MANUAL TRANSMISSION 2B

SECTION INDEX

GENERAL INFORMATION

GENERAL

Four manual transmission models are used in Jeep vehicles; they are Models T4, T5, T-176, and T-18A.

Models T4 and T-176 are 4-speed, constant mesh units providing synchromesh engagement in all forward gear ranges. The Model T5 is a 5-speed constant mesh unit 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 T4 is used with four- and six-cylinder engines. Model T5 is optional on four- and six-cylinder models except six-cylinder CJ-5 vehicles. Model T-176 is used with four-, six- and eight-cylinder engines. Model T-18A is used in J-20 Truck models only.

All four transmission models are 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. The four forward gear ranges for each model are in a standard "H" configuration.

BACKUP LAMP SWITCH

A spring and plunger-type backup lamp switch is used on all models. The switch is located in the transmission case 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 on T4 and T5 models to the right side of the adapter housing by an adapter housing-to-transmission case bolt. On T-176 and T-18 transmissions, the identification tag is bolted to the shift control lever housing near its left rear corner. 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

Refer to the Transmission Gear Ratio Chart at the end of this chapter for ratio applications.

Service Diagnosis

Condition	Possible Cause	Correction
TRANSMISSION SHIFTS HARD	(1) Clutch adjustment incorrect	(1) Adjust clutch.
	(2) Clutch linkage or cable binding	(2) Lubricate or repair as necessary.
	(3) Shift rail binding	(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) Internal bind in transmission caused by shift forks, selector plates, or synchronizer assemblies	(4) Remove, disassemble and inspect transmission. Replace worn or damaged components as necessary.
	(5) Clutch housing misalignment	(5) Check runout at rear face of clutch housing. Correct runout as outlined in Chapter 2A.
	(6) Incorrect lubricant	(6) Drain and refill transmission.
	(7) Block rings and/or cone seats worn	(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	(1) Adjust Clutch.
	(2) Clutch linkage or cable binding	(2) Lubricate or repair as necessary.
	(3) Clutch housing misalignment	(3) Check runout at rear of clutch housing. Correct runout as outlined in Chapter 2A
	(4) Lubricant level low or incorrect lubricant	(4) Drain and refill transmission and check for lubricant leaks if level was low. Repair as necessary.
	(5) Gearshift components, or sychronizer assemblies worn or damaged	(5) Remove, disassemble and inspect transmission. Replace worn or damaged components as necessary.
TRANSMISSION NOISY	(1) Lubricant level low or incorrect lubricant	(1) Drain and refill transmission. If lubricant level was low, check for leaks and repair as necessary.
	(2) Clutch housing-to-engine, or transmission-to-clutch housing bolts loose	(2) Check and correct bolt torque as necessary.
	(3) Dirt, chips, foreign material in transmission	(3) Drain, flush, and refill transmission.
	(4) Gearshift mechanism, transmission gears, or bearing components worn or damaged	(4) Remove, disassemble and inspect transmission. Replace worn or damaged components as necessary.
	(5) Clutch housing misalignment	(5) Check runout at rear face of clutch housing. Correct runout as outlined in Chapter 2A.

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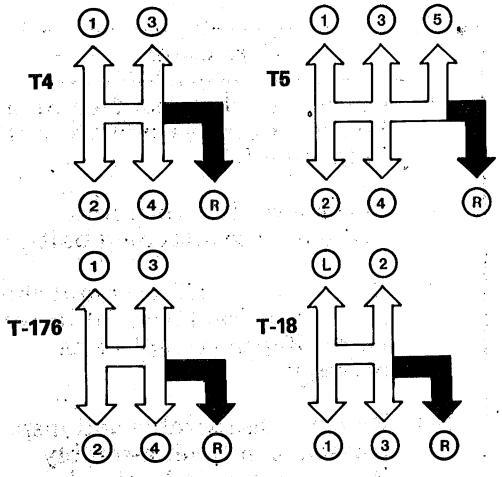
Service Diagnosis (Continued)

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.

Gearshift Pattern Chart



TRANSMISSION LUBRICANTS

The recommended lubricant for T4 and T5 transmission models is AMC/Jeep Automatic Transmission Fluid or equivalent labeled Dexron®. The recommended lubricant for T-176 and T-18 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 in T-176 and T-18 transmissions.*

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 four transmission models are:

- T4—3.5 Pints (1.7 liters).
- T5—4.0 Pints (1.9 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 the T4 or T5 transmission, remove bolts attaching transmission shift lever housing to transmission and remove lever and housing (fig. 2B-1).

(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. (fig. 2B-2).

(4) On models with T-176 transmission, press and turn transmission shift lever retainer counterclockwise to release lever. Remove lever, boot, spring and seat as assembly. (fig. 2B-3).

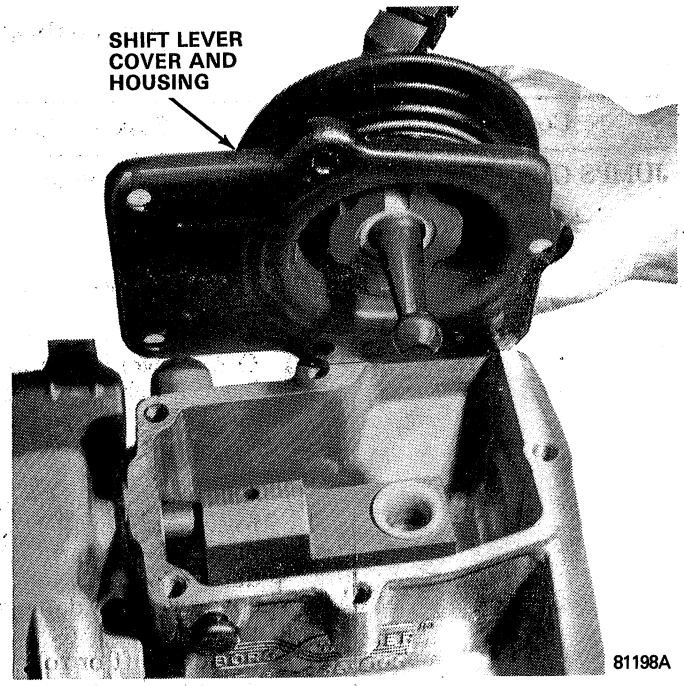


Fig. 2B-1 Shift Lever and Housing Removal/Installation—Models T4 and T5

(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.

(8) On Cherokee Wagoneer 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 lamp 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 yolk. Move shaft aside and secure to underbody with wire.

(17) On CJ and Scrambler 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.

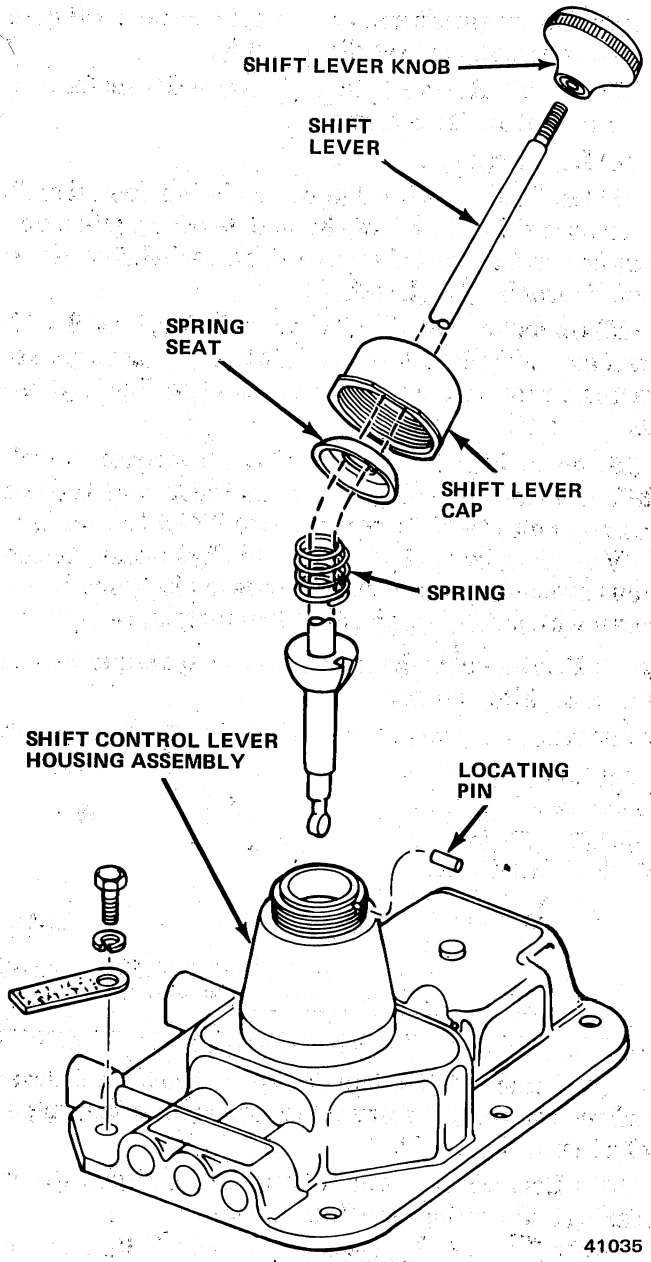


Fig. 2B-2 Shift Lever Removal—Model T-18A

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 by sliding it out of the lever.*

(18) On Cherokee Wagoneer 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.

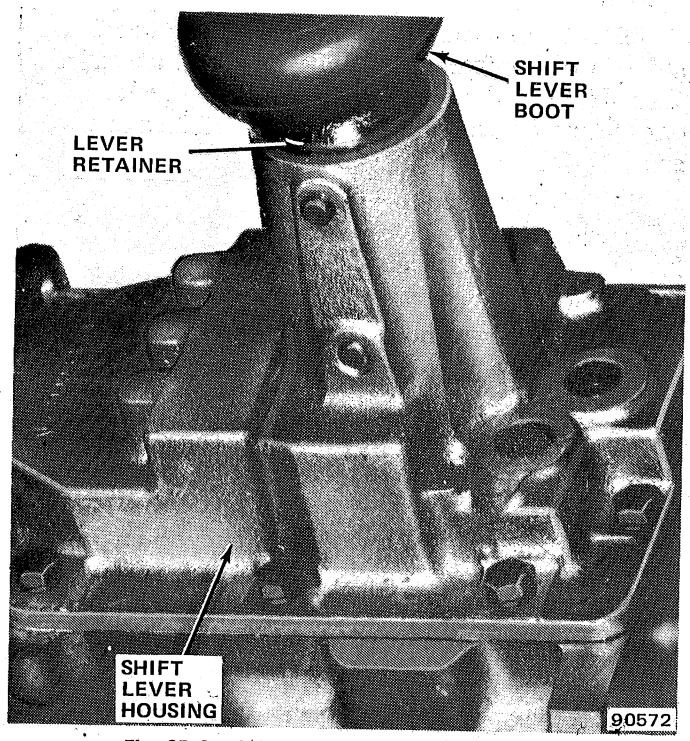


Fig. 2B-3 Shift Lever Removal—Model T-176

(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 needlenose 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 and Scrambler models, install and tighten transfer case attaching bolts to 30 foot-pounds (41 N•m) torque. On Cherokee Wagoneer and Truck models, install and tighten transfer case attaching stud nuts to 40 foot-pounds (54 N•m) torque.

(8) On CJ and Scrambler models, install transfer case shift lever, shifter shaft, link pins and control link assembly. On Cherokee Wagoneer 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 Wagoneer 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 clockwise 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 the T4 or T5 transmission, install shift lever and housing on transmission and tighten housing bolts to 10 foot-pounds (14 N•m) torque. Use RTV sealant, or equivalent to seal the housing to the transmission case. 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 T4
4-SPEED TRANSMISSION

TRANSMISSION DISASSEMBLY

CAUTION: *Except for the gearshift lever attaching bolts and fill plug, all threaded holes and bolts used in the Model T4 Transmission case have metric threads. If replacement bolts are required during service, use only those of the same size and length as the originals.*

(1) Remove drain plug on transmission case and drain lubricant (fig. 2B-4).

(2) Using pin punch and hammer, remove roll pin attaching offset lever to shift rail (fig. 2B-5).

(3) Remove adapter housing-to-transmission case bolts and remove housing and offset lever as assembly (fig. 2B-6).

CAUTION: *Do not attempt to remove the offset lever while the adapter housing is still bolted in place. The lever has a positioning lug engaged in the housing detent plate which prevents moving the lever far enough rearward for removal.*

(4) Remove detent ball and spring from offset lever and remove roll pin from extension/adapter housing or offset lever (fig. 2B-7).

(5) Remove and retain countershaft rear thrust bearing and bearing race (fig. 2B-8).

(6) Remove transmission cover and shift fork assembly attaching bolts and remove cover (fig. 2B-9).

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

(7) Remove C-clip attaching reverse lever to reverse lever pivot bolt (fig. 2B-10).

(8) Remove reverse lever pivot bolt and remove reverse lever and reverse lever fork as assembly (fig. 2B-11).

(9) Mark position of front bearing cap on transmission case using center punch, remove front bearing cap bolts and remove front bearing cap.

(10) Remove front bearing race and end play shims from front bearing cap (fig. 2B-12). Remove oil seal from bearing cap using screwdriver.

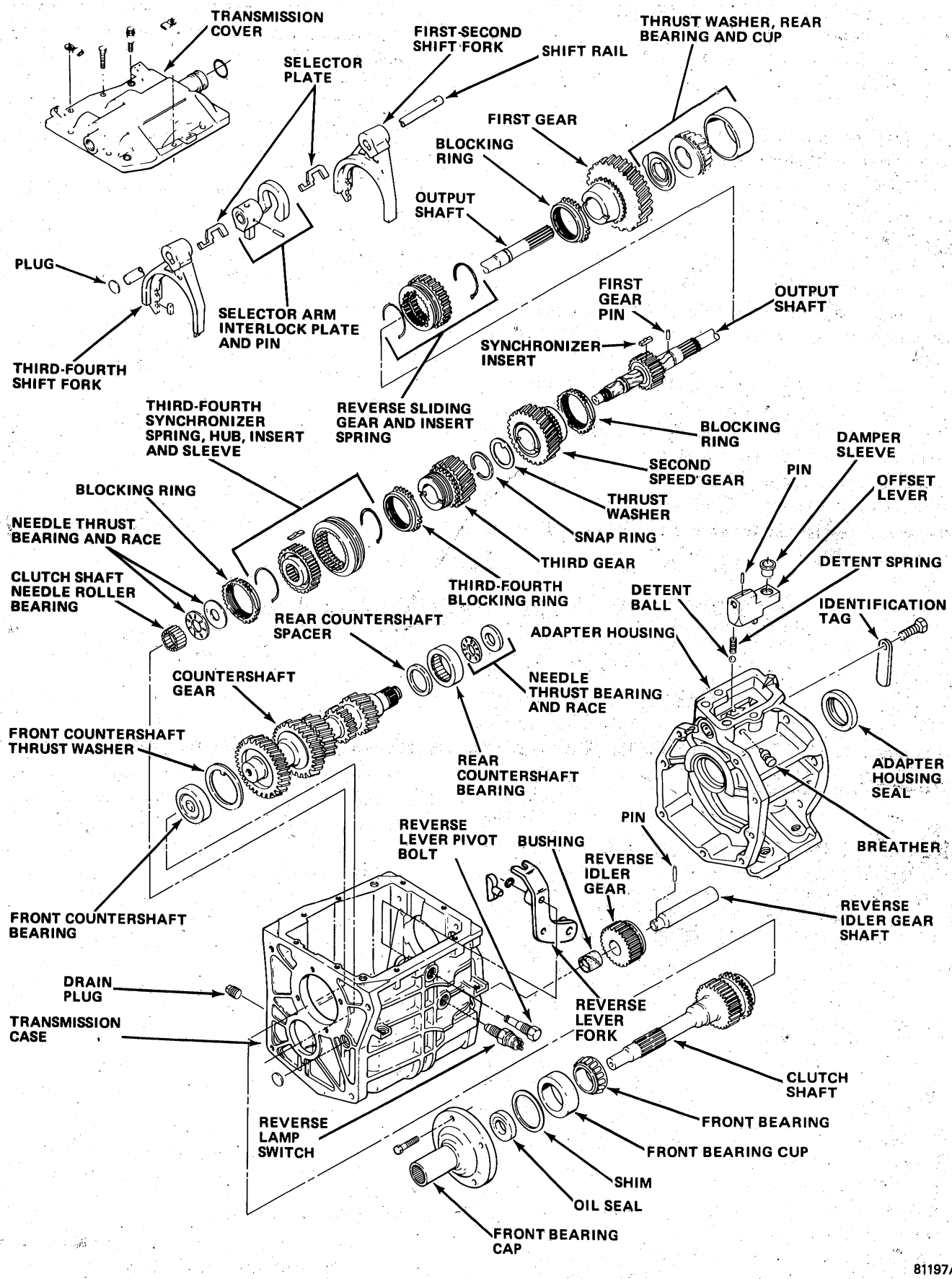


Fig. 2B-4 T4 Four-Speed Transmission

(11) Rotate clutch shaft until flat on gear teeth is facing countershaft and remove shaft (fig. 2B-13).

(12) Remove thrust bearing and 15 roller bearings from clutch shaft (fig. 2B-14).

(13) Remove output shaft bearing race (fig. 2B-15). Tap front of output shaft with rubber or plastic mallet, if necessary.

(14) Tilt output shaft assembly upward and remove from transmission case (fig. 2B-16).

(15) Remove countershaft rear bearing using brass drift and arbor press (fig. 2B-17). Note position of bearing for assembly reference. Bearing identification numbers face outward when bearing is correctly installed.

(16) Move countershaft rearward, tilt shaft upward and remove shaft from case. Remove countershaft front thrust washer from case, noting position of washer for assembly reference.

(17) Remove countershaft rear bearing spacer (fig. 2B-18).

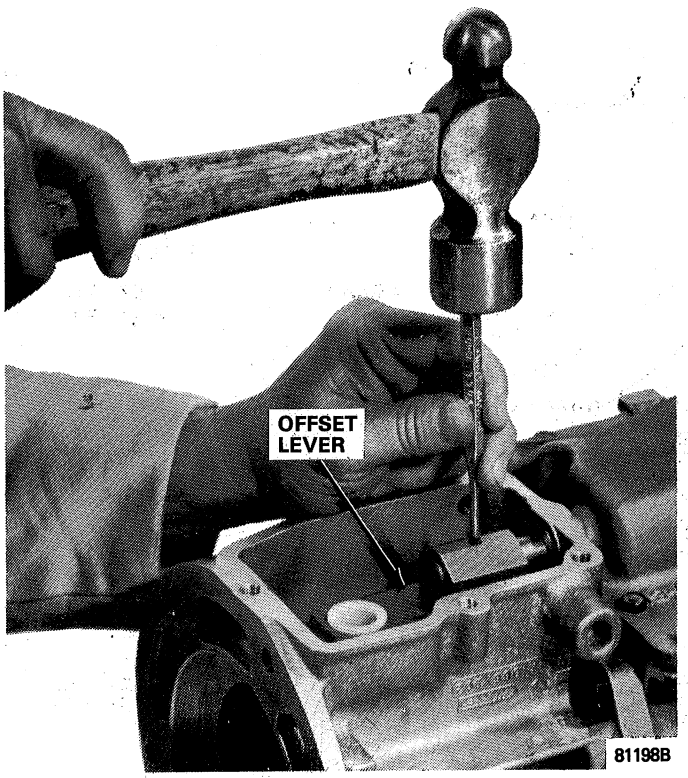


Fig. 2B-5 Offset Lever Pin Removal

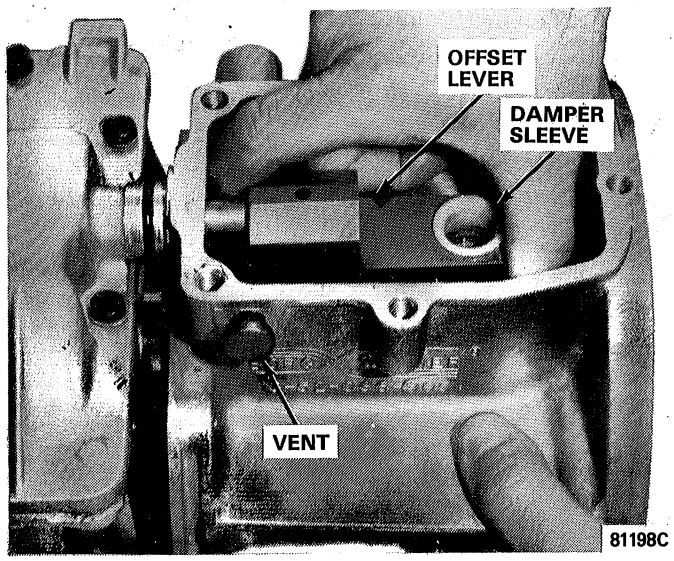


Fig. 2B-6 Offset Lever Removal/Installation

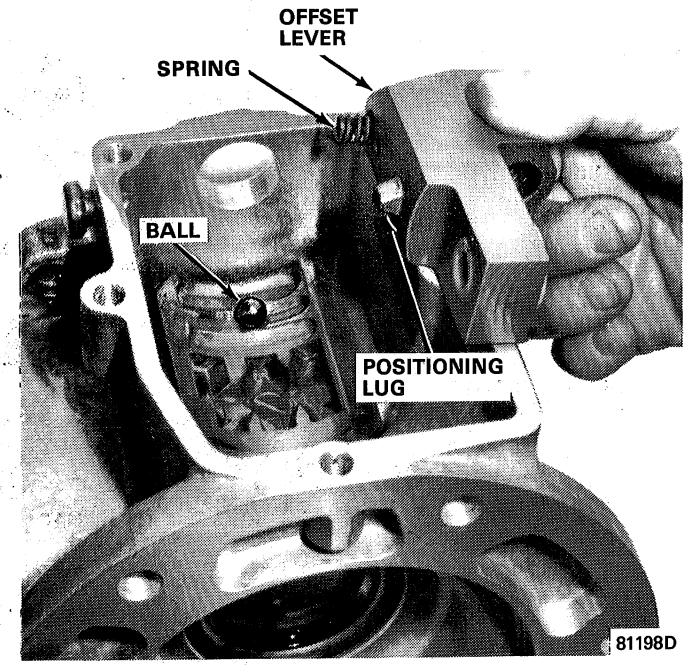


Fig. 2B-7 Offset Lever Spring and Ball

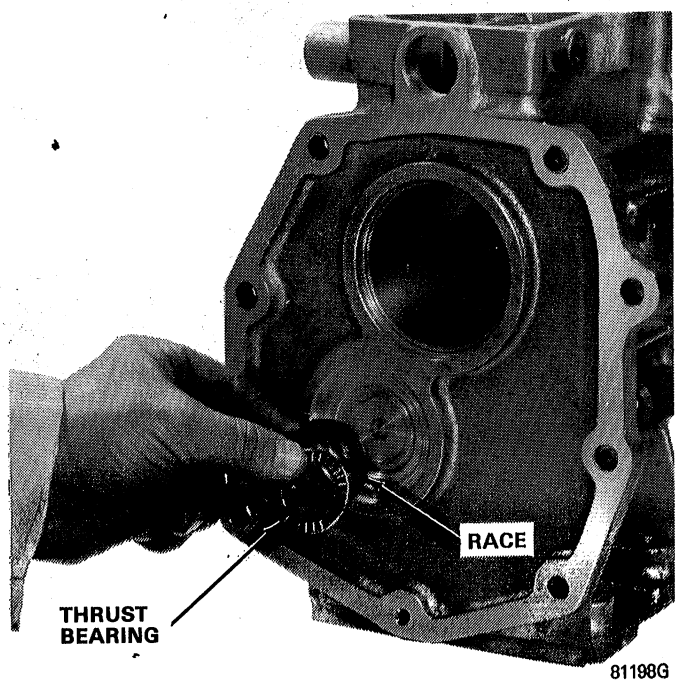


Fig. 2B-8 Countershaft Rear Thrust Bearing and Race Removal/Installation

(18) Remove reverse idler shaft roll pin using hammer and pin punch (fig. 2B-19).

