

# MANUAL TRANSMISSION 2B

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## GENERAL INFORMATION

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### GENERAL

Three manual transmission models are used in Jeep vehicles; they are Models SR-4, T-176, and T-18A.

Models SR-4 and T-176 are 4-speed, constant mesh units providing synchromesh engagement in all forward gear ranges. Model T-18A is a 4-speed, constant mesh unit providing synchromesh engagement in second, third, and fourth gear ranges only. First (low) gear is not synchronized in this transmission.

Model SR-4 is used with four- and six-cylinder engines. Model T-176 is used with six- and eight-cylinder engines. Model T-18A is used in J-20 Truck models only.

The three transmission models are all floor shift units. Column shift units are not available in any Jeep model.

The shift mechanism on all transmission models is located within the shift control housing which also serves as the transmission top cover. The shift mechanism does not require adjustment and can be serviced independently of the transmission.

### GEARSHIFT PATTERNS

The gearshift pattern for each transmission model is shown in the Gearshift Pattern Chart. Forward gear

ranges for each model are in a standard "H" configuration. However, reverse gear position differs between them. The SR-4 requires that the lever be pressed downward first before moving into the reverse position.

### BACKUP LAMP SWITCH

A spring and plunger-type backup lamp switch is used on all models. The switch is located in the shift control housing and is actuated by the reverse shift rail. The switch does not require adjustment and is serviced as an assembly only.

### IDENTIFICATION

An identification tag displaying the Jeep part number is attached to the shift control housing. The information on this tag is necessary to obtain correct replacement parts should replacement become necessary. Be sure the tag is securely attached in the original location after completing all service operations.

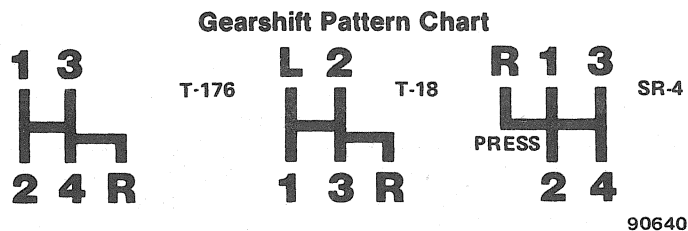
### TRANSMISSION GEAR RATIOS

Different ratio gear sets are used in SR-4 and T-176 transmissions. The ratios used for six- and eight-cylinder engine applications are not the same. Refer to the Transmission Gear Ratio Chart at the end of this section for ratio applications.

## Service Diagnosis

Condition	Possible Cause	Correction
TRANSMISSION SHIFTS HARD	(1) Clutch adjustment incorrect (2) Clutch linkage or cable binding (3) Shift rail binding  (4) Internal bind in transmission caused by shift forks, selector plates, or synchronizer assemblies (5) Clutch housing misalignment (6) Incorrect lubricant (7) Block rings and/or cone seats worn	(1) Adjust clutch. (2) Lubricate or repair as necessary. (3) Check for mispositioned selector arm roll pin, loose cover bolts, worn shift rail bores, worn shift rail, distorted oil seal, or extension housing not aligned with case. Repair as necessary. (4) Remove, disassemble and inspect transmission. Replace worn or damaged components as necessary. (5) Check runout at rear face of clutch housing. Correct runout as outlined in Chapter 2A. (6) Drain and refill transmission. (7) Blocking ring to gear clutch tooth face clearance must be 0.030 inch or greater. If clearance is correct it may still be necessary to inspect blocking rings and cone seats for excessive wear. Repair as necessary.
GEAR CLASH WHEN SHIFTING FROM ONE GEAR TO ANOTHER	(1) Clutch adjustment incorrect (2) Clutch linkage or cable binding (3) Clutch housing misalignment  (4) Lubricant level low or incorrect lubricant (5) Gearshift components, or synchronizer assemblies worn or damaged	(1) Adjust Clutch. (2) Lubricate or repair as necessary. (3) Check runout at rear of clutch housing. Correct runout as outlined in Chapter 2A (4) Drain and refill transmission and check for lubricant leaks if level was low. Repair as necessary. (5) Remove, disassemble and inspect transmission. Replace worn or damaged components as necessary.
TRANSMISSION NOISY	(1) Lubricant level low or incorrect lubricant (2) Clutch housing-to-engine, or transmission-to-clutch housing bolts loose (3) Dirt, chips, foreign material in transmission (4) Gearshift mechanism, transmission gears, or bearing components worn or damaged (5) Clutch housing misalignment	(1) Drain and refill transmission. If lubricant level was low, check for leaks and repair as necessary. (2) Check and correct bolt torque as necessary. (3) Drain, flush, and refill transmission. (4) Remove, disassemble and inspect transmission. Replace worn or damaged components as necessary. (5) Check runout at rear face of clutch housing. Correct runout as outlined in Chapter 2A.

Condition	Possible Cause	Correction
JUMPS OUT OF GEAR	(1) Clutch housing misalignment	(1) Check runout at rear face of clutch housing. Correct runout as outlined in Chapter 2A.
	(2) Gearshift lever loose	(2) Check lever for worn fork. Tighten loose attaching bolts.
	(3) Offset lever nylon insert worn or lever attaching nut loose	(3) Remove gearshift lever and check for loose offset lever nut or worn insert. Repair or replace as necessary.
	(4) Gearshift mechanism, shift forks, selector plates, interlock plate, selector arm, shift rail, detent plugs, springs or shift cover worn or damaged	(4) Remove, disassemble and inspect transmission cover assembly. Replace worn or damaged components as necessary.
	(5) Clutch shaft or roller bearings worn or damaged	(5) Replace clutch shaft or roller bearings as necessary.
	(6) Gear teeth worn or tapered, synchronizer assemblies worn or damaged, excessive end play caused by worn thrust washers or output shaft gears	(6) Remove, disassemble, and inspect transmission. Replace worn or damaged components as necessary.
	(7) Pilot bushing worn	(7) Replace pilot bushing.
WILL NOT SHIFT INTO ONE GEAR	(1) Gearshift selector plates, interlock plate, or selector arm, worn, damaged, or incorrectly assembled	(1) Remove, disassemble, and inspect transmission cover assembly. Repair or replace components as necessary.
	(2) Shift rail detent plunger worn, spring broken, or plug loose	(2) Tighten plug or replace worn or damaged components as necessary.
	(3) Gearshift lever worn or damaged	(3) Replace gearshift lever.
	(4) Synchronizer sleeves or hubs, damaged or worn	(4) Remove, disassemble and inspect transmission. Replace worn or damaged components.
LOCKED IN ONE GEAR — CAN NOT BE SHIFTED OUT	(1) Shift rail(s) worn or broken, shifter fork bent, setscrew loose, center detent plug missing or worn	(1) Inspect and replace worn or damaged parts.
	(2) Broken gear teeth on countershaft gear, clutch shaft, or reverse idler gear	(2) Inspect and replace damaged part.
	(3) Gearshift lever broken or worn, shift mechanism in cover incorrectly assembled or broken, worn damaged gear train components	(3) Disassemble transmission. Replace damaged parts or assemble correctly.



## TRANSMISSION LUBRICANT

The recommended lubricant for all transmission models is SAE 85W-90, A.P.I. classification GL-5 Gear Lubricant. This lubricant grade should be used during all service and maintenance operations.

**NOTE:** Do not use gear lubricants containing lead, chlorine, or sulphur compounds.

When refilling or adding lubricant to the transmission, fill the transmission until the lubricant level is at the lower edge of the fill plug hole only. Lubricant capacities for the three transmission models are:

- SR-4—3.0 Pints (1.4 liters).
- T-176—3.5 Pints (1.7 liters).
- T-18A—6.5 Pints (3.07 liters).

## TRANSMISSION REMOVAL

(1) Remove screws attaching transmission shift lever boot to floorpan and slide boot upward on lever.

(2) On models with SR-4 transmission, remove bolts attaching transmission shift lever housing to transmission. Lift shift lever and housing upward and secure assembly to floorpan with wire.

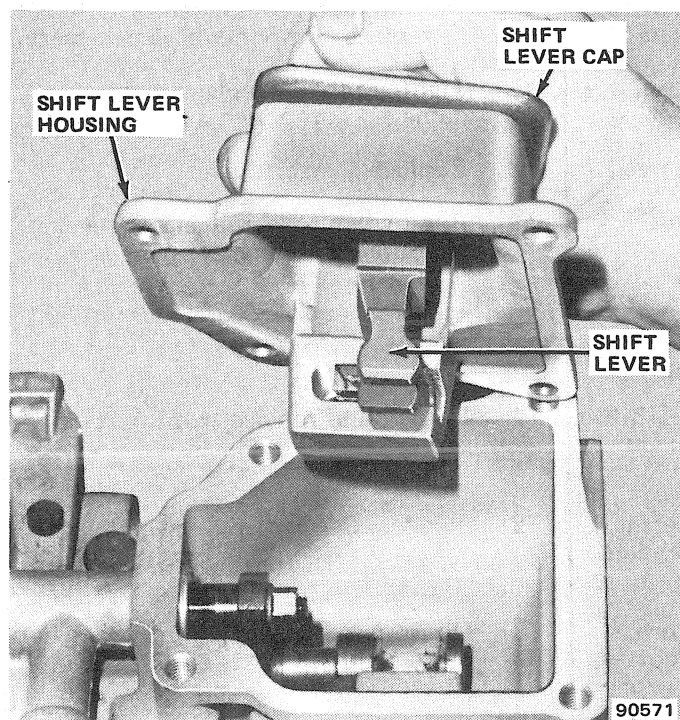


Fig. 2B-1 Shift Lever Removal—Model SR-4

(3) On models with T-18A transmission, unthread shift lever cap and remove cap, gasket, spring seat, spring and shift lever as assembly. Remove shift lever locating pin from housing.

(4) On models with T-176 transmission, press and turn transmission shift lever retainer to release lever. Remove lever, boot, spring and seat as assembly.

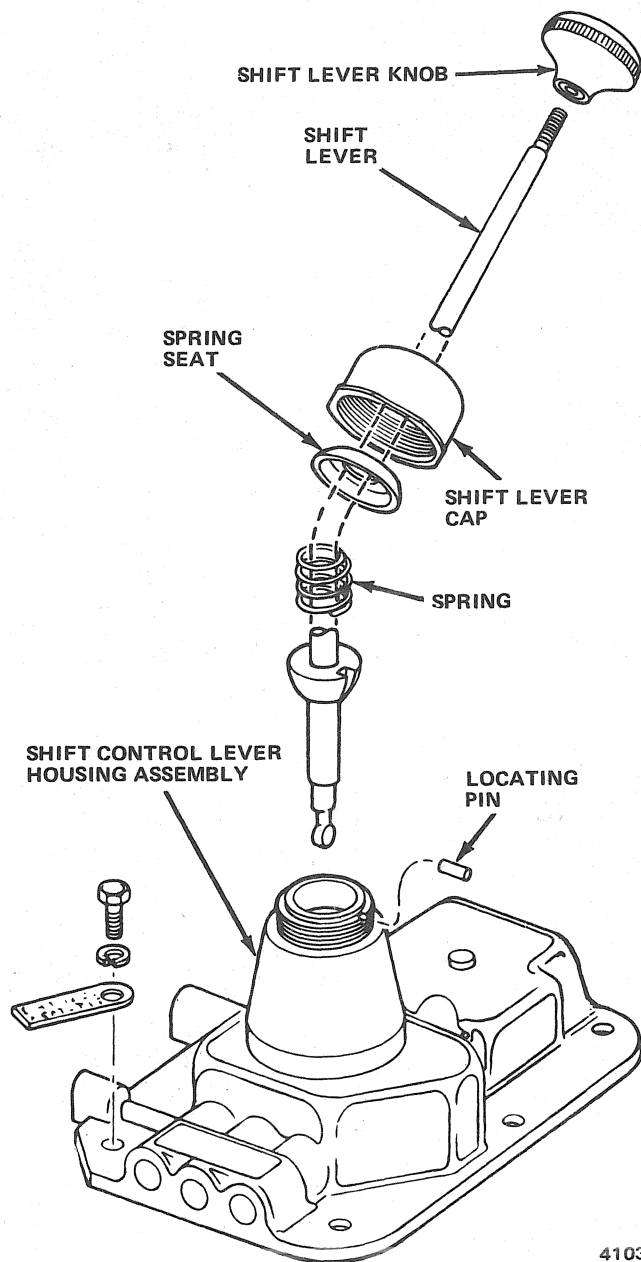


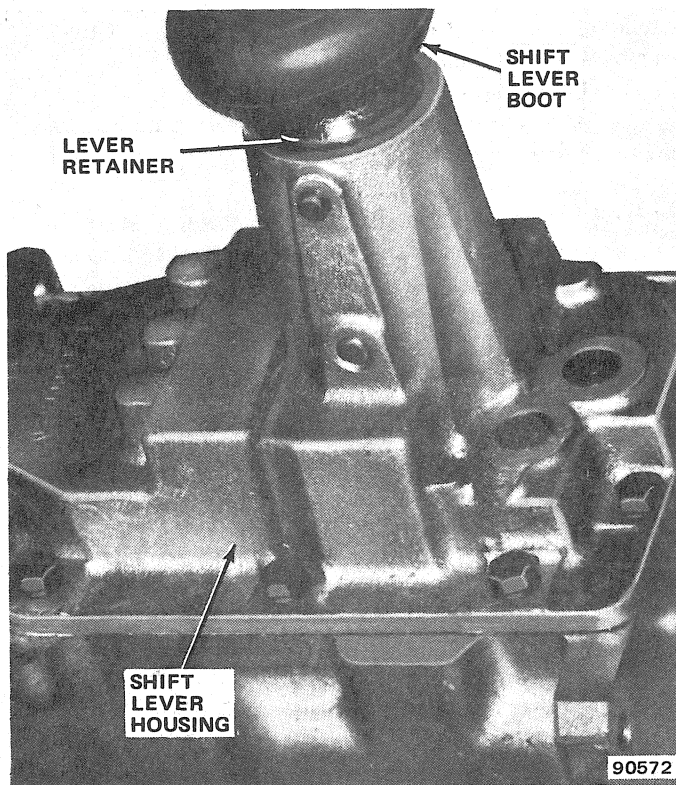
Fig. 2B-2 Shift Lever Removal—Model T-18A

(5) Raise vehicle.

(6) Mark rear propeller shaft and transfer case yoke for assembly alignment reference.

(7) Disconnect rear propeller shaft at transfer case yoke. Move shaft aside and secure to underbody with wire.





**Fig. 2B-3 Shift Lever Removal—Model T-176**

(8) On Cherokee and Truck models, disconnect front parking brake cable at equalizer. Remove clip that retains rear cable to rear crossmember and move cable aside.

(9) Position safety stand under clutch housing to support engine.

(10) Remove nuts and bolts attaching rear crossmember to frame rails and rear support cushion and remove crossmember.

(11) Disconnect speedometer cable.

(12) Disconnect backup light switch wire.

(13) Disconnect four-wheel drive indicator switch wire.

(14) Disconnect transfer case vent hose at transfer case.

(15) Mark front propeller shaft and transfer case yoke for assembly alignment reference.

(16) Disconnect front propeller shaft from transfer case yoke. Move shaft aside and secure to underbody with wire.

(17) On CJ models, remove transfer case shift lever as follows: Remove shifter shaft retaining nut. Remove cotter pins that retain shift control link pins in shift rods and remove pins. Remove shifter shaft and disengage shift lever from shift control links. Slide lever upward in boot to move lever out of way.

**NOTE:** On some models, the shifter shaft must be unthreaded from the shift lever in order to remove it. On other models, the shaft can be removed simply by sliding it out of the lever.

(18) On Cherokee and Truck models, remove cotter pin and washers that connect link to shift lever and disconnect link from shift lever.

(19) Support transmission-transfer case assembly with transmission jack. Use safety chain to secure assembly on jack.

(20) Remove bolts attaching transmission to clutch housing and remove transmission-transfer case assembly.

(21) Remove bolts attaching transfer case to transmission and remove transfer case.

(22) Clean old gasket material and sealer from mating surfaces of transmission and transfer case.

(23) Remove pilot bushing lubricating wick from bushing and soak wick in engine oil. Use long needle-nose pliers to remove wick from bushing.

## TRANSMISSION INSTALLATION

(1) Install pilot bushing lubricating wick and align throwout bearing with splines in driven plate hub.

(2) Shift transmission into gear using shift lever or long screwdriver. This prevents clutch shaft from rotating during installation and makes clutch shaft-to-driven plate spline alignment easier.

(3) Mount transmission on transmission jack. Raise transmission and align transmission clutch shaft with splines in driven plate hub.

(4) Install transmission. When transmission is seated on clutch housing, install and tighten transmission-to-clutch housing bolts to 55 foot-pounds (75 N•m) torque.

(5) Apply Permatex Number 3 sealer, or equivalent, to both sides of replacement transmission-to-transfer case gasket and position gasket on transfer case.

(6) Mount transfer case on transmission jack. Raise transfer case and align transmission output shaft and transfer case input shaft splines.

(7) Install transfer case on transmission. On CJ models, install and tighten transfer case attaching bolts to 30 foot-pounds (41 N•m) torque. On Cherokee and Truck models, install and tighten transfer case attaching stud nuts to 40 foot-pounds (54 N•m) torque.

(8) On CJ models, install transfer case shift lever, shifter shaft, link pins and control link assembly. On Cherokee and Truck models, connect shift lever link to operating lever on transfer case.

(9) Connect front propeller shaft to transfer case yoke. Tighten clamp strap bolts to 15 foot-pounds (20 N•m) torque. Be sure shaft and yoke are aligned according to reference marks made at disassembly.

(10) Connect vent hose to transfer case.

(11) Connect wire to four-wheel drive indicator switch.

(12) Connect speedometer cable.

(13) Install rear crossmember. Tighten crossmember attaching nuts and bolts to 30 foot-pounds (41 N•m) torque.

- (14) Remove safety stand used to support engine.
- (15) On Cherokee and Truck models, connect parking brake rear cable to clip that retains cable on crossmember, and connect front cable to equalizer.
- (16) Connect rear propeller shaft to transfer case yoke. Tighten clamp strap bolts to 15 foot-pounds (20 N•m) torque. Be sure shaft and yoke are aligned according to reference marks made at disassembly.
- (17) Check and correct transmission and transfer case lubricant levels, if necessary.
- (18) Lower vehicle.
- (19) On models with T-176 transmission, install shift lever assembly. Seat lever in shift housing, press and

turn lever retainer to lock lever in housing and install lever boot on housing.

(20) On models with T-18A transmission, install shift lever assembly. Seat lever in shift housing, seat gasket on housing and thread lever cap onto housing. Tighten cap securely.

(21) On models with SR-4 transmission, install shift lever and housing on transmission and tighten housing bolts to 10 foot-pounds (14 N•m) torque. Be sure shift lever is properly engaged with offset lever before tightening housing bolts.

(22) Position shift lever boot on floorpan and install boot attaching screws.

## MODEL SR-4 4-SPEED TRANSMISSION

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### DISASSEMBLY

- (1) Remove bolts attaching transfer case to transmission.
- (2) Remove transfer case from transmission.
- (3) Place drain pan under transmission and adapter housing.
- (4) Remove drain bolt (fig. 2B-4) and drain lubricant from transmission.
- (5) Remove flanged nut attaching offset lever to shift rail (fig. 2B-5) and remove offset lever.

**NOTE:** Two of the shift control housing attaching bolts are dowel-type alignment bolts (fig. 2B-6). Note the location of these bolts for assembly reference.

- (8) Remove spring clip that attaches reverse lever to reverse lever pivot bolt (fig. 2B-7).

