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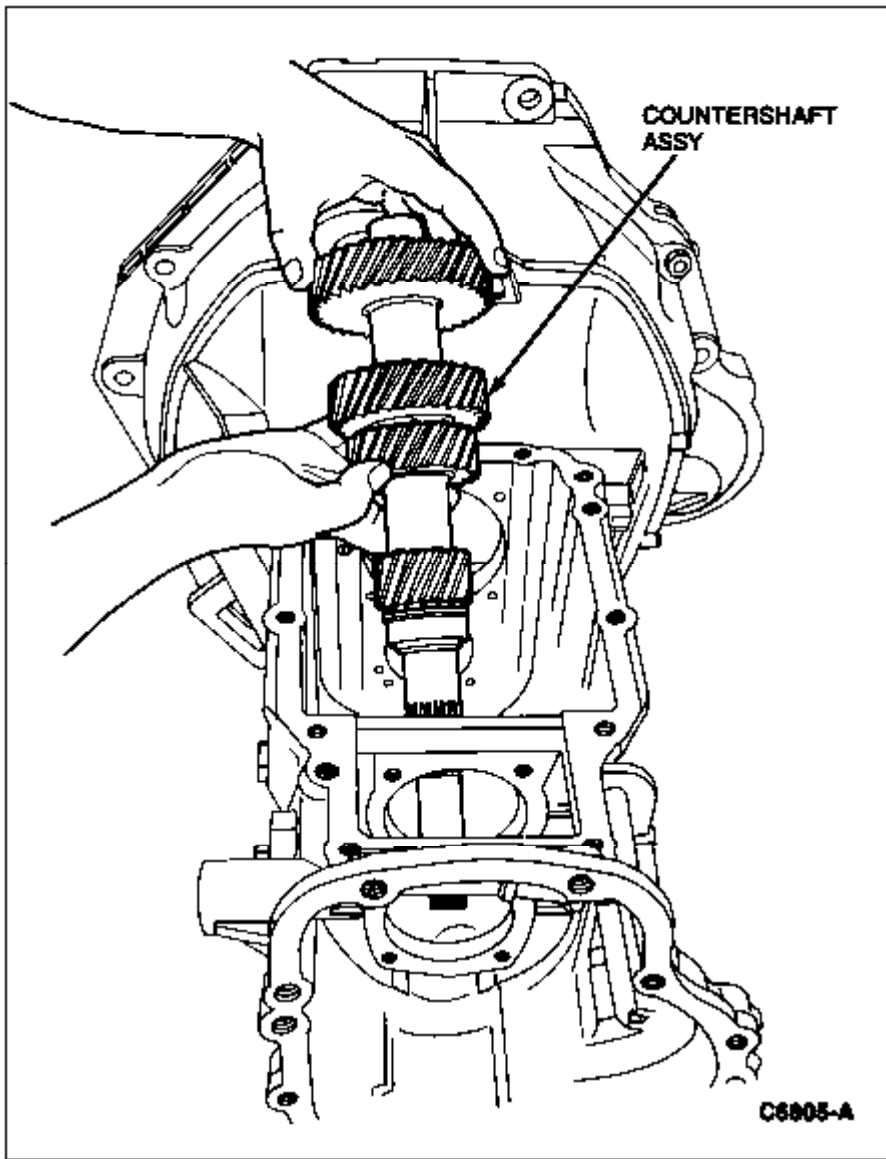
## **Transmission -- Assembly**

### **Tools Required:**

- Extension Housing Seal Replacer T61L-7657-A
- Remover/Replacer Tube T75L-7025-B
- Shaft Sleeve Replacing T75L-7025-K
- Shaft Collar T75L-7025-P
- Locknut Staking Tool T77J-7025-F
- Ball Housing Seal Replacer T77J-7025-G
- Depth Micrometer D82L-4201-C
- Remover/Replacer Tube T85T-7025-A
- Gear Installing Spacer T88T-7025-G
- Ball Detent Inserter T88T-7025-H

### **Assembly**

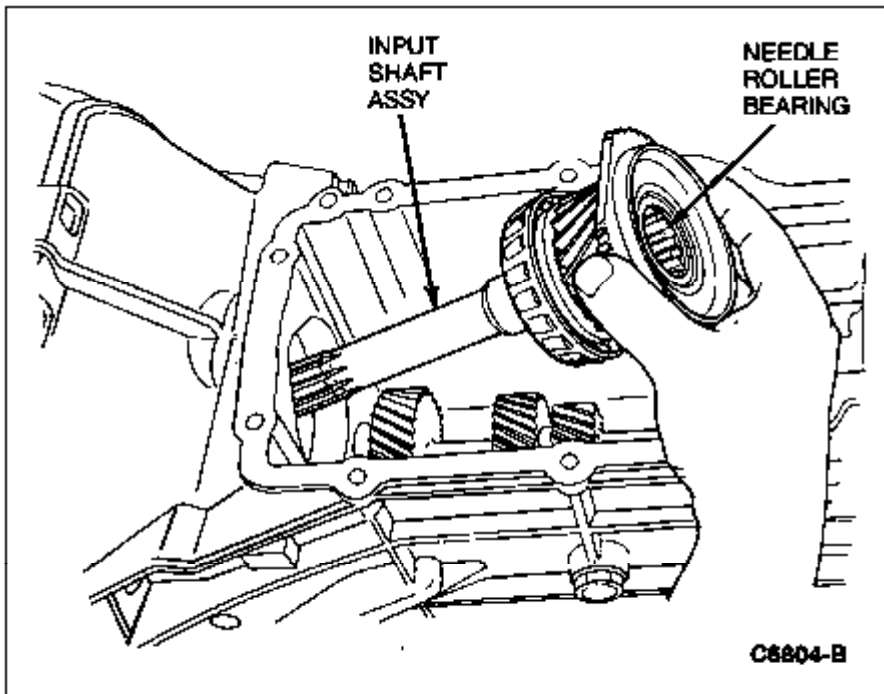
1. Position countershaft into transmission case through top opening.



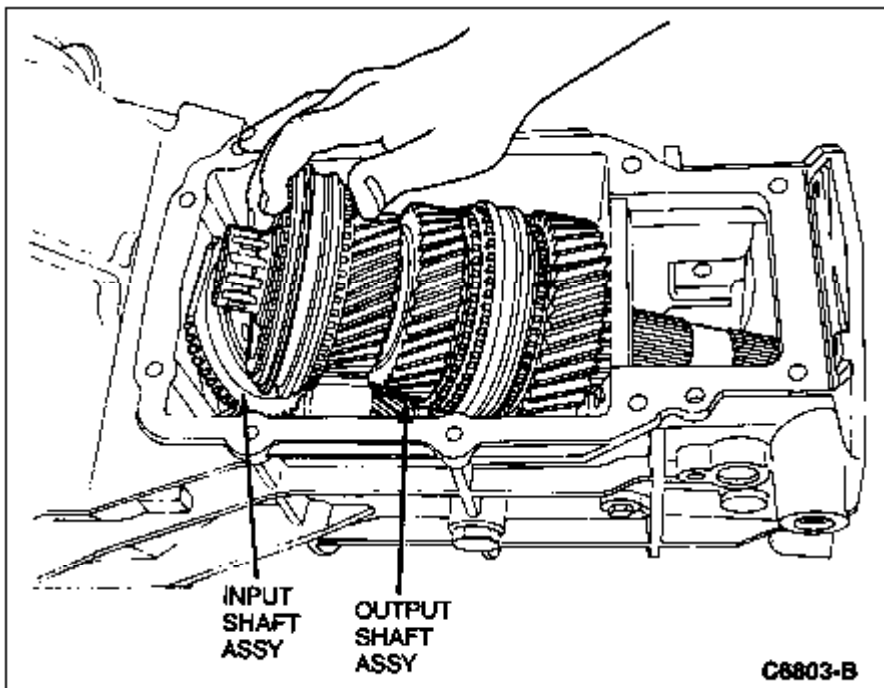
**NOTE:**

Ensure that needle roller bearing is installed into input shaft.

2. Position input shaft with flats facing top and bottom into transmission case through top opening.
3. Install fourth gear synchronizer blocker ring on output shaft assembly.



4. Holding the synchronizer blocker ring in place, position output shaft assembly into transmission case. Mate input and output shaft assemblies by positioning them at an upward angle and setting them together.

