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**Miami, FL 33156**



**Revised Edition**

## **INTRODUCTION FORD ATX**

The ATX automatic transaxle is a three speed transmission and axle assembly combined into a single unit. It is capable of providing three forward speeds and one reverse speed. It also provides for the manual selection, at certain speeds, of first and second.

The transaxle assembly consists of a torque converter, a planetary gear set, three multiple disc clutches, a one-way clutch, a band and servo assembly, a hydraulic control system, an input, idler and output final drive gear set, and a differential assembly.

The unique torque converter consists of the typical impeller, turbine, and reactor assemblies, and it also has a unique carrier (planet) damper assembly found in no other Ford automatic transmission

**We thank FORD MOTOR COMPANY  
for the information and illustrations that have  
made this booklet possible**

**The information and part numbers contained in this  
booklet have been carefully compiled from industry  
sources known for their reliability, but ATSG does not  
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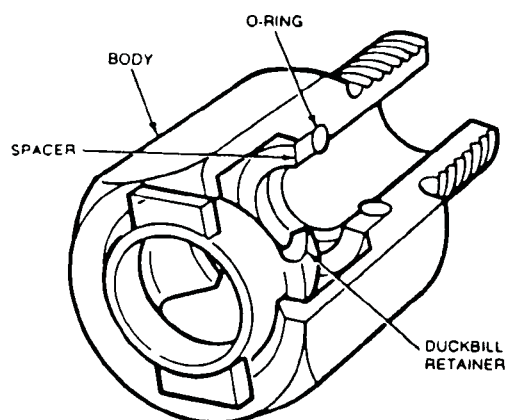
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## Service Procedures

### Oil Cooler Steel Lines Using Push Connect Fittings—Transaxle End Only

1. If leakage is noted at the transaxle end of the cooler line(s) and the line appears to be sound, remove the affected cooler line from its push connect fitting using Cooler Line Disconnect Tool T82L-9500-AH or equivalent, and remove and discard the fitting from the transaxle. Replace the fitting with N802684-S100 (push connect fitting) and reinstall the cooler line in the fitting by aligning the end of line with bore of fitting. Push line into fitting; a click should be heard when the retainer engages the tube bead. Pull back on tube to ensure full engagement. Check for leakage. If leakage is noted, replace line. Again, remove line and fitting from transaxle.



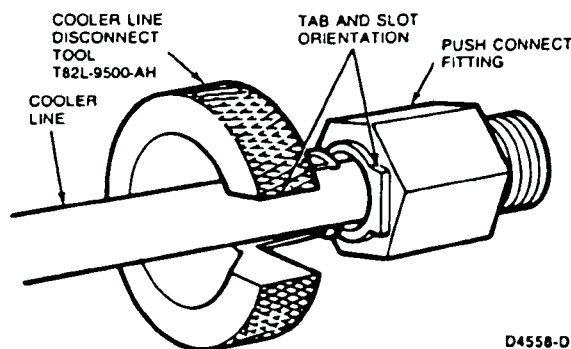
2. Install an E2SZ-7D273-A or equivalent angled flare fitting in the transaxle. Tighten fitting to 24-31 N·m (18-23 lb-ft).
3. Cut approximately 76-102mm (3-4 inches) from the existing cooler line. From bulk stock cooler line steel tubing that is the equivalent of SAEJ526 welded low carbon lead/tin coated 5/16-inch OD, cut a piece of sufficient length and shape it to connect the existing line to the new flare fitting.
4. Clean all cut ends of both lines with the blade edge of the cutting tool to avoid line restrictions. Clean metal particles from the tube ends.
5. Install an 87944-S8 or equivalent flare nut on the transaxle end of the new cooler line section.
6. Connect the new cooler line section to the existing cooler line using a piece of 5/16-inch fuel line hose and two worm drive hose clamps. Use a sufficient length of fuel line hose to achieve a 38-51mm (1½-2 inches) overlap of the ends of the cooler lines.
7. Connect the cooler line to the flare fittings and tighten to 16-24 N·m (12-18 lb-ft).

### Cooler Line Disconnect Tool Usage Push Connect Fittings—Transaxle End Only

For transaxle cooler line service, Cooler Line Disconnect Tool T82L-9500-AH or equivalent, is required. The illustration shows the tool end and its proper orientation for disassembly of tube from fitting. The purpose of the tool is to spread the "duck bill" retainer to disengage the tube bead. The following steps are necessary for use of the tool:

To facilitate use of the tool, clean the road dirt from the fitting before inserting the tool into the fitting. Also, it is important to avoid any contamination of the fitting and transaxle, dirt in the fitting could cause an O-ring leak.

1. Slide the tool over the tube.
2. Align the opening of the tool with one of the two tabs on the fitting "duck bill" retainer.



3. Firmly insert tool into fitting until it seats against the tube bead (a definite click should be heard).
4. With thumb held against the tool, firmly pull back on tube until it disengages from fitting.

**CAUTION:** Do not attempt to separate cooler line from fitting by prying with another tool. This will break the plastic insert in fitting and bend the cooler lines at the junction to the fitting.

Before assembly of the lines in the fitting, visually inspect the plastic retainer in the fitting for a broken tab. If a tab is broken, the fitting must be replaced. Also visually inspect the cooler lines to make sure they are not bent at the junction of the fitting.

Tube assembly is accomplished by inserting the tube into the fitting until the retainer engages the tube bead (a definite click should be heard). Pull back on the tube to ensure full engagement.

Cooler line out to the cooler is close to the bellhousing.

Cooler return to transaxle is near the pump.



# Technical Service Information

## Diagnosing and Testing

CONDITION	POSSIBLE SOURCE	ACTION
Slow initial engagement	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Damaged or improperly adjusted manual linkage</li><li>• Contaminated fluid</li><li>• Improper clutch and band application, or oil control pressure</li><li>• Dirty valve body</li></ul>	<ul style="list-style-type: none"><li>• Add fluid as required.</li><li>• Service or adjust linkage.</li><li>• Change fluid and filter.</li><li>• Perform control pressure test.</li><li>• Clean, service, or replace valve body.</li></ul>
Rough initial engagement in either forward or reverse	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• High engine idle</li><li>• Automatic choke on (warm temperature)</li><li>• Looseness in halfshafts, CV joints, or engine mounts</li><li>• Improper clutch or band application, or oil control pressure</li><li>• Sticky or dirty valve body</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid check.</li><li>• Adjust idle to specification.</li><li>• Disengage choke.</li><li>• Service as required.</li><li>• Perform control pressure test.</li><li>• Clean, service, or replace valve body.</li></ul>
No drive in any gear	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Damaged or improperly adjusted manual linkage</li><li>• Improper clutch or band application, or oil control pressure</li><li>• Internal leakage</li><li>• Valve body loose</li><li>• Damaged or worn clutches or band</li><li>• Sticking or dirty valve body</li><li>• Broken pump or turbine shaft</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid check.</li><li>• Service or adjust linkage.</li><li>• Perform control pressure test.</li><li>• Check and service as required.</li><li>• Tighten to specification.</li><li>• Perform air pressure test.</li><li>• Clean, service, or replace valve body.</li><li>• Service as required.</li></ul>
No forward drive — reverse OK	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Damaged or improperly adjusted manual linkage</li><li>• Improper one-way clutch, or band application, or oil pressure control system</li><li>• Valve body loose</li><li>• Dirty or sticking valve body</li><li>• Damaged or worn band or servo</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Service or adjust linkage.</li><li>• Perform control pressure test.</li><li>• Tighten to specification.</li><li>• Clean, service or replace valve body.</li><li>• Perform air pressure test.</li></ul>
No drive, slips, or chatters in reverse — forward OK	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Damaged or improperly adjusted manual linkage</li><li>• Improper oil pressure control</li><li>• Valve body loose</li><li>• Dirty or sticking valve body.</li><li>• Damaged or worn reverse clutch</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Service or adjust linkage.</li><li>• Perform control pressure test.</li><li>• Tighten to specification.</li><li>• Clean, service, or replace valve body.</li><li>• Perform air pressure test.</li></ul>
Will not start in neutral or park	<ul style="list-style-type: none"><li>• Neutral start switch improperly adjusted</li><li>• Neutral start wire disconnected/damaged</li><li>• Manual linkage improperly adjusted</li></ul>	<ul style="list-style-type: none"><li>• Service or adjust neutral start switch.</li><li>• Replace/service.</li><li>• Service or adjust linkage.</li></ul>

AUTOMATIC TRANSMISSION SERVICE GROUP



## Technical Service Information

### DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
Slips or chatters in first gear in D	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Damaged or worn band</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Service or replace band assembly.</li></ul>
Slips or chatters in second gear	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Internal leakage</li><li>• Dirty or sticking valve body</li><li>• Improper clutch application</li><li>• Intermediate friction clutch</li><li>• Polished, glazed band or drum</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Perform air pressure test.</li><li>• Clean, service, or replace valve body.</li><li>• Perform control pressure test.</li><li>• Service clutch.</li><li>• Replace or service as required.</li></ul>
Starts up in 2nd or 3rd	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Damaged or improperly adjusted manual linkage</li><li>• Governor valve stuck</li><li>• Improper band and/or clutch application, or oil pressure control system</li><li>• Valve body loose</li><li>• Dirty or sticking valve body</li><li>• Cross leaks between valve body and case mating surface</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Service or adjust linkage.</li><li>• Perform governor check. Replace or service governor.</li><li>• Perform control pressure test.</li><li>• Tighten to specification.</li><li>• Clean, service, or replace valve body.</li><li>• Replace valve body and/or case as required.</li></ul>
Shift points incorrect	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Damaged or worn governor</li><li>• Improper clutch or band application, or oil pressure system</li><li>• Dirty or sticking valve body</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Service or replace governor. Clean screen.</li><li>• Perform shift test and control pressure test.</li><li>• Clean, service, or replace valve body.</li></ul>
No upshift at any speed in D	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Damaged or worn governor</li><li>• Dirty or sticking valve body</li><li>• Improper band or clutch application, or oil pressure control system</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Service or replace governor. Clean screen.</li><li>• Clean, service or replace valve body.</li><li>• Perform control pressure test.</li></ul>
Shifts 1-3 in D	<ul style="list-style-type: none"><li>• Dirty or sticking valve body</li><li>• Intermediate friction clutch</li><li>• Improper clutch application, or oil pressure control system</li></ul>	<ul style="list-style-type: none"><li>• Clean, service, or replace valve body.</li><li>• Service.</li><li>• Perform control pressure test.</li></ul>



## Technical Service Information

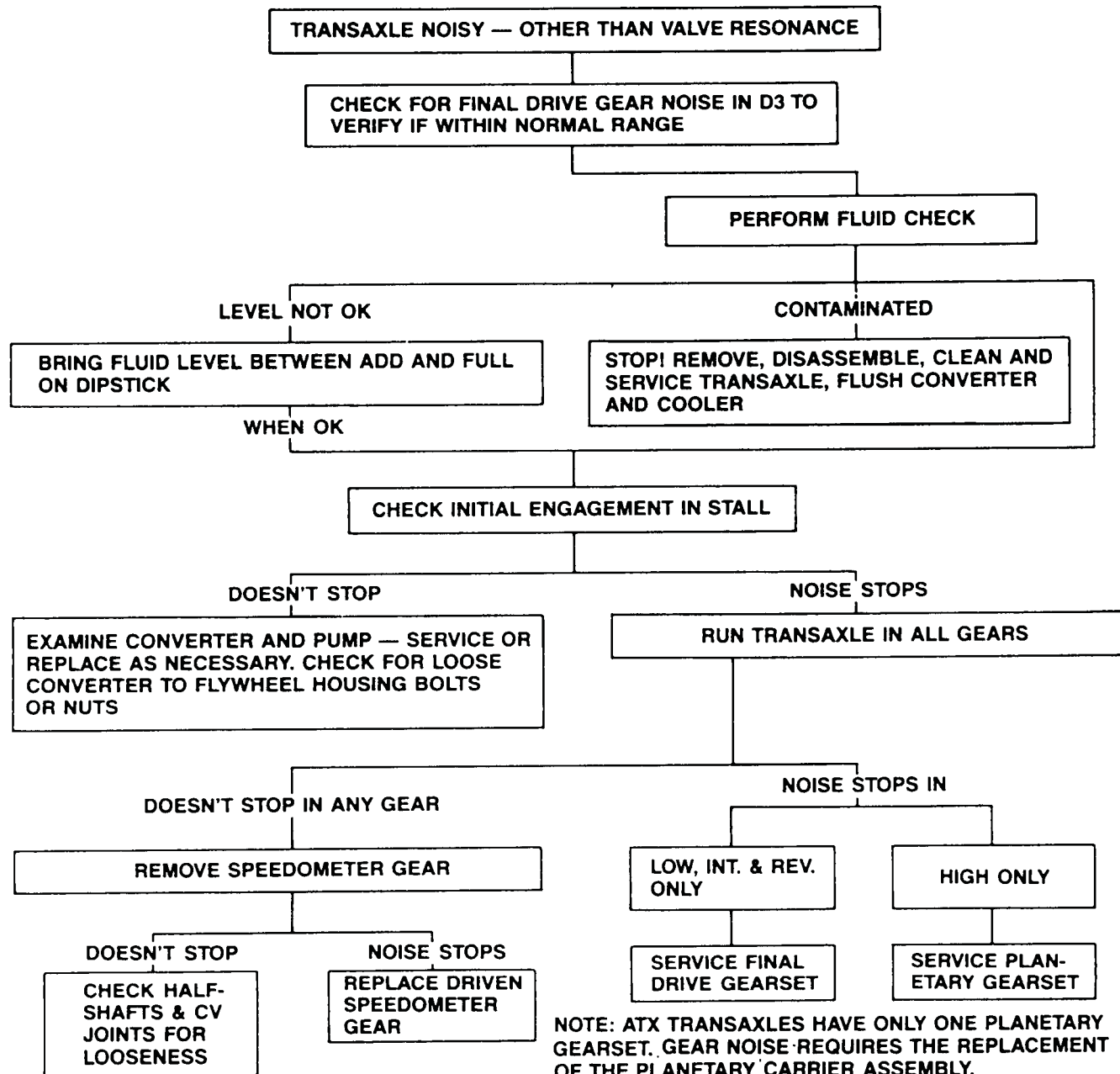
### DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
Engine over-speeds on 2-3 shift	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Improper band or clutch application, or oil pressure control system</li><li>• Damaged or worn direct clutch and/or servo</li><li>• Dirty or sticking valve body</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Perform control pressure test.</li><li>• Perform air pressure test. Service as required.</li><li>• Clean, service, or replace valve body.</li></ul>
Mushy 1-2 shift	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Improper intermediate clutch application, or oil pressure control system</li><li>• Damaged intermediate clutch</li><li>• Dirty or sticking valve body</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Perform control pressure test.</li><li>• Perform air pressure test. Service as required.</li><li>• Clean, service or replace valve body.</li></ul>
Rough 1-2 shift	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Incorrect engine performance</li><li>• Improper intermediate clutch application or oil pressure control system</li><li>• Dirty or sticking valve body</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Tune and adjust engine idle.</li><li>• Perform control pressure test.</li><li>• Clean, service or replace valve body.</li></ul>
Rough 2-3 shift (1-2 shift OK)	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Incorrect engine performance</li><li>• Improper band release or direct clutch application, or oil control pressure system</li><li>• Damaged or worn servo release and direct clutch piston check ball</li><li>• Dirty or sticking valve body</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Tune and adjust engine idle.</li><li>• Perform control pressure test.</li><li>• Air pressure test the servo apply and release and the direct clutch piston check ball. Service as required.</li><li>• Clean, service, or replace valve body.</li></ul>
Rough 3-2 shift at closed throttle in D	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Incorrect engine idle or performance</li><li>• Improper band or clutch application, or oil pressure control system</li><li>• Improper governor operation</li><li>• Dirty or sticking valve body</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Tune and adjust engine idle.</li><li>• Perform control pressure test.</li><li>• Perform governor test. Service as required.</li><li>• Clean, service or replace valve body.</li></ul>



## Technical Service Information

### DIAGNOSIS AND TESTING (Continued)



★ BEFORE REMOVING A TRANSAXLE FOR GEAR NOISE CONCERNS, MAKE SURE THAT THE NOISE IS IN FACT BEING CAUSED BY THE TRANSAXLE. FIRST, BRING THE VEHICLE TO A STOP AND PLACE SHIFT SELECTOR IN THE NEUTRAL POSITION. THEN INCREASE THE ENGINE RPM'S. IF THE SUBJECT NOISE REMAINS PRESENT, THE TRANSAXLE IS NOT AT FAULT. SECOND, DISCONNECT THE SPEEDOMETER CABLE FROM THE TRANSAXLE AND DRIVE THE VEHICLE. IF THE NOISE STOPS, THEN THE NOISE IS BEING TRANSMITTED FROM THE TRANSAXLE THROUGH THE SPEEDOMETER CABLE INTO THE PASSENGER COMPARTMENT. IN ORDER TO DAMP OUT THE NOISE, INSTALL A 356MM (14 INCH) PIECE OF 3/8 DIAMETER FUEL HOSE (C9PZ-9324-A) OR EQUIVALENT, OVER THE SPEEDOMETER CABLE. SLICE THE FUEL HOSE IN A SPIRAL FASHION FROM END TO END (DO NOT SLICE IN A STRAIGHT LINE). POSITION THE HOSE ONTO THE CABLE BETWEEN THE GROMMET AT THE DASH PANEL (UNDER THE DASH) AND THE UPPER QUICK CONNECT, WITH A 6.35MM (1/4 INCH) OVERLAP ONTO THE FERRULE OF THE UPPER QUICK CONNECT. THE HOSE CAN BE INSTALLED FROM THE INTERIOR OF THE VEHICLE WITHOUT DISCONNECTING EITHER END OF THE SPEEDOMETER CABLE. THIRD, MAKE SURE THE ENGINE MOUNTS ARE NEUTRALIZED, PAYING SPECIAL ATTENTION TO THE NO. 4 ENGINE MOUNT.





## Technical Service Information

### DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
No forced downshifts	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Improper clutch or band application, or oil pressure control system</li><li>• Damaged internal TV lever.</li><li>• Dirty or sticking valve body</li><li>• Dirty or sticking governor</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Perform control pressure test.</li><li>• Service internal TV lever.</li><li>• Clean, service or replace valve body.</li><li>• Clean or replace governor.</li></ul>
Runaway engine on 3-2 or 3-1 downshift (1-2 shift OK)	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Dirty or sticking valve body</li><li>• Band out of adjustment</li><li>• Improper band or clutch application, or oil pressure control system</li><li>• Damaged or worn servo</li><li>• Polished, glazed band or drum</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Clean, service or replace valve body.</li><li>• Check and adjust servo rod travel.</li><li>• Perform control pressure test.</li><li>• Air pressure test check the servo. Service servo and/or seals.</li><li>• Service or replace as required</li></ul>
No engine braking in manual first gear	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Damaged or improperly adjusted manual linkage</li><li>• Band or clutch out of adjustment</li><li>• Oil pressure control system</li><li>• Polished, glazed band or drum</li><li>• Dirty or sticking valve body</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Check direct clutch and service as required.</li><li>• Check servo rod travel.</li><li>• Perform control pressure test.</li><li>• Service or replace as required.</li><li>• Clean, service or replace valve body.</li></ul>
No engine braking in manual second gear	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Damaged or improperly adjusted manual linkage</li><li>• Improper band or clutch application, or oil pressure control system</li><li>• Servo leaking</li><li>• Polished, glazed band or drum</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Perform control pressure test.</li><li>• Perform air pressure test of servo for leakage. Service as required.</li><li>• Service or replace as required.</li></ul>





## Technical Service Information

### DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE SOURCE	ACTION
Transaxle noisy — valve resonance  <b>NOTE: Gauges may aggravate any hydraulic resonance. Remove gauge and check for resonance level.</b>	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Improper band or clutch application, or oil pressure control system</li><li>• Cooler lines grounding</li><li>• Dirty or sticking valve body</li><li>• Internal leakage or pump cavitation</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Perform control pressure test.</li><li>• Free cooler lines.</li><li>• Clean, service or replace valve body.</li><li>• Service as required.</li></ul>
Transaxle overheats	<ul style="list-style-type: none"><li>• Excessive tow loads</li><li>• Improper fluid level</li><li>• Incorrect engine idle or performance</li><li>• Improper clutch or band application, or oil pressure control system</li><li>• Restriction in cooler or lines</li><li>• Seized converter one-way clutch</li><li>• Dirty or sticking valve body</li></ul>	<ul style="list-style-type: none"><li>• Check Owner's Manual for tow restriction.</li><li>• Perform fluid level check.</li><li>• Tune or adjust engine idle.</li><li>• Perform control pressure test.</li><li>• Service restriction.</li><li>• Replace converter.</li><li>• Clean, service or replace valve body.</li></ul>
Transaxle fluid leaks	<ul style="list-style-type: none"><li>• Improper fluid level</li><li>• Leakage at gaskets, seals, etc.</li></ul>	<ul style="list-style-type: none"><li>• Perform fluid level check.</li><li>• Remove all traces of lubrication on exposed surfaces of transaxle. Check the vent for free-breathing. Operate transaxle at normal temperatures and inspect for leakage. Service as required.</li></ul>

CD3900-C

### ADJUSTMENTS

#### Carbureted Engine, 2.3L

The Throttle Valve (TV) Control Linkage System consists of the coupling lever on the carburetor, TV linkage shaft assembly, TV bracket assembly, transaxle control rod assembly, external TV control lever on the transaxle and a linkage return spring. The coupling lever follows the motion of the carburetor throttle lever. The TV linkage shaft and control rod transmits motion between the coupling lever on the carburetor and TV control lever on the transaxle.

#### All Throttle Linkage Systems

The control rod assembly is adjusted to proper length during initial assembly. The external TV control lever actuates the internal TV control mechanism which regulates the TV control pressure. The external TV control lever motion is controlled by stops internal to the transaxle at idle and beyond Wide Open Throttle (WOT). The linkage return spring must overcome the transaxle TV lever load (due to spring loading to WOT).

The TV control linkage is set to its proper length during initial assembly using the sliding trunnion block on the TV control rod assembly. Any required adjustment of the TV control linkage can be accomplished using this sliding trunnion block.

#### All ATX

At WOT, the TV control lever on the transmission will not be at wide open stop. The wide open throttle position must not be used as the reference point in adjusting linkage.

## ADJUSTMENTS (Continued)

### Shift Trouble Diagnosis Related to Throttle Linkage Adjustment

If there is a complaint of poor transaxle shift quality, the following diagnosis procedure should be followed:

- A. **Symptoms:** Excessively early and/or soft upshifts with or without slip-bump feel. No forced downshift (kickdown) function at appropriate speeds.

**Cause:** TV control linkage is set too short.

**Remedy:** Adjust linkage using Linkage Adjustment procedure.

- B. **Symptoms:** Extremely delayed and harsh upshifts and harsh idle engagement.

**Cause:** TV control linkage is set too long.

**Remedy:** Adjust linkage using Linkage Adjustment procedure.

- C. **Symptoms:** Harsh idle engagement after engine warm up. Shift clunk when throttle is backed off after full or heavy throttle acceleration. Harsh coasting downshifts (automatic 3-2, 2-1 shifts in D range). Delayed upshifts at light acceleration.

**Cause:** Interference due to hoses, wires, etc. prevents return of TV control rod or TV linkage shaft.

**Remedy:** Correct interference area. Check or reset linkage using the Linkage Adjustment procedure.

**Cause:** Excess friction due to binding of grommets prevents return of TV control linkage.

**Remedy:** Check for bent or twisted rods or levers causing misalignment of grommets. Service or replace damaged components (replace grommets if damaged). Reset TV control linkage using the Linkage Adjustment procedure.

- D. **Symptoms:** Erratic/delayed upshifts, possibly no kickdown, harsh engagements.

**Cause:** Clamping bolt on trunnion at upper end of TV control rod is loose.

**Remedy:** Reset TV control linkage using the Linkage Adjustment procedure.

- E. **Symptoms:** No upshifts and harsh engagements.

**Cause:** TV control rod disconnected. (Transaxle is at maximum TV pressure).

**Remedy:** Connect TV control rod. Replace grommet(s) if rod disconnect was due to damaged or worn grommet(s).

**Cause:** Linkage return spring broken or disconnected.

**Remedy:** Connect or replace spring.

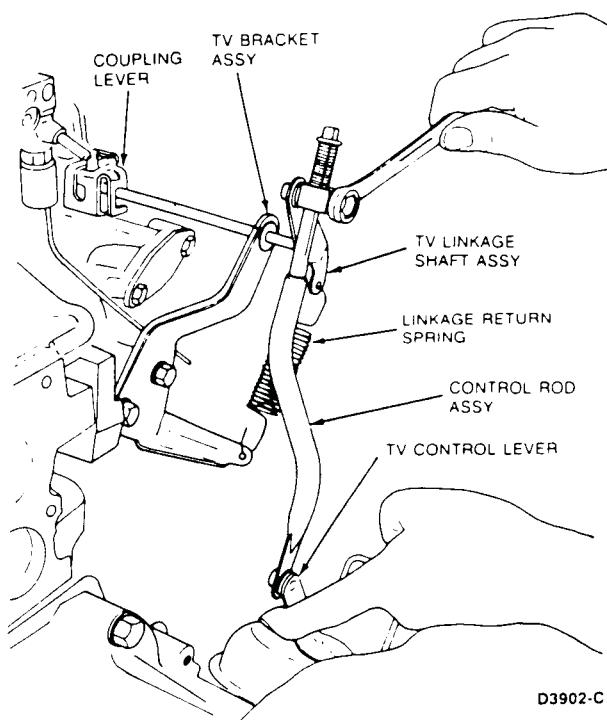
### Linkage Adjustment

#### Except 2.3L CFI Engines

The TV control linkage must be adjusted at the TV control rod assembly sliding trunnion block using the following procedures:

1. Operate engine until normal operating temperature is reached and all accessories are off. Assure that the hot engine curb idle speed is to specification. Refer to the Engine/Emissions Diagnosis\* manual.

**CAUTION:** The following steps involve working in proximity to the EGR system. Care must be taken to avoid contact with hot parts.



D3902-C

2. If the TV control rod assembly must be removed, refer to Section 24-60 for External TV Control Linkage Removal and Installation.

Loosen the bolt on the sliding trunnion block on the TV control rod assembly one turn minimum.

Remove any corrosion from the control rod and free-up the trunnion block so that it slides freely on the control rod.

3. With engine idling in Park, rotate transaxle TV control lever up using one finger and a light force, 4.5 N (approximately 1 pound), to ensure that the TV control lever is against its internal idle stop. Without relaxing the force on the TV control lever, tighten the bolt on the trunnion block to 9-14 N·m (7-11 lb-ft).



# Technical Service Information

## ADJUSTMENTS (Continued)

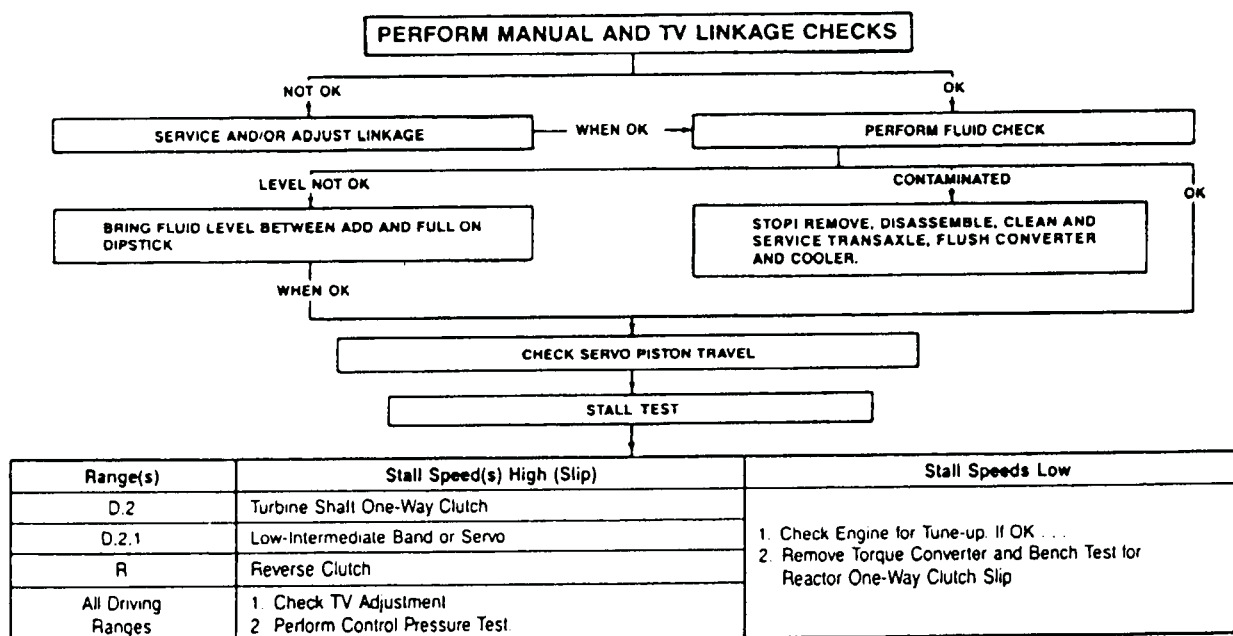
### Stall Test

Start the engine and allow it to reach its normal temperature. Apply both the parking and service brakes while making tests.

The stall test is made in DRIVE 2, 1 (First) or REVERSE at full throttle to check engine performance, converter clutch operation or installation, and the holding ability of the direct clutch, reverse clutch and low-intermediate band and the gear train one-way clutch.

**While making this test, do not hold the throttle open for more than five seconds at a time.**

After test, move the selector lever to NEUTRAL and run engine at 1000 rpm for about 15 seconds to cool the converter before making the next test. If the engine speed recorded by the tachometer exceeds the maximum limits given in Specifications, release the accelerator immediately because clutch or band slippage is indicated.



Trans.	Transmission Model/ Application	Range	Line Pressure At Idle	WOT Stall
ATX	1.9L PMA-CC PMB-AB (Mazda)	D, 2, P, N R LOW 1	45-56 50-96 53-67	87-103 202-254 114-135
ATX	2.3L PMA-BJ, BH, RN, BX, BT	D, 2, P, N R LOW 1	41-54 75-111 57-70	94-110 236-288 165-195
ATX	2.5L PMA-CE	D, 2, P, N R LOW 1	41-54 46-82 57-70	94-110 197-249 129-159

## ADJUSTMENTS (Continued)

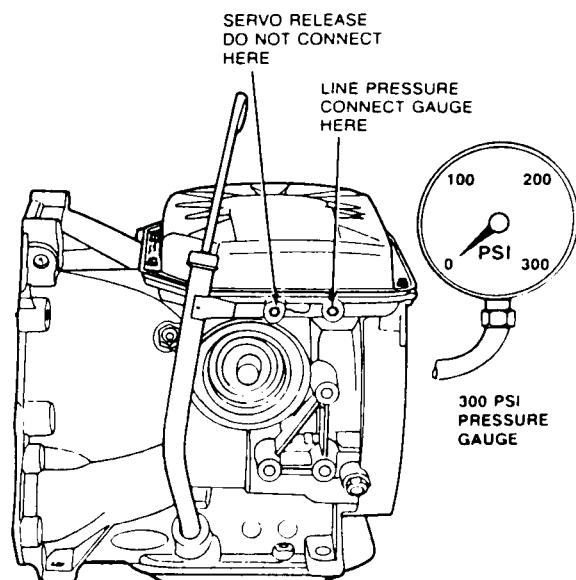
### Transaxle Fluid Cooler Flow Check

The linkage, fluid and control pressure must be within specification before performing this flow check.

Remove the transaxle dipstick from the filler tube. Place a funnel in the transaxle filler tube. Raise the vehicle, remove the cooler return line from its fitting in the case. Attach a hose to the cooler return line and fasten the free end of the hose in the funnel installed in the filler tube. Start the engine and set idle speed at 1000 rpm with the transaxle in NEUTRAL.

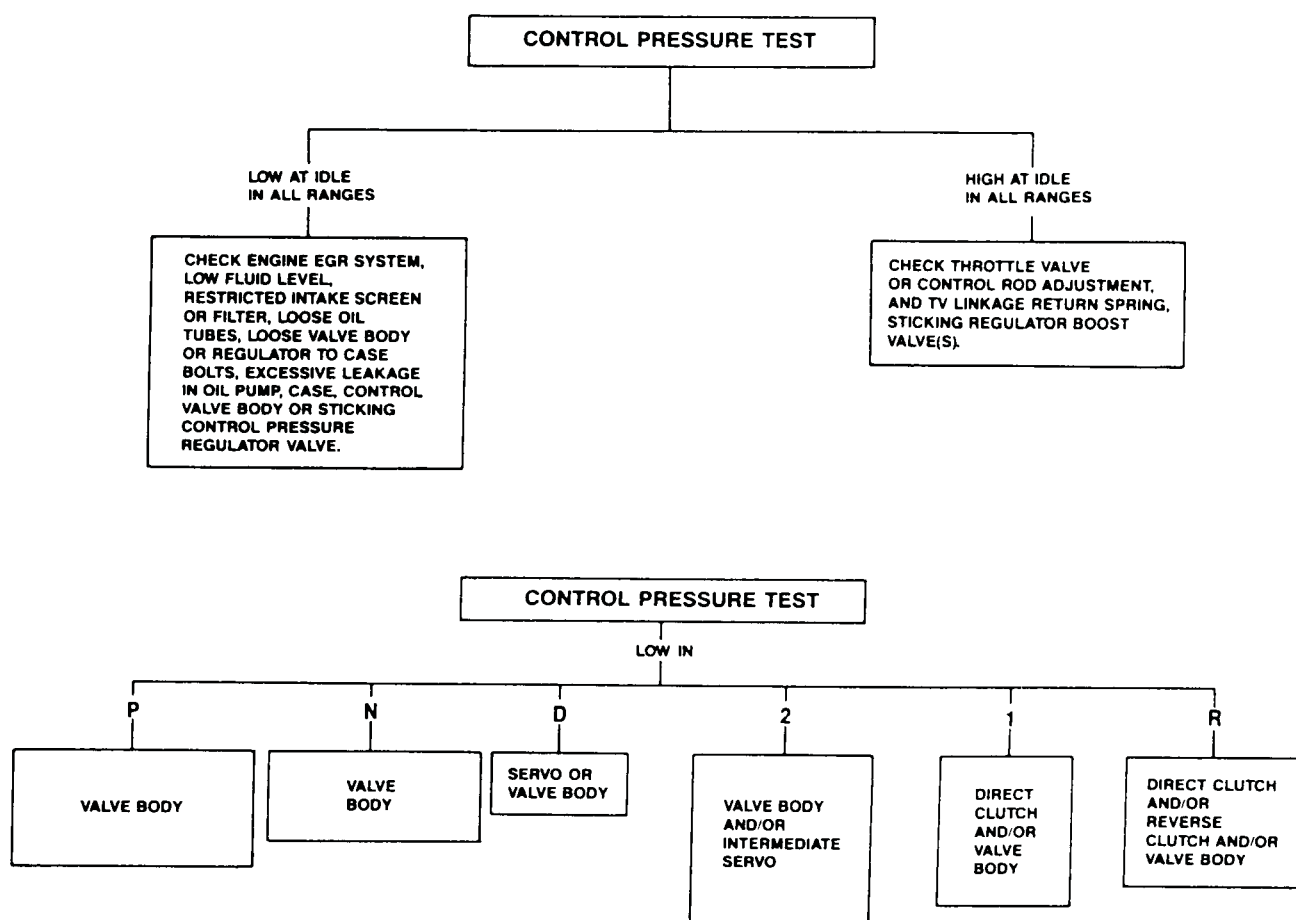
Observe the fluid flow at the funnel. When the flow is "solid" (air bleeding has been completed), the flow should be liberal. If there is not a liberal flow at 1000 rpm in NEUTRAL, low pump capacity, main circuit system leakage, or cooler system restriction is indicated.

To separate transaxle trouble from cooler system trouble, observe the flow at the transaxle case converter-out fitting.



CONTROL PRESSURE CHECK  
(GAUGE INSTALLATION)

D3904-E



CD3893-C



## Technical Service Information

### ADJUSTMENTS (Continued)

#### Shift Point Checks

##### Road Test

Check the minimum throttle upshifts in DRIVE. The transaxle should start in first gear, shift to second, and then shift to third, within the shift points in the Service Specifications manual.

With transaxle in third gear, depress the accelerator pedal to the floor. The transaxle should shift from third to second or third to first, depending on vehicle speed.

Check the closed throttle downshifts from third to first by coasting down from about 48 km/h (30 mph) in third gear. The shifts should occur within the limits in the Service Specifications manual.

When the selector lever is at 2 (SECOND), the transaxle will operate in first and in second gear.

With transaxle in third gear and road speed over approximately 48 km/h (30 mph), the transaxle shifts to second gear when selector lever is moved from DRIVE 3 (THIRD), to 1 (FIRST). The transaxle will shift into 1 (FIRST) when road speeds are less than 48 km/h (30 mph).

When the selector lever is moved from DRIVE (D) to SECOND (2), the transaxle will shift into Second (2), regardless of vehicle speed.

This check will determine if the governor pressure and shift control valves are functioning properly. During the shift point check operation, if the transaxle does not shift within specification, or certain gear ratios cannot be obtained, refer to the Diagnosis Charts to resolve the problem.

##### In Shop

A shift test can be performed in the shop to check shift valve operation, governor circuits, shift delay pressures, throttle boost and downshifts valve action.

**CAUTION: Never exceed 97 km/h (60 mph) speedometer speed.**

1. Place the transaxle in DRIVE and make a minimum throttle 1-2, 2-3 shift test. At this point of shift you will see the speedometer needle make a momentary surge and feel the driveline bump. If the shift points are within specification, the 1-2 and 2-3 shift valves and governor are OK.

If the shift points are not within specification, perform a Governor Check to isolate the problem.

#### ATSG BULLETIN INFORMATION

Additional information is available to ATSG Subscribers in the blue binders containing updates and bulletins. ATX bulletins are as follows:

Bulletin 86-10 Governor gear

Bulletin 87-03 Governor gear

Bulletin 87-59 Converter adapter sleeve

Bulletin 88-24 2-3 Slip

Bulletin 89-15 Check ball location

Bulletin 89-68 Harsh or soft 1-2 shift

Bulletin 90-18 Low speed shudder

Bulletin 91-24 No upshift

Bulletin 91-64 Band interchange information



## Technical Service Information

### Air Pressure Testing

A NO DRIVE condition can exist, even with the correct transaxle fluid pressure, because of inoperative clutches or band. Erratic shifts could be caused by a stuck governor valve. The inoperative units can be located through a series of checks by substituting air pressure for the fluid pressure to determine the location of the malfunction.

A NO DRIVE condition in Drive and 2 may be caused by an inoperative band or one-way clutch. When there is no drive in 1, the difficulty could be caused by improper functioning of the direct clutch or band and the one-way clutch. Failure to drive in reverse range could be caused by a malfunction of the reverse clutch or one-way clutch.

When you have a slip problem but do not know whether it is in the valve body or in the hydraulic system beyond the valve body, the air pressure tests can be very valuable.

To properly air test the automatic transaxle a main control to case gasket (Base No. -7D100-) and the following special service tools or equivalent will be required.

- Adapter Plate T82P-7006-B
- Adapter Plate Attaching Screws T82P-7006-C
- Air Nozzle TOOL-7000-DE
- Air Nozzle Rubber Tip TOOL-7000-DD

With the main control body removed, position the adapter plate and gasket on the transmission. Install the adapter plate attaching screws and tighten the screws to 9-11 N·m (80-100 lb-in). Note that each passage is identified on the plate. Using the air nozzle equipped with the rubber tip, apply air pressure to each passage shown in the following order:

#### Band Apply Servo

Apply air pressure to the servo apply passage in the service tool plate. The band should apply, however, because of the cushioning effect of the servo release spring the application of the band may not be felt or heard. The servo should hold the air pressure without leakage and a dull thud should be heard when air pressure is removed allowing the servo piston to return to the released position.

#### Direct Clutch

Apply air pressure to the forward clutch apply passage in the service tool plate. A dull thud can be heard or movement of the piston can be felt on the case as the clutch piston is applied. If the clutch seal(s) are leaking a hissing sound will be heard.

#### Intermediate Clutch

Apply air pressure to the intermediate clutch apply passage in the service tool plate. A dull thud can be heard or movement of the piston can be felt on the case as the clutch piston is applied. If the clutch seal(s) are leaking a hissing sound will be heard.

#### Reverse Clutch

Apply air pressure to the reverse clutch apply passage in the service tool plate. A dull thud can be heard or movement of the piston can be felt on the case as the clutch piston is applied. If the clutch seal(s) are leaking a hissing sound will be heard.

#### Converter In

This passage can only be checked for blockage. If the passage holds air pressure remove the service tool plate and check for an obstruction or damage.

#### Control Pressure to Governor

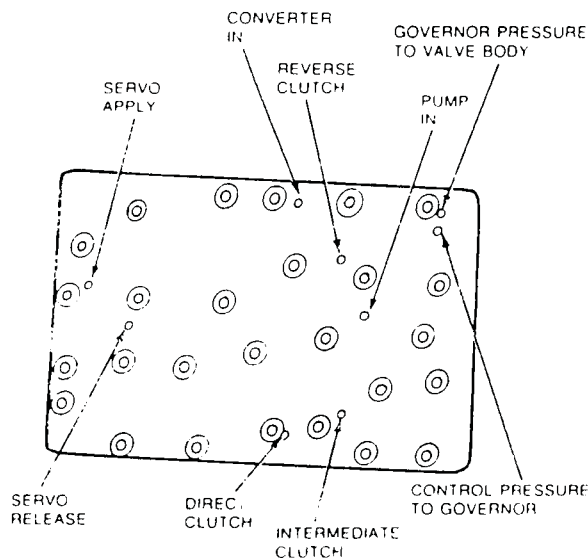
Remove the governor cover and while applying air pressure to the passage in the service tool plate watch for movement of the governor valve.

#### Governor to Control Pressure

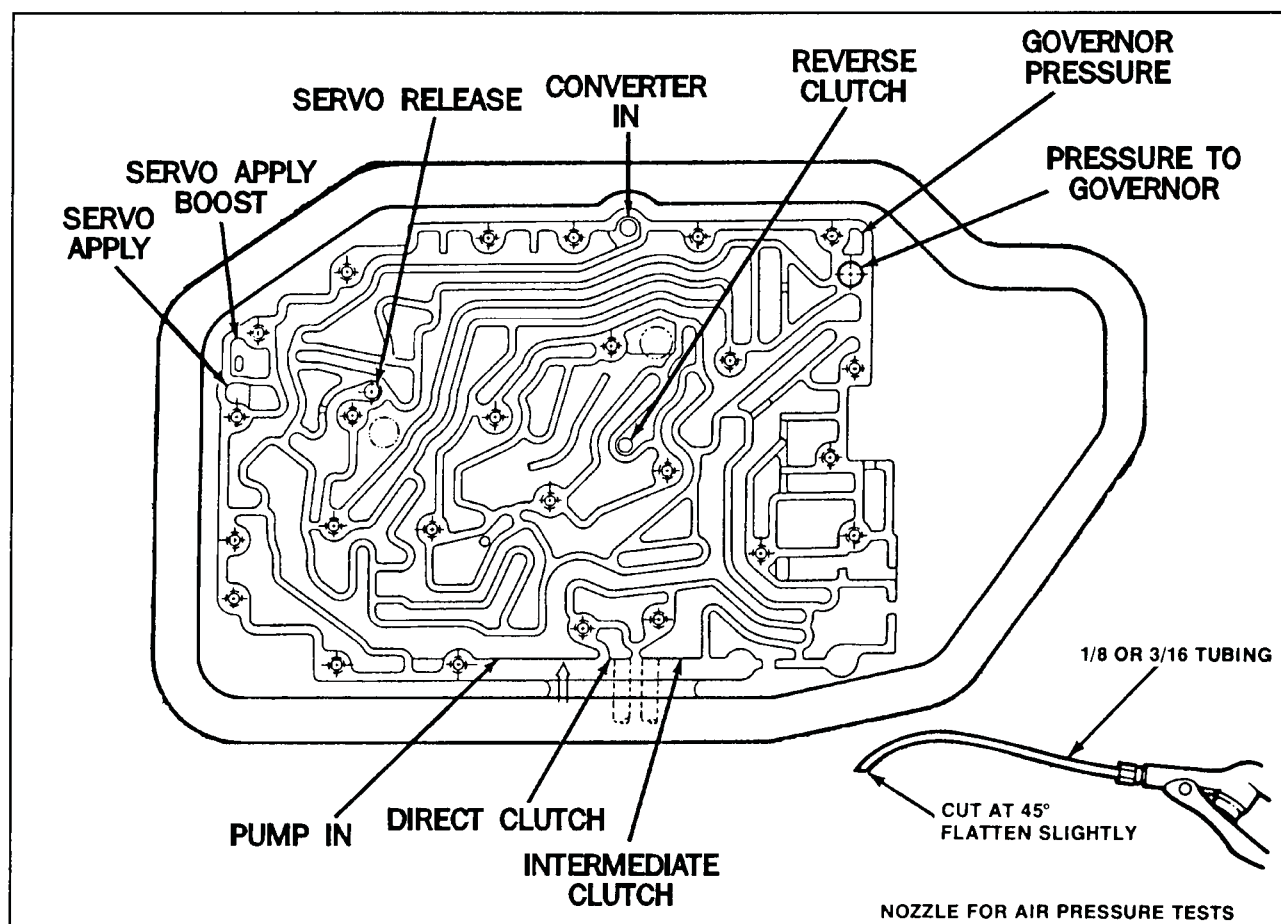
This passage can only be checked for blockage. If the passage holds air pressure remove the service tool plate and check for an obstruction or damage.

#### Pump In (Bench Test)

With the transmission removed from the vehicle and the converter removed, the rotating pump gears should be heard when air pressure is applied to this passage. This check is normally performed during the assembly of an overhauled transmission.







## Case Air Pressure Tests

The clutch, servo and governor circuits can be air tested through the passages identified. A nozzle should be used similar to that shown in the inset view. A rubber tip is helpful when the nozzle is inserted into a fluid supply hole. Where there is not a tight fitting hole in the passage, stuff rags around the nozzle.

Air pressure should be regulated to about 25 psi. The compressed air should be filtered and dry to avoid contaminating the fluid.

## CLUTCHES

The clutches should apply with a dull thud when compressed air is blown into their pressure ports. A hissing sound and the absence of application noise indicates a leak.

## SERVO

The servo application should be heard as the piston bottoms with air pressure at the FORWARD SERVO APPLY passage. When the air is removed, you should be able to feel the piston move back against the cover. (The band application and release can be seen with the pump assembly removed.)

The servo release circuit also can be checked by holding the servo applied and pressurizing the RELEASE passage. The servo and band should **release** with pressure held at both the APPLY and RELEASE passages.

## GOVERNOR

Air blown into the CONTROL PRESSURE TO GOVERNOR passage should cause the governor to whistle and/or make a sharp clicking noise. If there is no noise, the governor may be stuck.





## Technical Service Information

### ATX TORQUE CONVERTER INFORMATION

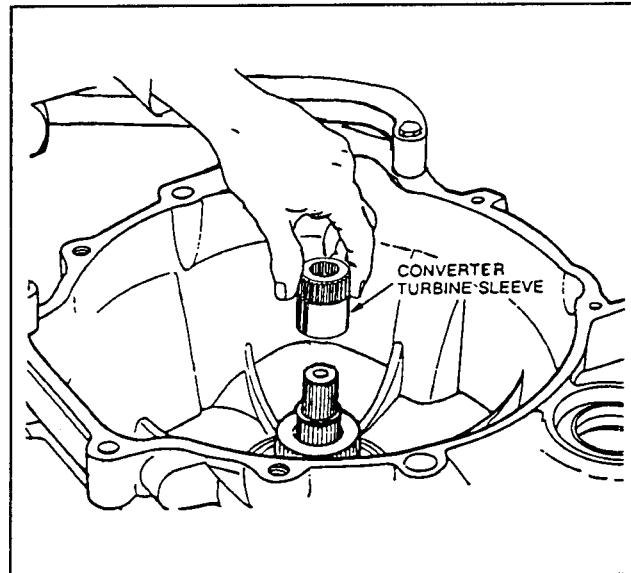
**There are three types of torque converter that are used in the ATX.**

All Escort and Lynx vehicles use a **planetary gear type** converter. Tempo and Topaz used this converter in their ATX transaxles from 1984-1986. This torque converter is driven by the turbine shaft to the sun gear, and by the intermediate shaft through the planetary carrier. This design was used exclusively by Ford in the ATX until 1986.

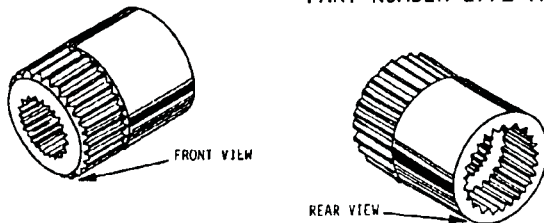
Ford used the **CLC** torque converter in the Taurus and Sable in 1986 and 1987. It has a centrifugal clutch inside similar to that used in a C5 transmission. The transaxle calibration was changed. **DO NOT** put a gear type torque converter in a Taurus or Sable or lurching shifts will result.