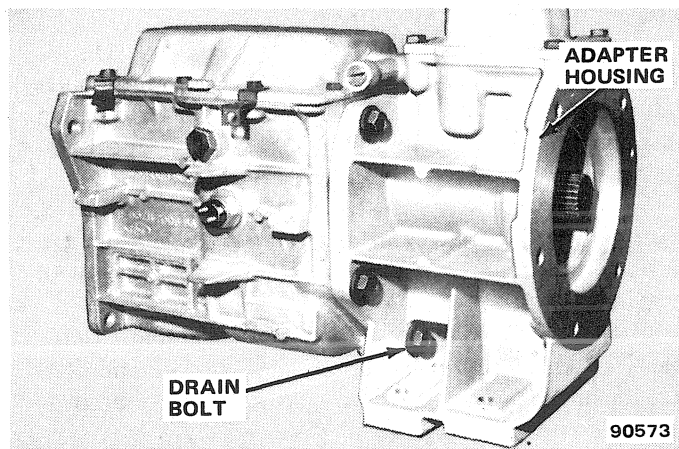


Fig. 2B-4 Drain Bolt Location

- (6) Remove bolts attaching adapter housing to transmission case and remove housing.
- (7) Remove shift control housing and gasket from transmission (fig. 2B-6). Discard gasket.

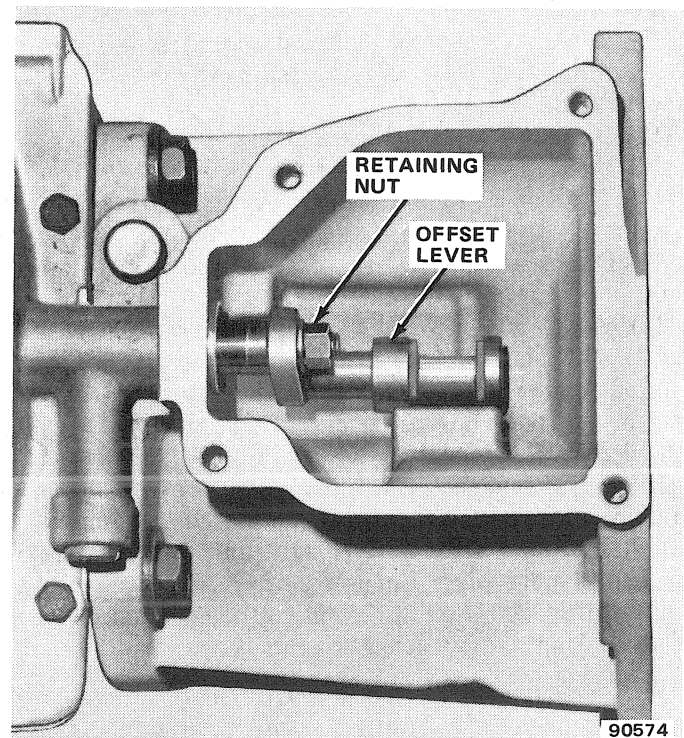
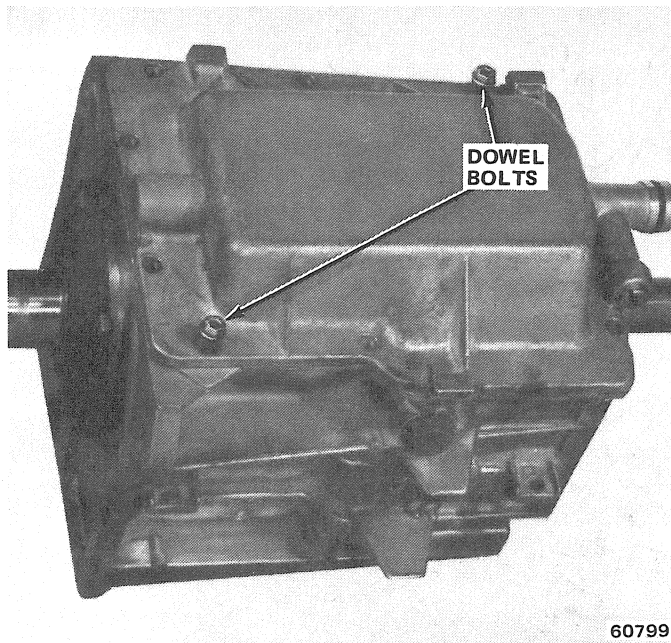


Fig. 2B-5 Offset Lever and Retaining Nut



**Fig. 2B-6 Shift Control Housing Dowel Bolt Location**

(9) Remove reverse lever pivot bolt (fig. 2B-8) and remove reverse lever and reverse lever fork as assembly.

(10) Punch alignment marks in front bearing cap and transmission case for assembly reference and remove bearing cap and gasket. Discard gasket.

(11) Remove small retaining and large locating snap rings from front and rear bearings.

(12) Remove front bearing from clutch shaft using Bearing Remover J-8157-01, Puller Bolts J-26636 and Puller Assembly J-25152 (fig. 2B-9), and remove clutch shaft from case.

(13) Remove rear bearing from output shaft using Bearing Remover J-8157-01, Puller Bolts J-26827, and Puller Assembly J-25152 (fig. 2B-10).

(14) Remove output shaft and gear train as assembly. Do not allow first-second or third-fourth synchronizer sleeves to separate from hubs during removal.

(15) Push reverse idler gear shaft out rear of case and remove shaft and reverse idler gear.

(16) Remove countershaft from rear of case using Countershaft Loading Tool J-26624 (fig. 2B-11).

(17) Remove countershaft gear and loading tool as assembly and remove countershaft gear thrust washers and any clutch shaft pilot bearings that fell into case during disassembly.

**NOTE:** The countershaft gear front thrust washer is plastic. The rear washer is metal.

(18) Remove countershaft loading tool, needle bearing retainers and 50 needle bearings from countershaft gear.

## Disassembly—Output Shaft Gear Train

(1) Scribe alignment marks on third-fourth synchronizer hub and sleeve for assembly alignment reference (fig. 2B-12).

(2) Remove output shaft snap ring (fig. 2B-12) and remove third-fourth synchronizer assembly.

(3) Disassemble third-fourth synchronizer assembly. Remove blocking rings, insert springs and inserts, and separate synchronizer sleeve from hub.

(4) Remove third gear.

(5) Remove second gear retaining snap ring, remove tabbed thrust washer and remove second gear and blocking ring.

(6) Remove first gear thrust washer (fig. 2B-13) and first gear roll pin (fig. 2B-14) from rear of output shaft. Use diagonal cutters to remove roll pin.

**NOTE:** The thrust washer has an oil groove and roll pin locating slot on one side. This side must face first gear when assembled.

(7) Remove first gear and blocking ring.

(8) Scribe alignment marks on first-second synchronizer sleeve and output shaft hub for assembly reference.

(9) Remove insert spring and inserts from first-second sleeve and remove sleeve from output shaft hub.

**CAUTION:** Do not attempt to remove the first-second-reverse hub from the output shaft. The hub and shaft are assembled and machined as a matched unit during manufacture to insure concentricity.

## CLEANING AND INSPECTION

Thoroughly wash all parts in solvent and dry them with compressed air. Do not dry the front or rear bearings with compressed air. Allow them to air dry or wipe them dry with a clean shop cloth.

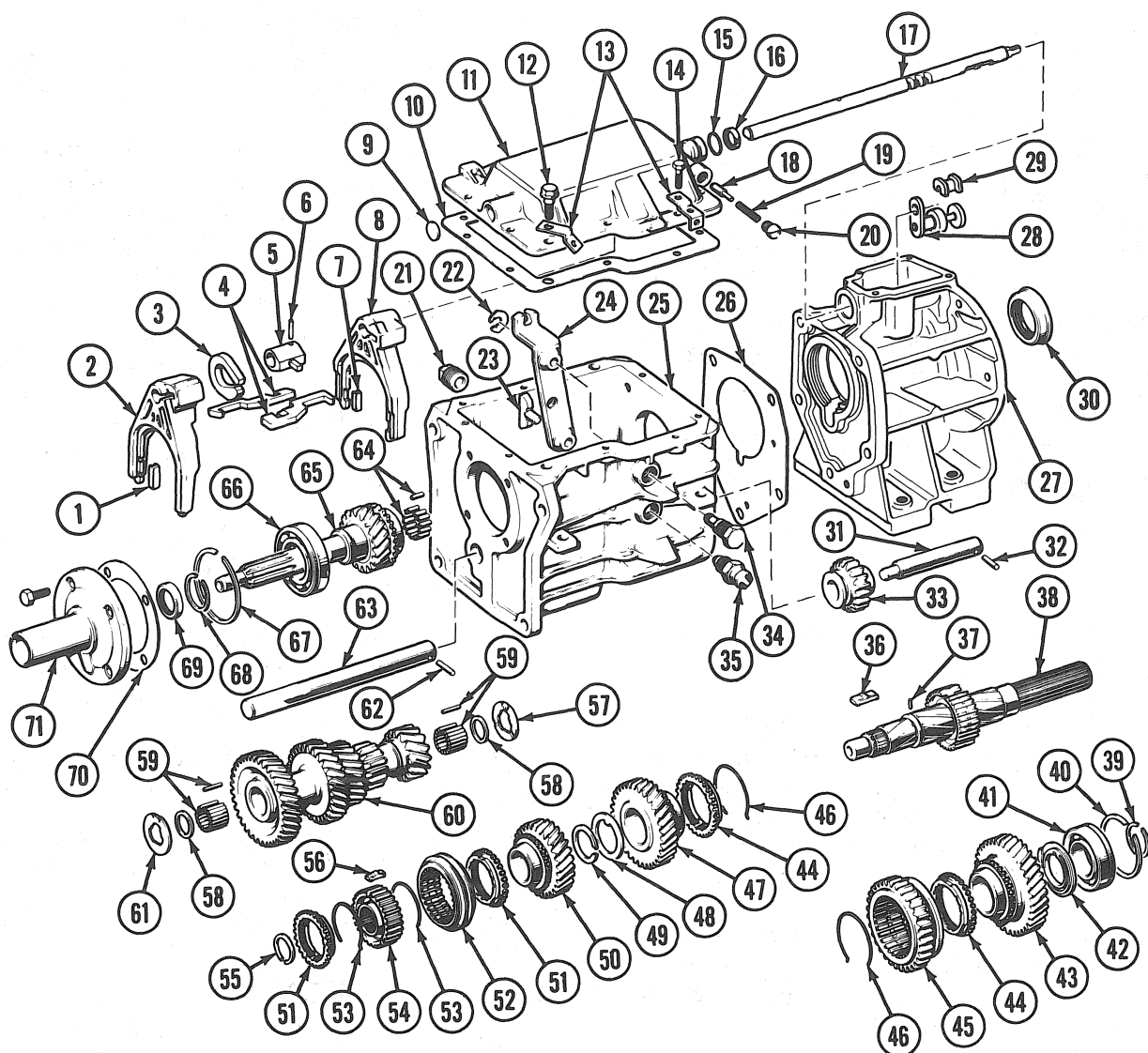
Clean the needle and roller bearings by wrapping them in a cloth and submerging the cloth and bearings in solvent. Or, place them in a shallow parts cleaning tray and cover them with solvent. Allow the bearings to air dry or wipe them dry with a clean shop cloth.

Inspect the transmission case, cover and extension housing. Replace any of these parts if they exhibit the following conditions:

- Cracks in bores, sides, bosses or at bolt holes.
- Stripped threads in bolt holes.
- Nicks, burrs, rough surfaces in shaft bores or on gasket surfaces.

Inspect the gear train and shift mechanism. Replace any parts that exhibit the following conditions:

- Broken, chipped or worn gear teeth.
- Bent or broken inserts.
- Weak or broken insert springs.
- Damaged roller or needle bearings, or bearing bores in countershaft gear or clutch shaft.



- |                                       |   |   |
|---------------------------------------|---|---|
| 1. THIRD - FOURTH SHIFT INSERT        | 30. EXTENSION HOUSING OIL SEAL                    | 52. THIRD - FOURTH SYNCHRONIZER SLEEVE              |
| 2. THIRD - FOURTH SHIFT FORK          | 31. REVERSE IDLER SHAFT                           | 53. THIRD - FOURTH SYNCHRONIZER INSERT SPRING (2)   |
| 3. SELECTOR INTERLOCK PLATE           | 32. REVERSE IDLER SHAFT ROLL PIN                  | 54. THIRD - FOURTH SYNCHRONIZER HUB                 |
| 4. SELECTOR ARM PLATE (2)             | 33. REVERSE IDLER GEAR                            | 55. OUTPUT SHAFT SNAP RING                          |
| 5. SELECTOR ARM                       | 34. REVERSE LEVER PIVOT BOLT                      | 56. THIRD - FOURTH SYNCHRONIZER INSERT (3)          |
| 6. SELECTOR ARM ROLL PIN              | 35. BACKUP LAMP SWITCH                            | 57. COUNTERSHAFT GEAR REAR THRUST WASHER (METAL)    |
| 7. FIRST - SECOND SHIFT FORK INSERT   | 36. FIRST - SECOND SYNCHRONIZER INSERT (3)        | 58. COUNTERSHAFT NEEDLE BEARING RETAINER (2)        |
| 8. FIRST - SECOND SHIFT FORK          | 37. FIRST GEAR ROLL PIN                           | 59. COUNTERSHAFT NEEDLE BEARING (50)                |
| 9. SHIFT RAIL PLUG                    | 38. OUTPUT SHAFT AND HUB ASSEMBLY                 | 60. COUNTERSHAFT GEAR                               |
| 10. TRANSMISSION COVER GASKET         | 39. REAR BEARING RETAINING SNAP RING              | 61. COUNTERSHAFT GEAR FRONT THRUST WASHER (PLASTIC) |
| 11. TRANSMISSION COVER                | 40. REAR BEARING LOCATING SNAP RING               | 62. COUNTERSHAFT ROLL PIN                           |
| 12. TRANSMISSION COVER DOWEL BOLT (2) | 41. REAR BEARING                                  | 63. COUNTERSHAFT                                    |
| 13. CLIP                              | 42. FIRST GEAR THRUST WASHER                      | 64. CLUTCH SHAFT ROLLER BEARINGS (15)               |
| 14. TRANSMISSION COVER BOLT (8)       | 43. FIRST GEAR                                    | 65. CLUTCH SHAFT                                    |
| 15. SHIFT RAIL O-RING SEAL            | 44. FIRST - SECOND SYNCHRONIZER BLOCKING RING (2) | 66. FRONT BEARING                                   |
| 16. SHIFT RAIL OIL SEAL               | 45. FIRST - REVERSE SLEEVE AND GEAR               | 67. FRONT BEARING LOCATING SNAP RING                |
| 17. SHIFT RAIL                        | 46. FIRST - SECOND SYNCHRONIZER INSERT SPRING (2) | 68. FRONT BEARING RETAINING SNAP RING               |
| 18. DETENT PLUNGER                    | 47. SECOND GEAR                                   | 69. FRONT BEARING CAP OIL SEAL                      |
| 19. DETENT SPRING                     | 48. SECOND GEAR THRUST WASHER (TABBED)            | 70. FRONT BEARING CAP GASKET                        |
| 20. DETENT PLUG                       | 49. SECOND GEAR SNAP RING                         | 71. FRONT BEARING CAP                               |
| 21. FILL PLUG                         | 50. THIRD GEAR                                    |   |
| 22. REVERSE LEVER PIVOT BOLT C-CLIP   | 51. THIRD - FOURTH SYNCHRONIZER BLOCKING RING (2) |   |
| 23. REVERSE LEVER FORK                |   |   |
| 24. REVERSE LEVER                     |   |   |
| 25. TRANSMISSION CASE                 |   |   |
| 26. GASKET                            |   |   |
| 27. ADAPTER HOUSING                   |   |   |
| 28. OFFSET LEVER                      |   |   |
| 29. OFFSET LEVER INSERT               |   |   |

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Fig. 2B-7 Model SR-4 4-Speed Transmission



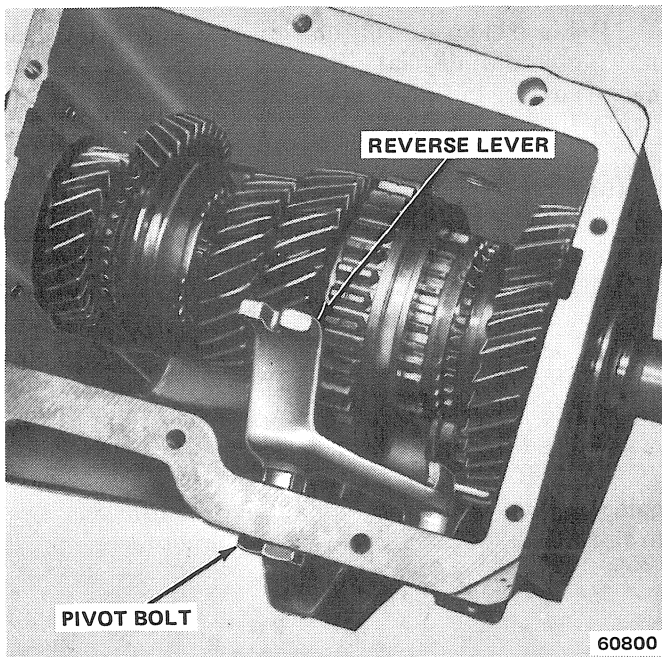


Fig. 2B-8 Reverse Lever and Pivot Bolt

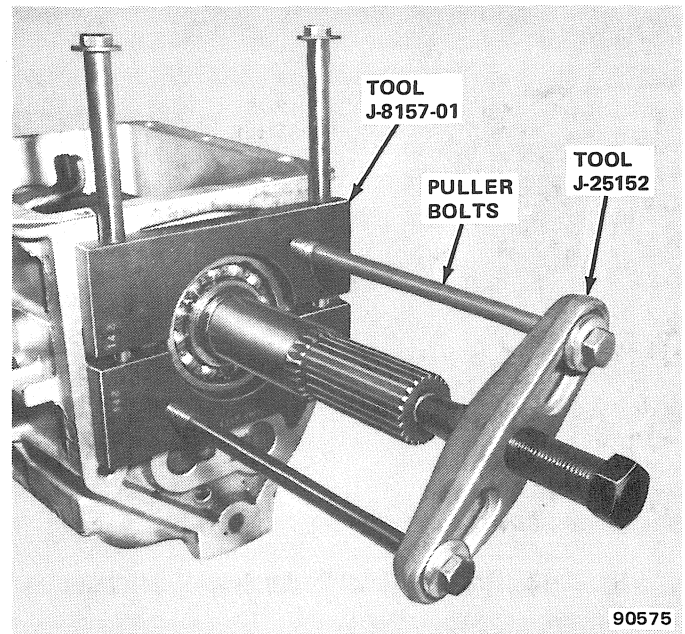


Fig. 2B-10 Rear Bearing Removal

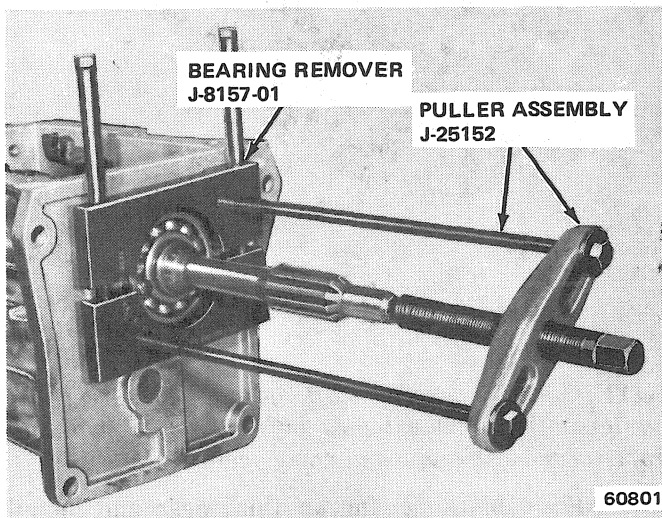


Fig. 2B-9 Front Bearing Removal

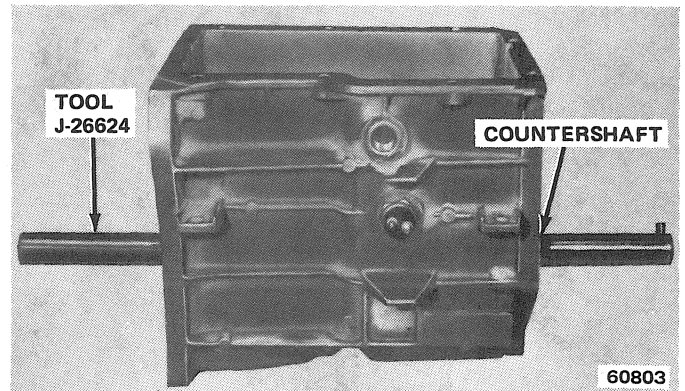


Fig. 2B-11 Countershaft Removal/Installation

- Worn or galled countershaft and hub, clutch shaft or reverse idler gear shaft.
- Worn thrust washers.
- Nicked, broken or worn output or clutch shaft splines.
- Bent, distorted or weak snap rings.
- Worn bushings in reverse idler gear.
- Rough, galled or broken front or rear bearing.
- Worn shift fork inserts.
- Broken, cracked or worn shift forks.
- Bent, worn or galled shift rail.
- Worn, bent or broken selector arms, plates, or interlock.
- Worn, bent, broken or stripped offset lever, or worn lever insert.