(19) Remove reverse idler shaft and gear (fig. 2B-19). Note position of gear for assembly reference.

(20) Remove countershaft front bearing using arbor press.

(21) Remove clutch shaft front bearing using Bearing Removal Tool J-29721 and J-22912 (fig. 2B-20).

(22) Remove rear adapter housing seal using flat drift and hammer.

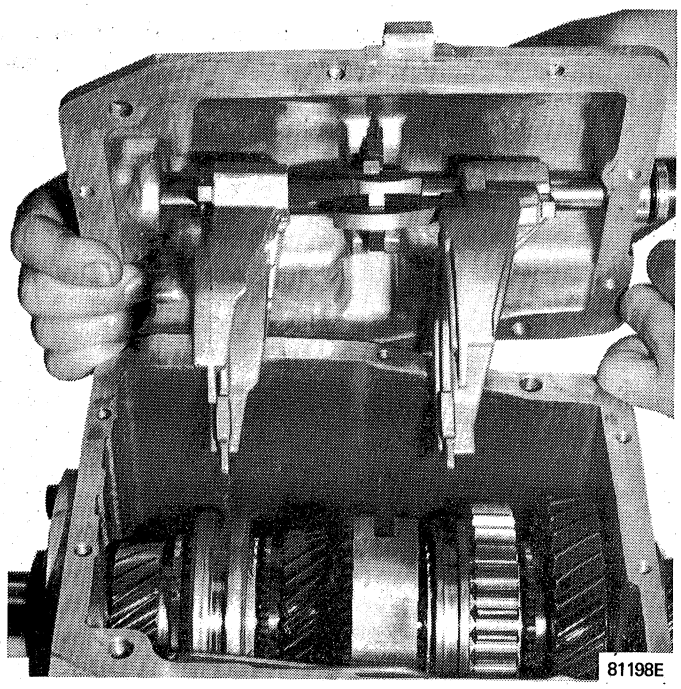


Fig. 2B-9 Transmission Cover Removal/Installation

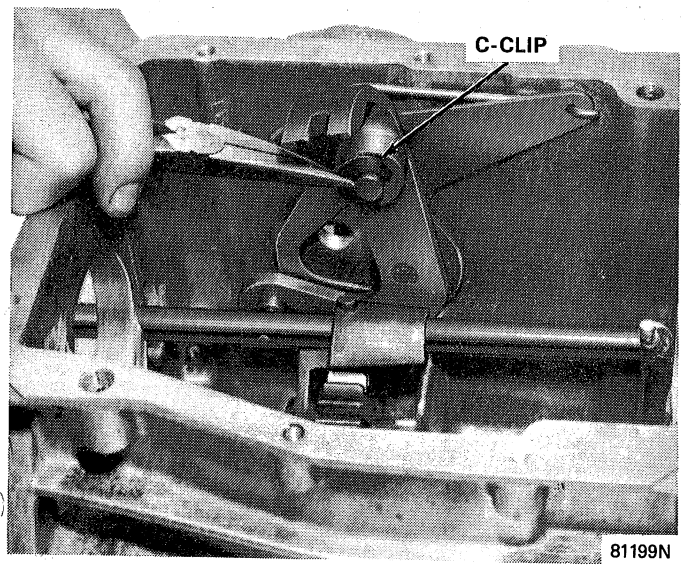


Fig. 2B-10 Reverse Lever C-Clip Removal/Installation

(23) Remove backup lamp switch from transmission case.

Disassembly—Output Shaft Geartrain

(1) Remove thrust bearing washer from front end of output shaft.

(2) Scribe alignment marks on third-fourth synchronizer hub and sleeve for assembly reference (fig. 2B-21).

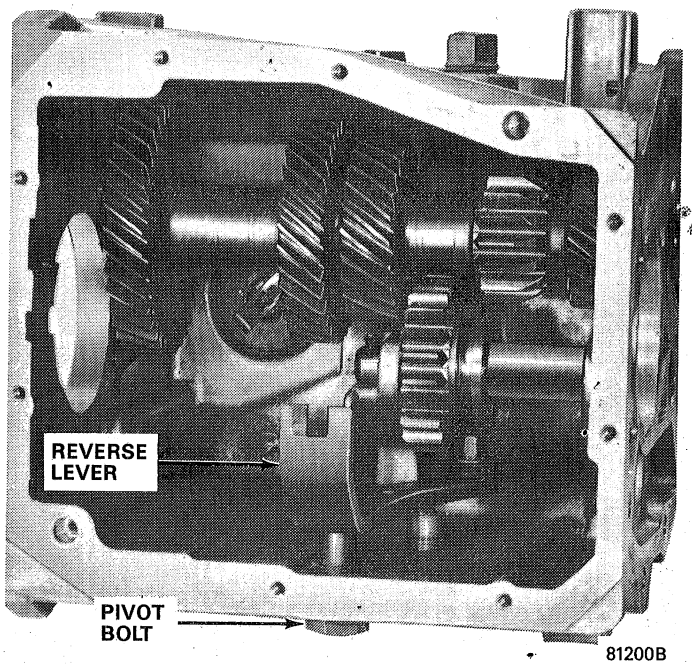


Fig. 2B-11 Reverse Lever and Pivot Bolt

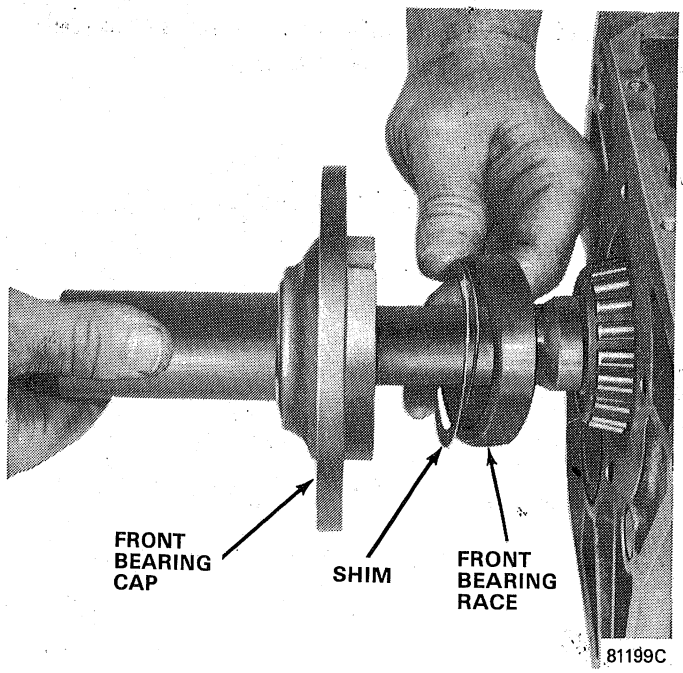


Fig. 2B-12 Front Bearing Cap, Shim and Race Removal/Installation

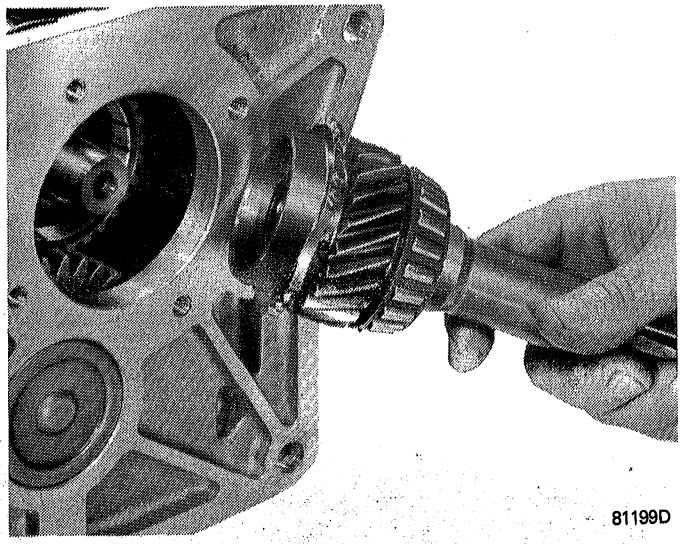


Fig. 2B-13 Clutch Shaft Removal/Installation

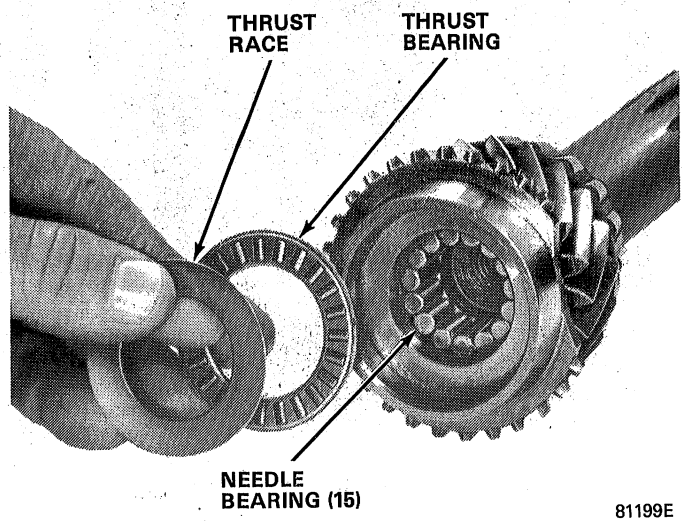


Fig. 2B-14 Clutch Shaft Roller Bearing, Thrust Bearing and Race Removal/Installation

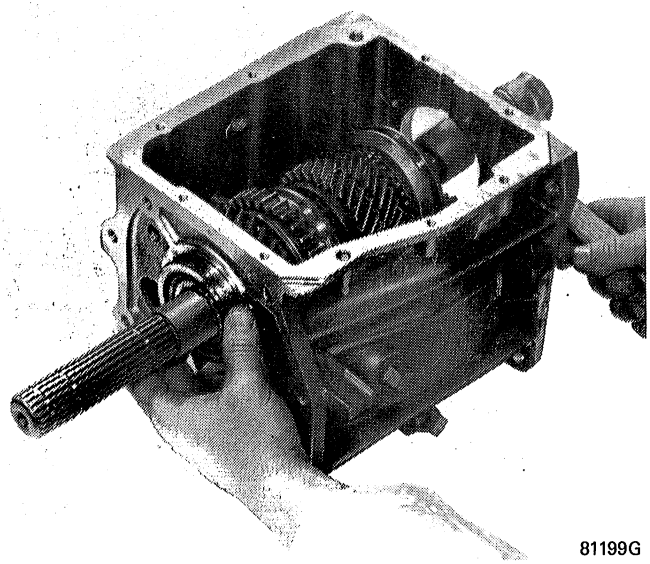


Fig. 2B-15 Output Shaft Bearing Race Removal

(3) Remove third-fourth synchronizer blocking ring, sleeve and hub as assembly. Note position of hub and sleeve for assembly reference.

(4) Remove third-fourth synchronizer, insert springs, remove inserts and remove sleeve from hub.

(5) Remove third gear from shaft.

(6) Remove snap ring retaining second gear on shaft (fig. 2B-22) and remove tabbed second gear thrust washer and second gear (fig. 2B-23).

(7) Remove output shaft bearing using Puller Set J-29721 and adapters 293-39 (fig. 2B-24).

(8) Remove first gear thrust washer, first gear roll pin, first gear and blocking ring (fig. 2B-25). Use diagonal cutters to remove roll pin.

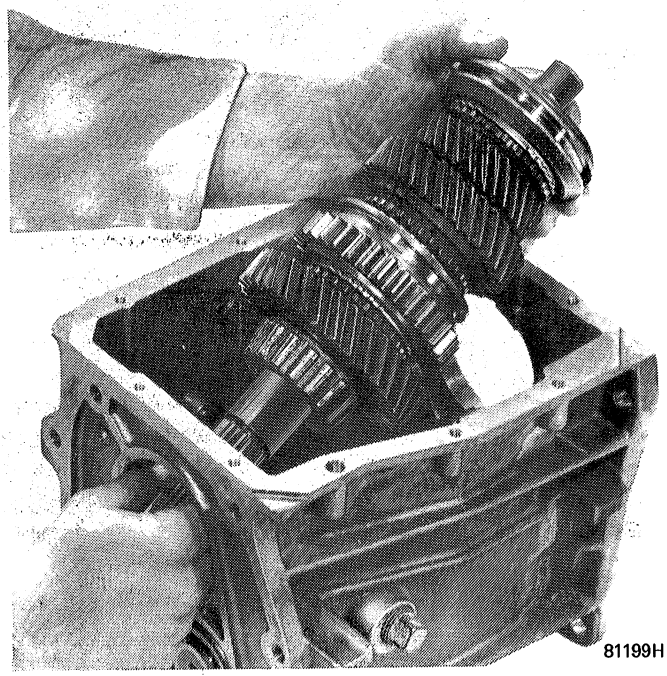


Fig. 2B-16 Output Shaft Removal/Installation

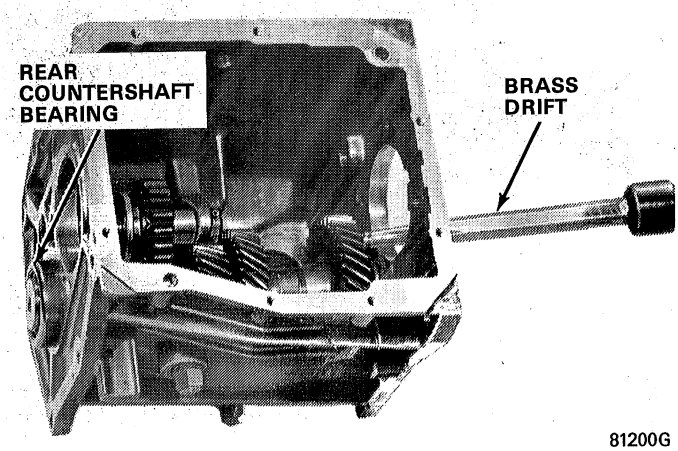


Fig. 2B-17 Countershaft Rear Bearing Removal

(9) Scribe alignment marks on first-second gear synchronizer sleeve and output shaft hub for assembly reference (fig. 2B-21).

(10) Remove insert spring and inserts from first-reverse sliding gear and remove gear from output shaft hub.

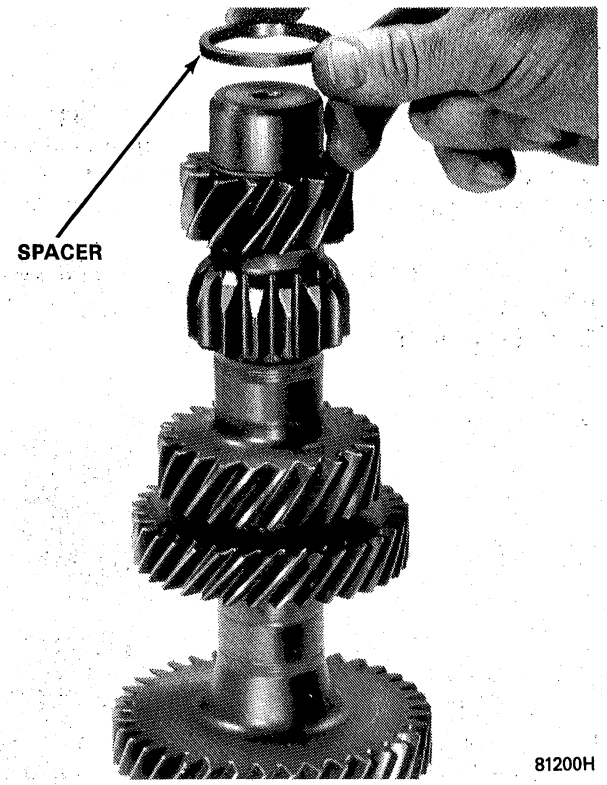


Fig. 2B-18 Countershaft Rear Spacer Removal/Installation

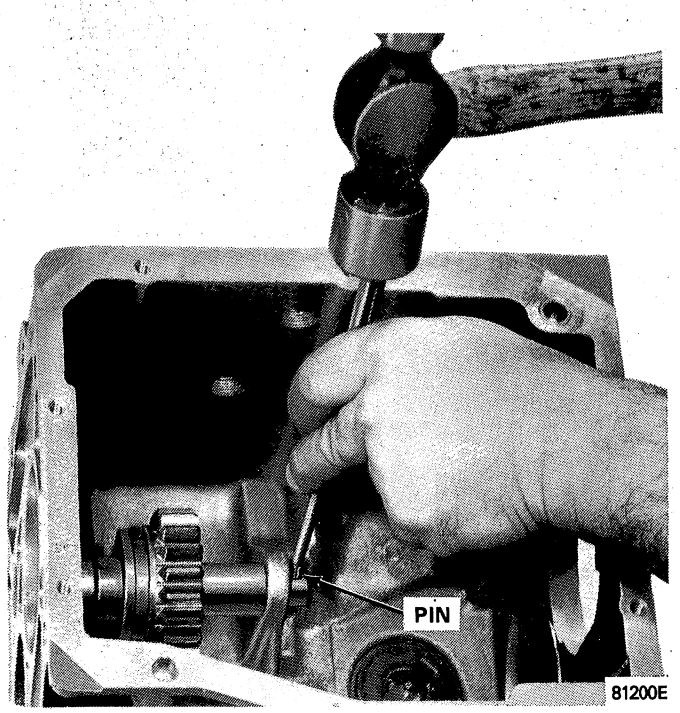


Fig. 2B-19 Reverse Idler Gear Shaft Removal/Installation

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 set during manufacture to insure concentricity.*

Disassembly—Transmission Cover Assembly

(1) Place selector arm plates and shift rail in neutral position (centered).

(2) Rotate shift rail counterclockwise until selector arm disengages from selector arm plates and selector arm roll pin is accessible (fig. 2B-26).

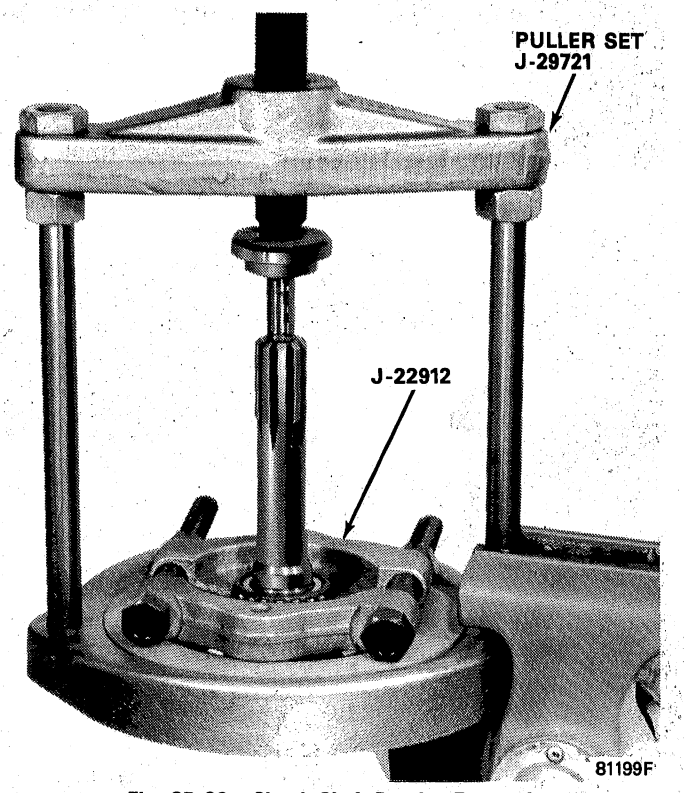


Fig. 2B-20 Clutch Shaft Bearing Removal

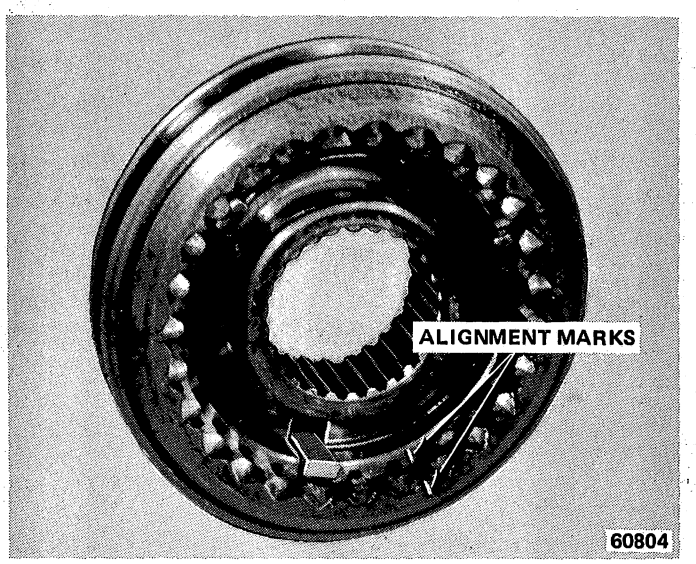


Fig. 2B-21 Marking Synchronizer Assembly

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

(4) Remove selector arm roll pin using 3/16 inch (5 mm) diameter pin punch and remove shift rail (fig. 2B-26).