Beginning in 1987 the **FLC** type torque converter was used in the Tempo and Topaz, and continued to the Taurus and Sable in 1988. This type converter uses a converter adapter sleeve to lock the turbine shaft and the intermediate shaft together. See figure

The FLC (Fluid Locking Converter) converter does not lock up totally as in a typical lock up converter. Since the converter adapter sleeve is required to connect the two shafts, if it is left out, the vehicle will not move. This sleeve may stick inside the converter upon removal. Be sure that it is installed on to the transaxle before installing the FLC converter. See figure below.



PART NUMBER E7FZ-7A878-A



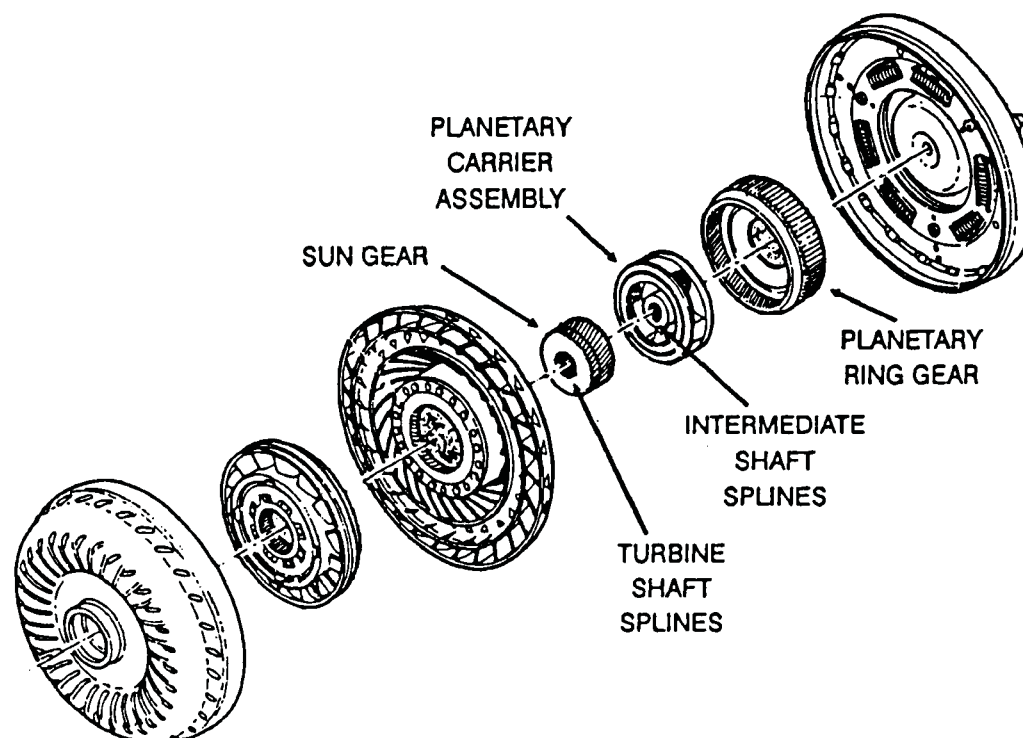
## FORD ATX

### NO UP-SHIFT

**COMPLAINT:** *Transmission does not shift to second or third gear.  
Valve body and governor good.*

**CAUSE:** *Splines for the intermediate shaft in the converter are stripped, or bad gear set in converter, preventing torque transfer to the intermediate drum.*

**CORRECTION:** *Replace the torque converter.*

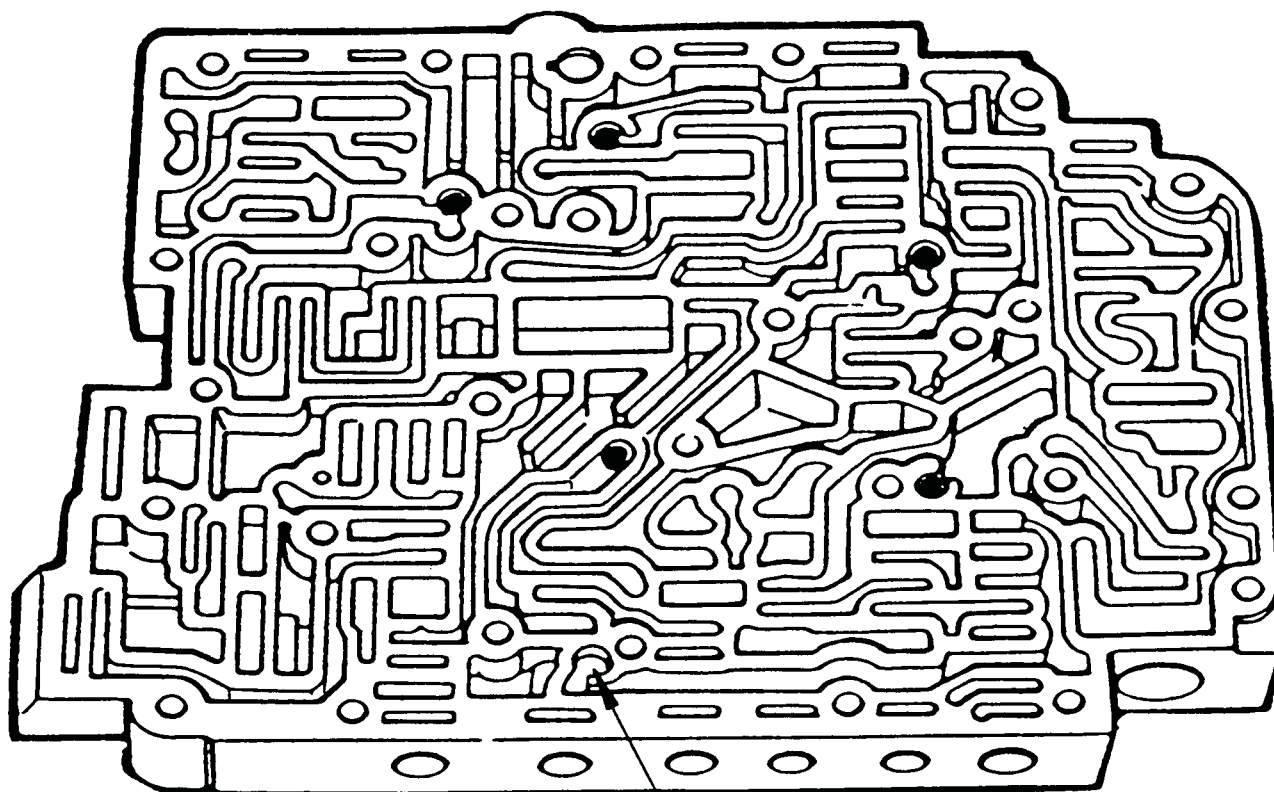




## Technical Service Information

### FORD - ATX VALVE BODY CHECKBALL LOCATIONS

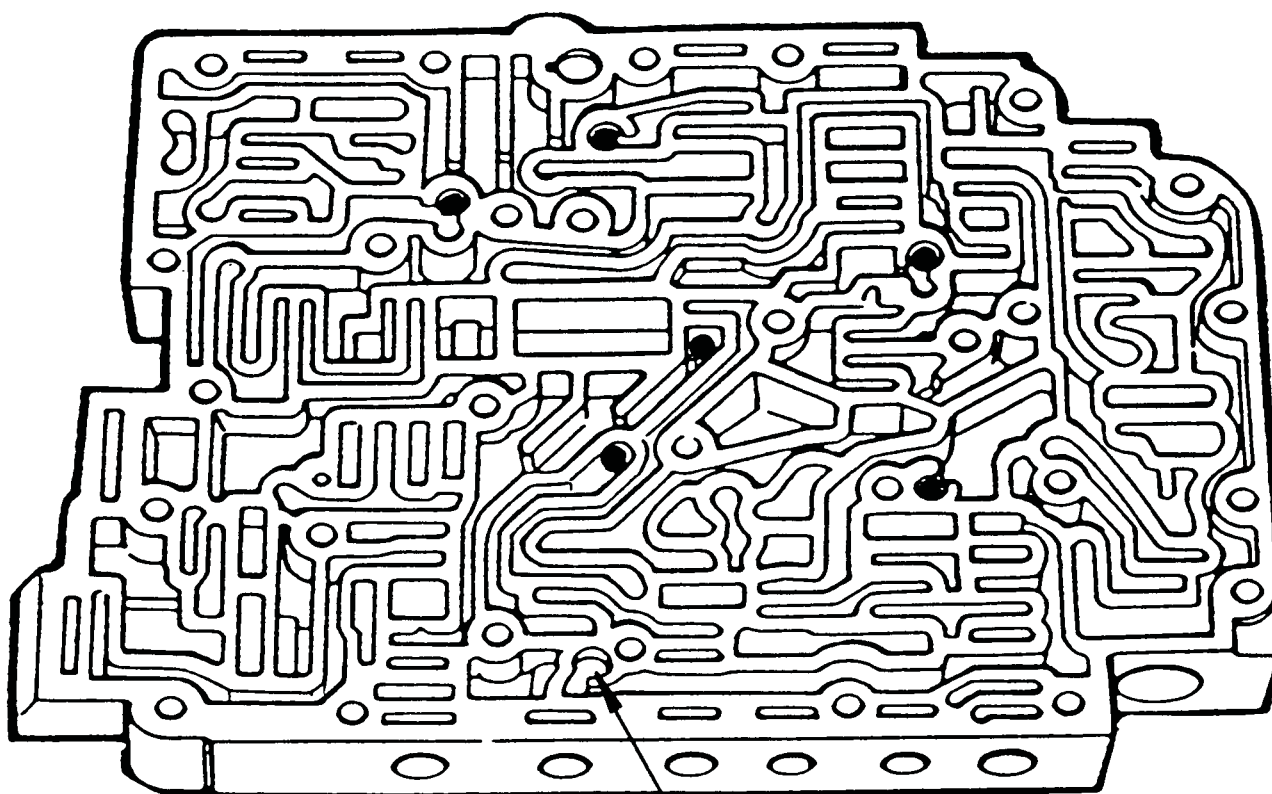
GEAR TYPE CONVERTER  
REQUIRES 5 CHECKBALLS



NO CHECKBALL HERE.

FORD - ATX  
VALVE BODY CHECKBALL LOCATIONS

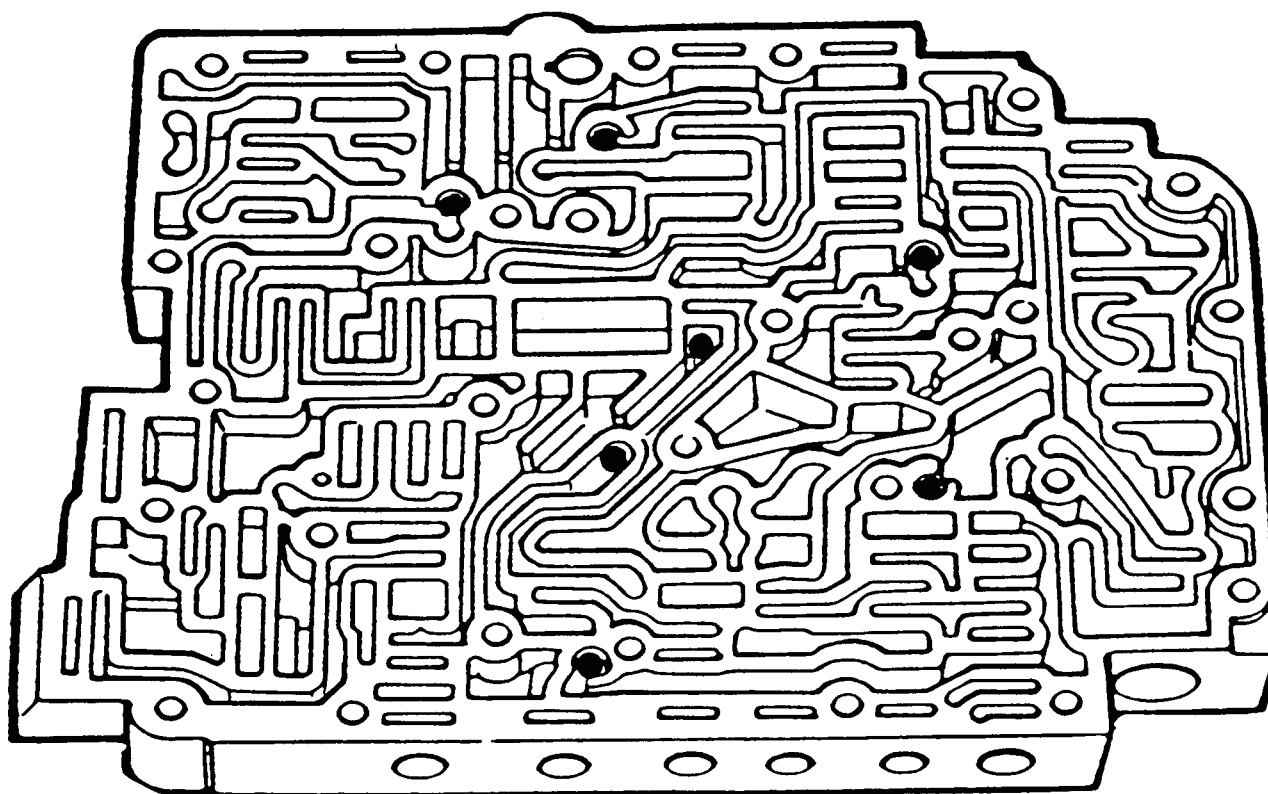
"CLC" TYPE CONVERTER  
REQUIRES 6 CHECKBALLS



NO CHECKBALL HERE.

FORD - ATX  
VALVE BODY CHECKBALL LOCATIONS

"FLC" TYPE CONVERTER  
REQUIRES 7 CHECKBALLS



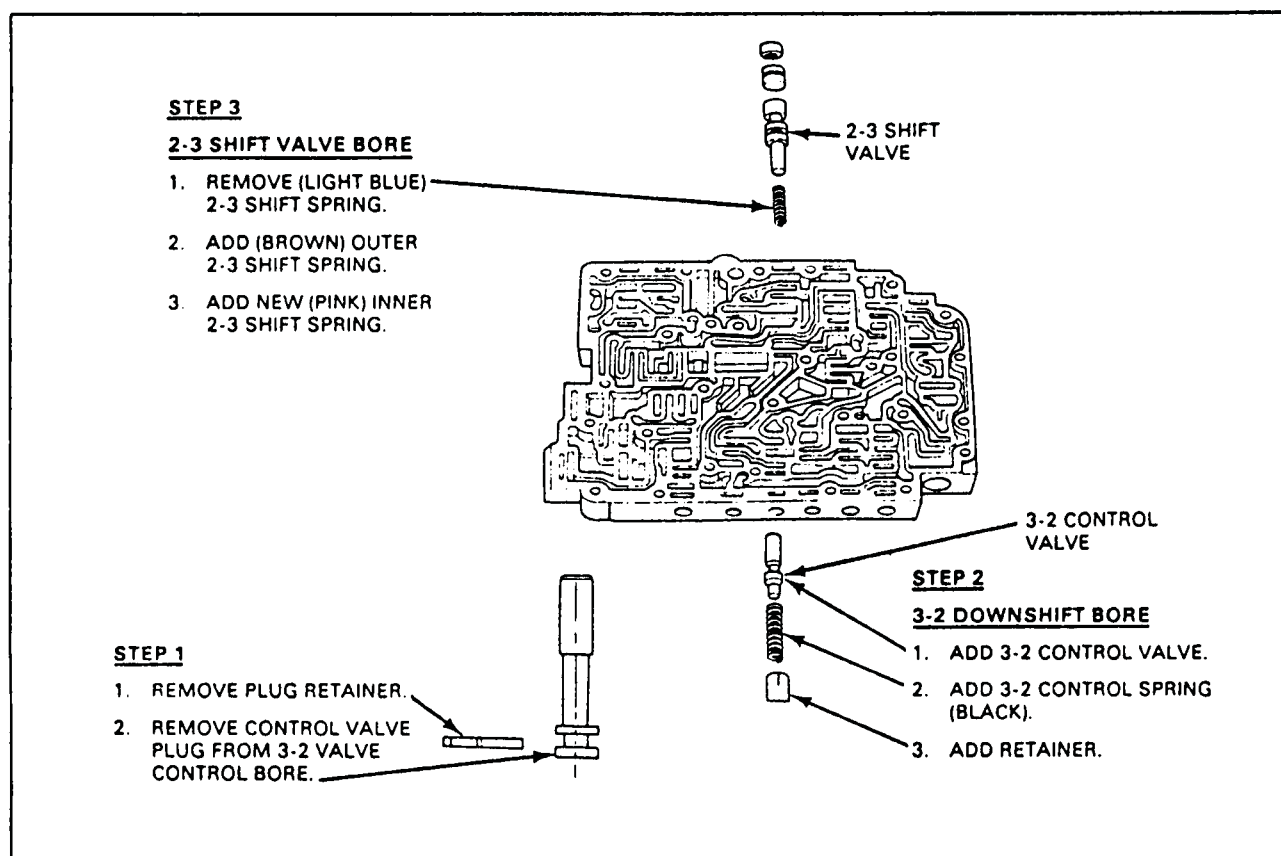
## FORD - ATX (TEMPO & TOPAZ) LOW SPEED 3-2 SHUDDER

**COMPLAINT:** A low speed shudder and/or boom while driving in third gear.

**CAUSE:** The cause may be shift point variances in the 2-3 upshift and the 3-2 downshift pattern.

**CORRECTION:** Install a new design main control service kit, OEM part number E6FZ-7A230-A, that revises the part throttle 2-3 upshift and 3-2 downshift pattern. Refer to the following procedure.

1. Remove and discard the 3-2 control valve plug and retainer. (See Figure 1)
2. Install the new 3-2 control valve, control valve spring, and flat plate retainer from the main control service kit. (See Figure 1).
3. Replace the 2-3 shift valve spring with the two spring "Nested" assembly from the main control service kit (See Figure 1).



**NOTE:** Spring color must be properly observed for correction to be achieved.



## Technical Service Information

### ATX DIFFERENTIAL IDENTIFICATION

A number of different axle ratios are found in the ATX Transaxle. It is important to be certain that the right ratio is used for the vehicle. Ford has an identification tag on the door which gives an axle code on the lower line. Under the code labeled AX there will be a number. This number corresponds to the axle Ratio. There are currently five different ratios. Each ratio can be identified by the tooth count on the input gear, idler gear, and ring gear. A few of the differentials use the same number of teeth on the ring gear so be careful to match the gear size and tooth pitch if any gears are to be changed. A wrong ratio will cause driveability problems which cannot be resolved with any adjustments .

If an attempt is made to change ratios, The planetary gearset may have a compatability problem with the differential input gear. The early short gear will work with any planetary set, but the latest gear will not work with the early planets. The input gear bearings are also important. The late long bearing (over 13/16 in. long) will work only with the late input gear. The early short input gear bearing will work with any input gear. Rear drums, planets and sun gears must be kept as a set to prevent mismatches and fit problems. To identify the gear ratio check the axle code and count the teeth on the gears as outlined in the chart below.

### GEAR TOOTH COUNT

AXLE CODE	INPUT GEAR	IDLER GEAR	RING GEAR	RATIO
0	27	34	83	3:07
1	26	40	86	3:31
2	22	30	71	3:23
6	27	39	88	3:26
9	23	28	71	3:09

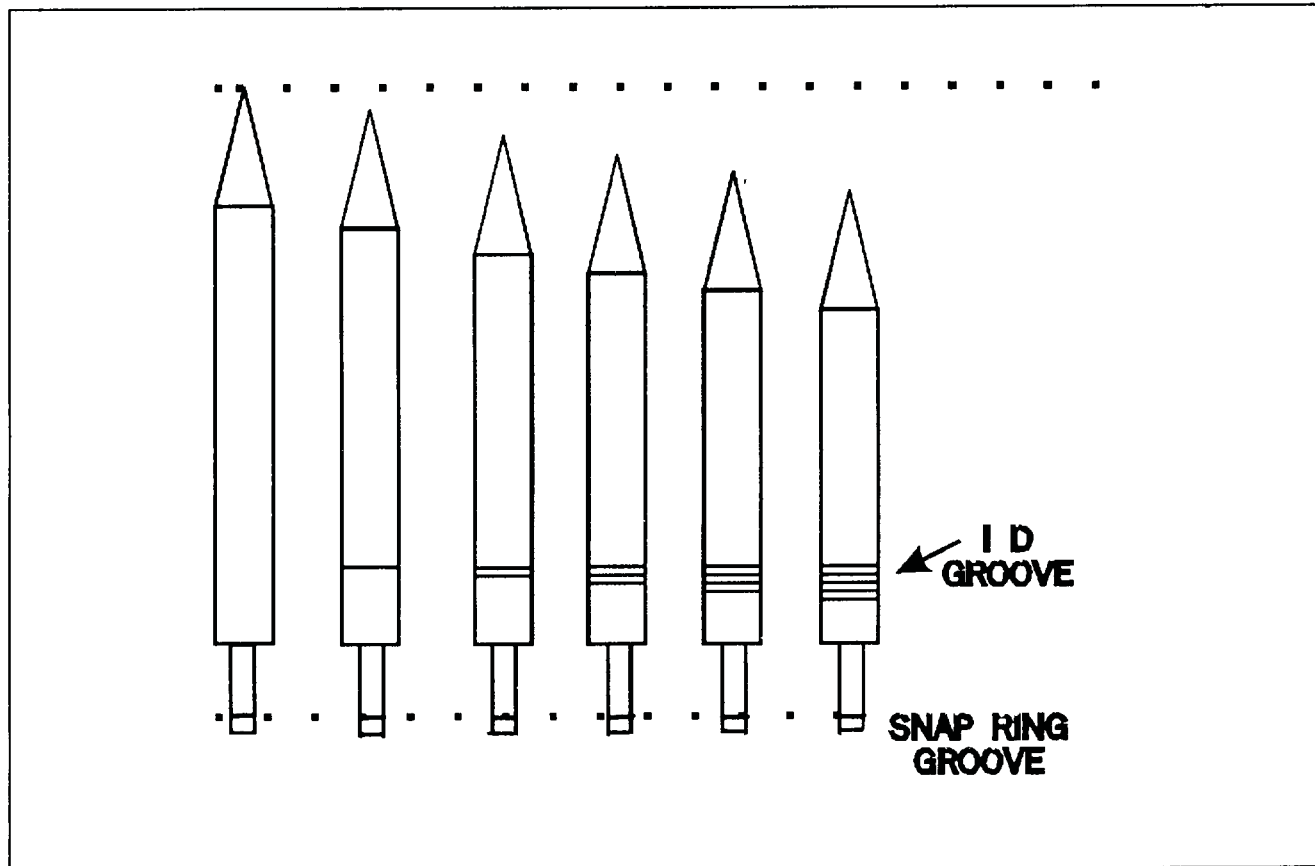




## Technical Service Information

### BAND ADJUSTMENT

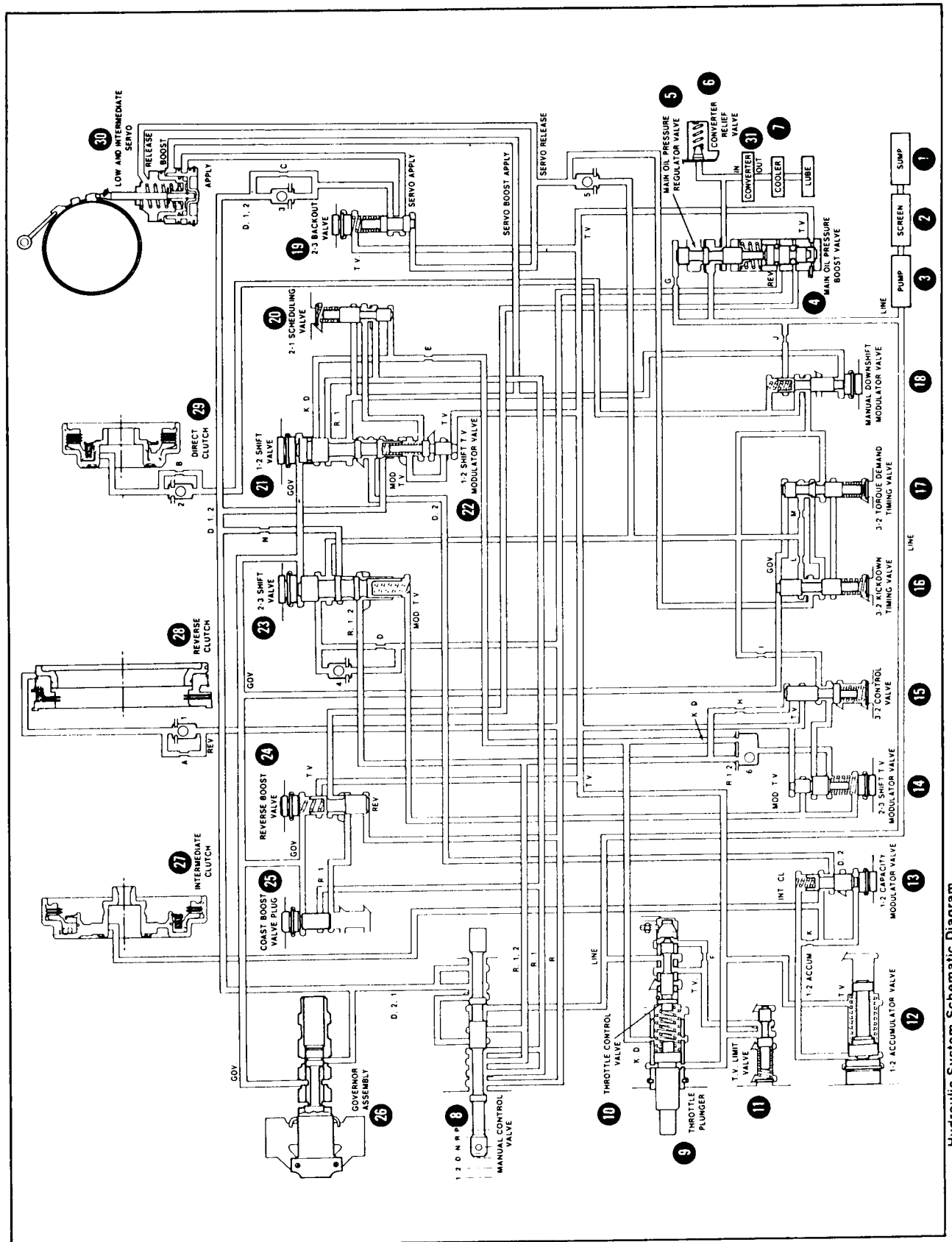
The only way to adjust the band is by changing the length of the servo pin. There are six different pins available to adjust the servo travel. The object is to have 1/4 to 3/16 in. free travel when the correct pin is installed. The longest pin has no Identification groove on it. See the figure below.



NOTE: If a longer pin is needed than that shown above, see ATSG bulletin 91-64.

### GOVERNOR DIFFERENCES

There are three different weight sizes for the governors on the ATX. The most common governor has no markings on the weights and it was used in all early Escort models and some as late as 1988. Some governors are stamped with a letter "P" on the inner weight, and it is found in Tempo and Topaz cars, depending on the axle ratio. This governor has heavier inner weights than that of the governors that have no markings. Starting in 1987, a governor with the number "7" was used in some Escorts and Lynx, and this governor has much thinner inner weights than the other governors.



Hydraulic System Schematic Diagram

- 1 SUMP** — The transmission oil pan contains a supply of hydraulic fluid for the system.
- 2 SCREEN** — Protects the pump inlet from dirt and other foreign material that may cling to the fluid.
- 3 OIL PUMP** — Pumps hydraulic fluid to the system when the engine is running.
- 4 MAIN OIL PRESSURE BOOSTER VALVE** — Increases or decreases main control pressure in relation to throttle opening. Also provides different main control pressures depending on range or gear ratio.
- 5 MAIN OIL PRESSURE REGULATOR VALVE** — Regulates main (line) control pressure in the system.
- 6 CONVERTER RELIEF VALVE** — Prevents excess pressure build-up in the torque converter.
- 7 COOLER** — Removes heat generated in the torque converter and transmission.  
**NOTE:** Cooler return fluid is used for lubrication before it returns to the sump **1**.
- 8 MANUAL VALVE** — Moves with the shift selector and directs control pressure to various passages to apply clutches and servos, and to provide automatic functions of the hydraulic system.
- 9 THROTTLE PLUNGER** — Varies spring force on throttle valve with throttle opening. Also operates "kickdown" system at wide-open throttle.
- 10 THROTTLE CONTROL VALVE** — Regulates throttle pressure as an engine load signal to the hydraulic system.
- 11 T.V. LIMIT VALVE** — Regulates maximum T.V. (throttle) pressure in the throttle control circuit.
- 12 1-2 ACCUMULATOR VALVE** — And . . .
- 13 1-2 CAPACITY MODULATOR VALVE** — Operate together to smooth the 1-2 upshift.
- 14 2-3 SHIFT T.V. MODULATOR VALVE** — Modulates T.V. pressure acting on the 2-3 shift valve.
- 15 3-2 CONTROL VALVE** — Regulates 3-2 downshift timing.
- 16 3-2 KICKDOWN TIMING VALVE** — Operates to smooth the 3-2 downshift during kickdown (full throttle).
- 17 3-2 TORQUE DEMAND TIMING VALVE** — Operates to smooth the 3-2 downshift at part throttle.
- 18 MANUAL DOWNSHIFT MODULATOR VALVE** — Provides modulated line pressure to the direct clutch in Manual Low (1).
- 19 2-3 BACKOUT VALVE** — Controls feed rate of apply pressure to low and intermediate servo.
- 20 2-1 SCHEDULING VALVE** — Determines 2-1 downshift speed when the shift selector is moved to Manual Low (1) from D range.
- 21 1-2 SHIFT VALVE** — Controls automatic 1-2 upshift and 2-1 downshift.
- 22 1-2 SHIFT T.V. MODULATOR VALVE** — Modulates T.V. pressure on 1-2 shift valve.
- 23 2-3 SHIFT VALVE** — Controls automatic 2-3 upshift and 3-2 downshift.
- 24 REVERSE BOOST VALVE** — Provides increased main control pressure in reverse gear.
- 25 COAST BOOST VALVE PLUG** — No hydraulic function except to plug a hole.
- 26 GOVERNOR** — Road speed input signal to hydraulic system.
- 27 INTERMEDIATE CLUTCH** — Described in Section 3.
- 28 REVERSE CLUTCH** — Described in Section 3.
- 29 DIRECT CLUTCH** — Described in Section 3.
- 30 LOW AND INTERMEDIATE SERVO** — Described in Section 3.
- 31 TORQUE CONVERTER** — Hydraulic coupling and torque multiplier as described in Section 2.



# Technical Service Information

## DISASSEMBLY AND ASSEMBLY

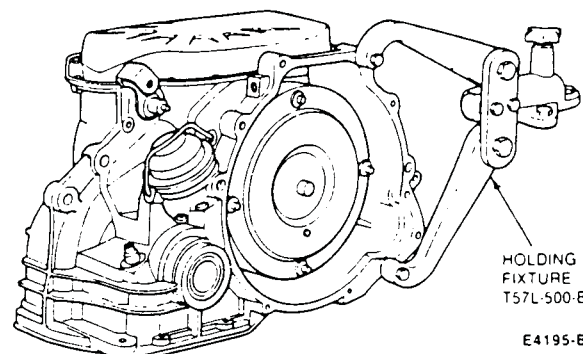
NOTE: Before beginning the transaxle overhaul, review the following guidelines. These general rules are provided to emphasize the need for attention to detail and care when servicing an automatic transaxle.

- Thorough cleaning of the transaxle exterior will reduce the possibility that damaging contaminants might enter the subassemblies during disassembly and assembly.
- All fasteners must be tightened to the torque indicated in the text. In addition to appearing in the text, the necessary torques can be found in Specifications.
- When building-up sub-assemblies each component part should be lubricated with clean transmission fluid. It is also good practice to lubricate the sub-assemblies as they are installed in the case.
- Needle bearings, thrust washers and seals should be lightly coated with petroleum jelly during sub-assembly build-up or transaxle assembly.
- Many components and surfaces in the transaxle are precision machined. Careful handling during disassembly, cleaning, inspection and assembly can prevent unnecessary damage to machined surfaces.
- When building-up sub-assemblies or assembling the transaxle, always use new gasket and seals.
- The transaxle service area should be kept clean, well organized and supplied with clean lint-free shop cloths.
- Whenever a seal is removed from a piston, shaft or servo, note the type of seal and when applicable, the direction of the sealing lip.
- Always use the specified transmission oil when lubricating seals or other components prior to assembly (refer to Specifications for the proper oil).

### Transaxle

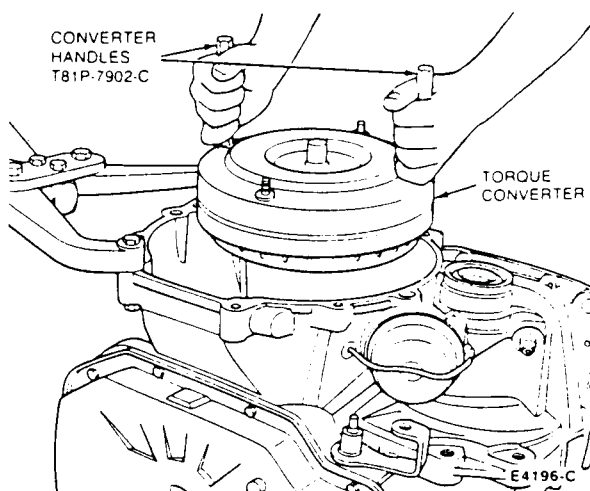
#### Disassembly

1. Mount transaxle in Holding Fixture T57L-500-B or equivalent.



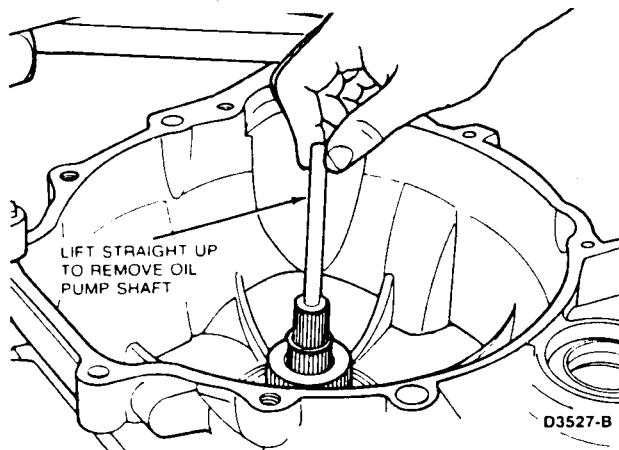
2. Install Converter Handles T81P-7902-C or equivalent and lift converter out of transaxle.

NOTE: The torque converter is relatively heavy. Be prepared to handle the weight.

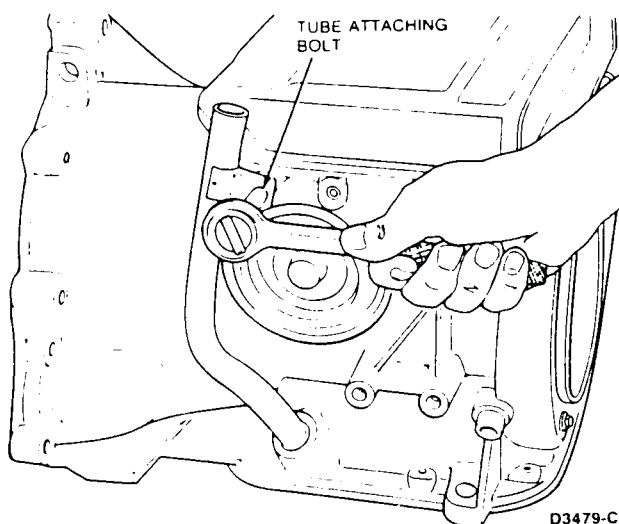


## DISASSEMBLY AND ASSEMBLY (Continued)

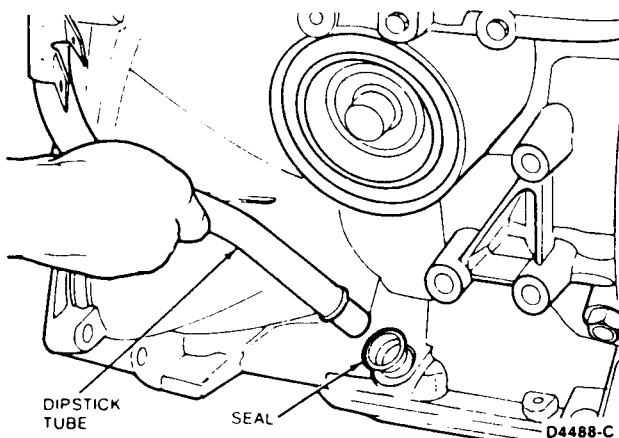
3. Remove oil pump driveshaft.



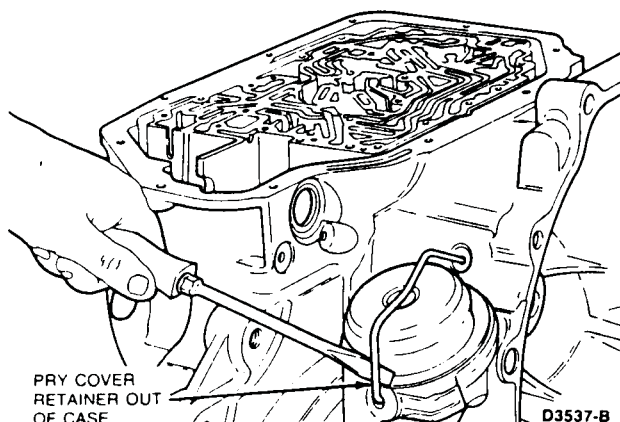
4. Remove fluid level dipstick tube attaching bolt and remove tube from case.



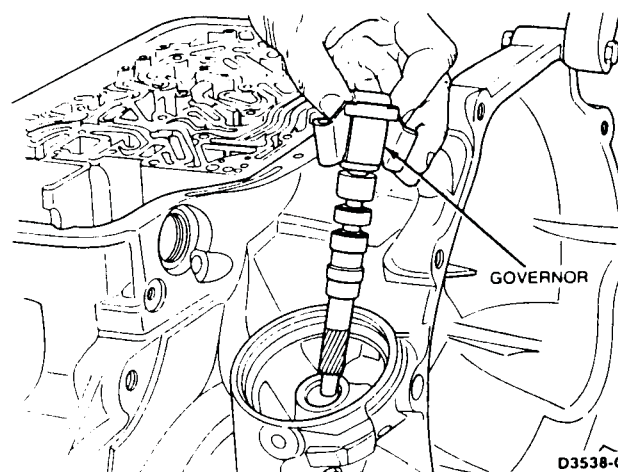
Remove seal from case and discard.



5. Remove governor cover by prying retainer out of case. Then pry cover out of case.



6. Remove governor.





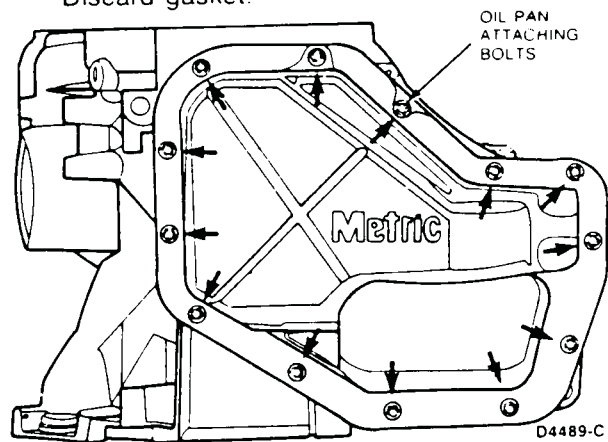
## Technical Service Information

### DISASSEMBLY AND ASSEMBLY (Continued)

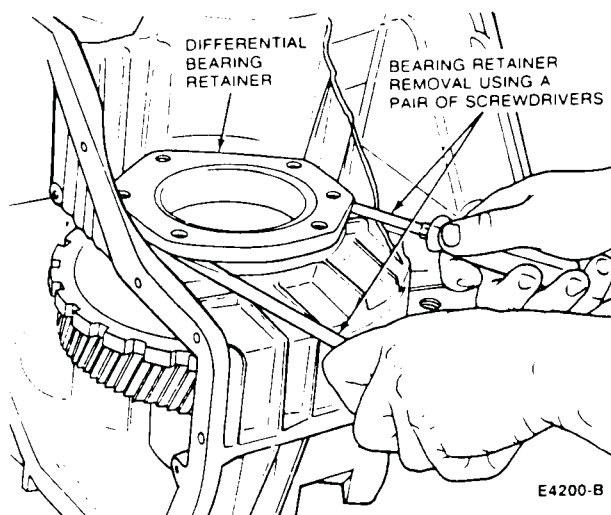
7. Remove 13 oil pan attaching bolts.

8. Remove oil pan.

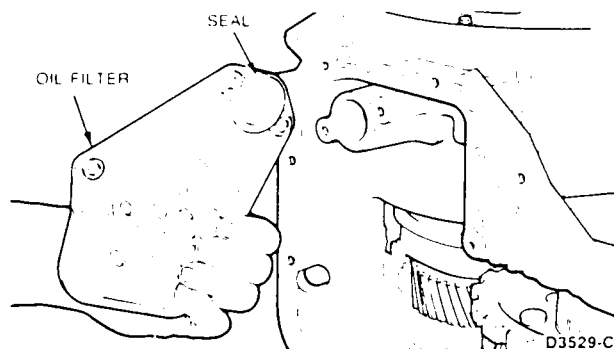
Discard gasket.



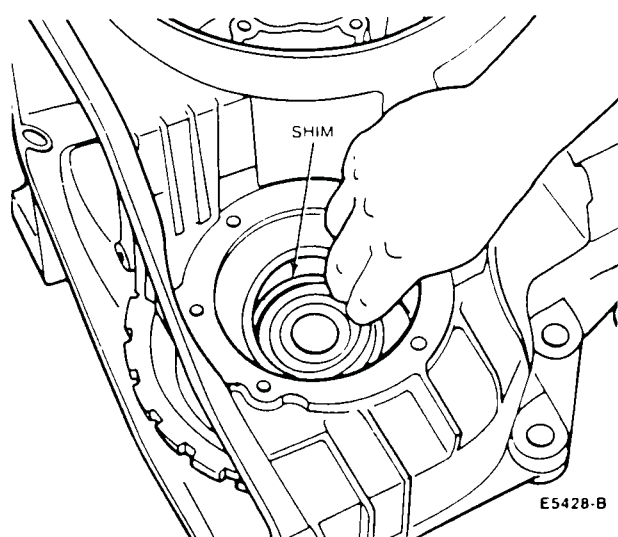
11. Remove differential bearing retainer.



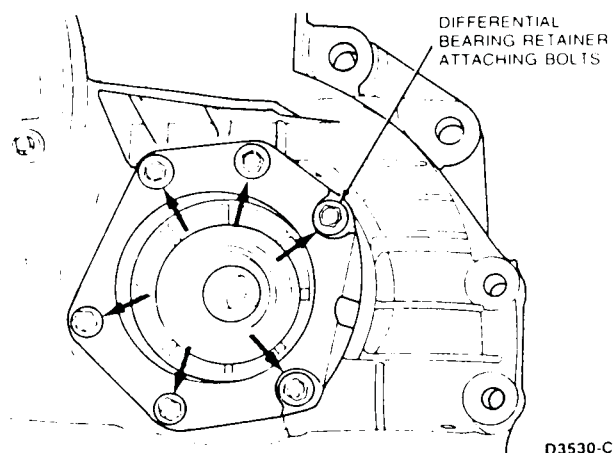
9. Remove three oil filter attaching bolts and remove filter. Discard seal. Thoroughly clean filter at this time.



12. Remove differential bearing spacer shims.



10. Remove six differential bearing retainer attaching bolts.

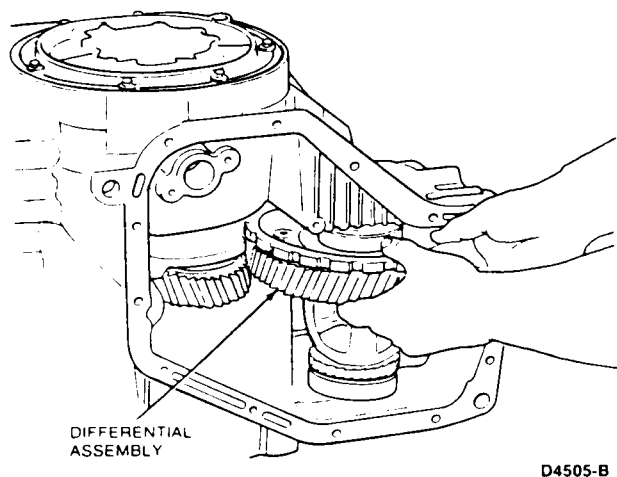




## DISASSEMBLY AND ASSEMBLY (Continued)

13. Remove differential assembly.

NOTE: For differential service, refer to Section 15-20.

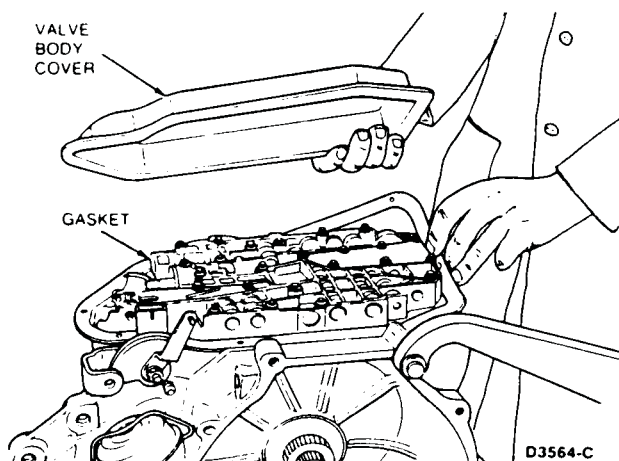


14. Remove 10 valve body cover attaching bolts.

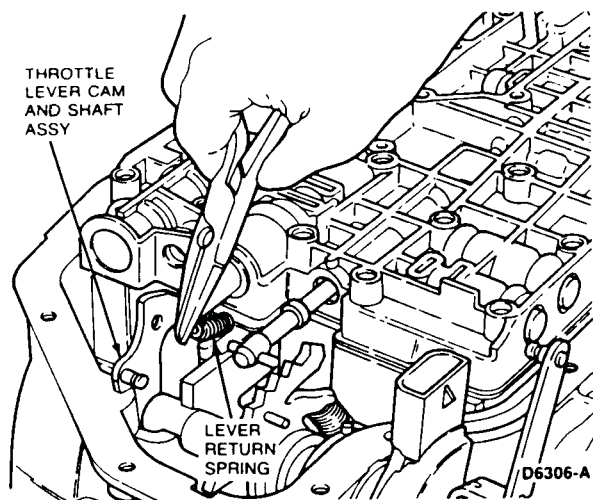
NOTE: The transaxle identification tag is attached to the case by a valve body attaching bolt. This tag must be installed in its original position during assembly.

15. Remove valve body cover.

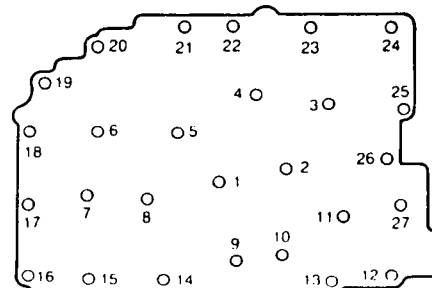
Discard gasket.



16. Disconnect throttle lever return spring.



17. Loosen the 27 valve body attaching bolts.

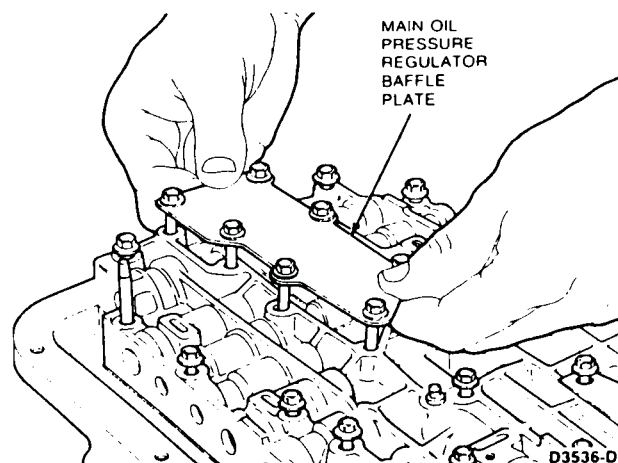


FROM PUMP SIDE OF CASE

D3483-B

18. Remove main oil pressure regulator baffle plate.

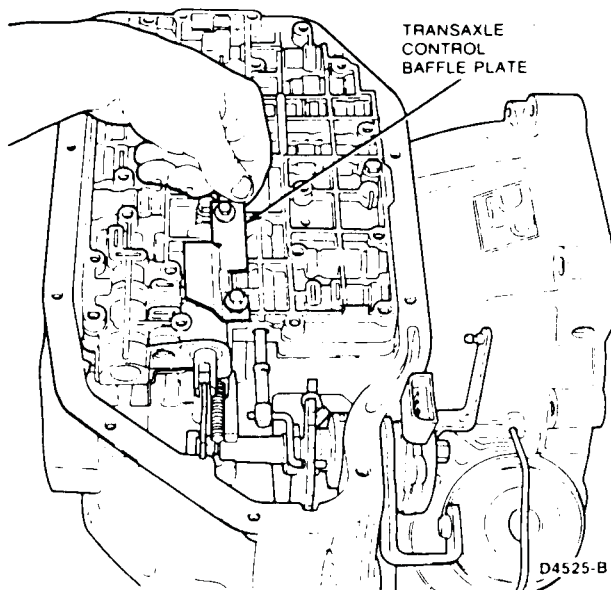
NOTE: Because the seven baffle attaching bolts are longer on the main oil pressure regulator plate, keep them separate from the other valve body attaching bolts.



