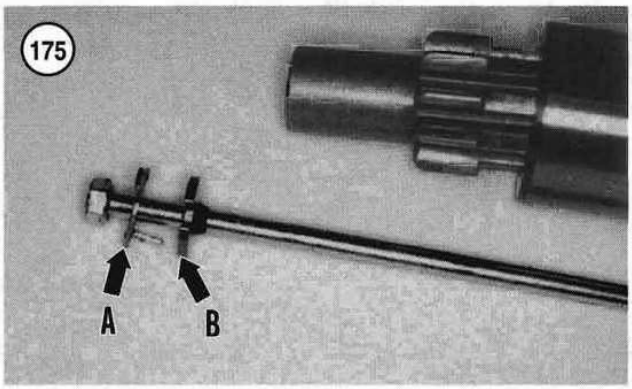


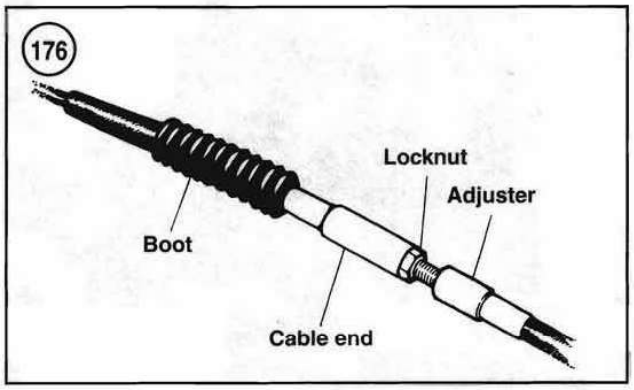






3. Visually check the jackshaft surfaces for cracks, deep scoring, excessive wear or discoloration. Check the keyway slot and snap ring grooves for damage.
4. Check the jackshaft and pinion gear teeth for cracks, severe wear or damage.
5. Check the spring for stretching or damage.
6. Check the jackshaft bolt and jackshaft threads for stripping, cross-threading or deposit buildup. If necessary, use a tap to true up jackshaft threads and remove any deposits. Replace the jackshaft bolt if threads or the bolt head is damaged.
7. Check the large coupling for surface damage. Check the spline and the snap ring groove inside the coupling for damage.
8. On 1989 models, inspect the small sleeve for surface damage. Check the keyway inside the sleeve for damage. Check the key for damage.
9. Install the outer coupling (A, **Figure 170**) onto the jackshaft (B) with the snap ring side going on first.
10. Install the spring (**Figure 171**) onto the jackshaft and inside the outer coupling (**Figure 172**).
11. Slide the pinion gear (A, **Figure 173**) onto the jackshaft (B).
12. Temporarily install the bolt, lockplate and thrust washer into the jackshaft (**Figure 174**).





13. Slide the pinion gear back and forth on the jackshaft and into the outer coupling and check for ease of movement. If the movement is erratic or binds, replace the damaged part(s).
14. Disassemble all parts assembled in Steps 10-13.
15. Inspect the lockplate (A, **Figure 175**) for cracked, broken or weak alignment and locktabs.
16. Check the thrust washer and O-ring (B, **Figure 175**) for deterioration.
17. Replace worn or damaged parts as required.

CLUTCH CABLE REPLACEMENT

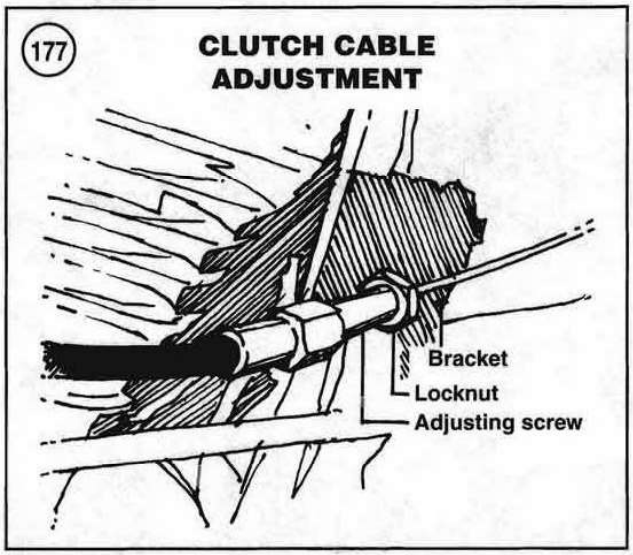
1. Disconnect the negative battery cable from the battery.
2. Remove the seat as described in Chapter Fifteen.
3. Before removing the clutch cable, make a drawing of its routing path from the handlebar to the transmission side door.
4. At the clutch cable in-line adjuster, slide the rubber boot off the adjuster (**Figure 176**). Loosen the locknut and turn the adjuster to provide as much cable slack as possible.

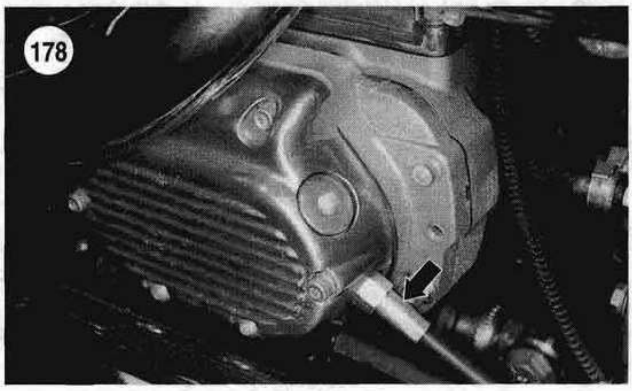
5A. On FXWG, FXSB and FXEF models, perform the following:

a. Disconnect the clutch cable from the release lever bracket (**Figure 177**).
b. Remove the E-clip from the clutch lever pivot pin and withdraw the pivot pin.
c. Release the cable from the clutch lever mounting bracket. Then disconnect the cable from the anchor pin in the lever.
d. Remove the clutch cable from the frame.

5B. On all other models, perform the following:

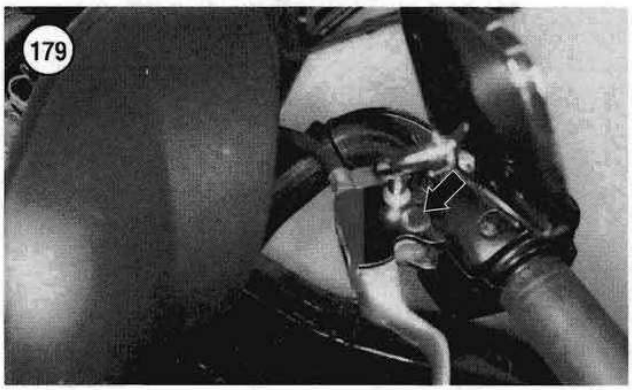
a. Disconnect the clutch cable from the clutch release mechanism (**Figure 178**) as described under *Transmission Side Cover* in Chapter Seven.
b. Remove the snap ring from the base of the clutch lever pivot pin.

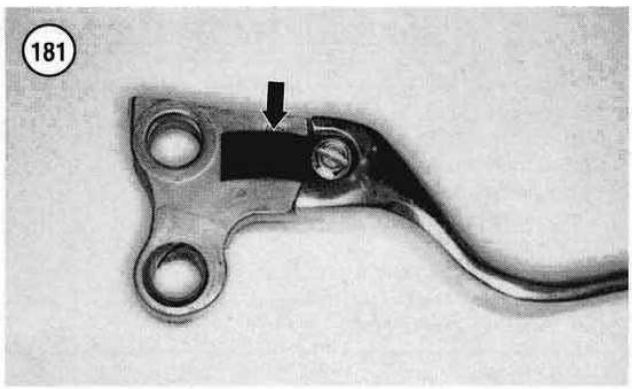


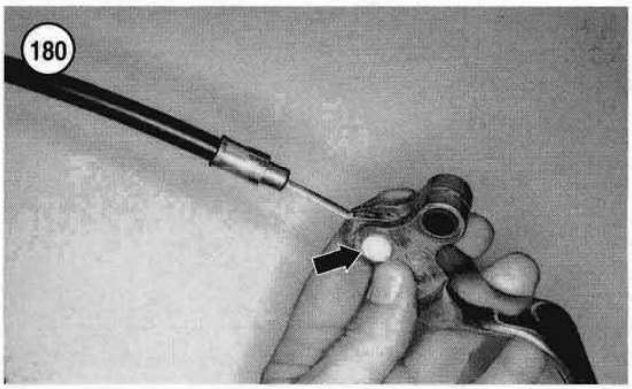


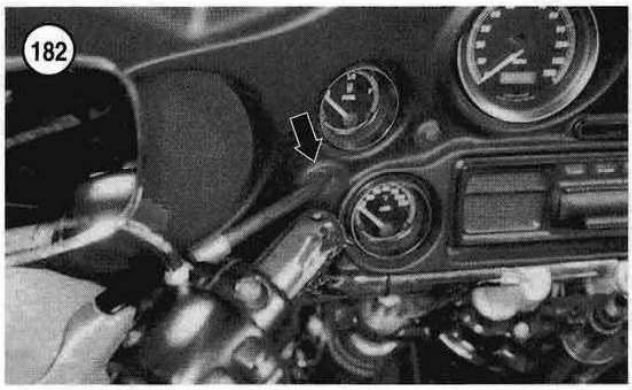
c. Remove the pivot pin (**Figure 179**) and slide the clutch lever out of its perch.
d. Remove the plastic anchor pin (**Figure 180**) and disconnect the clutch cable from the lever.

6. Check the clutch lever components for worn or damaged parts.









7. Check that the antislack spring screw (**Figure 181**) on the bottom of the clutch lever is tight.
8. On models so equipped, withdraw the clutch cable from the inner fairing rubber grommet (**Figure 182**). Move the clutch cable forward and out of the fairing.
9. Route the new clutch cable from the handlebar to the transmission side cover. Following the drawing made in Step 3.
10. Fit the clutch cable into its lever and secure with the plastic anchor pin (**Figure 180**).
11. Slide the clutch lever into the perch and install the pivot pin (**Figure 179**).
12. Secure the pivot pin with the snap ring.
13A. On FXWG, FXSB and FXEF models, perform the following:

a. Connect the clutch cable to the anchor pin and insert the pin in the clutch lever.
b. Hook the clutch cable into the clutch lever mounting bracket.
c. Install the clutch lever into the mounting bracket and install the pivot pin.
d. Install the E-clip onto the pivot pin and make sure it is seated correctly in the pivot pin groove.
e. Connect the clutch cable onto the release lever bracket (**Figure 177**).

13B. On all other models, connect the clutch cable to the clutch release mechanism as described under *Transmission Side Cover* in Chapter Seven.
14. Adjust the clutch as described in Chapter Three.

Tables 1 through 6 are on the following pages.

Table 1 DRY CLUTCH SPECIFICATIONS (EARLY 1984)

Item	Specification in. (mm)
Type	Dry multiplate disc
Clutch adjustment screw	See text
Clutch hand lever free play	1/16 (1.59)
Spring adjustment	1 1/32-1 7/8 (26.2-47.6) from spring collar edge
Spring free length	1 45/64-1 47/64 (43.26-44.04)
Clutch friction disc	
Thickness service limit	1/32 (0.8)
Warp service limit	0.010 (0.25)
Clutch plate service limit	0.010 (0.25)

Table 2 WET CLUTCH SPECIFICATIONS (LATE 1984-1989)

Item	Specification in. (mm)
Type	Wet multiplate disc
Clutch hand lever free play	1/8-3/16 (3.17-4.76)
Clutch friction discs	
Thickness service limit	0.044 (1.12)
Warp service limit	0.011 (0.28)
Clutch plate service limit	0.078 (1.98)

Table 3 WET CLUTCH SPECIFICATIONS (1990-1997)

Item	Specification in. (mm)
Type	Wet multiplate disc
Clutch hand lever free play	
1990	1/8-3/16 (3.17-4.76)
1991-1997	1/16-1/8 (1.6-3.2)
Clutch friction disc assembly	
Lining thickness service limit (assembly)	0.661 (16.8)*
Clutch plate warp service limit	0.006 (0.15)
Compensating sprocket shim thickness	0.010 (0.25), 0.020 (0.51), 0.030 (0.76), 0.060 (1.52)

*See text for measuring procedure.

