

TRANSMISSION AND TRANSFER CASE

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AX5 MANUAL TRANSMISSION

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DESCRIPTION AND OPERATION

AX5 MANUAL TRANSMISSION

DESCRIPTION

The AX5 is a five speed manual transmission with fifth gear being the overdrive range. An adapter housing is used to attach the transmission to the transfer case on 4-wheel drive applications. A standard style extension housing is used for the 2-wheel drive applications. The shift mechanism is integral to the transmission assembly and mounted in the shift tower portion of the adapter/extension housing (Fig. 1).

GEAR RATIOS

Gear ratios for the AX5 manual transmission are as follows:

- First gear: 3.93:1

- Second gear: 2.33:1
- Third gear: 1.45:1
- Fourth gear: 1.00:1
- Fifth gear: 0.85:1
- Reverse gear: 4.74:1

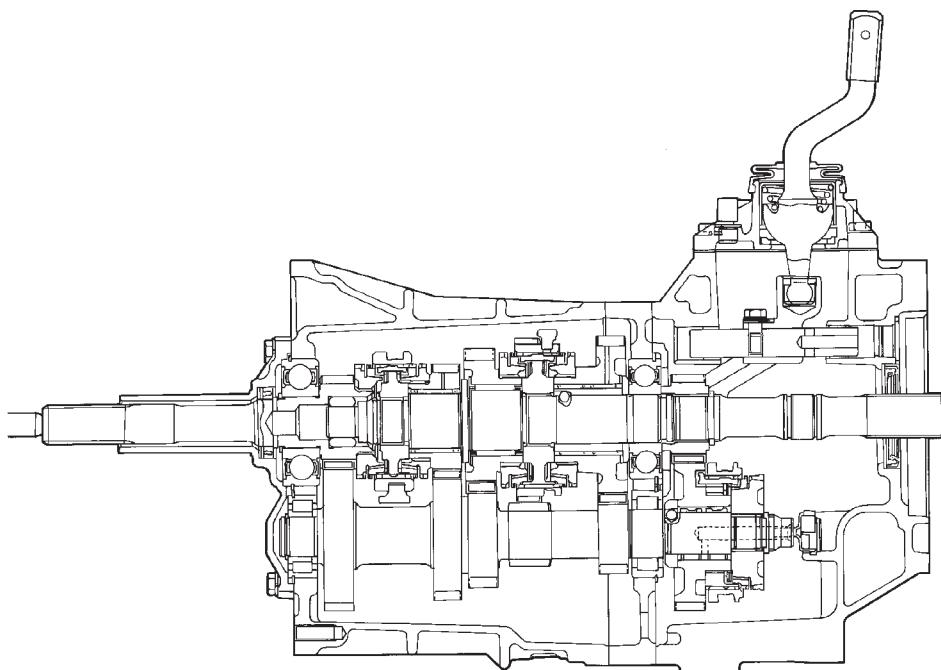
TRANSMISSION IDENTIFICATION

The AX5 identification code is on the bottom surface of the transmission case near the fill plug (Fig. 2). The first number is year of manufacture. The second and third numbers indicate month of manufacture. The next series of numbers is the transmission serial number.

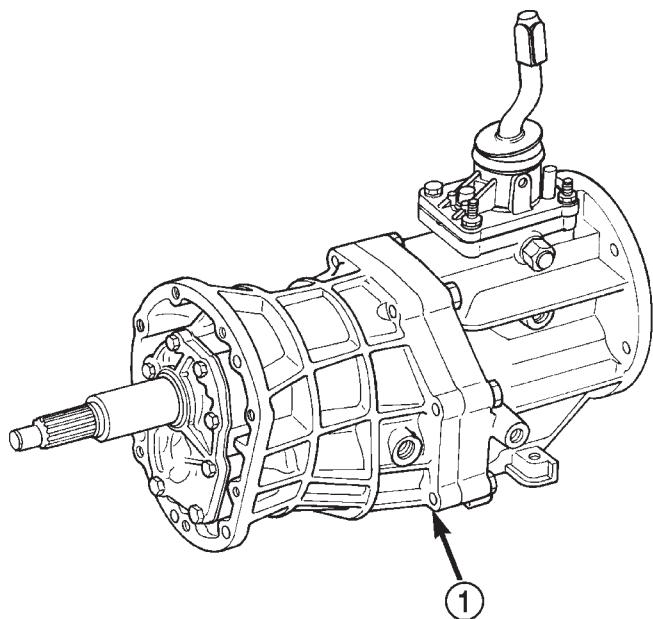
OPERATION

The manual transmission receives power through the clutch assembly from the engine. The clutch disc is splined to the transmission input shaft and is turned at engine speed at all times that the clutch is

DESCRIPTION AND OPERATION (Continued)



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Fig. 1 AX5 Manual Transmission

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Fig. 2 Transmission Identification

1 – I. D. CODE ON CASE NEAR DRAIN PLUG

engaged. The input shaft is connected to the transmission countershaft through the mesh of fourth speed gear on the input shaft and the fourth countershaft gear. At this point, all the transmission gears are spinning.

The driver selects a particular gear by moving the shift lever to the desired gear position. This movement moves the internal transmission shift compo-

nents to begin the shift sequence. As the shift lever moves the selected shift rail, the shift fork attached to that rail begins to move. The fork is positioned in a groove in the outer circumference of the synchronizer sleeve. As the shift fork moves the synchronizer sleeve, the synchronizer begins to speed-up or slow down the selected gear (depending on whether we are up-shifting or down-shifting). The synchronizer does this by having the synchronizer hub splined to the mainshaft, or the countershaft in some cases, and moving the blocker ring into contact with the gear's friction cone. As the blocker ring and friction cone come together, the gear speed is brought up or down to the speed of the synchronizer. As the two speeds match, the splines on the inside of the synchronizer sleeve become aligned with the teeth on the blocker ring and the friction cone and eventually will slide over the teeth, locking the gear to the mainshaft, or countershaft, through the synchronizer.

LUBRICANT**DESCRIPTION**

Recommended lubricant for AX5 transmissions is Mopar® 75W-90, API Grade GL-3 gear lubricant, or equivalent.

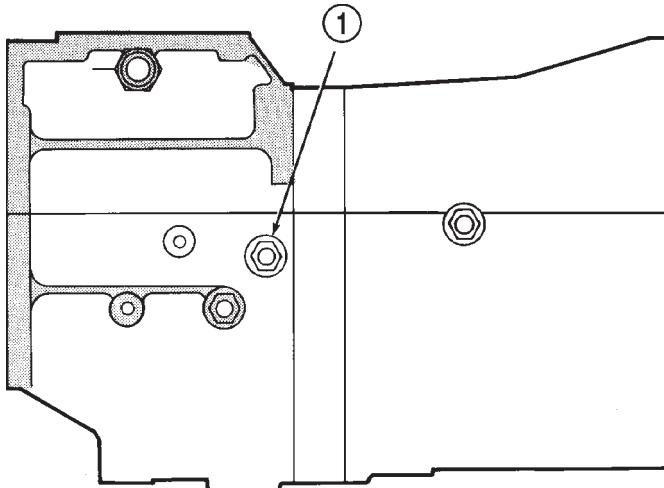
Correct lubricant level is from the bottom edge, to no more than 6 mm (1/4 in.) below the bottom edge of the fill plug hole.

The fill plug is on the passenger side of the adapter housing (Fig. 3). The drain plug is on the bottom of the case.

DESCRIPTION AND OPERATION (Continued)

Approximate dry fill lubricant capacity is:

- 3.3 liters (3.49 quarts) for 4-wheel drive applications.
- 3.5 liters (3.70 quarts) for 2-wheel drive applications.



J8921-4

Fig. 3 Fill Plug Location

1 – FILL PLUG LOCATION

DIAGNOSIS AND TESTING

LOW LUBRICANT LEVEL

A low transmission lubricant level is generally the result of a leak, inadequate lubricant fill, or an incorrect lubricant level check.

Leaks can occur at the mating surfaces of the gear case, intermediate plate and adaptor or extension housing, or from the front/rear seals. A suspected leak could also be the result of an overfill condition.

Leaks at the rear of the extension or adapter housing will be from the housing oil seals. Leaks at component mating surfaces will probably be the result of inadequate sealer, gaps in the sealer, incorrect bolt tightening, or use of a non-recommended sealer.

A leak at the front of the transmission will be from either the front bearing retainer or retainer seal. Lubricant may be seen dripping from the clutch housing after extended operation. If the leak is severe, it may also contaminate the clutch disc causing the disc to slip, grab, and/or chatter.

A correct lubricant level check can only be made when the vehicle is level. Also allow the lubricant to settle for a minute or so before checking. These recommendations will ensure an accurate check and avoid an underfill or overfill condition. Always check the lubricant level after any addition of fluid to avoid an incorrect lubricant level condition.

HARD SHIFTING

Hard shifting is usually caused by a low lubricant level, improper, or contaminated lubricants. The consequence of using non-recommended lubricants is noise, excessive wear, internal bind, and hard shifting. Substantial lubricant leaks can result in gear, shift rail, synchro, and bearing damage. If a leak goes undetected for an extended period, the first indications of component damage are usually hard shifting and noise.

Component damage, incorrect clutch adjustment, or a damaged clutch pressure plate or disc are additional probable causes of increased shift effort. Incorrect adjustment or a worn/damaged pressure plate or disc can cause incorrect release. If the clutch problem is advanced, gear clash during shifts can result. Worn or damaged synchro rings can cause gear clash when shifting into any forward gear. In some new or rebuilt transmissions, new synchro rings may tend to stick slightly causing hard or noisy shifts. In most cases, this condition will decline as the rings wear-in.

TRANSMISSION NOISE

Most manual transmissions make some noise during normal operation. Rotating gears generate a mild whine that is audible, but generally only at extreme speeds.

Severe, highly audible transmission noise is generally the initial indicator of a lubricant problem. Insufficient, improper, or contaminated lubricant will promote rapid wear of gears, synchros, shift rails, forks and bearings. The overheating caused by a lubricant problem, can also lead to gear breakage.

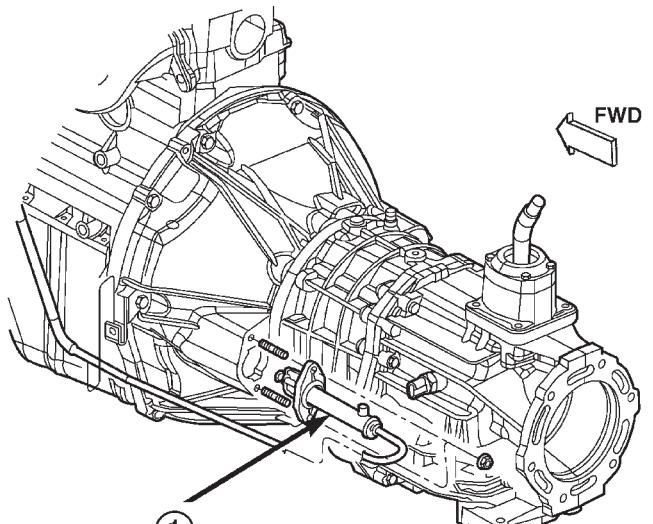
REMOVAL AND INSTALLATION

TRANSMISSION

REMOVAL

- (1) Shift transmission into first or third gear.
- (2) Raise and support vehicle on suitable safety stands.
- (3) Support engine with adjustable jack stand. Position wood block between jack and oil pan to avoid damaging pan.
- (4) Remove crossmember/skid plate.
- (5) Disconnect necessary exhaust system components.
- (6) Remove skid plate, if equipped.
- (7) Remove slave cylinder (Fig. 4) from clutch housing.
- (8) Mark rear propeller shaft and rear axle yokes for installation alignment (Fig. 5).

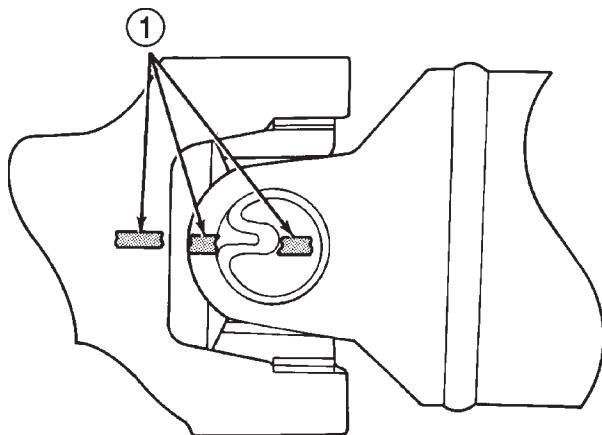
REMOVAL AND INSTALLATION (Continued)



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Fig. 4 Slave Cylinder—Typical

1 – CLUTCH SLAVE CYLINDER



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Fig. 5 Marking Propeller Shaft And Axle Yokes

1 – REFERENCE MARKS

(9) Mark front propeller shaft, axle, and transfer case yokes for installation alignment, if equipped.

(10) Remove propeller shaft(s).

(11) Unclip wire harnesses from transmission and transfer case, if equipped.

(12) Disconnect transfer case vent hose, if equipped.

(13) Disengage any wire connectors attached to transmission or transfer case, if equipped, components.

(14) Support transfer case, if equipped, with transmission jack.

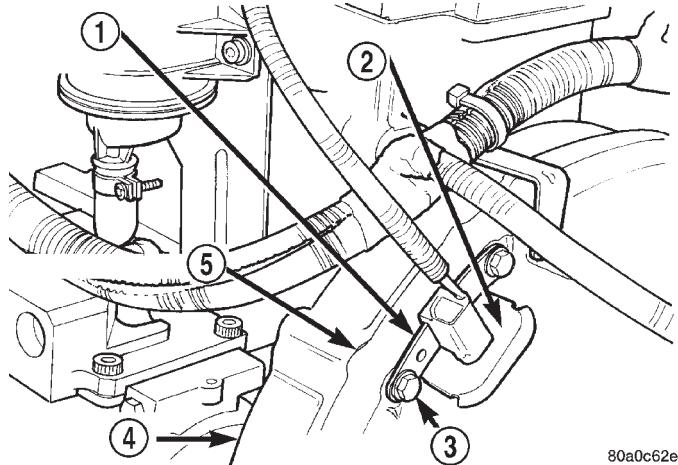
(15) Secure transfer case, if equipped, to jack with safety chains.

(16) Disconnect transfer case shift linkage at transfer case, if equipped.

(17) Remove nuts attaching transfer case to transmission, if equipped.

(18) Remove transfer case, if equipped.

(19) Remove crankshaft position sensor (Fig. 6).



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Fig. 6 Crankshaft Position Sensor —2.5 and 4.0L Engine

1 – ENGINE SPEED SENSOR

2 – GROMMET

3 – MOUNTING BOLT(S)

4 – LEFT REAR OF ENGINE

5 – TRANSMISSION

CAUTION: It is important that the crankshaft position sensor be removed prior to transmission removal. The sensor can easily be damaged if left in place during removal operations.

(20) Support engine with adjustable jack stand. Position wood block between jack and oil pan to avoid damaging pan.

(21) Support transmission with transmission jack.

(22) Secure transmission to jack with safety chains.

(23) Disconnect rear cushion and bracket from transmission.

(24) Remove rear crossmember.

(25) Disconnect transmission shift lever as follows:

(a) Lower transmission approximately 7–8 cm (3 in.) for access to shift lever.

(b) Reach up and around transmission case and unseat shift lever dust boot from transmission shift tower (Fig. 7). Move boot upward on shift lever for access to retainer that secures lever in shift tower.

(c) Reach up and around transmission case and press shift lever retainer downward with finger pressure. Turn retainer counterclockwise to release it.

(d) Lift lever and retainer out of shift tower (Fig. 7). Do not remove the shift lever from the floor con-

REMOVAL AND INSTALLATION (Continued)

sole shifter boots. Leave the lever in place for transmission installation.

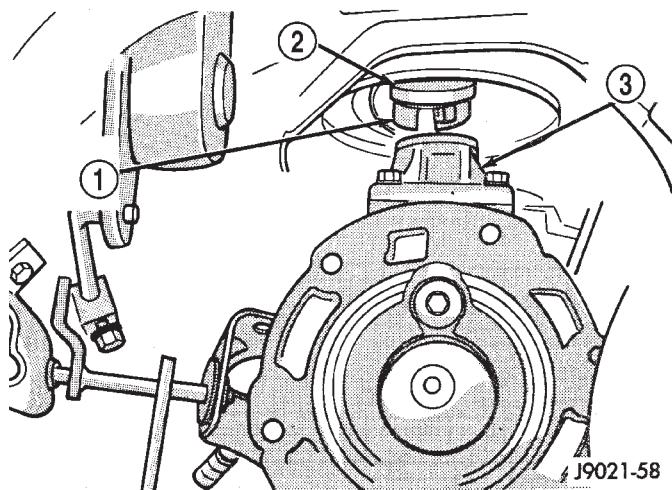
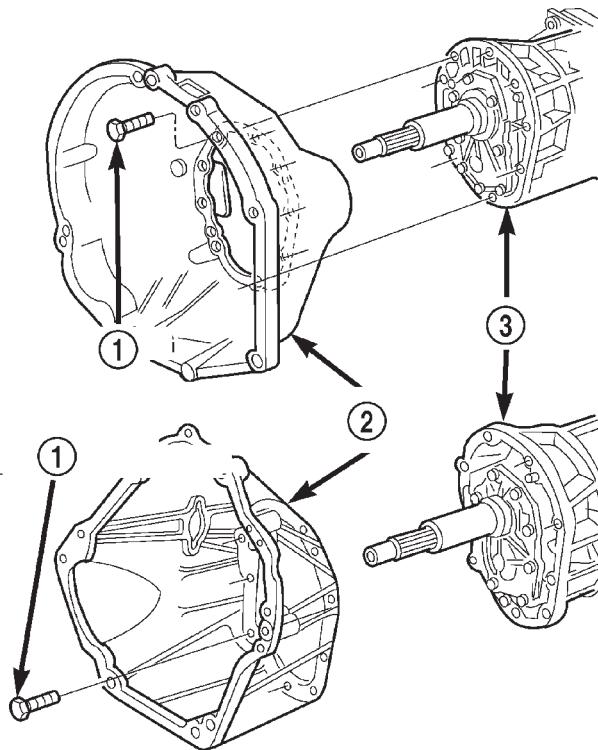


Fig. 7 Removing/Installing Shift Lever

- 1 – SHIFT LEVER RETAINER
- 2 – DUST BOOT
- 3 – SHIFT TOWER



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Fig. 8 Clutch Housing

- 1 – HOUSING-TO-TRANSMISSION BOLTS (46 N·m/34 ft. lbs.)
- 2 – CLUTCH HOUSING
- 3 – TRANSMISSION

- (26) Remove clutch housing brace rod.
- (27) Remove clutch housing-to-engine bolts.
- (28) Pull transmission jack rearward until input shaft clears clutch. Then slide transmission out from under vehicle.
- (29) Remove clutch release bearing, release fork, and retainer clip.
- (30) Remove clutch housing from transmission (Fig. 8).

INSTALLATION

- (1) Install clutch housing (Fig. 8) on transmission. Tighten housing bolts to 46 N·m (34 ft. lbs.) torque.
- (2) Lubricate contact surfaces of release fork pivot ball stud and release fork with high temp grease.
- (3) Install release bearing, fork, and retainer clip.
- (4) Position and secure transmission on transmission jack.
- (5) Lightly lubricate pilot bearing and transmission input shaft splines with Mopar® high temp grease.
- (6) Raise transmission and align transmission input shaft and clutch disc splines. Then slide transmission into place.

(7) Install and tighten clutch housing-to-engine bolts to the appropriate torque: **Be sure the housing is properly seated on engine block before tightening bolts.**

- Tighten 3/8" diameter bolts to 37 N·m (27 ft.lbs.).
- Tighten 7/16" diameter bolts to 58 N·m (43 ft.lbs.).

- Tighten M12 bolts to 75 N·m (55 ft.lbs.).
- (8) Install clutch housing brace rod.
- (9) Lower transmission approximately 7–8 cm (3 in.) for access to shift tower. Be sure transmission is in first or third gear.
- (10) Reach up and around transmission and insert shift lever in shift tower. Press lever retainer downward and turn it clockwise to lock it in place. Then install lever dust boot on shift tower.
- (11) Install rear crossmember. Tighten crossmember-to-frame bolts to 41 N·m (31 ft. lbs.) torque.
- (12) Install fasteners to hold rear cushion and bracket to transmission. Then tighten transmission-to-rear support bolts/nuts to 54 N·m (40 ft. lbs.) torque.
- (13) Remove support stands from engine and transmission.
- (14) Install and connect crankshaft position sensor.
- (15) Position transfer case on transmission jack, if equipped.
- (16) Secure transfer case to jack with safety chains, if equipped.
- (17) Raise transfer case, if equipped, and align transfer case input shaft to the transmission output shaft.

REMOVAL AND INSTALLATION (Continued)

(18) Slide transfer case forward until case is seated on transmission, if necessary.

(19) Install nuts to attach transfer case to transmission, if equipped. Tighten transfer case-to-transmission nuts to 35 N·m (26 ft. lbs.) torque.

(20) Connect transfer case shift linkage at transfer case, if equipped.

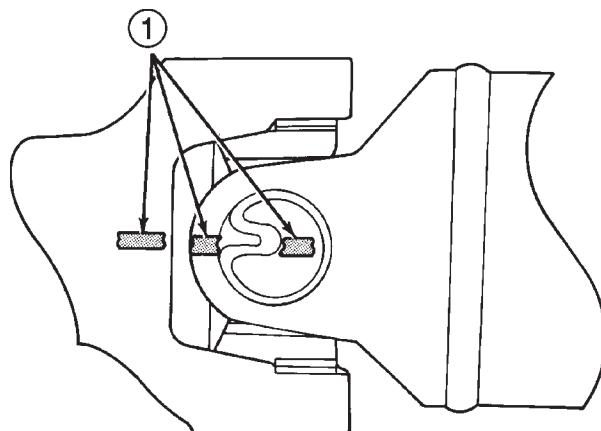
(21) Connect transfer case vent hose, if equipped.

(22) Secure wire harnesses in clips/tie straps on transmission and transfer case, if equipped.

(23) Engage wire connectors attached to all necessary transmission or transfer case, if equipped, components.

(24) Install rear propeller shaft slip yoke to transmission or transfer case, if equipped, output shaft.

(25) Align marks on rear propeller shaft and rear axle yokes (Fig. 9).



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Fig. 9 Align Propeller Shaft And Rear Axle Yokes Alignment Marks

1 – REFERENCE MARKS

(26) Install and tighten propeller shaft U-joint clamp bolts to 19 N·m (170 in. lbs.) torque.

(27) Align marks on front propeller shaft, axle, and transfer case yokes, if equipped.

(28) Install and tighten propeller shaft U-joint clamp bolts to 19 N·m (170 in. lbs.) torque.

(29) Install slave cylinder in clutch housing.

(30) Install skid plate, if equipped. Tighten bolts to 42 N·m (31 ft. lbs.) torque. Tighten stud nuts to 17 N·m (150 in. lbs.) torque.

(31) Fill transmission and transfer case, if equipped, with recommended lubricants. Refer to the Lubricant Recommendation sections of the appropriate component for correct fluid.

(32) Lower vehicle.

FRONT BEARING RETAINER SEAL

REMOVAL

(1) Remove release bearing and lever from the transmission.

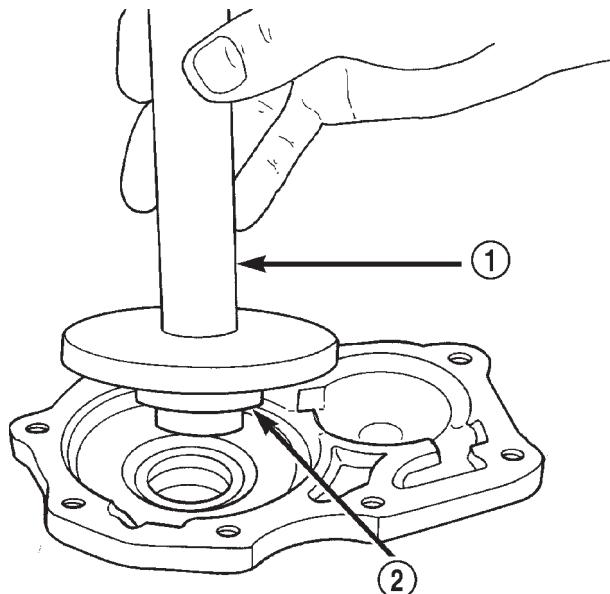
(2) Remove the bolts holding the front bearing retainer to the transmission case.

(3) Remove the front bearing retainer from the transmission case.

(4) Using a suitable pry tool, remove the front bearing retainer seal.

INSTALLATION

(1) Using Tool Handle C-4171 and Seal Installer 8211, install new seal in to the front bearing retainer (Fig. 10).



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Fig. 10 Install Front Bearing Retainer Seal

1 – SPECIAL TOOL C-4171

2 – SPECIAL TOOL 8211 (AX5) OR 8209 (AX15)

(2) Remove any residual gasket material from the sealing surfaces of the bearing retainer and the transmission case.

(3) Install new front bearing retainer gasket to the front bearing retainer.

(4) Install the front bearing retainer onto the transmission case.

(5) Install the bolts to hold the bearing retainer onto the transmission case.

(6) Tighten the bolts to 17 N·m (12 ft. lbs.).

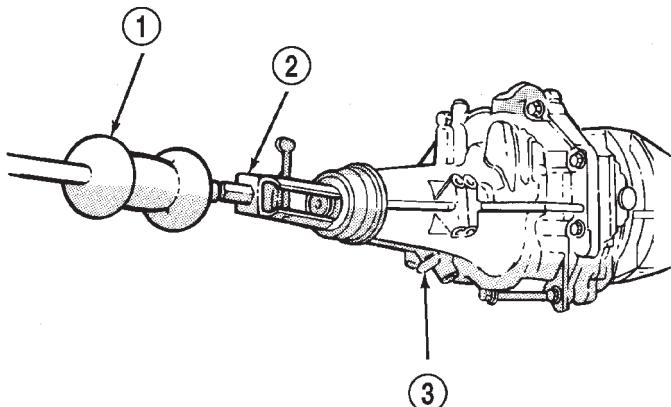
(7) Install release bearing and lever onto the transmission.

REMOVAL AND INSTALLATION (Continued)

EXTENSION HOUSING SEAL

REMOVAL

- (1) Raise and support vehicle.
- (2) Remove propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedures.
- (3) Using a suitable seal puller or screw with a slide hammer, remove the extension housing seal (Fig. 11).



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Fig. 11 Remove Extension Housing Seal

- 1 – SLIDE HAMMER
2 – SEAL PULLER
3 – 2WD EXTENSION HOUSING

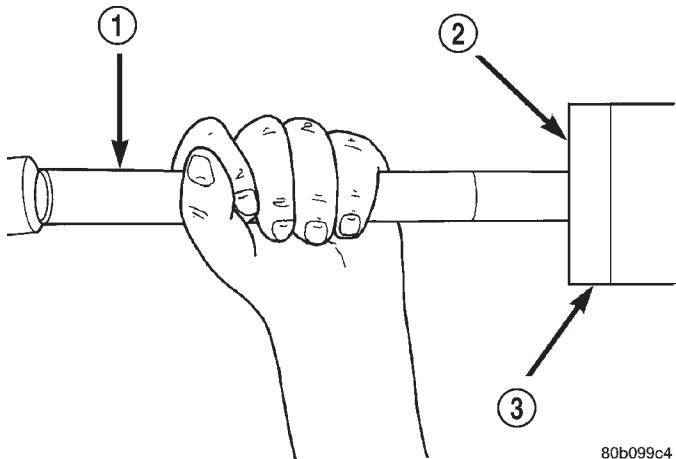
INSTALLATION

- (1) Clean seal bore of extension housing of any residual sealer material from original seal.
- (2) Using Tool Handle C-4171 and Seal Installer 8212, install new extension housing seal so that the seal is located 0 ± 0.5 mm (0 ± 0.02 in.) to the face of the extension housing (Fig. 12).
- (3) Install propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedures.
- (4) Check and add fluid to transmission as necessary. Refer to the Recommended Lubricant section for proper fluid requirements.
- (5) Lower vehicle.

ADAPTER HOUSING SEAL

REMOVAL

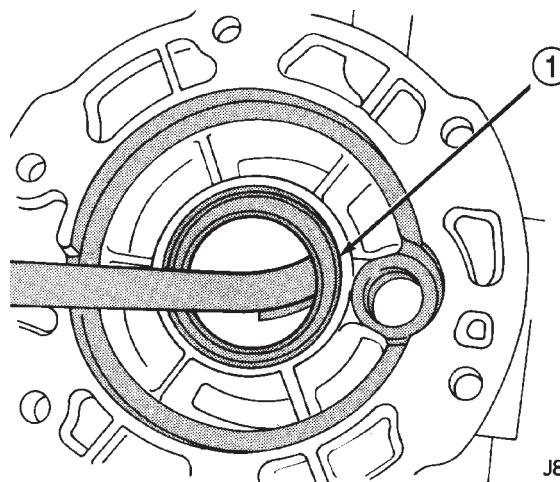
- (1) Hoist and support vehicle.
- (2) Remove transfer case.
- (3) Using a suitable pry tool, or a slide hammer mounted screw, remove the adapter housing seal (Fig. 13).



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Fig. 12 Install Extension Housing Seal

- 1 – SPECIAL TOOL
C-4171
2 – SPECIAL TOOL
8212
3 – EXTENSION HOUSING



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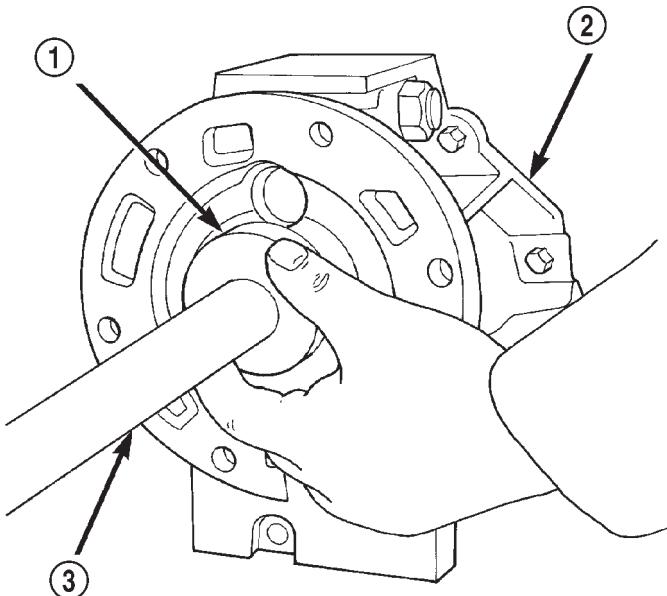
Fig. 13 Remove Adapter Housing Seal

- 1 – ADAPTER HOUSING OIL SEAL

INSTALLATION

- (1) Clean seal bore of adapter housing of any residual sealer material from original seal.
- (2) Using Tool Handle C-4171 and Seal Installer 8208, install new seal so that the seal is located 0 ± 0.2 mm (0 ± 0.008 in.) to the seal bore face of adapter housing (Fig. 14).
- (3) Install transfer case.
- (4) Check and add fluid to transmission as necessary. Refer to the Recommended Lubricant section for proper fluid requirements.
- (5) Lower vehicle.

REMOVAL AND INSTALLATION (Continued)



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Fig. 14 Install Adapter Housing Seal

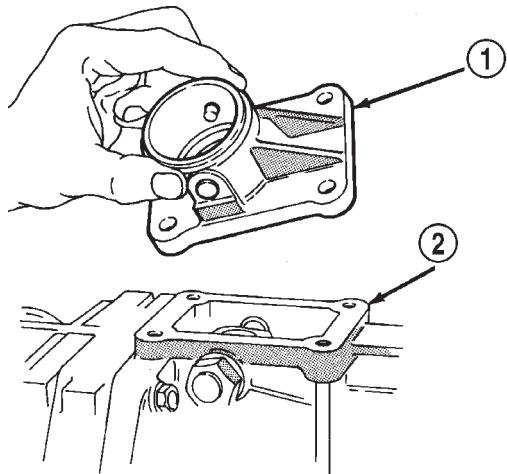
- 1 – SPECIAL TOOL 8208
2 – ADAPTER HOUSING
3 – SPECIAL TOOL C-4171

DISASSEMBLY AND ASSEMBLY

ADAPTER/EXTENSION HOUSING AND FRONT BEARING RETAINER

DISASSEMBLY

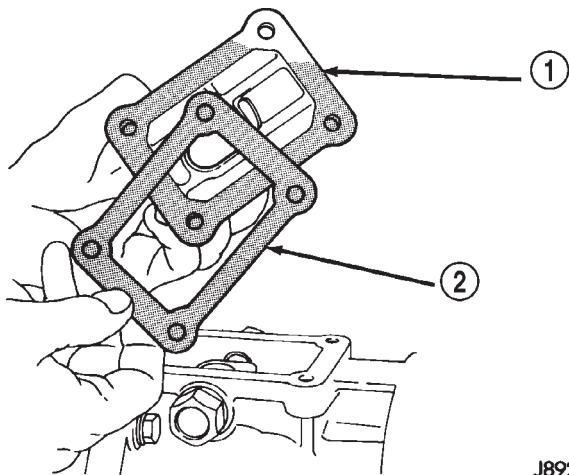
- (1) Drain transmission lubricant, if necessary.
- (2) Remove release bearing and lever.
- (3) Remove clutch housing bolts and remove housing (Fig. 17).
- (4) Remove vehicle speed sensor and speedometer adapter, if necessary.
- (5) Remove bolts holding shift tower to transmission case.
- (6) Remove shift tower from transmission case (Fig. 15).
- (7) Remove shift tower gasket from shift tower or transmission case (Fig. 16).



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Fig. 15 Remove Shift Tower

- 1 – SHIFT TOWER
2 – ADAPTER/EXTENSION HOUSING



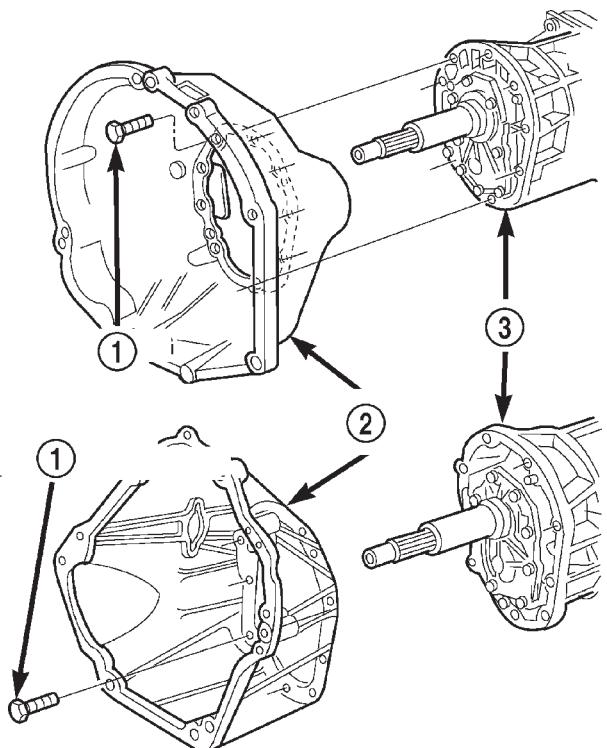
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Fig. 16 Remove Shift Tower Gasket

- 1 – SHIFT TOWER
2 – GASKET

- (8) Remove detent ball plug (Fig. 18).
- (9) Remove detent spring and ball with pencil magnet (Fig. 19), (Fig. 20).

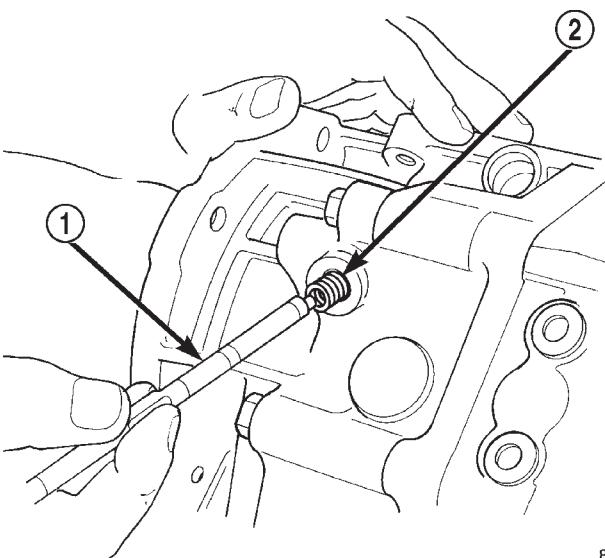
DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 17 Clutch Housing

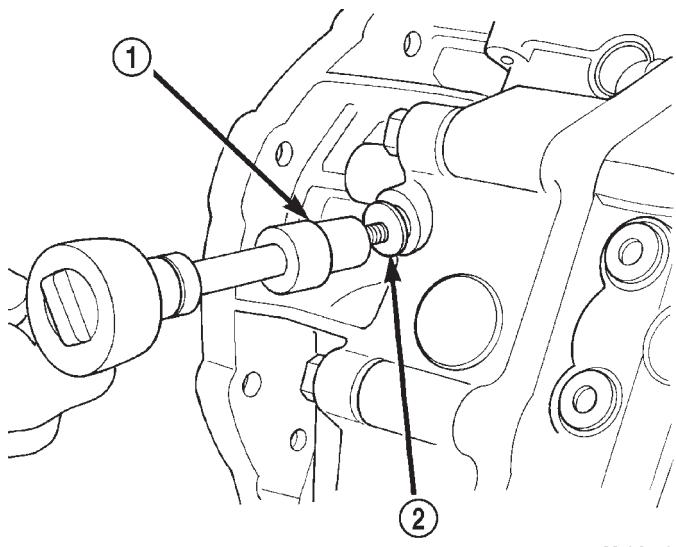
- 1 – HOUSING-TO-TRANSMISSION BOLTS (46 N·m/34 ft. lbs.)
- 2 – CLUTCH HOUSING
- 3 – TRANSMISSION



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Fig. 19 Remove Detent Spring

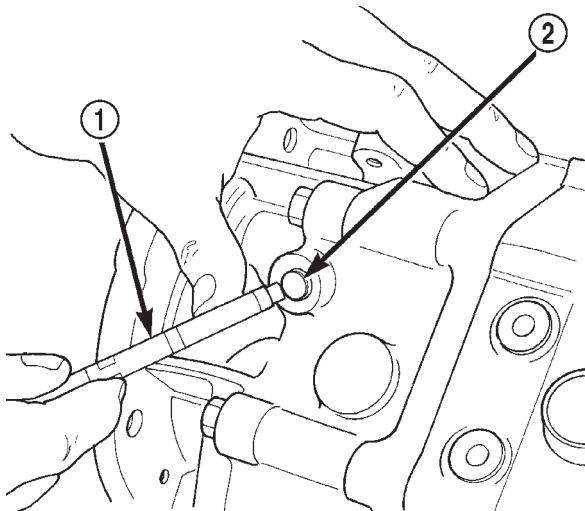
- 1 – PENCIL MAGNET
- 2 – DETENT BALL SPRING



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Fig. 18 Remove Detent Ball Plug

- 1 – TORX BIT
- 2 – DETENT BALL PLUG



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Fig. 20 Remove Detent Ball

- 1 – PENCIL MAGNET
- 2 – SHIFT DETENT BALL

DISASSEMBLY AND ASSEMBLY (Continued)

- (10) Remove shift arm retainer bolt (Fig. 21).
 (11) Remove shift arm restrictor pins (Fig. 22).

NOTE: The restrictor pins are not interchangeable and are color coded. Note which color restrictor pin is removed from each side of the transmission and be sure to install it into the same location.

- (12) Remove shift lever shaft plug (Fig. 23).
 (13) Remove shifter shaft with large magnet (Fig. 24).
 (14) Remove the shift arm from the adapter housing.

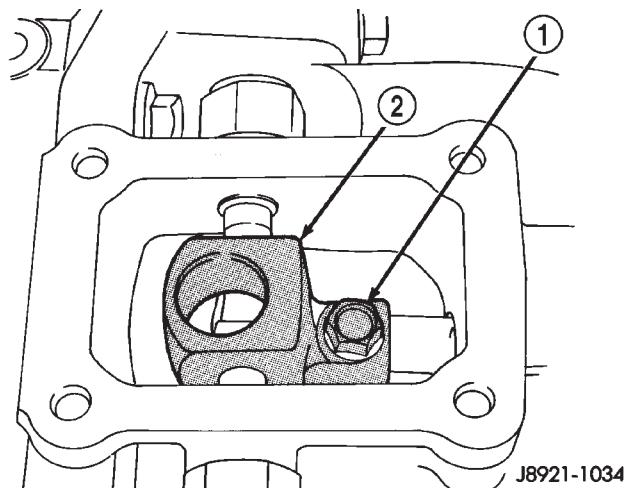


Fig. 21 Shift Arm Retainer Bolt Removal

- 1 – RETAINER BOLT
 2 – SHIFT ARM

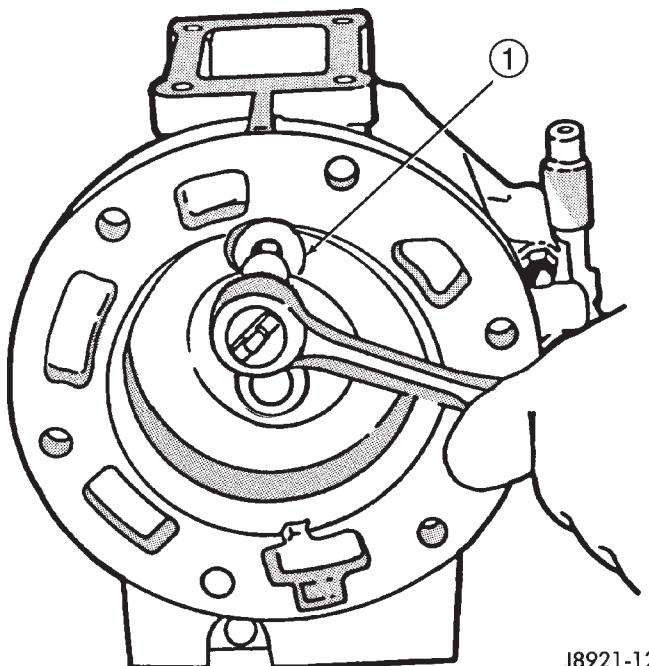


Fig. 23 Removing Shift Lever Shaft Plug

- 1 – SHIFT LEVER SHAFT PLUG

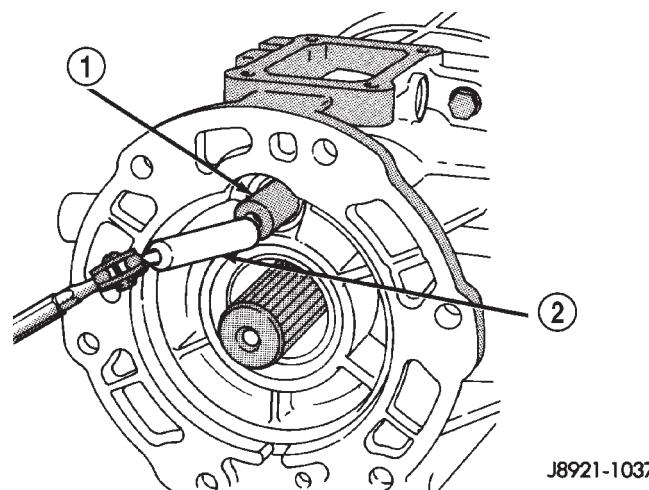


Fig. 24 Remove Shifter Shaft

- 1 – SHIFT ARM SHAFT
 2 – LARGE MAGNET

- (15) Remove adapter/extension housing bolts.
 (16) Loosen adapter/extension housing by tapping it loose with plastic mallet (Fig. 25).

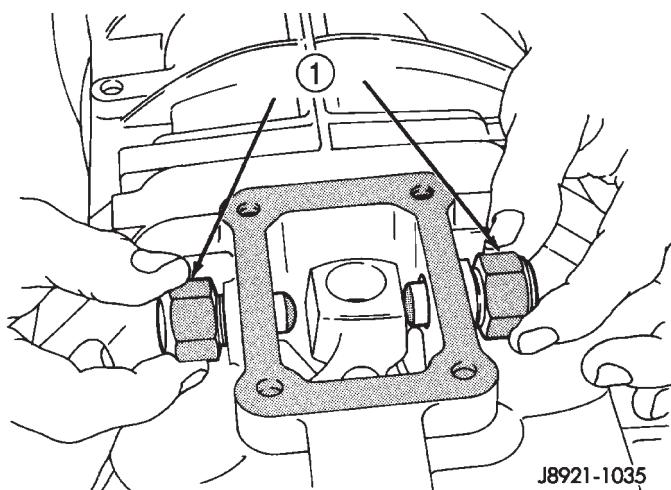


Fig. 22 Shift Arm Restrictor Pins

- 1 – RESTRICTOR PINS

DISASSEMBLY AND ASSEMBLY (Continued)

- (17) Remove adapter/extension housing (Fig. 26).

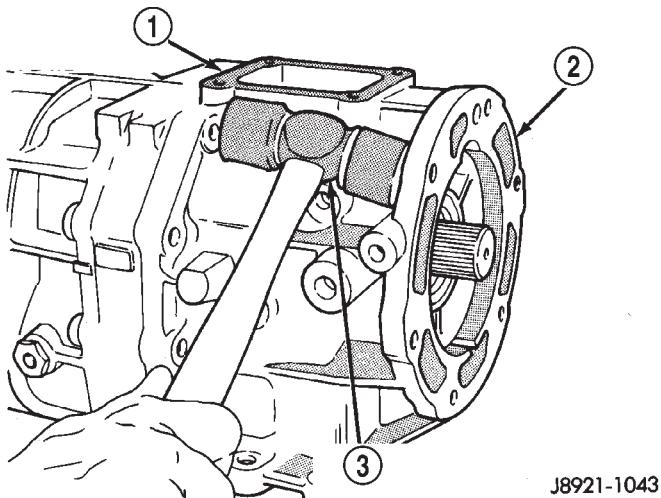


Fig. 25 Loosen Adapter/Extension Housing

- 1 – INTERMEDIATE PLATE
2 – ADAPTER HOUSING
3 – RUBBER FACED MALLET

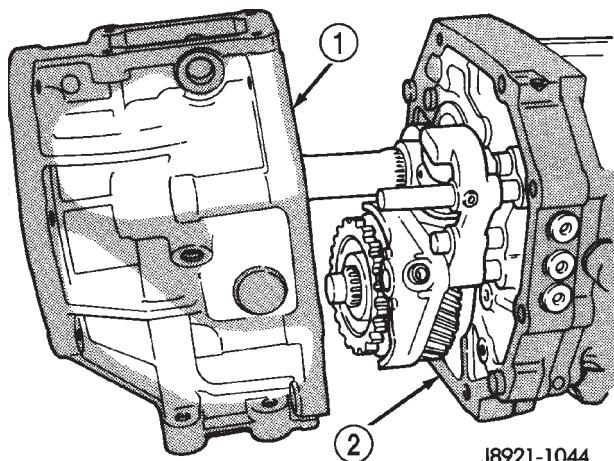


Fig. 26 Remove Adapter/Extension Housing—Typical

- 1 – ADAPTER HOUSING
2 – INTERMEDIATE PLATE

- (18) On 4x2 transmissions;

- (a) Remove speedometer gear retaining snap-ring from output shaft.
- (b) Remove speedometer gear from output shaft and remove speedometer gear lock ball from output shaft.
- (c) Remove speedometer drive gear locating snap-ring (Fig. 27).

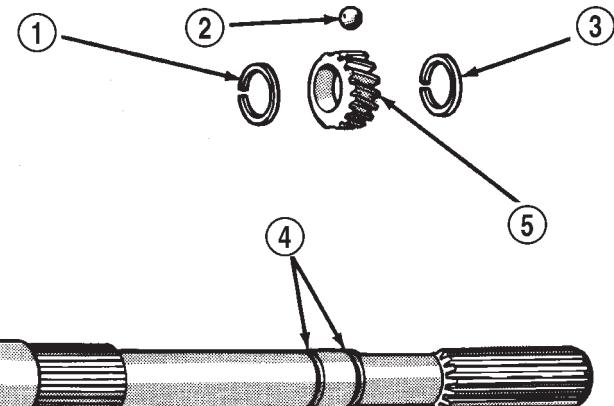


Fig. 27 Speedometer Drive Gear Assembly

- 1 – SNAP RING
2 – LOCK BALL
3 – SNAP RING
4 – OUTPUT SHAFT GROOVES
5 – SPEEDOMETER GEAR

- (19) Remove the bolts holding the front bearing retainer to the transmission case.

- (20) Remove the bearing retainer from transmission case (Fig. 28).

- (21) Remove input shaft bearing snap-ring (Fig. 29).

- (22) Remove countershaft front bearing snap-ring.

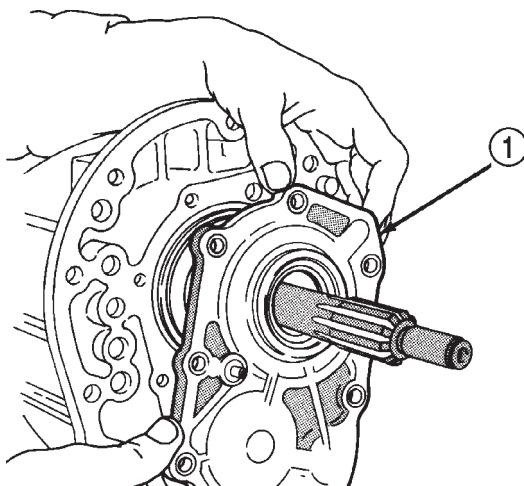
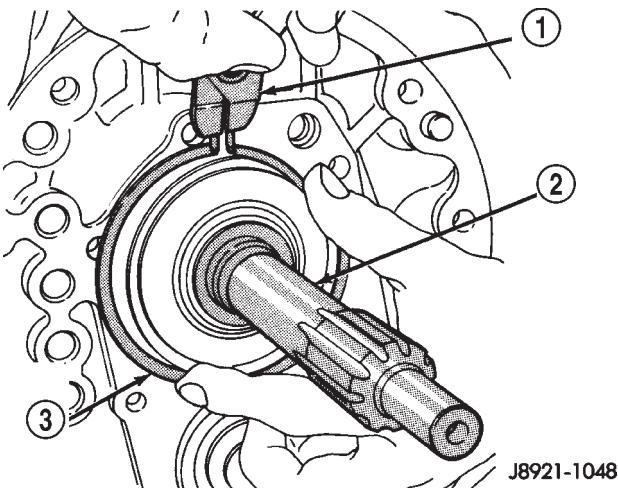


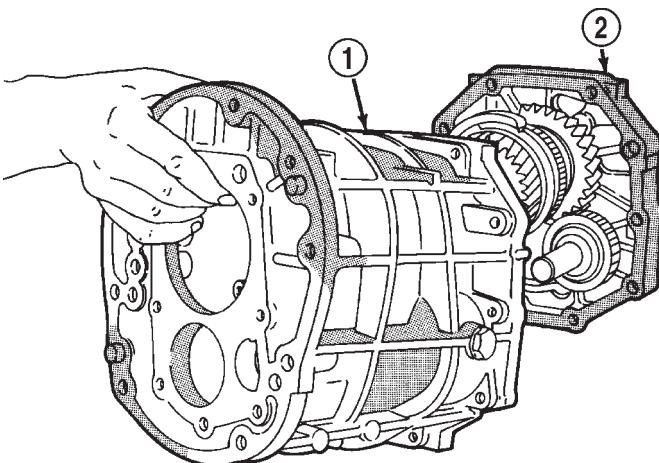
Fig. 28 Remove Front Bearing Retainer

- 1 – FRONT BEARING RETAINER

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 29 Remove Input Shaft Bearing Snap-ring**

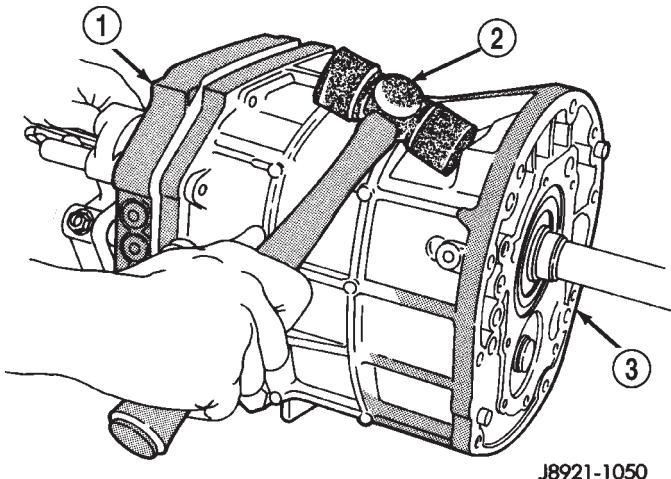
- 1 – SNAP RING PLIERS
- 2 – INPUT SHAFT
- 3 – INPUT SHAFT BEARING SNAP RING

**Fig. 31 Remove Intermediate Plate from Transmission Case**

- 1 – GEAR CASE
- 2 – INTERMEDIATE PLATE

(23) Separate intermediate plate and transmission case by tapping them loose with plastic mallet (Fig. 30).