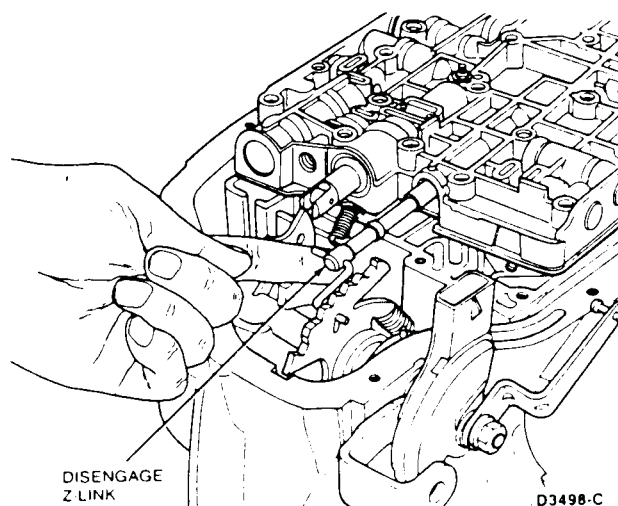


## DISASSEMBLY AND ASSEMBLY (Continued)

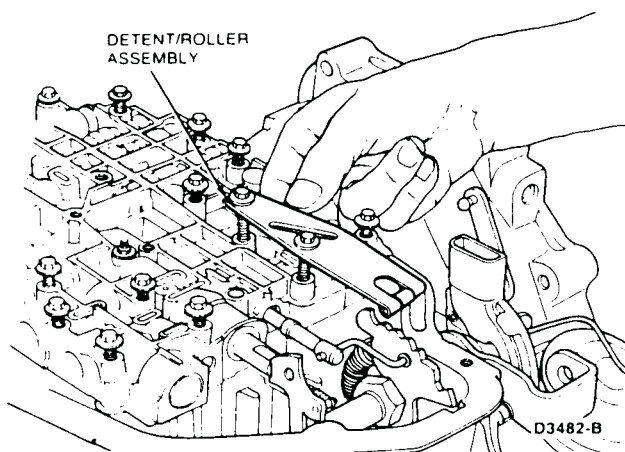
19. Remove transaxle control baffle plate.



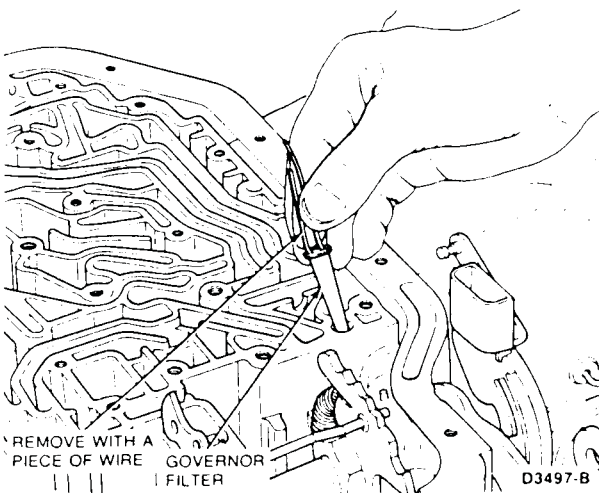
21. Disengage Z-link from manual valve and remove valve body. Discard gasket.



20. Remove detent spring and roller assembly.

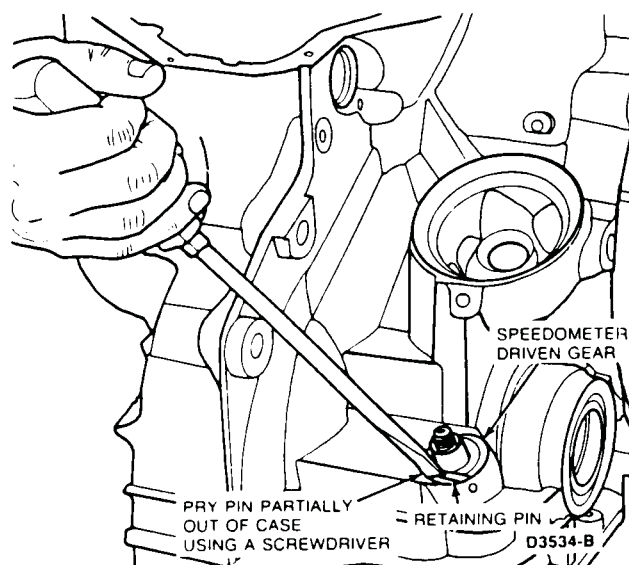


22. With valve body removed, lift governor filter from the case. A piece of wire can be used to lift filter from case bore.

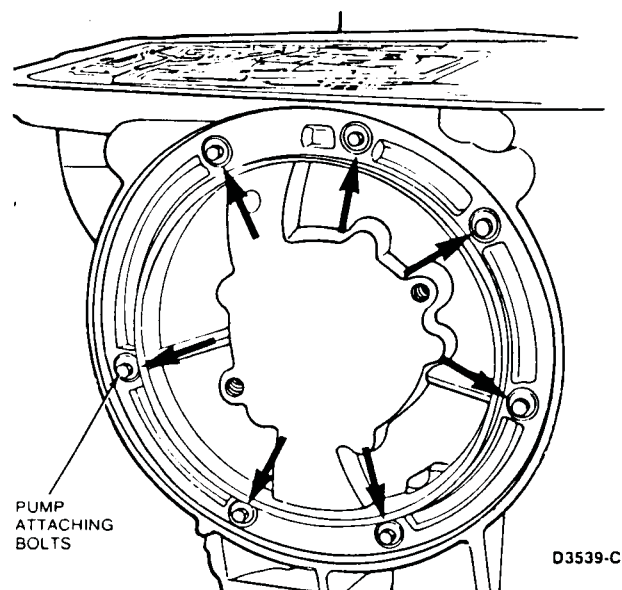


## DISASSEMBLY AND ASSEMBLY (Continued)

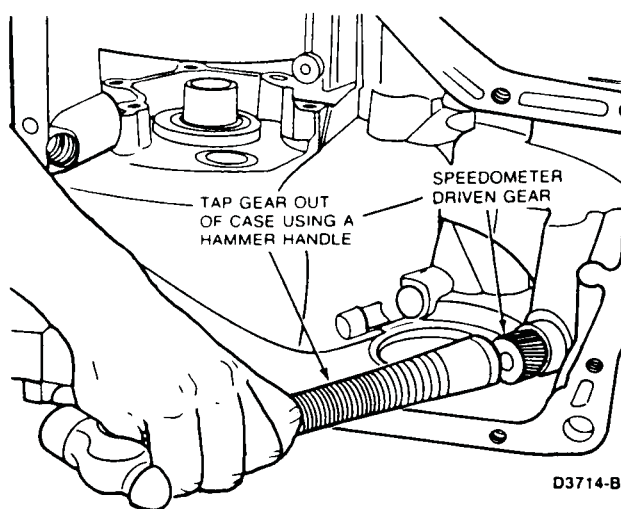
23. Partially pry speedometer driven gear retaining pin out of case using a screwdriver. Remove pin from case using sidecutters.



25. Remove the seven pump attaching bolts and washers.

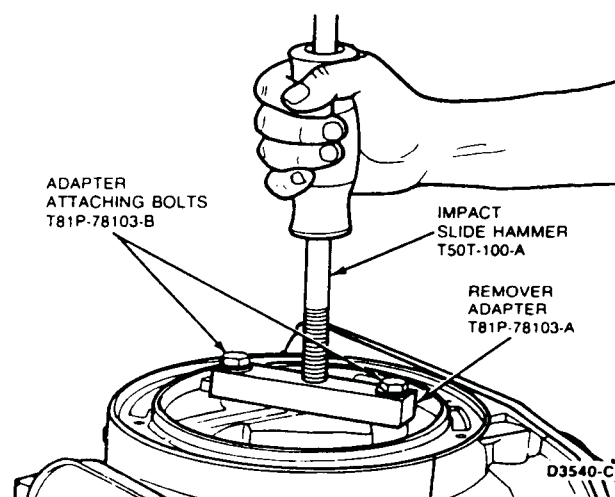


24. Remove speedometer driven gear from case using a hammer handle.



26. Remove pump body using Impact Slide Hammer T50T-100-A, Adapter T81P-78103-A and Adapter Attaching Bolts T81P-78103-B or equivalent.

NOTE: Be sure selective thrust washer under pump body is also removed.



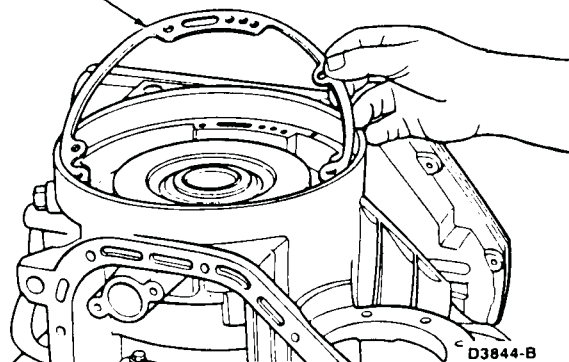


## Technical Service Information

### DISASSEMBLY AND ASSEMBLY (Continued)

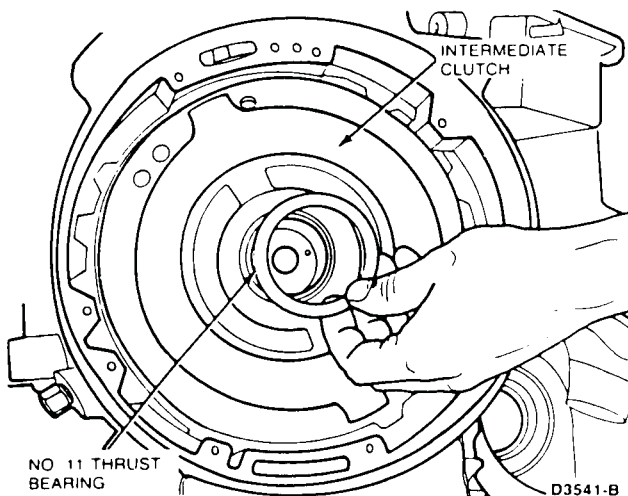
27. Remove and discard pump gasket.

PUMP GASKET

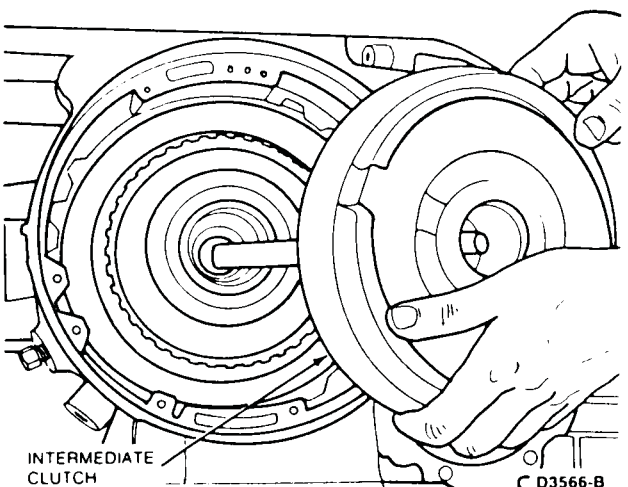


28. Remove No. 11 thrust bearing (needle) from intermediate clutch.

INTERMEDIATE CLUTCH



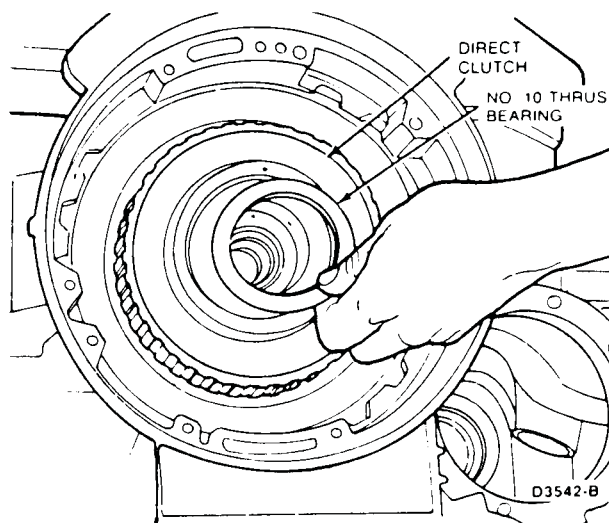
29. Remove intermediate clutch.



30. Remove No. 10 thrust bearing (needle) from direct clutch.

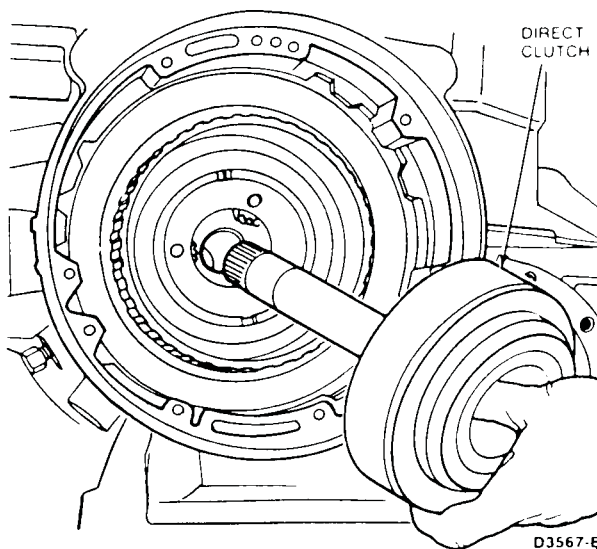
DIRECT CLUTCH

NO 10 THRUST BEARING



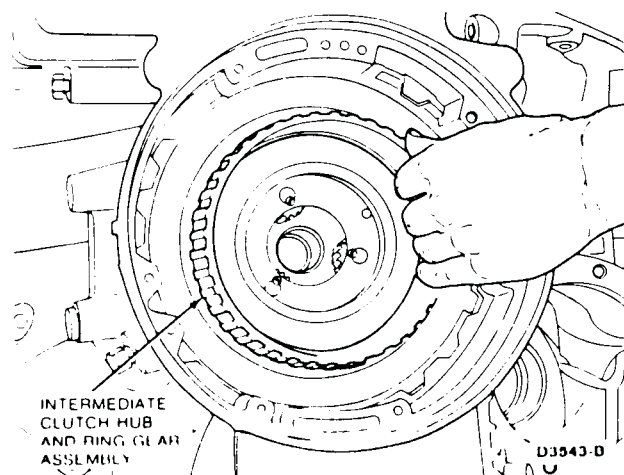
31. Remove direct clutch.

DIRECT CLUTCH

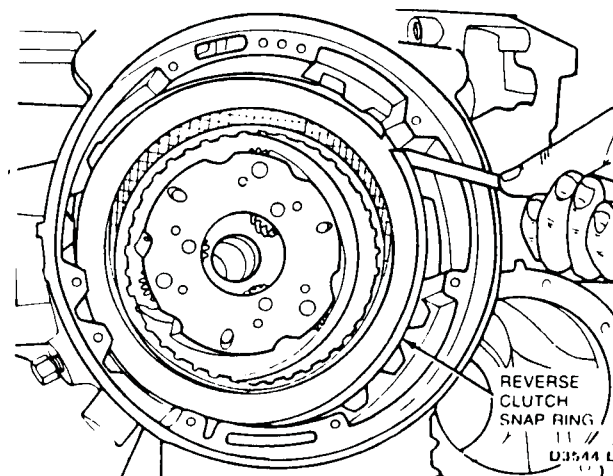


## DISASSEMBLY AND ASSEMBLY (Continued)

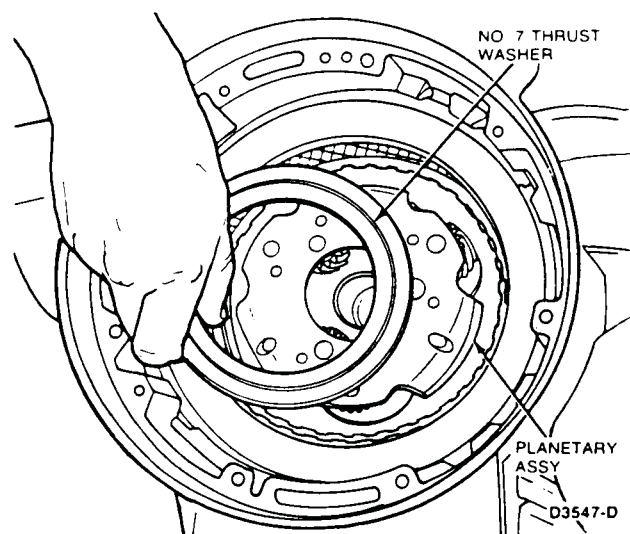
32. Remove intermediate clutch hub and ring gear assembly.



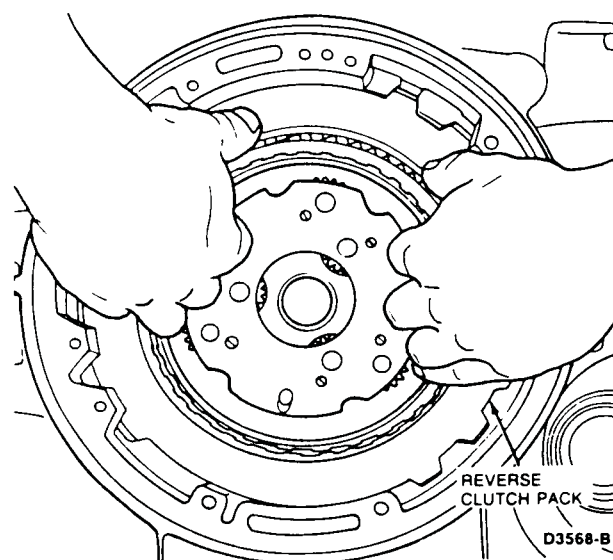
34. Remove reverse clutch snap ring.



33. Remove No. 7 thrust washer from planetary assembly.

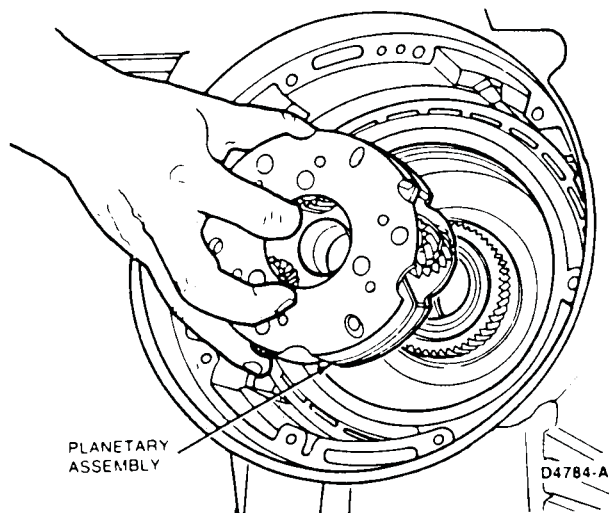


35. Remove reverse clutch pack.

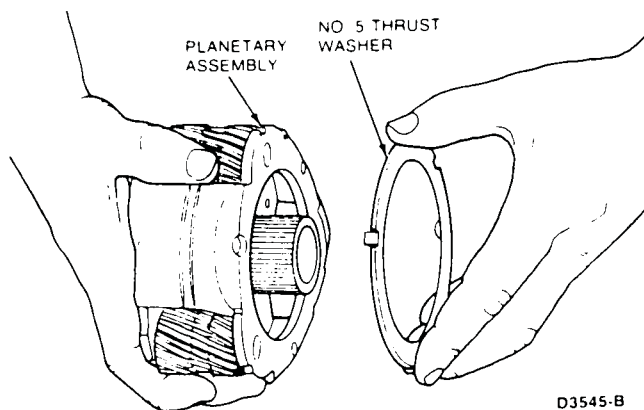


## DISASSEMBLY AND ASSEMBLY (Continued)

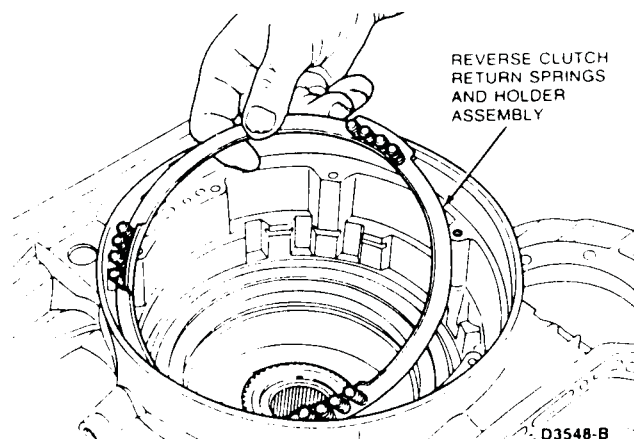
36. Remove planetary assembly.



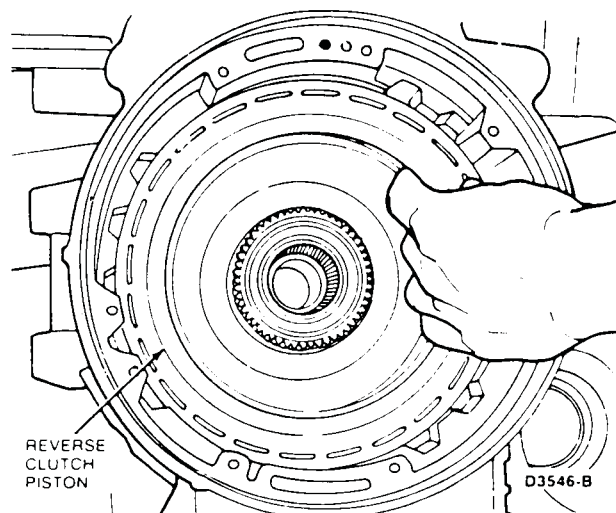
Remove No. 5 thrust washer from planetary assembly.



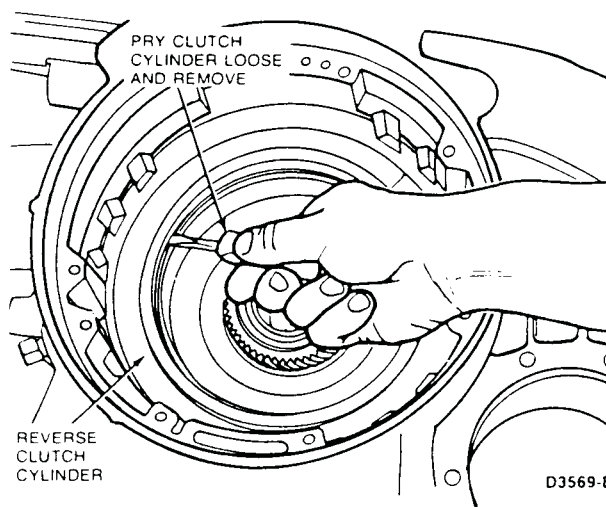
37. Remove reverse clutch return springs and holder assembly.



38. Remove reverse clutch piston.



39. Pry reverse clutch cylinder up to loosen, and remove from case.





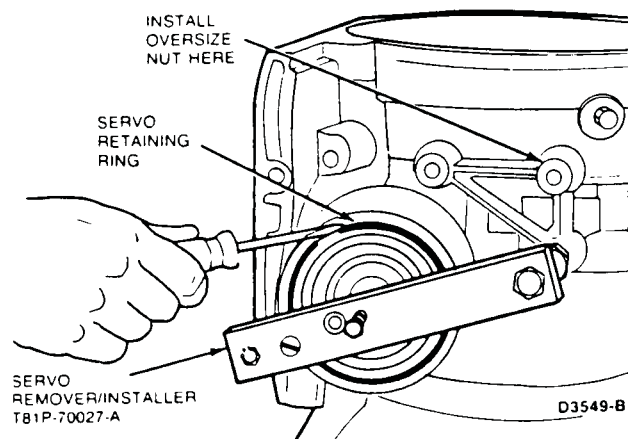


## Technical Service Information

### DISASSEMBLY AND ASSEMBLY (Continued)

40. Install Servo Remover/Installer T81P-70027-A or equivalent, and remove servo retaining ring.

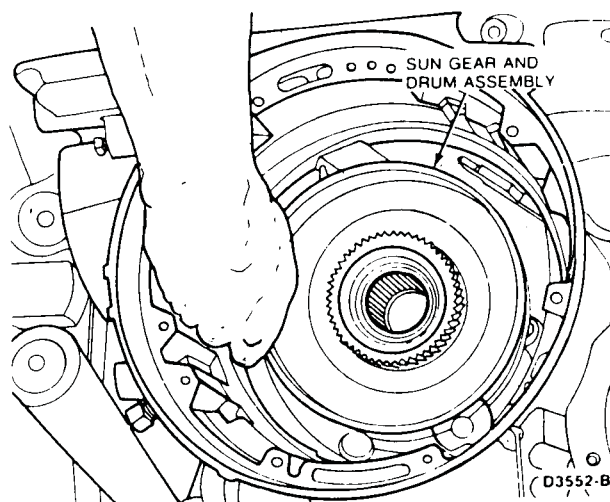
NOTE: An oversize nut will have to be installed under the rear spacer. The nut will compensate for the motor mount thickness.



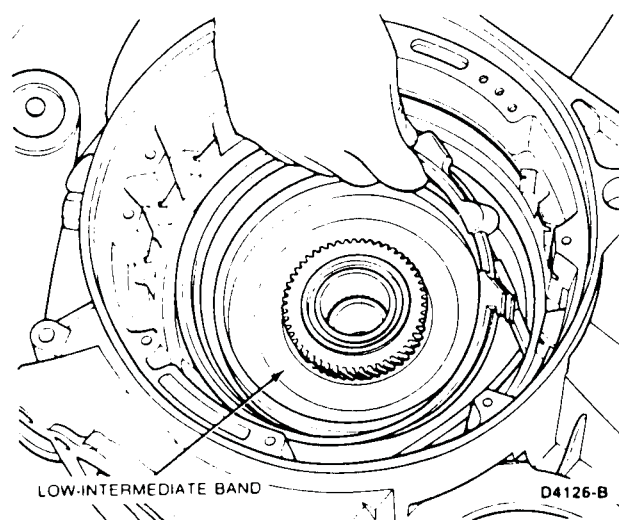
41. Back center screw out until spring pressure is removed from servo.

Remove tool and servo.

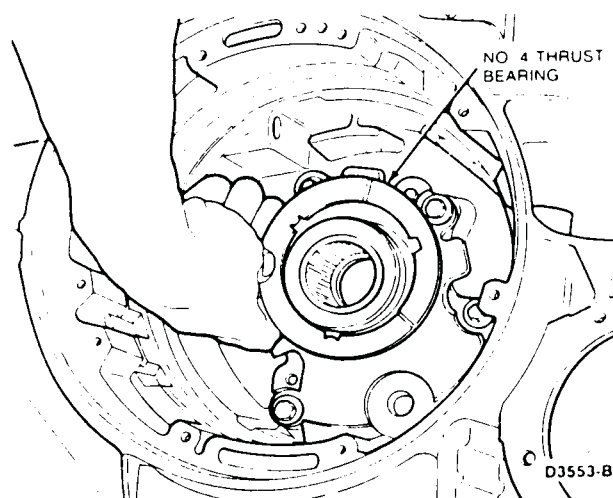
43. Remove sun gear and drum assembly.



42. Remove low-intermediate band.



44. Remove No. 4 thrust washer from transfer housing.

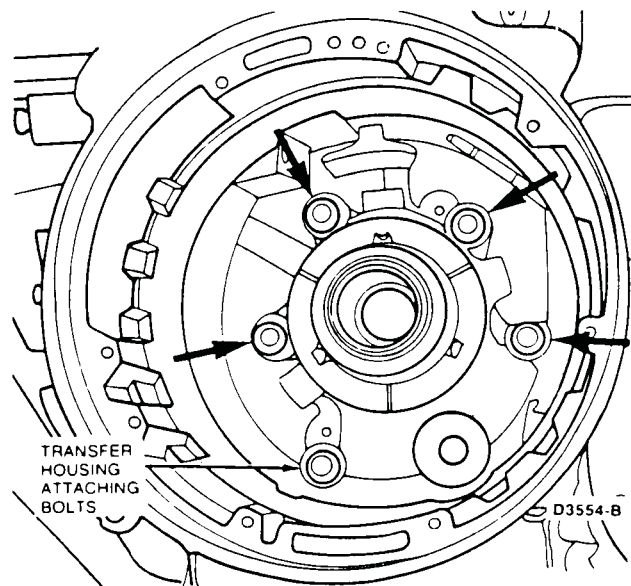




## Technical Service Information

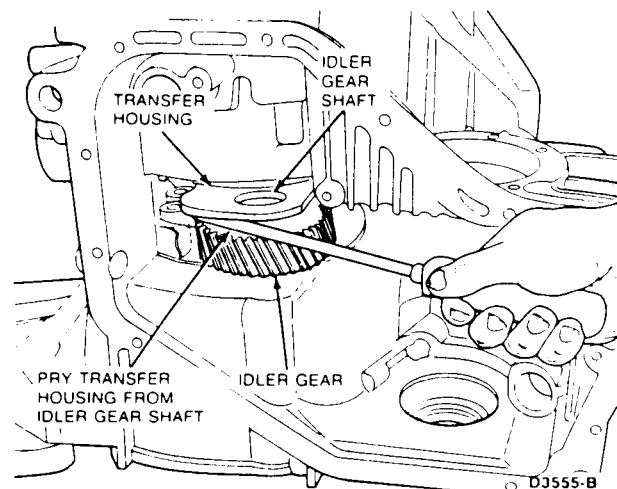
### DISASSEMBLY AND ASSEMBLY (Continued)

45. Remove and discard the five transfer housing attaching bolts.

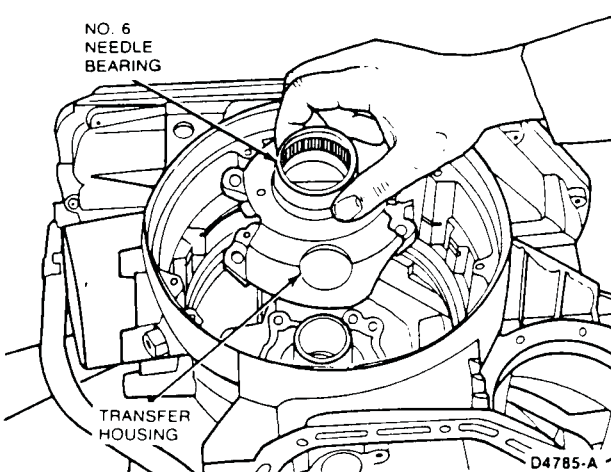


46. Using a screwdriver, pry transfer housing from idler gear shaft.

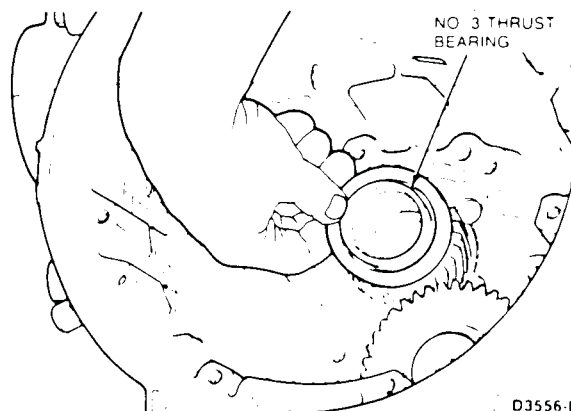
**CAUTION:** When prying against transfer housing lift upward against the housing only. Prying downward can result in damage to the transfer gear teeth.



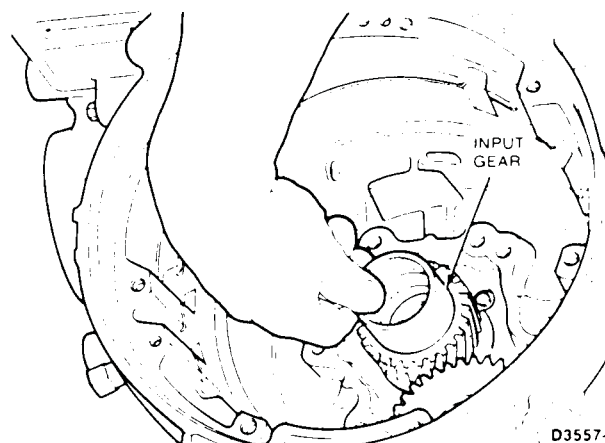
47. Remove transfer housing.



48. Remove No. 3 thrust bearing (needle type) from input gear.



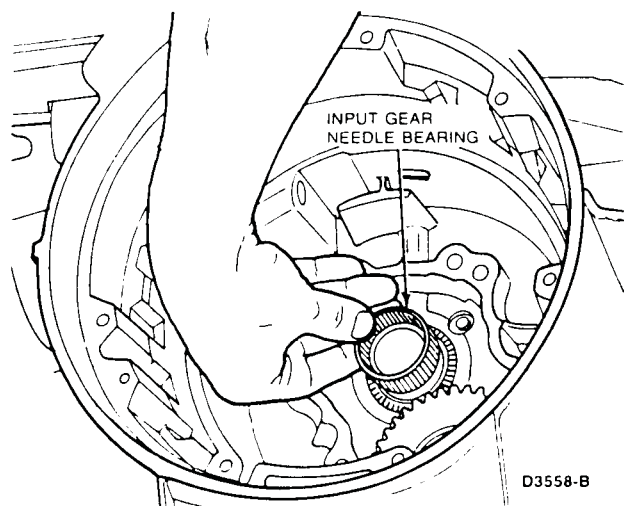
49. Remove input gear.



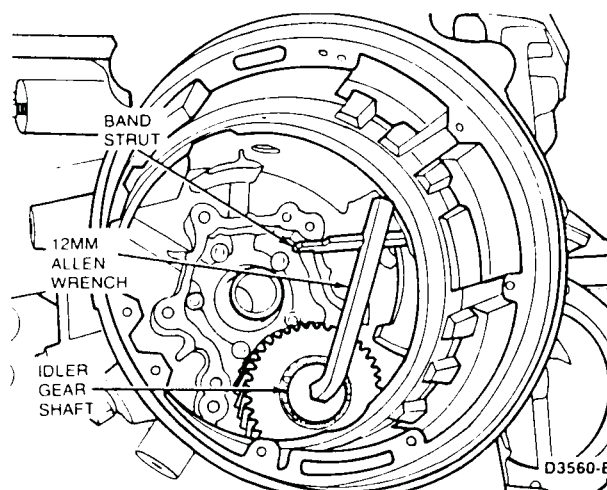


## DISASSEMBLY AND ASSEMBLY (Continued)

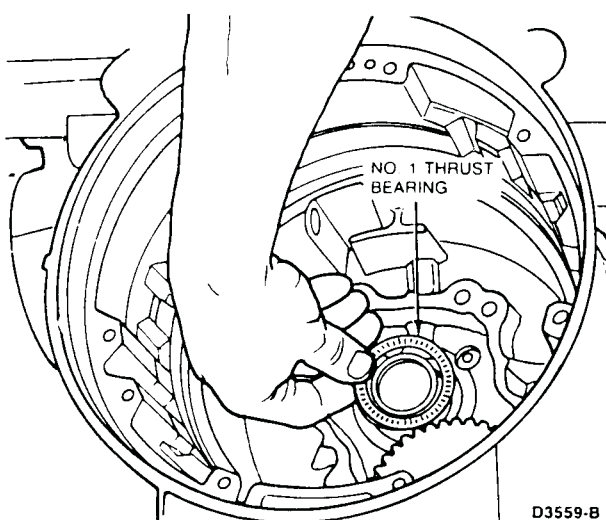
50. Remove input gear caged needle bearing (No. 2 bearing).



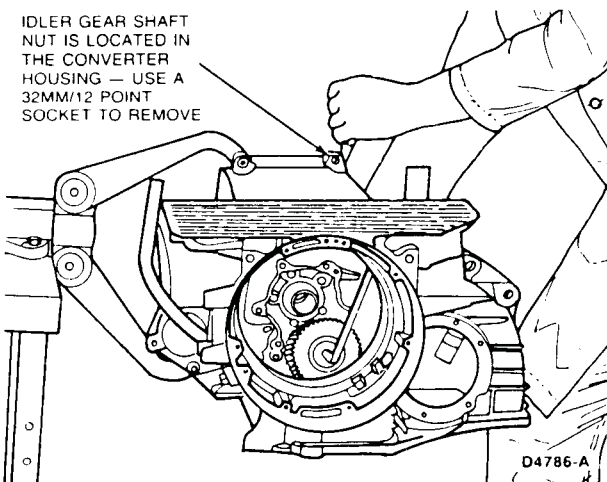
52. Position a 12mm Allen wrench in idler gear shaft and allow wrench to catch on side of case.



51. Remove No. 1 thrust bearing (needle type).



53. With Allen wrench holding idler gear shaft, remove nut from shaft using a 32mm/12 point socket.



54. Tap idler gear shaft with a hammer handle to loosen O-ring seal.

Remove idler gear and shaft from case.

NOTE: Inspect the reactor support for damage or wear. If inspection determines the reactor support to be unserviceable, refer to Reactor Support Removal.

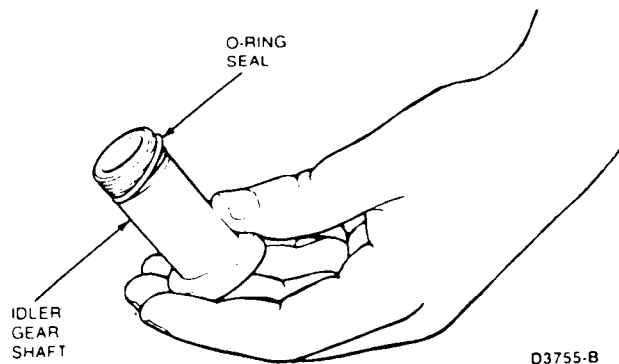


## Technical Service Information

### DISASSEMBLY AND ASSEMBLY (Continued)

#### Assembly

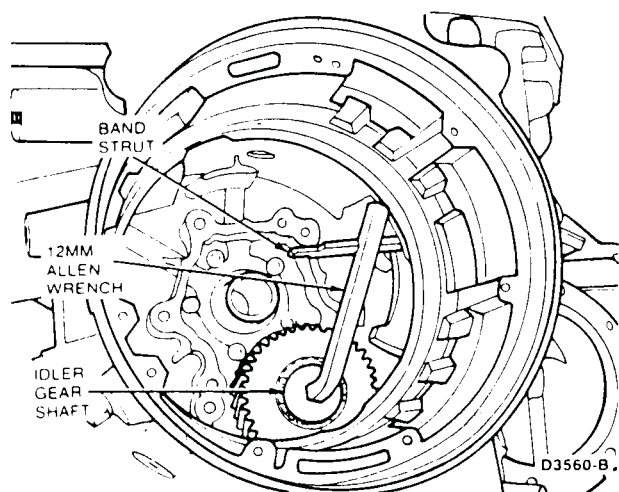
1. Clean threads of idler gear shaft and install a new O-ring.



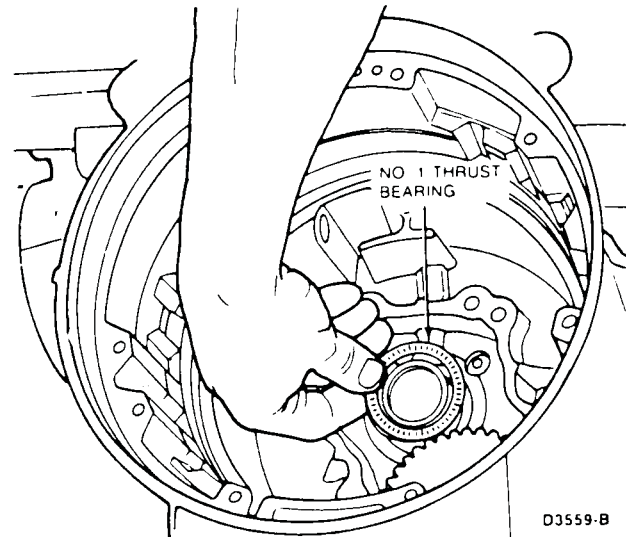
2. Position idler gear and shaft assembly in case.

Install a 12mm Allen wrench in idler gear shaft and bring it around until it catches on the band anchor strut.

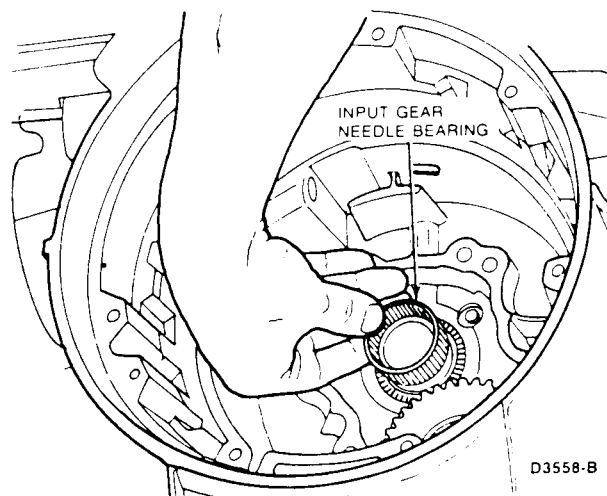
Apply Thread Lock and Sealer E0AZ-19554-A or equivalent, to attaching nut. Install and tighten to 108-136 N·m (80-100 lb-ft) using a 32mm, 12 point socket.



3. Install No. 1 thrust bearing (needle type).

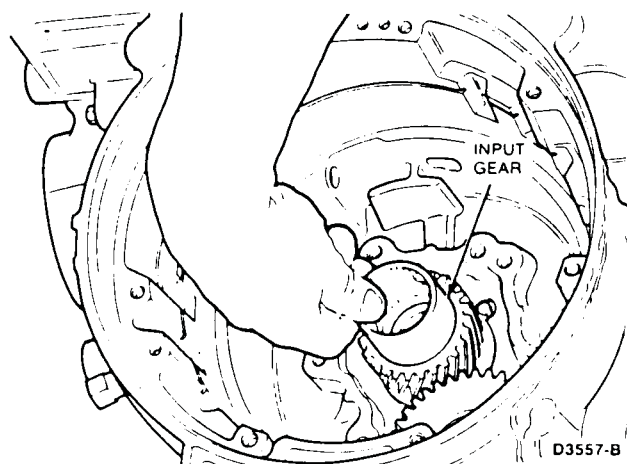


4. Install input gear caged needle bearing (No. 2 bearing).

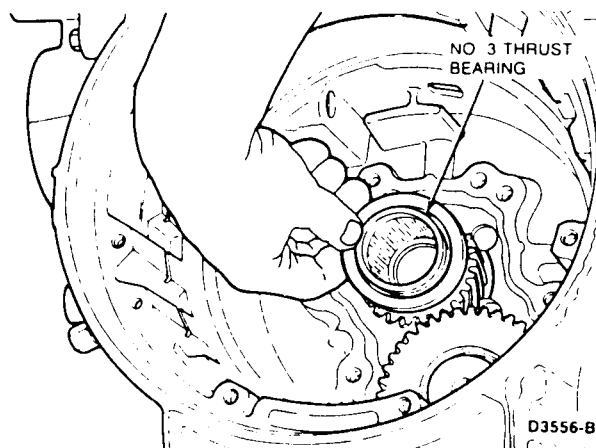


## DISASSEMBLY AND ASSEMBLY (Continued)

5. Install input gear.



6. Install the No. 3 thrust bearing (needle type) on input gear.

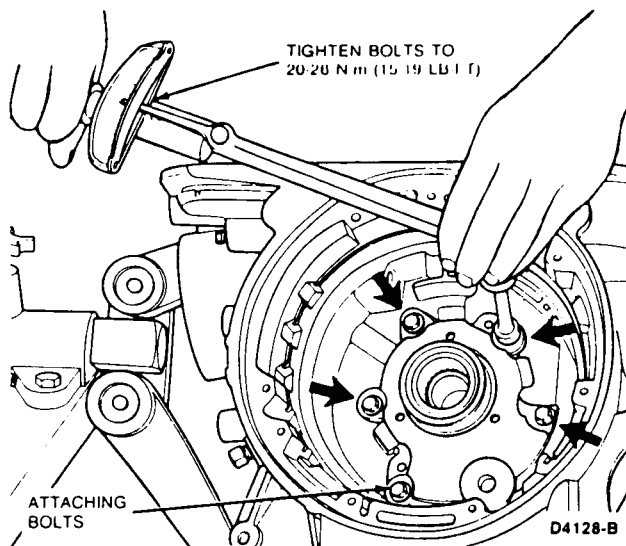


7. Position transfer housing in case making sure it is firmly seated on alignment dowels.

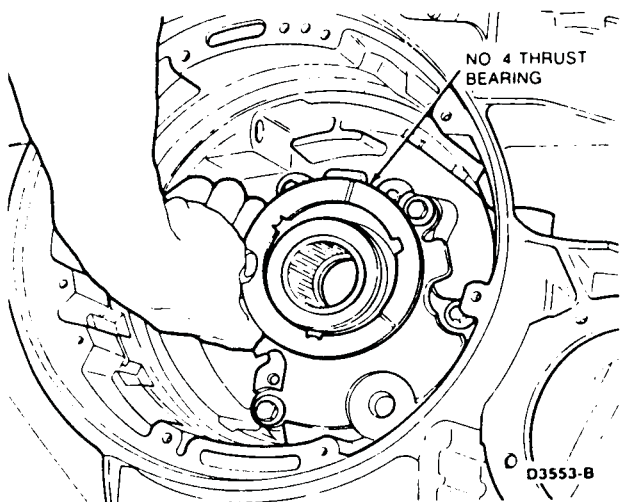
**NOTE:** The transmission case and transfer housing are matched parts. If one is damaged, both must be replaced.

8. Install new transfer housing attaching bolts and tighten to 20-26 N·m (15-19 lb-ft).

**NOTE:** Before installing transfer housing, make sure that the band strut is rotated into its operating position.

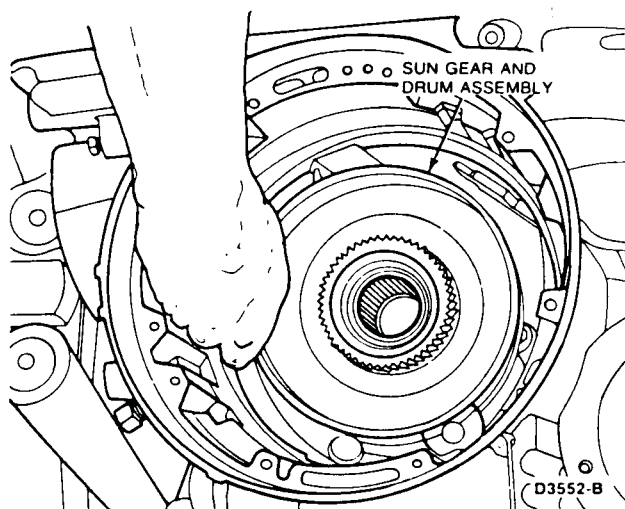


9. Install the No. 4 thrust washer on transfer housing.

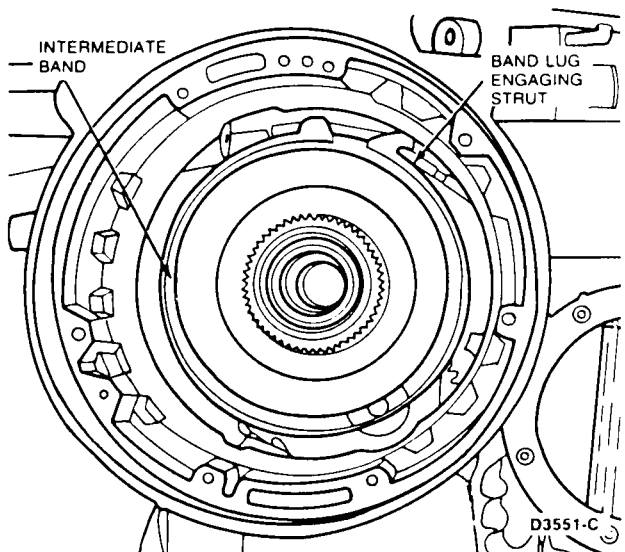


## DISASSEMBLY AND ASSEMBLY (Continued)

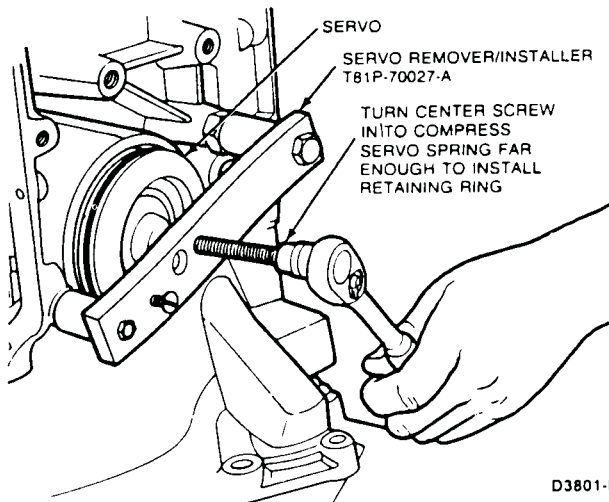
10. Install sun gear and drum assembly.



