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# INTRODUCTION

## CHRYSLER A-404/413/415/470

We thank CHRYSLER CORPORATION for the information and the illustrations that have made this booklet possible. This booklet contains the general description diagnosis and overhaul procedures necessary to repair, overhaul, or service the new CHRYSLER AUTOMATIC TRANSAXLE.

This information will help you to train your personnel to provide your customers with the best possible transmission service.

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## NOTES



# **TORQUEFLITE**

## **A-404, A-413 A-415, A-470**

### **GENERAL INFORMATION**

These transaxles combine a torque converter, fully automatic 3 speed transmission, final drive gearing and differential into a compact front-wheel-drive system. The unit is basically a "Metric" design.

The identification markings and usage of the transaxle are charted in Diagnosis and Tests.

**Transaxle operation requirements are different for each vehicle and engine combination and some internal parts will be different to provide for this. Therefore, when replacing parts, refer to the seven digit part number stamped on rear of the transmission oil pan flange.**

Within this transaxle, there are 3 primary areas:

- (1) Main centerline plus valve body (similar to conventional TorqueFlite).
- (2) Transfer shaft centerline (includes governor and parking sprag).
- (3) Differential centerline.

Center distances between the main rotating parts in these 3 areas are held precisely to maintain a low noise level through smooth accurate mesh of the gears connecting the centerlines.

The torque converter, transaxle area, and differential are housed in an integral aluminum die casting.

**NOTE: The differential oil sump is separate from the "transaxle sump."**

**Special emphasis is placed on filling and maintaining the differential oil level—to 1/8 inch to 3/8 inch below the fill hole in the differential cover.**

The torque converter is attached to the crankshaft through a flexible driving plate. Cooling of the converter is accomplished by circulating the transaxle fluid through an oil-to-water type cooler, located in the radiator side tank. The torque converter assembly is a sealed unit which cannot be disassembled.

The transaxle fluid is filtered by an internal "Dacron Type" filter attached to the lower side of the valve body assembly.

Engine torque is transmitted to the torque converter then, through the input shaft to the multiple disc clutches in the transaxle. The power flow depends on the application of the clutches and bands. Refer to "Elements in Use Chart" in Diagnosis and Tests section.

The transaxle consists of two multiple disc clutches, an overrunning clutch, two servos, a hydraulic accumulator, two bands, and two planetary gear sets to provide three forward ratios and a reverse ratio. The common sun gear of the planetary gear sets is connected to the front clutch by a driving shell which is splined to the sun gear and to the front clutch retainer. The hydraulic system consists of an oil pump, and a single valve body which contains all of the valves except the governor valves.

The transaxle sump is vented through the "dipstick". The differential sump is vented by a spring loaded cap on the "extension housing."

Output torque from the main centerline is delivered through helical gears to the "transfer shaft." This gear set is a factor of the final drive (axle) ratio. The shaft also carries the governor and parking sprag.

An integral helical gear on the transfer shaft drives the differential ring gear. The final drive gearing is completed with either of two gear sets producing overall ratios of:

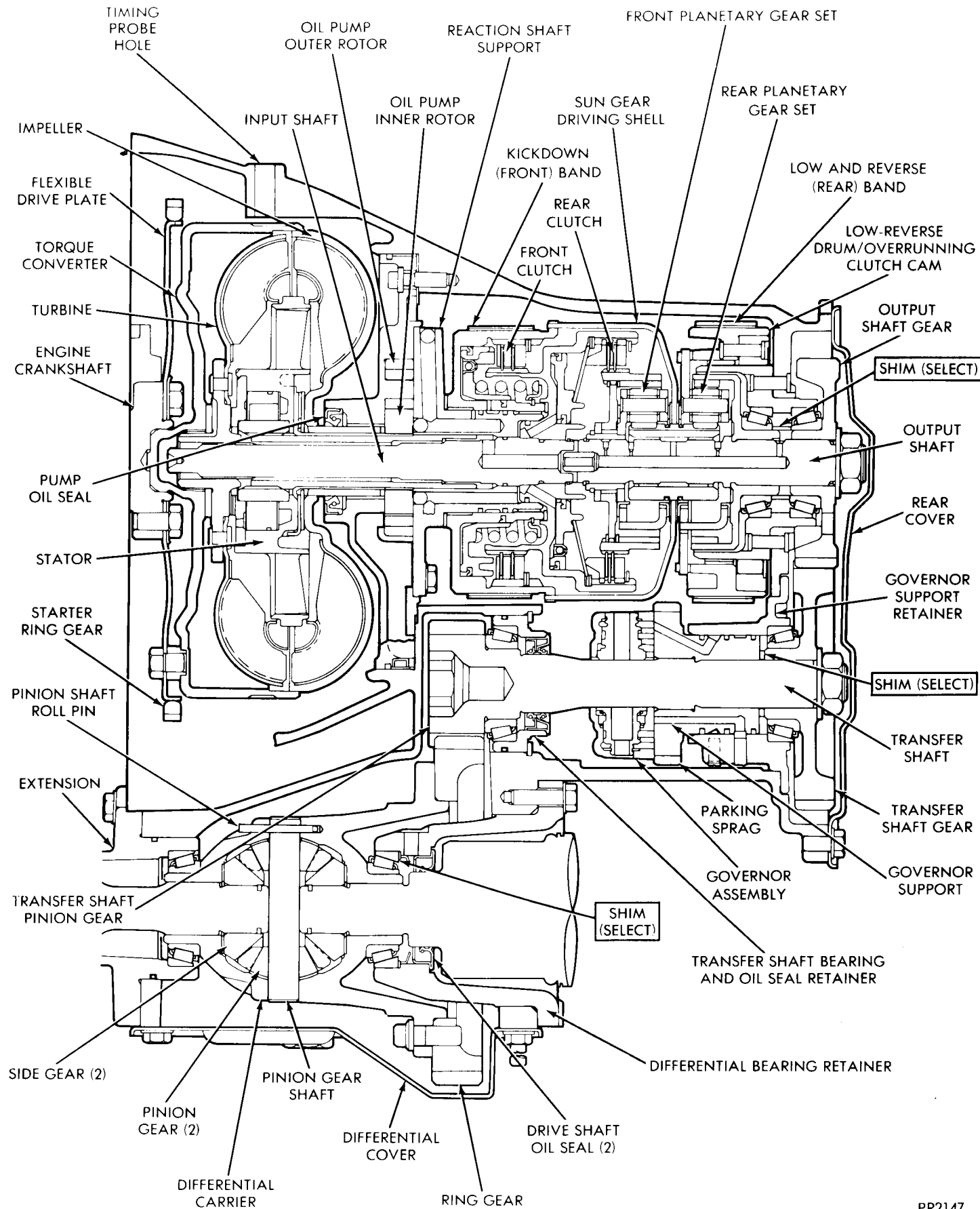
- |      |                                    |
|------|------------------------------------|
| 3.48 | 1.7L engine models                 |
| 2.78 | 2.2L and 2.6L engine models        |
| 3.22 | 2.2L (high altitude) engine models |

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

### **HYDRAULIC CONTROL SYSTEM**

The hydraulic control circuits (Pages 21-74 through 21-82) show the position of the various valves with color coded passages to indicate those under hydraulic pressure for all operations of the transaxle.

# TRANSAXLE



**Typical TorqueFlite Transaxle—Cutaway View**

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The hydraulic control system makes the transaxle fully automatic, and has four important functions to perform. In a general way, the components of any automatic control system may be grouped into the following basic groups:

The pressure supply system, the pressure regulating valves, the flow control valves, the clutches, and band servos.

Taking each of these basic groups or systems in turn, the control system may be described as follows:

### **Pressure Supply System**

The pressure supply system consists of an oil pump driven by the engine through the torque converter. The single pump furnishes pressure for all the hydraulic and lubrication requirements.

**NOTE:** Oil pump housing assemblies are available with pre-selected pump gears.

### **Pressure Regulating Valves**

The pressure regulating valves consist of a regulator valve which controls line pressure at a value dependent on throttle opening.

The governor valve transmits regulated pressure to the valve body (in conjunction with vehicle speed) to control upshift and downshift.

The throttle valve transmits regulated pressure to the transaxle (in conjunction with throttle position) to control upshift and downshift.

### **Flow Control Valves**

The manual valve provides the different transaxle drive ranges as selected by the vehicle operator.

The 1-2 shift valve automatically shifts the transaxle from low to second or from second to low depending on the vehicle operation.

The 2-3 shift valve automatically shifts the transaxle from second to direct or from direct to second depending on the vehicle operation.

The kickdown valve makes possible a forced downshift from direct to second, second to breakaway, or direct to breakaway (depending on vehicle speed) by depressing the accelerator pedal past the detent "feel" near wide open throttle.

The shuttle valve has two separate functions and performs each independently of the other. The first is that of providing fast release of the kickdown band, and smooth front clutch engagement when the driver makes a "lift-foot" upshift from second to direct. The second function of the shuttle valve is to regulate the application of the kickdown servo and band when making direct to second kickdowns.

The by-pass valve provides for smooth application of the kickdown band on 1-2 upshifts.

### **Clutches, Band Servos, and Accumulator**

The front and rear clutch pistons, and both servo pistons are moved hydraulically to engage the clutches and apply the bands. The pistons are released by spring tension when hydraulic pressure is released. On the 2-3 upshift, the kickdown servo piston is released by spring tension and hydraulic pressure.

The accumulator controls the hydraulic pressure on the apply side of the kickdown servo during the 1-2 shift; thereby, cushioning the kickdown band application at any throttle position.

## **OPERATING INSTRUCTIONS**

The transaxle will automatically upshift and downshift at approximately the speeds shown in the "Automatic Shift Speed Chart." All shift speeds given in the "Chart" may vary somewhat due to production tolerances. The quality of the shifts is very important. All shifts should be smooth and positive with no noticeable engine runaway. See "Diagnosis and Tests" for chart.

### **Gearshift and Parking Lock Controls**

The transaxle is controlled by a "lever type" gearshift incorporated within the console. The control has six selector lever positions: P (park), R (reverse), N (neutral), and D (drive), 2 (second) and 1 (first). The parking lock is applied by moving the selector lever past a gate to the "P" position.

**Do not apply the parking lock until the vehicle has stopped; otherwise, a severe ratcheting noise will occur.**

### **Starting the Engine**

The engine will start with the selector lever in either the P (park) or N (neutral) positions. As a safety precaution when starting in the N (neutral) position, apply the parking or foot brake. The TorqueFlite Transaxle will not permit starting the engine by pushing or towing.

### **Mountain Driving**

When driving in the mountains with either heavy loads or when pulling trailers, the 2 (second) or 1 (low) position should be selected on upgrades which require heavy throttle for 1/2 mile or more. This reduces possibility of overheating the transaxle and converter under these conditions.

### **Towing Vehicle**

Refer to "Lubrication and Maintenance, Group 0" for towing instructions.



## TORQUEFLITE DIAGNOSIS AND TESTS

### DIAGNOSIS—GENERAL

Automatic transaxle malfunctions may be caused by four general conditions: poor engine performance, improper adjustments, hydraulic malfunctions, and mechanical malfunctions. Diagnosis of these problems should always begin by checking the easily accessible variables: fluid level and condition, manual cable adjustment, and throttle cable adjustment. Then perform a road test to determine if the problem has been corrected or that more diagnosis is necessary. If the problem exists after the preliminary tests and corrections are completed, hydraulic pressure tests should be performed.

#### Fluid Level and Condition

Before removing the dipstick, wipe all dirt off of the protective disc and the dipstick handle.

Since this torque converter fills in both the "P" Park and "N" Neutral positions, place the selector lever in "P" Park to be sure that the fluid level check is accurate. The engine should be running at idle speed. The fluid should be at normal operating temperature (approximately 82°C or 180°F). The fluid level is correct if it is between the "Max. Level" and "Add" (crosshatched area) marks on the dipstick.

Low fluid level can cause a variety of conditions because it allows the pump to take in air along with the fluid. As in any hydraulic system, air bubbles make the fluid spongy, therefore, pressures will be low and build up slowly.

Improper filling can also raise the fluid level too high. When the transaxle has too much fluid, the gears churn up foam and cause the same conditions which occur with a low fluid level.

In either case, the air bubbles can cause overheating, fluid oxidation, and varnishing, which can interfere with normal valve, clutch, and servo operation. Foaming can also result in fluid escaping from the transaxle vent (dipstick handle) where it may be mistaken for a leak.

Along with fluid level, it is important to check the condition of the fluid. When the fluid smells burned, and is contaminated with metal or friction material particles, a complete transaxle overhaul is needed. Be sure to examine the fluid on the dipstick closely. If there is any doubt about its condition, drain out a sample for a double check.

After the fluid has been checked, seat the dipstick fully to seal out water and dirt.

#### Manual Linkage

Normal operation of the neutral safety switch provides a quick check to confirm proper manual linkage adjustment.

Move the selector lever slowly upward until it clicks into the "P" Park notch in the selector gate. If the starter will operate the "P" position is correct.

After checking "P" position move the selector slowly toward "N" Neutral position until the lever drops at the end of the "N" stop in the selector gate. If the starter will also operate at this point the manual linkage is properly adjusted. If adjustment is required, refer to "Gearshift Linkage Adjustment" in "Maintenance and Adjustments".

#### Throttle Cable

The throttle cable adjustment is very important to proper transaxle operation. This adjustment positions a valve which controls shift speed, shift quality and part throttle downshift sensitivity. If the setting is too short, early shifts and slippage between shifts may occur. If the setting is too long, shifts may be delayed and part throttle downshifts may be very sensitive.

#### Road Test

Prior to performing a road test, be certain that the fluid level and condition, and control cable adjustments have been checked and approved.

During the road test the transaxle should be operated in each position to check for slipping and any variation in shifting. Note whether the shifts are harsh or spongy and check the speeds where the upshifts and downshifts occur. Approximate shift speeds for the various modes of operation are shown in the "Automatic Shift Speeds and Governor Pressure" chart.

Observe closely for slipping or engine speed flare-up. Slipping or flare-up in any gear usually indicates clutch, band, or overrunning clutch problems. If the condition is far advanced, an overhaul will probably be necessary to restore normal operation.

In most cases, the clutch or band that is slipping can be determined by noting the transaxle operation in all selector positions and by comparing which internal units are applied in those positions. The "Elements in Use Chart" provides a basis for road test analysis.



## TRANSAXLE

### ELEMENTS IN USE AT EACH POSITION OF THE SELECTOR LEVER

Lever Position	Gear Ratio	Start Safety	Parking Sprag	Clutches		Over-running	Bands (Kickdown) (Low-Rev.)	
				Front	Rear		Front	Rear
P—PARK		X	X					
R—REVERSE	2.10			X				X
N—NEUTRAL		X						
D—DRIVE								
First	2.69				X	X		
Second	1.55				X		X	
Direct	1.00			X	X			
2—SECOND								
First	2.69				X	X		
Second	1.55				X		X	
1—LOW (First)	2.69				X			X

By observing that the rear clutch is applied in both the "D" first gear and "1" first gear positions, but that the overrunning clutch is applied in "D" first and the low and reverse band is applied in "1" first, if the transaxle slips in "D" range first gear but does not slip in "1" first gear, the overrunning clutch must be the unit that is slipping. Similarly, if the transaxle slips in any two forward gears, the rear clutch is the slipping unit.

Using the same procedure, the rear clutch and front clutch are applied in "D" third gear. If the transaxle slips in third gear, either the front clutch or the rear clutch is slipping. By selecting another gear which does not use one of those units, the unit which is slipping can be determined. If the transaxle also slips in reverse, the front clutch is slipping. If the transaxle does not slip in reverse, the rear clutch is slipping.

This process of elimination can be used to detect any unit which slips and to confirm proper operation of good units. However, although road test analysis can usually diagnose slipping units, the actual cause of the malfunction usually cannot be decided. Practically any condition can be caused by leaking hydraulic circuits or sticking valves.

Therefore, unless the condition is obvious, like no drive in "D" range first gear only, the transaxle should never be disassembled until hydraulic pressure tests have been performed.

### HYDRAULIC PRESSURE TESTS

Pressure testing is a very important step in the diagnostic procedure. These tests usually reveal the cause of most transaxle problems.

Before performing pressure tests, be certain that fluid level and condition, and control cable adjust-

### AUTOMATIC SHIFT SPEEDS AND GOVERNOR PRESSURE CHART (APPROXIMATE MILES AND KILOMETERS PER HOUR)

Vehicle	M and Z		M, Z, P, D, C, V		M, Z, P, D, C, V High Altitude	
Engine (Liter) .....	1.7L.		2.2 and 2.6L.		2.2L.	
Overall Top Gear Ratio .....	3.48		2.78		3.22	
Throttle Minimum	MPH	km/hr	MPH	km/hr	MPH	km/hr
1-2 Upshift .....	11-15	18-24	10-14	16-23	11-15	18-24
2-3 Upshift .....	16-21	26-34	15-20	24-32	16-22	26-35
3-1 Downshift .....	11-14	18-23	10-13	16-21	11-15	18-24
Throttle Wide Open						
1-2 Upshift .....	33-39	53-63	37-44	60-71	33-38	53-61
2-3 Upshift .....	55-64	89-103	61-71	98-114	62-73	100-117
Kickdown Limit						
3-2 WOT Downshift .....	51-60	82-97	57-66	92-106	56-66	90-106
3-2 Part Throttle Downshift .....	28-32	45-51	26-30	42-48	29-33	47-53
3-1 WOT Downshift .....	30-35	48-56	32-38	51-61	31-36	50-58
Governor Pressure*						
15 psi .....	23-26	37-42	22-24	35-39	24-27	39-43
50 psi .....	54-61	87-98	61-68	98-109	61-68	98-109

\*Governor pressure should be from zero to 3 psi at stand still or downshift may not occur.

NOTE: Changes in tire size will cause shift points to occur at corresponding higher or lower vehicle speeds.

Km/hr. = Kilometers per hour.





ments have been checked and approved. Fluid must be at operating temperature (150 to 200 degrees F.).

Install an engine tachometer, raise vehicle on hoist which allows front wheels to turn, and position tachometer so it can be read.

Disconnect throttle cable and shift cable from transaxle levers so they can be controlled from outside the vehicle.

Attach 150 psi gauges to ports required for test being conducted. A 300 psi gauge (C-3293) is required for "reverse" pressure test at rear servo.

Test port locations are shown in (Fig. 3).

### Test One (Selector in "1")

- (1) Attach gauges to "line" and "rear servo" ports.
- (2) Operate engine at 1000 rpm for test.
- (3) Move selector lever on transaxle all the way rearward ("1" position).
- (4) Read pressures on both gauges as throttle lever on transaxle is moved from full forward position to full rearward position.
- (5) Line pressure should read 52 to 58 psi with throttle lever rearward and gradually increase, as lever is moved forward, to 80 to 88 psi.
- (6) Rear servo pressure should read the same as line pressure within 3 psi.
- (7) This tests pump output, pressure regulation, and condition of rear clutch and rear servo hydraulic circuits.

### Test Two (Selector in "2")

- (1) Attach gauge to "line pressure" port and "tee" into lower cooler line fitting to read "lubrication" pressure.
- (2) Operate engine at 1000 rpm for test.
- (3) Move selector lever on transaxle one "detent" forward from full rearward position. This is selector "2" position.
- (4) Read pressures on both gauges as throttle lever

on transaxle is moved from full rearward position to full forward position.

(5) Line pressure should read 52 to 58 psi with throttle lever forward and gradually increase, as lever is moved rearward, to 80 to 88 psi.

(6) Lubrication pressure should be 10 to 25 psi with lever forward and 10 to 35 psi with lever rearward.

(7) This tests pump output, pressure regulation, and condition of rear clutch and lubrication hydraulic circuits.

### Test Three (Selector in "D")

- (1) Attach gauges to "line" and "front servo release" ports.
- (2) Operate engine at 1600 rpm for test.
- (3) Move selector lever on transaxle two "detents" forward from full rearward position. This is selector "D" position.
- (4) Read pressures on both gauges as throttle lever on transaxle is moved from full rearward position to full forward position.
- (5) Line pressure should read 52 to 58 psi with throttle lever forward and gradually increase, as lever is moved rearward.
- (6) Front servo release is pressurized only in direct drive and should be same as line pressure within 3 psi, up to kickdown point.
- (7) This tests pump output, pressure regulation, and condition of rear clutch, front clutch, and hydraulic circuits.

### Test Four (Selector in Reverse)

- (1) Attach 300 psi gauge to "rear servo apply" port.
- (2) Operate engine at 1600 rpm for test.
- (3) Move selector lever on transaxle four "detents" forward from full rearward position. This is selector "R" position.
- (4) Rear servo pressure should read 180 to 220 psi with throttle lever rearward and gradually increase, as

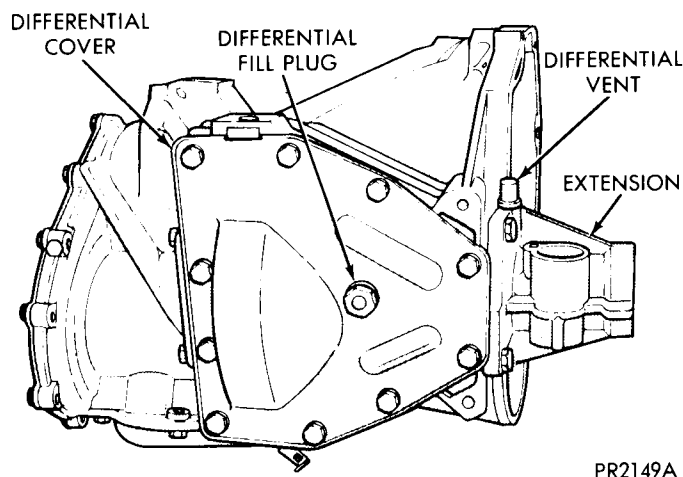


Fig. 1. Transaxle—Right Side

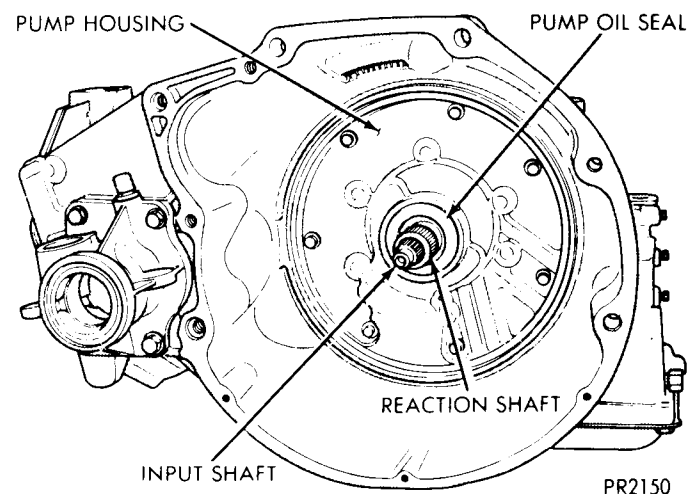
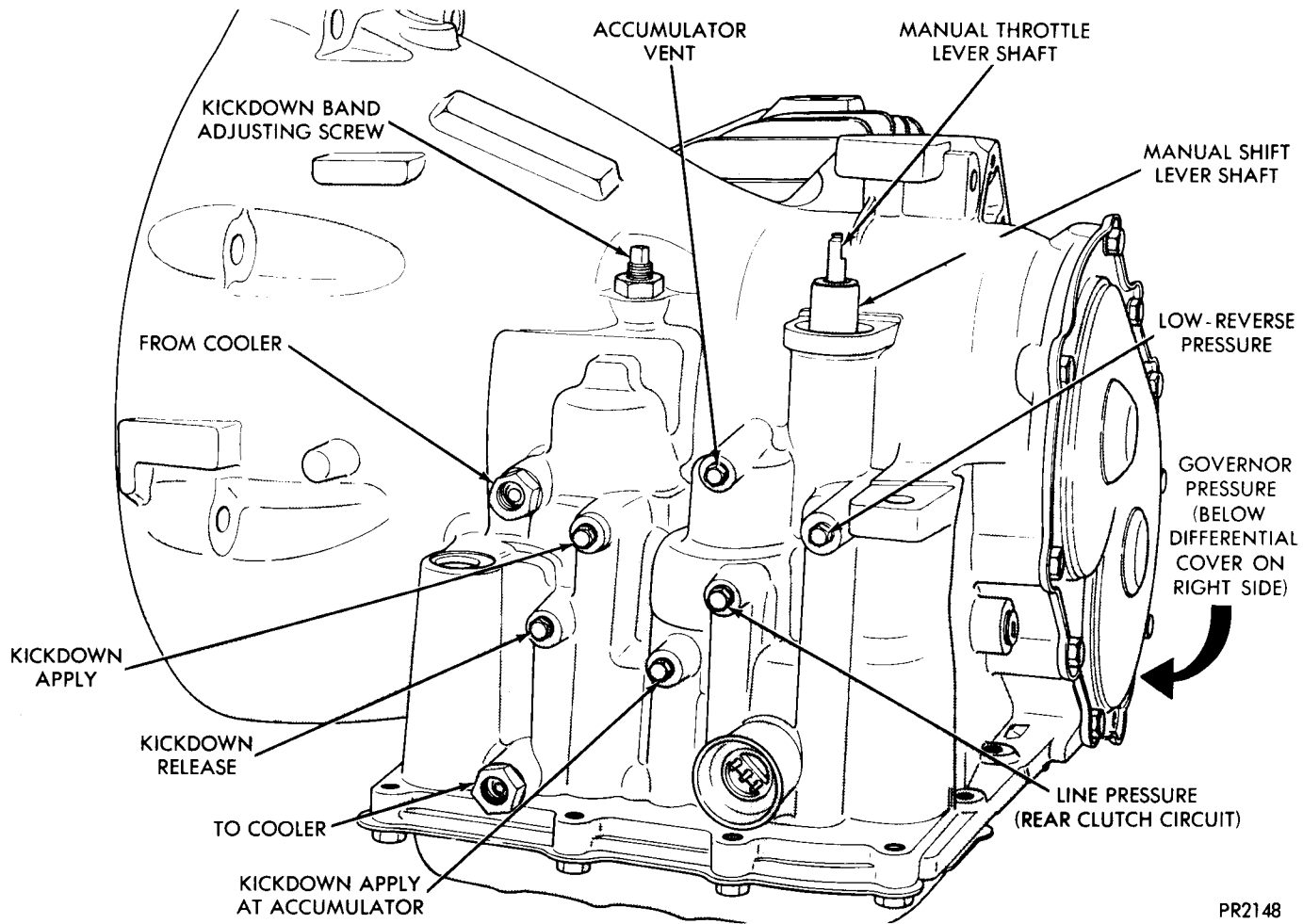


Fig. 2. Transaxle—Front End View



## TRANSAXLE



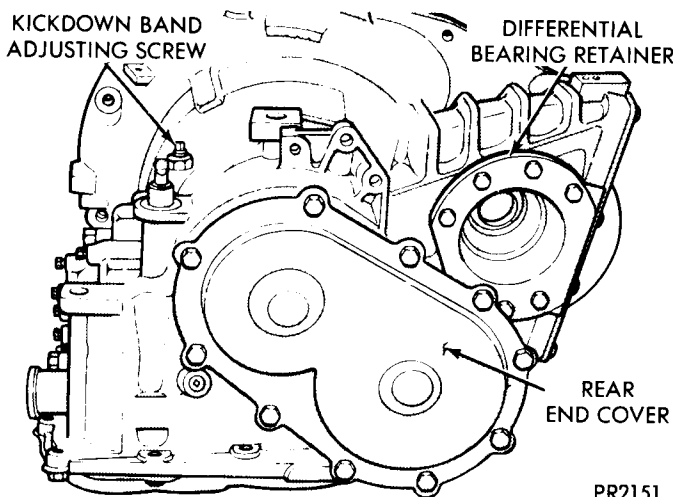
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**Fig. 3. Transaxle—Left Side**

lever is moved forward to 260 to 300 psi.

(5) This tests pump output, pressure regulation, and condition of front clutch and rear servo hydraulic circuits.

(6) Move selector lever on transaxle to "D" position to check that rear servo pressure drops to zero.



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**Fig. 4. Transaxle—Rear End View**

(7) This tests for leakage into rear servo, due to case porosity, which can cause reverse band burn out.

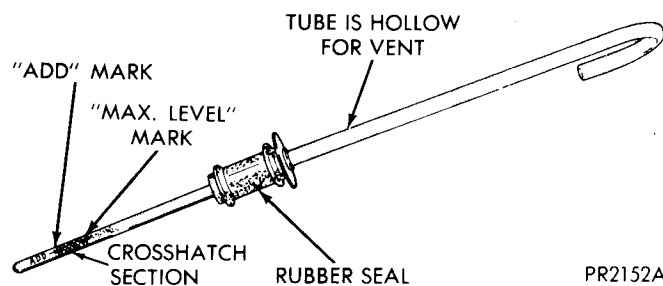
### **Test Result Indications**

(1) If proper line pressure, minimum to maximum, is found in any one test, the pump and pressure regulator are working properly.

(2) Low pressure in "D, 1, and 2" but correct pressure in "R" indicates rear clutch circuit leakage.

(3) Low pressure in "D and R" but correct pressure in "1" indicates front clutch circuit leakage.

(4) Low pressure in "R and 1" but correct pressure



PR2152A

**Fig. 5. Dipstick and Transmission Vent**



in "2" indicates rear servo circuit leakage.

(5) Low line pressure in all positions indicates a defective pump, a clogged filter, or a stuck pressure regulator valve.

### Governor Pressure

Test only if transaxle shifts at wrong vehicle speeds when throttle cable is correctly adjusted.

(1) Connect a 0-150 psi pressure gauge to governor pressure take-off point, located at lower right side of case, below differential cover (Fig. 3).

(2) Operate transaxle in third gear to read pressures and compare speeds shown in chart.

If governor pressures are incorrect at the given vehicle speeds, the governor valves are probably sticking. The governor pressure should respond smoothly to changes in mph and should return to 0 to 3 psi when vehicle is stopped. High pressure at stand still (above 3 psi) will prevent the transaxle from downshifting.

### Throttle Pressure

No gauge port is provided for throttle pressure. Incorrect throttle pressure should only be suspected if part throttle upshift speeds are either delayed or occur too early in relation to vehicle speeds. Engine runaway on either upshifts or downshifts can also be an indicator of incorrect (low) throttle pressure setting.

In no case should throttle pressure be adjusted until the transaxle throttle cable adjustment has been verified to be correct.

## CONVERTER STALL TEST

**WARNING:** During test let no one stand in front of vehicle.

The stall test consists of determining the engine speed obtained at full throttle in "D" position only. This test checks the torque converter stator clutch operation, and the holding ability of the transaxle clutches. The transmission oil level should be checked and the engine brought to normal operating temperature before stall operation. **Both the parking and service brakes must be fully applied and rear wheels blocked while making this test.**

Do not hold the throttle open any longer than is necessary to obtain a maximum engine speed reading, and never longer than five seconds at a time. If more than one stall check is required, operate the engine at approximately 1,000 rpm in neutral for 20 seconds to cool the transmission fluid between runs. If engine speed exceeds the maximum limits shown, release the accelerator immediately since transaxle clutch slippage is indicated.

### Stall Speed Above Specification

If stall speed exceeds the maximum specified in chart by more than 200 rpm, transaxle clutch slippage is indicated. Follow the transaxle oil pressure and air pressure checks outlined in this section to determine the cause of slippage.

### Stall Speed Below Specification

Low stall speeds with a properly tuned engine indicate torque converter stator clutch problems. A road test will be necessary to identify the exact problem.

If stall speeds are 250-350 rpm below specification, and the vehicle operates properly at highway speeds, but has poor through-gear acceleration, the stator overrunning clutch is slipping.

If stall speed and acceleration are normal, but abnormally high throttle opening is required to maintain highway speeds, the stator clutch has seized.

Both of these stator defects require replacement of the torque converter.

### Noise

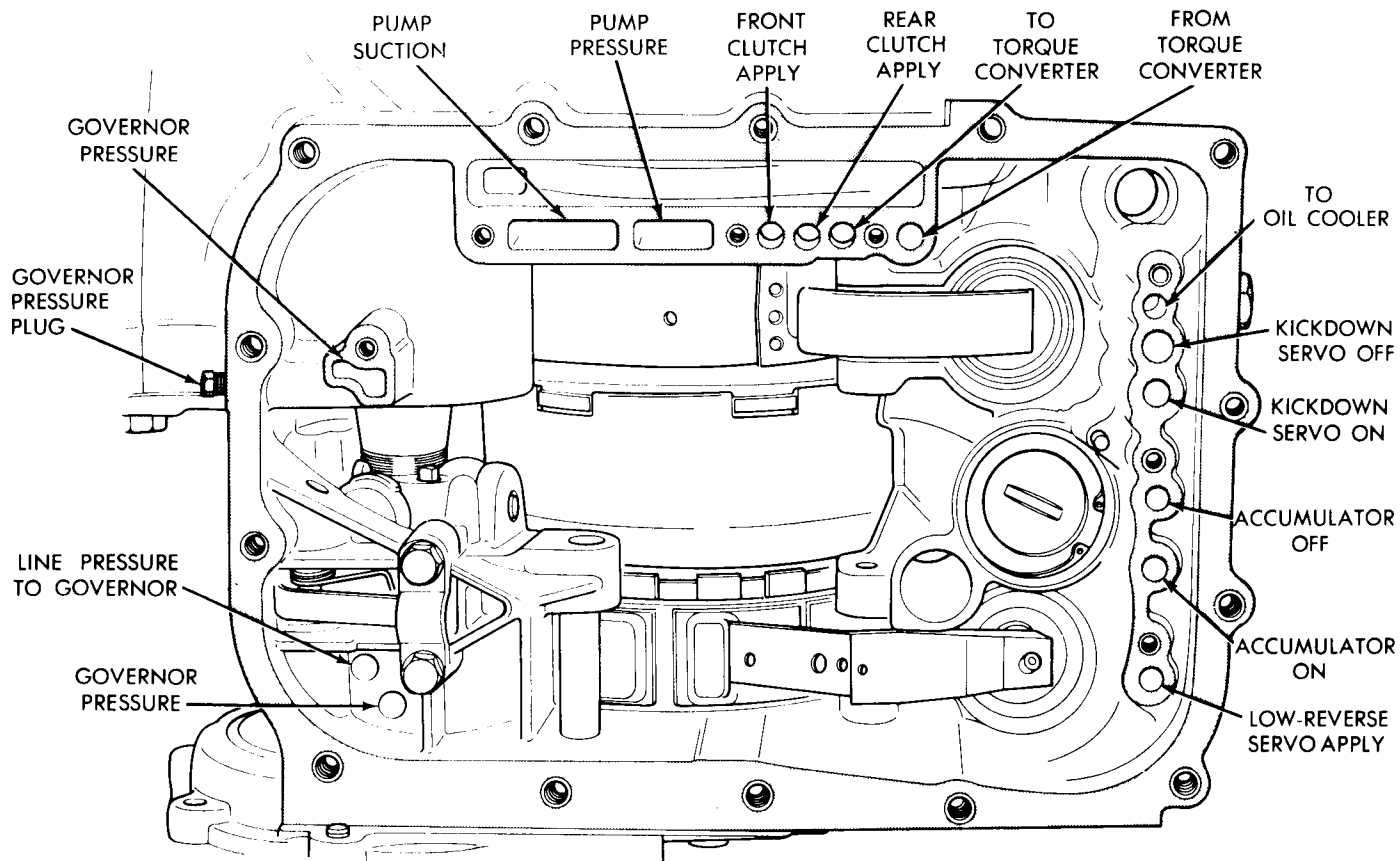
A whining or siren-like noise due to fluid flow is normal during stall operation with some converters; however, loud metallic noises from loose parts or interference within the assembly indicate a defective torque converter. To confirm that the noise originates within the converter, operate the vehicle at light throttle in D and N on a hoist and listen under the transaxle bell housing.

## CLUTCH AND SERVO AIR PRESSURE TESTS

A "NO DRIVE" condition might exist even with correct fluid pressure, because of inoperative clutches or bands. The inoperative units, clutches, bands, and servos can be located through a series of tests by substi-

## TORQUEFLITE TRANSMISSION STALL SPEED CHART

Engine Liter	Transaxle Type	Converter Diameter	Stall R.P.M.
1.7	A-404	9-1/2 inches (241 millimetres)	2300-2500
2.2	A-413	9-1/2 inches (241 millimeters)	2200-2410
2.6	A-470	9-1/2 inches (241 millimeters)	2400-2630



PU142A

**Fig. 6. Air Pressure Tests**

tuting air pressure for fluid pressure (Fig. 6).

The front and rear clutches, kickdown servo, and low-reverse servo may be tested by applying air pressure to their respective passages after the valve body assembly has been removed. To make air pressure tests, proceed as follows:

**Compressed air supply must be free of all dirt or moisture. Use a pressure of 30 psi.**

#### **Front Clutch**

Apply air pressure to front clutch "apply" passage and listen for a dull "thud" which indicates that front clutch is operating. Hold air pressure on for a few seconds and inspect system for excessive oil leaks.

#### **Rear Clutch**

Apply air pressure to rear clutch "apply" passage and listen for a dull "thud" which indicates that rear clutch is operating. Also inspect for excessive oil leaks. If a dull "thud" cannot be heard in the clutches, place finger tips on clutch housing and again apply air pressure. Movement of piston can be felt as the clutch is applied.

#### **Kickdown Servo (Front)**

Direct air pressure into front servo "apply" passage.

Operation of servo is indicated by a tightening of front band. Spring tension on servo piston should release the band.

#### **Low and Reverse Servo (Rear)**

Direct air pressure into rear servo "apply" passage. Operation of servo is indicated by a tightening of rear band. Spring tension on servo piston should release the band.

If clutches and servos operate properly, "no upshift" or "erratic shift" conditions indicate that malfunctions exist in the valve body.

### **FLUID LEAKAGE—TRANSAXLE CONVERTER HOUSING AREA**

#### **(1) Check for Source of Leakage.**

Since fluid leakage at or around the converter area may originate from an engine oil leak, the area should be examined closely. Factory fill fluid is dyed red and, therefore, can be distinguished from engine oil.

(2) Prior to removing the transaxle, perform the following checks:

When leakage is determined to originate from the transaxle, check fluid level prior to removal of the transaxle and torque converter.



High oil level can result in oil leakage out the vent located in the dipstick. If the fluid level is high, adjust to proper level.

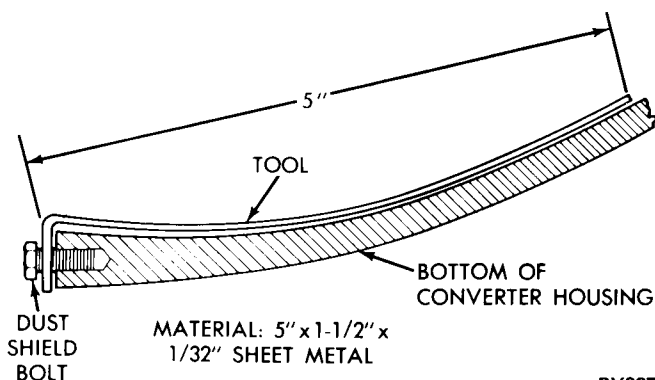
After performing this operation, inspect for leakage. If a leak persists, perform the following operation on the vehicle to determine if it is the converter or transaxle that is leaking.

### Leakage Test Probe

- (1) Remove converter housing dust shield.
- (2) Clean the inside of converter housing (lower area) as dry as possible. A solvent spray followed by compressed air drying is preferable.
- (3) Fabricate and fasten test probe (Fig. 7) securely to convenient dust shield bolt hole. Make certain converter is cleared by test probe. Tool must be clean and dry.
- (4) Run engine at approximately 2,500 rpm with transmission in neutral, for about 2 minutes. Transaxle must be at operating temperature.
- (5) Stop engine and carefully remove tool.
- (6) If upper surface of test probe is dry, there is no converter leak. A path of fluid across probe indicates a converter leak. Oil leaking under the probe is coming from the transaxle converter area.
- (7) Remove transaxle and torque converter assembly from vehicle for further investigation. The fluid should be drained from the transaxle. Install oil pan (with R.T.V. Sealant) at specified torque.

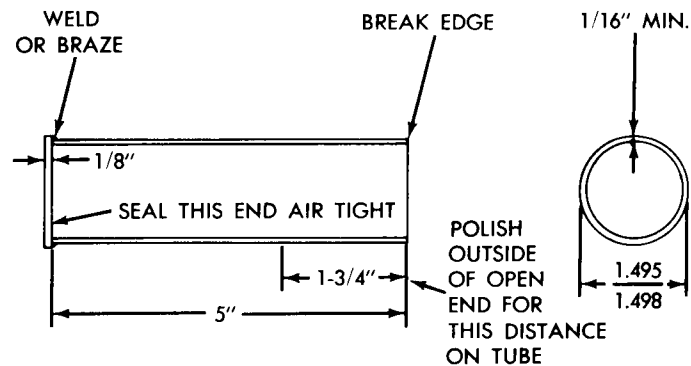
Possible sources of transaxle converter area fluid leakage are:

- (1) Converter Hub Seal.
  - (a) Seal lip cut, check converter hub finish.
  - (b) Bushing moved and/or worn.
  - (c) Oil return hole in pump housing plugged or omitted.
  - (d) Seal worn out (high mileage vehicles).
- (2) Fluid leakage at the outside diameter from pump housing "O" ring seal.
- (3) Fluid leakage at the front pump to case bolts.



RY287

Fig. 7. Leak Locating Test Probe Tool



MATERIAL: 1-1/2 INCH O.D. THIN WALLED STEEL TUBING AND 1/8 INCH STEEL DISC

PY305

Fig. 8. Converter Hub Seal Cup

- (4) Fluid leakage due to case or front pump housing porosity.

### Torque Converter Leakage

Possible sources of converter leakage are:

- (a) Torque converter weld leaks at the outside diameter (peripheral) weld.
- (b) Torque converter hub weld.

**Hub weld is inside and not visible. Do not attempt to repair. Replace torque converter.**

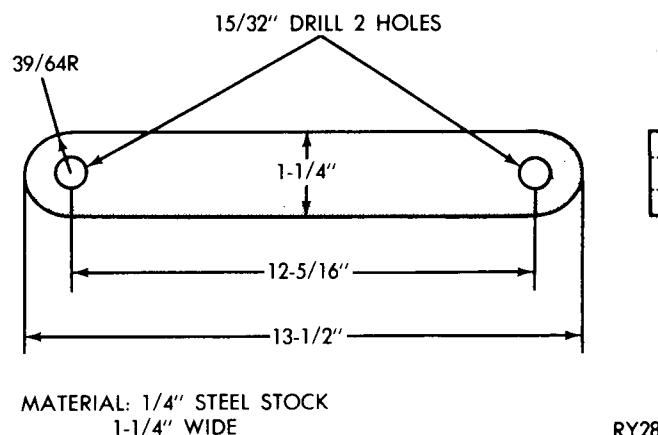
### Air Pressure Test of Transaxle

Fabricate equipment needed for test as shown in (Figs. 8 and 9).

The transaxle should be prepared for pressure test as follows after removal of the torque converter:

- (1) Install a dipstick bore plug and plug oil cooler line fitting (lower fitting).
- (2) With rotary motion, install converter hub seal cup over input shaft, and through the converter hub seal until the cup bottoms against the pump gear lugs. Secure with cup retainer strap (Fig. 9) using converter housing to engine block retaining bolt for tapped hole.

**NOTE:** Use lower starter hole and front dowel hole.



RY288

Fig. 9. Hub Seal Cup Retaining Strap



(3) Attach and clamp hose from nozzle of Tool C-4080 to the upper cooler line fitting position in case.

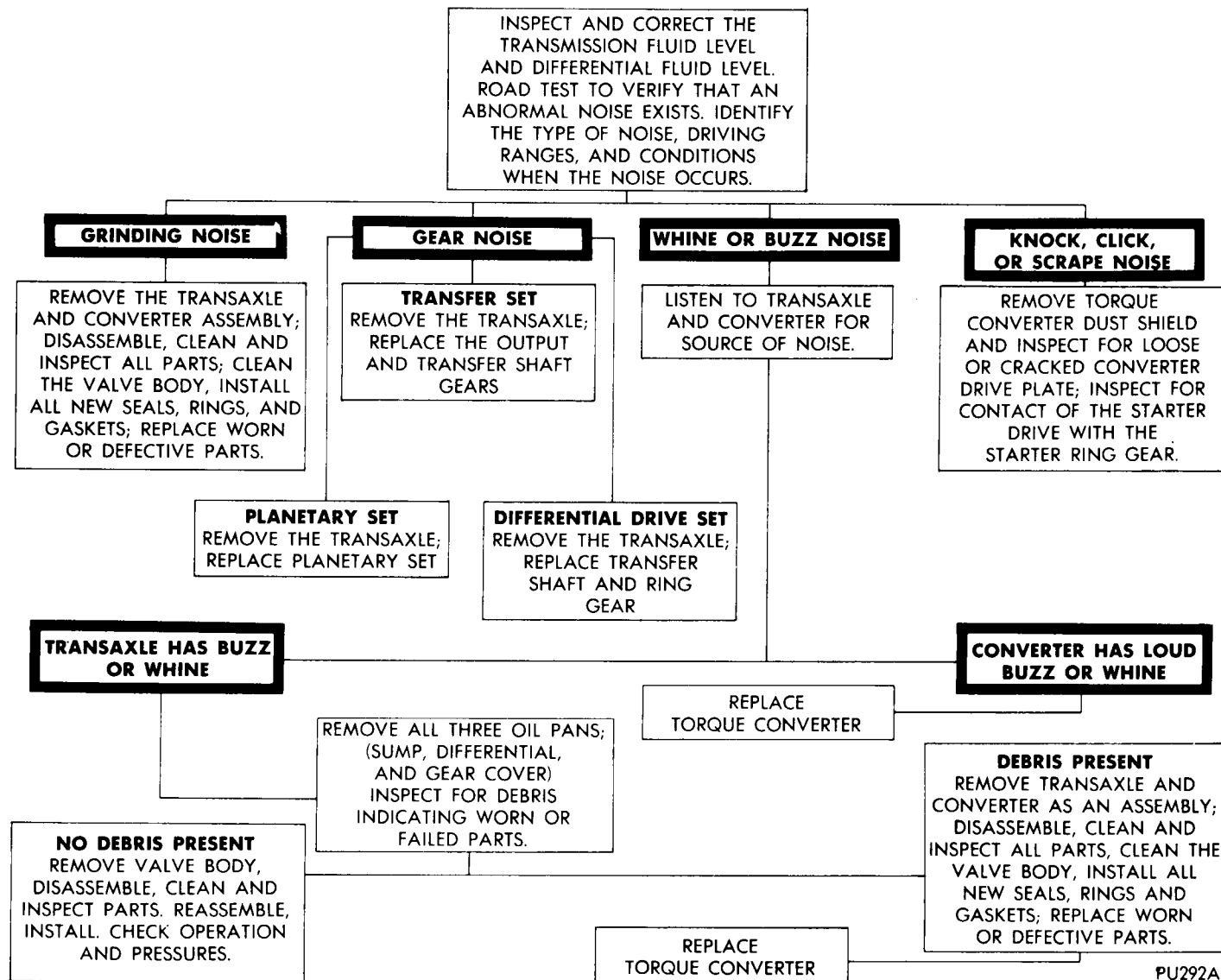
(4) Pressurize the transaxle using Tool C-4080 until the pressure gauge reads 8 psi. Position transaxle so that pump housing and case front may be covered with soapy solution or water. Leaks are sometimes caused by porosity in the case or pump housing.

**CAUTION:** Do not, under any circumstances, pressurize a transaxle to more than 10 psi.

**NOTE:** Air leakage at differential vent indicates leakage in the area of the transfer shaft bearing retainer.

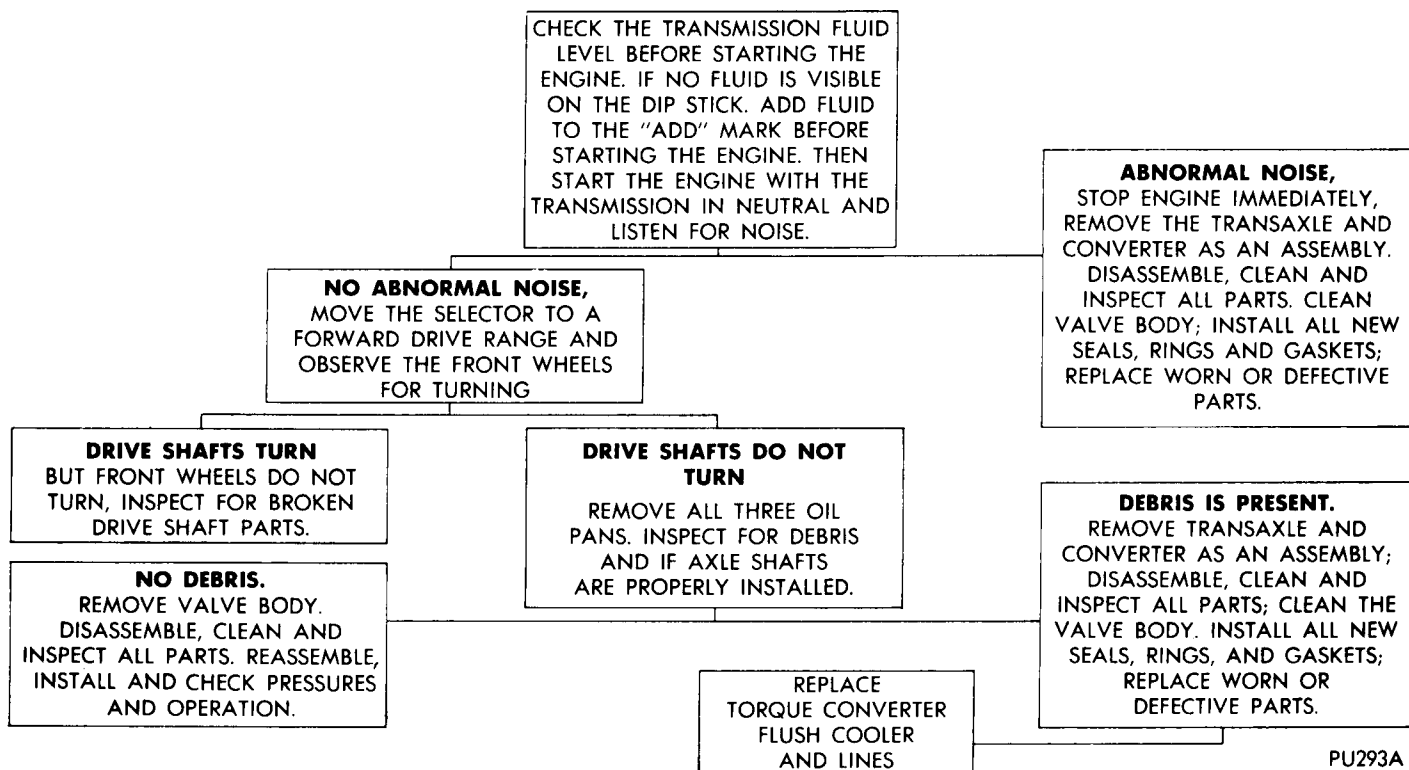
If a leak source is located, that part and all associated seals, "O" rings, and gaskets should be replaced with new parts.

## DIAGNOSIS GUIDE-ABNORMAL NOISE

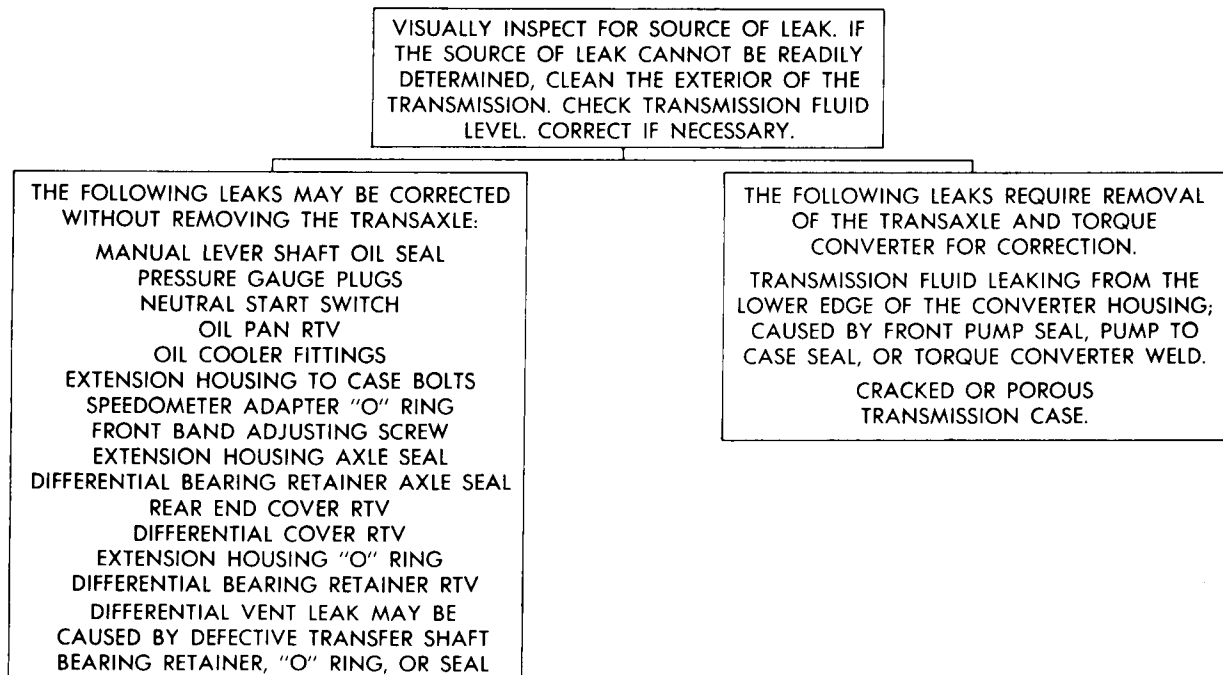




## DIAGNOSIS GUIDE-VEHICLE WILL NOT MOVE



## DIAGNOSIS GUIDE-FLUID LEAKS



PU294A



# TRANSAXLE

## POSSIBLE CAUSE

CONDITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33			
HARSH ENGAGEMENT FROM NEUTRAL TO D			X			X																														
R		X	X		X		X																						X							
DELAYED ENGAGEMENT FROM NEUTRAL TO D						X																														
R		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
RUNAWAY UPSHIFT						X		X		X					X																					
NO UPSHIFT					X		X	X	X						X																					
3-2 KICKDOWN RUNAWAY					X			X							X																					
NO KICKDOWN OR NORMAL DOWNSHIFT						X									X																					
SHIFTS ERRATIC					X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
SLIPS IN FORWARD DRIVE POSITIONS					X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
SLIPS IN REVERSE ONLY		X		X	X	X	X	X	X	X	X	X	X	X															X							
SLIPS IN ALL POSITIONS				X		X		X		X	X	X	X	X																						
NO DRIVE IN ANY POSITION				X		X		X		X	X																									
NO DRIVE IN FORWARD DRIVE POSITIONS				X		X		X				X					X													X						
NO DRIVE IN REVERSE				X	X	X	X	X	X																					X						
DRIVES IN NEUTRAL						X			X																				X	X	X					
DRAGS OR LOCKS					X																															
GRATING, SCRAPING GROWLING NOISE					X											X																				
BUZZING NOISE						X		X																												
HARD TO FILL, OIL BLOWS OUT FILLER HOLE									X																											
TRANSAXLE OVERHEATS			X	X	X			X	X		X																			X	X	X				
HARSH UPSHIFT															X																					
DELAYED UPSHIFT															X																					





## MAINTENANCE AND ADJUSTMENTS

### LUBRICATION

Inspect fluid level on dipstick every six months (Fig. 1) with engine idling and transaxle in park or neutral position. A properly filled transaxle will read near the "add" mark when fluid temperature is 21 degrees Celsius (70 degrees Fahrenheit) and near (but not over) the "MAX. LEVEL" mark at 82 degrees Celsius (180 degrees Fahrenheit) (average operating temperature).

