42LE TRANSAXLE

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DESCRIPTION AND OPERATION

42LE TRANSAXLE

DESCRIPTION

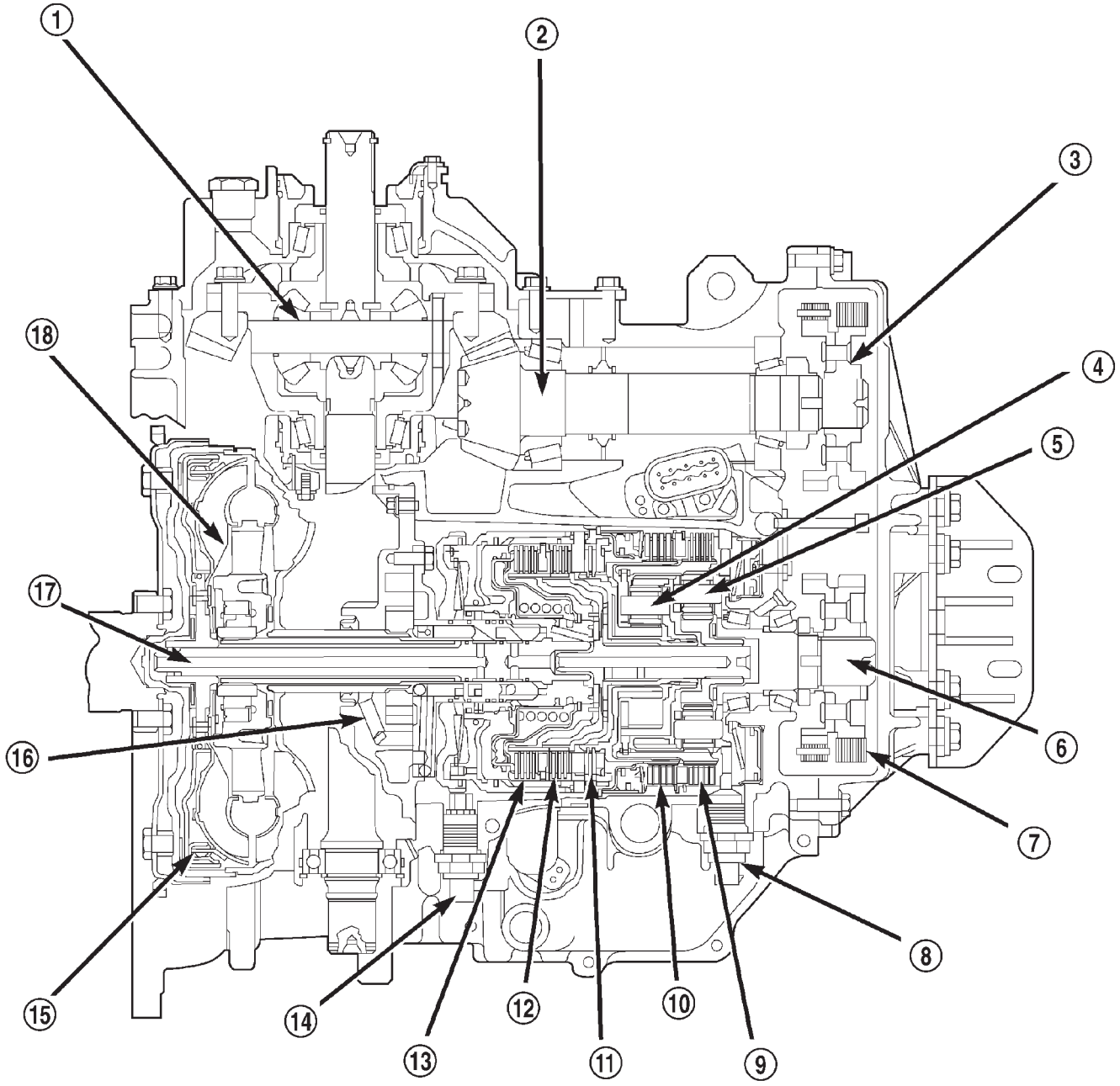

Fig. 1 42LE Transaxle

DESCRIPTION AND OPERATION (Continued)

1 – DIFFERENTIAL
2 – TRANSFER SHAFT
3 – TRANSFER GEAR
4 – FRONT PLANETARY CARRIER
5 – REAR PLANETARY CARRIER
6 – OUTPUT SHAFT
7 – OUTPUT GEAR
8 – OUTPUT SPEED SENSOR
9 – LOW/REVERSE CLUTCH
10 – 2/4 CLUTCH
11 – REVERSE CLUTCH
12 – OVERDRIVE CLUTCH
13 – UNDERDRIVE CLUTCH
14 – INPUT SPEED SENSOR
15 – CONVERTER CLUTCH
16 – OIL PUMP
17 – INPUT SHAFT
18 – TORQUE CONVERTER

The 42LE (Fig. 1) is a four-speed transaxle that is a conventional hydraulic/mechanical assembly with an integral differential, and is controlled with adaptive electronic controls and monitors. The hydraulic system of the transaxle consists of the transaxle fluid, fluid passages, hydraulic valves, and various line pressure control components. An input clutch assembly which houses the underdrive, overdrive, and reverse clutches is used. It also utilizes separate holding clutches: 2nd/4th gear and Low/Reverse. The primary mechanical components of the transaxle consist of the following:

- Three multiple disc input clutches
- Two multiple disc holding clutches
- Four hydraulic accumulators
- Two planetary gear sets
- Hydraulic oil pump
- Valve body
- Solenoid/Pressure switch assembly
- Integral differential assembly

Control of the transaxle is accomplished by fully adaptive electronics. Optimum shift scheduling is accomplished through continuous real-time sensor feedback information provided to the Transmission Control Module (TCM).

The TCM is the heart of the electronic control system and relies on information from various direct and indirect inputs (sensors, switches, etc.) to determine driver demand and vehicle operating conditions. With this information, the TCM can calculate and perform timely and quality shifts through various output or control devices (solenoid pack, transmission control relay, etc.).

The TCM also performs certain self-diagnostic functions and provides comprehensive information (sensor data, DTC's, etc.) which is helpful in proper diagnosis and repair. This information can be viewed with the DRB scan tool.

TRANSAXLE IDENTIFICATION

The 42LE transaxle identification code is a series of digits printed on a bar-code label that is fixed to the transaxle case as shown in (Fig. 2).

For example, the identification code K 821 1125 1316 can be broken down as follows:

- K = Kokomo Transmission Plant
- 821 = Last three digits of the transaxle part number
- 1125 = Build date
- 1316 = Build sequence number

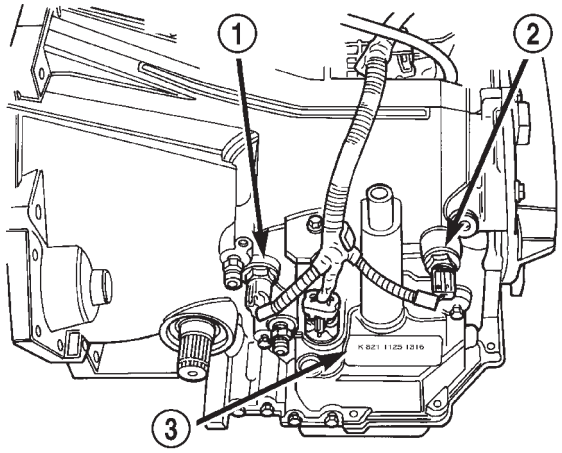

Fig. 2 Transaxle Identification Label

1 – INPUT SPEED SENSOR
2 – OUTPUT SPEED SENSOR
3 – IDENTIFICATION TAG

If the tag is not legible or missing, the "PK" number, which is stamped into the transaxle case, can be referred to for identification. This number differs slightly in that it contains the entire transaxle part number, rather than the last three digits.

OPERATION

Transmission output is directed to an integral differential by a transfer gear system in the following input-to-output ratios:

First	2.84 : 1
Second	1.57 : 1
Third	1.00 : 1
Overdrive	0.69 : 1
Reverse	2.21 : 1

DESCRIPTION AND OPERATION (Continued)

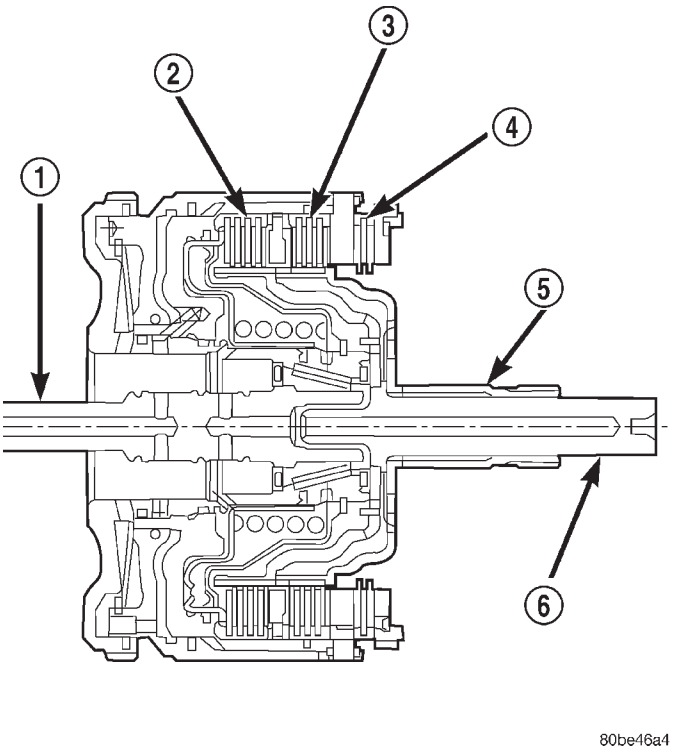

Fig. 10 Input Clutch Assembly

1 – INPUT SHAFT
2 – UNDERDRIVE CLUTCH
3 – OVERDRIVE CLUTCH
4 – REVERSE CLUTCH
5 – OVERDRIVE SHAFT
6 – UNDERDRIVE SHAFT

drive clutch is applied, the underdrive hub drives the rear sun gear.