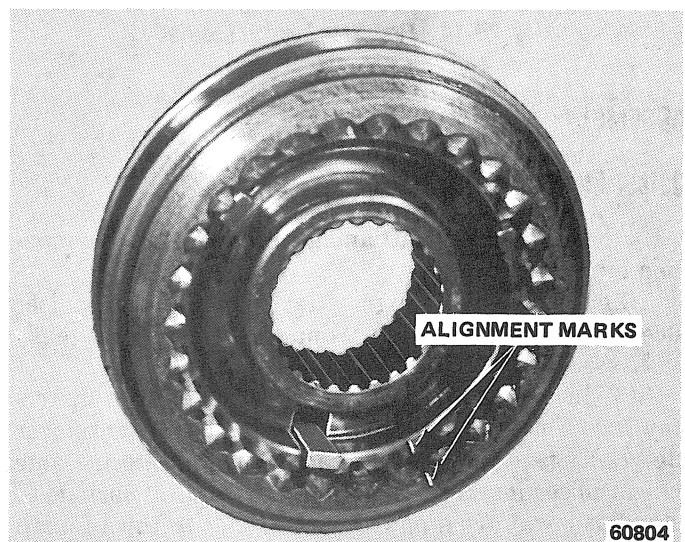


Fig. 2B-12 Marking Synchronizer Assembly

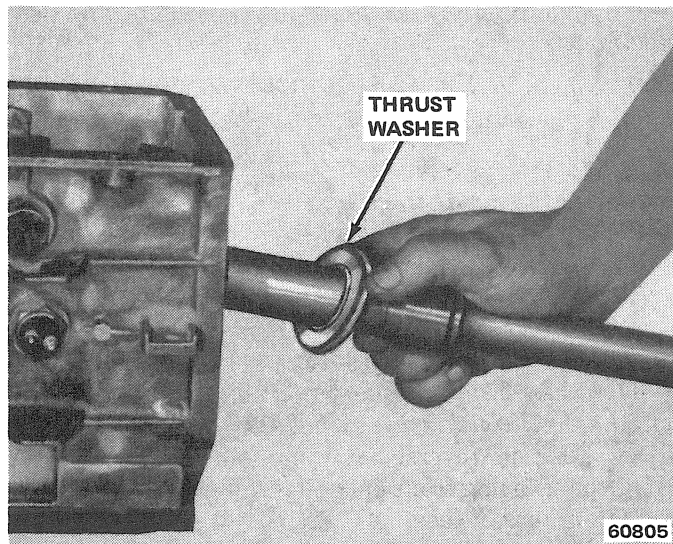


Fig. 2B-13 First Gear Thrust Washer Removal/Installation

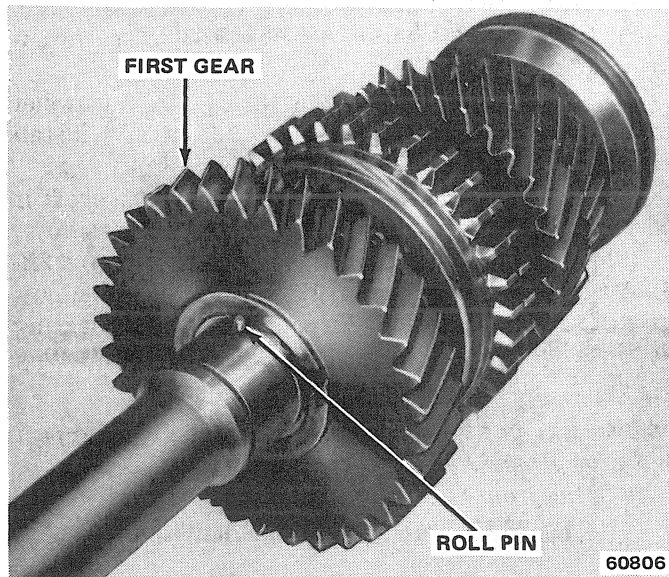


Fig. 2B-14 First Gear Roll Pin Location

## ASSEMBLY

### Output Shaft Gear Train

- (1) Coat output shaft and gear bores with transmission lubricant.
- (2) Install and align first-second synchronizer sleeve on output shaft hub using reference marks made at disassembly.
- (3) Install three first-second synchronizer inserts and two insert springs in first-second synchronizer sleeve. Engage tang end of each insert spring in same synchronizer insert but position open ends of springs so they face away from one another. Refer to third-fourth synchronizer insert spring assembly illustration (fig. 2B-16).

(4) Place blocking ring on first gear and install gear and ring on output shaft. Be sure synchronizer inserts engage notches in first gear blocking ring.

(5) Install first gear roll pin in output shaft (fig. 2B-14).

(6) Place blocking ring on second gear and install gear and ring on output shaft. Be sure synchronizer inserts engage notches in second gear blocking ring.

(7) Install second gear thrust washer and snap ring on output shaft. Be sure sharp edge of washer faces outward and that tab is engaged in output shaft notch.

(8) Measure second gear end play using feeler gauge (fig. 2B-15). Insert gauge between gear and thrust washer. End play should be 0.004 to 0.014 inch (0.10 to 0.35 mm). If end play is over 0.014 inch (0.35 mm), replace thrust washer and snap ring and inspect synchronizer hub for excessive wear on thrust faces.

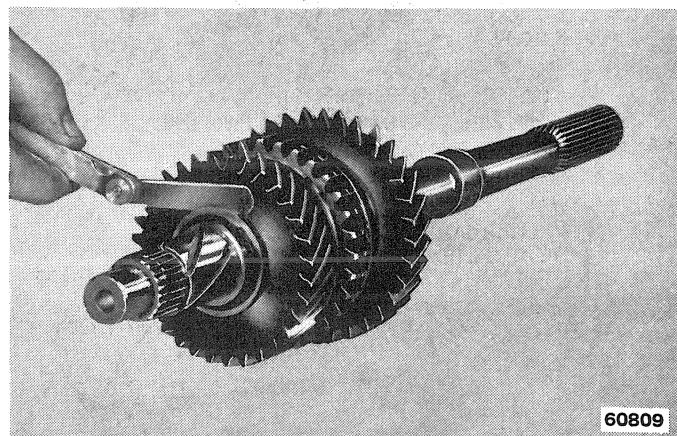


Fig. 2B-15 Measuring Second Gear End Play

**NOTE:** If any output shaft gear is replaced, the countershaft gear must also be replaced to maintain proper gear mesh and avoid noisy operation.

(9) Place blocking ring on third gear and install gear and ring on output shaft.

(10) Install and align third-fourth synchronizer sleeve on third-fourth synchronizer hub using reference marks made at disassembly.

(11) Install three inserts and two insert springs in third-fourth synchronizer. Engage tang end of each insert spring in same synchronizer insert but position open ends of springs so they face away from one another (fig. 2B-16).

(12) Install assembled third-fourth synchronizer on output shaft with machined groove in synchronizer hub facing forward and install output shaft snap ring. Be sure synchronizer inserts engage notches in third gear blocking ring.

(13) Measure third-fourth synchronizer end play using feeler gauge (fig. 2B-17). Insert gauge between output shaft snap ring and third-fourth synchronizer hub. End play should be 0.004 to 0.014 inch (0.10 to 0.35 mm).



If end play is over 0.014 inch (0.35 mm), replace snap ring and inspect synchronizer hub for excessive wear on thrust faces.

**NOTE:** If any output shaft gear is replaced, the countershaft gear must also be replaced to maintain proper gear mesh and prevent noisy operation.

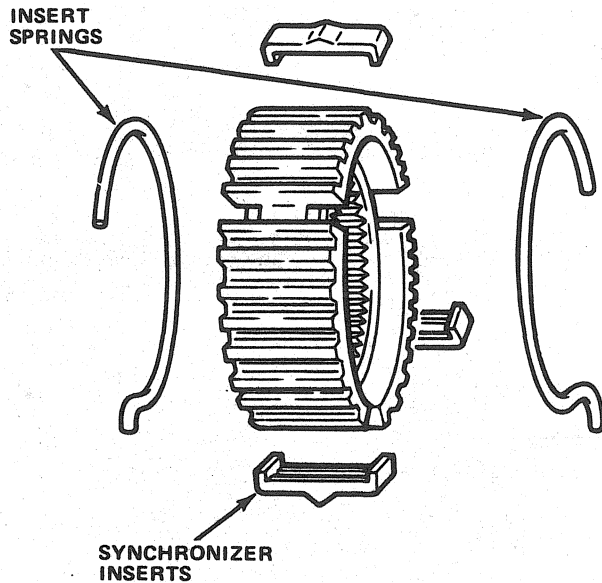


Fig. 2B-16 Third-Fourth Synchronizer Spring Installation

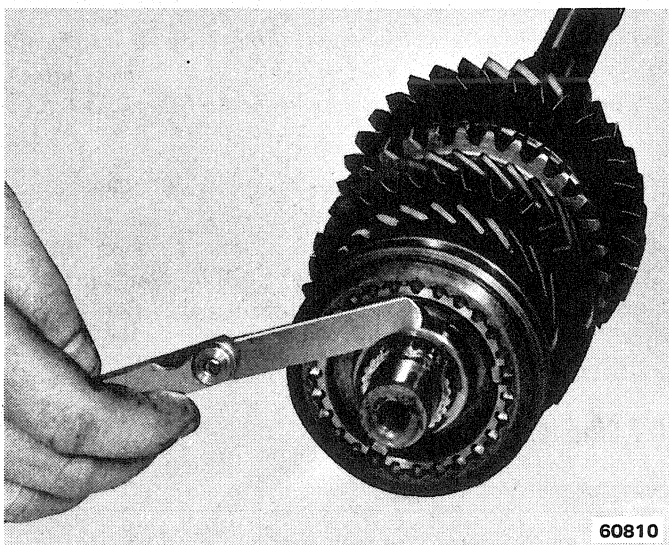


Fig. 2B-17 Measuring Third-Fourth Synchronizer End Play

## Transmission Case

**CAUTION:** Except for the gearshift lever attaching bolts and fill plug, all threaded holes and bolts used in the Model SR-4 Transmission are metric sizes. Do not attempt to substitute a different thread-type bolt if the original ones are lost.

(1) Coat countershaft gear thrust washers with petroleum jelly and position washers in case.

**NOTE:** Install the plastic washer at the front of the case and the metal washer at the rear.

(2) Insert Countershaft Loading Tool J-26624 in countershaft gear. Install 50 needle bearings in bearing bores at front and rear of gear and install needle bearing retainers. Lubricate bearings with petroleum jelly during installation.

(3) Position assembled countershaft gear in case and install countershaft from rear of case (fig. 2B-11). Be sure that thrust washers are not displaced during installation of countershaft and gear.

(4) Position reverse idler gear in case with shift lever groove facing front of case and install reverse idler shaft from rear of case.

(5) Install output and gear train in case. Do not disturb position of synchronizer assemblies during installation.

(6) Install fourth gear blocking ring in third-fourth synchronizer sleeve. Be sure synchronizer inserts engage notches in blocking ring.

(7) Coat all 15 roller bearings and clutch shaft roller bearing bore with petroleum jelly (only) and install bearings in shaft bore.

(8) Install clutch shaft in case and engage shaft in third-fourth synchronizer sleeve and blocking ring.

(9) Install front bearing using Tool J-22697 (fig. 2B-18). Start front bearing onto clutch shaft. Position output shaft first gear against rear of case. Align bearing with bearing bore in case and drive bearing completely onto clutch shaft and into case.

**NOTE:** To identify the front and rear bearings, inspect the bearing races. The rear bearing race has a notch in it, while the front bearing race does not.

(10) Install front bearing retaining and locating snap rings.

(11) Install front bearing cap oil seal in front bearing cap using Tool J-26625 (fig. 2B-19).

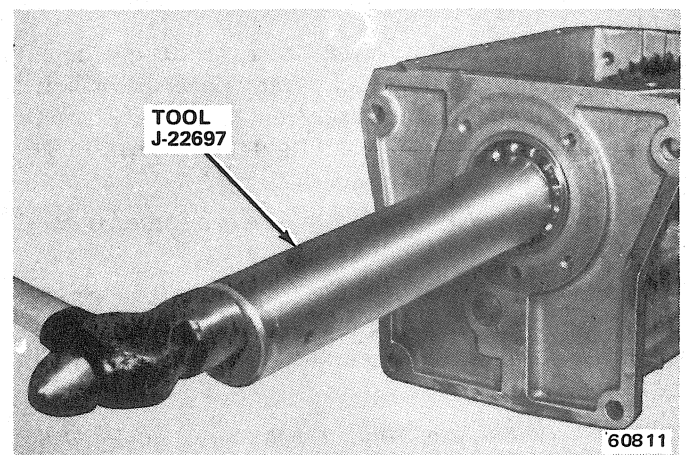
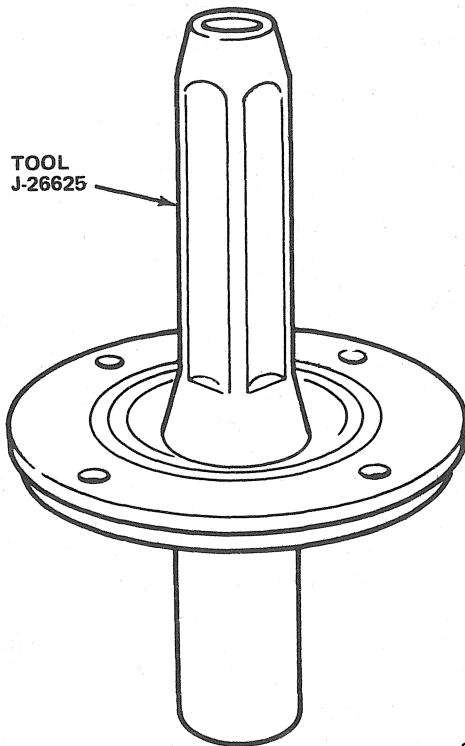


Fig. 2B-18 Bearing Installation





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**Fig. 2B-19 Front Bearing Cap Seal Installation**

(12) Install front bearing cap gasket and front bearing cap. Be sure to align groove in cap and cutout in gasket with oil hole in case. Coat bearing cap bolts with nonhardening sealer and install bolts. Tighten bolts to 13 foot-pounds (18 N•m) torque.

(13) Install first gear thrust washer on output shaft. Be sure side of washer with oil groove faces first gear after installation (fig. 2B-13).

(14) Install rear bearing using Tool J-22697 or J-25234. Refer to figure 2B-18 for procedure.

**CAUTION:** Be sure the first gear thrust washer is correctly installed and is engaged on the first gear roll pin before installing the rear bearing.

(15) Install retaining and locating snap rings on rear bearing.

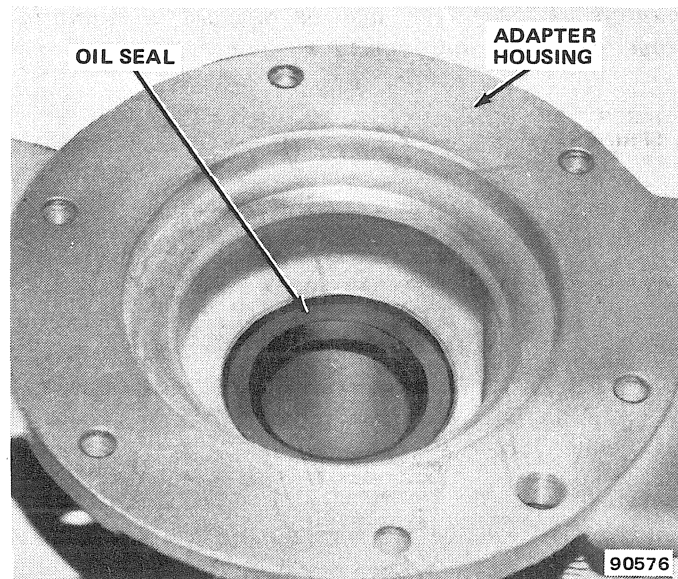
(16) Position reverse lever in case. Apply non-hardening sealer to threads of reverse lever pivot bolt and partially install bolt in case. Mount reverse lever on pivot bolt, install spring clip and tighten pivot bolt to 20 foot-pounds (27 N•m) torque.

**NOTE:** Be sure the reverse lever fork is engaged in the reverse idler gear.

(17) Rotate clutch shaft and output shaft gears. If blocking rings tend to stick on gear cones, release the rings by gently prying them off the cones using a screwdriver.

**NOTE:** Check blocking ring to gear clutch tooth face clearance. Clearance should be 0.030 inch (0.001 mm) minimum.

(18) Remove adapter housing oil seal using punch or screwdriver. Install new seal so metal face of seal is flush with or slightly below edge of seal bore in housing (fig. 2B-20).


**Fig. 2B-20 Adapter Housing Oil Seal Installation**

(19) Place reverse lever in Neutral position, position transmission cover gasket and cover assembly on case, and install cover bolts. Alternately and evenly tighten cover bolts to 10 foot-pounds (14 N•m) torque.

**CAUTION:** The two top cover dowel bolts must be installed in the proper location to maintain cover alignment and prevent hard shifting. Refer to figure 2B-6 for correct bolt location.

(20) Position adapter housing gasket on case and carefully install adapter housing.

(21) Pour 3.0 pints (1.41 liters) of transmission lubricant into transmission case through fill hole and install fill plug. Tighten plug to 23 foot-pounds (31 N•m) torque.

(22) Install transfer case on transmission.

## SHIFT CONTROL HOUSING

### Disassembly

(1) Remove detent plug, spring and plunger (fig. 2B-21).

(2) Place selector arm plates and shift rail in Neutral position (centered).

(3) Rotate shift rail counterclockwise until selector arm disengages from selector arm plates and selector arm roll pin is accessible (fig. 2B-22).

(4) Pull shift rail rearward until selector arm contacts first-second shift fork.

(5) Remove selector arm roll pin using 3/16-inch (4.76 mm) diameter pin punch and remove shift rail.

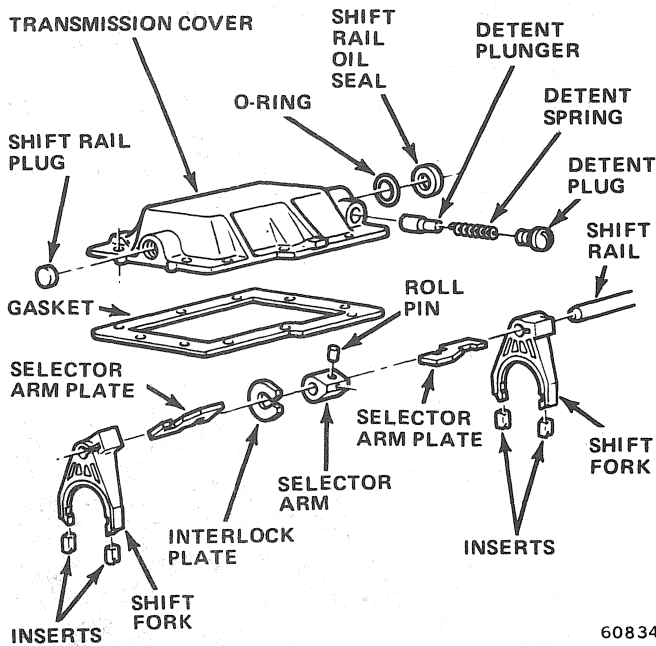


Fig. 2B-21 Shift Control Housing Assembly

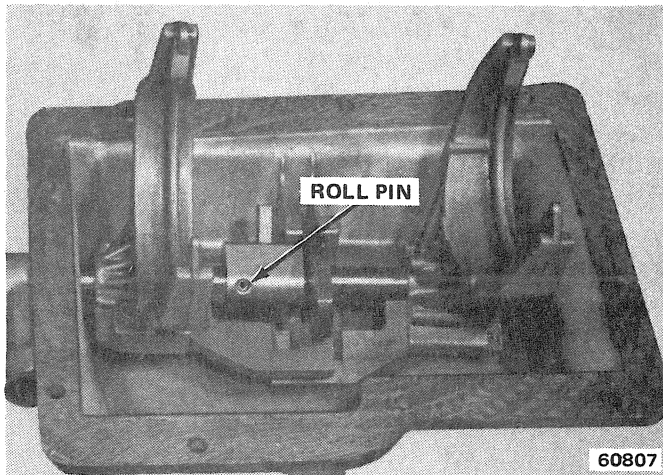


Fig. 2B-22 Roll Pin Location

(6) Remove shift forks, selector arm plates, selector arm and roll pin, and interlock plate.