#### Fluid and Filter Changes

Fluid and filter changes or band adjustments are not required for average passenger car usage.

Severe usage as defined below, requires that fluid and filter be changed and bands adjusted every 24 000 km (15,000 miles).

(1) More than 50% operation in heavy city traffic during hot weather above 32°C (90°F.).

(2) Police, Taxi, Commercial Type Operation, and Trailer Towing.

#### NOTES:

(1) When the factory fill fluid is changed as recommended above, only fluids of the type labeled "DEXRON II" Automatic Transmission Fluid should be used. A band adjustment and filter change should be made at the time of the oil change.

(2) If the transaxle is disassembled for any reason, the fluid and filter should be changed, and the band(s) adjusted.

#### Drain and Refill

(1) Raise vehicle on a hoist (See Lubrication, "Group 0"). Place a drain container with a large opening, under transaxle oil pan.

(2) Loosen pan bolts and tap the pan at one corner

to break it loose allowing fluid to drain, then remove the oil pan.

(3) Install a new filter on bottom of the valve body and tighten retaining screws to 5 N·m (40 inch-pounds).

(4) Clean the oil pan, and reinstall using R.T.V. Tighten oil pan bolts to 19 N·m (165 in. lbs.).

(5) Pour four quarts of "DEXRON II" type Automatic Transmission Fluid through the filler opening.

(6) Start engine and allow to idle for at least two minutes. Then, with parking brake on, move selector lever momentarily to each position, ending in the park or neutral position.

(7) Add sufficient fluid to bring level to the "ADD" mark.

Recheck fluid level after transaxle is at normal operating temperature. The level should be between the "MAX. LEVEL" mark and "ADD" mark (Fig. 1).

To prevent dirt from entering transaxle, make certain that dipstick is fully seated into the filler opening.

### GEARSHIFT LINKAGE ADJUSTMENT (Console or Column Shift) (Fig. 2)

When it is necessary to disassemble linkage cable from lever, which use plastic grommets as retainers, the grommets should be replaced with new grommets. Use a prying tool to force rod from grommet in lever, then cut away old grommet. Use pliers to snap new grommet into lever and rod into grommet.

(1) Place gearshift lever in "P" (PARK) position.

(2) Pull the shift lever by hand all the way to the front detent position (PARK) with a load of 10 pounds.

While maintaining the 10 pounds of pull on the shift lever, tighten lock nut bolt to 10 N·m (90 in. lbs.). Gearshift linkage should now be properly adjusted.

(4) Check adjustment as follows:

(a) Detent position for neutral and drive should be within limits of hand lever gate stops.

(b) Key start must occur only when shift lever is in park or neutral positions.

(5) If console removal is required, disconnect battery ground cable. Insert a 1/16 inch diameter wire in hole in bottom of knob and push up on wire. To remove knob retainer clip, insert long nose plier tips in clip holes, push downward lightly and turn counter-

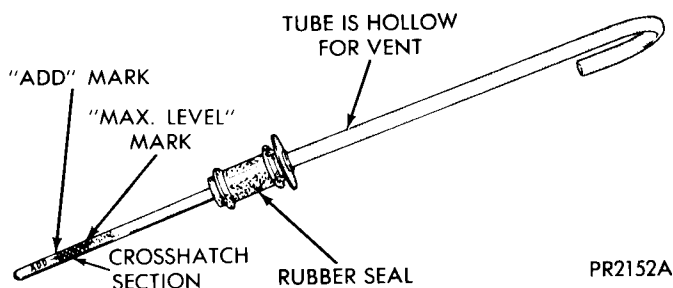
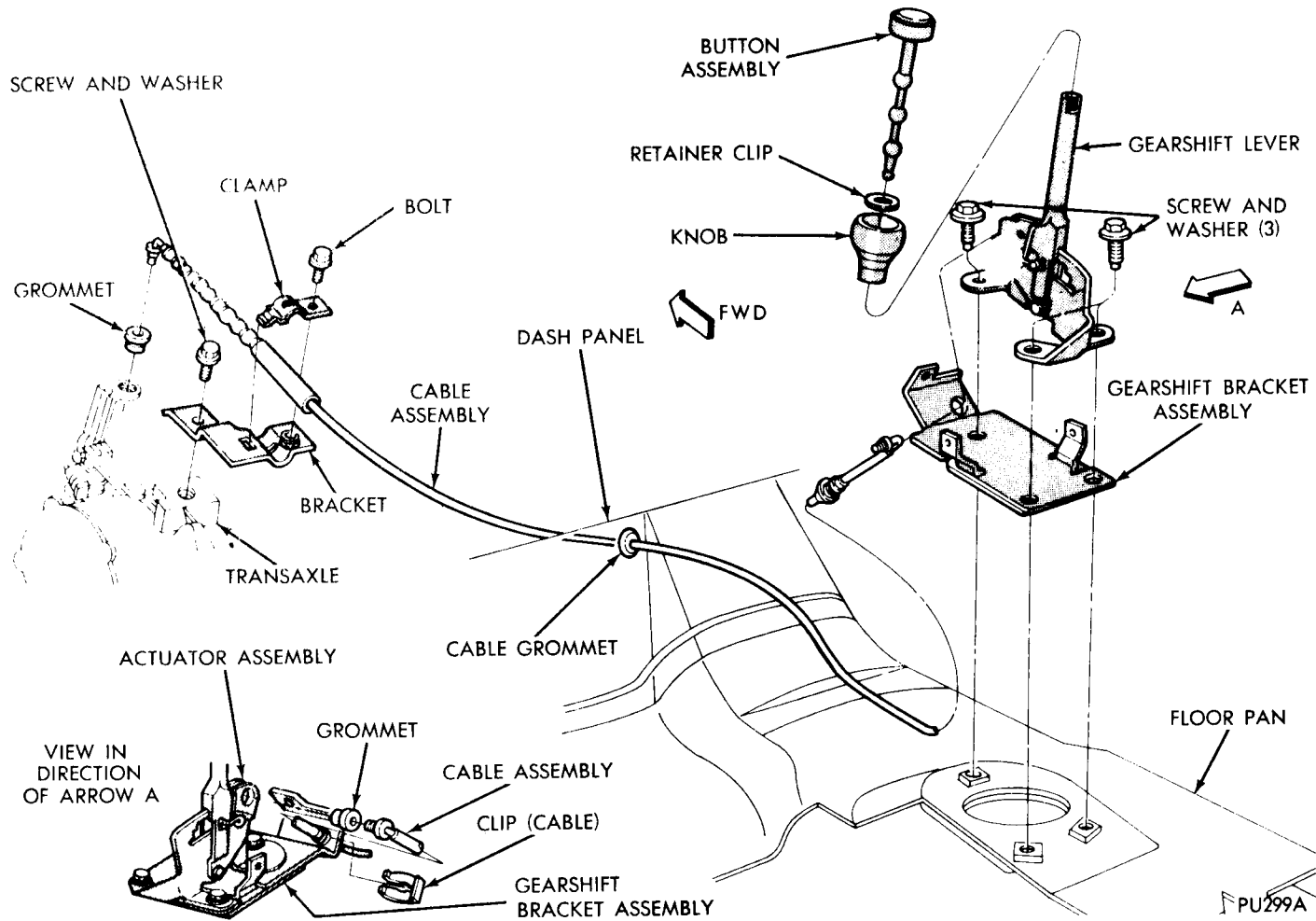


Fig. 1. Dipstick and Transmission Vent



**Fig. 2. Gearshift Linkage**

clockwise (action similar to a light bulb socket). Pull knob straight up to remove from gearshift lever. Proceed as outlined in console removal, "Group 23".

(7) After console is in place, install shift knob and button by reversing the procedure in step (6).

### THROTTLE CABLE ADJUSTMENT (Fig. 3)

With engine at operating temperature and carburetor off fast idle cam, adjust idle speed of engine using a tachometer. Refer to "Fuel System" Group 14 for idle speed Specifications and carburetor cable adjustment.

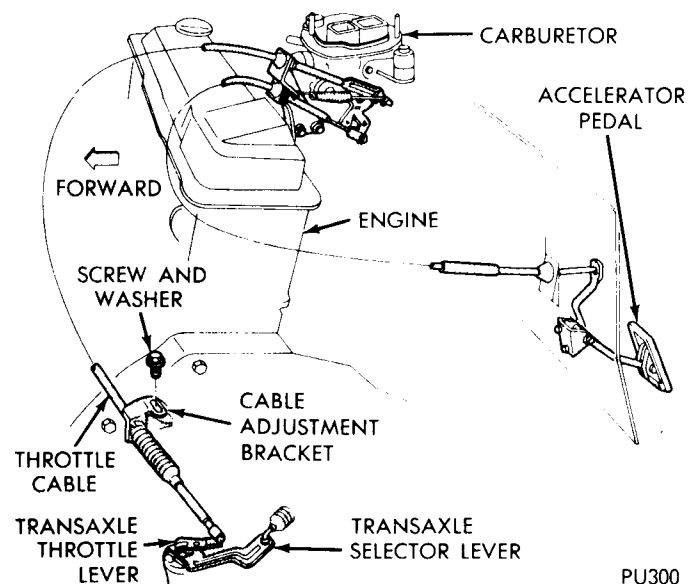
#### **Adjustment Procedure**

(1) Perform transaxle throttle cable adjustment while engine is at normal operating temperature, otherwise make sure carburetor is not on fast idle cam by disconnecting choke.

(2) Loosen adjustment bracket lock screw.

(3) To insure proper adjustment, bracket must be free to slide on its slot. If necessary, disassemble and clean or repair bracket and case boss sliding surface to assure free action.

(4) Hold throttle lever firmly rearward against its internal stop and tighten the adjusting bracket lock screw to 12 N·m (105 in. lbs.).



**Fig. 3. Throttle Control (Typical)**



(5) The adjustment is finished and throttle cable backlash was automatically removed.

(6) If lubrication is required see Lubrication, Group 0.

(7) Reconnect choke if disconnected. Test cable freedom of operation by moving the throttle lever forward and slowly release it to confirm it will return fully rearward.

## BAND ADJUSTMENT

### Kickdown Band (Front)

The kickdown band adjusting screw is located on left side (top front) of the transaxle case.

(1) Loosen lock nut and back off nut approximately five turns. Test adjusting screw for free turning in the transaxle case.

(2) Using wrench, Tool C-3380-A with adapter C-3705, tighten band adjusting screw 5 N·m (47 to 50 in. lbs.). If adapter C-3705 is not used, tighten adjusting screw to 8 N·m (72 in. lbs.) which is the true torque.

(3) Back off adjusting screw the number of turns listed in "Specifications". Hold adjusting screw in this position and tighten lock nut to 47 N·m (35 ft. lbs.)

### Low-Reverse Band (Rear)

(1) **A-404.** The low-reverse band is not adjustable in this transaxle. If excessive band wear is suspected, a simple check may be made as follows:

(a) Remove transaxle oil pan and pressurize low-reverse servo with 30 psi shop air pressure.

(b) Measure the gap between band ends. If the gap is less than 2 mm. (.080 inch), the band has worn excessively and should be replaced.

(2) **A-413 and A-470.** Before attempting adjustment, the low-reverse band should be checked for end gap as indicated above. To adjust band, proceed as follows:

(a) Loosen and back off lock nut approximately 5 turns.

(b) Using an inch-pound torque wrench, tighten

adjusting screw to 5 N·m (41 inch-pounds) true torque.

(c) Back off adjusting screw the number of turns listed under "Specifications" in the rear of Transaxle Section in this service manual.

(d) Tighten lock nut to 27 N·m (20 ft. lbs.).

## HYDRAULIC CONTROL PRESSURE ADJUSTMENTS

### Line Pressure

An incorrect throttle pressure setting will cause incorrect line pressure readings even though line pressure adjustment is correct. Always inspect and correct throttle pressure adjustment before adjusting the line pressure.

The approximate adjustment is 1-5/16 inches, measured from valve body to inner edge of adjusting nut. However, due to manufacturing tolerances, the adjustment can be varied to obtain specified line pressure.

The adjusting screw may be turned with an Allen wrench. One complete turn of adjusting screw changes closed throttle line pressure approximately 1-2/3 psi. Turning adjusting screw counterclockwise increases pressure, and clockwise decreases pressure.

### Throttle Pressure

Throttle pressures cannot be tested accurately; therefore, the adjustment should be measured if a malfunction is evident.

(1) Insert gauge pin of Tool C-3763 between the throttle lever cam and kickdown valve.

(2) By pushing in on tool, compress kickdown valve against its spring so throttle valve is completely bottomed inside the valve body.

(3) As force is being exerted to compress spring, turn throttle lever stop screw with adapter C-4553 with handle until head of screw touches the throttle lever tang with throttle lever cam touching tool and the throttle valve bottomed. Be sure adjustment is made with spring fully compressed and valve bottomed in the valve body.

## SERVICE IN VEHICLE

### GENERAL INFORMATION

Various transaxle components can be removed for repairs without removing the transaxle from the vehicle. The removal, reconditioning, and installation

procedures for some of these components are covered here.

**NOTE:** The valve body (see service out of vehicle) may



be serviced in the vehicle, as can the transfer shaft oil seal, parking sprag, governor assembly and extension housing oil seal.

### SPEEDOMETER PINION GEAR

**NOTE:** When the speedometer pinion adapter is removed for any reason, a **NEW** O-ring must be installed on the outside diameter of the adapter.

#### Remove and Install

(1) Remove bolt and washer assembly securing speedometer pinion adapter in the extension housing.

(2) With cable housing connected, carefully work adapter and pinion out of the extension housing.

(3) Remove the retainer and remove the pinion from the adapter.

(4) If transmission fluid is found in cable housing, install a new speedometer pinion and seal assembly.

(5) If transmission fluid is found leaking between the cable and adapter, replace the small "O" ring on the cable. Remove the adapter from the cable. Replace the "O" ring.

(6) Install the adapter on the cable.

(7) Install pinion on adapter with a new large "O" ring and install retainer on pinion and adapter. Be sure the retainer is properly seated.

Before installing pinion, adapter, and cable assembly make sure adapter flange and its mating areas on extension housing are clean. Dirt or sand will cause misalignment resulting in speedometer pinion gear damage.

(8) Install bolt and washer. Tighten retainer bolt to 7 N·m (60 in. lbs.).

### NEUTRAL STARTING AND BACK-UP LIGHT SWITCH (Fig. 1)

#### Replacement and Test

The Neutral Starting Switch is the center terminal of the 3 terminal switch. It provides ground for the starter solenoid circuit through the selector lever in only **Park** and **Neutral** positions.

(1) To test switch, remove wiring connector from switch and test for continuity between center pin of switch and transaxle case. Continuity should exist only when transaxle is in **Park** or **Neutral**.

(2) Check gearshift cable adjustment before replacing a switch which tests bad.

(3) Unscrew switch from transaxle case allowing fluid to drain into a container. Move selector lever to **Park** and then to **Neutral** positions, and inspect to see that the switch operating lever fingers are centered in switch opening in the case.

(4) Screw switch with new seal into transaxle case and tighten to 33 N·m (24 ft. lbs.). Retest switch with the test lamp.

(5) Add fluid to transmission to bring up to proper level.

(6) The Back-up Light Switch Circuit is through the two outside terminals of the 3 terminal switch.

(7) To test switch, remove wiring connector from switch and test for continuity between the two outside pins.

(8) Continuity should exist only with transaxle in Reverse position.

(9) No continuity should exist from either pin to the case.

### GOVERNOR

To service the governor assembly in the vehicle, it is **not** necessary to remove the transfer gear cover, transfer gear, and governor support. The governor may be serviced by removing the transaxle oil pan and valve body assembly. With the oil pan and valve body removed, the governor may be unbolted from the governor support and removed from the vehicle for reconditioning or replacement.

When cleaning or assembling the governor, make sure the governor valves move freely in the bores of the governor body.

### ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum transaxle case and valve body can be repaired by the use of Heli-Coils, or equivalent. Essentially, this repair consists of drilling out the worn-out damaged threads, tapping the hole with a special Heli-Coil, or equivalent, Tap, and installing a Heli-Coil, or equivalent, insert into the tapped hole. This brings the hole back to its original thread size.

Heli-Coil, or equivalent, tools and inserts are readily available from most automotive parts suppliers.

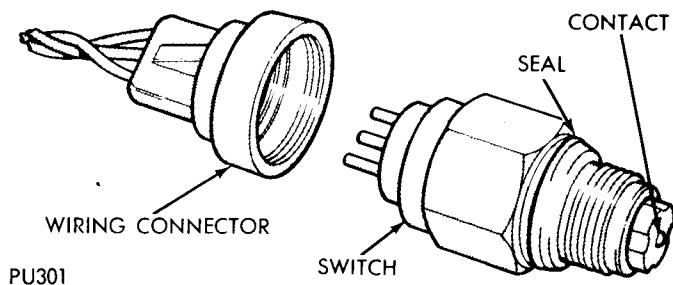


Fig. 1. Neutral-Park Start & Back-up Lamp Switch



## SERVICE OUT OF VEHICLE

### OIL COOLERS AND TUBES REVERSE FLUSHING

When a transaxle failure has contaminated the fluid, the oil cooler(s) should be flushed and the torque converter replaced with an exchange unit to insure that metal particles or sludged oil are not later transferred back into the reconditioned (or replaced) transaxle.

(1) Place a length of hose over the end of the lower (from cooler) oil cooler tube. Insert hose securely into a waste oil container.

(2) Apply compressed air to the upper oil cooler tube in very short, sharp blasts.

(3) Pump approximately one pint of "DEXRON II" type automatic transmission fluid into the upper (to cooler) oil cooler tube.

(4) Repeat step (2). Remove hose.

### TRANSAXLE AND CONVERTER REMOVAL

**NOTE:** Transaxle removal does **not** require engine removal.

(1) The transaxle and converter must be removed as an assembly; otherwise, the converter drive plate, pump bushing, or oil seal may be damaged. The drive

plate will not support a load; therefore, none of the weight of the transaxle should be allowed to rest on the plate during removal.

**CAUTION:** After installing transaxle, fill "DIFFERENTIAL" with "DEXRON II" automatic transmission fluid before lowering vehicle to floor.

(2) Disconnect or connect **positive** battery cable.

(3) Disconnect or connect throttle and shift linkage from transaxle.

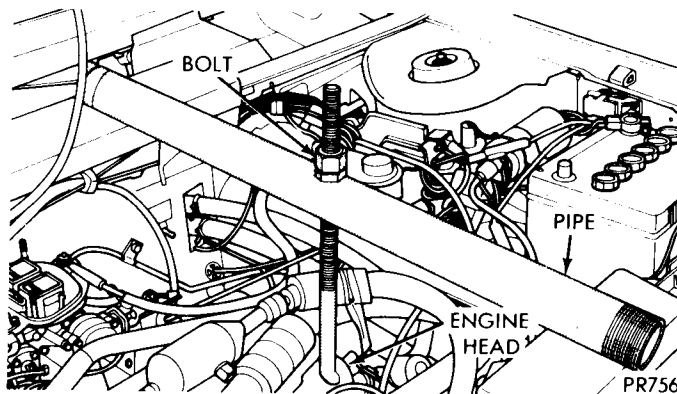


Fig. 2. Engine Support Fixture

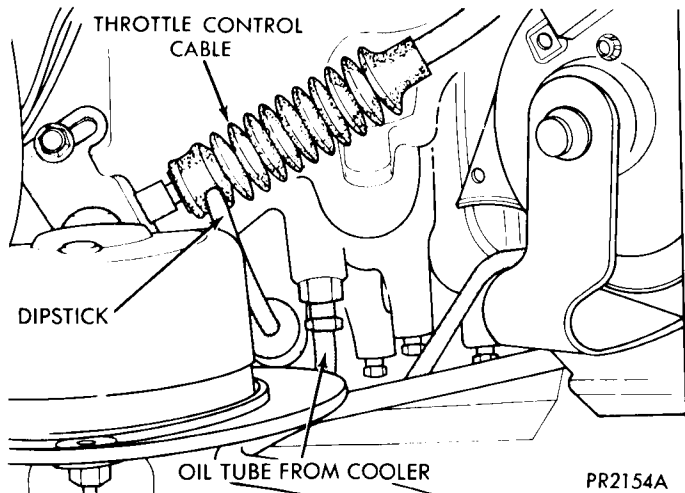


Fig. 1. Remove or Install Upper Oil Cooler Tube

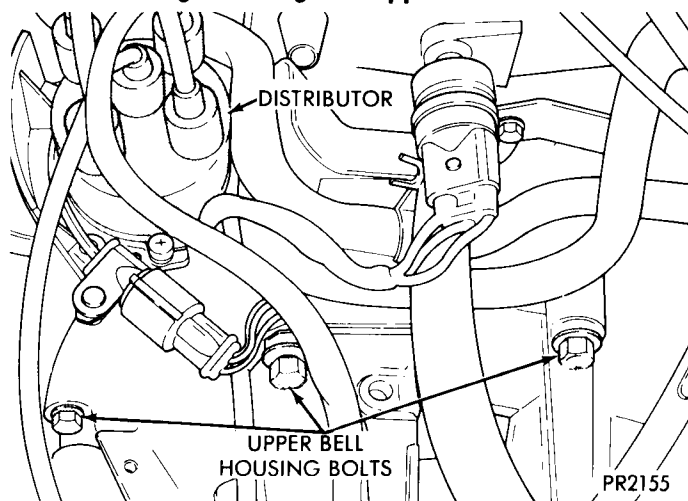
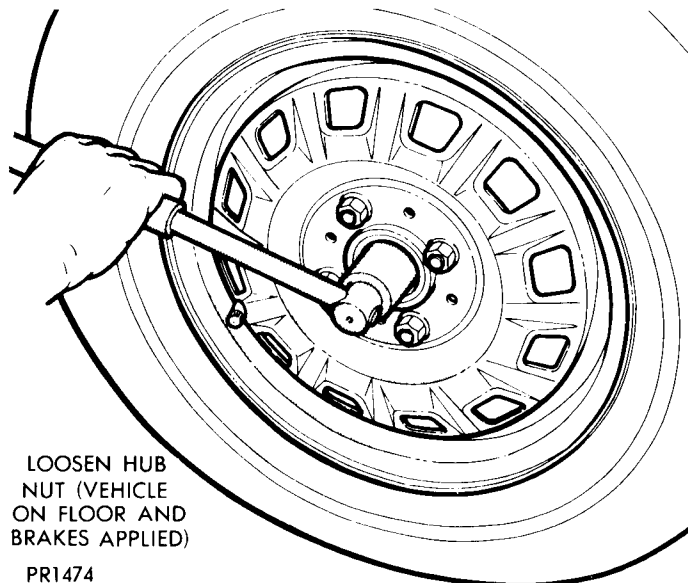
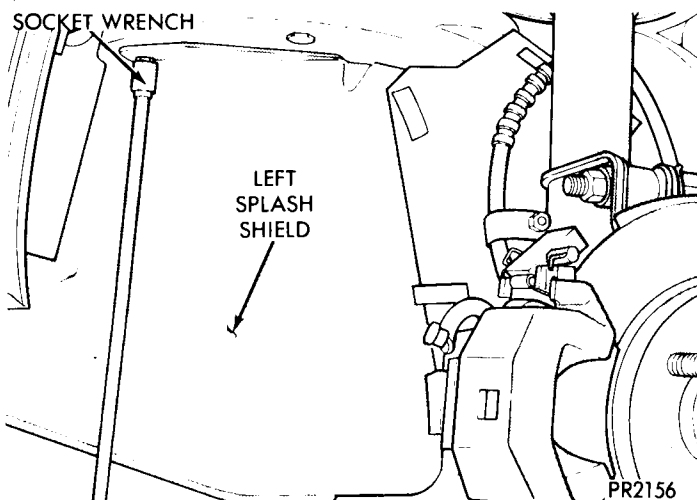


Fig. 3. Remove or Install Bell Housing Upper Bolts

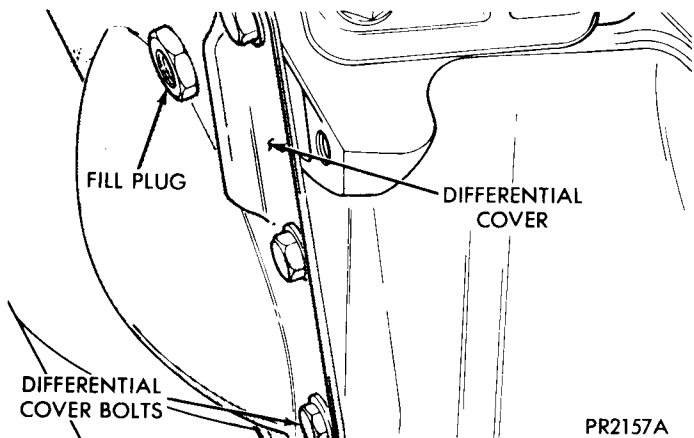


**Fig. 4. Remove or Install Hub Castle Lock, Nut, and Cotter Pin**

**CAUTION:** Raise vehicle. Remove front wheels. Refer to "Suspension, Group 2" to remove or install wheel hub nut and drive shafts.

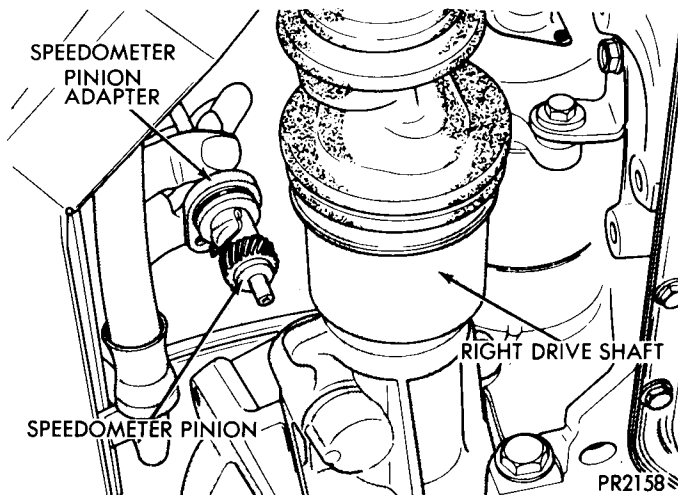


**Fig. 5. Remove or Install Left Splash Shield**

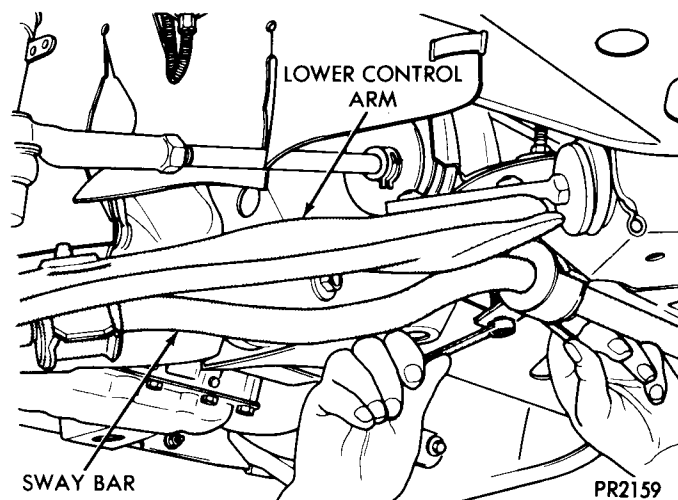


**Fig. 6. Fill Differential & Remove or Install Differential Cover**

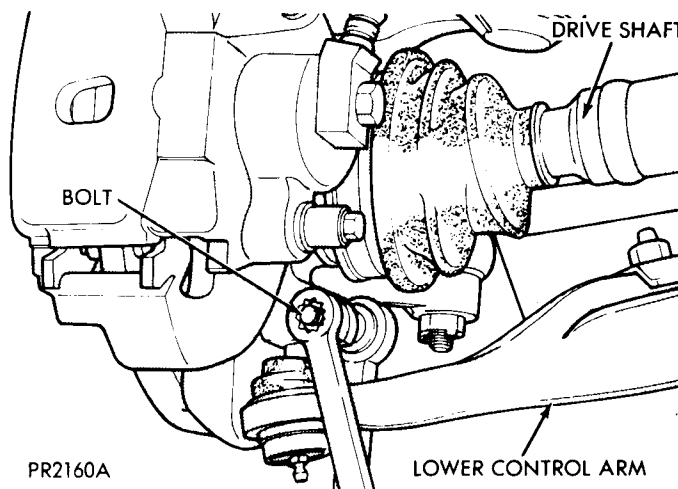
Use only R.T.V. sealant when installing cover.



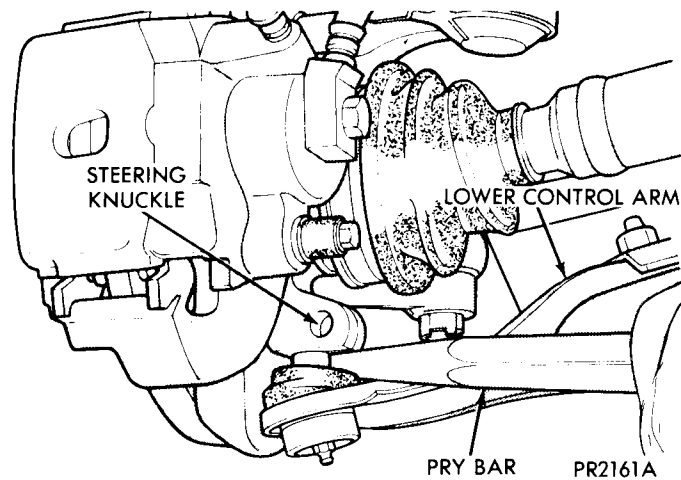
**Fig. 7. Remove or Install Speedometer Adapter, Cable, and Pinion as an Assembly**



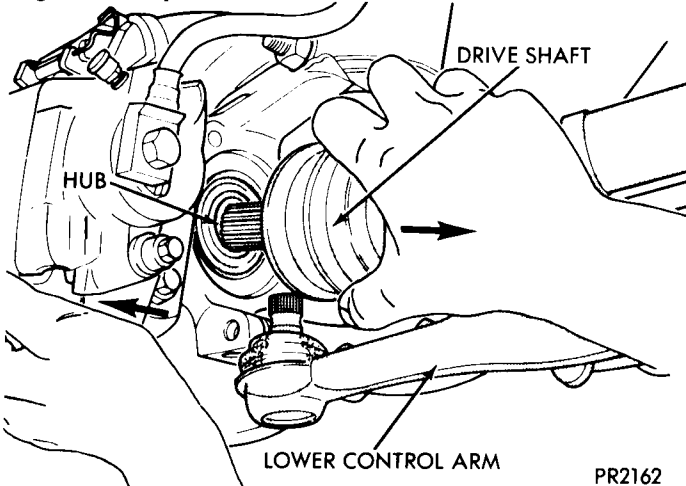
**Fig. 8. Remove or Install Sway Bar**



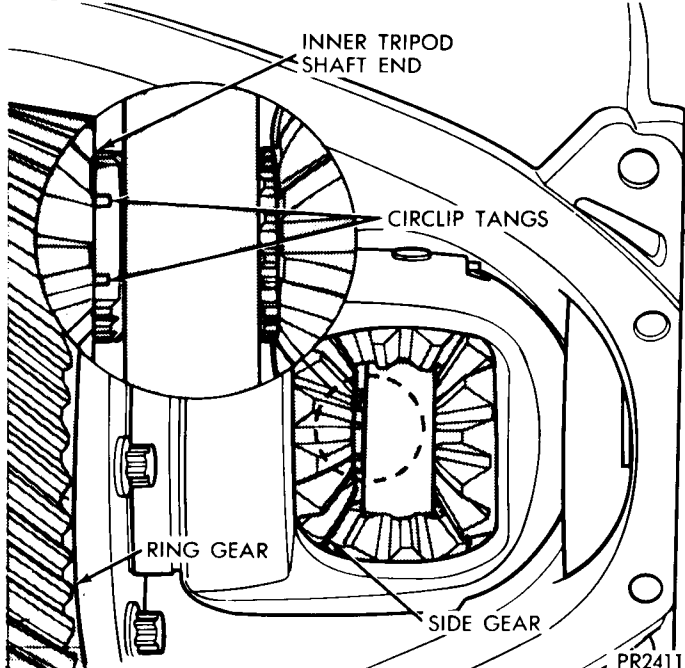
**Fig. 9. Remove or Install both Lower Ball Joint to Steering Knuckle Bolts**



**Fig. 10. Pry Lower Ball Joint from Steering Knuckle**

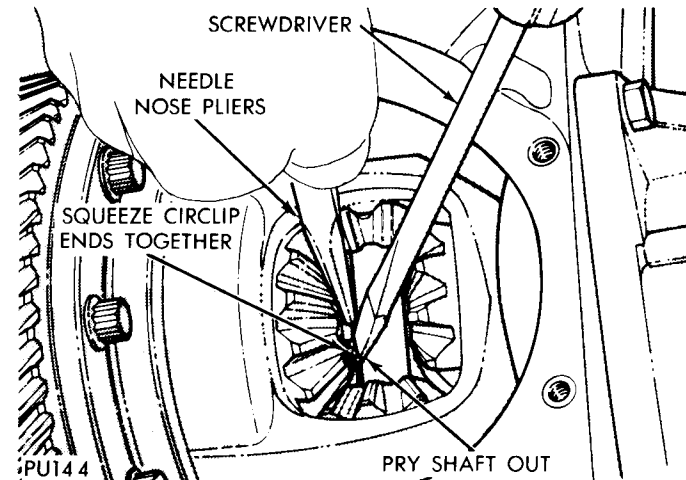


**Fig. 11. Remove or Install Drive Shaft from (to) Hub**

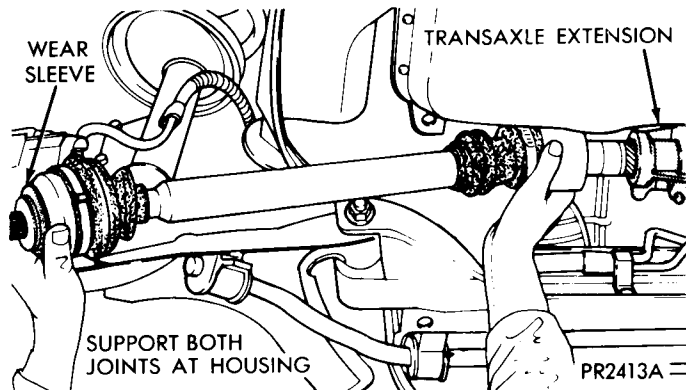


**Fig. 12. Rotate both Drive Shafts to Expose Circlip Ends**

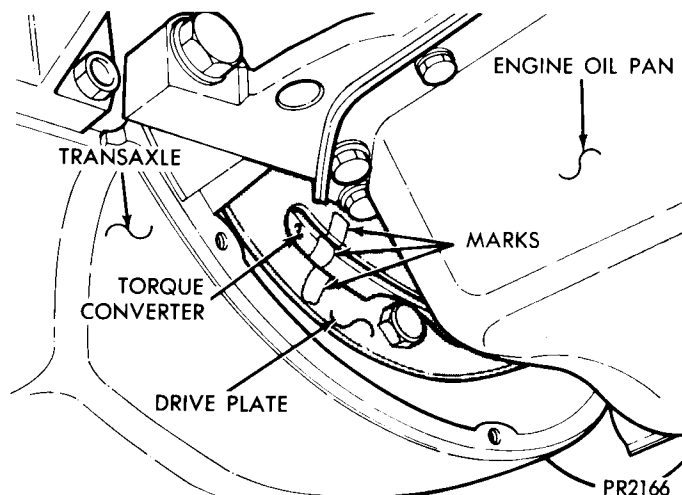
**NOTE:** Observe flat surface on the inner ends of both axle tripod shafts.  
**CAUTION:** REFER TO "SUSPENSION, GROUP 2" OF THIS SERVICE MANUAL TO REMOVE OR INSTALL DRIVE SHAFTS.



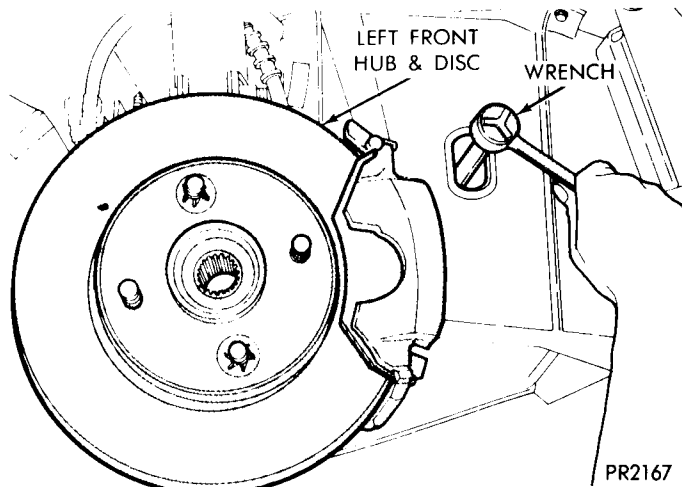
**Fig. 13. Pry Drive Shaft out of Side Gear**



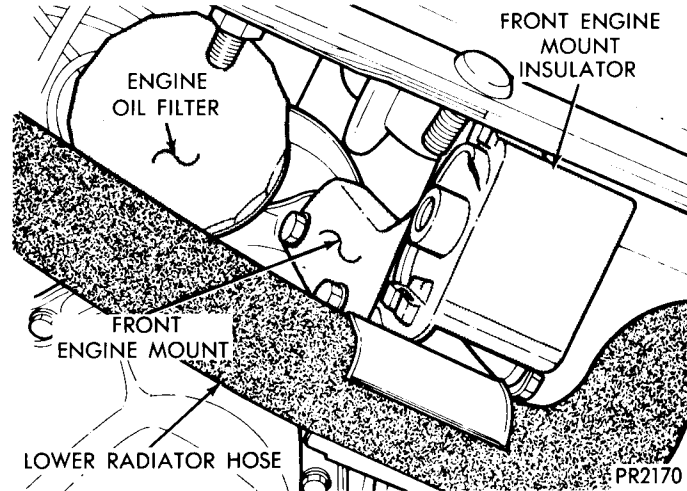
**Fig. 14. Remove or Install both Drive Shafts**



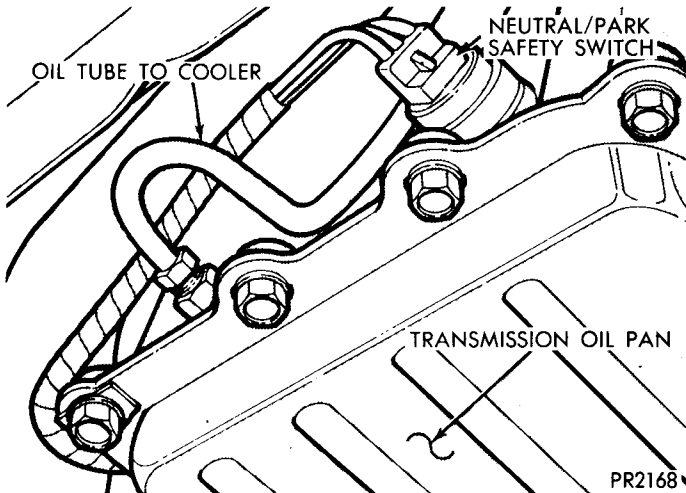
**Fig. 15. Mark Torque Converter and Drive Plate and Remove or Install Torque Converter Mounting Bolts**



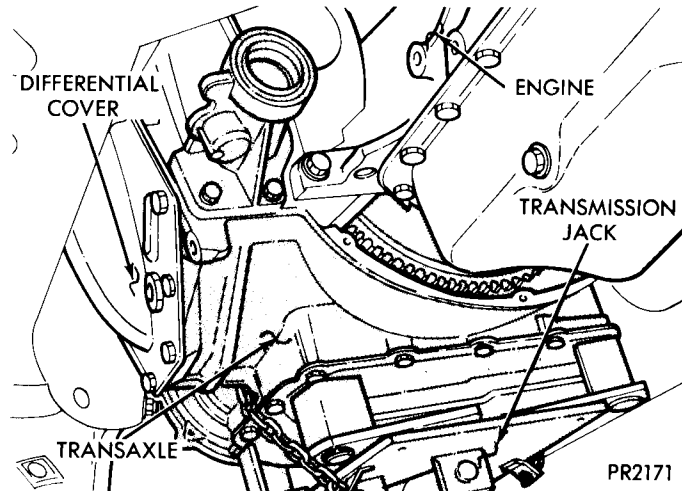
**Fig. 16. Remove or Install Access Plug in right Splash Shield to Rotate Engine Crankshaft**



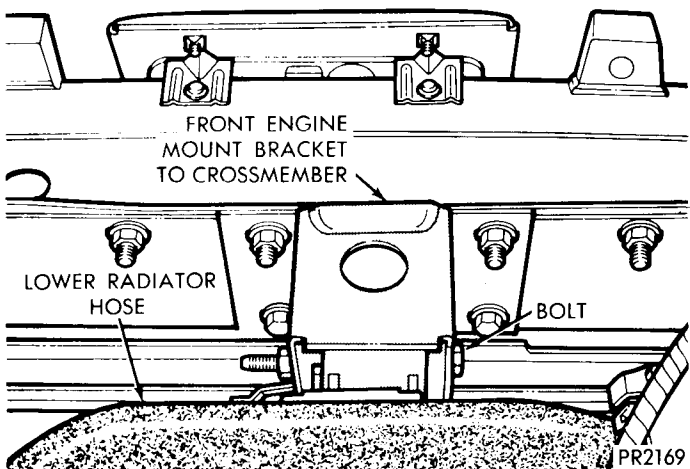
**Fig. 19. Remove or Install Front Mount Insulator Through-Bolt and Bell Housing Bolts**



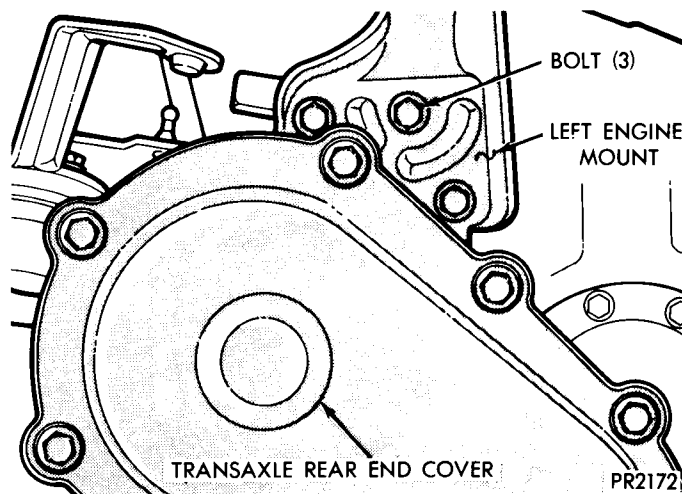
**Fig. 17. Remove or Install Lower Cooler Tube and Wire to Neutral/Park Safety Switch**



**Fig. 20. Position Transmission Jack under Transaxle**

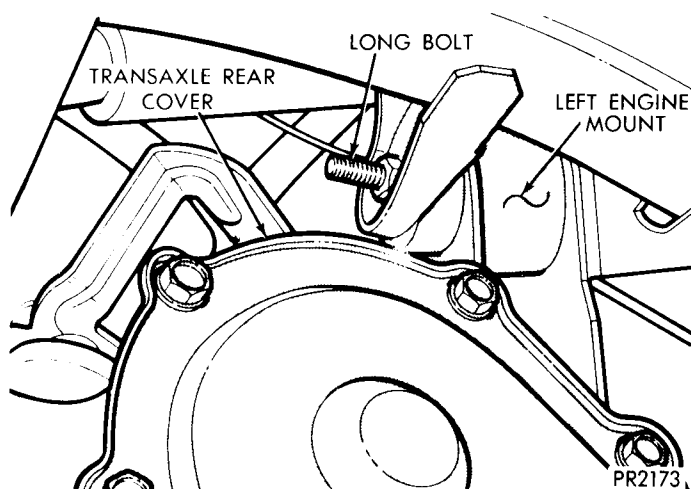


**Fig. 18. Remove or Install Engine Mount Bracket from Front Crossmember**



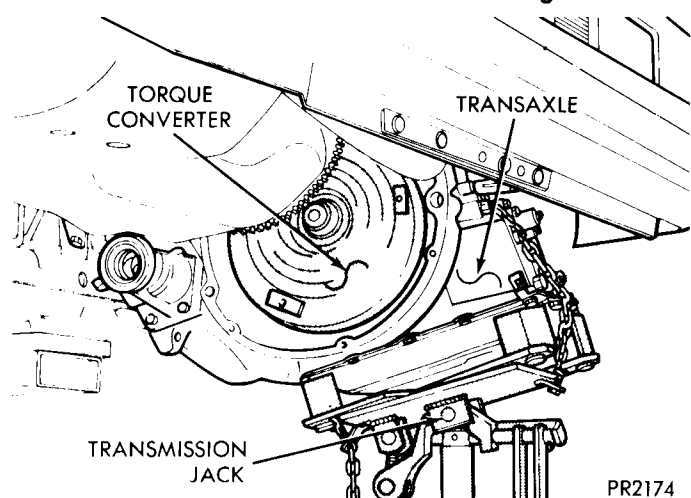
**Fig. 21. Remove or Install Engine Left Mount**



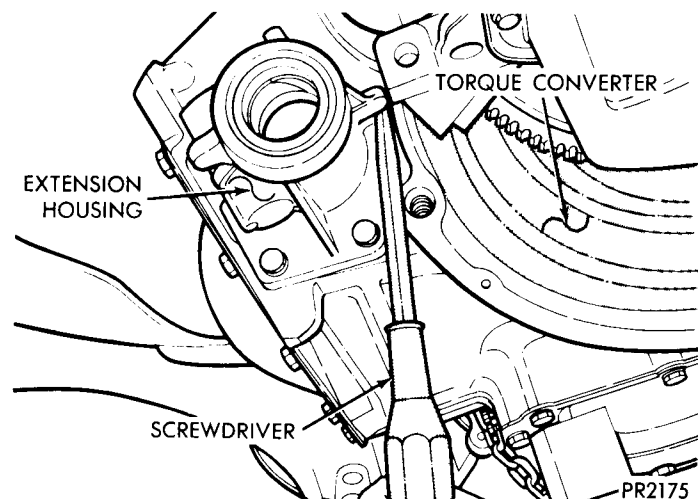


**Fig. 22. Remove or Install Long Bolt Through Left Engine Mount**

**NOTE:** Remove or install lower bell housing bolts.



**Fig. 23. Raise or Lower Transaxle**



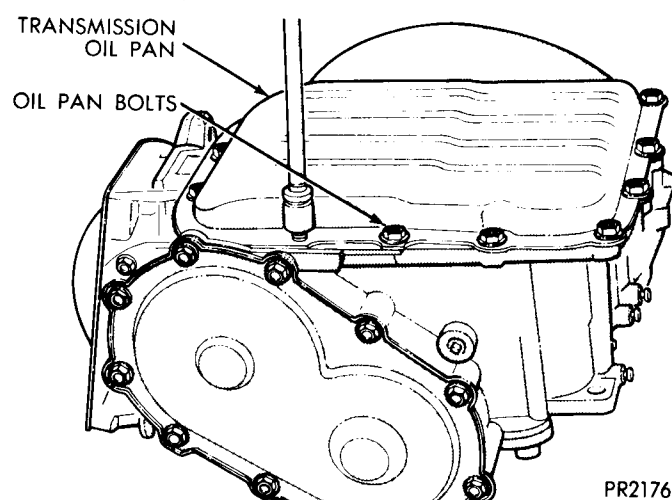
**Fig. 24. Pry Engine for Clearance**

When installing transaxle, the above procedure should be reversed.

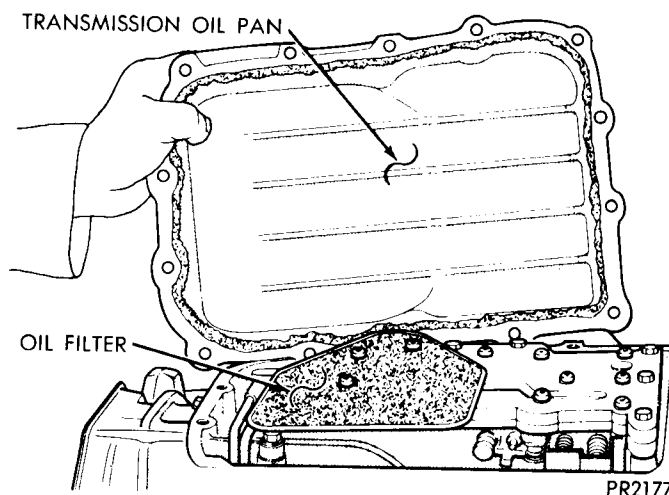
**CAUTION:** Be sure to fill "DIFFERENTIAL" with "DEXRON II" automatic transmission fluid before lowering vehicle to floor. The level of oil should be even with, to 3/8 inch below, the bottom of the fill plug hole.

## DISASSEMBLY—SUBASSEMBLY REMOVAL

Prior to removing any transaxle subassemblies, plug all openings and thoroughly clean exterior of the unit, preferably by steam. Cleanliness through entire disassembly and assembly cannot be over-emphasized. When disassembling, each part should be washed in a suitable solvent, then dried by compressed air. **Do not wipe parts with shop towels.** All mating surfaces in the transaxle are accurately machined; therefore, careful handling of parts must be exercised to avoid nicks or burrs.

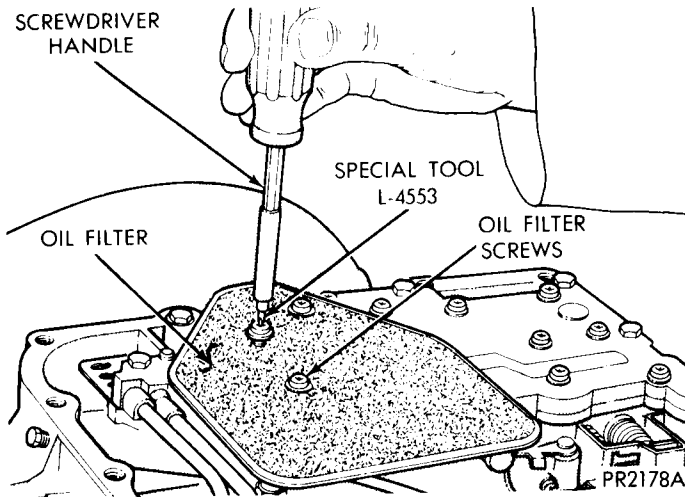


**Fig. 1. Remove or Install Transmission Oil Pan Bolts (14)**

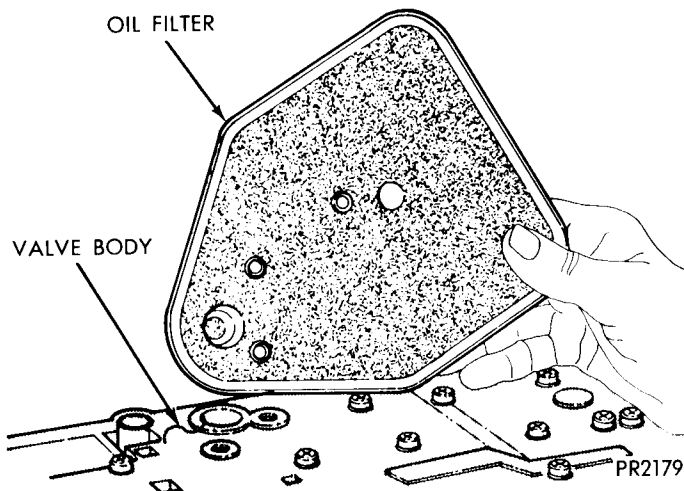


**Fig. 2. Remove or Install Transmission Oil Pan**

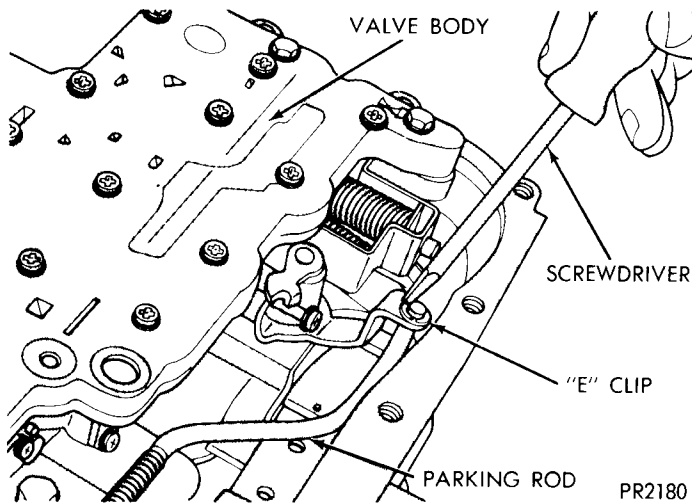
Use only R.T.V. sealant when installing oil pan.