Table 4 WET CLUTCH SPECIFICATIONS (1998-1999)

Item	Specification in. (mm)
Type	Wet multiplate disc
Clutch hand lever free play	1/16-1/8 (1.6-3.2)
Clutch friction disc	
Thickness service limit	0.143 (3.62)
Clutch plate thickness service limit	0.006 (0.15)
Compensating sprocket shim thickness	0.010 (0.25), 0.020 (0.51), 0.030 (0.76), 0.060 (1.52)

Table 5 CLUTCH TORQUE SPECIFICATIONS (1984-1997)

Item	ft.-lb.	in.-lb.	N•m
All 1/4-in. fasteners	–	80-106	9-12
Clutch hub nut			
Dry clutch	50-60	–	67-81
Wet clutch			
1984-1989	50-60	–	67-81
1990-1997	70-80	–	95-108
Clutch pressure plate-to-clutch hub bolts			
1984-1989	–	80-97	9-11
Compensating sprocket nut			
1984-1989	90-100	–	122-136
1990-1999	150-165	–	203-224
Jackshaft bolt (1989-1997)	–	88-106	10-12
Primary chaincase cover bolts	–	80-106	9-12
Primary chaincase to engine and transmission			
1984-1992 FXR, FLH and FLT series models			
Chaincase-to-transmission bolts			
3/8-in. bolts	21-27	–	29-37
5/16-in. bolts	13-16	–	18-22
Chaincase-to-engine bolts	16-18	–	22-24
1984-1986 T-bracket-to-transmission bolts	13-16	–	18-22
1987-1992 engine-to-transmission bolts	35-38	–	47-52
FXWG, FXSB and FXEF			
Chaincase-to-transmission bolts	18-22	–	24-30
Lower engine-to-frame bolts	35-38	–	47-52
Transmission-to-frame bolts	35-38	–	47-52
1993-1998 all models	18-21	–	24-28

Table 6 CLUTCH TORQUE SPECIFICATIONS (1998-1999)

Item	ft.-lb.	in.-lb.	N•m
All 1/4-in. fasteners	–	80-106	9-12
Clutch hub nut	70-80	–	95-108
Compensating sprocket nut	150-165	–	203-224
Diaphragm spring bolts	–	90-110	10-12
Jackshaft bolt	–	80-106	9-12
Primary cover screws	–	80-106	9-12
Primary chaincase to engine and transmission	18-21	–	24-28

CHAPTER SIX

FOUR-SPEED TRANSMISSION

This chapter covers procedures for the four-speed transmission, shift linkage and kickstarter installed on the FXWG, FXSB and FXEF models. Special tool requirements are described in the procedures.

All models are equipped with a four-speed transmission that is a separate unit attached to the rear of the engine. The transmission shaft and shifter assemblies can be serviced with the transmission case mounted in the frame.

A ratchet-type kickstarter assembly is mounted in the side cover. The kickstarter mechanism can be removed with the transmission mounted on the motorcycle.

Table 1 and **Table 2** are at the end of the chapter.

SPECIAL TOOLS

The four-speed transmission requires a number of special tools. These tools and the part numbers are listed with the individual procedures. For a complete list of the special tools mentioned in this manual, refer to **Table 12** in Chapter One. The transmission tools used in this chapter are either Harley-Davidson or JIMS special tools. JIMS special tools are available through many aftermarket motorcycle suppliers.

When purchasing special tools, make sure to specify that the tools required are for the 1985-1986 FXWG, FXSB and FXEF models. Many of the tools are specific to this transmission. Tools for other transmissions and years may be slightly different.

SHIFTER ASSEMBLY

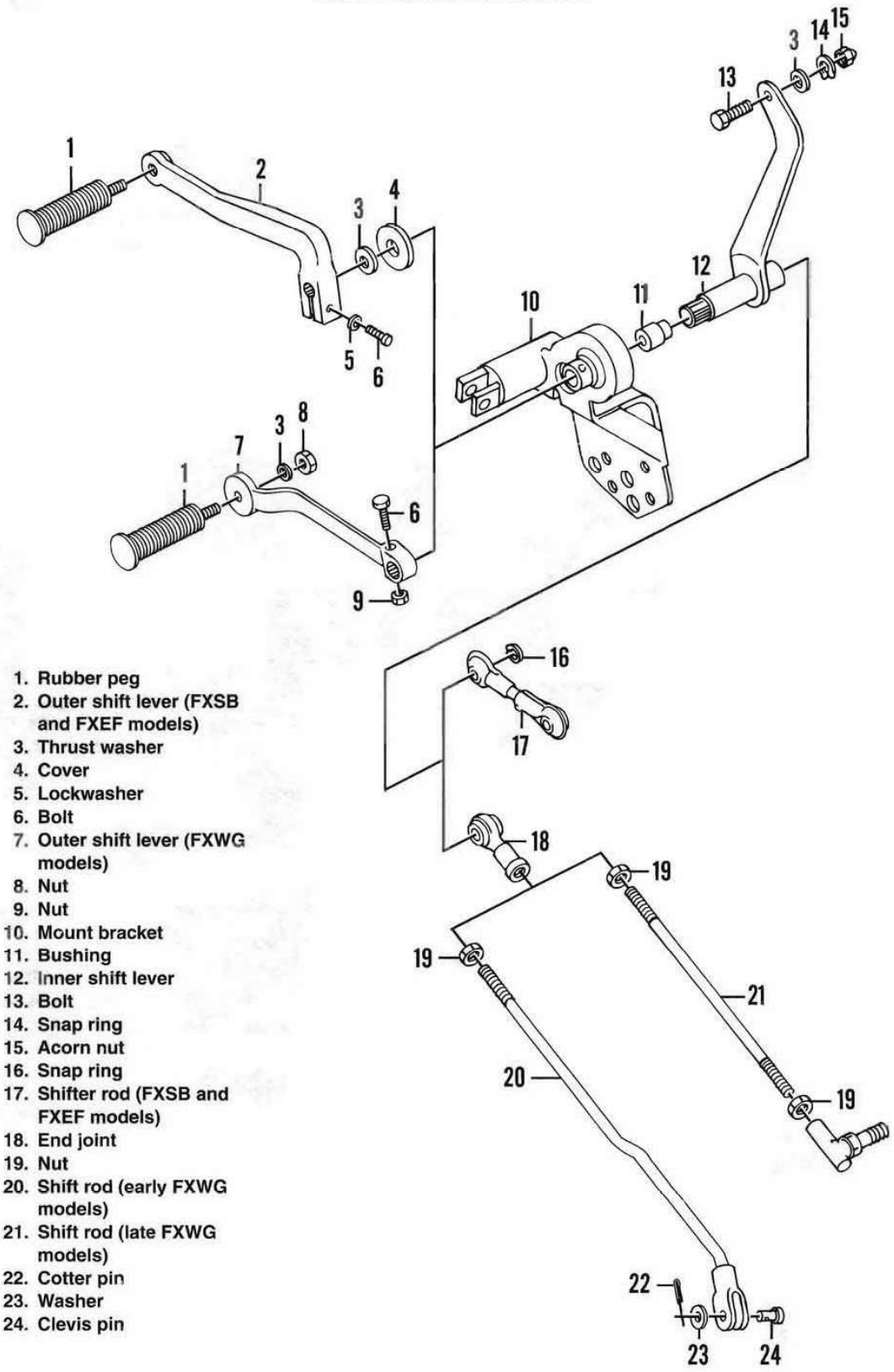
The shifter assembly consists of the external shift linkage and internal shift cam and shift arm components. The internal components can be serviced with the transmission case installed in the frame by removing the top cover.

If a shift problem is encountered, refer to the troubleshooting procedures in Chapter Two and eliminate all clutch and shifter mechanism possibilities *before* considering transmission repairs. Improper clutch adjustment is often a cause of poor shifting. Refer to Chapter Three for adjustment procedures.

The external shift linkage assembly (**Figure 1**) connects the foot-operated shift rod and levers. The shift linkage does not require adjustment unless it is replaced, or the transmission gears do not engage properly.

(1)

SHIFTER MECHANISM



1. Rubber peg
2. Outer shift lever (FXSB and FXEF models)
3. Thrust washer
4. Cover
5. Lockwasher
6. Bolt
7. Outer shift lever (FXWG models)
8. Nut
9. Nut
10. Mount bracket
11. Bushing
12. Inner shift lever
13. Bolt
14. Snap ring
15. Acorn nut
16. Snap ring
17. Shifter rod (FXSB and FXEF models)
18. End joint
19. Nut
20. Shift rod (early FXWG models)
21. Shift rod (late FXWG models)
22. Cotter pin
23. Washer
24. Clevis pin

Shift Linkage Adjustment (FXSB and FXEF Models)

Refer to **Figure 2**.

1. Remove the retaining clip securing the shifter rod to the shift lever.
2. Slide the shift linkage rod off of the clevis pin.
3. Loosen the locknut and turn the shift linkage rod in either direction until the shift linkage can travel its full limit without interference.
4. Securely tighten the locknut.
5. Reconnect the shift linkage rod and secure it with a *new* retaining clip.

Shift Linkage Adjustment (FXWG Models)

Refer to **Figure 3**.

1. Remove the retaining clip securing the shifter rod to the clevis pin.
2. Pull the shifter rod off of the clevis pin.
3. Loosen the shifter rod locknut and turn the shifter rod end in either direction until the shift pedal travels through all gear positions without interference. Securely tighten the locknut.
4. Reconnect the shifter rod and secure it with a *new* retaining clip.

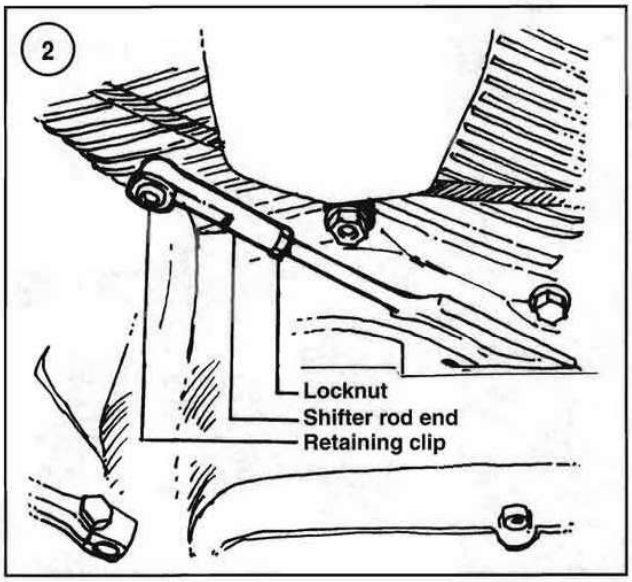
TRANSMISSION SHIFT COVER

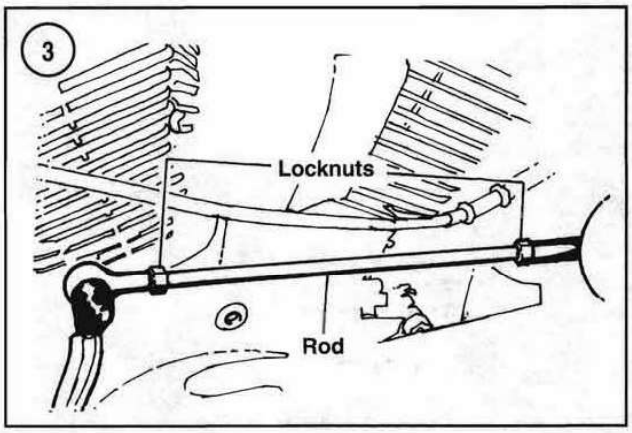
Removal/Installation

The shift cam cover assembly can be removed with the transmission installed on the motorcycle. If transmission repairs are also required, remove the transmission and shift cam cover as one unit. This procedure describes removal of the shifter cover only.

Refer to **Figure 4**.

1. Shift the transmission into neutral.
2. Remove the battery as described in Chapter Three.
3. Remove the bolts, washers and nuts securing the battery carrier and remove the carrier.
4. Drain the oil tank as described in Chapter Three. Then remove the oil tank as described in Chapter Four.
5. Remove the bolts and washers attaching the shift cover to the transmission. Refer to the arrow directed to the circled bolt in **Figure 4**. This bolt cannot be removed at this time; it can only be loosened. To remove the bolt, the shift cover must be removed first.
6. Lift the shift cover off of the transmission case. Discard the shifter cover gasket.





7. Install by reversing these removal steps, while noting the following:
   a. Install a *new* shift cover gasket.
   b. Apply a light coat of threadlocking compound to the cover mounting bolts. Tighten the mounting bolts to 13-16 ft.-lb. (18-22 N•m).
   c. Adjust the shift linkage as described in this chapter.

