

# TRANSAXLE

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## NV T350 (A-578) MANUAL TRANSAXLE

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## GENERAL INFORMATION

### NV T350 (A578) MANUAL TRANSAXLE

The NV T350 (A-578) transaxle is a fully synchronized (except reverse), constant-mesh transaxle. The transaxle case is constructed of die-cast aluminum, and is a two-piece design (bell housing case half and rear housing case half) with a steel end plate bearing cover. All forward gears are in constant-mesh with

each other, which eliminates the need to move gears together for engagement. This feature improves response and eliminates gear “clash” noises. The reverse idler gear is supported and rotates on a spindle idler shaft. Depending on application, a reverse gear brake/blocking ring is available on some units for shifting ease.

The NV T350 (A-578) transaxle also incorporates an open differential, which converts power from the output shaft pinion gear to the differential ring gear. The dif-

## GENERAL INFORMATION (Continued)

ferential case transfers torque from the ring gear to the drive axles by means of differential side gears.

The NV T350 (A-578) transaxle internal components can only be serviced by separating the case halves.

**CAUTION:** The transaxle output shaft is serviced as a unit. No disassembly and reassembly is possible. Damage to the transaxle may result.

## TRANSAXLE IDENTIFICATION

The transaxle model, part number, build sequence and date are shown on a bar code label that is attached to the front of the transaxle. This information is also shown on a metal I.D. tag that is attached to the end cover of the transaxle (Fig. 1).

**NOTE:** Transaxles use various final drive gear ratios in different vehicle applications. Therefore, it is necessary that the correct transaxle assembly number is used when ordering service parts.

**NOTE:** There are three different versions of this transaxle. There are no external differences between the models. Refer to the identification tag on the transaxle to determine which transaxle the vehicle is equipped with.

## FLUID REQUIREMENTS

NV T350 (A-578) transaxles use Mopar® Manual Transaxle Lubricant (MS-9417). **Hypoid gear lube, engine oil, and/or automatic transmission fluid should not be used in this transaxle.** Hard shifting effort, bearing, gear, and/or synchronizer failure may occur if incorrect fluid is used.

## SPECIAL ADDITIVES

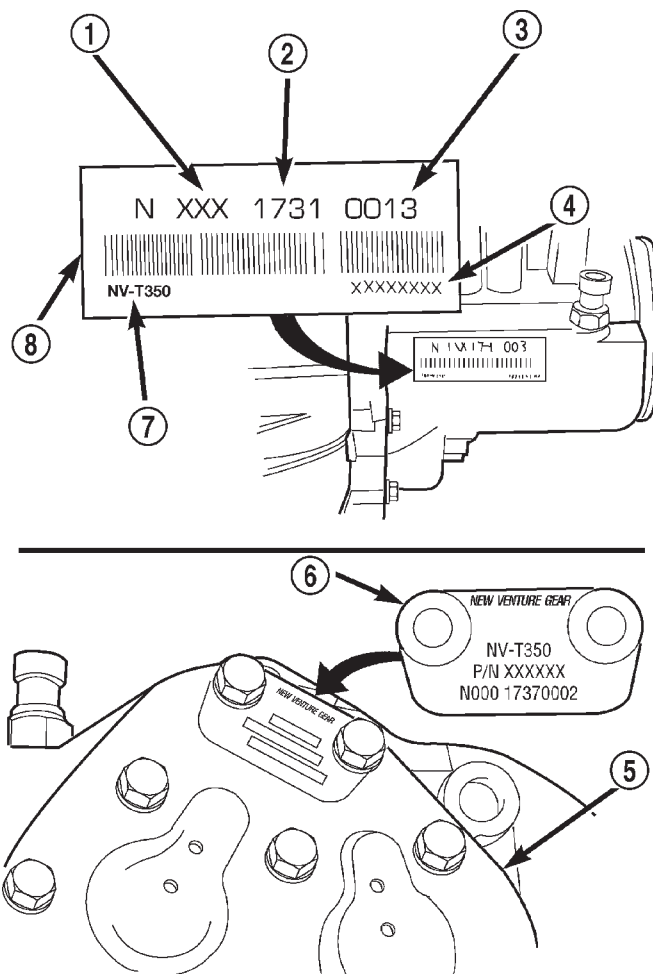
The addition of any fluids to the transaxle, other than the fluid listed above, is not recommended. An exception to this policy is the use of special dyes to aid in detecting fluid leaks. The use of transmission sealers should be avoided, since they may adversely affect seals.

## SEALANTS

The sealant used to seal the transaxle case halves and input bearing is Mopar® Gasket Maker, Loctite® 518, or equivalent. The sealant used for the bearing end plate cover is Mopar® RTV.

## GEAR RATIOS

**CAUTION:** All gears and shafts must not be interchanged with other transaxles; they will not function correctly.



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**Fig. 1 NV T350 (A-578) Transaxle Identification**

- 1 - LAST 3 DIGITS OF PART #
- 2 - DATE CODE
- 3 - PRODUCTION LINE SEQUENCE CODE
- 4 - FULL PART #
- 5 - END COVER
- 6 - METAL TAG
- 7 - NVG MODEL #
- 8 - LABEL

The differential is a conventional arrangement of gears that is supported by tapered roller bearings. The final output gear turns the ring gear and differential assembly, thereby turning the drive axle shafts.

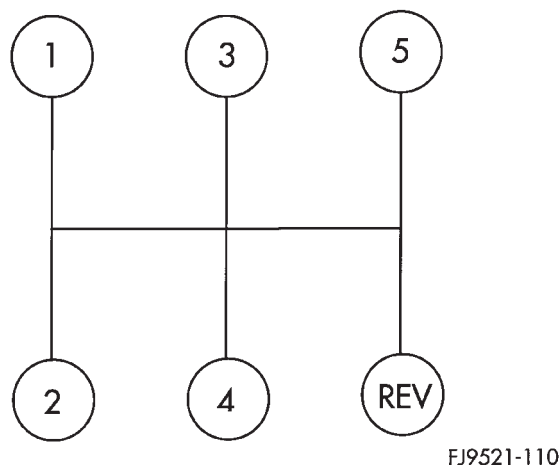
All transaxles have a torque capacity of 136 lb. ft. The gear ratios of each transaxle are shown in the following chart. The chart also shows which transaxles are available with the reverse-input shaft brake. This brake allows easier shifting into reverse and helps eliminate reverse gear clash.

## GENERAL INFORMATION (Continued)

ENGINE	2.0 SOHC EUROPE AND U. S.	1.8 BUX or 2.0L SALES CODE ACR	1.8 RIGHT HAND DRIVE ONLY
GEAR			
1st	3.54	3.54	3.54
2nd	2.13	2.13	2.13
3rd	1.36	1.36	1.36
4th	1.03	1.03	1.03
5th	0.72	0.81	0.81
FINAL DRIVE	3.55	3.94	3.94
REVERSE BRAKE	NO	YES	YES
CLUTCH RELEASE SYSTEM	CABLE	CABLE	HYDRAULIC

**GEARSHIFT PATTERN**

The NV T350 (A-578) transaxle shift pattern is a modified H-pattern (Fig. 2). Overdrive fifth and reverse gears are in-line and outboard of the first through fourth gear positions.



**Fig. 2 NV T350 (A-578) Shift Pattern**

**DIAGNOSIS AND TESTING****COMMON PROBLEM CAUSES**

The majority of transaxle malfunctions are a result of:

- Insufficient lubrication
- Incorrect lubricant
- Misassembled or damaged internal components
- Improper operation

**HARD SHIFTING**

Hard shifting may be caused by a misadjusted crossover cable. If hard shifting is accompanied by gear clash, synchronizer clutch and stop rings, or gear teeth may be worn or damaged.

Misassembled synchronizer components also cause shifting problems. Incorrectly installed synchronizer sleeves, struts, or springs can cause shift problems.

**NOISY OPERATION**

Before removing a transaxle to diagnose and repair a noisy condition, verify the correct level and type of fluid is installed in the transaxle. Abnormal wear and damage to the internal components is frequently the end result of insufficient/improper lubricant. Refer to Fluid Requirements in this group.

Transaxle noise is most often a result of worn or damaged components. Chipped, pitted, spalled and broken gears or synchronizer teeth can cause noise.

Brinnelled or spalled bearings will generate noise.

Improperly assembled (missing, loose, or improperly installed parts, etc) transaxles are likely to generate abnormal noise.

Squealing noises are commonly caused by defective clutch release bearings and the reverse brake (if equipped). Inspect the bearing cage and reverse cone for signs of heat damage.

Gear rattle, gear clash, hard shifts, and premature clutch disc wear can result from misalignment of the transmission to the engine. Inspect for excessive clutch dust in the clutch housing and oblonged (mushroomed) dowel holes.

**SLIPS OUT OF GEAR**

Transaxle disengagement may be caused by misaligned or damaged shift components, manufacturing burrs on the gear teeth, or worn teeth on the drive gears or synchronizer components. Incorrect assembly, such as missing snap rings, also causes gear disengagement.

## DIAGNOSIS AND TESTING (Continued)

**LOW LUBRICANT LEVEL**

Insufficient transaxle lubricant is usually the result of leaks, or inaccurate fluid level check or refill method. Leakage is evident by the presence of oil around the leak point. If leakage is not evident, the condition is probably the result of an underfill.

If air-powered lubrication equipment is used to fill a transaxle, be sure the equipment is properly calibrated. Equipment out of calibration can lead to an underfill condition.

**FLUID LEAKS**

Fluid leaks can occur around the input shaft seal, axleshaft seals, case split lines, and the end cover. Be careful not to misdiagnose an input shaft seal leak for an engine rear main seal leak. Also, the transaxle case sealer (split line) will accumulate dirt and look like an oil leak.

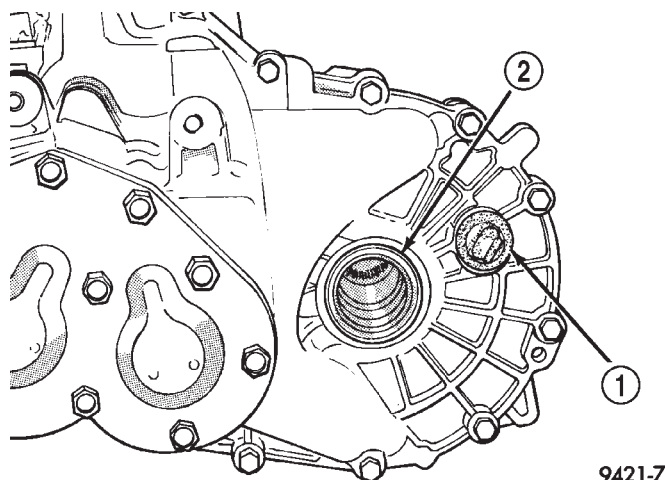
**CLUTCH PROBLEMS**

Worn, damaged, or misaligned clutch components can cause difficult shifting, gear clash, and noise.

A worn or damaged clutch disc, pressure plate, or release bearing can cause hard shifting and gear clash.

**SERVICE PROCEDURES****FLUID DRAIN AND FILL**

All NV T350 (A-578) transaxles are equipped with a fill plug. The fill plug is located on the left side of the transaxle differential area (Fig. 3). The fluid level should be within 3/16 inch from the bottom of the transaxle fill hole (vehicle must be level when checking).

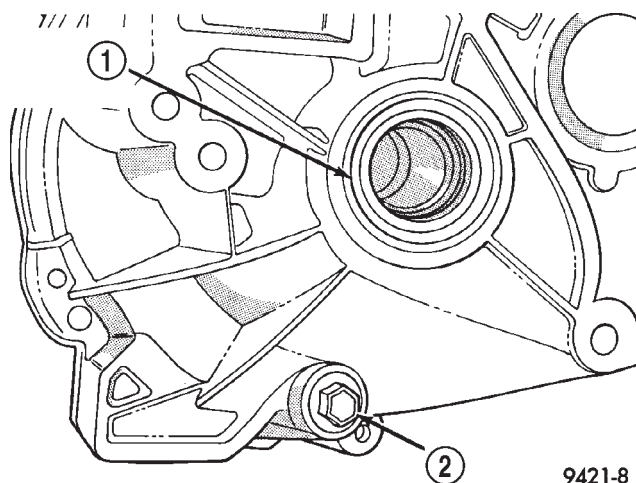


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**Fig. 3 Fill Plug Location**

- 1 - RUBBER FILL PLUG
- 2 - LEFT DRIVESHAFT SEAL

All NV T350 (A-578) transaxles are equipped with a drain plug. The drain plug is located on the lower right side of the transaxle differential housing (Fig. 4). Tighten drain plug to 28 N·m (250 in. lbs.)



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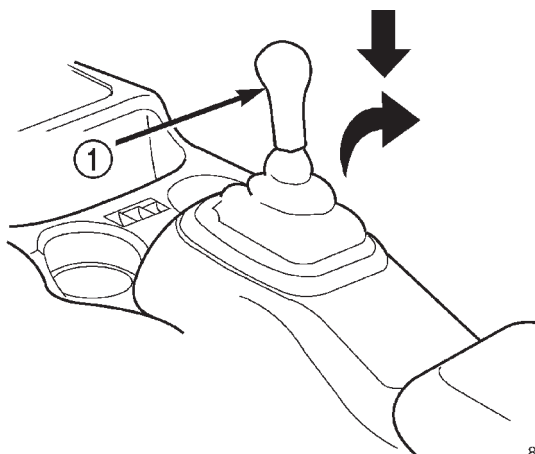
**Fig. 4 Drain Plug Location**

- 1 - RIGHT DRIVESHAFT SEAL
- 2 - DRAIN PLUG

Dry fill lubricant capacity is approximately 1.9-2.2 liters (4.0-4.6 pints). Wipe the outside of the transaxle if any lubricant spills.

**REMOVAL AND INSTALLATION****GEARSHIFT KNOB****REMOVAL**

- (1) Pull shifter boot down and away from shifter knob.
- (2) Push down on knob and rotate clockwise to remove (Fig. 5).



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**Fig. 5 Gearshift Knob Removal**

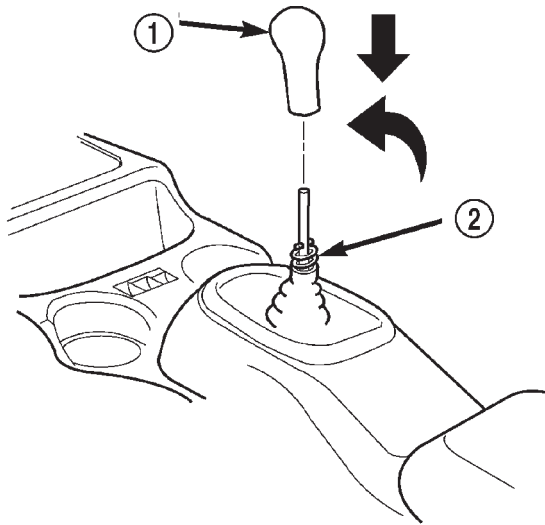
- 1 - GEARSHIFT KNOB

## REMOVAL AND INSTALLATION (Continued)

### INSTALLATION

(1) Install knob to shifter lever, align knob to three o'clock position, push knob down to engage spring and rotate counter clockwise (Fig. 6).

(2) Return shifter boot to its original position (seated around knob lip).



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**Fig. 6 Gearshift Knob Installation**

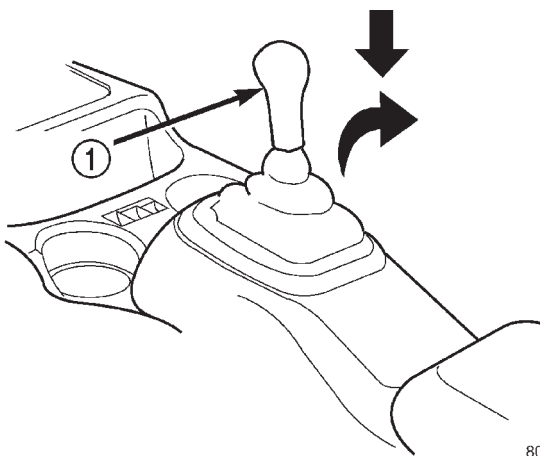
- 1 - GEARSHIFT KNOB  
2 - SPRING

## GEARSHIFT BOOT

### REMOVAL

(1) Pull shifter boot down and away from shifter knob.

(2) Push down on knob and rotate clockwise to remove (Fig. 7).

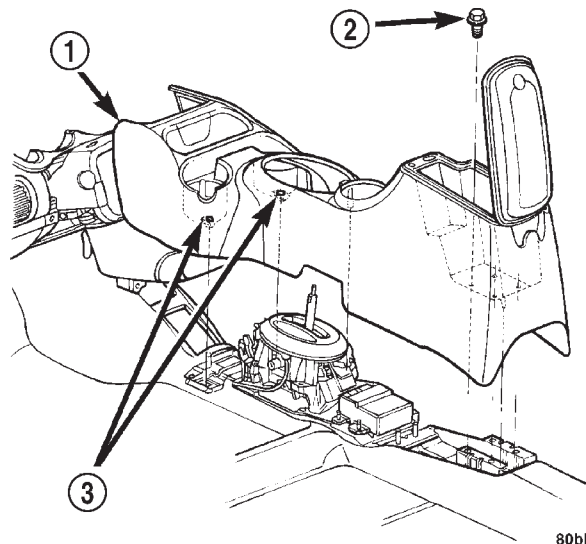


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**Fig. 7 Gearshift Knob Removal**

- 1 - GEARSHIFT KNOB

(3) Remove the center console assembly as shown in (Fig. 8).

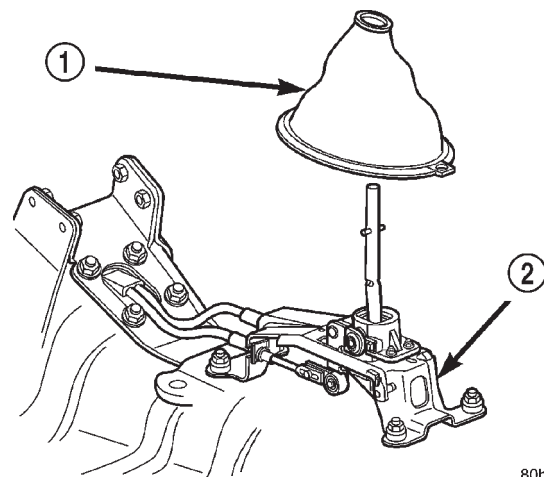


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**Fig. 8 Center Console Removal/Installation—Typical**

- 1 - CONSOLE  
2 - SCREW (4)  
3 - SCREW (2)

(4) Separate shifter boot from shifter assembly (Fig. 9). Boot is retained to shifter by three push-pin retainers.



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**Fig. 9 Gearshift Boot Removal/Installation**

- 1 - BOOT  
2 - SHIFTER ASSEMBLY

### INSTALLATION

(1) Install boot to the shifter assembly (Fig. 9). Fasten boot to shifter with the three retainers.

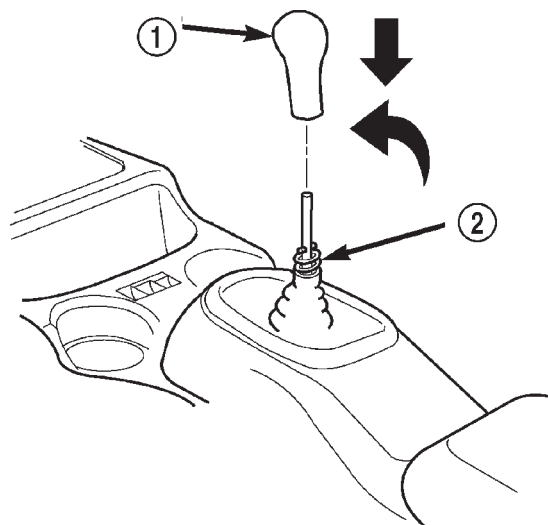
(2) Install center console assembly (Fig. 8). Verify that boot is not pinched at console opening before tightening.

(3) Install knob to shifter lever, align knob to three o'clock position, push knob down to engage spring and rotate counter clockwise (Fig. 10).



## REMOVAL AND INSTALLATION (Continued)

(4) Return shifter boot to its original position (seated around knob lip).



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**Fig. 10 Gearshift Knob Installation**

- 1 - GEARSHIFT KNOB  
2 - SPRING

## GEARSHIFT CABLE ASSEMBLY

**NOTE:** The crossover and selector cables are manufactured as a cable "assembly" and cannot be serviced individually.

## REMOVAL

(1) Raise hood and disconnect battery negative cable.

(2) Pull shifter boot down and away from shifter knob.

(3) Push down on knob and rotate clockwise to remove (Fig. 11).

(4) Remove the center console assembly as shown in (Fig. 12).

(5) Separate shifter boot from shifter assembly (Fig. 13). Boot is retained to shifter by three push-pin retainers.

(6) Remove crossover cable retaining clip and disconnect from shift lever (Fig. 14).

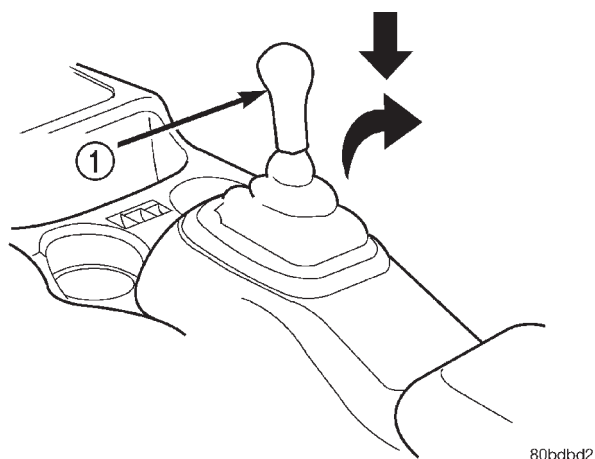
(7) Remove selector cable retaining clip and disconnect from shift lever (Fig. 15).

(8) Remove three grommet plate-to-floor pan attaching nuts (Fig. 14).

(9) Remove air cleaner/throttle body assy. (Fig. 16) as follows:

(a) Disconnect proportional purge solenoid (PPS) and crankcase vent hose from throttle body.

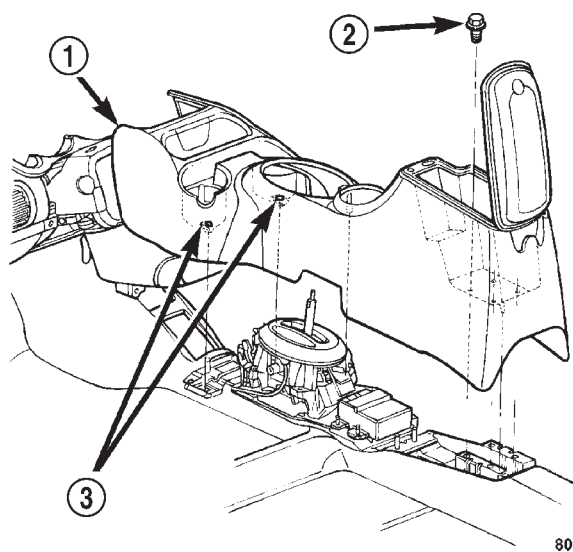
(b) Disconnect the Throttle Position Sensor (TPS) and Idle Air Control (IAC) connectors.



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**Fig. 11 Gearshift Knob Removal**

- 1 - GEARSHIFT KNOB



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**Fig. 12 Center Console Removal/Installation—Typical**

- 1 - CONSOLE  
2 - SCREW (4)  
3 - SCREW (2)

(c) Disconnect throttle body air duct from intake manifold.

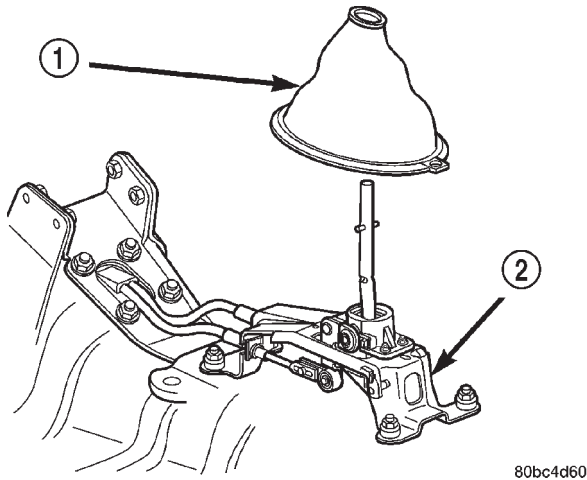
(d) Remove mounting bolt and nut (Fig. 16) and partially remove air cleaner assembly.

(e) Disconnect accelerator and speed control (if equipped) cables after the assy. is removed from position. Remove air cleaner assembly from vehicle.

(10) Disconnect cables from the shift levers at the transaxle (Fig. 17).

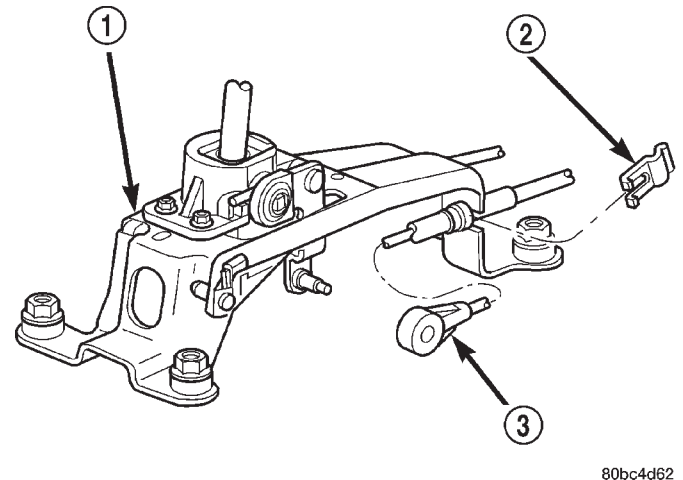
**CAUTION:** Pry up with equal force on both sides of shifter cable isolator bushings to avoid damaging cable isolator bushings.

## REMOVAL AND INSTALLATION (Continued)



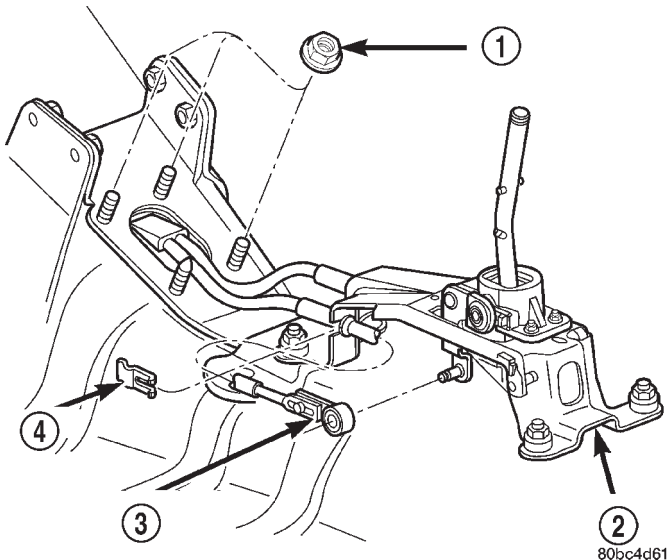
**Fig. 13 Gearshift Boot Removal/Installation**

- 1 - BOOT
- 2 - SHIFTER ASSEMBLY



**Fig. 15 Selector Cable at Shifter Assembly**

- 1 - SHIFTER
- 2 - CLIP
- 3 - SELECTOR CABLE



**Fig. 14 Crossover Cable at Shifter Assembly**

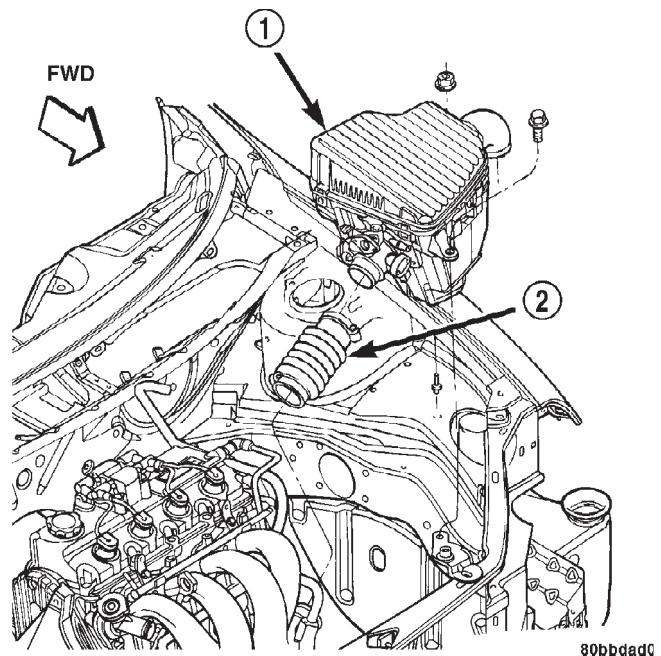
- 1 - GROMMET PLATE NUT
- 2 - SHIFTER
- 3 - CROSSOVER CABLE
- 4 - CLIP

Remove cable retaining clips and remove cables from bracket (Fig. 17).

- (11) Raise vehicle on hoist.
- (12) Remove converter heat shield (Fig. 18).
- (13) Remove remaining grommet plate-to-floor pan screw (Fig. 19).
- (14) Remove cable assembly from vehicle.

## INSTALLATION

**CAUTION:** Gearshift cable bushings must not be lubricated or the bushings will swell and split.

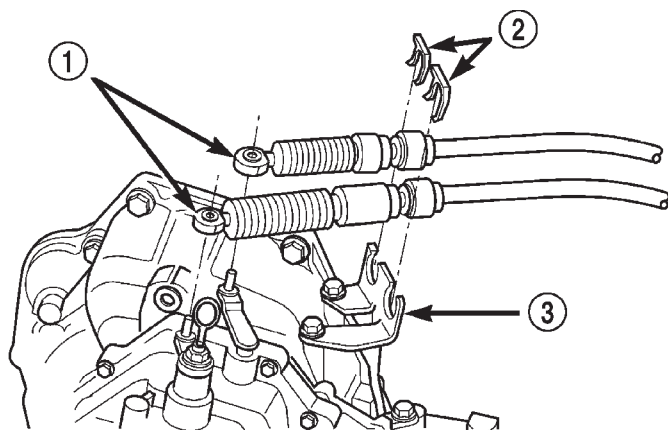


**Fig. 16 Air Cleaner Assembly Removal/Installation**

- 1 - AIR CLEANER ASSY.
- 2 - THROTTLE BODY DUCT

- (1) Raise vehicle on hoist.
- (2) Install cable assembly through floor pan opening and secure to floor pan with grommet plate and one screw (Fig. 19). Make sure the three grommet plate studs protrude through cable assembly and floor pan and tighten screw to 7 N·m (60 in. lbs.).
- (3) Route transaxle end of cable assembly into engine compartment and over transaxle assembly.
- (4) Install converter heat shield (Fig. 18).
- (5) Lower vehicle.

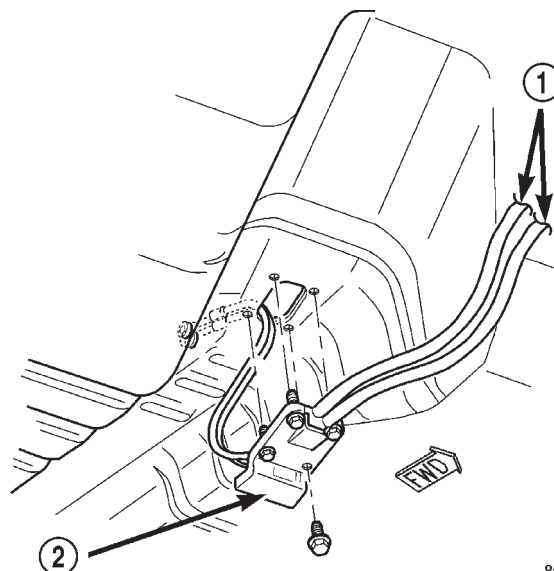
## REMOVAL AND INSTALLATION (Continued)



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**Fig. 17 Shift Cables at Transaxle**

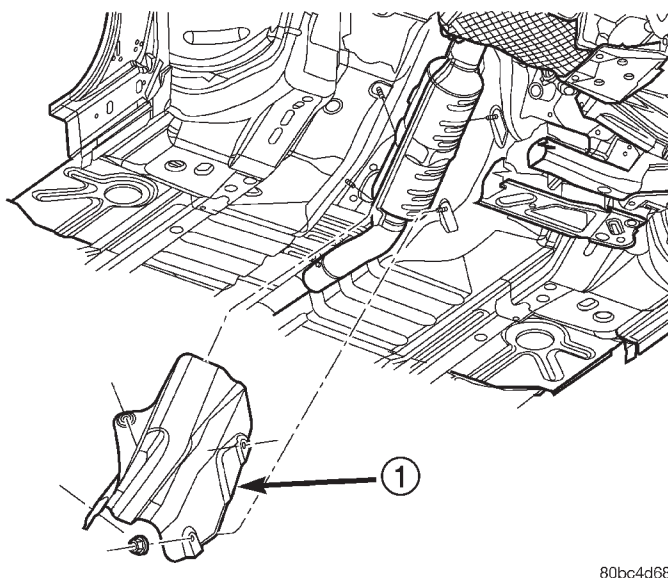
- 1 - SHIFT CABLES
- 2 - CLIPS
- 3 - BRACKET



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**Fig. 19 Shift Cable Assembly at Floor Pan**

- 1 - CABLE ASSEMBLY
- 2 - GROMMET PLATE



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**Fig. 18 Converter Heat Shield Removal/Installation**

- 1 - CONVERTER HEAT SHIELD

(6) Install gearshift cables to mounting bracket and fasten with NEW clips (Fig. 17). Make sure clips are installed flush to bracket.

(7) Connect gearshift selector and crossover cable to shift levers at transaxle (Fig. 17).

(8) Install and tighten the three grommet plate-to-floor pan nuts to 6 N·m (50 in. lbs.) torque.

(9) Install selector cable to shifter lever and secure cable to shifter bracket. Install clip (Fig. 15).

(10) Install crossover cable to shifter lever and secure cable to shifter bracket. Install clip (Fig. 14).

**NOTE:** Only the crossover cable is adjustable. The selector cable does not have any adjustment capabilities.

**(11) Adjust crossover cable as follows:**

(a) Loosen adjusting screw on crossover cable at shifter (Fig. 20).

(b) Pin transaxle crossover lever in 3-4-N position using a 1/4 inch drill bit. Align hole in crossover lever with the hole in the boss on the transaxle case (Fig. 21). Be sure drill bit goes into transaxle case at least one half inch.

(c) The shifter is spring-loaded and self-centering. Allow shifter to rest in its neutral position. Torque adjustment screw to 8 N·m (70 in. lbs.). Care must be taken to avoid moving the shift mechanism off-center during screw tightening.

(d) Remove drill bit from transaxle case and perform functional check by shifting transaxle into all gears.

(12) Install boot to the shifter assembly (Fig. 13). Fasten boot with the three retainers.

(13) Install center console assembly (Fig. 12). Verify that boot is not pinched at console opening before tightening.

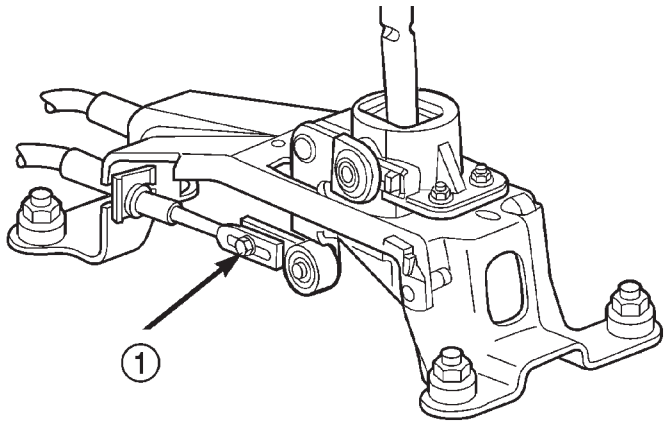
(14) Install knob to shifter lever, align knob to three o'clock position, push knob down to engage spring and rotate counter clockwise (Fig. 22).

(15) Return shifter boot to its original position (seated around knob lip).

(16) Install the air cleaner/throttle body assy. (Fig. 16) as follows:



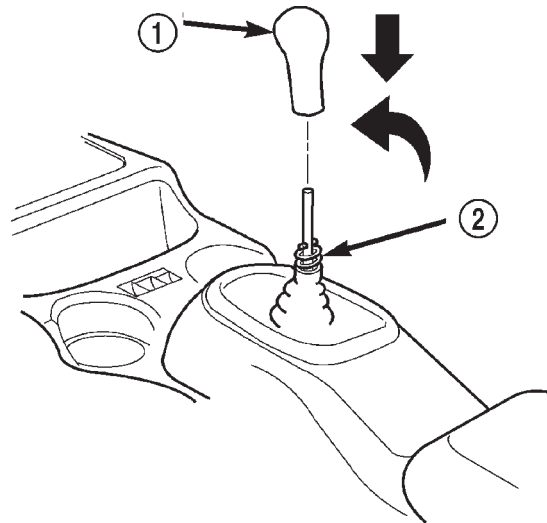
## REMOVAL AND INSTALLATION (Continued)



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**Fig. 20 Crossover Cable Adjustment Screw**

1 - CROSSOVER ADJUSTMENT SCREW

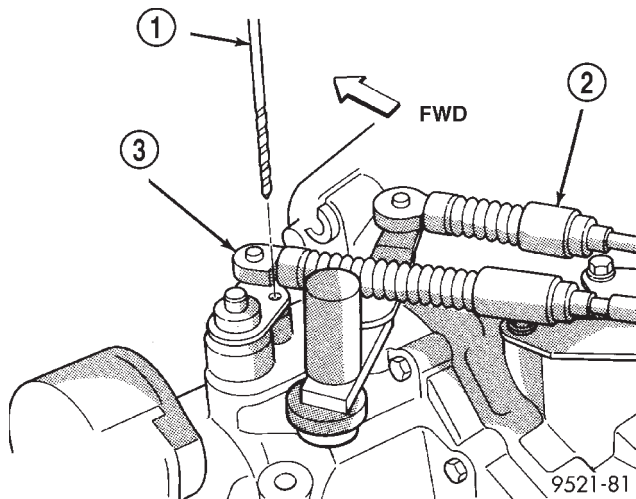


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**Fig. 22 Gearshift Knob Installation**

1 - GEARSHIFT KNOB

2 - SPRING



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**Fig. 21 Crossover Lever Pin Procedure**

1 - 1/4" DRILL BIT  
2 - SELECTOR CABLE  
3 - CROSSOVER CABLE

(a) Connect the accelerator and speed control (if equipped) cables to the air cleaner/throttle body assy.

(b) Install assy into position, making sure the air cleaner locating slot is engaged to the battery bracket tab, and tighten fasteners to 14 N·m (120 in. lbs.) torque.

(c) Verify throttle body duct is fully seated to intake manifold and tighten clamp to 5 N·m (40 in. lbs.) torque.

(d) Connect the Throttle Position Sensor (TPS) and Idle Air Control (IAC) connectors.

(e) Connect proportional purge solenoid (PPS) and crankcase vent hose from throttle body.

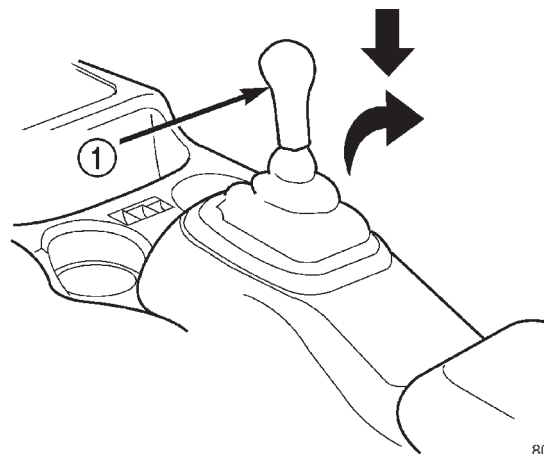
(17) Connect battery negative cable.

## GEARSHIFT MECHANISM REPLACEMENT

### REMOVAL

(1) Pull shifter boot down and away from shifter knob.

(2) Push down on knob and rotate clockwise to remove (Fig. 23).



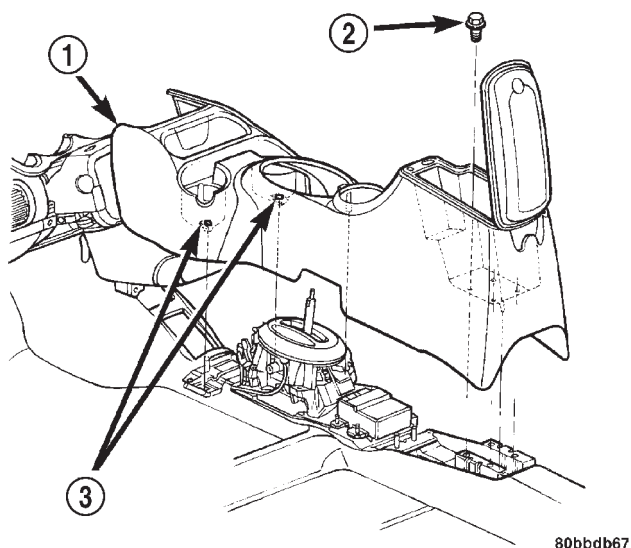
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**Fig. 23 Gearshift Knob Removal**

1 - GEARSHIFT KNOB

## REMOVAL AND INSTALLATION (Continued)

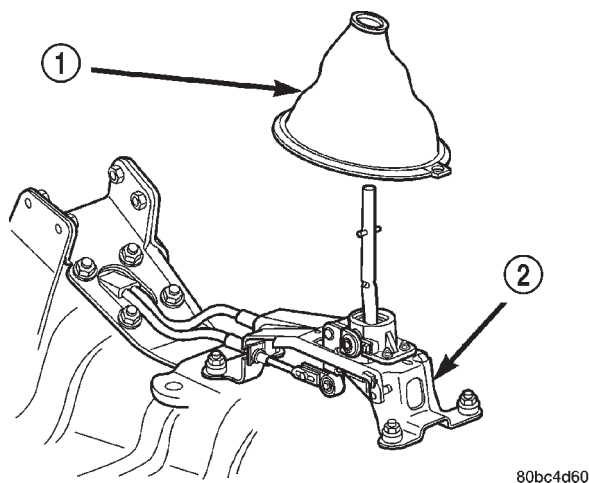
(3) Remove the center console assembly as shown in (Fig. 24).



**Fig. 24 Center Console Removal/Installation—Typical**

- 1 - CONSOLE
- 2 - SCREW (4)
- 3 - SCREW (2)

(4) Separate shifter boot from shifter assembly (Fig. 25). Boot is retained to shifter by three push-pin retainers.



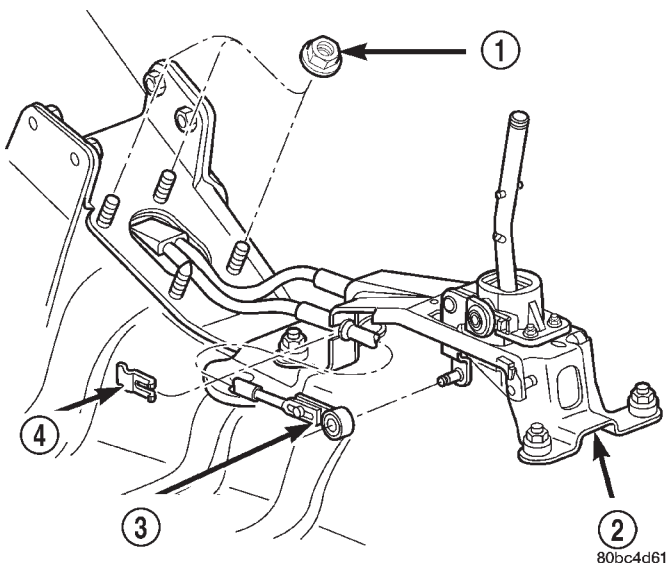
**Fig. 25 Gearshift Boot Removal/Installation**

- 1 - BOOT
- 2 - SHIFTER ASSEMBLY

(5) Remove crossover cable retaining clip and disconnect from shift lever (Fig. 26).

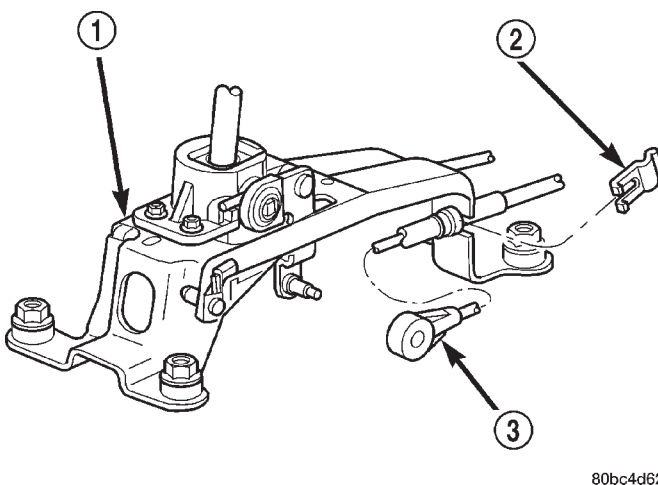
(6) Remove selector cable retaining clip and disconnect from shift lever (Fig. 27).

(7) Remove four shifter assy.-to-floor pan nuts and remove shifter from vehicle (Fig. 28).



**Fig. 26 Crossover Cable at Shifter Assembly**

- 1 - GROMMET PLATE NUT
- 2 - SHIFTER
- 3 - CROSSOVER CABLE
- 4 - CLIP



**Fig. 27 Selector Cable at Shifter Assembly**

- 1 - SHIFTER
- 2 - CLIP
- 3 - SELECTOR CABLE

## INSTALLATION

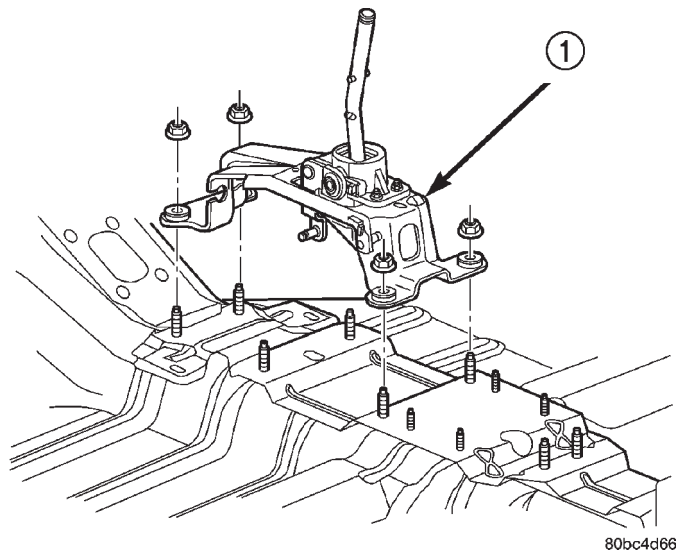
(1) Install shifter assy. to floor pan (Fig. 28). Install and tighten four nuts to 12 N·m (105 in. lbs.) torque.

(2) Install selector cable to shifter lever and secure cable to shifter bracket. Install clip (Fig. 27).

(3) Install crossover cable to shifter lever and secure cable to shifter bracket. Install clip (Fig. 26).

(4) Install boot to the shifter assembly (Fig. 25). Fasten boot with the three retainers.

# REMOVAL AND INSTALLATION (Continued)



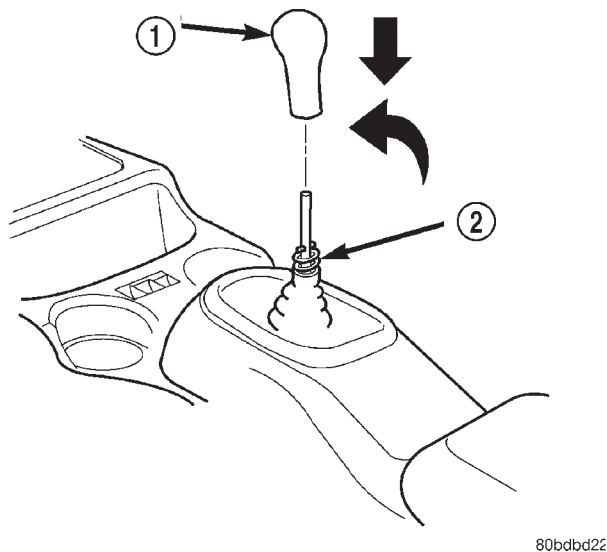
**Fig. 28 Shifter Assy. Removal/Installation**

1 – SHIFTER ASSEMBLY

(5) Install center console assembly (Fig. 24). Verify that boot is not pinched at console opening before tightening.

(6) Install knob to shifter lever, align knob to three o'clock position, push knob down to engage spring and rotate counter clockwise (Fig. 29).

(7) Return shifter boot to its original position (seated around knob lip).



**Fig. 29 Gearshift Knob Installation**

1 – GEARSHIFT KNOB  
2 – SPRING

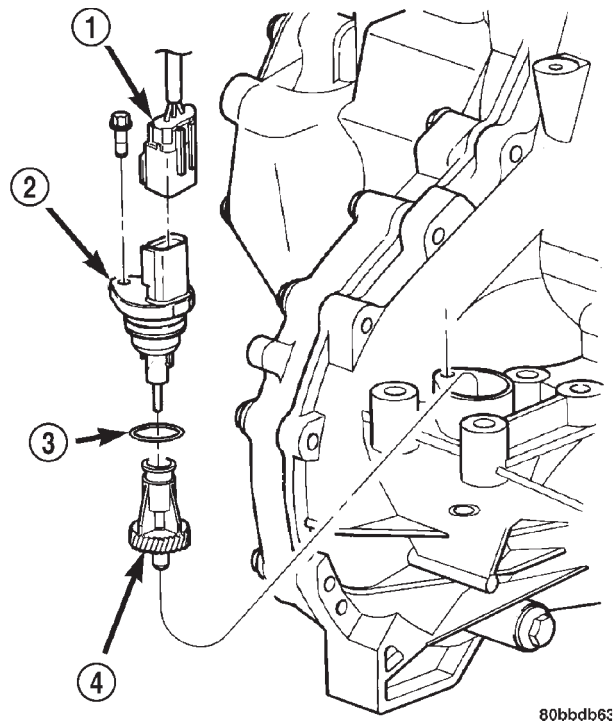
## VEHICLE SPEED SENSOR AND DRIVE PINION

### REMOVAL

- (1) Raise vehicle on hoist.
- (2) Disconnect the speed sensor connector (Fig. 30).

**CAUTION:** Clean area around speed sensor before removing to prevent dirt from entering the transaxle during speed sensor removal.

- (3) Remove speed sensor retaining bolt (Fig. 30).



**Fig. 30 Speed Sensor and Pinion—Removal/Installation**

1 – CONNECTOR  
2 – SENSOR  
3 – O-RING  
4 – SPEEDO PINION

- (4) Remove speed sensor from transaxle.

**CAUTION:** Carefully remove vehicle speed sensor so that sensor drive gear does not fall into transaxle. Should sensor drive gear fall into the transaxle during sensor removal, drive gear must be reattached to sensor.

- (5) Remove speed sensor drive gear from speed sensor.

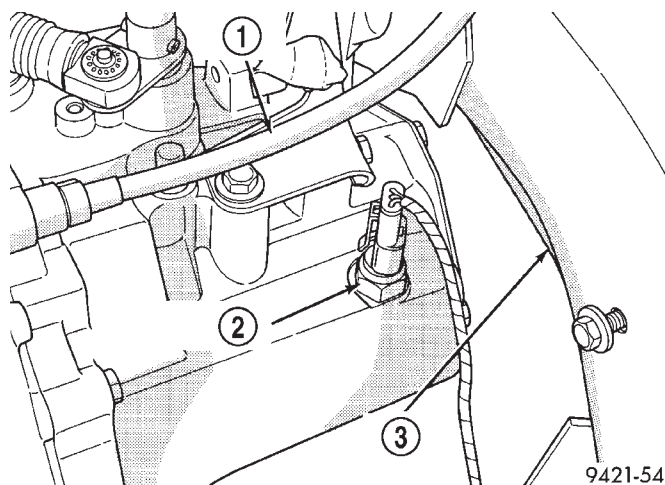
## REMOVAL AND INSTALLATION (Continued)

## INSTALLATION

- (1) Install pinion gear to speed sensor (Fig. 30).
- (2) Using a NEW o-ring, install the speed sensor to the transaxle (Fig. 30).
- (3) Install the bolt and torque to 7 N·m (60 in. lbs.).
- (4) Connect speed sensor connector (Fig. 30).
- (5) Lower vehicle and road test to verify proper speedometer operation.

## BACK-UP LAMP SWITCH

The back-up lamp switch is located on the top left front side of the transaxle case (Fig. 31).



**Fig. 31 Back-up Lamp Switch**

- 1 – CLUTCH CABLE  
2 – BACK-UP LAMP SWITCH  
3 – LEFT FRAME RAIL

## REMOVAL

- (1) Lift vehicle on hoist.
- (2) From bottom side of vehicle, disconnect back-up lamp switch connector.
- (3) Unscrew switch from transaxle.

## INSTALLATION

- (1) Install back-up lamp switch. Teflon tape or equivalent must be used on switch threads.

**CAUTION:** Do not overtighten switch.

- (2) Connect back-up lamp switch connector.
- (3) Lower vehicle.
- (4) Verify back-up lamp operation.

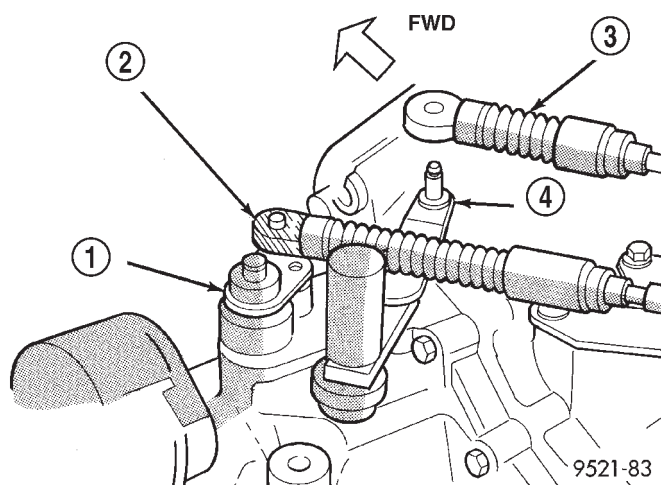
## CROSSOVER LEVER

## REMOVAL

- (1) Disconnect crossover cable from crossover lever and cable bracket. Refer to Gearshift Cable Removal and Installation in this Group.
- (2) Using a pin punch, remove the crossover roll pin from lever.
- (3) Pull up and remove the crossover lever from the transaxle crossover shaft (Fig. 32).

## INSTALLATION

- (1) Install crossover lever to shaft and fasten with NEW roll pin.
- (2) Install crossover cable to bracket. Fasten with clip.
- (3) Install crossover cable to crossover lever.



**Fig. 32 Crossover Lever**

- 1 – CROSSOVER LEVER  
2 – CROSSOVER CABLE  
3 – SELECTOR CABLE  
4 – SELECTOR LEVER

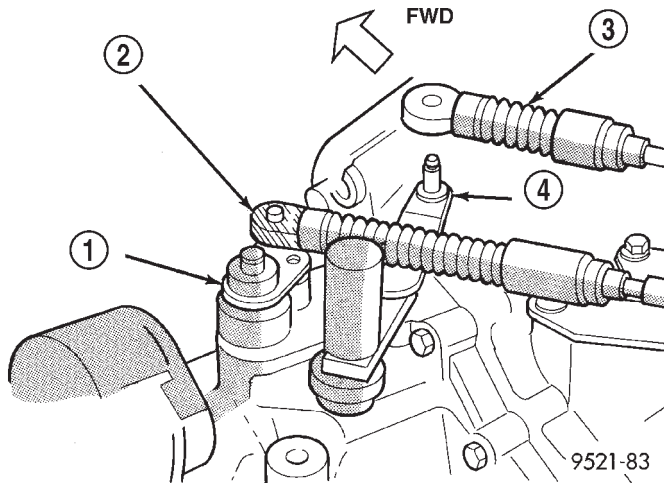
## SELECTOR LEVER

The selector lever is retained to the shaft by two roll pins (one inside the other).

## REMOVAL

- (1) Disconnect the selector cable from the selector lever (Fig. 33) and remove from cable bracket. Refer to Gearshift Cable Removal and Installation in this Group.
- (2) Using a pin punch, remove both roll pins from the lever.
- (3) Pull up and remove the selector lever from the transaxle selector shaft.

## REMOVAL AND INSTALLATION (Continued)



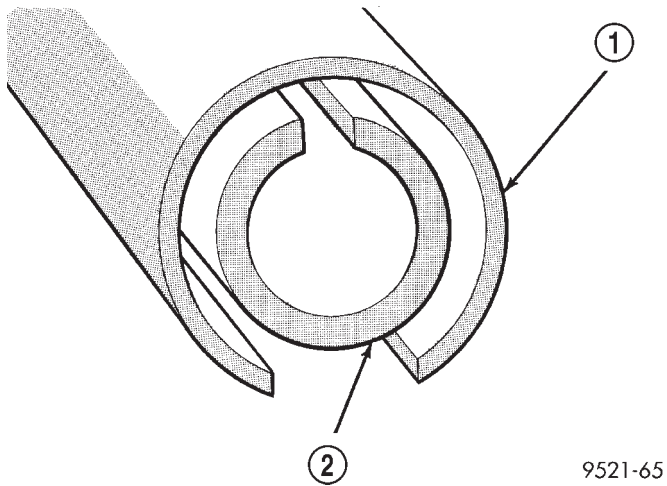
**Fig. 33 Shift Cables at Transaxle**

- 1 - CROSSOVER LEVER
- 2 - CROSSOVER CABLE
- 3 - SELECTOR CABLE
- 4 - SELECTOR LEVER

### INSTALLATION

(1) Install the selector lever to the shaft and fasten with two NEW roll pins. Refer to (Fig. 34) for correct roll pin orientation.

(2) Install selector cable to cable bracket and install clip. Install cable to selector lever.



**Fig. 34 Correct Orientation of Roll Pins**

- 1 - OUTER ROLL PIN
- 2 - INNER ROLL PIN

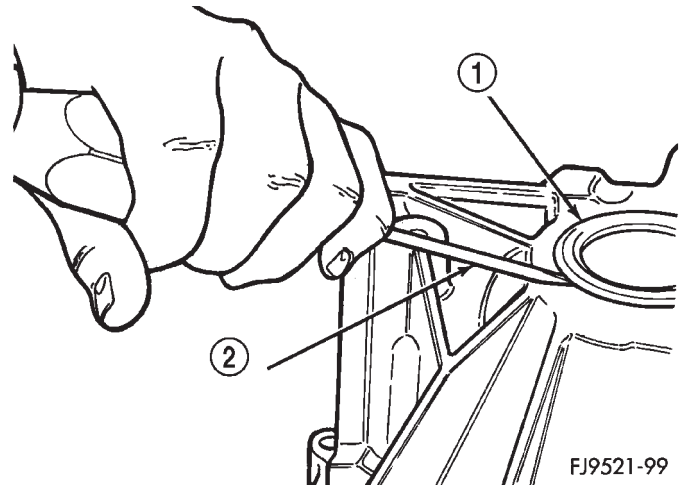
## AXLE SHAFT SEALS

### REMOVAL

(1) Remove axle shaft. Refer to Group 3, Differential and Driveline for the correct procedures.

(2) Insert a flat-blade pry tool at outer edge of axle shaft seal (Fig. 35).

(3) Tap on the pry tool with a small hammer and remove axle shaft seal.



**Fig. 35 Axle Shaft Seal Removal**

- 1 - AXLE SEAL
- 2 - PRY TOOL

### INSTALLATION

(1) Clean axle shaft seal bore of any excess sealant.

(2) Align axle shaft seal with axle shaft seal bore.

(3) Install axle seal on tool #6709 and C-4171 and insert into axle shaft seal bore.

(4) Tap seal into position until seated against transaxle case.

(5) Install axle shaft. Refer to Group 3, Differential and Driveline for the correct procedures.

## SHIFT SHAFT SEALS

It is **not** necessary to remove the shift shafts from the transaxle to service the shift shaft seals.

### REMOVAL

(1) Using a pick tool, pry up on the shift shaft seal and remove seal from bore.

### INSTALLATION

(1) Position new shift shaft seal in bore.

(2) Install shift shaft seal into bore using an appropriate size deep-well socket.

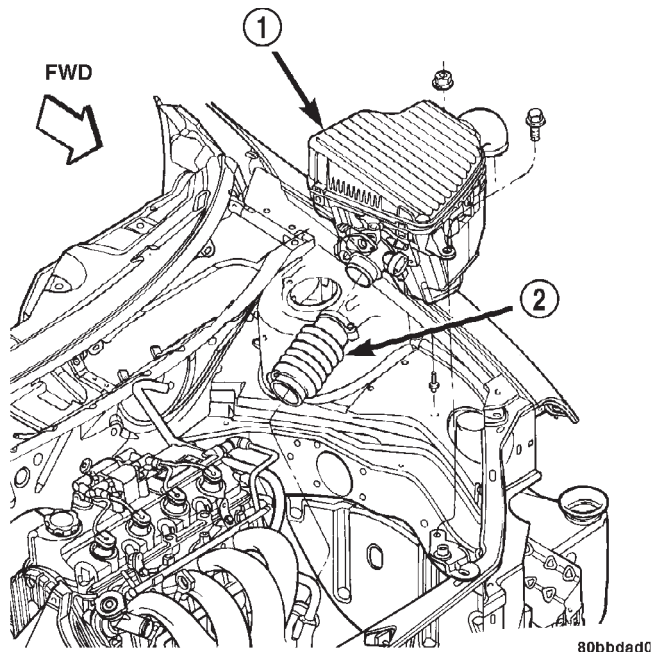


## REMOVAL AND INSTALLATION (Continued)

## TRANSAXLE

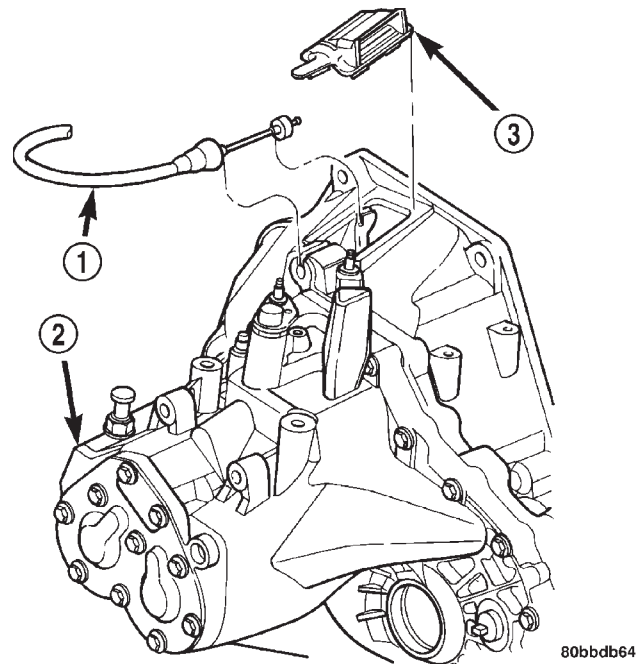
## REMOVAL

- (1) Raise hood.
- (2) Disconnect both battery cables, remove battery hold down clamp and bolt, and remove battery.
- (3) Remove air cleaner/throttle body assy. (Fig. 36) as follows:
  - (a) Disconnect proportional purge solenoid (PPS) and crankcase vent hose from throttle body.
  - (b) Disconnect the Throttle Position Sensor (TPS) and Idle Air Control (IAC) connectors.
  - (c) Disconnect throttle body air duct at intake manifold.
  - (d) Remove mounting bolt and nut (Fig. 36) and partially remove air cleaner assembly.
  - (e) Disconnect accelerator and speed control (if equipped) cables after the assy. is removed from position. Remove air cleaner assembly from vehicle.

**Fig. 36 Air Cleaner Assembly Removal/Installation**

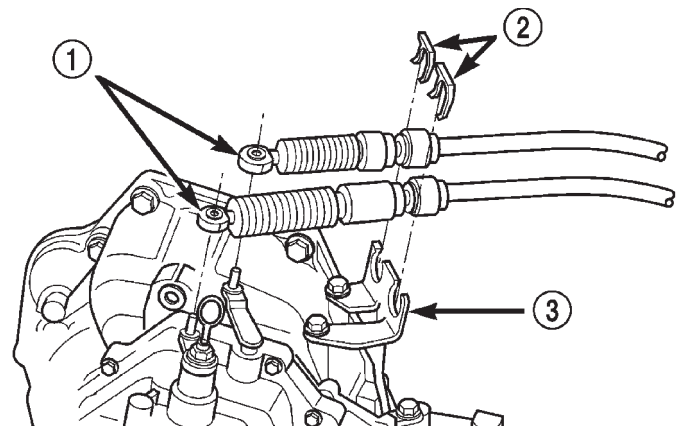
- 1 - AIR CLEANER ASSY.  
2 - THROTTLE BODY DUCT

- (4) Remove battery tray from bracket.
- (5) Disconnect ground cable at battery tray bracket.
- (6) Disconnect back-up lamp switch connector.
- (7) Remove bellhousing cap (Fig. 37).
- (8) Disconnect clutch cable from fork and remove from transaxle (Fig. 37).

**Fig. 37 Clutch Cable at Transaxle**

- 1 - CLUTCH CABLE  
2 - TRANSAXLE  
3 - BELLHOUSING CAP

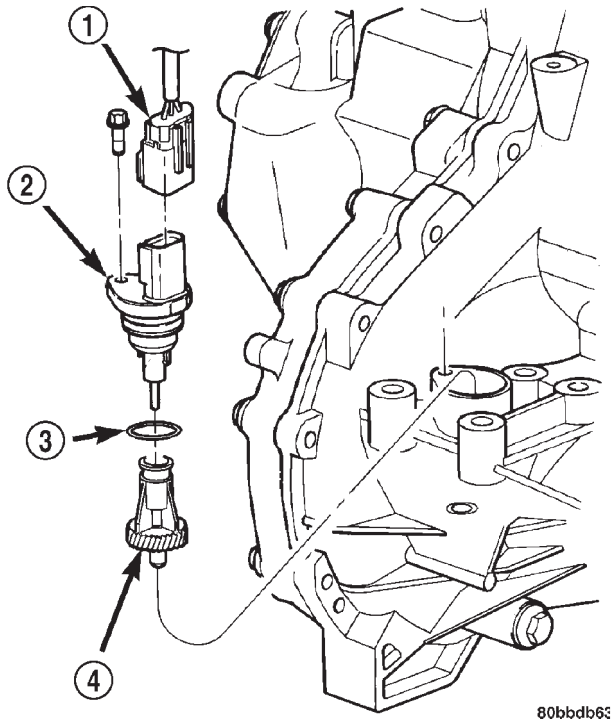
- (9) Remove shift cable-to-bracket clips (Fig. 38).
- (10) Disconnect shift selector and crossover cable from levers (Fig. 38). Remove cables and secure out of the way.

**Fig. 38 Shift Cables at Transaxle**

- 1 - SHIFT CABLES  
2 - CLIPS  
3 - BRACKET

## REMOVAL AND INSTALLATION (Continued)

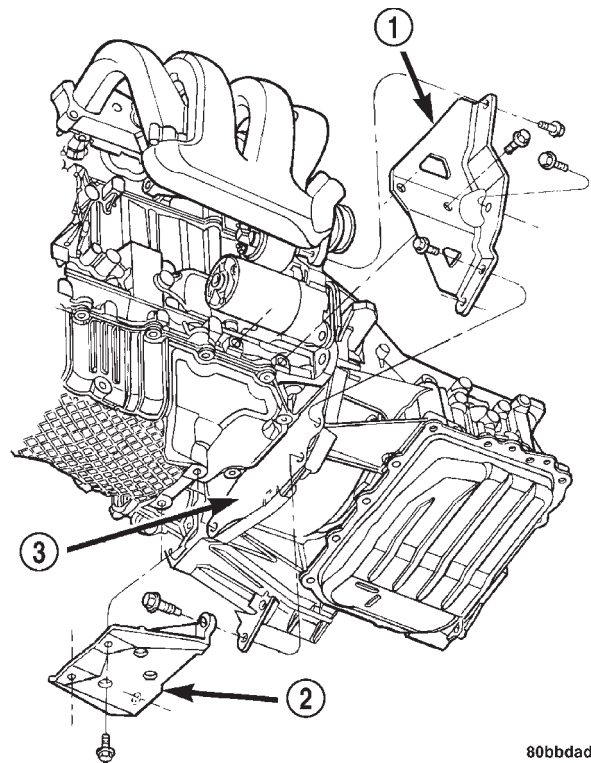
(11) Disconnect the vehicle speed sensor connector (Fig. 39).



**Fig. 39 Vehicle Speed Sensor Connector**

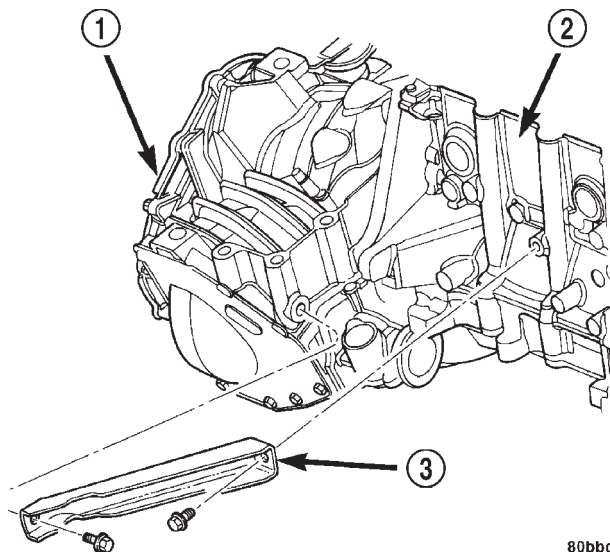
- 1 - CONNECTOR
- 2 - SENSOR
- 3 - O-RING
- 4 - SPEEDO PINION

- (12) Raise vehicle on hoist.
- (13) Remove transaxle oil drain plug and drain oil into a suitable container.
- (14) Remove both axle shafts. Refer to Group 3, Differential and Driveline for the correct procedures.
- (15) Remove structural collar (Fig. 40).
- (16) Remove the left engine-to-transaxle lateral bending brace (Fig. 40).
- (17) Remove bellhousing dust cover (Fig. 40).
- (18) Remove the right engine-to-transaxle lateral bending brace (Fig. 41).
- (19) Remove starter motor (Fig. 42).
- (20) Remove drive plate-to-clutch module bolts.
- (21) Support engine at oil pan with screw jack and wood block.
- (22) Remove transaxle upper mount thru-bolt. Gain access to this bolt through the driver's side wheel house (Fig. 43).



**Fig. 40 Left Lateral Bending Brace and Structural Collar—Typical**

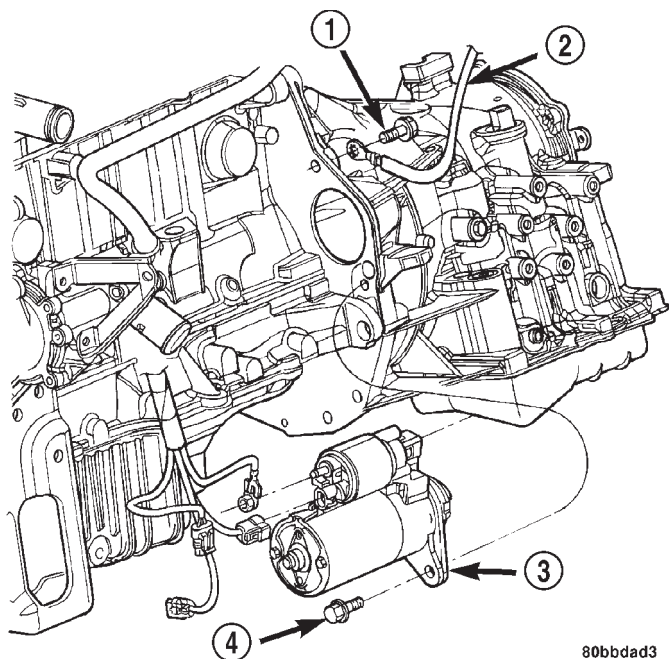
- 1 - LATERAL BENDING BRACE
- 2 - STRUCTURAL COLLAR
- 3 - DUST COVER



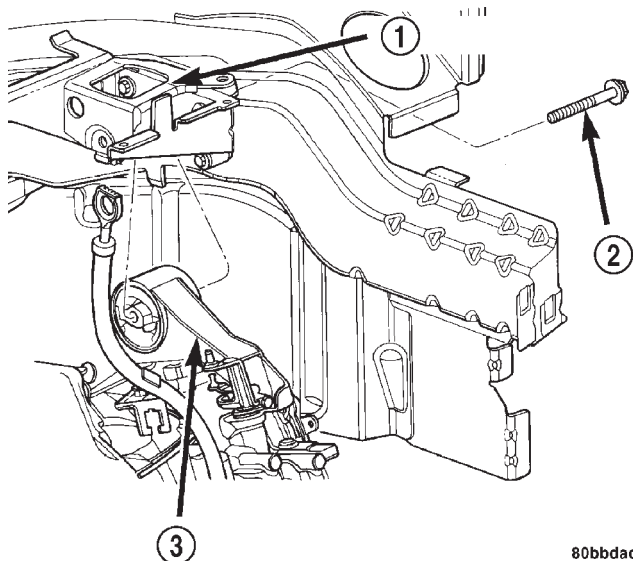
**Fig. 41 Right Lateral Bending Brace Removal/Installation—Typical**

- 1 - TRANSAXLE
- 2 - ENGINE
- 3 - LATERAL BENDING BRACE

## REMOVAL AND INSTALLATION (Continued)

**Fig. 42 Starter Motor Removal/Installation—Typical**

- 1 - BOLT
- 2 - GROUND
- 3 - STARTER
- 4 - BOLT

**Fig. 43 Transaxle Upper Mount Thru-Bolt—Typical**

- 1 - MOUNT BRACKET
- 2 - BOLT
- 3 - MOUNT

(23) Carefully lower engine and transaxle on screw jack until proper removal clearance is obtained.

(24) Obtain a helper to assist in holding transaxle while removing transaxle-to-engine mounting bolts (Fig. 44).

(25) Remove transaxle from vehicle (Fig. 44).

(26) If installing a new or replacement transaxle, remove the upper mount as shown in (Fig. 45), transfer to the replacement unit and torque all bolts to 68 N·m (50 ft. lbs.) torque.

**INSTALLATION**

(1) Install clutch module onto input shaft. Install transaxle into position.

(2) Install transaxle-to-engine mounting bolts (Fig. 44) and tighten to 95 N·m (70 ft. lbs.) torque.

(3) Raise engine and transaxle with screw jack until through hole in upper mount aligns with hole in mount bracket. Install mount bolt and tighten to 108 N·m (80 ft. lbs.) torque (Fig. 43).

(4) Remove screwjack.

(5) Install drive plate-to-clutch module bolts and torque to 88 N·m (65 ft. lbs.) torque.

(6) Install starter motor and tighten bolts to 54 N·m (40 ft. lbs.) torque. Make sure to fasten ground cable to upper starter bolt as shown in (Fig. 42).

(7) Connect starter electrical harness and tighten positive cable nut to 10 N·m (90 in. lbs.) torque.

(8) Install bellhousing dust cover (Fig. 40).

(9) Install left engine-to-transaxle bending brace (Fig. 40).

(10) Install structural collar (Fig. 40) as follows:

(a) Position collar and install all bolts finger tight.

(b) Tighten the collar-to-oil pan bolts to 3 N·m (30 in. lbs.) torque.

(c) Tighten the collar-to-transaxle bolts to 108 N·m (80 ft. lbs.) torque.

(d) Final torque the collar-to-oil pan bolts to 54 N·m (40 ft. lbs.) torque.

(11) Install the right lateral bending brace and tighten bolts to 81 N·m (60 ft. lbs.) torque (Fig. 41).

(12) Install both front axle driveshafts. Refer to Group 3, Differential and Driveline for the correct procedures.

(13) Fill transaxle with suitable amount of Mopar® Manual Transaxle Lubricant (PN 04874465).

(14) Lower vehicle.

(15) Connect vehicle speed sensor connector (Fig. 39).

(16) Connect shift crossover and selector cables to shift lever. Install cables to bracket and install retaining clips (Fig. 38).

(17) Connect clutch cable to fork and secure to transaxle (Fig. 37).

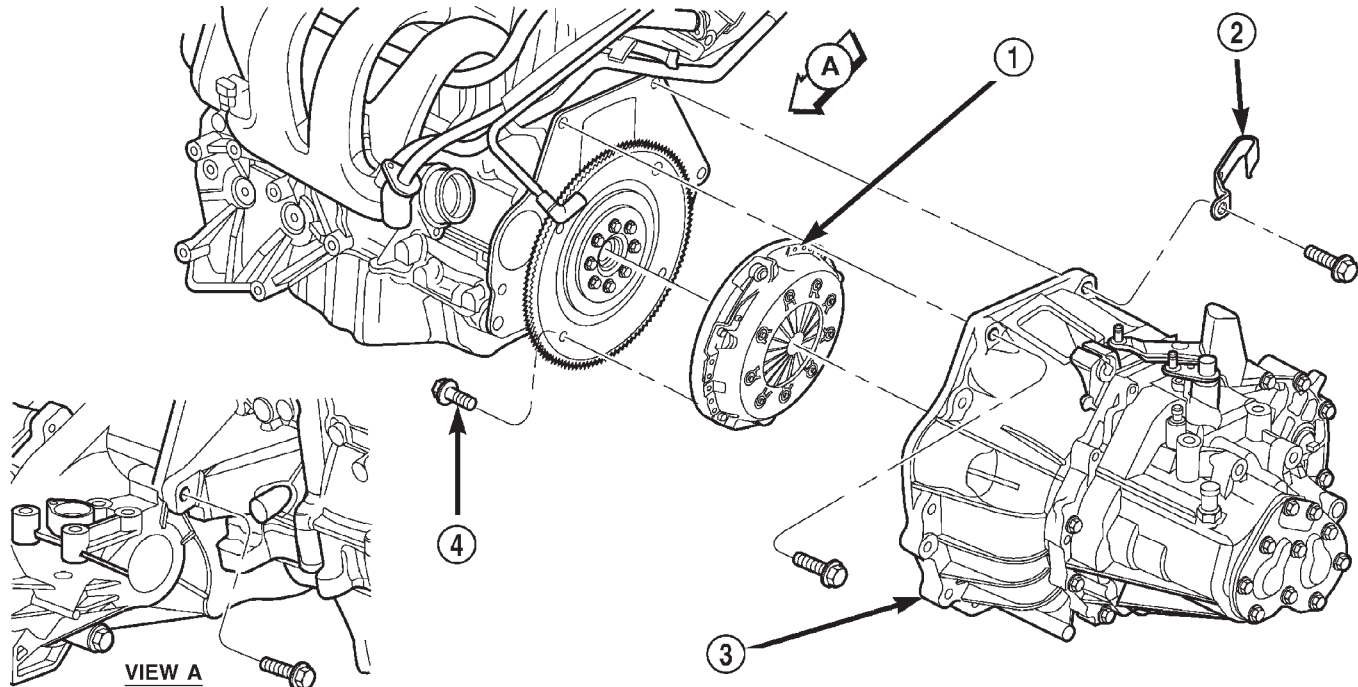
(18) Install bellhousing cap (Fig. 37).

(19) Connect back-up lamp switch connector.

(20) Connect ground strap to transaxle upper mount bracket.

(21) Install battery lower tray and battery, and tighten battery hold down clamp to secure battery.

## REMOVAL AND INSTALLATION (Continued)

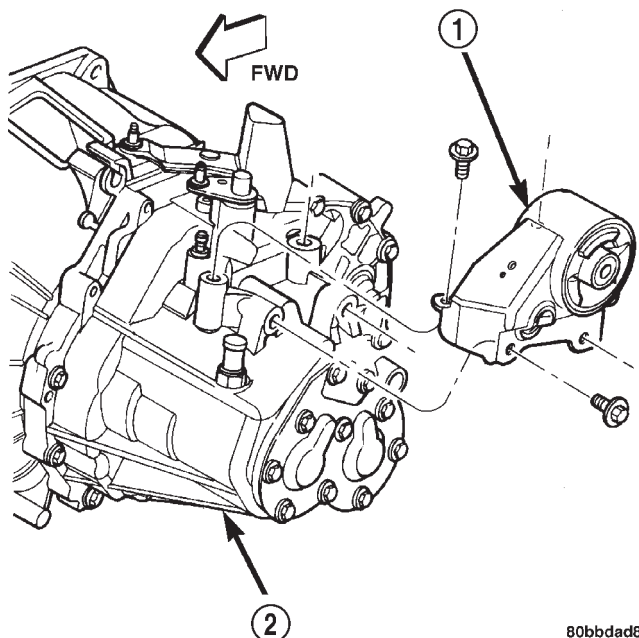


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**Fig. 44 Transaxle Removal/Installation**

1 - MODULAR CLUTCH ASSEMBLY  
2 - CLIP

3 - TRANSAXLE  
4 - CLUTCH MODULE BOLT (4)



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**Fig. 45 Transaxle Upper Mount and Bracket**

1 - MOUNT  
2 - TRANSAXLE

(22) Install the air cleaner/throttle body assy. as follows:

(a) Connect the accelerator and speed control (if equipped) cables to the air cleaner/throttle body assy.

(b) Install assy into position, making sure the air cleaner locating slot is engaged to the battery bracket tab, and tighten fasteners to 14 N·m (120 in. lbs.) torque.

(c) Verify throttle body duct is fully seated to intake manifold and tighten clamp to 5 N·m (40 in. lbs.) torque.

(d) Connect the Throttle Position Sensor (TPS) and Idle Air Control (IAC) connectors.

(e) Connect proportional purge solenoid (PPS) and crankcase vent hose from throttle body.

(23) Connect the battery cables.

(24) Road test vehicle and inspect for leaks.



## DISASSEMBLY AND ASSEMBLY

### TRANSAXLE

The NV T350 (A-578) transaxle internal components can be serviced only by separating the gear case from the bellhousing case.

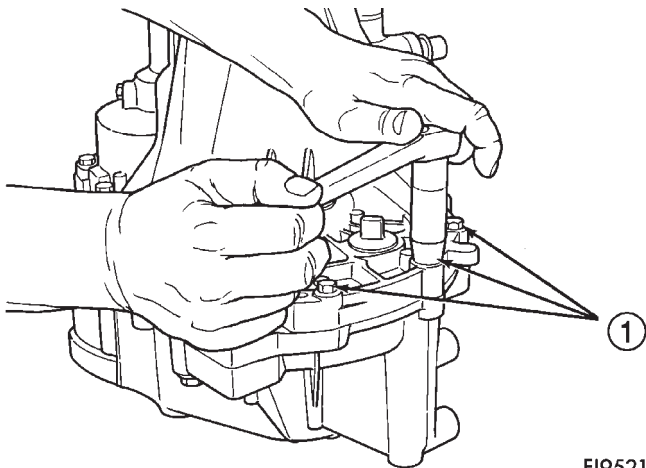
**CAUTION:** The transaxle output shaft is serviced as a unit. No disassembly and reassembly is possible. Damage to the transaxle may result.

### DISASSEMBLY

- (1) Place transaxle on bench.
- (2) Remove the clutch release bearing and fork. Move the release fork and bearing to an in-line position. Grasp the release lever with two hands in the pivot stud socket area. Pull with even pressure to release the fork from the pivot stud.

**CAUTION:** Do not use a screwdriver or pry bar to release the fork as this may cause damage to the fork and/or clip.

- (3) Remove shift levers by driving out the roll pins.
- (4) Remove transaxle case half bolts (Fig. 46).

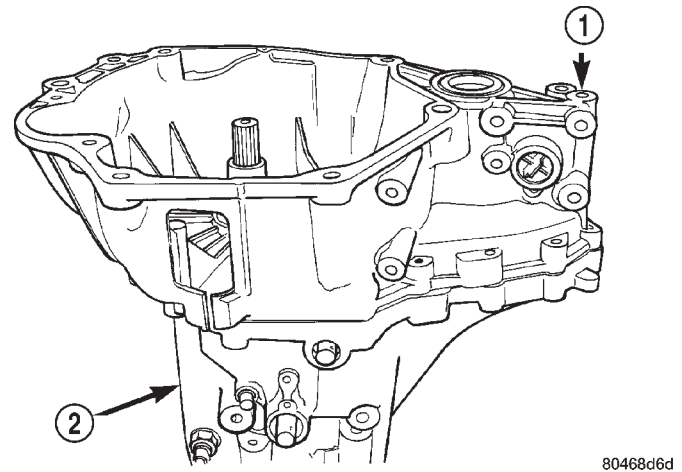


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**Fig. 46 Case Bolts**

1 - CASE BOLTS

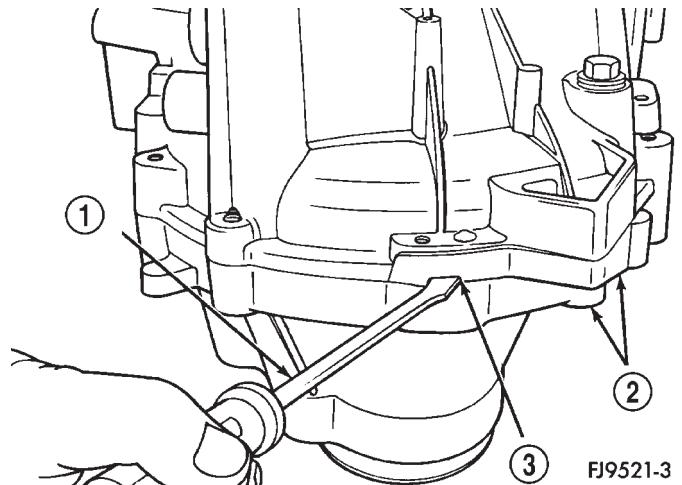
- (5) Place two screwdrivers into the slots provided in the case halves near the dowels (Fig. 47). Separate the case halves (Fig. 48).



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**Fig. 47 Transaxle Case Halves**

1 - BELLHOUSING HALF  
2 - GEAR CASE HALF



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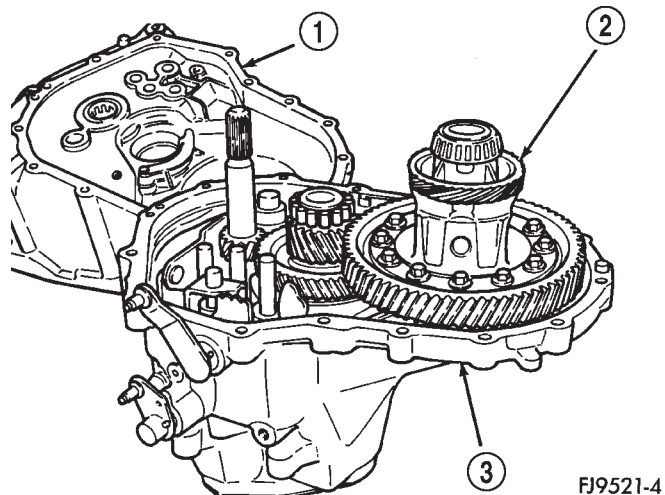
**Fig. 48 Separate Case Halves**

1 - PRY TOOL  
2 - CASE HALVES  
3 - PRY SLOT



## DISASSEMBLY AND ASSEMBLY (Continued)

(6) Remove bellhousing half from gear case half (Fig. 49).