**Fig. 3. Remove or Install Oil Filter Screws (3)**

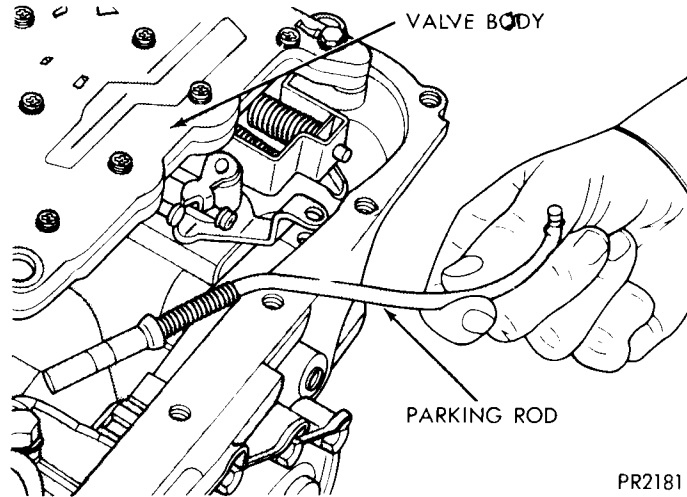


**Fig. 4. Remove or Install Oil Filter**

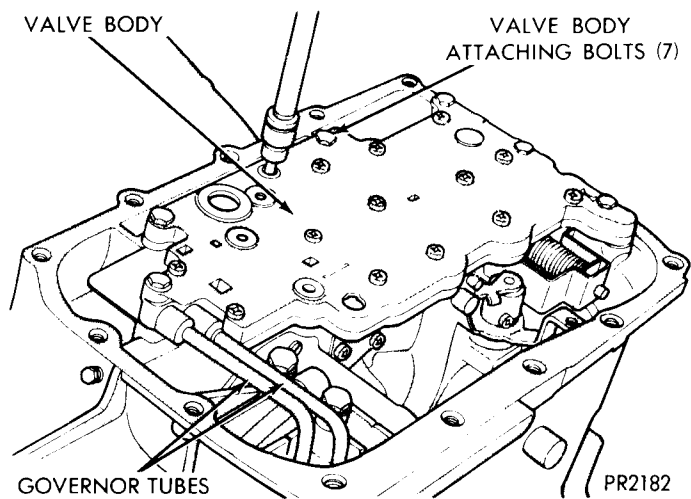


**Fig. 5. Remove or Install Parking Rod "E" Clip**

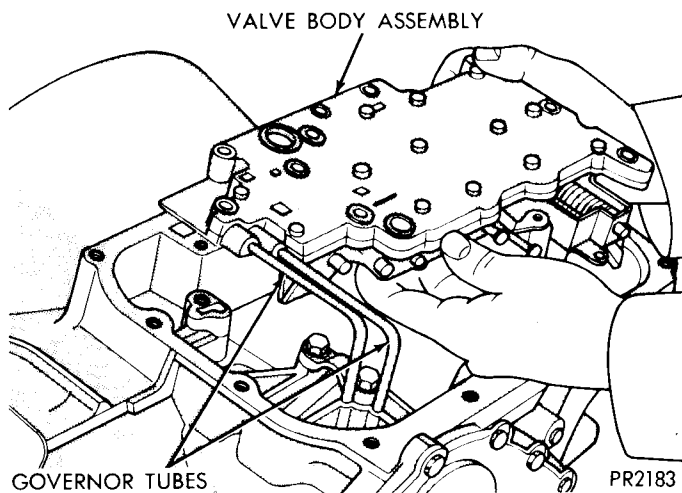
Remove or install neutral starting and back-up lamp switch.



**Fig. 6. Remove or Install Parking Rod**



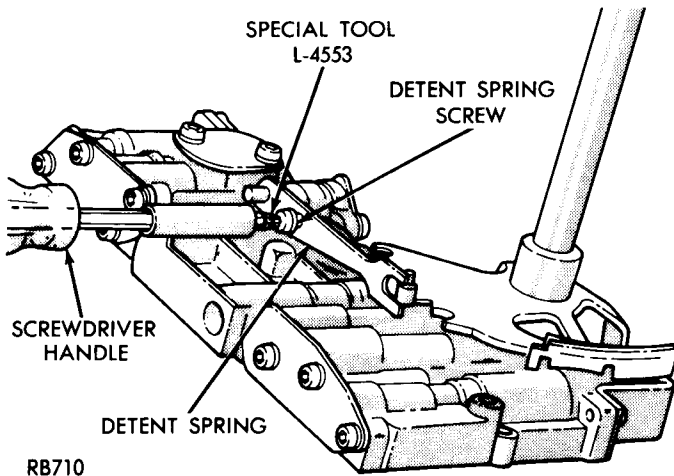
**Fig. 7. Remove or Install Valve Body Attaching Bolts (7)**



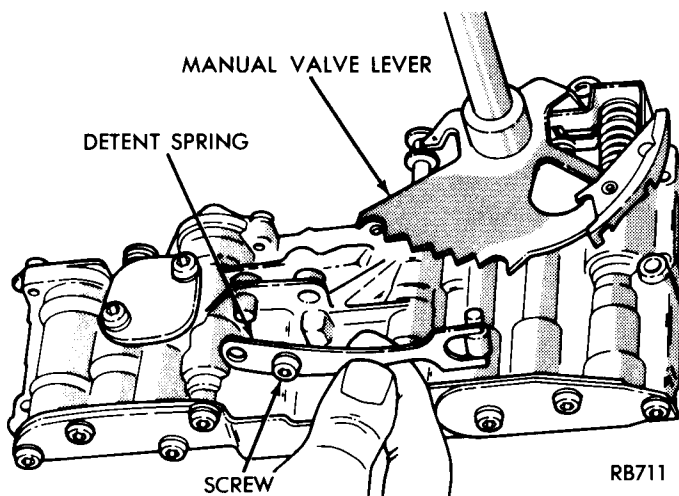
**Fig. 8. Remove or Install Valve Body and Governor Tubes**



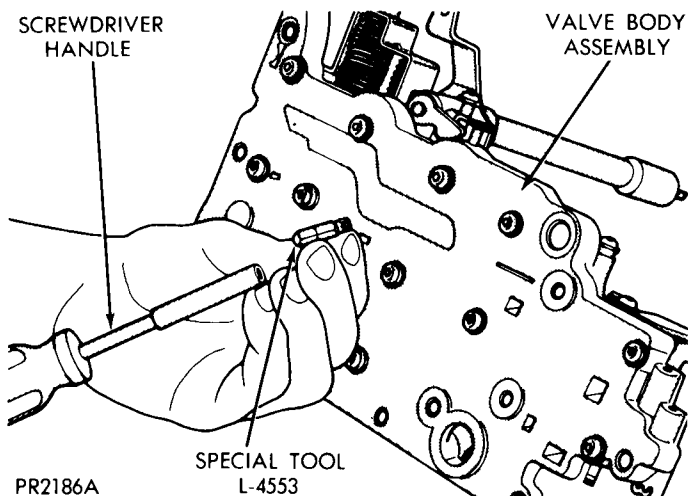
## VALVE BODY RECONDITION



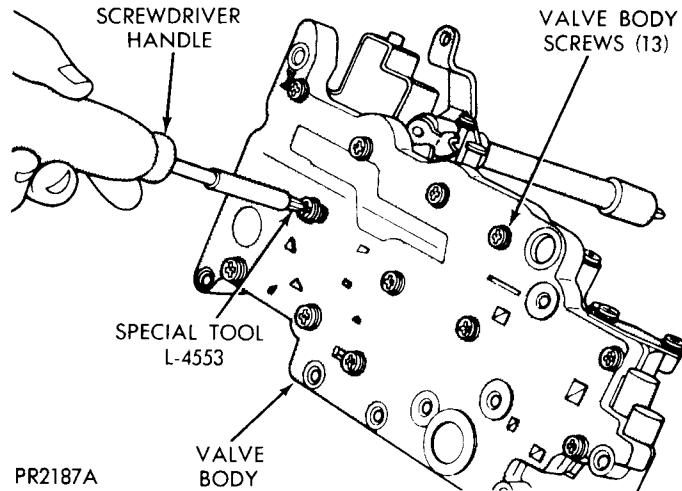
**Fig. 1. Remove or Install Detent Spring Attaching Screw**



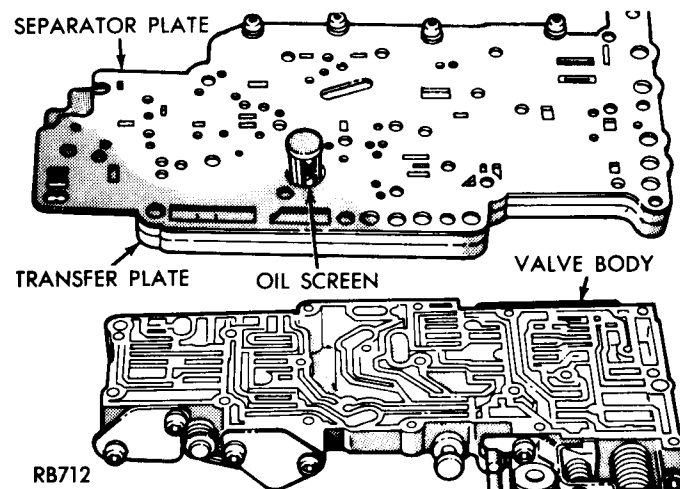
**Fig. 2. Remove or Install Detent Spring**



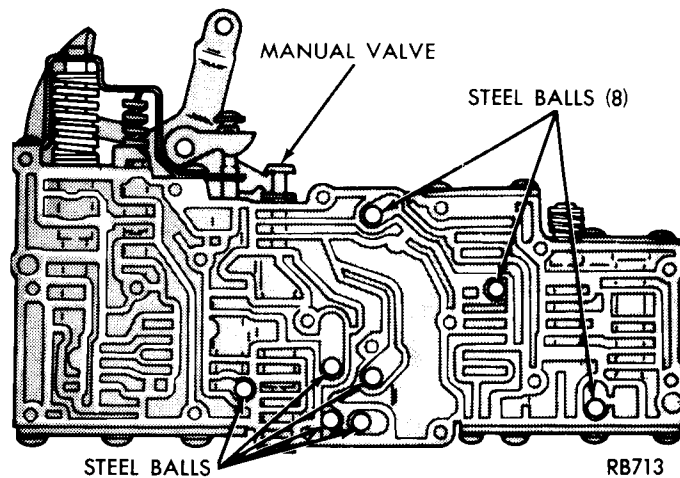
**Fig. 3. Using Tool L-4553 On Valve Body Screws**



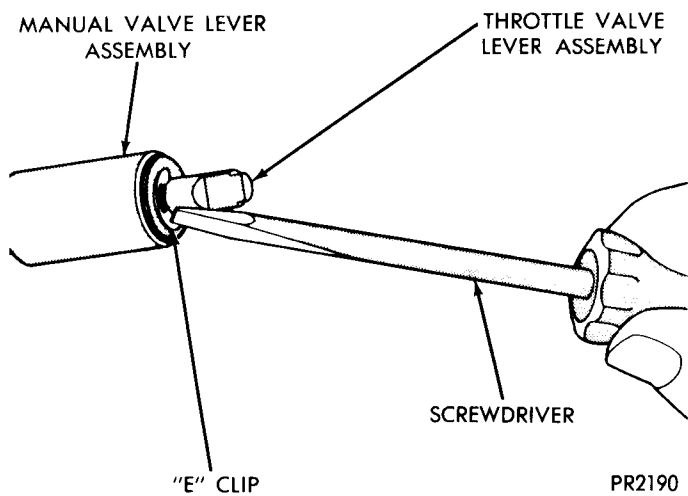
**Fig. 4. Remove or Install Valve Body Screws (13)**



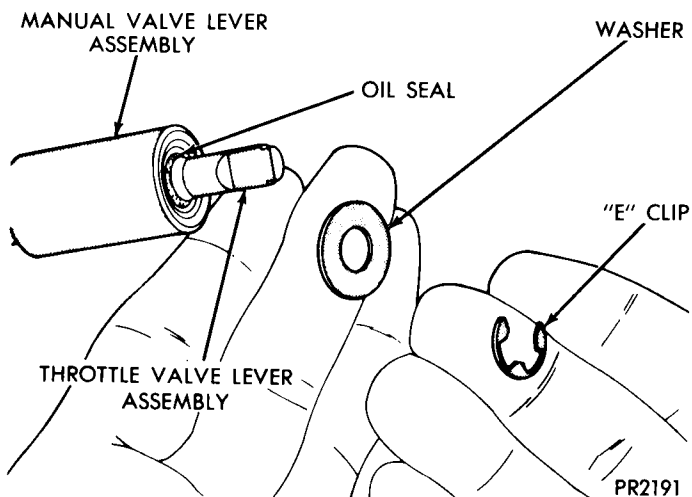
**Fig. 5. Remove or Install Transfer Plate and Separator Plate**



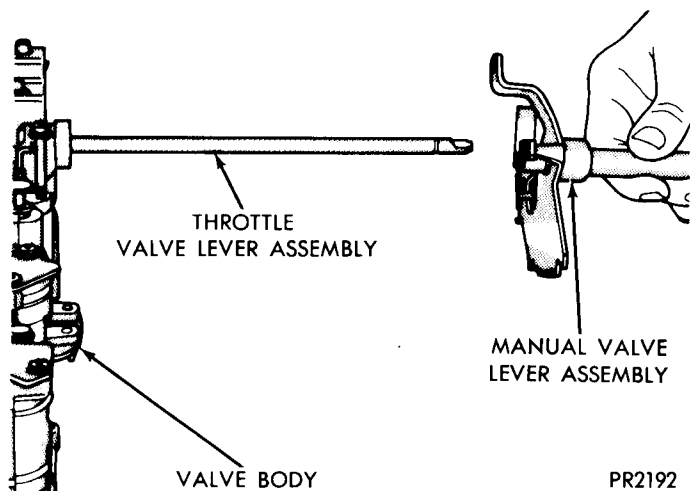
**Fig. 6. Steel Ball Locations**



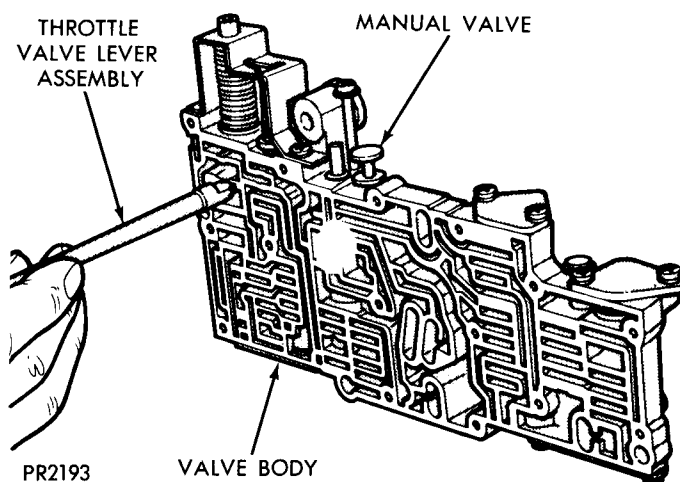
**Fig. 7. Remove or Install Throttle Shaft "E" Clip**



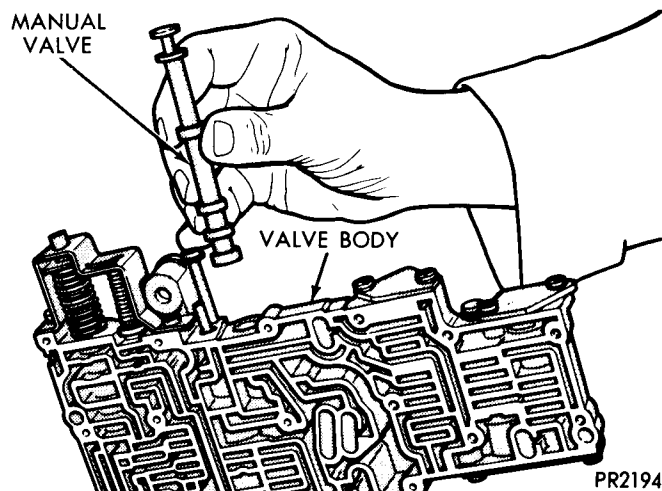
**Fig. 8. Throttle Shaft "E" Clip, Washer, and Oil Seal**



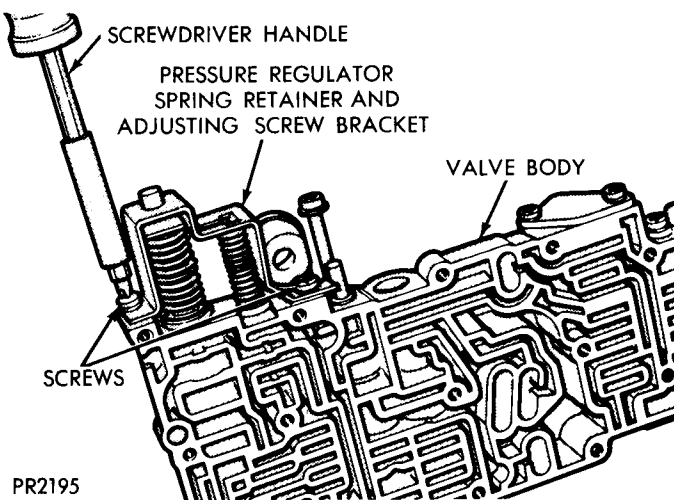
**Fig. 9. Remove or Install Manual Valve Lever Assembly**



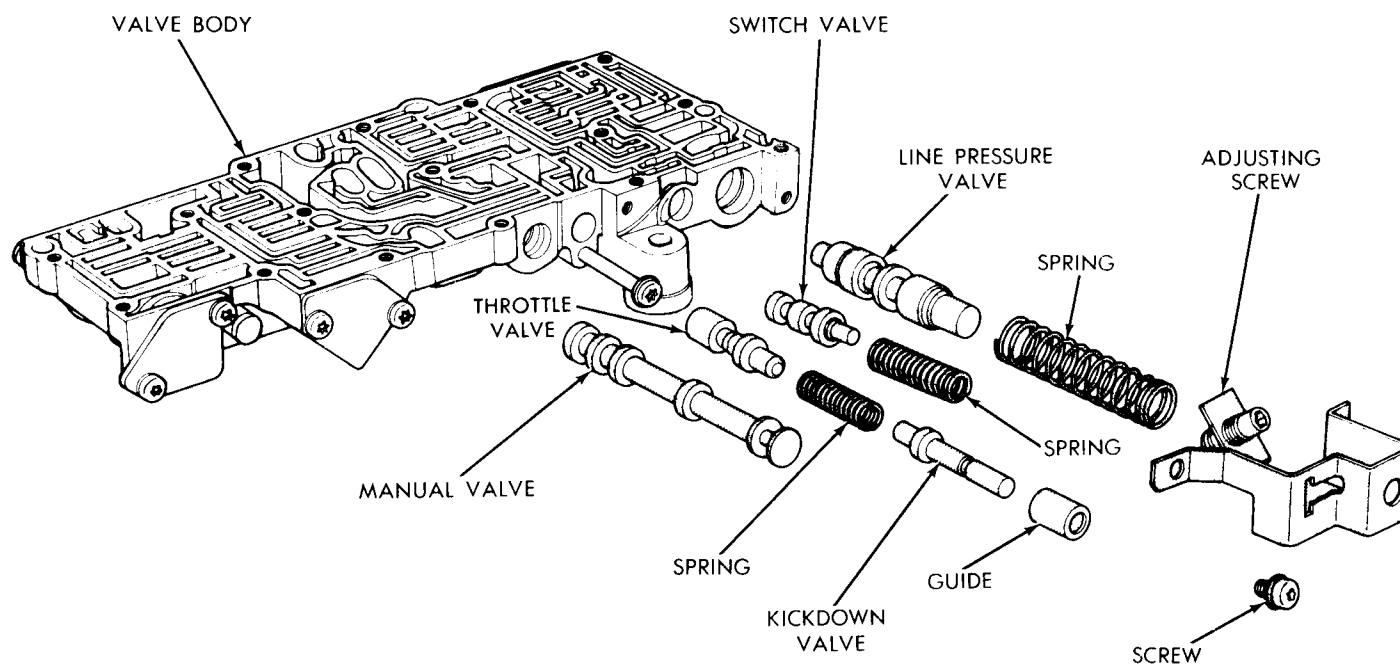
**Fig. 10. Remove or Install Throttle Valve Lever Assembly**



**Fig. 11. Remove or Install Manual Valve**

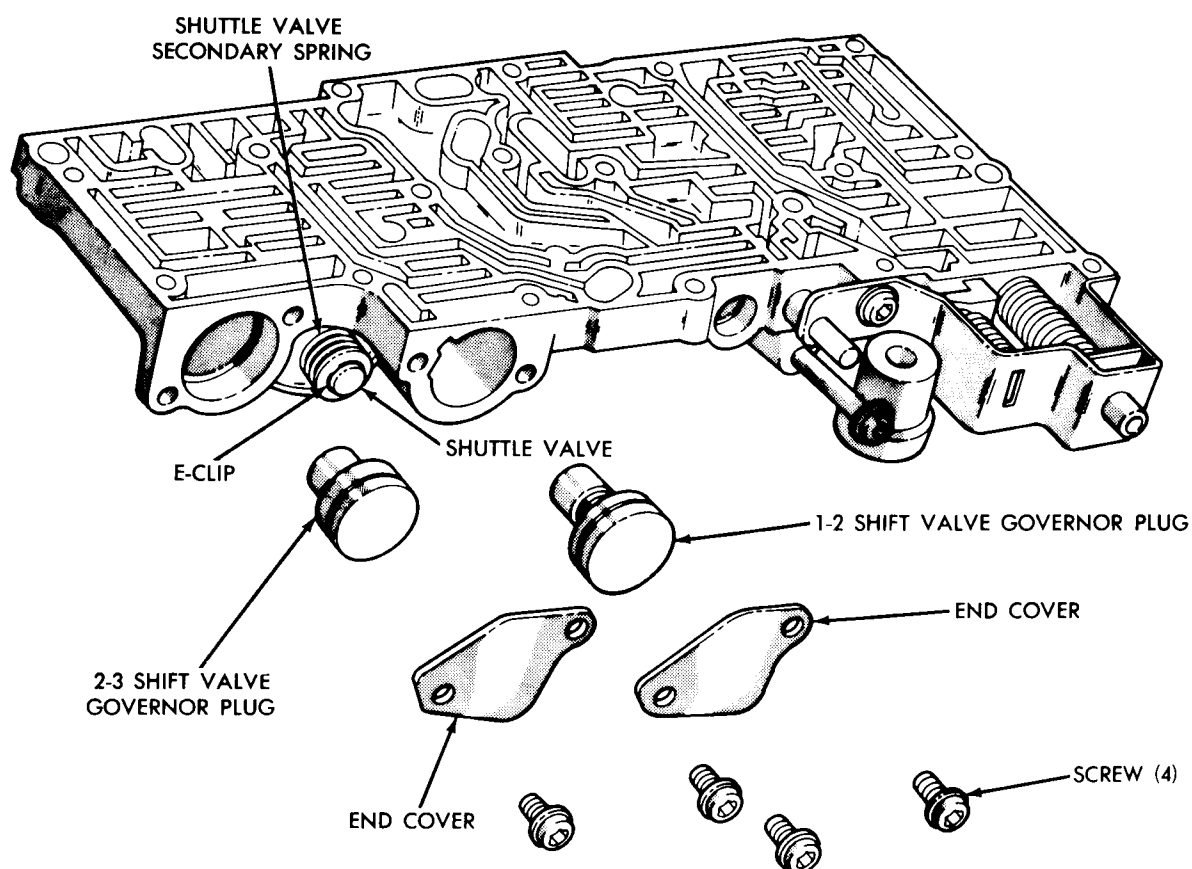


**Fig. 12. Remove or Install Pressure Regulator and Adjusting Screw Bracket**



PR2196A

**Fig. 13. Pressure Regulators and Manual Controls**



RB714

**Fig. 14. Governor Plugs**

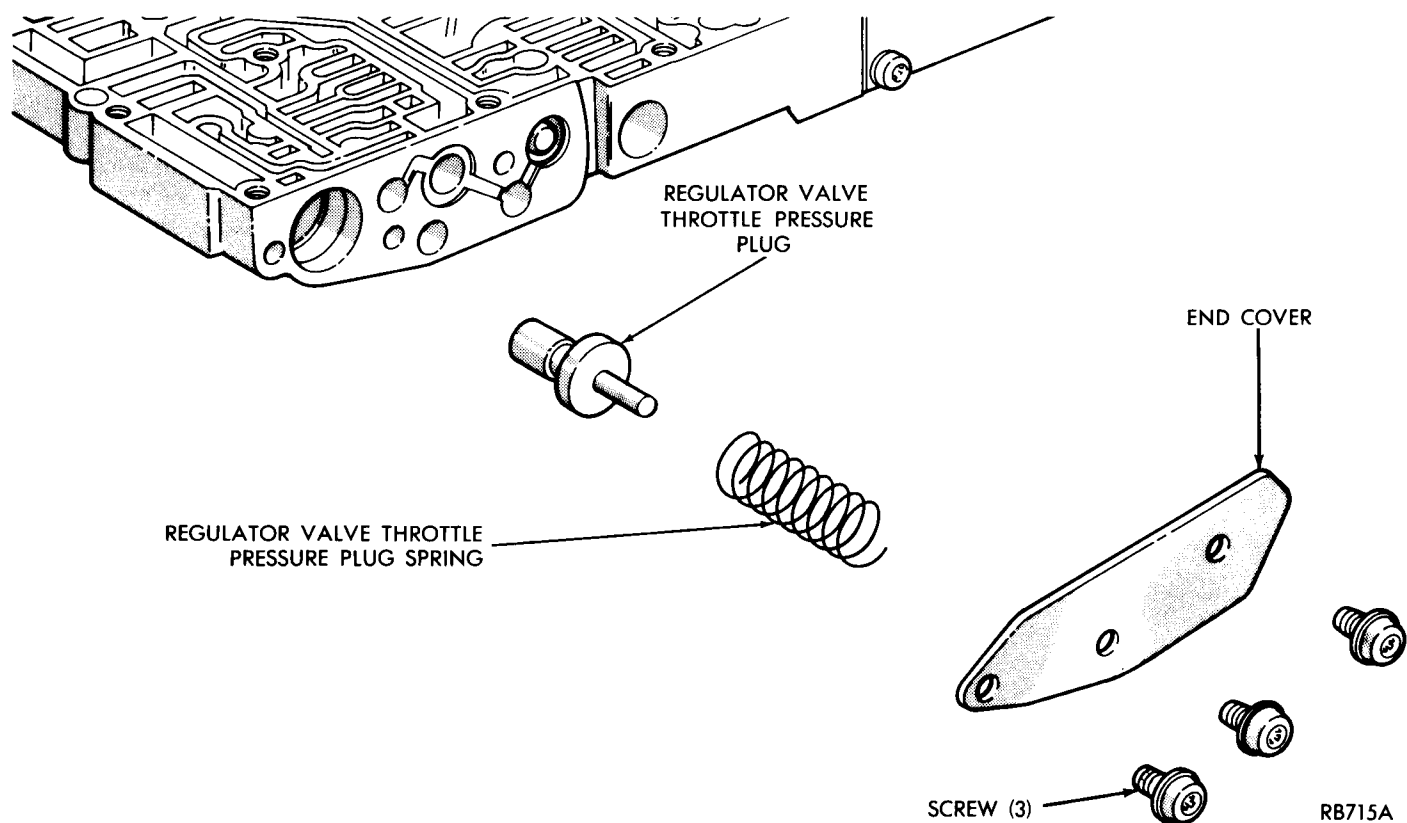


Fig. 15. Pressure Regulator Valve Plugs

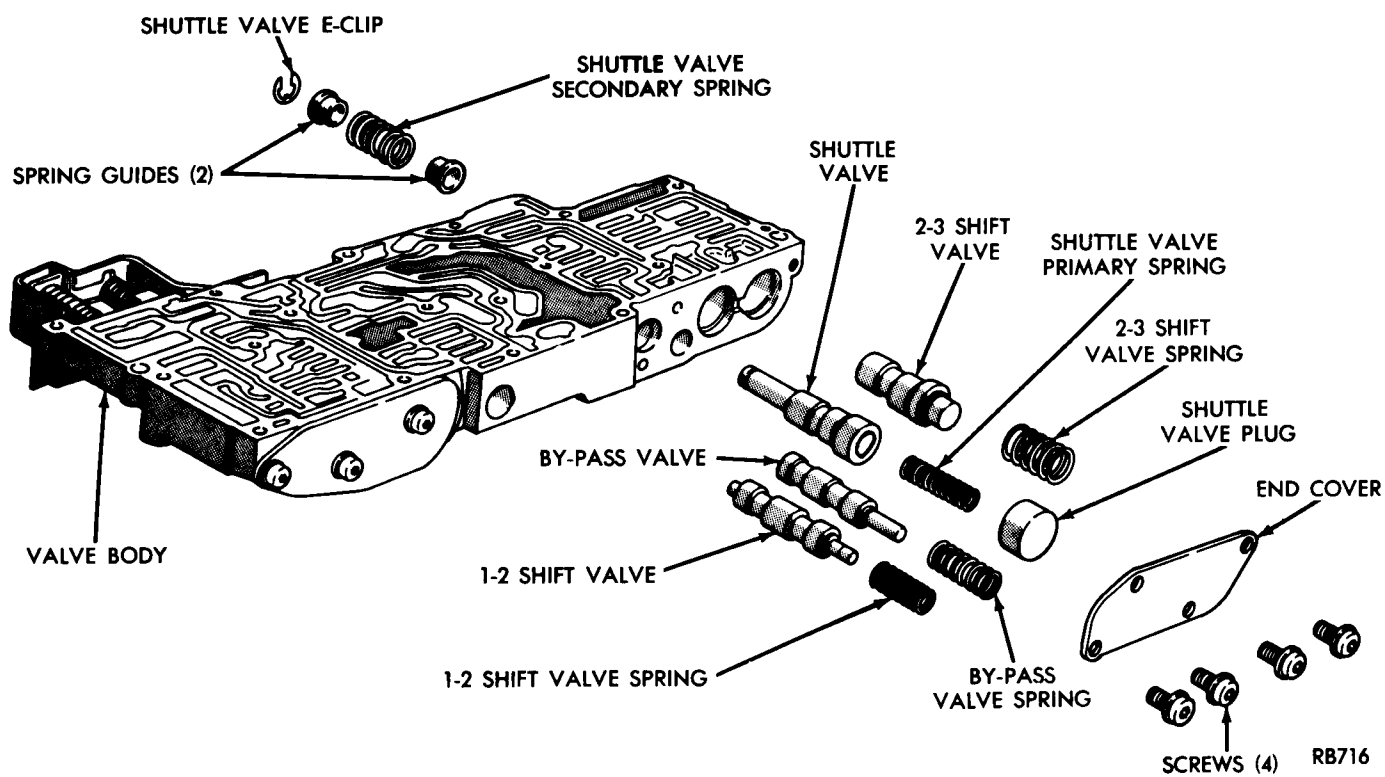


Fig. 16. Shift Valves and Shuttle Valve



## TRANSAXLE RECONDITION

### PUMP OIL SEAL

#### Replacement

The pump oil seal can be replaced without removing pump and reaction shaft support assembly from the transaxle case.

(1) Screw seal remover Tool C-3981 into seal (Fig. 1), then tighten screw portion of tool to withdraw the seal.

(2) To install a new seal, place seal in opening of the pump housing (lip side facing inward). Using Tool C-4193, drive seal into housing until tool bottoms (Fig. 2).

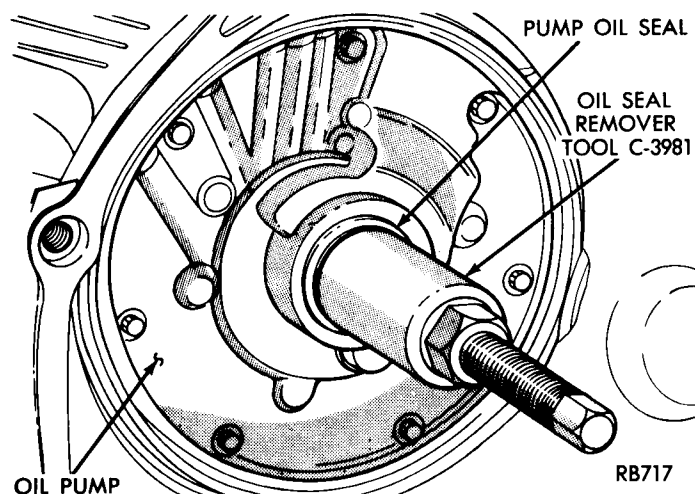


Fig. 1. Remove Pump Oil Seal

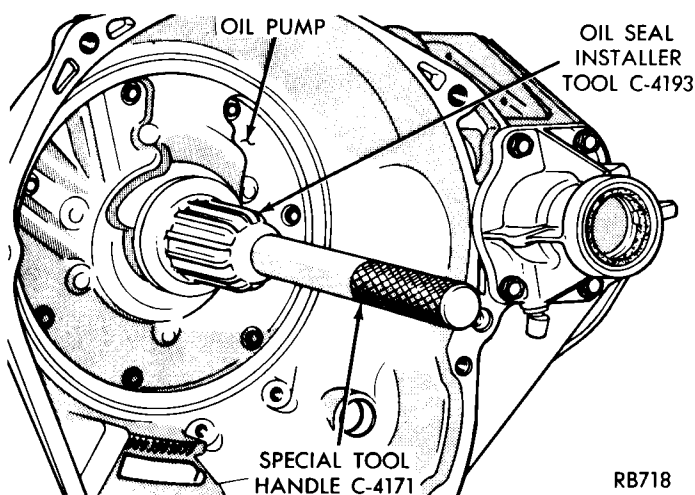


Fig. 2. Install Pump Oil Seal

#### Input Shaft End Play

Measuring input shaft end play before disassembly will usually indicate when a thrust washer change is required, (except when major parts are replaced). The thrust washer is located between input and output shafts.

(1) Attach a dial indicator to transaxle bell housing with its plunger seated against end of input shaft (Fig. 3).

Move input shaft in and out to obtain end play reading. End play specifications are .007 to .073 inch.

(2) Record indicator reading for reference when reassembling the transaxle.

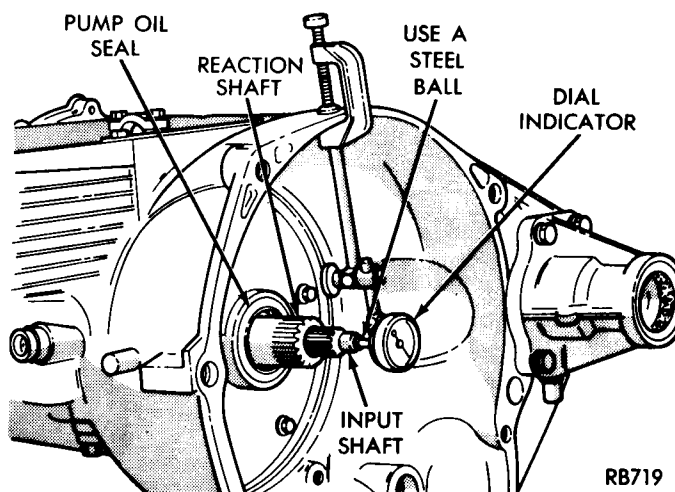


Fig. 3. Measure Input Shaft End Play

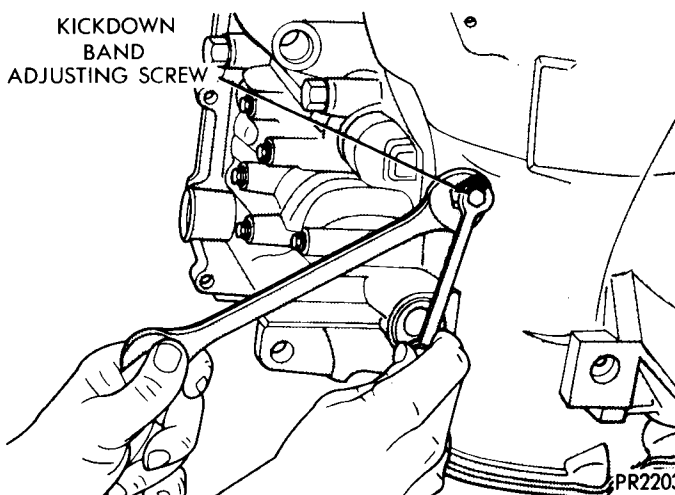
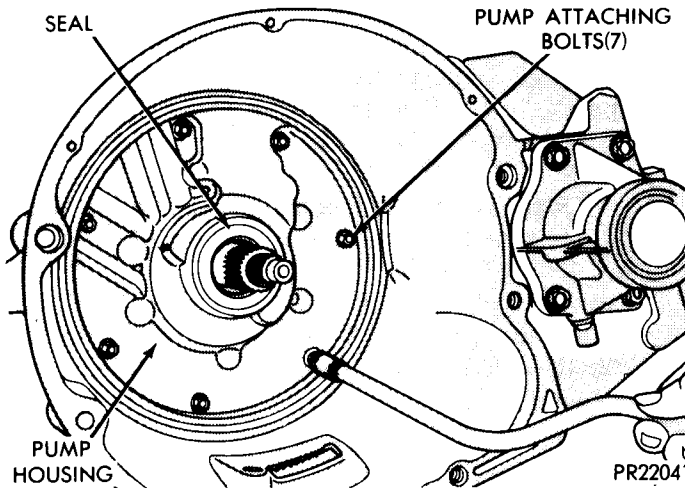
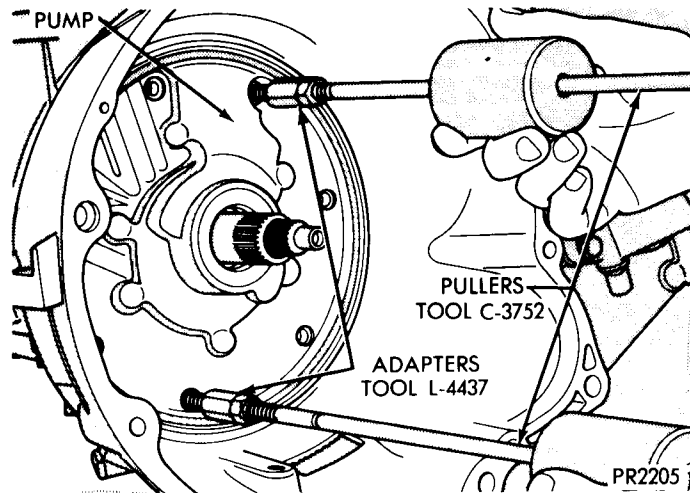


Fig. 4. Tighten Kickdown Band Adjusting Screw

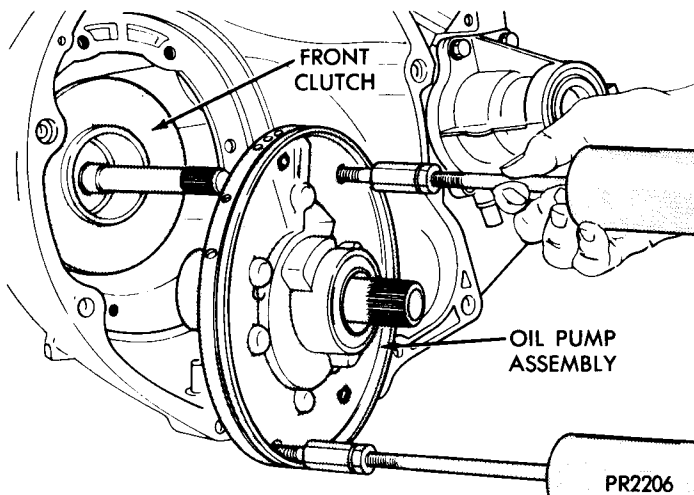


**Fig. 5. Remove or Install Pump Attaching Bolts (7)**

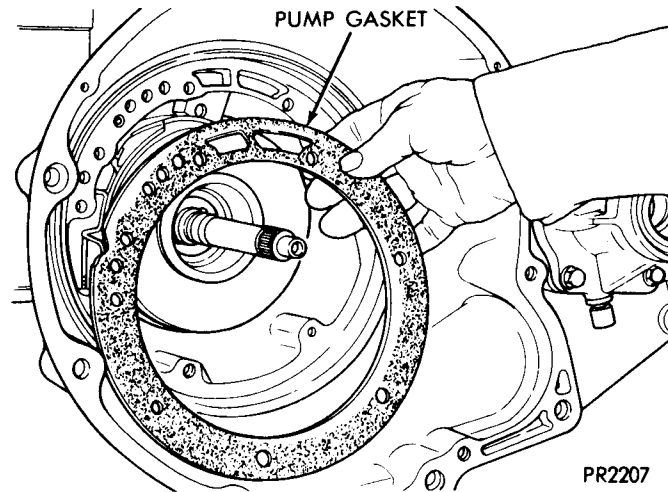
**Note:** Install new bolts when rebuilding.



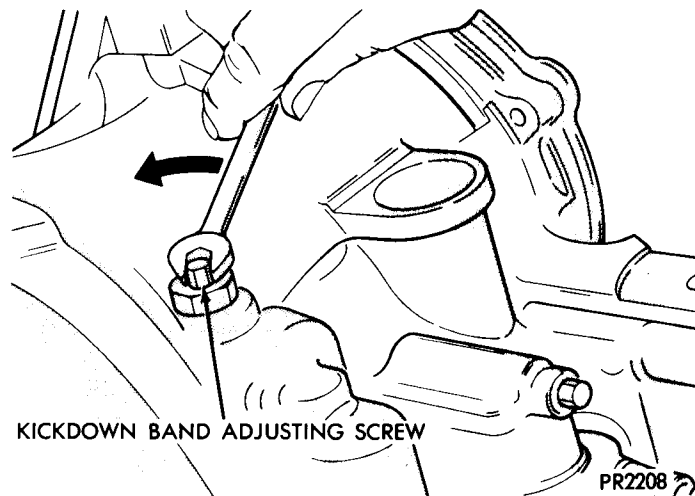
**Fig. 6. Install Tool C-3752 with Adapters L-4437**



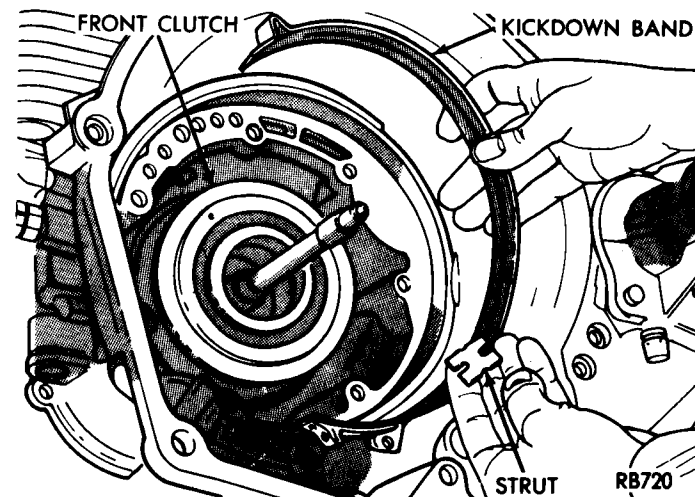
**Fig. 7. Remove or Install Oil Pump with No. 1 Thrust Washer**



**Fig. 8. Remove or Install Oil Pump Gasket**

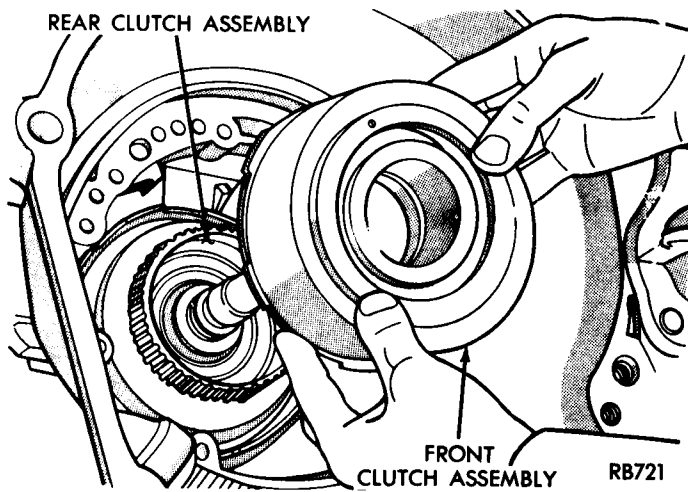


**Fig. 9. Loosen Kickdown Band Adjusting Screw**

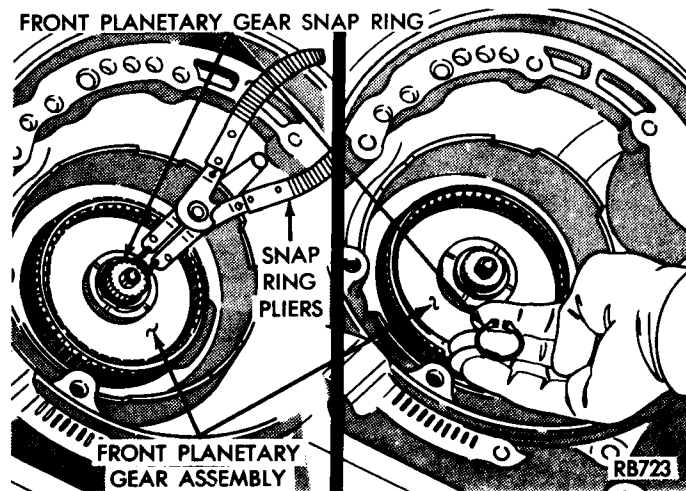


**Fig. 10. Remove or Install Kickdown Band and Strut**

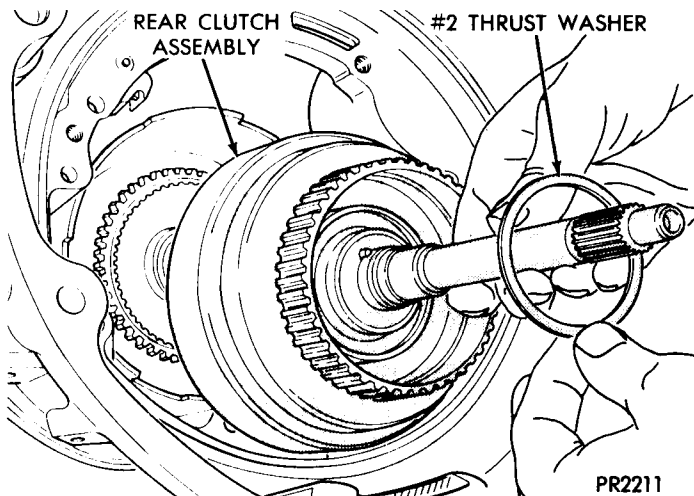




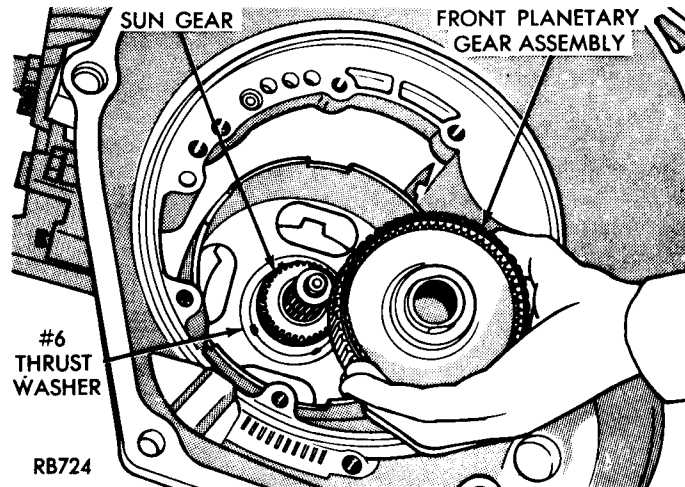
**Fig. 11. Remove or Install Front Clutch Assembly**



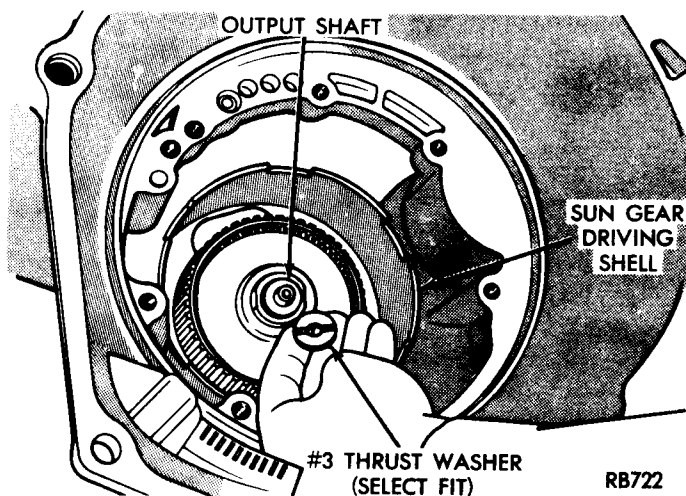
**Fig. 14. Remove or Install Front Planetary Gear Snap Ring**



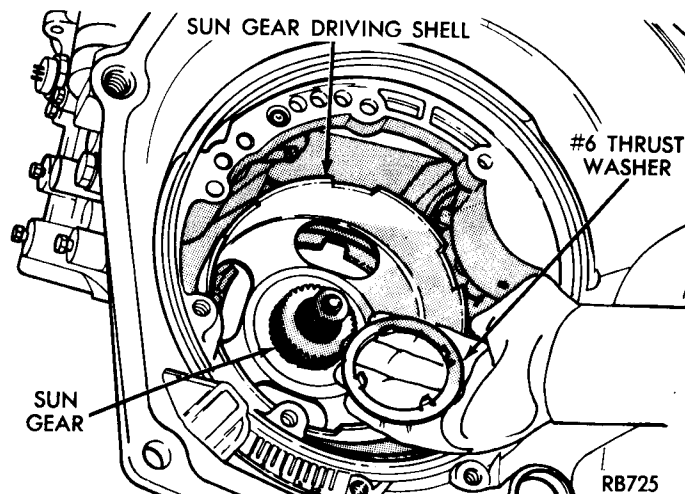
**Fig. 12. Remove or Install No. 2 Thrust Washer and Rear Clutch Assembly**



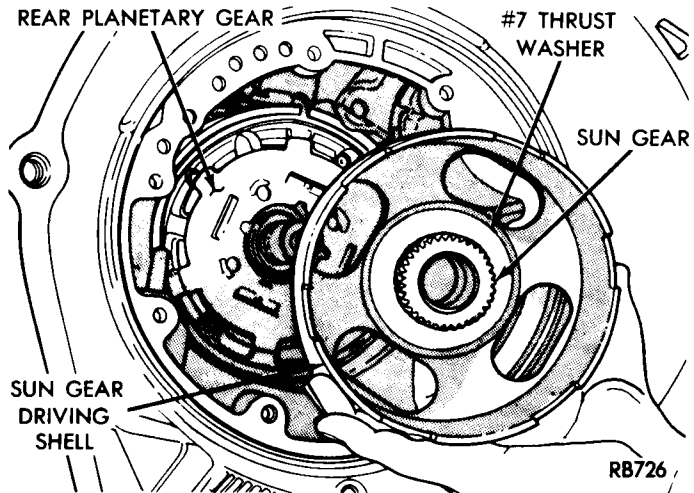
**Fig. 15. Remove or Install Front Planetary Gear Assembly**



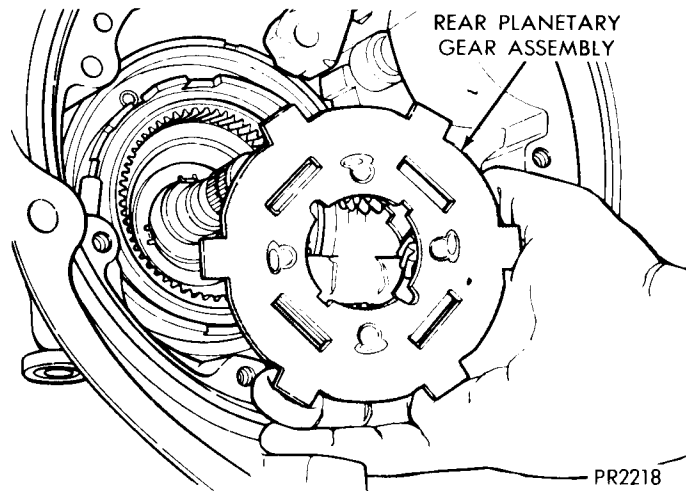
**Fig. 13. Remove or Install No. 3 Thrust Washer**



