# Turbo Dodge Transmission Rebuilding Guide
## 1984-1989
# A525 / A520 / A555

# TRANSAXLE

## CONTENTS



## A-525, A-520, and A-555 MANUAL TRANSAXLES

### INDEX



## GENERAL INFORMATION

**Safety goggles should be worn at all times when working on these transaxles.**

**All manual transaxles, including the A-555, use SAE 5W-30 engine oil, meeting SF and/or SF-CC qualifications, as the lubricant in order to reduce wear.**

The Chrysler Motors designed and built A-525, A-520, and A-555 fully-synchronized, dual shift rail, 5-speed manual transaxles combine gear reduction, ratio selection, and differential functions in one unit housed in a die-cast aluminum case.

The A-520 and A-555 have NEW, DUAL-CONE synchronizers for 1st and 2nd gears that provide greater capacity and reduce 1st and 2nd gear shift effort. All shift forks are cast iron. The 1-2 shift fork pads have a thinner wall. **Do not interchange 1-2 shift fork pads with the 3-4 or 5th shift forks.** All synchronizers use a "winged strut" design that prevents the struts from popping out of position.

**If any synchronizer is to be disassembled, mark all parts so that they will be reassembled in the same position.**

**CAUTION: 1-2 synchronizer assembly components must NOT be interchanged with any other synchronizer assembly, or with previous model years transaxles; they will NOT function correctly.**

The 1-2 shift fork slides with the shift rail and the 3-4 shift fork slides on the shift rail. The 5th speed shift fork has its own shift rail.

### *A-555 Heavy-duty Manual Transaxle for Turbo II*

The greater torque of the Turbo II engine require a stronger transmission. It includes a new die-cast aluminum case and a stronger, coarse-pitch gear set made in Germany by Getrag—transmission supplier to top European manufacturers. The transmission is assembled by New Process Gear. It has five forward speed ratios and reverse. Gear ratios are as follows: 1st—3.00, 2nd—1.89, 3rd—1.28, 4th—0.94, 5th—0.72, Reverse—3.14. Final drive ratio of 3.85 was selected for maximum performance. All forward gears are sychronized, with a new stop-ring actuation system to provide positive and precise shifting.

To reduce wear, this transaxle, in common with other manual transaxles, uses SAE 5W-30 engine oil as the lubricant.

### *A-520 Manual Transaxle*

The A-520 manual transaxle is used in all applications, except L-body and Turbo II. Positive

and precise shifting results from the new stop-ring synchronizer system used on all forward gears.

To reduce wear, the manual transaxle now uses SAE 5W-30 engine oil as the lubricant.

### *A-525 Manual Transaxle (L-Body only)*

This transaxle incorporates many of the improvements found in the A-520 including improved shift quality and sealing techniques. The A-525 uses a similar gear set to the A-520; the difference is that the A-525 uses a carryover die-cast aluminum case. This does not allow the transaxle to incorporates the improved differential.

Use SAE 5W-30 engine oil in this transaxle, also.

## IDENTIFICATION

A-525: the transaxle model, assembly number, build date, and final-drive ratio are stamped on a tag that is attached to the differential cover. A-520 and A-555: the tag is attached to the top of the transaxle.

**Certain transaxle assemblies utilize high-strength steel in various gears** to provide adequate life in heavy-duty applications. **Therefore, it is imperative that the correct transaxle assembly number is utilized when ordering service parts.** Also, be sure to reinstall this tag whenever it is removed, so the information is available for future service.

The last eight digits of the Vehicle Identification Number (V.I.N.) are stamped on a raised boss on top of the clutch housing area.

### *Gearshift Linkage Adjustment (Rod Operated)*

(1) Working over the left front fender, remove the lock pin from the transaxle selector shaft housing (Fig. 1).

(2) Reverse the lock pin (so long end is down) and insert lock pin into same threaded hole while pushing the selector shaft into the selector housing. A hole in the selector shaft will align with the lock pin, allowing the lock pin to be screwed into the housing. This operation locks the selector shaft in the 1-2 neutral position.

(3) Raise vehicle on hoist.

(4) Loosen the clamp bolt that secures the gearshift tube to the gearshift connector.

(5) Check to see that gearshift connector slides and turns freely in gearshift tube.

(6) Position the shifter mechanism connector assembly so that the isolator is contacting the upstanding flange and the rib on the isolator is aligned fore and aft with the hole in the block-out bracket. Hold the connector isolator in this position while tightening the clamp bolt on the gearshift tube to 19 N·m (170 in. lbs.). No significant force should be exerted on the linkage during this operation (Fig. 2).

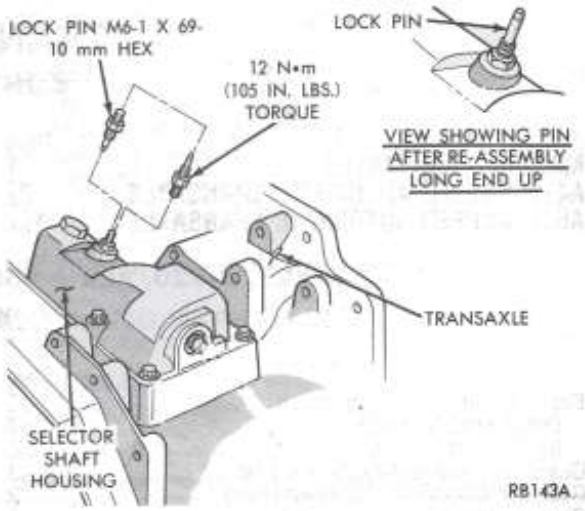


*Fig. 1—Manual Transaxle Pinned in the 1-2 Neutral Position to Adjust Gearshift Linkage*

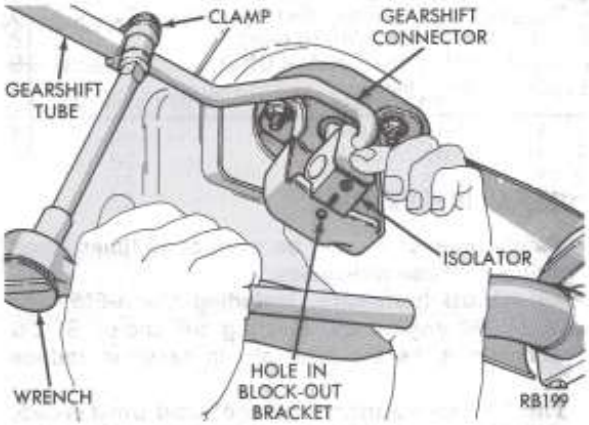


*Fig. 2—Adjusting Gearshift Linkage (L-Body)*

(7) Lower vehicle to floor.

(8) Remove lock pin from selector shaft housing and reinstall lock pin (so long end is up) in selector shaft housing (Fig. 1). Tighten lock pin to 12 N·m (105 in. lbs.).

(9) Check for shift into first and reverse. Check for blockout into reverse.

(10) Gearshift linkage is now properly adjusted.

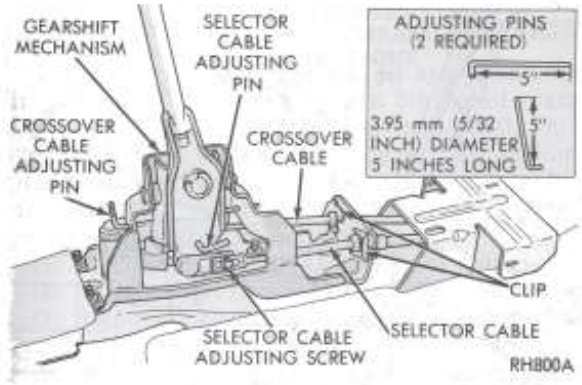


*Fig. 3—Make Cable Adjusting Pins (2) as Shown (H-Body)*

### Gearshift Linkage Adjustment (Cable Operated)

**Before replacing the gearshift selector cable or crossover cable for a "hard-shifting" complaint, disconnect both cables at the transaxle. Then, from the driver's seat, manually operate the gearshift lever through all gear ranges. If the gearshift lever moves smoothly, the cable(s) should NOT be replaced.**

(1) Working over the left front fender, remove the lock pin from the transaxle selector shaft housing (Fig. 1).

(2) Reverse the lock pin (so long end is down) and insert lock pin into same threaded hole while pushing the selector shaft into the selector housing. A hole in the selector shaft will align with the lock pin, allowing the lock pin to be screwed into the housing. This operation locks the selector shaft in the 1-2 neutral position.

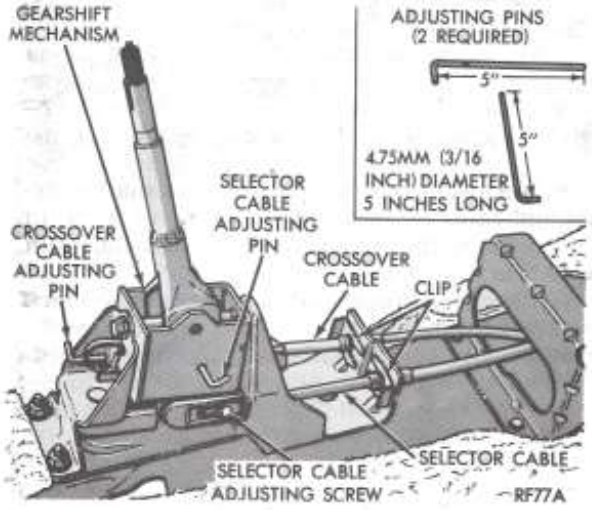


*Fig. 4—Make Cable Adjusting Pins (2) as Shown (K,P-Bodies)*

Remove gearshift knob by unscrewing the knob. **Boot is to be pulled over the pull-up ring.** A soap lubricant will help.

To remove console, see "Group 23" Body.

**Loosen cable adjusting screws before installing adjusting pin(s) or adjusting screw tool.**

**Cable attachment clips must be installed from the side. Install cable fittings to ballstuds using channel-lock pliers.**

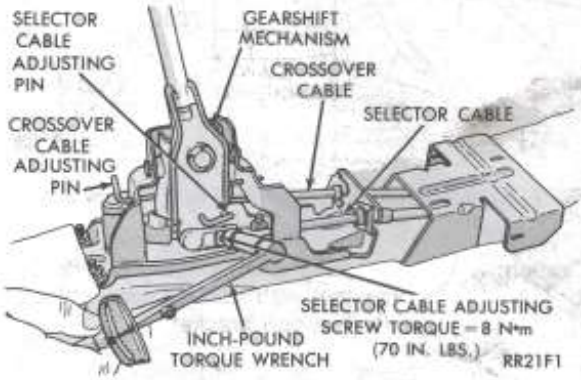


*Fig. 5—Adjusting Selector Cable (H,K,P-Bodies)*

**CAUTION: Proper torque to the selector cable adjusting screw is very important (Fig. 5).**

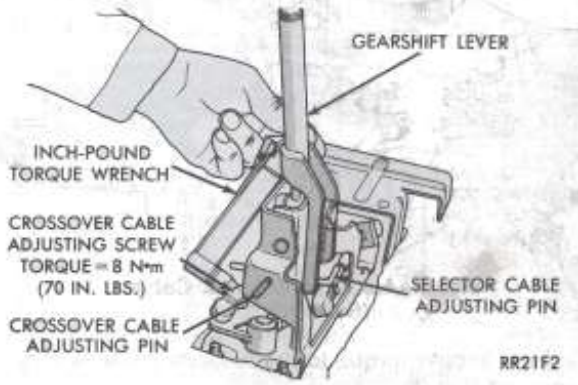


*Fig. 6—Adjusting Crossover Cable (H,K,P-Bodies)*

**CAUTION: Proper torque to the crossover cable adjusting screw is very important (Fig. 6).**

a

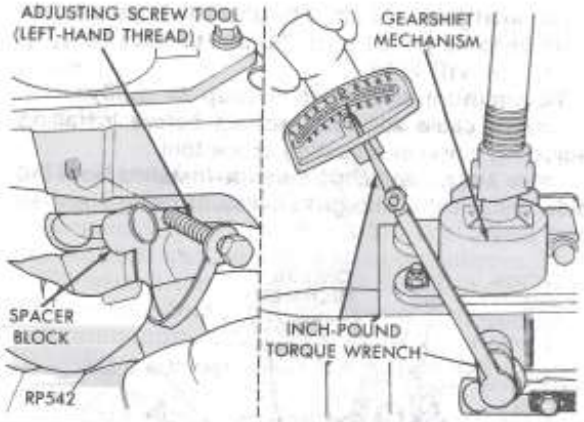


*Fig. 7—Install Adjusting Screw Tool with Spacer Block (G,J-Bodies)*

**Caution: Tighten adjusting screw tool to 2 N·m (20 in. lbs.). Adjusting screw tool, with tethered spacer block, is taped to the shifter support bracket.**

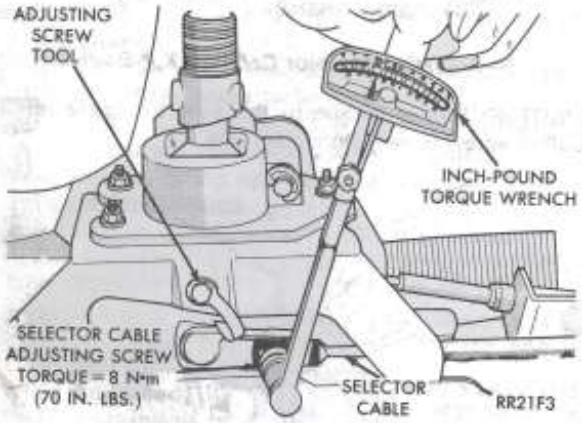


*Fig. 8—Adjusting Selector Cable (G,J-Bodies)*

**Caution: Proper torque to the selector cable is very important (Fig. 8).**

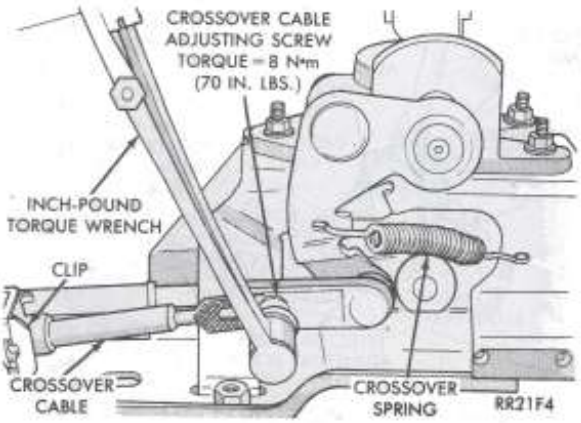


*Fig. 9—Adjusting Crossover Cable (G,J-Bodies)*

**Caution: Proper torque to the crossover cable is very important (Fig. 9).**

Remove adjusting screw tool, with tethered spacer block, and fasten to shifter support bracket, for future service.

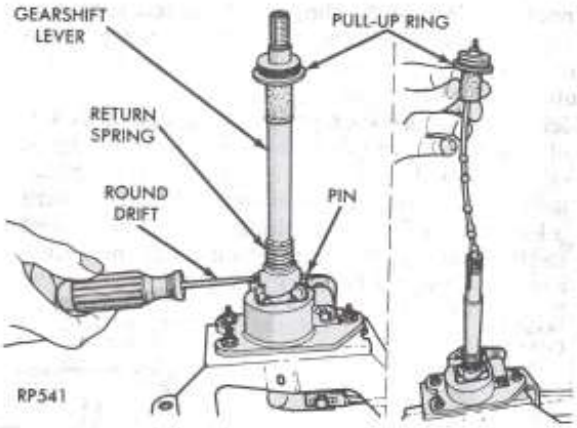


*Fig. 10—Replacing Pull-Up Ring (G,J-Bodies)*

(3) Remove lock pin from selector shaft housing and reinstall lock pin (so long end is up) in selector shaft housing (Fig. 1). Tighten lock pin to 12 N·m (105 in. lbs.).

(4) Check for shift into first and reverse. Check for blockout into reverse.

(5) Gearshift cables are now properly adjusted.

## SERVICE IN VEHICLE

The selector shaft housing, all synchronizers, intermediate shaft speed gears, 5th speed gears, input shaft, reverse idler gear and shaft, shift forks and pads, shift fork rails, and the speedometer pinion can be serviced on the vehicle without removing the transaxle from the vehicle. Observe following procedure:

(1) Disconnect negative cable from battery.

(2) L-body only: Loosen left engine mount.

(3) Remove lock-patch screw attaching the operating lever to the selector shaft. Remove operating lever. **When installing the operating lever, install a NEW lock-patch bolt and torque to 37 N·m (27 ft. lbs.).**

(4) Remove selector shaft housing bolts (note the two pilot bolts) and remove selector shaft housing.

(5) Remove 5th speed shifter guide pin and 1-2 shifter set screw through the shift cover opening. Refer to page 21-12 to remove or install 5th speed shifter guide pin, 1-2 shifter set screw, fill plug, end cover, 5th speed synchronizer, and both 5th speed gears.

(6) Raise vehicle on hoist. Remove left front wheel and tire assembly and left splash shield.

(7) Place drain pan under transaxle and remove transaxle rear end cover.

(8) Remove 5th gears, synchronizer, and fork.

(9) Remove bearing retainer plate.

(10) Remove reverse idler shaft and reverse idler gear as an assembly.

(11) Rotate both 1-2 and 3-4 shift forks to the left (toward front of vehicle). Rotate 5th speed shifter to the right (toward rear of vehicle). Firmly grasp both input shaft and intermediate shaft assemblies. Pull gear set out of transaxle.

**The differential assembly can only be serviced by removing the complete transaxle from the vehicle because bearing preload must be reset.**

The components listed in the first paragraph can now be serviced. Refer to the appropriate "subassembly recondition" section.

(13) To reassemble, reverse the above procedure. Fill transaxle with SAE 5W-30 engine oil to the bottom of the fill hole in end cover.

### *Transaxle Remove and Install*

**Transaxle removal does not require engine removal.** After installing transaxle, fill transaxle to bottom of fill plug hole with SAE 5W-30 engine oil before lowering vehicle to floor.

(1) Disconnect or connect **negative** battery cable.

(2) Install a "lifting eye" on battery ground strap bolt on left side of engine and install the engine support fixture as shown in Figure 1.

(3) Disconnect or connect gearshift operating lever from selector shaft. **When reinstalling the operating lever, install a NEW lock-patch bolt and torque to 37 N·m (27 ft. lbs.).** Disconnect or connect gearshift cables bracket (3 bolts) at transaxle.

(4) Remove or install both front wheel and tire assemblies.

(5) Remove or install left front splash shield.

(6) Remove or install engine left mount from transaxle.

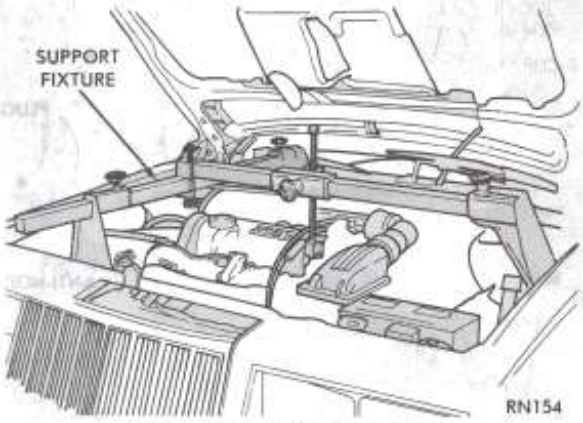


*Fig. 1—Engine Support Fixture*

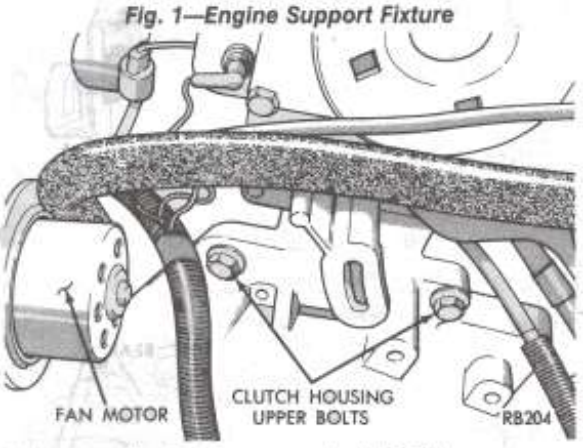


*Fig. 2—Remove or Install Bolts*

(7) Remove or install anti-rotational link (or anti-hop damper) from crossmember bracket. **Do Not Remove Bracket from Transaxle.**

(8) Refer to Group 2 "Suspension", to remove or install both driveshafts.

**When removing or installing the transaxle, it may be helpful to use two locating pins in place of the top two transaxle to engine block bolts.** Make the locating pins from two stock (transaxle case to engine block) bolts as follows: Using a hacksaw, remove bolt heads, cut slot in end of bolts for a screwdriver, and remove burrs with a grinding wheel. Install the locating pins into the engine block and proceed with transaxle installation. After transaxle is in place, install bolts and remove locating pins before removing transmission jack.

