

CHAPTER SIX

TRANSMISSION AND GEARSHIFT MECHANISMS

This chapter provides complete service procedures for the transmission shaft assemblies and the external and the internal shift mechanism.

Table 1 is located at the end of this chapter.

EXTERNAL GEARSHIFT MECHANISM

The external gearshift mechanism is located on the same side of the crankcase as the clutch assembly. To remove the internal shift mechanism (shift drum and shift forks), it is necessary to remove the engine and split the crankcase as described in Chapter Four.

The gearshift lever is subject to a lot of abuse. If the bike has been in a hard spill, the gearshift lever may have been hit and the gearshift shaft bent. It is very hard to straighten the shaft without subjecting the crankcase halves to abnormal stress where the shaft enters the crankcase. If the shaft is bent enough

to prevent it from being withdrawn from the crankcase, there is little recourse but to cut the shaft off with a hacksaw very close to the crankcase. It is much cheaper in the long run to replace the shaft than risk damaging a very expensive crankcase assembly.

Removal

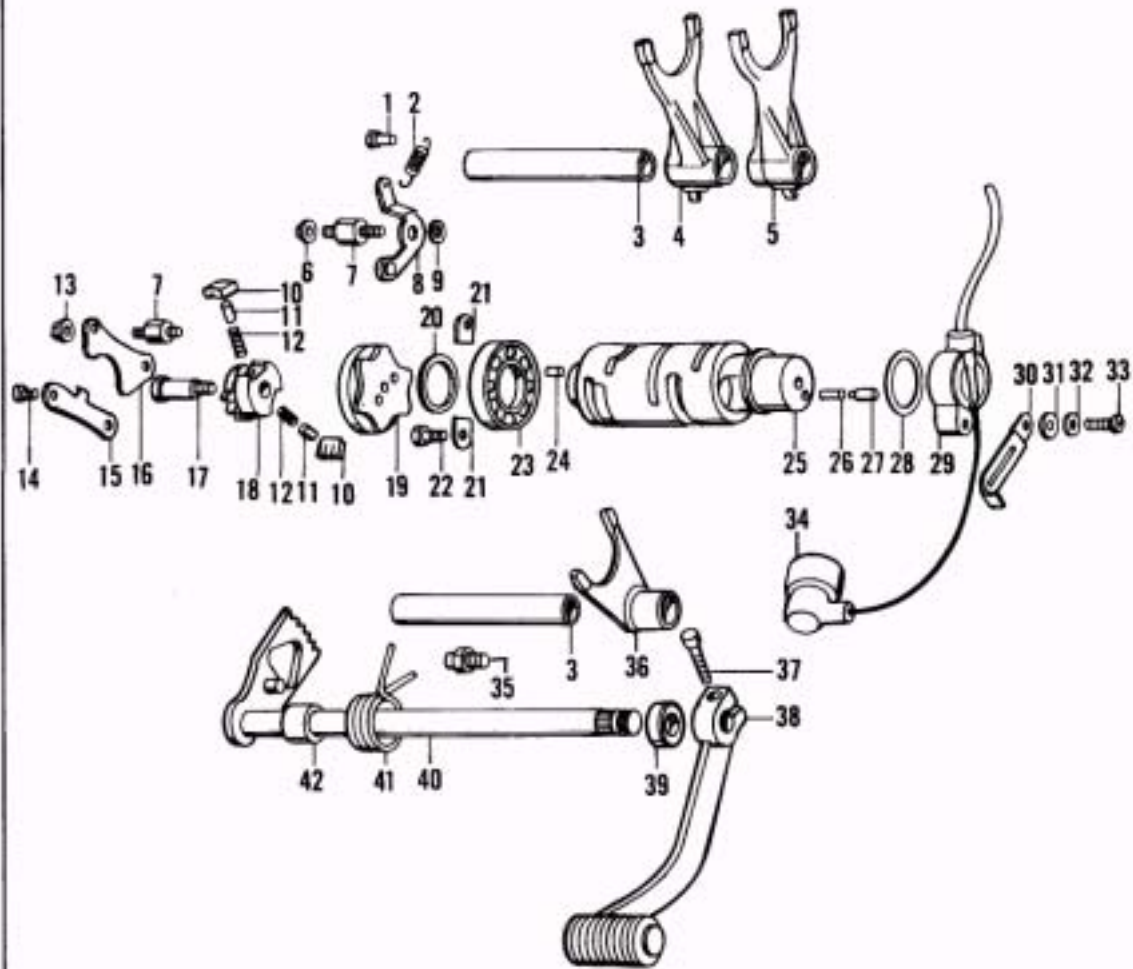
This procedure is shown with the engine removed and partially disassembled for clarity. It is not necessary to remove the engine from the frame for this procedure.

Refer to **Figure 1** for this procedure.

1. Remove the bolt (**Figure 2**) securing the shift lever and remove the lever (**Figure 3**) from the shift shaft.
2. Remove the clutch assembly as described under *Clutch Removal/Installation* in Chapter Five.

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EXTERNAL AND INTERNAL SHIFT MECHANISM



- 16. Pawl retainer
- 17. Bolt
- 18. Cam driven gear
- 19. Stopper plate
- 20. Washer
- 21. Bearing retainer
- 22. Bolt
- 23. Bearing
- 24. Pin
- 25. Shift drum
- 26. Spring
- 27. Pin
- 28. O-ring
- 29. Neutral indicator switch

- 10. Hook
- 11. Spring
- 12. Shift fork shaft
- 13. Shift fork (right-hand)
- 14. Shift fork (left-hand)
- 15. Cam guide
- 16. Threaded boss
- 7. Cam stopper
- 9. Washer

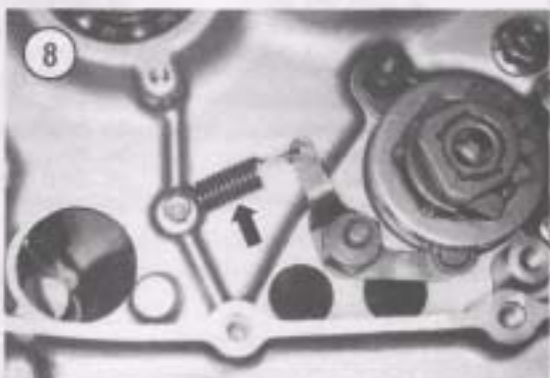
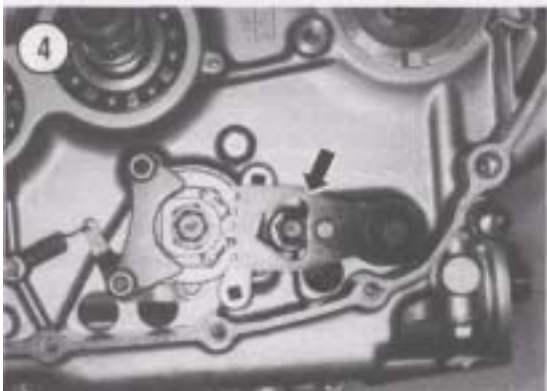
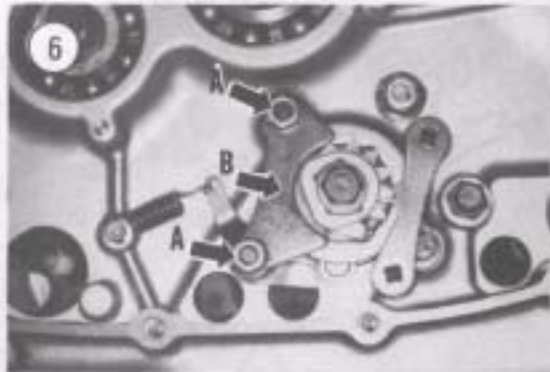
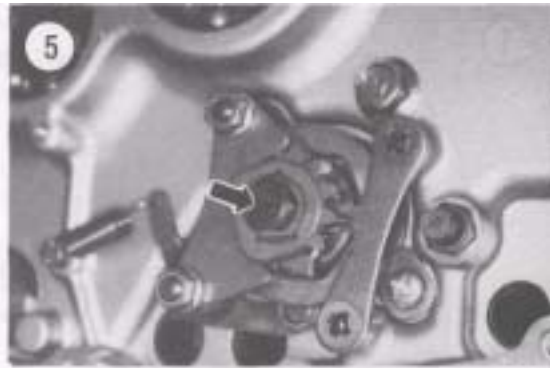
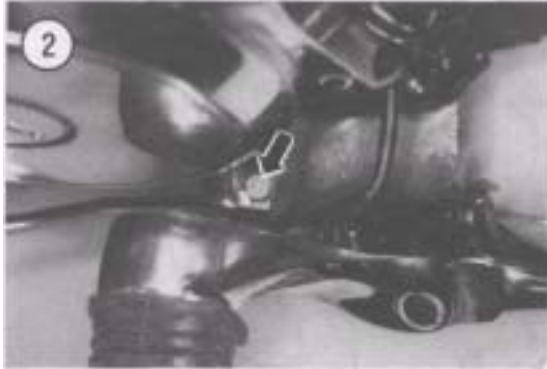
- 30. Wire harness strap
- 31. Washer
- 32. Lockwasher
- 33. Screw
- 34. Oil pressure switch electrical connector and cap
- 35. Threaded stud
- 36. Center shift fork
- 37. Bolt
- 38. Shift lever
- 39. Oil seal
- 40. Shift shaft
- 41. Return spring
- 42. Spacer