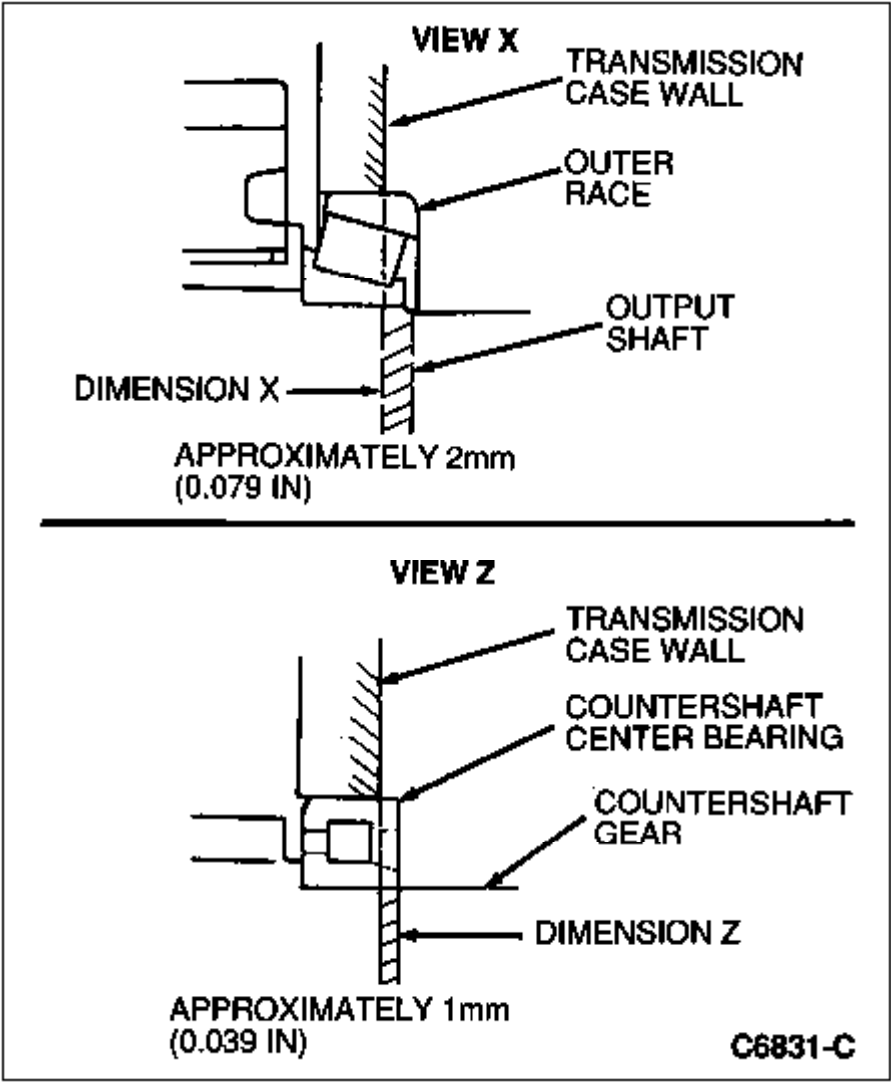


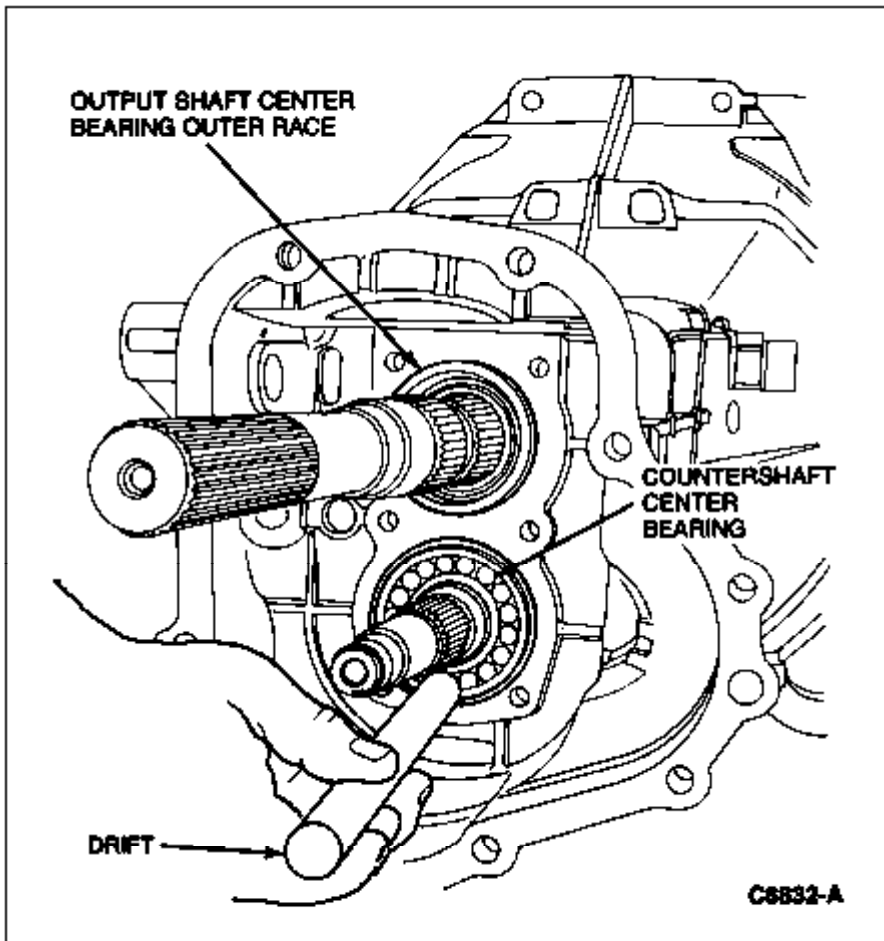
5. Apply Pipe Sealant with Teflon® D8AZ-19554-A (ESG-M4G194-A and ESR-M18P7-A) or equivalent to front oil trough retaining bolt. Position oil trough and install retaining bolt. Tighten to 8-10 N-m (6-7 lb-ft).
6. Install output shaft center bearing outer race using a brass drift. Seat center bearing outer races, maintaining bearing position illustrated in View X.

NOTE:

View X (Dimension X) is a cross sectional view of how far the output shaft center bearing outer race

protrudes above transmission case. The shoulder of the outer race should be approximately 2mm (0.078 inch) above case wall.





**NOTE:**

Ensure that center bearing outer races are squarely positioned in bores.

**NOTE:**

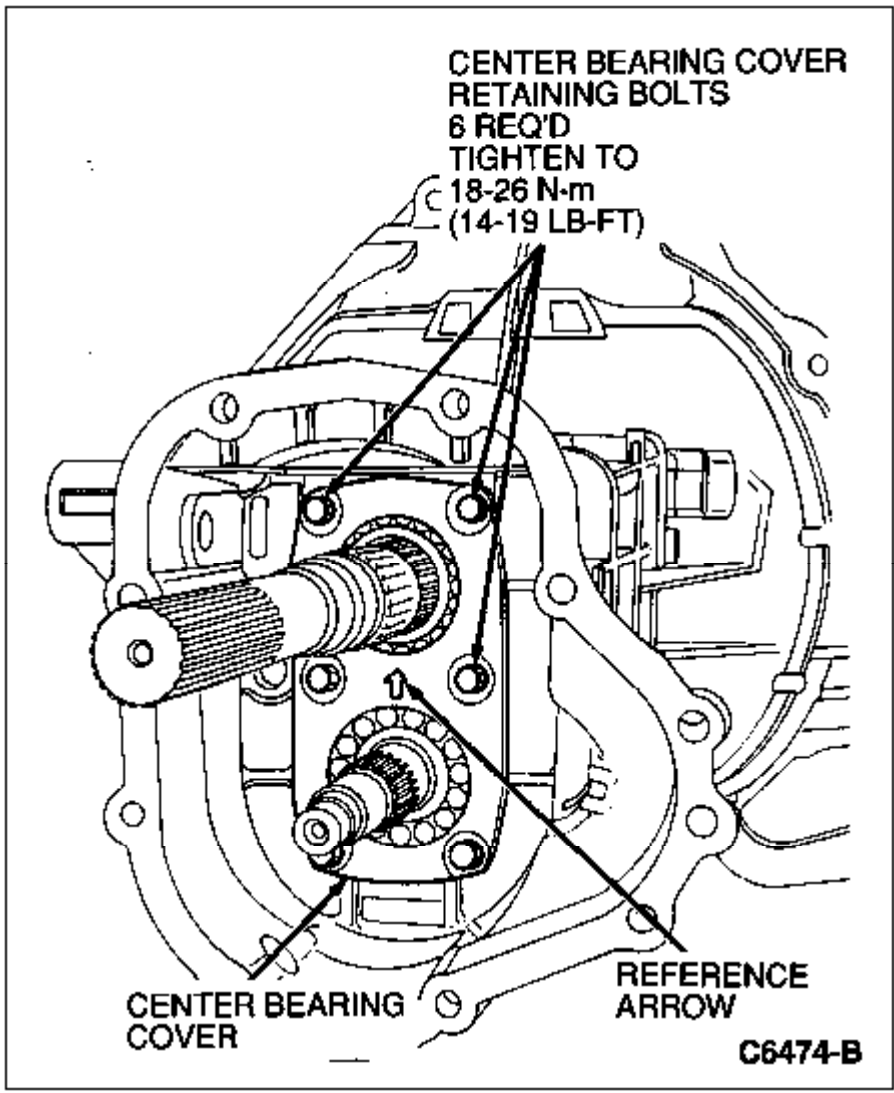
View Z (Dimension Z) is a cross sectional view of how far the countershaft center bearing protrudes above the transmission case. The shoulder of the countershaft center bearing should be approximately 1mm (0.039 inch) above case wall.

7. Install countershaft center bearing (not race) using a brass drift. Maintain bearing position as illustrated in View Z following Step 6.

**NOTE:**

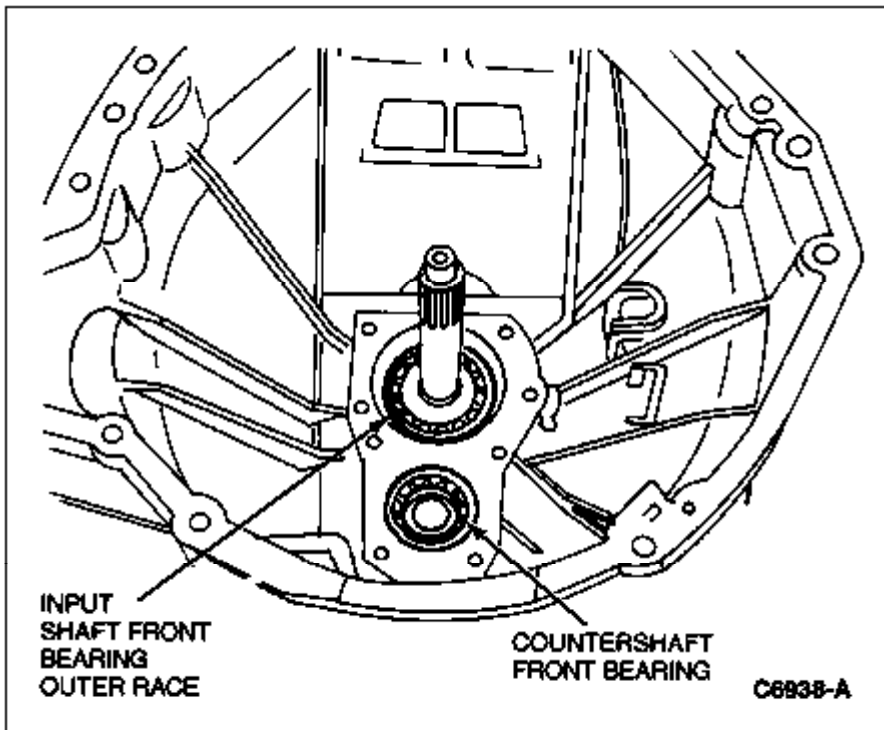
Ensure that all center bearing cover retaining bolt heads are marked with an "8".

8. Position center bearing cover to transmission case with reference arrow pointing upward. Install and tighten center bearing cover retaining bolts to 18-26 N-m (14-19 lb-ft).



NOTE:  
Ensure that the outer race is squarely positioned in the bore and that the output shaft is free of obstruction.

9. Position transmission vertically (input shaft and flywheel housing facing upward). Install input shaft front bearing outer race using a brass drift.