11. Install intermediate band. Make sure band lug engages strut.



12. Position servo piston in case and install Remover/Installer T81P-70027-A or equivalent. Compress piston spring far enough to allow installation of retaining ring.

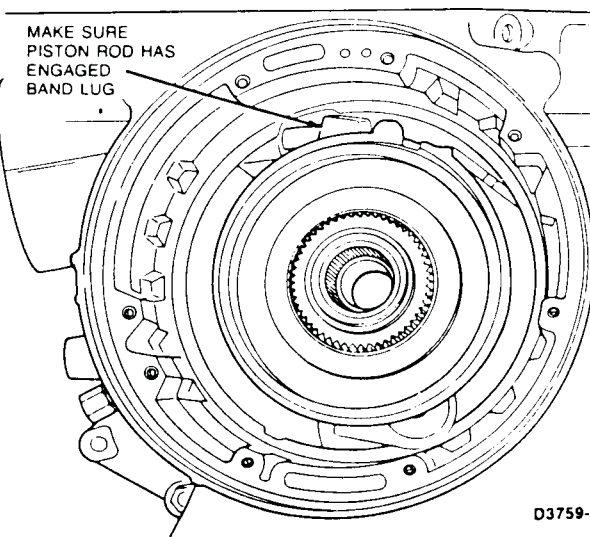


NOTE: If a component(s) listed below has been replaced, refer to the Servo Rod Selection procedure before installing the servo piston:

- Case
- Band
- Servo Rod
- Sun Gear/Shell Assembly
- Anchor Strut

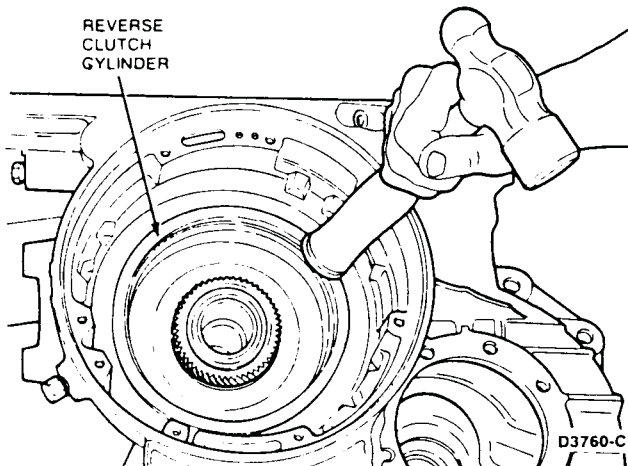
13. Install servo retaining ring.

Before removing tool, make sure piston rod has engaged band lug.

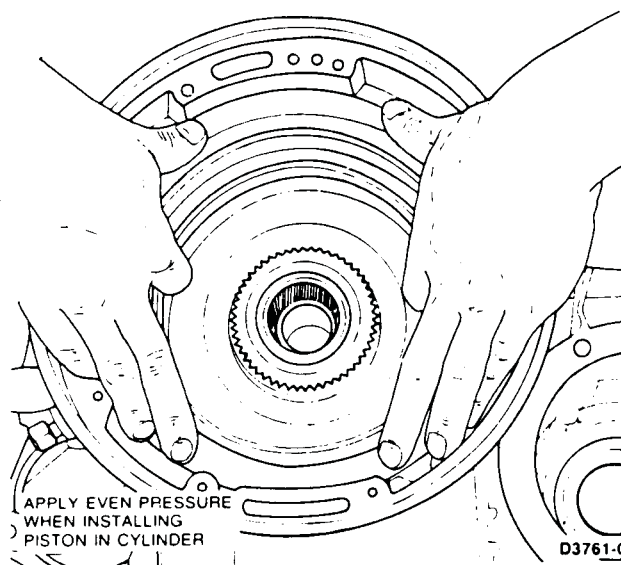


## DISASSEMBLY AND ASSEMBLY (Continued)

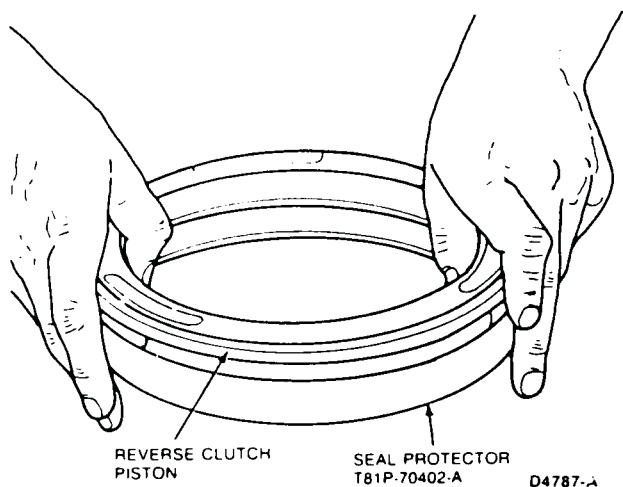
14. Position reverse clutch cylinder in case.  
Tap cylinder into case using a hammer handle.



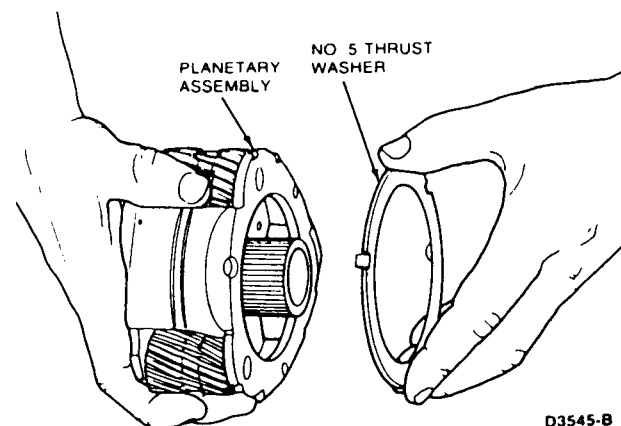
16. Install reverse clutch piston in clutch cylinder using Seal Protector T81P-70402-A or equivalent.



15. Install reverse clutch piston into Seal Protector T81P-70402-A or equivalent.



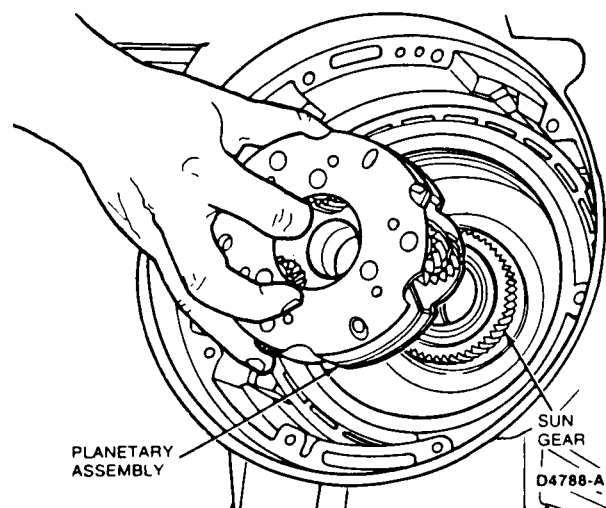
17. Install the No. 5 thrust washer on planetary assembly. Petroleum jelly can be used to hold washer in position.



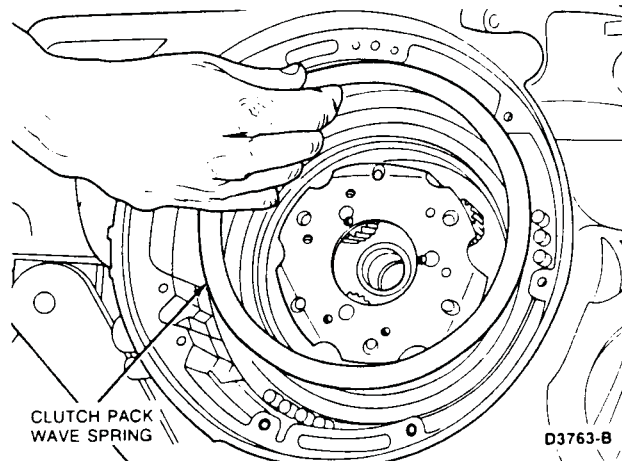


## DISASSEMBLY AND ASSEMBLY (Continued)

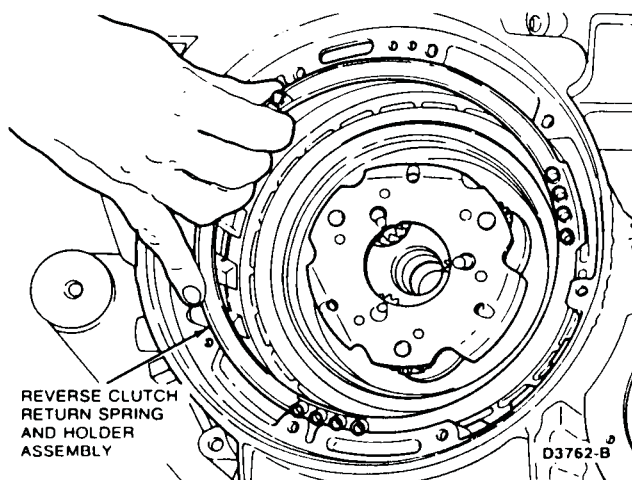
18. Install planetary on sun gear.



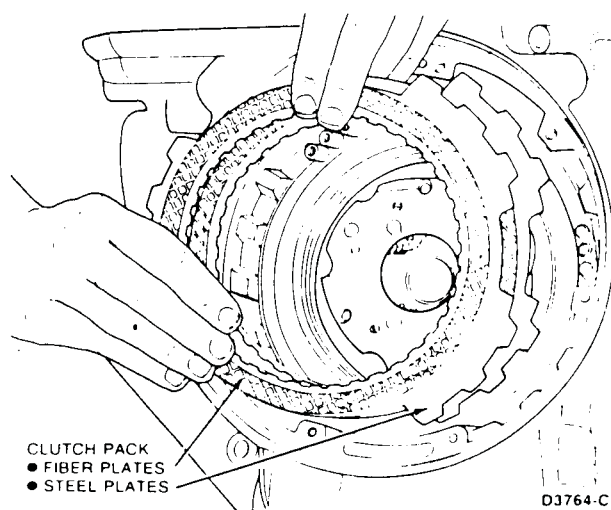
20. Install clutch pack wave spring.



19. Install reverse clutch return spring and holder assembly.



21. Install clutch pack.

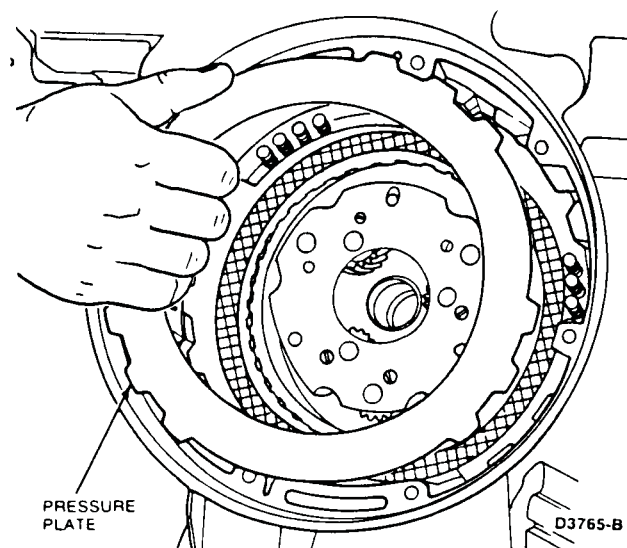




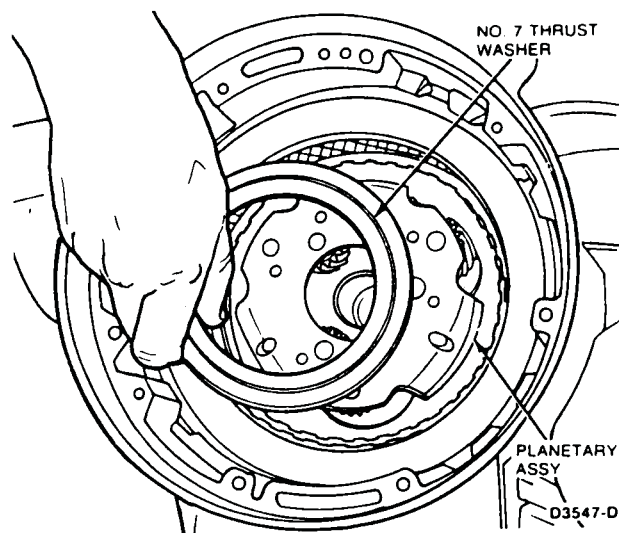
## Technical Service Information

### DISASSEMBLY AND ASSEMBLY (Continued)

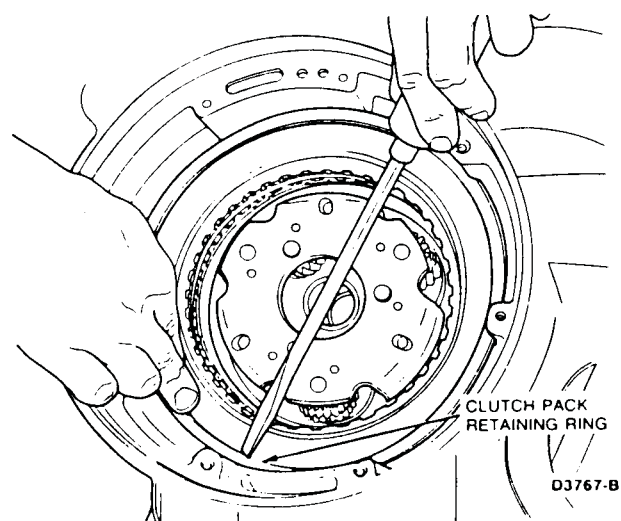
22. Install pressure plate.



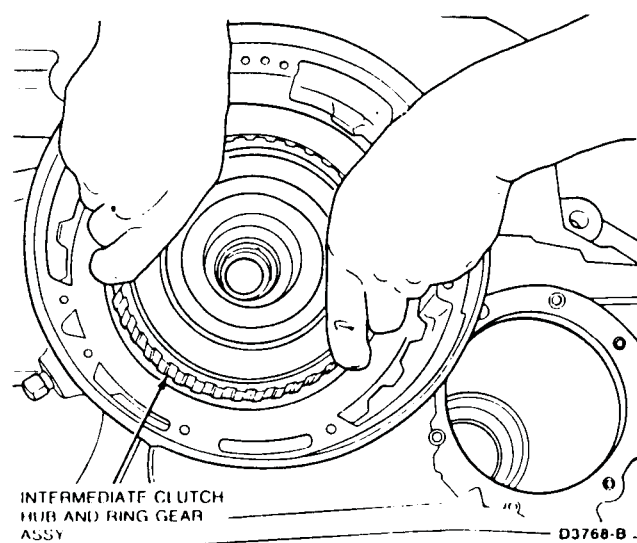
24. Install No. 7 thrust washer on planetary assembly.



23. Install clutch pack retaining ring and check clearance between clutch retaining ring and pressure plate. Refer to Sub Assemblies, Intermediate Clutch, Assembly, Step 10.



25. Install intermediate clutch hub and ring gear assembly.



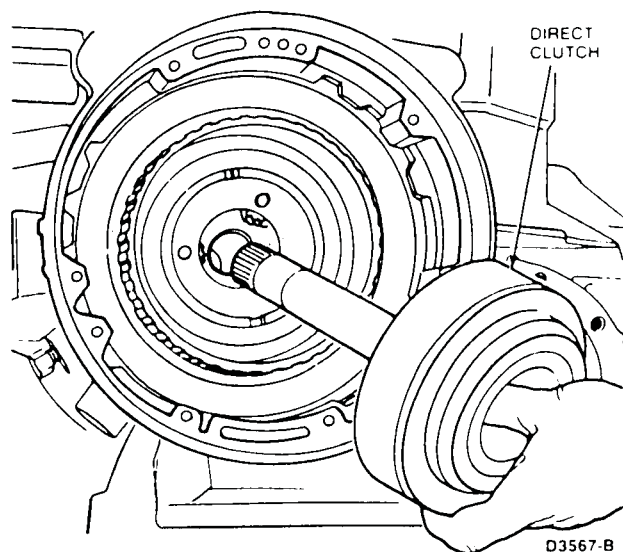




## Technical Service Information

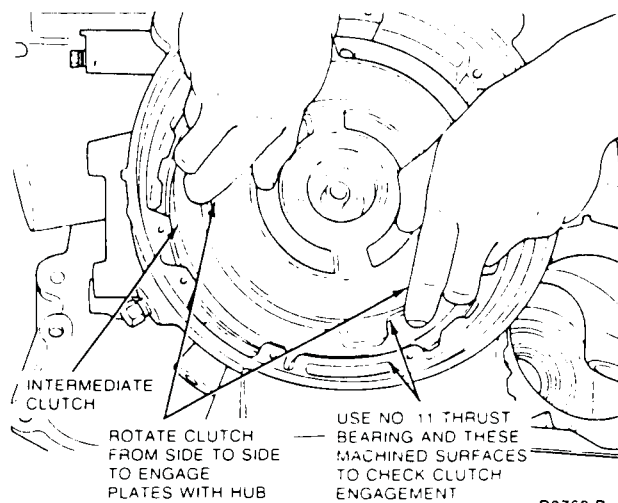
### DISASSEMBLY AND ASSEMBLY (Continued)

26. Install direct clutch.

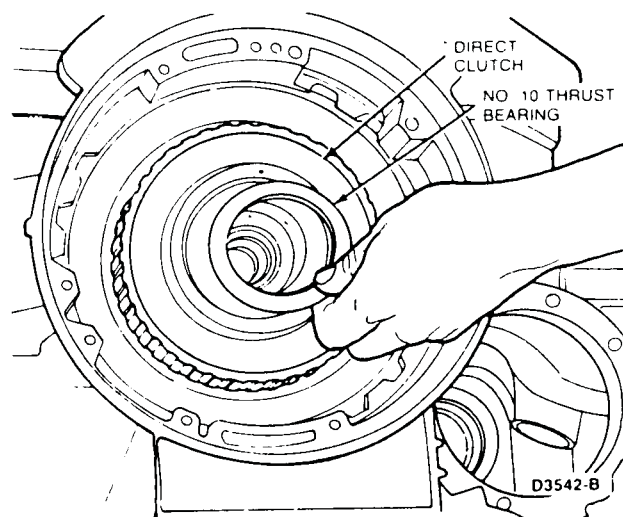


28. Install intermediate clutch.

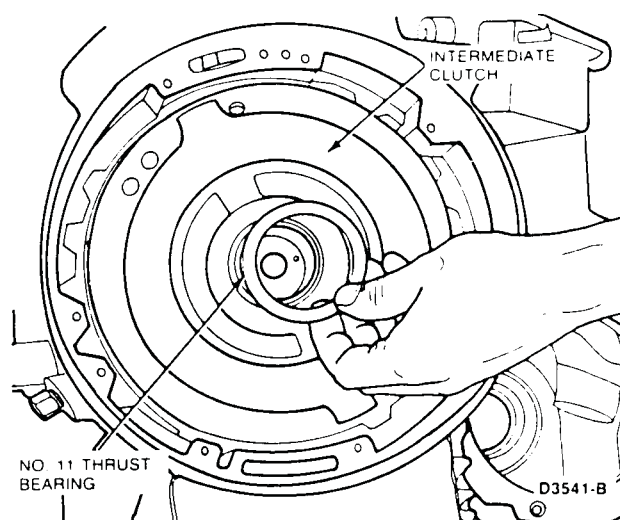
To check clutch for proper engagement, use No. 11 thrust bearing. Position bearing on one of machined tabs and push it up against case. If bearing is flush with or slightly below machined pump housing surface, the clutch is fully engaged.



27. Install No. 10 thrust bearing (needle type).

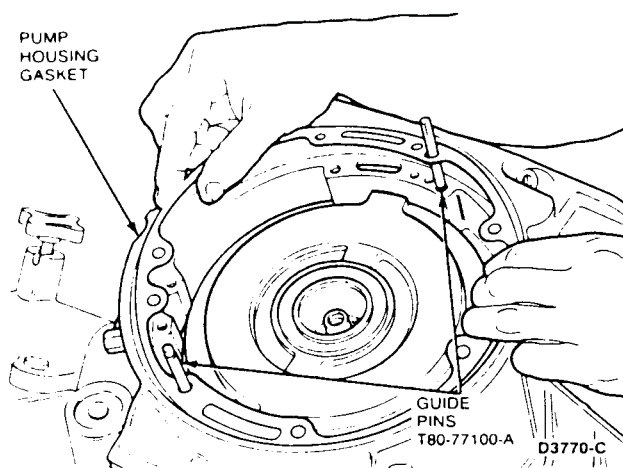


29. Install No. 11 thrust bearing (needle type).



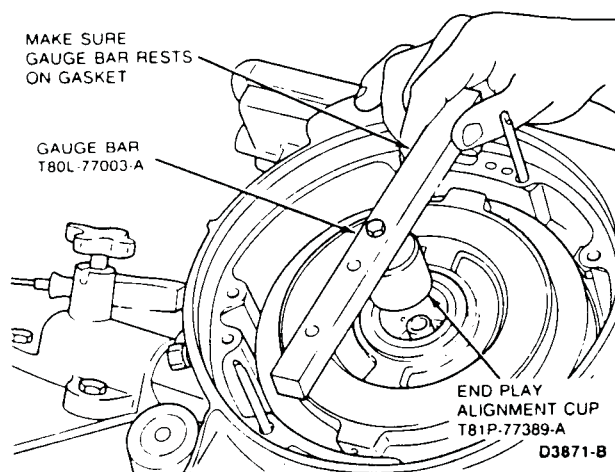
## DISASSEMBLY AND ASSEMBLY (Continued)

30. Install Guide Pins T80L-77100-A or equivalent, and pump housing gasket.

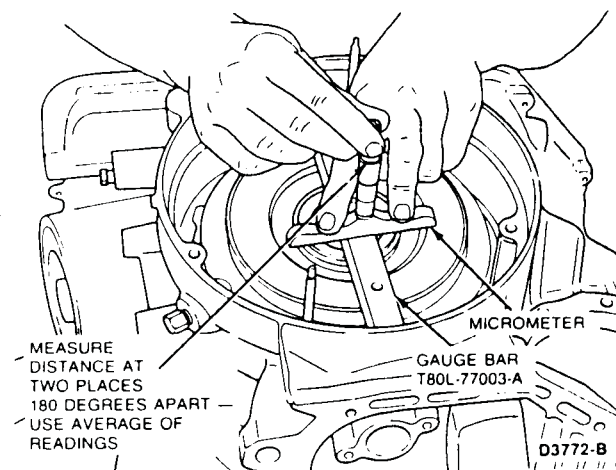


31. If necessary, bolt End Play Alignment Cup T81P-77389-A to Gauge Bar T80L-77003-A or equivalent.

Position assembled tool in the intermediate clutch.



32. Using a micrometer, measure the distance from the top of the gauge bar to the top of the No. 11 thrust bearing. Make the measurement at two places 180 degrees apart and use average.



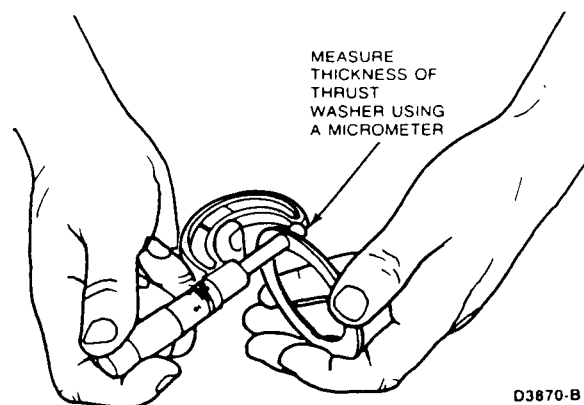
From the micrometer reading, choose the correct thickness from the Thrust Washer Selection Chart.

THRUST WASHER SELECTION CHART

For This Reading	Use This Washer Part ID
2.00-1.77mm (0.079-0.070 inch)	AA
2.20-2.00mm (0.087-0.079 inch)	BA
2.41-2.20mm (0.087-0.079 inch)	CA
1.77-1.46mm (0.070-0.057 inch)	EA

CD3890-B

NOTE: If the thrust washer thickness is not known, measure its thickness using a micrometer.



## DISASSEMBLY AND ASSEMBLY (Continued)

Then identify the washer using the Thrust Washer Thickness Chart.

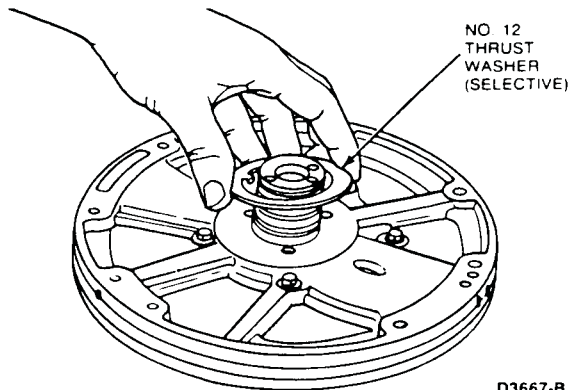
THRUST WASHER THICKNESS CHART

Thickness		ID
MM	Inch	
1.40-1.45	(.055-.057)	AA
1.60-1.65	(.063-.065)	BA
1.80-1.85	(.071-.073)	CA
1.15-1.20	(.045-.047)	EA

CD3891-B

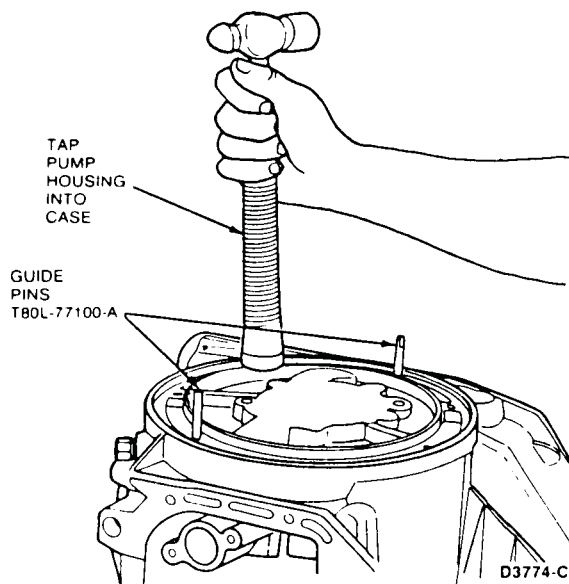
33. Install correct selective thrust washer (No. 12) on pump.

NOTE: Petroleum jelly can be used to hold washer in position.



D3667-B

34. Position pump in case and tap into place using a hammer handle.

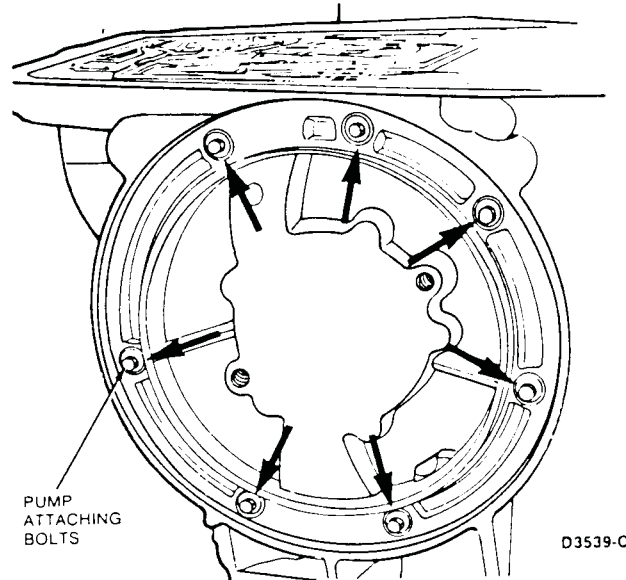


D3774-C

35. Remove alignment pins and install seven pump attaching bolts and sealing washers.

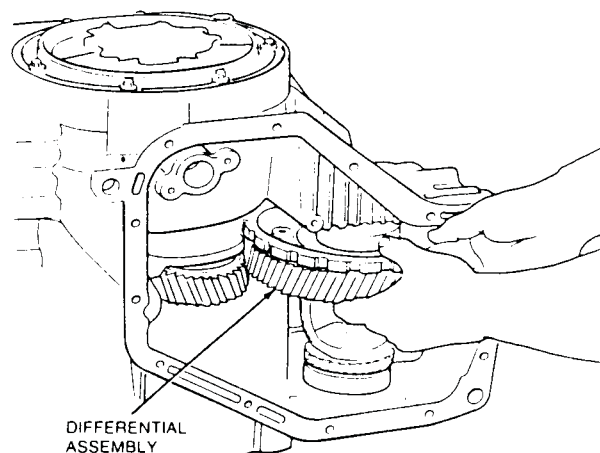
**CAUTION:** The washers provide the bolt seal and must not be substituted. Failure to use the sealing washers may result in a transaxle fluid leak.

Tighten bolts to 9-12 N·m (7-9 lb-ft).



D3539-C

36. Install differential assembly.



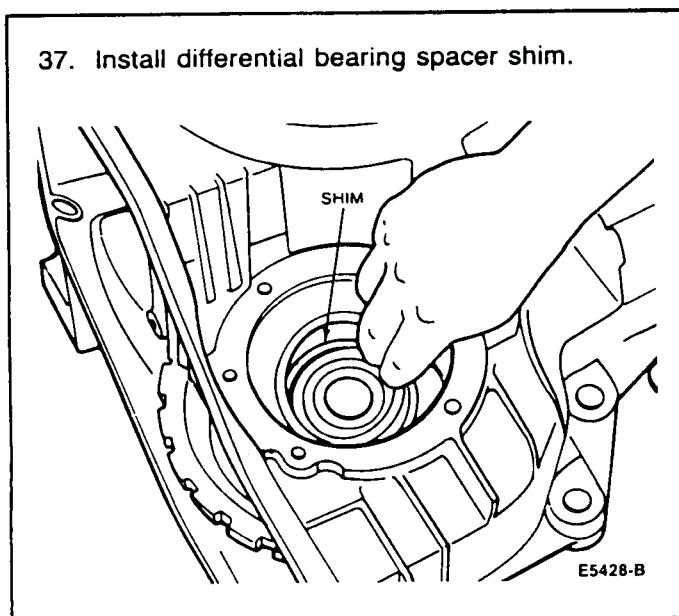
D4505-B



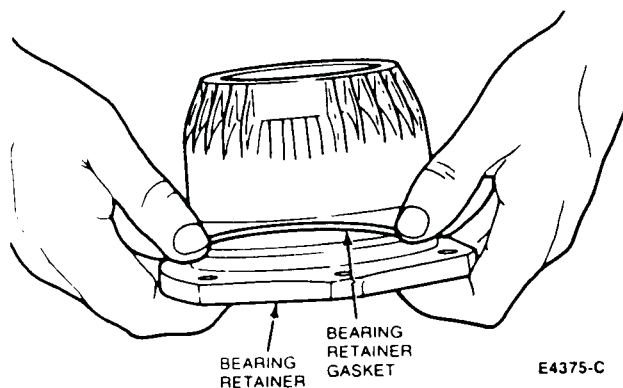
## Technical Service Information

### DISASSEMBLY AND ASSEMBLY (Continued)

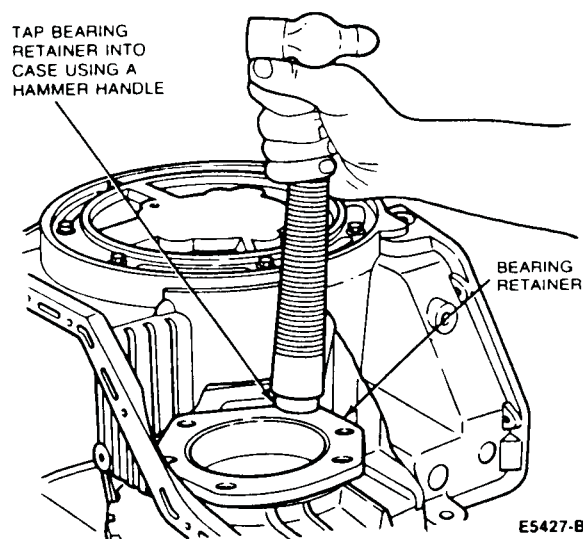
37. Install differential bearing spacer shim.



38. Install a new gasket on differential retainer.



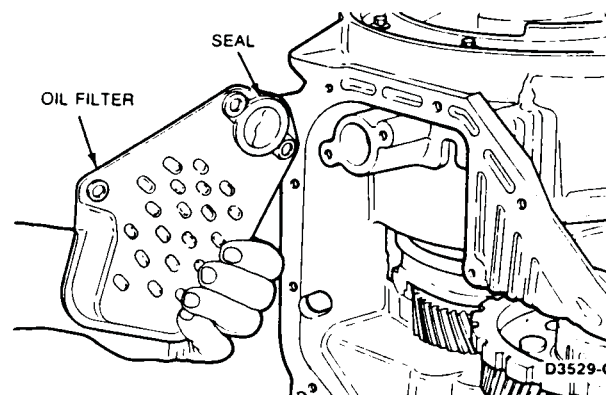
Position retainer in case. Tap retainer into case using a hammer handle.



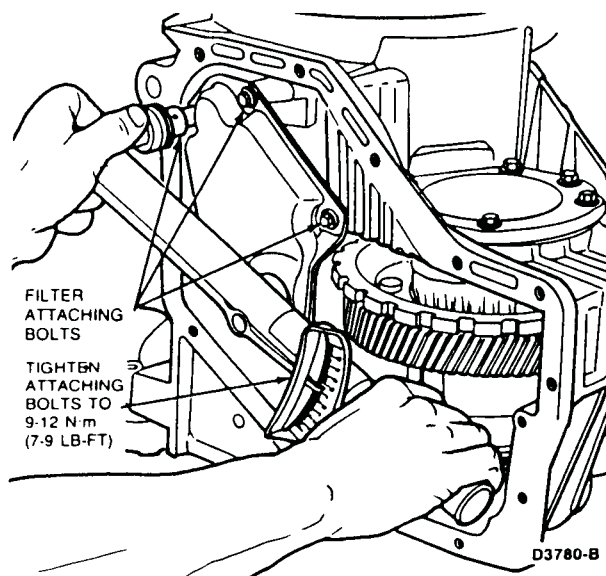
39. Apply Thread-Lock Sealer E0AZ-19554-A or equivalent to threads of bearing retainer attaching bolts.

Install bolts and tighten to 20-26 N·m (15-19 lb-ft).

40. Position a new seal on filter and install filter.



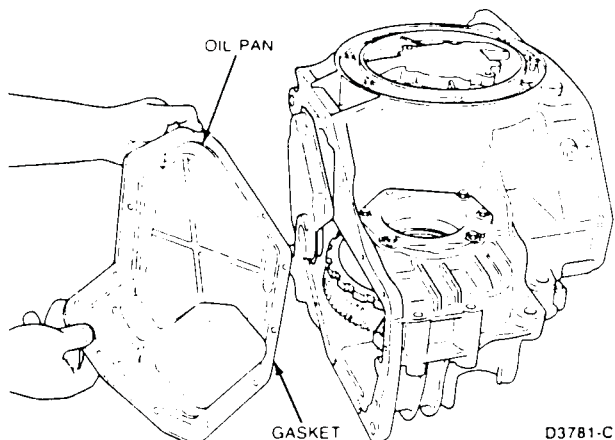
Install filter attaching bolts and tighten to 9-12 N·m (7-9 lb-ft).



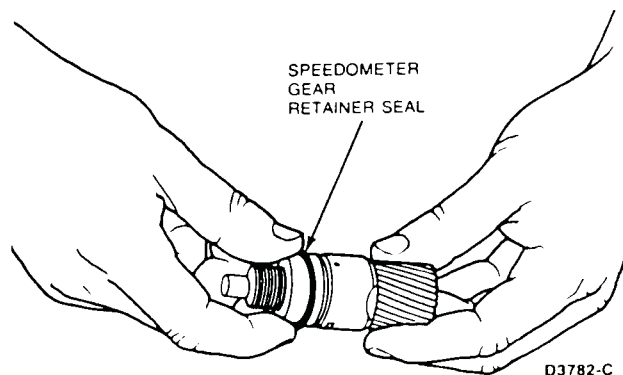
## DISASSEMBLY AND ASSEMBLY (Continued)

41. Install oil pan using a new gasket.

Install oil pan attaching bolts and tighten to 20-26 N·m (15-19 lb-ft).

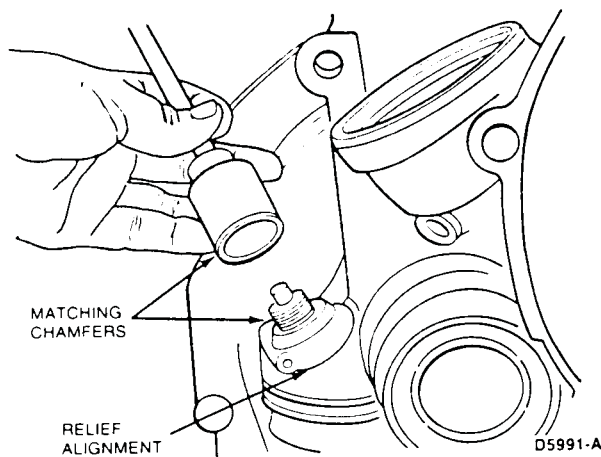


42. Install a new seal on speedometer gear retainer.



43. Install speedometer gear retainer in case as follows:

- Lightly lubricate O-ring seal on speedometer gear retainer with Speedometer Cable Lubricant D2AZ-19581-A or equivalent.
- Align relief in retainer with retaining pin hole in case.

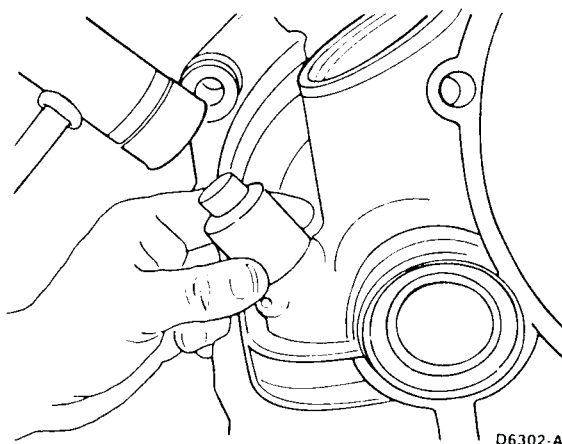


**CAUTION:** Tapping directly on the speedometer gear assembly may cause damage to the plastic driven gear.

- Place socket required for installation and removal of engine oil pressure sending unit on gear and retainer assembly.

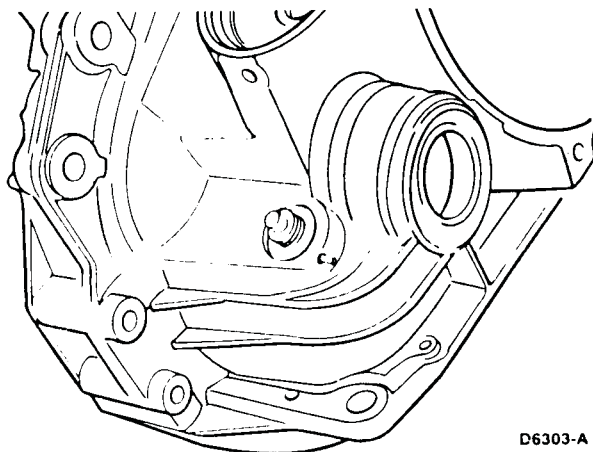
**NOTE:** The socket size and chamfer matches the case bore. Failure to use the recommended socket will affect retainer position, causing potential repeat service.

- Tap socket until it makes contacts against case bore.

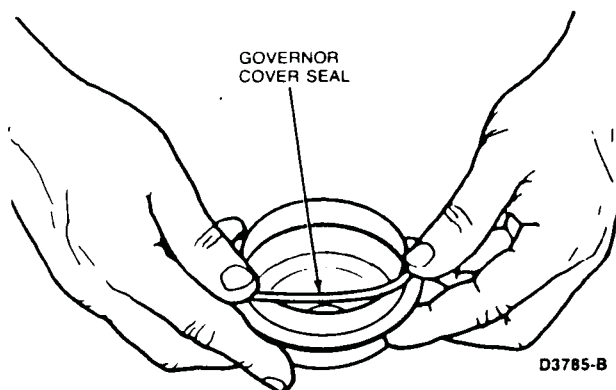


## DISASSEMBLY AND ASSEMBLY (Continued)

- e. Verify that retainer has maintained alignment with retaining pin hole.
- f. Tap retaining pin into case.

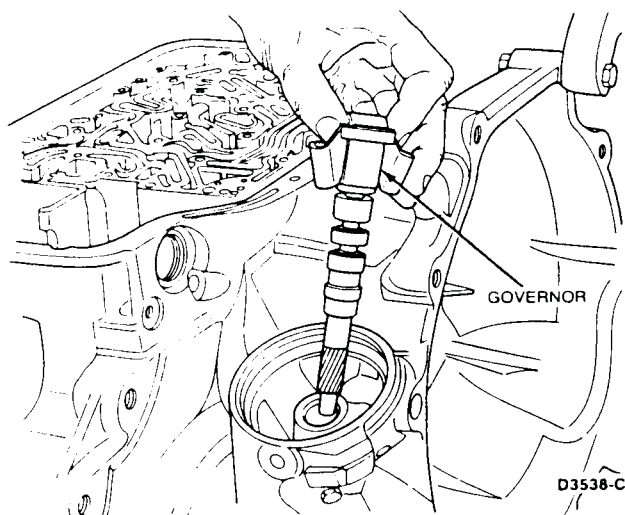


45. Install a new seal on governor cover and position cover on case.



44. Install governor.

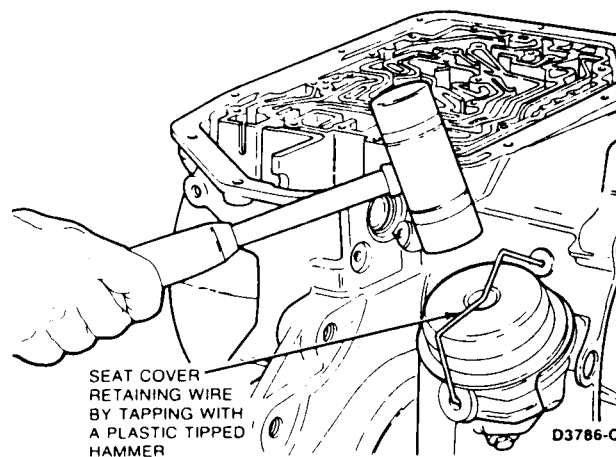
NOTE: Inspect governor gear for wear prior to installation.



46. Tap governor cover with a plastic tipped hammer to seat in case.

NOTE: Tap near outer edge to avoid cracking plastic cover.

47. Install cover retaining wire.





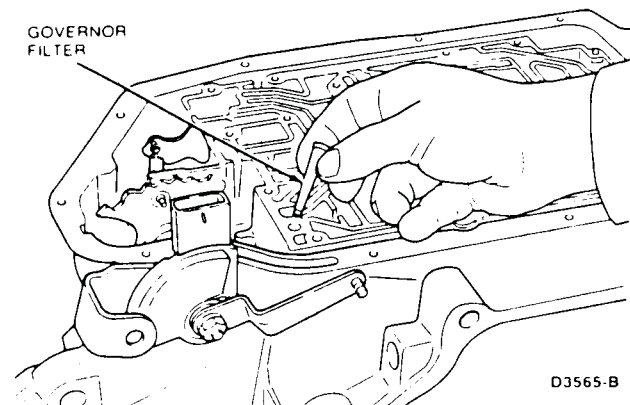


## Technical Service Information

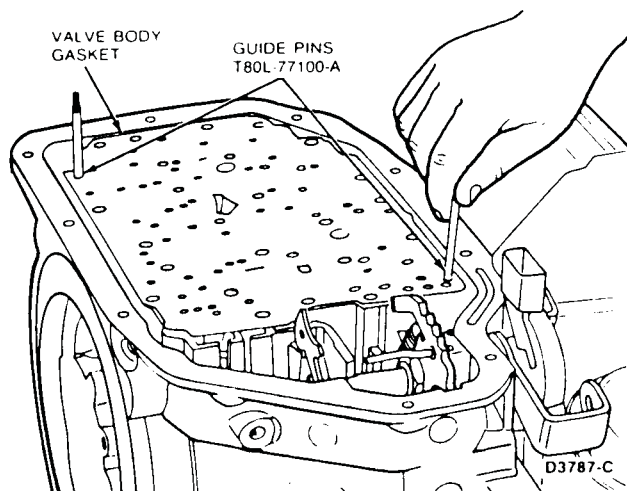
### DISASSEMBLY AND ASSEMBLY (Continued)

#### 48. Install governor filter.

Make sure filter is clean before installing.



#### 49. Position valve body gasket on case and install Guide Pins T80L-77100-A or equivalent to hold gasket in position.



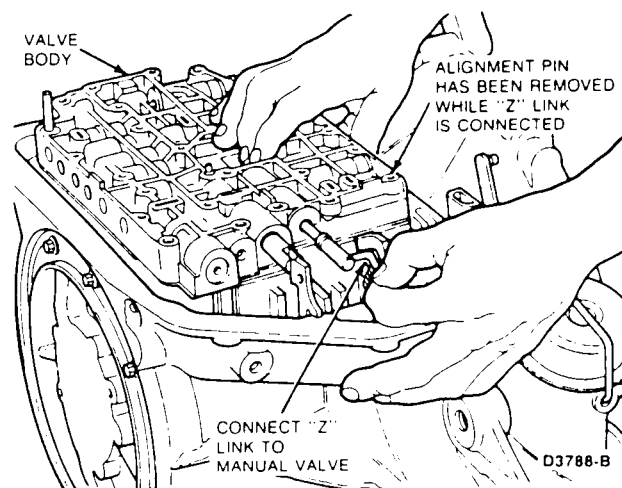
#### 50. Install valve body.

Connect throttle valve control spring to separator plate. The spring stretches from inner lever cam to separator plate.

Install Z-link in manual valve while positioning valve body on case.

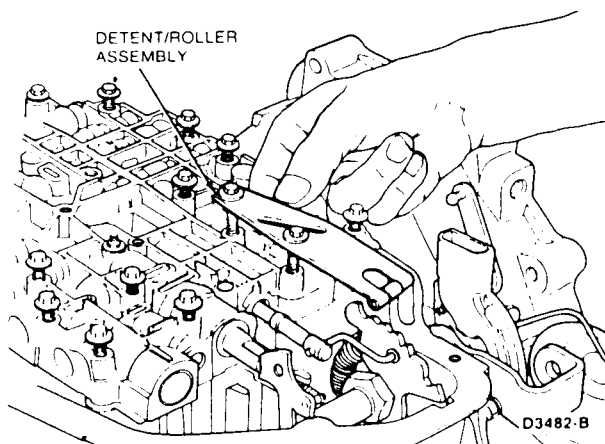
NOTE: One alignment pin has to be removed to allow the Z-link to be installed in the manual valve.

Make sure roller on end of throttle valve plunger has engaged cam on end of throttle lever shaft.



#### 51. Install alignment pin removed in Step 50.

#### 52. Install detent spring and roller assembly.

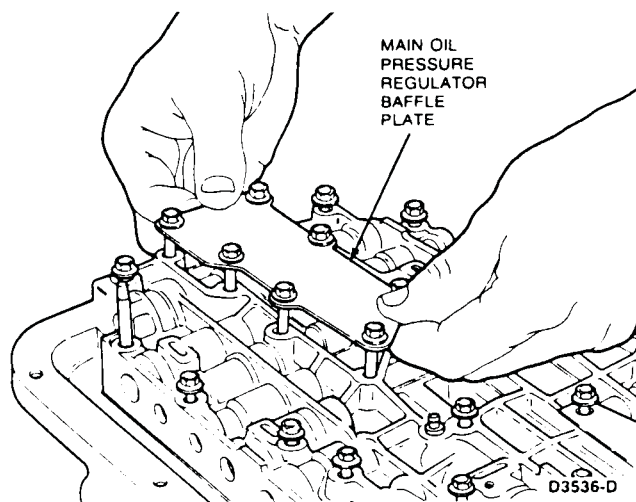




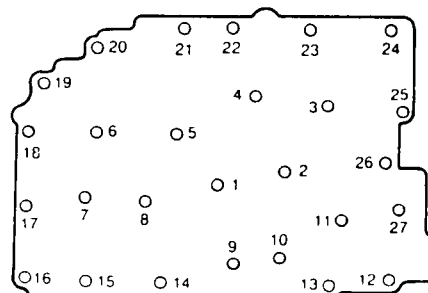
## DISASSEMBLY AND ASSEMBLY (Continued)

53. Install main oil pressure regulator baffle plate.

NOTE: The main oil pressure regulator plate uses longer attaching bolts.