(24) Separate the intermediate plate from the transmission case (Fig. 31).

**Fig. 30 Separate Intermediate Plate and Transmission Case**

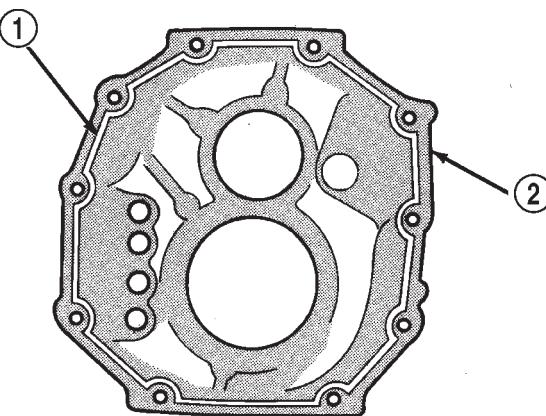
- 1 – INTERMEDIATE PLATE
- 2 – RUBBER MALLETS
- 3 – GEAR CASE

ASSEMBLY

(1) Remove any residual sealer from transmission case, intermediate plate, and adapter/extension housing.

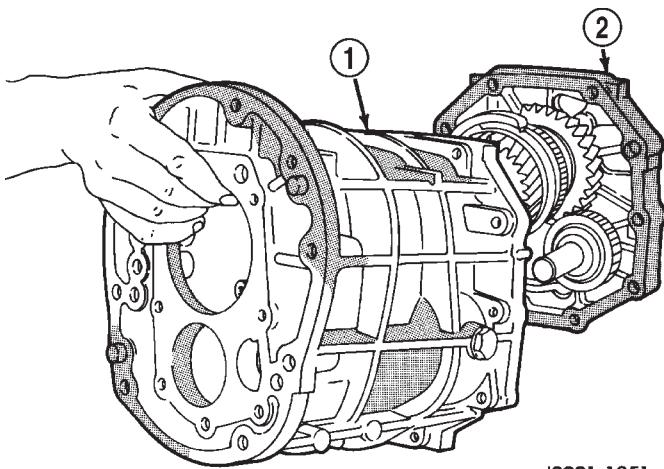
(2) Apply a 1/8 to 3/16 inch wide bead of Threebond® Liquid Gasket TB1281, P/N 83504038, as shown, making sure to keep sealer bead to inside of bolt holes (Fig. 32).

(3) Align geartrain and shift rails with mating holes in transmission case and install transmission case to the intermediate plate (Fig. 33). Verify that the transmission case is seated on the intermediate plate locating pins.

**Fig. 32 Apply Sealer to Transmission Gear Case**

- 1 – SEALER BEAD (1/8" - 3/16" WIDE)
- 2 – GEAR CASE

DISASSEMBLY AND ASSEMBLY (Continued)

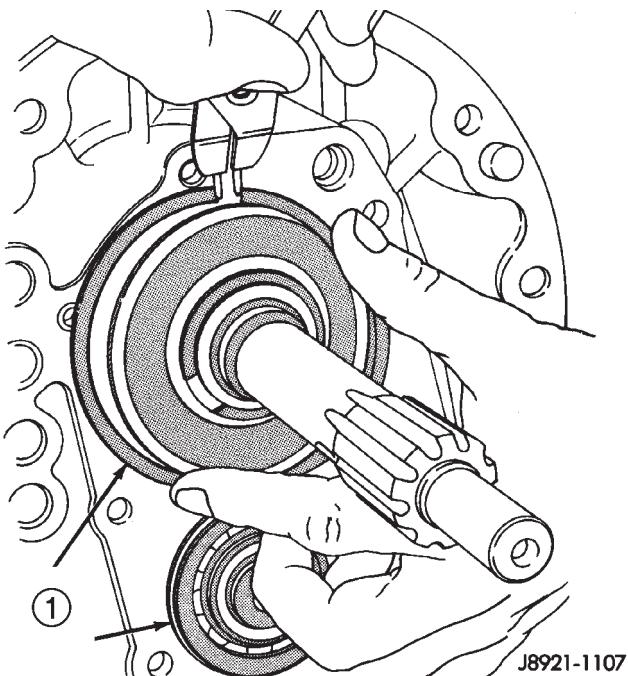


J8921-1051

Fig. 33 Install Transmission Gear Case to the Intermediate Plate

1 – GEAR CASE
2 – INTERMEDIATE PLATE

- (4) Install new front bearing snap rings (Fig. 34).



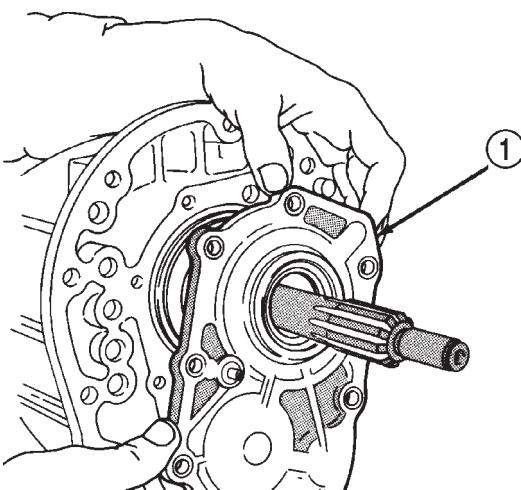
J8921-1107

Fig. 34 Install Front Bearing Snap-rings

1 – FRONT BEARING SNAP RINGS

- (5) Install front bearing retainer gasket to front bearing retainer.

- (6) Install the front bearing retainer (Fig. 35) and tighten bolts to 17 N·m (12 ft. lbs.).



J8921-1046

Fig. 35 Install Front Bearing Retainer

1 – FRONT BEARING RETAINER

- (7) On 4x2 transmissions;

- (a) Install speedometer drive gear locating snap-ring (Fig. 36).

- (b) Install speedometer gear lock ball in output shaft and install speedometer gear onto output shaft.

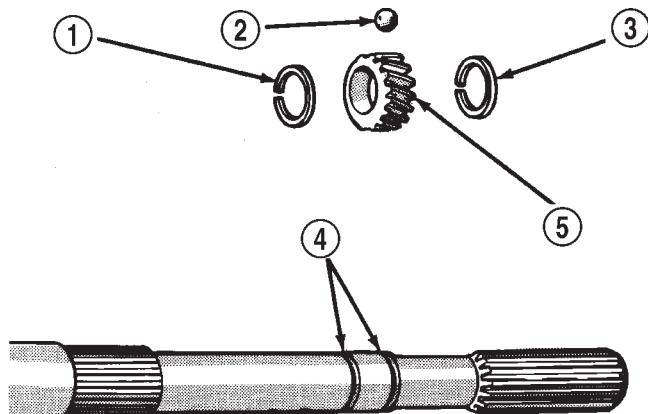
- (c) Install speedometer gear retaining snap-ring onto output shaft.

- (8) Apply a 1/8 to 3/16 inch wide bead of Threebond® Liquid Gasket TB1281, P/N 83504038, to sealing surface of adapter/extension housing, making sure to keep sealer bead to inside of bolt holes.

- (9) Install adapter or extension housing on intermediate plate (Fig. 37). Tighten housing bolts to 34 N·m (25 ft. lbs.) torque.

- (10) Position shift arm in shifter tower opening of adapter or extension housing (Fig. 38). Be sure that the shifter arm is engaged into the shift rails.

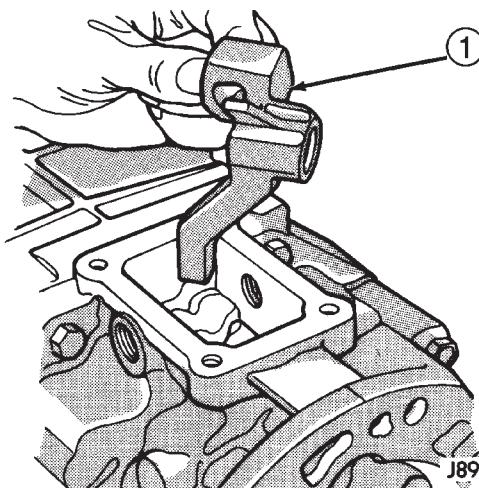
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-1119

Fig. 36 Speedometer Drive Gear Assembly

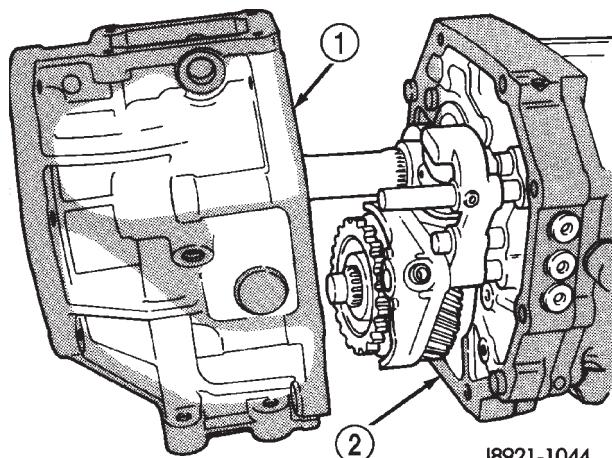
- 1 – SNAP RING
- 2 – LOCK BALL
- 3 – SNAP RING
- 4 – OUTPUT SHAFT GROOVES
- 5 – SPEEDOMETER GEAR



J8921-1127

Fig. 38 Position Shift Arm in Adapter or Extension Housing

- 1 – SHIFT ARM

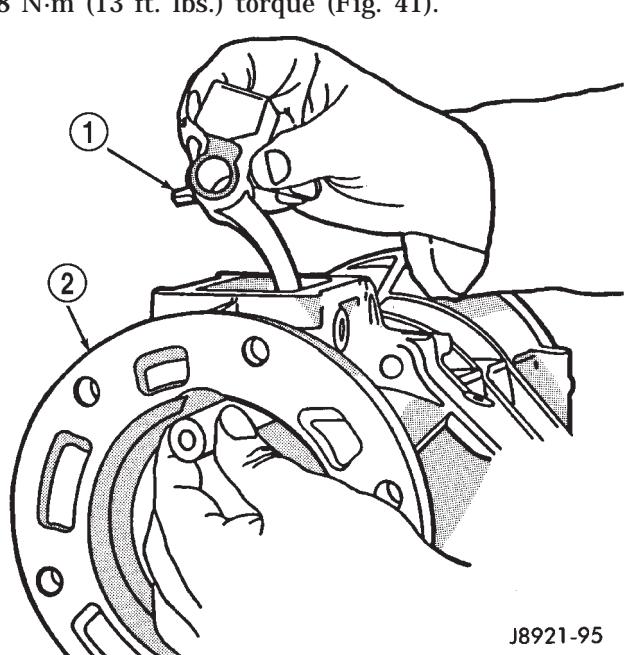


J8921-1044

Fig. 37 Install Adapter/Extension Housing-Typical

- 1 – ADAPTER HOUSING
- 2 – INTERMEDIATE PLATE

(11) Start shifter arm shaft in hole in back of adapter or extension housing. Align shift arm and shifter arm shaft and insert shifter arm shaft through the shifter arm and into the forward portion of the adapter or extension housing (Fig. 39).

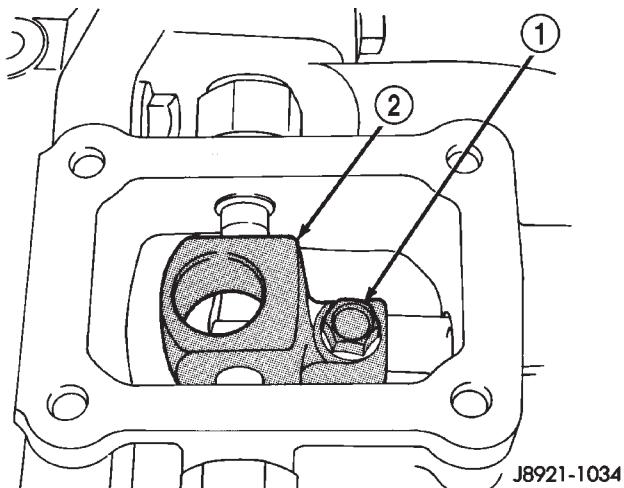


J8921-95

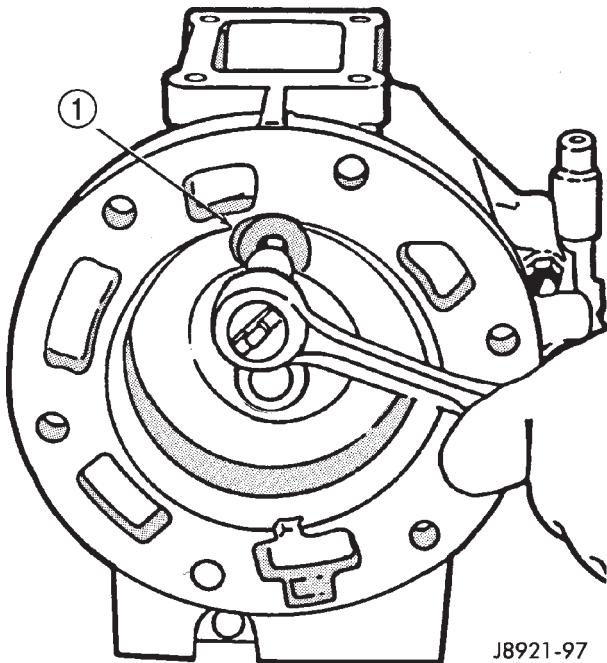
Fig. 39 Install Shifter Arm Shaft

- 1 – SHIFT ARM
- 2 – ADAPTER OR EXTENSION HOUSING

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 40 Install Shift Arm Retainer Bolt**

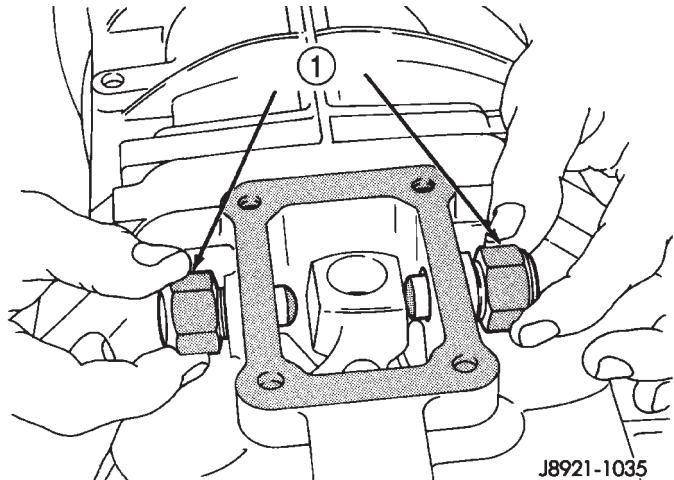
- 1 – RETAINER BOLT
2 – SHIFT ARM

**Fig. 41 Shifter Arm Shaft Plug Installation**

- 1 – SHAFT PLUG

(15) Install shift restrictor pins in shift tower and tighten to 27 N·m (20 ft. lbs.) (Fig. 42).

NOTE: The restrictor pins are not interchangeable and are color coded. Be sure to install the pin into the same location from which it was removed.

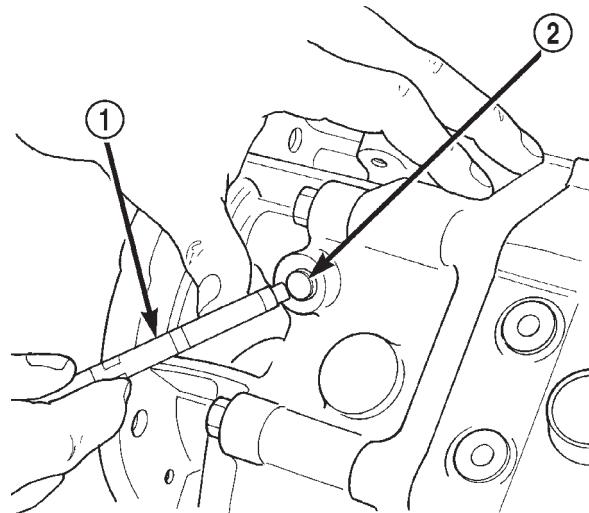
**Fig. 42 Install Shifter Restrictor Pins**

- 1 – RESTRICTOR PINS

(16) Install shift detent ball in detent opening of case (Fig. 43).

(17) Install detent spring in case (Fig. 44).

(18) Install detent plug and tighten to 19 N·m (14 ft. lbs.) (Fig. 45).

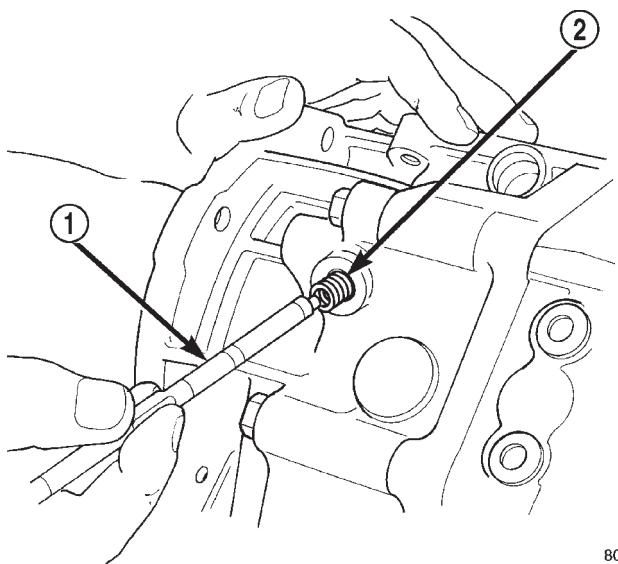


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Fig. 43 Install Detent Ball

- 1 – PENCIL MAGNET
2 – SHIFT DETENT BALL

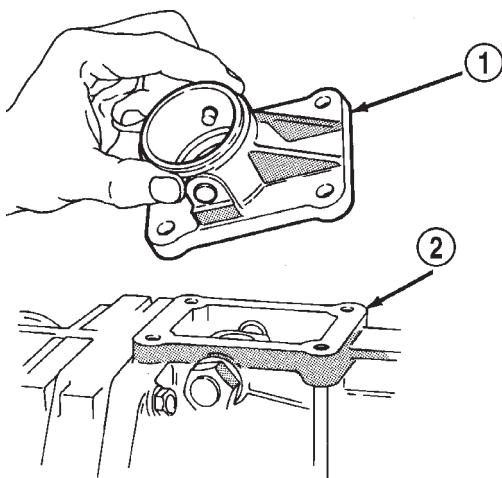
DISASSEMBLY AND ASSEMBLY (Continued)



80abfee

Fig. 44 Install Detent Spring

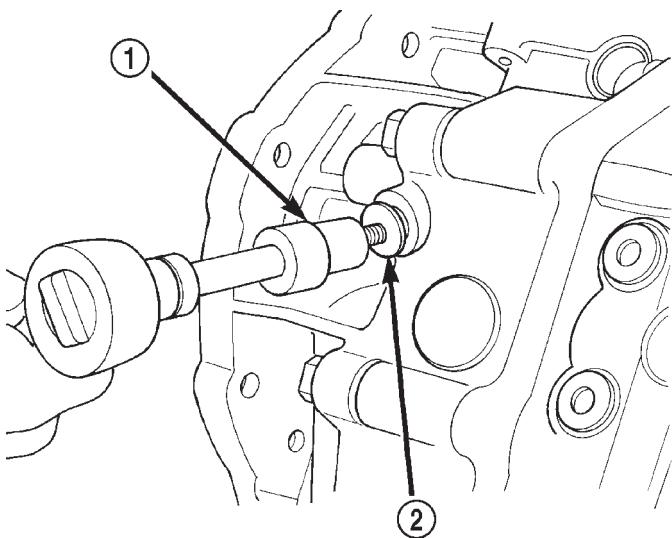
- 1 – PENCIL MAGNET
2 – DETENT BALL SPRING



J8921-1032

Fig. 46 Install Shift Tower

- 1 – SHIFT TOWER
2 – ADAPTER/EXTENSION HOUSING



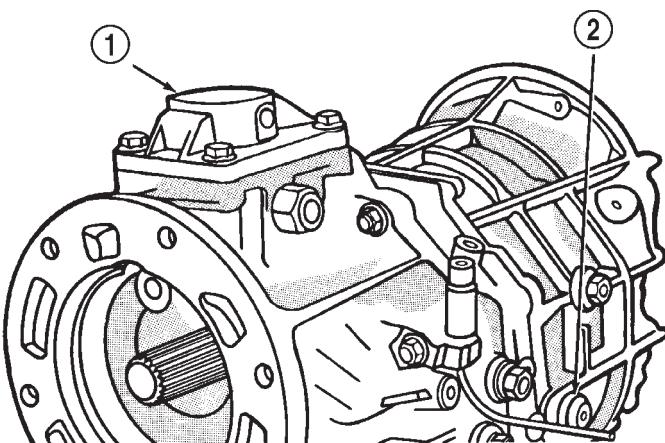
80abfeed

Fig. 45 Install Detent Ball Plug

- 1 – TORX BIT
2 – DETENT BALL PLUG

- (19) Install shift tower gasket onto shift tower.
 (20) Install the shift tower oil deflector and gasket onto the adapter or extension housing.
 (21) Install shift tower onto transmission case (Fig. 46).
 (22) Install bolts to hold shift tower to transmission case. Tighten tower bolts to 18 N·m (13 ft. lbs.) torque.

- (23) Install new metal O-ring onto the backup lamp switch.
 (24) Install backup lamp switch (Fig. 47). Tighten switch to 44 N·m (32.5 ft. lbs.) torque.



J8921-100

Fig. 47 Install Backup Lamp Switch

- 1 – SHIFT TOWER
2 – BACKUP LAMP SWITCH

- (25) Install new seal in adapter/extension housing.
 (26) Install vehicle speed sensor, if necessary.
 (27) Install clutch housing, release bearing, release fork and retainer clip.

DISASSEMBLY AND ASSEMBLY (Continued)

SHIFT MECHANISM AND GEARTRAIN

DISASSEMBLY

(1) Install suitable bolts and washers in intermediate plate (Fig. 48). Then clamp plate and gear assembly in vise. Use enough washers to prevent bolts from touching. Also be sure vise jaws are clamped on bolt heads.

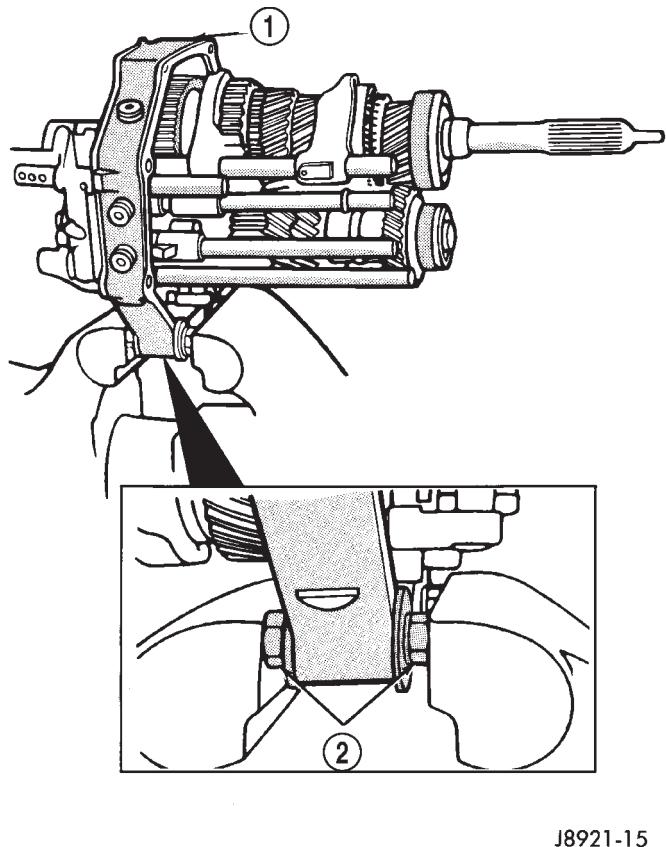


Fig. 48 Positioning Intermediate Plate In Vise

- 1 – INTERMEDIATE PLATE
2 – BOLTS

(2) Remove countershaft fifth gear retaining snap-ring (Fig. 49).

(3) Remove bolt holding fifth gear shift fork to shift rail (Fig. 50).

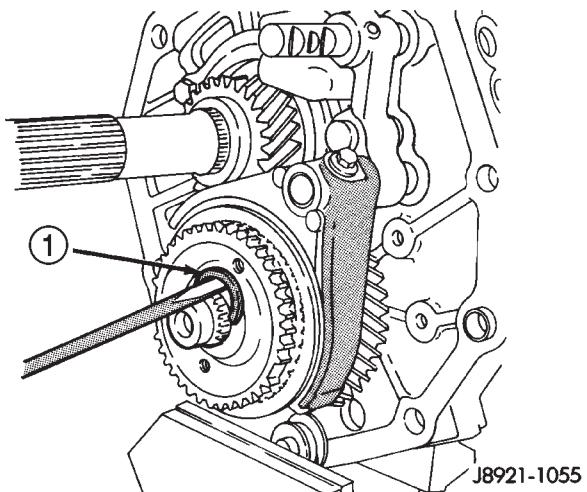


Fig. 49 Remove Fifth Gear Snap-ring

- 1 – FIFTH GEAR SNAP RING (SELECT FIT)

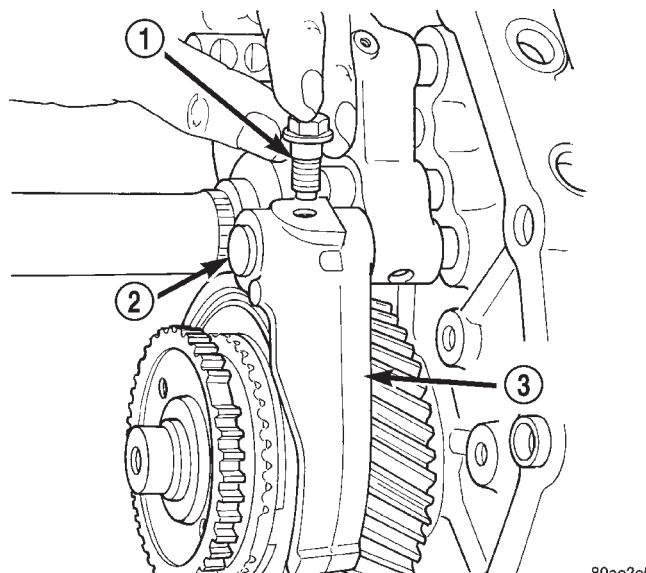
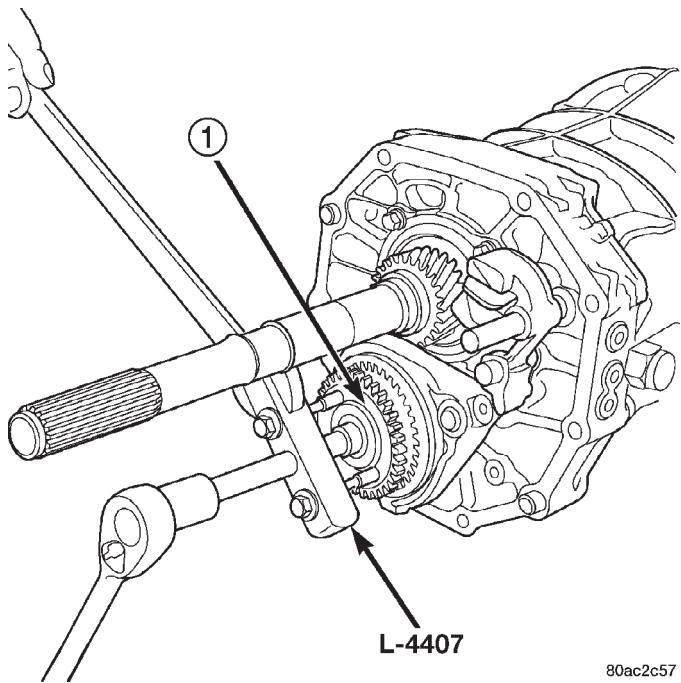


Fig. 50 Remove Shift Fork Retainer Bolt

- 1 – SHIFT FORK RETAINER BOLT
2 – FIFTH GEAR SHIFT RAIL
3 – FIFTH GEAR SHIFT FORK

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Remove fifth gear blocker ring from counter-shaft assembly with Puller L-4407 (Fig. 51).



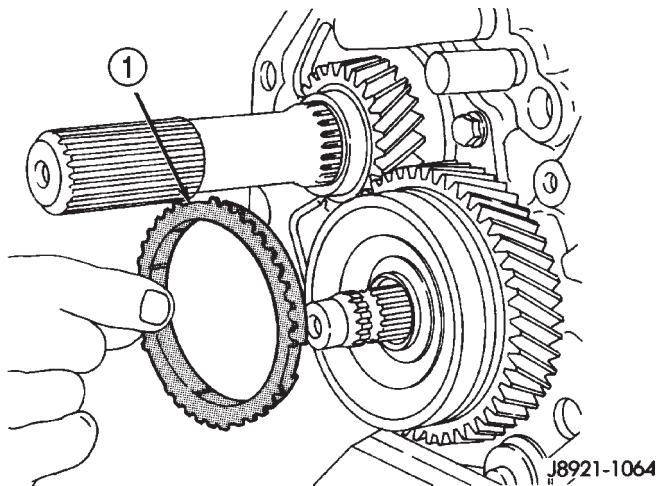
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Fig. 51 Remove Fifth Gear Blocker Ring

1 – FIFTH GEAR BLOCKER RING

(5) Remove fifth gear synchro ring (Fig. 52).

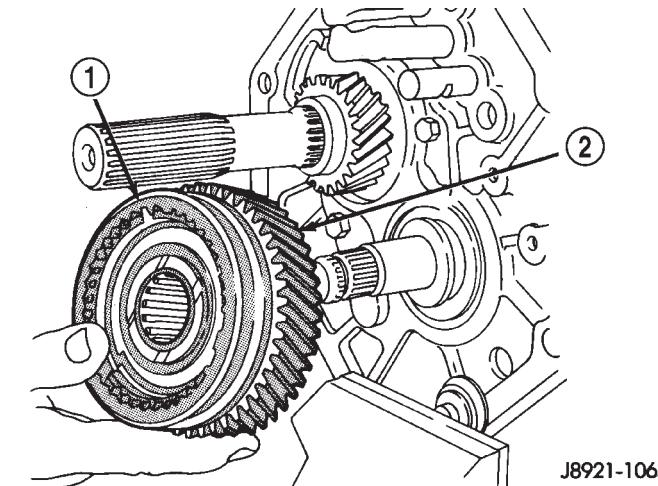
(6) Remove the countershaft fifth gear assembly from countershaft (Fig. 53).



J8921-1064

Fig. 52 Remove Fifth Gear Synchro Ring

1 – FIFTH GEAR SYNCHRO RING



J8921-1065

Fig. 53 Remove Fifth Gear and Synchro Assembly

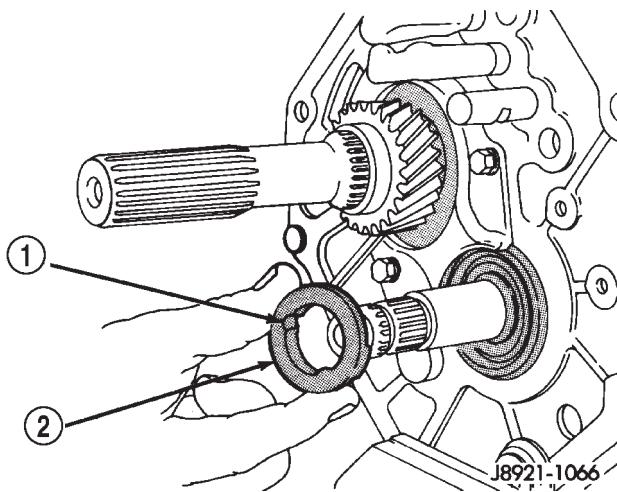
1 – FIFTH GEAR SYNCHRO SLEEVE ASSEMBLY

2 – COUNTER FIFTH GEAR

(7) Remove fifth gear thrust ring from counter-shaft (Fig. 54).

(8) Remove fifth gear thrust ring lock ball from countershaft (Fig. 55).

NOTE: There are many lock balls, check balls, interlock balls, and interlock pins used in various places in the transmission. Whenever a pin or ball is removed, it should be identified in such a way that it can be reinstalled in the same location from which it was removed.



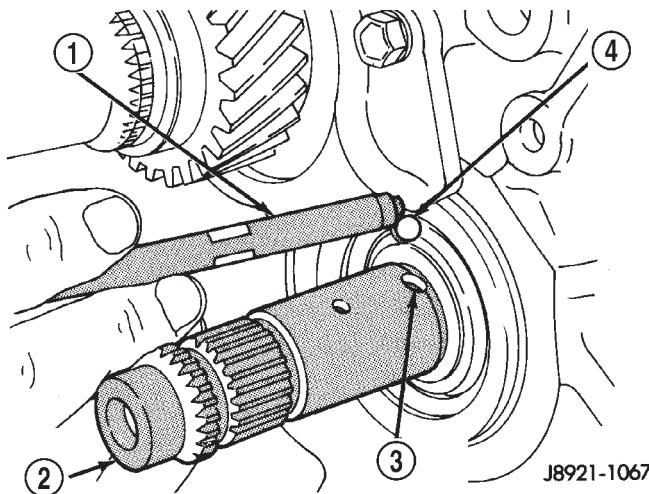
J8921-1066

Fig. 54 Remove Fifth Gear Thrust Ring

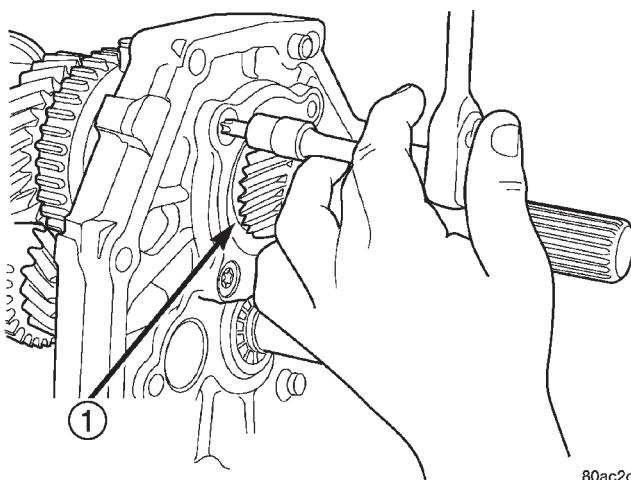
1 – LOCK BALL NOTCH

2 – FIFTH GEAR THRUST RING

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 55 Remove Fifth Gear Thrust Ring Lock Ball**

- 1 – PENCIL MAGNET
- 2 – CLUSTER GEAR
- 3 – LOCK BALL RECESS
- 4 – THRUST RING LOCK BALL

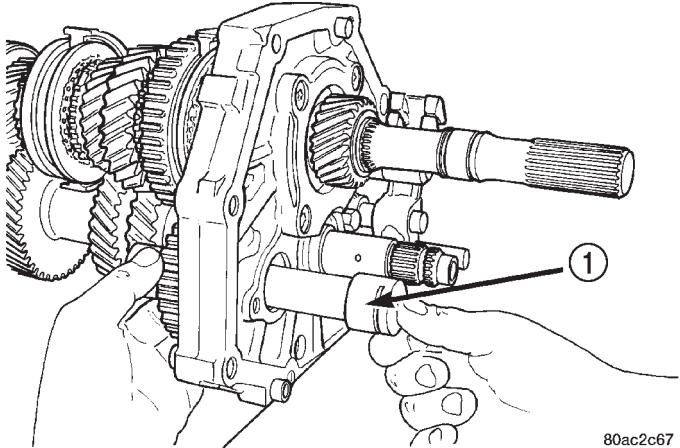
**Fig. 57 Remove Output Shaft Rear Bearing Retainer**
1 – OUTPUT SHAFT REAR BEARING RETAINER

(9) Remove bolt holding reverse idler gear shaft lock plate to the intermediate plate.

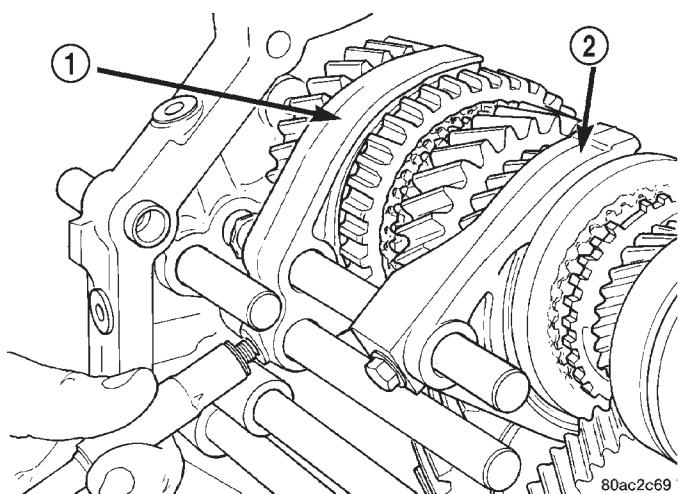
(10) Remove reverse idler gear shaft and reverse idler gear assembly (Fig. 56).

NOTE: Be sure to retrieve the pin and compression spring from the reverse idler shaft.

(11) Remove bolts holding output shaft rear bearing retainer to the intermediate plate and remove retainer (Fig. 57).

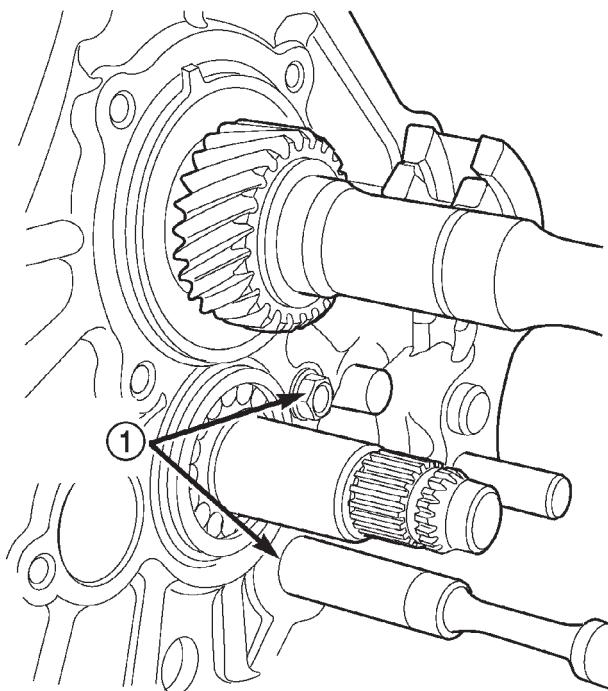
**Fig. 56 Remove Reverse Idler Shaft**

- 1 – REVERSE IDLER SHAFT

**Fig. 58 Remove Shift Fork To Shift Rail Bolts**

- 1 – 1-2 SHIFT FORK
- 2 – 3-4 SHIFT FORK

DISASSEMBLY AND ASSEMBLY (Continued)



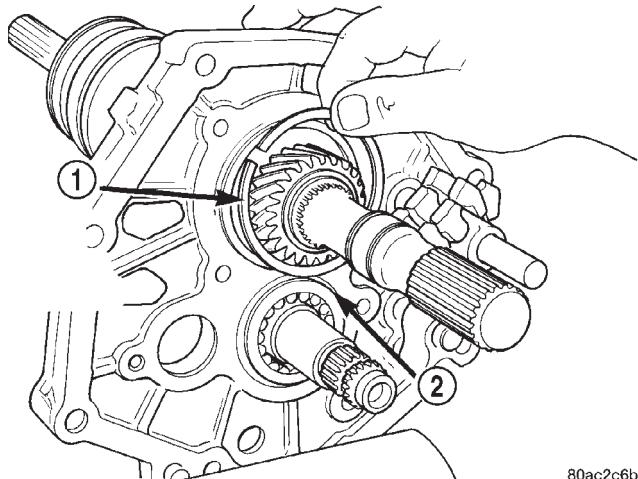
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Fig. 59 Remove Reverse Shift Arm Bracket Bolts

1 – REVERSE SHIFT ARM BOLTS

(14) Remove snap-ring holding output shaft rear bearing into the intermediate plate (Fig. 60).

(15) Remove countershaft rear bearing snap-ring.



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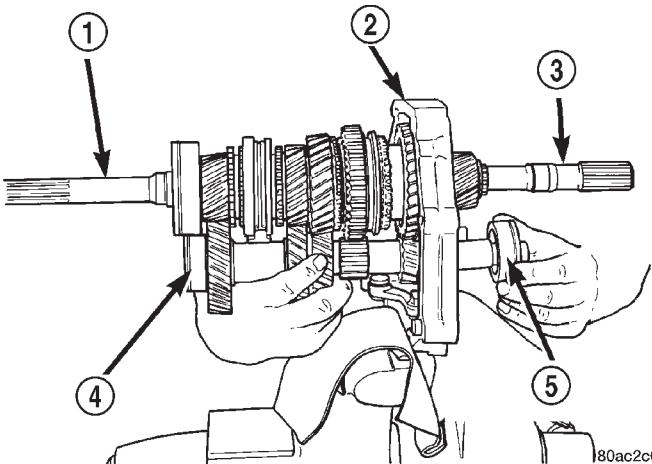
Fig. 60 Remove Output Shaft Rear Bearing Snap-ring

1 – OUTPUT SHAFT REAR BEARING SNAP-RING
2 – COUNTERSHAFT REAR BEARING SNAP-RING

(16) With aid of an assistant, support the mainshaft and countershaft. Tap on the rear of the mainshaft and countershaft with a suitable plastic mallet. This will release the countershaft from the countershaft rear bearing and the mainshaft rear bearing

from the intermediate plate. The countershaft will release from the countershaft bearing first and can be removed by moving the countershaft rearward and downward (Fig. 61).

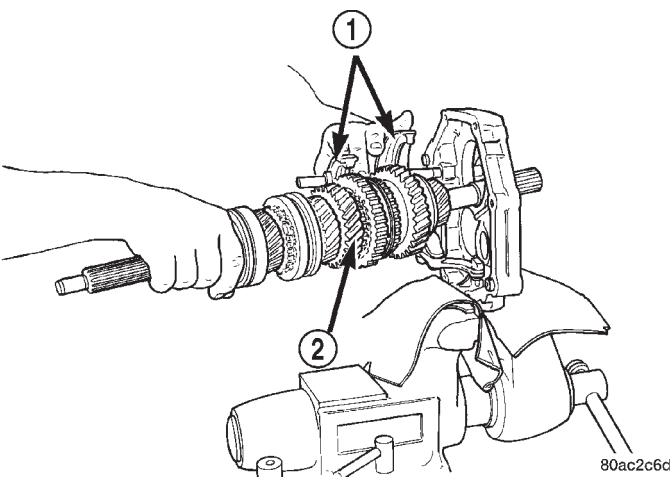
(17) Remove the mainshaft by moving the mainshaft forward until the mainshaft rear bearing is clear of the intermediate plate and then rotating the mainshaft downward out of the shift forks (Fig. 62).



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Fig. 61 Remove Countershaft and Countershaft Rear Bearing

1 – INPUT SHAFT
2 – INTERMEDIATE PLATE
3 – OUTPUT SHAFT
4 – COUNTERSHAFT
5 – COUNTERSHAFT REAR BEARING



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Fig. 62 Remove Mainshaft

1 – SHIFT FORKS
2 – MAINSHAFT

(18) Remove the 3-4 shift fork from the 3-4 shift rail (Fig. 63).

(19) Remove the snap-ring from near the end of the 1-2 shift rail to allow the removal of the 1-2 shift fork.

DISASSEMBLY AND ASSEMBLY (Continued)

(20) Remove the 1-2 shift fork from the 1-2 and the 3-4 shift rails (Fig. 64).

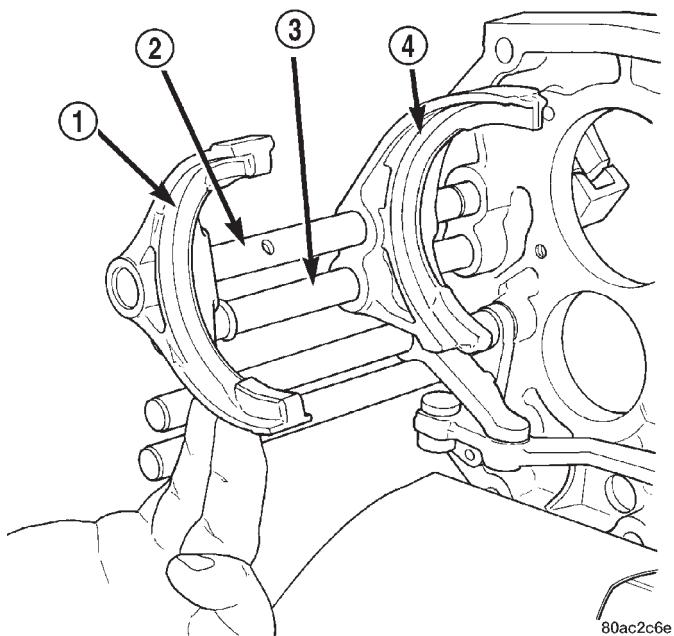


Fig. 63 Remove 3-4 Shift Fork

- 1 – 3-4 SHIFT FORK
- 2 – 3-4 SHIFT RAIL
- 3 – 1-2 SHIFT RAIL
- 4 – 1-2 SHIFT FORK

(21) Remove threaded plugs from intermediate plate. Then remove lock ball and spring from plug holes with pencil magnet (Fig. 65). Note that the bottom spring is shorter in length than the other two springs.

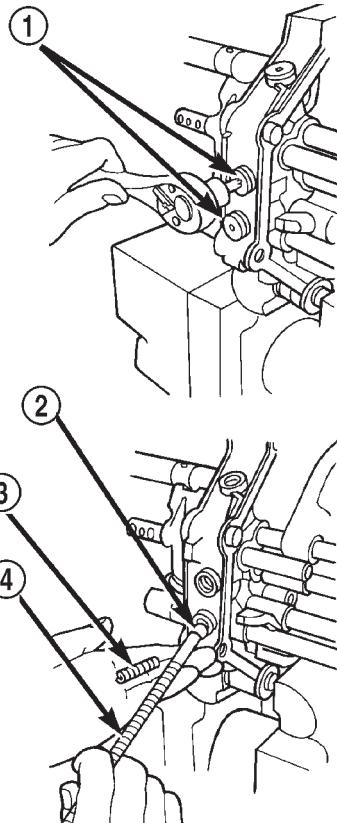


Fig. 65 Remove Lock Ball And Spring

- 1 – THREADED PLUGS
- 2 – LOCK BALL
- 3 – SPRING
- 4 – PENCIL MAGNET

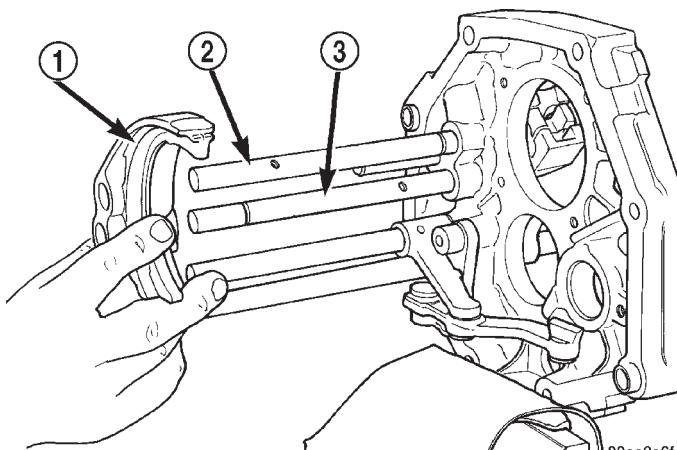


Fig. 64 Remove 1-2 Shift Fork

- 1 – 1-2 SHIFT FORK
- 2 – 3-4 SHIFT RAIL
- 3 – 1-2 SHIFT RAIL

(22) Remove the intermediate plate from the vise, rotate the plate 180°, and reinstall the plate in the vise using the same bolt and washer mounting set-up.

CAUTION: The interlock balls and pins are different sizes and shapes. Be sure to correctly identify which position an item is removed from to ensure that it is reinstalled in the same location.

DISASSEMBLY AND ASSEMBLY (Continued)

(23) Remove fifth gear shift rail (Fig. 66).

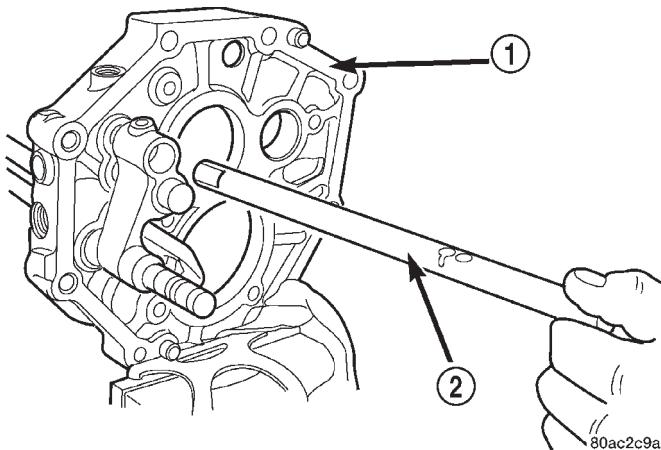


Fig. 66 Remove Fifth Gear Shift Rail

- 1 – INTERMEDIATE PLATE
2 – FIFTH GEAR SHIFT RAIL

(24) Remove fifth gear check ball (Fig. 67) and interlock pin.

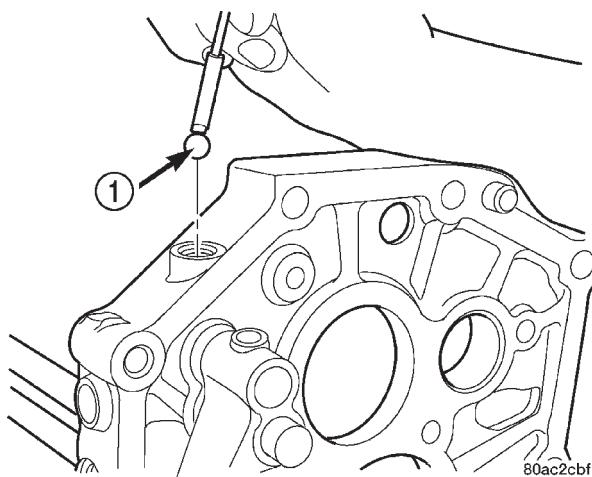


Fig. 67 Remove Fifth Gear Check Ball

- 1 – FIFTH GEAR CHECK BALL

(25) Remove reverse shift head and rail assembly (Fig. 68).

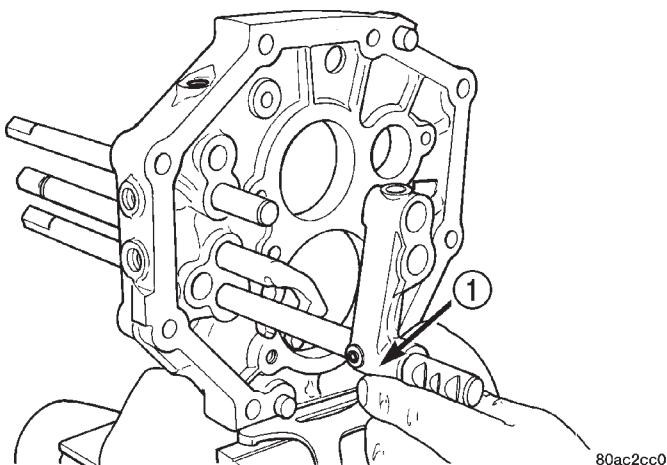


Fig. 68 Remove Reverse Shift Head And Rail Assembly

- 1 – REVERSE SHIFT HEAD AND RAIL ASSEMBLY

(26) Remove snap-ring holding reverse shift rail into intermediate plate.

(27) Remove reverse shift rail and reverse shift fork and arm assembly from intermediate plate (Fig. 69).

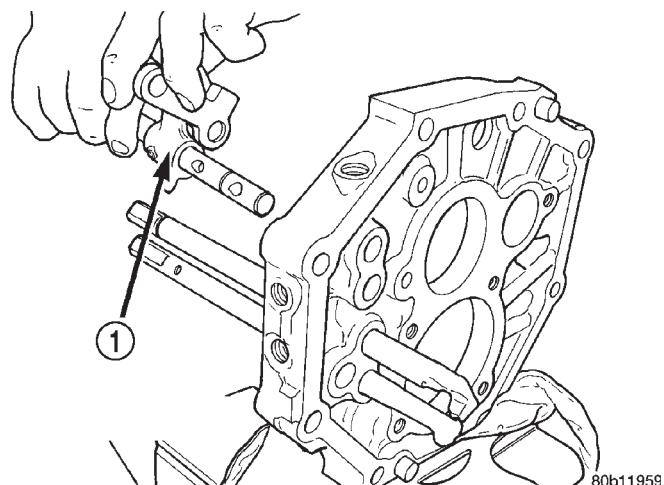


Fig. 69 Remove Reverse Shift Rail

- 1 – REVERSE SHIFT RAIL AND REVERSE FORK ASSEMBLY

DISASSEMBLY AND ASSEMBLY (Continued)

- (28) Remove interlock pin from reverse shift rail (Fig. 70).