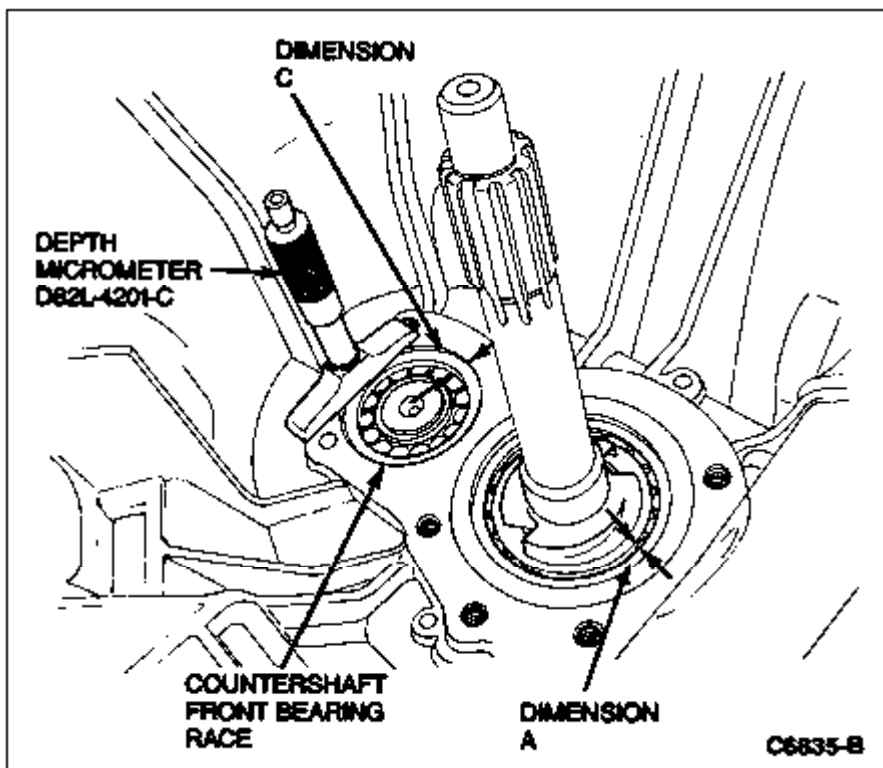
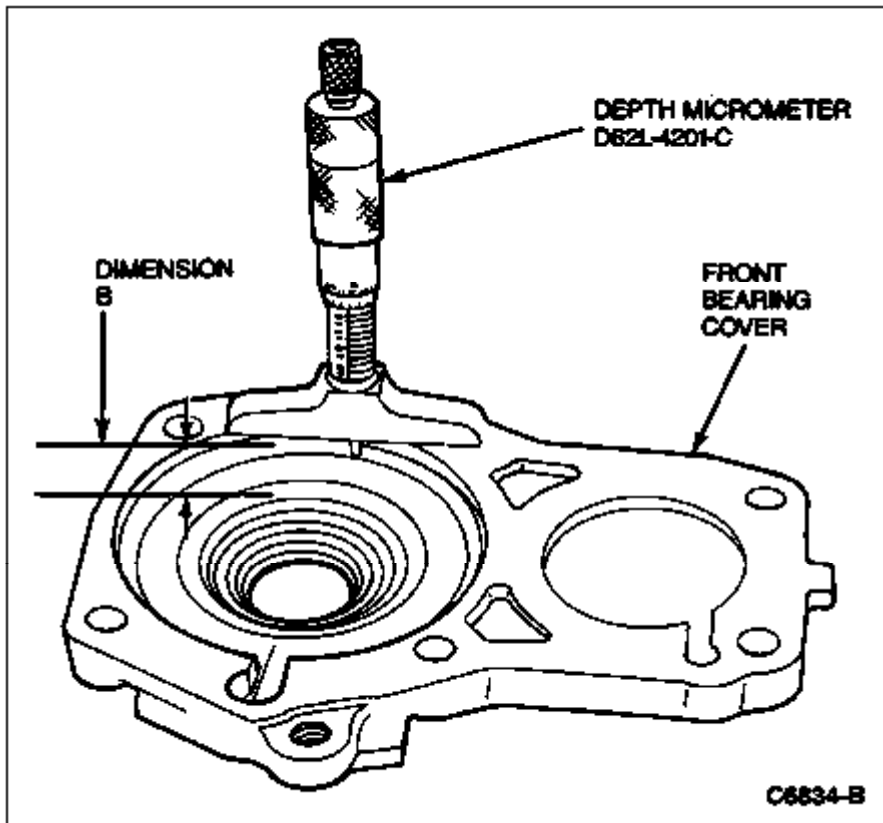


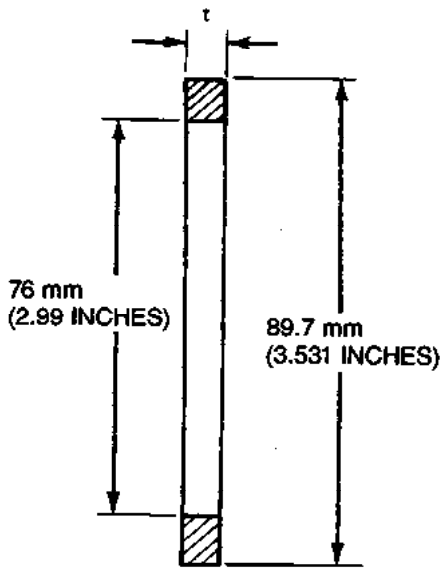
10. Install countershaft front bearing by hand.

**NOTE:**

If any related parts (such as output shaft, bearing, etc.) have been replaced, measure dimensions A, B and C using Depth Micrometer D82L-4201-C or equivalent as illustrated. After measuring all dimensions, select bearing shim to maintain end play within specified limits.

- To determine input shaft end play shim thickness, proceed as follows:
  - a. Measure dimensions A and B.
  - b. Subtract dimension A from dimension B. Then, add 0.05-0.15mm (0.002-0.006 inch). This will equal required shim thickness.
  - c. Refer to the Input Shaft Shim Selection Chart to select the proper shim.
    - To determine countershaft end play shim thickness, proceed as follows:
  - d. Measure dimension C. Then, subtract 0.15- 0.25mm (0.006-0.010 inch). This will equal required shim thickness.
  - e. Refer to the Countershaft Shim Selection Chart to select the proper shim.
    - **Dimension A:** Height of input shaft bearing outer race above transmission front bearing cover mating surface.
    - **Dimension B:** Depth of front cover outer race bore (input shaft).
    - **Dimension C:** Depth of countershaft front bearing race (transmission case to front cover mating surface).

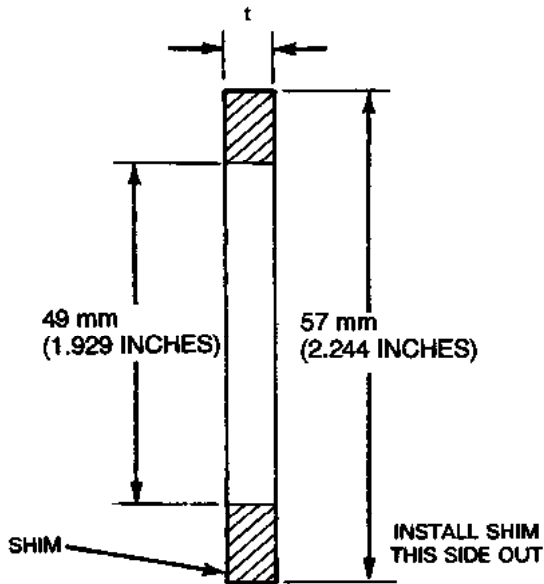




**INPUT SHAFT SHIM SELECTION CHART — M5R2**

Part Number	Thickness (t)
E8TZ-7029-FA	1.4mm (0.0551 inch)
E8TZ-7029-GA	1.5mm (0.0590 inch)
E8TZ-7029-Ha	1.6mm (0.0629 inch)
E8TZ-7029-Ja	1.7mm (0.0669 inch)
E8TZ-7029-S	1.8mm (0.0708 inch)
E8TZ-7029-T	1.9mm (0.0748 inch)
E8TZ-7029-U	2.0mm (0.0787 inch)
E8TZ-7029-V	2.1mm (0.0826 inch)
E8TZ-7029-W	2.2mm (0.0866 inch)
E8TZ-7029-X	2.3mm (0.0905 inch)
E8TZ-7029-Y	2.4mm (0.0944 inch)
E8TZ-7029-Z	2.5mm (0.0984 inch)
E8TZ-7029-AA	2.6mm (0.1023 inch)
E8TZ-7029-BA	2.7mm (0.1062 inch)
E8TZ-7029-CA	2.8mm (0.1102 inch)
E8TZ-7029-DA	2.9mm (0.1141 inch)
E8TZ-7029-EA	3.0mm (0.1181 inch)

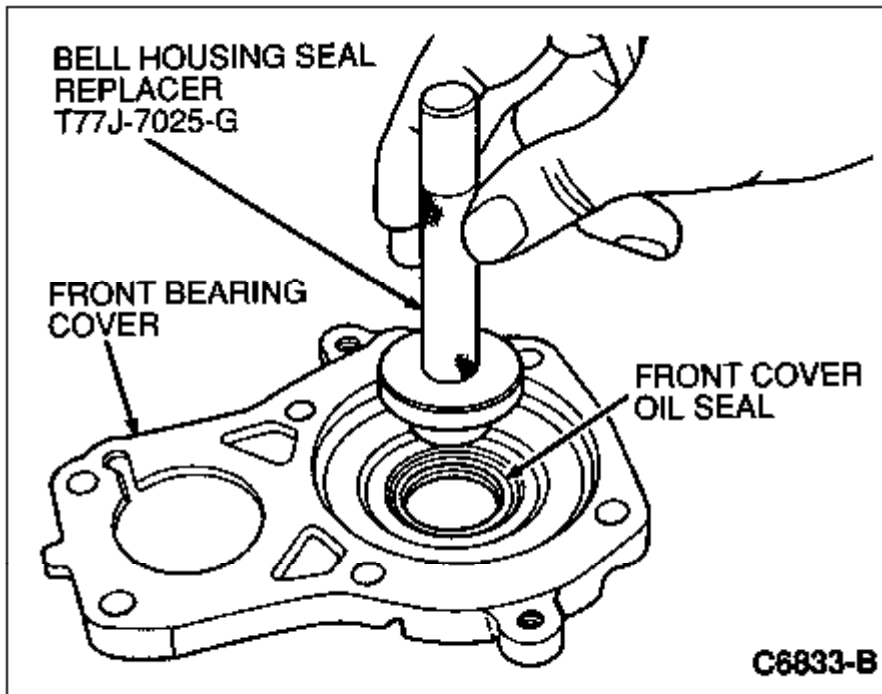
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**COUNTERSHAFT SHIM SELECTION CHART — M5R2**

Part Number	Thickness (t)
E8TZ-7C434-K	3.1mm (0.122 inch)
E8TZ-7C434-L	3.2mm (0.125 inch)
E8TZ-7C434-M	3.3mm (0.129 inch)
E8TZ-7C434-N	3.4mm (0.133 inch)
E8TZ-7C434-P	3.5mm (0.137 inch)
E8TZ-7C434-R	3.6mm (0.141 inch)
E8TZ-7C434-S	3.7mm (0.145 inch)
E8TZ-7C434-T	3.0mm (0.1181 inch)

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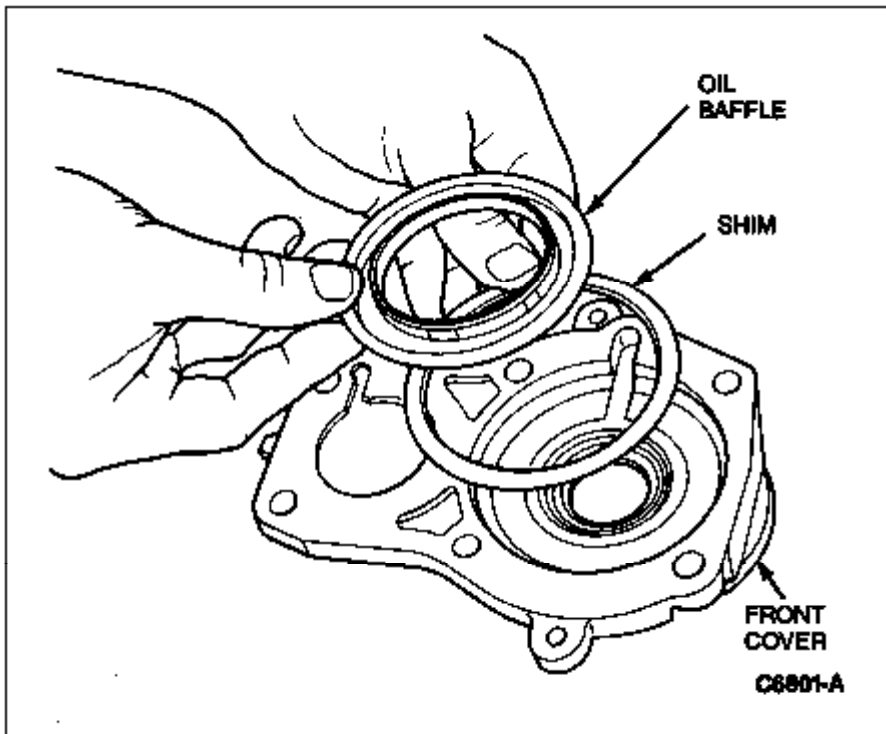
**NOTE:**

To prevent damage to new oil seal lip during assembly, tape the input shaft splines along their entire length.