## SERVICE OUT OF VEHICLE

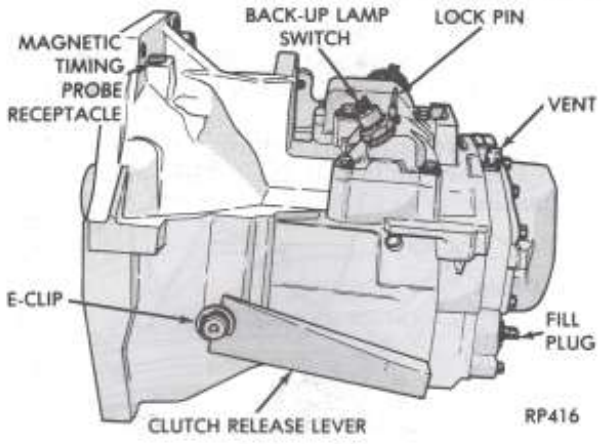


*Fig. 1—Transaxle (Left Side)*

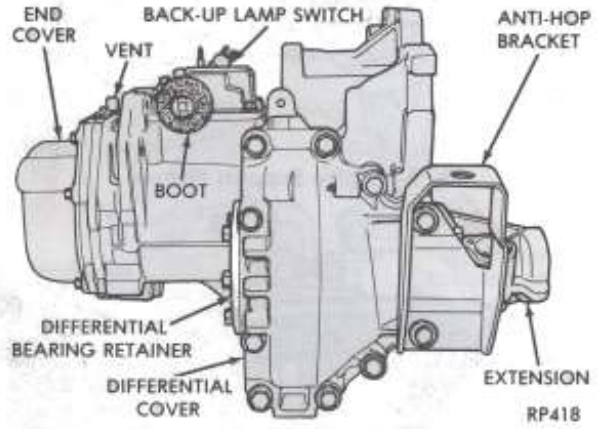


*Fig. 2—A-520 and A-555 Transaxle (Right Side)*

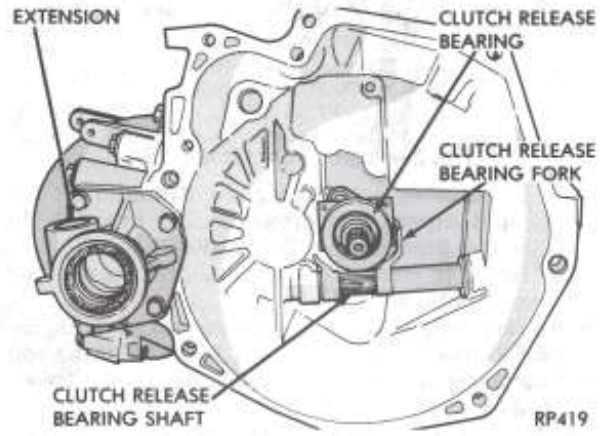


*Fig. 3—Transaxle (Front End View)*

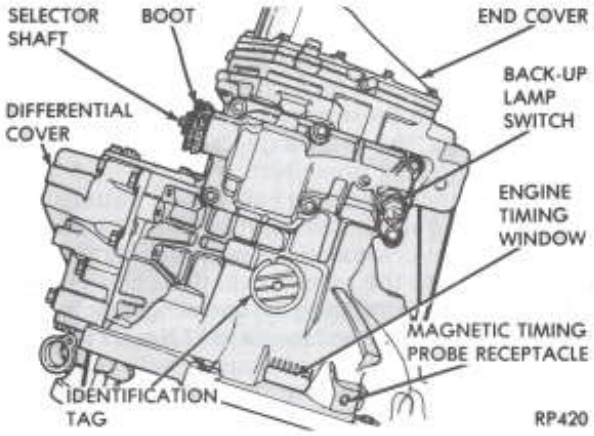


*Fig. 4—Transaxle (Top View)*

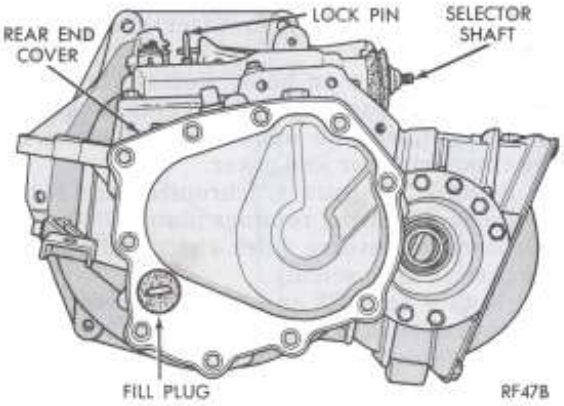


*Fig. 5—Transaxle (Rear End View)*

## TRANSAXLE—Disassemble and Assemble

### A-525 (L-BODY ONLY)

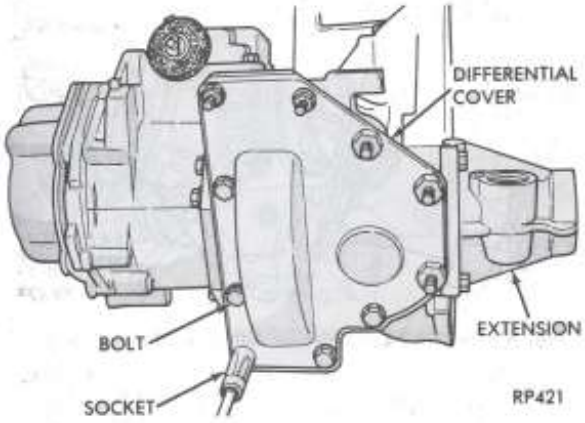


*Fig. 1—Differential Cover Bolts (A-525)*

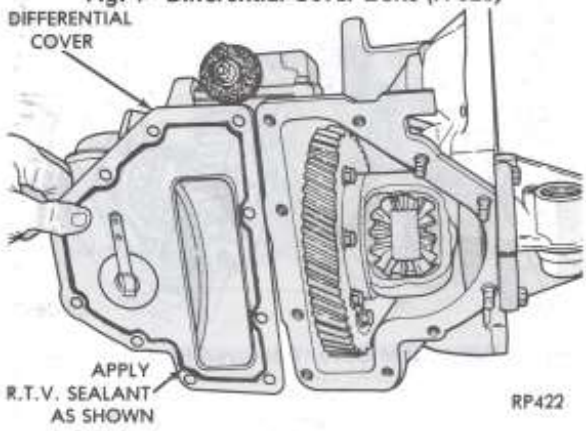


*Fig. 2—Remove or Install Differential Cover (A-525)*

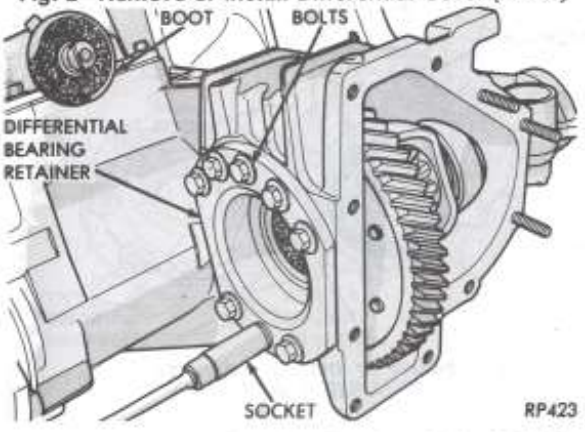


*Fig. 3—Differential Bearing Retainer Bolts (A-525)*

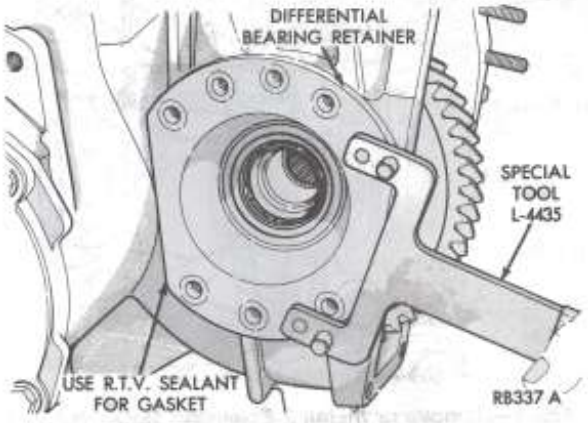


*Fig. 4—Rotate Differential Bearing Retainer to Remove or Install (A-525)*

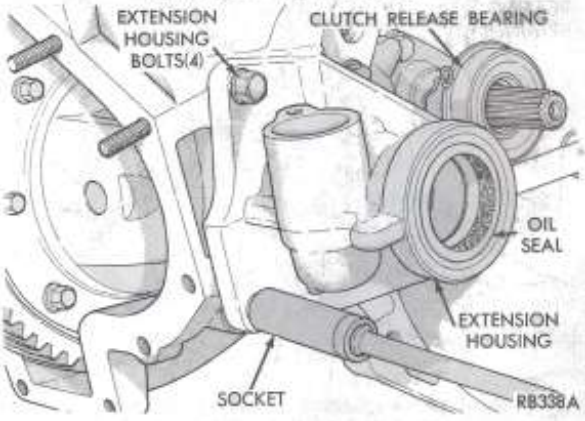


*Fig. 5—Remove or Install Extension Housing Bolts (A-525)*

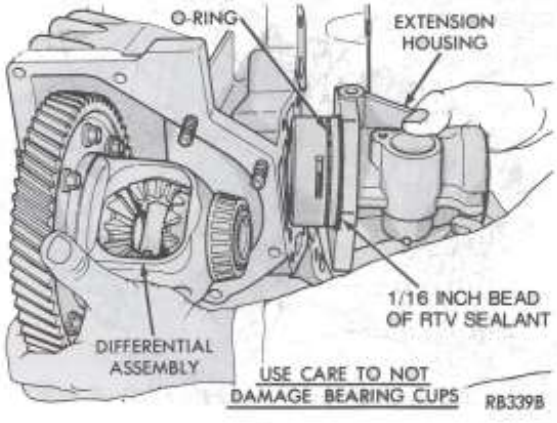


*Fig. 6—Remove or Install Differential and Extension Housing (A-525)*

## A-520 and A-555

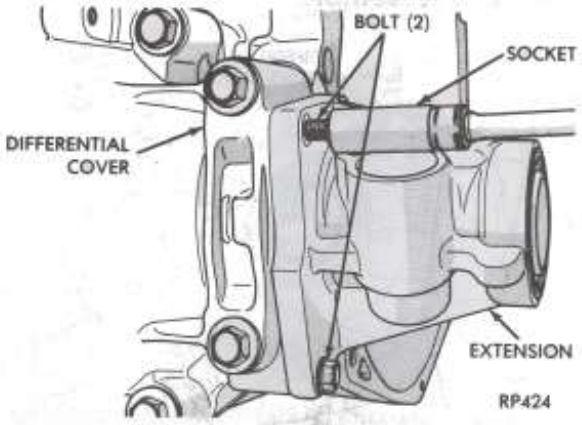


*Fig. 1—Remove or Install 2 Extension Outer Bolts (A-520/A-555)*

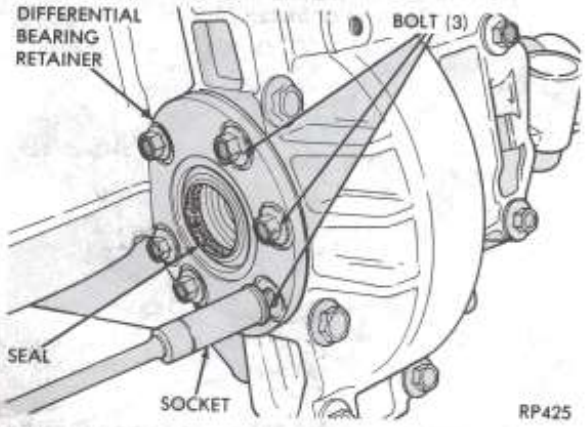


*Fig. 2—Remove or Install 3 Differential Bearing Retainer Outer Bolts (A-520/A-555)*

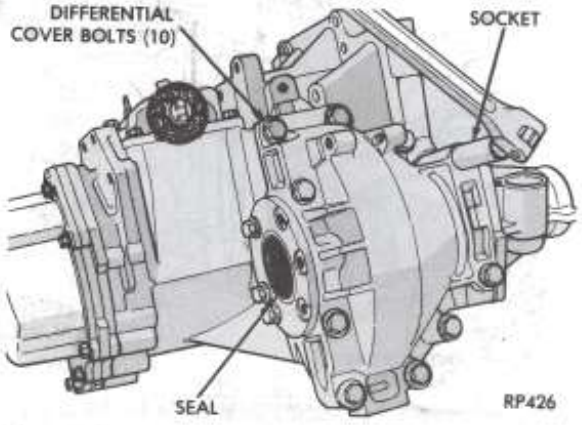


*Fig. 3—Remove or Install Differential Cover Bolts (A-520/A-555)*

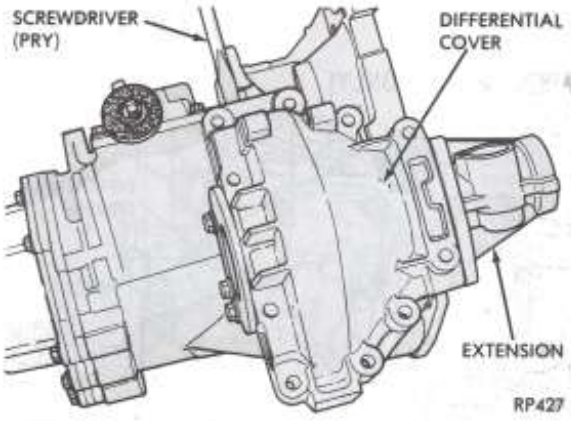


*Fig. 4—Remove Differential Cover (A-520/A-555)*

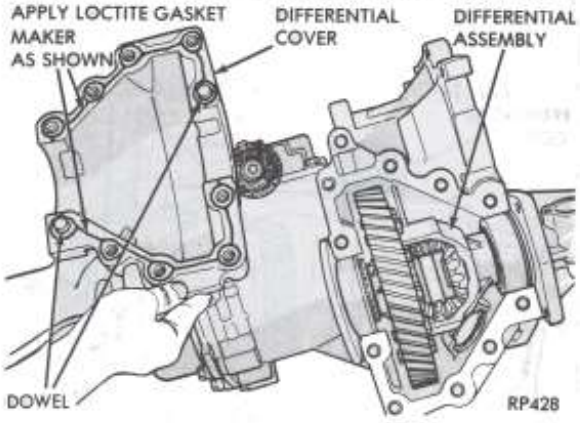


*Fig. 5—Differential Cover Removed (A-520/A-555)*

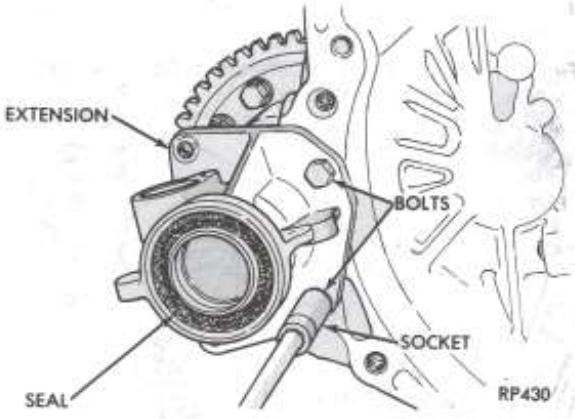


*Fig. 6—Remove or Install 2 Extension Bolts (A-520/A-555)*

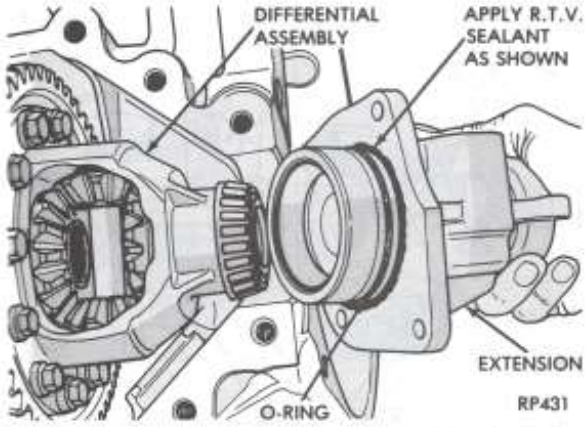


Fig. 7—Remove or Install Extension (A-520/A-555)

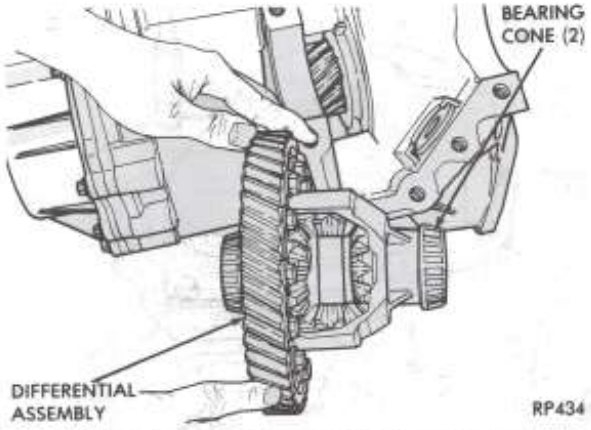


Fig. 10—Differential Assembly—Removed

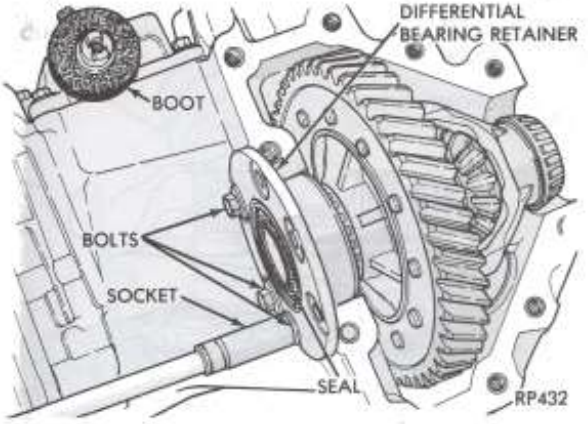


Fig. 8—Remove or Install 3 Differential Bearing Retainer Bolts (A-520/A-555)

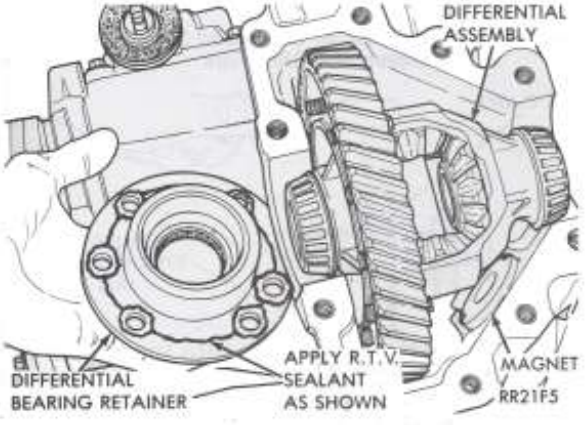


Fig. 9—Remove or Install Differential Bearing Retainer (A-520/A-555)