(7) Remove shift rail oil seal and O-ring using screwdriver.

(8) Remove shift rail plug using hammer and punch.

(9) Remove nylon inserts and selector arm plates from shift forks. Note position of inserts and plates for assembly reference.

### Cleaning and Inspection

Thoroughly wash all parts in solvent and dry them with compressed air.

Inspect the shift control housing. Replace the housing if it exhibits the following conditions:

- Cracks in bores, sides, bosses, or at bolt holes.

- Nicks, burrs, rough surfaces in shaft bores or on gasket surfaces.

Inspect the shift mechanism. Replace any parts that exhibit the following conditions:

- Bent or broken inserts
- Worn shift fork inserts.
- Broken, cracked or worn shift forks.
- Damaged shift rail.
- Worn or damaged shift rail bores (in housing).
- Worn, damaged or bent offset lever.
- Worn, bent or broken selector arms, plates, or interlock.

### Assembly

(1) Install nylon inserts and selector arm plates in shift forks (fig. 2B-23).

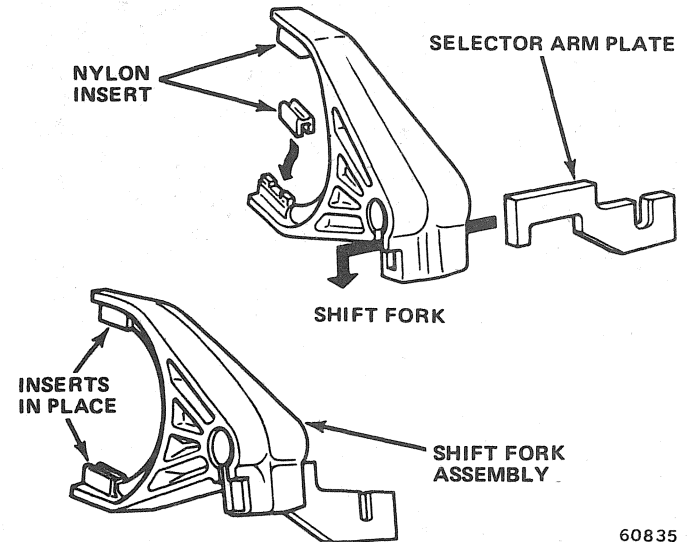


Fig. 2B-23 Assembling Shift Forks and Selector Arm Plates

(2) Install shift rail plug. Coat edges of plug with sealer before installing.

(3) Coat shift rail and shift rail bores with petroleum jelly and insert shift rail in cover. Install rail until end of rail is flush with inside edge of cover.

(4) Position first-second shift fork in cover with fork offset facing rear of cover and push shift rail through fork.

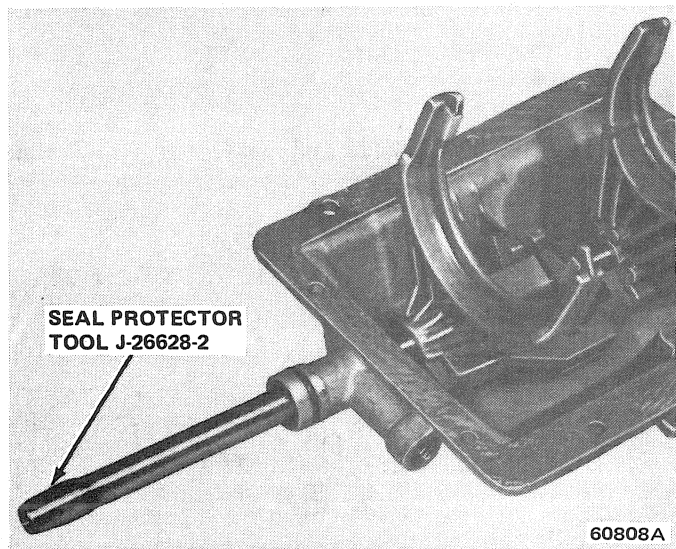
**NOTE:** The first-second shift fork is the larger of the two forks.

(5) Position selector arm and C-shaped interlock plate in cover and insert shift rail through arm. Widest part of interlock plate must face away from cover, and selector arm roll pin hole must face downward and toward rear of cover.

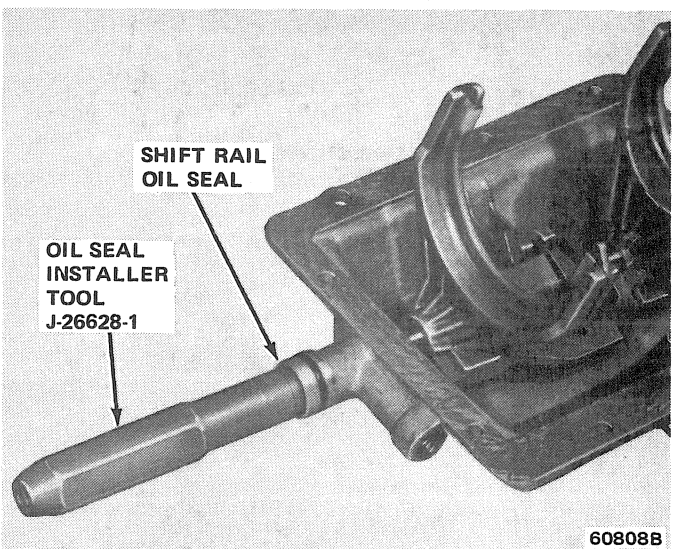
(6) Position third-fourth shift fork in cover with fork offset facing rear of cover. Third-fourth shift fork selector arm plate must be positioned under first-second shift fork selector arm plate.

- (7) Insert shift rail through third-fourth shift fork and into front shift rail bore in cover.
- (8) Rotate shift rail until selector arm plate at forward end of rail faces away from, but is parallel to cover.
- (9) Align roll pin holes in selector arm and shift rail and install roll pin. Be sure roll pin is installed flush with surface of selector arm to prevent pin from contacting selector arm plates during shifts.

- (10) Install detent plunger, spring and plug.
- (11) Install O-ring in groove of shift rail oil seal.
- (12) Install shift rail oil seal as follows:
  - (a) Install Oil Seal Protector Tool J-26628-2 over threaded end of shift rail (fig. 2B-24, View A).
  - (b) Lubricate lip of oil seal with petroleum jelly and slide seal over protector and onto shift rail.
  - (c) Seat oil seal in shift control housing using Oil Seal Installer Tool J-26628-1 (fig. 2B-24, View B).



VIEW A



VIEW B

**Fig. 2B-24    Shift Rail Oil Seal Installation**

**SPECIFICATIONS**

**Transmission Specifications—Model SR-4**

<b>Transmission Specifications</b>	
<b>End Play Tolerance:</b>	
Countershaft Gear End Play . . . . .	0.004 to 0.018 inch (0.102 to 0.457 mm)
Second Gear End Play . . . . .	0.004 to 0.014 inch (0.102 to 0.356 mm)
Output Shaft End Play . . . . .	0.004 to 0.014 inch (0.102 to 0.356 mm)
Blocking Ring to Cone Seat Clearance . . . . .	0.030 inch min. (0.001 mm)
<b>Lubrication</b>	
Level . . . . .	to bottom of fill hole
Inspect Correct Fill Level . . . . .	every 5000 miles (8045 km)
Recommended Lubricants . . . . .	SAE 85W-90
<b>Lubricant Capacity</b>	
U.S. Measure . . . . .	3.0 pints
Imperial Measure . . . . .	3.5 pints
Metric Measure . . . . .	1.41 liters

## Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	USA (ft-lbs)		Metric (N-m)	
	Service Set-To Torque	Service In-Use Recheck Torque	Service Set-To Torque	Service In-Use Recheck Torque
Backup Lamp Switch . . . . .	10	8-12	14	11-16
Adapter Housing Bolt . . . . .	23	18-27	31	24-37
Detent Plug (in housing) . . . . .	10	8-12	14	11-16
Fill Plug . . . . .	20	15-25	27	20-34
Front Bearing Cap Bolt . . . . .	13	11-15	18	15-20
Offset Lever Nut . . . . .	10	8-12	14	11-16
Reverse Lever Pivot Bolt . . . . .	20	15-25	27	20-34
Shift Control Housing Bolt . . . . .	10	7-12	14	9-16
Transmission-to-Clutch Housing Bolt . . . . .	55	45-65	75	61-65
Universal Joint Clamp Strap Bolt . . . . .	14	12-18	19	16-24

All torque values given in foot-pounds and newton-meters with dry fits unless otherwise specified.

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## Transmission Gear Ratios

ENGINE-VEHICLE MODEL	T-176					T-18A				
	1st	2nd	3rd	4th	REV.	1st	2nd	3rd	4th	REV.
4-Cylinder CJ-5, CJ-7 (SR-4 Only)	4.07:1	2.39:1	1.49:1	1.00:1	3.95:1					
6-Cylinder CJ-7	4.07:1	2.39:1	1.49:1	1.00:1	3.95:1					
6/8 Cylinder CJ-5, CJ-7	3.82:1	2.29:1	1.46:1	1.00:1	3.52:1					
6-Cylinder Cherokee, J-10 Truck	3.82:1	2.29:1	1.46:1	1.00:1	3.52:1					
8-Cylinder Cherokee, J-10 Truck	3.52:1	2.27:1	1.46:1	1.00:1	3.01:1					
J-20 Truck						6.32:1	3.09:1	1.69:1	1.00:1	7.44:1

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# MODEL T-176 4-SPEED TRANSMISSION

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Cleaning and Inspection	2B-17
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	Page
Shift Control Housing	2B-22
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## DISASSEMBLY

- (1) Remove bolts attaching transfer case to transmission and remove transfer case.
- (2) Remove shift control housing.

**NOTE:** Two of the housing attaching bolts are dowel-type alignment bolts. Note the location of these bolts for assembly reference.

- (3) Drain lubricant from transmission case if not drained during removal.

- (4) Remove countershaft using Arbor Tool J-29342 (fig. 2B-25). Tap countershaft out rear of case.

- (5) Remove locating ring and retaining snap ring from rear bearing.

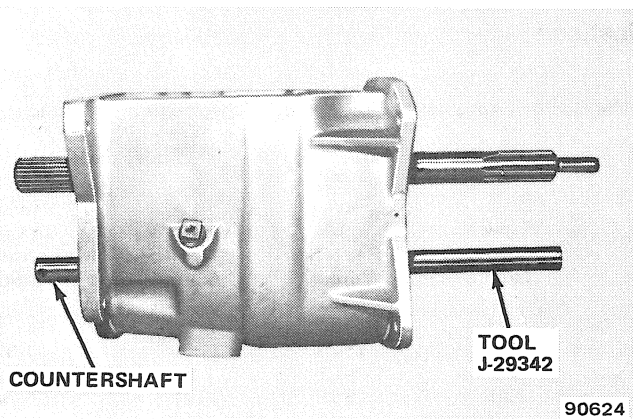
- (6) Remove rear bearing using Puller Set J-25152 (fig. 2B-26).

- (7) Scribe or punch alignment reference marks in front bearing cap and transmission case.

- (8) Remove front bearing cap and gasket.

- (9) Remove and discard front bearing cap oil seal. Use screwdriver to pry seal out of cap.





**Fig. 2B-25 Countershaft Removal/Installation**

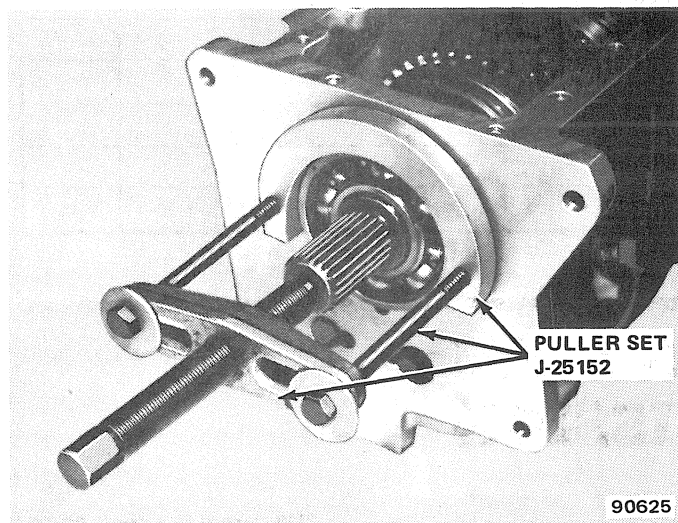
(10) Remove locating ring and retaining snap ring from front bearing (fig. 2B-27).

(11) Remove clutch shaft and front bearing using Adapter J-29344 and Puller Set J-25152 (fig. 2B-28).

(12) Remove third-fourth blocking ring from clutch shaft or synchronizer hub.

(13) Remove front bearing from clutch shaft using Puller Set J-25152 (fig. 2B-29).

(14) Remove mainshaft pilot bearing rollers from clutch shaft (fig. 2B-27).



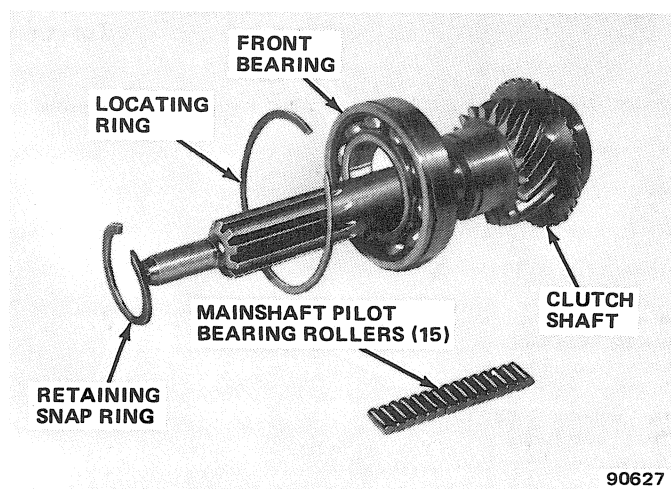
**Fig. 2B-26 Rear Bearing Removal**

(15) Remove mainshaft and geartrain assembly. Move third-fourth synchronizer sleeve rearward (to third gear position). Tilt rear end of shaft downward and lift front end of shaft upward and out of case.

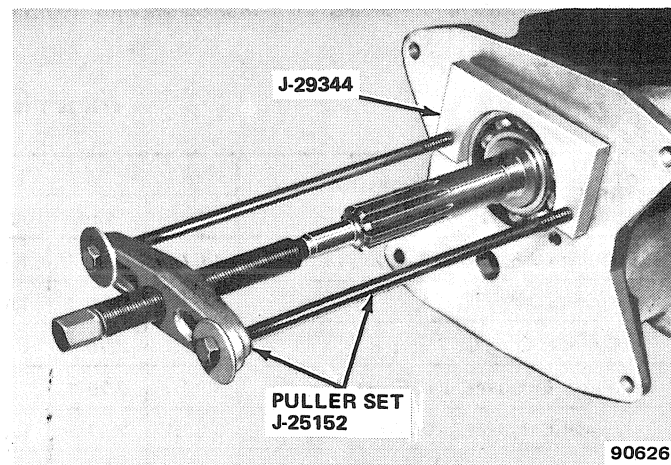
(16) Remove countershaft gear and arbor tool as assembly.

(17) Remove countershaft gear thrust washers and any mainshaft pilot bearing rollers that may have fallen into case during clutch shaft removal.

(18) Remove reverse idler gear assembly. Tap idler gear shaft out rear of case (fig. 2B-30). Remove gear assembly thrust washers.



**Fig. 2B-27 Clutch Shaft and Front Bearing Assembly**



**Fig. 2B-28 Clutch Shaft Front Bearing Removal**

(19) Remove needle bearings and bearing retainers from gear assembly (fig. 2B-31). Remove sliding gear from idler gear. Note position of sliding gear for assembly reference.

(20) Remove arbor tool from countershaft gear and remove needle bearings and bearing retainers (fig. 2B-32).

### Disassembly Mainshaft Geartrain

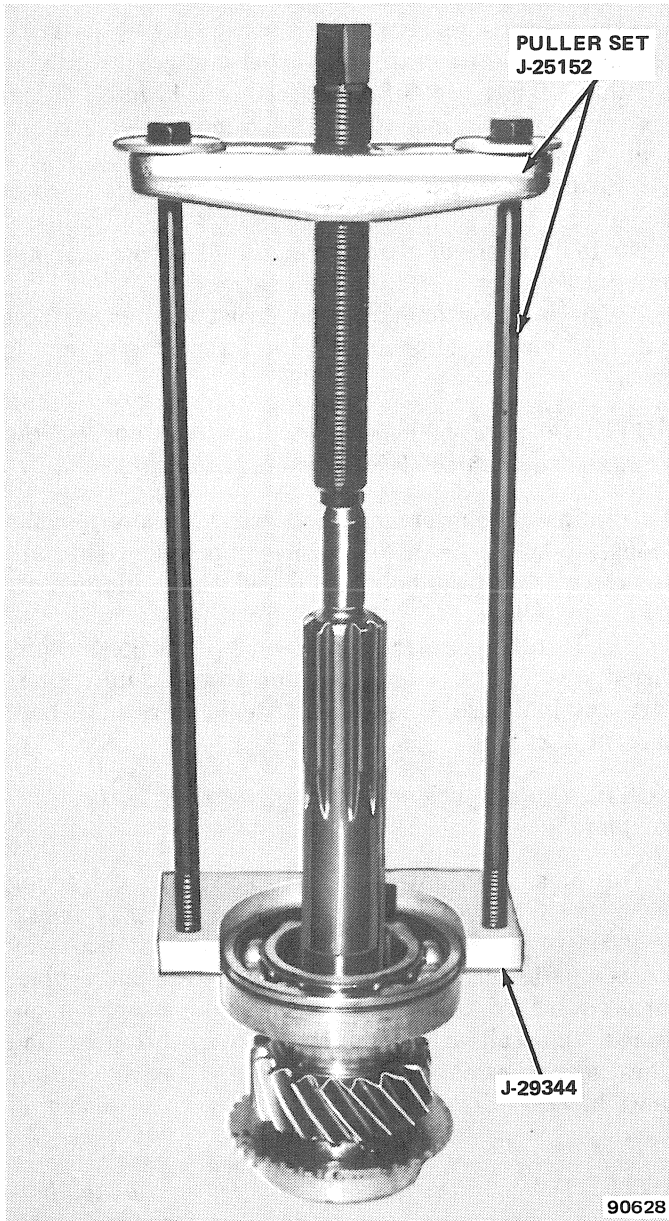
(1) Remove third-fourth synchronizer snap ring from front end of mainshaft (fig. 2B-33).

(2) Remove third-fourth synchronizer assembly from mainshaft. Slide hub out of sleeve. Remove insert springs and three inserts and blocking ring. Note position of insert springs for assembly reference.

(3) Remove third gear from mainshaft.

(4) Remove second gear snap ring from mainshaft and remove second gear and blocking ring.

(5) Remove tabbed thrust washer from mainshaft (fig. 2B-33).



