SECTION 4-C
4-SPEED TRANSMISSION

CONTENTS OF SECTION 4-C

4-17 4-SPEED TRANSMISSION SPECIFICATIONS

a. Tightening Specifications

Part	Location	Thread Size	Torque Ft. Lbs.
Bolt	Front bearing retainer to transmission case	5/16-18	20-25
Bolt	Side Cover Bolts	5/16-18	20-25
Nut	Shift lever to shaft	5/16-18	12-18
Bolt	Transmission to flywheel housing	1/2-13	45-60

b. 4-Speed Transmission Specifications

Mounting	Unit with Engine
Oil Capacity, Pints	2 1/2
Type of Gearing	All Helical
Transmission Ratio	
Fourth	1.00:1
Third	1.51:1
Second	1.92:1
First	2.54:1
Reverse	2.61:1

c. Speedometer Gear

Speedometer Worm on Main Shaft	Press Fit
Teeth on Worm	8

4-18 4-SPEED TRANSMISSION

a. Description

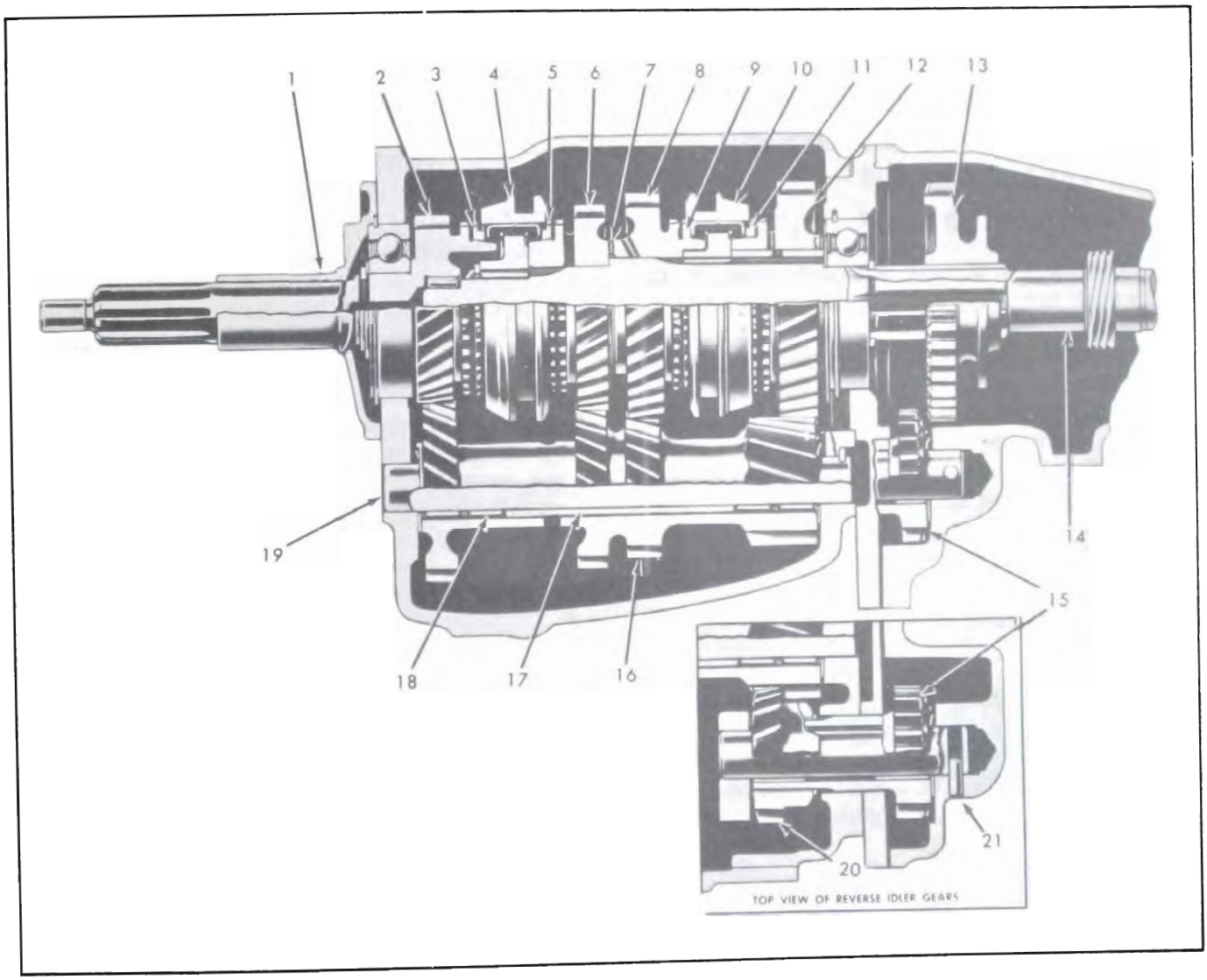
The four-speed synchromesh transmission (fig. 4-33), incorporates helical gears specially designed to provide high torque capacity without additional weight, and gear teeth proportioned to operate at high speeds with neither excessive heat generation nor excessive frictional losses. Shafts, bearings, high capacity clutches and other precision parts are held to close limits, providing proper clearances necessary for durability and during extended heavy usage.

Gearshifting is manual through a floor-type gear shift lever which activates shift control rods connected to the transmission cover shifter levers for first through fourth gears, and to the reverse lever located in the case extension. The shifter lever to the rear of the transmission cover controls the first and second speed gears, while the lever to the front controls the third and fourth speed gears.

The rear end of the main drive gear is supported by a heavy-duty ball bearing at the front end of the transmission case and is piloted at its front end in an oil impregnated bushing mounted in the engine crankshaft. The front end of the mainshaft is piloted in a row of roller bearings set into the hollow end of the main drive gear and the rear end is carried by a heavy-duty ball bearing identical to the one which supports the main drive gear.

The countergear is carried on a double row of rollers at both ends while thrust is taken on thrust washers located between the ends of the gear and the front and rear of the case.

The two-piece reverse idler gear is carried on bronze bushings while thrust is taken on thrust washers located between the front of the



1. Bearing Retainer
2. Main Drive Gear
3. Fourth Speed Synchronizing Ring
4. Third and Fourth Speed Clutch Assembly
5. Third Speed Synchronizing Ring
6. Third Speed Gear
7. Thrust Bearing
8. Second Speed Gear
9. Second Speed Synchronizing Ring
10. First and Second Speed Clutch Assembly
11. First Speed Synchronizing Ring
12. First Speed Gear
13. Reverse Gear
14. Mainshaft
15. Reverse Idler Gear (Rear)
16. Countershaft Gear
17. Countershaft Bearing Roller Spacer
18. Countershaft Bearing Roller
19. Countershaft
20. Reverse Idler Shift Lock Pin
21. Reverse Idler Gear (Front)

Figure 4-33C—Four-Speed Transmission

gear and the back of the reverse idler thrust boss and between the rear of the gear and the reverse idler shaft boss in the case extension.

All four forward gears are provided with synchronizing clutches which can be engaged while the car is in motion. Closely spaced gear ratios of 2.54 (first), 1.92 (second), 1.51 (third) and 1.00 (fourth) provide excellent ratio matching with minimum loss of engine speed at the shift points. Reverse gear (2.61 ratio) is not synchronized; therefore, vehicle should be brought to a complete stop before engaging reverse gear.

The transmission may be used as an aid in deceleration by downshifting in sequence without double shifting or gear clashing, due to all forward speeds being synchronized.

4-19 POWER FLOW THROUGH TRANSMISSION

a. Operation in Neutral

In neutral, with engine clutch engaged, the drive gear turns the countergear. The countergear then turns the third, second, first, and reverse idler gears. But, because the third and fourth and first and second speed clutch (sleeves) are neutrally positioned, and the reverse speed gear is positioned at the rear, away from the reverse idler gear, power will not flow through the mainshaft. See fig. 4-34.

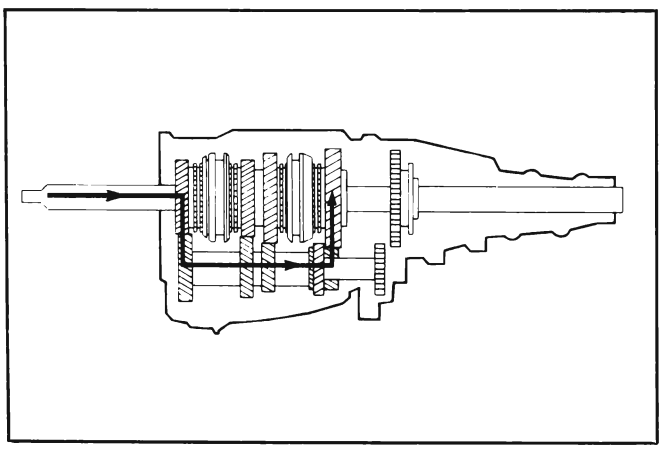


Figure 4-34A—Power Flow in Neutral

b. Operation in First

In first speed, the first and second speed clutch (sleeve) is moved rearwards to engage the first speed gear, which is being turned by the countergear. Because the first and second speed clutch (hub) is splined to the mainshaft, torque is imparted to the mainshaft from the first speed gear through the clutch assembly. See fig. 4-35.