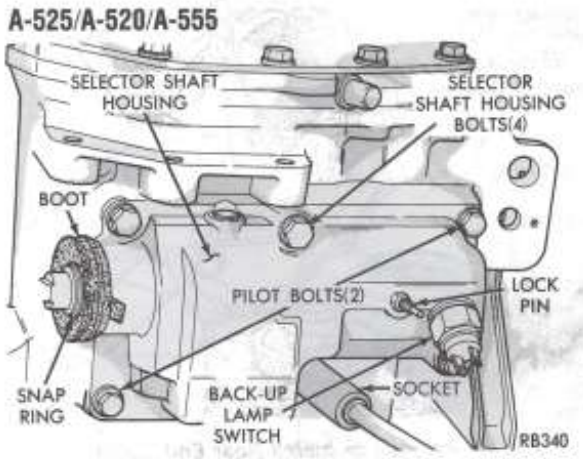


Fig. 1—Remove or Install Selector Shaft Housing

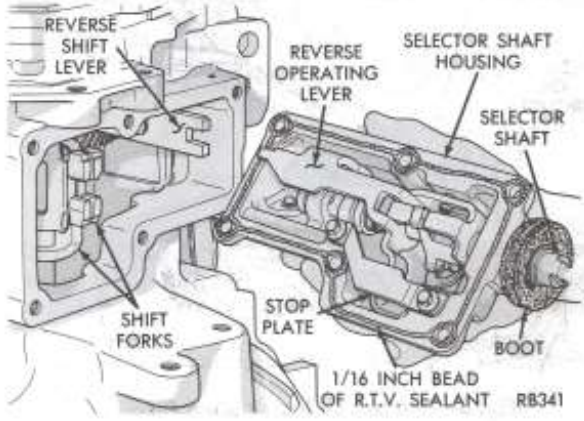


Fig. 2—Selector Shaft Housing Assembly

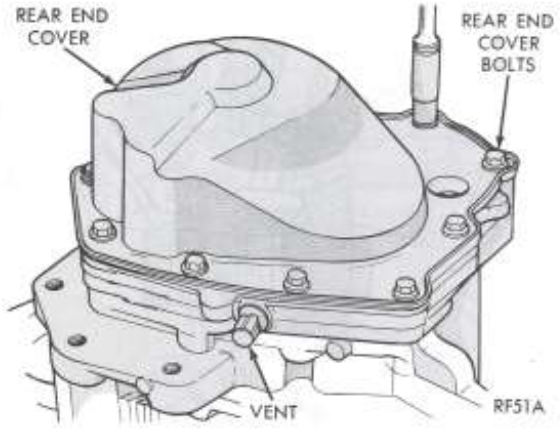


*Fig. 3—Rear End Cover Bolts*

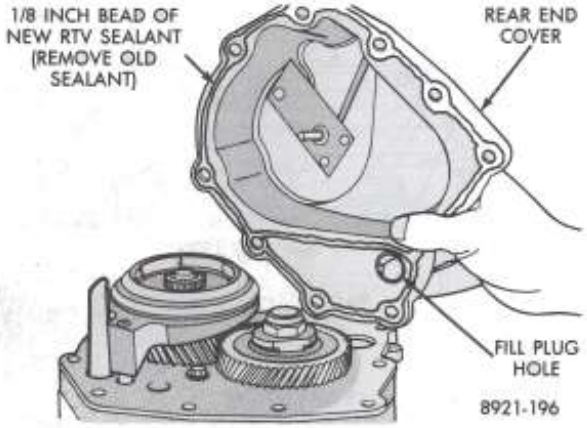


*Fig. 4—Remove or Install Rear End Cover*

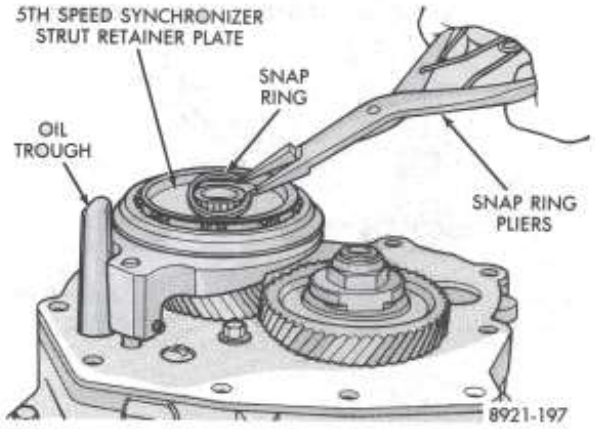


*Fig. 5—Remove or Install Snap Ring*

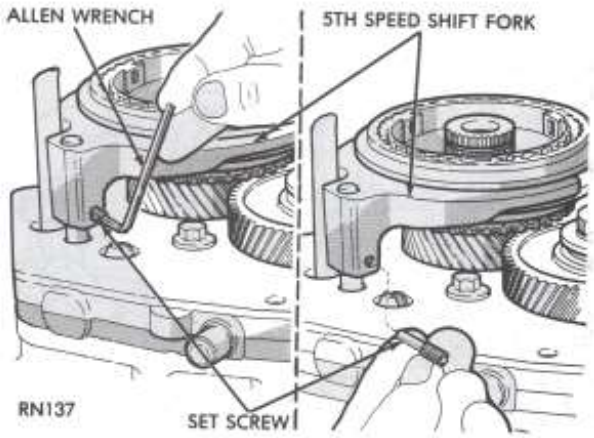


*Fig. 6—Remove or Install 5th Fork Set Screw*

**CAUTION: Mark the synchronizer sleeve and hub for reassembly.**

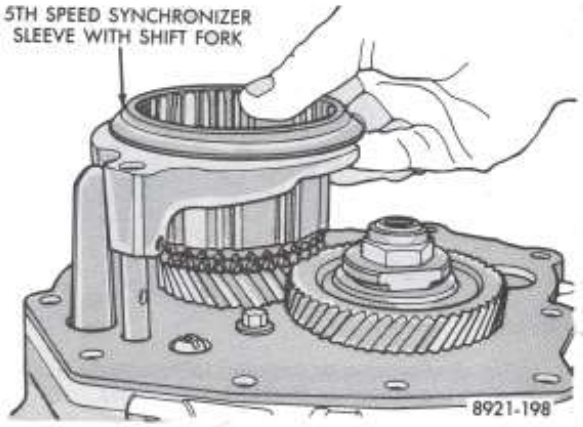


*Fig. 7—Remove or Install 5th Speed Synchronizer Sleeve and Shift Fork*

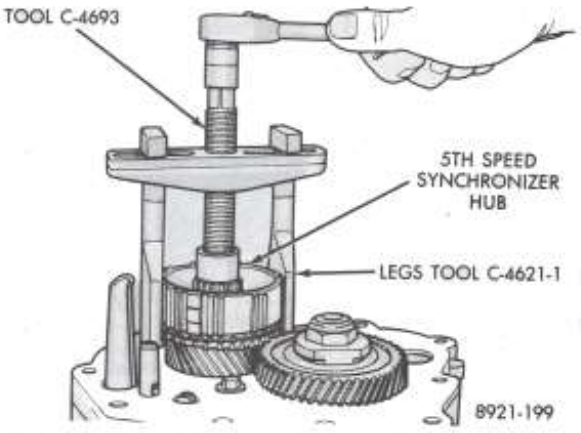


*Fig. 8—Remove 5th Speed Gear and Synchronizer with Struts*

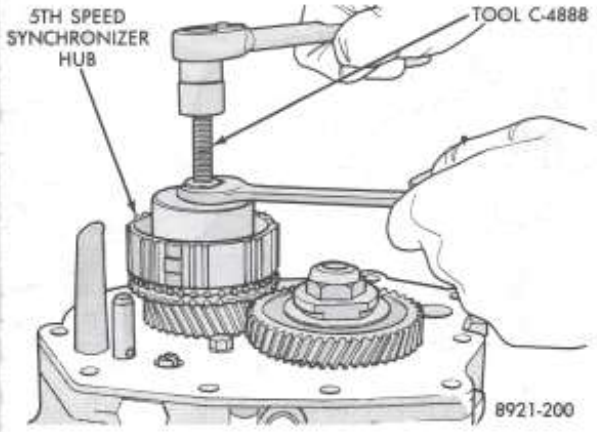


*Fig. 9—Install 5th Speed Synchronizer with Struts*

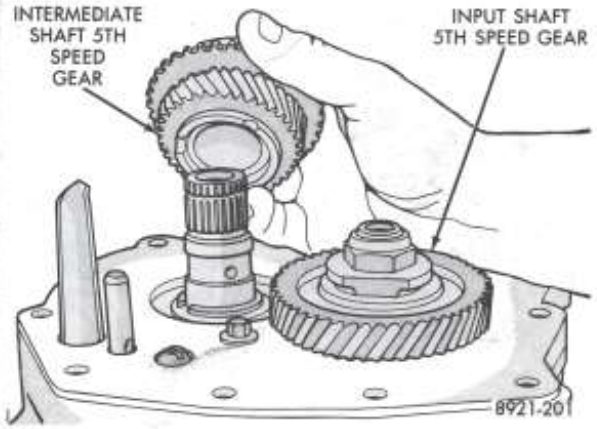


*Fig. 10—Intermediate Shaft 5th Speed Gear*

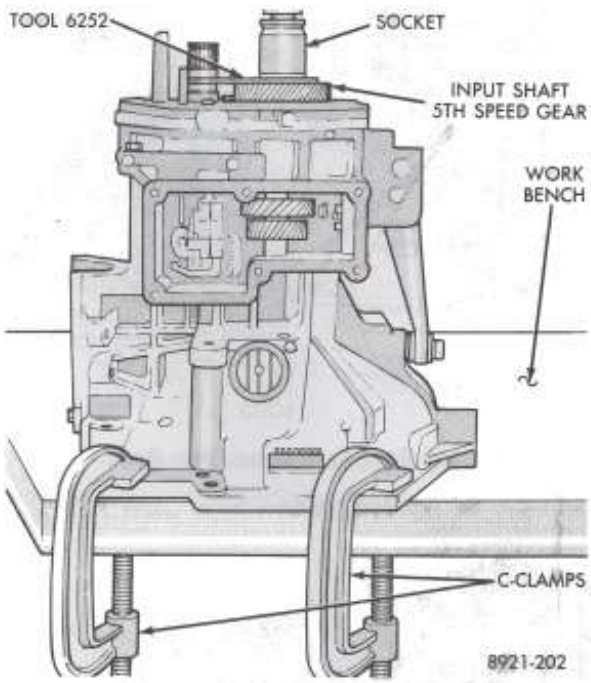


*Fig. 11—Holding Transaxle to Remove or Install Nut*

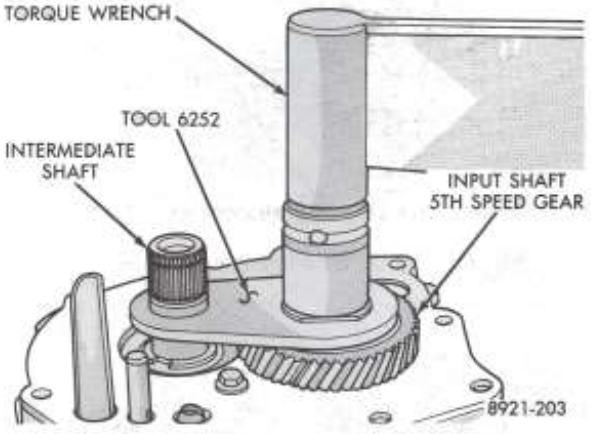


*Fig. 12—Remove or Install Input Shaft 5th Speed Gear Nut*

**CAUTION: Tool 6252 must be used to remove or install this nut. Always install a NEW nut and torque to 258 N·m (190 ft. lbs.).**