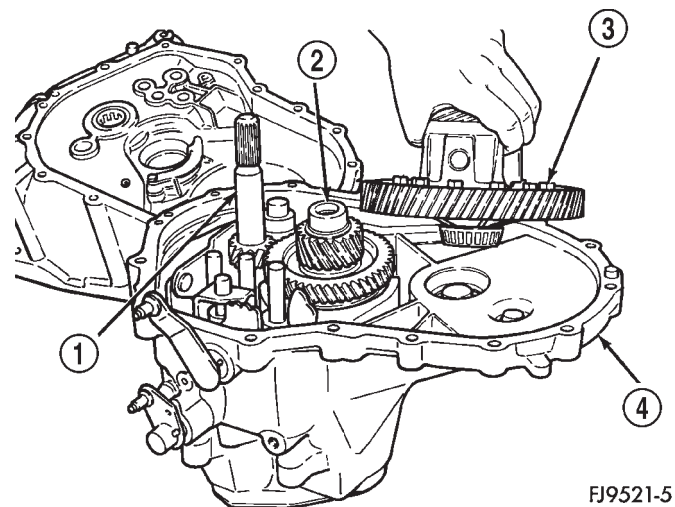


**Fig. 49 Bellhousing Case Half Removal**

- 1 - BELLHOUSING CASE HALF
- 2 - DIFFERENTIAL
- 3 - GEAR CASE HALF

(7) Remove output shaft roller bearing from output shaft.

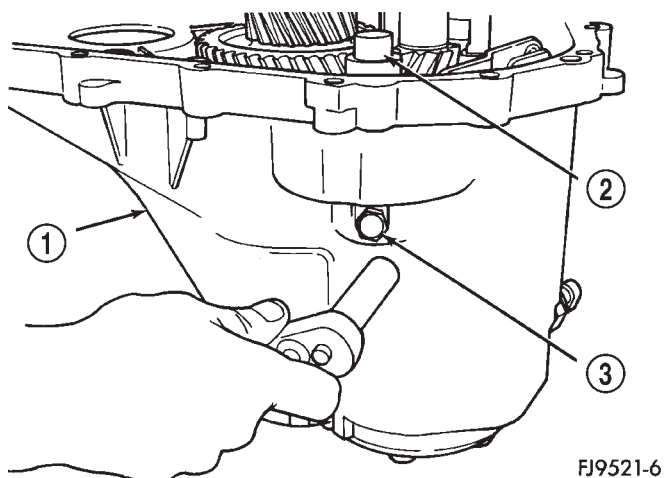
(8) Remove differential assembly (Fig. 50).



**Fig. 50 Differential Assembly Removal**

- 1 - INPUT SHAFT
- 2 - OUTPUT SHAFT
- 3 - DIFFERENTIAL
- 4 - CASE

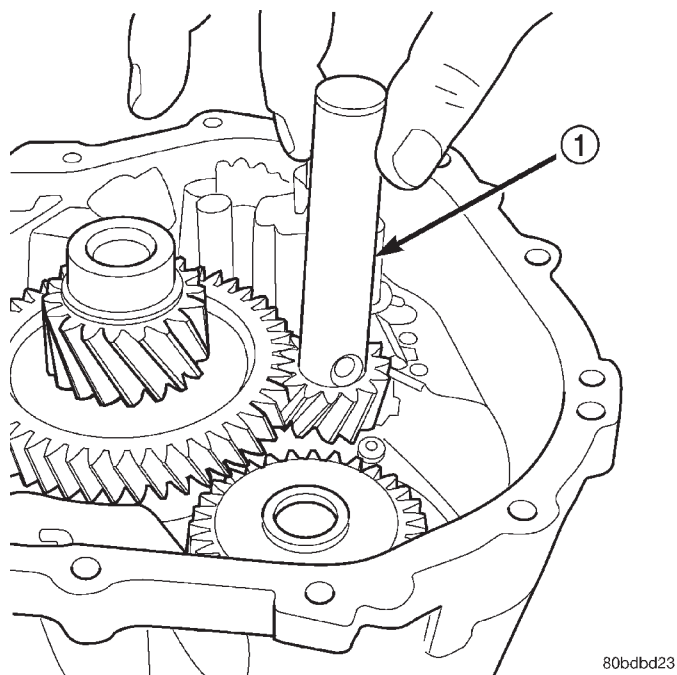
(9) Remove reverse idler shaft bolt (Fig. 51).



**Fig. 51 Reverse Idler Shaft Bolt Removal**

- 1 - CASE
- 2 - REVERSE IDLER SHAFT
- 3 - REVERSE IDLER SHAFT BOLT

(10) Remove reverse idler shaft (Fig. 52).

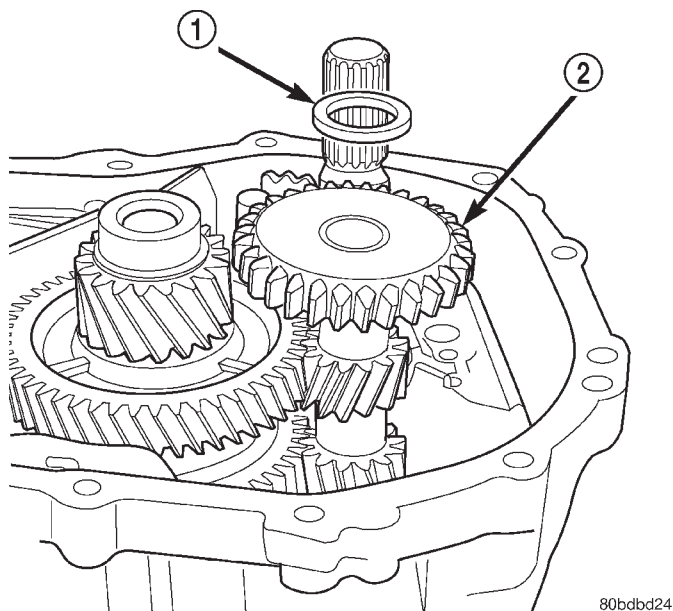


**Fig. 52 Reverse Idler Shaft Removal**

- 1 - REVERSE IDLER SHAFT

## DISASSEMBLY AND ASSEMBLY (Continued)

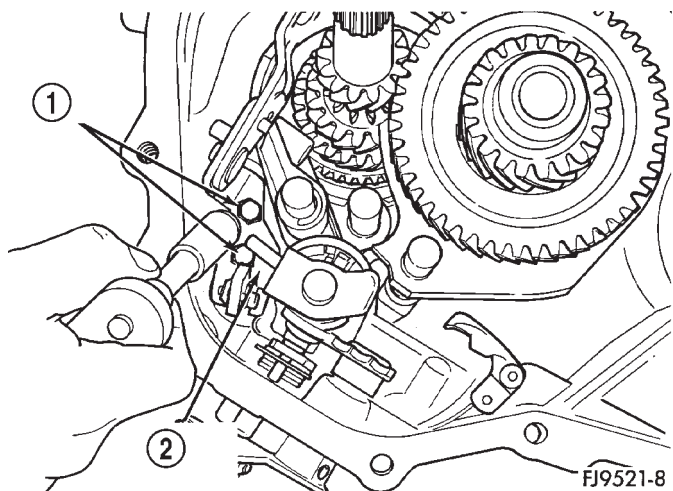
(11) Remove reverse idler gear and spacer (Fig. 53).



**Fig. 53 Reverse Idler Gear and Spacer Removal**

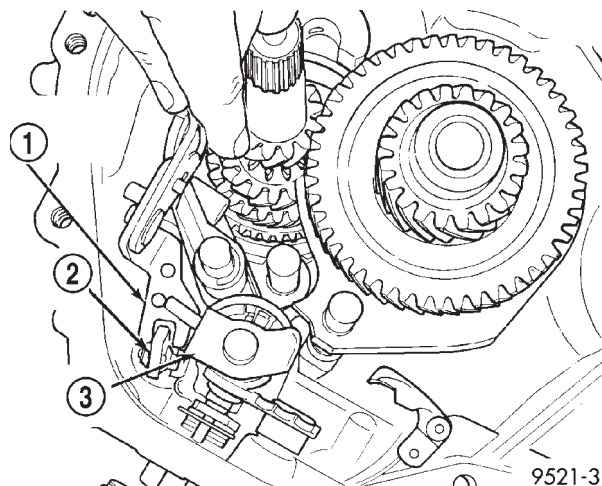
- 1 - SPACER
- 2 - REVERSE IDLER GEAR

(12) Remove two screws retaining reverse fork bracket (Fig. 54). Remove reverse fork bracket and reverse cam blockout assembly (Fig. 55).



**Fig. 54 Screws Retaining Reverse Fork Bracket**

- 1 - SCREWS (2)
- 2 - REVERSE FORK BRACKET

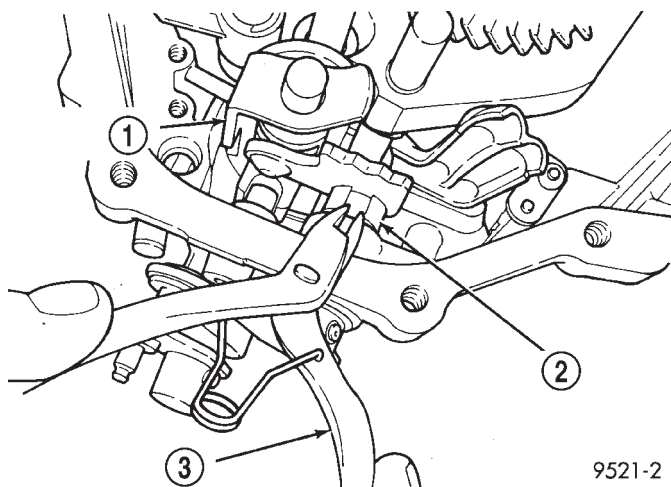


**Fig. 55 Remove Reverse Fork Bracket**

- 1 - REVERSE FORK BRACKET
- 2 - REVERSE CAM BLOCKOUT
- 3 - SHIFT BLOCKER ASSEMBLY

(13) Using snap-ring pliers, remove selector shaft spacer (Fig. 56).

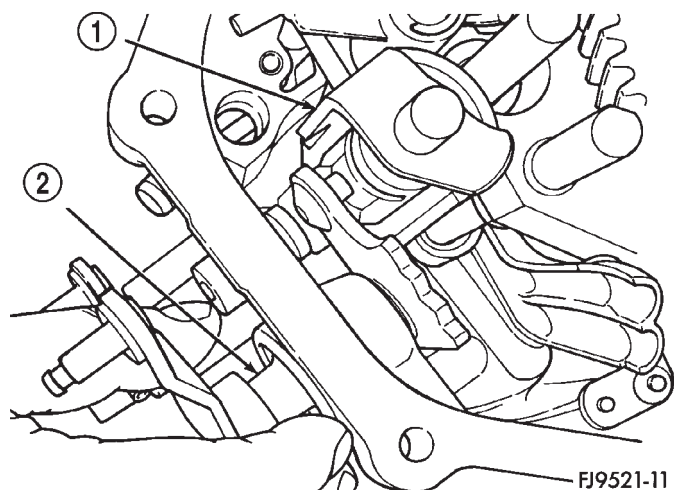
(14) Pull the selector shaft shift pin out of the slot in the blocker assembly. Turn selector shaft up and out of the way (Fig. 57).



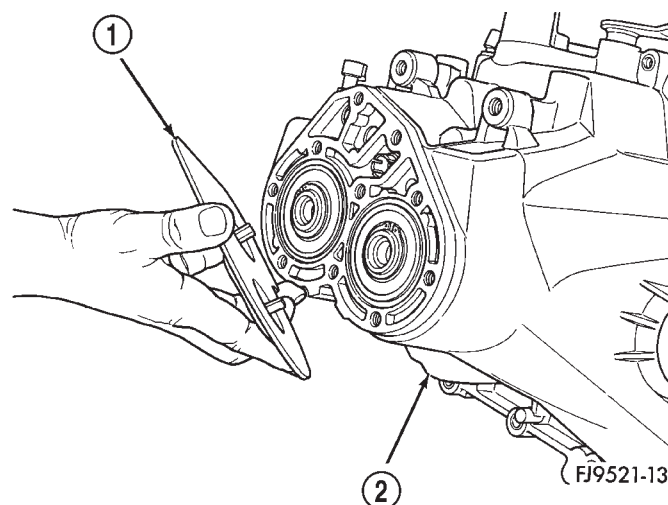
**Fig. 56 Remove Selector Shaft Spacer**

- 1 - SHIFT BLOCKER ASSEMBLY
- 2 - SELECTOR SHAFT SPACER (PLASTIC)
- 3 - SNAP RING PLIERS

## DISASSEMBLY AND ASSEMBLY (Continued)

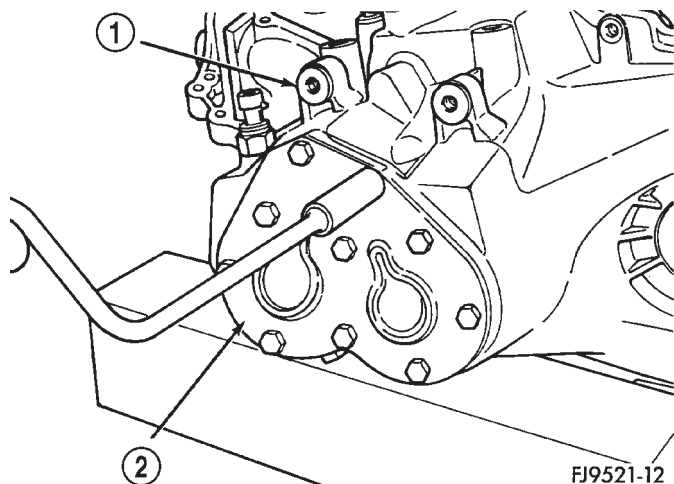
**Fig. 57 Selector Shaft**

- 1 - SHIFT ASSEMBLY  
2 - SELECTOR SHAFT

**Fig. 59 End Cover**

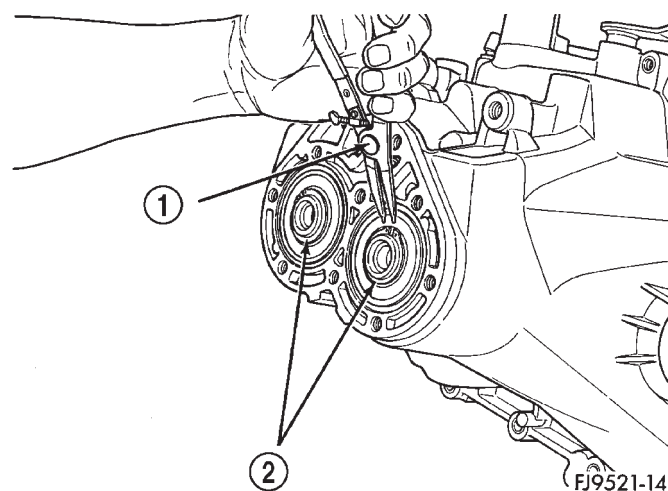
- 1 - END COVER  
2 - CASE

(15) Remove transaxle end cover (Fig. 58) (Fig. 59).

**Fig. 58 Transaxle Cover Removal**

- 1 - TRANSAXLE CASE  
2 - END COVER

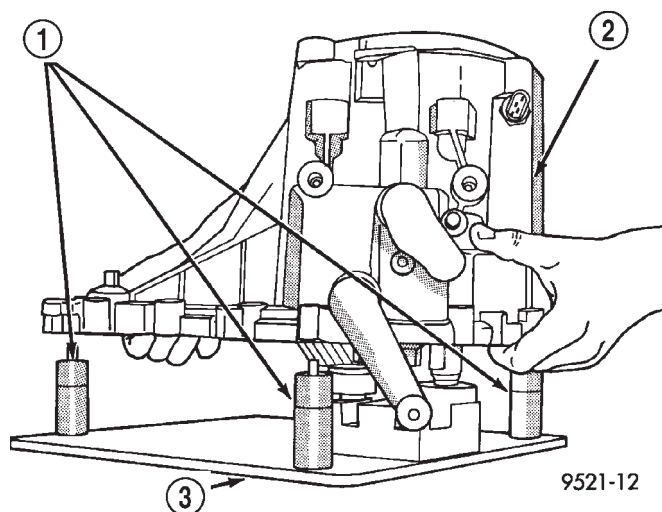
(16) Remove two snap rings retaining the output shaft and the input shaft to the bearings (Fig. 60).

**Fig. 60 Snap Rings Retaining Bearings**

- 1 - SNAP RING PLIERS  
2 - SNAP RINGS

## DISASSEMBLY AND ASSEMBLY (Continued)

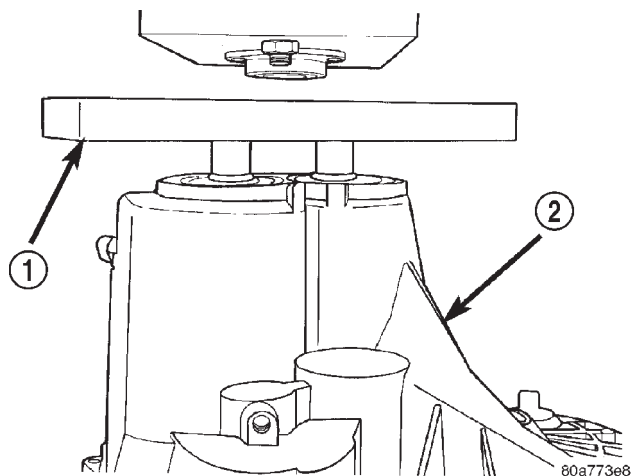
(17) Using bench fixture and shims provided (Miller tools # 6785, 6785-1, and 6785-2), turn transaxle over. Install transaxle onto bench fixture (Fig. 61). Verify shim spacers are in position on bench fixture. Install transaxle into shop press.



**Fig. 61 Bench Fixture**

- 1 - SHIMS
- 2 - TRANSAXLE
- 3 - 6785 BENCH FIXTURE

(18) Install bearing fixture Miller tool #6768 onto transaxle end bearings (Fig. 62). Verify tool is properly aligned to input and output shafts.

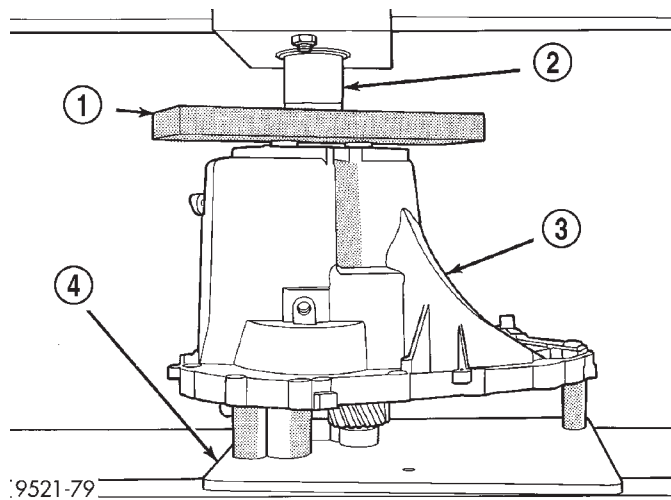


**Fig. 62 Bearing Fixture**

- 1 - BEARING FIXTURE
- 2 - TRANSAXLE CASE

**CAUTION:** The oil dams in the input and output shafts can be damaged while pressing on the shafts if the bearing fixture is not used properly.

(19) Install transaxle gear case into shop press. Press output and input shaft assemblies out of case (Fig. 63).

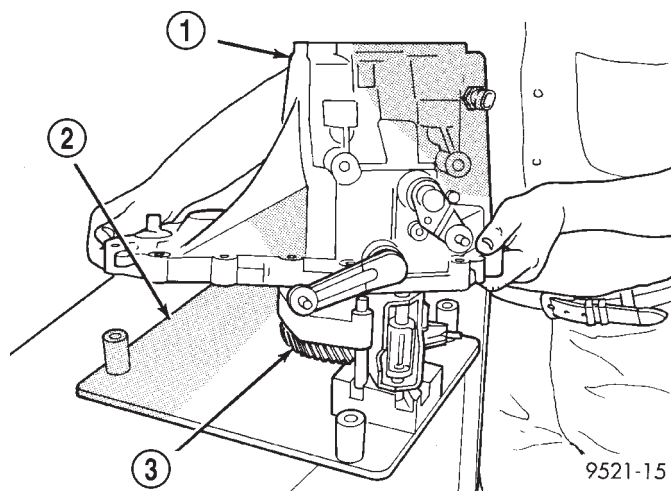


**Fig. 63 Pressing Gears Out of Case**

- 1 - BEARING FIXTURE
- 2 - PRESS RAM
- 3 - TRANSAXLE CASE
- 4 - BENCH FIXTURE

(20) Remove transaxle from press.

(21) Carefully remove transaxle case from the shaft assemblies and bench fixture (Fig. 64). Be sure the oil-feed trough to the end bearings is not damaged (Fig. 65).

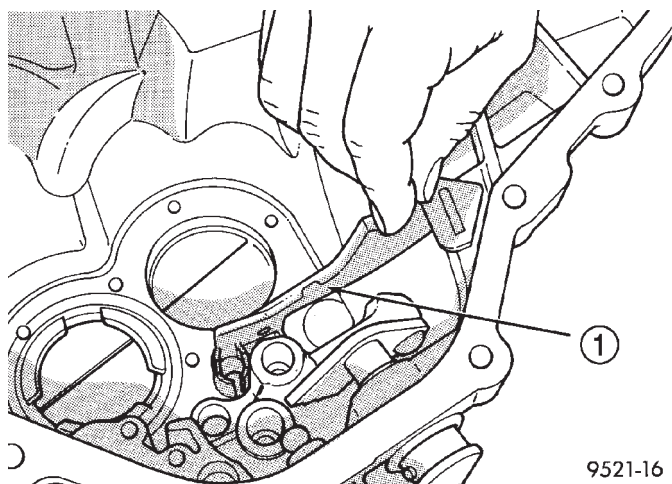


**Fig. 64 Transaxle Case Removal**

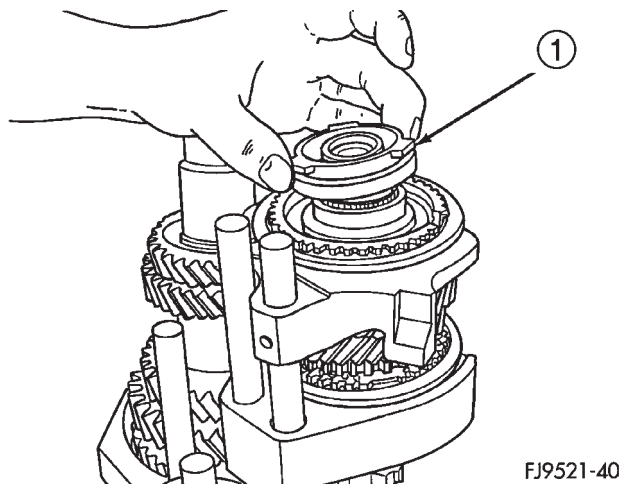
- 1 - TRANSAXLE CASE
- 2 - BENCH FIXTURE
- 3 - GEARTRAIN



## DISASSEMBLY AND ASSEMBLY (Continued)

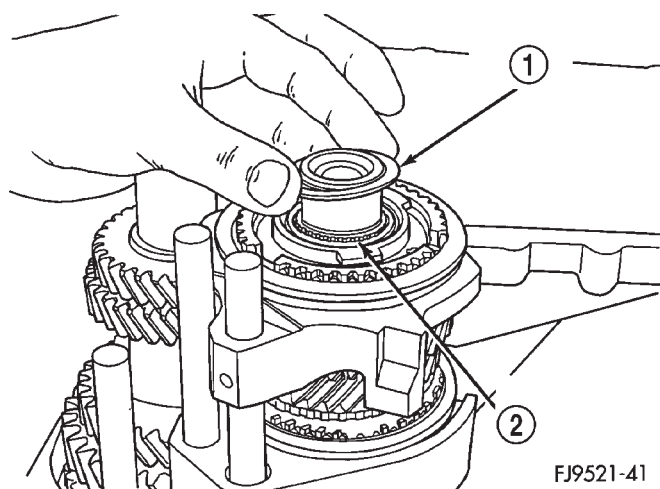
**Fig. 65 Oil Feed Trough**

1 - OIL FEED TROUGH

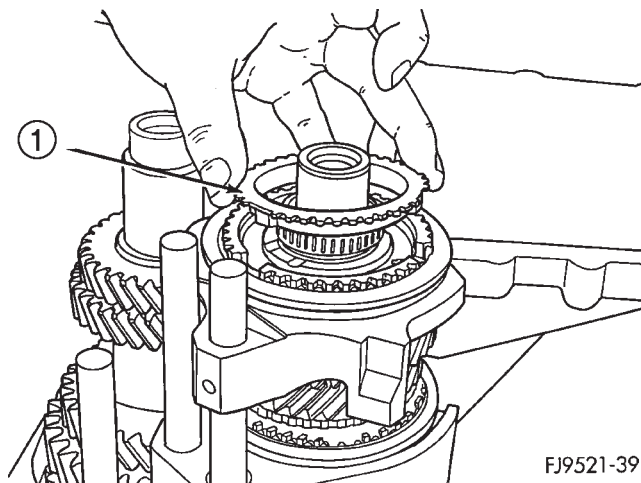
**Fig. 67 Reverse Brake Friction Cone**

1 - REVERSE BRAKE FRICTION CONE

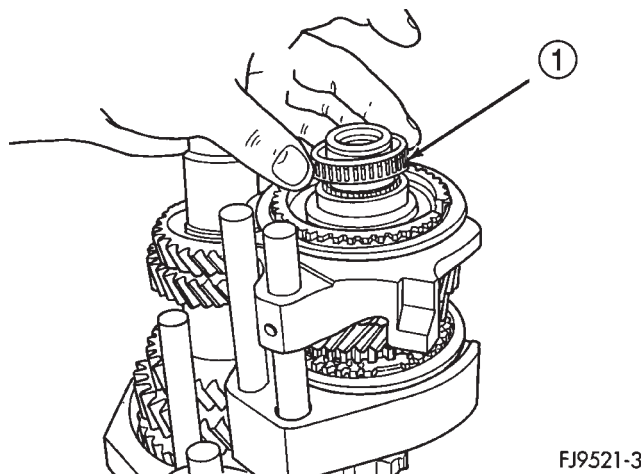
(22) **TRANSAXLE W/REVERSE BRAKE:** Remove the reverse brake blocking ring, shim, reverse brake friction cone, bearing and race from the input shaft assembly (Fig. 66) (Fig. 67) (Fig. 68) (Fig. 69) (Fig. 70). **TRANSAXLE W/O REVERSE BRAKE:** Remove plastic spacer from the input shaft assembly.

**Fig. 66 Reverse Brake Shim**

1 - REVERSE BRAKE SHIM  
2 - REVERSE BRAKE FRICTION CONE

**Fig. 68 Reverse Brake Blocking Ring**

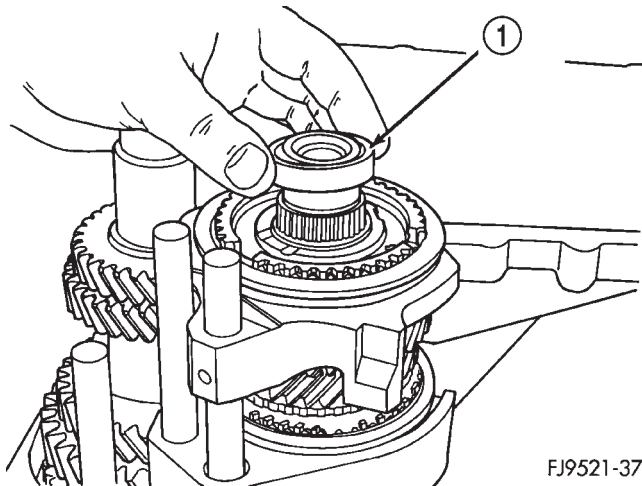
1 - REVERSE BRAKE BLOCKING RING

**Fig. 69 Reverse Brake Needle Bearing**

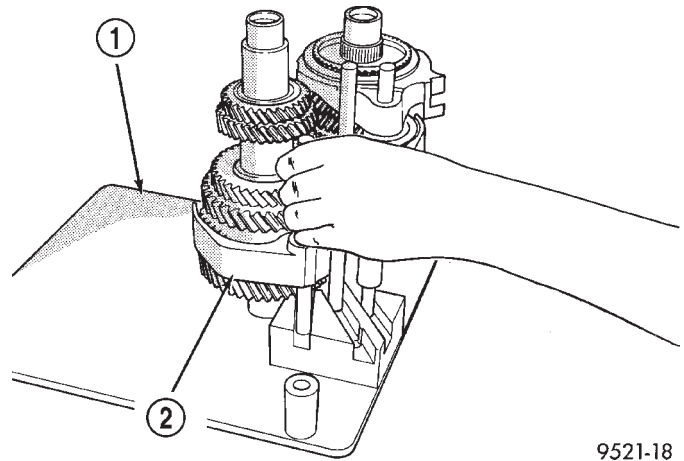
1 - REVERSE BRAKE NEEDLE BEARING



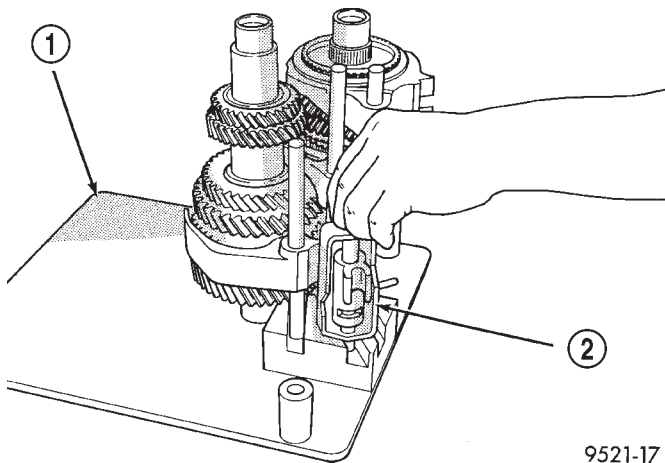
## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 70 Reverse Brake Race**

1 - REVERSE BRAKE RACE

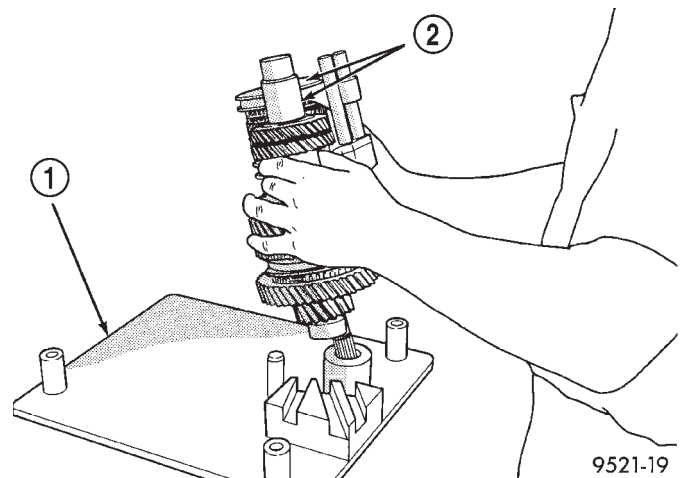
**Fig. 72 1-2 Shift Fork Removal**1 - 6785 BENCH FIXTURE  
2 - 1-2 SHIFT FORK

(23) Remove the shift blocker assembly from the bench fixture (Fig. 71).

**Fig. 71 Shift Blocker Removal**1 - 6785 BENCH FIXTURE  
2 - SHIFT BLOCKER ASSEMBLY

(24) Remove the 1-2 shift fork from the output shaft (Fig. 72).

(25) Remove input and output shaft assemblies from bench fixture (Fig. 73).

**Fig. 73 Gear Train Removal**1 - 6785 BENCH FIXTURE  
2 - INPUT AND OUTPUT SHAFTS

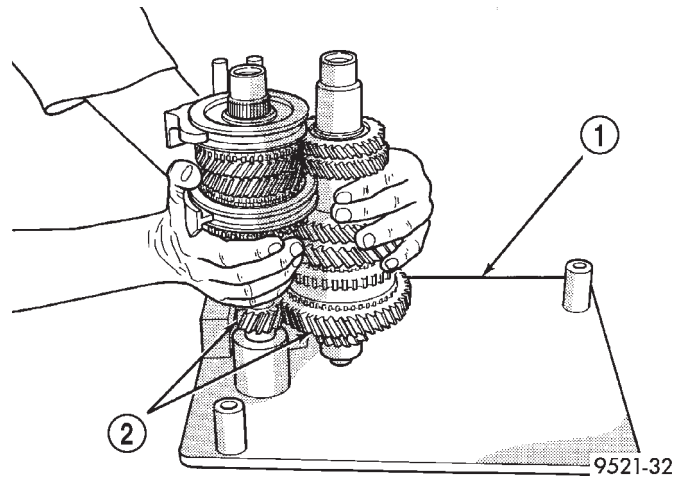
**CAUTION:** The output shaft assembly is serviced as an assembly. Do not try to repair any component on the output shaft. If the 1-2 synchronizer or gear fails, it is necessary to replace the complete output shaft assembly.

## DISASSEMBLY AND ASSEMBLY (Continued)

### ASSEMBLY

The sealant used to seal the transaxle case halves is Mopar® Gasket Maker, Loctite® 518, or equivalent. The sealant used for the bearing end plate cover is Mopar® RTV.

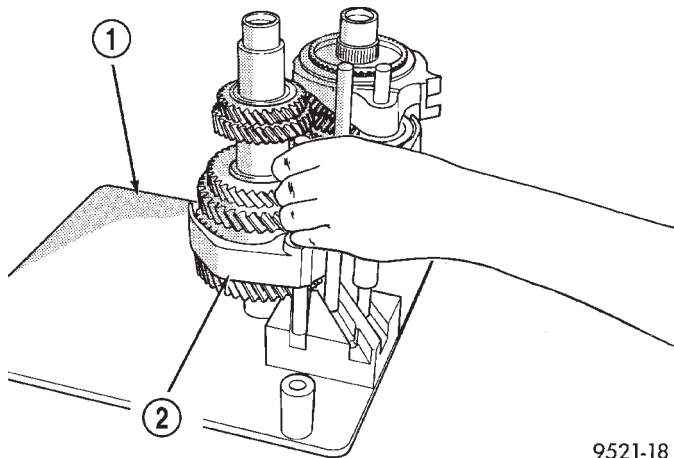
(1) Verify bench fixture shims are removed from bench fixture. Install output and input shafts into bench fixture (Miller tool #6785) (Fig. 74).



**Fig. 74 Bench Fixture**

- 1 - BENCH FIXTURE
- 2 - GEARTRAIN

(2) Install shift rails and forks into bench fixture (Fig. 75).



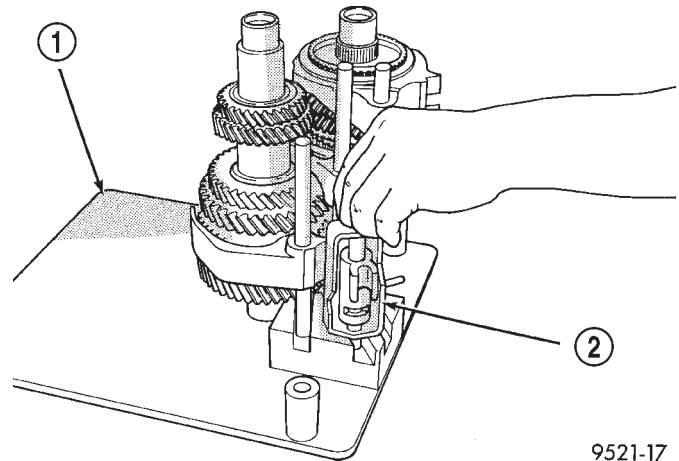
**Fig. 75 Shift Rail Installation**

- 1 - 6785 BENCH FIXTURE
- 2 - 1-2 SHIFT FORK

(3) Install shift blocker assembly into bench fixture (Fig. 76).

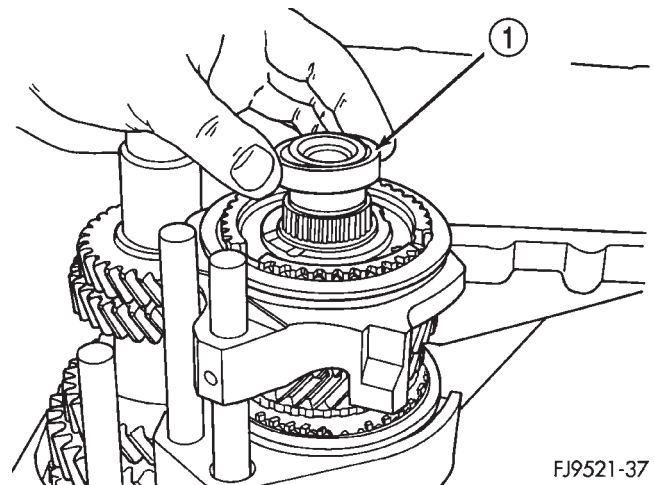
(4) Install reverse brake race onto input shaft (Fig. 77).

(5) Install reverse brake needle bearing (Fig. 78).



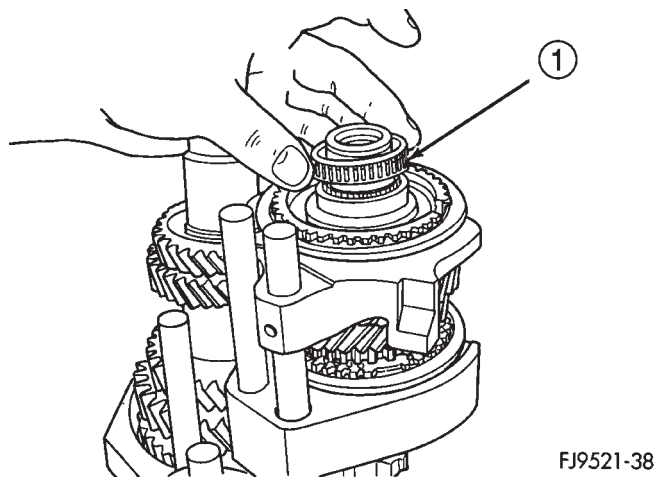
**Fig. 76 Shift Blocker Installation**

- 1 - 6785 BENCH FIXTURE
- 2 - SHIFT BLOCKER ASSEMBLY



**Fig. 77 Reverse Brake Race Installation**

- 1 - REVERSE BRAKE RACE

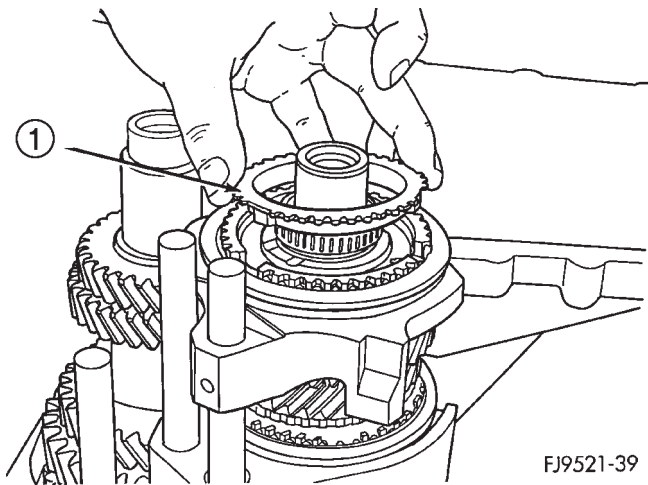


**Fig. 78 Reverse Brake Needle Bearing**

- 1 - REVERSE BRAKE NEEDLE BEARING

## DISASSEMBLY AND ASSEMBLY (Continued)

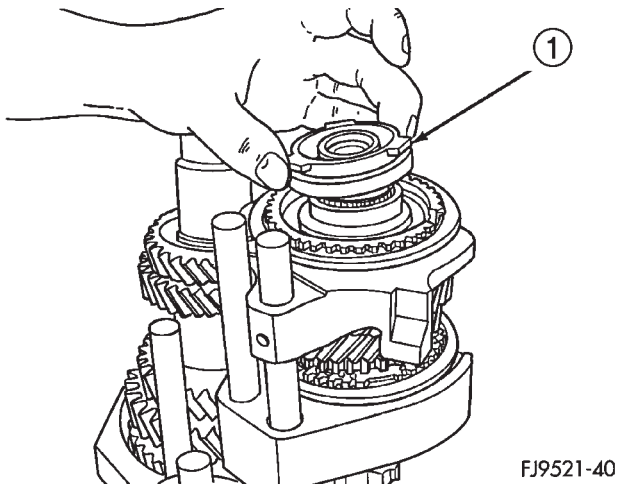
(6) Install reverse brake blocking ring (Fig. 79).



**Fig. 79 Reverse Brake Blocking Ring Installation**

1 - REVERSE BRAKE BLOCKING RING

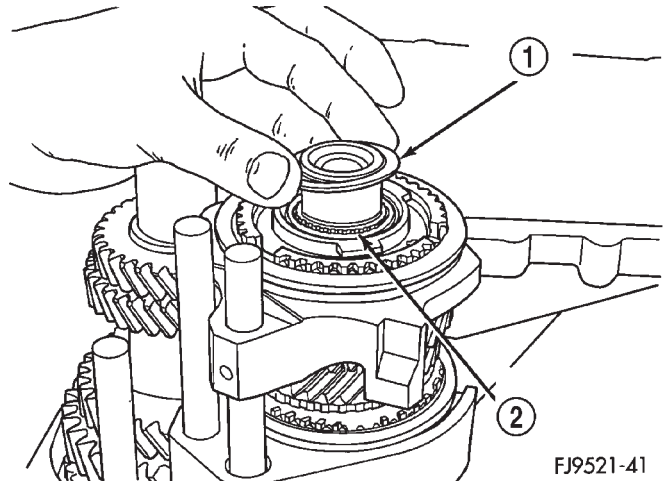
(7) Install reverse brake friction cone (Fig. 80).



**Fig. 80 Reverse Brake Friction Cone Installation**

1 - REVERSE BRAKE FRICTION CONE

(8) Install reverse brake shim (Fig. 81). Apply petroleum jelly to shim to hold in place.

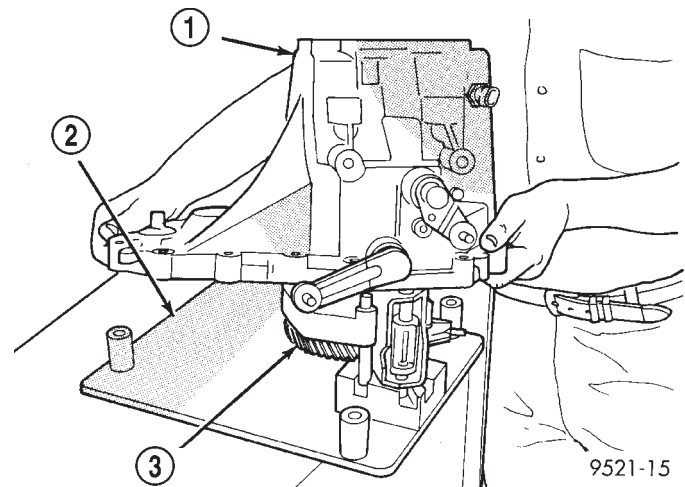


**Fig. 81 Reverse Brake Shim**

1 - REVERSE BRAKE SHIM

2 - REVERSE BRAKE FRICTION CONE

(9) Install gear-case half over bench fixture (Fig. 82). Line up shift finger over 3-4 lug.



**Fig. 82 Gear Case Half**

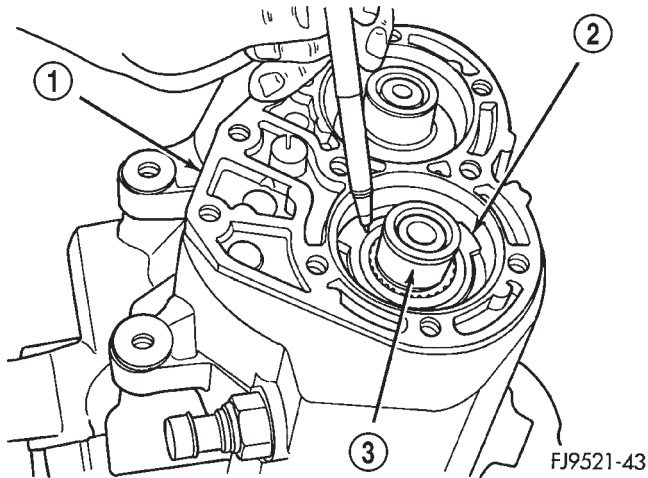
1 - TRANSAXLE CASE

2 - BENCH FIXTURE

3 - GEARTRAIN

## DISASSEMBLY AND ASSEMBLY (Continued)

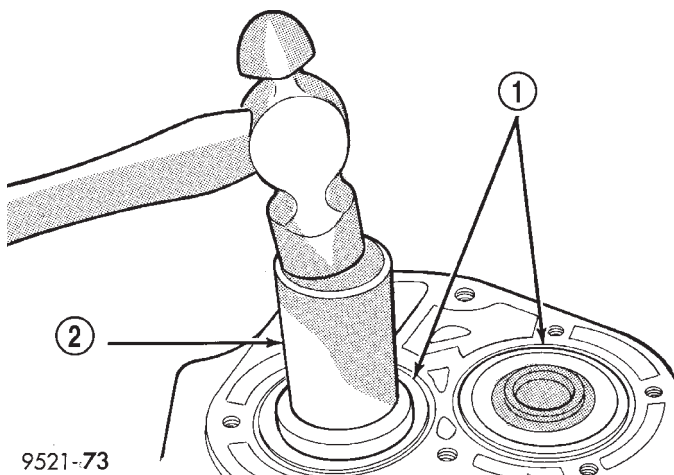
(10) Line up reverse brake friction cone lugs to the slots in the gear case (Fig. 83). Verify reverse brake shim is in position.



**Fig. 83 Friction Cone Lugs**

- 1 - CASE
- 2 - FRICTION CONE LUGS
- 3 - INPUT SHAFT

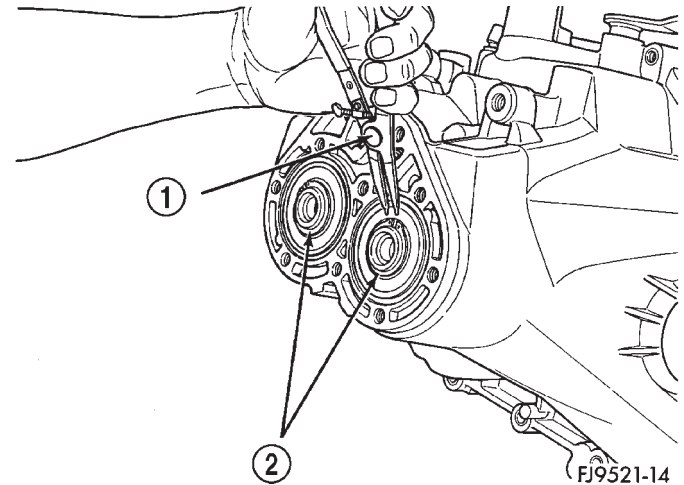
(11) Position input and output bearings on the shafts. Using Miller tool C-4992-1, press on input and output shaft bearings until they bottom into the case and against the shafts (Fig. 84).



**Fig. 84 Installing Input and Output Bearings**

- 1 - INPUT AND OUTPUT BEARINGS
- 2 - SPECIAL TOOL C-4992-1

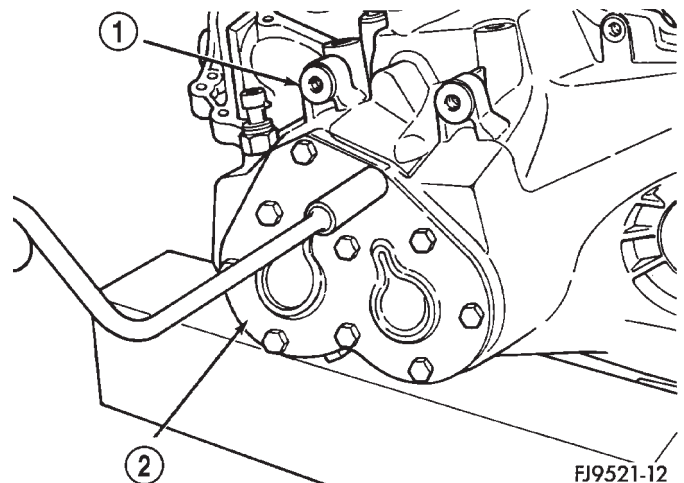
(12) Install shaft snap rings at input and output bearings (Fig. 85).



**Fig. 85 Snap Rings Retaining Bearings**

- 1 - SNAP RING PLIERS
- 2 - SNAP RINGS

(13) Apply Mopar® RTV sealant to end-cover outer edge and around bolt holes. Install end-cover onto gear case. Tighten end cover bolts to 29 N·m (21 ft. lbs.) torque (Fig. 86).

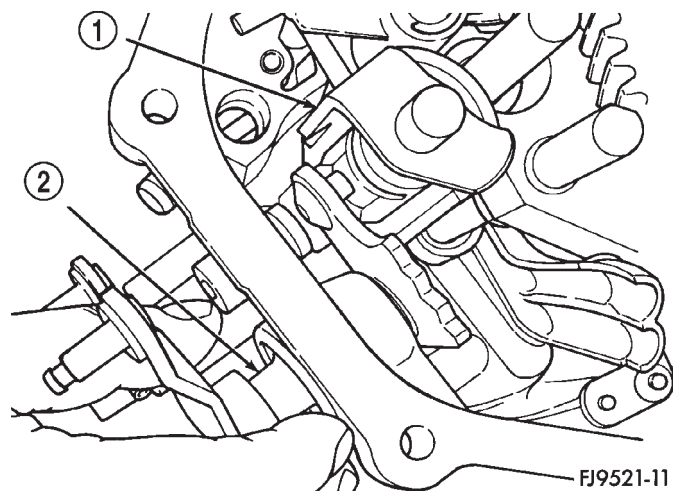


**Fig. 86 Transaxle End Cover**

- 1 - TRANSAXLE CASE
- 2 - END COVER

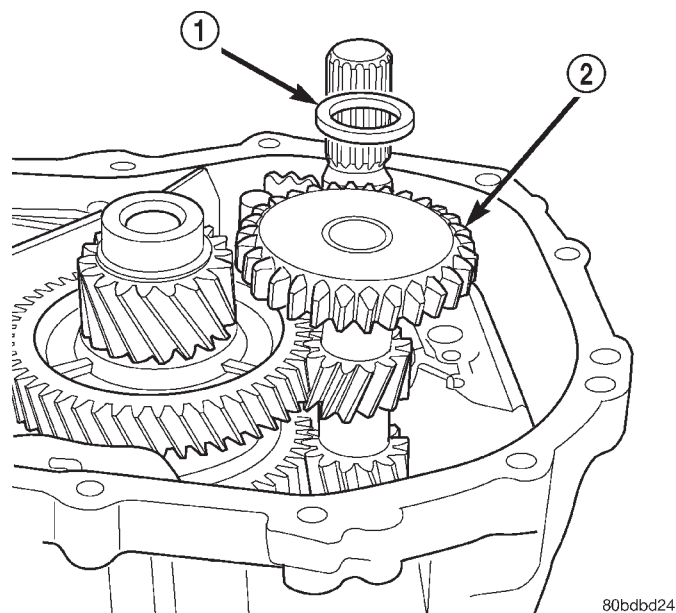
## DISASSEMBLY AND ASSEMBLY (Continued)

- (14) Remove gear case from bench fixture.  
 (15) Install gear case in a holding fixture with end cover facing down.  
 (16) Turn selector shaft into slot on blocker assembly (Fig. 87).

**Fig. 87 Selector Shaft**

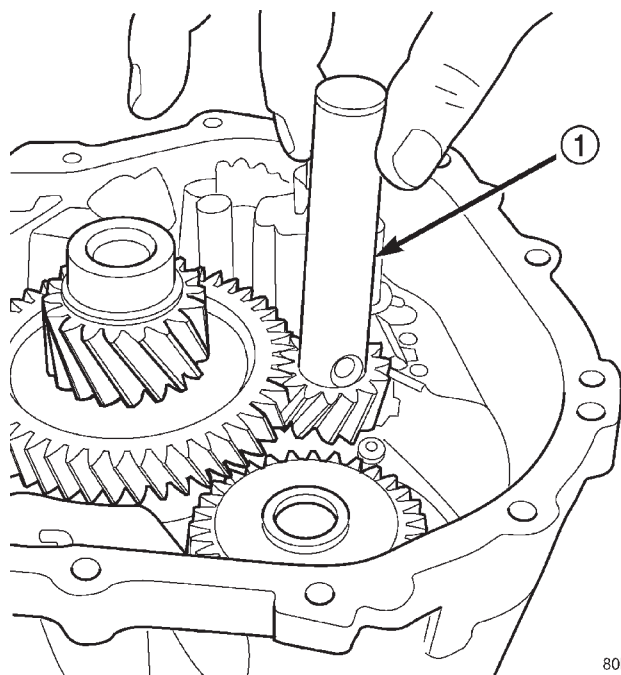
- 1 - SHIFT ASSEMBLY  
 2 - SELECTOR SHAFT

- (17) Push selector shaft spacer clip onto selector shaft. Install shift levers.  
 (18) Install reverse idler gear and spacer as shown in (Fig. 88)

**Fig. 88 Reverse Idler Gear and Spacer**

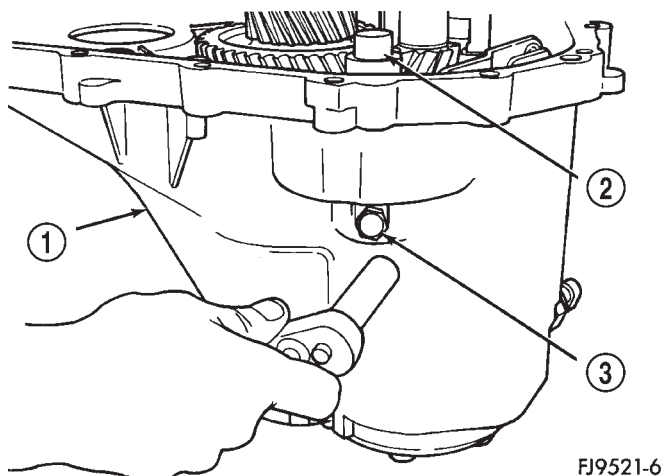
- 1 - SPACER  
 2 - REVERSE IDLER GEAR

- (19) Install reverse idler shaft (Fig. 89).

**Fig. 89 Reverse Idler Shaft**

- 1 - REVERSE IDLER SHAFT

- (20) Install bolt into shaft and tighten to 26 N·m (19 ft. lbs.) torque (Fig. 90).

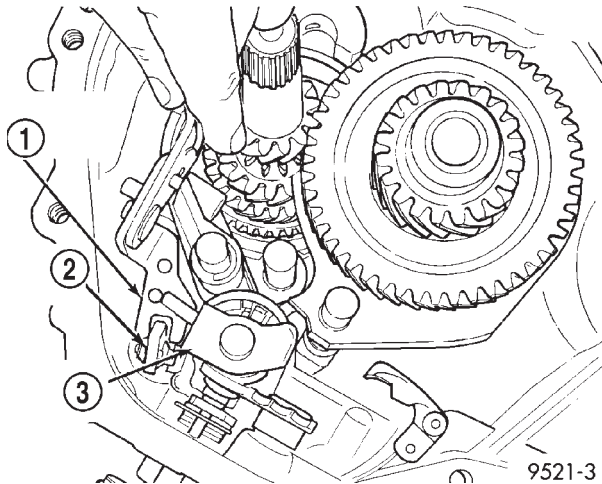
**Fig. 90 Reverse Idler Shaft Bolt**

- 1 - CASE  
 2 - REVERSE IDLER SHAFT  
 3 - REVERSE IDLER SHAFT BOLT



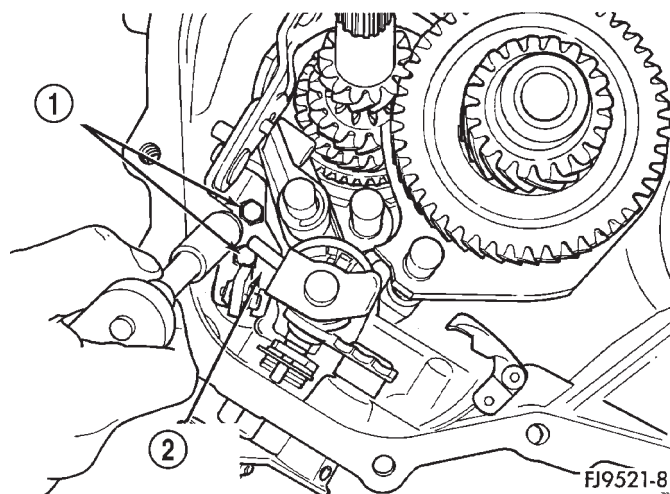
## DISASSEMBLY AND ASSEMBLY (Continued)

(21) Install reverse fork bracket and reverse lock-out. Tighten screws to 11 N·m (96 in. lbs.) torque (Fig. 91) (Fig. 92).



**Fig. 91 Reverse Fork Bracket**

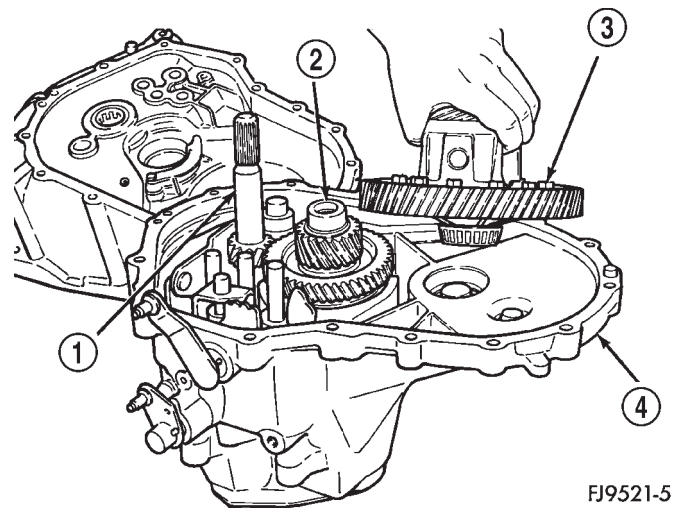
- 1 - REVERSE FORK BRACKET
- 2 - REVERSE CAM BLOCKOUT
- 3 - SHIFT BLOCKER ASSEMBLY



**Fig. 92 Reverse Fork Screws**

- 1 - SCREWS (2)
- 2 - REVERSE FORK BRACKET

(22) Install differential into gear case (Fig. 93).



**Fig. 93 Differential Assembly**

- 1 - INPUT SHAFT
- 2 - OUTPUT SHAFT
- 3 - DIFFERENTIAL
- 4 - CASE

### BEARING ADJUSTMENT PROCEDURE

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

(2) Bearing cups and cones should be replaced if they show signs of pitting or heat distress. If distress is seen on either the cup or bearing rollers, both cup and cone must be replaced.

(3) Bearing preload and drag torque specifications must be maintained to avoid premature bearing failures. Used (original) bearings may lose up to 50% of the original drag torque after break-in. All bearing adjustments must be made with no other component interference or gear intermesh.

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

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

(6) Turning-torque readings should be obtained while smoothly rotating in either direction.

## DISASSEMBLY AND ASSEMBLY (Continued)

## DIFFERENTIAL BEARING PRELOAD ADJUSTMENT

**NOTE:** True bearing turning-torque readings can be obtained only with the geartrain removed from the case.

(1) Remove bearing cup and existing shim from clutch bellhousing case.

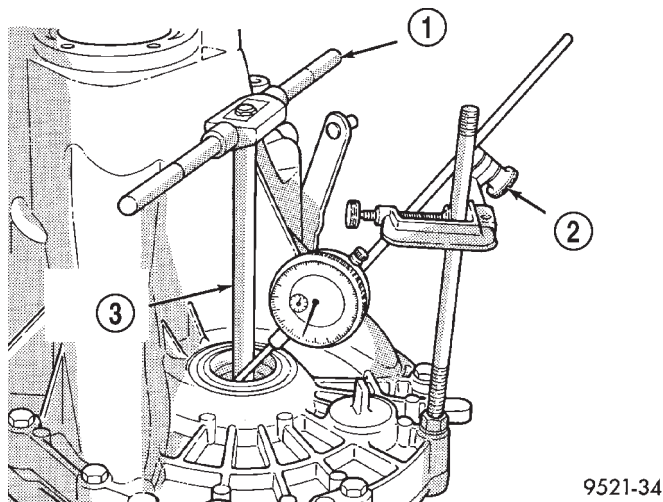
(2) Press in new bearing cup into bellhousing case (or use a cup that has been ground down on the outer edge for ease of measurement).

(3) Press in new bearing cup into gear case side.

(4) Oil differential bearings with Mopar® type M. S. 9417 Manual Transaxle Fluid. Install differential assembly in transaxle gear case. Install clutch bellhousing over gear case. Install and torque case bolts to 29 N·m (21 ft. lbs.).

(5) Position transaxle with bellhousing facing down on workbench with C-clamps. Position dial indicator.

(6) Apply a medium load to differential with Tool C-4995 and a T-handle, in the downward direction. Roll differential assembly back and forth a number of times. This will settle the bearings. Zero the dial indicator. To obtain end play readings, apply a medium load in an upward direction while rolling differential assembly back and forth (Fig. 94). Record end play.



9521-34

**Fig. 94 Checking Differential Bearing End Play To Determine Shim Thickness**

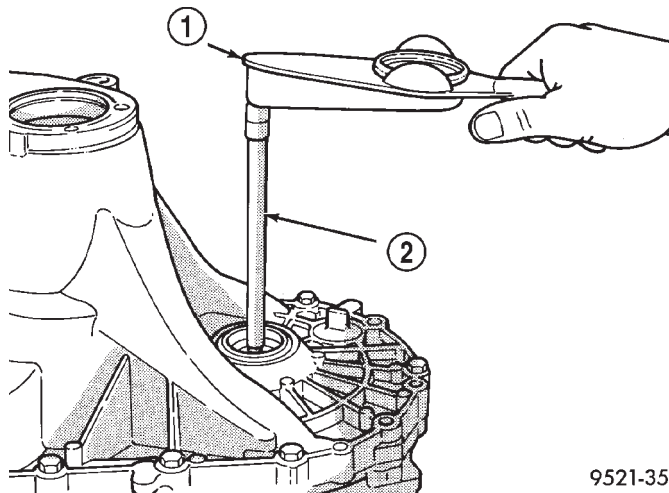
- 1 - T-HANDLE
- 2 - DIAL INDICATOR SET
- 3 - SPECIAL TOOL C-4995

(7) The shim required for proper bearing preload is the **total of end play, plus (constant) preload of 0.18mm (0.007 in.)**. Never combine shims to obtain the required preload.

(8) Remove case bolts. Remove clutch bellhousing differential bearing cup. Install shim(s) selected in Step 7. Then press the bearing cup into clutch bellhousing.

(9) Install clutch bellhousing. Install and torque case bolts to 26 N·m (19 ft. lbs.).

(10) Using Special Tool C-4995 and an inch-pound torque wrench, check turning torque of the differential assembly (Fig. 95). **The turning torque should be 6 to 12 in. lbs. If the turning torque is too high, install a 0.05mm (0.002 inch) thinner shim. If the turning torque is too low, install a 0.05mm (0.002 inch) thicker shim.**



9521-35

**Fig. 95 Checking Differential Bearing Turning Torque**

- 1 - INCH-POUND TORQUE WRENCH
- 2 - SPECIAL TOOL C-4995

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

Once proper turning torque has been established, place gear case on the end plate. Draw a bead of Mopar® Gasket Maker, Loctite® 518, or equivalent, on the flat surface of the case mating flange. Install clutch bellhousing onto gear case. Install and tighten case bolts to 29 N·m (21 ft. lbs.).

## DISASSEMBLY AND ASSEMBLY (Continued)

### INPUT SHAFT

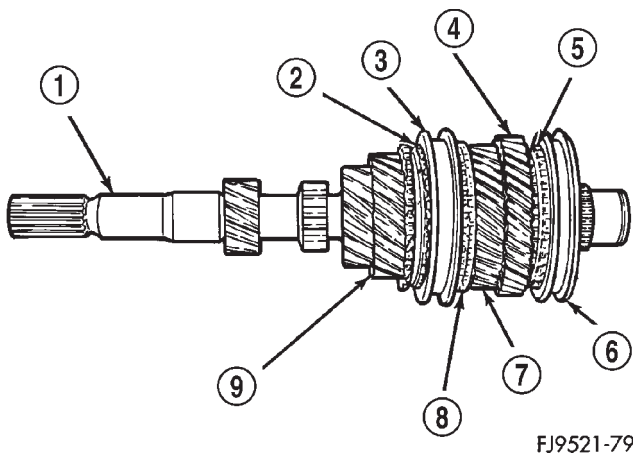
#### DISASSEMBLY

Before disassembly of the input shaft, it is necessary to check the synchronizer stop ring gap. Use a feeler gauge to measure the gaps between the stop rings and the speed gears. The correct gaps are listed below:

- 1st—1.04-1.72 mm (0.041-0.069 in).
- 2nd—0.94-1.72 mm (0.038-0.069 in).
- 3rd—1.37-1.93 mm (0.054-0.076 in).
- 4th—1.41-1.97 mm (0.056-0.078 in).
- 5th—1.37-1.93 mm (0.054-0.076 in).

If a stop ring gap does not fall within the specifications, it must be inspected for wear and replaced. If the 1st or 2nd synchronizer stop ring is worn beyond specifications, the complete output shaft assembly must be replaced.

The input shaft incorporates the 3rd, 4th, and 5th speed gears and synchronizers on the assembly (Fig. 96).

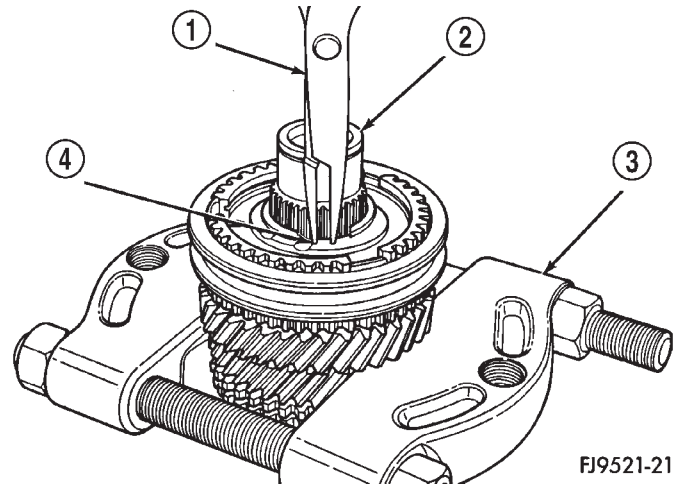


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**Fig. 96 Input Shaft**

- 1 - INPUT SHAFT
- 2 - STOP RING
- 3 - SLEEVE
- 4 - 5TH SPEED GEAR
- 5 - STOP RING
- 6 - SLEEVE
- 7 - 4TH SPEED GEAR
- 8 - STOP RING
- 9 - 3RD SPEED GEAR

(1) Install bearing splitter behind 5th speed gear. Remove snap ring at 5th synchronizer hub on input shaft (Fig. 97).

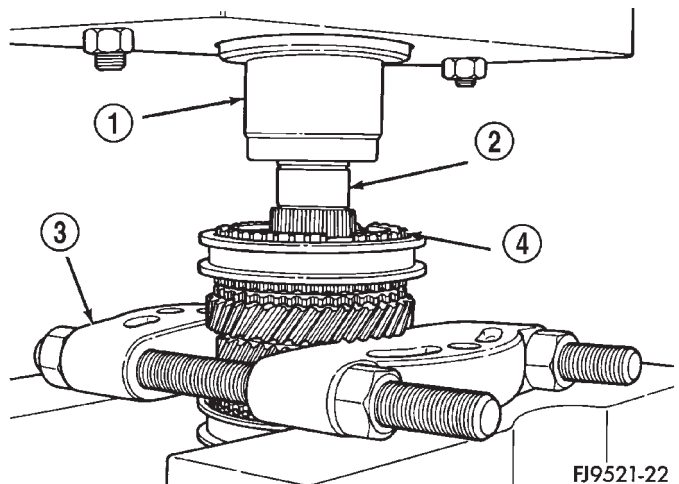


FJ9521-21

**Fig. 97 5th Synchro and Hub Snap Ring Removal**

- 1 - SNAP RING PLIERS
- 2 - INPUT SHAFT
- 3 - BEARING SPLITTER
- 4 - SNAP RING

(2) Remove synchronizer and gear using shop press (Fig. 98).



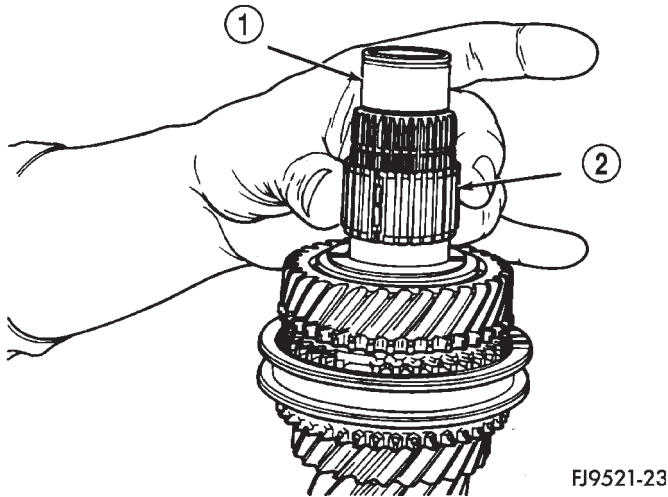
FJ9521-22

**Fig. 98 Remove Synchronizer Using Shop Press**

- 1 - PRESS RAM
- 2 - INPUT SHAFT
- 3 - BEARING SPLITTER
- 4 - SYNCHRONIZER ASSEMBLY

## DISASSEMBLY AND ASSEMBLY (Continued)

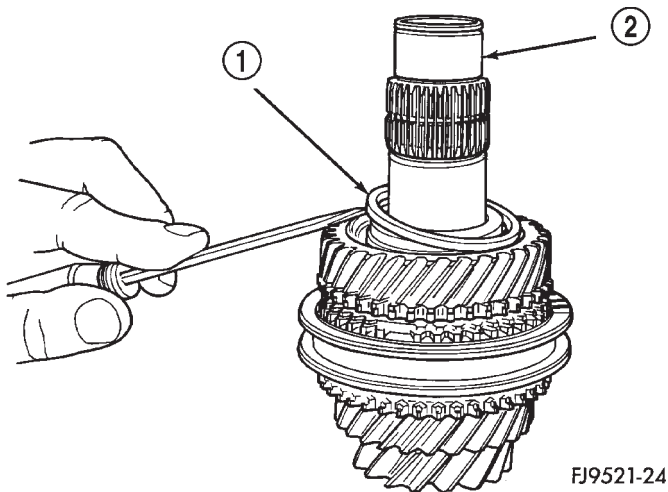
(3) Remove caged needle bearing (Fig. 99).



**Fig. 99 Caged Needle Bearing Removal**

- 1 - INPUT SHAFT
- 2 - CAGED NEEDLE BEARING

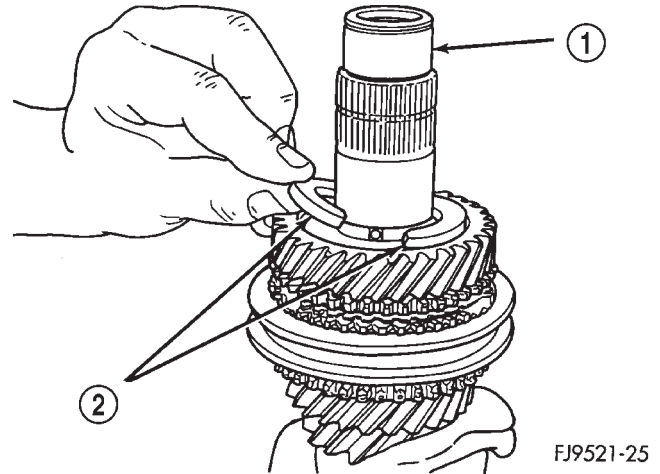
(4) Remove 4-5 gears split thrust washer ring (Fig. 100).



**Fig. 100 Split Thrust Washer Ring Removal**

- 1 - SPLIT THRUST WASHER RING
- 2 - INPUT SHAFT

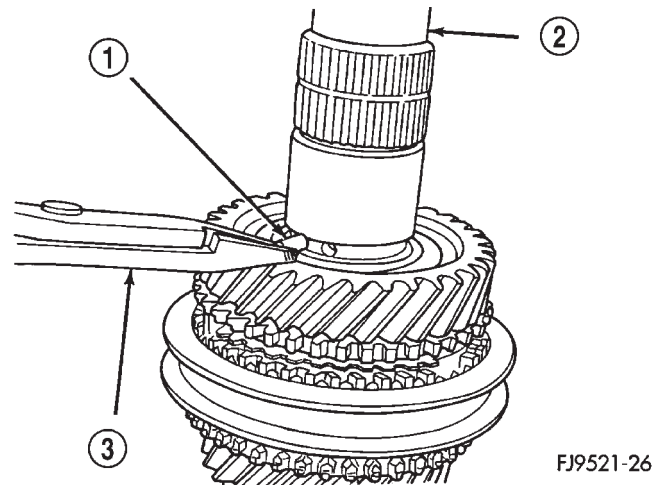
(5) Remove split thrust washer (Fig. 101).



**Fig. 101 Split Thrust Washer Removal**

- 1 - INPUT SHAFT
- 2 - SPLIT THRUST WASHER

(6) Remove split thrust washer separation pin (Fig. 102).



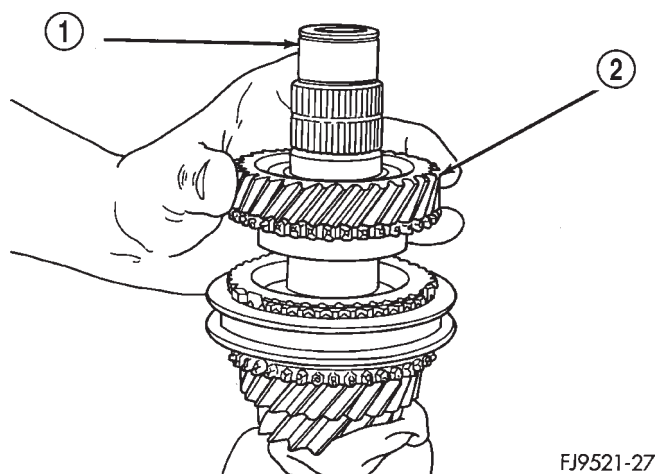
**Fig. 102 Split Thrust Washer Separation Pin**

- 1 - SEPARATION PIN
- 2 - INPUT SHAFT
- 3 - PLIERS



## DISASSEMBLY AND ASSEMBLY (Continued)

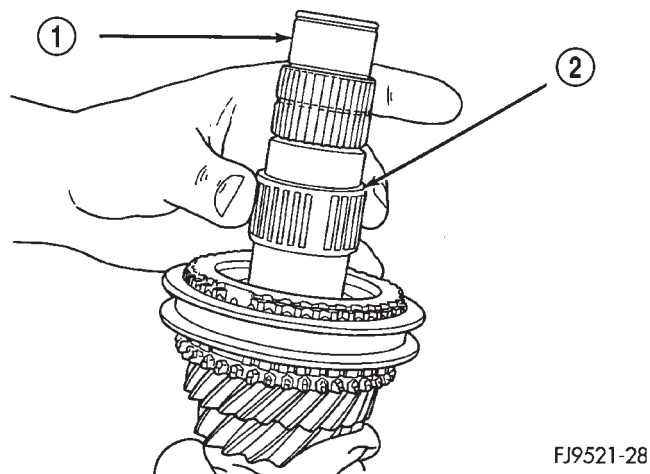
(7) Remove 4th gear (Fig. 103).



**Fig. 103 4th Gear Removal**

- 1 - INPUT SHAFT  
2 - 4TH GEAR

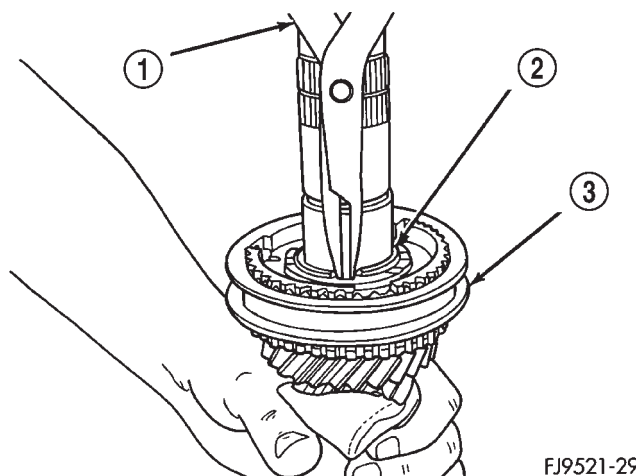
(8) Remove 4th gear caged needle bearing (Fig. 104). Check the caged needle bearing for a broken retention spring.



**Fig. 104 Caged Needle Bearing Removal**

- 1 - INPUT SHAFT  
2 - CAGED NEEDLE BEARING

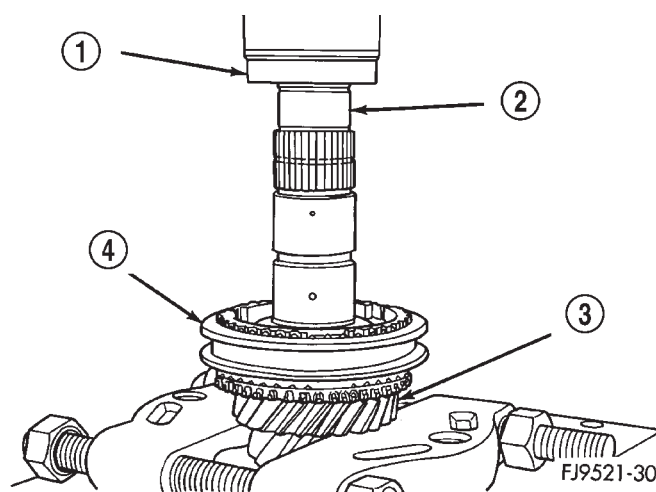
(9) Remove blocking ring. Remove 3-4 synchronizer hub retaining snap ring (Fig. 105).



**Fig. 105 3-4 Synchronizer Hub Snap Ring**

- 1 - SNAP RING PLIERS  
2 - SYNCHRO SNAP RING  
3 - SYNCHRONIZER ASSEMBLY

(10) Install input shaft in shop press. Using bearing splitter, remove 3-4 synchronizer and 3rd gear (Fig. 106).



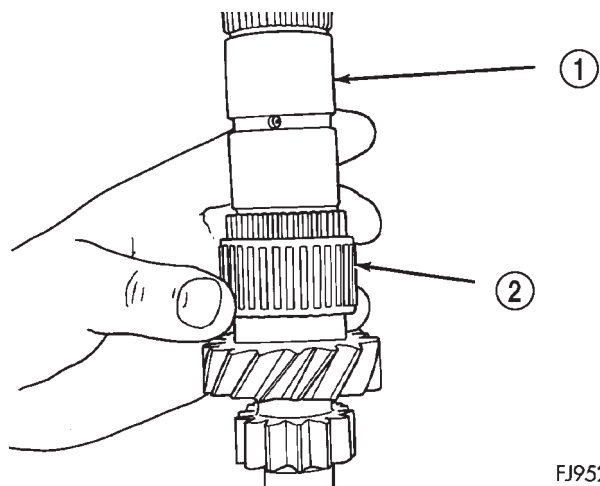
**Fig. 106 3rd Gear Removal**

- 1 - PRESS RAM  
2 - INPUT SHAFT  
3 - 3RD GEAR  
4 - SYNCHRONIZER ASSEMBLY

(11) Remove 3rd gear caged needle bearing (Fig. 107). Check the caged needle bearing for a broken retention spring.

(12) Inspect the input shaft for worn or damaged bearing races or chipped gear teeth. Replace as necessary.

## DISASSEMBLY AND ASSEMBLY (Continued)



FJ9521-31

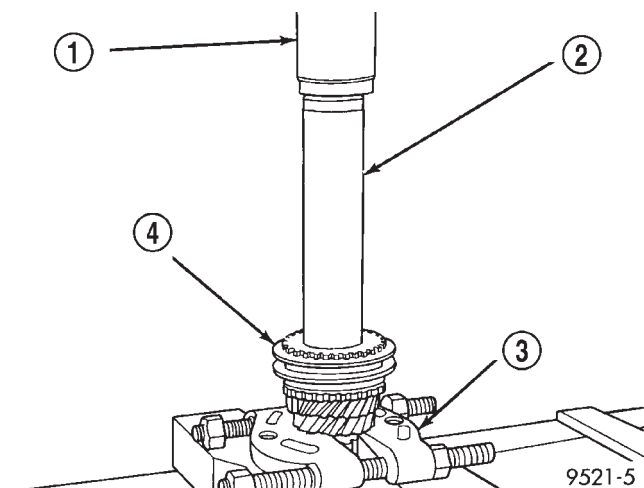
**Fig. 107 3rd Gear Caged Needle Bearing**

- 1 - INPUT SHAFT  
2 - 3RD GEAR CAGED NEEDLE BEARING

**ASSEMBLY**

The snap rings that are used on the input shaft are available in select fit sizes. Use the thickest snap ring that fits in each snap ring groove.

- (1) Place input shaft into shop press.
- (2) Install 3rd gear caged needle bearing on input shaft.
- (3) Install 3rd gear and 3-4 synchronizer onto input shaft. Install Tool #C-3717 over input shaft and press on synchronizer hub and 3rd gear (Fig. 108). The synchronizer hub has the letter **U** stamped on the top face of the hub. This designates that the hub must be installed with the **U** facing upward.

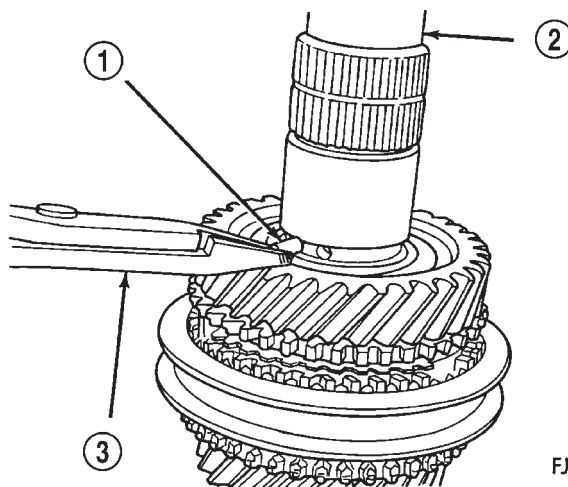


9521-5

**Fig. 108 Press On 3rd Gear Synchronizer Hub**

- 1 - PRESS RAM  
2 - SPECIAL TOOL C-3717  
3 - BEARING SPLITTER  
4 - 3RD GEAR SYNCHRONIZER ASSEMBLY

- (4) Install 3-4 synchronizer snap ring into slot on input shaft.
- (5) Install blocking ring into 3-4 synchronizer. Install 4th gear caged needle bearing.
- (6) Install 4th gear onto input shaft.
- (7) Install 4-5 split thrust washer separation pin (Fig. 109).

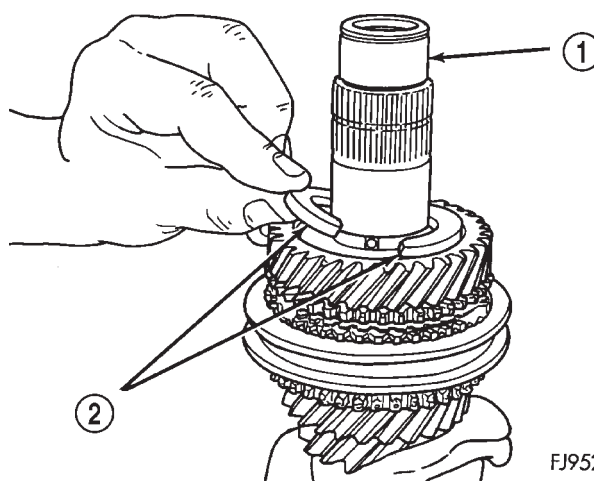


FJ9521-26

**Fig. 109 Split Thrust Washer Separation Pin Installation**

- 1 - SEPARATION PIN  
2 - INPUT SHAFT  
3 - PLIERS

- (8) Install split thrust washer onto input shaft (Fig. 110).



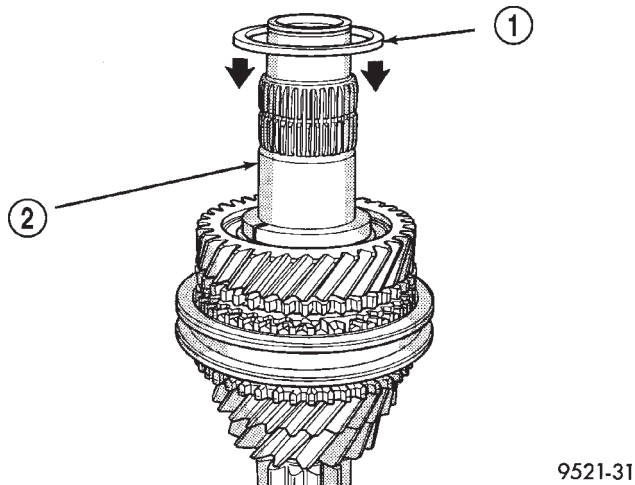
FJ9521-25

**Fig. 110 Split Thrust Washer Installation**

- 1 - INPUT SHAFT  
2 - SPLIT THRUST WASHER

## DISASSEMBLY AND ASSEMBLY (Continued)

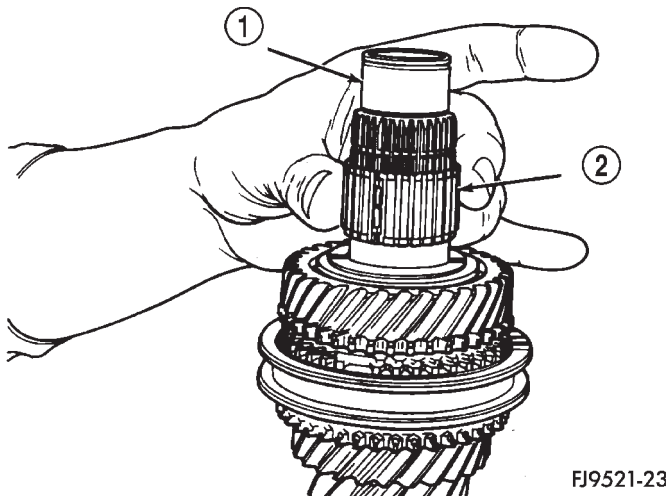
(9) Install split thrust washer retaining ring (Fig. 111).



**Fig. 111 Retaining Ring Installation**

- 1 - SPLIT THRUST WASHER RING
- 2 - INPUT SHAFT

(10) Install 5th gear caged needle bearing (Fig. 112).