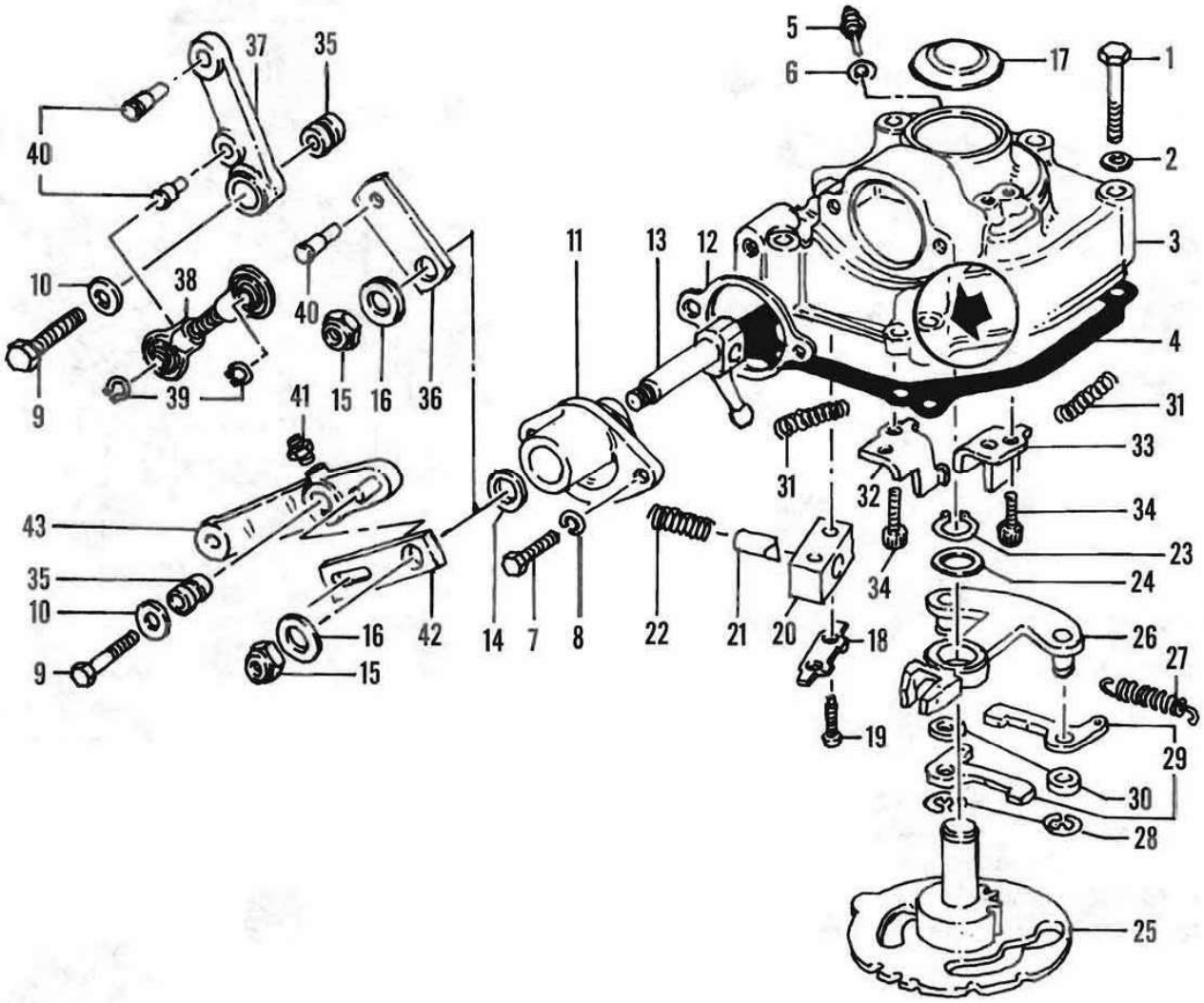
Disassembly

Refer to **Figure 4**.

1. Remove the neutral indicator switch and washer.
2. Remove the shift shaft cover bolts and washers.
3. Remove the shift lever bolt and washer.
4. Remove the shifter linkage assembly from the transmission cover.
5. Remove the remaining shifter cover bolt.

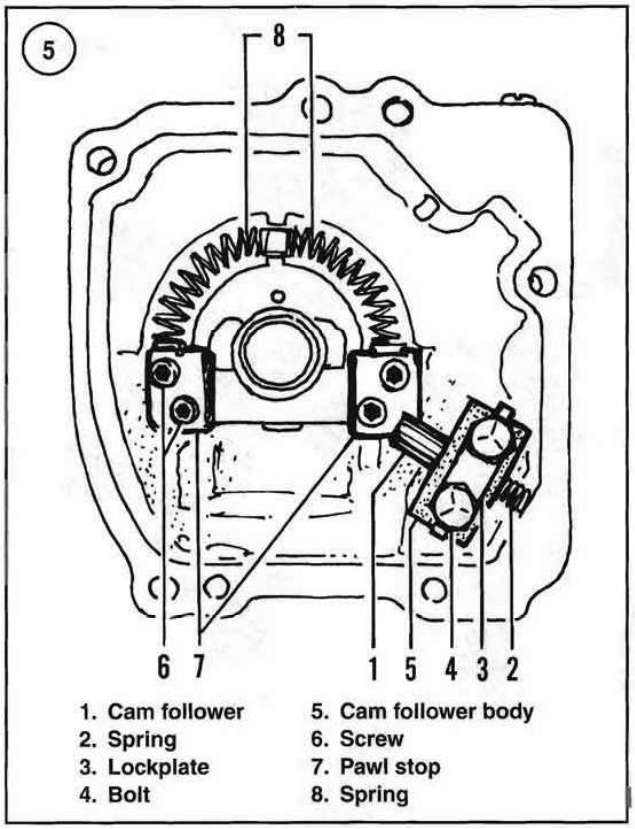
(4)

SHIFTCAM ASSEMBLY



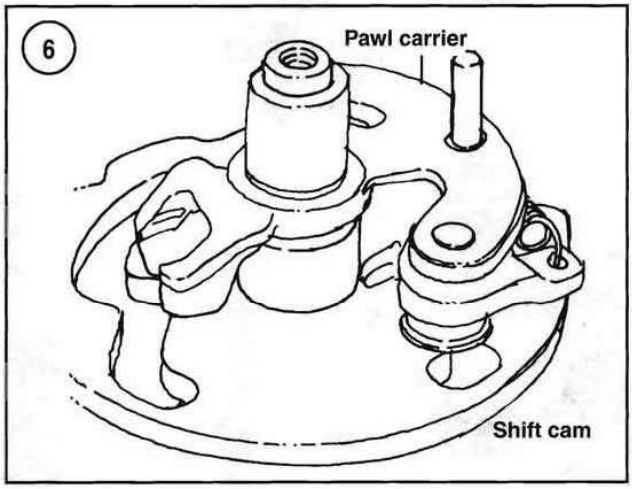
1. Bolt
2. Washer
3. Shift cover
4. Gasket
5. Neutral indicator switch
6. Washer
7. Bolt
8. Lockwasher
9. Bolt
10. Washer
11. Shifter shaft cover
12. Gasket
13. Shifter shaft
14. Oil seal
15. Nut
16. Washer
17. Plug
18. Lockplate
19. Bolt
20. Plunger body
21. Plunger
22. Spring
23. Retaining ring
24. Thrust washer
25. Shifter cam
26. Pawl carrier
27. Shifter pawl spring
28. Retaining rings
29. Pawls
30. Spacers
31. Pawl carrier spring
32. Shift pawl stop, rear
33. Shift pawl stop, front
34. Socket head screw
35. Bushing
36. Shift lever arm (FXEF and FXSB)
37. Shift lever (FXEF and FXSB)
38. Shift linkage arm (FXEF and FXSB)
39. Retaining ring (2) (FXEF and FXSB)
40. Pivot pin (3) (FXEF and FXSB)
41. Grease fitting
42. Shift lever arm (FXWG)
43. Shift lever (1985 FXWG)

6. If necessary, remove the top plug from the shift cover as follows:
   a. Drill a 1/4-in. (6.35 mm) hole through the top plug. Drill only far enough to penetrate completely through the top plug material.
   b. Insert a punch through the drilled hole and pry the top plug off of the shift cover.
   c. Discard the top plug; a new plug must be installed during assembly.
7. Remove the shift cam retaining ring and washer through the top plug hole opening and remove the shifter cam and pawl assembly.
8. Disassemble the shift cover (**Figure 5**) as follows:
   a. Remove the bolts securing the cam follower and spring and remove them from the cam follower body.
   b. Straighten the lockwasher tabs and remove the cam follower body bolts.
   c. Lift the cam follower body out of the shift cover.
   d. Remove the Allen bolts securing the pawl stops.
   e. Remove the pawl stop springs.



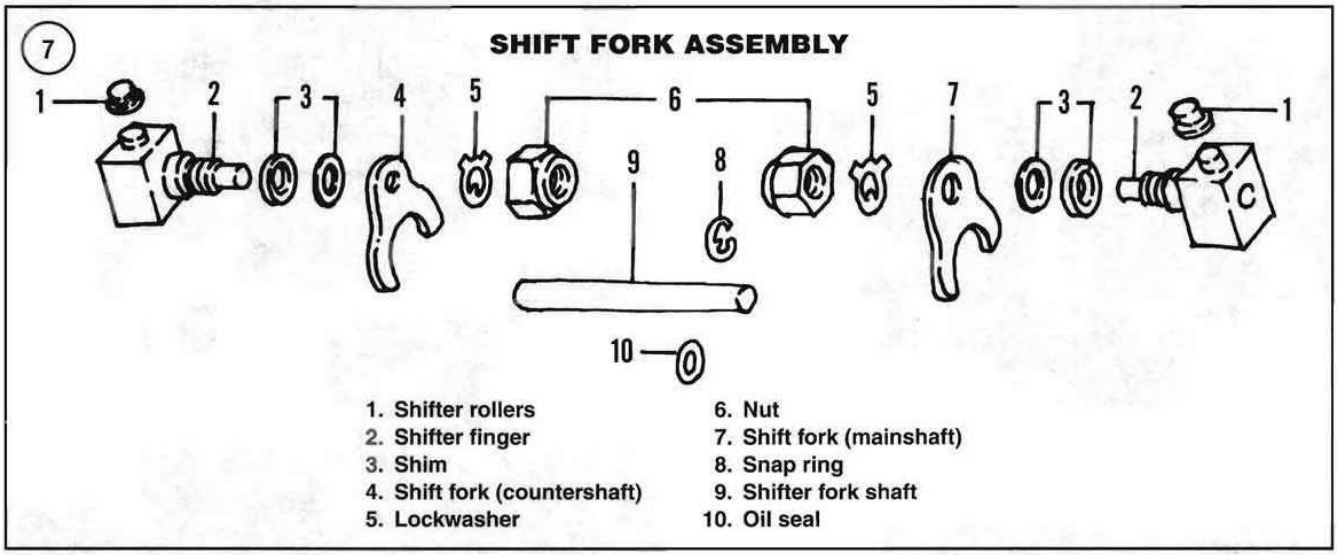
Assembly

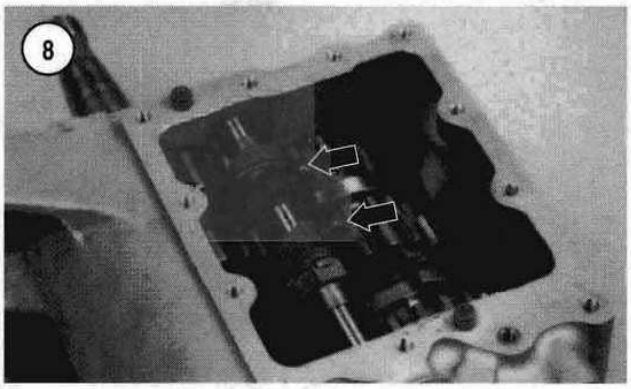
1. Lubricate the pawl stop springs with multipurpose grease.
2. Install the pawl stops and secure with the Allen bolts. Securely tighten the bolts.
3. Install both pawl stop springs.
4. Install the cam follower body, lockwasher and bolts. Tighten the bolts securely. Then bend the lockwasher tabs over the bolts to lock them.
5. Install the spring and cam follower into the cam follower body.
6. Coat the neutral switch threads with Loctite Pipe Sealant with Teflon. Install the neutral switch and washer and tighten to 62-124 in.-lb. (7-14 N•m).
7. Slide the pawl carrier assembly on the shift cam (**Figure 6**). Engage the pawls with the shift cam gear teeth and make sure they are correctly engaged.
8. Install the shift cam and pawl carrier assembly into the shift cover. Position the tab on the pawl carrier assembly between the pawl stop springs.
9. Install the shift cam washer and a *new* snap ring.
10. Coat a new top plug with Seal-All sealant or an equivalent. Then place the top plug in the cover and tap it into place with a hammer.
11. Assemble the shift linkage using a *new* snap ring. Tighten all linkage bolts securely.

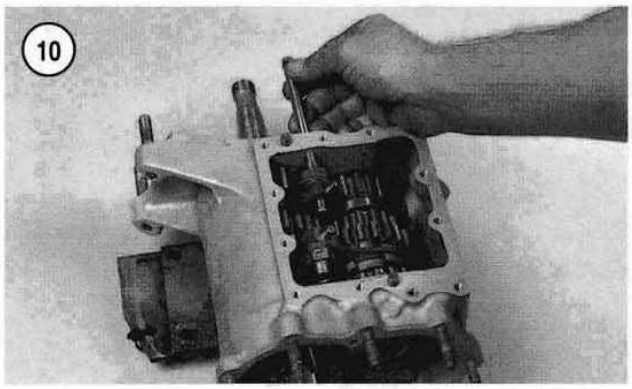


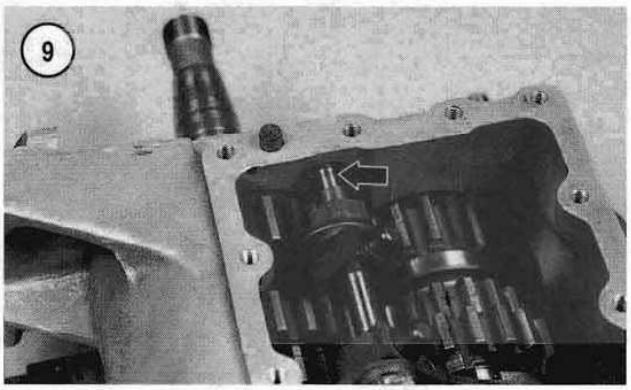
Inspection

1. Thoroughly clean all parts (except neutral switch) in solvent. Then blow dry.
2. Inspect them for any signs of wear, cracks, breakage or other damage. Replace as necessary.
3. Check the shift cam slots for worn or grooved cam slots. Excessive wear will result in difficult shifting.
4. Check pawl stops for breakage or surface cracks.









