



## CHRYSLERA404 thru A670

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## **INTRODUCTION**

### **CHRYSLER A404 THROUGH A670**

We wish to thank Chrysler Corporation for the information and the illustrations that have made this booklet possible. This booklet contains the general description, diagnosis, and assembly/disassembly procedures necessary to repair, overhaul, or service the A404, A413, A415, A470 and A670 transaxles. We have also included the updates and engineering changes that we are aware of, that have occurred over the years. We feel that this information will help in training your personnel, to provide your customers with the best possible transmission service.

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# Technical Service Information

## GENERAL INFORMATION

The A404/A670 family transaxles combine a torque converter (Lock-Up On A470/A670), with a fully automatic 3 speed transmission, transfer gearing and differential gearing into a compact front wheel drive system.

Transaxle operation requirements are different for each vehicle and engine combination and some of the 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 bottom pan flange.

Within this family of transaxles, there are three primary centerlines:

- (1) Main centerline plus valve body, similar to conventional rear drive Torqueflite.
- (2) Transfer shaft centerline, includes governor and parking pawl.
- (3) Differential centerline.

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

The torque converter, transaxle area, & differential are housed in an integral aluminum case casting.

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

**Special emphasis is placed on maintaining the differential oil level to, 1/8" to 3/8" 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 fluid through an oil-to-water type cooler, located in the radiator side tank. The torque converter assembly is a sealed unit.

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

Engine torque is transferred to the torque converter via the flex plate, 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 the component application chart that is shown in Figure 1.

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 located on the "extension housing".

Output torque from the transaxle main centerline is delivered through helical gears to the transfer shaft. This gear set is a factor of the "Overall" transaxle gear ratio. The transfer shaft also carries the governor and parking gear.

An integral helical gear on the transfer shaft (Pinion Gear) drives the differential ring gear. The final drive gearing is completed with either of two different gear sets (ratios), producing the overall ratios used in this unit.

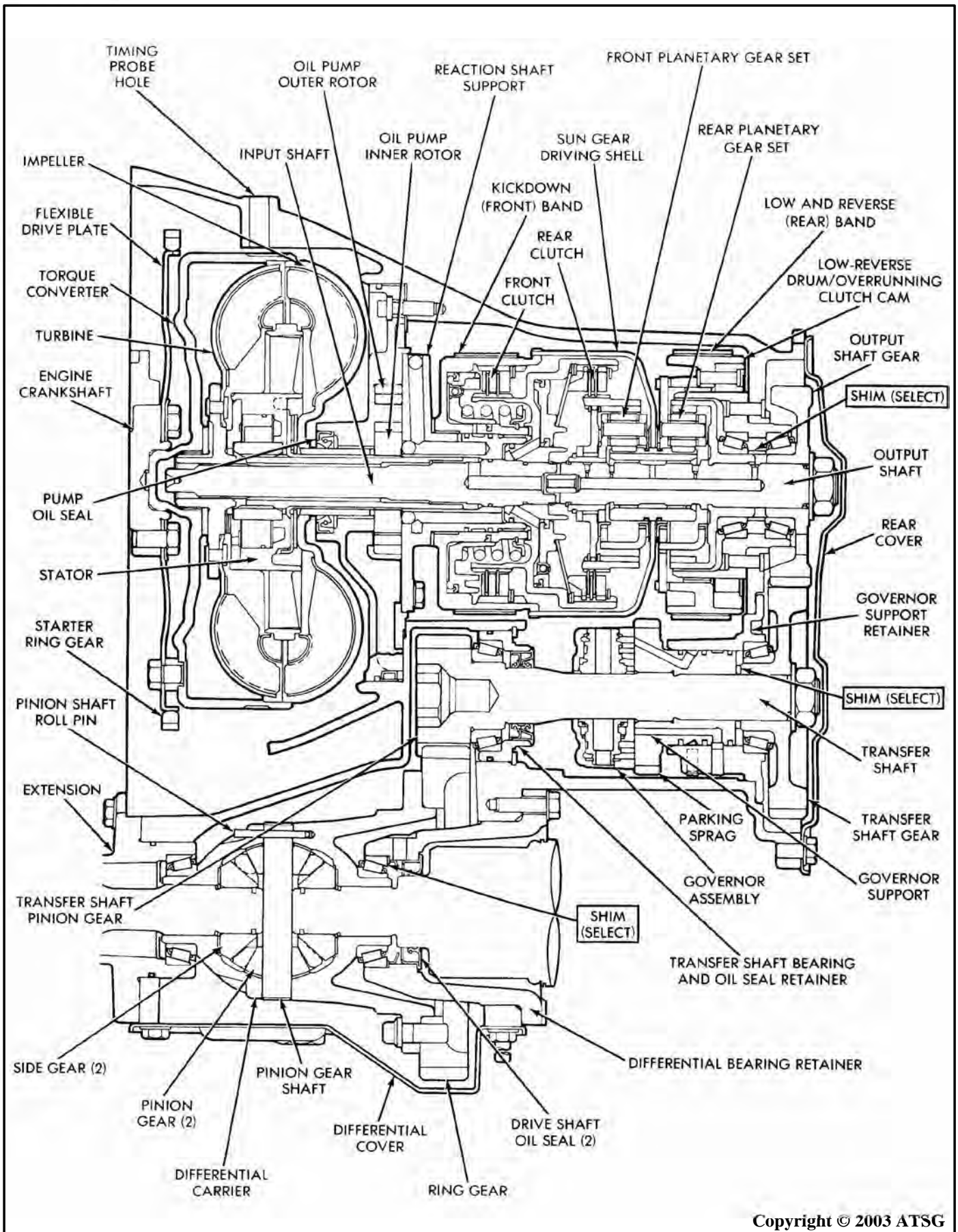
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COMPONENT APPLICATION CHART							
Shift Lever Position	Forward (Rear) Clutch	Intermediate (Front) Band	Direct (Front) Clutch	Low Roller	Low-Rev Band	470/670 "ONLY" TCC	Gear Ratio
<i>P - Park</i>							
<i>R - Reverse</i>			ON		ON		2.10
<i>N - Neutral</i>							
<i>D - Drive, 1st Gear</i>	ON			HOLD			2.69
<i>D - Drive, 2nd Gear</i>	ON	ON					1.55
<i>D - Drive, 3rd Gear</i>	ON		ON			*ON	1.00
<i>2 - Second, 1st Gear</i>	ON						2.69
<i>2 - Second, 2nd Gear</i>	ON	ON					1.55
<i>1 - Low, 1st Gear</i>	ON				ON		2.69

\*ON = TCC, dependent on throttle position and vehicle speed.

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Figure 1



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Figure 2



## HYDRAULIC CONTROL SYSTEM

Refer to Pages 8 through 14 for the hydraulic schematics that show the position of the various valves with color coded passages to indicate those under hydraulic pressure for most operations of the transaxle.

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:

### *Pressure Supply System*

The pressure supply system consists of an oil pump driven by the engine through the torque converter hub. 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 upshifts and downshifts.

The throttle valve transmits regulated pressure to the transaxle shift valves, in conjunction with throttle position, to control upshifts and downshifts.

### *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 1st to 2nd or 2nd to 1st, depending on vehicle speed and throttle position.

The 2-3 shift valve automatically shifts the transaxle from 2nd to 3rd or 3rd to 2nd, depending on vehicle speed and throttle position.

The kickdown valve makes possible a forced downshift from 3rd to 2nd, 2nd to 1st, or 3rd to 1st, depending on vehicle speed, by depressing the accelerator pedal past the detent to wide open throttle.

The shuttle valve has two separate functions and performs each independently of the other. The first is that of providing a fast release of the kickdown band, and smooth front (direct) clutch engagement on a "Lift-foot" upshift from 2nd to 3rd gear. The

second function of the shuttle valve is to regulate the application of the kickdown servo and band when making 3rd to 2nd 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 the hydraulic pressure is exhausted. 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 "Shift Speed Chart" in Figure 3. 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.

### *Gearshift and Parking Lock Controls*

This transaxle is controlled by a "Lever Type" shifter incorporated within the console. The control has six lever positions: P-(Park), R-(Reverse), N-Neutral, D-(Drive), 2-(Second) and 1-(Low). The parking lock is applied by moving the selector lever past a gate to the "P" position.

**Note:** *Do not select the "P" position until vehicle has come to a complete stop, otherwise a severe ratcheting noise will occur and may create damage to the transaxle.*

### *Starting the Engine*

The engine will start with the selector lever placed in either the P (Park) or N (Neutral) positions. As a safety precaution when starting in the N (Neutral) position, always apply the parking or foot brake. This transaxle will not permit starting the engine by pushing or towing, as it has no rear oil pump

Continued on next Page

<b>"APPROXIMATE" SHIFT SPEEDS</b>			
<b>Overall Ratio</b>	<b>3.48</b>	<b>2.78</b>	<b>3.22</b>
<b>Minimum Throttle</b> 1-2 Upshift 2-3 Upshift 3-1 Downshift	11-15 MPH 16-21 MPH 11-14 MPH	10-14 MPH 15-20 MPH 10-13 MPH	11-15 MPH 16-22 MPH 11-15 MPH
<b>Wide Open Throttle</b> 1-2 Upshift 2-3 Upshift	33-39 MPH 55-64 MPH	37-44 MPH 61-71 MPH	33-38 MPH 62-73 MPH
<b>Kickdown Limit</b> 3-2 WOT Downshift 3-2 Part Throttle Downshift 3-1 WOT Downshift	51-60 MPH 28-32 MPH 30-35 MPH	57-66 MPH 26-30 MPH 32-38 MPH	56-66 MPH 29-33 MPH 31-36 MPH

Figure 3

## OPERATING INSTRUCTIONS (Cont'd)

### Mountain Driving

When driving in the mountains with either heavy loads or when pulling trailers, the "2" (Second) or the "1" (Low) position should be selected on the upgrades which require heavy throttle for 1/2 mile or more. This reduces the possibility of overheating the transaxle and converter under these conditions. The "2" (Second) or "1" (Low) positions may also be used, and is recommended, for engine braking on severe downgrades.

### Towing the Vehicle

ATSG recommends that the vehicle *not be towed* with the front wheels on the ground, or consult the particular owners manual.

## GENERAL DIAGNOSIS

Automatic transaxle malfunctions may be caused by 4 general conditions: poor engine performance, improper adjustments, hydraulic malfunctions, and mechanical malfunctions. Diagnosis on any of these concerns, should always begin by checking the easily accessible variables first. Check the fluid level and condition, manual cable adjustment and throttle cable adjustment. Then perform a road test to determine if the concern has been corrected, or that more diagnosis is necessary. If the concern still exists after the preliminary tests and corrections are completed, hydraulic pressure tests should be done.

### 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 Park and Neutral positions, place the selector lever in the "P" Park position to be sure that the fluid level check is accurate. The engine should be running at idle speed and transaxle fluid should be at normal operating temperature, which is approximately 180F. The fluid level is correct if it is between "Max. Level" and "Add" marks, in the crosshatched area on the dipstick, as shown in Figure 4.

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 and pressures will be low and build up slowly.

Continued on next Page

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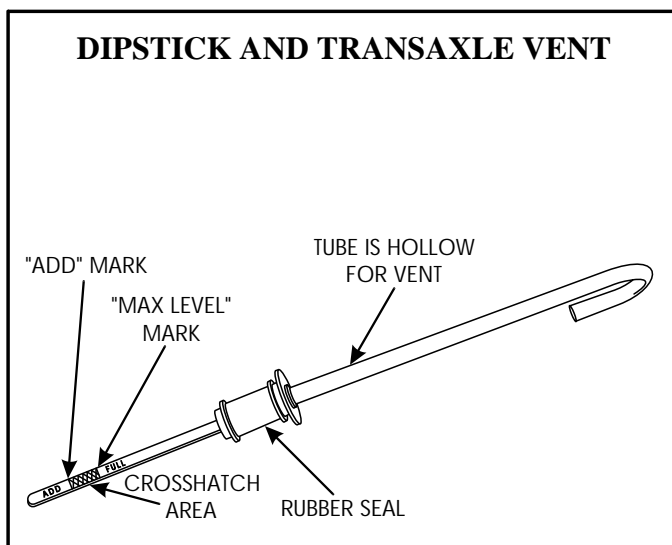


Figure 4



## Technical Service Information

### *Fluid Level and Condition (Cont'd)*

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

In either case, the air bubbles can cause the fluid to overheat, 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, in the dipstick handle, where it may be mistaken for a leak.

Along with fluid level, it is also 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 to examine, 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 the "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 not, the manual linkage must be adjusted before proceeding.

### *Throttle Cable*

The throttle cable adjustment is **very important** for proper transaxle operation. This adjustment will position a valve which controls line pressure rise, shift speed, 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, ensure 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 shift speed chart in Figure 3.

Observe closely for slipping or engine speed flare-up. Slipping or flare-up in any gear, usually indicates clutch, band, or overrunning clutch concerns. If the condition is far advanced, an overhaul will most likely 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 components are applied in those positions. Refer to the "Component Application Chart" found in Figure 1.

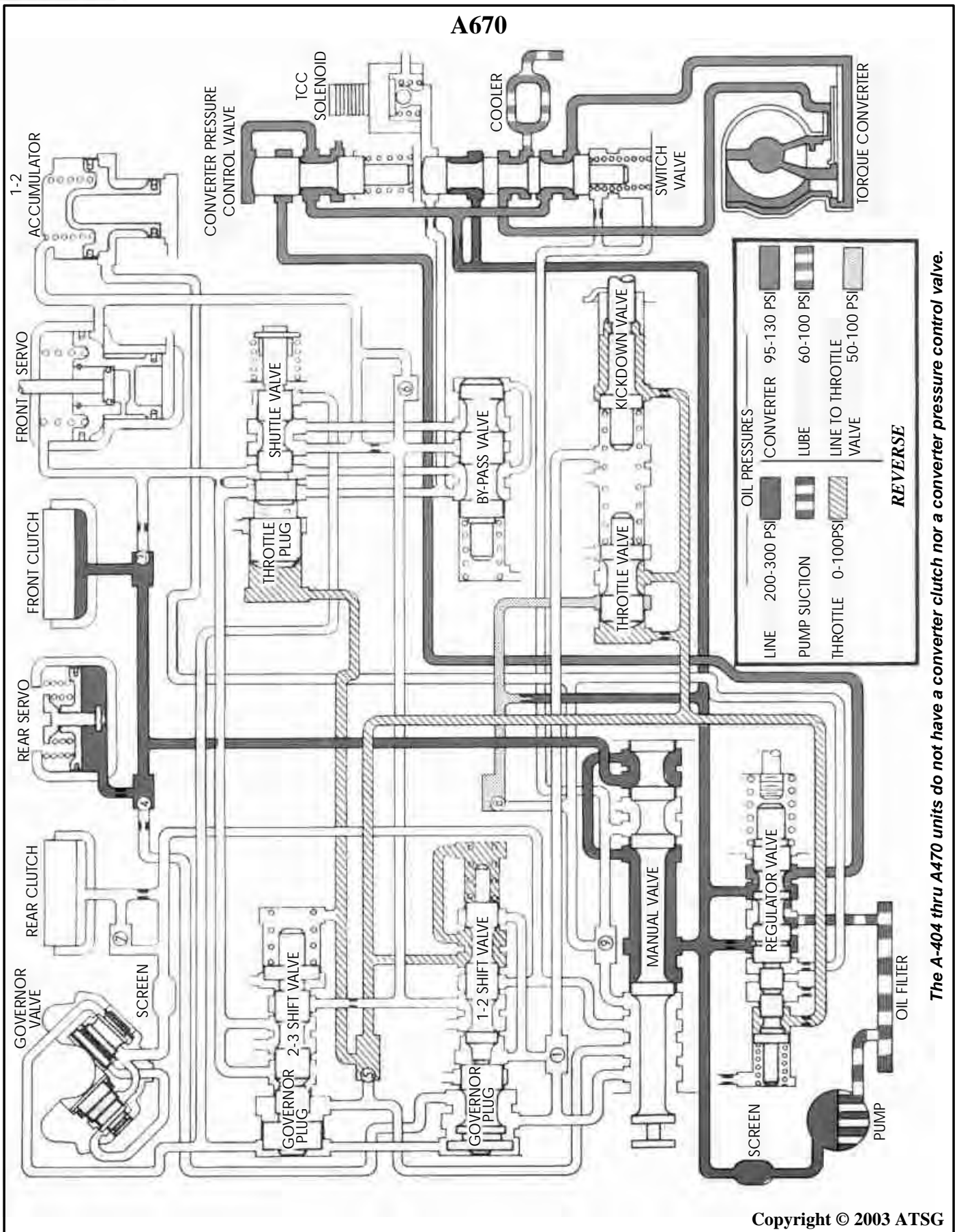
### *TCC Operation, A470/A670 Models Only*

The A470 and A670 transaxle models are also equipped with a Torque Converter Clutch (TCC) enclosed within the torque converter, for greatly improved fuel economy.

The TCC is operated with both electronics and hydraulics, with the addition of a converter pressure control valve in the valve body and a TCC solenoid bolted to the valve body.

Direct (Front) clutch oil is fed to the end of the switch valve and on to the TCC solenoid, where it is exhausted. When the computer energizes the TCC solenoid, the exhaust passage is blocked and the result is a build up of direct clutch oil, that now strokes the switch valve for converter clutch to apply. The computer monitors signals from a throttle position sensor, vehicle speed sensor, and engine coolant sensor, to know when to energize the TCC solenoid.

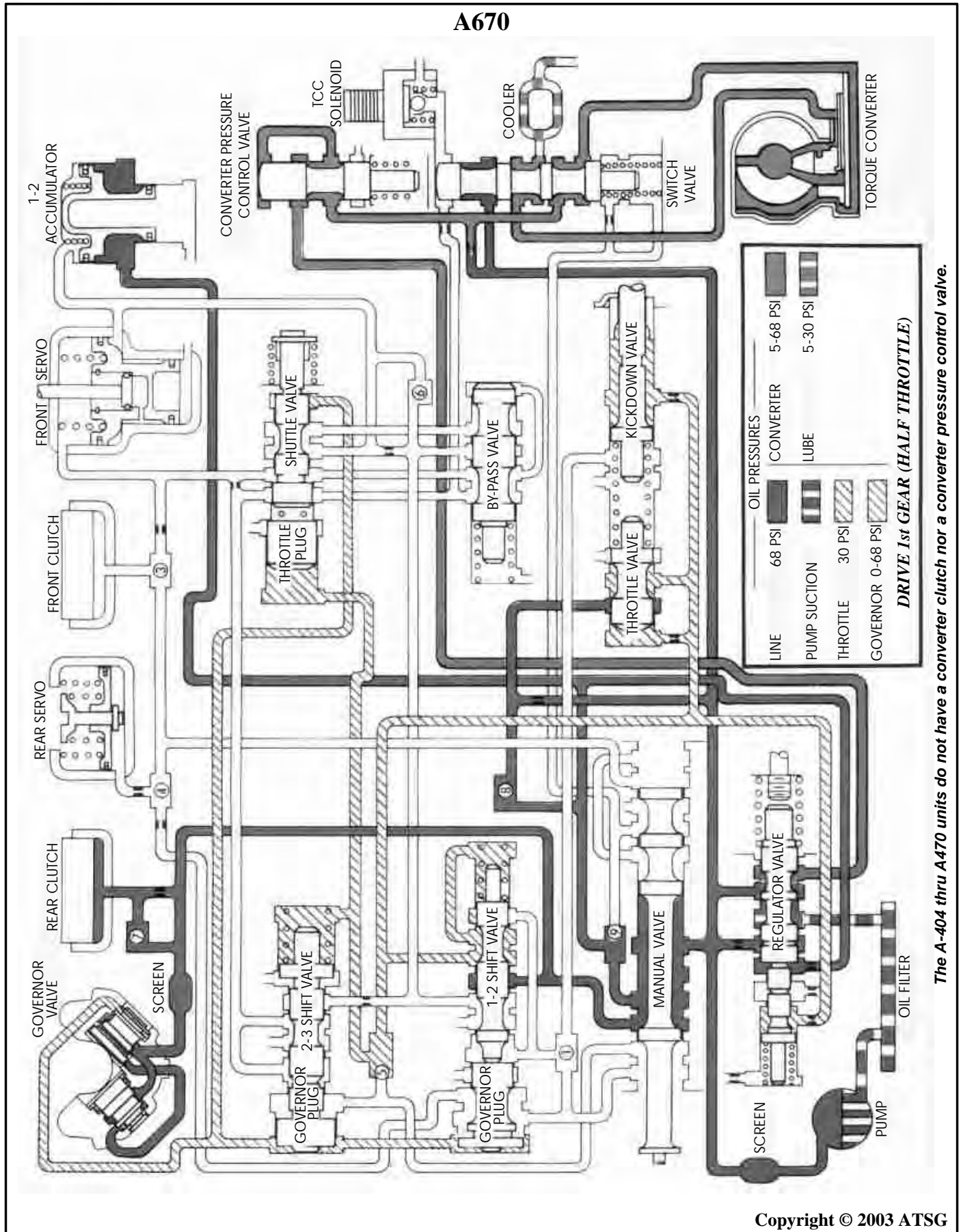
The Torque Converter Clutch should also be checked during the road test for proper operation, keeping in mind that engine must be up to operating temperature, vehicle speed must be above a pre-calibrated speed, and throttle position must be in a cruise mode. All of these conditions must be met before the converter clutch will apply.



*The A-404 thru A470 units do not have a converter clutch nor a converter pressure control valve.*

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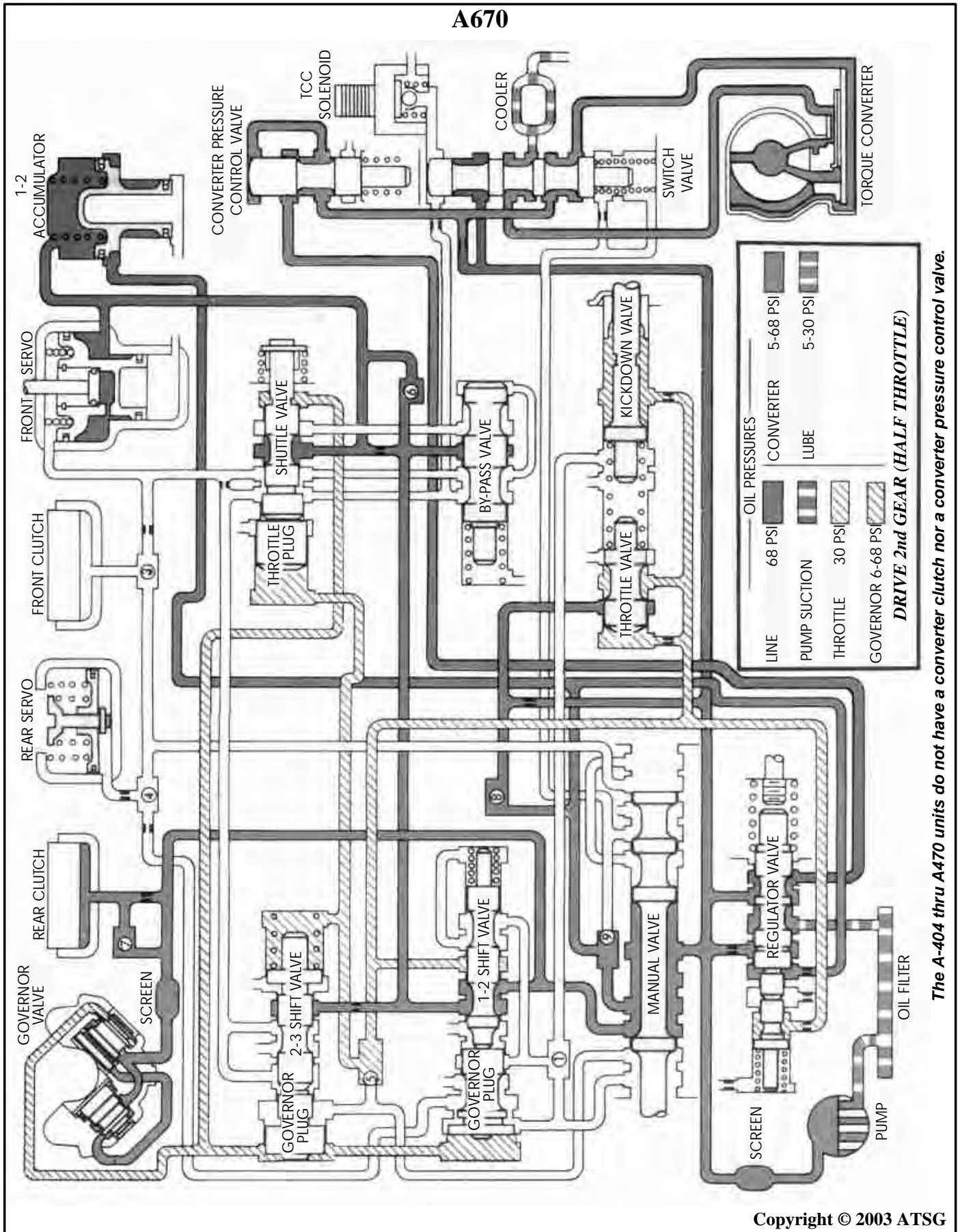
Figure 5



*The A-404 thru A470 units do not have a converter clutch nor a converter pressure control valve.*

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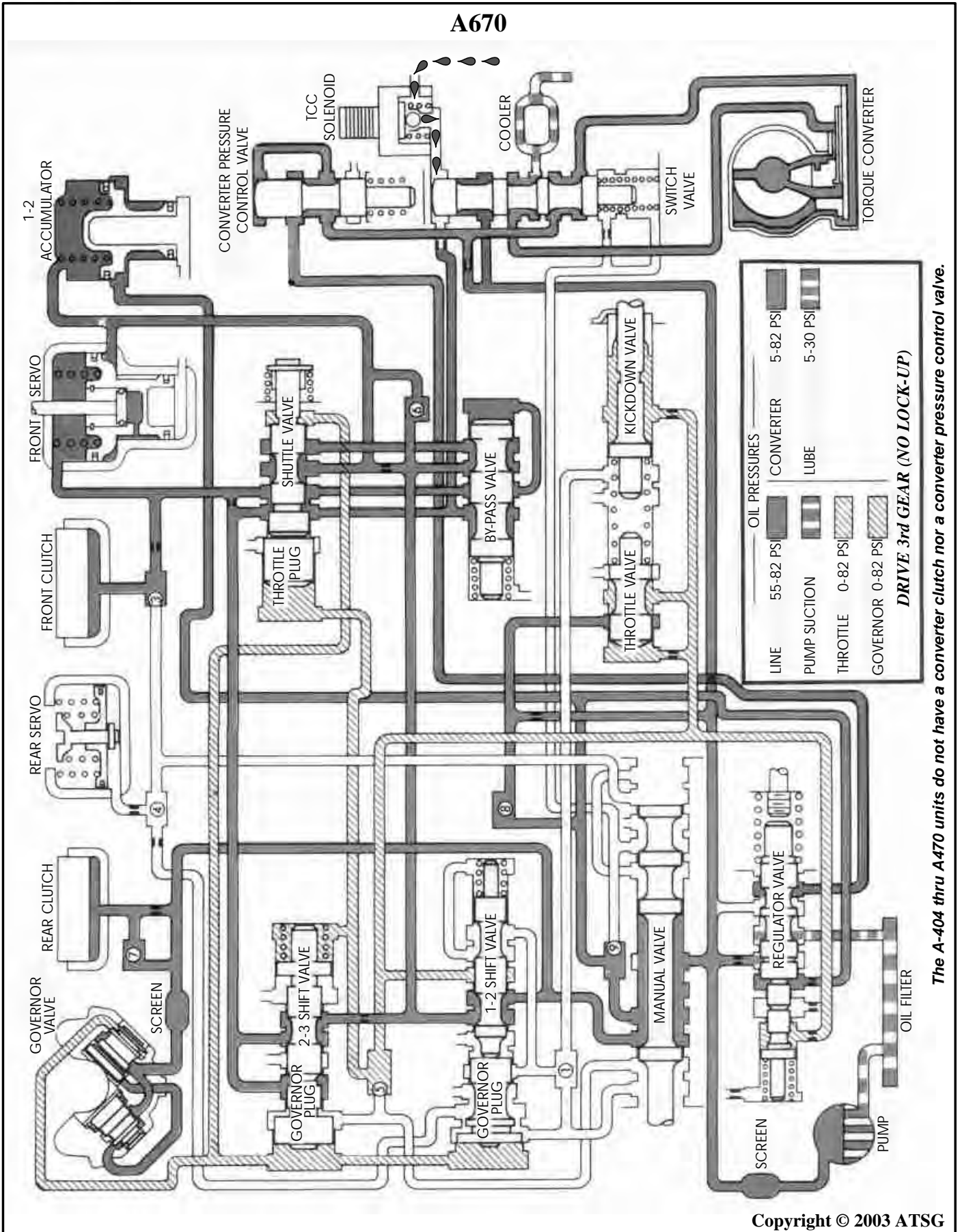
Figure 6



*The A-404 thru A470 units do not have a converter clutch nor a converter pressure control valve.*

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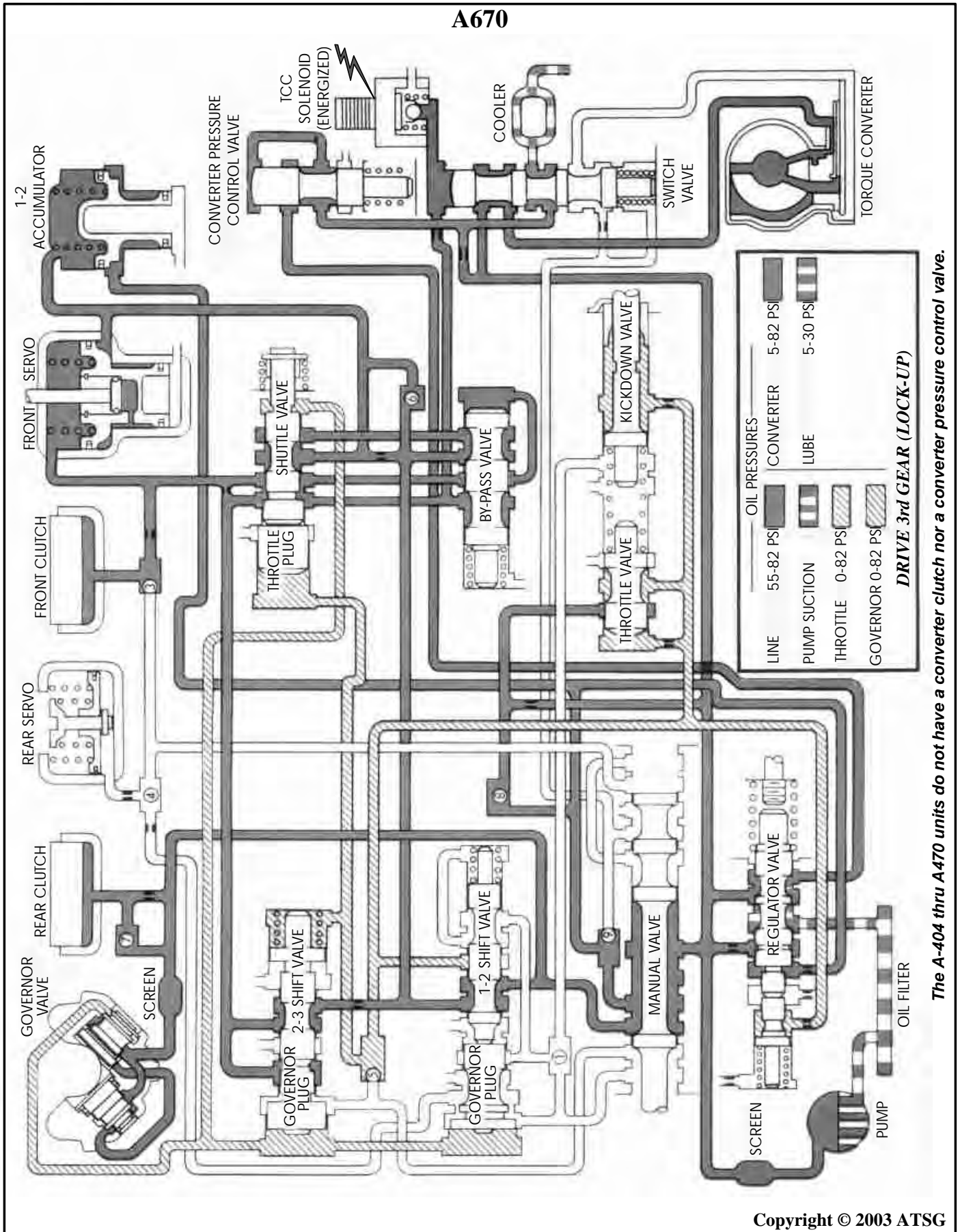
Figure 7



*The A-404 thru A470 units do not have a converter clutch nor a converter pressure control valve.*

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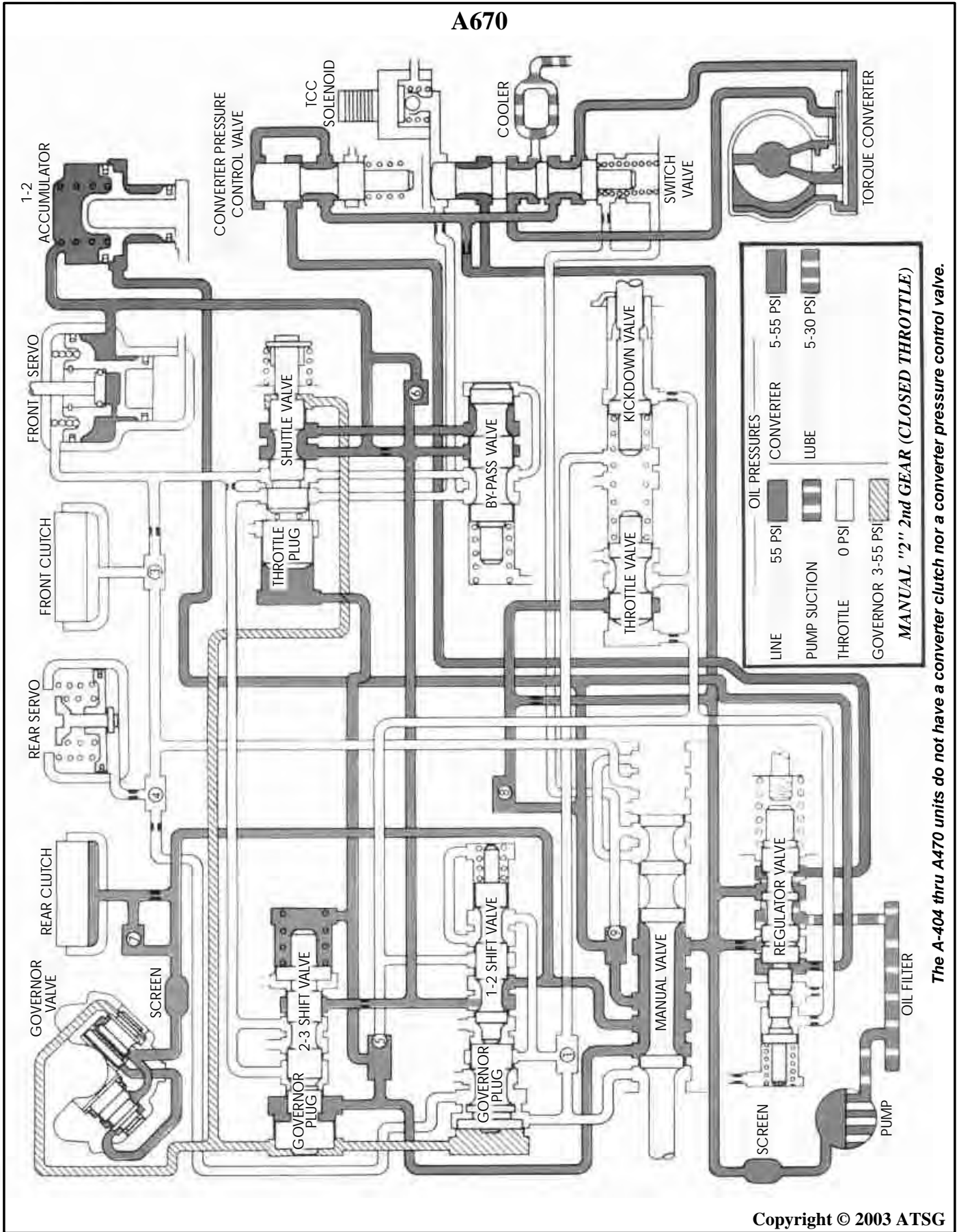
Figure 8



*The A-404 thru A470 units do not have a converter clutch nor a converter pressure control valve.*

Figure 9

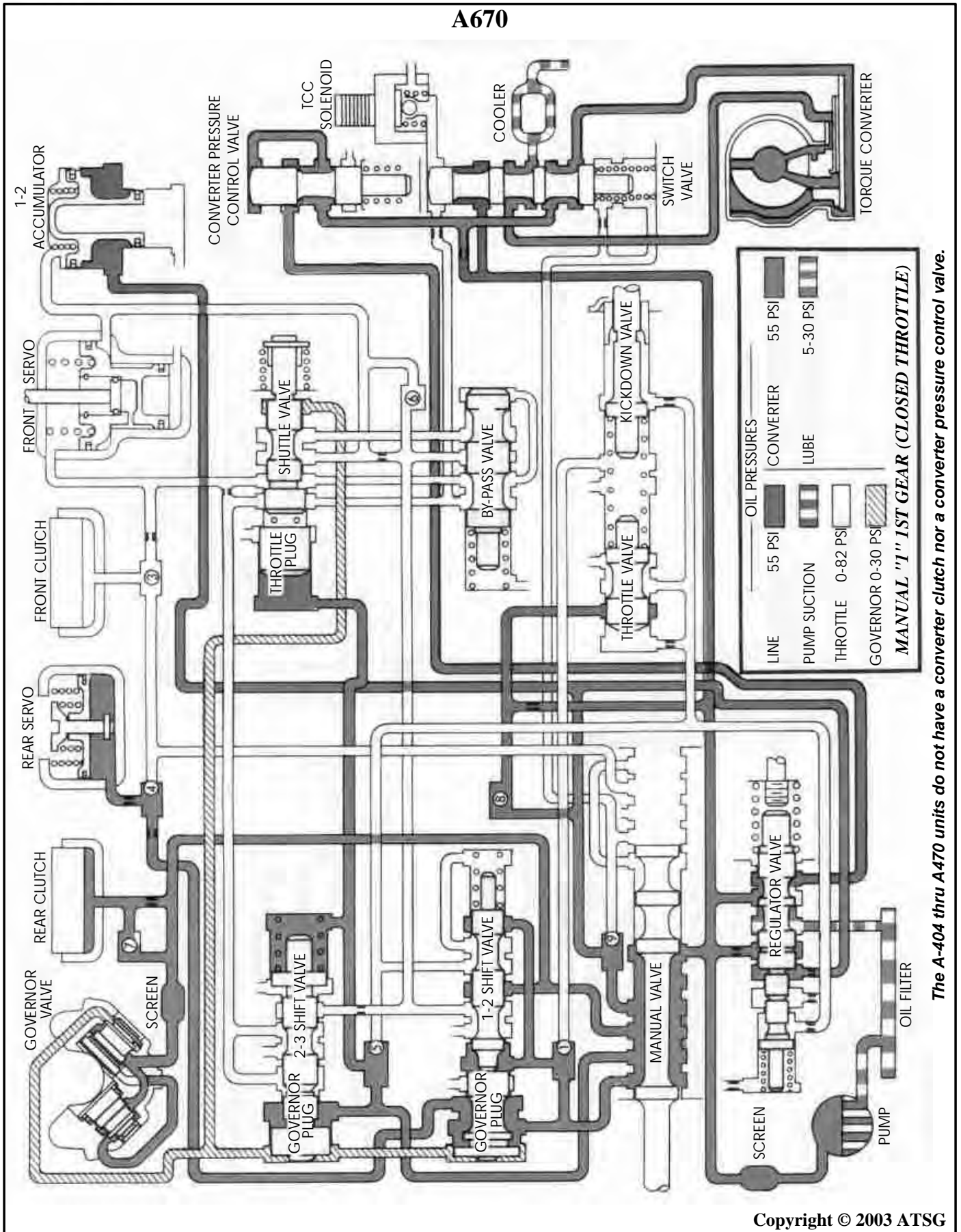
## A670



The A-404 thru A470 units do not have a converter clutch nor a converter pressure control valve.

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Figure 10



*The A-404 thru A470 units do not have a converter clutch nor a converter pressure control valve.*

Figure 11

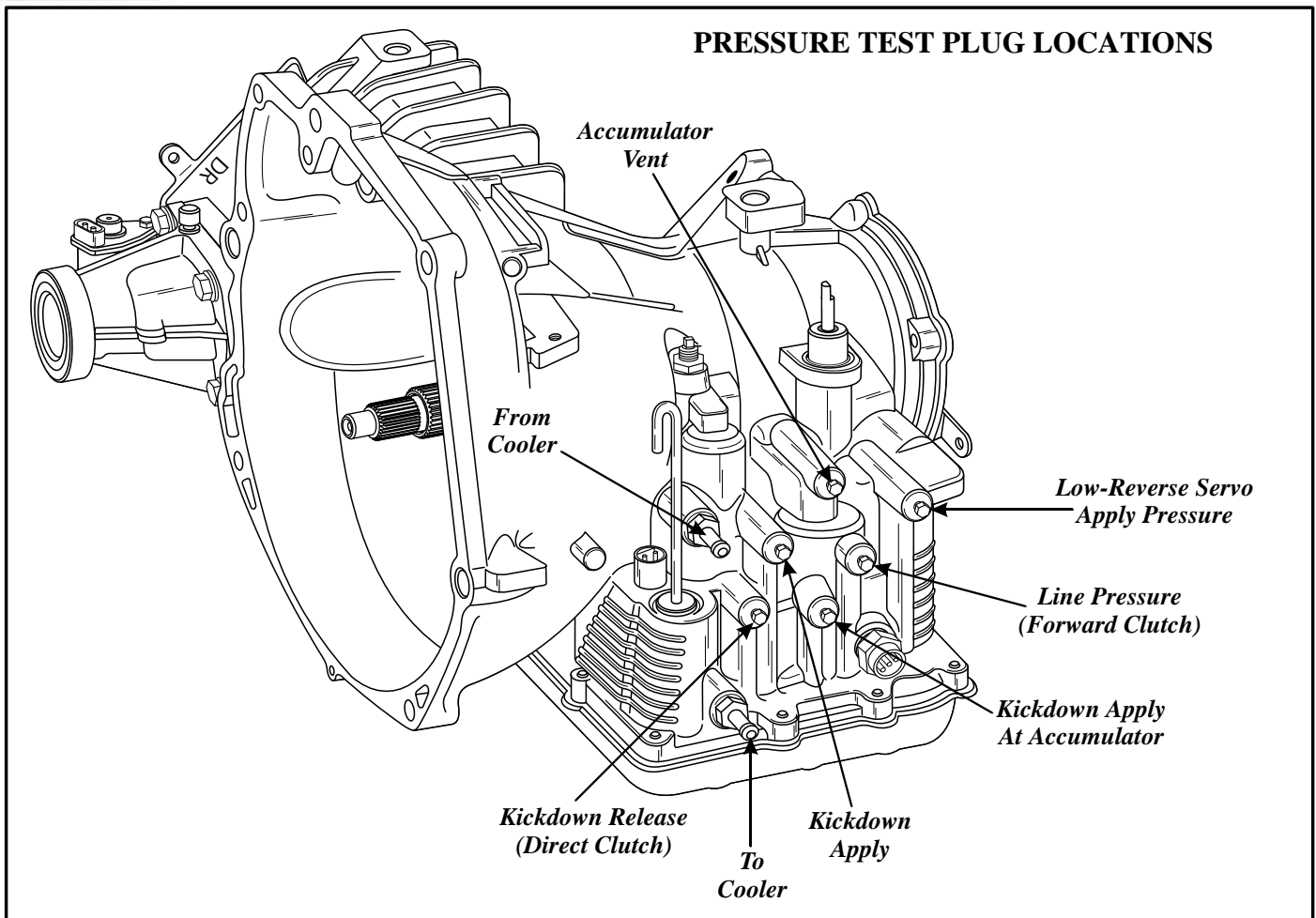


Figure 12

## 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, ensure that fluid level and condition, manual cable and throttle cable adjustments have been verified as good. Fluid temperature must be at operating temperature which is 150 to 200 degrees F.

Install a tachometer, and position tachometer so that it can be easily read.

These tests require a 300 PSI gauge installed in the ports required for the individual tests being conducted. Refer to Figure 12 for the various test port locations.

Use the Line Pressure Chart in Figure 13 to verify that pressures are correct.

LINE PRESSURE CHART		
Range	Minimum Throttle**	Maximum Throttle
All Forward	52-58 PSI	80-88 PSI
Reverse	180-220 PSI	260-300 PSI
** Forward checked at 1000 RPM ** Reverse checked at 1600 RPM		

Figure 13

### Throttle Pressure

No test plug 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 speed, with a correctly adjusted throttle cable

## Governor Pressure Test

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

Connect a 0-150 psi pressure gauge to governor pressure test port, located at lower right side of case below differential cover, as shown in Figure 14.

Operate vehicle on road test while watching the pressure gauge and the vehicles speed. Governor pressure should be **approximately** equal to vehicle speed. The governor pressure should respond smoothly to changes in vehicle speed and should return to 0 to 3 psi when vehicle is stopped. High pressure at a standstill, above 3 psi, may prevent the transaxle from downshifting.

## Pressure Test Result Indications

1. If proper line pressure, minimum to maximum, is found in any one test, the pump and the pressure regulator are working properly.
2. Low pressure in "D", "2", and "1", but correct pressure in "R", indicates forward (rear) clutch circuit leakage.
3. Low pressure in "R", but correct pressure in "2", and "1", indicates the direct (front) clutch circuit is leaking.
4. Low pressure in "R" and "1", but correct pressure in "2", indicates leakage in the rear servo circuit.
5. Low line pressure in all selector lever positions, indicates a defective oil pump, a clogged filter, or a stuck pressure regulator valve.

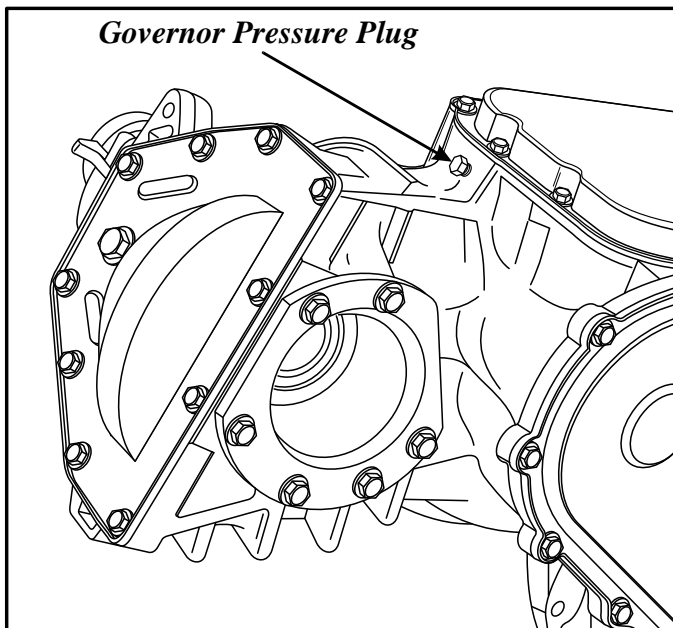


Figure 14

## TORQUE CONVERTER STALL TEST

### WARNING:

**Do not let anyone stand in front of the vehicle during a torque converter stall test.**

The stall test consists of determining the engine speed obtainable at full throttle in the "D" position only. This test checks the torque converter stator clutch operation, and the holding ability of the transaxle forward (rear) clutch. The transaxle fluid level should be checked and the engine at normal operating temperature before stall test operation.

**Note: Both the parking brake and service brakes must be fully applied, and the front wheels chocked while making this test.**

Do not hold the throttle open any longer than is necessary to obtain maximum engine speed reading on the tachometer, and **never** longer than 5 seconds at a time. If engine speed exceeds the maximum limits shown in the stall speed chart in Figure 15, release the accelerator immediately, since transaxle clutch slippage is indicated.

### Stall Speed Below Specification

Low stall speeds with a properly tuned engine indicate converter stator clutch concerns, and a road test will be necessary.

If the vehicle has poor acceleration from stops, but operates properly at highway speeds, the stator overrunning clutch is slipping.

If the acceleration rate from stops is normal, but abnormally high throttle opening is required to maintain highway speeds, the stator overrunning clutch has siezed.

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

### Stall Speed Above Specification

If stall speed exceeds the maximum specified in the chart in Figure 15, by more than 200 rpm, the wrong converter, or transaxle clutch slippage is indicated. Ensure that you have the proper torque converter installed. Follow the transaxle oil pressure tests and air pressure checks outlined in this section to determine the cause for slippage.

## TRANSAXLE STALL SPEED CHART

Engine Size	Transaxle Type	Torque Converter Diameter	Stall Speed Engine RPM
1.7 Liter	A404	9 1/2 inches	2300-2500
2.2 Liter	A413	9 1/2 inches	2200-2410
2.5 Liter	A413	9 1/2 inches	2225-2425
2.6 Liter	A470	9 1/2 inches	2400-2630
3.0 Liter	A670	9 1/2 inches	2200-2400

Figure 15

### Converter Noise

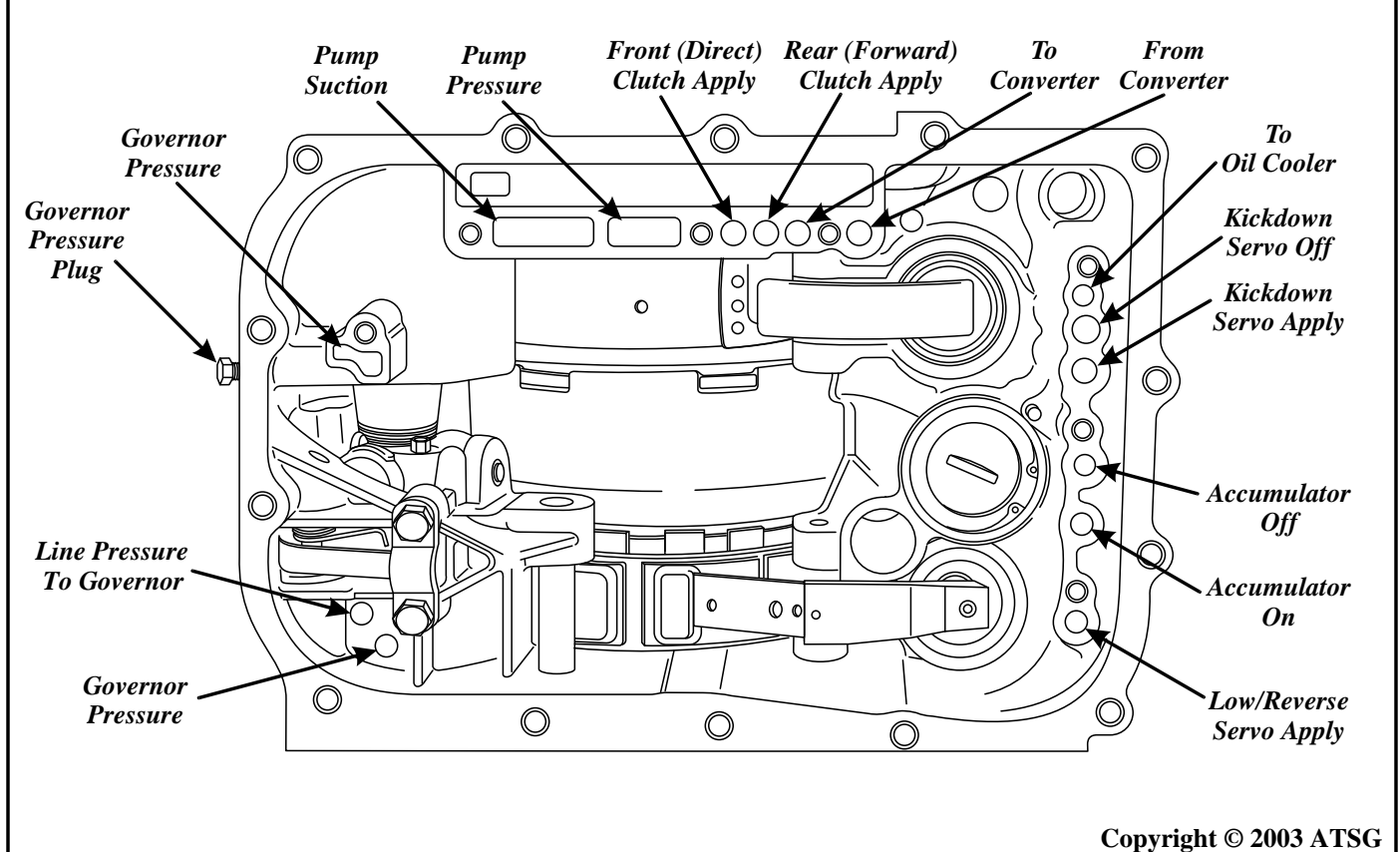
A whining noise due to fluid flow is normal during stall operation with some converters, however, loud metallic noises from loose parts or interference within the assembly indicate a defective torque converter. To confirm that noises originate within the converter, operate the vehicle in "D" and "N"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

### CLUTCH AND SERVO "AIR" TESTS

Any inoperative components, clutches, bands, and servos can also be located through a series of tests by substituting air pressure for oil pressure.

The front (Direct) and rear (Forward) clutches, kickdown servo, and low/reverse servo may be tested by applying air pressure to their respective passages, after the valve body has been removed, as shown in Figure 16. To make air pressure tests proceed as described on Page 18.

### AIR PRESSURE TEST PASSAGE IDENTIFICATION



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Figure 16



# Technical Service Information

## "AIR" PRESSURE TESTS (Cont'd)

**Caution:** *Compressed air supply must be free of all dirt and moisture. Compressed air supply must be regulated to 30 PSI.*

### **Front (Direct) Clutch Test**

Apply 30 psi regulated air pressure to the front clutch apply passage, shown in Figure 16, 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 leaks.

### **Rear (Forward) Clutch Test**

Apply 30 psi regulated air pressure to the rear clutch apply passage, shown in Figure 16, and listen for a dull "Thud" which indicates that rear clutch is operating. Hold air pressure on for a few seconds and inspect system for excessive leaks.

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

Apply 30 psi regulated air pressure to the front servo apply passage, shown in Figure 16. Operation of the servo can be observed by a tightening of the front band. Spring tension on the servo piston should fully release the front band.

### **Low/Reverse (Rear) Servo Test**

Apply 30 psi regulated air pressure to the rear servo apply passage, shown in Figure 16. Operation of the servo can be observed by a tightening of the rear band. Spring tension on the servo piston should fully release the rear band.

### **Air Pressure Test Indications**

If the clutches and servos operate properly, any "No Upshift" and/or "Erratic Shift" conditions exist, would indicate that malfunctions exist in the valve body.

## BAND ADJUSTMENTS

### **Kickdown Band (Front)**

The kickdown band adjusting screw is located on the left side (top front) of the transaxle case, as shown in Figure 17.

- (1) Loosen the lock nut and back the lock nut off approximately five turns. Test the adjusting screw for free turning in transaxle case.
- (2) Tighten the adjusting screw to 72 in.lbs. or 8 Nm, while holding lock nut.
- (3) Back off the adjusting screw **exactly** the number of turns as follows:

**A404** ..... **3 Turns**

**All Others** ..... **2 3/4 Turns**

- (4) Hold adjusting screw in this position, tighten lock nut to 35 ft.lbs. or 47 Nm.

### **Low/Reverse Band (Rear)**

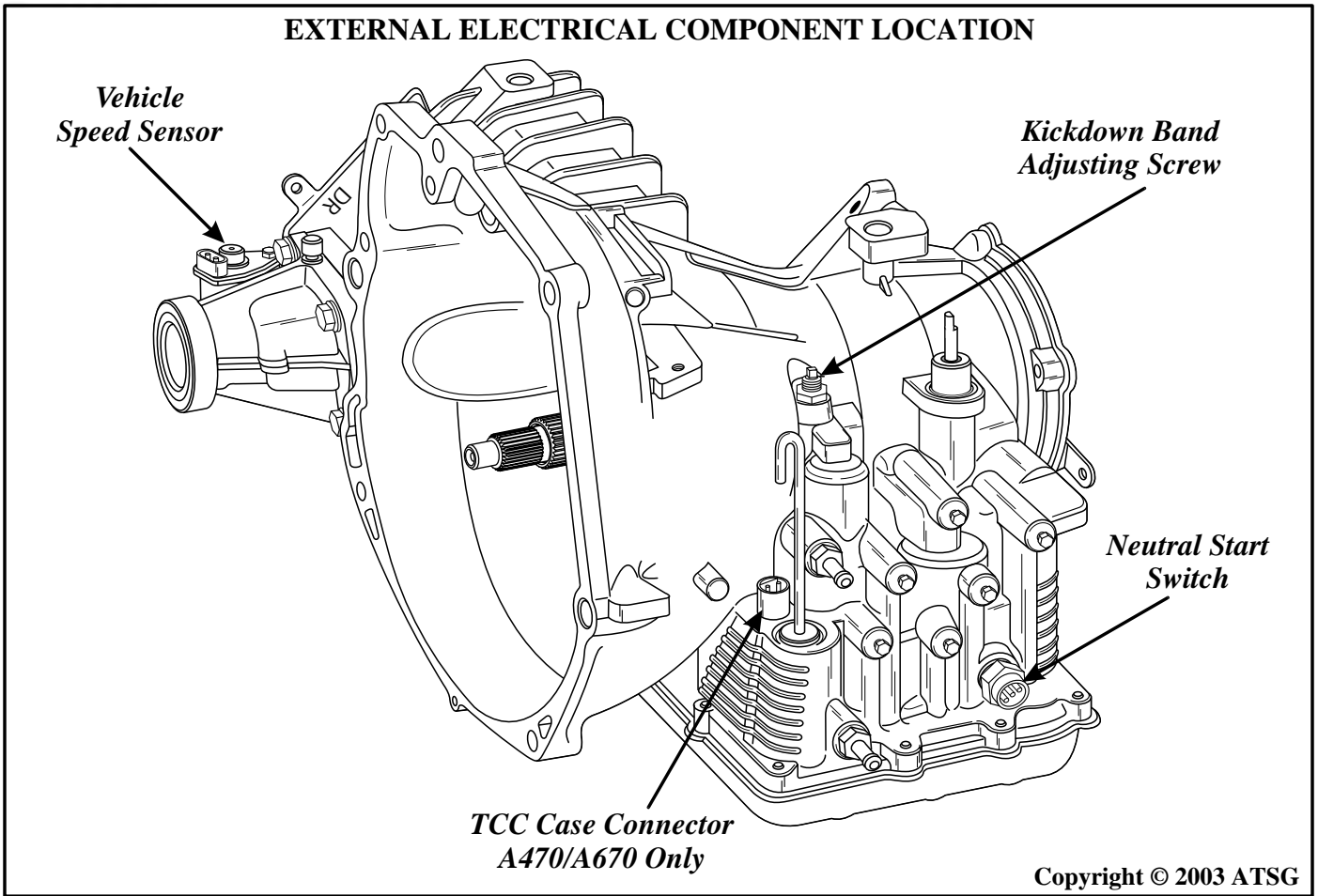
**A404.** The low/reverse band is not adjustable in this transaxle. If excessive band wear is suspected, a simple check may be made as follows:

- (1) Remove transaxle oil pan and pressurize low/reverse servo with 30 psi air pressure.
- (2) Measure the gap between band ends. If the gap is less than .080" (2 mm), the band has worn excessively and should be replaced.

**All Others.** Before attempting any adjustment, the low/reverse band should be checked for end gap as indicated above. To adjust low/reverse band, proceed as follows:

- (1) Loosen and back off the lock nut approximately five turns.
- (2) Using an inch-pound torque wrench, turn adjusting screw in to 41 in.lbs. (5 Nm).
- (3) Back off the adjusting screw **exactly** 3 1/2 turns, torque lock nut to 20 ft.lbs. (27 Nm)

## EXTERNAL ELECTRICAL COMPONENT LOCATION



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Figure 17

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### P/N START AND BACK-UP LAMP SWITCH

The Park/Neutral starting switch is the center terminal of the 3 terminal switch (See Figure 19). The center terminal provides a ground for the starter solenoid circuit through the internal selector lever in only *Park* and *Neutral* positions.

The back-up lamp switch circuit is through the two outside terminals of the 3 terminal switch.

### Testing The Switch

- (1) Two different tests will be necessary to test the integrity of the switch. To test switch, remove the harness connector from switch and test for continuity between the center pin of switch and transaxle case. Continuity should exist only when transaxle is in *Park* or *Neutral*. Refer to Figure 19 for schematic.
- (2) Check manual lever cable adjustment *before* replacing a switch that tests defective.
- (3) To test the reverse circuit, continuity should exist between the two outside pins of switch. Continuity should exist only when transaxle is in *Reverse*. No continuity should exist from either pin to the transaxle case. Refer to Figure 19 for schematic.

**See Page 20 for Switch Replacement.**

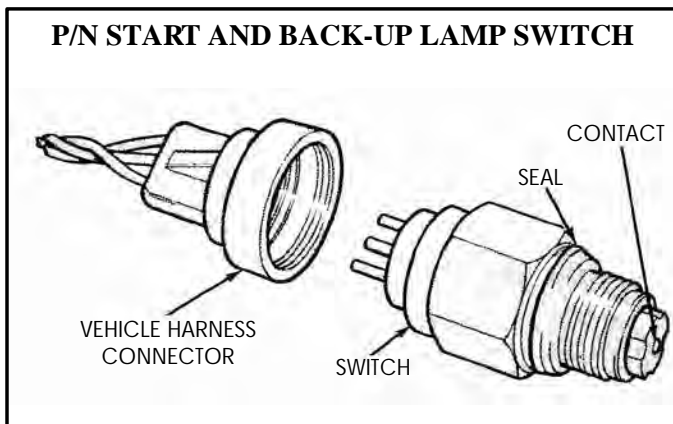


Figure 18

## P/N START AND BACK-UP LAMP SWITCH

### Replacment Of The Switch

Check the manual shift cable adjustment *before* replacing a switch that tests defective. Unscrew the switch from transaxle case, allowing the fluid to drain into a container.

**Caution:** *Removal of the switch when transaxle fluid is hot, may cause injury, as fluid drains from the hole.*

Move the selector lever to Park and then to Neutral positions, and inspect to ensure that the switch internal operating lever fingers are centered in the switch opening in transaxle case.

Screw new switch, with new seal, into transaxle case opening and torque to 24 ft.lbs (33 Nm). Retest the P/N Start and Back-Up Lamp Switch.

*Add the proper transaxle fluid to bring it up to the proper level.*

**Special Note:** *Since this manual covers many years of this particular transaxle, the unit may use Dexron® III, or Mopar ATF+3® (Type 7176), depending on model year.*

**REFER TO DIPSTICK OR OWNERS MANUAL.**  
\*\*\*\*\*

## LOCK-UP SOLENOID CASE CONNECTOR

### TCC Operation, A470/A670 Models Only

The A470 and A670 transaxle models are also equipped with a Torque Converter Clutch (TCC) enclosed within the torque converter, for greatly improved fuel economy.

The TCC is operated with both electronics and hydraulics, with the addition of a converter pressure control valve in the valve body and a TCC solenoid bolted to the valve body (See Figures 20 and 21).

Direct (Front) clutch oil is fed to the end of the switch valve and on to the TCC solenoid, where it is exhausted. When the computer energizes (Grounds) the TCC solenoid, the exhaust passage is blocked and the result is a build up of direct clutch oil, that now strokes the switch valve for converter clutch to apply. The computer monitors signals from a throttle position sensor, map sensor, vehicle speed sensor, and engine coolant sensor, to know when to energize or de-energize the TCC solenoid.