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

(6) Remove shift rail oil seal and O-ring using screwdriver (fig. 2B-27).

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

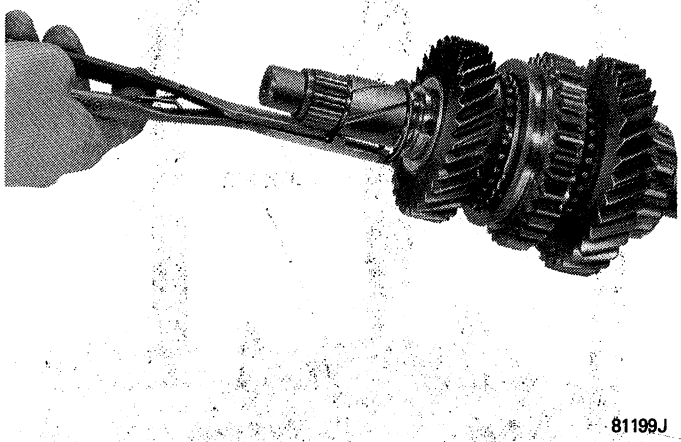


Fig. 2B-22 Second Gear Snap Ring Removal/Installation

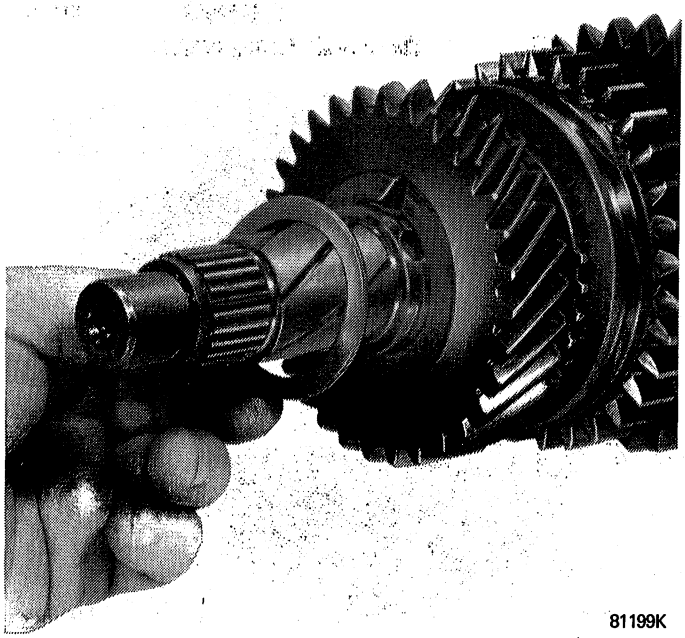


Fig. 2B-23 Second Gear Thrust Washer Removal/Installation

(8) 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. Do not dry the front or rear bearing with compressed air. Allow them to air dry or wipe them dry with a clean shop cloth.

Clean the needle thrust 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:

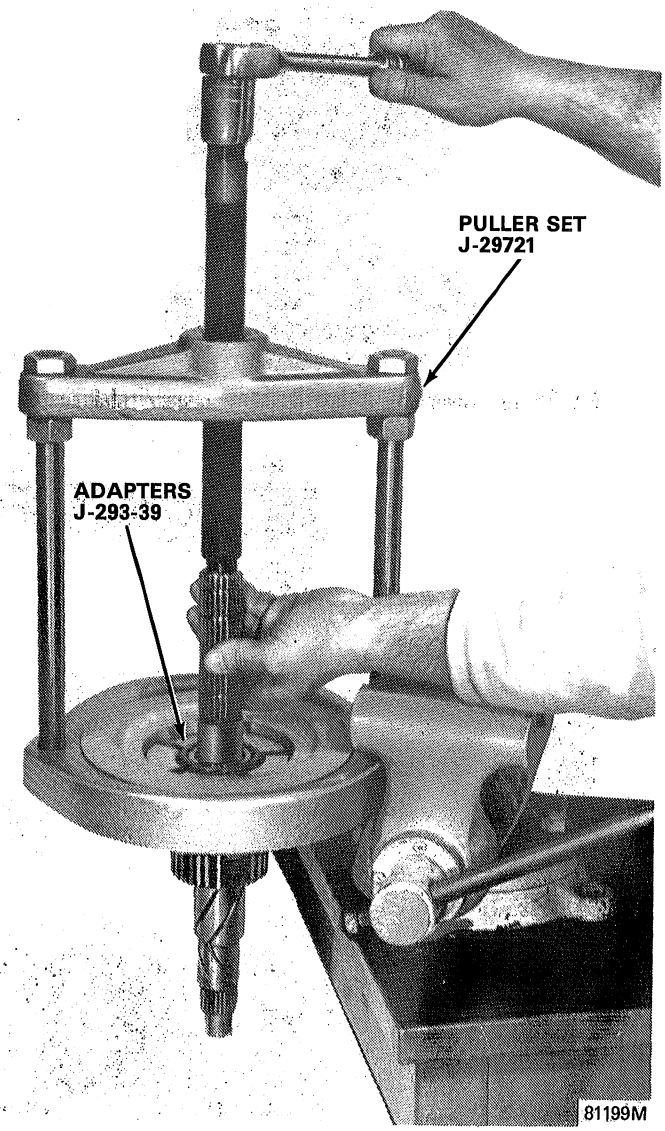


Fig. 2B-24 Output Shaft Bearing Removal

- 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 geartrain 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 thrust or needle bearings, or bearing bores in countershaft gear or clutch shaft.

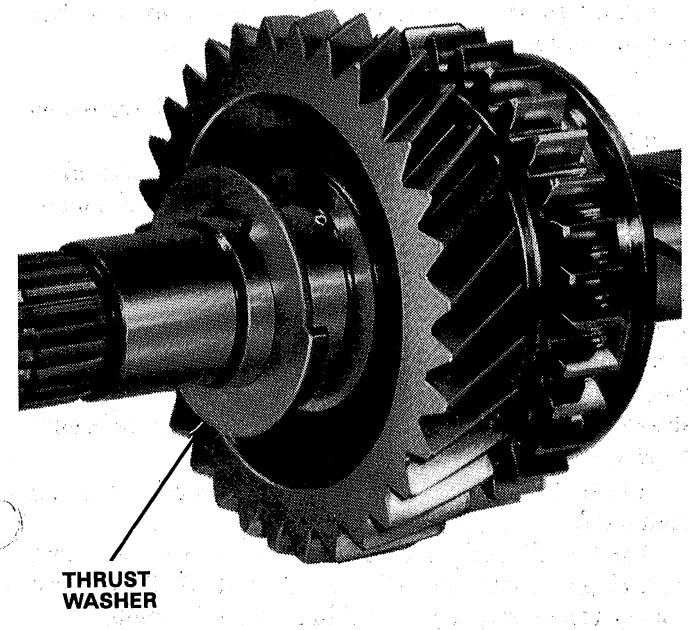


Fig. 2B-25 First Gear Thrust Washer Removal/Installation

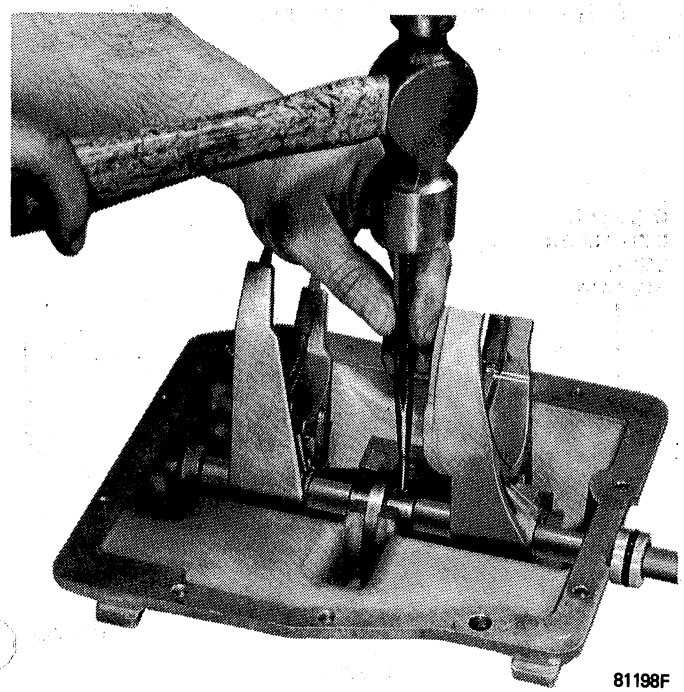


Fig. 2B-26 Roll Pin Removal

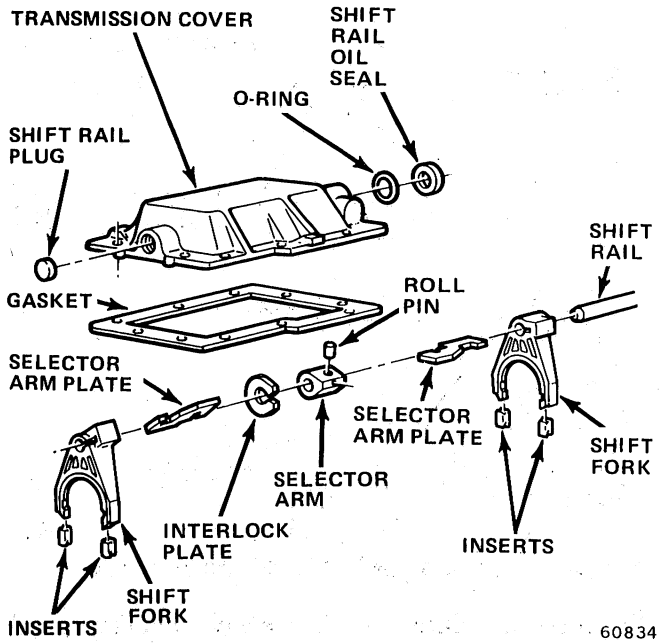


Fig. 2B-27 Shift Control Housing Assembly

- 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 bushing 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.

TRANSMISSION ASSEMBLY

Assembly—Transmission Cover

(1) Install nylon inserts and selector arm plates in shift forks (fig. 2B-28).

(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

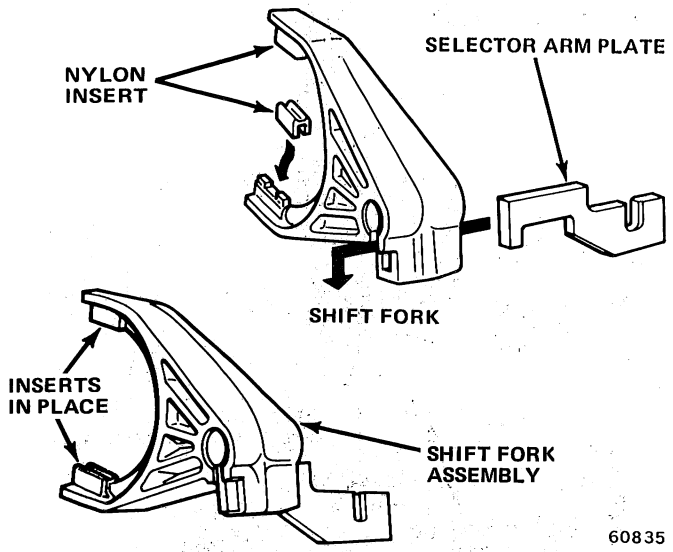


Fig. 2B-28 Assembling Shift Forks and Selector Arm Plates

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 O-ring in groove of shift rail oil seal.

(11) Install shift rail oil seal as follows:

(a) Install Oil Seal Protector Tool J-26628-2 over threaded end of shift rail (fig. 2B-29, 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 transmission cover using Oil Seal Installer Tool J-26628-1 (fig. 2B-29, View B).

Assembly—Output Shaft Geartrain

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

(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-reverse synchronizer sleeve. Engage tang end of each insert spring in same synchronizer insert but position open ends of springs to face 180 degrees from one another (fig. 2B-30). Be sure sleeve and hub are aligned using assembly reference marks.

(4) Install blocking ring and second gear on mainshaft.

(5) Install tabbed thrust washer and second gear snap ring on mainshaft (figs. 2B-22 and 2B-23). Be sure washer tab is properly seated in mainshaft notch.

(6) Install blocking ring and first gear on output shaft.

(7) Install first gear roll pin in output shaft (fig. 2B-31).

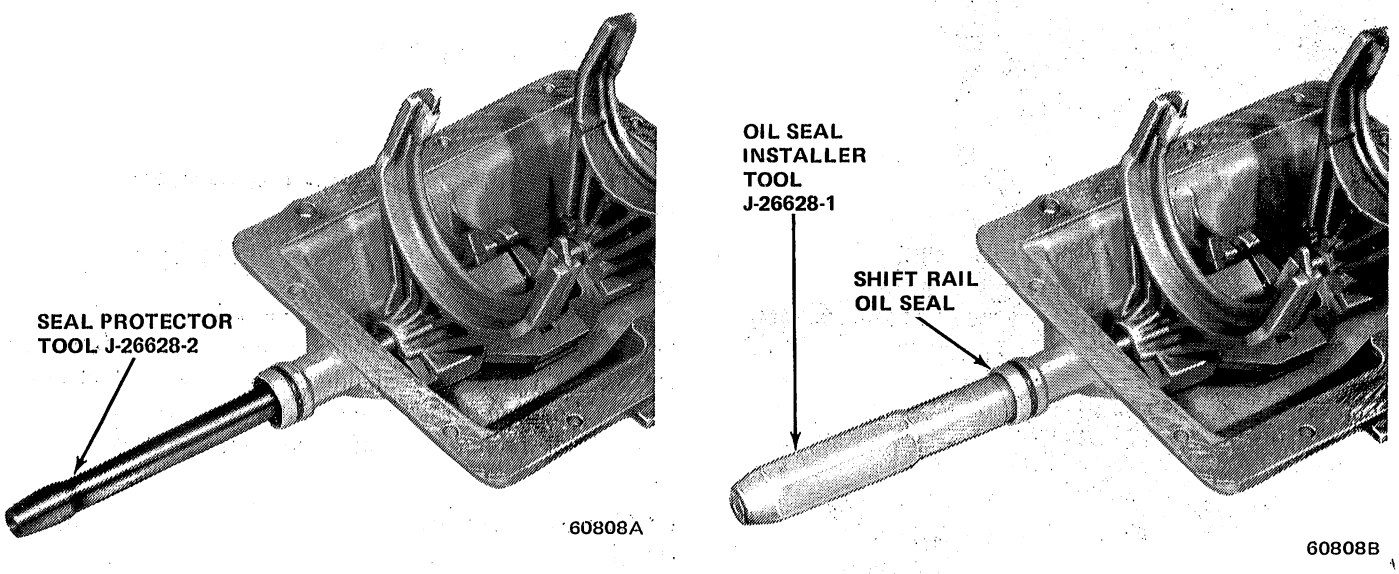


Fig. 2B-29 Shift Rail Oil Seal Installation

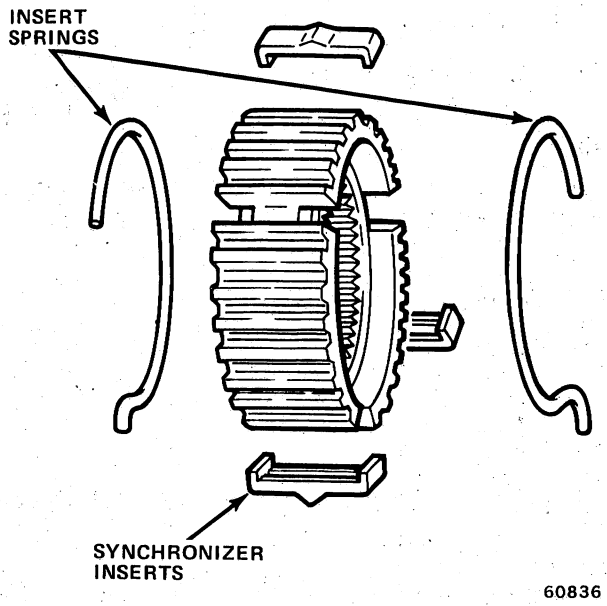


Fig. 2B-30 Synchronizer Insert Spring Installation

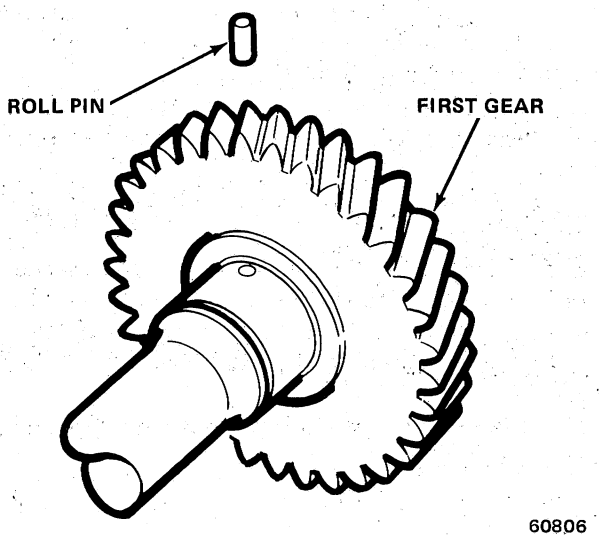


Fig. 2B-31 First Gear Roll Pin Location

(8) Install first gear thrust washer.

(9) Install rear bearing on output shaft using Tool J-2995 and press (fig. 2B-32).

(10) Install third gear, third and fourth gear synchronizer hub inserts and sleeve on shaft. Hub offset must face forward.

(11) Install thrust bearing washer on forward end of output shaft.

Assembly—Transmission Case

CAUTION: *Except for the gearshift lever attaching bolts and fill plug, all threaded holes and bolts used in the Model T4 Transmission are metric sizes. Do not attempt to substitute a different thread-type bolt if the original ones are lost.*

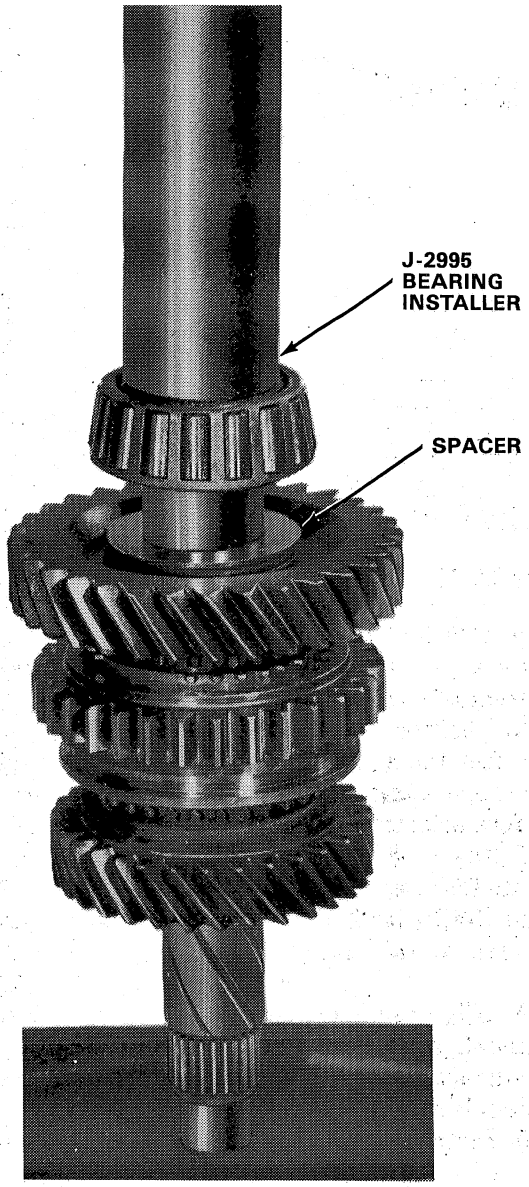


Fig. 2B-32 Rear Output Shaft Bearing Installation

(1) Coat countershaft front bearing outer cage with Loctite 601, or equivalent, and install countershaft front bearing flush with case using arbor press (fig. 2B-33).

(2) Coat countershaft tabbed thrust washer with petroleum jelly. Install thrust washer so tab engages corresponding depression in case.

(3) Tip case on end and install countershaft in front bearing bore.

(4) Install countershaft rear bearing spacer (fig. 2B-18).

(5) Coat countershaft rear bearing with petroleum jelly and install bearing using installer Tool J-29895 and mallet (fig. 2B-34).