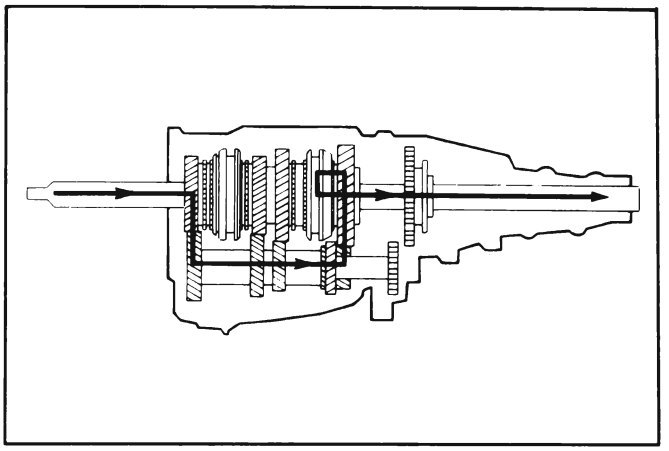


Figure 4-35—Power Flow in First

c. Operation in Second

In second speed, the first and second speed clutch (sleeve) is moved forward to engage the second speed gear, which is being turned by the countergear. This engagement of the clutch (sleeve) with the second speed gear imparts torque to the mainshaft because the first and second speed clutch (hub) is splined to the mainshaft. See fig. 4-36.

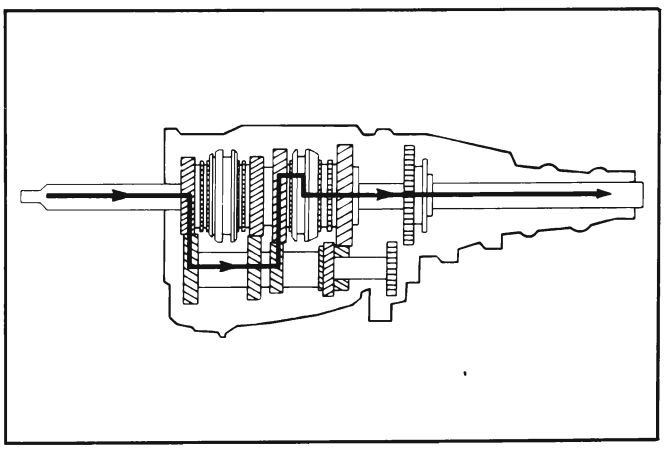


Figure 4-36—Power Flow in Second

d. Operation in Third

In third speed, the first and second speed clutch assumes a neutral position. The third and fourth speed clutch (sleeve) moves rearward

to engage the third speed gear, which is being turned by the countergear. Because the third and fourth speed clutch (hub) is splined to the mainshaft, torque is imparted to the mainshaft from the third speed gear through the clutch assembly. See fig. 4-37.

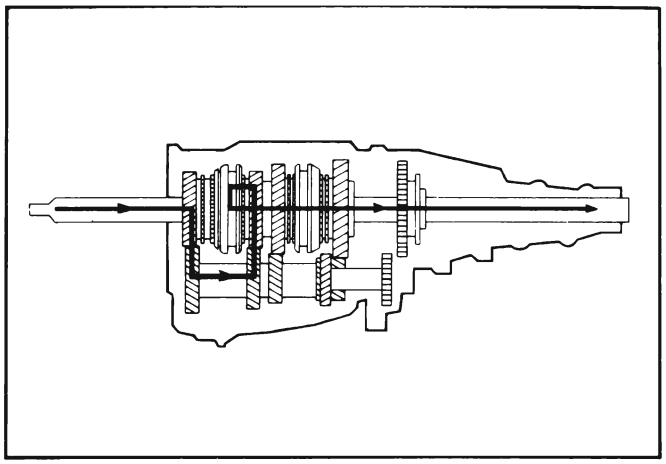


Figure 4-37—Power Flow in Third

e. Operation in Fourth

In fourth speed, or direct drive, the third and fourth speed clutch (sleeve) is moved forward to engage the main drive gear and the first and second speed clutch remains in a neutral position. This engagement of the main drive gear with the third and fourth speed clutch assembly imparts torque directly to the mainshaft. See fig. 4-38.

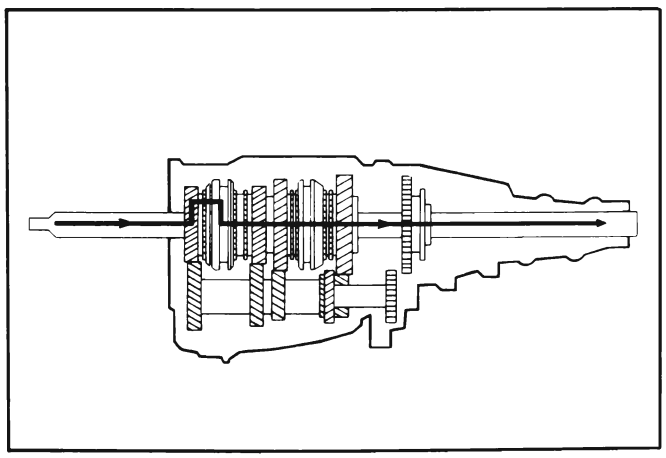


Figure 4-38—Power Flow in Fourth

f. Operation in Reverse

In reverse speed, both clutch assemblies assume a neutral position. The reverse speed gear is moved forward to engage the rear reverse idler gear, which is being turned by the countergear. Because the reverse speed gear is splined to the mainshaft, this engagement causes the mainshaft to turn; however, because power flows from main drive gear to countergear and through reverse idler gear to reverse speed gear, the direction of rotation will be opposite that of the engine. See fig. 4-39.

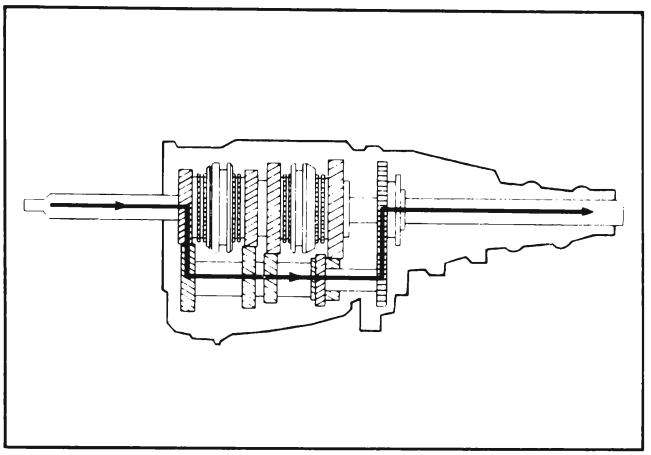


Figure 4-39—Power Flow in Reverse

4-20 PERIODIC SERVICE

a. Transmission

No periodic service of the transmission is required except checking for leaks and proper lubricant level at each 1000-mile chassis lubrication.

If there is evidence of leakage, the leak should be corrected and lubricant added, if needed. Refill capacity: 2.5 pints.

Remove filler plug at side of case and add S.A.E. 90 "multi-purpose gear lubricant." Lubricant level should be approximately level with bottom of filler plug hole.

b. Shift Control

No periodic service of the shift control is required. Certain parts are lubricated on assembly and require further lubrication only when parts become dry and sticky.

4-21 SHIFT LINKAGE ADJUSTMENT

The 4-speed transmission gearshift linkage

(fig. 4-40), utilizes three shift rods and levers. A simple gauge block, shown in Figure 4-41, will aid in making the proper adjustments. The adjustments can be made without the gauge block by having an assistant hold the manual shift lever in the neutral positions for each gear.

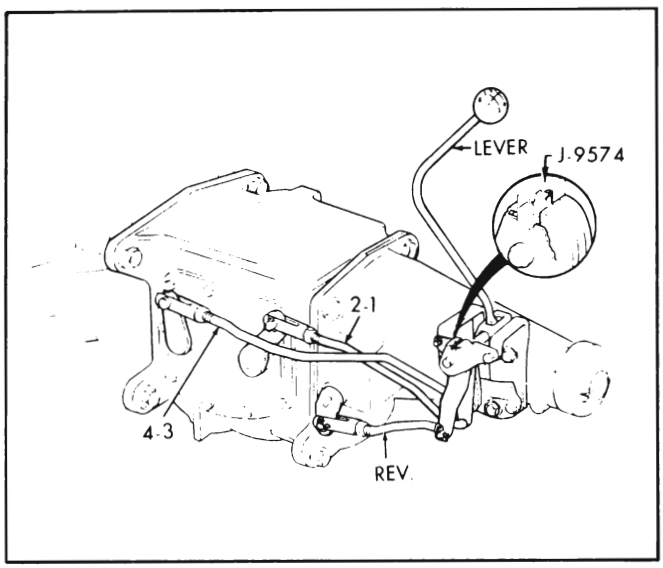


Figure 4-40—Four-Speed Transmission Gearshift Linkage

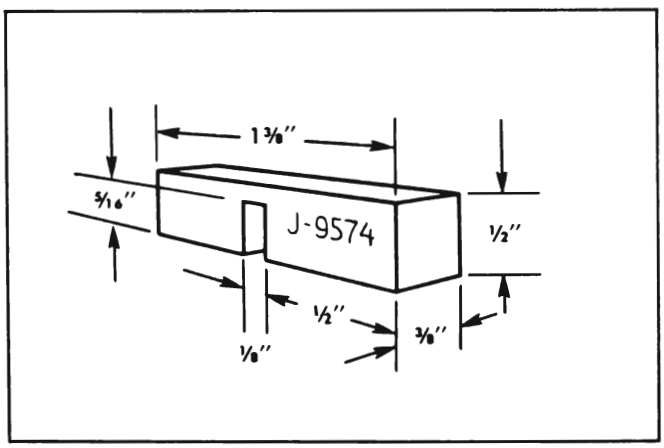


Figure 4-41—Linkage Gauge Block J-9574

1. Remove transmission gearshift lever seal from floor pan.

2. Place transmission in neutral and install gauge block, J-9574, in position shown in Figure 4-40.

3. Remove the cotter pin, anti-rattle washer, and clevis pin at each shift lever.

4. On each shift rod, adjust the threaded clevis to permit free entry of the clevis pin into the hole in the transmission shift lever.