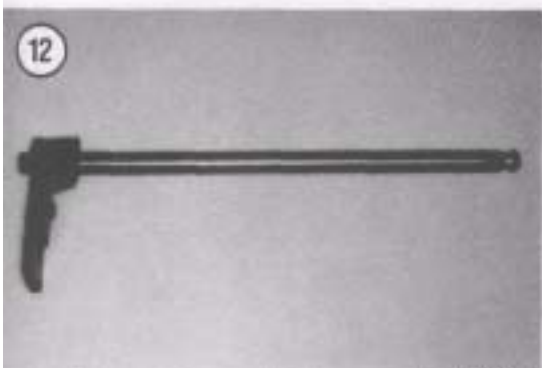
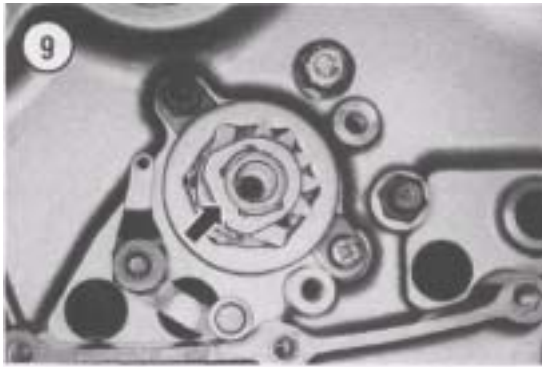
3. Withdraw the gearshift shaft (**Figure 4**) from the crankcase. See information regarding a *bent gear shift shaft* in the introductory paragraph of this procedure.

4. Remove the bolt (**Figure 5**) securing the cam gear assembly.

5. Remove the nuts (A, **Figure 6**) securing the pawl retainer (B, **Figure 6**) and remove the pawl retainer.

6. Remove the screws securing the cam guide (**Figure 7**) and remove the cam guide.





7. Unhook the spring (**Figure 8**) from the stopper arm.

8. Remove the cam gear assembly (**Figure 9**) from the end of the shift drum. Don't lose the pawls, springs and pins in the assembly. Store these small parts in a reclosable plastic bag to avoid misplacing any small parts.

9. Remove the washer (**Figure 10**) from the end of the shift drum.

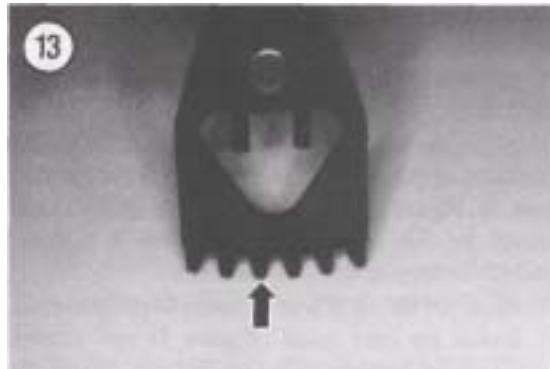
Inspection

1. Inspect the return spring (**Figure 11**) on the gear shift shaft assembly. If broken or weak it must be replaced.

2. Inspect the gearshift shaft assembly (**Figure 12**) for bending, wear or other damage; replace if necessary.

3. Inspect the gear teeth (**Figure 13**) on the gearshift shaft assembly. If broken or damaged the gearshift shaft must be replaced.

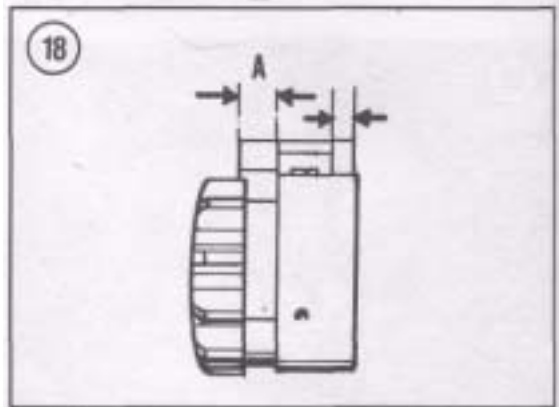
4. Disassemble the cam gear assembly (**Figure 14**) and inspect the pawls, springs and pins for wear or damage. Replace any worn or damaged parts.

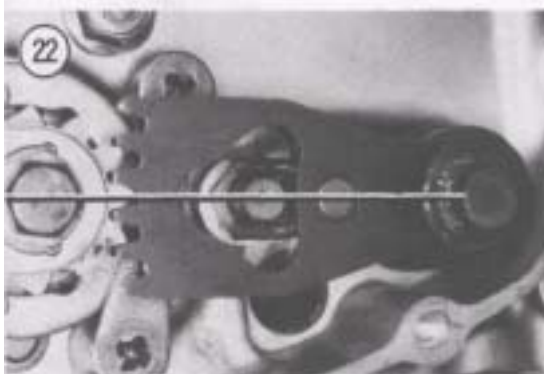
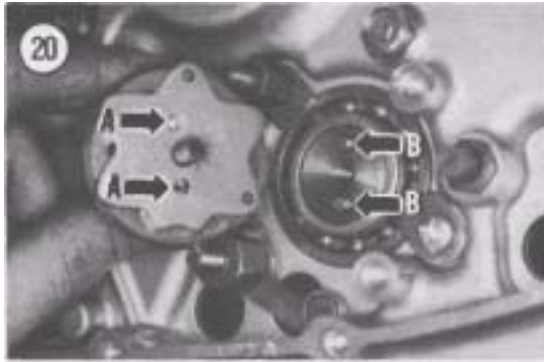


5. Inspect the ramps (**Figure 15**) on the backside of the stopper plate for wear or damage. Replace the stopper plate if necessary.
6. Inspect the cam driven gear receptacle (**Figure 16**) in the stopper plate for wear or damage. Replace the stopper plate if necessary.
7. Inspect the gear teeth (**Figure 17**) on the cam drive gear. If broken or damaged the cam drive gear must be replaced.
8. Assemble the cam gear assembly as follows:
 - a. Install the springs into the cam gear body.
 - b. Position the pawl pins with the rounded end facing out and install them onto the springs.
 - c. Install the pawls onto the pins and into the cam gear body.
 - d. The pin grooves in the pawls are offset. When the pawls are installed correctly the wider shoulder (A, **Figure 18**) must face toward the outside.
 - e. Hold the pawls in place and place the assembly into an aerosol spray paint can top.

Installation

1. Compress the spring-loaded shift pawls with your fingers. Install the cam gear assembly into the receptacle of the cam driven gear (**Figure 19**).
2. Install the washer (**Figure 10**) into the end of the shift drum.
3. Align the locating holes (A, **Figure 20**) on the backside of the cam gear assembly with the locating pins (B, **Figure 20**) on the end of the shift drum and install the cam gear assembly (**Figure 9**) onto the end of the shift drum.
4. Hook the spring (**Figure 8**) onto the stopper arm.
5. Install the cam guide (**Figure 7**) and screws. Apply a small amount of red Loctite (No. 271) to the





screw threads prior to installation. Tighten the screws securely.

6. Install the pawl retainer (B, **Figure 6**) and the nuts (A, **Figure 6**). Apply a small amount of red Loctite (No. 271) to the threaded studs prior to installing the nuts. Tighten the nuts securely.