11. If removed, install front bearing cover oil seal using Bell Housing Seal Replacer T77J-7025-G. Remove any sealant residue remaining on mating surfaces of transmission and front cover.
12. Apply a thin coat of Synthetic MERCON® Multi-Purpose Automatic Transmission Fluid E6AZ-19582-B (ESR-M2C163-A2) or equivalent to front cover oil seal lip. Position bearing shim and baffle plate into front cover (install shim with groove showing). Install spacer to transmission case countershaft front bearing bore.

**NOTE:**

If necessary, apply a sufficient quantity of Synthetic MERCON® Multi-Purpose Automatic Transmission Fluid E6AZ-19582-B (ESR-M2C163-A2) or equivalent to shim, bearing cover and oil baffle to retain them in position during assembly.



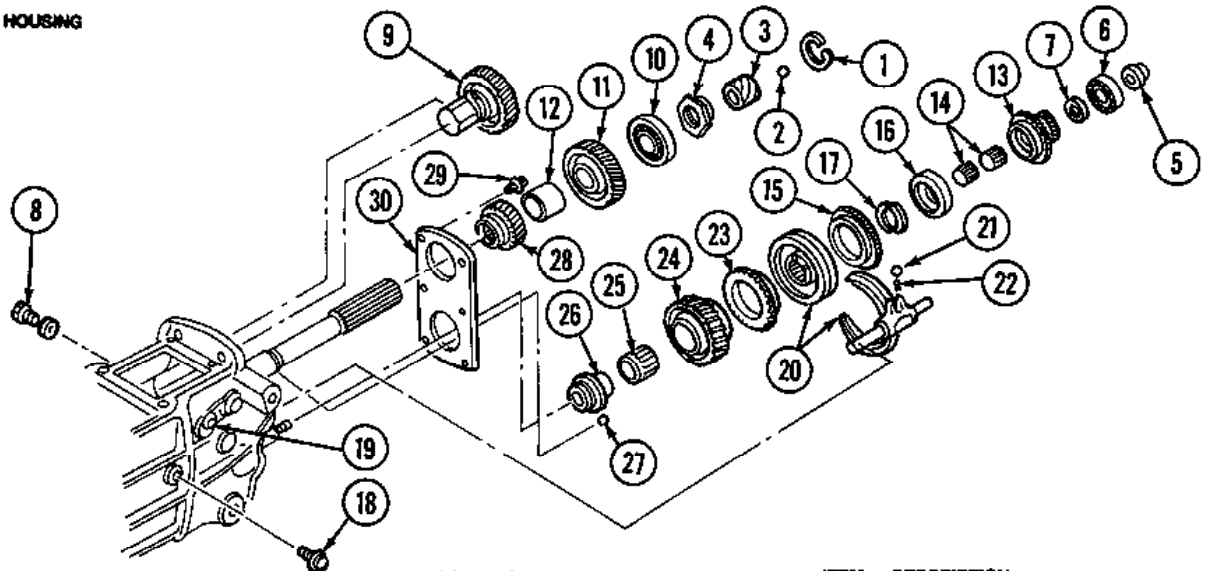
13. Apply a 1/8-inch bead of Silicone Rubber D6AZ-19562-BA (ESB-M4G92-A and ESE-M4G195-A) or equivalent to front cover and front cover retaining bolt threads. Install front bearing cover to transmission case. Install and tighten front bearing cover retaining bolts to 12-16 N-m (9-12 lb-ft).

**NOTE:**

Ensure that front bearing cover retaining bolt heads are marked with a "6".

14. Position transmission horizontally in holding fixture and ensure that transmission rotates freely. Assemble the following parts in the order listed.
  - Ball
  - Fifth gear sleeve
  - Needle bearing

T/M — REAR HOUSING



<b>ITEM</b>	<b>DESCRIPTION</b>	<b>ITEM</b>	<b>DESCRIPTION</b>	<b>ITEM</b>	<b>DESCRIPTION</b>
1.	SNAP RING	13.	COUNTERSHAFT REVERSE GEAR	23.	SYNCHRONIZER RING — 5TH GEAR
2.	BALL	14.	NEEDLE BEARING	24.	5TH GEAR — COUNTERSHAFT
3.	SPEEDO GEAR	15.	SYNCHRONIZER RING — REVERSE (BRASS)	25.	NEEDLE BEARING — 5TH GEAR
4.	LOCKNUT — OUTPUT SHAFT	16.	THRUST WASHER	26.	SLEEVE — 5TH GEAR
5.	LOCKNUT — COUNTERSHAFT	17.	SPLIT WASHER (2 PCS)	27.	BALL
6.	COUNTERSHAFT REAR BEARING	18.	FIXING BOLT — SHIFT ROD	28.	5TH GEAR — OUTPUT SHAFT
7.	THRUST WASHER	19.	5TH/REVERSE COUNTER LEVER ASSY FIXING BOLT	29.	CENTER BEARING COVER BOLT
8.	FIXING BOLT — REVERSE IDLER GEAR	20.	SHIFT RAIL/FORK/HUB/SLEEVE ASSY	30.	CENTER BEARING COVER
9.	REVERSE IDLE GEAR ASSY	21.	LOCK BALL (STEEL)		
10.	BEARING — OUTPUT SHAFT REAR	22.	SPRING — SHIFT RAIL		
11.	REVERSE GEAR — OUTPUT SHAFT				
12.	SLEEVE — OUTPUT SHAFT				

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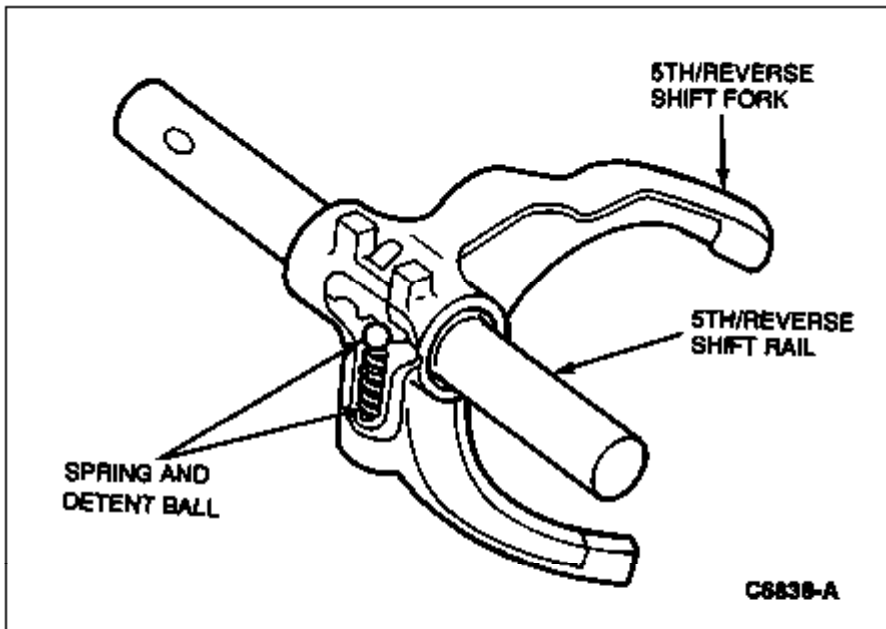
- Install fifth gear onto output shaft by hand. Ensure longer collar of gear faces forward to the transmission.

**WARNING:**

**WEAR SAFETY GLASSES WHEN REMOVING OR INSTALLING THE FIFTH/REVERSE FORK SHIFT RAIL.**

If necessary to remove the fifth/reverse fork shift rail, be sure to cover the installation hole for the detent ball and spring. This will prevent the detent ball and spring from ejecting when the rail is removed.

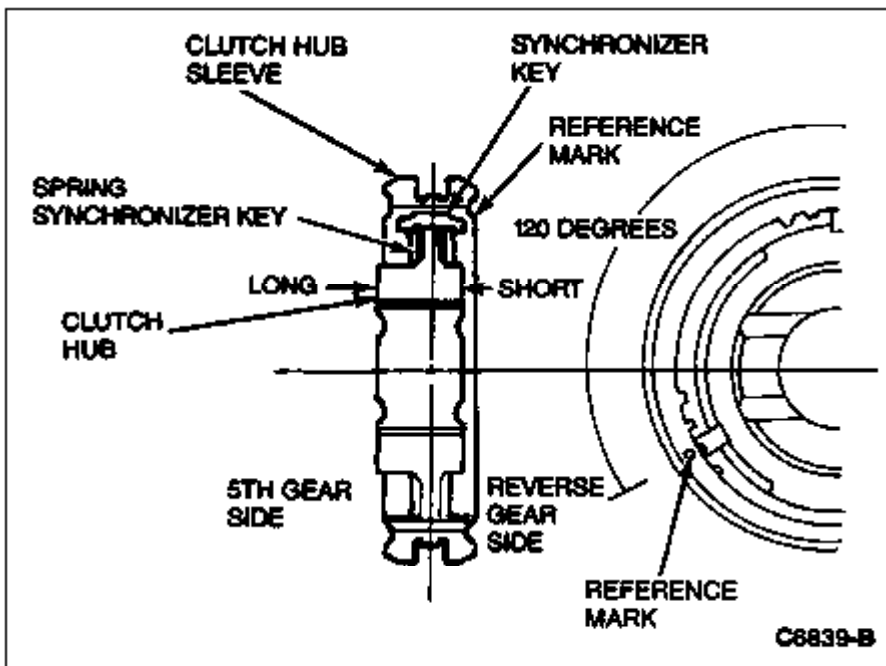
- If fifth/reverse shift fork rail were removed, insert detent ball and spring into installation hole. Using Ball Detent Inserter T88T-7025-H, depress detent ball and spring below fifth/reverse fork rail bore. Install fifth/reverse fork shift rail with detent notches facing detent ball and spring and retaining bolt hole located toward front of transmission. Remove inserter, and push rail completely through fork bore until detent ball locks into first detent notch.



**NOTE:**

Install the longer flange (on the fifth/reverse hub, sleeve, and synchronizer assembly) toward the front of transmission. The reference mark on synchronizer sleeve must be installed toward reverse gear side.

17. Assemble the fifth/reverse synchronizer hub, sleeve, and fifth gear synchronizer blocker ring to fifth/reverse shift fork and rail assembly.