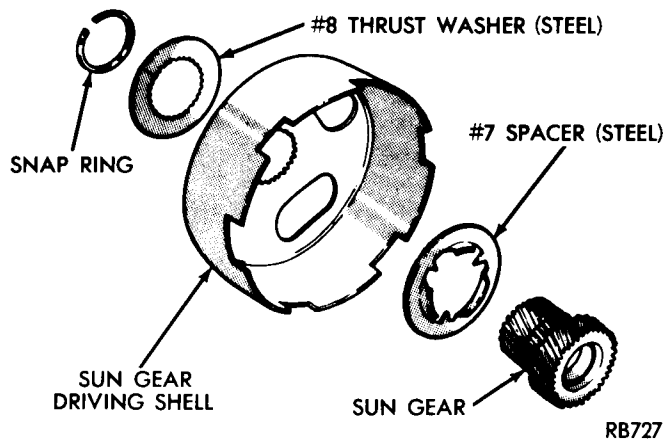
**Fig. 16. Remove or Install No. 6 Thrust Washer**



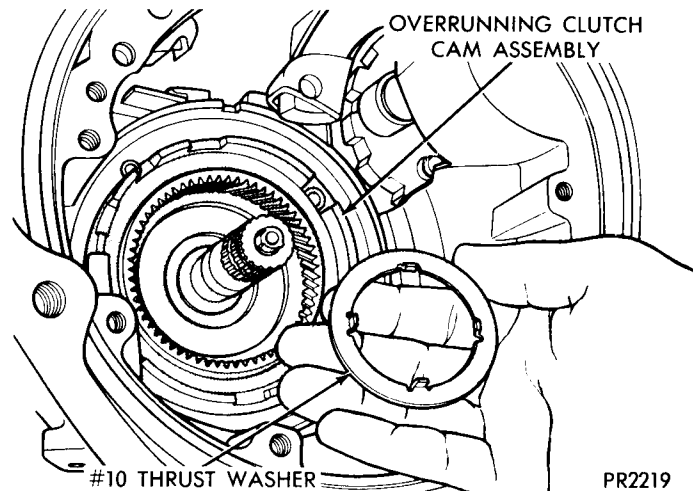
**Fig. 17. Remove or Install Sun Gear Driving Shell**



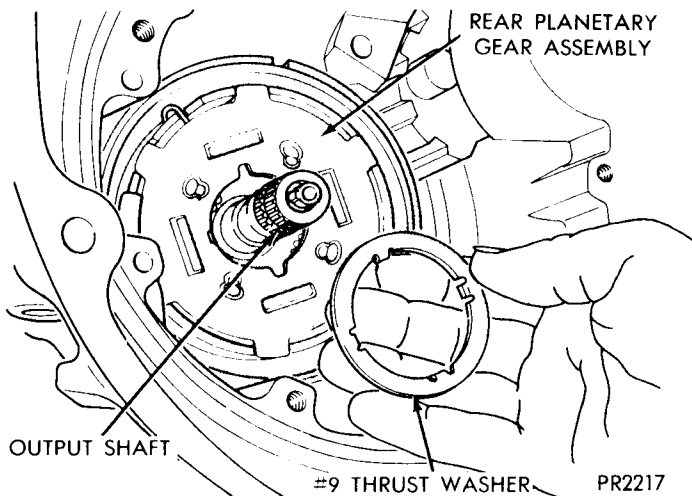
**Fig. 20. Remove or Install Rear Planetary Gear Assembly**



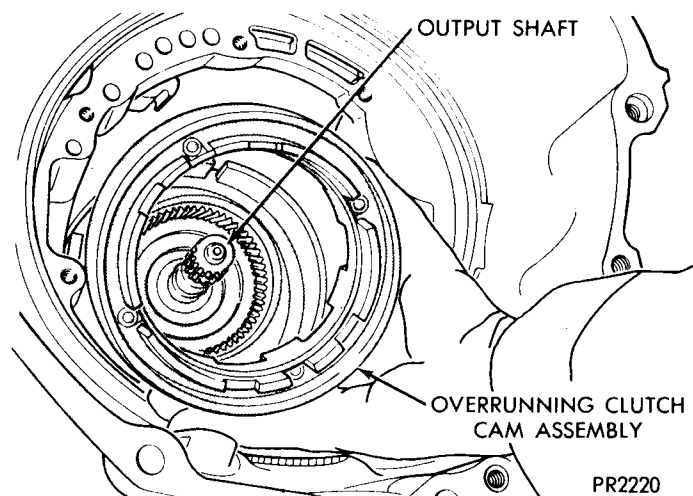
**Fig. 18. Sun Gear Driving Shell—Disassembled**



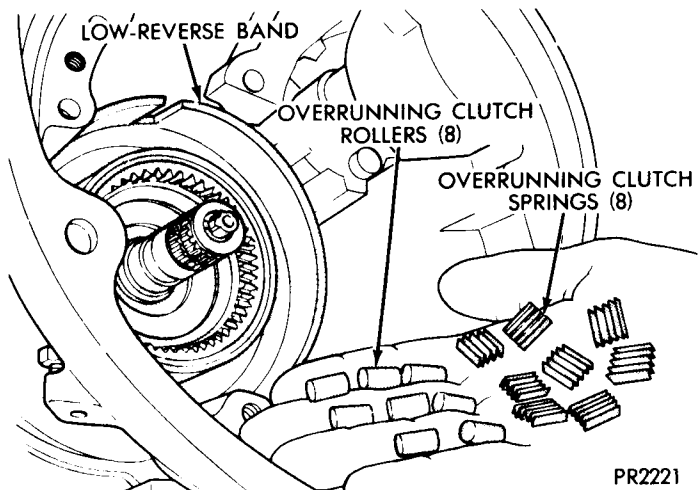
**Fig. 21. Remove or Install No. 10 Thrust Washer**



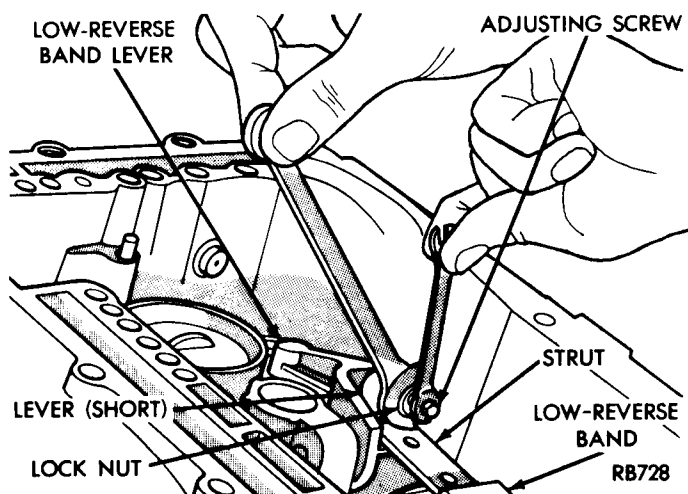
**Fig. 19. Remove or Install No. 9 Thrust Washer**



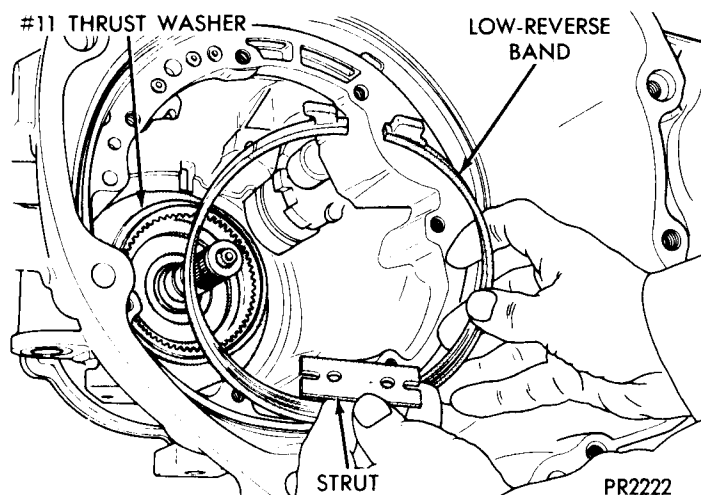
**Fig. 22. Remove or Install Overrunning Clutch Cam Assembly**



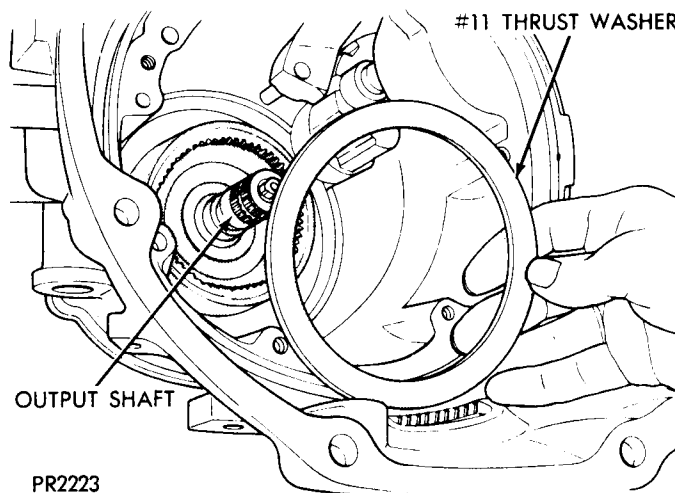
**Fig. 23. Remove Overrunning Clutch Rollers and Springs**



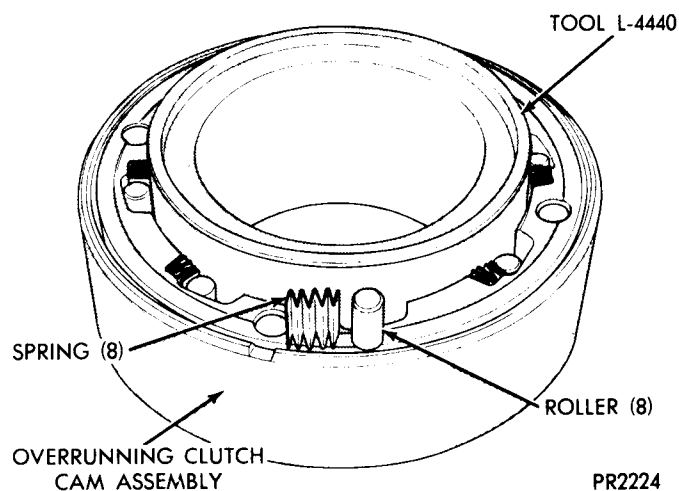
**Fig. 24. Loosen or Adjust Low-Reverse Band**



**Fig. 25. Remove or Install Low-Reverse Band and Strut**



**Fig. 26. Remove or Install No. 11 Thrust Washer**



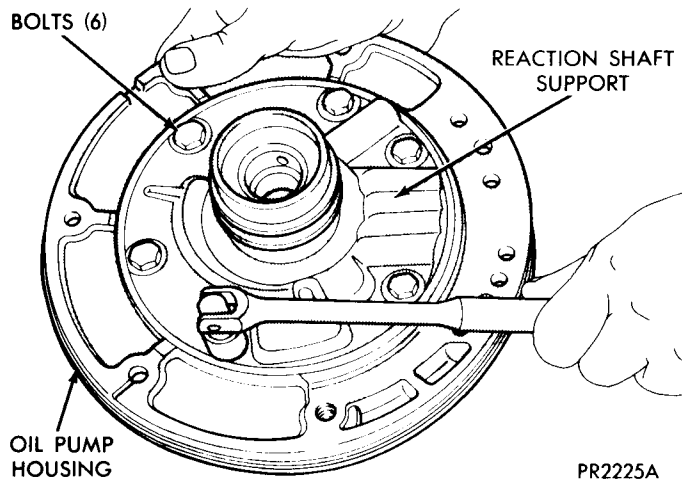
**Fig. 27. Install Overrunning Clutch Rollers and Springs**

## ASSEMBLY—SUBASSEMBLY INSTALLATION

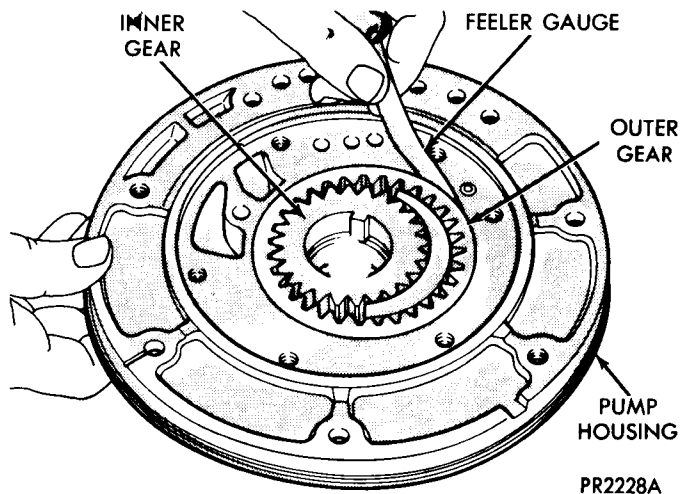
When rebuilding, reverse the above procedure.



## SUBASSEMBLY—RECONDITION— PUMP



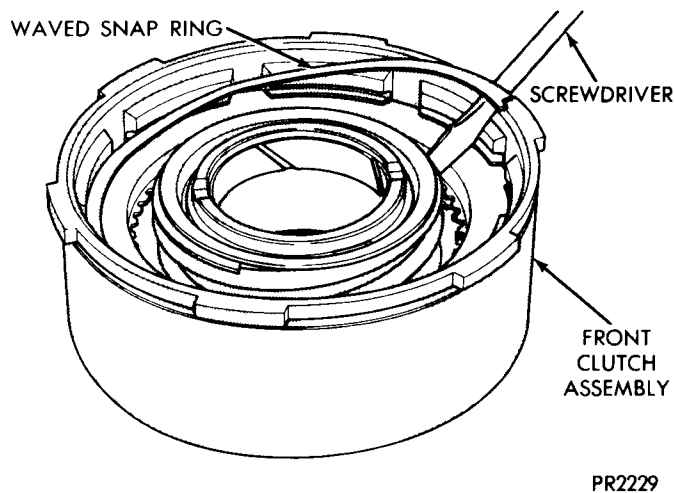
**Fig. 1. Remove or Install Reaction Shaft Support Bolts (6)**



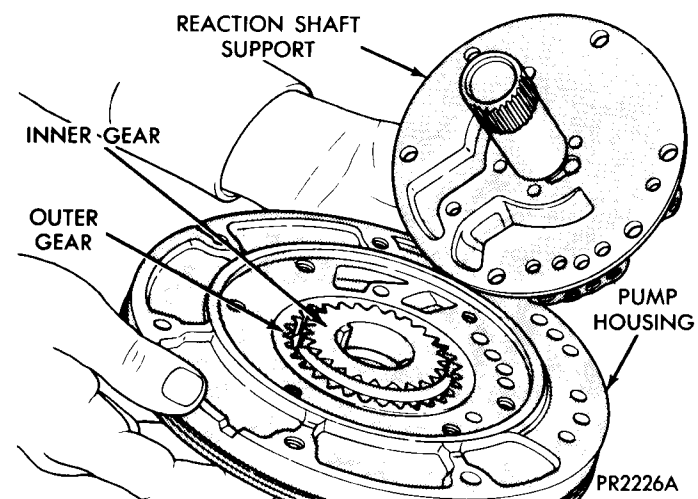
**Fig. 4. Measuring Pump Clearance (Gear to Pocket)**

**NOTE:** Also, check gear side clearance with a straight edge and a feeler gauge (See Specifications).

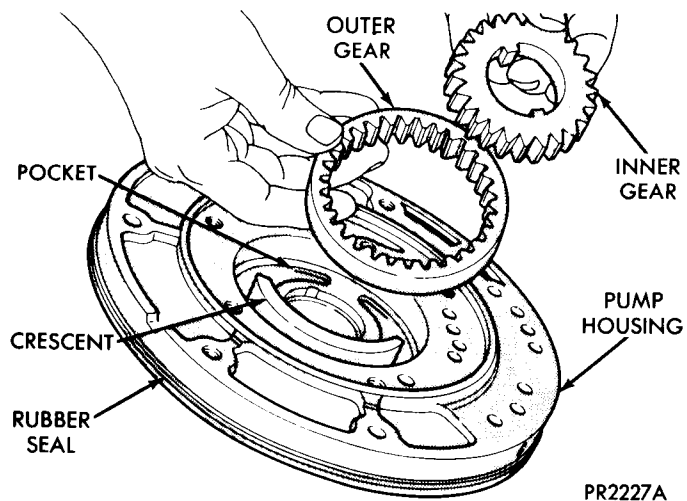
## FRONT CLUTCH



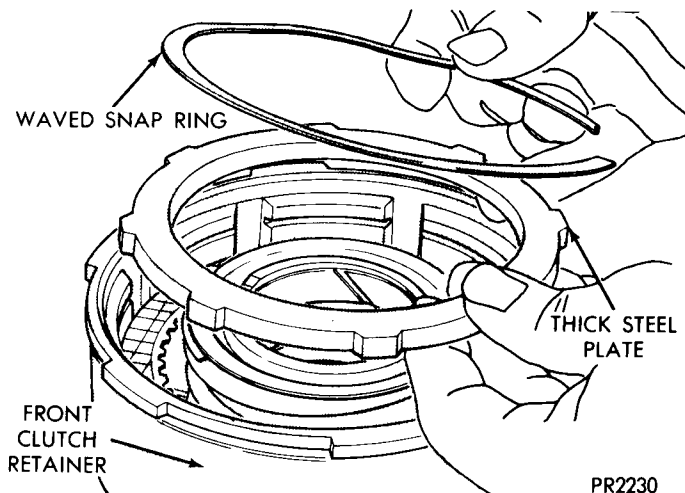
**Fig. 1. Remove or Install Front Clutch Waved Snap Ring**



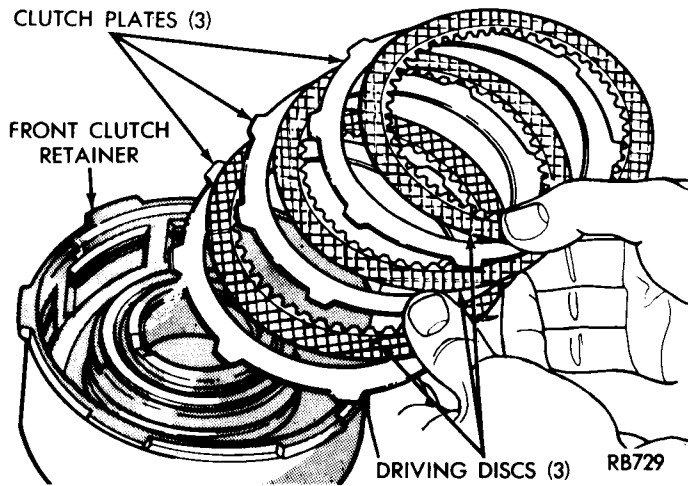
**Fig. 2. Remove or Install Reaction Shaft Support**



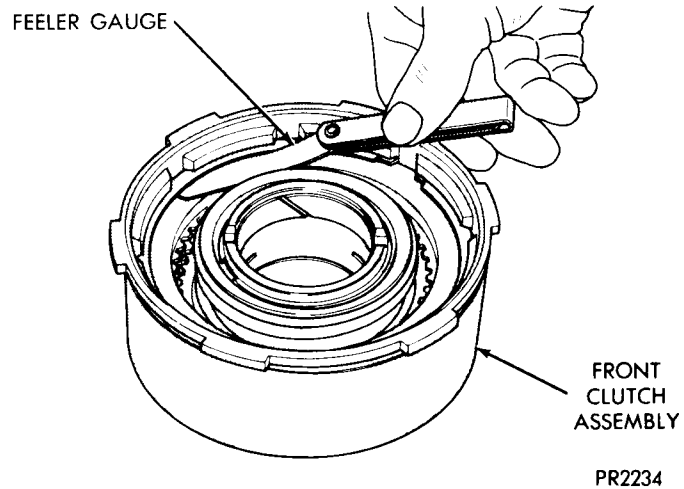
**Fig. 3. Remove or Install Inner and Outer Pump Gears**



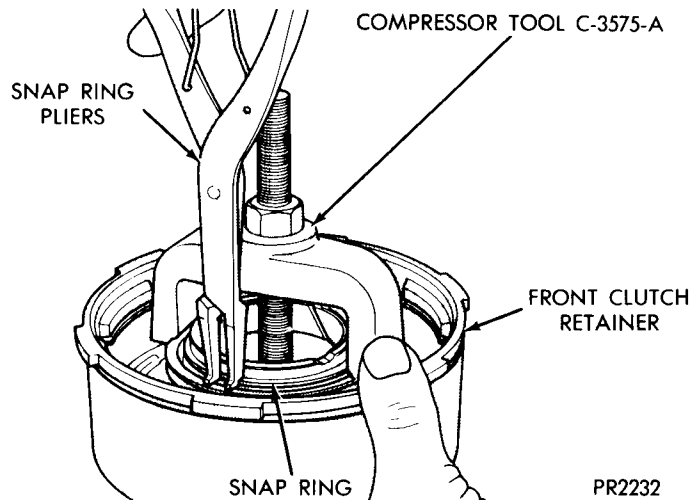
**Fig. 2. Remove or Install Thick Steel Plate and Waved Snap Ring**



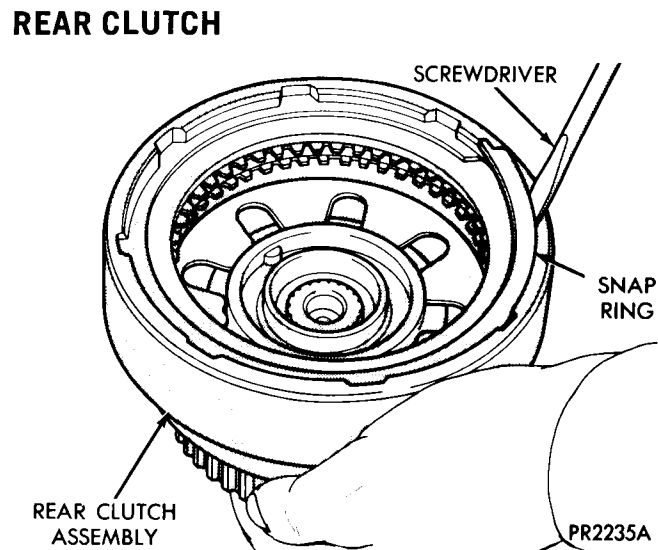
**Fig. 3. Remove or Install Front Clutch Discs and Plates**



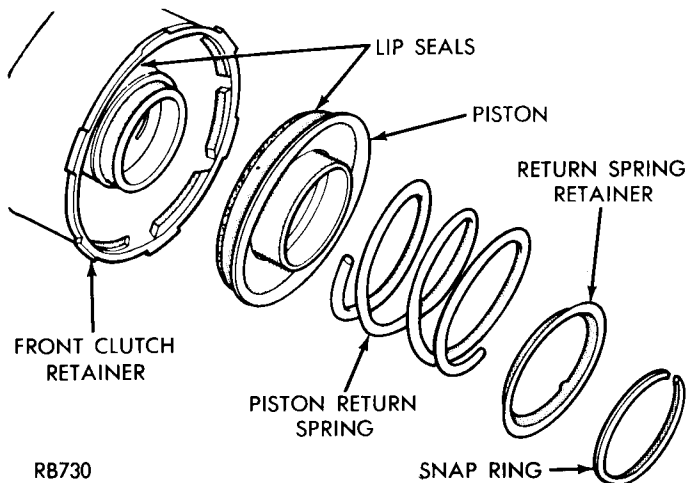
**Fig. 6. Measuring Front Clutch Plate Clearance**



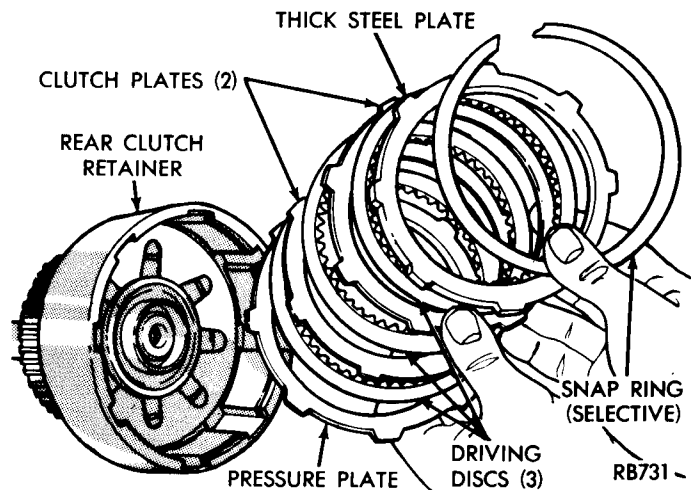
**Fig. 4. Remove or Install Front Clutch Return Spring Snap Ring**



**Fig. 1. Remove or Install Rear Clutch Outer Snap Ring**

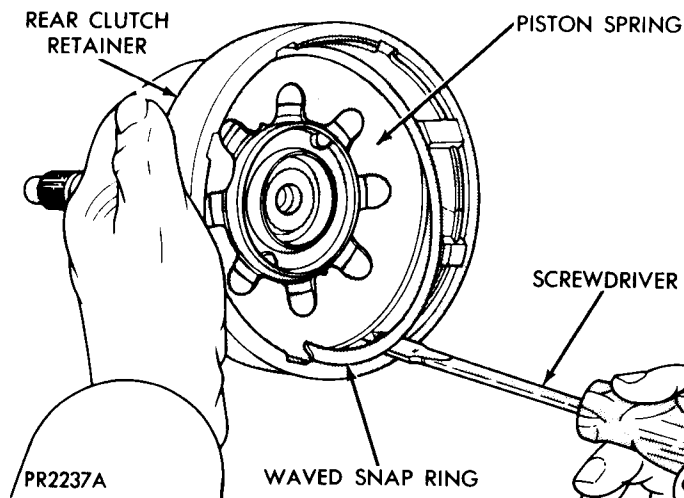


**Fig. 5. Remove or Install Front Clutch Return Spring and Piston**

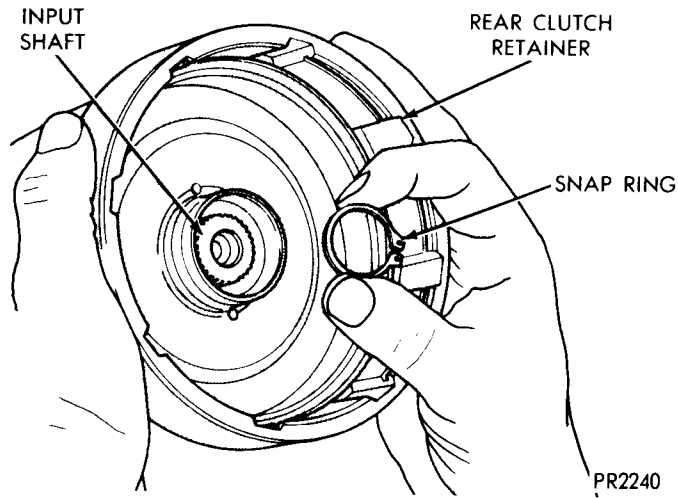


**Fig. 2. Remove or Install Rear Clutch Discs and Plates**

To reassemble, reverse the above procedure.

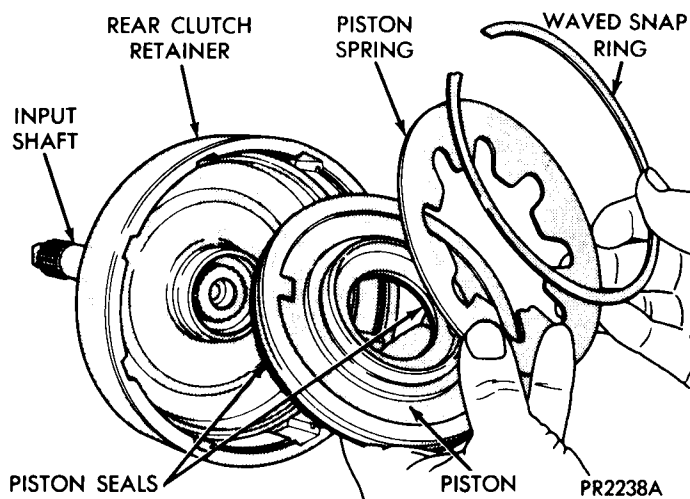


**Fig. 3. Remove or Install Piston Spring Waved Snap Ring**

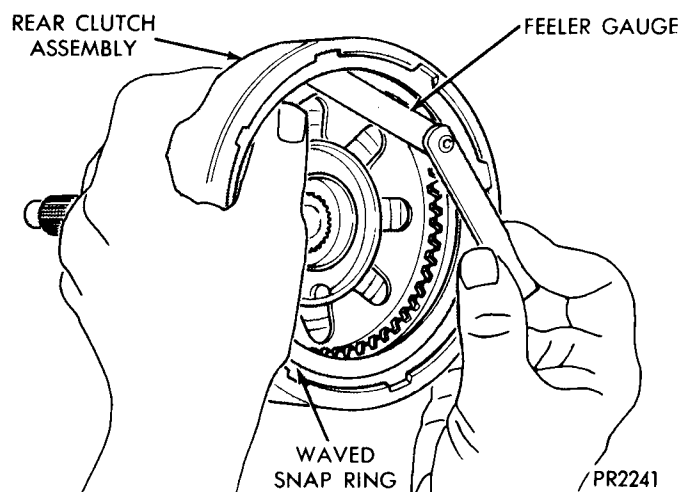


**Fig. 6. Input Shaft Snap Ring—Removed**

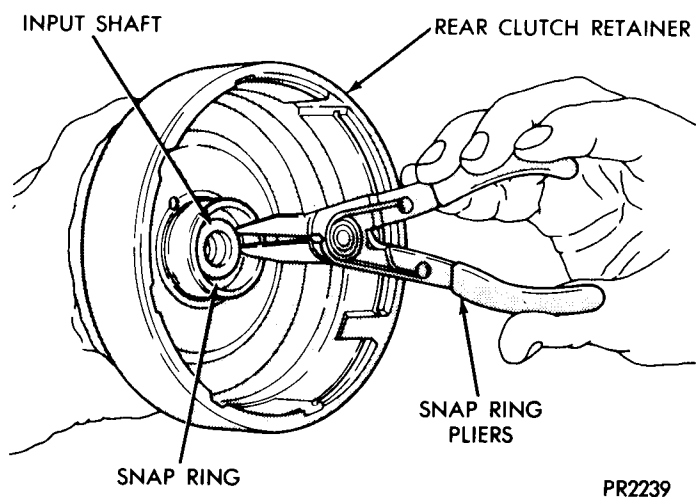
Press out input shaft, if required.  
To reassemble, reverse the above procedure.



**Fig. 4. Remove or Install Rear Clutch Piston and Piston Spring**

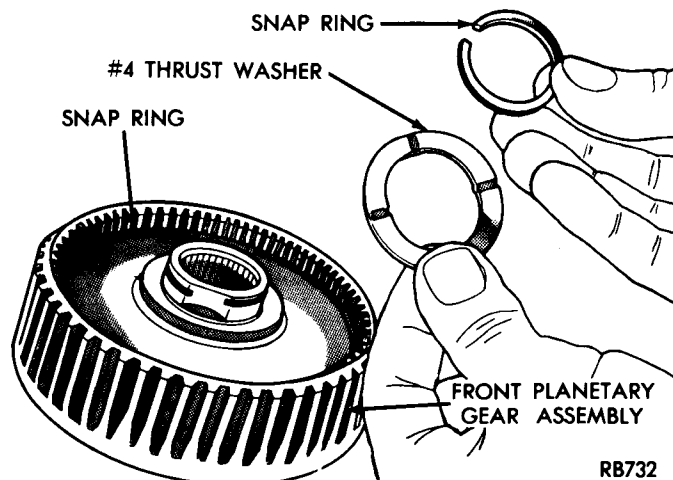


**Fig. 7. Measuring Rear Clutch Plate Clearance**

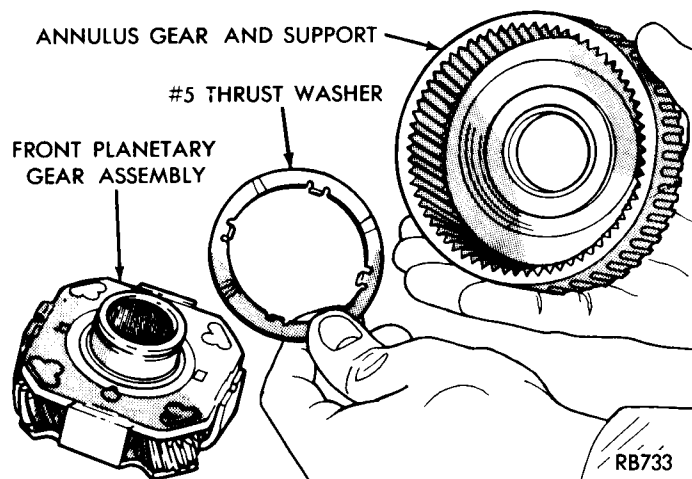


**Fig. 5. Remove or Install Input Shaft Snap Ring**

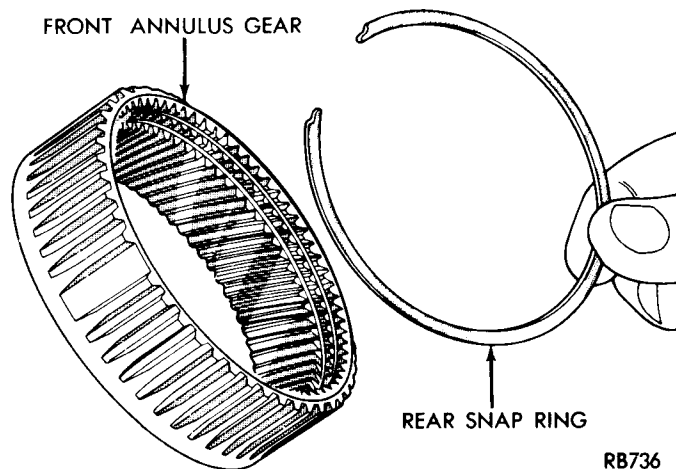
## FRONT PLANETARY & ANNULUS GEAR



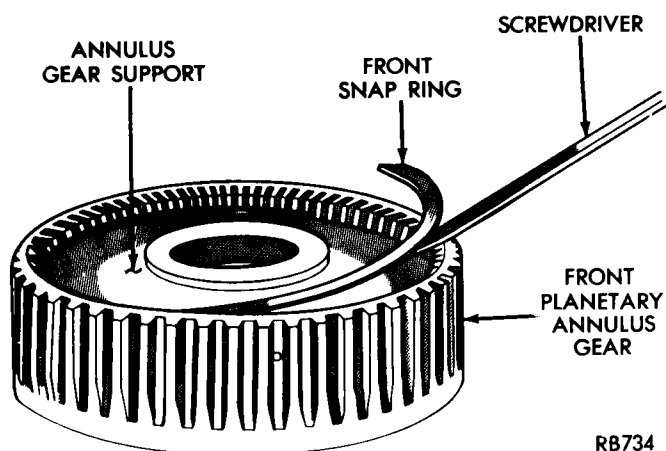
**Fig. 1. Remove or Install Front Planetary Gear Snap Ring and No. 4 Thrust Washer**



**Fig. 2. Remove or Install Front Planetary Gear Annulus Gear and No. 5 Thrust Washer**

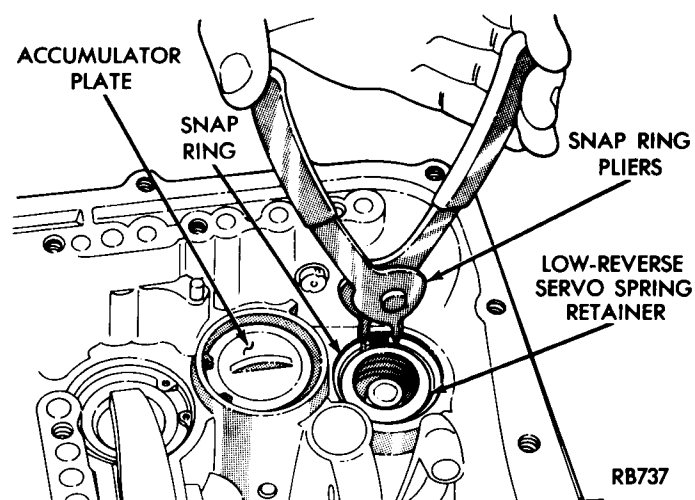


**Fig. 5. Remove or Install Front Annulus Gear Support Rear Snap Ring**

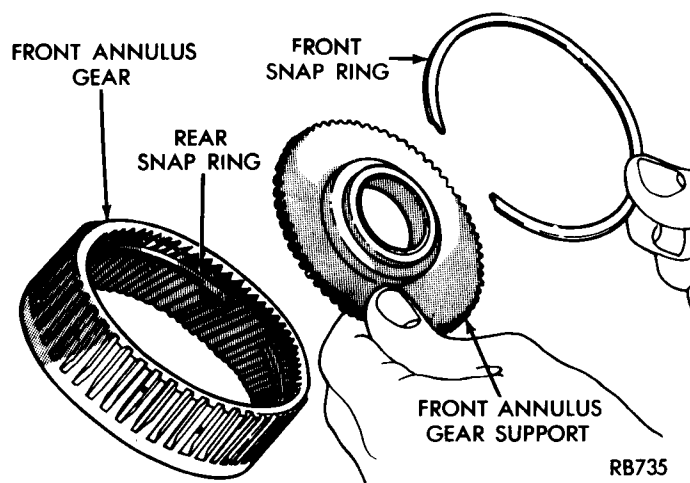


**Fig. 3. Remove or Install Annulus Gear Support Front Snap Ring**

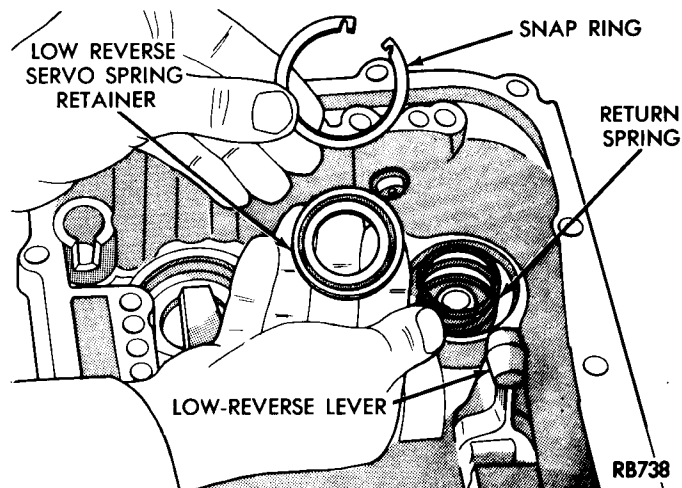
### LOW-REVERSE (REAR) SERVO



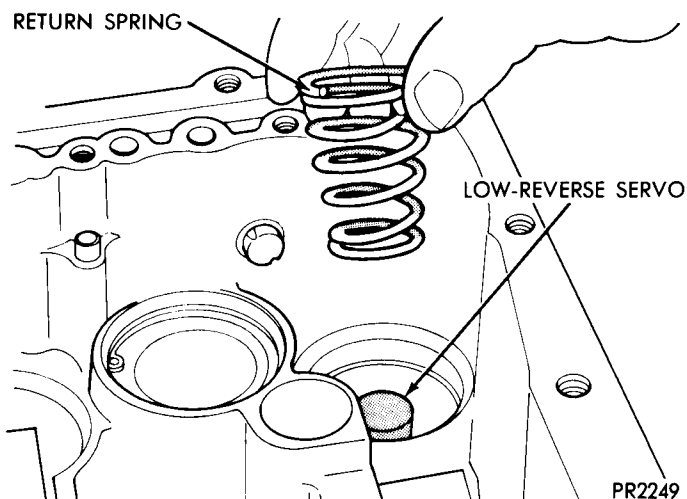
**Fig. 1. Remove or Install Low-Reverse Servo Retainer Snap Ring**



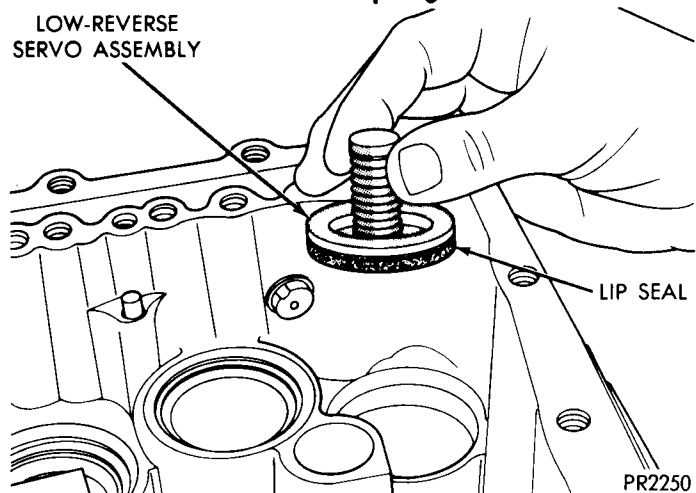
**Fig. 4. Remove or Install Front Annulus Gear Support and Front Snap Ring**



**Fig. 2. Remove or Install Low-Reverse Servo Retainer and Snap Ring**



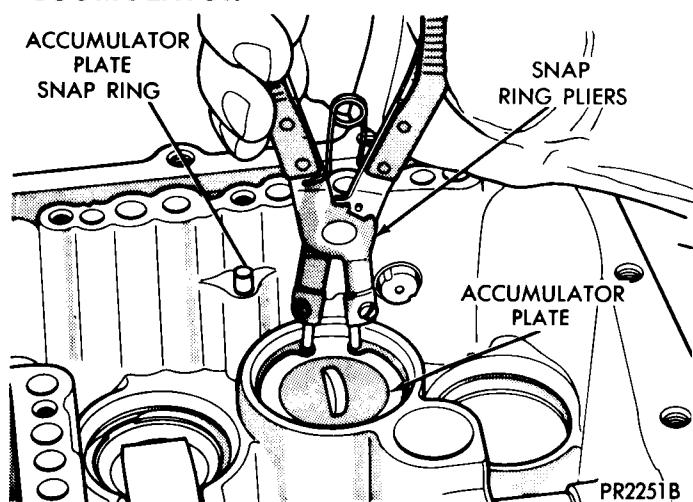
**Fig. 3. Remove or Install Low-Reverse Servo Return Spring**



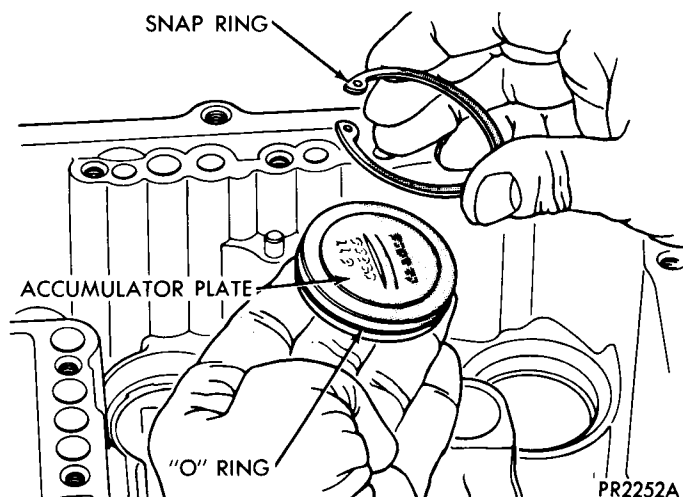
**Fig. 4. Remove or Install Low-Reverse Servo Assembly**

To assemble, reverse the above procedure.

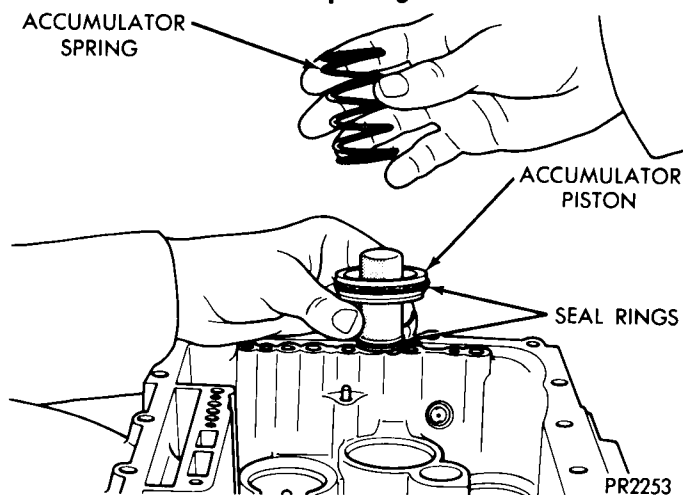
## ACCUMULATOR



**Fig. 1. Remove or Install Accumulator Snap Ring**



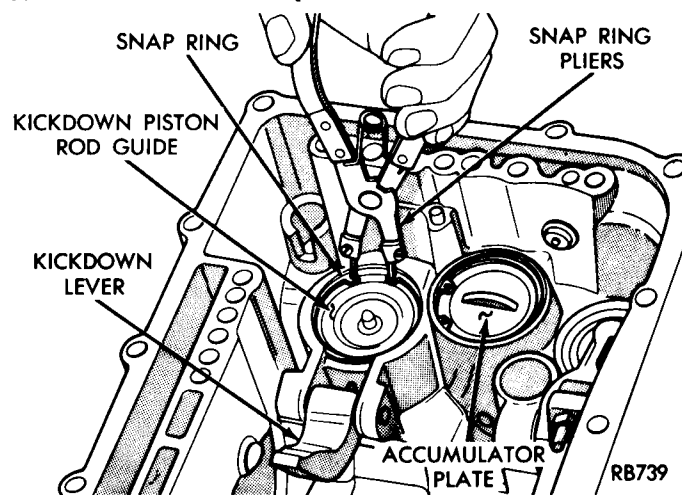
**Fig. 2. Remove or Install Accumulator Plate and Snap Ring**



**Fig. 3. Remove or Install Accumulator Spring and Piston**

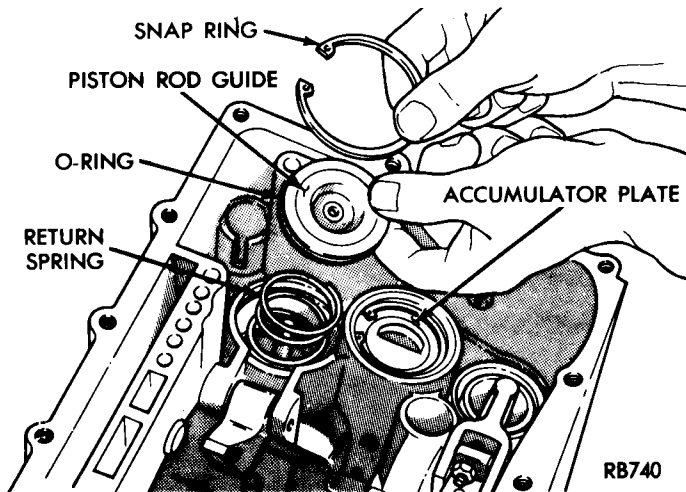
To assemble, reverse the above procedure.

## KICKDOWN SERVO (CONTROLLED LOAD)

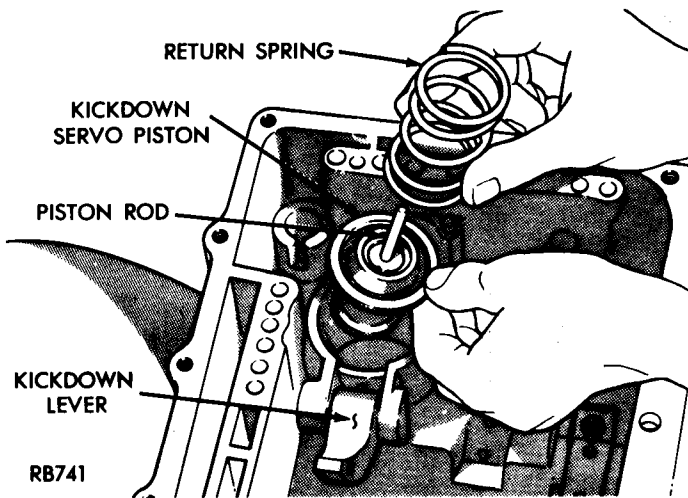


**Fig. 1. Remove or Install Kickdown Servo Snap Ring**

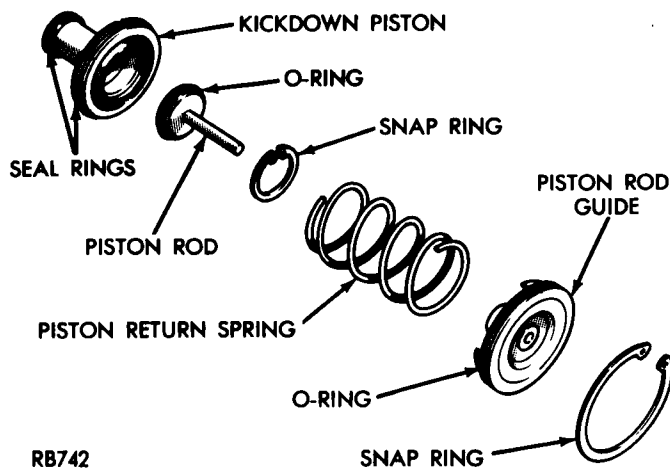




**Fig. 2. Remove or Install Kickdown Servo Rod Guide and Snap Ring**



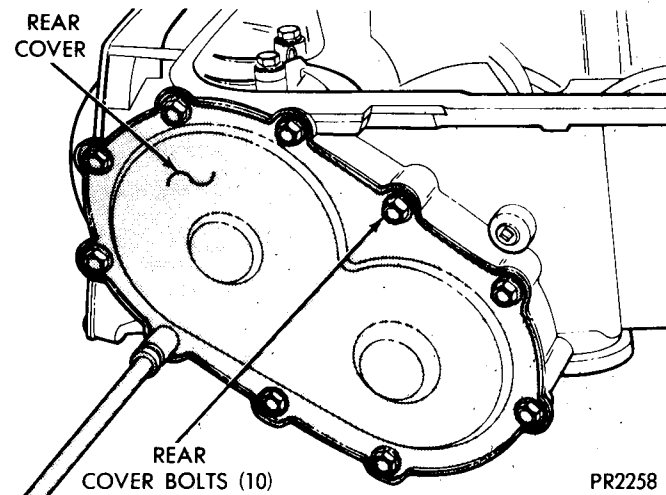
**Fig. 3. Remove or Install Kickdown Piston Return Spring and Piston**



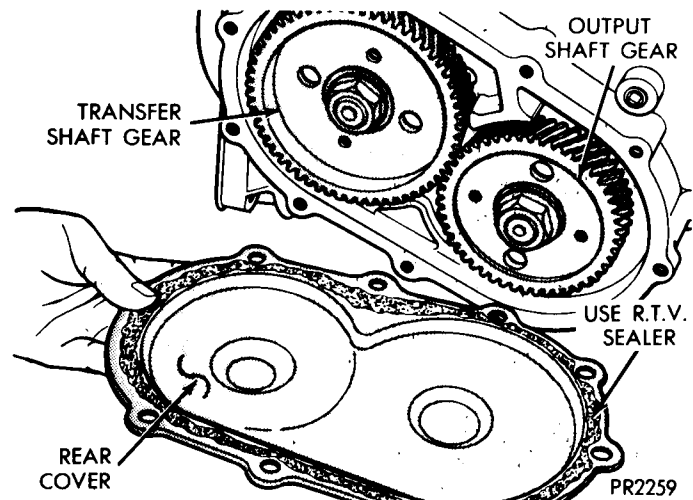
**Fig. 4. Controlled Load Kickdown Servo—Disassembled**

To assemble, reverse the above procedure.

## TRANSFER SHAFT REPAIR

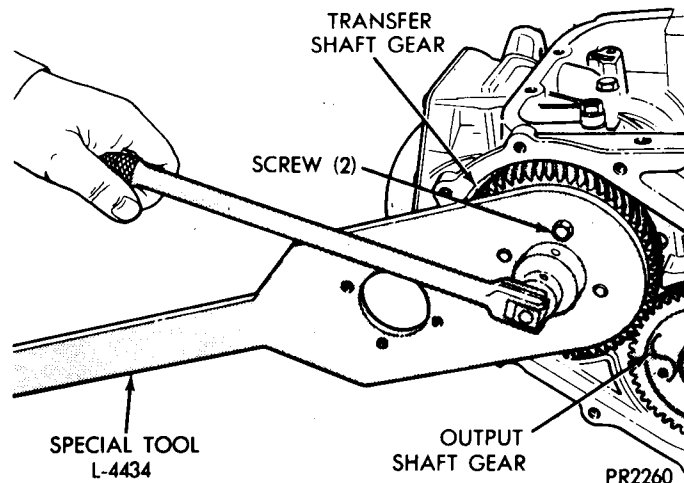


**Fig. 1. Remove or Install Rear Cover Bolts (10)**



**Fig. 2. Remove or Install Rear Cover**

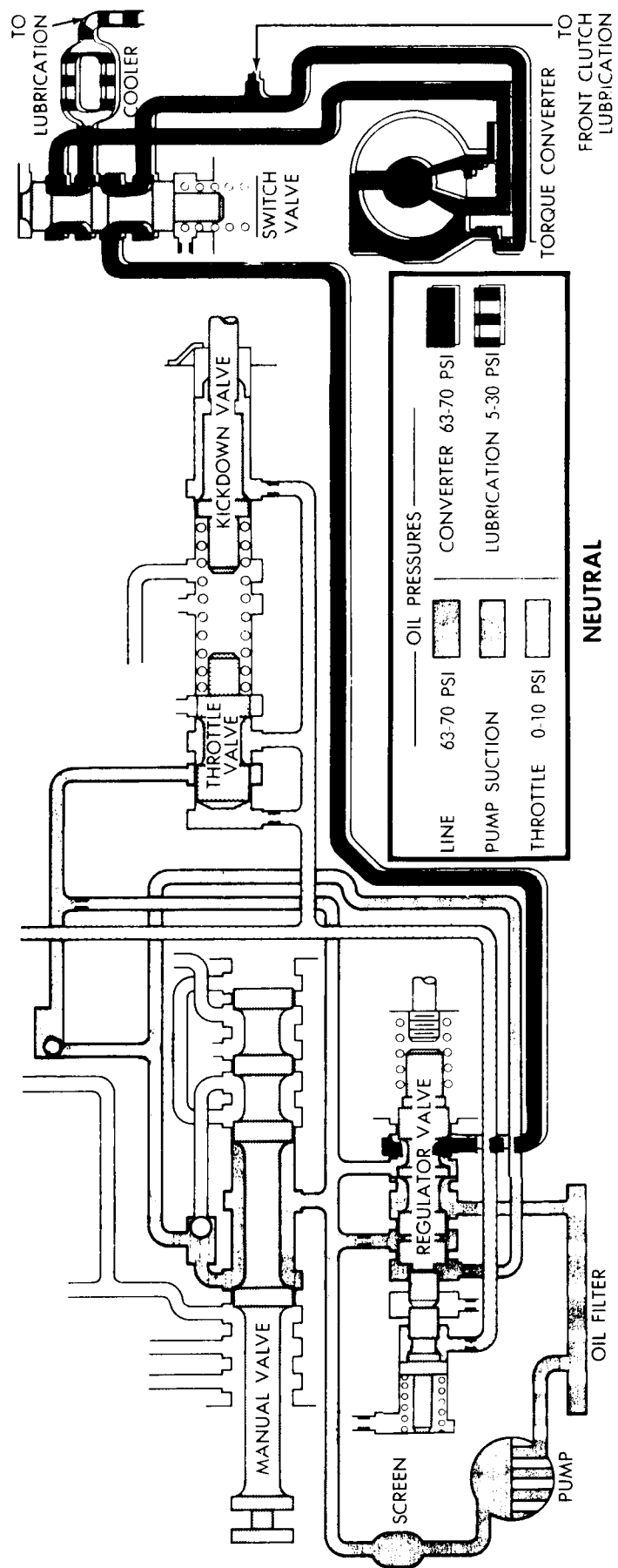
**NOTE:** Use R.T.V. sealant when installing cover.