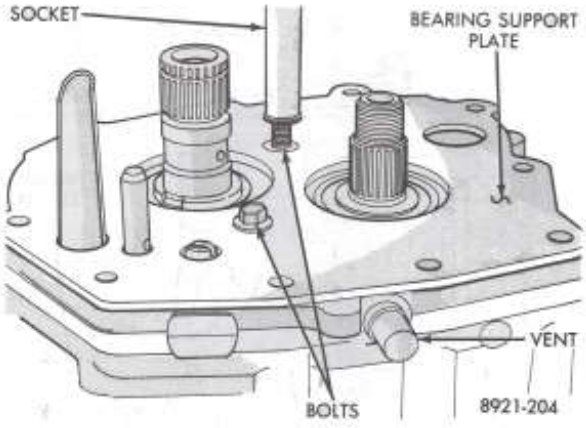


*Fig. 13—Bearing Support Plate Bolts*

**CAUTION: Do not damage bearing support plate.**

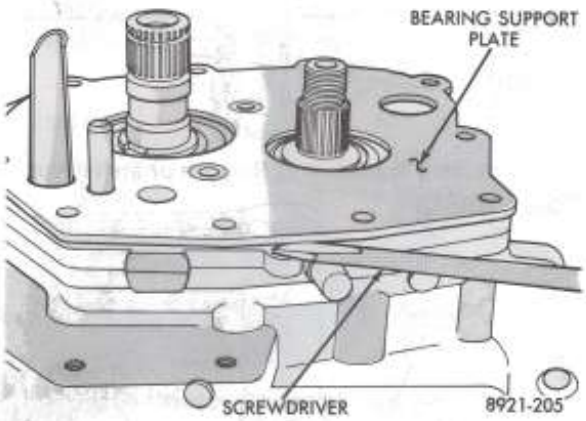


*Fig. 14—Pry Off Bearing Support Plate*

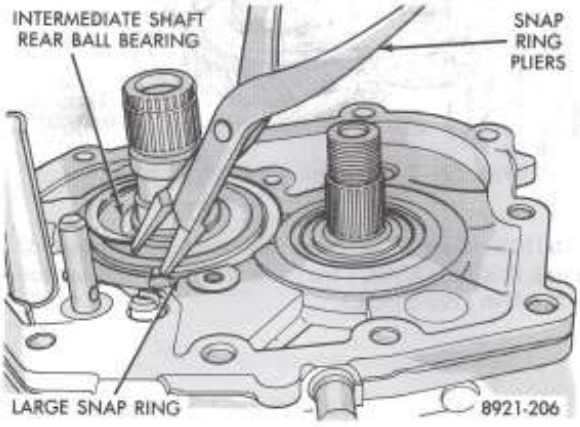


*Fig. 15—Remove or Install Snap Ring*

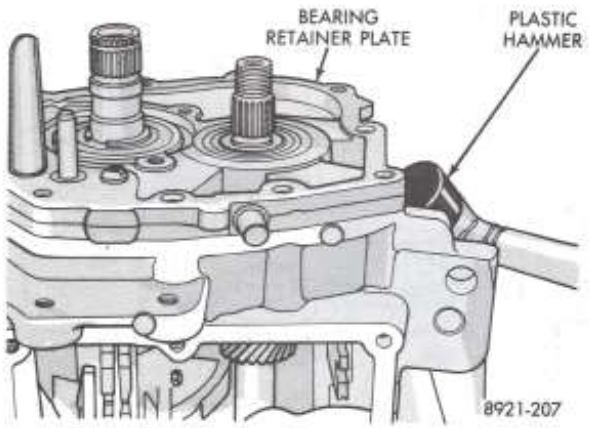


*Fig. 16—Tap Bearing Retainer Plate to Remove*

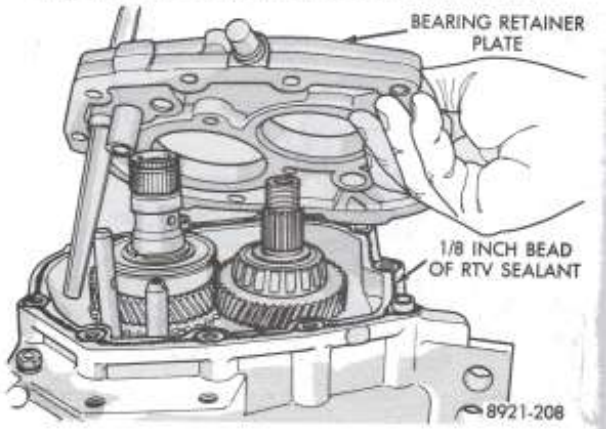


*Fig. 17—Bearing Retainer Plate—Removed*

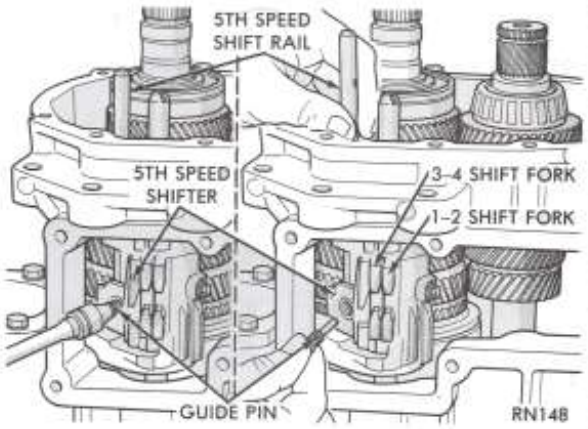


*Fig. 18—5th Speed Shifter Guide Pin*

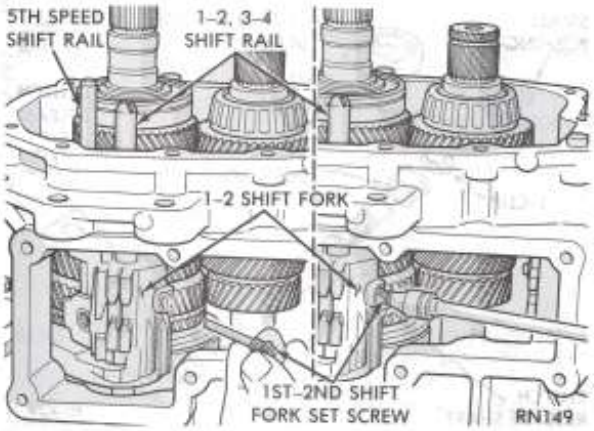


*Fig. 19—1st-2nd Shift Fork Set Screw*

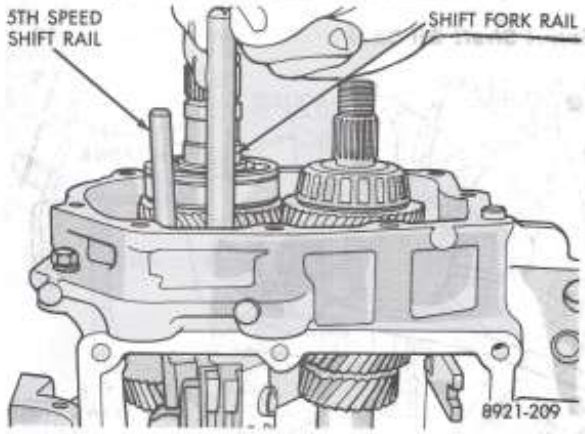


*Fig. 20—Remove or Install Shift Fork Rail*

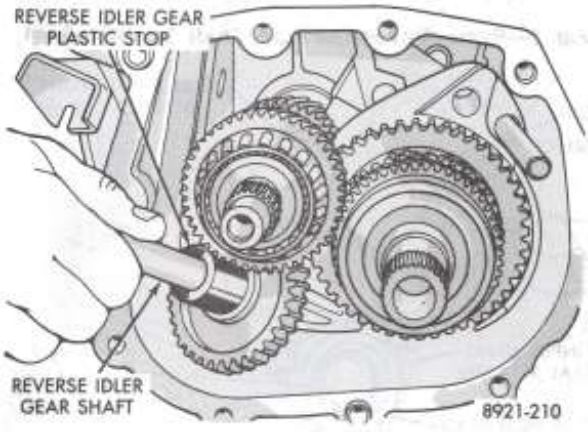


*Fig. 21—Remove or Install Reverse Idler Gear Shaft and Gear*

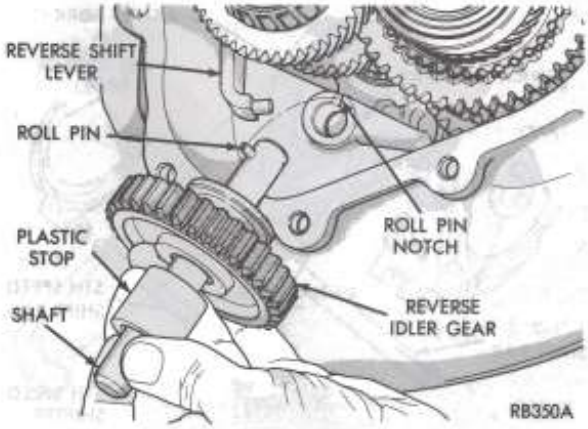


*Fig. 22—Reverse Idler Gear, Shaft, and Plastic Stop*

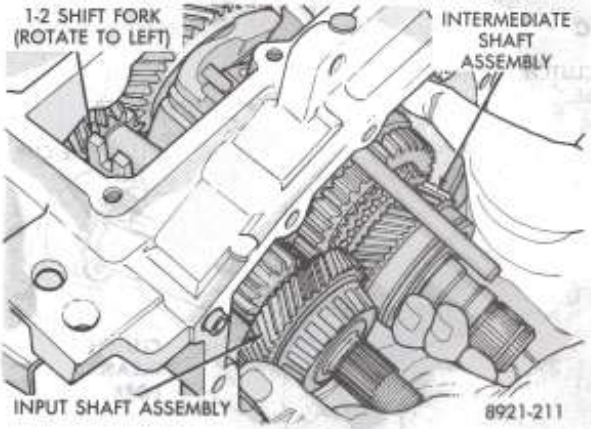


*Fig. 23—Remove or Install Gear Set*

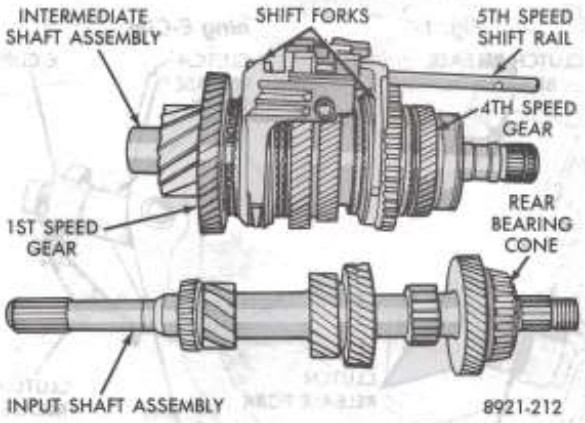


*Fig. 24—Gear Set—Removed*

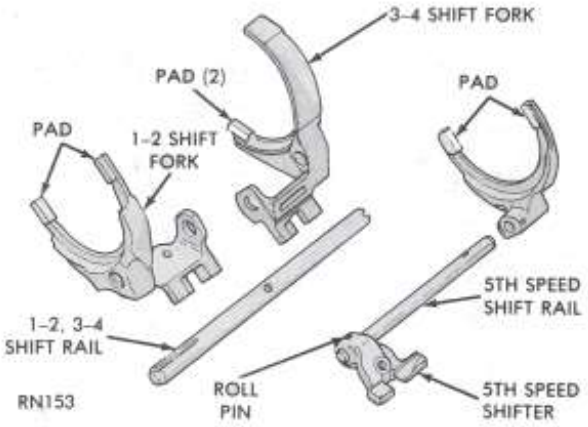


*Fig. 25—Shift Forks and Rails (A-525)*

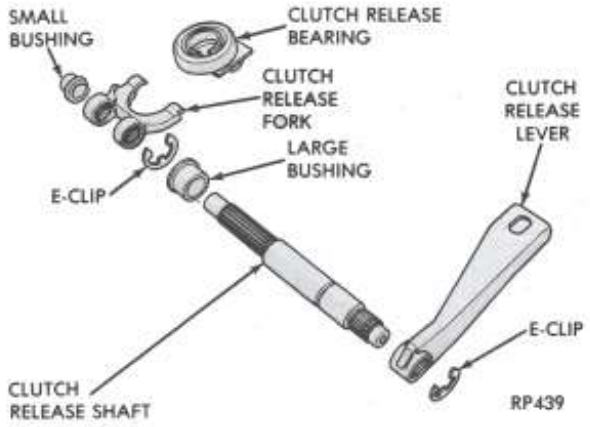


*Fig. 3—Clutch Release Shaft Components*

### Clutch Release Bearing

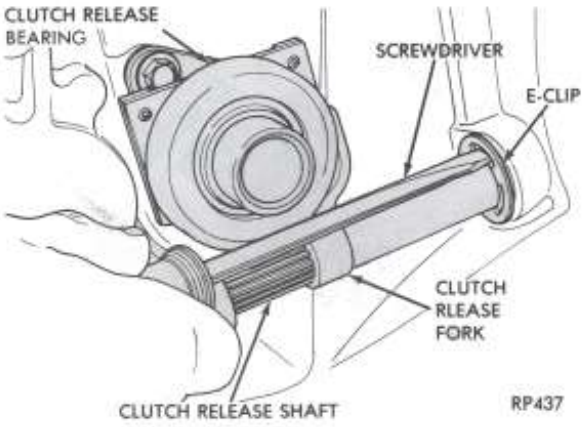


*Fig. 1—Remove Retaining E-Clip*

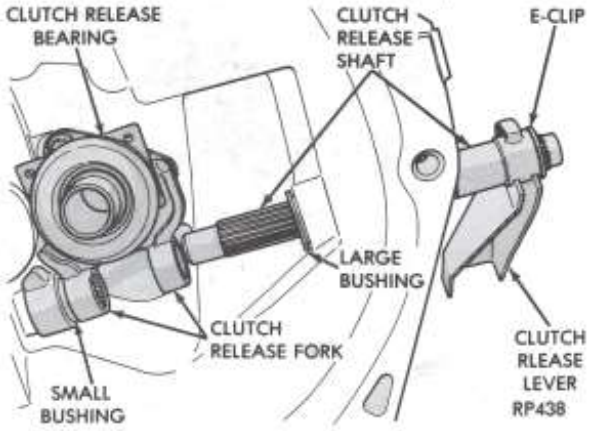


*Fig. 2—Remove or Install Clutch Release Shaft*

### Input Shaft Oil Seal

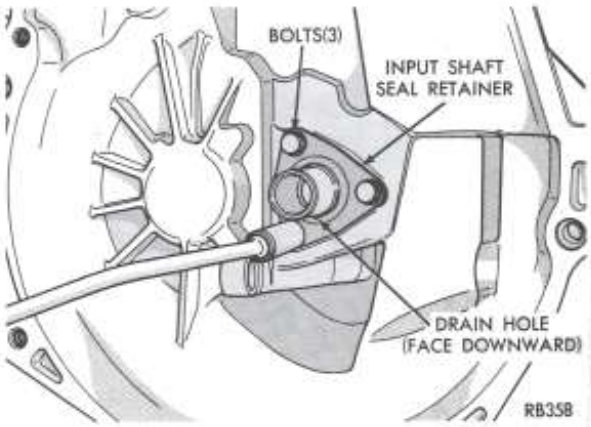


*Fig. 1—Remove or Install Input Shaft Seal Retainer*

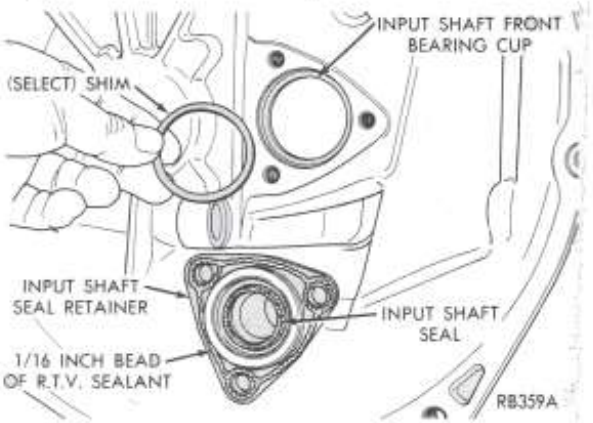


*Fig. 2—Input Shaft Seal Retainer*

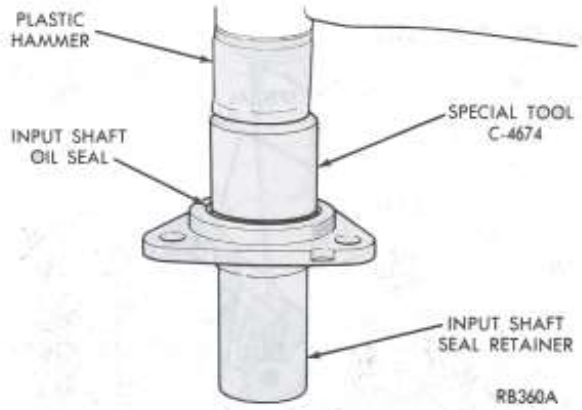


*Fig. 3—Install New Input Shaft Seal*

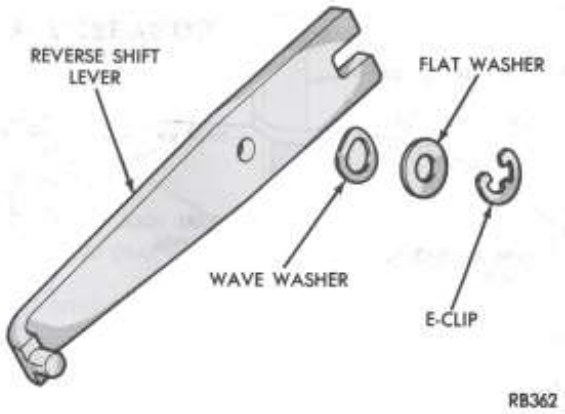


*Fig. 2—Reverse Shift Lever—Components*

### Reverse Shift Lever

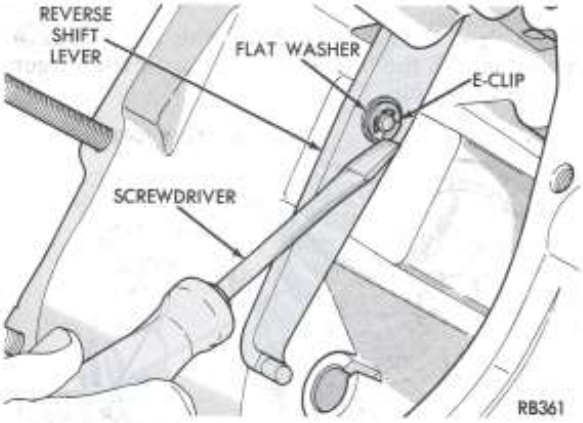


*Fig. 1—Remove or Install Reverse Shift Lever E-Clip*

## SUBASSEMBLY—RECONDITION

**Transaxle Case**

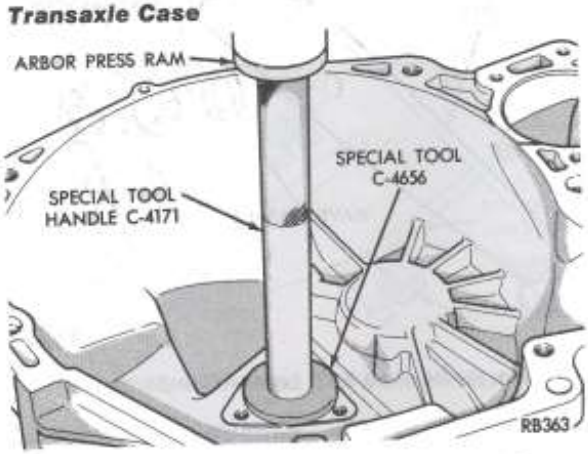


*Fig. 1—Remove Input Shaft Front Bearing Cup*

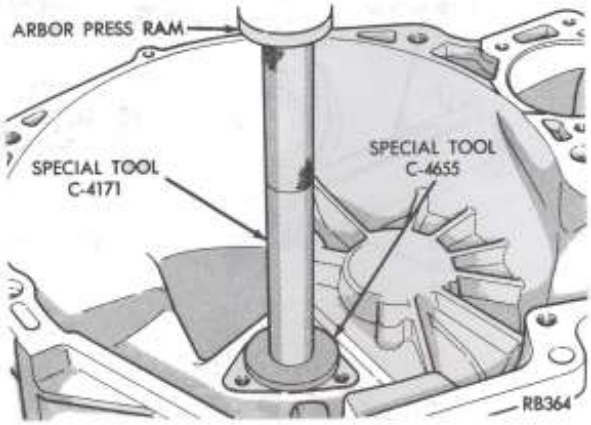


*Fig. 2—Install Input Shaft Front Bearing Cup*

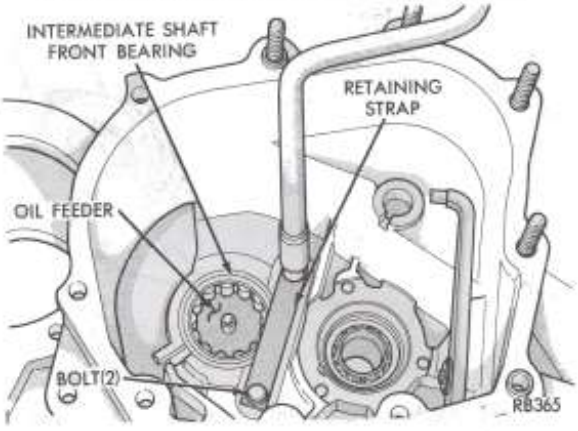


*Fig. 3—Remove or Install Bearing Retaining Strap*

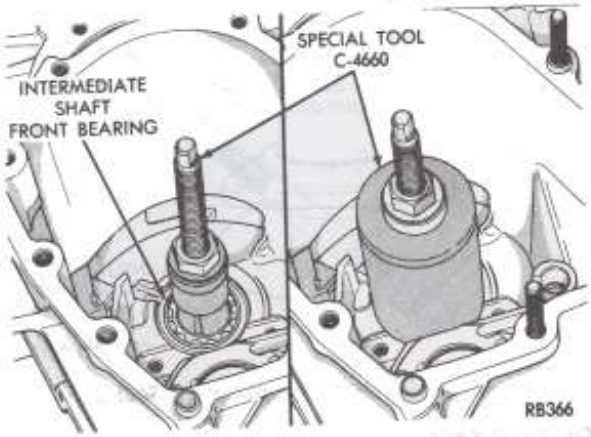


*Fig. 4—Remove Intermediate Shaft Front Bearing*

Use Tool C-4660-2A Screw. The screw has a larger hole in the lower end to fit over the larger oil feeder nipple (Fig. 6).