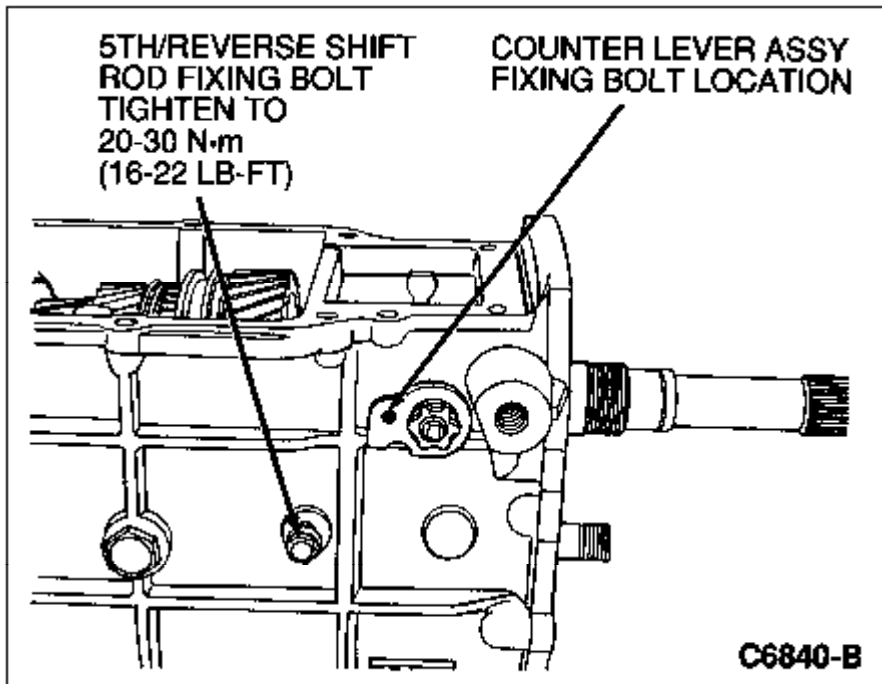


**NOTE:**

For ease of assembly, position the fifth/reverse shift fork into the rearmost of the three detent positions (rearmost from threaded bore). Return shift fork to neutral gear position after installation.

18. Install fifth/reverse shift fork and shift rail assembly (including fifth/reverse synchronizer hub, sleeve, fifth gear, bearing and synchronizer blocker ring) to countershaft. Mate shift fork gate to fifth/reverse counter lever end. Install fifth/reverse fork and shift rail assembly with threaded fixing bolt bores (in rail and transmission case) aligned with each other.

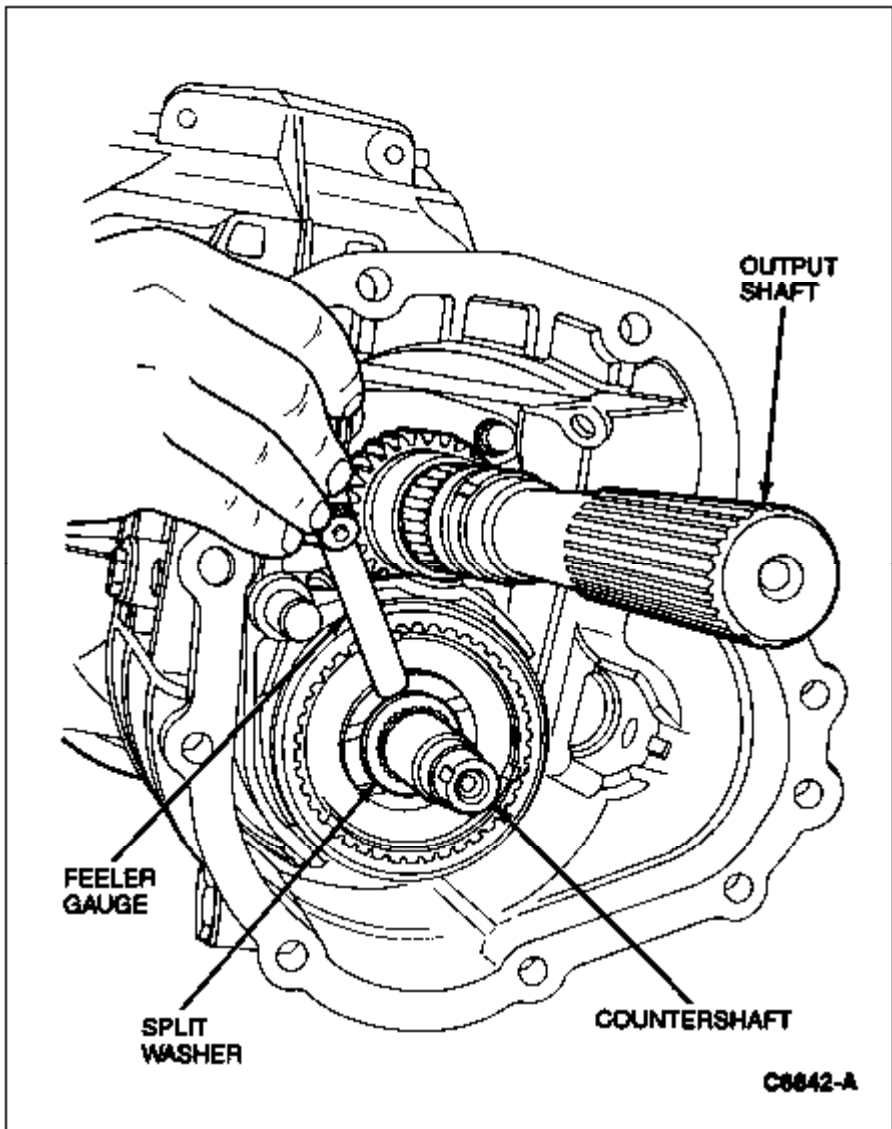
- a. Apply Pipe Sealant with Teflon® D8AZ-19554-A (ESG-M4G194-A and ESR-M18P7-A) or equivalent to fifth/reverse shift rail fixing bolt threads. Install fifth/reverse shift rail fixing bolt to transmission case. Tighten fifth/reverse shift rail fixing bolt to 20-30 N-m (16-22 lb-ft).



**NOTE:**

If clutch hub and/or counter reverse gear have been replaced, new split washers must be selected to maintain end play within 0.00-0.05mm (0.00-0.0019 inch). Measure end play using a feeler gauge. Select replacement split washers using the Split Washer Selection Chart. Ensure that split washers are a matched set of identical thickness.

19. Install split washer onto countershaft.



**SPLIT WASHER SELECT CHART**

Part Number	Thickness
E8TZ-7R482-A	3.0mm (0.118 inch)
E8TZ-7R482-B	3.1mm (0.122 inch)
E8TZ-7R482-C	3.2mm (0.125 inch)
E8TZ-7R482-D	3.3mm (0.129 inch)
E8TZ-7R482-E	3.4mm (0.133 inch)
To Be Determined	3.05mm (0.120 inch)
To Be Determined	3.15mm (0.124 inch)
To Be Determined	3.25mm (0.127 inch)
To Be Determined	3.35mm (0.131 inch)
To Be Determined	3.45mm (0.135 inch)
To Be Determined	3.50mm (0.137 inch)

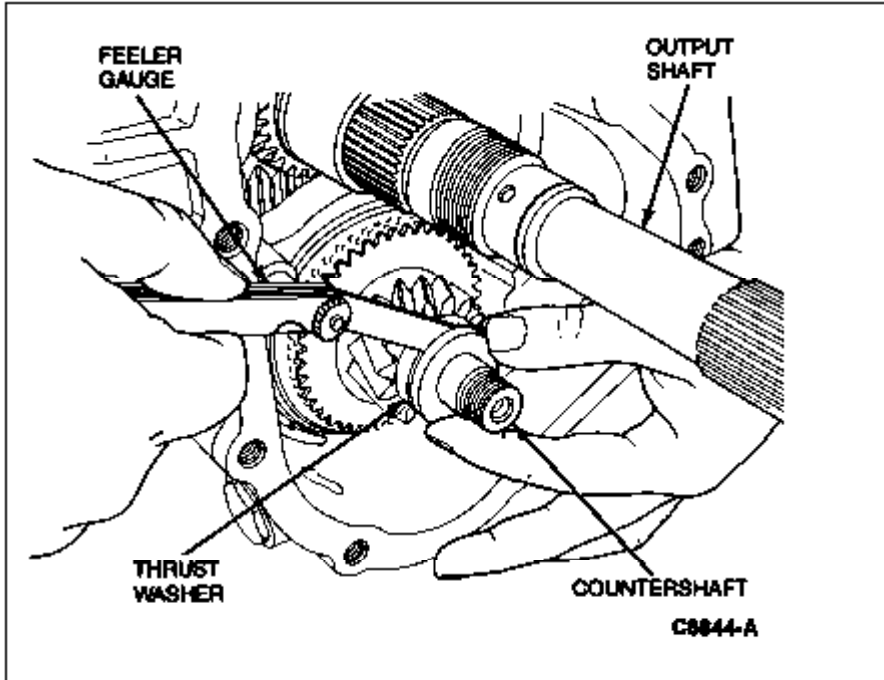
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20. Install reverse gear thrust washer over countershaft (groove of washer toward split washer).

**NOTE:**

Ensure that reverse synchronizer blocker ring is in line with insert keys.

21. Install reverse synchronizer blocker ring and needle bearings into counter reverse gear. Install counter reverse gear and needle bearings onto countershaft as an assembly. Install thrust washer to countershaft.
22. Press thrust washer forward (by hand) against shoulder on countershaft. Maintain forward pressure against thrust washer and insert feeler gauge between thrust washer and counter reverse gear. Using the chart, determine correct thrust washer to obtain specified end play. Counter reverse gear end play: 0.25-0.35mm (0.010-0.014 inch).



23. Using the Thrust Washer Selection Chart, determine the correct select thrust washer to obtain specified end play. This will require removing reverse countershaft gear in order to replace select thrust washer.

THRUST WASHER SELECT CHART

Part Number	Thickness
E8TZ-7C340-A	7.5mm (0.2952 inch)
E8TZ-7C340-B	7.7mm (0.3031 inch)
E8TZ-7C340-C	7.9mm (0.3110 inch)
E8TZ-7C340-D	7.4mm (0.2913 inch)
E8TZ-7C340-E	7.6mm (0.2992 inch)
E8TZ-7C340-F	7.8mm (0.3070 inch)

24. Install thrust washer.

**NOTE:**

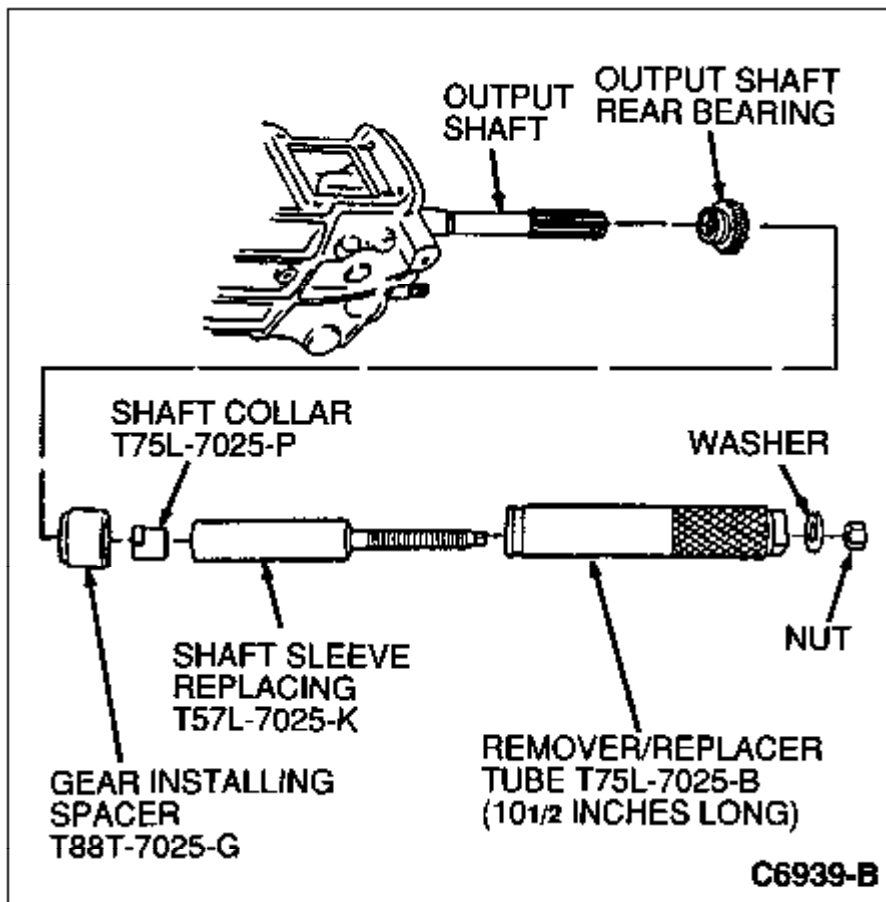
Installation of a suitable spacer prevents thrust washer and split washers from slipping off shaft, and avoids interference with reverse idler gears.