5. Reconnect the clevises to the shift levers.

6. Remove the gauge block and check the shifts. If any roughness still exists, one of the clevises may require adjustment of approximately one-half turn. Determine the rod and clevis requiring adjustment by sighting along the slot where the gauge block was used in step 2.

4-22 SPEEDOMETER DRIVEN GEAR REMOVAL AND REPLACEMENT

a. Removal

1. Disconnect speedometer cable.

2. Remove retainer to housing bolt and lockwasher and remove retainer.

3. Insert screwdriver in slot in fitting, and pry fitting, gear and shaft from housing.

4. Pry "O" ring from groove in fitting.

5. Check gear, shaft and fitting for wear and replace, if necessary.

b. Installation

1. Install new "O" ring in groove and insert shaft-driven gear.

2. Hold the assembly so slot in fitting is toward boss on housing and install in housing.

3. Push fitting into housing until retainer can be inserted into groove.

4. Install retainer bolt and lockwasher.

5. Connect speedometer cable to speedometer-driven gear.

4-24 TRANSMISSION EXTENSION OIL SEAL REMOVAL AND INSTALLATION

a. Removal

To inspect or replace the rear extension oil seal, it is necessary to remove the propeller shaft driveline assembly from the vehicle.

1. Remove "U" bolt nuts, lock plates, and "U" bolts from rear axle drive pinion flange.

2. Use suitable rubber band to hold bearings

onto journals if tie wire has been removed, to prevent loss of needle bearings where rear joint is disconnected.

3. Slide propeller shaft assembly rearward to disengage yoke from splines on transmission mainshaft.

4. Use punch or other suitable tool and loosen seal from rear extension of transmission and remove. See Figure 4-42.

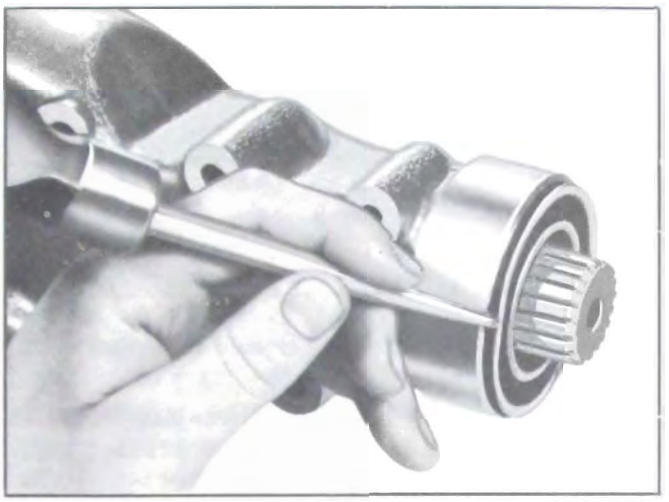


Figure 4-42—Removing Extension Oil Seal

5. Wash counterbore with cleaning solvent and inspect for damage.

6. Inspect front companion flange for nicks, burrs or scratches which would cut new seal or cause seal to leak or damage bushing.

4-25 TRANSMISSION SIDE COVER REMOVAL AND INSTALLATION

NOTE: It is not necessary to remove transmission from vehicle for inspection or replacement of parts in transmission side cover assembly, but the side cover assembly itself must be removed from the transmission case.

a. Removal

1. Remove drain plug at the bottom of transmission and drain lubricant.

2. Disconnect first, second, third and fourth shift rods from levers. See fig. 4-43.

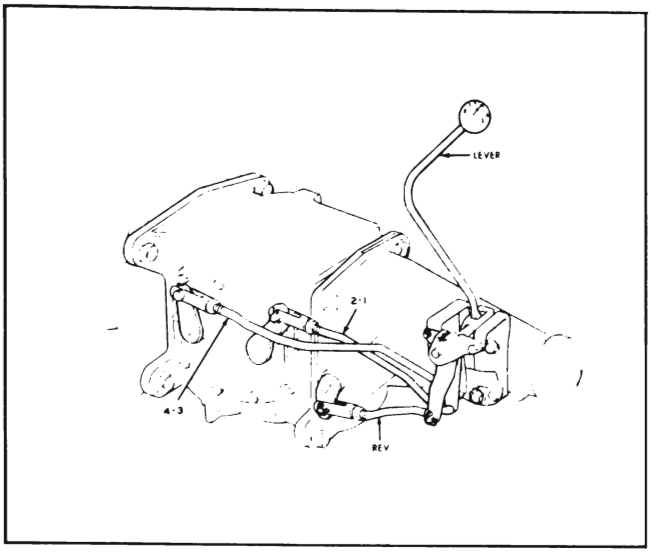


Figure 4-43—Four Speed Transmission Gearshift Linkage

3. Remove transmission side cover assembly from transmission case.

4. Remove the outer shifter lever nuts and lockwashers and pull levers from shafts.

5. Carefully push the shifter shafts into cover, allowing the detent balls to fall free, then remove both shifter shafts.

6. Remove interlock sleeve, interlock pin and poppet spring.

7. Replace necessary parts.

b. Installation

1. Install interlock sleeve and one shifter shaft. Place steel detent into sleeve followed by poppet spring and interlock pin.

2. Start second shifter shaft into position and place second detent ball on poppet spring. Compress ball and spring with screwdriver and push the shifter shaft fully in.

3. With transmission in neutral and shifter forks and levers in place, lower side cover into place. Install attaching bolts, using sealer and lower right bolt (see fig. 4-44), and tighten evenly.

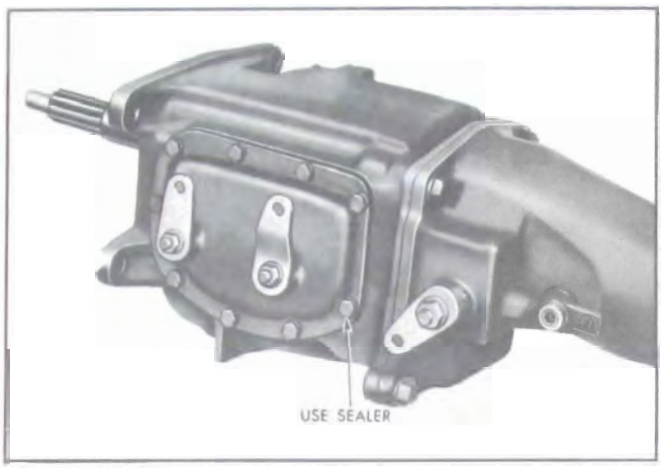


Figure 4-44—Transmission Side Cover Assembly

4. Remove the filler plug and add 2-1/2 pints of S.A.E. 90 "Multi-Purpose Gear Lubricant." This quantity should bring the lubricant level to a point approximately level with the filler plug hole.

4-26 REMOVAL AND INSTALLATION OF TRANSMISSION

1. Drain lubricant from transmission.

2. Remove six metal boot retainer to floor plate attaching screws (see fig. 4-45), and slide boot over stick shift.

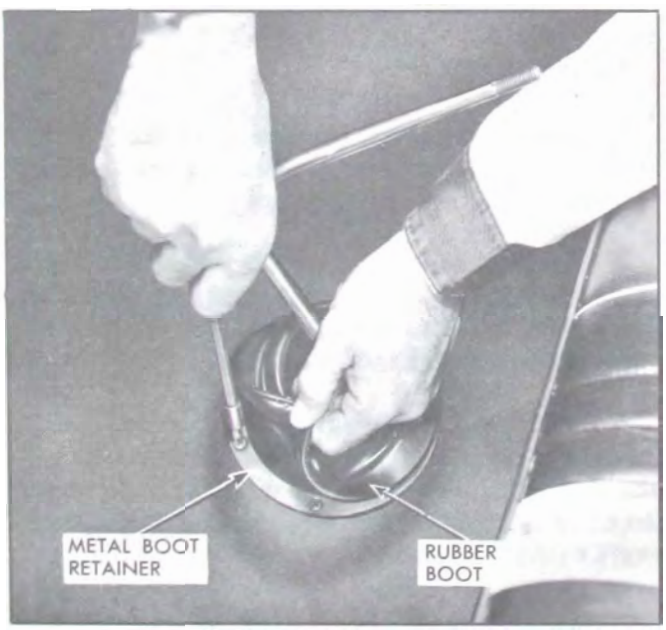


Figure 4-45—Removing Rubber Boot and Retainer

3. Disconnect the speedometer cable from speedometer-driven gear-fitting and disconnect shift control rods from the shifter levers at the transmission.