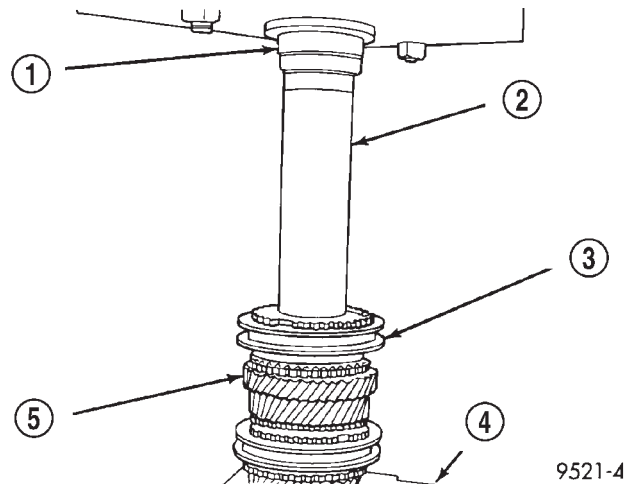


**Fig. 112 Caged Needle Bearing Installation**

- 1 - INPUT SHAFT
- 2 - CAGED NEEDLE BEARING

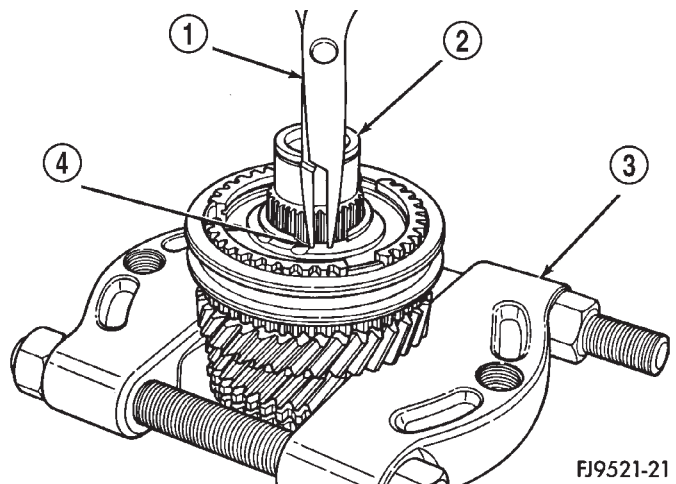
(11) Using special tool #C-3717, install 5th speed gear and synchronizer (Fig. 113). The 5th gear synchronizer hub has the letter **S** stamped on the top face of the hub. This designates that the hub must be installed with the **S** facing upward.

(12) Install 5th gear synchronizer snap ring (Fig. 114).



**Fig. 113 5th Speed Gear Installation**

- 1 - PRESS RAM
- 2 - SPECIAL TOOL C-3717
- 3 - SYNCHRONIZER ASSEMBLY
- 4 - BEARING SPLITTER
- 5 - 5TH SPEED GEAR



**Fig. 114 5th Gear Synchronizer Snap Ring Installation**

- 1 - SNAP RING PLIERS
- 2 - INPUT SHAFT
- 3 - BEARING SPLITTER
- 4 - SNAP RING

## DISASSEMBLY AND ASSEMBLY (Continued)

## OUTPUT SHAFT

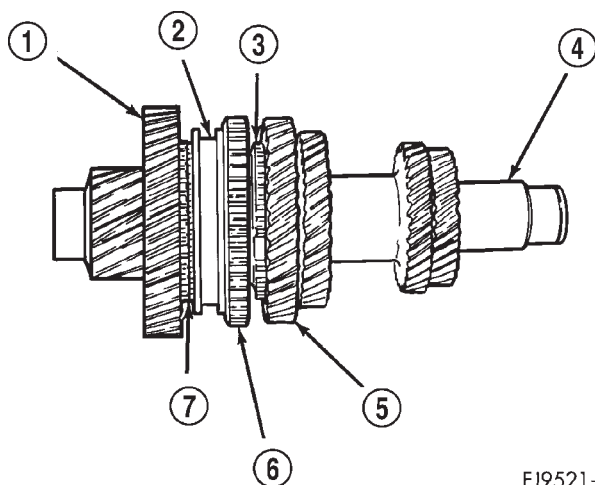
**CAUTION:** The output shaft is serviced as an assembly. Do not try to repair any component on the output shaft. If the 1-2 synchronizer or gear fails, it is necessary to replace the output shaft assembly.

It is necessary to check the synchronizer stop ring gap. Use a feeler gauge to measure the gaps between the stop rings and the speed gears. The correct gaps are listed below:

- 1st—1.04-1.72 mm (0.041-0.069 in).
- 2nd—0.94-1.72 mm (0.038-0.069 in).
- 3rd—1.37-1.93 mm (0.054-0.076 in).
- 4th—1.41-1.97 mm (0.056-0.078 in).
- 5th—1.37-1.93 mm (0.054-0.076 in).

If a stop ring gap does not fall within the specifications it must be inspected for wear and replaced. If the 1st or 2nd synchronizer stop ring is worn beyond specifications, the complete output shaft assembly must be replaced.

The output shaft incorporates the 1st and 2nd gears and synchronizers on the assembly (Fig. 115).



FJ9521-80

**Fig. 115 Output Shaft**

- 1 - 1ST GEAR
- 2 - SLEEVE
- 3 - STOP RING
- 4 - OUTPUT SHAFT
- 5 - 2ND SPEED GEAR
- 6 - REVERSE GEAR
- 7 - STOP RING

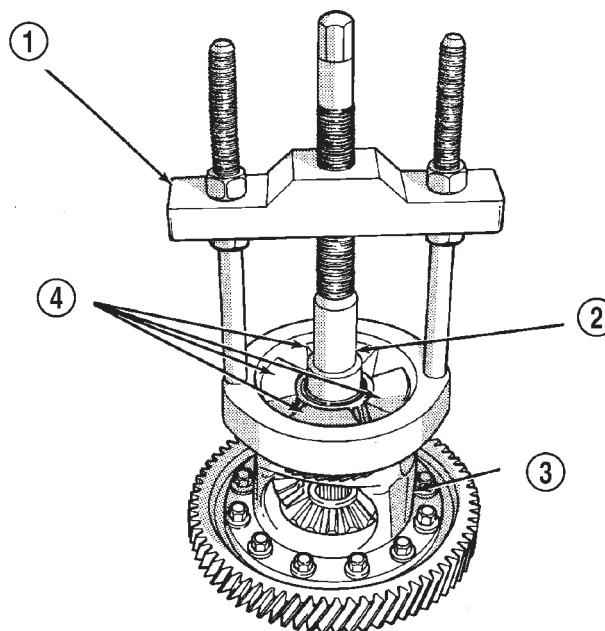
## DIFFERENTIAL

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

- Transaxle gear case
- Clutch bellhousing case
- Differential case
- Differential bearings

Refer to **Bearing Adjustment Procedure** in the Adjustments section at the end of this section to determine proper shim thickness. This will provide correct bearing preload and proper bearing turning torque.

## DIFFERENTIAL BEARINGS



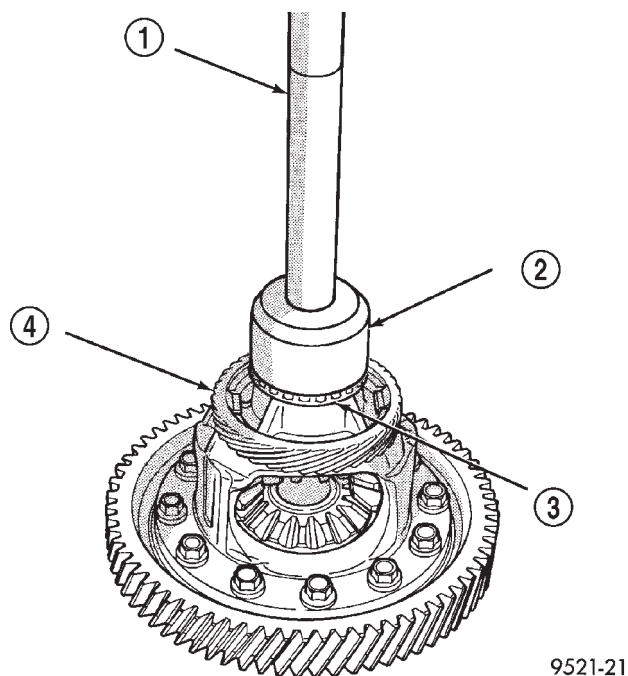
9521-20

**Fig. 116 Remove Differential Bearing Cone**

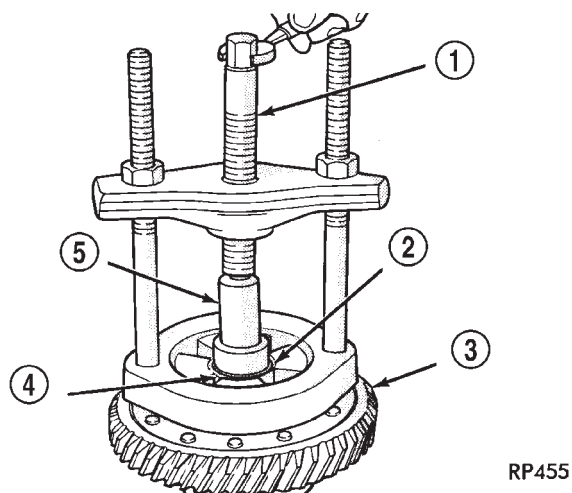
- 1 - SPECIAL TOOL C-293-PA
- 2 - SPECIAL TOOL C-4996
- 3 - DIFFERENTIAL ASSEMBLY
- 4 - SPECIAL TOOL C-293-45



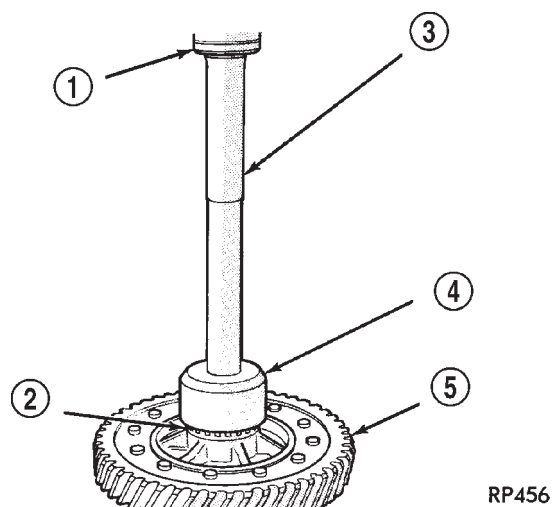
## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 117 Install Differential Bearing Cone**

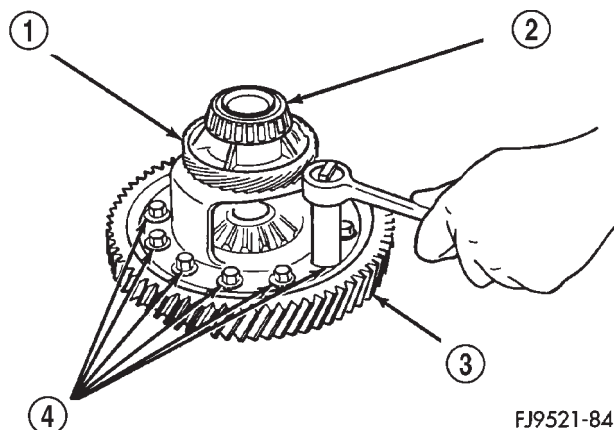
- 1 - SPECIAL TOOL C-4171
- 2 - SPECIAL TOOL L-4410
- 3 - BEARING CONE
- 4 - SPEED SENSOR DRIVE GEAR

**Fig. 118 Remove Differential Bearing Cone**

- 1 - SPECIAL TOOL C-293
- 2 - SPECIAL TOOL ADAPTER C-293-45 (USE 4 PIECES)
- 3 - DIFFERENTIAL ASSEMBLY
- 4 - DIFFERENTIAL BEARING CONE
- 5 - SPECIAL TOOL C-4996 (NOTE POSITION)

**Fig. 119 Install Differential Bearing Cone**

- 1 - ARBOR PRESS RAM
- 2 - BEARING CONE
- 3 - SPECIAL TOOL HANDLE C-4171
- 4 - SPECIAL TOOL L-4410
- 5 - DIFFERENTIAL ASSEMBLY

**RING GEAR****Fig. 120 Remove or Install Ring Gear Bolts and Ring Gear**

- 1 - SPEEDOMETER DRIVE GEAR
- 2 - BEARING
- 3 - RING GEAR
- 4 - RING GEAR BOLTS

**CAUTION:** Always install new ring gear bolts. Tighten ring gear bolts to 81 N·m (60 ft. lbs.) torque.

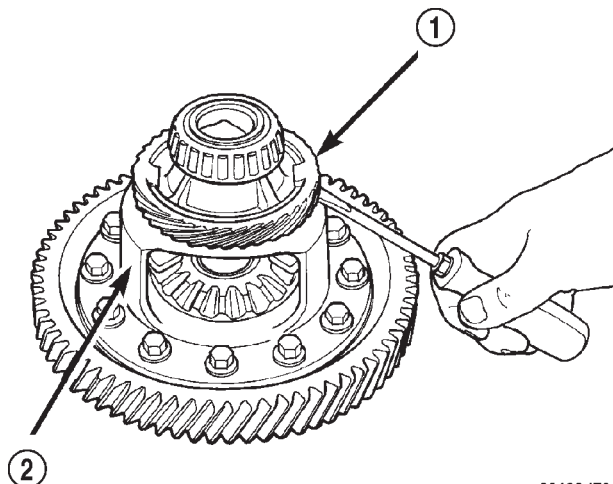
## DISASSEMBLY AND ASSEMBLY (Continued)

## SPEEDOMETER DRIVE GEAR

**NOTE:** The plastic speedometer drive gear must be removed from the differential case in order to service the differential gears

## REMOVAL

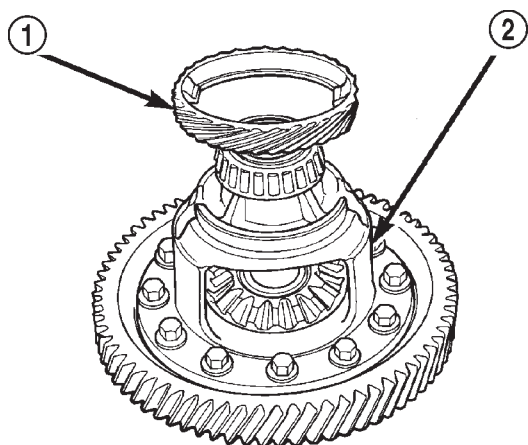
(1) Pry the plastic speedometer drive gear off of the differential case using a flat blade pry tool (Fig. 121) (Fig. 122).



80468d70

**Fig. 121 Pry Off Speedometer Drive Gear**

- 1 - SPEEDOMETER DRIVE GEAR  
2 - DIFFERENTIAL ASSEMBLY



80468d71

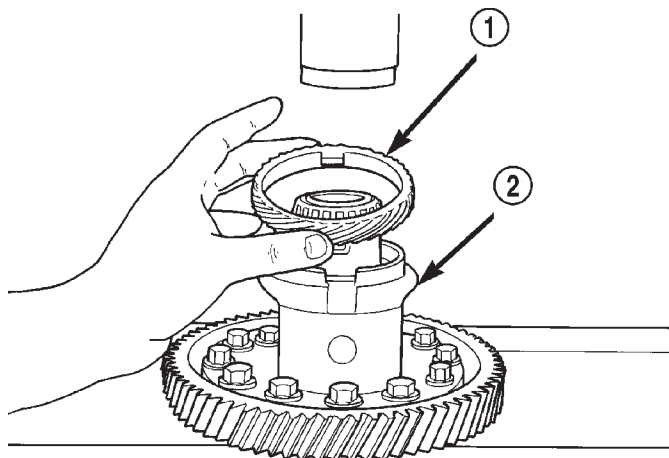
**Fig. 122 Speedometer Drive Gear Removed**

- 1 - SPEEDOMETER DRIVE GEAR  
2 - DIFFERENTIAL ASSEMBLY

## INSTALLATION

**NOTE:** A new speedometer drive gear must be installed on differential assembly. The lip on the speedometer drive gear must be positioned downward when installing onto differential assembly.

(1) Position speedometer drive gear onto differential assembly (Fig. 123).

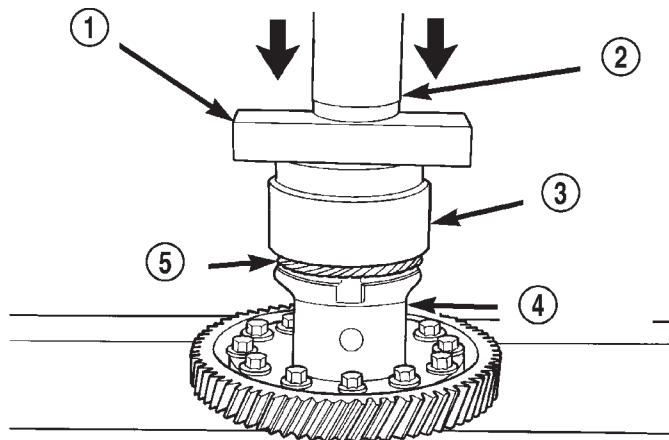


804d8ea0

**Fig. 123 Speedometer Drive Gear**

- 1 - SPEEDOMETER DRIVE GEAR  
2 - DIFFERENTIAL ASSEMBLY

(2) Using Miller Tool # L-4440 and steel stock, press speedometer drive gear onto differential (Fig. 124) (Fig. 125). Do not use a hammer.

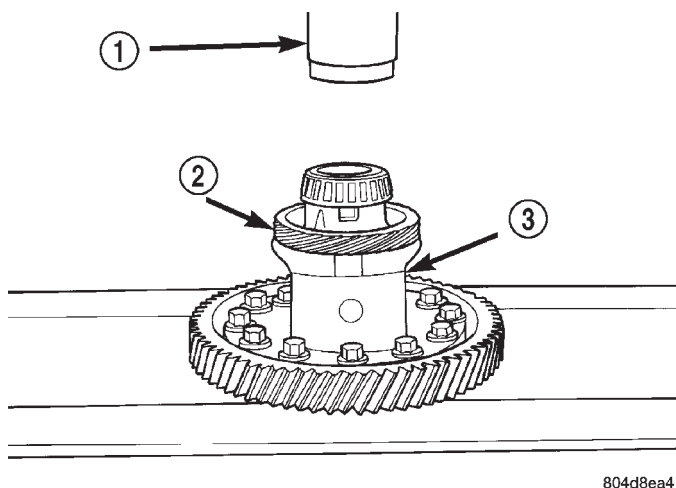


804d8ea3

**Fig. 124 Press Gear onto Differential**

- 1 - STEEL STOCK  
2 - PRESS RAM  
3 - SPECIAL TOOL L-4440  
4 - DIFFERENTIAL ASSEMBLY  
5 - SPEEDOMETER DRIVE GEAR

## DISASSEMBLY AND ASSEMBLY (Continued)



804d8ea4

**Fig. 125 Drive Gear Pressed onto Differential**

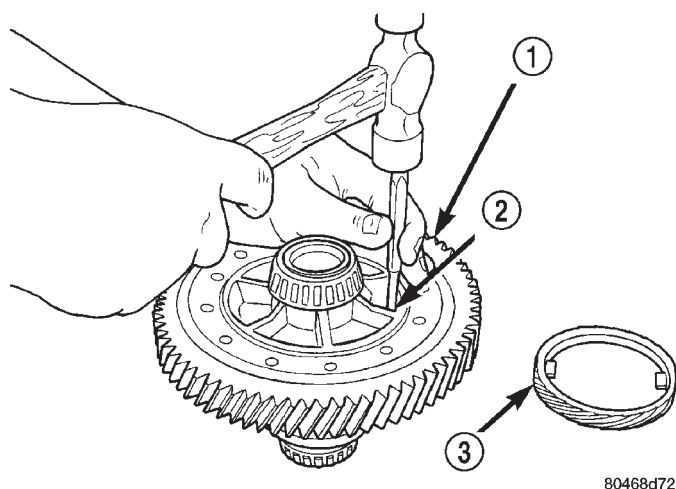
- 1 - PRESS RAM
- 2 - SPEEDOMETER DRIVE GEAR
- 3 - DIFFERENTIAL ASSEMBLY

## DIFFERENTIAL GEARS

**NOTE:** The plastic speedometer drive gear must be removed from the differential case in order to service the differential gears. Refer to Speedometer Drive Gear for service information.

### REMOVAL

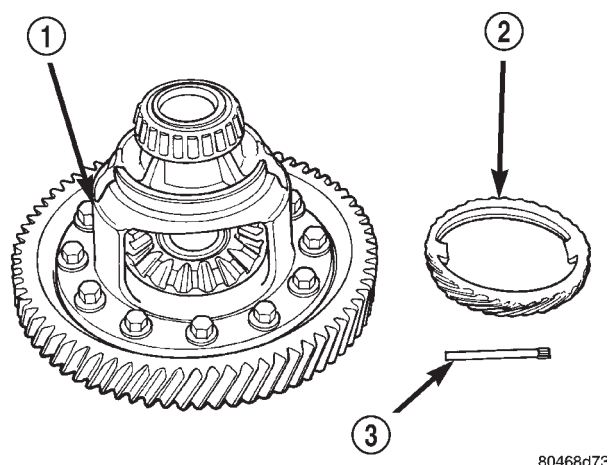
(1) Remove pinion shaft retaining pin (Fig. 126) (Fig. 127).



80468d72

**Fig. 126 Remove Pinion Shaft Retaining Pin**

- 1 - RING GEAR
- 2 - PINION SHAFT RETAINING PIN
- 3 - SPEEDOMETER DRIVE GEAR

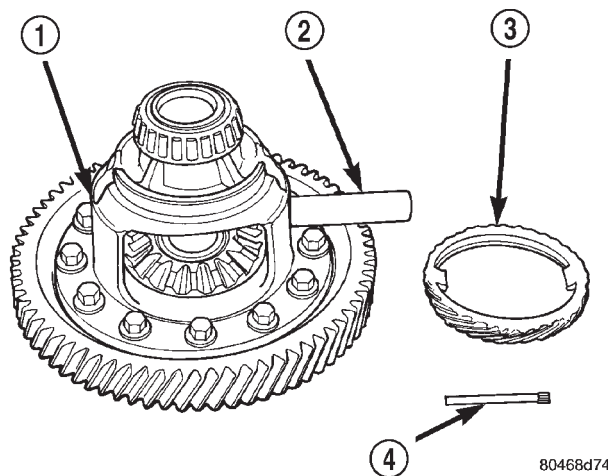


80468d73

**Fig. 127 Retaining Pin Removed**

- 1 - DIFFERENTIAL ASSEMBLY
- 2 - SPEEDOMETER DRIVE GEAR
- 3 - PINION SHAFT RETAINING PIN

(2) Remove pinion shaft (Fig. 128).



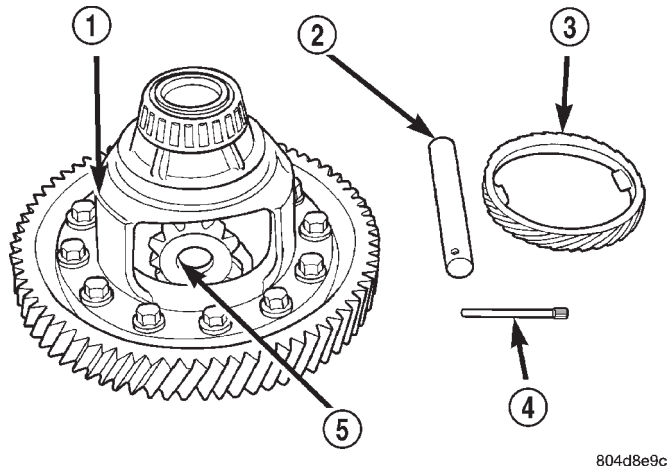
80468d74

**Fig. 128 Pinion Shaft Removal**

- 1 - DIFFERENTIAL ASSEMBLY
- 2 - PINION SHAFT
- 3 - SPEEDOMETER DRIVE GEAR
- 4 - PINION SHAFT RETAINING PIN

## DISASSEMBLY AND ASSEMBLY (Continued)

(3) Rotate side gears to opening in differential (Fig. 129).



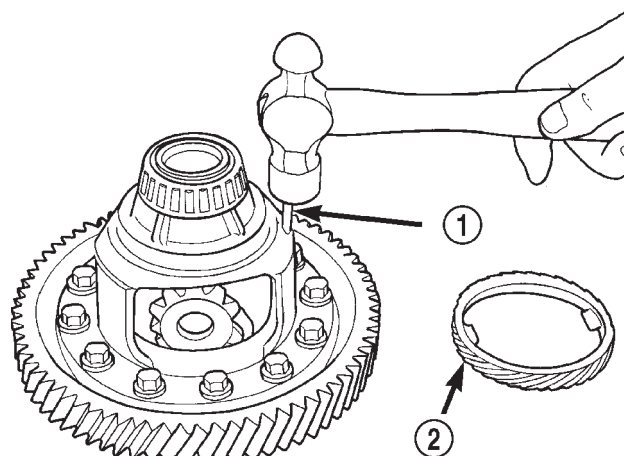
804d8e9c

**Fig. 129 Remove Pinion Gears, Side Gears, and Thrust Washers by Rotating Side Gears to Opening in Case**

- 1 - DIFFERENTIAL ASSEMBLY
- 2 - PINION SHAFT
- 3 - SPEEDOMETER DRIVE GEAR
- 4 - PINION SHAFT RETAINING PIN
- 5 - PINION GEAR (2)

## INSTALLATION

- (1) Assemble the differential side gears, pinion gears and pinion gears with the pinion gear washers.
- (2) Install pinion shaft retaining pin (Fig. 131).

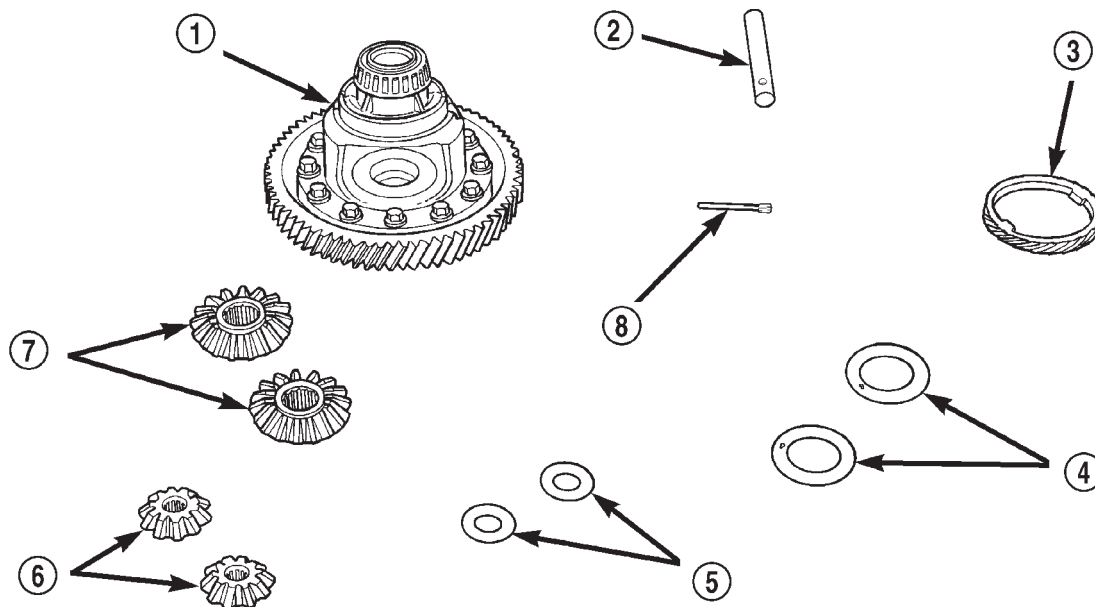


804d8e9e

**Fig. 131 Install Retaining Pin**

- 1 - PINION SHAFT RETAINING PIN
- 2 - SPEEDOMETER DRIVE GEAR

(4) Remove differential gears (Fig. 130).



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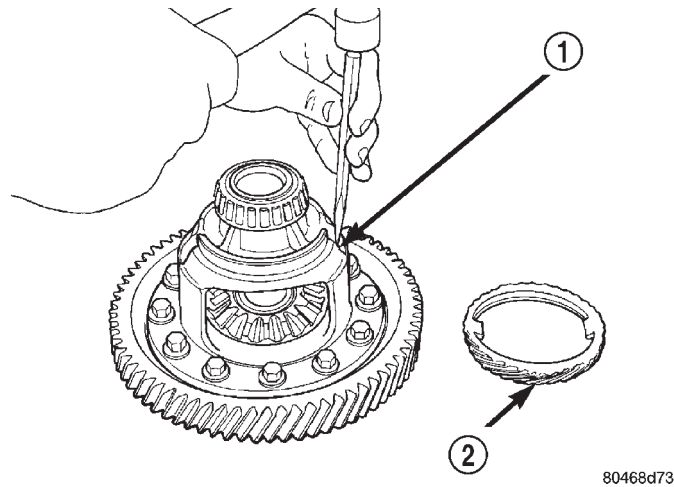
**Fig. 130 Differential Gears**

- 1 - DIFFERENTIAL ASSEMBLY
- 2 - PINION SHAFT
- 3 - SPEEDOMETER DRIVE GEAR
- 4 - SIDE GEAR THRUST WASHERS (SELECT THICKNESS)
- 5 - PINION GEAR THRUST WASHERS
- 6 - PINION GEARS
- 7 - SIDE GEARS
- 8 - PINION SHAFT RETAINING PIN



## DISASSEMBLY AND ASSEMBLY (Continued)

(3) Stake pinion shaft retaining pin with a suitable chisel (Fig. 132).

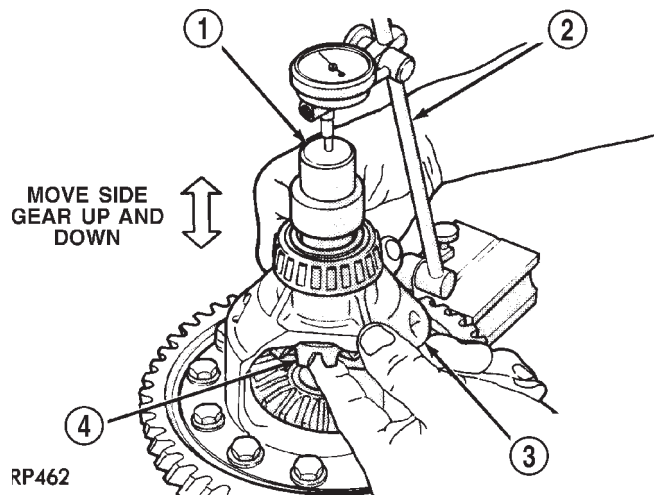


**Fig. 132 Staking Retaining Pin**

- 1 - PINION SHAFT RETAINING PIN
- 2 - SPEEDOMETER DRIVE GEAR

(4) Rotate the assembly two full revolutions both clockwise and counterclockwise.

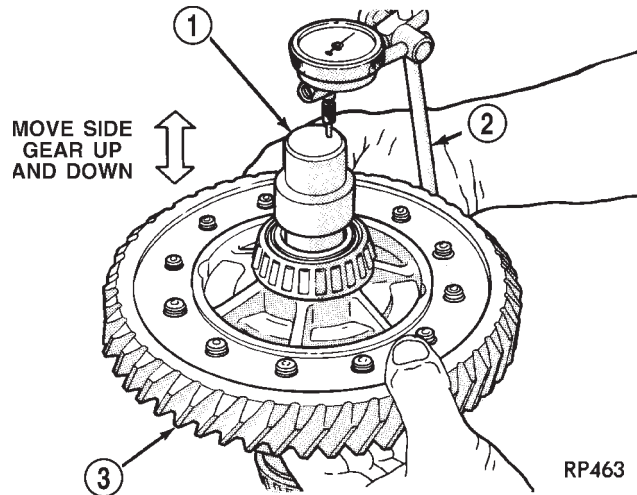
(4) Set up dial indicator as shown and record end play (Fig. 133) (Fig. 134). Rotate side gear 90 degrees and record another end play. Again, rotate side gear 90 degrees and record a final end play.



**Fig. 133 Checking Side Gear End Play (Typical)**

- 1 - SPECIAL TOOL C-4996 (NOTE POSITION)
- 2 - DIAL INDICATOR SET
- 3 - DIFFERENTIAL ASSEMBLY
- 4 - SIDE GEAR

(5) Using the smallest end play recorded, shim that side gear to within 0.001 to 0.013 inch. The other side gear should be checked using the same procedure.



**Fig. 134 Checking Side Gear End Play (Typical)**

- 1 - SPECIAL TOOL C-4996 (NOTE POSITION)
- 2 - DIAL INDICATOR SET
- 3 - DIFFERENTIAL ASSEMBLY

**CAUTION:** Side gear end play must be within 0.001 to 0.013 inch. Five select thrust washers are available: 0.027, 0.032, 0.037, 0.042, and 0.047 inch.

(6) After the end play is measured and adjusted, replace speedometer drive gear with a new one. Install drive gear lip downward. For service information, refer to Speedometer Drive Gear service in this section.

## SYNCHRONIZER

### DISASSEMBLY

Place synchronizer in a clean shop towel and wrap. Press on inner hub. Carefully open up shop towel and remove springs, balls, keys, hub, and sleeve.

### ASSEMBLY

(1) Position synchronizer hub onto a suitable holding fixture (input shaft). The synchronizer hubs are directional. The hubs must be installed with the U facing upward.

(2) Install springs into hub slot (Fig. 135).

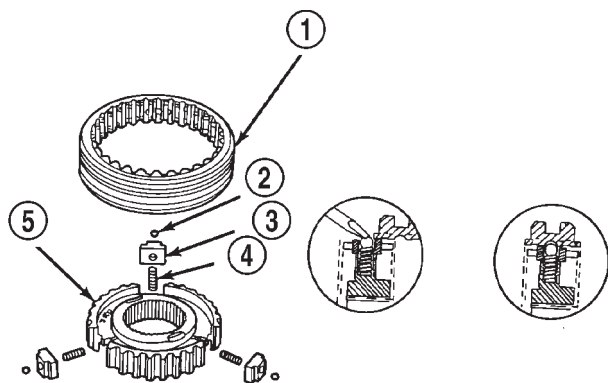
(3) Insert key into hub and spring.

(4) Apply petroleum jelly to the hole in the key. Insert balls into each key (Fig. 136).

(5) Slide sleeve over the hub and depress balls as you carefully slip the sleeve into position (Fig. 137).

(6) Line up stop ring tang over the keys in the hub (Fig. 138). Install stop rings. Center the keys and balls by pushing on both stop rings.

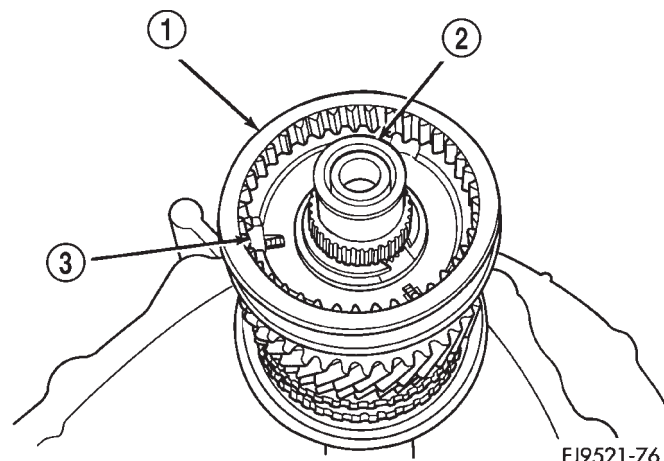
## DISASSEMBLY AND ASSEMBLY (Continued)



9521-69

**Fig. 135 Synchronizer Assembly**

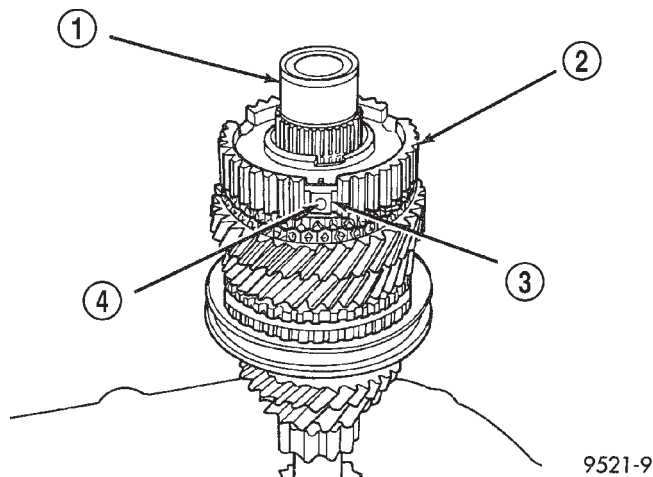
- 1 - SLEEVE
- 2 - BALL
- 3 - KEY
- 4 - SPRING
- 5 - HUB



FJ9521-76

**Fig. 137 Synchronizer Sleeve**

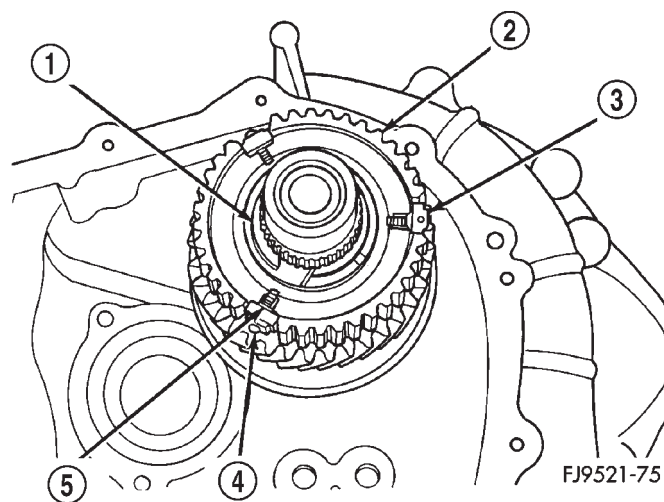
- 1 - SLEEVE
- 2 - INPUT SHAFT
- 3 - KEY



9521-9

**Fig. 136 Synchronizer Balls**

- 1 - INPUT SHAFT
- 2 - HUB
- 3 - KEY
- 4 - BALL



FJ9521-75

**Fig. 138 Keys in Hub**

- 1 - SNAP RING
- 2 - CLUTCH
- 3 - KEY
- 4 - BALL
- 5 - SPRING

**SHIFT RAILS OVERHAUL**

- (1) Remove shift rails from the geartrain.
- (2) To service the 5-R shift rail, remove the C-clip retaining the reverse shift lever arm. Remove the 5th shift fork roll pin and remove the 5th shift fork. Remove the shift lug roll pin and remove the shift lug. Replace parts as necessary.
- (3) To service the 3-4 shift rail, remove the roll pin retaining the 3-4 shift fork. Remove the shift fork. Remove the shift lug roll pin and remove the shift lug. Replace parts as necessary.

- (4) To service the 1-2 shift rail, remove the roll pin retaining the 1-2 shift fork. Remove the shift fork and replace parts as necessary.

**TRANSAXLE CASE OVERHAUL**

The sealant used to seal the transaxle case halves is Mopar® Gasket Maker, Loctite® 518, or equivalent. The sealant used for the bearing end-plate cover is Mopar® RTV.

The components that are left in the gear cases when the gear train is pulled out are the:

- Axle shaft seals

## DISASSEMBLY AND ASSEMBLY (Continued)

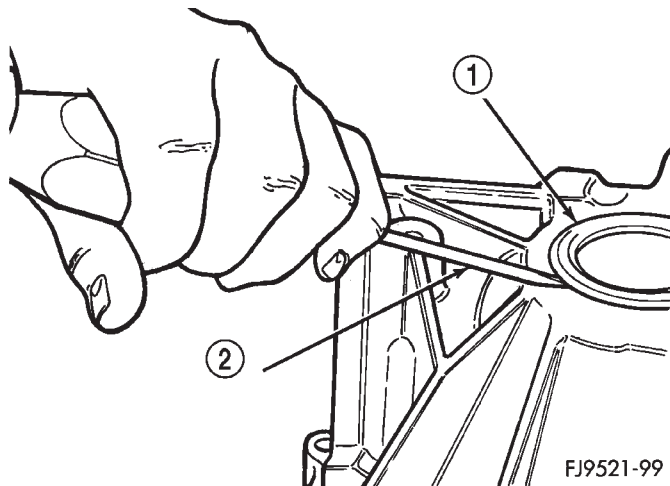
- Output bearing race and retainer
- Input bearing and sleeve
- Differential bearing cones
- Shift rail bushings
- Shift shafts
- Shift shaft seals
- Shift shaft bushings
- Rear bearing oil feed trough

### AXLE SHAFT SEALS

#### REMOVAL

(1) Insert a flat-blade pry tool at outer edge of axle shaft seal (Fig. 139).

(2) Tap on the pry tool with a small hammer and remove axle shaft seal.



**Fig. 139 Axle Shaft Seal Removal**

- 1 - AXLE SEAL  
2 - PRY TOOL

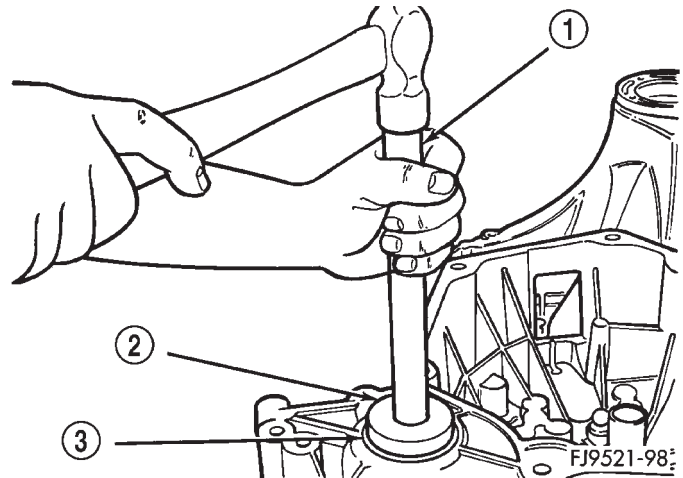
#### INSTALLATION

- (1) Clean axle shaft seal bore of any excess sealant.
- (2) Align axle shaft seal with axle shaft seal bore.
- (3) Install axle seal on tool #6709 with C-4171 and insert into axle shaft seal bore.
- (4) Tap seal into position (Fig. 140).

### OUTPUT BEARING

#### REMOVAL

**NOTE:** The position of the output shaft bearing is critical. The bearing is not identical end-to-end. Install bearing with larger diameter cage ring facing out.



**Fig. 140 Axle Seal Installation**

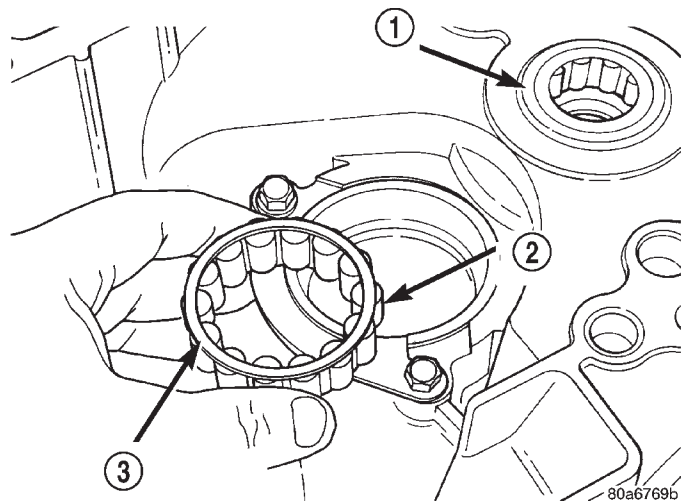
- 1 - TOOL C-4171  
2 - TOOL 6709  
3 - AXLE SEAL

(1) Remove caged roller bearing from output bearing race (Fig. 141).

(2) Remove screws at output bearing retainer strap (Fig. 142).

(3) Install tool #6787 and slide hammer (Fig. 143). Tighten tool to output bearing race.

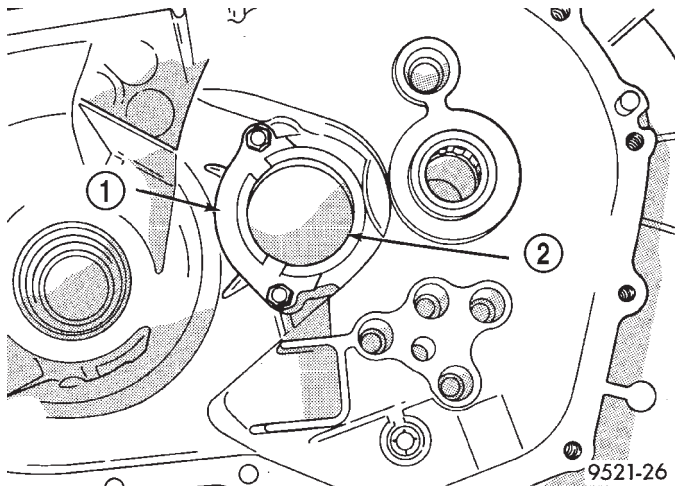
(4) Using slide hammer, remove output bearing race.



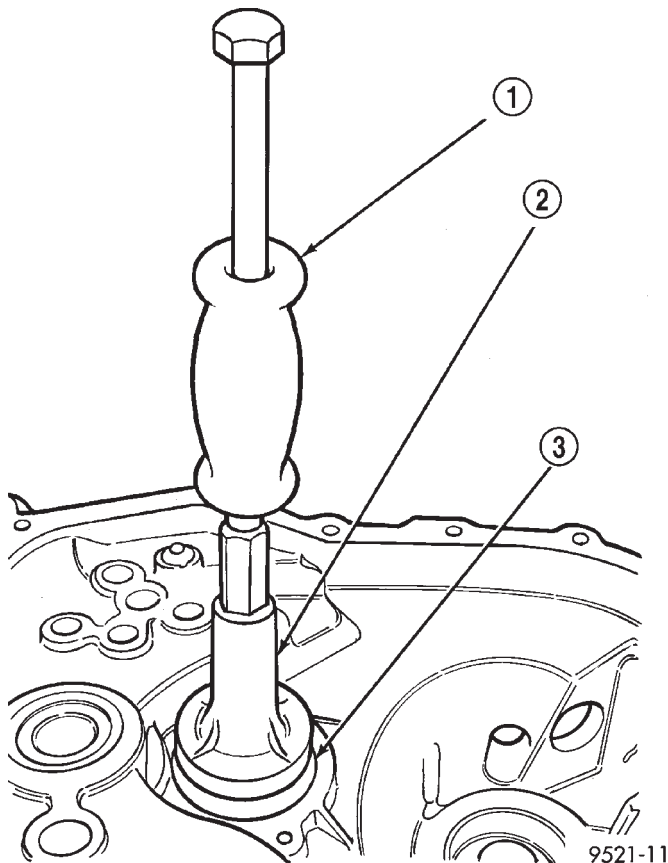
**Fig. 141 Output Roller Bearing**

- 1 - INPUT BEARING  
2 - OUTPUT BEARING  
3 - LARGER DIAMETER CAGE RING

## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 142 Output Bearing Strap**

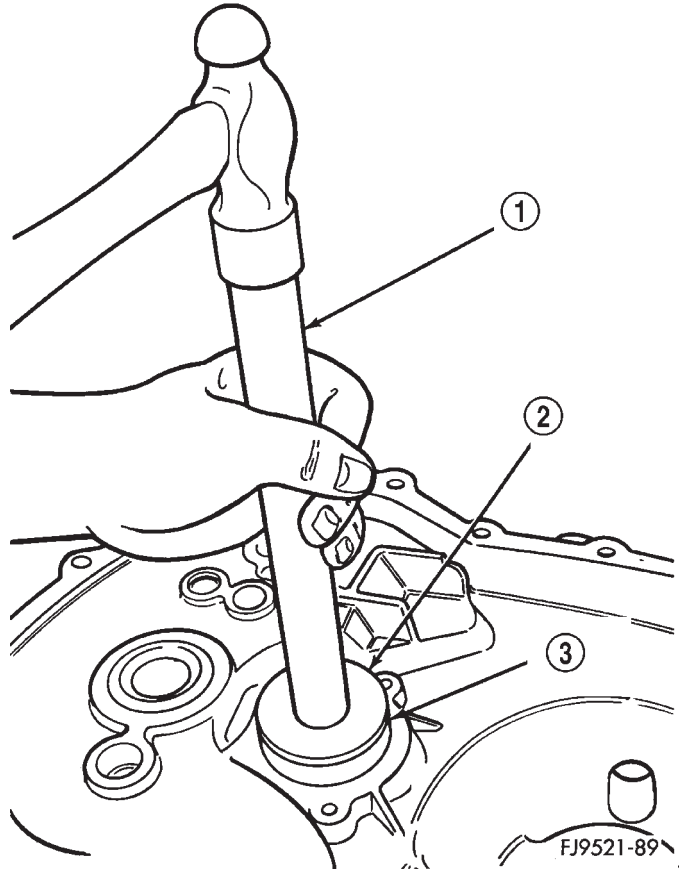
- 1 - BEARING RETAINER
- 2 - OUTPUT BEARING RACE

**Fig. 143 Output Bearing Race Removal**

- 1 - C-3752
- 2 - SPECIAL TOOL 6787
- 3 - OUTPUT SHAFT BEARING RACE

## INSTALLATION

- (1) Line up output bearing race to race bore.
- (2) Insert tool #4628 with C-4171 into output bearing race (Fig. 144). Tap race into bore. Install output bearing into race. Verify that the larger diameter cage is facing outward. Position bearing retaining strap. Tighten bolts to 11 N·m (96 in. lbs.).

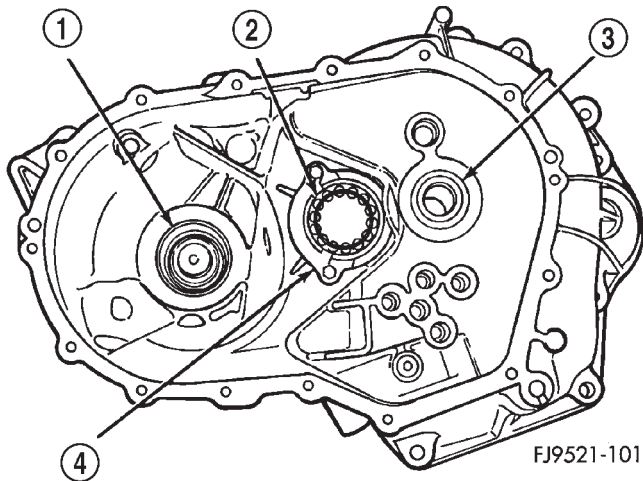
**Fig. 144 Output Bearing Race Installation**

- 1 - TOOL C-4171
- 2 - TOOL C-4628
- 3 - OUTPUT BEARING RACE

## DISASSEMBLY AND ASSEMBLY (Continued)

### INPUT BEARING AND SLEEVE

The input bearing is a one-piece bearing and sleeve unit (Fig. 145). The sleeve is the slide point for the clutch-release bearing and lever.

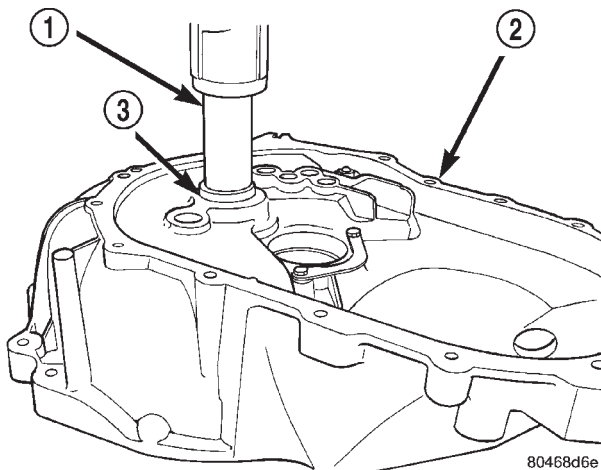


**Fig. 145 Input Bearing And Sleeve**

- 1 - DIFFERENTIAL BEARING
- 2 - OUTPUT BEARING
- 3 - INPUT BEARING
- 4 - BEARING RETAINER

### REMOVAL

- (1) Install tool #6342 over input bearing on the gear case side of the transaxle clutch housing.
- (2) Press the input bearing out of the housing (Fig. 146).

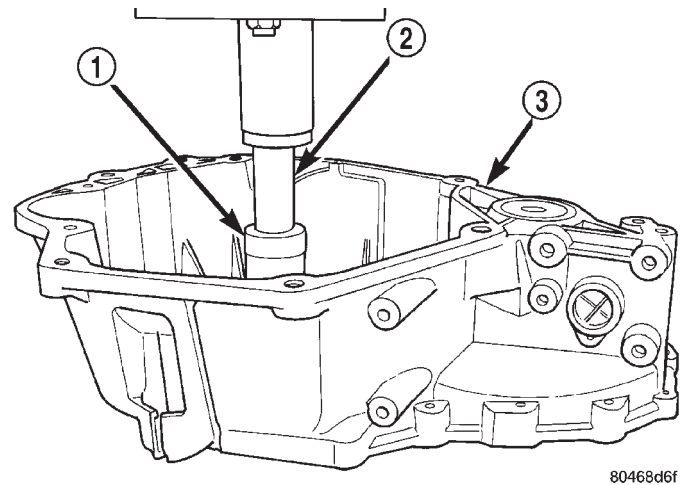


**Fig. 146 Input Bearing Removal**

- 1 - SPECIAL TOOL 6342
- 2 - BELLHOUSING HALF
- 3 - INPUT BEARING AND SLEEVE

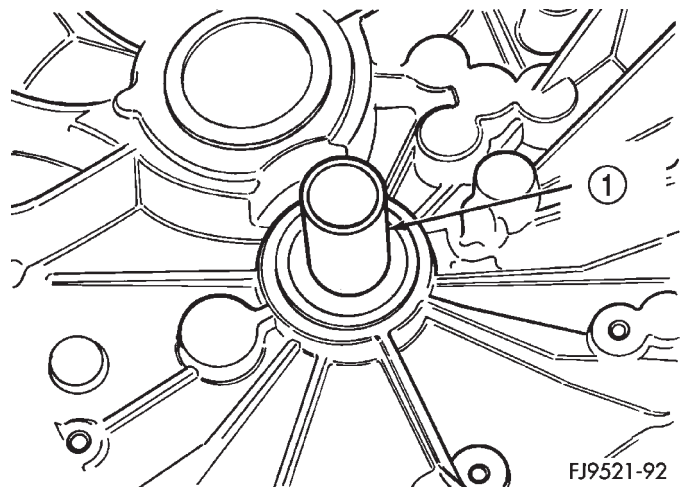
### INSTALLATION

- (1) Apply coating of Loctite® sealant on bearing outer diameter. Position sleeve and bearing assembly at input bearing bore.
- (2) Install tool #C-4680-1 over input bearing (Fig. 147).
- (3) Using the spacer tool #4894 and shop press, install input bearing into bore until it is fully seated (Fig. 148).



**Fig. 147 Input Bearing Tool**

- 1 - SPECIAL TOOL C-4680-1
- 2 - SPECIAL TOOL 4894
- 3 - BELLHOUSING HALF



**Fig. 148 Input Bearing Installed**

- 1 - SLEEVE AND BEARING ASSEMBLY

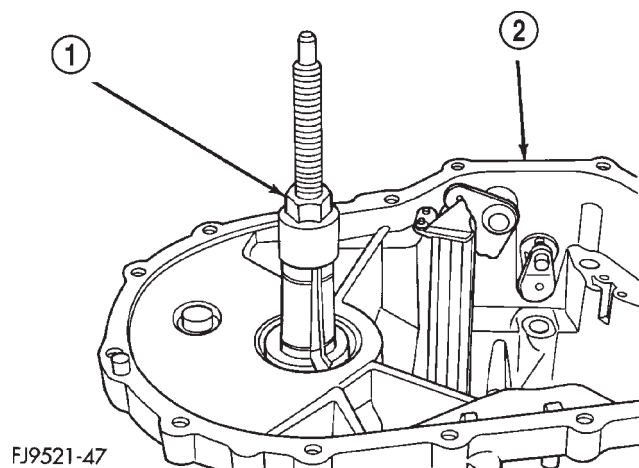


## DISASSEMBLY AND ASSEMBLY (Continued)

## DIFFERENTIAL BEARING CUPS

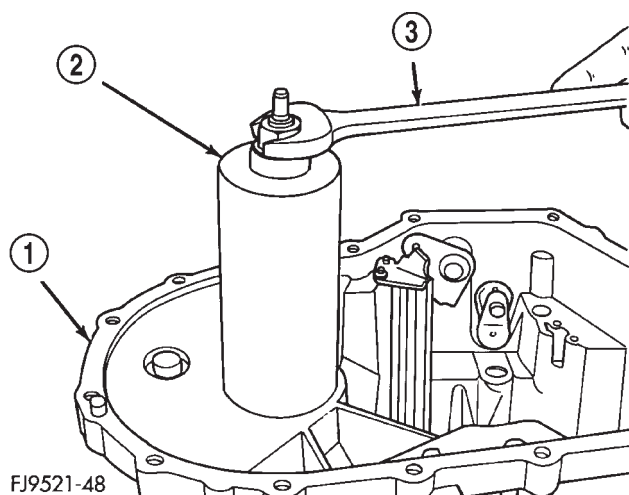
## REMOVAL

- (1) Remove differential assembly from gear case using the procedure outlined in this group.
- (2) Install Miller tool #L-4518 into the differential bearing cup (Fig. 149).

**Fig. 149 Tool Installed in Bearing**

- 1 - SPECIAL TOOL L-4518  
2 - GEAR CASE

- (3) Install the tool cup over the tool (Fig. 150).

**Fig. 150 Tool Cup Installed**

- 1 - GEAR CASE  
2 - SPECIAL TOOL L-4518  
3 - WRENCH

- (4) Tighten the tool until the race is removed from the case.

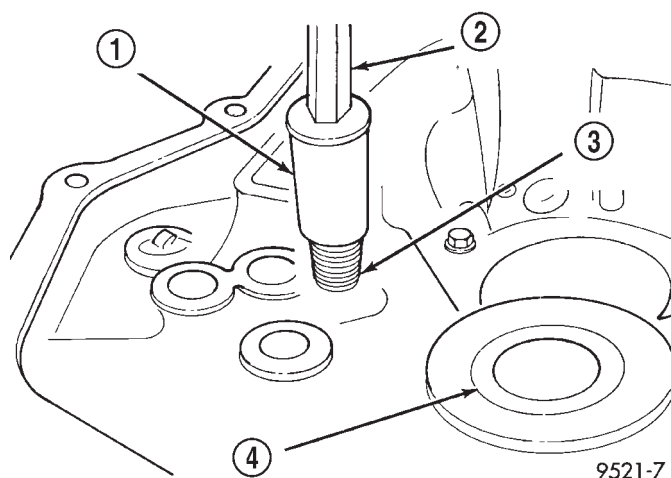
## INSTALLATION

- (1) Position the bearing cup into the case.
- (2) Install the bearing cup onto Miller tool #L-4520.
- (3) Using Miller tool #L-4520 and C-4171 driver, install differential bearing cup into the transaxle case.

## SHIFT RAIL BUSHINGS

## REMOVAL

- (1) Thread tool #6786 into shift rail bushing.
- (2) Install slide hammer #3752 onto tool.
- (3) Remove bushing using slide hammer and tool assembly (Fig. 151).

**Fig. 151 Shift Rail Bushing Removal**

- 1 - SPECIAL TOOL 6786  
2 - SLIDE HAMMER C-3752  
3 - SHIFTER RAIL BUSHING  
4 - INPUT BEARING

## INSTALLATION

- (1) Line up replacement bushing in bore.
- (2) Using tool #MD998343, tap bushing into bore until flush with the chamfer in the case.

## SHIFT SHAFT SEALS

It is not necessary to remove the shift shafts from the transaxle to service the shift shaft seals.

## REMOVAL

- (1) Using a pick tool, pry up on the shift shaft seal and remove seal from bore.

## INSTALLATION

- (1) Position new shift shaft seal in bore.
- (2) Install shift shaft seal into bore using an appropriate size deep-well socket.

## DISASSEMBLY AND ASSEMBLY (Continued)

### SHIFT SELECTOR SHAFT

#### REMOVAL

- (1) Disassemble transaxle using the procedure outlined in this group.
- (2) With the transaxle disassembled, remove the selector shaft by pushing on the shaft from the outside. Pull shaft out from the inside.

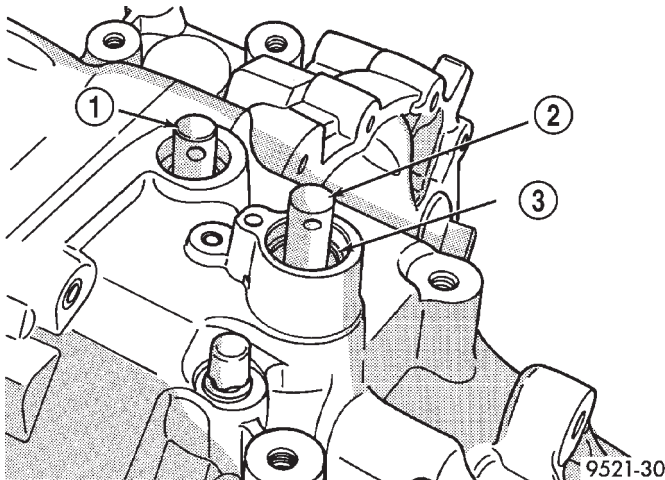
#### INSTALLATION

- (1) Reverse removal procedure to install selector shaft.

### SHIFT CROSSOVER SHAFT

#### REMOVAL

- (1) Disassemble transaxle using the procedure outlined in this group.
- (2) With the transaxle disassembled, remove the crossover shaft seal.
- (3) Using snap-ring pliers, remove the snap ring at the crossover shaft bore (Fig. 152).



**Fig. 152 Crossover Shaft Snap Ring**

- 1 - SELECTOR SHAFT
- 2 - CROSSOVER SHAFT
- 3 - SNAP RING

- (4) Push the crossover shaft in the case and remove the crossover assembly.

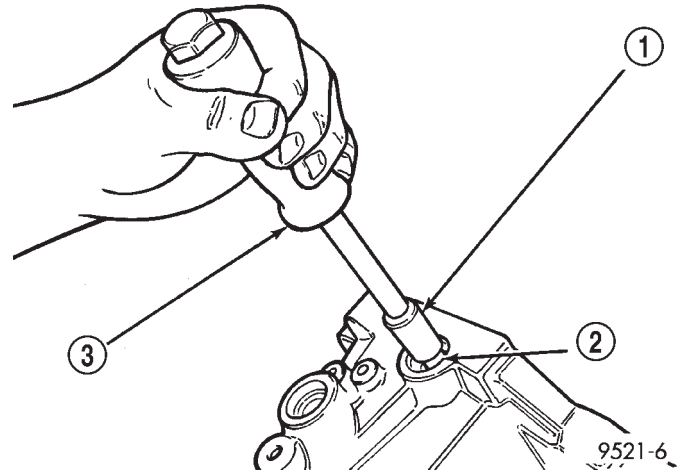
#### INSTALLATION

- (1) Reverse removal procedure to install crossover shaft.

### SHIFT SELECTOR SHAFT BUSHING

#### REMOVAL

- (1) Remove selector shaft using procedure in this group.
- (2) Thread tool #6786 into bushing.
- (3) Install slide hammer #3752 onto tool and remove bushing using slide hammer (Fig. 153).

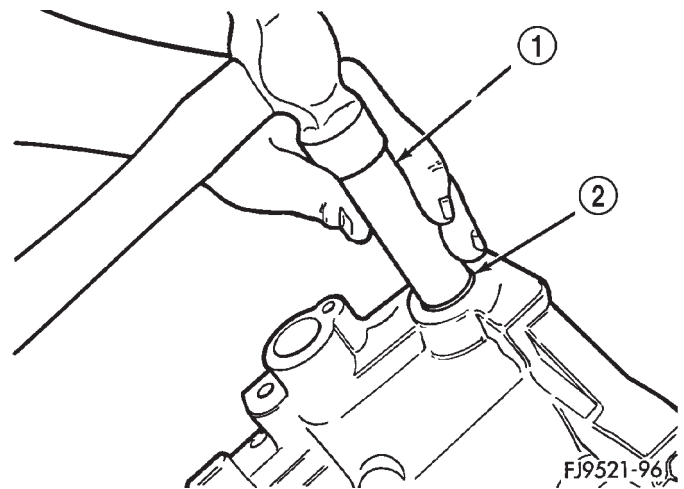


**Fig. 153 Selector Shaft Bushing Removal**

- 1 - SPECIAL TOOL 6786
- 2 - SHIFT SHAFT BUSHING
- 3 - SLIDE HAMMER C-3752

#### INSTALLATION

- (1) Position replacement bushing over selector shaft bore.
- (2) Using an appropriate size deep-well socket, install bushing in selector shaft bore (Fig. 154).



**Fig. 154 Selector Shaft Bushing Installation**

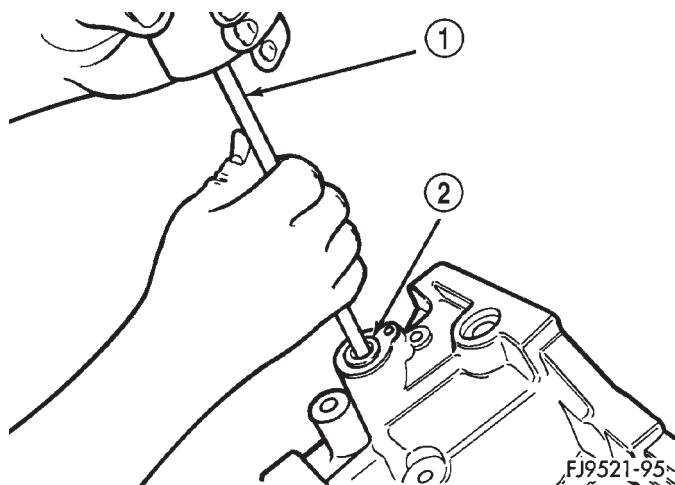
- 1 - DEEP WELL SOCKET
- 2 - SHIFTER SHAFT BUSHING

## DISASSEMBLY AND ASSEMBLY (Continued)

## SHIFT CROSSOVER SHAFT BUSHING

## REMOVAL

- (1) Install slide hammer #3752 through the cross-over bushing.
- (2) Thread nut and washer onto slide hammer.
- (3) Using the slide hammer, remove the crossover shaft bushing (Fig. 155).

**Fig. 155 Crossover Shaft Bushing Removal**

- 1 - SLIDE HAMMER  
2 - SHIFTER SHAFT BUSHING

## INSTALLATION

- (1) Position the replacement crossover shaft bushing over the crossover shaft bushing bore.
- (2) Using an appropriate size deep-well socket, install the crossover shaft bushing into the bushing bore.

## REAR BEARING OIL FEED TROUGH

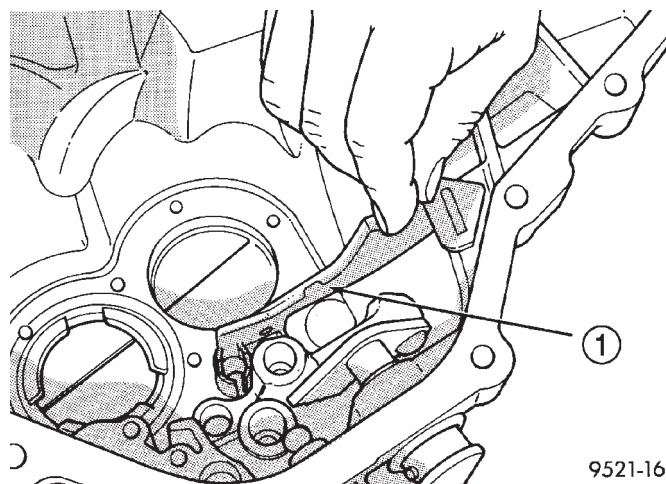
The bearing oil feed trough is retained in the case by a pin that is molded into the case and clips that are part of the trough (Fig. 156).

## REMOVAL

- (1) Using light plier pressure, squeeze the clips together at the rear of the trough.
- (2) Slide the trough over the retaining pin that locates the trough in the case.

## INSTALLATION

- (1) Reverse removal procedure to install oil feed trough.



9521-16

**Fig. 156 Oil Feed Trough**

- 1 - OIL FEED TROUGH

## CLEANING AND INSPECTION

## TRANSAXLE

Clean the gears, bearings, shafts, synchronizers, thrust washers, oil feeder, shift mechanism, gear case, and bellhousing with solvent. Dry all parts except the bearings with compressed air. Allow the bearings to either air dry or wipe them dry with clean shop towels.

Inspect the gears, bearings, shafts and thrust washers. Replace the bearings and cups if the rollers are worn, chipped, cracked, flat spotted, or brinnelled, or if the bearing cage is damaged or distorted. Replace the thrust washers if cracked, chipped, or worn. Replace the gears if the teeth are chipped, cracked, or worn thin. Inspect the synchronizers. Replace the sleeve if worn or damaged in any way. Replace the stop rings if the friction material is burned, flaking off, or worn. Check the condition of the synchro keys and springs. Replace these parts if worn, cracked, or distorted.

## SYNCHRONIZER

## CLEAN

Do not attempt to clean the blocking rings in solvent. The friction material will become contaminated. Place synchronizer components in a suitable holder and clean with solvent. Air dry.

## INSPECT

Proper inspection of components involve:

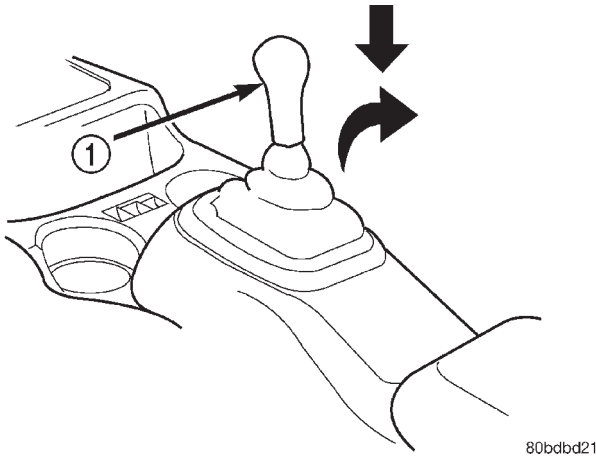
- Teeth, for wear, scuffed, nicked, burred, or broken teeth
  - Keys, for wear or distortion
  - Balls and springs, for distortion, cracks, or wear
- If any of these conditions exist in these components, replace as necessary.

## ADJUSTMENTS

### GEARSHIFT CROSSOVER CABLE

(1) Pull shifter boot down and away from shifter knob.

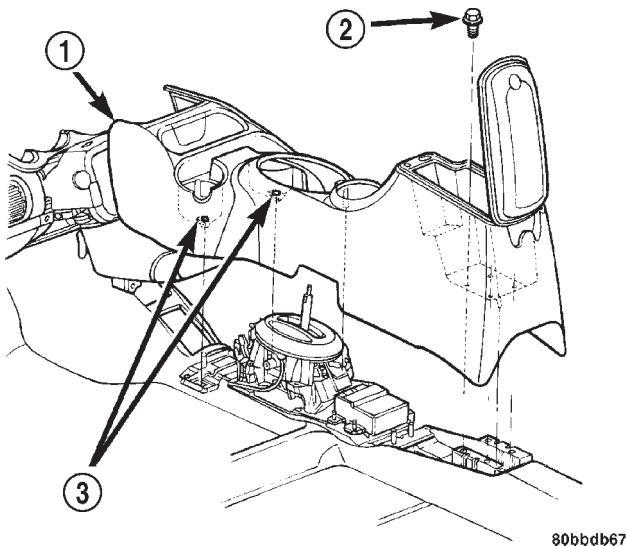
(2) Push down on knob and rotate clockwise to remove (Fig. 157).



**Fig. 157 Gearshift Knob Removal**

1 - GEARSHIFT KNOB

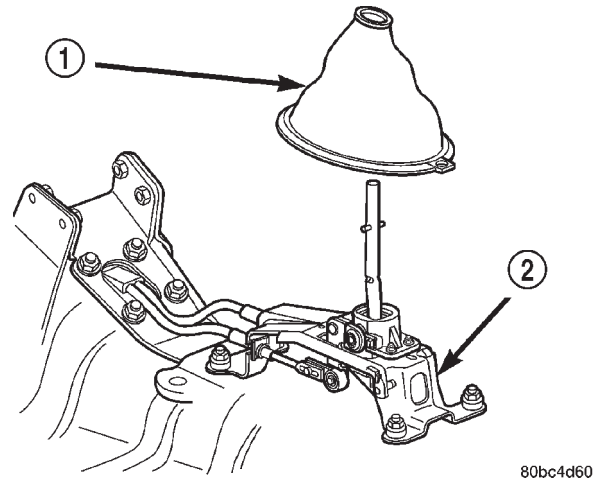
(3) Remove the center console assembly as shown in (Fig. 158).



**Fig. 158 Center Console Removal/Installation—Typical**

1 - CONSOLE  
2 - SCREW (4)  
3 - SCREW (2)

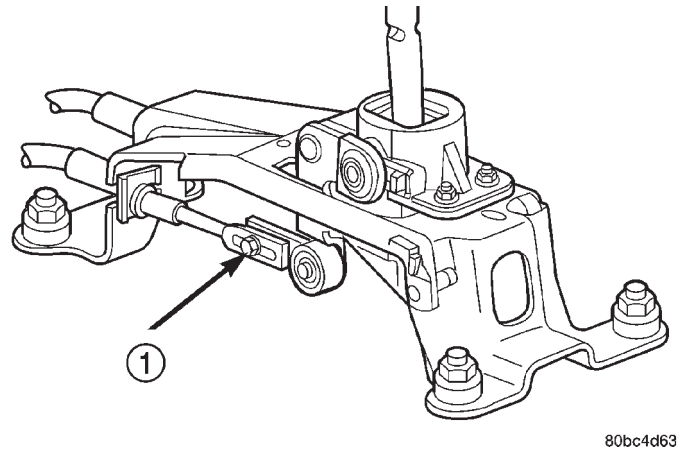
(4) Separate shifter boot from shifter assembly (Fig. 159). Boot is retained to shifter by three push-pin retainers.



**Fig. 159 Gearshift Boot Removal/Installation**

1 - BOOT  
2 - SHIFTER ASSEMBLY

(5) Loosen crossover adjustment screw at shifter assembly (Fig. 160).



**Fig. 160 Crossover Adjustment Screw**

1 - CROSSOVER ADJUSTMENT SCREW

(6) Pin transaxle crossover lever in 3-4 neutral position using a 1/4 inch drill bit. Align hole in crossover lever with the hole in the boss on the transaxle case (Fig. 161). Be sure drill bit goes into transaxle case at least one-half inch.

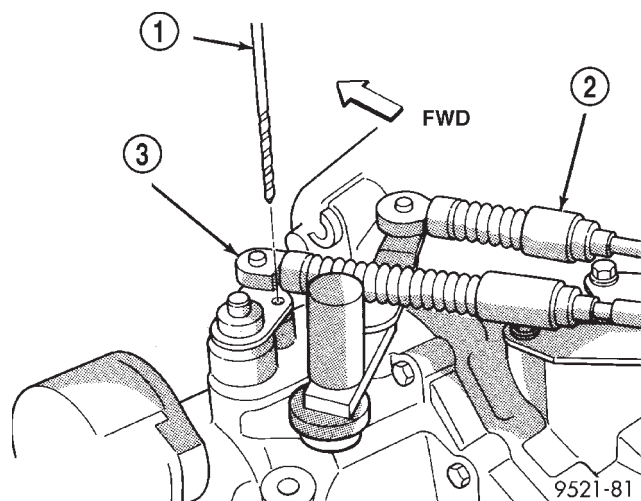
(7) The shifter is spring-loaded and self-centering. Allow shifter to rest in its neutral position. Torque adjustment screw to 8 N·m (70 in. lbs.). Care must be taken to avoid moving the shift mechanism off-center during screw tightening.

(8) Remove drill bit from transaxle case and perform functional check by shifting transaxle into all gears.

(9) Install boot to the shifter assembly (Fig. 159). Fasten boot with the three retainers.



## ADJUSTMENTS (Continued)

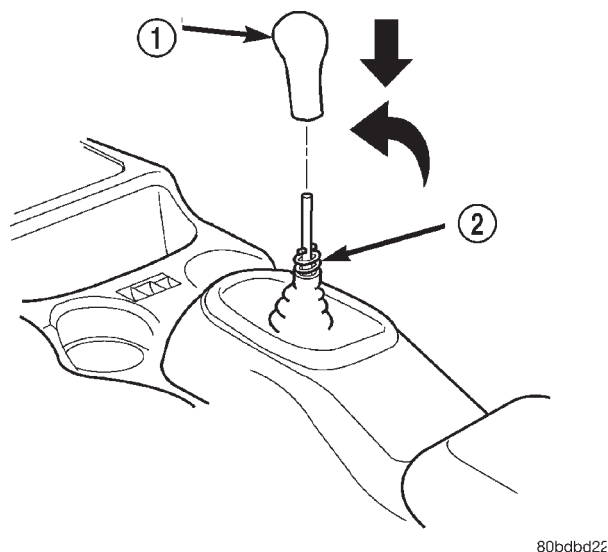
**Fig. 161 Crossover Lever Pin Procedure**

- 1 - 1/4" DRILL BIT  
2 - SELECTOR CABLE  
3 - CROSSOVER CABLE

(10) Install center console assembly (Fig. 158). Verify that boot is not pinched at console opening before tightening.

(11) Install knob to shifter lever, align knob to three o'clock position, push knob down to engage spring and rotate counter clockwise (Fig. 162).

(12) Return shifter boot to its original position (seated around knob lip).

**Fig. 162 Gearshift Knob Installation**

- 1 - GEARSHIFT KNOB  
2 - SPRING

**BEARING ADJUSTMENT PROCEDURE****GENERAL RULES ON SERVICING BEARINGS**

(1) Use extreme care when removing and installing bearing cups and cones. Use only an arbor press

for installation, as a hammer may not properly align the bearing cup or cone. Burrs or nicks on the bearing seat will give a false end play reading while gauging for proper shims. Improperly seated bearing cups and cones are subject to low-mileage failure.

(2) Bearing cups and cones should be replaced if they show signs of pitting or heat distress. If distress is seen on either the cup or bearing rollers, both cup and cone must be replaced.

(3) Bearing preload and drag torque specifications must be maintained to avoid premature bearing failures. Used (original) bearings may lose up to 50% of their original drag torque after break in. All bearing adjustments must be made with no other component interference or gear intermesh.

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

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

(6) Turning torque readings should be obtained while smoothly rotating in either direction.

**DIFFERENTIAL BEARING PRELOAD ADJUSTMENT**

**NOTE:** True bearing turning torque readings can be obtained only with the geartrain removed from the case.

(1) Remove bearing cup and existing shim from clutch bellhousing case.

(2) Press in new bearing cup into bellhousing case (or use a cup that has been ground down on the outer edge for ease of measurement).

(3) Press in new bearing cup into gear case side.

(4) Oil differential bearings with Mopar® type M. S. 9417 Manual Transaxle Fluid. Install differential assembly in transaxle gear case. Install clutch bellhousing over gear case. Install and torque case bolts to 29 N·m (21 ft. lbs.).

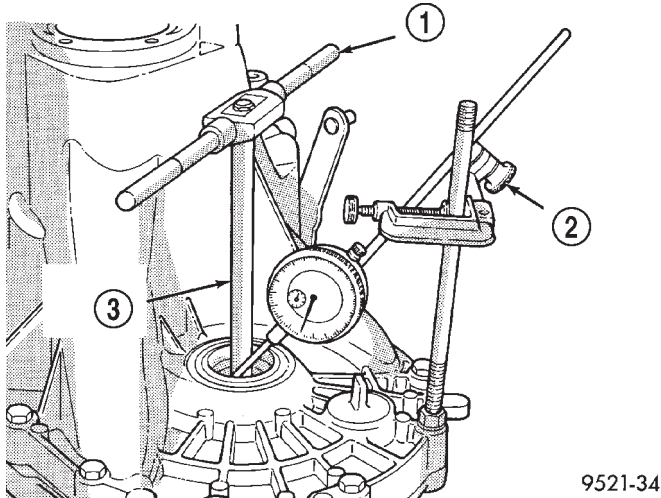
(5) Position transaxle with bellhousing facing down on workbench with C-clamps. Position dial indicator.

(6) Apply a medium load to differential with Tool C-4995 and a T-handle, in the downward direction. Roll differential assembly back and forth a number of times. This will settle the bearings. Zero the dial indicator. To obtain end play readings, apply a medium load in an upward direction while rolling differential assembly back and forth (Fig. 163). Record end play.

(7) The shim required for proper bearing preload is the **total of end play, plus (constant) preload of 0.18mm (0.007 in.)**. Never combine shims to obtain the required preload.



## ADJUSTMENTS (Continued)



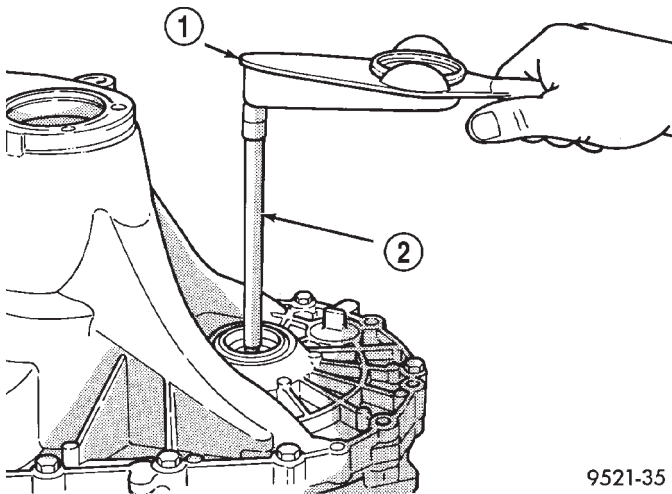
**Fig. 163 Checking Differential Bearing End Play to Determine Shim Thickness**

- 1 - T-HANDLE
- 2 - DIAL INDICATOR SET
- 3 - SPECIAL TOOL C-4995

(8) Remove case bolts. Remove clutch bellhousing differential bearing cup. Install shim(s) selected in Step 7. Then press the bearing cup into clutch bellhousing.

(9) Install clutch bellhousing. Install and torque case bolts to 26 N·m (19 ft. lbs.).

(10) Using Special Tool C-4995 and an inch-pound torque wrench, check turning torque of the differential assembly (Fig. 164). **The turning torque should be 6 to 12 in. lbs. If the turning torque is too high, install a 0.05mm (0.002 inch) thinner shim. If the turning torque is too low, install a 0.05mm (0.002 inch) thicker shim.**



**Fig. 164 Checking Differential Bearing Turning Torque**

- 1 - INCH-POUND TORQUE WRENCH
- 2 - SPECIAL TOOL C-4995

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

## SPECIFICATIONS

### NV T350 (A-578) SPECIFICATIONS

DESCRIPTION	TORQUE
Back-up Lamp Switch . . . . .	24 N·m (18 ft. lbs.)
Crossover Cable Adj. Screw . . . . .	8 N·m (70 in. lbs.)
Drain Plug . . . . .	28 N·m (250 in. lbs.)
Differential Ring Gear Bolts . . . . .	81 N·m (60 ft. lbs.)
Dust Shield to Transaxle . . . . .	12 N·m (105 in. lbs.)
End Plate Cover Bolts . . . . .	29 N·m (21 ft. lbs.)
Lateral Bending Strut to Engine . . . . .	81 N·m (60 ft. lbs.)
Lateral Bending Strut to Trans. . . . .	81 N·m (60 ft. lbs.)
Left Mount Through Bolt . . . . .	108 N·m (80 ft. lbs.)
Left Mount to Transaxle . . . . .	68 N·m (50 ft. lbs.)
Output Bearing Race Ret. Strap . . . . .	11 N·m (96 in. lbs.)
Reverse Fork Bracket . . . . .	11 N·m (96 in. lbs.)
Reverse Idler Shaft Bolt . . . . .	26 N·m (19 ft. lbs.)
Shift Cable Bracket to Transaxle . . . . .	28 N·m (250 in. lbs.)
Transaxle Case Bolts . . . . .	29 N·m (21 ft. lbs.)
Transaxle to Engine Bolt . . . . .	95 N·m (70 ft. lbs.)
Trans. to Eng. Intake Bkt. Bolts . . . . .	95 N·m (70 ft. lbs.)
Vehicle Speed Sensor . . . . .	7 N·m (60 in. lbs.)
Vertical Bending Strut to Engine . . . . .	81 N·m (60 ft. lbs.)
Vertical Bending Strut to Trans. . . . .	81 N·m (60 ft. lbs.)

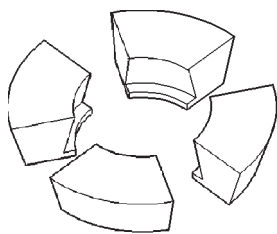
**NOTE: Bolts that have thread sealer or torque lock patches should not be reused. Always install new bolts in these applications.**

### NV T350 (A-578) MANUAL TRANSAXLE FLUID FILL

TRANSAXLE	METRIC MEASURE	U. S. MEASURE
NV T350	1.9-2.2 Liters	2.0-2.3 Quarts

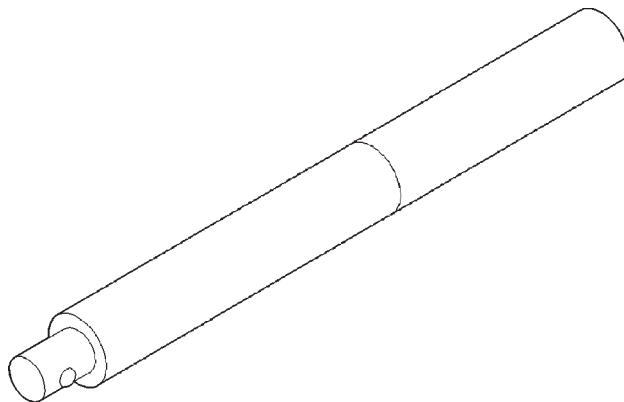
## SPECIAL TOOLS

### NV T350 (A-578) MANUAL TRANSAXLE



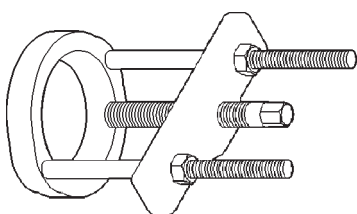
c-293-45-8011d408

**Adapter Blocks C-293-45**

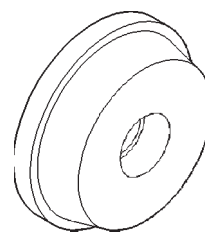


8011d499

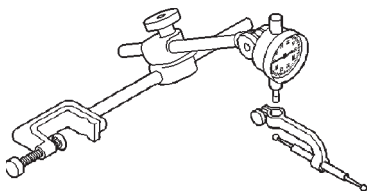
**Universal Handle C-4171**



**Puller Press C-293-PA**

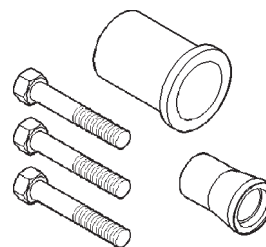


**Bearing Installer C-4628**

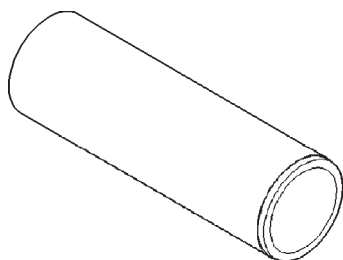


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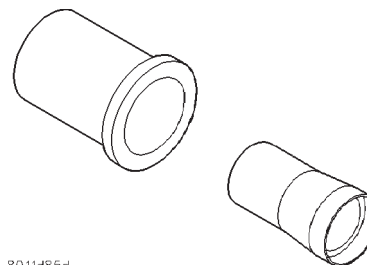
**Dial Indicator C-3339**



**Seal Remover C-4680**

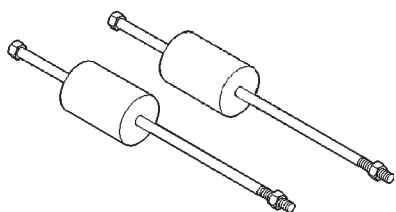


**Sleeve C-3717**

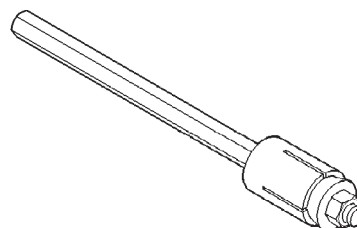


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**Seal Installer C-4992**

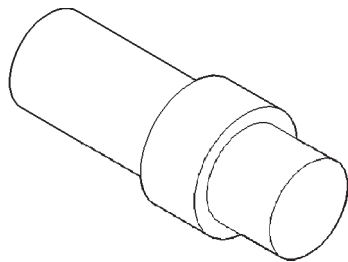


**Slide Hammer C-3752**

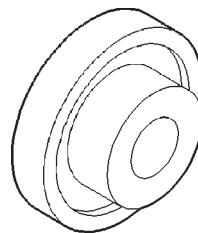


**Torque Tool C-4995**

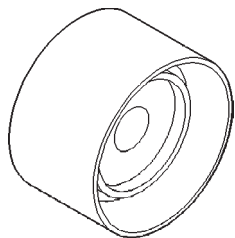
SPECIAL TOOLS (Continued)



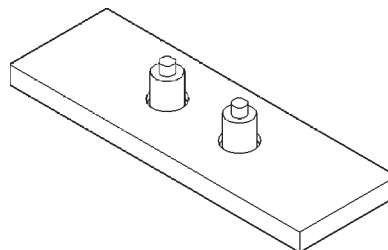
**Adapter C-4996**



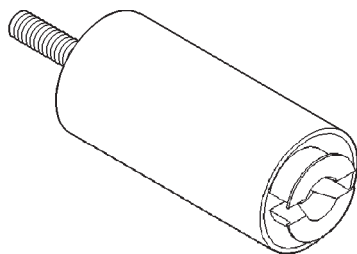
**Seal Installer 6709**



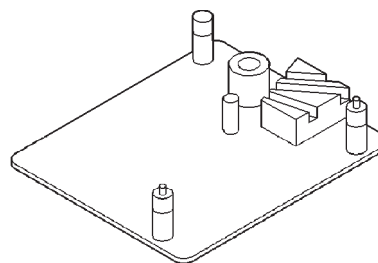
**Installer L-4410**



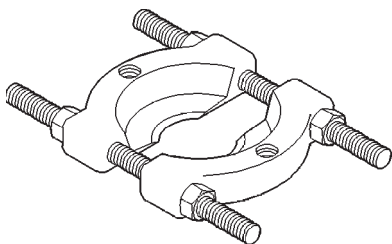
**Bearing Remover 6768**



**Special Jaw Set L-4518**

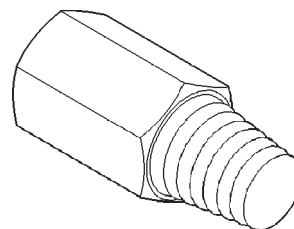


**Bench Fixture 6785**

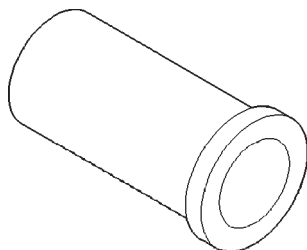


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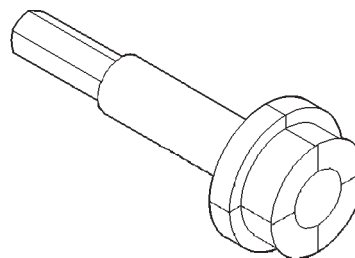
**Bearing Splitter 1130**



**Remover 6786**



**Driver 6342**



**Remover 6787**

## 31TH AUTOMATIC TRANSAXLE

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## GENERAL INFORMATION

### IN VEHICLE SERVICE

The following components are serviceable in the vehicle without transaxle removal:

- Valve Body Assembly
- Converter Clutch Solenoid
- Governor
- Vehicle Speed Sensor & Pinion
- Park/Neutral & Back-up Lamp Switch
- Transfer Gears and Transfer Shaft
- Low/Reverse Servo
- Kickdown Servo
- Accumulator

### FLUID REQUIREMENTS

**NOTE:** The transmission and differential have a common oil sump with an opening between the two.

### TRANSMISSION/DIFFERENTIAL

Mopar® ATF+4 (Automatic Transmission Fluid Type 9602) is required in this transaxle. Substitute fluids must meet fluid specification MS-9602.