25. Temporarily install a suitable spacer (inner bore larger than 21mm (0.826 inch), outer bore smaller than 36mm (1.417 inch), 15-20mm (0.59-0.78 inch) in length) in place of countershaft bearing. Loosely install countershaft locknut to retain components.
26. Install reverse idler gear assembly. Apply Pipe Sealant with Teflon® D8AZ-19554-A (ESG-M4G194-A and ESR-M18P7-A) to reverse idler gear fixing bolt threads. Install and tighten fixing bolt to 79-116 N-m (58-86 lb-ft).

**NOTE:**

If it is necessary to replace reverse idler gear, refer to Subassemblies, «Reverse Idler Gear Shaft» , for selective reverse idler gear assembly procedure.

27. Install sleeve and reverse gear onto output shaft by hand. Ensure that the longer flange of the reverse gear faces rearward to the transmission.
28. Position counter lever assembly to transmission and align to slot in fork. Install thrust washer and retaining ring. Apply Pipe Sealant with Teflon® D8AZ-19554-A (ESG-M4G194-A and ESR-M18P7-A) to counter lever fixing bolt threads. Install counter lever fixing bolt and tighten to 8-10 N-m (6-7 lb-ft).
29. Install output shaft rear bearing using Gear Installing Spacer T88T-7025-G, Shaft Collar T75L-7025-P, Shaft Sleeve-Replacing T75L-7025-K, Remover/Replacer Tube T75L-7025-B or Remover/Replacer Tube T85T-7025-A nut and washer.



30. Remove temporary spacer from countershaft.
31. Install countershaft rear bearing by hand.

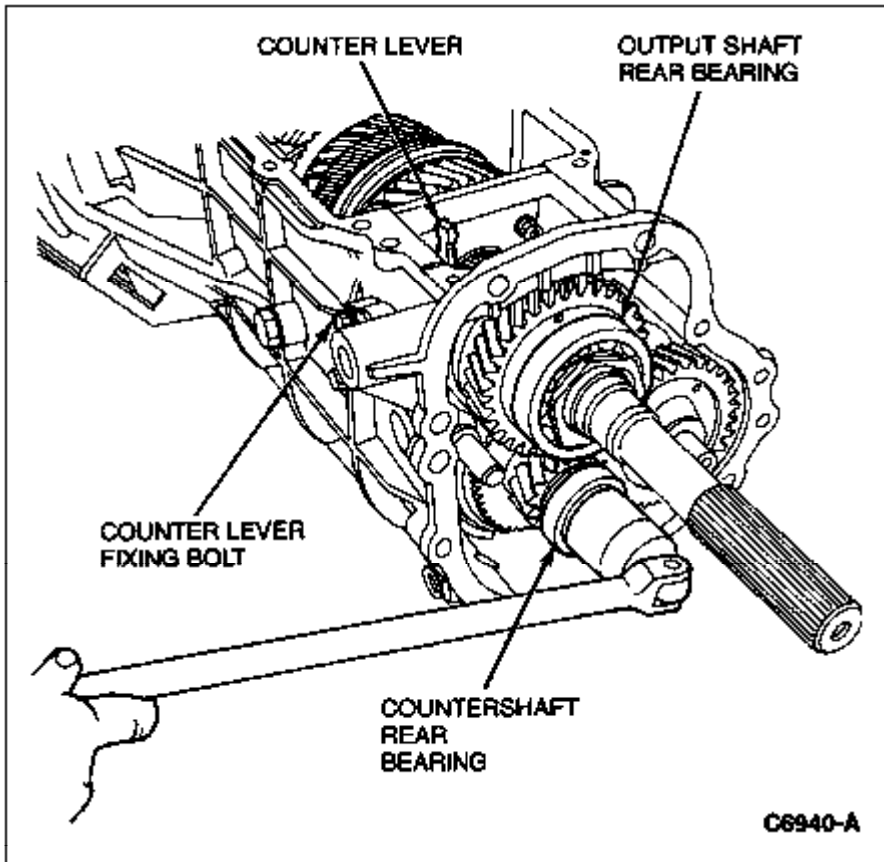
**NOTE:**

Tightening shaft locknuts without fully seating bearing can cause damage to output shaft threads.

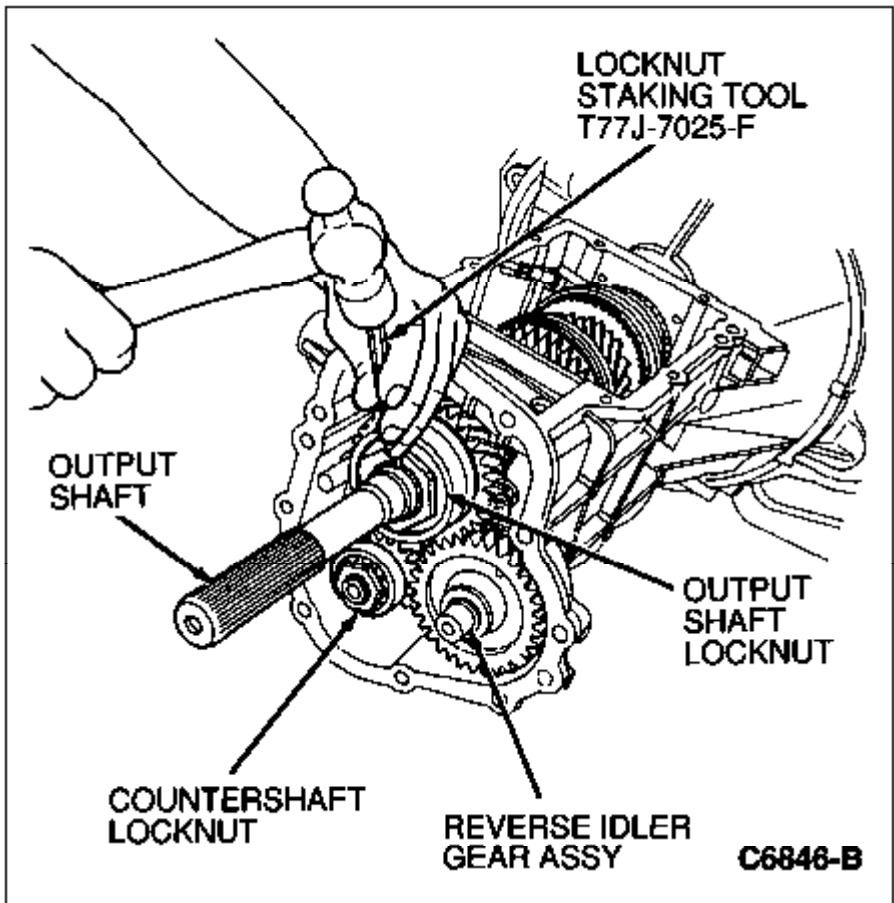
**NOTE:**

Always install new output and countershaft locknuts when assembling transmission. Locknuts unstaked during disassembly cannot be reused.

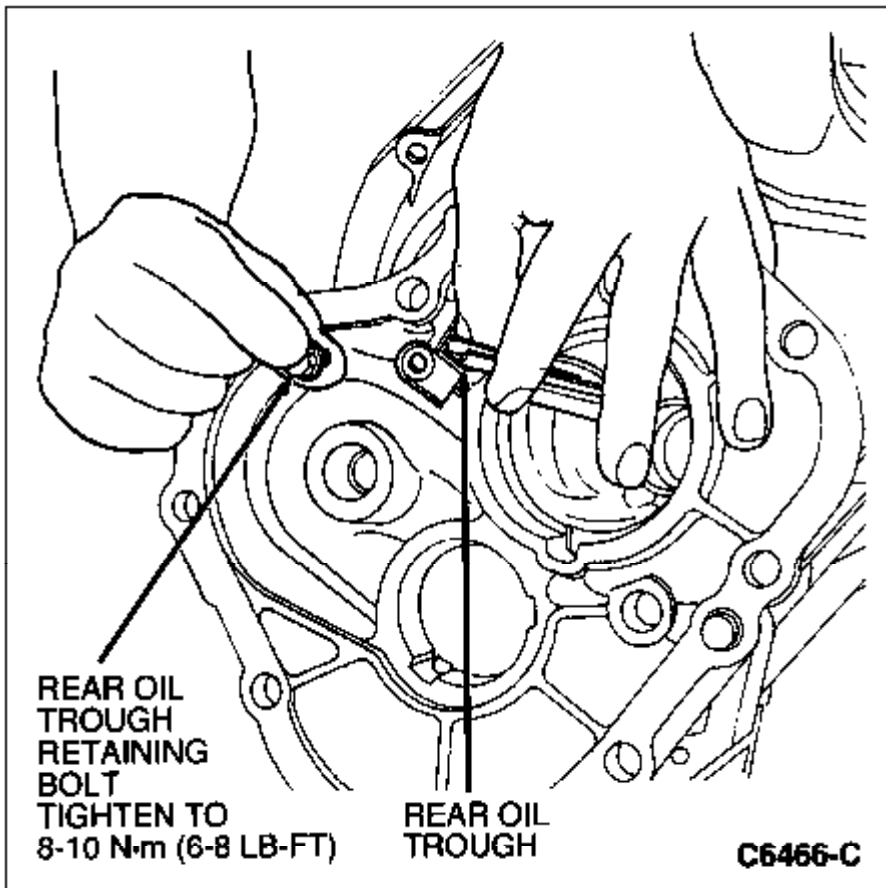
32. Lock transmission into first and third gears. Install new output and countershaft locknuts hand tight. Tighten output shaft to 216-274 N-m(160-202 lb-ft). Tighten countershaft locknut to 128-196 N-m (94-144 lb-ft).



33. Stake (tightened) locknuts to bottom of shaft groove using Locknut Staking Tool T77J-7025-F.



34. Apply Pipe Sealant with Teflon® D8AZ-19554-A (ESG-M4G194-A and ESR-M18P7-A) or equivalent to rear oil trough retaining bolt. Position oil passage to transmission case and install retaining bolt. Tighten retaining bolt to 8-10 N-m (6-7 lb-ft).