Keep in mind that engine must be up to operating temperature, vehicle speed must be above a pre-calibrated speed, and throttle position must be in a cruise mode. All of these conditions must be met before the converter clutch will apply.

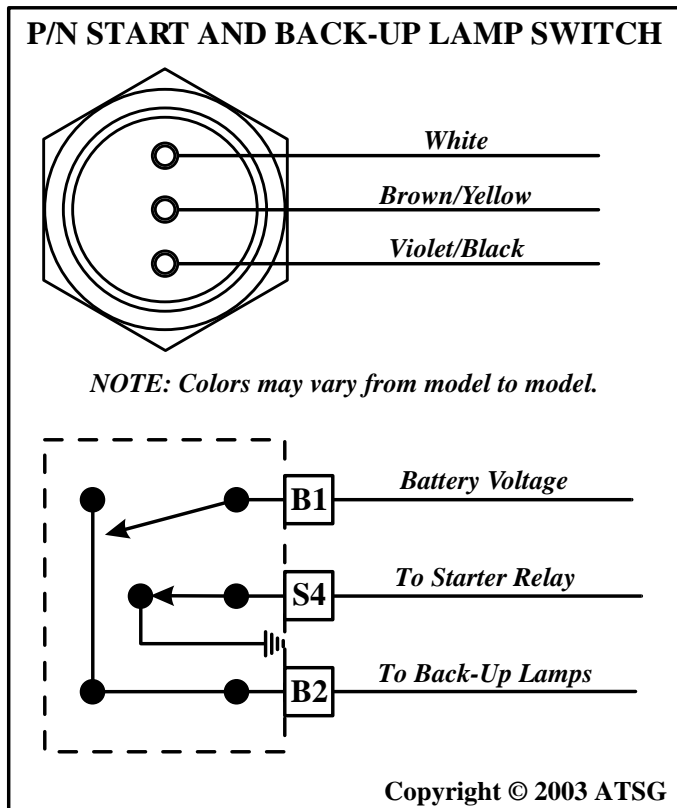


Figure 19

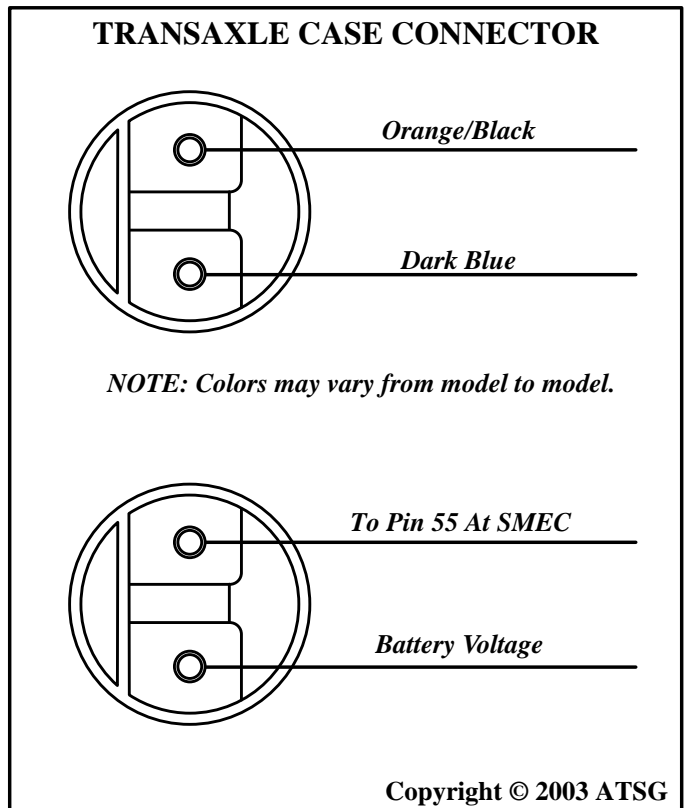


Figure 20

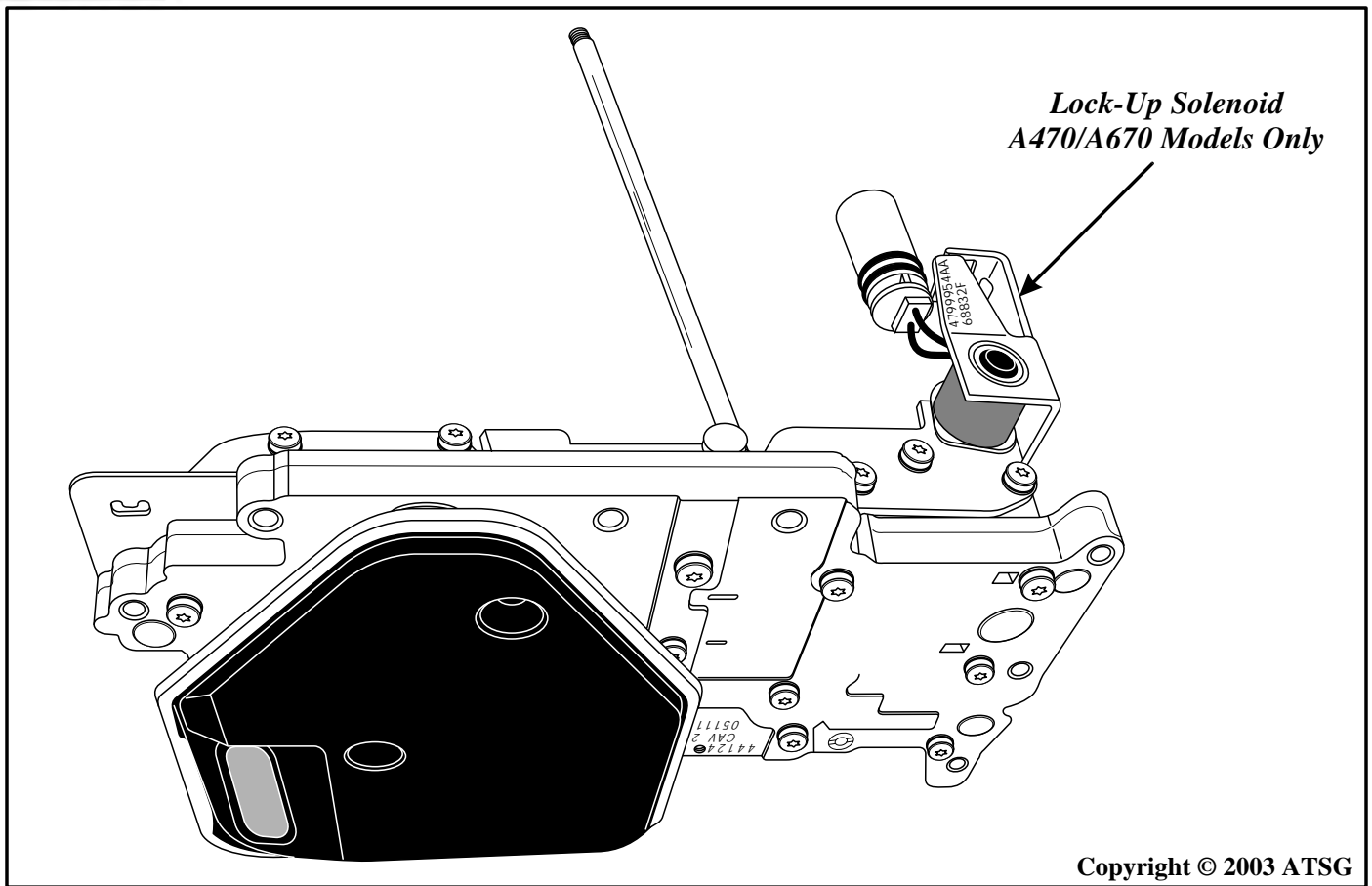


Figure 21

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## VEHICLE SPEED SENSOR

The Vehicle Speed Sensor, on some models is referred to as "Distance Sensor", generates and sends a signal to the SMEC that represents vehicle speed.

There are currently four different design levels of the vehicle speed sensor. The "1st Design" which is cable driven, as it is illustrated in Figure 22, and includes the basic wire schematic. The "2nd Design" which is gear driven, is illustrated in Figure 23, and is still a two wire sensor and includes the basic schematic. The "3rd Design" which is also gear driven is illustrated in Figure 24, and is the replacement for the 2nd Design, which is no longer available for service. The "4th Design" is also gear driven, as illustrated in Figure 25, but now becomes a three wire sensor and includes the basic wire schematic.

These basic wire schematics are provided to assist you in the diagnosis process and may exclude some of the additional connectors that the wires run through, on some models.

Because of the variety of models that we are covering in this manual, you will also notice the absence of the "computer" pin cavities that these wires run to. This will require a full blown wire schematic for the particular model you are working on, if harness diagnosis is necessary.

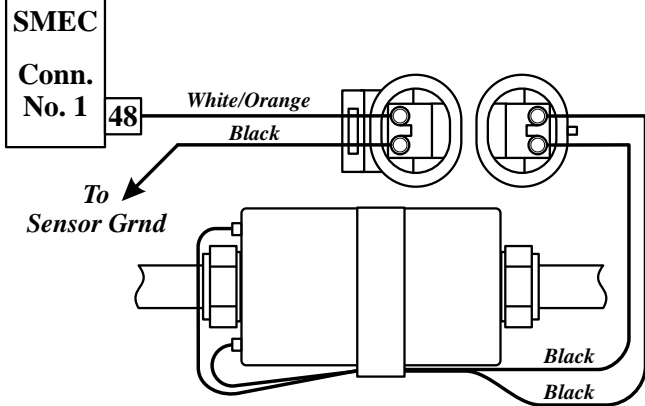
The SMEC and PCM pins for the vehicle speed signal and the pins for the TCC solenoid, vary from model to model and from year to year, with no consistency that we can find.

Refer to Figures 22 through 25, on Page 22, for illustrations of all of the Vehicle Speed Sensors.

## VEHICLE SPEED (DISTANCE) SENSOR

*"1st Design" Cable Driven*

*NOTE: Colors may vary from model to model.*



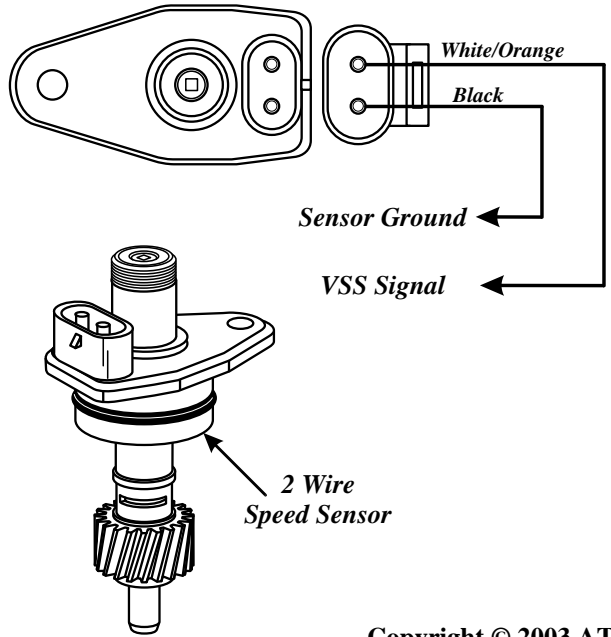
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Figure 22

## VEHICLE SPEED (DISTANCE) SENSOR

*"3rd Design" Gear Driven*

*NOTE: Colors may vary from model to model.*



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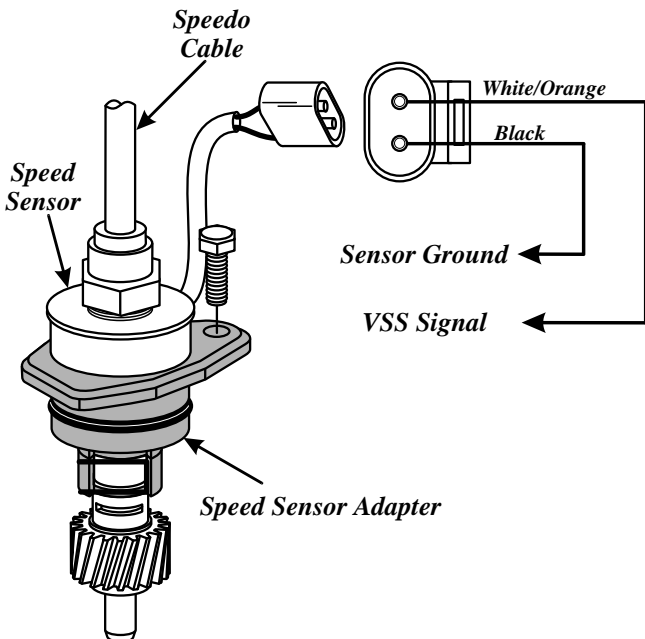
Figure 24

## VEHICLE SPEED (DISTANCE) SENSOR

*"2nd Design" Gear Driven*

*"NO LONGER AVAILABLE FOR SERVICE"*

*NOTE: Colors may vary from model to model.*



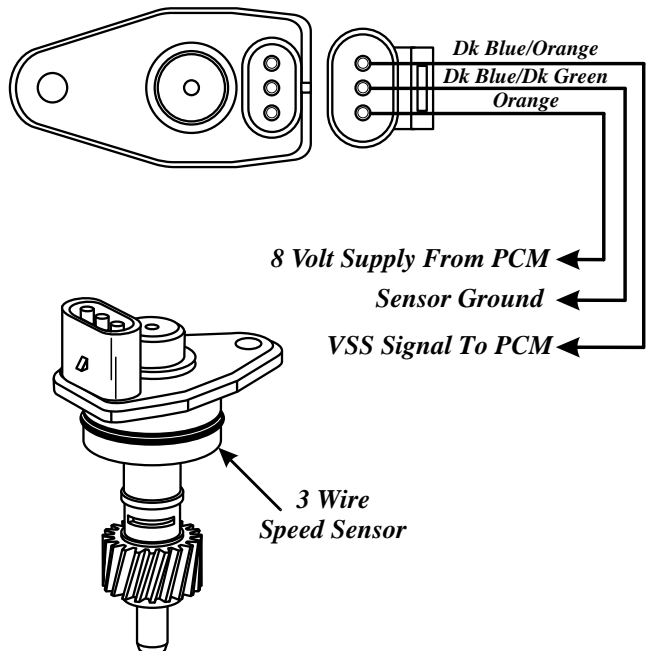
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Figure 23

## VEHICLE SPEED (DISTANCE) SENSOR

*"4th Design" Gear Driven*

*NOTE: Colors may vary from model to model.*



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Figure 25



# Technical Service Information

## CHRYSLER FAULT CODES (Transmission Related Codes Only)

### STANDARD FAULT CODES

<i>Standard Code</i>	<i>Description Standard Code</i>
13	<i>Manifold Absolute Pressure (MAP) sensor vacuum circuit.</i>
14	<i>Manifold Absolute Pressure (MAP) sensor electrical circuit.</i>
15	<i>Vehicle Speed/Distance Sensor circuit failure.</i>
17	<i>Engine running too cool during closed loop operation.</i>
22	<i>Coolant Temperature Sensor (CTS) circuit malfunction.</i>
24	<i>Throttle Position Sensor (TPS) circuit malfunction.</i>
37	<i>Torque Converter Clutch (TCC), RPM did not change at lock-up.</i>

### OBD II FAULT CODES

<i>OBD II Code</i>	<i>Description OBD II Code</i>
P0107	<i>Manifold Absolute Pressure (MAP) sensor voltage too low.</i>
P0108	<i>Manifold Absolute Pressure (MAP) sensor voltage too high.</i>
P0117	<i>Engine Coolant Temperature (ECT) sensor voltage too low.</i>
P0118	<i>Engine Coolant Temperature (ECT) sensor voltage too high.</i>
P0122	<i>Throttle Position Sensor (TPS) sensor voltage too low.</i>
P0123	<i>Throttle Position Sensor (TPS) sensor voltage too high.</i>
P0125	<i>Engine running too cool during closed loop operation.</i>
P0500	<i>Vehicle Speed/Distance Sensor circuit failure.</i>
P0740	<i>Torque Converter Clutch (TCC), RPM did not change at lock-up.</i>
P0743	<i>Torque Converter Clutch (TCC), Solenoid malfunction (Electrical Circuit)</i>
P1295	<i>Throttle Position Sensor (TPS), does not show 5 volt reference voltage.</i>
P1296	<i>Manifold Absolute Pressure (MAP), does not show 5 volt reference voltage.</i>
P1297	<i>Manifold Absolute Pressure (MAP), signal does not change from start to run.</i>
P1899	<i>Park/Neutral Switch Failure.</i>

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Figure 26

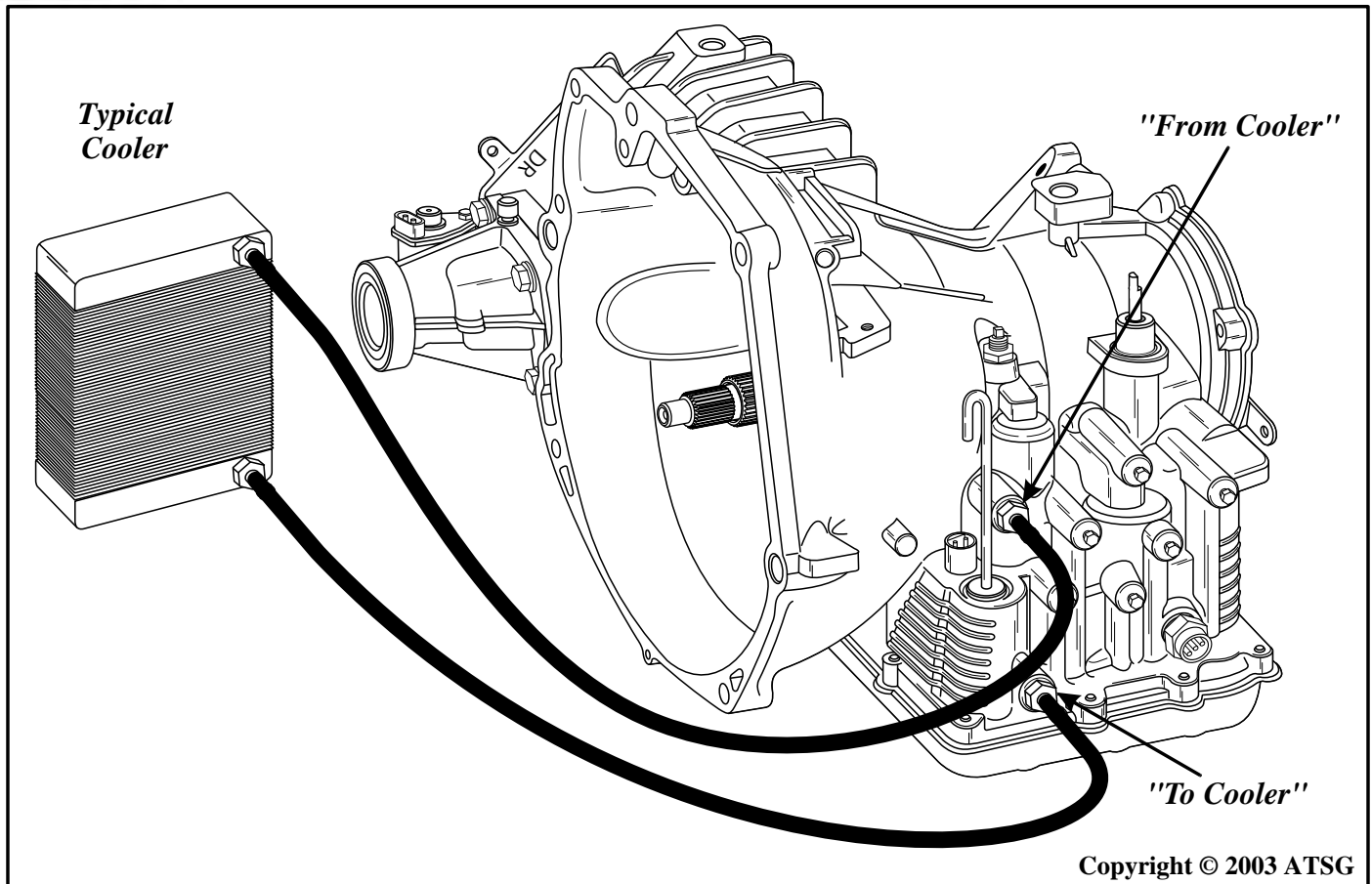


Figure 27

## COOLER FLUSHING AND FLOW TEST

Cooler flushing and back-flushing *must* be done whenever a transaxle is removed for service, major overhaul, total replacement with factory unit, in any case that contamination is suspected.

Our suggestion is to use one of many cooler line flushers that have filters, heaters, flow meters, and are capable of reversing the flow. If you do not have one of these cooler flushers:

***A minimum of 1 quart of fluid flow is required, during a 20 second period of time, at idle in Park.***

After filling the transaxle with fluid, start the engine and run for 30 seconds. This will remove any residual moisture from the oil cooler. To check fluid flow, disconnect the "From Cooler" line at the transaxle, as shown in Figure 27, with the cooler line pointed into a container, and observe the flow with the engine running. If the fluid return flow is insufficient, check flow by removing "To Cooler" line at the cooler (Figure 27), with the cooler line pointed into a container, and observe the flow with the engine running.

### *Transaxle Cooler Diagnosis*

- Insufficient Flow from "From Cooler" return line at Transaxle: Blockage exists in transaxle, cooler or cooler lines.
- Insufficient Flow from "To Cooler" line at the Cooler: Transaxle or cooler line is cause of fluid flow concern.
- Sufficient flow from transaxle "To Cooler" line, but not at "From Cooler" line to transaxle: Inspect cooler lines, fittings, and repeat cooler flushing procedure. If flow is still insufficient, replace the transaxle cooler.

## ENGINE COOLANT IN TRANSAXLE

**WARNING:** Antifreeze will deteriorate the "Viton" and rubber "O" ring seals, lip seals, and the glue used to bond clutch plate and band linings to their respective cores. *This will cause transaxle damage.*

### *If The Transaxle Oil Cooler Develops A Leak Allowing Engine Coolant To Enter The Transaxle:*

- Disassemble transaxle and replace all rubber type seals and "O" ring seals. The coolant will attack the seal material causing leakage.
- Replace all clutch plates and band assemblies. The coolant will attack the glue used to bond the linings to their respective cores.
- Replace all nylon parts such as thrust washers.
- Replace the Torque Converter.
- Thoroughly clean and rebuild transaxle using new gaskets and oil filter.
- Flush the cooler lines after the transaxle cooler has been properly repaired or replaced.

## TRANSAXLE DISASSEMBLY

1. Prior to the transaxle disassembly process, plug all openings and thoroughly clean exterior of the unit, preferably by steam cleaning.
2. Cleanliness through the entire disassembly and assembly process is extremely important.
3. A suitable solvent should be used to wash each part, then dried with compressed air regulated to 30 PSI.
4. Do not wipe parts with shop towels.
5. All mating surfaces in transaxle are accurately machined and require extra care in handling of parts to avoid damage.
6. Remove 14 transaxle oil pan bolts, as shown in Figure 28.
7. Remove the transaxle oil pan and clean RTV sealant from surface (See Figure 29).
8. Remove the oil filter screws from the valve body, as shown in Figure 30.

**Continued on next Page.**

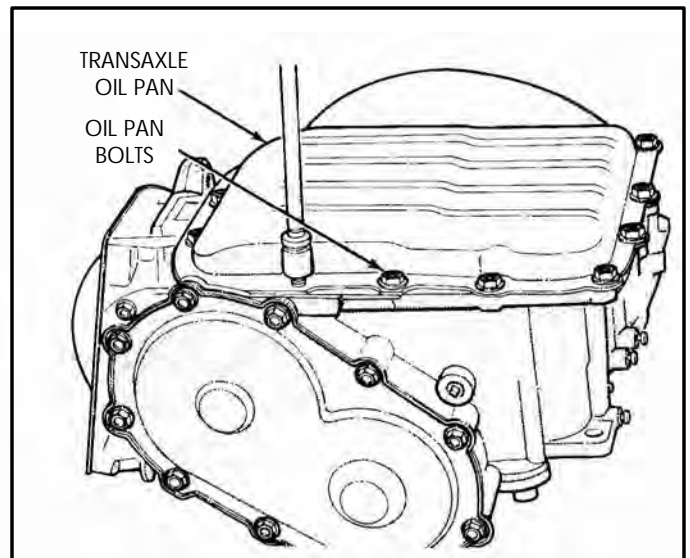


Figure 28

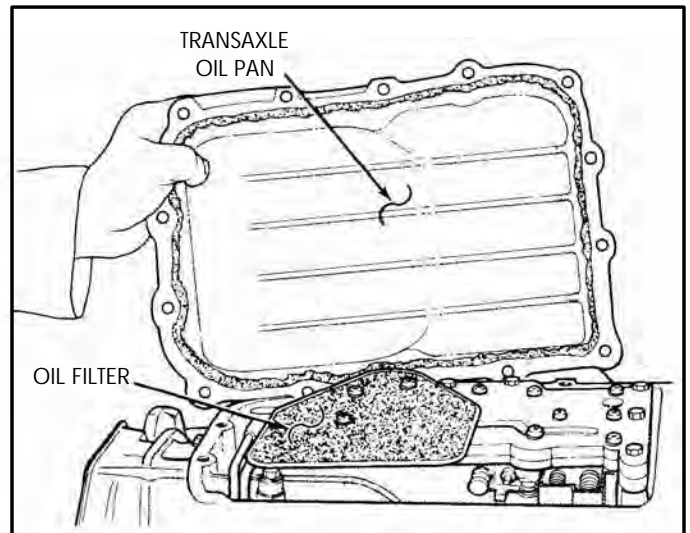


Figure 29

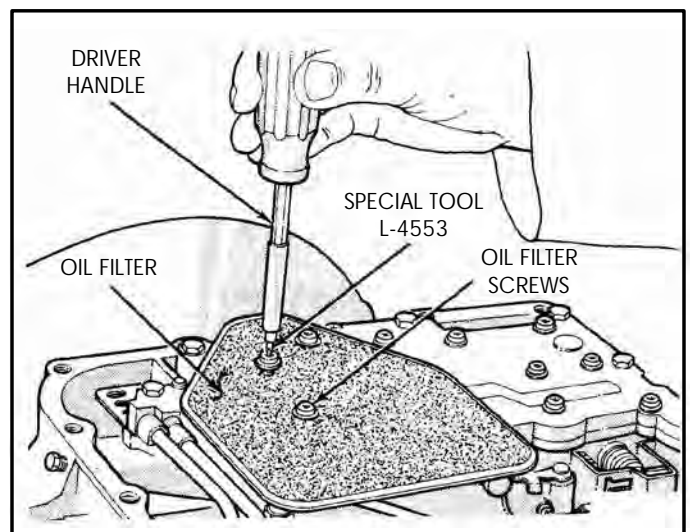


Figure 30

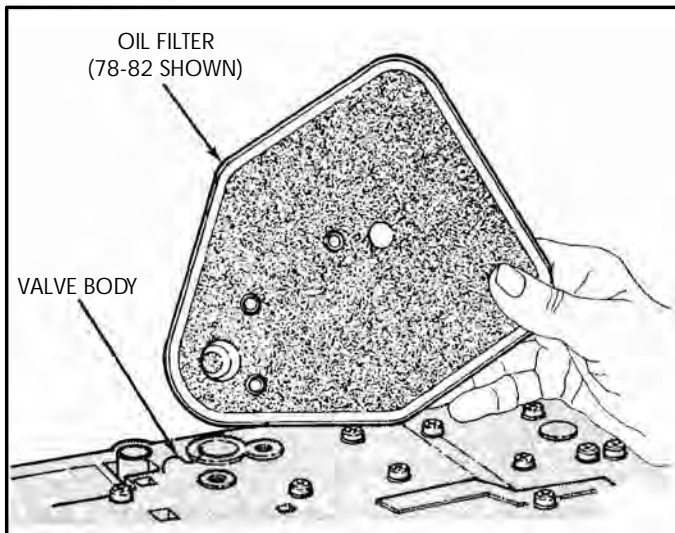


Figure 31

## TRANSAXLE DISASSEMBLY (Cont'd)

9. Remove and discard the oil filter, as shown in Figure 31. *Note: We have shown the 78-82 model filter in Figure 31. The filter changes in 1983, but we will discuss this on assembly.*
10. Remove the retaining "E" clip from the parking rod, as shown in Figure 32.
11. Remove the parking rod from the inside detent lever and transaxle, as shown in Figure 33.
12. Remove the Park/Neutral switch from case to relieve pressure on valve body (See Figure 34).
13. Remove the seven valve body attaching bolts, as shown in Figure 35.

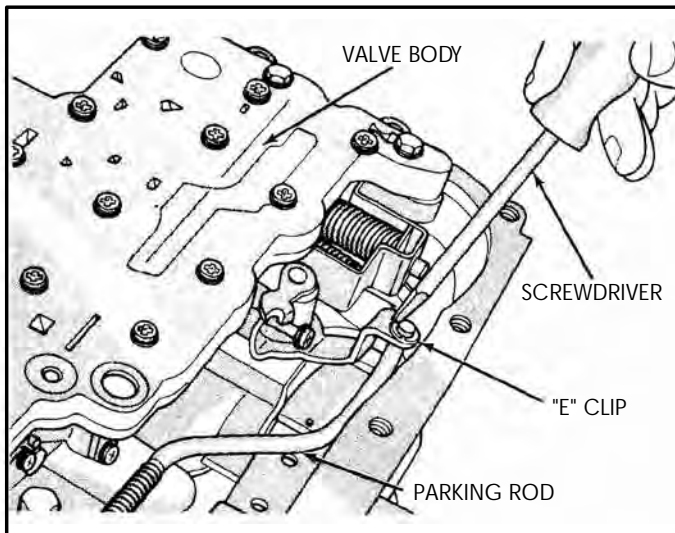


Figure 32

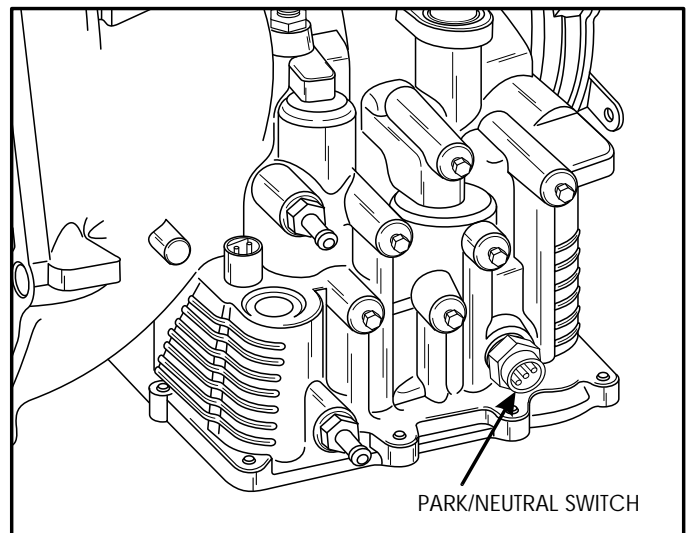


Figure 34

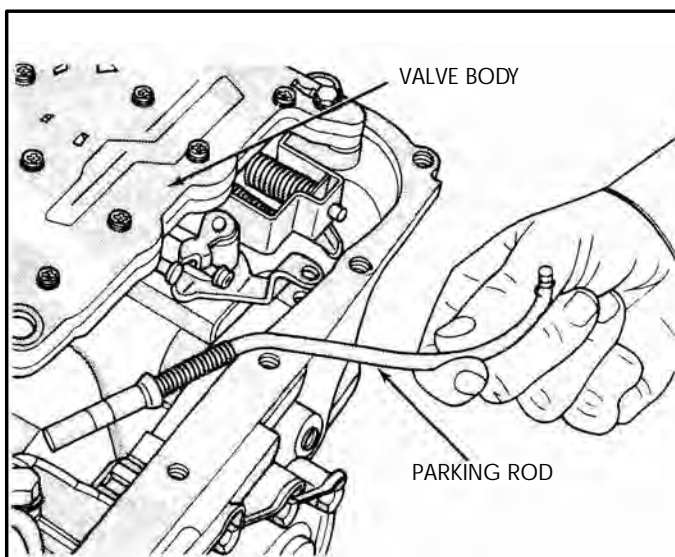


Figure 33

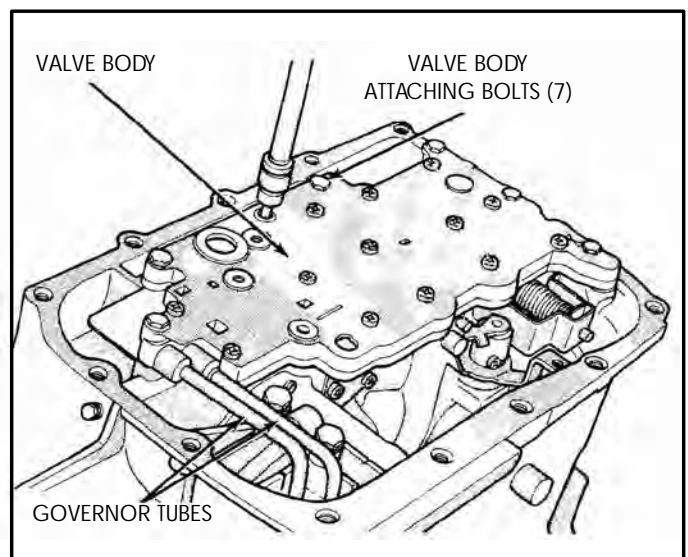


Figure 35

## TRANSAXLE DISASSEMBLY (Cont'd)

14. Remove the valve body and governor tubes, as shown in Figure 36, and set aside for the component rebuild section.
15. Attach a dial indicator to transaxle bell housing with the plunger seated against end of the input shaft, as shown in Figure 37, and zero the dial indicator.
16. Move the input shaft in and out to obtain end play reading. Should be .007" to .073", record indicator reading to reference during assembly.
17. Tighten the kickdown band adjusting screw, as shown in Figure 38, to retain the front (direct) drum during pump removal.
18. Remove the seven oil pump assembly retaining bolts, as shown in Figure 39.

**Continued on next Page.**

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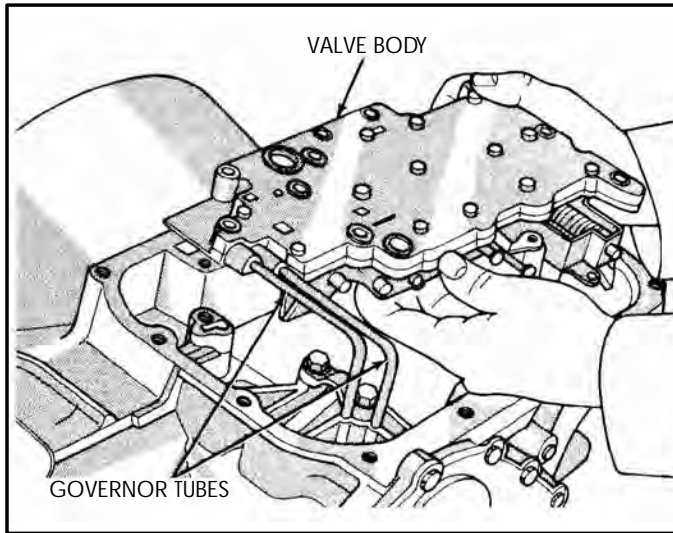


Figure 36

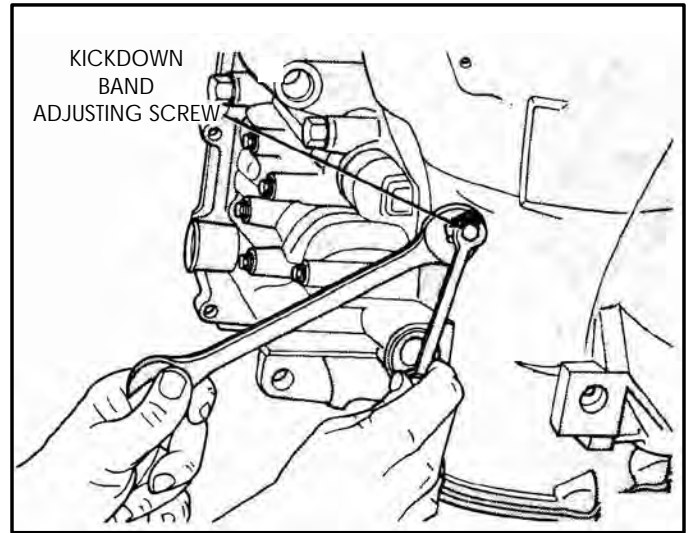


Figure 38

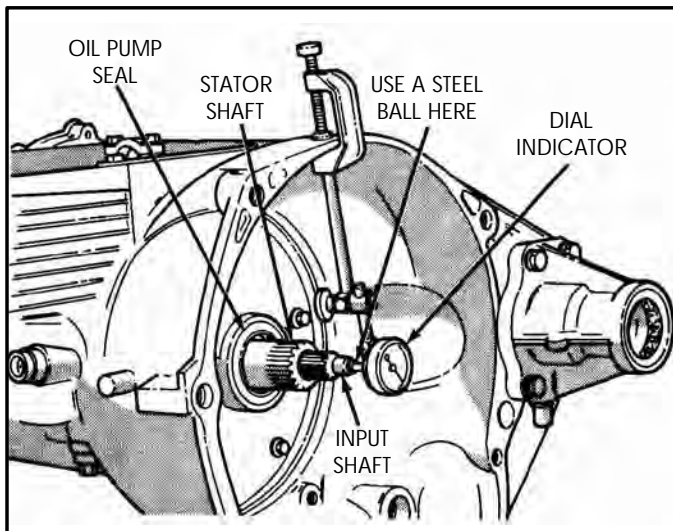


Figure 37

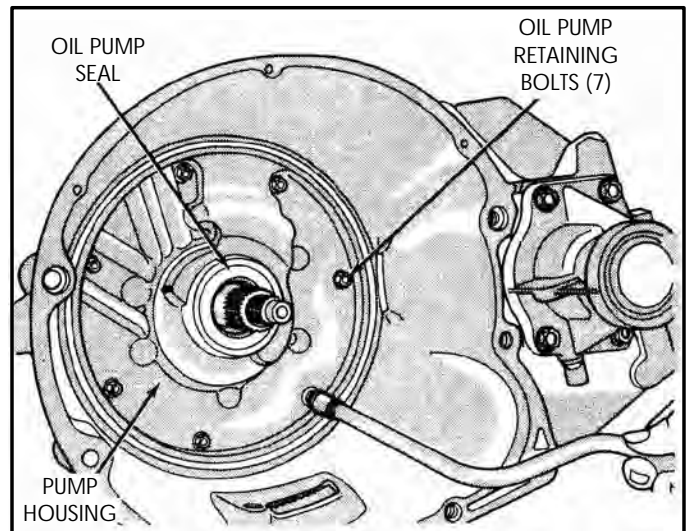


Figure 39

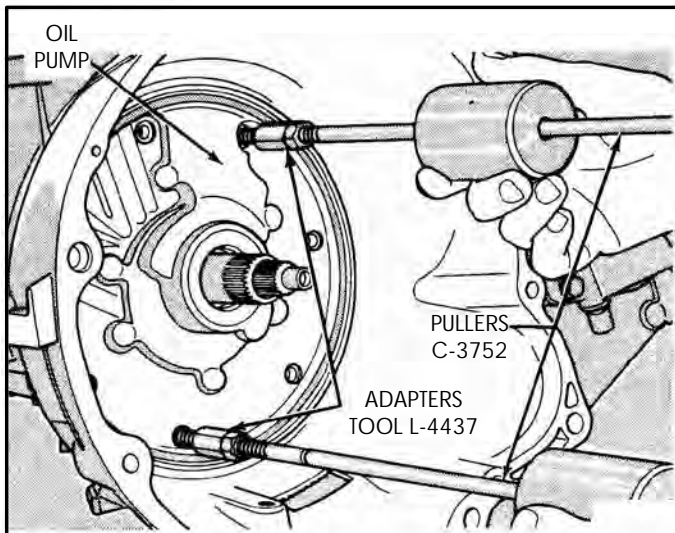


Figure 40

## TRANSAXLE DISASSEMBLY (Cont'd)

19. Install slide hammers and adapters into the oil pump, as shown in Figure 40, use the slide hammers to break loose.
20. Remove the oil pump assembly from the case, as shown in Figure 41, and set pump assembly aside for component rebuild section.
21. Remove and discard oil pump to case gasket, as shown in Figure 42.
22. Loosen the kickdown band adjusting screw, as shown in Figure 43.
23. Remove the kickdown band and band strut, as shown in Figure 44.
24. Remove front (direct) clutch drum assembly, as shown in Figure 45, and set the assembly aside for component rebuild section.

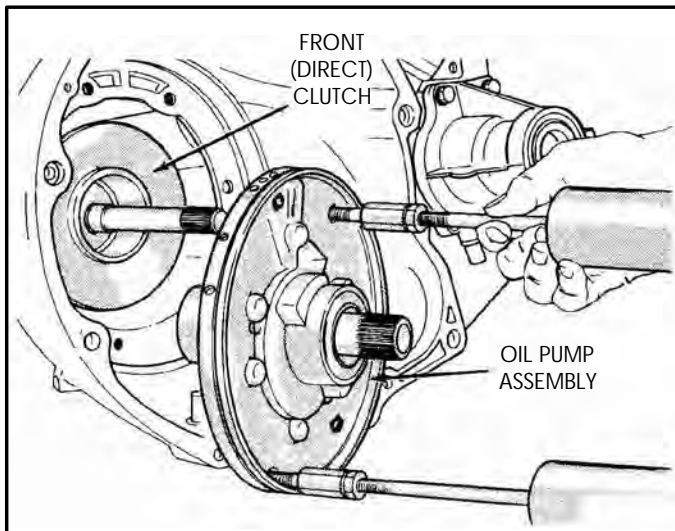


Figure 41

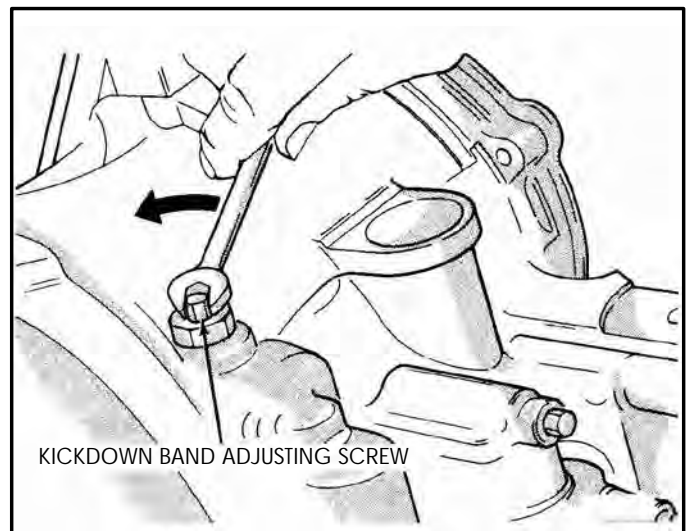


Figure 43

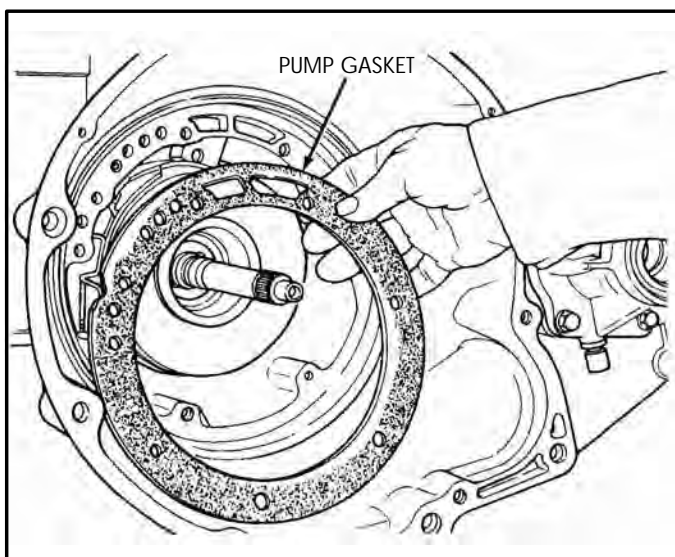


Figure 42

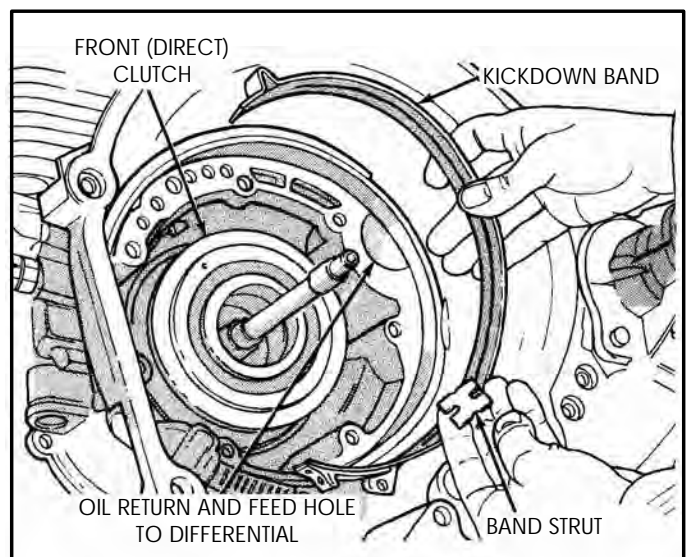


Figure 44

## TRANSAXLE DISASSEMBLY (Cont'd)

25. Remove rear (forward) clutch drum assembly, as shown in Figure 46, and set assembly aside for component rebuild section.
26. Remove the number 2 thrust washer, as shown in Figure 46.
27. Remove the number 3 selective thrust washer, shown in Figure 47.
28. Remove the front planetary snap ring using the snap ring pliers, as shown in Figure 48.
29. Remove front planetary assembly, as shown in Figure 49, and set aside for the component rebuild section.

Continued on next Page.

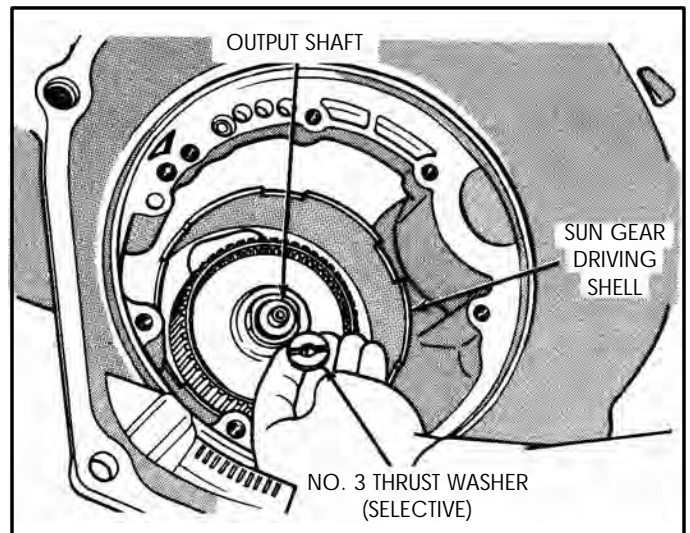


Figure 47

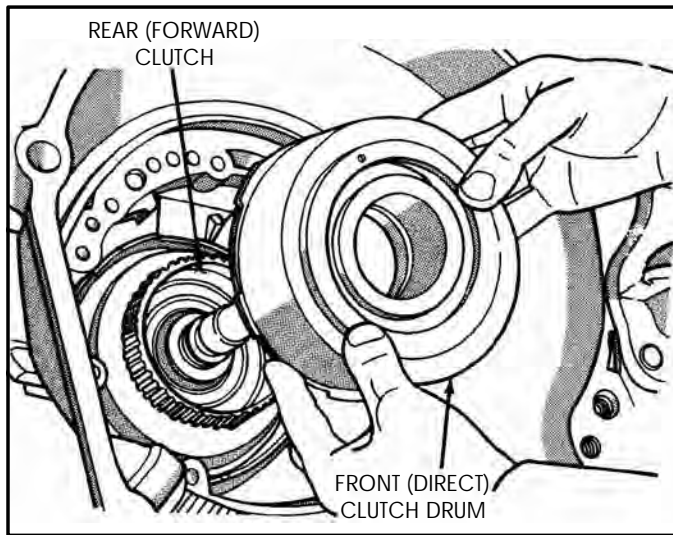


Figure 45

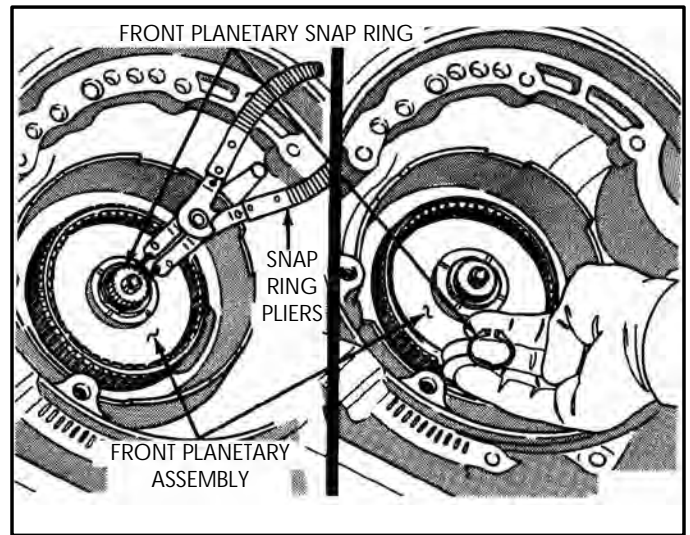


Figure 48

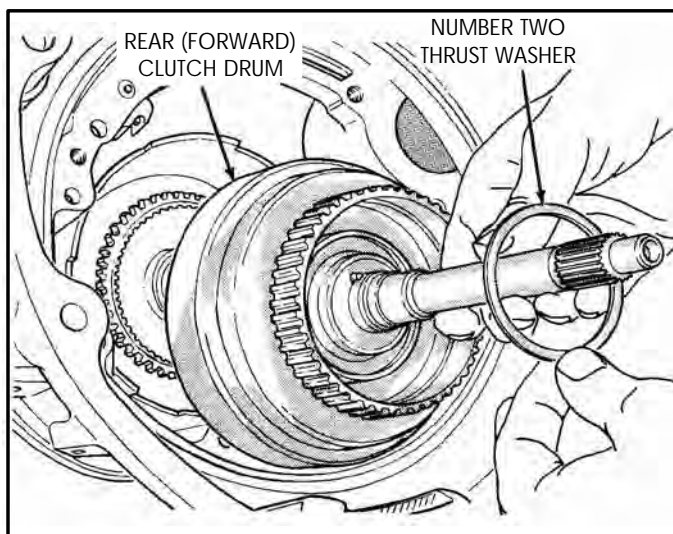


Figure 46

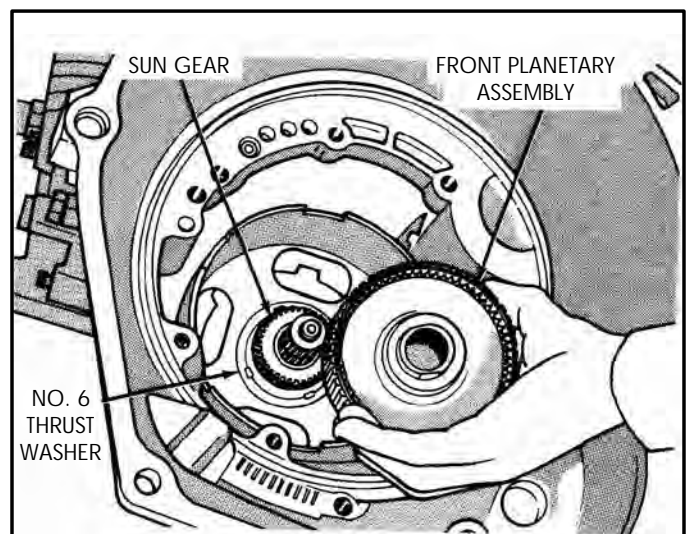


Figure 49

## TRANSAXLE DISASSEMBLY (Cont'd)

30. Remove the number 6 thrust washer from the transaxle, as shown in Figure 50.
31. Remove the sun gear and drive shell assembly and number 7 thrust washer from the transaxle, as shown in Figure 51.
32. Remove the number 9 thrust washer, as shown in Figure 53.
33. Remove rear planetary carrier from transaxle, as shown in Figure 54.
34. Remove the number 10 thrust washer from the transaxle, as shown in Figure 55.
35. Remove the overrun clutch cam assembly from transaxle, as shown in Figure 56.

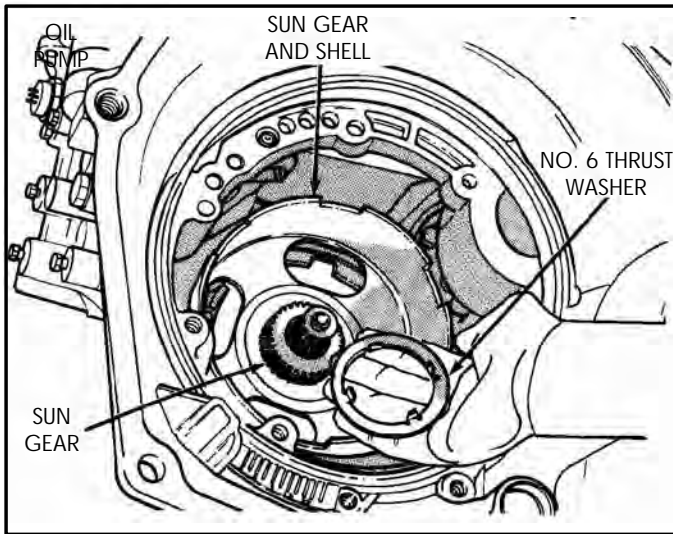


Figure 50

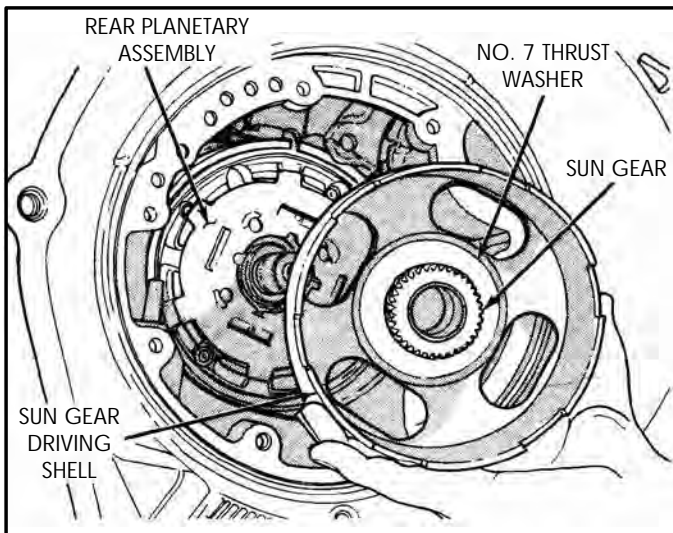


Figure 51

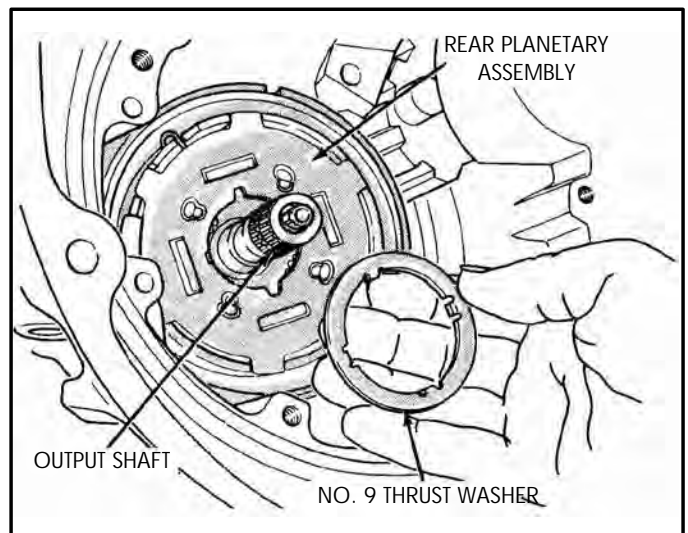


Figure 53

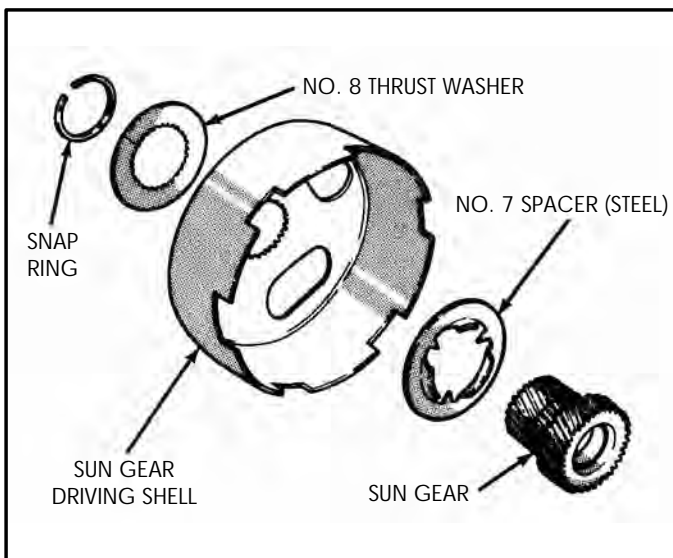


Figure 52

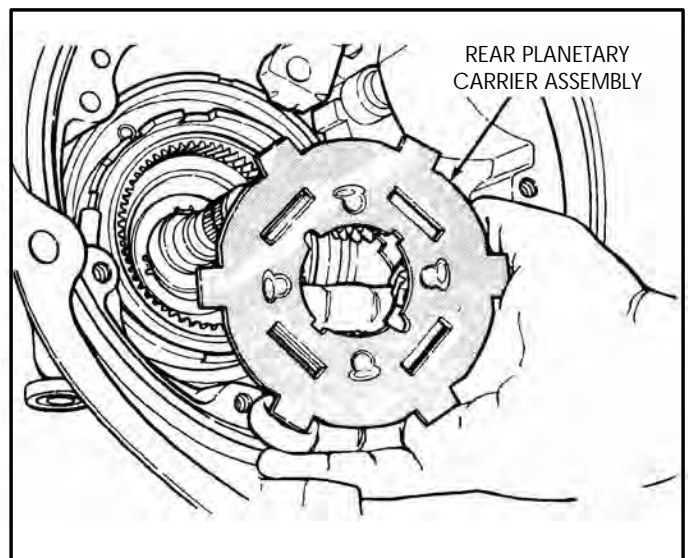


Figure 54

## TRANSAXLE DISASSEMBLY (Cont'd)

36. Remove low overrun clutch rollers and springs if any are in transaxle case (See Figure 57).
37. Loosen the rear band lock nut and the adjusting screw, as shown in Figure 58.
38. Remove low/reverse band and the band strut, as shown in Figure 59.

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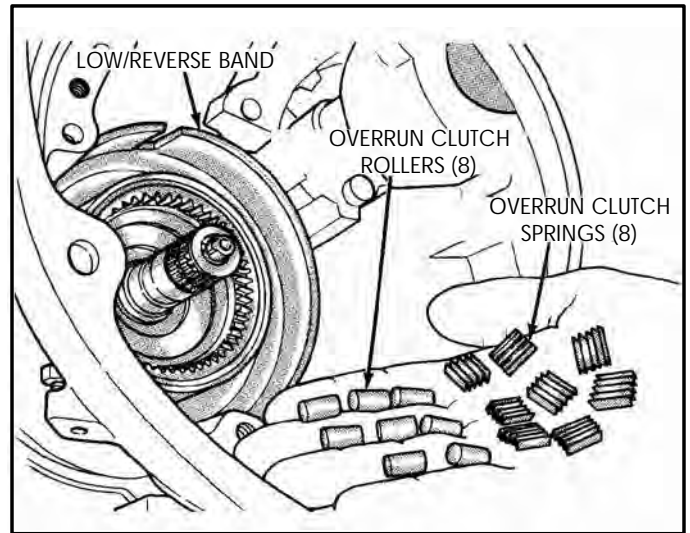


Figure 57

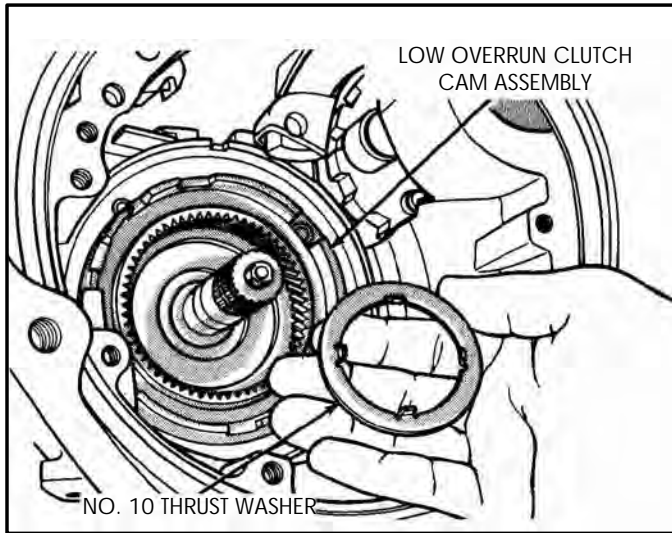


Figure 55

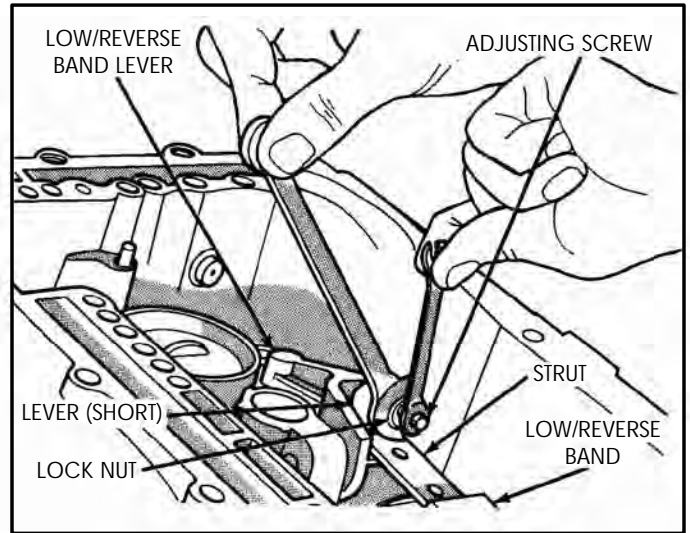


Figure 58

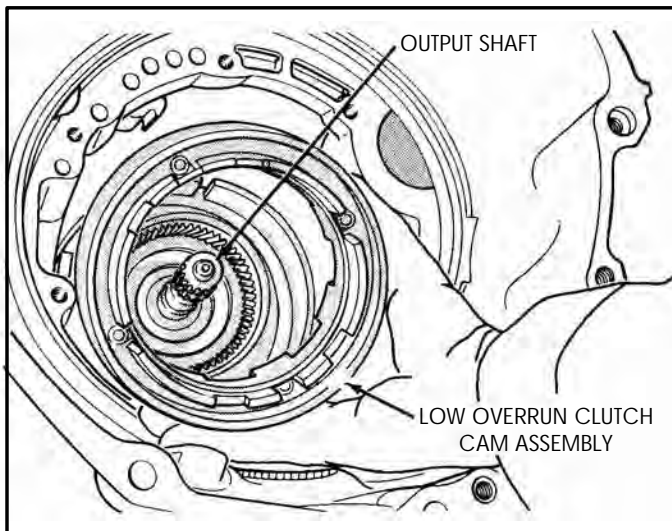


Figure 56

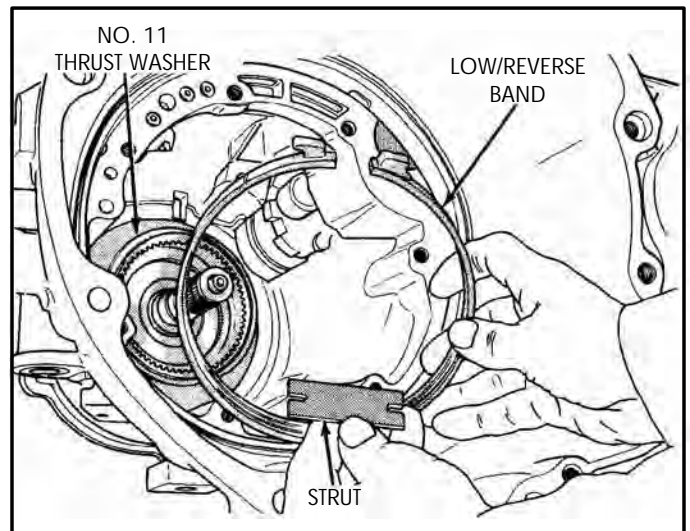


Figure 59

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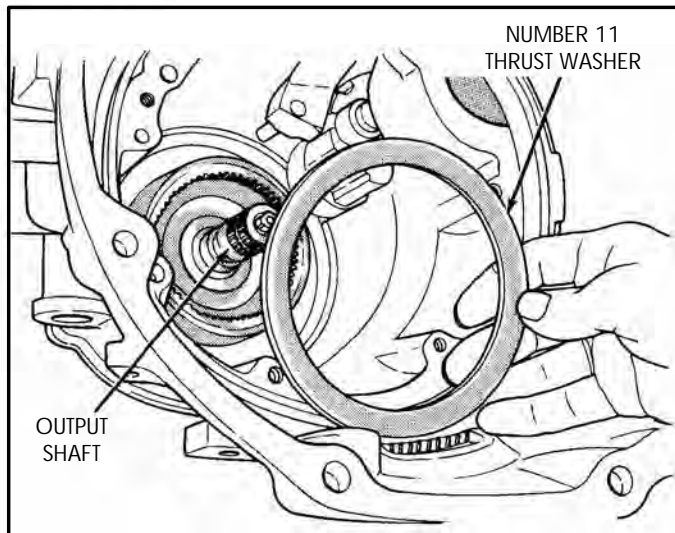


Figure 60

## TRANSAXLE DISASSEMBLY (Cont'd)

39. Remove the number 11 thrust washer from the transaxle case, as shown in Figure 60.
40. The output shaft, transfer shaft and differential repair will be covered in the component repair section.