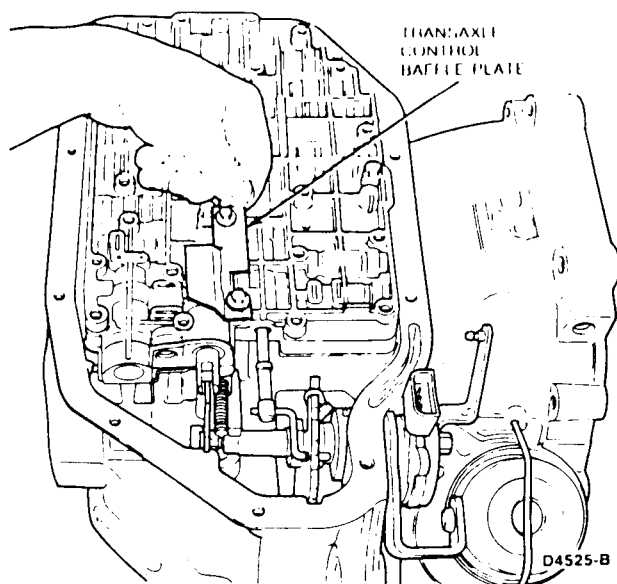
55. Tighten valve body attaching bolts to 8-11 N·m (72-96 lb-in) in the sequence shown.



FROM PUMP SIDE OF CASE

D3483-B

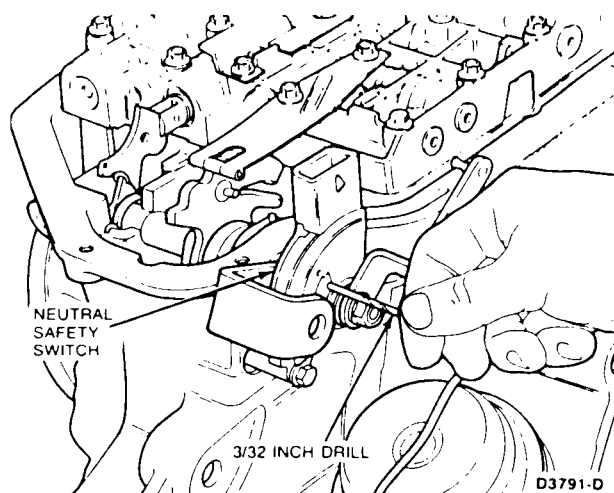
54. Install transaxle control baffle plate.



56. If necessary, loosen neutral safety switch attaching bolts.

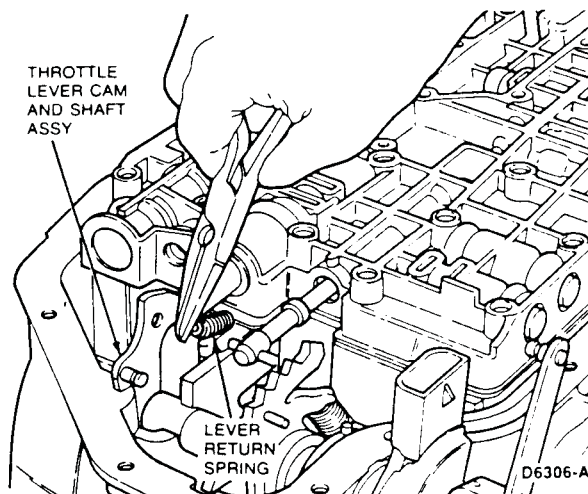
With manual valve in neutral position, insert a No. 43 drill (.089 inch) through neutral safety switch. Push drill through switch until it seats against case.

Tighten switch attaching bolts to 9-12 N·m (7-9 lb-ft) and remove drill.

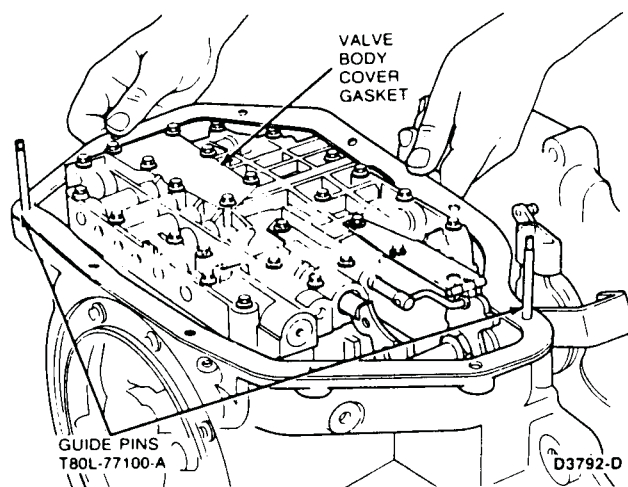


## DISASSEMBLY AND ASSEMBLY (Continued)

57. Connect throttle lever return spring to spring anchor on throttle lever cam assembly and exposed hole extending from separator plate of valve body assembly.



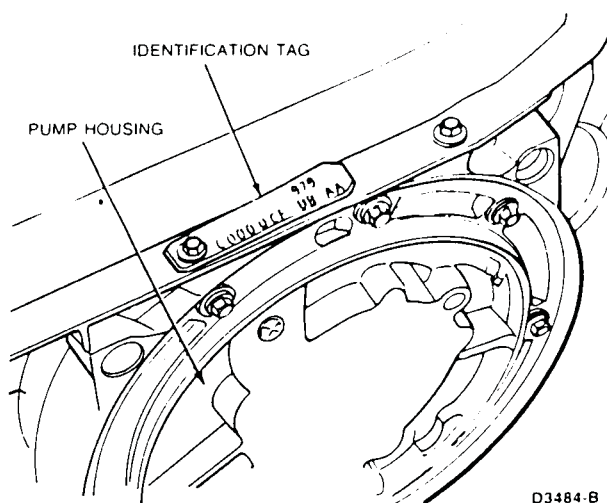
58. Install Guide Pins T80L-77100-A or equivalent, and a new valve body cover gasket.



59. Install valve body cover and cover attaching bolts.

NOTE: Make sure transmission identification tag is installed in the position shown.

60. Tighten valve body cover attaching bolts to 9-12 N·m (7-9 lb-ft).

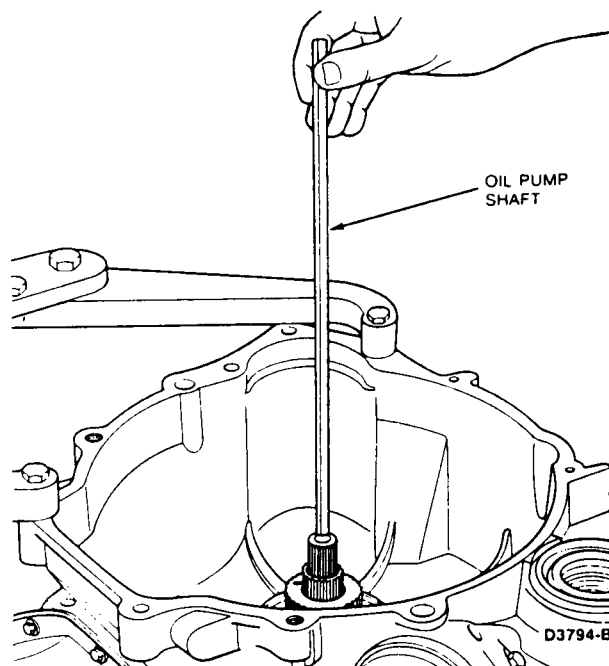




## Technical Service Information

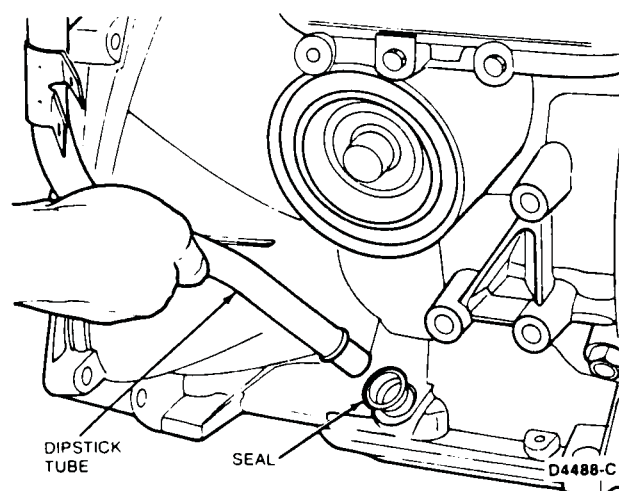
### DISASSEMBLY AND ASSEMBLY (Continued)

61. Install oil pump shaft.

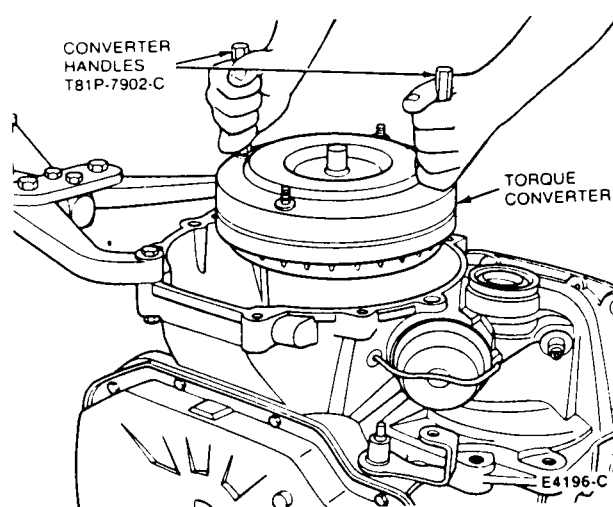


62. Install a new seal on fluid level dipstick tube and install tube in case.

Tighten tube attaching bolts to 9-12 N·m (7-9 lb-ft).



63. Install torque converter using Converter Handles T81P-7902-C or equivalent.



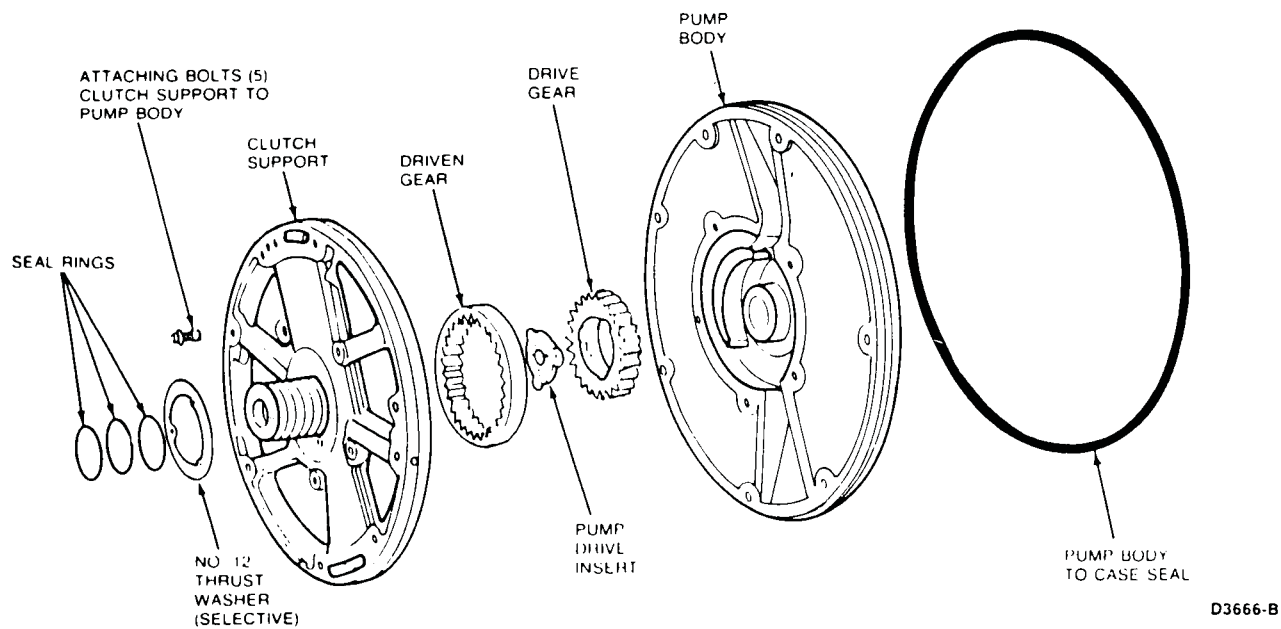


## Technical Service Information

### DISASSEMBLY AND ASSEMBLY (Continued)

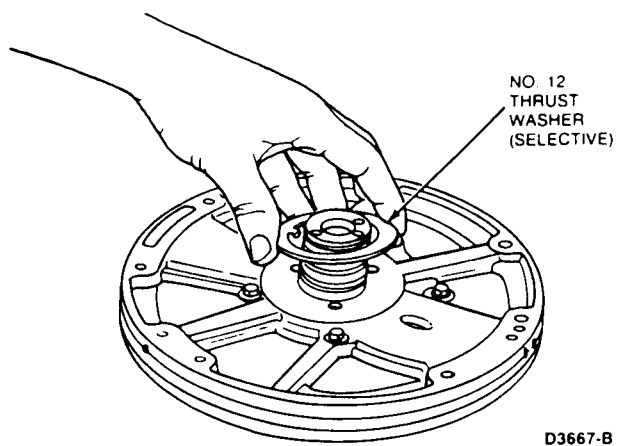
#### Sub-Assemblies

#### Pump

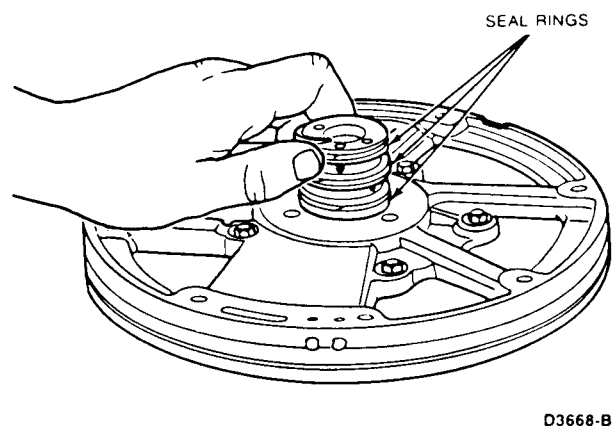


#### Disassembly

1. Remove No. 12 thrust washer (selective).

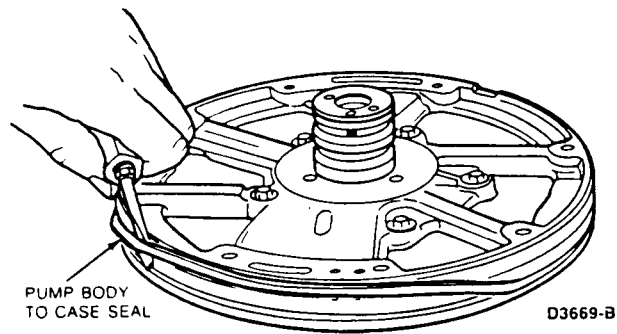


2. Remove seal rings from clutch support.

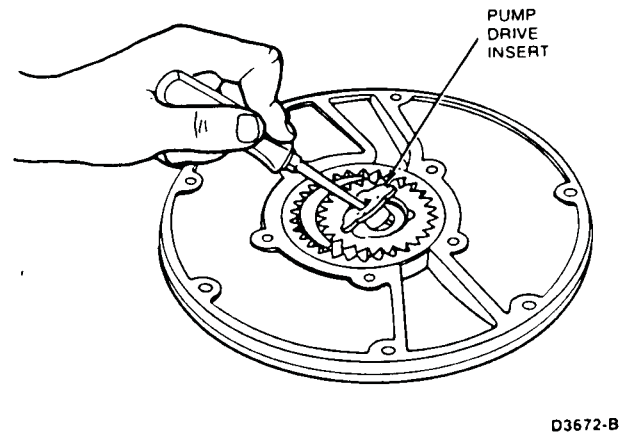


## DISASSEMBLY AND ASSEMBLY (Continued)

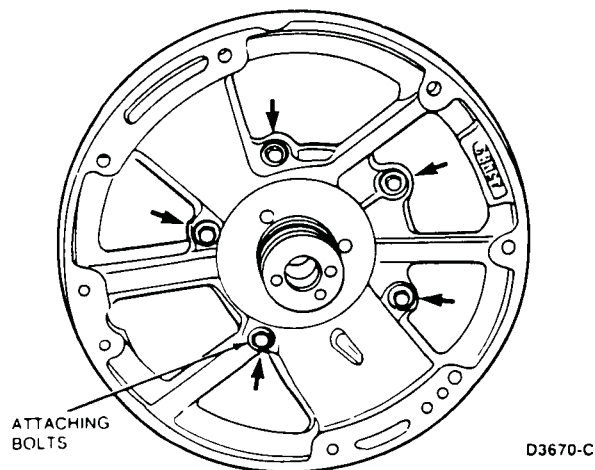
3. Remove pump to case seal.



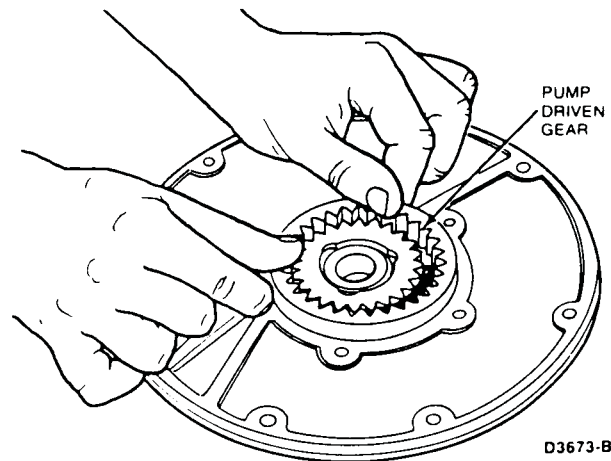
6. Remove insert from pump drive gear.



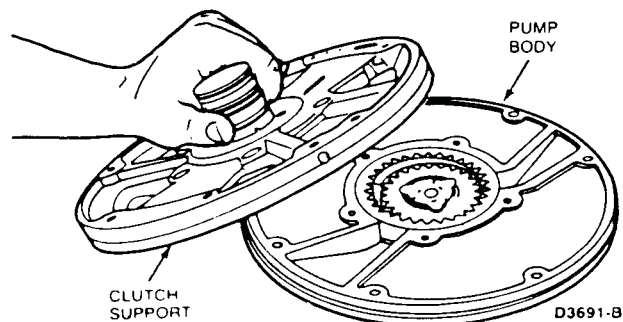
4. Remove five clutch support-to-pump body attaching bolts.



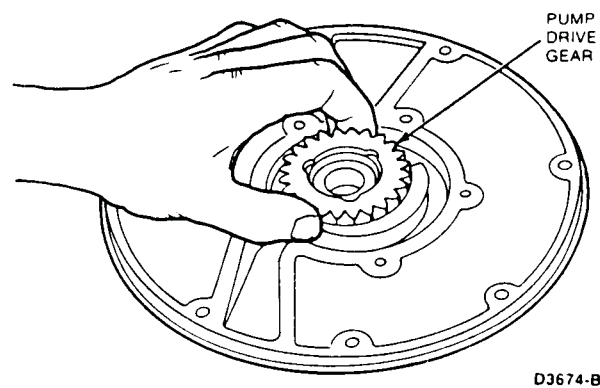
7. Remove pump driven gear.



5. Remove clutch support from pump body.



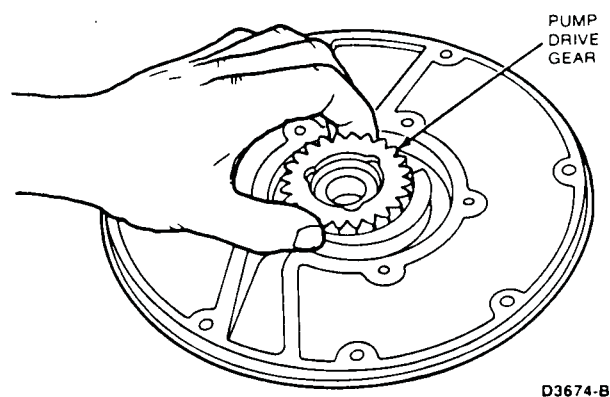
8. Remove pump drive gear.



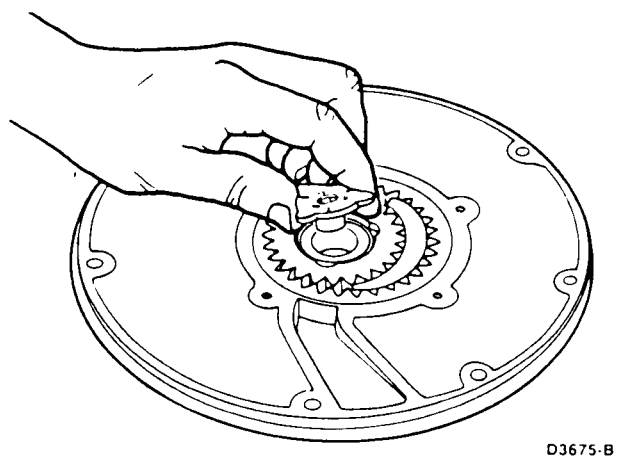
## DISASSEMBLY AND ASSEMBLY (Continued)

### Assembly

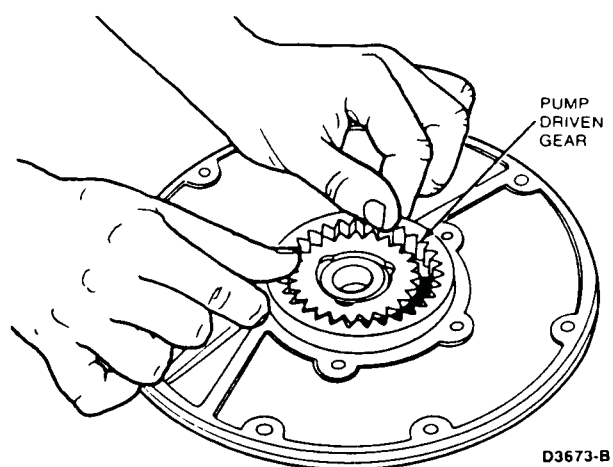
1. Install pump drive gear.



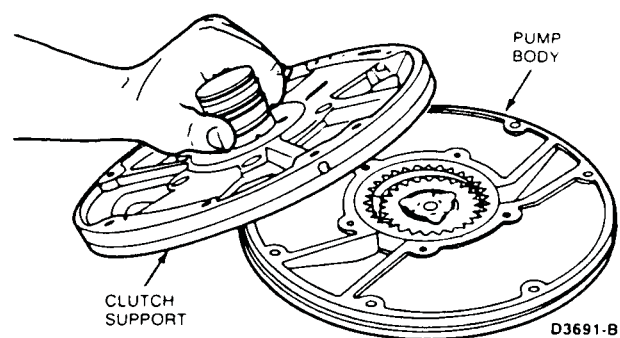
3. Install pump drive insert.



2. Install pump driven gear.



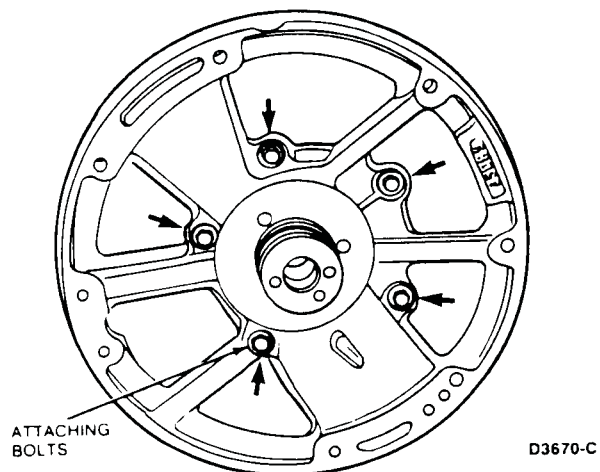
4. Position clutch support on pump body.



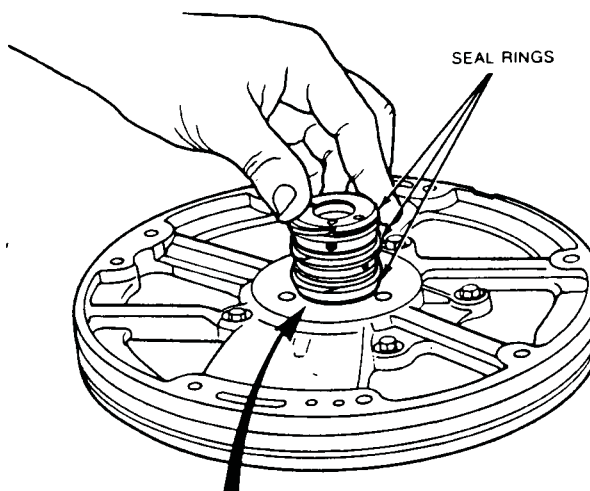


## DISASSEMBLY AND ASSEMBLY (Continued)

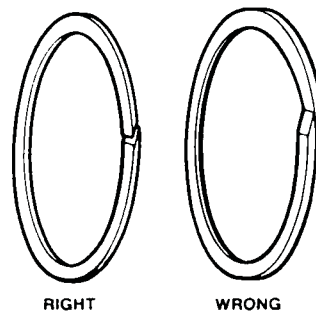
5. Install five clutch support-to-pump body attaching bolts and tighten to 8-11 N·m (6-8 lb-ft).



7. Install seal rings.

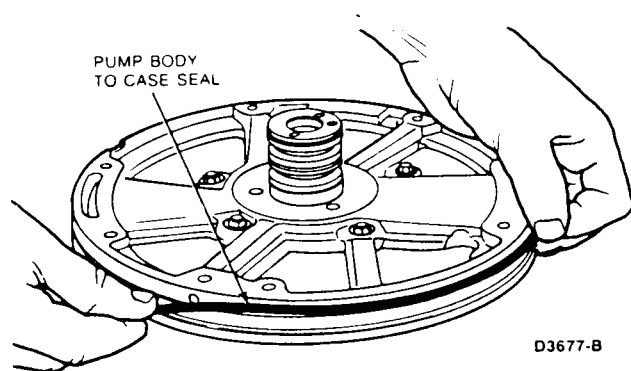


NOTE: SCARF CUT SEALS MUST OVERLAP AS SHOWN

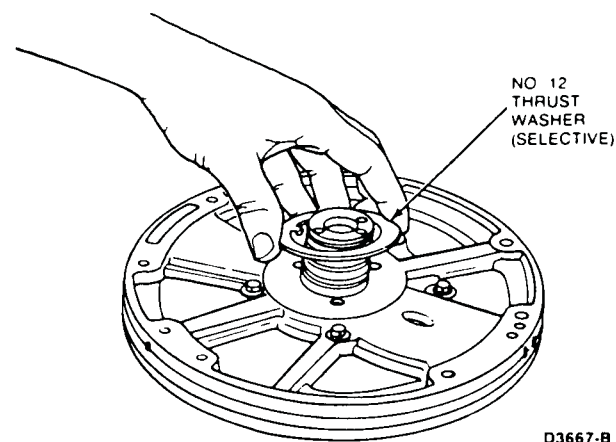


D3678-B

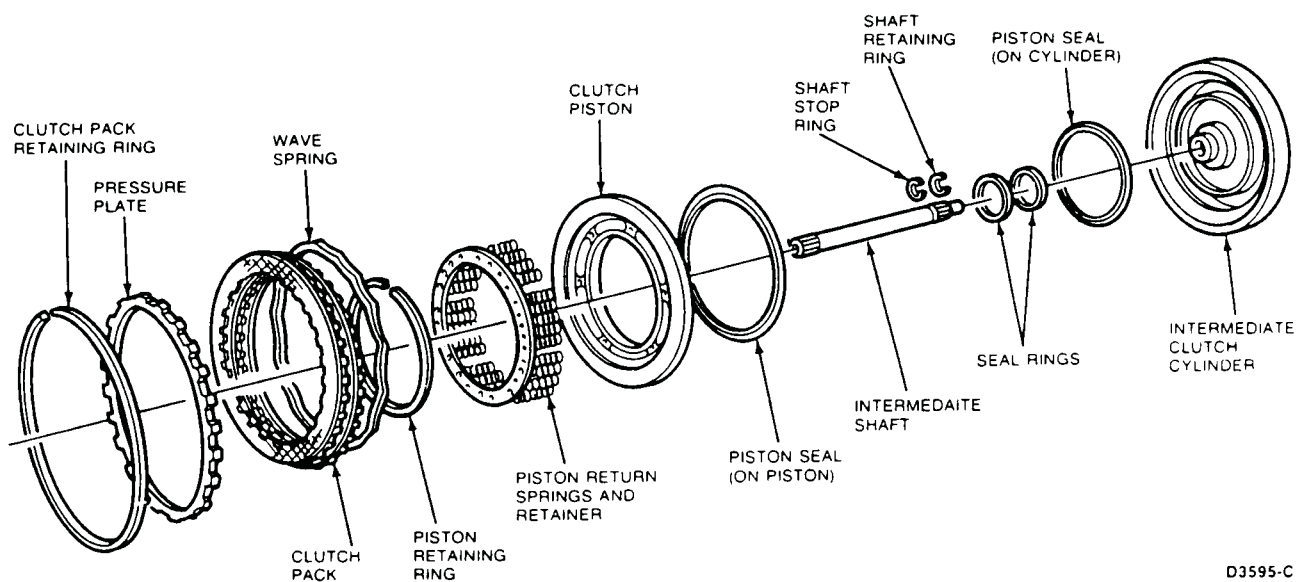
6. Install a new pump body to case seal.



8. Install the No. 12 thrust washer (selective).

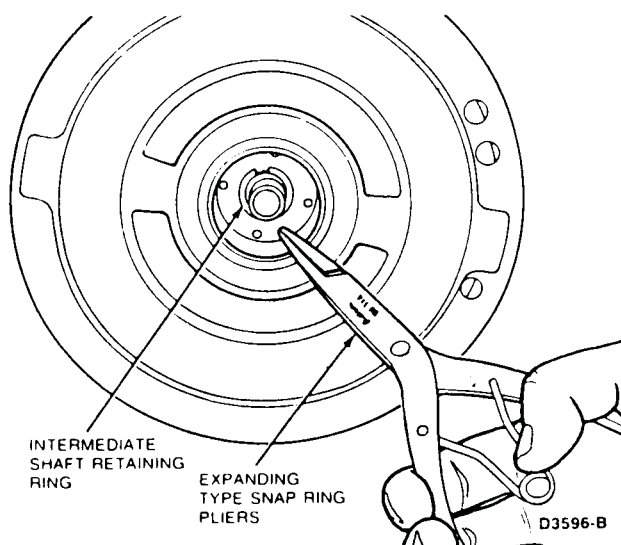


### Intermediate Clutch

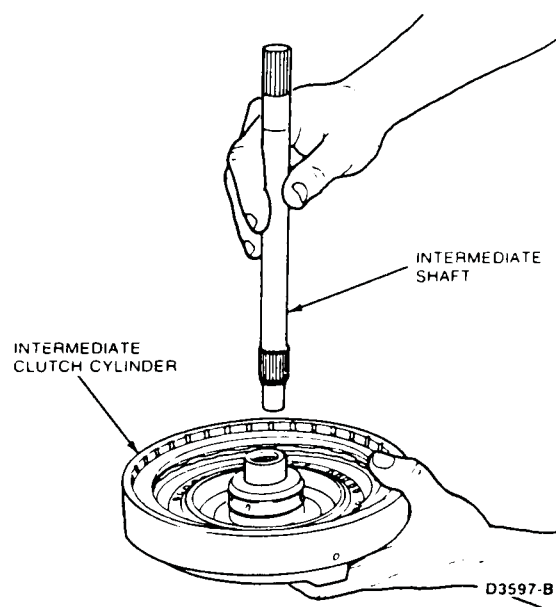


### Disassembly

1. Using expanding type snap ring pliers, remove intermediate shaft retaining ring.

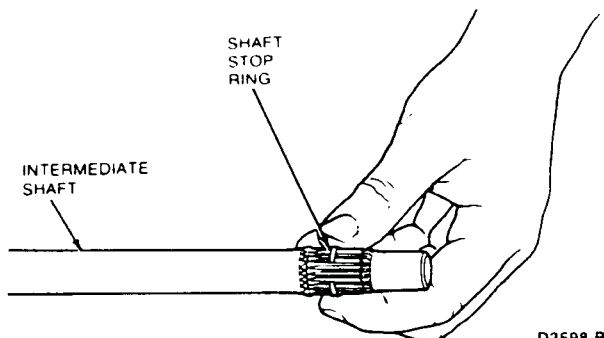


2. Remove intermediate shaft from intermediate clutch cylinder.



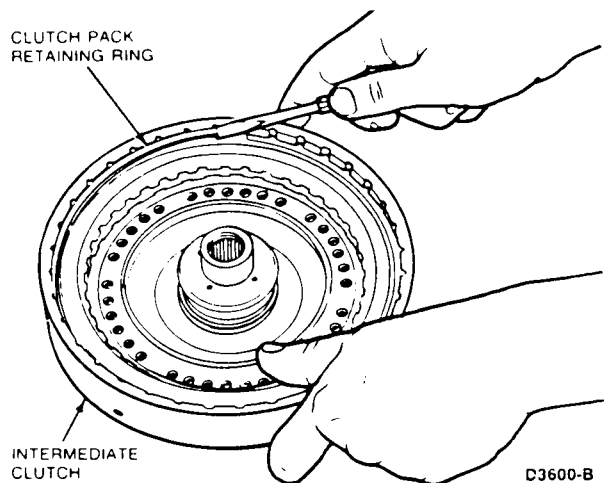
## DISASSEMBLY AND ASSEMBLY (Continued)

3. Inspect intermediate shaft stop ring. Remove ring if damaged.



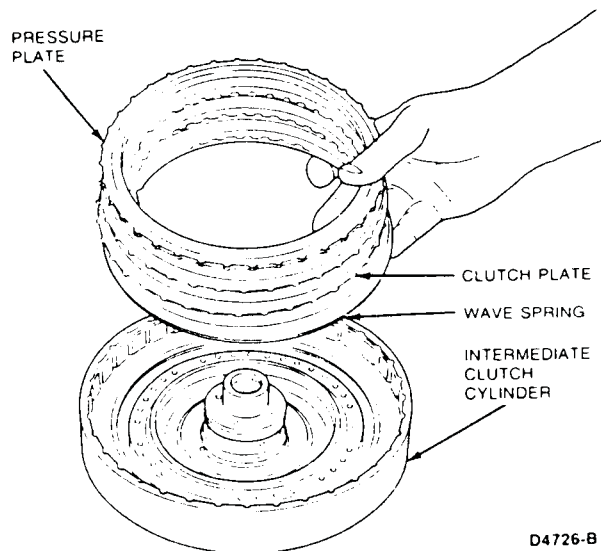
D3598-B

4. Remove clutch pack retaining ring.



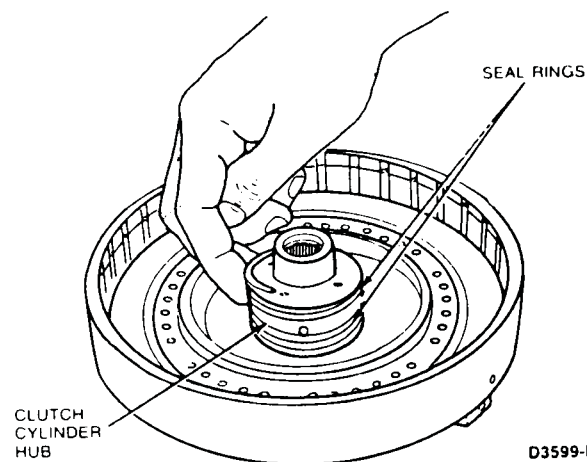
D3600-B

5. Remove pressure plate, clutch pack and wave spring.



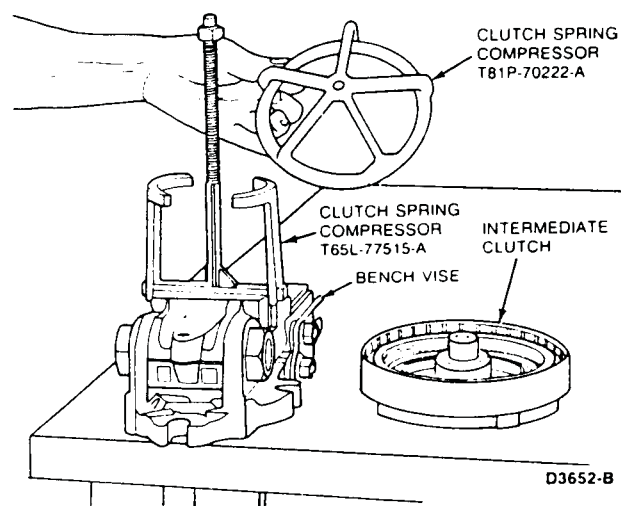
D4726-B

6. Remove seal rings from clutch cylinder hub.

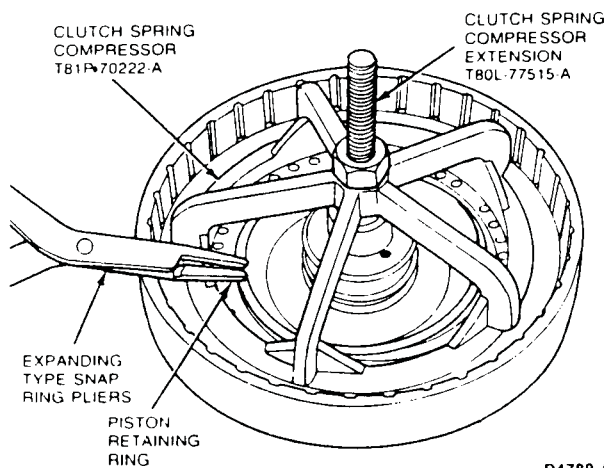


D3599-B

7. Remove piston retaining ring using a bench vise and special tools shown.



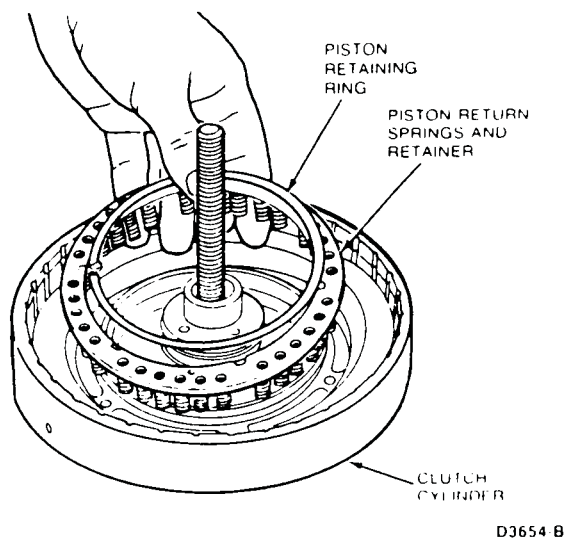
D3652-B



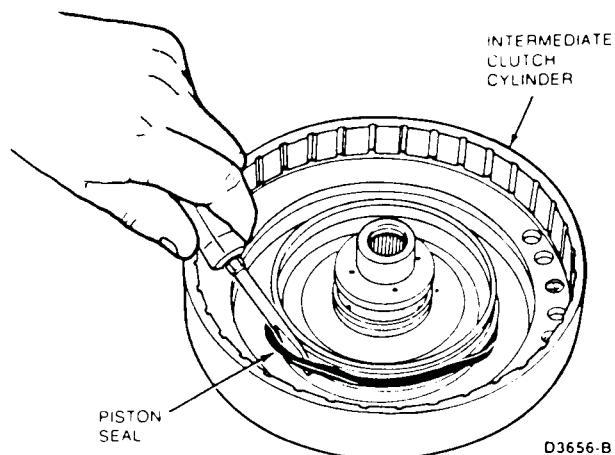
D4789-A

## DISASSEMBLY AND ASSEMBLY (Continued)

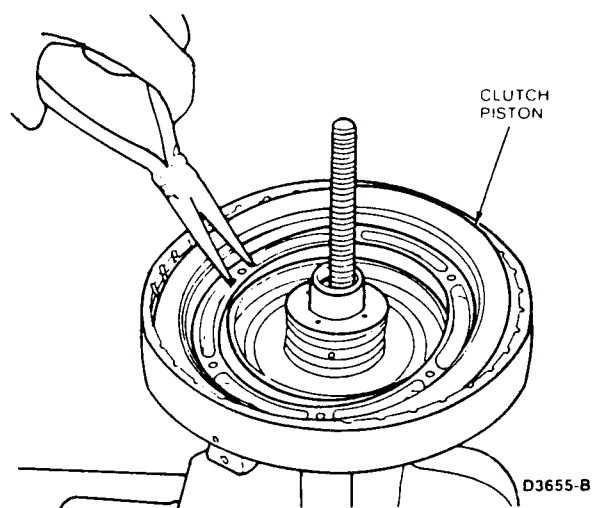
8. Remove retaining ring and piston return spring retainer.



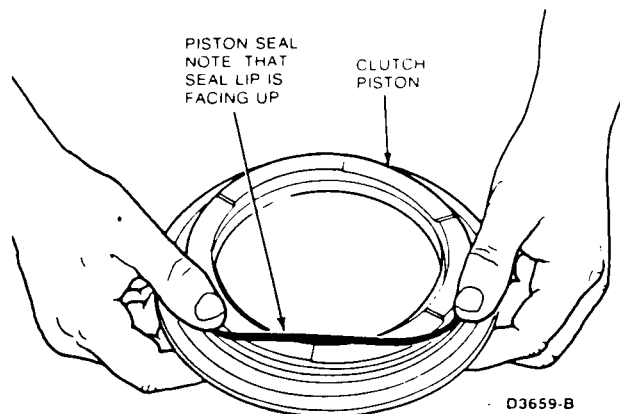
10. Remove piston seal from intermediate clutch cylinder.



9. Remove clutch piston using pliers.



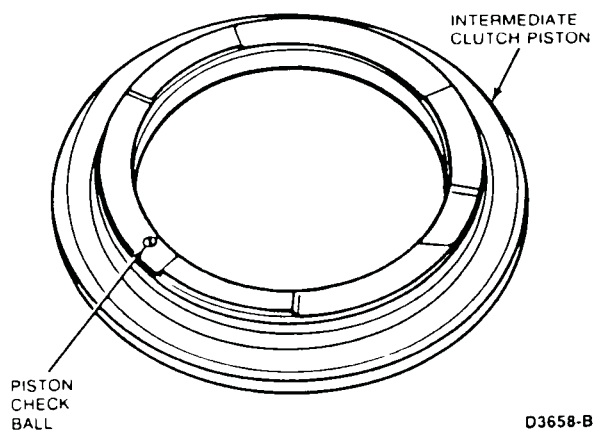
11. Remove seal from clutch piston.



## DISASSEMBLY AND ASSEMBLY (Continued)

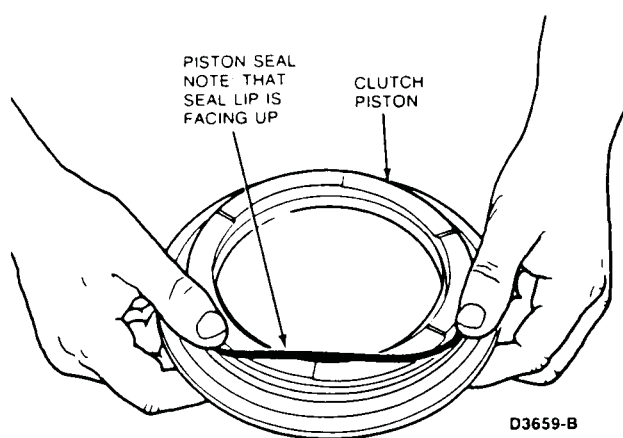
### Assembly

1. Inspect piston check ball. Make sure ball is present and free in cage.



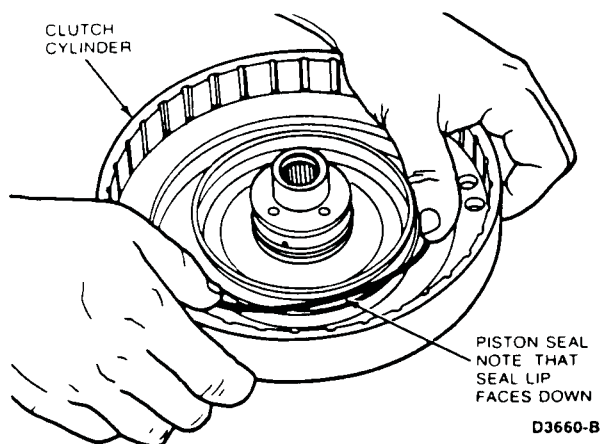
D3658-B

2. Install seal on piston.



D3659-B

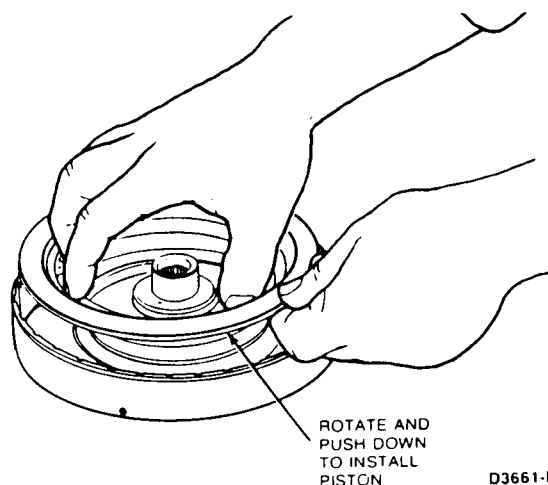
3. Install piston seal in clutch cylinder.



D3660-B

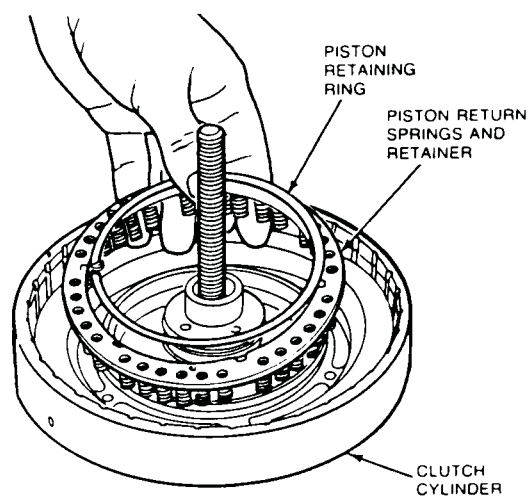
4. Apply a light film of petroleum jelly to piston seals, clutch cylinder seal area and the clutch piston inner seal area.

Install clutch piston.



D3661-B

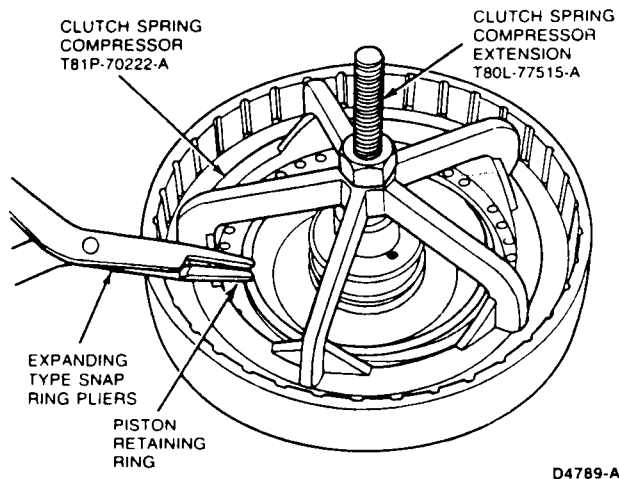
5. Position piston return spring retainer and piston retaining ring.



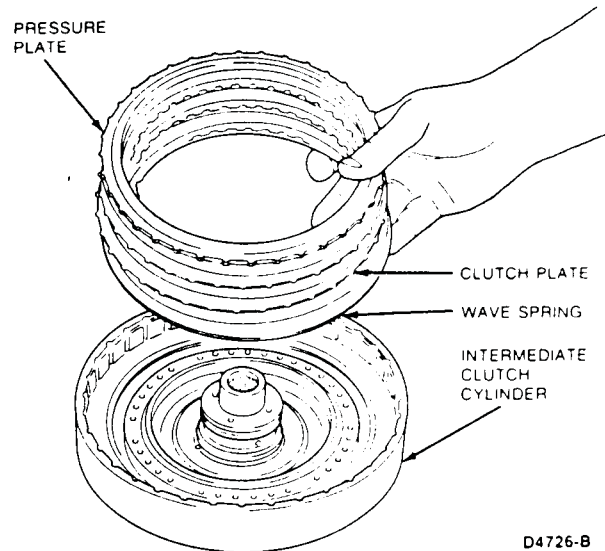
D3654-B

## DISASSEMBLY AND ASSEMBLY (Continued)

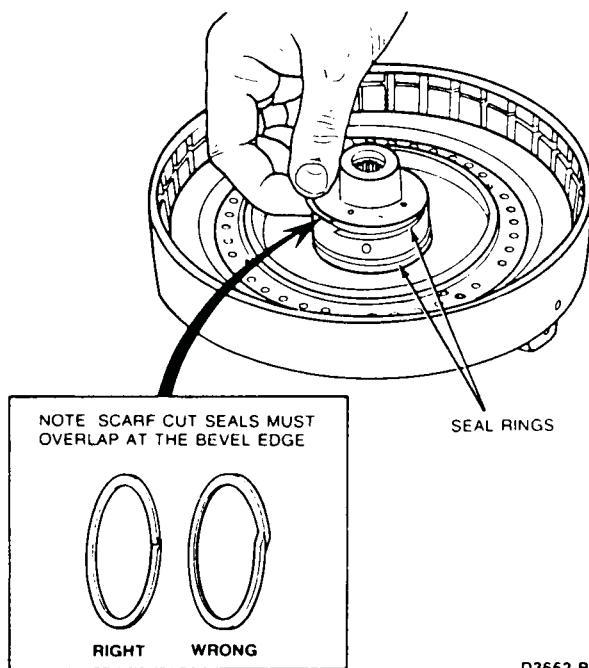
6. Install Clutch Spring Compressor T81P-70222-A or equivalent, and install piston retaining ring.