7. Install the bolt (**Figure 5**) securing the cam gear assembly. Apply a small amount of red Loctite (No. 271) to the bolt threads prior to installing the bolt. Tighten the bolt securely.

8. Apply clean engine oil to the gearshift shaft and install the gearshift shaft (**Figure 21**) into the crankcase. Align the center of the cam gear with the center of the gearshift shaft gear (**Figure 22**), then push the shaft assembly all the way in (**Figure 4**).

9. Install the clutch assembly as described in Chapter Five.

10. Align the split on the gearshift lever joint with the alignment mark on the gearshift lever and install the lever (**Figure 3**) onto the gearshift shaft. Tighten the clamping bolt securely (**Figure 2**).

TRANSMISSION

To gain access to the transmission and internal shift mechanism it is necessary to remove the engine and split the crankcase as described in Chapter Four.

Refer to **Table 1** at the end of the chapter for transmission and gearshift mechanism specifications.

Removal/Installation

1. Remove the engine and split the crankcase as described under *Crankcase Disassembly* in Chapter Four.
2. Remove the reduction gear (**Figure 23**) and bushing from the secondary bevel drive gear assembly.

NOTE

If you are unable to remove the mainshaft assembly from the crankcase, make sure the bolt and washer was removed from the right-hand end of the mainshaft during crankcase disassembly.

3. Remove the countershaft assembly (A, **Figure 24**) and main shaft assembly (B, **Figure 24**) from the left crankcase.
4. Inspect the transmission shaft assemblies as described under *Preliminary Inspection* in this chapter.

NOTE

Prior to installation, coat all bearing surfaces with assembly oil.

5. Install the countershaft assembly (**Figure 25**). Push the countershaft in until it bottoms completely.
6. Apply a light coat of multipurpose grease to the backside of the washer to help hold it in place.
7. Hold onto the washer (**Figure 26**) next to the 2nd gear and install the mainshaft assembly (B, **Figure 24**). Properly mesh the gears with the countershaft gears and push it in until it bottoms out completely.
8. Install the reduction gear (**Figure 23**) and bushing onto the secondary bevel drive gear assembly.
9. After both transmission assemblies are installed, perform the following:
 - a. Shift both shafts into NEUTRAL. Hold onto the mainshaft and rotate the countershaft. The countershaft should rotate freely. If it does not, shift the gear that is engaged so that both shafts are in NEUTRAL.
 - b. Rotate both shaft assemblies by hand. Make sure there is no binding. This is the time to find that something may be installed incorrectly—not after the crankcase is completely assembled.
10. Reassemble the crankcase as described under *Crankcase Assembly* and install the engine as described in Chapter Four.

Preliminary Inspection

After the transmission shaft assemblies have been removed from the crankcase, clean and inspect the assemblies prior to disassembling them. Place the assembled shaft into a large can or plastic bucket and thoroughly clean with a petroleum based solvent such as kerosene and a stiff brush. Dry with compressed air or let it sit on rags to drip dry. Repeat for the other shaft assembly.

1. After they have been cleaned, visually inspect the components of the assemblies for excessive wear. Any burrs, pitting or roughness on the teeth of a gear will cause wear on the mating gear. Minor roughness can be cleaned up with an oil-stone but there's little point in attempting to remove deep scars.

NOTE

Defective gears should be replaced. It is a good idea to replace the mating gear

on the other shaft even though it may not show as much wear or damage.

2. Carefully check the engagement dogs. If any is chipped, worn, rounded or missing, the affected gear must be replaced.
3. Rotate the transmission bearings (**Figure 27**) in both crankcase halves by hand. Check for roughness, noise and radial play. Any bearing that is suspect should be replaced as described in this chapter.



4. If the transmission shafts are satisfactory and are not going to be disassembled, apply assembly oil or engine oil to all components and reinstall them in the crankcase as described in this chapter.

NOTE

If disassembling a used, well run-in (high milage) transmission for the first time by yourself, pay particular attention to any additional shims that may have been added by a previous owner. These may have been added to take up

the tolerance of worn components and must be reinstalled in the same position since the shims have developed a wear pattern. If new parts are going to be installed these shims may be eliminated. This is something you will have to determine upon reassembly.

Transmission

Service Notes

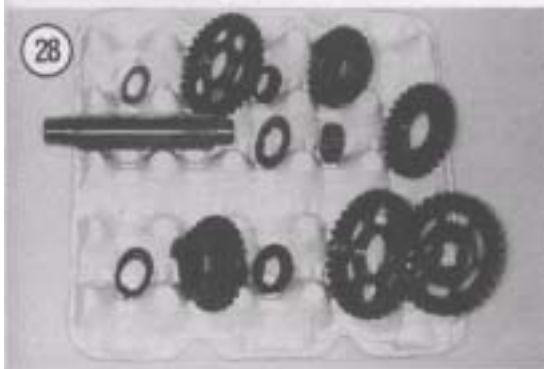
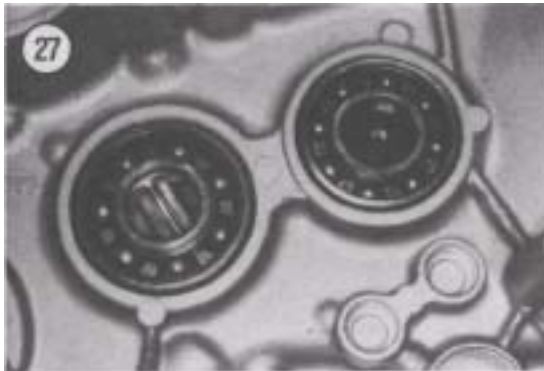
1. A divided container, such as a restaurant type egg carton can be used to help maintain correct alignment and positioning of the parts. As you remove a part from the shaft set it in one of the depressions in the same position from which it was removed. Refer to **Figure 28** for the mainshaft and **Figure 29** for the countershaft. This is an easy way to remember the correct relationship of all parts.
2. The circlips are a tight fit on the transmission shafts. It is recommended that all circlips be replaced during reassembly.
3. Circlips will turn and fold over making removal and installation difficult. To ease replacement, open the circlips with a pair of circlip pliers while at the same time holding the back of the circlip with a pair of pliers and remove them. Repeat for installation.

Mainshaft

Disassembly/Inspection

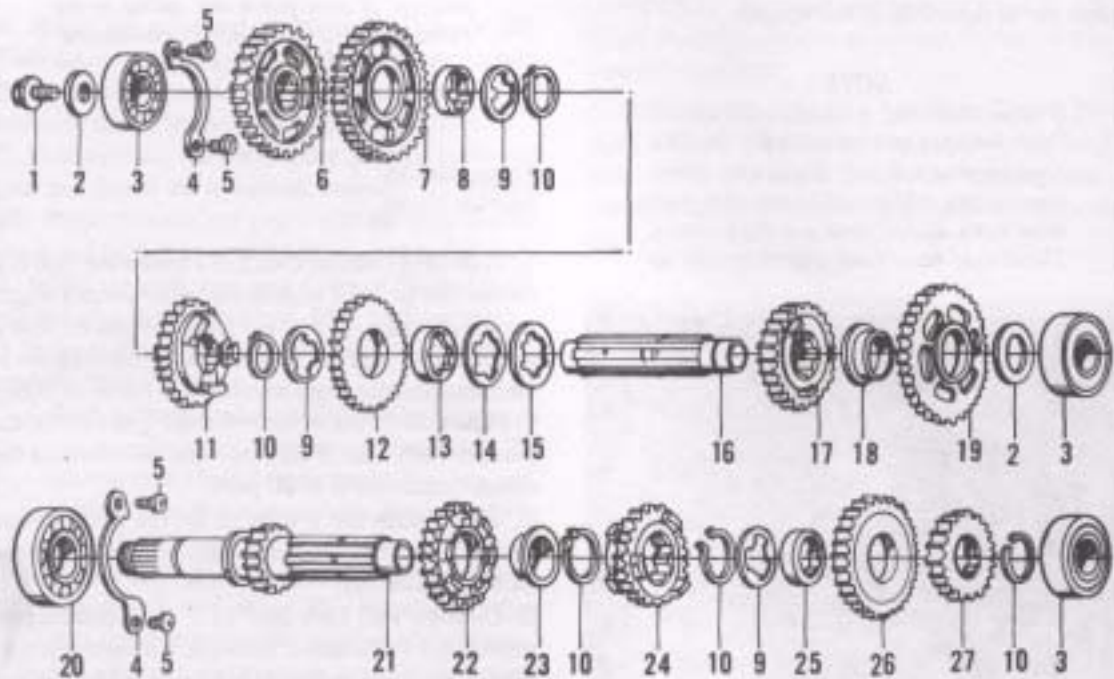
Refer to **Figure 30** for this procedure.