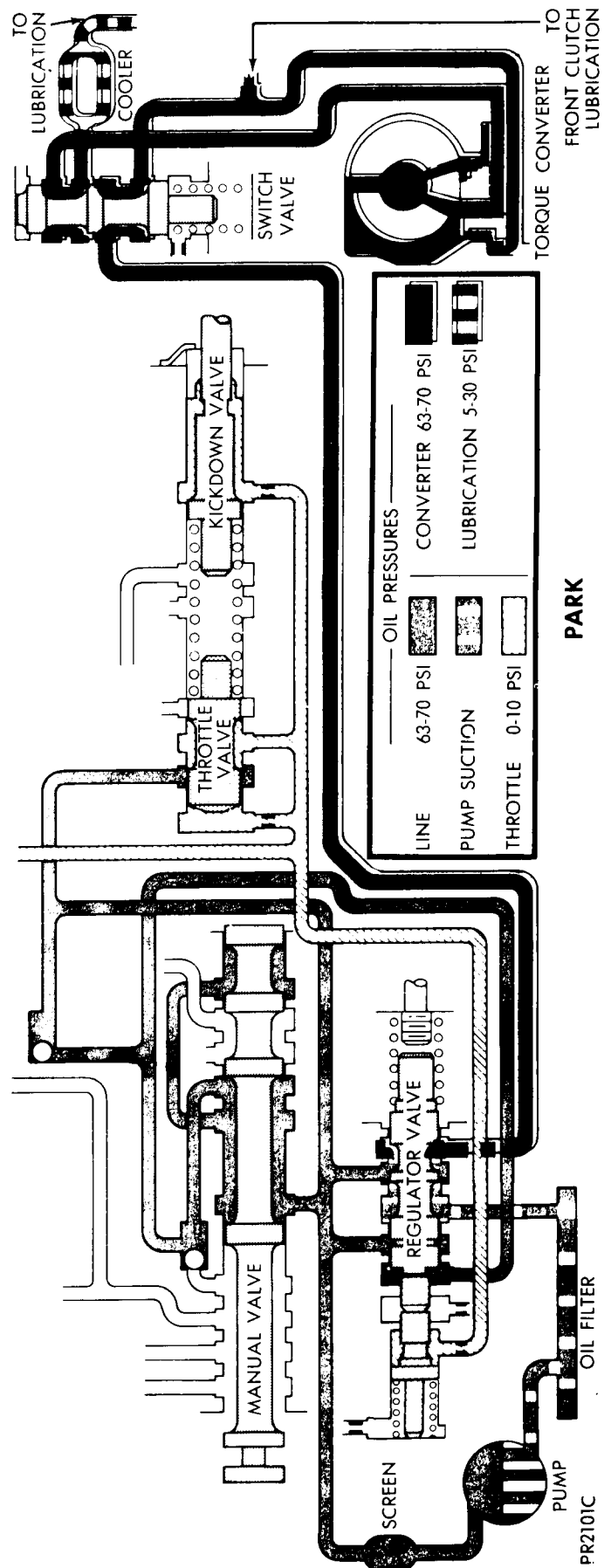
**Fig. 3. Remove Transfer Shaft Gear Retaining Nut**

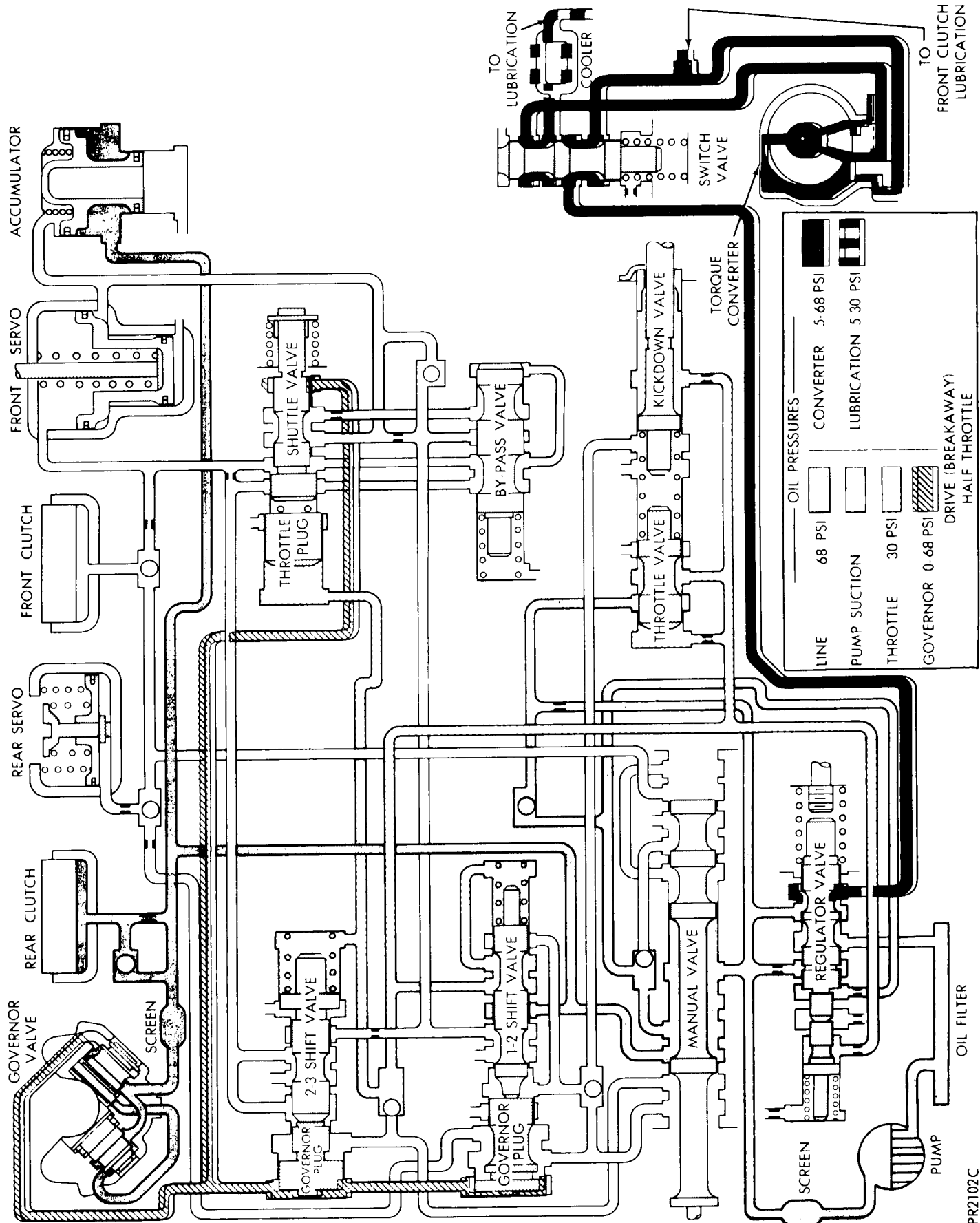


# TRANSAXLE



42

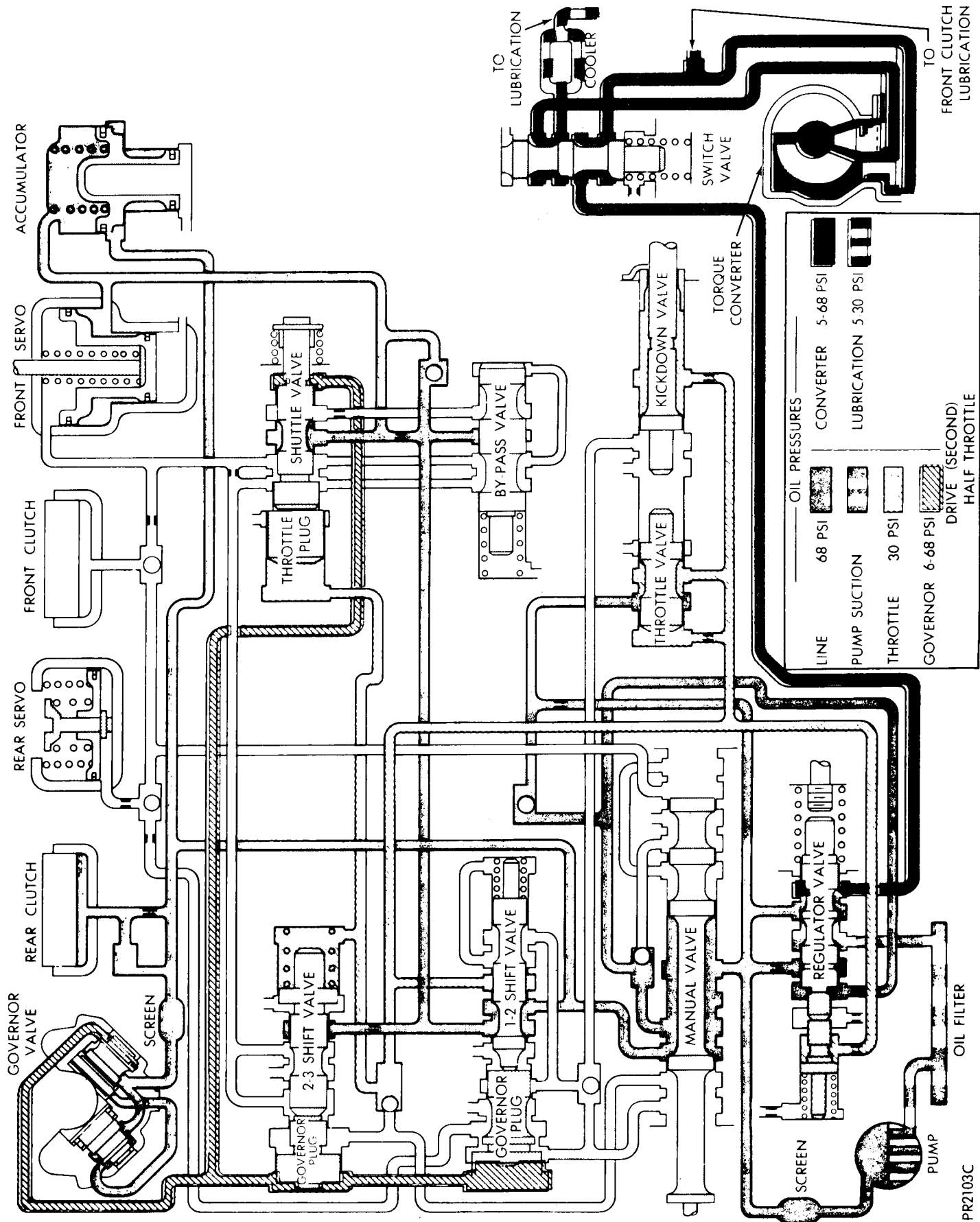




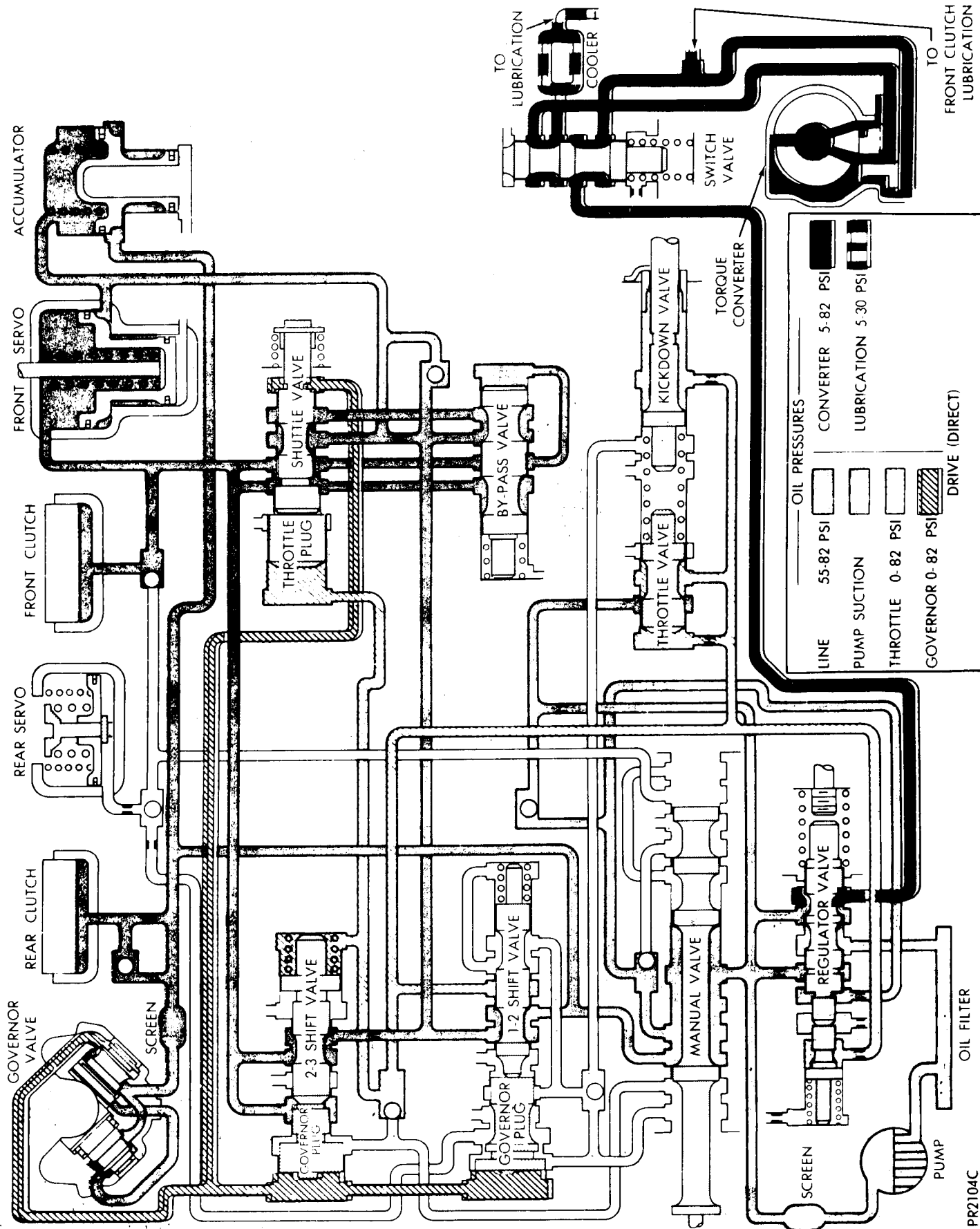
PR2102C



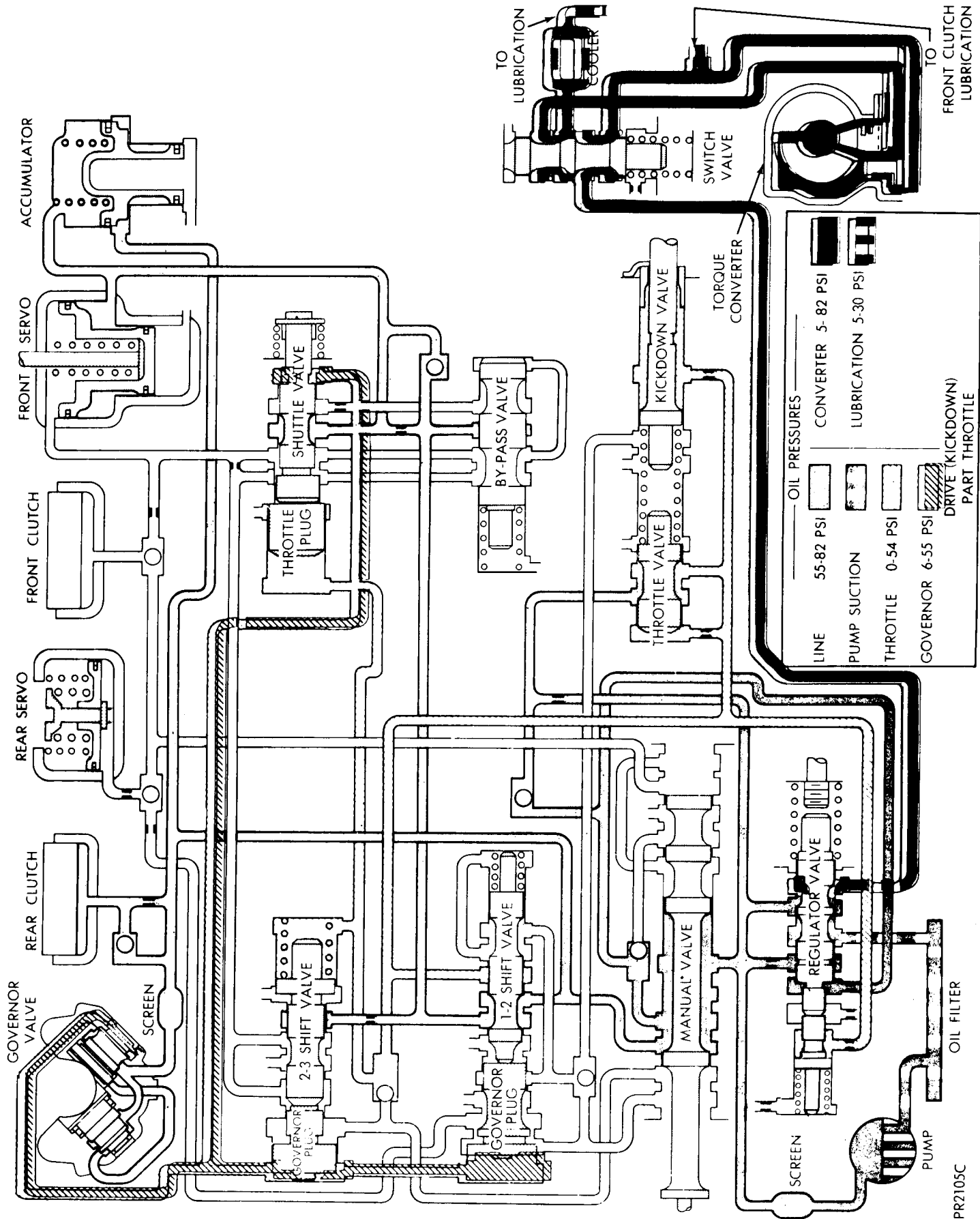
# TRANSAXLE



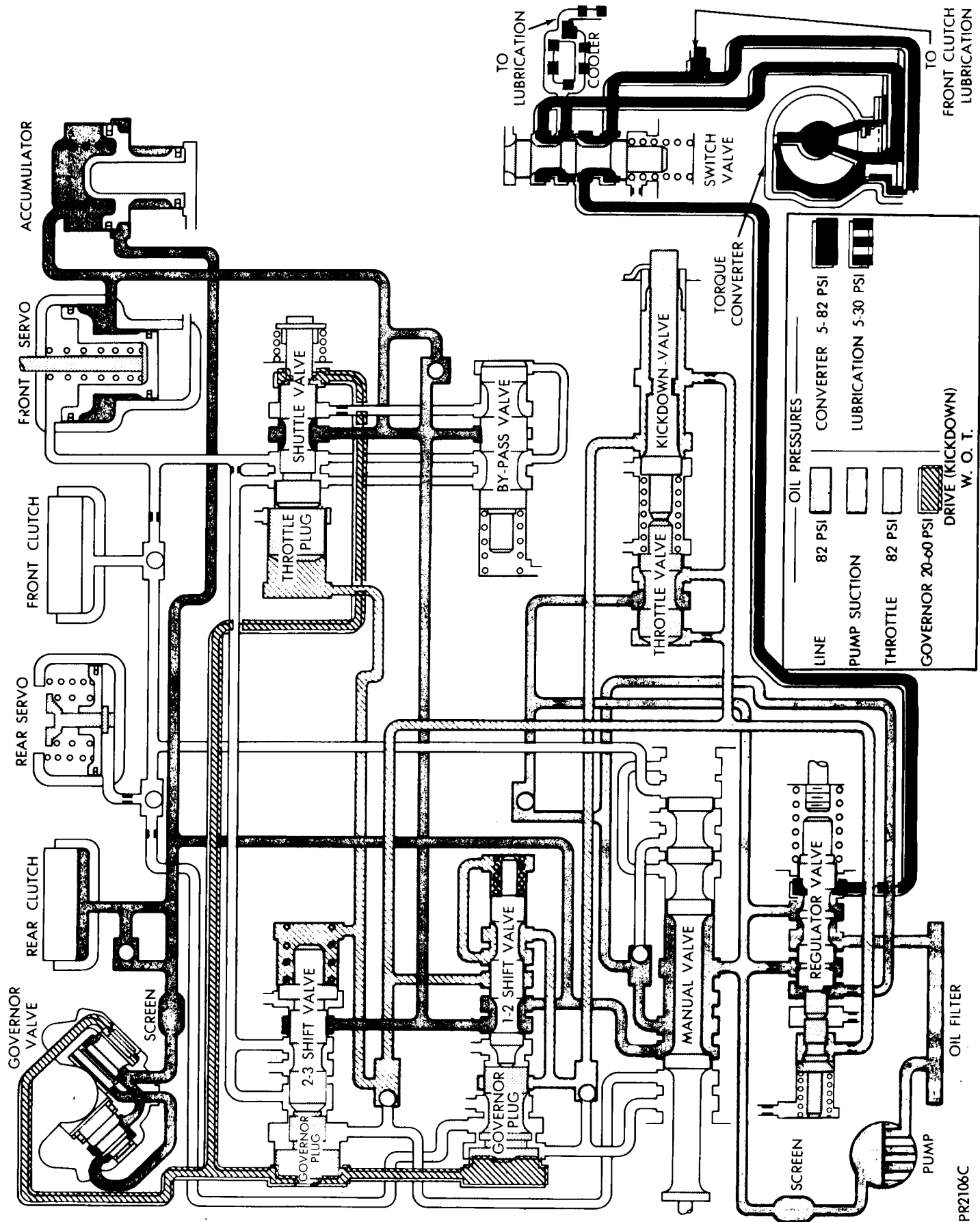
PR2103C



PR2104C



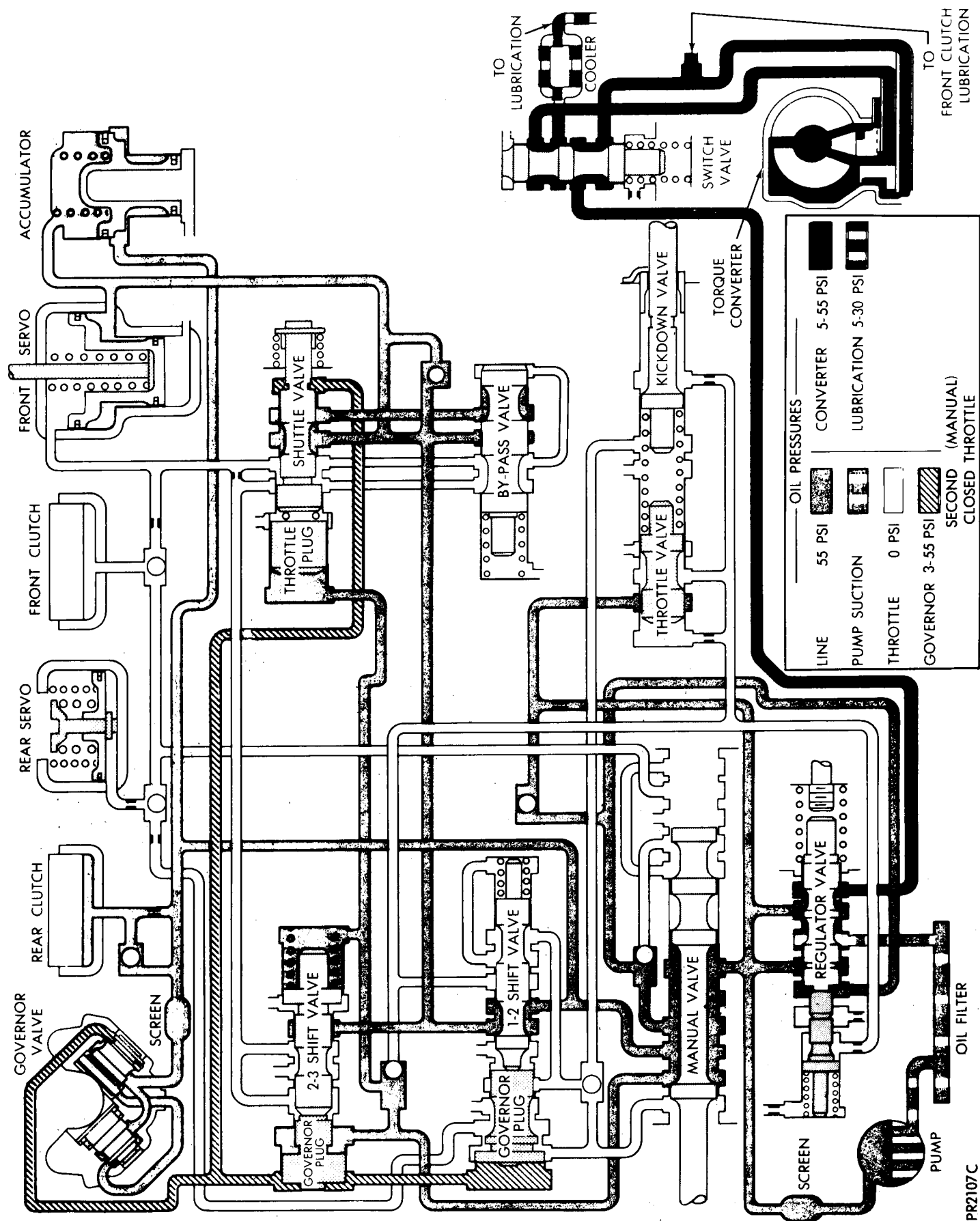
PR2105C



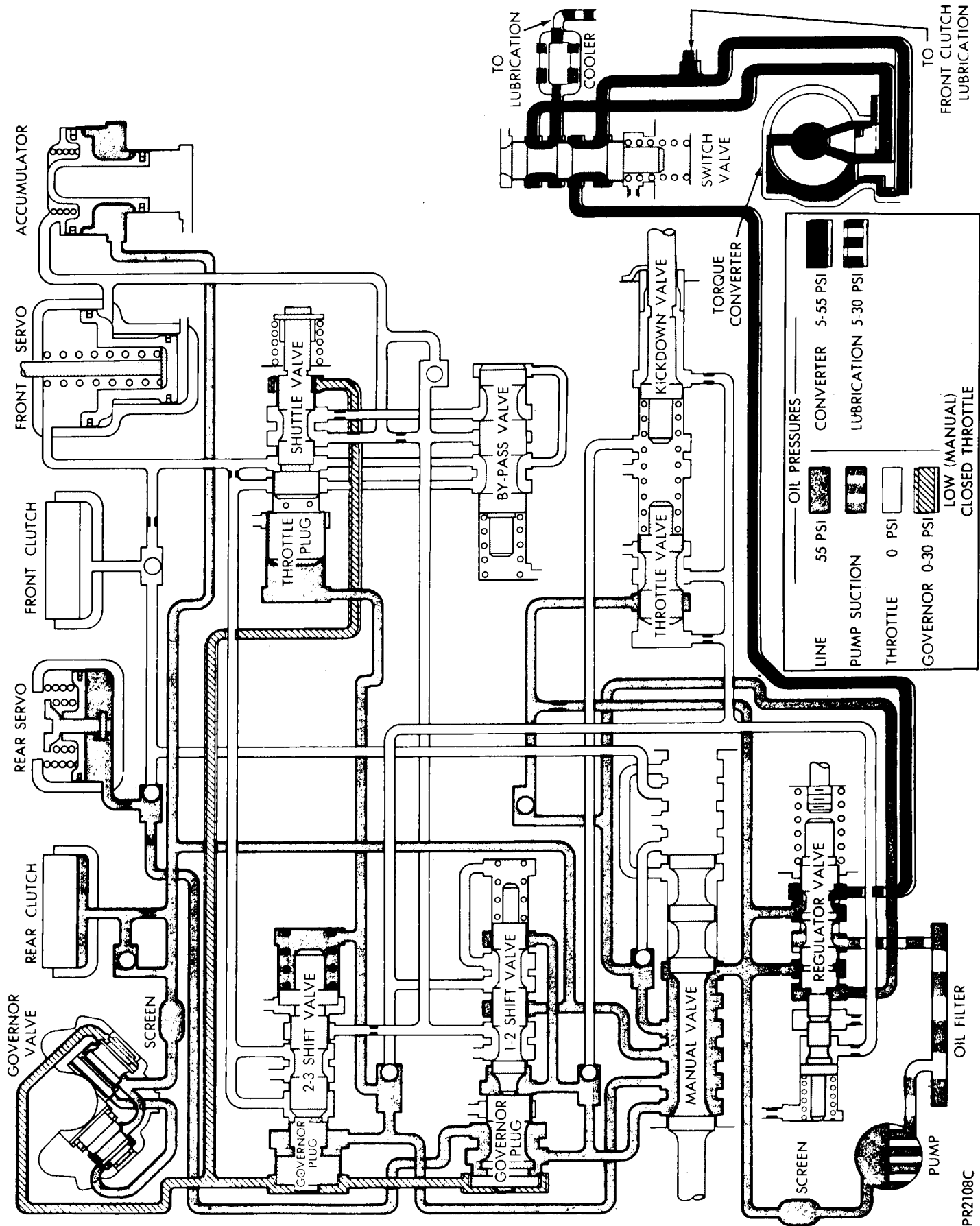
PR2106C



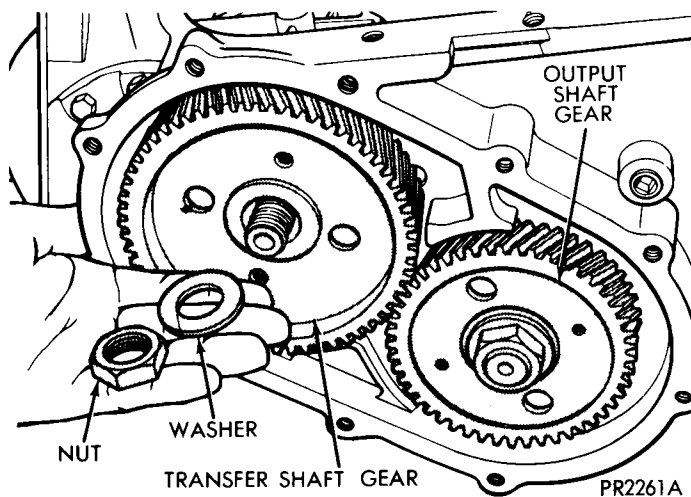
# TRANSAXLE



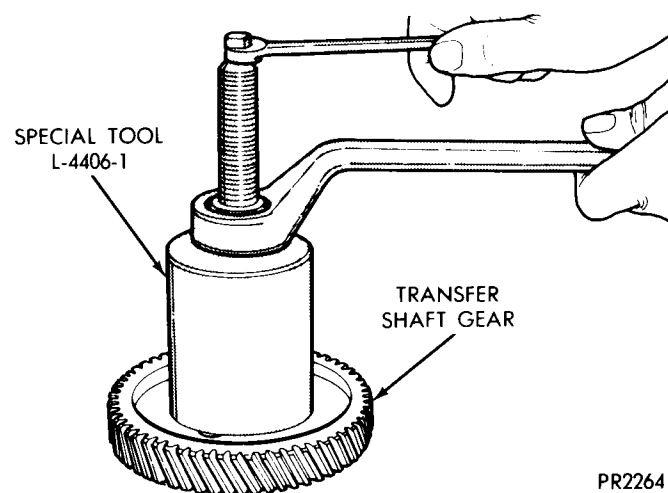




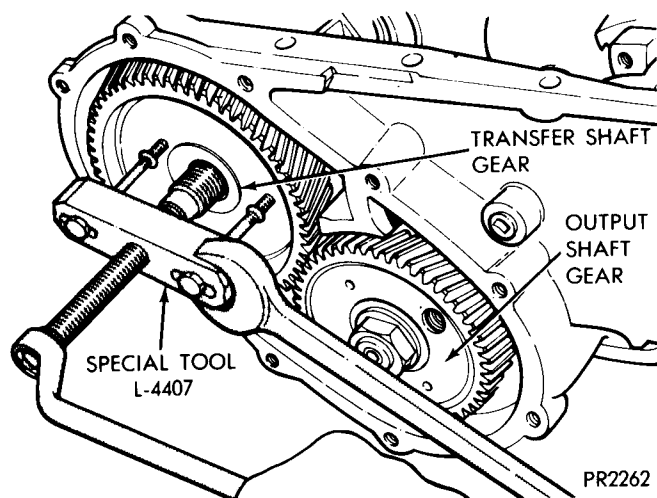




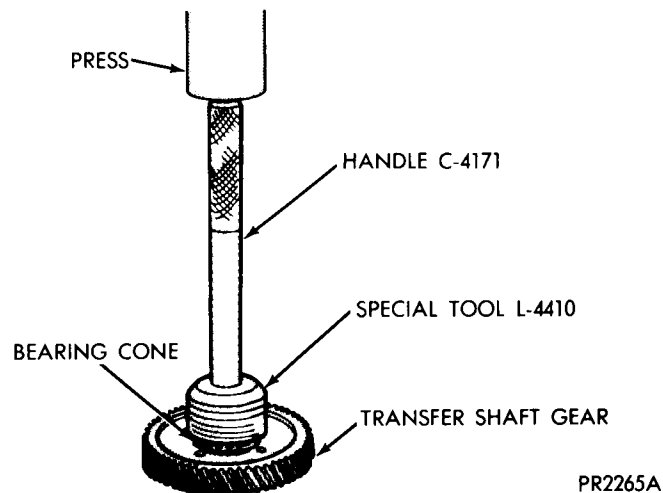
**Fig. 4. Remove or Install Transfer Shaft Gear Nut and Washer**



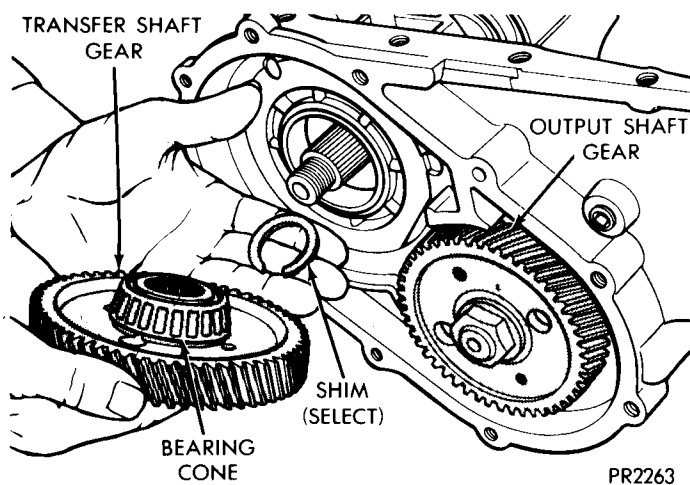
**Fig. 7. Using Tool L-4406-1 with Adapter L-4406-3, Remove Transfer Shaft Gear Bearing Cone**



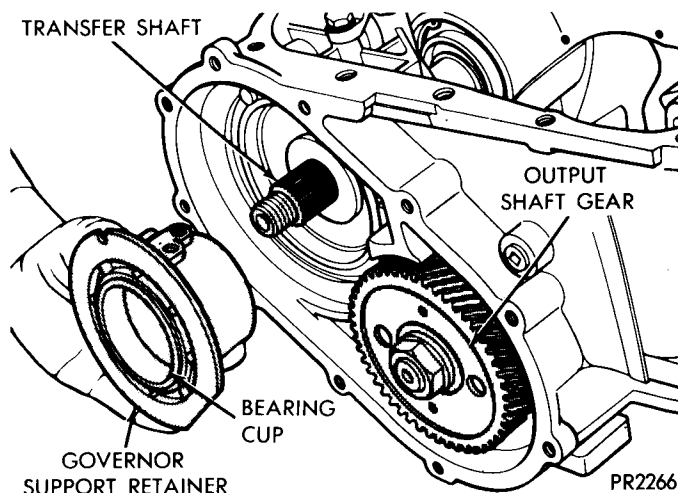
**Fig. 5. Remove Transfer Shaft Gear**



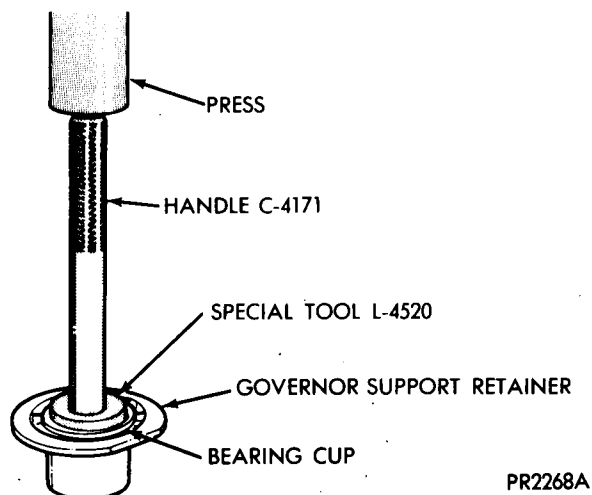
**Fig. 8. Install Transfer Shaft Gear Bearing Cone**



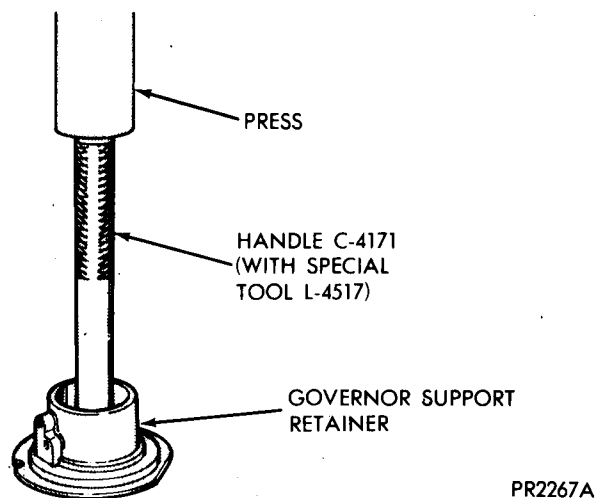
**Fig. 6. Remove or Install Transfer Shaft Gear and (Select) Shim**



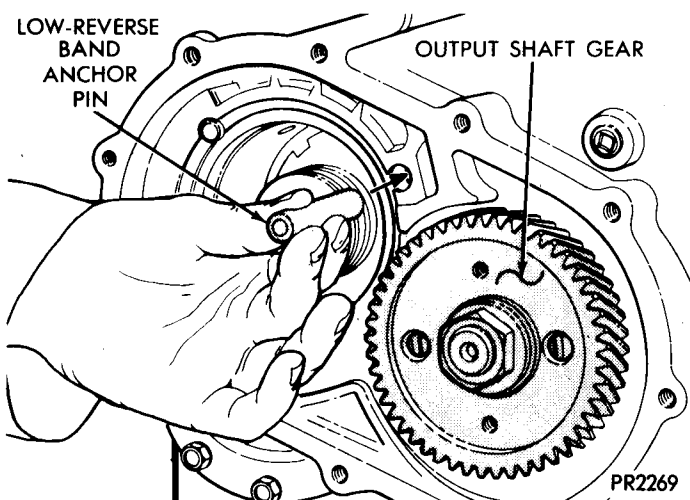
**Fig. 9. Remove or Install Governor Support Retainer**



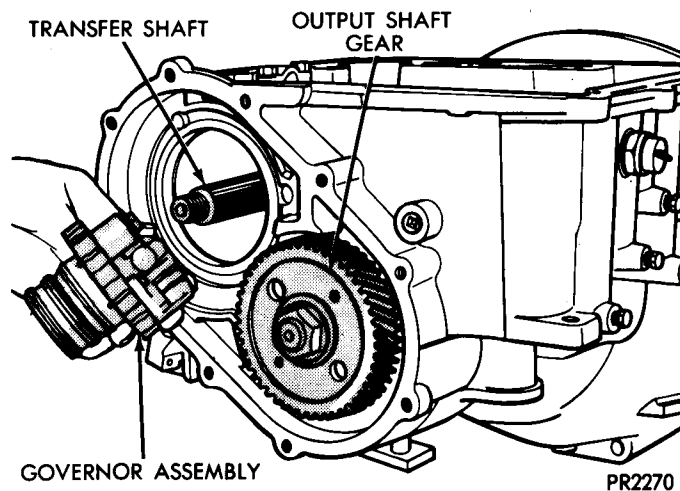
**Fig. 10. Remove Governor Support Retainer Bearing Cup**



**Fig. 11. Install Governor Support Retainer Bearing Cup**

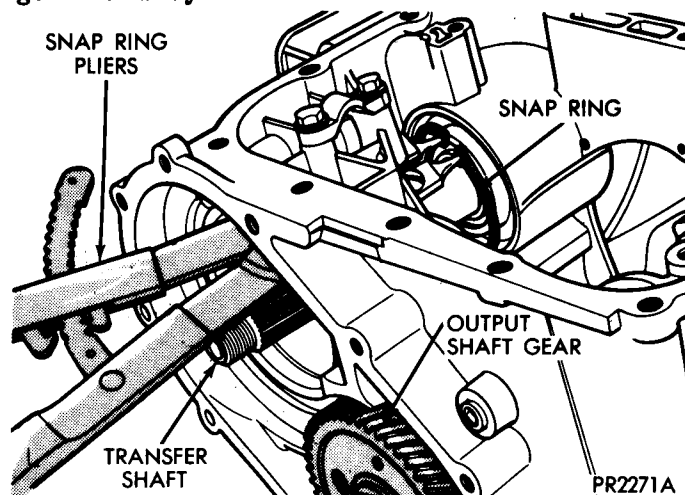


**Fig. 12. Remove or Install Low-Reverse Band Anchor Pin**

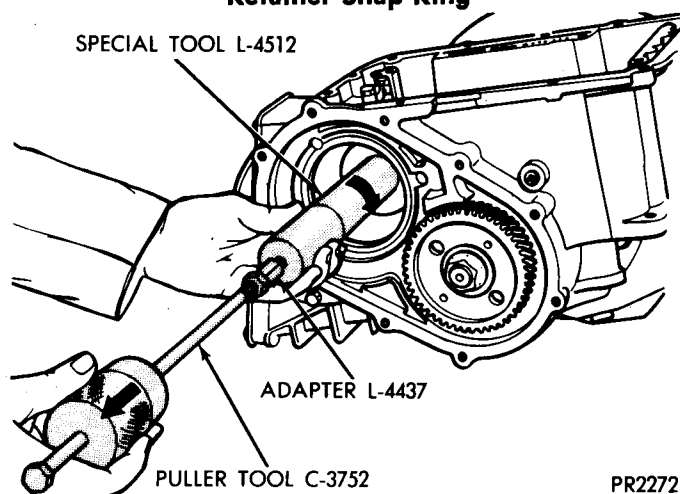


**Fig. 13. Remove or Install Governor Assembly**

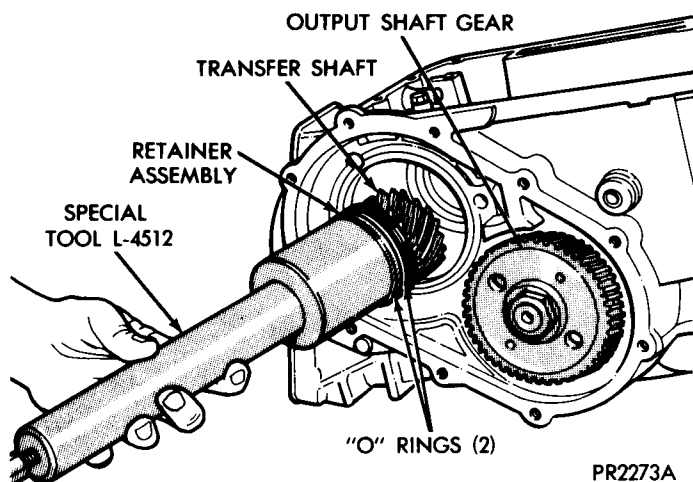
**NOTE:** Remove or install both governor valves and governor body.



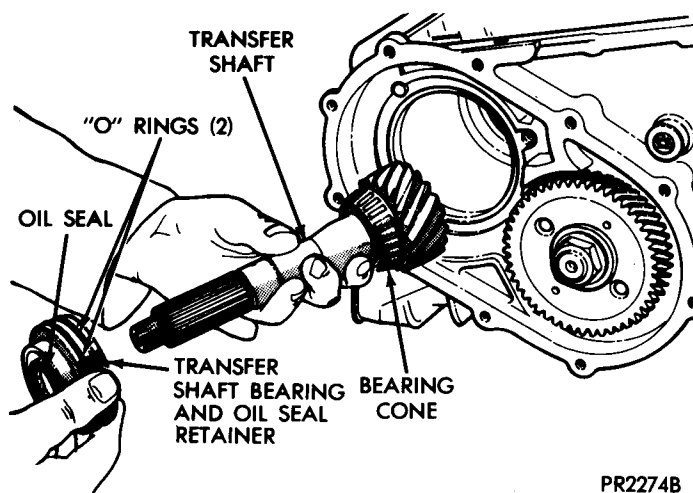
**Fig. 14. Remove or Install Transfer Shaft Bearing Retainer Snap Ring**



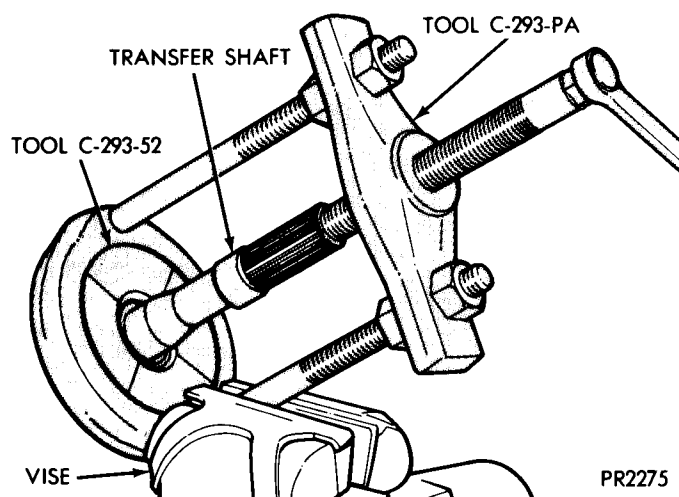
**Fig. 15. Remove Transfer Shaft and Bearing Retainer Assembly**



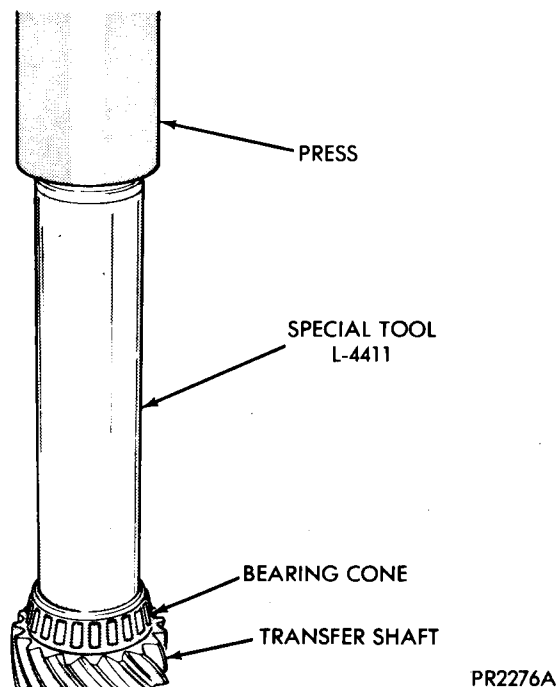
**Fig. 16. Remove or Install Transfer Shaft and Bearing Retainer Assembly using Tool L-4512**



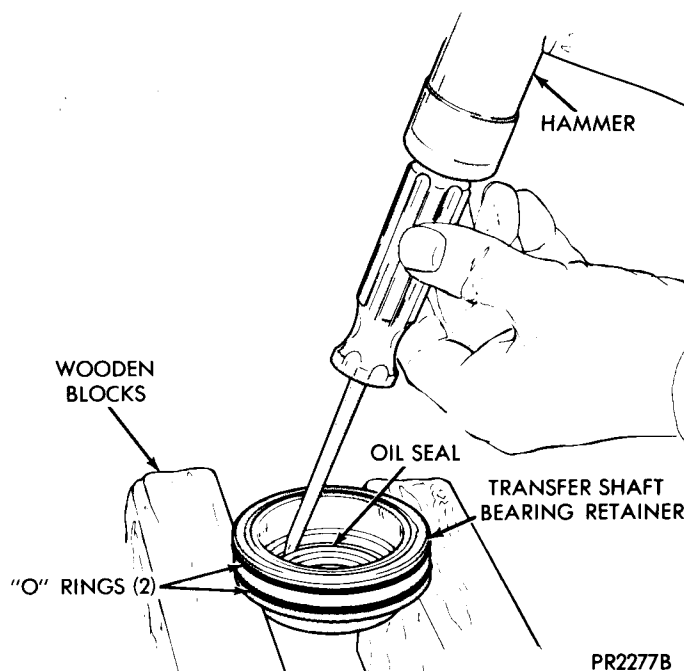
**Fig. 17. Transfer Shaft and Bearing Retainer**



**Fig. 18. Remove Transfer Shaft Bearing Cone**



**Fig. 19. Install Transfer Shaft Bearing Cone**



**Fig. 20. Remove Oil Seal from Transfer Shaft Bearing Retainer**

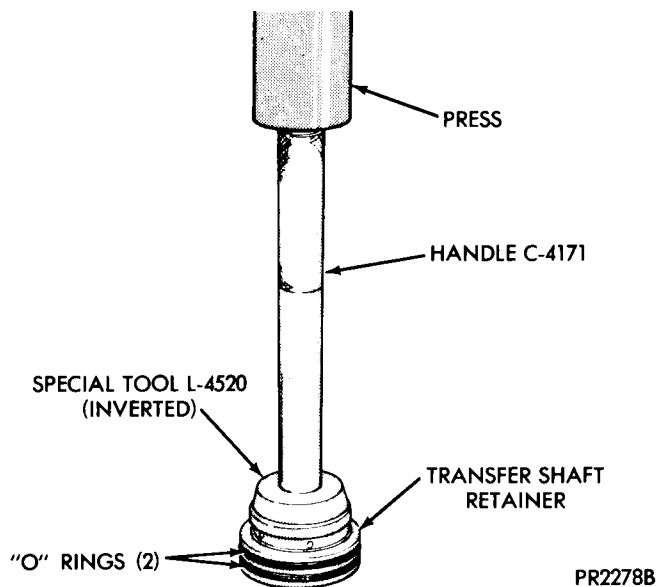


Fig. 21. Install New Oil Seal into Bearing Retainer

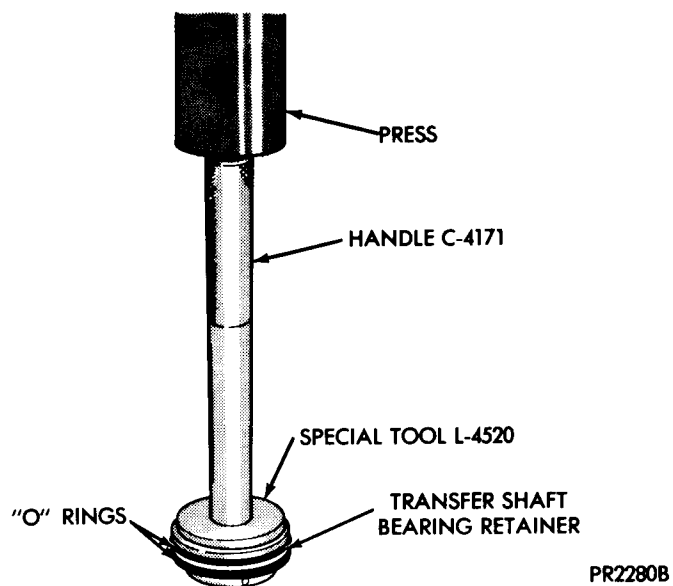


Fig. 23. Install Transfer Shaft Bearing Cup

To install transfer shaft, reverse the above procedure.