## COMPONENT REBUILD SECTION

### Low Overrun Clutch And Cam

1. Place the low overrun cam on a flat working surface, as shown in Figure 61.
2. Install the loading tool L-4440 into the overrun clutch cam, as shown in Figure 61.
3. Install *new* overrun clutch rollers and springs, eight of each, as shown in Figure 61.
4. Place the entire assembly aside, including the loading tool, for the final assembly process. The loading tool will make it easy to install this assembly into the transaxle case, during the final assembly process.

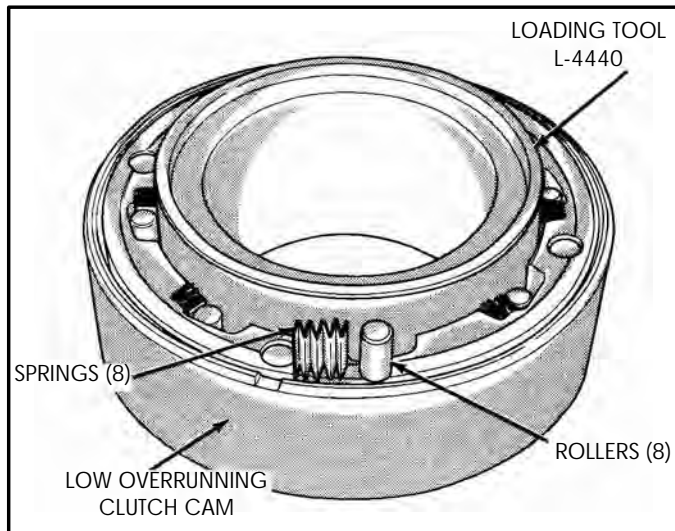


Figure 61

### Front Planetary Assembly

1. Remove and discard retaining snap ring, as shown in Figure 62.
2. Remove the number 4 thrust washer, as shown in Figure 62.
3. Remove planetary ring gear and the number 5 thrust washer, as shown in Figure 63.

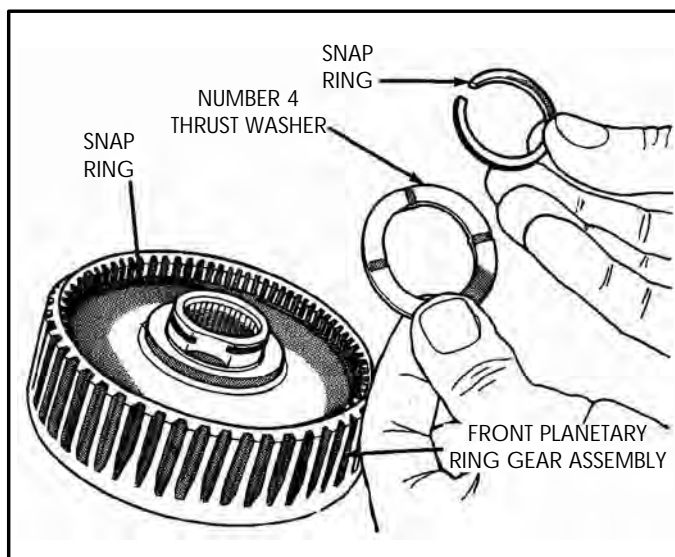


Figure 62

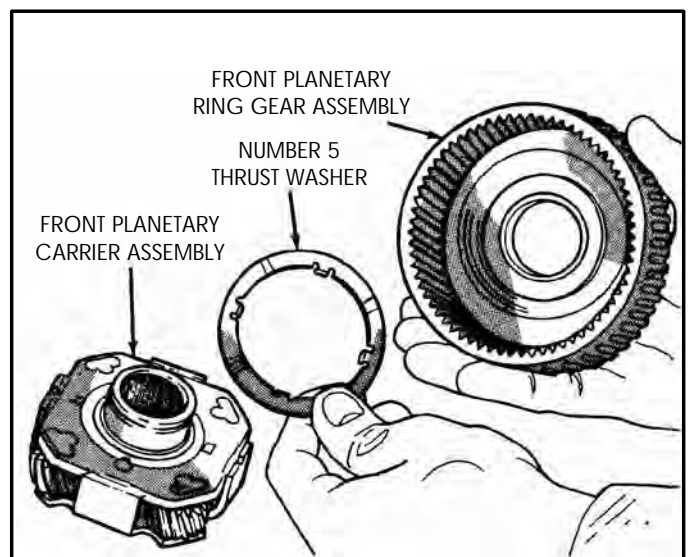


Figure 63

## Front Planetary Assembly (Cont'd)

4. Remove the snap ring retaining the ring gear support in the ring gear (See Figure 64).
5. Remove the ring gear support from ring gear, as shown in Figure 65.
6. Inspect all components for any wear and/or damage.
7. Clean all of the parts thoroughly and dry with compressed air.
8. Install the front ring gear support into the ring gear on top of the rear snap ring, as shown in Figure 65.
9. Install the front snap ring into the groove in ring gear and ensure that it is fully seated using a screwdriver, as shown in Figure 64.
10. Install the number 5 thrust washer on top of the front planetary and lube with small amount of Trans-Jel®, as shown in Figure 63.
11. Install the ring gear onto the front planetary using a rotating motion to engage ring gear with planetary pinions (See Figure 63).
12. Install the number 4 thrust washer on assembly, as shown in Figure 62.
13. Install a *new* snap ring, as shown in Figure 62, and ensure that it is fully seated in groove.
14. Set the completed front planetary assembly aside for the final assembly process.

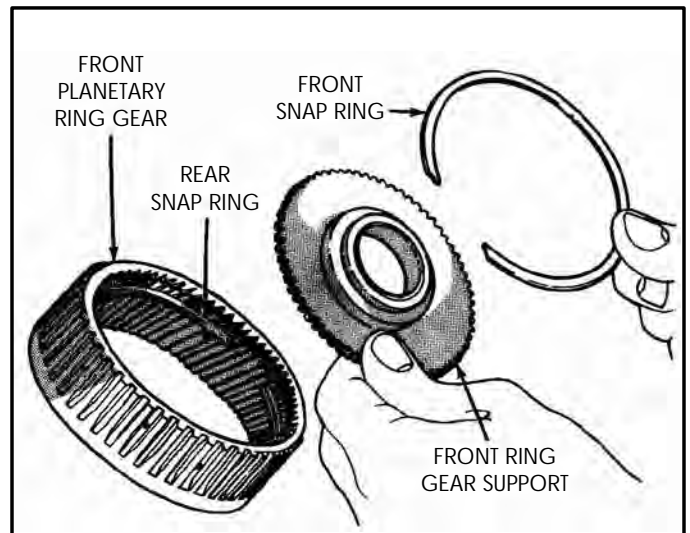


Figure 65

## Front (Direct) Drum Assembly

1. Remove the "Waved" snap ring from the front drum assembly using a screwdriver, as shown in Figure 66.

Continued on next Page.

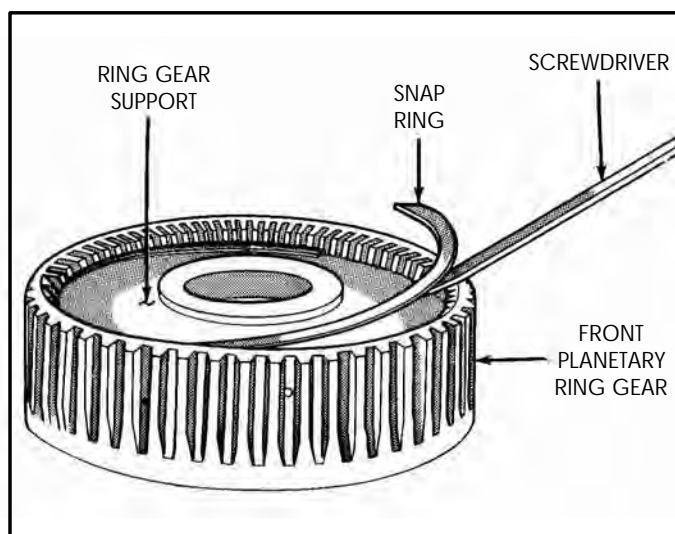


Figure 64

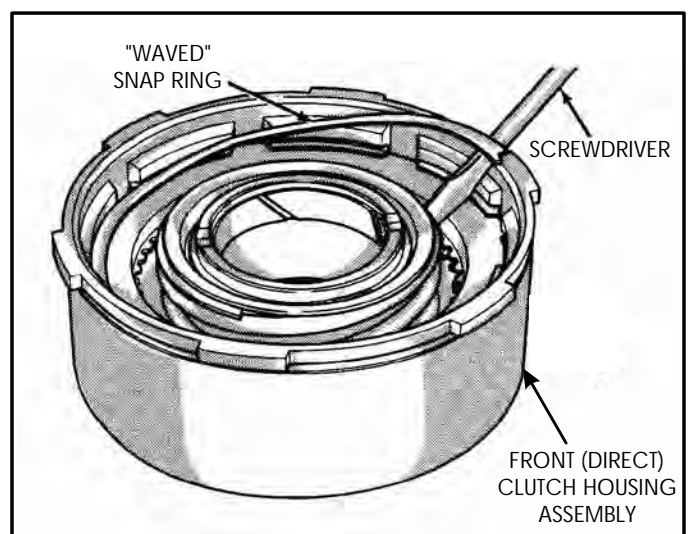


Figure 66

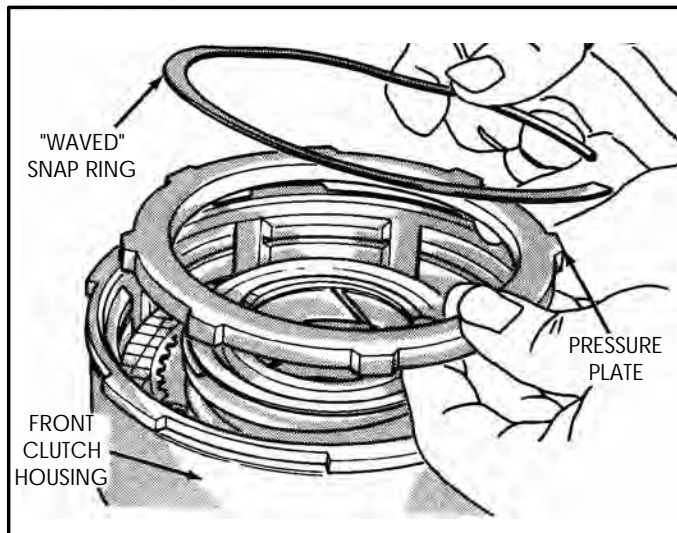


Figure 67

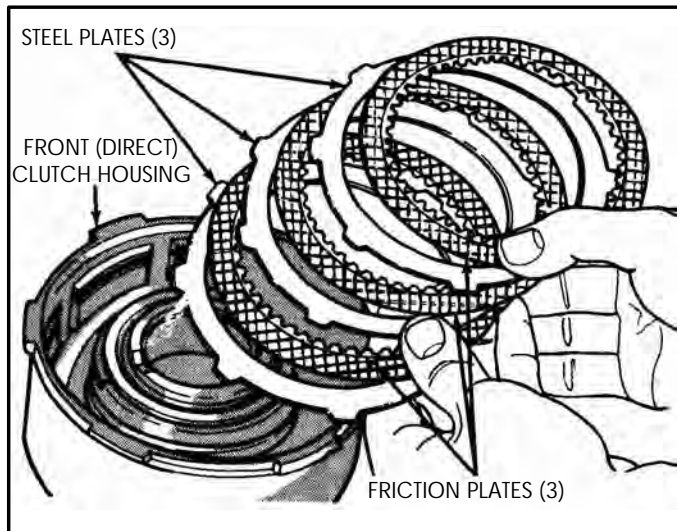


Figure 68

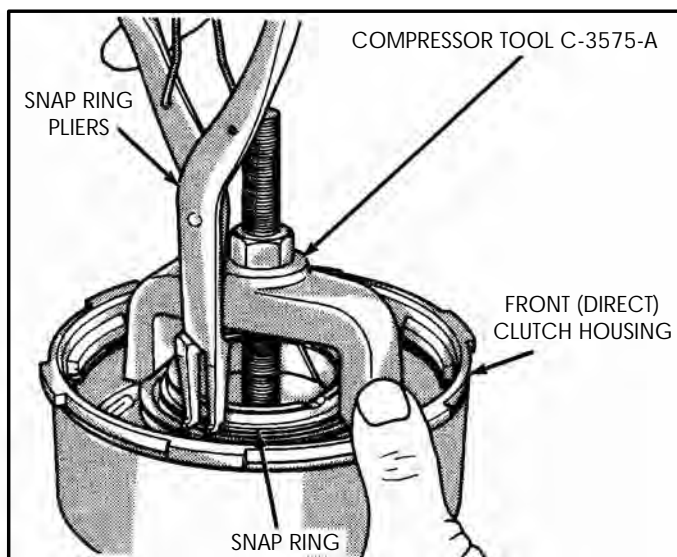


Figure 69

## Front (Direct) Drum Assembly (Cont'd)

2. Remove the "Waved" snap ring and pressure plate, as shown in Figure 67.
3. Remove the friction and steel plates from front (Direct) clutch housing (See Figure 68).
4. Install compressor tool, as shown in Figure 69, and remove return spring retainer snap ring.
5. Loosen the compressor tool very slowly, to release the pressure on return spring.
6. Remove the piston, return spring, and retainer from front (Direct) housing (See Figure 70).
7. Remove and discard the inner lip seal from the front drum (See Figure 70).
8. Remove and discard the outer lip seal from the front clutch piston (See Figure 70).
9. Clean all front (Direct) clutch parts thoroughly and dry with compressed air.
10. Inspect all front (Direct) clutch parts for any wear and/or damage.
11. Install **new** lip seal on the front clutch piston with the lip facing away from the top of the piston (See Figure 70).
12. Install **new** lip seal into the groove in the front clutch housing, with the lip facing bottom of the housing (See Figure 70).
13. Lubricate both seals, and the seal surfaces on both the piston and the housing with a small of Trans-Jel®.
14. Install the piston into the front clutch housing with a rotating motion and **slight** downward pressure, ensuring no damage to lip seals.

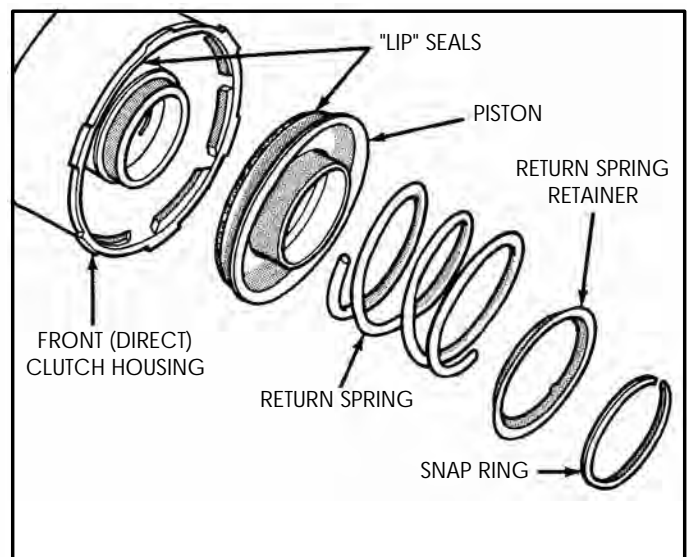


Figure 70

## Front (Direct) Drum Assembly (Cont'd)

15. Install the front clutch piston return spring, as shown in Figure 70.
16. Install the front clutch return spring retainer on top of the return spring (See Figure 70).
17. Lay the snap ring on top of the return spring retainer to prepare for compression of spring.
18. Install compressor tool, as shown in Figure 69, and carefully compress the return spring and retainer down until the snap ring groove is fully exposed (See Figure 69).
19. Install front clutch retainer snap ring using the snap ring pliers, as shown in Figure 69.
20. Slowly release the compressor tool and ensure that return spring retainer is seated against the snap ring.
21. Install **new** steel and friction plates into front clutch housing, beginning with a steel plate and alternating with a friction plate, until the proper amount of plates have been installed.  
**NOTE: Some models require 3 of each and some models require 4 of each.**
22. Install the pressure plate on top of last friction plate, as shown in Figure 67.
23. Install the "Waved" pressure plate snap ring into its groove using a screwdriver, as shown in Figure 71.
24. Turn the front clutch housing over and tap the housing against the bench to seat the "Waved" snap ring against the top of its groove.
25. Check the piston travel by measuring with a feeler gauge, as shown in Figure 72.  
**Note: Measure from pressure plate to "Farthest" Wave (See Figure 72).**
26. This clutch pack is **Non-Adjustable**. If clutch clearance is not correct, you must remove the parts and recheck, as you have a mis-assembly.
27. After clutch clearance is correct, set complete front clutch housing aside for final assembly.

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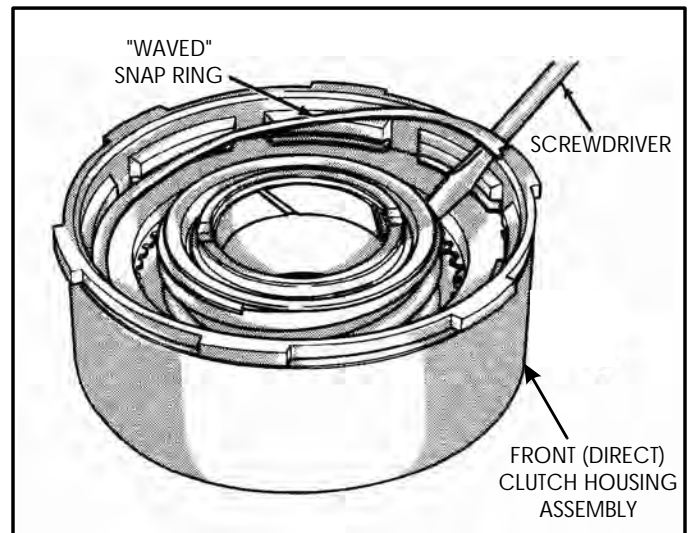


Figure 71

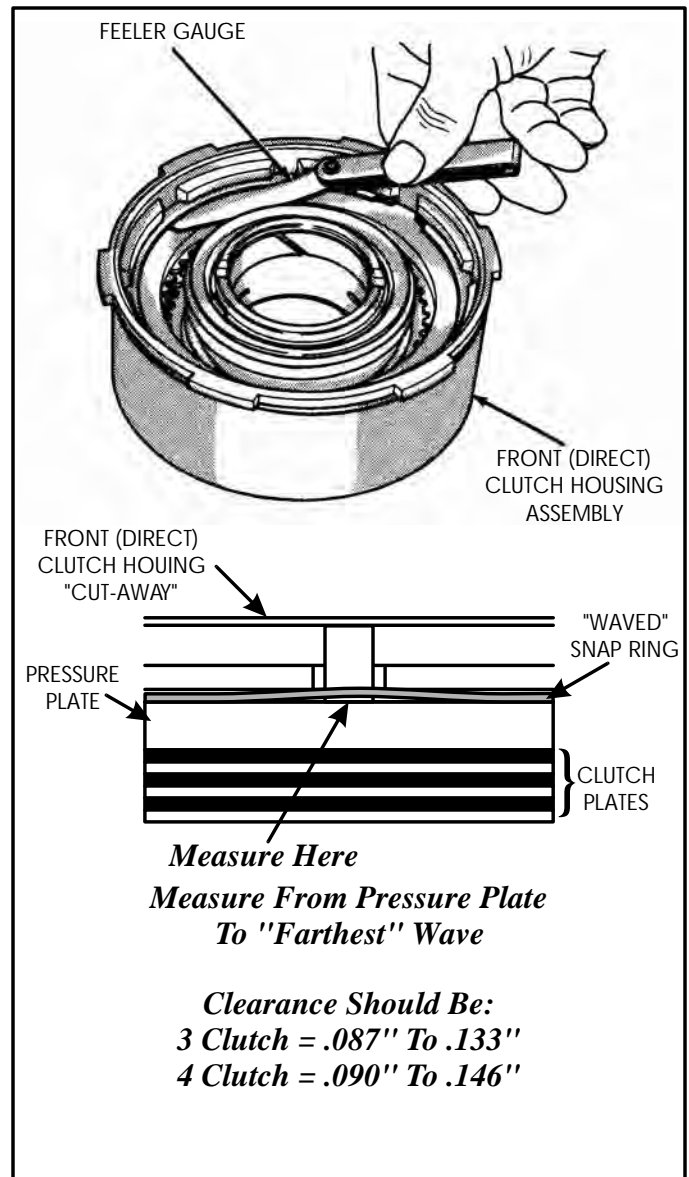


Figure 72

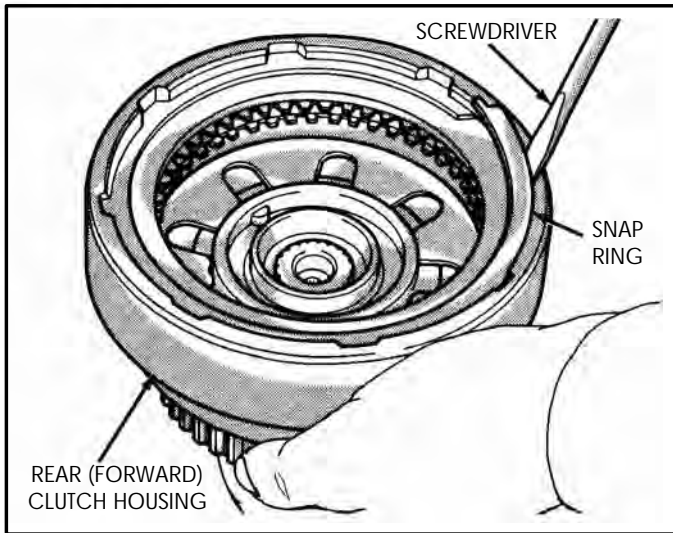


Figure 73

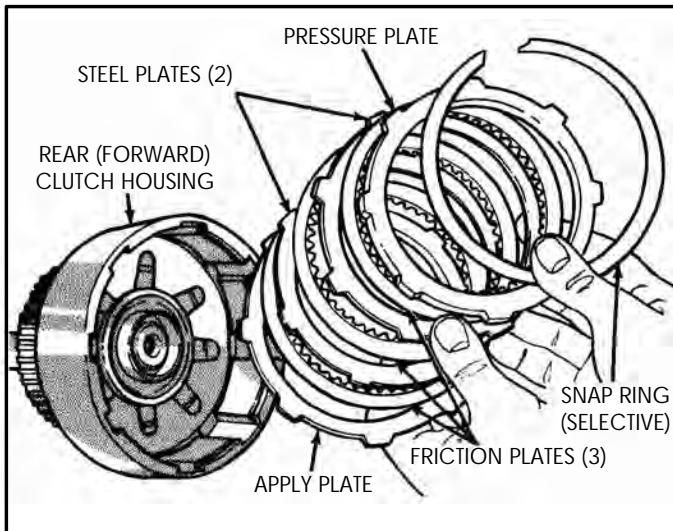


Figure 74

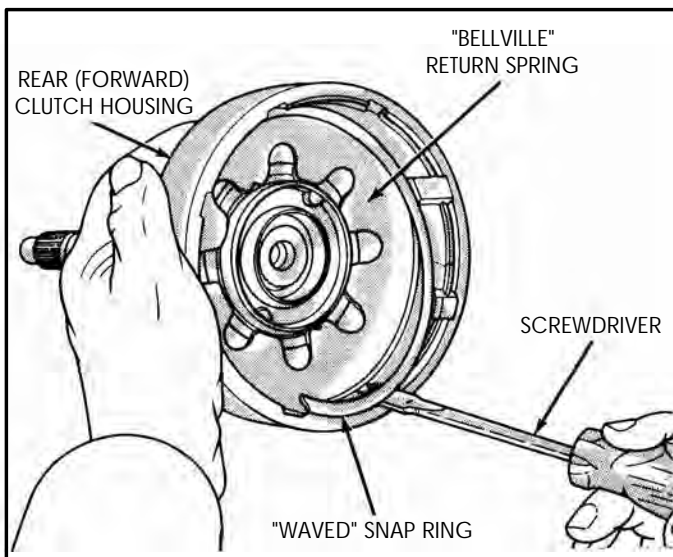


Figure 75

## COMPONENT REBUILD SECTION (Cont'd)

### Rear (Forward) Drum Assembly

1. Remove snap ring retaining the pressure plate, using a screwdriver, as shown in Figure 73.
2. Remove the pressure plate, friction and steel plates and apply plate from the housing, as shown in Figure 74.
3. Remove the "Waved" snap ring retaining the bellville return spring, using a screwdriver, as shown in Figure 75.
4. Remove the "bellville" return spring and the rear clutch piston, as shown in Figure 76.
5. Remove and discard the lip seals from the rear clutch piston (See Figure 76).
6. Clean all of the rear (Forward) clutch parts thoroughly and dry with compressed air.
7. Inspect all rear (Forward) clutch parts for any wear and/or damage, replace as necessary.

### SPECIAL NOTE:

*The turbine shaft in the Rear (Forward) Clutch Housing has changed three times, as shown in Figure 77. It is extremely important that the turbine shaft be matched with the proper stator support, as they are different for each design level shaft.*

8. It is not necessary to remove the input shaft from the housing unless replacement of the input shaft is necessary.
9. If it does become necessary to remove the input shaft, refer to Figures 79 and 80.

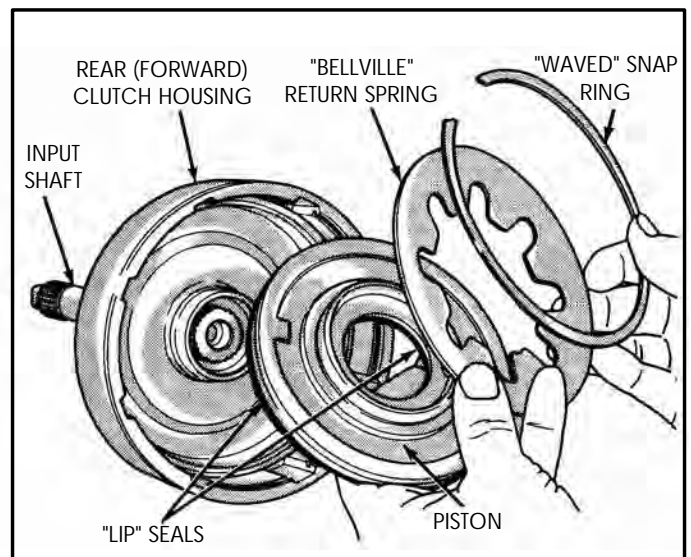


Figure 76

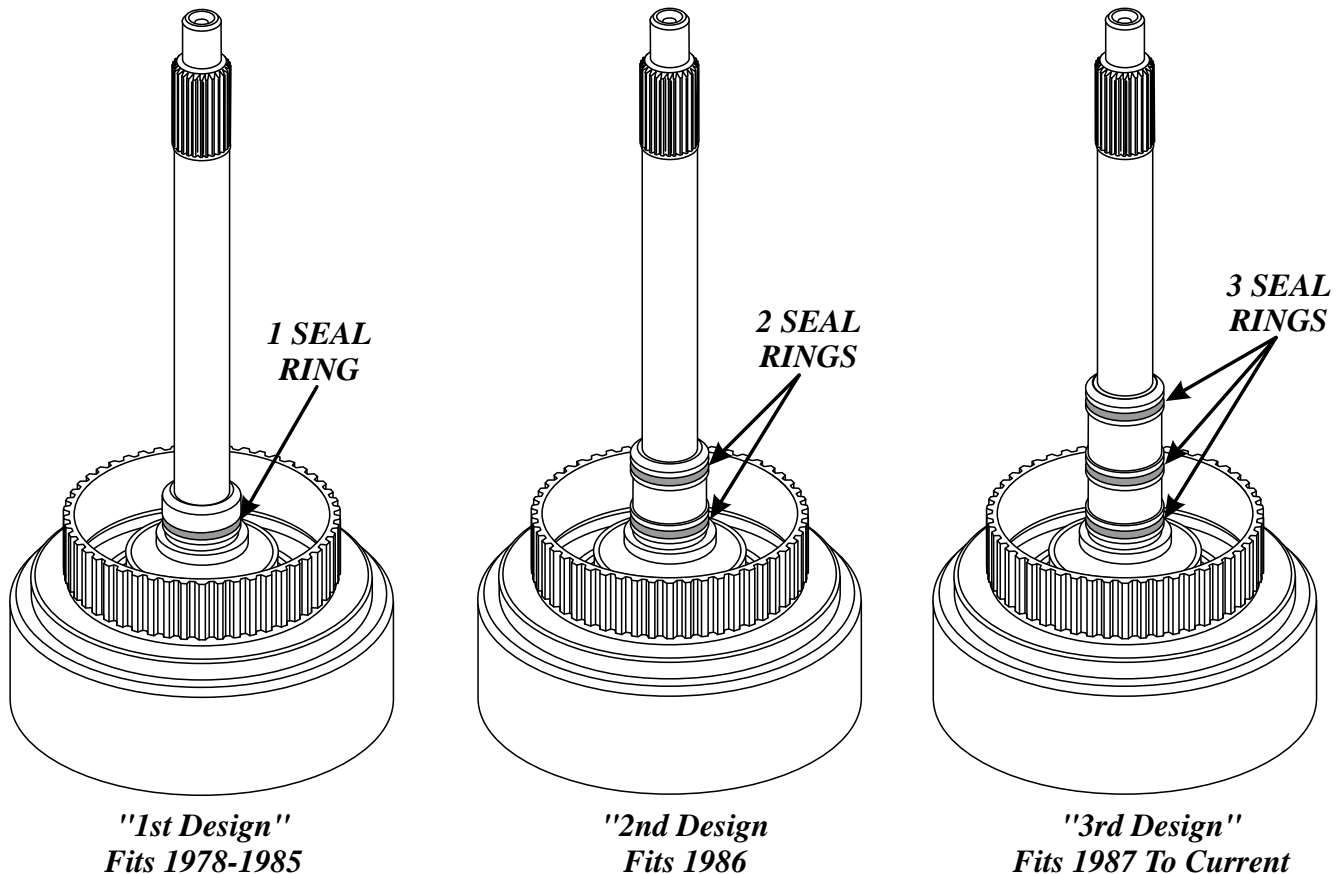
## Rear (Forward) Drum Assembly (Cont'd)

10. Install new lip seals into the grooves in the rear clutch piston with the lips facing the bottom of the housing (See Figure 76).
11. Lubricate both lip seals and the surfaces that they ride on in housing with a small amount of Trans-Jel®.
12. Install the piston into the rear clutch housing with a rotating motion and *slight* downward pressure, ensuring no damage to lip seals
13. Install "Bellville" return spring into housing, as shown in Figure 76.
14. Install the "Waved" snap ring into the bottom groove, as shown in Figure 75, and ensure that it is fully seated.
15. Install the apply plate into rear clutch housing, as shown in Figure 74.
16. Install *new* friction and steel plates into the rear clutch housing, beginning with a friction plate and alternating with a steel plate, until proper amount of plates have been installed.  
*Note: Some Models 3 Friction, and 2 Steels  
Some Models 4 Friction, and 3 Steels*
17. Install the pressure plate into the rear clutch housing, as shown in Figure 74.
18. Install the pressure plate retaining snap ring into its groove, as shown in Figure 73, ensuring that it is fully seated.

Continued on next Page.

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### FORWARD (REAR) CLUTCH HOUSING



*The turbine shaft in the Forward (Rear) Clutch Housing has changed three times. All of the housings have a "larger" seal ring at the base of the shaft, and located on the housing boss. The 1978 through 1985 units have only one small seal ring on the turbine shaft. The 1986 units have two small seal rings on the turbine shaft and is still a non-lockup unit. Finally the 1987 to current units have three small seal rings on the turbine shaft for the lock-up units. It is extremely important that the turbine shaft be matched with the proper stator support, as they are different for each design level shaft.*

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Figure 77

## Rear (Forward) Drum Assembly (Cont'd)

19. Turn the rear (Forward) clutch housing over and tap the housing against the bench to seat the snap ring against the top of its groove.
20. Check the clutch clearance by measuring with a feeler gauge, between the bottom of snap ring and top of the pressure plate (See Figure 78)

**Clearance should be:**

**3 Friction Plates = .026" to .034"**

**4 Friction Plates = .030" to .043"**

21. Change the "Selective" retaining snap ring as necessary to obtain the proper clearance, as shown in chart below.

### Selective Snap Ring Chart

**Thickness = .048"-.050"**

**Thickness = .060"-.062"**

**Thickness = .068"-.070"**

**Thickness = .074"-.076"**

**Thickness = .087"-.089"**

22. Install the appropriate amount of **new** small sealing rings on the turbine shaft, as shown in Figure 77, and a **new** large sealing ring on the boss of the housing.
23. After completion, set the complete rear clutch housing aside for final assembly.

**Continued on next Page.**

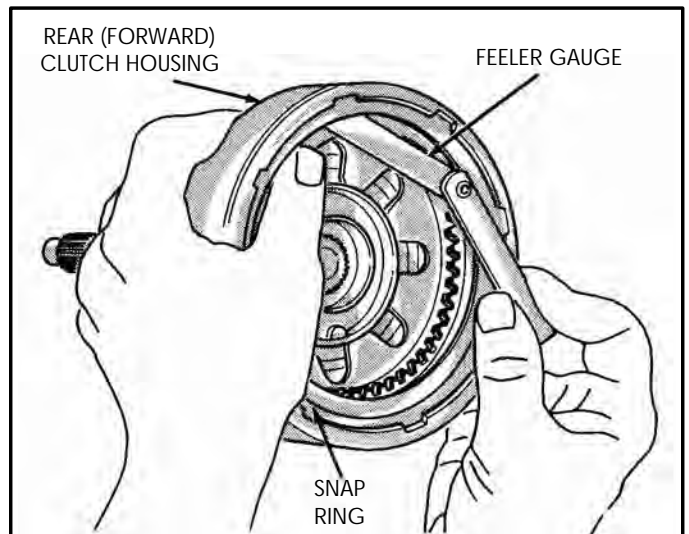


Figure 78

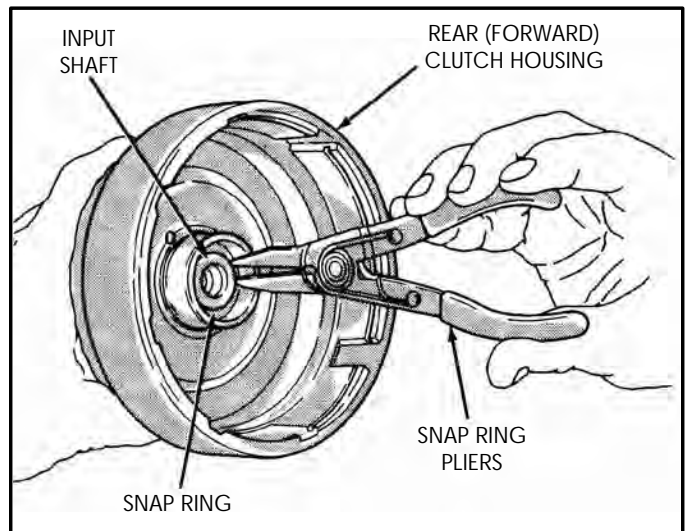


Figure 79

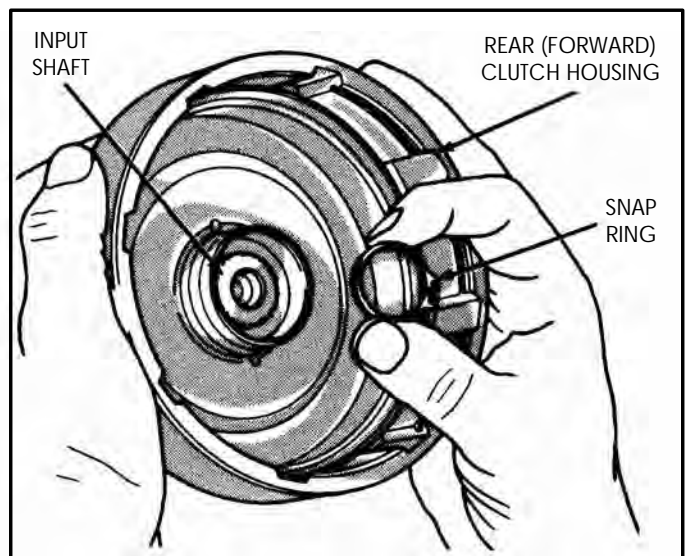


Figure 80

## COMPONENT REBUILD SECTION (Cont'd)

### Oil Pump Assembly

1. Remove the 6 reaction shaft support to pump housing retaining bolts (See Figure 81).
2. There are currently 3 different designs of the oil pump assembly, that affect several other parts inside and outside the transaxle. This will require extra care when replacing any parts, as it *will* affect durability and operation. We will cover all three designs, the changes that have occurred on each design, and all of the parts affected by the changes.

### "1st Design" Oil Pump Assembly

The "1st Design" Oil Pump Assembly has "Lugs" on the inside diameter of the inner pump gear, as shown in Figure 82. On the "1st Design" stator shaft, the input shaft bushing is one inch down inside the second bore, and also shown in Figure 82. The "1st Design" level pump assembly also requires the "1st Design" level input shaft, that is shown in Figure 77. Obviously this design level would also require a torque converter that was compatible with the inner pump gear.

Continued on Page 41.

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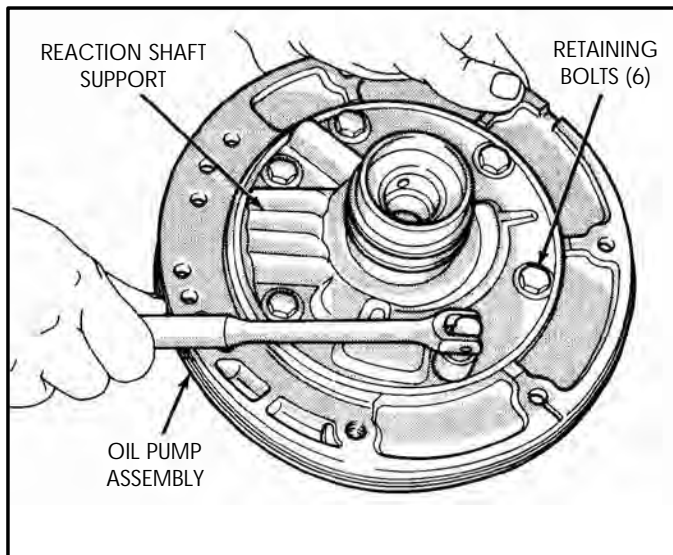


Figure 81

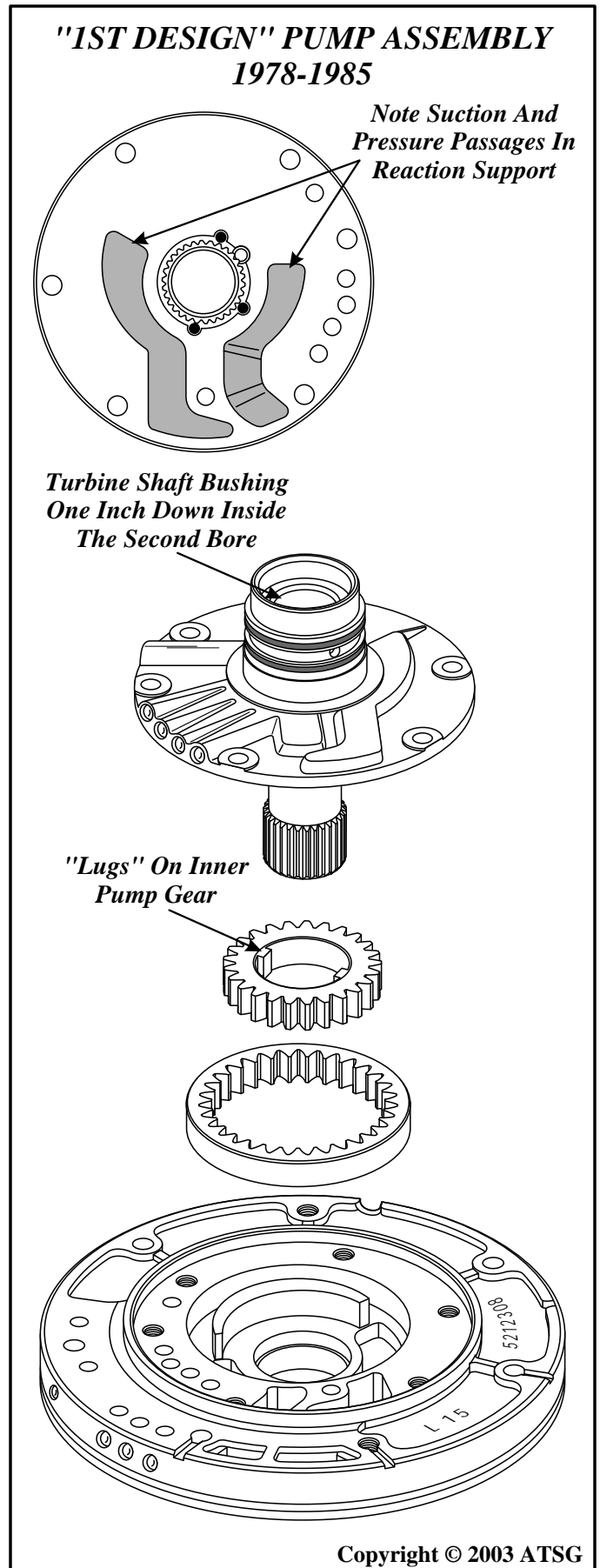
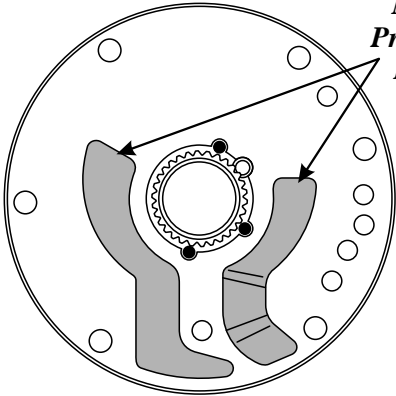


Figure 82

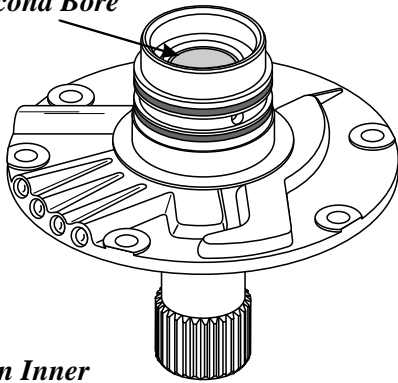
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## "2ND DESIGN" PUMP ASSEMBLY 1986-1999

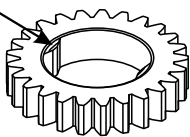
Note Suction And Pressure Passages In Reaction Support



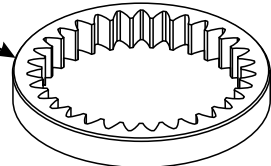
Turbine Shaft Bushing Is "Flush" Inside The Second Bore



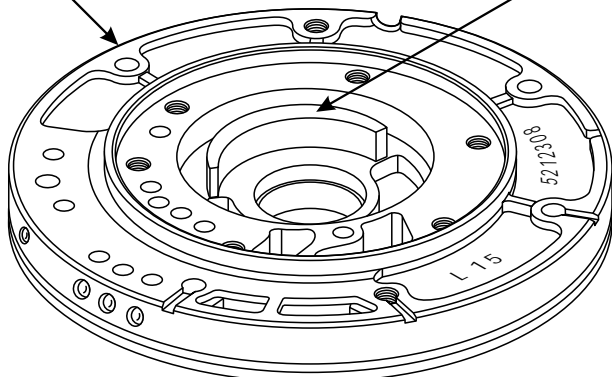
"Flats" On Inner Pump Gear



Outer Pump Gear



Pump Housing



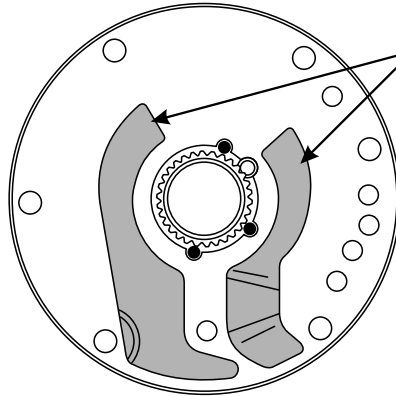
Note Cresnet

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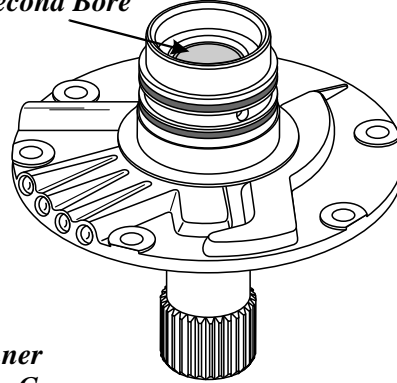
Figure 83

## "3RD DESIGN" PUMP ASSEMBLY 2000-CURRENT

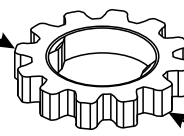
Note Passage Changes In This Reaction Support



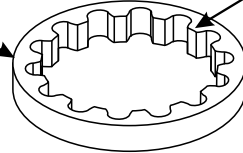
Turbine Shaft Bushing Is "Flush" Inside The Second Bore



Inner Pump Gear

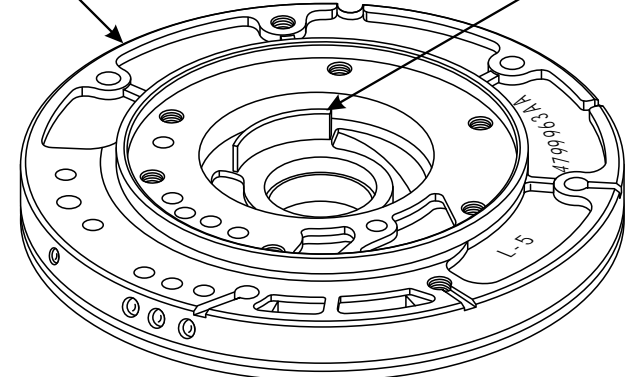


Outer Pump Gear



Different Tooth Configuration On Both Gears

Pump Housing



Note Cresnet

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Figure 84

## COMPONENT REBUILD SECTION (Cont'd)

### Oil Pump Assembly (Cont'd)

#### "2nd Design" Oil Pump Assembly

The "2nd Design" Oil Pump Assembly has "Flats" on the inside diameter of the inner pump gear, as shown in Figure 83. On the "2nd Design" stator shaft, the input shaft bushing is flush with the second bore, and also shown in Figure 83. The "2nd Design" level pump assembly also requires the "2nd Design" or "3rd Design" level input shaft, that is shown in Figure 77. Obviously this design level would also require a torque converter that was compatible with the flats on the inner pump gear. This pump assembly was used up through mid-year 1999.

#### "3rd Design" Oil Pump Assembly

The Chrysler A670 (31TH) transaxle now has a "3rd Design" oil pump assembly as a running 1999 model year change. The new oil pump design is called a "Dual Cycloidal" pump and replaces the "2nd Design" pump assembly, and is illustrated in Figure 84.

The "3rd Design" oil pump has increased flow and capacity at low idle speeds, also has reduced flow at high speeds which reduces the load on the engine resulting in improved fuel economy. The new design oil pump is also quieter than the current gear pump.

The "3rd Design" pump has revised (Larger) suction and pressure cavities, also revised machining in the pump rotor pocket area, as the new design inner and outer rotor are smaller in diameter, and illustrated in Figure 84.

The "3rd Design" stator support also has revised (Larger) suction and pressure ports to accommodate the new design "Dual Cycloidal" pump rotors, as shown in Figure 84.

The "3rd Design" level pump assembly also requires the "3rd Design" level input shaft, that is shown in Figure 77.

None of the parts above will interchange with previous design level parts. Even though the old and new parts will bolt together, they "will not" function properly. However, the complete "Dual Cycloidal" pump assembly when used as a service package, will retro-fit back for past model service.

### Oil Pump Assembly (Cont'd)

3. Install the pump gears into the pump housing pocket, as shown in Figure 85, and check the outer gear to pump pocket clearance, using a feeler gauge.

**Clearance should be .002" to .006"**

4. With the pump gears installed in pump pocket, check the gear to face clearance using a feeler gauge and straight edge (See Figure 85).

**Gear to Face should be .0008" to .002"**

Continued on Page 42.

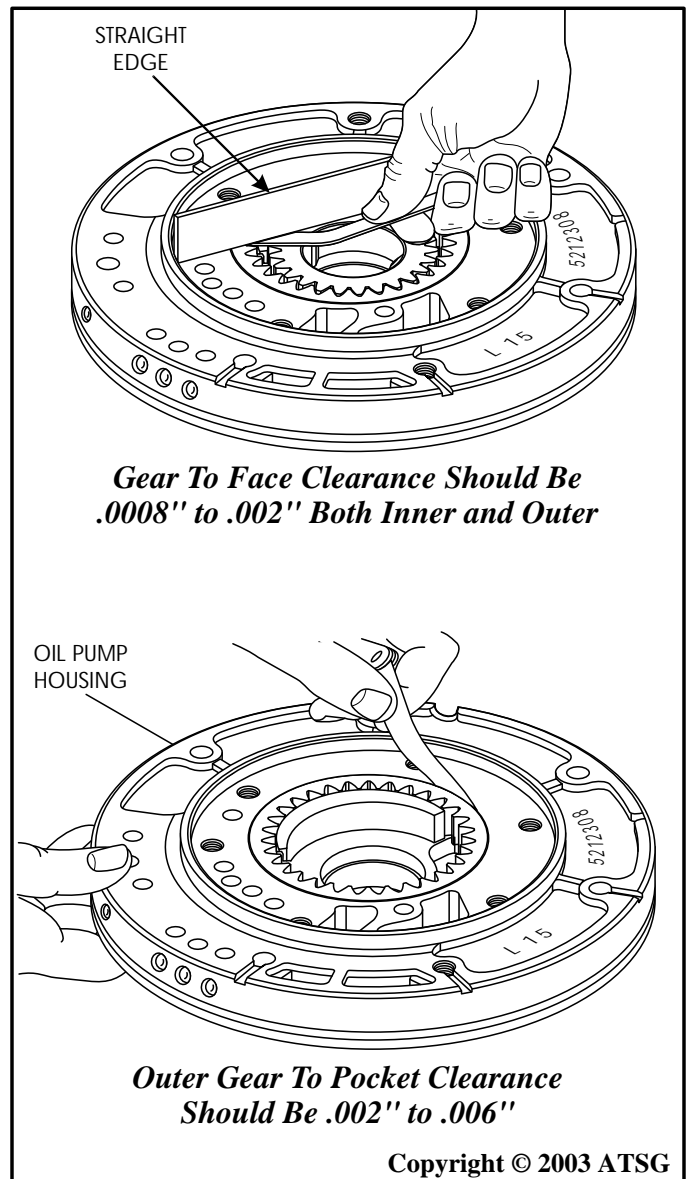


Figure 85

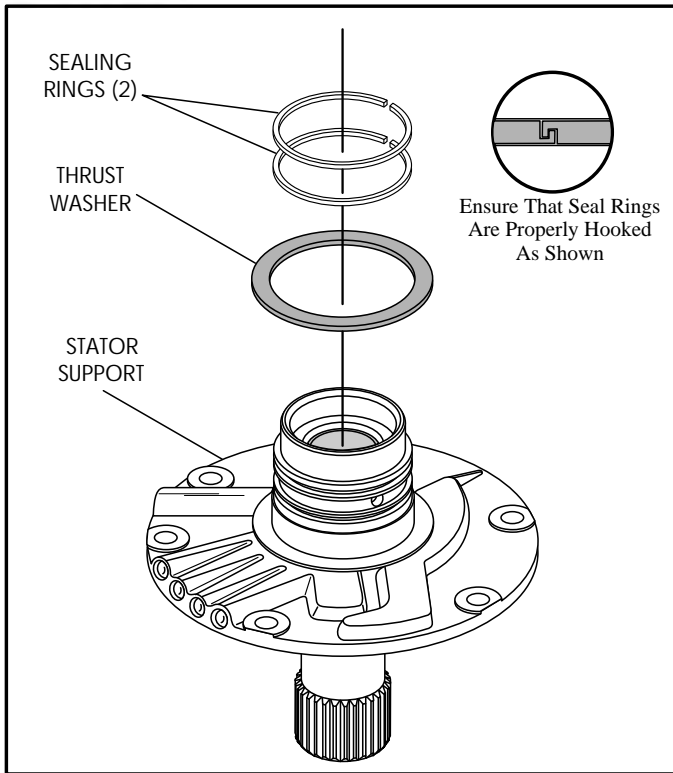


Figure 86

## Oil Pump Assembly (Cont'd)

6. Clean all oil pump parts thoroughly and dry with compressed air.
7. Inspect all oil pump parts for any wear and/or damage and replace as necessary.
8. Install oil pump to front drum thrust washer, as shown in Figure 86, and retain with a small amount of Trans-Jel®.
9. Install two **new** pump sealing rings and ensure that they are hooked properly (See Figure 86).
10. Install both outer and inner pump gears into pump pocket, as shown in Figure 87, using a small amount of transaxle fluid.
11. Install the completed stator support assembly onto oil pump housing, as shown in Figure 88.
12. Install the six stator support bolts and finger tighten only (See Figure 88).
13. Torque the six stator support to pump housing bolts to 20 ft.lb. as shown in Figure 89.
14. Set the completed pump assembly aside for the final assembly process.

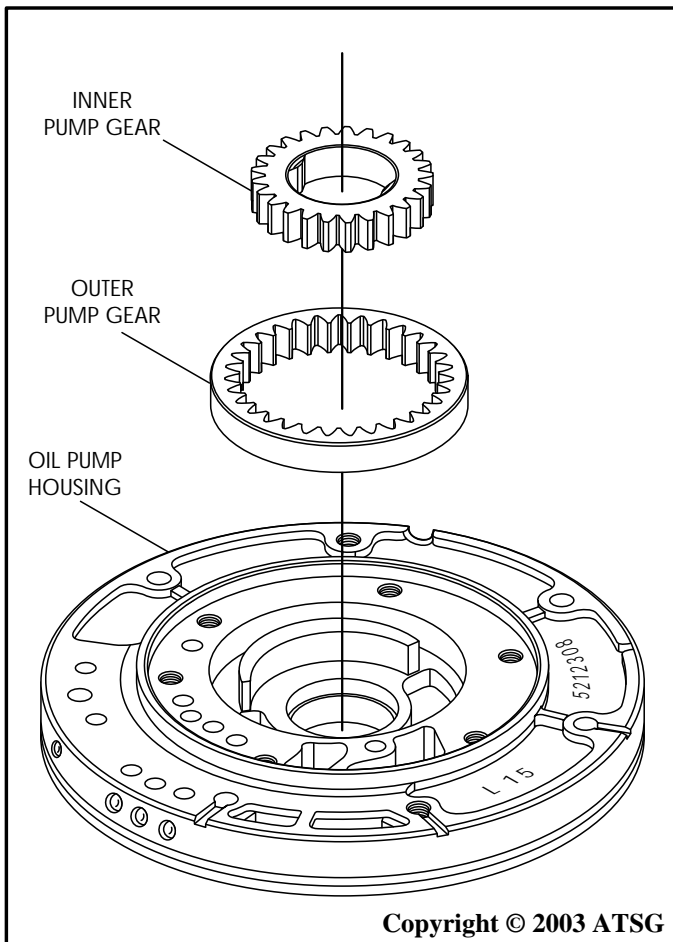


Figure 87

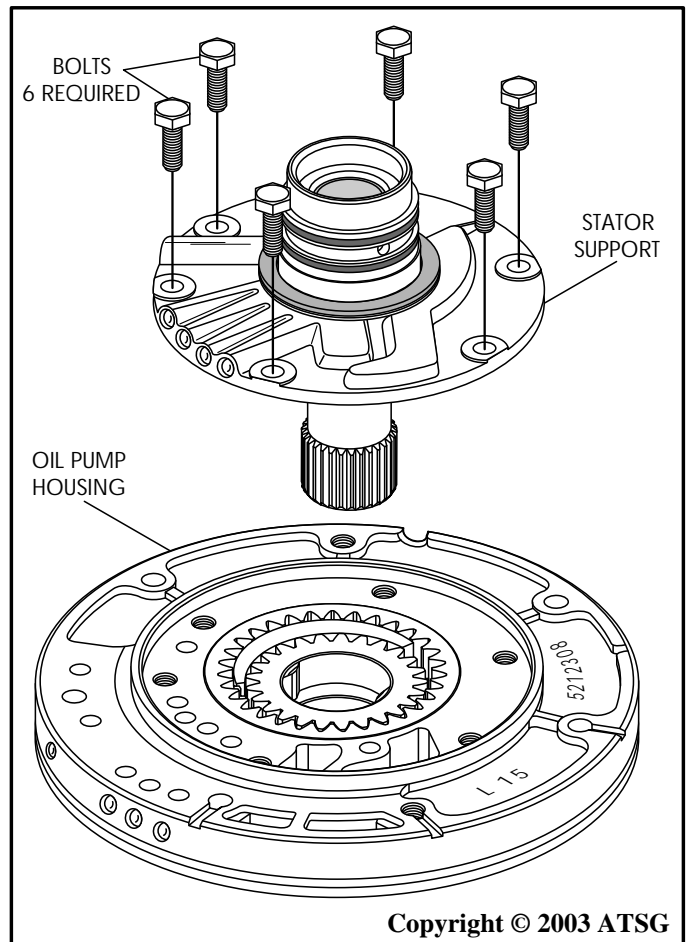


Figure 88

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## COMPONENT REBUILD SECTION (Cont'd)

### Valve Body Assembly

1. Remove the retaining screw for detent spring, as shown in Figure 90, and remove the detent spring.
2. Remove valve body to transfer plate retaining screws, as shown in Figure 91.
3. Separate the transfer plate and valve body, as shown in Figure 92.
4. Remove the checkballs from the valve body cavities, as shown in Figure 93.

**Note:** *There are two different checkball configurations. Shown in Figure 93 is the 1980 to current version.*

Continued on Page 44.