4. Remove propeller shaft assembly as outlined in par. 6-8, then support rear of engine and remove transmission mounting plate bolts and washers. See fig. 4-46. Remove support to underbody bolts and washers and remove support.

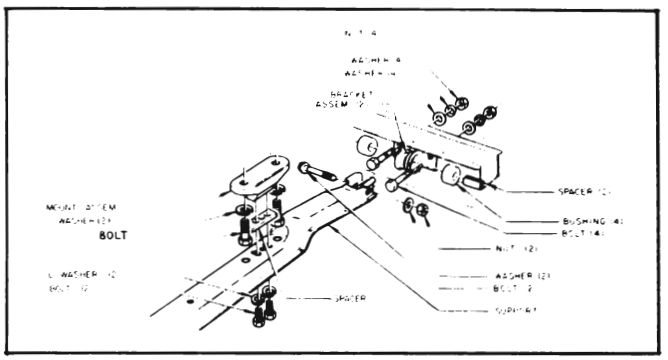


Figure 4-46—Four Speed Transmission Mounting

5. Remove the two top transmission to clutch housing bolts and insert two transmission guide pins in these holes.

NOTE: The use of the two guide pins during this operation will support the transmission and prevent damage to the clutch disc through springing.

6. Remove the two lower transmission to clutch housing bolts.

7. Slide the transmission straight back on guide pins.

4-27 DISASSEMBLY OF 4-SPEED TRANSMISSION

1. Remove transmission side cover assembly from transmission case.

NOTE: If cover assembly is to be disassembled for inspection or replacement of worn parts, follow procedures 2 through 6, Section 4-23.

2. Remove four bolts from front bearing retainer and remove retainer and gasket.

3. Drive lock pin up from reverse shifter lever boss, as shown in fig. 4-47, and pull shifter shaft out about 1/8". This disengages the reverse shift fork from reverse gear.

Figure 4-47—Removing Reverse Shifter Shaft Lock Pin

4. Remove five bolts attaching the case extension to the rear bearing retainer. Tap extension with soft hammer in a rearward direction to start. When the reverse idler shaft is out as far as it will go, move extension to left so reverse fork clears reverse gear and remove extension and gasket.

5. Remove rear bearing snap ring on mainshaft.

6. Remove speedometer gear and reverse gear. The speedometer gear may be removed with J-9578.

7. The rear reverse idler gear and tanged thrust washer may now be removed.

8. Remove the self-locking bolt attaching the rear bearing retainer to transmission case. Carefully remove the entire mainshaft assembly.

9. Unload bearing rollers from main drive gear and remove fourth speed synchronizer blocker ring.

10. Lift the front half of reverse idler gear and its thrust washer from case.

11. Remove the main drive gear snap ring (see fig. 4-48), and remove spacer washer.

12. With soft hammer, tap main drive gear down from front bearing as shown in fig. 4-49.

13. From inside case, tap out front bearing and snap ring.

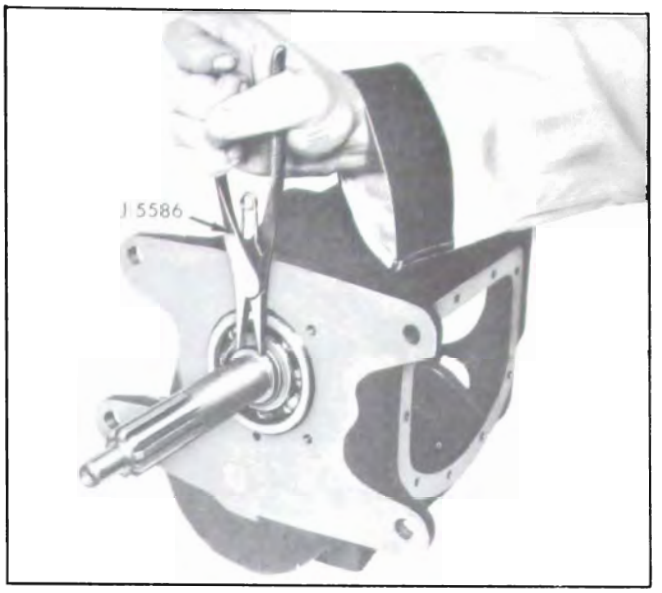


Figure 4-48—Removing Main Drive Gear Retaining Snap Ring

Figure 4-49—Removing Main Drive Gear

14. From the front of the case, press out the countershaft (fig. 4-50) with J-9573; then remove the counter gear and both tanged washers.

Figure 4-50—Removing Countershaft with J-9573

15. Remove the 80 rollers, six .050'' spacers and roller spacer from countergear.

16. Remove mainshaft front snap ring (see fig. 4-51), and slide third and fourth speed clutch assembly, third speed gear and synchronizing ring, second and third speed gear thrust washer (needle roller bearing), second speed gear and second speed synchronizing ring from front of mainshaft.

17. Spread rear bearing retainer snap ring and press mainshaft out of retainer. See fig. 4-52.

18. Remove the mainshaft rear snap ring. Support first and second speed clutch assembly as shown in fig. 4-52, and press on rear of mainshaft to remove shaft from rear bearing, first speed gear, and synchronizing ring first and second speed clutch sliding sleeve and first speed gear bushing.