OVERDRIVE CLUTCH

The overdrive clutch is hydraulically applied in third (direct) and overdrive gears by pressurized fluid against the overdrive/reverse piston. When the overdrive clutch is applied, the overdrive hub drives the front planet carrier.

REVERSE CLUTCH

The reverse clutch is hydraulically applied in reverse gear only by pressurized fluid against the overdrive/reverse piston. When the reverse clutch is applied, the front sun gear assembly is driven.

HOLDING CLUTCHES

DESCRIPTION

Two hydraulically applied multi-disc clutches are used to hold planetary geartrain components stationary while the input clutches drive others. The 2/4 and Low/Reverse clutches are considered holding clutches and are contained at the rear of the transaxle case. (Fig. 11).

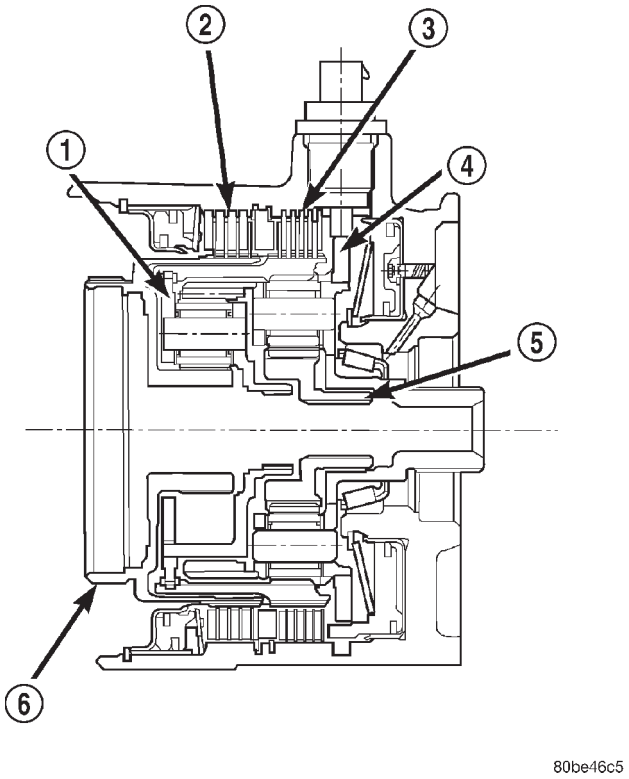

Fig. 11 2/4 and Low/Reverse Clutches

1 – FRONT PLANET CARRIER/REAR ANNULUS
2 – 2/4 CLUTCH
3 – L/R CLUTCH
4 – REAR PLANET CARRIER/FRONT ANNULUS
5 – REAR SUN GEAR
6 – FRONT SUN GEAR ASSEMBLY

OPERATION

NOTE: Refer to the "Elements In Use" chart in Diagnosis and Testing for a collective view of which clutch elements are applied at each position of the selector lever.

2/4 CLUTCH

The 2/4 clutch is hydraulically applied in second and fourth gears by pressurized fluid against the 2/4 clutch piston. When the 2/4 clutch is applied, the front sun gear assembly is held or grounded to the transaxle case.

LOW/REVERSE CLUTCH

The Low/Reverse clutch is hydraulically applied in park, reverse, neutral, and first gears by pressurized fluid against the Low/Reverse clutch piston. When the Low/Reverse clutch is applied, the front planet

DESCRIPTION AND OPERATION (Continued)

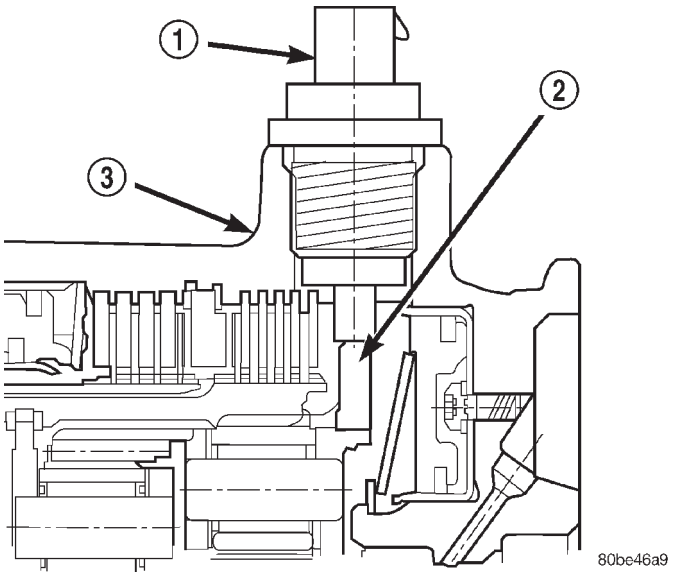

Fig. 25 Sensor Relation to Planet Carrier Park Pawl Lugs

1 – OUTPUT SPEED SENSOR
2 – REAR PLANET CARRIER/OUTPUT SHAFT ASSEMBLY
3 – TRANSAXLE CASE

signal to the Instrument Cluster to display vehicle speed to the driver. The vehicle speed signal pulse is roughly 8000 pulses per mile.

BRAKE TRANSMISSION SHIFT INTERLOCK SYSTEM (FLOOR SHIFT)

DESCRIPTION

The Brake Transmission Shifter/Ignition Interlock (BTSI) is a cable and solenoid operated system that prevents the transmission gear shifter from being moved out of PARK without a driver in place.

Refer to the following chart that expected shifter response, depending on ignition key/switch (Fig. 26) and brake pedal positions.

OPERATION

The Brake Transmission Shifter/Ignition Interlock (BTSI) is engaged whenever the ignition switch is in the LOCK or ACCESSORY position (Fig. 26). An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed at least one-half inch. A magnetic holding device integral to the interlock cable is energized when the ignition is in the ON/RUN position. When the key is in the ON/RUN position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK or ACCESSORY position, unless the shifter is in the gated PARK position.

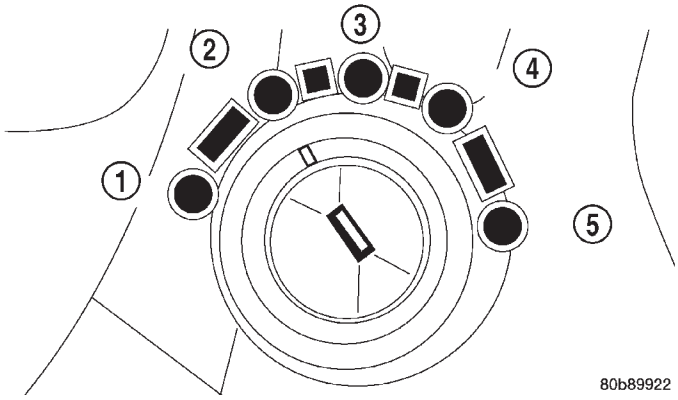

Fig. 26 Ignition Key/Switch Positions

1 – ACC
2 – LOCK
3 – OFF
4 – ON/RUN
5 – START

The following chart describes the normal operation of the Brake Transmission Shift Interlock (BTSI) system. If the “expected response” differs from the vehicle’s response, then system repair and/or adjustment is necessary.

ACTION	EXPECTED RESPONSE
1. Turn key to the “OFF” position.	1. Shifter CAN be shifted out of park.
2. Turn key to the ″ON/RUN” position.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the “ON/RUN” position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear and try to return key to the “LOCK” or ″ACC” position.	4. Key cannot be returned to the “LOCK” or “ACC” position.
5. Return shifter to “PARK” and try to remove the key.	5. Key can be removed (after returning to “LOCK” position).
6. With the key removed, try to shift out of “PARK”.	6. Shifter cannot be shifted out of “PARK”.
NOTE: Any failure to meet these expected responses requires system adjustment or repair.	

BRAKE TRANSMISSION SHIFT INTERLOCK SYSTEM (COLUMN SHIFT)

DESCRIPTION

Vehicles equipped with a column shifter utilize a brake transmission shift interlock (BTSI) solenoid, which prevents the transmission gear shifter from

SERVICE PROCEDURES (Continued)

TRANSAXLE QUICK LEARN PROCEDURE

The quick learn procedure requires the use of the DRB scan tool.