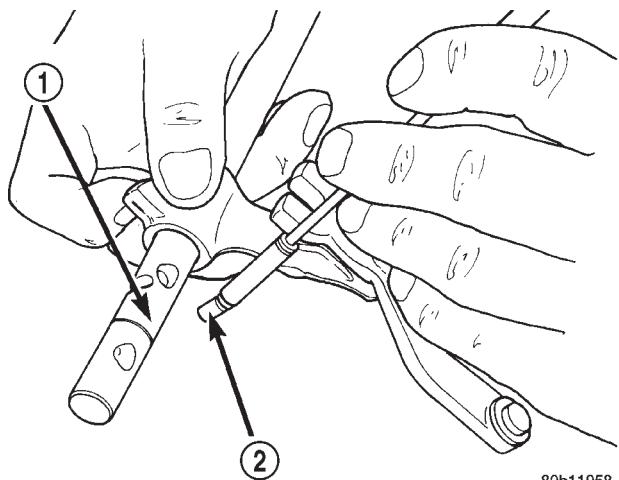


Fig. 70 Remove Interlock Pin From Reverse Shift Rail

1 – REVERSE SHIFT RAIL
2 – INTERLOCK PIN

- (29) Remove reverse elongated check ball (Fig. 71).

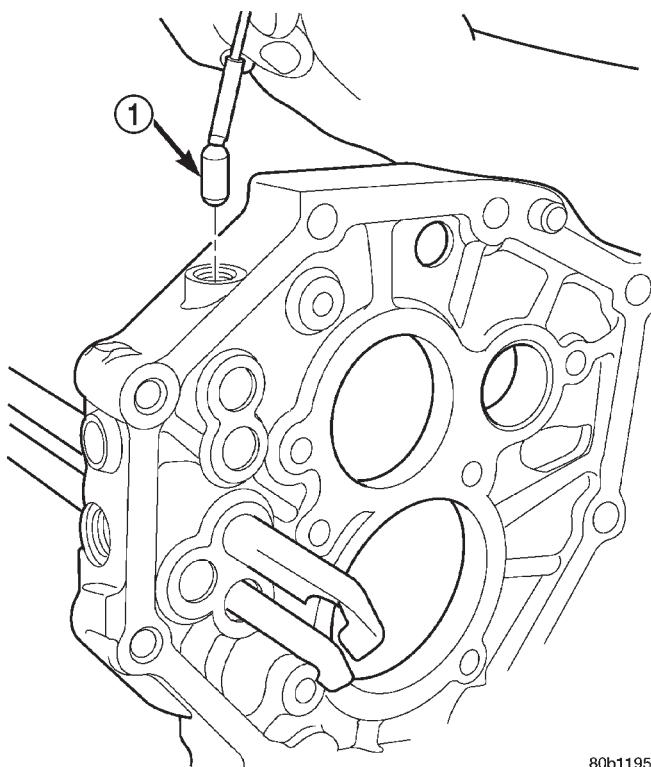


Fig. 71 Remove Reverse Check Ball

1 – REVERSE CHECK BALL

- (30) Remove snap-ring on 3-4 shift rail.
(31) Remove 1-2 shift rail from intermediate plate.
(32) Remove interlock pin from 1-2 shift rail (Fig. 72).

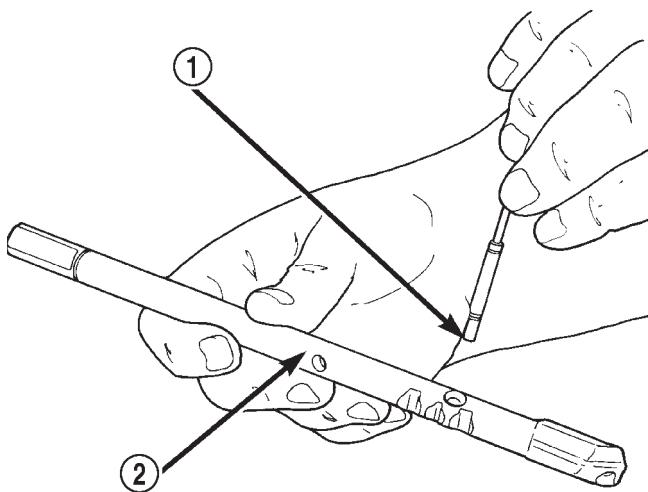


Fig. 72 Remove 1-2 Shift Rail Interlock Pin

1 – INTERLOCK PIN
2 – 1-2 SHIFT RAIL

- (33) Remove 1-2 shift rail elongated check ball from intermediate plate (Fig. 73).

- (34) Remove 3-4 shift rail from intermediate plate.

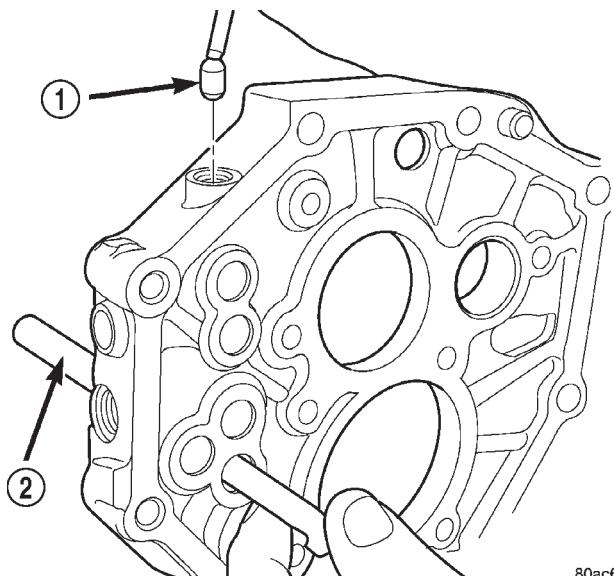
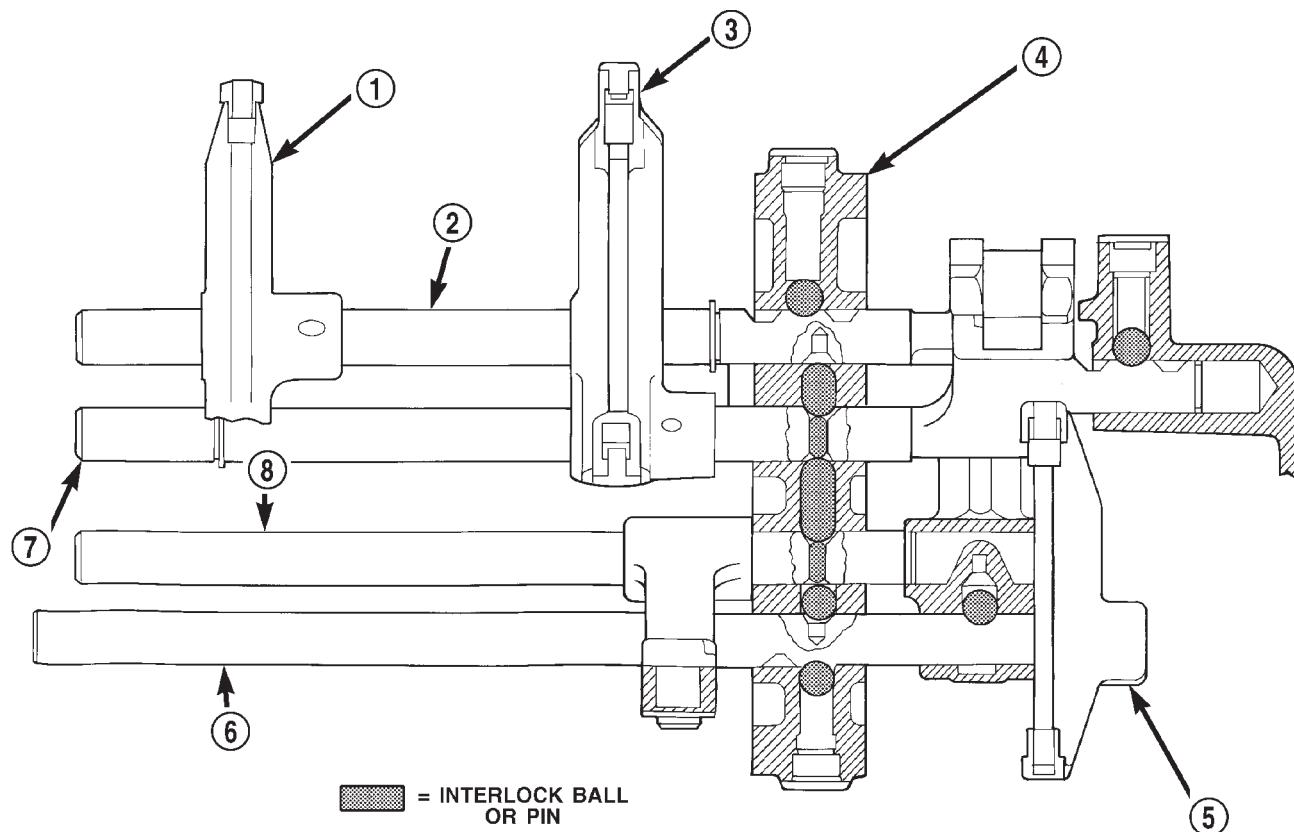


Fig. 73 Remove 1-2 Check Ball

1 – 1-2 CHECK BALL
2 – 3-4 SHIFT RAIL

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 74 Shift Rail Components**

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- 1 – 3-4 FORK
- 2 – 3-4 SHIFT RAIL
- 3 – 1-2 FORK
- 4 – INTERMEDIATE PLATE

- 5 – FIFTH GEAR FORK
- 6 – FIFTH GEAR SHIFT RAIL
- 7 – 1-2 SHIFT RAIL
- 8 – REVERSE SHIFT RAIL

ASSEMBLY

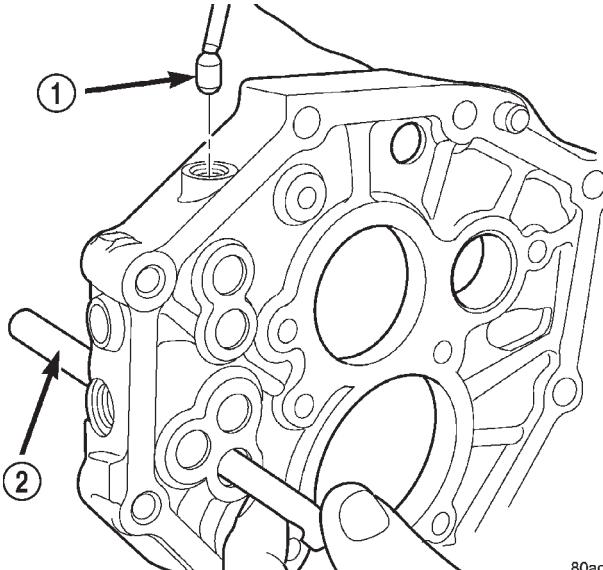
Refer to (Fig. 74) while assembling and installing the shift rail components. Also, verify that all shift rail components are in their neutral position when installing the check balls and interlock pins.

(1) Install the 3-4 shift rail into the intermediate plate.

(2) Install the 1-2 elongated check ball into the intermediate plate (Fig. 75).

(3) Install the interlock pin into the 1-2 shift rail (Fig. 76).

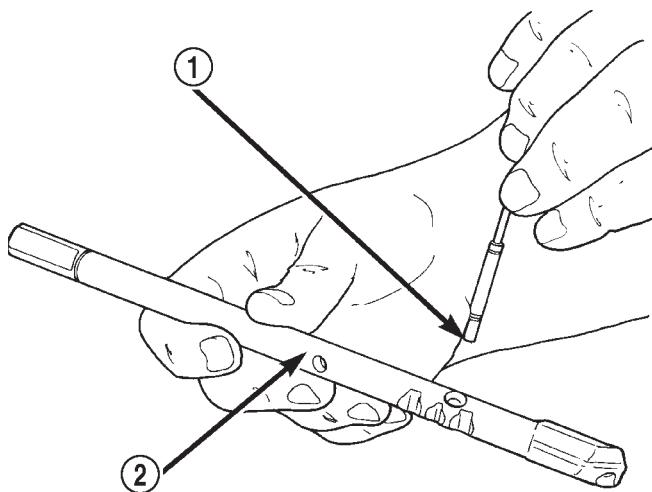
(4) Install the 1-2 shift rail into the intermediate plate.

**Fig. 75 Install 1-2 Check Ball**

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- 1 – 1-2 CHECK BALL
- 2 – 3-4 SHIFT RAIL

DISASSEMBLY AND ASSEMBLY (Continued)



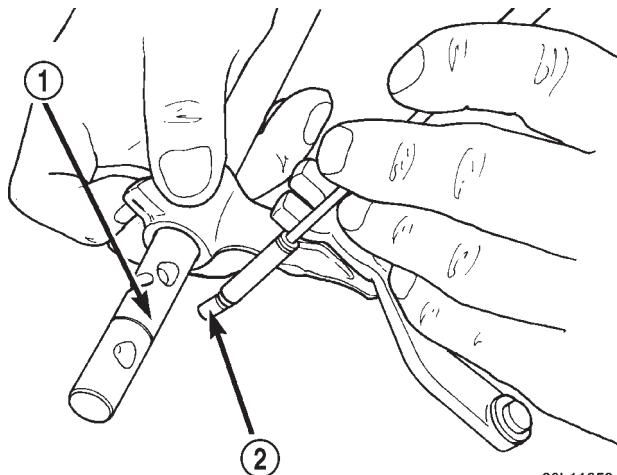
80ac6997

Fig. 76 Install 1-2 Shift Rail Interlock Pin

- 1 – INTERLOCK PIN
2 – 1-2 SHIFT RAIL

(7) Install the interlock pin into the reverse shift rail (Fig. 78).

(8) Assemble the reverse arm bracket to the reverse fork (Fig. 79).

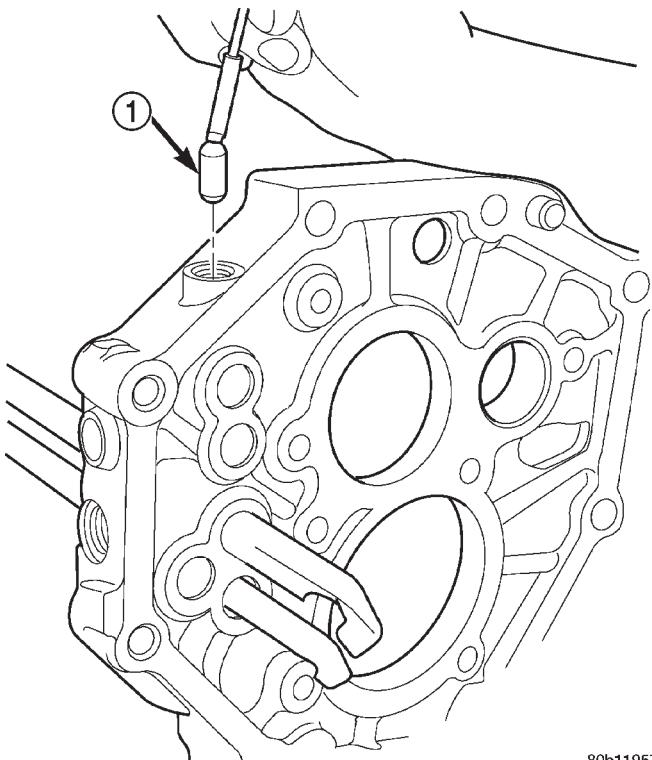


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Fig. 78 Install Reverse Interlock Pin

- 1 – REVERSE SHIFT RAIL
2 – INTERLOCK PIN

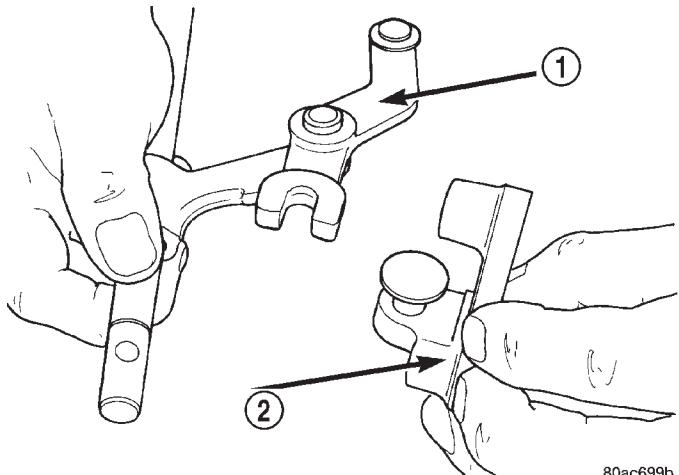
- (5) Install snap-ring onto 3-4 shift rail.
(6) Install the reverse check ball into the intermediate plate (Fig. 77).



80b11957

Fig. 77 Install Reverse Check Ball

- 1 – REVERSE CHECK BALL



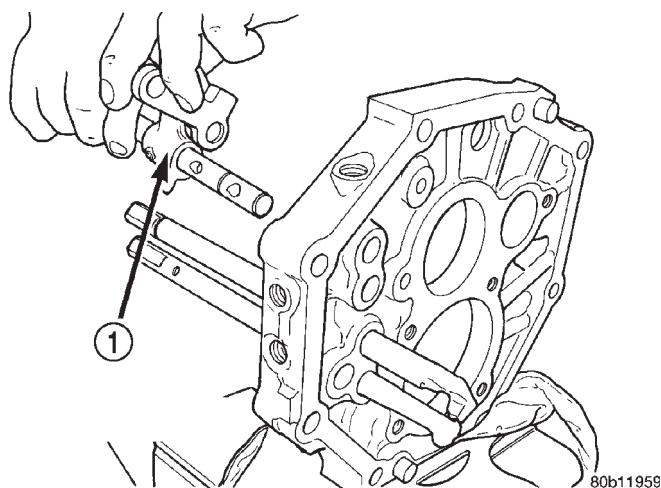
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Fig. 79 Install Reverse Arm Bracket to Fork

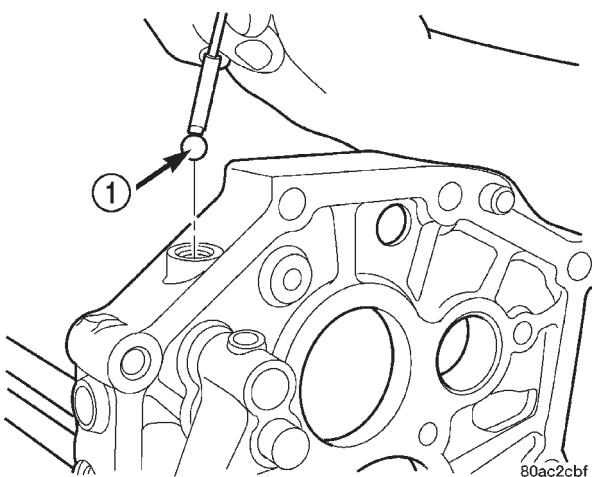
- 1 – REVERSE SHIFT FORK
2 – REVERSE ARM BRACKET

- (9) Install reverse shift rail into intermediate plate and position reverse arm bracket to intermediate plate (Fig. 80).

DISASSEMBLY AND ASSEMBLY (Continued)

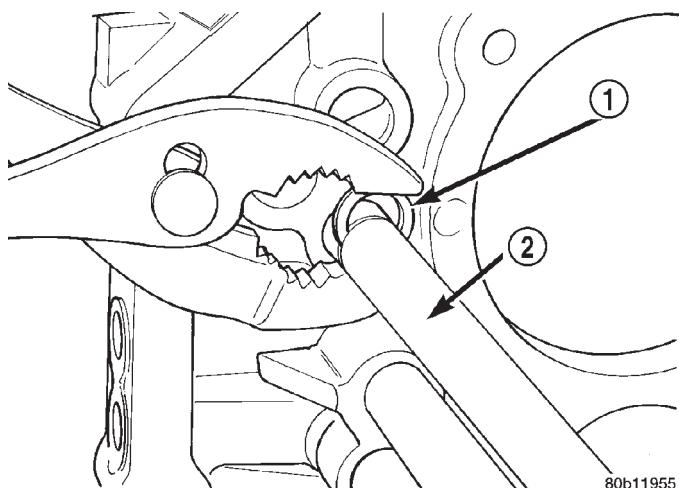
**Fig. 80 Install Reverse Shift Rail**

1 – REVERSE SHIFT RAIL AND REVERSE FORK ASSEMBLY

**Fig. 82 Install Fifth Gear Check Ball**

1 – FIFTH GEAR CHECK BALL

- (10) Install snap-ring onto reverse shift rail (Fig. 81).

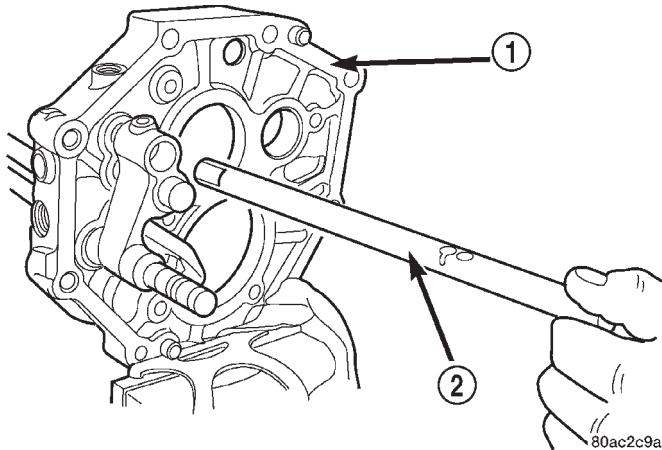
**Fig. 81 Install Reverse Snap-ring**

1 – SNAP RING
2 – REVERSE SHIFT RAIL

- (11) Install reverse shift head and rail assembly into the intermediate plate.

- (12) Install the fifth gear interlock ball and check ball (Fig. 82).

- (13) Install fifth gear shift rail (Fig. 83).

**Fig. 83 Install Fifth Gear Shift Rail**

1 – INTERMEDIATE PLATE
2 – FIFTH GEAR SHIFT RAIL

- (14) Remove the intermediate plate from the vise, rotate the plate 180°, and reinstall the plate in the vise using the same bolt and washer mounting set-up.

- (15) Install the shift rail detent balls in the intermediate plate.

DISASSEMBLY AND ASSEMBLY (Continued)

(16) Install the shift rail detent springs in the intermediate plate. Note that the bottom detent spring is shorter than the others.

(17) Install the shift rail detent plugs in the intermediate plate.

(18) Install the 1-2 shift fork onto the 1-2 and 3-4 shift rails (Fig. 84).

(19) Install the snap-ring onto the 1-2 shift rail.

(20) Install the 3-4 shift fork onto the 3-4 shift rail (Fig. 85).

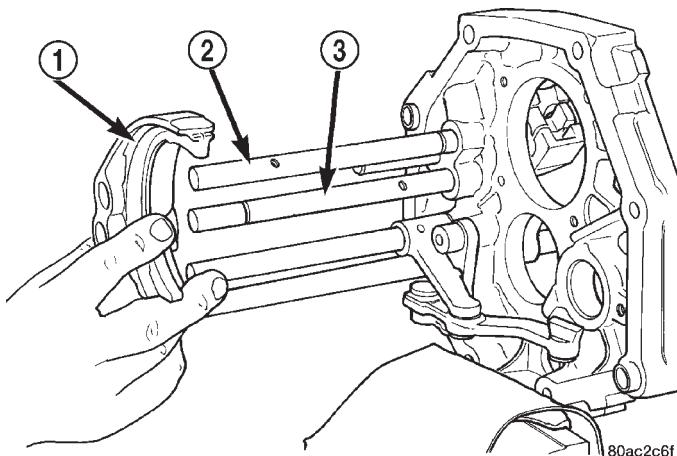


Fig. 84 Install 1-2 Shift Fork

- 1 – 1-2 SHIFT FORK
- 2 – 3-4 SHIFT RAIL
- 3 – 1-2 SHIFT RAIL

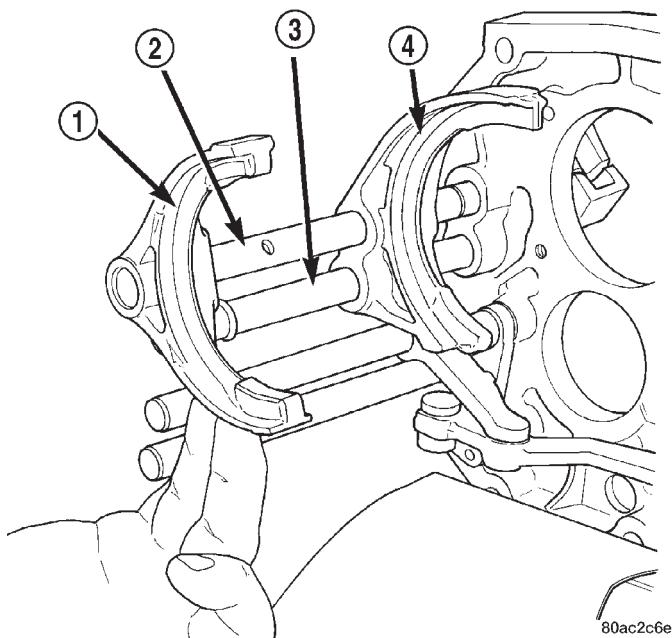


Fig. 85 Install 3-4 Shift Fork

- 1 – 3-4 SHIFT FORK
- 2 – 3-4 SHIFT RAIL
- 3 – 1-2 SHIFT RAIL
- 4 – 1-2 SHIFT FORK

(21) Install mainshaft into the intermediate plate by guiding the output shaft through opening in intermediate plate until the shift forks are aligned with the appropriate synchronizer sleeves. The mainshaft rear bearing will be started in the intermediate plate but not fully driven in at this point.

(22) While an assistant supports the mainshaft, align rear of countershaft with inner race of countershaft rear bearing.

(23) Raise countershaft upward until gears mesh with the mating gears on the mainshaft.

(24) Using a suitable rubber mallet, tap on the input shaft and the front of the countershaft equally to install the mainshaft rear bearing into the intermediate plate and the rear of the countershaft into the rear countershaft bearing. It may be necessary to occasionally hold the countershaft into the intermediate plate and tap the countershaft rear bearing onto the countershaft and into the intermediate plate.

(25) Install snap-rings onto the rear mainshaft and countershaft bearings.

(26) Install the bolts to hold the reverse shift arm bracket to the intermediate plate.

(27) Install new bolts to hold the shift forks to the shift rails (Fig. 86).

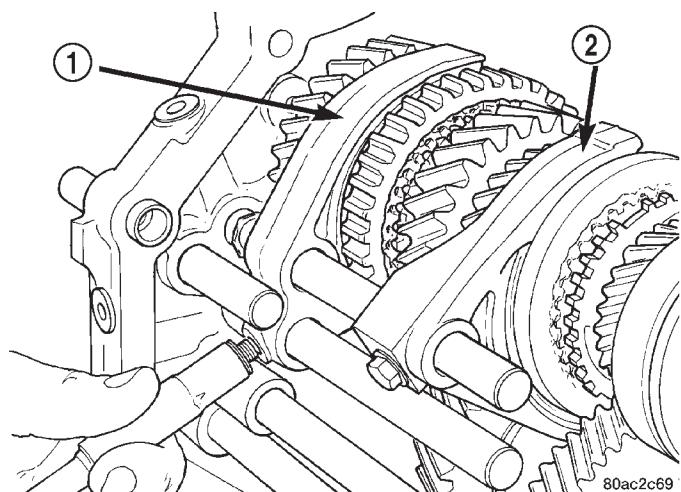


Fig. 86 Install Shift Fork Bolts

- 1 – 1-2 SHIFT FORK
- 2 – 3-4 SHIFT FORK

(28) Position the mainshaft rear bearing retainer over the output shaft and onto the intermediate plate.

(29) Install new bolts to hold the bearing retainer to the intermediate plate.

(30) Move the reverse shift arm into the reverse gear position. The reverse gear position is with the arm moved away from the intermediate plate (Fig. 87).

(31) Install the reverse idler gear assembly into position on the mainshaft and reverse shift arm.

DISASSEMBLY AND ASSEMBLY (Continued)

(32) Install the compression spring and pin into the reverse idler gear shaft (Fig. 88).

(33) Install the reverse idler shaft through the intermediate plate and reverse idler gear assembly (Fig. 89) until the idler shaft pin contacts the gear assembly. Make sure that the notched cut-out in the idler shaft is to the rear of the transmission.

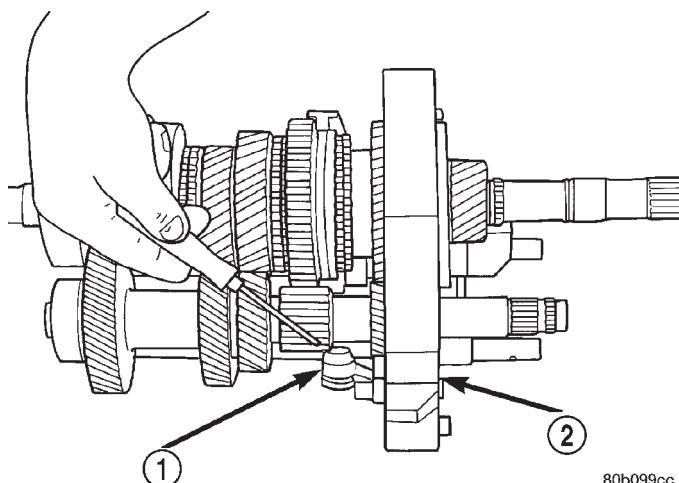


Fig. 87 Reverse Shift Arm Position

- 1 – REVERSE SHIFT ARM
2 – INTERMEDIATE PLATE

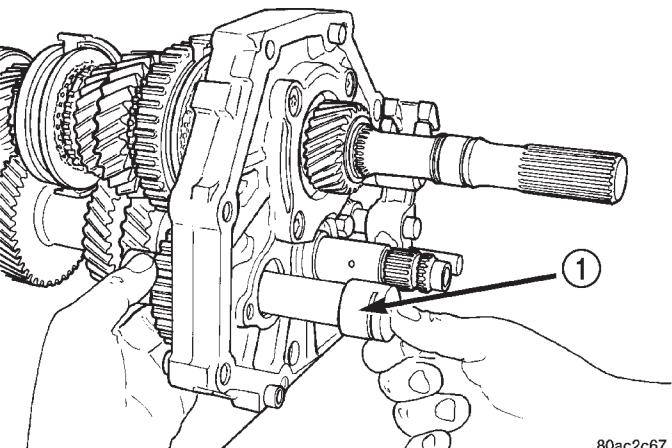


Fig. 89 Install Reverse Idler Shaft

- 1 – REVERSE IDLER SHAFT

(34) Align the pin with the alignment notch in the reverse idler gear assembly (Fig. 90). The alignment notch in the reverse idler gear race/hub is a small relief cut above one of the main longitudinal slots. Be sure that the pin is aligned with the proper slot, the opposite slot has an oil drain hole which the pin will drop into. The assembly will then be locked onto the shaft and will need to be disassembled in order to be removed.

(35) Depress compression spring and pin in reverse idler gear shaft (Fig. 91).

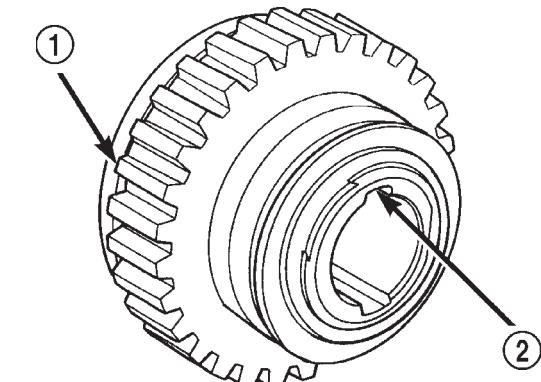


Fig. 90 Align Idler Shaft Pin

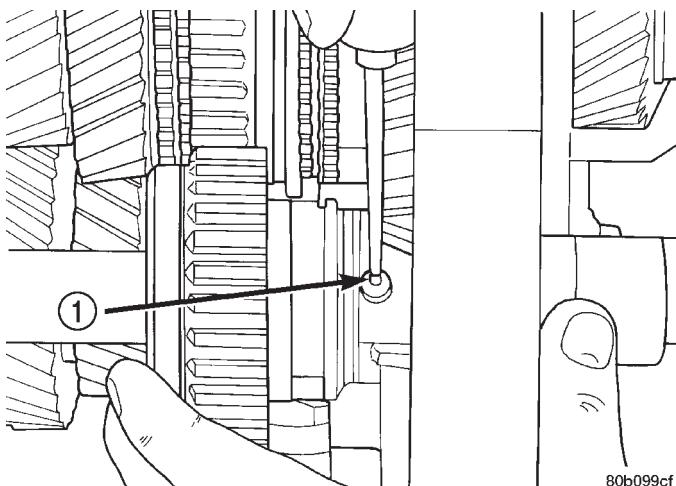
- 1 – REVERSE IDLER GEAR ASSEMBLY
2 – ALIGNMENT NOTCH

(36) Install the reverse idler gear shaft the remainder of the way through the reverse idler gear assembly.

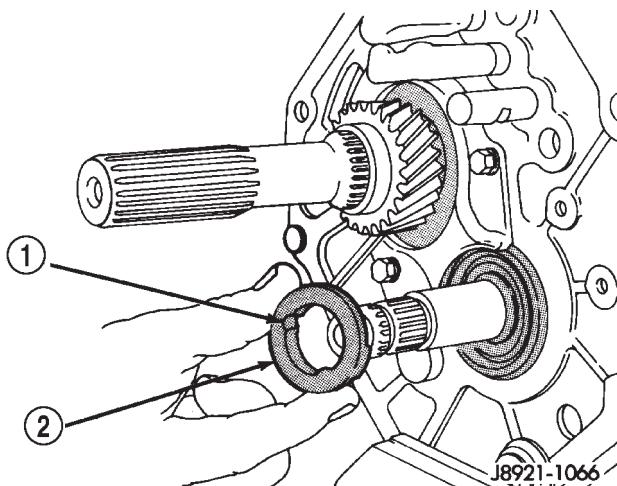
Fig. 88 Install Compression Spring And Pin

- 1 – REVERSE IDLER GEAR SHAFT
2 – PIN
3 – COMPRESSION SPRING

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 91 Depress Pin In Reverse Idler Gear Shaft**

1 – DEPRESS PIN

**Fig. 93 Install Fifth Gear Thrust Ring**

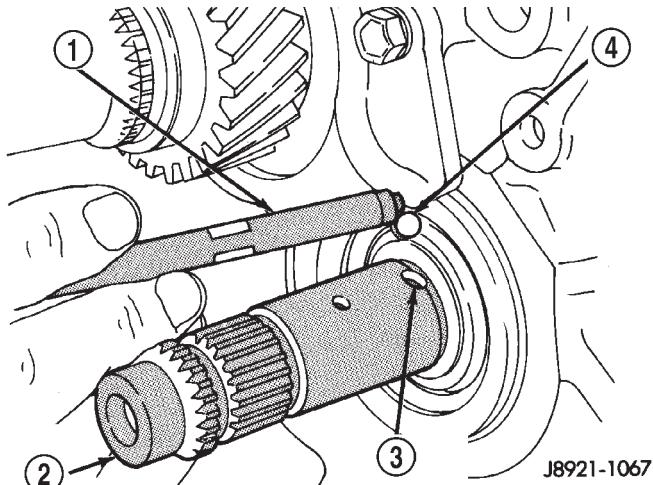
1 – LOCK BALL NOTCH
2 – FIFTH GEAR THRUST RING

(37) Position the reverse idler gear shaft lock plate onto the intermediate plate.

(38) Install a new bolt to hold the idler gear shaft lock plate to the intermediate plate.

(39) Install the fifth gear thrust ring lock ball to the countershaft (Fig. 92).

(40) Install the fifth gear thrust ring onto the countershaft and over the lock ball (Fig. 93).

**Fig. 92 Install Fifth Gear Thrust Ring Lock Ball**

1 – PENCIL MAGNET
2 – CLUSTER GEAR
3 – LOCK BALL RECESS
4 – THRUST RING LOCK BALL

(41) Install fifth gear shift fork to the countershaft fifth gear assembly.

(42) Install the countershaft fifth gear bearings into the countershaft fifth gear assembly.

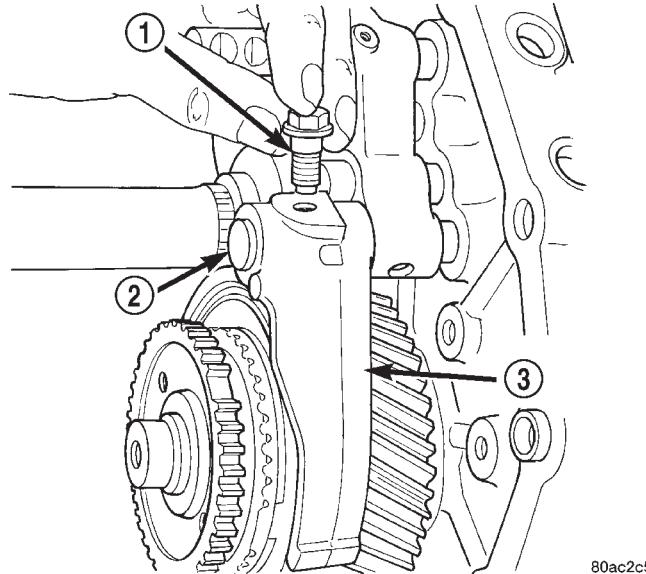
(43) Position the countershaft fifth gear assembly on the countershaft. Ensure that the fifth gear fork is installed onto the fifth gear shift rail.

(44) Install the fifth gear synchro ring.

(45) Position the fifth gear blocker ring onto the countershaft.

(46) Using a suitable mallet and spacer, tap the fifth gear blocker ring onto the countershaft.

(47) Install new bolt to hold fifth gear shift fork to the fifth gear shift rail (Fig. 94).

**Fig. 94 Install Fifth Gear Retainer Bolt**

1 – SHIFT FORK RETAINER BOLT
2 – FIFTH GEAR SHIFT RAIL
3 – FIFTH GEAR SHIFT FORK

(48) Measure countershaft fifth gear thrust clearance.

(49) Select a snap-ring so that the thrust clearance is 0.10–0.30 mm (0.004–0.010 in.).

(50) Install snap-ring to hold fifth gear blocker ring onto countershaft.

DISASSEMBLY AND ASSEMBLY (Continued)

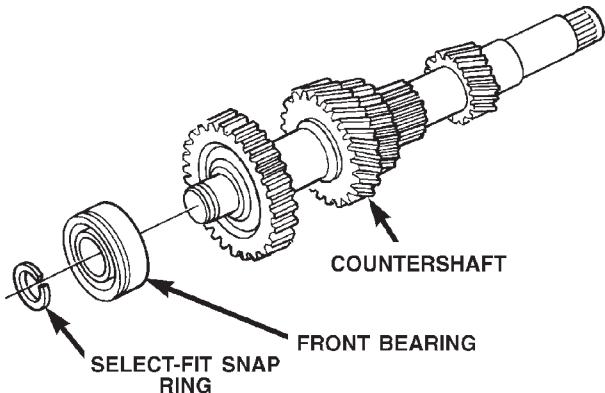
(51) Remove intermediate plate from vise and remove bolts and washers from intermediate.

COUNTERSHAFT

DISASSEMBLY

(1) Remove select fit snap-ring holding the countershaft front bearing onto the countershaft (Fig. 95).

(2) Using Bearing Splitter P-334, a suitable spacer on center of countershaft, and a shop press, remove the countershaft front bearing from the countershaft.



I. D. MARK	SNAP RING THICKNESS MM (IN.)	
1	2.05 - 2.10	(0.0807 - 0.0827)
2	2.10 - 2.15	(0.0827 - 0.0846)
3	2.15 - 2.20	(0.0846 - 0.0866)
4	2.20 - 2.25	(0.0866 - 0.0886)
5	2.25 - 2.30	(0.0886 - 0.0906)
6	2.30 - 2.35	(0.0906 - 0.0925)

80ac6a0a

Fig. 95 Countershaft Front Bearing Snap-ring

ASSEMBLY

(1) Remove any nicks or burrs on countershaft hub with fine emery or crocus cloth.

(2) Position countershaft front bearing on end of countershaft.

(3) Using Special Tool 8109 and a shop press, press bearing onto countershaft.

(4) Select the thickest snap-ring that will fit into the snap-ring groove of the countershaft (Fig. 95).

(5) Install snap-ring to hold countershaft front bearing onto countershaft.

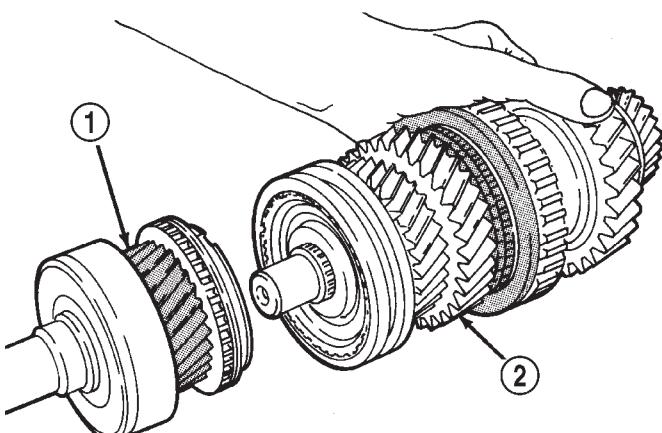
INPUT SHAFT

DISASSEMBLY

(1) Verify that the 3-4 synchronizer is in the neutral position.

(2) Separate input shaft from output shaft (Fig. 96). Note that the output shaft pilot bearing is an uncaged roller type bearing.

(3) Remove the output shaft pilot bearing rollers from the input shaft and the output shaft.



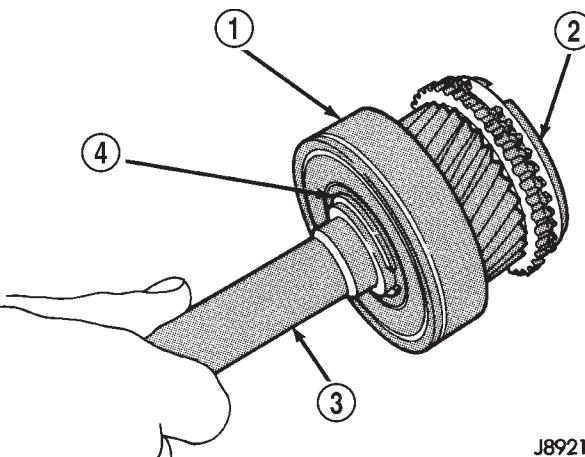
J8921-1089

Fig. 96 Separate Input and Output Shafts

1 - INPUT SHAFT ASSEMBLY

2 - OUTPUT SHAFT AND GEAR ASSEMBLY

(4) Remove the fourth gear synchronizer ring from the input shaft (Fig. 97).



J8921-1091

Fig. 97 Input Shaft Components

1 - BEARING

2 - SYNCHRO RING

3 - INPUT SHAFT

4 - BEARING SNAP RING

(5) Remove the select fit snap-ring holding the input shaft bearing onto the input shaft.

(6) Using Bearing Splitter P-334 and a shop press, remove the bearing from the input shaft.

ASSEMBLY

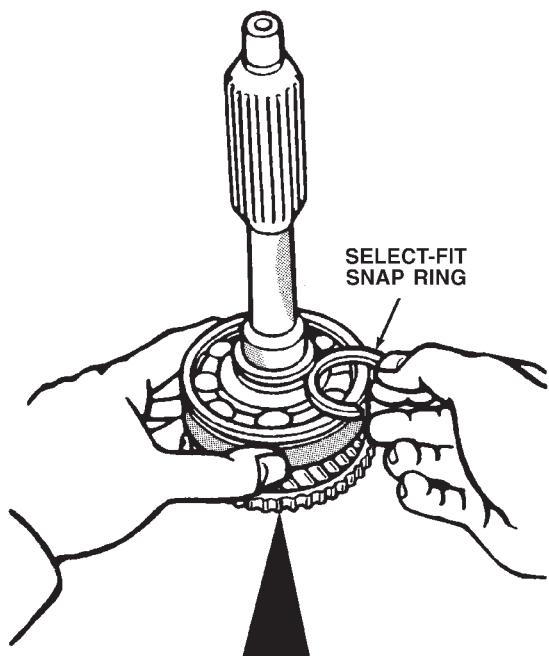
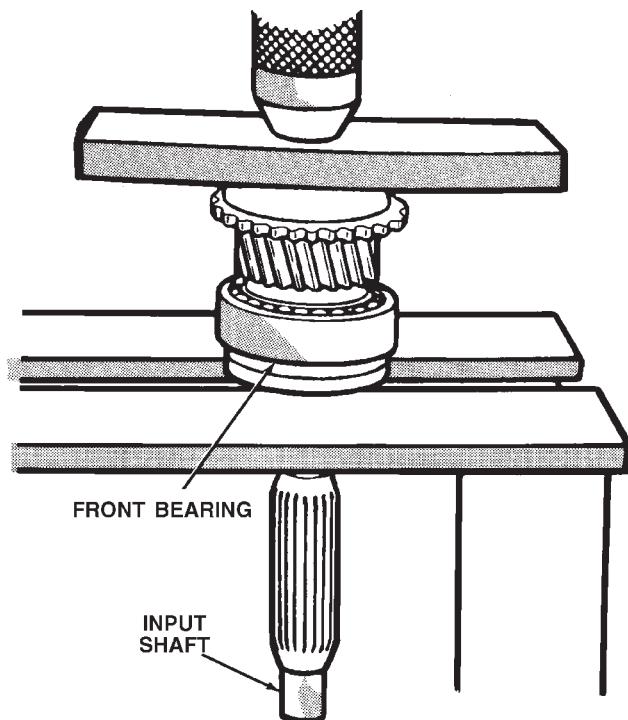
(1) Position input shaft bearing onto input shaft.

(2) Using Driver L-4507, drive bearing onto input shaft.

(3) Select the thickest snap-ring that will fit into the snap-ring groove of the input shaft (Fig. 98).

(4) Lubricate output shaft pilot bearing bore of input shaft with petroleum jelly.

DISASSEMBLY AND ASSEMBLY (Continued)

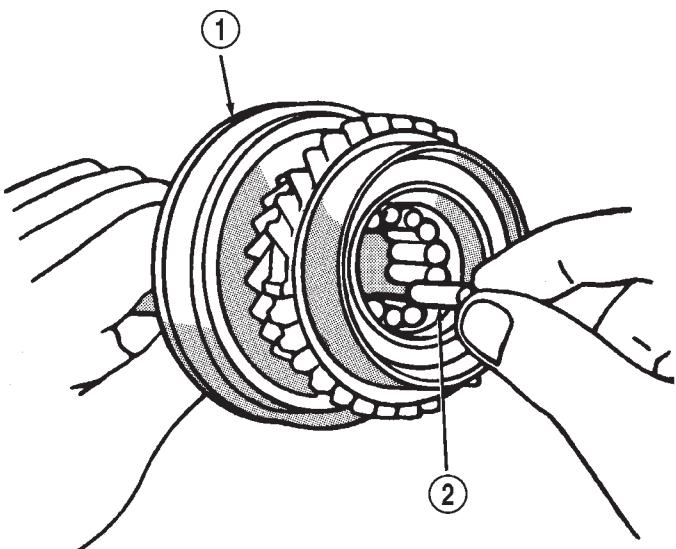


I. D. Mark	Snap Ring Thickness mm (in.)
0	2.05-2.10 (0.0807-0.0827)
1	2.10-2.15 (0.0827-0.0846)
2	2.15-2.20 (0.0846-0.0866)
3	2.20-2.25 (0.0866-0.0886)
4	2.25-2.30 (0.0886-0.0906)
5	2.30-2.35 (0.0906-0.0925)

J8921-50

Fig. 98 Select Input Shaft Bearing Snap-ring

(5) Install output shaft pilot bearing rollers in input shaft bore (Fig. 99). Ensure to use sufficient petroleum jelly to hold rollers in position.



J8921-64

Fig. 99 Install Output Shaft Pilot Bearing Rollers

- 1 – INPUT SHAFT
2 – BEARING ROLLERS

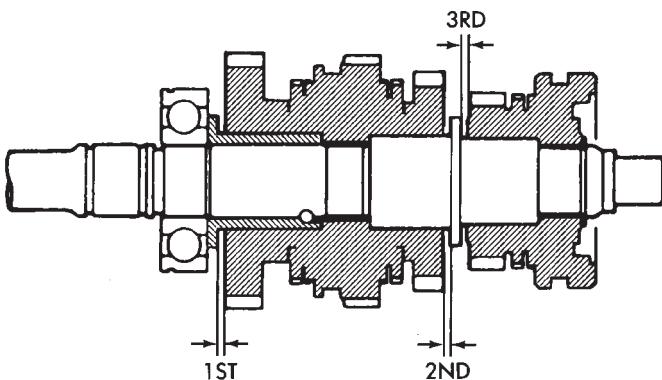
(6) Install the fourth gear synchronizer ring onto the input shaft.

(7) Install input shaft to output shaft. Use care when mating the two shafts not to displace any output shaft pilot bearing rollers.

OUTPUT SHAFT**DISASSEMBLY**

(1) Remove input shaft and output shaft pilot bearing rollers from output shaft.

(2) Measure and note thrust clearance of output shaft gears (Fig. 100). Clearance should be 0.10 – 0.25 mm (0.004 – 0.010 in.).



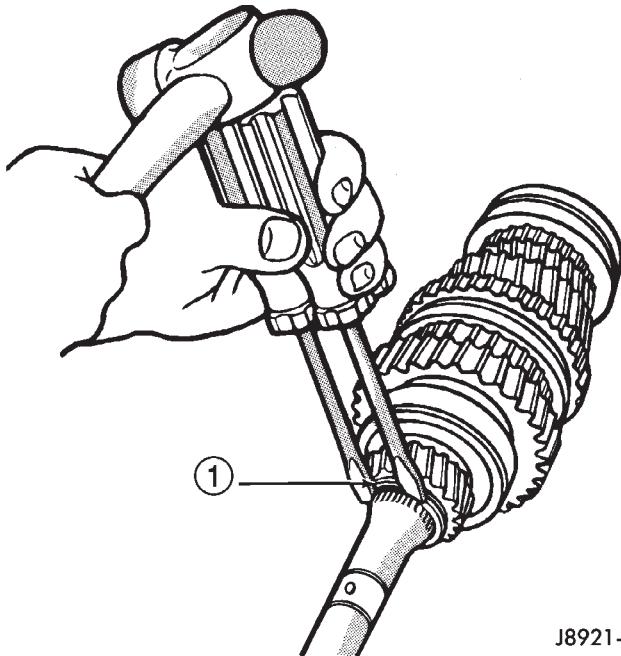
THRUST CLEARANCE
IS 0.004 TO 0.012 INCH
(0.10 TO 0.25 mm)

J8921-36

Fig. 100 Check Output Shaft Gear Thrust Clearance

DISASSEMBLY AND ASSEMBLY (Continued)

- (3) Remove output shaft fifth gear snap ring with two screwdrivers (Fig. 101).



J8921-37

Fig. 101 Remove Fifth Gear Snap-ring

1 – SNAP RING

- (4) Using Bearing Splitter P-334 or suitable press plates positioned under first gear, press fifth gear, rear bearing, first gear, and first gear bearing inner race off output shaft (Fig. 102).

(5) Remove first gear needle roller bearing from output shaft.

(6) Remove first gear bearing inner race lock ball with pencil magnet (Fig. 103).

(7) Remove first gear synchronizer ring.

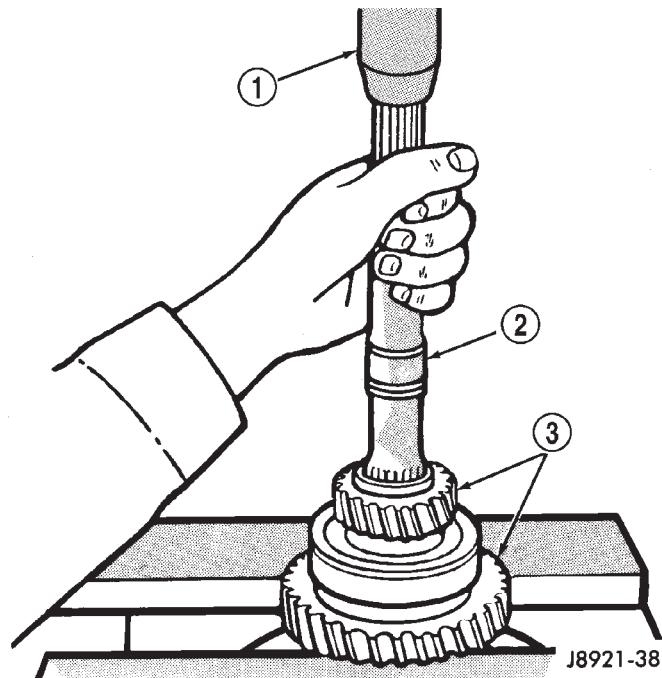
(8) Using Bearing Splitter P-334 or suitable press plates positioned under second gear, press 1-2 synchronizer, reverse gear, and second gear from output shaft (Fig. 104).

(9) Remove second gear needle roller bearing from the output shaft or second gear.

(10) Remove select fit snap-ring holding the 3-4 synchronizer onto the output shaft (Fig. 105).