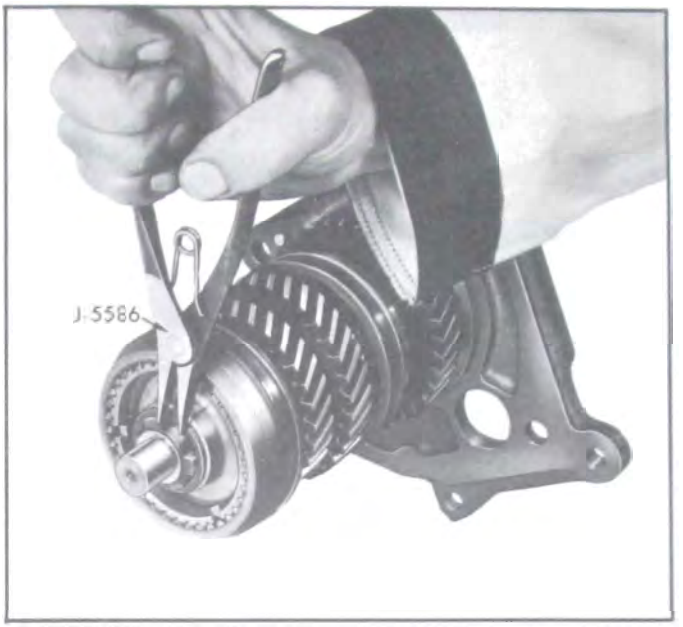


Figure 4-51—Removing Mainshaft Front Snap Ring

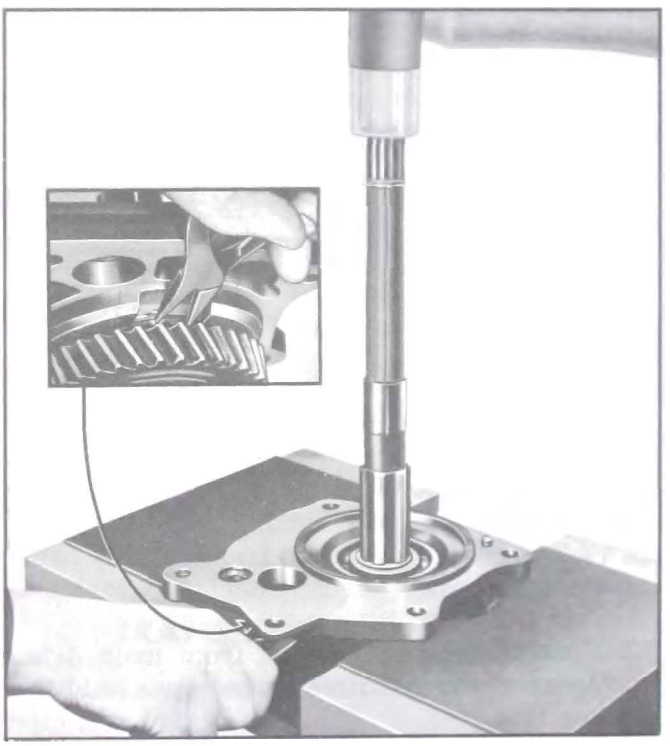
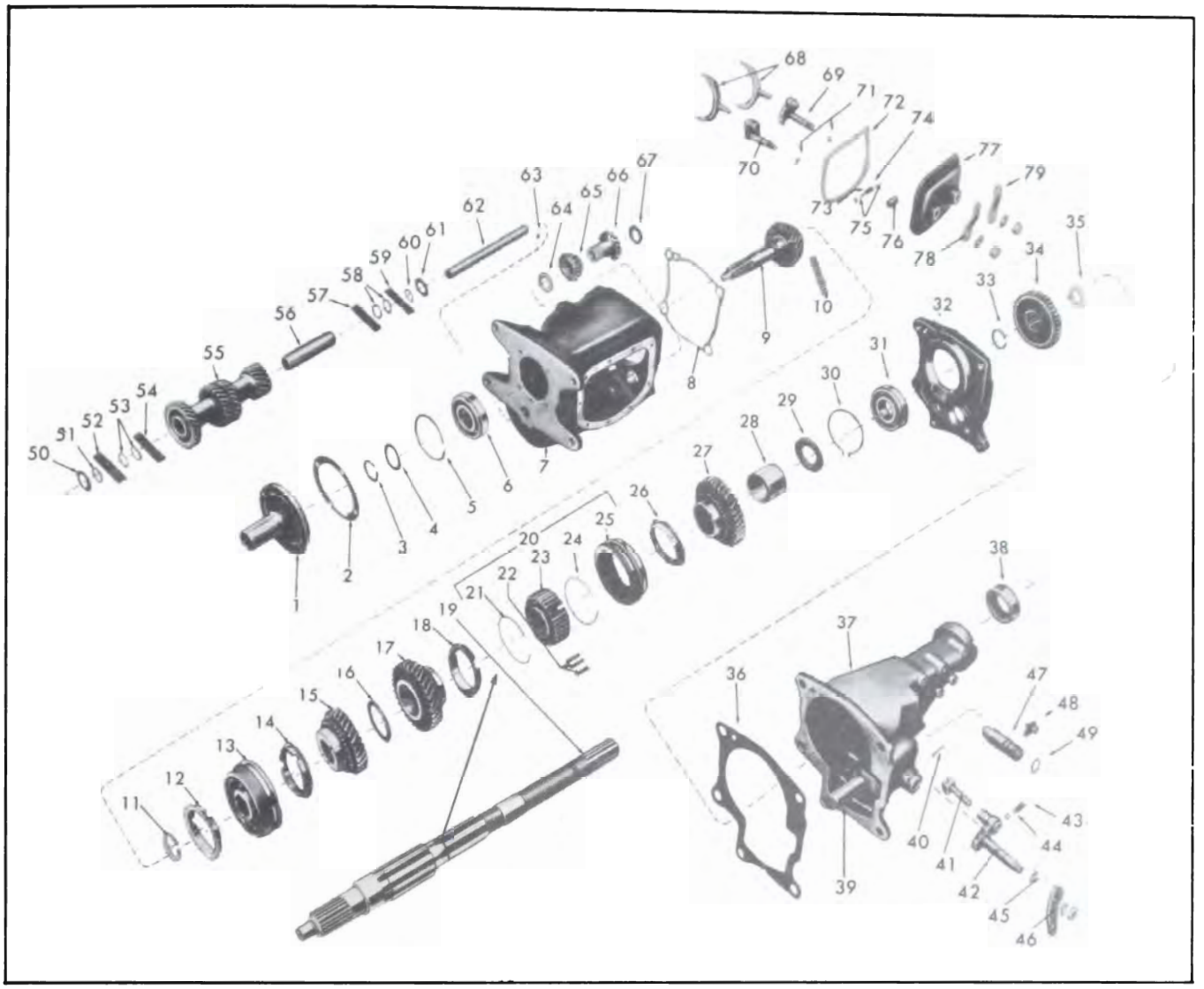


Figure 4-52—Removing Rear Bearing Retainer



1. Bearing Retainer
2. Gasket
3. Selective Fit Snap Ring
4. Spacer Washer
5. Bearing Snap Ring
6. Main Drive Gear Bearing
7. Transmission Case
8. Rear Bearing Retainer Gasket
9. Main Drive Gear
10. Bearing Rollers (14)
11. Snap Ring (.086" to .088")
12. Fourth Speed Gear Synchronizing Ring
13. Third and Fourth Speed Clutch Sliding Sleeve
14. Third Speed Synchronizing Ring
15. Third Speed Gear
16. Second and Third Speed Gear Thrust Washer (Needle Roller Bearing)
17. Second Speed Gear
18. Second Speed Gear Synchronizing Ring
19. Mainshaft
20. First and Second Speed Clutch Assembly
21. Clutch Key Spring
22. Clutch Keys
23. Clutch Hub
24. Clutch Key Spring
25. First and Second Speed Clutch Sliding Sleeve
26. First Speed Gear Synchronizing Ring
27. First Speed Gear
28. First Speed Gear Bushing
29. First Speed Gear Thrust Washer
30. Rear Bearing Snap Ring
31. Rear Bearing
32. Rear Bearing Retainer
33. Selective Fit Snap Ring
34. Reverse Gear
35. Speedometer Drive Gear
35A. Special Snap Ring
36. Rear Bearing Retainer to Case Extension Gasket
37. Case Extension
38. Rear Oil Seal
39. Reverse Idler Shaft
40. Reverse Shifter Shaft Lock Pin
41. Reverse Shift Fork
42. Reverse Shifter Shaft and Detent Plate
43. Reverse Shifter Shaft Ball Detent Spring
44. Reverse Shifter Shaft Detent Ball
45. Reverse Shifter Shaft "O" Ring Seal
46. Reverse Shifter Lever
47. Speedometer Driven Gear and Fitting
48. Retainer and Bolt
49. "O" Ring Seal
50. Tanged Washer
51. Spacer (.050")
52. Bearing Rollers (20)
53. Spacer (2—.050")
54. Bearing Rollers (20)
55. Countergear
56. Countergear Roller Spacer
57. Bearing Rollers (20)
58. Spacers (2—.050")
59. Bearing Rollers (20)
60. Spacer (.050")
61. Tanged Washer
62. Countershaft
63. Countershaft Woodruff Key
64. Reverse Idler Front Thrust Washer (Flat)
65. Reverse Idler Gear (Front)
66. Reverse Idler Gear (Rear)
67. Tanged Thrust Washer
68. Forward Speed Shift Forks
69. First and Second Speed Gear Shifter Shaft and Detent Plate
70. Third and Fourth Speed Gear Shifter Shaft and Detent Plate
71. "O" Ring Seals
72. Gasket
73. Interlock Pin
74. Poppet Spring
75. Detent Balls
76. Interlock Sleeve
77. Transmission Side Cover
78. Third and Fourth Speed Shifter Lever
79. First and Second Speed Shifter Lever

Figure 4-54—Four Speed Synchromesh Transmission - Exploded View

Figure 4-53—Removing Mainshaft from First and Second Speed Clutch Assembly

4-28 CLEANING AND INSPECTION

a. Transmission Case

Wash the transmission case inside and out with a cleaning solvent and inspect for cracks. Inspect the front face which fits against the clutch housing for burrs and if any are present, dress them off with a fine cut mill file.

b. Front and Rear Bearings

1. Wash the front and rear thoroughly in a cleaning solvent.

2. Blow out bearing with compressed air.

NOTE: Do not allow the bearings to spin but turn them slowly by hand. Spinning bearings will damage the race and balls.

3. Make sure the bearings are clean; then lubricate them with light engine oil and check them for roughness. Roughness may be determined by slowly turning the outer race by hand.

c. Bearing Rollers and Spacers

All main drive gear and countergear bearing rollers should be inspected closely and replaced if they show wear. Inspect countershaft at the same time and replace if necessary. Replace all worn parts.

d. Gears

Inspect all gears and replace all that are worn or damaged.

4-29 REVERSE IDLER SHAFT REPLACEMENT

1. With case extension removed from the transmission, drive the reverse idler shaft lock pin into the boss until it falls into the clearance hole in the shaft. See fig. 4-55.

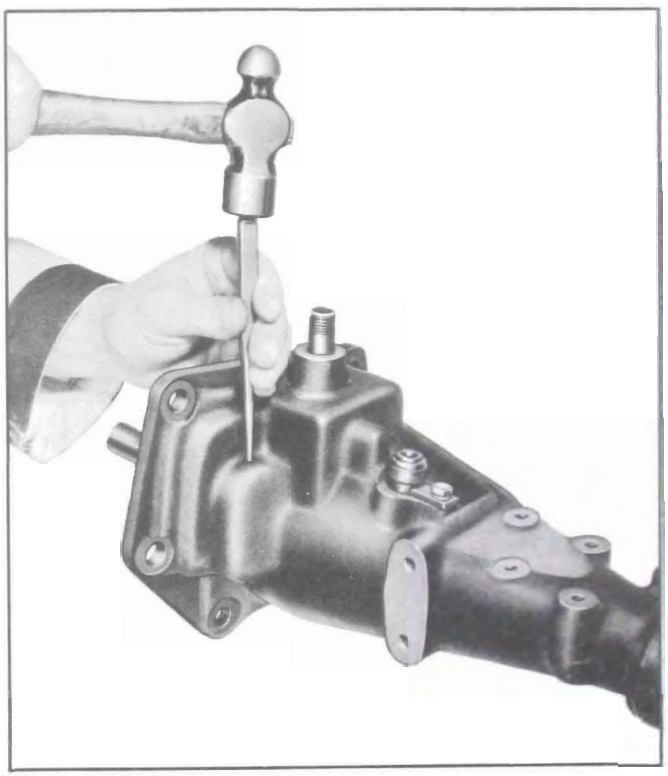


Figure 4-55—Removing Reverse Idler Shaft Lock Pin

2. Pry out the welch plug at the end of the shaft and press the shaft from the extension.

3. Line up the lock pin hole in the shaft with the hole in the boss. Install idler shaft and taper pin in place to lock.

4-30 REVERSE SHIFT AND SEAL REPLACEMENT

1. With case extension removed from transmission, the reverse shifter shaft lock pin will already be removed.

2. Remove shift fork.

3. Carefully drive shifter shaft into case extension, allowing ball detent to drop into case. Remove shaft and ball detent spring.