1. If not cleaned in the *Preliminary Inspection* sequence, place the assembled shaft into a large can or plastic bucket and thoroughly clean with solvent and a stiff brush. Dry with compressed air or let it sit on rags to dry.
2. Slide off the reduction gear.
3. Slide off the 1st gear and 1st gear bushing.
4. Slide off the splined washer and remove the circlip.
5. Slide off the 4th gear.
6. Remove the circlip and slide off the splined washer.
7. Slide off the 3rd gear and 3rd gear bushing.
8. From the other end of the shaft, remove the washer.
9. Slide off the 2nd gear and 2nd gear bushing.
10. Slide off the 5th gear.



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TRANSMISSION ASSEMBLY



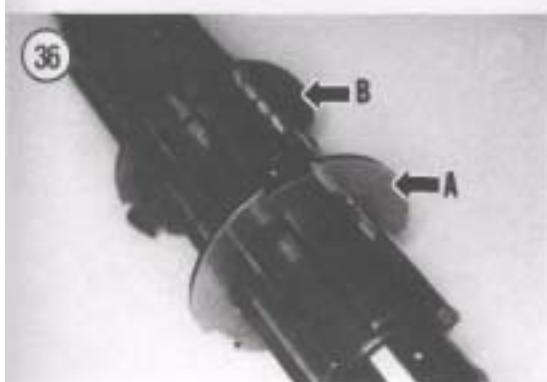
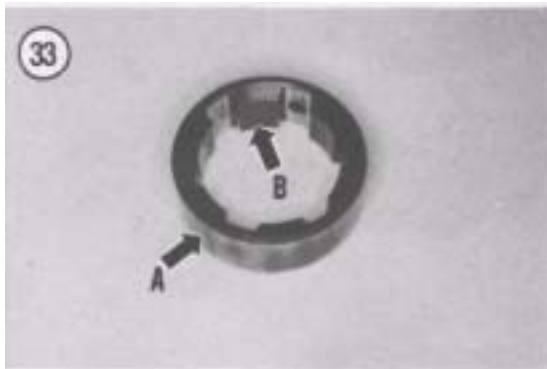
- | | | |
|-------------------------------|--------------------------------|-----------------------------------|
| 1. Bolt | 11. Mainshaft 4th gear | 20. Bearing |
| 2. Washer | 12. Mainshaft 3rd gear | 21. Countershaft/1st gear |
| 3. Bearing | 13. Mainshaft 3rd gear bushing | 22. Countershaft 4th gear |
| 4. Bearing retainer | 14. Splined washer | 23. Countershaft 4th gear bushing |
| 5. Bolt | 15. Splined lockwasher | 24. Countershaft 3rd gear |
| 6. Reduction gear | 16. Mainshaft | 25. Countershaft 5th gear bushing |
| 7. Mainshaft 1st gear | 17. Mainshaft 5th gear | 26. Countershaft 5th gear |
| 8. Mainshaft 1st gear bushing | 18. Mainshaft 2nd gear bushing | 27. Countershaft 2nd gear |
| 9. Splined washer | 19. Mainshaft 2nd gear | |
| 10. Circlip | | |

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11. Slide off the splined lockwasher.
12. Rotate the splined washer in either direction to disengage the tangs from the grooves on the transmission shaft. Slide off the splined washer.
13. Check each gear for excessive wear, burrs, pitting, or chipped or missing teeth (**Figure 31**). Make sure the lugs (**Figure 32**) on the gears are in good condition.
14. Check each gear bushing (A, **Figure 33**) for excessive wear, pitting or damage. Replace if necessary.
15. Check each gear bushing inner splines (B, **Figure 33**) for excessive wear or damage. Replace if necessary.
16. On gears with bushings, inspect the inner surface of the gear (**Figure 34**) where the bushing rides for wear, pitting or damage.
17. Inspect the splined lockwasher and splined washer for wear, cracks or damage. Replace if necessary.
18. Inspect the circlips and splined washers for bending wear or damage. Replace if necessary.
19. Inspect the shift fork-to-gear clearance as described under *Internal Gearshift Mechanism* in this chapter.

NOTE

Defective gears should be replaced. It is a good idea to replace the mating gear on the countershaft even though it may not show as much wear or damage.

20. Make sure that all gears and bushings slide smoothly on the mainshaft splines.

NOTE

It is recommended that all circlips be replaced every time the transmission is disassembled to ensure proper gear alignment. Do not expand a circlip more than necessary to slide it over the shaft.

21. Inspect the splines and circlip grooves (**Figure 35**) of the mainshaft. If any are damaged, the shaft must be replaced.

Mainshaft Assembly

1. Apply a light coat of clean engine oil to all sliding surfaces prior to installing any parts.
2. Slide on the splined washer (A, **Figure 36**). Rotate the splined washer in either direction to engage

the tangs into the transmission shaft first groove on the end of the transmission shaft with the stepped end.

3. Slide on the splined lockwasher (B, **Figure 36**).

Push it on until the tangs go into the open areas of the splined washer and lock the washer into place (**Figure 37**). Make sure the splined washer and splined lockwasher are installed in the correct shaft groove as shown in **Figure 38**.

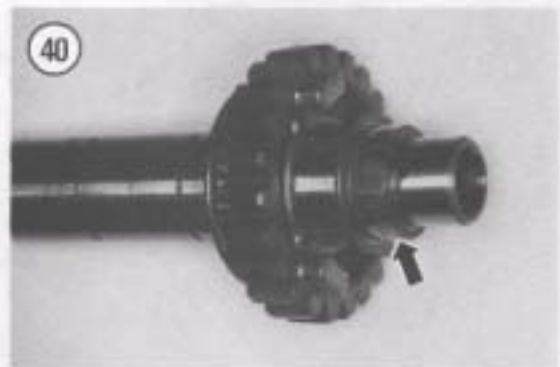
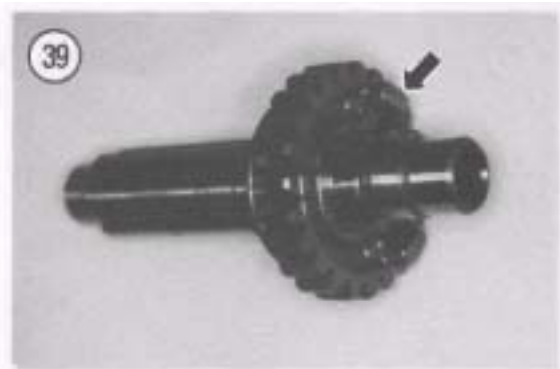
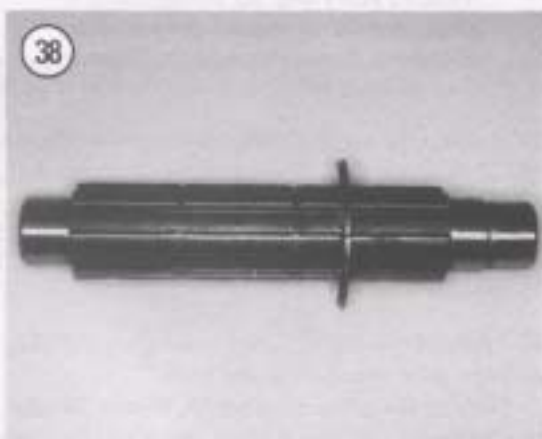
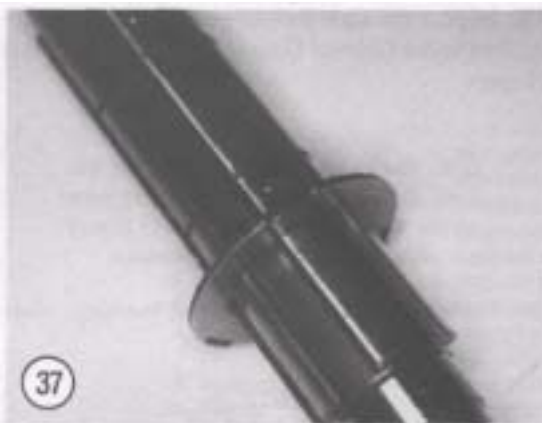
4. Position the 5th gear with the shift fork groove going on first and install the 5th gear (**Figure 39**).