(11) Using Bearing Splitter P-334 or suitable press plates positioned under third gear, press the 3-4 synchronizer and third gear from output shaft (Fig. 106).

(12) Remove third gear needle roller bearing from output shaft or gear.



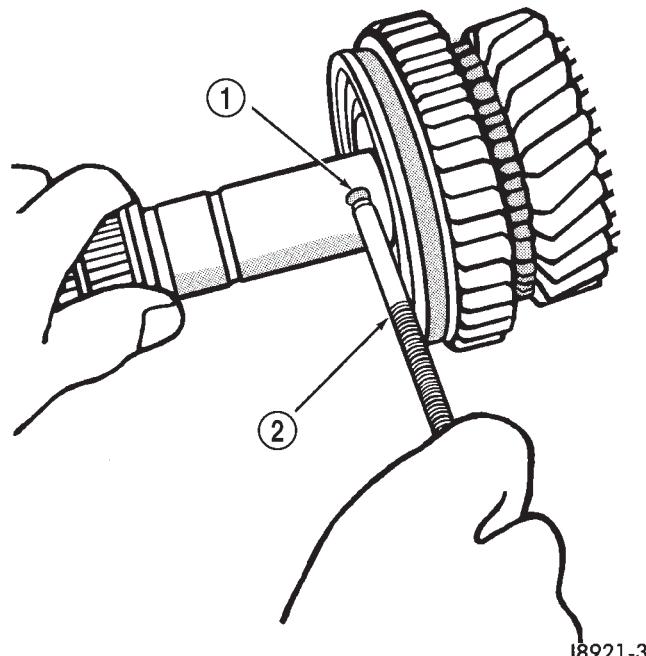
J8921-38

Fig. 102 Remove Fifth Gear, First Gear Bearing, And Race

1 – PRESS RAM

2 – OUTPUT SHAFT

3 – FIRST-FIFTH GEAR-BEARING ASSEMBLY



J8921-39

Fig. 103 Remove First Gear Bearing Inner Race Lock Ball

1 – LOCK BALL

2 – PENCIL MAGNET

DISASSEMBLY AND ASSEMBLY (Continued)

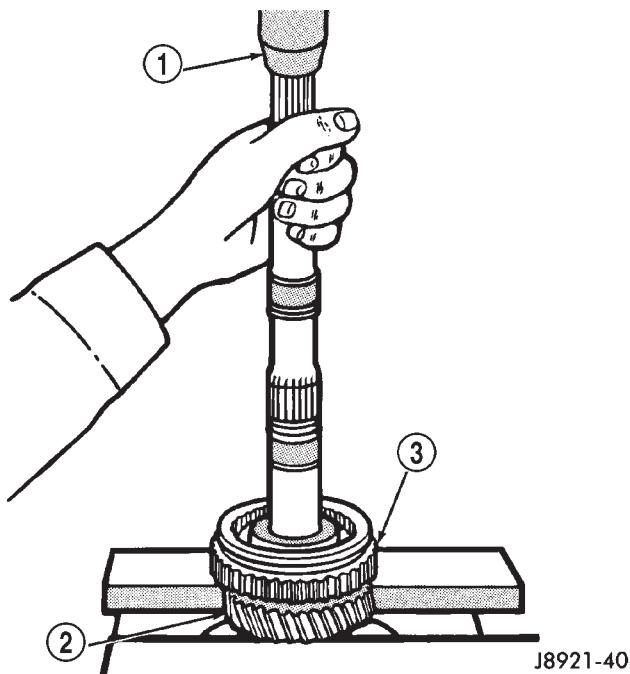


Fig. 104 Remove Second Gear, Reverse Gear, And 1-2 Synchronizer

- 1 – PRESS RAM
2 – SECOND GEAR
3 – 1-2 SYNCHRONIZER HUB

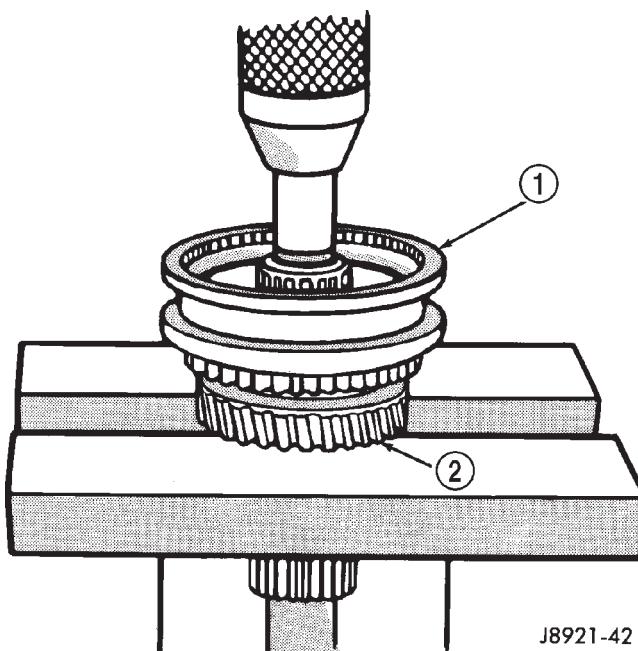


Fig. 106 Remove 3-4 Synchronizer And Third Gear

- 1 – 3-4 SYNCHRONIZER
2 – THIRD GEAR

ASSEMBLY

TRANSMISSION ASSEMBLY INFORMATION

Lubricate the transmission components with Mopar® 75W-90, GL 3 gear lubricant during assembly. Use petroleum jelly to lubricate seal lips and/or hold parts in place during installation.

Refer to (Fig. 107) during assembly for AX5 gear assembly identification.

(1) Lubricate transmission components with specified gear lubricant.

(2) If necessary, assemble 1-2 and 3-4 synchronizer hubs, sleeves, springs and key inserts (Fig. 108).

(3) Install third gear needle bearing onto the output shaft.

(4) Install third gear over bearing and onto output shaft flange.

(5) Install third gear synchronizer ring to third gear.

(6) Position the 3-4 synchronizer onto the output shaft.

(7) Using Adapter 6747-1A and a shop press, press the 3-4 synchronizer onto the output shaft.

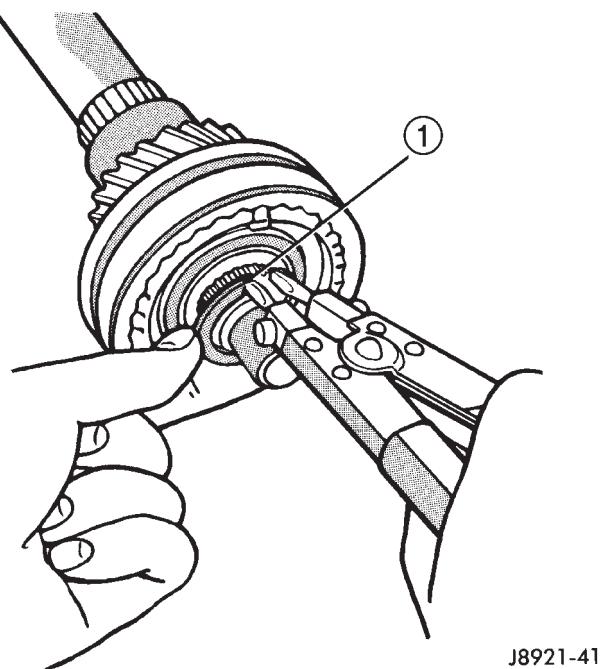
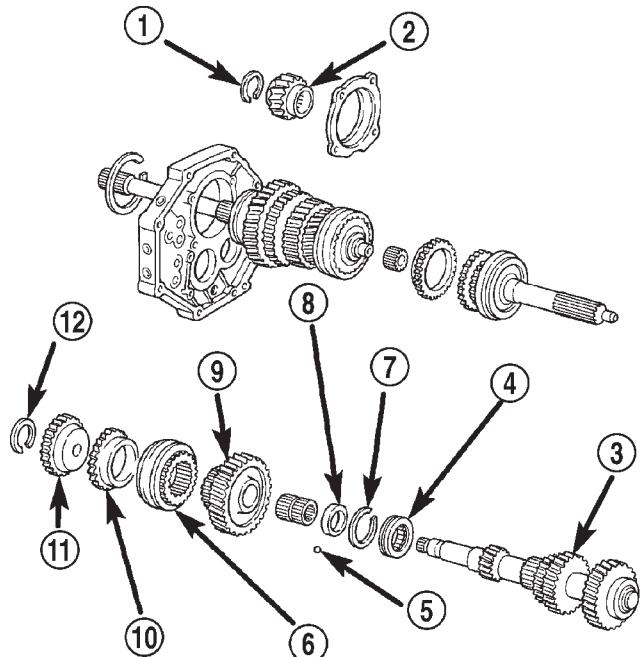


Fig. 105 Remove 3-4 Synchronizer Snap Ring

- 1 – 3-4 SYNCHRONIZER SNAP RING

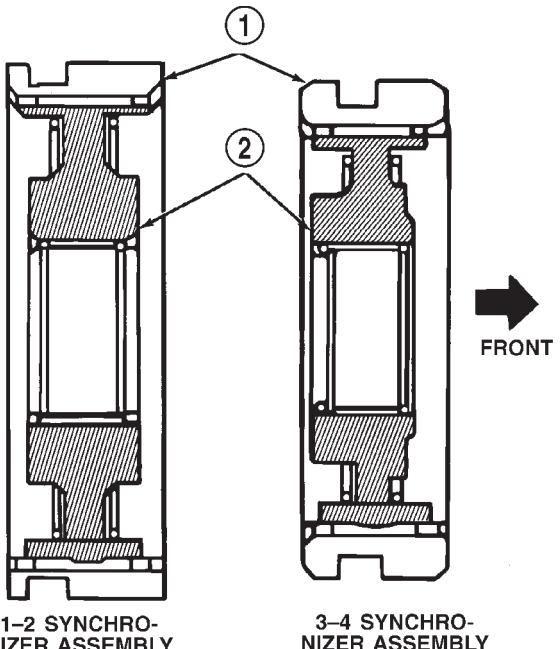
DISASSEMBLY AND ASSEMBLY (Continued)



80be45fb

Fig. 107 Geartrain Components

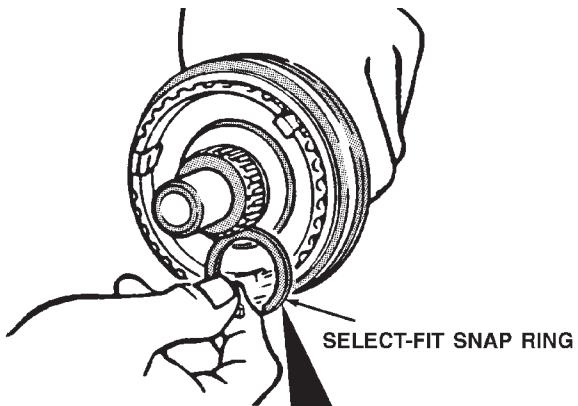
- 1 – SNAP RING
- 2 – FIFTH GEAR
- 3 – COUNTER GEAR
- 4 – BEARING
- 5 – LOCK BALL
- 6 – SYNCHRO HUB/SLEEVE
- 7 – SNAP RING
- 8 – SPACER
- 9 – COUNTER 5TH GEAR
- 10 – SYNCHRO RING
- 11 – 5TH SPLINE GEAR
- 12 – SNAP RING



J8921-54

Fig. 108 Synchronizer Identification

- 1 – SLEEVES
- 2 – HUBS



I. D. Mark	Snap Ring Thickness mm (in.)
C-1	1.75-1.80 (0.0689-0.0709)
D	1.80-1.85 (0.0709-0.0728)
D-1	1.85-1.90 (0.0728-0.0748)
E	1.90-1.95 (0.0748-0.0768)
E-1	1.95-2.00 (0.0768-0.0787)
F	2.00-2.05 (0.0788-0.0807)
F-1	2.05-2.10 (0.0807-0.0827)

J8921-55

Fig. 109 Select 3-4 Synchronizer Snap-ring

(8) Select the thickest snap-ring that will fit into the snap-ring groove of the output shaft (Fig. 109).

(9) Install snap-ring to hold 3-4 synchronizer onto output shaft.

(10) Verify third gear thrust clearance with feeler gauge (Fig. 110). Clearance should be 0.10 – 0.25 mm (0.004 – 0.010 in.). If clearance is out of specification, refer to Cleaning and Inspection section within this group.

(11) Install second gear needle bearing onto output shaft.

(12) Install second gear over bearing and onto output shaft flange.

(13) Install second gear synchronizer ring onto second gear.

(14) Position 1-2 synchronizer assembly onto splines of output shaft.

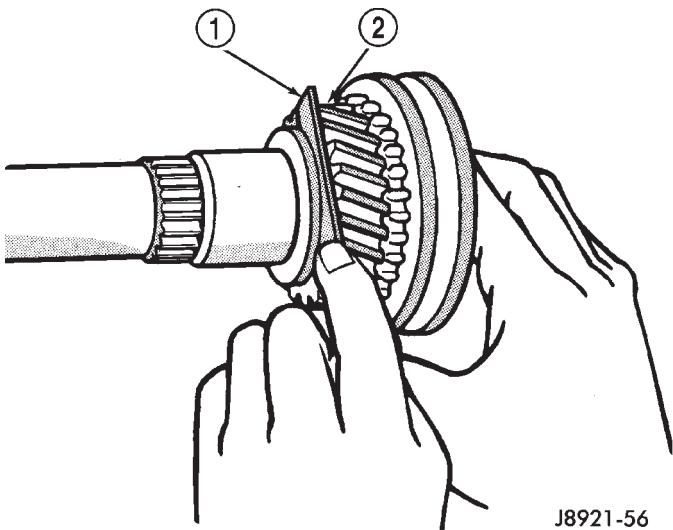
(15) Using Driver MD-998805, Adapter 6747-1A, and a shop press, press the 1-2 synchronizer onto the output shaft.

(16) Install first gear synchronizer ring into 1-2 synchronizer.

(17) Install first gear bearing inner race lock ball in output shaft (Fig. 111).

(18) Install first gear needle bearing onto output shaft (Fig. 112).

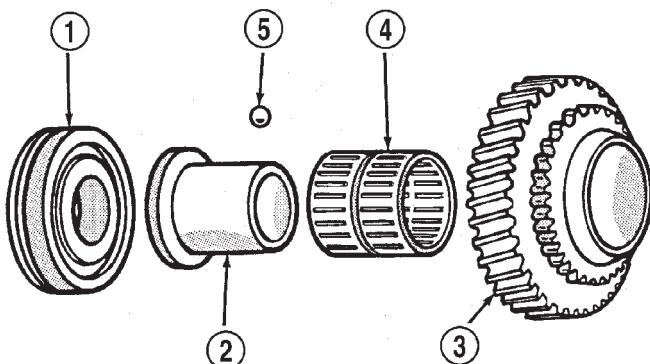
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 110 Check Third Gear Clearance**

1 – FEELER GAUGE

2 – THIRD GEAR

(23) Install snap-ring onto output shaft rear bearing outer race.



J8921-59

Fig. 112 First Gear Components

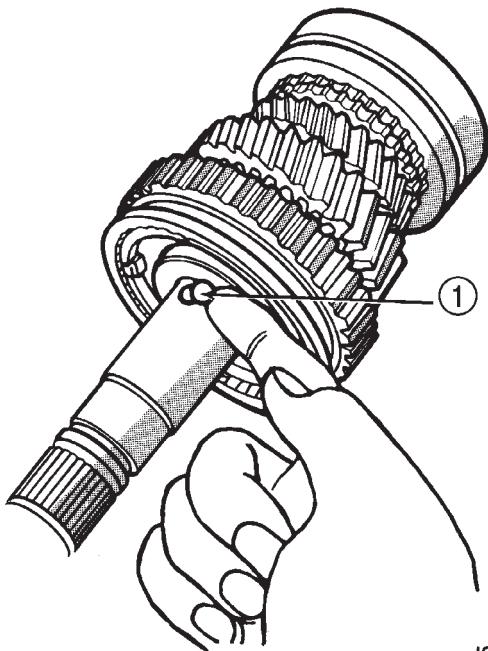
1 – REAR BEARING

2 – INNER RACE

3 – FIRST GEAR

4 – NEEDLE BEARING

5 – FIRST GEAR LOCK BALL

**Fig. 111 Install First Gear Bearing Inner Race Lock Ball**

1 – FIRST GEAR LOCK BALL

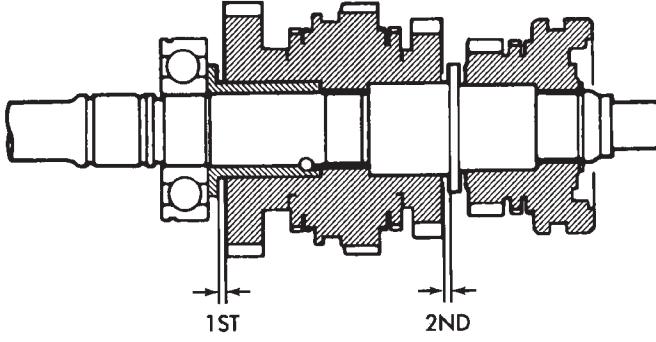
(19) Install first gear onto output shaft and over bearing.

(20) Install first gear bearing inner race onto output shaft and inside first gear bearing. Rotate bearing race until race installs over lock ball.

(21) Position output shaft rear bearing onto output shaft. Ensure that the snap ring groove in bearing outer race is toward rear of output shaft.

(22) Using Driver L-4507 and suitable mallet, drive bearing onto output shaft.

(24) Check first-second gear thrust clearance (Fig. 113). Standard clearance is 0.10 – 0.25 mm (0.004 – 0.010 in.). If clearance is out of specification, refer to Cleaning and Inspection section within this group.



STANDARD CLEARANCE
0.004-0.010 INCH
(0.10-0.25 mm)

J8921-61

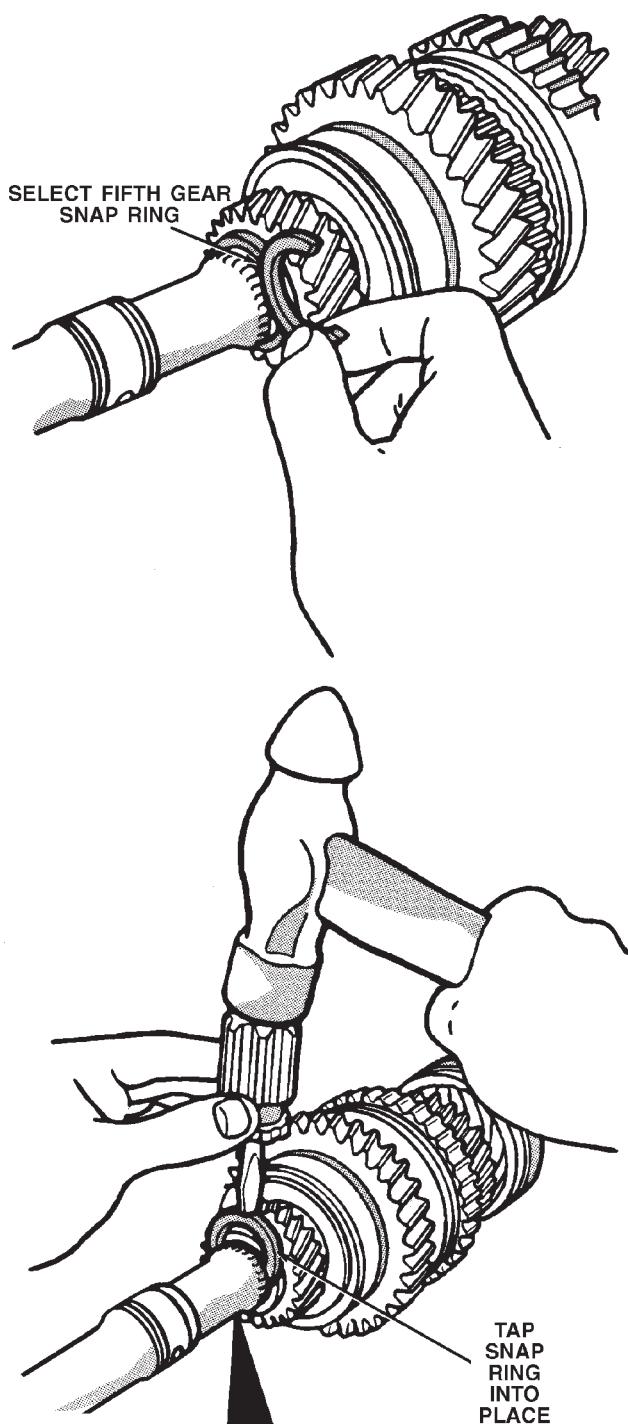
Fig. 113 Check First-Second Gear Thrust Clearance

(25) Position fifth gear onto output shaft with the gear's short shoulder toward the rear of shaft. Ensure that the gear and output shaft splines are aligned.

(26) Using Adapter 6747-1A, Driver L-4507, and a shop press, press fifth gear onto output shaft.

(27) Select the thickest snap-ring that will fit into the snap-ring groove of the output shaft (Fig. 114).

DISASSEMBLY AND ASSEMBLY (Continued)



I. D. Mark	Snap Ring Thickness mm (in.)
A	2.67-2.72 (0.1051-0.1071)
B	2.73-2.78 (0.1075-0.1094)
C	2.79-2.84 (0.1098-0.1118)
D	2.85-2.90 (0.1122-0.1142)
E	2.91-2.96 (0.1146-0.1165)
F	2.97-3.02 (0.1169-0.1189)
G	3.03-3.08 (0.1193-0.1213)
H	3.09-3.14 (0.1217-0.1236)
J	3.15-3.20 (0.1240-0.1260)
K	3.21-3.26 (0.1264-0.1283)
L	3.27-3.32 (0.1287-0.1307)

J8921-63

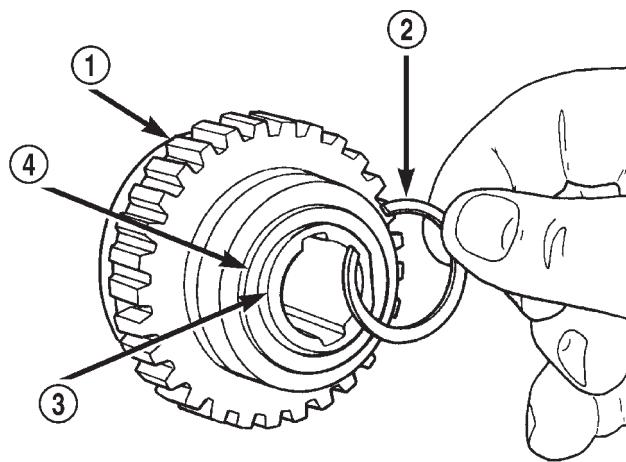
Fig. 114 Select/Install Fifth Gear Snap Ring

- (28) Install snap-ring to hold fifth gear onto output shaft.

SEMI-SYNCHRONIZED REVERSE IDLER GEAR DISASSEMBLY

- (1) Remove snap-ring holding the reverse idler gear onto the reverse idler gear hub/race (Fig. 115).

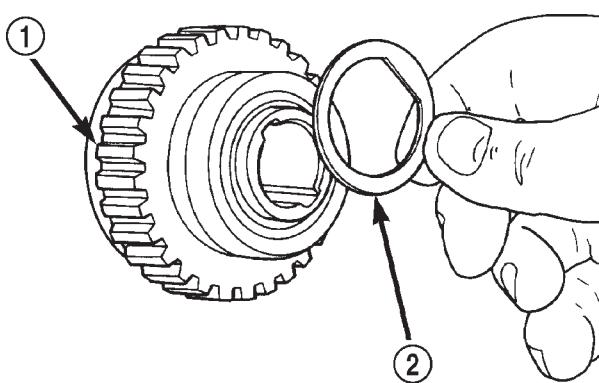
- (2) Remove the plate washer from the reverse idler gear hub/race (Fig. 116).



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Fig. 115 Remove Reverse Idler Gear Snap-ring

- 1 – REVERSE IDLER GEAR
2 – SNAP-RING
3 – REVERSE IDLER GEAR HUB
4 – PLATE WASHER



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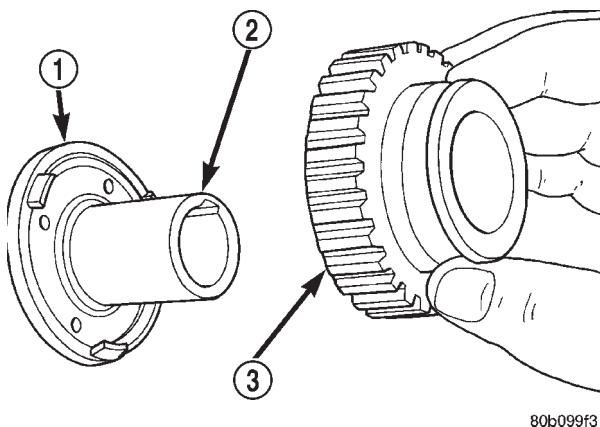
Fig. 116 Remove Reverse Idler Gear Plate Washer

- 1 – REVERSE IDLER GEAR
2 – PLATE WASHER

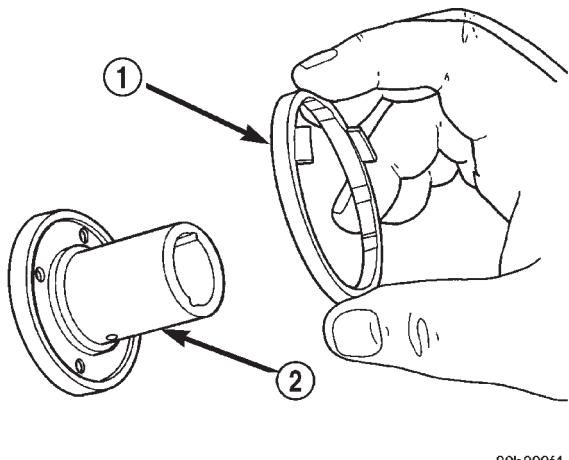
- (3) Remove the reverse idler gear from the reverse idler gear hub/race (Fig. 117).

- (4) Remove the reverse idler gear synchronizer ring from the reverse idler gear hub/race (Fig. 118).

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 117 Remove Reverse Idler Gear**

- 1 – REVERSE SYNCHRONIZER RING
2 – REVERSE IDLER GEAR HUB
3 – REVERSE IDLER GEAR

**Fig. 118 Remove Reverse Idler Gear Synchronizer Ring**

- 1 – REVERSE SYNCHRONIZER RING
2 – REVERSE IDLER GEAR HUB

ASSEMBLY

(1) Install the reverse idler gear synchronizer ring onto the reverse idler gear hub/race. Apply a film of 75W-90 GL-3 transmission oil to the contact surface of the synchronizer ring prior to assembly.

(2) Install the reverse idler gear onto the reverse idler gear hub/race. Apply a film of 75W-90 GL-3 transmission oil to the reverse idler gear bushing prior to assembly. Verify that the teeth on the synchronizer ring are properly engaged into the recesses of the reverse idler gear.

(3) Install the plate washer over the reverse idler gear hub/race and onto the reverse idler gear.

(4) Install the snap-ring to hold the reverse idler gear onto the reverse idler hub/race.

CLEANING AND INSPECTION**AX5 MANUAL TRANSMISSION COMPONENTS****GENERAL INFORMATION**

Clean the transmission components in solvent. Dry the cases, gears, shift mechanism and shafts with compressed air. Dry the bearings with clean, dry shop towels only. Never use compressed air on the bearings. This could cause severe damage to the bearing roller and race surfaces.

If output shaft or inner race flange thickness is within specification but any gear thrust clearance is out of specification, replace the necessary gear and gear needle bearing as an assembly.

GEAR CASE, ADAPTER/EXTENSION HOUSING, INTERMEDIATE PLATE

Clean the case, housing, and intermediate plate with solvent and dry with compressed air. Replace the case if cracked, porous, or if any of the bearing and gear bores are damaged.

Inspect the threads in the case, housing, and plate. Minor thread damage can be repaired with steel thread inserts, if necessary. Do not attempt to repair any threads which show evidence of cracks around the threaded hole.

OUTPUT SHAFT

Check thickness of the output shaft and inner bearing race flanges with a micrometer or vernier calipers (Fig. 119).

- Minimum thickness for shaft flange is 4.80 mm (0.189 in.)
- Minimum thickness for first gear bearing inner race flange is 3.99 mm (0.157 in.)

Measure diameter of the output shaft journal surfaces with a micrometer. Replace the shaft if either of these surfaces are worn beyond specified limits.

- Second gear surface minimum diameter is 37.964 mm (1.495 in.)
- Third gear surface minimum diameter is 34.984 mm (1.377 in.)

Measure diameter of the first gear bearing inner race. Minimum diameter is 38.985 mm (1.535 in.).

Measure output shaft runout with a dial indicator (Fig. 120). Runout should not exceed 0.05 mm (0.002 in.).

Replace output shaft or first gear inner bearing race if measurement of any surface is out of specification. Do not attempt to repair out of specification components.

CLEANING AND INSPECTION (Continued)

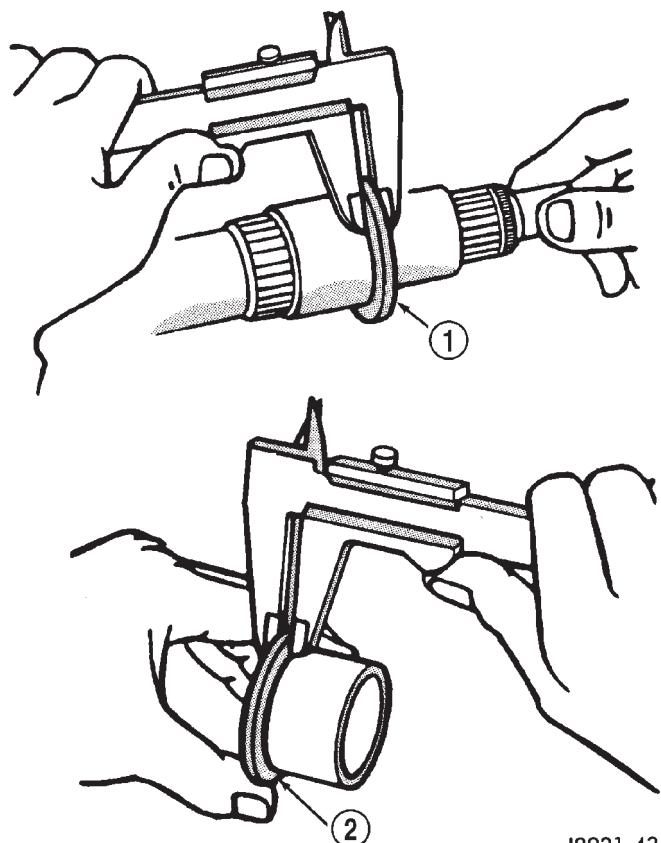


Fig. 119 Check Shaft And Bearing Race Flange Thickness

1 – OUTPUT SHAFT FLANGE
2 – INNER RACE FLANGE

J8921-43

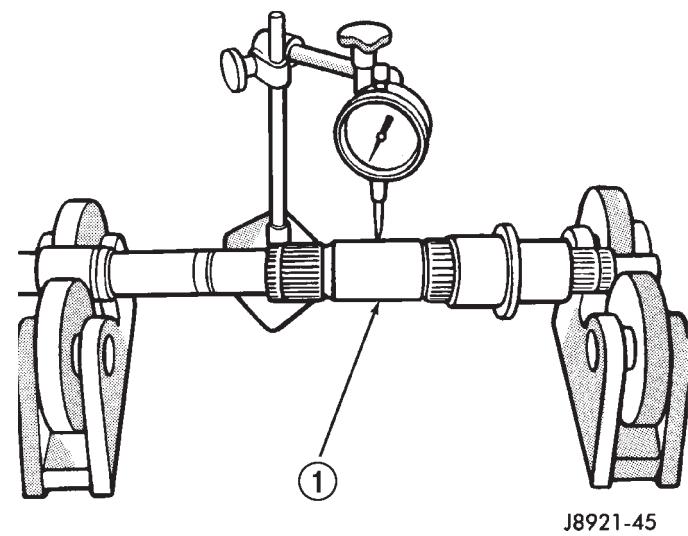


Fig. 120 Check Output Shaft Runout

1 – OUTPUT SHAFT JOURNAL

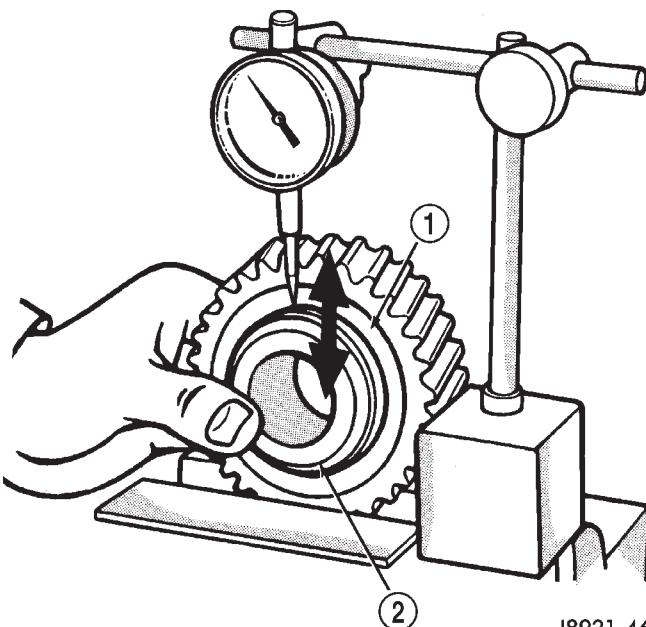
COUNTERSHAFT

Inspect the countershaft gear teeth. Replace the countershaft if any teeth are worn or damaged. Inspect the bearing surfaces and replace shaft if any surface shows damage or wear.

Check condition of the countershaft front bearing. Replace the bearing if worn, noisy, or damaged.

GEAR AND SYNCHRONIZER

Install the needle bearing and inner race in the first gear. Then check oil clearance between the gear and inner race (Fig. 121). Clearance should be 0.009 – 0.032 mm (0.0004 – 0.0013 in.).



J8921-46

Fig. 121 Check Gear-To-Race Clearance

1 – GEAR
2 – INNER RACE

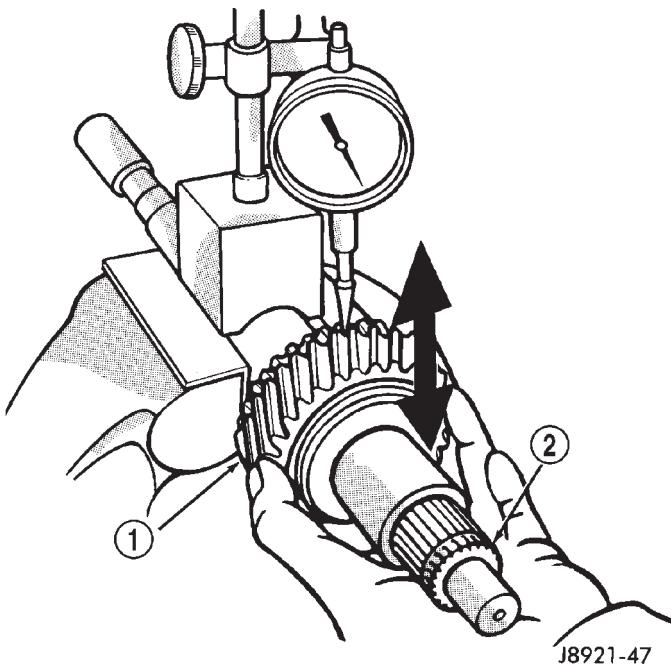
Install the needle bearings and the second, third and counter fifth gears on the output shaft. Then check oil clearance between the gears and shaft with a dial indicator (Fig. 122). Oil clearance for all three gears is 0.009 – 0.0013 mm (0.0004 – 0.0013 in.).

Check synchronizer ring wear (Fig. 123). Insert each ring in matching gear. Measure clearance between each ring and gear with feeler gauge. Replace ring if clearance exceeds 2.0 mm (0.078 in.).

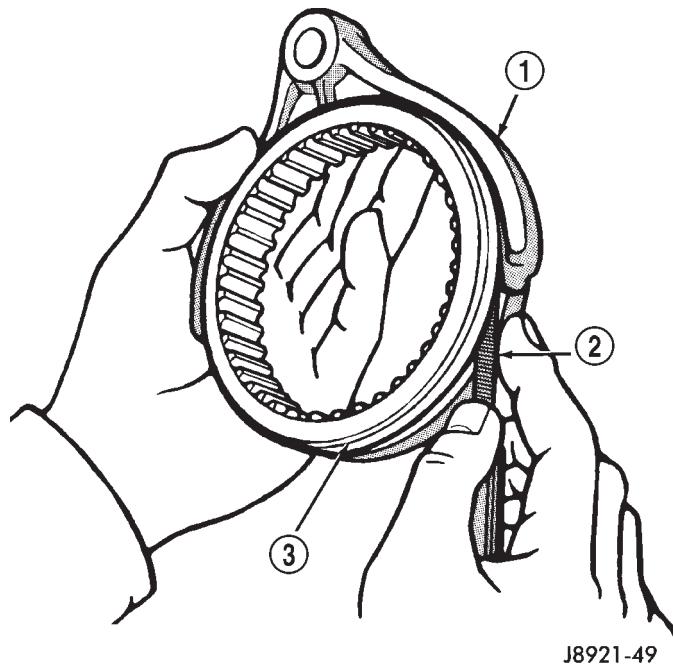
Check shift fork-to-synchronizer hub clearance with a feeler gauge (Fig. 124). Replace the fork if clearance exceeds 1.0 mm (0.039 in.).

(1) Inspect all mainshaft gear teeth. Replace any gear which shows any worn or damaged teeth.

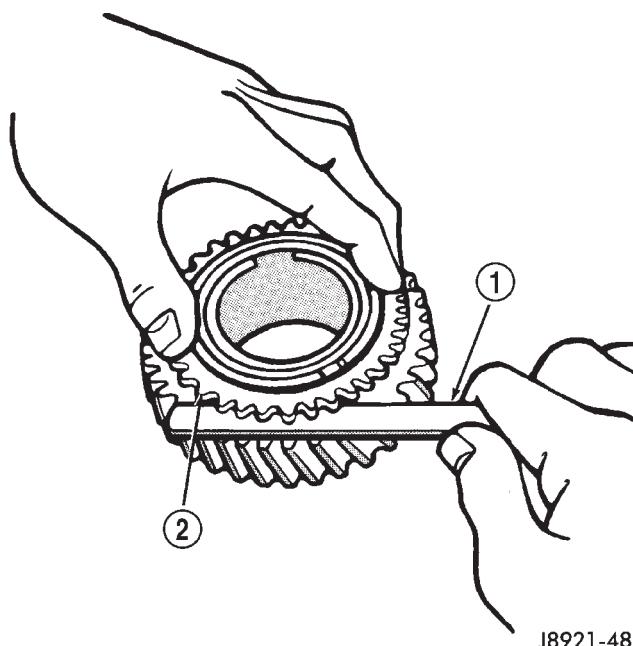
CLEANING AND INSPECTION (Continued)

**Fig. 122 Check Gear-To-Shaft Oil Clearance**

- 1 – GEAR BEING CHECKED
2 – OUTPUT SHAFT

**Fig. 124 Check Fork-To-Hub Clearance**

- 1 – SHIFT FORK
2 – FEELER GAUGE
3 – SYNCHRONIZER SLEEVE

**Fig. 123 Check Synchronizer Ring Wear**

- 1 – FEELER GAUGE
2 – SYNCHRONIZER RING

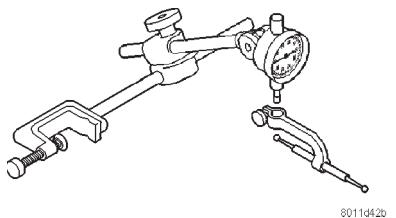
SPECIFICATIONS

TORQUE

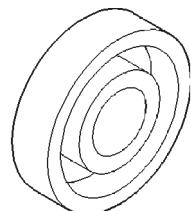
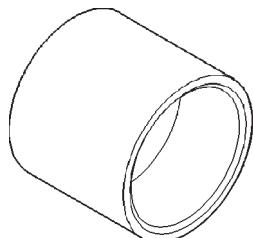
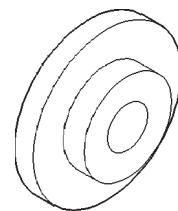
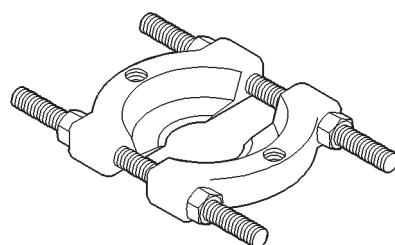
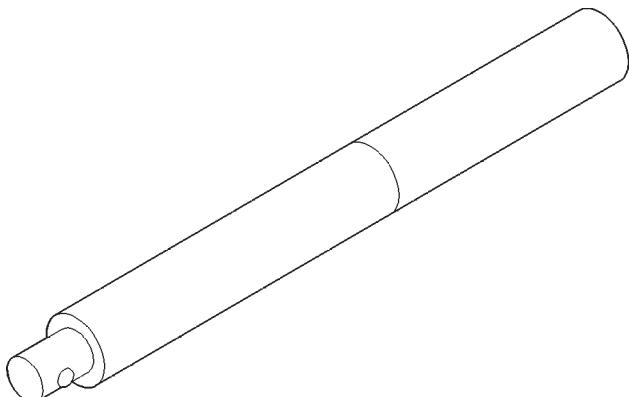
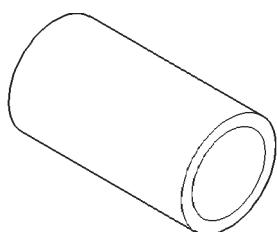
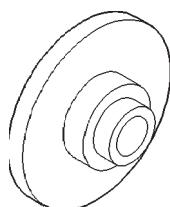
DESCRIPTION	TORQUE
Plugs, Access	19 N·m (14 ft.lbs.)
Bolts, Adapter Housing	34 N·m (25 ft.lbs.)
Switch, Back-up Light	44 N·m (32.5 ft.lbs.)
Plugs, Drain and Fill	44 N·m (32.5 ft.lbs.)
Bolts, Front Bearing Retainer ..	17 N·m (12 ft.lbs.)
Plugs, Interlock and Detent	19 N·m (14 ft.lbs.)
Screws, Propeller Shaft Clamp	16–23 N·m (140–200 in.lbs.)
Bolts, Rear Mount to Transmission	33–60 N·m (24–44 ft.lbs.)
Nut, Rear Mount Clevis ..	54–75 N·m (40–55 ft.lbs.)
Nuts, Rear Mount to Crossmember	41–68 N·m (30–50 ft.lbs.)
Pins, Restrictor	27.4 N·m (20 ft.lbs.)
Bolts, Reverse Shift Arm Bracket	18 N·m (13 ft.lbs.)
Screw, Shift Arm Set	38 N·m (28 ft.lbs.)
Screws, Shift Fork Set	20 N·m (15 ft.lbs.)
Nut, Shift Knob	20–34 N·m (15–25 ft.lbs.)
Screws, Shifter Floor Cover	2–3 N·m (17–30 in.lbs.)
Bolts, Shift Tower	18 N·m (13 ft.lbs.)
Nuts, Transfer Case Mounting	30–41 N·m (22–30 ft.lbs.)

SPECIAL TOOLS

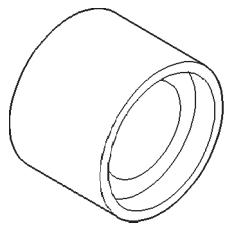
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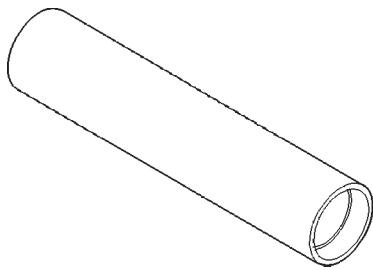
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C-3339 Dial Indicator Set**8212 Installer, Seal****C-3995-A Installer, Extension Housing Seal****8208 Installer, Seal****P-334 Splitter, Bearing****C-4171 Handle, Universal Tool****8109 Cup, Installer****8211 Installer, Seal****L-4507 Tube, Driver**

SPECIAL TOOLS (Continued)



6747-1A Adapter, Fixture



MD-998805 Installer, Seal

NV3550 MANUAL TRANSMISSION

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GENERAL INFORMATION

NV3550 MANUAL TRANSMISSION

DESCRIPTION

The NV3550 is a medium-duty, 5-speed, constant mesh, fully synchronized manual transmission. Fifth gear is an overdrive range with a ratio of 0.78:1. The NV3550 is available in two and four-wheel drive configurations.

The transmission gear case consists of two aluminum housings. The clutch housing is a removable component. It is not an integral part of the transmission front housing.

A combination of roller and ball bearings are used to support the transmission shafts in the two housings. The transmission gears all rotate on caged type needle bearings. A roller bearing is used between the input and output shaft.

The NV3550 has a single shaft shift mechanism with three shift forks all mounted on the shaft. The shaft is supported in the front and rear housings by bushings and one linear ball bearing. Internal shift components consist of the forks, shaft, shift lever socket, and detent components (Fig. 1).

GEAR RATIOS

Gear ratios for the NV3550 are as follows:

RANGE	RATIO
FIRST	4.01:1
SECOND	2.32:1
THIRD =	1.40:1
FOURTH =	1:1
FIFTH =	0.78:1
REVERSE =	3.55:1

IDENTIFICATION

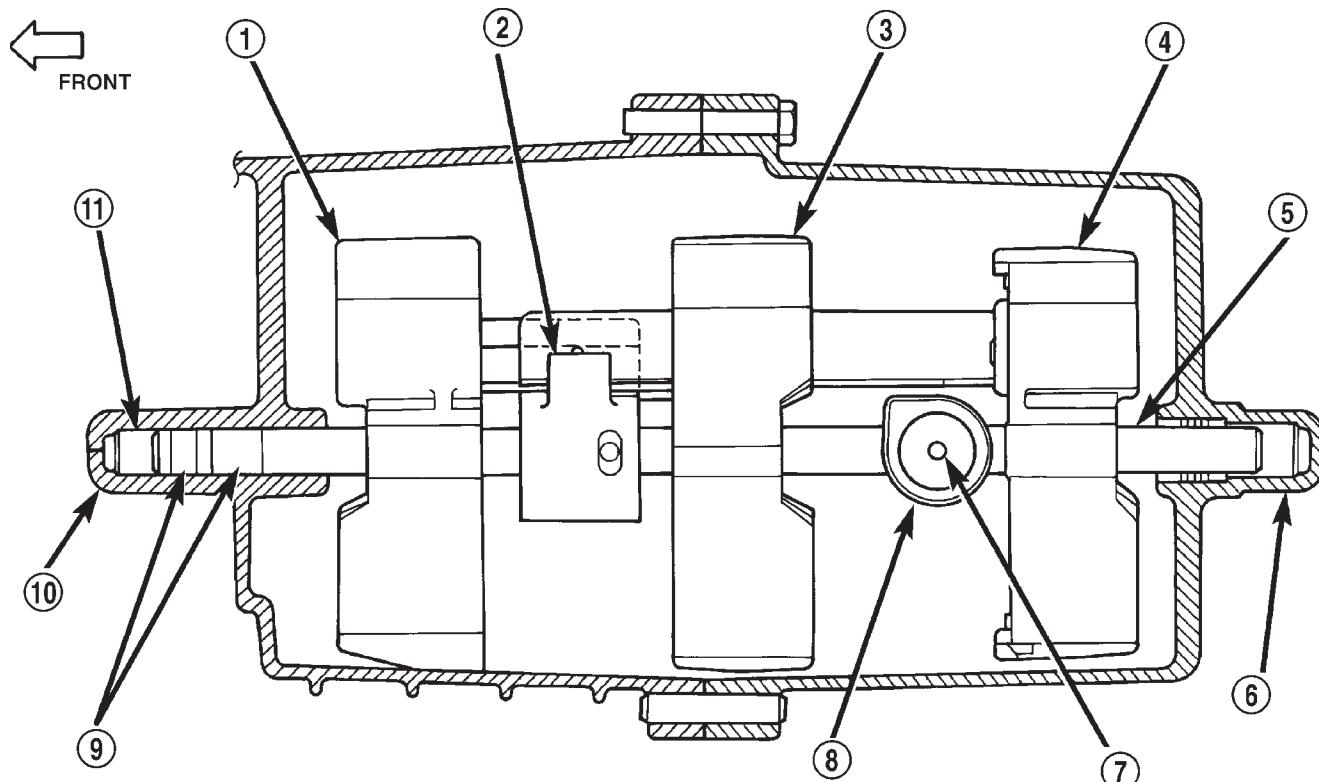
The NV3550 identification and part number bar code tags (Fig. 2) are located on the top of the transmission, forward of the shift tower.

OPERATION

The manual transmission receives power through the clutch assembly from the engine. The clutch disc is splined to the transmission input shaft and is turned at engine speed at all times that the clutch is engaged. The input shaft is connected to the transmission countershaft through the mesh of fourth speed gear on the input shaft and the fourth counter-shaft gear. At this point, all the transmission gears are spinning.

The driver selects a particular gear by moving the shift lever to the desired gear position. This movement moves the internal transmission shift components to begin the shift sequence. As the shift lever moves the selected shift rail, the shift fork attached to that rail begins to move. The fork is positioned in a groove in the outer circumference of the synchronizer sleeve. As the shift fork moves the synchronizer sleeve, the synchronizer begins to speed-up or slow down the selected gear (depending on whether we are up-shifting or down-shifting). The synchronizer does this by having the synchronizer hub splined to the mainshaft, or the countershaft in some cases, and moving the blocker ring into contact with the gear's friction cone. As the blocker ring and friction cone come together, the gear speed is brought up or down to the speed of the synchronizer. As the two speeds match, the splines on the inside of the synchronizer sleeve become aligned with the teeth on the blocker ring and the friction cone and eventually will slide over the teeth, locking the gear to the mainshaft, or countershaft, through the synchronizer.

GENERAL INFORMATION (Continued)

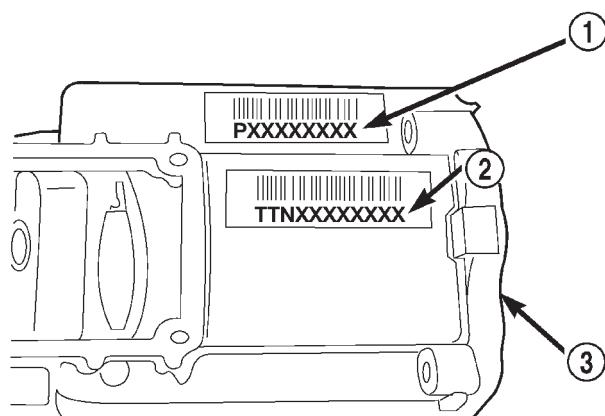


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Fig. 1 NV3550 Shift Mechanism

- 1 – 3-4 FORK
- 2 – SHIFT SHAFT LEVER AND BUSHING
- 3 – 1-2 FORK
- 4 – FIFTH-REVERSE FORK
- 5 – SHIFT SHAFT
- 6 – REAR HOUSING

- 7 – ROLL PIN
- 8 – SHIFT LEVER SOCKET
- 9 – SHAFT RAIL DETENTS
- 10 – FRONT HOUSING
- 11 – SHIFT SHAFT



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Fig. 2 NV3550 Identification

- 1 – PART NUMBER TAG
- 2 – IDENTIFICATION TAG
- 3 – FRONT OF REAR HOUSING

LUBRICANT**DESCRIPTION**

Required lubricant for the NV3550 is Mopar® Manual Transmission Lubricant, P/N 4761526. This is the **only** lubricant to be used in NV3550 transmissions. No other lubricants are acceptable, or recommended.

The correct transmission lubricant level is to the bottom edge of the fill plug hole (Fig. 3).

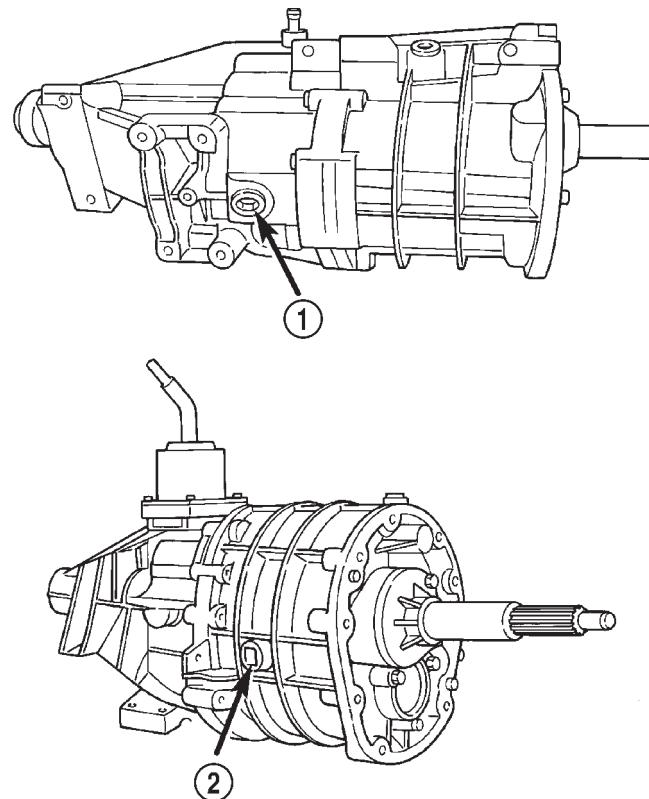
The transmission must be level to obtain an accurate lubricant level check. A drive-on type of hoist is recommended for this purpose.