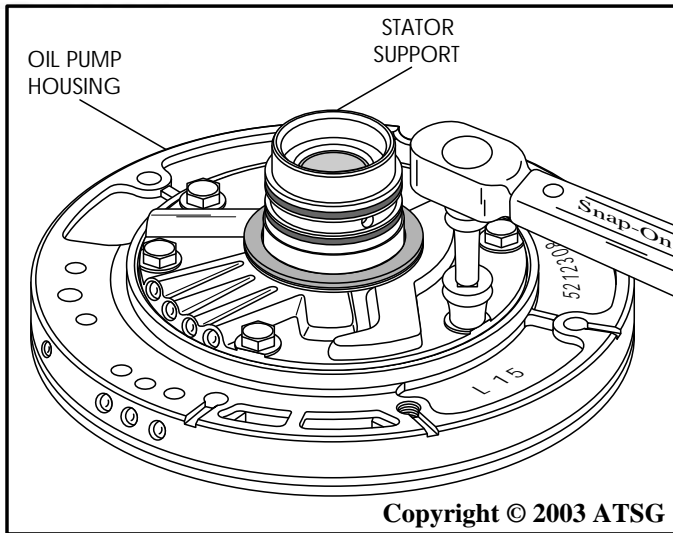


Figure 89

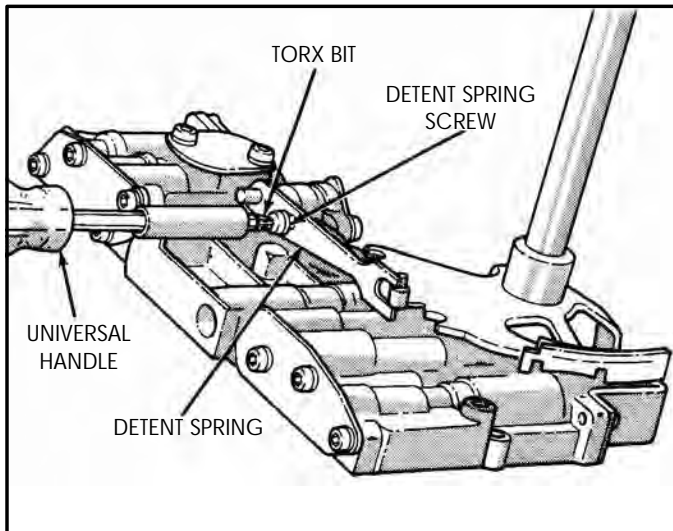


Figure 90

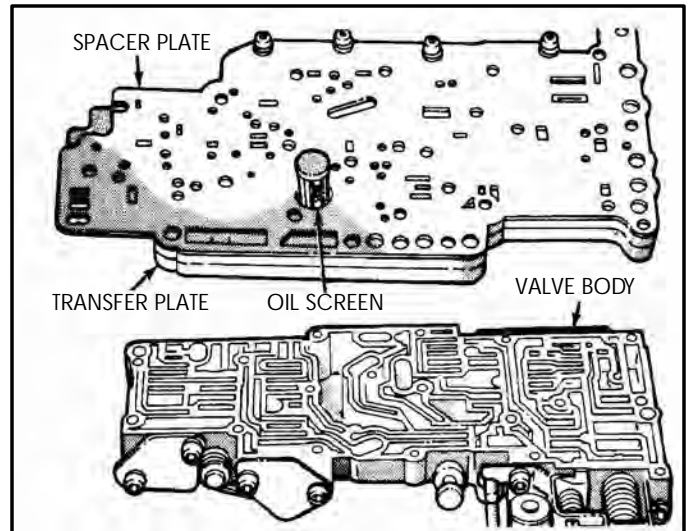


Figure 92

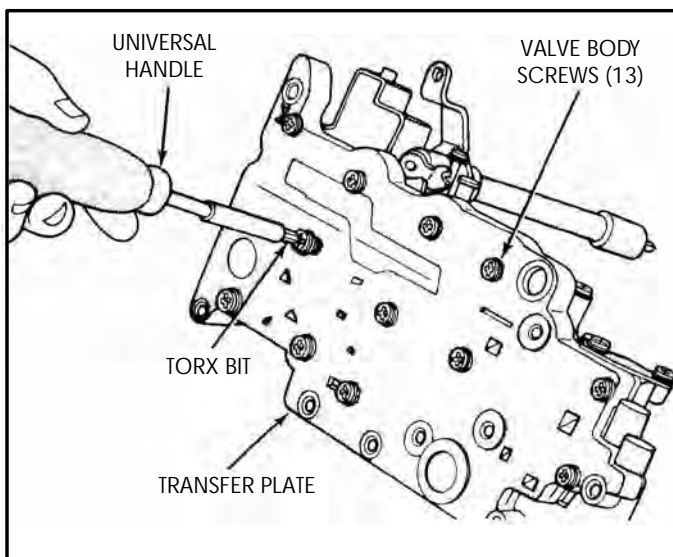


Figure 91

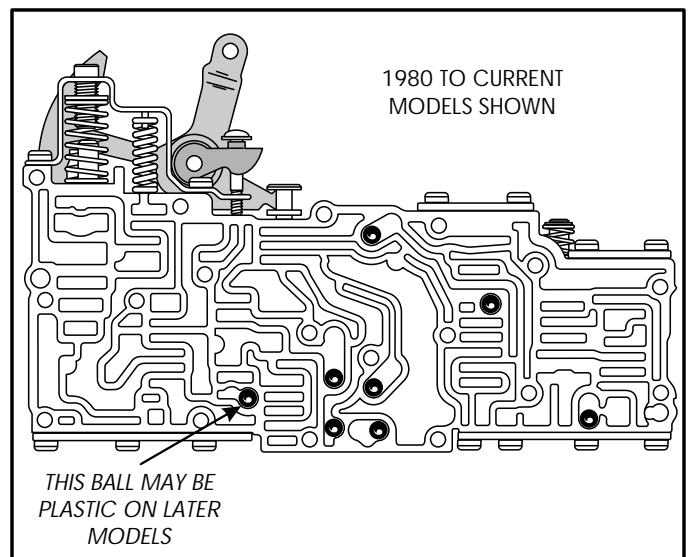


Figure 93

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**COOLER BY-PASS VALVE  
ADDED TO VALVE BODY  
IN MID 1999**

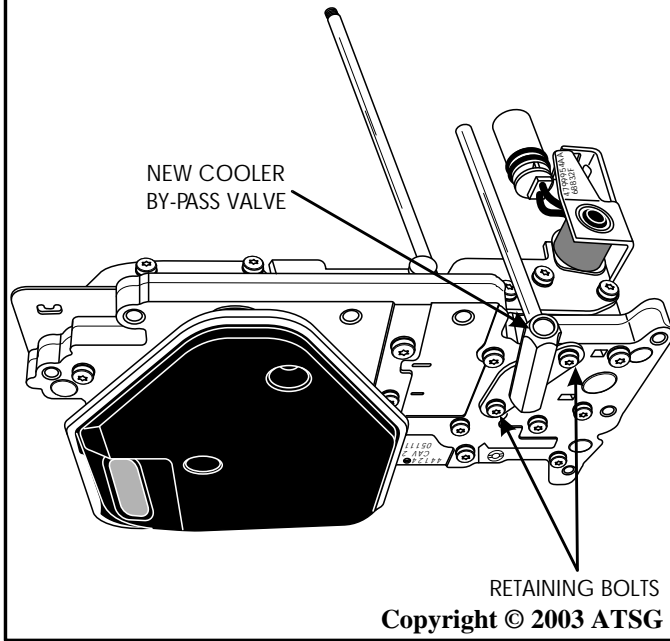


Figure 94

**NEW CASE TO ACCEPT  
COOLER BY-PASS VALVE  
ADDED TO VALVE BODY  
IN MID 1999**

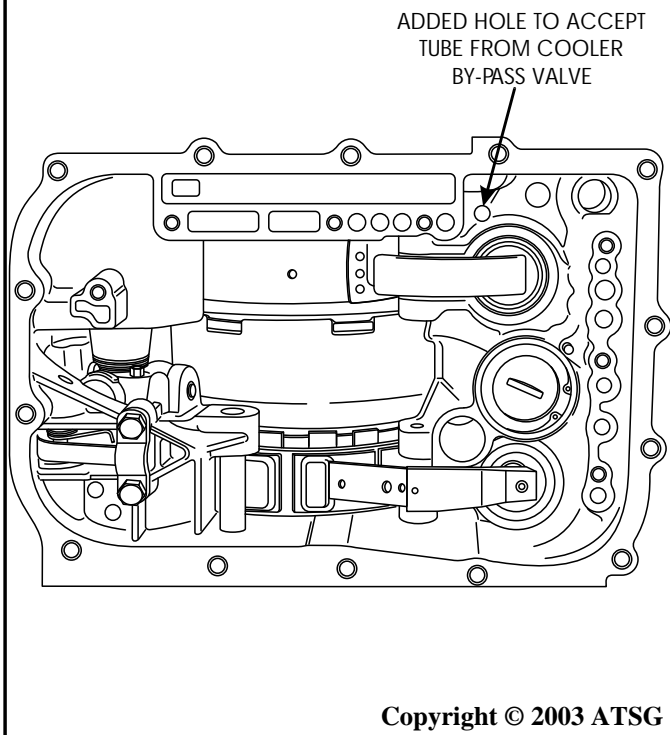


Figure 95

**COMPONENT REBUILD SECTION (Cont'd)  
Valve Body Assembly (Cont'd)**

- If you have a mid 1999 or later model, there will be an added cooler by-pass valve assembly on the valve body, as shown in Figure 94, that must also be removed.

**New Valve Body Assembly Changes**

The Chrysler 31TH (A670) transaxle has been revised to include a cooler by-pass system and was changed during the 1999 model year as a running change (See Figure 94).

This new system will allow lube oil to by-pass the transaxle oil cooler in the vehicle under extreme cold conditions and feed oil directly back into the lube circuit. This will improve durability at extreme cold conditions, instead of restricting lube oil to the transaxle and possibly resulting in a failure.

A new drilled hole has also been added in the valve body face area of the case, as shown in Figure 95, to the cooler return circuit of the case. The pump face cooler return hole has also been made larger and relocated, to align with case lube circuit, which also requires a new pump gasket.

The transfer plate has a drilled through hole and a pocket to accept the by-pass valve seal, and two added screw holes to accommodate the added cooler by-pass valve assembly (See Figure 94).

The new seal locates in the pocket of the transfer plate and seals against the new cooler by-pass valve assembly.

The by-pass valve assembly consists of a spring loaded ball inside of a body/tube that is attached to the transfer plate with two new screws and inserted into the new case lube circuit hole, as shown in Figures 94 and 95.

**NOTE: "None of the parts listed above can be used with any previous design transaxles, unless all parts are used as a service package together."**

- New OEM Part Numbers as of this printing:
- Transfer Plate (New Design) ..... 4377811AD
  - Cooler By-Pass Valve Assembly ..... 4800018AA
  - Cooler By-Pass Seal ..... 4800019AA
  - Pump Gasket (New Design) ..... 4269661AB

## Valve Body Assembly (Cont'd)

6. Remove the "E" clip from throttle shaft using a screwdriver, as shown in Figure 96.
7. Remove the "E" clip and washer from throttle shaft as shown in Figure 97.
8. Remove the manual valve lever assembly and throttle valve lever assembly (See Figure 98).
9. Remove the manual valve from the valve body, as shown in Figure 99.
10. Remove the 2 retaining screws and remove the pressure regulator spring bracket, as shown in Figure 100.

**Continued on Page 48.**

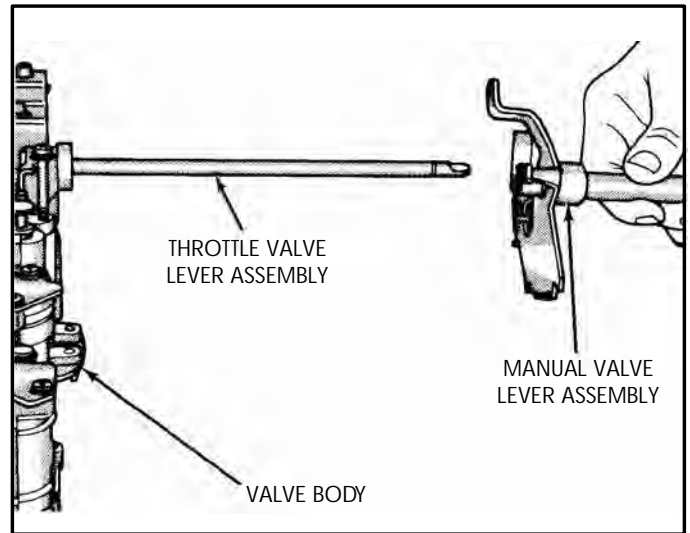


Figure 98

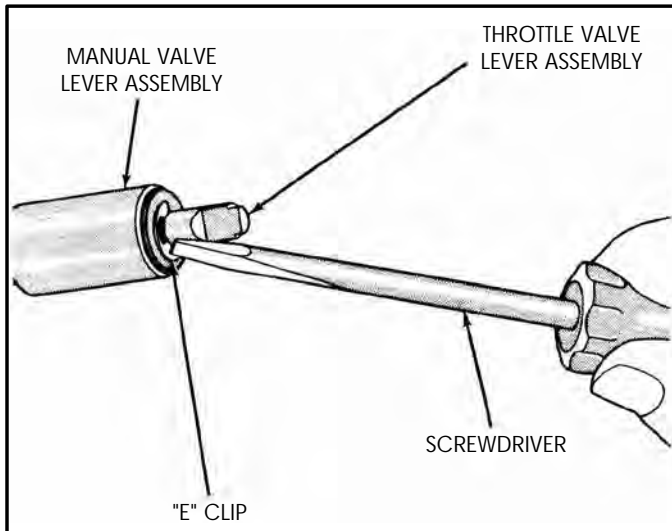


Figure 96

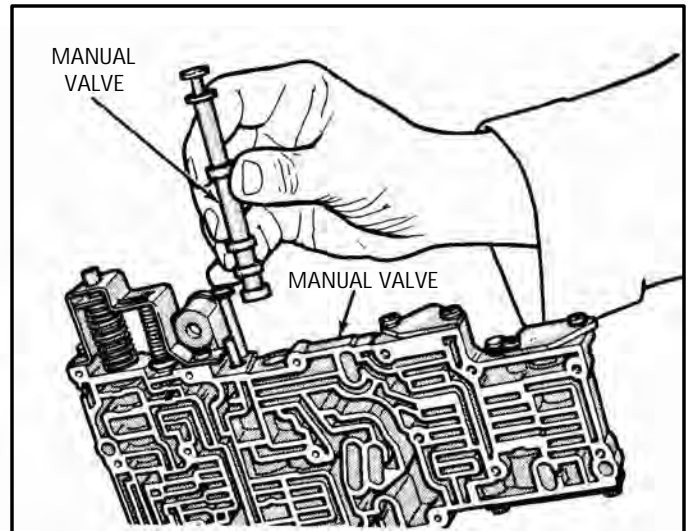


Figure 99

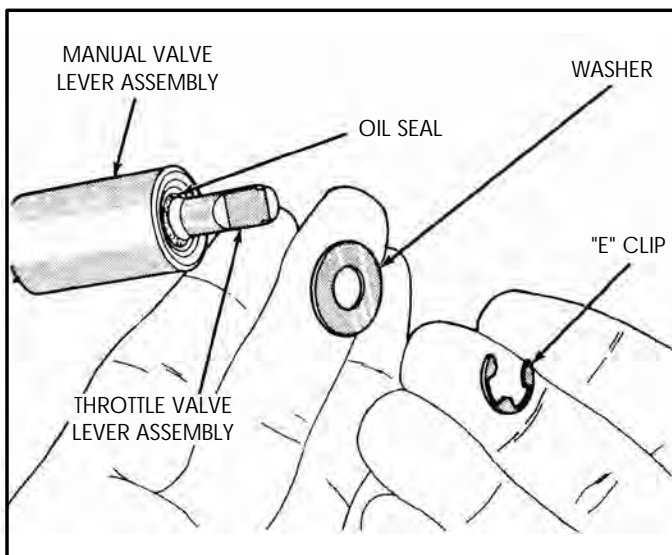


Figure 97

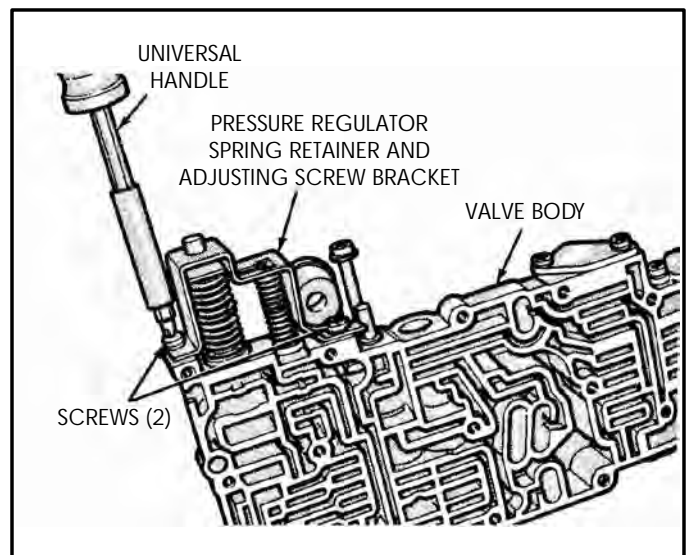
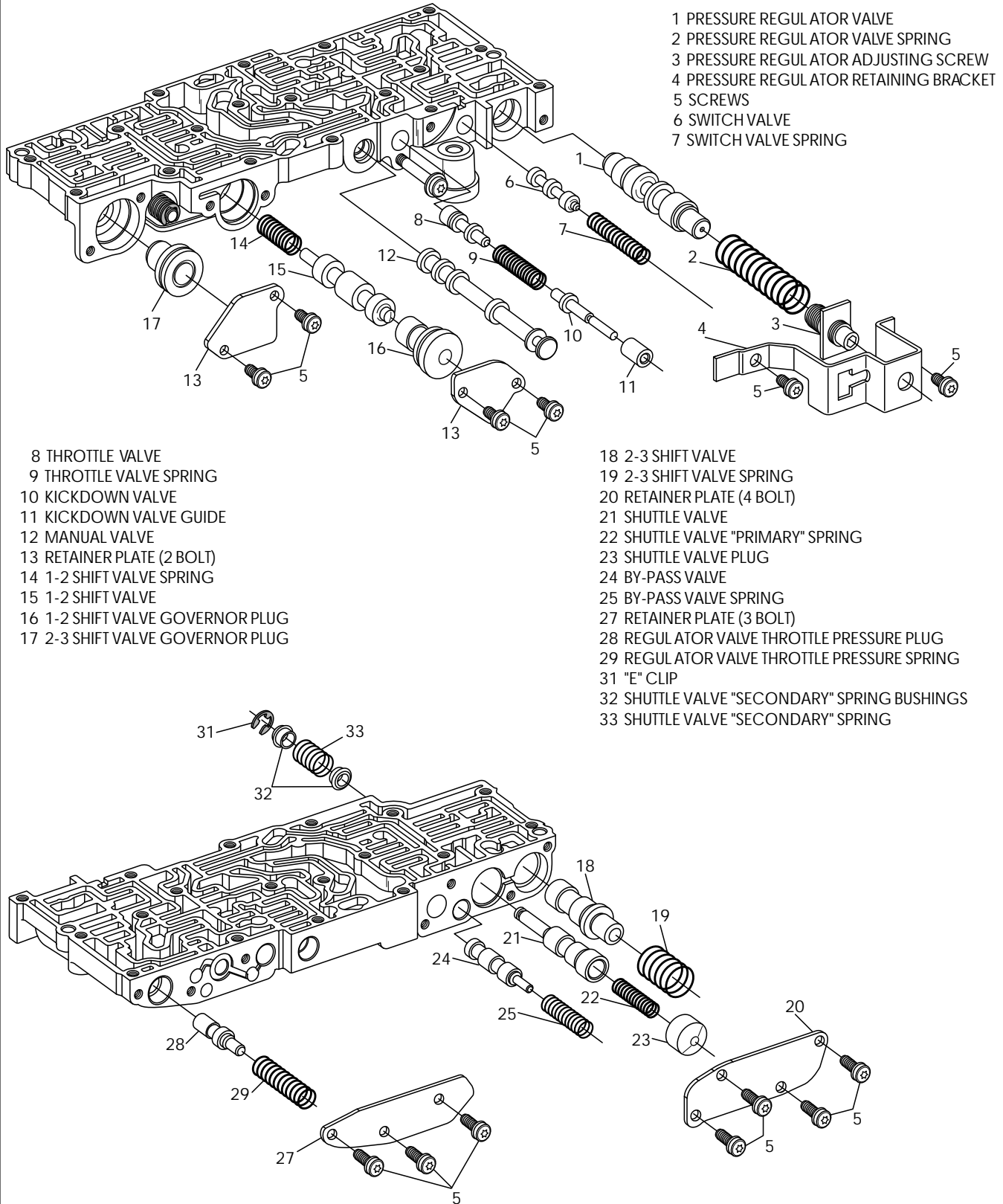


Figure 100

## TYPICAL A404 "NON-LOCK-UP" VALVE BODY EXPLODED VIEW



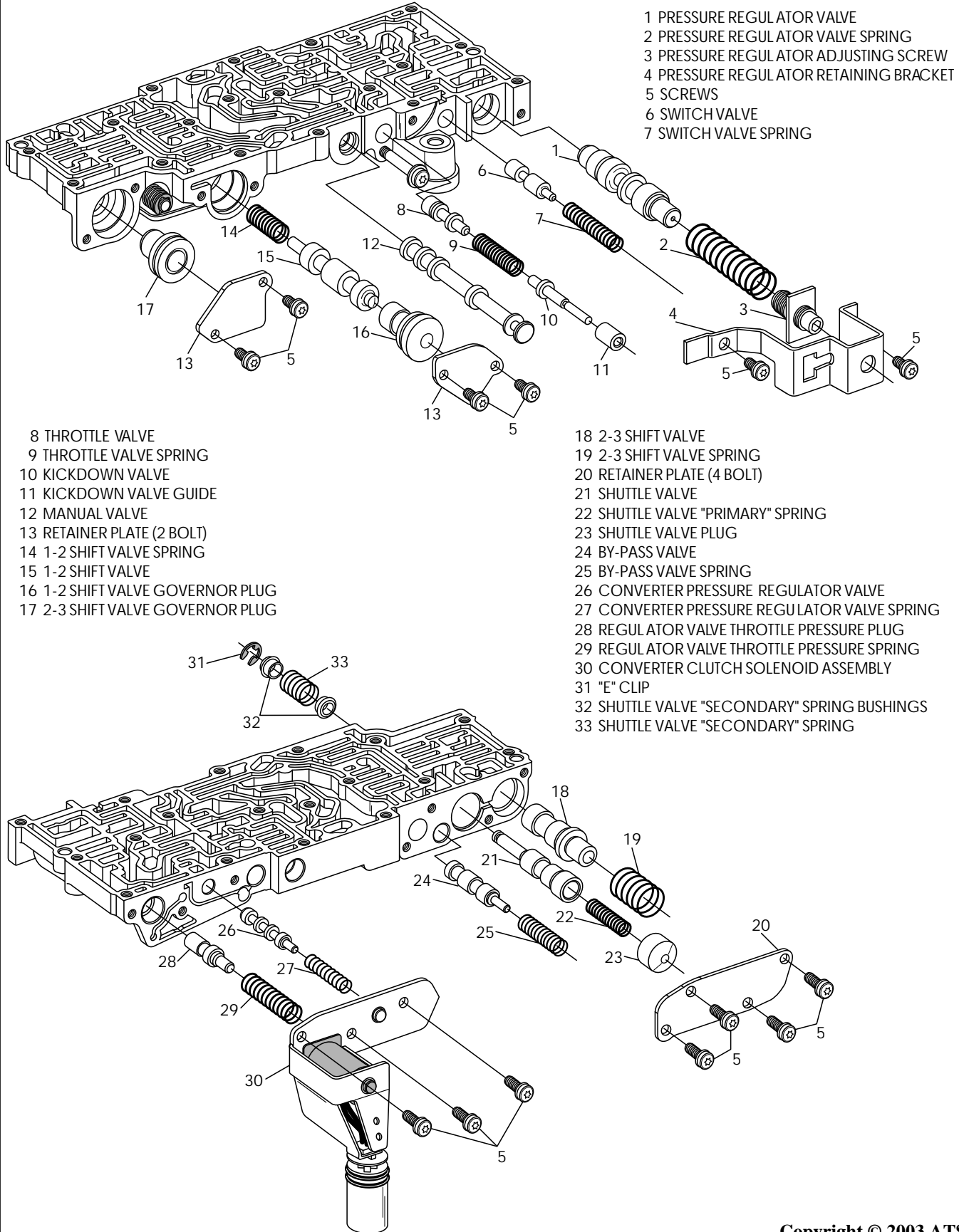
- 1 PRESSURE REGULATOR VALVE
- 2 PRESSURE REGULATOR VALVE SPRING
- 3 PRESSURE REGULATOR ADJUSTING SCREW
- 4 PRESSURE REGULATOR RETAINING BRACKET
- 5 SCREWS
- 6 SWITCH VALVE
- 7 SWITCH VALVE SPRING

- 8 THROTTLE VALVE
- 9 THROTTLE VALVE SPRING
- 10 KICKDOWN VALVE
- 11 KICKDOWN VALVE GUIDE
- 12 MANUAL VALVE
- 13 RETAINER PLATE (2 BOLT)
- 14 1-2 SHIFT VALVE SPRING
- 15 1-2 SHIFT VALVE
- 16 1-2 SHIFT VALVE GOVERNOR PLUG
- 17 2-3 SHIFT VALVE GOVERNOR PLUG

- 18 2-3 SHIFT VALVE
- 19 2-3 SHIFT VALVE SPRING
- 20 RETAINER PLATE (4 BOLT)
- 21 SHUTTLE VALVE
- 22 SHUTTLE VALVE "PRIMARY" SPRING
- 23 SHUTTLE VALVE PLUG
- 24 BY-PASS VALVE
- 25 BY-PASS VALVE SPRING
- 27 RETAINER PLATE (3 BOLT)
- 28 REGULATOR VALVE THROTTLE PRESSURE PLUG
- 29 REGULATOR VALVE THROTTLE PRESSURE SPRING
- 31 "E" CLIP
- 32 SHUTTLE VALVE "SECONDARY" SPRING BUSHINGS
- 33 SHUTTLE VALVE "SECONDARY" SPRING

Figure 101

## A670 "LOCK-UP" VALVE BODY EXPLODED VIEW



- 1 PRESSURE REGULATOR VALVE
- 2 PRESSURE REGULATOR VALVE SPRING
- 3 PRESSURE REGULATOR ADJUSTING SCREW
- 4 PRESSURE REGULATOR RETAINING BRACKET
- 5 SCREWS
- 6 SWITCH VALVE
- 7 SWITCH VALVE SPRING

- 8 THROTTLE VALVE
- 9 THROTTLE VALVE SPRING
- 10 KICKDOWN VALVE
- 11 KICKDOWN VALVE GUIDE
- 12 MANUAL VALVE
- 13 RETAINER PLATE (2 BOLT)
- 14 1-2 SHIFT VALVE SPRING
- 15 1-2 SHIFT VALVE
- 16 1-2 SHIFT VALVE GOVERNOR PLUG
- 17 2-3 SHIFT VALVE GOVERNOR PLUG

- 18 2-3 SHIFT VALVE
- 19 2-3 SHIFT VALVE SPRING
- 20 RETAINER PLATE (4 BOLT)
- 21 SHUTTLE VALVE
- 22 SHUTTLE VALVE "PRIMARY" SPRING
- 23 SHUTTLE VALVE PLUG
- 24 BY-PASS VALVE
- 25 BY-PASS VALVE SPRING
- 26 CONVERTER PRESSURE REGULATOR VALVE
- 27 CONVERTER PRESSURE REGULATOR VALVE SPRING
- 28 REGULATOR VALVE THROTTLE PRESSURE PLUG
- 29 REGULATOR VALVE THROTTLE PRESSURE SPRING
- 30 CONVERTER CLUTCH SOLENOID ASSEMBLY
- 31 "E" CLIP
- 32 SHUTTLE VALVE "SECONDARY" SPRING BUSHINGS
- 33 SHUTTLE VALVE "SECONDARY" SPRING

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Figure 102

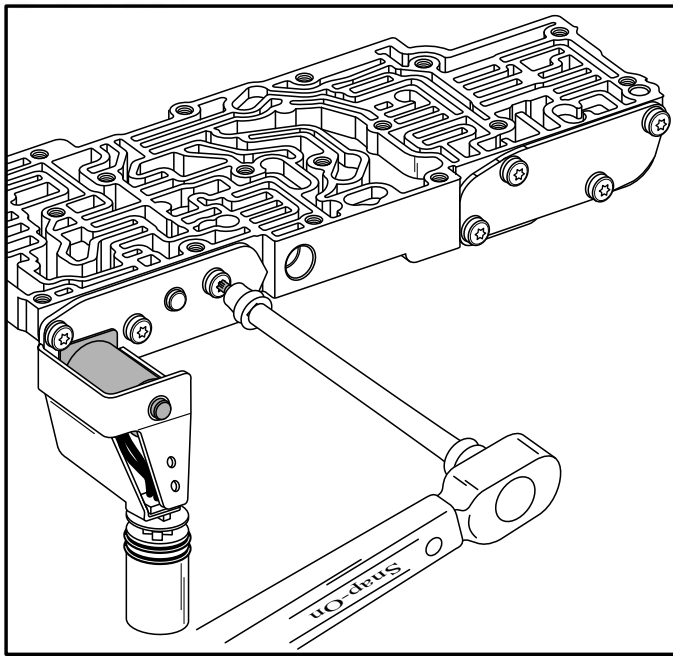


Figure 103

### Valve Body Assembly (Cont'd from Page 45)

11. Remove and/or install the valves, springs, bore plugs and retainer plates using Figures 101 and 102 as a guide.
12. Lubricate the valves, springs and bore plugs with clean transmission fluid.
13. Install retainer plates, lock-up solenoid and pressure regulator bracket, and torque all bolts to 40 in.lbs. (See Figure 103).
14. Install the manual valve into its bore in valve body, as shown in Figure 105.
15. Install the checkballs in their proper locations, depending on the model that you are working on, as shown in Figure 104.
16. Install spacer plate and screen on the transfer plate and install the four retaining screws, as shown in Figure 106.

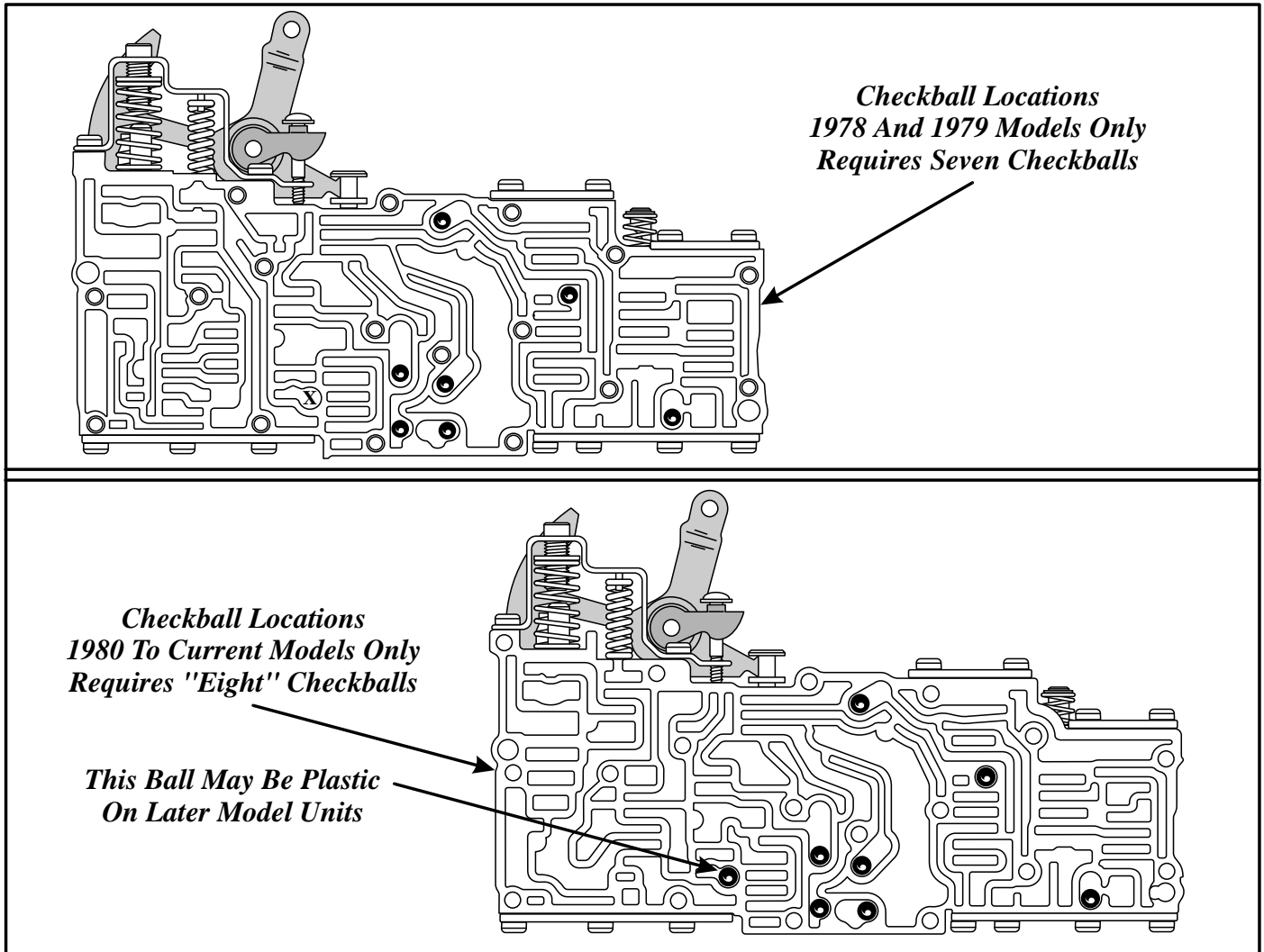


Figure 104

## Valve Body Assembly (Cont'd)

17. Install the throttle valve lever assembly and the manual valve lever assembly, using Figure 98 as a reference.
18. Install transfer plate and spacer plate assembly onto valve body and **hand start** all retaining screws, as shown in Figure 107.
19. If your model is so equipped, install by-pass valve seal and cooler by-pass valve assembly, as shown in Figure 108.
20. Install the two by-pass valve retaining screws and **now** torque all screws to 40 in.lbs.

Continued on Page 50.

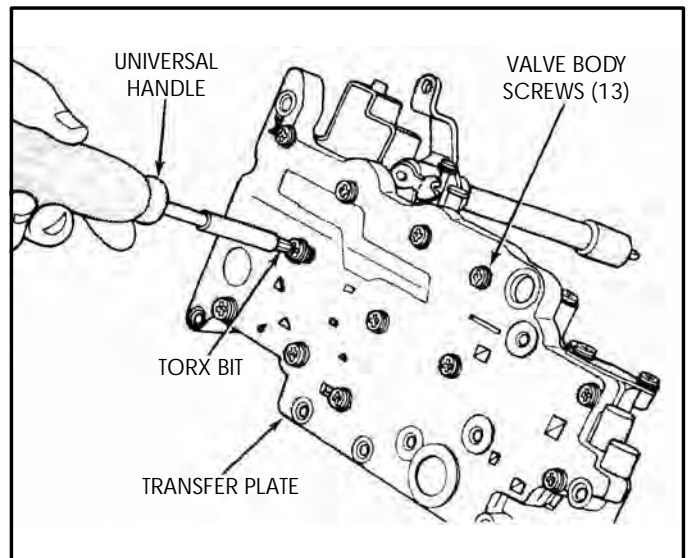


Figure 107

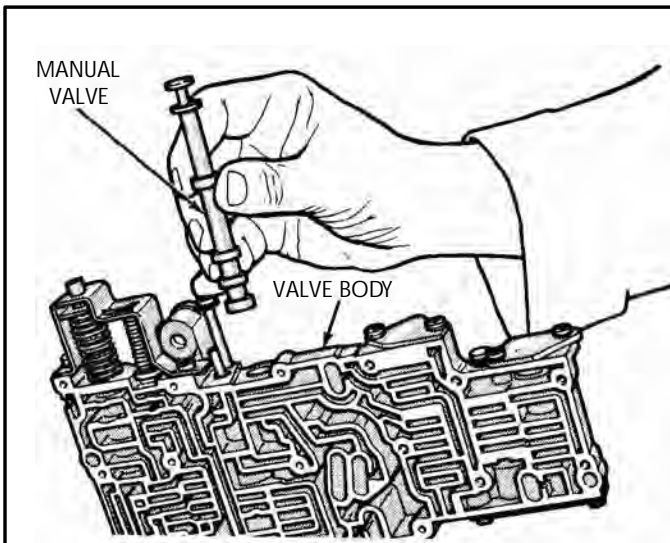


Figure 105

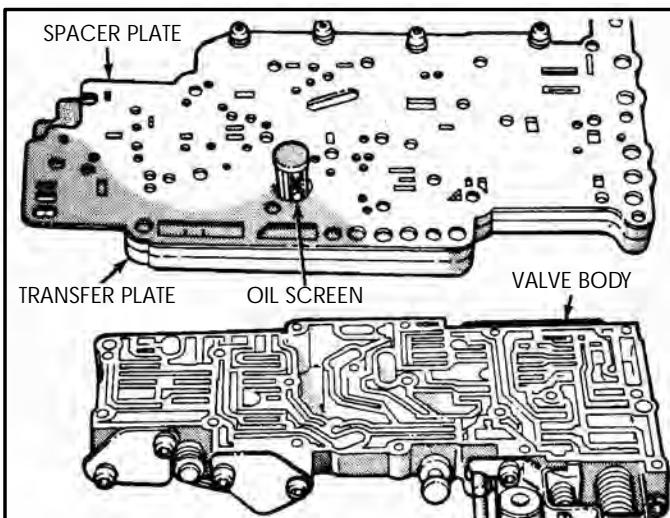


Figure 106

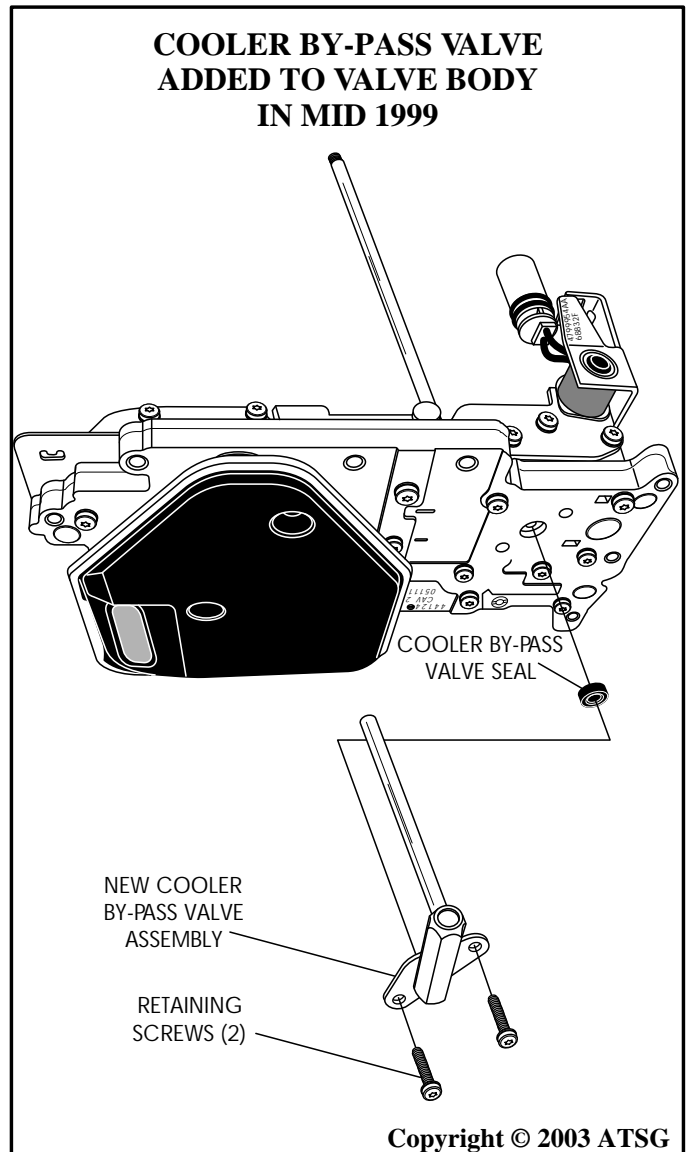


Figure 108

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## Valve Body Assembly (Cont'd)

21. Install **new** throttle shaft oil seal, as shown in Figure 109.
22. Install flat washer and "E" clip, as shown in Figures 109 and 110.
23. Install the detent spring onto the valve body, as shown in Figure 111, and torque the screw to 40 in.lbs.
23. Set the completed valve body assembly aside for the final assembly process.

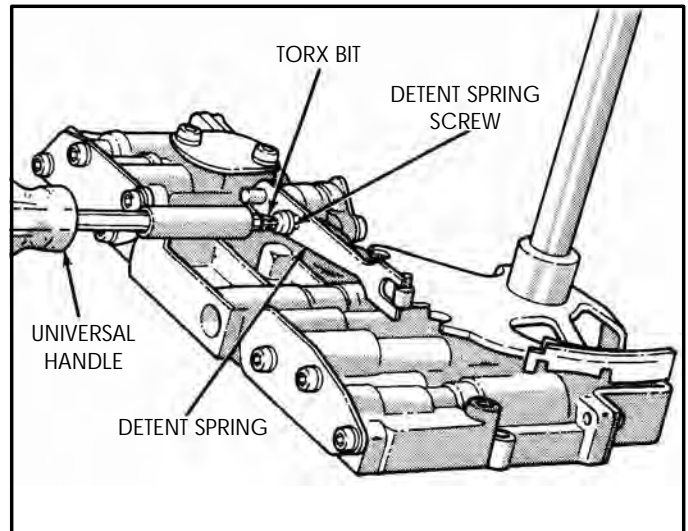


Figure 111

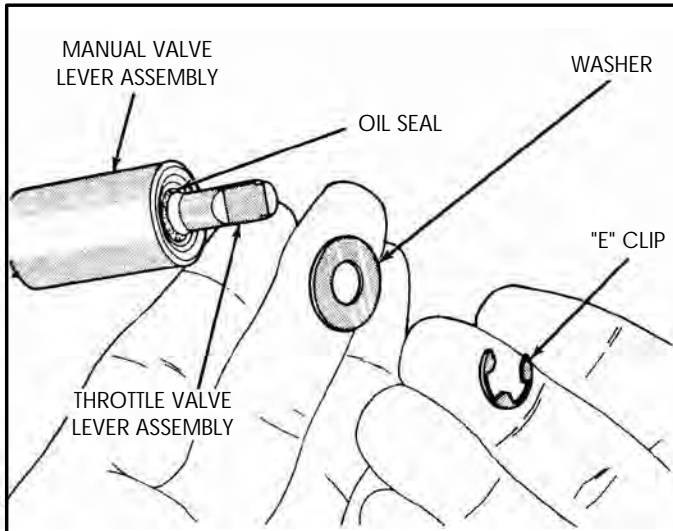


Figure 109

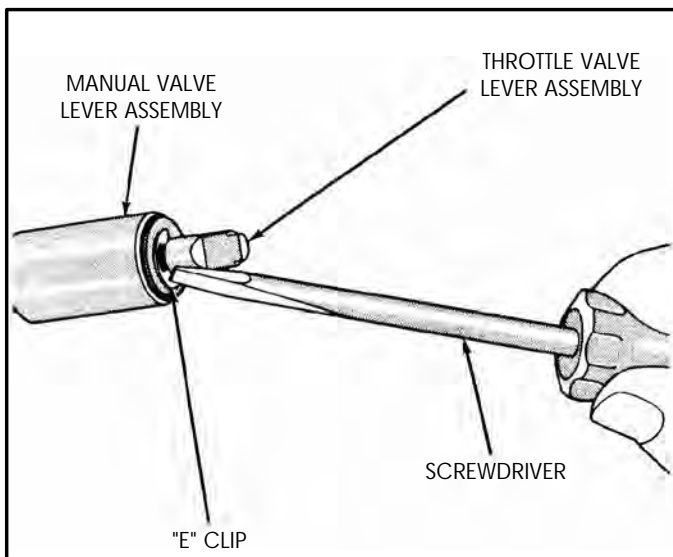


Figure 110

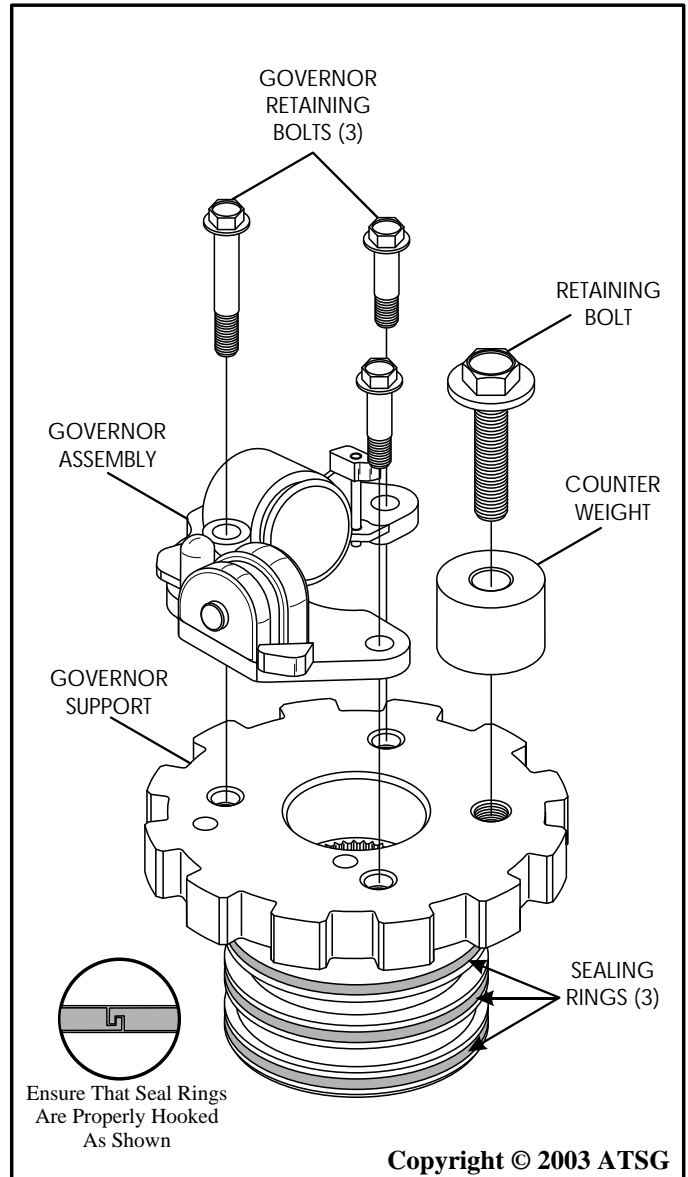


Figure 112

## COMPONENT REBUILD SECTION (Cont'd)

### Governor and Governor Support Assembly

1. Disassemble governor and governor support assembly, as shown in Figure 112.
- Note: It is not necessary to remove the counter weight, as shown in Figure 112, unless damage is apparent.*
2. Disassemble the governor valves, springs and screen from governor body, using Figure 113 as a guide.
3. Clean governor and support parts thoroughly and dry with compressed air.
4. Install 3 **new** sealing rings on governor support, as shown in Figure 112, and insure that they are properly hooked.
5. Install valves, weights and springs in governor body exactly as shown in Figure 113.
6. Install the "Nail" to retain the governor weight and spring in the bore (See Figure 113).
7. Install **new** governor screen in governor body, as shown in Figure 113.
8. Governor assembly is now ready to install onto the support, as shown in Figure 112.
- Note: This unit is bad about the governor valve sticking and creating high gear starts. There is available from Sonnax® a bracket and spring kit, under part number 32204-03K, that will remedy this concern, and illustrated in Figure 114. This bracket and spring kit must be installed under two of the bolts.*
9. Install the governor body onto the governor support, as shown in Figure 112, and torque the three retaining bolts to 60 in.lbs.
10. Insure the valve and weight operate freely in their bores after tightening.
11. If the counter weight was removed, torque its retaining bolt to 250 in.lbs. (See Figure 112).
12. Set the completed governor and support aside for the final assembly process, ensuring that it is placed so that the valve does not fall out. Refer to Figure 115.

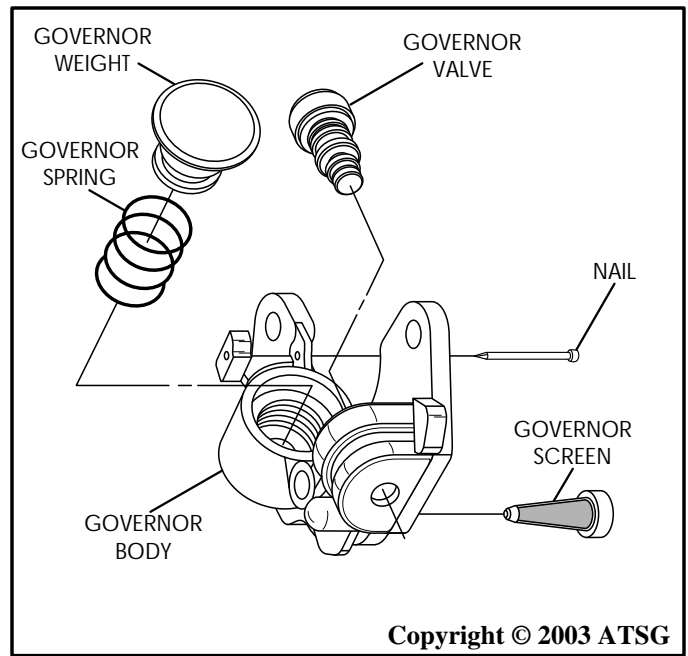


Figure 113

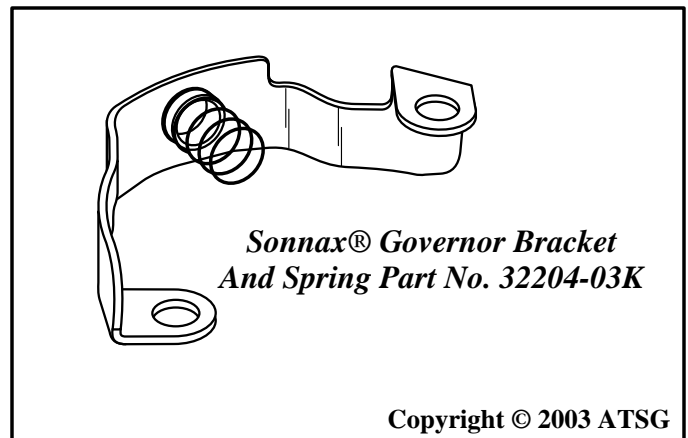


Figure 114

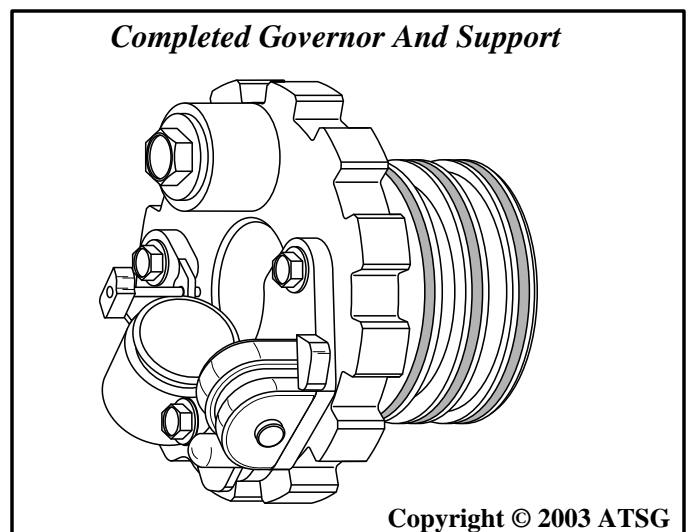


Figure 115

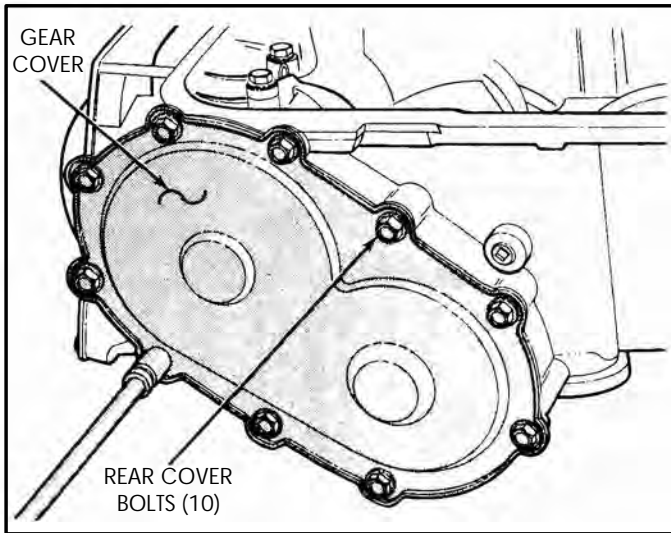


Figure 116

## GEAR TRAIN DISASSEMBLY

1. If disassembly of the gear train is necessary proceed as follows.
2. Remove the 10 gear cover bolts, as shown in Figure 116.
3. Remove the rear transfer gear cover and clean off the R.T.V. sealant (See Figure 117).
4. Using special tool L-4434 installed with two bolts, as shown in Figure 118, remove the transfer shaft gear retaining nut and washer.
5. Install gear puller on the transfer shaft gear, as shown in Figure 120, and remove transfer gear using the puller (See Figure 120).

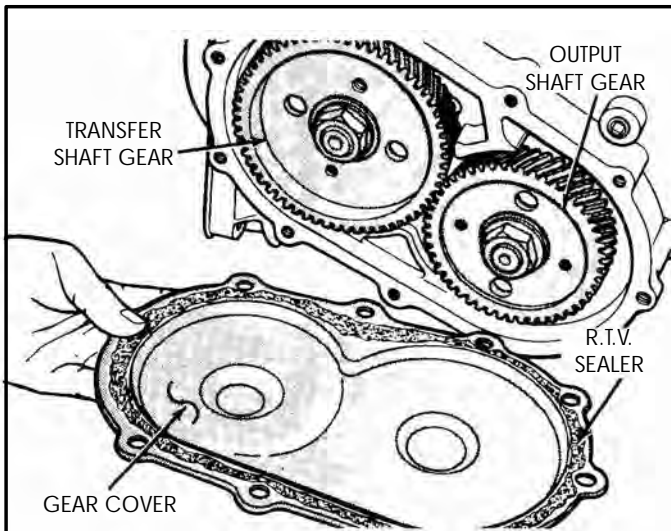


Figure 117

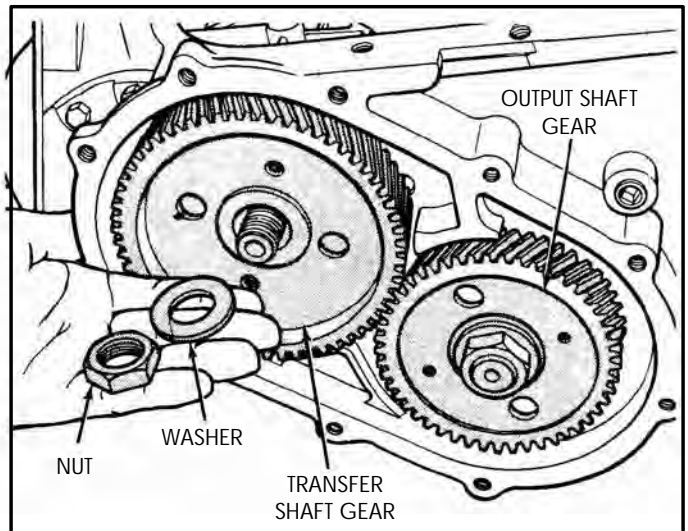


Figure 119

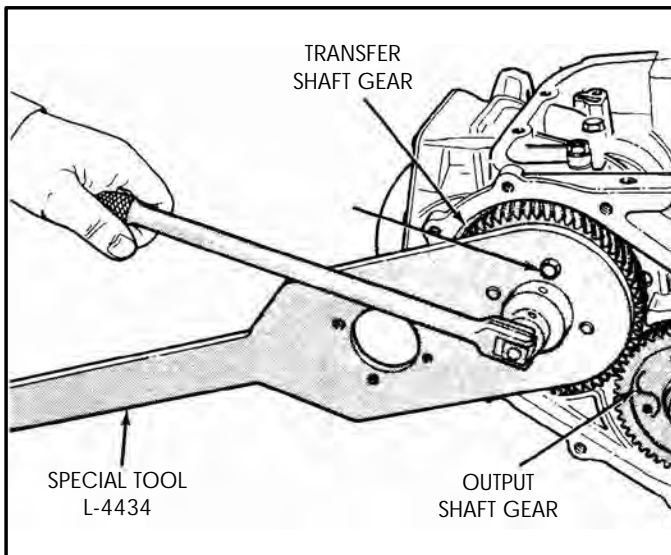


Figure 118

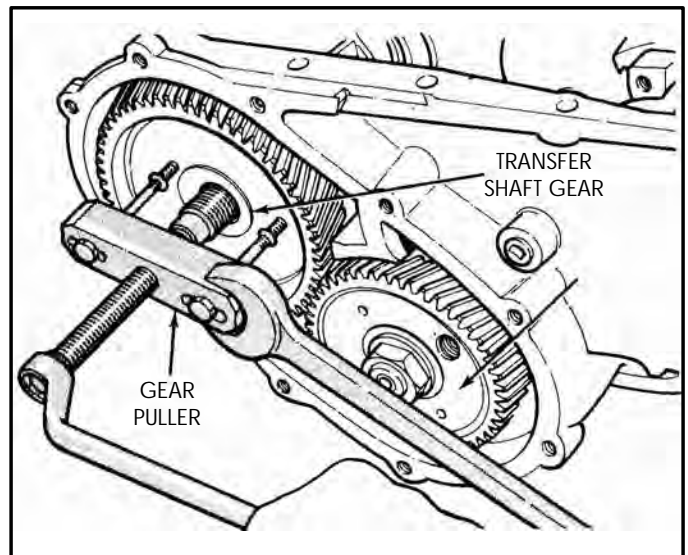


Figure 120

6. Remove transfer shaft gear and the *selective* shim from unit, as shown in Figure 121.
7. Remove governor support retainer, as shown in Figure 122.
8. Remove the low/reverse band anchor pin from case, as shown in Figure 123.
9. Remove the governor and governor support as an assembly, as shown in Figure 124, and refer to Pages 50 and 51 for service.
10. Remove the transfer shaft bearing retainer snap ring using the snap ring pliers, as shown in Figure 125.

Continued on Page 54

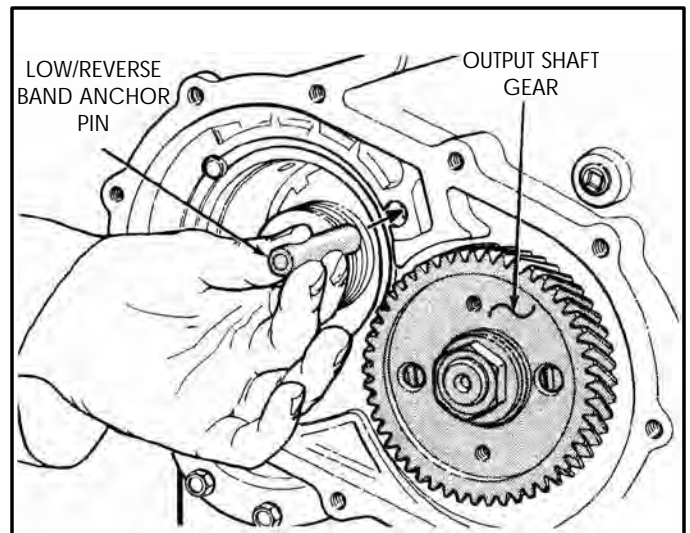


Figure 123

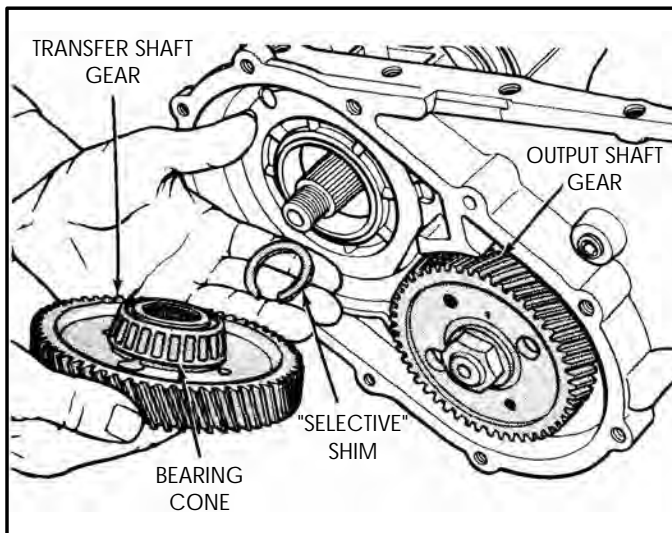


Figure 121

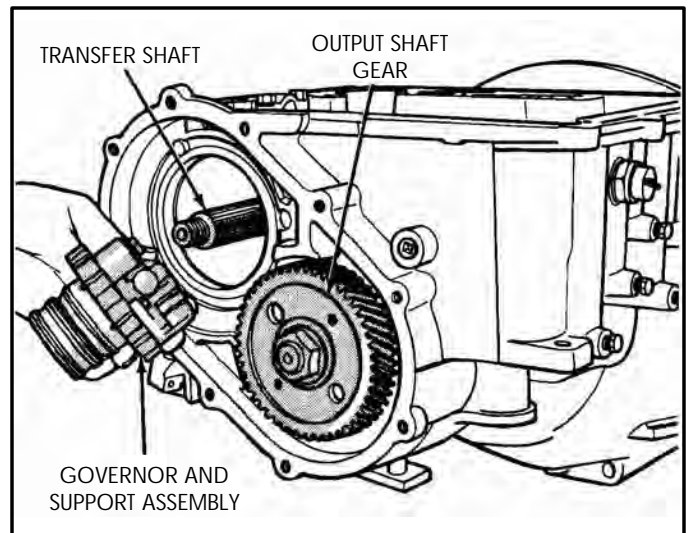


Figure 124

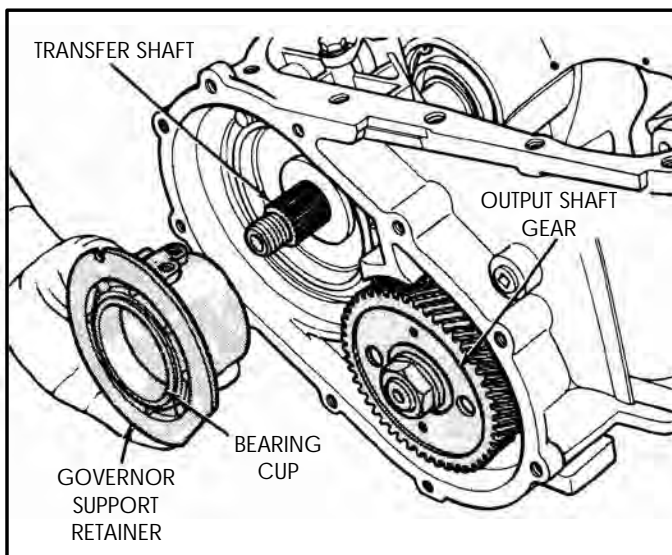


Figure 122

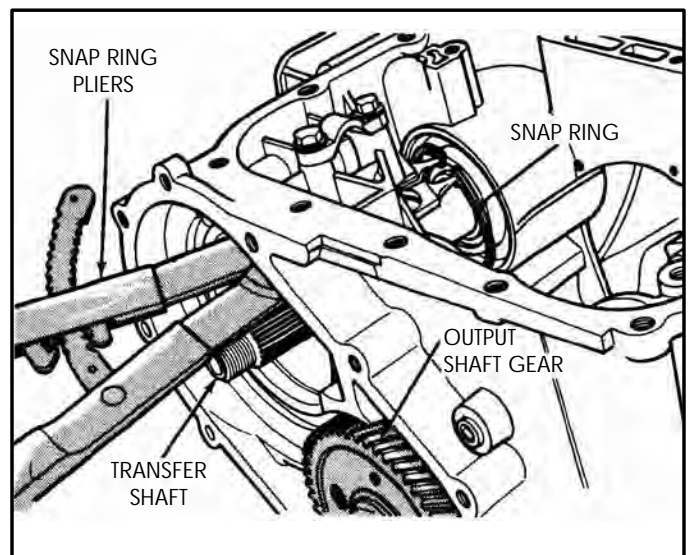


Figure 125

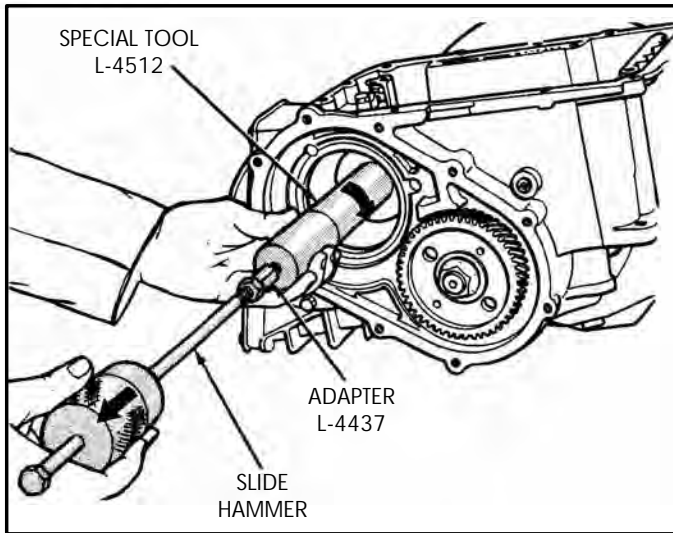


Figure 126

## GEAR TRAIN DISASSEMBLY (Cont'd)

11. Install the special tool L-4512 over the transfer shaft, as shown in Figure 126, and attach slide hammer using adapter L-4437.
12. Using the slide hammer action, remove transfer shaft and bearing retainer assembly, as shown in Figure 127.
13. Separate the bearing retainer from the transfer shaft, as shown in Figure 128.
14. Remove the two bolts from parking pawl rod support and remove the parking pawl support from case, as shown in Figures 129 and 130.
15. Remove park pawl pivot shaft, park pawl and return spring, as shown in Figure 131.