5. Position the 2nd gear bushing with the shoulder side going on first and slide on the bushing (**Figure 40**).

6. Position the 2nd gear with the shoulder side (**Figure 41**) going on first and slide on the 2nd gear (**Figure 42**).

7. Apply a light coat of multipurpose grease to the backside of the washer to hold it in place. Install the washer (**Figure 43**).

8. Turn the mainshaft around.





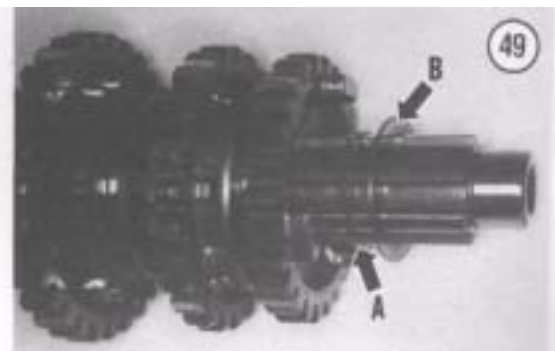
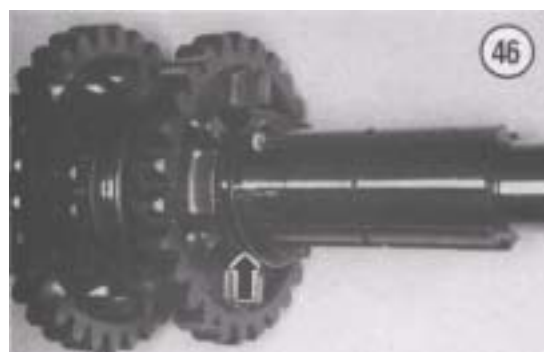
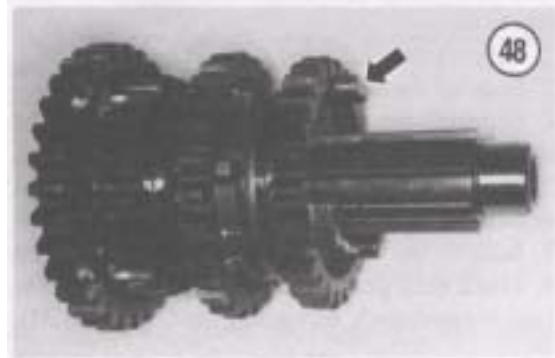
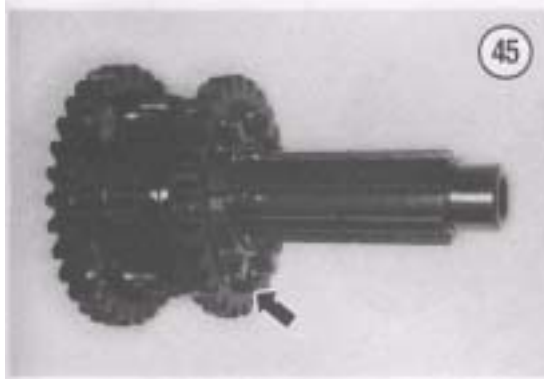
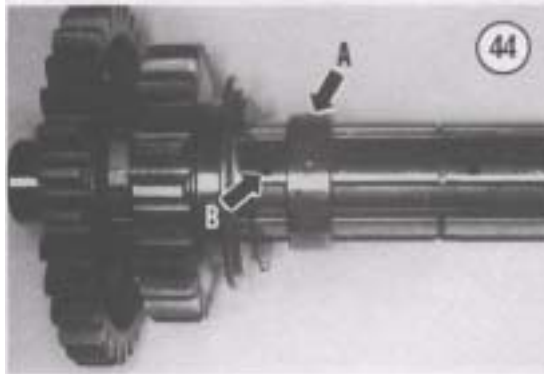
9. Align the oil hole in the 3rd gear bushing (A, **Figure 44**) with the transmission shaft oil hole (B, **Figure 44**) and slide on the bushing. This alignment is necessary for proper gear lubrication.

10. Slide on the 3rd gear (**Figure 45**).

11. Slide on the splined washer and install the circlip (**Figure 46**). Make sure the circlip is seated correctly in the mainshaft groove (**Figure 47**).

12. Position the 4th gear with the shift fork groove going on first and install the 4th gear (**Figure 48**).

13. Install the circlip (A, **Figure 49**) and slide on the splined washer (B, **Figure 49**).



14. Align the oil hole in the 1st gear bushing (A, **Figure 50**) with the transmission shaft oil hole (B, **Figure 50**) and slide on the bushing. This alignment is necessary for proper gear lubrication.

15. Position the 1st gear with the shoulder side (**Figure 51**) going on first and slide on the 1st gear (**Figure 52**).

16. Position the reduction gear with the wide shoulder side (**Figure 53**) going on first and slide on the 1st gear (**Figure 54**). If installed correctly, the splined portion of the reduction gear should be flush with the end of the mainshaft splines (**Figure 55**).

17. Refer to **Figure 56** for correct placement of all gears. Make sure all circlips are correctly seated in the mainshaft grooves.

18. Make sure each gear engages the adjoining gear properly, where applicable.

Countershaft

Disassembly/Inspection

Refer to **Figure 30** for this procedure.

1. If not cleaned in the *Preliminary Inspection* sequence, place the assembled shaft into a large can or plastic bucket and thoroughly clean with solvent and a stiff brush. Dry with compressed air or let it sit on rags to dry.

2. Remove the circlip and slide off the 2nd gear.

3. Slide off the 5th gear and the 5th gear bushing.

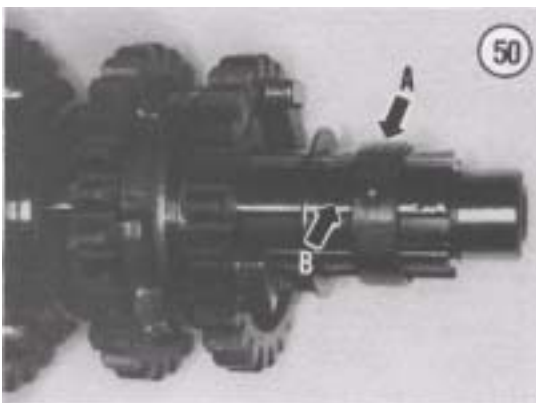
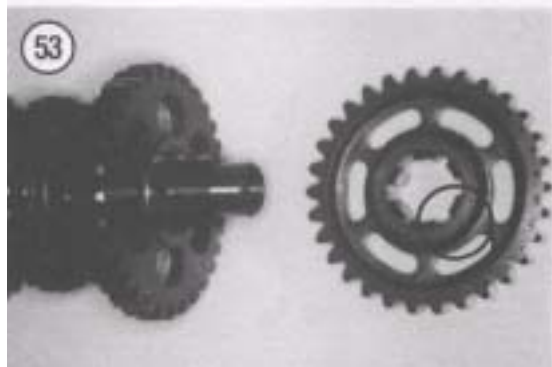
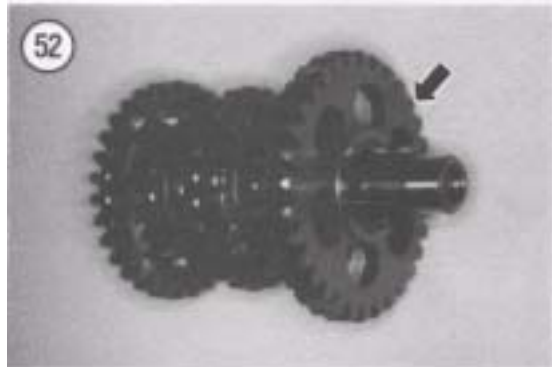
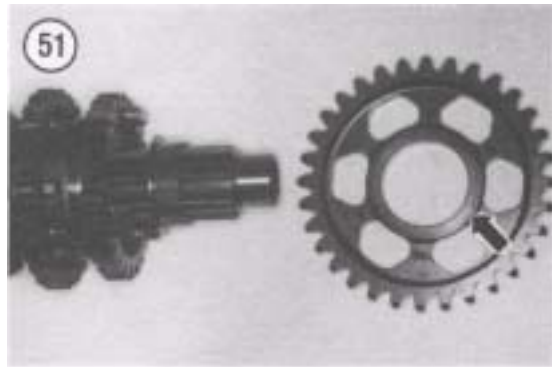
4. Slide off the splined washer and remove the circlip.