### Determining Shim Thickness

Shim thickness determining need only be done if any of the following parts are replaced: (a) transaxle case, (b) transfer shaft, (c) transfer shaft gear, (d) transfer shaft bearings, (e) governor support retainer, (f) transfer shaft bearing retainer, (g) retainer snap ring and (h) governor support. Refer to "Bearing Adjustment Procedure" in rear of this section to determine proper shim thickness for correct end play.

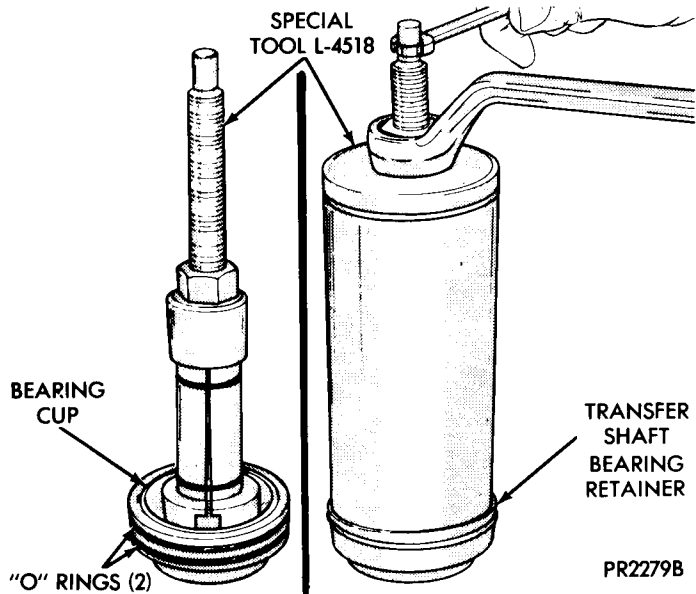


Fig. 22. Remove Transfer Shaft Bearing Cup

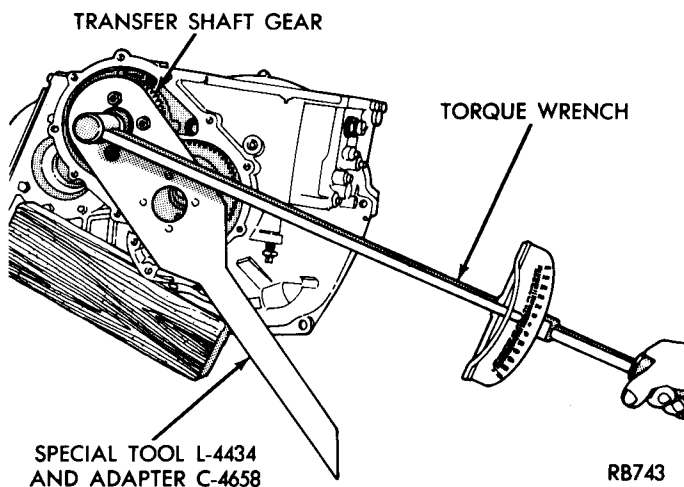
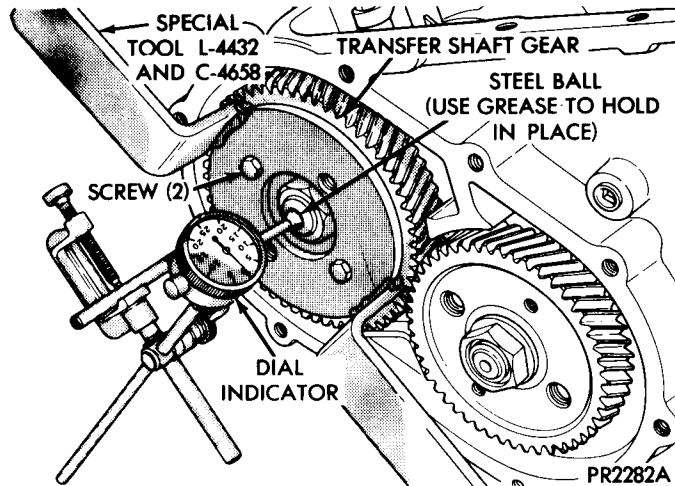
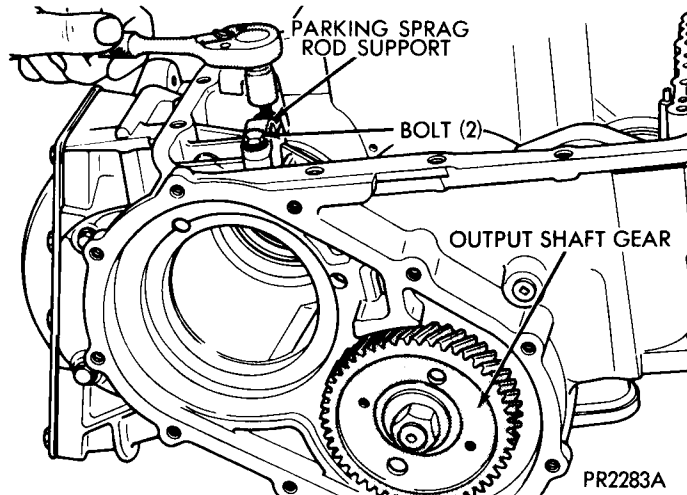


Fig. 24. Tighten Transfer Shaft Gear Retaining Nut to 271 N·m (200 ft. lbs.)

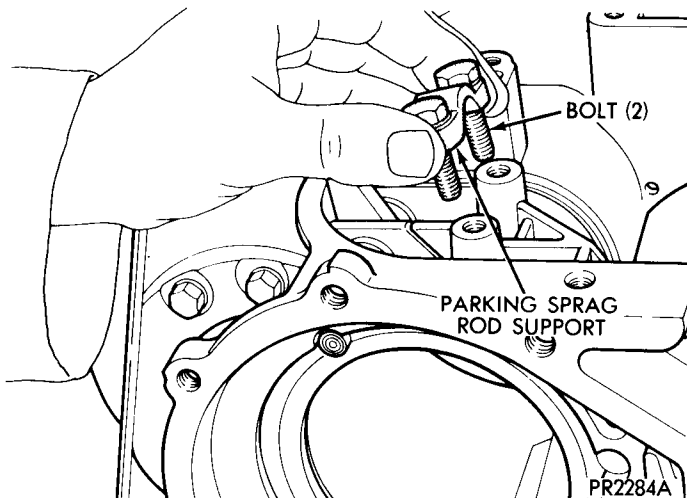


**Fig. 25. Checking Transfer Shaft End Play**

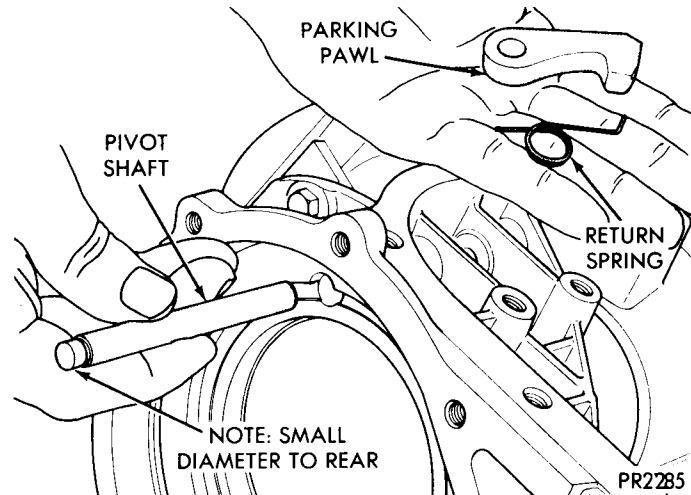
### PARKING PAWL



**Fig. 1. Remove or Install Parking Sprag Rod Support Bolt (2)**



**Fig. 2. Parking Sprag Rod Support and Bolts**

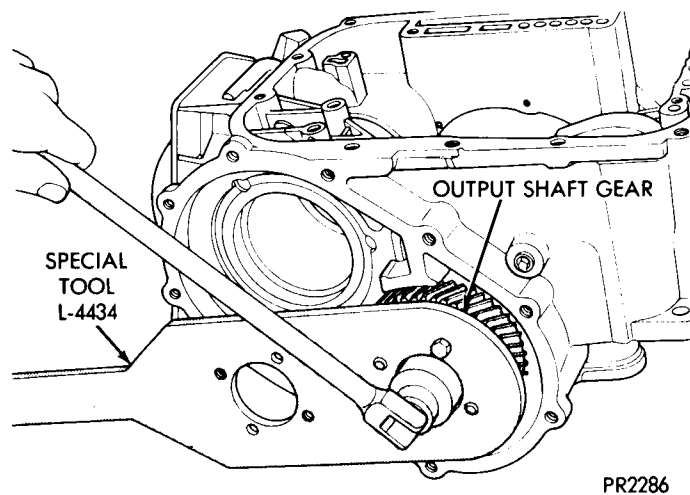


**Fig. 3. Remove or Install Parking Pawl, Return Spring, and Pivot Shaft**

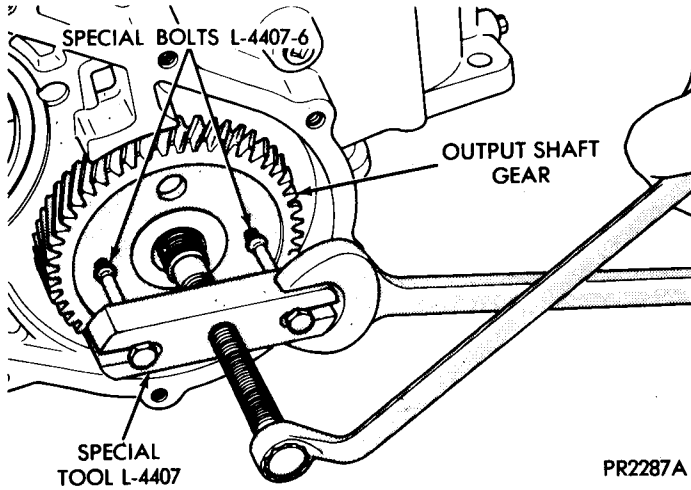
To install, reverse the above procedure.

### OUTPUT SHAFT REPAIR

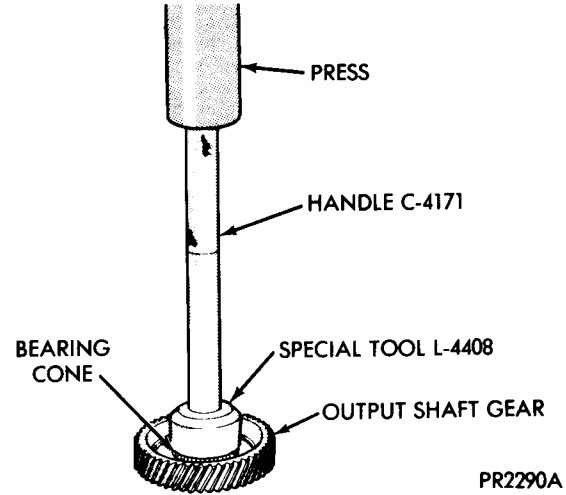
**NOTE:** Transfer shaft should be removed for repair of output shaft. Planetary gear sets must be removed to accurately check output shaft bearing turning torque.



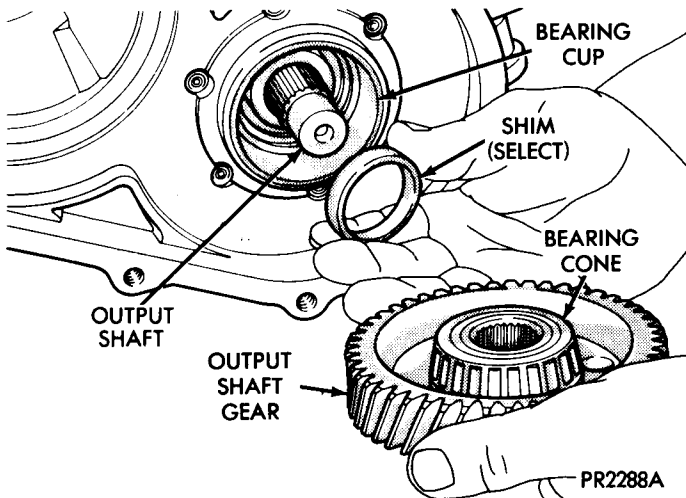
**Fig. 1. Remove Output Shaft Retaining Nut and Washer**



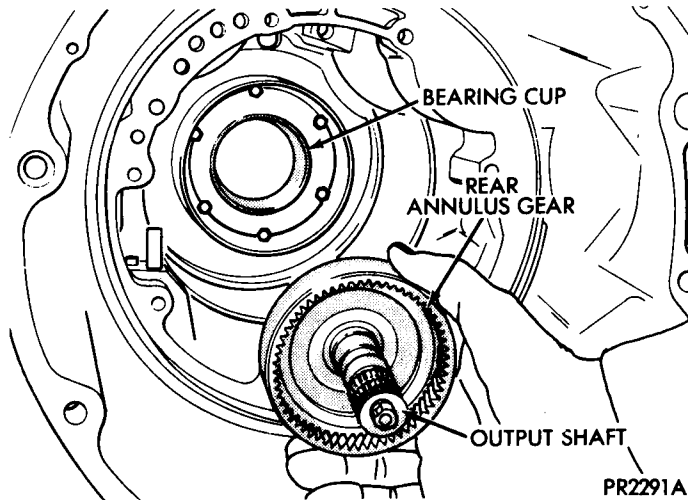
**Fig. 2. Remove Output Shaft Gear**



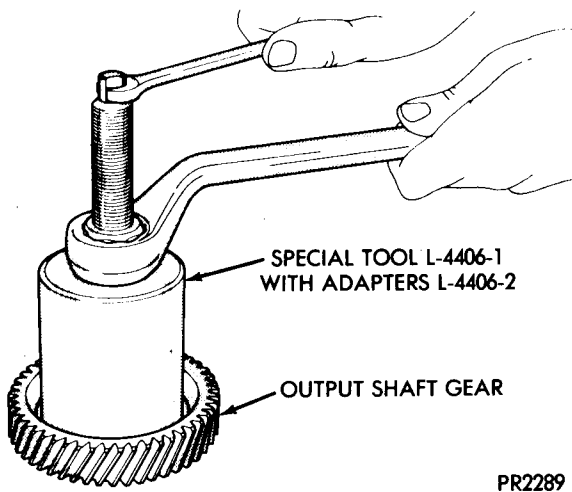
**Fig. 5. Install Output Shaft Gear Bearing Cone**



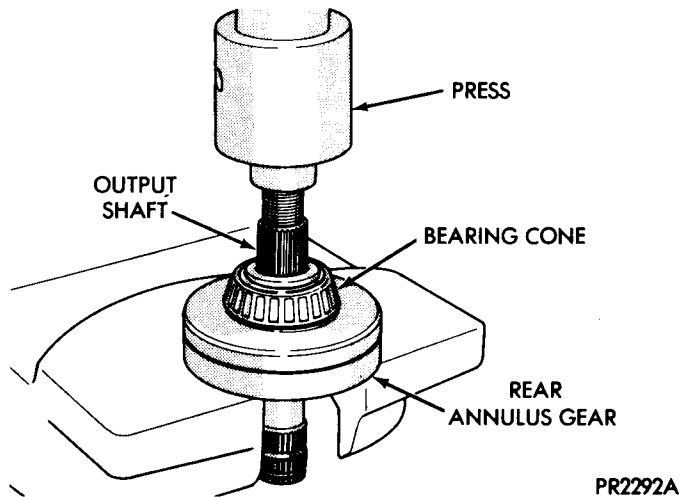
**Fig. 3. Remove or Install Output Shaft Gear and (select) Shim**



**Fig. 6. Remove Output Shaft and Rear Annulus Gear Assembly**

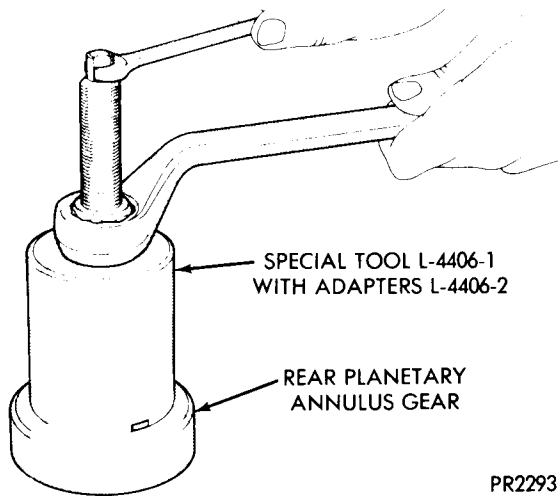


**Fig. 4. Remove Output Shaft Gear Bearing Cone**



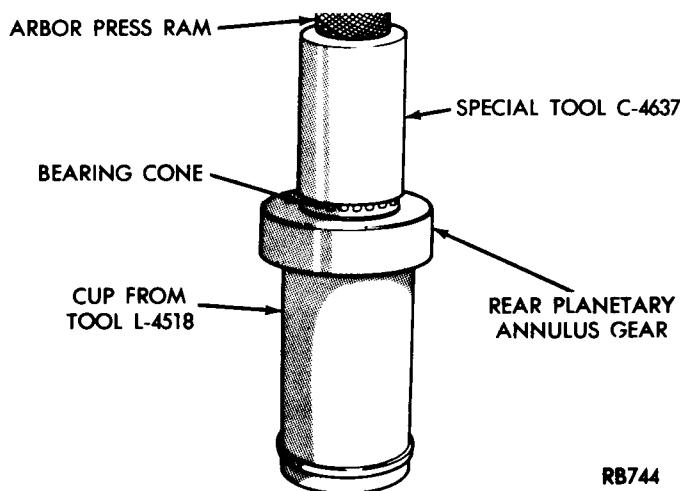
**Fig. 7. Remove Output Shaft from Rear Planetary Annulus Gear**





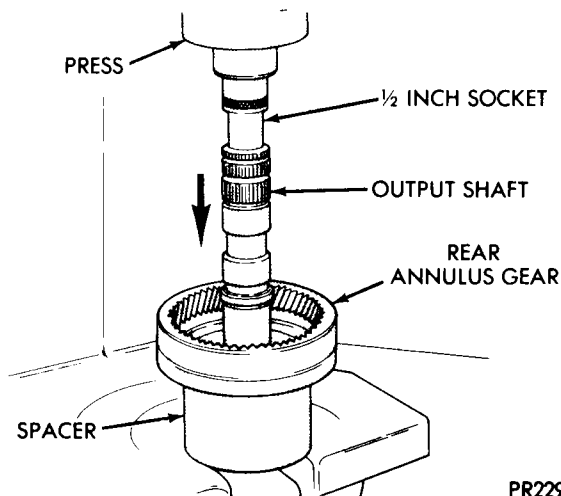
PR2293

**Fig. 8. Remove Rear Planetary Annulus Gear Bearing Cone**



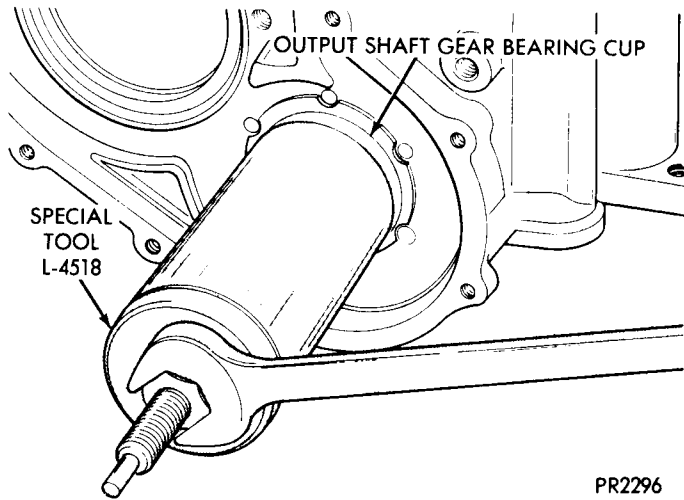
RB744

**Fig. 9. Install Rear Planetary Annulus Gear Bearing Cone**



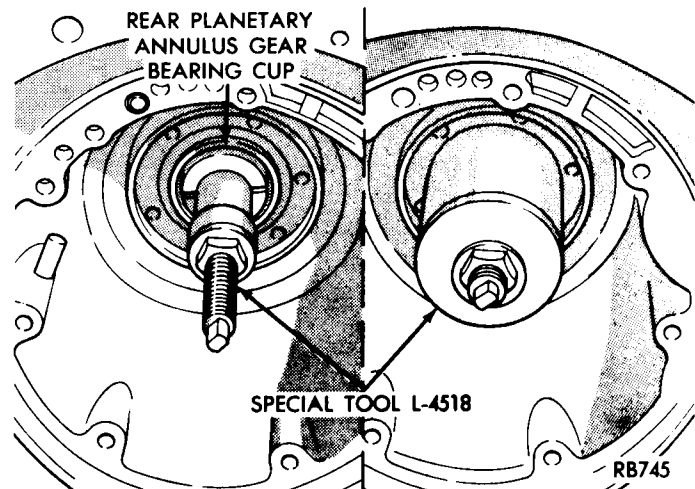
PR2295A

**Fig. 10. Install Output Shaft into Rear Planetary Annulus Gear**



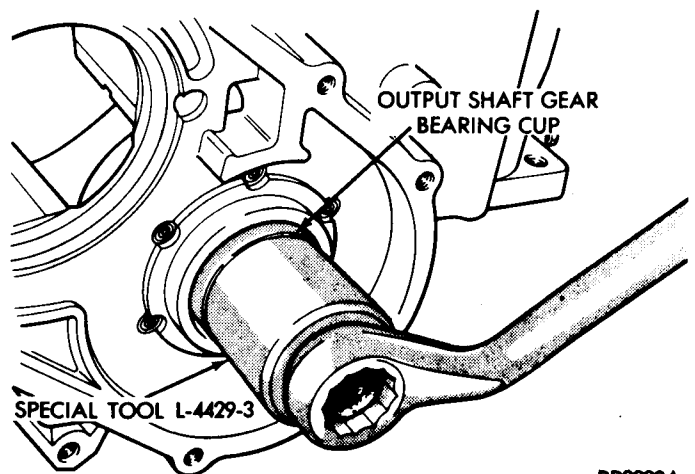
PR2296

**Fig. 11. Remove Output Shaft Gear Bearing Cup**



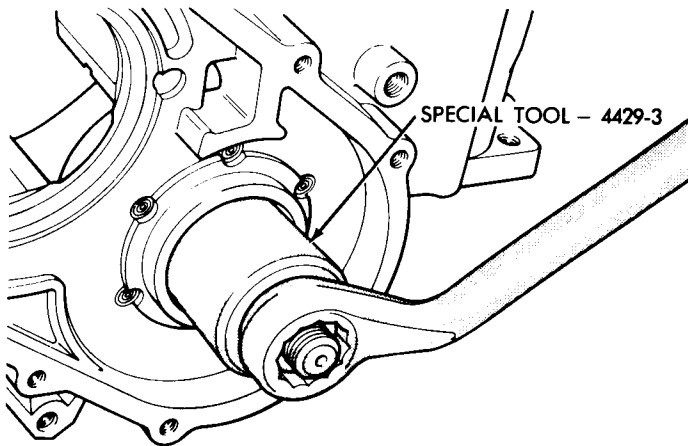
RB745

**Fig. 12. Remove Rear Planetary Annulus Gear Bearing Cup**



PR2298A

**Fig. 13. Install Output Shaft Gear Bearing Cup**



PR2299A

**Fig. 14. Install Rear Planetary Annulus Gear Bearing Cup**

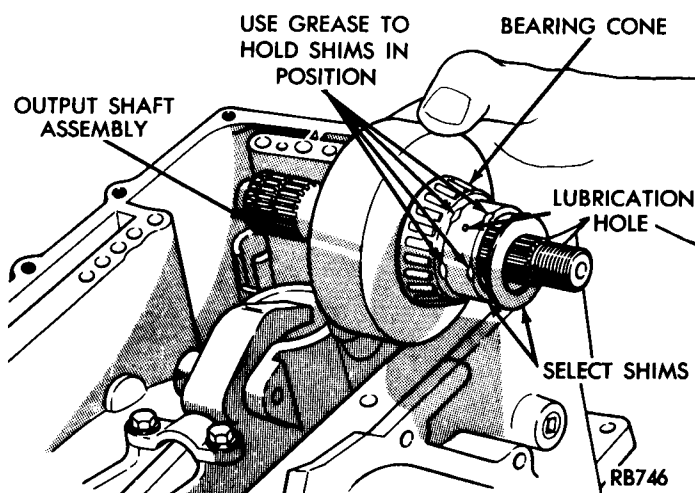
### Determining Shim Thickness

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

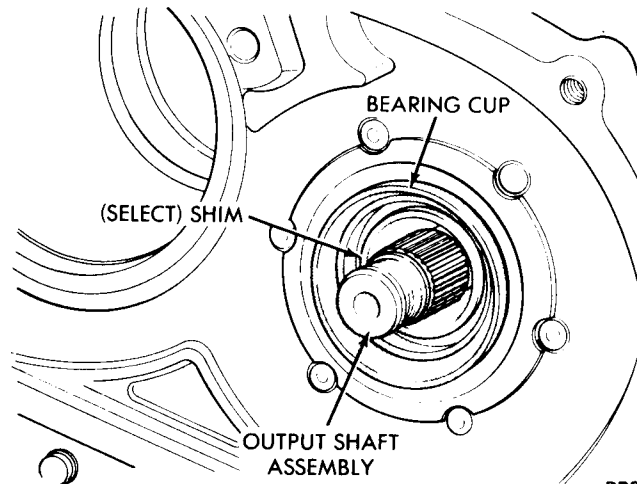
(a) transaxle case, (b) output shaft, (c) rear planetary annulus gear, (d) output shaft gear (e) rear annulus and output shaft gear bearing cones, and (f) overrunning clutch race cups.

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

**NOTE:** Check output shaft bearings turning torque, using an inch-pound torque wrench. If turning torque is 3 to 8 inch-pounds, the proper shim has been installed.

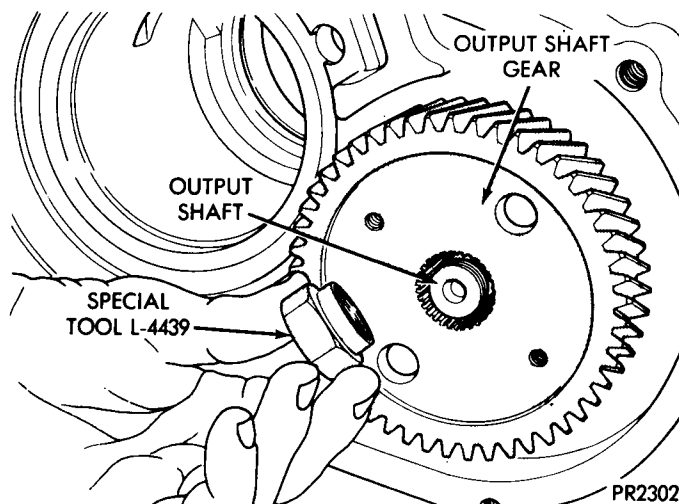


**Fig. 15. Install Output Shaft Assembly, Using Grease to hold the (Select) Shims in place on Rear Planetary Annulus Gear**



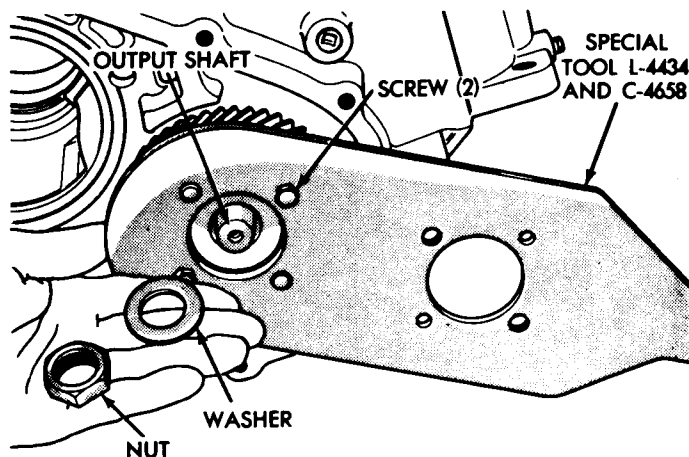
PR2301

**Fig. 16. Output Shaft Assembly and (Select) Shims in Position**



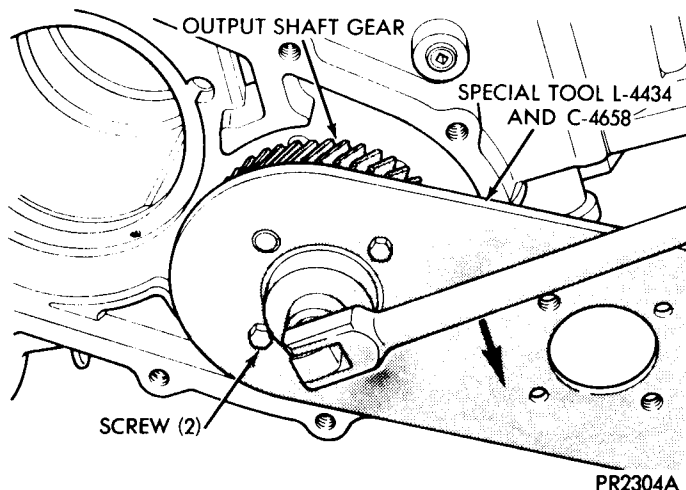
PR2302

**Fig. 17. Using Tool L-4439 to Start Output Shaft Gear onto Output Shaft**

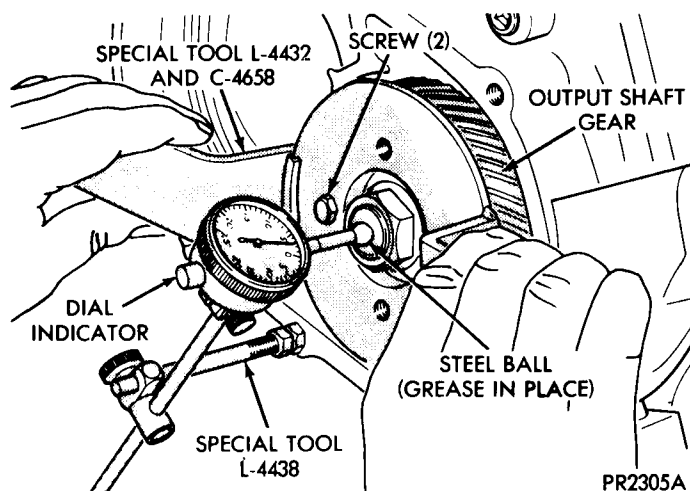


PR2303A

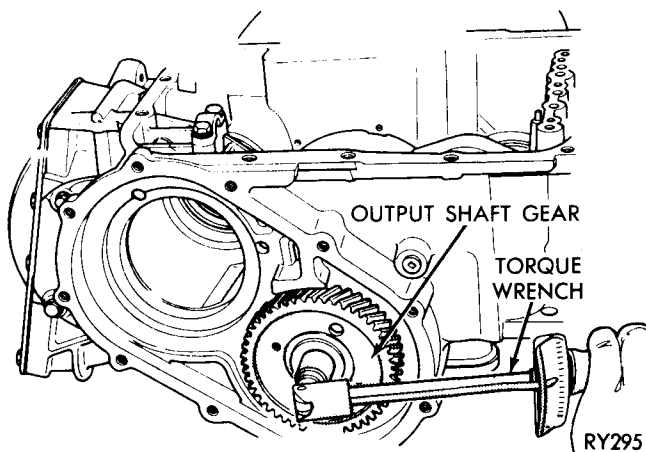
**Fig. 18. Using Tool L-4434 and C-4658 to Hold Output Shaft Gear**



**Fig. 19. Tighten Output Shaft Retaining Nut to 271 N·m (200 ft. lbs.)**



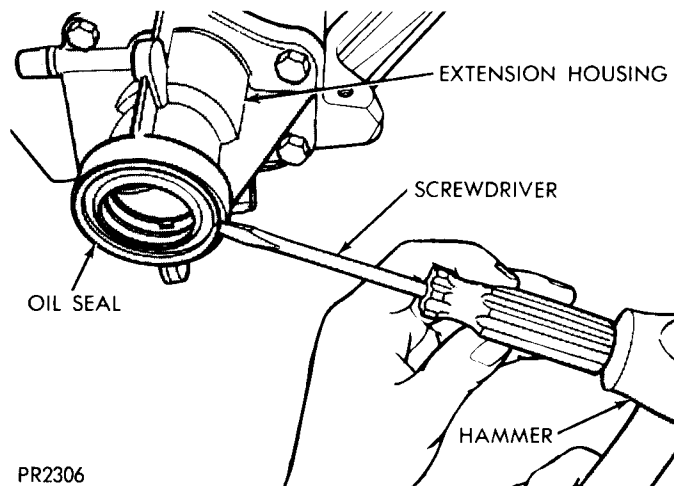
**Fig. 20. Checking Output Shaft End Play**



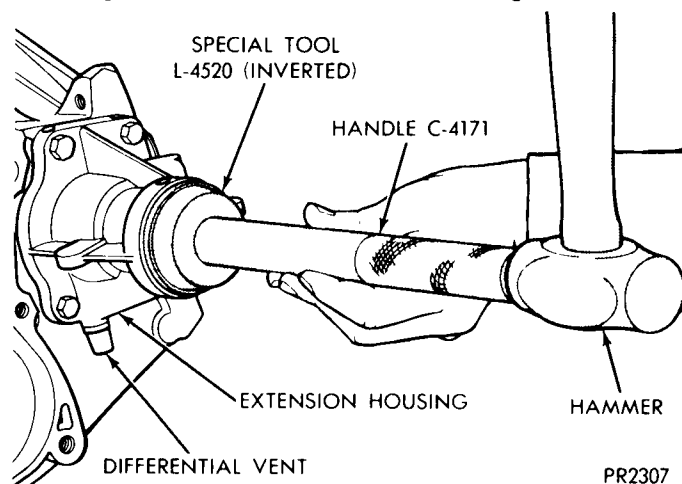
**Fig. 21. Checking Output Shaft Bearing Turning Torque**

## DIFFERENTIAL REPAIR

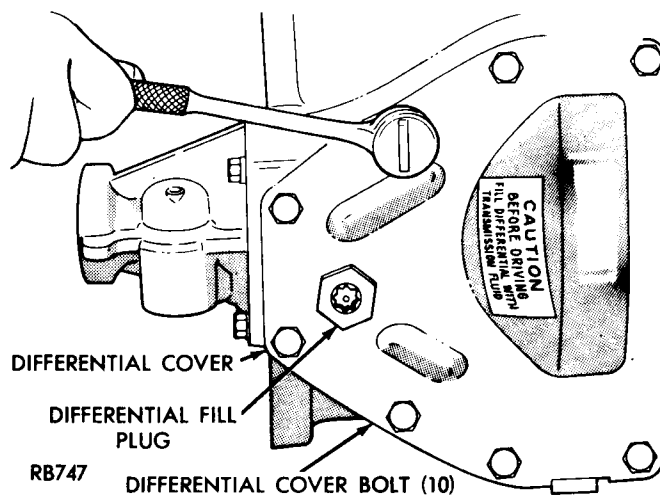
**NOTE:** Transfer shaft should be removed for differential repair and bearing turning torque checking.



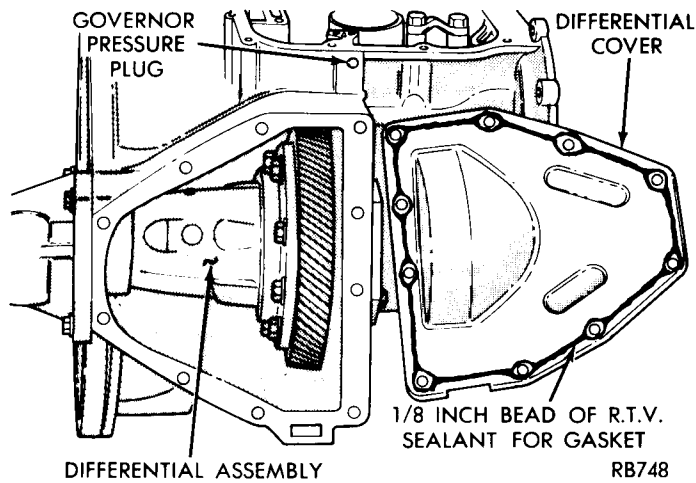
**Fig. 1. Remove Extension Housing Oil Seal**



**Fig. 2. Install New Oil Seal into Extension Housing**

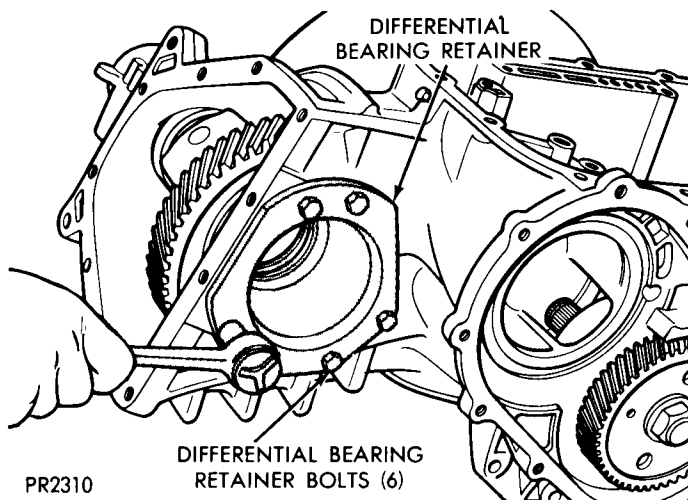


**Fig. 3. Remove or Install Differential Cover Bolts (10)**

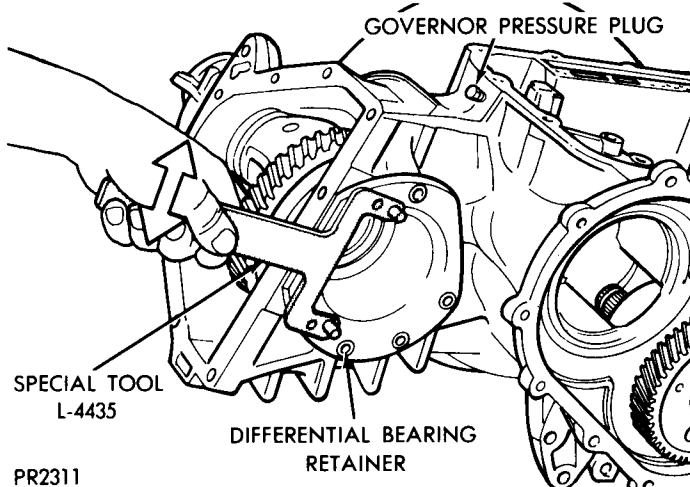


**Fig. 4. Remove or Install Differential Cover**

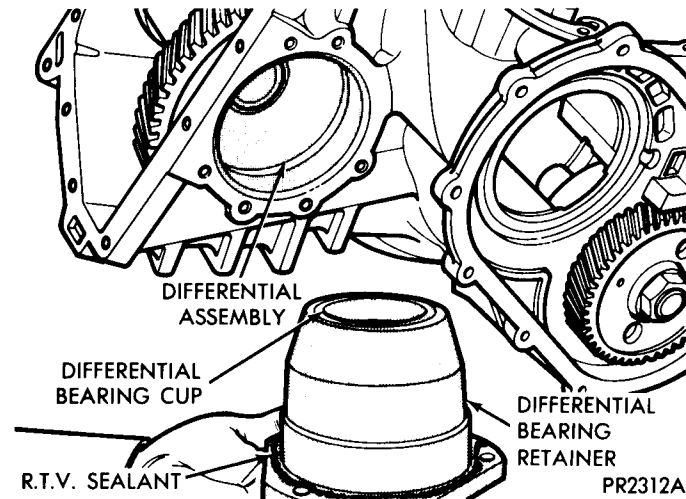
Use R.T.V. sealant when installing differential cover.



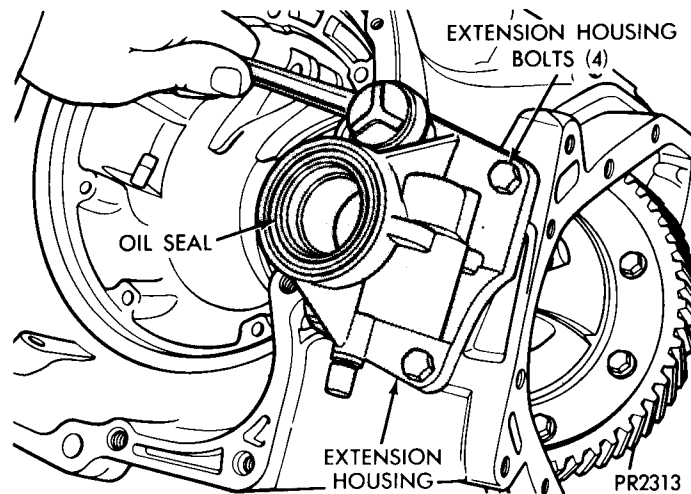
**Fig. 5. Remove or Install Differential Bearing Retainer Bolts (6)**



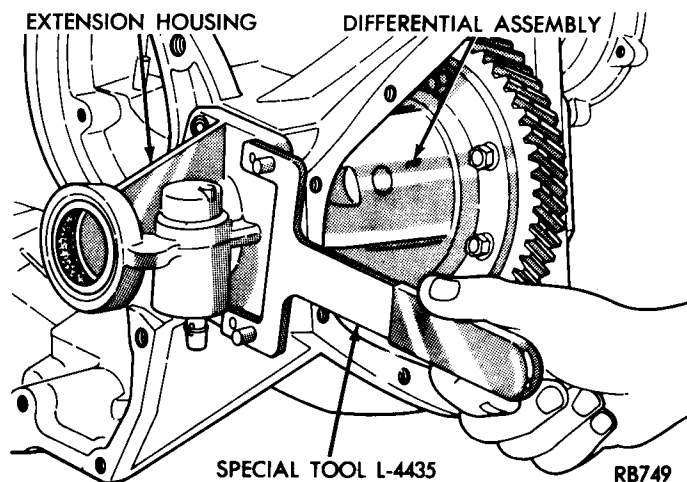
**Fig. 6. Using Tool L-4435, Gently Rotate Differential Bearing Retainer to Remove or Install**



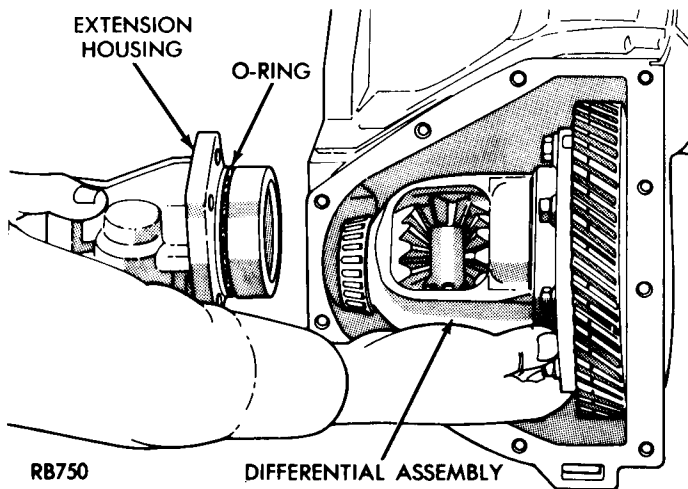
**Fig. 7. Differential Bearing Retainer removed from Case**



**Fig. 8. Remove or Install Extension Housing Bolts (4)**

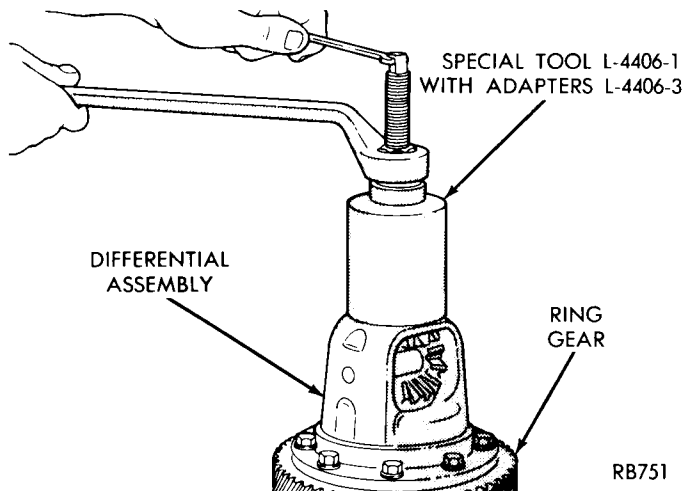


**Fig. 9. Using Tool L-4435, Gently Rotate Extension Housing to Remove or Install**

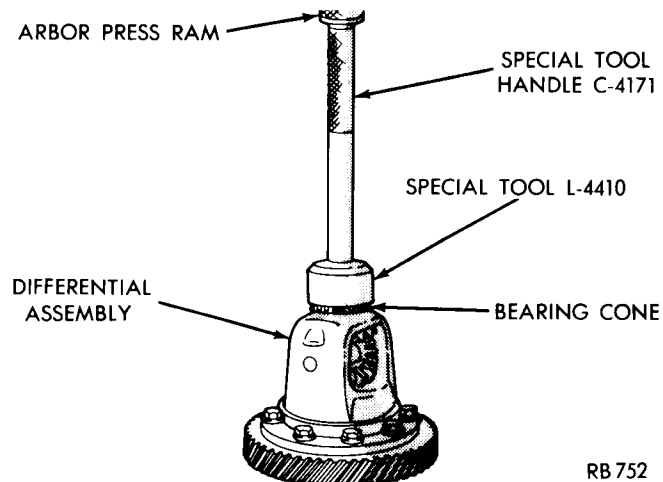


**Fig. 10. Remove or Install Differential Assembly and Extension Housing**

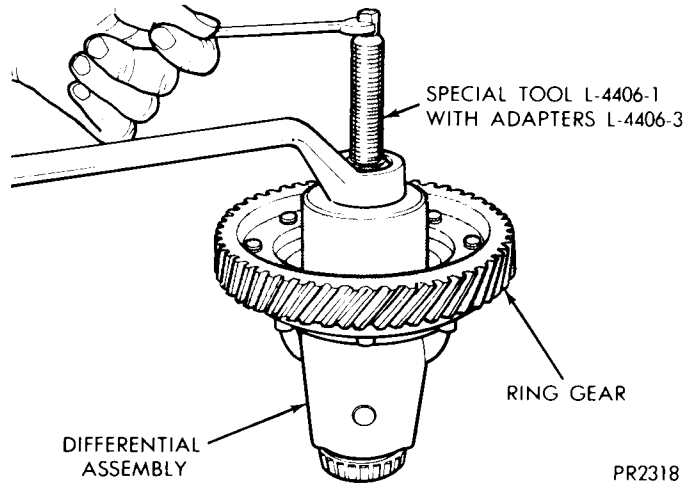
**WARNING:** Hold onto differential assembly to prevent it from rolling out of housing.



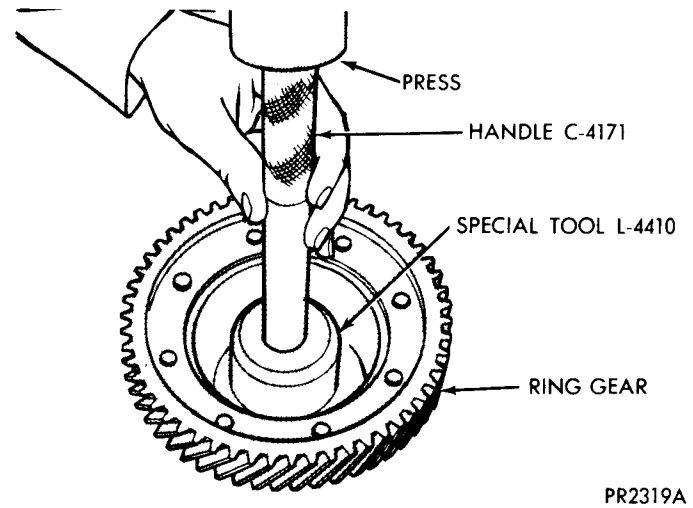
**Fig. 11. Remove Differential Bearing Cone**



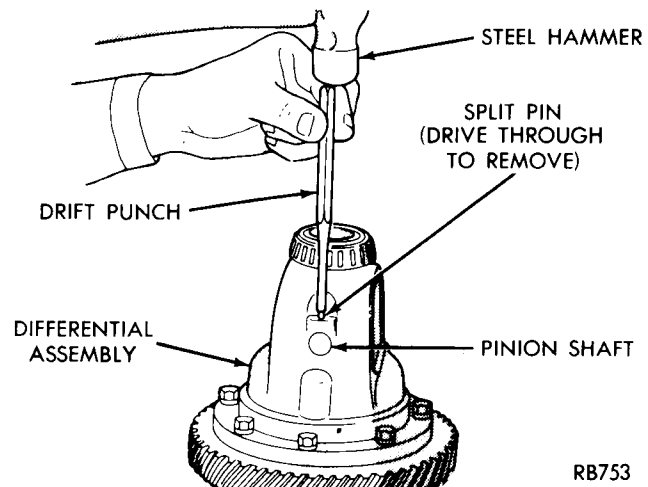
**Fig. 12. Install Differential Bearing Cone**



**Fig. 13. Remove Differential Bearing Cone**



**Fig. 14. Install Differential Bearing Cone**



**Fig. 15. Remove Pinion Shaft Split Pin**

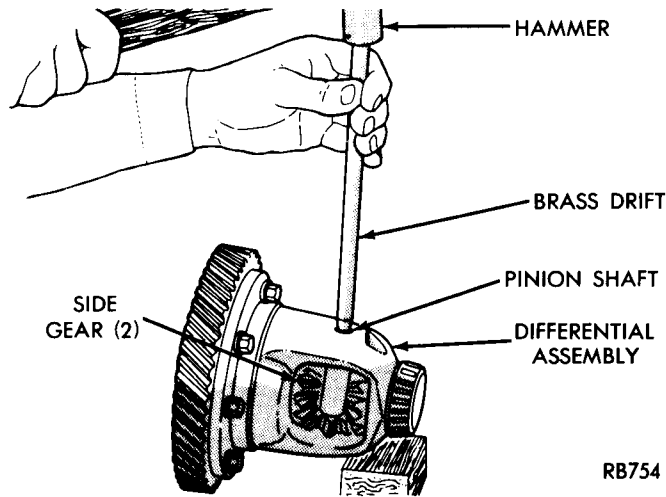


Fig. 16. Remove Pinion Shaft

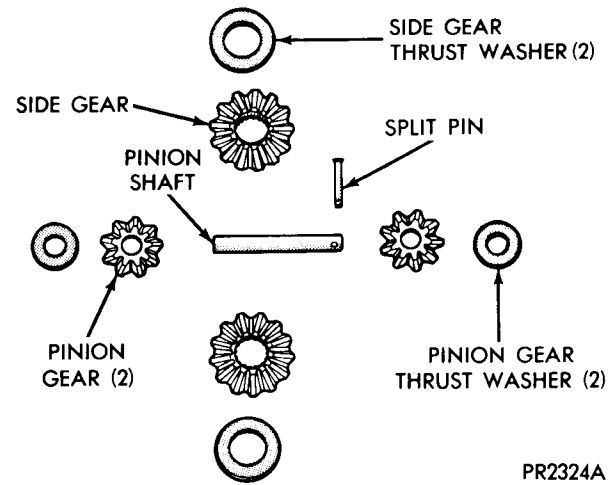


Fig. 19. Disassembled View of Differential Gears, Thrust Washers, and Pinion Shaft

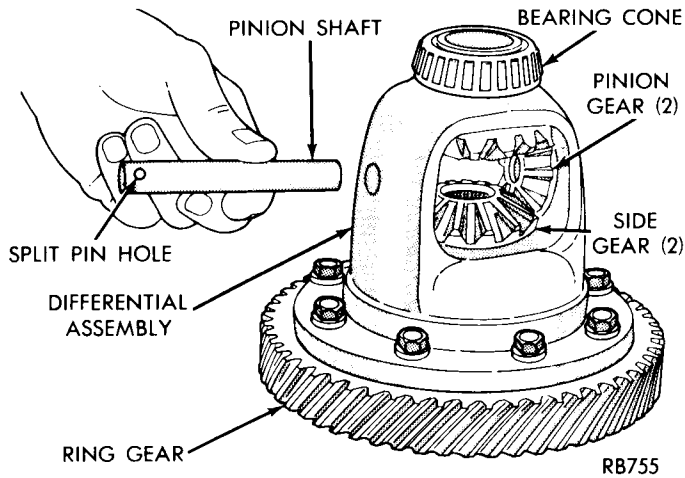


Fig. 17. Remove or Install Pinion Shaft

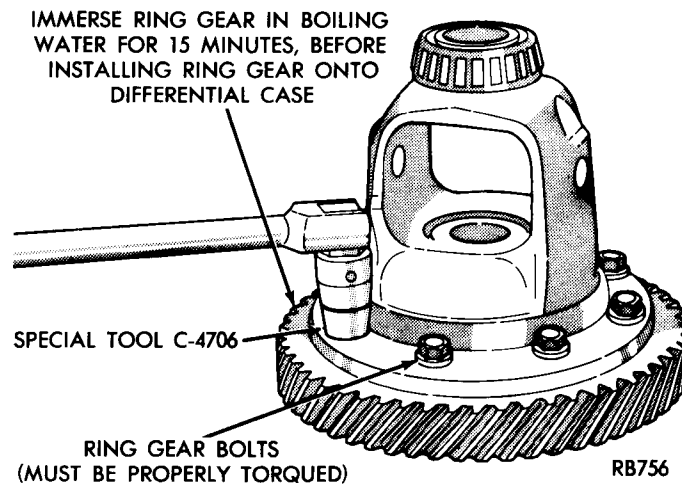


Fig. 20. Remove or Install Ring Gear Attaching Bolts (8)

Press ring gear off carrier (if necessary).