### FLUID ADDITIVES

Chrysler Corporation strongly recommends against the addition of any fluids to the transmission, other than those automatic transmission fluids listed above. Exceptions to this policy are the use of special dyes to aid in detecting fluid leaks.

Various "special" additives and supplements exist that claim to improve shift feel/quality and converter clutch operation, inhibit overheating, oxidation, varnish and sludge. These claims have not been supported to Chrysler's satisfaction and these additives must not be used. The use of transmission "sealers" should also be avoided, since they may adversely affect the integrity of transmission seals.

## DESCRIPTION AND OPERATION

### 31TH GENERAL INFORMATION

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

This transaxle combines torque converter, three speed transmission, final drive gearing, and differential into a front wheel drive system.

**NOTE:** Transaxle operation requirements are different for each vehicle and engine combination. Some internal parts will be different to provide for this.

Therefore, when replacing parts, refer to the seven digit part number stamped on rear of the transaxle oil pan flange.

Within this transaxle, there are three primary areas:

- (1) Main center line plus valve body.
- (2) Transfer shaft center line (includes governor and parking sprag).
- (3) Differential center line.

Center distances between the main rotating parts in these three areas are held precise to maintain a low noise level.

The torque converter, transaxle area, and differential are housed in an integral aluminum die casting. **The differential oil sump is common with the transaxle sump. Separate filling of the differential is NOT necessary.**

The torque converter is attached to the crankshaft through a flexible driving plate. Cooling of the converter is accomplished by circulating the transaxle fluid through a remote cooler. There are two types of coolers used. An oil-to-water type cooler located in the radiator side tank and/or an oil-to-air heat exchanger. The torque converter assembly is a sealed unit that cannot be disassembled.

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

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

The transaxle consists of:

- Two multiple-disc clutches
- An overrunning clutch
- Two servos
- A hydraulic accumulator
- Two bands
- Two planetary gear sets

This provides three forward ratios and a reverse ratio. The common sun gear of the planetary gear sets is connected to the front clutch by a driving shell. The driving shell is splined to the sun gear and front clutch retainer. The hydraulic system consists of an oil pump and a single valve body which contains all of the valves except the governor valves. The transaxle sump and differential sump are both vented through the dipstick. Output torque from the main center line is delivered through helical gears to the transfer shaft. This gear set is a factor in the transaxle final drive (axle) ratio. The shaft also carries the governor and parking sprag. An integral helical gear on the transfer shaft drives the differential ring gear.

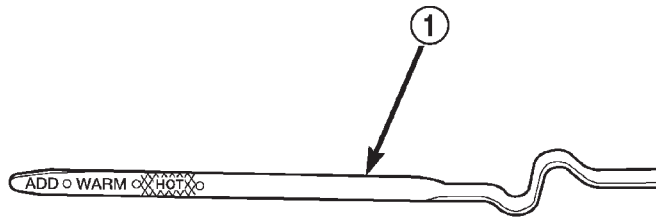


## DESCRIPTION AND OPERATION (Continued)

## FLUID LEVEL AND CONDITION

**NOTE:** The transmission and differential sump have a common oil sump with a communicating opening between the two.

The torque converter fills in both the P (Park) and N (Neutral) positions. Place the selector lever in P (Park) to be sure that the fluid level check is accurate. **The engine should be running at idle speed for at least one minute, with the vehicle on level ground. This will ensure complete oil level stabilization between differential and transmission.** The fluid should be at normal operating temperature (approximately 82° C. or 180° F.). The fluid level is correct if it is in the HOT region (cross-hatched area) on the dipstick (Fig. 1).



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**Fig. 1 Transaxle Dipstick**

1 - TRANSAXLE DIPSTICK

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

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

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

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

## TORQUE CONVERTER CLUTCH

A torque converter clutch is standard on all vehicles. The torque converter clutch is activated only in direct drive and is controlled by the engine electronics. A solenoid on the valve body, is powered by the powertrain control module to activate the torque converter clutch.

## HYDRAULIC CONTROL SYSTEM

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

- Pressure supply system
- Pressure regulating valves
- Flow control valves
- Clutches
- Band servos

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

## PRESSURE SUPPLY SYSTEM

The pressure supply system consists of an oil pump driven by the engine through the torque converter. The single pump furnishes pressure for all hydraulic and lubrication requirements. **Oil pump housing assemblies are available with preselected pump gears.**

## PRESSURE REGULATING VALVES

The pressure regulating valve controls line pressure dependent on throttle opening. The governor valve transmits regulated pressure to the valve body (in conjunction with vehicle speed) to control upshift and downshift.

The throttle valve transmits regulated pressure to the transaxle (dependent on throttle position) to control upshift and downshift.

## FLOW CONTROL VALVES

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

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

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

## DESCRIPTION AND OPERATION (Continued)

The kickdown valve makes possible a forced down-shift from third to second, second to first, or third to first (depending on vehicle speed). This can be done by depressing the accelerator pedal past the detent feel near wide open throttle.

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

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

The torque converter clutch solenoid allows for the electronic control of the torque converter clutch. It also disengages the torque converter at closed throttle. This is done during engine warm-up and part-throttle acceleration.

The switch valve directs oil to apply the torque converter clutch in one position. The switch valve releases the torque converter clutch in the other position.

## CLUTCHES, BAND SERVOS, AND ACCUMULATOR

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

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

## BRAKE TRANSMISSION SHIFT INTERLOCK SYSTEM

The Brake Transmission Shifter/Ignition Interlock (BTSI) is a cable and solenoid operated system. It interconnects the automatic transmission floor mounted shifter to the steering column ignition switch. The system locks the shifter into the PARK position. The interlock system is engaged whenever the ignition switch is in the LOCK or ACCESSORY position. 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 RUN position. When the key is in the 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.

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”.
<b>NOTE: Any failure to meet these expected responses requires system adjustment or repair.</b>	

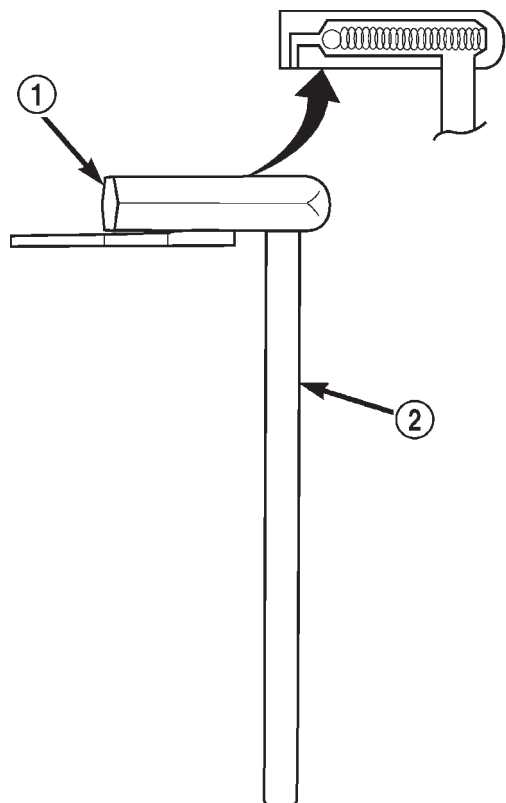
## GEARSHIFT AND PARKING LOCK CONTROLS

The transaxle is controlled by a **lever type** gearshift incorporated within the console. The control has six selector lever positions: P (Park), R (Reverse), N (Neutral), and D (Drive), 2 (Second), and 1 (First). The parking lock is applied by moving the selector lever past a gate to the (P) position. **Do not apply the parking lock until the vehicle has stopped; otherwise, a severe banging noise will occur.**

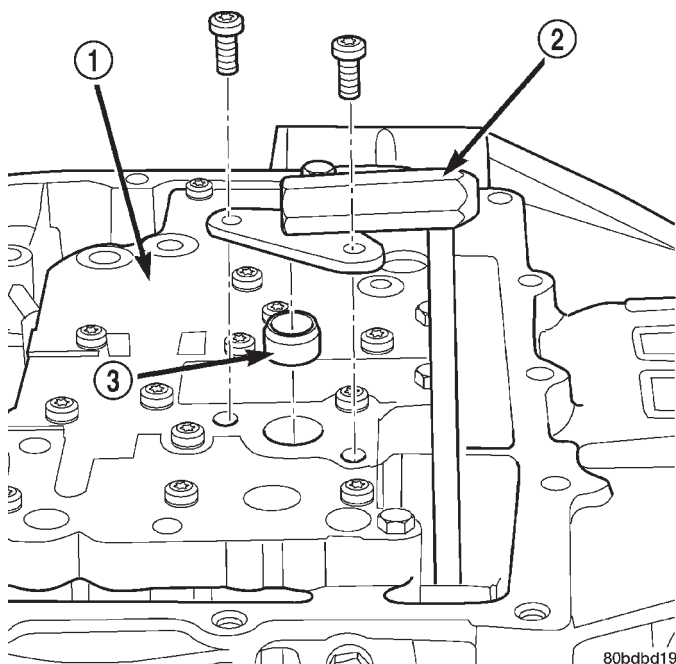
## COOLER BYPASS VALVE

Some 31TH transaxles are equipped with a cooler bypass valve (Fig. 2). The valve is designed to bypass the transaxle oil cooler circuit in cold weather conditions, or when circuit restriction exceeds 25–30 p.s.i. The valve consists of an integrated check ball and spring, and a return tube to carry bypassed oil back to the pump. The bypass valve is mounted to the valve body transfer plate and is sealed with a rubber o-ring seal (Fig. 3).

## DESCRIPTION AND OPERATION (Continued)

**Fig. 2 Cooler Bypass Valve**

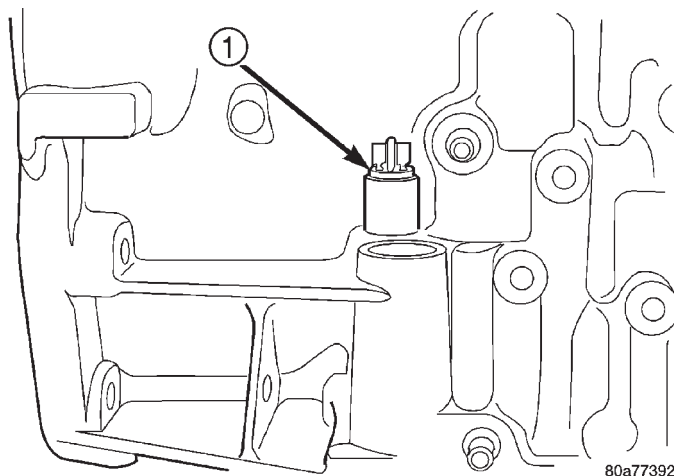
- 1 - BYPASS VALVE  
2 - TUBE

**Fig. 3 Bypass Valve Location (If Equipped)**

- 1 - TRANSFER PLATE  
2 - BYPASS VALVE  
3 - SEAL

**TORQUE CONVERTER CLUTCH SOLENOID WIRING CONNECTOR**

If the solenoid wiring connector is unplugged, the torque converter will not engage (Fig. 4).

**Fig. 4 Torque Converter Clutch Solenoid Wiring Connector**

- 1 - TCC SOLENOID WIRING CONNECTOR

**GOVERNOR**

The governor can be serviced by removing the transaxle oil pan and valve body assembly. The governor can be unbolted from the governor support and removed from the transaxle for reconditioning or replacement.

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

**DIAGNOSIS AND TESTING****TRANSAXLE PRELIMINARY DIAGNOSIS**

Automatic transaxle malfunctions are usually caused by the following general conditions:

- Improper fluid level/condition
- Poor engine performance
- Improper engine or transaxle adjustments
- Transaxle hydraulic malfunctions
- Transaxle mechanical malfunctions

Diagnosis of transaxle problems should always begin with checking the easily accessible variables:

- Fluid level and condition
- Gearshift cable adjustment
- Throttle valve cable adjustment

After verifying or adjusting these variables, road test the vehicle to determine if the problem has been corrected or that further diagnosis is necessary. If the problem still exists, refer to the following diagnosis charts to aid in determining the source or cause of failure.

## DIAGNOSIS AND TESTING (Continued)

Hydraulic pressure tests should be performed when a transaxle internal failure is suspected. The hydraulic flow charts, in the Schematics and Diagrams section of this group, outline fluid flow and hydraulic circuitry. Circuit operation is provided for all gear ranges. Normal working pressures are also supplied for each of the gear ranges.

## TRANSAXLE DIAGNOSIS CHARTS

CONDITION	POSSIBLE CAUSES	CORRECTION
HARSH ENGAGEMENT (FROM NEUTRAL TO DRIVE OR REVERSE)	1. Fluid Level Low	1. Add Fluid
	2. Throttle Linkage Misadjusted	2. Adjust linkage - setting may be too long.
	3. Excessive Pinion Backlash	3. Check per Service Manual. Correct as needed.
	4. Hydraulic Pressure Incorrect	4. Check pressure. Remove, overhaul or adjust valve body as needed.
	5. Band Misadjusted.	5. Adjust rear band.
	6. Valve Body Check Balls Missing.	6. Inspect valve body for proper check ball installation.
	7. Clutch, band or planetary component Damaged.	7. Remove, disassemble and repair transmission as necessary.
	8. Converter Clutch (if equipped) Faulty.	8. Replace converter and flush cooler and line before installing new converter.
DELAYED ENGAGEMENT (FROM NEUTRAL TO DRIVE OR REVERSE)	1. Fluid Level Low.	1. Correct level and check for leaks.
	2. Filter Clogged.	2. Change filter.
	3. Gearshift Linkage Misadjusted.	3. Adjust linkage and repair linkage if worn or damaged.
	4. Rear Band Misadjusted.	4. Adjust band.
	5. Valve Body Filter Plugged.	5. Replace fluid and filter. If oil pan and old fluid were full of clutch disc material and/or metal particles, overhaul will be necessary.
	6. Oil Pump Gears Worn/Damaged.	6. Remove transmission and replace oil pump.
	7. Hydraulic Pressure Incorrect.	7. Perform pressure test, remove transmission and repair as needed.
	8. Reaction Shaft Seal Rings Worn/Broken.	8. Remove transmission, remove oil pump and replace seal rings.
	9. Rear Clutch/Input Shaft, Rear Clutch Seal Rings Damaged.	9. Remove and disassemble transmission and repair as necessary.
	10. Governor Valve Stuck.	10. Remove and inspect governor components. Replace worn or damaged parts.
	11. Regulator Valve Stuck.	11. Clean.

## DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO DRIVE RANGE (REVERSE OK)	1. Fluid Level Low.	1. Add fluid and check for leaks if drive is restored.
	2. Gearshift Linkage/Cable Loose/Misadjusted.	2. Repair or replace linkage components.
	3. Rear Clutch Burnt.	3. Remove and disassemble transmission and rear clutch and seals. Repair/replace worn or damaged parts as needed.
	4. Valve Body Malfunction.	4. Remove and disassemble valve body. Replace assembly if any valves or bores are damaged.
	5. Transmission Overrunning Clutch Broken.	5. Remove and disassemble transmission. Replace overrunning clutch.
	6. Input Shaft Seal Rings Worn/Damaged.	6. Remove and disassemble transmission. Replace seal rings and any other worn or damaged parts.
	7. Front Planetary Failed Broken.	7. Remove and repair.
NO DRIVE OR REVERSE (VEHICLE WILL NOT MOVE)	1. Fluid Level Low.	1. Add fluid and check for leaks if drive is restored.
	2. Gearshift Linkage/Cable Loose/Misadjusted.	2. Inspect, adjust and reassemble linkage as needed. Replace worn/damaged parts.
	3. Filter Plugged.	3. Remove and disassemble transmission. Repair or replace failed components as needed. Replace filter. If filter and fluid contained clutch material or metal particles, an overhaul may be necessary. Perform lube flow test. Flush oil. Replace cooler as necessary.
	4. Oil Pump Damaged.	4. Perform pressure test to confirm low pressure. Replace pump body assembly if necessary.
	5. Valve Body Malfunctioned.	5. Check press and inspect valve body. Replace valve body (as assembly) if any valve or bore is damaged. Clean and reassemble correctly if all parts are in good condition.
	6. Transmission Internal Component Damaged.	6. Remove and disassemble transmission. Repair or replace failed components as needed. Remove and disassemble transmission. Repair or replace failed components as needed.
	7. Park Sprag not Releasing - Check Stall Speed, Worn/Damaged/Stuck.	7. Remove, disassemble, repair.
	8. Torque Converter Damage.	8. Inspect and replace as required.



## DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
SHIFTS DELAYED OR ERRATIC (ALSO SHIFTS HARSH AT TIMES)	1. Fluid Level Low/High.	1. Correct fluid level and check for leaks if low.
	2. Fluid Filter Clogged.	2. Replace filter. If filter and fluid contained clutch material or metal particles, an overhaul may be necessary. Perform lube flow test.
	3. Throttle Linkage Misadjusted.	3. Adjust linkage as described in service section.
	4. Throttle Linkage Binding.	4. Check cable for binding. Check for return to closed throttle at transmission.
	5. Gearshift Linkage/Cable Misadjusted.	5. Adjust linkage/cable as described in service section.
	6. Governor Valve Sticking.	6. Inspect, clean or repair.
	7. Governor Seal Rings Worn/Damaged.	7. Inspect/replace.
	8. Clutch or Servo Failure.	8. Remove valve body and air test clutch, and band servo operation. Disassemble and repair transmission as needed.
	9. Front Band Misadjusted.	9. Adjust band.
	10. Pump Suction Passage Leak.	10. Check for excessive foam on dipstick after normal driving. Check for loose pump bolts, defective gasket. Replace pump assembly if needed.
NO REVERSE (D RANGES OK)	1. Gearshift Linkage/Cable Misadjusted/Damaged.	1. Repair or replace linkage parts as needed.
	2. Rear Band Misadjusted/Worn.	2. Adjust band; replace.
	3. Valve Body Malfunction.	3. Remove and service valve body. Replace valve body if any valves or valve bores are worn or damaged.
	4. Rear Servo Malfunction.	4. Remove and disassemble transmission. Replace worn/damaged servo parts as necessary.
	5. Direct Clutch in Overdrive Worn	5. Disassemble overdrive. Replace worn or damaged parts.
	6. Front Clutch Burnt.	6. Remove and disassemble transmission. Replace worn, damaged clutch parts as required.
HAS FIRST/REVERSE ONLY (NO 1-2 OR 2-3 UPSHIFT)	1. Governor Valve, Shaft, Weights or Body Damaged/Stuck.	1. Remove governor assembly and clean or repair as necessary.
	2. Valve Body Malfunction.	2. Stuck 1-2 shift valve or governor plug.
	3. Front Servo/Kickdown Band Damaged/Burned.	3. Repair/replace.
MOVES IN 2ND OR 3RD GEAR, ABRUPTLY DOWNSHIFTS TO LOW	1. Valve Body Malfunction.	1. Remove, clean and inspect. Look for stuck 1-2 valve or governor plug.
	2. Governor Valve Sticking.	2. Remove, clean and inspect. Replace faulty parts.

## DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO LOW GEAR (MOVES IN 2ND OR 3RD GEAR ONLY)	1. Governor Valve Sticking.	1. Remove governor, clean, inspect and repair as required.
	2. Valve Body Malfunction.	2. Remove, clean and inspect. Look for sticking 1-2 shift valve, 2-3 shift valve, governor plug or broken springs.
	3. Front Servo Piston Cocked in Bore.	3. Inspect servo and repair as required.
	4. Front Band Linkage Malfunction	4. Inspect linkage and look for bind in linkage.
NO KICKDOWN OR NORMAL DOWNSHIFT	1. Throttle Linkage Misadjusted.	1. Adjust linkage.
	2. Accelerator Pedal Travel Restricted.	2. Floor mat under pedal, accelerator cable worn or brackets bent.
	3. Governor/Valve Body Hydraulic Pressures Too High or Too Low Due to Sticking Governor, Valve Body Malfunction or Incorrect Hydraulic Control Pressure Adjustments.	3. Perform hydraulic pressure tests to determine cause and repair as required. Correct valve body pressure adjustments as required.
	4. Valve Body Malfunction.	4. Perform hydraulic pressure tests to determine cause and repair as required. Correct valve body pressure adjustments as required.
	5. Valve Body Malfunction.	5. Sticking 1-2, 2-3 shift valves, governor plugs, 3-4 solenoid, 3-4 shift valve, 3-4 timing valve.
STUCK IN LOW GEAR (WILL NOT UPSHIFT)	1. Throttle Linkage Misadjusted/Stuck.	1. Adjust linkage and repair linkage if worn or damaged. Check for binding cable.
	2. Gearshift Linkage Misadjusted.	2. Adjust linkage and repair linkage if worn or damaged.
	3. Governor/Valve Body, Governor Valve Stuck Closed; Loose Output Shaft Support or Governor Housing Bolts, Leaking Seal Rings or Valve Body Problem (i.e., Stuck 1- 2 Shift Valve/Gov. Plug).	3. Check line and governor pressures to determine cause. Correct as required.
	4. Front Band Out of Adjustment.	4. Adjust Band.
	5. Clutch or Servo Malfunction.	5. Air pressure check operation of clutches and bands. Repair faulty component.
CREEPS IN NEUTRAL	1. Gearshift Linkage Misadjusted.	1. Adjust linkage.
	2. Rear Clutch Dragging/Warped Welded.	2. Disassemble and repair.
	3. Valve Body Malfunction.	3. Perform hydraulic pressure test to determine cause and repair as required.

## DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
BUZZING NOISE	1. Fluid Level Low	1. Add fluid and check for leaks.
	2. Shift Cable Misassembled.	2. Route cable away from engine and bell housing.
	3. Valve Body Misassembled.	3. Remove, disassemble, inspect valve body. Reassemble correctly if necessary. Replace assembly if valves or springs are damaged. Check for loose bolts or screws.
	4. Pump Passages Leaking	4. Check pump for porous casting, scores on mating surfaces and excess rotor clearance. Repair as required. Loose pump bolts.
	5. Cooling System Cooler Plugged.	5. Flow check cooler circuit. Repair as needed.
	6. Overrunning Clutch Damaged.	6. Replace clutch.
SLIPS IN REVERSE ONLY	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Gearshift Linkage Misadjusted.	2. Adjust linkage.
	3. Rear Band Misadjusted.	3. Adjust band.
	4. Rear Band Worn.	4. Replace as required.
	5. Hydraulic Pressure Too Low.	5. Perform hydraulic pressure tests to determine cause.
	6. Rear Servo Leaking.	6. Air pressure check clutch-servo operation and repair as required.
	7. Band Linkage Binding.	7. Inspect and repair as required.
SLIPS IN FORWARD DRIVE RANGES	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Fluid Foaming.	2. Check for high oil level, bad pump gasket or seals, dirt between pump halves and loose pump bolts. Replace pump if necessary.
	3. Throttle Linkage Misadjusted.	3. Adjust linkage.
	4. Gearshift Linkage Misadjusted.	4. Adjust linkage.
	5. Rear Clutch Worn.	5. Inspect and replace as needed.
	6. Low Hydraulic Pressure Due to Worn Pump, Incorrect Control Pressure Adjustments, Valve Body Warpage or Malfunction, Sticking Governor, Leaking Seal Rings, Clutch Seals Leaking, Servo Leaks, Clogged Filter or Cooler Lines	6. Perform hydraulic and air pressure tests to determine cause.
	7. Rear Clutch Malfunction, Leaking Seals or Worn Plates.	7. Air pressure check clutch-servo operation and repair as required.
	8. Overrunning Clutch Worn, Not Holding (Slips in 1 Only).	8. Replace Clutch.
SLIPS IN LOW GEAR "D" ONLY, BUT NOT IN 1 POSITION	Overrunning Clutch Faulty.	Replace overrunning clutch.

## DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
GROWLING, GRATING OR SCRAPING NOISES	1. Drive Plate Broken.	1. Replace.
	2. Torque Converter Bolts Hitting Dust Shield.	2. Dust shield bent. Replace or repair.
	3. Planetary Gear Set Broken/ Seized.	3. Check for debris in oil pan and repair as required.
	4. Overrunning Clutch Worn/Broken.	4. Inspect and check for debris in oil pan. Repair as required.
	5. Oil Pump Components Scored/ Binding.	5. Remove, inspect and repair as required.
	6. Output Shaft Bearing or Bushing Damaged.	6. Remove, inspect and repair as required.
	7. Clutch Operation Faulty.	7. Perform air pressure check and repair as required.
	8. Front and Rear Bands Misadjusted.	8. Adjust bands.
DRAGS OR LOCKS UP	1. Fluid Level Low.	1. Check and adjust level.
	2. Clutch Dragging/Failed	2. Air pressure check clutch operation and repair as required.
	3. Front or Rear Band Misadjusted.	3. Adjust bands.
	4. Case Leaks Internally.	4. Check for leakage between passages in case.
	5. Servo Band or Linkage Malfunction.	5. Air pressure check servo operation and repair as required.
	6. Overrunning Clutch Worn.	6. Remove and inspect clutch. Repair as required.
	7. Planetary Gears Broken.	7. Remove, inspect and repair as required (look for debris in oil pan).
WHINE/NOISE RELATED TO ENGINE SPEED	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Shift Cable Incorrect Routing.	2. Check shift cable for correct routing. Should not touch engine or bell housing.
TORQUE CONVERTER LOCKS UP IN SECOND AND/OR THIRD GEAR	Lockup Solenoid, Relay or Wiring Shorted/Open.	Test solenoid, relay and wiring for continuity, shorts or grounds. Replace solenoid and relay if faulty. Repair wiring and connectors as necessary.
HARSH 1-2 OR 2-3 SHIFTS	Lockup Solenoid Malfunction.	Remove valve body and replace solenoid assembly.
NO START IN PARK OR NEUTRAL	1. Gearshift Linkage/Cable Misadjusted.	1. Adjust linkage/cable.
	2. Neutral Switch Wire Open/Cut.	2. Check continuity with test lamp. Repair as required.
	3. Neutral Switch Faulty.	3. Refer to service section for test and replacement procedure.
	4. Neutral Switch Connect Faulty.	4. Connectors spread open. Repair.
	5. Valve Body Manual Lever Assembly Bent/Worn/Broken.	5. Inspect lever assembly and replace if damaged.

## DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO REVERSE (OR SLIPS IN REVERSE)	1. Direct Clutch Pack (front clutch) Worn.	1. Disassemble unit and rebuild clutch pack.
	2. Rear Band Misadjusted.	2. Adjust band.
	3. Front Clutch Malfunctioned/Burnt.	3. Air pressure test clutch operation. Remove and rebuild if necessary.
OIL LEAKS (ITEMS LISTED REPRESENT POSSIBLE LEAK POINTS AND SHOULD ALL BE CHECKED.)	1. Fluid Lines and Fittings Loose/Leaks/Damaged.	1. Tighten fittings. If leaks persist, replace fittings and lines if necessary.
	2. Filler Tube (where tube enters case) Leaks/Damaged.	2. Replace tube seal. Inspect tube for cracks in tube.
	3. Pressure Port Plug Loose Loose/Damaged.	3. Tighten to correct torque. Replace plug or reseal if leak persists.
	4. Pan Gasket Leaks.	4. Tighten pan screws to 150 inch pounds. If leaks persist, replace gasket. Do no over tighten screws.
	5. Valve Body Manual Lever Shaft Seal Leaks/Worn.	5. Replace shaft seal.
	6. Rear Bearing Access Plate Leaks.	6. Replace gasket. Tighten screws.
	7. Gasket Damaged or Bolts are Loose.	7. Replace bolts or gasket or tighten both.
	8. Adapter/Extension Gasket Damaged Leaks/Damaged.	8. Replace gasket.
	9. Neutral Switch Leaks/Damaged.	9. Replace switch and gasket.
	10. Converter Housing Area Leaks.	10. Check for leaks at seal caused by worn seal or burr on converter hub (cutting seal), worn bushing, missing oil return, oil in front pump housing or hole plugged. Check for leaks past O-ring seal on pump or past pump-to-case bolts; pump housing porous, oil coming out vent due to overfill or leak past front band shaft access plug.
	11. Pump Seal Leaks/Worn/Damaged.	11. Replace seal.
	12. Torque Converter Weld Leak/Cracked Hub.	12. Replace converter.
	13. Case Porosity Leaks.	13. Replace case.

## ROAD TEST

Prior to performing a road test, check the fluid level and throttle valve cable adjustments.

During the road test, the transaxle should be operated in each position to check for slipping and any variation in shifting.

If vehicle operates at high speeds, but has poor acceleration, the converter's overrunning clutch may be slipping. If acceleration is normal, but high throttle opening is needed for high speeds, the stator clutch may have seized.

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

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



## DIAGNOSIS AND TESTING (Continued)

LEVER POSITION	START SAFETY	PARK SPRAG	CLUTCHES				BANDS	
			FRONT	REAR	LOCKUP	OVER-RUNNING	(KICK-DOWN)	LOW/REV
							FRONT	REAR
P — PARK	X	X						
R — REVERSE			X					X
N — NEUTRAL	X							
D — DRIVE								
First				X		X		
Second				X			X	
Third			X	X	X			
2 — SECOND								
First				X		X		
Second				X			X	
1 — Low				X				X

The rear clutch is applied in both the D first gear and 1 first gear positions. Also, the overrunning clutch is applied in D first gear and the low/reverse band is applied in 1 first gear position. If the transaxle slips in D range first gear, but does not slip in 1 first gear, the overrunning clutch is slipping. Similarly, if the transaxle slips in any two forward gears, the rear clutch is slipping.

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

The process of elimination can be used to detect any unit that slips and to confirm proper operation of good units. Road testing can usually diagnose slipping units, although the actual cause of the problem may not be detected. Practically any condition can be caused by leaking hydraulic circuits or sticking valves.

Therefore, unless the condition is obvious, the transaxle should never be disassembled until hydraulic pressure tests have been performed.

## HYDRAULIC PRESSURE TESTS

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

Before performing pressure tests, check fluid level and condition, as well as control cable adjustments. Fluid must be at operating temperature (150 to 200 degrees F.).

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

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

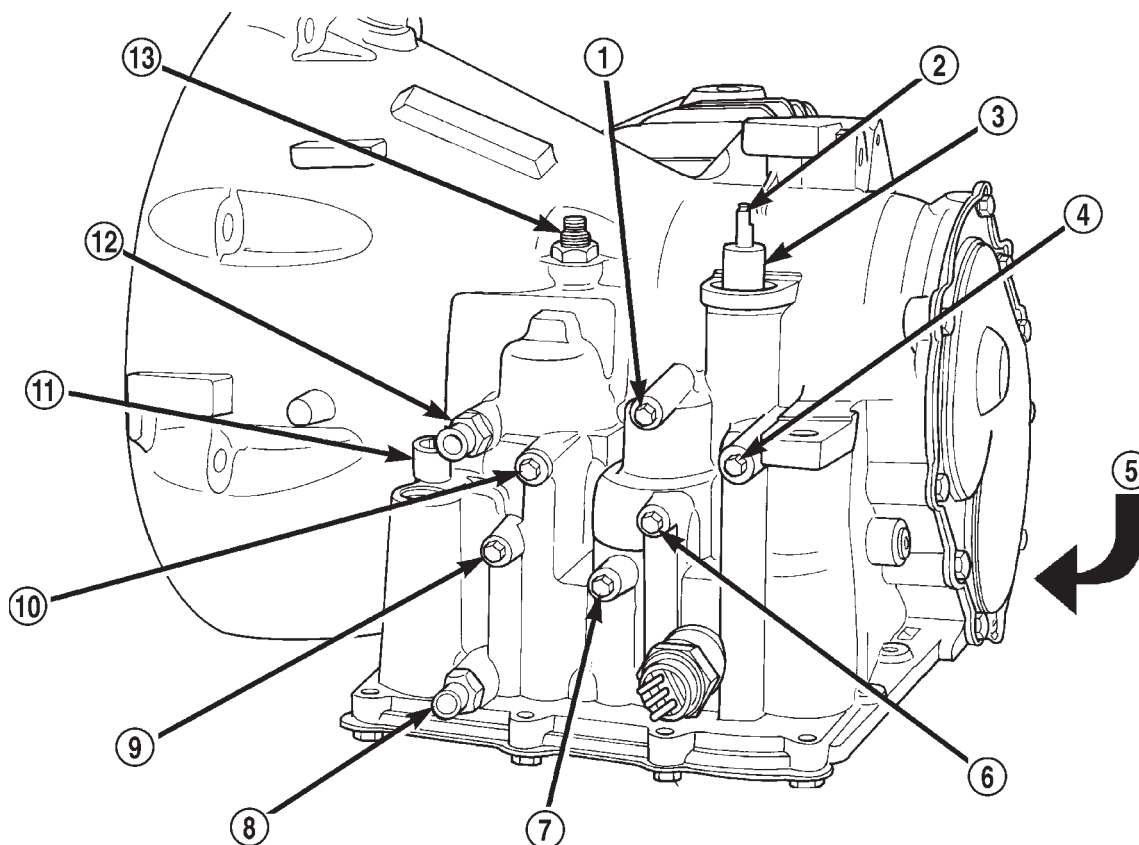
Attach 150 psi gauges to ports required for test being conducted. A 300 psi gauge (C-3293) is required for reverse pressure test at rear servo.

Test port locations are shown in (Fig. 5).

## TEST ONE (SELECTOR IN 1)

- (1) Attach gauges to line and low-reverse ports.
- (2) Operate engine at 1000 rpm for test.
- (3) Move selector lever on transaxle all the way rearward (1 position).
- (4) Read pressures on both gauges as throttle lever on transaxle is moved from full clockwise position to full counterclockwise position.

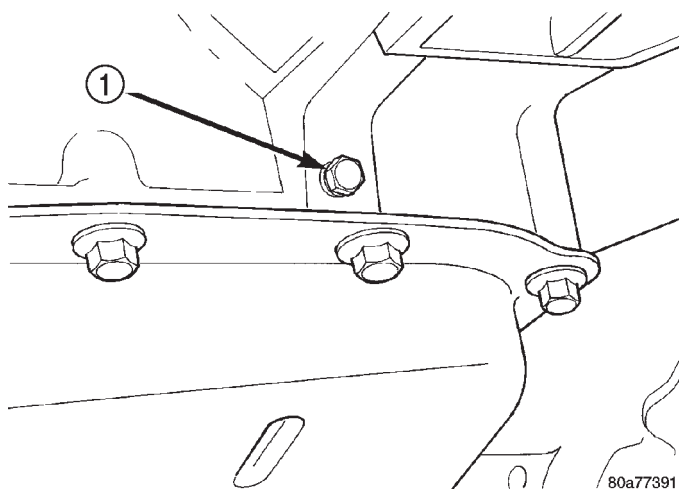
## DIAGNOSIS AND TESTING (Continued)



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**Fig. 5 Test Port Locations**

- |  |  |
|--|--|
| 1 - ACCUMULATOR VENT   | 8 - TO COOLER                            |
| 2 - MANUAL THROTTLE LEVER SHAFT                                | 9 - KICKDOWN RELEASE (FRONT CLUTCH)      |
| 3 - MANUAL SHIFT LEVER SHAFT                                   | 10 - KICKDOWN APPLY                      |
| 4 - LOW-REVERSE PRESSURE                                       | 11 - CONVERTER CLUTCH SOLENOID CONNECTOR |
| 5 - GOVERNOR PRESSURE (BELOW DIFFERENTIAL COVER ON RIGHT SIDE) | 12 - FROM COOLER                         |
| 6 - LINE PRESSURE  | 13 - KICKDOWN BAND ADJUSTING SCREW       |
| 7 - KICKDOWN APPLY AT ACCUMULATOR                              |  |



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**Fig. 6 Governor Pressure Tap**

- 1 - GOVERNOR PRESSURE PLUG

(5) Line pressure should read 52 to 58 psi with throttle lever clockwise. Pressure should gradually increase to 80 to 88 psi as lever is moved counter-clockwise.

(6) Low/reverse pressure should read the same as line pressure, within 3 psi.

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

## DIAGNOSIS AND TESTING (Continued)

**TEST TWO (SELECTOR IN 2)**

(1) Attach one gauge to line pressure port, and tee another gauge into lower cooler line fitting. This will allow lubrication pressure readings to be taken..

(2) Operate engine at 1000 rpm for test.

(3) Move selector lever on transaxle one detent forward from full rearward position. This is selector 2 position.

(4) Read pressures on both gauges as throttle lever on transaxle is moved from full clockwise position to full counterclockwise position.

(5) Line pressure should read 52 to 58 psi with throttle lever clockwise. Pressure should gradually increase to 80 to 88 psi. as lever is moved counterclockwise.

(6) Lubrication pressure should be 10 to 25 psi with lever clockwise and 10 to 35 psi with lever at full counterclockwise.

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

**TEST THREE (SELECTOR IN D)**

(1) Attach gauges to line and kickdown release ports.

(2) Operate engine at 1600 rpm for test.

(3) Move selector lever on transaxle two detents forward from full rearward position. This is selector D position.

(4) Read pressures on both gauges as throttle lever on transaxle is moved from full clockwise to the full counterclockwise position.

(5) Line pressure should read 52 to 58 psi with throttle lever clockwise. Pressure should gradually increase to 80 to 88 psi. as lever is moved counterclockwise.

(6) Kickdown release is pressurized only in direct drive and should be same as line pressure within 3 psi, up to kickdown point.

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

**TEST FOUR (SELECTOR IN REVERSE)**

(1) Attach 300 psi gauge to low-reverse port.

(2) Operate engine at 1600 rpm for test.

(3) Move selector lever on transaxle four detents forward from full rearward position. This is selector R position.

(4) Low/reverse pressure should read 180 to 220 psi with throttle lever clockwise. Pressure should gradually increase to 260 to 300 psi. as lever is moved counterclockwise.

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

(6) Move selector lever on transaxle to D position to check that low/reverse pressure drops to zero.

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

**TEST RESULT INDICATIONS**

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

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

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

(4) Low pressure in R and 1, but correct pressure in 2 indicates rear servo circuit leakage.

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

**GOVERNOR PRESSURE**

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

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

(2) Operate transaxle in third gear to read pressures. The governor pressure should respond smoothly to changes in mph and should return to 0 to 3 psi when vehicle is stopped. High pressure (above 3 psi) at standstill will prevent the transaxle from downshifting.

**THROTTLE PRESSURE**

No gauge port is provided for throttle pressure. Incorrect throttle pressure should be suspected if part throttle upshift speeds are either delayed or occur too early in relation to vehicle speed. Engine runaway on shifts can also be an indicator of low throttle pressure setting, or misadjusted throttle cable.

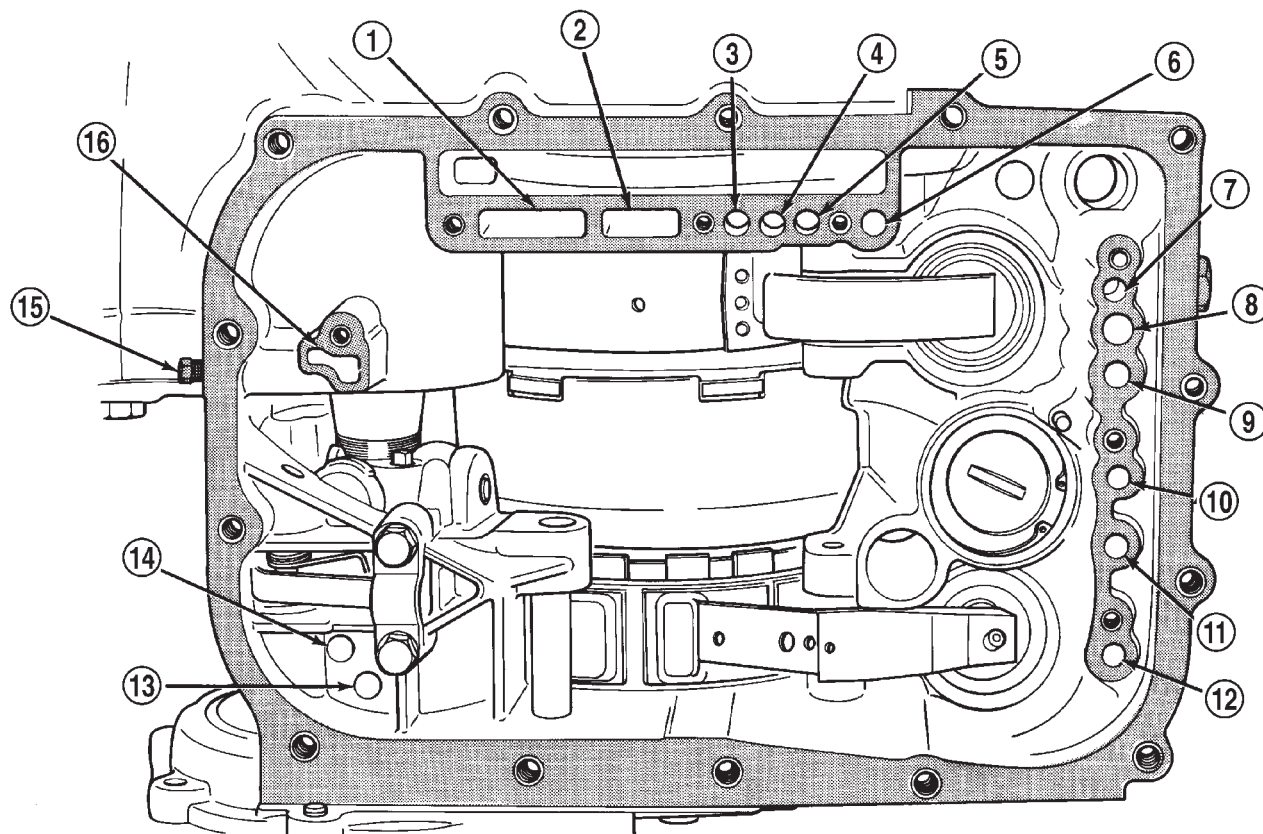
In no case should throttle pressure be adjusted until the transaxle throttle cable adjustment has been verified to be correct.

**CLUTCH AND SERVO AIR PRESSURE TESTS**

A no-drive condition might exist even with correct fluid pressure, because of inoperative clutches or bands. The inoperative units, clutches, bands, and servos can be located through a series of tests. This is done by substituting air pressure for fluid pressure (Fig. 7).

The front and rear clutches, kickdown servo, and low/reverse servo can be tested by applying air pressure to their respective passages. To make air pressure tests, proceed as follows:

## DIAGNOSIS AND TESTING (Continued)



PU142A

**Fig. 7 Air Pressure Tests**

- |                           |                                |
|---------------------------|--------------------------------|
| 1 - PUMP SUCTION          | 9 - KICKDOWN SERVO ON          |
| 2 - PUMP PRESSURE         | 10 - ACCUMULATOR OFF           |
| 3 - FRONT CLUTCH APPLY    | 11 - ACCUMULATOR ON            |
| 4 - REAR CLUTCH APPLY     | 12 - LOW-REVERSE SERVO APPLY   |
| 5 - TO TORQUE CONVERTER   | 13 - GOVERNOR PRESSURE         |
| 6 - FROM TORQUE CONVERTER | 14 - LINE PRESSURE TO GOVERNOR |
| 7 - TO OIL COOLER         | 15 - GOVERNOR PRESSURE PLUG    |
| 8 - KICKDOWN SERVO OFF    | 16 - GOVERNOR PRESSURE         |

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

Remove oil pan and valve body. Refer to Valve Body for removal procedure.

**FRONT CLUTCH**

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

**REAR CLUTCH**

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

**KICKDOWN SERVO (FRONT)**

Direct air pressure into KICKDOWN SERVO ON passage. Operation of servo is indicated by a tightening of front band. Spring tension on servo piston should release the band.

## DIAGNOSIS AND TESTING (Continued)

**LOW AND REVERSE SERVO (REAR)**

Direct air pressure into LOW/REVERSE SERVO APPLY passage. Operation of servo is indicated by a tightening of rear band. Spring tension on servo piston should release the band.

If clutches and servos operate properly, no upshift indicates that a malfunction exists in the valve body.

**FLUID LEAKAGE-TRANSAXLE TORQUE CONVERTER HOUSING AREA**

(1) Check for source of leakage.

(2) Since fluid leakage near the torque converter area may be from an engine oil leak, the area should be checked closely. Factory fill fluid is dyed red and, therefore, can be distinguished from engine oil.

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

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

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

(6) After performing this operation, inspect for leakage. If a leak persists, perform the following operation on the vehicle. This will determine if the torque converter or transaxle is leaking.

**TORQUE CONVERTER LEAKAGE**

Possible sources of torque converter leakage are:

- Torque converter weld leaks at the outside diameter (peripheral) weld
- Torque converter hub weld
- Torque converter impeller shell cracked adjacent to hub
- At drive lug welds

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

**BRAKE TRANSMISSION SHIFT INTERLOCK**

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. Refer to Brake Transmission Interlock Removal and Installation or Adjustment in this Group.

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".
<b>NOTE: Any failure to meet these expected responses requires system adjustment or repair.</b>	

**SERVICE PROCEDURES****TRANSAXLE FLUID AND FILTER SERVICE**

**NOTE:** Refer to Group 0, Lubrication and Maintenance, or the vehicle owner's manual, for the recommended maintenance (fluid/filter change) intervals for this transaxle.

**NOTE:** Only fluids of the type labeled Mopar® ATF+4 (Automatic Transmission Fluid) Type 9602 should be used. A filter change should be made at the time of the transmission oil change. The magnet (on the inside of the oil pan) should also be cleaned with a clean, dry cloth.

**NOTE:** If the transaxle is disassembled for any reason, the fluid and filter should be changed.

**FLUID/FILTER SERVICE (RECOMMENDED)**

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

(2) Loosen pan bolts and tap the pan at one corner to break it loose allowing fluid to drain, then remove the oil pan.

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



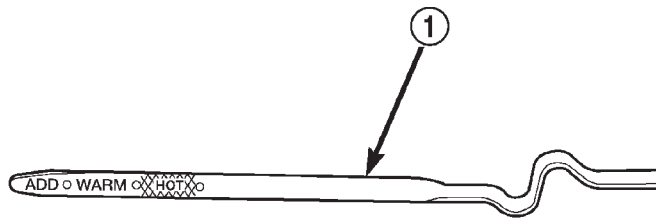
## SERVICE PROCEDURES (Continued)

(4) Clean the oil pan and magnet. Reinstall pan using new Mopar Silicone Adhesive sealant. Tighten oil pan bolts to 19 N·m (165 in. lbs.).

(5) Pour four quarts of Mopar® ATF+4 (Automatic Transmission Fluid) Type 9602 through the dipstick opening.

(6) Start engine and allow to idle for at least one minute. Then, with parking and service brakes applied, move selector lever momentarily to each position, ending in the park or neutral position.

(7) Check the transaxle fluid level and add an appropriate amount to bring the transaxle fluid level to 3mm (1/8 in.) below the "ADD" mark on the dipstick (Fig. 8).



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**Fig. 8 Dipstick Markings**

1 - TRANSAXLE DIPSTICK

(8) Recheck the fluid level after the transaxle has reached normal operating temperature (180°F).

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

## ALTERNATIVE MAINTENANCE METHODS

### TRANSAXLE FLUID EXCHANGER METHOD

**CAUTION:** The use of any fluid exchanger that introduces additives into the transaxle is not recommended.

(1) To perform the transaxle fluid exchange, the transaxle must be at operating temperature. Drive the vehicle until it reaches full operating temperature.

(2) Obtain a suitable transaxle fluid exchanger and verify the tank is clean and dry.

(3) Fill the tank to the recommended fill capacity with Mopar® ATF+4 Type 9602.

(4) Connect the machine to the vehicle following the manufacturers instructions. Perform the exchange procedure following the instructions provided with the machine.

(5) Once machine has completed the fluid exchange. Check the fluid level and condition and fill to proper level with Mopar® ATF+4 Type 9602. Refer to Fluid Level and Condition Check in this group for the proper fluid "top-off" procedure.

**NOTE:** Verify that the transaxle cooler lines are tightened to proper specifications. Cooler line torque specification is 2 N·m (18 in. lbs.).

### DIPSTICK TUBE FLUID SUCTION METHOD

(1) When performing the fluid suction method, make sure the transaxle is at full operating temperature.

(2) To perform the dipstick tube fluid suction method, use a suitable fluid suction device (Vacula™ or equivalent).

(3) Insert the fluid suction line into the dipstick tube.

**NOTE:** Verify that the suction line is inserted to the lowest point of the transaxle oil pan. This will ensure complete evacuation of the fluid in the pan.

(4) Follow the manufacturers recommended procedure and evacuate the fluid from the transaxle.

(5) Remove the suction line from the dipstick tube.

(6) Pour four quarts of Mopar® ATF+4 (Automatic Transmission Fluid) Type 9602 through the dipstick opening.

(7) Start engine and allow to idle for at least one minute. Then, with parking and service brakes applied, move selector lever momentarily to each position, ending in the park or neutral position.

(8) Check the transaxle fluid level and add an appropriate amount to bring the transaxle fluid level to 3mm (1/8 in.) below the "ADD" mark on the dipstick (Fig. 8).

(9) Recheck the fluid level after the transaxle has reached normal operating temperature (180°F).

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

## ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum transaxle case and valve body can be repaired by the use of Heli-Coils. This repair consists of drilling out the worn-out or damaged threads. Then tap the hole with a Heli-Coil tap, and install a Heli-Coil insert into the hole. This brings the hole back to its original thread size.

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

## SERVICE PROCEDURES (Continued)

## FLUSHING COOLERS AND TUBES

When a transaxle failure has contaminated the fluid, the transaxle oil cooler(s) must be flushed (both radiator and remote). The cooler bypass valve in the transaxle must be replaced also. The torque converter must also be replaced with an exchange unit. This will ensure that metal particles or sludged oil are not later transferred back into the reconditioned (or replaced) transaxle.

The recommended procedure for flushing the coolers and tubes is to use Tool 6906A Cooler Flusher.

**WARNING: WEAR PROTECTIVE EYEWEAR THAT MEETS THE REQUIREMENTS OF OSHA AND ANSI Z87.1-1968. WEAR STANDARD INDUSTRIAL RUBBER GLOVES.**

**KEEP LIT CIGARETTES, SPARKS, FLAMES, AND OTHER IGNITION SOURCES AWAY FROM THE AREA TO PREVENT THE IGNITION OF COMBUSTIBLE LIQUIDS AND GASES. KEEP A CLASS (B) FIRE EXTINGUISHER IN THE AREA WHERE THE FLUSHER WILL BE USED.**

**KEEP THE AREA WELL VENTILATED.**

**DO NOT LET FLUSHING SOLVENT COME IN CONTACT WITH YOUR EYES OR SKIN: IF EYE CONTAMINATION OCCURS, FLUSH EYES WITH WATER FOR 15 TO 20 SECONDS. REMOVE CONTAMINATED CLOTHING AND WASH AFFECTED SKIN WITH SOAP AND WATER. SEEK MEDICAL ATTENTION.**

## COOLER FLUSH USING TOOL 6906A

(1) Remove cover plate filler plug on Tool 6906A. Fill reservoir 1/2 to 3/4 full of fresh flushing solution. Flushing solvents are petroleum based solutions generally used to clean automatic transmission components. **DO NOT** use solvents containing acids, water, gasoline, or any other corrosive liquids.

(2) Reinstall filler plug on Tool 6906A.

(3) Verify pump power switch is turned OFF. Connect red alligator clip to positive (+) battery post. Connect black (-) alligator clip to a good ground.

(4) Disconnect the cooler lines at the transmission.

**NOTE: When flushing transmission cooler and lines, ALWAYS reverse flush.**

(5) Connect the BLUE pressure line to the OUTLET (From) cooler line.

(6) Connect the CLEAR return line to the INLET (To) cooler line

(7) Turn pump ON for two to three minutes to flush cooler(s) and lines. Monitor pressure readings

and clear return lines. Pressure readings should stabilize below 20 psi. for vehicles equipped with a single cooler and 30 psi. for vehicles equipped with dual coolers. If flow is intermittent or exceeds these pressures, replace cooler.

(8) Turn pump OFF.

(9) Disconnect CLEAR suction line from reservoir at cover plate. Disconnect CLEAR return line at cover plate, and place it in a drain pan.

(10) Turn pump ON for 30 seconds to purge flushing solution from cooler and lines. Turn pump OFF.

(11) Place CLEAR suction line into a one quart container of Mopar® ATF+4 (Automatic Transmission Fluid) Type 9602.

(12) Turn pump ON until all transmission fluid is removed from the one quart container and lines. This purges any residual cleaning solvent from the transmission cooler and lines. Turn pump OFF.

(13) Disconnect alligator clips from battery. Reconnect flusher lines to cover plate, and remove flushing adapters from cooler lines.

## OIL PUMP VOLUME CHECK

After the new or repaired transmission has been installed, fill to the proper level with Mopar® ATF+4 (Automatic Transmission Fluid) Type 9602. The volume should be checked using the following procedure:

(1) Disconnect the **From cooler** line at the transmission and place a collecting container under the disconnected line.

**CAUTION: With the fluid set at the proper level, fluid collection should not exceed (1) quart or internal damage to the transmission may occur.**

(2) Run the engine **at curb idle speed**, with the shift selector in neutral.

(3) If fluid flow is intermittent or it takes more than 20 seconds to collect one quart of ATF, disconnect the **To Cooler** line at the transaxle.

(4) Refill the transaxle to proper level and recheck pump volume.

(5) If flow is found to be within acceptable limits, replace the cooler. Then fill transmission to the proper level, using Mopar® ATF+4 (Automatic Transmission Fluid) Type 9602.

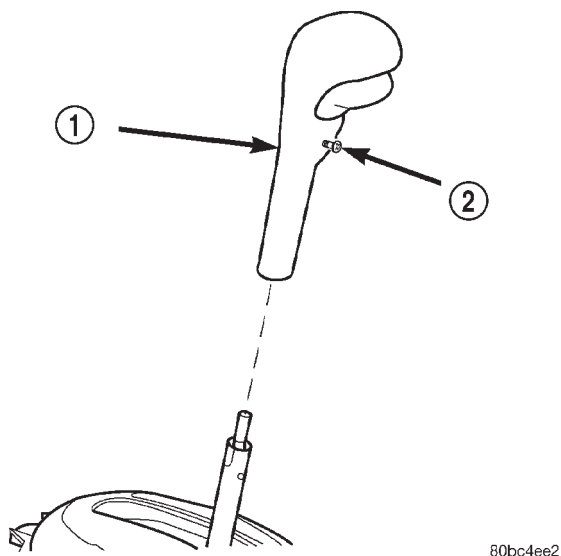
(6) If fluid flow is still found to be inadequate, check the line pressure using the Transaxle Hydraulic Pressure Test procedure.

## REMOVAL AND INSTALLATION

### GEARSHIFT CABLE

#### REMOVAL

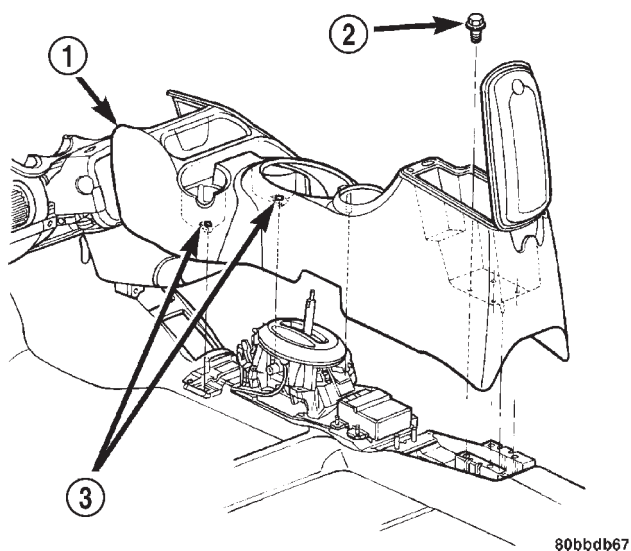
(1) Loosen set screw and remove knob from shifter handle (Fig. 9).



**Fig. 9 Gearshift Knob Removal/Installation**

- 1 - SHIFTER KNOB
- 2 - SET SCREW

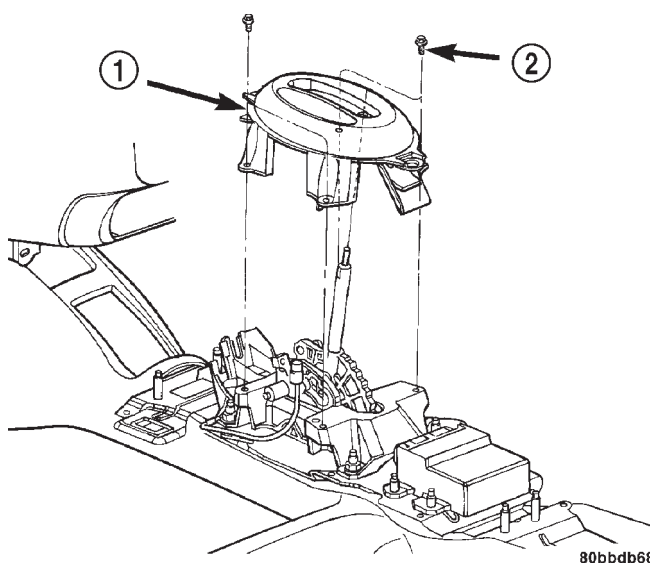
(2) Remove the center console assembly as shown in (Fig. 10).



**Fig. 10 Center Console Removal/Installation**

- 1 - CONSOLE
- 2 - SCREW (4)
- 3 - SCREW (2)

(3) Remove shifter bezel (Fig. 11).

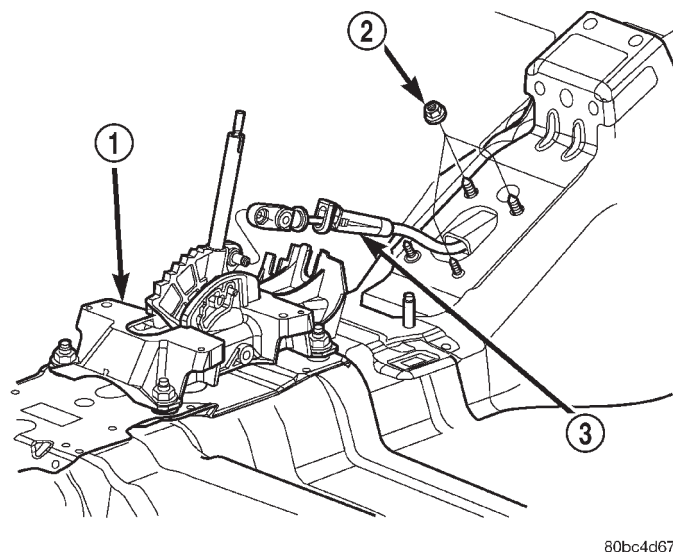


**Fig. 11 Shifter Bezel Removal/Installation**

- 1 - BEZEL
- 2 - SCREW (4)

(4) Disconnect shift cable from shifter assembly as shown in (Fig. 12).

(5) Remove three grommet plate to floor pan nuts as shown in (Fig. 12).



**Fig. 12 Gearshift Cable at Shifter Assembly**

- 1 - SHIFTER ASSEMBLY
- 2 - GROMMET PLATE NUT
- 3 - SHIFT CABLE

## REMOVAL AND INSTALLATION (Continued)

(6) Disconnect both battery cables, remove battery hold down clamp and bolt, and remove battery.

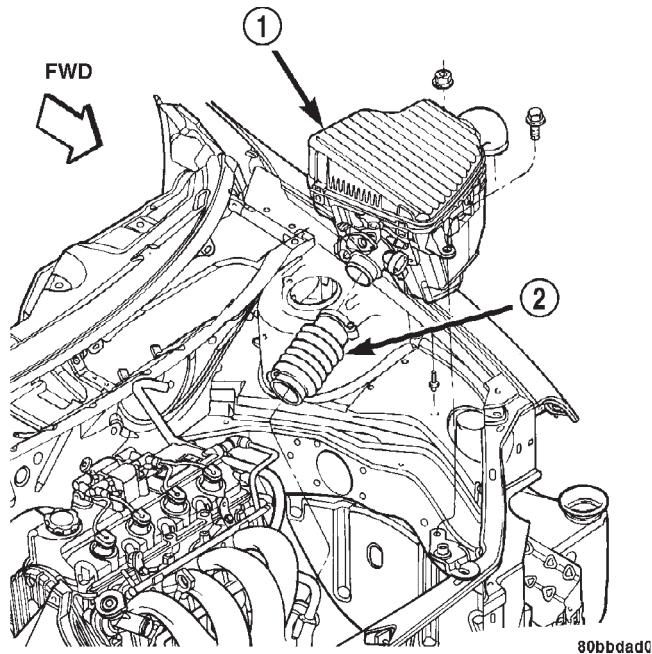
(7) Remove air cleaner/throttle body assy. (Fig. 13) as follows:

(a) Disconnect proportional purge solenoid (PPS) and crankcase vent hose from throttle body.

(b) Disconnect the Throttle Position Sensor (TPS) and Idle Air Control (IAC) connectors.

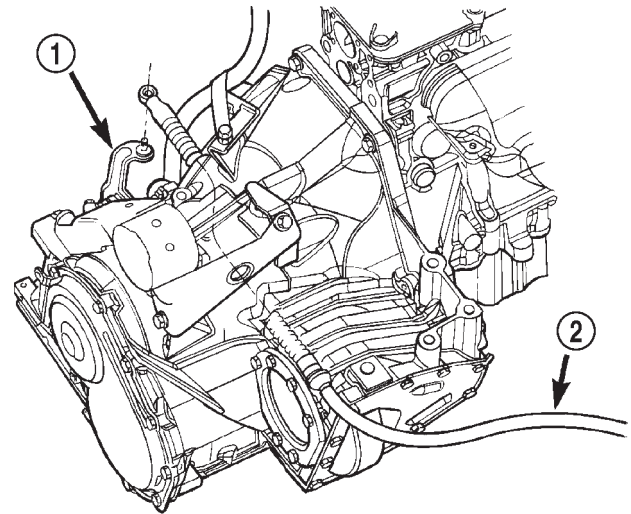
(c) Remove mounting bolt and nut (Fig. 13) and partially remove air cleaner assembly.

(d) Disconnect accelerator and speed control (if equipped) cables after the assy. is removed from position. Remove air cleaner assembly from vehicle.



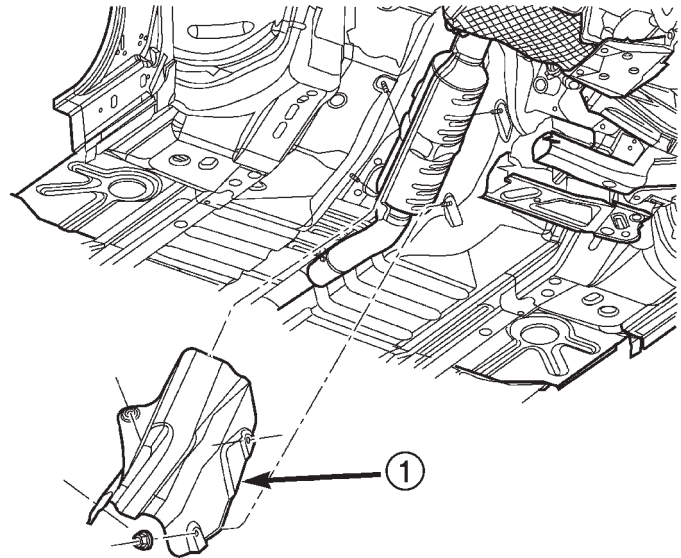
**Fig. 13 Air Cleaner Assembly Removal/Installation**

- 1 - AIR CLEANER ASSY.  
2 - THROTTLE BODY DUCT



**Fig. 14 Gear Shift Cable at Transaxle**

- 1 - SHIFT LEVER  
2 - SHIFT CABLE



**Fig. 15 Catalytic Converter Heat Shield**

- 1 - CONVERTER HEAT SHIELD

(8) Remove battery tray from bracket.

(9) Disconnect shifter cable from shift lever and remove from bracket (Fig. 14).

(10) Raise vehicle on hoist.

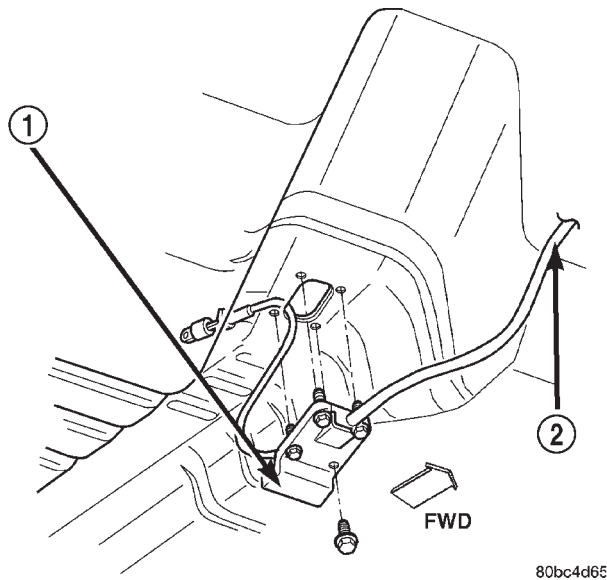
(11) Remove catalytic converter heat shield (Fig. 15).

(12) Remove intermediate pipe heat shield front bolts.

(13) Remove remaining grommet plate screw and remove cable assembly from vehicle (Fig. 16).



## REMOVAL AND INSTALLATION (Continued)

**Fig. 16 Grommet Plate/Shift Cable at Floor Pan**

- 1 - GROMMET PLATE  
2 - SHIFT CABLE

**INSTALLATION**

(1) Install cable assembly through floor pan opening and secure to floor pan with grommet plate and one screw (Fig. 16). Make sure the three grommet plate studs protrude through cable assembly and floor pan and tighten screw to 7 N·m (60 in. lbs.).

(2) Route transaxle end of cable assembly into engine compartment and over transaxle assembly.

(3) Install and tighten intermediate pipe heat shield front screws.

(4) Install catalytic converter heat shield (Fig. 15).

(5) Install gear shift cable to bracket and connect to shift lever (Fig. 14).

(6) Install and tighten the three grommet plate-to-floor pan nuts. Tighten to 6 N·m (50 in. lbs.) torque.

(7) Connect gearshift cable to shifter assembly as shown in (Fig. 12).

(8) Install shifter bezel (Fig. 11).

(9) **Adjust gearshift cable as follows:**

(a) Place gearshift lever in the PARK (P) position.

(b) Loosen shift cable adjustment screw (Fig. 17).

(c) Verify transaxle is in the PARK (P) position and the shifter lever is in gated PARK..

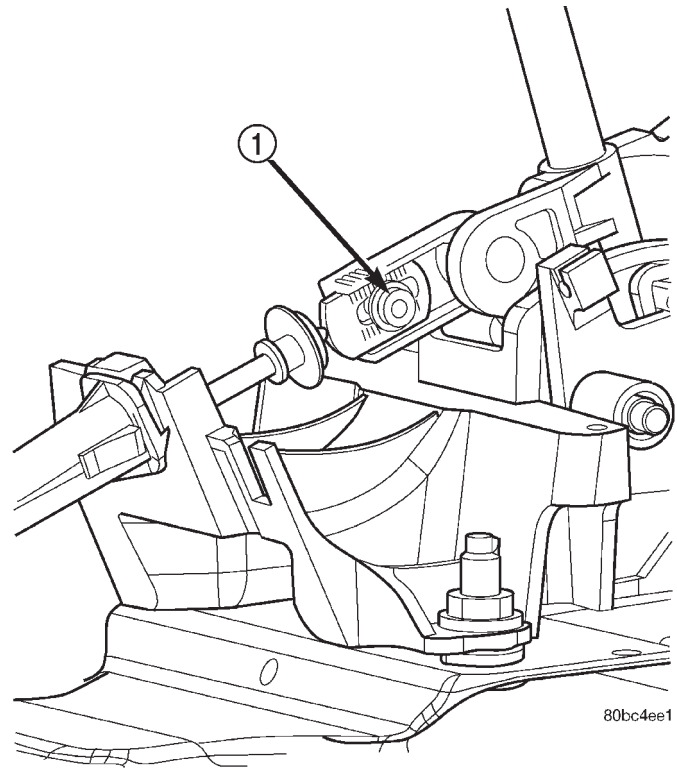
(d) Tighten shift cable adjustment screw to 8 N·m (70 in. lbs.) torque.

(10) Install battery tray.

(11) Install battery and hold down clamp.

(12) Install the air cleaner/throttle body assy. (Fig.

13) as follows:

**Fig. 17 Gearshift Cable Adjustment Screw**

- 1 - GEARSHIFT CABLE ADJUSTMENT SCREW

(a) Connect the accelerator and speed control (if equipped) cables to the air cleaner/throttle body assy.

(b) Install assy into position, making sure the air cleaner locating slot is engaged to the battery bracket tab, and tighten fasteners to 14 N·m (120 in. lbs.) torque.

(c) Verify throttle body duct is fully seated to intake manifold and tighten clamp to 5 N·m (40 in. lbs.) torque.

(d) Connect the Throttle Position Sensor (TPS) and Idle Air Control (IAC) connectors.

(e) Connect proportional purge solenoid (PPS) and crankcase vent hose from throttle body.

(13) Install center console assembly (Fig. 10).

(14) Install gearshift knob and tighten set screw to 2 N·m (15 in. lbs.) torque (Fig. 9).

(15) Connect battery cables.

(16) Verify that engine starter operates in both PARK (P) and NEUTRAL (N). Starter should not operate in any other gear position.

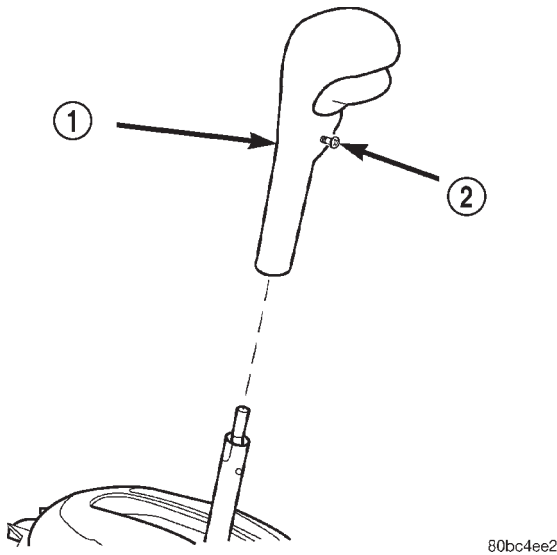


## REMOVAL AND INSTALLATION (Continued)

## GEARSHIFT MECHANISM

## REMOVAL

- (1) Disconnect battery negative cable and isolate.
- (2) Loosen set screw and remove knob from shifter handle (Fig. 18).

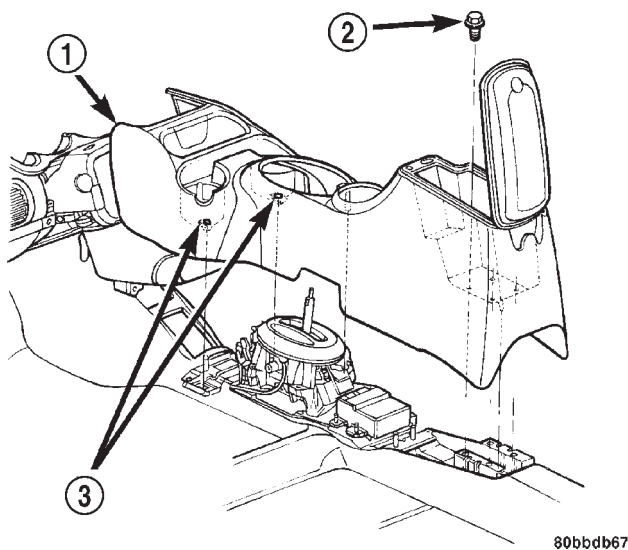


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**Fig. 18 Gearshift Knob Removal/Installation**

- 1 - SHIFTER KNOB
- 2 - SET SCREW

- (3) Remove the center console assembly as shown in (Fig. 19).

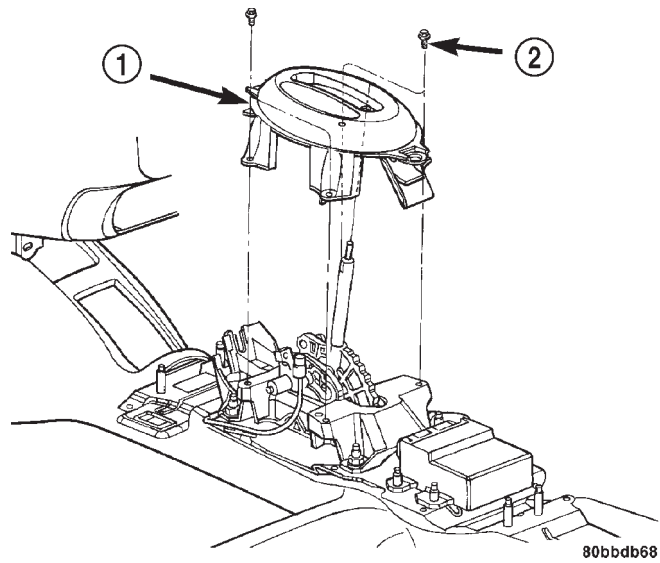


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**Fig. 19 Center Console Removal/Installation**

- 1 - CONSOLE
- 2 - SCREW (4)
- 3 - SCREW (2)

- (4) Remove shifter bezel (Fig. 20).

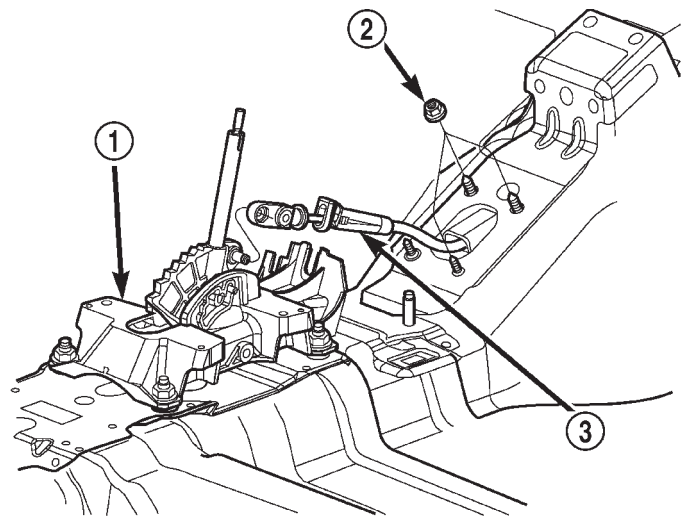


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**Fig. 20 Shifter Bezel Removal/Installation**

- 1 - BEZEL
- 2 - SCREW (4)

- (5) Disconnect shift cable from shifter assembly as shown in (Fig. 21).



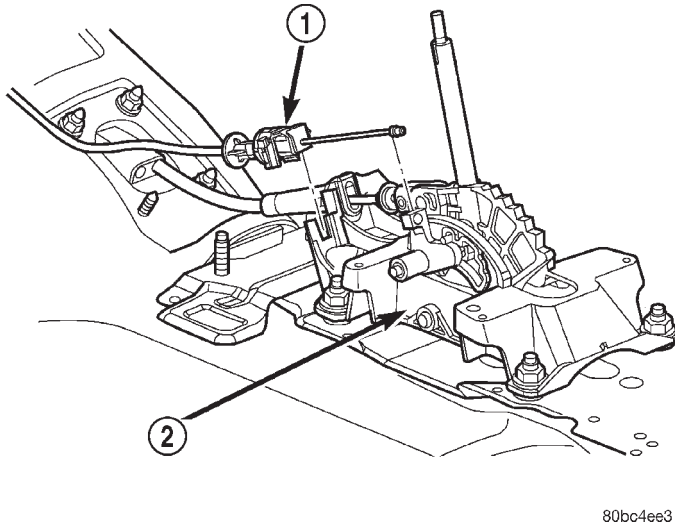
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**Fig. 21 Gearshift Cable at Shifter Assembly**

- 1 - SHIFTER ASSEMBLY
- 2 - GROMMET PLATE NUT
- 3 - SHIFT CABLE

## REMOVAL AND INSTALLATION (Continued)

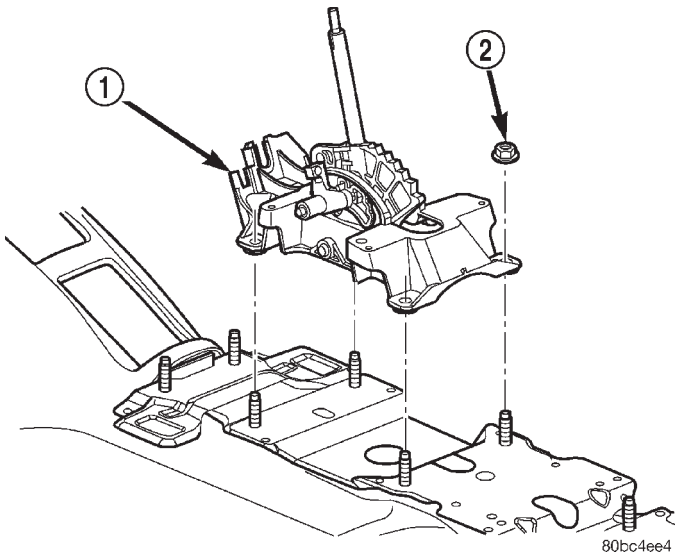
(6) Disconnect the shifter/ignition interlock cable from the shifter lever and bracket as shown in (Fig. 22).



**Fig. 22 Shifter Ignition Interlock Cable**

- 1 - INTERLOCK CABLE  
2 - SHIFTER ASSEMBLY

(7) Remove the four shifter assembly-to-floor pan nuts and remove shifter assembly from vehicle (Fig. 23).



**Fig. 23 Gearshift Mechanism Removal/Installation**

- 1 - SHIFTER ASSEMBLY  
2 - NUT (4)

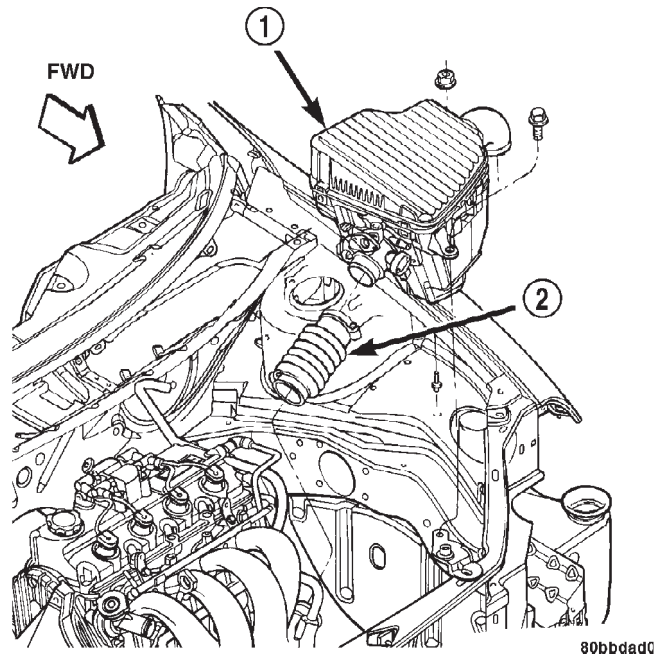
## INSTALLATION

- (1) Install gearshift mechanism and tighten the four nuts to 12 N·m (105 in. lbs.) torque.
- (2) Install gearshift cable as shown in (Fig. 21).
- (3) Install shifter/ignition interlock cable as shown in (Fig. 22).
- (4) Install shifter bezel (Fig. 20).
- (5) Install center console assembly (Fig. 19).
- (6) Install gearshift knob and tighten set screw to 2 N·m (15 in. lbs.) torque (Fig. 18).

## THROTTLE VALVE (KICKDOWN) CABLE

### REMOVAL

- (1) Remove air cleaner/throttle body assy. (Fig. 24) as follows:
  - (a) Disconnect proportional purge solenoid (PPS) and crankcase vent hose from throttle body.
  - (b) Disconnect the Throttle Position Sensor (TPS) and Idle Air Control (IAC) connectors.
  - (c) Disconnect throttle body air duct at intake manifold.
  - (d) Remove mounting bolt and nut (Fig. 24) and partially remove air cleaner assembly (leave cables attached).



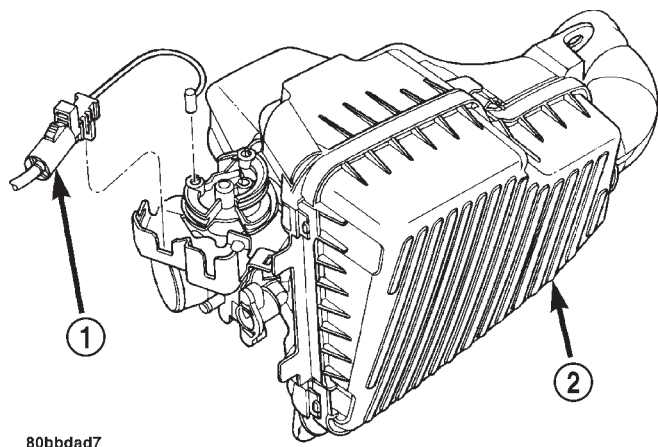
**Fig. 24 Air Cleaner Assembly Removal/Installation**

- 1 - AIR CLEANER ASSY.  
2 - THROTTLE BODY DUCT

**NOTE:** Pay attention to throttle valve cable routing before removal so it can be re-installed in the same manner. For proper transaxle operation, the cable must not bind.

## REMOVAL AND INSTALLATION (Continued)

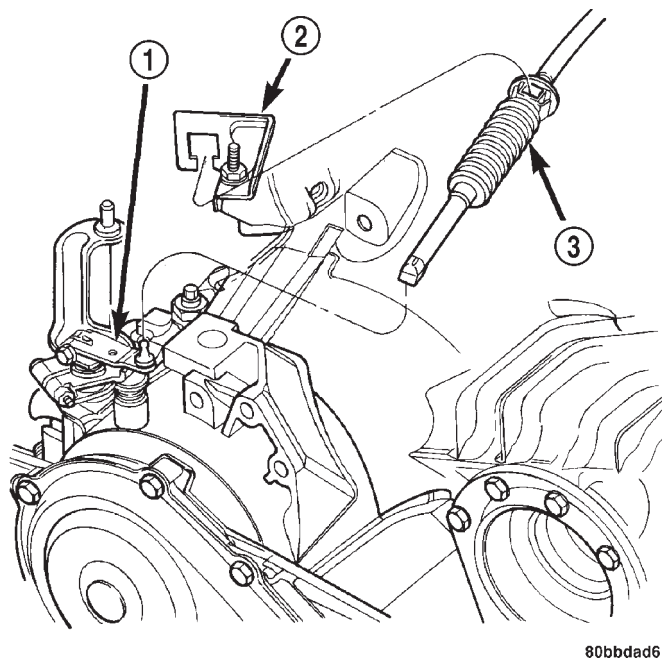
(2) Disconnect throttle valve cable from air cleaner/throttle body assembly as shown in (Fig. 25).



**Fig. 25 Throttle Valve Cable at Air Cleaner/Throttle Body**

- 1 - KICKDOWN CABLE  
2 - AIR CLEANER/THROTTLE BODY ASSY.

(3) Disconnect throttle valve cable from lever on transaxle and remove from bracket (Fig. 26).



**Fig. 26 Throttle Valve Cable at Transaxle**

- 1 - LEVER  
2 - BRACKET  
3 - KICKDOWN CABLE

## INSTALLATION

**NOTE:** Route throttle valve cable in a manner that allows free, unobstructed travel. For proper transaxle operation, the cable must not bind.

(1) Install transaxle throttle valve cable to bracket and lever as shown in (Fig. 26). Make sure the cable **snaps** onto the lever.

(2) Install the throttle valve cable to the air cleaner/throttle body as shown in (Fig. 25).

(3) Install the air cleaner/throttle body assy. as follows:

(a) Install assy into position, making sure the air cleaner locating slot is engaged to the battery bracket tab, and tighten fasteners to 14 N·m (120 in. lbs.) torque.

(b) Verify throttle body duct is fully seated to intake manifold and tighten clamp to 5 N·m (40 in. lbs.) torque.