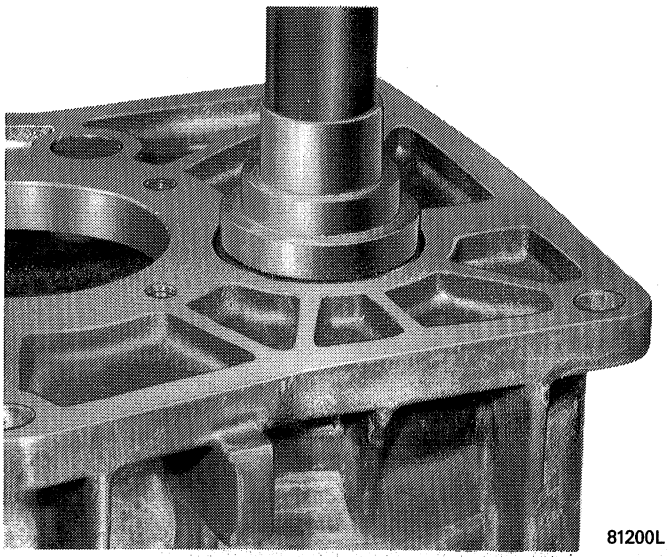


Fig. 2B-33 Front Countershaft Bearing Installation

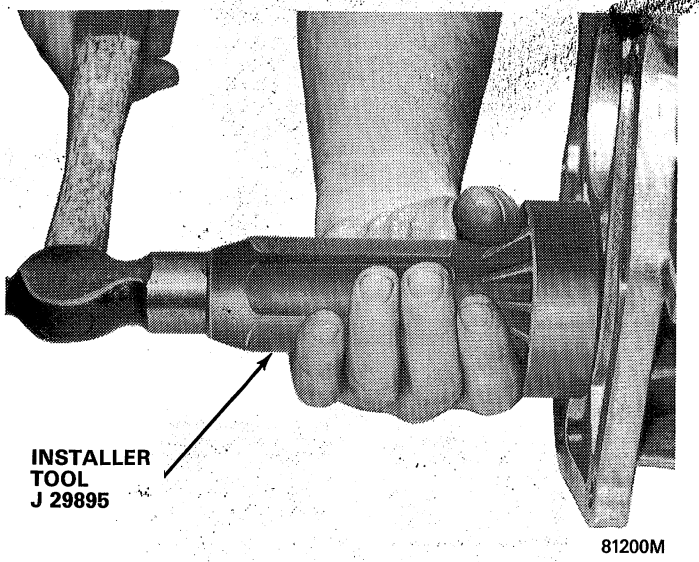


Fig. 2B-34 Rear Countershaft Bearing Installation

NOTE: *When correctly installed using Tool J-29895, the countershaft rear bearing extends .125 inch (3 mm) beyond case surface.*

(6) Position reverse idler gear in case with shift lever groove facing rear of case. Install reverse idler shaft from rear of case and install retaining roll pin in shaft (fig. 2B-19).

(7) Install assembled output shaft in case.

(8) Install front clutch shaft bearing on clutch shaft using Tool J-2995 and arbor press (fig. 2B-35).

(9) Coat 15 pilot roller bearings with petroleum jelly and install in clutch shaft (fig. 2B-14).

(10) Install thrust bearing and race in clutch shaft (fig. 2B-14).

(11) Install fourth gear blocker ring on output shaft.

(12) Install rear output shaft bearing race.

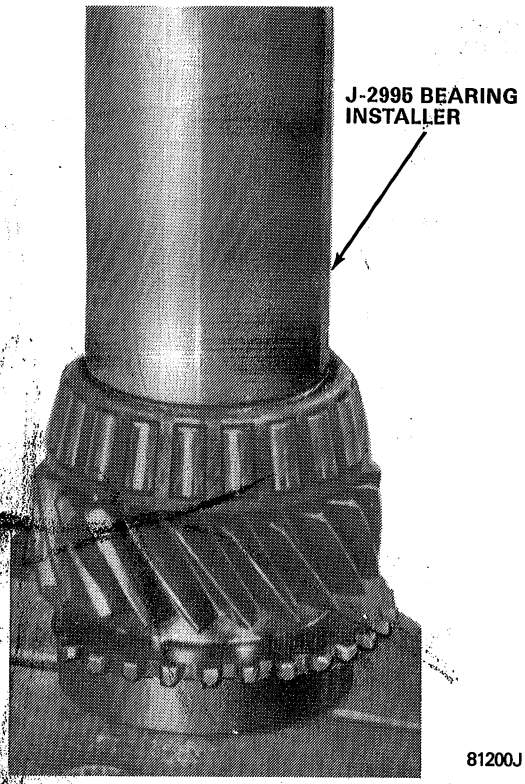


Fig. 2B-35 Clutch Shaft Bearing Installation

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

(14) Install replacement oil seal in front bearing cap using Tool J-26625 (fig. 2B-36).

(15) Install replacement oil seal in rear adapter housing using Tool J-29184 (fig. 2B-37).

(16) Install front bearing race in front bearing cap. Do not install shims at this time.

(17) Install front bearing cap. Do not apply sealer at this time.

(18) Install reverse lever, pivot pin and retaining C-clip. Coat pivot pin threads with sealer. Be sure reverse lever fork is engaged in reverse idler gear.

(19) Coat countershaft rear bearing race and thrust bearing with petroleum jelly and install in extension/adapter housing.

(20) Temporarily install adapter housing. Do not seal housing to case or tighten bolts to final torque values at this time.

(21) Turn transmission case on end (fig. 2B-38). Mount dial indicator on adapter housing with indicator stylus on end of output shaft.

(22) Rotate clutch and output shaft and zero dial indicator.

(23) Pull upward on output shaft until end play is removed. Read end play dimension on dial indicator.

NOTE: *To completely eliminate output shaft and clutch shaft end play, bearings must be preloaded from .001 to .005 inch (0.03 to 0.13 mm).*

(24) Select shim pack measuring .001 to .005 inch (0.03 to 0.13 mm) **thicker** than the end play measured in Step 23.

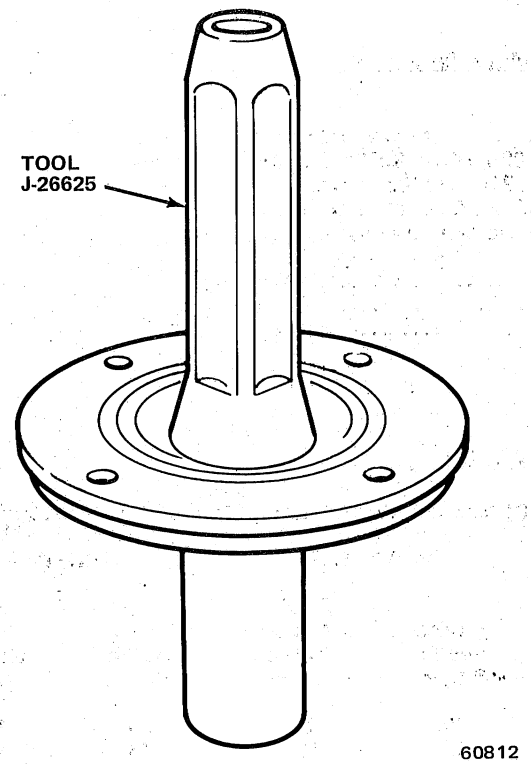


Fig. 2B-36 Front Bearing Cap Seal Installation

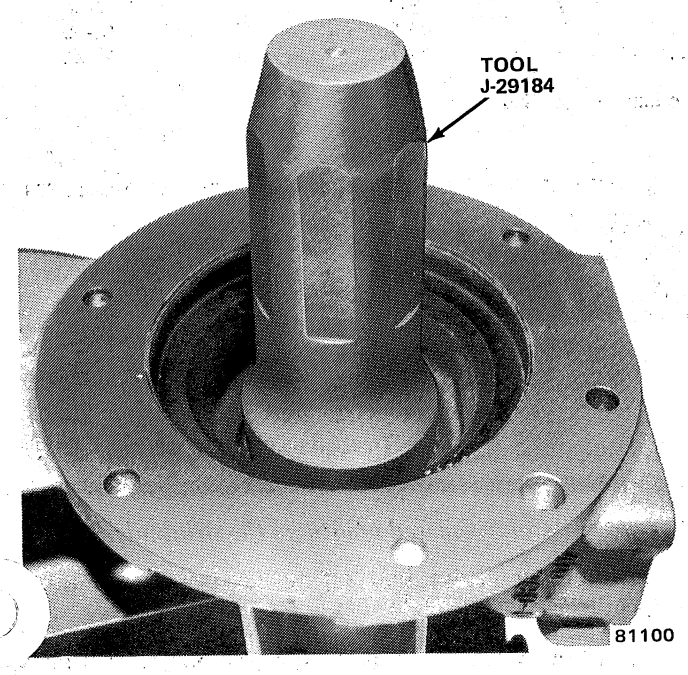


Fig. 2B-37 Adapter Housing Oil Seal Installation

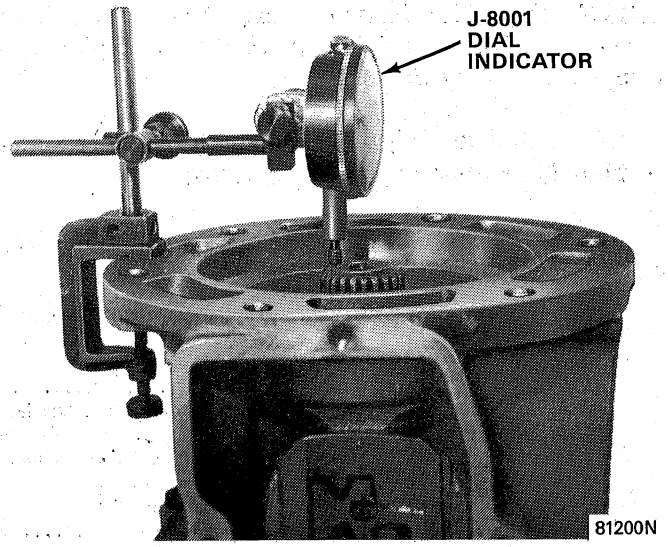


Fig. 2B-38 Measuring End Play

(25) Place transmission horizontally on workbench and remove front bearing cap and front bearing race.

(26) Add shims to bearing cap to obtain necessary preload and install clutch shaft bearing race in cap.

(27) Apply bead of RTV sealant, or equivalent, on case mating surface of front bearing cap. Install front bearing cap using reference marks made during disassembly and tighten retaining bolts to 15 foot-pounds (20 N•m) torque.

(28) Recheck end play. There must be no end play.

(29) Remove dial indicator from adapter housing.

(30) Remove adapter housing.

(31) Move shift forks on transmission cover and synchronizer rings inside transmission to the neutral position.

(32) Apply bead of RTV sealant, or equivalent, to cover mating surface of transmission.

(33) Lower cover assembly, at slightly off center attitude, onto case while aligning shift forks and synchronizer sleeves. Center cover on case to engage reverse relay lever and install two dowel bolts in cover. Install remaining bolts and tighten all cover bolts to 9 foot-pounds (12 N•m) torque.

NOTE: *The offset lever-to-shift rail roll pin hole is in a vertical position when Steps 30 and 32 are performed correctly.*

(34) Apply bead of RTV sealant, or equivalent, to adapter housing-to-transmission case mating surface.

(35) Install adapter housing over output shaft and shift rail to a position where shift rail just enters shift cover opening.

(36) Install detent spring into offset lever. Place steel ball in neutral guide plate detent (fig. 2B-7). Apply pressure on steel ball with detent spring and offset lever and slide offset lever on shift rail and seat adapter housing against transmission case.

NOTE: *The offset lever and shift rail roll pin holes should be aligned and in a vertical position following completion of Step 35.*

(37) Install and tighten adapter housing retaining bolts to 25 foot-pounds (34 N•m) torque.

(38) Install roll pin in offset lever and shift rail (fig. 2B-5).

(39) Install damper sleeve in offset lever.

(40) Coat backup lamp switch threads with RTV sealant, or equivalent, and install switch in case.

SPECIFICATIONS

Transmission Specifications Model T4

Lubrication	
Level	to bottom of fill hole
Inspect Correct Fill Levels	5,000 mi/5 mo/8 000 km initially, then every 7,500 mi/7½ mo/12 000 km thereafter
Recommended Lubricants	AMC/Jeep Automatic Transmission Fluid or equivalent labeled Dexron II®
Lubricant Capacity	
U.S. Measure	3.5 pints
Imperial Measure	2.9 pints
Metric Measure	1.7 liters

60790

Torque Specifications Model T4

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-tightened 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	12-18	20	16-24
Adapter Housing Bolt	13	11-15	18	15-20
Fill Plug	20	15-25	27	20-34
Front Bearing Cap Bolt	13	11-15	18	15-20
Reverse Lever Pivot Bolt	20	15-25	27	20-34
Shift Control Housing Bolt	10	7-12	14	9-16
Transmission Cover Bolt	7	5-9	10	7-12
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.

60791

MODEL T5 5-SPEED TRANSMISSION

TRANSMISSION DISASSEMBLY

CAUTION: *Except for the gearshift lever attaching bolts and fill plug, all threaded holes and bolts used in the Model T5 Transmission case have metric threads. If replacement bolts are required during service, use only those of the same size and length as the originals.*

(1) Remove drain bolt on transmisson case and drain lubricant (fig. 2B-39).

(2) Using pin punch and hammer, remove roll pin attaching offset lever to shift rail (fig. 2B-5).

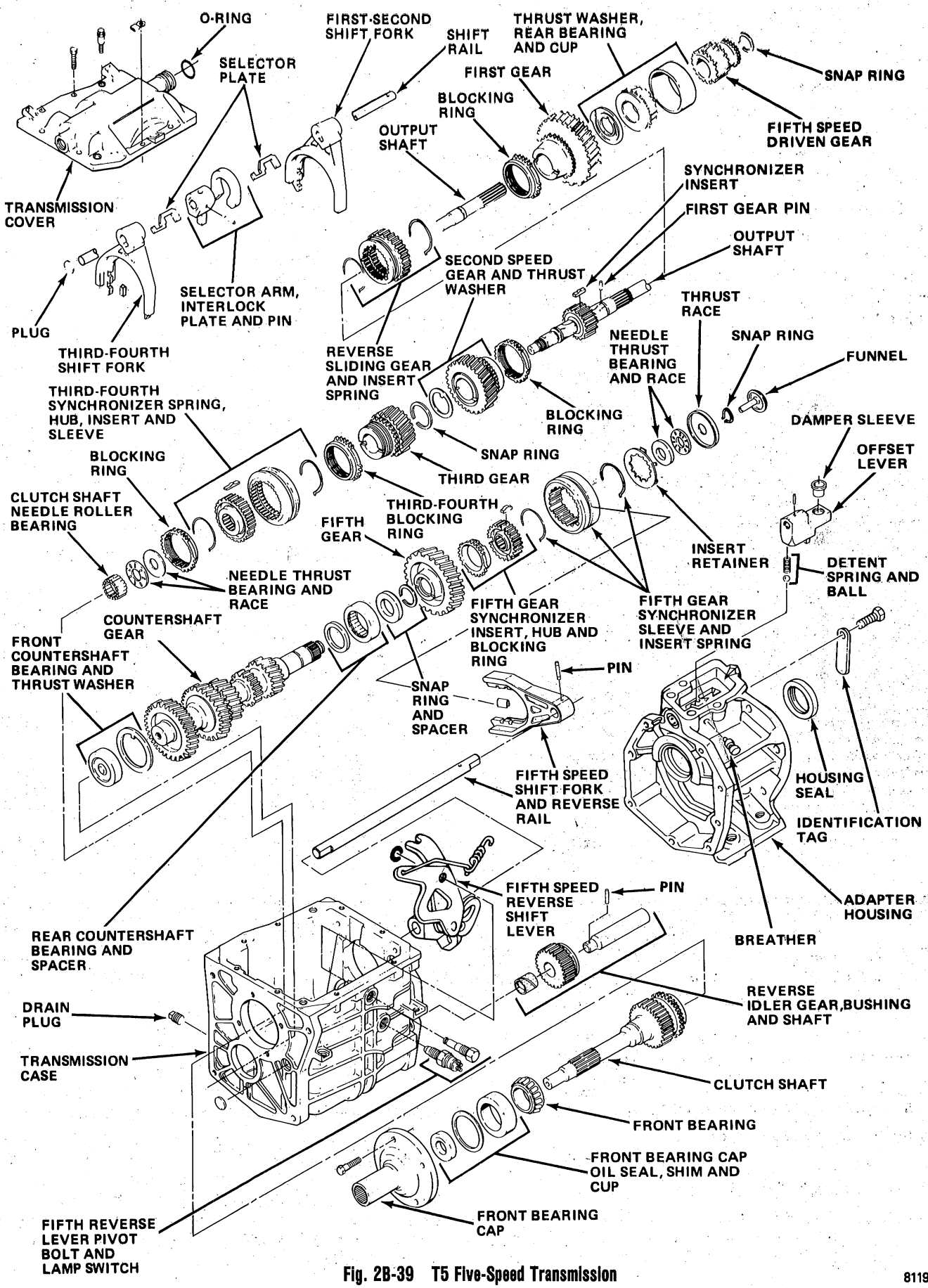


Fig. 2B-39 T5 Five-Speed Transmission

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(3) Remove adapter housing-to-transmission case bolts and remove housing and offset lever as assembly (fig. 2B-6).

CAUTION: *Do not attempt to remove the offset lever while the adapter housing is still bolted in place. The lever has a positioning lug engaged in the housing detent plate which prevents moving the lever far enough forward for removal.*

(4) Remove detent ball and spring from offset lever and remove roll pin from adapter housing or offset lever (fig. 2B-7).

(5) Remove plastic funnel, thrust bearing race and thrust bearing from rear of countershaft (figs. 2B-40 and 2B-41).

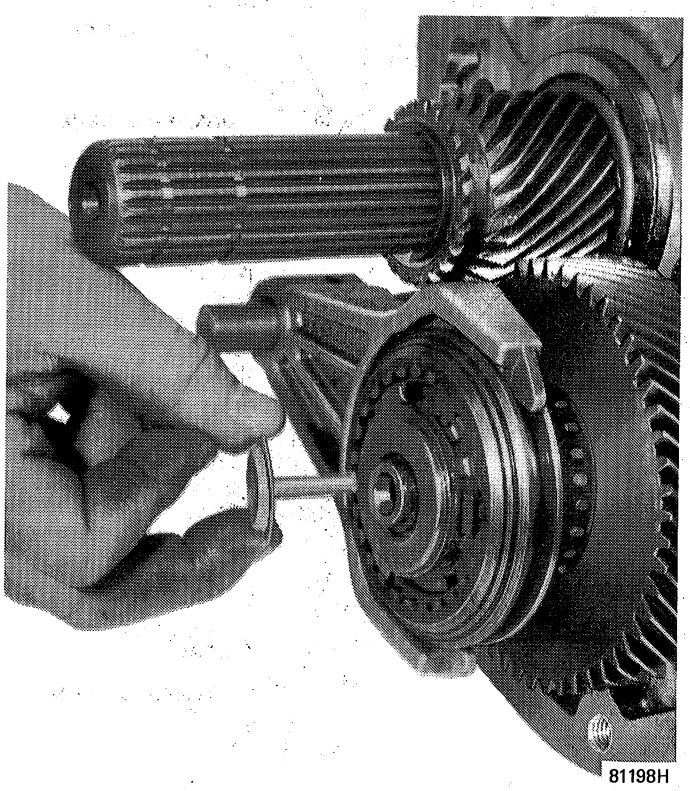

Fig. 2B-40 Funnel Removal/Installation

NOTE: *The countershaft rear thrust bearing, bearing washer and plastic funnel may be found on the end of the countershaft or inside the adapter housing.*

(6) Remove bolts attaching transmission cover and shift fork assembly and remove cover (fig. 2B-9).

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

(7) Remove roll pin from fifth gear shift fork using hammer and punch (fig. 2B-42).

CAUTION: *Place wood block under the fifth gearshift fork during roll pin removal to prevent damage to fifth gear/reverse shift rail.*

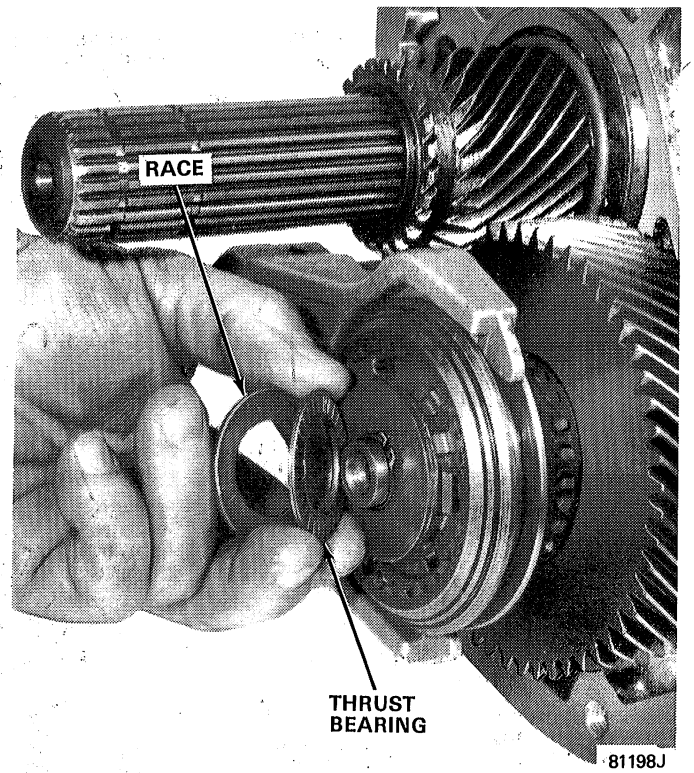

Fig. 2B-41 Countershaft Thrust Bearing and Race Removal/Installation

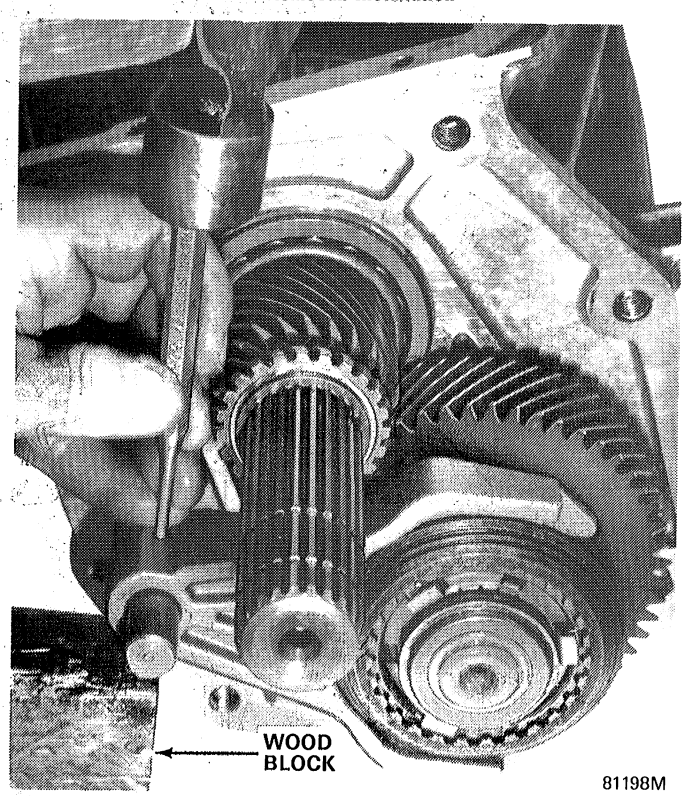

Fig. 2B-42 Fifth Gearshift Fork Roll Pin Removal/Installation

(8) Remove fifth synchronizer gear snap ring, shift fork, fifth gear synchronizer sleeve, blocking ring and fifth speed drive gear from rear of countershaft (figs. 2B-43 and 2B-44).