SHIFT FORKS

Removal/Disassembly

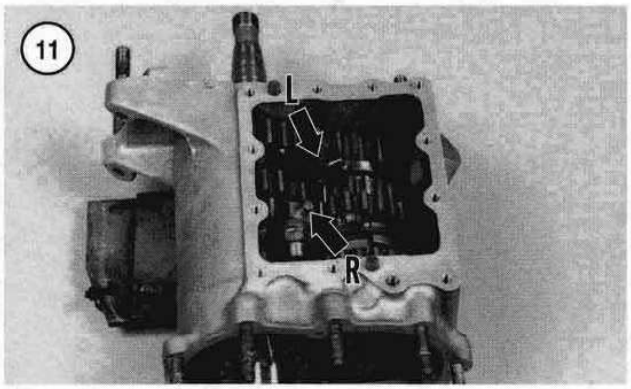
Refer to **Figure 7**.

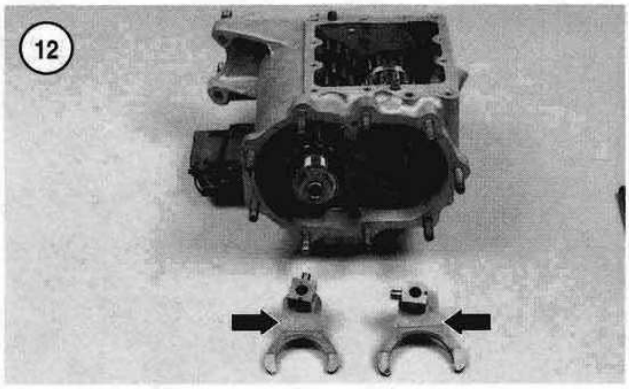
1. Remove the shift cover as described in this section.
2. Remove the rollers (**Figure 8**) from each shift finger.
3. Remove the snap ring (**Figure 9**) from the end of the shift fork shaft.
4. Tap on the end of the shift fork shaft with a drift and remove the shaft from the case (**Figure 10**).
5. Mark the shift forks with an *L* (left side or driven-sprocket side) and *R* (right side). Remove both shift forks (**Figure 11**).

NOTE

Do not disassemble the forks unless a portion requires replacement.

6. Disassemble one shift fork (**Figure 12**) at a time and keep them separate. Do not interchange any of the parts.
7. Straighten the lockwasher tabs (A, **Figure 13**). Loosen and remove the nut (B) and lockwasher securing the shift fork to the shift finger.
8. Remove the shift fork and shims from the shift finger and keep them in order shown in **Figure 7**.
9. Repeat for the other shift fork assembly.





Assembly/Installation

NOTE

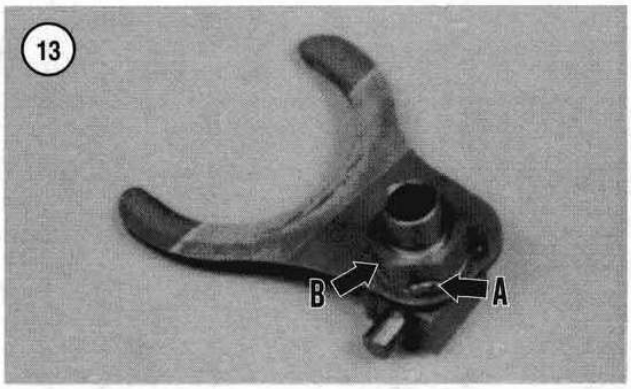
If any part was replaced, the shift fork clearance must be checked and adjusted.

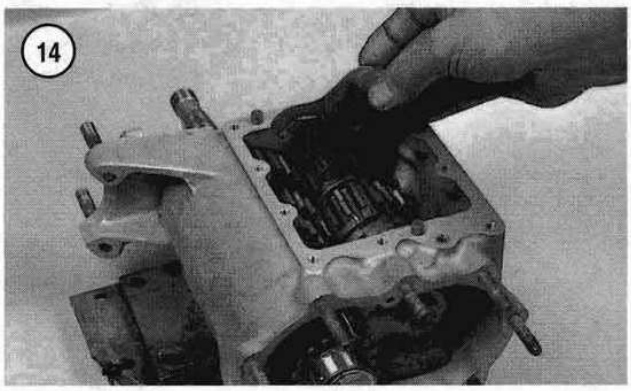
1. Coat all bearing and sliding surfaces with assembly oil.

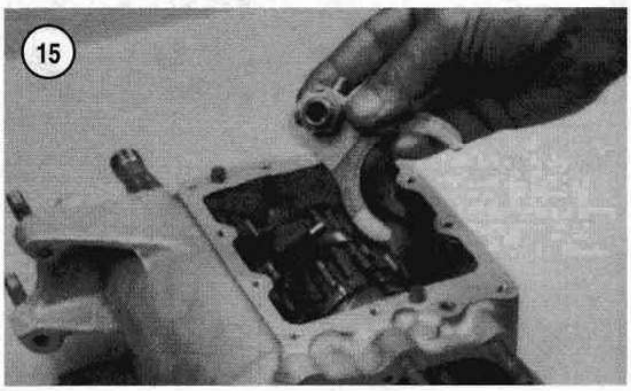
CAUTION

Do not exceed the torque specifications in Step 2 because this could cause the shift finger to bind on the shift shaft.

2. Install the spacer(s), shift fork, *new* lockwasher and then nut on the shift finger. Tighten the nut to 124-150 in.-lb. (14-17 N•m). Bend the lockwasher tab against the nut to lock it.
3. Refer to the marks made in Step 5 of *Removal/Disassembly* and install the shift fork assemblies into the transmission case. Refer to **Figure 14** and **Figure 15**. Engage the shift forks with the respective gears. (**Figure 11**).
4. Insert the shift shaft through the transmission case (**Figure 16**) and through both shift fork assemblies. Push the shaft in until it bottoms in the transmission case.
5. Install a *new* snap ring (**Figure 17**) into the shaft groove and make sure it properly seats (**Figure 9**).
6. Install the shift rollers (**Figure 8**) onto the shift fingers. Press them down until they bottom.
7. If any part was replaced, adjust the shift forks as described in this section.

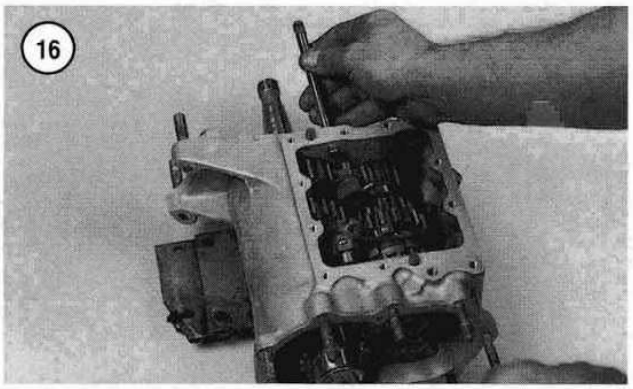


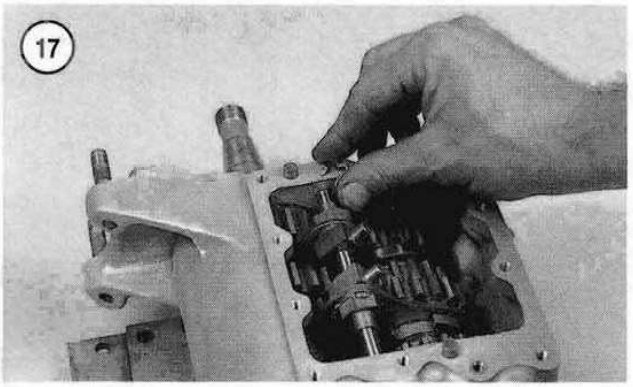


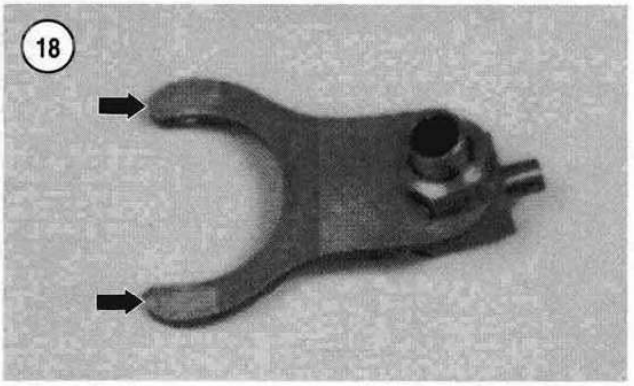


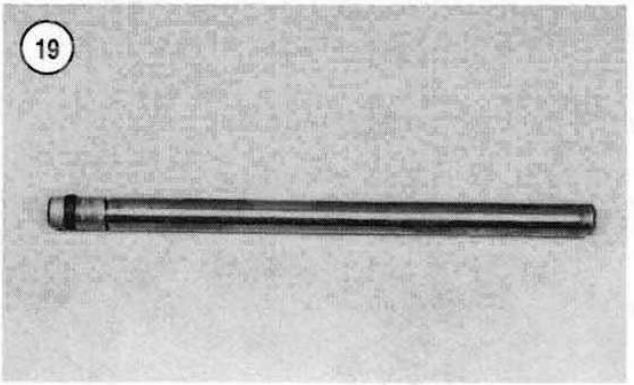
Inspection

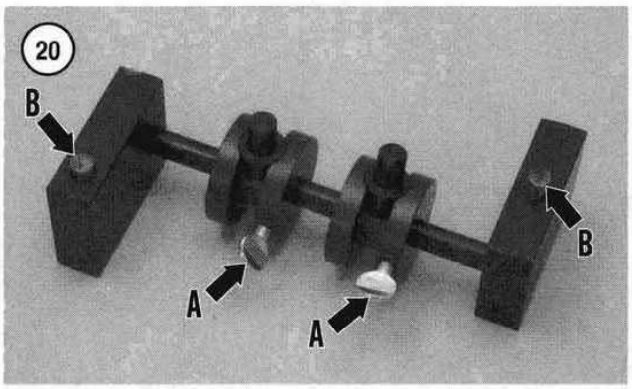
1. Clean all parts in solvent and dry.
2. Inspect each shift fork (**Figure 13**) for signs of wear or damage.
3. Make sure the forks slide smoothly on the shifter fork shaft.
4. Check for any arc-shaped wear or burn marks on the shift forks (**Figure 18**). If this is apparent, the shift fork











has come in contact with the gear, which indicates that the fingers are worn and must be replaced.

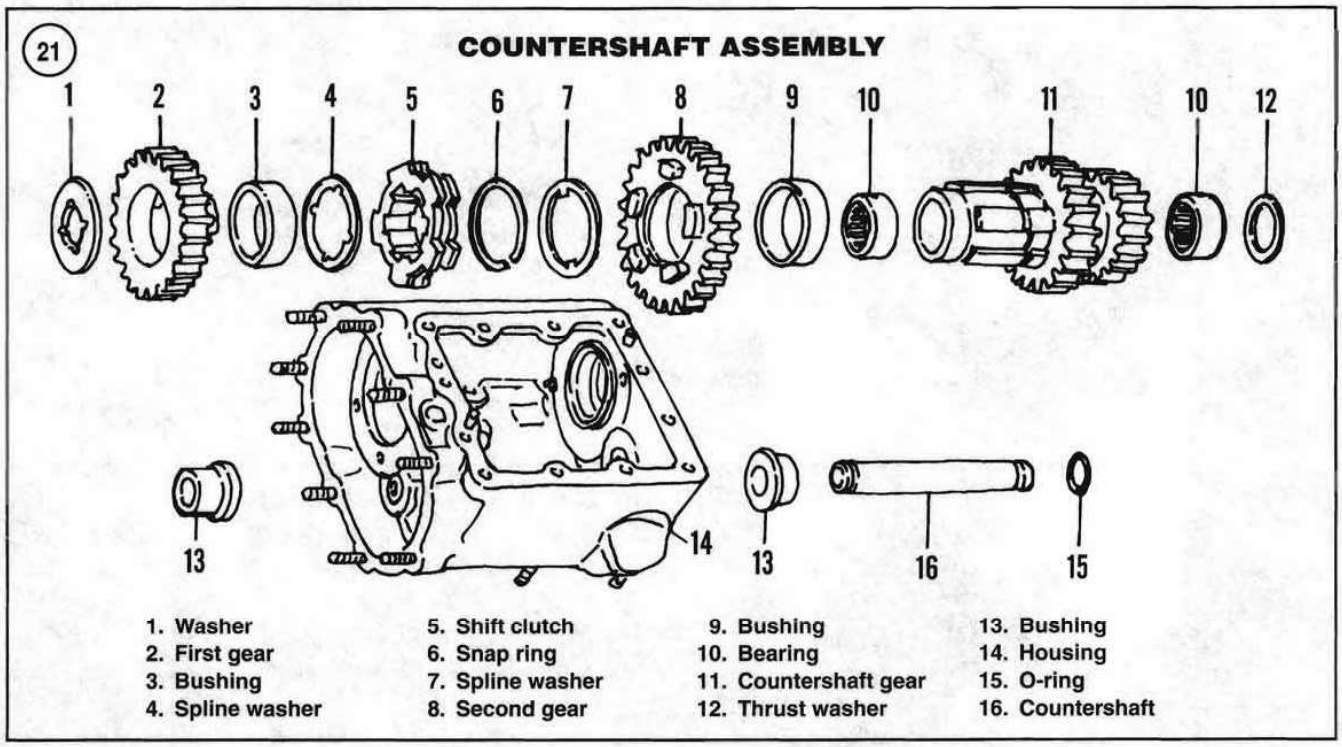
5. Roll the shift fork shaft (**Figure 19**) on a flat surface and check for bending. If the shaft is bent, it must be replaced.