This program allows the electronic transaxle system to recalibrate itself. This will provide the best possible transaxle operation. The quick learn procedure should be performed if any of the following procedures are performed:

- Transaxle Assembly Replacement
- Transmission Control Module Replacement
- Solenoid/Pressure Switch Assembly Replacement
- Clutch Plate and/or Seal Replacement
- Valve Body Replacement or Recondition

To perform the Quick Learn Procedure, the following conditions must be met:

- The brakes must be applied
- The engine speed must be above 500 rpm
- The throttle angle (TPS) must be less than 3 degrees
- The shift lever position must stay until prompted to shift to overdrive
- The shift lever position must stay in overdrive after the Shift to Overdrive prompt until the DRB indicates the procedure is complete
- The calculated oil temperature must be above 60° and below 200°

(1) Plug the DRB scan tool into the data link connector. The connector is located under the instrument panel.

(2) Go to the Transmission screen.

(3) Go to the Miscellaneous screen.

(4) Select Quick Learn Procedure. Follow the instructions of the DRB to perform the Quick Learn Procedure.

PINION FACTOR PROCEDURE

The vehicle speed readings for the speedometer are taken from the output speed sensor. The TCM must be calibrated to the different combinations of equipment available. Pinion Factor allows the technician to set the Transmission Control Module initial setting so that the speedometer readings will be correct.

Failure to perform this procedure will cause a No Speedometer Operation condition.

This procedure must be performed if the Transmission Control Module has been replaced.

To properly read or reset the Pinion Factor, it is necessary to use a DRB scan tool. Perform the following steps with the DRB scan tool to read or reset the Pinion Factor:

(1) Plug the DRB scan tool into the data link connector located under the instrument panel.

(2) Select the Transmission menu.

(3) Select the Miscellaneous menu.

(4) Select Pinion Factor. Then follow the instructions on the DRB scan tool screen.

REMOVAL AND INSTALLATION

GEARSHIFT CABLE–COLUMN SHIFT

REMOVAL

(1) Place vehicle in park, and turn ignition key to the “LOCK” position (Fig. 40).

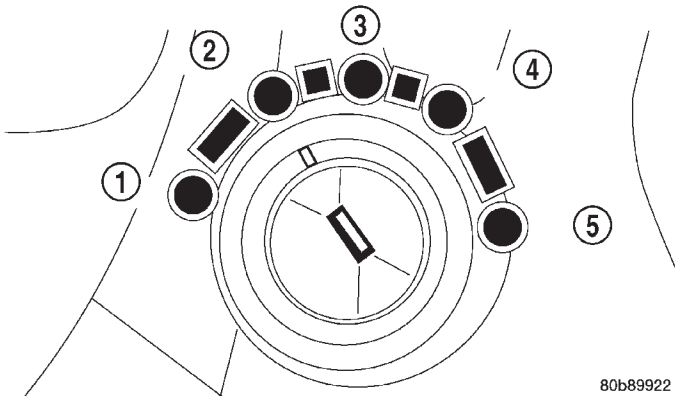

Fig. 40 Ignition Key/Switch Position

1 – ACC
2 – LOCK
3 – OFF
4 – ON/RUN
5 – START

(2) Remove under panel silencer/duct assembly (Fig. 41).

(3) Remove column cover screws (Fig. 42).

(4) Tilt column down and remove upper half of column cover (Fig. 43).

(5) Tilt the column to the uppermost postion and remove the tilt lever (Fig. 44).

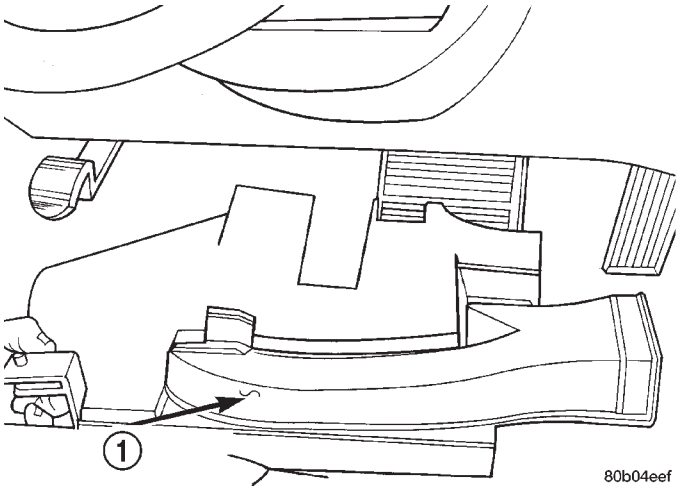

Fig. 41 Panel Removal/Installation

1 – SILENCER/DUCT ASSEMBLY

REMOVAL AND INSTALLATION (Continued)

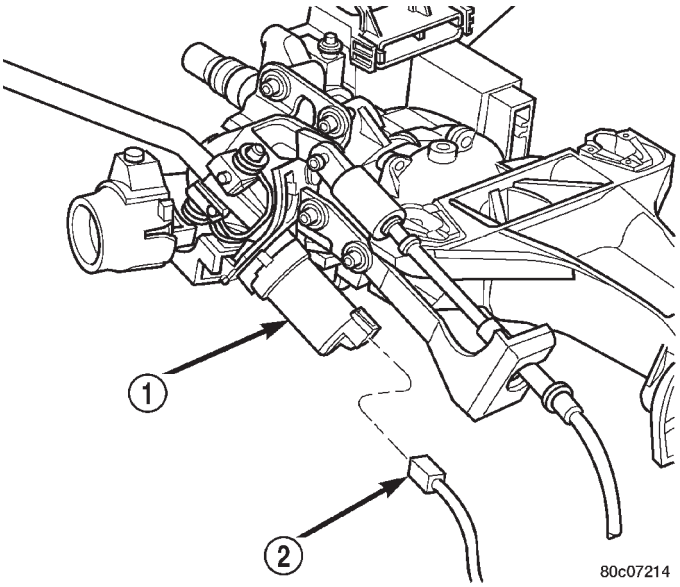

Fig. 70 Solenoid Connector

1 – BTSI SOLENOID
2 – CONNECTOR

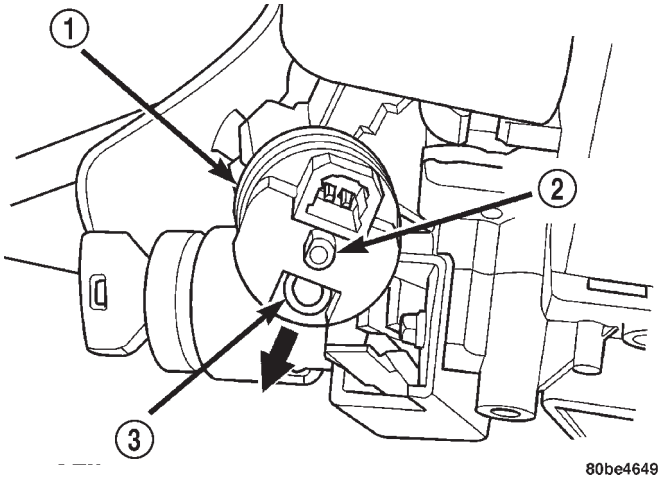

Fig. 71 Solenoid Retainer Clip Removal

1 – SOLENOID
2 – MOUNTING STUD
3 – RETAINER CLIP

(3) Install the retainer clip until it snaps into place in the slot cut into the shift lever mounting stud (Fig. 74).

(4) Verify the BTSI solenoid is locked in place and will not slide off the mounting stud.

(5) Connect the wiring harness connector to the BTSI solenoid.

(6) Verify the BTSI is operating properly. With the ignition on (engine not running) and the parking brake applied, try shifting the transmission shift lever out of the PARK position with and without the brake pedal being applied. The shift lever should

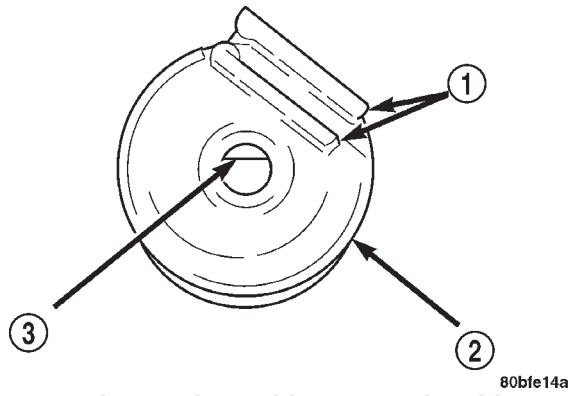

Fig. 72 Flat Inside BTSI Solenoid

1 – GUIDES
2 – SOLENOID
3 – FLAT

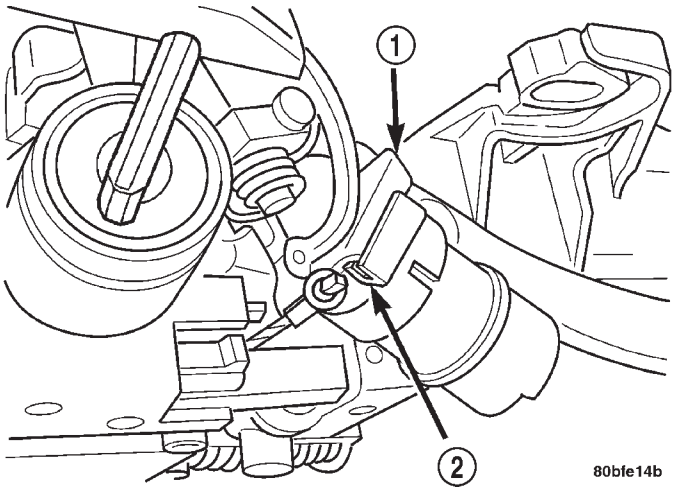

Fig. 73 Guide And Flange Alignment

1 – BRACKET FLANGE
2 – GUIDE

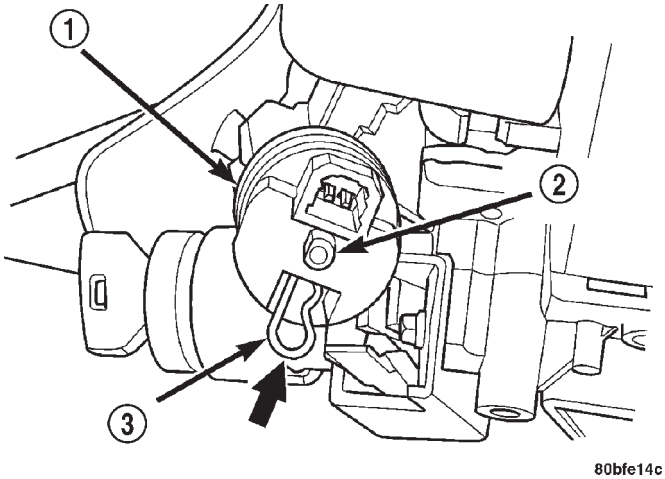

Fig. 74 Solenoid Retainer Clip Installation

1 – SOLENOID
2 – MOUNTING STUD
3 – RETAINER CLIP

REMOVAL AND INSTALLATION (Continued)