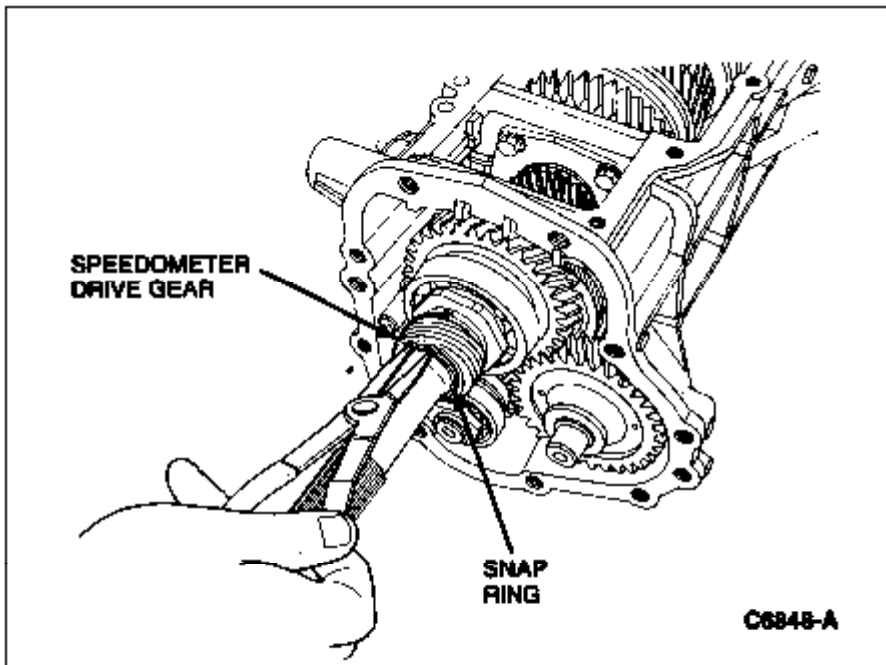
**NOTE:**

The speedometer drive gear contains three detents into which the steel drive ball can be installed. The steel drive ball can be installed into any of the three detents.

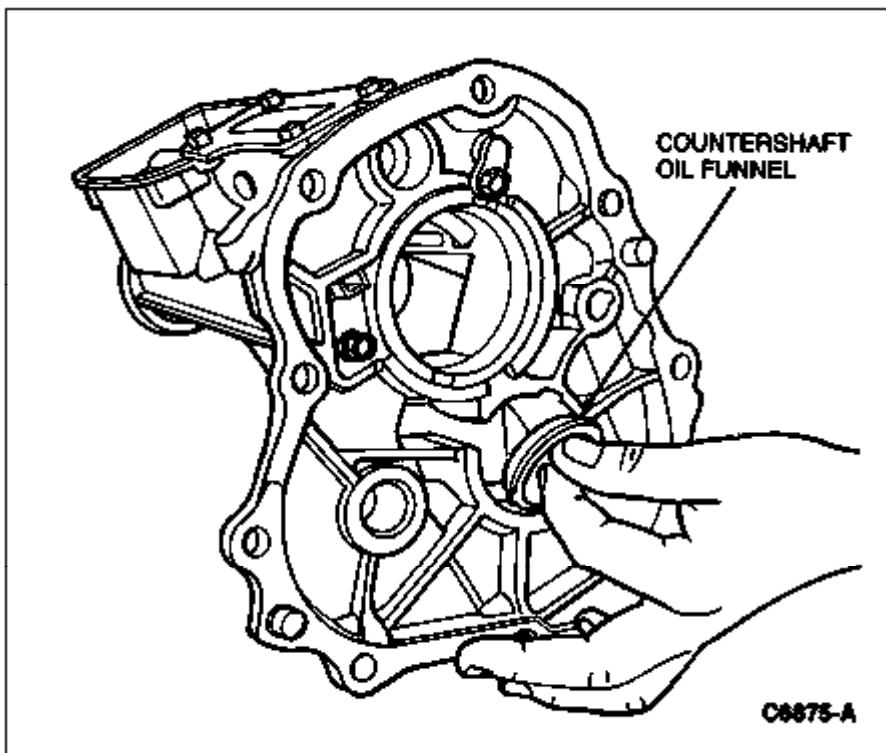
**NOTE:**

When installing a speedometer drive gear, ensure that replacement gear is the same color as original. Speedometer drive gear part number and corresponding color is as follows: Green--E8TZ-17285-C (8 teeth RH).

35. Install speedometer drive gear and steel ball to output shaft. Install snap ring retaining speedometer drive gear to output shaft.



36. Install countershaft oil funnel with tabs located in correct slots.

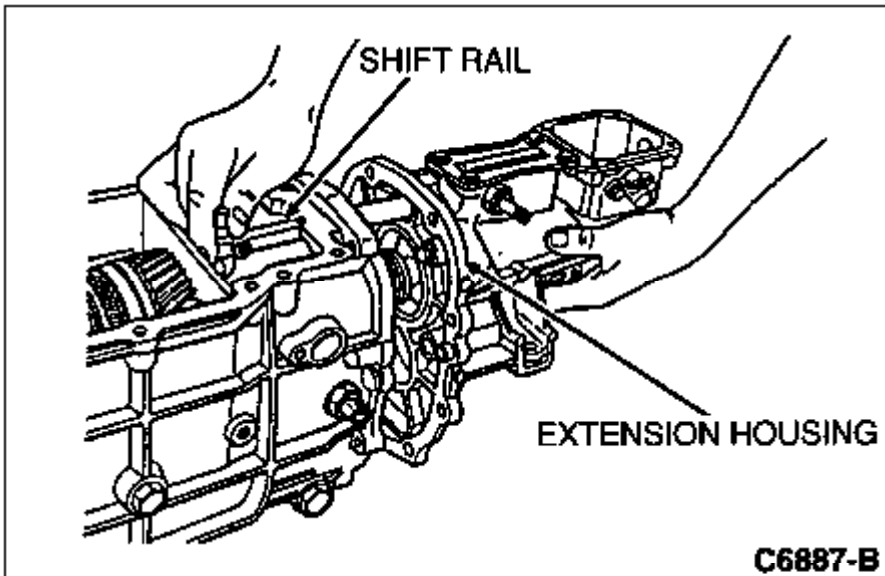


**NOTE:**

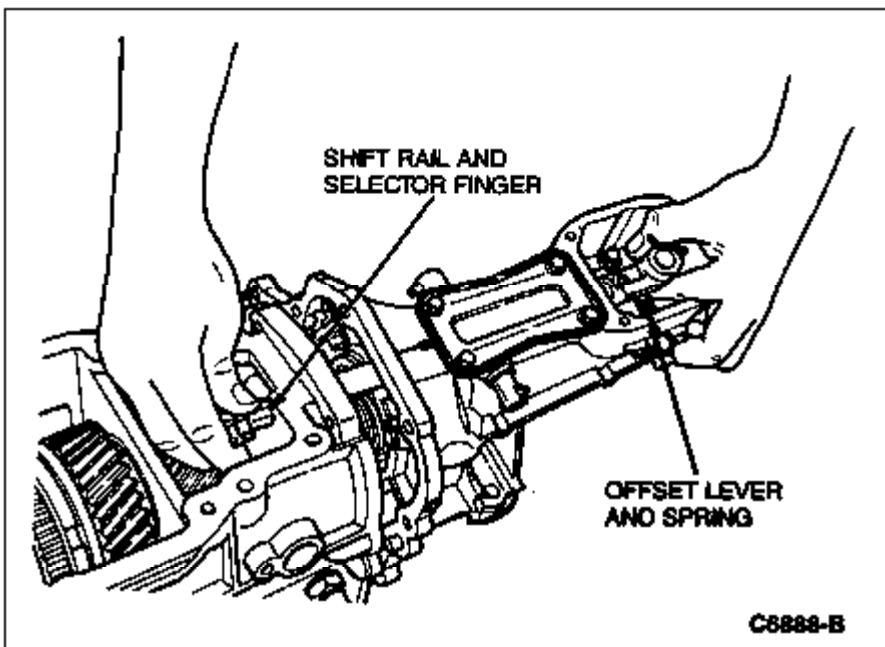
Extension housing bushing cannot be serviced. If bushing requires service, extension housing must be replaced as a unit.

37. Remove any sealant residue from mating surfaces of transmission case and extension housing. Apply a 1/8-inch bead of Silicone Rubber D6AZ-19562-BA (ESB-M4G92-A and ESE-M4G195-A) or equivalent to transmission case.
38. Insert shift rail and selector finger assembly into rear hole of transmission case.
39. Position extension housing approximately three-fourths of the way to transmission case guiding shift

rail through extension housing bushing.



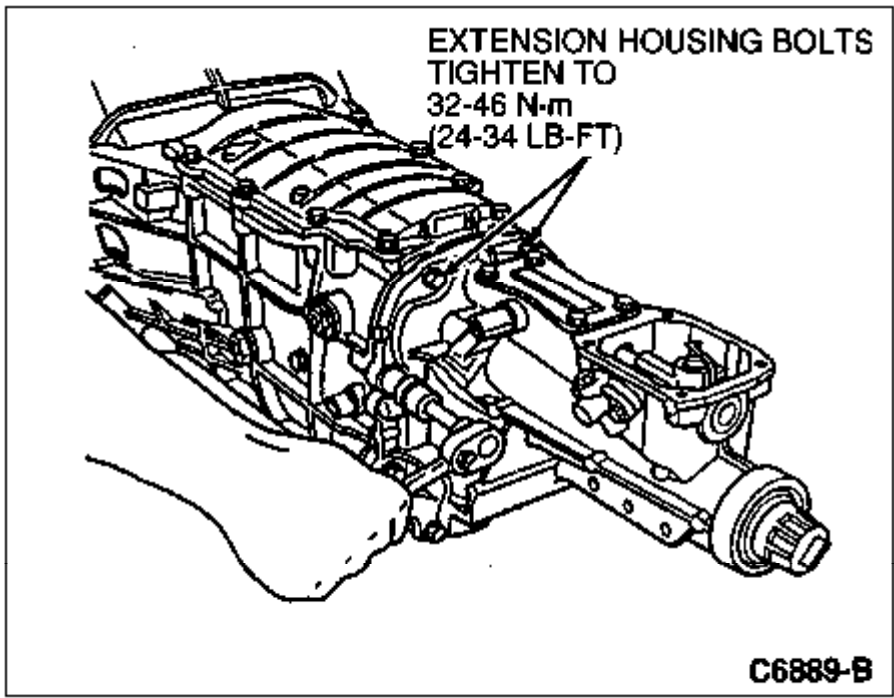
40. Place offset lever and guide spring in extension housing. Continue mounting extension housing toward transmission case, guiding shift rail into offset lever and spring.