**Fig. 2B-29 Removing Front Bearing from Clutch Shaft**

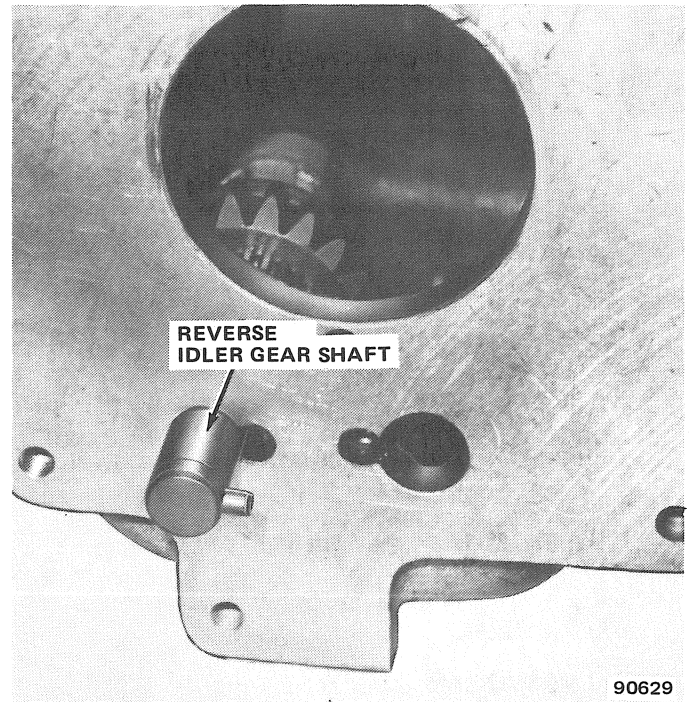
(6) Remove snap ring from first-second synchronizer hub. Remove hub and reverse gear and sleeve as assembly. Mark hub and sleeve for assembly reference. Remove insert springs from hub, remove three inserts, and remove sleeve and gear from hub.

(7) Remove first gear thrust washer from rear of shaft and remove first gear and blocking ring (if ring was not removed previously).

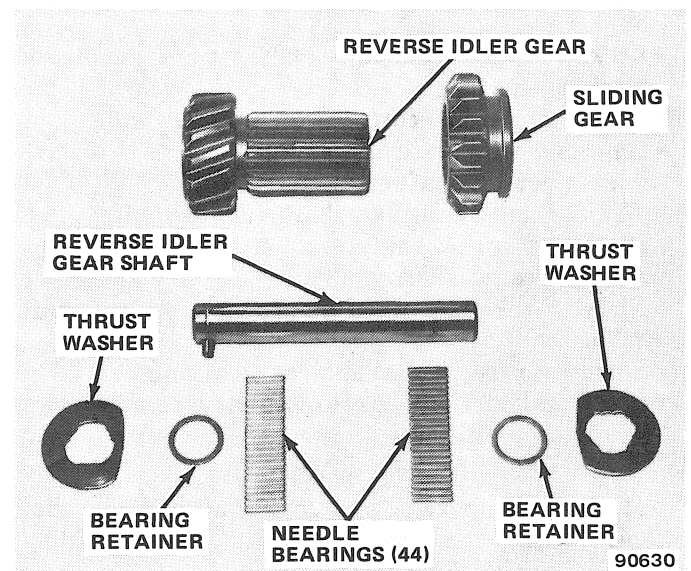
## CLEANING AND INSPECTION

### Cleaning

Thoroughly wash all parts in solvent and dry using compressed air. However, do not dry the bearings with compressed air. Air dry the bearings or wipe them dry using a clean shop cloth only.



**Fig. 2B-30 Reverse Idler Gear Shaft Removal/Installation**



**Fig. 2B-31 Reverse Idler Gear Assembly**

Clean the needle and clutch shaft roller bearings by wrapping the bearings in a clean cloth and submerging them in solvent. Or, place the bearings in a shallow parts cleaning tray and cover them with solvent. Allow the bearings to air dry on a clean cloth.

### Inspection

Inspect the transmission components. Replace any components that exhibit the following conditions:

#### Case

- Cracks in bores, sides, bosses or at bolt holes.
- Stripped threads in bolt holes.

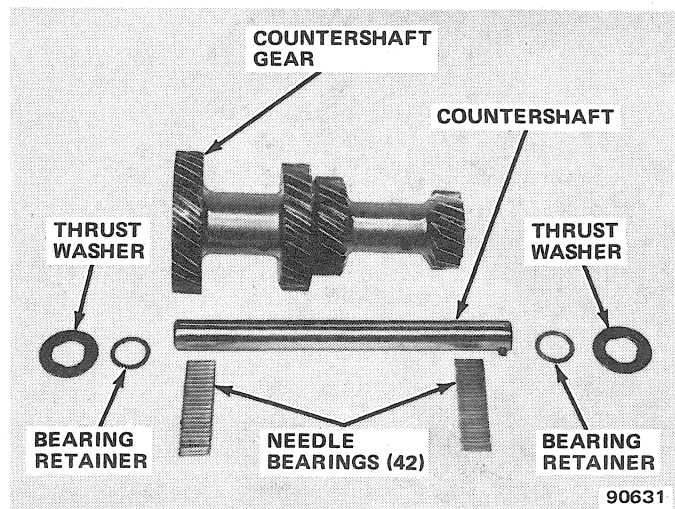


Fig. 2B-32 Countershaft Gear Assembly

- Nicks, burrs, rough surfaces in shaft bores or on gasket surfaces.

#### Gear, Shaft and Synchronizer Assemblies

- Broken, chipped or worn gear teeth.
- Damaged splines on mainshaft, synchronizer hubs, or sleeves.
- Broken or worn teeth or excessive wear or damage of blocking rings.
- Bent or broken synchronizer inserts.
- Damaged needle bearings or bearing bores in reverse idler or countershaft gear.
- Wear or galling of mainshaft, countershaft, clutch shaft or idler gear shafts.
- Worn thrust washers.
- Nicked, broken, or worn mainshaft or clutch shaft splines.
- Bent, distorted, broken or weak snap rings.
- Rough, galled, worn, or broken front or rear bearing.

#### ASSEMBLY

(1) Lubricate reverse idler gear shaft bore and sliding gear with transmission lubricant. Install sliding gear on reverse idler gear (fig. 2B-31).

(2) Install Arbor Tool J-29343 in reverse idler gear and install 22 needle bearings and one bearing retainer at each end of gear (fig. 2B-34).

(3) Coat reverse idler gear thrust washer surfaces with petroleum jelly and install thrust washers in case.

**NOTE:** The thrust washers have flats on them. Be sure to install the washers so these flats will face the mainshaft. Also, be sure to engage the thrust washer locating tabs in the case locating slots.

(4) Install reverse idler gear assembly (fig. 2B-35). Align gear bore, thrust washers, case bores, and install reverse idler gear shaft from rear of case. Be sure to seat roll pin in shaft, align roll pin with counterbore in case and push shaft into rear of case (fig. 2B-30).

(5) Measure reverse idler gear end play by inserting feeler gauge between thrust washer and gear. End play should be 0.004 to 0.018 inch (0.10 to 0.45 mm). If end play exceeds 0.018 inch (0.45 mm), remove idler gear and replace thrust washers.

(6) Coat counter shaft gear bore, needle bearings and bearing bores in gear with petroleum jelly. Insert arbor tool in bore of gear and install 21 needle bearings and one retainer in each end of gear.

(7) Coat countershaft gear thrust washer surfaces with petroleum jelly and position thrust washers in case.

**NOTE:** Be sure to engage the locating tabs on the thrust washers in the locating slots in the case.

(8) Insert countershaft into rear case bore just far enough to hold rear thrust washer in position. This will prevent washer from being displaced when countershaft gear is installed.

(9) Install countershaft gear. Align gear bore, thrust washers, bores in case, and install countershaft part-way into case. Be sure arbor tool enters shaft bore at front of case.

**NOTE:** Do not remove the countershaft arbor tool completely.

(10) Measure countershaft gear end play by inserting feeler gauge between washer and gear. End play should be 0.004 to 0.018 inch (0.10 to 0.45 mm). If end play exceeds 0.018 inch (0.45 mm), remove gear and replace thrust washers. After correct end play has been obtained, reinstall arbor tool in countershaft gear and allow gear to remain at bottom of case. Leave countershaft in rear case bore to hold rear thrust washer in place.

**NOTE:** The countershaft gear must remain at the bottom of the case to provide sufficient clearance for installation of the mainshaft and clutch shaft assemblies.

(11) Lubricate mainshaft, synchronizer assemblies and gear bores with transmission lubricant.

(12) Assemble first-second synchronizer hub and reverse gear and sleeve (fig. 2B-33):

(a) Install gear and sleeve on hub and place assembly flat on workbench.

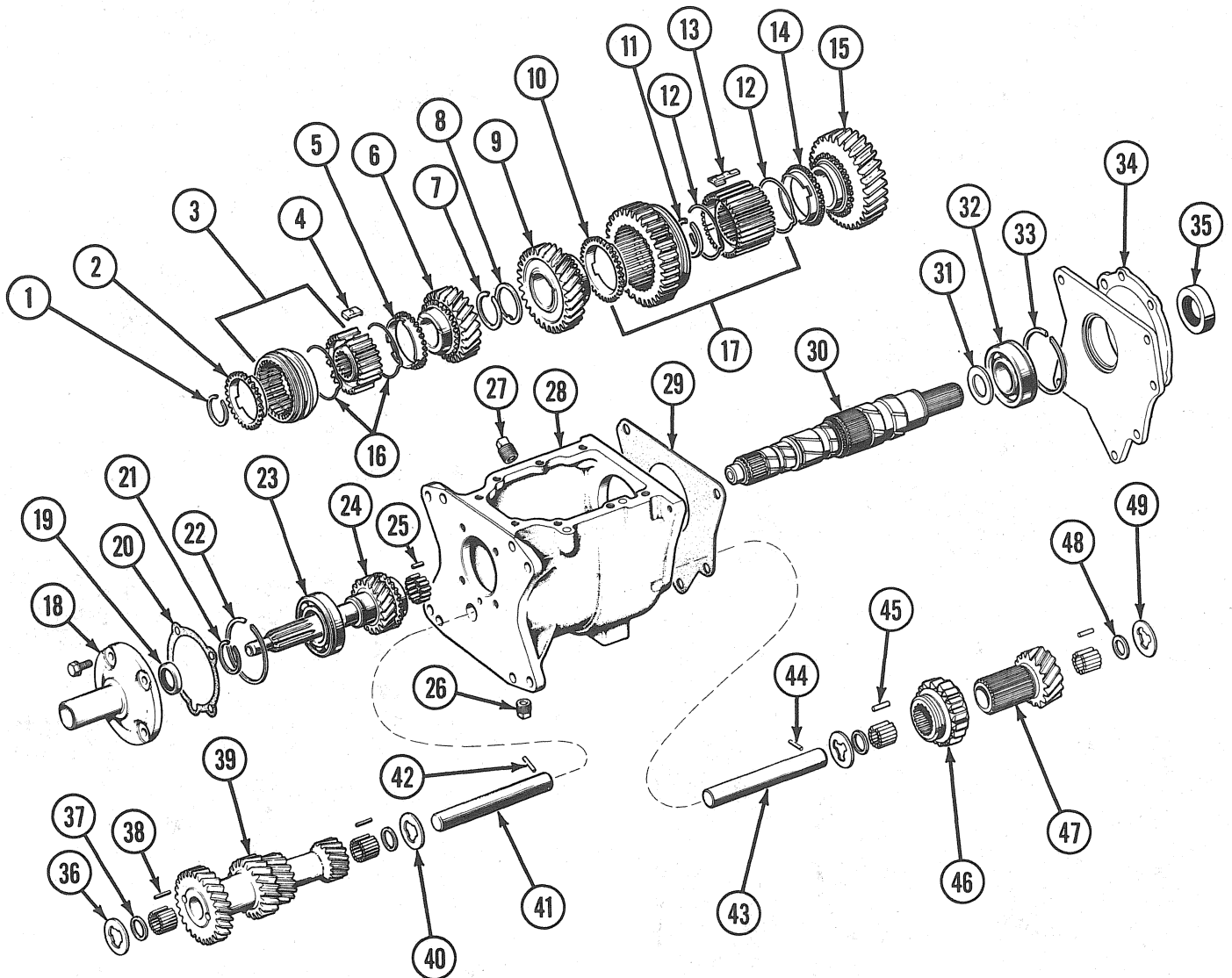
(b) Drop inserts into hub slots.

(c) Install insert spring. Position loop-end of spring in one insert, compress spring ends and insert spring ends under lips of remaining two inserts. Be sure spring is under lip of each insert (fig. 2B-36).

(d) Turn assembly over and install remaining insert spring as described in previous step. However, install this spring so open end faces 180° opposite first spring.

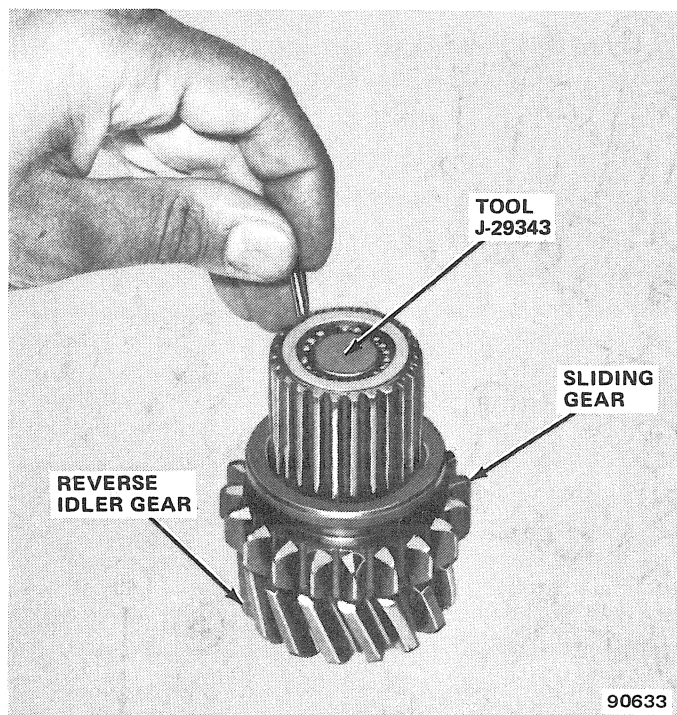
(13) Install assembled first-second synchronizer hub and reverse gear and sleeve on mainshaft.



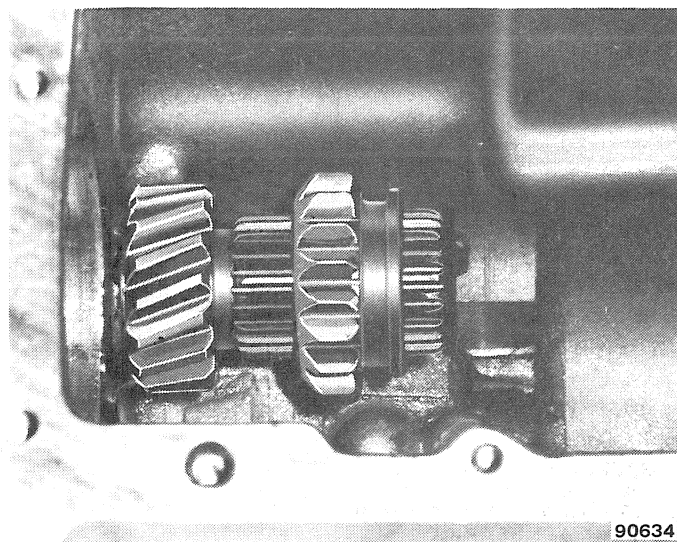


- |                                       |   |
|---------------------------------------|---|
| 1. THIRD-FOURTH GEAR SNAP RING        | 26. DRAIN PLUG                            |
| 2. FOURTH GEAR SYNCHRONIZER RING      | 27. FILL PLUG                             |
| 3. THIRD-FOURTH GEAR CLUTCH ASSEMBLY  | 28. CASE                                  |
| 4. THIRD-FOURTH GEAR PLATE            | 29. GASKET                                |
| 5. THIRD GEAR SYNCHRONIZER RING       | 30. SPLINE SHAFT                          |
| 6. THIRD SPEED GEAR                   | 31. FIRST GEAR THRUST WASHER              |
| 7. SECOND GEAR SNAP RING              | 32. REAR BALL BEARING                     |
| 8. SECOND GEAR THRUST WASHER          | 33. SNAP RING                             |
| 9. SECOND SPEED GEAR                  | 34. ADAPTER PLATE                         |
| 10. SECOND GEAR SYNCHRONIZER RING     | 35. ADAPTER SEAL                          |
| 11. MAIN SHAFT SNAP RING              | 36. FRONT COUNTERSHAFT GEAR THRUST WASHER |
| 12. FIRST-SECOND SYNCHRONIZER SPRING  | 37. ROLLER WASHER                         |
| 13. LOW-SECOND PLATE                  | 38. REAR ROLLER BEARING                   |
| 14. FIRST GEAR SYNCHRONIZER RING      | 39. COUNTERSHAFT GEAR                     |
| 15. FIRST GEAR                        | 40. REAR COUNTERSHAFT THRUST WASHER       |
| 16. THIRD-FOURTH SYNCHRONIZER SPRING  | 41. COUNTERSHAFT                          |
| 17. FIRST-SECOND GEAR CLUTCH ASSEMBLY | 42. PIN                                   |
| 18. FRONT BEARING CAP                 | 43. IDLER GEAR SHAFT                      |
| 19. OIL SEAL                          | 44. PIN                                   |
| 20. GASKET                            | 45. IDLER GEAR ROLLER BEARING             |
| 21. SNAP RING                         | 46. REVERSE IDLER SLIDING GEAR            |
| 22. LOCK RING                         | 47. REVERSE IDLER GEAR                    |
| 23. FRONT BALL BEARING                | 48. IDLER GEAR WASHER                     |
| 24. CLUTCH SHAFT                      | 49. IDLER GEAR THRUST WASHER              |
| 25. ROLLER BEARING                    |   |

Fig. 2B-33 Model T-176 4-Speed Transmission



**Fig. 2B-34 Reverse Idler Gear Needle Bearing Installation**



**Fig. 2B-35 Reverse Idler Gear Installation**

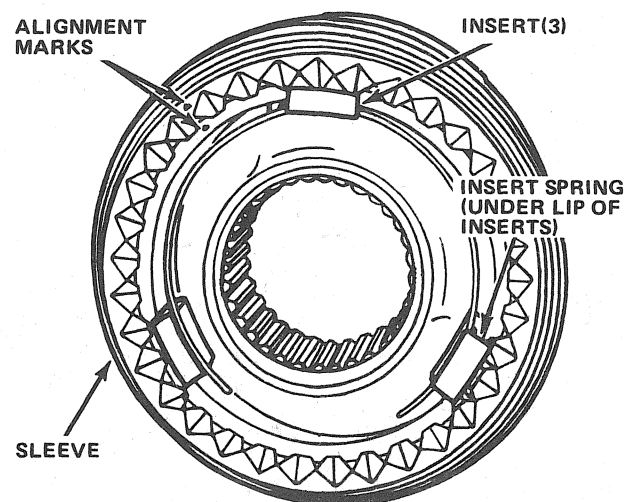
(14) Install new first-second synchronizer snap ring on mainshaft (fig. 2B-33).

(15) Install first gear and blocking ring on rear of mainshaft and install first gear thrust washer (fig. 2B-37).

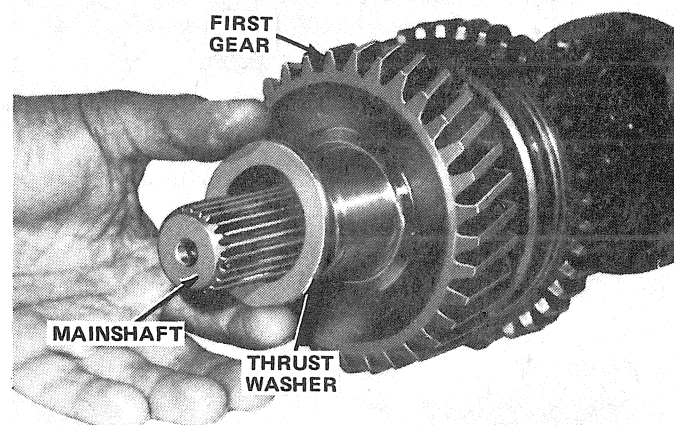
(16) Install new tabbed thrust washer on mainshaft. Be sure washer tab is seated in mainshaft tab bore (fig. 2B-38).