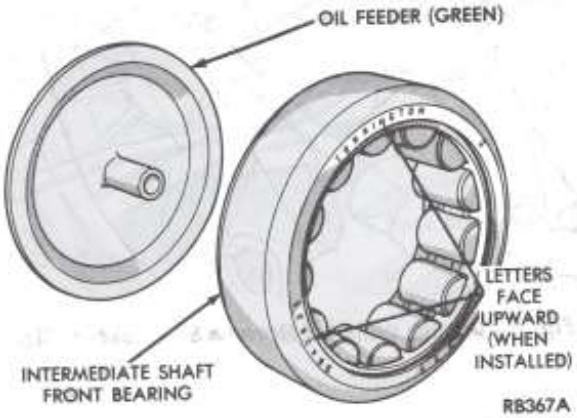


*Fig. 5—Bearing and Oil Feeder (A-525)*

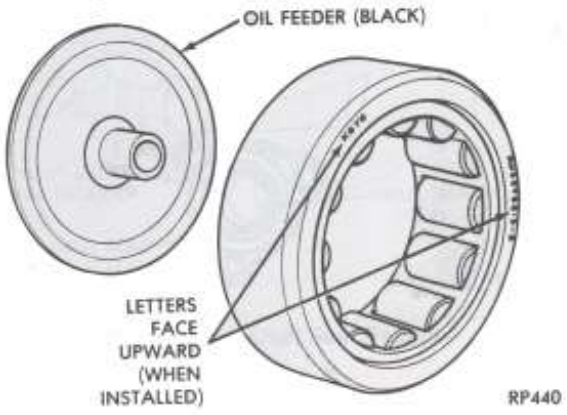


*Fig. 6—Bearing and Oil Feeder (A-520/A-555)*

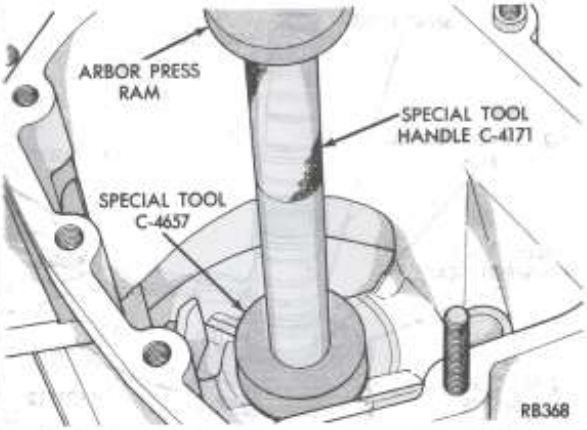


*Fig. 7—Install Intermediate Shaft Front Bearing*

### Intermediate Shaft Assembly

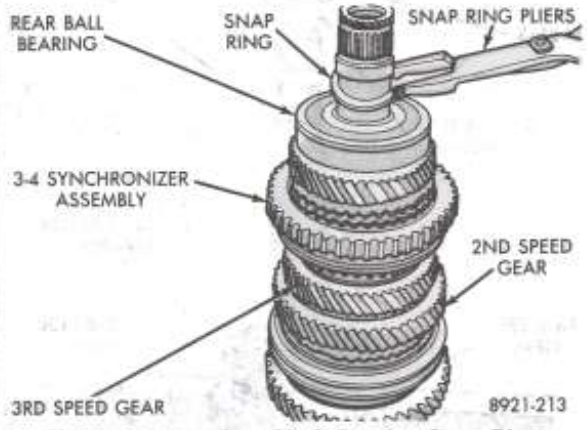


*Fig. 1—Intermediate Shaft Bearing Snap Ring*

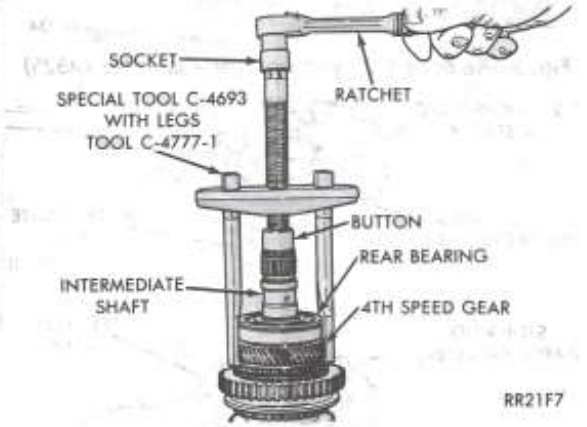


*Fig. 2—Remove Intermediate Shaft Rear Bearing*

**Intermediate shaft ball bearing seal color:**
**A-525 Black, A-520 Black, A-555 Blue.**

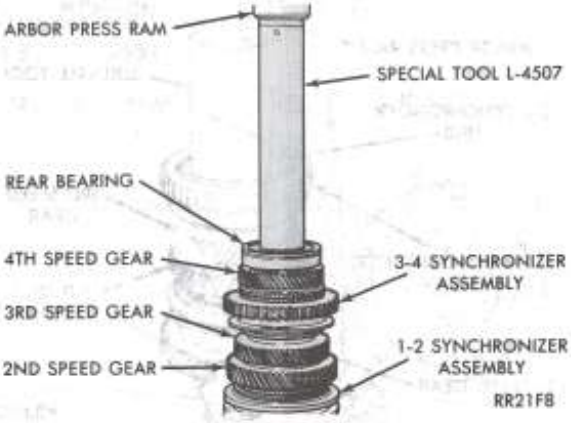


*Fig. 3—Install Intermediate Shaft Rear Bearing*

**When assembling intermediate shaft, make sure all speed gears turn freely.**

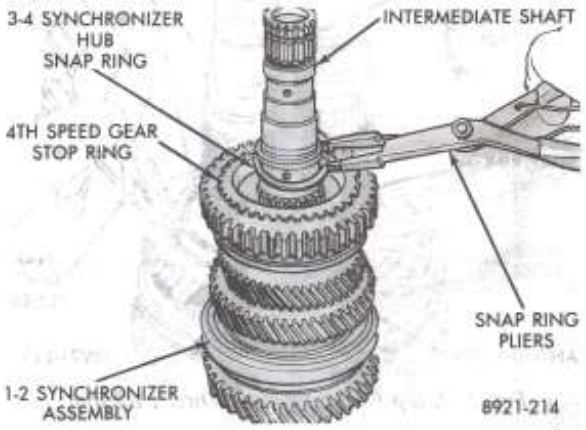


*Fig. 4—3-4 Synchronizer Hub Snap Ring*

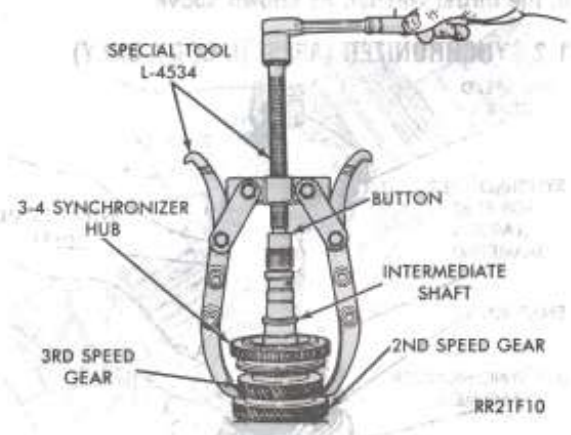


*Fig. 5—Remove 3-4 Synchronizer Hub and 3rd Speed Gear*

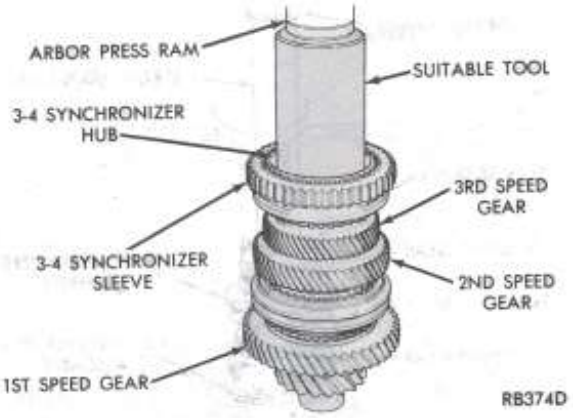


*Fig. 6—Install 3-4 Synchronizer Hub and 3rd Speed Gear*

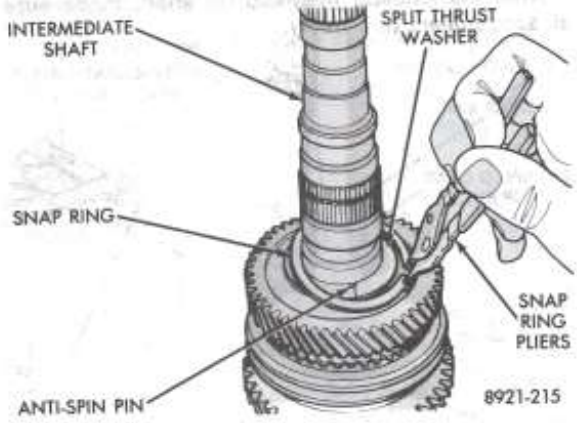


*Fig. 7—Snap Ring and Split Thrust Washer*

**CAUTION: Index snap ring 90 degrees to the split in the thrust washer, as shown above.**

## 1-2 SYNCHRONIZER (A525) (L-BODY ONLY)

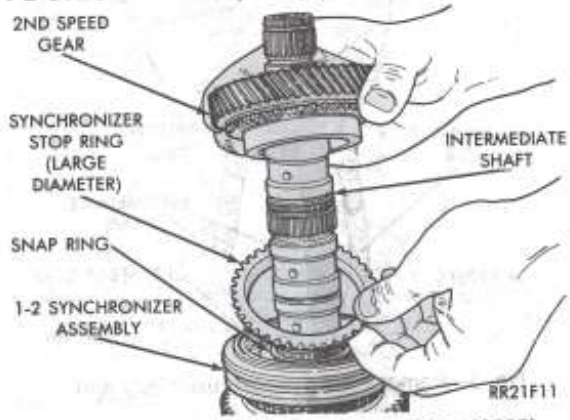


*Fig. 1—2nd Speed Gear and Stop Ring (A525)*

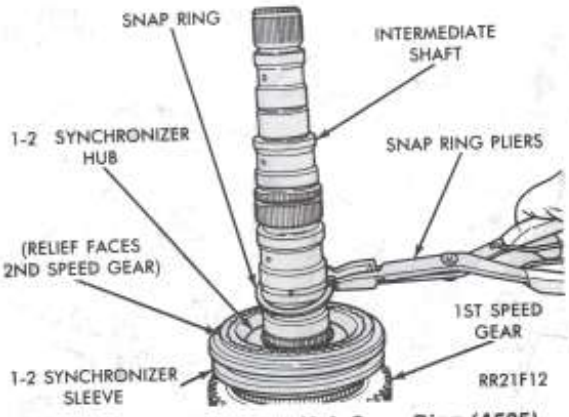


*Fig. 2—1-2 Synchronizer Hub Snap Ring (A525)*

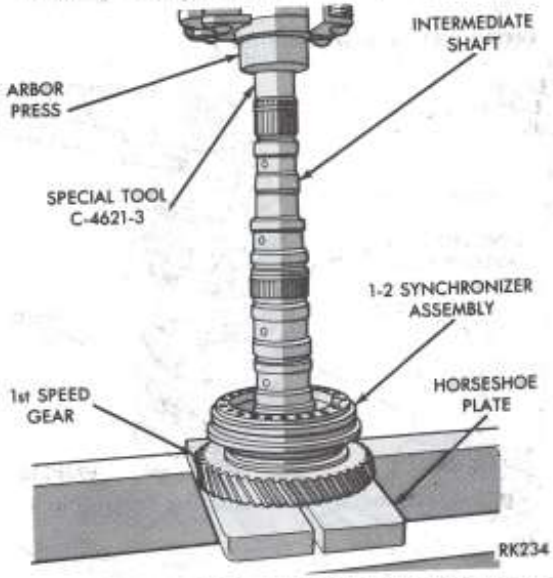


*Fig. 3—Remove 1-2 Synchronizer Assembly (A525)*

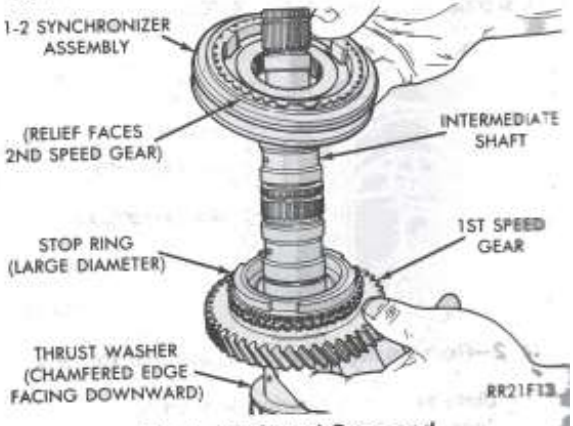


*Fig. 4—1st Speed Gear, and 1-2 Synchronizer Assembly (A525)*

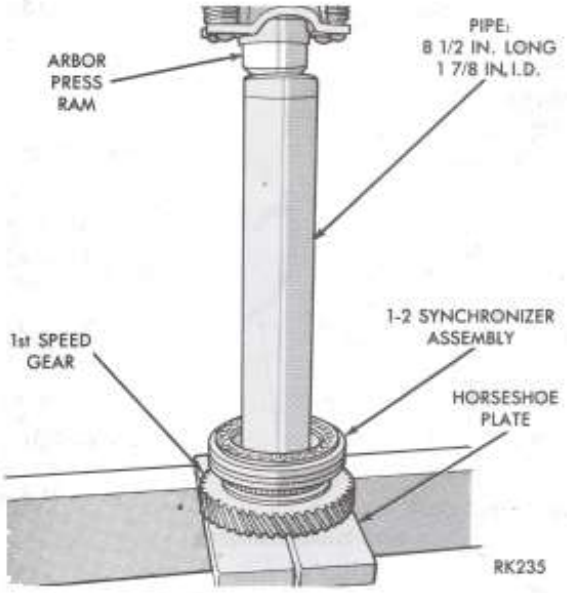


*Fig. 5—Install 1-2 Synchronizer Assembly (A525)*

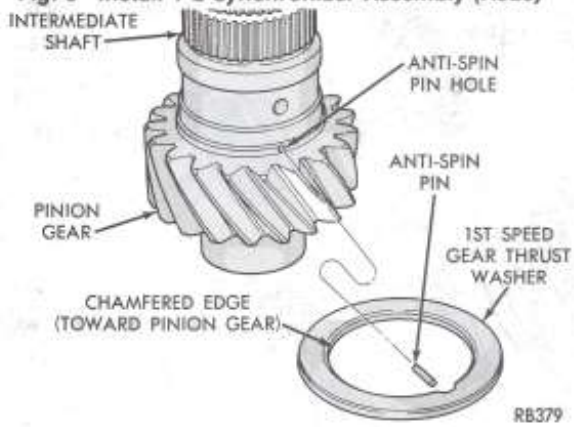


*Fig. 6—1st Speed Gear Thrust Washer*

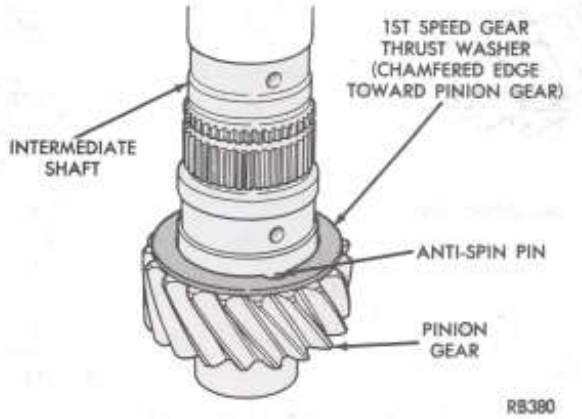


*Fig. 7—Thrust Washer—Installed*

## 1-2 SYNCHRONIZER (DUAL-CONE)

***(A-520, A-555)***

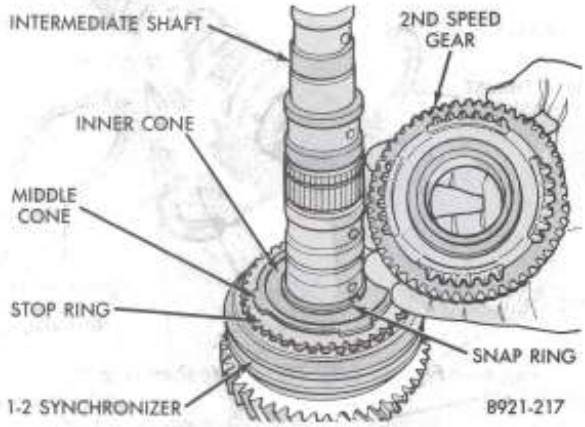


*Fig. 1—2nd Speed Gear*

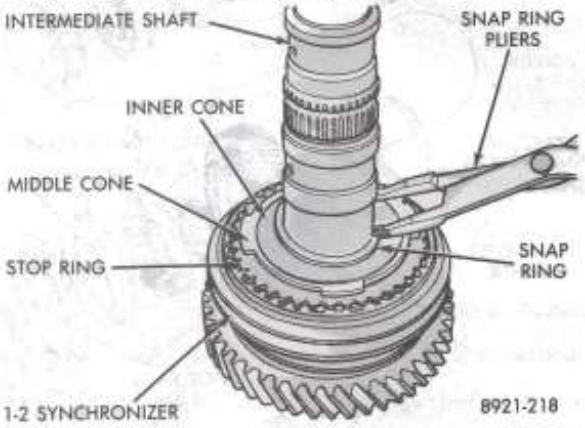


*Fig. 2—1-2 Synchronizer Hub Snap Ring*

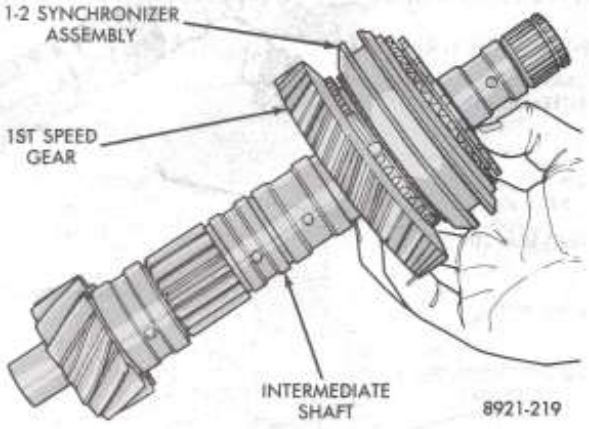


*Fig. 3—1st Speed Gear and 1-2 Synchronizer Assembly*

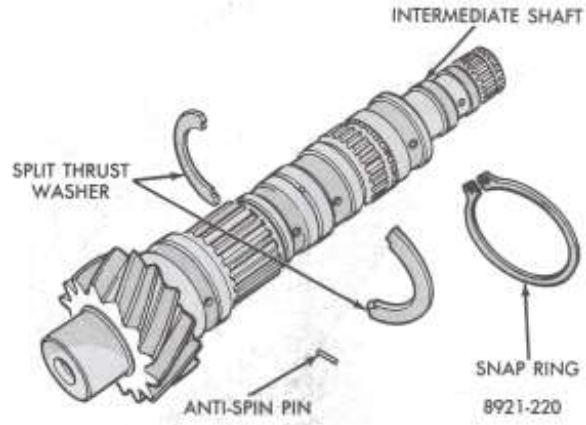


*Fig. 4—Split Thrust Washer*

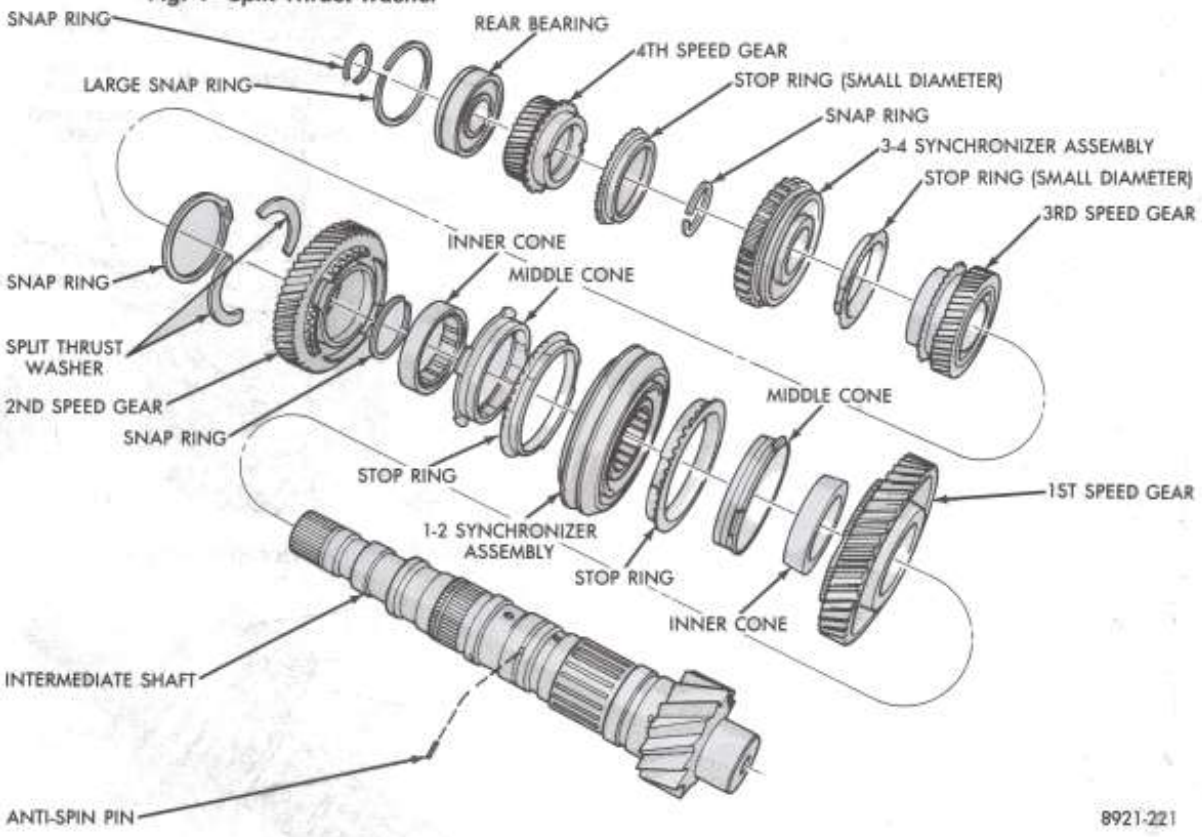


*Fig. 5—Intermediate Shaft Assembly*

## SYNCHRONIZERS (A-525, A-520, A-555)

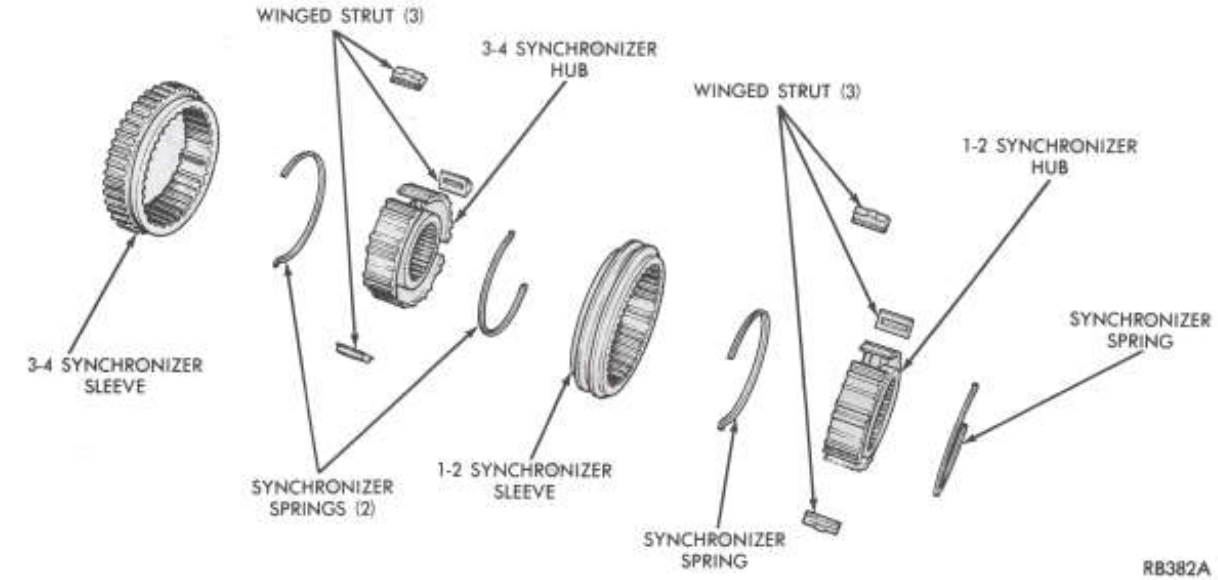


*Fig. 1—1-2 and 3-4 Synchronizer Sleeves and Hubs*

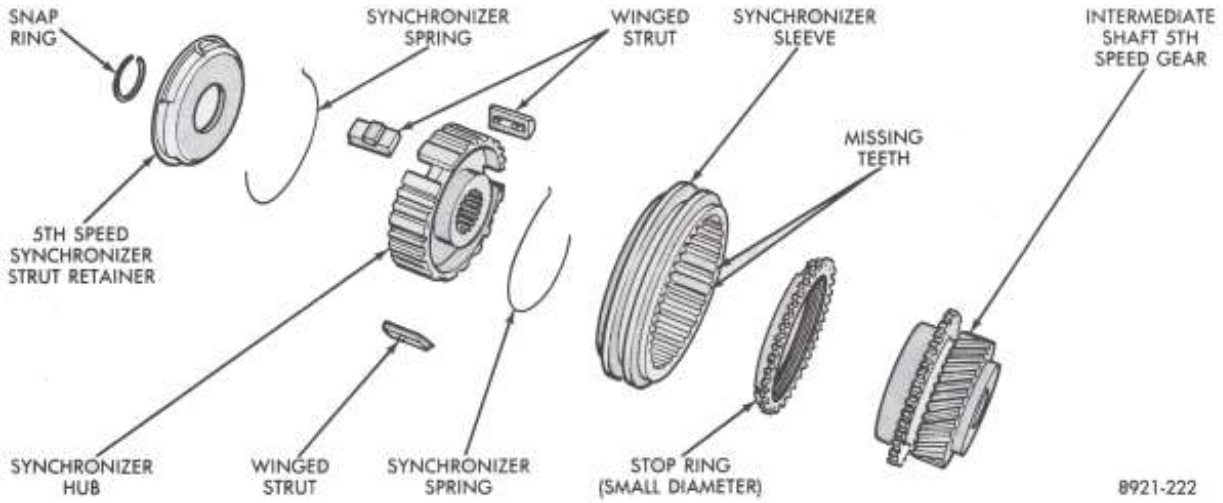


*Fig. 2—5th Speed Synchronizer*

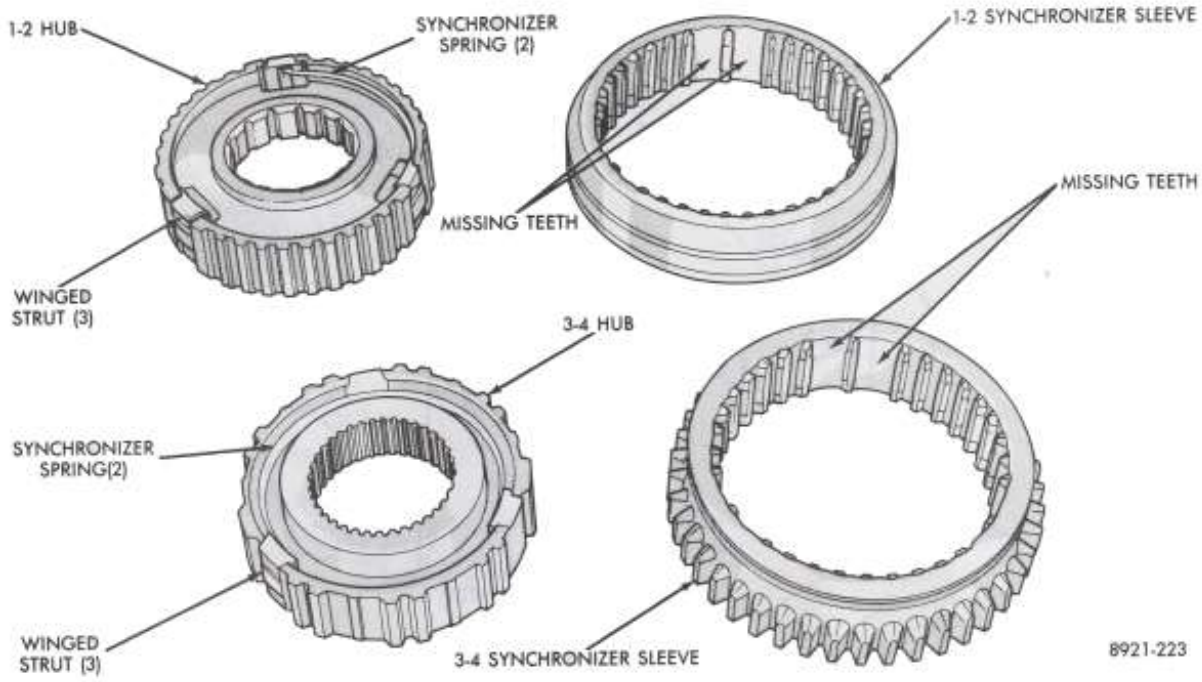


*Fig. 3—Synchronizer Identification*

**CAUTION: 1-2 synchronizer assembly components must NOT be interchanged with any other synchronizer assembly, or with previous model years transaxles; they will NOT function correctly.**