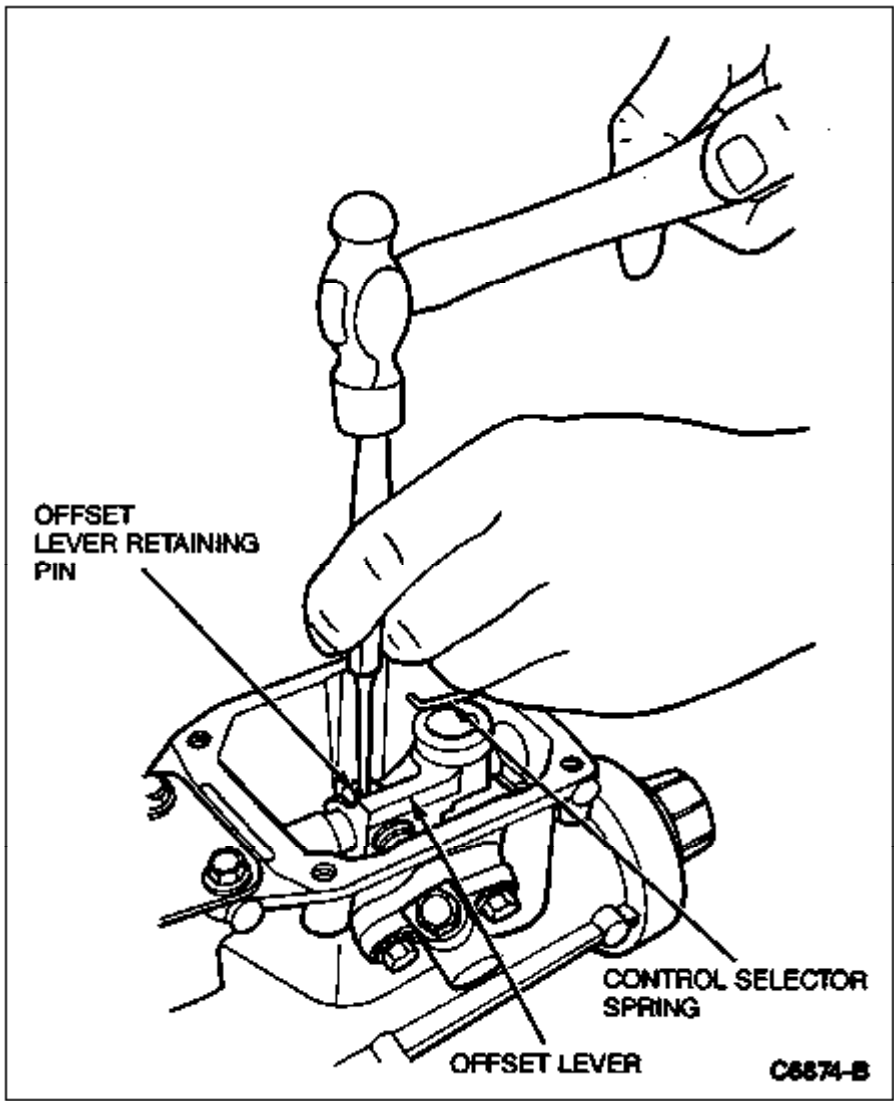
41. Seat extension housing assembly to transmission case and install extension housing retaining bolts. Tighten bolts to 32-46 N-m (24-34 lb-ft).

**CAUTION:**

Ensure transmission input and output shafts rotate freely.



42. Align hole in offset lever to shift rail hole and drive roll pin into holes using hammer.



43. Place synchronizers into NEUTRAL position. Ensure that shift forks on top cover assembly and shift rod selector finger are in NEUTRAL position.

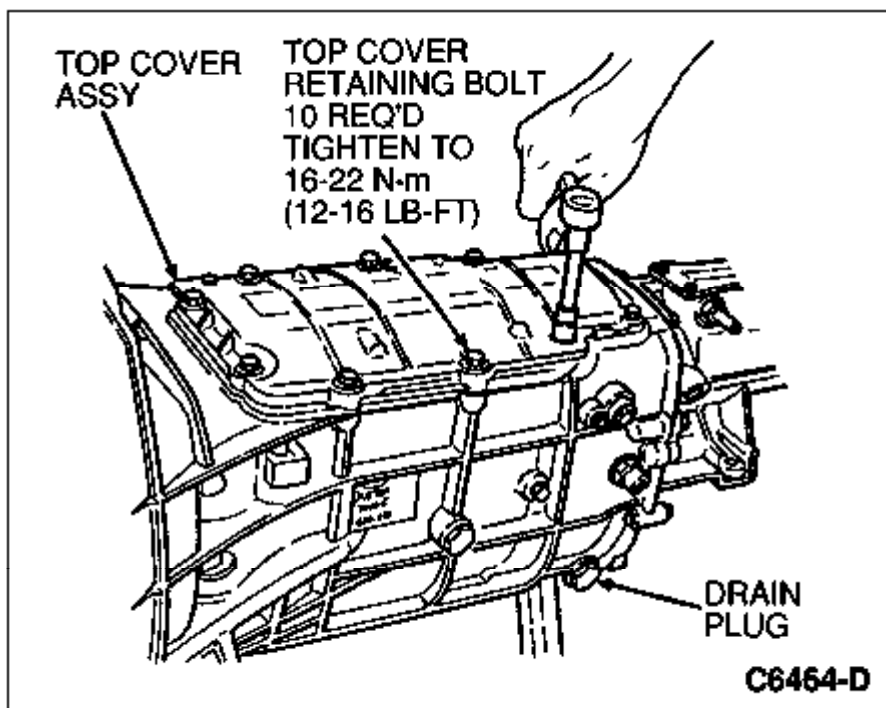
**NOTE:**

Do not apply sealant to top cover of transmission case mating surfaces. If necessary, apply a small quantity of Synthetic MERCON® Multi-Purpose Automatic Transmission Fluid E6AZ-19582-B (ESR-M2C163-A2) or equivalent to sealing gasket to retain gasket in position during assembly.

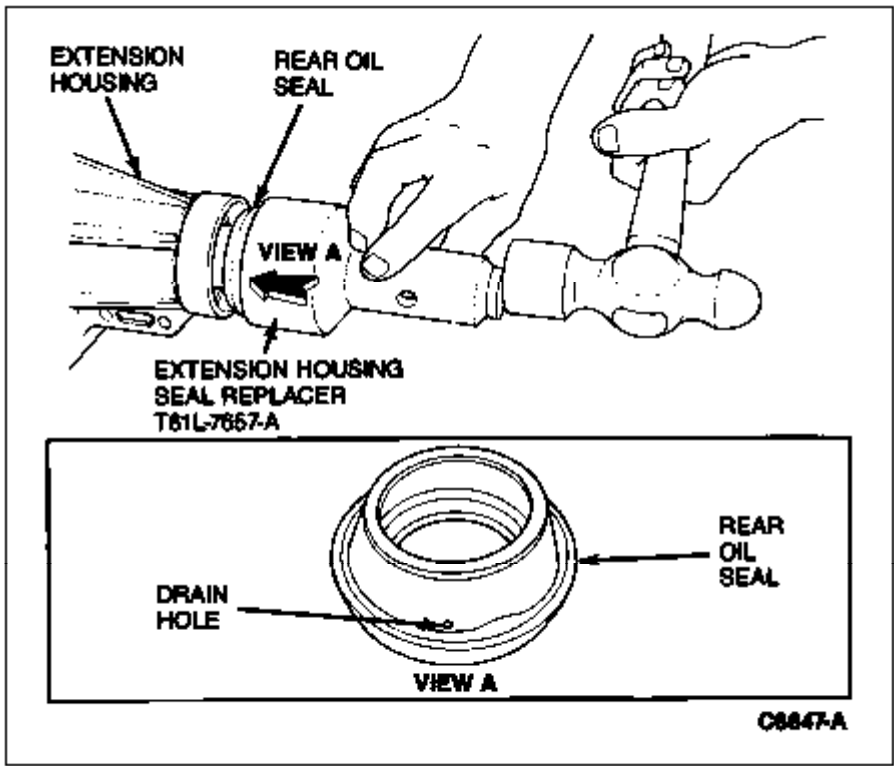
44. Check position of top cover gasket to ensure proper seating. Position top cover to transmission case, and carefully engage selector finger with shift forks, and shift forks with synchronizers.
45. Install 10 transmission top cover retaining bolts into top cover retaining bolt locations and tighten to 16-22 N-m (12-16 lb-ft).

**NOTE:**

Apply Pipe Sealant with Teflon® D8AZ-19554-A (ESG-M4G194-A and ESR-M18P7-A) or equivalent to rear two top cover retaining bolts prior to assembly.



46. Coat thread of drain plug with Pipe Sealant with Teflon® D8AZ-19554-A (ESG-M4G194-A and ESR-M18P7-A) or equivalent. Install transmission drain plug sealing washer. Tighten to 40-58 N-m (29-43 lb-ft).
47. If removed, install rear seal into extension housing using Extension Housing Seal Replacer T61L-7657-A or equivalent. Ensure that oil seal drain hole faces downward.



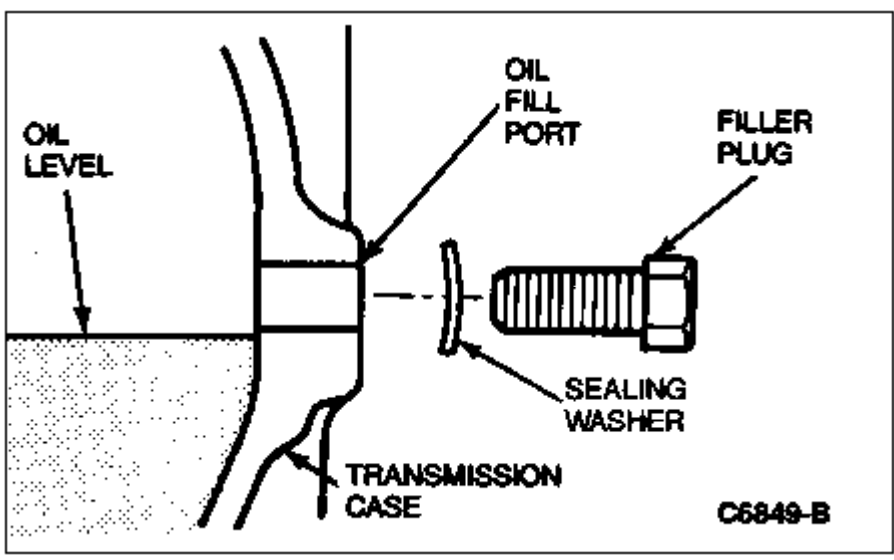
48. Install neutral sensing switch, if removed. Apply Pipe Sealant with Teflon® D8AZ-19554-A (ESG-M4G194-A and ESR-M18P7-A) or equivalent to threads and tighten to 25-35 N-m (18-26 lb-ft).

NOTE:  
Shift transmission into all gear positions to test for proper function.

49. Install backup lamp switch, if removed. Apply Pipe Sealant with Teflon® D8AZ-19554-A (ESG-M4G194-A and ESR-M18P7-A) or equivalent to threads and tighten to 25-35 N-m (18-26 lb-ft).

NOTE:  
Do not fill transmission with fluid until after it has been installed in vehicle.

50. After transmission is installed, add five ounces of Additive Friction Modifier C8AZ-19B546-A (EST-M2C118-A) and fill to a total of 3L (6.3 pt) with Synthetic MERCON® Multi-Purpose transmission fluid E6AZ-19582-B (ESR-M2C163-A2) or equivalent.



NOTE:

Apply Pipe Sealant with Teflon® D8AZ-19554-A (ESG-M4G194-A and ESR-M18P7-A) or equivalent to fill plug threads prior to installation.

51. Install transmission fill plug and sealing washer. Tighten fill plug to 40-58 N-m (29-43 lb-ft) using a 24mm socket.
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