(17) Install second gear and blocking ring on mainshaft and install new second gear snap ring.

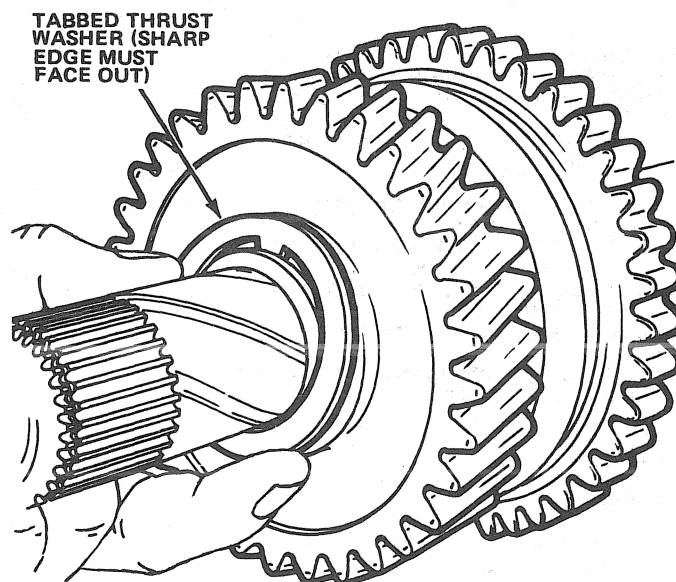
(18) Install third gear and blocking ring on mainshaft.



**Fig. 2B-36 Synchronizer Insert Spring Installation**



**Fig. 2B-37 First Gear and Thrust Washer Installation**



**Fig. 2B-38 Tabbed Thrust Washer Installation**

(19) Assemble third-fourth synchronizer (fig. 2B-33).

(a) Install sleeve on synchronizer hub. Align parts using reference marks.

(b) Place assembled hub and sleeve flat on workbench.

(c) Drop inserts into hub slots.

(d) Install insert spring. Position loop-end of spring in one insert, compress spring ends and insert spring ends under lips of remaining two inserts (fig. 2B-36).

(e) Turn assembly over and install remaining insert spring as described in previous step. However, position this spring so open end faces 180° opposite first spring.

(20) Install assembled third-fourth synchronizer assembly on mainshaft.

(21) Install new third-fourth synchronizer retaining snap ring on mainshaft and measure end play between synchronizer hub and snap ring (fig. 2B-39). End play should be 0.004 to 0.014 inches (0.10 to 0.35 mm). If end play exceeds limits, replace mainshaft thrust washers and snap rings.

(22) Install mainshaft geartrain assembly in case. Be sure synchronizers are in neutral position so sleeves will clear top of case when assembly is installed.

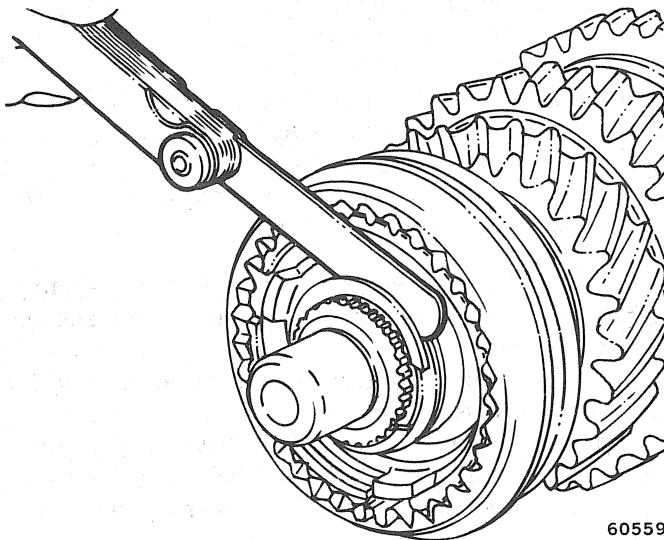


Fig. 2B-39 Checking Mainshaft Geartrain End Play

(23) Install locating snap ring on front bearing and install front bearing part-way onto clutch shaft.

**NOTE:** Do not install the bearing completely at this time as the shaft will not clear the countershaft gear and prevent installation.

(24) Coat bearing bore in clutch shaft and mainshaft pilot roller bearings with petroleum jelly. Install 15 roller bearings in clutch shaft bearing bore.

**CAUTION:** Do not use chassis grease or a similar "heavy" grease in the clutch shaft bore. Use petroleum jelly only. Heavy grease will plug the lubrication holes in the shaft and prevent proper lubrication of the roller bearing.

(25) Coat blocking ring surface of clutch shaft with transmission lubricant and position blocking ring on shaft.

(26) Support main shaft assembly and insert clutch shaft through front bearing bore in case. Seat main shaft pilot hub in clutch shaft roller bearings and tap front bearing and clutch shaft into case using rawhide mallet.

(27) Install front bearing cap and tighten cap bolts finger tight only.

(28) Position rear bearing on mainshaft. Do not install bearing locating ring at this time. Start bearing into shaft and into case bore using Tool J-29345. Remove tool and complete bearing installation using rawhide mallet. When bearing is fully seated on shaft, install bearing retaining snap ring.

**NOTE:** In order to seat the rear bearing on the mainshaft, the bearing must be tapped into the case deeper than the locating snap ring would allow. For this reason, do not install the locating snap ring until after the bearing is fully seated on the shaft and the retaining snap ring is installed.

(29) Remove front bearing cap, seat front bearing fully on clutch shaft and install bearing retaining snap ring.

(30) Apply thin film of sealer to front bearing cap gasket and position gasket on case. Be sure gasket notch is aligned with oil return hole in case.

(31) Remove front bearing cap oil seal using screwdriver and install replacement oil seal using Tool J-25233 (fig. 2B-40).

(32) Install front bearing cap. Tighten cap bolts to 12 foot-pounds (16 N•m) torque.

(33) Install locating ring on rear bearing. If necessary, reseal bearing in case using rawhide mallet.

(34) Install countershaft as follows:

(a) Turn transmission case on end. Position case at edge of workbench with clutch shaft pointing downward. Be sure countershaft bore in front of case is accessible.

(b) Have helper hold case in position.

(c) Align countershaft gear bores with thrust washers and case bores and tap shaft into place. Do not let arbor tool drop onto floor as shaft is installed.

**CAUTION:** Do not damage the thrust washers during counter shaft installation. Be sure they are aligned with the case bores and gear bores before tapping the countershaft into place.

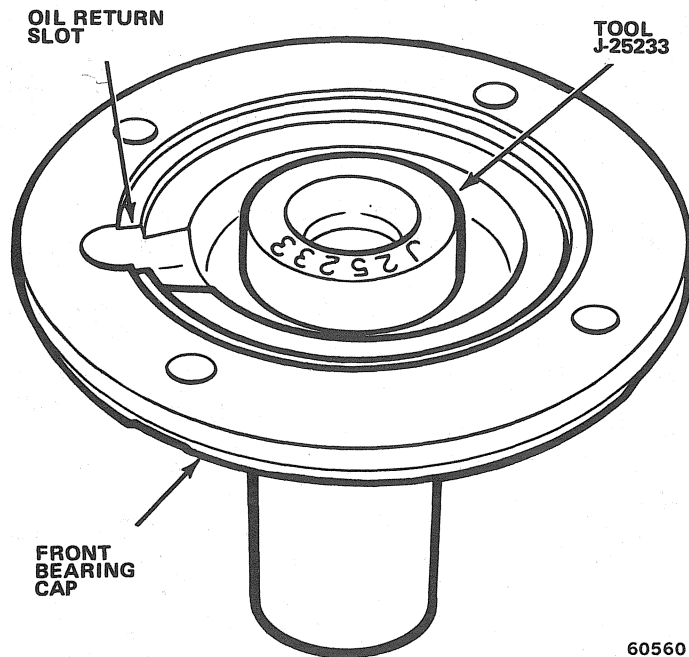


Fig. 2B-40 Front Bearing Cap Seal Installation

(35) Shift synchronizer sleeves into all gear positions and check operation. If clutch shaft and mainshaft appear to bind in Neutral position, check for blocking rings sticking on tapered portion of gears. Use screwdriver to free any sticking blocking rings.

(36) Fill transmission with 3.5 pints (1.7 liters) of SAE 85W-90 gear lubricant.

(37) Position new shift control housing gasket on case and install control housing. Tighten housing bolts to 12 foot-pounds (16 N•m) torque.

(38) Install transmission on transfer case.

## SHIFT CONTROL HOUSING

### Disassembly

(1) Remove shift lever cover, control housing cap, retainer and remove shift lever and spring.

(2) Position transmission case cover in vise so shift forks are facing upward. Use wood blocks to protect cover from vise jaws and do not overtighten vise.

(3) Place all shift forks in neutral position.

(4) Remove shift rail support plate attaching bolts and tabbed washers and remove support plates (fig. 2B-41).

(5) Remove first-second shift rail.

(6) Remove third-fourth shift rail, shift lug and interlock pin.

(7) Remove reverse shift rail.

(8) Remove poppet balls.

(9) Remove shifter interlock rings.

(10) Remove poppet springs.

(11) Remove fulcrum pins.

(12) Remove cover from vise.

(13) Clean all components in solvent and dry using compressed air.

(14) Inspect all components. Replace any components that are nicked, cracked, broken or excessively worn.

### Assembly

(1) Clamp transmission case cover in vise using protective wood blocks and install fulcrum pins in cover.

**CAUTION:** To avoid damaging the cover do not overtighten the vise jaws.

(2) Lubricate shift rails and shift rail grooves in cover with petroleum jelly.

(3) Install poppet springs in transmission case cover bores.

(4) Install poppet balls (one on each spring).

(5) Position reverse gear shift rail and fork on reverse rocker arm in transmission case cover.

**NOTE:** Be sure the notch on the shift rail is positioned over the reverse poppet ball and that reverse rocker arm is engaged in the reverse fork slot.

(6) Install third-fourth shift rail and shift fork assembly in transmission case cover.

**NOTE:** Be sure the interlock pin is in position in the shift rail before further assembly.

(7) Install first-second shift rail and fork assembly. Be sure shift rail notch is over poppet ball in transmission case cover.

(8) Install shifter interlock rings in cover and between poppet balls.

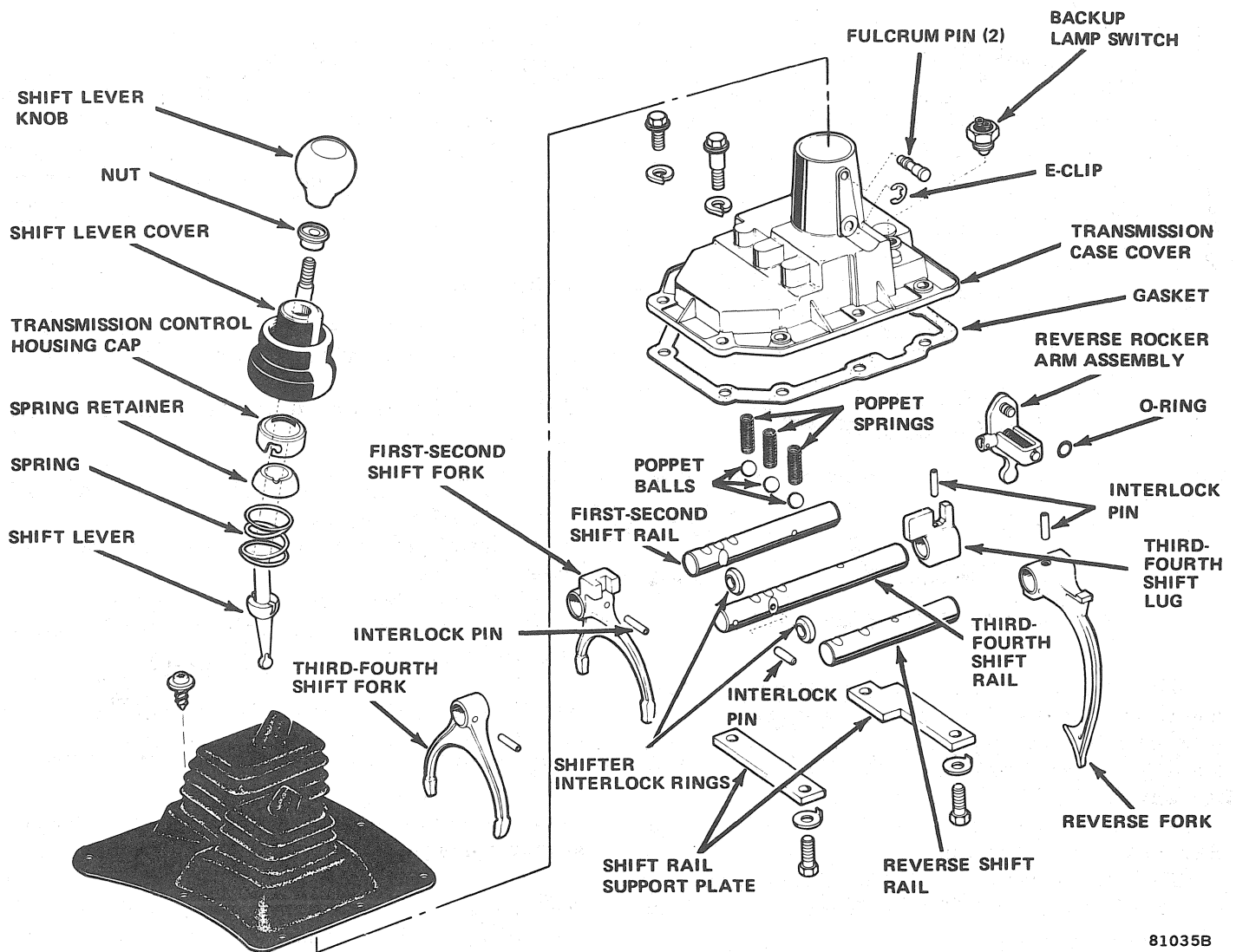
(9) Press downward on shift rails to compress poppet balls and springs. Use wood block long enough to contact all three shift rails to press rails downward evenly.

(10) While holding shift rails downward, position shift rail retaining plates on housing and install plate attaching bolts and tabbed washers finger-tight.

(11) Remove wood block and tighten shift rail retaining bolts to 12 to 15 foot-pounds (16 to 19 N•m) torque. Be sure tabbed washers are in correct position before bending washer tabs.

(12) Check shift rail operation. Each rail must slide smoothly in cover groove. Be sure it is not possible to overshift into another gear position. After checking shift operation, place forks in third gear position.

(13) Install shift lever, spring, spring retainer and control housing cap (fig. 2B-41). Push cap downward and turn clockwise to install and seat.



81035B

Fig. 2B-41 Shift Control Housing—T-176

## SPECIFICATIONS

### T-176 Lubricant Capacity and End Play Tolerances

#### End Play Tolerances:

Countershaft Gear to Case . . . . .	.0004 to 0.018 inch (0.10 to 0.45 mm)
Reverse Idler Gear to Case . . . . .	.0004 to 0.018 inch (0.10 to 0.45 mm)
Mainshaft Gear Train . . . . .	.0004 to 0.018 inch (0.10 to 0.45 mm)
Lubricant Capacity . . . . .	3.5 pints (1.7 liters)
Lubricant Type . . . . .	SAE 85W-90, APJ GL5

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## Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	USA (ft-lbs)		Metric (N-m)	
	Service Set-To Torque	Service In-Use Recheck Torque	Service Set-To Torque	Service In-Use Recheck Torque
Backup Lamp Switch . . . . .	15	10-20	20	14-27
Drain and Fill Plugs . . . . .	15	10-20	20	14-27
Front Bearing Cap Bolts . . . . .	13	11-15	18	15-20
Shift Housing-to-Transmission Case Bolts . . . . .	13	11-15	18	15-20
Support Plate Bolts . . . . .	18	15-20	24	20-27

All torque values given in foot-pounds and newton-meters with dry fits unless otherwise specified.

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## MODEL T-18A

### 4-SPEED TRANSMISSION

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Cleaning and Inspection	2B-25
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#### DISASSEMBLY

(1) Remove transmission-to-transfer case adapter Stud Nuts and remove transmission from transfer case.

(2) Remove and discard transmission-to-transfer case gasket.

(3) Position shift lever in reverse, remove case cover bolts, remove shift control housing.

(4) Punch alignment marks on the front bearing cap, remove capscrews and bearing cap.

(5) Remove front bearing lock ring and snap ring.

(6) Remove front bearing from clutch shaft using puller J-25152 (fig. 2B-43).

(7) Remove front bearing retainer washer from clutch shaft.

(8) Remove rear adapter housing retaining bolts and housing.

(9) Remove rear bearing lock ring and snap ring.

(10) Reinstall front bearing cap temporarily.

(11) Remove rear bearing using Puller Set J-25152.

**NOTE:** If the bearing puller plates will not seat in the bearing snap ring groove, tap the end of the clutch shaft with a lead hammer to move the mainshaft rearward and expose the bearing groove fully.

(12) Remove front bearing cap.

(13) Rotate clutch shaft until flat area of fourth speed gear is in line with the countershaft gear.

(14) Move mainshaft to rear of case and separate clutch shaft from mainshaft by pulling toward front bearing bore. 22 needle bearings will be displaced.

**NOTE:** On six-cylinder models the clutch shaft will come out of front bearing bore. On eight-cylinder models the clutch shaft is removed from inside the case after mainshaft assembly removal.

(15) Remove bearing roller spacer from mainshaft pilot hub (fig. 2B-42).

(16) Remove mainshaft assembly through top of case.

(17) Remove clutch shaft through top of case.

(18) Remove lock plate retaining bolt from countershaft and reverse idler gear shaft, and remove lock plate.

(19) Tap countershaft toward rear of case using brass drift and hammer. Stop when end of shaft is approximately even with front inside edge of case bore.

(20) Complete countershaft removal as follows:

(a) Make arbor tool from steel rod 1.115 inches (2.83 cm) in diameter by 9.85 inches (25.01 cm) long.

(b) After making tool, remove all burrs or sharp edges using file.

(c) Insert tool into shaft bore at front of case and drive countershaft out rear of case. Keep tool in constant contact with shaft to avoid displacing bearing rollers or washers.



(21) Tip case on side and remove countershaft gear and arbor tool as assembly.

(22) Remove countershaft gear thrust washers and any mainshaft pilot bearing rollers that may have fallen into case during mainshaft removal.

(23) Remove reverse idler gear shaft using brass drift through front bearing opening in case (fig. 2B-42).

(24) Remove arbor tool from countershaft gear and remove bearing rollers, washers and spacer.

(25) Remove snap rings, bearing rollers, washers and sleeve from reverse idler gear.

(26) Remove fill plug, drain plug and 22 clutch shaft needle bearings from case.

(27) Remove front bearing cap seal and rear adapter seal.

### Main Shaft Gear Train Disassembly

(1) Scribe alignment marks on main shaft splines and clutch hubs for assembly reference.

(2) Remove pilot bearing spacer from front of main shaft (fig. 2B-42).

(3) Remove third-fourth synchronizer snap ring and remove third-fourth synchronizer assembly and third gear (fig. 2B-42).

(4) Remove first-second synchronizer snap ring and remove first-second synchronizer assembly (fig. 2B-42).

(5) Remove second gear snap ring and remove thrust washer and second gear.

(6) Scribe alignment marks on clutch hubs and sleeves for assembly reference.

(7) Remove insert springs and shifting plates from third-fourth clutch sleeve and remove sleeve from hub. Observe position of springs and plates for assembly reference.

(8) Place first-second synchronizer assembly on work bench and wrap cloth around clutch sleeve. Cloth is necessary to prevent losing shift plate lock balls during disassembly.