(36) Remove connector on top of transaxle for solenoid pack.

(37) The transaxle can now be lowered from the vehicle.

INSTALLATION

(1) When installing transaxle, reverse the above procedure.

CAUTION: To prevent damage to the structural collar, hand tighten all fasteners. This will ensure that the collar is flush against transmission and oil pan before torquing to specifications.

(2) If the torque converter is being replaced, apply a light coating of grease to the crankshaft pilot hole.

(3) Inspect the drive plate for cracks before reinstalling transaxle. If any cracks are found replace the drive plate. Do not attempt to repair a cracked drive plate.

CAUTION: The bolts for the torque converter are a new short-headed design. Bolts from previous year vehicles cannot be used.

(4) Always use new torque converter to drive plate bolts.

NOTE: If the transaxle assembly, TCM, solenoid pack or clutch plates have been replaced, refer to Quick Learn Procedure. This program will allow the transmission control module to compensate for any parts replaced in the electronic transaxle system.

(5) Check and/or adjust gearshift cable. Refer to Shift Linkage in this section for procedure.

(6) Refill transaxle with Mopar ATF Plus 3 (Automatic Transmission Fluid) Type 7176.

OIL PUMP SEAL REPLACEMENT

The transaxle must be removed from the vehicle to replace this oil seal.

REMOVAL

(1) Remove the transaxle from the vehicle.

(2) Remove the torque converter from the transaxle bellhousing.

(3) Use special tool C-3981B to remove oil pump seal (Fig. 105).

INSTALLATION

(1) Clean and inspect oil pump seal seat. Then install seal using special tool C-4193A (Fig. 106).

(2) Clean and inspect torque converter hub. If nicks, scratches or hub wear are found, torque converter replacement will be required.

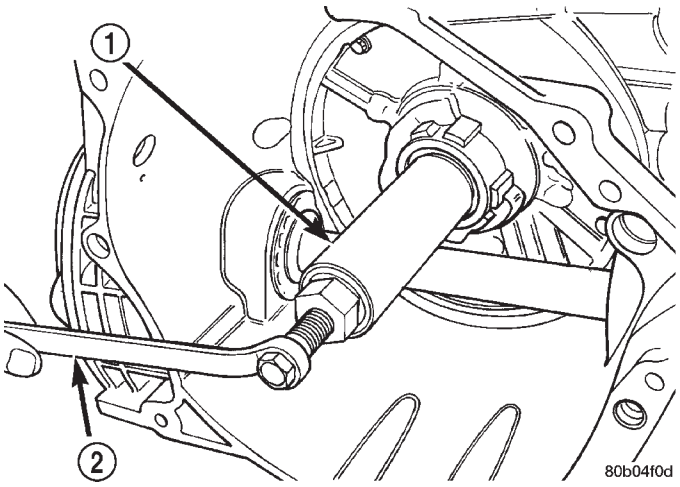

Fig. 105 Oil Seal Removal

1 – SPECIAL TOOL C-3981B
2 – WRENCH

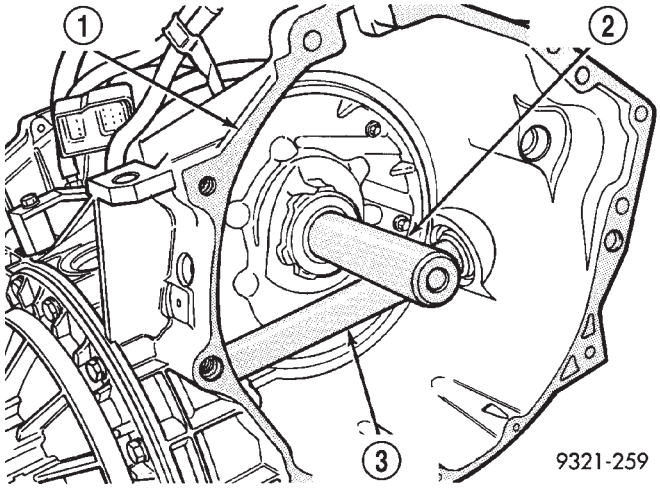

Fig. 106 Oil Seal Installation

1 – TRANSAXLE BELL HOUSING
2 – SPECIAL TOOL C-4193A
3 – LONG STUB SHAFT

CAUTION: If the torque converter is being replaced, apply a light coating of grease to the crankshaft pilot hole. Also inspect the engine drive plate for cracks. If any cracks are found replace the drive plate. Do not attempt to repair a cracked drive plate. Always use new torque converter to drive plate bolts.

(3) Apply a light film of transmission oil to the torque converter hub and oil seal lips. Then install torque converter into transaxle. Be sure that the hub lugs mesh with the front pump lugs when installing.

(4) Reinstall the transaxle into the vehicle.

DISASSEMBLY AND ASSEMBLY (Continued)

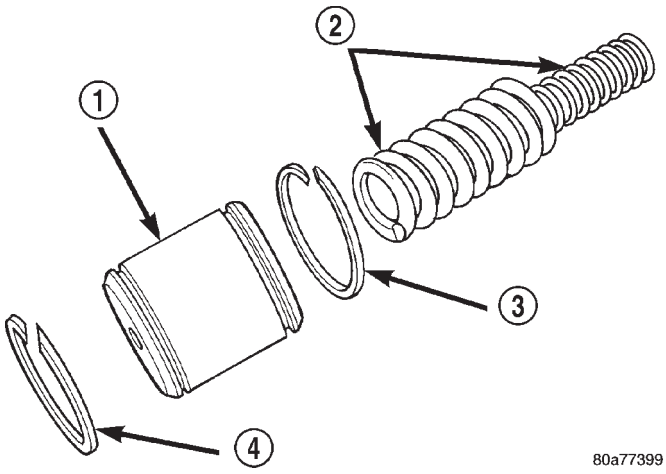

Fig. 161 Remove Underdrive Accumulator and Spring

1 – ACCUMULATOR PISTON (UNDERDRIVE)
2 – RETURN SPRINGS
3 – SEAL RING
4 – SEAL RING

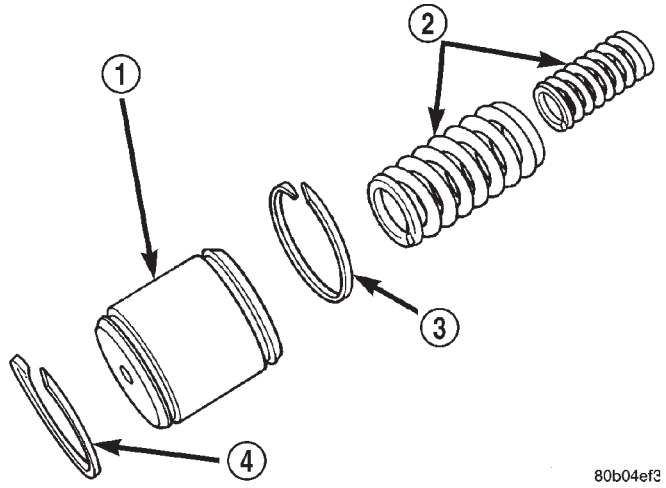

Fig. 162 Remove Overdrive Accumulator and Springs

1 – OVERDRIVE ACCUMULATOR PISTON
2 – RETURN SPRINGS
3 – SEAL RING
4 – SEAL RING

CAUTION: Tag the springs for the Overdrive Accumulator so that they are not confused with the springs in the Low/Reverse Accumulator.