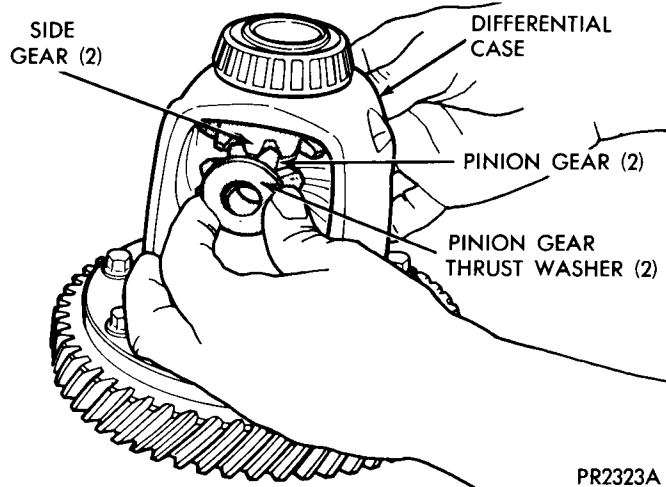


Fig. 18. Remove or Install Pinion Gears, Side Gears, and Four (4) Thrust Washers, by Rotating Pinion Gears to Opening in Differential Case

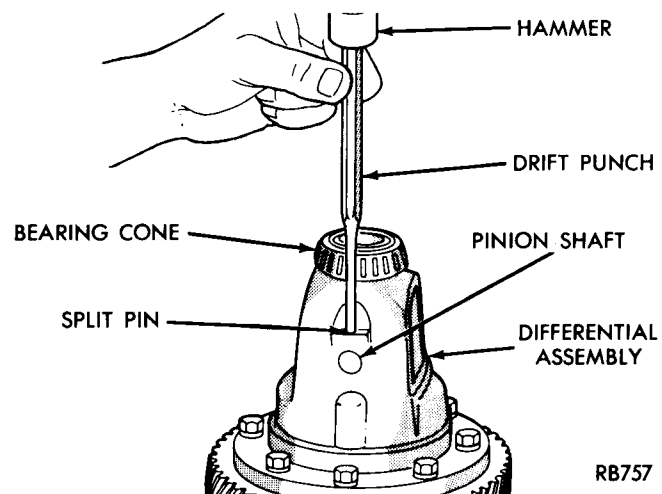
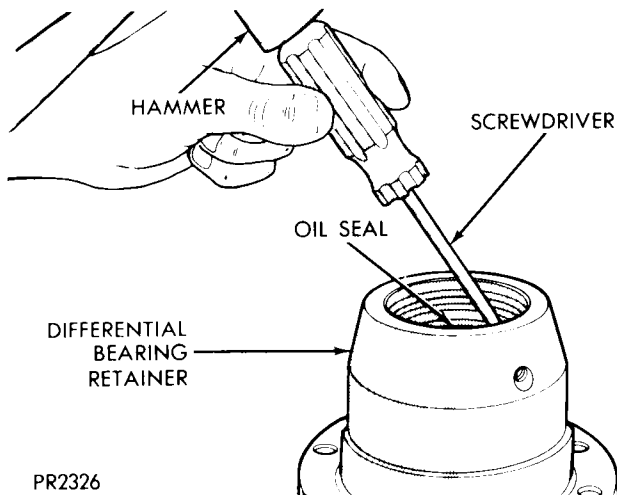
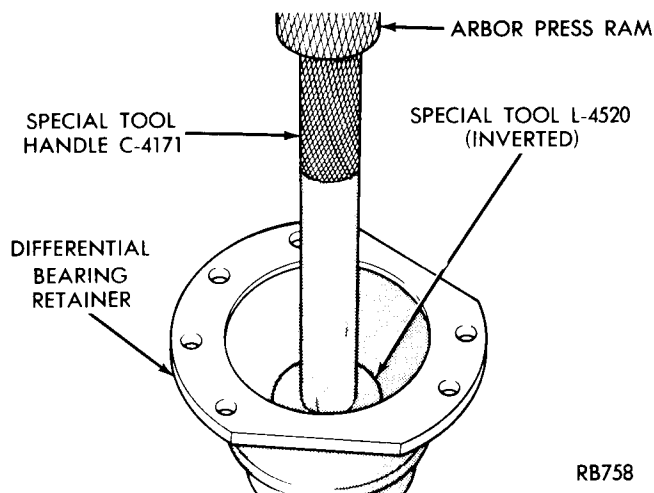


Fig. 21. Install Pinion Shaft Split Pin



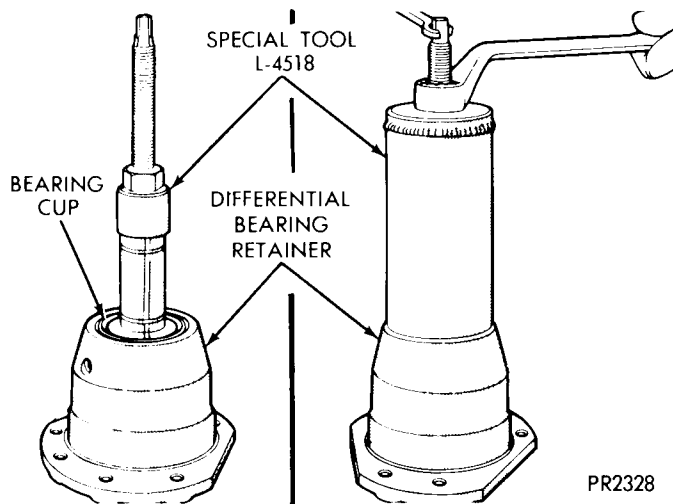
PR2326

**Fig. 22. Using Suitable Tool, Remove Differential Bearing Retainer Oil Seal**



RB758

**Fig. 23. Install New Oil Seal into Differential Bearing Retainer**



PR2328

**Fig. 24. Remove Bearing Cup from Differential Bearing Retainer**

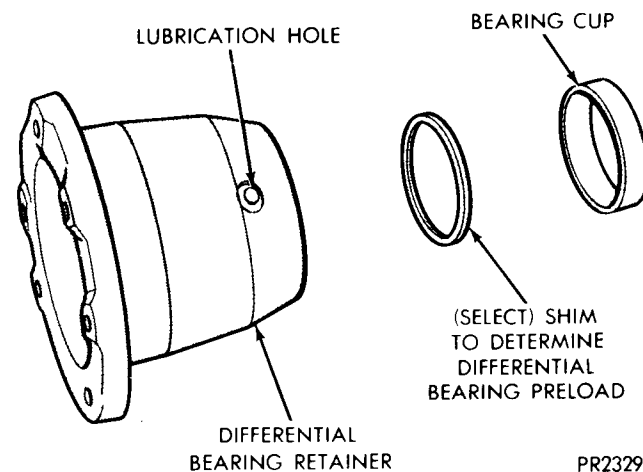
**NOTE: Bearing cones and cups are matched. DO NOT INTERCHANGE.**

### Determining Shim Thickness

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

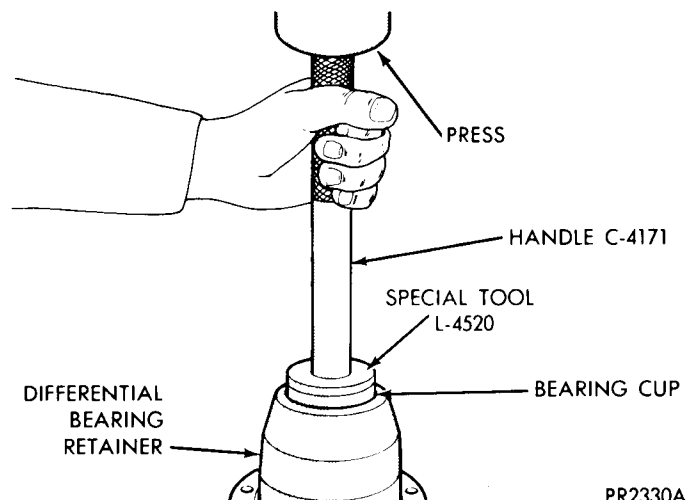
- (a) transaxle case
- (b) differential carrier
- (c) differential bearing retainer
- (d) extension housing
- (e) differential bearing cups and cones

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



PR2329

**Fig. 25. Disassembled View of Differential Bearing Retainer (Select) Shim, and Bearing Cup**



PR2330A

**Fig. 26. Install Bearing Cup into Differential Bearing Retainer**

When rebuilding, reverse the above procedure.

**NOTE: Use R.T.V. Sealant on retainer to seal retainer to case.**

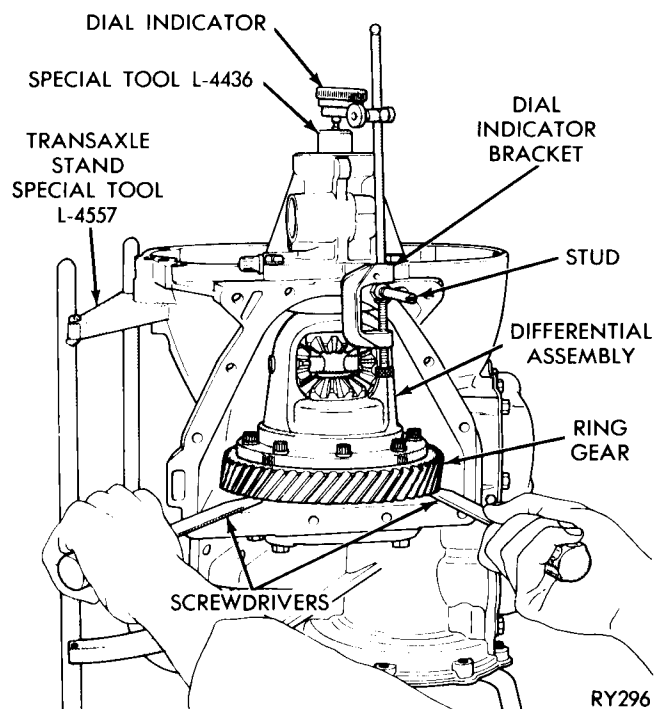


Fig. 27. Checking Differential End Play

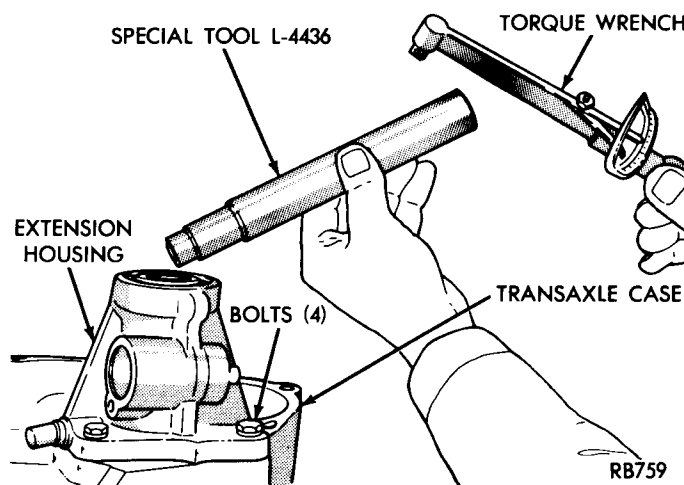


Fig. 28. Using Tool L-4436 and Torque Wrench to Check Turning Torque of Differential Bearings

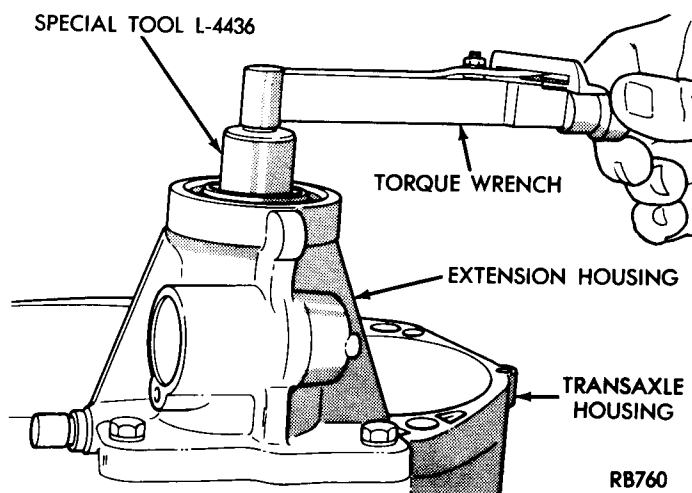


Fig. 29. Checking Differential Bearings Turning Torque

## BEARING ADJUSTMENT PROCEDURES

### 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 gaging for proper shims. Improperly seated bearing cup 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 end play 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.

**NOTE:** All bearing adjustments must be made with no other component interference or gear inter-mesh, except the transfer gear bearing.

## OUTPUT SHAFT BEARING

With output shaft gear removed.

(1) Install a 13.65 mm (.537 inch) and a 1.34 mm (.053 inch) gaging shims on the planetary rear annulus gear hub using grease to hold the shims in place. The 13.65 mm shim has a larger inside diameter and must be installed over the output shaft first. The 1.34 mm shim pilots on the output shaft.

(2) Install output shaft gear and bearing assembly, torque to 271 N·m (200 foot-pounds).

(3) To measure bearing end play:

(a) Attach Tool L-4432 to the transfer gear.

(b) Mount a steel ball with grease into the end of the output shaft.

(c) Push and pull the gear while rotating back and forth to insure seating of the bearing rollers.

(d) Using a dial indicator, mounted to the trans-axle case, measure output shaft end play.

(4) Once bearing end play has been determined, refer to the output shaft bearing shim chart for the required shim combination to obtain proper bearing setting.

(a) The 12.65 mm (.498 inch), 13.15 mm (.518 inch) or 13.65 mm (.537 inch) shims are always installed first. These shims have lubrication slots which are necessary for proper bearing lubrication.

(b) Shims thinner than 12.65 mm listed in the chart are common to both the transfer shaft and out-put shaft bearings.

(5) Use Tool L-4424 to remove the retaining nut and washer. To remove the output shaft gear use Tool L-4407.

(6) Remove the two gaging shims and install the proper shim combination, making sure to install the 12.65, 13.15, or 13.65 mm shim first. Use grease to hold the shims in place. Install the output shaft gear and bearing assembly.

(7) Install the retaining nut and washer and torque to 271 N·m (200 ft. lbs.).

(8) Using an inch-pound torque wrench, check the turning torque. The torque should be between 3 and 8 inch-pounds.

**Note:** If the turning torque is too high, install a .05 mm (.002 inch) thicker shim. If the turning torque is too low, install a .05 mm (.002 inch) thinner shim. Repeat until the proper turning torque is 3 to 8 inch pounds.

## OUTPUT SHAFT BEARING SHIM CHART

End Play (with 13.65mm and 1.34mm gaging shims installed)		Required Shim Combination	Total Thickness	
mm	Inch		mm	Inch
.0	.0	13.65 + 1.34	14.99	.590
.05	.002	13.65 + 1.24	14.89	.586
.10	.004	13.65 + 1.19	14.84	.584
.15	.006	13.65 + 1.14	14.79	.582
.20	.008	13.65 + 1.09	14.74	.580
.25	.010	13.65 + 1.04	14.69	.578
.30	.012	13.65 + .99	14.64	.576
.35	.014	13.65 + .94	14.59	.574
.40	.016	13.15 + 1.39	14.54	.572
.45	.018	13.15 + 1.34	14.49	.570
.50	.020	13.15 + 1.29	14.44	.568
.55	.022	13.15 + 1.24	14.39	.566
.60	.024	13.15 + 1.19	14.34	.564
.65	.026	13.15 + 1.14	14.29	.562
.70	.028	13.15 + 1.09	14.24	.560
.75	.030	13.15 + 1.04	14.19	.558
.80	.032	13.15 + .99	14.14	.556
.85	.034	13.15 + .94	14.09	.554
.90	.036	12.65 + 1.39	14.04	.552
.95	.038	12.65 + 1.34	13.99	.550
1.00	.040	12.65 + 1.29	13.94	.548
1.05	.042	12.65 + 1.24	13.89	.547
1.10	.044	12.65 + 1.19	13.84	.545
1.15	.046	12.65 + 1.14	13.79	.543
1.20	.048	12.65 + 1.09	13.74	.541
1.25	.049	12.65 + 1.04	13.69	.539
1.30	.051	12.65 + .99	13.64	.537
1.35	.053	12.65 + .94	13.59	.535

Average Conversion .05mm = .002 inch

## DIFFERENTIAL BEARING

(1) Remove the bearing cup from the differential bearing retainer using Tool L-4518, and remove the existing shim from under the cup.

(2) Install a .50 mm (.020 inch) gaging shim and re-install the bearing cup into the retainer. Use an arbor press to install the cup.

**Note:** Oil Baffle is not required when making shim selection.

(3) Install the bearing retainer into the case and torque bolts to 28 N·m (250 inch-pounds).

(4) Position the transaxle assembly vertically on the support stand and install tool L-4436 into the extension.

(5) Rotate the differential at least one full revolution to ensure the tapered roller bearings are fully seated.

(6) Attach a dial indicator to the case and zero the dial indicator. Place the indicator tip on the end of Tool L-4436.



(7) Place a large screwdriver to each side of the ring gear and lift. Check the dial indicator for the amount of end play. **CAUTION:** Do not damage the transaxle case and/or differential cover sealing surface.

(8) When the end play has been determined, refer to the Differential Bearing Shim Chart for the correct shim combination to obtain the proper bearing setting.

## DIFFERENTIAL BEARING SHIM CHART

End Play (with .50mm gaging shim Installed)		Required Shim Combination	Total Thickness	
mm	Inch		mm	Inch
.0	.0	.50	.50	.020
.05	.002	.75	.75	.030
.10	.004	.80	.80	.032
.15	.006	.85	.85	.034
.20	.008	.90	.90	.035
.25	.010	.95	.95	.037
.30	.012	1.00	1.00	.039
.35	.014	1.05	1.05	.041
.40	.016	.50 + .60	1.10	.043
.45	.018	.50 + .65	1.15	.045
.50	.020	.50 + .70	1.20	.047
.55	.022	.50 + .75	1.25	.049
.60	.024	.50 + .80	1.30	.051
.65	.026	.50 + .85	1.35	.053
.70	.027	.50 + .90	1.40	.055
.75	.029	.50 + .95	1.45	.057
.80	.031	.50 + 1.00	1.50	.059
.85	.033	.50 + 1.05	1.55	.061
.90	.035	1.00 + .60	1.60	.063
.95	.037	1.00 + .65	1.65	.065
1.00	.039	1.00 + .70	1.70	.067
1.05	.041	1.00 + .75	1.75	.069
1.10	.043	1.00 + .80	1.80	.071
1.15	.045	1.00 + .85	1.85	.073
1.20	.047	1.00 + .90	1.90	.075
1.25	.049	1.00 + .95	1.95	.077
1.30	.051	1.00 + 1.00	2.00	.079
1.35	.053	1.00 + 1.05	2.05	.081
1.40	.055	1.05 + 1.05	2.10	.083

(9) Remove the differential bearing retainer. Remove the bearing cup and the .50 mm (.020 inch) gaging shim.

(10) Install the proper shim combination under the bearing cup. Make sure the oil baffle is installed properly in the bearing retainer, below the bearing shim and cup.

(11) Install the differential bearing retainer. Make sure to seal the retainer to the housing with RTV Sealant and torque the bolts to 28 N·m (250 inch-pounds).

(12) Using special Tool L-4436 and an inch-pound torque wrench, check the turning torque of the dif-

ferential. The turning torque should be between 5 and 18 inch-pounds.

**NOTE:** If the turning torque is too high, install a .05 mm (.002 inch) thinner shim. If the turning torque is too low, install a .05 mm (.002 inch) thicker shim. Repeat until 5 to 18 inch-pounds turning torque is obtained.

## TRANSFER SHAFT BEARING

(1) Use tool L-4424 to remove the retaining nut and washer. Remove the transfer shaft gear using tool L-4407.

(2) Install a 2.29 mm (.090 inch) and a 1.39 mm (.055 inch) gaging shims on the transfer shaft behind the governor support.

(3) Install transfer shaft gear and bearing assembly and torque the nut to 271 N·m (200 ft. lbs.).

## TRANSFER BEARING SHIM CHART

End Play (with 2.29mm and 1.39mm gaging shims installed)		Required Shim Combination	Total Thickness	
mm	Inch		mm	Inch
.0	.0	2.29 + 1.39	3.68	.145
.05	.002	2.29 + 1.39	3.68	.145
.10	.004	2.29 + 1.39	3.68	.145
.15	.006	2.29 + 1.39	3.68	.145
.20	.008	2.29 + 1.34	3.63	.143
.25	.010	2.29 + 1.29	3.58	.141
.30	.012	2.29 + 1.24	3.53	.139
.35	.014	2.29 + 1.19	3.48	.137
.40	.016	2.29 + 1.14	3.43	.135
.45	.018	2.29 + 1.09	3.38	.133
.50	.020	2.29 + 1.04	3.33	.131
.55	.022	2.29 + .99	3.28	.129
.60	.024	1.84 + 1.39	3.23	.127
.65	.026	1.84 + 1.34	3.18	.125
.70	.028	1.84 + 1.29	3.13	.123
.75	.030	1.84 + 1.24	3.08	.121
.80	.032	1.84 + 1.19	3.03	.119
.85	.034	1.84 + 1.14	2.98	.117
.90	.036	1.84 + 1.09	2.93	.115
.95	.038	1.84 + 1.04	2.88	.113
1.00	.040	1.84 + .99	2.83	.111
1.05	.042	1.39 + 1.39	2.78	.109
1.10	.044	1.39 + 1.34	2.73	.107
1.15	.046	1.39 + 1.29	2.68	.105
1.20	.048	1.39 + 1.24	2.63	.103
1.25	.049	1.39 + 1.19	2.58	.101
1.30	.050	1.39 + 1.14	2.53	.099
1.35	.052	1.39 + 1.09	2.48	.097
1.40	.055	1.39 + 1.04	2.43	.095
1.45	.057	1.39 + .99	2.38	.093
1.50	.059	.94 + 1.39	2.33	.091
1.55	.061	.94 + 1.34	2.28	.089
1.60	.063	.94 + 1.29	2.23	.087



- (4) To measure bearing end play:
- Attach Tool L-4432 to the transfer gear.
  - Mount a steel ball with grease into the end of the transfer shaft.
  - Push and pull the gear while rotating back and forth to insure seating of the bearing rollers.
  - Using a dial indicator, measure transfer shaft end play.
- (5) Refer to the Transfer Bearing Shim Chart for the required shim combination to obtain the proper bearing setting.
- (6) Use Tool L-4424 to remove the retaining nut and washer. Remove the transfer shaft gear using tool L-4407.
- (7) Remove the two gaging shims and install the correct shim combination. Install the transfer gear and bearing assembly.
- (8) Install the retaining nut and washer and torque to 271 N·m (200 foot-pounds). Measure transfer shaft end play, end play should be .05 to .25 mm (.002 to .010 inch).
- (9) Measure bearing end play as outlined in Step 4. End play should be between .05 mm and .25 mm.
- NOTE:** If end play is too high, install a .05 mm (.002 inch) thinner shim combination. If end play is too low, install a .05 mm (.002 inch) thicker shim combination. Repeat until .05 to .25 mm end play is obtained.

## BEARING SHIM CHART

Shim Thickness			Bearing Usage		
MM	Inch	Part Number	Output Shaft	Transfer Shaft	Differential
0.94	.037	4207166	x	x	—
0.99	.039	4207167	x	x	—
1.04	.041	4207168	x	x	—
1.09	.043	4207169	x	x	—
1.14	.045	4207170	x	x	—
1.19	.047	4207171	x	x	—
1.24	.049	4207172	x	x	—
1.29	.051	4207173	x	x	—
1.34	.053	4207174	x*	x	—
1.39	.055	4207175	x	x*	—
1.84	.072	4207176	x	x	—
2.29	.090	4207177	x	x*	—
12.65	.498	4207162	x	—	—
13.15	.518	4207163	x	—	—
13.65	.537	4207164	x*	—	—
0.50	.020	4207134	—	—	x*
0.55	.022	4207135	—	—	x
0.60	.024	4207136	—	—	x
0.65	.026	4207137	—	—	x
0.70	.027	4207138	—	—	x
0.75	.029	4207139	—	—	x
0.80	.031	4207140	—	—	x
0.85	.033	4207141	—	—	x
0.90	.035	4207142	—	—	x
0.95	.037	4207143	—	—	x
1.00	.039	4207144	—	—	x
1.05	.041	4207145	—	—	x

\* Also used as gaging shims



## TRANSAXLE

### INCHES TO MILLIMETERS

All values in this table are exact

inches	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
	millimeters									
0.000	—	0.0254	0.0508	0.0762	0.1016	0.1270	0.1524	0.1778	0.2032	0.2286
0.010	0.2540	0.2794	0.3048	0.3302	0.3556	0.3810	0.4064	0.4318	0.4572	0.4826
0.020	0.5080	0.5334	0.5588	0.5842	0.6096	0.6350	0.6604	0.6858	0.7112	0.7366
0.030	0.7620	0.7874	0.8128	0.8382	0.8636	0.8890	0.9144	0.9398	0.9652	0.9906
0.040	1.0160	1.0414	1.0668	1.0922	1.1176	1.1430	1.1684	1.1938	1.2192	1.2446
0.050	1.2700	1.2954	1.3208	1.3462	1.3716	1.3970	1.4224	1.4478	1.4732	1.4986
0.060	1.5240	1.5494	1.5748	1.6002	1.6256	1.6510	1.6764	1.7018	1.7272	1.7526
0.070	1.7780	1.8034	1.8288	1.8542	1.8796	1.9050	1.9304	1.9558	1.9812	2.0066
0.080	2.0320	2.0574	2.0828	2.1082	2.1336	2.1590	2.1844	2.2098	2.2352	2.2606
0.090	2.2860	2.3114	2.3368	2.3622	2.3876	2.4130	2.4384	2.4638	2.4892	2.5146
0.100	2.5400	2.5654	2.5908	2.6162	2.6416	2.6670	2.6924	2.7178	2.7432	2.7686
0.110	2.7940	2.8194	2.8448	2.8702	2.8956	2.9210	2.9464	2.9718	2.9972	3.0226
0.120	3.0480	3.0734	3.0988	3.1242	3.1496	3.1750	3.2004	3.2258	3.2512	3.2766
0.130	3.3020	3.3274	3.3528	3.3782	3.4036	3.4290	3.4544	3.4798	3.5052	3.5306
0.140	3.5560	3.5814	3.6068	3.6322	3.6576	3.6830	3.7084	3.7338	3.7592	3.7846
0.150	3.8100	3.8354	3.8608	3.8862	3.9116	3.9370	3.9624	3.9878	4.0132	4.0386
0.160	4.0640	4.0894	4.1148	4.1402	4.1656	4.1910	4.2164	4.2418	4.2672	4.2926
0.170	4.3180	4.3434	4.3688	4.3942	4.4196	4.4450	4.4704	4.4958	4.5212	4.5466
0.180	4.5720	4.5974	4.6228	4.6482	4.6736	4.6990	4.7244	4.7498	4.7752	4.8006
0.190	4.8260	4.8514	4.8768	4.9022	4.9276	4.9530	4.9784	5.0038	5.0292	5.0546
0.200	5.0800	5.1054	5.1308	5.1562	5.1816	5.2070	5.2324	5.2578	5.2832	5.3086
0.210	5.3340	5.3594	5.3848	5.4102	5.4356	5.4610	5.4864	5.5118	5.5372	5.5626
0.220	5.5880	5.6134	5.6388	5.6642	5.6896	5.7150	5.7404	5.7658	5.7912	5.8166
0.230	5.8420	5.8674	5.8928	5.9182	5.9436	5.9690	5.9944	6.0198	6.0452	6.0706
0.240	6.0960	6.1214	6.1468	6.1722	6.1976	6.2230	6.2484	6.2738	6.2992	6.3246
0.250	6.3500	6.3754	6.4008	6.4262	6.4516	6.4770	6.5024	6.5278	6.5532	6.5786
0.260	6.6040	6.6294	6.6548	6.6802	6.7056	6.7310	6.7564	6.7818	6.8072	6.8326
0.270	6.8580	6.8834	6.9088	6.9342	6.9596	6.9850	7.0104	7.0358	7.0612	7.0866
0.280	7.1120	7.1374	7.1628	7.1882	7.2136	7.2390	7.2644	7.2898	7.3152	7.3406
0.290	7.3660	7.3914	7.4168	7.4422	7.4676	7.4930	7.5184	7.5438	7.5692	7.5946
0.300	7.6200	7.6454	7.6708	7.6962	7.7216	7.7470	7.7724	7.7978	7.8232	7.8486
0.310	7.8740	7.8994	7.9248	7.9502	7.9756	8.0010	8.0264	8.0518	8.0772	8.1026
0.320	8.1280	8.1534	8.1788	8.2042	8.2296	8.2550	8.2804	8.3058	8.3312	8.3566
0.330	8.3820	8.4074	8.4328	8.4582	8.4836	8.5090	8.5344	8.5598	8.5852	8.6106
0.340	8.6360	8.6614	8.6868	8.7122	8.7376	8.7630	8.7884	8.8138	8.8392	8.8646
0.350	8.8900	8.9154	8.9408	8.9662	8.9916	9.0170	9.0424	9.0678	9.0932	9.1186
0.360	9.1440	9.1694	9.1948	9.2202	9.2456	9.2710	9.2964	9.3218	9.3472	9.3726
0.370	9.3980	9.4234	9.4488	9.4742	9.4996	9.5250	9.5504	9.5758	9.6012	9.6266
0.380	9.6520	9.6774	9.7028	9.7282	9.7536	9.7790	9.8044	9.8298	9.8552	9.8806
0.390	9.9060	9.9314	9.9568	9.9822	10.0076	10.0330	10.0584	10.0838	10.1092	10.1346
0.400	10.1600	10.1854	10.2108	10.2362	10.2616	10.2870	10.3124	10.3378	10.3632	10.3886
0.410	10.4140	10.4394	10.4648	10.4902	10.5156	10.5410	10.5664	10.5918	10.6172	10.6426
0.420	10.6680	10.6934	10.7188	10.7442	10.7696	10.7950	10.8204	10.8458	10.8712	10.8966
0.430	10.9220	10.9474	10.9728	10.9982	11.0236	11.0490	11.0744	11.0998	11.1252	11.1506
0.440	11.1760	11.2014	11.2268	11.2522	11.2776	11.3030	11.3284	11.3538	11.3792	11.4046
0.450	11.4300	11.4554	11.4808	11.5062	11.5316	11.5570	11.5824	11.6078	11.6332	11.6586
0.460	11.6840	11.7094	11.7348	11.7602	11.7856	11.8110	11.8364	11.8618	11.8872	11.9126
0.470	11.9380	11.9634	11.9888	12.0142	12.0396	12.0650	12.0904	12.1158	12.1412	12.1666
0.480	12.1920	12.2174	12.2428	12.2682	12.2936	12.3190	12.3444	12.3698	12.3952	12.4206
0.490	12.4460	12.4714	12.4968	12.5222	12.5476	12.5730	12.5984	12.6238	12.6492	12.6746
inches	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009



## SPECIFICATIONS

### A-404, A-413, and A-470

### TORQUEFLITE AUTOMATIC TRANSAXLE

	Metric Measure	U.S. Measure
Type .....	Automatic Three Speed With Torque Converter and Integral Differential	
Torque Converter Diameter .....	241 millimeters	9.48 inches
Oil Capacity—Note Two Separate Sumps:		
Differential Sump .....	1.12 Liters	2.37 pints
Transmission and Torque Converter Sumps:		
(1.7L engine) .....	6.87 Liters (A-404)	14.5 pints
(2.2L and 2.6L engine) .....	7.11 Liters (A-413, A-470)	15.0 pints
Use "DEXRON II" Type Automatic Transmission Fluid in Both Sumps		
Cooling Method .....	Water-Heat Exchanger	
Lubrication .....	Pump (Internal-External Gear Type)	
<b>Gear Ratios:</b>		
Transmission Portion: First .....		2.69
Second .....		1.55
Third .....		1.00
Reverse .....		2.10
Overall Top Gear Ratio: ENGINE: .....	<b>1.7L</b>	<b>High Altitude</b>
VEHICLE: M and Z .....	3.48	2.78
P, D, C, and V ...	N/A	3.22
		2.78
<b>Pump Clearances:</b>		
	<b>(Millimeter)</b>	<b>(Inch)</b>
Outer Gear to Pocket .....	0.045-.141	.0018-.0056
Outer Gear I.D. to Crescent .....	0.150-.306	.0059-.012
Outer Gear Side Clearance .....	0.025-.050	.001-.002
Inner Gear O.D. to Crescent .....	.160-.316	.0063-.0124
Inner Gear Side Clearance .....	.025-.050	.001-.002
<b>End Play:</b>		
	<b>(Millimeter)</b>	<b>(Inch)</b>
Input Shaft .....	0.18-1.85	.007-.073
Front Clutch Retainer .....	0.76-2.69	.030-.106
Front Carrier .....	0.89-1.45	.007-.057
Front Annulus Gear .....	0.09-0.50	.0035-.020
Planet Pinion .....	0.15-0.59	.006-.023
Reverse Drum .....	0.76-3.36	.030-.132
<b>Clutch Clearance and Selective Snap Rings:</b>		
	<b>(Millimeter)</b>	<b>(Inch)</b>
Front Clutch (Non-Adjustable) Measured from		
Reaction Plate to "Farthest" Wave 3 Disc	1.14-2.45	.045-.096
2 Disc	.86-2.03	.034-.080
Rear Clutch (All are 3 Disc)		
Adjustable .....	0.46-0.95	.018-.037
Selective Snap Rings (3) .....	1.52-1.57	.060-.062
	1.93-1.98	.076-.078
	2.36-2.41	.093-.095
<b>Band Adjustment:</b>		
Kickdown, Backed off from 8 N·m (72 in. lbs.) .....	A-404 3 Turns,	
	A-413 & A-470 2-3/4 Turns	
	non-adjustable	
Low-Reverse (Rear) .....	3-1/2 Turns from 5 N·m (41 in. lbs.)	
	A-404 .....	
	A-413 & A-470 .....	



## TRANSAXLE

### Thrust Washers:

	(Millimeter)	(Inch)
Reaction Shaft Support (Phenolic) ..... No. 1	1.55-1.60	.061-.063
Rear Clutch Retainer (Phenolic) ..... No. 2	1.55-1.60	.061-.063
Output Shaft, Steel Backed Bronze ....(Select) No. 3	1.98-2.03	.077-.080
	2.15-2.22	.085-.087
	2.34-2.41	.092-.095
Front Annulus, Steel Backed Bronze ..... No. 4	2.95-3.05	.116-.120
Front Carrier, Steel Backed Bronze ..... Nos. 5, 6	1.22-1.28	.048-.050
Sun Gear (Front) ..... No. 7	0.85-0.91	.033-.036
Sun Gear (Rear) ..... No. 8	0.85-0.91	.033-.036
Rear Carrier, Steel Backed Bronze ..... Nos. 9, 10	1.22-1.28	.048-.050
Rev. Drum, Phenolic ..... No. 11	1.55-1.60	.061-.063

### Tapered Roller Bearing Settings:

	(Millimeter)	(Inch)
Output Shaft .....	0.0-0.07 Preload	0.0-.0028
Transfer Shaft .....	0.05-0.25 End Play	.002-.010
Differential .....	0.15-0.29 Preload	.006-.012

## SPEEDOMETER PINION

The chart below applies to all front-wheel-drive vehicles equipped with Manual or Automatic Transaxles, except M and Z vehicles equipped with A-412 Manual Transaxle (see Note).

Tire Size:	Number of Teeth on Speedometer Pinion Gear
P155 80 R13 .....	21
P165 75 R13 .....	21
P175 75 R13 (Glass) .....	20
P175 75 R13 (Steel) .....	21
P185 70 R13 .....	21
P185 65 R14 .....	20
P195 60 R14 .....	21

NOTE: All M and Z vehicles equipped with the A-412 Manual Transaxle require a 16 Tooth Speedometer Pinion.

## SPECIFICATIONS

### A-460 TRANSAXLE SPECIFICATIONS

Gear Ratios:	A-460
1st .....	3.29
2nd .....	1.89
3rd .....	1.21
4th .....	0.88
Reverse .....	3.14
Differential .....	3.05
Overall top gear ratio* .....	2.69

\*The "overall top gear ratio" is obtained by multiplying the '4th gear' ratio by the 'differential' ratio.

## FLUID FILL

Fill Transaxle with "DEXRON II" Automatic Transmission Fluid (A.T.F.) to bottom of fill hole in end cover:

Metric Measure	U.S. Measure	Imperial Measure
1.8 Liters	2.0 Quarts	1.7 Quarts



# TIGHTENING REFERENCE

Item	Qty.	Thread Size	Driver	Torque	
				Newton-meters	Inch-Pounds
<b>A-404, A-413, and A-470 Automatic Transaxle</b>					
Bolt—Bell Housing Cover .....	3	9.8-M6-1-10	10mm Hex	12	105
Bolt—Flex Plate to Crank (A-404) .....	6	10.9-M10-1-16††	16mm Hex	68	50*††
Bolt—Flex Plate to Torque Converter (A-404) ..	3	10.9-M10-1.5-11#	18mm Hex	54	40*#
Screw Assy. Transmission to Cyl. Block .....	3	9.8A-M12-1.75-65	18mm Hex	95	70*
Screw Assy. Lower Bell Housing Cover .....	3	9.8-M6-1-10	10mm Hex	12	105
Screw Assy. Manual Control Lever .....	1	9.8A-M6-1-35	10mm Hex	12	105
Screw Assy. Speedometer to Extension .....	1	9.8A-M6-1-14	10mm Hex	7	60
Nut—Cooler Tube to Transmission .....	2	1/2-20	5/8 Hex	16	150
Connector, Cooler Hose to Radiator .....	2	1/8-27 NPTF	12mm Hex	12	110
Bolt—Starter to Transmission Bell Housing ...	3	M10-1.5-30	15mm Hex	54	40*
Bolt—Throttle Cable to Transmission Case ...	1	M6-1.0-14	10mm Hex	12	105
Bolt—Throttle Lever to Transmission Shaft ...	1	M6-1-25	10mm Hex	12	105
Bolt—Manual Cable to Transmission Case ....	1	M8-1.75-30	13mm Hex	28	250
Bolt—Front Motor Mount .....	2	M10	15mm Hex	54	40*
Bolt—Left Motor Mount .....	3	M10-1.5-25	15mm Hex	54	40*
<b>Dress Up</b>					
Connector Assembly, Cooler Line .....	2	M12-1.75-122	17.5mm Hex	28	250
Plug, Pressure Check .....	7	1/16-27NPTF	5/16 in. Hex	5	45
Switch, Neutral Safety .....	1	3/4-16UNF	1.0 in. Hex	34	25*
<b>Differential Area</b>					
Ring Gear Screw .....	8	12.9-M13-1.5-25	Tool C-4706	95	70*
Bolt, Extension to Case .....	4	9.8-M8-1.25-28	13mm Hex	28	250
Bolt, Differential Bearing Retainer to Case ....	6	9.8-M8-1.25-28	13mm Hex	28	250
Screw Assy., Differential Cover to Case .....	10	9.8-M8-1.25-16	13mm Hex	19	165
<b>Transfer &amp; Output Shaft Areas</b>					
Nut, Output Shaft .....	1	M20-1.5	30mm Hex	271	200*
Nut, Transfer Shaft .....	1	M20-1.5	30mm Hex	271	200*
Bolt, Gov to Support .....	2	9.8-M5-0.8-20	7mm Hex	7	60
Bolt, Gov to Support .....	1	9.8-M5-0.8-30	7mm Hex	7	60
Screw Assy., Governor Counterweight .....	1	M8-1.25-35	13mm Hex	28	250
Screw Assy., Rear Cover to Case .....	10	9.8-M8-1.25-16	13mm Hex	19	165
Plug, Reverse Band Shaft .....	1	1/4-18-NPTF	1/4 in. Sq. Skt.	7	60
<b>Pump &amp; Kickdown Band Areas</b>					
Bolt, Reaction Shaft Assembly .....	6	9.8-M8-1.25-19	13mm Hex	28	250
Bolt Assy., Pump to Case .....	7	9.8-M8-1.25-25	8mm 12 Pt.	31	275
Nut, Kickdown Band Adjustment Lock .....	1	M12-1.75	18mm Hex	47	35*
<b>Valve Body &amp; Sprag Areas</b>					
Bolt, Sprag Retainer to Transfer Case .....	2	9.8-M8-1.25-23	13mm Hex	28	250
Screw Assy., Valve Body .....	14	9.8A-M5-0.8-11	Torx, T25	5	40
Screw Assy., Transfer Plate .....	13	9.8A-M5-0.8-25	Torx, T25	5	40
Screw Assy., Filter .....	3	9.8A-M5-0.8-30	Torx, T25	5	40
Screw, Transfer Plate to Case .....	7	9.8-M6-1-30	10mm Hex	12	105
Screw Assy., Oil Pan to Case .....	14	9.8-M8-1.25-16	13mm Hex	19	165
Nut, Reverse Band Adjusting Lock .....	1	M8-1.25	13mm Hex	27	20

\*foot-pounds

\*foot-pounds

† A-413 = M10 x 1.5 x 18      17mm Hex      88 N·m      65 ft. lbs.  
‡ A-470 = M12 x 1.25 x 21      19mm Hex      136 N·m      100 ft. lbs.  
# A-413 and A-470 = M10 x 1.5 x 11.7      18mm Hex      54 N·m      40 ft. lbs.



## TRANSAXLE

### TIGHTENING REFERENCE

A-412 Manual Transaxle	Thread Size	Torque	
		Newton-meters	Inch-Pounds
Case—Clutch Housing Bolt .....	M 8 x 1.25	28	250
—Clutch Housing Stud .....	M 8 x 1.25	28	250
—Release Bearing End Cover Screw (4) .....	M 7 x 1.00	12	105
Back-up Light Switch .....	M12 x 1.50	16	144
Electronic Timing Probe Retainer .....	M36 x 1.50	9	80
Cover—Gearshift Selector Shaft .....	M60 x 1.50	47	35*
Gearshift Detent Body Lock Nut .....	M12 x 1.50	20	175
Drain Plug .....	M24 x 1.50	20	175
Fill Plug .....	M24 x 1.50	20	175
Pinion Shaft Bearing Retainer Bolt (4) .....	M 8 x 1.25	39	29*
Mainshaft Ball Bearing Retaining Nut (3) .....	M 7 x 1.00	18	155
Reverse Idler Shaft Set Screw .....	M 8 x 1.25	20	175
Reverse Idler Fork Bracket—Clutch Housing Screw (2) .....	M 7 x 1.00	12	105

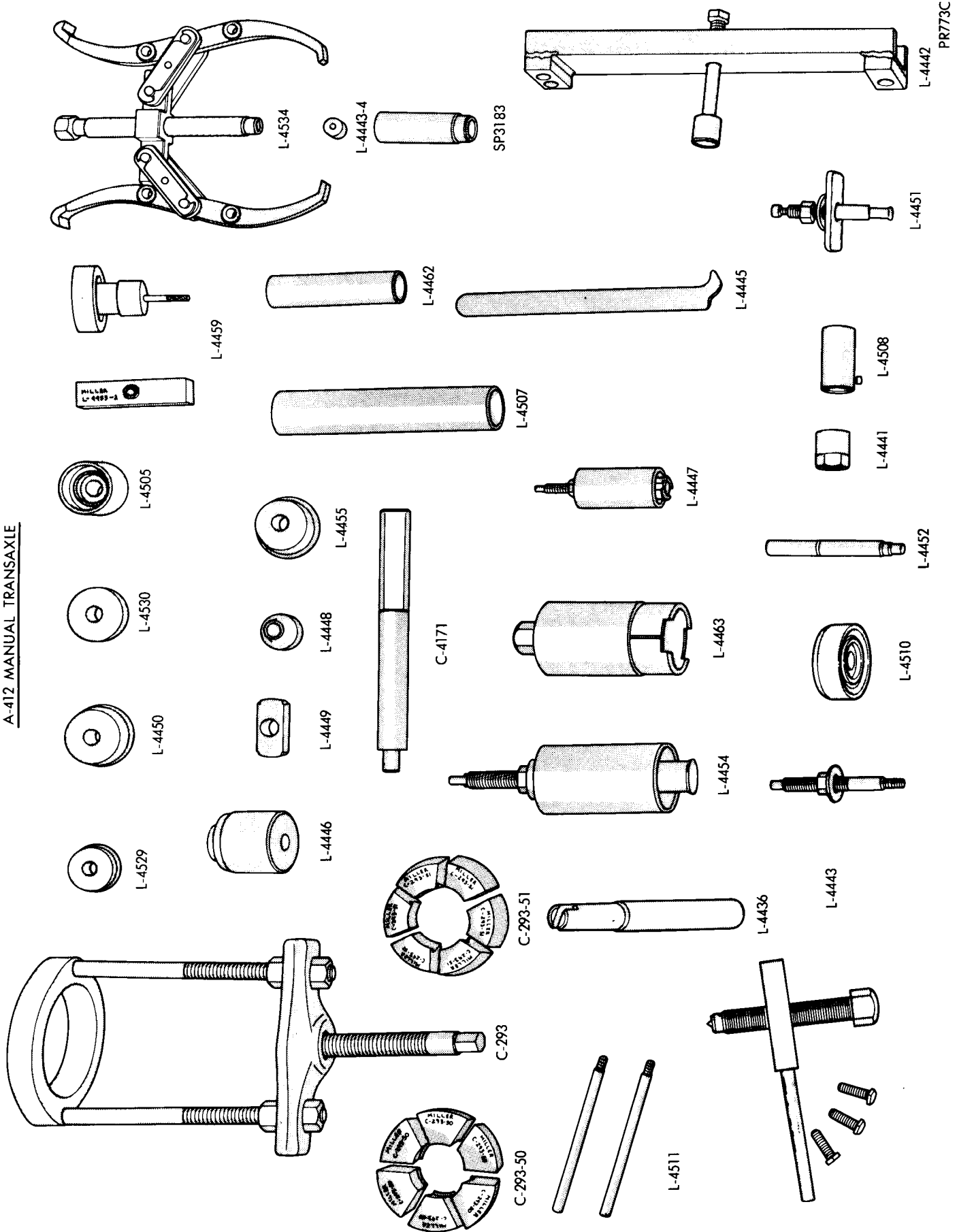
\* foot-pounds

A-460 Manual Transaxle	Grade x Thread Size	Torque	
		Newton-Meters	Foot-Pounds
Gearshift Housing to Case Bolt .....	9.8 x M8 x 1.25	28	21
Gearshift Operating Lever Attaching Nut ....	9.8 x M8 x 1.25 x 6H	30	22
Fork Stop Plate to Gearshift Housing Bolt ....	9.8 x M6 x 1.0	7	9
Shift Linkage Adjusting Pin .....	9.8 x M6 x 1.0 x 6G	7	9
Dust Covers to Case Screw (2.2L engine) .....	10.9 x M6 x 1.0	7	9
Dust Cover (upper) to Case Screw (1.7L engine) .....	9.8 x M6 x 1.0	7	9
Dust Cover (lower) to Case Bolt (1.7L engine) .	9.8 x M6 x 1.0	7	9
Strut to Block Bolt .....	10.9 x M12 x 1.75	95	70
Strut to Case Bolt .....	10.9 x M12 x 1.75	95	70
Flywheel to Crankshaft Bolt (2.2L engine) ....	12.9 x M10 x 1.5	88	65
Flywheel to Crankcase Bolt (1.7L engine) .....	12.9 x M10 x 1.0	81	60
Clutch Pressure Plate to Flywheel Bolt .....	9.8 x M8 x 1.25	28	21
Case to Block Bolt .....	9.8 x M12 x 1.75	95	70
Mount to Block and Case Bolt .....	9.8 x M12 x 1.75	95	70
Impact Bracket to Case Stud Nut .....	M8 x 1.25 x 6H	28	21
Anti-rotational Strut Bracket to Stud Nut .....	M8 x 1.25	23	17
Differential Ring Gear Bolt .....	12.9 x M10 x 1.25	95	70
Differential Bearing Retainer Bolt .....	9.8 x M8 x 1.25	28	21
Differential Extension Bolt .....	9.8 x M8 x 1.25	28	21
Differential Oil Pan Screw & Washer .....	9.8 x M8 x 1.25	19	14
Differential Oil Pan Stud Nut .....	M8 x 1.25 x 6H	19	14
Fill Plug .....	M22 x 1.5	33	24
Intermediate Shaft Bearing Strap Screw .....	9.8 x M6 x 1.0	7	9
Input Shaft Seal Retainer Bolt .....	9.8 x M8 x 1.25	28	21
Steel End Cover to Case Bolt .....	9.8 x M8 x 1.25	28	21
Steel End Cover to Bearing Retainer Bolt .....	9.8 x M8 x 1.25	28	21





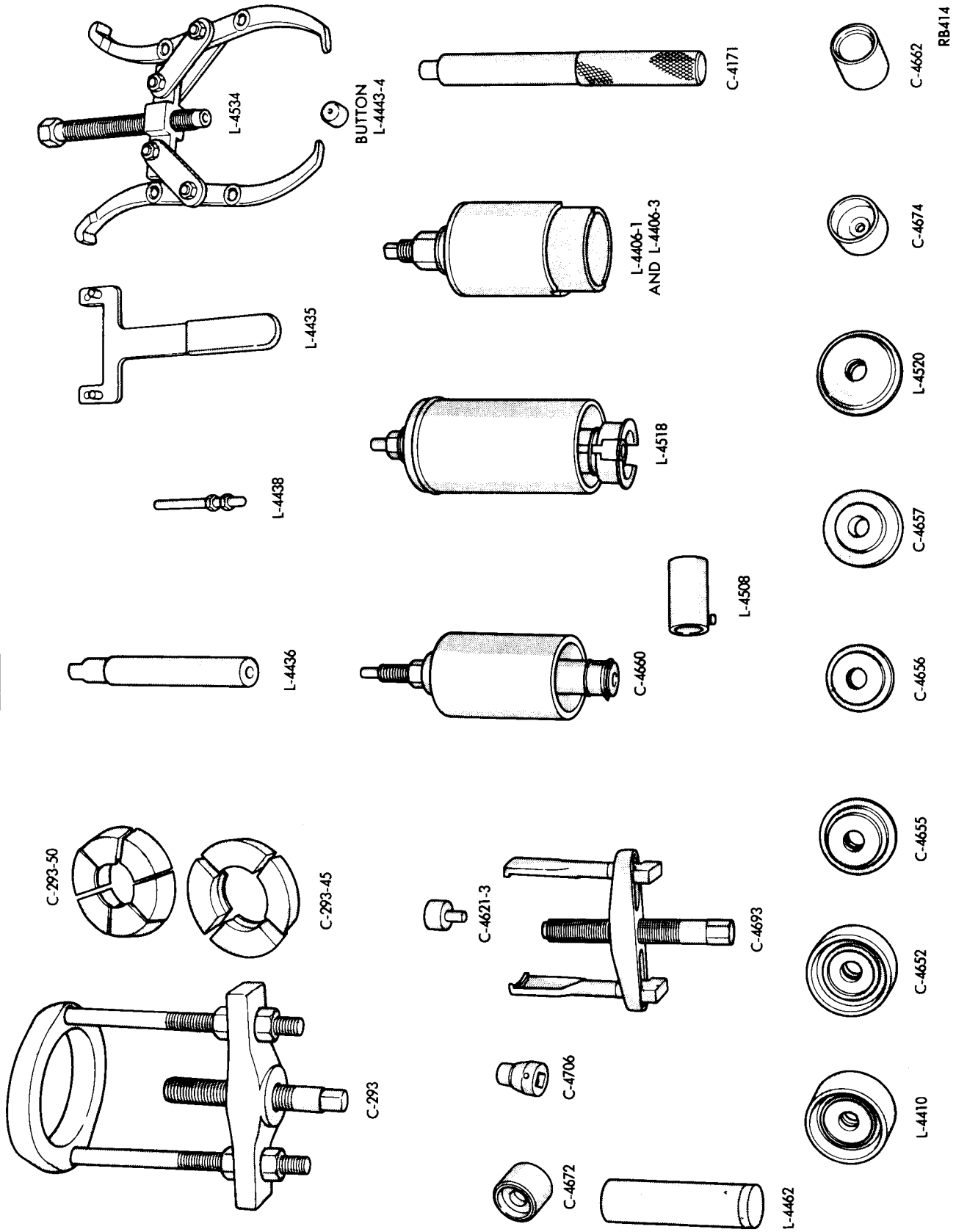
SPECIAL SERVICE TOOLS  
A-412 MANUAL TRANSAXLE



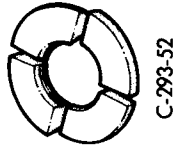
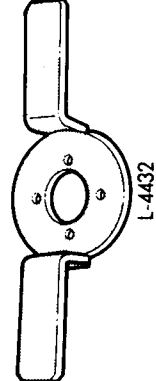
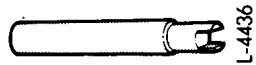
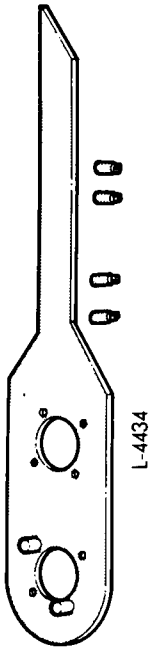
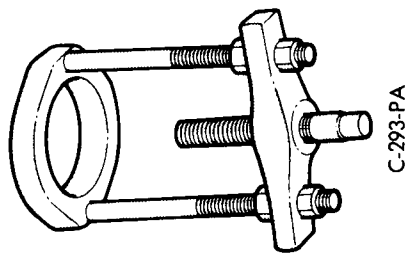


# TRANSAXLE

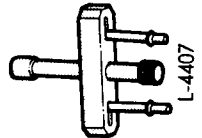
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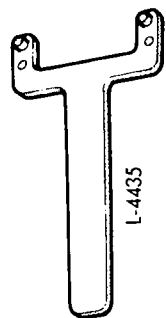
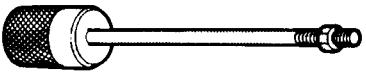
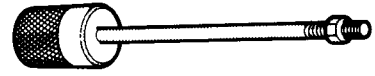
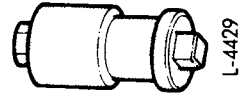
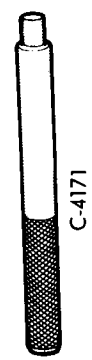
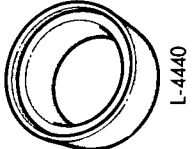
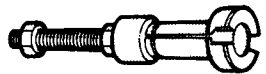
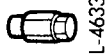
SPECIAL SERVICE TOOLS  
AUTOMATIC TRANSAXLES



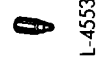
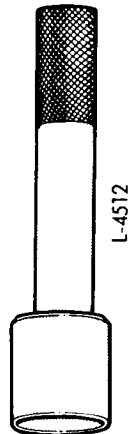
L-4437



L-4559



PR2334C



# BEARING SERVICE

## GENERAL RULES ON SERVICING BEARINGS

Take extreme care when removing and installing bearing cups and cones. Use only an arbor press for installation, 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 gaging. Improperly seated bearing cup and cones are subject to low mileage failure, reference Figure 1.