Lubricant capacity of the NV3500 is approximately 2.28 liters (4.8 pints). This represents the approximate quantity needed to refill the transmission after a lubricant change or overhaul.

DRAIN AND FILL PLUG LOCATIONS

The NV3550 fill plug is located in the front housing. The drain plug is at the bottom rear of the housing (Fig. 3).

GENERAL INFORMATION (Continued)

**Fig. 3 Drain and Fill Plug Locations**

- 1 – DRAIN PLUG
2 – FILL PLUG

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DIAGNOSIS AND TESTING**LOW LUBRICANT LEVEL**

A low transmission lubricant level is generally the result of a leak, inadequate lubricant fill, or an incorrect lubricant level check.

Leaks can occur at the mating surfaces of the housings, or from the front/rear seals. A suspected leak could also be the result of an overfill condition.

Leaks at component mating surfaces will probably be the result of inadequate sealer, gaps in the sealer, incorrect bolt tightening, or use of a non-recommended sealer.

A leak at the front of the transmission will be from either a loose or damaged, front bearing retainer or retainer seal. Lubricant may also drip from the transmission clutch housing after extended operation. If the leak is severe, it will contaminate the clutch disc causing slip, grab and chatter.

Transmissions filled from air or electrically powered lubricant containers can be under filled. Always check the lubricant level after filling to avoid an under fill condition.

A correct lubricant level check can only be made when the vehicle is level; use a drive-on hoist to ensure this. Also allow the lubricant to settle for a minute or so before checking. These recommendations will ensure an accurate check and avoid an under-or-overfill condition.

HARD SHIFTING

Hard shifting is usually caused by a low lubricant level, improper or contaminated lubricants, transmission component damage, clutch linkage malfunction, or by a damaged clutch pressure plate or disc.

Substantial lubricant leaks can result in gear, shift component, synchro and bearing damage. If a leak goes undetected for an extended period, the first indications of a problem are usually hard shifting and noise.

Incorrect or contaminated lubricants can also contribute to hard shifting. The consequence of using non-recommended lubricants is noise, excessive wear, internal bind and hard shifting.

Improper clutch release is a frequent cause of hard shifting. Incorrect adjustment or a worn, damaged pressure plate or disc can cause incorrect release. If the clutch problem is advanced, gear clash during shifts can result.

Worn or damaged synchro rings can cause gear clash when shifting into any forward gear. In some new or rebuilt transmissions, new synchro rings may tend to stick slightly causing stiff and/or noisy shifts. In most cases, this condition will decline as the rings wear in.

TRANSMISSION NOISE

Most manual transmissions make some noise during normal operation. Rotating gears can generate a mild whine that may only be audible at extreme speeds.

Severe, obviously audible transmission noise is generally the result of a lubricant problem. Insufficient, improper, or contaminated lubricant can promote rapid wear of gears, synchros, shift rails, forks and bearings. The overheating caused by a lubricant problem, can also lead to gear breakage.

REMOVAL AND INSTALLATION
TRANSMISSION**REMOVAL**

- (1) Shift transmission into first or third gear.
- (2) Remove the floor console and shift boot as necessary to access the bottom of the shift lever at the shift tower attachment.

REMOVAL AND INSTALLATION (Continued)

(3) Install nuts on two M6X1.0 bolts and thread the bolts into the threaded holes at the base of the shift lever.

(4) Tighten the nuts equally until the shift lever loosens on the shift tower stub shaft.

(5) Remove the shift lever from the shift tower.

(6) Raise and support vehicle on suitable safety stands.

(7) Support engine with adjustable jack stand. Position wood block between jack and oil pan to avoid damaging pan.

(8) Remove crossmember/skid plate.

(9) Disconnect necessary exhaust system components.

(10) Remove skid plate, if equipped.

(11) Remove slave cylinder (Fig. 4) from clutch housing.

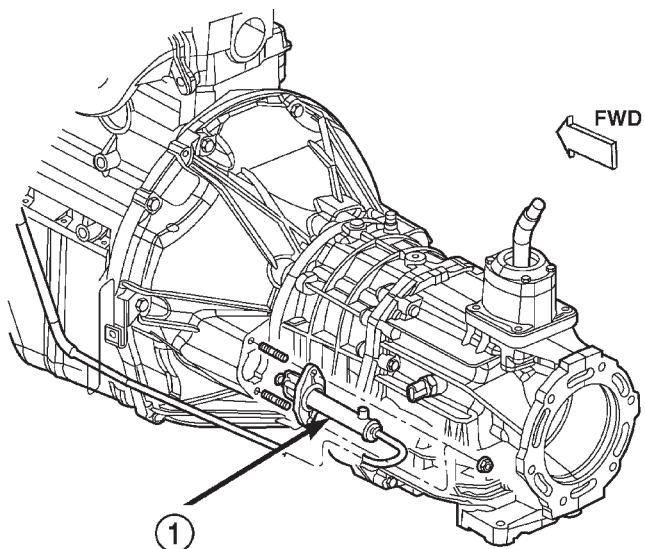


Fig. 4 Slave Cylinder

1 – CLUTCH SLAVE CYLINDER

(12) Mark rear propeller shaft and rear axle yokes for installation alignment (Fig. 5).

(13) Mark front propeller shaft, axle, and transfer case yokes for installation alignment, if equipped.

(14) Remove propeller shaft(s).

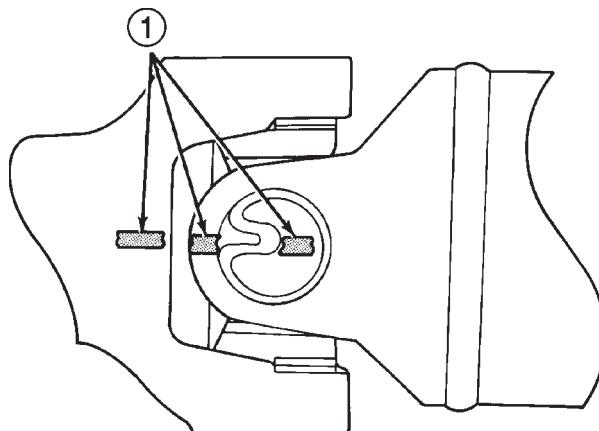
(15) Unclip wire harnesses from transmission and transfer case, if equipped.

(16) Disconnect transfer case vent hose, if equipped.

(17) Disengage any wire connectors attached to transmission or transfer case, if equipped, components.

(18) Support transfer case, if equipped, with transmission jack.

(19) Secure transfer case, if equipped, to jack with safety chains.



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Fig. 5 Marking Propeller Shaft And Axle Yokes

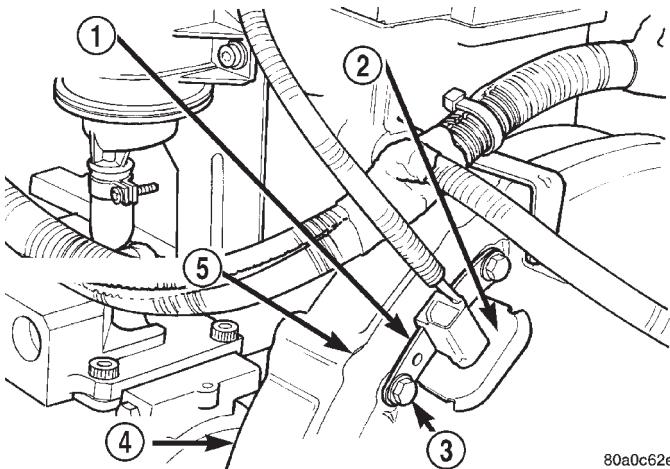
1 – REFERENCE MARKS

(20) Disconnect transfer case shift linkage at transfer case, if equipped.

(21) Remove nuts attaching transfer case to transmission, if equipped.

(22) Remove transfer case, if equipped.

(23) Remove crankshaft position sensor (Fig. 6).



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Fig. 6 Crankshaft Position Sensor —2.5 and 4.0L Engine

1 – ENGINE SPEED SENSOR

2 – GROMMET

3 – MOUNTING BOLT(S)

4 – LEFT REAR OF ENGINE

5 – TRANSMISSION

CAUTION: It is important that the crankshaft position sensor be removed prior to transmission removal. The sensor can easily be damaged if left in place during removal operations.

(24) Support engine with adjustable jack stand. Position wood block between jack and oil pan to avoid damaging pan.

(25) Support transmission with transmission jack.

(26) Secure transmission to jack with safety chains.

(27) Disconnect rear cushion and bracket from transmission.

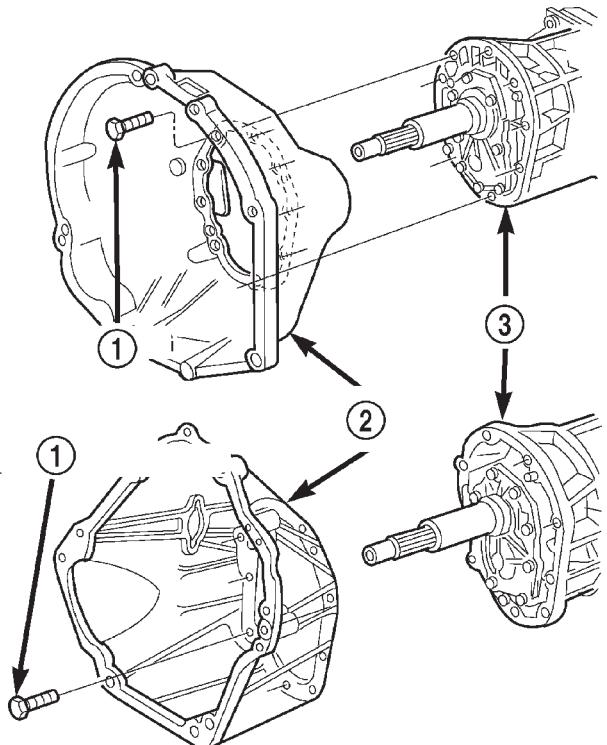
(28) Remove rear crossmember.

(29) Remove clutch housing-to-engine bolts.

(30) Pull transmission jack rearward until input shaft clears clutch. Then slide transmission out from under vehicle.

(31) Remove clutch release bearing, release fork, and retainer clip.

(32) Remove clutch housing from transmission (Fig. 7).



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Fig. 7 Clutch Housing

- 1 – HOUSING-TO-TRANSMISSION BOLTS (46 N·m/34 ft. lbs.)
- 2 – CLUTCH HOUSING
- 3 – TRANSMISSION

INSTALLATION

(1) Install clutch housing (Fig. 7) on transmission. Tighten housing bolts to 46 N·m (34 ft. lbs.) torque.

(2) Lubricate contact surfaces of release fork pivot ball stud and release fork with high temp grease.

(3) Install release bearing, fork, and retainer clip.

(4) Position and secure transmission on transmission jack.

(5) Lightly lubricate pilot bearing and transmission input shaft splines with Mopar® high temp grease.

(6) Raise transmission and align transmission input shaft and clutch disc splines. Then slide transmission into place.

(7) Install and tighten clutch housing-to-engine bolts to the appropriate torque: **Be sure the housing is properly seated on engine block before tightening bolts.**

- Tighten 3/8" diameter bolts to 37 N·m (27 ft.lbs.).

- Tighten 7/16" diameter bolts to 58 N·m (43 ft.lbs.).

- Tighten M12 bolts to 75 N·m (55 ft.lbs.).

(8) Be sure transmission is in first or third gear.

(9) Install rear crossmember. Tighten crossmember-to-frame bolts to 41 N·m (31 ft. lbs.) torque.

(10) Install fasteners to hold rear cushion and bracket to transmission. Then tighten transmission-to-rear support bolts/nuts to 54 N·m (40 ft. lbs.) torque.

(11) Remove support stands from engine and transmission.

(12) Install and connect crankshaft position sensor.

(13) Position transfer case on transmission jack, if equipped.

(14) Secure transfer case to jack with safety chains, if equipped.

(15) Raise transfer case, if equipped, and align transfer case input shaft to the transmission output shaft.

(16) Slide transfer case forward until case is seated on transmission, if necessary.

(17) Install nuts to attach transfer case to transmission, if equipped. Tighten transfer case-to-transmission nuts to 35 N·m (26 ft. lbs.) torque.

(18) Connect transfer case shift linkage at transfer case, if equipped.

(19) Connect transfer case vent hose, if equipped.

(20) Secure wire harnesses in clips/tie straps on transmission and transfer case, if equipped.

(21) Engage wire connectors attached to all necessary transmission or transfer case, if equipped, components.

(22) Install rear propeller shaft slip yoke to transmission or transfer case, if equipped, output shaft.

(23) Align marks on rear propeller shaft and rear axle yokes (Fig. 8).

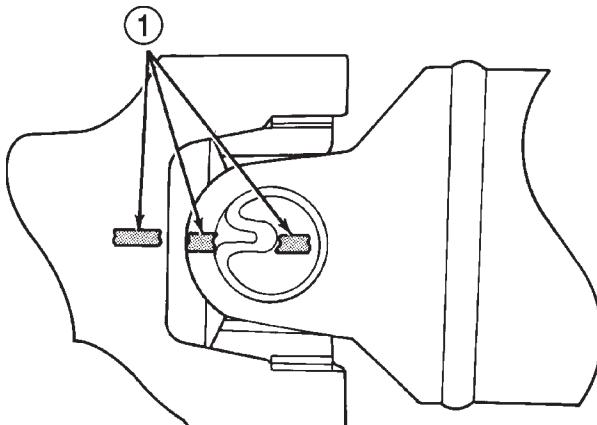
(24) Install and tighten propeller shaft U-joint clamp bolts to 19 N·m (170 in. lbs.) torque.

(25) Align marks on front propeller shaft, axle, and transfer case yokes, if equipped.

(26) Install and tighten propeller shaft U-joint clamp bolts to 19 N·m (170 in. lbs.) torque.

(27) Install slave cylinder in clutch housing.

REMOVAL AND INSTALLATION (Continued)



J9316-2

Fig. 8 Align Propeller Shaft And Rear Axle Yokes Alignment Marks

1 – REFERENCE MARKS

(28) Install skid plate, if equipped. Tighten bolts to 42 N·m (31 ft. lbs.) torque. Tighten stud nuts to 17 N·m (150 in. lbs.) torque.

(29) Fill transmission and transfer case, if equipped, with recommended lubricants. Refer to the Lubricant Recommendation sections of the appropriate component for correct fluid.

(30) Lower vehicle.

(31) Install nuts on two M6X1.0 bolts and thread the bolts into the threaded holes at the base of the shift lever.

(32) Tighten the nuts equally until the shift lever will slide over the shift tower stub shaft.

(33) Install the floor console and shift boot.

SHIFT TOWER**REMOVAL**

(1) Shift transmission into Neutral.

(2) Unscrew and remove the shift lever extension from the shift

(3) Remove any floor console components necessary to access the transmission shift tower.

(4) Remove the bolts holding the shift tower to the isolator plate and transmission gear case.

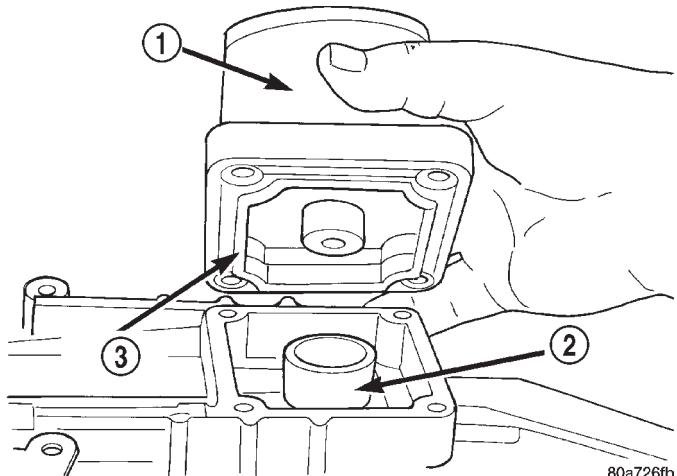
(5) Remove the shift tower (Fig. 9) from the transmission.

INSTALLATION

(1) Shift transmission into third gear.

(2) Clean the mating surfaces of shift tower and transmission gear case with suitable wax and grease remover.

(3) Install the shift tower onto the transmission case. No sealant is necessary between the shift tower and transmission case.



80a726fb

Fig. 9 Remove Shift Tower

1 – SHIFT TOWER AND LEVER ASSEMBLY

2 – SHIFT SOCKET

3 – SEAL

(4) Install the bolts to hold the shift tower to the isolator plate and the transmission gear case. Tighten the shift tower bolts to 8.5 N·m (6.3 ft. lbs.).

(5) Install the shift lever extension and any floor console components previously removed.

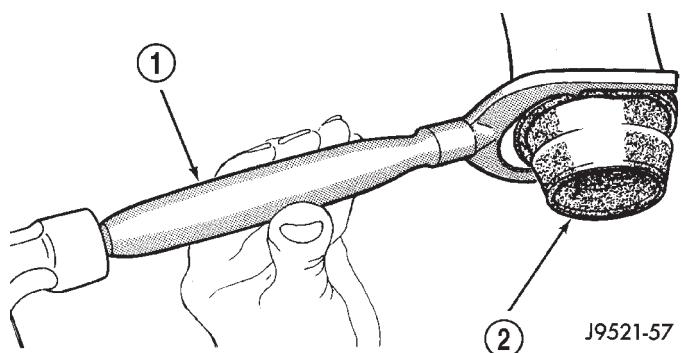
YODE SEAL—2WD**REMOVAL**

(1) Raise vehicle.

(2) Mark propeller shaft and axle yoke for alignment reference.

(3) Disconnect and remove propeller shaft.

(4) Remove old seal with Seal Remover C-3985-B (Fig. 10) from transmission housing.



J9521-57

Fig. 10 Removing Transmission Housing Yoke Seal

1 – SPECIAL TOOL C-3985-B

2 – SEAL

INSTALLATION

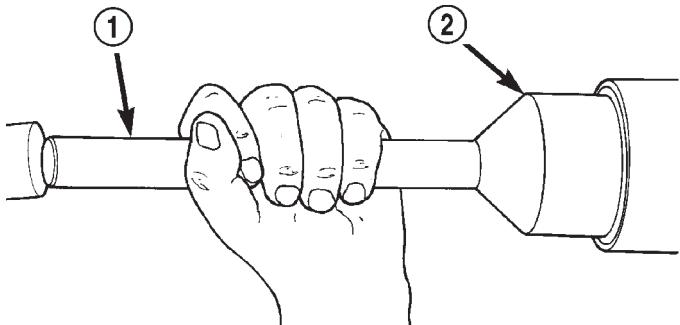
(1) Place seal in position on transmission housing.

(2) Drive seal into transmission housing with Seal Installer C-3972-A (Fig. 11).

REMOVAL AND INSTALLATION (Continued)

(3) Carefully guide propeller shaft slip yoke into housing and onto output shaft splines.

(4) Align marks made at removal and connect propeller shaft to rear axle pinion yoke.



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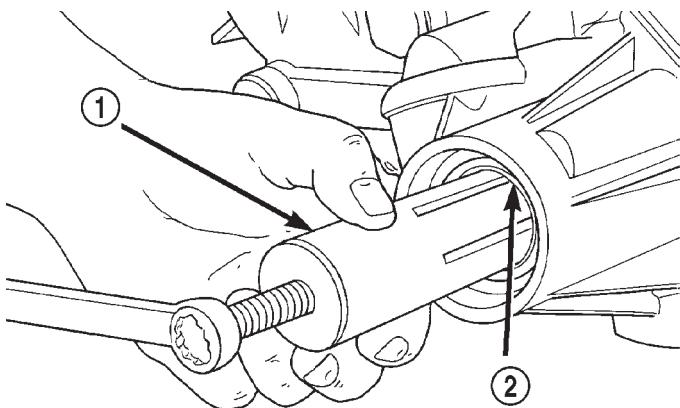
Fig. 11 Installing Transmission Housing Yoke Seal

- 1 – SPECIAL TOOL C-4171
2 – SPECIAL TOOL C-3972-A

REAR HOUSING YOKE BUSHING

REMOVAL

- (1) Remove housing yoke seal.
(2) Insert Remover 6957 into rear housing. Tighten tool to bushing and remove bushing (Fig. 12).



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Fig. 12 Bushing Removal—Typical

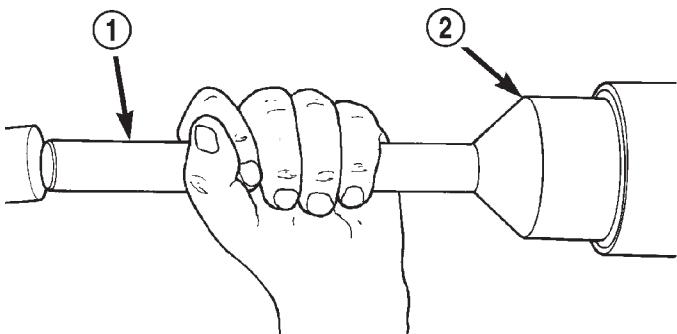
- 1 – REMOVER 6957
2 – EXTENSION HOUSING BUSHING

INSTALLATION

(1) Align bushing oil hole with oil slot in rear housing.

(2) Tap bushing into place with Installer 6951 and Handle C-4171.

(3) Install new oil seal in housing using Seal Installer C-3972-A (Fig. 13).



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Fig. 13 Rear Housing Seal Installation

- 1 – SPECIAL TOOL C-4171
2 – SPECIAL TOOL C-3972-A

DISASSEMBLY AND ASSEMBLY

TRANSMISSION

DISASSEMBLY

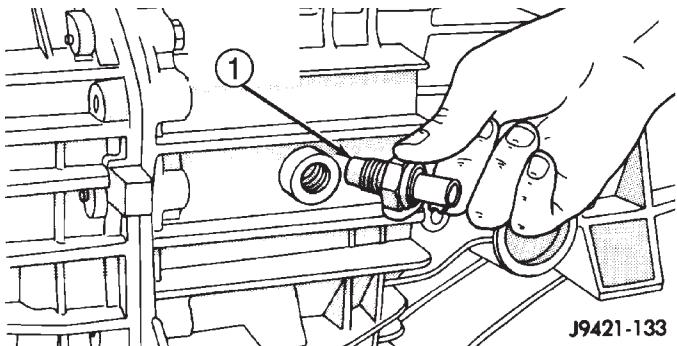
FRONT HOUSING

(1) If necessary, temporarily reinstall shift lever assembly. Shift transmission into Neutral.

(2) If lubricant was not drained out of transmission during removal, remove drain plug and drain lubricant into container at this time.

(3) Inspect drain plug magnet for debris.

(4) Remove backup light switch. Switch is located on passenger side of rear housing (Fig. 14).



J9421-133

Fig. 14 Backup Light Switch Location

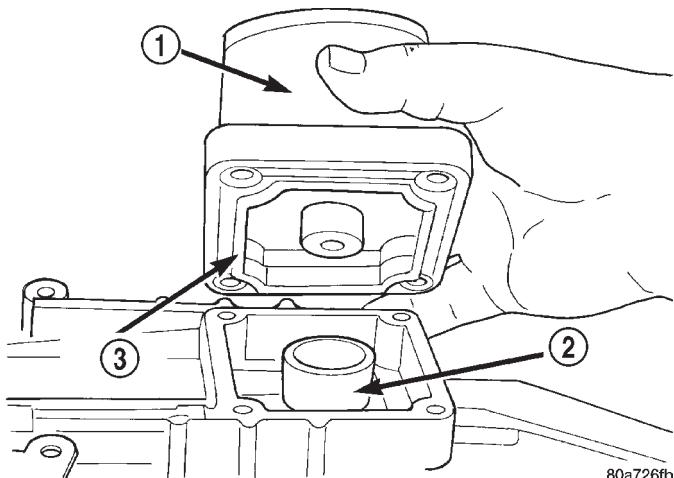
- 1 – BACKUP LIGHT SWITCH

(5) If necessary, remove shift tower bolts and remove tower and lever assembly (Fig. 15).

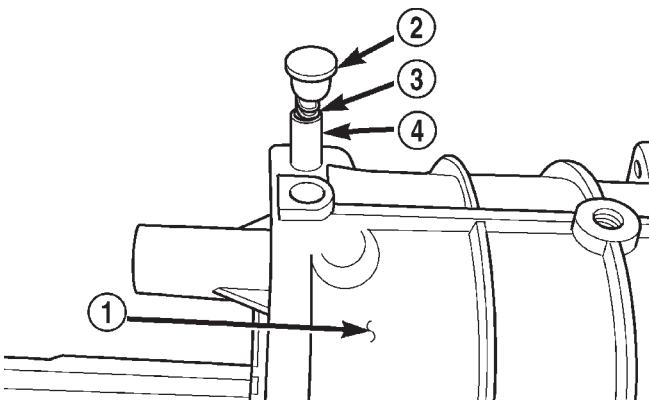
(6) Remove shift shaft lock bolt (Fig. 16). Bolt is located at top of front housing just forward of shift tower. Bolt is a shoulder bolt that secures the shift shaft bushing and lever.

(7) Use Remover 8117 and suitable slide hammer to remove shift shaft detent plug.

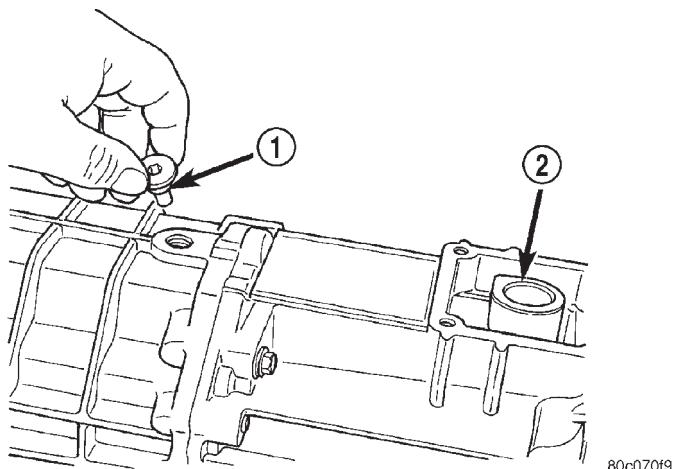
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 15 Shift Tower Removal**

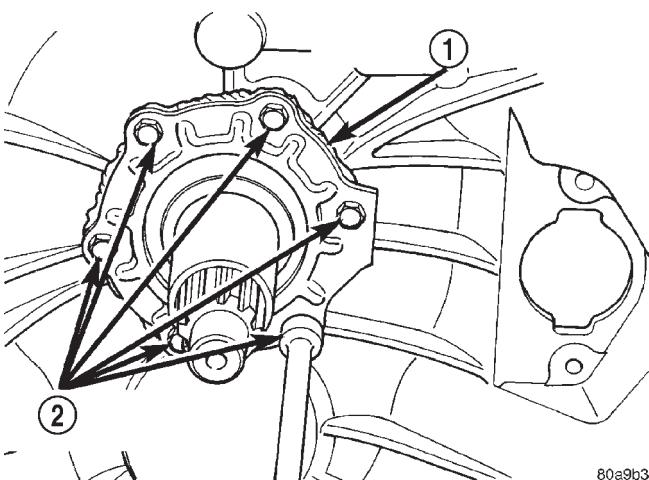
- 1 – SHIFT TOWER AND LEVER ASSEMBLY
- 2 – SHIFT SOCKET
- 3 – SEAL

**Fig. 17 Detent Plunger And Spring Removal**

- 1 – FRONT HOUSING
- 2 – PLUG
- 3 – SPRING
- 4 – PLUNGER

**Fig. 16 Shift Shaft Lock Bolt Removal**

- 1 – SHIFT SHAFT LOCK BOLT
- 2 – SHAFT SOCKET

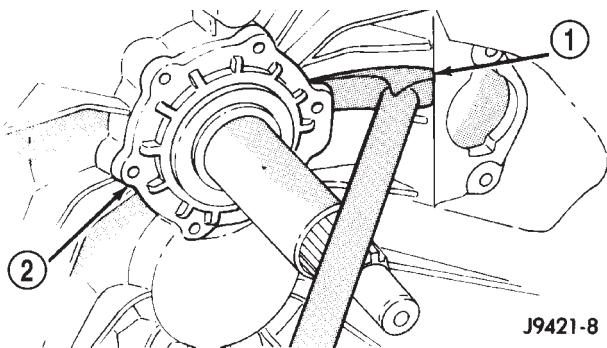
**Fig. 18 Input Shaft Bearing Retainer Bolt Removal—
Typical**

- 1 – INPUT SHAFT BEARING RETAINER
- 2 – RETAINER BOLTS

(8) Remove shift shaft detent plunger and spring (Fig. 17). Use pencil magnet to remove spring then plunger, if necessary.

(9) Remove bolts attaching input shaft bearing retainer to front housing (Fig. 18).

(10) Remove input shaft bearing retainer. Use pry tool to carefully lift retainer and break sealer bead (Fig. 19).

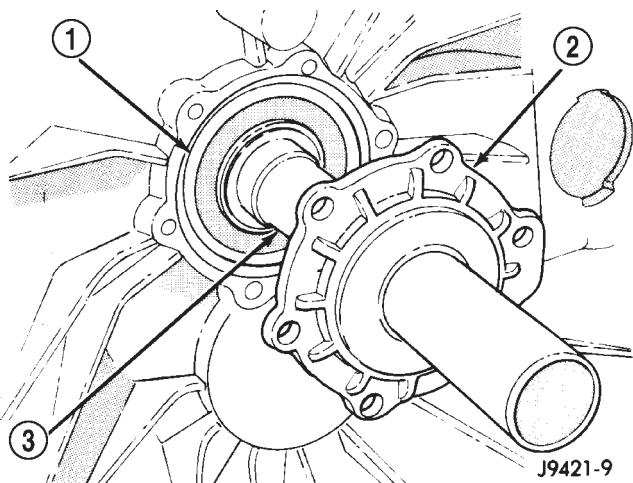


J9421-8

Fig. 19 Loosening Bearing Retainer Sealer Bead—Typical

- 1 – PRY TOOL
- 2 – INPUT SHAFT BEARING RETAINER

(11) Remove bearing retainer from input shaft (Fig. 20).



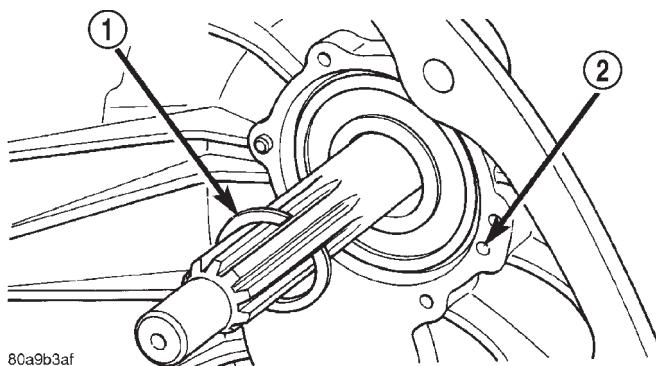
J9421-9

Fig. 20 Input Shaft Bearing Retainer Removal—Typical

- 1 – SHAFT BEARING
- 2 – BEARING RETAINER
- 3 – INPUT SHAFT

(12) Remove snap ring that secures input shaft in front bearing (Fig. 21).

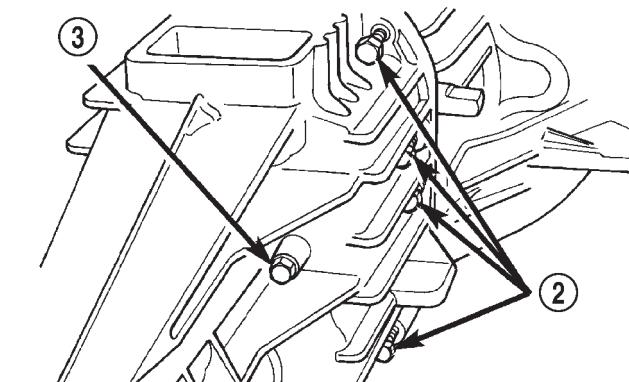
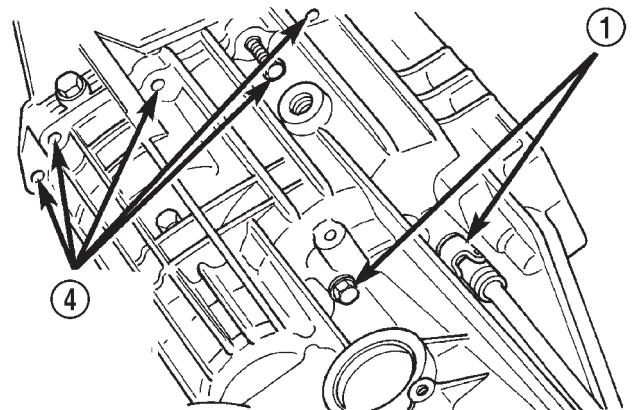
(13) Remove bolts that attach front housing to rear housing (Fig. 22). Three bolts at extreme rear of housing are actually for the output shaft bearing retainer. It is not necessary to remove all three bolts at this time. Leave at least one bolt in place until geartrain is ready to be removed from case.



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Fig. 21 Input Shaft Snap Ring Removal—Typical

- 1 – INPUT SHAFT SNAP RING
- 2 – OIL FEED



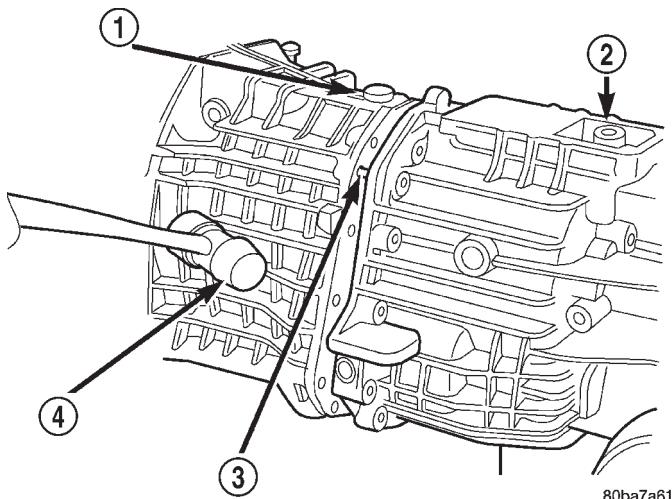
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Fig. 22 Housing And Bearing Retainer Bolt Locations

- 1 – RETAINER BOLTS
- 2 – HOUSING BOLTS
- 3 – RETAINER BOLT
- 4 – HOUSING BOLT LOCATIONS

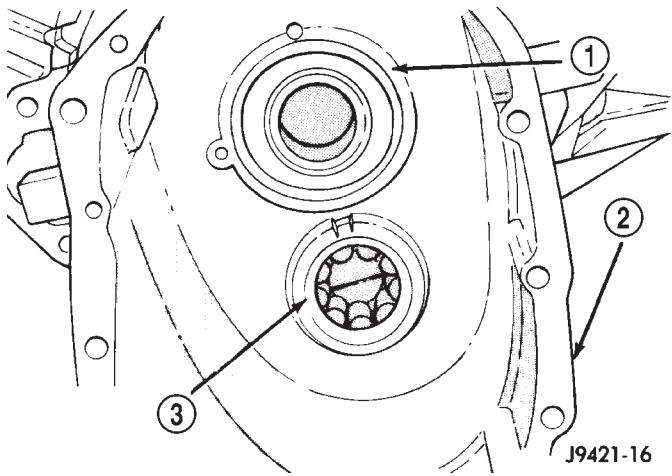
DISASSEMBLY AND ASSEMBLY (Continued)

(14) Separate front housing from rear housing (Fig. 23). Use plastic mallet to tap front housing off alignment dowels.

**Fig. 23 Front Housing Removal**

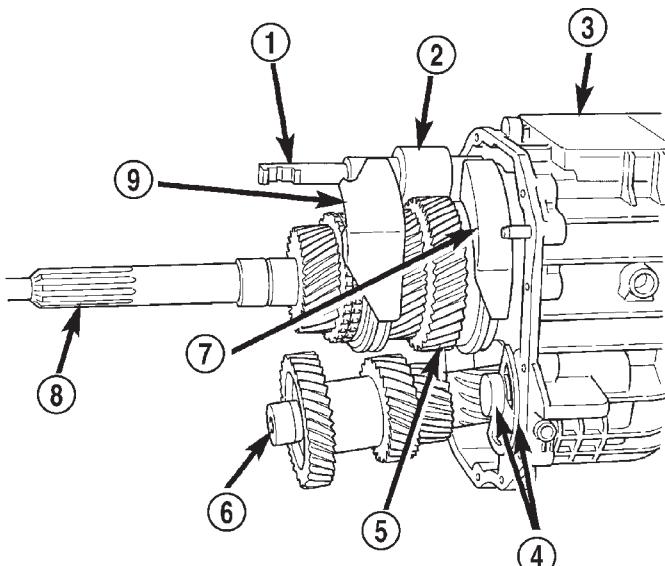
- 1 – FRONT HOUSING
- 2 – REAR HOUSING
- 3 – DOWELS (2)
- 4 – PLASTIC MALLETS

(15) Remove and inspect input shaft bearing. Inspect countershaft front bearing race (Fig. 24).

**Fig. 24 Input Shaft Bearing and Countershaft Front Bearing Race Location**

- 1 – INPUT SHAFT BEARING
- 2 – FRONT HOUSING
- 3 – COUNTERSHAFT FRONT BEARING

(16) Note position of input shaft, shift shaft and forks, and geartrain components in housing (Fig. 25).

**Fig. 25 Geartrain And Shift Component Identification**

- 1 – SHIFT SHAFT
- 2 – BUSHING
- 3 – REAR HOUSING
- 4 – REVERSE IDLER AND SUPPORT
- 5 – OUTPUT SHAFT AND GEARS
- 6 – COUNTERSHAFT
- 7 – 1-2 FORK
- 8 – INPUT SHAFT
- 9 – 3-4 FORK

SHIFT SHAFT, SHIFT FORKS AND REVERSE IDLER SEGMENT

(1) Unseat the roll pin that secures the shift socket to the shift shaft with Special Tool 6858 as follows:

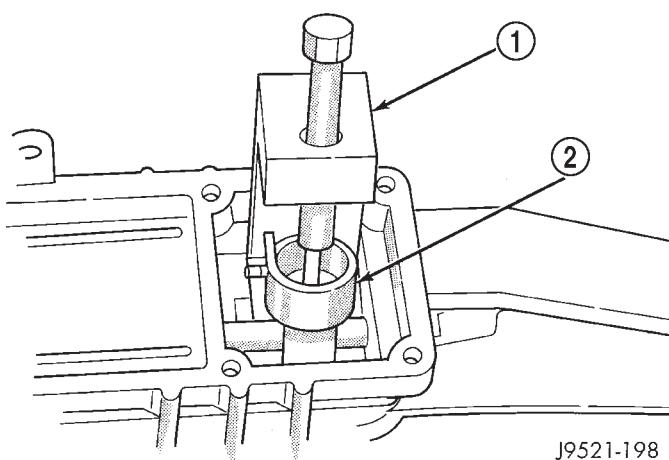
(a) Position Tool 6858 on the shift shaft. Center the tool over the roll pin and verify that the tool legs are firmly seated on the shift socket (Fig. 26).

(b) Tilt the socket toward the side of the case. This positions the roll pin at a slight angle to avoid trapping the pin between the gear teeth.

(c) Tighten the tool punch to press the roll pin downward and out of the shift socket (Fig. 26). The roll pin does not have to be completely removed from the shift socket. The roll pin must only be clear of the shift shaft. Be careful not to push the pin into the geartrain.

(2) Using a hammer and suitable punch, drive out roll pin that secures shift bushing and lever to shift shaft (Fig. 27).

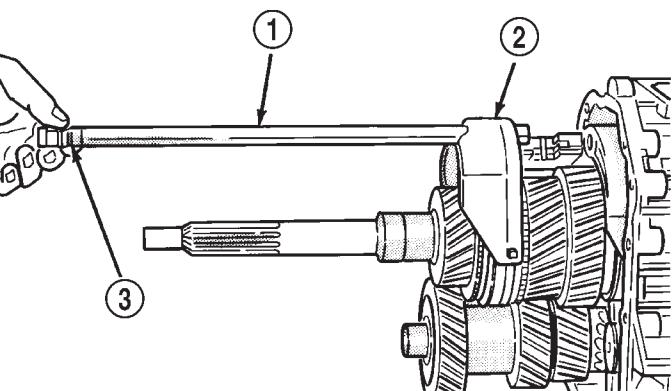
NOTE: Be sure to use the proper size punch to avoid bending the shift shaft.



J9521-198

Fig. 26 Removing the Shift Socket Roll Pin

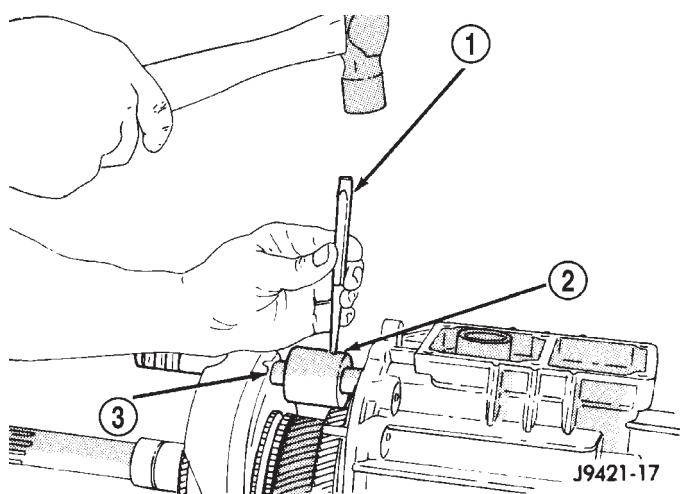
- 1 – SPECIAL TOOL
6858
- 2 – SHIFT SOCKET



J9421-42

Fig. 28 Shift Shaft Removal

- 1 – SHIFT SHAFT
- 2 – 3-4 FORK
- 3 – SHAFT DETENT NOTCHES



J9421-17

Fig. 27 Removing Shift Shaft Lever And Bushing Roll Pin

- 1 – PIN PUNCH
- 2 – BUSHING AND LEVER
- 3 – SHIFT SHAFT

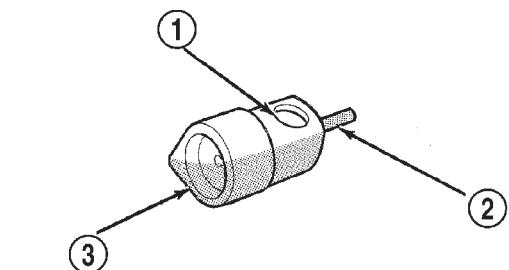
(3) Pull shift shaft straight out of rear housing, shift socket, fifth-reverse fork, and 1-2 fork (Fig. 28).

(4) Remove shift socket from rear housing (Fig. 29).

(5) Remove lever and bushing (Fig. 30).

(6) Remove 3-4 fork. Rotate 3-4 fork around synchro sleeve until fork clears shift arms on 1-2 and fifth-reverse forks. Then remove 3-4 fork (Fig. 31).

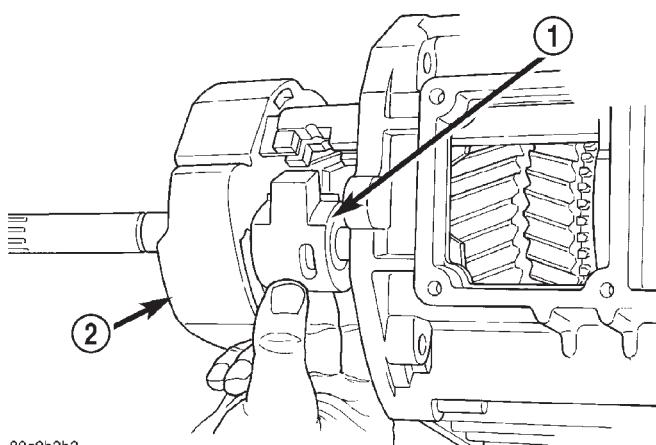
(7) Remove the reverse idler shaft support bolt (front bolt) (Fig. 32).



J9521-151

Fig. 29 Shift Socket And Roll Pin

- 1 – SHAFT BORE
- 2 – ROLL PIN
- 3 – SHIFT SOCKET

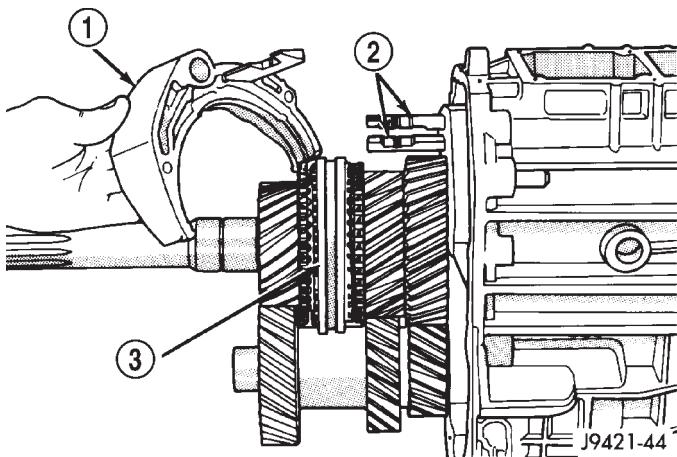


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Fig. 30 Removing Shift Shaft Lever And Bushing

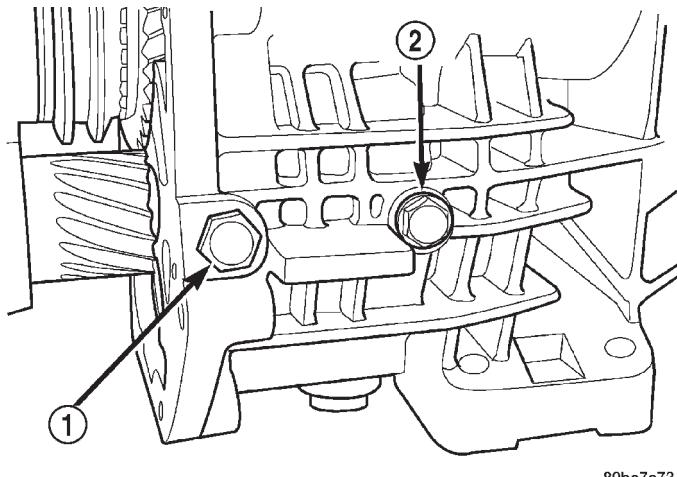
- 1 – SHAFT LEVER AND BUSHING
- 2 – 3-4 FORK

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 31 Removing 3-4 Shift Fork**

- 1 - 3-4 FORK
 2 - 1-2 AND 5TH-REVERSE FORK ARMS
 3 - 3-4 SYNCHRO SLEEVE

(8) Loosen rear reverse idler shaft bolt (rear bolt) (Fig. 32).

**Fig. 32 Reverse Idler Shaft/Support Bolts**

- 1 - SUPPORT BOLT
 2 - SHAFT BOLT

(9) Remove reverse idler shaft support segment by sliding it straight out of housing.

(10) Support geartrain and rear housing on Assembly Fixture Tool 6747 as follows:

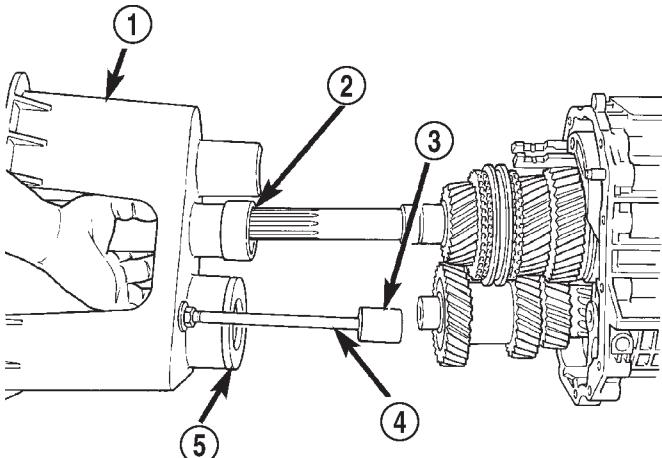
(a) Adjust height of reverse idler pedestal rod until the reverse idle shaft bottoms in Cup 8115.

(b) Position Adapters 6747-1A and 6747-2A on Assembly Fixture 6747.

(c) Slide fixture tool onto input shaft, counter-shaft and idler gear (Fig. 33).

(d) Stand geartrain and rear housing upright on fixture (Fig. 34). Have helper hold fixture tool in

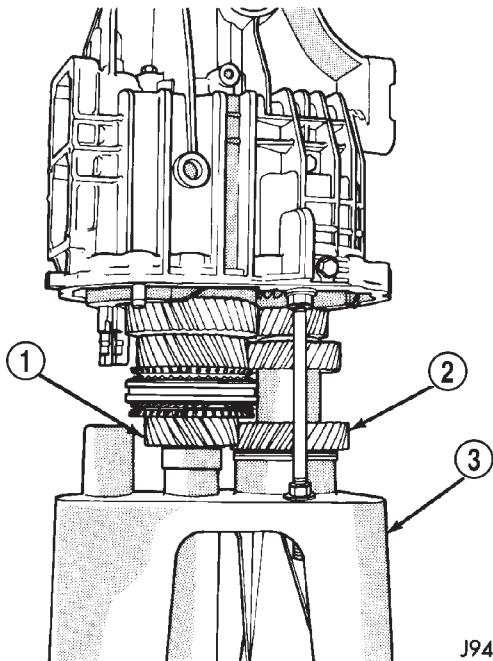
place while housing and geartrain is being rotated into upright position.



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Fig. 33 Installing Assembly Fixture On Geartrain

- 1 - SPECIAL TOOL 6747
 2 - SPECIAL TOOL 6747-1A
 3 - SPECIAL TOOL 8115
 4 - REVERSE IDLER PEDESTAL
 5 - SPECIAL TOOL 6747-2A

**Fig. 34 Geartrain And Housing Mounted On Fixture Tool**

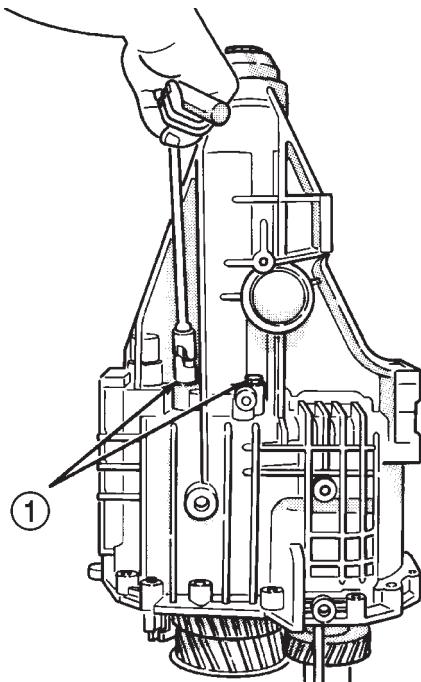
- 1 - INPUT SHAFT
 2 - COUNTERSHAFT
 3 - SPECIAL TOOL 6747

(11) Remove rear bolt holding reverse idler shaft in housing.

DISASSEMBLY AND ASSEMBLY (Continued)

REAR HOUSING REMOVAL—2WD

(1) On 2-wheel drive transmission, remove three bolts that attach output shaft bearing retainer to rear case (Fig. 35). Bolts are rear of shift tower opening.



J9421-50

Fig. 35 Removing/Installing Output Shaft Bearing Retainer Bolts—2WD

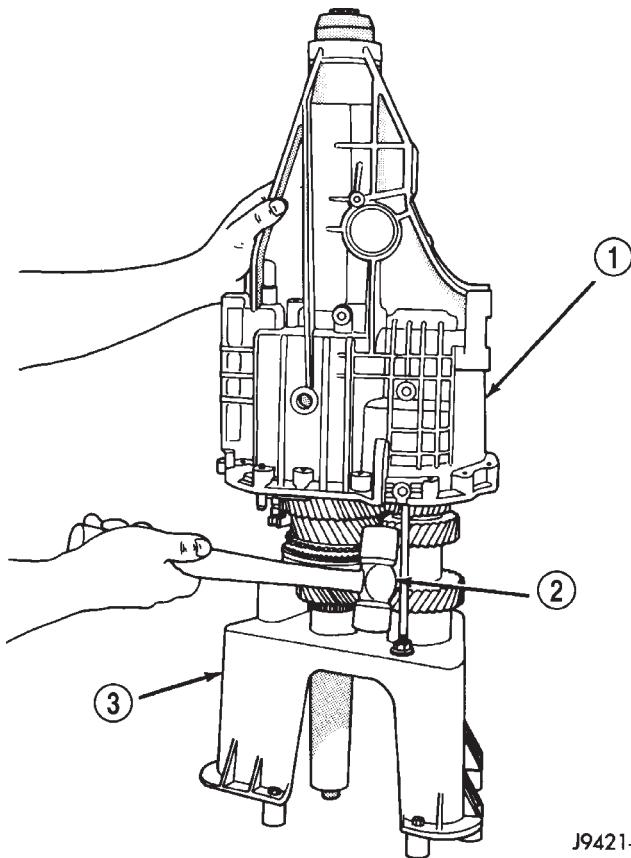
1 – OUTPUT SHAFT BEARING RETAINER BOLTS (THIRD BOLT IS AT OPPOSITE SIDE OF CASE)

(2) Unseat output shaft bearing from bearing bore in rear housing. Use plastic or rawhide mallet to tap rear housing upward and off output shaft bearing as shown (Fig. 36).