(9) Remove fifth gear insert retainer synchronizer springs and inserts from sleeve and hub. Mark position of hub and sleeve for assembly reference.

(10) Remove snap ring and remove fifth speed driven gear from rear of output shaft using Puller Assembly J-25215 (figs. 2B-45 and 2B-46).

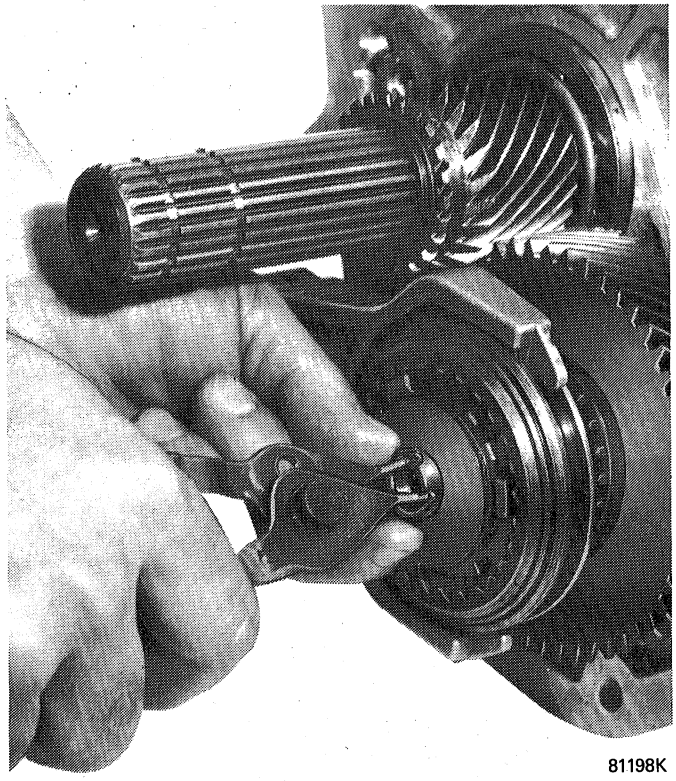

Fig. 2B-43 Fifth Gear Synchronizer Snap Ring Removal/Installation

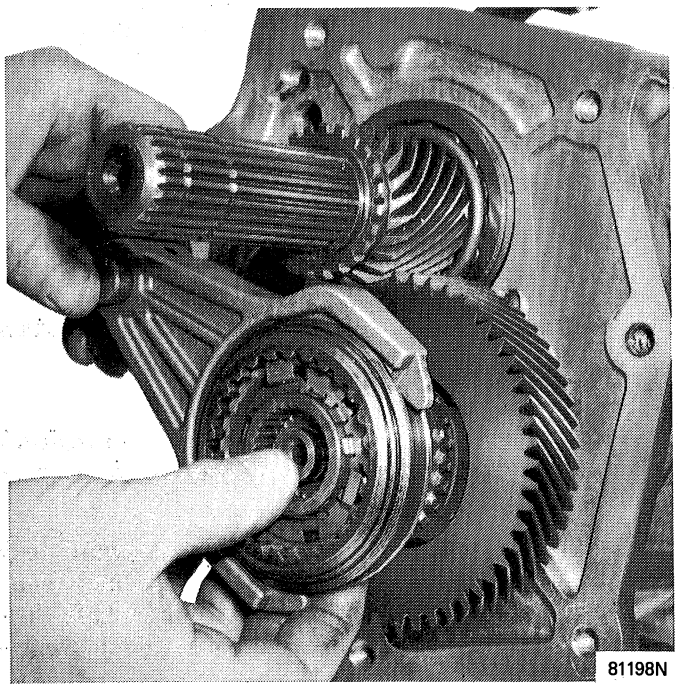

Fig. 2B-44 Fifth Gear, Shift Fork and Synchronizer Sleeve Removal/Installation

(11) For assembly reference, mark position of front bearing cap on front of transmission case. Use hammer and punch to mark both bearing cap and case.

(12) Remove front bearing cap bolts and remove front bearing cap.

(13) Remove front bearing race and end play shim(s) from front bearing cap (fig. 2B-12). Remove oil seal from bearing cap using screwdriver.

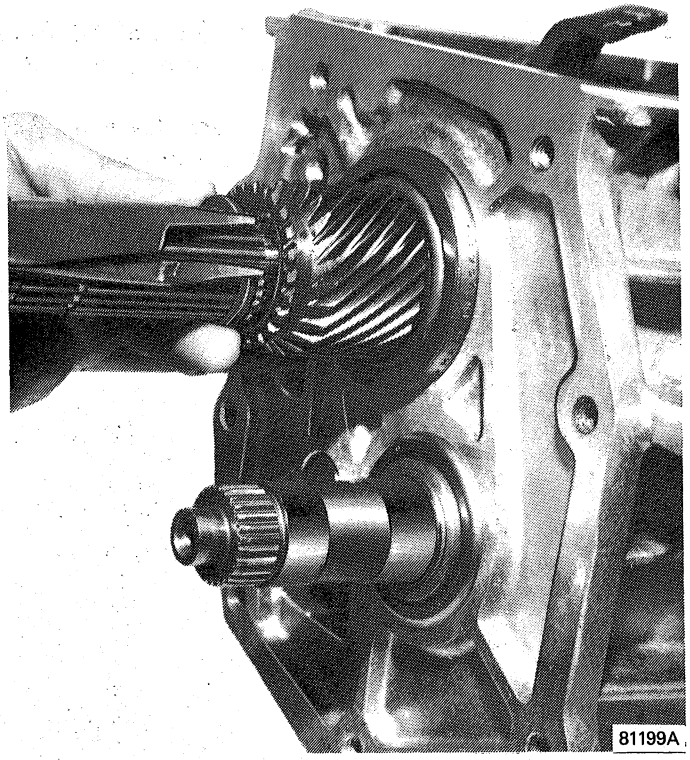

Fig. 2B-45 Fifth Speed Driven Gear Snap Ring Removal/Installation

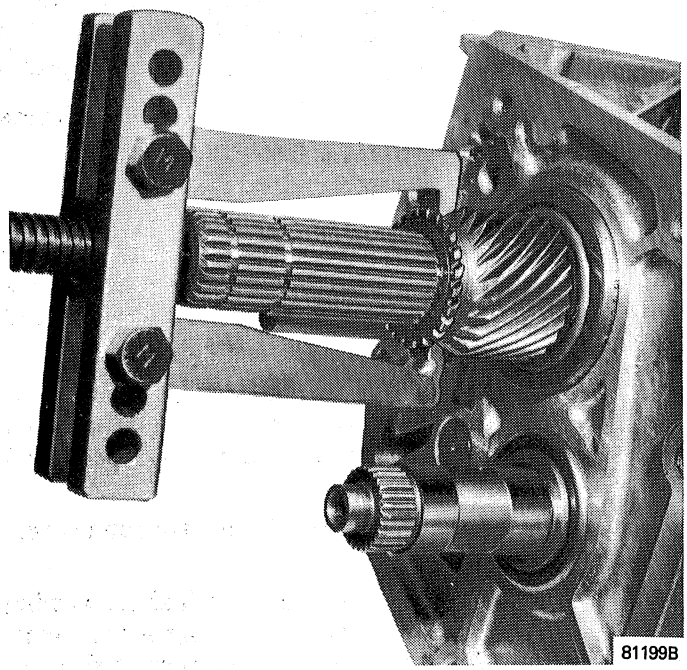

Fig. 2B-46 Fifth Speed Driven Gear Removal

(14) Rotate clutch shaft until flat surface on main drive gear faces countershaft and remove clutch shaft from transmission case (fig. 2B-14). Remove 15 clutch shaft needle bearings, thrust bearing and race.

(15) Remove output shaft rear bearing race and tilt output shaft assembly upward and remove assembly from transmission case (figs. 2B-15 and 2B-16).

(16) Unhook overcenter link spring from rear of transmission case (fig. 2B-47).

NOTE: *Using mechanic's wire or welding rod, fabricate spring remover tool similar to that shown in figure 2B-47.*

(17) Remove C-clip attaching reverse lever and fork assembly-to-reverse lever pivot pin (fig. 2B-10).

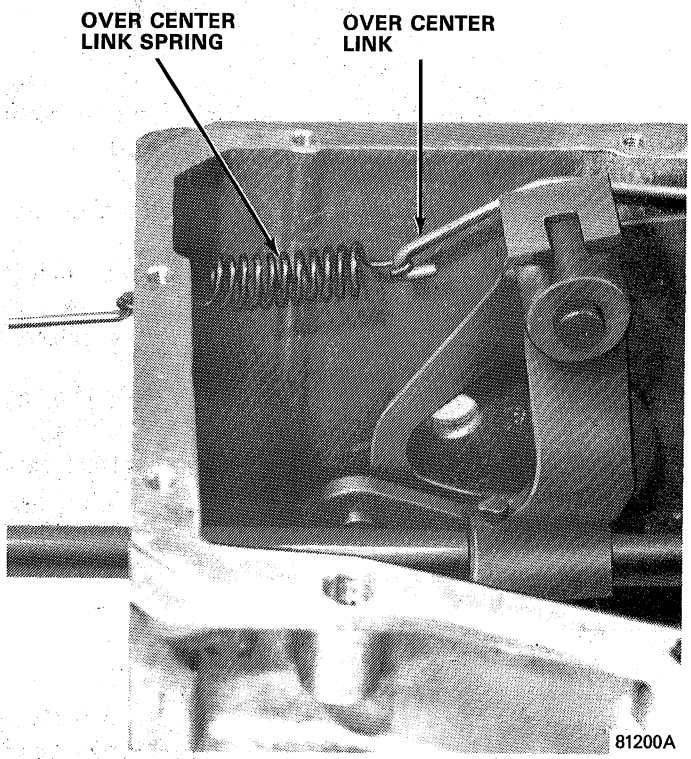

Fig. 2B-47 Reverse Lever Overcenter Link Spring Removal/Installation

(18) Rotate fifth gear-reverse shift rail clockwise (when viewed from top of transmission case) to disengage rail from reverse lever assembly. Remove rail from rear of transmission case (fig. 2B-48).

(19) Remove reverse lever and fork assembly pivot pin, detach reverse lever from reverse idler gear and remove reverse lever and fork assembly from transmission case (fig. 2B-49).

(20) Remove rear countershaft snap ring and spacer (fig. 2B-50).

(21) Insert brass drift through clutch shaft opening in front of transmission case and, using arbor press, carefully press countershaft assembly rearward to remove rear countershaft bearing (fig. 2B-17).

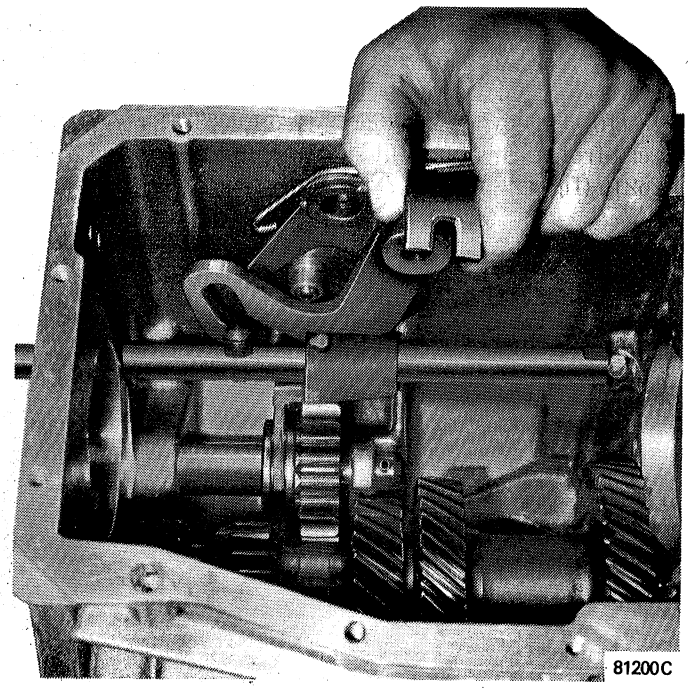

Fig. 2B-48 Reverse Rail Removal/Installation

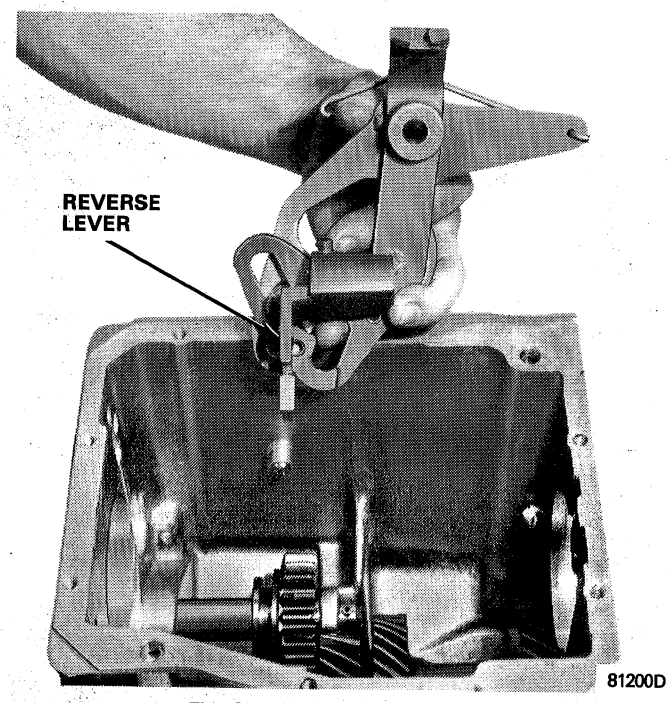

Fig. 2B-49 Reverse Lever Assembly

NOTE: *For assembly reference, bearing identification numbers face outward when bearing is correctly installed.*

(22) Move countershaft assembly rearward inside transmission case, tilt assembly upward and remove from case. Note position of front countershaft thrust washer in case for assembly reference and remove front thrust washer.

(23) Remove countershaft rear bearing spacer (fig. 2B-18).

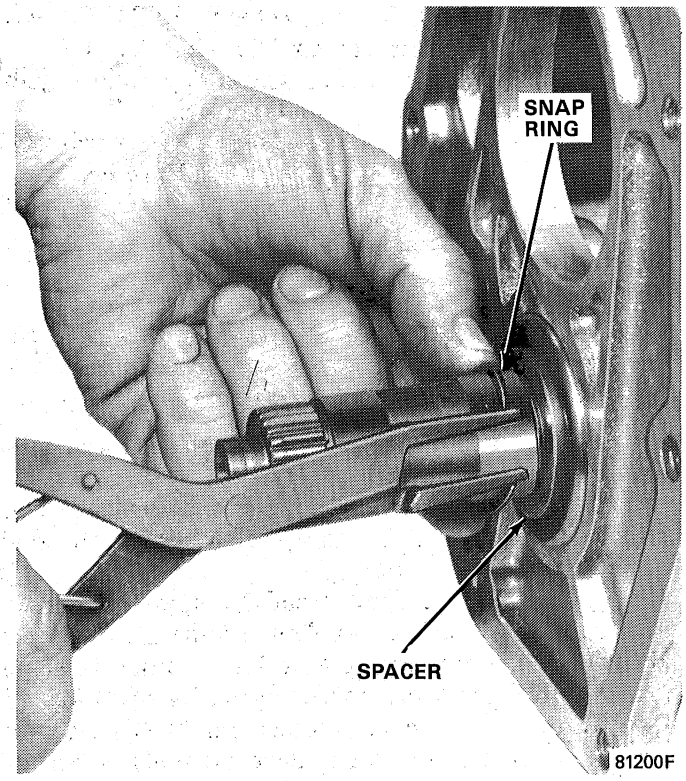

Fig. 2B-50 Countershaft Snap Ring Removal/Installation

(24) Using hammer and punch, remove roll pin from forward end of reverse idler shaft (fig. 2B-19).

(25) Remove reverse idler shaft and gear from transmission case. Note position of reverse idler gear for assembly reference.

(26) Remove countershaft front bearing from transmission case using arbor press.

(27) Remove clutch shaft front bearing using Tool J-29721 and J-22912-01 (fig. 2B-20).

(28) Remove rear adapter housing seal using flat drift and hammer.

Disassembly—Output Shaft Geartrain

(1) Remove thrust bearing washer from front end of output shaft.

(2) Scribe alignment marks on third-fourth synchronizer hub and sleeve for assembly reference (fig. 2B-21).

(3) Remove third-fourth synchronizer blocking ring, sleeve and hub as assembly. Note position of hub and sleeve for assembly reference.

(4) Remove third-fourth synchronizer insert springs, remove inserts and remove sleeve from hub.

(5) Remove third gear from shaft.

(6) Remove snap ring retaining second gear on shaft (fig. 2B-22) and remove tabbed second gear thrust washer and second gear (fig. 2B-23).

(7) Remove output shaft rear bearing using Puller Set J-29721 and adapters 293-39 (fig. 2B-24).

(8) Remove first gear thrust washer, first gear roll pin, first gear and blocking ring (fig. 2B-25). Use diagonal cutters to remove roll pin.

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

(10) Remove insert spring and inserts from first-reverse sliding gear and remove gear 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 set during manufacturing to insure concentricity.*

Disassembly—Transmission Cover Assembly

(1) Place selector arm plates and shift rail in neutral position (centered).

(2) Rotate shift rail counterclockwise until selector arm disengages from selector arm plates and selector arm roll pin is accessible (fig. 2B-26).

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

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

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

(6) Remove shift rail oil seal and O-ring using screwdriver (fig. 2B-27).

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

(8) 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. 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 thrust 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 geartrain 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 thrust or needle bearings, or bearing bores in countershaft gear or clutch shaft.
- 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 bushing 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.

TRANSMISSION ASSEMBLY

Assembly—Transmission Cover

(1) Install nylon inserts and selector arm plates in shift forks (fig. 2B-28).

(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 O-ring in groove of shift rail oil seal.

(11) Install shift rail oil seal as follows:

(a) Install Oil Seal Protector Tool J-26628-2 over threaded end of shift rail (fig. 2B-29, 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 transmission cover using Oil Seal Installer Tool J-26628-1 (fig. 2B-29, View B).

Assembly—Output Shaft Geartrain

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

(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-reverse synchronizer sleeve. Engage tang end of each insert spring in same synchronizer insert but position open ends of springs to face 180 degrees from one another (fig. 2B-30). Be sure sleeve and hub are aligned using assembly reference marks.

(4) Install blocking ring and second gear on mainshaft.

(5) Install tabbed thrust washer and second gear retaining snap ring on mainshaft (fig. 2B-22 and 23). Be sure washer tab is properly seated in mainshaft notch.

(6) Install blocking ring and first gear on output shaft.

(7) Install first gear roll pin in output shaft (fig. 2B-31).

(8) Install first gear thrust washer.

(9) Install rear bearing on output shaft using Tool J-2995 and press (fig. 2B-32).

(10) Install third gear, third and fourth gear synchronizer hub inserts and sleeve on shaft. Hub offset must face forward.

(11) Install thrust bearing washer on forward end of output shaft.

Assembly—Transmission Case

CAUTION: *Except for the gearshift lever attaching bolts and fill plug, all threaded holes and bolts used in the Model T5 Transmission are metric sizes. Do not attempt to substitute a different thread-type bolt if the original ones are lost.*

(1) Coat countershaft front bearing outer cage with Loctite 601, or equivalent, and install countershaft front bearing flush with case using arbor press (fig. 2B-33).

(2) Coat countershaft tabbed thrust washer with petroleum jelly and install washer so tab engages corresponding depression in case.

(3) Tip transmission case on end and install countershaft in front bearing bore.

(4) Install countershaft rear bearing spacer (fig. 2B-18).

(5) Coat countershaft rear bearing with petroleum jelly and install bearing using installer Tool J-29895 and Sleeve J-33032 (figs. 2B-34 and 2B-51).

CAUTION: *Sleeve tool must be used to prevent needles from catching on countershaft shoulder.*

NOTE: *When correctly installed, using Sleeve J-33032 and Tool J-29895, the countershaft rear bearing extends .125 inch (3 mm) beyond case surface.*

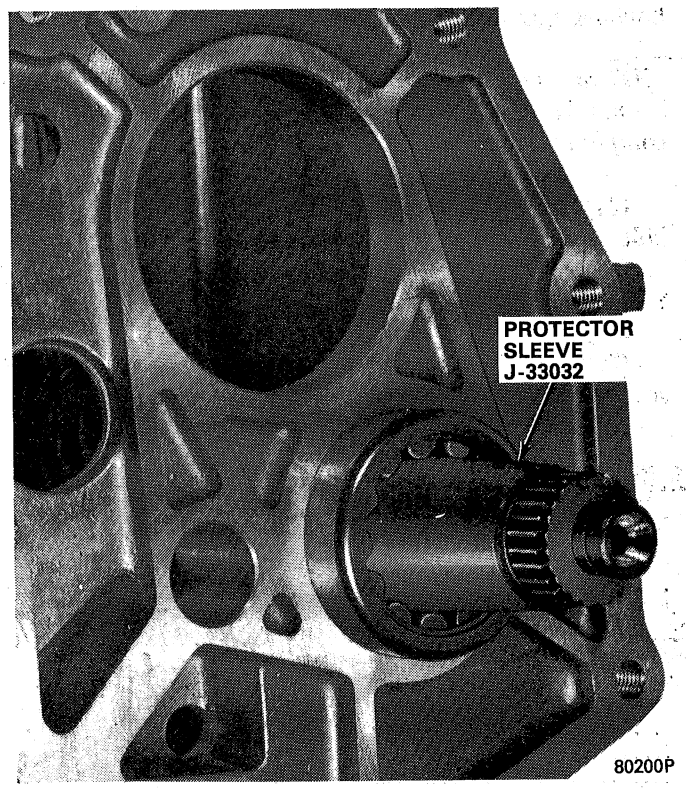

Fig. 2B-51 Rear Countershaft Bearing Sleeve Tool

(6) Position reverse idler gear in case with shift lever groove facing rear of case and install reverse idler shaft from rear of case. Install retaining roll pin in shaft (fig. 2B-19).