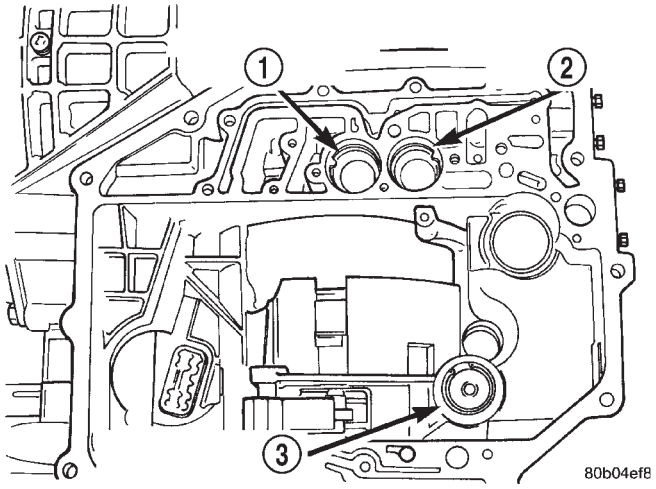

Fig. 163 Accumulator Locations

1 – OVERDRIVE ACCUMULATOR LOCATION
2 – UNDERDRIVE ACCUMULATOR LOCATION
3 – LOW/REVERSE ACCUMULATOR

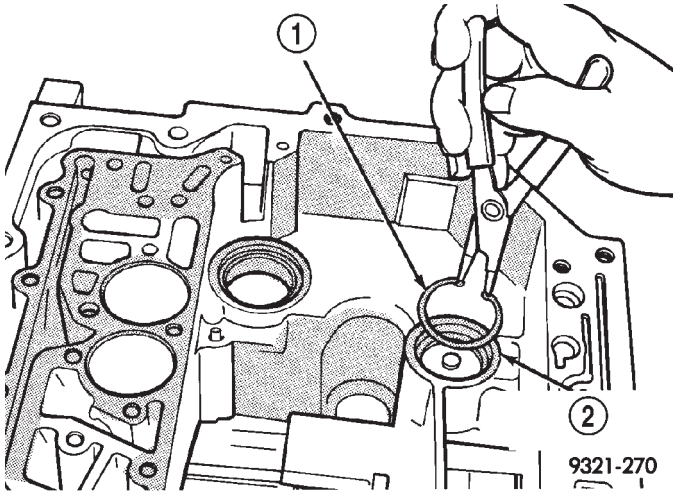

Fig. 164 Remove Low/Reverse Accumulator

1 – SNAP RING
2 – LOW/REVERSE ACCUMULATOR

DISASSEMBLY AND ASSEMBLY (Continued)

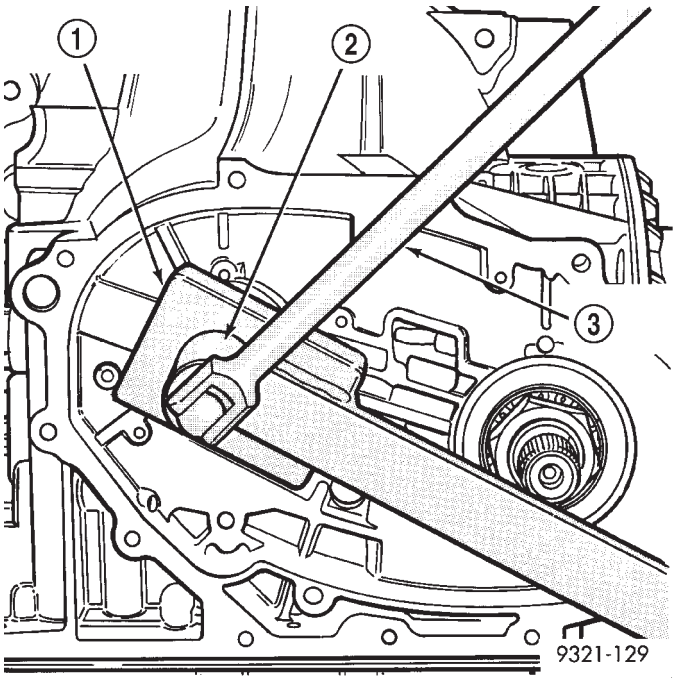

Fig. 205 Remove Output Shaft Nut

1 – SPECIAL TOOL 6497
2 – SPECIAL TOOL 6498
3 – BREAKER BAR

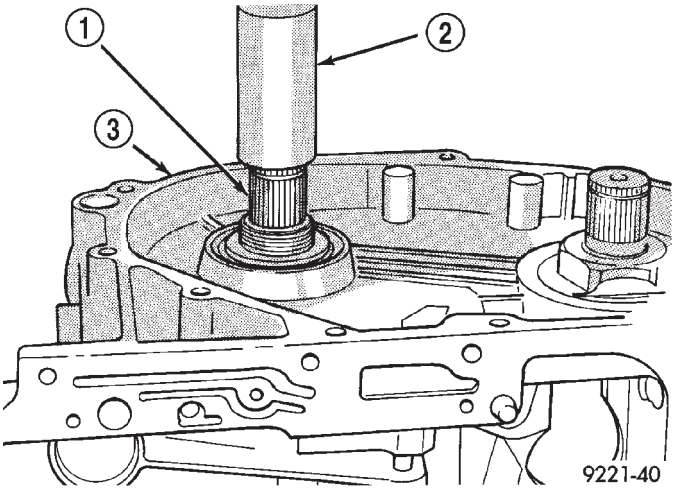

Fig. 206 Use Arbor Press to Remove Output Shaft from Case

1 – OUTPUT SHAFT
2 – ARBOR PRESS
3 – TRANSAXLE CASE

Use special tool 6597 and handle C-4171 and C-4171-2 to press rear output shaft bearing cup rearward (Fig. 208).

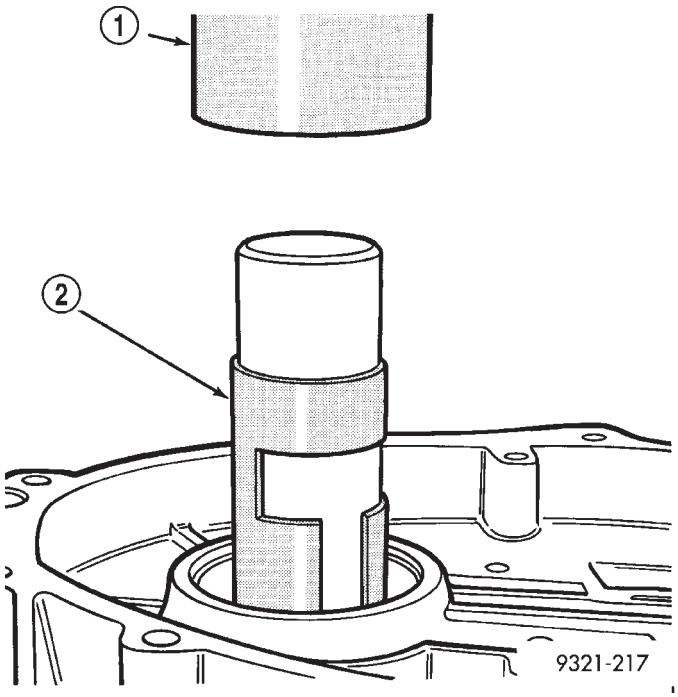

Fig. 207 Remove Front Bearing Cup

1 – ARBOR PRESS
2 – SPECIAL TOOL 6596

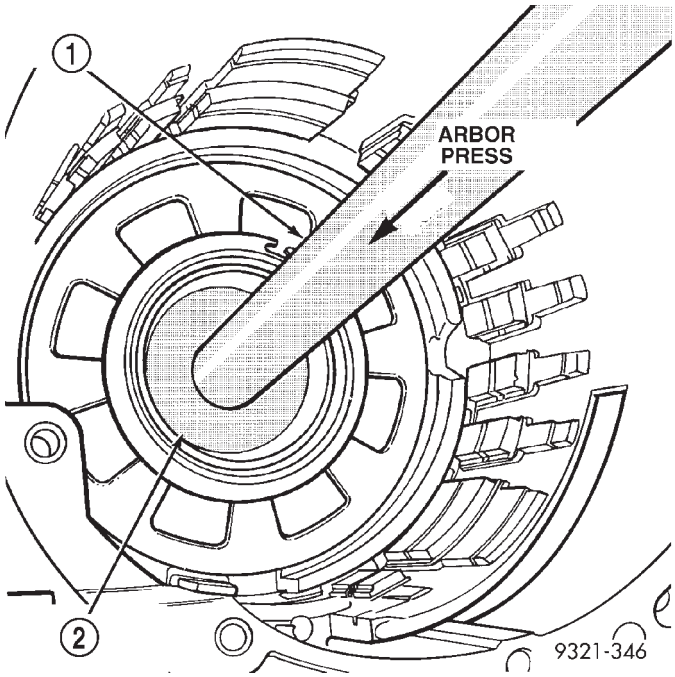

Fig. 208 Remove Rear Bearing Cup

1 – SPECIAL TOOL 4171 AND 4171–2
2 – SPECIAL TOOL 6597

DISASSEMBLY AND ASSEMBLY (Continued)