(3) Lift rear housing up and off geartrain (Fig. 37).

(4) Remove countershaft rear bearing from countershaft (Fig. 38).

(5) Examine condition of bearing bore and idler shaft notch in rear housing. Replace housing if any of these components are damaged.



J9421-49

Fig. 36 Unseating Rear Housing From Output Shaft Bearing—2WD

1 – REAR HOUSING

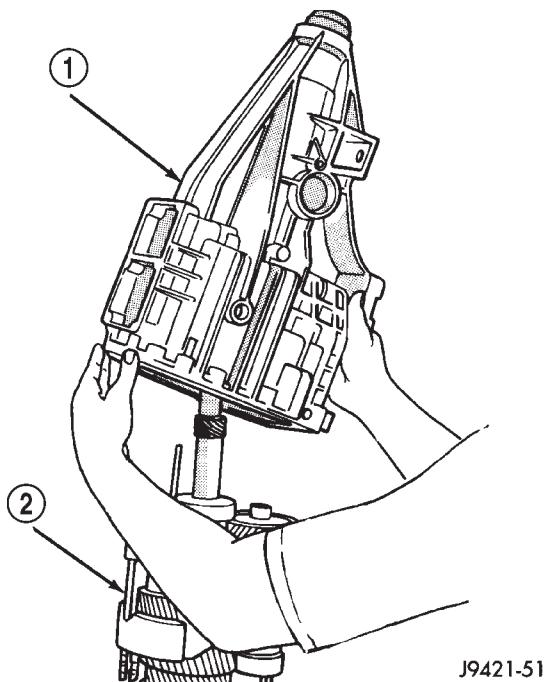
2 – PLASTIC OR RAWHIDE MALLET

3 – FIXTURE TOOL

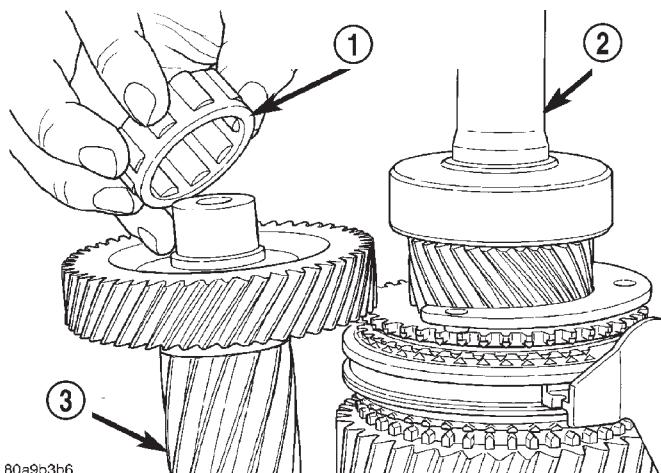
REAR ADAPTER HOUSING REMOVAL—4WD

(1) Locate dimples in face of rear seal (Fig. 39). Use a suitable slide hammer mounted screw to remove seal by inserting screw into seal at dimple locations (Fig. 40).

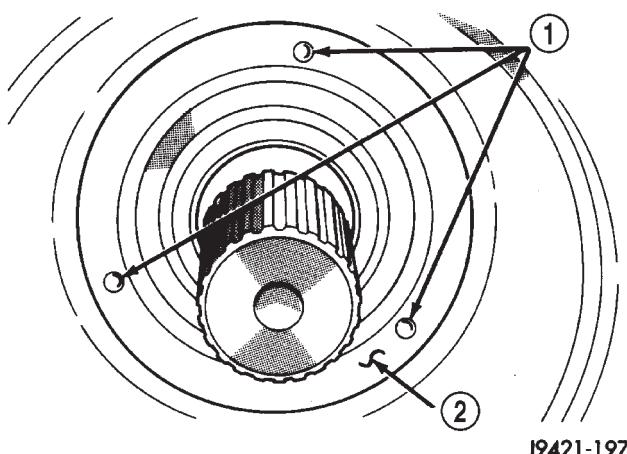
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 37 Rear Housing Removal—2WD**

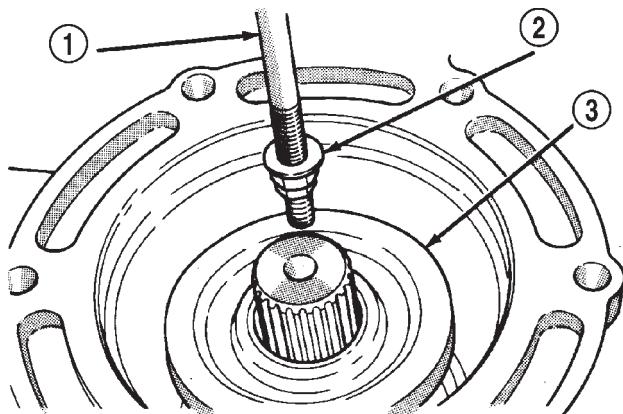
- 1 – REAR HOUSING
2 – SHIFT FORKS AND GEARTRAIN

**Fig. 38 Remove Countershaft Rear Bearing**

- 1 – COUNTERSHAFT REAR BEARING
2 – OUTPUT SHAFT
3 – COUNTER SHAFT

**Fig. 39 Location Of Dimples In Seal Face—4WD**

- 1 – LOCATION OF DIMPLES
2 – SEAL FACE

**Fig. 40 Rear Seal Removal—4WD**

- 1 – SLIDE HAMMER
2 – REMOVER TOOL
3 – REAR SEAL

(2) Remove rear bearing snap ring from output shaft with heavy duty snap ring pliers (Fig. 41).

(3) Lift rear adapter housing upward and off geartrain (Fig. 42).

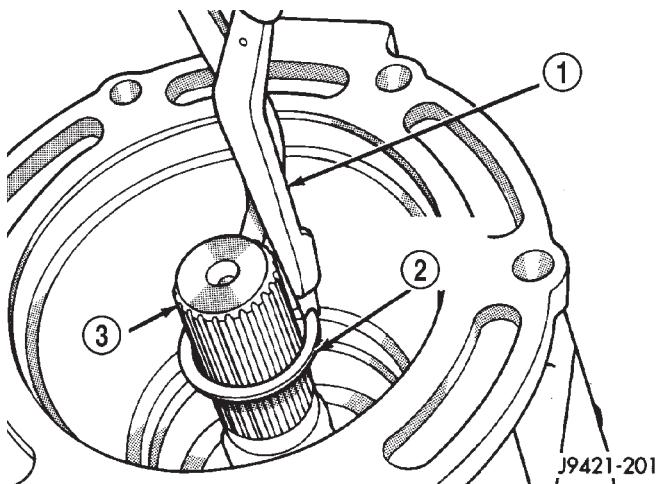


Fig. 41 Rear Bearing Snap Ring Removal—4WD

- 1 – HEAVY DUTY SNAP RING PLIERS
- 2 – REAR BEARING SNAP RING
- 3 – OUTPUT SHAFT

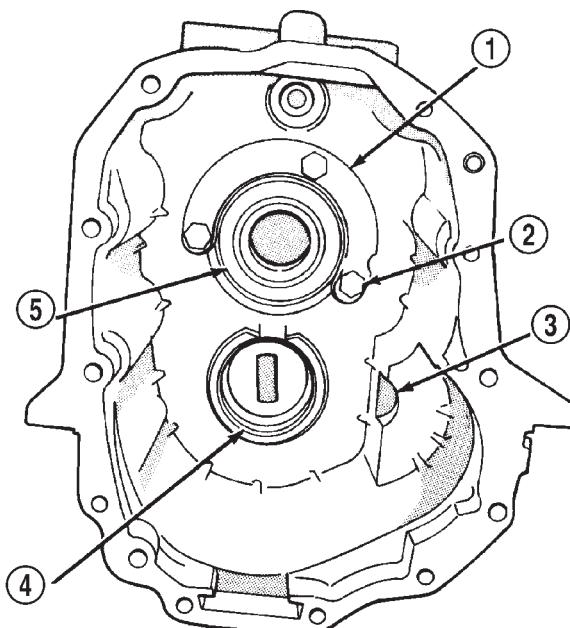


Fig. 43 Rear Adapter Housing Components

- 1 – BEARING RETAINER
- 2 – RETAINER BOLTS (3)
- 3 – IDLER SHAFT NOTCH
- 4 – COUNTERSHAFT REAR BEARING RACE
- 5 – REAR BEARING

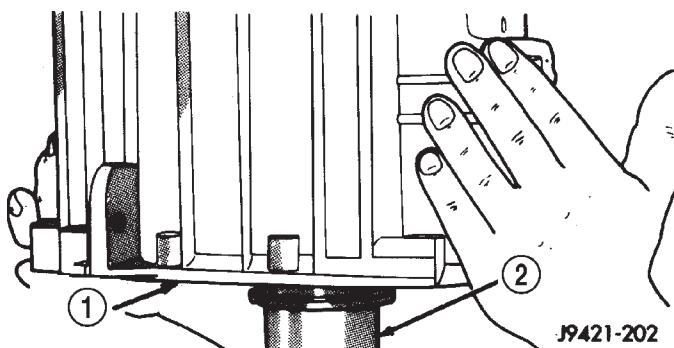


Fig. 42 Rear Adapter Housing Removal

- 1 – REAR ADAPTER HOUSING
- 2 – OUTPUT SHAFT

(4) Remove bearing retainer bolts and remove rear bearing retainer and rear bearing (Fig. 43). Use hammer handle to push or tap bearing out of housing if needed.

(5) Examine condition of bearing bore, countershaft rear bearing race and idler shaft notch in rear housing. Replace housing if race, bore or notch are worn or damaged.

GEARTRAIN DISASSEMBLY FROM FIXTURE

- (1) Remove reverse idler gear assembly from assembly fixture cup.
- (2) Remove 1-2 and fifth-reverse forks from synchro sleeves.
- (3) Slide countershaft out of fixture tool.
- (4) Remove output shaft bearing retainer from rear surface of fifth gear (retainer will drop onto gear after bolts are removed).
- (5) Lift and remove output shaft and gears off input shaft.
- (6) Lift and remove input shaft, pilot bearing and fourth gear synchro ring from assembly fixture tool.

DISASSEMBLY AND ASSEMBLY (Continued)

OUTPUT SHAFT

NOTE: The synchronizer hubs and sleeves are different and must not be intermixed. It is recommended that each synchronizer unit be removed as an assembly to avoid intermixing parts. It is also recommended that each synchro hub and sleeve be marked with a scribe or paint for correct assembly reference.

(1) Remove snap ring that secures 3-4 synchro hub on output shaft.

(2) Remove 3-4 synchro assembly, third gear synchro ring, and third gear with shop press and Remover Tool 1130. Position Tool 1130 between second and third gears.

(3) Remove third gear needle bearing (Fig. 44).

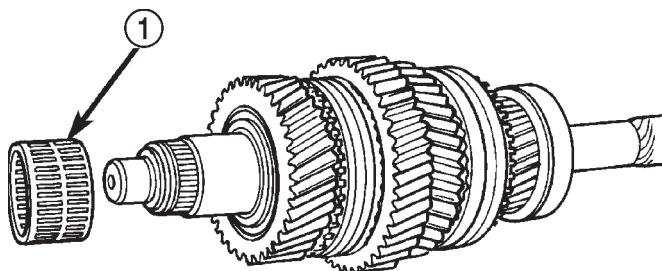


Fig. 44 Third Gear Needle Bearing Removal

1 – THIRD GEAR NEEDLE BEARING

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(4) Remove retaining ring that secures two-piece thrust washer on shaft (Fig. 45). Use small pry tool to remove retaining ring.

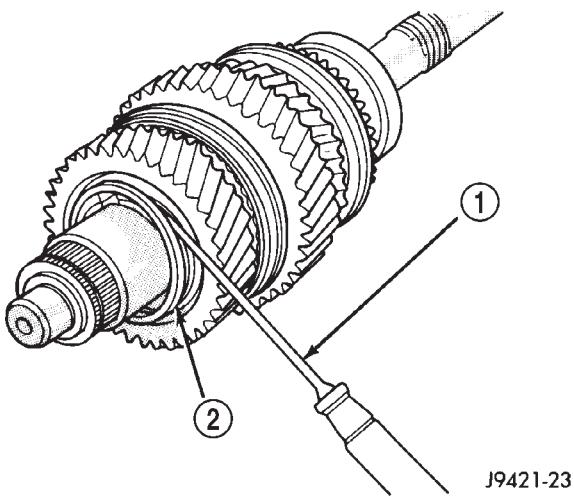
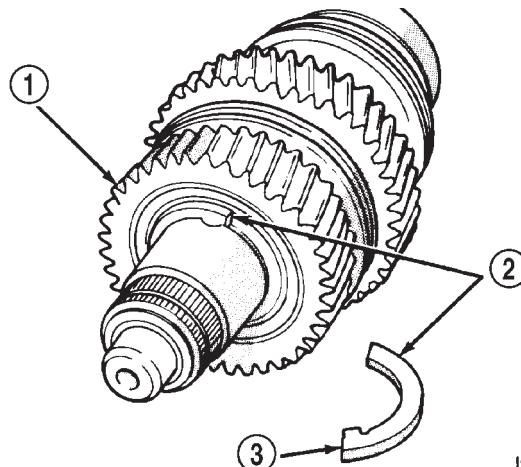


Fig. 45 Thrust Washer Retaining Ring Removal

1 – PRY TOOL

2 – THRUST WASHER RETAINING RING

(5) Remove two-piece thrust washer (Fig. 46). Note position of washer locating lugs in shaft notches for installation reference.



J9421-24

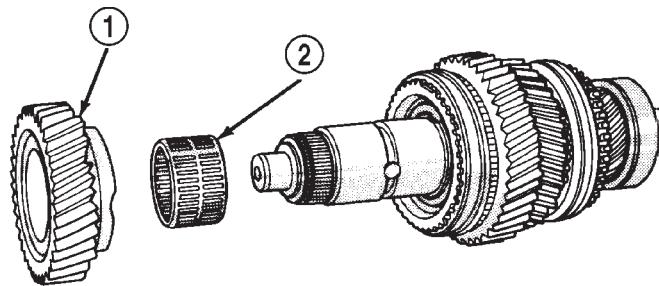
Fig. 46 Two-Piece Thrust Washer Removal

1 – SECOND GEAR

2 – THRUST WASHER (2-PIECE)

3 – WASHER LOCATING LUG

(6) Remove second gear and needle bearing (Fig. 47).



J9421-25

Fig. 47 Second Gear And Needle Bearing Removal

1 – SECOND GEAR

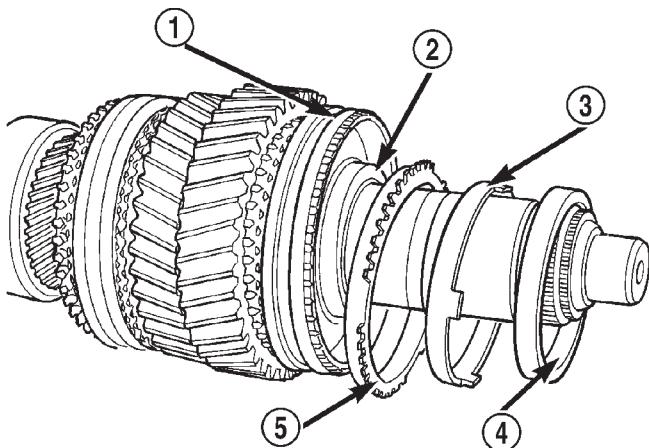
2 – SECOND GEAR NEEDLE BEARING

(7) Remove second gear synchro ring, synchro friction cone, and synchro cone (Fig. 48).

(8) Remove interm ring.

(9) Remove 1-2 synchro hub snap ring.

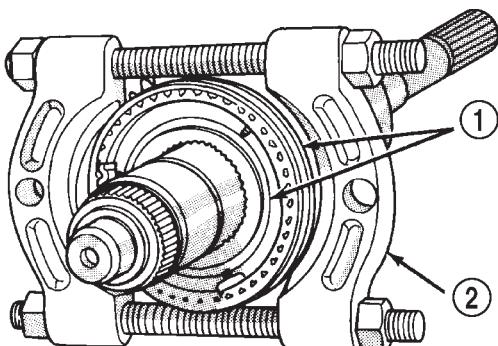
(10) Remove 1-2 synchro hub and sleeve and first gear from output shaft with shop press and Remover Tool 1130 (Fig. 49). Position Tool 1130 between first and reverse gears.



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Fig. 48 Second Gear Synchro Ring And Cones Removal

- 1 – 1-2 SYNCHRO HUB AND SLEEVE
- 2 – INTERM RING
- 3 – SYNCHRO FRICTION CONE
- 4 – SYNCHRO CONE
- 5 – SYNCHRO RING

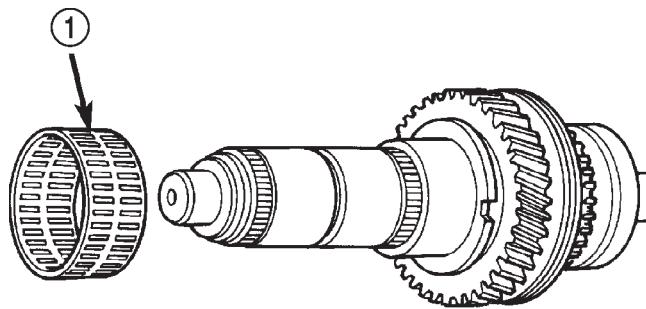


J9421-27

Fig. 49 Hub And Sleeve Removal—1-2 Synchro

- 1 – 1-2 SYNCHRO HUB AND SLEEVE
- 2 – SPECIAL TOOL
1130

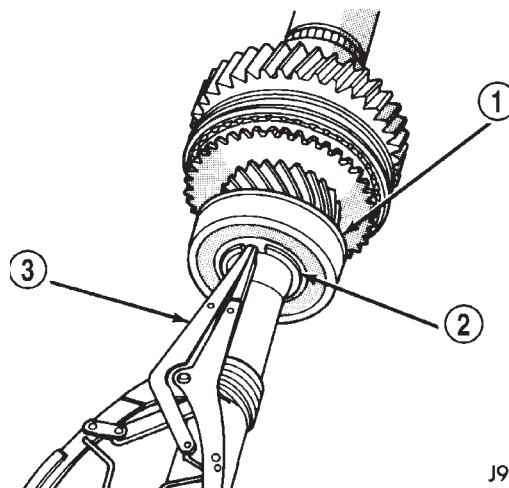
- (11) Remove first gear needle bearing (Fig. 50).
- (12) Remove output shaft bearing snap ring (Fig. 51).
- (13) On 2-wheel drive models, remove output shaft bearing.
- (14) Remove fifth gear (Fig. 52).



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Fig. 50 First Gear Needle Bearing Removal

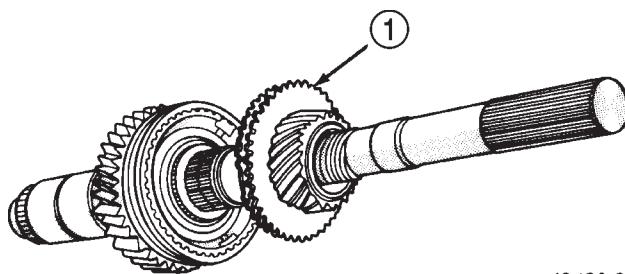
- 1 – FIRST GEAR NEEDLE BEARING



J9421-29

Fig. 51 Output Shaft Bearing Snap Ring Removal

- 1 – OUTPUT SHAFT BEARING
- 2 – BEARING SNAP RING
- 3 – SNAP RING PLIERS



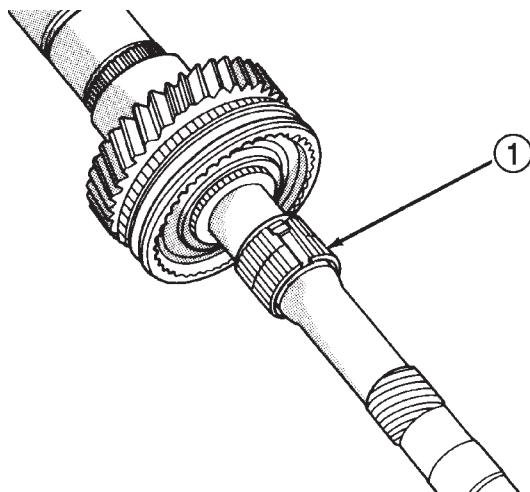
J9421-31

Fig. 52 Fifth Gear Removal

- 1 – FIFTH GEAR AND SYNCHRO RING

DISASSEMBLY AND ASSEMBLY (Continued)

(15) Remove fifth gear needle bearing. Spread bearing apart just enough to clear shoulder on output shaft (Fig. 53).

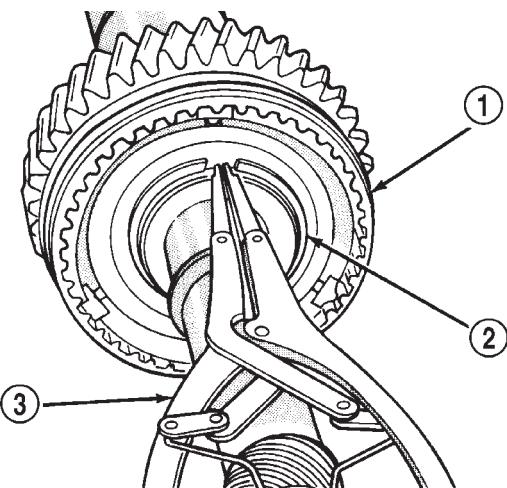


J9421-32

Fig. 53 Fifth Gear Needle Bearing Removal

- 1 – FIFTH GEAR NEEDLE BEARING (SPREAD BEARING TO CLEAR SHOULDER ON SHAFT)

(16) Remove fifth-reverse synchro hub snap ring (Fig. 54).

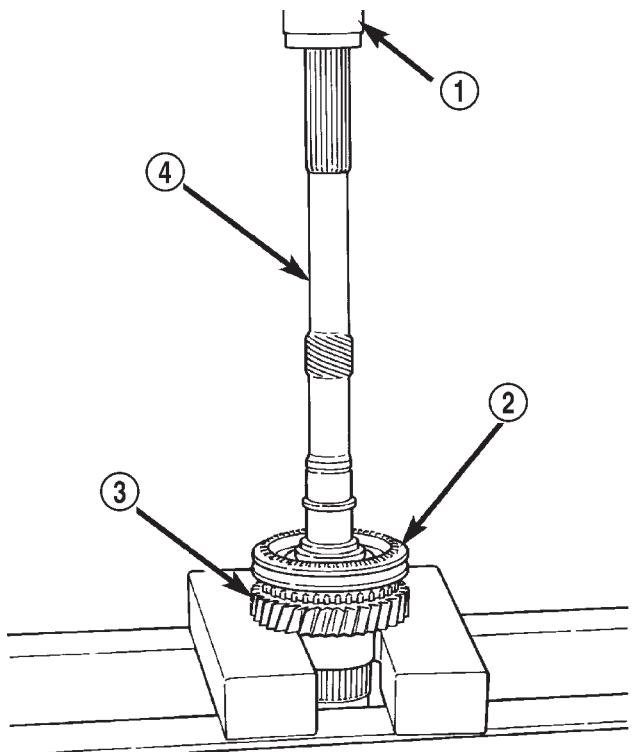


J9421-33

Fig. 54 Fifth-Reverse Synchro Hub Snap Ring Removal

- 1 – FIFTH-REVERSE SYNCHRO HUB AND SLEEVE
2 – SYNCHRO HUB SNAP RING
3 – SNAP RING PLIERS

(17) Remove fifth-reverse synchro hub and sleeve with shop press (Fig. 55).

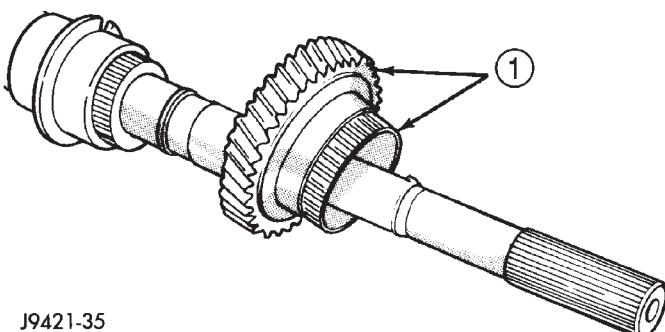


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Fig. 55 Fifth-Reverse Synchro Hub And Sleeve Removal

- 1 – PRESS
2 – FIFTH-REVERSE SYNCHRO HUB AND SLEEVE
3 – REVERSE GEAR
4 – OUTPUT SHAFT

(18) Remove reverse gear and needle bearing (Fig. 56).

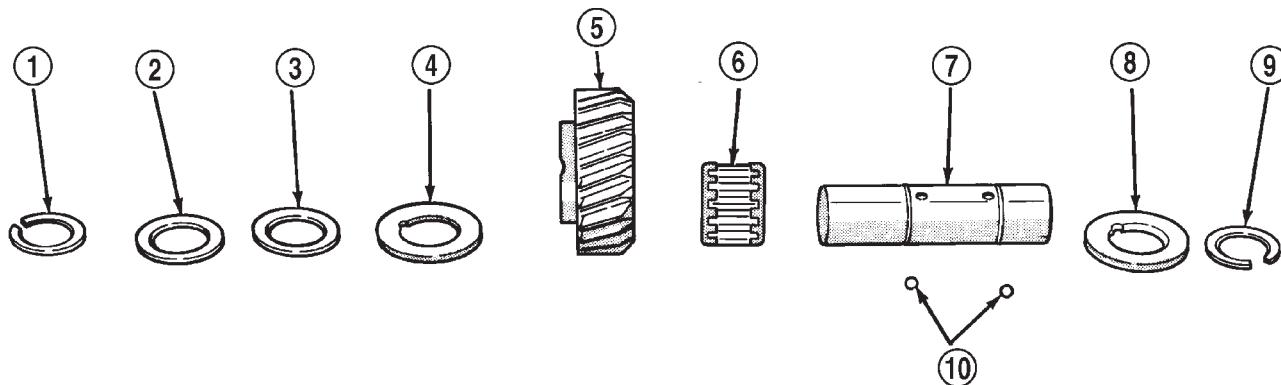


J9421-35

Fig. 56 Reverse Gear And Needle Bearing Removal

- 1 – REVERSE GEAR AND NEEDLE BEARING

DISASSEMBLY AND ASSEMBLY (Continued)



J9421-53

Fig. 57 Reverse Idler Components

- 1 – SNAP RING
2 – FLAT WASHER
3 – WAVE WASHER
4 – THRUST WASHER
5 – REVERSE IDLER GEAR

- 6 – IDLER GEAR BEARING
7 – IDLER SHAFT
8 – THRUST WASHER
9 – SNAP RING
10 – THRUST WASHER LOCK BALLS

REVERSE IDLER DISASSEMBLY

- (1) Remove idler gear snap rings (Fig. 57).
- (2) Remove thrust washer, wave washer, thrust plate and idler gear from shaft.
- (3) Remove idler gear needle bearing from shaft.

ASSEMBLY

Gaskets are not used in the NV3550 transmission. Sealers are used at all case joints. Recommended sealers are Mopar® Gasket Maker for all case joints and Mopar® silicone sealer, or equivalent, for the input shaft bearing retainer. Apply these products as indicated in the assembly procedures.

NOTE: It is very important that the transmission shift components be in Neutral position during assembly. This is necessary to prevent damaging synchro and shift components when the housings are installed.

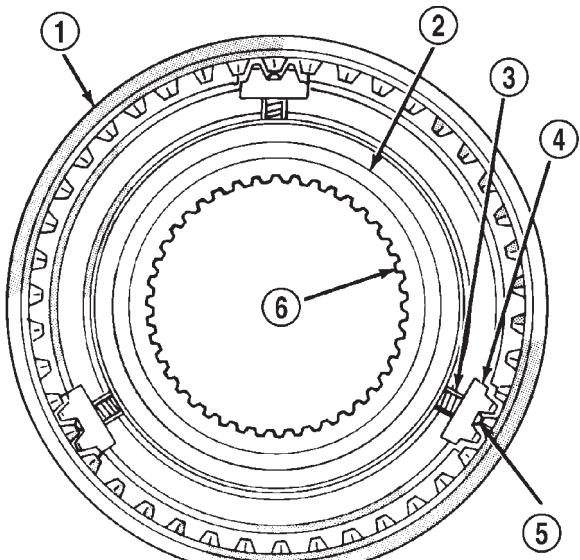
The 3-4, 1-2 and fifth-reverse synchro hub snap rings can be fitted selectively. New snap rings are available in 0.05 mm (0.0019 in.) thickness increments. Use the thickest snap ring that will fit in each snap ring groove.

SYNCHRONIZER

The easiest method of assembling each synchro is to install the springs, struts and detent balls one at a time as follows:

- (1) Slide the sleeve part way onto the hub. Leave enough room to install the spring in the hub and the strut in the hub groove.
- (2) Install the first spring in the hub. Then install a strut over the spring. Be sure the spring is seated in the spring bore in the strut.
- (3) Slide the sleeve onto the hub just far enough to hold the first strut and spring in place.
- (4) Place the detent ball in the top of the strut. Then carefully work the sleeve over the ball to hold it in place. A small flat blade screwdriver can be used to press the ball into place while moving the sleeve over it.
- (5) Repeat the procedure for the remaining springs, struts and balls. Tape, or a rubber band can be used to temporarily secure each strut and ball as they are installed.
- (6) Verify synchro assembly. Be sure the three springs, struts and detent balls are all in place (Fig. 58).

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 58 Assembled View Of Synchro Components**

- 1 – SLEEVE
- 2 – HUB SHOULDER
- 3 – SPRING (3)
- 4 – STRUT (3)
- 5 – DETENT BALL (3)
- 6 – HUB

OUTPUT SHAFT

(1) Lubricate shaft, gears and bearings with recommended lubricant during assembly. Petroleum jelly can be used to hold parts in place.

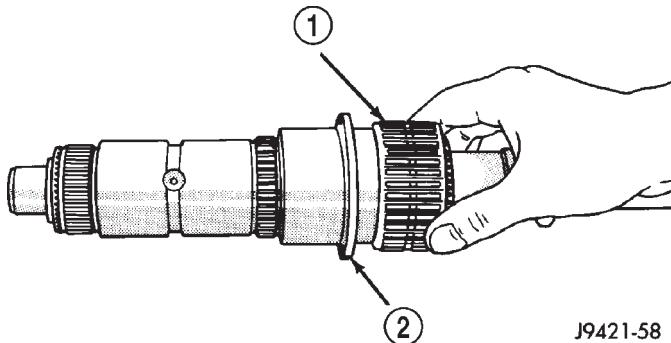
(2) Check bearing surfaces of output shaft for nicks or scratches. Smooth surfaces with 320/400 grit emery cloth if necessary. Apply oil to emery cloth and shaft surface before polishing.

(3) Inspect and replace any synchro ring that exhibits wear or damage. Completely immerse each synchro ring in lubricant before installation.

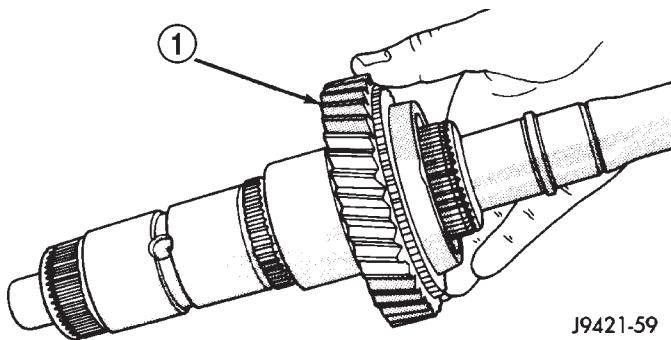
(4) Lubricate and install reverse gear needle bearing on shaft (Fig. 59). Slide bearing up against shoulder on output shaft.

(5) Install reverse gear over needle bearing (Fig. 60).

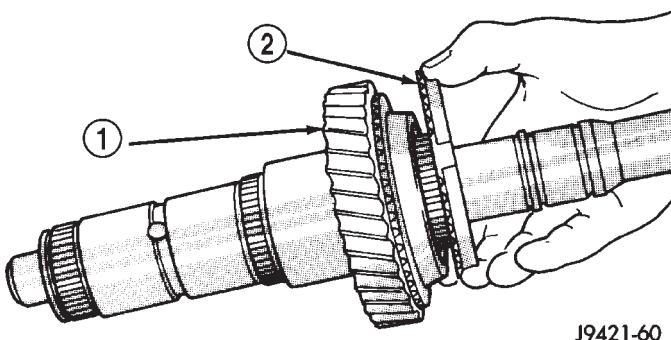
(6) Install solid brass synchro ring on reverse gear (Fig. 61).

**Fig. 59 Reverse Gear Bearing Installation**

- 1 – REVERSE GEAR BEARING
- 2 – SHOULDER

**Fig. 60 Reverse Gear Installation**

- 1 – REVERSE GEAR

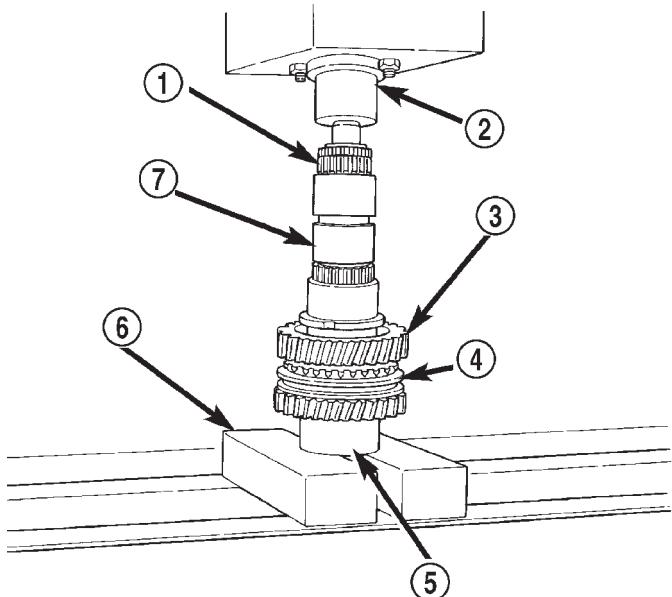
**Fig. 61 Reverse Gear Synchro Ring Installation**

- 1 – REVERSE GEAR
- 2 – SYNCHRO RING (SOLID BRASS)

(7) Assemble fifth-reverse synchro hub, sleeve, struts, springs and detent balls, if not previously done.

CAUTION: The fifth-reverse synchro hub and sleeve can be installed backwards if care is not exercised. One side of the hub has shoulders around the hub bore. Make sure this side of the hub is facing the front of the shaft. In addition, one side of the sleeve is tapered. Be sure the sleeve is installed so the tapered side will be facing the front of the shaft.

(8) Start fifth-reverse synchro assembly on output shaft splines by hand. Then seat synchro onto shaft with shop press and Remover 6310-1 (Fig. 62).



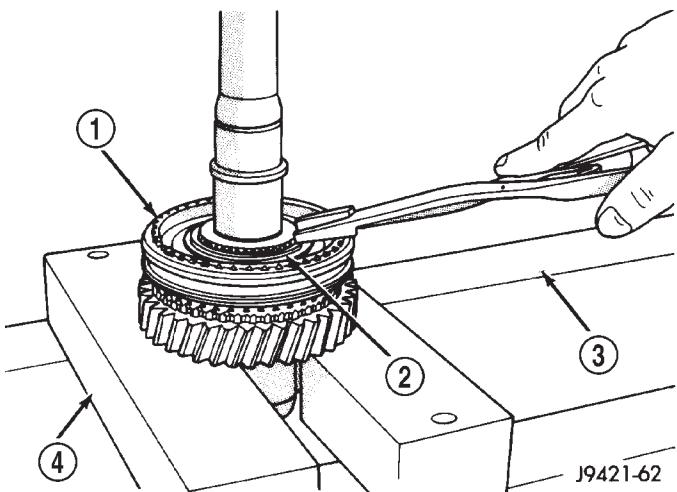
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Fig. 62 Fifth-Reverse Synchro Assembly Installation

- 1 – SPACER
- 2 – PRESS RAM
- 3 – REVERSE GEAR
- 4 – FIFTH-REVERSE SYNCHRO ASSEMBLY
- 5 – SPECIAL TOOL
6310-1
- 6 – PRESS BLOCKS
- 7 – OUTPUT SHAFT

(9) Install new fifth-reverse hub snap ring (Fig. 63) as follows:

- Snap rings are available in thicknesses from 2.00 mm to 2.20 mm (0.078 to 0.086 in.).
- Install thickest snap ring that will fit in shaft groove.
- Verify that snap ring is completely seated in groove before proceeding.

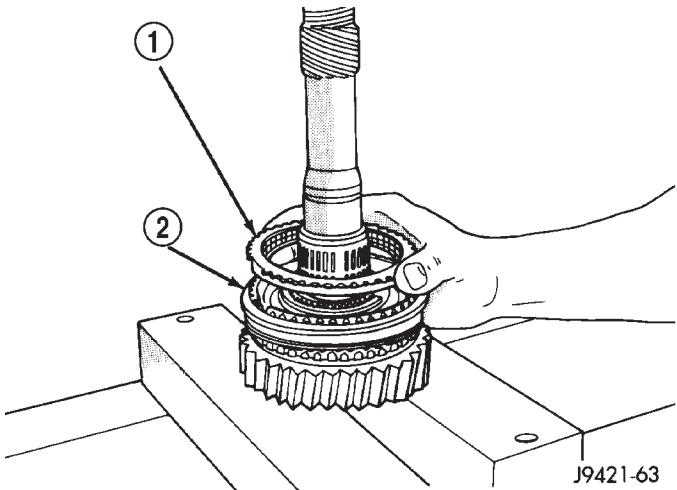


J9421-62

Fig. 63 Installing Fifth-Reverse Synchro Hub Snap Ring

- 1 – FIFTH-REVERSE SYNCHRO ASSEMBLY
- 2 – SNAP RING
- 3 – PRESS BED
- 4 – PRESS BLOCKS

(10) Install fifth gear synchro ring in synchro hub and sleeve (Fig. 64).



J9421-63

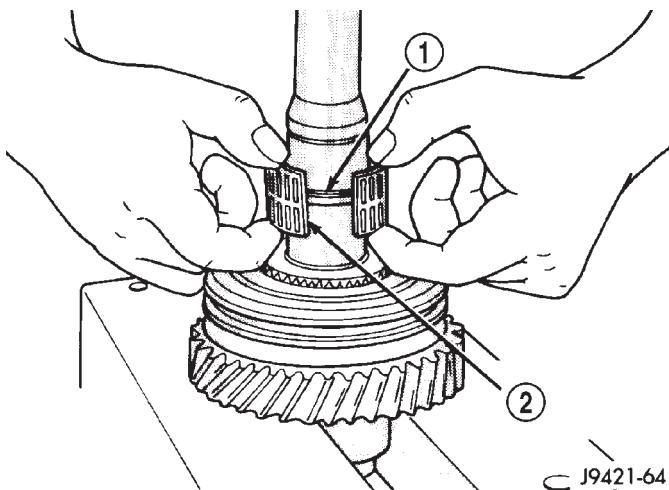
Fig. 64 Installing Fifth Gear Synchro Ring

- 1 – FIFTH-SPEED SYNCHRO RING
- 2 – FIFTH-REVERSE SYNCHRO ASSEMBLY

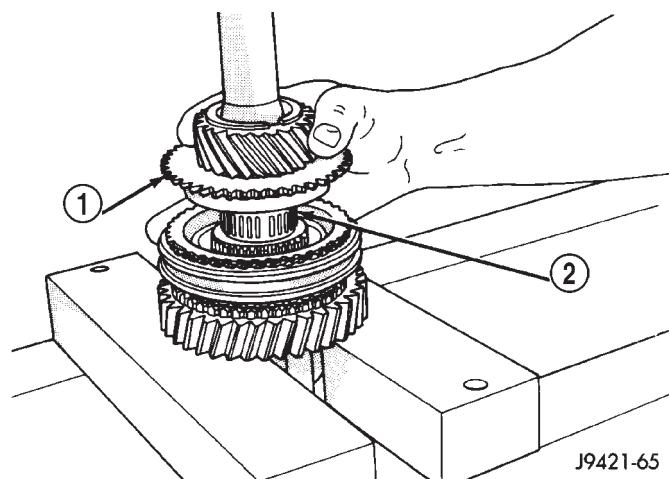
(11) Install fifth gear bearing. Spread bearing only enough to clear shoulder on output shaft (Fig. 65). Be sure bearing is properly seated after installation.

(12) Install fifth gear on shaft and onto bearing (Fig. 66).

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 65 Installing Fifth Gear Bearing**

- 1 – SHAFT SHOULDER
2 – FIFTH GEAR BEARING

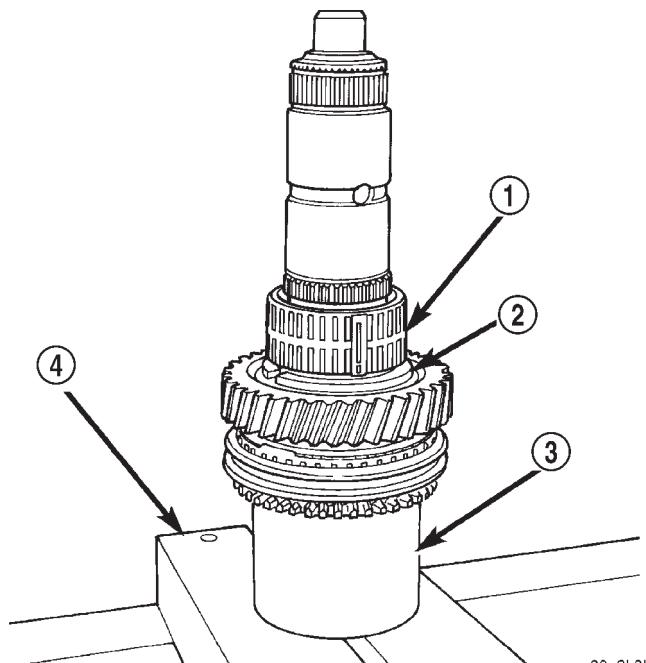
**Fig. 66 Fifth Gear Installation**

- 1 – FIFTH GEAR
2 – BEARING

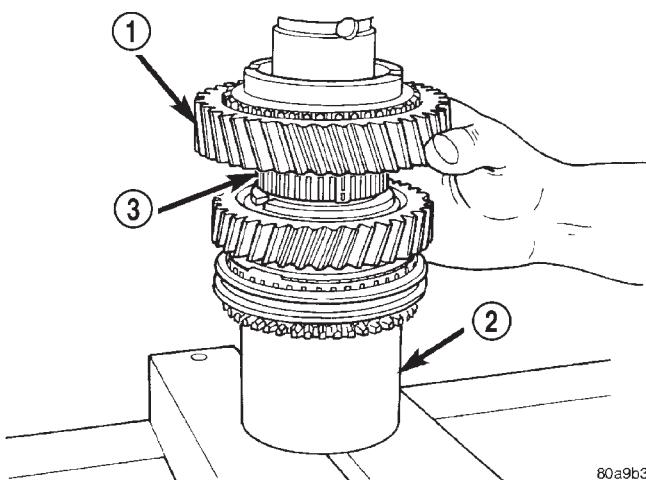
(13) Invert output shaft and set the shaft in Remover 6310-1 so that fifth gear is seated on the tool (Fig. 67).

(14) Install first gear bearing on output shaft (Fig. 67). Be sure bearing is seated on shaft shoulder and is properly joined.

(15) Install first gear on shaft and over bearing (Fig. 68). Make sure bearing synchro cone is facing up as shown.

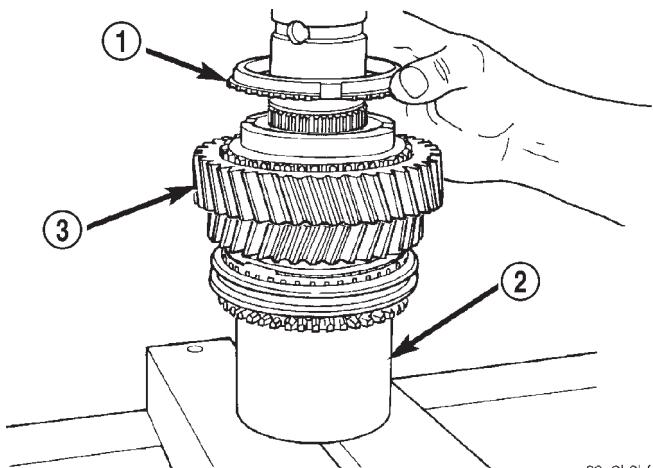
**Fig. 67 First Gear Bearing Installation**

- 1 – FIRST GEAR BEARING
2 – SHAFT SHOULDER
3 – SPECIAL TOOL
6310-1
4 – PRESS BLOCKS

**Fig. 68 First Gear Installation**

- 1 – FIRST GEAR
2 – SPECIAL TOOL
6310-1
3 – BEARING

(16) Install first gear synchro ring (Fig. 69).



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Fig. 69 First Gear Synchro Ring Installation

1 – FIRST GEAR SYNCHRO RING

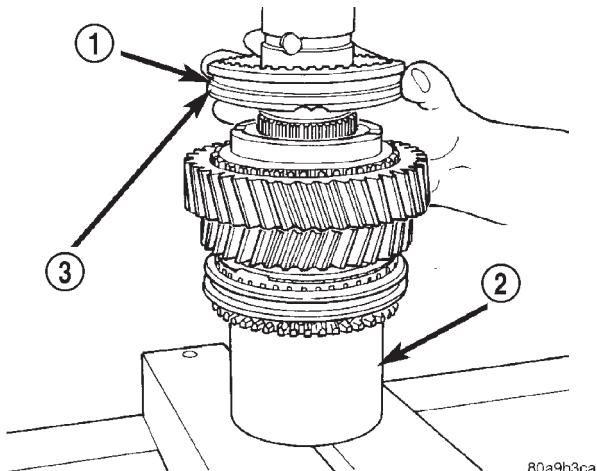
2 – SPECIAL TOOL 6310-1

3 – FIRST GEAR

(17) Assemble 1-2 synchro hub sleeve, springs, struts and detent balls.

CAUTION: The 1-2 synchro hub and sleeve can be installed backwards if care is not exercised. One side of the synchro sleeve is marked First Gear Side. Be sure this side of the sleeve will face first gear after installation.

(18) Start 1-2 synchro assembly on shaft by hand (Fig. 70). Be sure synchro sleeve is properly positioned. Side marked first side must be facing first gear.



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Fig. 70 Starting 1-2 Synchro On Shaft

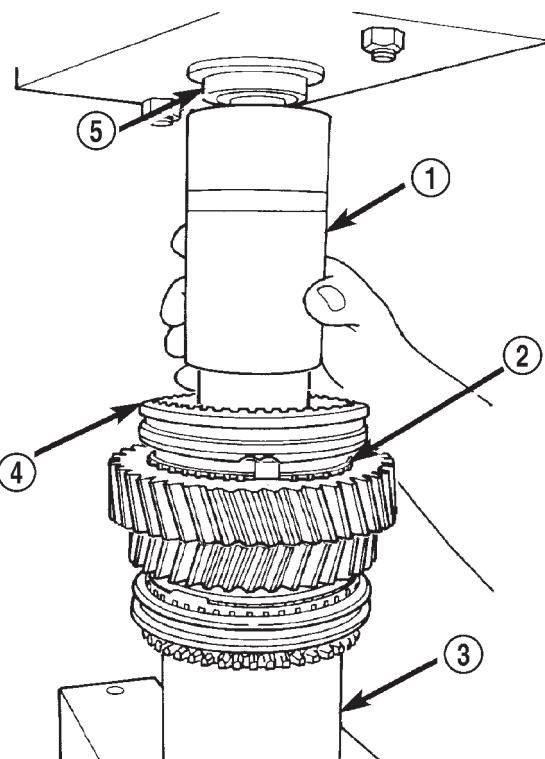
1 – 1-2 SYNCHRO ASSEMBLY

2 – SPECIAL TOOL 6310-1

3 – BE SURE THIS IS "FIRST GEAR SIDE" OF SYNCHRO SLEEVE

(19) Press 1-2 synchro onto output shaft using suitable size pipe tool and shop press (Fig. 71).

CAUTION: Take time to align the synchro ring and sleeve as hub the is being pressed onto the shaft. The synchro ring can be cracked if it becomes misaligned.



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Fig. 71 Pressing 1-2 Synchro Assembly Onto Output Shaft

1 – SUITABLE SIZE PIPE TOOL

2 – SYNCHRO RING

3 – SPECIAL TOOL

6310-1

4 – 1-2 SYNCHRO ASSEMBLY

5 – PRESS RAM

(20) Install interm ring.

(21) Install new 1-2 synchro hub snap ring (Fig. 72) as follows:

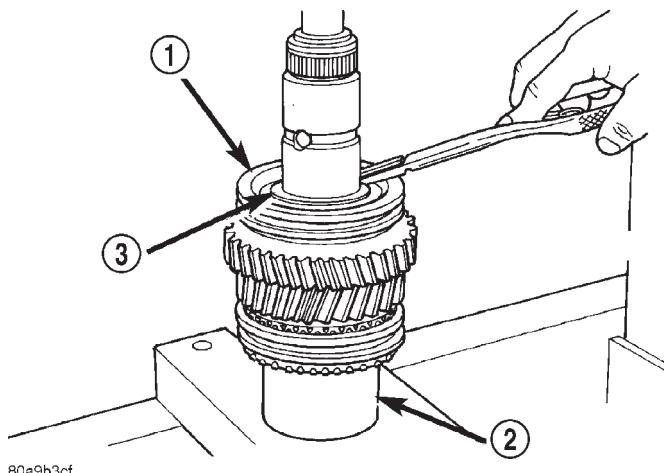
(a) Snap rings are available in thicknesses from 1.80 mm to 2.00 mm (0.070 to 0.078 in.).

(b) Install thickest snap ring that will fit in shaft groove.

(c) Verify that snap ring is completely seated in groove before proceeding.

(22) Install second gear synchro ring in 1-2 synchro hub and sleeve (Fig. 73). Be sure synchro ring is properly seated in sleeve.

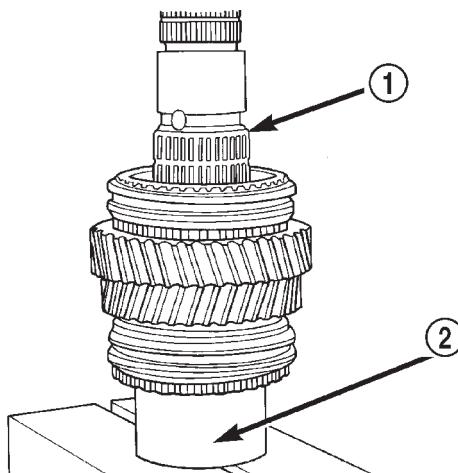
DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 72 Installing 1-2 Synchro Hub Snap Ring

- 1 – 1-2 SYNCHRO
- 2 – SPECIAL TOOL
6310-1
- 3 – SYNCHRO SNAP RING

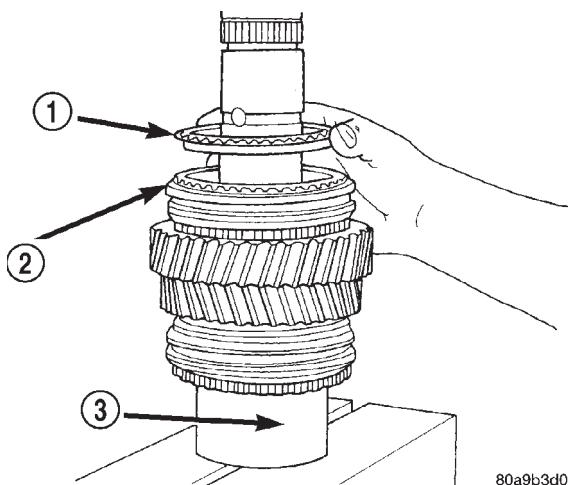


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Fig. 74 Second Gear Bearing Installation

- 1 – SECOND GEAR BEARING
- 2 – SPECIAL TOOL
6310-1

(23) Install synchro friction cone and synchro cone in synchro ring.

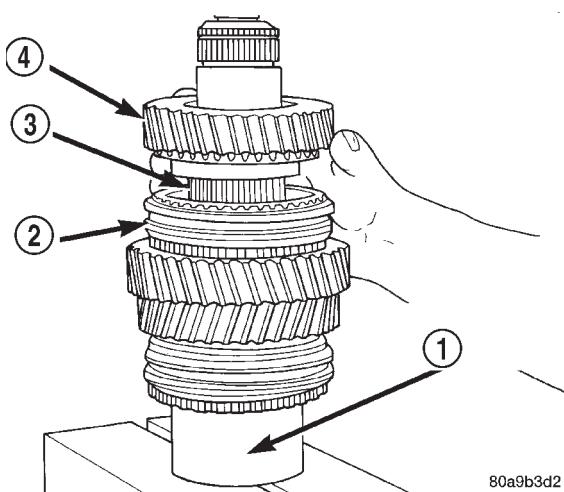


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Fig. 73 Second Gear Synchro Ring Installation

- 1 – SECOND GEAR SYNCHRO RING
- 2 – 1-2 SYNCHRO
- 3 – SPECIAL TOOL
6310-1

(24) Install second gear needle bearing on shaft (Fig. 74).