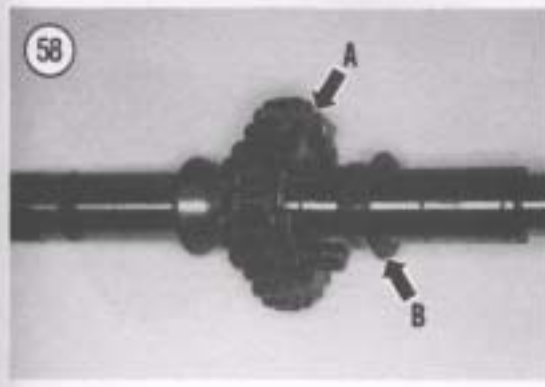
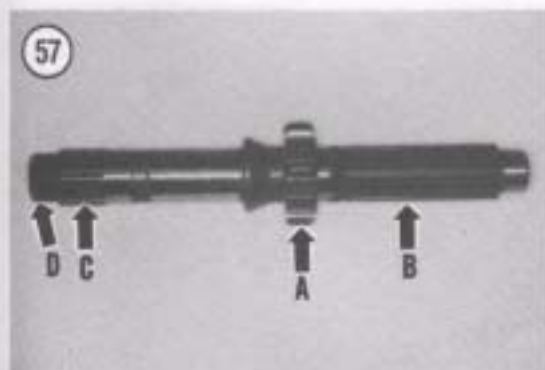
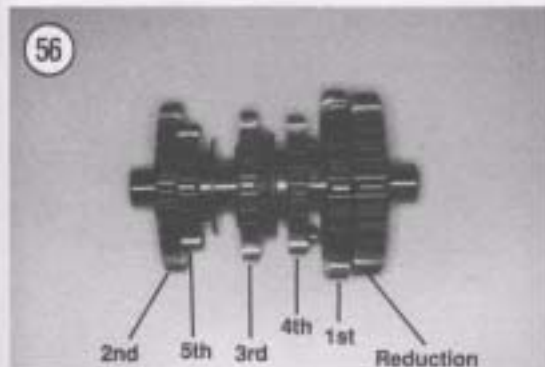
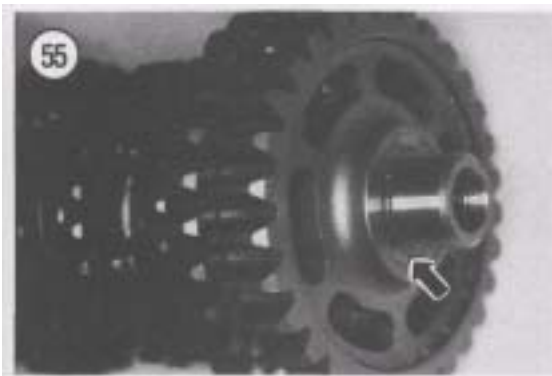
5. Slide off the 3rd gear.

6. Remove the circlip.

7. Slide off the 4th gear and 4th gear bushing.

8. Check each gear for excessive wear, burrs, pitting, chipped teeth or missing teeth (**Figure 31**).





Make sure the lugs (**Figure 32**) on the gears are in good condition.

9. Check each gear bushing (A, **Figure 33**) for excessive wear, pitting or damage.

10. Inspect the inner splines of the bushing (B, **Figure 33**) for wear or damage. Replace if necessary.

11. On gears with bushings, inspect the inner surface of the gear (**Figure 34**) where the bushing rides for wear, pitting or damage.

12. Inspect the circlips and splined washers for bending wear or damage. Replace if necessary.

13. Inspect the splined washer for wear, cracks or damage. Replace if necessary.

14. Inspect the shift fork-to-gear clearance as described under *Internal Gearshift Mechanism* in this chapter.

NOTE

Defective gears should be replaced. It is a good idea to replace the mating gear on the mainshaft even though it may not show as much wear or damage.

NOTE

*The 1st gear (A, **Figure 57**) is part of the countershaft. If the gear is defective, the countershaft must be replaced.*

15. Make sure that all gears slide smoothly on the countershaft splines.

NOTE

It is recommended that all circlips be replaced every time the transmission is disassembled to ensure proper gear alignment. Do not expand a circlip more than necessary to slide it over the shaft.

16. Inspect the splines (B, **Figure 57**) and circlip grooves of the countershaft. If any are damaged, the shaft must be replaced.

17. Inspect the clutch hub splines (C, **Figure 57**) and clutch nut threads (D, **Figure 57**) of the countershaft. If any splines are damaged, the shaft must be replaced. If the threads have burrs or have minor damage, clean with a proper size metric thread die.

Countershaft Assembly

1. Apply a light coat of clean engine oil to all sliding surfaces prior to installing any parts.

2. Slide on the 4th gear (A, **Figure 58**).

3. Position the 4th gear bushing with the flange side going on last. Slide on the 5th gear bushing (B, **Figure 58**) and push it all the way into the 5th gear.

4. Install the circlip (**Figure 59**). Make sure the circlip is correctly seated in the countershaft groove.

5. Position the 3rd gear with the shift dog side going on last and slide the 3rd gear on (**Figure 60**).

6. Install the circlip (A, **Figure 61**) and slide on the splined washer (B, **Figure 61**).

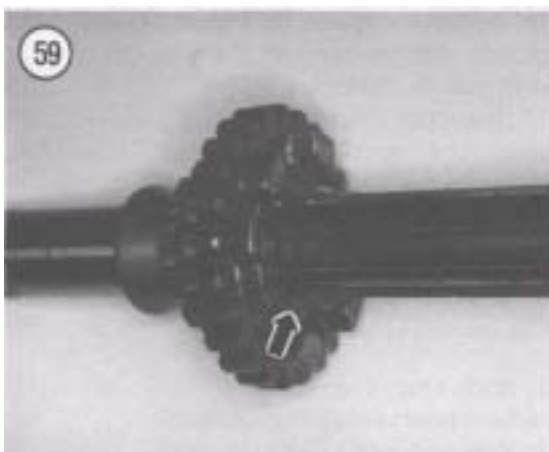
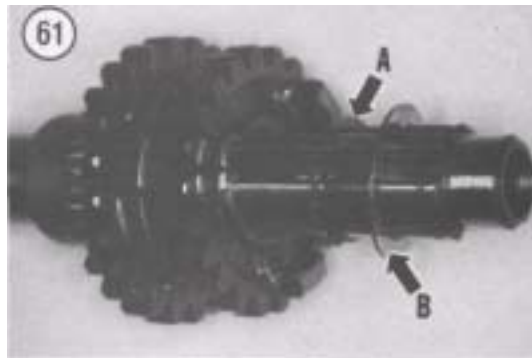
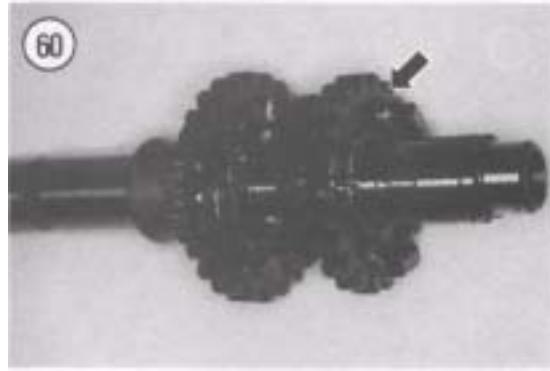
7. Align the oil hole in the 5th gear bushing (A, **Figure 62**) with the transmission shaft oil hole (B, **Figure 62**) and slide on the bushing. This alignment is necessary for proper gear lubrication.

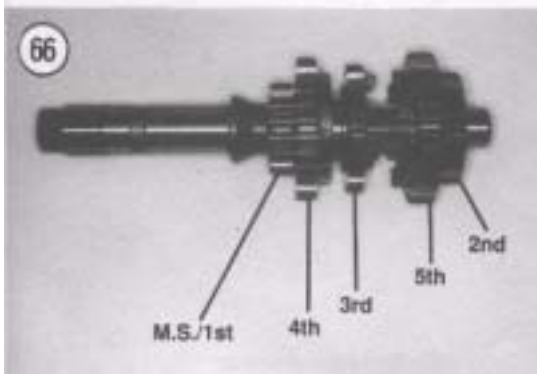
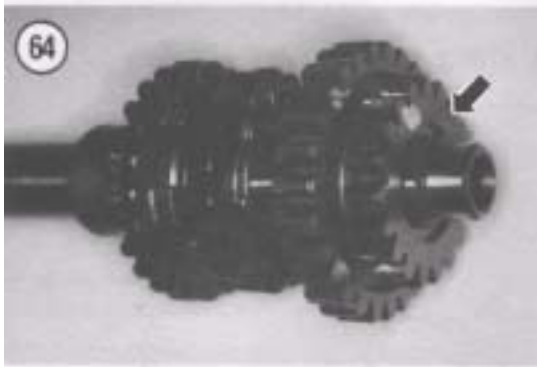
8. Position the 5th gear with the shift dog side going on first and slide the 5th gear on (**Figure 63**).