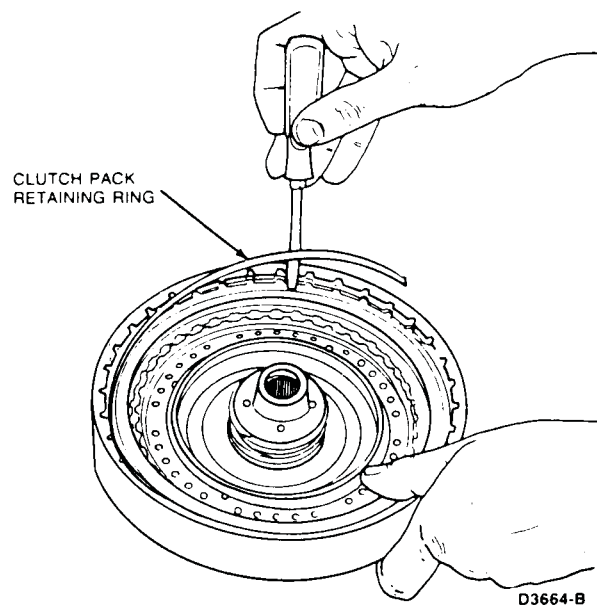
8. Install wave spring, clutch pack and pressure plate.



7. Install seal rings on clutch cylinder hub.



9. Install clutch pack retaining ring.





## DISASSEMBLY AND ASSEMBLY (Continued)

10. Check the clearance between the clutch retaining ring and the pressure plate.

Push downward on the clutch pack with at least 40 N (10 lbs) of pressure. Release pressure and zero Dial Indicator TOOL-4201-C or equivalent.

Lift pressure plate to bottom of retaining ring. Note dial indicator reading. Take two readings 180 degrees apart. Use the average of the two readings.

The clearance should be 0.76-1.40mm (0.030-0.055 inch) (reverse clutch), 0.75-1.22mm (0.030-0.044 inch) (intermediate clutch) for three plates. If the clearance is not within limits, selective snap rings are available in the following thickness:

### Intermediate Clutch

1.245-1.346mm (0.049-0.053 inch)

1.499-1.600mm (0.059-0.063 inch)

1.788-1.880mm (0.070-0.074 inch)

### Reverse Clutch

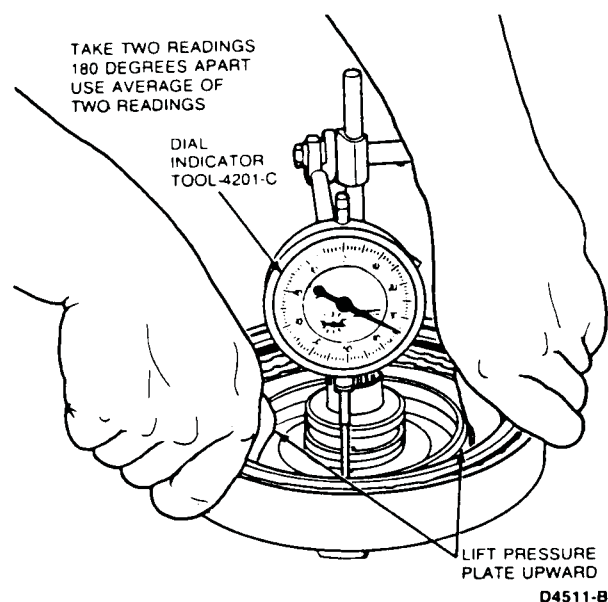
1.24-1.34mm (0.049-0.053 inch)

1.68-1.78mm (0.066-0.070 inch)

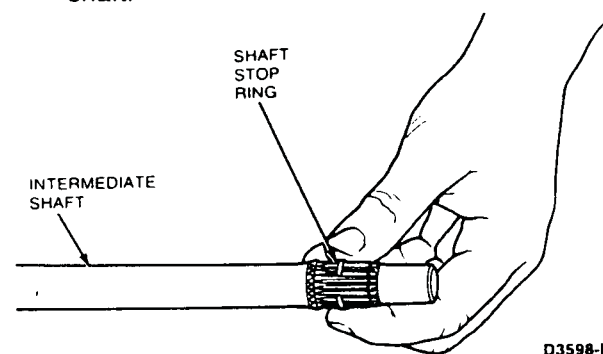
2.11-2.21mm (0.083-0.087 inch)

2.53-2.63mm (0.099-0.103 inch)

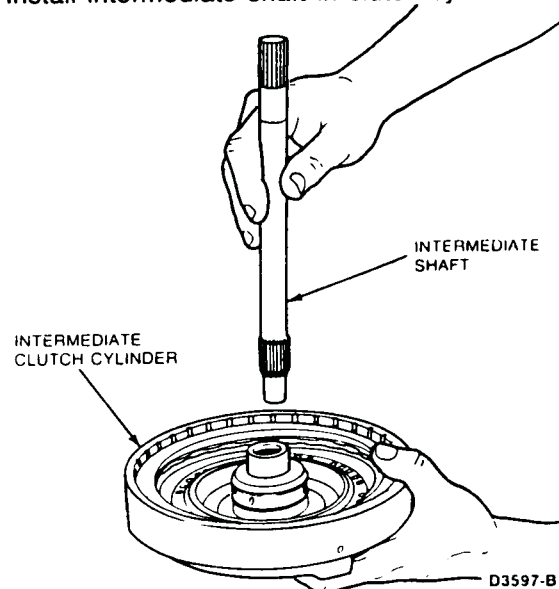
Install the correct size snap ring and recheck the clearance.



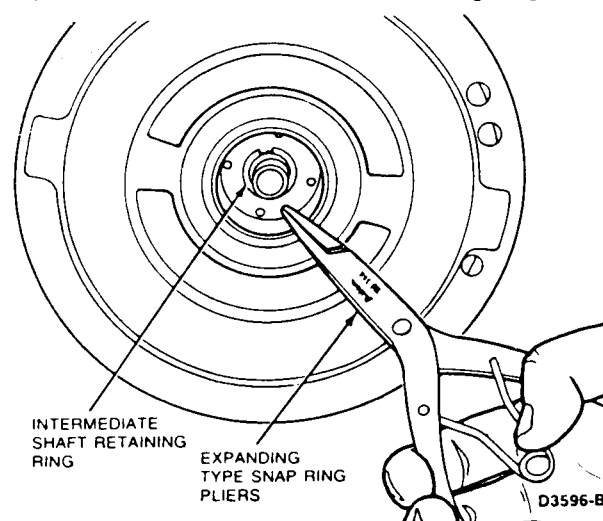
11. If removed, install stop ring on intermediate shaft.



12. Install intermediate shaft in clutch cylinder.

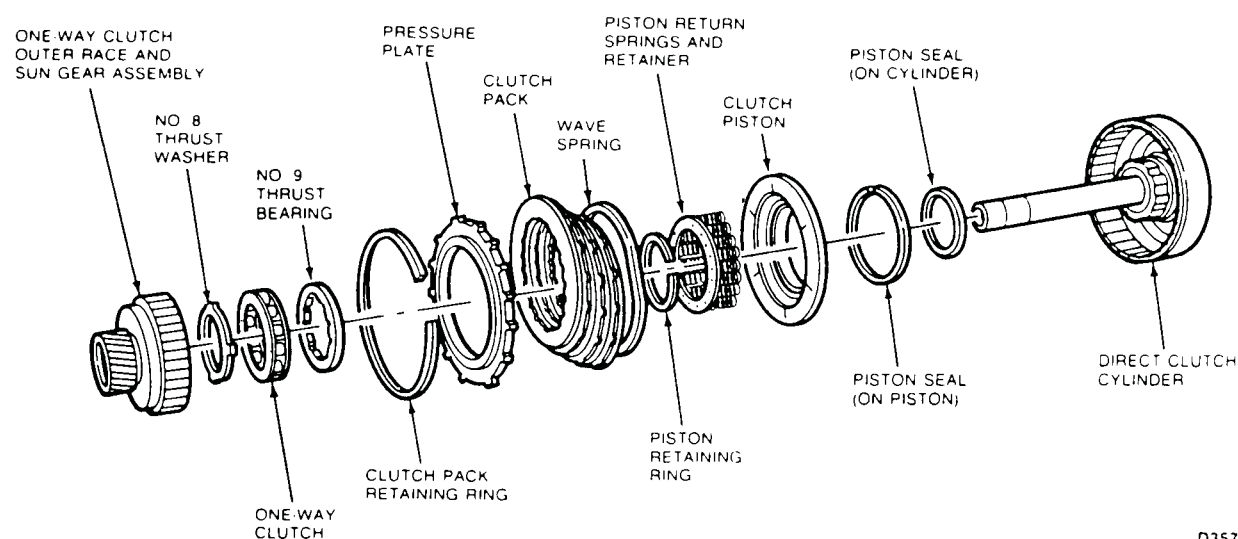


13. Install intermediate shaft retaining ring.



## DISASSEMBLY AND ASSEMBLY (Continued)

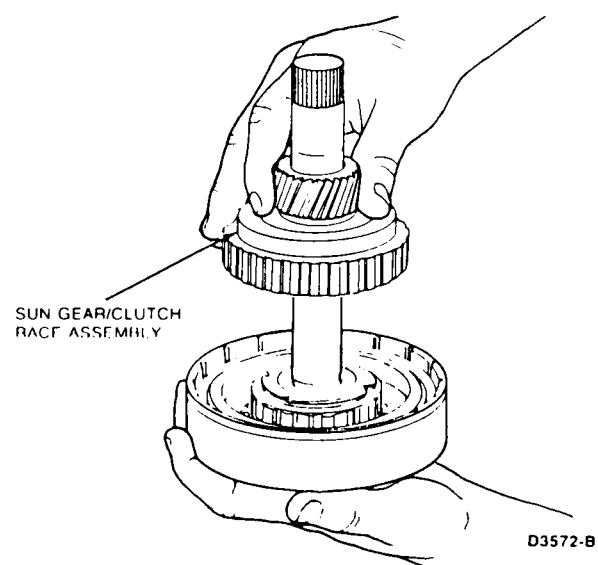
### Direct Clutch



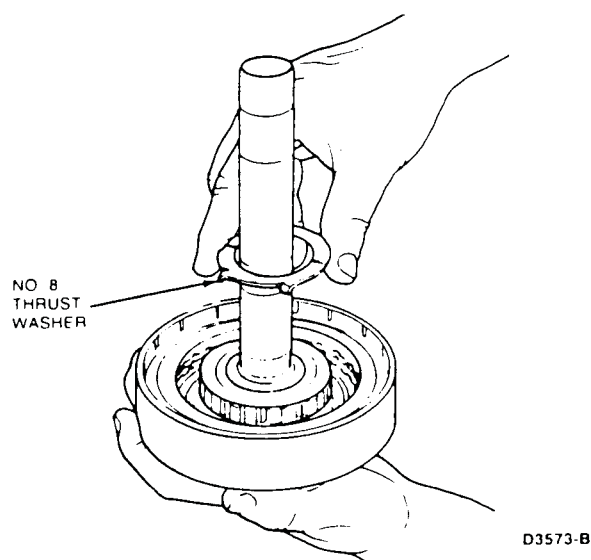
D3571-C

### Disassembly

1. Remove sun gear/clutch race assembly.

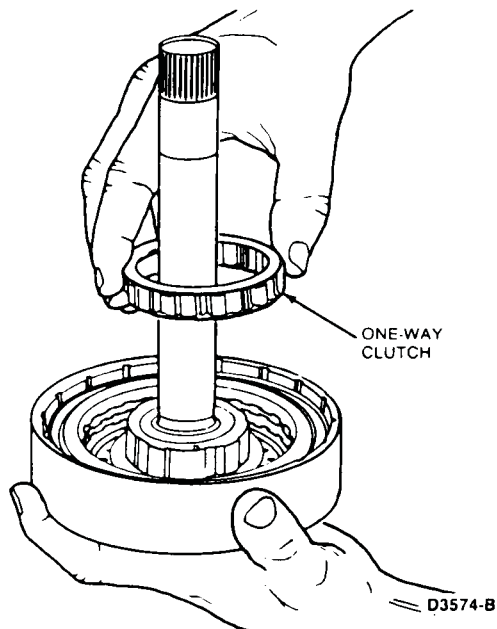


2. Remove No. 8 thrust washer.

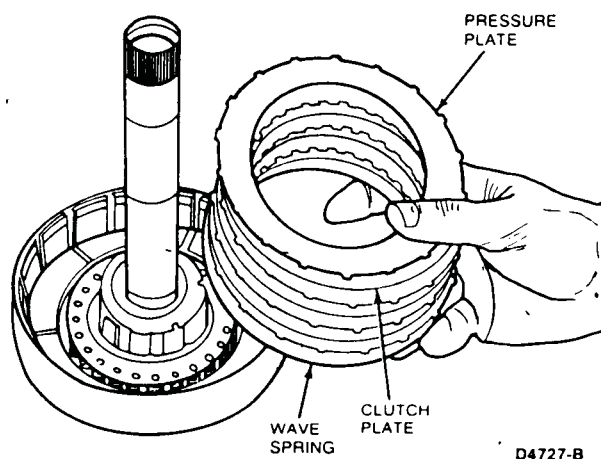


## DISASSEMBLY AND ASSEMBLY (Continued)

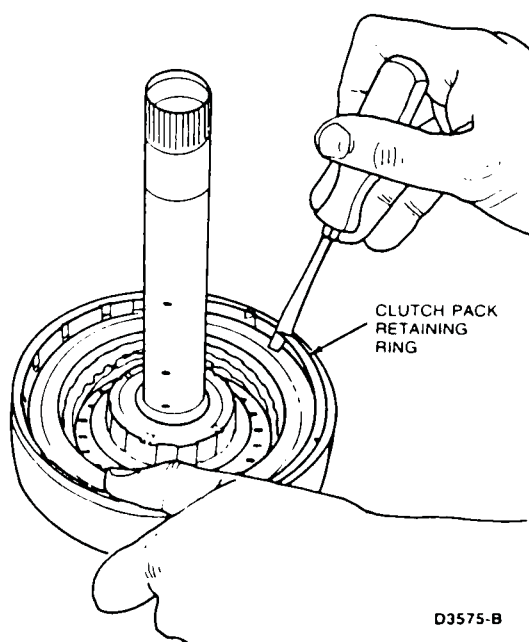
3. Remove the one-way clutch.



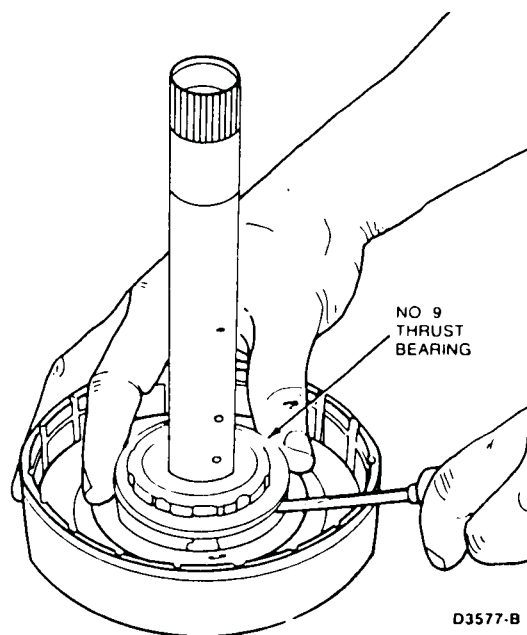
5. Remove pressure plate, clutch pack and wave spring.



4. Remove clutch pack retaining ring.



6. Remove No. 9 thrust bearing.

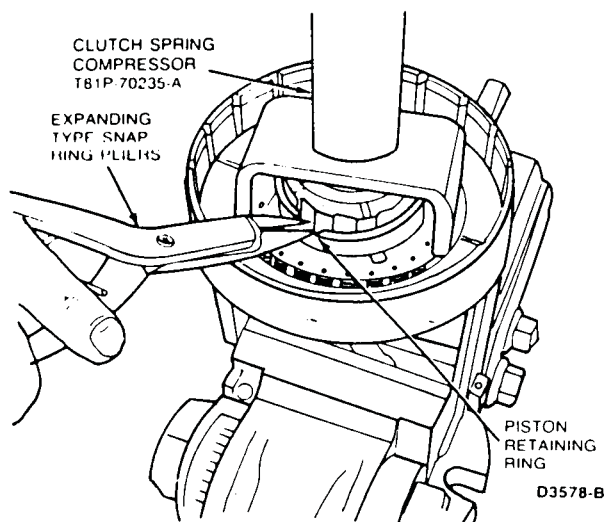
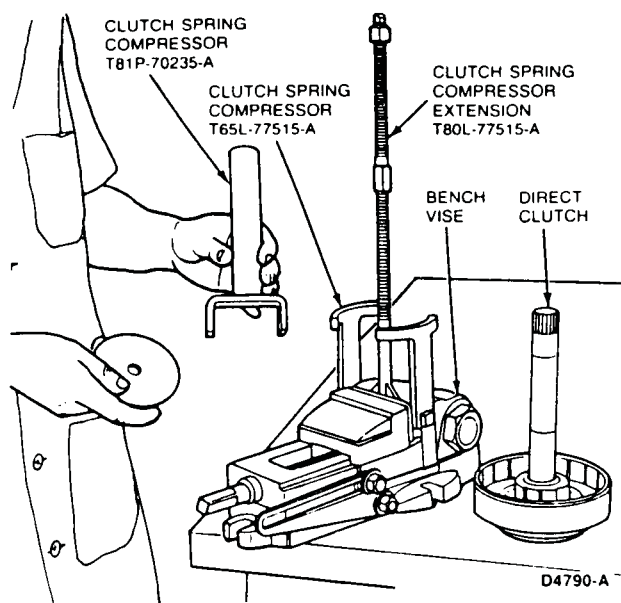




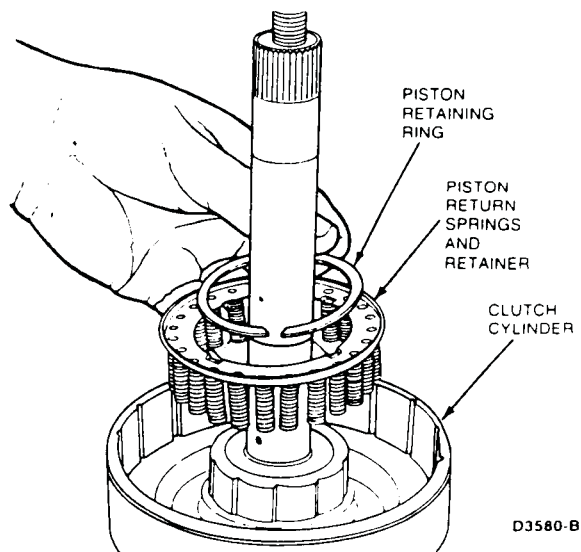
## Technical Service Information

### DISASSEMBLY AND ASSEMBLY (Continued)

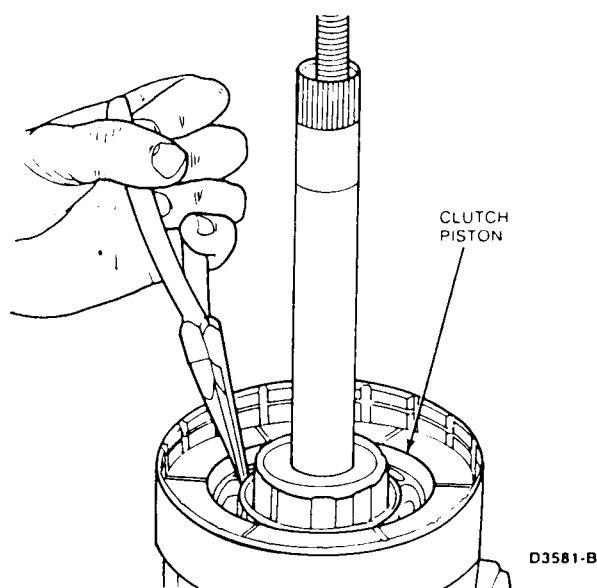
7. Remove piston retaining ring using a bench vise and special tools shown.



8. Remove retaining ring and piston return spring retainer.

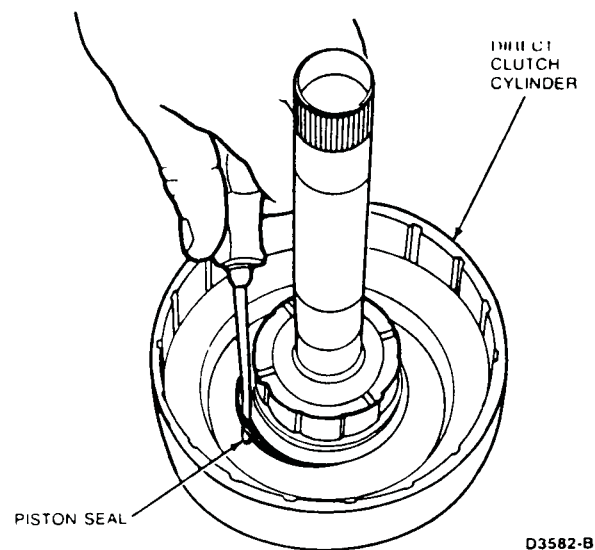


9. Remove clutch piston using pliers.



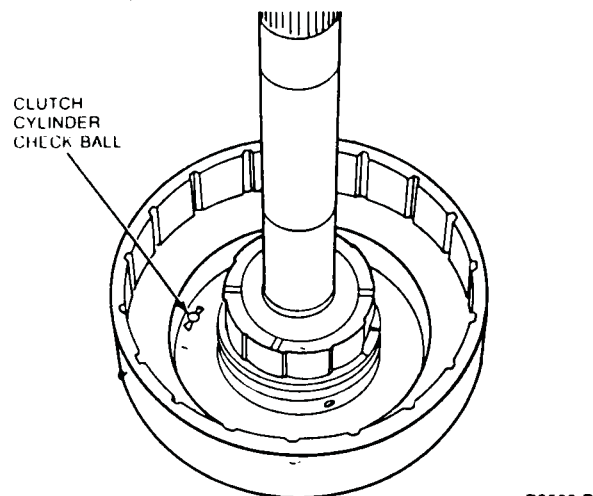
## DISASSEMBLY AND ASSEMBLY (Continued)

10. Remove piston seal from clutch cylinder.

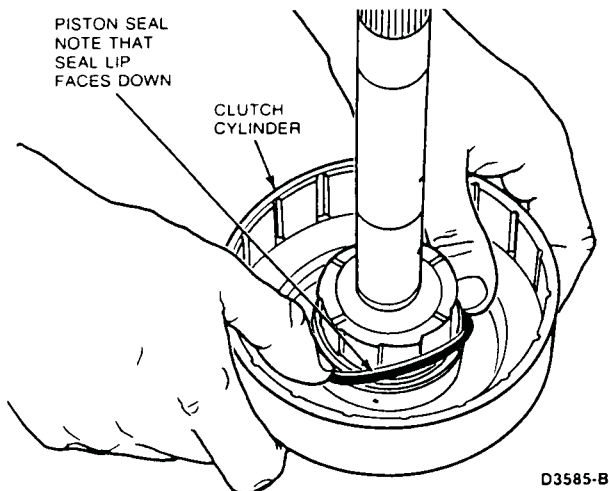


### Assembly

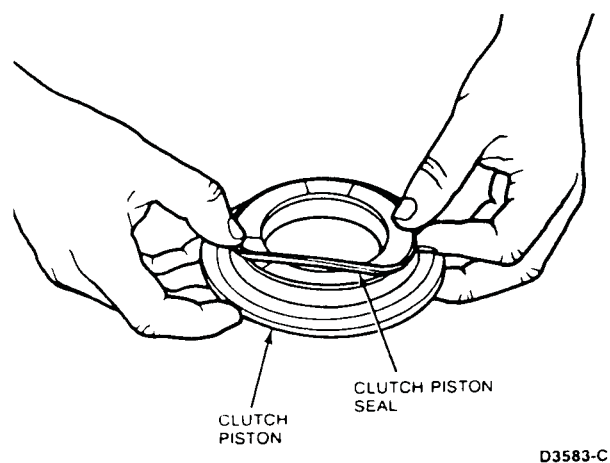
1. Inspect clutch cylinder check ball. Make sure ball is present and free in cage.



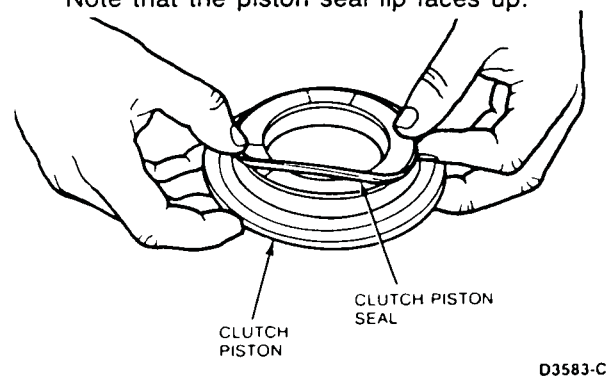
2. Install seal on clutch cylinder.



11. Remove seal from clutch piston.



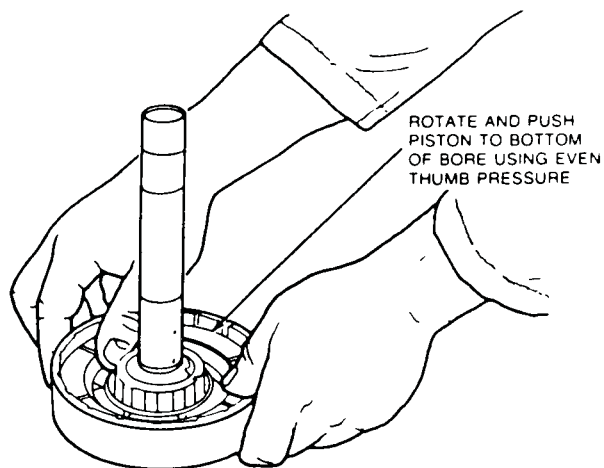
3. Install seal on clutch piston.  
Note that the piston seal lip faces up.



## DISASSEMBLY AND ASSEMBLY (Continued)

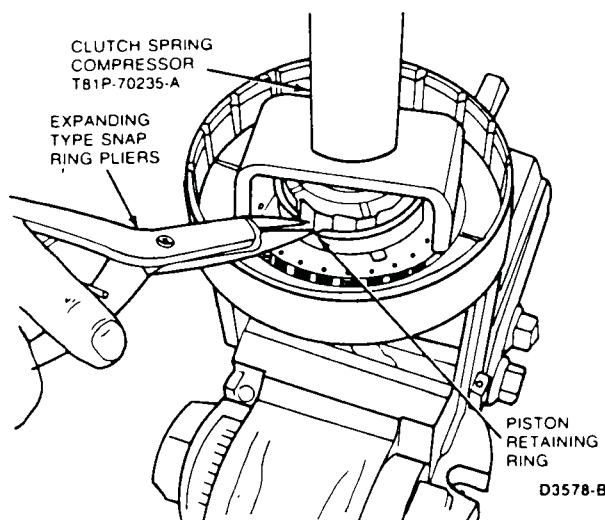
4. Apply a light film of petroleum jelly to piston seals, clutch cylinder seal area and clutch piston inner seal area.

Install clutch piston.



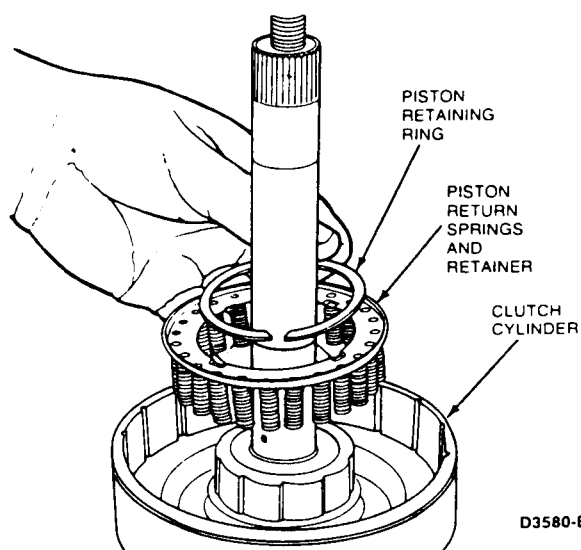
D3587-B

6. Using Clutch Spring Compressor T81P-70235-A or equivalent, install piston retaining ring.



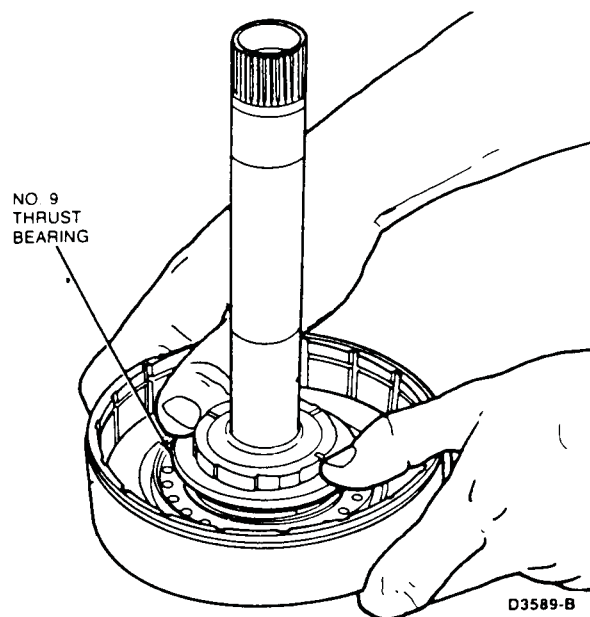
D3578-B

5. Position piston return spring retainer and piston retaining ring.



D3580-B

7. Install No. 9 thrust bearing.



D3589-B

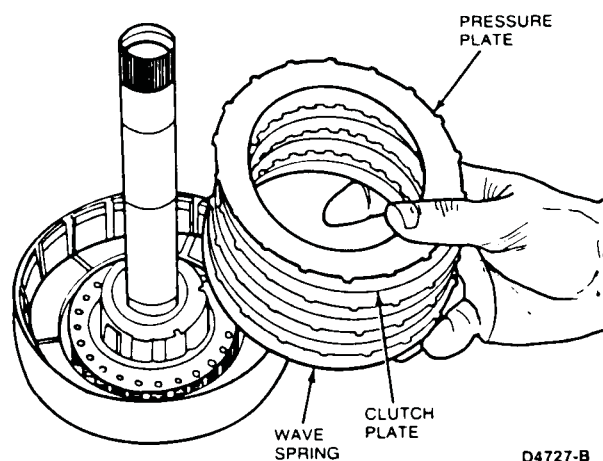




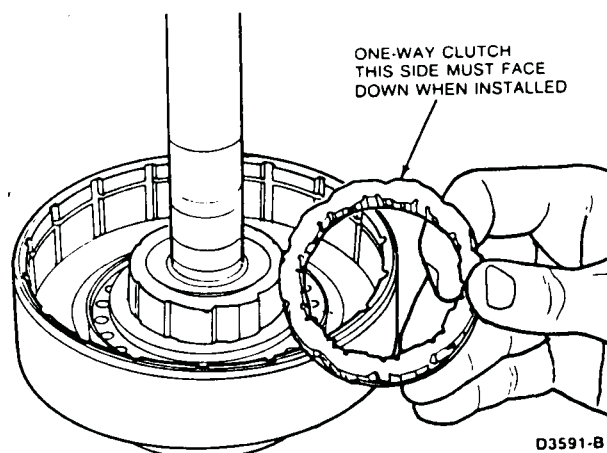
## Technical Service Information

### DISASSEMBLY AND ASSEMBLY (Continued)

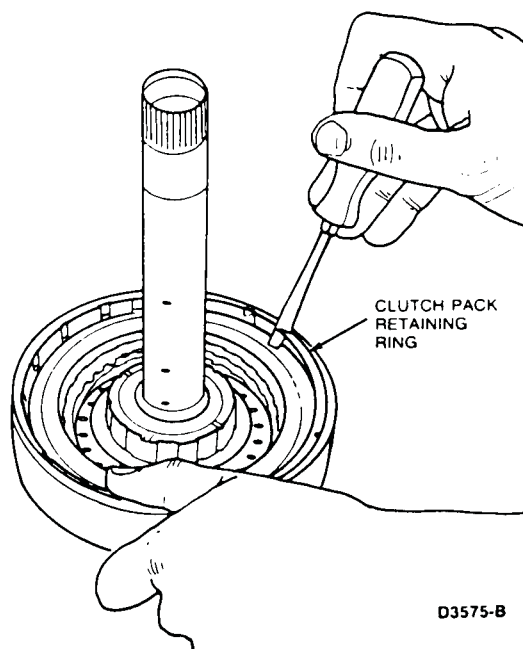
8. Install wave spring, clutch pack and pressure plate.



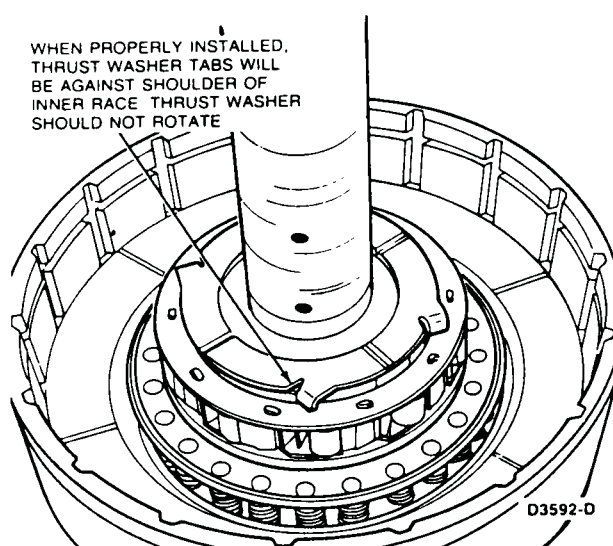
10. Install one-way clutch.



9. Install clutch pack retaining ring.



11. Install No. 8 thrust washer.



## DISASSEMBLY AND ASSEMBLY (Continued)

12. Install the clutch pack retaining ring and check the clearance between the ring and the pressure plate.

Push downward on the clutch pack with at least 40 N (10 lbs) of pressure. Release pressure and zero Dial Indicator TOOL-4201-C or equivalent.

Lift pressure plate to bottom of snap ring. Note dial indicator reading. Take two readings 180 degrees apart. Use the average of the two readings.

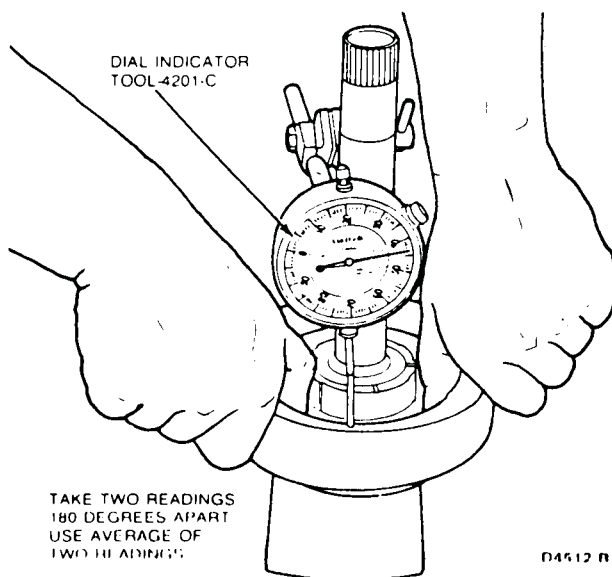
The clearance should be:

Four friction plates—1.01-1.43mm (0.040-0.056 inch).

If the clearance is not within specifications, selective snap rings are available in the following thickness:

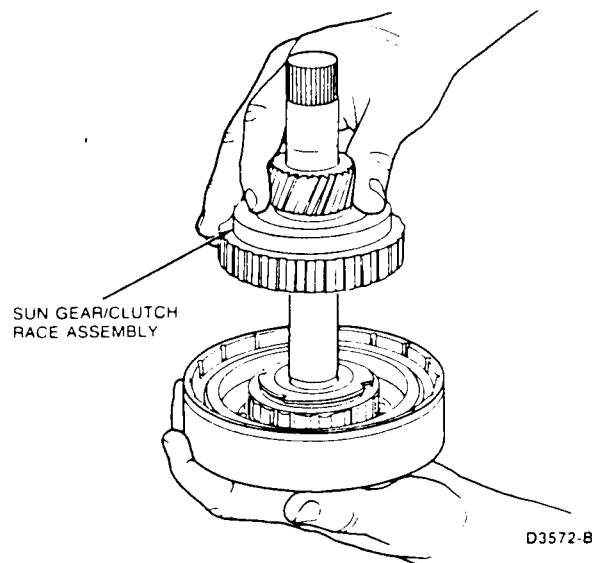
1.26-1.36mm (0.050-0.054 inch)  
1.58-1.68mm (0.062-0.066 inch)  
1.90-2.00mm (0.075-0.079 inch)

Insert the correct size snap ring and recheck the clearance.



13. Install sun gear/clutch race assembly.

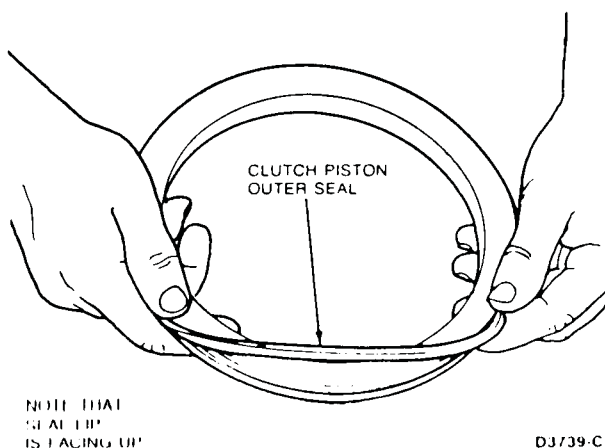
NOTE: The one-way clutch allows the sun gear/clutch race assembly to rotate in one direction only.



## Reverse Clutch

### Disassembly and Assembly

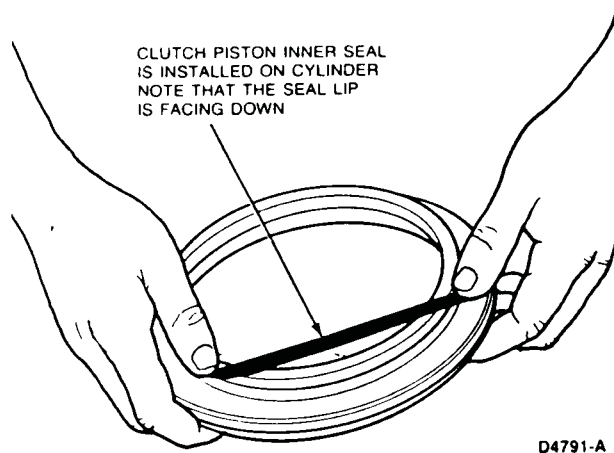
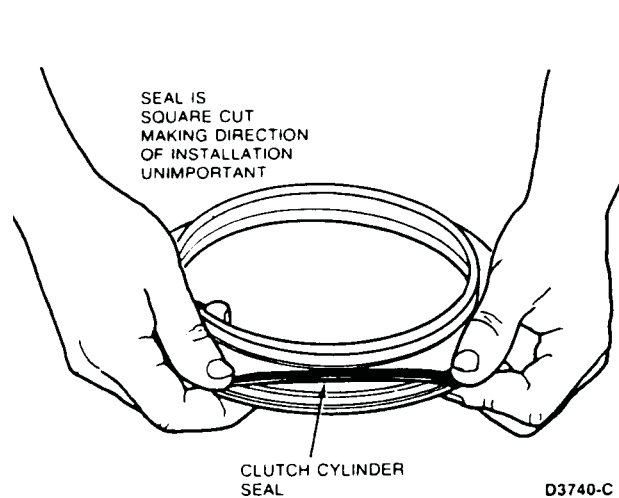
1. Remove seals from clutch cylinder and clutch piston.



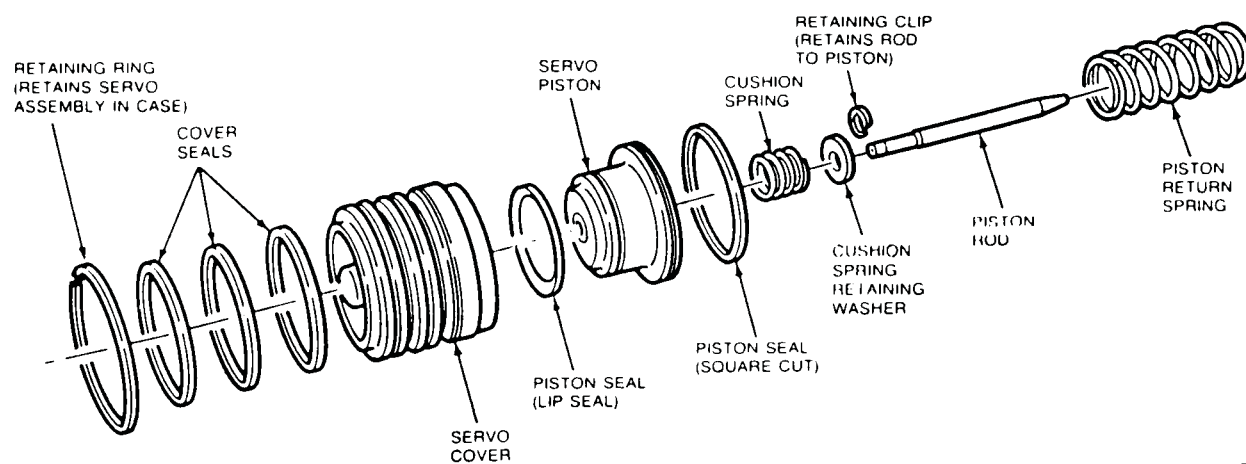
## DISASSEMBLY AND ASSEMBLY (Continued)

2. Install new seals on clutch cylinder and piston.

Note the direction of the inner seal lip.



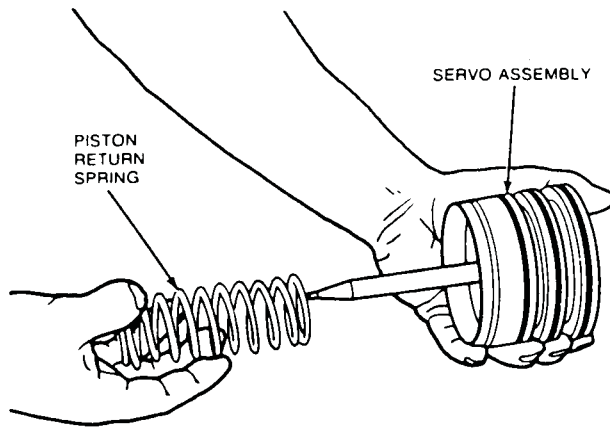
## Band Apply Servo



## DISASSEMBLY AND ASSEMBLY (Continued)

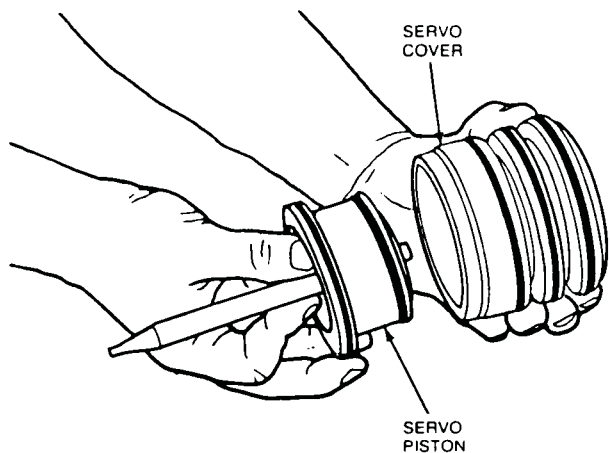
### Disassembly

1. Remove piston return spring.



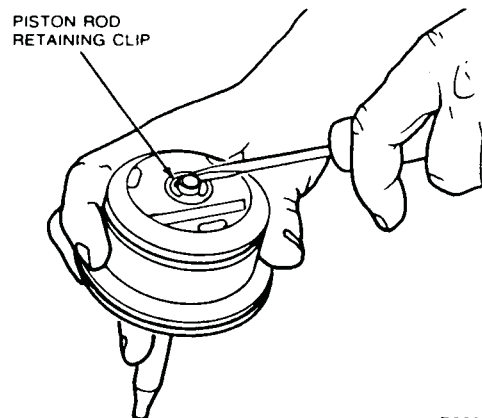
D4502-B

2. Remove servo piston from cover.



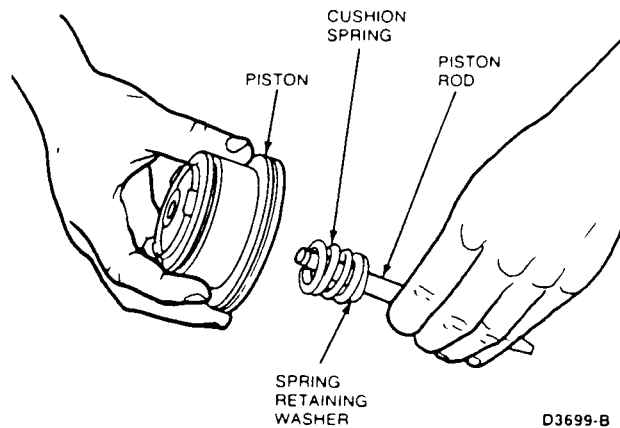
D4506-B

3. Remove piston rod retaining clip.



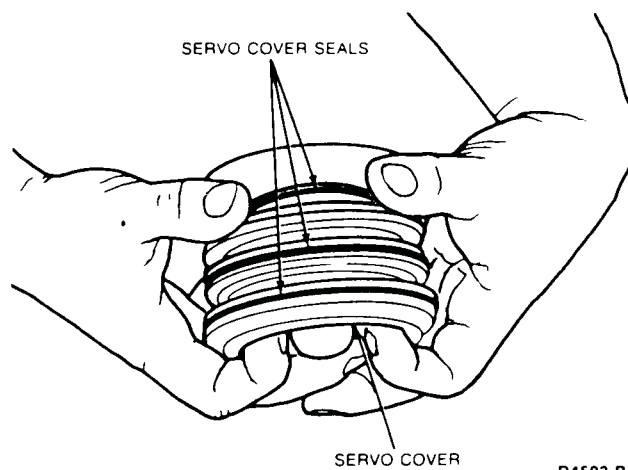
D3698-B

4. Remove piston rod, cushion spring and spring retaining washer from piston.



D3699-B

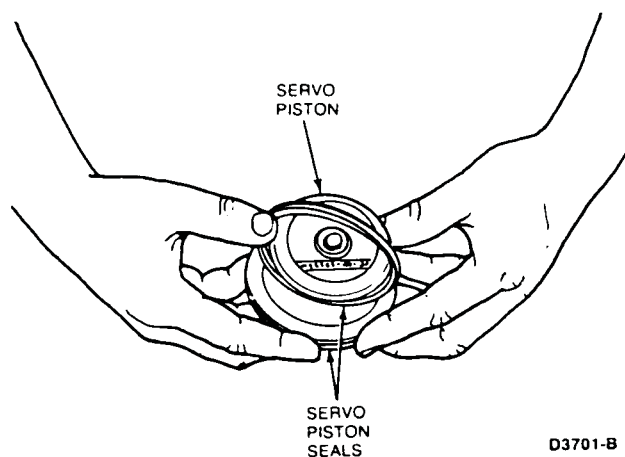
5. Remove seals from servo cover.



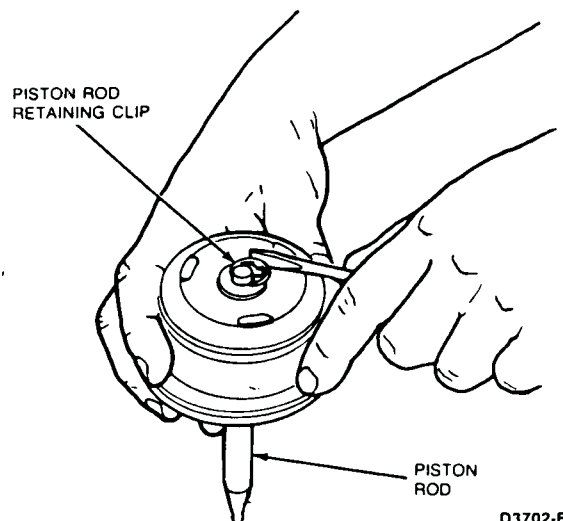
D4503-B

## DISASSEMBLY AND ASSEMBLY (Continued)

6. Remove seals from servo piston.



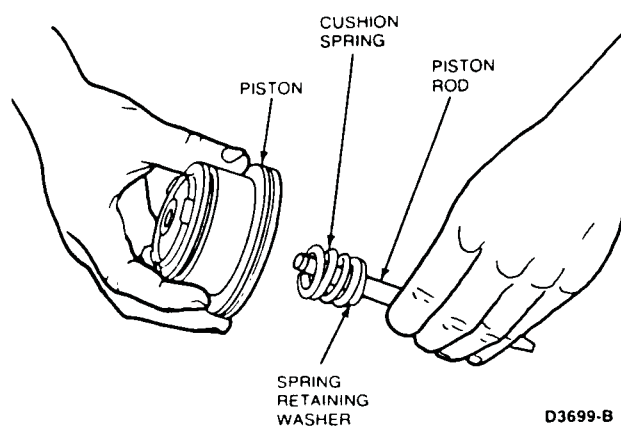
2. Compress cushion spring, and install retaining clip.