6. Install each shift fork on the shift shaft. The shift fork should slide smoothly without any sign of binding.

Shift Fork Adjustment

This procedure requires the Shift Fork Gauge (JIMS part No. 96385-78A) to correctly adjust the shift forks clearance.

1. Turn the shift cover assembly upside down on the workbench.
2. Move the shift cam to the neutral position.
3. Loosen the two thumb screws (A, **Figure 20**) on the sliding blocks on the tool. Move the sliding blocks back and forth to make sure they move freely.
4. Install the tool onto the cover and align the two dowel pins (B, **Figure 20**) into the pin holes in the cover. At the same time, align the sliding blocks into the shift plate located in the neutral position. Tighten the two thumb screws locking both sliding blocks in this position.
5. Pull the tool straight up off the cover and turn it over (dowel pins facing up).
6. Install the tool onto the transmission case. Index the case dowel pins into the tool pin receptacles while aligning the shift fork fingers with the sliding block grooves.
7. Check the clearance between the shift fingers and both sides of the shifter clutches with a flat feeler gauge. The specified clearance is as follows:
   a. Countershaft first and second gears: 0.080-0.090 in. (2.03-2.28 mm).
   b. Mainshaft third and forth gears: 0.100-0.110 in. (2.54-2.79 mm).
8. Remove the special tool from the transmission case.



9. If the clearance is not as specified, remove the shift fork assemblies and change the shim(s) with one of a different thickness. The shims are available in sizes from 0.007-0.014 in. (0.178-0.355 mm) from a Harley-Davidson dealership.

TRANSMISSION SHAFTS

Countershaft Removal/Installation

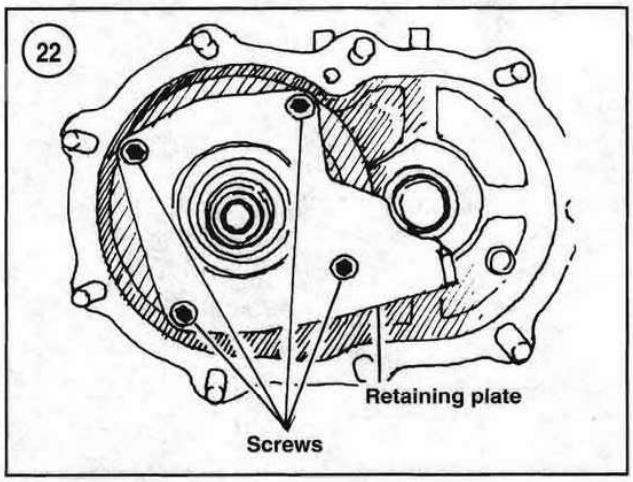
Refer to **Figure 21**.

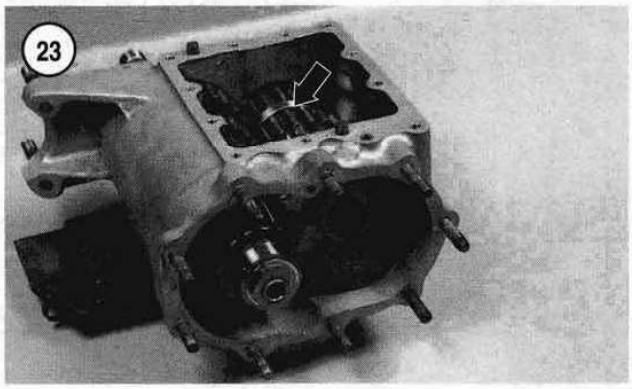
1. Remove the transmission case as described in this chapter.
2. If the countershaft drive sprocket was not removed during transmission case removal, remove it as follows:
   a. Hold the sprocket with a universal holding tool.
   b. Remove the sprocket nut setscrew.

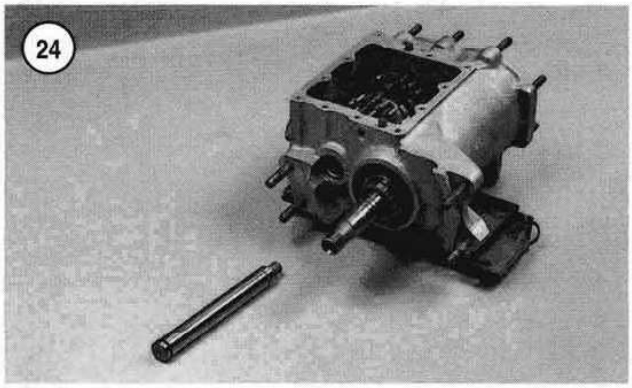
NOTE

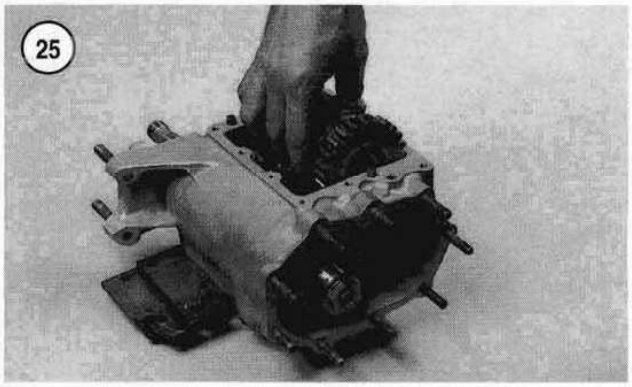
*The sprocket nut has left-hand threads. Turn the wrench **counterclockwise** to loosen and remove it.*

   c. Loosen and remove the sprocket nut.
   d. Remove the lockwasher (models so equipped).
   e. Remove the drive sprocket.
3. Remove the following assemblies from the transmission as described in this chapter:









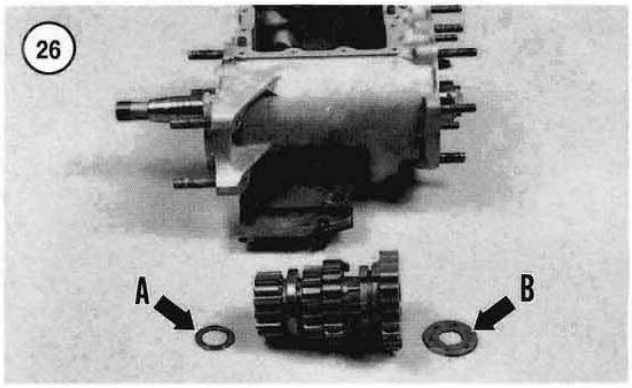
a. Shift cover.
b. Side cover.
c. Shift forks.

4. Remove the retaining plate screws and remove the retaining plate (**Figure 22**).
5. Hold onto the gear cluster (**Figure 23**) with one hand. Then withdraw the countershaft (**Figure 24**) through the side of the case.
6. Lift the gear cluster out of the case (**Figure 25**).

NOTE

In Step 7, the washer and thrust washer may come out with the gear cluster or stick to the side of the transmission case.

7. Remove the washer (A, **Figure 26**) and thrust washer (B) from the transmission case.
8. Coat the countershaft thrust washer (B, **Figure 26**) with grease and install it into the correct location in the transmission case.
9. Install a *new* O-ring on the sprocket end of the countershaft. Apply clean engine oil to the O-ring.
10. Position the gear cluster with the countershaft gear end going in first and install the gear cluster into the transmission case (**Figure 25**). Hold the gear cluster in position with one hand.



11. Position the countershaft with the sprocket side (O-ring) end going in last and insert the countershaft through the gear cluster from the sprocket side of the transmission case.
12. Push the countershaft in until it bottoms and make sure the O-ring is still in place.
13. Measure the countershaft gear end play as follows:
    a. Insert a flat feeler gauge between the washer (1, **Figure 21**) and the countershaft (11, **Figure 21**). Correct end play is listed in **Table 1**.
    b. If the end play is incorrect, replace the washer with a washer of a different thickness. The washers are available in sizes from 0.074-0.100 in. (1.88-2.54 mm) from a Harley-Davidson dealership.
14. Install the retaining plate (**Figure 22**). Tighten the screws to 94-108 in.-lb. (9.5-12.2 N•m).
15. Install the countershaft drive sprocket as follows:
    a. Install the drive sprocket onto the countershaft. Push it on until it bottoms.
    b. On models so equipped, install a *new* lockwasher.
    c. Install the sprocket nut and tighten securely.
    d. Hold the sprocket with a universal holding tool.

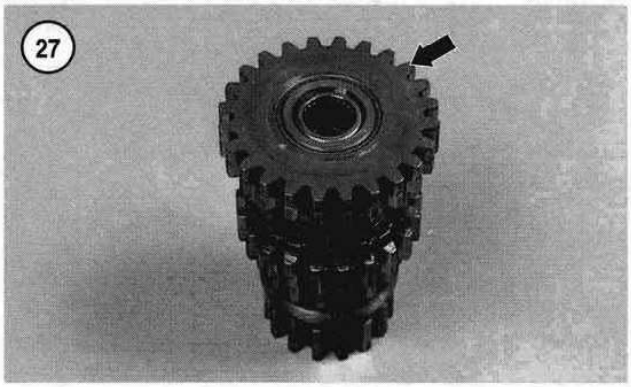
NOTE

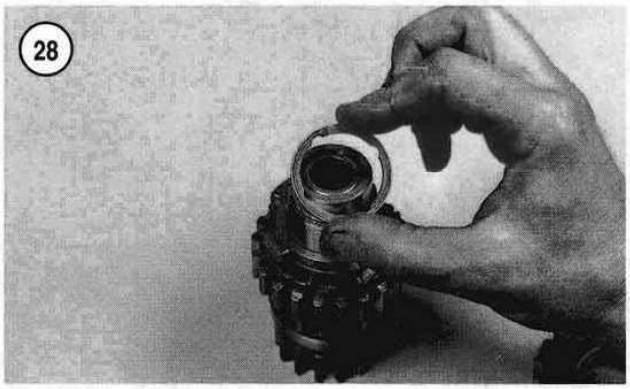
*The sprocket nut has left-hand threads, turn the wrench **clockwise** to tighten it.*

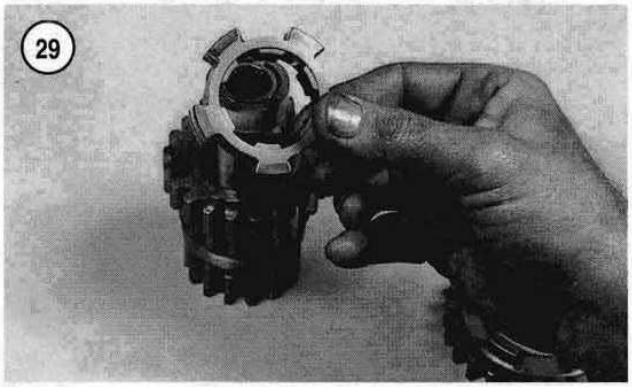
    e. Tighten the sprocket nut to 80-90 ft.-lb. (108-122 N•m).
    f. Tighten the sprocket nut setscrew to 50-60 in.-lb. (6-7 N•m).

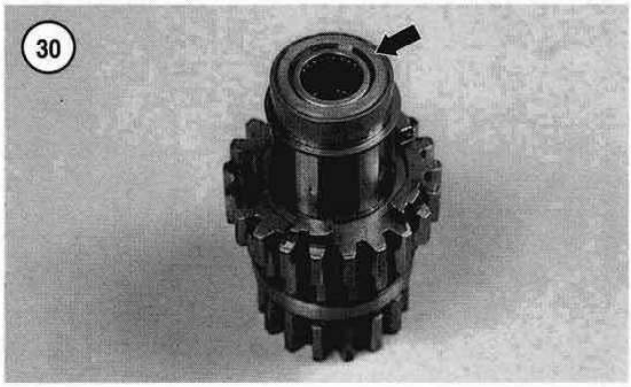
Countershaft Disassembly

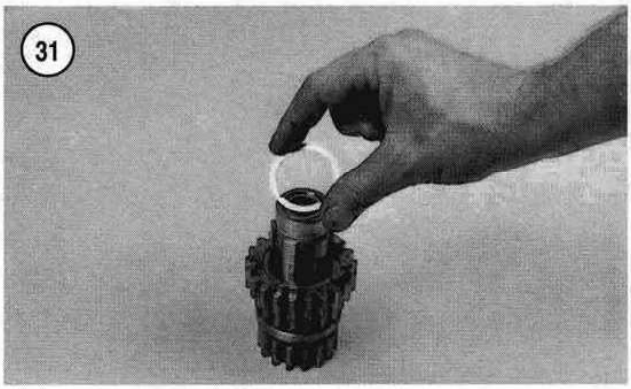
1. Remove the first gear (**Figure 27**) and slide off the first gear bushing.
2. Remove the spline washer (**Figure 28**).
3. Slide off the shift clutch (**Figure 29**).
4. Remove the snap ring (**Figure 30**) from the gear cluster.