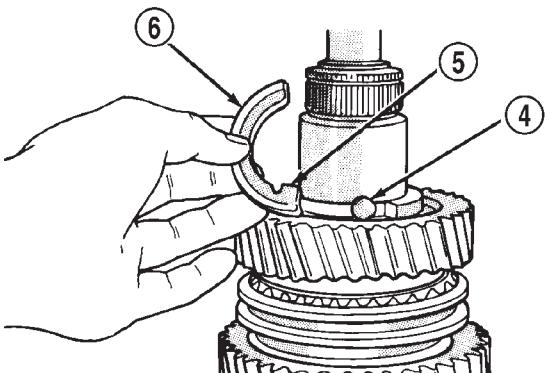
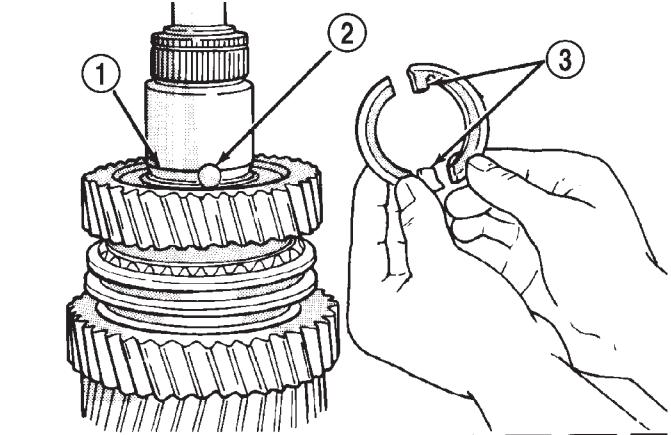


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Fig. 75 Second Gear Installation

- 1 – SPECIAL TOOL
6310-1
- 2 – 1-2 SYNCHRO ASSEMBLY
- 3 – BEARING
- 4 – SECOND GEAR

(26) Install two-piece thrust washer (Fig. 76). Be sure washer halves are seated in shaft groove and that washer lugs are seated in shaft lug bores. Also, ensure that the i.d. grooves and markings noted during removal are facing the correct direction.



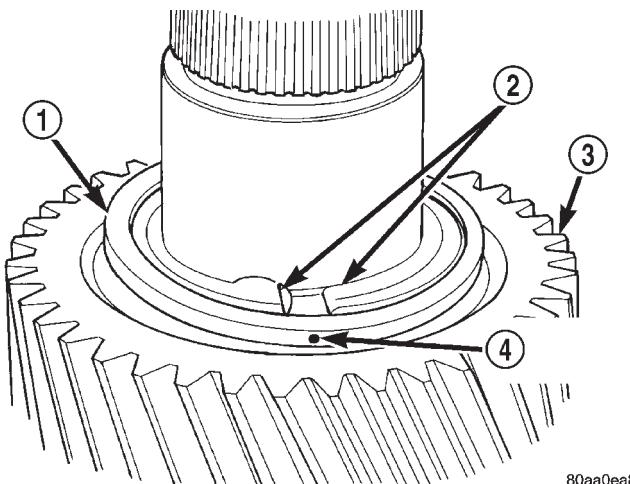
J9421-77

Fig. 76 Installing Two-Piece Thrust Washer

- 1 – WASHER GROOVE IN SHAFT
- 2 – LUG BORE
- 3 – THRUST WASHER LUGS
- 4 – LUG BORE
- 5 – LUG
- 6 – WASHER HALF

(27) Start retaining ring around two-piece thrust washer (Fig. 77). Make sure that the locating dimple is between the thrust washer halves.

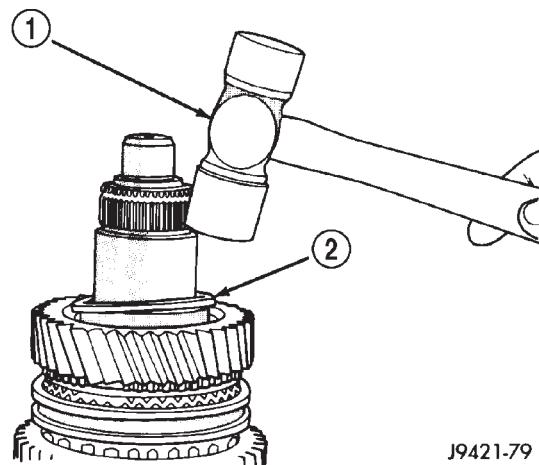
(28) Seat thrust washer retaining ring with plastic mallet (Fig. 78).



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Fig. 77 Starting Retaining Ring Over Two-Piece Thrust Washer

- 1 – THRUST WASHER RETAINING RING
- 2 – THRUST WASHER HALVES
- 3 – SECOND GEAR
- 4 – LOCATING DIMPLE



J9421-79

Fig. 78 Seating Thrust Washer Retaining Ring

- 1 – PLASTIC MALLETS
- 2 – THRUST WASHER RETAINING RING

DISASSEMBLY AND ASSEMBLY (Continued)

- (29) Install third gear needle bearing on shaft (Fig. 79).

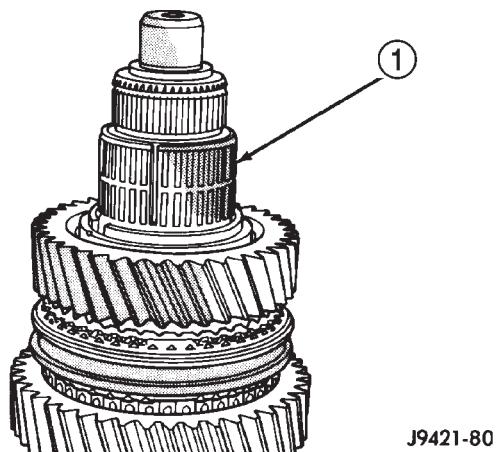


Fig. 79 Third Gear Bearing Installation

1 – THIRD GEAR BEARING

- (30) Install third gear on shaft and bearing (Fig. 80).

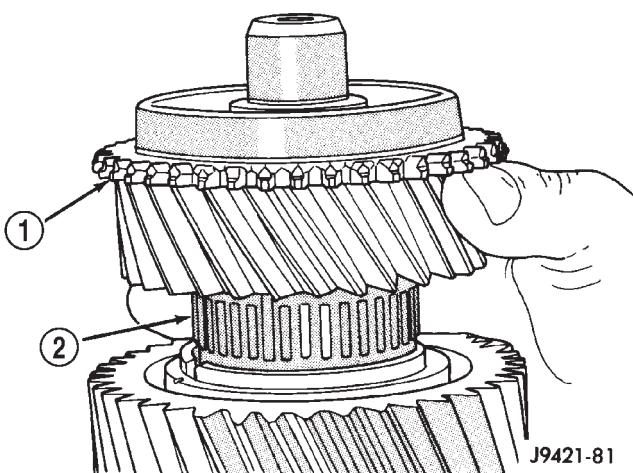


Fig. 80 Installing Third Gear

1 – THIRD GEAR
2 – BEARING

- (31) Install third speed synchro ring on third gear (Fig. 81).

- (32) Assemble 3-4 synchro hub, sleeve, springs, struts and detent balls.

CAUTION: The 3-4 synchro hub and sleeve can be installed backwards if care is not exercised. One side of the sleeve has grooves in it. Be sure this side of sleeve is also facing the front of the shaft.

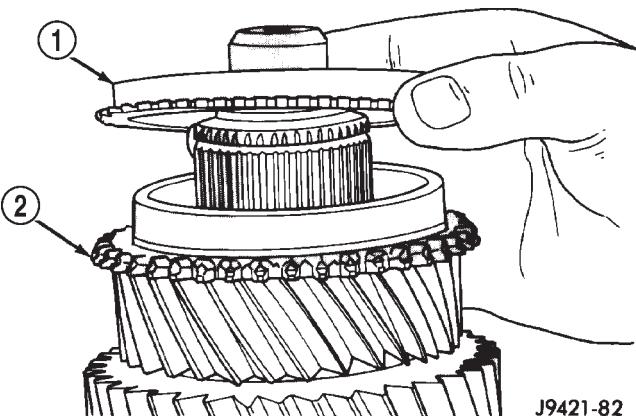


Fig. 81 Third Speed Synchro Ring Installation

1 – THIRD SPEED SYNCHRO RING
2 – THIRD GEAR

- (33) Start 3-4 synchro hub on output shaft splines by hand (Fig. 82).

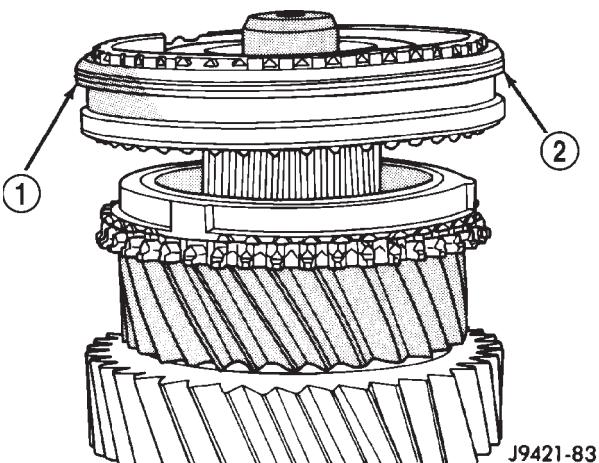


Fig. 82 Starting 3-4 Synchro Hub On Output Shaft

1 – GROOVED SIDE OF SLEEVE (TO FRONT)
2 – 3-4 SYNCHRO ASSEMBLY

- (34) Press 3-4 synchro assembly onto output shaft with shop press and suitable size pipe tool (Fig. 83). Make sure that the tool presses on hub as close to output shaft as possible but does not contact the shaft splines.

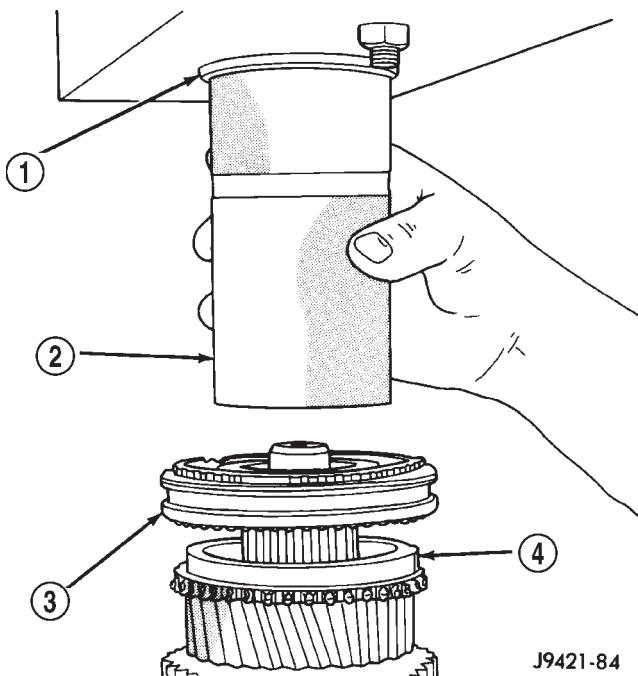


Fig. 83 Pressing 3-4 Synchro Assembly On Output Shaft

- 1 – PRESS RAM
- 2 – PIPE TOOL
- 3 – 3-4 SYNCHRO
- 4 – THIRD SPEED SYNCHRO RING

(35) Install 3-4 synchro hub snap ring (Fig. 84) as follows:

- Snap rings are available in thicknesses from 2.00 mm to 2.30 mm (0.078 to 0.090 in.).
- Install thickest snap ring that will fit in shaft groove. Use heavy duty snap ring pliers to install new ring.
- Verify that snap ring is completely seated in groove before proceeding.

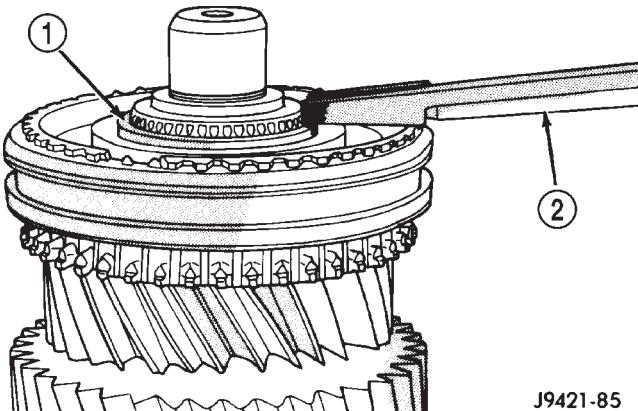


Fig. 84 Installing 3-4 Synchro Hub Snap Ring

- 1 – 3-4 SYNCHRO HUB SNAP RING
- 2 – HEAVY DUTY SNAP RING PLIERS

(36) Install output shaft bearing.

(37) Install output shaft bearing snap ring (Fig. 85). Use heavy duty snap ring pliers and spread snap ring only enough to install it. Be sure snap ring is completely seated in shaft groove before proceeding.

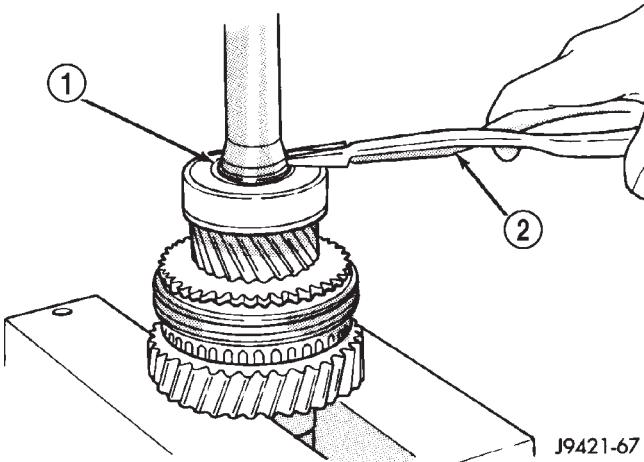


Fig. 85 Installing Output Shaft Bearing Snap Ring

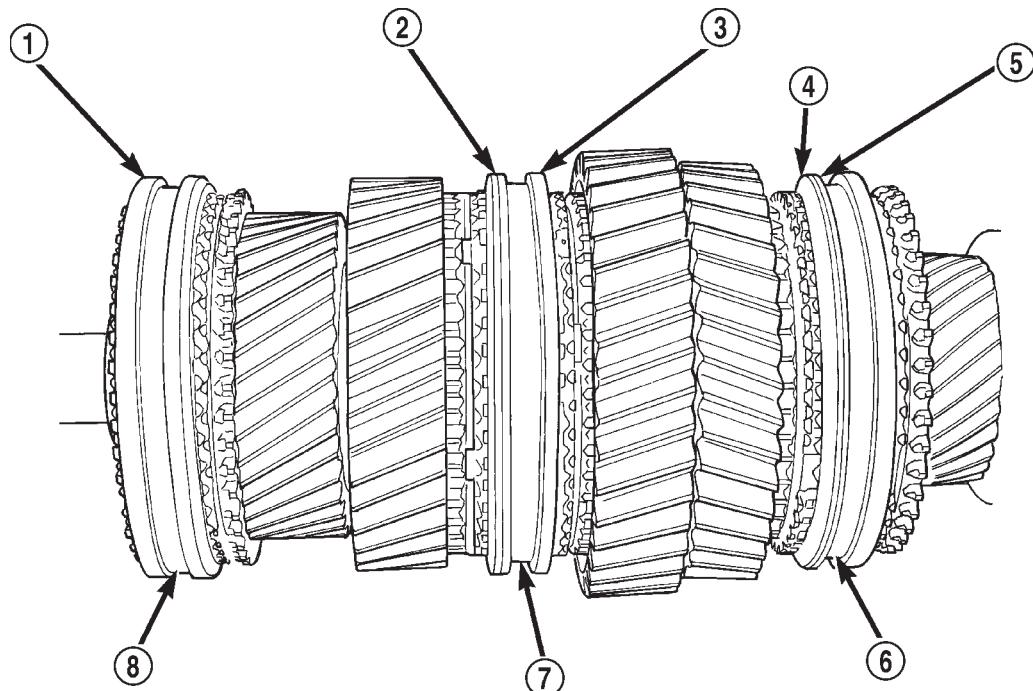
- 1 – BEARING SNAP RING
- 2 – HEAVY DUTY SNAP RING PLIERS

(38) Verify correct position of synchro sleeves before proceeding with assembly operations (Fig. 86). Grooved side of 3-4 sleeve should be facing forward. First gear side of 1-2 sleeve should be facing first gear. Tapered side of fifth-reverse sleeve should be facing forward.

REVERSE IDLER ASSEMBLY

- Lubricate idler components with gear lube.
- Slide idler gear bearing on shaft (Fig. 87). Bearing fits either way on shaft.
- Slide gear onto shaft. Side of gear with recess goes to rear (Fig. 87).
- Place first lock ball in dimple at rear end of idler shaft (Fig. 87). Petroleum jelly can be used to hold ball in place if desired.
- Slide thrust rear thrust washer onto shaft and over lock ball (Fig. 88).
- Install snap ring in groove at rear of shaft (Fig. 88).
- Install lock ball in dimple at front of shaft. Hold ball in place with petroleum jelly if desired.

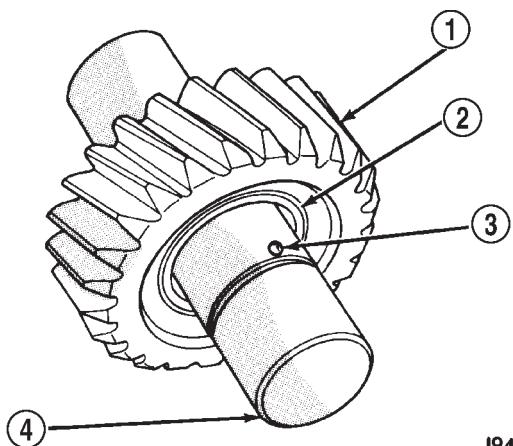
DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 86 Correct Synchro Sleeve Position

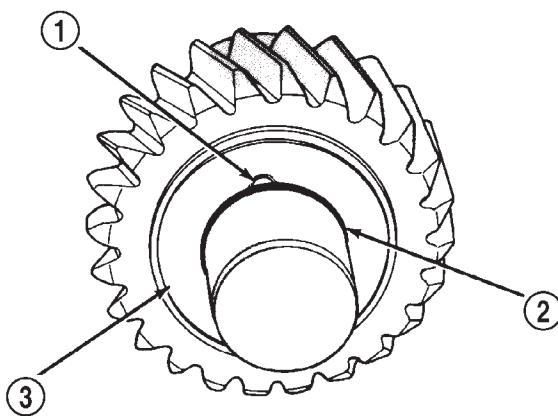
- | | |
|---|----------------------------|
| 1 – DOUBLE GROOVE FORWARD | 5 – GROOVE FORWARD |
| 2 – GROOVE FORWARD | 6 – 5TH-REV SYNCHRO SLEEVE |
| 3 – FIRST GEAR SIDE MARKING TOWARD FIRST GEAR | 7 – 1-2 SYNCHRO SLEEVE |
| 4 – TAPER FORWARD | 8 – 3-4 SYNCHRO SLEEVE |



J9421-87

Fig. 87 Idler Gear And Bearing Installation

- 1 – IDLER GEAR
- 2 – BEARING
- 3 – LOCK BALL
- 4 – REAR OF SHAFT



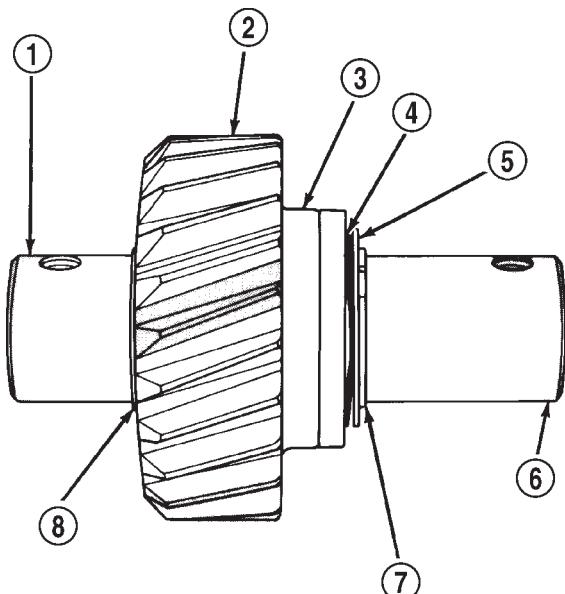
J9421-89

Fig. 88 Idler Gear Rear Thrust Washer Installation

- 1 – LOCK BALL
- 2 – SNAP RING GROOVE
- 3 – THRUST WASHER

(8) Install front thrust washer on shaft and slide washer up against gear and over lock ball (Fig. 89).

(9) Install wave washer, flat washer and remaining snap ring on idler shaft (Fig. 89). Be sure snap ring is fully seated.



J9421-90

Fig. 89 Idler Gear And Shaft Assembly

- 1 - REAR OF SHAFT
- 2 - GEAR
- 3 - THRUST WASHER AND BALL
- 4 - WAVE WASHER
- 5 - FLAT WASHER
- 6 - FRONT OF SHAFT
- 7 - SNAP RING
- 8 - SNAP RING

SHIFT SHAFT AND DETENT PLUNGER BUSHINGS/BEARINGS

- (1) Inspect shift shaft bushing and bearing for damage.
- (2) If necessary, the shift shaft bushing can be replaced as follows:
 - (a) Locate a bolt that will thread into the bushing without great effort.
 - (b) Thread the bolt into the bushing, allowing the bolt to make its own threads in the bushing.
 - (c) Attach a slide hammer or suitable puller to the bolt and remove bushing.
 - (d) Use the short end of Installer 8119 to install the new bushing.
 - (e) The bushing is correctly installed if the bushing is flush with the transmission case.
- (3) If necessary, the shift shaft bearing can be replaced as follows:
 - (a) Locate a bolt that will thread into the bearing without great effort.
 - (b) Thread the bolt into the bearing as much as possible.

(c) Attach a slide hammer or suitable puller to the bolt and remove the bearing.

(d) Use the short end of Installer 8119 to install the new bearing.

(e) The bearing is correctly installed if the bearing is flush with the transmission case.

(4) Inspect detent plunger bushings for damage.

NOTE: The detent plunger bushings are installed to a specific depth. The space between the two bushings when correctly installed contain an oil feed hole. Do not attempt to install the bushings with anything other than the specified tool or this oil hole may become restricted.

(5) If necessary, the detent plunger bushings can be replaced as follows:

(a) Using the long end of Installer 8119, drive the detent bushings through the outer case and into the shift shaft bore.

(b) Remove the bushings from the shift shaft bore.

(c) Install a new detent plunger bushing on the long end of Installer 8118.

(d) Start the bushing in the detent plunger bore in the case.

(e) Drive the bushing into the bore until the tool contacts the transmission case.

(f) Install a new detent plunger bushing on the short end of Installer 8118.

(g) Start the bushing in the detent plunger bore in the case.

(h) Drive the bushing into the bore until the tool contacts the transmission case.

GEARTRAIN ASSEMBLY

(1) Install Adapter 6747-1A on input shaft hub of fixture tool (Fig. 90). Then install Adapter 6747-2A on front bearing hub of countershaft. Adapter 6747-2A has a raised shoulder on one side. Be sure the shoulder is seated against the countershaft.

(2) Install input shaft in fixture tool. Make sure Adapter Tool 6747-1A is positioned under shaft as shown (Fig. 91).

(3) Install pilot bearing in input shaft (Fig. 91).

NOTE: There is a correct and an incorrect way to install the pilot bearing into the input shaft. The side of the pilot bearing with the small diameter goes toward the input shaft.

DISASSEMBLY AND ASSEMBLY (Continued)

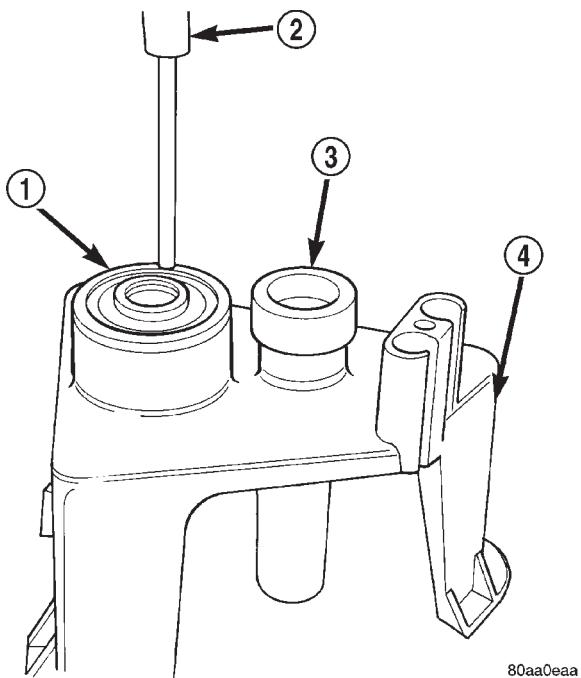


Fig. 90 Preparing Assembly Fixture For Geartrain Build-up

- 1 – SPECIAL TOOL 6747-2A (INSTALL ON COUNTERSHAFT FRONT HUB)
- 2 – SPECIAL TOOL 8115
- 3 – SPECIAL TOOL 6747-1A
- 4 – SPECIAL TOOL 6747

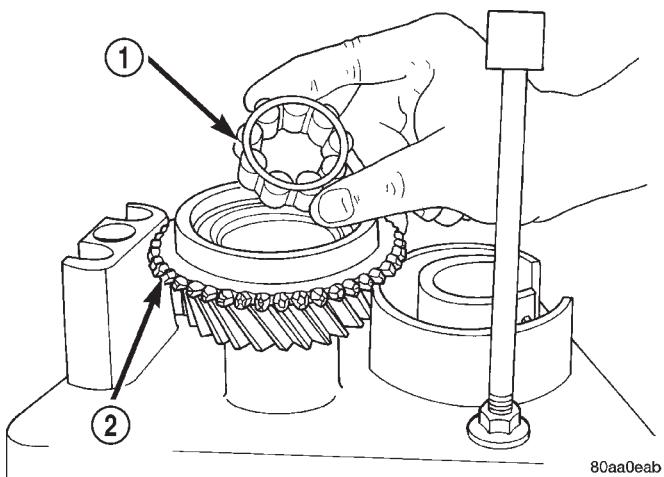


Fig. 91 Installing Pilot Bearing In Input Shaft

- 1 – PILOT BEARING
- 2 – INPUT SHAFT

(4) Install fourth gear synchro ring on input shaft (Fig. 92).

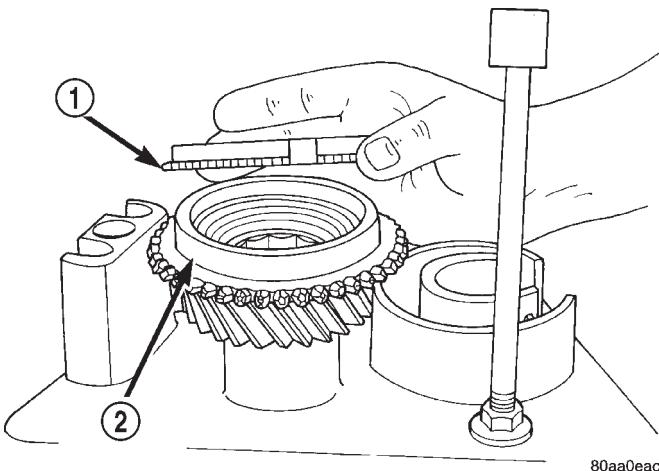


Fig. 92 Installing Fourth Gear Synchro Ring On Input Shaft

- 1 – FOURTH GEAR SYNCHRO RING
- 2 – INPUT SHAFT

(5) Adjust height of idler gear pedestal on assembly fixture (Fig. 93). Start with a basic height of 18.4 cm (7-1/4 in.). Final adjustment can be made after gear is positioned on pedestal.

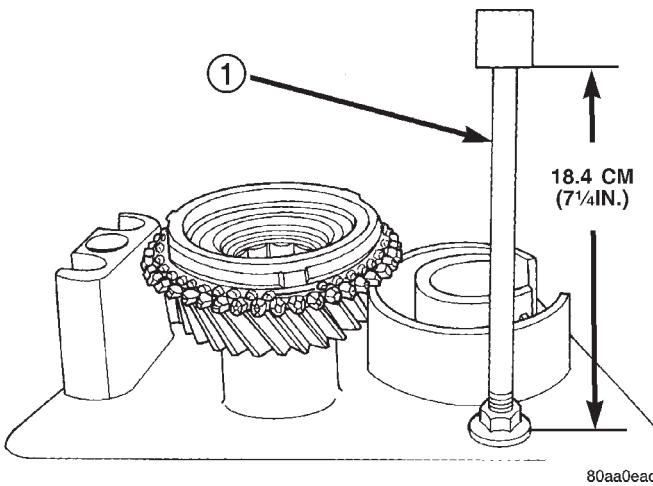
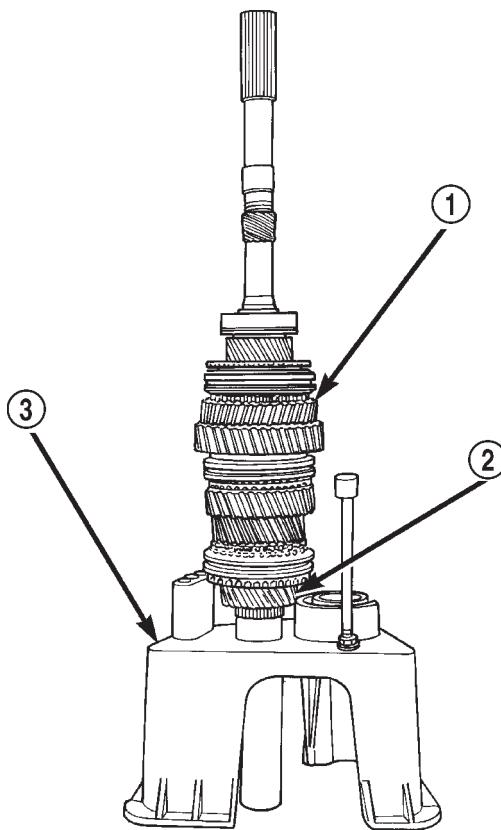


Fig. 93 Idler Pedestal Basic Height Adjustment

- 1 – REVERSE IDLER PEDESTAL

(6) Install assembled output shaft and geartrain in input shaft (Fig. 94). Carefully rotate output shaft until the 3-4 synchro ring seats in synchro hub and sleeve.



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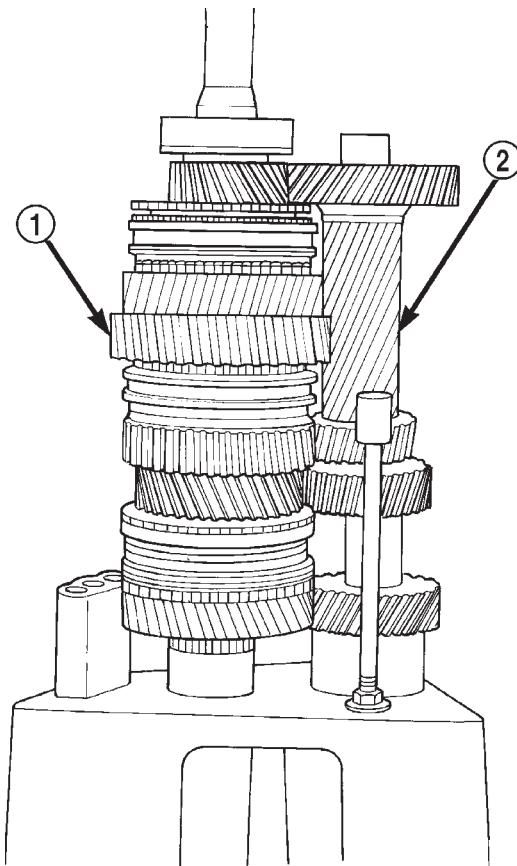
Fig. 94 Output Shaft And Geartrain Installed In Input Shaft

- 1 – OUTPUT SHAFT AND GEARTRAIN
- 2 – INPUT SHAFT
- 3 – SPECIAL TOOL
6747

(7) Install Adapter 6747-2A on front bearing hub of countershaft, if not previously done. The adapter has a shoulder on one side. The shoulder goes toward the countershaft.

(8) Slide countershaft (and adapter) into fixture slot. Verify that countershaft and output shaft gears are fully meshed with the mainshaft gears before proceeding (Fig. 95).

(9) Check alignment of countershaft and output shaft gear teeth. Note that gears may not align perfectly. A difference in height of 1.57 to 3.18 mm (1/16 to 1/8 in.) will probably exist. This difference will not interfere with assembly. However, if the difference is greater than this, the countershaft adapter tool is probably upside down. Remove countershaft, reverse adapter tool, reinstall countershaft and check alignment again.



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Fig. 95 Countershaft Installed On Fixture Tool

- 1 – OUTPUT SHAFT AND GEARTRAIN
- 2 – COUNTERSHAFT (SLIDE INTO PLACE ON FIXTURE TOOL)

DISASSEMBLY AND ASSEMBLY (Continued)

(10) Position reverse idler in support cup of assembly fixture (Fig. 96). Be sure idler gear is properly meshed and aligned with shaft gear teeth and that bolt holes are facing out and not toward geartrain. Adjust pedestal up or down if necessary. Also be sure that short end of idler shaft is facing up as shown.

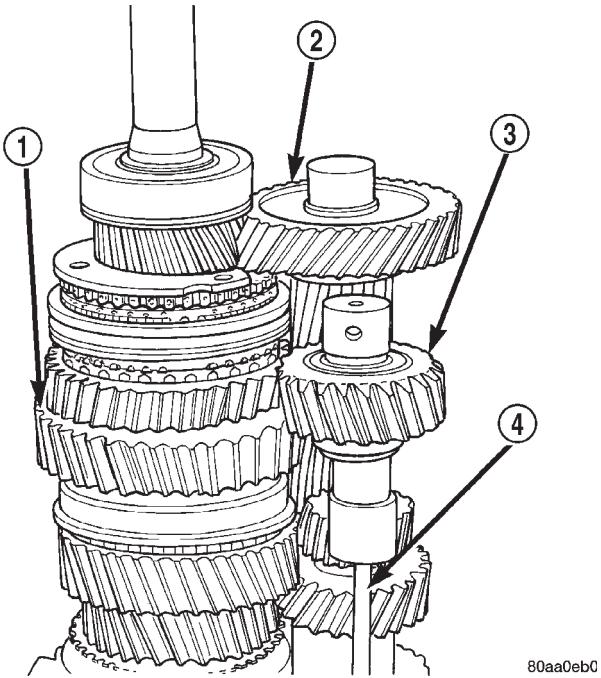


Fig. 96 Reverse Idler Assembly Positioned On Assembly Fixture Pedestal

- 1 – OUTPUT SHAFT AND GEARTRAIN
- 2 – COUNTERSHAFT
- 3 – REVERSE IDLER ASSEMBLY
- 4 – TOOL PEDESTAL

(11) On 2-wheel drive transmission, thread one Pilot Stud 8120 in center or passenger side hole of output shaft bearing retainer. Then position retainer on fifth gear as shown (Fig. 97).

(12) Assemble 1-2 and fifth reverse-shift forks (Fig. 98). Arm of fifth-reverse fork goes through slot in 1-2 fork.

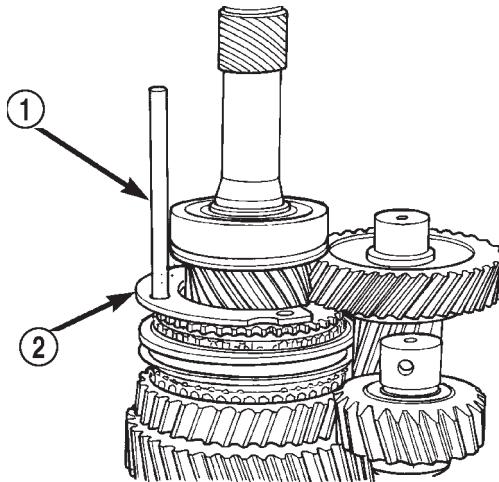


Fig. 97 Positioning Output Shaft Bearing Retainer For Rear Housing Installation

- 1 – SPECIAL TOOL
8120
- 2 – OUTPUT SHAFT BEARING RETAINER

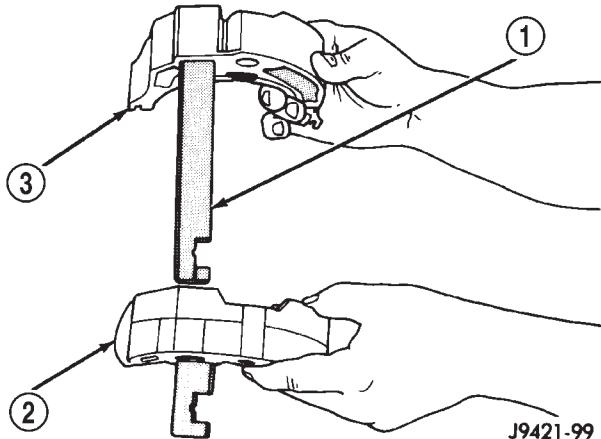


Fig. 98 Assembling 1-2 And Fifth-Reverse Shift Forks

- 1 – INSERT ARM THROUGH 1-2 FORK
- 2 – 1-2 FORK
- 3 – FIFTH-REVERSE FORK

(13) Install assembled shift forks in synchro sleeves (Fig. 99). Be sure forks are properly seated in sleeves.

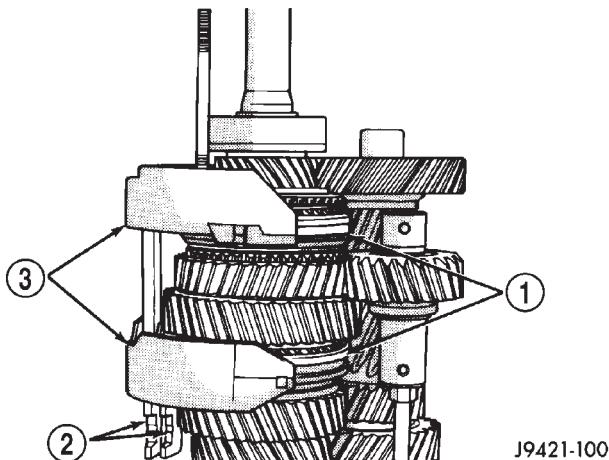


Fig. 99 Shift Forks Installed In Synchro Sleeves

- 1 – SYNCHRO SLEEVES
- 2 – FORK ARMS
- 3 – SHIFT FORKS

REAR HOUSING—2WD

(1) Drive adapter housing alignment dowels back into housing until dowels are flush with mounting surface (Fig. 100).

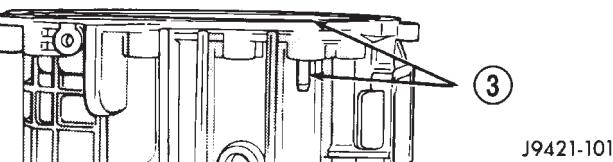
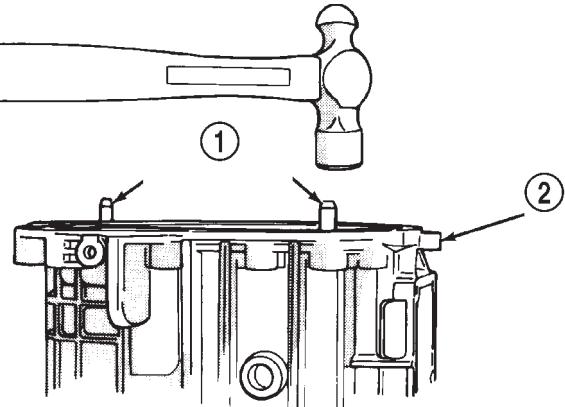


Fig. 100 Preparing Rear Housing Dowels For Installation

- 1 – HOUSING ALIGNMENT DOWELS
- 2 – REAR HOUSING
- 3 – DOWEL FLUSH WITH SURFACE

(2) Apply liberal quantity of petroleum jelly to countershaft rear bearing and bearing race.

(3) Install countershaft rear bearing in bearing race (Fig. 101).

CAUTION: The countershaft bearings can be installed backwards if care is not exercised. Be sure the large diameter side of the roller retainer faces the countershaft and the small diameter side faces the race and housing (Fig. 102).

(4) Apply extra petroleum jelly to hold countershaft rear bearing in place when housing is installed.

(5) Apply light coat of petroleum jelly to shift shaft bushing/bearing in rear housing (Fig. 102).

(6) Reach into countershaft rear bearing with finger, and push each bearing roller outward against race. Then apply extra petroleum jelly to hold rollers in place. This avoids having rollers becoming displaced during housing installation. This will result in misalignment between bearing and countershaft bearing hub.

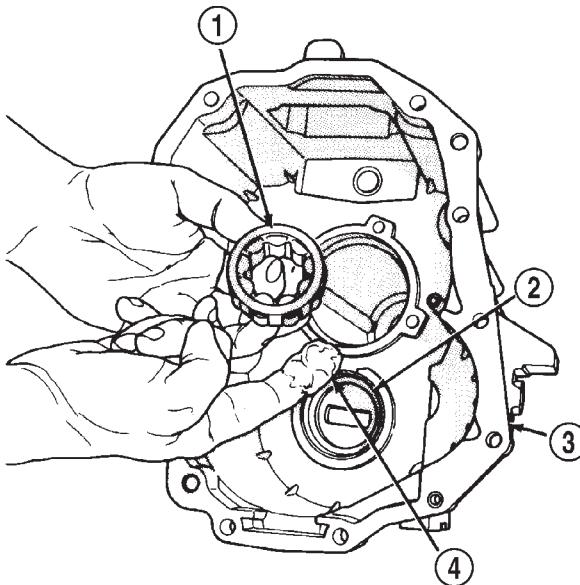


Fig. 101 Lubricating Countershaft Rear Bearing

- 1 – COUNTERSHAFT REAR BEARING
- 2 – REAR BEARING RACE
- 3 – REAR HOUSING
- 4 – PETROLEUM JELLY (APPLY TO BEARING AND RACE)

DISASSEMBLY AND ASSEMBLY (Continued)

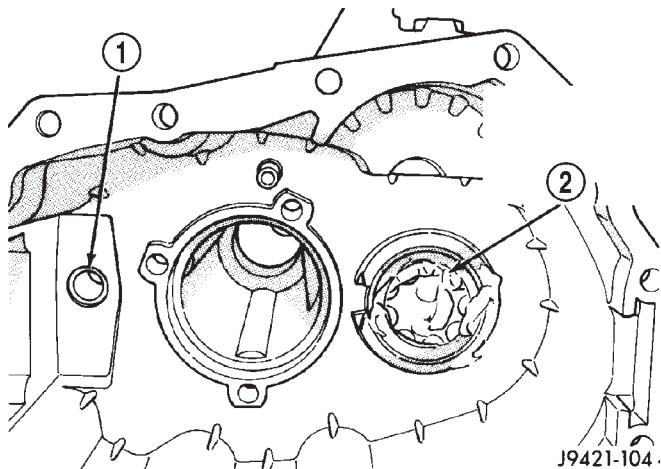


Fig. 102 Countershaft Rear Bearing Seated In Seated in Race

- 1 – SHIFT SHAFT BUSHING/BEARING
2 – COUNTERSHAFT REAR BEARING (SEATED IN RACE)

(7) Install rear housing onto geartrain (Fig. 103). Be sure bearing retainer pilot stud is in correct bolt hole in housing. Also be sure countershaft and output shaft bearings are aligned in housing and on countershaft. It may be necessary to lift upward on countershaft slightly to ensure that the countershaft rear bearing engages to the countershaft before the rear output shaft bearing engages the housing.

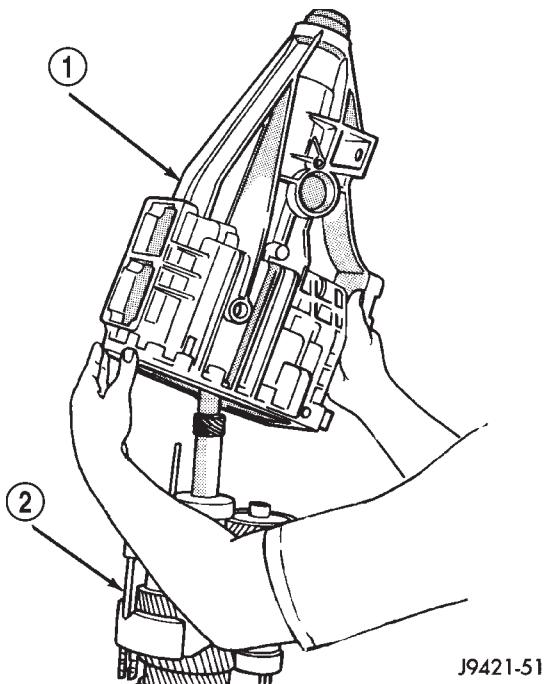


Fig. 103 Rear Housing Installation—2WD

- 1 – REAR HOUSING
2 – SHIFT FORKS AND GEARTRAIN

(8) Seat rear housing on output shaft rear bearing and countershaft. Use plastic or rawhide mallet to tap housing into place.

(9) Install the three bolts that secure rear bearing retainer to rear housing as follows:

- Apply Mopar® Gasket Maker, or equivalent, to bolt threads, bolt shanks and under bolt heads (Fig. 104).
- Start first two bolts in retainer (Fig. 105). It may be necessary to move retainer rearward (with pilot stud) in order to start bolts in retainer.
- Remove Pilot Stud 8120 and install last retainer bolt (Fig. 105).
- Tighten all three retainer bolts to 30-35 N·m (22-26 ft. lbs.) torque.

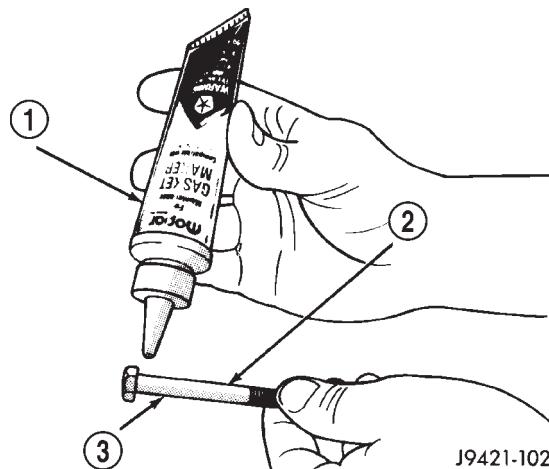


Fig. 104 Applying Sealer To Retainer And Housing Bolts

- 1 – MOPAR GASKET MAKER (OR LOCTITE 518)
2 – RETAINER AND HOUSING BOLTS
3 – APPLY SEALER TO UNDERSIDE OF BOLT HEAD, SHANK AND THREADS

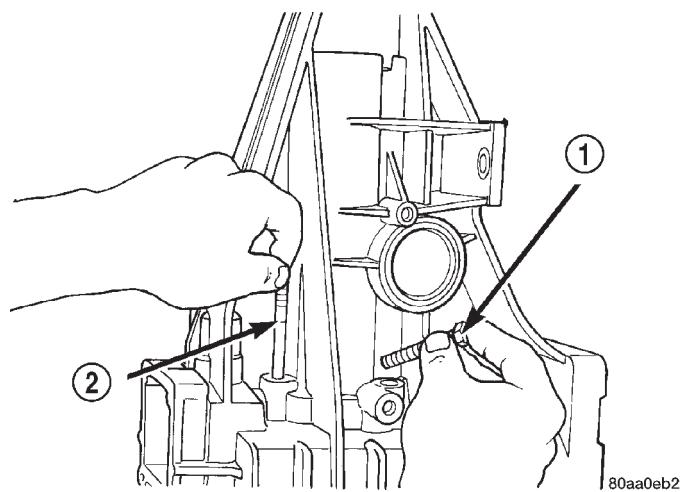


Fig. 105 Removing Pilot Stud Tool And Installing Retainer Bolts—2WD

- 1 – BEARING RETAINER BOLT
2 – SPECIAL TOOL 8120

ADAPTER HOUSING—4WD

(1) Install rear bearing in adapter housing. Use wood hammer handle or wood dowel to tap bearing into place.

(2) Position rear bearing retainer in adapter housing (Fig. 106).

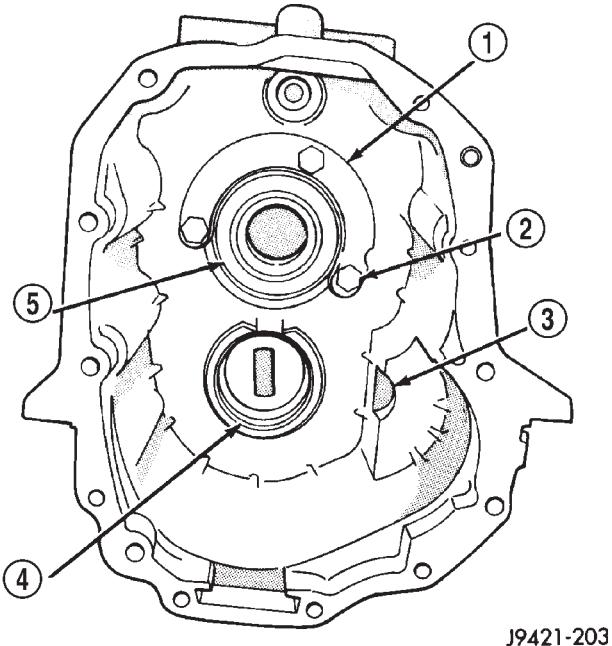


Fig. 106 Preparing Adapter Housing For Installation—4WD

- 1 – BEARING RETAINER
- 2 – RETAINER BOLTS (3)
- 3 – IDLER SHAFT NOTCH
- 4 – COUNTERSHAFT REAR BEARING RACE
- 5 – REAR BEARING

(3) Apply Mopar® Gasket Maker, or equivalent, to threads, bolt shanks and under hex heads of bearing retainer bolts (Fig. 107).

(4) Apply liberal quantity of petroleum jelly to countershaft rear bearing and bearing race.

(5) Install countershaft rear bearing in bearing race (Fig. 102).

CAUTION: The countershaft bearings can be installed backwards if care is not exercised. Be sure the large diameter side of the roller retainer faces the countershaft and the small diameter side faces the race and housing (Fig. 102).

(6) Apply extra petroleum jelly to hold countershaft rear bearing in place when housing is installed.

(7) Apply light coat of petroleum jelly to shift shaft bushing/bearing in adapter housing (Fig. 102).

(8) Install adapter housing on geartrain.

(9) Install rear bearing snap ring on output shaft (Fig. 107).

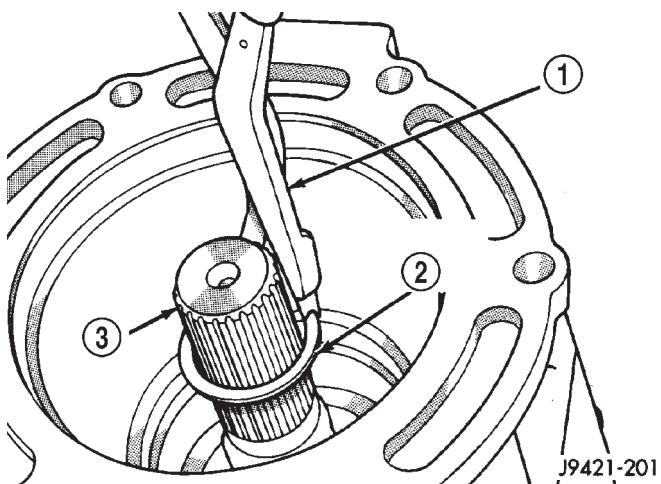


Fig. 107 Installing Rear Bearing Snap Ring—4WD

- 1 – HEAVY DUTY SNAP RING PLIERS
- 2 – REAR BEARING SNAP RING
- 3 – OUTPUT SHAFT

(10) Lubricate lip of new rear seal (Fig. 108) with Mopar® Door Ease, or transmission fluid.

(11) Install new rear seal in adapter housing bore with Installer C-3860-A. Be sure seal is fully seated in housing bore (Fig. 108).