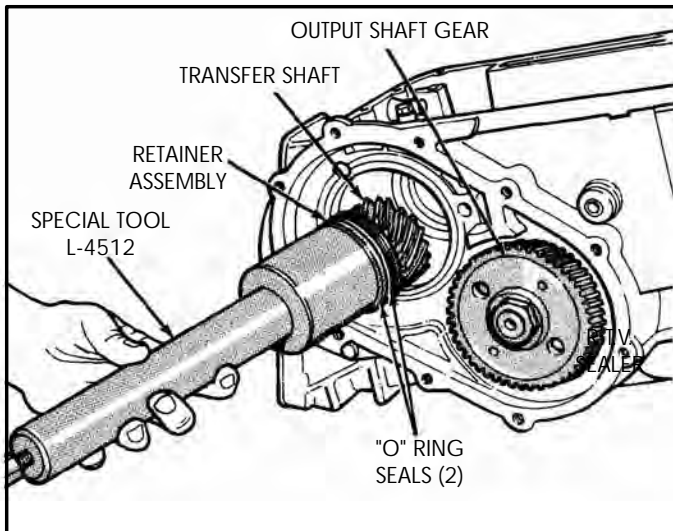


Figure 127

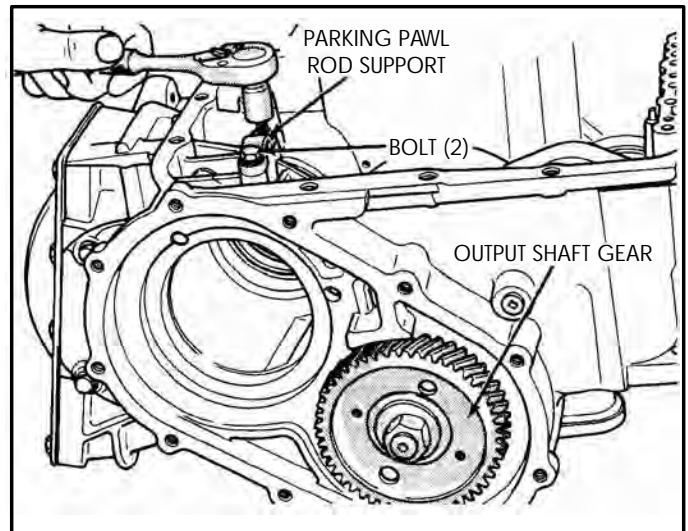


Figure 129

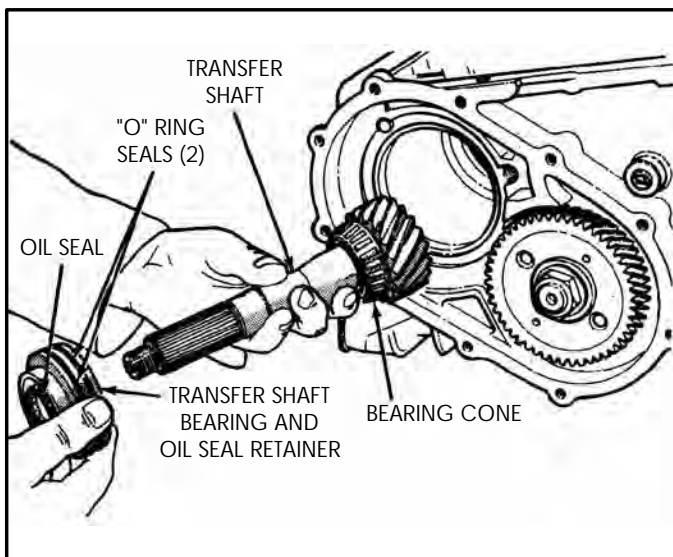


Figure 128

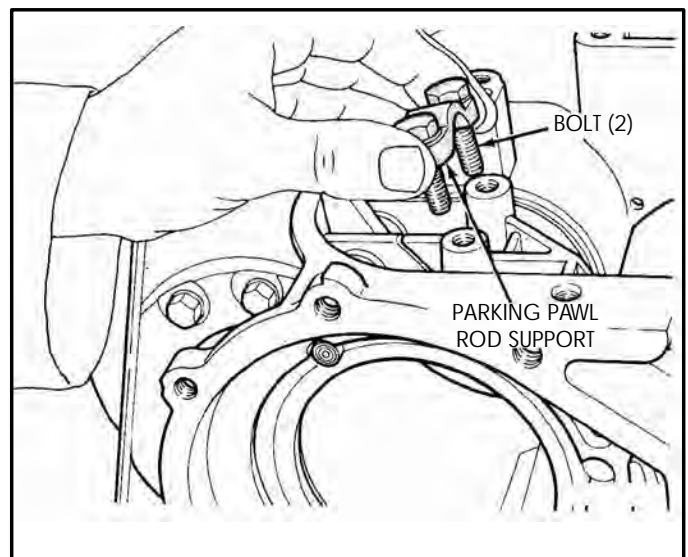


Figure 130

16. Install special tool L-4434 on output shaft gear as shown in Figure 132, to remove output shaft gear retaining nut.
17. Install gear puller onto the output shaft gear, as shown in Figure 133, and remove gear.
18. Remove the output shaft gear and the *selective* shim from output shaft (See Figure 134).
19. Remove the output shaft and the rear ring gear from opposite side of transaxle case, as shown in Figure 135.

**Continued on Page 56**

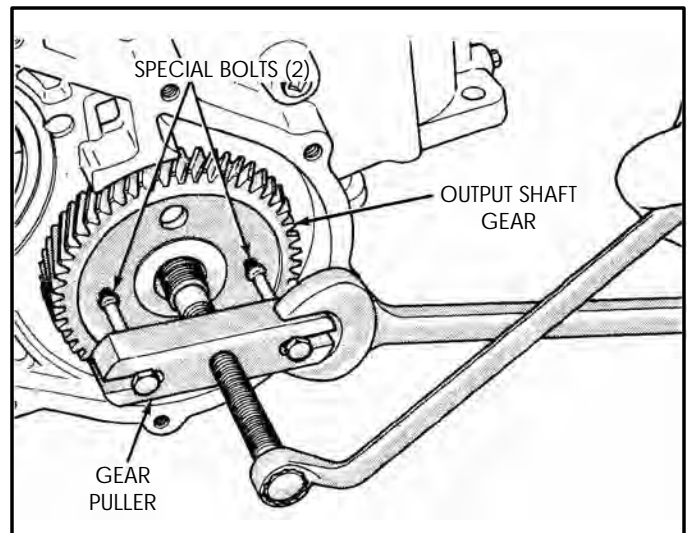


Figure 133

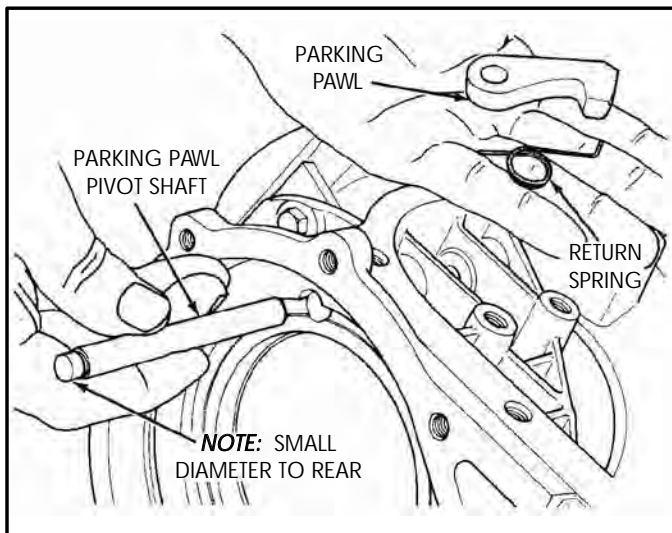


Figure 131

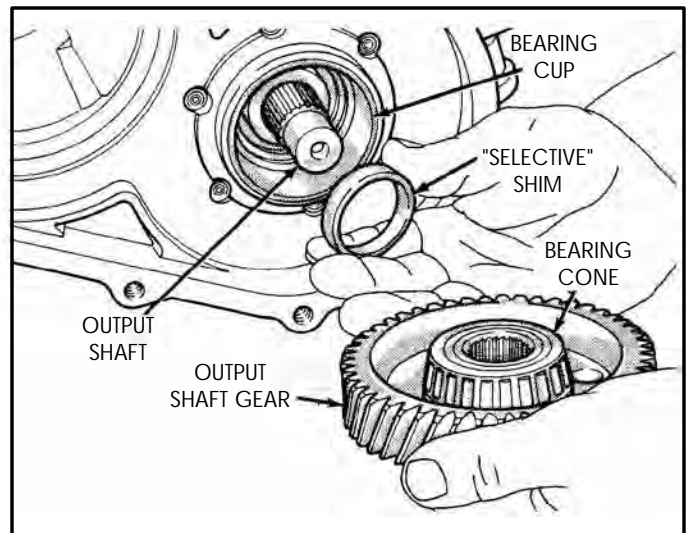


Figure 134

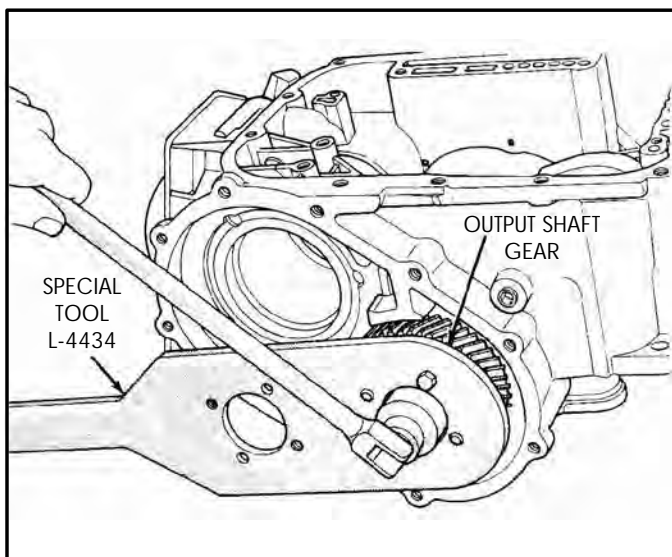


Figure 132

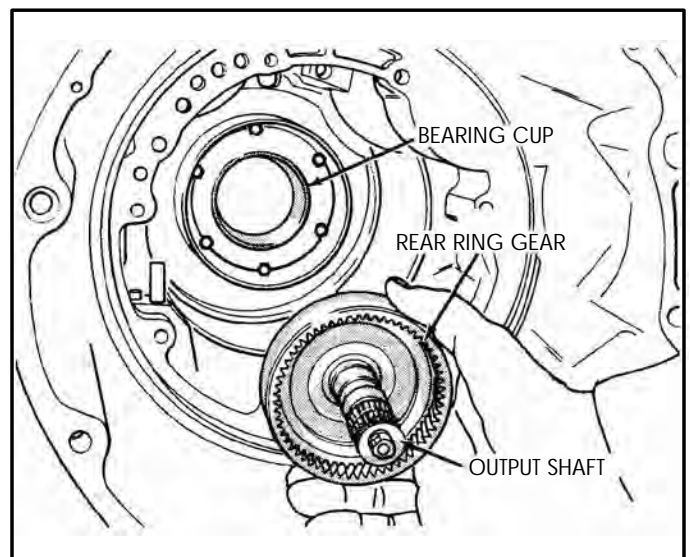


Figure 135

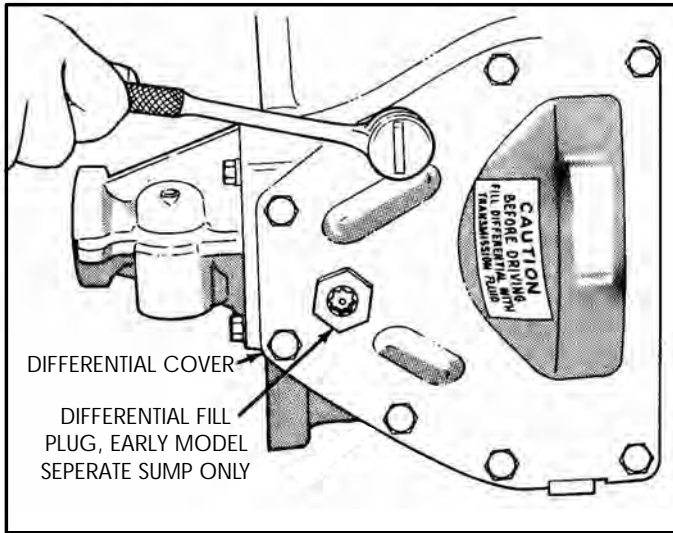


Figure 136

## GEAR TRAIN DISASSEMBLY (Cont'd)

20. Remove the differential cover bolts, as shown in Figure 136.
21. Remove the differential cover and remove the R.T.V. from the cover (See Figure 137).
22. Remove the six differential bearing retainer bolts, as shown in Figure 138.
23. Using the special tool L-4435, gently rotate the differential bearing retainer to remove it from case, as shown in Figure 139.
24. Remove the four extension housing bolts that retain the extension housing (See Figure 140).
25. Using the same special tool L-4435, rotate the extension housing to remove.

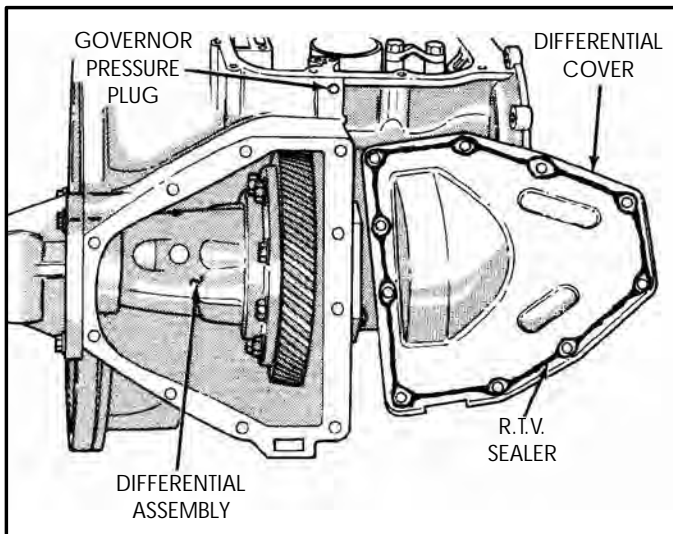


Figure 137

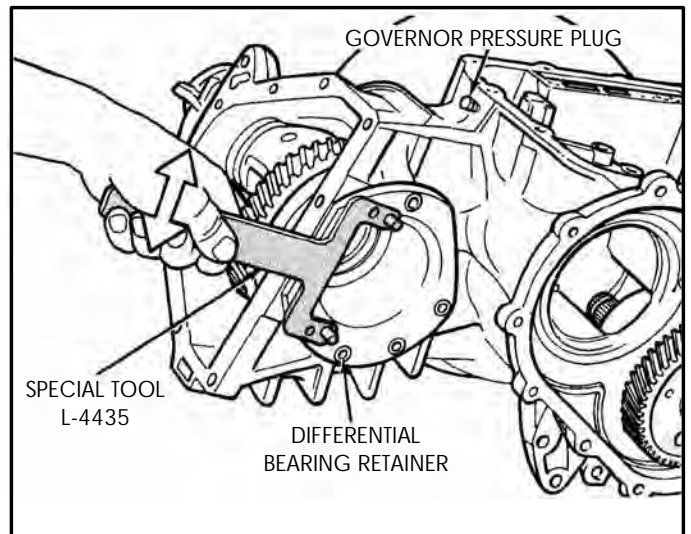


Figure 139

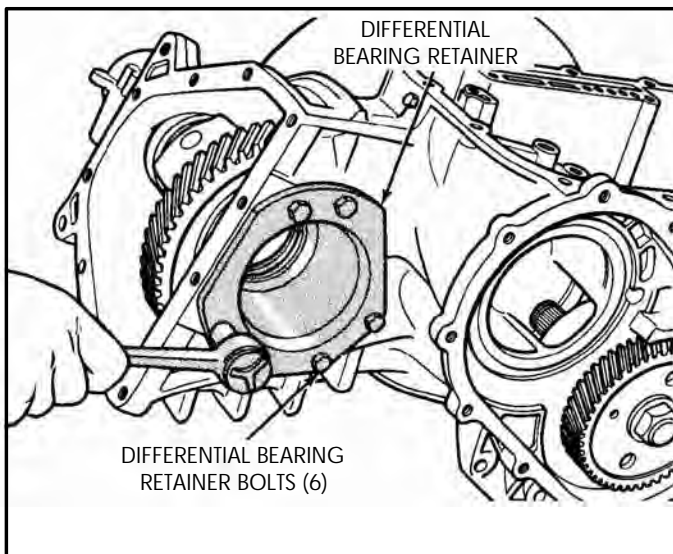


Figure 138

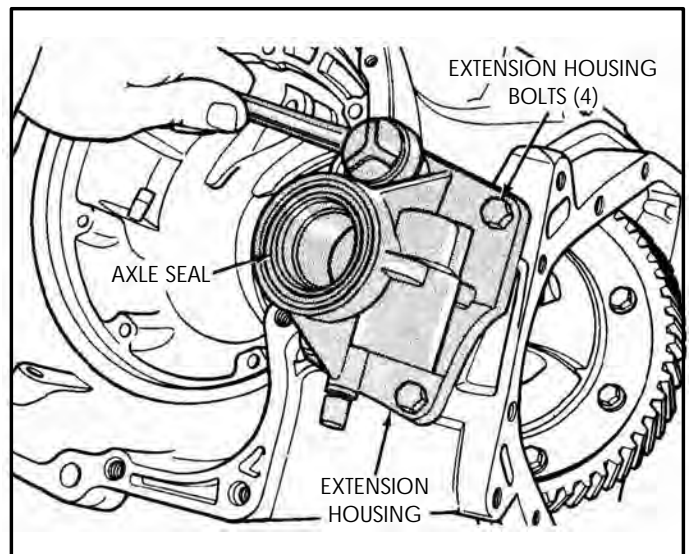


Figure 140

26. Remove the extension housing while holding the differential and ring gear assembly, and then remove the differential and ring gear from the case, as shown in Figure 141.
27. Clean and inspect all gear train parts and dry with compressed air.
28. Replace parts as necessary.
29. Now lets look at final drive differences and the many engineering changes that have occurred.

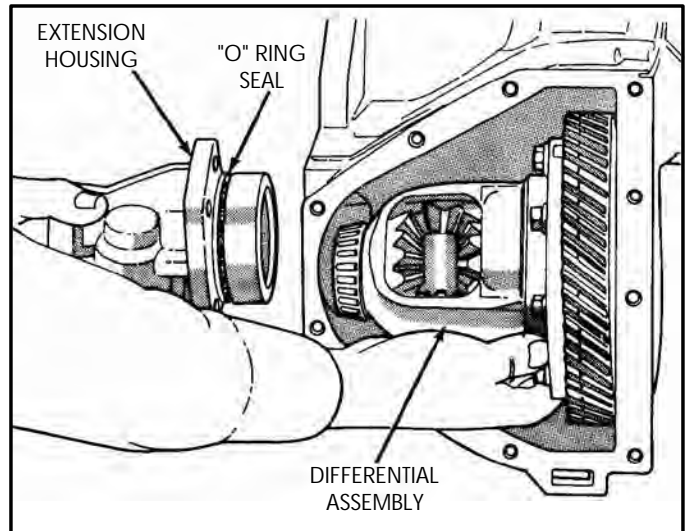


Figure 141

## FINAL DRIVE DIFFERENCES

Refer to Figures 142 and 143 for the differences in the design of the differential carrier and the related differential carrier parts. Notice in Figure 142 that the *"Single" Sump* units must have tabs on the side gear thrust washers. In Figure 143, we have given you the model year of the changes, illustrated the physical differences in the parts and the dimensions of the related parts for identification purposes.

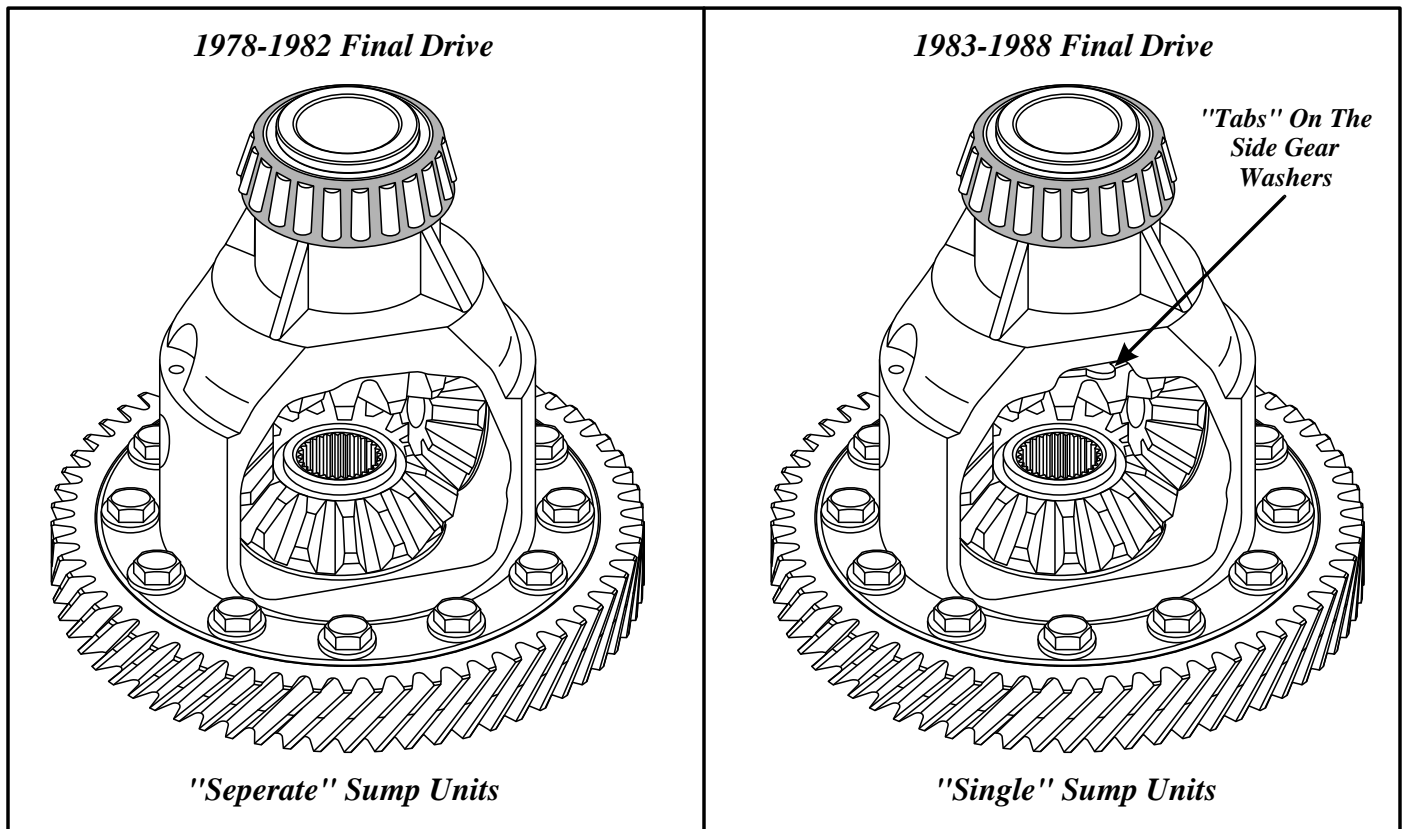


Figure 142

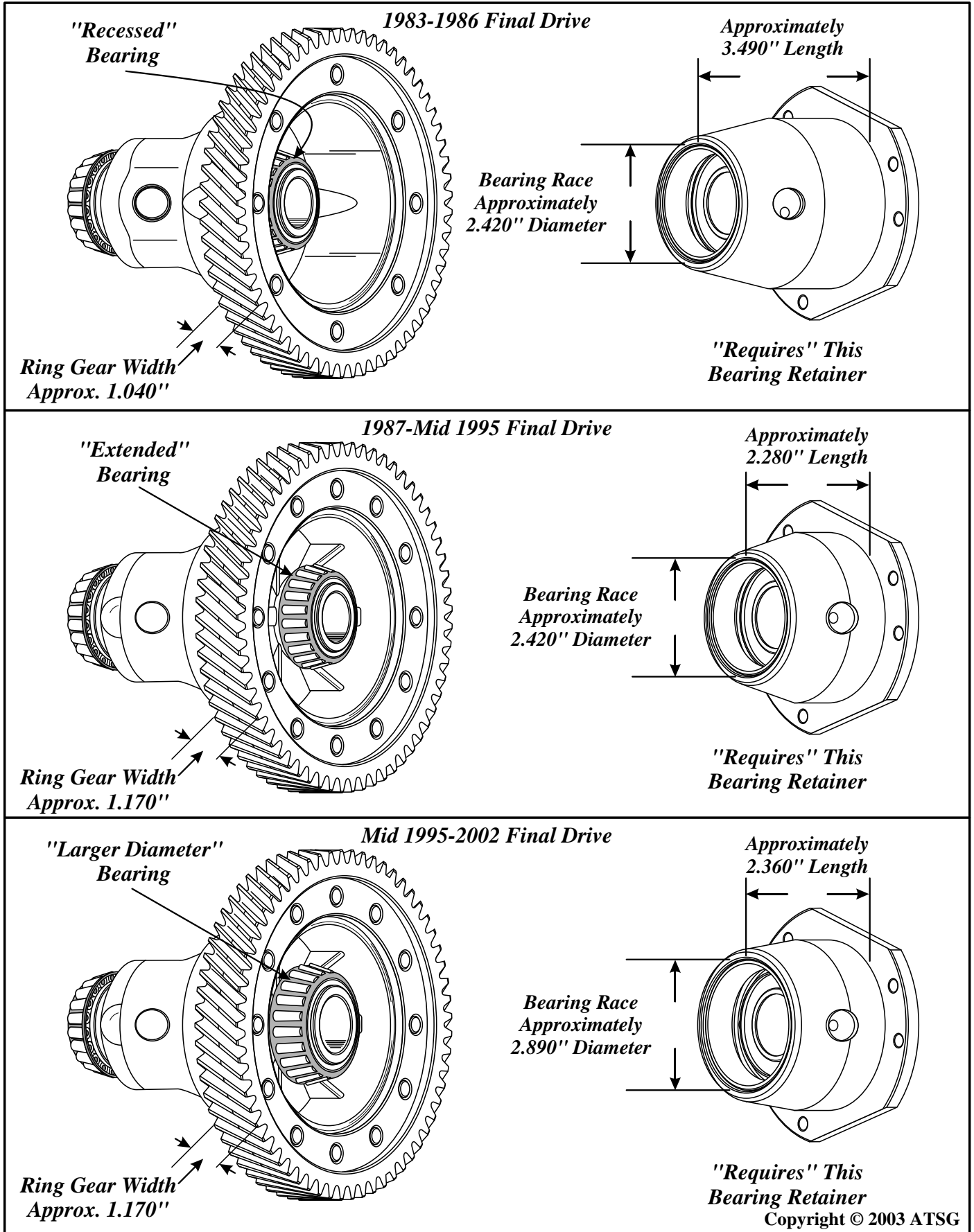


Figure 143

## GEAR TRAIN REPAIR

### Differential Assembly

1. Remove the differential carrier bearing cones using the special tools and procedures shown in Figures 144 and 145. The same tools are used for both sides.
2. Install new bearing cones on the differential carrier using special tool L-4410, and press on with an arbor press, as shown in Figure 146. Again the same tools are used for both sides. **Note: Tag the bearing cups as they "must" remain with the original bearing cone. They are matched and must not be mixed. Use only a press for installation as a hammer may not align cups or cones properly.**
3. If it was necessary to replace the ring gear, install it on the carrier and torque all ring gear bolts to 70 ft.lbs. as shown in Figure 148. **Note: Always install "New" ring gear bolts when the ring gear is changed.**

Continued on Page 60.

**All Bearing Cups And Cones Are Matched And "Must" Remain Together**

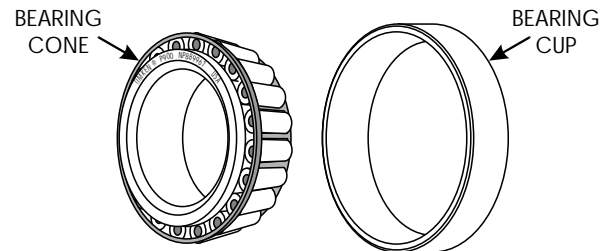


Figure 147

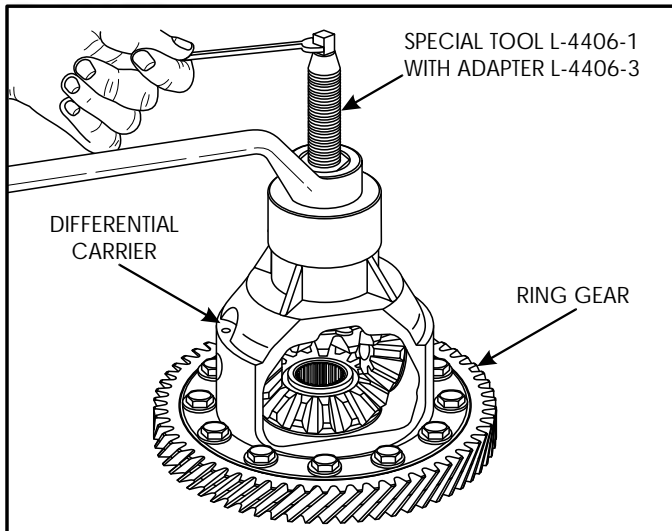


Figure 144

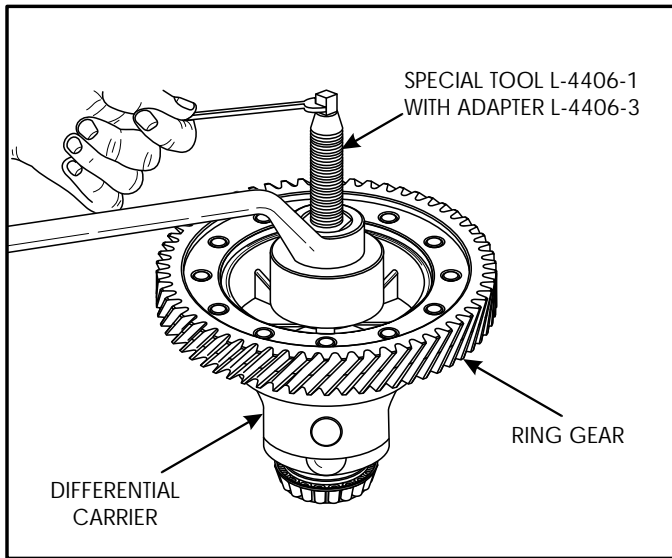


Figure 145

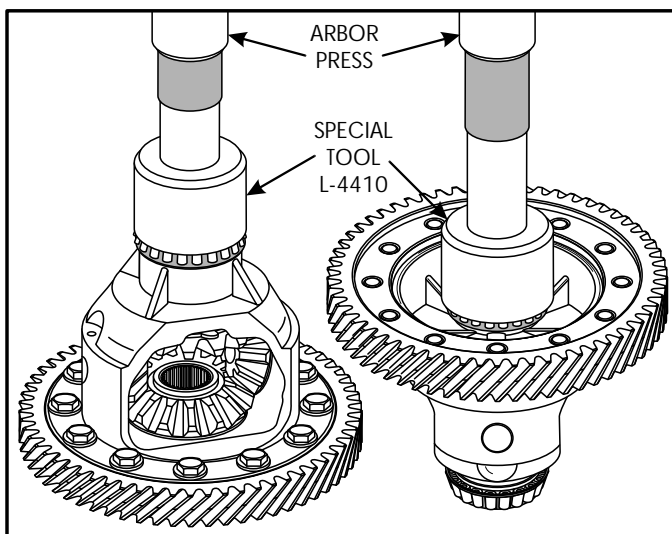


Figure 146

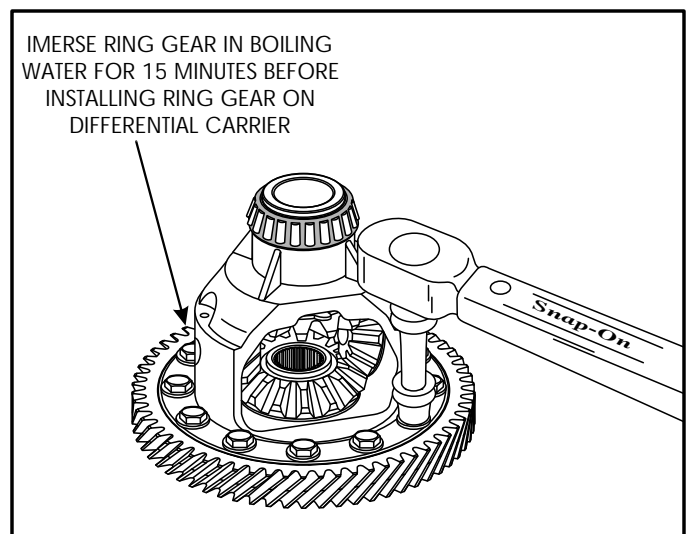


Figure 148

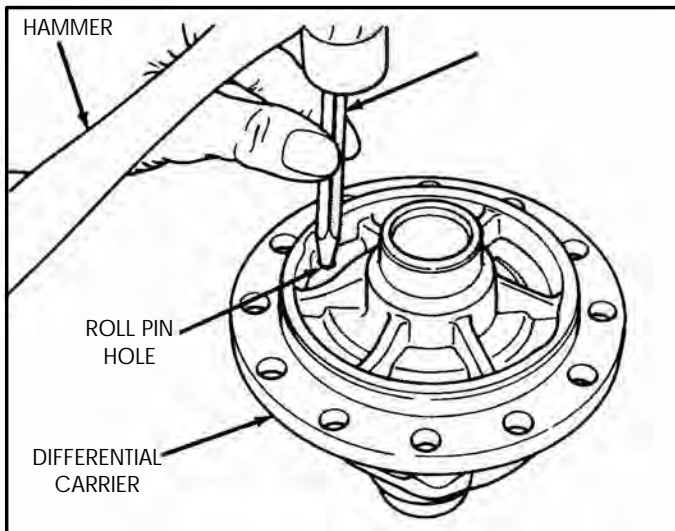


Figure 149

## GEAR TRAIN REPAIR (Cont'd)

### Differential Assembly (Cont'd)

4. Remove or install pinion gear cross shaft roll pin with a pin punch and hammer, as shown in Figure 149.
5. Remove or install pinion gear cross shaft, as shown in Figure 150.
6. Remove or install pinion gears, side gears, and tabbed thrust washers, by rotating pinion gears to opening in differential carrier, as shown in Figure 151.

**Note:** Some models may have the new design cross shaft retainers instead of the roll pin, as shown in Figure 152. See the "Update" section in this manual for details.

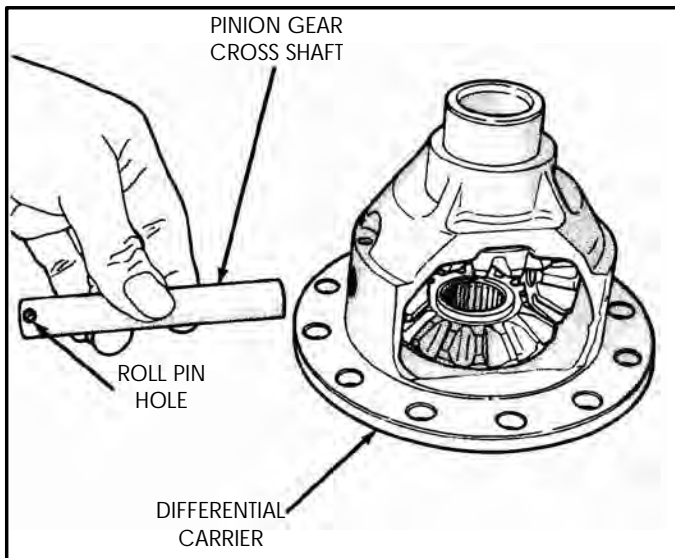


Figure 150

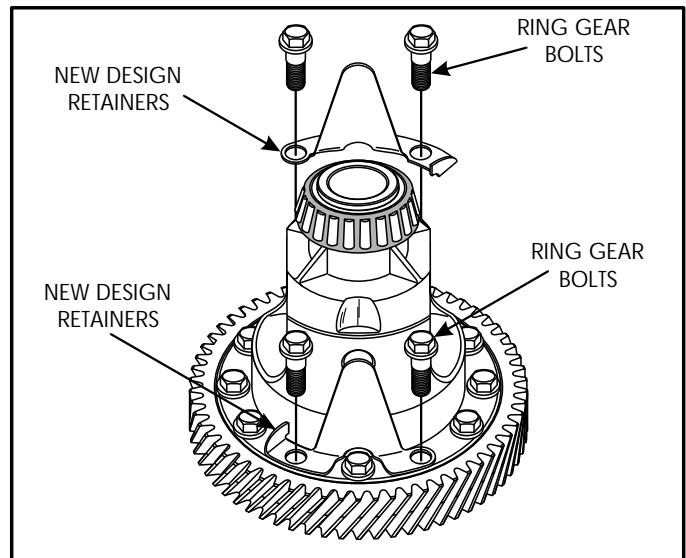


Figure 152

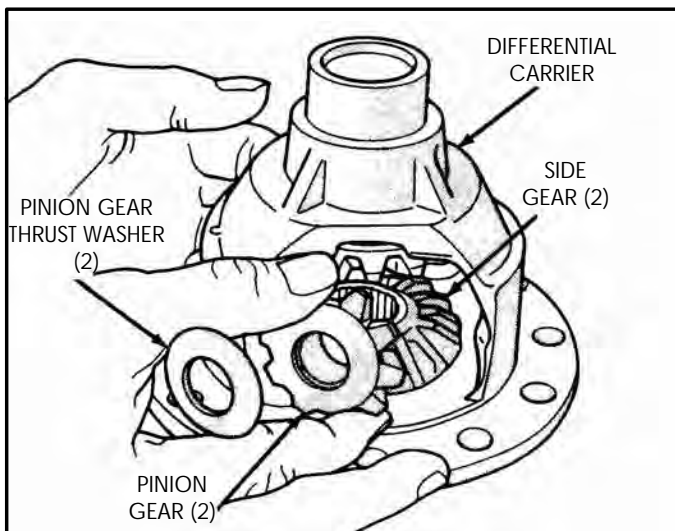


Figure 151

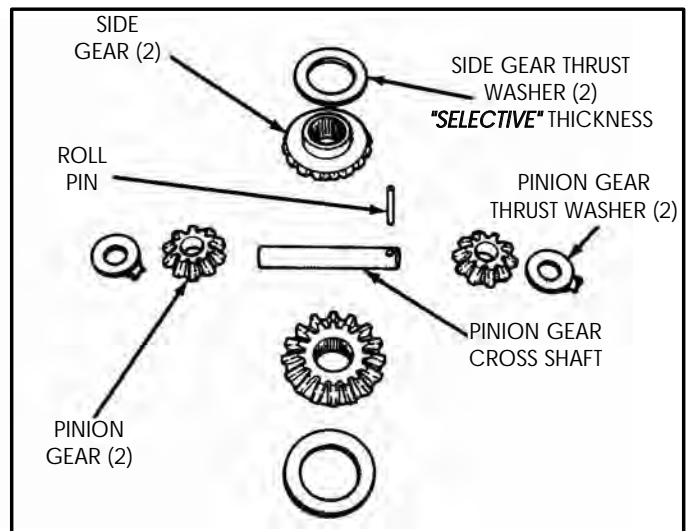


Figure 153

## Differential Assembly (Cont'd)

7. After assembling side gears and thrust washers, pinion gears and thrust washers, cross shaft and roll pin, we must check side gear end play.
8. Set up the dial indicator and special tool, as shown in Figure 154.
9. Move the side gear up and down, as shown in Figure 154, and record end play. Side gear end play should be .001" to .013" There are four different thickness washers available from your dealer: .032", .037", .042" and .047".
10. The other side gear end play should be checked using same procedure, as shown in Figure 155.
11. Install the special tool L-4518, bearing cup remover, in two steps, as shown in Figure 156, to remove bearing cup from the differential bearing retainer.
12. Install new axle seal using a seal driver, as shown in Figure 157, and lubricate with small amount of Trans-Jel®.

**Continued on Page 62.**

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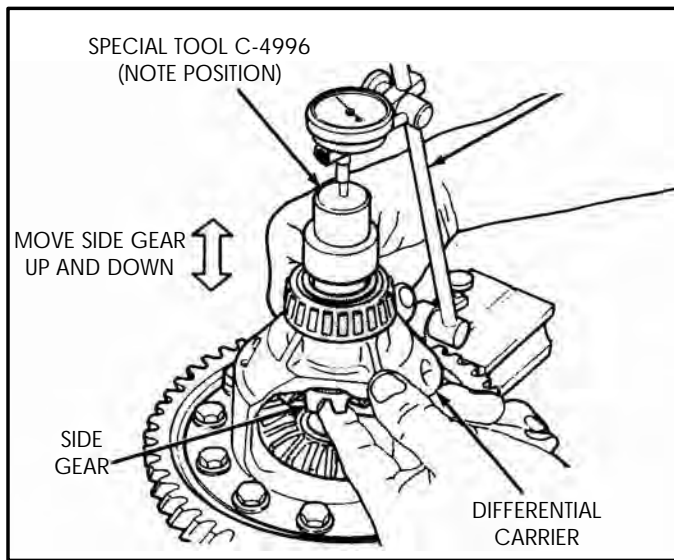


Figure 154

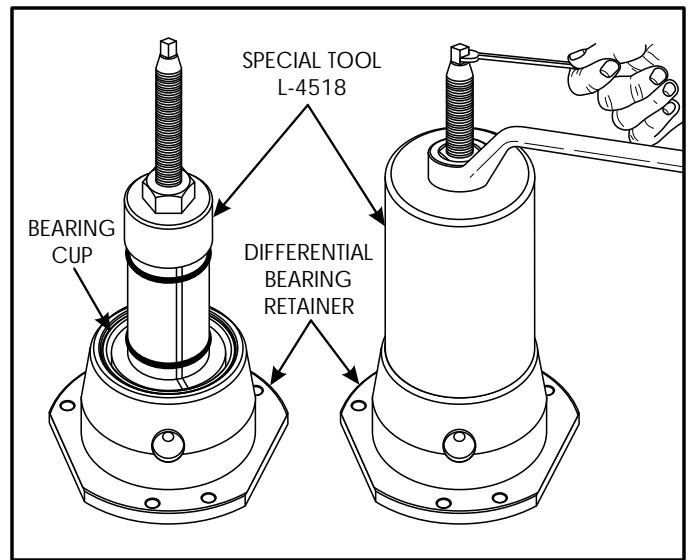


Figure 156

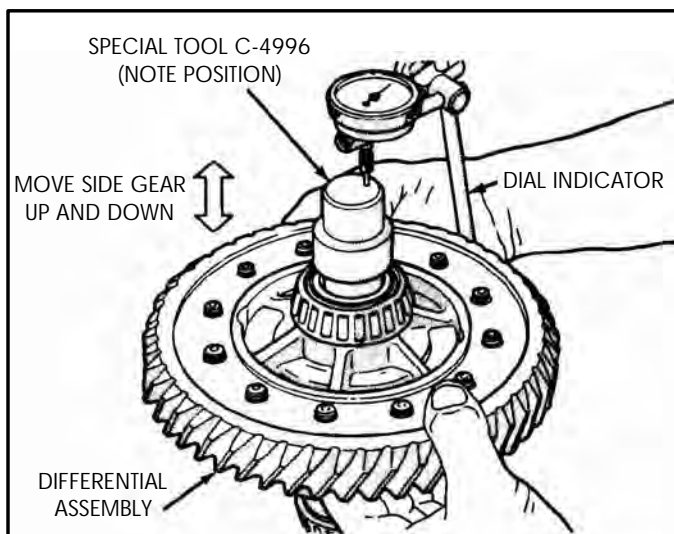


Figure 155

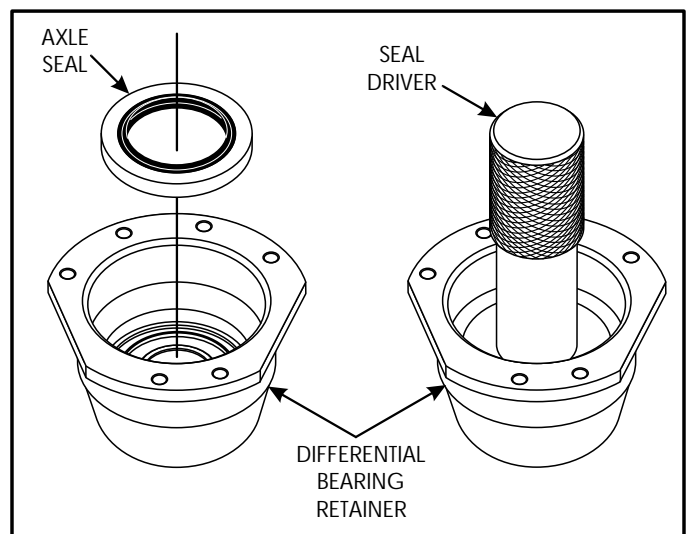


Figure 157

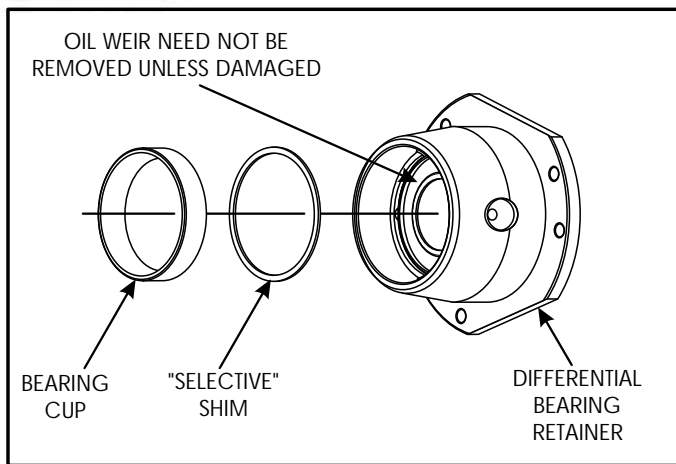


Figure 158

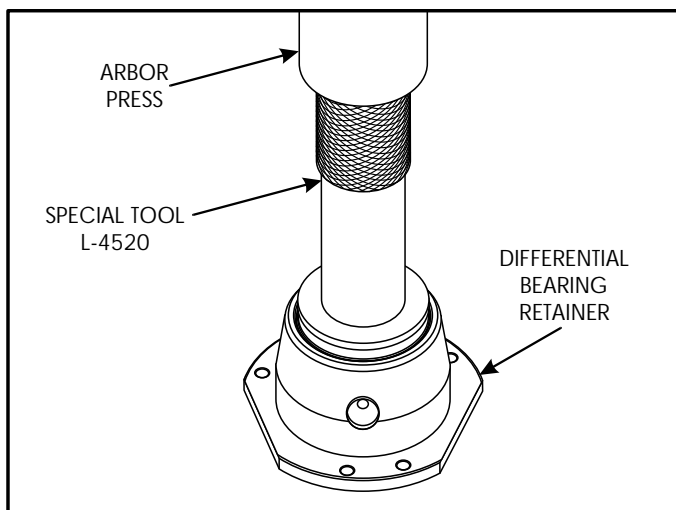


Figure 159

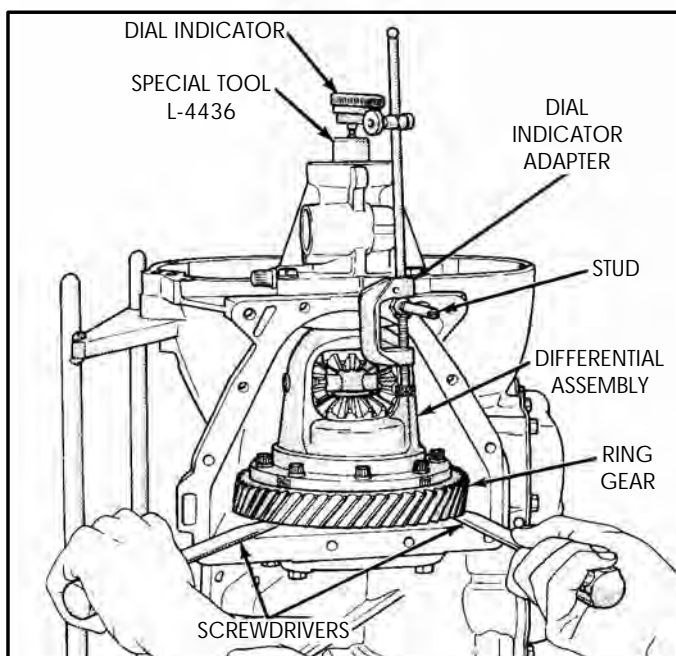


Figure 160

## GEAR TRAIN REPAIR (Cont'd)

### Differential Assembly (Cont'd)

#### Determining Differential "Preload"

**Special Note:** The determining of shim thickness need only be done if any of the following parts are replaced.

- (1) Transaxle Case
- (2) Differential Carrier
- (3) Differential Bearing Retainer
- (4) Extension Housing
- (5) Bearing Cups And Cones

1. The shim behind bearing cone in differential bearing retainer is the selective shim used to set the differential preload (See Figure 158).
2. If you are starting from scratch, install a .50mm (.020") "gauging" shim, and install bearing cup into the retainer using a press, as shown in Figure 159.
3. Install differential bearing retainer into case, **without** any R.T.V. for now.
4. Install the retaining bolts and torque the bolts to 20 ft.lbs. (28 N·m).
5. Install the differential assembly into transaxle case, as shown in Figure 160, and lubricate the bearings with light coat of oil.
6. Install the extension housing into case without the "O" ring for now, install the retaining bolts and torque to 20 ft.lbs. (28 N·m).

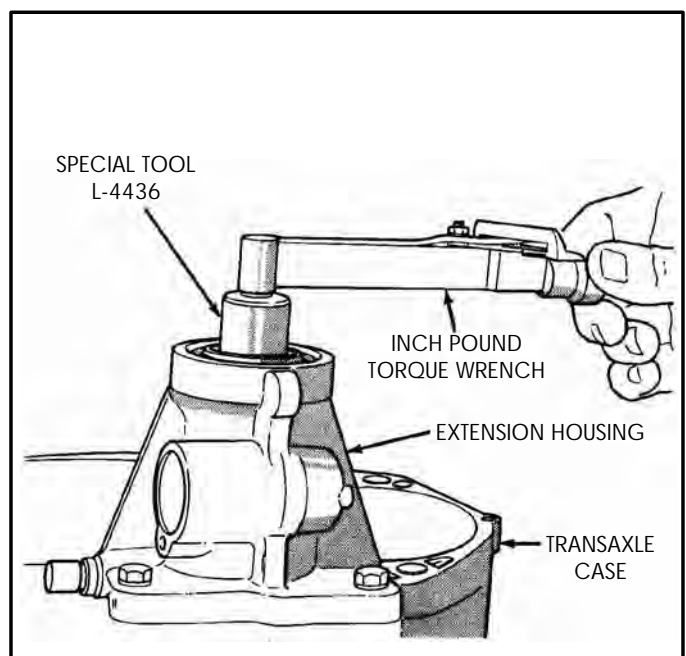


Figure 161

## Determining Differential "Preload"

7. Rotate the differential assembly at least 1 full turn to ensure the tapered roller bearings are fully seated.
8. Attach a dial indicator to the case, as shown in Figure 160, and zero dial indicator. Ensure that indicator plunger is on the special tool L-4436.
9. Using large screwdrivers on each side of ring gear, as shown in Figure 160, lift and check dial indicator for the amount of end play.
10. After the end play has been determined, refer to Differential Bearing Shim Chart, found in Figure 162, for the correct shim combination to obtain the proper *preload* for the differential bearings.

11. Remove differential bearing retainer, remove the bearing cup and and .50 mm gauging shim.
12. Install the proper shim combination, depending on end play reading that you obtained, into the bearing retainer, and once again install bearing cup using the press (See Figures 158 and 159).
13. Apply a 1/8" bead of R.T.V. sealant to bearing retainer, as shown in Figure 163.
13. Reinstall differential bearing retainer, torque retaining bolts to 20 ft.lbs. (28 N·m).
14. **Now**, you are ready to check the turning torque to verify that you have the proper preload for the differential bearings.
15. Install special tool L-4436, and using an inch pound torque wrench, as shown in Figure 161, verify that turning torque is between 5 and 18 inch pounds.
16. If turning torque is too high, install a .05mm (.002") thinner shim. If turning torque is too low, install a .05 mm (.002") thicker shim.
17. Repeat the above process until turning torque is 5 to 18 inch pounds.
18. Now you must remove the extension housing and differential assembly, but leave the bearing retainer in place.

**Note:** All bearing adjustments and preload checks on the differential and output shaft must be made without gear mesh from the other component.

Continued on Page 64.

DIFFERENTIAL BEARING SHIM CHART				
End Play (With .50mm gaging shim Installed)		Required Shim Combination	Total Thickness	
mm	Inch	mm	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 pl us .60	1.10	.043
.45	.018	.50 pl us .65	1.15	.045
.50	.020	.50 pl us .70	1.20	.047
.55	.022	.50 pl us .75	1.25	.049
.60	.024	.50 pl us .80	1.30	.051
.65	.026	.50 pl us .85	1.35	.053
.70	.027	.50 pl us .90	1.40	.055
.75	.029	.50 pl us .95	1.45	.057
.80	.031	.50 pl us 1.00	1.50	.059
.85	.033	.50 pl us 1.05	1.55	.061
.90	.035	1.00 pl us .60	1.60	.063
.95	.037	1.00 pl us .65	1.65	.065
1.00	.039	1.00 pl us .70	1.70	.067
1.05	.041	1.00 pl us .75	1.75	.069
1.10	.043	1.00 pl us .80	1.80	.071
1.15	.045	1.00 pl us .85	1.85	.073
1.20	.047	1.00 pl us .90	1.90	.075
1.25	.049	1.00 pl us .95	1.95	.077
1.30	.051	1.00 pl us 1.00	2.00	.079
1.35	.053	1.00 pl us 1.05	2.05	.081

Figure 162

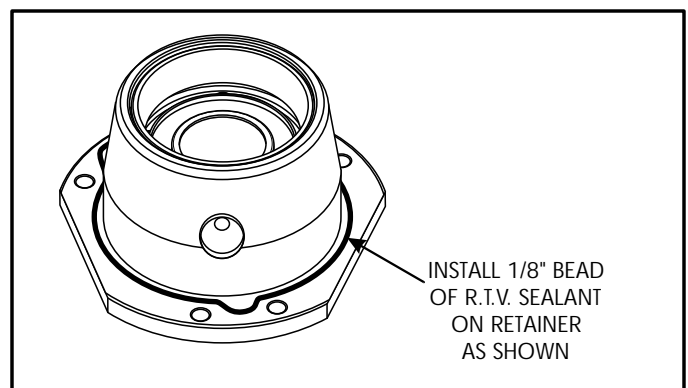


Figure 163

## GEAR TRAIN REPAIR (Cont'd)

### Output Shaft

1. Remove output gear bearing cone using special tool and adapters, as shown in Figure 164.
2. Install new bearing cone on output gear, using special tool L-4408 and arbor press, as shown in Figure 165.

**Note:** Tag all bearing cups as they "must" remain with the original bearing cone. They are matched and must not be mixed. Use only a press for installation, as a hammer may not align cups or cones properly.

3. Remove the output shaft from rear planetary ring gear using press (See Figure 166).

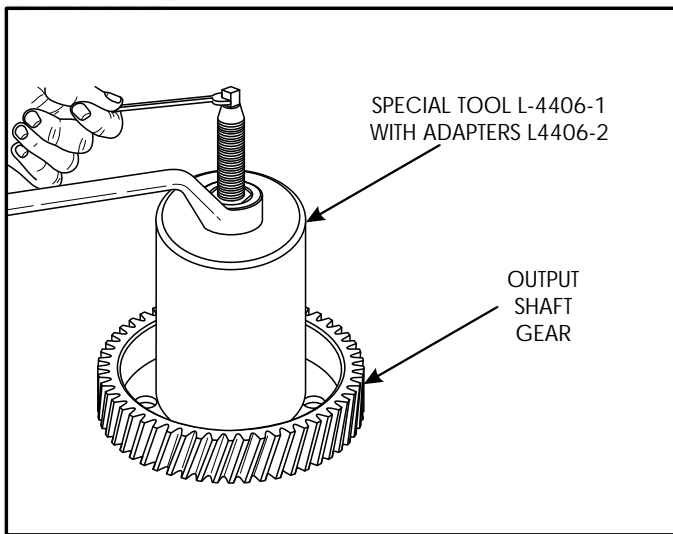


Figure 164

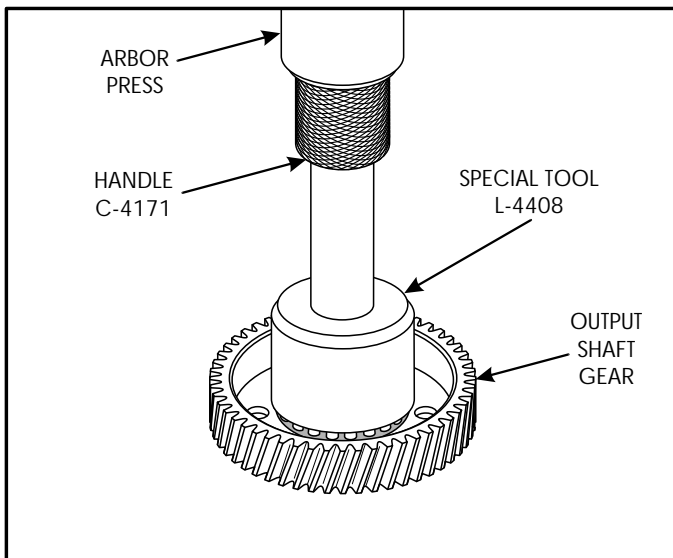


Figure 165

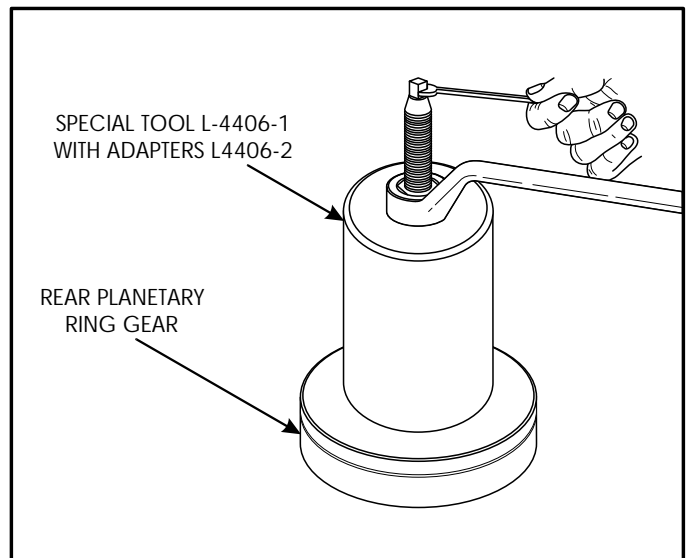


Figure 167

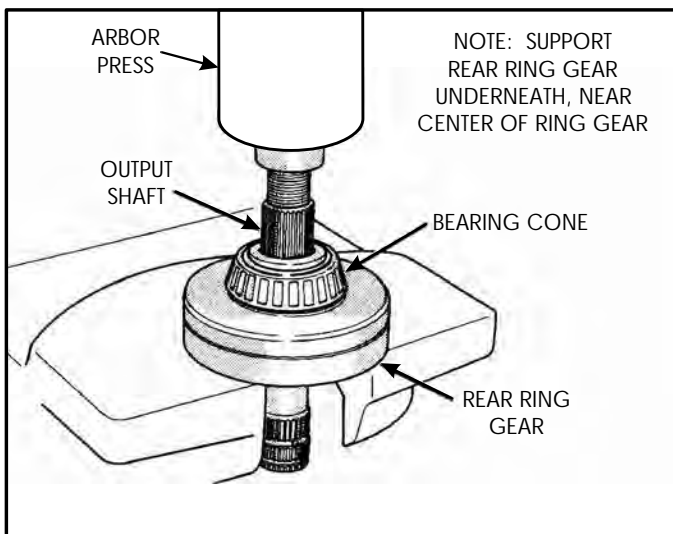


Figure 166

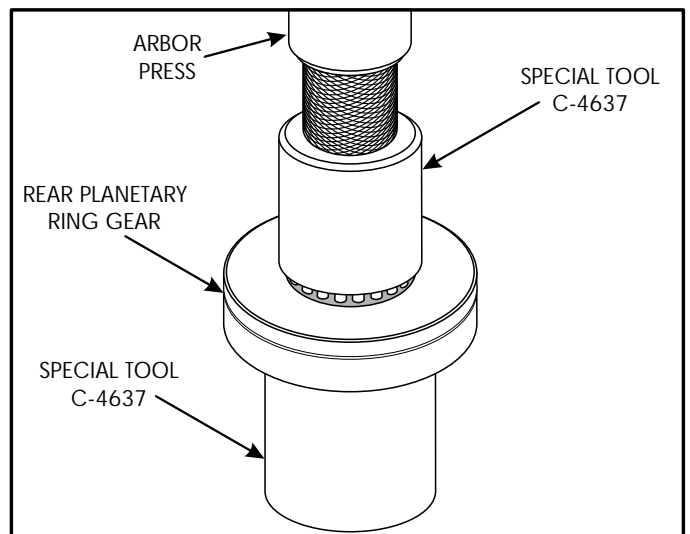


Figure 168

## Output Shaft (Cont'd)

4. Remove bearing cone from the rear planetary ring gear using special tool and adapters, as shown in Figure 167.
5. Install new bearing cone using special tool and adapters, as shown in Figure 168, with press.
6. Reinstall output shaft into rear planetary ring gear with press and 1/2" socket, as shown in Figure 169.
7. Remove the output shaft gear bearing cup from case using the special tool L-4518, as shown in Figure 170.
8. Remove the rear planetary ring gear bearing cup from the case using special tool L-4518, as shown in Figure 171.
9. Install new output shaft gear bearing cup into case using special tool L-4429-3, as shown in Figure 172.
10. Install new rear planetary ring gear cup into case using special tool L-4429-3, as shown in Figure 173.

Continued on Page 66.