(c) Connect the Throttle Position Sensor (TPS) and Idle Air Control (IAC) connectors.

(d) Connect proportional purge solenoid (PPS) and crankcase vent hose from throttle body.

(4) Connect the battery negative cable.

(5) Perform the Throttle Valve Cable Adjustment Procedure found in this group.

(6) Road test vehicle and verify proper transaxle operation.

## THROTTLE VALVE CABLE ADJUSTMENT PROCEDURE

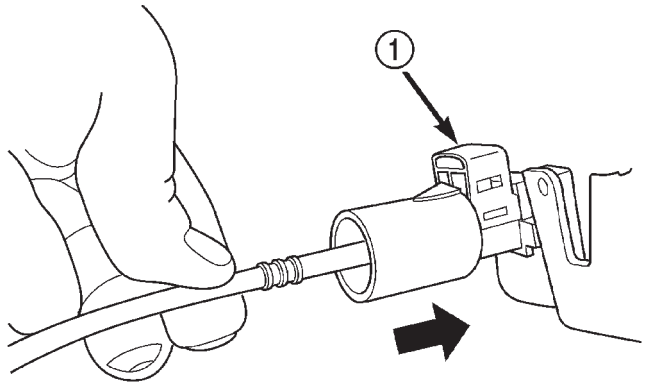
The transmission throttle valve is operated by a cam on the valve body throttle lever. The throttle lever is actuated by a cable connected to the engine throttle body lever.

The throttle valve is located within the transaxle valve body and is responsible for transaxle shift speed, shift quality, and part-throttle downshift sensitivity. Proper cable adjustment is essential for proper transaxle operation.

**NOTE:** The air cleaner/throttle body assembly must be installed into position before making this adjustment.

## REMOVAL AND INSTALLATION (Continued)

- (1) Verify cable is routed properly with no kinked or binding conditions.
- (2) Release adjustment locking clip on cable at throttle body. **It is not necessary to remove clip.**
- (3) Grab cable conduit near adjustment body, push in towards throttle body, then release grip (Fig. 27). This allows cable to self adjust.

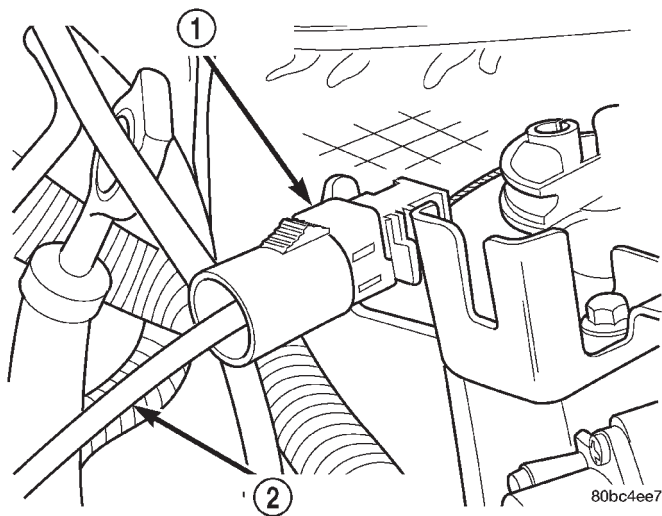


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**Fig. 27 Throttle Valve Cable Adjustment**

1 - TAB UNLOCKED

- (4) Press locking clip to secure cable position (Fig. 28).



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**Fig. 28 Cable Locking Clip**

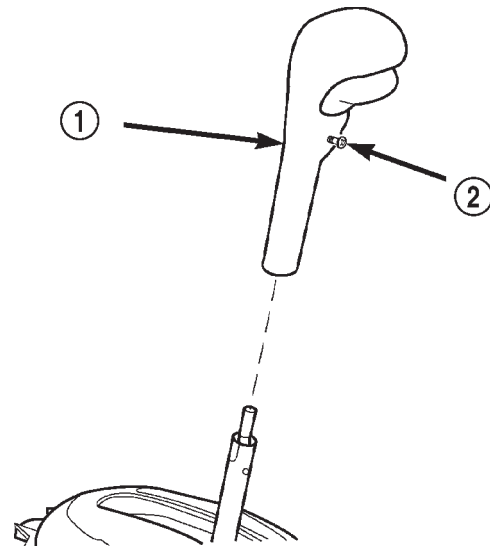
1 - TAB LOCKED  
2 - THROTTLE VALVE CABLE

- (5) Road test vehicle to verify proper transaxle operation.

## BRAKE TRANSMISSION SHIFT INTERLOCK CABLE

### REMOVAL

- (1) Disconnect the battery negative cable.
- (2) Loosen set screw and remove knob from shifter handle (Fig. 29).

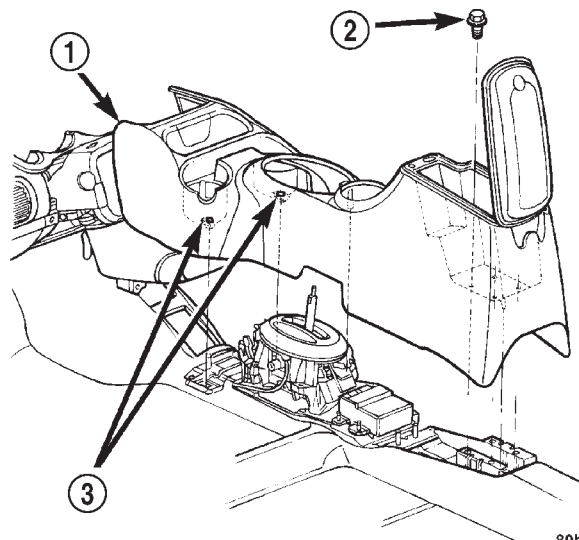


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**Fig. 29 Gearshift Knob Removal/Installation**

1 - SHIFTER KNOB  
2 - SET SCREW

- (3) Remove the center console assembly as shown in (Fig. 30).



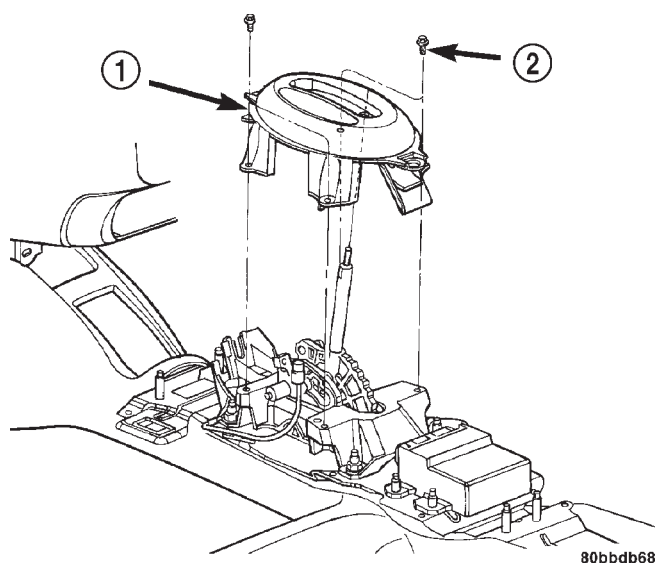
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**Fig. 30 Center Console Removal/Installation**

1 - CONSOLE  
2 - SCREW (4)  
3 - SCREW (2)

## REMOVAL AND INSTALLATION (Continued)

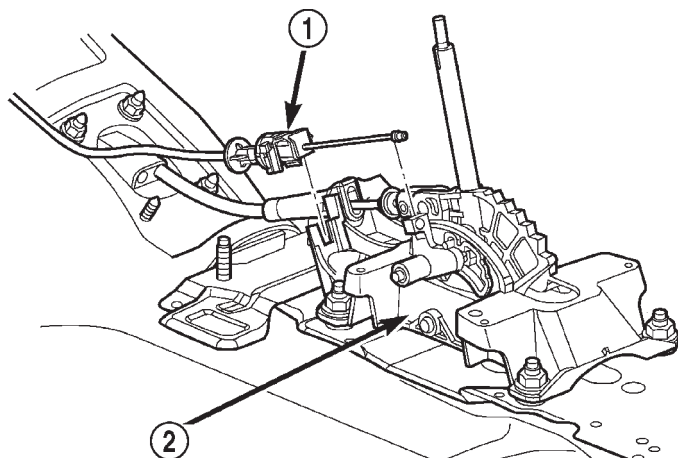
(4) Remove shifter bezel (Fig. 31).



**Fig. 31 Shifter Bezel Removal/Installation**

- 1 - BEZEL  
2 - SCREW (4)

(5) Disconnect the shifter/ignition interlock cable from the shifter lever and bracket as shown in (Fig. 32). Remove the cable core end from the plastic cam of the shifter mechanism and release cable from shifter bracket

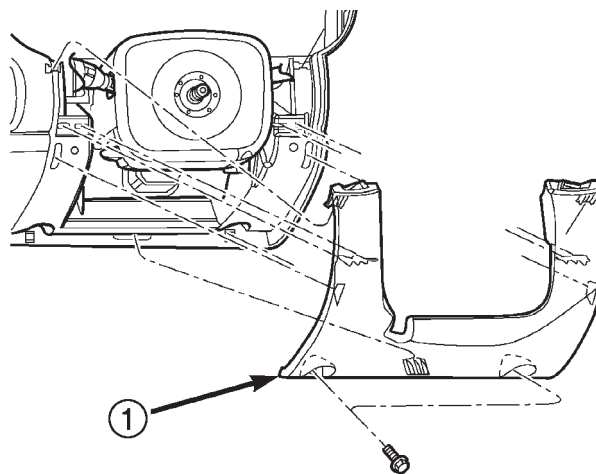


**Fig. 32 Interlock Cable at Shifter Assembly**

- 1 - INTERLOCK CABLE  
2 - SHIFTER ASSEMBLY

(6) Remove the steering column lower cover (Fig. 33).

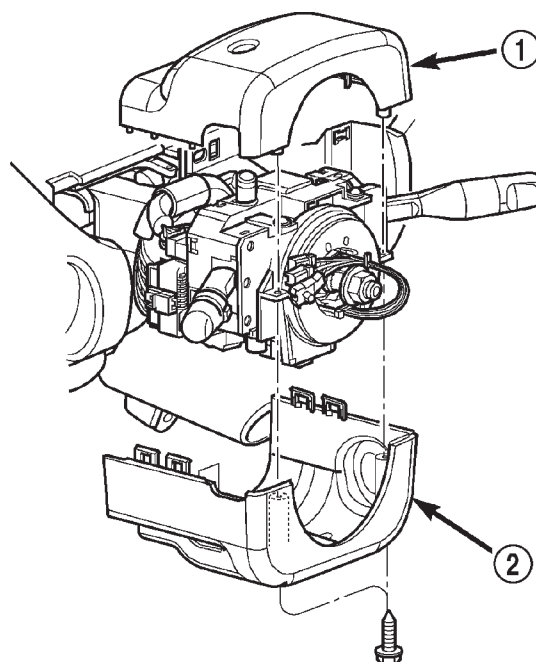
(7) Remove the steering column upper and lower shrouds (Fig. 34).



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**Fig. 33 Steering Column Lower Cover**

- 1 - LOWER COVER



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**Fig. 34 Steering Column Shrouds**

- 1 - UPPER SHROUD  
2 - LOWER SHROUD

(8) Disconnect the Brake Transmission Shift Interlock (BTSI) solenoid connector from the interlock cable (Fig. 35).

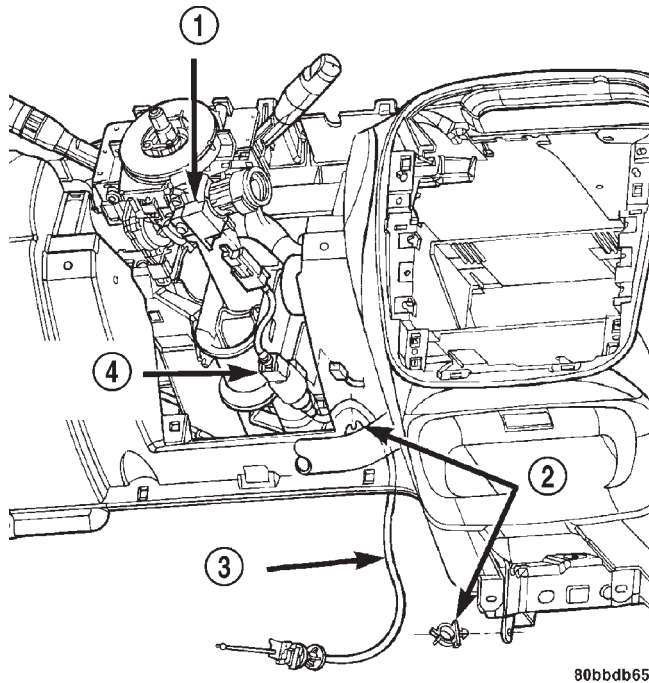
(9) Rotate the ignition key to the "OFF" or "ON/RUN" position (Fig. 36).

(10) Squeeze the interlock cable locking tab. Remove the cable from the interlock housing (Fig. 37).

(11) Release cable from retaining clips and remove through opening under steering column.

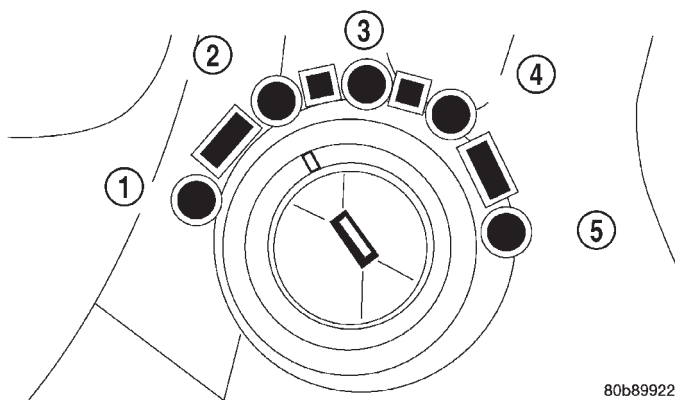


## REMOVAL AND INSTALLATION (Continued)



**Fig. 35 Interlock Cable at Steering Column**

- 1 - IGNITION SWITCH
- 2 - CLIP
- 3 - INTERLOCK CABLE
- 4 - BTSI SOLENOID

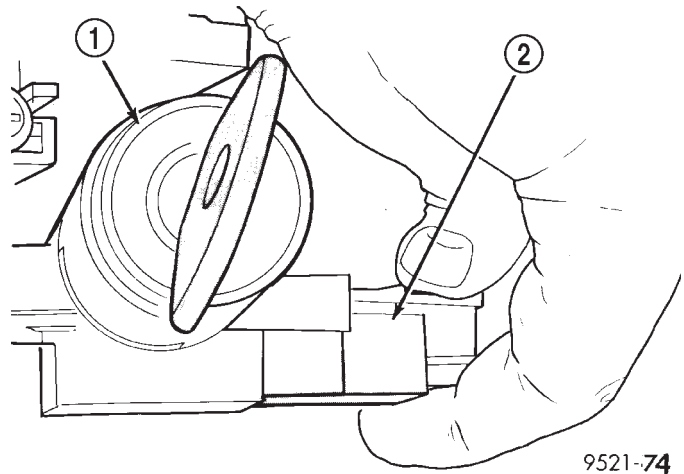


**Fig. 36 Ignition Key/Switch Positions**

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

## INSTALLATION

**CAUTION:** When installing interlock cable assembly, care must be taken not to bend exposed cable wire and slug at shifter end of cable.



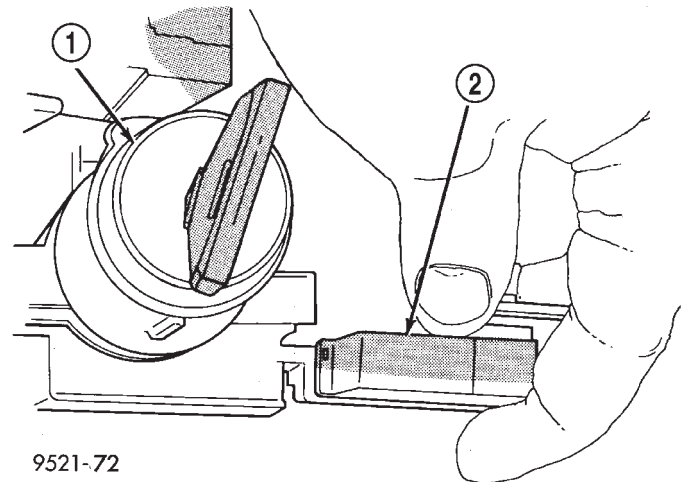
**Fig. 37 Interlock Cable and Connector**

- 1 - IGNITION LOCK CYLINDER
- 2 - INTERLOCK CABLE

(1) Route interlock cable through hole in instrument panel below steering column and around to gear shifter assembly.

(2) Turn the ignition key to the "OFF" or "ON/RUN" position (Fig. 36).

(3) Install the interlock cable into the interlock housing at the steering column (Fig. 38). Verify the cable snaps into the housing and is fully seated.



**Fig. 38 Interlock Cable at Interlock Housing**

- 1 - IGNITION SWITCH
- 2 - INTERLOCK CABLE

(4) Return the ignition key to the "LOCK" position (Fig. 36).

(5) Connect the BTSI solenoid connector (Fig. 35).  
(6) Install cable into retaining clips as shown in (Fig. 35).

(7) Install steering column upper and lower shrouds (Fig. 34).

(8) Install steering column lower cover (Fig. 33).

## REMOVAL AND INSTALLATION (Continued)

(9) Verify that shifter is in gated "PARK".

(10) Install the cable core end to the plastic cam of the shifter mechanism. Snap the shifter/ignition interlock cable end fitting into the groove in the gear-shift mechanism as shown in (Fig. 32).

(11) **Adjust interlock cable/system as follows:** If interlock cable is being replaced, it will come with an adjustment pin. Remove the pin from the cable and allow the cable to "self-adjust". Lock cable adjustment by pressing down on the adjuster lock until bottomed at the cable housing. If interlock cable is being re-used, no pin will be provided. Pry up on cable adjuster lock to release and allow cable to "self-adjust". Lock cable adjustment by pressing down on the adjuster lock until bottomed at the cable housing.

(12) **Connect battery negative cable and verify interlock system operation as follows:**

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".
<b>NOTE: Any failure to meet these expected responses requires system adjustment or repair.</b>	

(13) Install shifter bezel (Fig. 31).

(14) Install center console assembly (Fig. 30).

(15) Install gearshift knob and tighten set screw to 2 N·m (15 in. lbs.) torque (Fig. 29).

## INTERLOCK MECHANISM

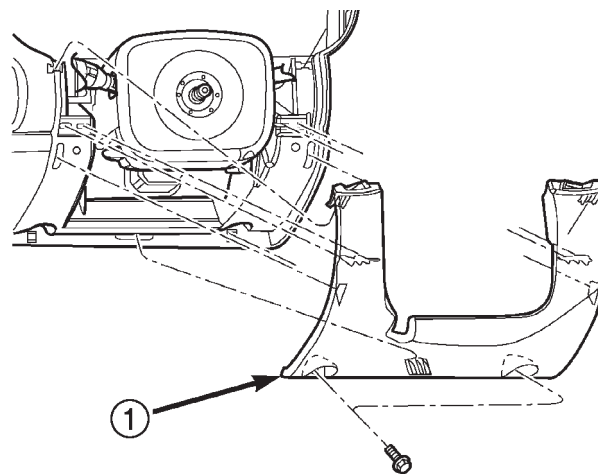
## REMOVAL

(1) Remove the steering column lower cover (Fig. 39).

(2) Remove the steering column upper and lower shrouds (Fig. 40).

(3) Turn the ignition key to the "OFF" or "ON/RUN" position (Fig. 41).

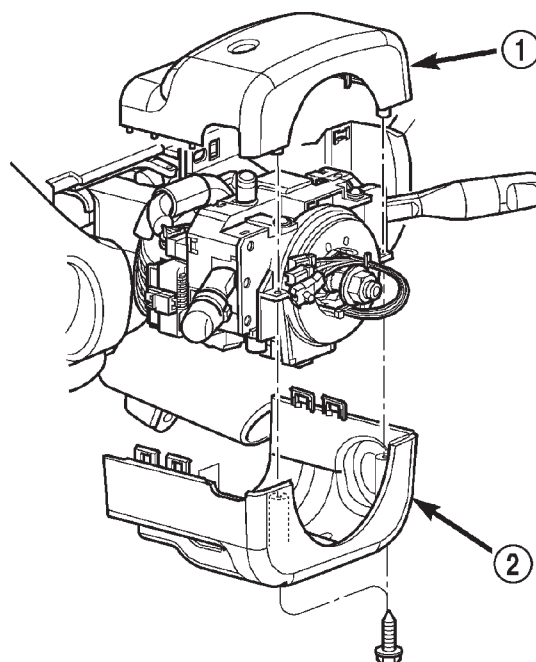
(4) Grasp the interlock cable and connector firmly. Remove the interlock cable (Fig. 42).



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**Fig. 39 Steering Column Lower Cover**

1 - LOWER COVER



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**Fig. 40 Steering Column Shrouds**

1 - UPPER SHROUD  
2 - LOWER SHROUD

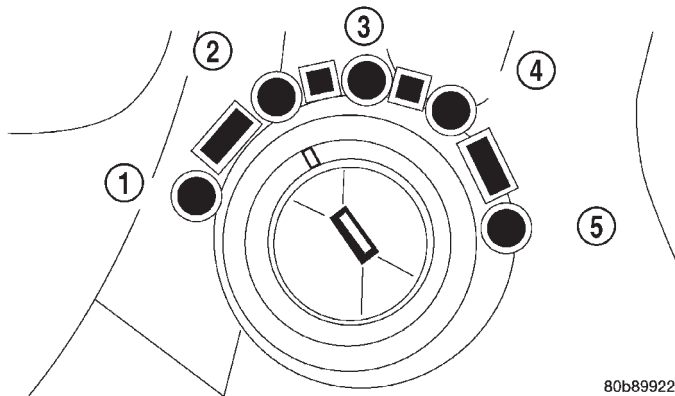
(5) Remove the two interlock mechanism-to-steering column attaching screws (Fig. 43). Remove the interlock housing.

## INSTALLATION

(1) Position the interlock housing at steering column. Install the two interlock mechanism-to-steering column attaching screws. Torque screws to 3 N·m (21 in. lbs.).

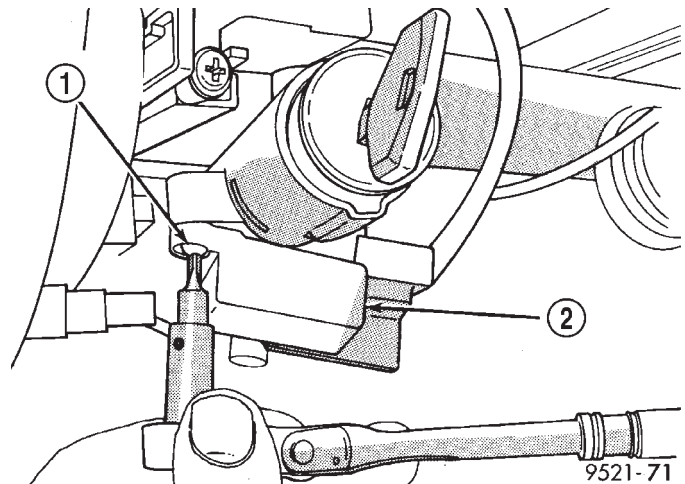
(2) Snap the interlock cable into the housing.

## REMOVAL AND INSTALLATION (Continued)



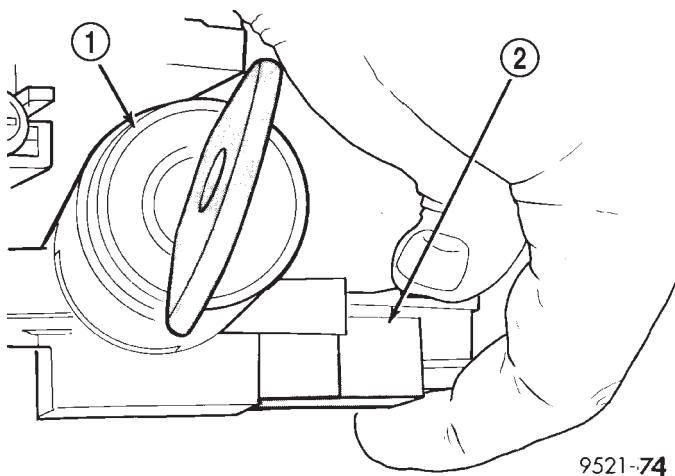
**Fig. 41 Ignition Key/Switch Positions**

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



**Fig. 43 Interlock Mechanism**

- 1 - MOUNTING SCREW
- 2 - INTERLOCK MECHANISM



**Fig. 42 Interlock Cable**

- 1 - IGNITION LOCK CYLINDER
- 2 - INTERLOCK CABLE

(3) Install steering column upper and lower shrouds (Fig. 40).

(4) Install steering column lower cover (Fig. 39).

## VEHICLE SPEED SENSOR PINION GEAR

### REMOVAL

(1) Remove harness connector from sensor (Fig. 44). Be sure weather seal stays on harness connector.

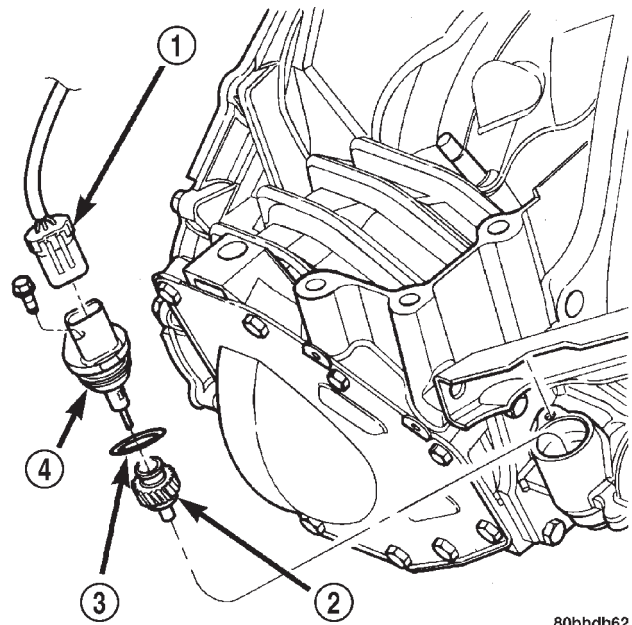
(2) Remove bolt securing the sensor in the extension housing (Fig. 44).

(3) Carefully pull sensor and pinion gear assembly out of extension housing.

(4) Remove pinion gear from sensor (Fig. 44).

(5) Inspect pinion gear for damage (missing teeth, etc.) and replace as necessary.

**NOTE:** When removing vehicle speed sensor for any reason, a new o-ring **MUST** be used.



**Fig. 44 Vehicle Speed Sensor Removal/Installation**

- 1 - CONNECTOR
- 2 - SPEEDO PINION
- 3 - O-RING
- 4 - SENSOR

### INSTALLATION

(1) Install pinion gear to vehicle speed sensor as shown in (Fig. 44).

(2) Install sensor to extension housing using a **NEW** o-ring.

(3) Tighten bolt to 7 N·m (60 in. lbs.).

(4) Connect harness connector.

## REMOVAL AND INSTALLATION (Continued)

## PARK/NEUTRAL STARTING AND BACK-UP LAMP SWITCH

## TEST

The park/neutral starting switch is the center terminal of the three terminal switch. It provides ground for the starter solenoid circuit through the selector lever in PARK and NEUTRAL positions only.

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

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

## REMOVAL

(1) Unscrew switch from transaxle case allowing fluid to drain into a container. Move selector lever to PARK, then to NEUTRAL position, and inspect to see the switch operating lever fingers are centered in switch opening.

## INSTALLATION

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

(2) Add fluid to transaxle to bring up to proper level.

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

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

(5) Continuity should exist only with transaxle in REVERSE position.

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

## TRANSAXLE AND TORQUE CONVERTER

## REMOVAL

(1) Raise hood.

(2) Disconnect both battery cables, remove battery hold down clamp and bolt, and remove battery.

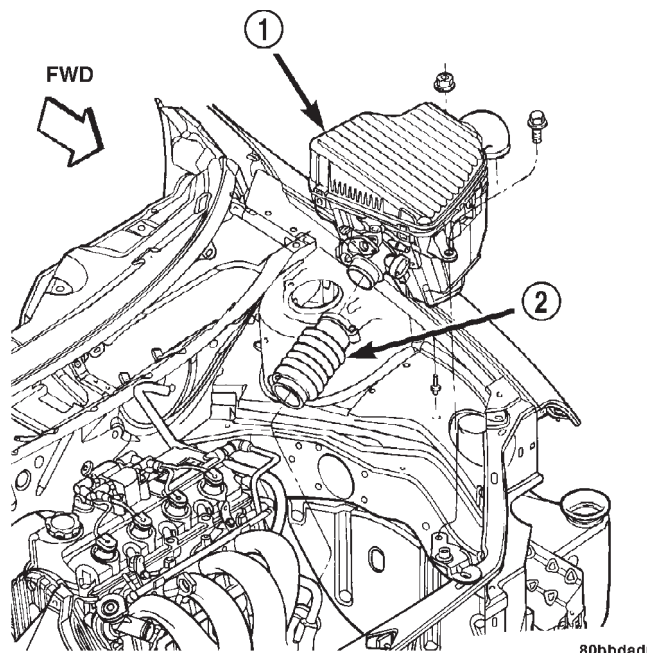
(3) Remove air cleaner/throttle body assy. (Fig. 45) as follows:

(a) Disconnect proportional purge solenoid (PPS) and crankcase vent hose from throttle body.

(b) Disconnect the Throttle Position Sensor (TPS) and Idle Air Control (IAC) connectors.

(c) Remove mounting bolt and nut (Fig. 45) and partially remove air cleaner assembly.

(d) Disconnect accelerator, transaxle kickdown, and speed control (if equipped) cables after the assy. is removed from position. Remove air cleaner assembly from vehicle.



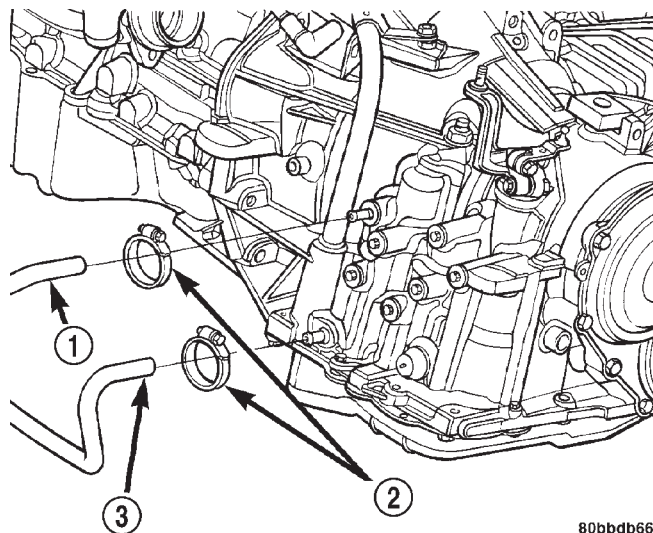
**Fig. 45 Air Cleaner Assembly Removal/Installation**

- 1 - AIR CLEANER ASSY.  
2 - THROTTLE BODY DUCT

(4) Remove battery tray from bracket.

(5) Disconnect torque converter clutch solenoid and neutral safety/back-up lamp switch connectors.

(6) Disconnect and plug transaxle oil cooler lines (Fig. 46).



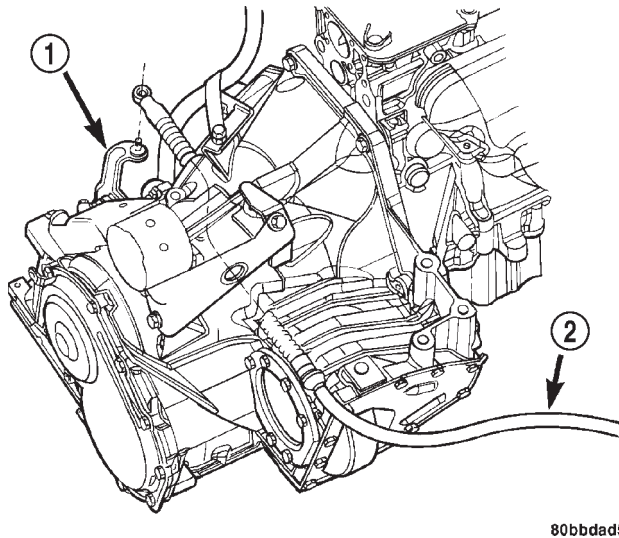
**Fig. 46 Transaxle Oil Cooler Lines**

- 1 - RETURN  
2 - CLAMPS  
3 - PRESSURE

(7) Disconnect shifter cable from shift lever and remove from bracket (Fig. 47). Secure cable out of the way.



# REMOVAL AND INSTALLATION (Continued)

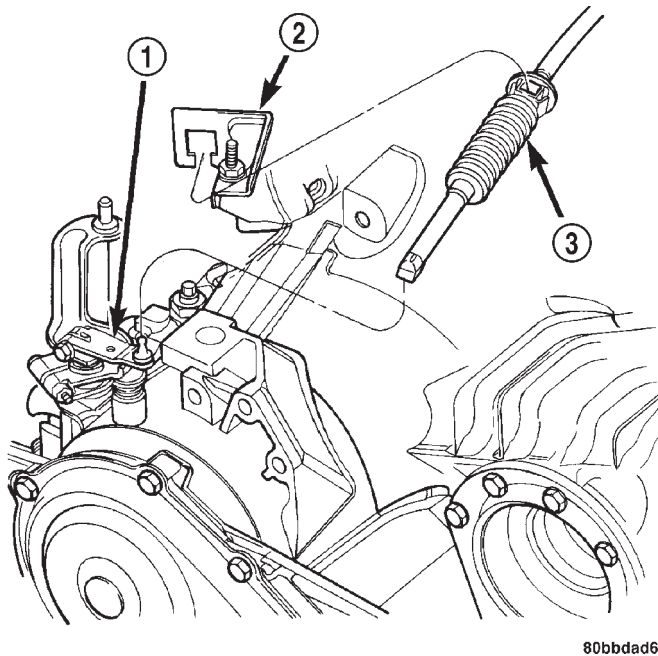


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**Fig. 47 Gear Shift Cable at Transaxle**

- 1 - SHIFT LEVER
- 2 - SHIFT CABLE

(8) Disconnect kick-down cable and remove from bracket. Secure cable out of the way (Fig. 48).



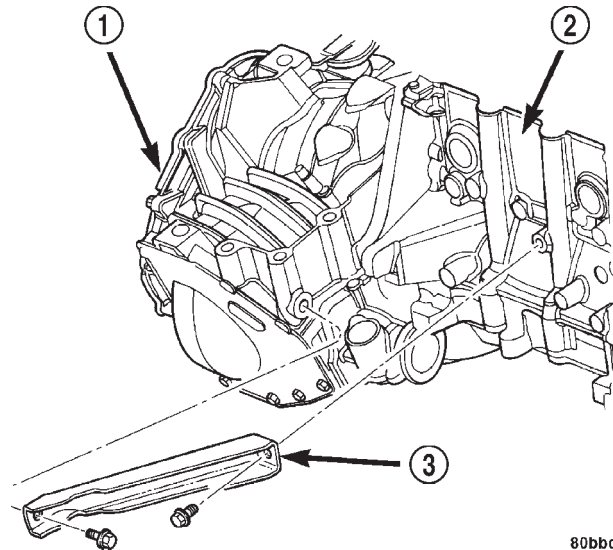
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**Fig. 48 Kickdown Cable at Transaxle**

- 1 - LEVER
- 2 - BRACKET
- 3 - KICKDOWN CABLE

(9) Raise vehicle on hoist.  
 (10) Remove transaxle oil pan and drain ATF into a suitable container.  
 (11) Remove both axle shafts. Refer to Group 3, Differential and Driveline for the correct procedures.

(12) Remove the right engine-to-transaxle lateral bending brace (Fig. 49).

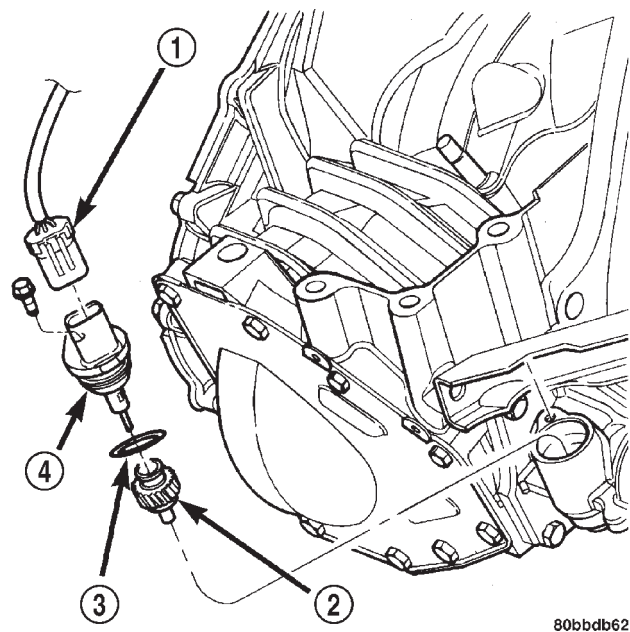


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**Fig. 49 Right Lateral Bending Brace Removal/Installation**

- 1 - TRANSAXLE
- 2 - ENGINE
- 3 - LATERAL BENDING BRACE

(13) Disconnect the vehicle speed sensor connector (Fig. 50).



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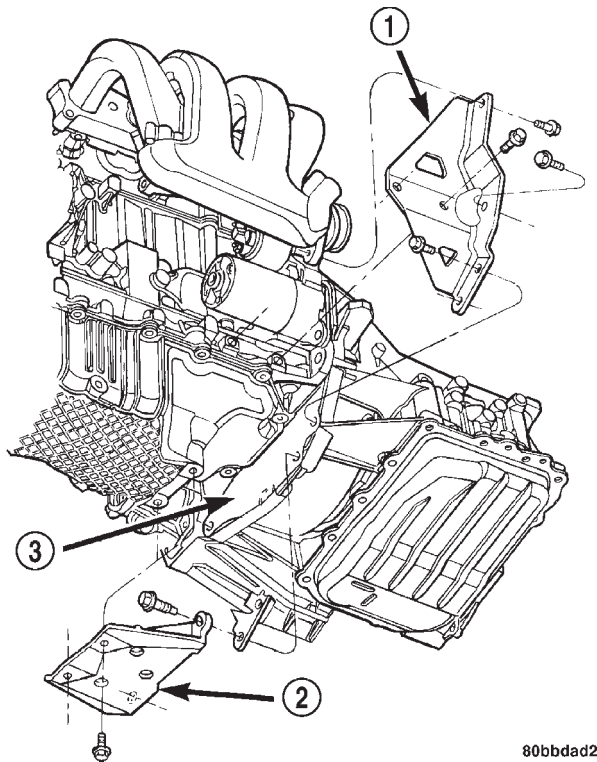
**Fig. 50 Vehicle Speed Sensor Connector**

- 1 - CONNECTOR
- 2 - SPEEDO PINION
- 3 - O-RING
- 4 - SENSOR



## REMOVAL AND INSTALLATION (Continued)

- (14) Remove structural collar (Fig. 51).
- (15) Remove the left engine-to-transaxle lateral bending brace (Fig. 51).
- (16) Remove bellhousing dust cover (Fig. 51).

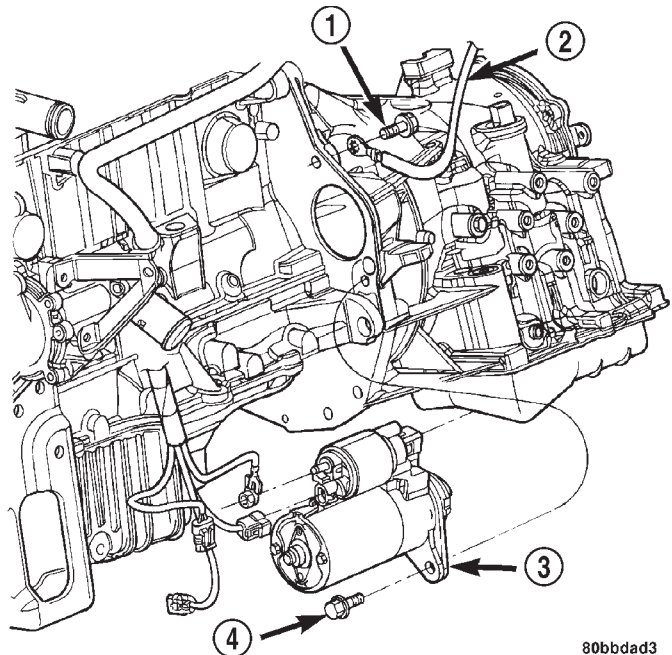


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**Fig. 51 Left Lateral Bending Brace and Structural Collar**

- 1 - LATERAL BENDING BRACE
- 2 - STRUCTURAL COLLAR
- 3 - DUST COVER

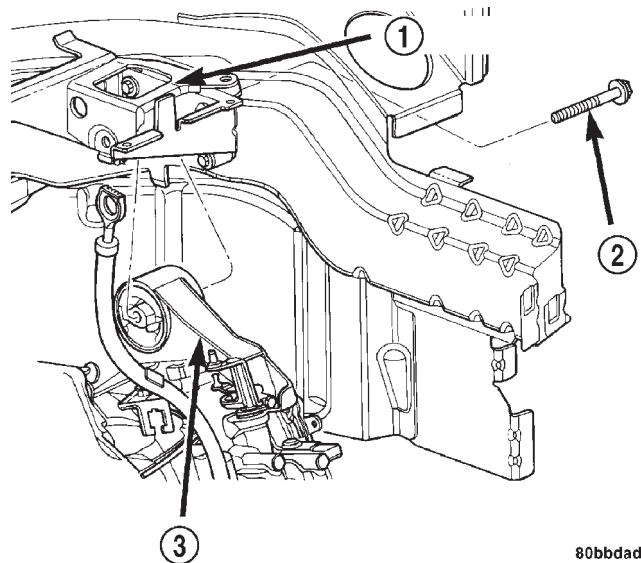
- (17) Remove starter motor (Fig. 52).
- (18) Remove drive plate to converter bolts (Fig. 54).
- (19) Support engine at oil pan with screw jack and wood block.
- (20) Remove transaxle upper mount thru-bolt. Gain access to this bolt through the driver's side wheel house (Fig. 53).
- (21) Carefully lower engine and transaxle on screw jack until proper removal clearance is obtained.
- (22) Obtain a helper to assist in holding transaxle while removing transaxle-to-engine mounting bolts (Fig. 54).
- (23) Remove transaxle from vehicle (Fig. 54).
- (24) Remove torque converter from front pump.
- (25) If installing a new or replacement transaxle, remove the upper mount and bracket as shown in (Fig. 55), and transfer to the replacement unit and torque all bolts to 68 N·m (50 ft. lbs.) torque.



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**Fig. 52 Starter Motor Removal/Installation**

- 1 - BOLT
- 2 - GROUND
- 3 - STARTER
- 4 - BOLT

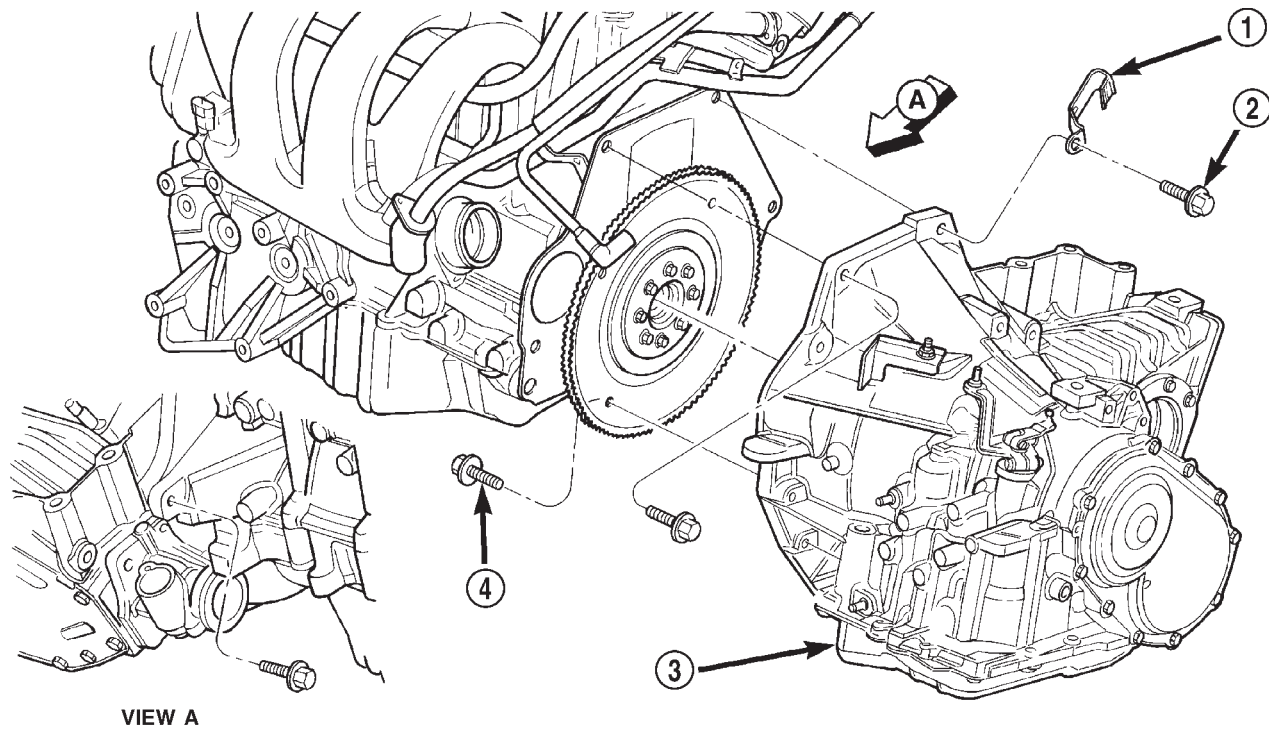


80bbdad4

**Fig. 53 Transaxle Upper Mount and Bracket**

- 1 - MOUNT BRACKET
- 2 - BOLT
- 3 - MOUNT

## REMOVAL AND INSTALLATION (Continued)

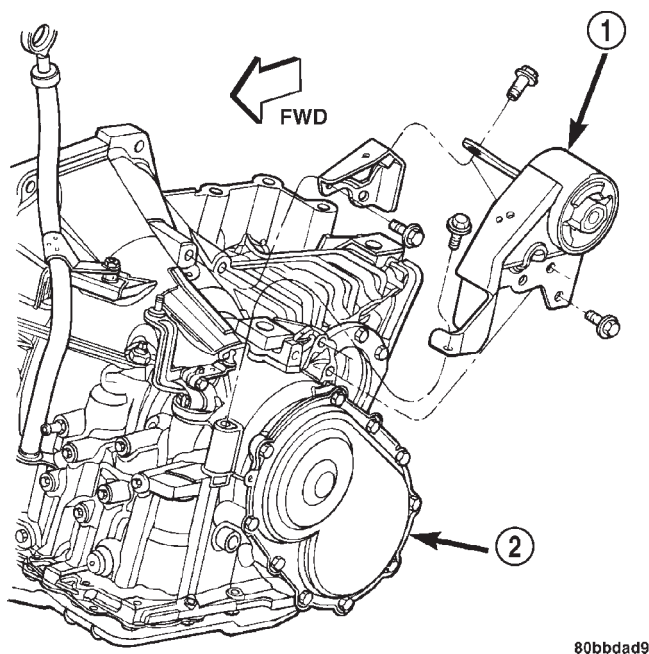


80bbc370

**Fig. 54 Transaxle Removal/Installation**

- 1 - CLIP  
2 - BOLT (3)

- 3 - TRANSAXLE  
4 - CONVERTER BOLT (4)



80bbdad9

**Fig. 55 Transaxle Upper Mount and Bracket**

- 1 - MOUNT  
2 - TRANSAXLE

**INSTALLATION**

- (1) Install torque converter into front pump. Rotate converter until the hub fully engages front pump gear lugs.
- (2) Install transaxle-to-engine mounting bolts (Fig. 54) and tighten to 95 N·m (70 ft. lbs.) torque.
- (3) Raise engine and transaxle with screw jack until through hole in upper mount aligns with hole in mount bracket. Install mount bolt and tighten to 108 N·m (80 ft. lbs.) torque (Fig. 53).
- (4) Remove screwjack.
- (5) Install converter-to-drive plate bolts and torque to 88 N·m (65 ft. lbs.) torque.
- (6) Install starter motor and tighten bolts to 54 N·m (40 ft. lbs.) torque. Make sure to fasten ground cable to upper starter bolt as shown in (Fig. 52).
- (7) Connect starter electrical harness and tighten positive cable nut to 10 N·m (90 in. lbs.) torque.
- (8) Install bellhousing dust cover (Fig. 51).
- (9) Install left engine-to-transaxle bending brace (Fig. 51).
- (10) Install structural collar (Fig. 51) as follows:
  - (a) Position collar and install all bolts finger tight.
  - (b) Tighten the collar-to-oil pan bolts to 3 N·m (30 in. lbs.) torque.

## REMOVAL AND INSTALLATION (Continued)

(c) Tighten the collar-to-transaxle bolts to 108 N·m (80 ft. lbs.) torque.

(d) Final torque the collar-to-oil pan bolts to 54 N·m (40 ft. lbs.) torque.

(11) Install both front axle driveshafts. Refer to Group 3, Differential and Driveline for the correct procedures.

(12) Connect vehicle speed sensor connector (Fig. 50).

(13) Install right lateral bending brace and tighten bolts to 81 N·m (60 ft. lbs.) torque.

(14) Lower vehicle.

(15) Connect transaxle cooler lines and tighten clamps (Fig. 46).

(16) Connect torque converter clutch solenoid and neutral safety/back-up lamp switch connectors.

(17) Install transaxle dipstick tube.

(18) Install gear shift cable to bracket and connect to shift lever (Fig. 47).

(19) Install transaxle kickdown cable to bracket and lever as shown in (Fig. 48).

(20) Install battery lower tray and battery, and tighten battery hold down clamp to secure battery.

(21) Install the air cleaner/throttle body assy. as follows:

(a) Connect the accelerator, transaxle kickdown, and speed control (if equipped) cables to the air cleaner/throttle body assy.

(b) Install assy into position and tighten fasteners to 14 N·m (120 in. lbs.) torque.

(c) Connect the Throttle Position Sensor (TPS) and Idle Air Control (IAC) connectors.

(d) Connect proportional purge solenoid (PPS) and crankcase vent hose from throttle body.

(22) Fill transaxle with a suitable amount of ATF+4.

(23) Road test vehicle.

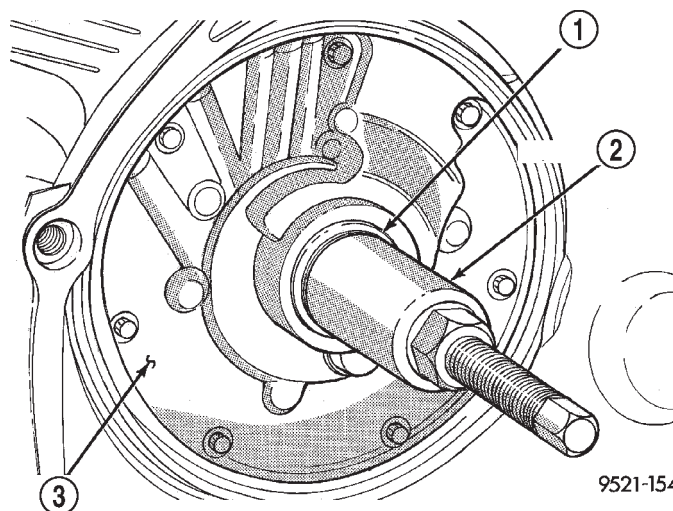
(24) Check for leaks, inspect fluid level, and adjust as necessary.

## PUMP OIL SEAL

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

## REMOVAL

(1) Screw seal remover Tool C-3981-B into seal (Fig. 56), then tighten screw portion of tool to withdraw the seal.

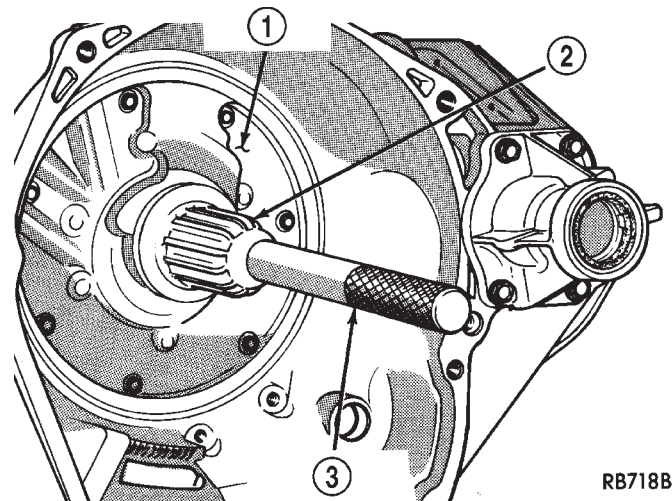


**Fig. 56 Remove Pump Oil Seal**

- 1 - PUMP OIL SEAL
- 2 - OIL SEAL REMOVER TOOL C-3981-B
- 3 - OIL PUMP

## INSTALLATION

(1) To install a new seal, place seal in opening of the pump housing (lip side facing inward). Using Tool C-4193 and Handle Tool C-4171, drive new seal into housing until tool bottoms (Fig. 57).



**Fig. 57 Install Pump Oil Seal**

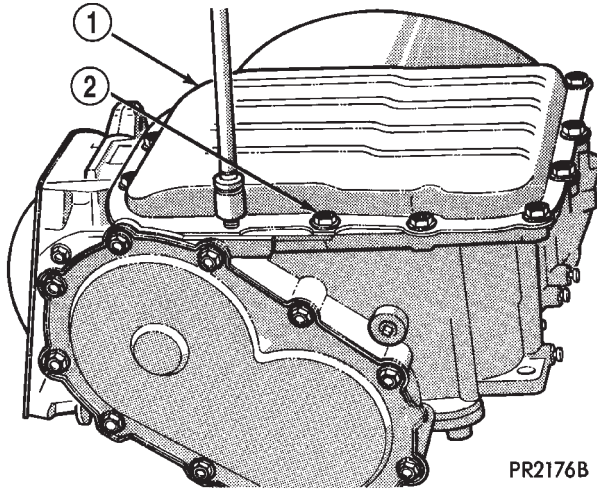
- 1 - OIL PUMP
- 2 - OIL SEAL INSTALLER TOOL C-4193
- 3 - SPECIAL TOOL HANDLE C-4171



## DISASSEMBLY AND ASSEMBLY

### TRANSAXLE

#### DISASSEMBLY



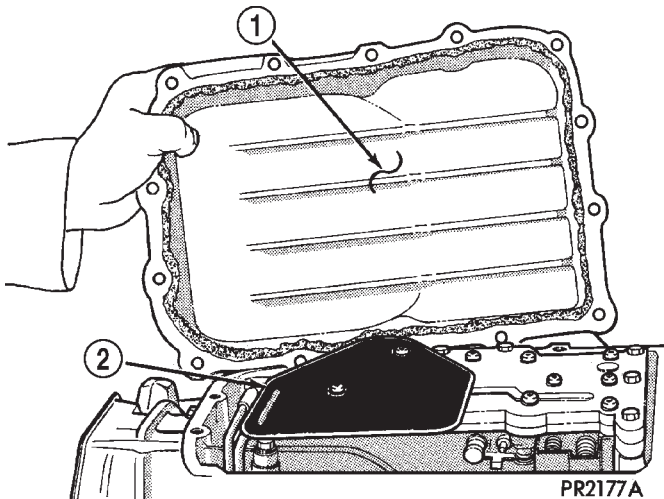
**Fig. 58 Transaxle Oil Pan Bolts**

- 1 - TRANSAXLE OIL PAN
- 2 - OIL PAN BOLTS

Remove all old sealant before applying new sealant.

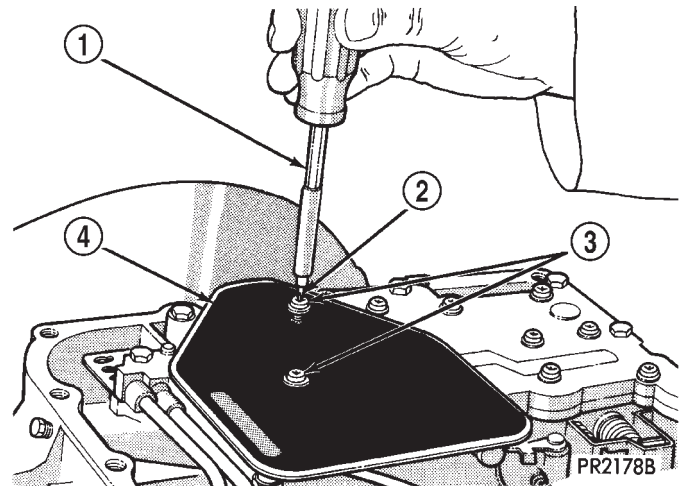
Use only Mopar® Silicone Rubber Sealant or equivalent when installing oil pan.

Put sealant on the oil pan flange (Fig. 59) and on all oil pan bolts (underside of bolt head).



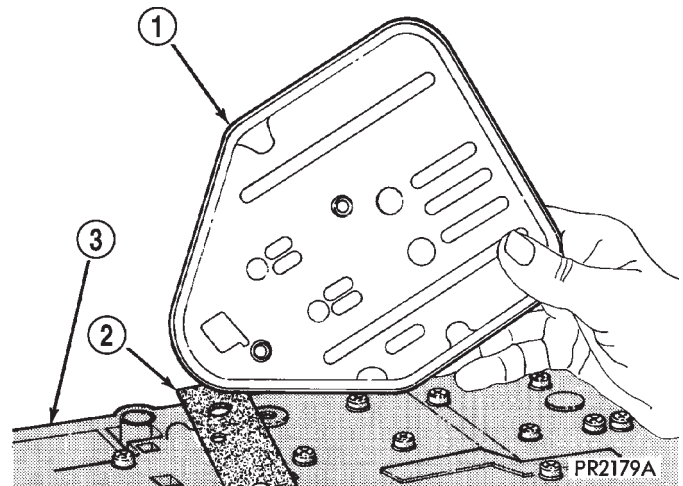
**Fig. 59 Transaxle Oil Pan**

- 1 - TRANSAXLE OIL PAN
- 2 - OIL FILTER



**Fig. 60 Oil Filter Screws**

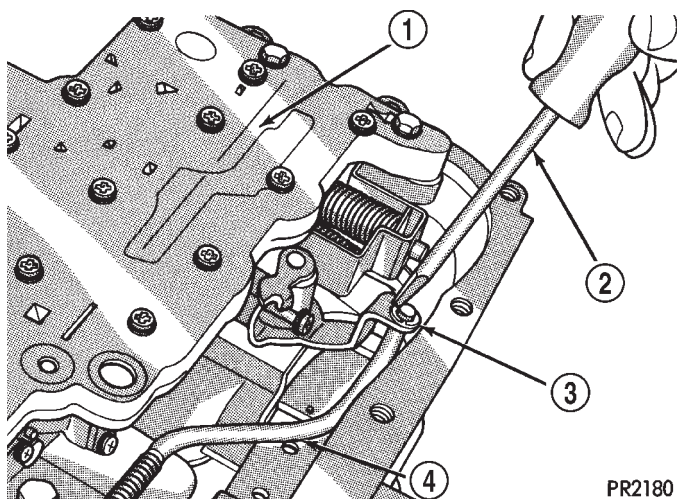
- 1 - SCREWDRIVER HANDLE
- 2 - SPECIAL TOOL L-4553
- 3 - OIL FILTER SCREWS (2)
- 4 - OIL FILTER



**Fig. 61 Oil Filter**

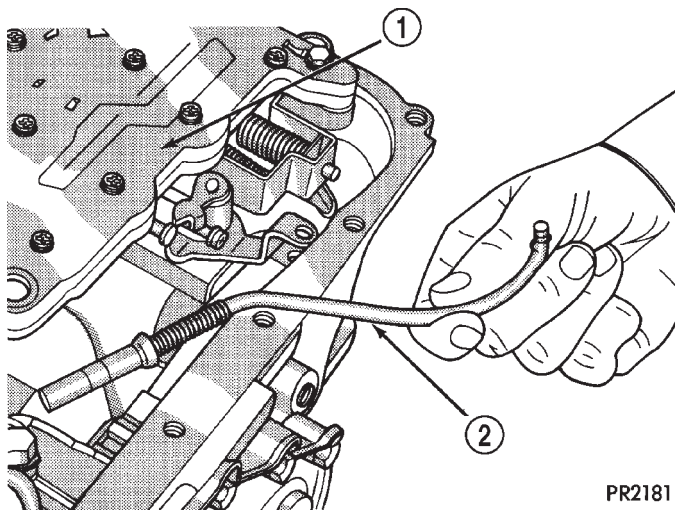
- 1 - OIL FILTER
- 2 - GASKET
- 3 - VALVE BODY

## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 62 Remove Parking Rod E-Clip**

- 1 - VALVE BODY
- 2 - SCREWDRIVER
- 3 - "E" CLIP
- 4 - PARKING ROD

Remove neutral starting and back-up lamp switch.

**Fig. 63 Parking Rod**

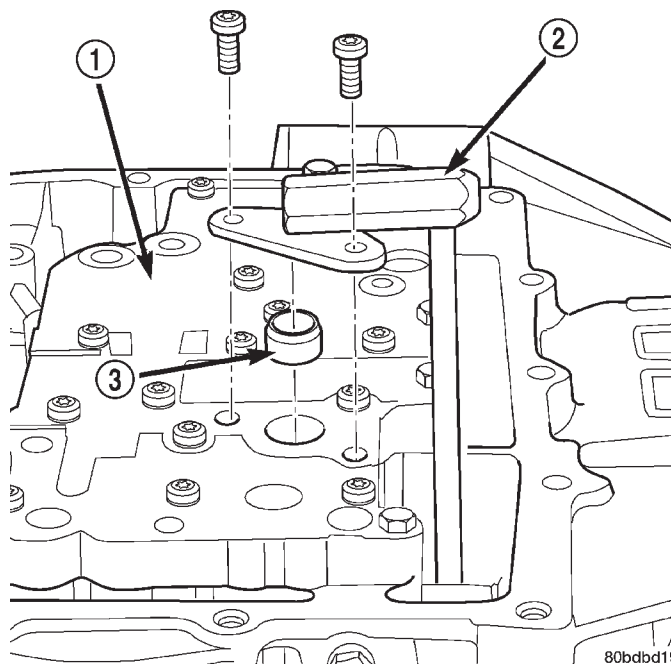
- 1 - VALVE BODY
- 2 - PARKING ROD

Measuring input shaft end play before disassembly will usually indicate if a thrust washer change is required (Fig. 66). The #3 thrust washer is located between input and output shafts.

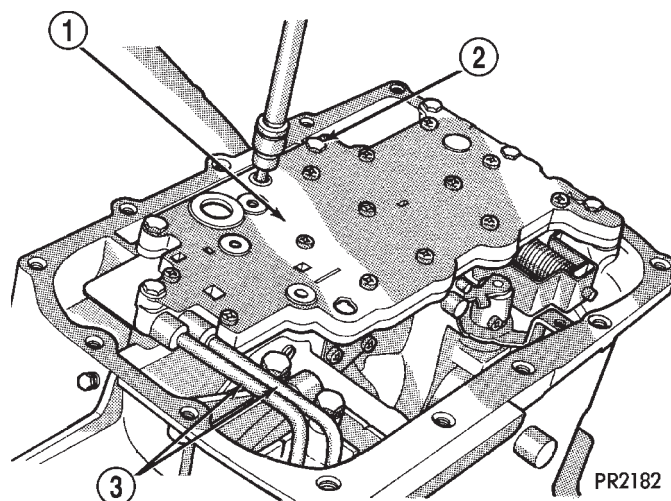
Move input shaft in and out to obtain end play reading. End play specifications are 0.19 to 1.50 mm (0.008 to 0.060 inch).

Record indicator reading for reference when reassembling the transaxle.

**Remove Number 6 thrust washer from sun gear driving shell.**

**Cooler Bypass Valve and Seal—If Equipped**

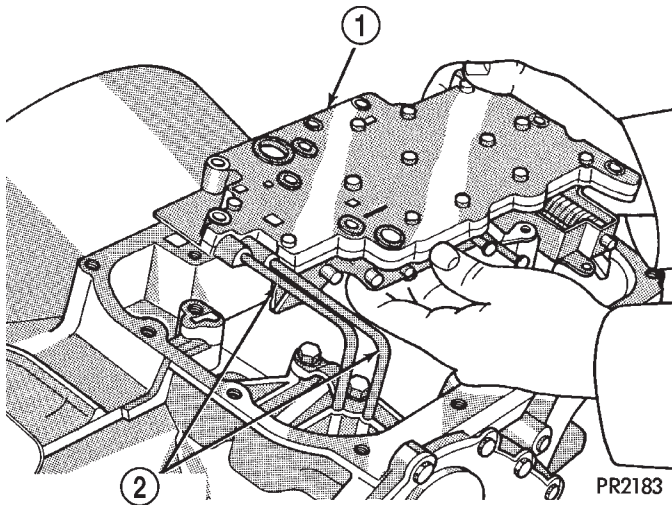
- 1 - TRANSFER PLATE
- 2 - BYPASS VALVE
- 3 - SEAL

**Fig. 64 Valve Body Attaching Bolts**

- 1 - VALVE BODY
- 2 - VALVE BODY ATTACHING BOLTS (7)
- 3 - GOVERNOR TUBES

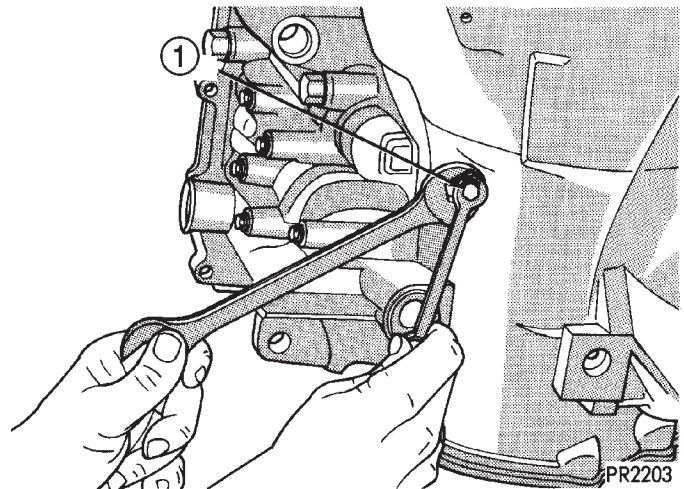


## DISASSEMBLY AND ASSEMBLY (Continued)



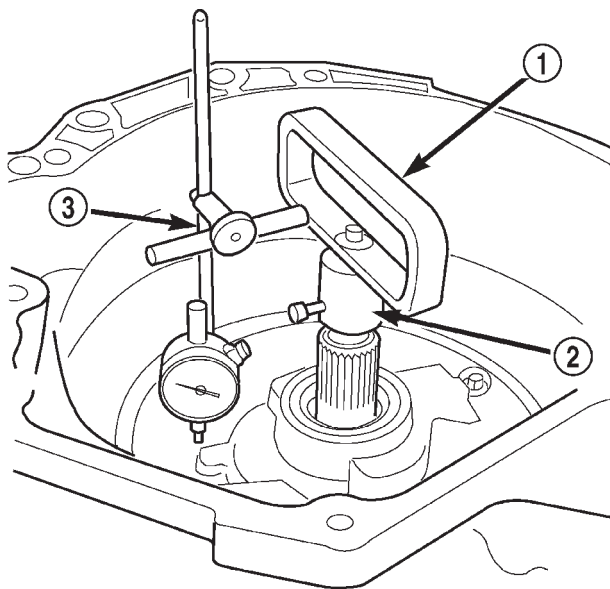
**Fig. 65 Valve Body and Governor Tubes**

- 1 - VALVE BODY ASSEMBLY
- 2 - GOVERNOR TUBES



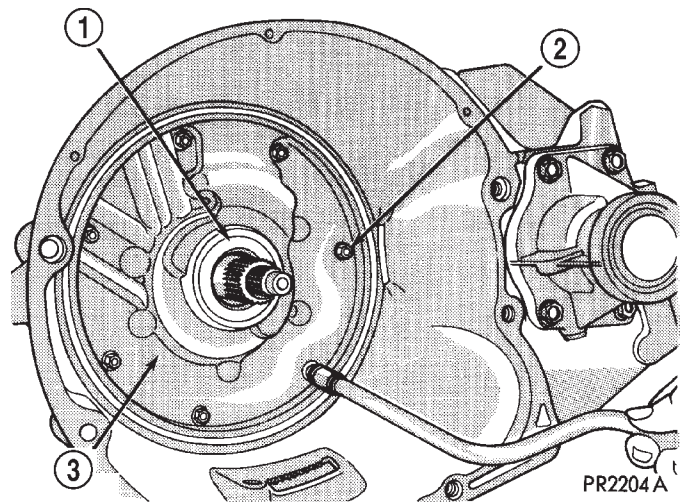
**Fig. 67 Loosen Lock Nut and Tighten Kickdown Band Adjusting Screw**

- 1 - KICKDOWN BAND ADJUSTING SCREW



**Fig. 66 Measure Input Shaft End Play using End Play Set 8266**

- 1 - TOOL 8266-8
- 2 - TOOL 8266-2
- 3 - TOOL C-3339



**Fig. 68 Pump Attaching Bolts**

- 1 - SEAL
- 2 - PUMP ATTACHING BOLTS (7)
- 3 - PUMP HOUSING

**CAUTION:** Do not clamp any portion of valve body or transfer plate in a vise. Any slight distortion of the aluminum body or transfer plate will result in sticking valves, excessive leakage, or both. When removing or installing valves or plugs, slide them in or out carefully. Do not use force.

**NOTE:** TAG ALL SPRINGS AS THEY ARE REMOVED FOR REASSEMBLY IDENTIFICATION.

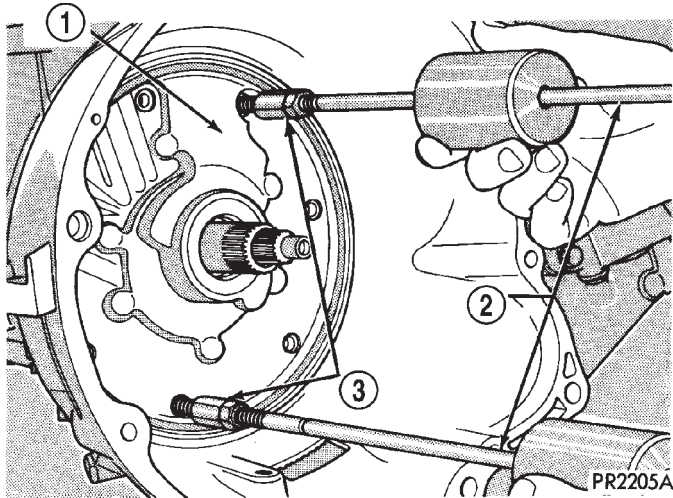
## ASSEMBLY

When rebuilding, reverse the above procedure.

## VALVE BODY

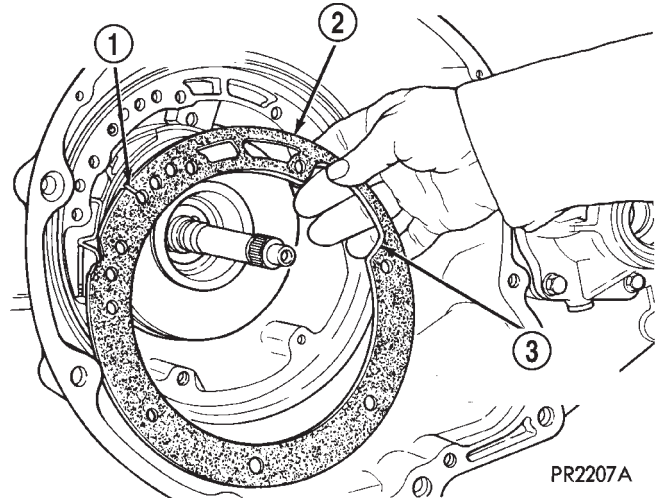
**NOTE:** Tighten all valve body screws to 5 N-m (40 in. lbs.)

## DISASSEMBLY AND ASSEMBLY (Continued)



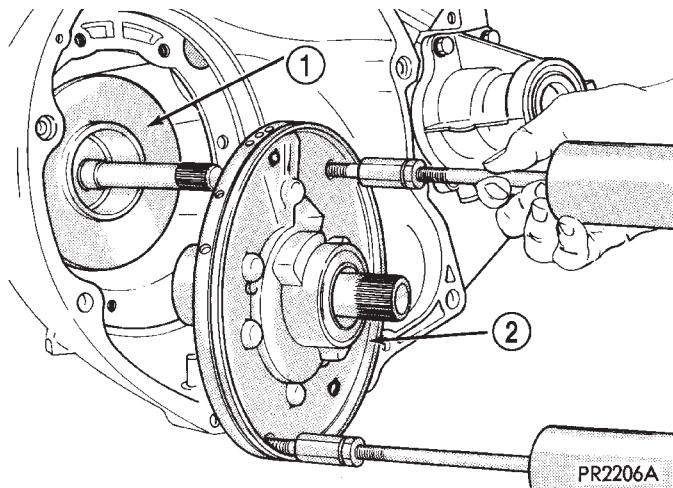
**Fig. 69 Install Tool C-3752 with Adapters L-4437**

- 1 - PUMP
- 2 - PULLERS TOOL C-3752
- 3 - ADAPTERS TOOL L-4437



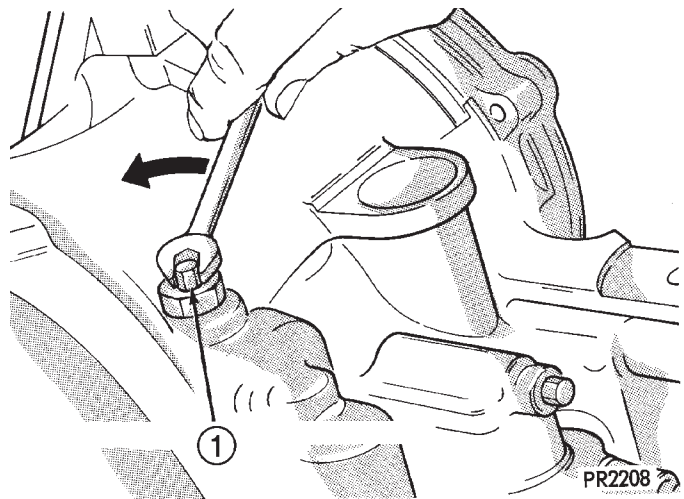
**Fig. 71 Oil Pump Gasket**

- 1 - SPLIT IN GASKET (DIFFERENTIAL OIL FEED)
- 2 - PUMP GASKET
- 3 - PUMP GASKET DIFFERENTIAL OIL FEED CUTOUT



**Fig. 70 Oil Pump with No. 1 Thrust Washer**

- 1 - FRONT CLUTCH
- 2 - OIL PUMP ASSEMBLY

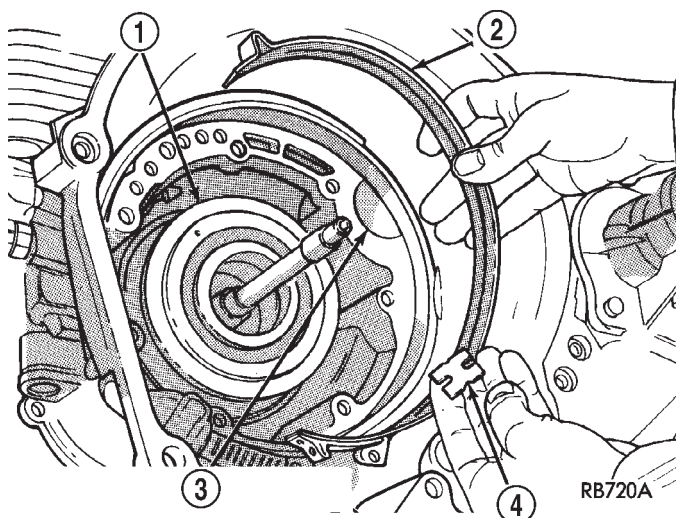


**Fig. 72 Loosen Kickdown Band Adjusting Screw**

- 1 - KICKDOWN BAND ADJUSTING SCREW

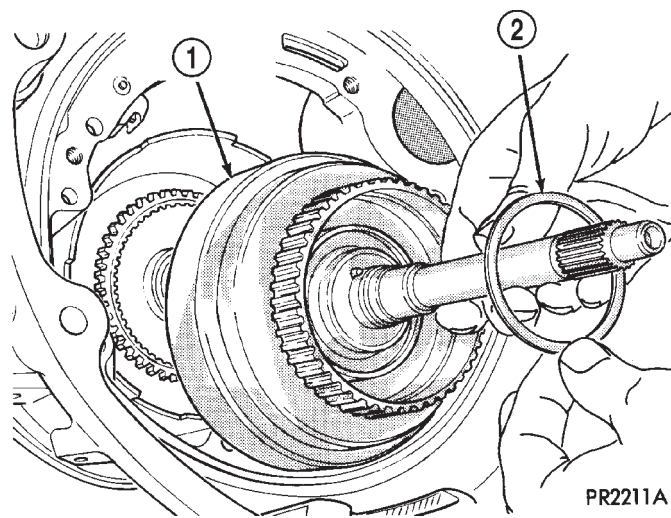


# DISASSEMBLY AND ASSEMBLY (Continued)



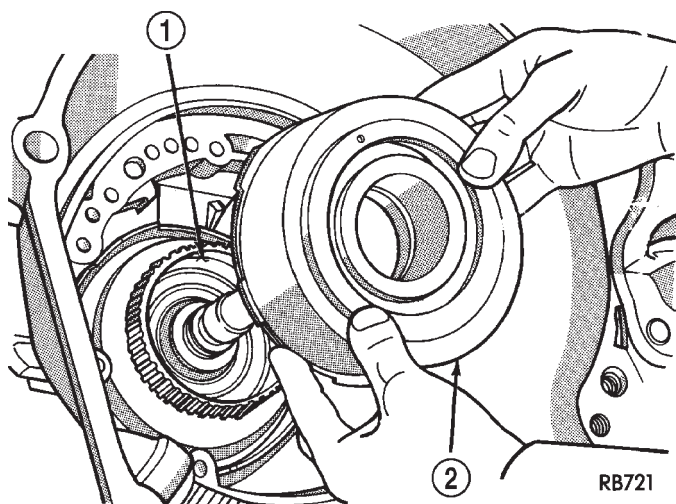
**Fig. 73 Kickdown Band and Strut**

- 1 - FRONT CLUTCH
- 2 - KICKDOWN BAND
- 3 - OIL RETURN AND FEED HOLE TO DIFFERENTIAL
- 4 - STRUT



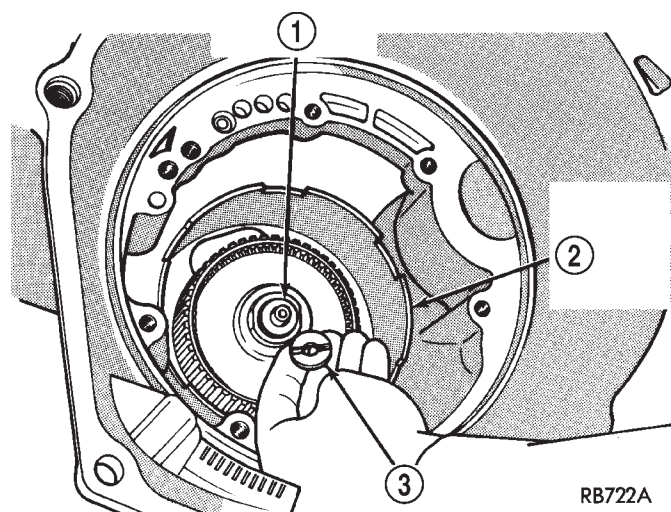
**Fig. 75 No. 2 Thrust Washer and Rear Clutch**

- 1 - REAR CLUTCH ASSEMBLY
- 2 - #2 THRUST WASHER



**Fig. 74 Front Clutch Assembly**

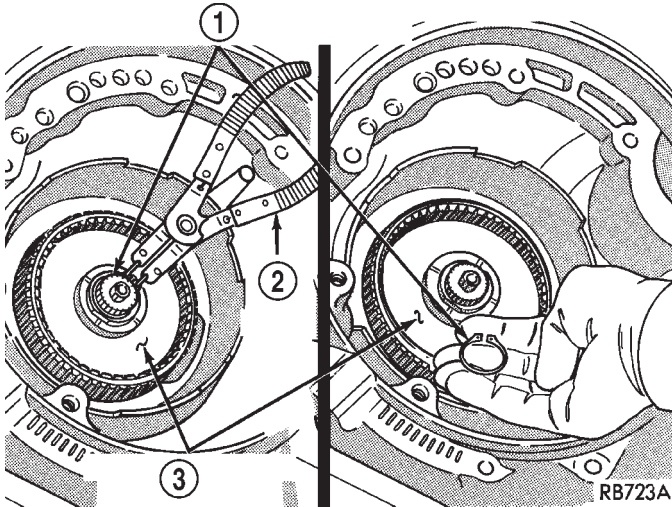
- 1 - REAR CLUTCH ASSEMBLY
- 2 - FRONT CLUTCH ASSEMBLY



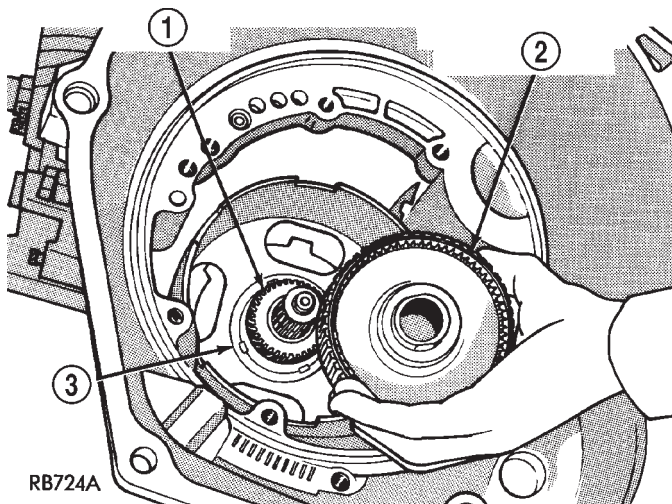
**Fig. 76 No. 3 Thrust Washer**

- 1 - OUTPUT SHAFT
- 2 - SUN GEAR DRIVING SHELL
- 3 - #3 THRUST WASHER (SELECT FIT)

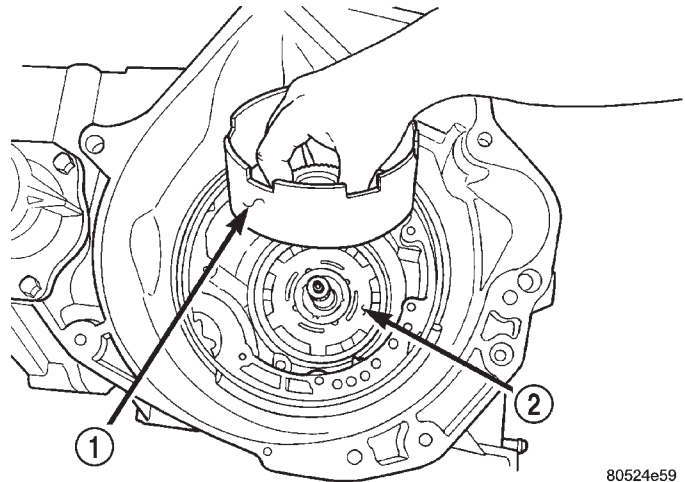
## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 77 Front Planetary Gear Snap Ring**

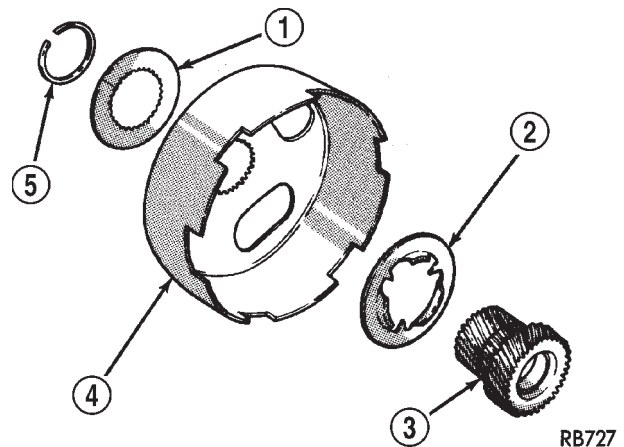
- 1 - FRONT PLANETARY GEAR SNAP RING
- 2 - SNAP RING PLIERS
- 3 - FRONT PLANETARY GEAR ASSEMBLY

**Fig. 78 Front Planetary Gear Assembly**

- 1 - SUN GEAR
- 2 - FRONT PLANETARY GEAR ASSEMBLY
- 3 - #6 THRUST WASHER

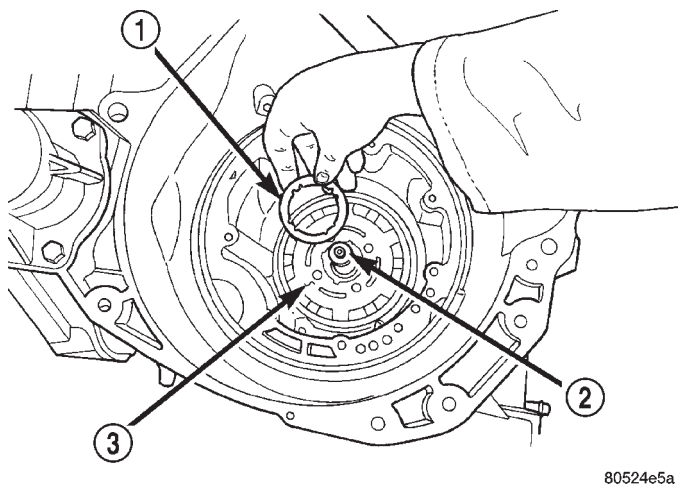
**Fig. 79 Sun Gear Driving Shell**

- 1 - SUN GEAR DRIVING SHELL
- 2 - REAR PLANETARY GEAR

**Fig. 80 Sun Gear Driving Shell Components**

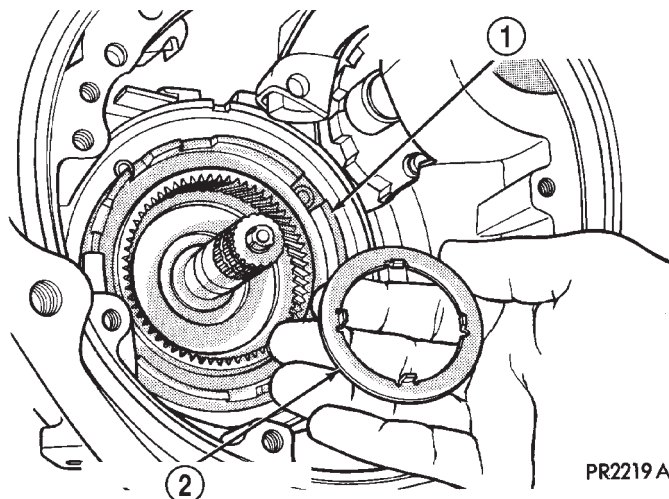
- 1 - #8 THRUST WASHER (STEEL)
- 2 - #7 SPACER (STEEL)
- 3 - SUN GEAR
- 4 - SUN GEAR DRIVING SHELL
- 5 - SNAP RING