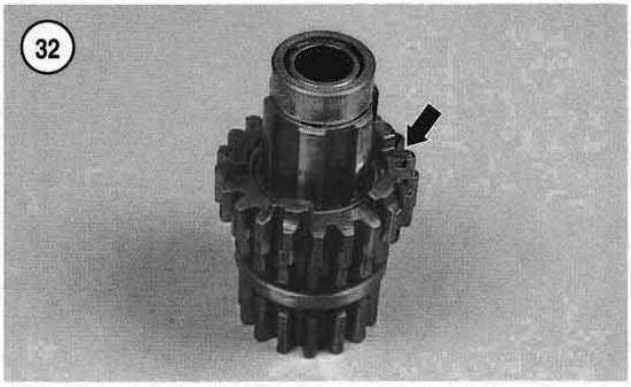




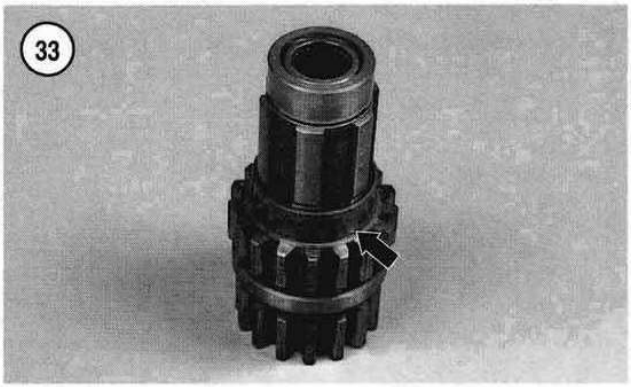






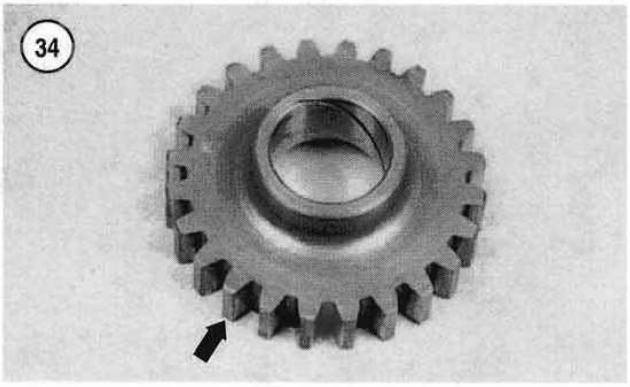


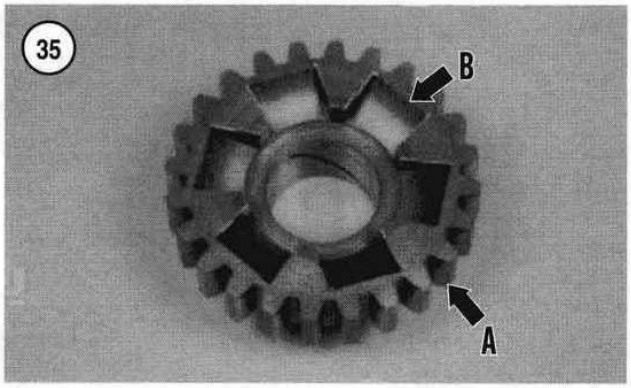
5. Slide off the spline washer (**Figure 31**).
6. Slide off the second gear (**Figure 32**) and slide off the second gear bushing (**Figure 33**).
7. Remove the thrust washer from the other end of the countershaft.

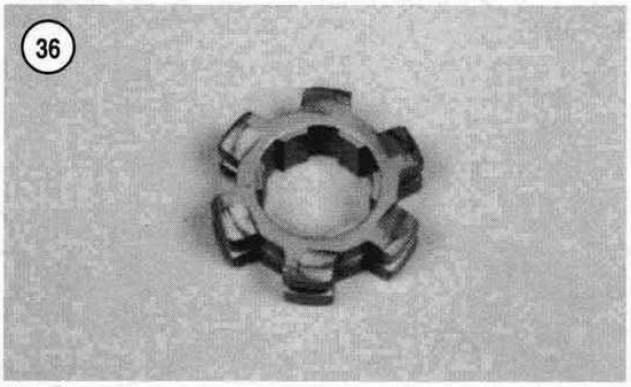


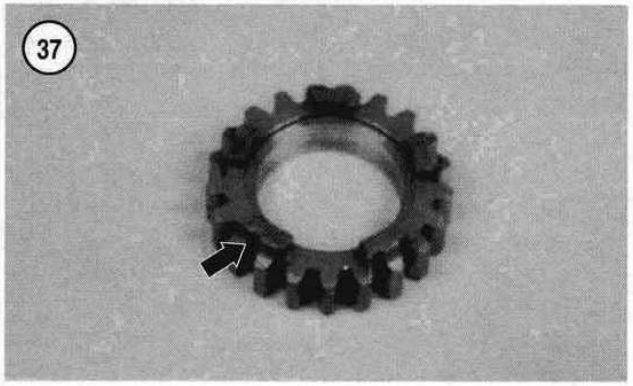
Countershaft Assembly

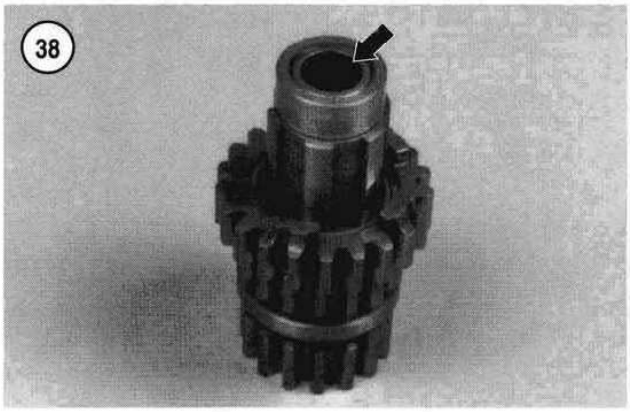
1. Coat all parts with engine oil prior to assembly.
2. Slide on the second gear bushing (**Figure 33**).











3. Position the second gear with the shift dog side going on last and install the second gear (**Figure 32**).
4. Install the spline washer (**Figure 31**).
5. Install a *new* snap ring (**Figure 30**). Make sure the snap ring seats correctly in the countershaft groove.
6. Install the shift clutch (**Figure 29**) and spline washer (**Figure 28**).
7. Slide on the first gear bushing and the first gear (**Figure 27**).

Inspection

1. Inspect each gear for excessive wear, burrs, pitting or chipped or missing teeth. Refer to **Figure 34** and A, **Figure 35**.
2. Inspect the shift clutch (**Figure 36**) for rounded edges or severe wear. Also check the inner splines for excessive wear or damage.
3. Check dogs on the gears (**Figure 37**) and receptacles (B, **Figure 35**) for excessive wear or rounded edges.
4. Examine gear and shaft splines for wear or rounded edges.
5. Slide the gears onto the shaft in the original positions. The gear should slide back and forth without any binding or excessive play.
6. Check the countershaft gear needle bearing (**Figure 38**) at each end for wear or roughness. If worn or damaged, they must be replaced in the following procedure.
7. Inspect the transmission case bushings and oil seals as described in this section.

Countershaft Gear Needle Bearing Replacement

A hydraulic press and Countershaft Bearing Tool (JIMS part No. 34733-77) (**Figure 39**) are required for this procedure.

1. Support the countershaft gear in a vise with soft jaws.

2A. Remove the old bearings with a blind bearing remover (**Figure 40**).
2B. Remove the old bearings with long drift and hammer.
3. Clean out the countershaft gear bore with solvent and dry with compressed air.
4. Check the bearing bore in the countershaft gear for burrs and remove if necessary.
5. Apply clean engine oil to the bearing bore and to the exterior of the bearings.
6. Place the countershaft gear on the press bed.
7. Position the needle bearing onto the countershaft gear with the manufacturer's mark facing out.
8. Install the bearing installer tool (**Figure 39**) onto the bearing and countershaft gear as shown in **Figure 41**. The tool is double-ended and must be positioned as shown to install the bearing to the correct depth within the countershaft gear.
9. Slowly press the bearing into the countershaft gear. When the tool bottoms on the gear surface, the bearing is installed at the correct depth.
10. Remove the special tool and the countershaft from the press bed.
11. Repeat Steps 5-9 for the remaining bearing.

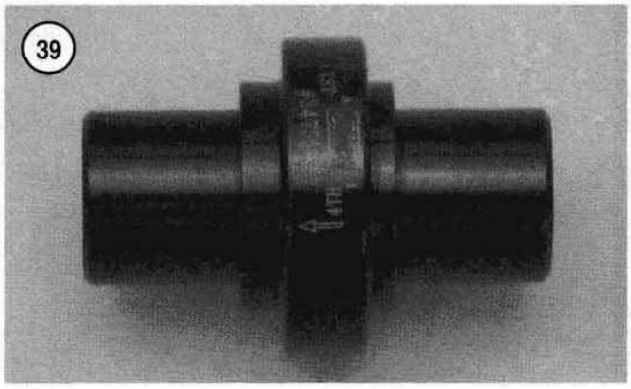
Mainshaft Removal/Disassembly

Refer to **Figure 42**.

The mainshaft is partially disassembled during the removal procedure.

1. Remove the transmission case as described in this chapter.
2. On late 1984-on models, remove the bearing race from the end of the mainshaft with the Mainshaft Bearing Race Tool (JIMS part No. 34902-84) (**Figure 43**) as follows:
   a. Thread the center screw into the puller bar. Thread the hardened tip onto the end of the center screw and tighten securely.
   b. Place a washer onto the two bolts. Position the bolts onto the puller bar with the washers resting on the puller bar.
   c. Thread the two bolts onto the bearing plate until they are flush with the back side of the bearing plate.
   d. Position the bearing plate behind the bearing and tighten the center screw onto the end of the transmission shaft. Center the hardened tip onto the end of the transmission shaft.

NOTE
If the bearing will not dislodge from the shaft, slowly heat (not to exceed 200° F [93° C]) the bearing until it is free to move on the shaft.



   e. Slowly tighten the center screw and withdraw the bearing from the shaft.
   f. Remove the special tools.
3. Remove countershaft from the transmission case as described in this chapter.
4. Using a plastic mallet, carefully drive the mainshaft (**Figure 44**) part way out through the cover side of the transmission case. Slowly drive it out until second gear almost contacts the inner surface of the case.
5. Release the snap ring (**Figure 45**) from its groove between the spline washer and shift clutch. Slide it on the mainshaft splines (**Figure 46**).
6. Slowly withdraw the mainshaft from the transmission case while removing the following parts from the end of the shaft and out through the case opening:
   a. The third gear (**Figure 47**) and the washer (**Figure 48**).
   b. The snap ring (**Figure 49**) and the shift clutch (**Figure 50**).
7. If necessary, remove the main drive gear from the transmission case as described in this section.

NOTE
Step 8 requires the use of a hydraulic press.

8. If necessary, remove the bearing (A, **Figure 51**) and the first/second combination gear (B) from the mainshaft. Perform the following:
   a. Clamp the mainshaft in a vise with soft jaws.
   b. Straighten the lockwasher tab away from the mainshaft nut. Then remove the nut and the lockwasher.
   c. Place the mainshaft assembly in the hydraulic press.
   d. Position the press plates under the larger gear.
   e. Place a suitably sized driver, or round stock, on the end of the mainshaft. The driver must be small

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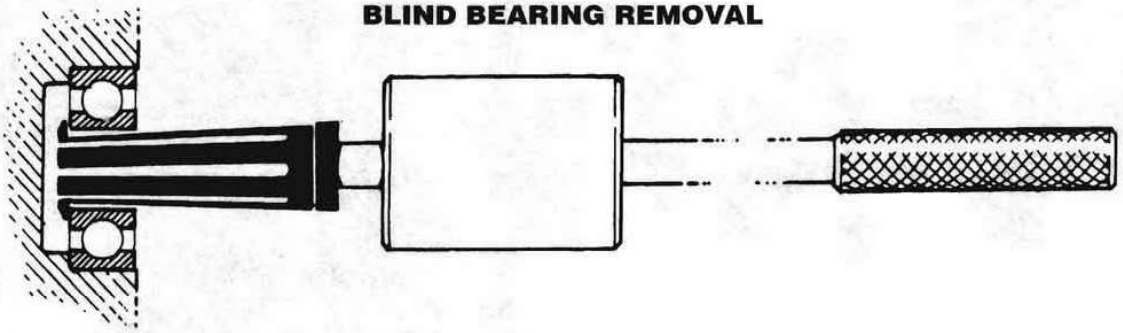
BLIND BEARING REMOVAL



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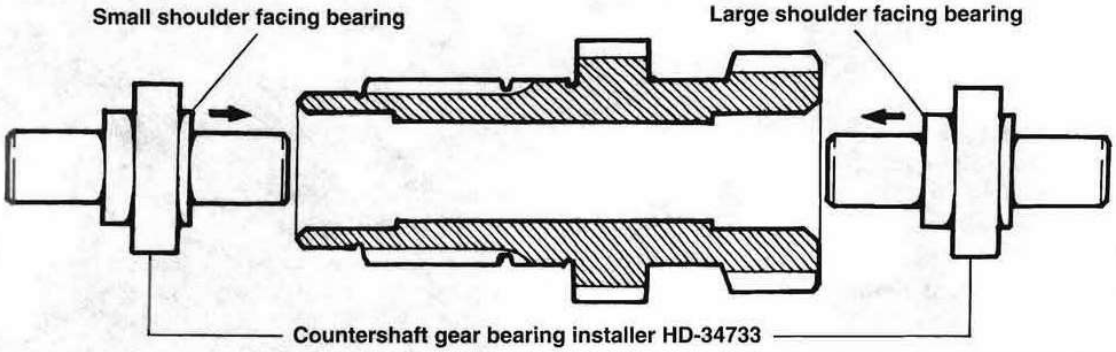