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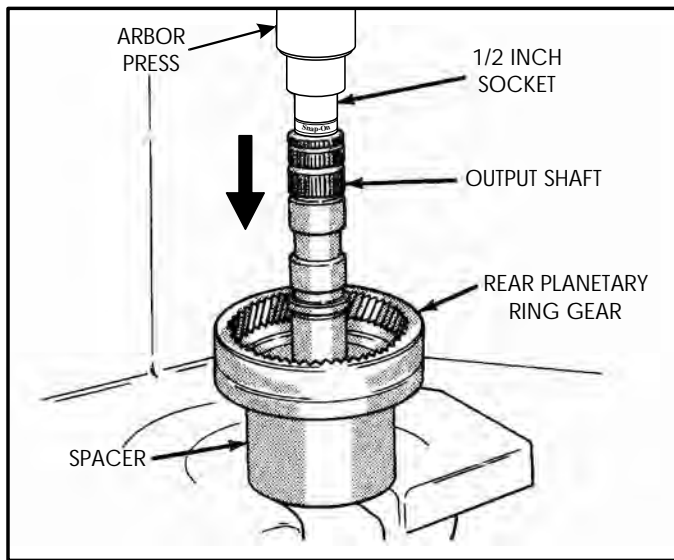


Figure 169

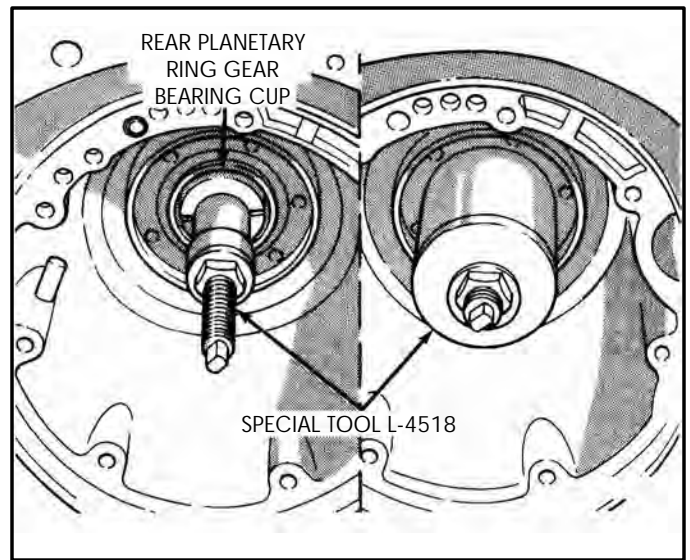


Figure 171

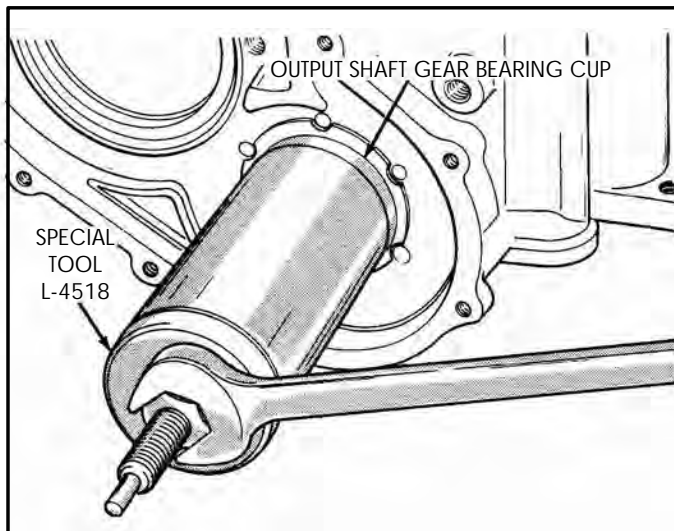


Figure 170

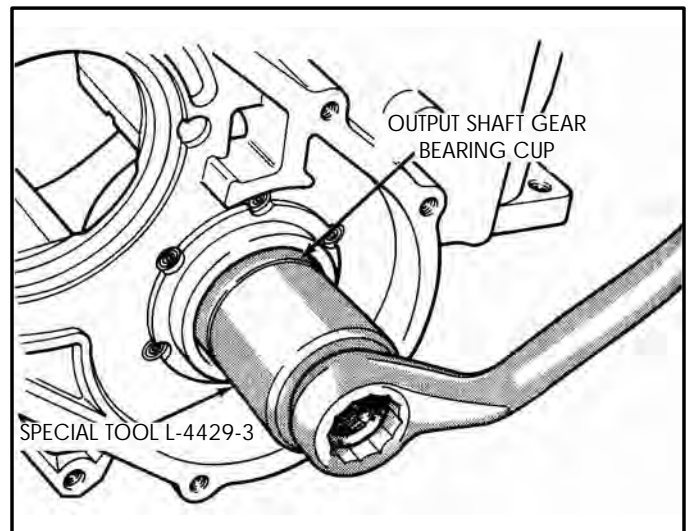


Figure 172

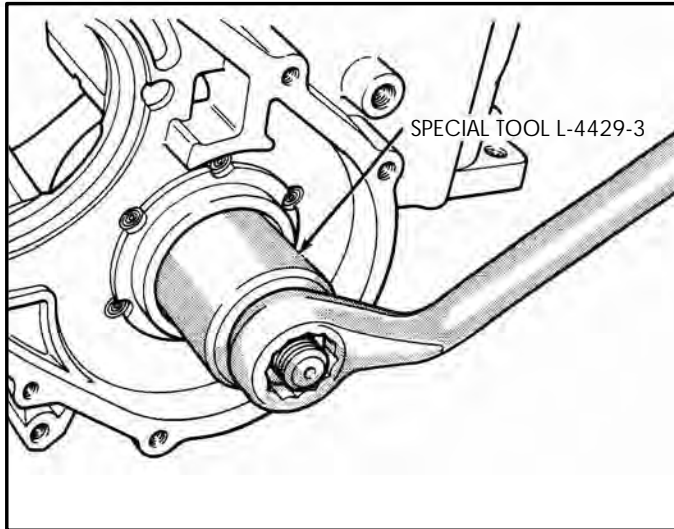


Figure 173

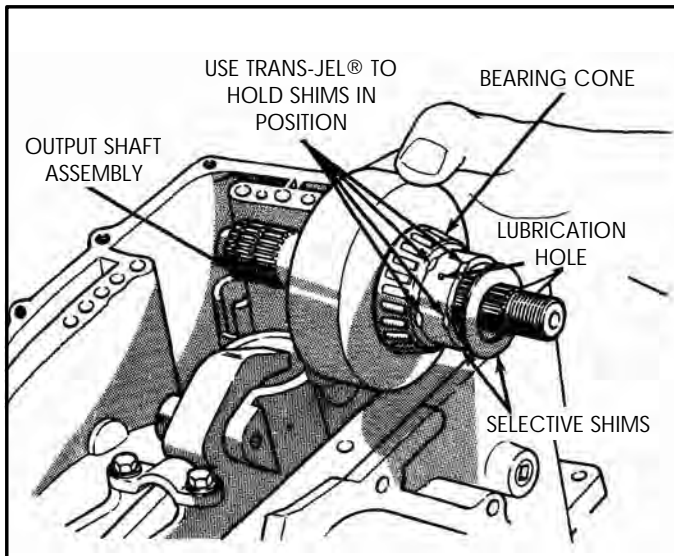


Figure 174

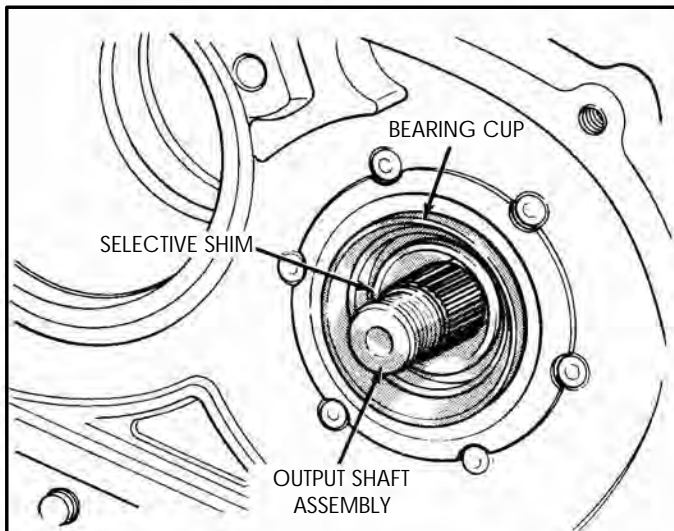


Figure 175

## GEAR TRAIN REPAIR (Cont'd)

### Output Shaft (Cont'd)

#### Determining Output Shaft "Preload"

**Special Note:** The determining of shim thickness need only be done if any of the following parts are replaced.

- (1) Transaxle Case
- (2) Output Shaft
- (3) Rear Planetary Ring Gear
- (4) Output Shaft Gear
- (5) Bearing Cups And Cones

1. Install the 13.65 mm (.537") and the 1.34 mm (.053")gaging shims on the rear planetary ring gear hub using TransJel® to hold the shims in place, as shown in Figure 174.

**Note:** The 13.65 mm shim has a larger inside diameter and must be installed first. The 1.34 mm shim pilots on the output shaft.

2. Install the output shaft/rear planetary ring gear and bearing assembly into the case and hold in position, as shown in Figure 175.
3. Install the output shaft gear and start onto the splines using special tool L-4439, as shown in Figure 176.
4. Install output shaft gear holding tool, as shown in Figure 177, install the washer and nut and torque nut to 271 N·m (200 ft.lb.).
5. Install lifting tool, steel ball retained with a small amount of grease and dial indicator, as shown in Figure 178.
6. Zero dial indicator and move output shaft in and out to measure end play (See Figure 179).

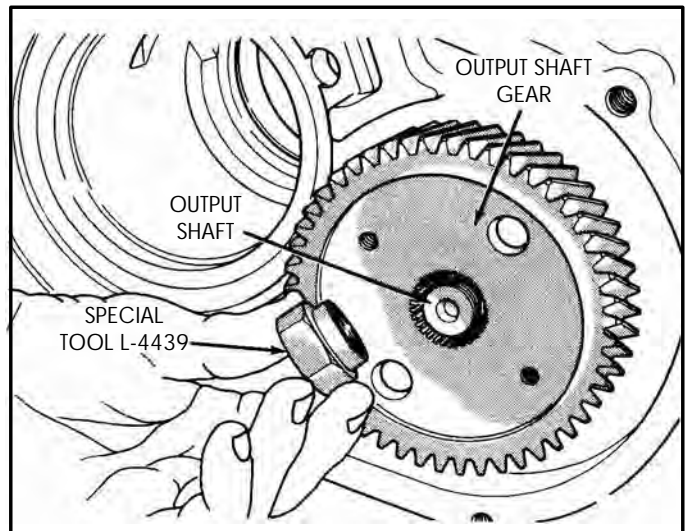


Figure 176

## Determining Output Shaft "Preload" (Cont'd)

7. After bearing end play has been determined, refer to the Output Shaft Bearing Shim Chart, as shown in Figure 179, for the required shim combination to obtain proper bearing preload.
8. Remove the two gaging shims and install the proper shim combination from the chart, and ensure that you install the thick shim first. Use small amount of Trans-Jel® to hold the shims in place.
9. Reinstall the output shaft gear, washer and the retaining nut and torque to 271 N·m (200 ft.lb).
10. Using an inch pound torque wrench, check the turning torque, as shown in Figure 180.  
**Turning torque should be 3 to 8 inch pounds.**

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

**Note: All bearing adjustments and preload checks on the differential and output shaft must be made without gear mesh from the other component.**

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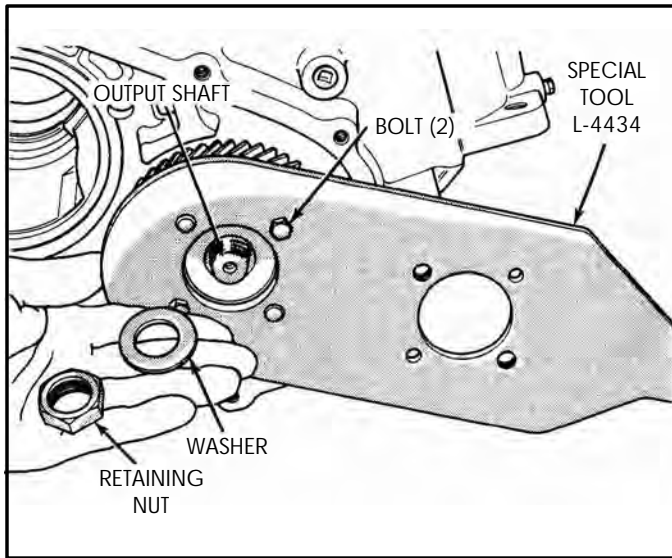


Figure 177

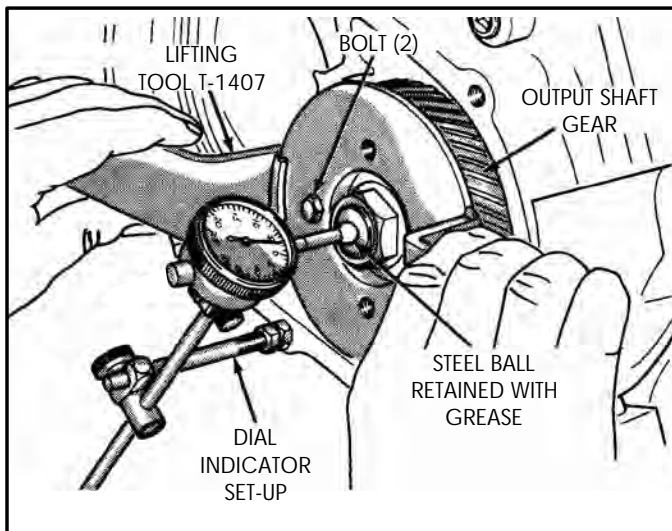


Figure 178

### OUTPUT SHAFT BEARING SHIM CHART

End Play (With 13.65mm and 1.34mm gaging shims Installed)		Required Shim Combination	Total Thickness	
mm	Inch	mm	mm	Inch
.0	.0	13.65 pl us 1.34	14.99	.590
.05	.002	13.65 pl us 1.24	14.89	.586
.10	.004	13.65 pl us 1.19	14.84	.584
.15	.006	13.65 pl us 1.14	14.79	.582
.20	.008	13.65 pl us 1.09	14.74	.580
.25	.010	13.65 pl us 1.04	14.69	.578
.30	.012	13.65 pl us .99	14.64	.576
.35	.014	13.65 pl us .94	14.59	.574
.40	.016	13.15 pl us 1.39	14.54	.572
.45	.018	13.15 pl us 1.34	14.49	.570
.50	.020	13.15 pl us 1.29	14.44	.568
.55	.022	13.15 pl us 1.24	14.39	.566
.60	.024	13.15 pl us 1.19	14.34	.564
.65	.026	13.15 pl us 1.14	14.29	.562
.70	.027	13.15 pl us 1.09	14.24	.560
.75	.029	13.15 pl us 1.04	14.19	.558
.80	.031	13.15 pl us .99	14.14	.556
.85	.033	13.15 pl us .94	14.09	.554
.90	.035	12.65 pl us 1.39	14.04	.552
.95	.037	12.65 pl us 1.34	13.99	.550
1.00	.039	12.65 pl us 1.29	13.94	.548
1.05	.041	12.65 pl us 1.24	13.89	.547
1.10	.043	12.65 pl us 1.19	13.84	.545
1.15	.045	12.65 pl us 1.14	13.79	.543
1.20	.047	12.65 pl us 1.09	13.74	.541
1.25	.049	12.65 pl us 1.04	13.69	.539
1.30	.051	12.65 pl us .99	13.64	.537

Figure 179

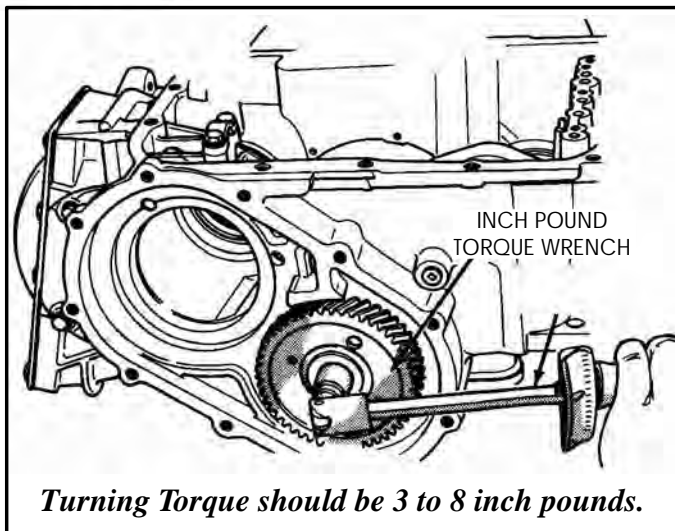


Figure 180

## GEAR TRAIN REPAIR (Cont'd)

### Output Shaft (Cont'd)

12. After turning torque is correct on output shaft, reinstall the differential assembly, as shown in Figure 181.
13. Install *new* "O" ring on extension housing, as shown in Figure 181, and lube with a small amount of Trans-Jel®.
14. Torque the four extension housing bolts down to 28 N·m (20 ft.lbs.) (See Figure 182).
15. Apply a 1/8" bead of R.T.V. to the differential cover, as shown in Figure 183.
16. Install the differential cover onto transaxle case and torque the ten bolts to 19 N·m (14 ft.lbs.), as shown in Figure 184.

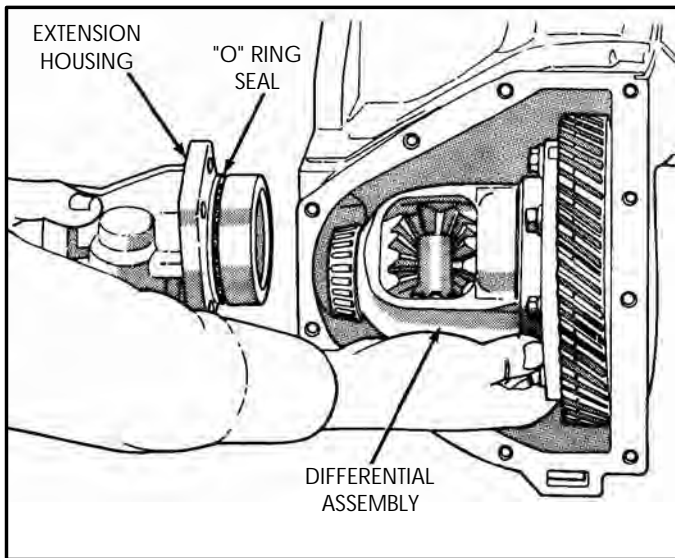


Figure 181

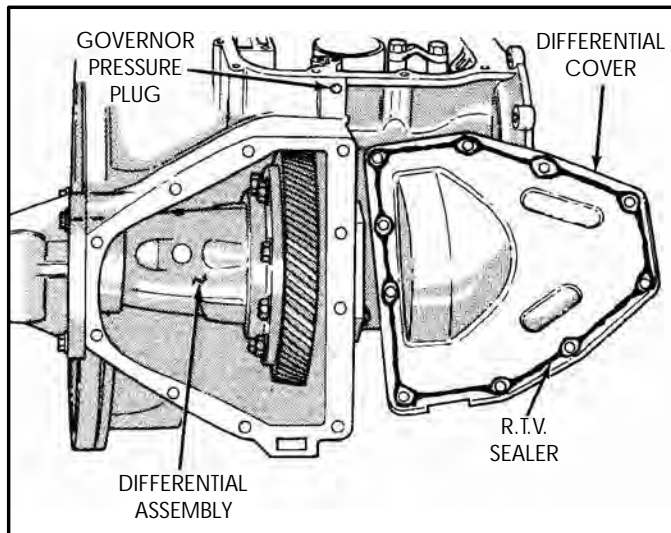


Figure 183

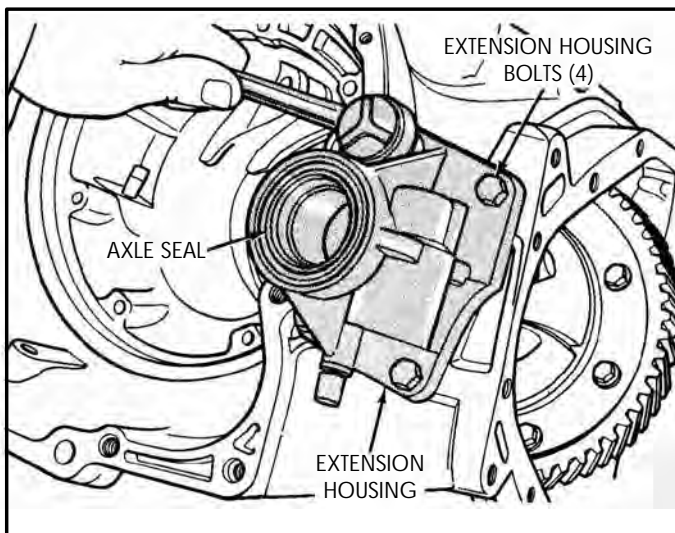


Figure 182

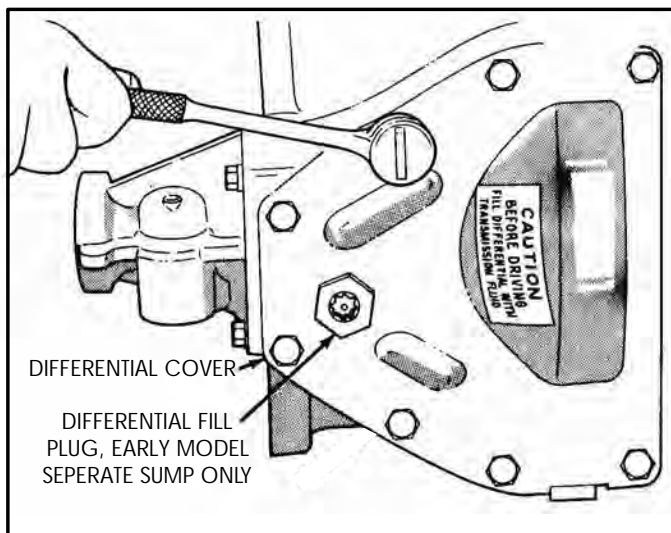


Figure 184

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## GEAR TRAIN REPAIR (Cont'd)

### Transfer Shaft

1. Remove transfer shaft bearing cone using the special tool, as shown in Figure 185.
2. Install transfer shaft bearing cone using special tool and arbor press, as shown in Figure 186.
3. Remove and replace oil seal (if used), using the tools shown in Figures 187 and 188.

**Note:** This oil seal is used "Only" in the early "Seperate Sump" models. It is "Not Used" in the "Common Sump" models.

4. Remove the bearing cup from the transfer shaft retainer using the special tool L-4518, shown in Figure 189.

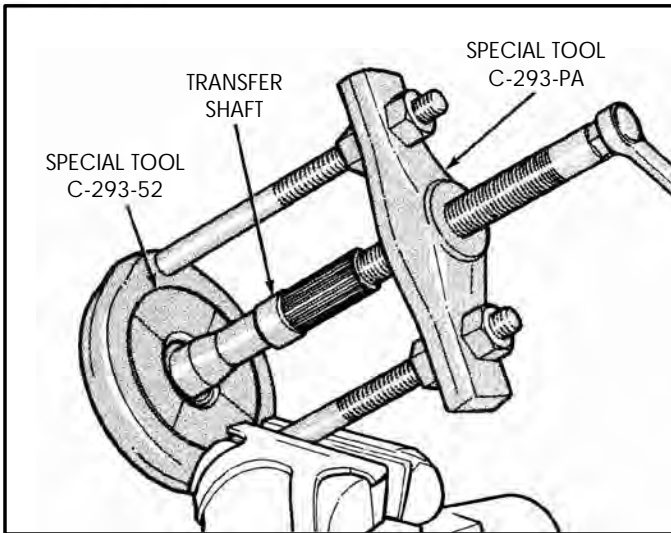


Figure 185

Continued on Page 70.

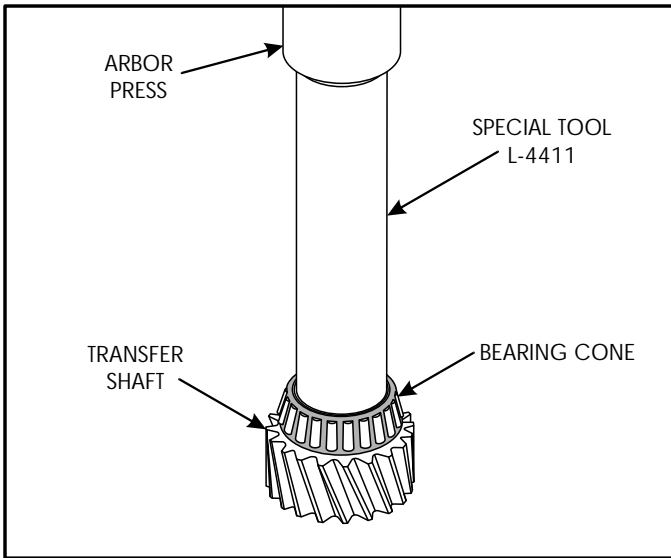
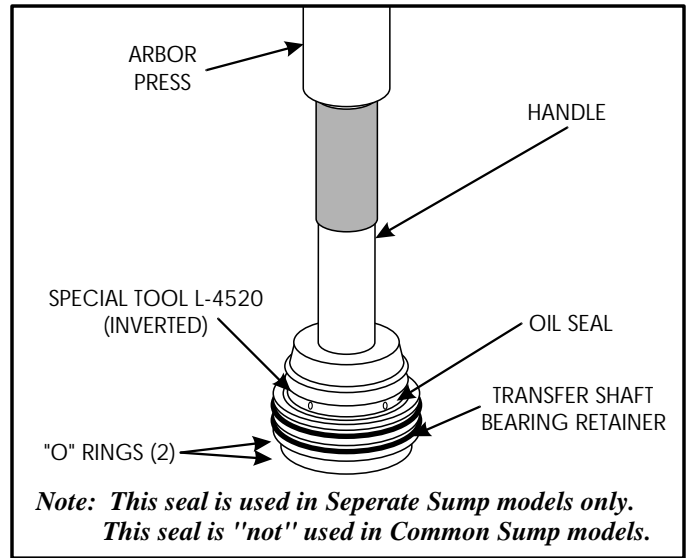
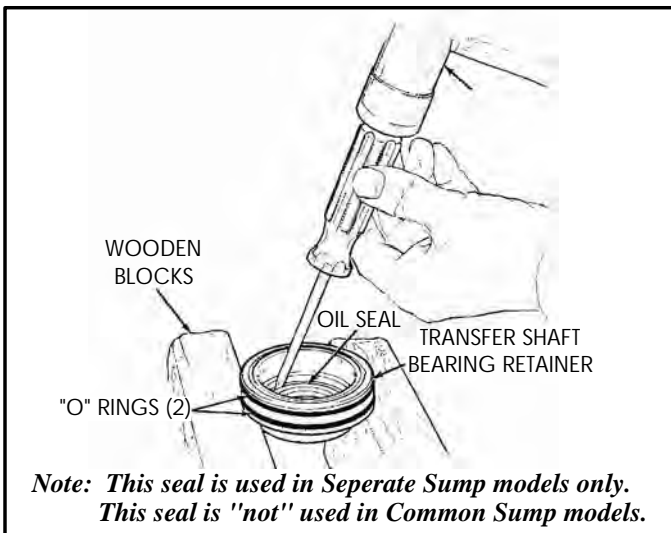


Figure 186



**Note:** This seal is used in Seperate Sump models only. This seal is "not" used in Common Sump models.

Figure 188



**Note:** This seal is used in Seperate Sump models only. This seal is "not" used in Common Sump models.

Figure 187

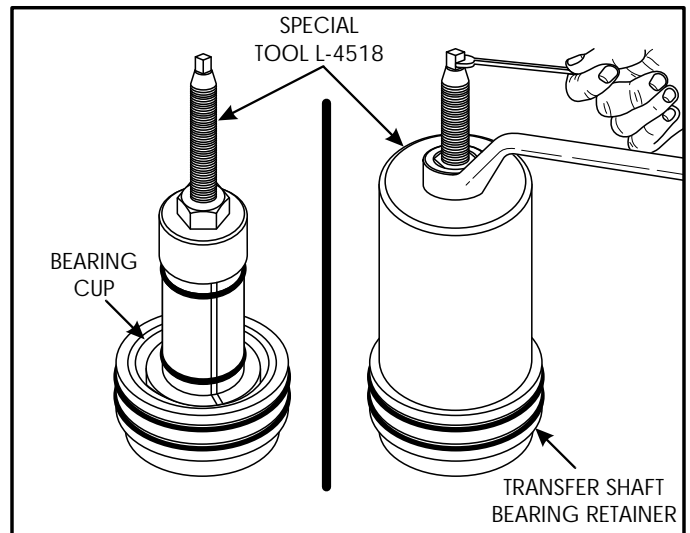


Figure 189

## GEAR TRAIN REPAIR (Cont'd)

### Transfer Shaft (Cont'd)

5. Install bearing cup into transfer shaft retainer using special tool L-4520 with arbor press, as shown in Figure 190.
6. Install two new "O" rings on transfer shaft bearing retainer and lubricate with a small amount of Trans-Jel® (See Figure 190).
7. Remove bearing cone from transfer shaft gear using the special tools shown in Figure 191.

**Note:** Tag all bearing cups as they "must" remain with the original bearing cone. They are matched and must not be mixed. Use only a press for installation, as a hammer may not align cups or cones properly.

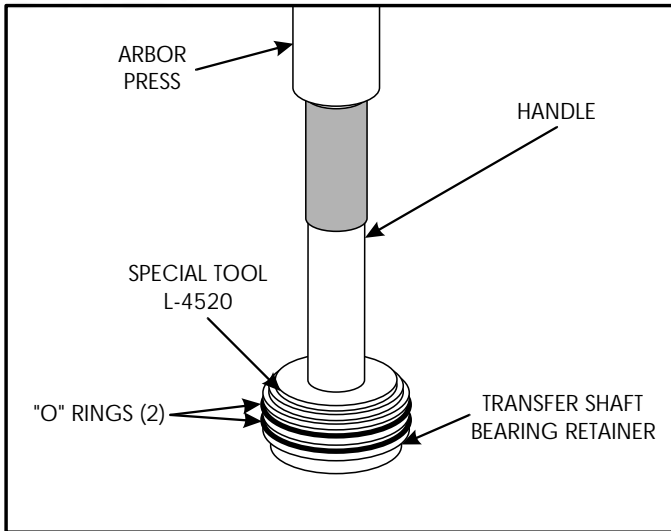


Figure 190

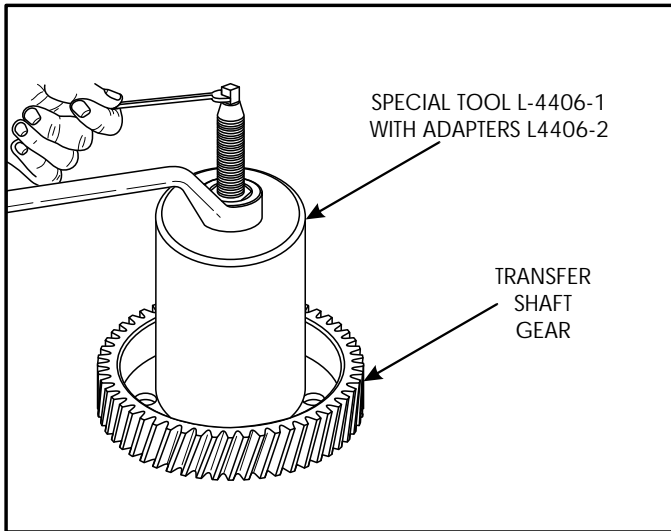


Figure 191

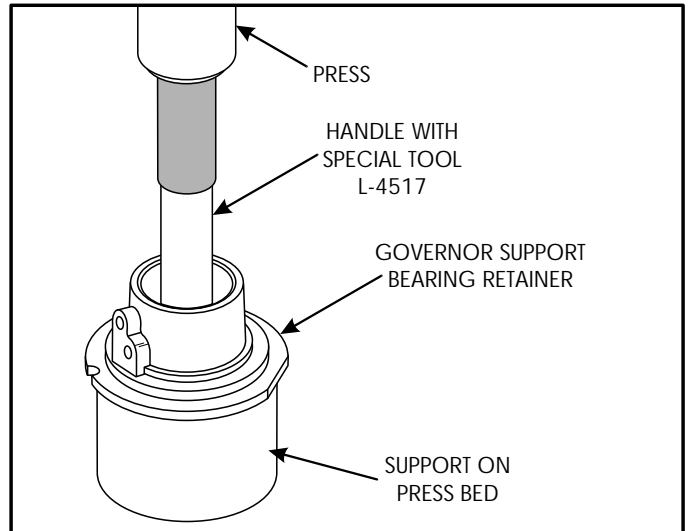


Figure 193

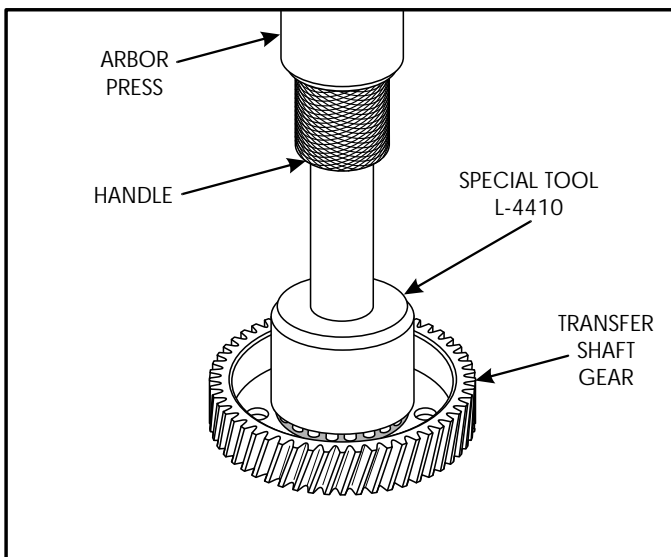


Figure 192

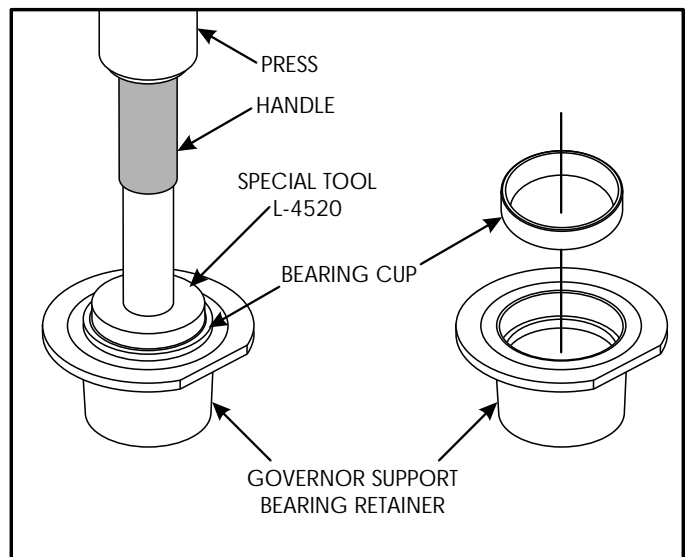


Figure 194

## GEAR TRAIN REPAIR (Cont'd)

### Transfer Shaft (Cont'd)

8. Install new bearing cone on transfer shaft gear using special tool L-4410 and an arbor press, as shown in Figure 192.
9. Remove bearing cup from governor support bearing retainer using special tool L-4517 and press, as shown in Figure 193.
10. Install new bearing cup in governor support bearing retainer using special tool L-4520 and press, as shown in Figure 194.
11. Install transfer shaft bearing retainer onto the transfer shaft, as shown in Figure 195.
12. Using special tool L-4512, install the transfer shaft and retainer assembly into transaxle case, as shown in Figure 196.
13. Install the transfer shaft bearing retainer snap ring using the snap ring pliers, as shown in Figure 197.
14. Install the pre-assembled governor and support assembly, as shown in Figure 198.

15. Install the governor support bearing retainer in case, as shown in Figure 199.

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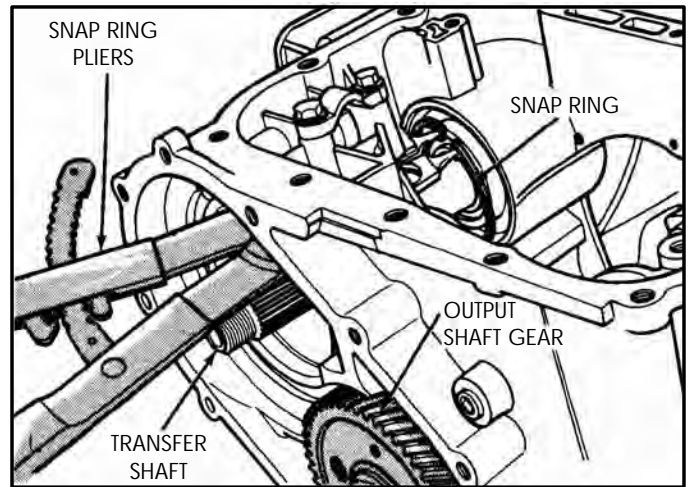


Figure 197

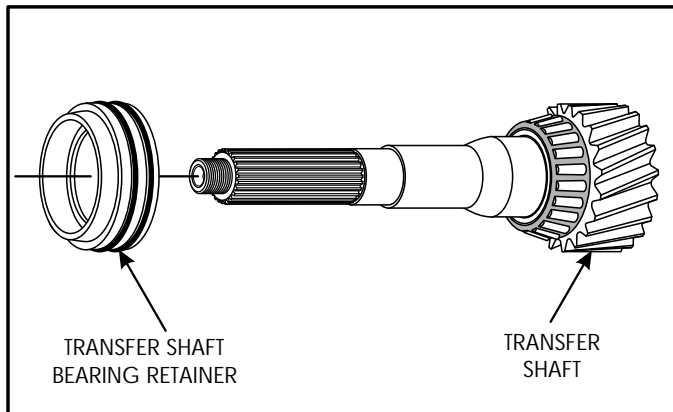


Figure 195

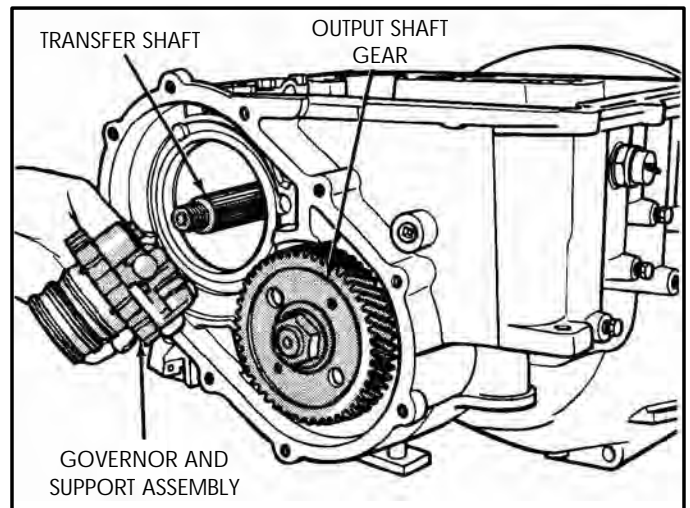


Figure 198

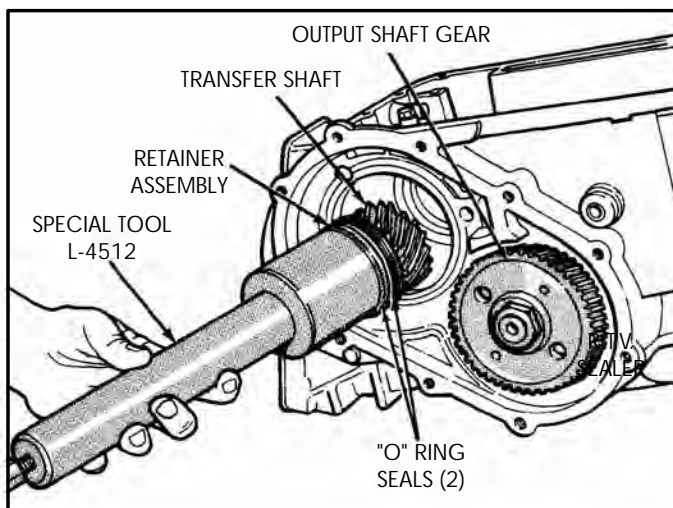


Figure 196

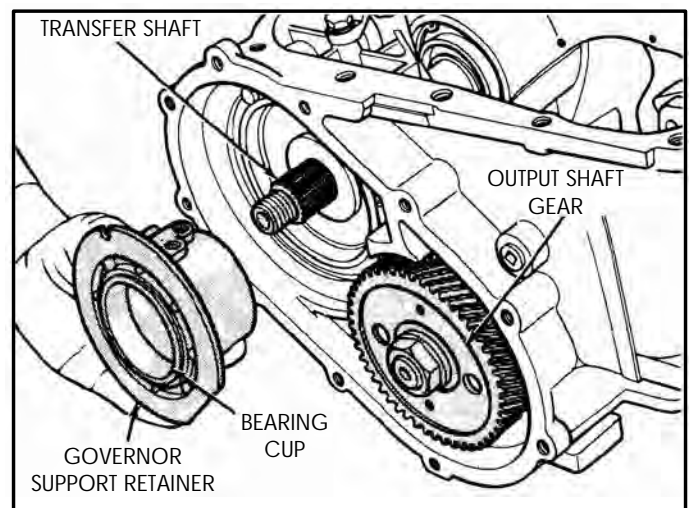


Figure 199

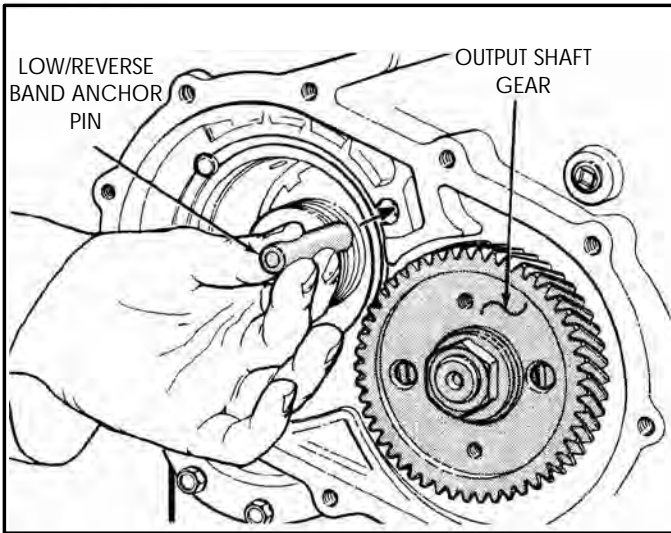


Figure 200

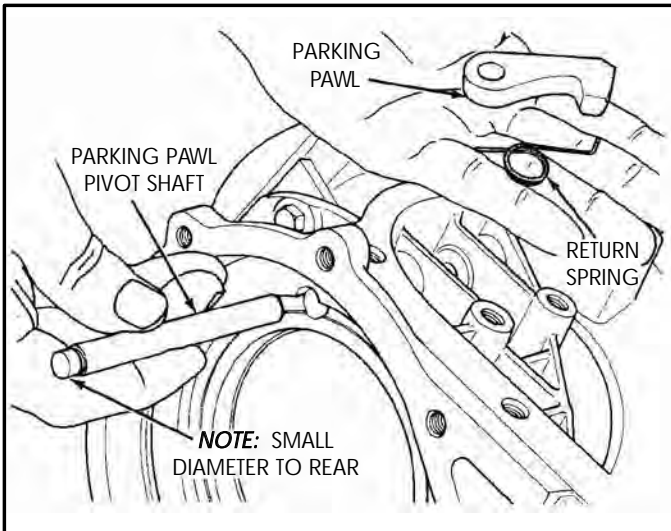


Figure 201

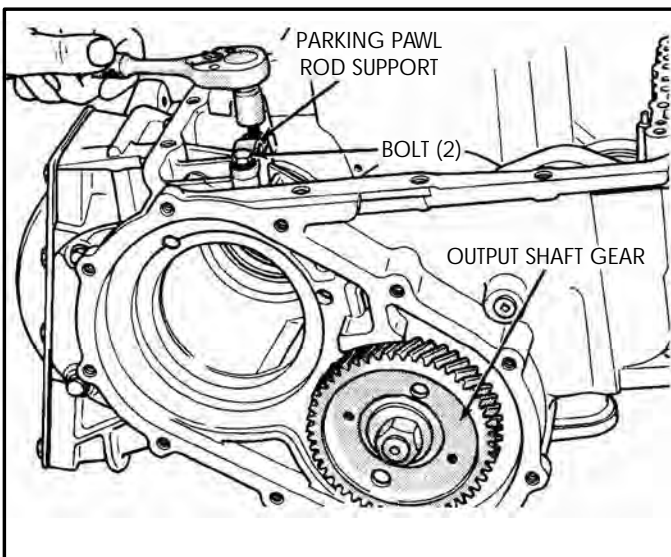


Figure 202

## GEAR TRAIN REPAIR (Cont'd)

### Transfer Shaft (Cont'd)

16. Install low/reverse servo lever and band anchor pin **before** installing transfer shaft gear. Refer to Figure 200.
17. Install the parking pawl, return spring and the parking pawl pivot shaft **before** installing the transfer shaft gear, as shown in Figure 201.
18. Install the parking rod support and torque bolts to 28 N·m (20 ft.lb.). (See Figure 202).

### Determining Transfer Shaft End Play

**Special Note:** The determining of shim thickness need only be done if any of the following parts are replaced.

- (1) Transaxle Case
- (2) Transfer Shaft
- (3) Governor Support Bearing Retainer
- (4) Transfer Shaft Gear
- (5) Bearing Cups And Cones

1. Install a 2.29mm (.090") and a 1.39mm (.055") gaging shims on the transfer shaft and slide them down behind governor support retainer (See Figure 203).
2. Install transfer shaft gear and bearing assembly and torque the nut to 271 N·m (200 ft.lbs.), as shown in Figure 204.
3. Install the lifting tool on transfer gear with two bolts, as shown in Figure 205.
4. Install steel ball in center of the transfer gear shaft and retain with small amount of grease, as shown in Figure 205.

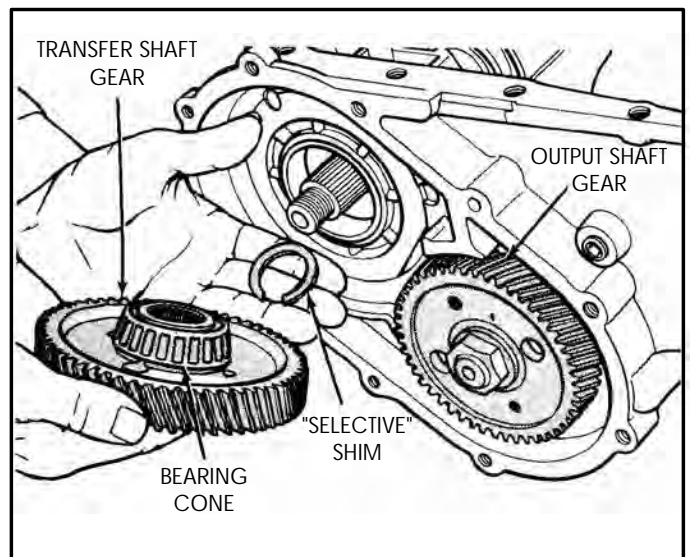


Figure 203

## GEAR TRAIN REPAIR (Cont'd)

### Determining Transfer Shaft End Play (Cont'd)

5. Mount dial indicator, as shown in Figure 205, with the plunger on steel ball and zero the dial indicator.
6. Move the lifting tool in and out and record the transfer shaft end play.
7. After determining end play, refer to Transfer Shaft Bearing Shim Chart found in Figure 206, for the required shim combination to obtain the proper transfer shaft end play.
8. Remove transfer shaft gear and the two gaging shims, and install the correct shim combination for proper transfer shaft end play.
9. Reinstall transfer gear and bearing assembly, washer and retaining nut and torque the nut to 271 N·m (200 ft.lbs.), as shown in Figure 204.
10. Again measure transfer shaft end play with the dial indicator, as shown in Figure 205. The end play should be .05 to .25mm (.002" to .010").
11. Repeat the above procedure as necessary to obtain the proper transfer shaft end play.

Continued on Page 74.

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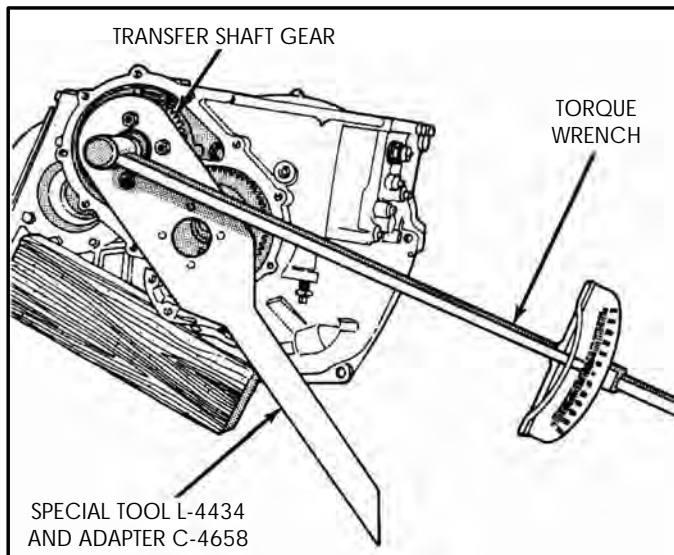


Figure 204

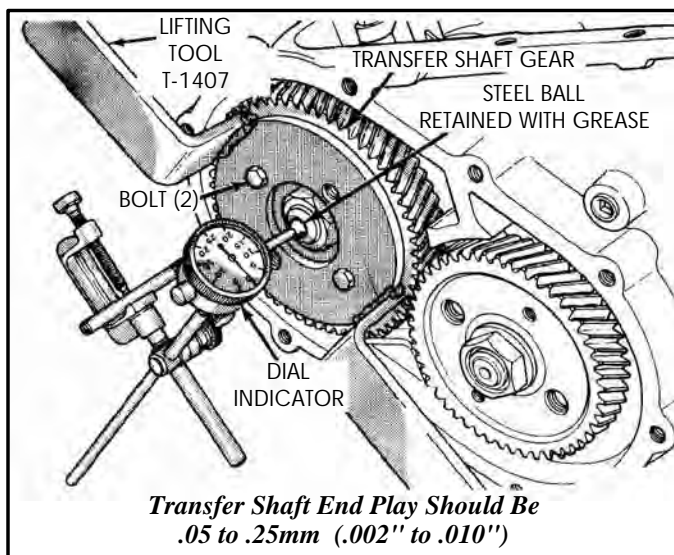


Figure 205

### TRANSFER SHAFT BEARING SHIM CHART

End Play (With 2.29mm and 1.39mm gaging shims Installed)		Required Shim Combination	Total Thickness	
mm	Inch	mm	mm	Inch
.0	.0	2.29 pl us 1.39	3.68	.145
.05	.002	2.29 pl us 1.39	3.68	.145
.10	.004	2.29 pl us 1.39	3.68	.145
.15	.006	2.29 pl us 1.39	3.68	.145
.20	.008	2.29 pl us 1.34	3.63	.143
.25	.010	2.29 pl us 1.29	3.58	.141
.30	.012	2.29 pl us 1.24	3.53	.139
.35	.014	2.29 pl us 1.19	3.48	.137
.40	.016	2.29 pl us 1.14	3.43	.135
.45	.018	2.29 pl us 1.09	3.38	.133
.50	.020	2.29 pl us 1.04	3.33	.131
.55	.022	2.29 pl us .99	3.28	.129
.60	.024	1.84 pl us 1.39	3.23	.127
.65	.026	1.84 pl us 1.34	3.18	.125
.70	.028	1.84 pl us 1.29	3.13	.123
.75	.030	1.84 pl us 1.24	3.08	.121
.80	.032	1.84 pl us 1.19	3.03	.119
.85	.034	1.84 pl us 1.14	2.98	.117
.90	.036	1.84 pl us 1.09	2.93	.115
.95	.038	1.84 pl us 1.04	2.88	.113
1.00	.040	1.84 pl us .99	2.83	.111
1.05	.042	1.39 pl us 1.39	2.78	.109
1.10	.044	1.39 pl us 1.34	2.73	.107
1.15	.046	1.39 pl us 1.29	2.68	.105
1.20	.048	1.39 pl us 1.24	2.63	.103
1.25	.049	1.39 pl us 1.19	2.58	.101
1.30	.051	1.39 pl us 1.14	2.53	.099
1.35	.053	1.39 pl us 1.09	2.48	.097
1.40	.055	1.39 pl us 1.04	2.43	.095
1.45	.057	1.39 pl us .99	2.38	.093
1.50	.059	.94 pl us 1.39	2.33	.091
1.55	.061	.94 pl us 1.34		

Figure 206

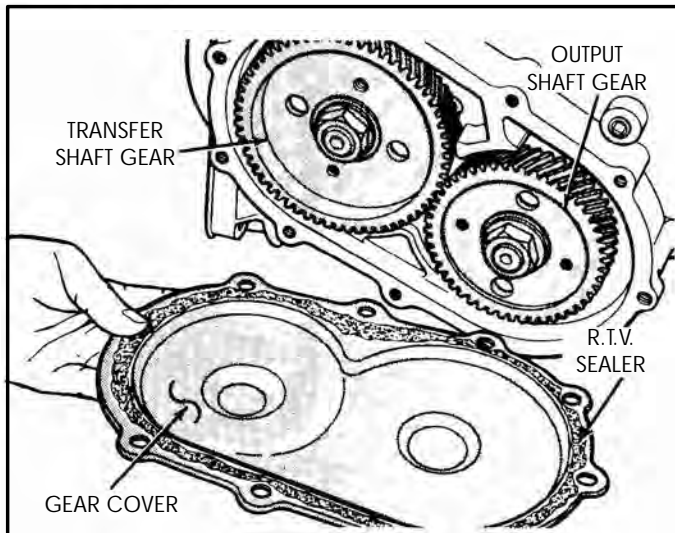


Figure 207

## GEAR TRAIN REPAIR (Cont'd)

### Transfer Shaft (Cont'd)

12. Apply 1/8" bead of R.T.V. to the transfer gear cover, as shown in Figure 207.
13. Install the transfer gear cover and hand start the ten bolts.
14. Now torque the ten transfer gear cover bolts to 19 N·m (14 ft.lb.), as shown in Figure 208.
15. You are now ready to start the re-assembly of the complete internal transaxle components.

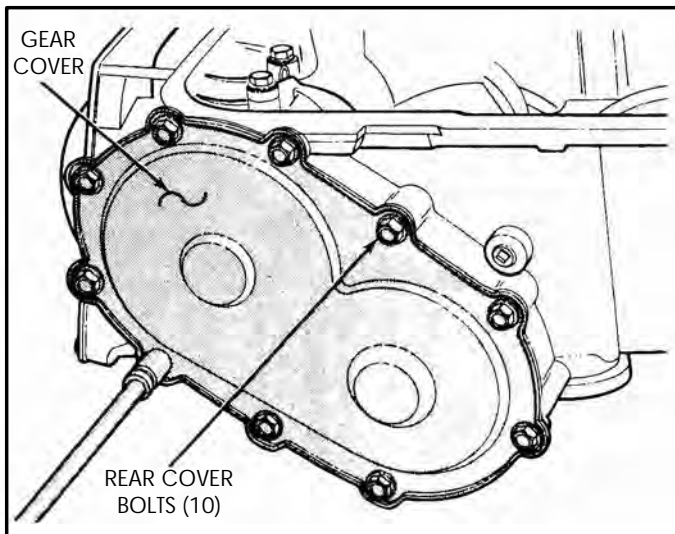


Figure 208

## TRANSAXLE ASSEMBLY

### Servos And Accumulator Components

1. Install new seal rings on kickdown piston, as shown in Figure 209.
2. Install new "O" ring on piston rod, as shown in Figure 209, and lube with Trans-Jel®.
3. Install piston rod into servo piston and install snap ring, as shown in Figure 209.
4. Install kickdown servo assembly into transaxle case in the bore shown in Figure 210, and then install return spring on top of piston.
5. Install new "O" ring on the piston rod guide, as shown in Figure 209, and lubricate with small amount of Trans-Jel®.

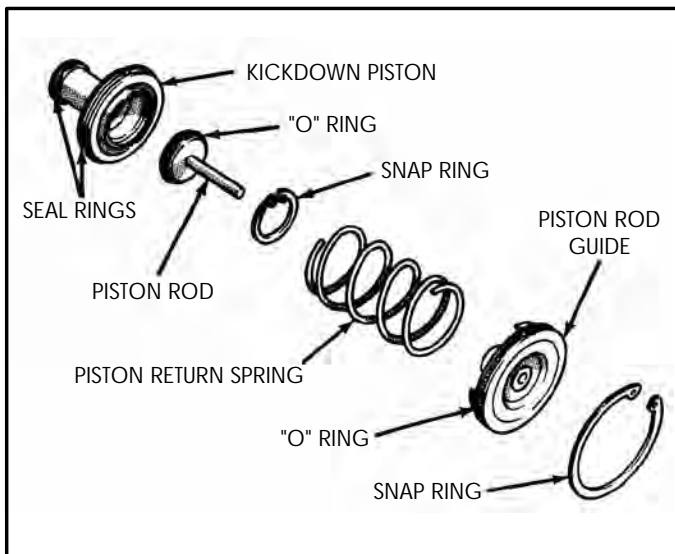


Figure 209

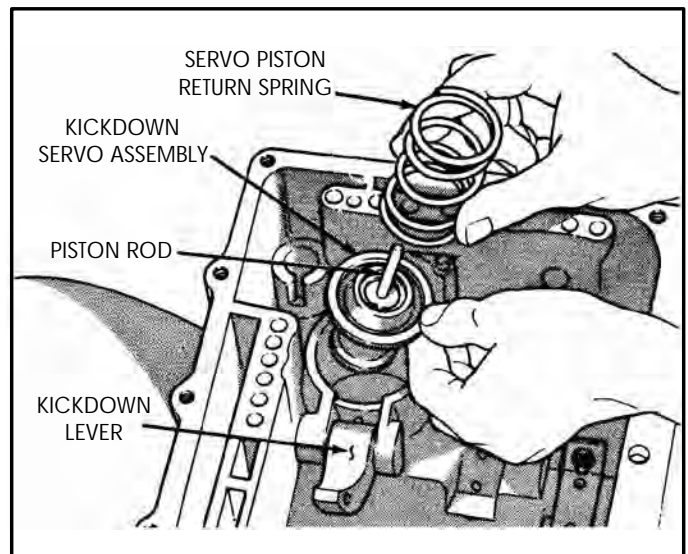


Figure 210

## TRANSAXLE ASSEMBLY

### Servos And Accumulator Components (Cont'd)

6. Install kickdown piston rod guide and snap ring, as shown in Figure 211.
7. Compress the piston rod guide over piston rod and install snap ring, as shown in Figure 212.
8. Install new piston seal rings on accumulator piston, as shown in Figure 213.
9. Install accumulator piston spring on top of the accumulator piston, as shown in Figure 213.
10. Install the accumulator cover, compress against spring and install snap ring using the snap ring pliers shown in Figure 215.

Continued on Page 76.

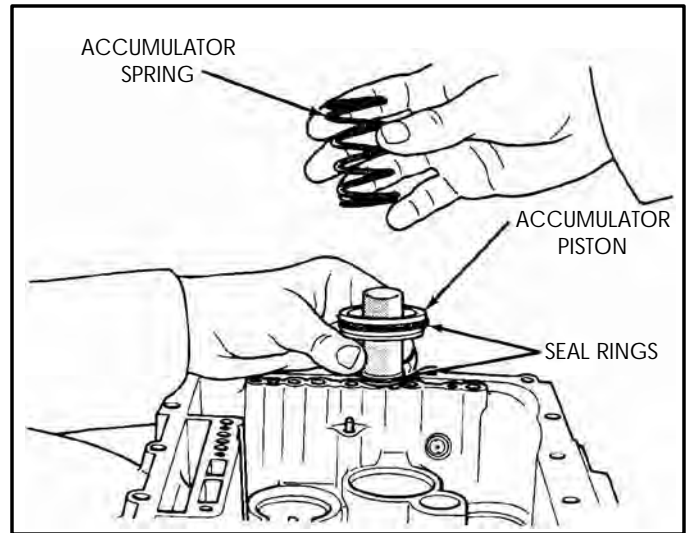


Figure 213

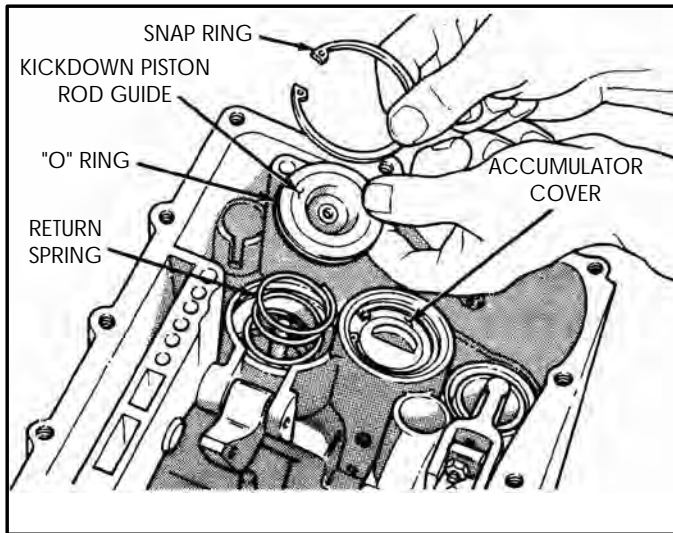


Figure 211

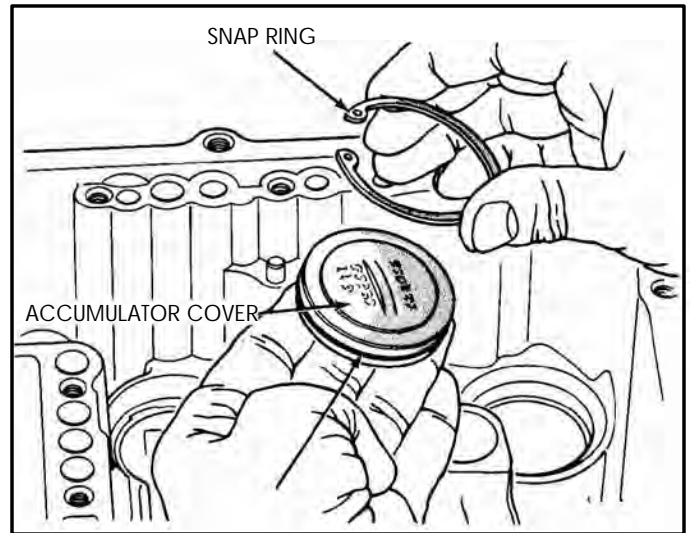


Figure 214

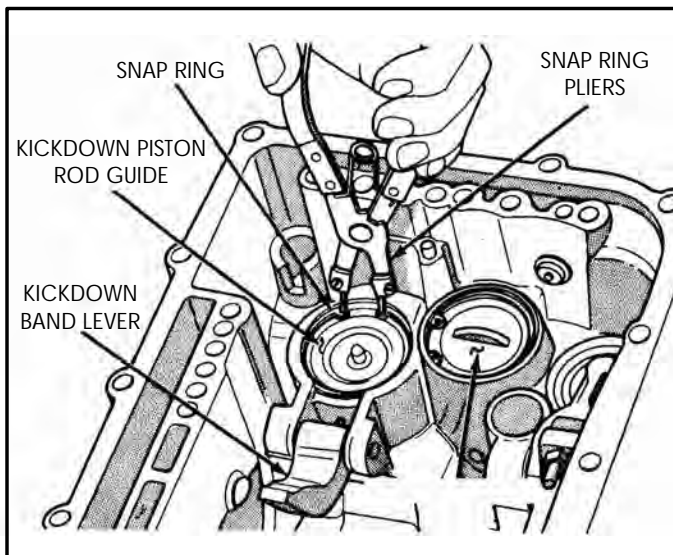


Figure 212

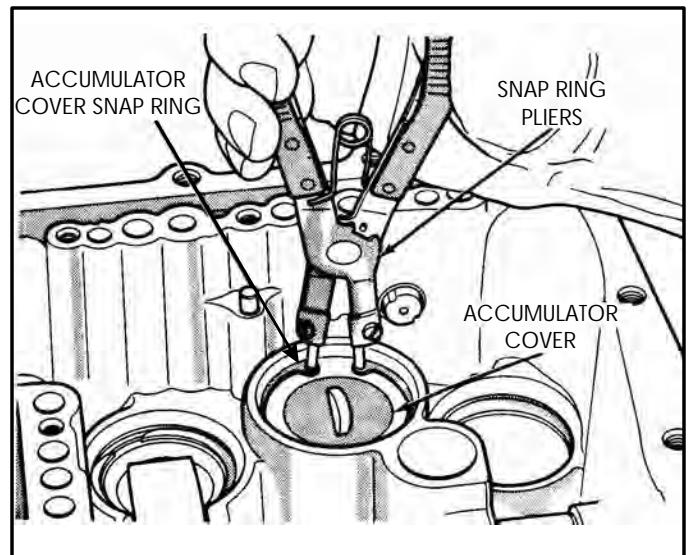


Figure 215

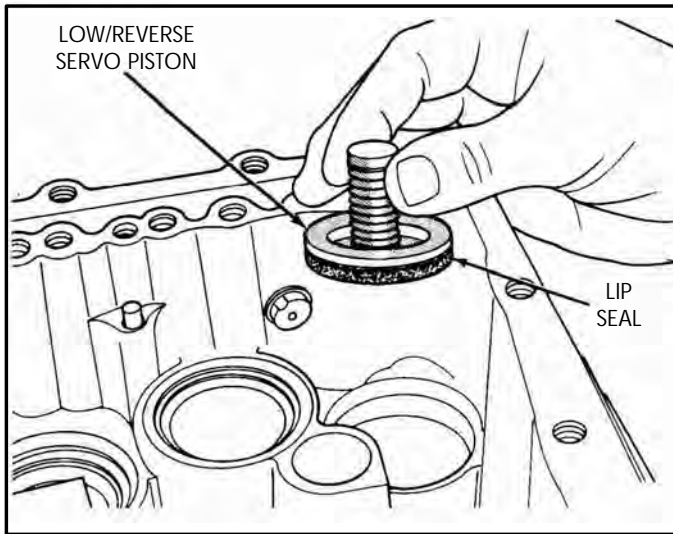


Figure 216

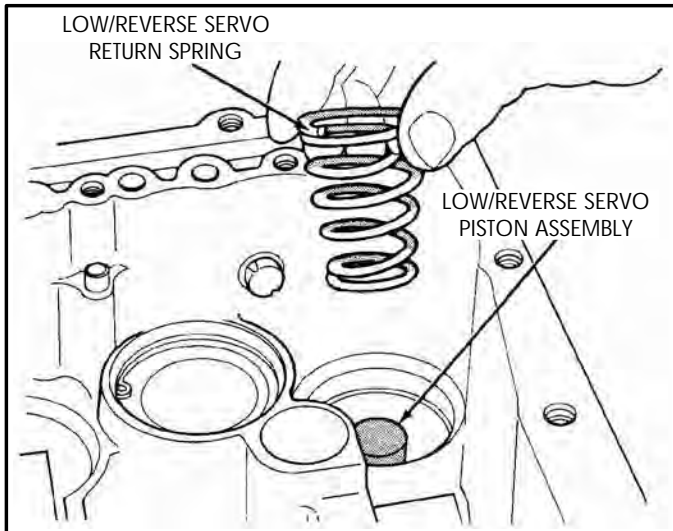


Figure 217

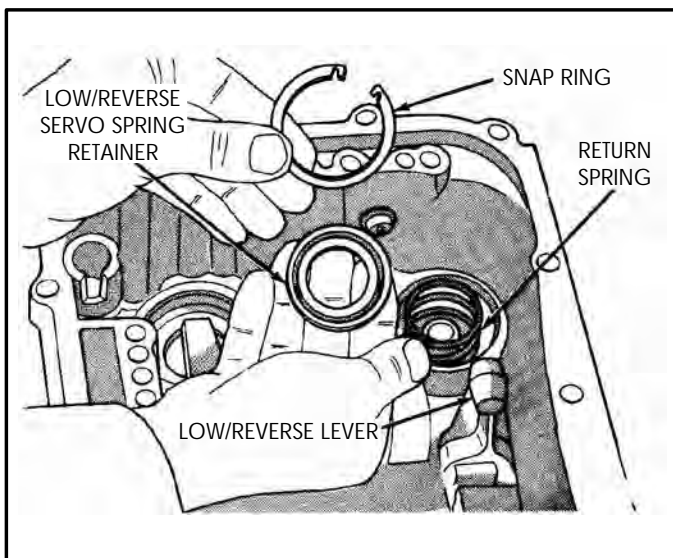


Figure 218

## TRANSAXLE ASSEMBLY (Cont'd) Servos And Accumulator Components (Cont'd)

11. Install new lip seal onto the low/reverse servo piston, with the lip facing down, as shown in Figure 216.
12. Lubricate the lip seal with a small amount of Trans-Jel® and install into the case servo bore, as shown in Figures 216 and 217.
13. Install the low/reverse servo return spring into servo bore, as shown in Figure 217.
14. Install the servo return spring retainer on top of spring, as shown in Figure 218.
15. Compress retainer against spring pressure and install snap ring using the snap ring pliers, as shown in Figure 219.