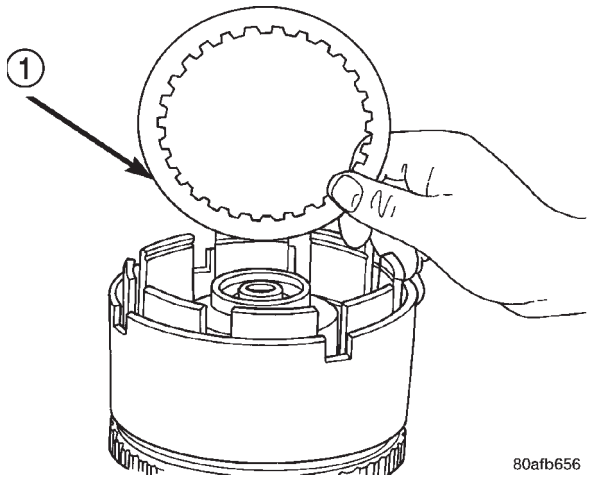

Fig. 240 Remove One UD Clutch Disc

1 – ONE UNDERDRIVE CLUTCH DISC

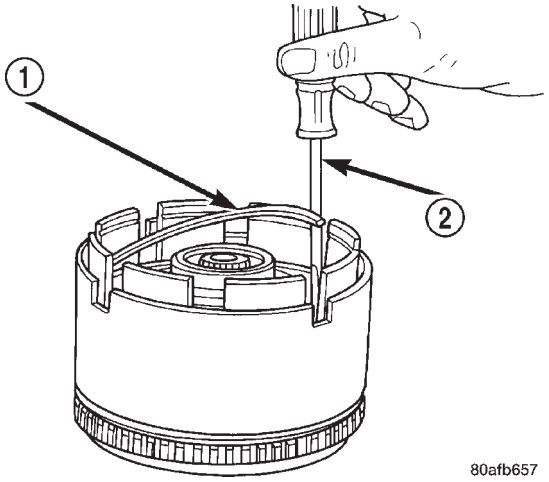

Fig. 241 UD Clutch Flat Snap Ring

1 – UNDERDRIVE CLUTCH REACTION PLATE FLAT SNAP RING
2 – SCREWDRIVER

NOTE: Tag underdrive clutch pack for reassembly identification.

(17) Remove the UD clutch pack (Fig. 242).

CAUTION: Compress return spring just enough to remove or install snap ring.

(18) Using Tool 5059A and an arbor press, compress UD clutch piston enough to remove snap ring (Fig. 243) (Fig. 244).

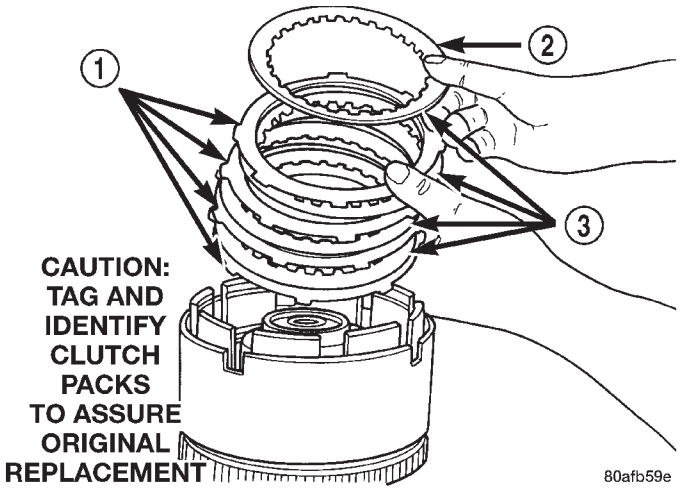

Fig. 242 Underdrive Clutch Pack

1 – CLUTCH PLATE
2 – ONE UD CLUTCH DISC
3 – CLUTCH DISC

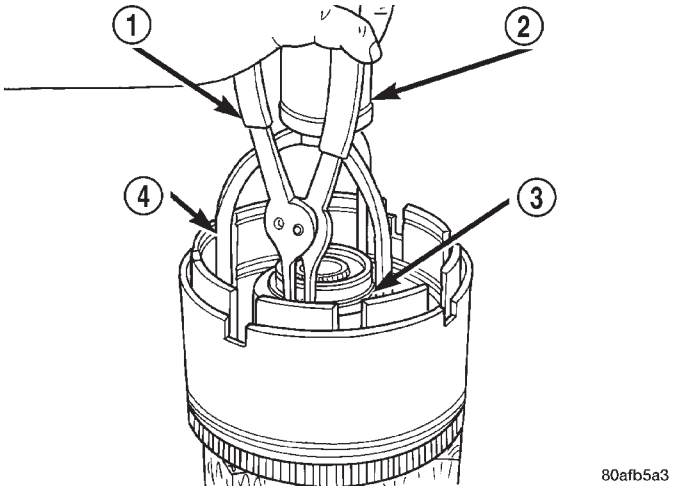

Fig. 243 UD Spring Retainer Snap Ring

1 – SNAP RING PLIERS
2 – ARBOR PRESS RAM
3 – SNAP RING
4 – SPECIAL TOOL 5059A

(19) Remove spring retainer (Fig. 244).

(20) Remove UD clutch piston (Fig. 245).

(21) Remove input hub tapered snap ring (Fig. 246).

(22) Tap on input hub with soft faced hammer and separate input hub from OD/Reverse piston and clutch retainer (Fig. 247) (Fig. 248).

DISASSEMBLY AND ASSEMBLY (Continued)

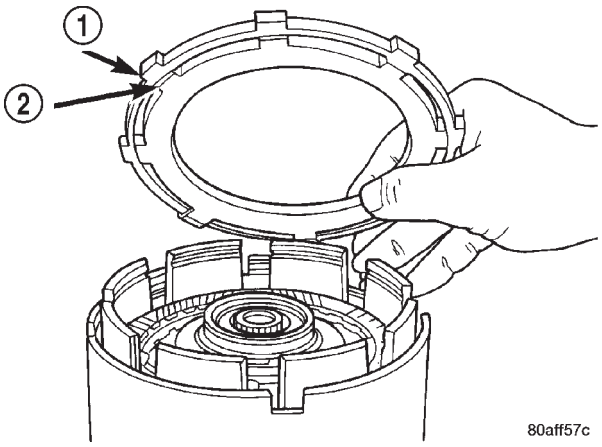

Fig. 276 OD/Reverse Reaction Plate

1 – OVERDRIVE/REVERSE PRESSURE PLATE
2 – (STEP SIDE DOWN)

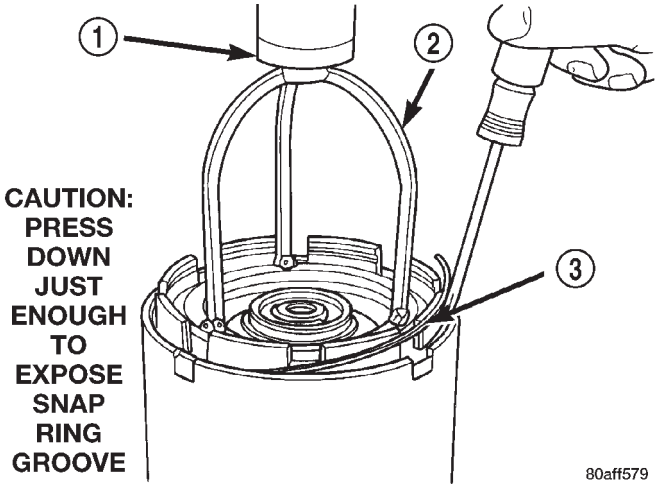

Fig. 277 Install Flat Snap Ring

1 – ARBOR PRESS RAM
2 – TOOL 5059A
3 – FLAT SNAP RING

(25) Measure OD clutch pack clearance. Set up dial indicator on top of the OD/Reverse reaction plate as shown in (Fig. 278).

(26) Zero dial indicator and apply 30 psi (206 kPa) air pressure to the overdrive clutch hose on Tool 8391. Measure and record OD clutch pack measurement in four (4) places, 90° apart.

(27) Take average of four measurements and compare with OD clutch pack clearance specification. **The overdrive (OD) clutch pack clearance is 1.07-3.25 mm (0.042-0.128 in.).**

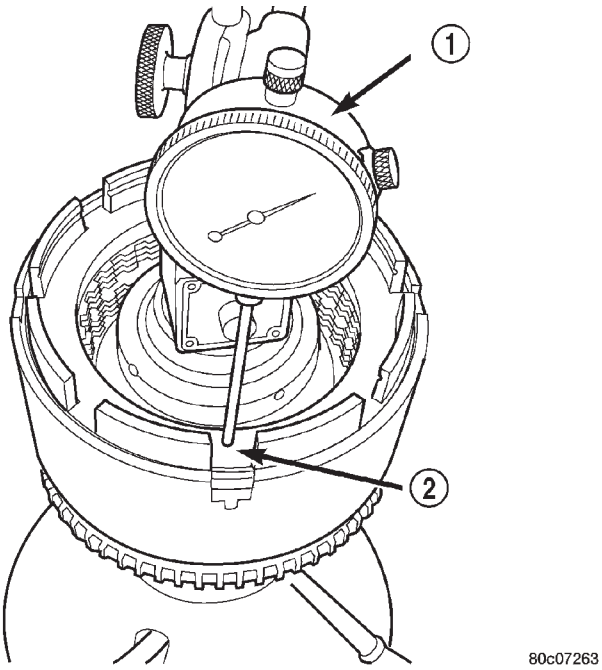

Fig. 278 Measure OD Clutch Pack Clearance

1 – DIAL INDICATOR
2 – OD/REVERSE REACTION PLATE

If not within specifications, the clutch is not assembled properly. There is no adjustment for the OD clutch clearance.

(28) Install reverse clutch pack (two fibers/one steel) (Fig. 279).