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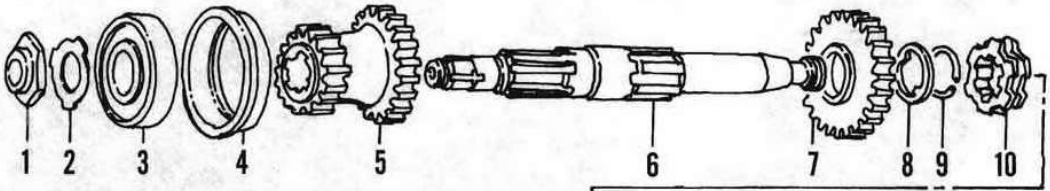
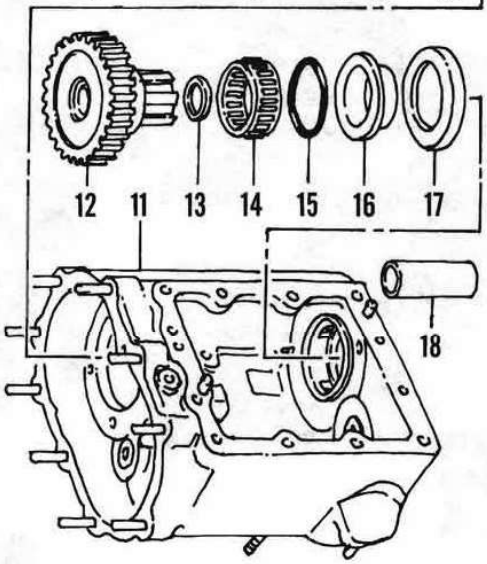
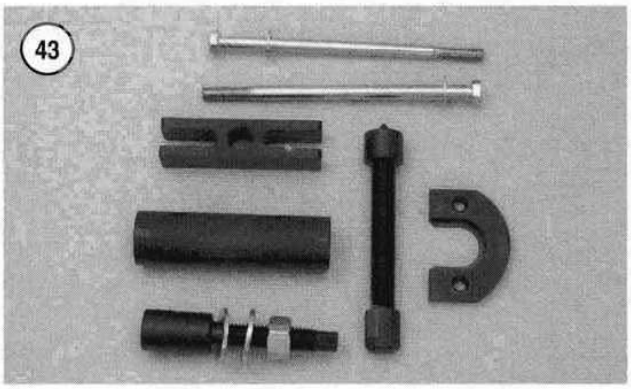
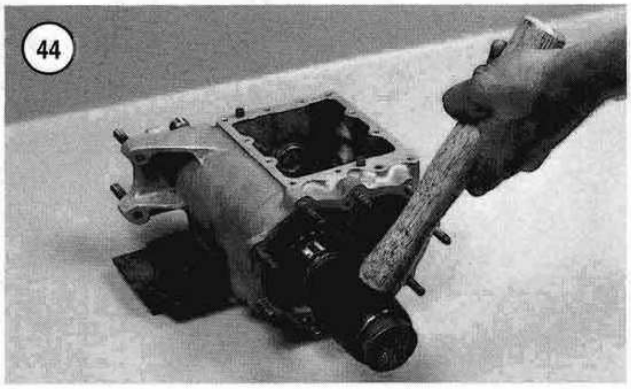
MAINSHAFT AND MAIN DRIVE GEAR



1. Nut
2. Lockwasher
3. Bearing
4. Bearing case
5. First/second gear combination
6. Mainshaft
7. Third gear
8. Spline washer
9. Snap ring
10. Shifter clutch
11. Housing
12. Main drive gear and bushing
13. Oil seal
14. Bearing
15. O-ring
16. Spacer
17. Oil seal
18. Bushing

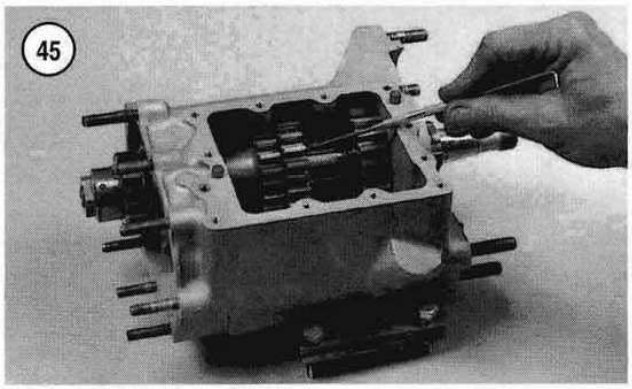






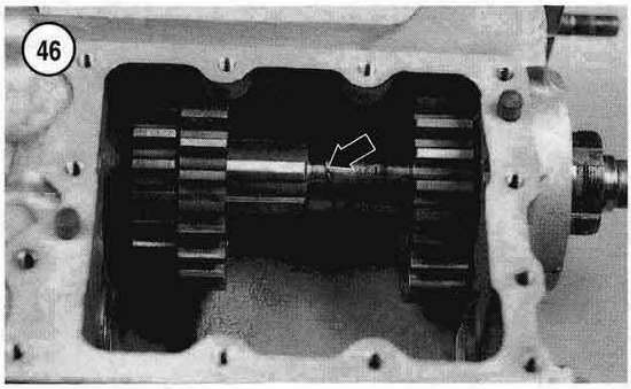
enough to pass through the bearing and combination gear being pressed off.

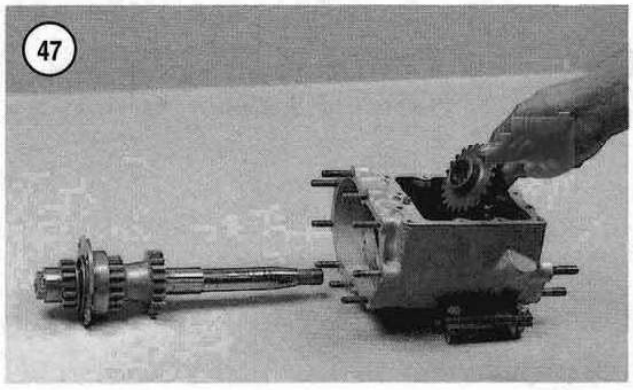
f. While holding the mainshaft, slowly press the combination gear and bearing off the mainshaft.
g. Remove the mainshaft.
h. If necessary, remove the bearing from the bearing case.

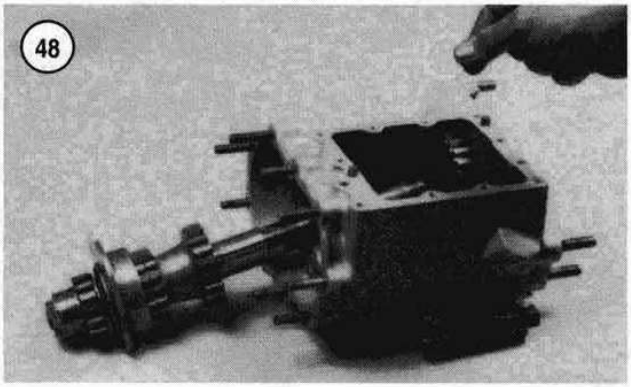


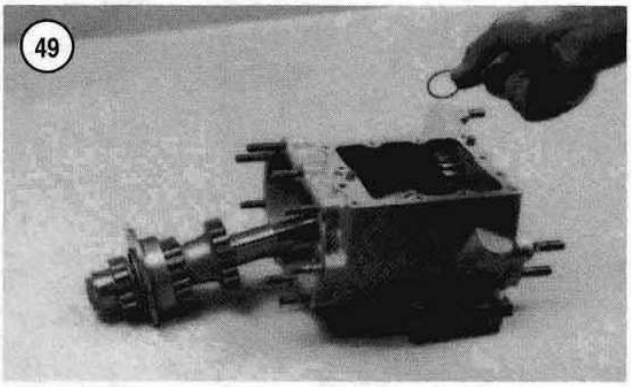
Mainshaft Assembly/Installation

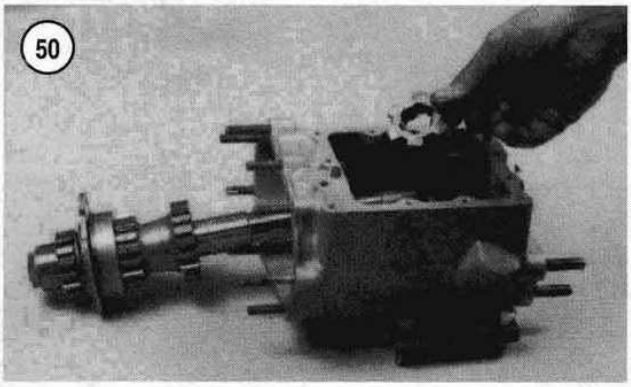
1. Coat all parts with transmission oil prior to assembly.
2. If removed, install the main drive gear into the transmission case as described in this section.
3. If the bearing was removed from the bearing case, perform the following:
   a. Place the bearing case on the press bed with the flange side facing up.
   b. Apply a light coat of clean transmission oil to the external sides of the bearing.
   c. Position the bearing with the manufacturer's marks facing up and place it on the bearing case.
   d. Place a suitably sized driver onto the bearing that fits the outer bearing race.
   e. Secure the two parts and slowly press the bearing into the bearing case until it bottoms.
   f. Remove the assembly from the press bed.
3. If removed, install the first/second combination gear and bearing onto the mainshaft, as follows:
   a. Position the first/second combination gear with the larger gear going on first and slide it onto the mainshaft.
   b. Position the bearing/bearing case with the case flange side going on last and install it onto the mainshaft.
   c. Place the opposite end of the mainshaft on the press bed and have an assistant hold it in a true vertical position.

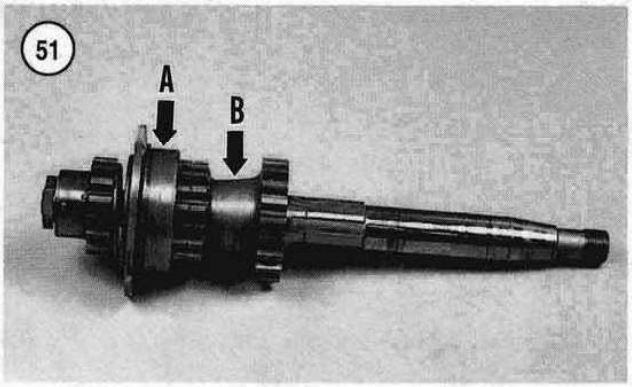


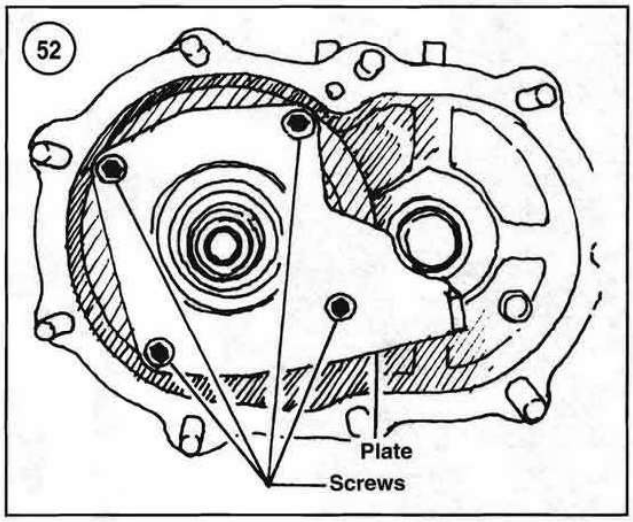












d. Place a suitably sized driver onto the bearing that fits the inner bearing race. The driver must fit the inner race and must also be large enough on the inside to clear the splines on the mainshaft. If the inner surface of the driver touches the shaft, splines will be damaged.

e. Hold onto the mainshaft and slowly press the bearing onto the shaft. Press the bearing on until it stops.

f. Remove the shaft and driver from the hydraulic press.

4. Support the mainshaft in a vise with soft jaws. Install the lockwasher and nut onto the end of the mainshaft. Tighten the nut to 50-60 ft.-lb. (67-81 N•m). Then bend the lockwasher tab against the nut.

5. Install the mainshaft into the transmission case and slide it so that the second gear barely contacts the case.

6. Slide the third gear (**Figure 47**) and then the spline washer (**Figure 48**) onto the mainshaft.

7. Install a *new* snap ring (**Figure 49**) and make sure it seats correctly in the mainshaft groove.

8. Position the shift clutch so that the side with the word HIGH faces toward the main drive gear. Install the shift clutch (**Figure 50**).

9. Move the mainshaft into the other side of the transmission case and lightly tap into place until the bearing case flange seats against the transmission case.