(9) Remove clutch sleeve from hub.

(10) Remove cloth from sleeve and remove lock balls, insert spring and shift plates from hub.

### CLEANING AND INSPECTION

Clean and inspect the transmission case and all components thoroughly. If any transmission gear requires replacement, also replace the gear with which it meshes. Use new gaskets, oil seals and snap rings during assembly.

Inspect the transmission case for cracks and worn or scored bearing bosses. Examine the ball bearings for cracked races, excessive wear, looseness, and for tight fit in the case bores. Inspect all gear teeth for cracks, chips, or spots where gear hardening has worn through. Main shaft gears must not bind on the shaft and should not exhibit excessive play. Inspect the synchronizer blocking

rings for cracks, excessive wear, or pitting in the tapered area of the ring. If thrust washer condition is doubtful, replace them.

Check all bearing rollers for flat spots, pitting, cracks or other damage. Replace rollers as required. Inspect the countershaft and reverse idler shafts for pitting, wear, scores, nicks, cracks and flat spots. Small nicks or scores can be reduced using crocus cloth or a fine-tooth file. Replace shafts if severely worn or damaged. Inspect the mainshaft and synchronizer hubs and sleeves for damaged or worn splines, cracks, worn mainshaft pilot hub and damaged mainshaft threads. Replace parts as required. Check reverse shifting arm and pivot pin for wear or other damage, and replace if necessary.

### ASSEMBLY

**NOTE:** *Prelubricate all components with petroleum jelly during assembly.*

#### Reverse Idler Gear

(1) Install snap ring in one end of reverse idler gear.

(2) Install thrust washer in gear bore against snap ring.

(3) Insert sleeve in gear bore.

(4) Install 37 roller bearings in one end of gear and install bearing spacer (fig. 2B-42).

(5) Install remaining 37 roller bearings in opposite end of gear and install remaining thrust washer and snap ring.

#### Countershaft Gear Assembly

(1) Install bearing spacer sleeve in gear and insert arbor tool into gear and through sleeve.

(2) Slide one bearing spacer onto arbor tool and seat spacer against sleeve.

(3) Insert 22 roller bearings into gear bore and seat bearings against spacer just installed.

(4) Slide second bearing spacer onto arbor tool and seat spacer against bearings.

(5) Install 22 more roller bearings in gear bore and seat bearings against second spacer.

(6) Install third bearing spacer on arbor tool and seat spacer against bearings.

(7) Repeat spacer/bearing installation procedure at opposite end of gear.

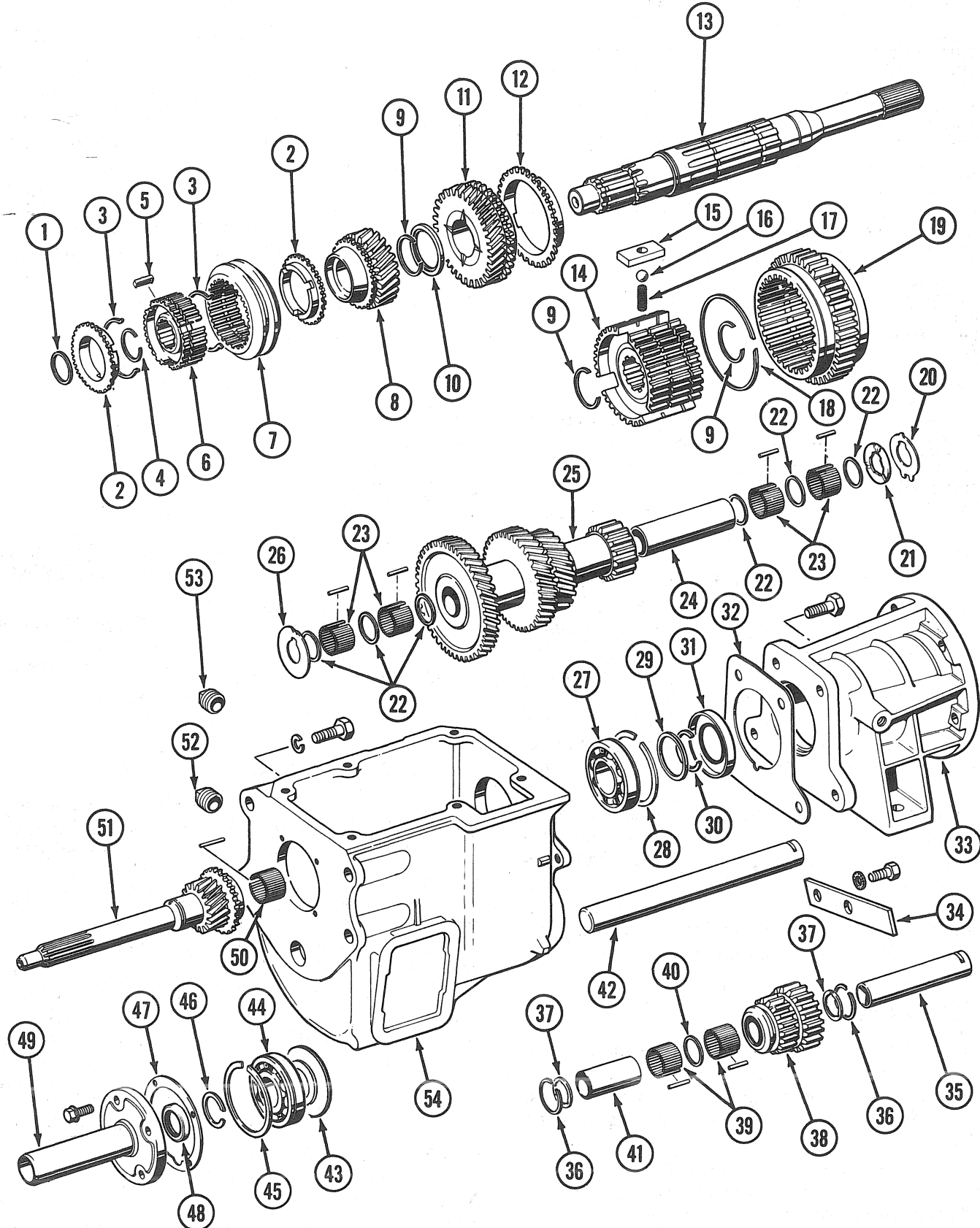
#### First-Second Synchronizer Assembly

**NOTE:** *The third-fourth clutch hub is used to help assemble the first-second synchronizer assembly.*

(1) Place third-fourth clutch hub on workbench.

(2) Install insert spring in first-second clutch hub spring groove.





**Fig. 2B-42 Model T-18A 4-Speed Transmission**

1. MAINSHAFT PILOT BEARING ROLLER SPACER
2. THIRD-FOURTH BLOCKING RING
3. THIRD-FOURTH RETAINING RING
4. THIRD-FOURTH SYNCHRONIZER SNAP RING
5. THIRD-FOURTH SHIFTING PLATE (3)
6. THIRD-FOURTH CLUTCH HUB
7. THIRD-FOURTH CLUTCH SLEEVE
8. THIRD GEAR
9. MAINSHAFT SNAP RING
10. SECOND GEAR THRUST WASHER
11. SECOND GEAR
12. SECOND GEAR BLOCKING RING
13. MAINSHAFT
14. FIRST-SECOND CLUTCH HUB
15. FIRST-SECOND SHIFTING PLATE (3)
16. POPPET BALL
17. POPPET SPRING
18. FIRST-SECOND INSERT RING
19. FIRST-SECOND CLUTCH SLEEVE
20. COUNTERSHAFT GEAR THRUST WASHER (STEEL) (REAR)
21. COUNTER SHAFT GEAR THRUST WASHER (STEEL BACKED BRONZE) (REAR)
22. COUNTERSHAFT GEAR BEARING WASHER
23. COUNTERSHAFT GEAR BEARING ROLLERS (88)
24. COUNTERSHAFT GEAR BEARING SPACER
25. COUNTERSHAFT GEAR
26. COUNTERSHAFT GEAR THRUST WASHER (FRONT)
27. REAR BEARING

28. REAR BEARING LOCATING SNAP RING
29. REAR BEARING SPACER RING
30. REAR BEARING SNAP RING
31. ADAPTER PLATE SEAL
32. ADAPTER PLATE TO TRANSMISSION GASKET
33. ADAPTER TO TRANSMISSION
34. COUNTERSHAFT-REVERSE IDLER SHAFT LOCKPLATE
35. REVERSE IDLER GEAR SHAFT
36. REVERSE IDLER GEAR SNAP RING
37. REVERSE IDLER GEAR THRUST WASHER
38. REVERSE IDLER GEAR
39. REVERSE IDLER GEAR BEARING ROLLERS (74)
40. REVERSE IDLER GEAR BEARING WASHER
41. REVERSE IDLER SHAFT SLEEVE
42. COUNTERSHAFT
43. FRONT BEARING RETAINER WASHER
44. FRONT BEARING
45. FRONT BEARING LOCATING SNAP RING
46. FRONT BEARING LOCK RING
47. FRONT BEARING CAP GASKET
48. FRONT BEARING CUP SEAL
49. FRONT BEARING CAP
50. MAINSHAFT PILOT BEARING ROLLERS (22)
51. CLUTCH SHAFT
52. DRAIN PLUG
53. FILLER PLUG
54. TRANSMISSION CASE

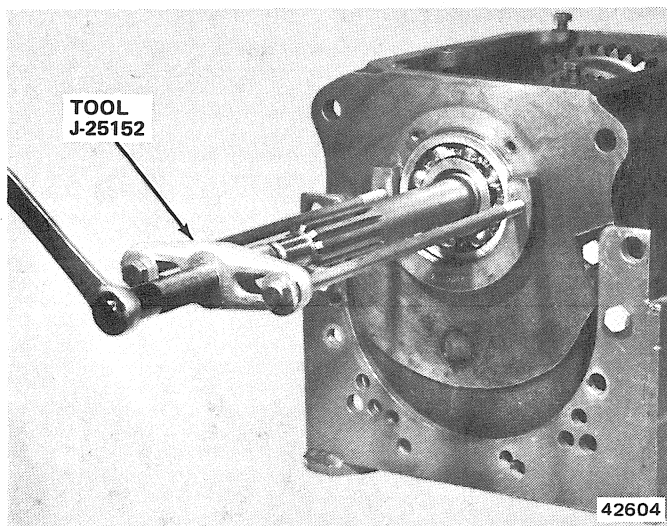


Fig. 2B-43 Front Bearing Removal

(3) Position first-second clutch hub on top of third-fourth hub so lock ball holes in first-second hub are in uppermost position (fig. 2B-44).

(4) Align scribe marks on first-second hub and sleeve and install sleeve on hub (fig. 2B-45). Allow sleeve to bottom against work bench.

(5) Install each shifting plate, poppet spring and lock ball assembly one at a time as follows (fig. 2B-45):

- (a) Install shifting plate in hub slot.
- (b) Insert poppet spring through plate.
- (c) Position lock ball on poppet spring, and compress ball and spring (fig. 2B-45).

**NOTE:** To ease lock ball installation use 7/32-inch socket and 1/4-inch drive extension to press lock ball into place.

(d) Maintain pressure on ball and spring and slide shifting plate downward in hub slot until ball is held in position by clutch sleeve.

(6) Install remaining shift plates, poppet springs and lock balls as described in previous step.

(7) Complete synchronizer assembly by pressing down on hub and pulling up on sleeve.

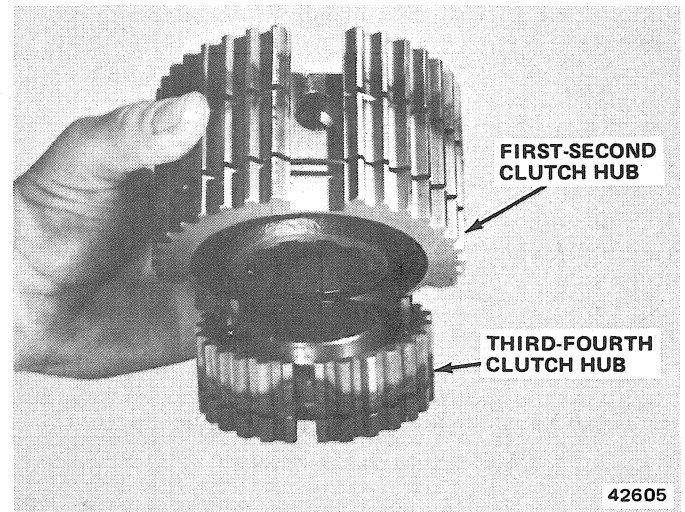


Fig. 2B-44 Supporting First-Second Clutch Hub

### Third-Fourth Synchronizer Assembly

(1) Align and assemble third-fourth clutch hub and sleeve using reference marks made at disassembly.

(2) Insert shifting plates in hub slots.

(3) Install insert springs so one end of each spring is hooked into same shifting plate (fig. 2B-46).

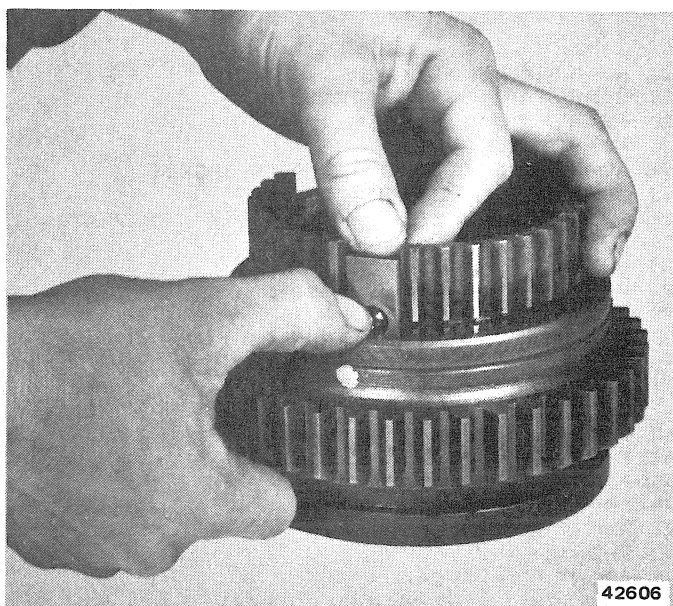


Fig. 2B-45 Assembling First-Second Synchronizer

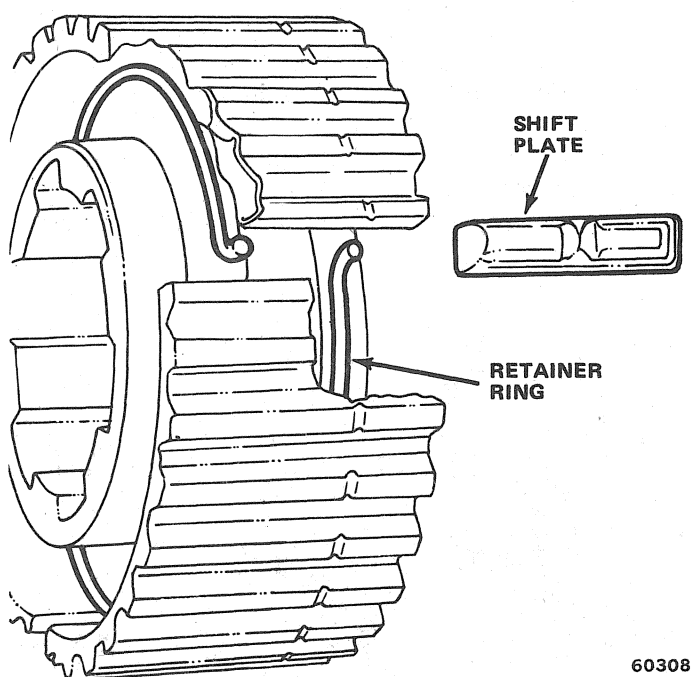


Fig. 2B-46 Third-Fourth Synchronizer Shifting Plate and Retaining Ring Installation

### Clutch Shaft Assembly

- (1) Lubricate mainshaft bearing rollers and clutch shaft bore with generous quantity of petroleum jelly.
- (2) Install 22 bearing rollers in clutch shaft bore. Use additional petroleum jelly to help retain rollers in bore if necessary.
- (3) Coat blocking ring with petroleum jelly and install ring on clutch shaft.

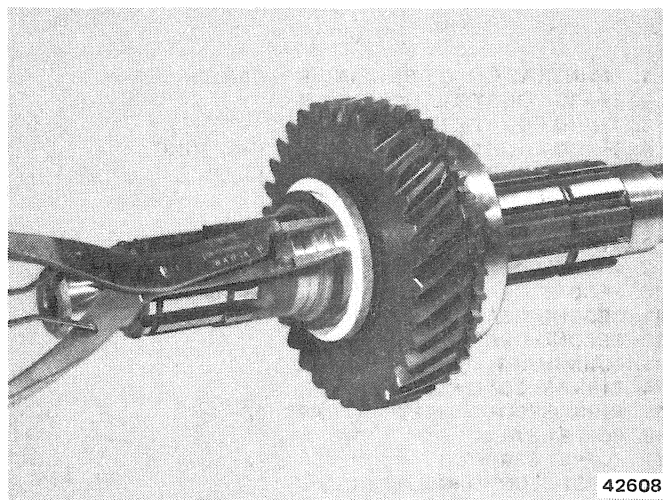


Fig. 2B-47 Second Gear and Thrust Washer Installation

### Mainshaft and Geartrain Assembly

- (1) Install second gear from front of mainshaft (fig. 2B-47).
- (2) Install second gear thrust washer so step bore in washer faces front end of mainshaft.
- (3) Install second gear snap ring. Be sure thrust washer step bore fits over snap ring.
- (4) Install second gear rear snap ring, blocking ring, first-second synchronizer assembly and snap ring from rear of mainshaft.

**NOTE:** The first-second synchronizer clutch sleeve shift fork groove must face the rear of the mainshaft (fig. 2B-48).

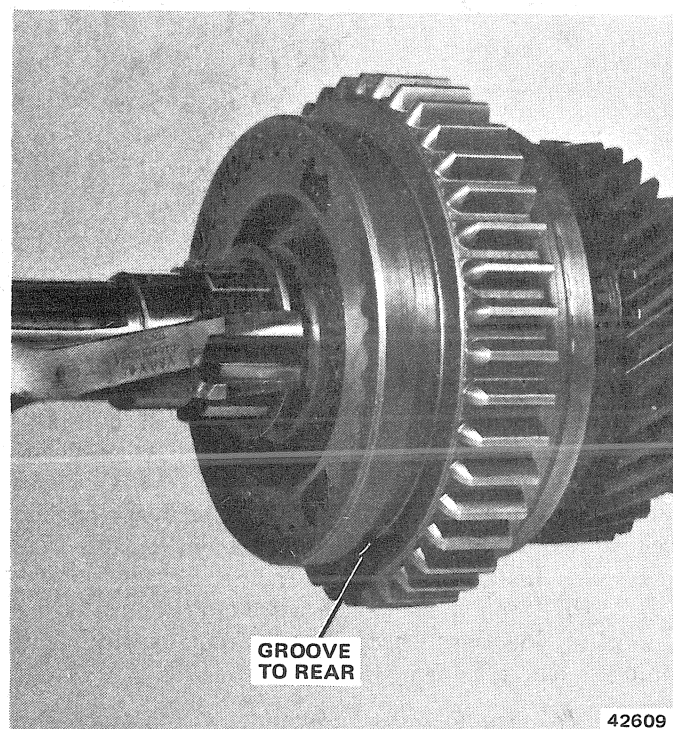


Fig. 2B-48 First-Second Synchronizer Installation

(5) Install third gear on mainshaft and install blocking ring on gear.

(6) Install third-fourth synchronizer assembly on mainshaft (fig. 2B-42).

**NOTE:** The third-fourth synchronizer must be installed with the chamfered side of the hub facing the front of the mainshaft (fig. 2B-49).

(7) Install third-fourth synchronizer retaining ring (fig. 2B-42).

(8) Install mainshaft bearing roller spacer on shaft pilot hub (fig. 2B-42).