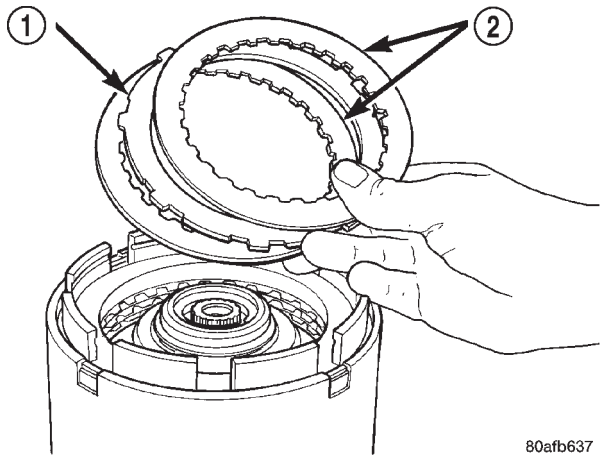

Fig. 279 Install Reverse Clutch Pack

1 – REVERSE CLUTCH PLATE
2 – REVERSE CLUTCH DISCS

DISASSEMBLY AND ASSEMBLY (Continued)

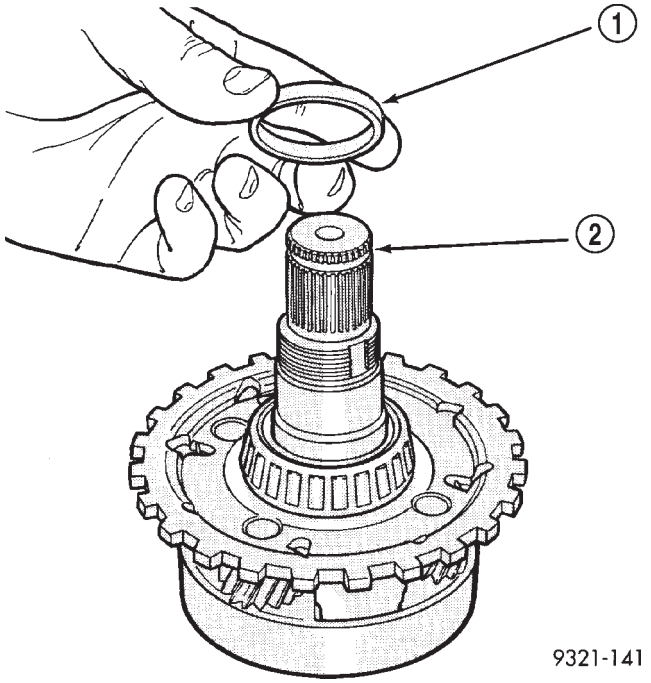

Fig. 307 Shim Installation

1 – SHIM
2 – OUTPUT SHAFT

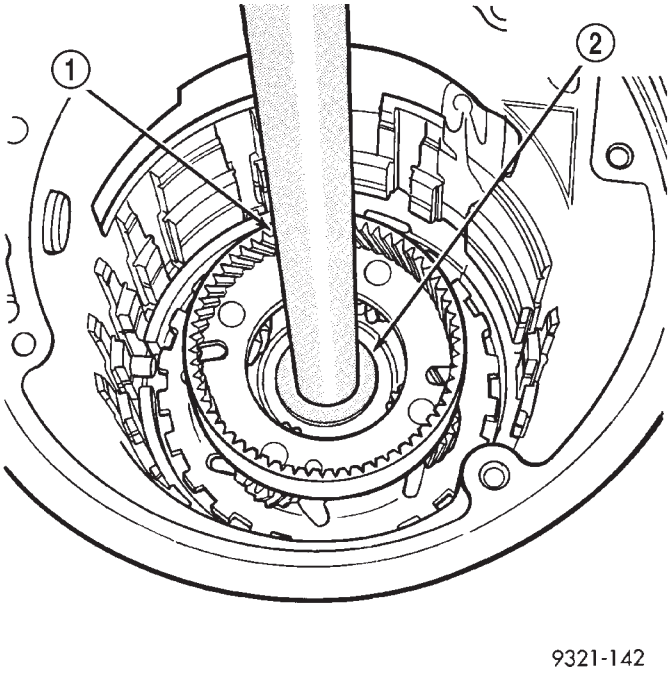

Fig. 308 Press Shaft Into Case

1 – SPECIAL TOOL C-4171 AND C-4171–2
2 – SPECIAL TOOL MD-998911

5.17 - 5.19 mm	5.62 - 5.64 mm
5.20 - 5.22 mm	5.65 - 5.67 mm
5.23 - 5.25 mm	5.68 - 5.70 mm
5.26 - 5.28 mm	5.71 - 5.73 mm
5.29 - 5.31 mm	5.74 - 5.76 mm
5.32 - 5.34 mm	5.77 - 5.79 mm
5.35 - 5.37 mm	5.80 - 5.82 mm
5.38 - 5.40 mm	5.83 - 5.85 mm
5.41 - 5.43 mm	5.86 - 5.88 mm
5.44 - 5.46 mm	5.89 - 5.91 mm
5.47 - 5.49 mm	5.92 - 5.94 mm
5.50 - 5.52 mm	5.95 - 5.97 mm
5.53 - 5.55 mm	5.98 - 6.00 mm
5.56 - 5.58 mm	6.01 - 6.03 mm
5.59 - 5.61 mm	6.04 - 6.06 mm

Output Shaft Rear Shim Chart

Tighten new output shaft nut to 271 N·m (200 ft. lbs.).

(7) Check the turning torque of the output shaft (Fig. 309). The shaft should have 1 to 8 in. lbs. of turning torque. If the turning torque is **higher than** 8 in. lbs., install a thicker shim. If the turning torque is **less than** 1 in. lb., install a thinner shim. Make sure there is no end play.

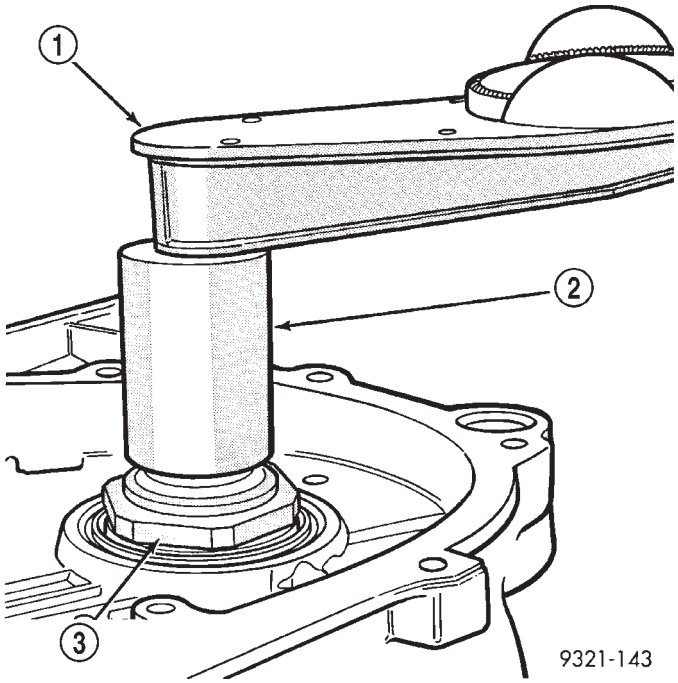

Fig. 309 Checking Turning Torque

1 – TORQUE WRENCH
2 – SPECIAL TOOL 6498
3 – OUTPUT SHAFT NUT

CAUTION: Failure to stake shaft nuts could allow the nuts to back-off during use.

DISASSEMBLY AND ASSEMBLY (Continued)

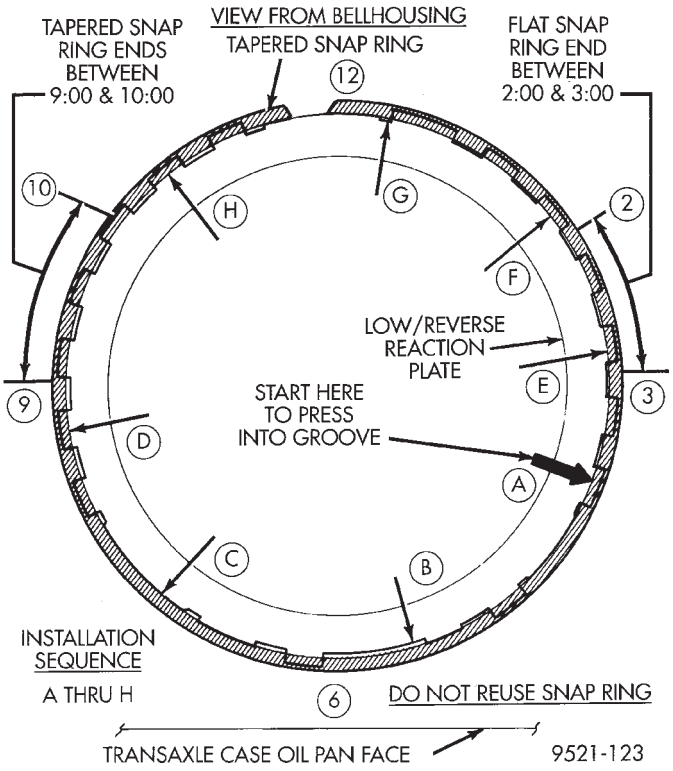

Fig. 326 Tapered Snap Ring Instructions

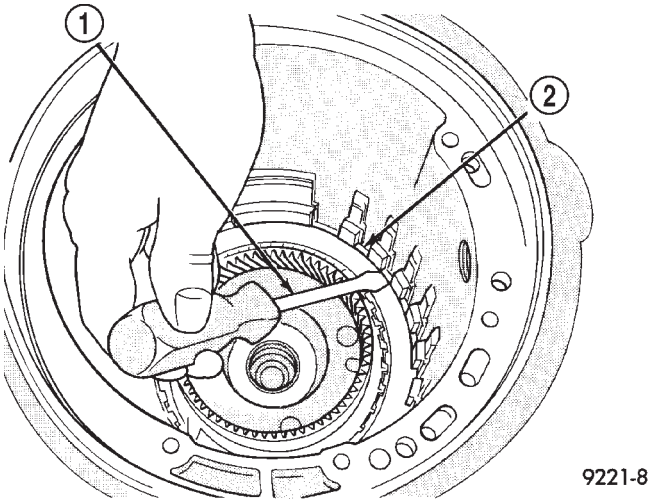

Fig. 327 Snap Ring Installed

1 – SCREWDRIVER
2 – TAPERED SNAP RING (INSTALL AS SHOWN)