10. Install the countershaft as described in this section.

11. Install the retaining plate (**Figure 52**). Tighten the screws to 84-108 in.-lb. (9.5-12.2 N•m).

12. On late 1984-on models, install the bearing race onto the end of the mainshaft with the Mainshaft Bearing Race Tool (JIMS part No. 34902-84) (**Figure 43**) as follows:

a. Apply transmission oil to the transmission shaft and to the inner surface of the bearing race.

b. Position the bearing race with the chamfered edge side going on first and slide it onto the transmission shaft.

NOTE
The extension shaft has left-hand threads. Turn the shaft ***counterclockwise*** *to install it.*

c. Thread the extension shaft onto the transmission shaft and tighten securely.
d. Install the pusher tube over the extension shaft. Then install the flat washer and large nut onto the extension shaft. Slowly tighten the nut until the washer is against the pusher tube.
e. Place a wrench on the end of the flat portion of the extension to keep it from turning.
f. Tighten the large nut and press the bearing race onto the mainshaft. Install the bearing race until the inside edge is 0.200 in. (5.08 mm) from the main drive gear. Before measuring the bearing race-to-main drive gear clearance, pull the main drive gear toward the end of the mainshaft.
g. Remove the installation tool.

Mainshaft Inspection

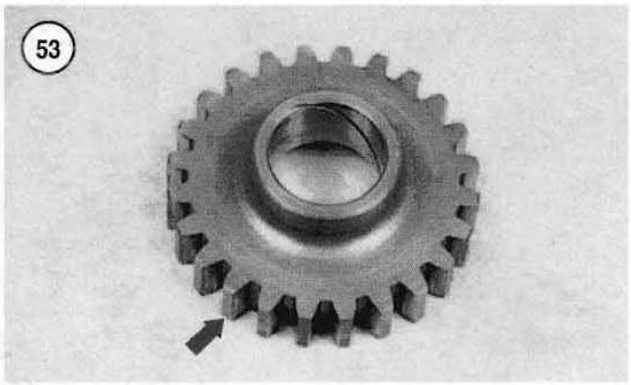
1. Inspect each gear for excessive wear, burrs, pitting or chipped or missing teeth (**Figure 53**).
2. Inspect the shift clutch (**Figure 54**) for rounded edges or severe wear. Also check the inner splines for excessive wear or damage.
3. Slide the gears onto the shaft in the original positions. The gears should slide back and forth without any binding or excessive play.
4. Replace the worn or damaged spline washer.

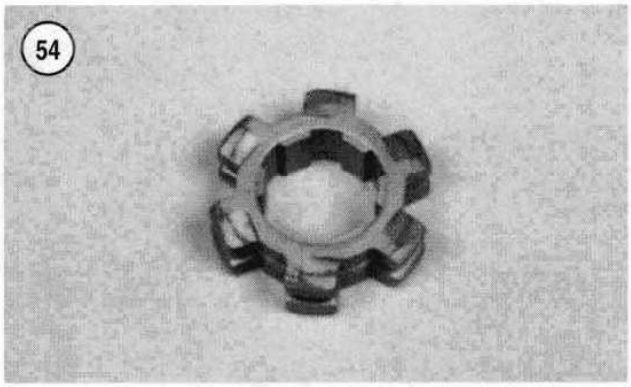
MAIN DRIVE GEAR

Removal/Inspection/Installation

Refer to **Figure 42**.

1. Remove the countershaft and mainshaft as described in this chapter.
2. Push the main drive gear (**Figure 55**) into the transmission case. Then remove it through the shift cover opening.
3. Examine the main drive gear for worn or chipped teeth, pitting, scoring or other damage. Replace if necessary. If the gear is damaged, also check the mating gear on the countershaft for wear or damage.
4. Examine gear splines for wear or rounded edges.

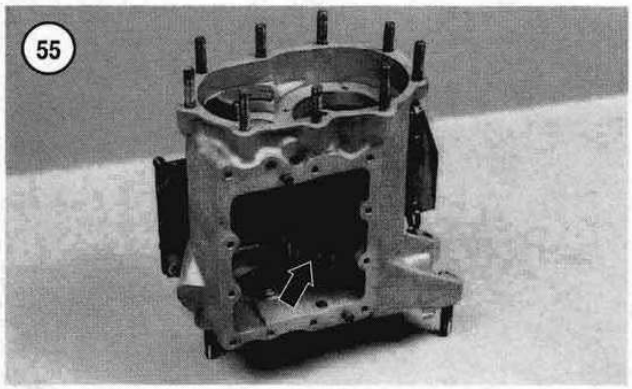


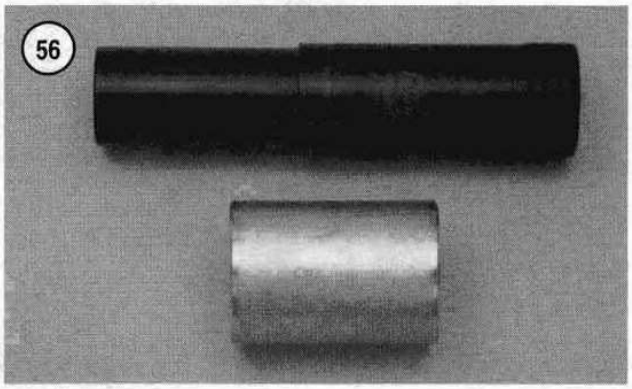


5. Examine the needle bearing within the transmission case for wear or damage. Replace if necessary as described in this section.
6. Install the main drive gear onto the end of the countershaft and check for excessive gear bushing-to-shaft clearance. Refer to **Table 1**. If the clearance is excessive, replace the bushing as described in this section.
7. Install by reversing these removal steps while noting the following:
   a. Wrap the main drive gear threads with clear tape to protect the O-ring during installation.
   b. Apply clean transmission oil to the O-ring. Then slide the O-ring over the main drive gear.
   c. Slide the O-ring onto the shaft until it seats in the shaft O-ring groove. Make sure it is correctly seated in the groove.
   d. Remove the tape from the threads.

Bushing Replacement

1. Remove the oil seal from the small end of the main drive gear.
2. Place the main drive gear on the press bed with the gear side facing down.





3. Install the Main Gear Bushing Tool (JIMS part No. 1005) (**Figure 56**) as follows:
   a. Insert the sleeve into the main drive gear.
   b. Insert the driver into the sleeve and rest it on the bushing.
   c. Carefully press the bushing out of the drive gear.
   d. Remove the special tools.
4. Clean out the bushing bore with solvent and dry with compressed air.
5. Check the bushing bore for burrs and remove if necessary.
6. Apply clean transmission oil to the bushing bore and to the exterior of the bushing.
7. Position the bushing with the tightly spaced grooved end going in last.
8. Position the bushing squarely over the drive gear and position the installer tool onto the bushing.
9. Slowly press the bushing squarely into drive gear until the tool bottoms on the drive gear. The bushing is now installed at the correct depth.
10. Remove tool and the drive gear from the press bed.

CAUTION

Improper bushing-to-shaft clearance can cause bushing and mainshaft failure from improper lubrication.

11. Install the main drive gear onto the end of the countershaft and check for the new gear bushing-to-shaft clearance. Refer to Table 1. If the clearance is excessive, hone the bushing to achieve the correct clearance.
12. Install a *new* seal into the small end of the main drive gear.

TRANSMISSION CASE

Removal/Installation

1. Drain the transmission oil as described in Chapter Three.
2. Remove the battery as described in Chapter Three.
3. Remove the bolts, washers and nuts securing the battery carrier and remove the carrier.
4. Remove the oil tank as described in Chapter Four.
5. Remove the passenger grab strap and the seat.
6. Remove the master cylinder reservoir mount bracket at the transmission end cover.
7. Remove the starter as described in Chapter Nine.
8. Remove the primary case as described in Chapter Five.
9. Disconnect the shift rod end from the shift lever (FXEF and FXSB models) or from the shift linkage (FXWG models).
10. Disconnect the clutch cable from the release lever.
11. Disconnect the wiring at the solenoid.
12. Disconnect the speedometer drive cable and case at the transmission (if so equipped).
13. Disconnect the neutral indicator switch wire at the transmission.

14A. On chain-driven models, disconnect the drive chain master link and remove the drive chain from the drive sprocket.

14B. On belt-driven models, loosen the rear axle and the belt adjusters and remove the drive belt from the drive sprocket.

NOTE

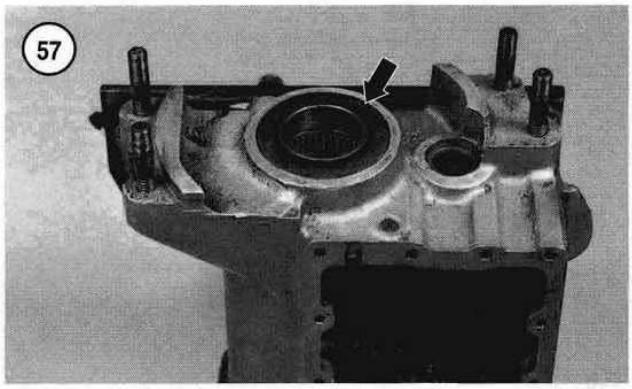
The transmission can be removed with its mounting plate attached.

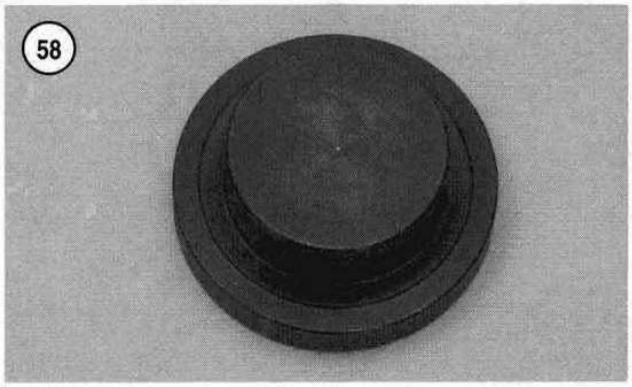
15. Remove the transmission mounting plate-to-frame bolts.
16. Remove the starter relay and wiring.
17. Remove the rear brake line bracket.
18. Remove the transmission-to-frame mounting bolt from underneath the right side.
19. On FXEF and FXSB models, remove the master cylinder alignment plate, if necessary.
20. On FXWG models, remove the rear brake line clip from the transmission end cover.

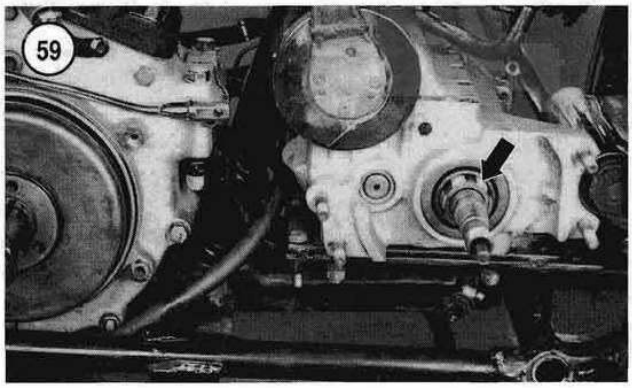
21. Remove the transmission and mounting plate from the left side of the frame.
22. Installation is the reverse of these steps while noting the following:
   a. Install the transmission assembly in the frame and install the mounting hardware. Tighten the mounting plate bolt to 30-33 ft.-lb. (41-45 N•m).
   b. Tighten the transmission-to-mounting plate bolts to 21-27 ft.-lb. (28-37 N•m).
   c. Tighten the right transmission-to-frame mounting bolt to 21-27 ft.-lb. (28-37 N•m).
   d. Refill the transmission with the correct type and quantity of oil as described in Chapter Three.
   e. Adjust the primary chain as described in Chapter Three.
   f. Check primary chain alignment as described in Chapter Five.
   g. When reconnecting the drive chain with its master link, make sure the closed end of the master link clip faces toward normal chain travel.
   h. Adjust the rear drive chain or drive belt as described in Chapter Three.
   i. Adjust the clutch as described in Chapter Three.

Transmission Case Needle Bearing and Oil Seal Replacement

1. Check the needle bearing in the transmission case for wear or roughness. If worn or damaged, replace it as follows.
2. Use a flat-tip screwdriver and carefully pry the main drive gear oil seal (**Figure 57**) out of the transmission case. Place a rag underneath the pry tool to prevent damage to the case.
3. Push the spacer in toward the transmission case and out of the needle bearing. Remove the spacer.
4. Carefully press the needle bearing out of the transmission case.
5. Clean out the needle bearing bore with solvent and dry with compressed air.
6. Check the bearing bore in the transmission case for burrs and remove if necessary.
7. Apply clean transmission oil to the bearing bore and to the exterior of the bearing.
8. Place the transmission case on the press bed. Protect the threaded studs on the opposite side of the case. Do not apply any pressure to the studs in the following steps.
9. Position the needle bearing squarely over the transmission case bearing bore with the manufacturer's mark facing out.
10. Install the bearing installer tool (JIMS part No. 33428-78) (**Figure 58**) onto the bearing.







11. Slowly press the bearing squarely into the transmission case until the installer tool bottoms on the transmission case surface. The bearing is now installed at the correct depth.
12. Remove the tool and the transmission case from the press bed.
13. Rotate the bearing to make sure it is installed correctly. It must rotate smoothly with no binding.
14. Position the spacer with the flange side going in last and install the spacer into the inner surface of the transmission case. Push it in until it bottoms.