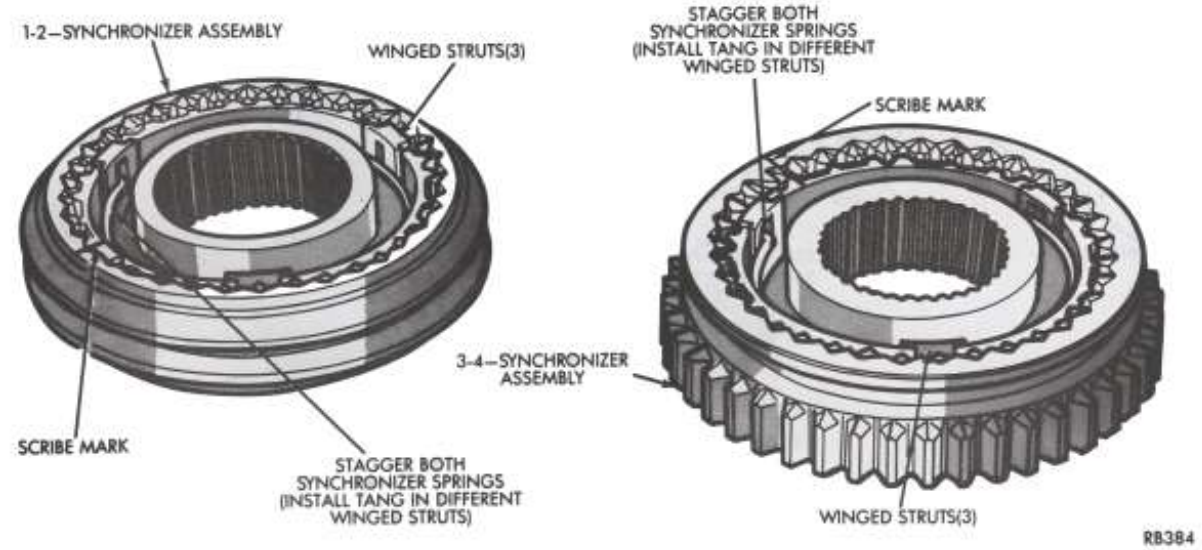


*Fig. 4—Synchronizers*

### Selector Shaft Housing

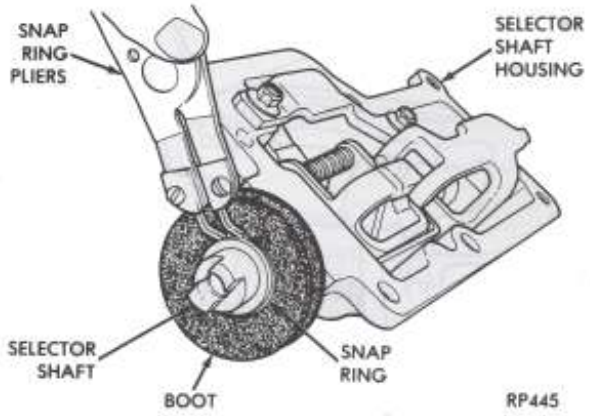


*Fig. 1—Remove or Install Selector Shaft Snap Ring and Boot*

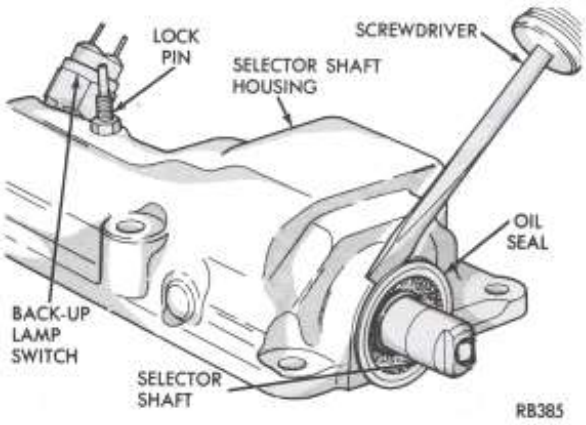


*Fig. 2—Remove Selector Shaft Seal*

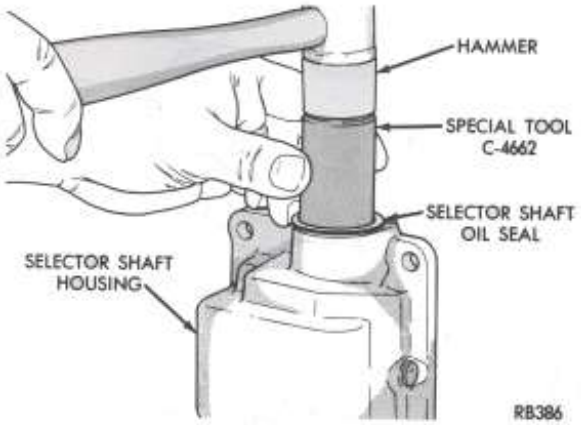


*Fig. 3—Install Selector Shaft Seal*

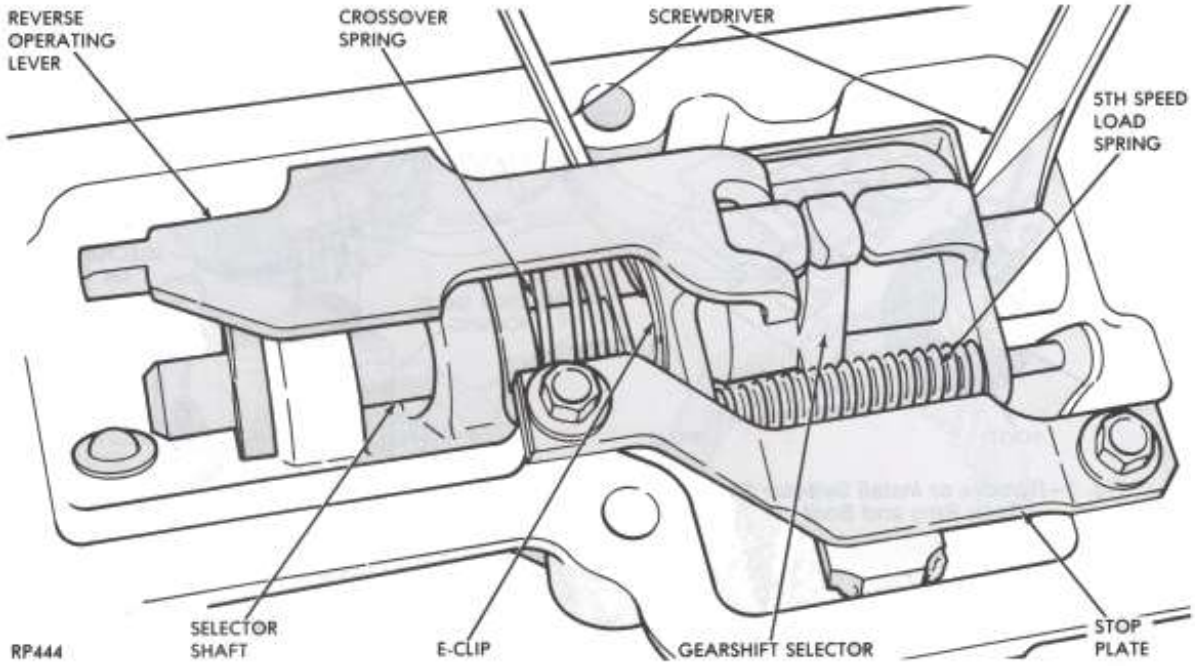


*Fig. 4—Remove or Install Selector Shaft E-Clip*

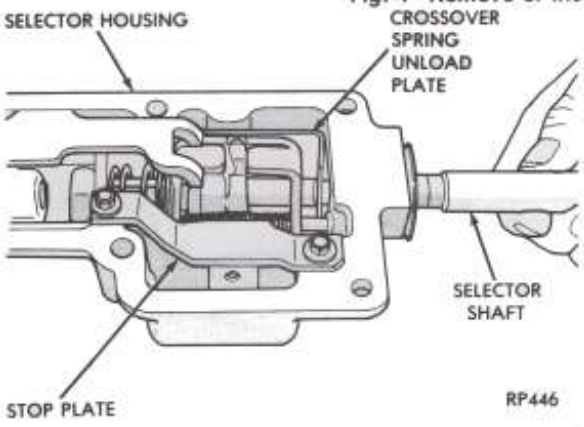


*Fig. 5—Remove or Install Selector Shaft*

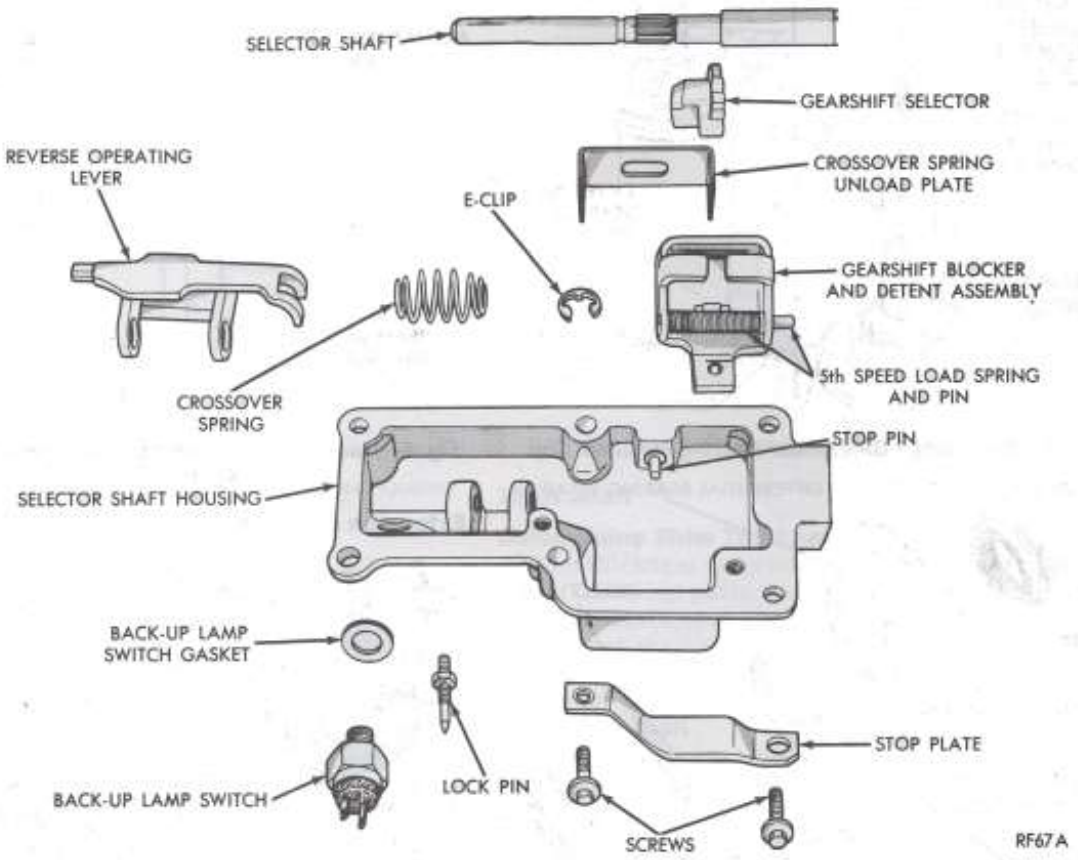


*Fig. 6—Selector Shaft Housing Components*

**Differential Bearing Retainer**

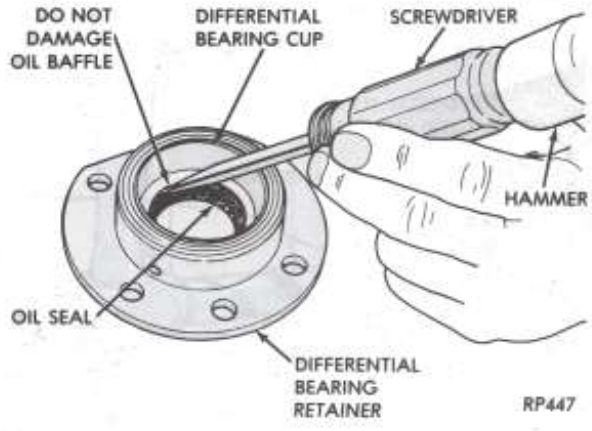


*Fig. 1—Remove Differential Bearing Retainer Seal*

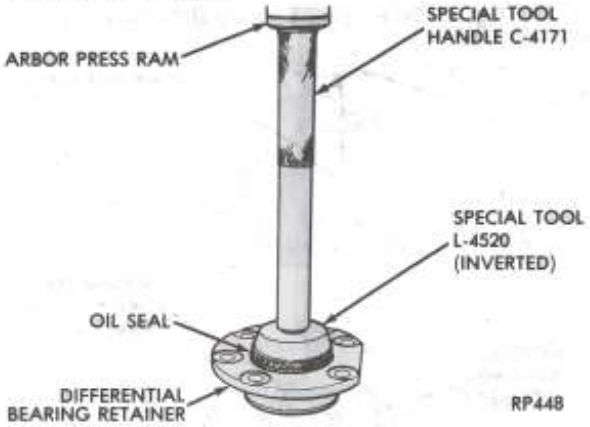


*Fig. 2—Install Differential Bearing Retainer Seal*

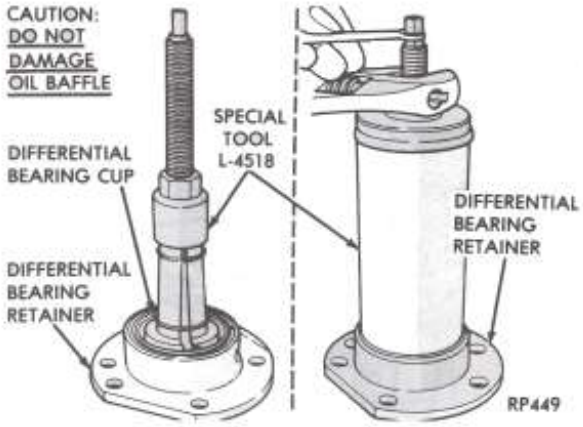


*Fig. 3—Remove Differential Bearing Retainer Cup*

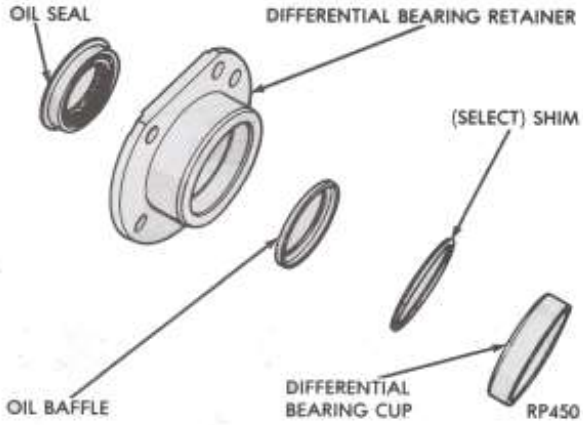


*Fig. 4—Differential Bearing Retainer*

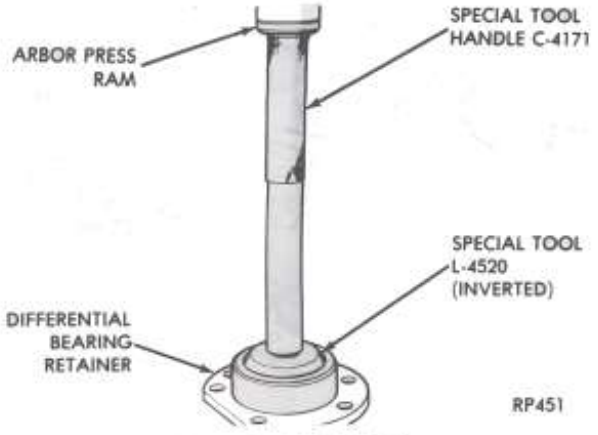


*Fig. 5—Install Oil Baffle*

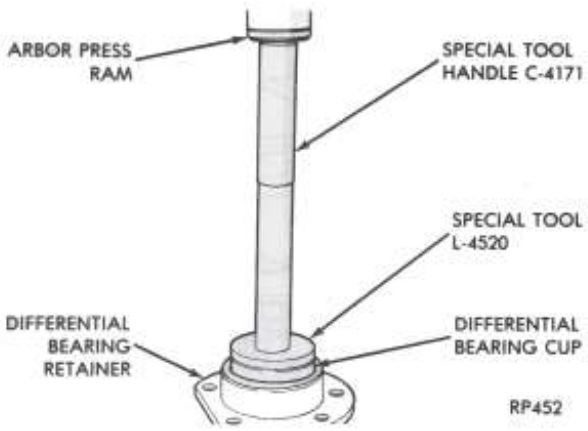


*Fig. 6—Insert (Select) Shim and Differential Bearing Retainer Cup*

### Extension Housing

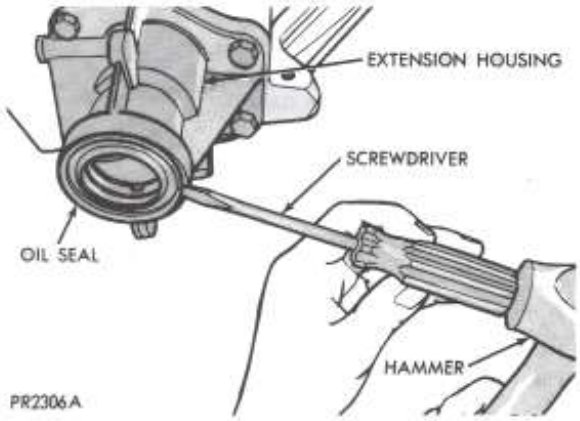


*Fig. 1—Remove Extension Seal*

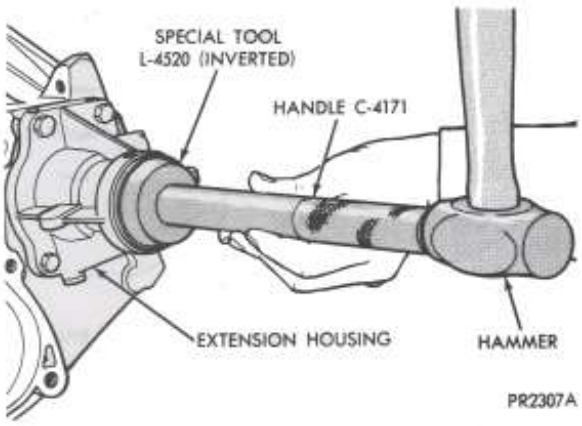


*Fig. 2—Install New Seal into Extension*

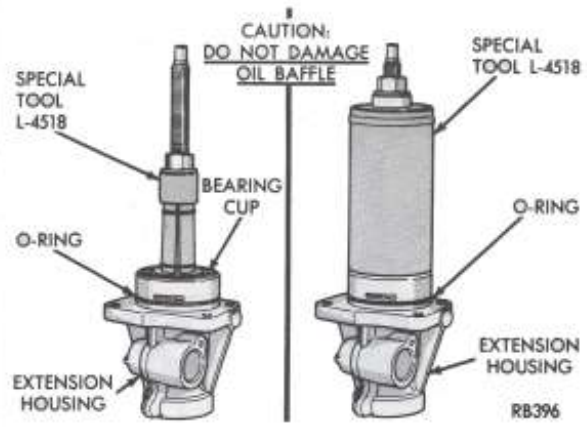


*Fig. 3—Remove Extension Bearing Cup*

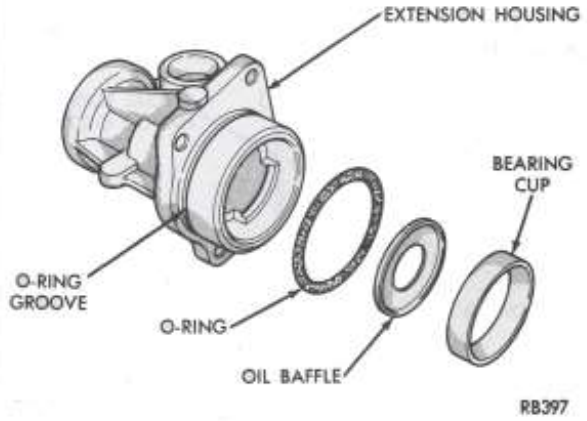


*Fig. 4—Extension*

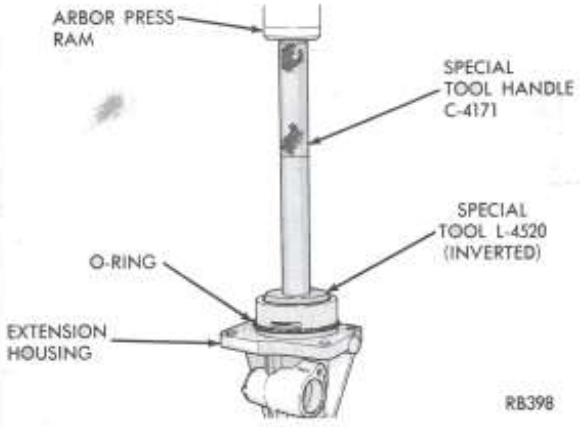


*Fig. 5—Install Extension Oil Baffle*

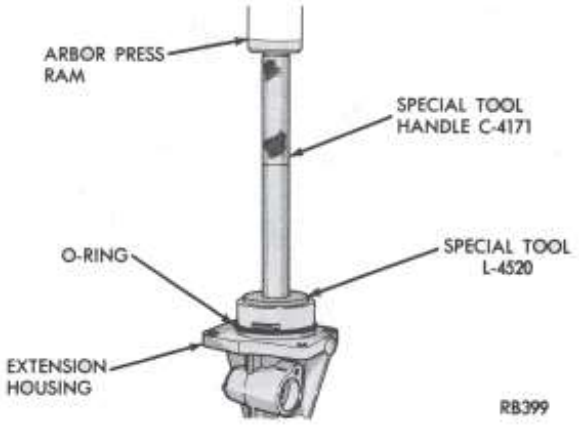


*Fig. 6—Install Extension Bearing Cup*

### Input Shaft

#### Determining Shim Thickness

Shim thickness need only be determined if any of the following parts are replaced:

(a) transaxle case
(b) input shaft seal retainer
(c) bearing retainer plate
(d) rear end cover
(e) input shaft
(f) input shaft bearings

Refer to "Bearing Adjustment Procedure" in rear of this section to determine proper shim thickness for correct bearing end play and proper turning torque.

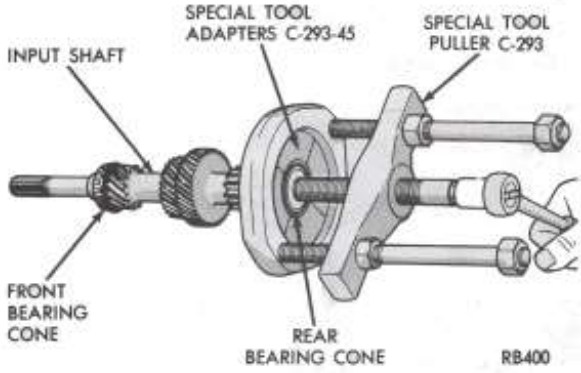


*Fig. 1—Remove Input Shaft Rear Bearing Cone*

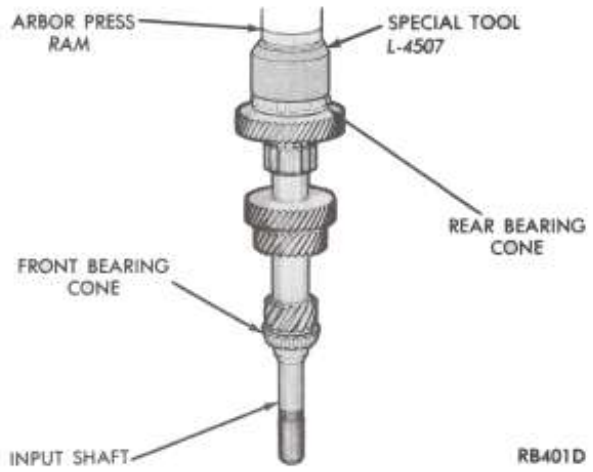


*Fig. 2—Install Input Shaft Rear Bearing Cone*

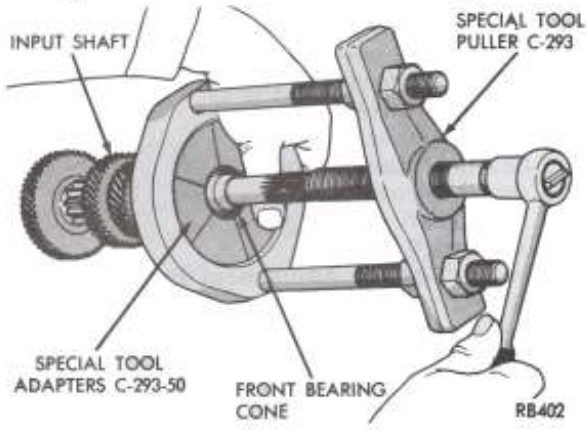


*Fig. 3—Remove Input Shaft Front Bearing Cone*

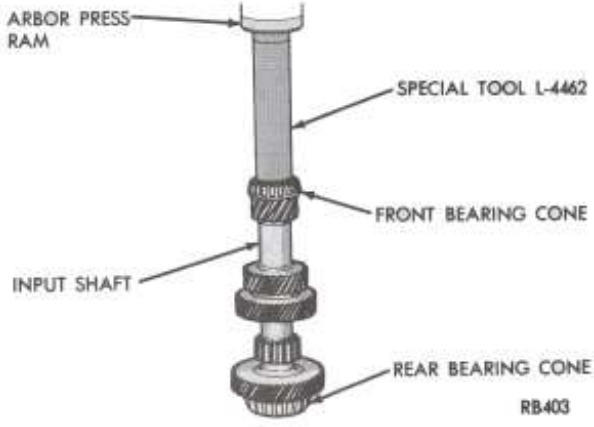


*Fig. 4—Install Input Shaft Front Bearing Cone*

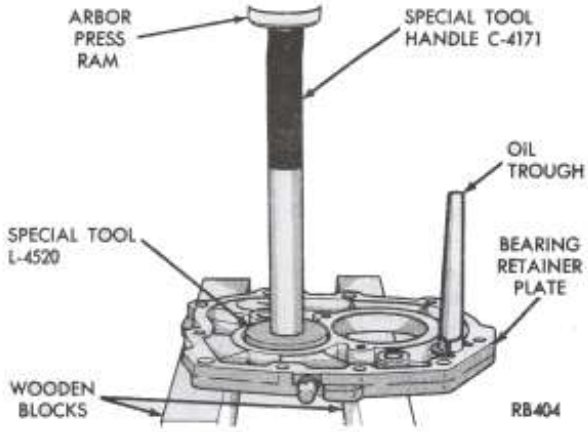


*Fig. 5—Remove Input Shaft Rear Bearing Cup*

**CAUTION: Bolt on bearing support plate before installing input shaft rear bearing cup.**

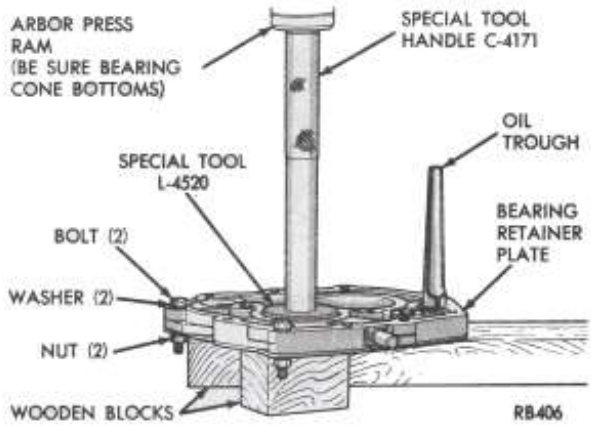


*Fig. 6—Install Input Shaft Rear Bearing Cup*

***A-525 Differential (L-body only)***

Shim thickness need only be determined if any of the following parts are replaced:

(a) transaxle case
(b) differential bearing retainer
(c) extension housing
(d) differential case
(e) differential bearings

Refer to "Bearing Adjustment Procedure" in rear of this section to determine proper shim thickness for correct bearing preload and proper bearing turning torque.