4. Place ball detent spring into detent spring hole and start reverse shifter shaft into hole in boss.

5. Place detent ball on spring and, holding ball down with a suitable tool (see fig. 4-56), push the shifter shaft into place and turn; the ball drops into place in detent on shaft detent plate.

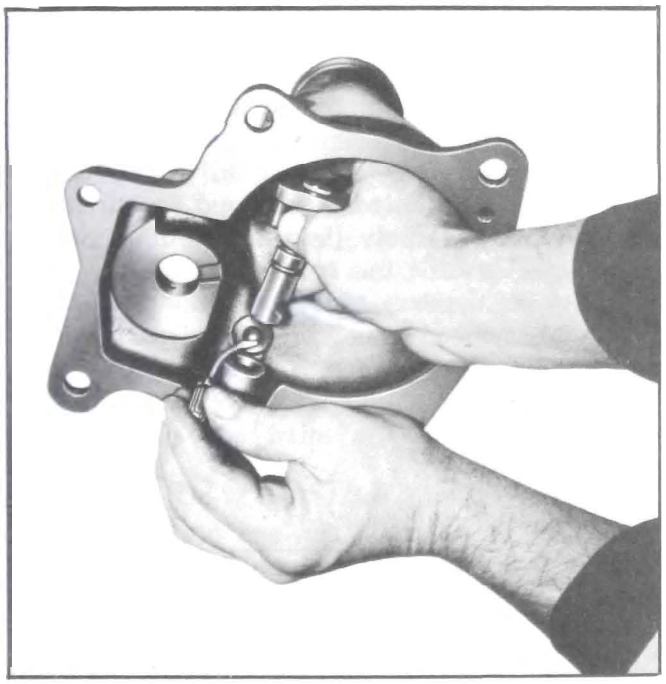


Figure 4-56—Installing Reverse Shifter Shaft

6. Install shift fork.

NOTE: Do not drive the shifter shaft lock pin into place until the extension has been installed on the transmission.

4-31 CLUTCH KEYS AND SPRINGS REPLACEMENT

NOTE: The clutch hubs and sliding sleeves are a selected assembly and should be kept together as originally assembled, but the three keys and two springs may be replaced if worn or broken.

1. Push the hub from the sliding sleeve. The keys will fall free and the springs may be easily removed.

2. Place the two springs in position (one on each side of hub), so a tanged end of each spring falls into the same keyway in the hub. Place the keys in position and, holding them in place, slide the hub into the sleeve.

4-32 ASSEMBLY

a. Mainshaft Assembly

1. From rear of mainshaft, assemble first and second speed clutch assembly to mainshaft (sliding clutch sleeve taper toward the rear, (hub to the front) and, using J-8853, press the first gear bushing on shaft. See fig. 4-57.

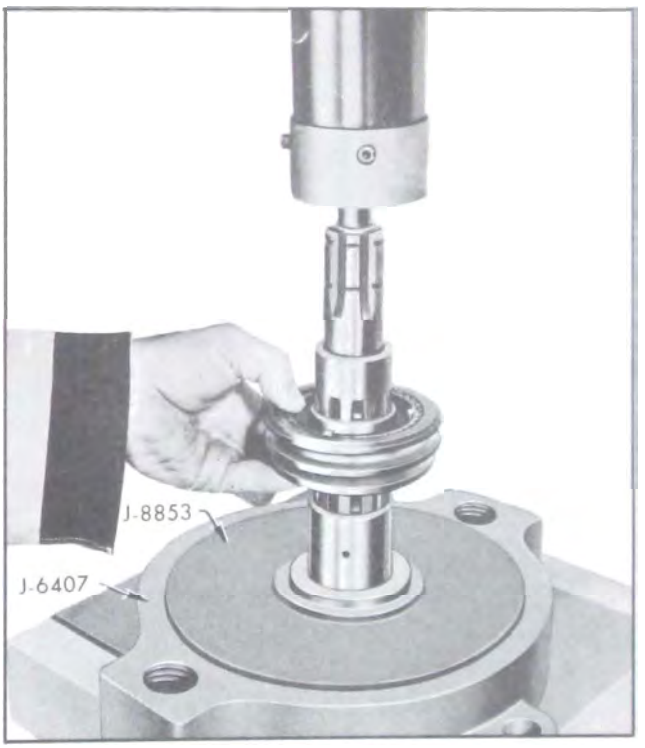


Figure 4-57—Installing First Speed Gear Bushing Using J-8853

2. Install the first speed gear synchronizing ring so the notches in the ring correspond to the keys in the hub. See fig. 4-58.

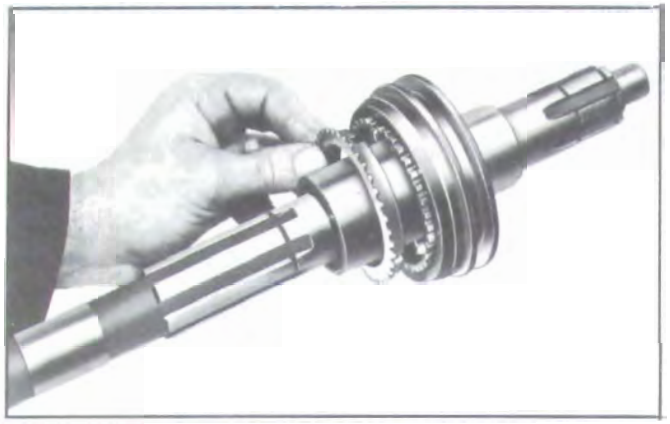


Figure 4-58—Installing Synchronizing Ring

3. Install first speed gear (with hub toward the front) and the first speed gear thrust washer. Make certain that the grooves in the washer are facing the first speed gear.

4. Using J-8853, press on the rear bearing with the snap ring groove toward the front of the transmission (see fig. 4-59). Firmly seat bearing against the shoulder on the mainshaft.

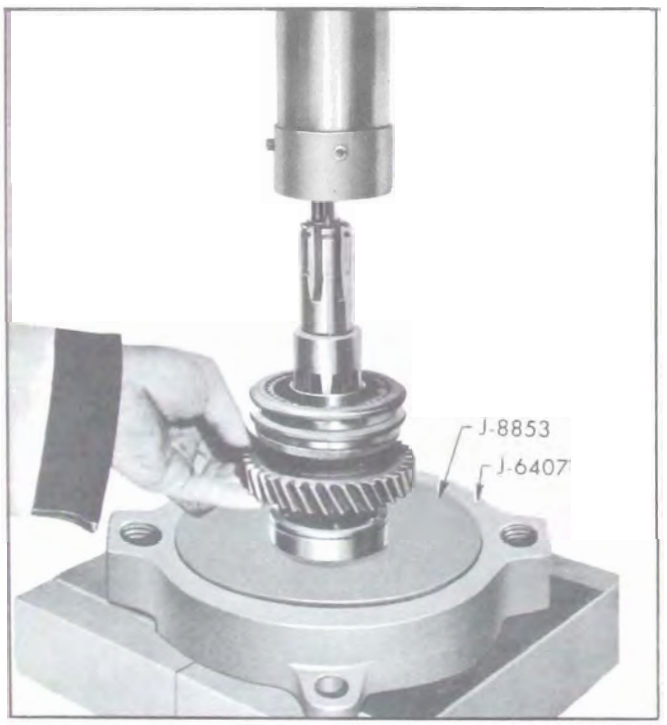


Figure 4-59—Installing Rear Bearing Using J-8853

5. Choose the correct selective fit snap ring and install it in the groove in the mainshaft behind the rear bearing. Snap rings are available in three thicknesses: .087'', .093'', and .099''. Use ring that will produce from zero to .005'' clearance between the rear face of the bearing and the front face of the snap ring.

NOTE: Always use new snap ring when reassembling transmission and do not expand the snap ring further than is necessary for assembly.

6. From the front of the mainshaft, install the second speed gear synchronizing ring so notches in the ring correspond to the keys in the hub.

7. Install the second speed gear (with the hub of the gear toward the back of the transmission) and install the second and third speed gear thrust washer (needle roller bearing).

8. Install the third speed gear (hub to front of transmission) and the third speed gear synchronizing ring (notches to front of transmission).

9. Install the third speed and fourth speed gear clutch assembly (hub and sliding sleeve) with taper toward the front, making sure that the keys in the hub correspond to the notches in the third speed gear synchronizing ring.

10. Install snap ring in the groove in mainshaft in front of the third and fourth speed clutch assembly.

NOTE: If there is no end play, check the thickness of the snap ring just installed; it should be .087'' thick. While the snap ring used at this location is NOT selective, it is identical to the selective washers used at the clutch gear and rear bearing locations.