9. Slide on the 2nd gear (**Figure 64**) and install the circlip. Make sure the circlip (**Figure 65**) is correctly seated in the countershaft groove.

10. Refer to **Figure 66** for correct placement of all gears. Make sure all circlips are correctly seated in the countershaft grooves.

11. After both transmission shafts have been assembled, mesh the 2 assemblies together in the correct position (**Figure 67**). Check that gear engages properly to the adjoining gear properly, where applicable. This is your last check prior to installing the shaft assemblies into the crankcase; make sure they are correctly assembled.





INTERNAL GEARSHIFT MECHANISM

Removal/Disassembly

Refer to **Figure 68** for this procedure.

1. Remove the engine as described under *Crankcase Disassembly* in Chapter Four.

NOTE

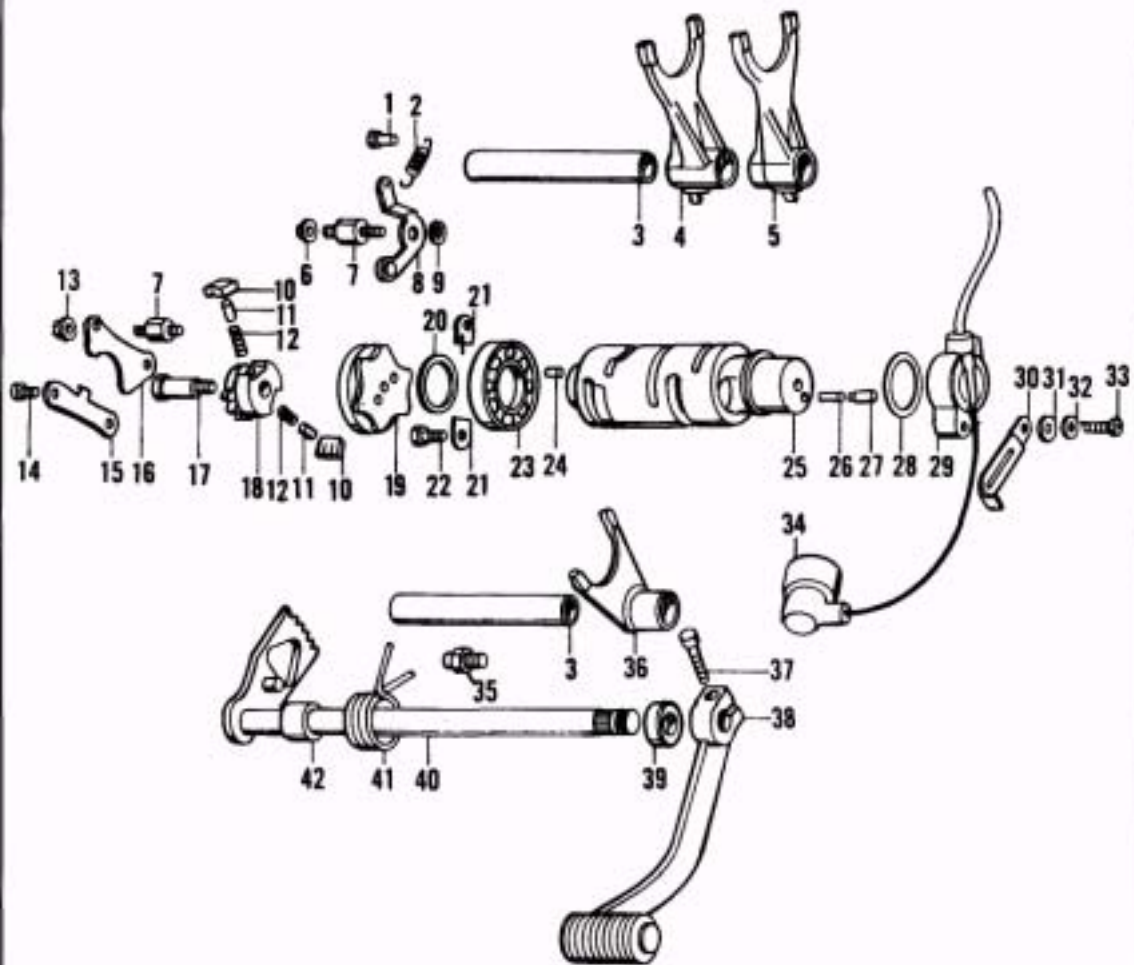
*Note the location of the electrical wire strap (A, **Figure 69**). It must be reinstalled in the same location during installation.*

2. Remove the screws securing the neutral switch (B, **Figure 69**) and remove the neutral switch assembly.
3. Remove the O-ring seal (**Figure 70**) from the receptacle in the crankcase.
4. Remove the switch contact plunger (**Figure 71**) and spring from the end of the gearshift drum.
5. Remove the external gearshift mechanism as described in this chapter.
6. Split the crankcase as described under *Crankcase Disassembly* in Chapter Four.
7. Mark shift forks with a "R," "C" and "L" (right, center and left) so they will be reinstalled in the correct position.
8. Hold onto the shift forks and withdraw both shift fork shafts (**Figure 72**) one at a time.
9. Swing the shift forks away from the shift drum.
10. Remove the shift drum (**Figure 73**).
11. Remove all 3 shift forks (**Figure 74**).
12. Thoroughly clean all parts in solvent and dry with compressed air.

Inspection

1. Inspect each shift fork for signs of wear or cracking. Check for any arc-shaped wear or burned marks on the fingers of the shift forks (**Figure 75**). This indicates that the shift fork has come in contact with the gear. The fork fingers have become excessively worn and the fork must be replaced.
2. Check the bore of each shift fork (A, **Figure 76**) and the shift fork shaft (B, **Figure 76**) for burrs, wear or pitting. Replace any worn parts.
3. Install each shift fork onto the shaft (**Figure 77**) and make sure it moves freely on the shaft with no binding.

EXTERNAL AND INTERNAL SHIFT MECHANISM

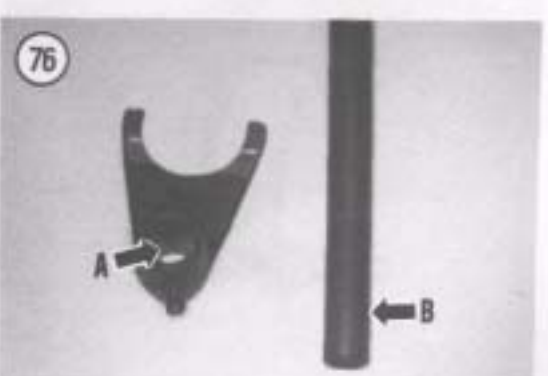
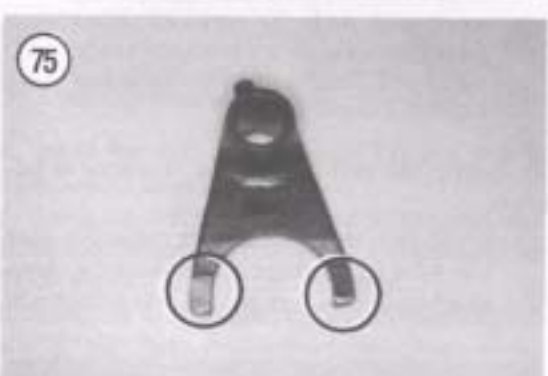
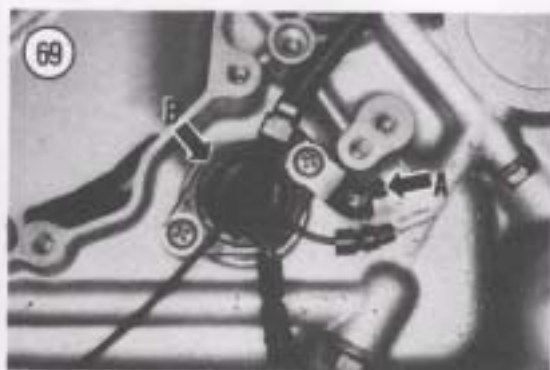