### Transmission Case Assembly

(1) Coat countershaft thrust washers with petroleum jelly and install washers in case. Index tab on large, bronze-faced washer in locating recess in front of case. Index notch in smaller, steel washer with locating lug at rear of case.

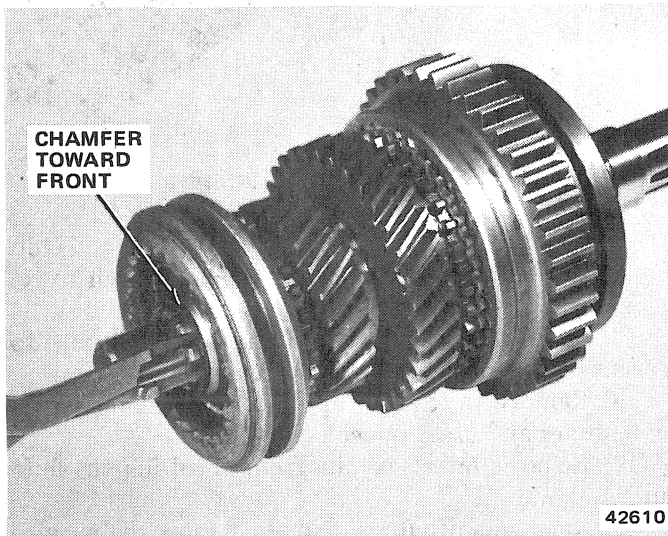


Fig. 2B-49 Third-Fourth Synchronizer Installation

(2) Install countershaft gear assembly.

(3) Install remaining countershaft thrust washer between rear of countershaft gear and smaller, steel thrust washer.

(4) Install countershaft from rear of case but do not install shaft completely. Stop installation when shaft just starts into case front bore.

**CAUTION:** When installing the countershaft, keep the shaft and arbor tool in constant contact to avoid displacing any bearing rollers or bearing washers.

(5) Install reverse idler gear. Larger gear end must face rear of case.

(6) Install reverse idler gear shaft from rear of case. Tap shaft forward until lock plate slot in shaft is aligned with lock plate slot in countershaft.

(7) Install lock plate in countershaft and reverse idler gear shaft slots.

(8) Tap ends of countershaft and reverse idler gear shafts alternately until shafts are fully installed.

(9) Insert assembled clutch shaft and fourth gear blocking ring in case front bearing bore. Insert shaft from case interior, not from front or outside of case.

(10) Install mainshaft and gear train assembly.

(11) Install mainshaft pilot bearing roller spacer on mainshaft pilot hub if not installed previously.

(12) Insert mainshaft pilot hub in clutch shaft bore. Be sure bearing rollers in clutch shaft are not displaced and that fourth gear blocking ring notches are aligned with shifting plates.

(13) Install front bearing cap temporarily to support clutch shaft.

(14) Install retaining snap ring on rear bearing and drive bearing onto mainshaft and into case rear bore. Seat snap ring against case.

**CAUTION:** During rear bearing installation avoid wedging each blocking ring on its mating tapered surface.

(15) Install replacement oil seal in transfer case adapter plate.

**CAUTION:** The adapter plate oil seal must be installed correctly to prevent lubricant flow from the transfer case into the transmission. When correctly positioned, the seal lip will face the transfer case (fig. 2B-50).

(16) Coat lip of adapter plate oil seal with petroleum jelly.

(17) Position replacement transmission-to-adapter gasket on transmission and install adapter plate. Apply nonhardening sealer to adapter plate attaching bolts and install bolts.

(18) Remove front bearing cap and install front bearing retaining washer on clutch shaft with dished side of washer facing mainshaft.

(19) Slide front bearing onto clutch shaft and tap bearing into case bore using section of pipe or driver sleeve (fig. 2B-51). Be sure to seat bearing against clutch shaft gear shoulder and front bearing retainer washer.

**CAUTION:** During front bearing installation avoid wedging each blocking ring on its mating tapered surface.

(20) Install thickest front bearing lock ring in clutch shaft ring groove.

**NOTE:** The front bearing lock rings are available in four thicknesses.

(21) Pull clutch shaft and front bearing forward just far enough to expose locating snap ring groove in bearing. Install locating snap ring and push clutch shaft rearward until locating snap ring seats against case.

(22) Position front bearing cap gasket on front bearing cap. Coat threads of bearing cap attaching bolts with



nonhardening sealer. Align oil return holes in cap, gasket and case, and install attaching bolts. Tighten bolts to 15 foot-pounds (20 N•m) torque.

(23) Check all synchronizer blocking rings for free movement. If blocking rings were wedged onto the tapered hubs of the clutch shaft, third and second speed gears during bearing installation, pry them free using screwdriver.

(24) Move synchronizer sleeves to Neutral position.

(25) Install fill and drain plugs and pour two pints of gear lubricant over all gears while rotating mainshaft.

(26) Coat shift control housing with RTV silicone sealer and install housing on case. Be sure shift forks engage synchronizer sleeves and that reverse shift arm engages flat on reverse shift rail.

(27) Coat shift lever housing attaching bolts with nonhardening sealer and install bolts. Tighten bolts to 12 foot-pounds (16 N•m) torque.

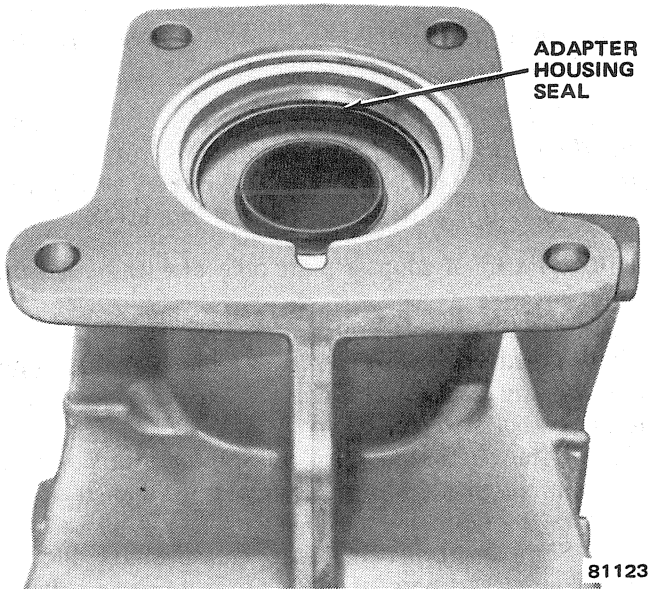


Fig. 2B-50 Adapter Plate Oil Seal Position

(28) Shift gears through all positions to check operation.

(29) Assemble transfer case and transmission and tighten attaching bolts to 30 foot-pounds (41 N•m) torque.

## SHIFT CONTROL HOUSING

### Disassembly

(1) Unthread shift lever cap and remove cap, gasket if equipped, spring seat, spring and shift lever as assembly (fig. 2B-52).

(2) Remove shift lever locating pins from housing (fig. 2B-52).

(3) Mount housing in vise with shift forks facing upward.

(4) Remove backup lamp switch.

(5) Remove shift rail bore plugs using hammer and punch.

(6) Move shift rails to Neutral position.

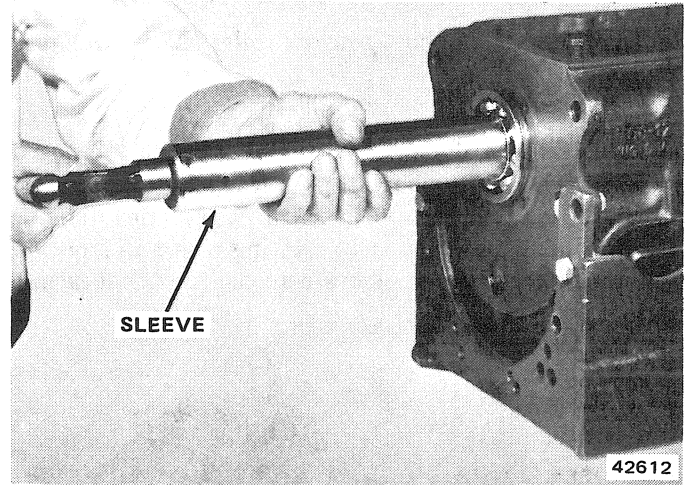


Fig. 2B-51 Front Bearing Installation

(7) Remove roll pins attaching shift forks and shift gates to shift rails. Use hammer and pin punch to remove pins.

(8) Cover poppet ball holes in housing with tape to prevent ball or spring loss during removal.

(9) Remove shift rails. Tap rails out of housing using hammer and brass punch.

(10) Remove interlock pin from third-fourth shift rail.

(11) Remove shift forks and shift gates. Be sure to mark or note position of forks and gates for assembly reference before removal.

(12) Remove poppet balls and springs from housing.

(13) Remove interlock plungers from housing.

(14) Remove retaining clip from reverse shift gate and remove spring and plunger from gate.

(15) Inspect housing breather. Remove breather if damaged or restricted in any way.

### Assembly

(1) Install replacement breather in housing if removed.

(2) Install spring and plunger in reverse shift gate. Compress plunger and install plunger retaining clip.

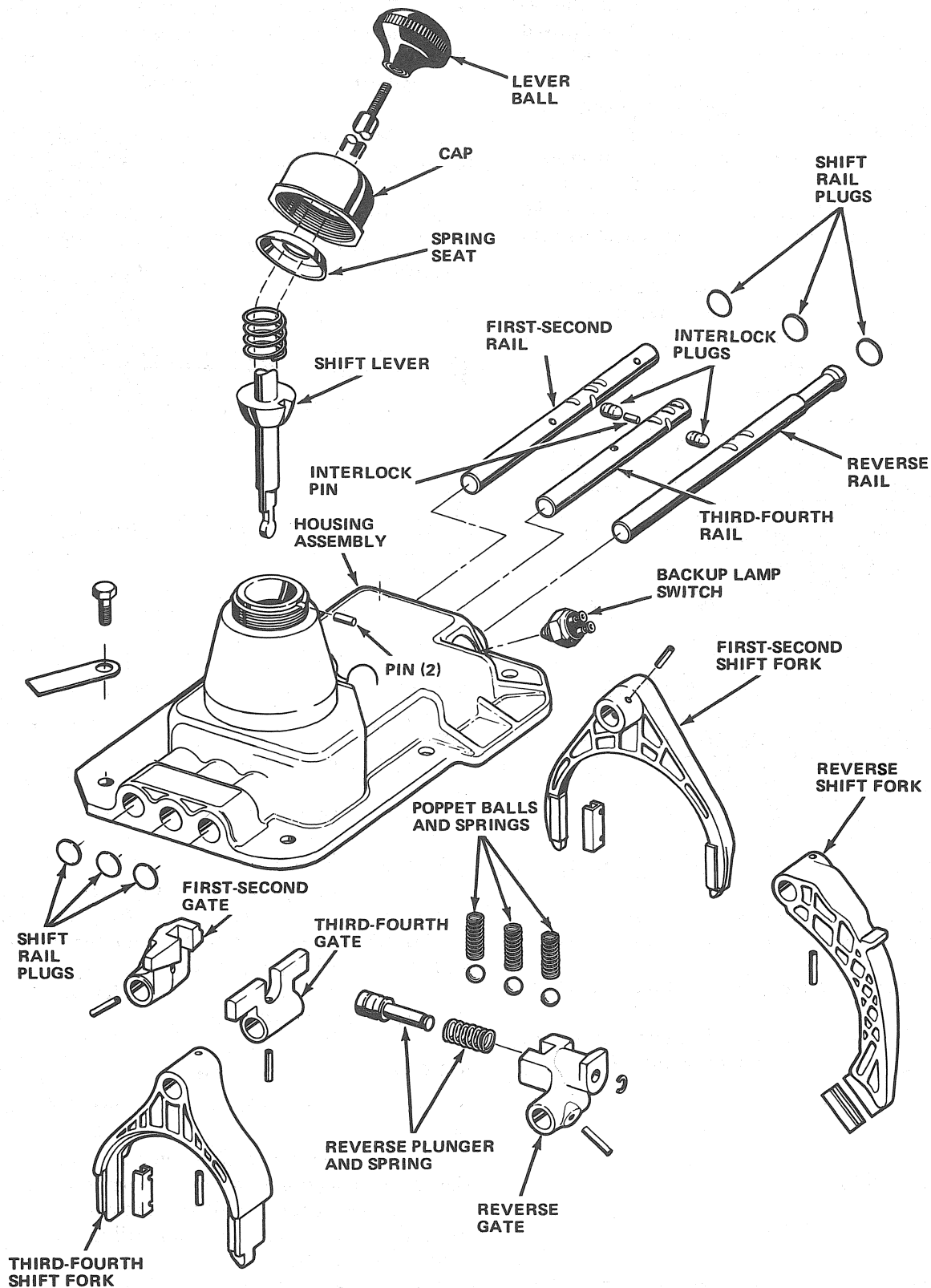
(3) Insert reverse shift rail into housing. Install reverse shift fork on rail and slide rail up to but not into shift rail poppet bore.

(4) Install poppet spring and ball in reverse shift rail poppet bore. Compress ball and spring using punch and slide rail through bore.

(5) Install reverse shift gate on opposite end of shift rail and slide rail into housing until poppet ball engages in rail notch. Install shift gate so plunger pin boss faces rear of housing (fig. 2B-53).

(6) Align and install roll pins that fasten reverse shift fork and shift gate to shift rail.

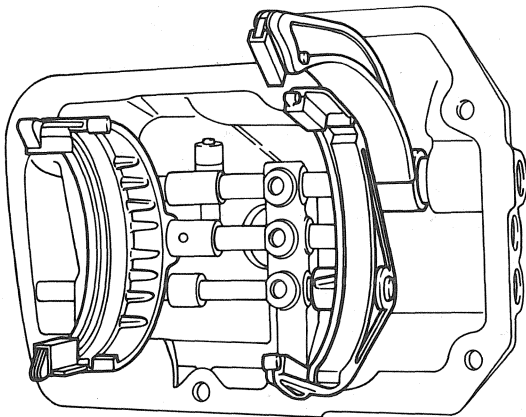
(7) Install interlock plungers in pockets located between housing shift rail poppet bores.



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Fig. 2B-52 Shift Control Housing—Transmission Model T-18A

- (8) Insert first-second shift rail into housing. Install first-second shift fork on rail so fork offset faces rear of housing (fig. 2B-53). Slide shift rail up to but not into shift rail poppet bore.
- (9) Install poppet spring and ball in first-second shift rail poppet bore. Compress ball and spring using punch and slide shift rail through bore.
- (10) Install first-second shift gate on opposite end of shift rail and slide rail into housing until poppet ball engages in rail notch.
- (11) Align and install roll pins that fasten first-second shift fork and shift gate to shift rail.
- (12) Insert third-fourth shift rail through center bore in housing. Install third-fourth shift gate on rail so flat tang on gate faces front of housing (fig. 2B-53).



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Fig. 2B-53
Shift Fork/Shift Gate Position

- (13) Coat interlock pin with petroleum jelly (to hold it in place) and install pin in third-fourth shift rail pin bore.
- (14) Install poppet spring and ball in third-fourth shift rail poppet bore. Compress ball and spring using punch and slide rail through bore.
- (15) Install third-fourth shift fork on shift rail and slide rail into housing until poppet ball engages in rail notch.
- (16) Align and install roll pins that fasten third-fourth shift fork and shift gate to shift rail.

**NOTE:** To avoid hard shifting after assembly, be sure the third-fourth shift gate roll pin is installed so it is flush with the bottom of the shift gate notch.

SPECIFICATIONS

Transmission Specifications

Model	T18A
Type	Synchromesh
Speeds	4 Forward, 1 Reverse
Gear Ratios:	
First (Low)	6.32:1
Second	3.09:1
Third	1.69:1
Fourth	1.00:1
Reverse	7.44:1
End Play Tolerances	All end play controlled by selective thickness snap rings. Use thickest snap rings available.
Lubricant Capacity	6-1/2 Pints (3.07 liters)
Lubricant Type	SAE 85W-90 Gear Lubricant

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Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	USA (ft-lbs)		Metric (N-m)	
	Service Set-To Torque	Service In-Use Recheck Torque	Service Set-To Torque	Service In-Use Recheck Torque
Backup Lamp Switch	18	15-20	24	20-27
Drain Plug	15	10-20	20	14-27
Fill Plug	15	10-20	20	14-27
Front Bearing Cap Bolt	15	12-18	20	16-24
Shift Control Housing-to-Case Bolt	12	10-15	16	14-20
Transfer Case Drive Gear Locknut	150	145-155	203	197-210
Transfer Case-to-Transmission Case Bolt	30	25-35	41	34-47
TCS Switch	18	15-20	24	20-27

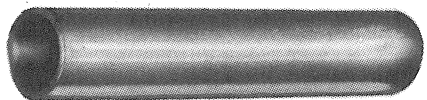
All torque values given in foot-pounds and newton-meters with dry fits unless otherwise specified.

Refer to the Standard Torque Specifications and Capscrew Marking chart in Chapter A for torque values not listed above.

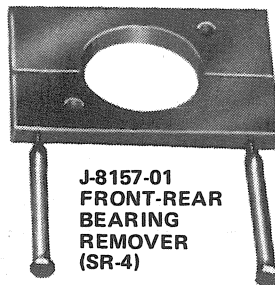
80123



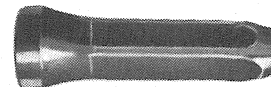
Tools



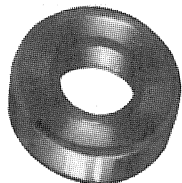
**J-25234  
BEARING INSTALLER TOOL (SR-4)**



**J-8157-01  
FRONT-REAR  
BEARING  
REMOVER  
(SR-4)**



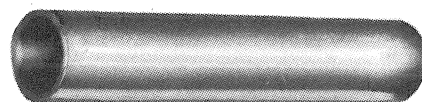
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FRONT BEARING CAP  
SEAL INSTALLER (SR-4)**



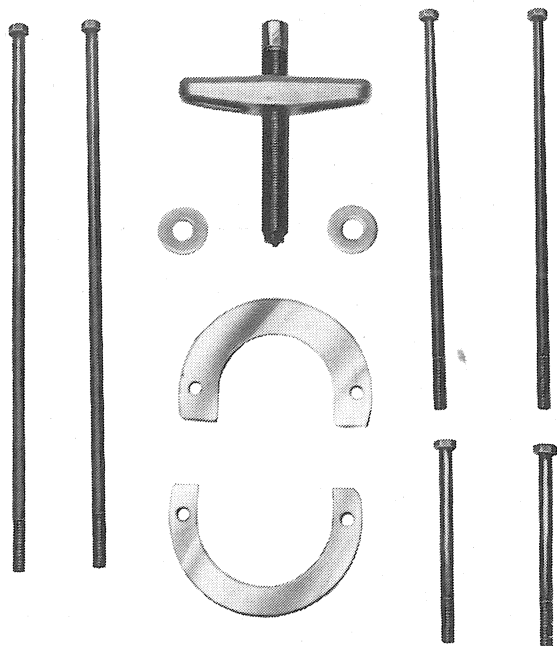
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FRONT BEARING CAP  
SEAL INSTALLER (T-176)**



**J-26624  
COUNTERSHAFT  
ARBOR TOOL (SR-4)**



**J-22697  
BEARING INSTALLER (SR-4)**



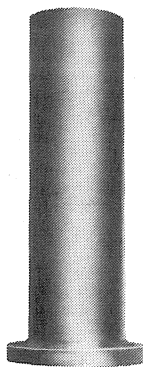
**J-25152  
BEARING PULLER SET**



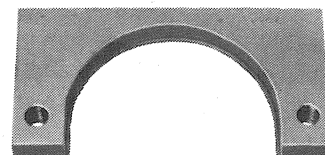
**J-26628-1  
OIL SEAL  
INSTALLER (SR-4)**



**J-26628-2  
OIL SEAL  
PROTECTOR (SR-4)**



**J-29343  
REVERSE IDLER SHAFT  
ARBOR TOOL (T-176)**



**J-29344  
FRONT BEARING  
PULLER (T-176)**



**J-29342  
COUNTERSHAFT  
ARBOR TOOL (T-176)**



**J-29345  
BEARING STARTER (T-176)**