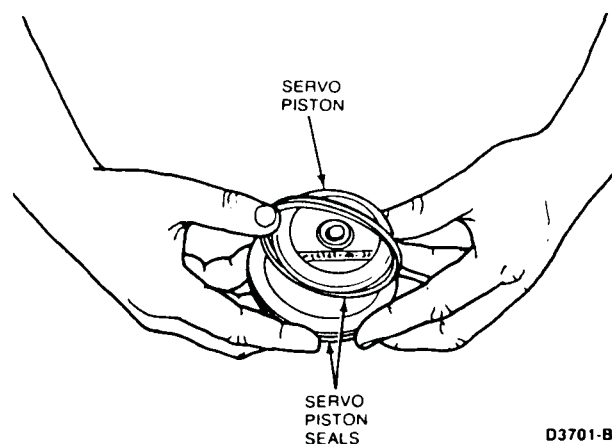
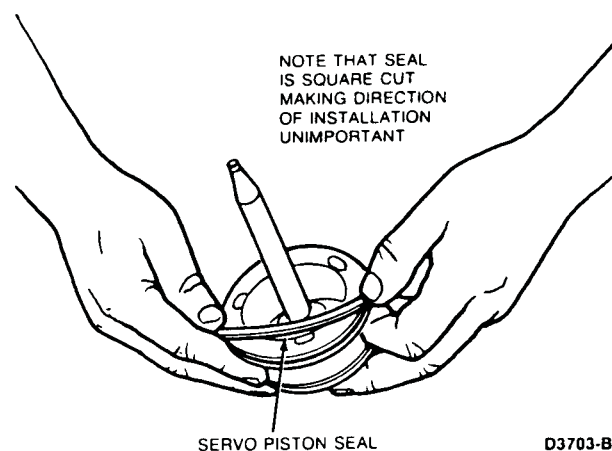
### Assembly

1. Position spring retainer washer and cushion spring on piston rod.

Install spring and rod assembly in servo piston.

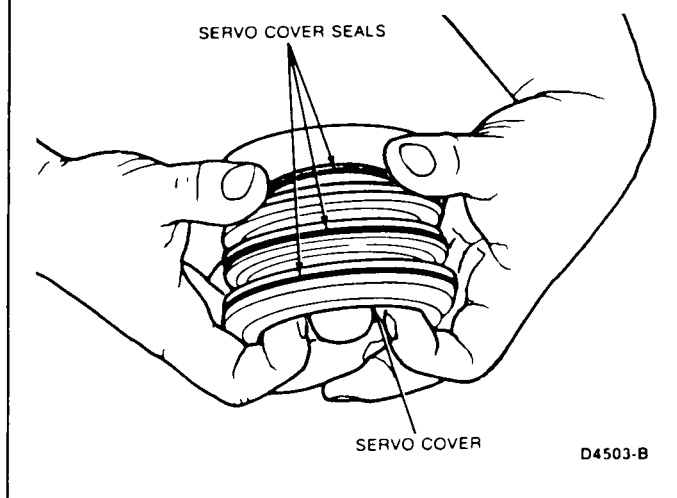


3. Install seals on servo piston.

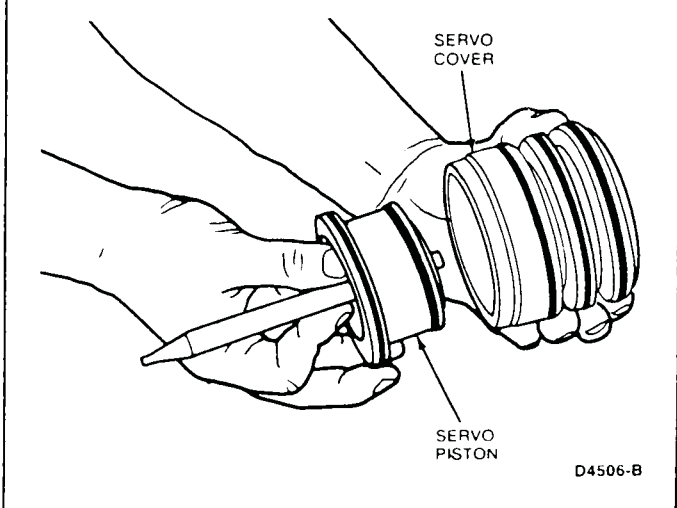


## DISASSEMBLY AND ASSEMBLY (Continued)

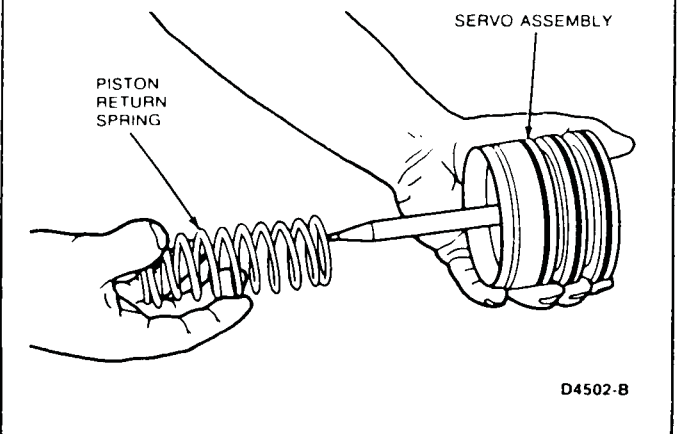
4. Install seals on servo cover.



5. Lubricate piston seal with petroleum jelly and install piston in cover.



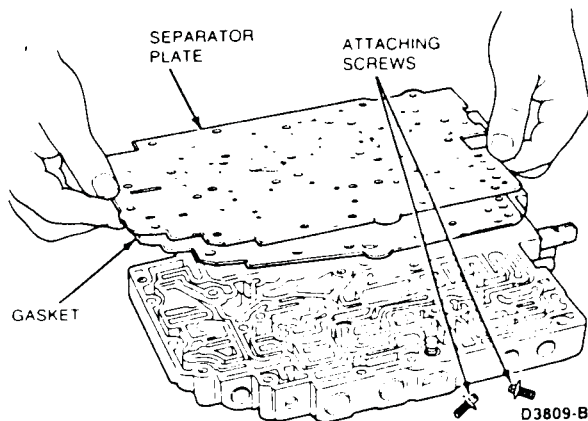
6. Install piston return spring on piston rod.



## Valve Body

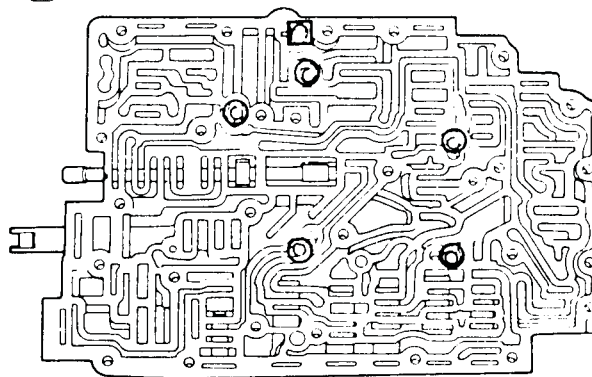
### Disassembly

1. Remove separator plate attaching screws.
2. Remove separator plate and gasket.



3. Remove check balls and relief valve.

- ☐ CHECK BALLS
- ☐ RELIEF VALVE

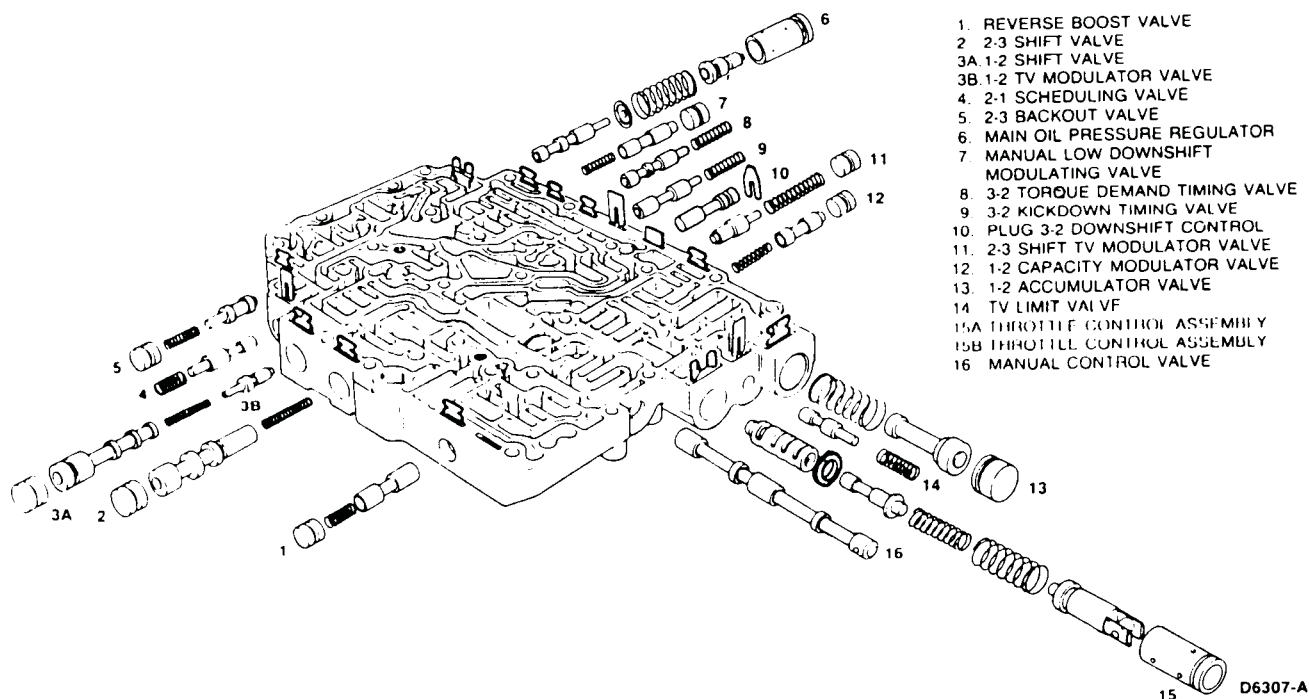




## DISASSEMBLY AND ASSEMBLY (Continued)

4. The following illustration shows the position and components for each of the valve assemblies in the valve body.

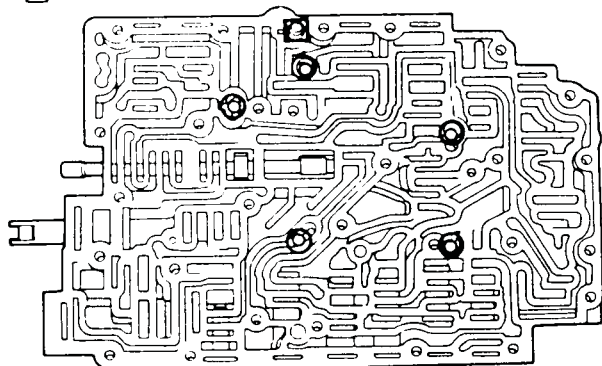
NOTE: Do not turn the throttle valve adjusting screw. The adjustment is set during manufacture and must not be altered.



### Assembly

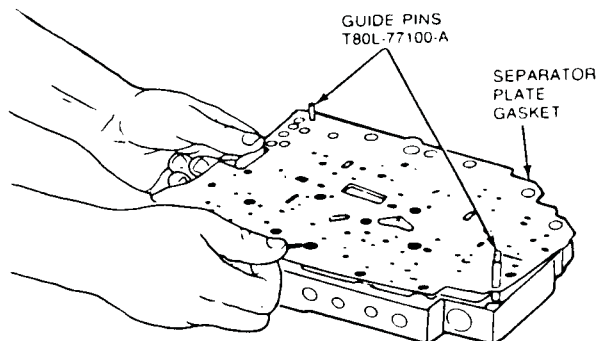
1. Install check balls and relief valve.

- CHECK BALLS
- RELIEF VALVE



D3811-D

2. Install Guide Pins T80L-77100-A or equivalent, and separator plate gasket.



D3813-C

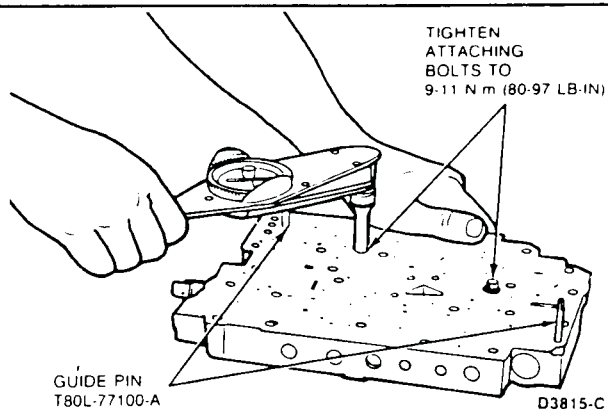


## Technical Service Information

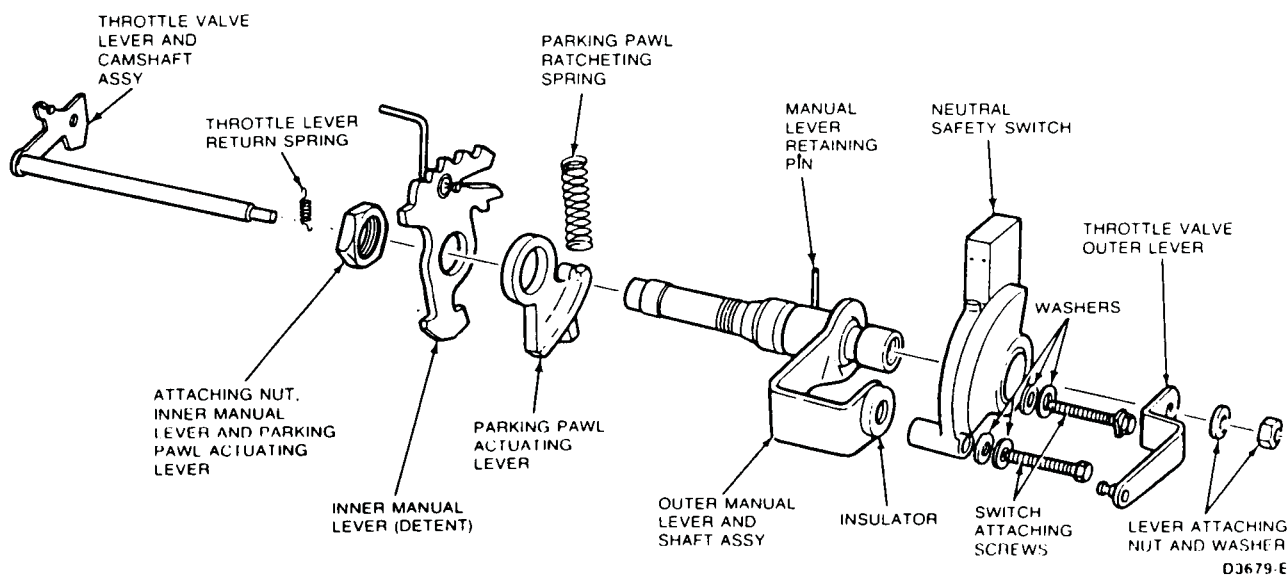
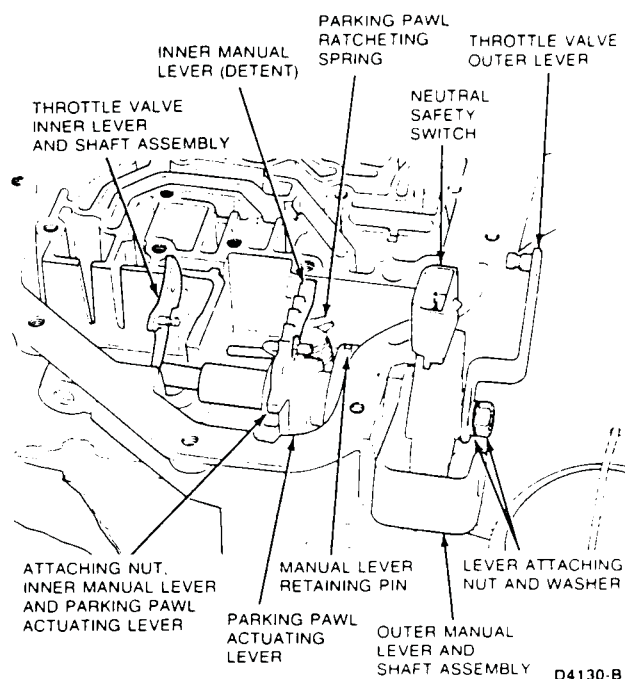
### DISASSEMBLY AND ASSEMBLY (Continued)

3. Install separator plate and attaching bolts.

Tighten bolts to 9-11 N·m (80-97 lb-in) and remove alignment pins.



### Manual and Throttle Linkage

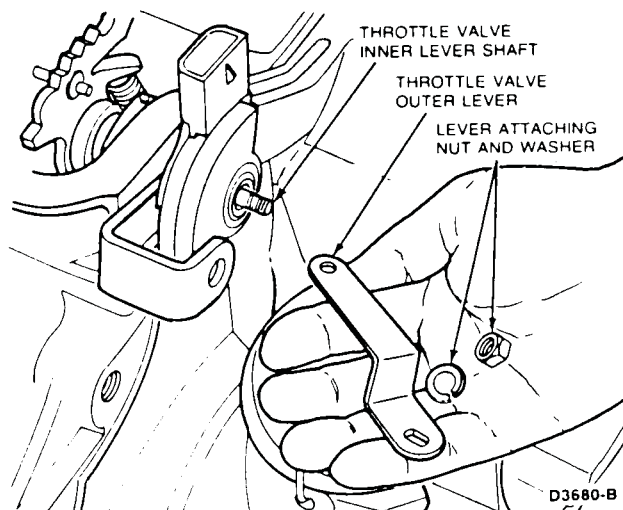


## DISASSEMBLY AND ASSEMBLY (Continued)

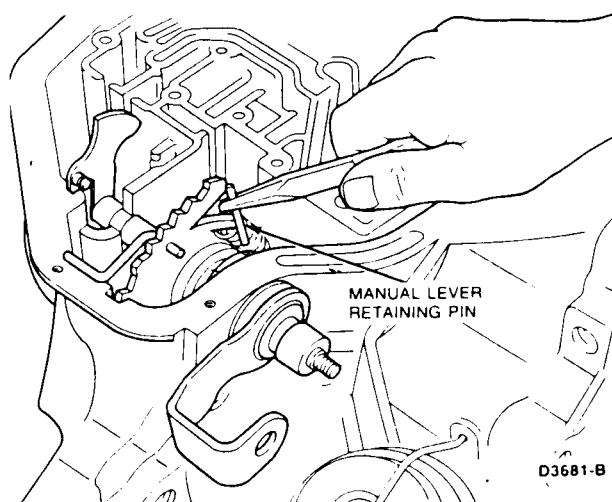
### Disassembly

1. Remove throttle valve outer lever.

NOTE: While loosening the lever attaching nut, hold the outer throttle lever stationary. Failure to hold the lever will allow the throttle shaft and cam to rotate an excessive amount causing possible damage to the cam.

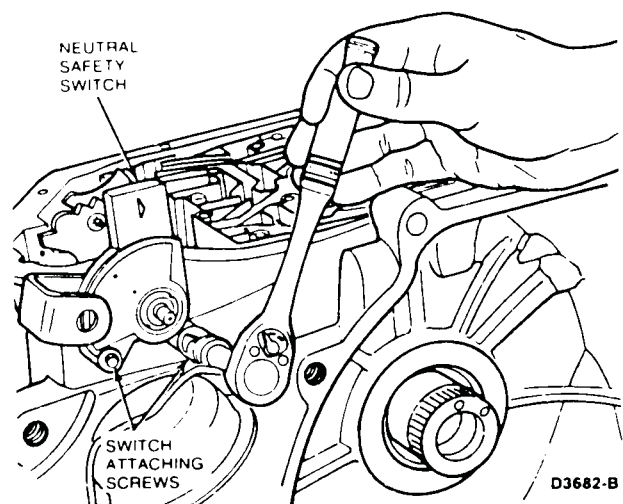


4. Remove manual lever retaining pin.

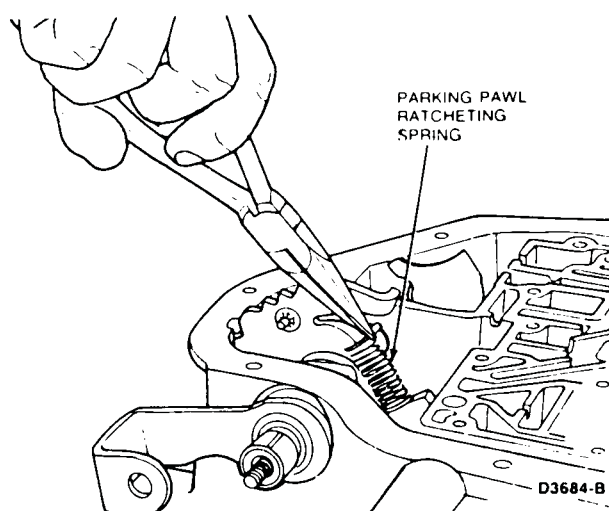


2. Remove neutral safety switch attaching screws and washers.

3. Remove neutral safety switch.

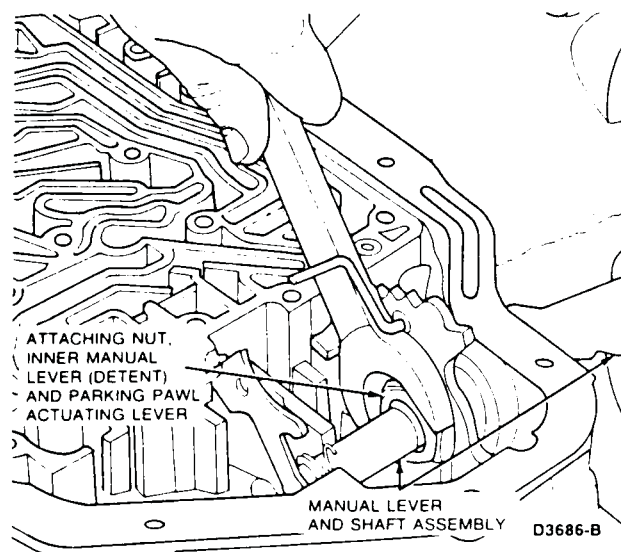


5. Remove parking pawl ratcheting spring.

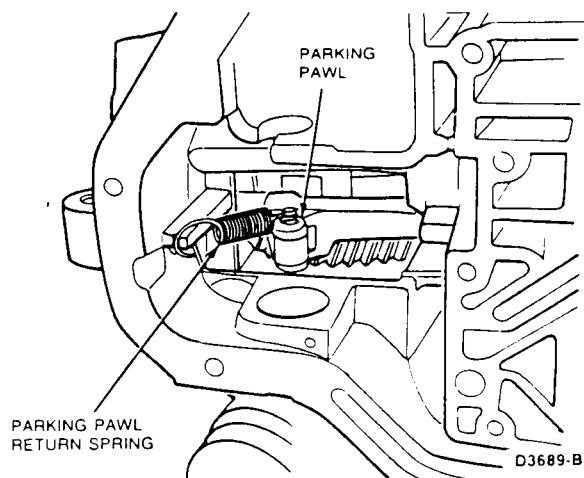


## DISASSEMBLY AND ASSEMBLY (Continued)

6. Loosen nut attaching inner manual lever (detent) and parking pawl actuating lever to manual lever shaft. After loosening, thread nut off shaft.

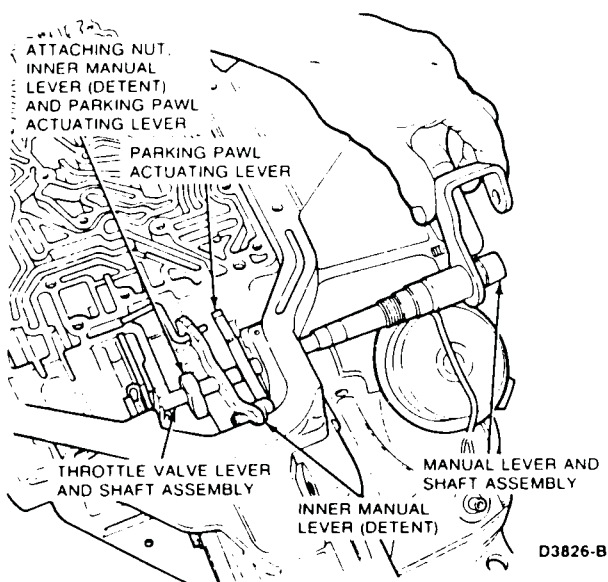


8. Remove parking pawl return springs.

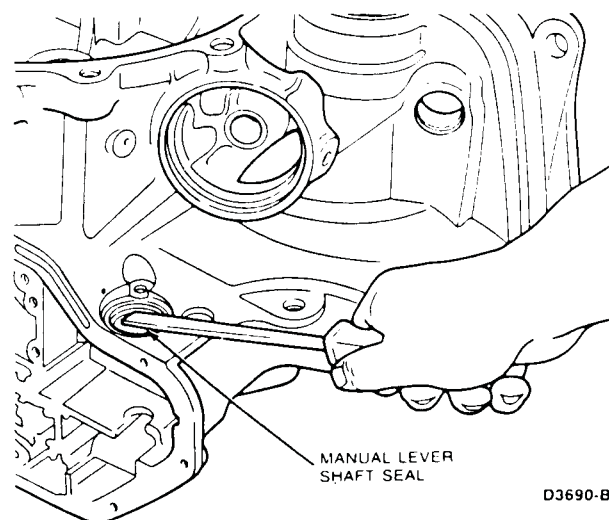


7. Remove manual lever and shaft assembly.

After removing manual lever, remove throttle valve lever and components on throttle valve lever shaft.

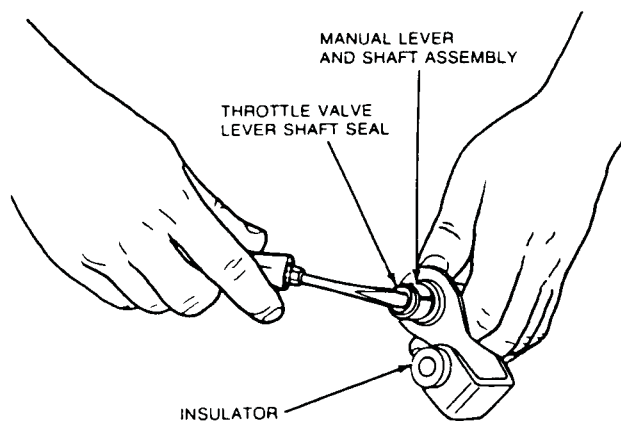


9. Remove manual lever shaft seal from case.



## DISASSEMBLY AND ASSEMBLY (Continued)

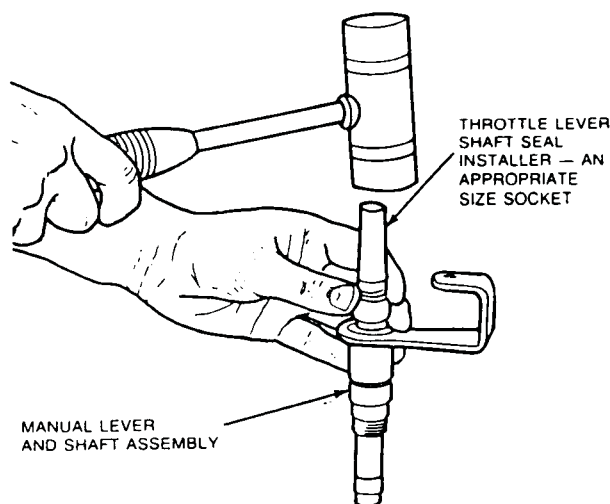
10. Remove throttle valve lever shaft seal.



D3692-C

Remove insulator from manual lever using Shift Insulator Remover/Replacer T67P-7341-A, or Shift Linkage Grommet Remover T84P-7341-A or equivalent.

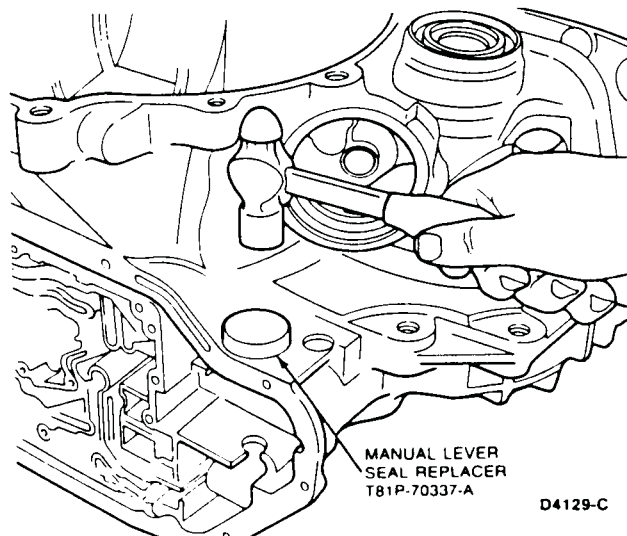
2. Install throttle lever shaft seal using an appropriate size socket.



D3693-B

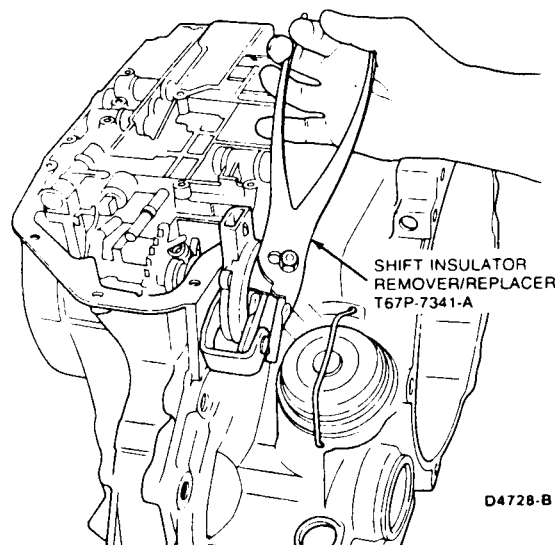
### Assembly

1. Install manual lever shaft seal in case using Manual Lever Seal Replacer T81P-70337-A or equivalent.



D4129-C

3. Install manual lever insulator using Shift Insulator Remover/Replacer T67P-7341-A or Replacer T84P-7341-B or equivalent.



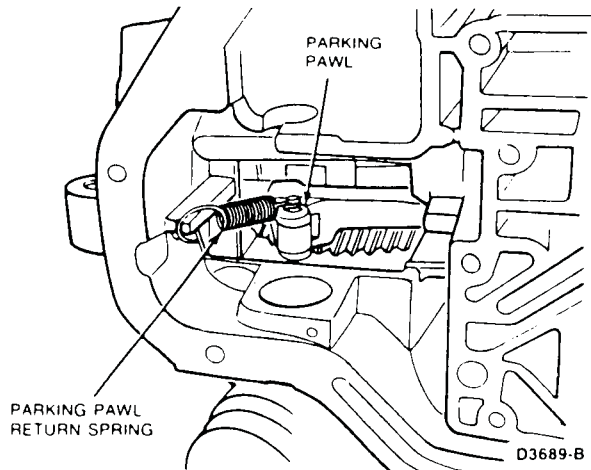
D4728-B



## Technical Service Information

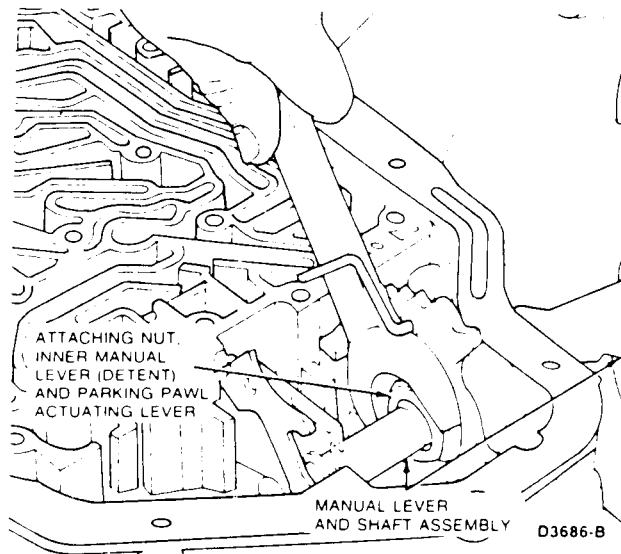
### DISASSEMBLY AND ASSEMBLY (Continued)

4. Install parking pawl return spring.



6. Position parking pawl actuator and inner manual lever (detent) on manual lever shaft and install attaching nut.

Tighten nut to 43-65 N·m (32-48 lb-ft).

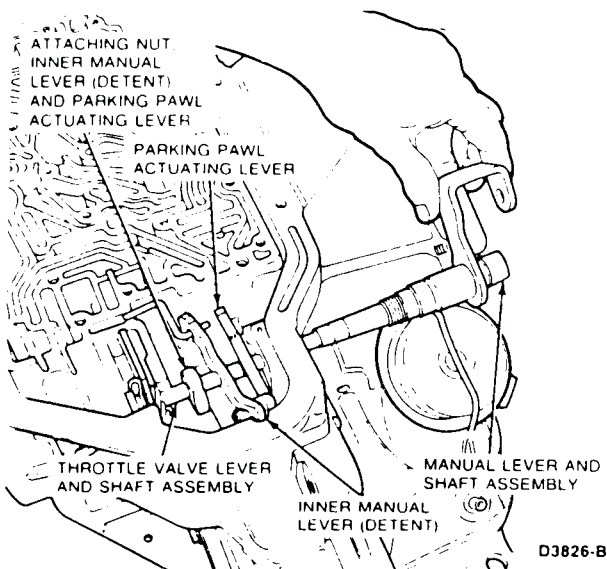


5. Install the following components on throttle shaft in this order:

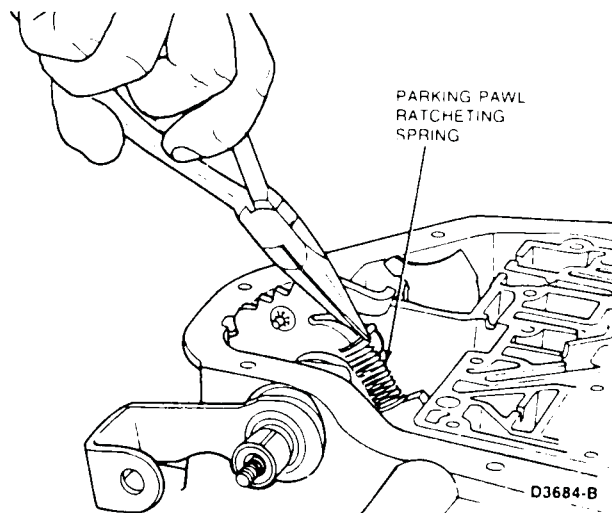
Must be positioned on shaft in this order.

- Parking Pawl Actuator
- Inner Manual Lever (Detent)
- Inner Manual Lever (Detent) and Parking Pawl Actuator Attaching Nut

Position throttle shaft in case and install manual lever and shaft assembly.



7. Install parking pawl ratcheting spring.



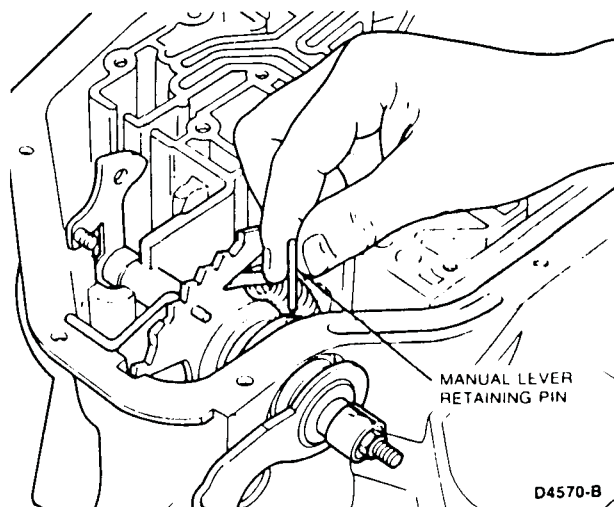




## Technical Service Information

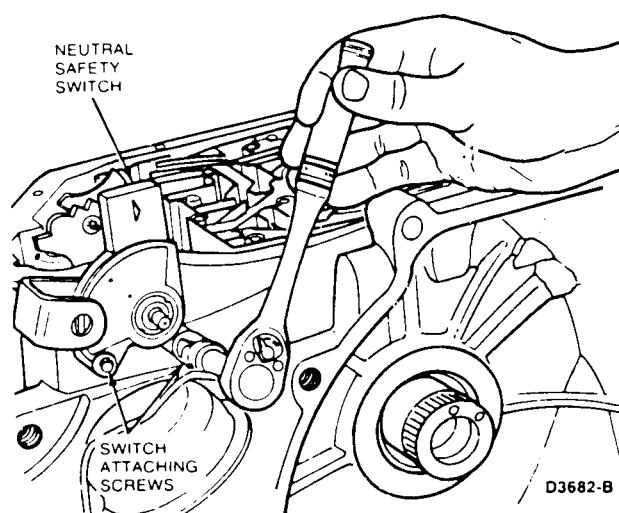
### DISASSEMBLY AND ASSEMBLY (Continued)

8. Install manual lever retaining pin.



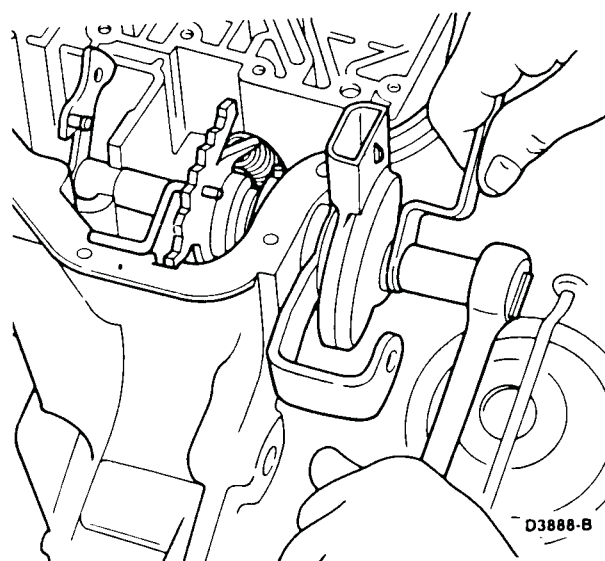
9. Install neutral safety switch and attaching screws and washers; do not tighten screws.

Adjust neutral safety switch as outlined before tightening switch attaching screws.



10. Install outer throttle valve lever and adjust switch as outlined.

**CAUTION:** While tightening the lever attaching nut hold the outer throttle lever stationary. Failure to hold the lever will allow the throttle shaft and cam to rotate an excessive amount causing possible damage to cam.





## Technical Service Information

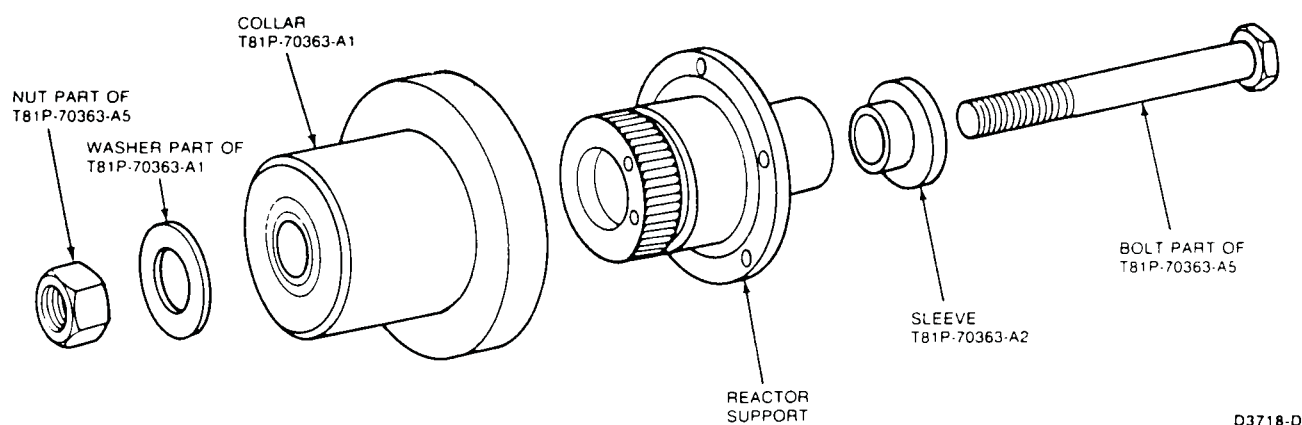
### MAJOR SERVICE OPERATIONS

#### Reactor Support

NOTE: The reactor support should be replaced only if inspection determines it to be damaged or otherwise unserviceable.

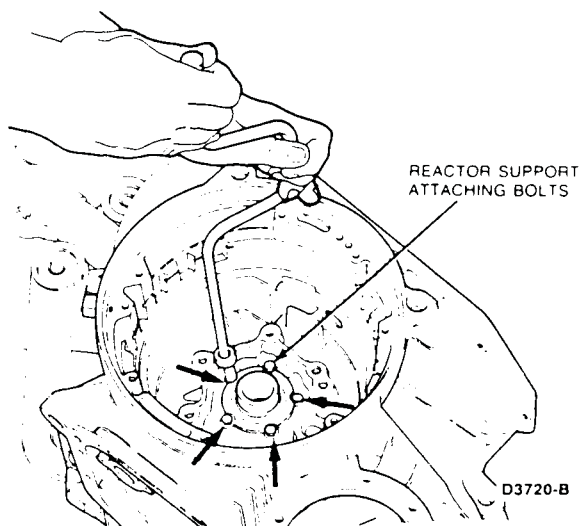
#### Removal Tools

TOOL ARRANGEMENT FOR REMOVAL  
T81P-70363-A



#### Removal

1. Remove reactor support attaching bolts.

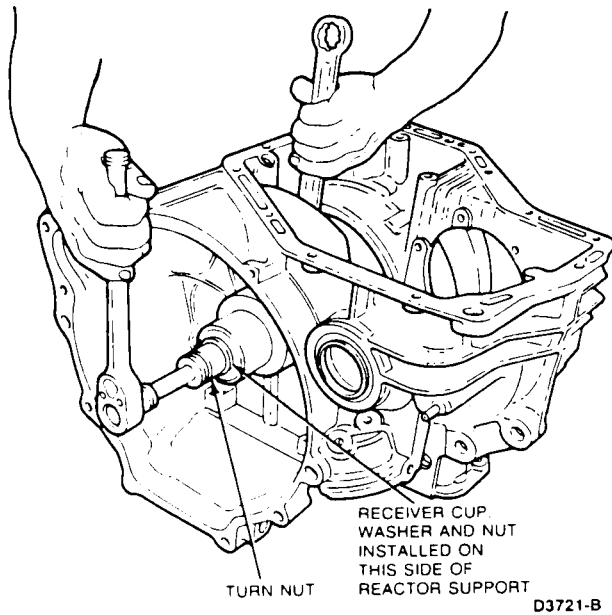




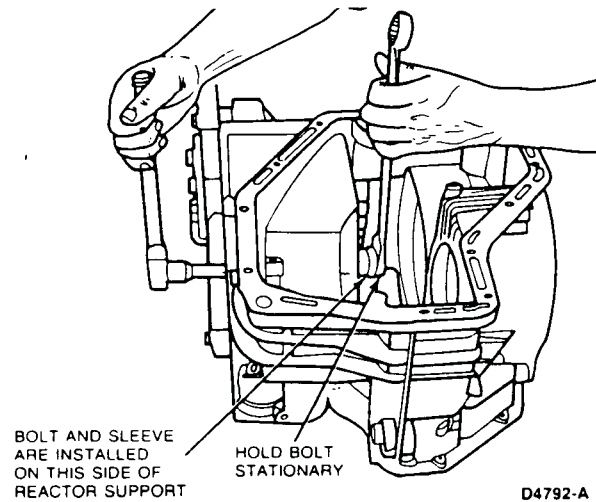
## Technical Service Information

### MAJOR SERVICE OPERATIONS (Continued)

2. Assemble removal tool and remove reactor support from case.



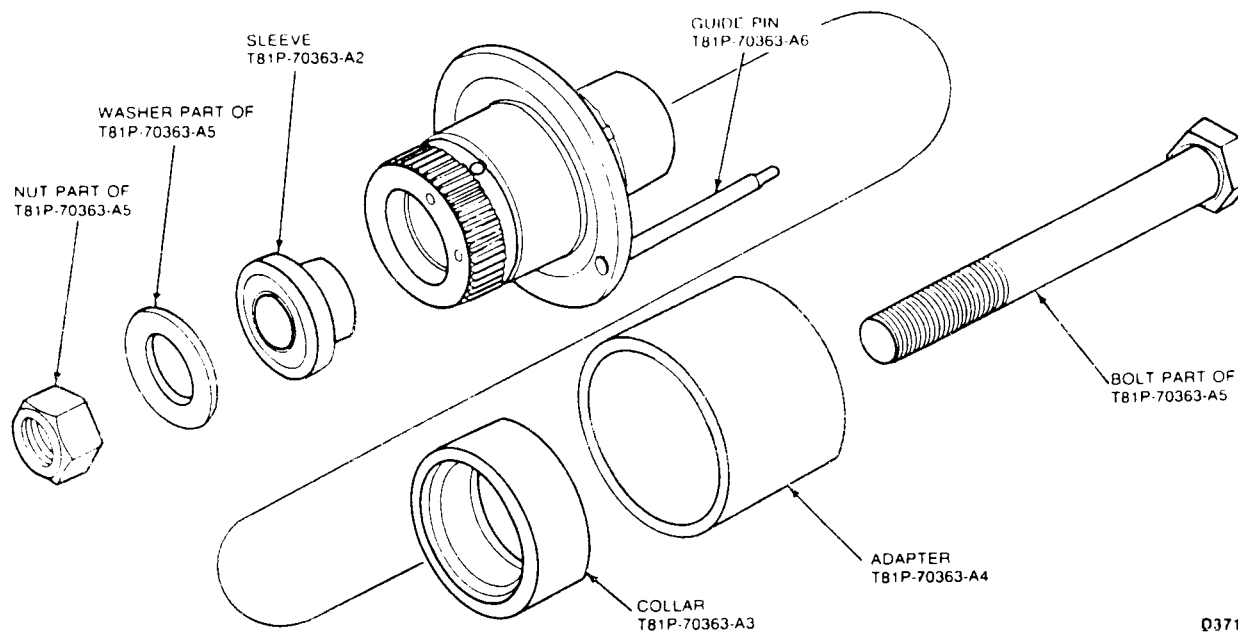
D3721-B



D4792-A

### Installation Tools

#### TOOL ARRANGEMENT FOR INSTALLATION T81P-70363-A

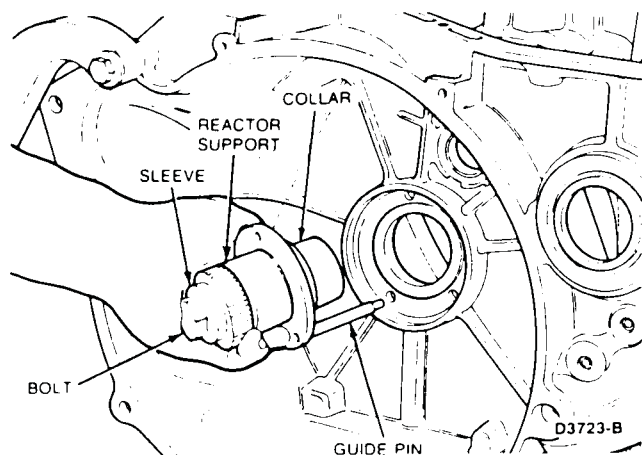


Q3719-B

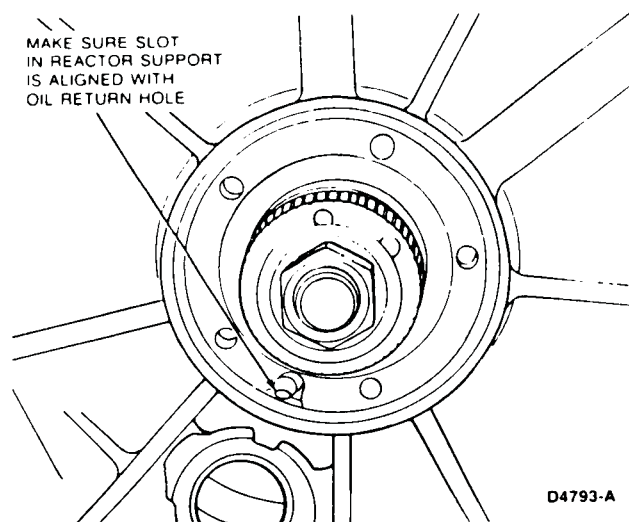
## MAJOR SERVICE OPERATIONS (Continued)

### Installation

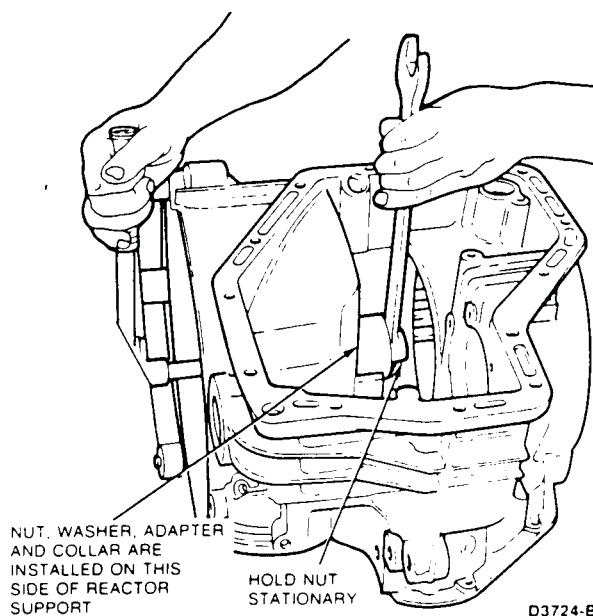
1. Install bolt, guide pin, sleeve and collar on reactor support.