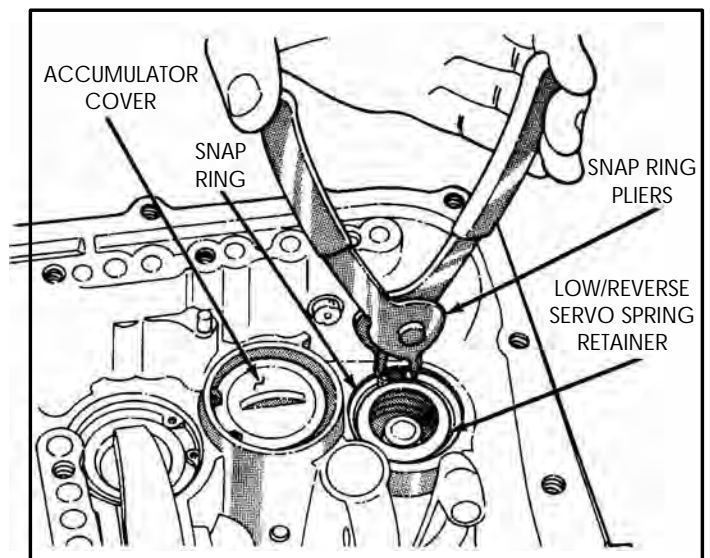


Figure 219

## TRANSAXLE ASSEMBLY

### Internal Components

1. Install the number 11 thrust washer, as shown in Figure 220.
2. Install the low/reverse band and band strut, as shown in Figure 221. (*See Update Page 99*).
3. Install the pre-assembled low overrun clutch with the assembly tool (See Figure 222).
4. Install the number 10 thrust washer on the back side of rear planetary carrier and retain with a small amount of Trans-Jel®.
5. Install the rear planetary carrier assembly into the case ensuring engagement with the ring gear, as shown in Figure 223.
6. Install the number 9 thrust washer, as shown in Figure 224.

Continued on Page 78.

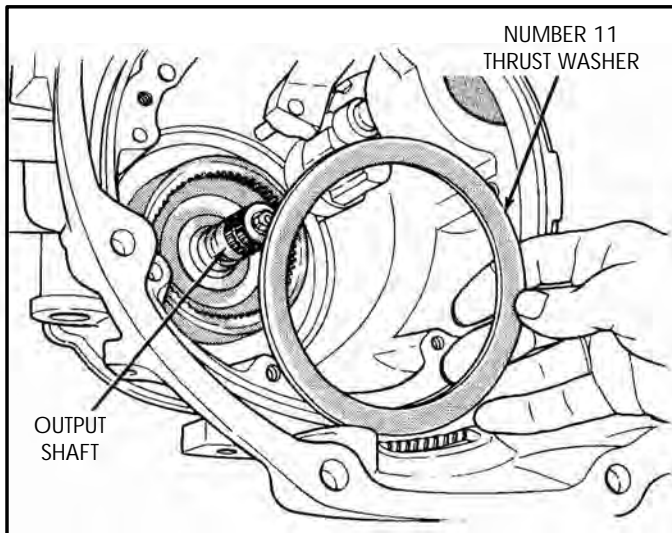


Figure 220

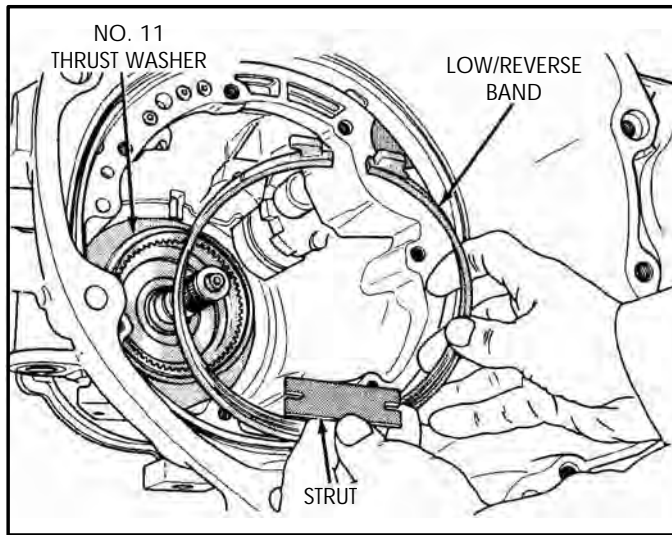


Figure 221

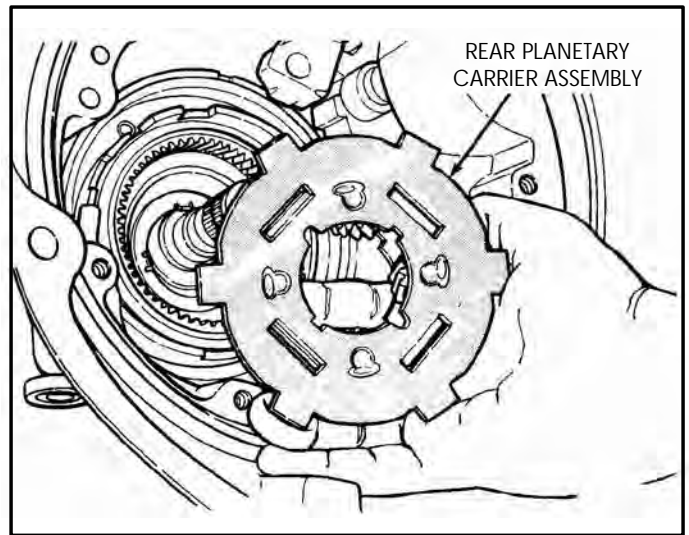


Figure 223

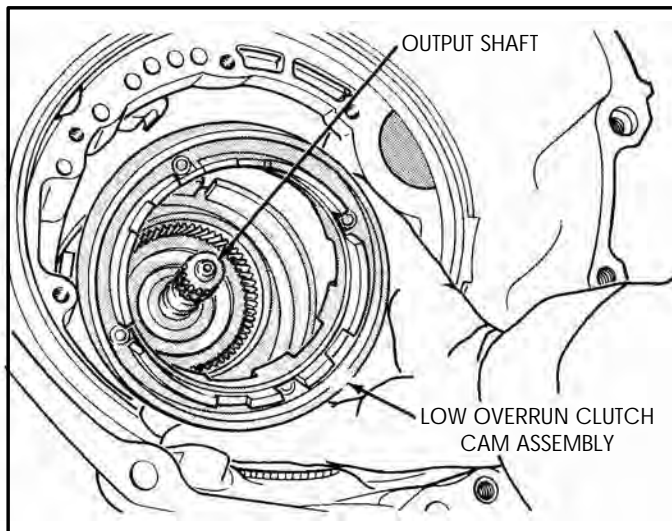


Figure 222

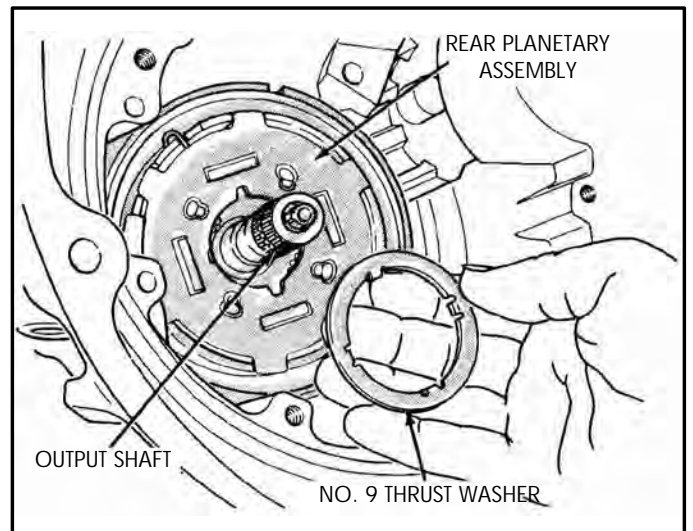


Figure 224

## TRANSAXLE ASSEMBLY (Cont'd)

### Internal Components (Cont'd)

7. Install the sun gear and shell assembly into the transaxle, as shown in Figure 225, ensuring engagement with the rear planetary.
8. Install the number 6 thrust washer on back side of front planetary assembly and retain with a small amount of Trans-Jel®.
9. Install the front planetary assembly into case, as shown in nFigure 226, ensuring engagement with the sun gear.
10. Install snap ring onto the output shaft using the snap ring pliers, as shown in Figure 227.
11. Install the number 3 thrust washer on top of the output shaft, as shown in Figure 228.

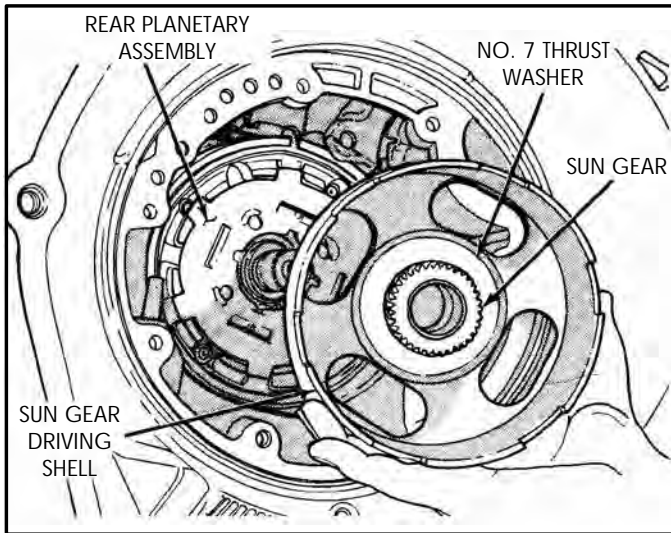


Figure 225

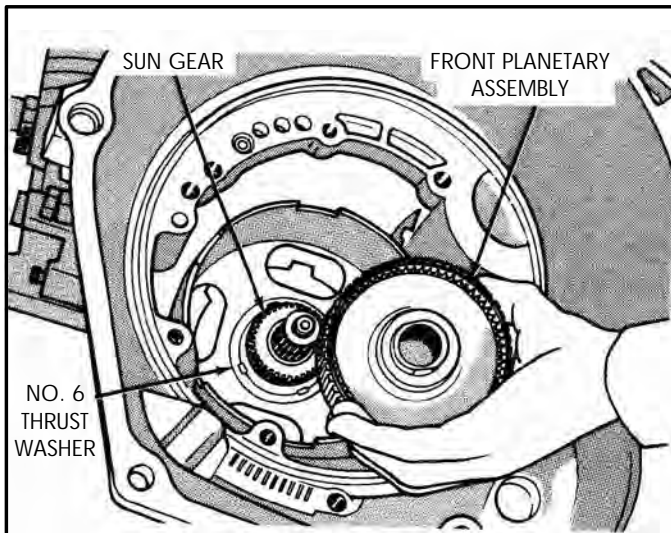


Figure 226

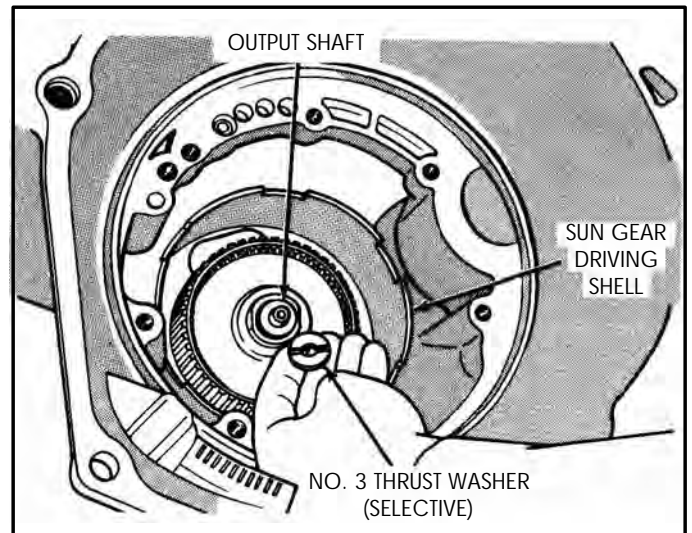


Figure 228

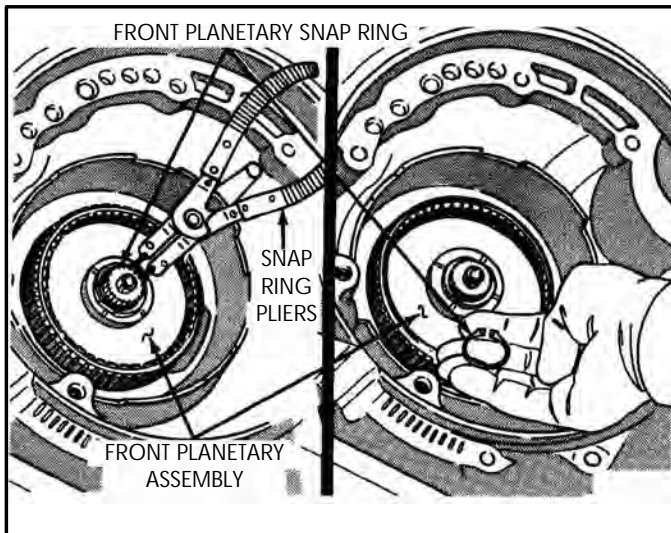


Figure 227

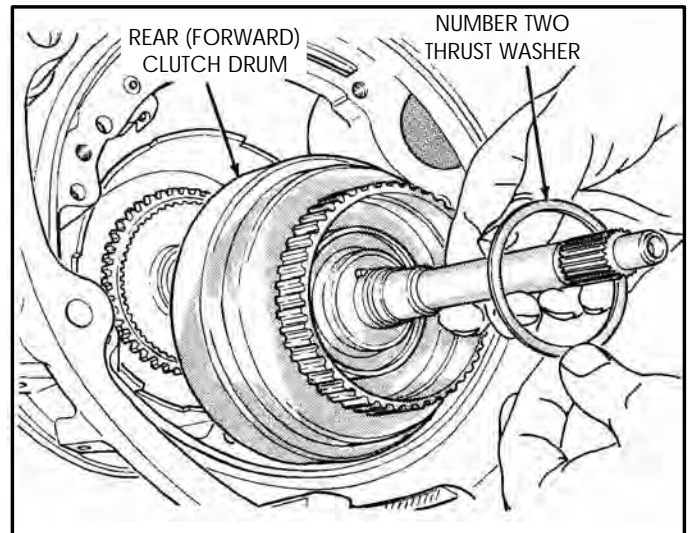


Figure 229

## TRANSAXLE ASSEMBLY (Cont'd)

### Internal Components (Cont'd)

12. Install the pre-assembled rear (forward) clutch housing, as shown in Figure 229, twisting back and forth to engage forward clutch plates, until fully seated.
  13. Install the number 2 thrust washer, as shown in Figure 229.
  14. Install the pre-assembled front (direct) clutch housing, as shown in Figure 230, twisting back and forth to engage direct clutch plates, until fully seated.
  15. Install the kickdown band around the front clutch housing, as shown in Figure 231, along with the band strut.
  16. Install the proper oil pump to case gasket, as shown in Figure 232.
- Note:** *There are currently two different pump gaskets, one for separate sump and one for common sump.*
17. Install the pre-assembled oil pump assembly, as shown in Figure 233.

Continued on Page 80.

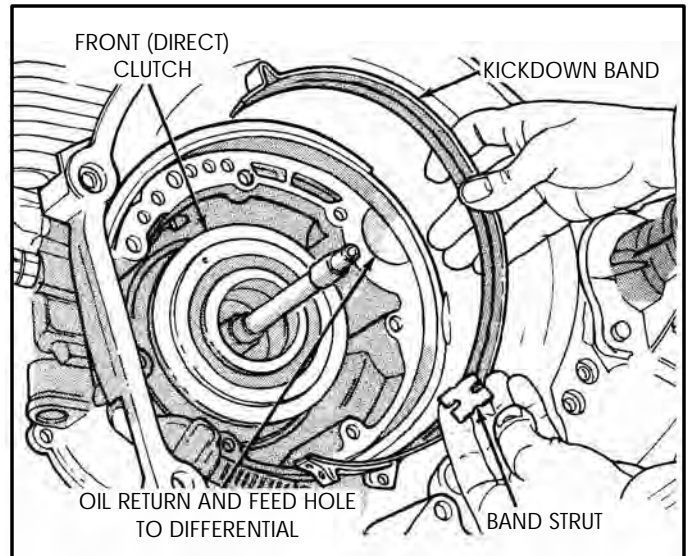


Figure 231

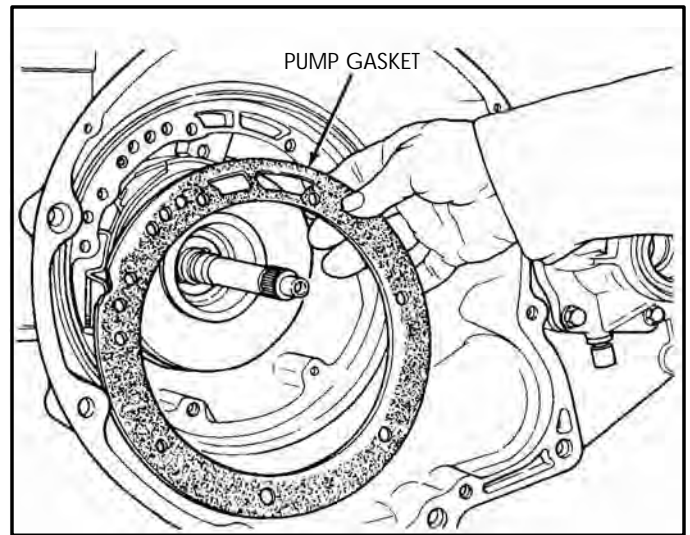


Figure 232

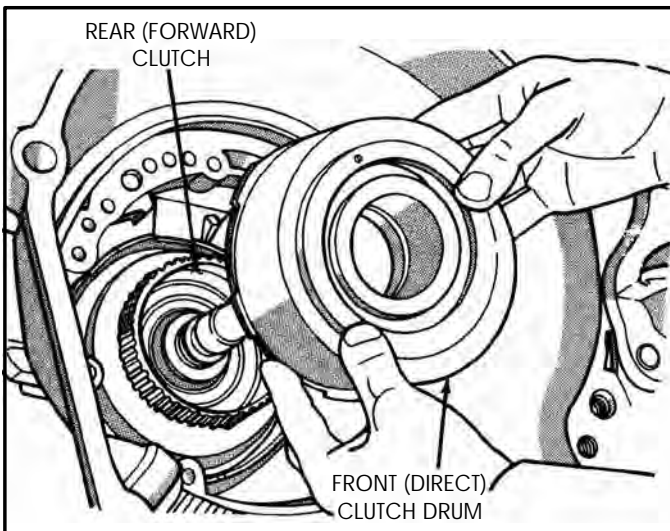


Figure 230

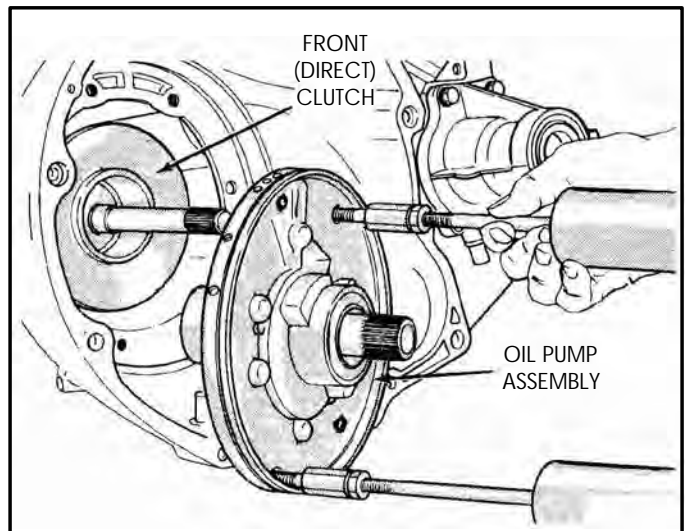


Figure 233

## TRANSAXLE ASSEMBLY (Cont'd)

### Internal Components (Cont'd)

18. Install the oil pump retaining bolts, as shown in Figure 234, and torque to 31 N·m (20 ft.lb.).
19. Attach a dial indicator to transaxle bell housing with the plunger seated against end of the input shaft, as shown in Figure 235, and zero the dial indicator.
20. Move input shaft in and out to obtain end play reading. End play should be .007" to .073".
21. Change the number 3 thrust washer, on top of the output shaft, as necessary to obtain proper end play. Refer to the chart in Figure 236.

OUTPUT SHAFT NO. 3 THRUST CHART	
Thickness "mm"	Thickness "inch"
1.98 - 2.03	.077" - .080"
2.15 - 2.22	.085" - .087"
2.34 - 2.41	.092" - .095"
<b>Transaxle Input Shaft End Play Should Be .018-1.85mm (.007"-.073")</b>	

Figure 236

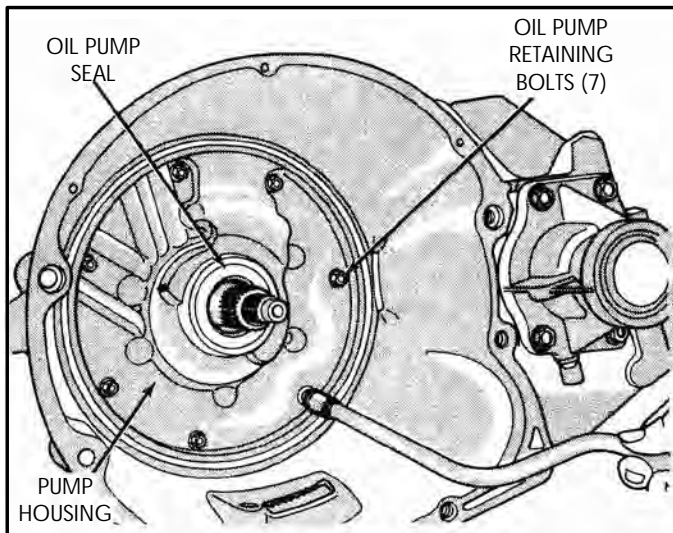


Figure 234

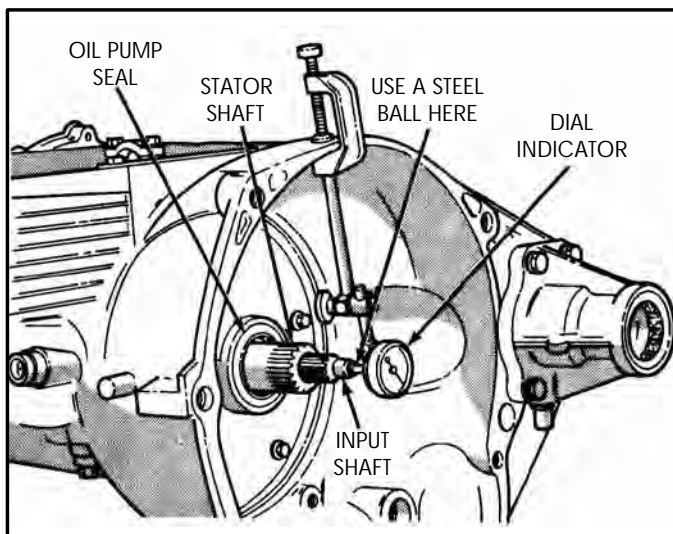


Figure 235

## TRANSAXLE ASSEMBLY (Cont'd)

### Bottom Pan Components

1. Adjust the reverse band assembly, as shown in Figure 237, to the proper setting.  
**Note: Refer to "Band Adjustment" on page 18 of this manual for proper settings.**
2. Install the pre-assembled valve body assembly and governor tubes, as shown in Figure 238, ensuring that governor tubes are in the proper locations in governor support bearing retainer.
3. Hand start the seven valve body attaching bolts, as shown in Figure 238.
4. Torque the seven valve body attaching bolts to 12 N·m or 105 inch pounds.
5. Install the parking rod through parking pawl and parking pawl bracket (See Figure 239).
6. Install parking rod into manual lever bracket, as shown in Figure 240, and install "E" clip.

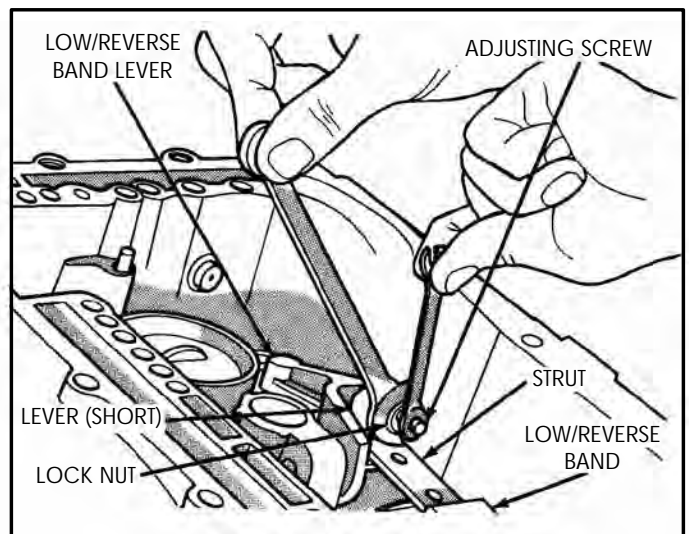


Figure 237

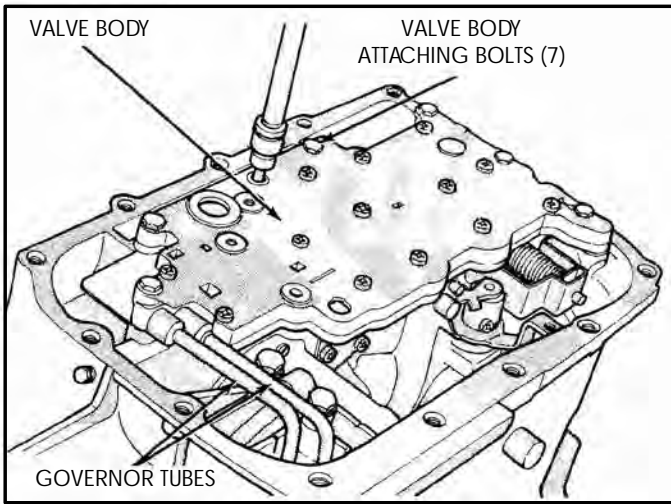


Figure 238

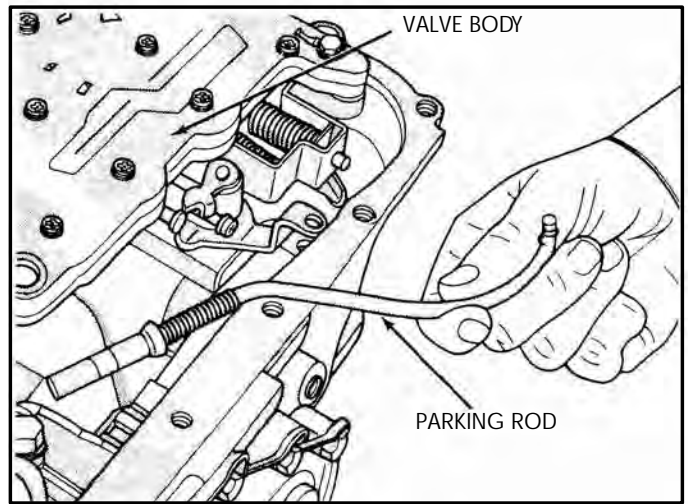


Figure 239

## TRANSAXLE ASSEMBLY (Cont'd)

### Bottom Pan Components

7. Install the *proper* oil filter onto the valve body, as shown in Figure 241.

**Note:** The 1978-1982 models use "Only" the three hole type filter. The 1983-UP models use "Only" the two hole type filter. Refer to Figure 241 for illustrations of both types.

Continued on Page 82.

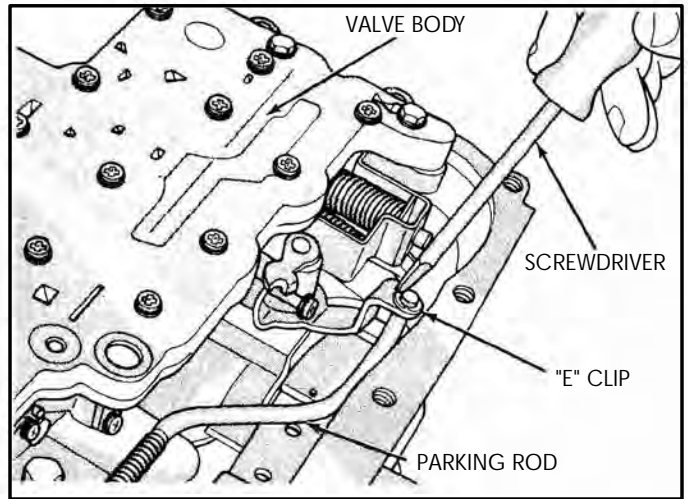


Figure 240

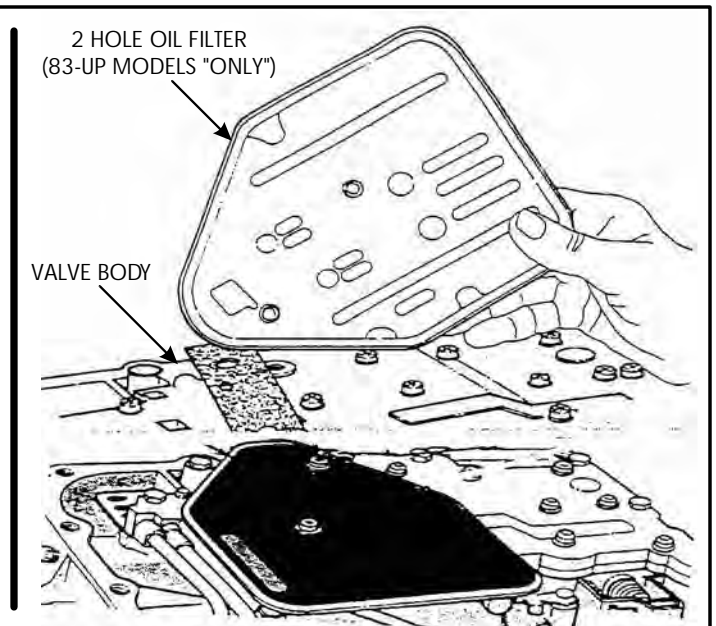
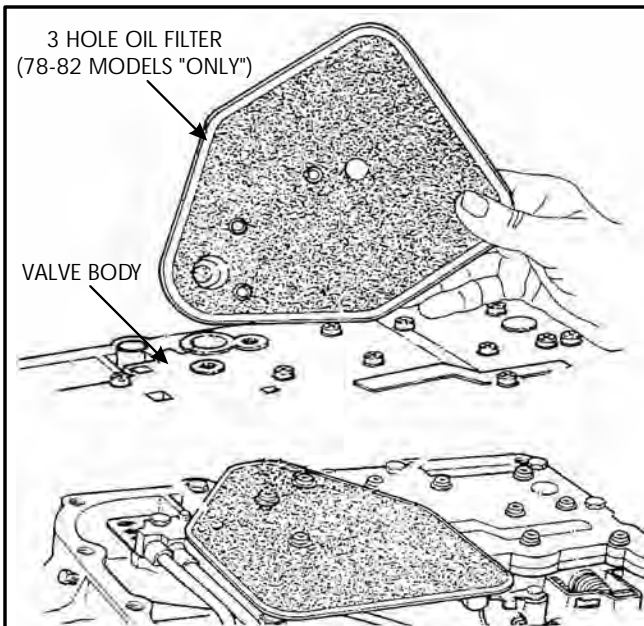


Figure 241

## TRANSAXLE ASSEMBLY (Cont'd)

### Bottom Pan Components

8. Torque the oil filter screws to 5 N·m (40 in.lb.), as shown in Figure 242.
9. Apply a 1/8" bead of R.T.V. to bottom oil pan, as shown in Figure 243.
10. Install bottom oil pan on transaxle case and 14 oil pan bolts, as shown in Figure 244.
11. Torque the 14 pan bolts to 19 N·m (165 in.lbs), as shown in Figure 244.
12. Install the Neutral/Start switch into transaxle case and torque to 34 N·m (25 ft.lbs.). Refer to Figure 245.

***Congratulations!  
You Are Finished!***

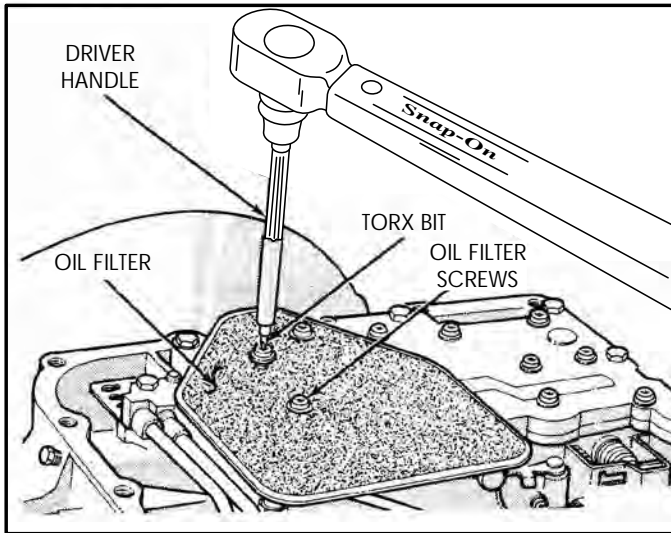


Figure 242

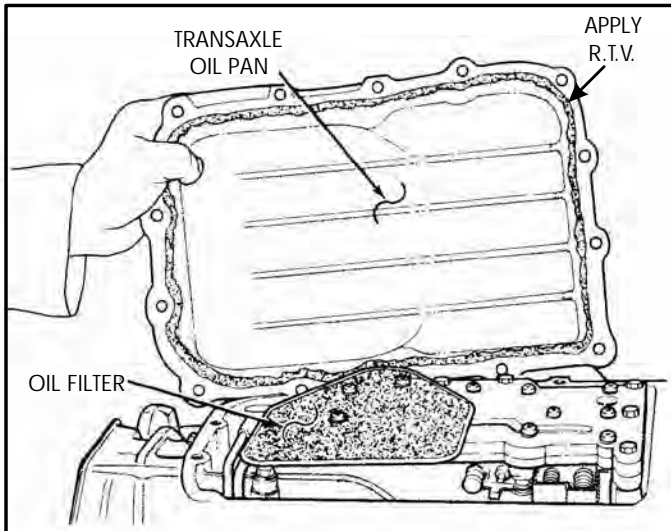


Figure 243

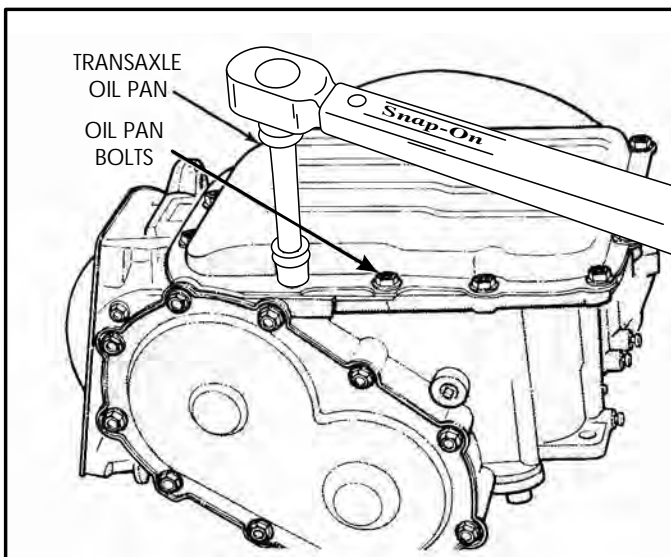


Figure 244

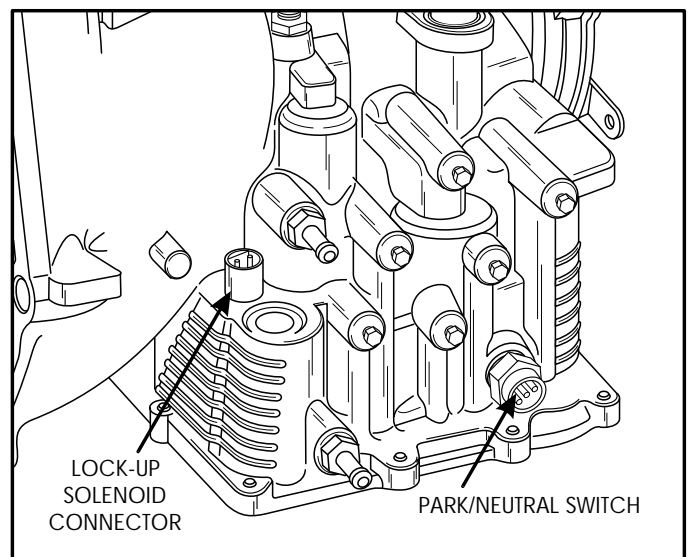


Figure 245



# Technical Service Information

## TORQUE SPECIFICATIONS

Item	Qty	Thread Size	Head Size	N-m	Inch Lbs
<b>Automatic Transaxle External</b>					
Bell Housing Cover .....	3	M6 X 1.0 X 10	10mm Hex	12	12
Flex Plate to Crank (A404) .....	6	M10 X 1.0 X 11	16mm Hex	68	50**
Flex Plate to Crank (A413) .....	6	M10 X 1.5 X 18	17mm Hex	88	65**
Flex Plate to Crank (A470/A670) .....	6	M12 X 1.25 X 21	19mm Hex	136	100**
Flex Plate to Torque Converter (A404) .....	3	M10 X 1.5 X 11	18mm Hex	54	40**
Flex Plate to Torque Converter (All Others) .....	3	M10 X 1.5 X 11	18mm Hex	54	40**
Lower Bell Housing Cover .....	3	M6 X 1.0 X 10	10MM Hex	12	105
Speedometer to Extension .....	1	M6 X 1.0 X 14	10mm Hex	7	60
Cooler Tube to Transaxle .....	2	1/2" - 20	5/8" Hex	16	150
Cooler Hose to Radiator .....	2	1/8"-27 NPT	12mm Hex	12	110
Pressure Check Plug .....	7	1/16"-27 NPT	5/16" Hex	5	45
Neutral Safety Switch .....	1	1/4"-16 UNF	1.0" Hex	34	25**
<b>Differential Area</b>					
Ring Gear to Differential Carrier .....	12	M13 X 1.5 X 25	Tool C-4706	95	70**
Extension Housing to Case .....	4	M8 X 1.25 X 28	13mm Hex	28	250
Differential Bearing Retainer to Case .....	6	M8 X 1.25 X 28	13mm Hex	28	250
Differential Cover to Case .....	10	M8 X 1.25 X 16	13mm Hex	19	165
<b>Transfer and Output Shaft Area</b>					
Output Shaft Nut .....	1	M20 X 1.5	30mm Hex	271	200**
Transfer Shaft Nut .....	1	M20 X 1.5	30mm Hex	271	200**
Governor to Support .....	2	M5 X 0.8 X 20	7mm Hex	7	60
Governor to Support .....	1	M5 X 0.8 X 30	7mm Hex	7	60
Governor Counter Weight .....	1	M8 X 1.25 X 35	13mm Hex	28	250
Rear Gear Cover to Case .....	10	M8 X 1.25 X 16	13mm Hex	19	165
<b>Pump and Kickdown Band Area</b>					
Stator to Oil Pump .....	6	M8 X 1.25 X 19	13mm Hex	28	250
Oil Pump to Case .....	7	M8 X 1.25 X 25	8mm, 12 Pt.	31	275
Kickdown Band Lock Nut .....	1	M12 X 1.75	18mm Hex	47	35**
<b>Valve Body, Oil Pan Area</b>					
Valve Body Plates .....	15	M5 X 0.8 X 11	Torx, T25	5	40
Transfer Plate to Valve Body .....	13	M5 X 0.8 X 25	Torx, T25	5	40
Oil Filter to Transfer Plate (78-82) .....	3	M5 X 0.8 X 30	Torx, T25	5	40
Oil Filter to Transfer Plate (83-Up) .....	2	M5 X 0.8 X 30	Torx, T25	5	40
Valve Body Assembly to Case .....	7	M6 X 1.0 X 30	10mm Hex	12	105
Oil Pan to Case .....	10	M8 X 1.25 X 16	13mm Hex	19	165
Reverse Band Lock Nut .....	1	M8 X 1.25	13mm Hex	27	20**

\*\* Foot Lbs

*The chart below applies to all front wheel drive vehicles equipped with Manual or Automatic Transaxles, except M and Z vehicles equipped with A412 Manual Transaxle.*

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

*All M and Z vehicles equipped with A412 Manual Transaxle require a 16 Tooth speedometer pinion.*

Figure 246

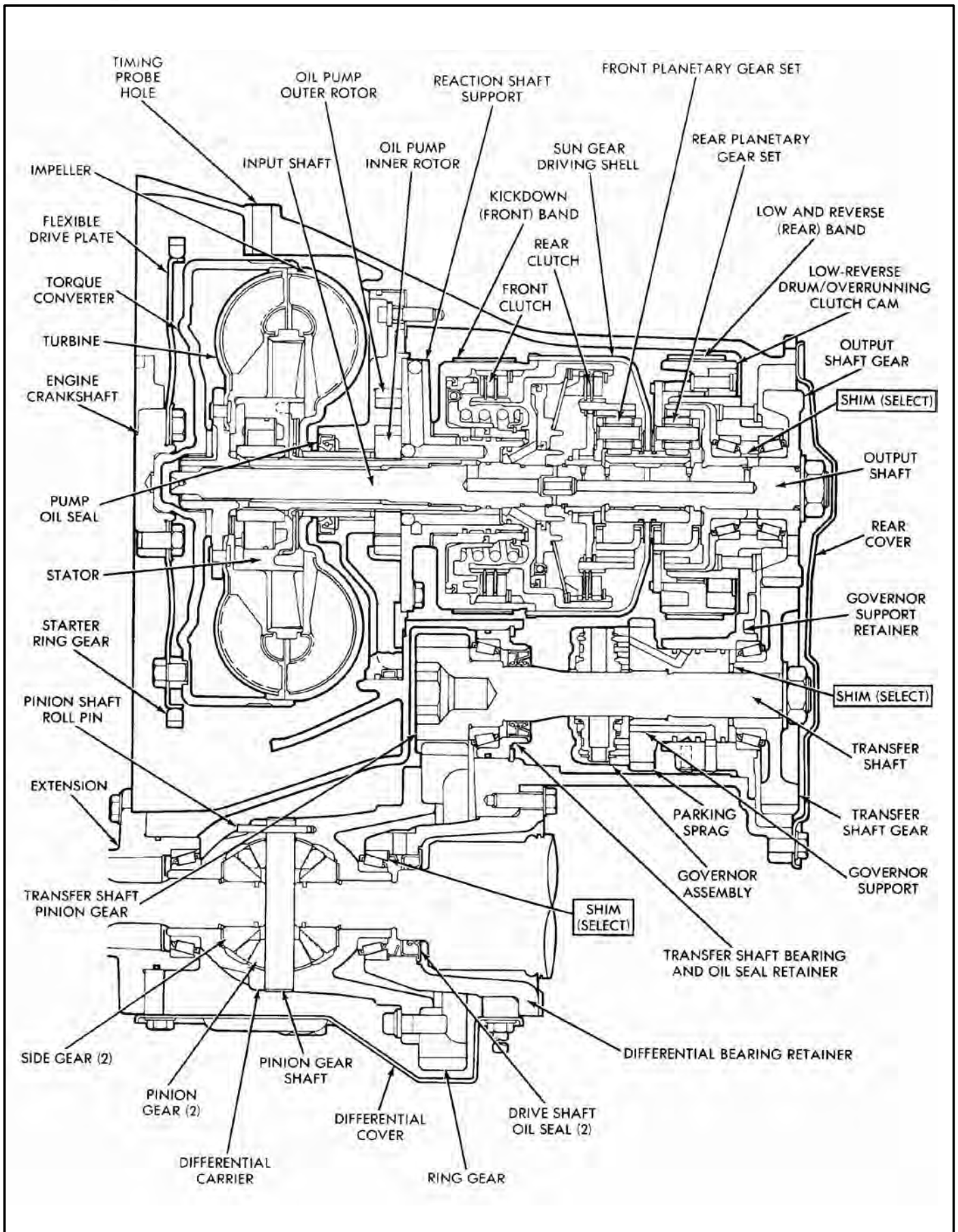


Figure 247

## BELL HOUSING CHANGES

USE THESE ILLUSTRATIONS TO HELP IN IDENTIFICATION OF THE TORQUE-FLITE FRONT WHEEL DRIVE TRANSAXLES.

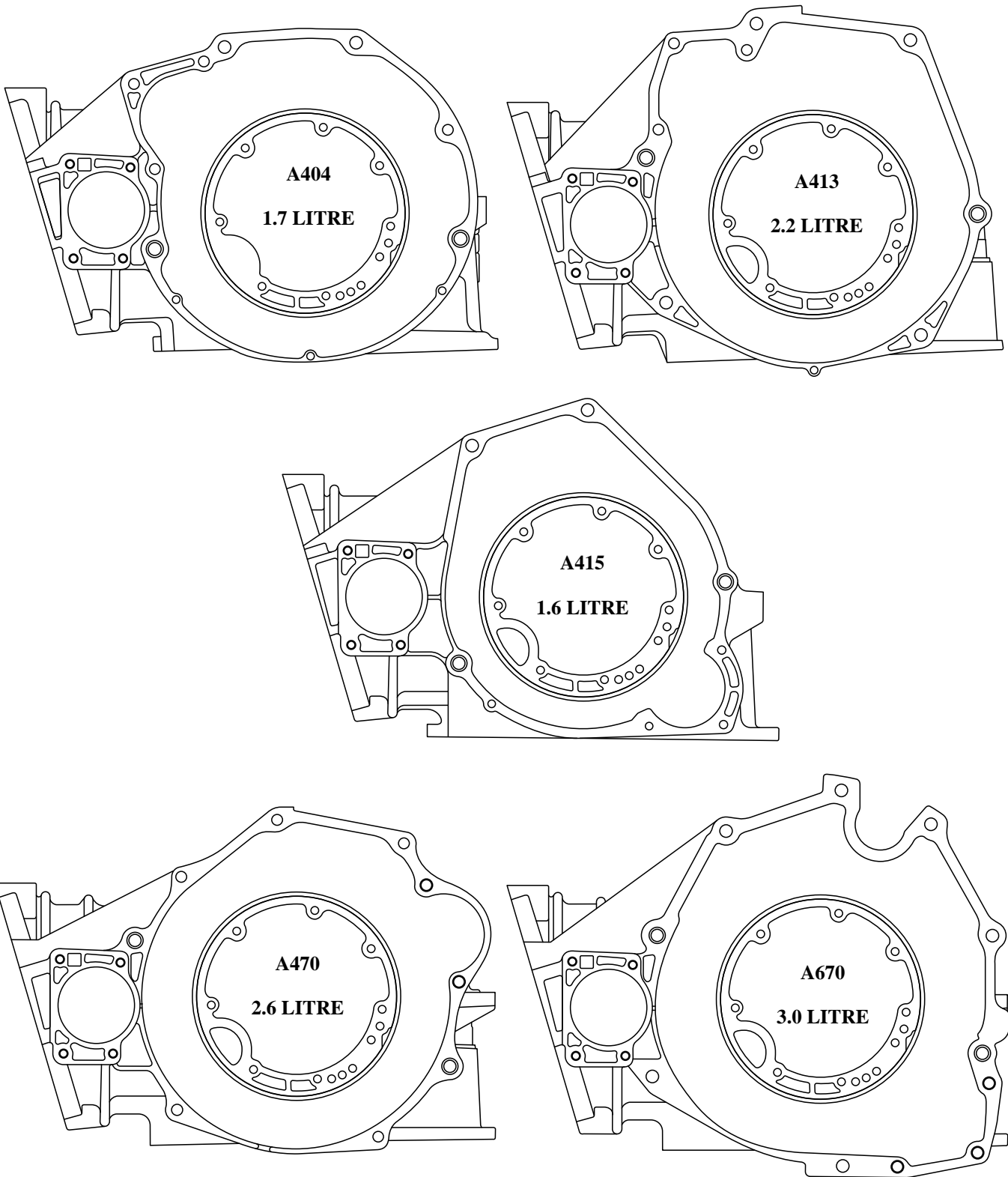


Figure 248



## "UPDATE SECTION"

### "SEPERATE SUMP" TO "COMMON SUMP"

#### 1983 CHANGES

TRANSAXLE CASE - 1983 cases were cast with an added port in the oil pump face to allow for the transaxle fluid to flow into the final drive section, as shown in Figure 249. The back of the oil pump cover was also relieved to allow fluid to flow through the added port.

OIL PUMP GASKET - Modified to allow for the transaxle fluid to flow through the added port and into the final drive section, as shown in Figure 250. The new pump gasket will retro-fit back, but the previous pump gasket **cannot** be used forward, as it would block fluid flow to final drive.

EXTENSION HOUSING - On 1978-1982 models the *transaxle sump* is vented through the hollow dipstick, and the *differential sump* is vented through a spring loaded cap on the extension housing. These units must be filled "*Seperately*", transaxle filled through the dipstick hole and the differential through the plug in the differential cover. With the engineering change to the *common sump*, the transaxle sump and differential sump are both vented through the hollow dipstick, thus the breather on the extension housing is no longer needed, as shown in Figure 251.

OIL PAN, OIL FILTER, DIPSTICK - The 1983 models have a deeper bottom oil pan, deeper and re-designed oil filter with two mounting screws, and a longer dipstick to accommodate the deeper oil pan and all of these are illustrated in Figure 252.

TRANSFER SHAFT BEARING RETAINER - The oil seal in the retainer has been eliminated as it is no longer needed in the "Single Sump" system, as illustrated in Figure 253. If you happen to be repairing a "Seperate Sump" system, the oil seal is required, as illustrated in Figure 253.

**Note: "Seperate Sump" systems are NOT recommended. Change it over to "Single Sump" system.**

DIFFERENTIAL CARRIER - Has been modified to accept side gear thrust washers that have "Tabs" on them to prevent them from rotating, as shown in Figure 254. The differential carrier with the "Tabs" on the side gear washers are **required** on "Single Sump" systems.