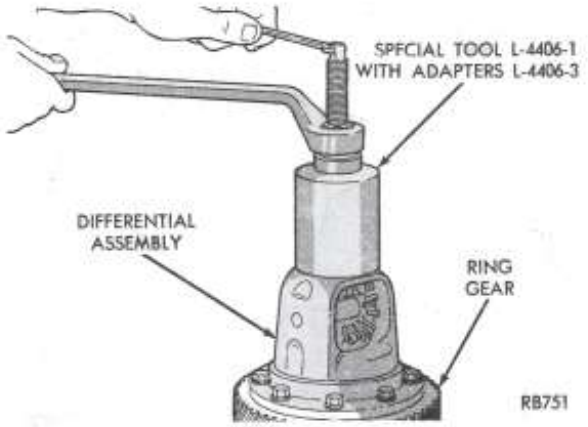


*Fig. 1—Remove Differential Bearing Cone*


*Fig. 2—Install Differential Bearing Cone*

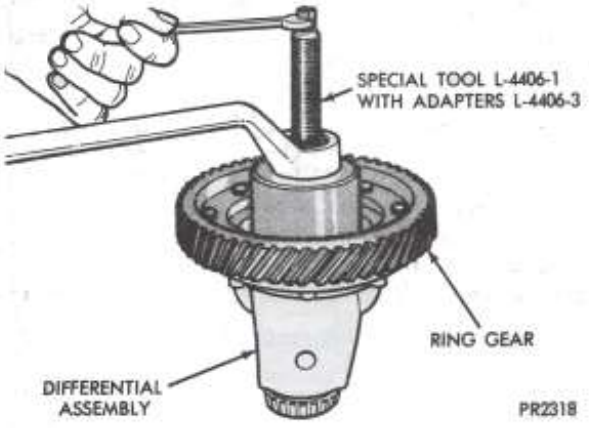


*Fig. 3—Remove Differential Bearing Cone*

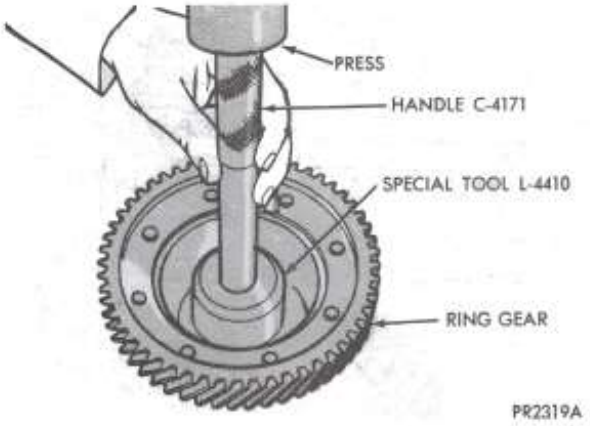


*Fig. 4—Install Differential Bearing Cone*

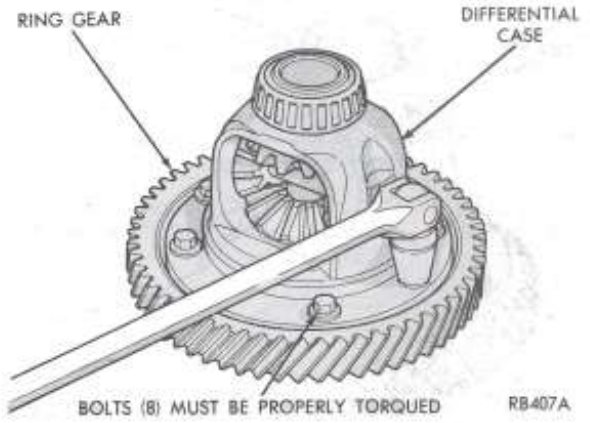


*Fig. 5—Remove or Install Differential Ring Gear Bolts and Ring Gear*

**CAUTION: Always install new ring gear bolts.**

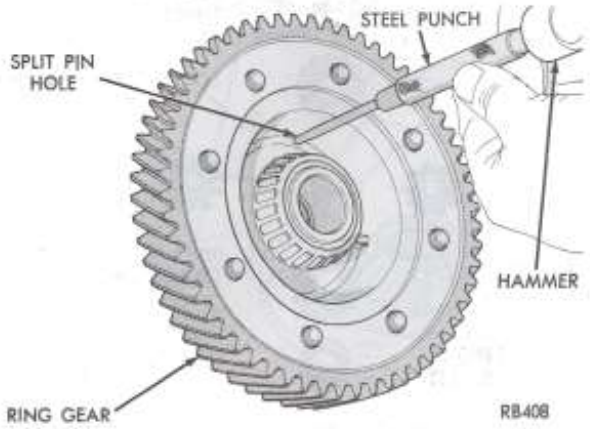


*Fig. 6—Remove Pinion Shaft Split Pin*

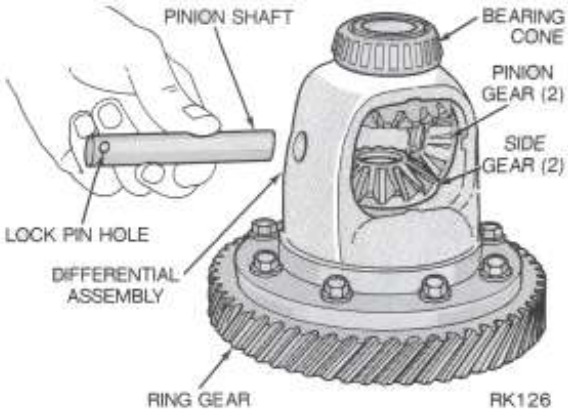


*Fig. 7—Remove or Install Pinion Shaft*

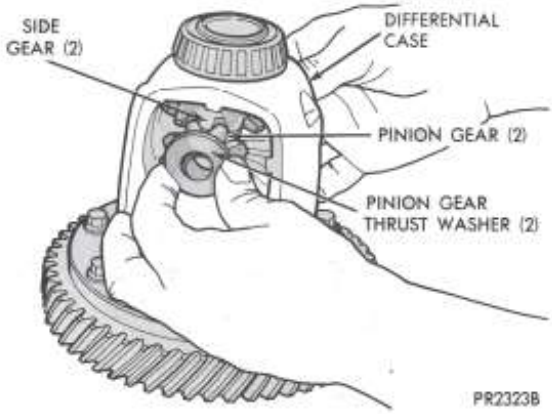


*Fig. 8—Remove or Install Pinion Gears, Side Gears, and 4 Thrust Washers by Rotating Pinion Gears to Opening in Differential Case*

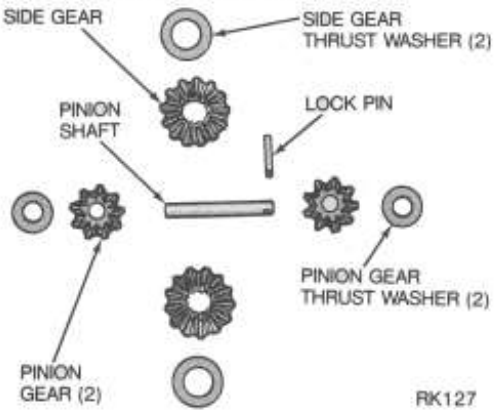


*Fig. 9—Differential Gears*

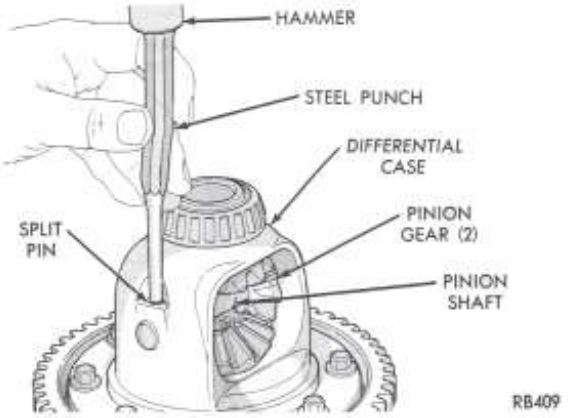


*Fig. 10—Install Pinion Shaft Split Pin*

### A-520 Differential

Shim thickness need only be determined if any of the following parts are replaced:

(a) transaxle case
(b) differential bearing retainer
(c) extension housing
(d) differential case
(e) differential bearings

Refer to "Bearing Adjustment Procedure" in rear of this section to determine proper shim thickness for correct bearing preload and proper bearing turning torque.

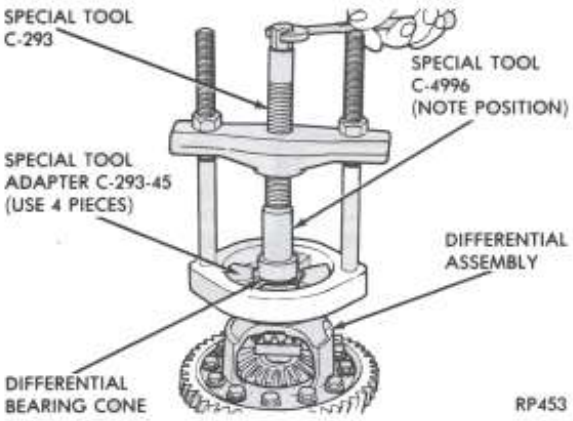


*Fig. 1—Remove Differential Bearing Cone*

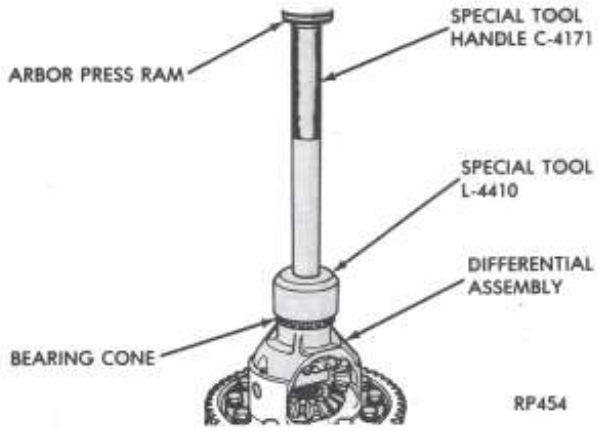


*Fig. 2—Install Differential Bearing Cone*

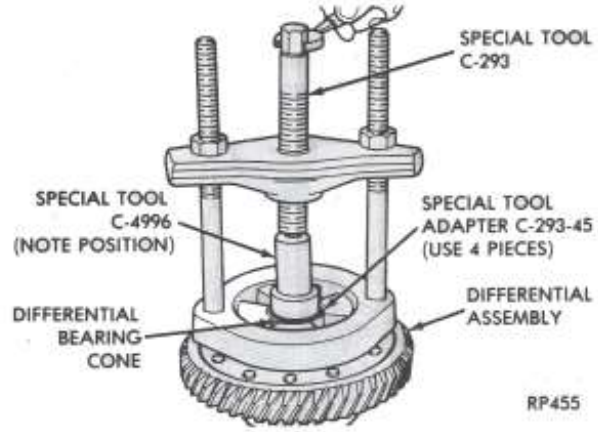


*Fig. 3—Remove Differential Bearing Cone*

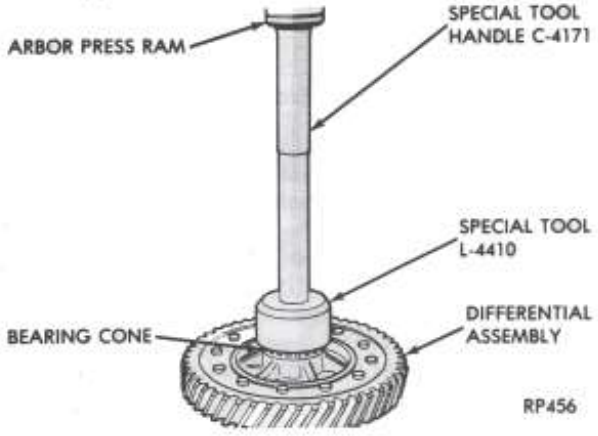


*Fig. 4—Install Differential Bearing Cone*

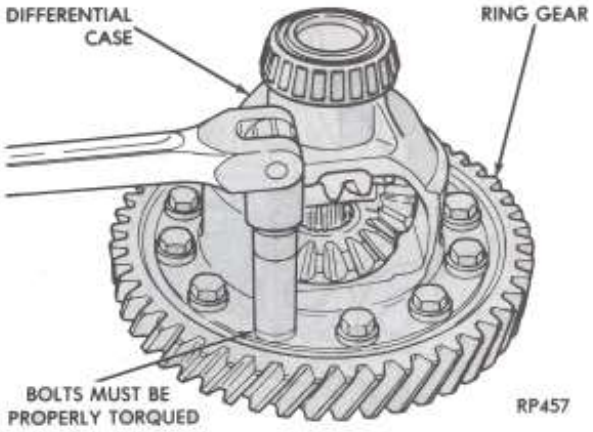


*Fig. 5—Remove or Install Ring Gear Bolts and Ring Gear*

**CAUTION: Always install new ring gear bolts. Bolts must be properly torqued (See Tightening Reference).**

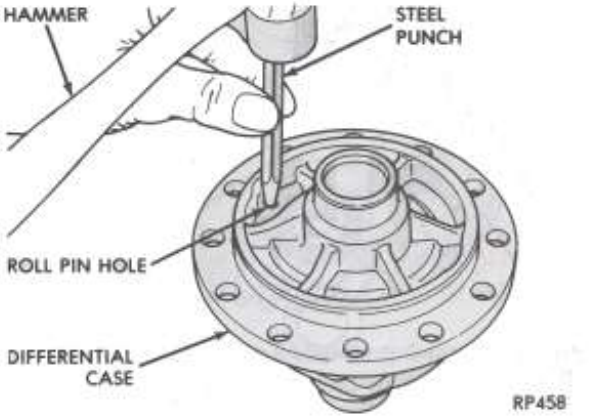


*Fig. 6—Remove Pinion Shaft Roll Pin*

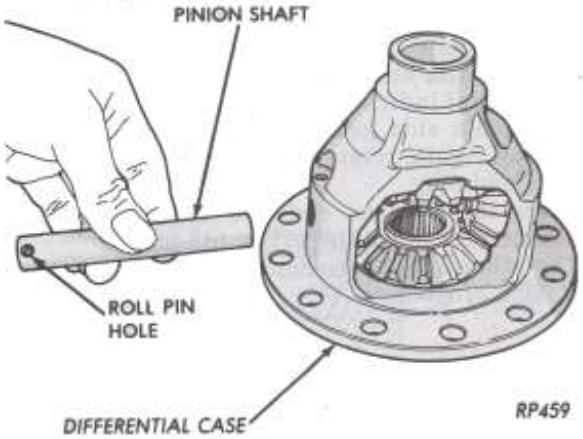


*Fig. 7—Remove or Install Pinion Shaft*

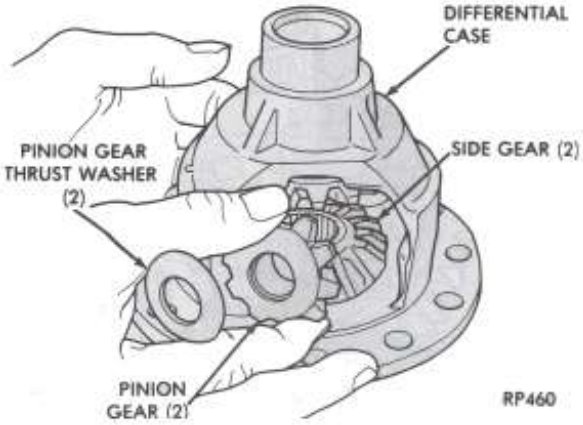


*Fig. 8—Remove or Install Pinion Gears, Side Gears, and Thrust Washers by Rotating Side Gears to Opening in Case*

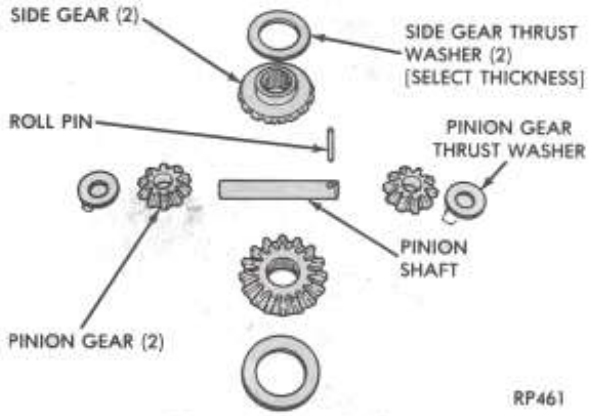


*Fig. 9—Differential Gears*

After assembling the differential side gears, pinion gears, and pinion gears **with** the pinion gear washers but **without** the side gear thrust washers, rotate the assembly 2 full revolutions both clockwise and counterclockwise.

Set up dial indicator as shown and record end play. Rotate side gear 90° and record another end play. Again, rotate side gear 90° and record a final end play.

Using the smallest end play recorded, shim that side gear to within .001 to .013 inch.

The other side gear should be checked using the same procedure.

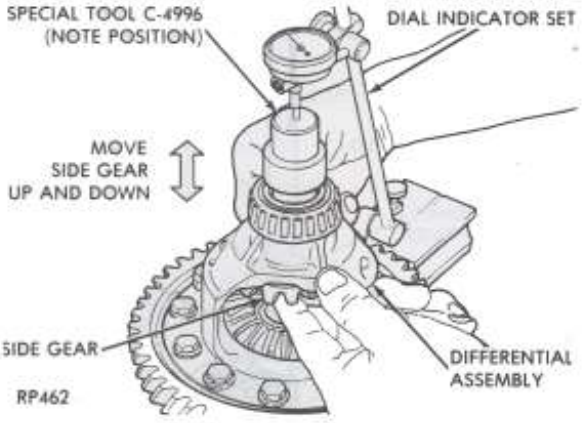


*Fig. 10—Checking Side Gear End Play*

**CAUTION: Side gear end play must be within .001 to .013 inch. 4 select thrust washes are available: .032, .037, .042, and .047 inch.**

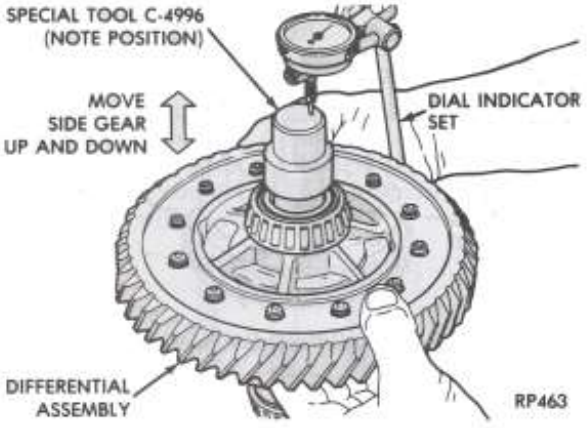


*Fig. 11—Checking Side Gear End Play*

**CAUTION: Side gear end play must be within .001 to .013 inch. 4 select thrust washers are available: .032, .037, .042, and .047 inch.**

***A-555 Differential (Turbo II only)***

Shim thickness need only be determined if any of the following parts are replaced:

(a) transaxle case
(b) differential bearing retainer
(c) extension housing
(d) differential case
(e) differential bearings

Refer to "Bearing Adjustment Procedure" in rear of this section to determine proper shim thickness for correct bearing preload and proper bearing turning torque.

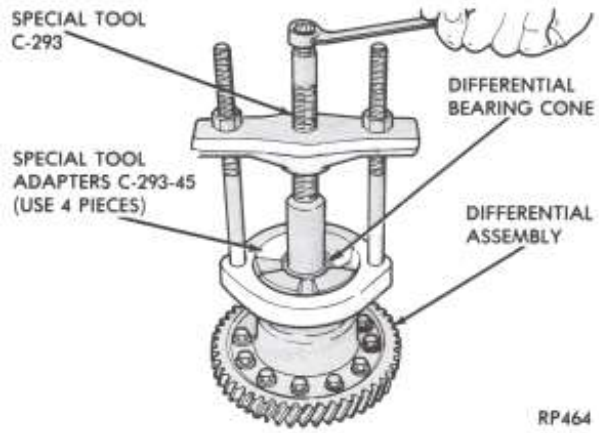


*Fig. 1—Remove Differential Bearing Cone*

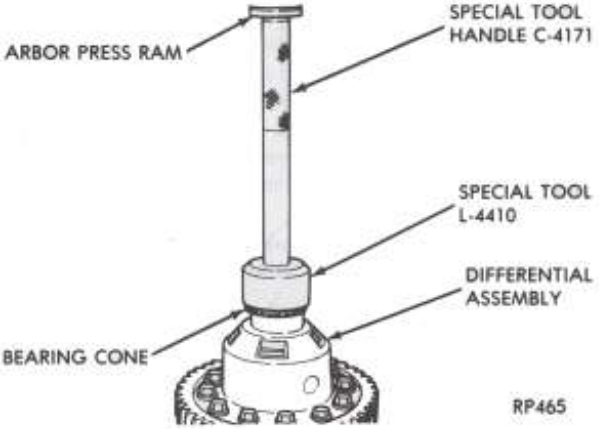


*Fig. 2—Install Differential Bearing Cone*

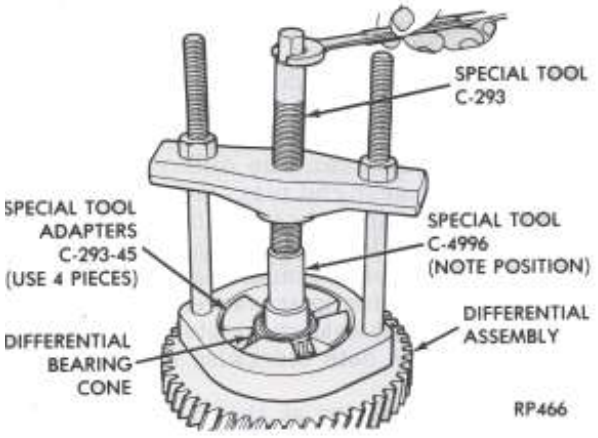


*Fig. 3—Remove Differential Bearing Cone*

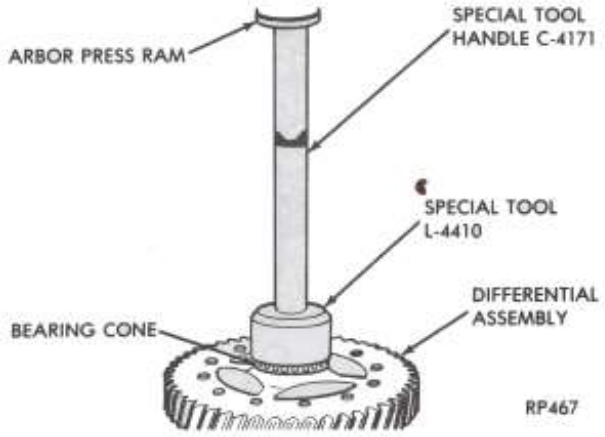


*Fig. 4—Install Differential Bearing Cone*

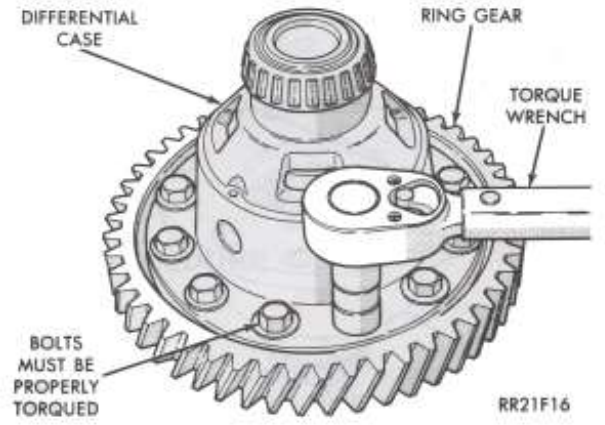


*Fig. 5—Remove or Install Ring Gear Bolts*

**CAUTION: Always install new ring gear bolts. Bolts must be properly torqued (See Tightening Reference).**

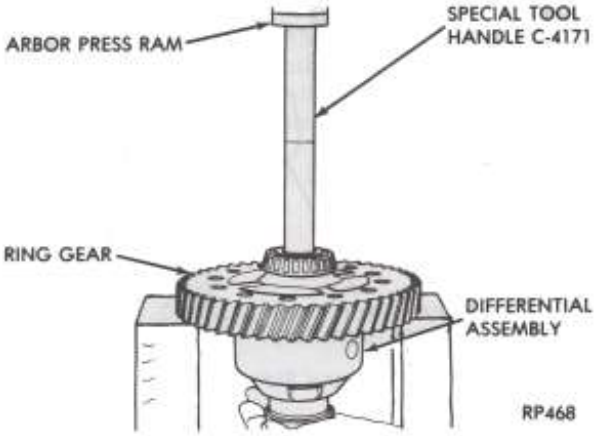


*Fig. 6—Remove Ring Gear*

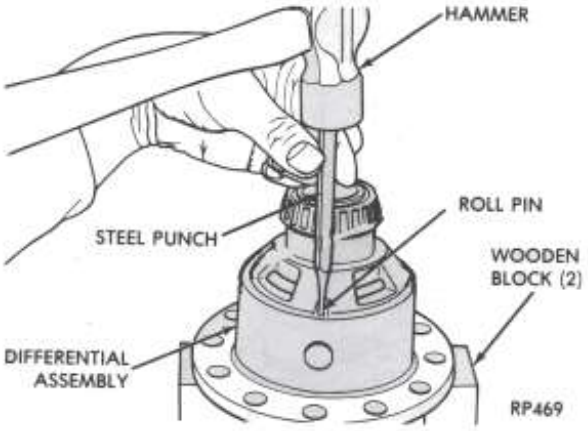


*Fig. 7—Remove Roll Pin*

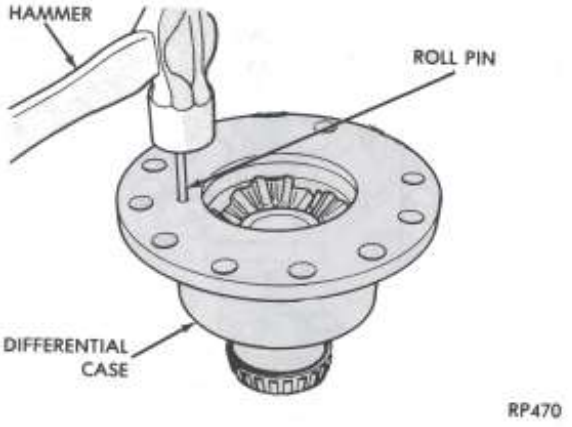


*Fig. 8—Install Roll Pin*

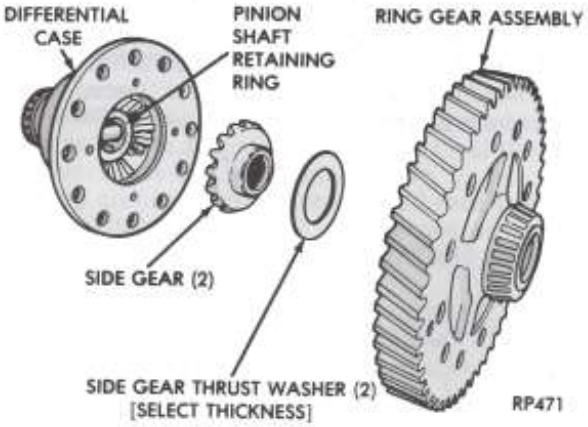


*Fig. 9—Ring Gear and Side Gear Removed*

**CAUTION: See Figure 12 to determine side gear thrust washer thickness. Side gear end play must be within .001 to .013 inch.**
**4 select thrust washes are available: .032, .037, .042, and .047 inch.**