(7) Install fifth speed-reverse lever, pivot bolt and retaining C-clip (fig. 2B-48). Coat pivot bolt threads with RTV sealer, or equivalent. Be sure to engage reverse lever fork in reverse idler gear.

(8) Install assembled output shaft in transmission case.

(9) Install front clutch shaft bearing on clutch shaft using Tool J-2995 and arbor press (fig. 2B-35).

(10) Coat 15 pilot roller bearings with petroleum jelly and install in clutch shaft (fig. 2B-14).

(11) Install thrust bearing and race in clutch shaft (fig. 2B-14).

(12) Install rear output shaft bearing race cap.

(13) Install fourth gear blocking ring on output shaft.

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

(15) Install replacement oil seal in front bearing cap using Tool J-26625 (fig. 2B-36).

(16) Install front bearing race in front bearing cap. Do not install shims in front bearing cap at this time.

(17) Temporarily install front bearing cap. Do not apply sealer at this time.

(18) Install fifth speed driven gear and retaining snap ring on rear of output shaft (fig. 2B-45).

(19) Install countershaft rear bearing spacer and retaining snap ring (fig. 2B-50).

(20) Install fifth speed gear on countershaft (fig. 2B-39).

(21) Insert fifth speed-reverse rail through opening in rear of case and install in reverse fifth speed lever. Rotate rail during installation to simplify engagement with lever (fig. 2B-48).

(22) Install fifth speed-reverse lever over center spring (fig. 2B-47).

(23) Assemble fifth gear synchronizer sleeve, insert springs and insert retainer using disassembly reference marks.

(24) Install plastic inserts in notches on each side of fifth speed shift fork.

(25) Place assembled fifth gear synchronizer sleeve on fifth speed shift fork and slide onto countershaft and fifth speed-reverse rail (fig. 2B-44).

NOTE: *Be sure roll pin hole in fifth speed-reverse rail and fifth speed shift fork are aligned.*

(26) Place assembled fifth speed-reverse rail and shift fork on block of wood and install retaining roll pin (fig. 2B-42).

(27) Install needle-type thrust bearing against thrust race on countershaft. Coat both thrust bearing and thrust race with petroleum jelly.

(28) Install thrust race against fifth speed synchronizer hub and install retaining snap ring (fig. 2B-43).

(29) Install lipped thrust race over needle-type thrust bearing and install plastic funnel into hole in end of countershaft gear (figs. 2B-40 and 2B-41).

(30) Temporarily install adapter housing. Do not seal housing to case or tighten bolts to final torque at this time.

(31) Turn transmission case on end (fig. 2B-38). Mount dial indicator on adapter housing with indicator stylus on end of output shaft.

(32) Rotate clutch and output shaft and zero dial indicator.

(33) Pull upward on output shaft until end play is removed. Read end play dimension on dial indicator.

NOTE: *To completely eliminate output shaft and clutch shaft end play, bearings must be preloaded from .001 to .005 inch (0.03 to 0.13 mm).*

(34) Select shim pack measuring .001 to .005 inch (0.03 to 0.13 mm) **thicker** than the end play measured in Step 33.

(35) Place transmission horizontally on workbench and remove front bearing cap and front bearing race.

(36) Add shims to bearing cap to obtain necessary preload and install clutch shaft bearing race in cap.

(37) Apply bead of RTV sealant, or equivalent, on case mating surface of front bearing cap. Install front bearing cap using reference marks made during disassembly and tighten retaining bolts to 15 foot-pounds (20 N•m) torque.

(38) Recheck end play. There must be no end play.

(39) Remove dial indicator from adpater housing.

(40) Remove extension/adapter housing and install adapter housing rear seal using Tool J-29184 (fig. 2B-37).

(41) Move shift forks on transmission cover and synchronizer rings inside transmission to the neutral position.

(42) Apply bead of RTV sealant, or equivalent, to cover mating surface of transmission.

(43) Lower cover assembly, at slightly off center attitude, onto case while aligning shift forks and synchronizer sleeves. Center cover on case to engage reverse relay lever and install two dowel bolts in cover. Install remaining bolts and tighten all cover bolts to 9 foot-pounds (12 N•m) torque.

NOTE: *The offset lever-to-shift rail roll pin hole is in a vertical position when Steps 40 and 42 are performed correctly.*

(44) Apply bead of RTV sealant, or equivalent, to extension/adapter housing-to-transmission case mating surface.

(45) Install extension/adapter housing over output shaft and shift rail to a position where shift rail just enters shift cover opening.

(46) Install detent spring into offset lever. Place steel ball in neutral guide plate detent (fig. 2B-7). Apply pressure on steel ball with detent spring and offset lever and slide offset lever on shift rail and seat extension/adapter housing against transmission case.

NOTE: *The offset lever and shift rail roll pin holes should be aligned and in a vertical position following completion of Step 45.*

(47) Install and tighten adapter housing retaining bolts to 25 foot-pounds (34 N•m) torque.

(48) Install roll pin in offset lever and shift rail (fig. 2B-5).

(49) Install damper sleeve in offset lever.

(50) Coat backup lamp switch threads with RTV sealant, or equivalent, and install switch in case.

SPECIFICATIONS

Transmission Specifications Model T5

Lubrication	
Level	to bottom of fill hole
Inspect Correct Fill Levels	5,000 mi/5 mo/8 000 km initially, then every 7,500 mi/7½ mo/12 000 km thereafter
Recommended Lubricants	AMC/Jeep Automatic Transmission Fluid or equivalent labeled Dexron II®
Lubricant Capacity	
U.S. Measure	4.0 pints
Imperial Measure	3.7 pints
Metric Measure	1.9 liters

60790

Torque Specifications Model T5

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-tightened 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	12-18	20	16-24
Adapter Housing Bolt	13	11-15	18	15-20
Fill Plug	20	15-25	27	20-34
Front Bearing Cap Bolt	13	11-15	18	15-20
Reverse Lever Pivot Bolt	20	15-25	27	20-34
Shift Control Housing Bolt	10	7-12	14	9-16
Transmission Cover Bolt	7	6-9	10	7-12
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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MODEL T-176
4-SPEED TRANSMISSION

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-52). Tap countershaft out rear of case.

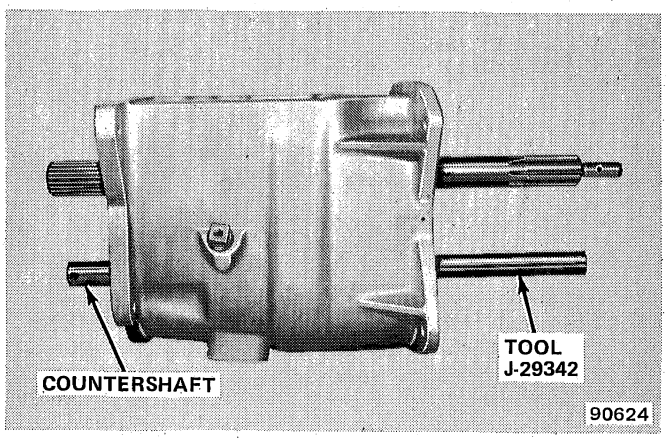


Fig. 2B-52 Countershaft Removal/Installation

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

(6) Remove rear bearing using Puller Set J-25152 (fig. 2B-53).

(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.

(10) Remove locating ring and retaining snap ring from front bearing (fig. 2B-54).

(11) Remove clutch shaft and front bearing using Adapter J-29344 and Puller Set J-25152 (fig. 2B-55).

(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-56).

(14) Remove mainshaft pilot bearing rollers from clutch shaft (fig. 2B-54).

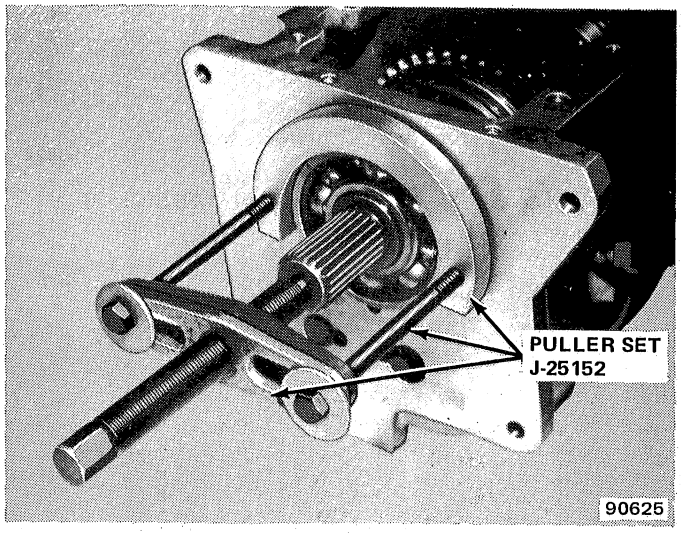


Fig. 2B-53 Rear Bearing Removal

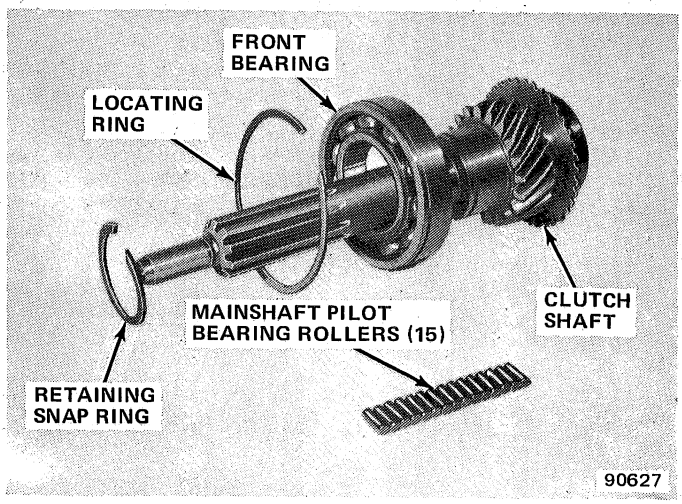


Fig. 2B-54 Clutch Shaft and Front Bearing Assembly

(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-57). Remove gear assembly thrust washers.

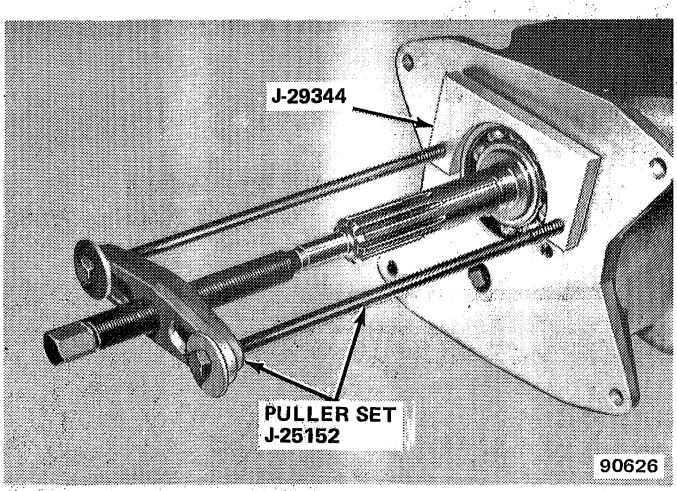


Fig. 2B-55 Clutch Shaft Front Bearing Removal

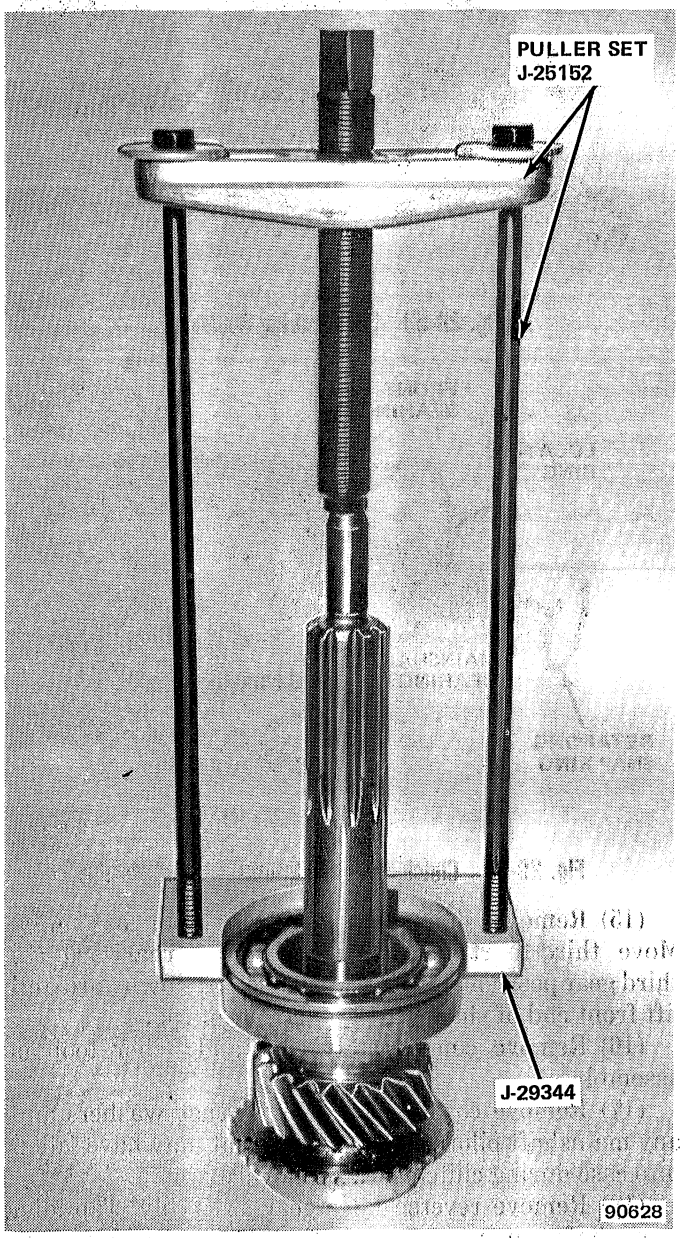


Fig. 2B-56 Removing Front Bearing from Clutch Shaft

(19) Remove needle bearings and bearing retainers from gear assembly (fig. 2B-58). 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-59).

Disassembly Mainshaft Geartrain

(1) Remove third-fourth synchronizer snap ring from front end of mainshaft (fig. 2B-60).

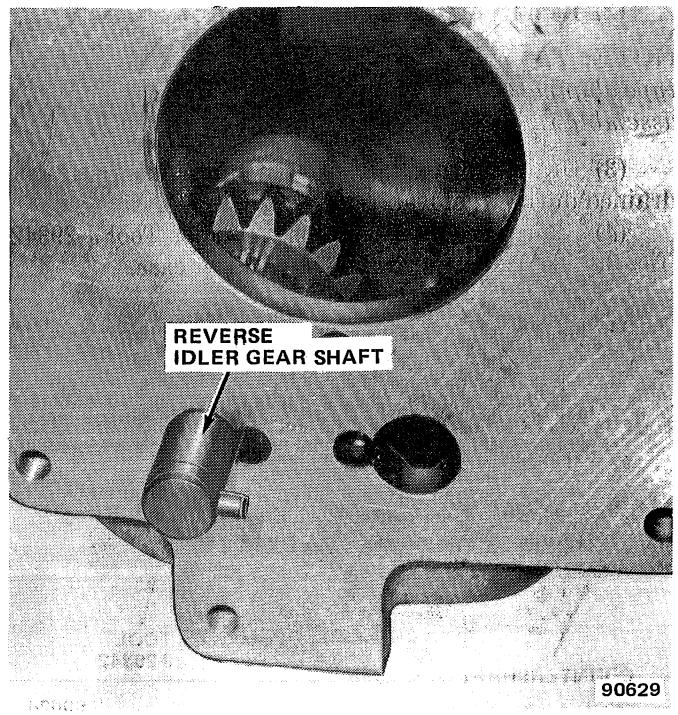


Fig. 2B-57 Reverse Idler Gear Shaft Removal/Installation

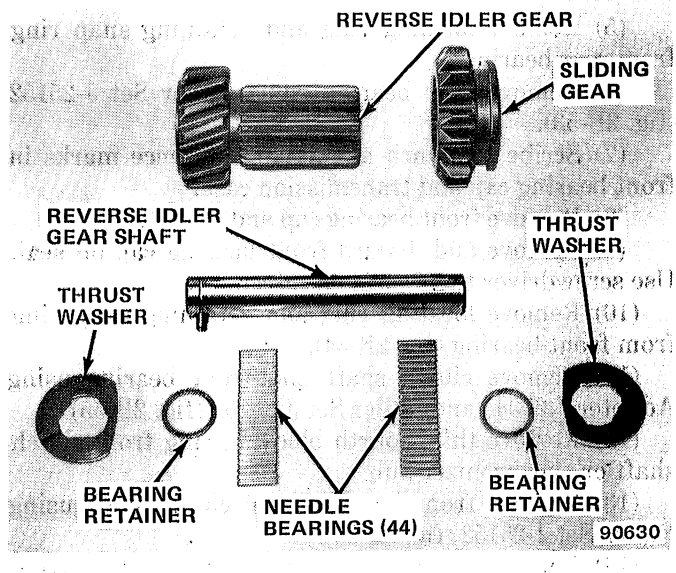


Fig. 2B-58 Reverse Idler Gear Assembly

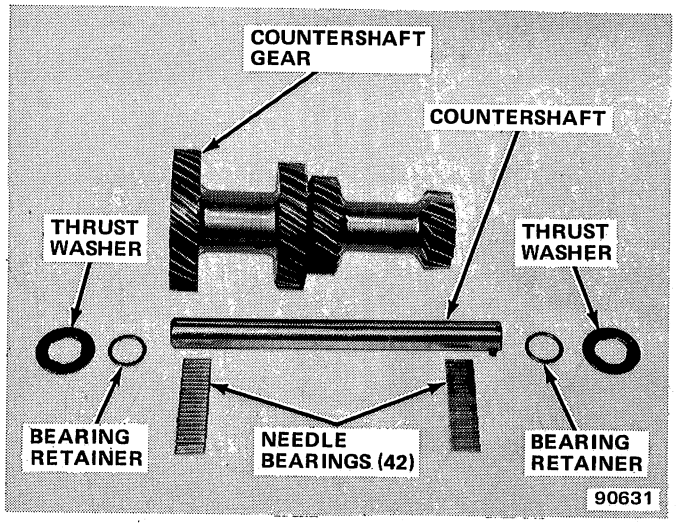


Fig. 2B-59 Countershaft Gear Assembly

(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-60).

(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.

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.
- 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-58).

(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-61).

(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-62). 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-57).

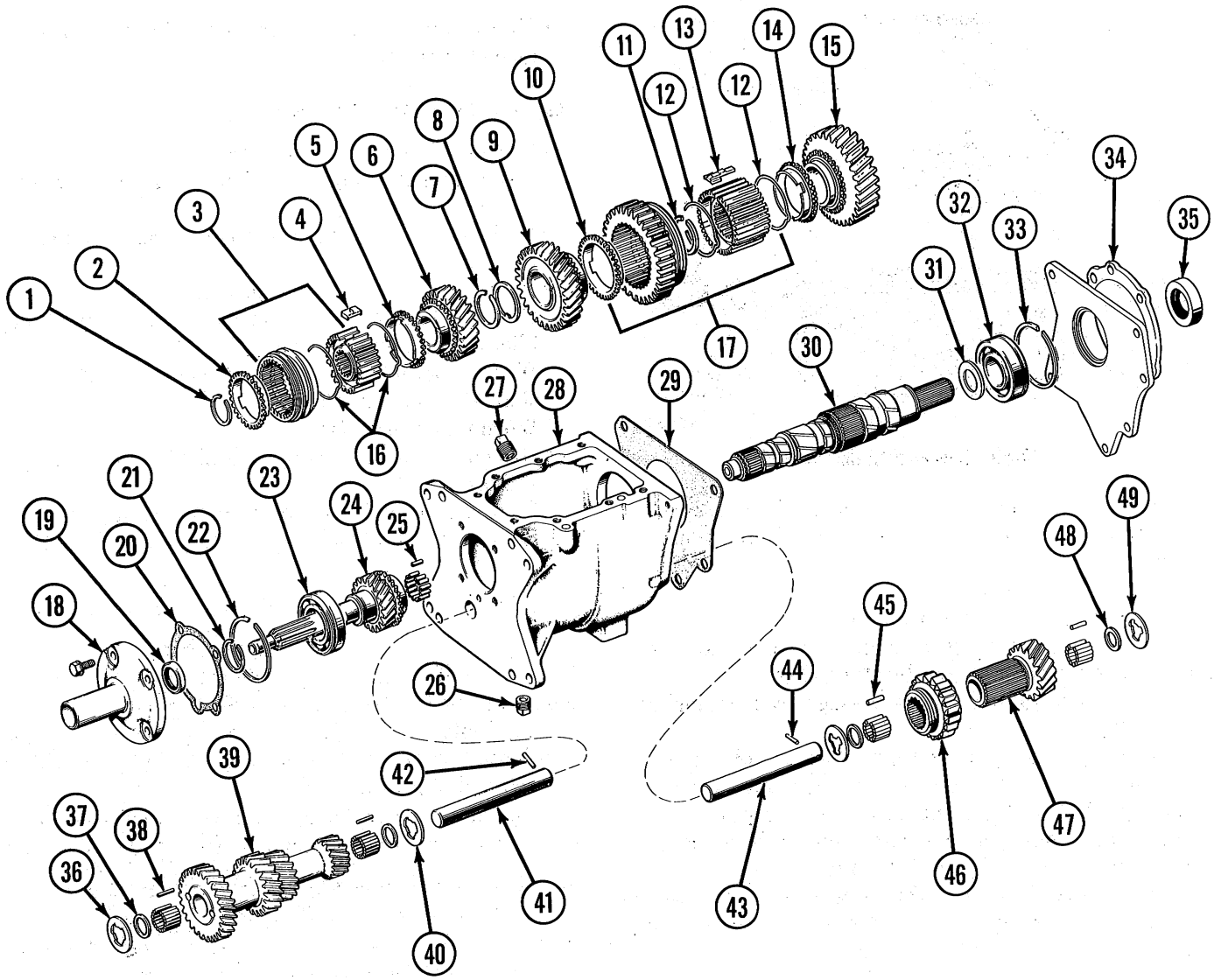
(5) Measure reverse idler gear end play by inserting feeler gauge between thrust washer and gear. End play should be 0.004 to 0.018 inch (0.10 to 0.45 mm). If end play exceeds 0.018 inch (0.45 mm), remove idler gear and replace thrust washers.