11. Install the rear bearing retainer (see fig. 4-60). Spread the snap ring in the plate to allow the snap ring to drop around the rear bearing and press on the end of the mainshaft until the snap ring engages the groove in the rear bearing.

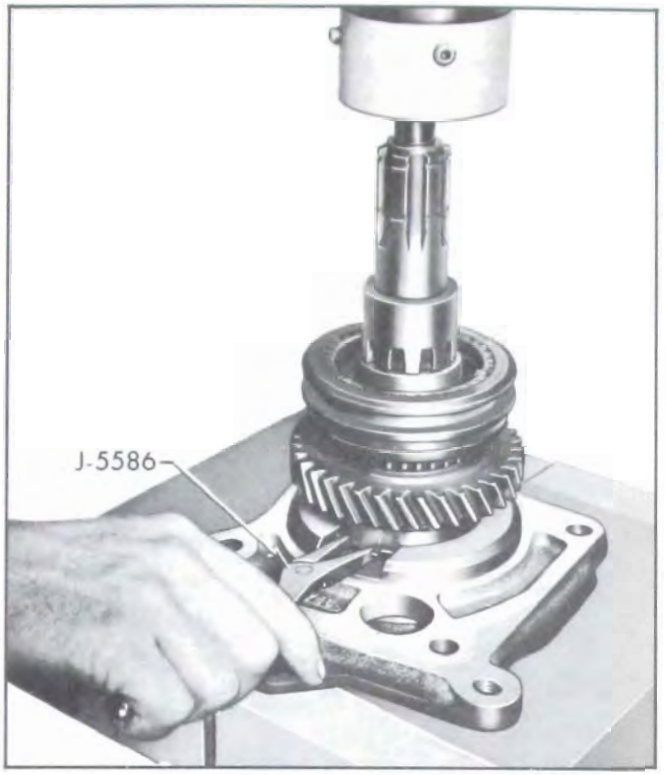


Figure 4-60—Installing Rear Bearing Retainer

12. Install the reverse gear (shift collar to rear).

13. Press speedometer drive gear onto the mainshaft, using a J-8853, press plate. Position the speedometer gear to get a measurement of 4-1/2" from the center of the gear to the flat surface of the rear bearing retainer. (See fig. 4-61.)

14. Replace rear bearing snap ring on mainshaft.

4-33 COUNTER GEAR ASSEMBLY

1. Install roller spacer in countergear.

2. Using heavy grease to retain the rollers, install 20 rollers in either end of the countergear, two .050" spacers, 20 more rollers, then one .050" spacer. Install in the other end of the countergear, 20 rollers, two .050" spacers, 20 more rollers, and another .050" spacer. (See fig. 4-62.)

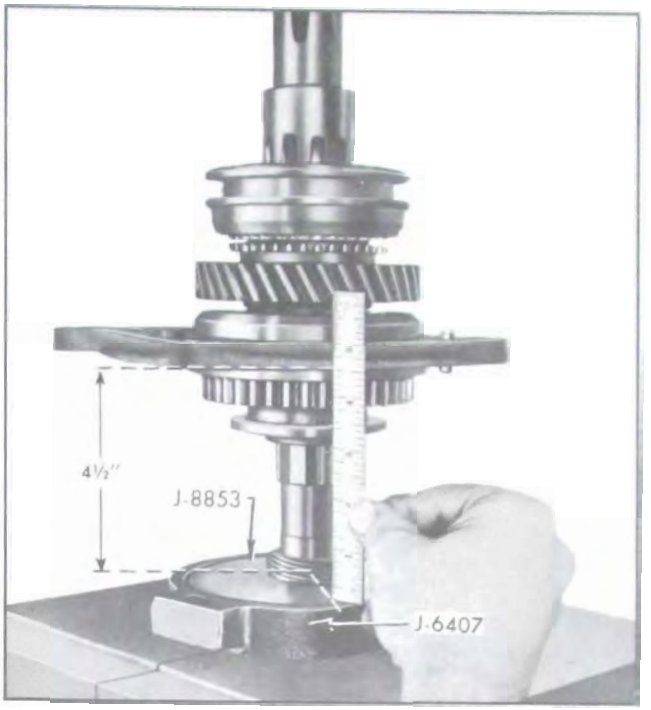


Figure 4-61—Installing Speedometer Drive Gear

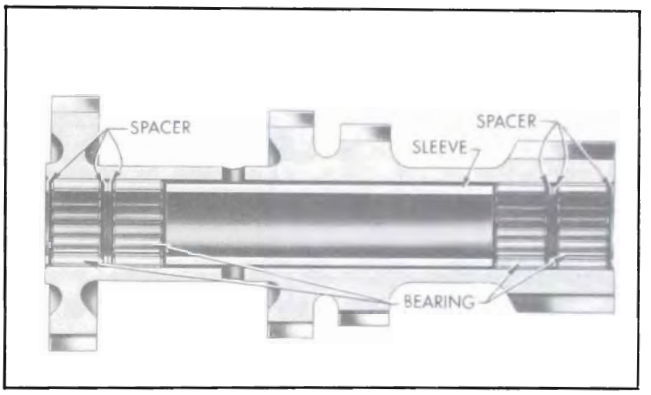


Figure 4-62—Cross Section of Countergear Assembly

4-34 TRANSMISSION ASSEMBLY

1. Rest the transmission case on its side with the side cover opening toward the assembler. Retainer thrust washers on end of countergear with grease.

2. Set countergear in place in bottom of transmission case, making sure that tanged thrust washers are correctly positioned.

3. Press bearing onto main drive gear (snap ring groove to front), using J-5746 (fig. 4-63). Be sure bearing fully seats against shoulder on gear.

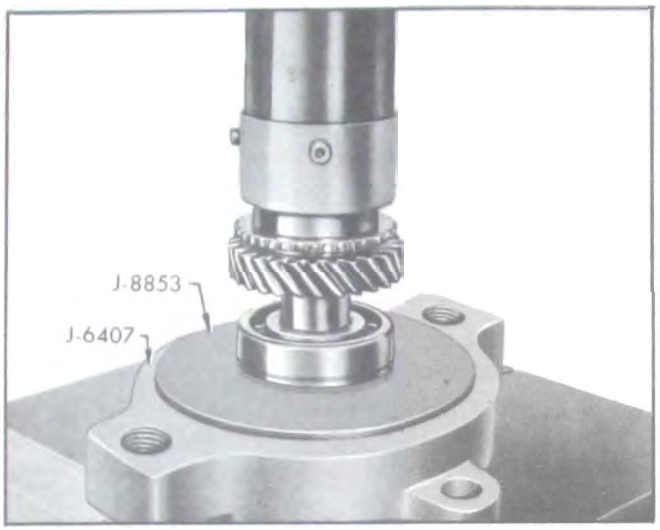


Figure 4-63—Installing Main Drive Gear Bearing

4. Install spacer washer and selective fit snap ring in groove on gear stem.

NOTE: The snap ring is available in three thicknesses: .087", .093", and .099". Use the ring that will produce from zero to .005" clearance between the rear face of the snap ring and the front face of the spacer washer.

5. Install the main drive gear and bearing assembly through the side cover opening and into position in transmission front bore. Tap lightly into place, if necessary, with a plastic hammer. Place snap ring and spacer in groove in front bearing.

6. With the transmission case resting on its front face, move countergear into mesh with main drive gear. Be sure thrust washers remain in place. Install woodruff key into end of countershaft and press shaft (fig. 4-64) until end of shaft is flush with rear face of transmission case.

7. Attach a dial indicator as shown in Fig. 4-65, and check the end play of the countergear. End play must not be more than .025".