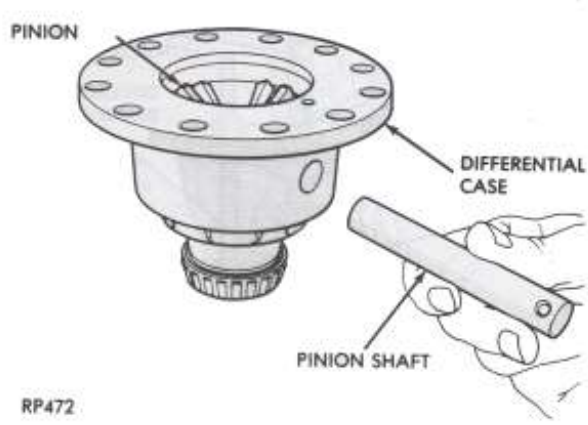


*Fig. 10—Remove or Install Pinion Shaft*

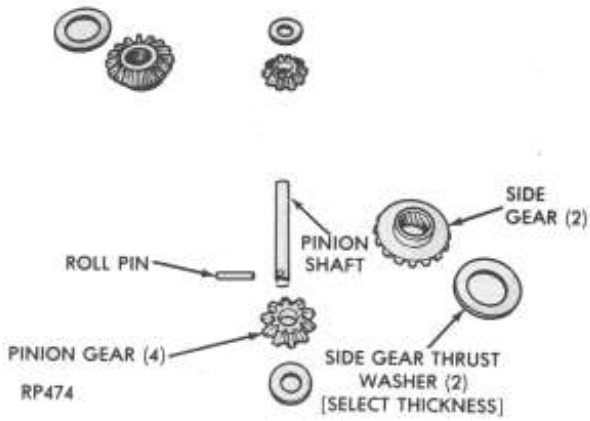


*Fig. 11—Differential Gears*

**Side gear thrust washers are available in 4 select thicknesses: .032, .037, .042, and .047 inch.**

Measure the depth from the differential case to the machined surface in 3 places, as shown in Figure 12, and measure the height of raised "step" on the ring gear. The difference, minus the proper side gear end play (.001 to .013 inch) is the proper thrust washer thickness.

For the other side gear: After assembling the differential side gears, pinion gears, and pinion gears **with** the pinion gear washers but **without** the side gear thrust washers, rotate the assembly 2 full revolutions both clockwise and counter-clockwise.

Set up dial indicator as shown in Figure 13 and record end play. Rotate side gear 90° and record another end play. Again, rotate side gear 90° and record a final end play.

Using the smallest end play recorded, shim that side gear to within .001 to .013 inch.

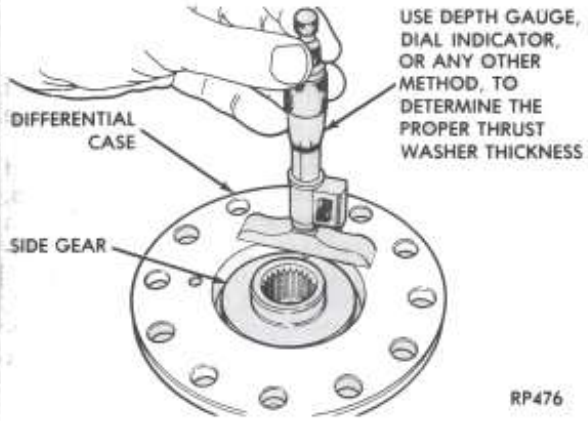


*Fig. 12—Determine Proper Side Gear Thrust Washer Thickness*

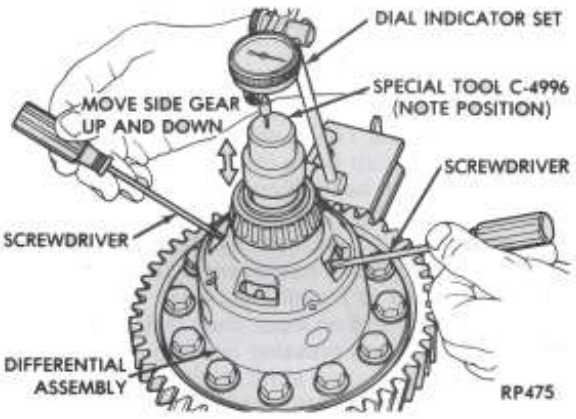


*Fig. 13—Checking Side Gear End Play*

**CAUTION: After reassembly of the differential assembly, insert the inner joint housing spline from a driveshaft into the side gear. By hand, turn the side gear with the joint housing spline. If the side gear will NOT turn, or it feels very tight, it will be necessary to remove the ring gear and install a thinner side gear thrust washer.**

**Side gear thrust washers are available in 4 select thicknesses: .032, .037, .042, and .047 inch.**

## BEARING ADJUSTMENT PROCEDURE

### GENERAL RULES ON SERVICING BEARINGS

(1) Take extreme care when removing and installing bearing cups and cones. Use only an arbor press for installation, as a hammer may not properly align the bearing cup or cone. Burrs or nicks on the bearing seat will give a false end play reading while gauging for proper shims. Improperly seated bearing cups and cones are subject to low mileage failure.

(2) Bearing cups and cones should be replaced if they show signs of pitting or heat distress.

If distress is seen on either the cup or bearing rollers, both cup and cone must be replaced.

(3) Bearing preload and drag torque specifications **must be maintained** to avoid premature bearing failures.

Used (original) bearing may lose up to 50% of the original drag torque after break-in.

**All bearing adjustments must be made with no other component interference or gear intermesh.**

(4) Replace bearings as a pair. For example, if one differential bearing is defective, replace both differential bearings. If one input shaft bearing is defective, replace both input shaft bearings.

(5) Bearing cones **must not** be reused if removed.

(6) Turning torque readings should be obtained while smoothly rotating in either direction (breakaway reading is not indicative of the true turning torque).

(7) Replace oil baffle, if damaged.

## INPUT SHAFT BEARING END PLAY ADJUSTMENT

(1) Using Tool L-4656 with Handle C-4171, press input shaft front bearing cup slightly forward in case. Then, using Tool L-4655 with Handle C-4171, press bearing cup back into case, from front, **to properly position bearing cup,** before checking input shaft end play (see input shaft front bearing cup replace in "Subassembly Recondition" section). **This step is not necessary if Tool L-4655 was previously used to install input shaft front bearing cup in the case and no input shaft (select) shim has been installed since pressing cup into case.**

(2) Select a gauging shim which will give 0.025 to 0.254mm **(.001 to .010 inch)** end play. **SUGGESTION: Measure original shim from input shaft seal retainer and select a shim 0.254mm (.010 inch) thinner than original for the gauging shim.**

(3) Install gauging shim on bearing cup and install input shaft seal retainer.

**CAUTION: The input shaft seal retainer is used to draw the input shaft front bearing cup the proper distance into the case bore during this step.** Alternately tighten input shaft seal retainer bolts until input shaft seal retainer is bottomed against case. Tighten bolts to 28 N·m (21 ft. lbs.).

(4) Oil input shaft bearings with SAE 5W-30 engine oil and install input shaft in case. Install bearing retainer plate with input shaft rear bearing cup pressed in and bearing support plate installed. Tighten all bolts and nuts to 28 N·m (21 ft. lbs.).

(5) Position dial indicator to check input shaft end play. Apply moderate load, by hand, to input shaft splines. Push toward rear while rotating input shaft back and forth a number of times to settle out bearings. Zero dial indicator. Pull input shaft toward the front while rotating input shaft back and forth a number of times to settle out bearings. Record end play.

(6) The **shim** required for proper bearing end play is the total of the **gauging shim thickness, plus end play, minus (constant) end play** of 0.051mm **(.002 inch)**. Combine shims, if necessary, to obtain a shim within .04mm (.0016 inch) of the required shim (see Shim Chart for proper shim[s]).

(7) Remove input shaft seal retainer and gauging shim. Install shim(s) selected in step (6) and reinstall input shaft seal retainer with a 1/16 inch beat of RTV sealant. Record end play.

Observe the **CAUTION** in step (3). Tighten input shaft seal retainer bolts to 28 N·m (21 ft. lbs.).

(8) To verify that a preload condition does not exist, use Special Tool L-4508 and an inch-pound

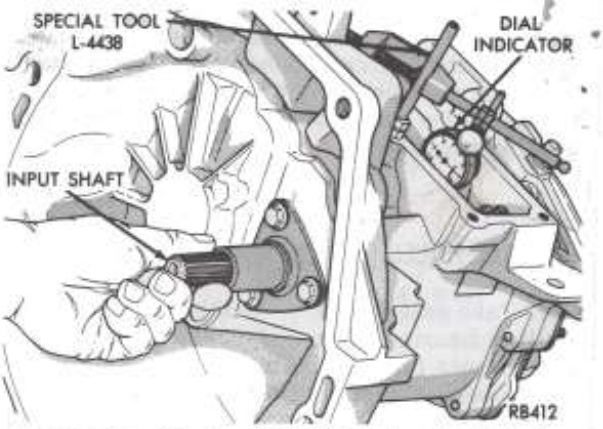


*Fig. 1—Checking Input Shaft Bearing End Play to Determine Shim Thickness*

torque wrench to check input shaft turning torque. **The turning torque should be less than 5 in. lbs. CAUTION: Step (1) MUST be repeated every time a thinner shim is installed. This will assure that the input shaft bearing cup is pressed the proper distance into the case. If the turning torque is too high, install a .04mm (.0016 inch) thinner shim.**

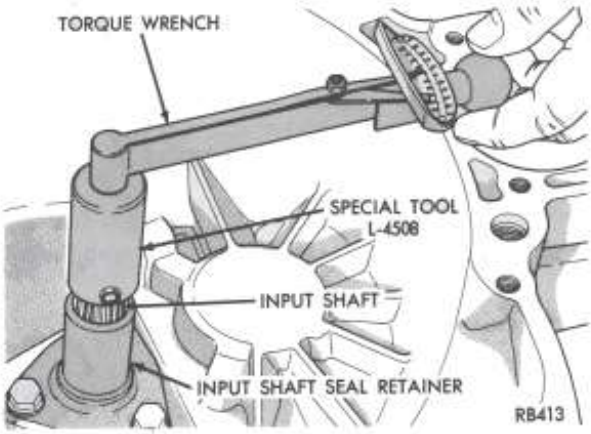


*Fig. 2—Checking Input Shaft Bearing Turning Torque*

(9) Recheck input shaft turning torque. Repeat step (8) until the proper bearing turning torque is obtained. Observe "**CAUTION**" in step (8).

**INPUT SHAFT SHIM CHART**

| mm | mm | inch |
|---|---|---|
| .62 | | .024 |
| .66 | | .026 |
| .70 | | .028 |
| .74 | | .029 |
| .78 | | .031 |
| .82 | | .032 |
| .86 | | .034 |
| .90 | | .035 |
| .94 | | .037 |
| .98 | | .039 |
| 1.02 | | .040 |
| 1.06 | | .042 |
| 1.10 | | .043 |
| 1.14 | | .045 |
| 1.18 | | .046 |
| 1.22 | | .048 |
| 1.26 | | .050 |
| 1.30 | | .051 |
| 1.34 | | .053 |
| 1.36 | (.66 + .70) | .054 |
| 1.40 | (.66 + .74) | .055 |
| 1.44 | (.70 + .74) | .057 |
| 1.48 | (.70 + .78) | .059 |
| 1.52 | (.74 + .78) | .060 |
| 1.56 | (.74 + .82) | .061 |
| 1.60 | (.78 + .82) | .063 |
| 1.64 | (.78 + .86) | .065 |
| 1.68 | (.82 + .86) | .066 |
| 1.72 | (.82 + .90) | .068 |
| 1.76 | (.86 + .90) | .069 |

## DIFFERENTIAL BEARING PRELOAD ADJUSTMENT

(1) Remove bearing cup and existing shim from differential bearing retainer. (See Differential Bearing Retainer in "Subassembly Recondition" section).

(2) Select a gauging shim which will give 0.025 to 0.254mm (.001 to .010 inch) end play. **SUGGESTION: Measure original shim from differential bearing retainer and select a shim 0.381mm (.015 inch) thinner than original for the gauging shim.**

Install gauging shim in differential bearing retainer and press in bearing cup. **Installation of oil baffle is not necessary when checking differential assembly end play.**

(3) Oil differential bearings with SAE 5W-30 engine oil and install differential assembly in transaxle case. Check extension housing O-ring for damage (replace if necessary) and add a 1/16 inch bead of RTV sealant to extension flange. Install extension housing and differential bearing retainer. Torque bolts (see Tightening Reference).

(4) Position transaxle with bell housing facing down on workbench with C-clamps. Position dial indicator (Fig. 1 or 2).

(5) Apply a medium load to differential by hand (A-525), or Tool C-4995 with T-Handle (A-520/A-555), in the downward direction while rolling differential assembly back and forth a number of times to settle bearings. Zero dial indicator. To obtain end play readings, apply a medium load in the

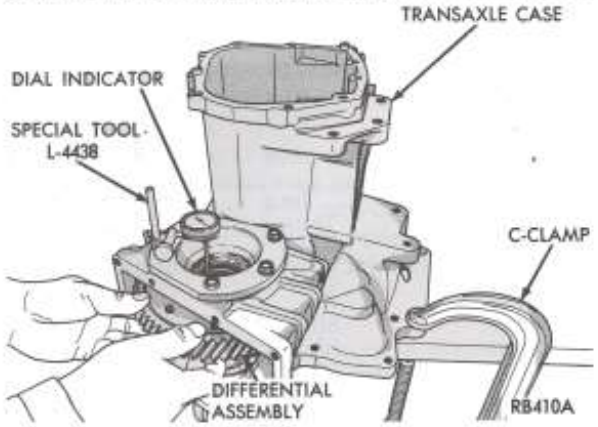


*Fig. 1—Checking Differential Bearing End Play to Determine Shim Thickness (A-525 only)*

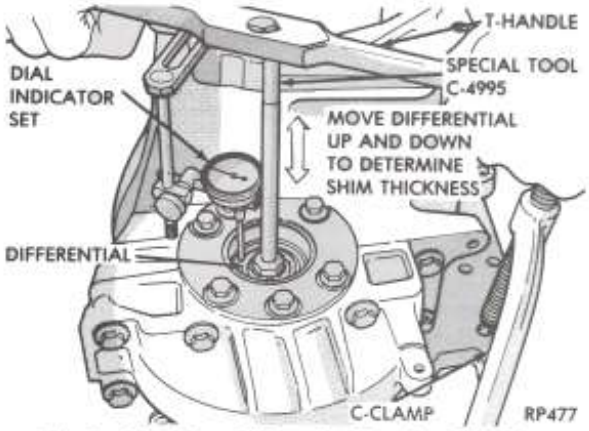


*Fig. 2—Checking Differential Bearing End Play to Determine Shim Thickness (A-520/A-555)*

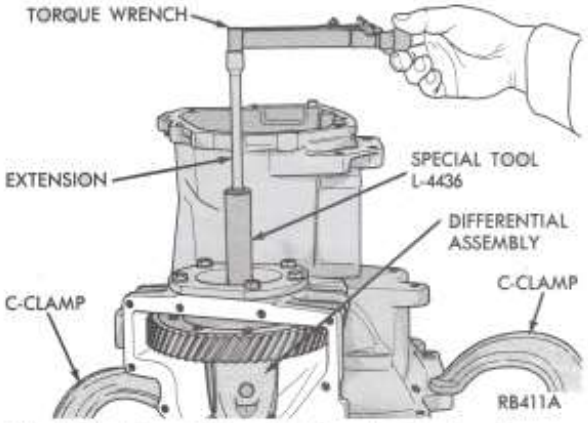


*Fig. 3 Checking Differential Bearing Turning Torque (A-525 only)*

upward direction while rolling differential assembly back and forth a number of times to settle out the bearings. Record end play.

(6) The **Shim** required for proper bearing preload is the **total** of the **gauging shim thickness, plus end play, plus** (constant) **preload** of 0.254mm

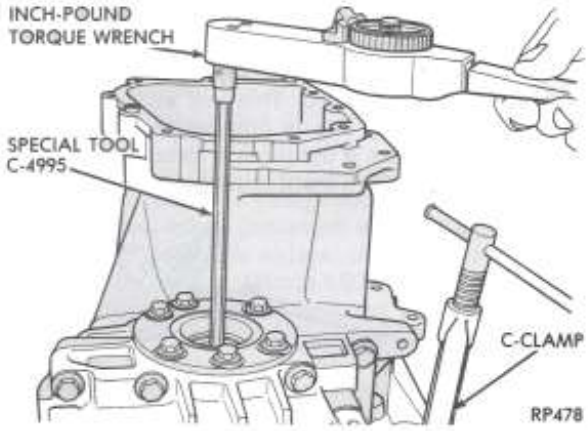


*Fig. 4—Checking Differential Bearing Turning Torque (A-520/A-555)*

**(.010 inch).** Combine shims, if necessary, to obtain a shim within .05mm (.002 inch) of the required shim (see Shim Chart for proper shim[s]).

(7) Remove differential bearing retainer. Remove bearing cup and gauging shim. Properly install oil baffle. **Be sure oil baffle is not damaged.** Install shim(s) selected in step (6) and press in the bearing cup into differential bearing retainer.

(8) Using a 1/16 inch bead of RTV sealant for a gasket, install differential bearing retainer. Torque all bolts (See Tightening Reference).

(9) Using Special Tool L-4436 (A-525), or Tool C-4995 (A-520/A-555), and an inch-pound torque wrench, check turning torque of the differential assembly in clockwise and counterclockwise directions. **The turning torque should be 9 to 14 in. lbs. for new bearings or a minimum of 6 in. lbs. for used bearings. If the turning torque is too high, install a .05mm (.002 inch) thinner shim. If the turning torque is too low, install a .05mm (.002 inch) thicker shim.**

(10) Recheck turning torque. Repeat Step (9) until the proper turning torque is obtained.

## DIFFERENTIAL BEARING SHIM CHART

| Required Shim Combination | Total Thickness | | Required Shim Combination | Total Thickness | | Required Shim Combination | Total Thickness | |
|---|---|---|---|---|---|---|---|---|
| mm | mm | Inch | mm | mm | Inch | mm | mm | Inch |
| .50 | .50 | .020 | .50 + .70 | 1.20 | .047 | 1.00 + .70 | 1.70 | .067 |
| .75 | .75 | .030 | .50 + .75 | 1.25 | .049 | 1.00 + .75 | 1.75 | .069 |
| .80 | .80 | .032 | .50 + .80 | 1.30 | .051 | 1.00 + .80 | 1.80 | .071 |
| .85 | .85 | .034 | .50 + .85 | 1.35 | .053 | 1.00 + .85 | 1.85 | .073 |
| .90 | .90 | .035 | .50 + .90 | 1.40 | .055 | 1.00 + .90 | 1.90 | .075 |
| .95 | .95 | .037 | .50 + .95 | 1.45 | .057 | 1.00 + .95 | 1.95 | .077 |
| 1.00 | 1.00 | .039 | .50 + 1.00 | 1.50 | .059 | 1.00 + 1.00 | 2.00 | .079 |
| 1.05 | 1.05 | .041 | .50 + 1.05 | 1.55 | .061 | 1.00 + 1.05 | 2.05 | .081 |
| .50 + .60 | 1.10 | .043 | 1.00 + .60 | 1.60 | .063 | 1.05 + 1.05 | 2.10 | .083 |
| .50 + .65 | 1.15 | .045 | 1.00 + .65 | 1.65 | .065 | | | |