# DISASSEMBLY AND ASSEMBLY (Continued)



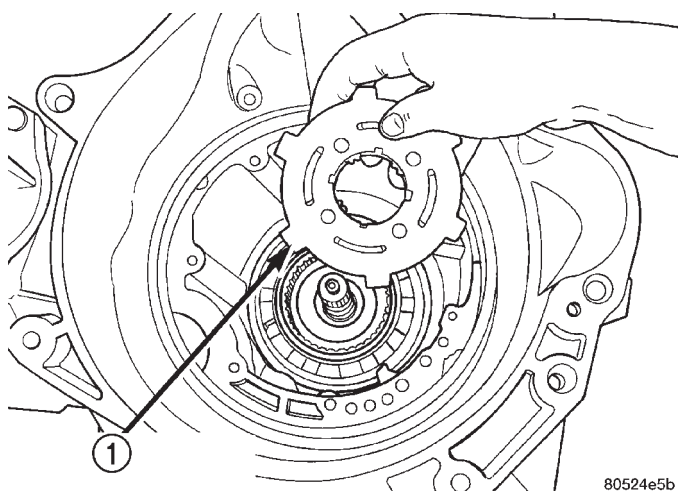
**Fig. 81 No. 9 Thrust Washer**

- 1 - #9 THRUST WASHER
- 2 - OUTPUT SHAFT
- 3 - REAR PLANETARY GEAR ASSEMBLY



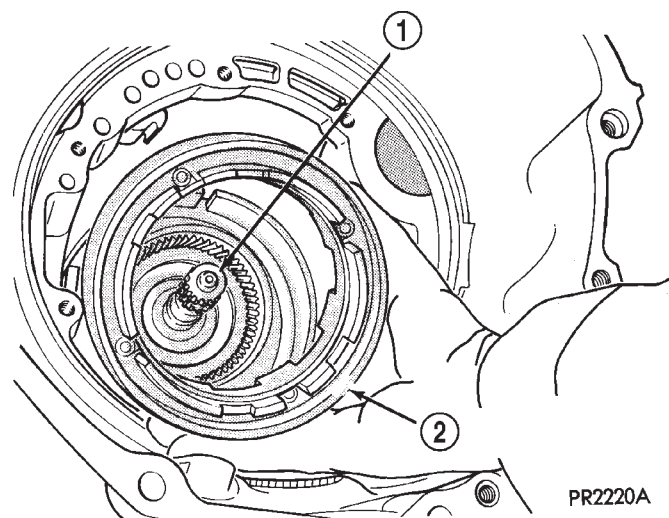
**Fig. 83 No. 10 Thrust Washer**

- 1 - OVERRUNNING CLUTCH CAM ASSEMBLY
- 2 - #10 THRUST WASHER



**Fig. 82 Rear Planetary Gear Assembly**

- 1 - REAR PLANETARY GEAR ASSEMBLY

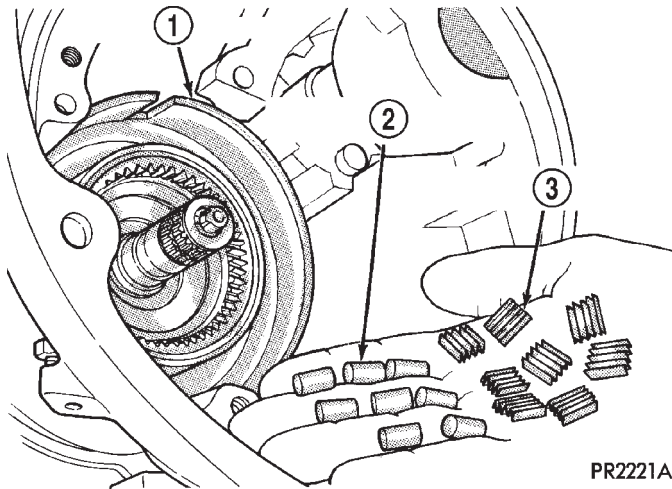


**Fig. 84 Overrunning Clutch Cam Assembly**

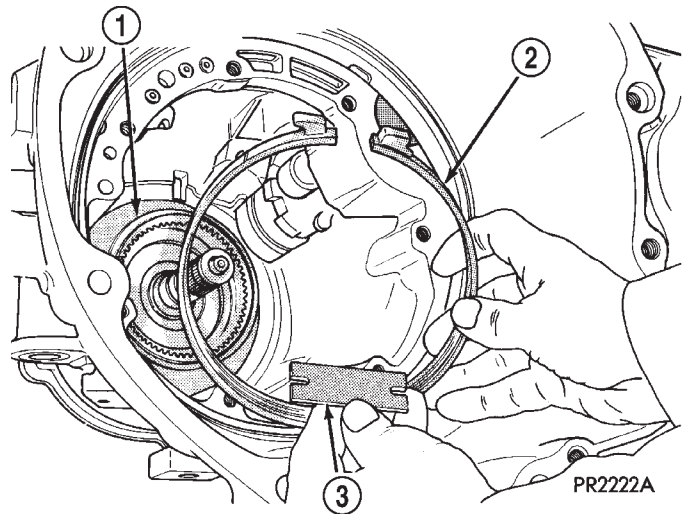
- 1 - OUTPUT SHAFT
- 2 - OVERRUNNING CLUTCH CAM ASSEMBLY



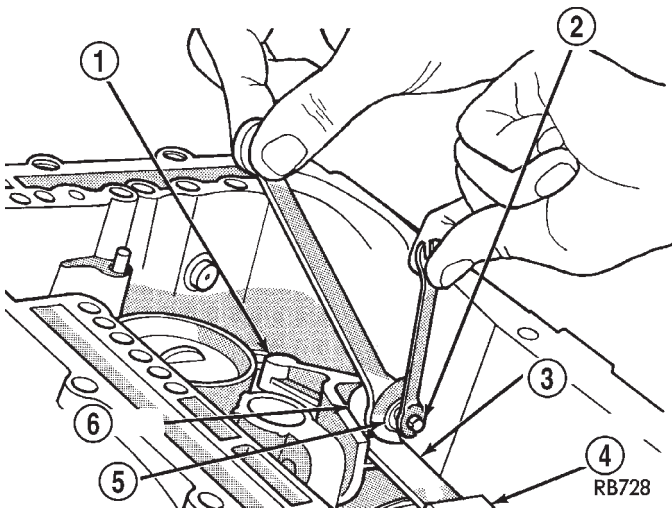
## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 85 Overrunning Clutch Rollers and Spring**

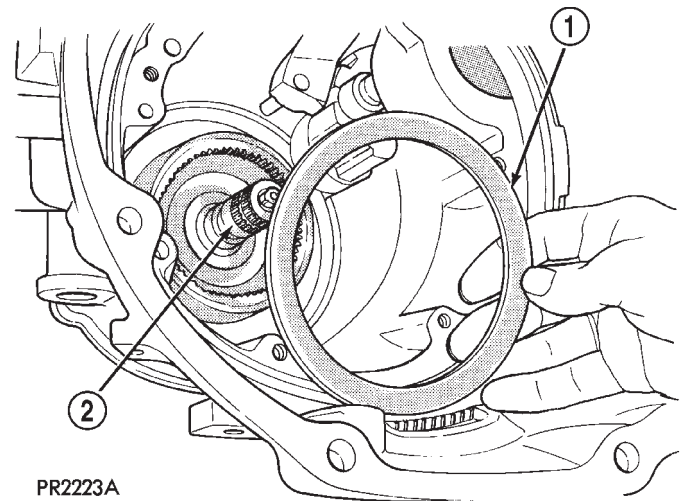
- 1 - LOW-REVERSE BAND
- 2 - OVERRUNNING CLUTCH ROLLERS (8)
- 3 - OVERRUNNING CLUTCH SPRINGS (8)

**Fig. 87 Low/Reverse Band and Strut**

- 1 - #11 THRUST WASHER
- 2 - LOW-REVERSE BAND
- 3 - STRUT

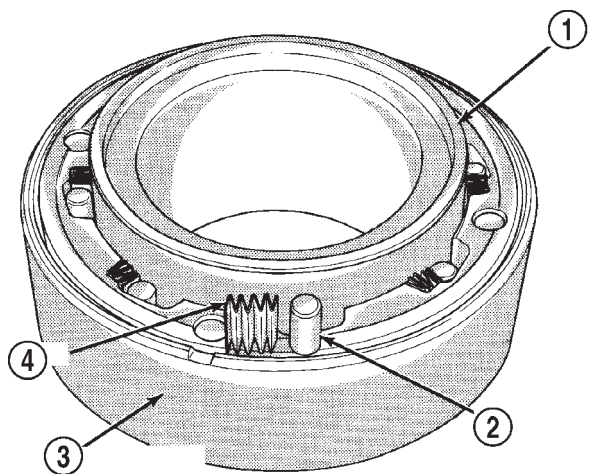
**Fig. 86 Loosen or Adjust Low/Reverse Band**

- 1 - LOW-REVERSE BAND LEVER
- 2 - ADJUSTING SCREW
- 3 - STRUT
- 4 - LOW-REVERSE BAND
- 5 - LOCK NUT
- 6 - LEVER (SHORT)

**Fig. 88 No. 11 Thrust Washer**

- 1 - #11 THRUST WASHER
- 2 - OUTPUT SHAFT

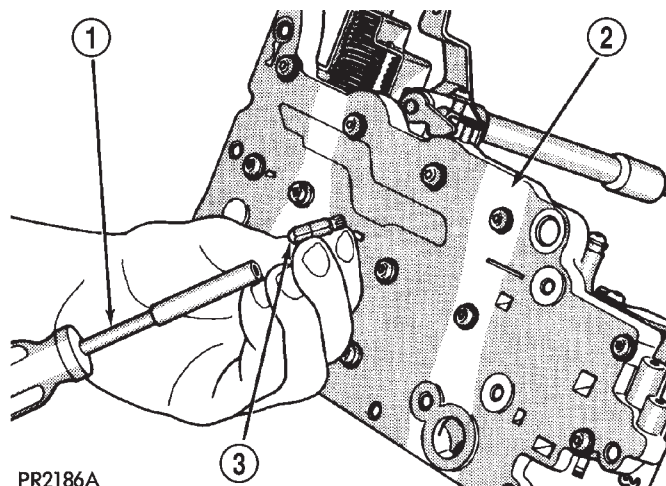
# DISASSEMBLY AND ASSEMBLY (Continued)



PR2224

**Fig. 89 Install Overrunning Clutch Rollers and Springs**

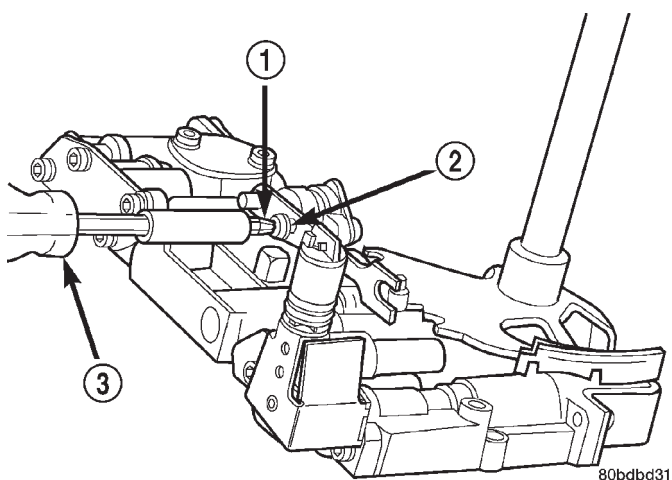
- 1 - TOOL L-4440
- 2 - ROLLER (8)
- 3 - OVERRUNNING CLUTCH CAM ASSEMBLY
- 4 - SPRING (8)



PR2186A

**Fig. 91 Using Tool L-4553 on Valve Body Screw**

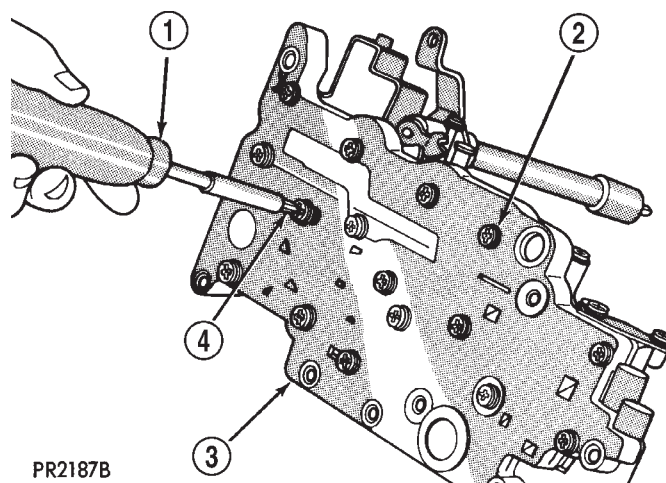
- 1 - SCREWDRIVER HANDLE
- 2 - VALVE BODY ASSEMBLY
- 3 - SPECIAL TOOL L-4553



80bdbc31

**Fig. 90 Detent Spring Attaching Screw and Spring**

- 1 - SPECIAL TOOL L-4553
- 2 - DETENT SPRING SCREW
- 3 - SCREWDRIVER HANDLE

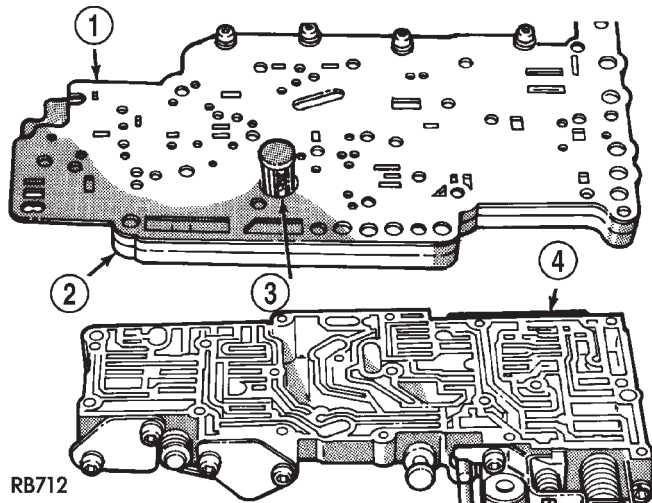


PR2187B

**Fig. 92 Remove or Install Valve Body Screws**

- 1 - SCREWDRIVER HANDLE
- 2 - VALVE BODY SCREWS (16)
- 3 - VALVE BODY
- 4 - SPECIAL TOOL L-4553

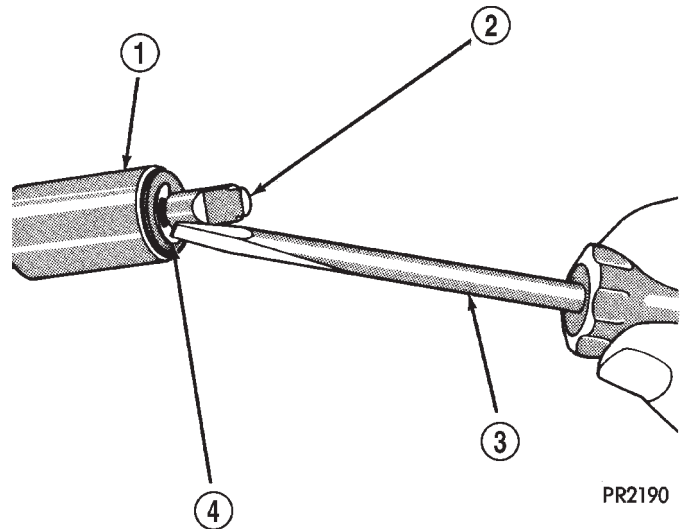
## DISASSEMBLY AND ASSEMBLY (Continued)



RB712

**Fig. 93 Transfer Plate and Separator Plate**

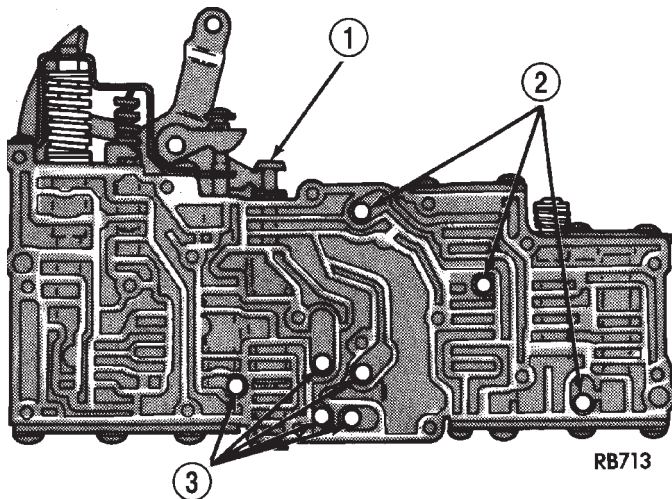
- 1 - SEPARATOR PLATE
- 2 - TRANSFER PLATE
- 3 - OIL SCREEN
- 4 - VALVE BODY



PR2190

**Fig. 95 Remove or Install Throttle Shaft E-Clip**

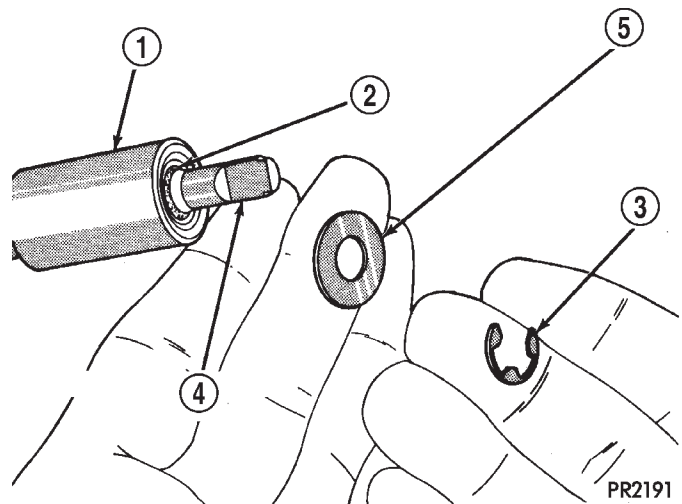
- 1 - MANUAL VALVE LEVER ASSEMBLY
- 2 - THROTTLE VALVE LEVER ASSEMBLY
- 3 - SCREWDRIVER
- 4 - "E" CLIP



RB713

**Fig. 94 Steel Ball Locations**

- 1 - MANUAL VALVE
- 2 - STEEL BALLS (8)
- 3 - STEEL BALLS



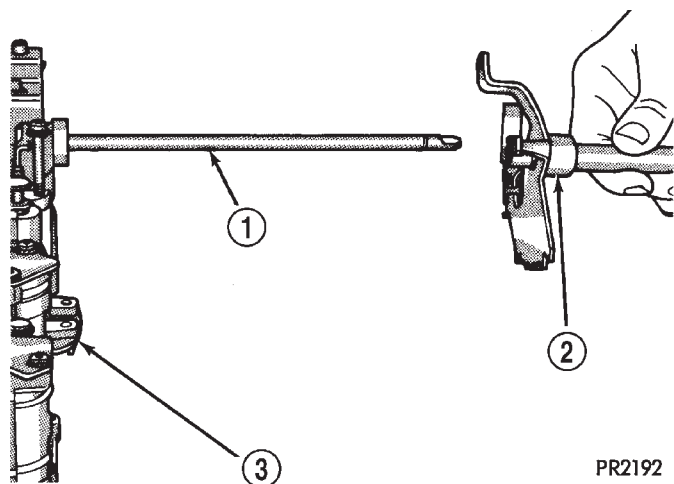
PR2191

**Fig. 96 Throttle Shaft E-Clip, Washer, and Seal**

- 1 - MANUAL VALVE LEVER ASSEMBLY
- 2 - OIL SEAL
- 3 - "E" CLIP
- 4 - THROTTLE VALVE LEVER ASSEMBLY
- 5 - WASHER



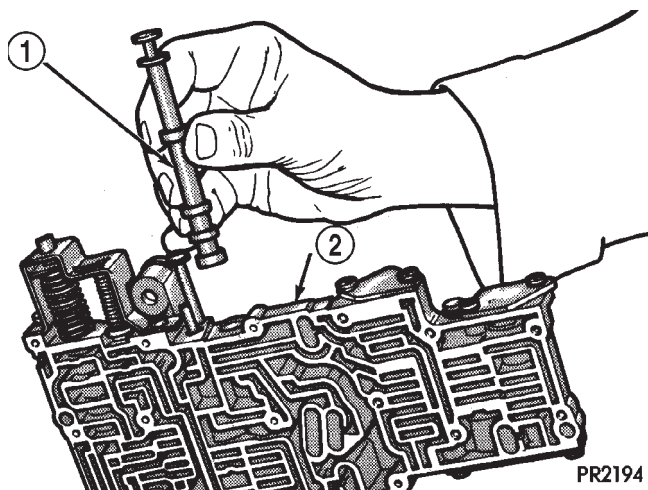
# DISASSEMBLY AND ASSEMBLY (Continued)



PR2192

**Fig. 97 Manual Valve Lever Assembly**

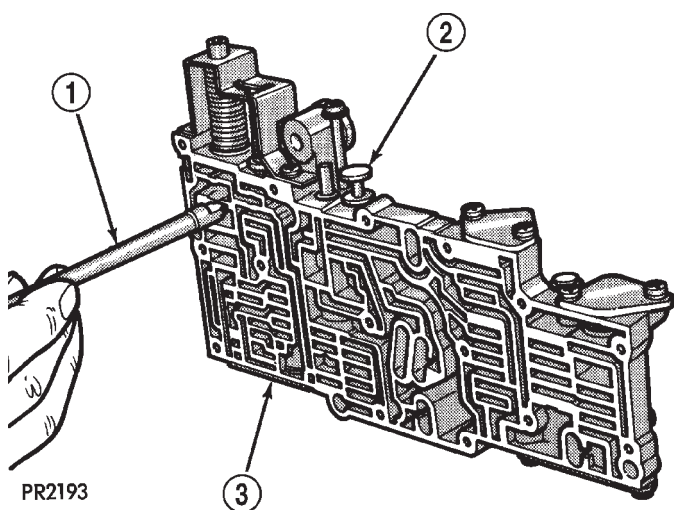
- 1 - THROTTLE VALVE LEVER ASSEMBLY
- 2 - MANUAL VALVE LEVER ASSEMBLY
- 3 - VALVE BODY



PR2194

**Fig. 99 Manual Valve**

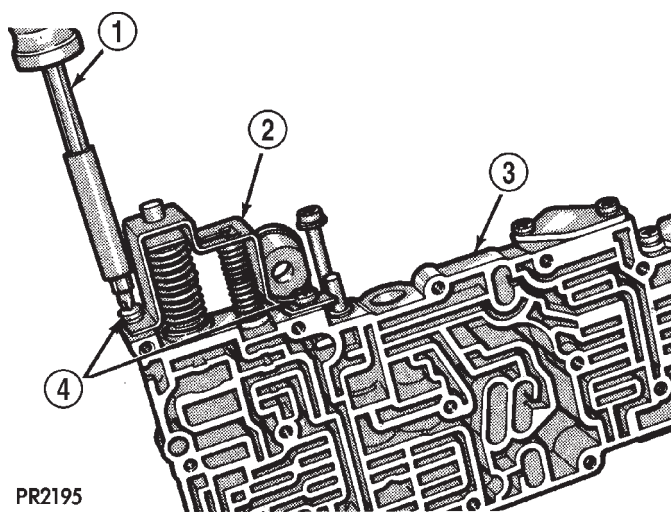
- 1 - MANUAL VALVE
- 2 - VALVE BODY



PR2193

**Fig. 98 Throttle Valve Lever Assembly**

- 1 - THROTTLE VALVE LEVER ASSEMBLY
- 2 - MANUAL VALVE
- 3 - VALVE BODY

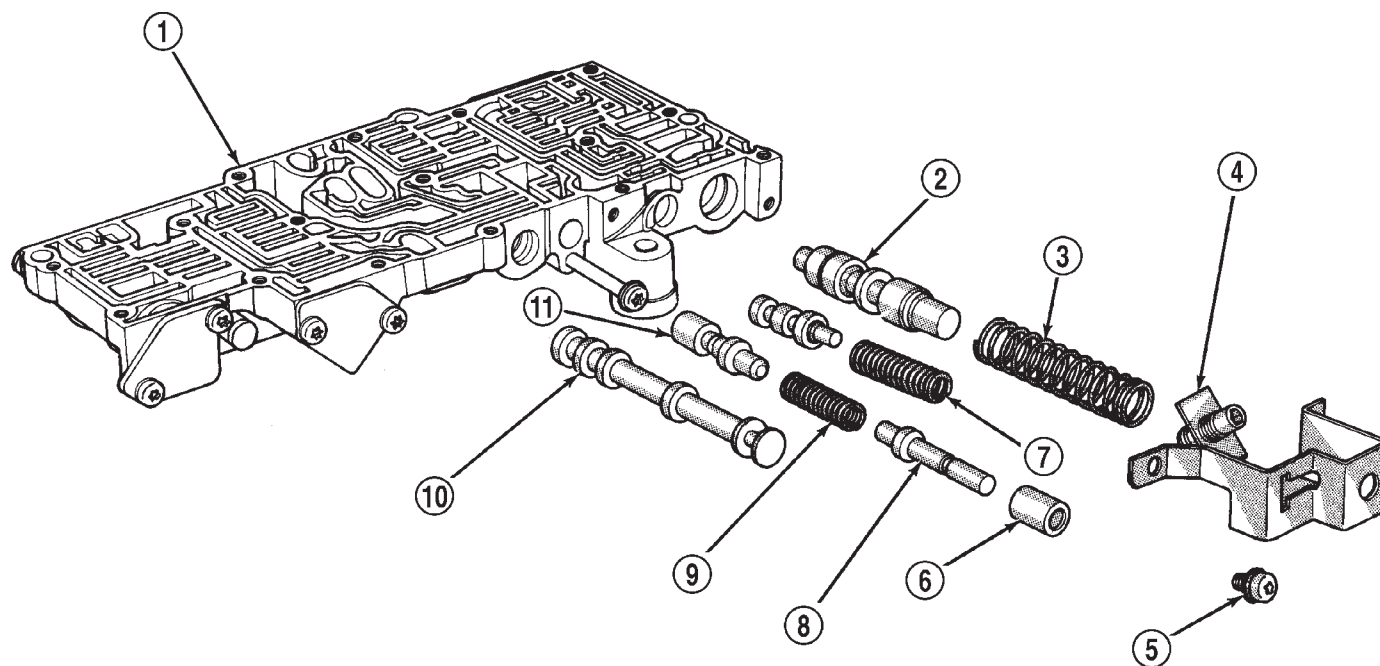


PR2195

**Fig. 100 Pressure Regulator and Adjusting Screw Bracket**

- 1 - SCREWDRIVER HANDLE
- 2 - PRESSURE REGULATOR SPRING RETAINER AND ADJUSTING SCREW BRACKET
- 3 - VALVE BODY
- 4 - SCREWS

## DISASSEMBLY AND ASSEMBLY (Continued)



PR2196A

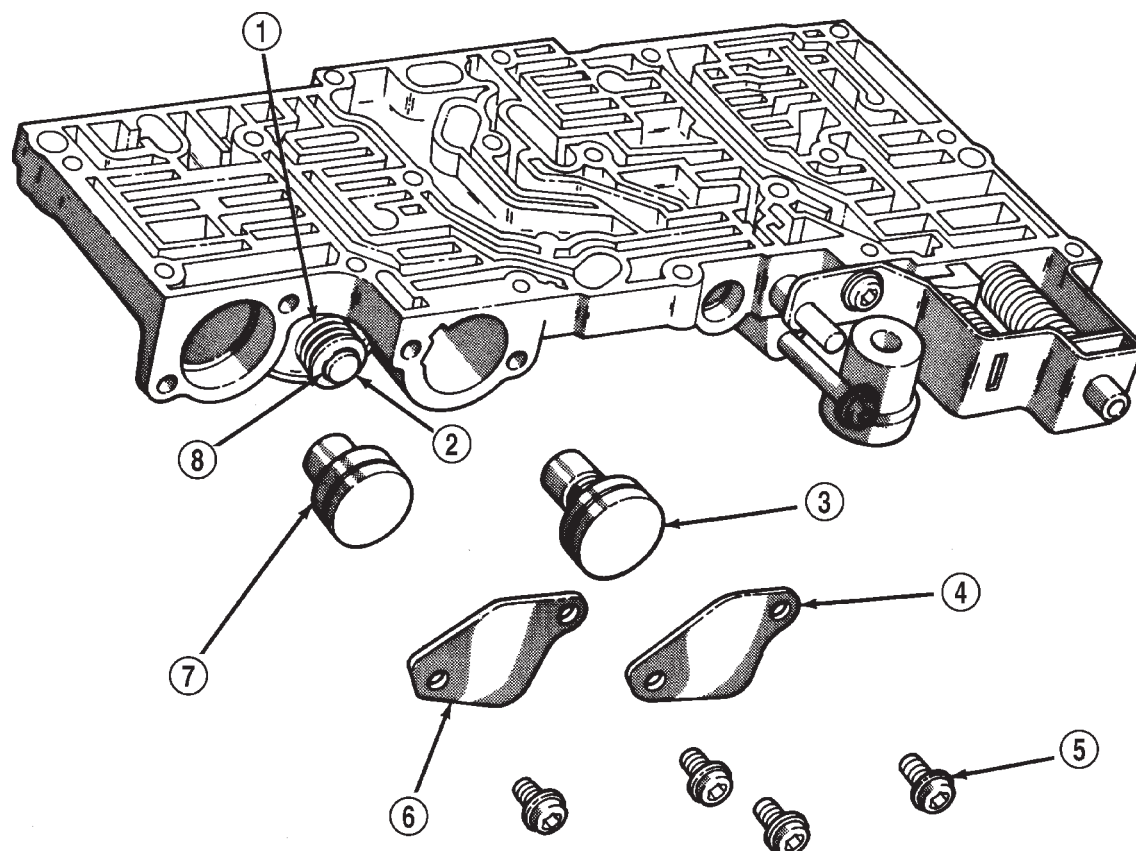
**Fig. 101 Pressure Regulators and Manual Controls**

- 1 - VALVE BODY
- 2 - LINE PRESSURE VALVE
- 3 - SPRING
- 4 - ADJUSTING SCREW
- 5 - SCREW
- 6 - GUIDE

- 7 - SPRING
- 8 - KICKDOWN VALVE
- 9 - SPRING
- 10 - MANUAL VALVE
- 11 - THROTTLE VALVE



## DISASSEMBLY AND ASSEMBLY (Continued)



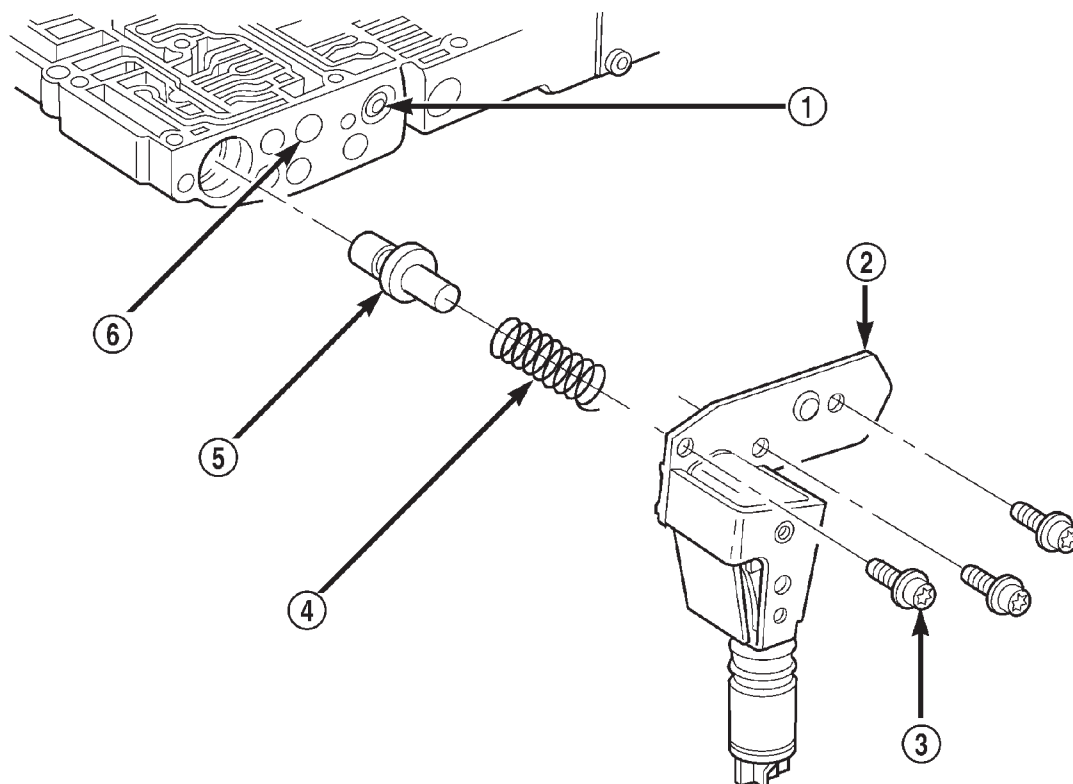
RB714

**Fig. 102 Governor Plugs**

- 1 - SHUTTLE VALVE SECONDARY SPRING
- 2 - SHUTTLE VALVE
- 3 - 1-2 SHIFT VALVE GOVERNOR PLUG
- 4 - END COVER

- 5 - SCREW (4)
- 6 - END COVER
- 7 - 2-3 SHIFT VALVE GOVERNOR PLUG
- 8 - E-CLIP

## DISASSEMBLY AND ASSEMBLY (Continued)



80bdcd32

**Fig. 103 Torque Converter Clutch Solenoid and Regulator/Control Valves**

1 - CONVERTER PRESSURE CONTROL VALVE

2 - END COVER

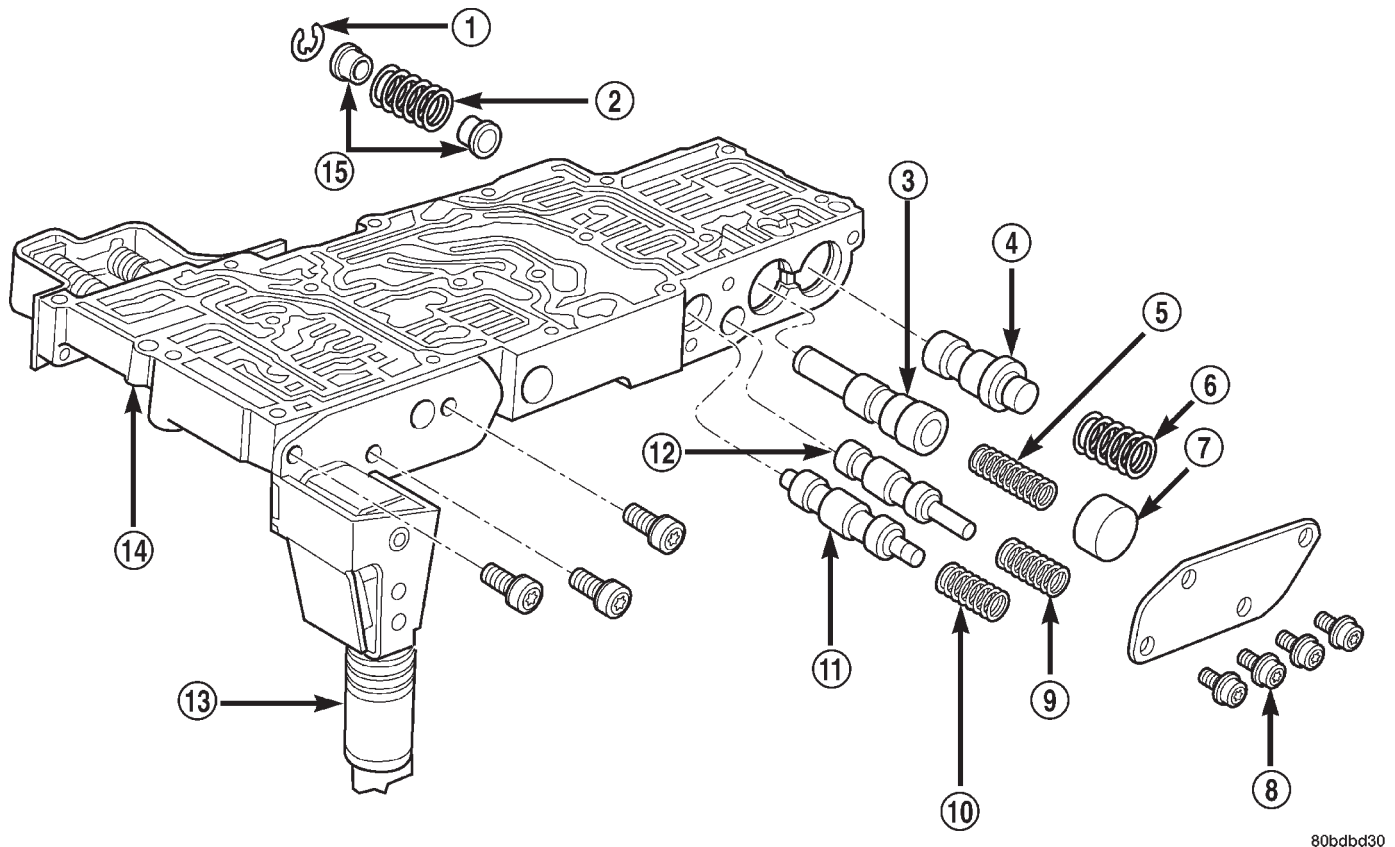
3 - SCREW (3)

4 - REGULATOR VALVE THROTTLE PRESSURE PLUG SPRING

5 - REGULATOR VALVE THROTTLE PRESSURE PLUG

6 - SWITCH VALVE

## DISASSEMBLY AND ASSEMBLY (Continued)



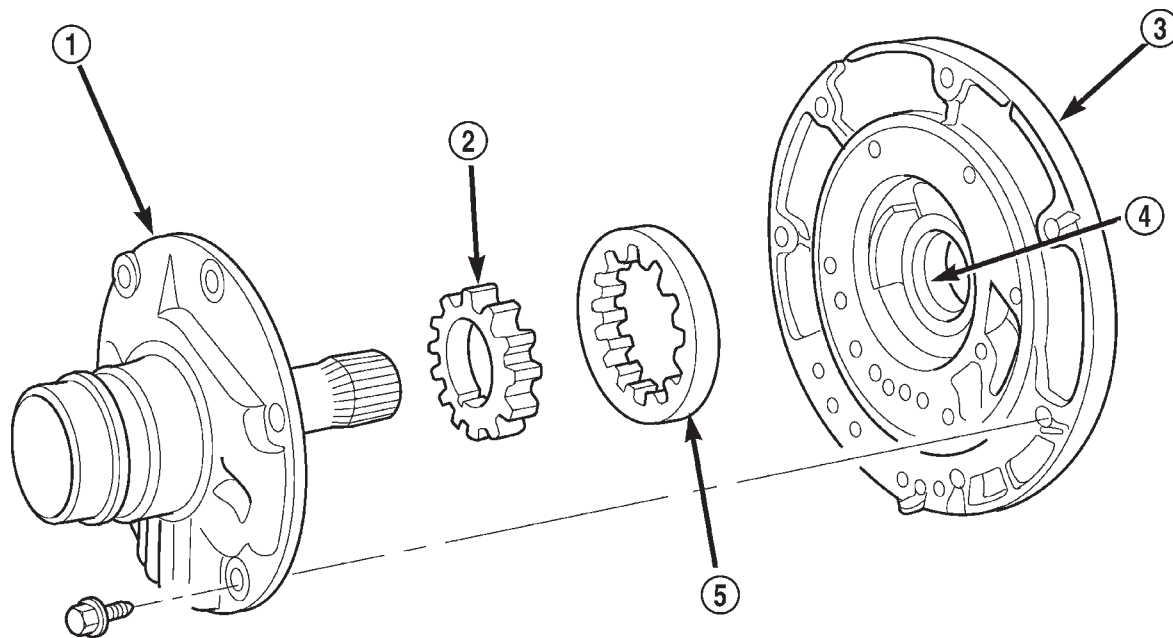
80bdbd30

**Fig. 104 Shift Valves and Shuttle Valve**

- |                                    |                                       |
|------------------------------------|---------------------------------------|
| 1 - SHUTTLE VALVE E-CLIP           | 9 - BY-PASS VALVE SPRING              |
| 2 - SHUTTLE VALVE SECONDARY SPRING | 10 - 1-2 SHIFT VALVE SPRING           |
| 3 - SHUTTLE VALVE                  | 11 - 1-2 SHIFT VALVE                  |
| 4 - 2-3 SHIFT VALVE                | 12 - BY-PASS VALVE                    |
| 5 - SHUTTLE VALVE PRIMARY SPRING   | 13 - TORQUE CONVERTER CLUTCH SOLENOID |
| 6 - 2-3 SHIFT VALVE SPRING         | 14 - VALVE BODY                       |
| 7 - SHUTTLE VALVE PLUG             | 15 - SPRING GUIDES (2)                |
| 8 - SCREWS                         |                                       |

## DISASSEMBLY AND ASSEMBLY (Continued)

## OIL PUMP



80bdbd50

**Fig. 105 Oil Pump Assembly**

- 1 - REACTION SHAFT SUPPORT
- 2 - INNER GEAR
- 3 - PUMP BODY

- 4 - PUMP BUSHING
- 5 - OUTER GEAR

(1) Remove reaction shaft support-to-pump body bolts.

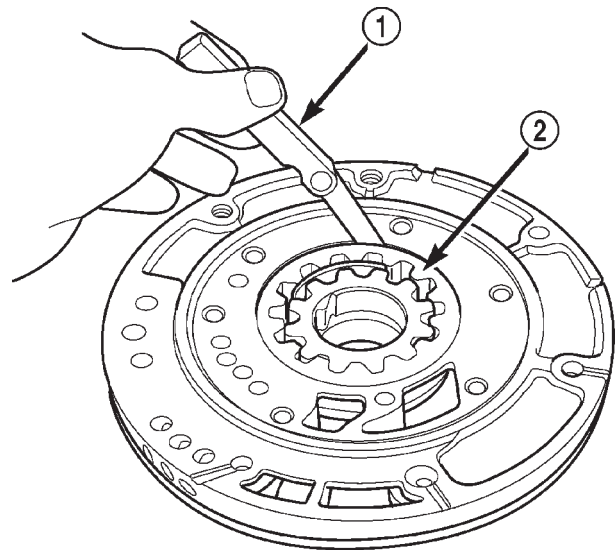
(2) Remove reaction shaft support, and the inner and outer pump gears (Fig. 105).

(3) Visually inspect gears for excessive wear.

(4) Inspect pump bushing for excessive wear.

(5) Reinstall gears and measure outer gear-to-pocket clearance. Clearance should be within 0.045-0.141 mm (0.0018-0.0056 in.).

(6) Measure both inner and outer gear side clearance using a straight edge and feeler gauge across the pump face. Inner and outer gear side clearance should be within 0.020-0.046 mm (0.0008-0.0018 in.).



80bdbd00

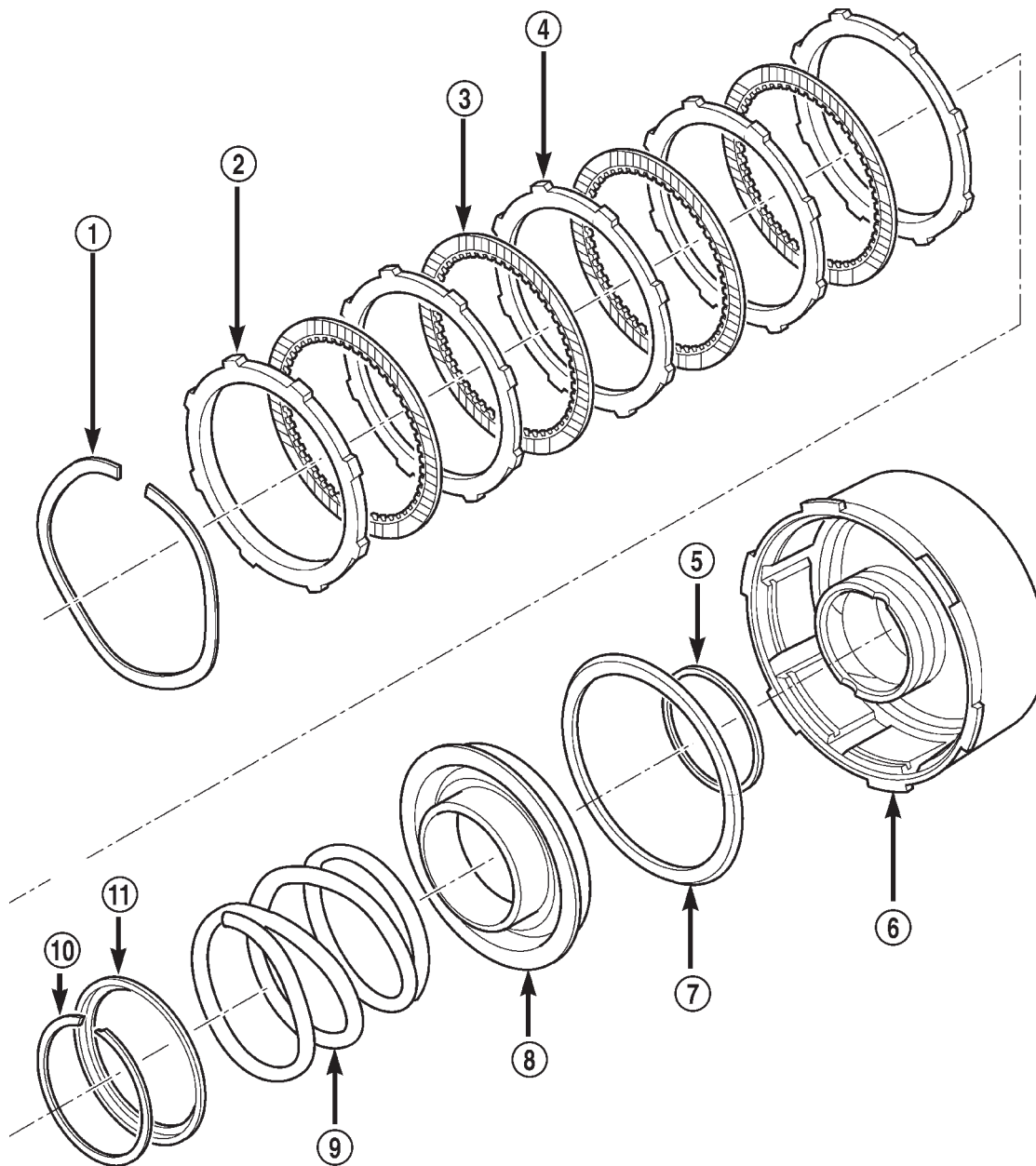
**Measuring Pump Outer Gear-to-Pocket Clearance)**

- 1 - FEELER GAUGE
- 2 - OUTER GEAR



# DISASSEMBLY AND ASSEMBLY (Continued)

## FRONT CLUTCH



80bcb40

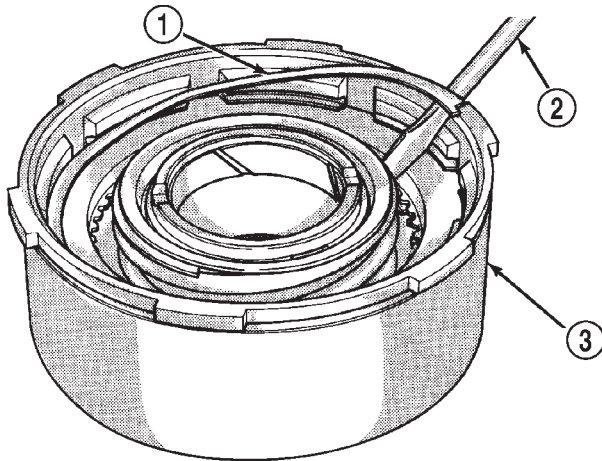
### Front Clutch Assembly

- 1 - SNAP RING (WAVE)
- 2 - REACTION PLATE
- 3 - CLUTCH DISC
- 4 - CLUTCH PLATE
- 5 - SEAL
- 6 - CLUTCH RETAINER

- 7 - SEAL
- 8 - PISTON
- 9 - SPRING
- 10 - SNAP RING
- 11 - SPRING RETAINER

## DISASSEMBLY AND ASSEMBLY (Continued)

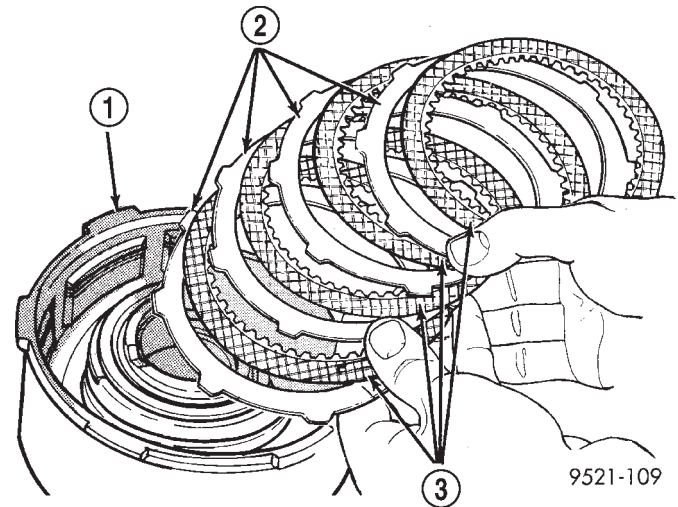
## DISASSEMBLY



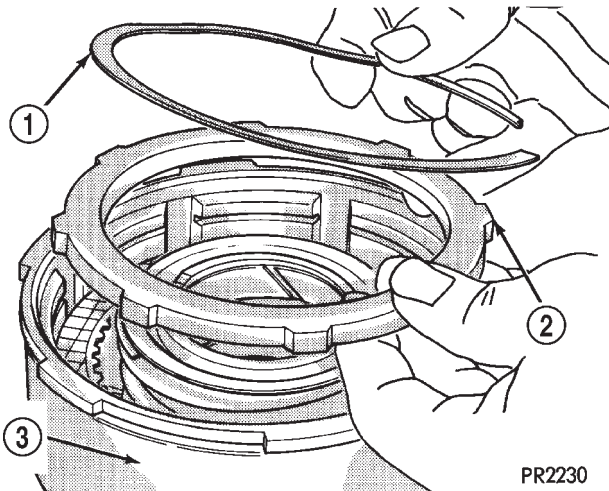
PR2229

**Fig. 106 Front Clutch Waved Snap Ring**

- 1 - WAVED SNAP RING
- 2 - SCREWDRIVER
- 3 - FRONT CLUTCH ASSEMBLY

**Fig. 108 Front Clutch (4-Disc Shown)**

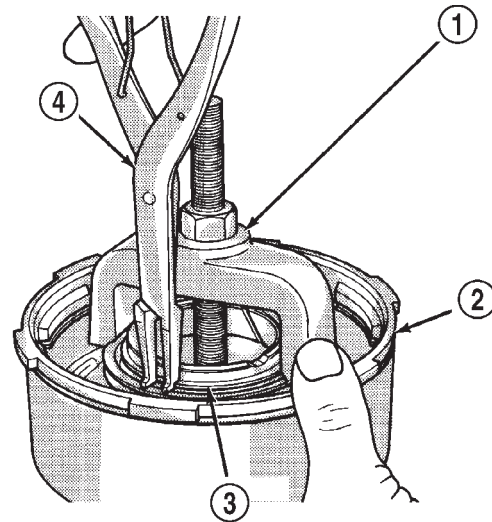
- 1 - FRONT CLUTCH RETAINER
- 2 - CLUTCH PLATES
- 3 - DRIVING DISCS



PR2230

**Fig. 107 Thick Steel Plate and Waved Snap Ring**

- 1 - WAVED SNAP RING
- 2 - THICK STEEL PLATE
- 3 - FRONT CLUTCH RETAINER

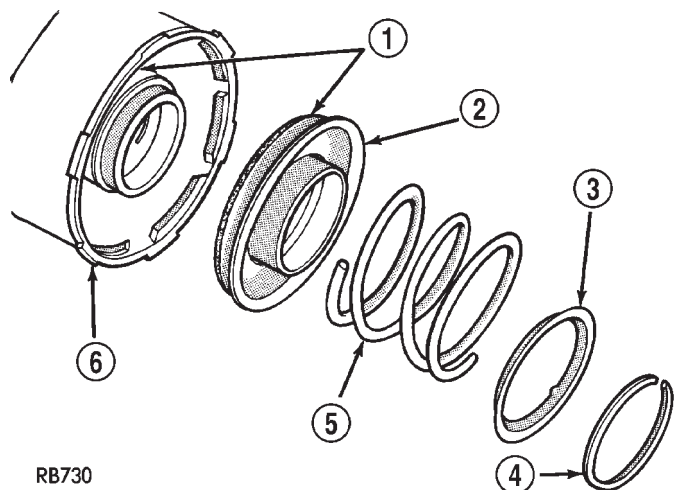


PR2232

**Fig. 109 Front Clutch Return Spring Snap Ring**

- 1 - COMPRESSOR TOOL C-3575-A
- 2 - FRONT CLUTCH RETAINER
- 3 - SNAP RING
- 4 - SNAP RING PLIERS

## DISASSEMBLY AND ASSEMBLY (Continued)



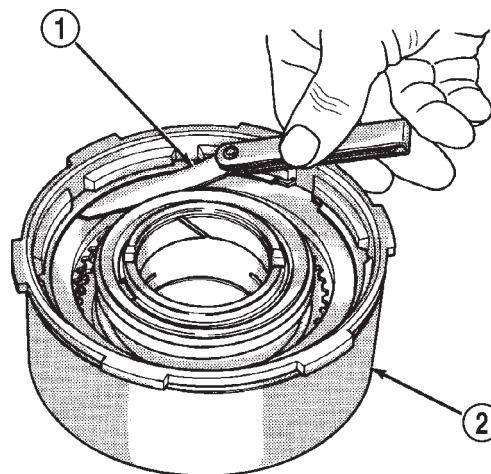
RB730

**Fig. 110 Front Clutch Return Spring and Piston**

- 1 - LIP SEALS
- 2 - PISTON
- 3 - RETURN SPRING RETAINER
- 4 - SNAP RING
- 5 - PISTON RETURN SPRING
- 6 - FRONT CLUTCH RETAINER

**ASSEMBLY**

To reassemble, reverse the above procedure.

**MEASURING PLATE CLEARANCE**

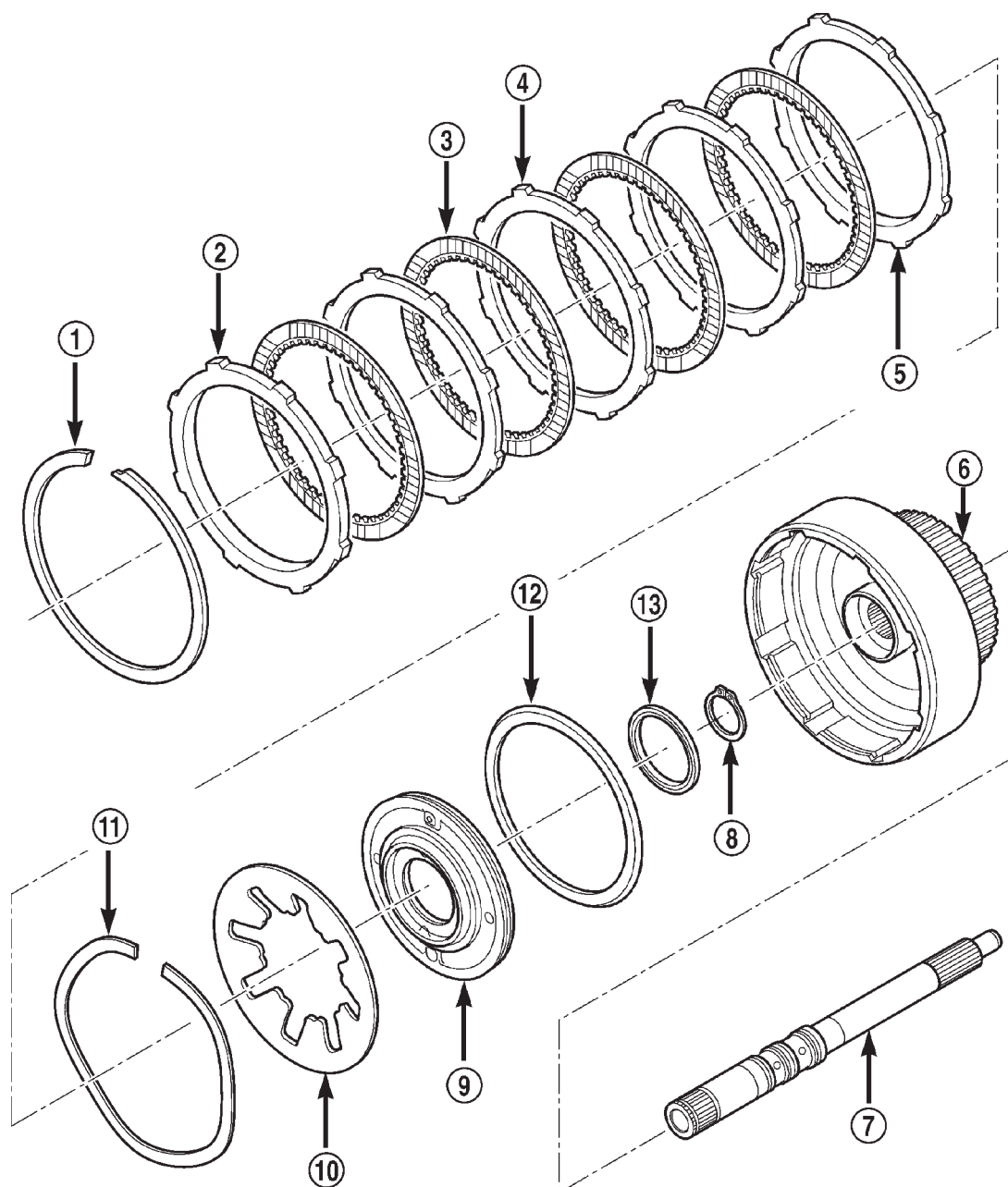
PR2234

**Fig. 111 Measuring Front Clutch Plate Clearance**

- 1 - FEELER GAUGE
- 2 - FRONT CLUTCH ASSEMBLY

## DISASSEMBLY AND ASSEMBLY (Continued)

## REAR CLUTCH ASSEMBLY



80bdbd41

**Rear Clutch Assembly**

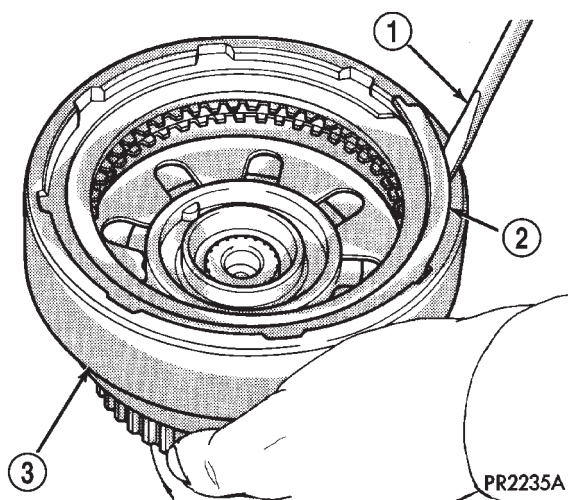
- 1 - SNAP RING (SELECT)
- 2 - REACTION PLATE
- 3 - CLUTCH DISC
- 4 - CLUTCH PLATE
- 5 - REACTION PLATE
- 6 - CLUTCH RETAINER
- 7 - INPUT SHAFT

- 8 - SNAP RING
- 9 - PISTON
- 10 - SPRING
- 11 - SNAP RING (WAVE)
- 12 - SEAL
- 13 - SEAL



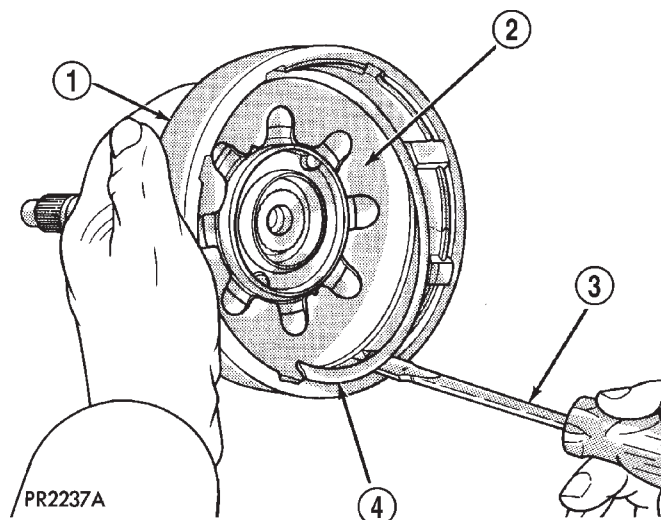
# DISASSEMBLY AND ASSEMBLY (Continued)

## DISASSEMBLY



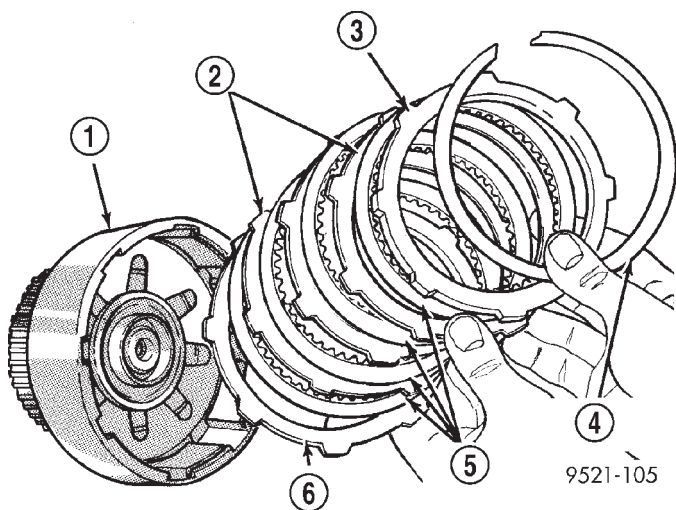
**Fig. 112 Rear Clutch Outer Snap Ring**

- 1 - SCREWDRIVER
- 2 - SNAP RING
- 3 - REAR CLUTCH ASSEMBLY



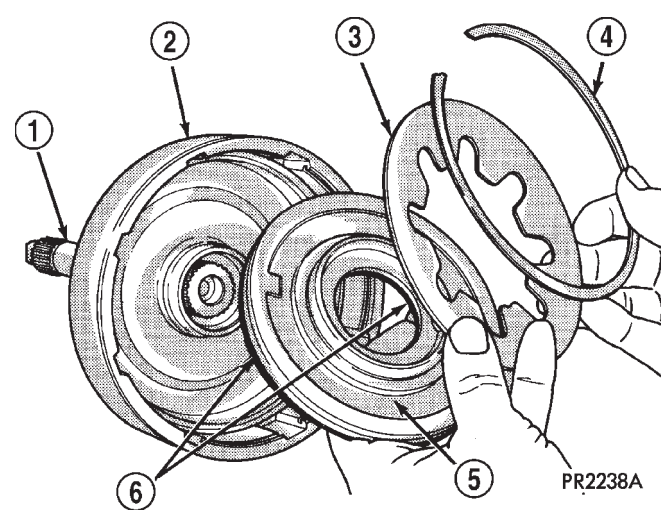
**Fig. 114 Piston Spring Waved Snap Ring**

- 1 - REAR CLUTCH RETAINER
- 2 - PISTON SPRING
- 3 - SCREWDRIVER
- 4 - WAVED SNAP RING



**Fig. 113 Rear Clutch (4-Disc Shown)**

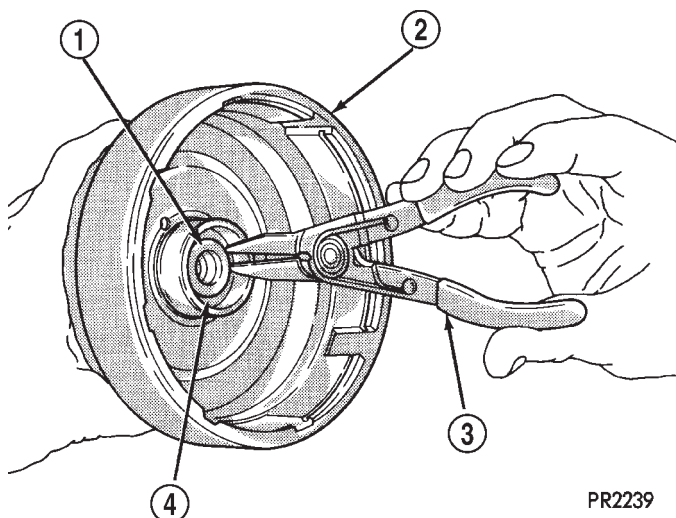
- 1 - REAR CLUTCH RETAINER
- 2 - CLUTCH PLATES
- 3 - THICK STEEL PLATE
- 4 - SNAP RING (SELECTIVE)
- 5 - DRIVING DISCS
- 6 - PRESSURE PLATE



**Fig. 115 Rear Clutch Piston and Piston Spring**

- 1 - INPUT SHAFT
- 2 - REAR CLUTCH RETAINER
- 3 - PISTON SPRING
- 4 - WAVED SNAP RING
- 5 - PISTON
- 6 - PISTON SEALS

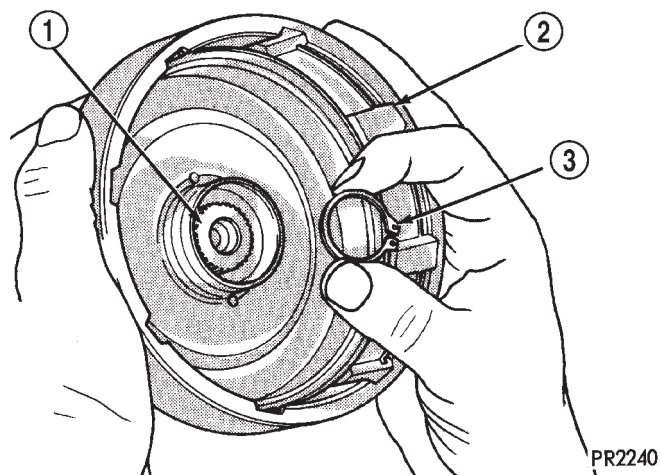
## DISASSEMBLY AND ASSEMBLY (Continued)



PR2239

**Fig. 116 Remove or Install Input Shaft Snap Ring**

- 1 - INPUT SHAFT
- 2 - REAR CLUTCH RETAINER
- 3 - SNAP RING PLIERS
- 4 - SNAP RING



PR2240

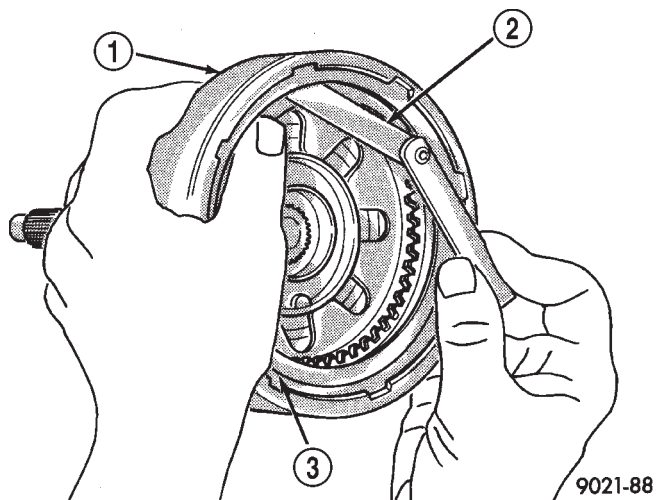
**Fig. 117 Input Shaft Snap Ring**

- 1 - INPUT SHAFT
- 2 - REAR CLUTCH RETAINER
- 3 - SNAP RING

Press out input shaft, if required.

**ASSEMBLY**

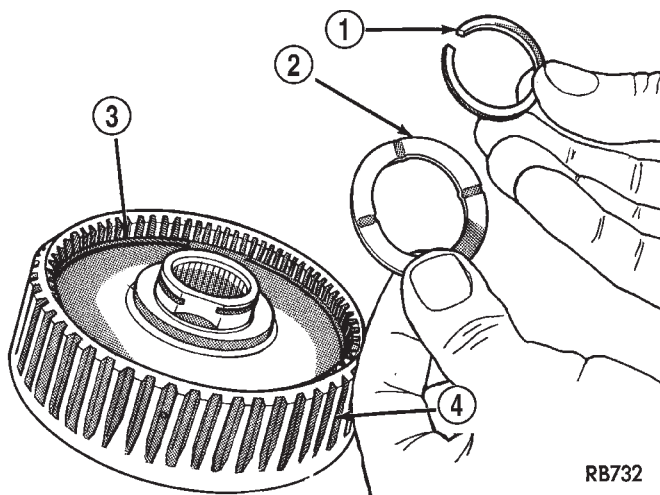
To reassemble, reverse the above procedure.

**MEASURING PLATE CLEARANCE**

9021-88

**Fig. 118 Measuring Rear Clutch Plate Clearance**

- 1 - REAR CLUTCH ASSEMBLY
- 2 - FEELER GAUGE
- 3 - SELECTIVE SNAP RING

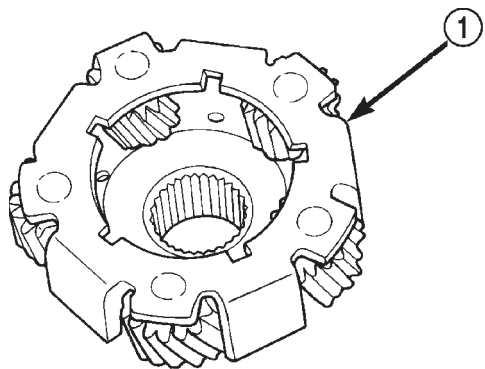
**FRONT PLANETARY AND ANNULUS GEAR-RECONDITION**

RB732

**Fig. 119 Front Planetary Gear Snap Ring and No. 4 Thrust Washer (Always Install a New Snap Ring)**

- 1 - SNAP RING
- 2 - #4 THRUST WASHER
- 3 - SNAP RING
- 4 - FRONT PLANETARY GEAR ASSEMBLY

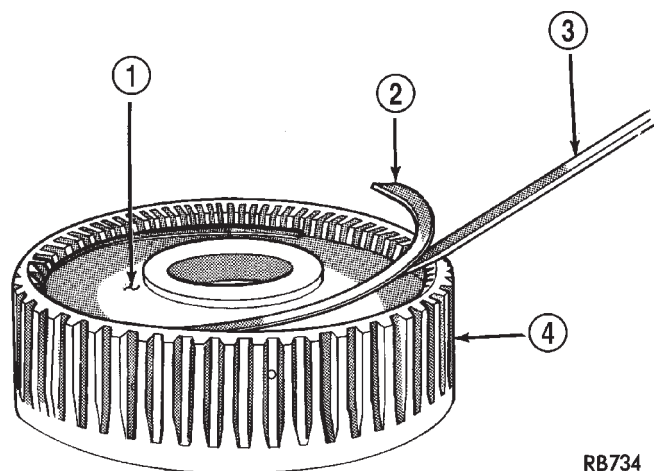
# DISASSEMBLY AND ASSEMBLY (Continued)



80524e5c

**Fig. 120 Front Planetary Gear**

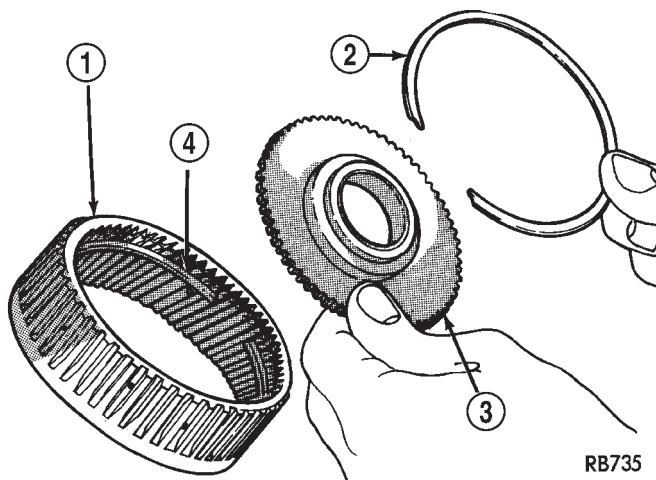
1 – FRONT PLANETARY GEAR ASSEMBLY



RB734

**Fig. 121 Annulus Gear Support Front Snap Ring**

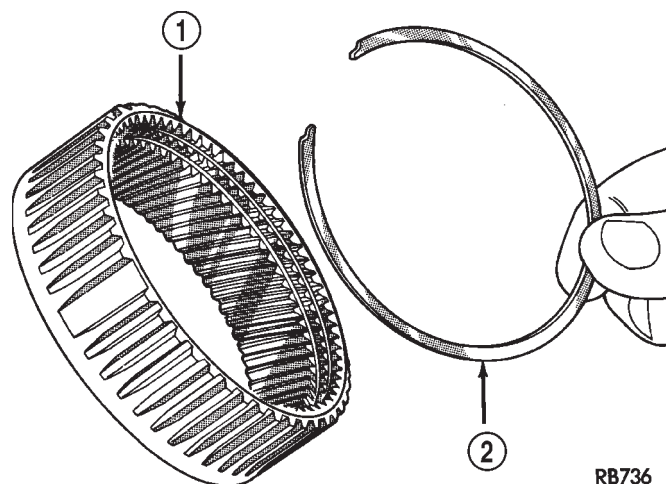
1 – ANNULUS GEAR SUPPORT  
2 – FRONT SNAP RING  
3 – SCREWDRIVER  
4 – FRONT PLANETARY ANNULUS GEAR



RB735

**Fig. 122 Front Annulus Gear Support and Snap Ring**

1 – FRONT ANNULUS GEAR  
2 – FRONT SNAP RING  
3 – FRONT ANNULUS GEAR SUPPORT  
4 – REAR SNAP RING



RB736

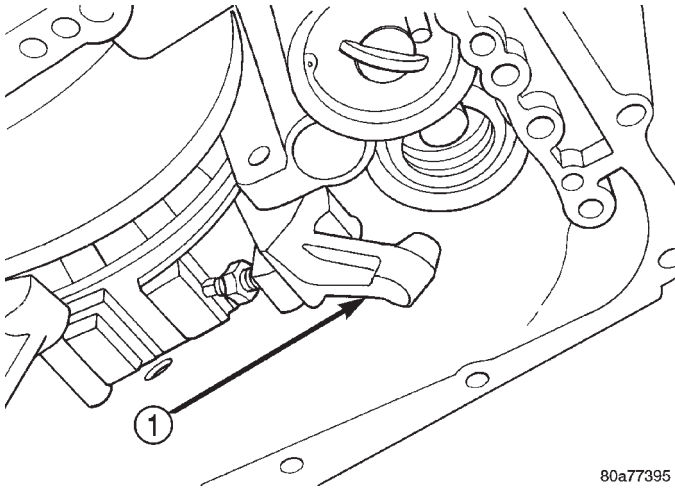
**Fig. 123 Front Annulus Gear Support Snap Ring**

1 – FRONT ANNULUS GEAR  
2 – REAR SNAP RING

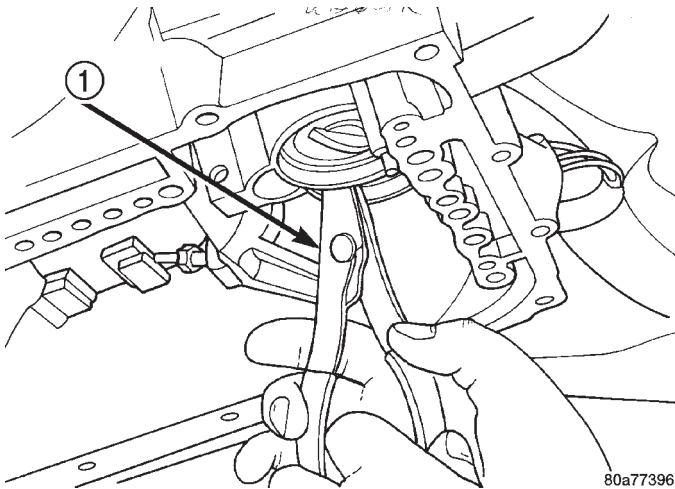
## DISASSEMBLY AND ASSEMBLY (Continued)

## LOW/REVERSE (REAR) SERVO-RECONDITION

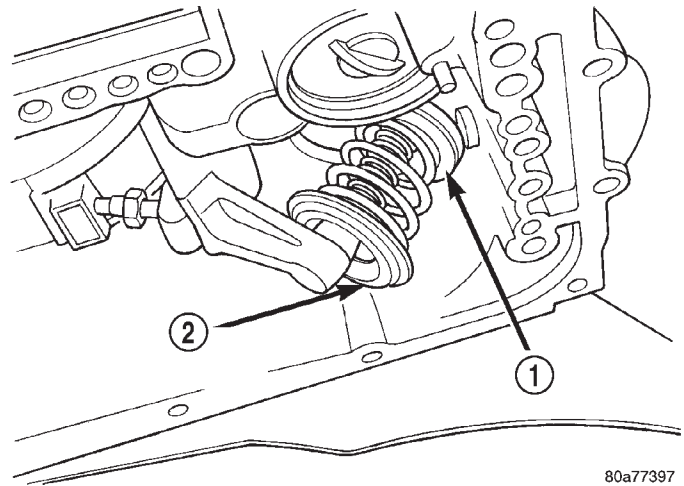
## DISASSEMBLY

**Fig. 124 Low/Reverse Lever**

1 - LOW-REVERSE LEVER

**Fig. 125 Low/Reverse Servo Snap Ring**

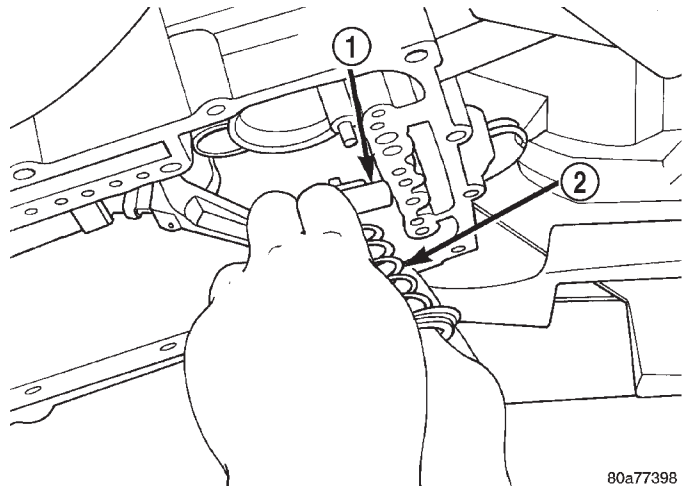
1 - SNAP-RING PLIERS

**Fig. 126 Remove Retainer, Spring and Servo**

1 - SERVO PISTON

2 - SPRING AND RETAINER

## ASSEMBLY

**Fig. 127 Low/Reverse Servo Assembly**

1 - SERVO PISTON

2 - SPRING

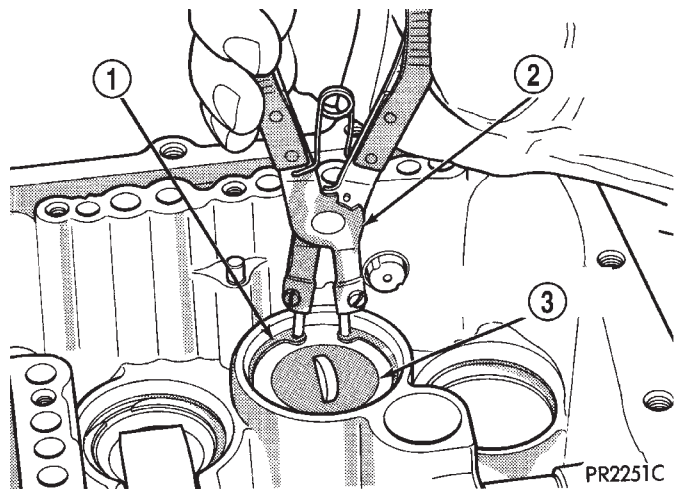
To assemble, reverse the above procedure.



## DISASSEMBLY AND ASSEMBLY (Continued)

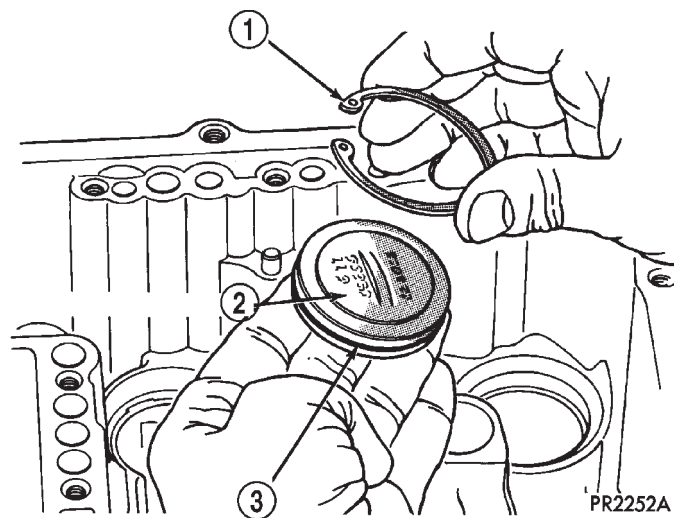
### ACCUMULATOR-RECONDITION

#### DISASSEMBLY



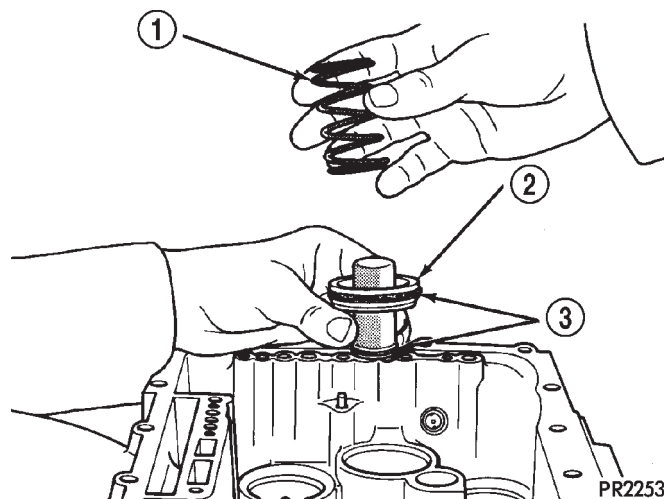
**Fig. 128 Accumulator Snap Ring**

- 1 - ACCUMULATOR PLATE SNAP RING
- 2 - SNAP RING PLIERS
- 3 - ACCUMULATOR PLATE



**Fig. 129 Accumulator Plate and Snap Ring**

- 1 - SNAP RING
- 2 - ACCUMULATOR PLATE
- 3 - "O" RING



**Fig. 130 Accumulator Spring and Piston**

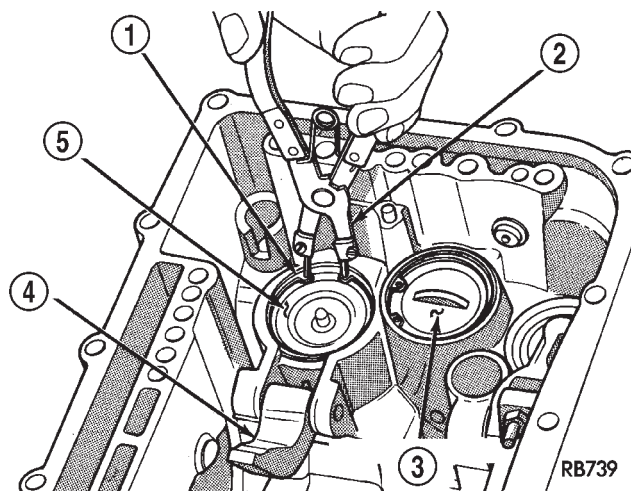
- 1 - ACCUMULATOR SPRING
- 2 - ACCUMULATOR PISTON
- 3 - SEAL RINGS

#### ASSEMBLY

To assemble, reverse the above procedure.

### KICKDOWN SERVO (CONTROLLED LOAD)-RECONDITION

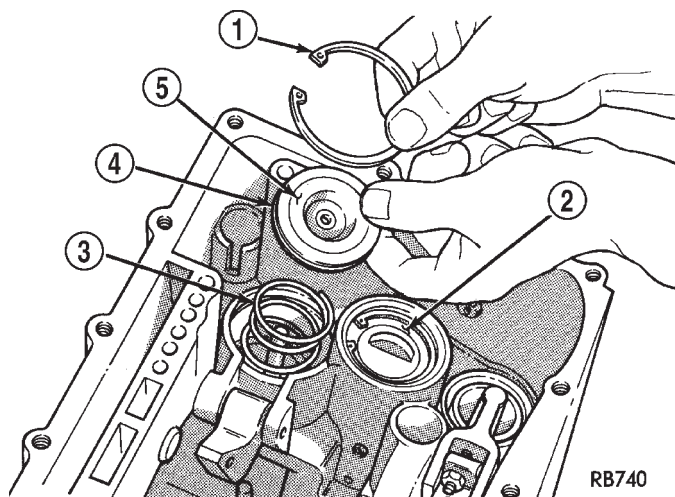
#### DISASSEMBLY



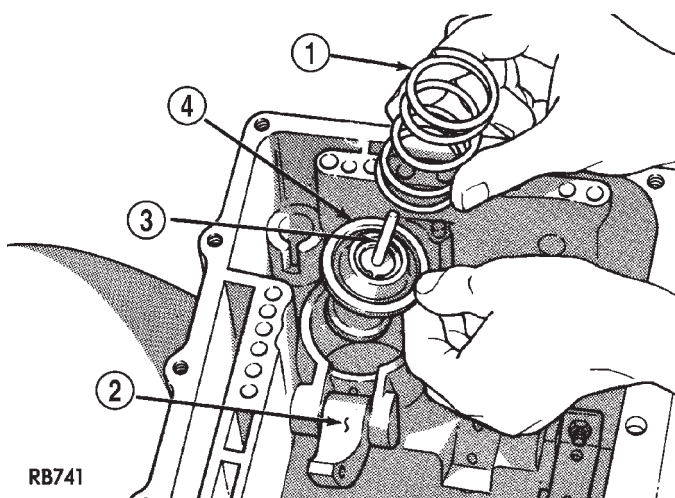
**Fig. 131 Kickdown Servo Snap Ring**

- 1 - SNAP RING
- 2 - SNAP RING PLIERS
- 3 - ACCUMULATOR PLATE
- 4 - KICKDOWN LEVER
- 5 - KICKDOWN PISTON ROD GUIDE

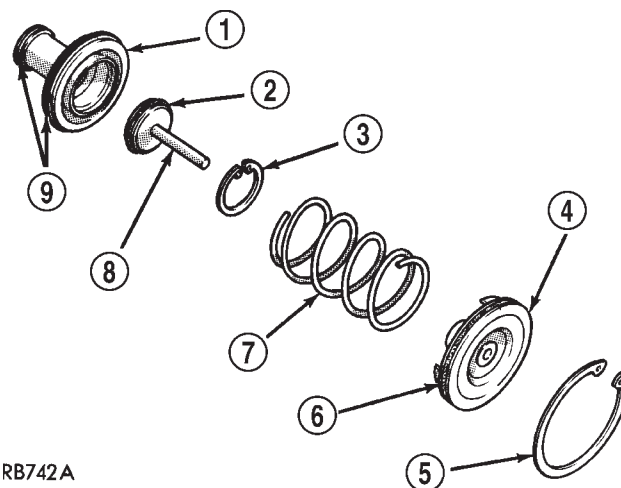
## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 132 Kickdown Servo Rod Guide and Snap Ring**

- 1 – SNAP RING
- 2 – ACCUMULATOR PLATE
- 3 – RETURN SPRING
- 4 – O-RING
- 5 – PISTON ROD GUIDE

**Fig. 133 Kickdown Piston Return Spring and Piston**

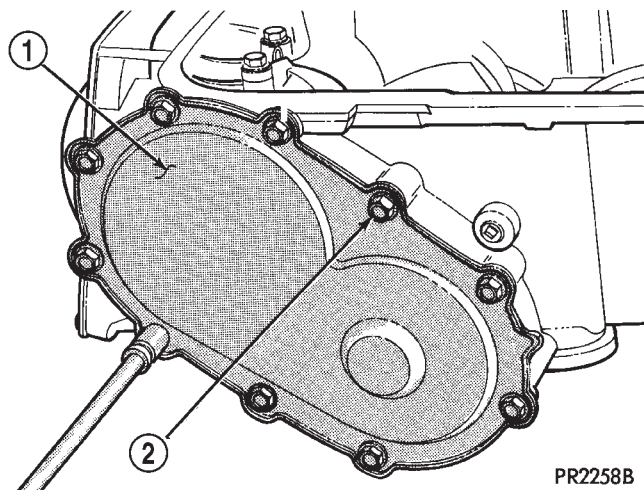
- 1 – RETURN SPRING
- 2 – KICKDOWN LEVER
- 3 – PISTON ROD
- 4 – KICKDOWN SERVO PISTON

**Fig. 134 Controlled Load Kickdown Servo**

- 1 – KICKDOWN PISTON
- 2 – O-RING
- 3 – SNAP RING
- 4 – PISTON ROD GUIDE
- 5 – SNAP RING
- 6 – O-RING
- 7 – PISTON RETURN SPRING
- 8 – PISTON ROD
- 9 – SEAL RINGS

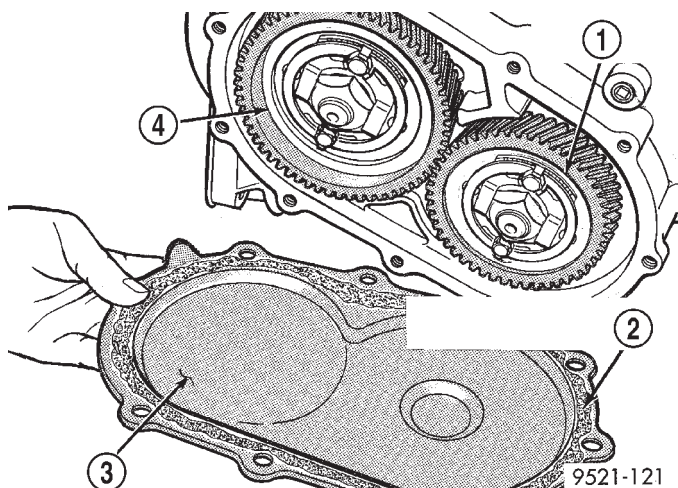
**ASSEMBLY**

To assemble, reverse the above procedure.