8. Install the fourteen roller bearings into the main drive gear, using heavy grease to hold the bearing in place.

9. Using heavy grease, place gasket in position on front face of rear bearing retainer.

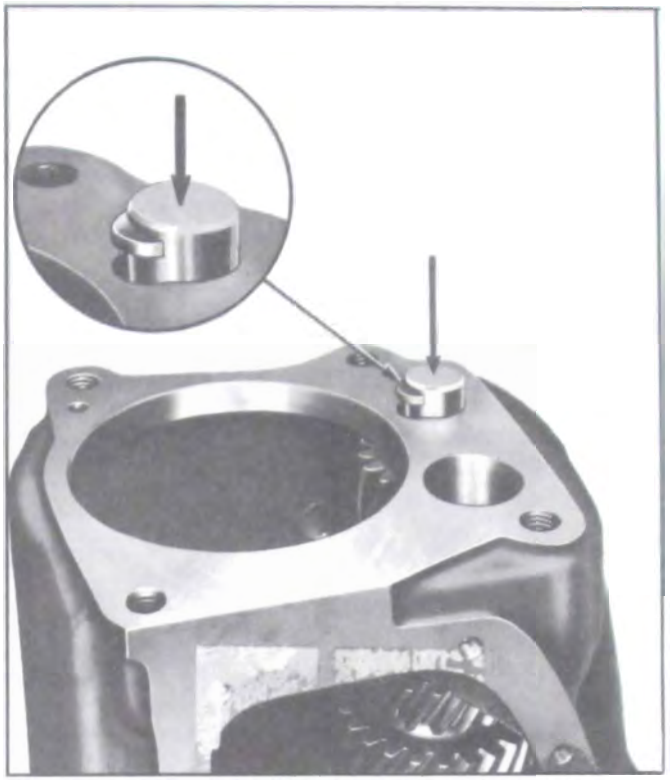


Figure 4-64—Installing Countershaft

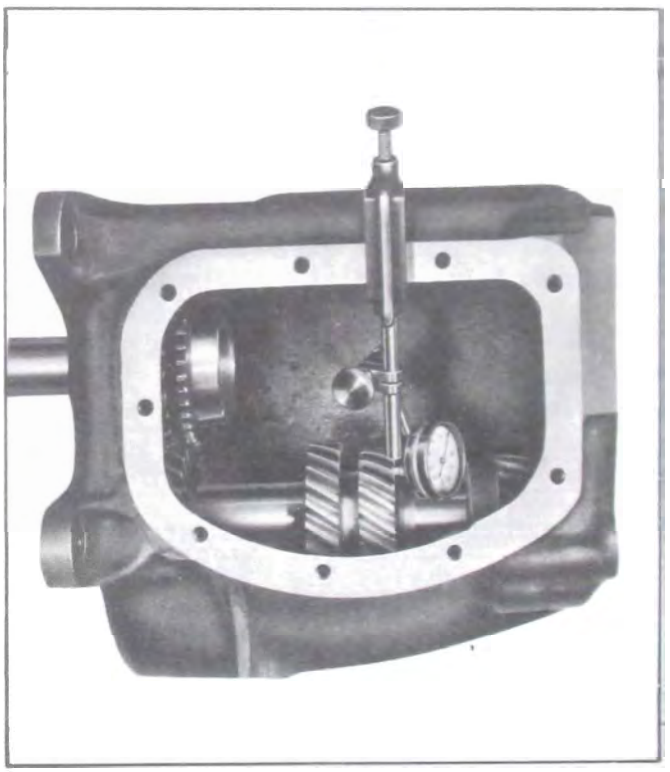


Figure 4-65—Checking Countergear End Play

10. Install fourth speed synchronizing ring on main drive gear with the notches toward the rear of the transmission.

11. Position the reverse idler gear thrust washer (untanged) on the machined face of the ear cast for the reverse idler shaft. Position the front reverse idler gear on top of the thrust washer, with the hub facing forward rear of the case.

12. Lower the mainshaft assembly into the case, making certain that the notches on the fourth speed synchronizing ring correspond to the keys in the clutch assembly. See fig. 4-66.

Figure 4-66—Installing Mainshaft Assembly

13. Install the self-locking bolt attaching rear bearing retainer to transmission case, (see fig. 4-67). Torque to 20 to 30 ft. lbs.

14. From the rear of the case, insert the rear reverse idler gear, engaging the splines with the portion of the gear, within the case.

15. Using heavy grease, place gasket into position on rear face of rear bearing retainer.

16. Using heavy grease, install the remaining thrust washer into place on the reverse idler shaft, making sure tang on the thrust washer is in the notch in the idler thrust face of the extension.

17. Place the two clutches in neutral position. Pull reverse shifter shaft to left side of extension and rotate shaft to bring reverse shift fork as far forward in extension as possible. Start the extension onto the transmission case

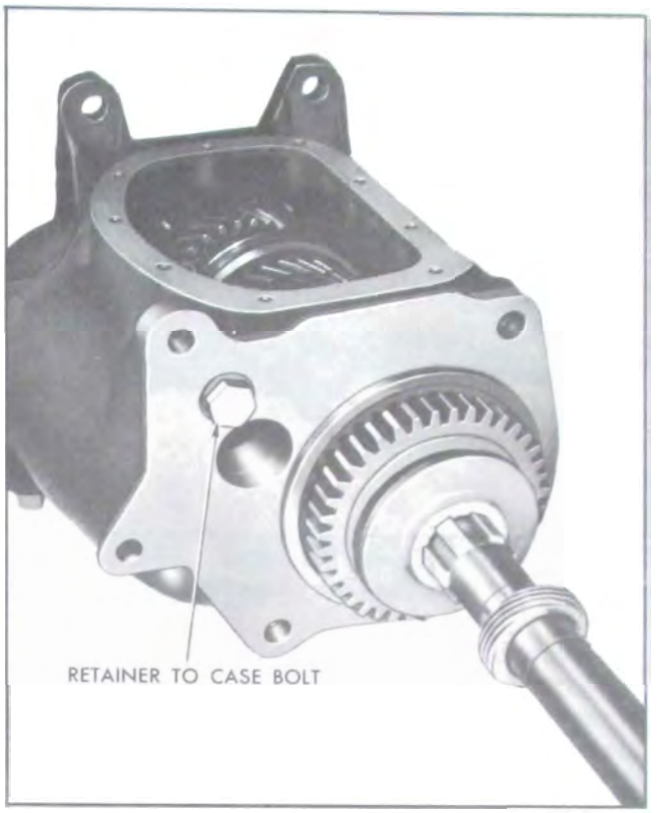


Figure 4-67—Bearing Retainer to Transmission Bolt

(fig. 4-68) while slowly pushing in on the shifter shaft to engage the shift fork with the reverse gear shift collar. When the fork engages, rotate the shifter shaft to move the reverse gear rearward, permitting the extension to slide onto the transmission case.

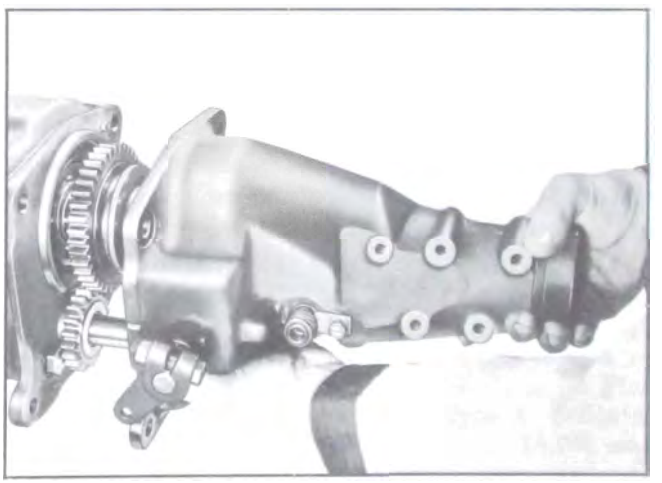


Figure 4-68—Installing Case Extension to Transmission Case

18. Install three extension and retainer to case attaching bolts (torque to 35 to 45 ft. lbs.) and two extension to retainer attaching bolts (torque to 20 to 30 ft. lbs.). Use suitable

sealer on the lower right attaching bolt as viewed from rear. See fig. 4-69.

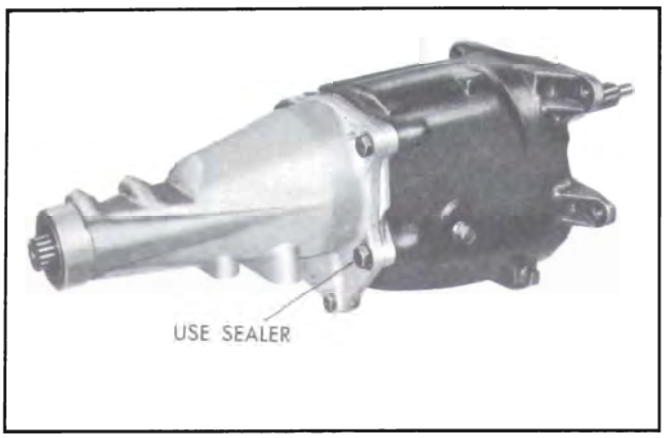


Figure 4-69—Sealing Case Extension Attaching Bolt

19. Push or pull reverse shifter shaft to line up groove in the shaft with the holes in the boss and drive in the lock pin. Install shifter lever.

20. Install the main drive gear bearing retainer, gasket and four attaching bolts, using a suitable sealer on bolts. Torque to 15 to 20 ft. lbs.

21. Install a shift fork in each clutch sleeve.

22. Place both clutches in neutral, install side cover gasket and carefully lower side cover into place. Install attaching bolts and tighten evenly to avoid side cover distortion. Use suitable sealer when installing the lower right bolt.

NOTE: The transmission should "overshift" slightly in all ranges.

4-35 INSTALLATION IN VEHICLE

1. Install guide pin in upper right transmission to clutch housing bolt hole for alignment, and place transmission guide pin. Rotate transmission as necessary. Start main drive gear shaft into clutch disc and slide transmission forward.

2. Install the two lower transmission mounting bolts and lockwashers and tighten securely. Remove guide pin and install upper mounting bolts and lockwashers and tighten securely.

3. Install cross member, align the mounting holes with the lower holes in the underbody and install the support.

4. Install propeller shaft as outlined in paragraph 6-11.

5. Connect shift control rods at the transmission.

6. Check and adjust linkage.

7. Connect speedometer cable to driven gear and tighten securely.

8. Remove filler plug and add 2-1/2 pints of S.A.E. 90 "Multi-Purpose Gear Lubricant" to bring oil level to the filler plug hole.