1. Hook
2. Spring
3. Shift fork shaft
4. Shift fork (right-hand)
5. Shift fork (left-hand)
6. Nut
7. Threaded boss
8. Cam stopper
9. Washer

- 10. Pawl
- 11. Pin
- 12. Spring
- 13. Nut
- 14. Bolt
- 15. Cam guide

- 16. Pawl retainer
- 17. Bolt
- 18. Cam driven gear
- 19. Stopper plate
- 20. Washer
- 21. Bearing retainer
- 22. Bolt
- 23. Bearing
- 24. Pin
- 25. Shift drum
- 26. Spring
- 27. Pin
- 28. O-ring
- 29. Neutral indicator switch

- 30. Wire harness strap
- 31. Washer
- 32. Lockwasher
- 33. Screw
- 34. Oil pressure switch electrical connector and cap
- 35. Threaded stud
- 36. Center shift fork
- 37. Bolt
- 38. Shift lever
- 39. Oil seal
- 40. Shift shaft
- 41. Return spring
- 42. Spacer



4. Check the cam follower pins (**Figure 78**) on each shift fork that rides in the shift drum for wear or damage. Replace the shift fork(s) as necessary.
5. Roll the shift fork shaft on a flat surface such as a piece of plate glass and check for any bends. If the shaft is bent, it must be replaced.
6. Check the grooves in the shift drum (**Figure 79**) for wear or roughness. If any of the groove profiles have excessive wear or damage, replace the shift drum.
7. Inspect the cam gear locating pins and threaded hole (**Figure 80**) in the end of the shift drum for wear or damage. Replace the shift drum if necessary.
8. Check the neutral switch contact plunger and spring for wear or damage. If the spring has sagged, replace it.
9. Check the shift drum bearings (**Figure 81**). Make sure they operate smoothly with no signs of wear or damage. If damaged, replace as described under *Crankcase Bearings Removal/Installation* in Chapter Four.

CAUTION

It is recommended that marginally worn shift forks be replaced. Worn forks can cause the transmission to slip out of gear, leading to more serious and expensive damage.

10. Inspect the shift fork-to-gear clearance as follows:
 - a. Install each shift fork into its respective gear. Use a flat feeler gauge and measure the clearance between the fork and the gear as shown in

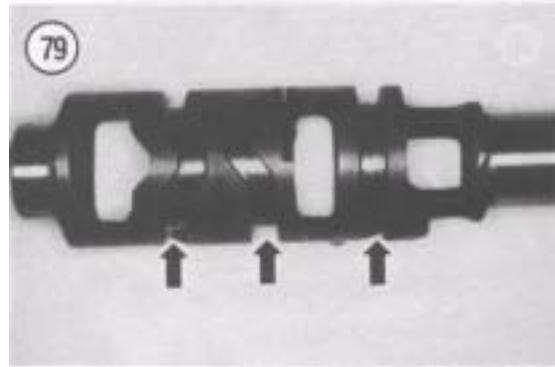
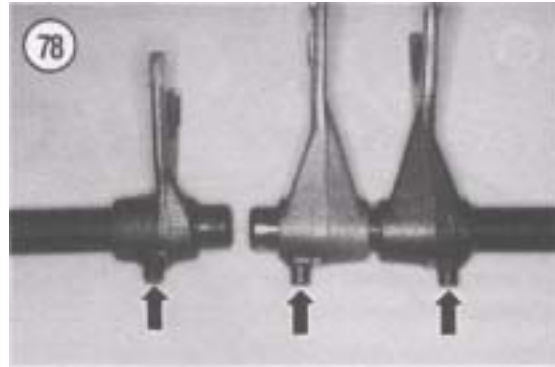
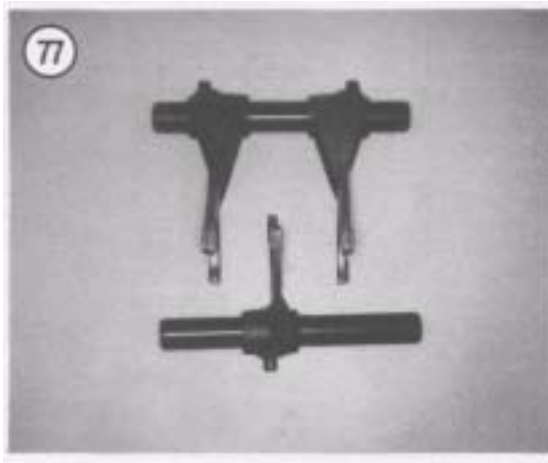




Figure 82. Compare to the specifications listed in **Table 1**.

- b. If the clearance is greater than specified in **Table 1**, measure the width of the gearshift fork fingers with a micrometer (**Figure 83**). Replace the shift fork(s) worn to the service limit listed in **Table 1**.
- c. If the shift fork finger width is within tolerance, measure the shift fork groove width in the gears. Compare to the specifications listed in **Table 1**. Replace the gear(s) if the groove is worn to the service limit or more.



Assembly/Installation

1. Apply a light coat of oil to the shift fork shafts, the inside bores of the shift forks, the shift drum bearing surfaces and to the bearings in the crankcase prior to installing any parts.
2. Install all 3 shift forks (**Figure 84**) into their respective gears. Refer to marks made in Step 7 of *Removal/Disassembly*.
3. Swing the shift forks out to allow room for the installation of the shift drum.

NOTE

After installing the shift drum, make sure it rotates smoothly with no binding.



4. Install the shift drum (**Figure 73**) and push it down until it stops.
5. Swing the shift forks into place in the shift drum. Make sure the guide pin on each fork is indexed into its respective groove in the shift drum.
6. Install the shift shaft all the way through the "L" and "R" shift forks. Push it down until it bottoms out in the crankcase.
7. Install the other shift shaft all the way through the "C" shift fork. Push it down until it bottoms out in the crankcase.
8. Make sure the shift fork guide pins are correctly meshed with the grooves in the shift drum (**Figure 85**).
9. Assemble the crankcase as described in Chapter Four.
10. Install the external gearshift mechanism as described in this chapter.
11. Install the switch contact spring and plunger (**Figure 86**) into the end of the gearshift drum. Make sure they are completely seated (**Figure 71**).

12. Apply a light coat of oil to the O-ring and install the O-ring seal (**Figure 70**) into the receptacle in the crankcase. Make sure it is seated correctly.

13. Install the neutral switch (B, **Figure 69**), the electrical wire strap (A, **Figure 69**) and screws. Tighten the screws securely.

14. Install the engine as described in Chapter Four.

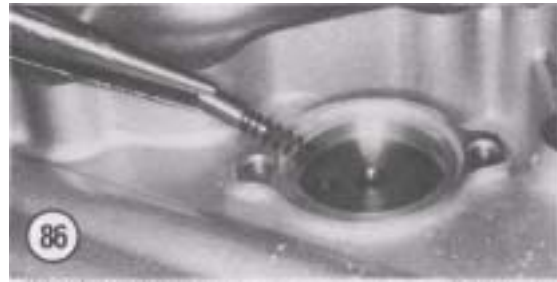


Table 1 TRANSMISSION AND GEARSHIFT SPECIFICATIONS

Item	Specifications	Wear limit
Shift fork-to-groove in gear clearance	0.1 -0.3 mm 0.004-0.012 in.)	0.5 mm (0.02 in.)
Shift fork groove width in gear 4th and 5th gear	5.50-5.60 mm (0.217-0.220 in.)	4.50-4.60 mm (0.117-0.181 in.)
3rd gear	5.30-5.40 mm (0.209-0.213 in.)	4.30-4.40 mm (0.169-0.173 in.)
Shift fork finger thickness 4th and 5th gear (right and left)		
3rd gear (center)		
	2.090(34:11)	
	1.631 (31:19)	
Transmission gear ratios 1st gear 2nd gear 3rd gear	1.227(27:22)	
4th gear 5th gear	1.000(25:25)	
	0.851 (23:27)	
Primary reduction ratio	1.690(71:42)	
Secondary reduction ratio	1.133(30:30x17:15)	
Final reduction ratio	3.090(34:11)	