#### **"Special Note:"**

***On 1978-1982 models the differential sump is "Seperate" from the transaxle sump. Special emphasis is placed on filling and maintaining the differential oil level to 1/8" to 3/16" below the fill hole in the differential cover.***

***On 1983-Up models the differential oil sump is "Common" with the transaxle sump, and seperate filling of the differential is not necessary.***

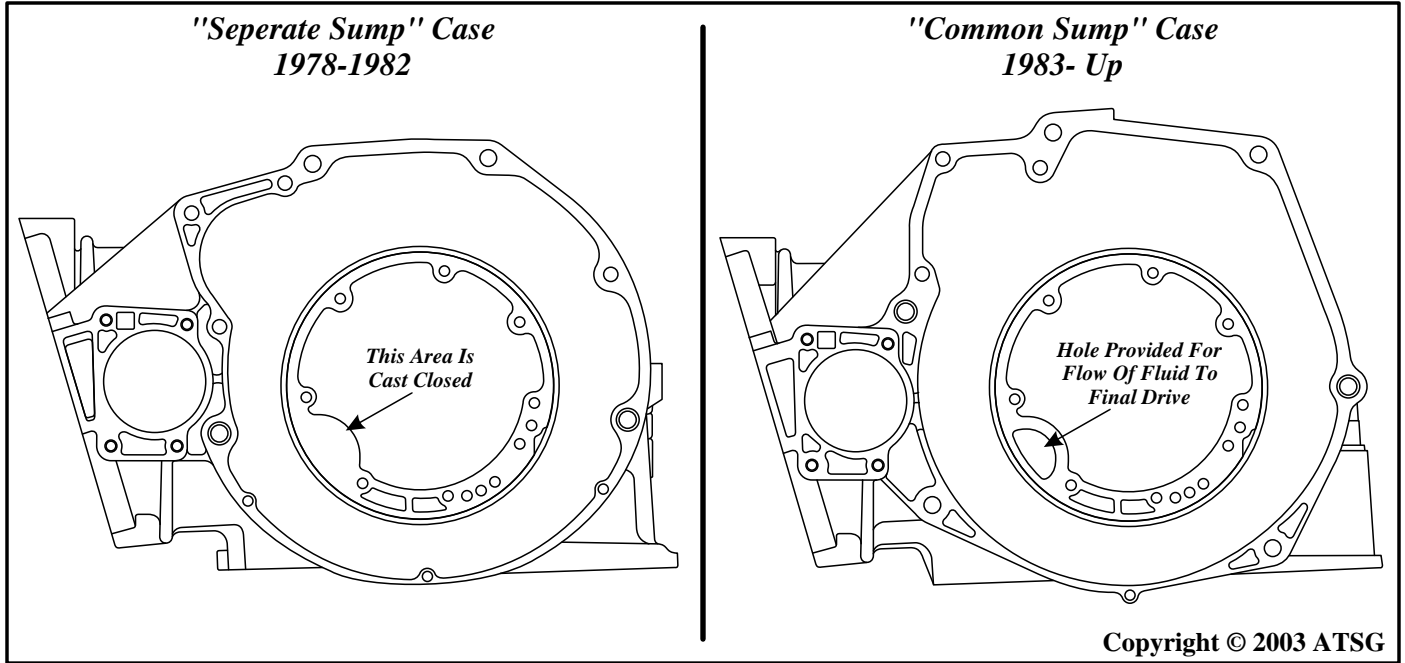


Figure 249

ProCarManuals.com

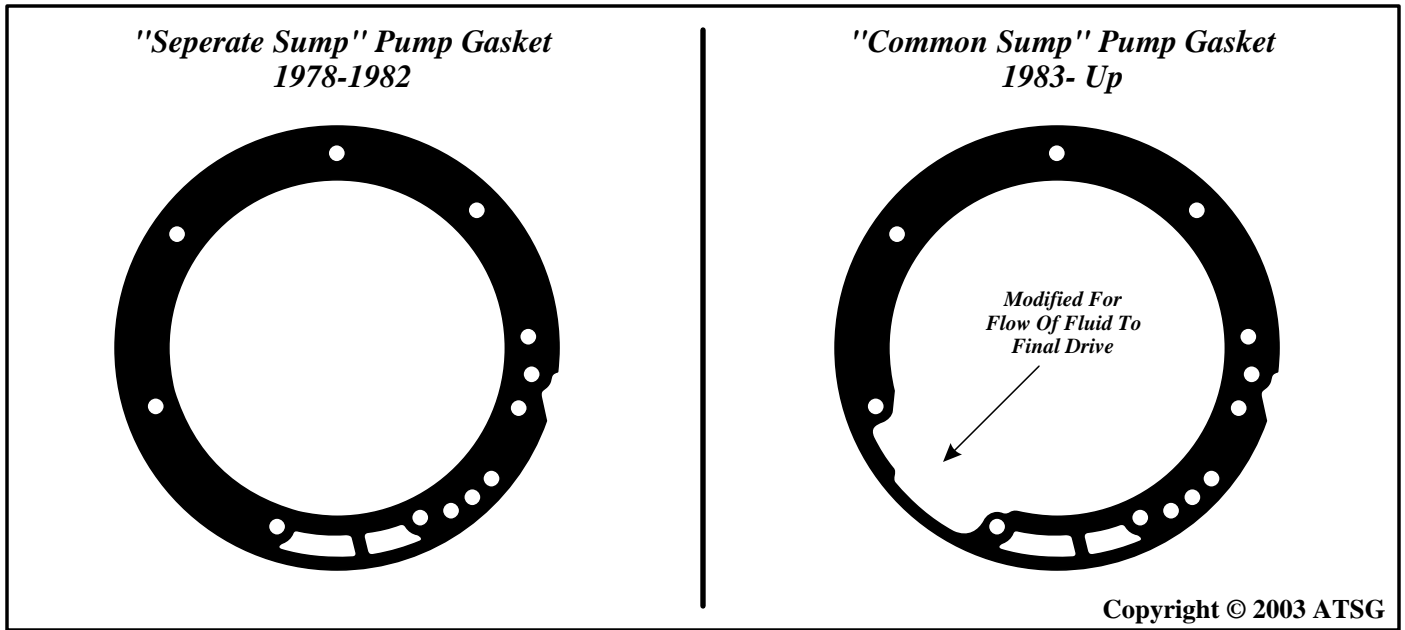


Figure 250

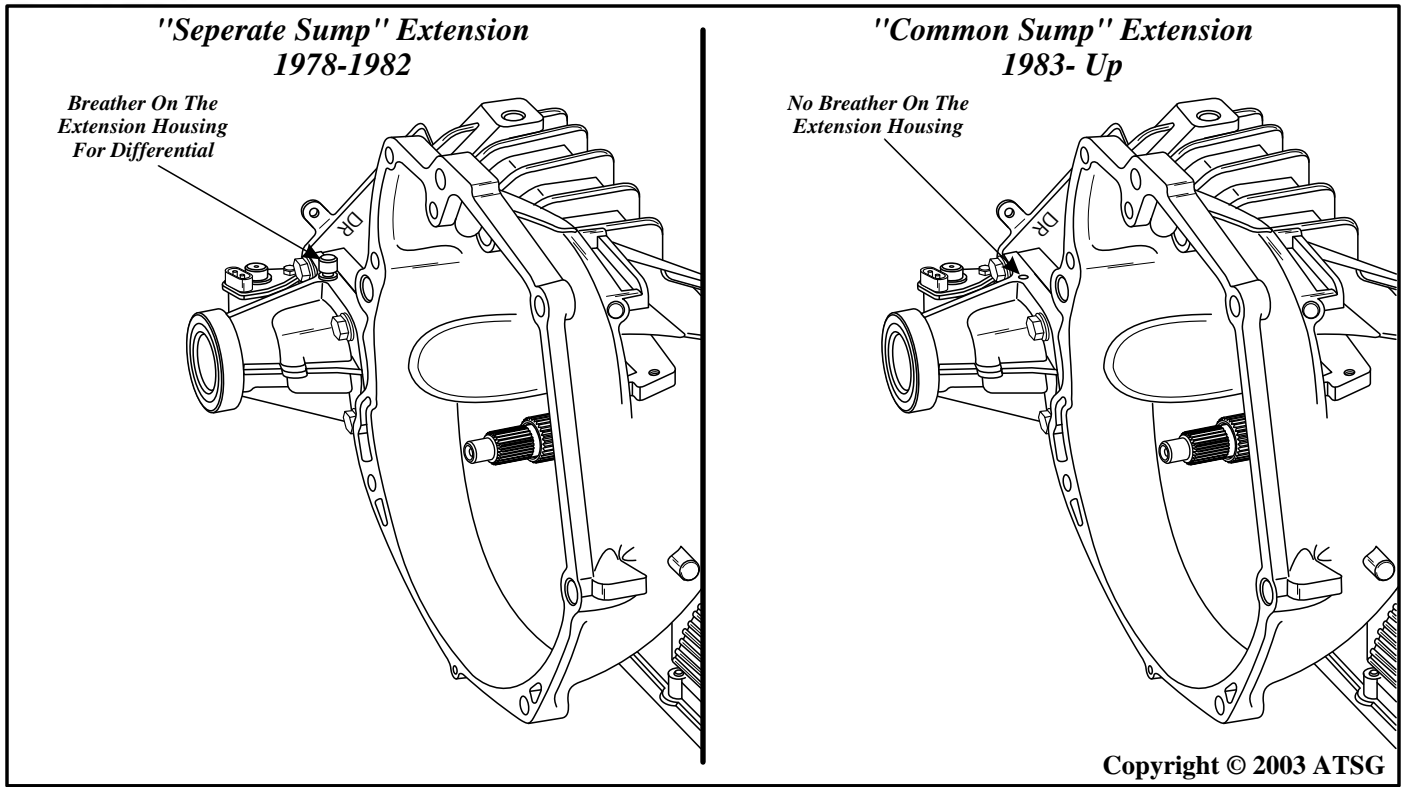


Figure 251

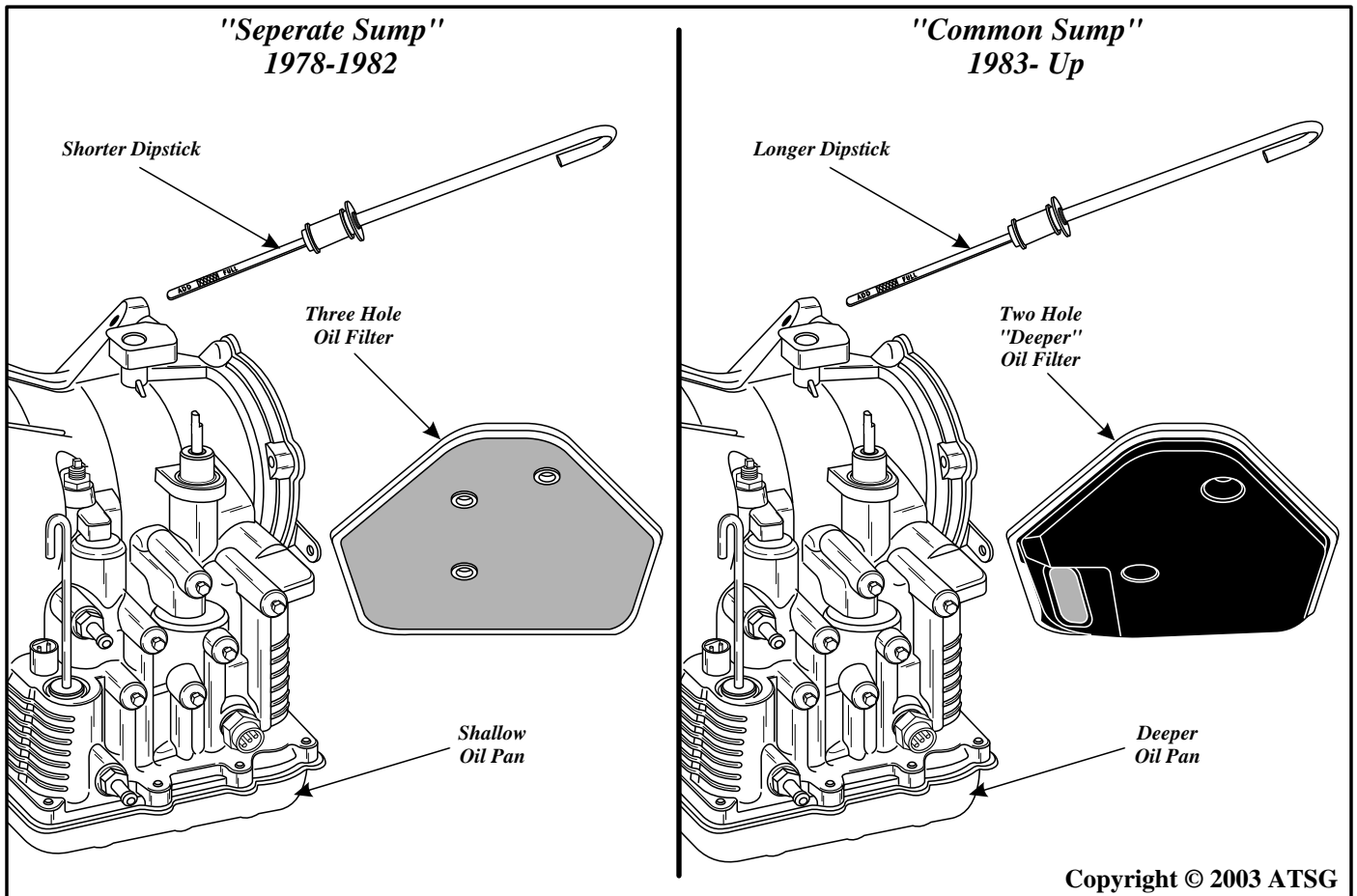


Figure 252

# "UPDATE SECTION"

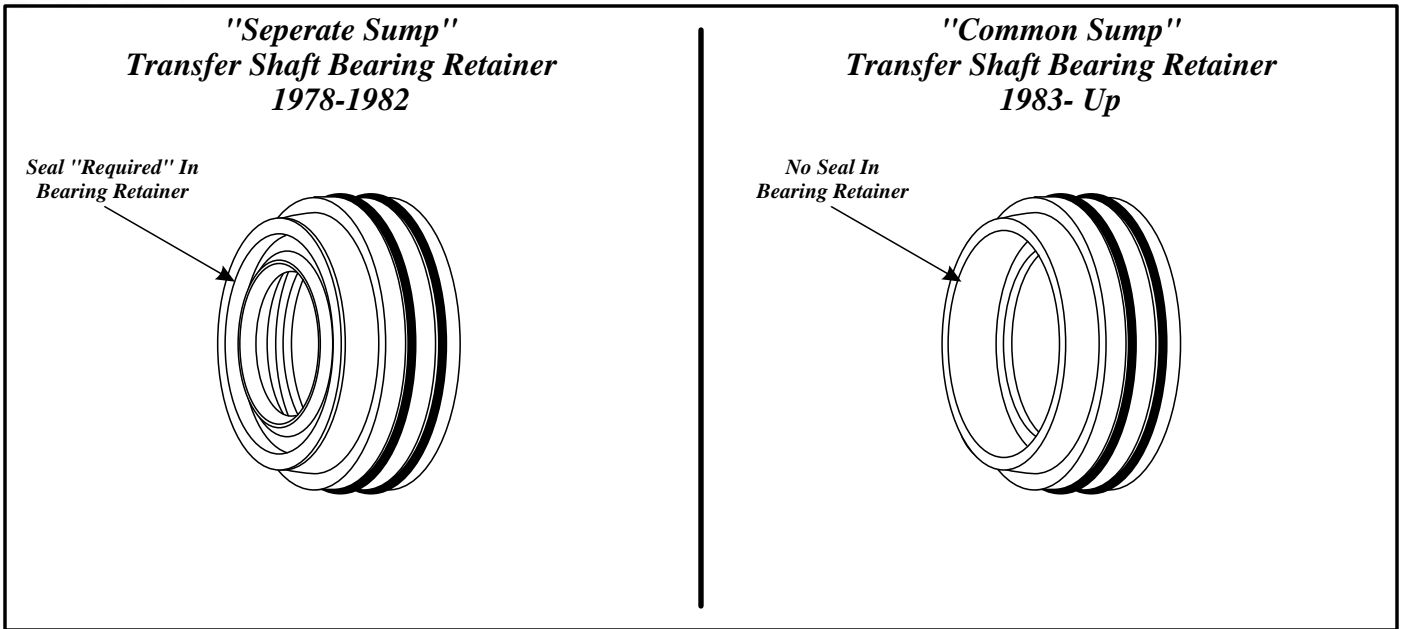
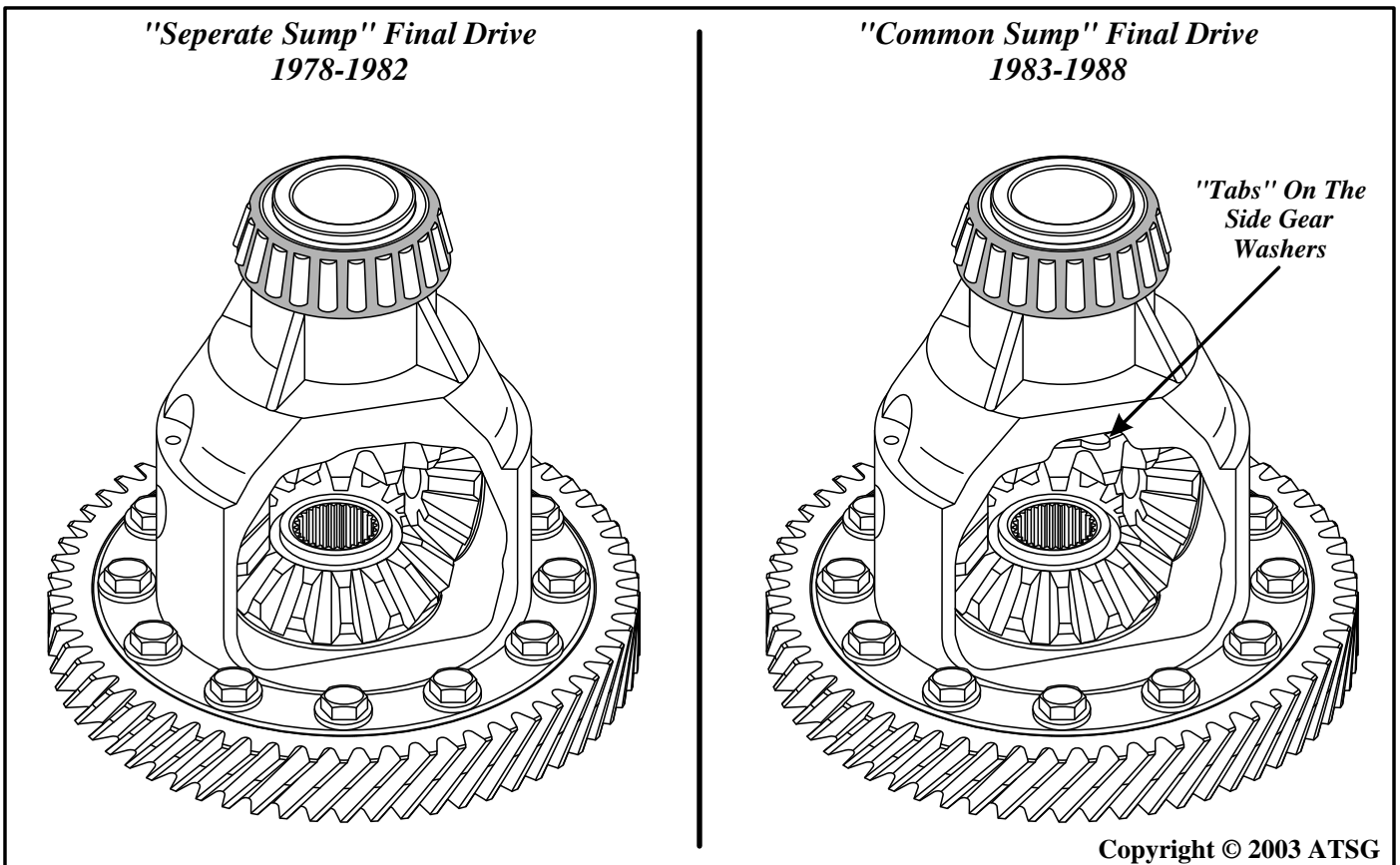


Figure 253



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Figure 254



## "UPDATE SECTION"

### *ADDITIONAL FINAL DRIVE CHANGES*

#### ***1983-1986 Final Drive***

The 1983-1986 has a "***Recessed***" roller bearing on the differential carrier, as shown in Figure 255, and requires a final drive bearing retainer that is approximately 3.490" in length. The bearing race diameter is approximately 2.420", as shown in Figure 255. The ring gear width is approximately 1.040", also shown in Figure 255.

#### ***1987-Mid 1995 Final Drive***

The 1987-Mid 1995 differential carrier changed in the roller bearing area, as shown in Figure 255, with an "Extended" roller bearing and requires a final drive bearing retainer that is approximately 2.280" in length. The bearing race diameter remained the same as previous models. The ring gear width changed to a wider dimension of approximately 1.170", also shown in Figure 255

#### ***Mid 1995-2002 Final Drive***

The Mid 1995-2002 differential bearing retainer changed with the introduction of a larger diameter bearing and race in this area. The differential bearing retainer changed with a bearing race diameter of approximately 2.890", as shown in Figure 255. The approximate length of the bearing retainer changed to 2.360" also shown in Figure 255. All other dimensions remained the same as the previous year.

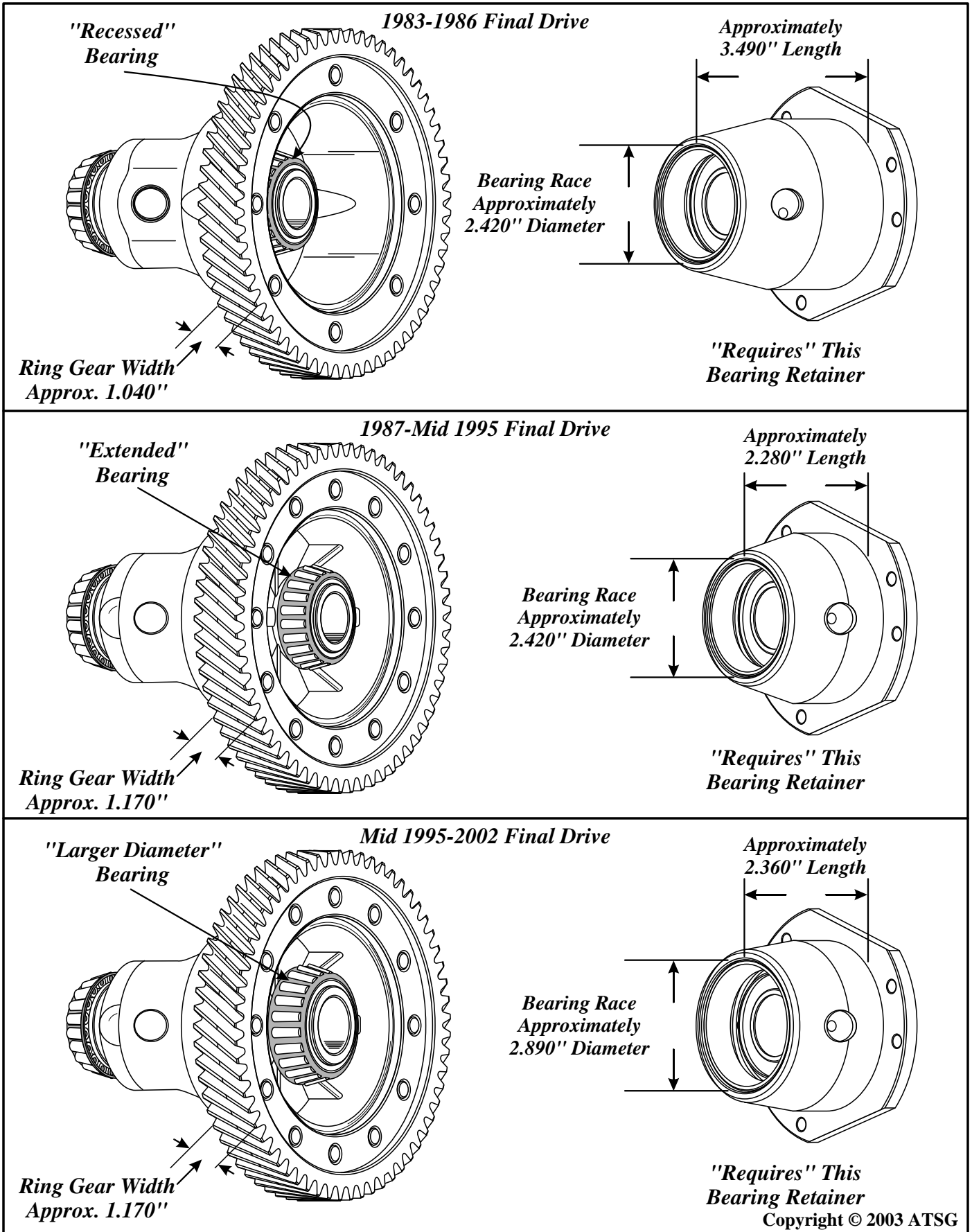


Figure 255

## CHRYSLER A670 (31TH) AND A604 (41TE) NEW DESIGN FINAL DRIVE CROSS SHAFT RETAINERS

**CHANGE:** Beginning in the model year 2000, as a running change, Chrysler introduced a new design final drive cross shaft retainer and eliminated the retaining pin. The new design retainers are held in place by two of the ring gear retaining bolts (See Figure 256).

**REASON:** Eliminates the possibility of the cross shaft coming out and breaking the case.

**PARTS AFFECTED:**

- (1) FINAL DRIVE HOUSING - Retaining pin hole eliminated (See Figure 257).
- (2) CROSS SHAFT - Retaining pin hole eliminated (See Figure 257).
- (3) CROSS SHAFT RETAINER - New design cross shaft retainer to replace the previous design retaining pin (See Figure 257).

**INTERCHANGEABILITY:**

Chrysler has now made available two service packages to back service previous design levels, one kit for the 31TH and one kit for the 41TE transaxles. The contents of these kits are illustrated in Figure 257 and part numbers are listed below under "Service Information".

The new design retainers are also available individually from the OEM, and are installed as shown in Figures 258 and 259.

**SERVICE INFORMATION:**

A604 (41TE) Differential Service Package (New Design) .....	4798858AB
A670 (31TH) Differential Service Package (New Design) .....	4798859AB
A604 (41TE) Cross Shaft Retaining Brackets (New Design) .....	4800058AA
A670 (31TH) Cross Shaft Retaining Brackets (New Design) .....	4800059AA

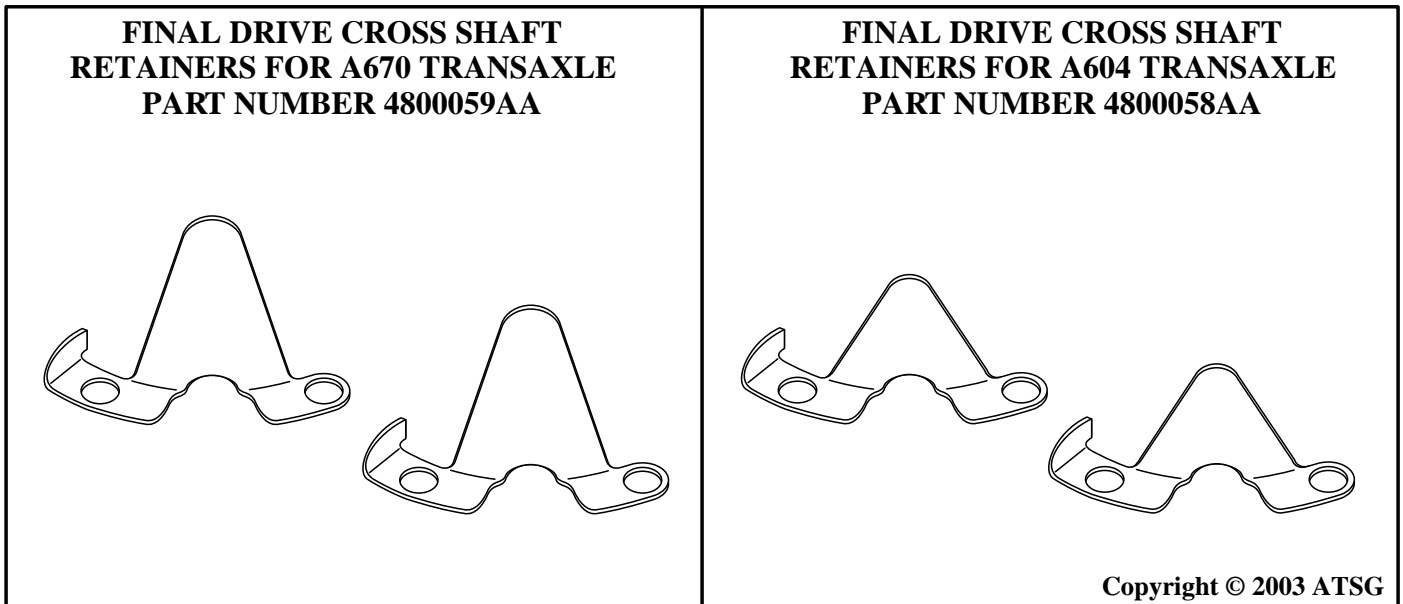
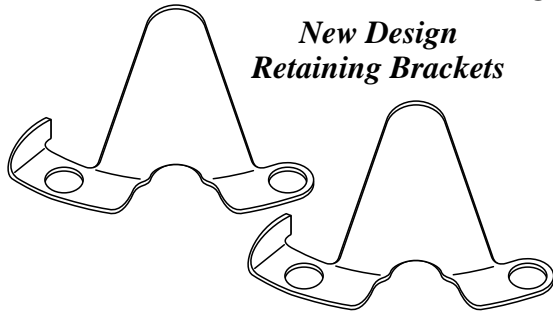


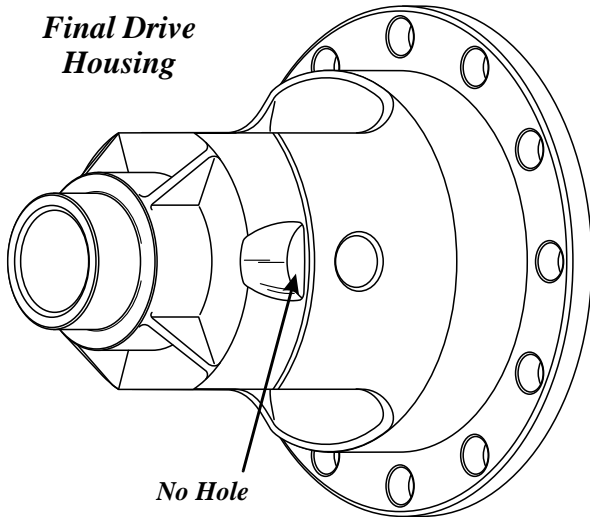
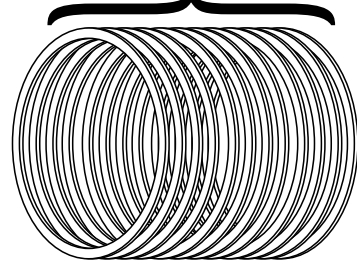
Figure 256

# "UPDATE SECTION"

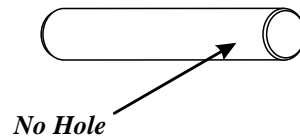
## CONTENTS OF KIT NUMBER 4798859AB FOR A670 FAMILY



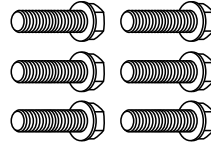
### *Various Selective Shims*



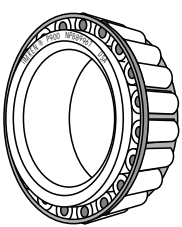
### *Cross Shaft*



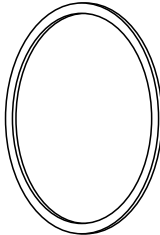
### *Bearing Retainer Retaining Bolts*



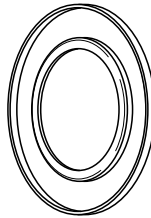
### *New Large Tapered Bearing*



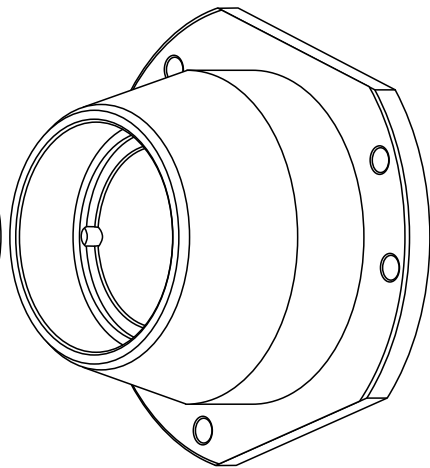
### *Selective Shim*



### *Oil Weir*



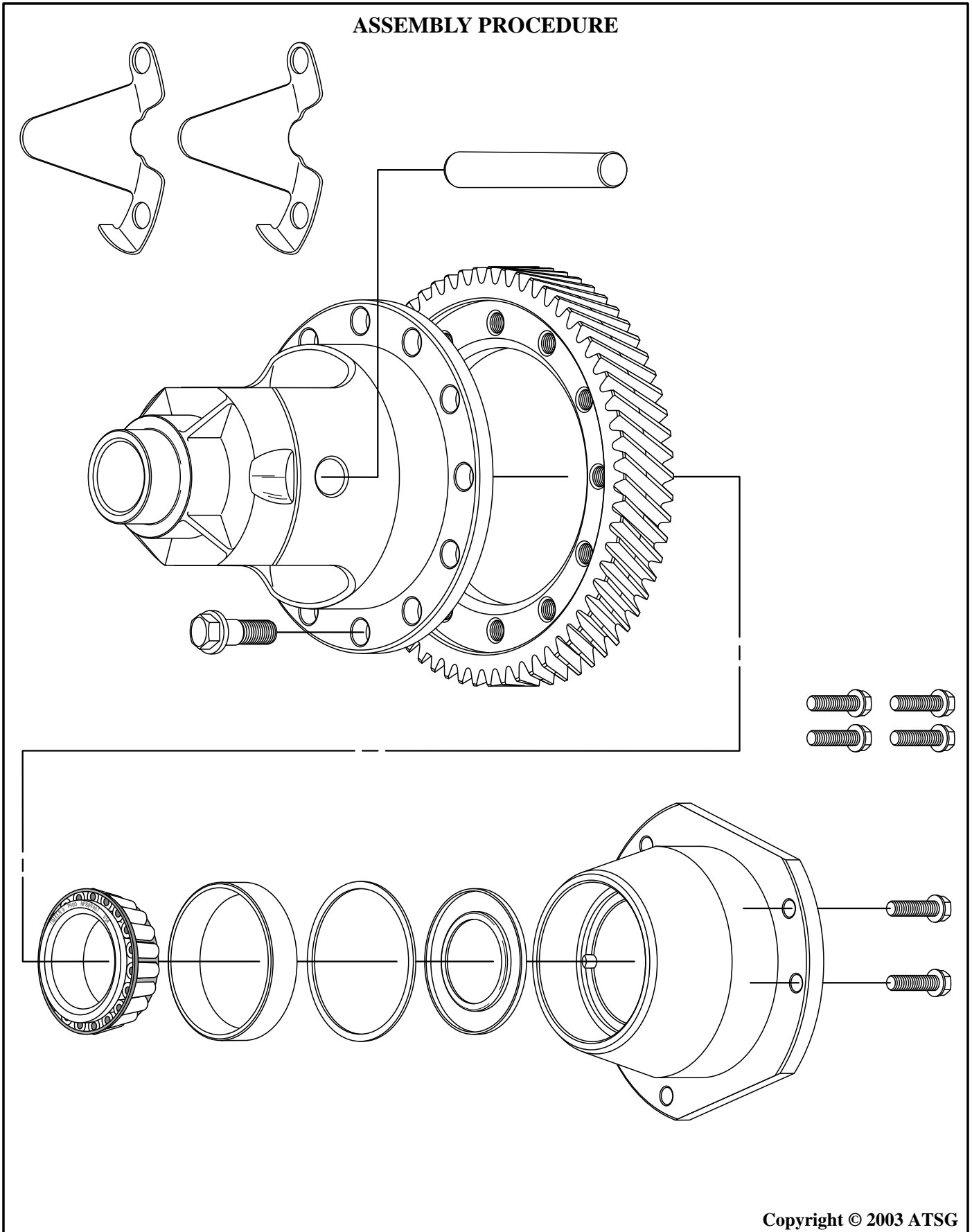
### *Bearing Retainer*



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Figure 257

## ASSEMBLY PROCEDURE



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Figure 258

**NEW DESIGN CROSS SHAFT  
RETAINER INSTALLATION**

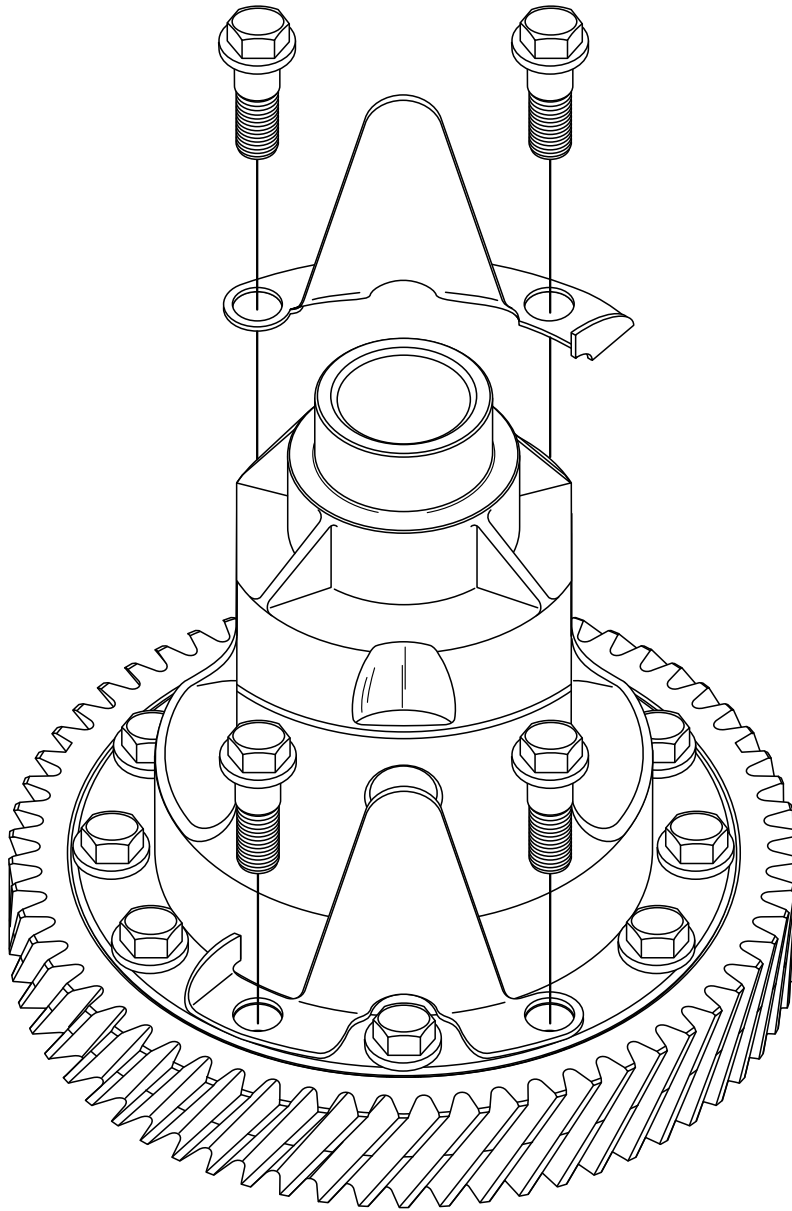


Figure 259

## OIL PUMP/FORWARD DRUM CHANGES

### "1st Design" Oil Pump Assembly

The "1st Design" Oil Pump Assembly has "Lugs" on the inside diameter of the inner pump gear, shown in Figure 260. On the "1st Design" stator shaft, the input shaft bushing is one inch down inside the second bore, and is also shown in Figure 260. The "1st Design" level pump assembly also requires the "1st Design" level input shaft, that is shown in Figure 263.

### "2nd Design" Oil Pump Assembly

The "2nd Design" Oil Pump Assembly has "Flats" on the inside diameter of the inner pump gear, shown in Figure 261. On the "2nd Design" stator shaft, the input shaft bushing is flush with the second bore, and is also shown in Figure 261. The "2nd Design" level pump assembly also requires the "2nd Design" or "3rd Design" level input shaft, that is shown in Figure 263. This pump assembly was used up through mid-year 1999.

### "3rd Design" Oil Pump Assembly

The Chrysler A670 (31TH) transaxle now has a "3rd Design" oil pump assembly as a running 1999 model year change. The new oil pump design is called a "Dual Cycloidal" pump and replaces the "2nd Design" pump assembly, and is illustrated in Figure 262.

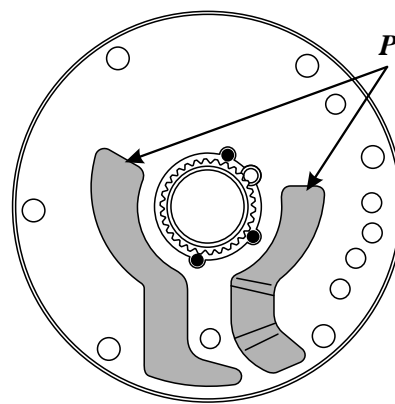
The "3rd Design" pump has revised (Larger) suction and pressure cavities, also revised machining in the pump rotor pocket area, as the new design inner and outer rotor are smaller in diameter, and illustrated in Figure 262.

The "3rd Design" stator support also has revised (Larger) suction and pressure ports to accommodate the new design "Dual Cycloidal" pump rotors, as shown in Figure 262.

The "3rd Design" level pump assembly also requires the "3rd Design" level input shaft, that is shown in Figure 263.

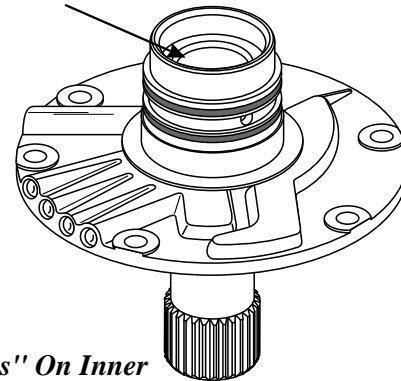
None of the parts above will interchange with previous design level parts. Even though the old and new parts will bolt together, they "will not" function properly. However, the complete "Dual Cycloidal" pump assembly when used as a service package, will retro-fit back for past model service.

### "1ST DESIGN" PUMP ASSEMBLY 1978-1985

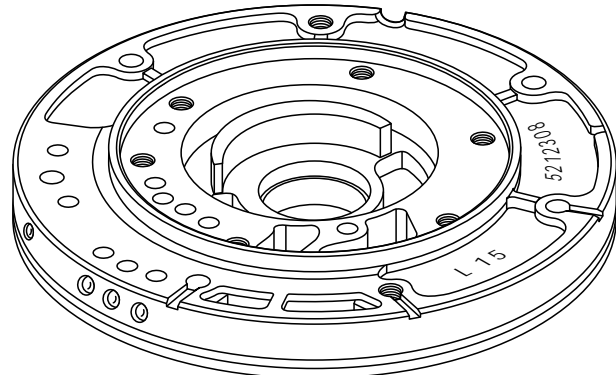
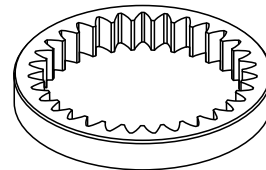
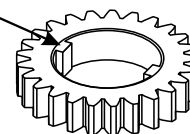


Note Suction And Pressure Passages In Reaction Support

Turbine Shaft Bushing One Inch Down Inside The Second Bore



"Lugs" On Inner Pump Gear

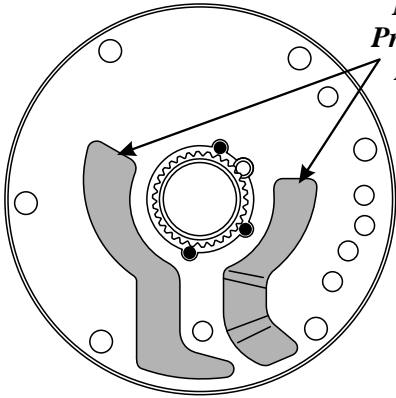


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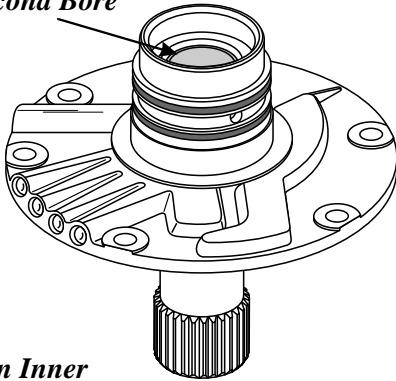
Figure 260

## "2ND DESIGN" PUMP ASSEMBLY 1986-1999

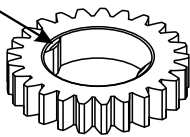
Note Suction And Pressure Passages In Reaction Support



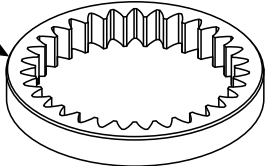
Turbine Shaft Bushing Is "Flush" Inside The Second Bore



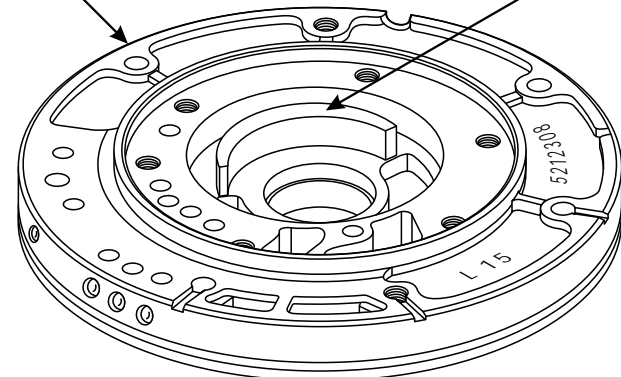
"Flats" On Inner Pump Gear



Outer Pump Gear



Pump Housing



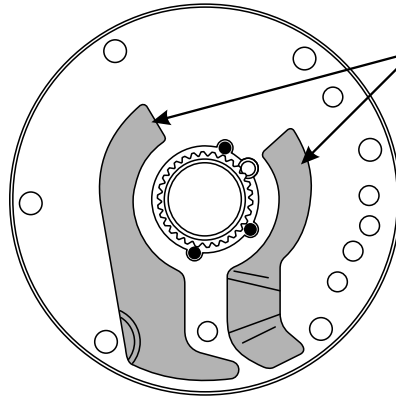
Note Crescent

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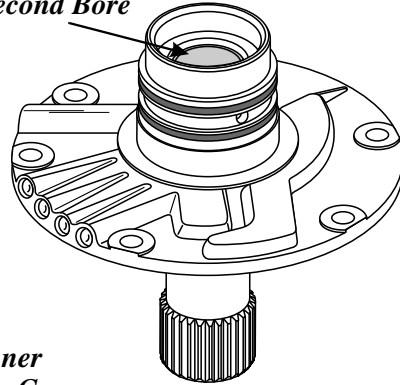
Figure 261

## "3RD DESIGN" PUMP ASSEMBLY 2000-CURRENT

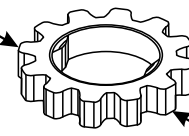
Note Passage Changes In This Reaction Support



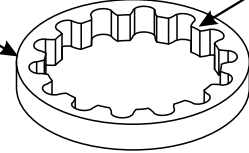
Turbine Shaft Bushing Is "Flush" Inside The Second Bore



Inner Pump Gear

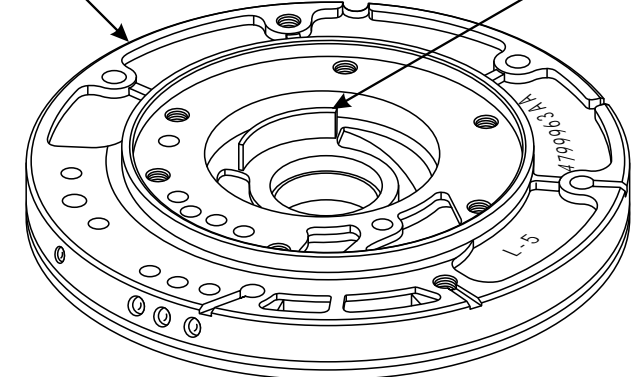


Outer Pump Gear



Different Tooth Configuration On Both Gears

Pump Housing

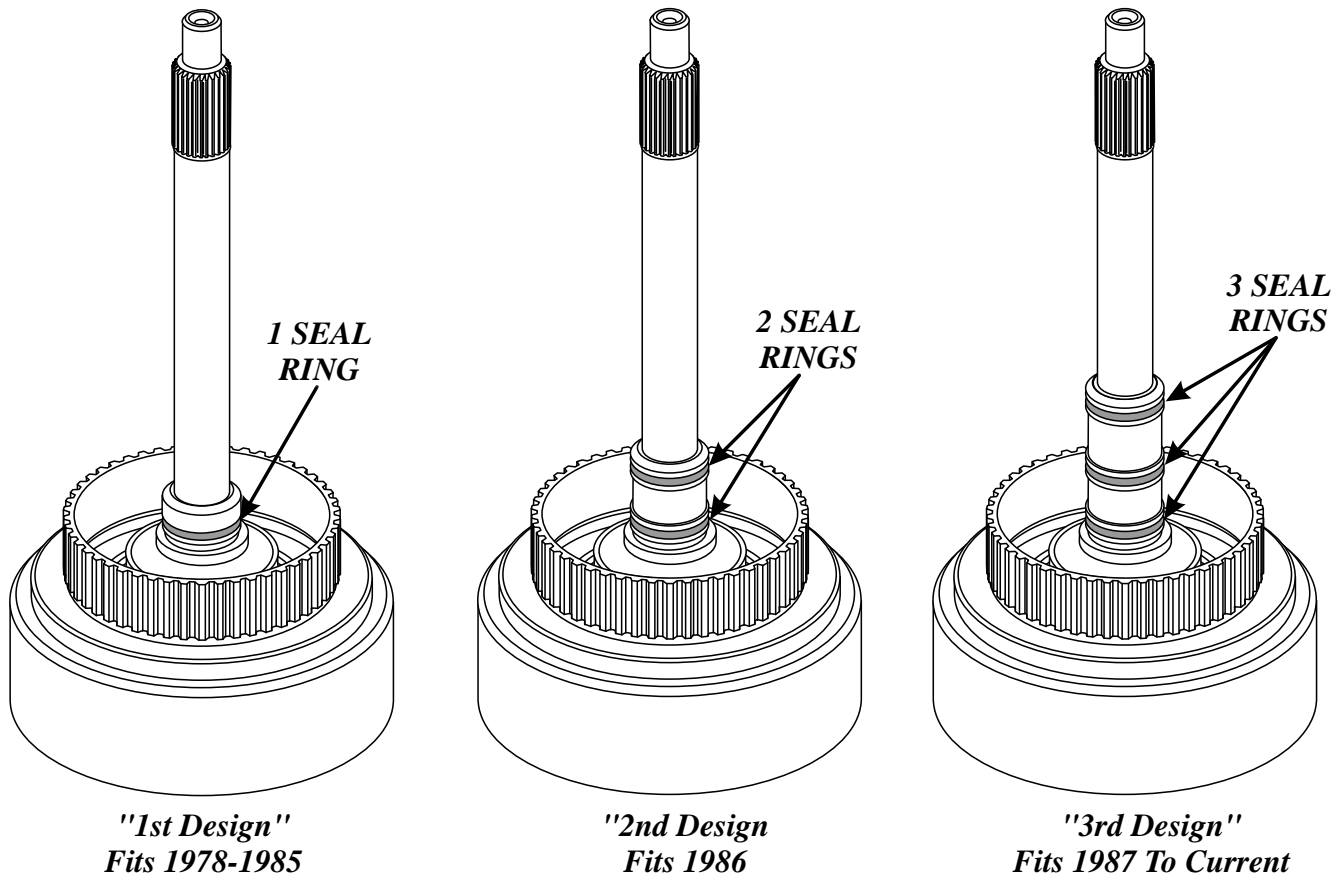


Note Crescent

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Figure 262

## FORWARD (REAR) CLUTCH HOUSING



*The turbine shaft in the Forward (Rear) Clutch Housing has changed three times. All of the housings have a "larger" seal ring at the base of the shaft, and located on the housing boss. The 1978 through 1985 units have only one small seal ring on the turbine shaft. The 1986 units have two small seal rings on the turbine shaft and is still a non-lockup unit. Finally the 1987 to current units have three small seal rings on the turbine shaft for the lock-up units. It is extremely important that the turbine shaft be matched with the proper stator support, as they are different for each design level shaft.*

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Figure 263

## CHRYSLER A470 SERIES REVERSE BAND STRUT BREAKAGE

**COMPLAINT:** Some vehicles equipped with the Chrysler A404, A413, A470, A670 front wheel drive transaxle, may exhibit a no reverse condition before and/or after rebuild.

**CAUSE:** The cause may be, a bent or broken reverse band strut (See Figure 264).

**CORRECTION:** There is now a new design reverse band strut available from Aftermarket Suppliers for the Chrysler A404 Series transaxle, that has a thicker cross-section in the middle to provide much greater resistance to bending, and is manufactured out of a high quality hardened alloy steel that has a much higher yield strength than the original equipment material. This new design reverse band strut is manufactured by Sonnax®, and is available under Sonnax® part number 32710-01 (See Figure 264).

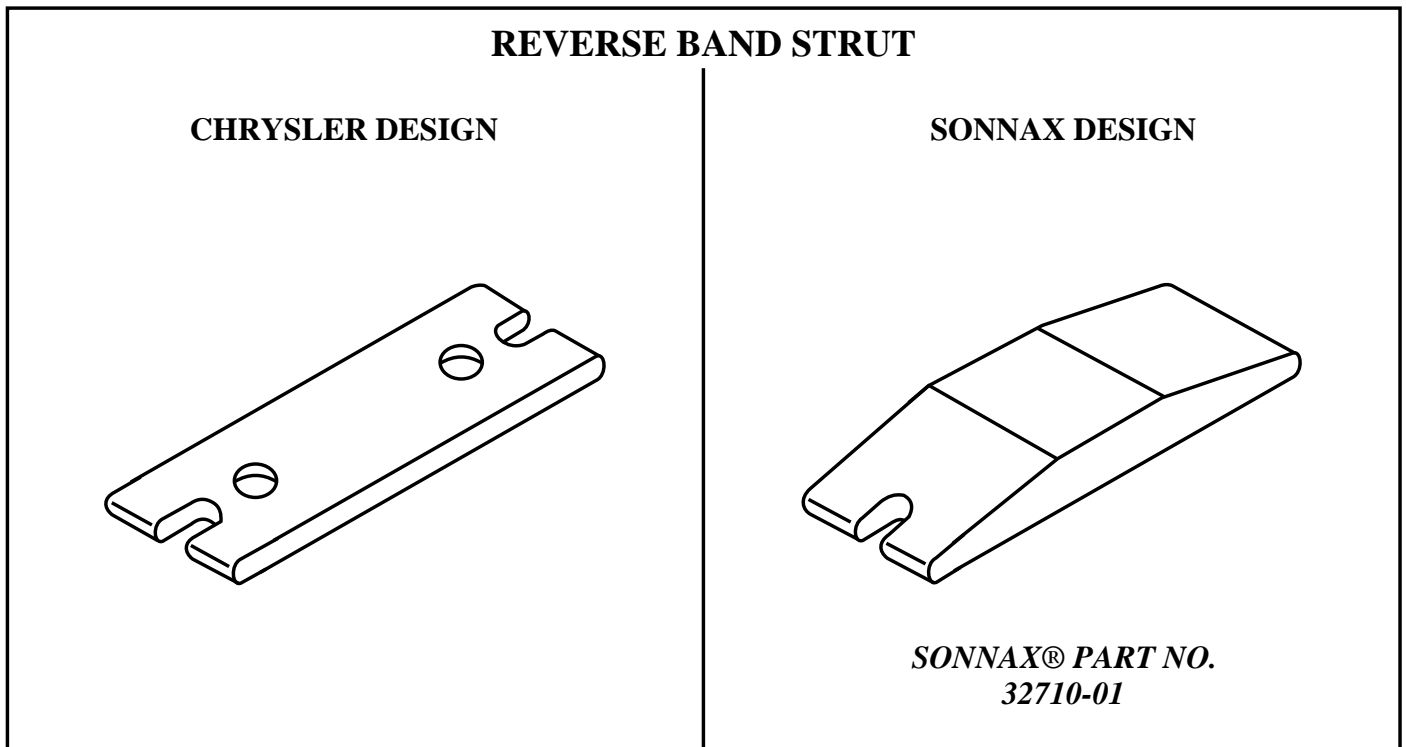


Figure 264



# "UPDATE SECTION"

## CHRYSLER 31TH (A670) NEW DESIGN COOLER BY-PASS SYSTEM

**CHANGE:** The Chrysler 31TH (A670) transaxle has been revised to include a cooler by-pass system and was changed during the 1999 model year as a running change (See Figure 265).

**REASON:** This new system will allow lube oil to by-pass the transaxle oil cooler in the vehicle under extreme cold conditions and feed oil directly back into the lube circuit. This will improve durability at extreme cold conditions, instead of restricting lube oil to the transaxle and possibly resulting in a failure.

**PARTS AFFECTED:**

- (1) TRANSAXLE CASE - A new drilled hole has been added in the valve body face area, as shown in Figure 265, to the cooler return circuit of the case. The pump face cooler return hole has also been made larger and relocated, to align with case lube circuit.
- (2) PUMP GASKET - The hole in the pump gasket for the cooler return circuit has been relocated in the gasket to accommodate the relocated hole in the case.
- (3) VALVE BODY TRANSFER PLATE - The transfer plate has a drilled through hole and a pocket to accept the by-pass valve seal, and two added screw holes to accommodate the added cooler by-pass valve assembly (See Figure 265).
- (4) COOLER BY-PASS SEAL - The new seal locates in the pocket of the transfer plate and seals against the new cooler by-pass valve assembly.
- (5) COOLER BY-PASS VALVE ASSEMBLY - The valve assembly consists of a spring loaded ball inside of a body/tube that is attached to the transfer plate with two new screws and inserted into the new case lube circuit hole, as shown in Figure 265.

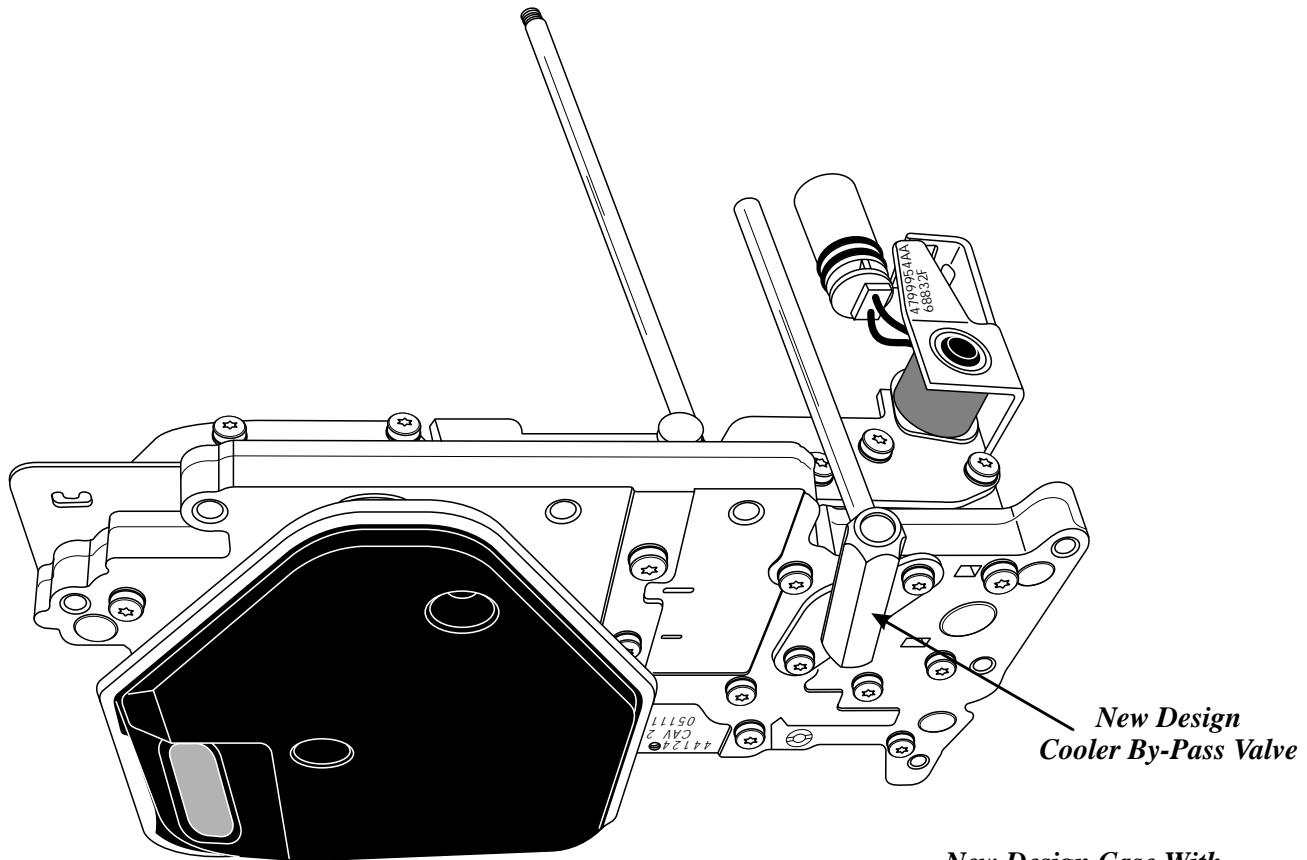
**INTERCHANGEABILITY:**

None of the parts listed above can be used with any previous design transaxles, unless they are used as a service package together.

**SERVICE INFORMATION:**

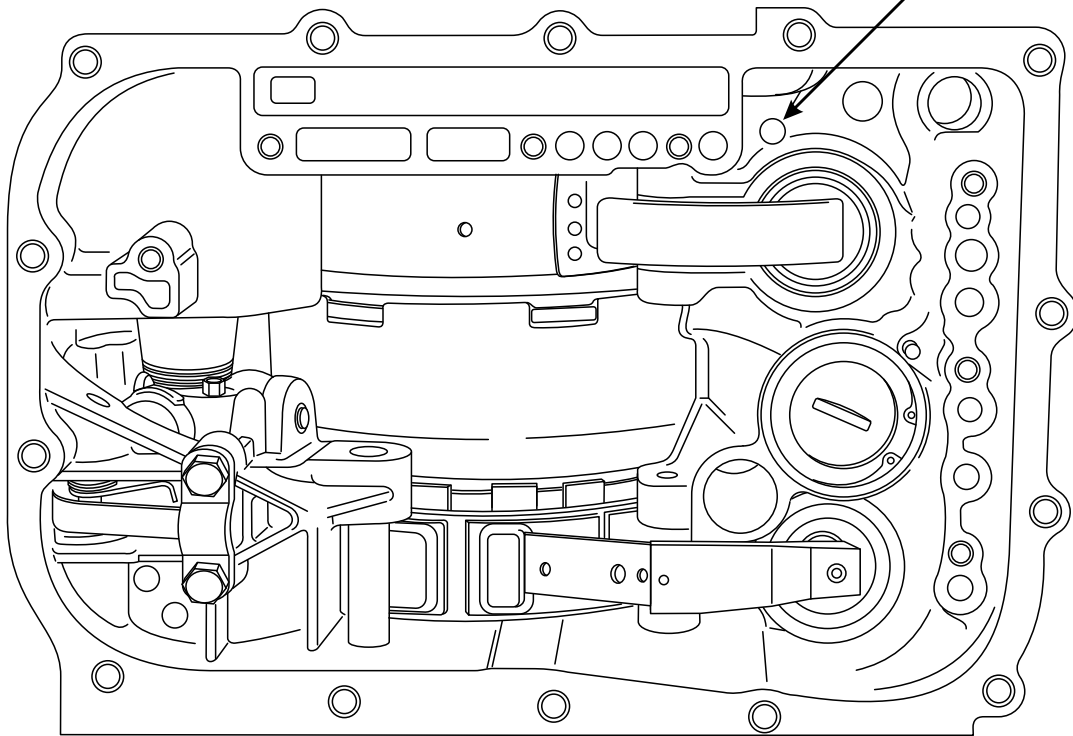
Transfer Plate (New Design) .....	4377811AD
Cooler By-Pass Valve Assembly .....	4800018AA
Cooler By-Pass Seal .....	4800019AA
Pump Gasket (New Design) .....	4269661AB
Transaxle Case (New Design) .....	Model Dependent On Engine Size

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*New Design  
Cooler By-Pass Valve*

*New Design Case With  
Hole To Accept Tube From  
New Cooler By-Pass Valve*



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Figure 265

## "UPDATE SECTION"

### CHRYSLER A-470/A-670 TORQUE CONVERTER CLUTCH "SHUDDER"

**COMPLAINT:** Torque Converter Clutch shudder in the A-470 or A-670 transaxles has been a very persistent concern in the past models, without 100% success on modifications to raise line pressure etc . . . The A-470/A-670 transaxle uses line pressure to apply the converter clutch and increasing line pressure will increase converter clutch apply pressure, but is not always the smart thing to try.

**CAUSE:** In many situations, a shudder sensation can be created by engine related concerns. Because of this Chrysler has authorized the disabling of the TCC.

**CORRECTION:** There is a service package available from Chrysler under part number 4419447, to eliminate the converter clutch operation. This service package consists of a wire harness assembly, solenoid connector cap, two tie-wraps and an Authorized Modification Label. This service package should be installed as shown in Figure 266, or refer to Chrysler service bulletin number 18-03-88 addressing this concern.

**CAUTION:** *This package may produce a p0740 code "No RPM drop during TCC" when used on 1996 and later vehicles.*

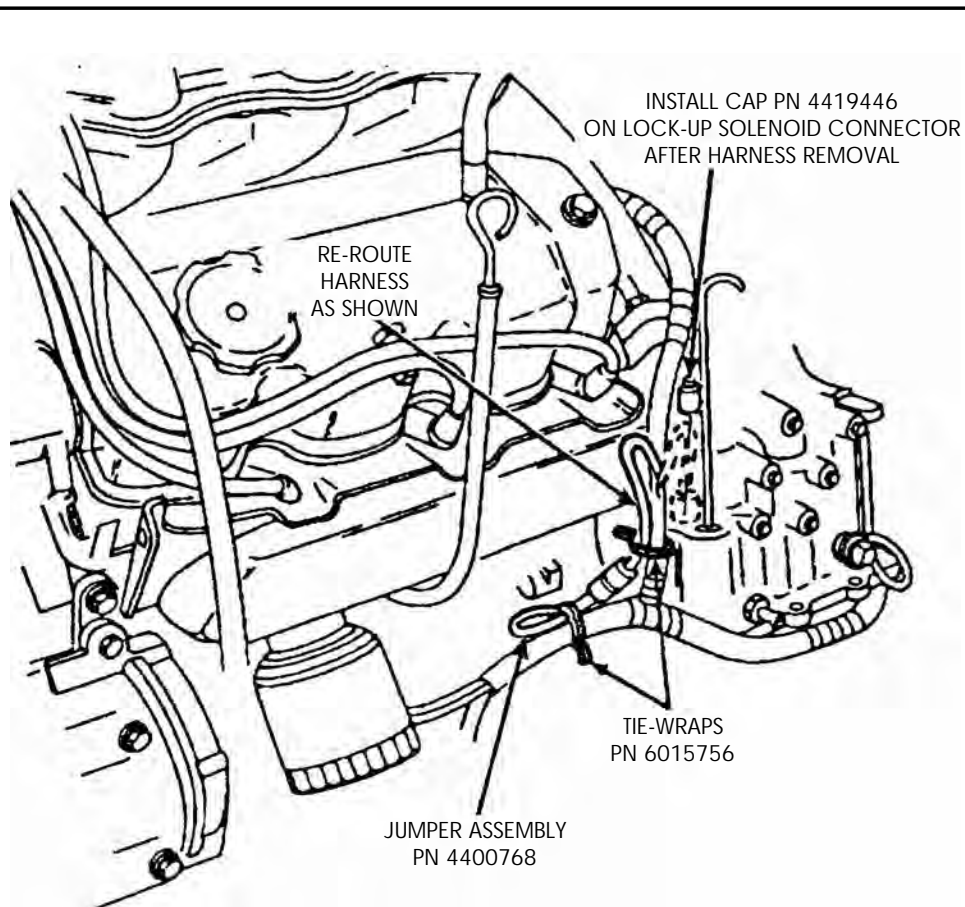


Figure 266



## **"UPDATE SECTION"**

### **"SPECIAL TOOLS"**

**SPECIAL TOOLS ARE ALL AVAILABLE FROM:**



**ATEC TRANS-TOOL**  
**110 Connelly**  
**San Antonio, Texas 78203**

**TELEPHONE (210) 225-6745**

**FAX (210) 225-2114**

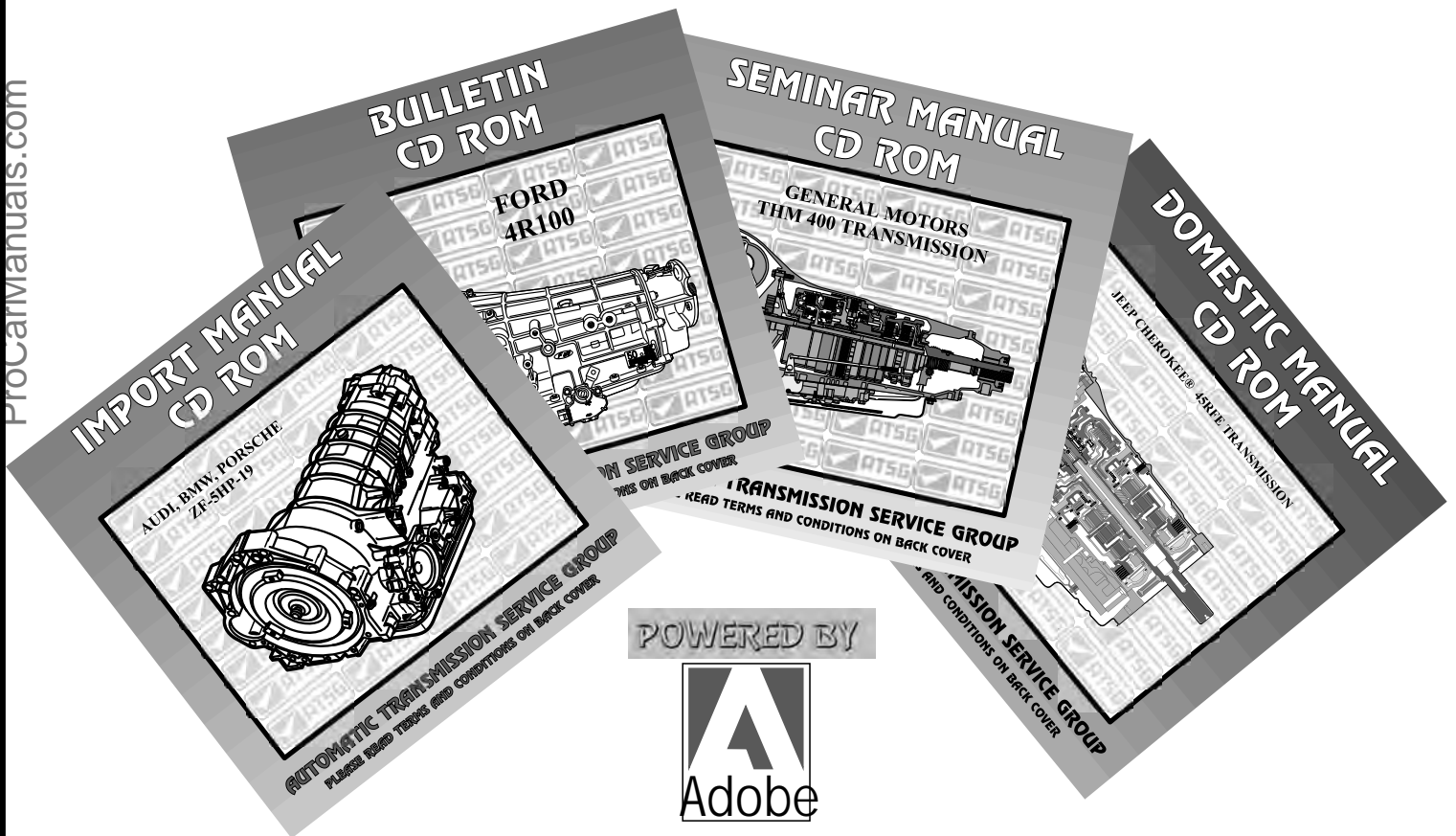
**E-Mail: [sales@atec-trans-tool.com](mailto:sales@atec-trans-tool.com)**



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