Press down clutch pack with finger and zero dial indicator. **Low/Reverse clutch pack clearance is 0.86 to 1.52 (.034 to.060 inch).**

Select the proper low/reverse reaction plate to achieve specifications:

NOTE: When installing the 2-4 clutch plates and discs, the orientation should be alternated so the pilot pads of adjacent plates do not align, refer to (Fig. 330).

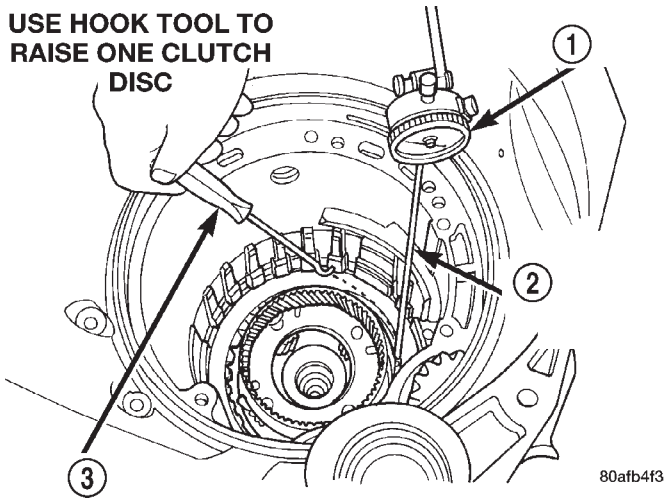

Fig. 328 Check Low/Reverse Clutch Clearance

1 – DIAL INDICATOR
2 – DIAL INDICATOR TIP TOOL 6268
3 – HOOK TOOL

LOW/REVERSE REACTION PLATE CHART

PART NUMBER	THICKNESS
4799846AA	5.88 mm (.232 in.)
4799847AA	6.14 mm (.242 in.)
4799848AA	6.40 mm (.252 in.)
4799849AA	6.66 mm (.262 in.)
4799855AA	6.92 mm (.273 in.)

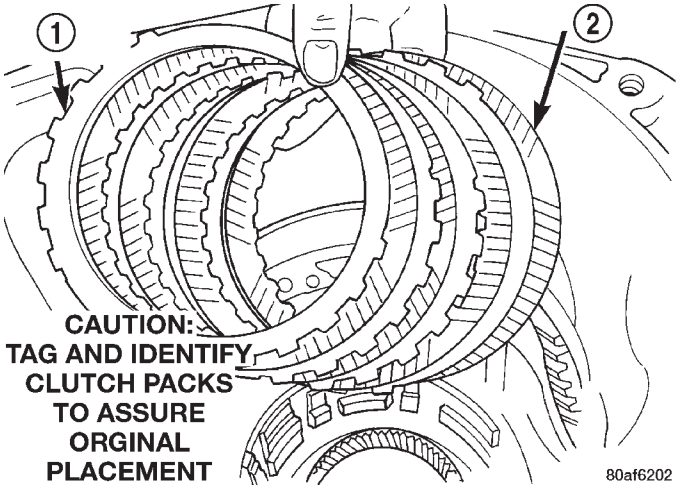

Fig. 329 Install 2/4 Clutch Pack

1 – CLUTCH PLATE (4)
2 – CLUTCH DISC (4)

DISASSEMBLY AND ASSEMBLY (Continued)

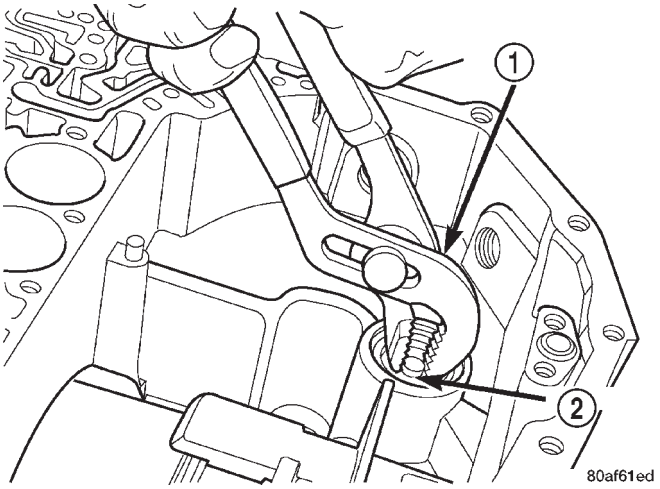

Fig. 353 Install Low/Reverse Accumulator Plug (Cover)

1 – ADJUSTABLE PLIERS
2 – PLUG

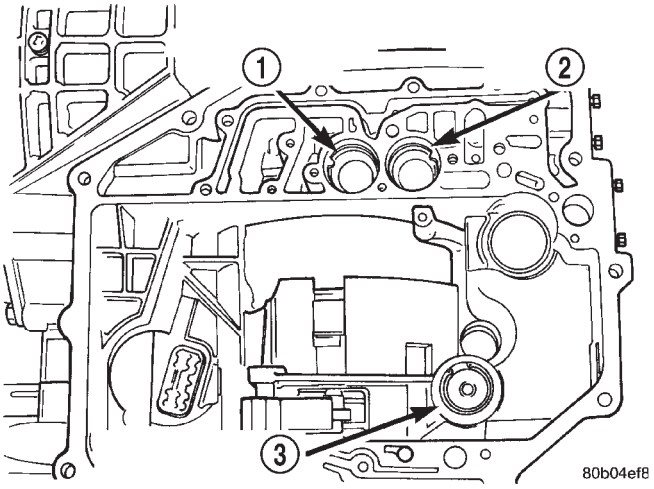

Fig. 355 Accumulator Locations

1 – OVERDRIVE ACCUMULATOR LOCATION
2 – UNDERDRIVE ACCUMULATOR LOCATION
3 – LOW/REVERSE ACCUMULATOR

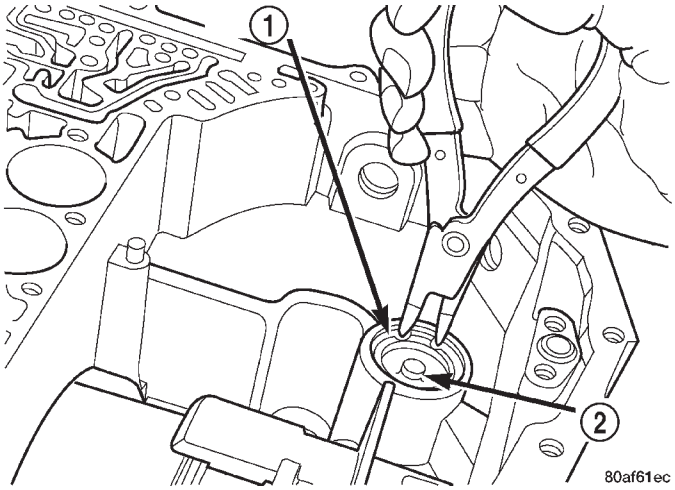

Fig. 354 Install Low/Reverse Accumulator Snap Ring

1 – SNAP RING
2 – PLUG

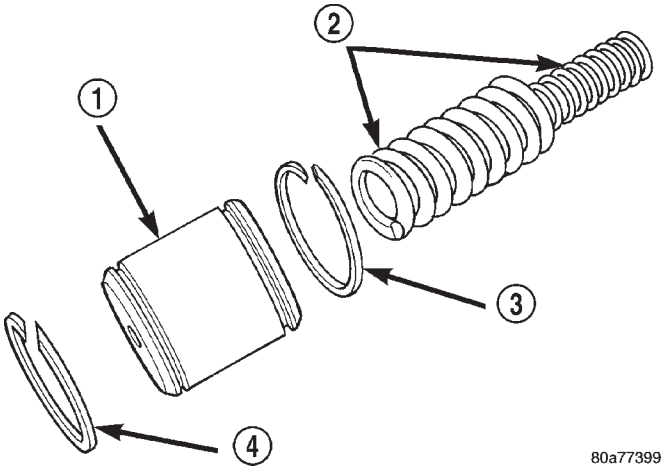

Fig. 356 Install Underdrive Accumulator and Springs

1 – ACCUMULATOR PISTON (UNDERDRIVE)
2 – RETURN SPRINGS
3 – SEAL RING
4 – SEAL RING