**TRANSFER SHAFT REPAIR****DISASSEMBLY****Fig. 135 Rear Cover Bolts**

- 1 – REAR COVER
- 2 – REAR COVER BOLTS (10)

## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 136 Remove or Install Rear Cover**

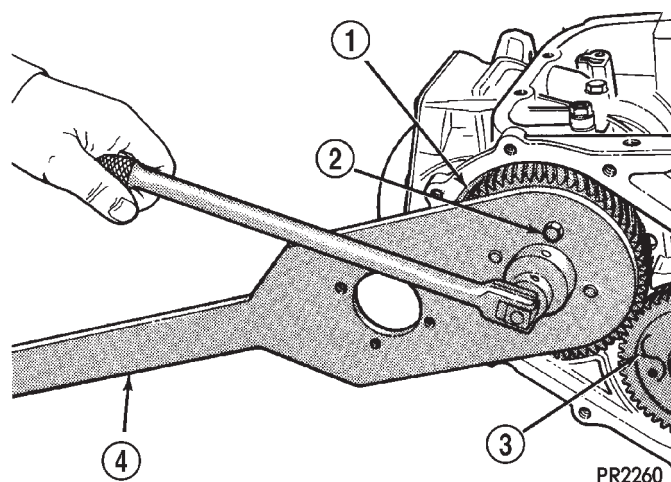
- 1 - OUTPUT SHAFT GEAR
- 2 - USE MOPAR SILICONE RUBBER ADHESIVE SEALER
- 3 - REAR COVER
- 4 - TRANSFER SHAFT GEAR

**NOTE:** Remove old sealant before applying new sealant. Use Mopar® RTV sealant, or equivalent, when installing cover.

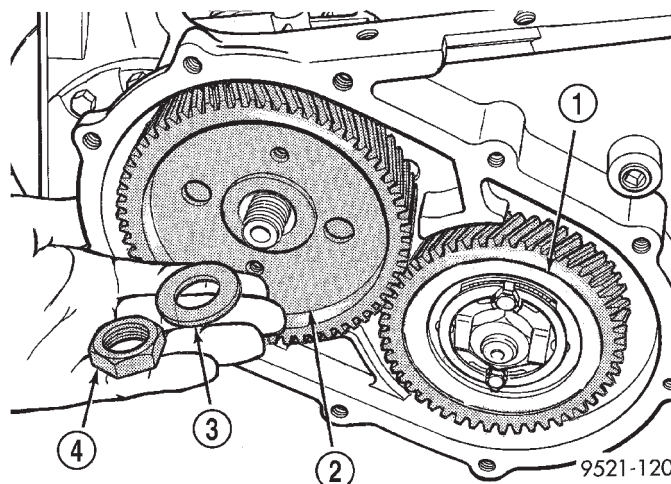
## STIRRUP AND STRAP REMOVAL

**NOTE:** A stirrup and retaining strap is attached to the transfer gear. The stirrup prevents the transfer gear retaining nut from turning and backing off the transfer shaft. The strap is used to hold the stirrup to the transfer gear and prevent the stirrup retaining bolts from backing out.

- (1) Using a punch, bend tabs on strap flat against transfer gear.
- (2) Remove bolts holding retaining strap to stirrup.
- (3) Remove strap from transfer gear and stirrup.
- (4) Remove stirrup from transfer gear.

**Fig. 137 Remove Transfer Shaft Gear Retaining Nut**

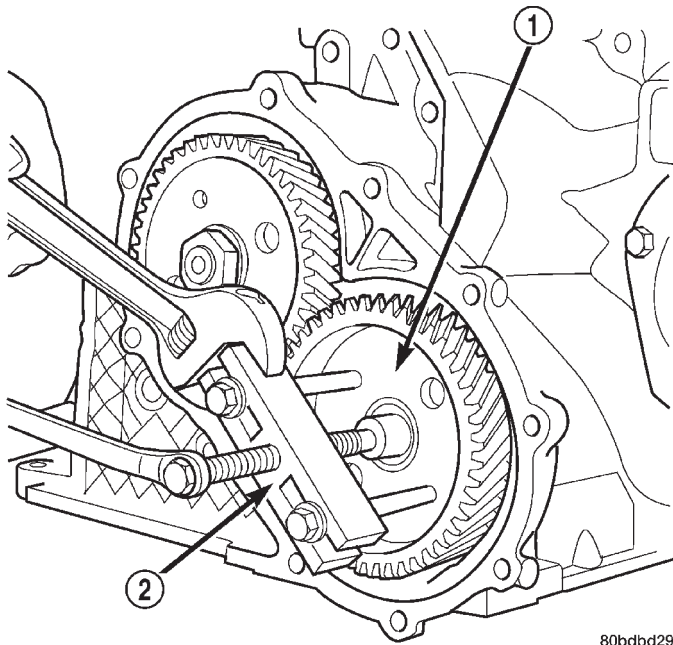
- 1 - TRANSFER SHAFT GEAR
- 2 - SCREW (2)
- 3 - OUTPUT SHAFT GEAR
- 4 - SPECIAL TOOL L-4434

**Fig. 138 Transfer Shaft Gear Nut and Washer**

- 1 - OUTPUT SHAFT GEAR
- 2 - TRANSFER SHAFT GEAR
- 3 - WASHER
- 4 - NUT



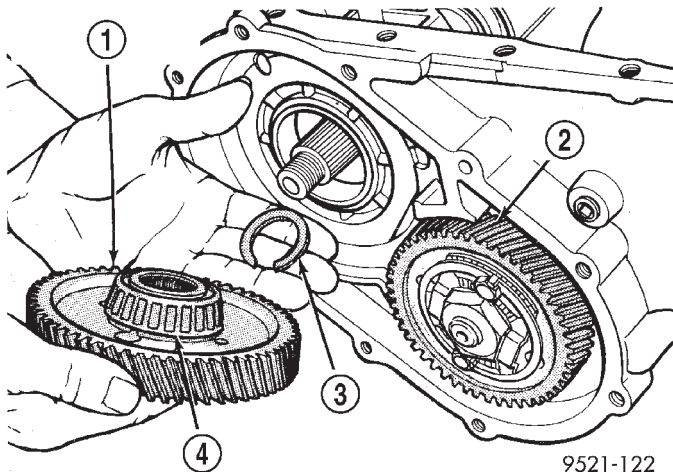
## DISASSEMBLY AND ASSEMBLY (Continued)



80bdbd29

**Fig. 139 Remove Transfer Shaft Gear using L-4407A**

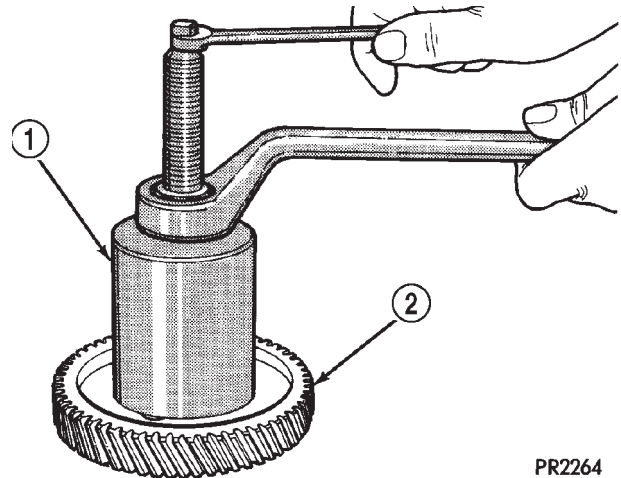
- 1 - TRANSFER GEAR
- 2 - TOOL L-4407A



9521-122

**Fig. 140 Transfer Shaft Gear and (Select) Shim**

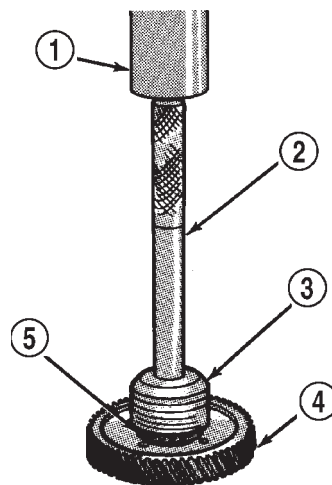
- 1 - TRANSFER SHAFT GEAR
- 2 - OUTPUT SHAFT GEAR
- 3 - SHIM (SELECT)
- 4 - BEARING CONE



PR2264

**Fig. 141 Using Tool L-4406-1 with Adapter L-4406-3, Remove Transfer Shaft Gear Bearing Cone**

- 1 - SPECIAL TOOL L-4406-1
- 2 - TRANSFER SHAFT GEAR



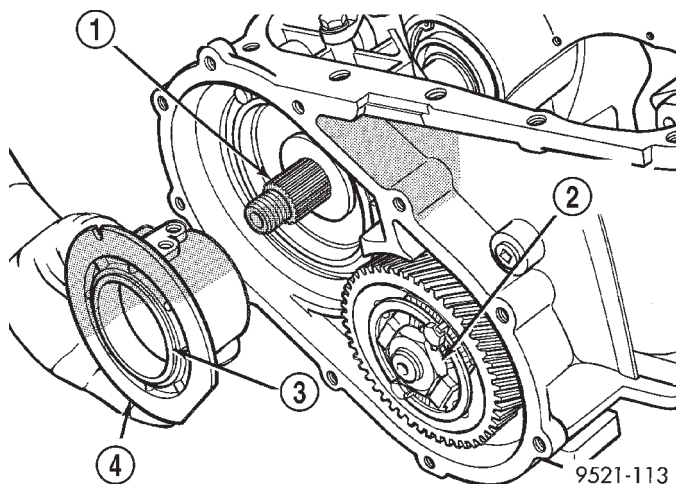
PR2265A

**Fig. 142 Install Transfer Shaft Gear Bearing Cone**

- 1 - PRESS
- 2 - HANDLE C-4171
- 3 - SPECIAL TOOL L-4410
- 4 - TRANSFER SHAFT GEAR
- 5 - BEARING CONE

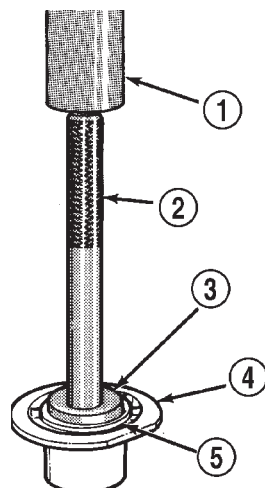


# DISASSEMBLY AND ASSEMBLY (Continued)



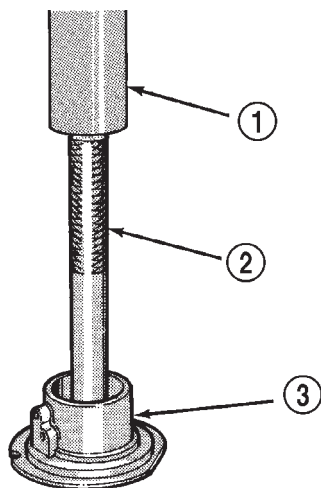
**Fig. 143 Governor Support Retainer**

- 1 - TRANSFER SHAFT
- 2 - OUTPUT SHAFT GEAR
- 3 - BEARING CUP
- 4 - GOVERNOR SUPPORT RETAINER



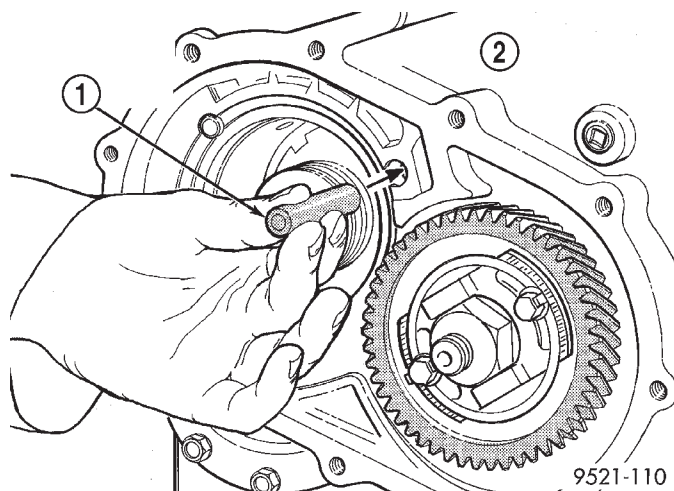
**Fig. 145 Install Governor Support Retainer Bearing Cup**

- 1 - PRESS
- 2 - HANDLE C-4171
- 3 - SPECIAL TOOL L-4520
- 4 - GOVERNOR SUPPORT RETAINER
- 5 - BEARING CUP



**Fig. 144 Remove Governor Support Retainer Bearing Cup**

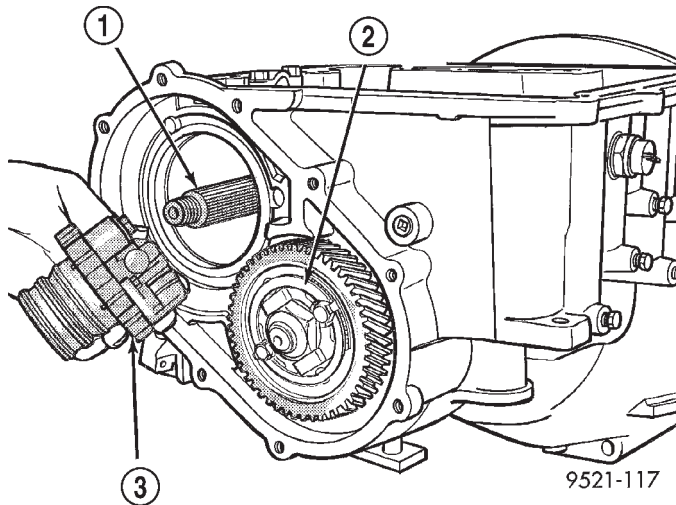
- 1 - PRESS
- 2 - HANDLE C-4171 (WITH SPECIAL TOOL L-4517)
- 3 - GOVERNOR SUPPORT RETAINER



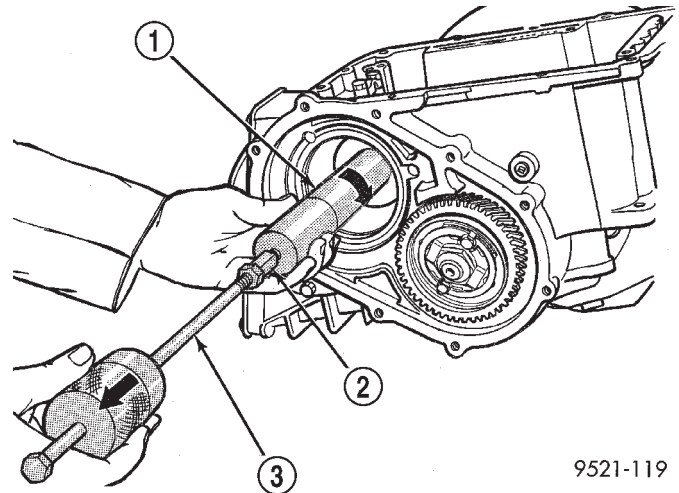
**Fig. 146 Low/Reverse Band Anchor Pin**

- 1 - LOW-REVERSE BAND ANCHOR PIN
- 2 - OUTPUT SHAFT GEAR

## DISASSEMBLY AND ASSEMBLY (Continued)

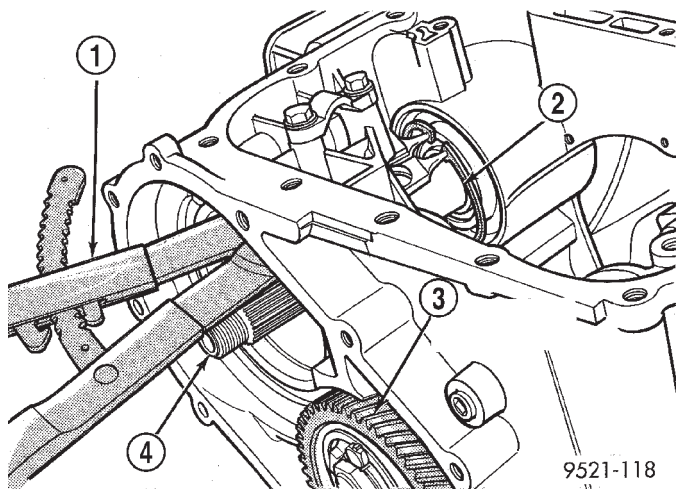
**Fig. 147 Governor Assembly**

- 1 - TRANSFER SHAFT
- 2 - OUTPUT SHAFT GEAR
- 3 - GOVERNOR ASSEMBLY

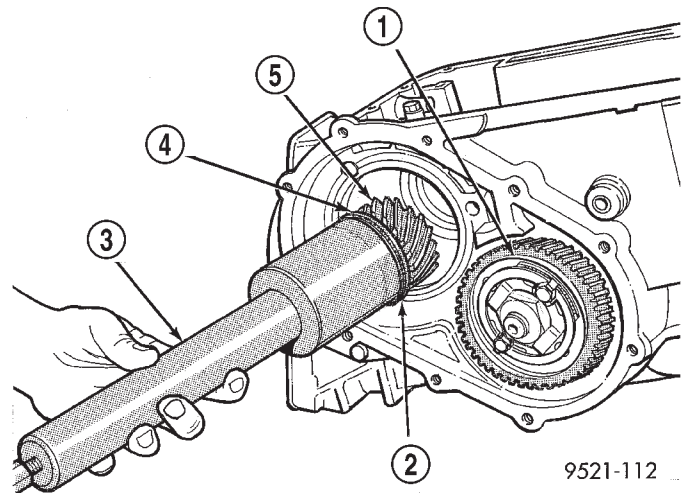
**Fig. 149 Remove Transfer Shaft and Bearing Retainer Assembly**

- 1 - SPECIAL TOOL L-4512
- 2 - SPECIAL TOOL L-4437
- 3 - SPECIAL TOOL C-3752

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

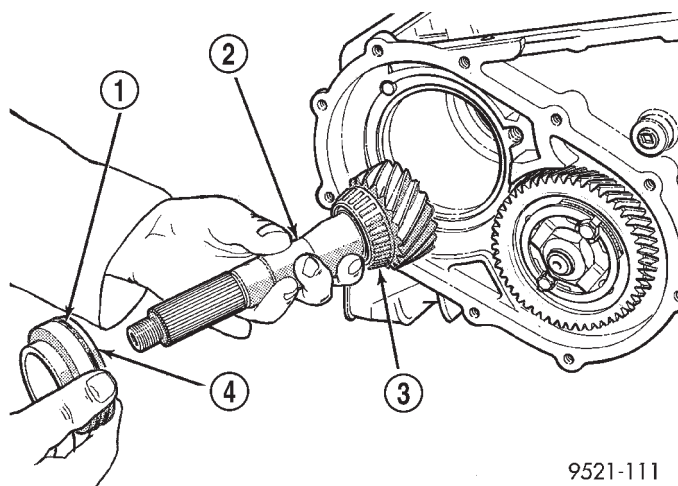
**Fig. 148 Transfer Shaft Bearing Snap Ring**

- 1 - SNAP RING PLIERS
- 2 - SNAP RING
- 3 - OUTPUT SHAFT GEAR
- 4 - TRANSFER SHAFT

**Fig. 150 Remove or Install Transfer Shaft and Bearing Retainer Assembly Using Tool L-4512**

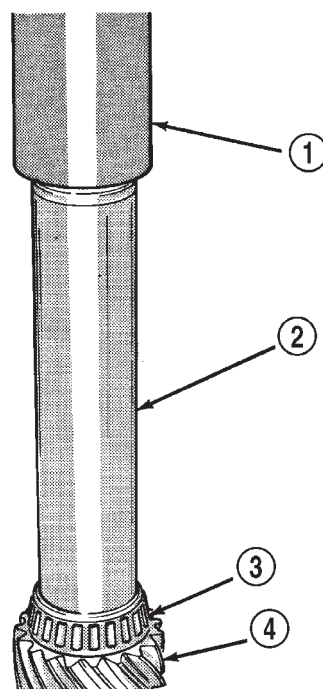
- 1 - OUTPUT SHAFT GEAR
- 2 - O-RING
- 3 - SPECIAL TOOL L-4512
- 4 - BEARING RETAINER ASSEMBLY
- 5 - TRANSFER SHAFT

# DISASSEMBLY AND ASSEMBLY (Continued)



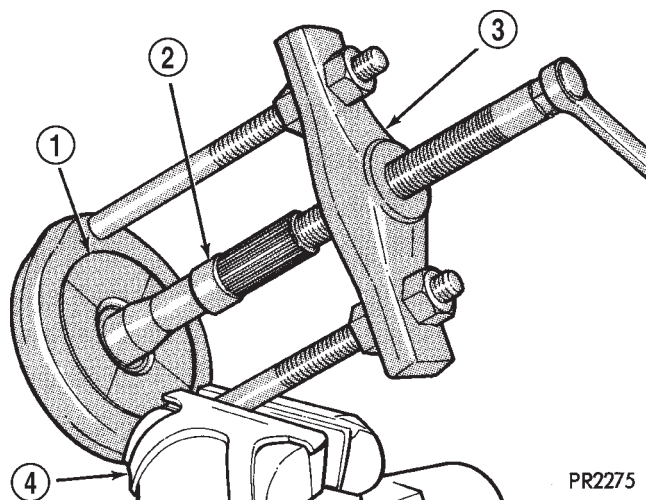
**Fig. 151 Transfer Shaft and Bearing Retainer**

- 1 - O-RING
- 2 - TRANSFER SHAFT
- 3 - BEARING CONE
- 4 - TRANSFER SHAFT BEARING RETAINER



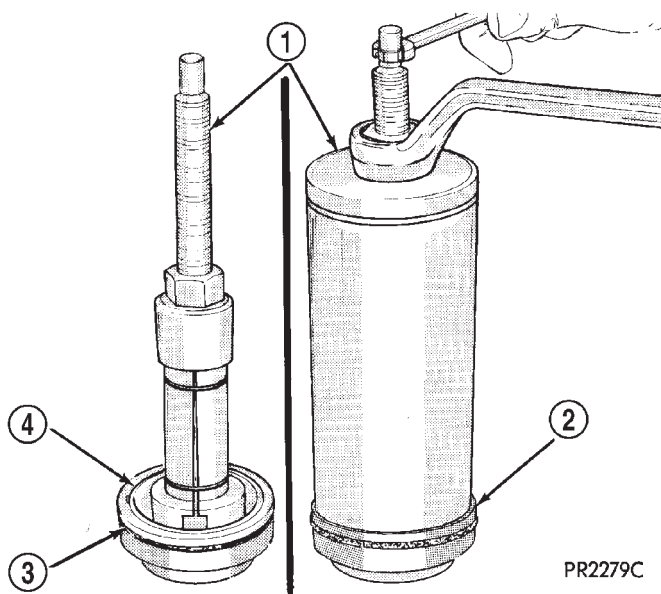
**Fig. 153 Install Transfer Shaft Bearing Cone**

- 1 - PRESS
- 2 - SPECIAL TOOL L-4411
- 3 - BEARING CONE
- 4 - TRANSFER SHAFT



**Fig. 152 Remove Transfer Shaft Bearing Cone**

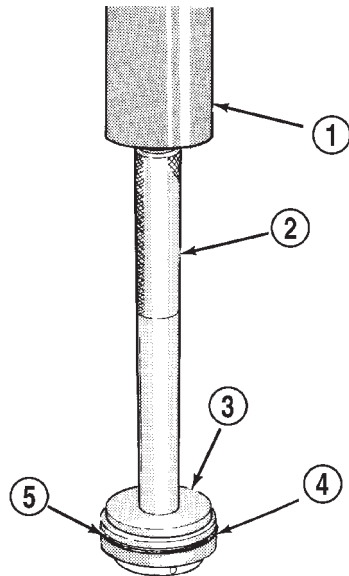
- 1 - TOOL C-293-52
- 2 - TRANSFER SHAFT
- 3 - TOOL C-293-PA
- 4 - VISE



**Fig. 154 Remove Transfer Shaft Bearing Cup**

- 1 - SPECIAL TOOL L-4518
- 2 - TRANSFER SHAFT BEARING RETAINER
- 3 - "O" RING
- 4 - BEARING CUP

## DISASSEMBLY AND ASSEMBLY (Continued)



PR2280C

**Fig. 155 Install Transfer Shaft Bearing Cup**

- 1 - PRESS
- 2 - HANDLE C-4171
- 3 - SPECIAL TOOL L-4520
- 4 - TRANSFER SHAFT BEARING RETAINER
- 5 - "O" RING

**DETERMINING SHIM THICKNESS**

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

- Transaxle case
- Transfer shaft
- Transfer shaft gear
- Transfer shaft bearings
- Governor support retainer
- Transfer shaft bearing retainer
- Retainer snap ring
- Governor support

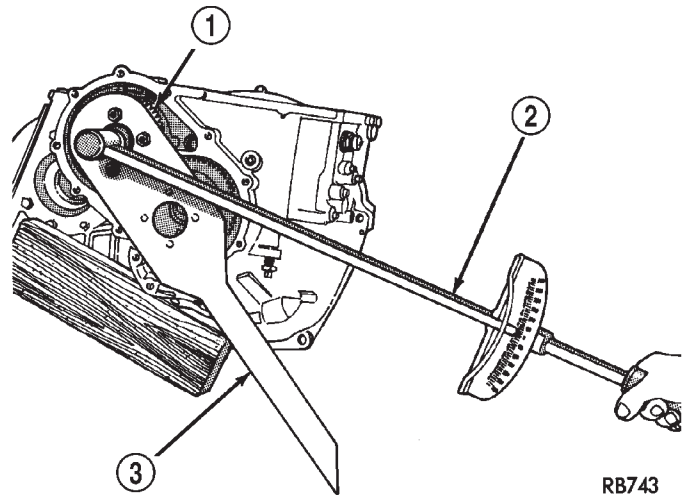
Refer to Bearing Adjustment Procedure in rear of this section to determine proper shim thickness.

**STIRRUP AND STRAP INSTALLATION**

Once bearing shim selection has been adjusted, install stirrup and strap assembly onto transfer gear.

**NOTE:** Once the stirrup assembly is positioned onto the transfer gear, it is necessary to "clock" the stirrup against the flats of the transfer gear retaining nut.

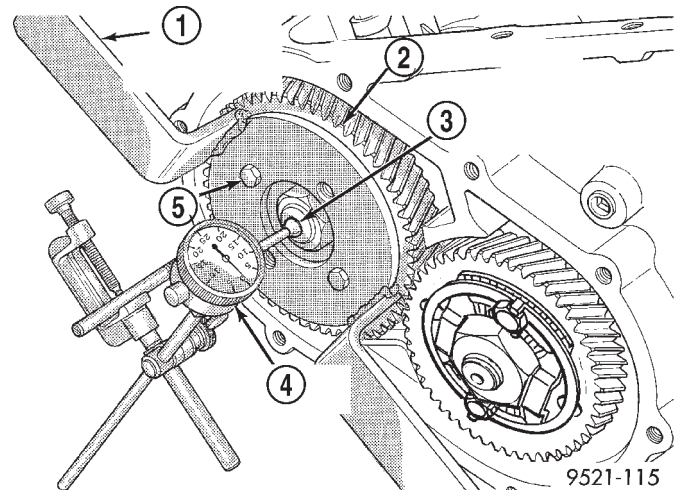
- (1) Position the stirrup on the transfer gear.
- (2) Position strap.
- (3) Install retaining bolts into transfer gear. Finger-tighten bolts.
- (4) Turn stirrup clockwise against the flats of the transfer gear retaining nut.
- (5) Tighten retaining bolts to 23 N-m (200 in. lbs.).



RB743

**Fig. 156 Tighten Transfer Shaft Gear Retaining Nut to 271 N-m (200 ft. lbs.)**

- 1 - TRANSFER SHAFT GEAR
- 2 - TORQUE WRENCH
- 3 - SPECIAL TOOL L-4434 AND ADAPTER C-4658



9521-115

**Fig. 157 Checking Transfer Shaft End Play**

- 1 - SPECIAL TOOL L-4432 AND C-4658
- 2 - TRANSFER SHAFT GEAR
- 3 - STEEL BALL (USE GREASE TO HOLD IN PLACE)
- 4 - DIAL INDICATOR
- 5 - SCREW (2)

(6) Bend tabs of strap up against "flats" of retaining bolts.

**ASSEMBLY**

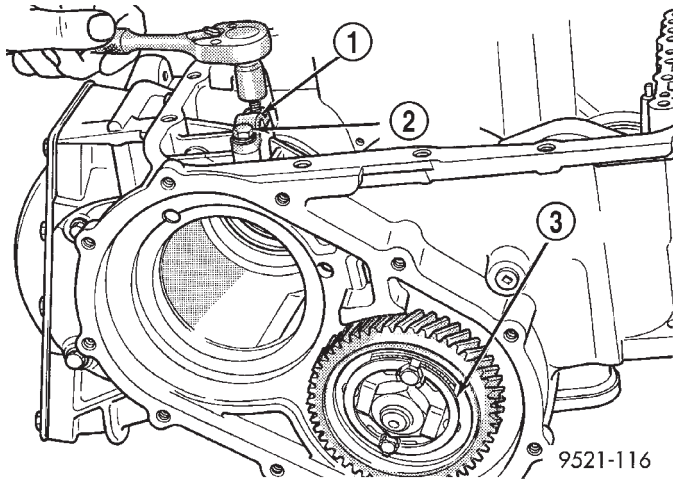
To install transfer shaft, reverse the above procedure.



## DISASSEMBLY AND ASSEMBLY (Continued)

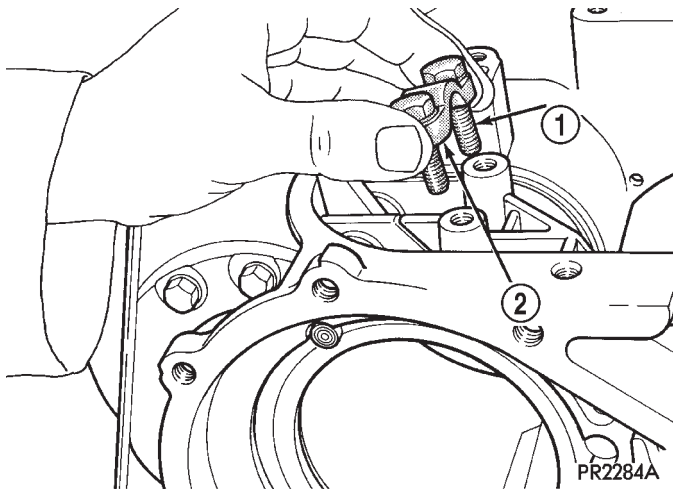
### PARKING PAWL

#### DISASSEMBLY



**Fig. 158 Parking Sprag Rod Support**

- 1 - PARKING SPRAG ROD SUPPORT
- 2 - BOLT (2)
- 3 - OUTPUT SHAFT GEAR



**Fig. 159 Support and Bolts**

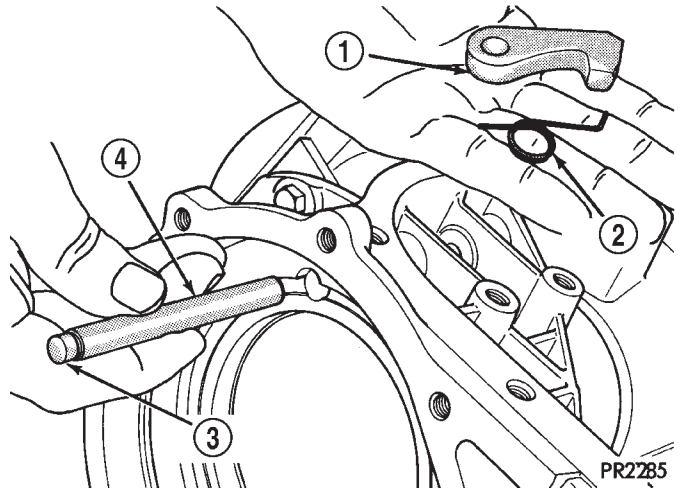
- 1 - BOLT (2)
- 2 - PARKING SPRAG ROD SUPPORT

#### ASSEMBLY

To install, reverse the above procedure.

### OUTPUT SHAFT REPAIR

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



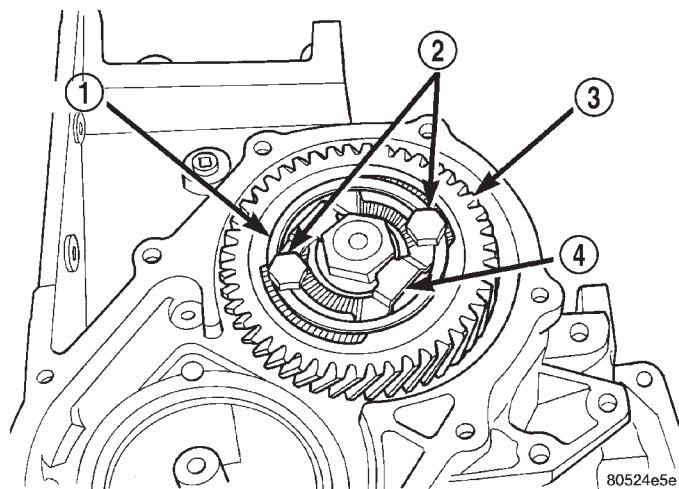
**Fig. 160 Parking Pawl, Return Spring, and Pivot Shaft**

- 1 - PARKING PAWL
- 2 - RETURN SPRING
- 3 - NOTE: SMALL DIAMETER TO REAR
- 4 - PIVOT SHAFT

### STIRRUP AND RETAINING STRAP

**NOTE:** A stirrup and retaining strap (Fig. 161) is attached to the output gear. The stirrup prevents the output gear retaining nut from turning and backing off the output shaft. The strap is used to hold the stirrup to the output gear and prevent the stirrup retaining bolts from backing out.

#### REMOVAL

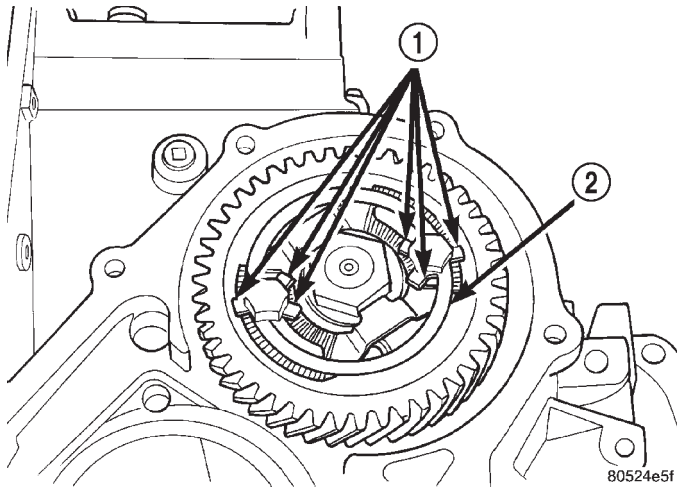


**Fig. 161 Stirrup and Retaining Strap Assembly**

- 1 - STRAP
- 2 - RETAINING BOLTS (2)
- 3 - OUTPUT GEAR
- 4 - STIRRUP

## DISASSEMBLY AND ASSEMBLY (Continued)

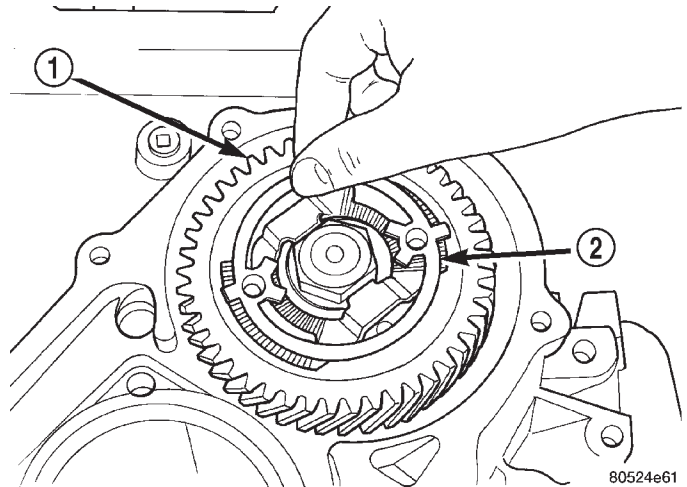
(1) Using a punch, bend tabs on strap flat against output gear (Fig. 162).



**Fig. 162 Bend Strap Tabs Flat**

- 1 - RETAINING TABS
- 2 - STRAP

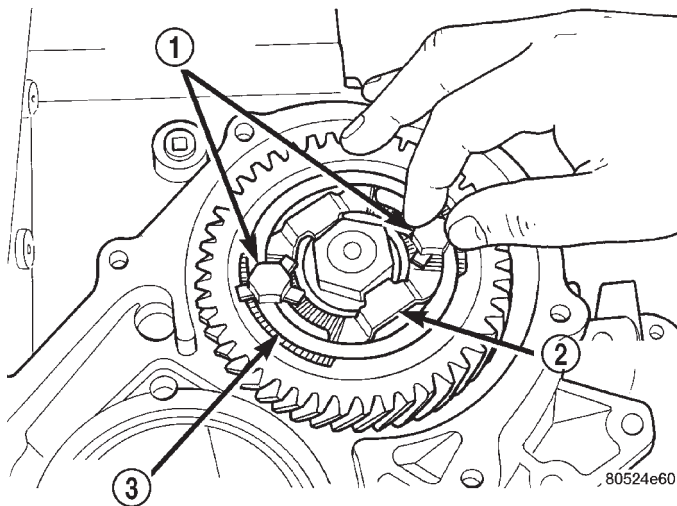
(3) Remove strap from output gear and stirrup (Fig. 164).



**Fig. 164 Remove Strap From Stirrup and Gear**

- 1 - OUTPUT GEAR
- 2 - STRAP

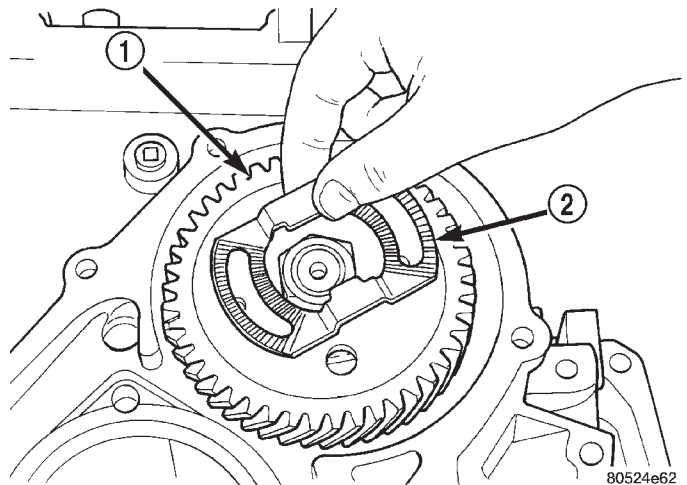
(2) Remove bolts holding retaining strap to stirrup (Fig. 163).



**Fig. 163 Remove Strap Bolts**

- 1 - RETAINING BOLTS
- 2 - STIRRUP
- 3 - STRAP

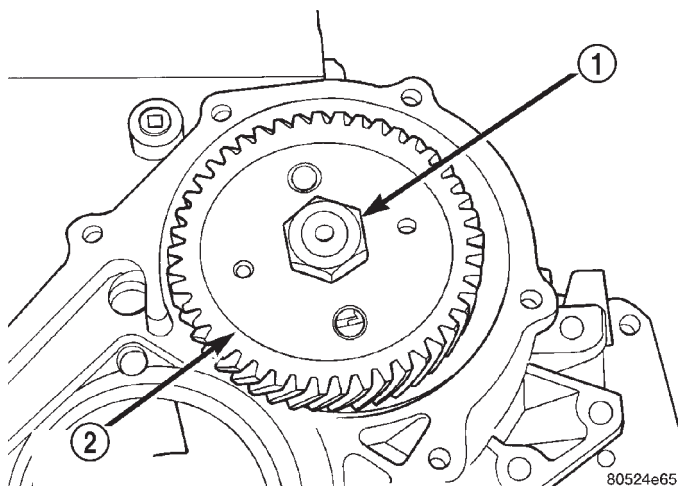
(4) Remove stirrup from output gear (Fig. 165) (Fig. 166).



**Fig. 165 Remove Stirrup From Gear**

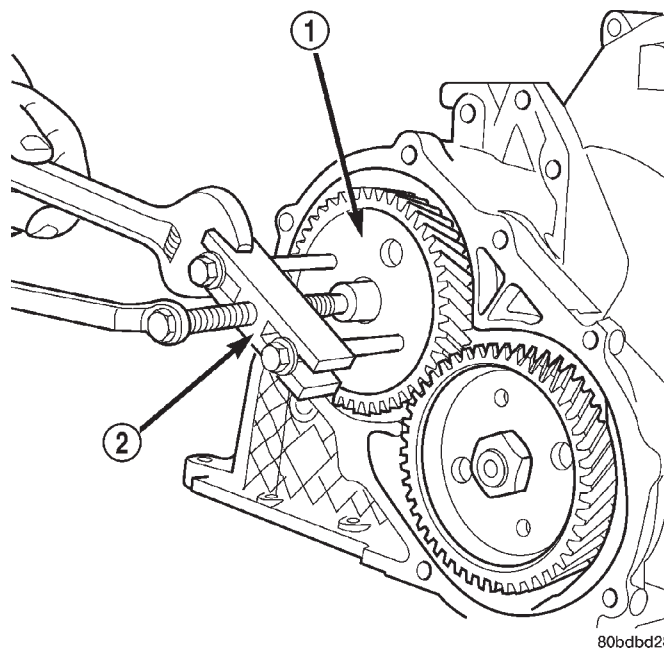
- 1 - OUTPUT GEAR
- 2 - STIRRUP

# DISASSEMBLY AND ASSEMBLY (Continued)



**Fig. 166 Stirrup and Strap Removed From Output Gear**

- 1 - OUTPUT GEAR RETAINING NUT
- 2 - OUTPUT GEAR

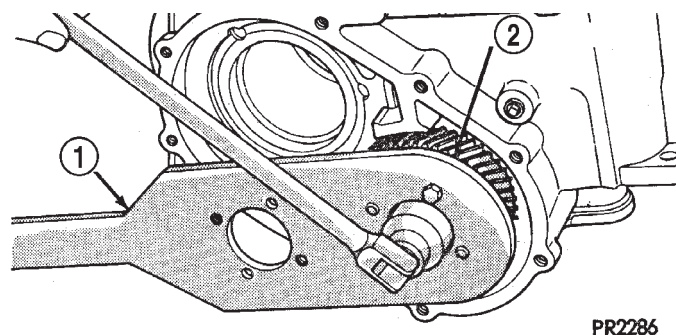


**Fig. 168 Remove Output Shaft Gear using L-4407A**

- 1 - OUTPUT GEAR
- 2 - TOOL L-4407A

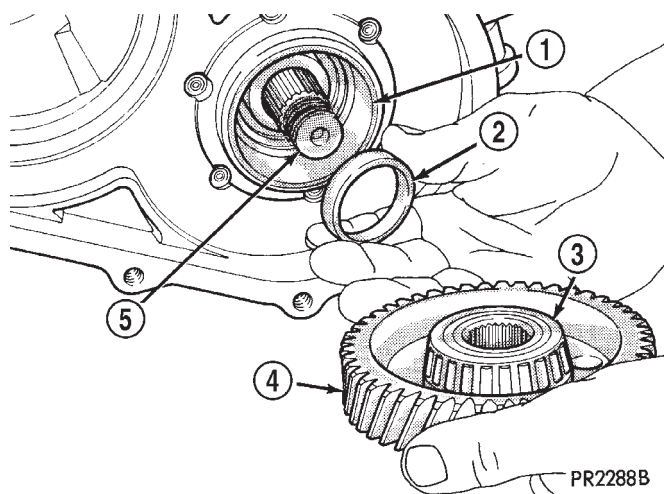
## OUTPUT GEAR AND SHAFT

### DISASSEMBLY



**Fig. 167 Remove Output Shaft Retaining Nut and Washer**

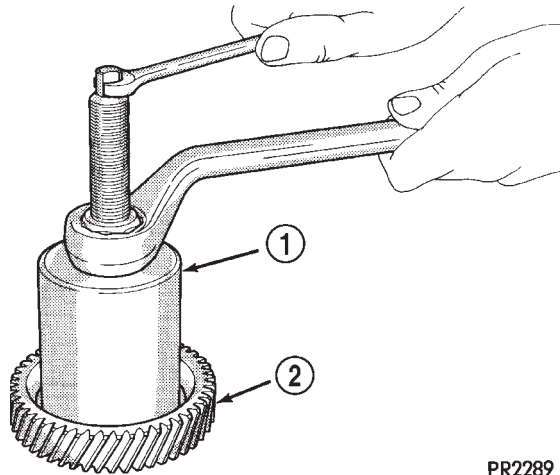
- 1 - SPECIAL TOOL L-4434
- 2 - OUTPUT SHAFT GEAR



**Fig. 169 Output Shaft Gear and (Select) Shim**

- 1 - BEARING CUP
- 2 - SHIM (SELECT)
- 3 - BEARING CONE
- 4 - OUTPUT SHAFT GEAR
- 5 - OUTPUT SHAFT

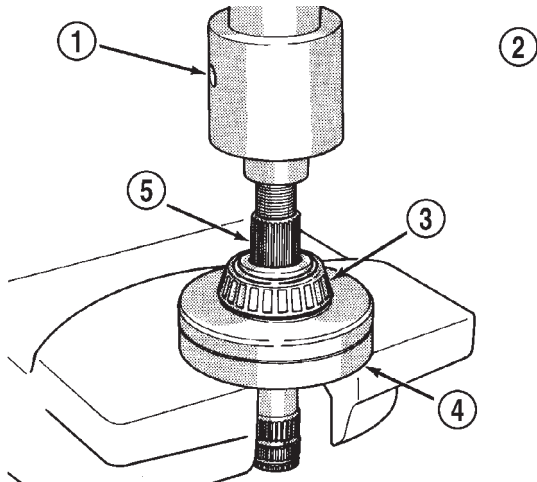
## DISASSEMBLY AND ASSEMBLY (Continued)



PR2289

**Fig. 170 Remove Output Shaft Gear Bearing Cone**

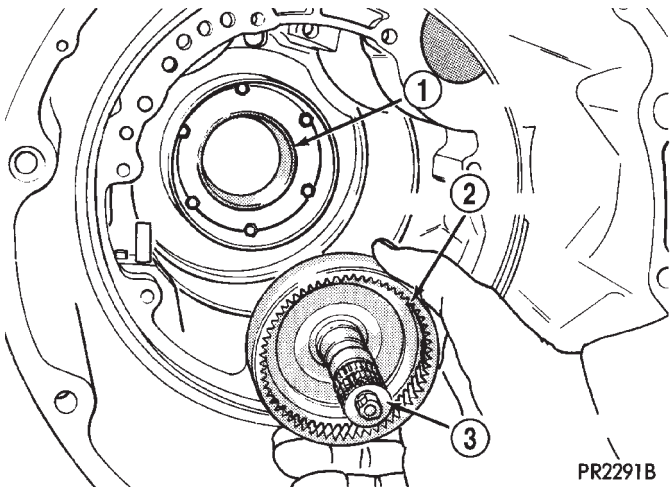
- 1 - SPECIAL TOOL L-4406-1 WITH ADAPTERS L-4406-2  
2 - OUTPUT SHAFT GEAR



PR2292C

**Fig. 172 Remove Output Shaft**

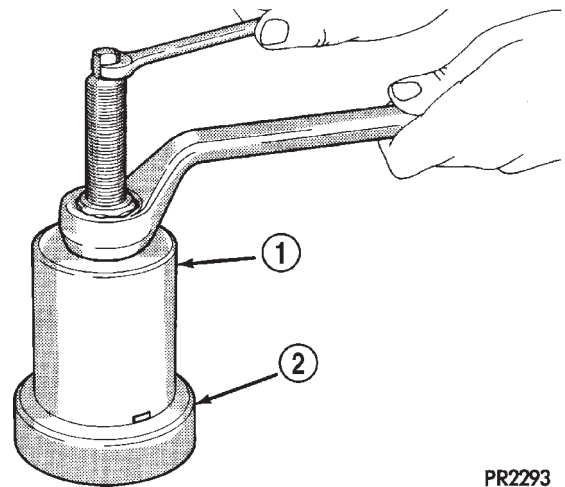
- 1 - ARBOR PRESS RAM  
2 - CAUTION: SUPPORT ANNULUS GEAR UNDERNEATH, NEAR GEAR CENTER.  
3 - BEARING CONE  
4 - REAR ANNULUS GEAR  
5 - OUTPUT SHAFT



PR2291B

**Fig. 171 Remove Output Shaft and Rear Annulus Gear Assembly**

- 1 - BEARING CUP  
2 - REAR ANNULUS GEAR  
3 - OUTPUT SHAFT



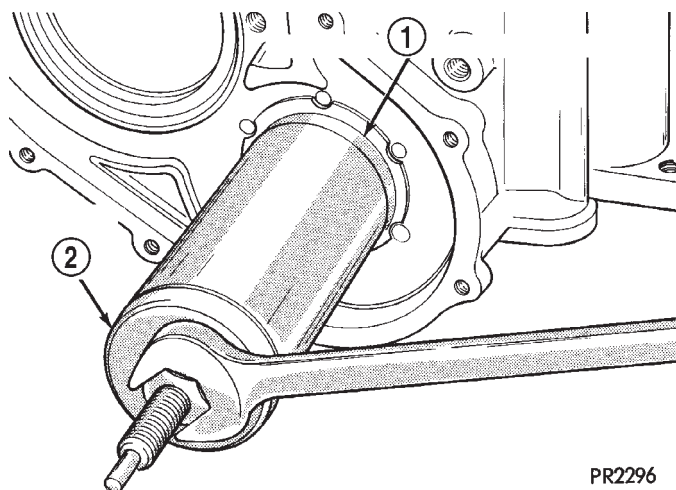
PR2293

**Fig. 173 Remove Rear Planetary Annulus Gear Bearing Cone**

- 1 - SPECIAL TOOL L-4406-1 WITH ADAPTERS L-4406-2  
2 - REAR PLANETARY ANNULUS GEAR

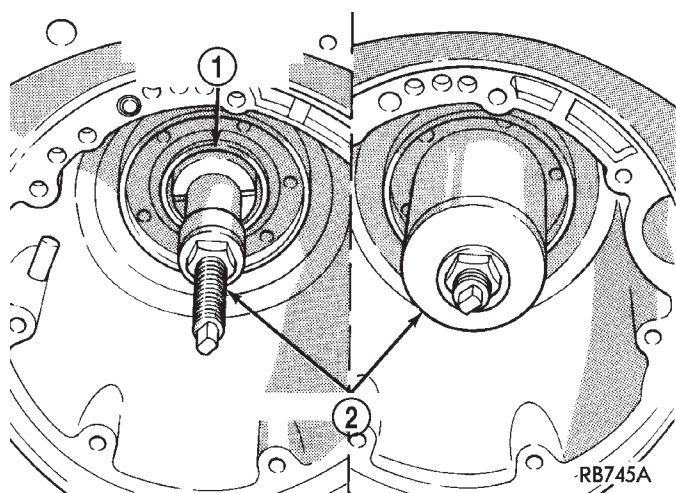


# DISASSEMBLY AND ASSEMBLY (Continued)



**Fig. 174 Remove Output Shaft Gear Bearing Cup**

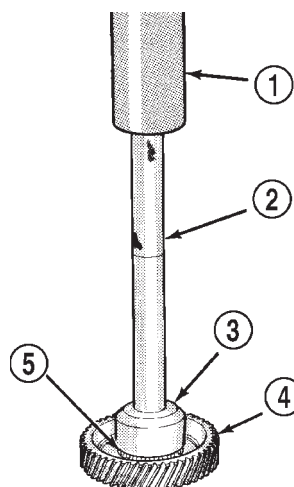
- 1 - OUTPUT SHAFT GEAR BEARING CUP
- 2 - SPECIAL TOOL L-4518



**Fig. 175 Remove Rear Planetary Annulus Gear Bearing Cup**

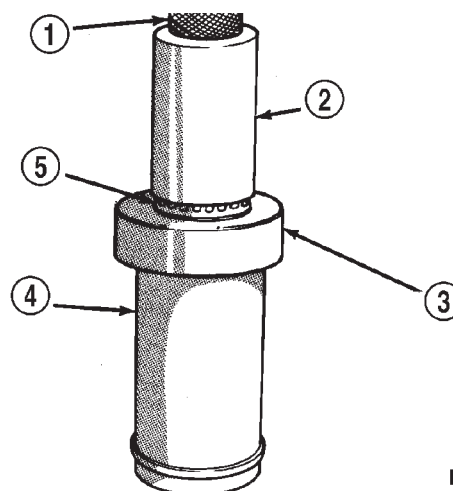
- 1 - REAR PLANETARY ANNULUS GEAR BEARING CUP
- 2 - SPECIAL TOOL L-4518

## ASSEMBLY



**Fig. 176 Install Output Shaft Gear Bearing Cone**

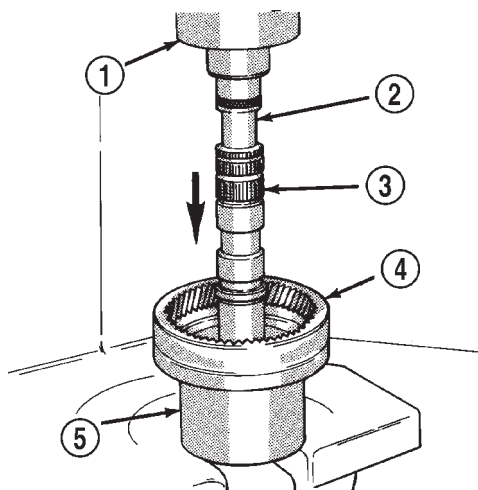
- 1 - PRESS
- 2 - HANDLE C-4171
- 3 - SPECIAL TOOL L-4408
- 4 - OUTPUT SHAFT GEAR
- 5 - BEARING CONE



**Fig. 177 Install Rear Planetary Annulus Gear Bearing Cone**

- 1 - ARBOR PRESS RAM
- 2 - SPECIAL TOOL C-4637
- 3 - REAR PLANETARY ANNULUS GEAR
- 4 - CUP FROM TOOL L-4518
- 5 - BEARING CONE

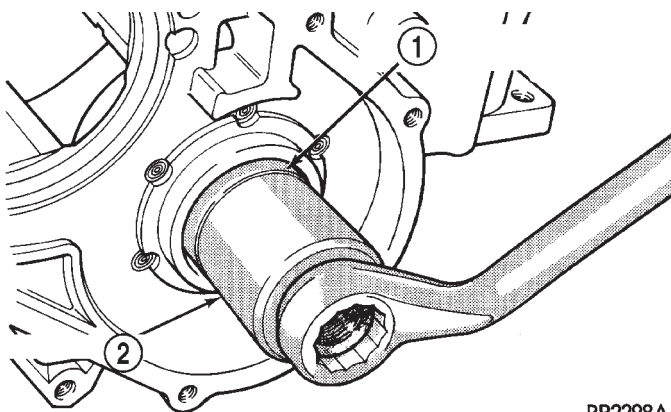
## DISASSEMBLY AND ASSEMBLY (Continued)



PR2295A

**Fig. 178 Install Output Shaft into Rear Planetary Annulus Gear**

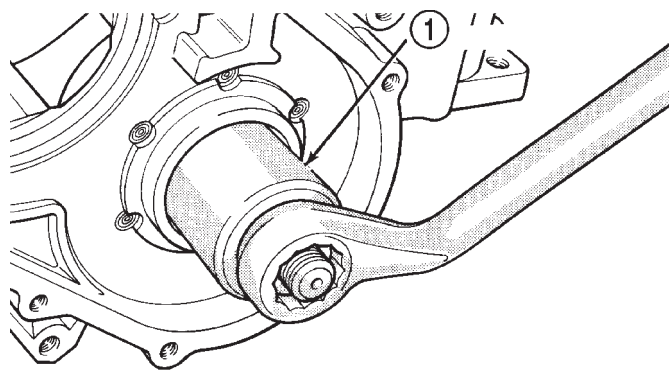
- 1 - PRESS
- 2 - 1/2 INCH SOCKET
- 3 - OUTPUT SHAFT
- 4 - REAR ANNULUS GEAR
- 5 - SPACER



PR2298A

**Fig. 179 Install Output Shaft Gear Bearing Cup**

- 1 - OUTPUT SHAFT GEAR BEARING CUP
- 2 - SPECIAL TOOL L-4429-3



PR2299 B

**Fig. 180 Install Rear Planetary Annulus Gear Bearing Cup**

- 1 - SPECIAL TOOL L-4429-3

### DETERMINING SHIM THICKNESS

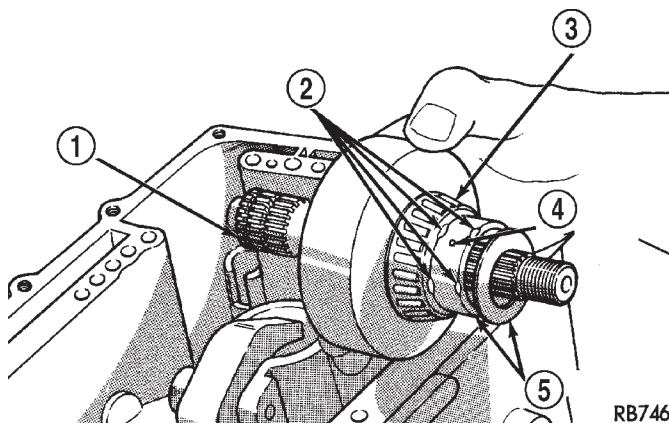
Shim thickness need be determined only if any of the following parts are replaced:

- Transaxle case
- Output shaft
- Rear planetary annulus gear
- Output shaft gear
- Rear annulus and output shaft gear bearing cones

- Overrunning clutch race cups

Refer to Bearing Adjustment Procedure at the rear of this section, to determine proper shim thickness.

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

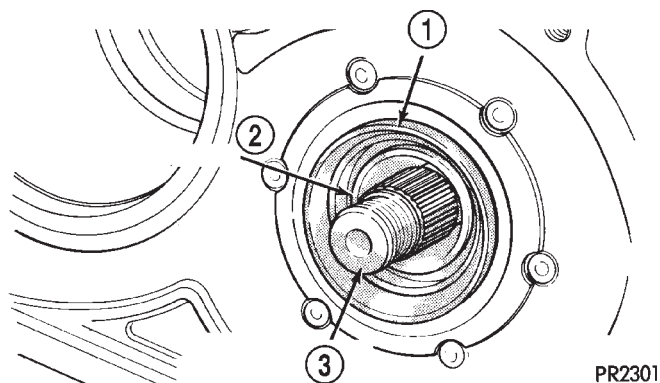


RB746

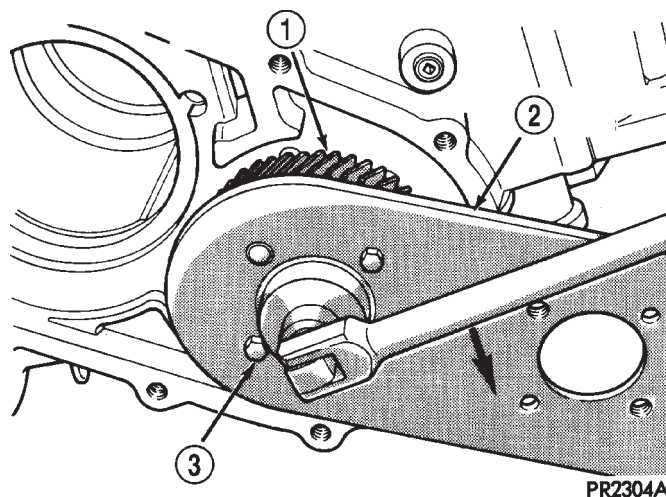
**Fig. 181 Install Output Shaft Assembly**

- 1 - OUTPUT SHAFT ASSEMBLY
- 2 - USE GREASE TO HOLD SHIMS IN POSITION
- 3 - BEARING CONE
- 4 - LUBRICATION HOLE
- 5 - SELECT SHIMS

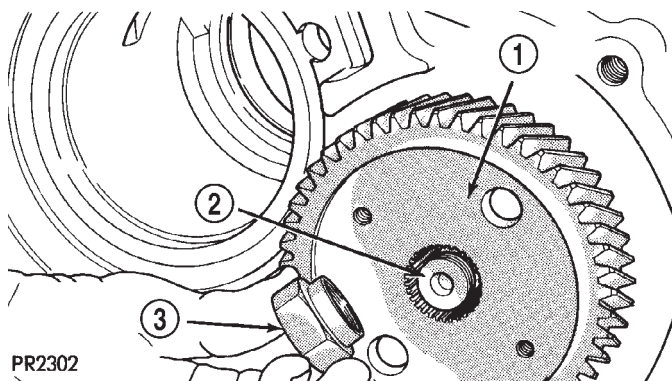
## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 182 Output Shaft and (Select) Shims in Position**

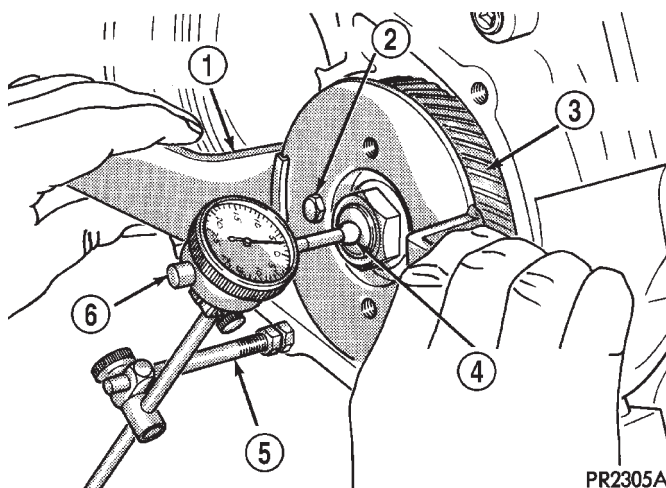
- 1 - BEARING CUP
- 2 - (SELECT) SHIM
- 3 - OUTPUT SHAFT ASSEMBLY

**Fig. 185 Tighten Output Shaft Retaining Nut to 271 N·m (200 ft. lbs.)**

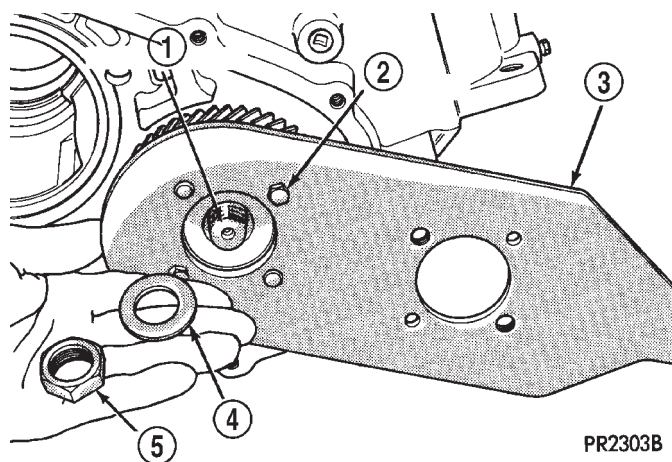
- 1 - OUTPUT SHAFT GEAR
- 2 - SPECIAL TOOL L-4434 AND C-4658
- 3 - SCREW (2)

**Fig. 183 Start Output Shaft Gear onto Output Shaft**

- 1 - OUTPUT SHAFT GEAR
- 2 - OUTPUT SHAFT
- 3 - SPECIAL TOOL L-4439

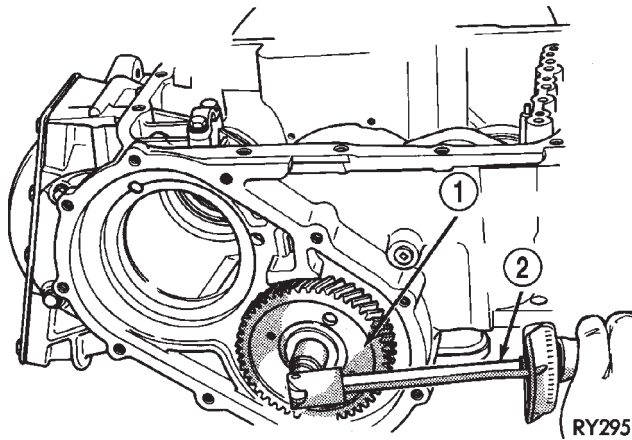
**Fig. 186 Checking Output Shaft End Play**

- 1 - SPECIAL TOOL L-4432 AND C-4658
- 2 - SCREW (2)
- 3 - OUTPUT SHAFT GEAR
- 4 - STEEL BALL (GREASE IN PLACE)
- 5 - SPECIAL TOOL L-4438
- 6 - DIAL INDICATOR

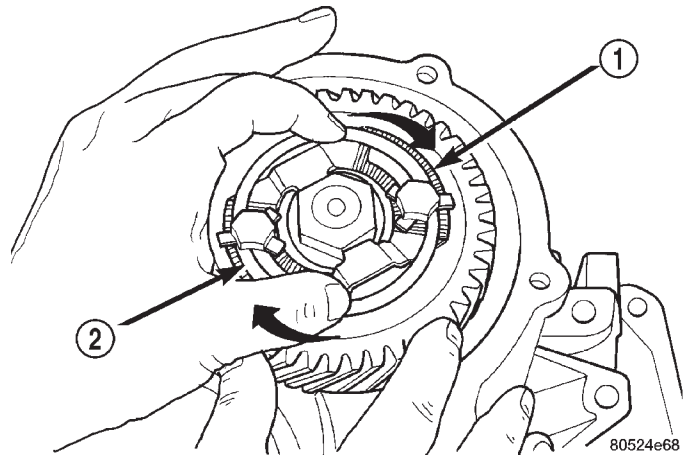
**Fig. 184 Holding Output Shaft Gear**

- 1 - OUTPUT SHAFT
- 2 - SCREW (2)
- 3 - SPECIAL TOOL L-4434 AND C-4658
- 4 - WASHER
- 5 - NUT

## DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 187 Checking Bearing Turning Torque**

- 1 - OUTPUT SHAFT GEAR
- 2 - TORQUE WRENCH

**Fig. 188 Turn Stirrup Clockwise Against Flats Of Retaining Nut**

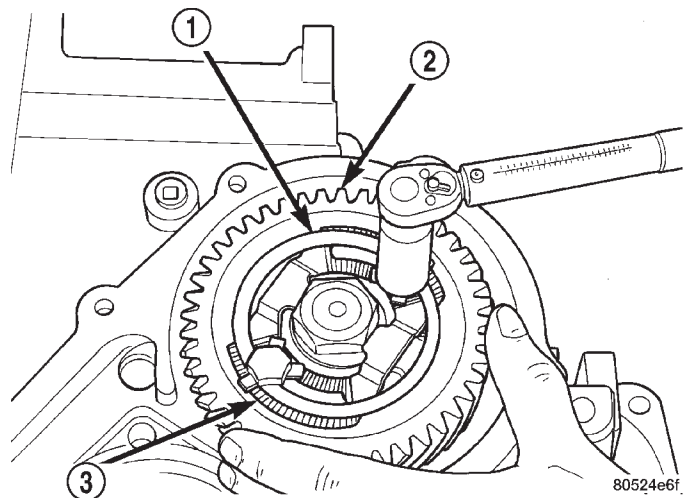
- 1 - TURN STIRRUP CLOCKWISE
- 2 - STRAP

**STIRRUP AND RETAINING STRAP****INSTALLATION**

Once bearing turning torque and shim selection has been adjusted, install stirrup and strap assembly onto output gear.

**NOTE:** Once the stirrup assembly is positioned onto the output gear, it is necessary to “clock” the stirrup against the flats of the output gear retaining nut.

- (1) Position the stirrup on the output gear.
- (2) Position strap.
- (3) Install retaining bolts into output gear. Finger-tighten bolts.
- (4) Turn stirrup clockwise against the flats of the output gear retaining nut (Fig. 188).
- (5) Tighten retaining bolts to 23 N·m (200 in. lbs.) (Fig. 189).
- (6) Bend tabs of strap up against “flats” of retaining bolts.

**Fig. 189 Tighten Strap Retaining Nuts**

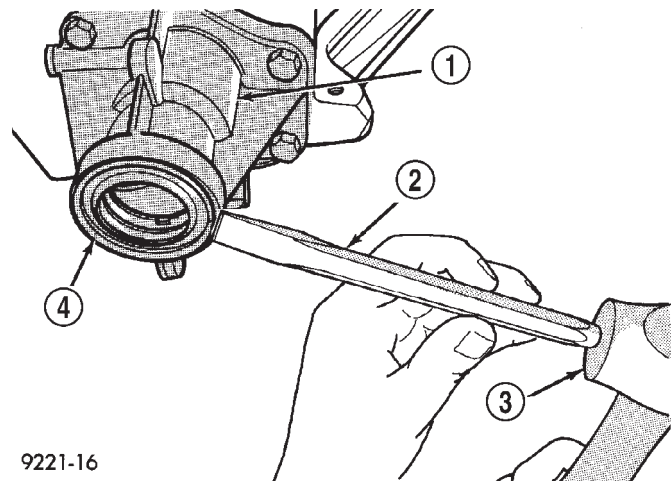
- 1 - STRAP
- 2 - OUTPUT GEAR
- 3 - STIRRUP



## DISASSEMBLY AND ASSEMBLY (Continued)

### DIFFERENTIAL REPAIR

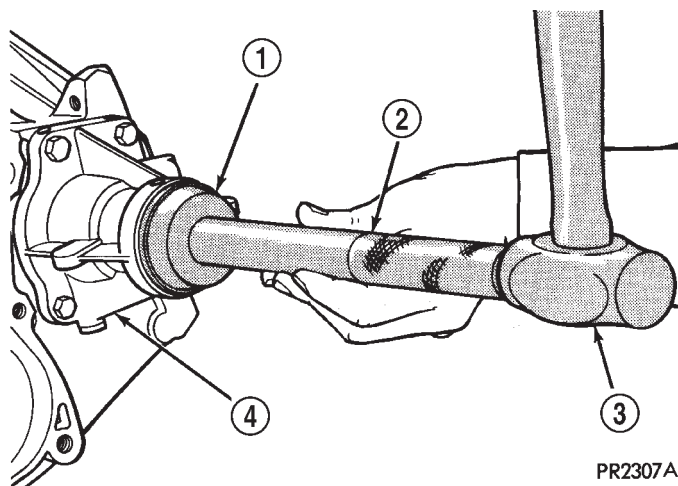
**NOTE:** The transfer shaft should be removed for differential repair and bearing turning torque checking.



9221-16

**Fig. 190 Remove Extension Seal**

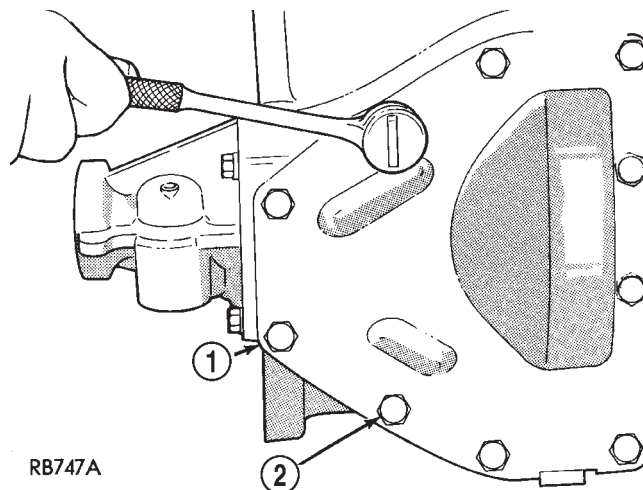
- 1 - EXTENSION HOUSING
- 2 - SMALL CHISEL
- 3 - HAMMER
- 4 - OIL SEAL



PR2307A

**Fig. 191 Install New Seal into Extension**

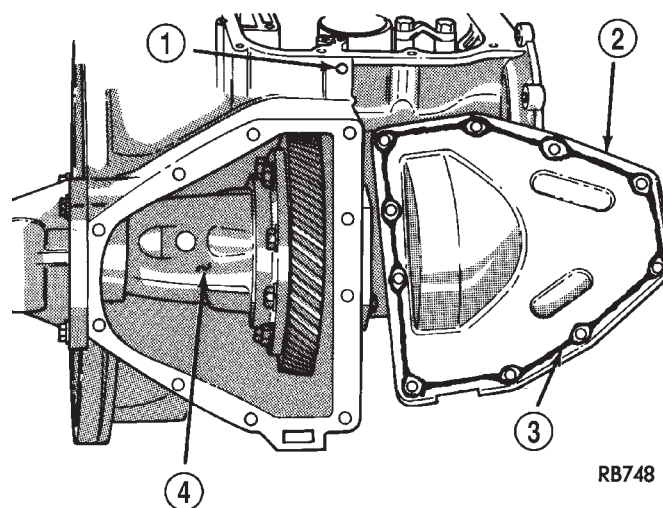
- 1 - SPECIAL TOOL L-4520 (INVERTED)
- 2 - HANDLE C-4171
- 3 - HAMMER
- 4 - EXTENSION HOUSING



RB747A

**Fig. 192 Differential Cover Bolts**

- 1 - DIFFERENTIAL COVER
- 2 - DIFFERENTIAL COVER BOLT



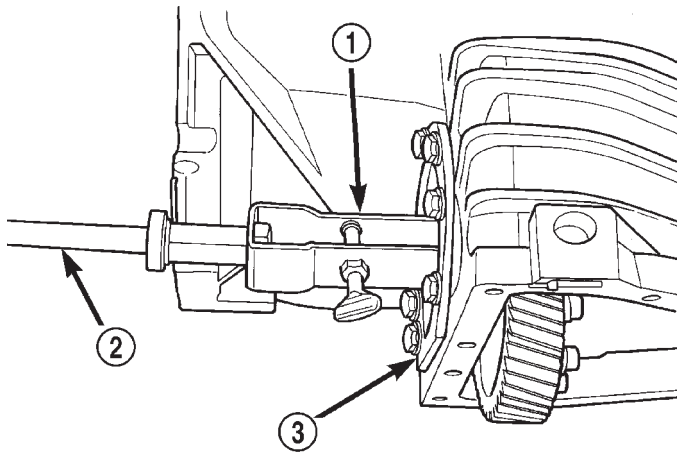
RB748

**Fig. 193 Remove or Install Differential Cover**

- 1 - GOVERNOR PRESSURE PLUG
- 2 - DIFFERENTIAL COVER
- 3 - 1/8 INCH BEAD OF R T V SEALANT
- 4 - DIFFERENTIAL ASSEMBLY

## DISASSEMBLY AND ASSEMBLY (Continued)

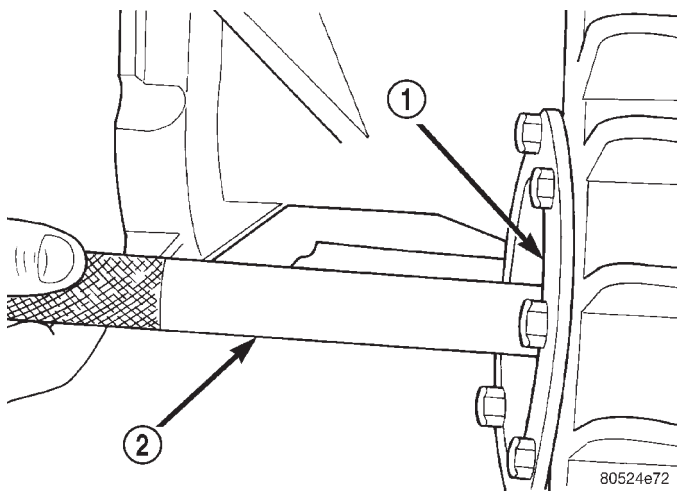
**NOTE:** Use Mopar® RTV sealant, or equivalent, when installing differential cover.



80524e71

**Fig. 194 Remove Bearing Retainer Axle Seal**

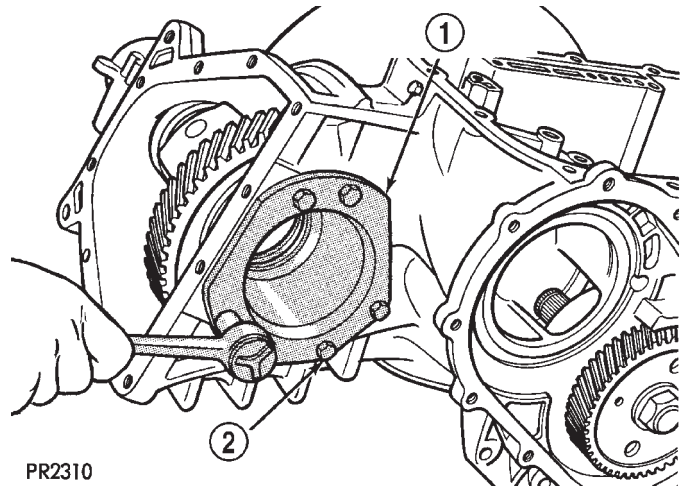
- 1 - SPECIAL TOOL 7794A
- 2 - SPECIAL TOOL C-637
- 3 - DIFFERENTIAL BEARING RETAINER



80524e72

**Fig. 195 Install Bearing Retainer Axle Seal**

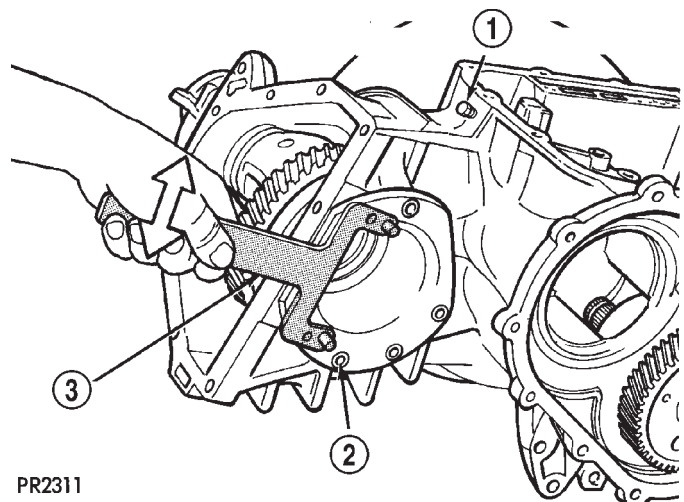
- 1 - SPECIAL TOOL L-4520
- 2 - SPECIAL TOOL C-4171



PR2310

**Fig. 196 Differential Bearing Retainer Bolts**

- 1 - DIFFERENTIAL BEARING RETAINER
- 2 - DIFFERENTIAL BEARING RETAINER BOLTS (6)

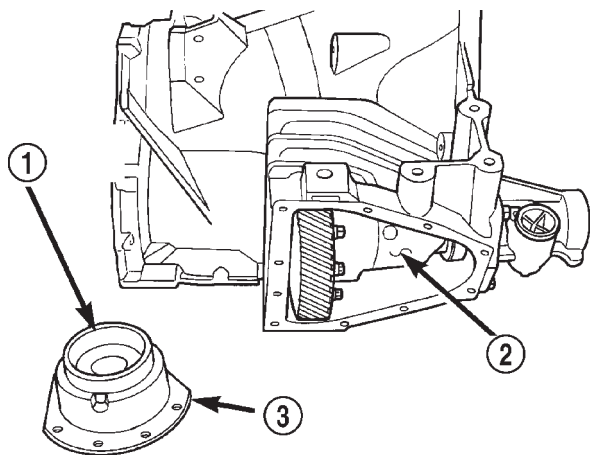


PR2311

**Fig. 197 Remove or Install Bearing Retainer**

- 1 - GOVERNOR PRESSURE PLUG
- 2 - DIFFERENTIAL BEARING RETAINER
- 3 - SPECIAL TOOL L-4435

## DISASSEMBLY AND ASSEMBLY (Continued)

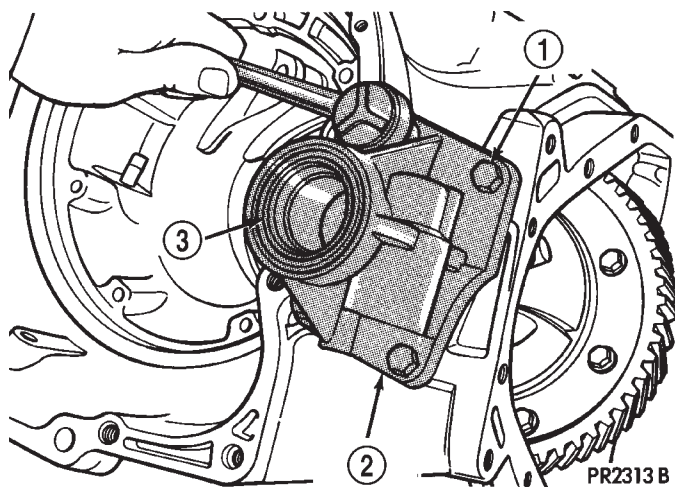


80524e70

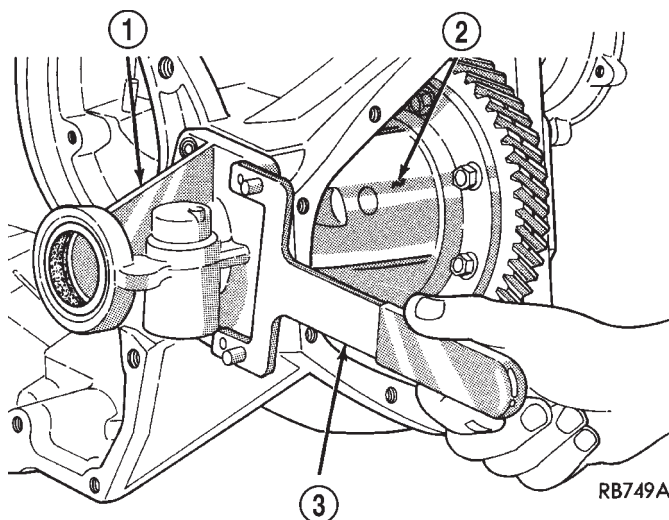
**Fig. 198 Differential Bearing Retainer (Typical)**

- 1 - DIFFERENTIAL BEARING CUP
- 2 - DIFFERENTIAL
- 3 - DIFFERENTIAL BEARING RETAINER

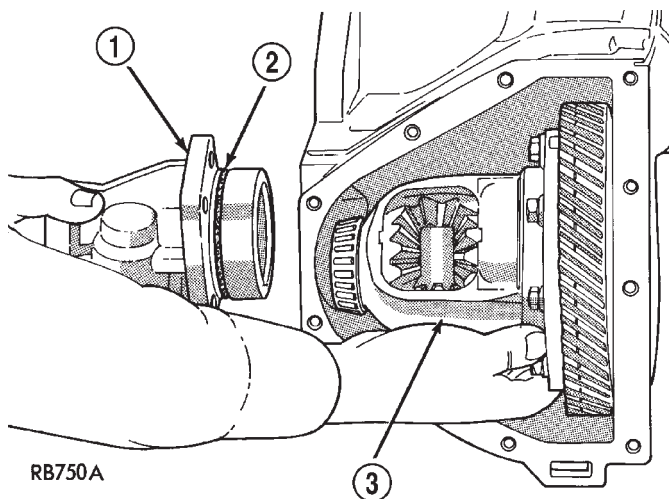
**NOTE:** Use Mopar® RTV sealant, or equivalent, when installing differential bearing retainer.

**Fig. 199 Extension Bolts**

- 1 - EXTENSION HOUSING BOLTS (4)
- 2 - EXTENSION HOUSING
- 3 - OIL SEAL

**Fig. 200 Remove or Install Extension Housing**

- 1 - EXTENSION HOUSING
- 2 - DIFFERENTIAL ASSEMBLY
- 3 - SPECIAL TOOL L-4435

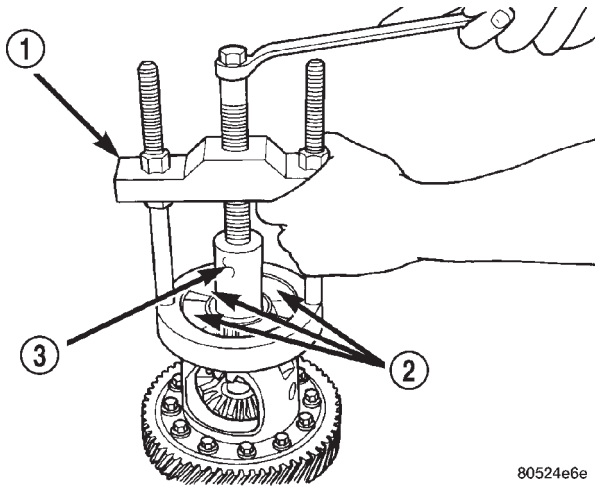
**Fig. 201 Differential and Extension**

- 1 - EXTENSION HOUSING
- 2 - "O" RING
- 3 - DIFFERENTIAL ASSEMBLY

## DISASSEMBLY AND ASSEMBLY (Continued)

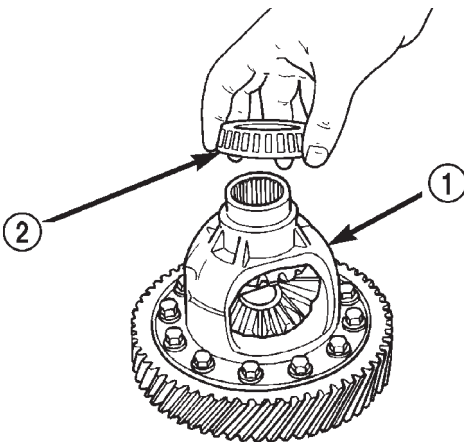
**WARNING: HOLD ONTO DIFFERENTIAL ASSEMBLY TO PREVENT IT FROM ROLLING OUT OF HOUSING.**

Use Mopar® Silicone Rubber Adhesive Sealant, or equivalent, when installing extension housing.