(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



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

Fig. 2B-60 Model T-176 Four-Speed Transmission

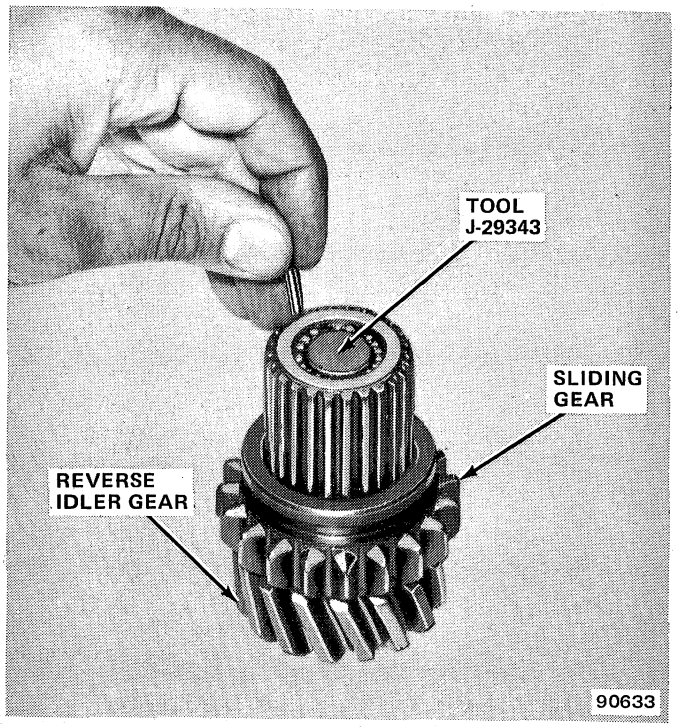


Fig. 2B-61 Reverse Idler Gear Needle Bearing Installation

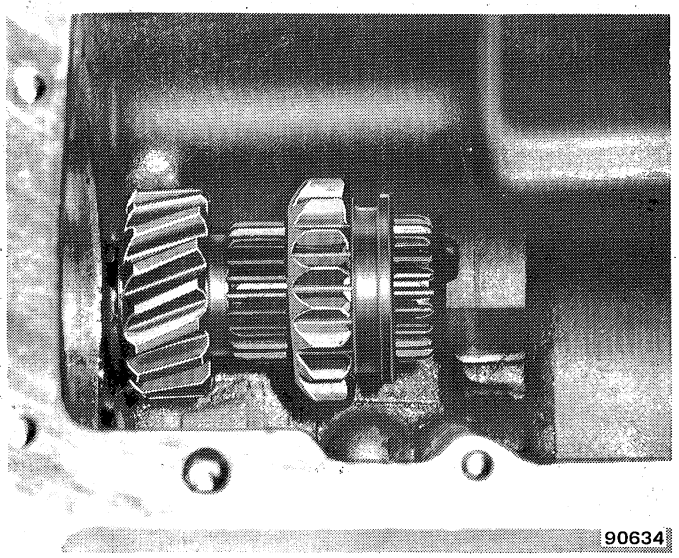


Fig. 2B-62 Reverse Idler Gear Installation

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-60):

(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-63).

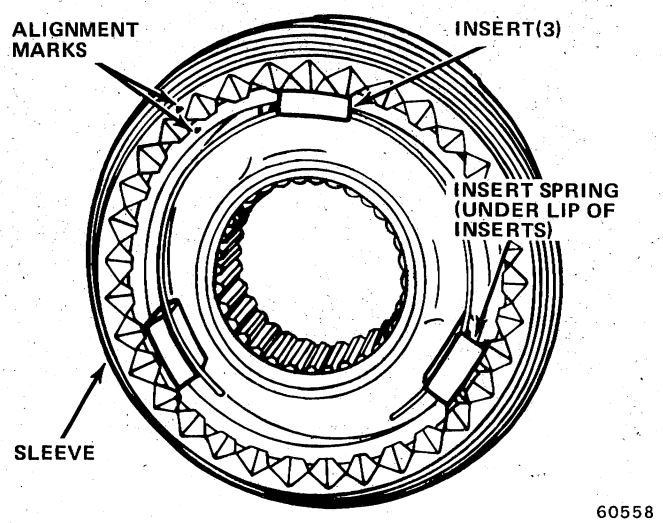


Fig. 2B-63 Synchronizer Insert Spring Installation

(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.

(14) Install new first-second synchronizer snap ring on mainshaft (fig. 2B-60).

(15) Install first gear and blocking ring on rear of mainshaft and install first gear thrust washer (fig. 2B-64).

(16) Install new tabbed thrust washer on mainshaft. Be sure washer tab is seated in mainshaft tab bore (fig. 2B-65).

(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.

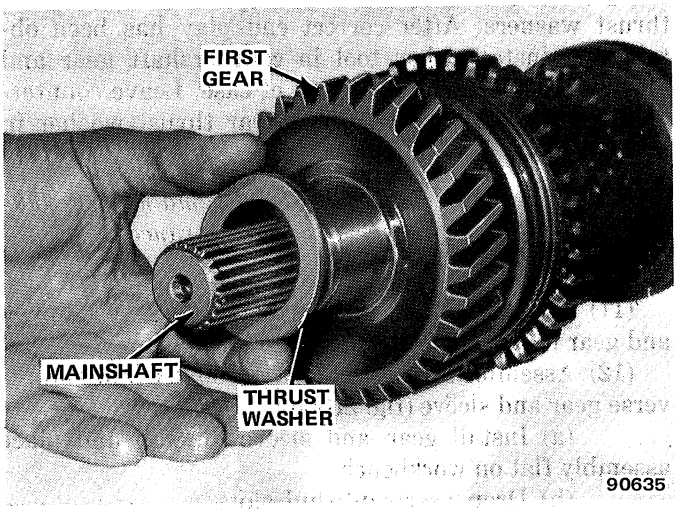


Fig. 2B-64 First Gear and Thrust Washer Installation

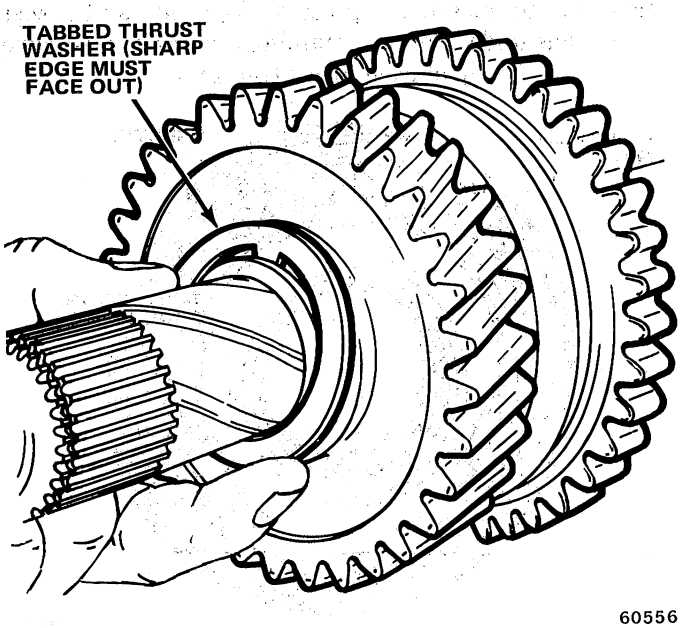


Fig. 2B-65 Tabbed Thrust Washer Installation

(19) Assemble third-fourth synchronizer (fig. 2B-60).

(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-63).

(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-66). 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.

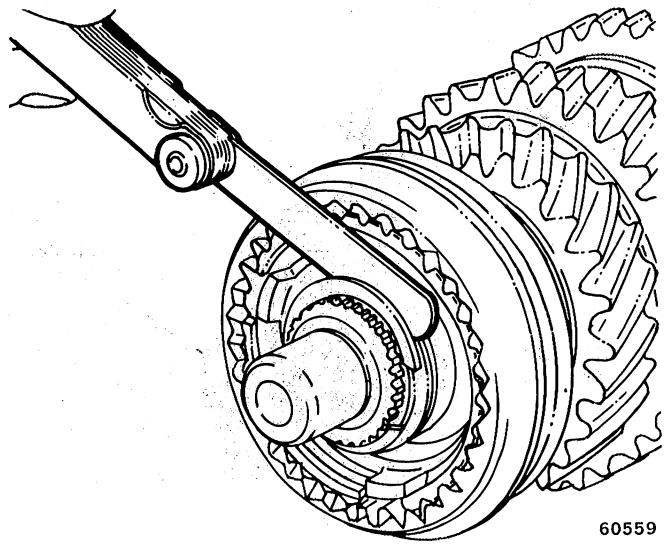


Fig. 2B-66 Checking Mainshaft Geartrain End Play

(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.

(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 mainshaft assembly and insert clutch shaft through front bearing bore in case. Seat mainshaft 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-67).

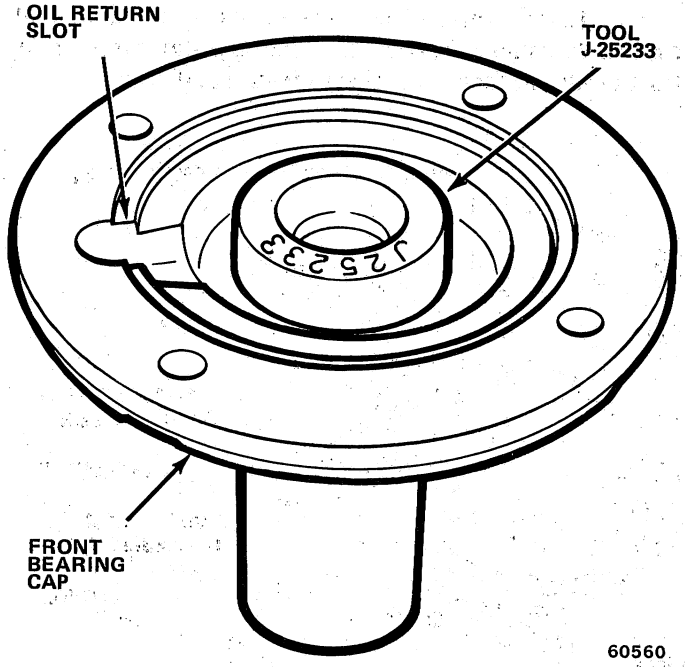


Fig. 2B-67 Front Bearing Cap Seal Installation

(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, reseat 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 countershaft installation. Be sure they are aligned with the case bores and gear bores before tapping the countershaft into place.*

(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-68).

(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. 1). Push cap downward and turn lever retainer clockwise to install and seat.

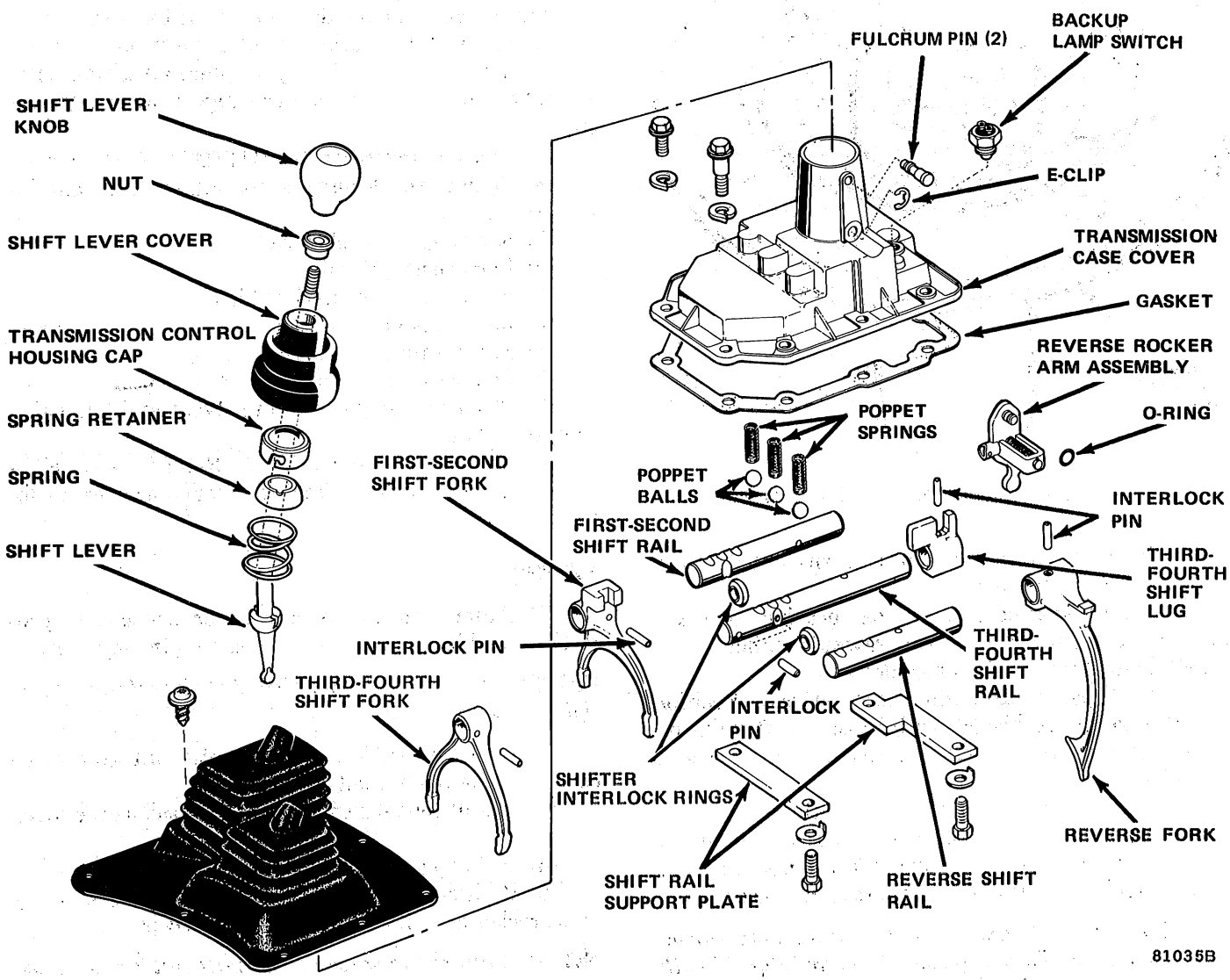


Fig. 2B-68 Shift Control Housing—T-176

SPECIFICATIONS

Lubricant Capacity and End Play Tolerances — Model T-176

End Play Tolerances:
Countershaft Gear to Case . .0.004 to 0.018 inch (0.10 to 0.45 mm)
Reverse Idler Gear to Case . .0.004 to 0.018 inch (0.10 to 0.45 mm)
Mainshaft Gear Train . . . . .0.004 to 0.018 inch (0.10 to 0.45 mm)
Lubricant Capacity . . . . . 3.5 pints (1.7 liters)
Lubricant Type . . . . . SAE 85W-90, API GL5

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Torque Specifications — Model T-176

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

90638

MODEL T-18A 4-SPEED TRANSMISSION

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 (fig. 2B-69).

(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-70).

(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) Install 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-69).

(16) Remove mainshaft assembly through top of case.

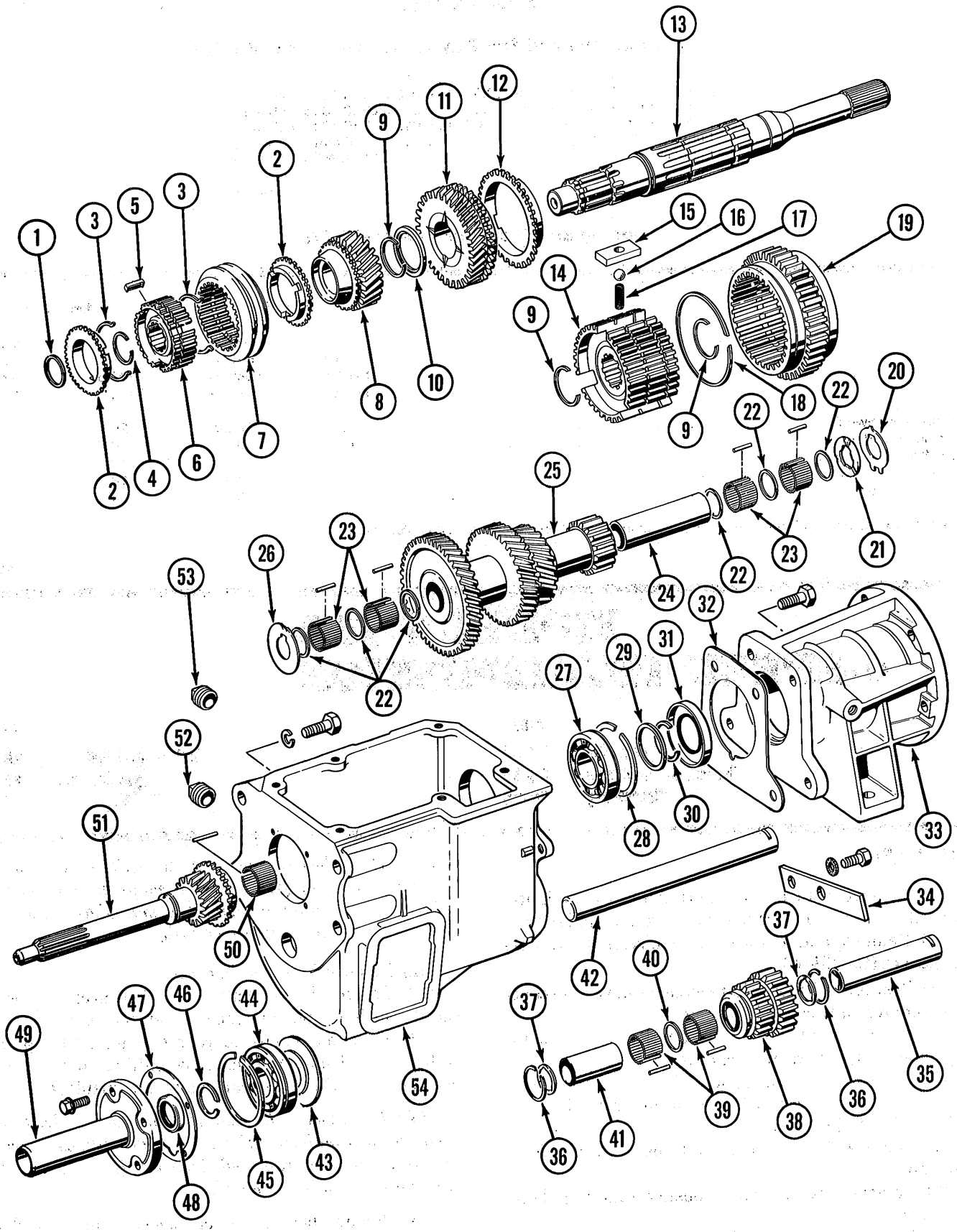

Fig. 2B-69 Model T-18A—4-Speed Transmission

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

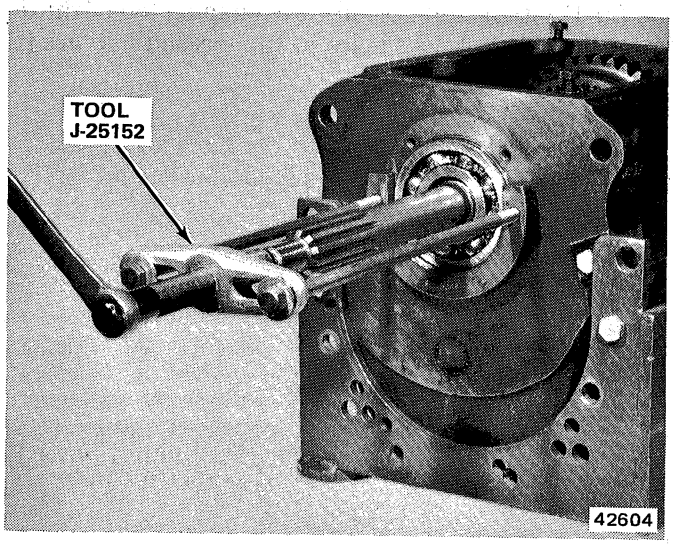

Fig. 2B-70 Front Bearing Removal

(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-69).

(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.

Mainshaft Geartrain Disassembly

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

(2) Remove pilot bearing spacer from front of mainshaft (fig. 2B-69).

(3) Remove third-fourth synchronizer snap ring and remove third-fourth synchronizer assembly and third gear (fig. 2B-69).

(4) Remove first-second synchronizer snap ring and remove first-second synchronizer assembly (fig. 2B-69).

(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 workbench 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, 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. Mainshaft 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-69).

(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.

(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-71).