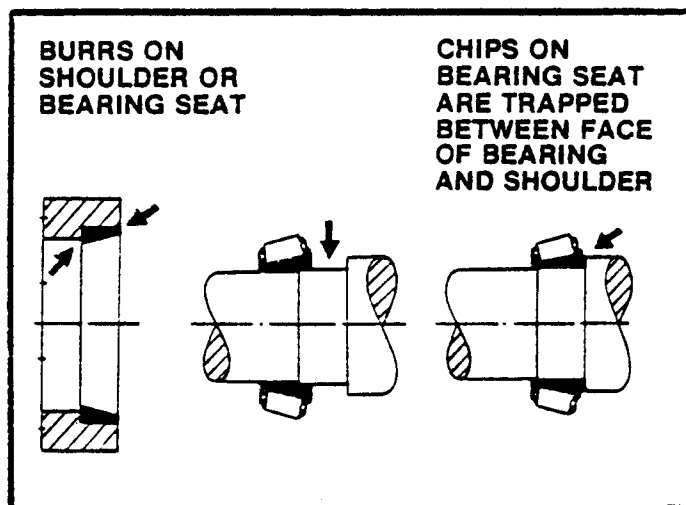


FIGURE 1

Bearing cups and cones should be replaced if they show signs of:

- a. Pitting
- b. Heat Distress

If distress is seen on either the cup or bearing rollers, both the cup and cone must be replaced, reference Figure 2.

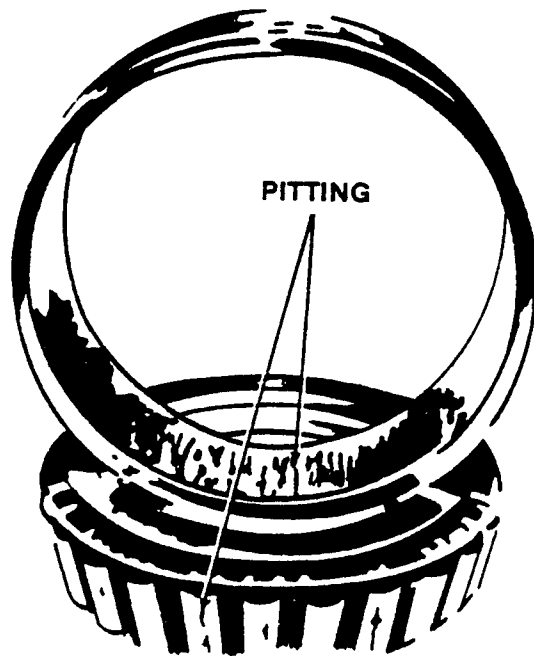


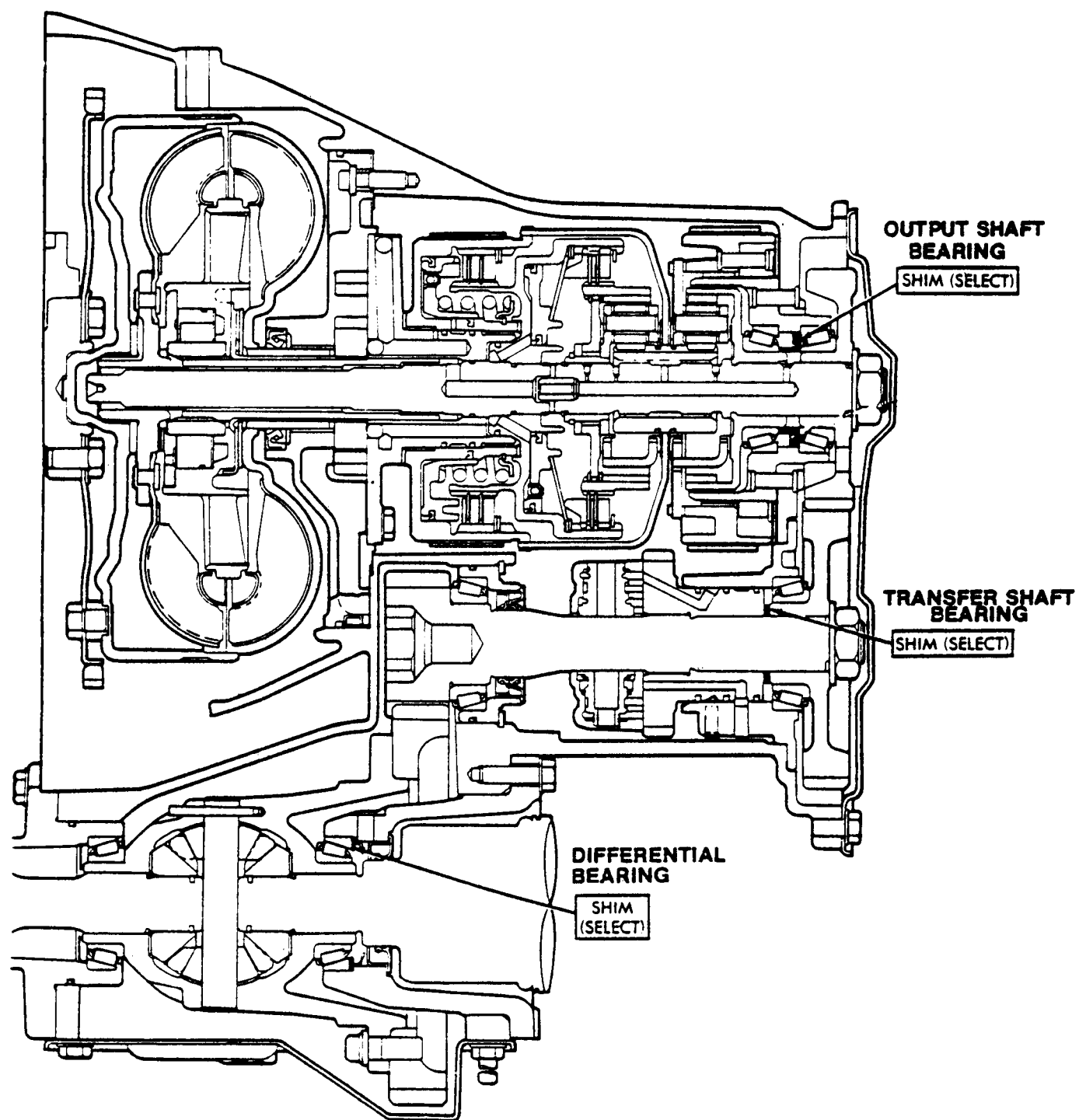
FIGURE 2

Bearing end play and drag torque specifications must be maintained to avoid premature bearing failures.

REMEMBER: All bearing adjustments, except transfer shaft bearing, must be made with no other gear train component interference or in gear mesh.

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

When replacement of either the output or transfer gear is required, both gears should be replaced in a matched set.



**A-404 TORQUEFLITE TRANSAXLE - CUTAWAY VIEW**

## OUTPUT SHAFT BEARING

1. For removal of the retaining nut and washer, use Tool L-4434, reference Figure 3. Use Tool L-4407 to remove the output gear, reference Figure 4.

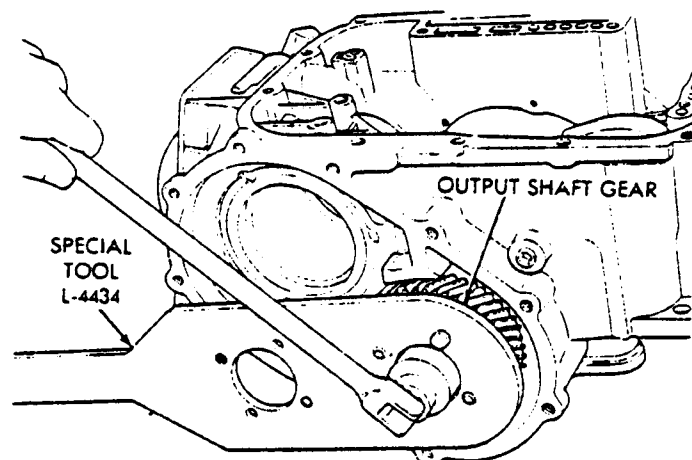


FIGURE 3

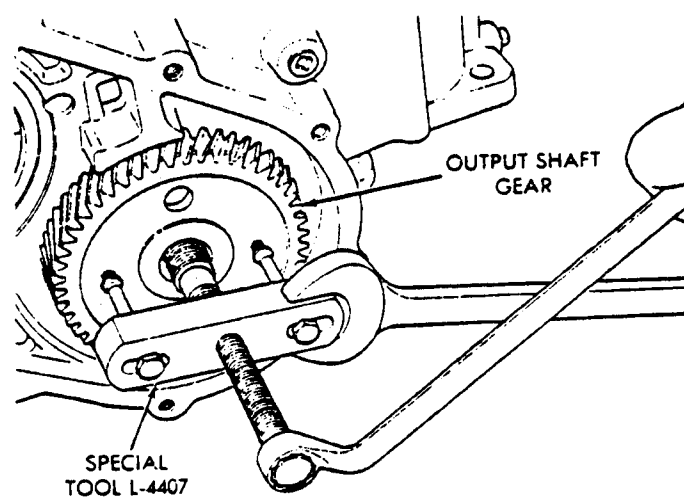


FIGURE 4

2. With output shaft gear removed, install a 7.65 mm (.301 inch) gaging shim on the planetary rear annulus gear hub and a 1.34 mm (.053 inch) gaging shim on the output shaft as shown in Figure 5, using lubriplate to hold the shims in place. The 7.65 mm shim has a larger inside diameter and must be installed first. The 1.34 mm shim pilots on the output shaft.

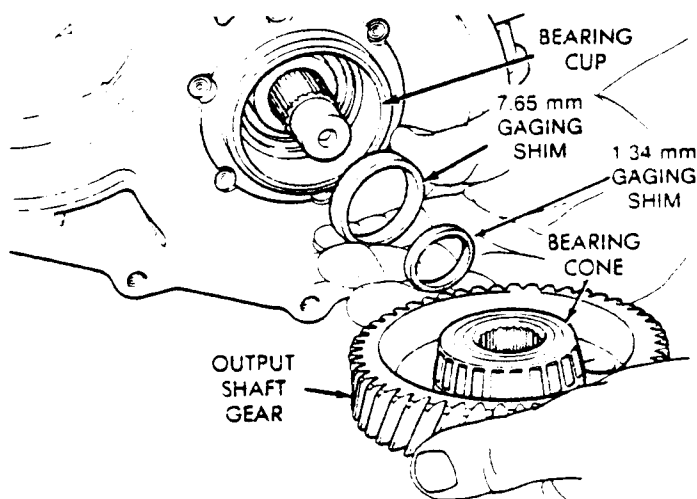


FIGURE 5

3. Install output shaft gear and bearing assembly, torque the retaining nut to 200 foot-pounds (271 N·m).

NOTE: A few drops of Automatic Transmission Fluid applied to the bearing rollers will ensure proper seating and rolling resistance.

4. To measure bearing end play: (Reference Figure 6)
  - o Attach Tool L-4432 to the transfer gear.
  - o Mount a steel ball with lubriplate on the end of the output shaft.
  - o Push down on the gear while rotating back and forth to ensure seating of the bearing rollers.
  - o Using a dial indicator, mounted to the transaxle case, measure output shaft end play.



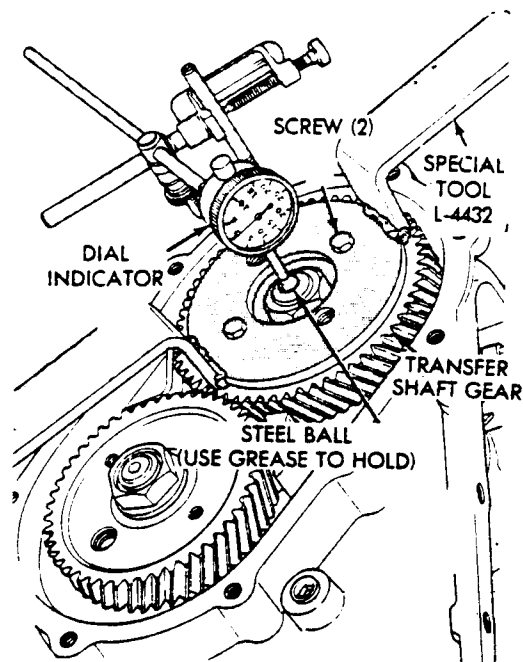


FIGURE 6

5. Once bearing end play has been determined, refer to the Output Shaft Bearing Shim Chart for the required shim combination to obtain proper bearing setting. (A millimeter to inch conversion chart is located in the back of this booklet.)

NOTE: 1. The 6.65 mm (.262 inch) 7.15 mm (.281 inch) or 7.65 mm (.301 inch) shim is always installed first. These shims have a lubrication hole which is necessary for proper bearing lubrication.

2. Shims thinner than 6.65 mm listed in the chart are common to both the transfer and output shaft bearings.

6. Use Tool L-4432 to remove the retaining nut and washer. Remove the output shaft gear using Tool L-4407.

7. Remove the two gaging shims and install the proper shim combination, making sure to install the 6.65, 7.15, or 7.65 mm shim first. Use lubriplate to hold the shims in place. Install the output gear and bearing assembly.
8. Install the retaining nut and washer and torque to 200 foot-pounds (271 N·m).
9. Using an inch-pound torque wrench, check the turning torque. The torque should be between 3 to 8 inch-pounds (Figure 7).

NOTE: If the turning torque is too high, install a .05 mm (.002 inch) thicker shim. If the turning torque is too low, install a .05 mm (.002 inch) thinner shim. Repeat until the proper turning torque of 3 to 8 inch-pounds is obtained.

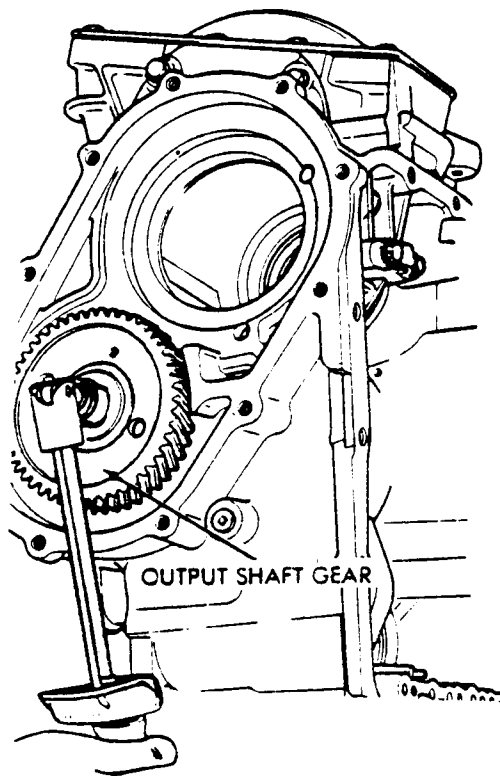


FIGURE 7

## OUTPUT SHAFT BEARING SHIM CHART

End Play (with 7.65mm and 1.34mm gaging shims installed)		Required Shim Combination	Total Thickness	
mm	Inch		mm	Inch
0	0	7.65 + 1.34	8.99	.354
.05	.002	7.65 + 1.24	8.89	.350
.10	.004	7.65 + 1.19	8.84	.348
.15	.006	7.65 + 1.14	8.79	.346
.20	.008	7.65 + 1.09	8.74	.344
.25	.010	7.65 + 1.04	8.69	.342
.30	.012	7.65 + .99	8.64	.340
.35	.014	7.65 + .94	8.59	.338
.40	.016	7.15 + 1.39	8.54	.336
.45	.018	7.15 + 1.34	8.49	.334
.50	.020	7.15 + 1.29	8.44	.332
.55	.022	7.15 + 1.24	8.39	.330
.60	.024	7.15 + 1.19	8.34	.328
.65	.026	7.15 + 1.14	8.29	.326
.70	.028	7.15 + 1.09	8.24	.324
.75	.030	7.15 + 1.04	8.19	.322
.80	.032	7.15 + .99	8.14	.320
.85	.034	7.15 + .94	8.09	.318
.90	.036	6.65 + 1.39	8.04	.316
.95	.038	6.65 + 1.34	7.99	.314
1.00	.040	6.65 + 1.29	7.94	.312
1.05	.042	6.65 + 1.24	7.89	.311
1.10	.044	6.65 + 1.19	7.84	.309
1.15	.046	6.65 + 1.14	7.79	.307
1.20	.048	6.65 + 1.09	7.74	.305
1.25	.049	6.65 + 1.04	7.69	.303
1.30	.051	6.65 + .99	7.64	.301
1.35	.053	6.65 + .94	7.59	.299

Average Conversion .05mm = .002 inch

## DIFFERENTIAL BEARING

1. Remove the bearing cup from the differential bearing retainer using Tool L-4518, and remove the existing shim, from under the cup, Figure 8. The original shim should not be re-used.

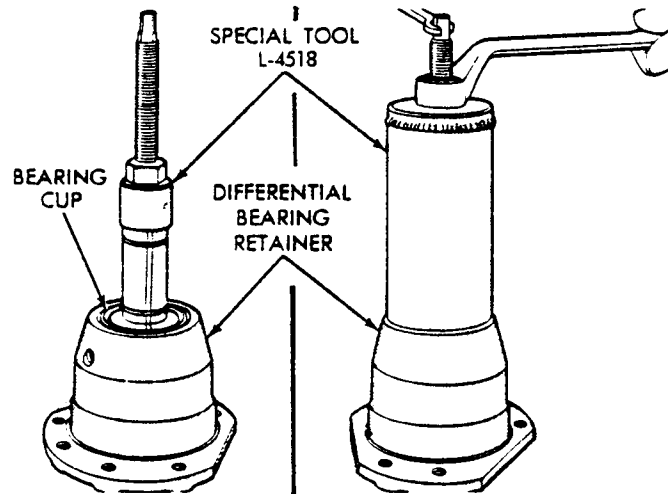


FIGURE 8

**CAUTION:** Care must be taken when using Tool L-4158, so as to seat the tool jaws against the back of the bearing cup. This can be accomplished by lifting the jaws up while tightening the nut with your fingers.

2. Install a .50 mm (.020 inch) gaging shim, Figure 9, and reinstall the bearing cup into the retainer. Use an arbor press to install the cup.

**NOTE:** A few drops of Automatic Transmission Fluid applied to the bearing rollers will ensure proper seating and rolling resistance.

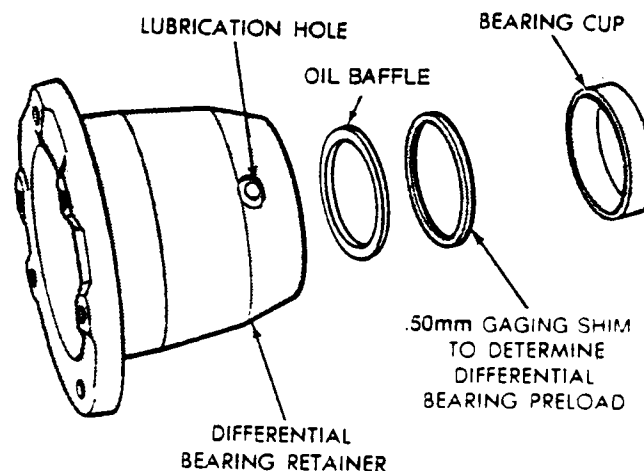


FIGURE 9

**NOTE:** Oil baffle does not have to be removed to make shim selection.

3. Install the bearing retainer into the case and the torque bolts to 250 inch-pounds (28 N·m).
4. Position the transaxle assembly vertically on the support stand and install Tool L-4436 into the extension, reference Figure 10.

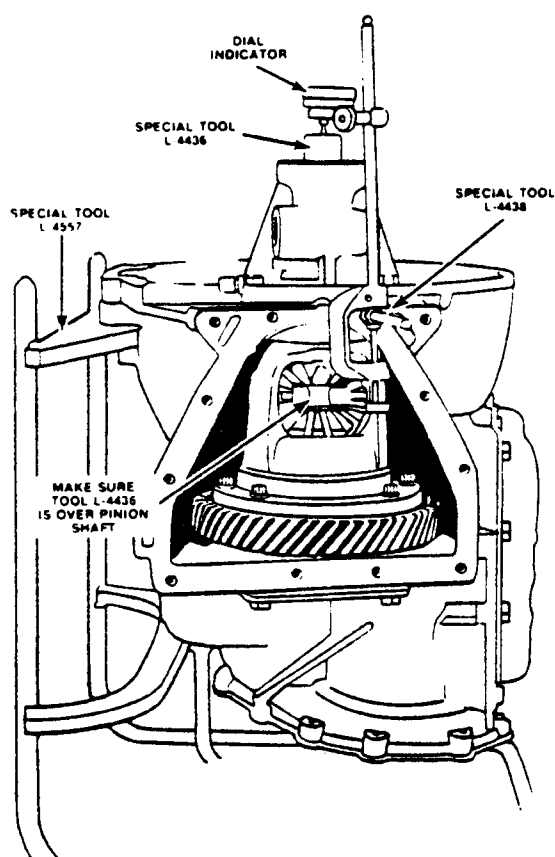


FIGURE 10

5. Rotate the differential assembly at least one full revolution to ensure the tapered roller bearings are fully seated.
6. Attach a dial indicator to the case and zero the indicator on the flat end of Tool L-4436, reference Figure 10.
7. Place a large screwdriver to each side of the ring gear and lift with enough force to take up the clearance between the bearings. Check the dial indicator for the amount of end play, reference Figure 11. Caution should be used not to damage the transmission case and/or differential cover sealing surface.

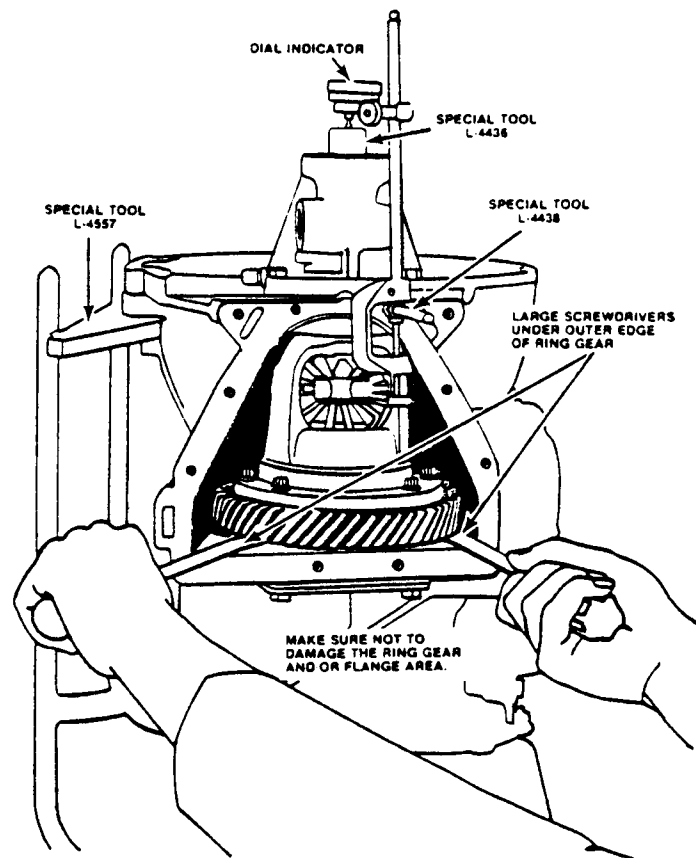


FIGURE 11

8. Once the end play has been determined, refer to the differential bearing shim chart for the required shim combination to obtain the proper bearing setting.
9. Remove the differential bearing retainer. Remove the bearing cup and the .50 mm (.020 inch) gaging shim.
10. Install the proper shim combination under the bearing cup. Make sure the oil baffle is installed properly in the bearing retainer below the bearing shim and cup.
11. Install the differential retainer. Make sure to seal the retainer to the housing with RTV sealer and torque the bolts to 250 inch-pounds (28 N·m).

12. Using special Tool L-4436 and an inch-pound torque wrench, check the turning torque of the differential, reference Figure 12. The turning torque should be between 5 and 18 inch-pounds.

NOTE: If the turning torque is too high, install a .05 mm (.002 inch) thinner shim. If the turning torque is too low, install a .05 mm (.002 inch) thicker shim. Repeat until 5 to 18 inch-pounds turning torque is obtained.

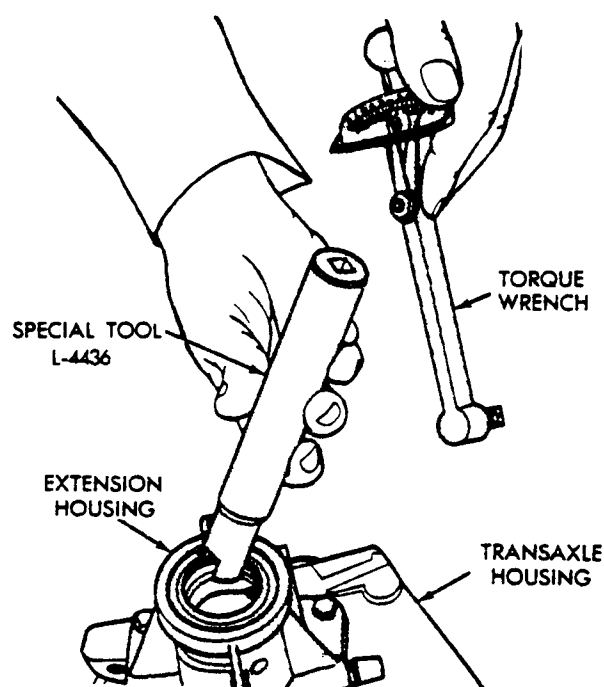


FIGURE 12

## DIFFERENTIAL BEARING SHIM CHART

End Play (with .50mm) gaging shim Installed)		Required Shim Combination	Total Thickness	
mm	Inch		mm	Inch
0	0	.50	.50	.020
.05	.002	.75	.75	.030
.10	.004	.80	.80	.032
.15	.006	.85	.85	.034
.20	.008	.90	.90	.035
.25	.010	.95	.95	.037
.30	.012	1.00	1.00	.039
.35	.014	1.05	1.05	.041
.40	.016	.50 + .60	1.10	.043
.45	.018	.50 + .65	1.15	.045
.50	.020	.50 + .70	1.20	.047
.55	.022	.50 + .75	1.25	.049
.60	.024	.50 + .80	1.30	.051
.65	.026	.50 + .85	1.35	.053
.70	.027	.50 + .90	1.40	.055
.75	.029	.50 + .95	1.45	.057
.80	.031	.50 + 1.00	1.50	.059
.85	.033	.50 + 1.05	1.55	.061
.90	.035	1.00 + .60	1.60	.063
.95	.037	1.00 + .65	1.65	.065
1.00	.039	1.00 + .70	1.70	.067
1.05	.041	1.00 + .75	1.75	.069
1.10	.043	1.00 + .80	1.80	.071
1.15	.045	1.00 + .85	1.85	.073
1.20	.047	1.00 + .90	1.90	.075
1.25	.049	1.00 + .95	1.95	.077
1.30	.051	1.00 + 1.00	2.00	.079
1.35	.053	1.00 + 1.05	2.05	.081
1.40	.055	1.05 + 1.05	2.10	.083



## TRANSFER SHAFT BEARING

1. Use Tool L-4424 to remove the retaining nut and washer. Remove the transfer shaft gear using Tool L-4407.
2. Install a 2.29 mm (.090 inch) and 1.39 mm (0.055 inch) gaging shims on the transfer shaft behind the governor support, reference Figure 13.

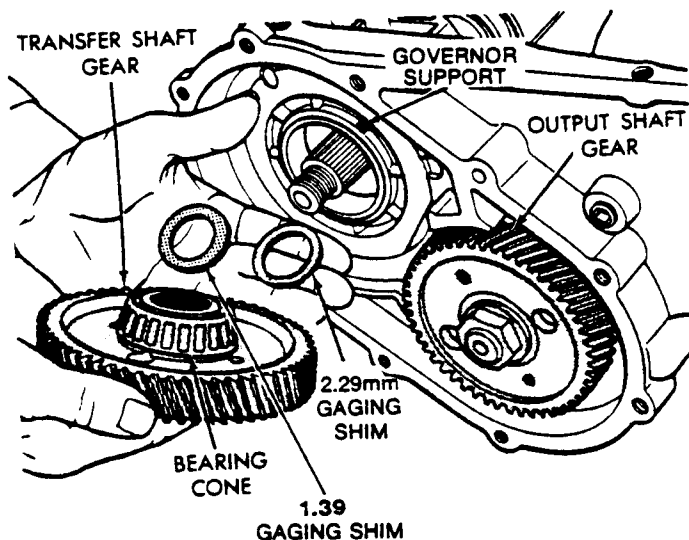


FIGURE 13

3. Install transfer shaft gear and bearing assembly and torque nut to 200 foot-pounds (271 N·m).

NOTE: A few drops of Automatic Transmission Fluid applied to the bearing rollers will ensure proper seating and rolling resistance.

4. To measure bearing end play: (Reference Figure 14)
  - o Attach Tool L-4432 to the transfer gear.
  - o Mount a steel ball with grease on the end of the transfer shaft.
  - o Push down on the gear while rotating back and forth to ensure proper seating of the bearing rollers.
  - o Using a dial indicator mounted to the transaxle case, measure transfer shaft end play.

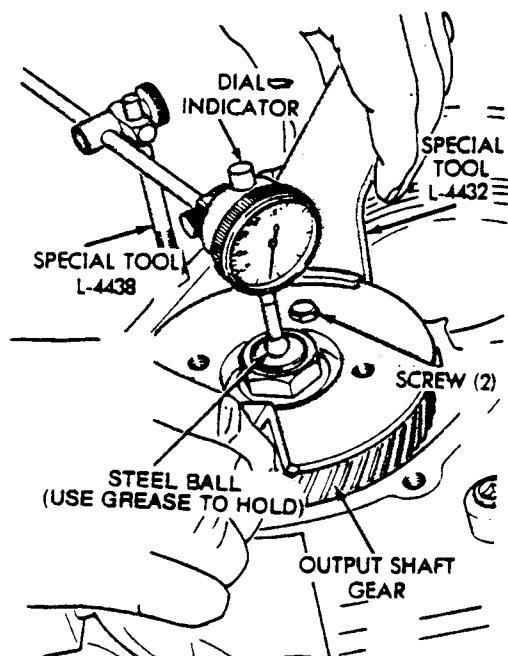


FIGURE 14

5. Refer to the Transfer Shaft Bearing Shim Chart for the required shim combination to obtain the proper bearing setting.
6. Use Tool L-4424 to remove the retaining nut and washer. Remove the transfer gear using Tool L-4407.
7. Remove the two gaging shims and install the correct shim combination. Install the transfer gear and bearing assembly.
8. Install the retaining nut and washer and torque to 200 foot-pounds (271 N·m).
9. Measure bearing end play as outlined in step 4. End play should be between .05 mm and .25 mm (.002 and .010 inch)

NOTE: If end play is too high, install a .05 mm (.002 inch) thinner shim combination. If end play is too low, install a .05 mm (.002 inch) thicker shim combination. Repeat until .05 to .25 mm (.002 to .010 inch) end play is obtained.

## TRANSFER BEARING SHIM CHART

End Play (with 2.29mm and 1.39mm gaging shims installed		Required Shim Combination	Total Thickness	
mm	Inch		mm	Inch
0	0	2.29 + 1.39	3.68	.145
.05	.002	2.29 + 1.39	3.68	.145
.10	.004	2.29 + 1.39	3.68	.145
.15	.006	2.29 + 1.39	3.68	.145
.20	.008	2.29 + 1.34	3.63	.143
.25	.010	2.29 + 1.29	3.58	.141
.30	.012	2.29 + 1.24	3.53	.139
.35	.014	2.29 + 1.19	3.48	.137
.40	.016	2.29 + 1.14	3.43	.135
.45	.018	2.29 + 1.09	3.38	.133
.50	.020	2.29 + 1.04	3.33	.131
.55	.022	2.29 + .99	3.28	.129
.60	.024	1.84 + 1.39	3.23	.127
.65	.026	1.84 + 1.34	3.18	.125
.70	.028	1.84 + 1.29	3.13	.123
.75	.030	1.84 + 1.24	3.08	.121
.80	.032	1.84 + 1.19	3.03	.119
.85	.034	1.84 + 1.14	2.98	.117
.90	.036	1.84 + 1.09	2.93	.115
.95	.038	1.84 + 1.04	2.88	.113
1.00	.040	1.84 + .99	2.83	.111
1.05	.042	1.39 + 1.39	2.78	.109
1.10	.044	1.39 + 1.34	2.73	.107
1.15	.046	1.39 + 1.29	2.68	.105
1.20	.048	1.39 + 1.24	2.63	.103
1.25	.049	1.39 + 1.19	2.58	.101
1.30	.050	1.39 + 1.14	2.53	.099
1.35	.052	1.39 + 1.09	2.48	.097
1.40	.055	1.39 + 1.04	2.43	.095
1.45	.057	1.39 + .99	2.38	.093
1.50	.059	.94 + 1.39	2.33	.091
1.55	.061	.94 + 1.34	2.28	.089
1.60	.063	.94 + 1.29	2.23	.087

## BEARING SHIM CHART

Shim Thickness		Bearing Usage			
mm	Inch	Part Number	Output Shaft	Transfer Shaft	Differential
0.94	.037	4207166	x	x	—
0.99	.039	4207167	x	x	—
1.04	.041	4207168	x	x	—
1.09	.043	4207169	x	x	—
1.14	.045	4207170	x	x	—
1.19	.047	4207171	x	x	—
1.24	.049	4207172	x	x	—
1.29	.051	4207173	x	x	—
1.34	.053	4207174	x*	x	—
1.39	.055	4207175	x	x*	—
1.84	.072	4207176	x	x	—
2.29	.090	4207177	x	x*	—
6.65	.262	4207159	x	—	—
7.15	.281	4207160	x	—	—
7.65	.301	4207161	x*	—	—
0.50	.020	4207134	—	—	x*
0.55	.022	4207135	—	—	x
0.60	.024	4207136	—	—	x
0.65	.026	4207137	—	—	x
0.70	.027	4207138	—	—	x
0.75	.029	4207139	—	—	x
0.80	.031	4207140	—	—	x
0.85	.033	4207141	—	—	x
0.90	.035	4207142	—	—	x
0.95	.037	4207143	—	—	x
1.00	.039	4207144	—	—	x
1.05	.041	4207145	—	—	x

\*Also used as gaging shims

**INCHES TO MILLIMETRES**

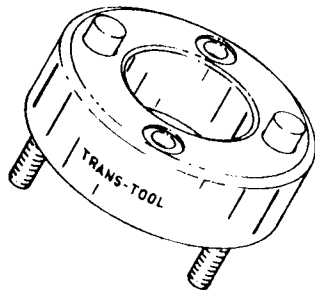
**All values in this table are exact**

inches	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
<b>millimetres</b>										
0.000	—	0.0254	0.0508	0.0762	0.1016	0.1270	0.1524	0.1778	0.2032	0.2286
0.010	0.2540	0.2794	0.3048	0.3302	0.3556	0.3810	0.4064	0.4318	0.4572	0.4826
0.020	0.5080	0.5334	0.5588	0.5842	0.6096	0.6350	0.6604	0.6858	0.7112	0.7366
0.030	0.7620	0.7874	0.8128	0.8382	0.8636	0.8890	0.9144	0.9398	0.9652	0.9906
0.040	1.0160	1.0414	1.0668	1.0922	1.1176	1.1430	1.1684	1.1938	1.2192	1.2446
0.050	1.2700	1.2954	1.3208	1.3462	1.3716	1.3970	1.4224	1.4478	1.4732	1.4986
0.060	1.5240	1.5494	1.5748	1.6002	1.6256	1.6510	1.6764	1.7018	1.7272	1.7526
0.070	1.7780	1.8034	1.8288	1.8542	1.8796	1.9050	1.9304	1.9558	1.9812	2.0066
0.080	2.0320	2.0574	2.0828	2.1082	2.1336	2.1590	2.1844	2.2098	2.2352	2.2606
0.090	2.2860	2.3114	2.3368	2.3622	2.3876	2.4130	2.4384	2.4638	2.4892	2.5146
0.100	2.5400	2.5654	2.5908	2.6162	2.6416	2.6670	2.6924	2.7178	2.7432	2.7686
0.110	2.7940	2.8194	2.8448	2.8702	2.8956	2.9210	2.9464	2.9718	2.9972	3.0226
0.120	3.0480	3.0734	3.0988	3.1242	3.1496	3.1750	3.2004	3.2258	3.2512	3.2766
0.130	3.3020	3.3274	3.3528	3.3782	3.4036	3.4290	3.4544	3.4798	3.5052	3.5306
0.140	3.5560	3.5814	3.6068	3.6322	3.6576	3.6830	3.7084	3.7338	3.7592	3.7846
0.150	3.8100	3.8354	3.8608	3.8862	3.9116	3.9370	3.9624	3.9878	4.0132	4.0386
0.160	4.0640	4.0894	4.1148	4.1402	4.1656	4.1910	4.2164	4.2418	4.2672	4.2926
0.170	4.3180	4.3434	4.3688	4.3942	4.4196	4.4450	4.4704	4.4958	4.5212	4.5466
0.180	4.5720	4.5974	4.6228	4.6482	4.6736	4.6990	4.7244	4.7498	4.7752	4.8006
0.190	4.8260	4.8514	4.8768	4.9022	4.9276	4.9530	4.9784	5.0038	5.0292	5.0546
0.200	5.0800	5.1054	5.1308	5.1562	5.1816	5.2070	5.2324	5.2578	5.2832	5.3086
0.210	5.3340	5.3594	5.3848	5.4102	5.4356	5.4610	5.4864	5.5118	5.5372	5.5626
0.220	5.5880	5.6134	5.6388	5.6642	5.6896	5.7150	5.7404	5.7658	5.7912	5.8166
0.230	5.8420	5.8674	5.8928	5.9182	5.9436	5.9690	5.9944	6.0198	6.0452	6.0706
0.240	6.0960	6.1214	6.1468	6.1722	6.1976	6.2230	6.2484	6.2738	6.2992	6.3246
0.250	6.3500	6.3754	6.4008	6.4262	6.4516	6.4770	6.5024	6.5278	6.5532	6.5786
0.260	6.6040	6.6294	6.6548	6.6802	6.7056	6.7310	6.7564	6.7818	6.8072	6.8326
0.270	6.8580	6.8834	6.9088	6.9342	6.9596	6.9850	7.0104	7.0358	7.0612	7.0866
0.280	7.1120	7.1374	7.1628	7.1882	7.2136	7.2390	7.2644	7.2898	7.3152	7.3406
0.290	7.3660	7.3914	7.4168	7.4422	7.4676	7.4930	7.5184	7.5438	7.5692	7.5946
0.300	7.6200	7.6454	7.6708	7.6962	7.7216	7.7470	7.7724	7.7978	7.8232	7.8486
0.310	7.8740	7.8994	7.9248	7.9502	7.9756	8.0010	8.0264	8.0518	8.0772	8.1026
0.320	8.1280	8.1534	8.1788	8.2042	8.2296	8.2550	8.2804	8.3058	8.3312	8.3566
0.330	8.3820	8.4074	8.4328	8.4582	8.4836	8.5090	8.5344	8.5598	8.5852	8.6106
0.340	8.6360	8.6614	8.6868	8.7122	8.7376	8.7630	8.7884	8.8138	8.8392	8.8646
0.350	8.8900	8.9154	8.9408	8.9662	8.9916	9.0170	9.0424	9.0678	9.0932	9.1186
0.360	9.1440	9.1694	9.1948	9.2202	9.2456	9.2710	9.2964	9.3218	9.3472	9.3726
0.370	9.3980	9.4234	9.4488	9.4742	9.4996	9.5250	9.5504	9.5758	9.6012	9.6266
0.380	9.6520	9.6774	9.7028	9.7282	9.7536	9.7790	9.8044	9.8298	9.8552	9.8806
0.390	9.9060	9.9314	9.9568	9.9822	10.0076	10.0330	10.0584	10.0838	10.1092	10.1346
0.400	10.1600	10.1854	10.2108	10.2362	10.2616	10.2870	10.3124	10.3378	10.3632	10.3886
0.410	10.4140	10.4394	10.4648	10.4902	10.5156	10.5410	10.5664	10.5918	10.6172	10.6426
0.420	10.6680	10.6934	10.7188	10.7442	10.7696	10.7950	10.8204	10.8458	10.8712	10.8966
0.430	10.9220	10.9474	10.9728	10.9982	11.0236	11.0490	11.0744	11.0998	11.1252	11.1506
0.440	11.1760	11.2014	11.2268	11.2522	11.2776	11.3030	11.3284	11.3538	11.3792	11.4046
0.450	11.4300	11.4554	11.4808	11.5062	11.5316	11.5570	11.5824	11.6078	11.6332	11.6586
0.460	11.6840	11.7094	11.7348	11.7602	11.7856	11.8110	11.8364	11.8618	11.8872	11.9126
0.470	11.9380	11.9634	11.9888	12.0142	12.0396	12.0650	12.0904	12.1158	12.1412	12.1666
0.480	12.1920	12.2174	12.2428	12.2682	12.2936	12.3190	12.3444	12.3698	12.3952	12.4206
0.490	12.4460	12.4714	12.4968	12.5222	12.5476	12.5730	12.5984	12.6238	12.6492	12.6746
inches	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009

## T-1462

### ADAPTOR FOR

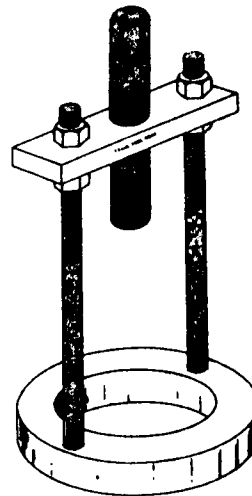
T-1407 & T-1460



THE T-1462 IS USED TO ADAPT THE (PREVIOUSLY RELEASED) T-1407 AND THE T-1460 TO WORK ON 1979+ A-404 TRANSMISSIONS. THE T-1407 REQUIRES ONE ADAPTOR AND THE T-1460 REQUIRES TWO ADAPTORS.

## T-1483

### PULLER-PRESS

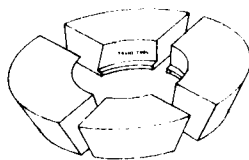


THIS PRESS WAS DESIGNED TO WORK ON MANY OEM TOOLS FOR CHRYSLER, SUCH AS THE T-1493 WHICH REMOVES THE TRANSFER BEARING CONES IN THE A-404.

## T-1493

### ADAPTER SET

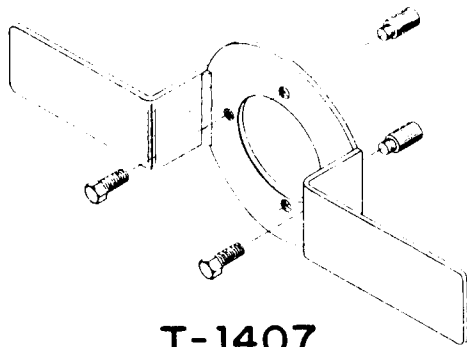
A-404 TORQUEFLIGHT AUTOMATIC TRANSAXLE



THIS SET OF ADAPTERS IS USED TO REMOVE THE TRANSFER BEARING CONE. (MUST BE USED WITH THE T-1483)

## A-404 TRANSAXLE

TM-404	SERVICE MANUAL
T-99	UNIVERSAL SEAL REM.
T-154-HD	SLIDE HAMMERS HEAVY DUTY
T-154-B	SLIDE HAMMER ADAPTORS (10mm)
T-156-A	TRANSMISSION & ENGINE HOLDING FIXTURE
T-158-HD	CLUTCH SPRING COMPRESSOR TOOL
T-163-A	VACUUM PUMP HEAVY DUTY
T-163-D	PRESSURE GAUGE 0-300 lbw.
T-1104-A	TORQUE DRIVE BIT
T-1407	END-PLAY GAUGE
T-1409	OVER-RUNNING CLUTCH INSTALLER
T-1411	OUTPUT & ANNULUS GEAR BEARING CONE INST.
T-1412	TRANSFER SHAFT GEAR/DIF. BEARING CONE INST.
T-1413	GOVERNOR SUPPORT RETAINER BEARING CUP REM.
T-1414	GOVERNOR SUPPORT BEARING CONE/DIF. CUP INST.
T-1415	DIFFERENTIAL BEARING DRAG TORQUE TOOL
T-1416	TRANSFER SHAFT BEARING CONE INSTALLER
T-1417	DIFFERENTIAL BEARING RETAINER/EXT. REMOVER
T-1425	TRANSFER SHAFT REM/INST.
T-1454	OUTPUT & TRANSFER SHAFT PULLER
T-1460	HOLDER, REMOVER, INSTALLER
T-1462	ADAPTOR
T-1483	BEARING CONE PRESSURE PULLER
T-1493	BEARING ADAPTOR SET



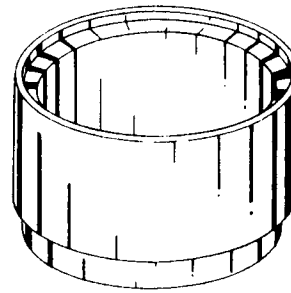
## T-1407

### TRANSFER SHAFT GEAR END PLAY GAUGE

#### A-404 TORQUEFLITE AUTOMATIC TRANSAXLE

TO CHECK TRANSFER SHAFT END PLAY TO DETERMINE PROPER THICKNESS.  
A MUST WHEN YOU HAVE REPLACED THE TRANSAXLE CASE - TRANSFER SHAFT -  
TRANSFER SHAFT GEAR - TRANSFER SHAFT BEARING, ETC.

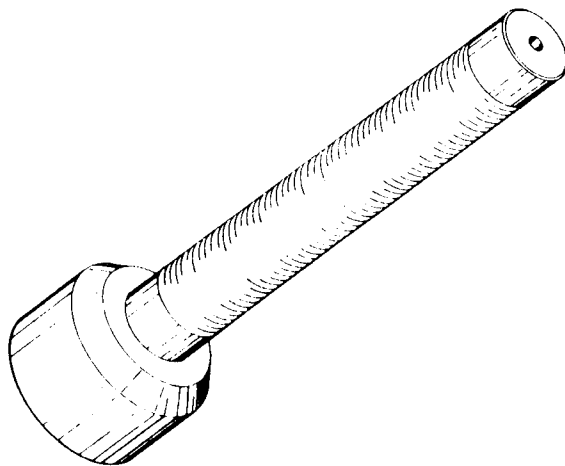
FOR THIS TOOL TO WORK ON THE 19795-UP MODELS, ONE OF THE T-1402  
ADAPTORS MUST BE ATTACHED.



## T-1409

### TF 404 INSTALLER OVER-RUNNING CLUTCH ASSEMBLY

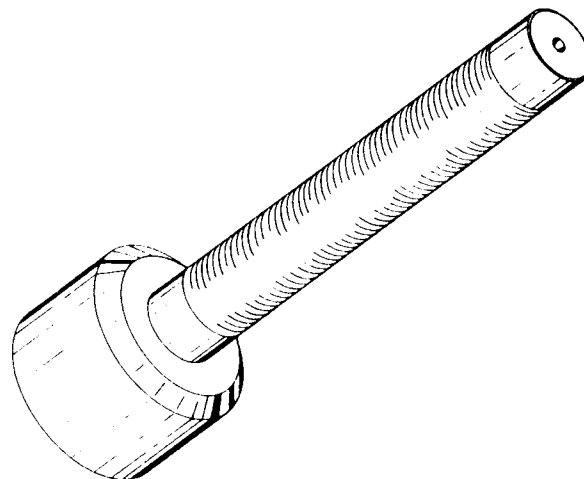
THE T-1409 ALIGNS, REMOVES AND INSTALLS THE OVER-RUNNING CLUTCH  
ASSEMBLY QUICKLY AND ACCURATELY. THE T-1409 WILL ALSO RETAIN  
THE 8 ROLLERS AND 8 SPRINGS WHILE REMOVING AND INSTALLING THE  
OVER-RUNNING CLUTCH.



#### A-404 TORQUEFLITE AUTOMATIC TRANSAXLE

## T-1411

### INSTALLER - OUTPUT & ANNULUS GEAR BEARING CONES



#### A-404 TORQUEFLITE AUTOMATIC TRANSAXLE

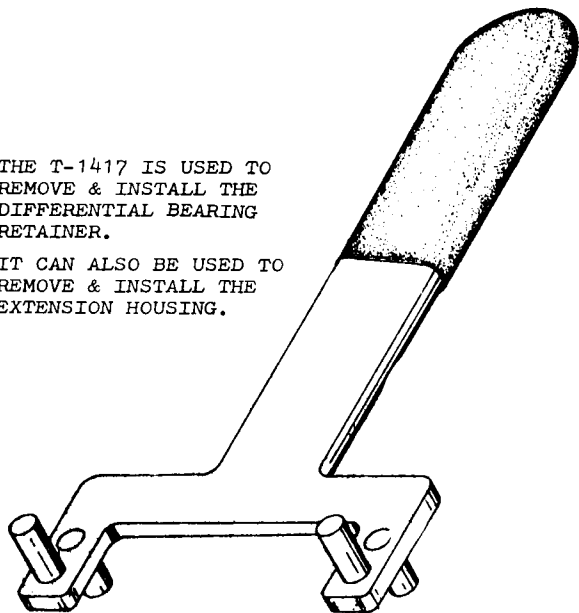
## T-1412

### INSTALLER - TRANSFER SHAFT GEAR AND DIFFERENTIAL BEARING CONES

A-404 TORQUEFLITE AUTOMATIC TRANSAXLE

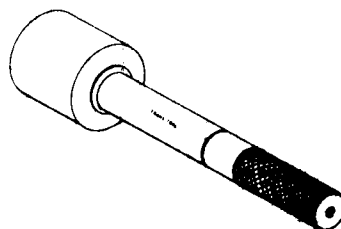
THE T-1417 IS USED TO REMOVE & INSTALL THE DIFFERENTIAL BEARING RETAINER.

IT CAN ALSO BE USED TO REMOVE & INSTALL THE EXTENSION HOUSING.



**T-1417**

**REMOVER - DIFFERENTIAL BEARING RETAINER AND EXTENSIONS**

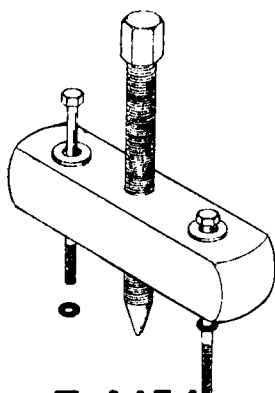


**T-1425**

**TRANSFER SHAFT & RETAINER  
REMOVER AND INSTALLER**

A-404 TORQUEFLIGHT AUTOMATIC TRANSAXLE

THE T-1425 MAKES THE VERY DIFFICULT JOB OF REMOVING AND INSTALLING THE TRANSFER SHAFT AND RETAINER A FAST AND EASY JOB.

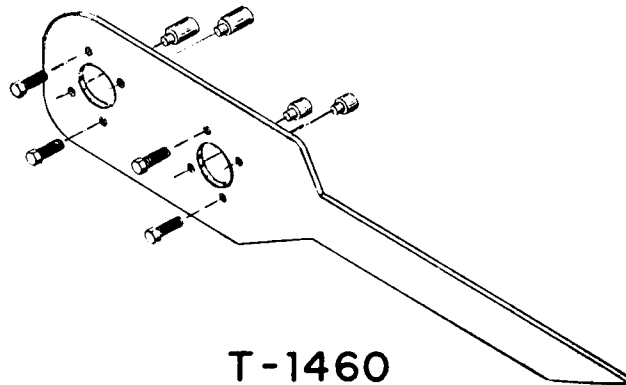


**T-1454**

**OUTPUT & TRANSFER SHAFT GEAR PULLER**

A-404 TORQUEFLITE AUTOMATIC TRANSAXLE

EVEN STUBBORN HARD TO MOVE GEARS CAN BE REMOVED QUICKLY AND EASILY.



**T-1460**

**HOLDER REMOVER INSTALLER**

A-404 TORQUEFLITE AUTOMATIC TRANSAXLE

THIS DUAL PURPOSE TOOL IS USED TO REMOVE & INSTALL THE OUTPUT AND TRANSFER GEARS.

IT ALSO HOLDS THE UNIT SECURELY SO THAT PROPER FOOT POUNDS OF PRESSURE CAN BE APPLIED WHEN TIGHTENING THE TRANSFER SHAFT GEAR RETAINING NUT.

FOR THIS TOOL TO WORK ON THE 1979 $\frac{1}{2}$ -UP MODELS, TWO OF THE T-1462 ADAPTERS MUST BE ATTACHED.