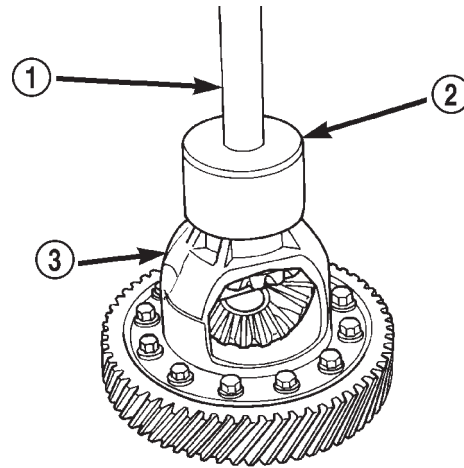
**Fig. 202 Remove Differential Bearing Cone (Extension Housing Side)**

- 1 - SPECIAL TOOL C-293
- 2 - SPECIAL TOOL C-293-36
- 3 - SPECIAL TOOL C-293-3



**Fig. 203 Position Bearing Cone Onto Differential**

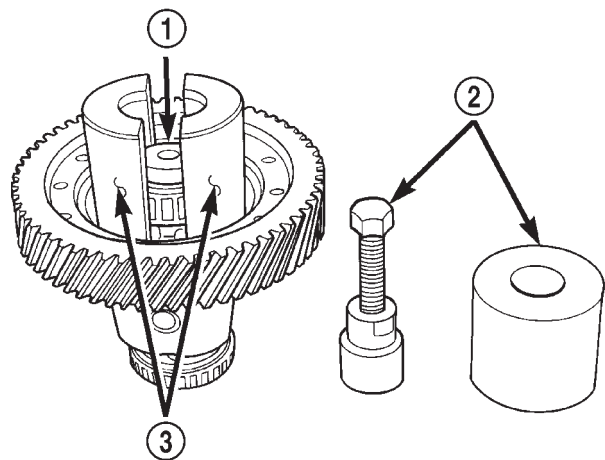
- 1 - DIFFERENTIAL ASSEMBLY
- 2 - DIFFERENTIAL BEARING



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**Fig. 204 Install Differential Bearing Cone**

- 1 - SPECIAL TOOL C-4171
- 2 - SPECIAL TOOL 6536
- 3 - DIFFERENTIAL ASSEMBLY



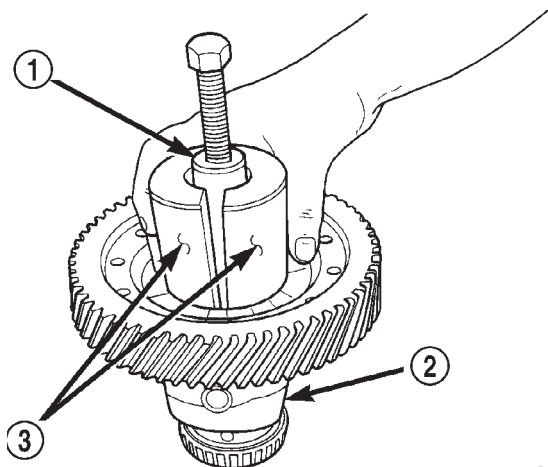
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**Fig. 205 Position Button and Collets Onto Differential and Bearing (Ring Gear Side)**

- 1 - SPECIAL TOOL L-4539-2
- 2 - SPECIAL TOOL 5048
- 3 - SPECIAL TOOL 5048-4



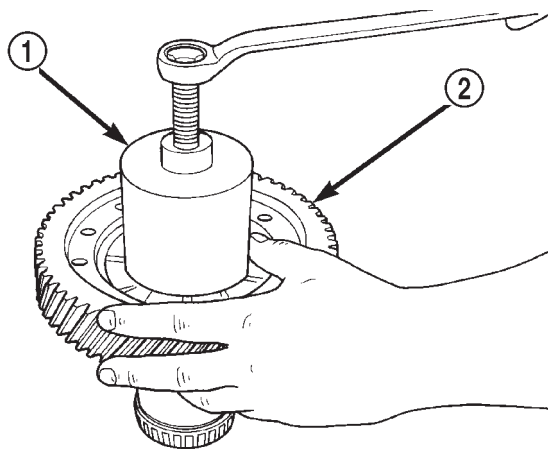
## DISASSEMBLY AND ASSEMBLY (Continued)



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**Fig. 206 Position Tool 5048 Over Button and Collets at Differential Bearing**

- 1 - SPECIAL TOOL 5048
- 2 - DIFFERENTIAL
- 3 - SPECIAL TOOL 5048-4



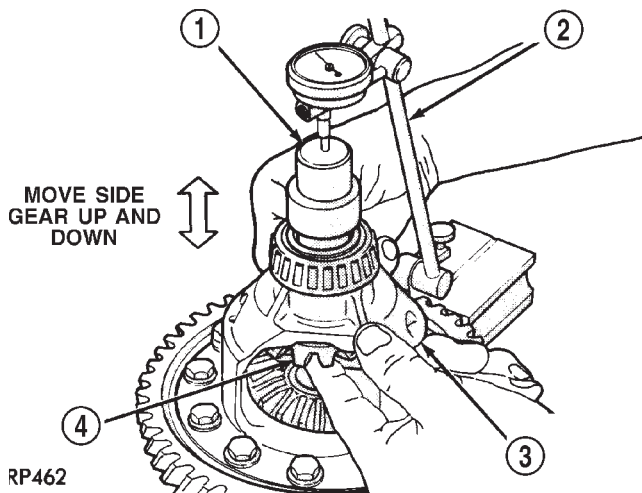
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**Fig. 207 Remove Differential Bearing Cone**

- 1 - SPECIAL TOOL 5048
- 2 - RING GEAR

To install the differential bearing cup and cone on the ring gear side, use Special Tool 5052, and Special Tool C-4171.

**NOTE:** The differential is serviced as an assembly. The only parts that are serviceable within the differential are the differential bearing cups and cones. If any other part fails within the differential, you must replace the differential assembly along with the transfer shaft.

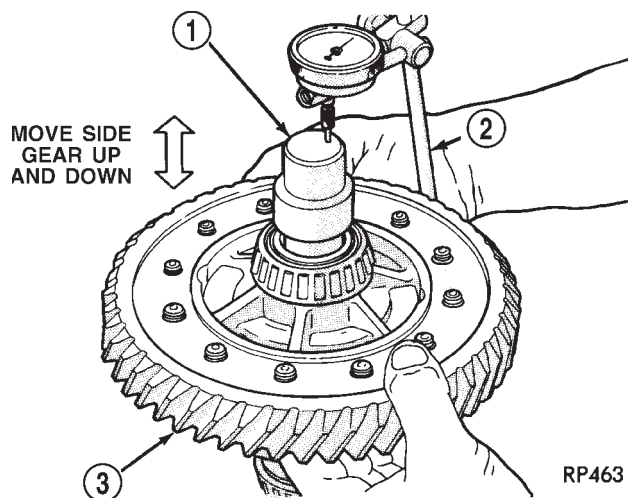


RP462

**Fig. 208 Checking Side Gear End Play**

- 1 - SPECIAL TOOL C-4996 (NOTE POSITION)
- 2 - DIAL INDICATOR SET
- 3 - DIFFERENTIAL ASSEMBLY
- 4 - SIDE GEAR

**CAUTION:** Side gear end play must be BETWEEN 0.001 to 0.013 inch.

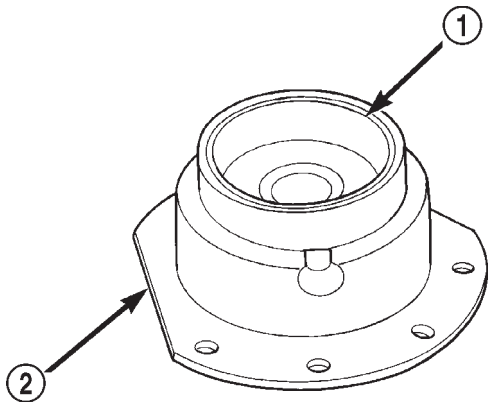


RP463

**Fig. 209 Checking Side Gear End Play (Typical)**

- 1 - SPECIAL TOOL C-4996 (NOTE POSITION)
- 2 - DIAL INDICATOR SET
- 3 - DIFFERENTIAL ASSEMBLY

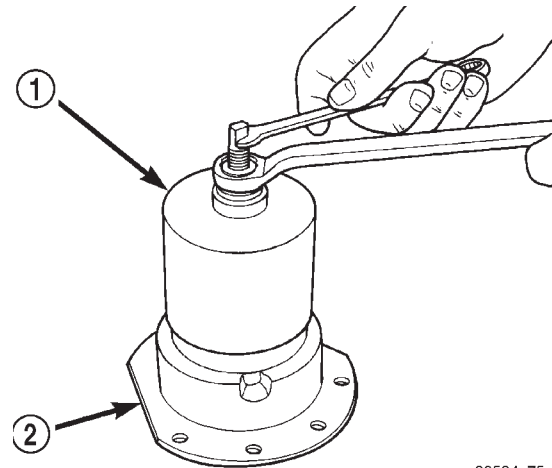
## DISASSEMBLY AND ASSEMBLY (Continued)



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**Fig. 210 Differential Bearing Retainer**

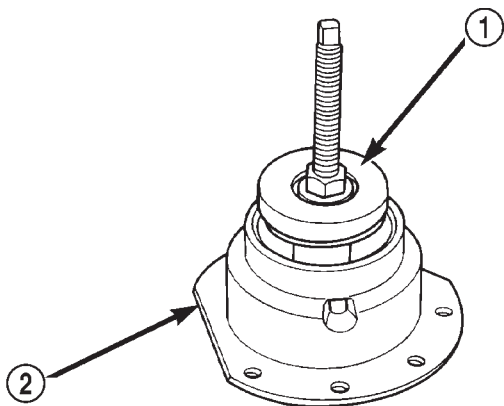
- 1 - DIFFERENTIAL BEARING CUP  
2 - DIFFERENTIAL BEARING RETAINER



80524e75

**Fig. 212 Remove Bearing Cup**

- 1 - SPECIAL TOOL 6062A  
2 - DIFFERENTIAL BEARING RETAINER



80524e74

**Fig. 211 Position Bearing Cup Remover Tool in Retainer**

- 1 - SPECIAL TOOL 6062A  
2 - DIFFERENTIAL BEARING RETAINER

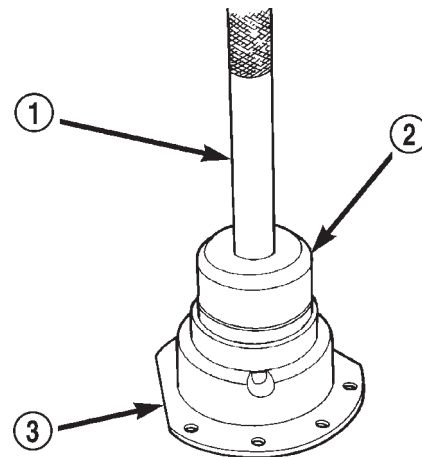
To remove the differential bearing cup from the extension housing/adapter side, use Special Tool 6062A, Remover. To install the differential bearing cup on the extension housing/adapter side, use Special Tool 6536, Driver and Special Tool C-4171, Handle.

**DETERMINING SHIM THICKNESS**

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

- Transaxle case
- Differential carrier
- Differential bearing retainer
- Extension housing
- Differential bearing cups and cones

Refer to Bearing Adjustment Procedure in rear of this section to determine proper shim thickness.



80524e76

**Fig. 213 Install Bearing Cup**

- 1 - SPECIAL TOOL C-4171  
2 - SPECIAL TOOL 5052  
3 - DIFFERENTIAL BEARING RETAINER

## CLEANING AND INSPECTION

### VALVE BODY

Allow all parts to soak a few minutes in a suitable clean solvent. Wash thoroughly and blow dry with compressed air. Be sure all passages are clean and free from obstructions.

Inspect manual and throttle valve operating levers and shafts for being bent, worn or loose. If a lever is loose on its shaft, it should be replaced. Do not attempt to straighten bent levers.

Inspect all mating surfaces for burrs, nicks and scratches. Minor blemishes may be removed with crocus cloth, using only a very light pressure. Using a straightedge, inspect all mating surfaces for warpage or distortion. Slight distortion may be corrected, using a surface plate. Be sure all metering holes in steel plate are open. Using a penlight, inspect bores in valve body for scores, scratches, pits, and irregularities.

Inspect all valve springs for distortion and collapsed coils. Inspect all valves and plugs for burrs, nicks, and scores. Small nicks and scores may be removed with crocus cloth, providing extreme care is taken not to round off sharp edges. The sharpness of these edges is vitally important. It prevents foreign matter from lodging between valve and valve body. This reduces the possibility of sticking. Inspect all valves and plugs for freedom of operation in valve body bores.

When bores, valves, and plugs are clean and dry, the valves and plugs should fall freely in the bores. The valve body bores do not change their dimensions with use. Therefore, a valve body that was functioning properly when vehicle was new, will operate correctly if it is properly and thoroughly cleaned. There is no need to replace a valve body unless it is damaged in handling.

## ADJUSTMENTS

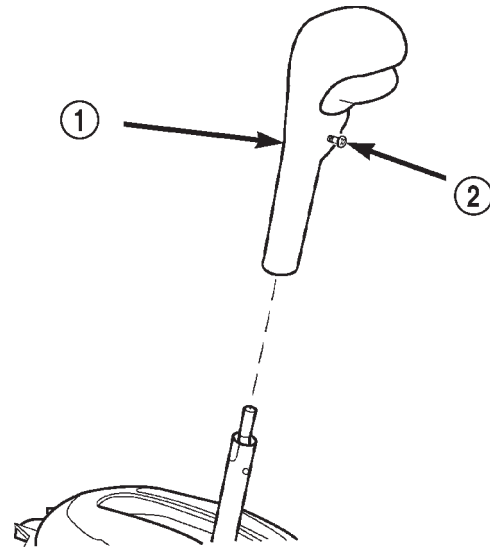
### GEARSHIFT CABLE

Normal operation of the Park/Neutral Position Switch provides a quick check to confirm proper linkage adjustment. The engine starter should only operate when the transaxle shift lever is in the PARK (P) or NEUTRAL (N) positions.

If the engine starts in any other gear position, or the vehicle rolls when the shifter is in gated PARK (P), a gearshift cable adjustment is necessary.

### ADJUSTMENT

(1) Loosen set screw and remove knob from shifter handle (Fig. 214).

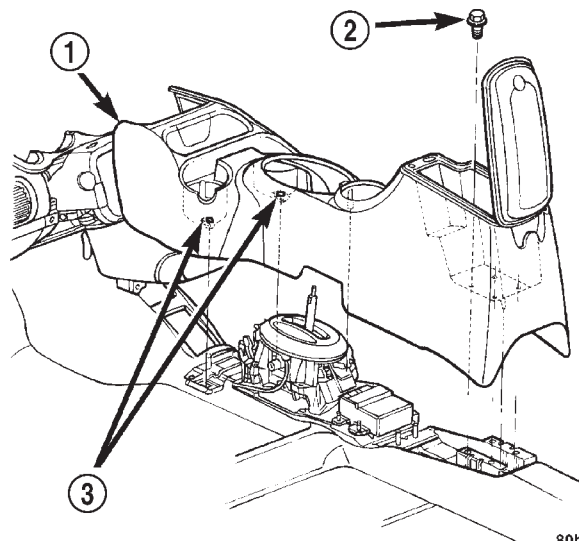


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**Fig. 214 Gearshift Knob Removal/Installation**

- 1 - SHIFTER KNOB  
2 - SET SCREW

(2) Remove the center console assembly as shown in (Fig. 215).



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**Fig. 215 Center Console Removal/Installation**

- 1 - CONSOLE  
2 - SCREW (4)  
3 - SCREW (2)

(3) **Adjust gearshift cable as follows:**

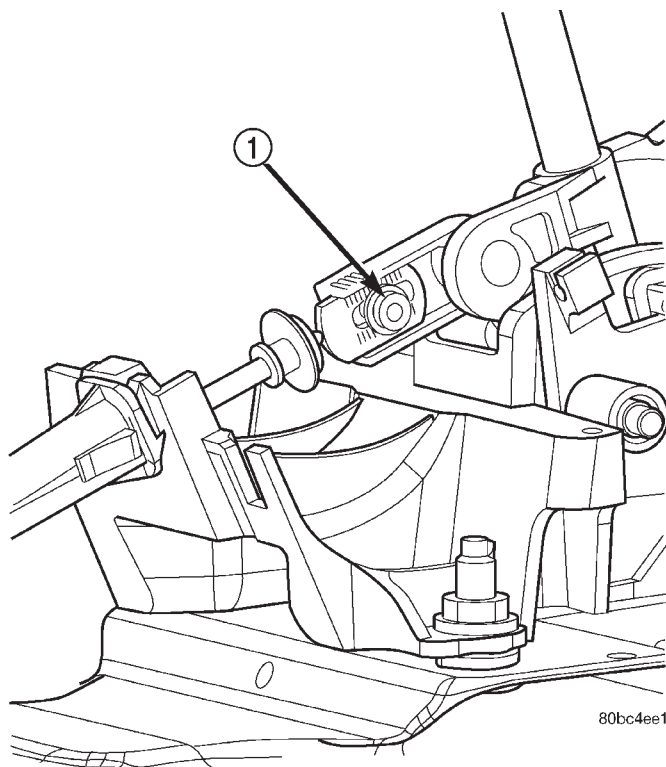
(a) Place gearshift lever in the PARK (P) position.

(b) Loosen shift cable adjustment screw (Fig. 216).

(c) Move transaxle manual lever to the PARK. Verify transaxle is in PARK by attempting to roll vehicle in either direction.

## ADJUSTMENTS (Continued)

- (d) Tighten shift cable adjustment screw to 8 N·m (70 in. lbs.) torque.



**Fig. 216 Gearshift Cable Adjustment Screw**

1 - GEARSHIFT CABLE ADJUSTMENT SCREW

- (4) Verify proper cable adjustment. Engine should start with the shifter lever in PARK (P) and NEUTRAL (N) positions ONLY.

- (5) Install center console assembly (Fig. 215).

- (6) Install gearshift knob and tighten set screw to 2 N·m (15 in. lbs.) torque (Fig. 214).

## THROTTLE VALVE CABLE ADJUSTMENT PROCEDURE

The transmission throttle valve is operated by a cam on the valve body throttle lever. The throttle lever is actuated by a cable connected to the engine throttle body lever.

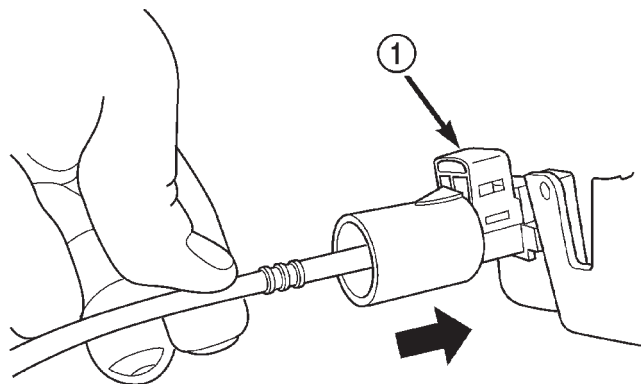
The throttle valve is located within the transaxle valve body and is responsible for transaxle shift speed, shift quality, and part-throttle downshift sensitivity. Proper cable adjustment is essential for proper transaxle operation.

**NOTE:** The air cleaner/throttle body assembly must be installed into position before making this adjustment.

- (1) Verify cable is routed properly with no kinked or binding conditions.

- (2) Release adjustment locking clip on cable at throttle body. **It is not necessary to remove clip.**

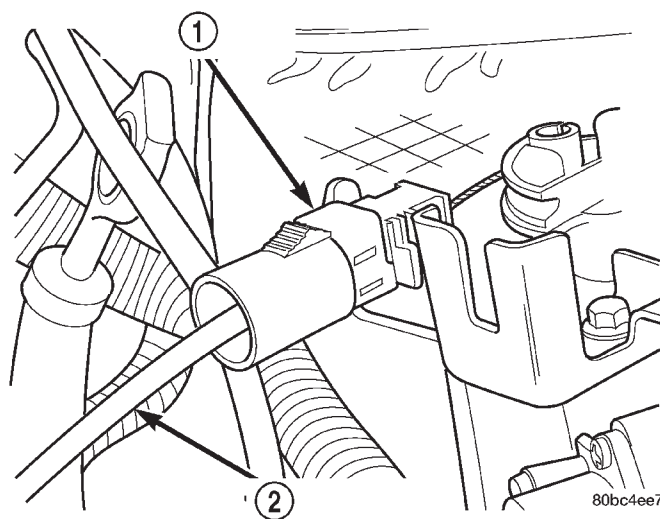
- (3) Grab cable conduit near adjustment body, push in towards throttle body, then release grip (Fig. 217). This allows cable to self adjust.



**Fig. 217 Throttle Valve Cable Adjustment**

1 - TAB UNLOCKED

- (4) Press locking clip to secure cable position (Fig. 218).



**Fig. 218 Cable Locking Clip**

1 - TAB LOCKED

2 - THROTTLE VALVE CABLE

- (5) Road test vehicle to verify proper transaxle operation.



## ADJUSTMENTS (Continued)

## BRAKE TRANSMISSION SHIFT INTERLOCK SYSTEM

## VERIFICATION

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".
<b>NOTE: Any failure to meet these expected responses requires system adjustment or repair.</b>	

## ADJUSTMENT

(1) Loosen set screw and remove knob from shifter handle (Fig. 219).

(2) Remove the center console assembly as shown in (Fig. 220).

(3) Remove shifter bezel (Fig. 221).

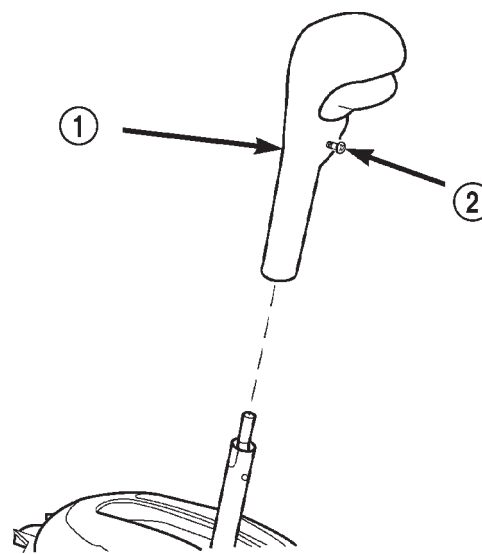
(4) **Adjust interlock cable/system as follows:** Pry up on cable adjuster lock to release and allow cable to "self-adjust". Lock cable adjustment by pressing down on the adjuster lock until bottomed at the cable housing.

(5) Verify correct system operation. Refer to verification procedure.

(6) Install shifter bezel (Fig. 221).

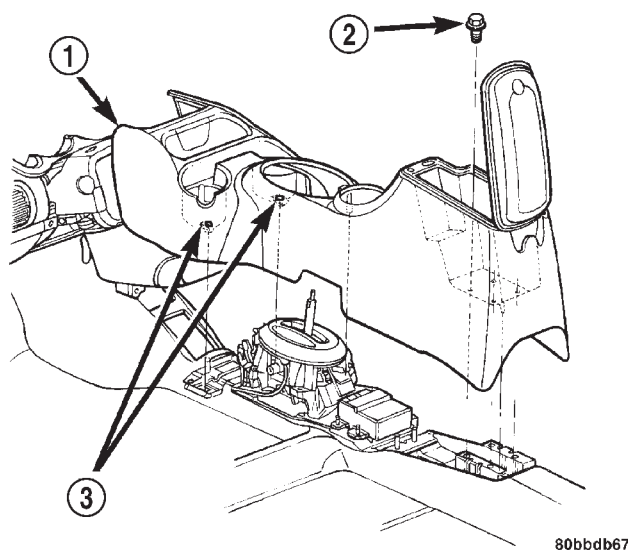
(7) Install center console assembly (Fig. 220).

(8) Install gearshift knob and tighten set screw to 2 N·m (15 in. lbs.) torque (Fig. 219).



**Fig. 219 Gearshift Knob Removal/Installation**

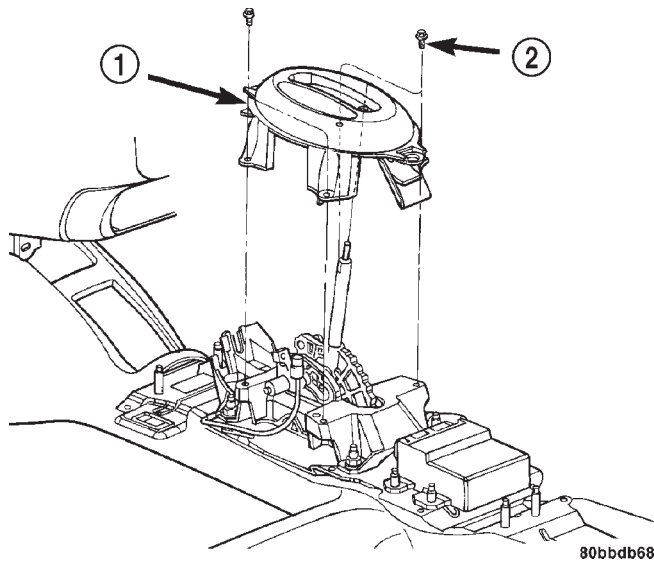
- 1 – SHIFTER KNOB  
2 – SET SCREW



**Fig. 220 Center Console Removal/Installation**

- 1 – CONSOLE  
2 – SCREW (4)  
3 – SCREW (2)

## ADJUSTMENTS (Continued)

**Fig. 221 Shifter Bezel Removal/Installation**

- 1 - BEZEL  
2 - SCREW (4)

**BAND ADJUSTMENT****KICKDOWN BAND (FRONT)**

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

- (1) Loosen locknut and back-off nut approximately five turns. Test adjusting screw for free turning in the transaxle case.
- (2) Using wrench, tighten adjusting screw to 8 N·m (72 in. lbs.).
- (3) Back-off adjusting screw the number of turns listed in Specifications. Hold adjusting screw in this position and tighten locknut to 47 N·m (35 ft. lbs.).

**LOW/REVERSE BAND (REAR)**

To adjust low/reverse band, proceed as follows:

- (1) Loosen and back off locknut approximately five turns.
- (2) Using an inch-pound torque wrench, tighten adjusting screw to 5 N·m (41 in. lbs.) true torque.
- (3) Back-off adjusting screw the number of turns listed under Specifications. A chart is located at the rear of this section.
- (4) Tighten locknut to 14 N·m (10 ft. lbs.).

**HYDRAULIC CONTROL PRESSURE ADJUSTMENTS****LINE PRESSURE**

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

correct throttle pressure adjustment before adjusting the line pressure.

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

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

**THROTTLE PRESSURE**

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

- (1) Insert gauge pin of Tool C-3763 between the throttle lever cam and kickdown valve.
- (2) By pushing in on tool, compress kickdown valve against its spring so throttle valve is completely bottomed inside the valve body.
- (3) While compressing spring, turn throttle lever stop screw with adapter C-4553. Turn until head of screw touches throttle lever tang, with throttle lever cam touching tool and throttle valve bottomed. Be sure adjustment is made with spring fully compressed and valve bottomed in the valve body.

**BEARING ADJUSTMENT PROCEDURES**

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

- (2) Bearing cups and cones should be replaced if they show signs of pitting or heat distress.
- (3) If distress is seen on either the cup or bearing rollers, both cup and cone must be replaced.

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

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

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

(5) Refer to the conversion chart in specifications to convert inches to millimeter measurements. Refer to bearing shim chart for proper shim thicknesses.

## ADJUSTMENTS (Continued)

## OUTPUT SHAFT BEARING

With output shaft gear removed, install a 13.65 mm (0.537 inch) and a 1.34 mm (0.053 inch) gauging shim on the planetary rear annulus gear hub using grease to hold the shim in place. The 13.65 mm shim has a larger inside diameter and must be installed over the output shaft first. The 1.34 mm shim pilots on the output shaft.

Install output shaft gear and bearing assembly, torque to 271 N·m (200 ft. lbs.).

To measure bearing end play:

(1) Attach Tool L-4432 to the output shaft gear.  
(2) Mount a steel ball with grease into the end of the output shaft.

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

(4) Using a dial indicator mounted to the transaxle case, measure output shaft end play.

(5) Once bearing end play has been determined, refer to the output shaft bearing shim chart.

(6) The 12.65 mm (0.498 inch), 13.15 mm (0.518 inch) or 13.65 mm (0.537 inch) shims are always installed first. **These shims have lubrication slots that are necessary for proper bearing lubrication.**

(7) Shims thinner than 12.65 mm listed in the chart are common to both the transfer shaft and output shaft bearings.

(8) Use tool L-4434 to remove the retaining nut and washer. To remove the output shaft gear use tool L-4407.

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

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

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

(12) If the turning torque is too high, install a 0.05mm (0.002 inch) thicker shim. If the turning torque is too low, install a 0.05 mm (0.002 inch) thinner shim. Repeat until the proper turning torque is 3 to 8 inch pounds.

## DIFFERENTIAL BEARING

(1) Position the transaxle assembly vertically on the support stand, differential bearing retainer side up.

(2) Install Tool L-4436A into the differential and onto the pinion mate shaft.

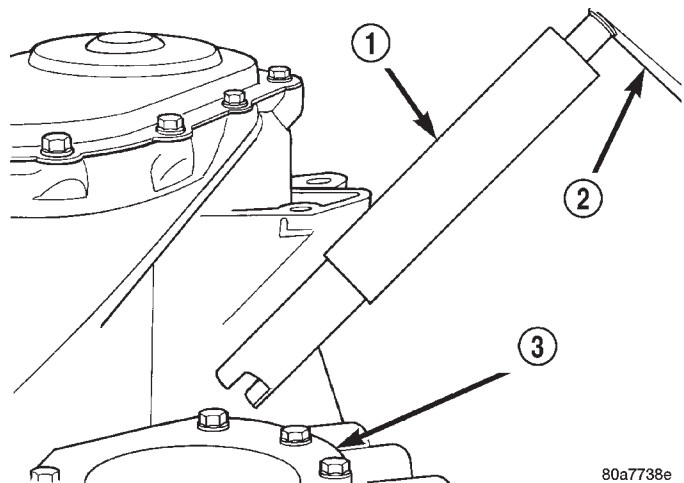
(3) Rotate the differential at least one full revolution to ensure the tapered roller bearings are fully seated.

## OUTPUT SHAFT BEARING SHIM CHART

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

Average Conversion .05 mm = .002 inch

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**Fig. 222 Tool L-4436 and Torque Wrench**

1 - SPECIAL TOOL L-4436-A

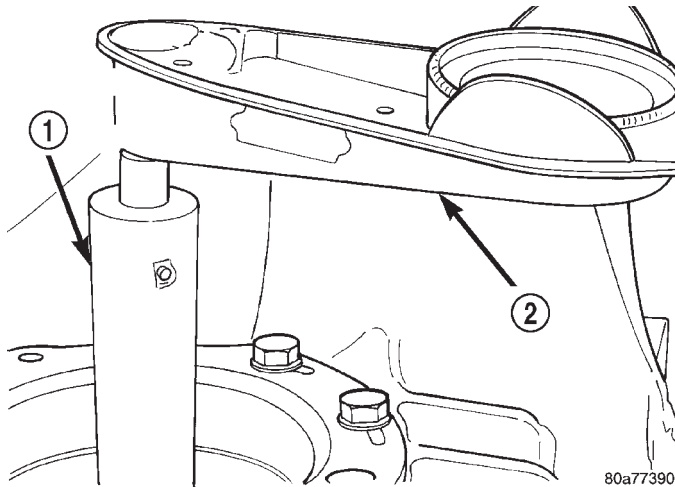
2 - TORQUE WRENCH

3 - DIFFERENTIAL BEARING RETAINER

(4) Using Tool L-4436A and an inch-pound torque wrench, check the turning torque of the differential.

## ADJUSTMENTS (Continued)

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



**Fig. 223 Checking Differential Bearings Turning Torque**

- 1 – SPECIAL TOOL L-4436-A  
2 – TORQUE WRENCH

(5) If the turning torque is within specifications, remove tools. Setup is complete.

(6) If turning torque is not within specifications proceed with the following steps.

- Remove differential bearing retainer from the transaxle case.
- Remove the bearing cup from the differential bearing retainer using Tool 6062A.
- Remove the existing shim from under the cup.
- Measure the existing shim.
- 

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

Oil Baffle is not required when making shim selection.

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

(g) Install the differential bearing retainer using Tool 5052 and C-4171. Seal the retainer to the housing with MOPAR® Adhesive Sealant and torque bolts to 28 N·m (250 in. lbs.).

(7) Using Tool L-4436A and an inch-pound torque wrench, recheck the turning torque of the differential. **The turning torque should be between 5 and 18 inch-pounds.**

## DIFFERENTIAL BEARING SHIM CHART

SHIM THICKNESS	
MM	INCH
.980	0.0386
1.02	0.0402
1.06	0.0418
1.10	0.0434
1.14	0.0449
1.18	0.0465
1.22	0.0481
1.26	0.0497
1.30	0.0512
1.34	0.0528
1.38	0.0544
1.42	0.0560
1.46	0.0575
1.50	0.0591
1.54	0.0607
1.58	0.0623
1.62	0.0638
1.66	0.0654
1.70	0.0670
2.02	0.0796
2.06	0.0812

## TRANSFER SHAFT BEARING

(1) Use tool L-4434 to remove the retaining nut and washer. Remove the transfer shaft gear using tool L-4407.

(2) Install a 2.29 mm (0.090 inch) and a 1.39 mm (0.055 inch) gauging shims on the transfer shaft behind the governor support.

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

To measure bearing end play:

- Attach tool L-4432 to the transfer gear.
- Mount a steel ball with grease into the end of the transfer shaft.
- Push and pull the gear while rotating back and forth to insure seating of the bearing rollers.
- Using a dial indicator, measure transfer shaft end play.
- Refer to the Transfer Bearing Shim Chart for the required shim combination to obtain the proper bearing setting.

f. Use tool L-4434 to remove the retaining nut and washer. Remove the transfer shaft gear using tool L-4407.



## ADJUSTMENTS (Continued)

g. Remove the two gauging shims and install the correct shim combination. Install the transfer gear and bearing assembly.

h. Install the retaining nut and washer and torque to 271 N·m (200 ft. lbs.). Measure transfer shaft end play, end play should be 0.05 to 0.25 mm (0.002 to 0.010 inch).

i. Measure bearing end play. End play should be between .05 mm and .25 mm (.002 to .010 inch).

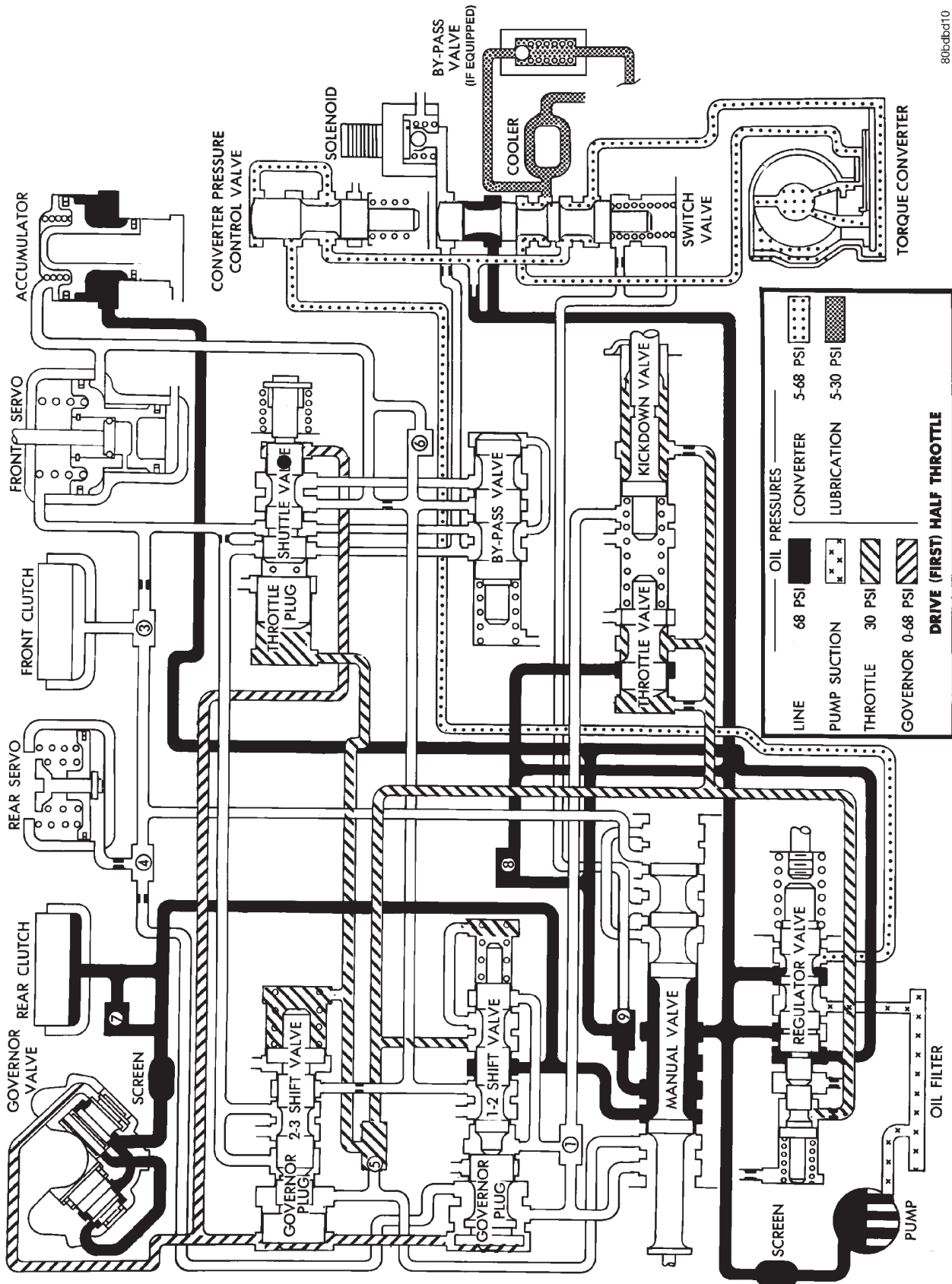
**NOTE:** If end play is too high, install a 0.05 mm (0.002 inch) thinner shim combination. If end play is too low, install a 0.05 mm (0.002 inch) thicker shim combination. Repeat until 0.05 to 0.25 mm (0.002 to 0.010 inch) end play is obtained.

**TRANSFER BEARING SHIM CHART**

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

## SCHEMATICS AND DIAGRAMS

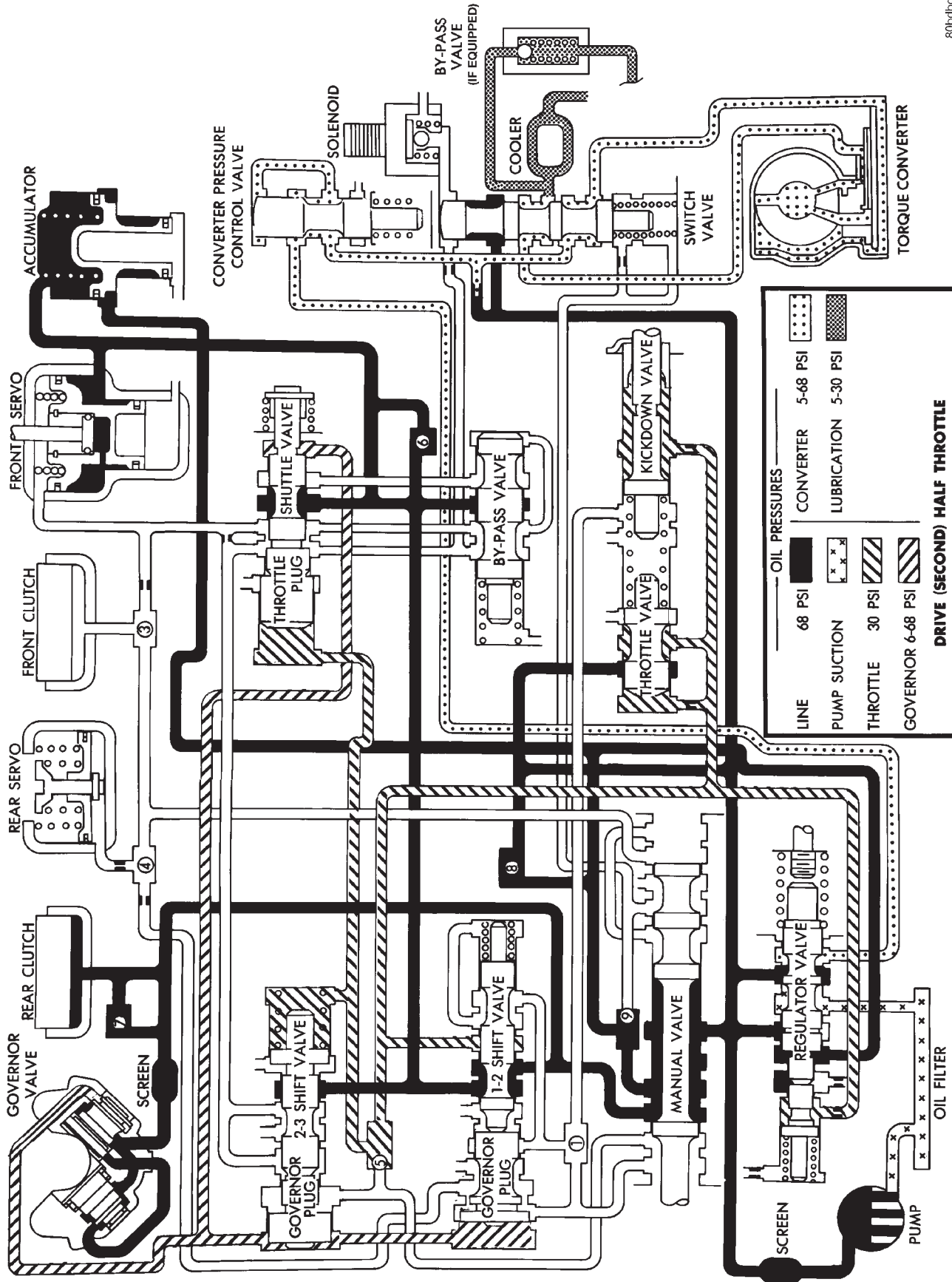
## 31TH TRANSAXLE HYDRAULIC SCHEMATIC



31TH TRANSAXLE HYDRAULIC SCHEMATIC

SCHEMATICS AND DIAGRAMS (Continued)

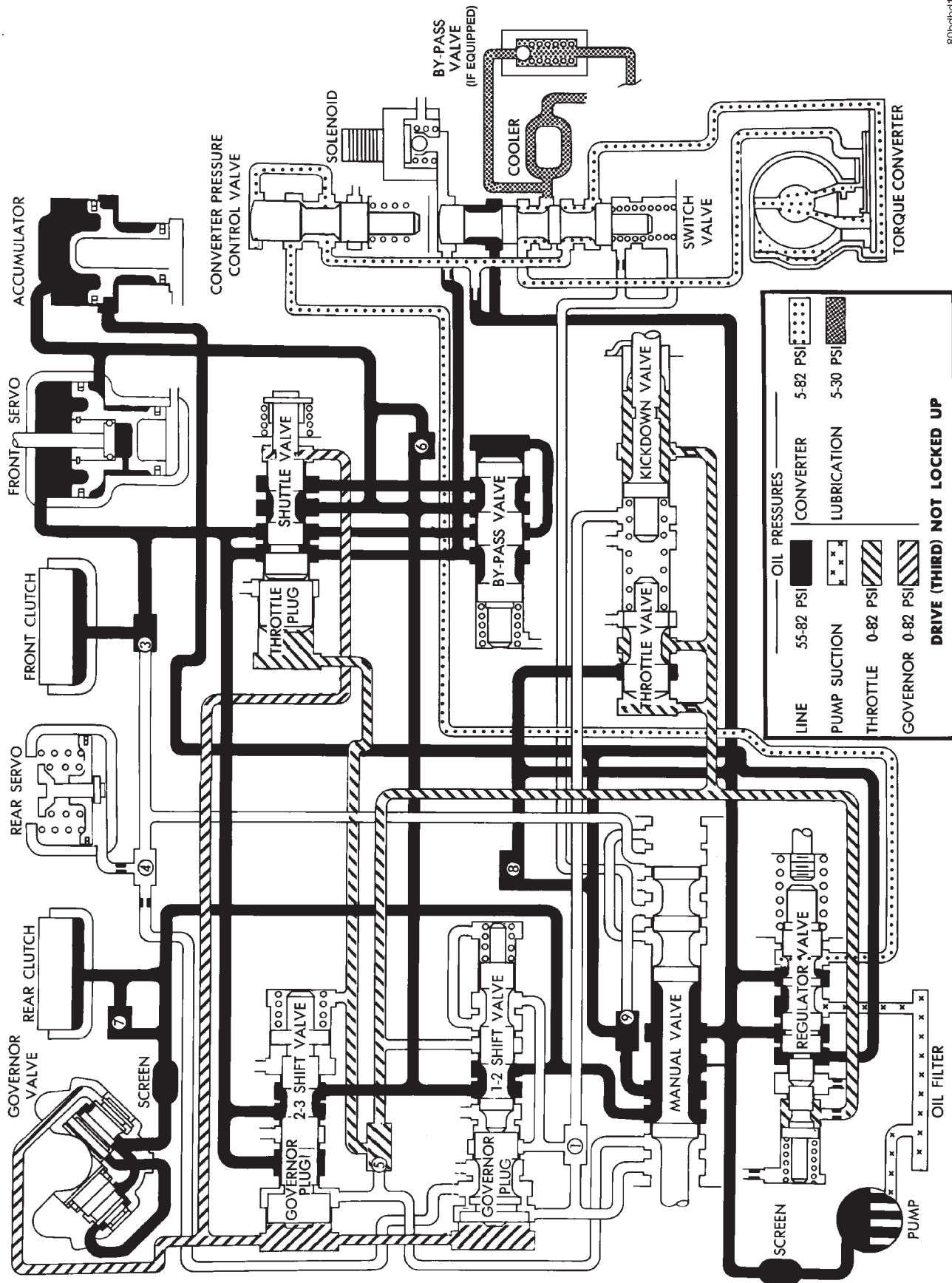
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31TH TRANSAXLE HYDRAULIC SCHEMATIC

## SCHEMATICS AND DIAGRAMS (Continued)

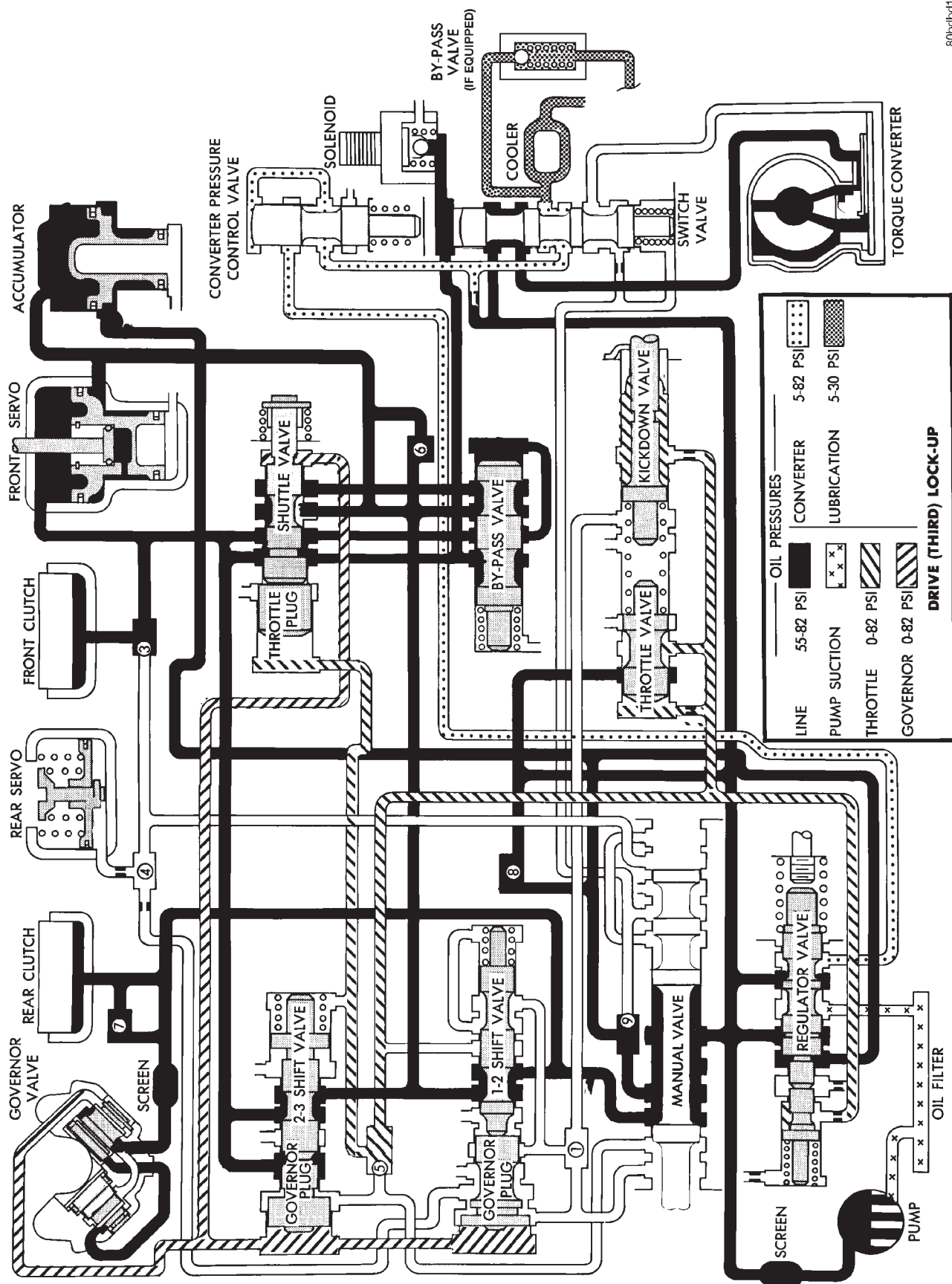
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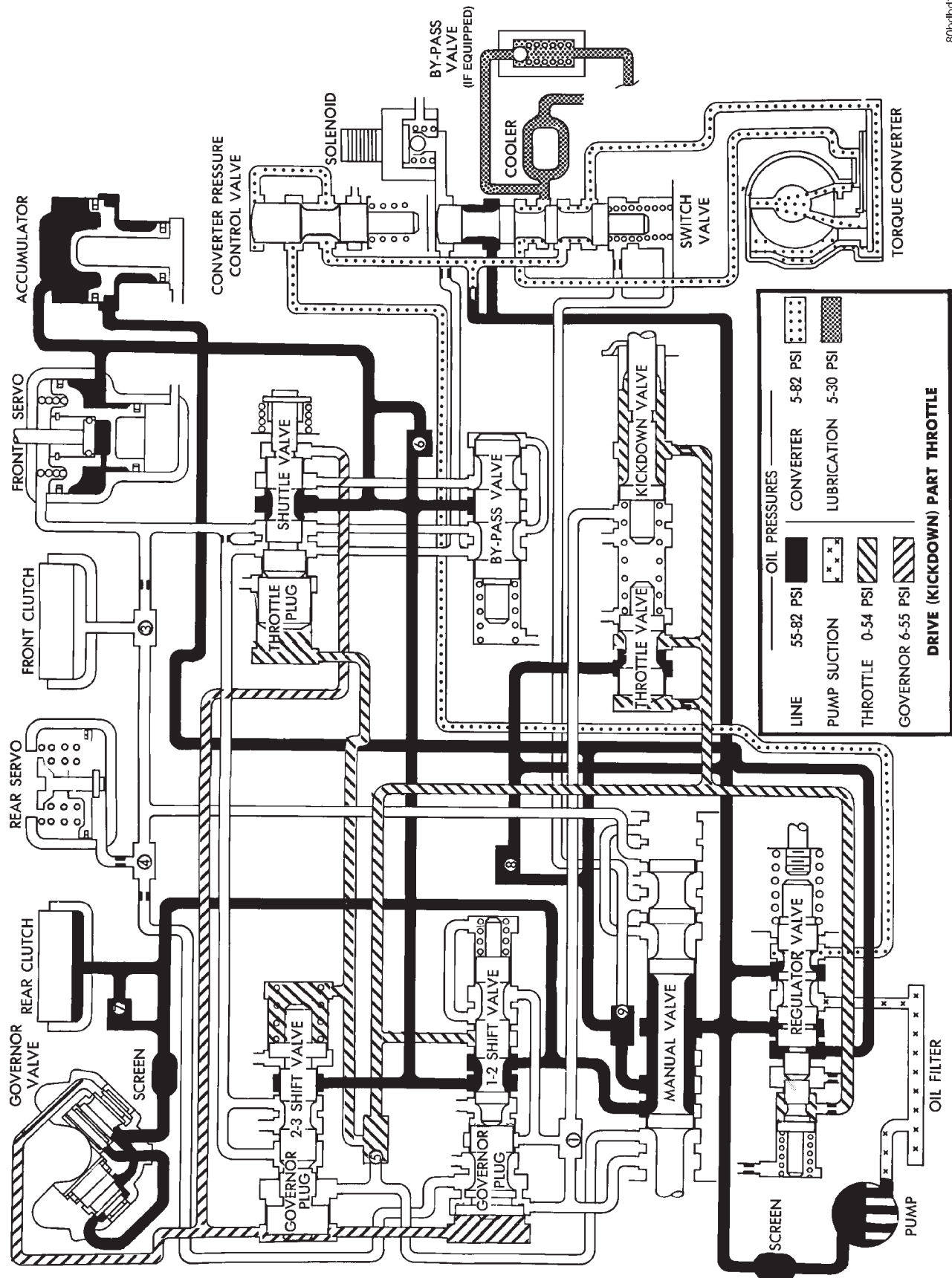
SCHEMATICS AND DIAGRAMS (Continued)



80bdbd13

31TH TRANSAXLE HYDRAULIC SCHEMATIC

## SCHEMATICS AND DIAGRAMS (Continued)

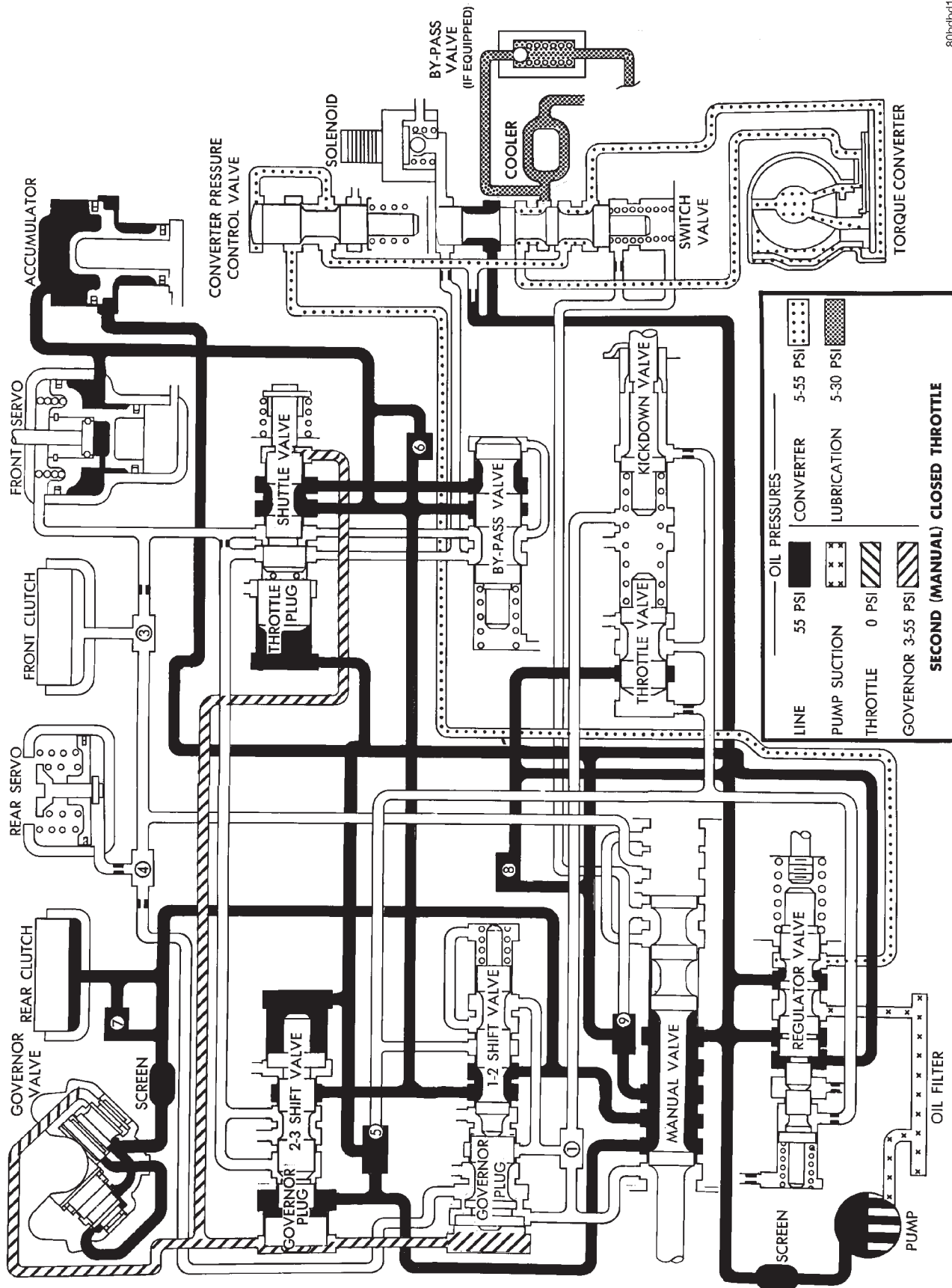


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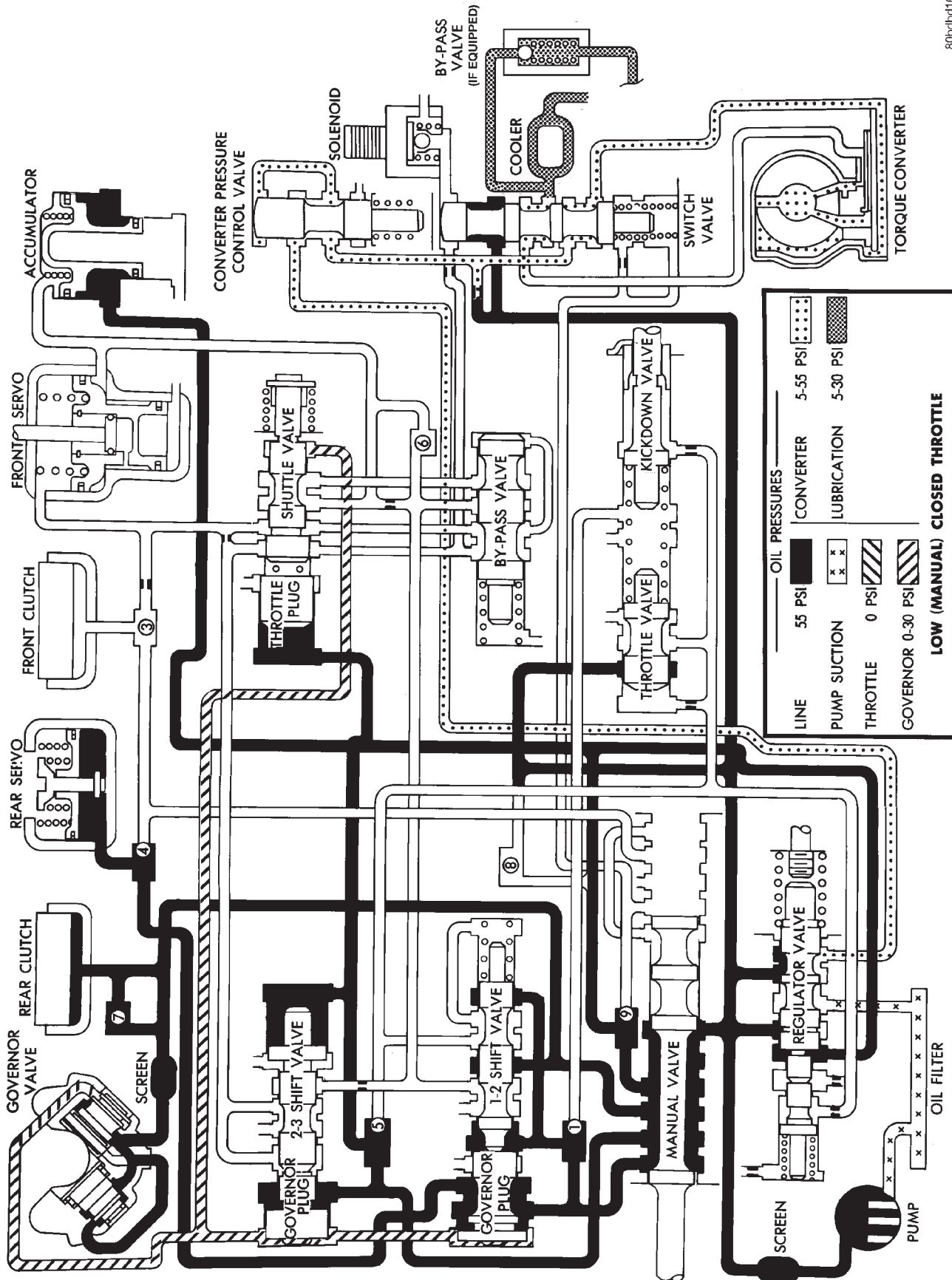
## SCHEMATICS AND DIAGRAMS (Continued)

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31TH TRANSAXLE HYDRAULIC SCHEMATIC

## SCHEMATICS AND DIAGRAMS (Continued)

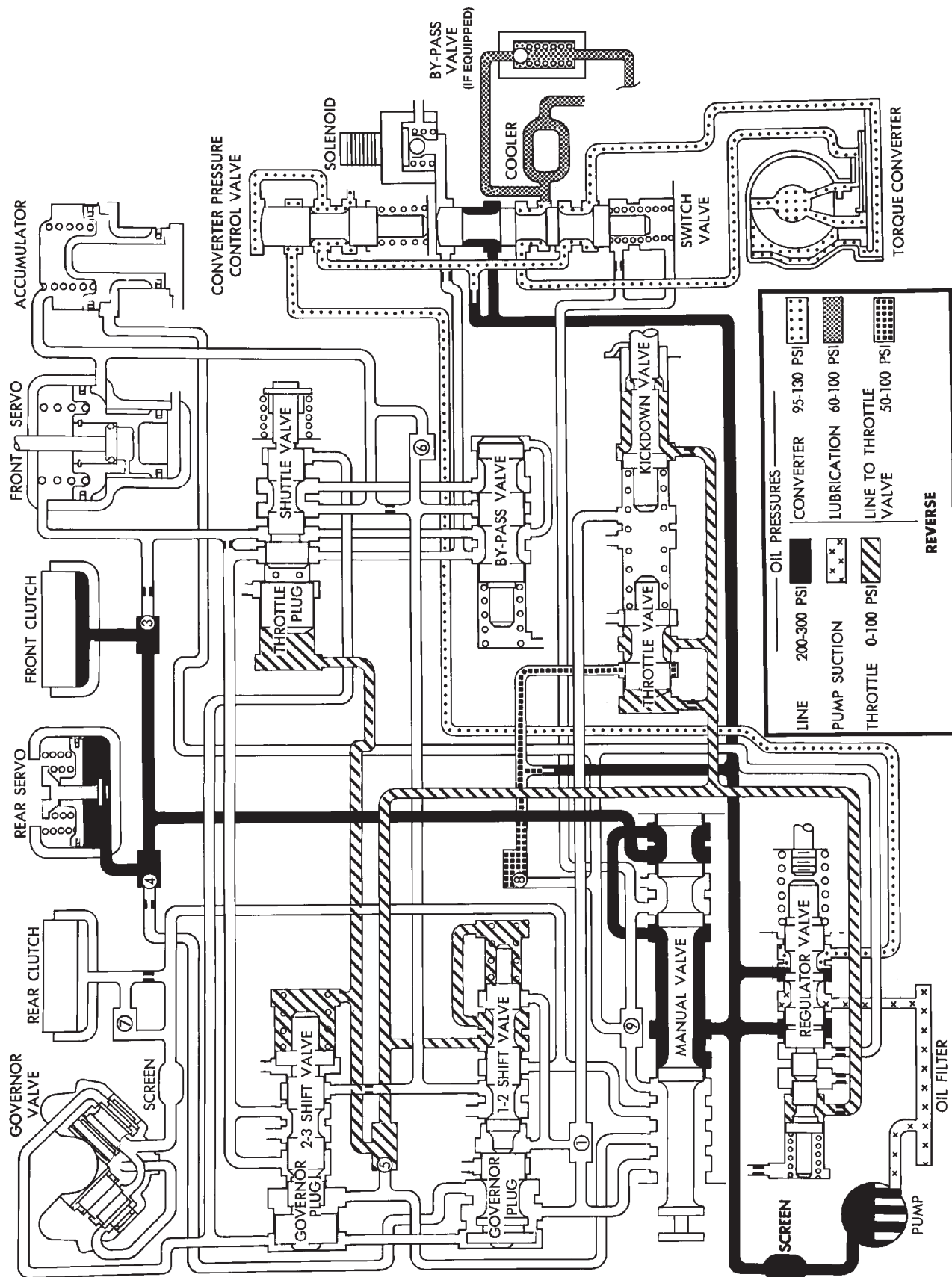


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31TH TRANSAXLE HYDRAULIC SCHEMATIC



## SCHEMATICS AND DIAGRAMS (Continued)



80bdbd17

31TH TRANSAXLE HYDRAULIC SCHEMATIC

## SPECIFICATIONS

## 31TH AUTOMATIC TRANSAXLE

Type . . . . . Automatic three speed with torque converter and integral differential  
 Torque Converter Diameter . . . . . 241 millimeters (9.48 in.)  
 Oil Type . . . . . Mopar® ATF+4 (Automatic Transmission Fluid) Type 9602  
 Cooling Method . . . . . Water Heat Exchanger and/or air to oil heat exchanger  
 Lubrication . . . . . Pump (internal-external gear-type)

**Transmission Gear Ratios**

First Gear . . . . . 2.69  
 Second Gear . . . . . 1.55  
 Third Gear . . . . . 1.00  
 Reverse Gear . . . . . 2.10

**Band Adjustment**

Kickdown—Backed Off From 8 N•m (72 in. lbs.) . . . . . 2 1/4 Turns  
 Low-Reverse—Backed Off From 5 N•m (41 in. lbs.) . . . . . 3 1/2 Turns

**Clutch Pack Clearances**

Front Clutch (Not Adjustable) . . . . . 1.27-2.79mm (0.050-0.110 in.)  
 Rear Clutch . . . . . 0.71-1.10mm (0.028-0.043 in.)

**End Play**

Input Shaft . . . . . 0.19–1.50 mm (.008–.060 in.)  
 Front Clutch Retainer . . . . . 0.76–2.69 mm (.030–.106 in.)  
 Front Carrier . . . . . 0.89–1.45 mm (.007–.057 in.)  
 Front Annulus Gear . . . . . 0.09–0.50 mm (.0035–.020 in.)  
 Planet Pinion . . . . . 0.15–0.59 mm (.006–.023 in.)  
 Reverse Drum . . . . . 0.76–3.36 mm (.030–.132 in.)

**Oil Pump Clearances**

Outer Gear To Pocket . . . . . 0.045-0.141mm (0.0018-0.0056 in.)  
 Outer Gear Side Clearance . . . . . 0.020-0.046mm (0.0008-0.0018 in.)  
 Inner Gear Side Clearance . . . . . 0.020-0.046mm (0.0008-0.0018 in.)

**Tapered Roller Bearing Settings**

Differential Assembly . . . . . 6 to 12 in. lbs. Drag Torque  
 Output Hub . . . . . 0 to 3 in. lbs. Drag Torque  
 Transfer Shaft . . . . . 0.002 to 0.010 in. End Play  
 Overall Drag At Output  
 Hub . . . . . 3 to 16 in. lbs. Drag Torque

**Thrust Washers**

Reaction Shaft Support (No. 1) . . . . . 1.55–1.60 mm (.061–.063 in.)  
 Rear Clutch Retainer (No. 2) . . . . . 1.55–1.60 mm (.061–.063 in.)  
 Output Shaft (No. 3) (Select) . . . . . 1.98–2.03 mm (.077–.080 in.)  
 Output Shaft (No. 3) (Select) . . . . . 2.15–2.22 mm (.085–.087 in.)  
 Output Shaft (No. 3) (Select) . . . . . 2.34–2.41 mm (.092–.095 in.)  
 Front Annulus (No. 4) . . . . . 2.95–3.05 mm (.116–.120 in.)  
 Front Carrier (Nos. 5&6) . . . . . 1.22–1.28 mm (.0948–.050 in.)  
 Sun Gear-Front (No. 7) . . . . . 0.85–0.91 mm (.033–.036 in.)  
 Sun Gear-Rear (No. 8) . . . . . 0.85–0.91 mm (.033–.036 in.)  
 Rear Carrier (Nos. 9&10) . . . . . 1.22–1.28 mm (.0948–.050 in.)  
 Rev. Drum (No. 11) . . . . . 1.55–1.60 mm (.061–.063 in.)

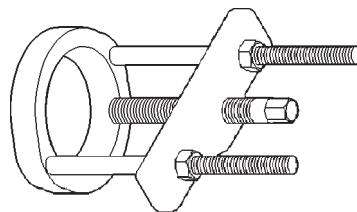
## 31TH TRANSAXLE TORQUE SPECIFICATIONS

**DESCRIPTION****TORQUE**

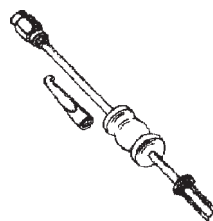
Bell Housing Cover Bolts . . . . . 12 N•m (105 in. lbs.)  
 Cooler Line Clamps . . . . . 2 N•m (18 in. lbs.)  
 Diff. Bear. Ret. To Case Bolt . . . . . 34 N•m (300 in. lbs.)  
 Diff. Cover To Case Bolt . . . . . 19 N•m (165 in. lbs.)  
 Exten. Hous. To Case Bolt . . . . . 28 N•m (250 in. lbs.)  
 Drive Plate To Crankshaft  
 Bolts . . . . . 95 N•m (70 ft. lbs.)  
 Drive Plate To Torque Conv.  
 Bolts . . . . . 88 N•m (65 ft. lbs.)  
 Fluid Filter Screw . . . . . 5 N•m (45 in. lbs.)  
 Governor Counterweight  
 Screw . . . . . 28 N•m (250 in. lbs.)  
 Governor To Support Bolt . . . . . 7 N•m (60 in. lbs.)  
 Kickdown Band Adj. Lock Nut . . . . . 47 N•m (35 ft. lbs.)  
 Left Motor Mount Bolts . . . . . 54 N•m (40 ft. lbs.)  
 Manual Cable To Trans.  
 Case Bolt . . . . . 28 N•m (250 in. lbs.)  
 Manual Control Lever Screw . . . . . 12 N•m (105 in. lbs.)  
 Oil Pan To Trans. Case  
 Screw . . . . . 19 N•m (165 in. lbs.)  
 Output Gear Strap Bolts . . . . . 23 N•m (17 ft. lbs.)  
 Output Shaft Nut . . . . . 271 N•m (200 ft. lbs.)  
 Park/Neutral Switch . . . . . 34 N•m (25 ft. lbs.)  
 Pressure Check Plug . . . . . 5 N•m (45 in. lbs.)  
 Pump To Case Bolts . . . . . 31 N•m (275 in. lbs.)  
 Reaction Shaft Assembly  
 Bolt . . . . . 28 N•m (250 in. lbs.)  
 Rear Cover To Case Screw . . . . . 19 N•m (165 in. lbs.)  
 Reverse Band Adj. Lock Nut . . . . . 14 N•m (125 in. lbs.)

## SPECIFICATIONS (Continued)

DESCRIPTION	TORQUE
Reverse Band Shaft Plug . . . . .	7 N·m (60 in. lbs.)
Ring Gear Screw . . . . .	95 N·m (70 ft. lbs.)
Speedo. To Ext. Hous. Screw . . .	7 N·m (60 in. lbs.)
Sprag Ret. To Transfer Case Bolt . . . . .	28 N·m (250 in. lbs.)
Starter To Trans. Bell Bolts . . .	54 N·m (40 ft. lbs.)
Stirrup Strap Ret. Bolts . . . . .	23 N·m (200 in. lbs.)
Trans. To Cyl. Block Bolt . . . . .	95 N·m (70 ft. lbs.)
Transfer Shaft Nut . . . . .	271 N·m (200 ft. lbs.)
Transfer Gear Strap Bolts . . . . .	23 N·m (17 ft. lbs.)
Valve Body Assy. To Case Bolts . . . . .	12 N·m (105 in. lbs.)
Valve Body Screw . . . . .	5 N·m (45 in. lbs.)



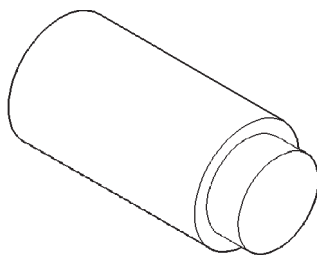
**Puller Press C-293-PA**



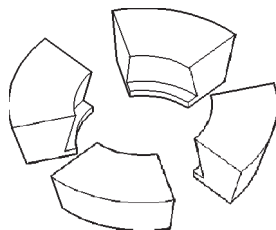
**Slide Hammer C-637**

## SPECIAL TOOLS

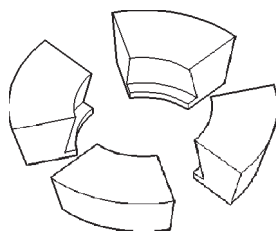
### 31TH AUTOMATIC TRANSAXLE



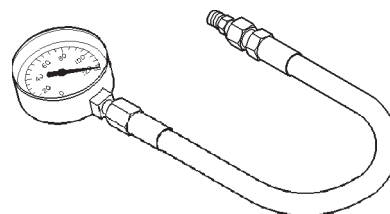
**Puller Press Extension C-293-3**



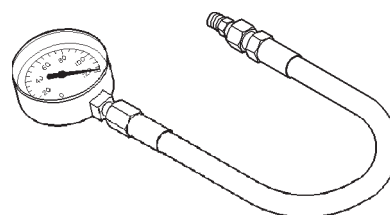
**Adapter Blocks C-293-36**



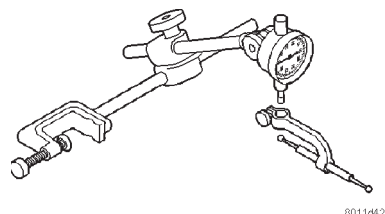
**Adapter Blocks C-293-52**



**Pressure Gauge (Low) C-3292**



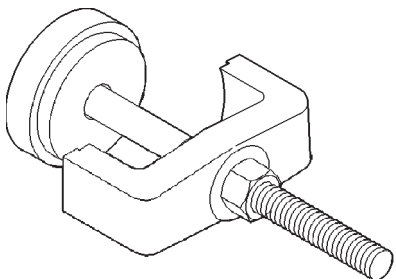
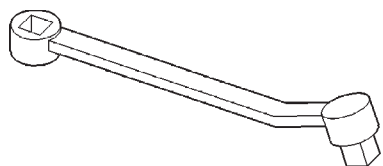
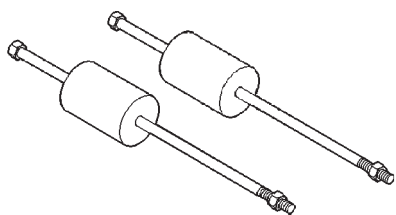
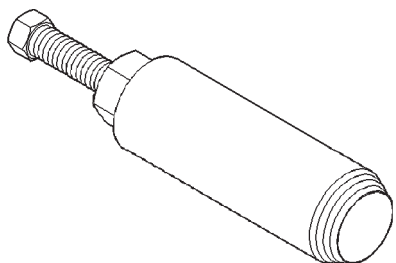
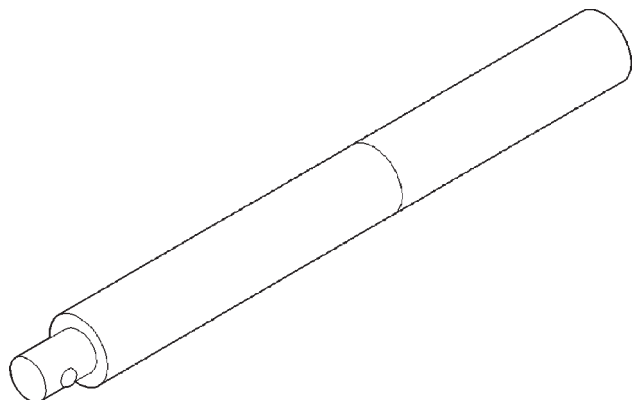
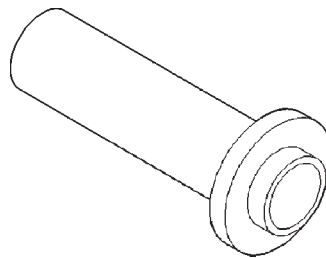
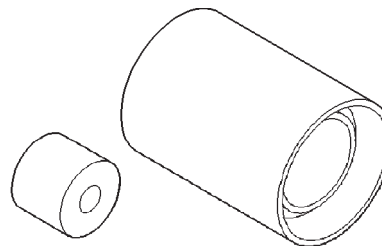
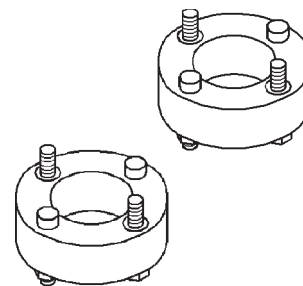
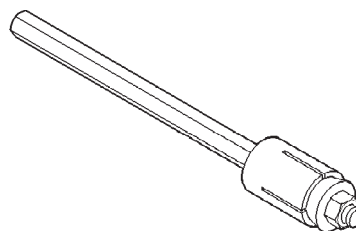
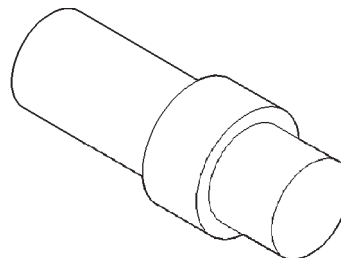
**Pressure Gauge (High) C-3293SP**



**Dial Indicator C-3339**

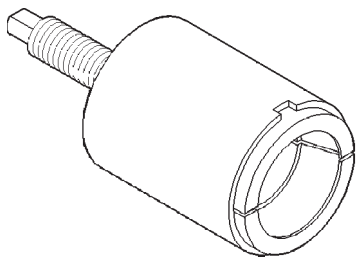
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## SPECIAL TOOLS (Continued)

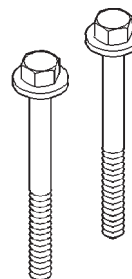
**Spring Compressor C-3575-A****Band Adjusting Adapter****Oil Pump Puller C-3752****Seal Puller C-3981B****Universal Handle C-4171****Seal Installer C-4193A****Bearing Installer C-4637****Adapter C-4658****Torque Tool C-4995****Adapter C-4996**



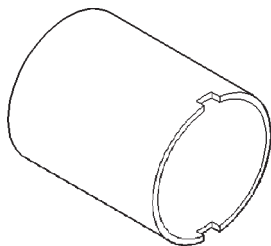
SPECIAL TOOLS (Continued)



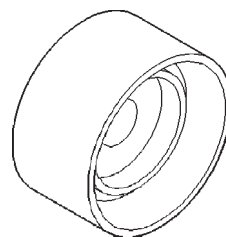
**Remover Kit L-4406**



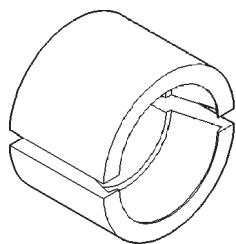
**Puller L-4407-6**



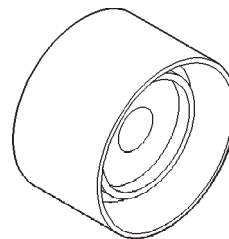
**Bearing Remover Cup L-4406-1**



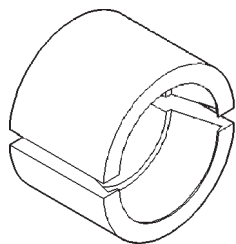
**Bearing Installer L-4408**



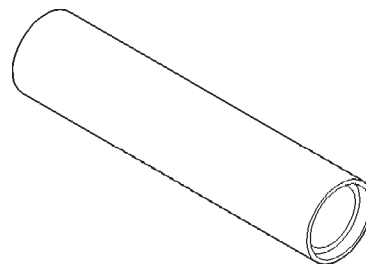
**Bearing Remover Jaws L-4406-2**



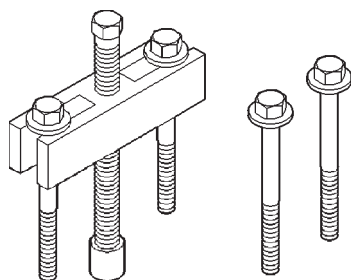
**Bearing Installer L-4410**



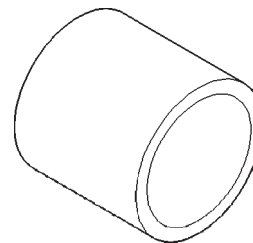
**Adapter L-4406-3**



**Bearing Installer L-4411**

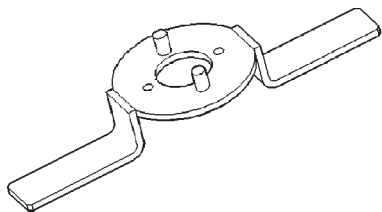
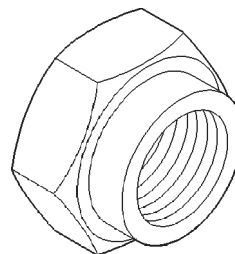
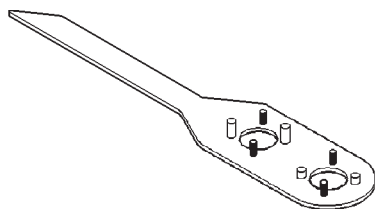
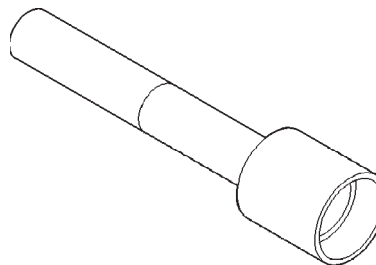
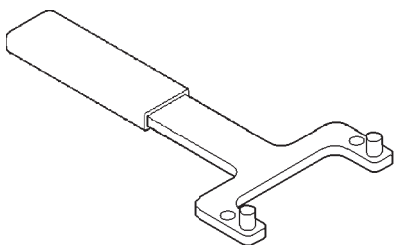
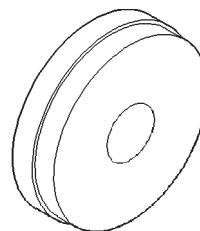
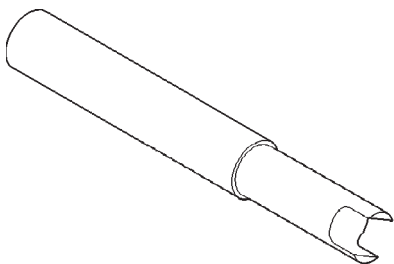
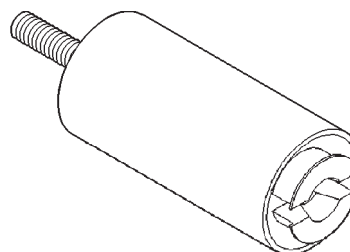
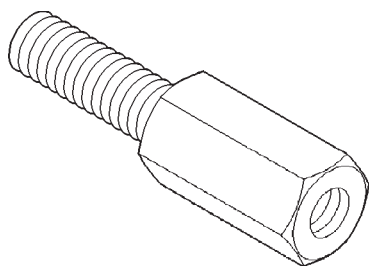


**Gear Puller L-4407A**

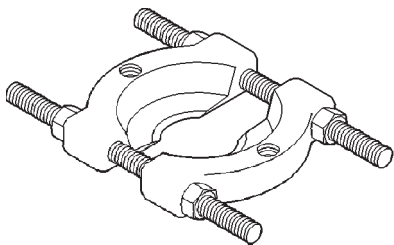


**Installer Adapter L-4429-3**

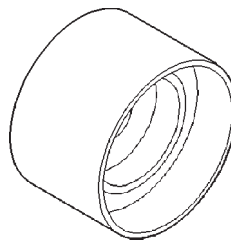
## SPECIAL TOOLS (Continued)

***Gear Checking Plate L-4432******Starter Nut L-4439******Gear Removing Plate L-4434******Transfer Shaft Remover-Installer L-4512******Bearing Puller L-4435******Bearing Cup Remover L-4517******Differential Tool L-4436A******Special Jaw Set L-4518******Housing Remover Adapter L-4437******Installer L-4520***

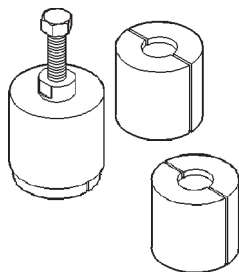
SPECIAL TOOLS (Continued)



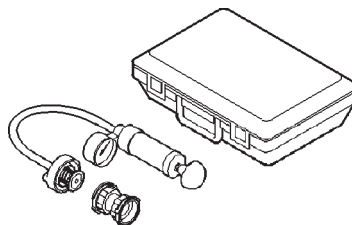
***Bearing Splitter P-334***



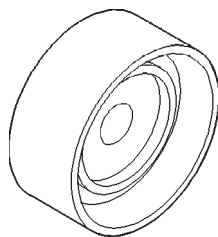
***Bearing Installer 6536-A***



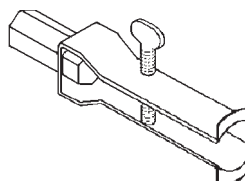
***Bearing Cone Remover 5048***



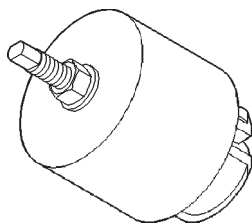
***Cooling System Tester 7700***



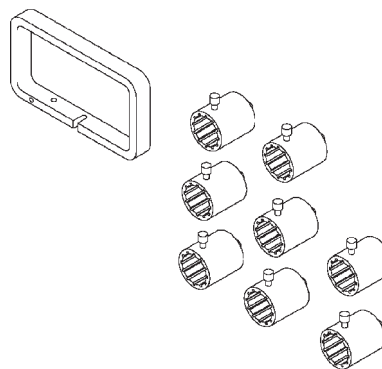
***Bearing Installer 5052***



***Seal Remover 7794-a***



***Bearing Cup Remover 6062-A***



***End Play Set—8266***