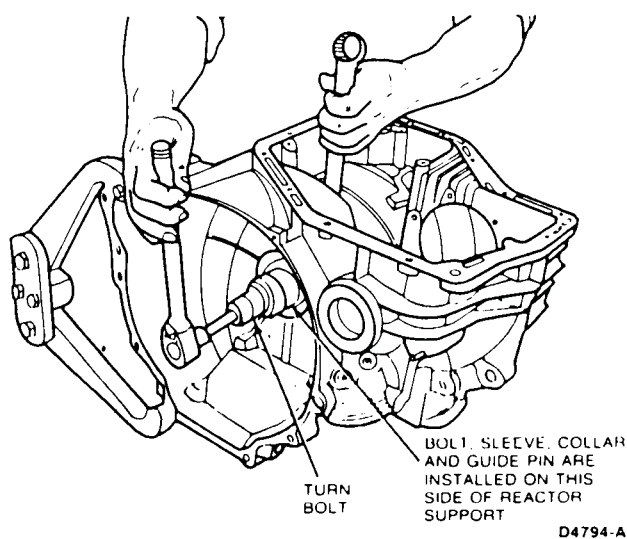
2. Position this assembly in the case making sure slot in reactor support is aligned with oil return hole in case.



3. Position adapter in case and install bolt.  
Install nut and washer on bolt.



With tool properly assembled, pull reactor support into case.



4. Remove guide pin and install attaching bolts. Tighten bolts to 8-11 N·m (6-8 lb-ft).

## MAJOR SERVICE OPERATIONS (Continued)

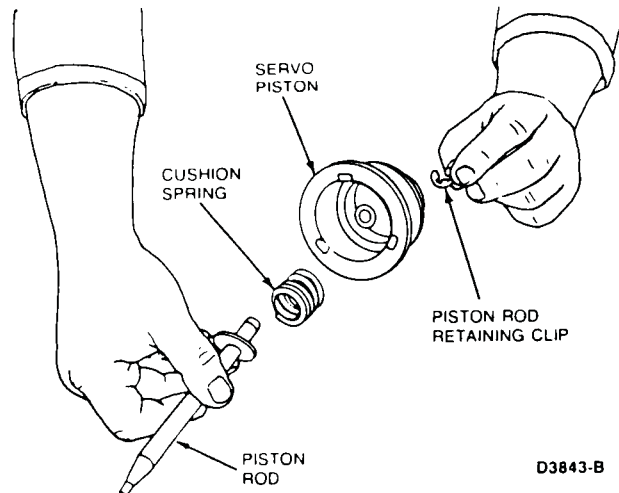
### Servo Travel Check

NOTE: The following procedure need be performed only if one of the components listed below is being replaced during assembly of the transaxle.

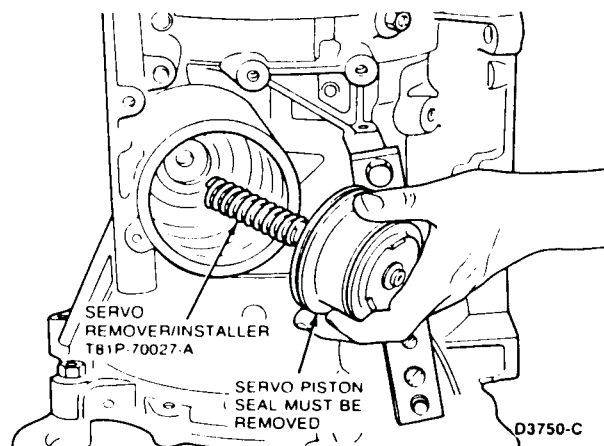
- Transaxle Case
- Band Assembly
- Drum and Sun Gear Assembly
- Servo Piston Rod
- Servo Piston
- Band Anchor Strut

1. If necessary clean and assemble the servo piston.

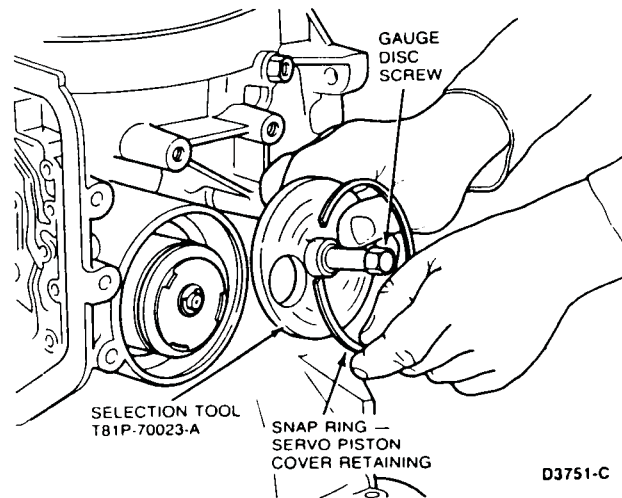
NOTE: Do not install piston seals. This check is performed without seals on piston.



2. Install Servo Remover/Installer T81P-70027-A or equivalent on piston rod and position piston in case.



3. Install Selection Tool T81P-70023-A or equivalent and secure in case using servo cover snap ring.
4. Tighten gauge disc screw to 13.5 N·m (10 lb-ft).

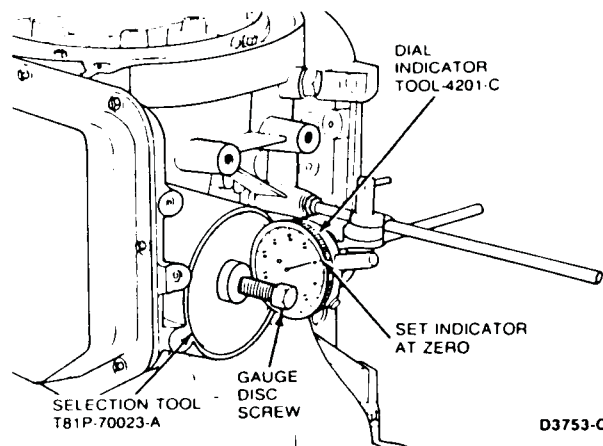


5. Mount Dial Indicator TOOL-4201-C or equivalent, and position stylus through hole in gauge disc.

Make certain indicator stylus has contacted servo piston and zero indicator.

6. Back off gauge disc screw until piston movement stops and read dial indicator.

The amount of piston travel as shown on dial indicator will determine the rod length to be installed.





## Technical Service Information

### MAJOR SERVICE OPERATIONS (Continued)

7. Select a new piston rod using the measurement obtained in Step 6. Install piston rod and repeat Steps 1 through 6 to verify amount of piston travel.

#### PISTON ROD SIZES

ID	Rod Length*	
	MM	Inch
0 Groove	160.22-160.52	6.313-6.324
1 Groove	159.61-159.90	6.289-6.300
2 Grooves	159.00-159.30	6.265-6.276
3 Grooves	158.39-158.69	6.240-6.252
4 Grooves	157.78-158.08	6.216-6.189
5 Grooves	157.17-157.47	6.197-6.209

\*From far end of snap ring groove to end of rod

CD3842-B

If the dial indicator reads:

**LESS THAN 5.15mm (.203 inch)**

The piston rod is too long. A shorter rod (more grooves) will have to be installed.

**MORE THAN 7.04mm (.247 inch)**

The piston rod is too short. A longer rod (less grooves) will have to be installed.

**5.15-7.04mm (.203-.247 inch)**

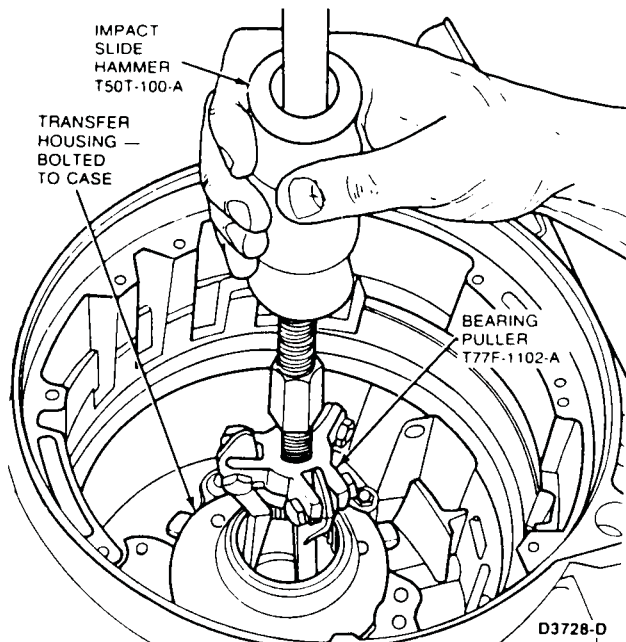
The piston rod is the correct length and no change is required.

CD3495-D

### Transfer Housing Bearing

#### Removal

1. Position transfer housing in case and install attaching bolts.
2. Remove bearing using Bearing Puller T77F-1102-A and Impact Slide Hammer T50T-100-A or equivalent.



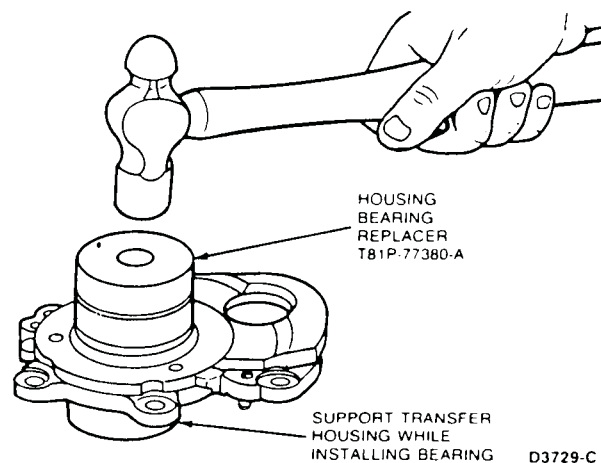
3. Remove transfer housing.

#### Installation

With transfer housing removed from case, install the bearing using Housing Bearing Replacer T81P-77380-A or equivalent.

**CAUTION: Support housing from underneath while installing bearing.**

**NOTE: The transmission case and transfer housing are matched parts. If one is damaged, both must be replaced.**

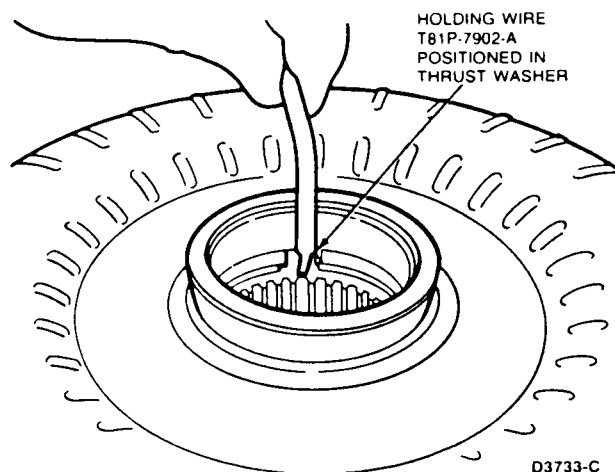




## MAJOR SERVICE OPERATIONS (Continued)

### Torque Converter Reactor One-Way Clutch Check

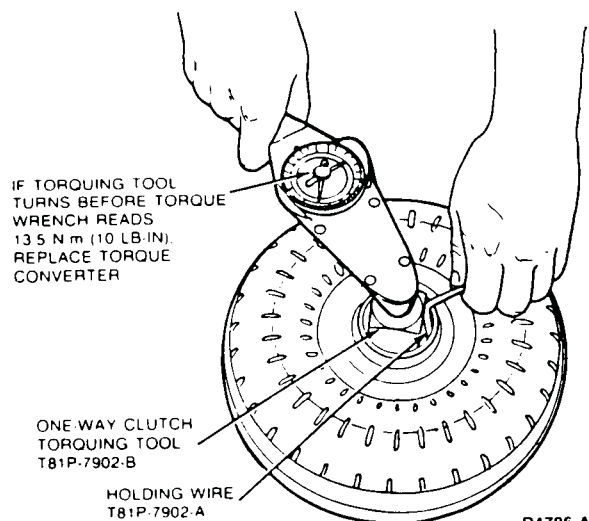
1. Position Holding Wire T81P-7902-A or equivalent, with slot in thrust washer.



2. While holding wire in position install One-Way Clutch Torquing Tool T81P-7902-B or equivalent in reactor spline.

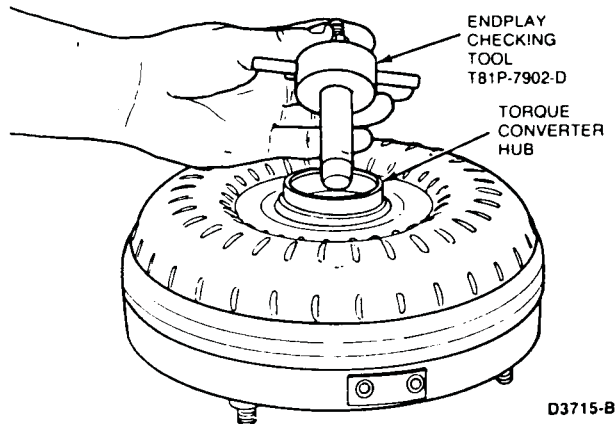
Continue holding wire and turn torquing tool counterclockwise with a torque wrench.

If torquing tool begins to turn before torque wrench reads 13.5 N·m (10 lb-ft), replace converter.

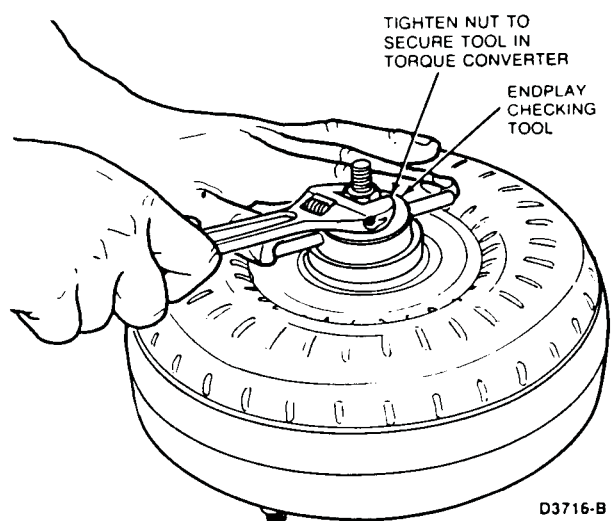


### Torque Converter End Play Check

1. Position End Play Checking Tool T81P-7902-D or equivalent in torque converter hub.



2. Tighten nut on end play checking tool.

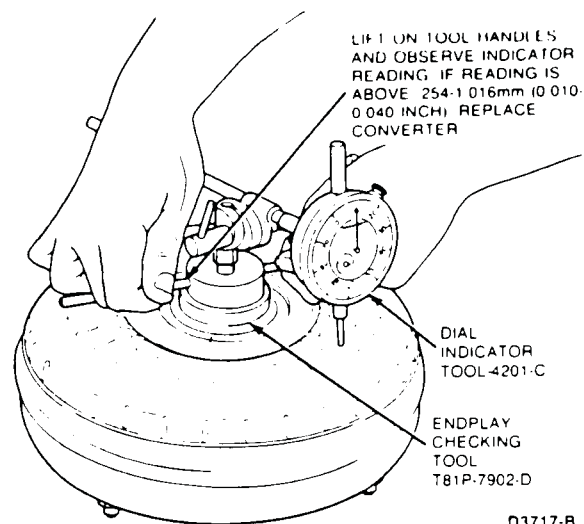


## MAJOR SERVICE OPERATIONS (Continued)

3. Mount Dial Indicator TOOL-4201-C or equivalent on end play checking tool.

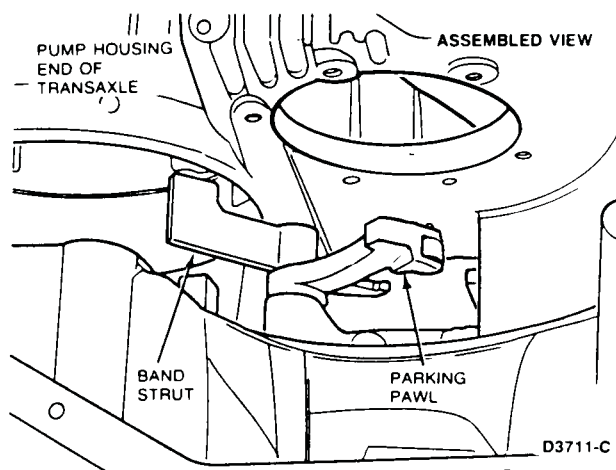
With stylus contacting converter shell and with indicator zeroed, lift on checking tool handles.

If indicator reading is above 0.254-1.016mm (0.010-0.040 inch), replace the converter.

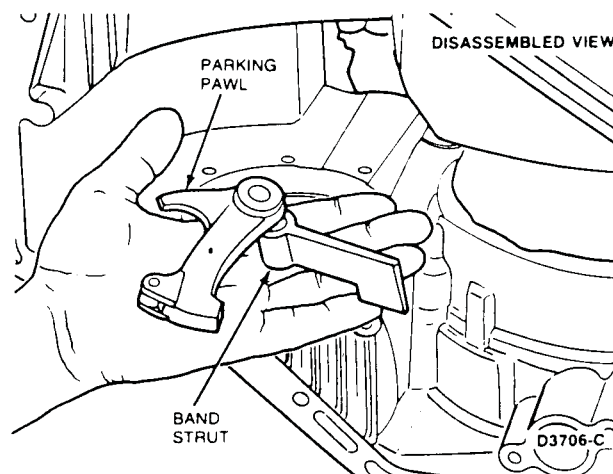


D3717-B

## Parking Pawl and Band Strut



D3711-C

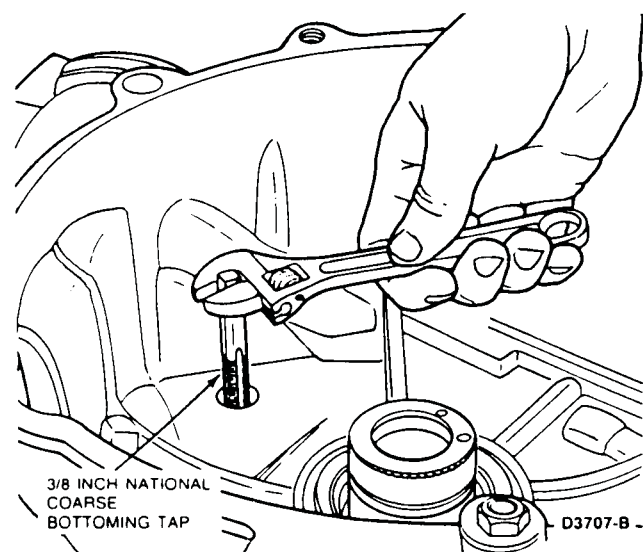


D3706-C

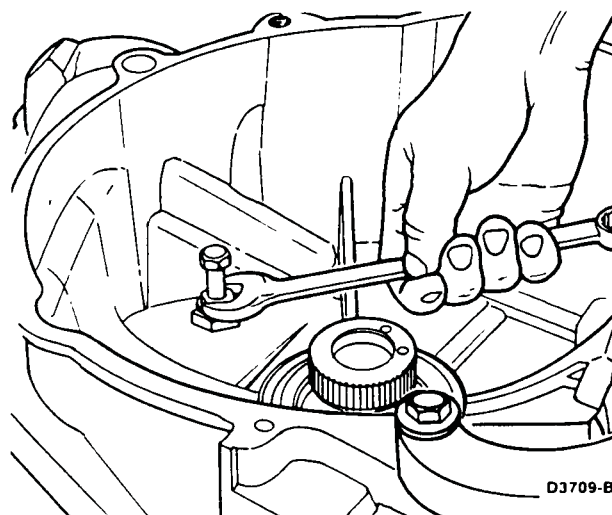
## MAJOR SERVICE OPERATIONS (Continued)

### Removal

1. Thread plug using a 3/8 inch national coarse tap. The tap has to be of the bottoming type.

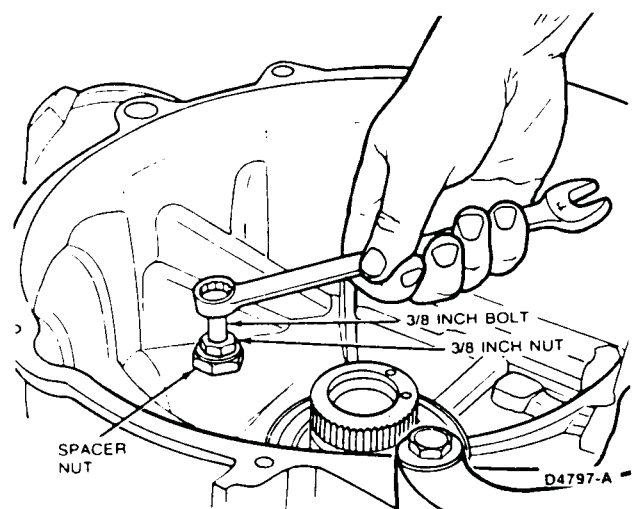


3. To remove plug, thread nut installed on bolt downward against spacer nut.

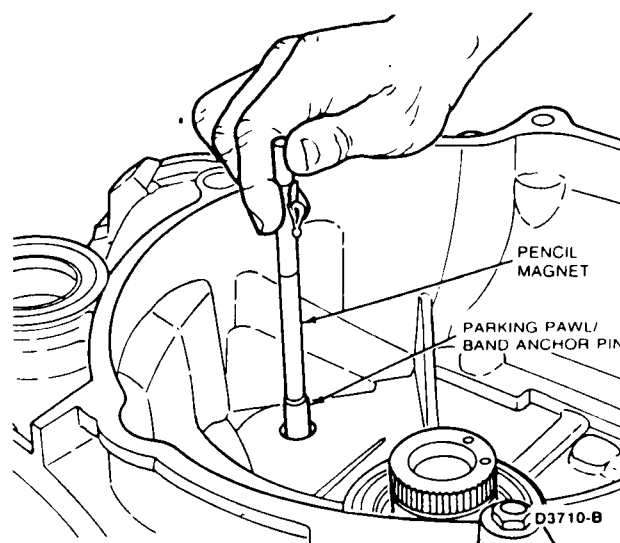


2. Position a nut over the plug to act as a spacer. The hole in the nut has to be larger than the diameter of the plug.

With spacer in position, install a nut on a 3/8-inch 16 national coarse bolt and thread bolt into plug.

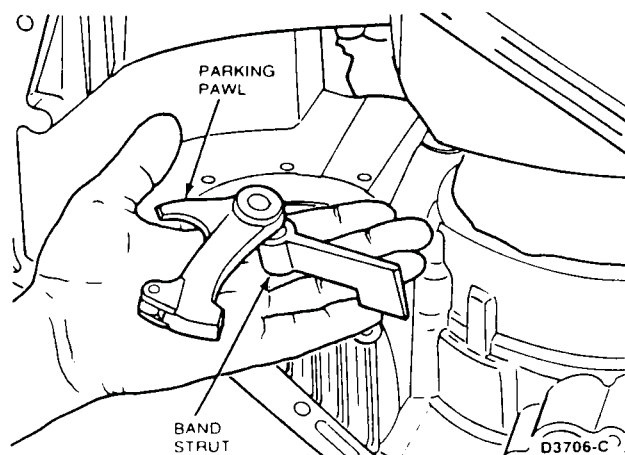


4. Remove parking pawl/band anchor pin using a magnet. Because of the tight fit between the components, it may be necessary to work the parking pawl and band strut up and down while removing pin.

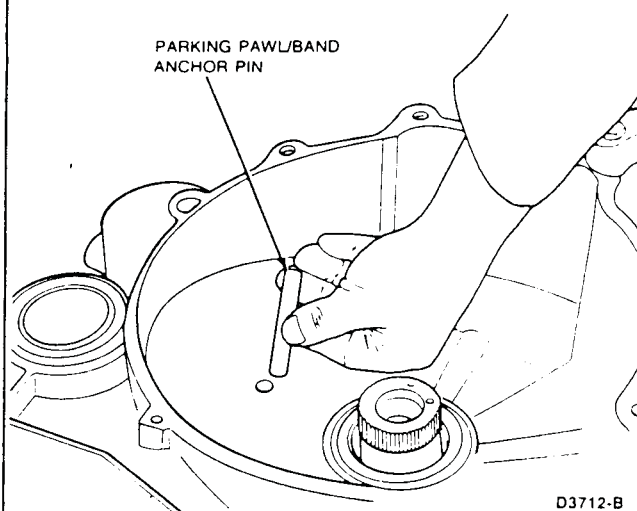


## MAJOR SERVICE OPERATIONS (Continued)

5. Remove parking pawl and band anchor from case.



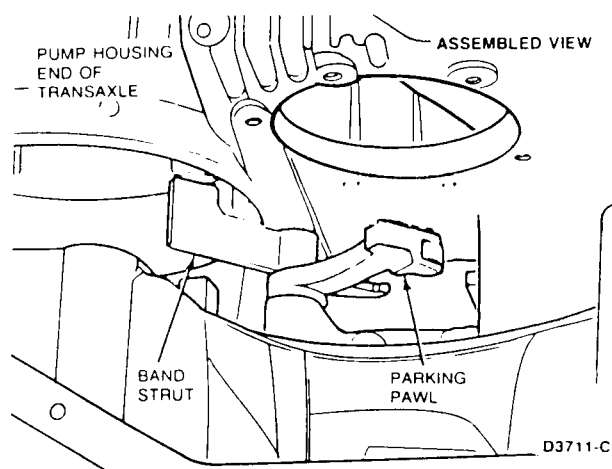
2. Install parking pawl/band anchor pin in case.



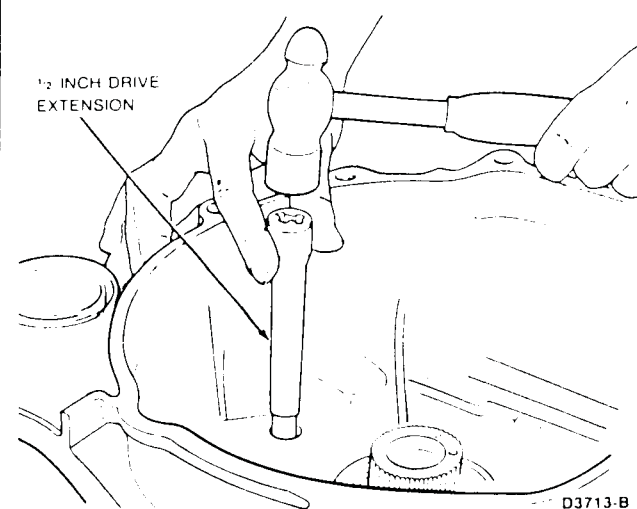
### Installation

1. Position parking pawl and band anchor in case.

Note that band strut is positioned closest to the pump housing end of the transaxle.



3. Position plug in case and seat in case.





## Technical Service Information

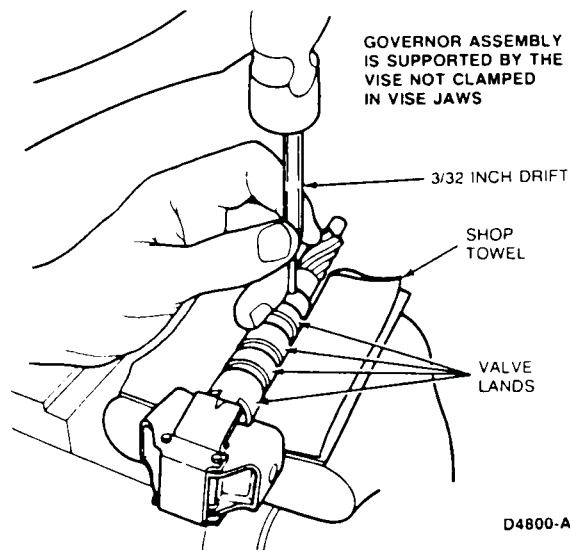
### MAJOR SERVICE OPERATIONS (Continued)

#### Governor Driven Gear

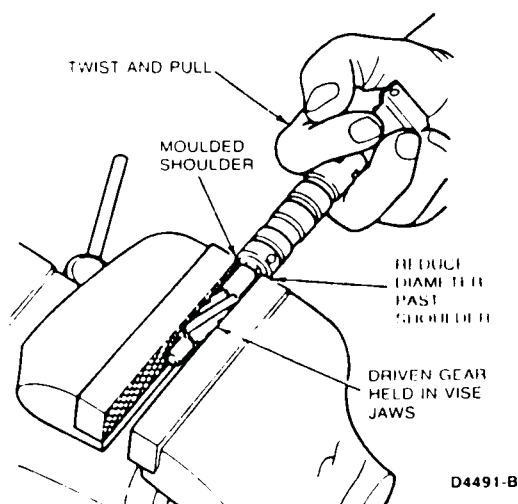
##### Disassembly

1. Support governor assembly on a vise and remove the 3/32-inch roll pin using a drift.

NOTE: Care must be taken not to damage governor body valve lands. Governor assembly is supported by vise, not clamped in vise jaws.

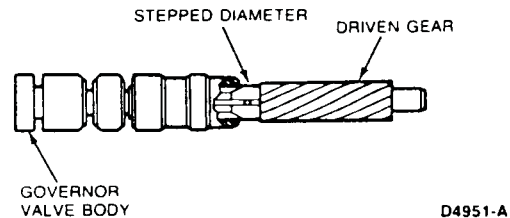


2. Clamp plastic driven gear in the vise. Grip governor body firmly, then twist and pull at same time.



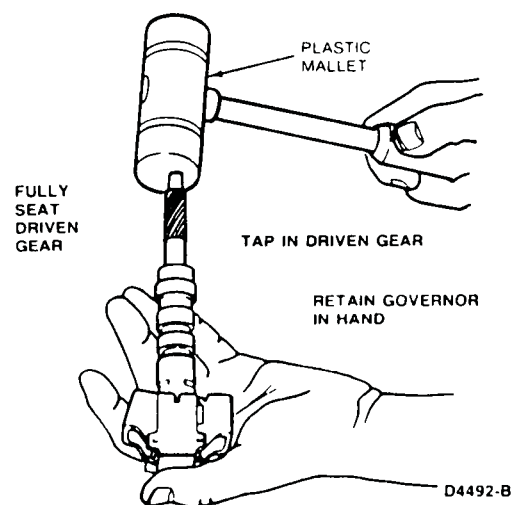
##### Assembly

1. Align driven gear to governor body driven gear bore. Press new driven gear into body as far as possible by hand.



2. Make sure driven gear is properly aligned to governor body then carefully tap driven gear into position with a plastic mallet.

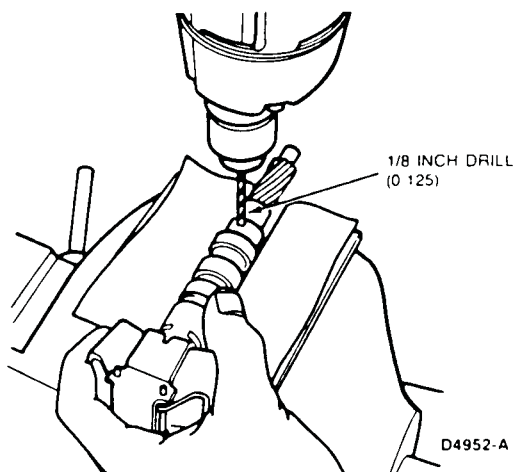
NOTE: Driven gear is in position when moulded shoulder is seated against governor body.



## MAJOR SERVICE OPERATIONS (Continued)

3. Drill a 1/8 inch hole through the plastic driven gear.

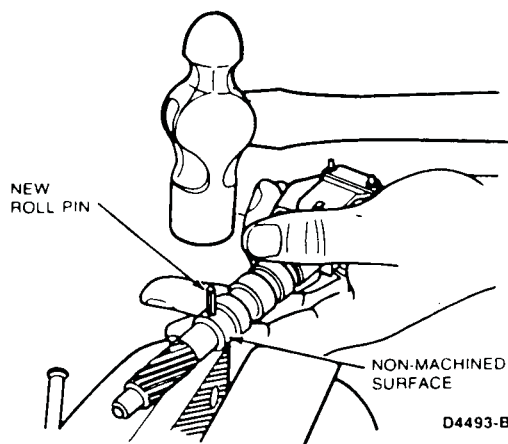
**NOTE:** Use a drill press, if possible. Proper alignment of the drill is imperative to prevent damaging the governor body.



D4952-A

4. Tap in new roll pin. Do not reuse old roll pin.

**NOTE:** The governor body must be supported on a non-machined surface.



D4493-B

### Transaxle Fluid Drain and Refill

Normal maintenance and lubrication requirements do not necessitate periodic automatic transaxle fluid changes. If a major service, such as a clutch band, bearing, etc., is required in the transaxle, it will have to be removed for service. **At this time the converter, transaxle cooler and cooler lines must be thoroughly flushed to remove any dirt.**

When used under continuous or severe conditions the transaxle and torque converter should be drained and refilled with fluid as specified.

**CAUTION: Use of a fluid other than specified could result in transaxle malfunction and/or failure.**

Refer to Vehicle Certification Label affixed to left front door lock face panel or door pillar for transaxle code.

When filling a dry transaxle and converter, refer to Specifications for capacity. Check the fluid level following the room temperature checking procedures.

Procedures for partial drain and refill, due to in-vehicle service operation, are as follows:

1. Raise vehicle on a hoist or jack stands. Refer to the Pre-Delivery manual, Section 50-04.
2. Place a drain pan under transaxle.
3. Loosen pan attaching bolts and drain fluid from transaxle.
4. When fluid has drained to level of pan flange, remove rest of pan bolts working from rear and both sides of pan to allow it to drop and drain slowly.
5. When all fluid has drained from transaxle, remove and thoroughly clean the pan. Discard gasket.
6. Place a new gasket on pan, and install pan on transaxle.
7. Fill transaxle to correct level.
8. Lower vehicle.

### Oil Cooler Tube Leakage

When fluid leakage is found at the oil cooler, the cooler must be replaced. Refer to Section 27-03.

When one or more of the fluid cooler steel tubes must be replaced, each replacement tube must be fabricated from the same size steel tubing as the original line.

Using the old tube as a guide, bend the new tube as required. Add the necessary fittings, and install the tube.

After the fittings have been tightened, add fluid as needed and check for fluid leaks.





## Technical Service Information

### CLEANING AND INSPECTION (Continued)

#### Input Idler and Final Drive Gears

Inspect the gear teeth. They should be smooth with a uniform contact pattern without signs of excessive wear. Replace any gear that is cracked, chipped, broken or excessively worn.

#### Idler Gear Bearings

Wash the idler gear bearings thoroughly in cleaning solvent. Blow the bearings dry with compressed air.

**CAUTION: Do not allow bearings to spin; turn them slowly by hand. Air spinning of the bearings will result in damage to the bearing races and rollers.**

Make certain the bearings are clean, then lubricate with transmission fluid. Refer to the Tapered Roller Bearing Diagnosis chart for specific bearing conditions.

#### Thrust Bearings

Wash the thrust bearings thoroughly in cleaning solvent. Blow the bearings dry with compressed air.

Make certain the bearings are clean and then lubricate with transmission fluid. Replace any bearings and races which show signs of pitting or roughness.

**NOTE:** This bearing is serviced only as part of the transfer housing assembly.

#### Stator to Impeller Interference Check

1. Position the stator support assembly on a bench with the spline end of the stator shaft pointing up.
2. Mount a converter on the stator support with the splines on the one-way clutch inner race engaging the mating splines of the stator support.
3. Hold the stator support stationary, and try to rotate the converter counterclockwise. The converter should rotate freely without any signs of interference or scraping within the converter assembly.
4. If there is an indication of scraping, the trailing edges of the stator blades may be interfering with the leading edges of the impeller blades. In such cases, replace the converter.

#### Stator to Turbine Interference Check

1. Position the converter on the bench, front side down.
2. Install a stator support assembly to engage the mating splines of the stator support and stator, and pump drive gear lugs.
3. Install the turbine shaft, engaging the splines with the turbine hub.
4. Hold the stator support stationary and attempt to rotate the turbine with the turbine shaft. The turbine should rotate freely in both directions without any signs of interference or scraping noise.
5. If interference exists, the stator front thrust washer may be worn, allowing the stator to hit the turbine. In such cases, the converter must be replaced.

The converter crankshaft pilot should be checked for nicks or damaged surfaces that could cause interference when installing the converter into the crankshaft. Check the converter hub for nicks or sharp edges that would damage the converter seal.

#### Stator Support

Inspect the stator support splines for burrs and wear.

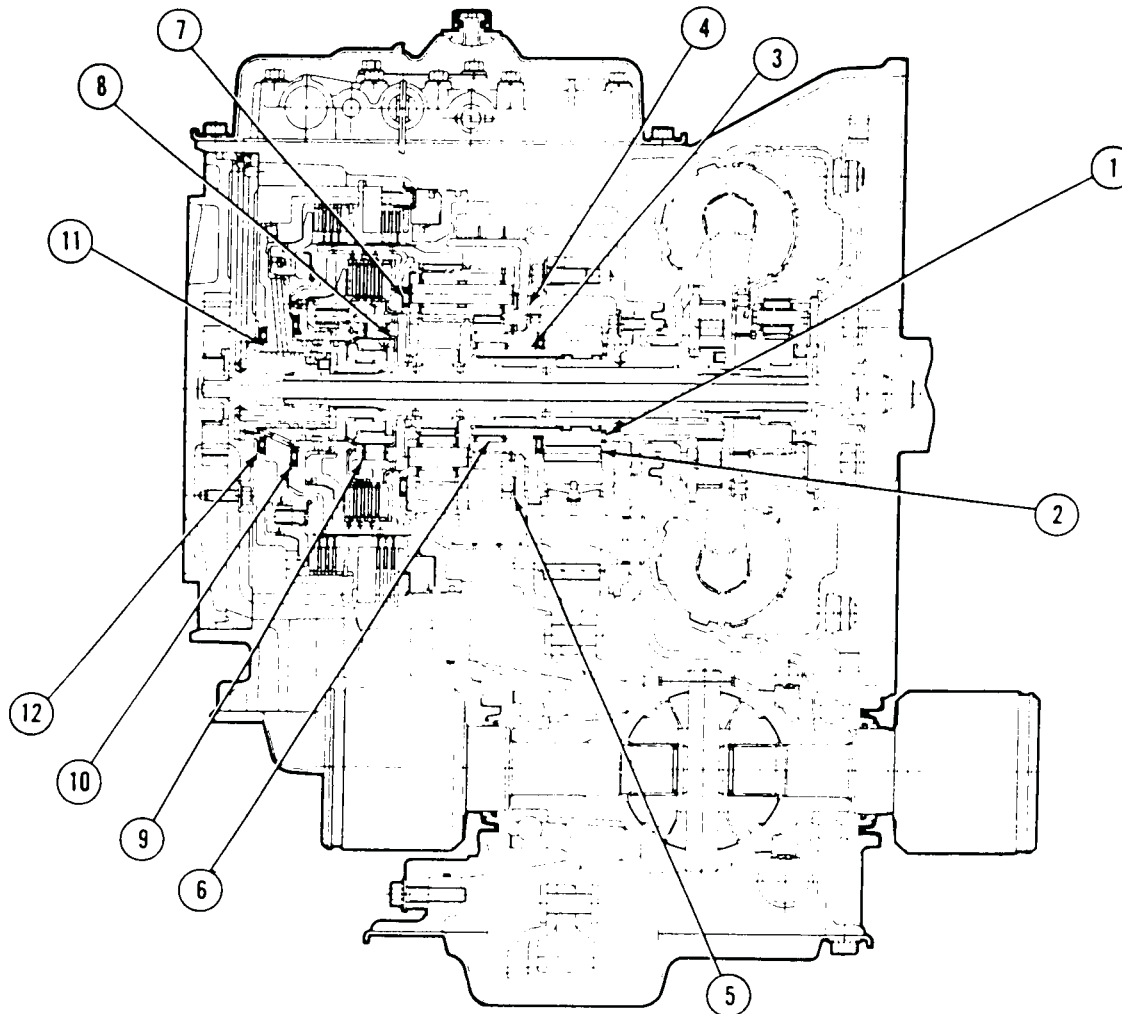
#### Converter and Oil Cooler

When internal wear or damage has occurred in the transaxle, metal particles, clutch plate material, or band material may have been carried into the converter and oil cooler. These contaminants are a major cause of recurring transaxle troubles and **MUST** be removed from the system before the transaxle is put back into service.

Whenever a transaxle has been disassembled to replace worn or damaged parts or because the valve body sticks from foreign material, the converter and oil cooler **MUST** be cleaned by using a mechanically agitated cleaner, such as Rotunda model 014-00028 or equivalent.



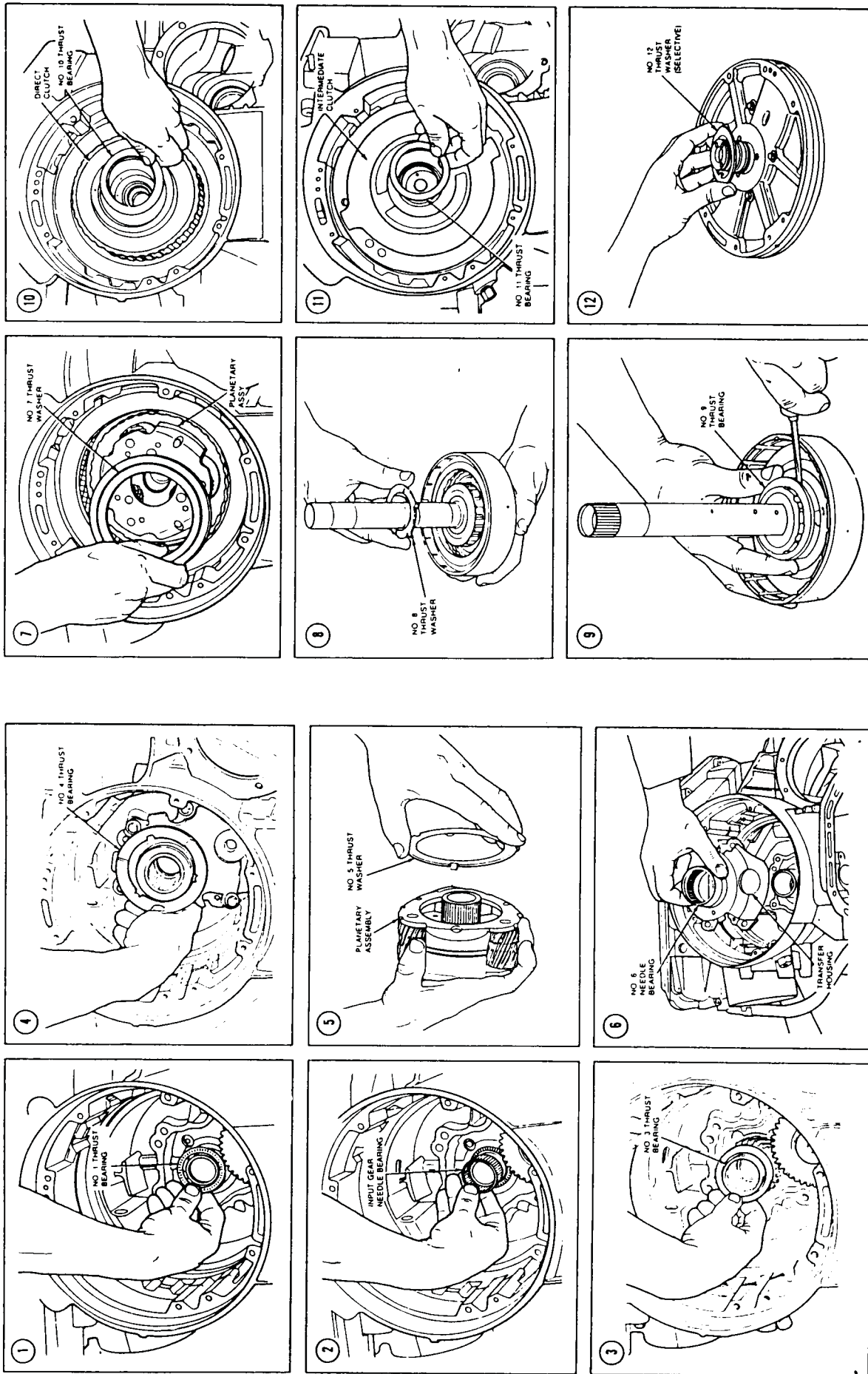
## Thrust Bearing-Washer Locator



AUTOMATIC TRANSMISSION SERVICE GROUP



# Technical Service Information





## Technical Service Information

### SPECIFICATIONS

#### FLUID CAPACITY

Liters	Quarts
7.65	8.1

CD3880-C

Description	N-m	Lb-Ft
Cooler Line Fittings at Radiator	11-16 ①	8-12
Transaxle	24-31 ①	18-23
Cooler Line Nut	16-24	12-18
Push Connector Fitting to Transaxle	24-31	18-23
Tube Nut to Connector	16-24	12-18
Threaded Connector to Oil Cooler	11-16	8-12

① 1/4 inch x 18 Straight Pipe Fitting

CD4507-B

#### CLUTCH PACK PLATE USAGE AND CLEARANCE

##### Reverse Clutch

Steel	Friction	Clearance	Selective Snap Ring — Thickness
3	3	0.76-1.40mm (0.030-0.055 in.)	1.24-1.34mm (0.049-0.053 in.) 1.68-1.78mm (0.066-0.070 in.) 2.11-2.21mm (0.083-0.087 in.) 2.53-2.63mm (0.099-0.103 in.)

##### Direct Clutch

Steel	Friction	Clearance	Selective Snap Ring — Thickness
3*	3*	0.78-1.20mm (0.031-0.048 in.)	1.26-1.36mm (0.050-0.054 in.) 1.58-1.68mm (0.062-0.066 in.) 1.90-2.00mm (0.075-0.079 in.)

##### Intermediate Clutch

Steel	Friction	Clearance	Selective Snap Ring — Thickness
3	3	0.75-1.12mm (0.030-0.044 in.)	1.24-1.34mm (0.049-0.053 in.) 1.51-1.61mm (0.060-0.064 in.) 1.78-1.88mm (0.071-0.075 in.)

\*With Cushion Spring

CD3873-G

#### CLUTCH AND BAND APPLICATION CHART

Gear	Band	Direct Clutch	Intermediate Clutch	Reverse Clutch	Intermediate One-Way Clutch
1st Gear Manual Low	Applied	Applied			Holding
2nd Gear Manual Low	Applied		Applied		
1st Gear (Drive)	Applied				Holding
2nd Gear (Drive)	Applied		Applied		
3rd Gear (Drive)		Applied	Applied		
Reverse (R)		Applied		Applied	Holding
Neutral (N)					Holding
Park (P)					Holding

CD3874-B

Description	N-m	Lb-Ft	Description	N-m	Lb-Ft
Reactor Support to Case	8-11	6-8	Transmission Oil Pan to Case	20-26	15-19
Separator Plate to Valve Body	8-11	6-8	Lower Ball Joint to Steering Knuckle	50-60	37-44
Filler Tube Bracket to Case	9-12	7-9	Transfer Housing to Case	24-32	18-23
Filter to Case	9-12	7-9	Differential Retainer to Case (with sealant)	20-26	15-19
Valve Body Cover to Case	9-12	7-9	Pressure Test Port Plugs to Case	5-11	4-8
Pump Support to Pump Body	8-11	6-8	Outer Throttle Lever to Shaft Nut	10-13	7.5-9.5
Neutral Safety Switch to Case	9-12	7-9	Inner Manual Lever to Shaft Nut	43-65	32-48
Pump Assembly to Case	9-12	7-9	Idler Shaft Attaching	108-136	80-100
Valve Body to Case	8-11	72-96 (lb-in)			

CD3500-E