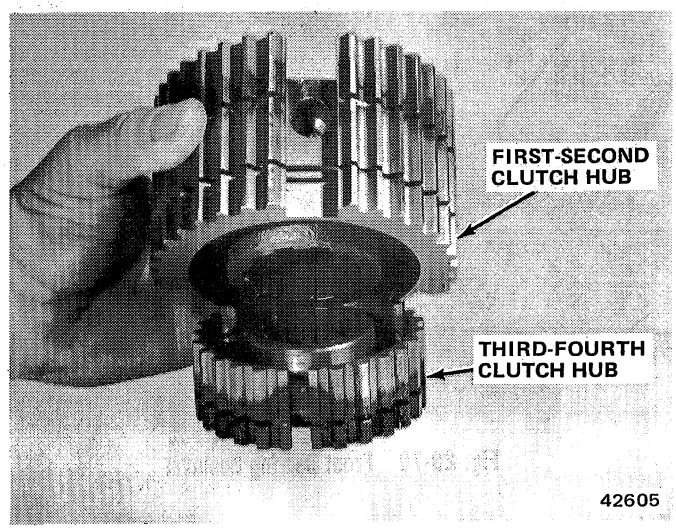

Fig. 2B-71 Supporting First-Second Clutch Hub

(4) Align scribe marks on first-second hub and sleeve and install sleeve on hub (fig. 2B-72). Allow sleeve to bottom against workbench.

(5) Install each shifting plate, poppet spring and lock ball assembly one at a time as follows (fig. 2B-72):

(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-72).

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

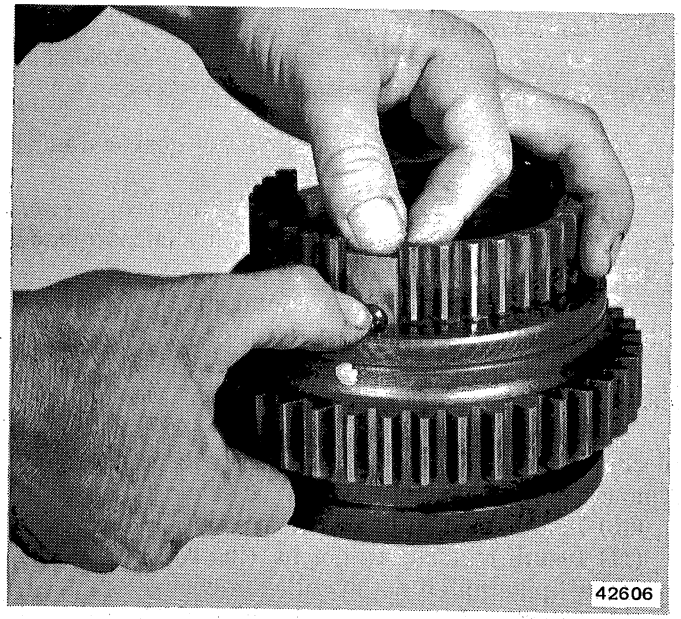

Fig. 2B-72 Assembling First-Second Synchronizer

(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.

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-73).

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.

Mainshaft and Geartrain Assembly

(1) Install second gear from front of mainshaft (fig. 2B-74).

(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.

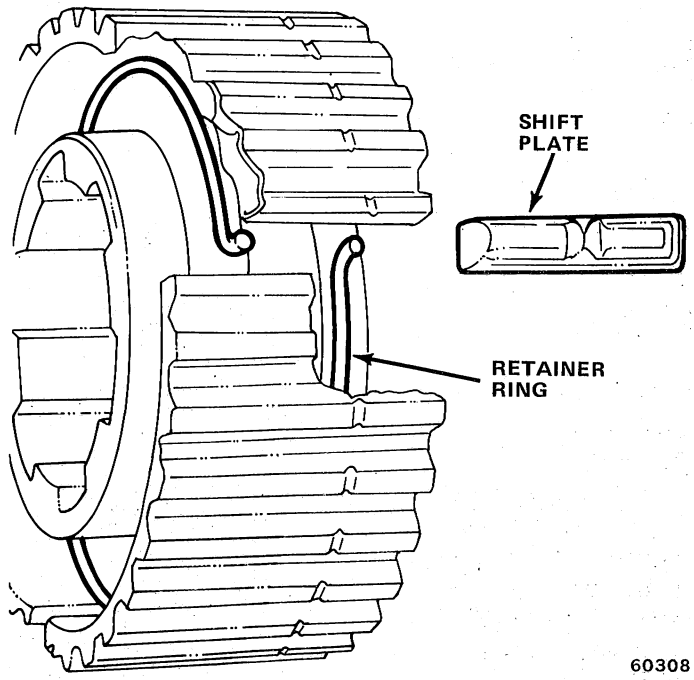

Fig. 2B-73 Third-Fourth Synchronizer Shifting Plate and Retaining Ring Installation

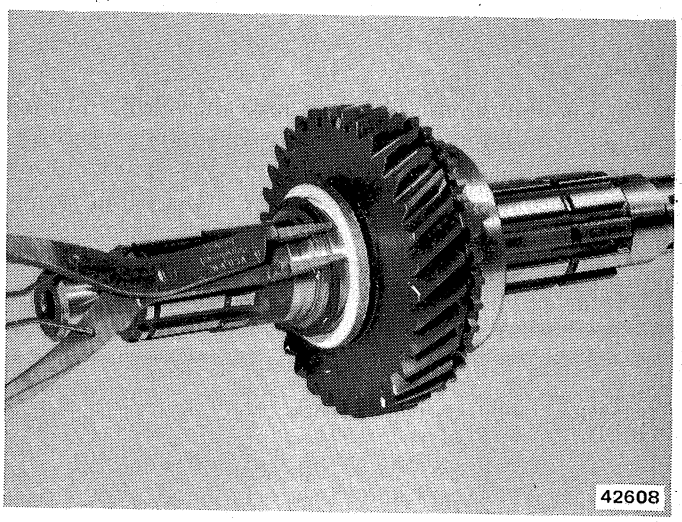

Fig. 2B-74 Second Gear and Thrust Washer Installation

NOTE: *The first-second synchronizer clutch sleeve shift fork groove must face the rear of the mainshaft (fig. 2B-75).*

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

(6) Install third-fourth synchronizer assembly on mainshaft (fig. 2B-69).

NOTE: *The third-fourth synchronizer must be installed with the chamfered side of the hub facing the front of the mainshaft (fig. 2B-76).*

(7) Install third-fourth synchronizer retaining ring (fig. 2B-69).

(8) Install mainshaft bearing roller spacer on shaft pilot hub (fig. 2B-69).

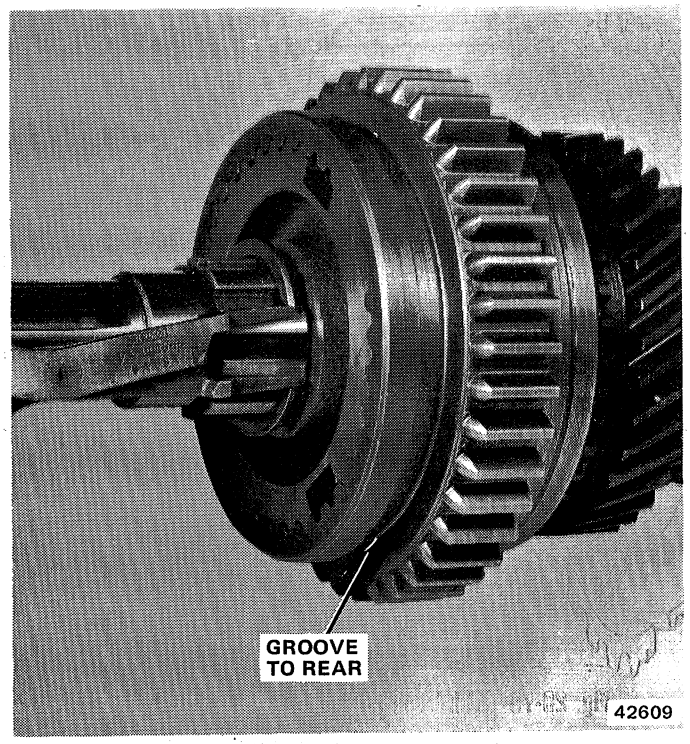

Fig. 2B-75 First-Second Synchronizer Installation

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.

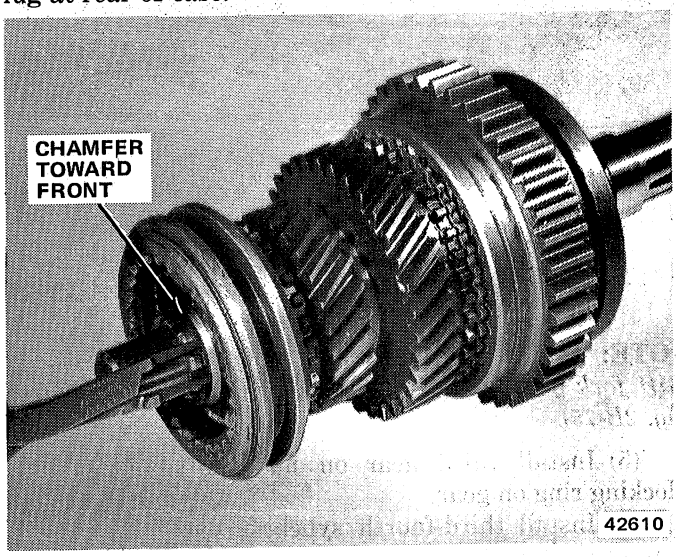

Fig. 2B-76 Third-Fourth Synchronizer Installation

(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 geartrain 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-77).*

(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-78). 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.*

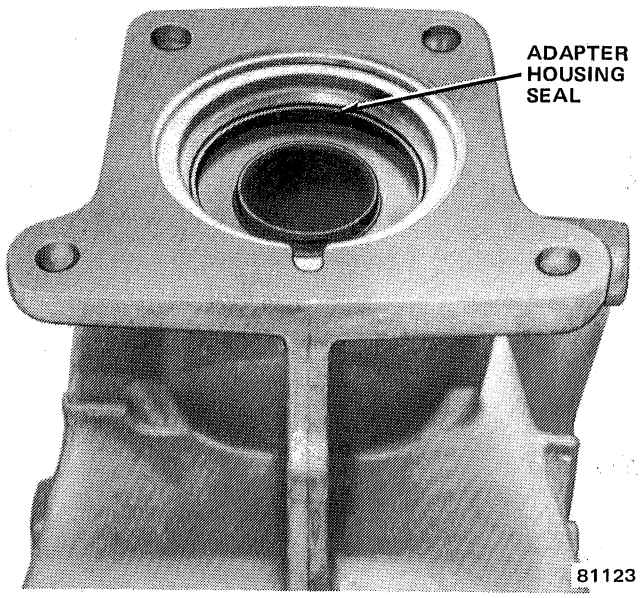

Fig. 2B-77 Adapter Plate Oil Seal Position

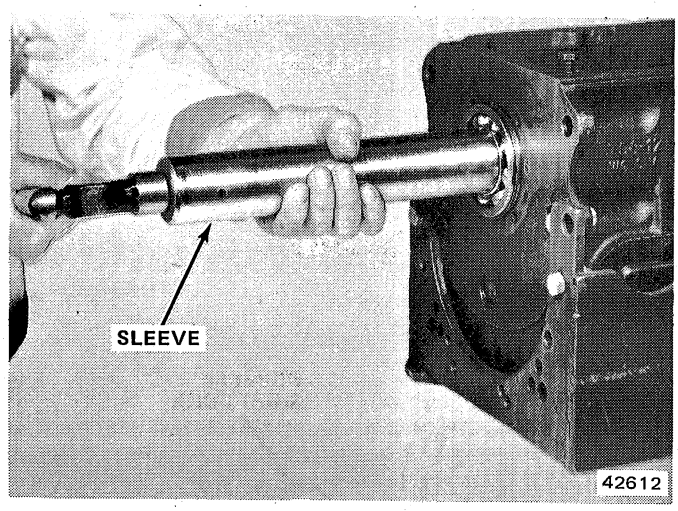

Fig. 2B-78 Front Bearing Installation

(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 sealer, or equivalent, 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.

(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-79).

(2) Remove shift lever locating pins from housing (fig. 2B-79).

(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.

(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.

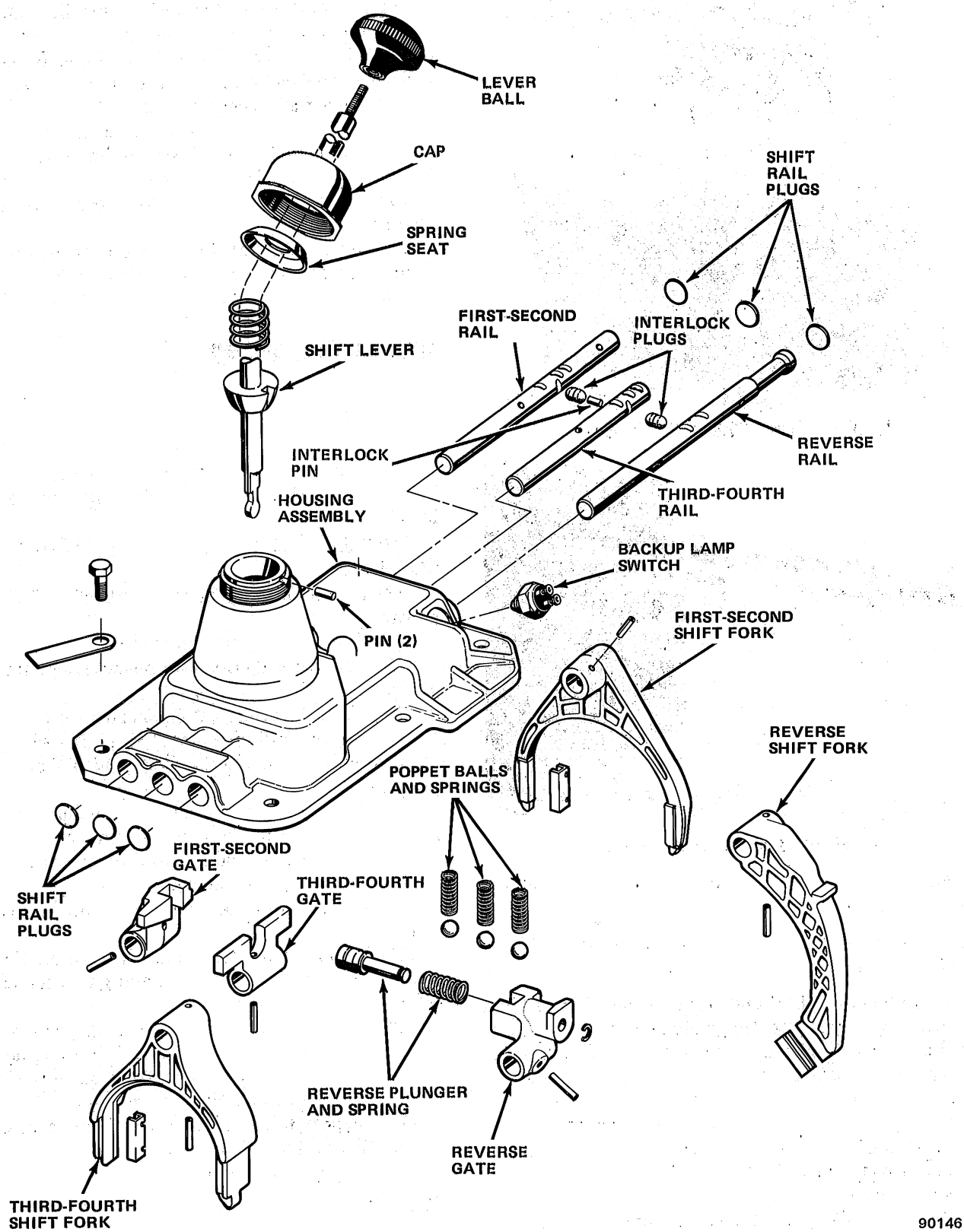

Fig. 2B-79 Shift Control Housing—Transmission Model T-18A

(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-80).

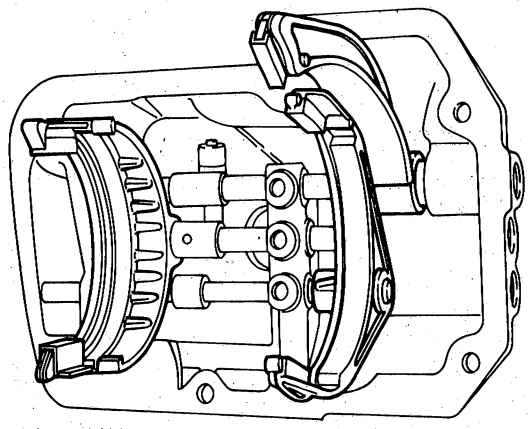

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Fig. 2B-80 Shift Fork/Shift Gate Position

(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.

(8) Insert first-second shift rail into housing. Install first-second shift fork on rail so fork offset faces rear of housing (fig. 2B-80). 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-80).

(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 T-18A

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 — Model T-18A

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

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Transmission Gear Ratios

ENGINE-VEHICLE MODEL	T4					T5					
	1st	2nd	3rd	4th	REV.	1st	2nd	3rd	4th	5th	REV.
4-Cylinder CJ-5, CJ-7, Scrambler	4.03:1	2.37:1	1.50:1	1.00:1	3.76:1						
4-Cylinder CJ-5, CJ-7, Scrambler*						4.03:1	2.37:1	1.50:1	1:00:1	0.76:1	3.76:1
4-Cylinder CJ-5, CJ-7, Scrambler**						4.03:1	2.37:1	1.50:1	1:00:1	0.86:1	3.76:1
6-Cylinder CJ-7, Scrambler	4.03:1	2.37:1	1.50:1	1.00:1	3.76:1						
6-Cylinder Cherokee, Wagoneer, J-10 Truck						4.03:1	2.37:1	1.50:1	1.00:1	0.76:1	3.76:1

* with 4.09 axle ratio
** with 3.54 axle ratio

ENGINE-VEHICLE MODEL	T-176					T-18A				
	1st	2nd	3rd	4th	REV.	1st	2nd	3rd	4th	REV.
6-Cylinder CJ-5, CJ-7, Scrambler	3.82:1	2.29:1	1.46:1	1.00:1	3.82:1					
6-Cylinder Cherokee, Wagoneer, J-10 Truck	3.82:1	2.29:1	1.46:1	1.00:1	3.82:1					
8-Cylinder Cherokee, Wagoneer, J-10 Truck	3.52:1	2.27:1	1.46:1	1.00:1	3.52:1					
J-20 Truck						6.32:1	3.09:1	1.69:1	1.00:1	7.44:1

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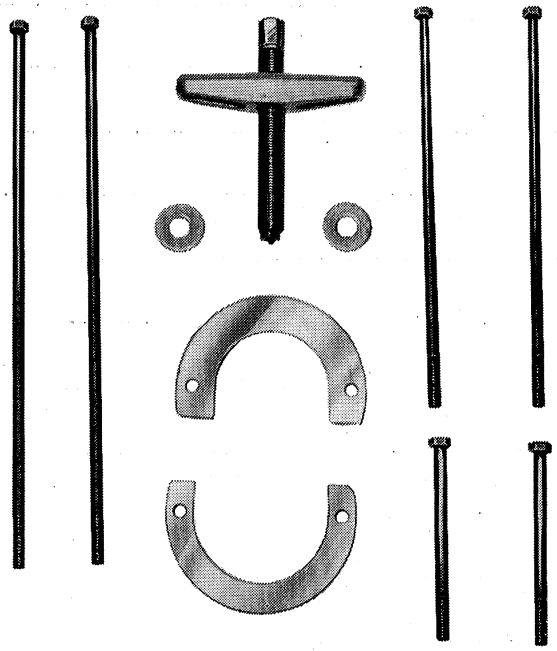
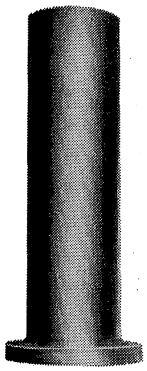
Tools

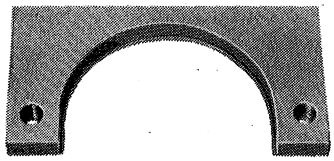


J-25152
BEARING PULLER SET

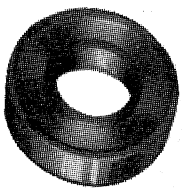
J-29345
BEARING STARTER (T-176)



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

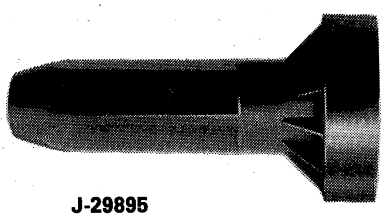


J-29344
FRONT BEARING
PULLER (T-176)

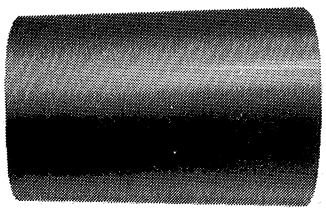


J-25233
FRONT BEARING CAP
SEAL INSTALLER (T-176)

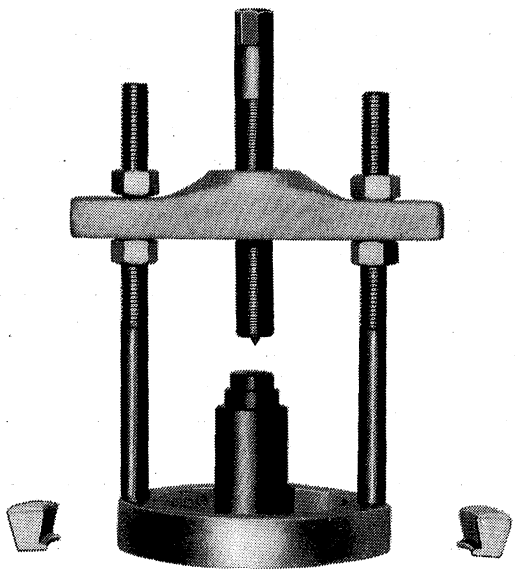
J-29342
COUNTERSHAFT
ARBOR TOOL (T-176)



J-29895
REAR COUNTERSHAFT
BEARING INSTALLER



J-33032
PROTECTOR
SLEEVE



BEARING REMOVER SET
J-29721

PULLER
J-25215

NOTES