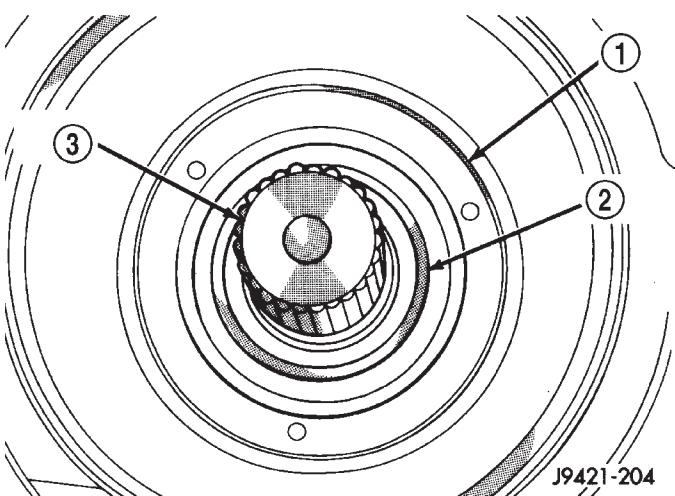


Fig. 108 Rear Seal Installation—4WD

- 1 – REAR SEAL
- 2 – SEAL LIP
- 3 – OUTPUT SHAFT

SHIFT SHAFT, SHAFT LEVER AND BUSHING AND SHIFT SOCKET

(1) Before proceeding, verify that all synchro sleeves are in Neutral position (centered on hub). Move sleeves into neutral if necessary.

DISASSEMBLY AND ASSEMBLY (Continued)

CAUTION: The transmission synchros must all be in Neutral position for proper reassembly. Otherwise, the housings, shift forks and gears can be damaged during installation of the two housings.

(2) Install 3-4 shift fork in synchro sleeve (Fig. 109). Verify that groove in fork arm is aligned with grooves in 1-2 and fifth-reverse fork arms as shown.

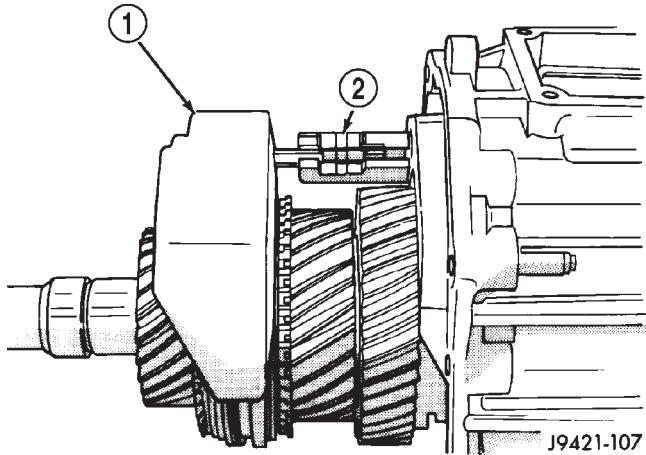


Fig. 109 Installing 3-4 Shift Fork

- 1 – 3-4 FORK
- 2 – ALIGN GROOVES IN FORK ARMS

(3) Slide shift shaft through 3-4 shift fork (Fig. 110). Be sure shaft detent notches are to front.

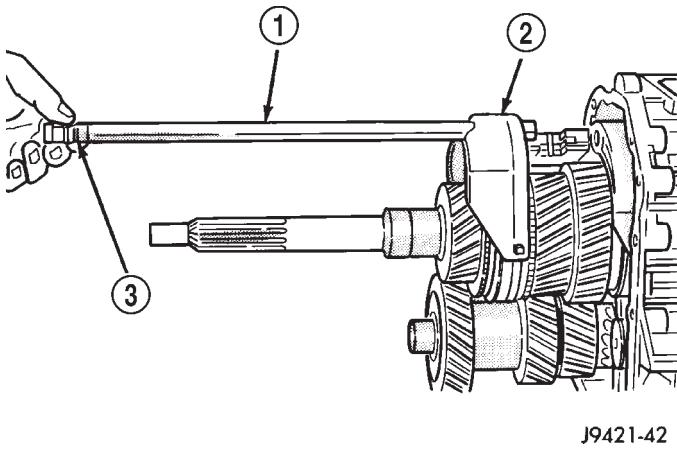


Fig. 110 Shift Shaft Installation

- 1 – SHIFT SHAFT
- 2 – 3-4 FORK
- 3 – SHAFT DETENT NOTCHES

(4) Assemble shift shaft shift lever and bushing (Fig. 111). Be sure slot in bushing is facing up and roll pin hole for lever is aligned with hole in shaft.

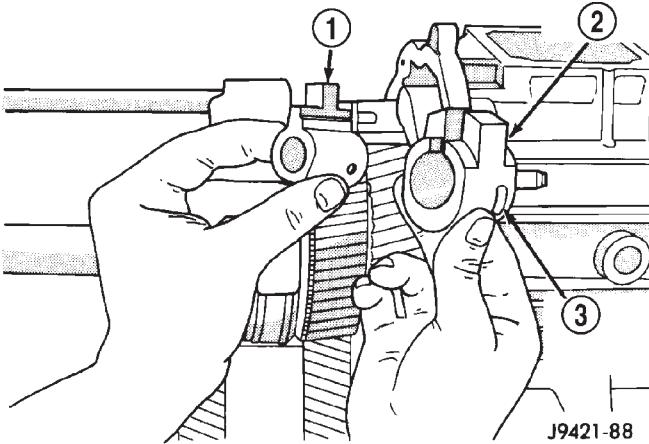


Fig. 111 Assembling Shift Shaft Lever And Bushing

- 1 – SHAFT LEVER
- 2 – LEVER BUSHING
- 3 – BUSHING LOCK PIN SLOT

(5) Install assembled lever and bushing on shift shaft (Fig. 112).

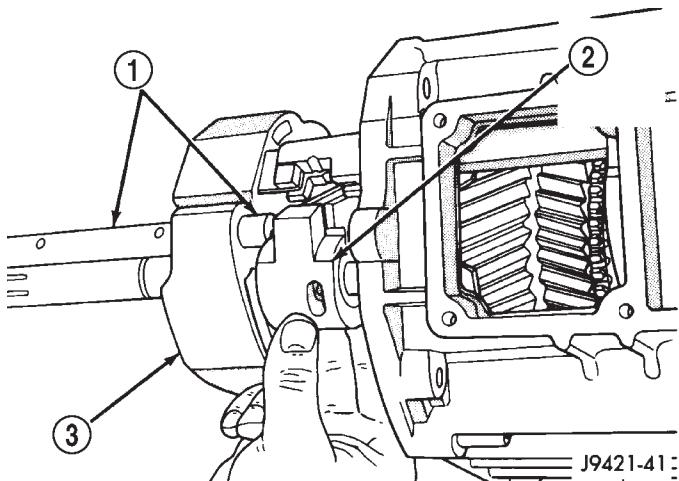


Fig. 112 Installing Shift Shaft Lever And Bushing

- 1 – SHIFT SHAFT
- 2 – SHIFT SHAFT LEVER AND BUSHING
- 3 – 3-4 FORK

(6) Slide shift shaft through 1-2 and fifth-reverse fork and into shift lever opening in rear housing (Fig. 113).

(7) Align shift socket with shaft and slide shaft through socket and into shift shaft bearing in rear housing (Fig. 114).

(8) Rotate shift shaft so detent notches in shaft are facing the TOP of the transmission housing.

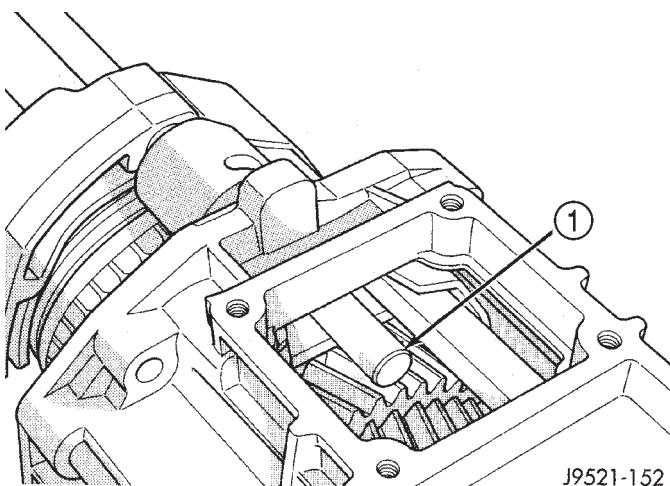


Fig. 113 Inserting Shaft Into Lever Opening In Housing

1 – SHIFT SHAFT

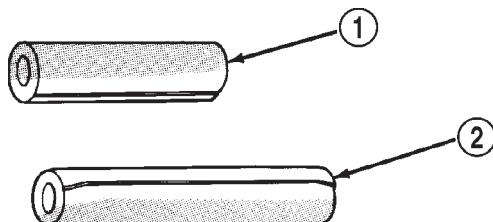


Fig. 115 Roll Pin Identification—Shaft Lever And Shift Socket

1 – SHAFT LEVER ROLL PIN

2 – SHIFT SOCKET ROLL PIN

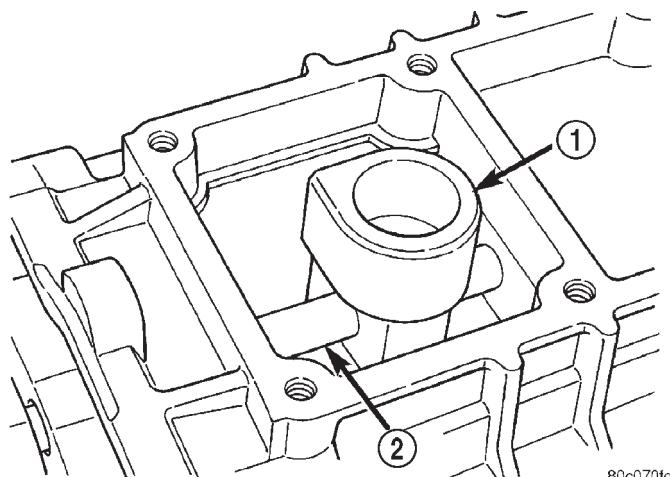


Fig. 114 Shift Socket Installation

1 – SHIFT SOCKET

2 – SHIFT SHAFT

CAUTION: Correct positioning of the shift shaft detent notch is important. Both of the shaft roll pins can be installed even when the shaft is 180° off. If this occurs, the transmission will have to be disassembled again to correct shaft alignment.

(9) Select correct new roll pin for shift shaft lever (Fig. 115). Shaft lever roll pin is approximately 22 mm (7/8 in.) long. Shift socket roll pin is approximately 33 mm (1-1/4 in.) long.

(10) Align roll pin holes in shift shaft, lever and bushing. Then start roll pin into shaft lever by hand (Fig. 116).

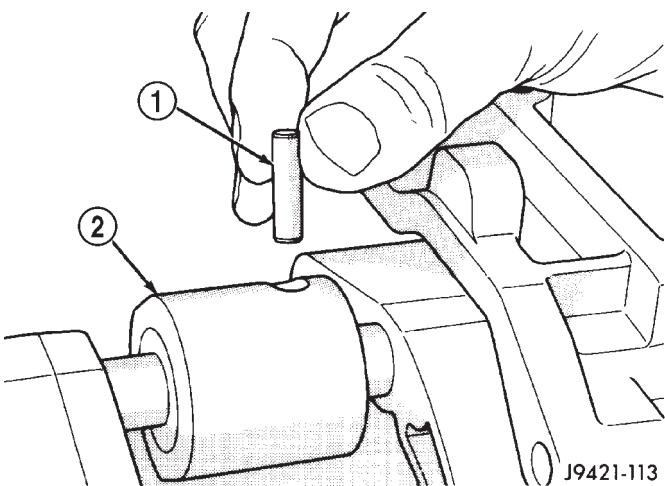


Fig. 116 Starting Roll Pin In Shift Shaft Lever

1 – SHAFT LEVER ROLL PIN (7/8" LONG)

2 – LEVER AND BUSHING

(11) Seat shaft lever roll pin with pin punch (Fig. 117).

CAUTION: The shaft lever roll pin must be flush with the surface of the lever. The lever bushing will bind on the roll pin if the pin is not seated flush.

(12) Before proceeding, verify that lock pin slot in lever bushing is positioned as shown (Fig. 117).

(13) Align roll pin holes in shift socket and shift shaft. Then start roll pin into shift shaft by hand (Fig. 118).

DISASSEMBLY AND ASSEMBLY (Continued)

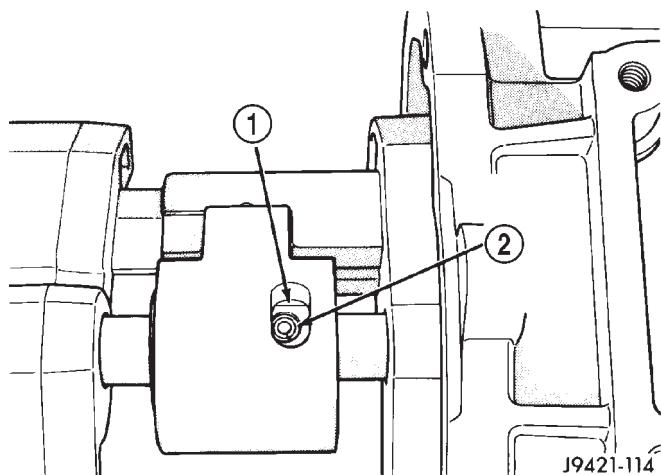


Fig. 117 Correct Seating Of Shift Shaft Lever Roll Pin

1 – BUSHING LOCK PIN SLOT
2 – SEAT ROLL PIN FLUSH WITH LEVER

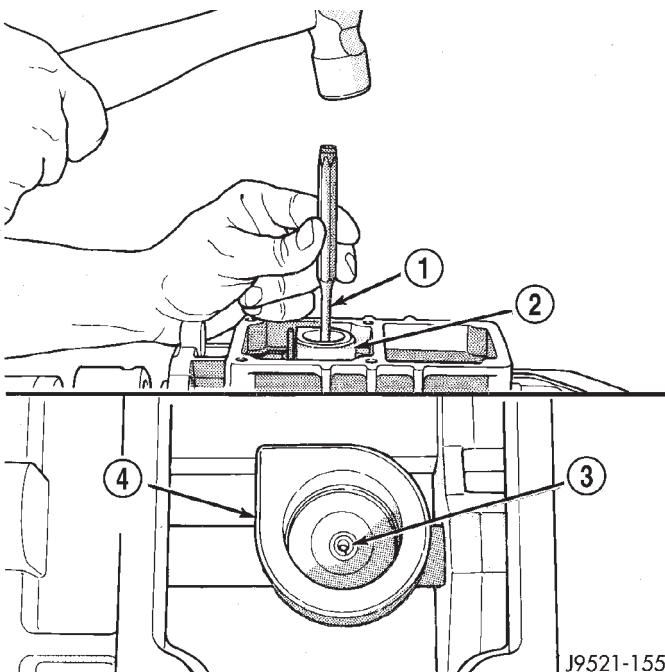


Fig. 119 Seating Shift Socket Roll Pin

1 – PIN PUNCH
2 – SHIFT SOCKET
3 – SEAT ROLL PIN FLUSH
4 – SHIFT SOCKET

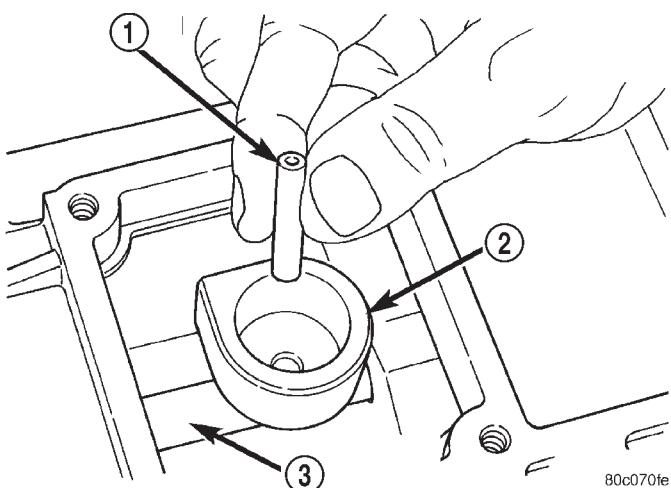


Fig. 118 Starting Roll Pin In Shift Socket

1 – ROLL PIN
2 – SHIFT SOCKET
3 – SHIFT SHAFT

(14) Seat roll pin in shift socket with pin punch. Roll pin must be flush with socket after installation (Fig. 119).

(15) Verify that notches in shift fork arms are aligned. Realign arms if necessary.

FRONT HOUSING AND INPUT SHAFT BEARING RETAINER

(1) If previously removed, install input shaft bearing in front housing bore (Fig. 120). Install snap ring and use plastic mallet to seat bearing. Bearing goes in from front side of housing only.

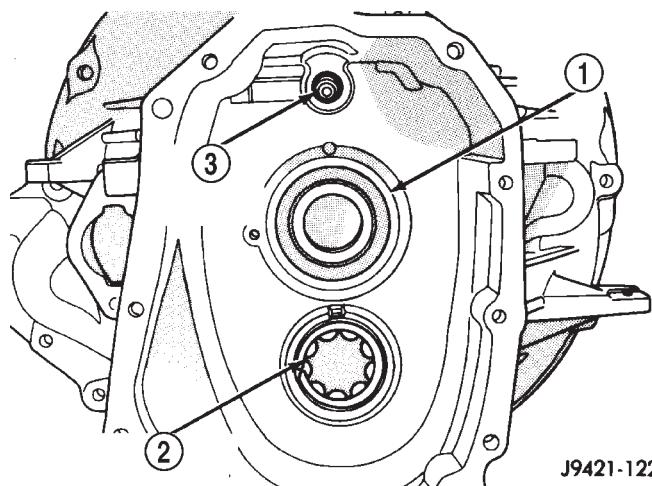
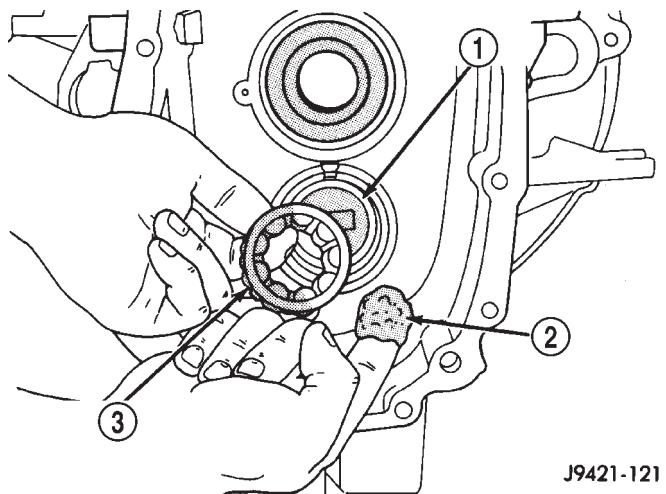


Fig. 120 Input Shaft Bearing And Countershaft Front Bearing

1 – INPUT SHAFT BEARING
2 – COUNTERSHAFT FRONT BEARING
3 – SHIFT SHAFT BUSHING

(2) Apply liberal quantity of petroleum jelly to countershaft front bearing. Then insert bearing in front housing race (Fig. 120). Large diameter side of bearing cage goes toward countershaft (Fig. 121). Small diameter side goes toward bearing race in housing.

(3) Reach into countershaft front bearing with finger, and push each bearing roller outward against race. Then apply extra petroleum jelly to hold rollers in place. This avoids having rollers becoming displaced during housing installation. This will result in misalignment between bearing and countershaft bearing hub.



J9421-121

Fig. 121 Lubricating/Positioning Countershaft Front Bearing

- 1 – BEARING RACE
- 2 – PETROLEUM JELLY
- 3 – COUNTERSHAFT FRONT BEARING

(4) Apply small amount of petroleum jelly to shift shaft bushing in front housing.

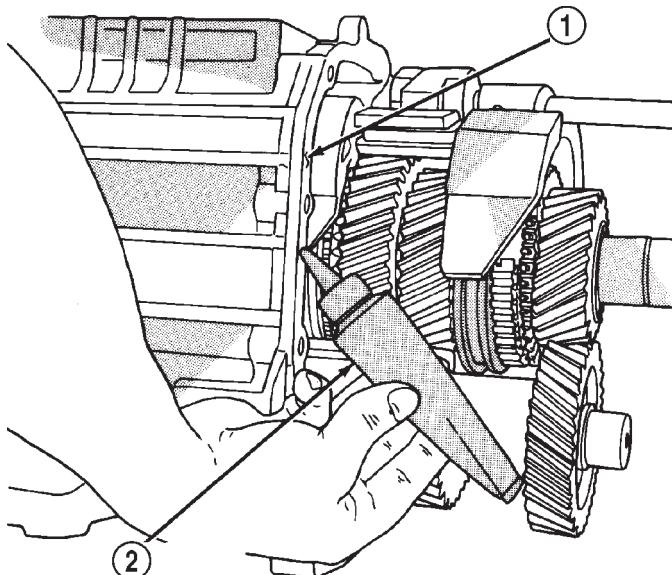
(5) Apply 1/8 in. wide bead of Mopar® Gasket Maker, or equivalent, to mating surfaces of front and rear housings (Fig. 122).

(6) Have helper hold rear housing and geartrain in upright position. Then install front housing on rear housing and geartrain.

(7) Work front housing downward onto geartrain until seated on rear housing.

CAUTION: If the front housing will not seat on the rear housing, either the shift components are not in Neutral, or one or more components are misaligned. Do not force the front housing into place. This will only result in damaged components.

(8) Tap rear housing alignment dowels back into place with hammer and pin punch. Both dowels should be flush fit in each housing. Have helper hold



J9421-123

Fig. 122 Applying Sealer To Front/Rear Housings

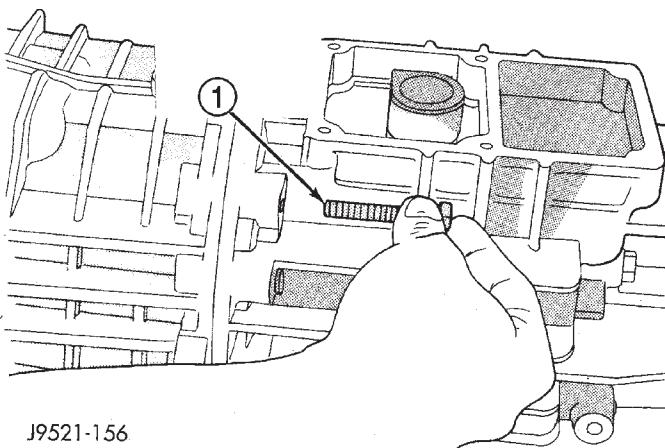
- 1 – HOUSING FLANGE SURFACE
- 2 – MOPAR GASKET MAKER (OR LOCTITE 518)

transmission upright while dowels are tapped back into place.

(9) Place transmission in horizontal position.

(10) Apply Mopar® Gasket Maker, or equivalent, to housing attaching bolts. Apply sealer material sealer to underside of bolt heads and to bolt shanks and threads (Fig. 123).

(11) Install and start housing attaching bolts by hand (Fig. 123). Then tighten bolts to 34 N·m (25 ft. lbs.) torque.



J9521-156

Fig. 123 Installing Housing Attaching Bolts

- 1 – HOUSING ATTACHING BOLTS (APPLY SEALER BEFOREHAND)

DISASSEMBLY AND ASSEMBLY (Continued)

(12) Install shift shaft bushing lock bolt (Fig. 124). Apply Mopar® Gasket Maker, or equivalent, to bolt threads, shank and underside of bolt head before installation.

CAUTION: If the lock bolt cannot be fully installed, do not try to force it into place. Either the shift shaft is not in Neutral, or the shaft bushing (or lever) is misaligned.

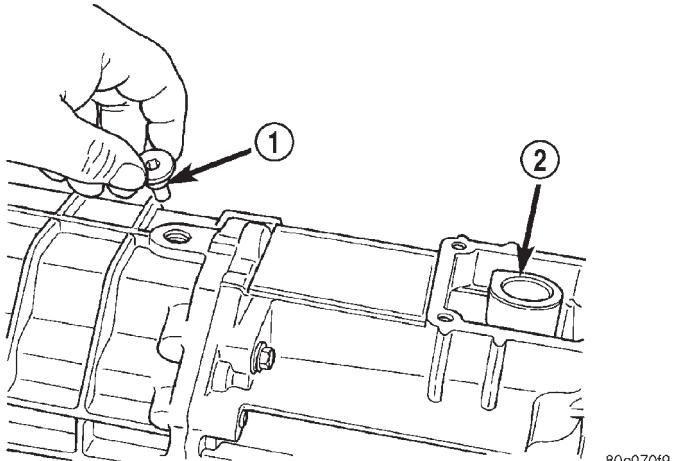


Fig. 124 Installing Shift Shaft Bushing Lock Bolt

1 – SHIFT SHAFT LOCK BOLT

2 – SHAFT SOCKET

(13) Lubricate then install shift shaft detent plunger in housing bore (Fig. 125). Lubricate plunger with petroleum jelly or gear lubricant. **Be sure plunger is fully seated in detent notch in shift shaft.**

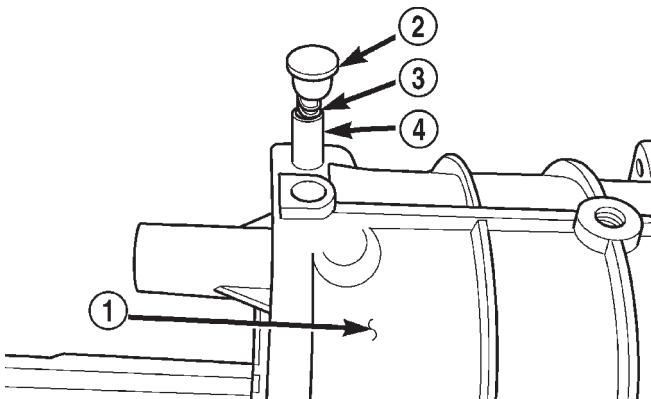


Fig. 125 Installing Shift Shaft Detent Plunger, Spring, and Plug

1 – FRONT HOUSING

2 – PLUG

3 – SPRING

4 – PLUNGER

(14) Install detent spring inside plunger (Fig. 125).

(15) Install detent plug as follows:

(a) Install detent plug in end of Installer 8123.

(b) Position plug on detent spring and compress spring until detent plug pilots in detent plunger bore.

(c) Drive detent plug into transmission case until plug seats.

(16) Install backup light switch (Fig. 126).

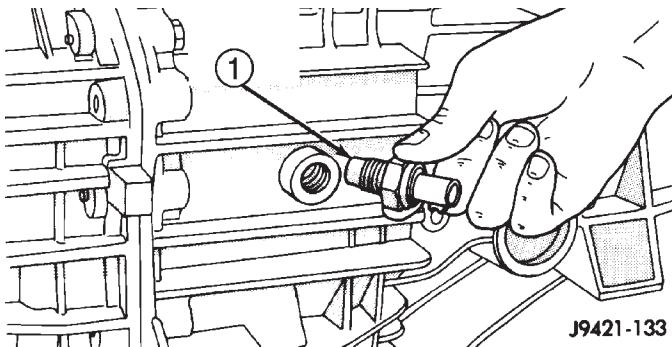


Fig. 126 Installing Backup Light Switch

1 – BACKUP LIGHT SWITCH

(17) Install input shaft snap ring (Fig. 127).

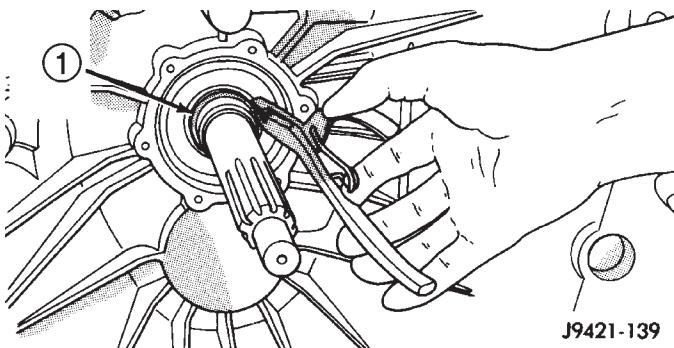
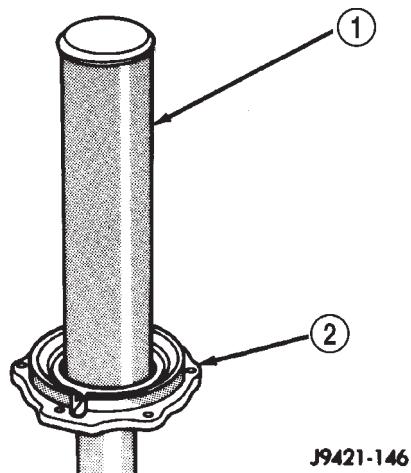


Fig. 127 Installing Input Shaft Snap Ring—Typical

1 – INPUT SHAFT SNAP RING

(18) Install new oil seal in front bearing retainer with Installer Tool 6448 (Fig. 128).

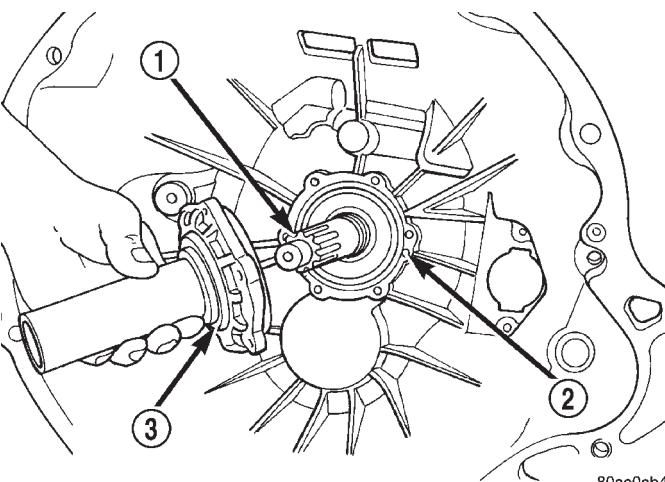
(19) Apply bead of Mopar® silicone sealer, or equivalent, to flange surface of front bearing retainer (Fig. 129).



J9421-146

Fig. 128 Installing Oil Seal In Front Bearing Retainer

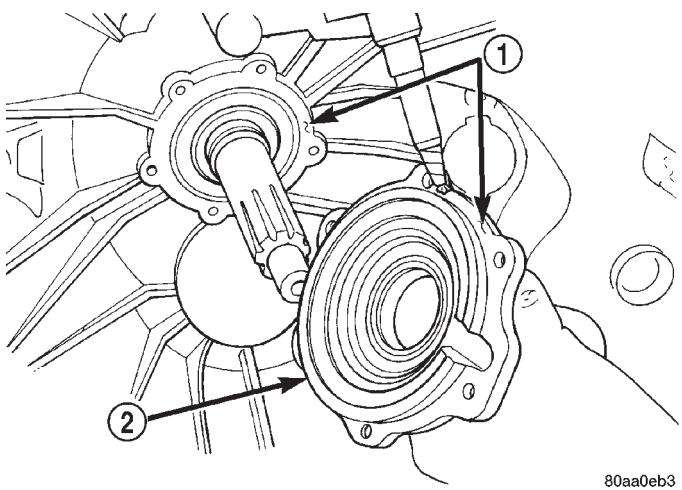
- 1 – SPECIAL TOOL
6448
- 2 – FRONT BEARING RETAINER



80aa0eb4

Fig. 130 Installing Input Shaft Bearing Retainer—Typical

- 1 – INPUT SHAFT
- 2 – OIL FEED
- 3 – BEARING RETAINER



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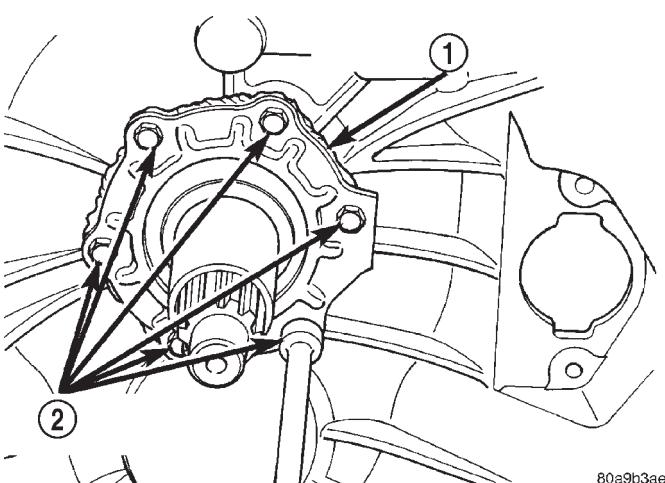
Fig. 129 Applying Sealer To Bearing Retainer And Housing—Typical

- 1 – APPLY SEALER BEAD
- 2 – INPUT SHAFT BEARING RETAINER

(20) Align and install front bearing retainer over input shaft and onto housing mounting surface (Fig. 130). Although retainer is one-way fit on housing, be sure bolt holes are aligned before seating retainer.

NOTE: Be sure that no sealer gets into the oil feed hole in the transmission case or bearing retainer.

(21) Install and tighten bearing retainer bolts to 7-10 N·m (5-7 ft. lbs.) torque (Fig. 131).



80a9b3ae

Fig. 131 Installing Input Shaft Bearing Retainer Bolts—Typical

- 1 – INPUT SHAFT BEARING RETAINER
- 2 – RETAINER BOLTS

SHIFT TOWER AND LEVER ASSEMBLY

(1) Apply petroleum jelly to ball end of shift lever and interior of shift socket.

(2) Shift the transmission into third gear.

(3) Align and install shift tower and lever assembly (Fig. 132). Be sure shift ball is seated in socket and the offset in the tower is toward the passenger side of the vehicle before installing tower bolts.

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Install shift tower bolts (Fig. 133). Tighten bolts to 8.5 N·m (75.2 in. lbs.) torque.

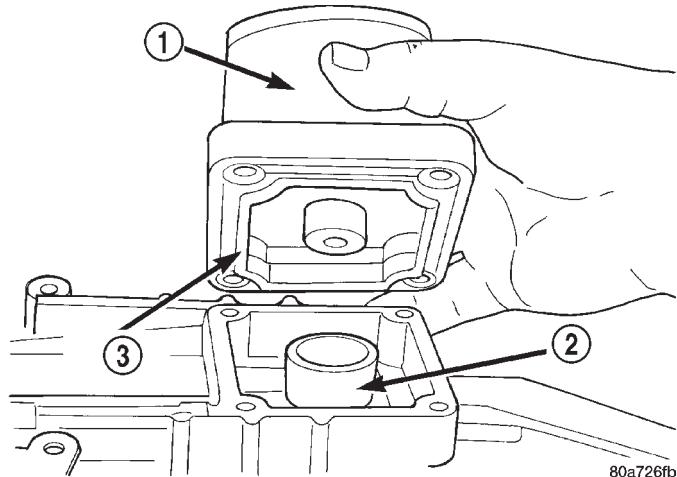


Fig. 132 Shift Tower Installation

- 1 – SHIFT TOWER AND LEVER ASSEMBLY
- 2 – SHIFT SOCKET
- 3 – SEAL

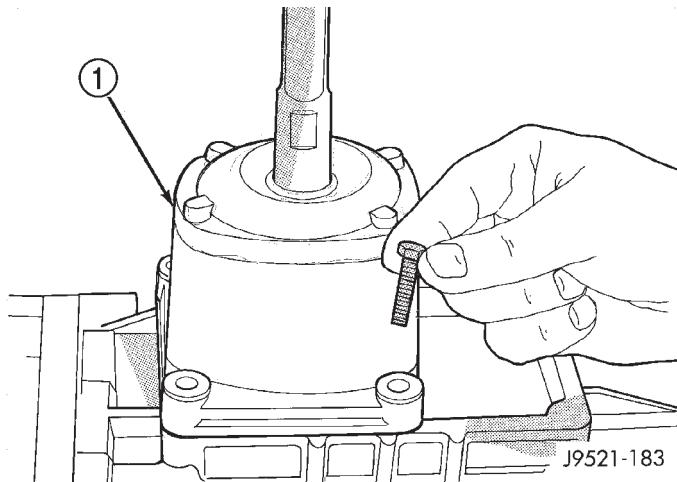


Fig. 133 Shift Tower Bolt Installation

- 1 – SHIFT TOWER AND LEVER ASSEMBLY

(5) Fill transmission to bottom edge of fill plug hole with Mopar® Transmission Lubricant, P/N 4761526.

(6) Install and tighten fill plug to 34 N·m (25 ft. lbs.) torque.

(7) Check transmission vent. Be sure vent is open and not restricted.

CLEANING AND INSPECTION

TRANSMISSION COMPONENTS

Clean the gears, shafts, shift components and transmission housings with a standard parts cleaning solvent. Do not use acid or corrosive base solvents. Dry all parts except bearings with compressed air.

Clean the shaft bearings with a mild solvent such as Mopar® degreasing solvent, Gunk, or similar solvents. Do not dry the bearings with compressed air. Allow the bearings to either air dry, or wipe them dry with clean shop towels.

SHIFT LEVER ASSEMBLY

The shift lever assembly is not serviceable. Replace the lever and shift tower as an assembly if the tower, lever, lever ball, or internal components are worn, or damaged.

SHIFT SHAFT AND FORKS

Inspect the shift fork interlock arms and synchro sleeve contact surfaces (Fig. 134). Replace any fork exhibiting wear or damage in these areas. Do not attempt to salvage shift forks.

Check condition of the shift shaft detent plunger and spring. The plunger should be smooth and free of nicks, or scores. The plunger spring should be straight and not collapsed, or distorted. Minor scratches, or nicks on the plunger can be smoothed with 320/400 grit emery soaked in oil. Replace the plunger and spring if in doubt about condition. Check condition of detent plunger bushings. Replace if damaged.

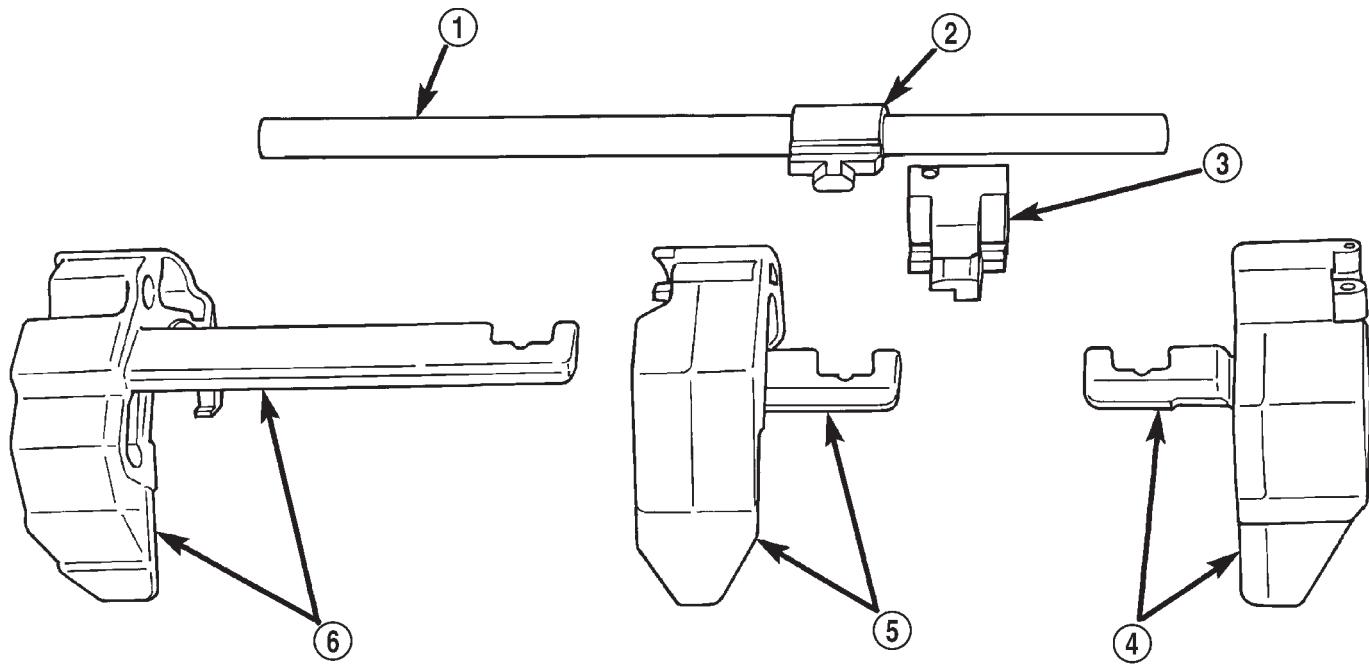
Inspect the shift shaft, shift shaft bushing and bearing, the shaft lever, and the lever bushing that fits over the lever. Replace the shaft if bent, cracked, or severely scored. Minor burrs, nicks, or scratches can be smoothed off with 320/400 grit emery cloth followed by polishing with crocus cloth. Replace the shift shaft bushing or bearing if damaged.

Replace the shaft lever and bushing if either part is deformed, or worn. Do not attempt to salvage these parts as shift fork binding will occur. Replace the roll pin that secures the lever to the shaft.

FRONT/REAR HOUSINGS AND BEARING RETAINERS

Inspect the housings carefully. Look for cracks, stripped threads, scored mating surfaces, damaged bearing bores, or worn dowel pin holes. Minor nicks on mating surfaces can be dressed off with a fine file, or emery cloth. Damaged threads can be renewed by either re-tapping or installing Helicoil inserts.

CLEANING AND INSPECTION (Continued)



80c070ff

Fig. 134 Shift Forks And Shaft

- 1 – SHIFT SHAFT
2 – SHAFT LEVER
3 – SHAFT LEVER BUSHING

- 4 – 3-4 SHIFT FORK
5 – 1-2 SHIFT FORK
6 – FIFTH-REVERSE SHIFT FORK

NOTE: The front housing contains the countershaft front bearing race. The rear housing contains the countershaft rear bearing race. Be advised that these components are NOT serviceable items. The front housing will have to be replaced if the countershaft bearing race is loose, worn, or damaged. The rear housing will have to be replaced if the countershaft rear bearing race is loose, worn, or damaged.

Inspect the input shaft bearing retainer. Be sure the release bearing slide surface of the retainer is in good condition. Minor nicks on the surface can be smoothed off with 320/420 grit emery cloth and final polished with oil coated crocus cloth. Replace the retainer seal if necessary.

Inspect the output shaft bearing retainer. Be sure the U-shaped retainer is flat and free of distortion. Replace the retainer if the threads are damaged, or if the retainer is bent, or cracked.

COUNTERSHAFT BEARINGS AND RACES

The countershaft bearings and races are machine lapped during manufacture to form matched sets. The bearings and races should not be interchanged.

NOTE: The bearing races are a permanent press fit in the housings and are NOT serviceable. If a bear-

ing race becomes damaged, it will be necessary to replace the front or rear housing as necessary. A new countershaft bearing will be supplied with each new housing for service use.

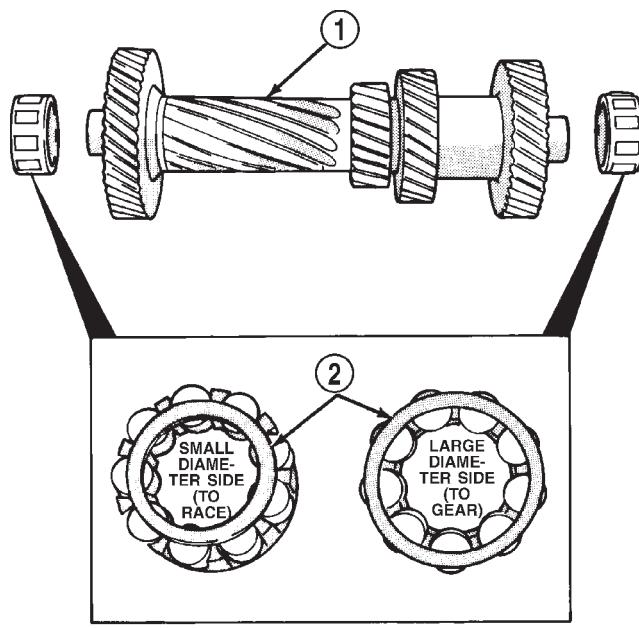
The countershaft bearings can be installed backwards if care is not exercised. The bearing roller cage is a different diameter on each side. Be sure the bearing is installed so the large diameter side of the cage is facing the countershaft gear (Fig. 135). The small diameter side goes in the bearing race.

REVERSE IDLER COMPONENTS

Inspect the idler gear, bearing, shaft, thrust washer, wave washer and thrust plate. Replace the bearing if any of the needle bearing rollers are worn, chipped, cracked, flat-spotted, or brinelled. Also replace the bearing if the plastic bearing cage is damaged or distorted.

Replace the thrust washer, wave washer, or thrust plate if cracked, chipped, or worn. Replace the idler gear if the teeth are chipped, cracked or worn thin. Replace the shaft if worn, scored, or the bolt threads are damaged beyond repair. Replace the support segment if cracked, or chipped and replace the idler attaching bolts if the threads are damaged.

CLEANING AND INSPECTION (Continued)



J9421-55

Fig. 135 Correct Countershaft Bearing Installation

- 1 – COUNTERSHAFT
2 – BEARING CAGE

Shift Socket

Inspect the shift socket for wear or damage. Replace the socket if the roll pin, or shift shaft bores are damaged. Minor nicks in the shift lever ball seat in the socket can be smoothed down with 400 grit emery or wet/dry paper. Replace the socket if the ball seat is worn, or cracked. Do not reuse the original shift socket roll pin. Install a new pin during reassembly. The socket roll pin is approximately 33 mm (1-1/4 in.) long.

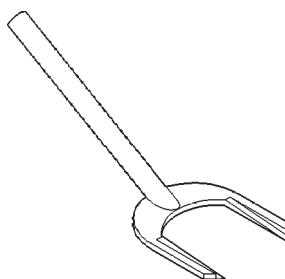
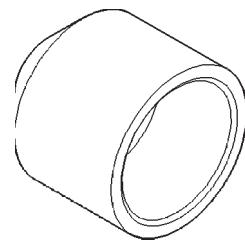
Output Shaft And Geartrain

Inspect all of the gears for worn, cracked, chipped, or broken teeth. Also check condition of the bearing bore in each gear. The bores should be smooth and free of surface damage. Discoloration of the gear bores is a normal occurrence and is not a reason for replacement. Replace gears only when tooth damage has occurred, or if the bores are brinelled or severely scored.

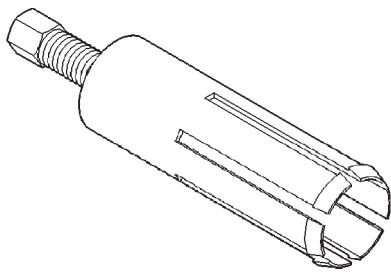
Inspect the shaft splines and bearings surfaces. Minor nicks on the bearing surfaces can be smoothed with 320/420 grit emery and final polished with crocus cloth. Replace the shaft if the splines are damaged or bearing surfaces are deeply scored, worn, or brinelled.

SPECIFICATIONS**TORQUE**

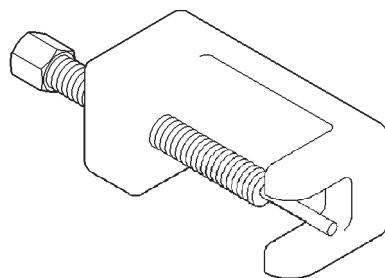
Description	Torque
Clutch Housing Bolts . . .	54–61 N·m (40–45 ft. lbs.)
Crossmember-To-Frame Bolts	61–75 N·m (44–55 ft. lbs.)
Crossmember-To-Insulator Nuts	54–61 N·m (40–45 ft. lbs.)
Drain/Fill Plug	9–27 N·m (14–20 ft. lbs.)
Front-To-Rear Housing Bolts	30–35 N·m (22–26 ft. lbs.)
Front Bearing Retainer Bolts	7–10 N·m (5–7 ft. lbs.)
Idler Shaft Bolts	19–25 N·m (14–18 ft. lbs.)
Rear Bearing Retainer Bolts	30–35 N·m (22–26 ft. lbs.)
Shift Tower Bolts	7–10 N·m (5–7 ft. lbs.)
Slave Cylinder Attaching Nuts	23 N·m (200 in. lbs.)
Transfer Case Attaching Nuts . .	47 N·m (35 ft. lbs.)
U-Joint Clamp Bolts	19 N·m (170 in. lbs.)

SPECIAL TOOLS**NV3550 MANUAL TRANSMISSION****Remover, Seal—C-3985-B****Installer, Seal—C-3972-A**

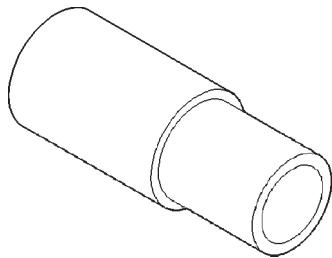
SPECIAL TOOLS (Continued)



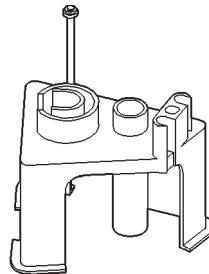
Remover, Bushing—6957



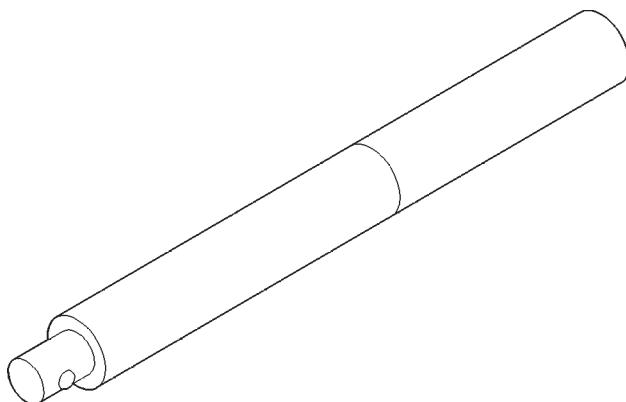
Remover/Installer, NV3550 Shift Rail Roll Pin—6858



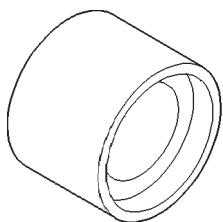
Installer, Bushing—6951



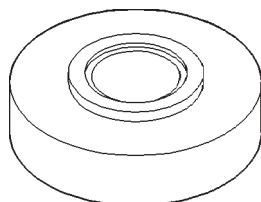
Fixture, NV3550—6747



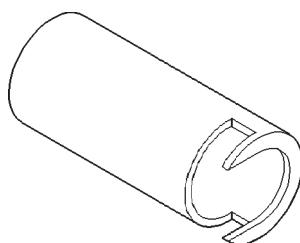
Handle—C-4171



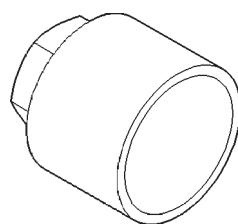
Adapter, Fixture—6747-1A



Adapter, Fixture—6747-2A

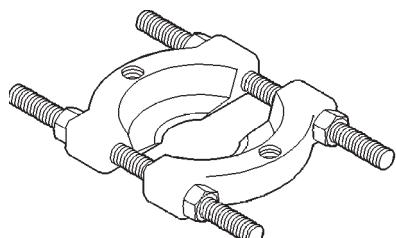


Remover—8117



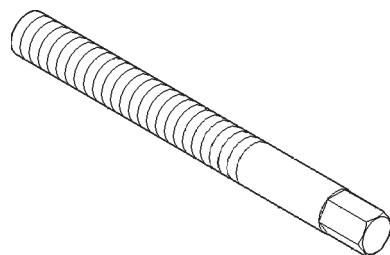
Cup, Fixture—8115

SPECIAL TOOLS (Continued)

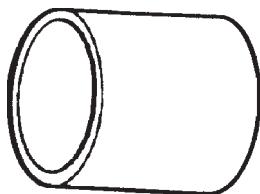


Splitter, Bearing—1130

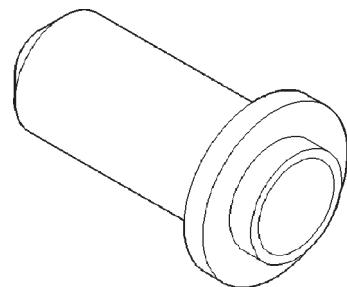
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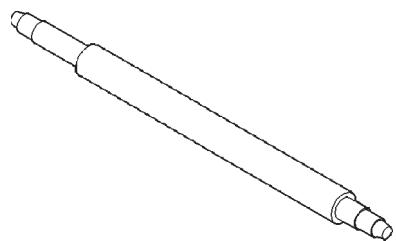
Stud, Alignment—8120



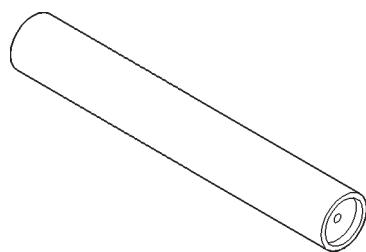
Tube—6310-1



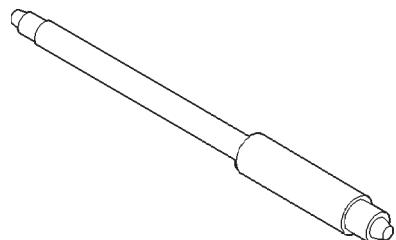
Installer, Seal—C-3860-A



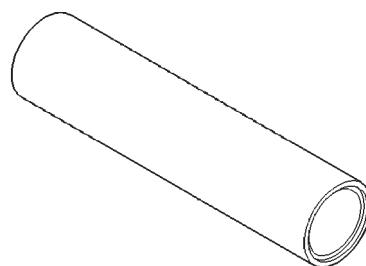
Installer—8118



Installer—8123



Remover/Installer—8119



Installer, Bearing Cone—6448

AUTOMATIC TRANSMISSION—30RH

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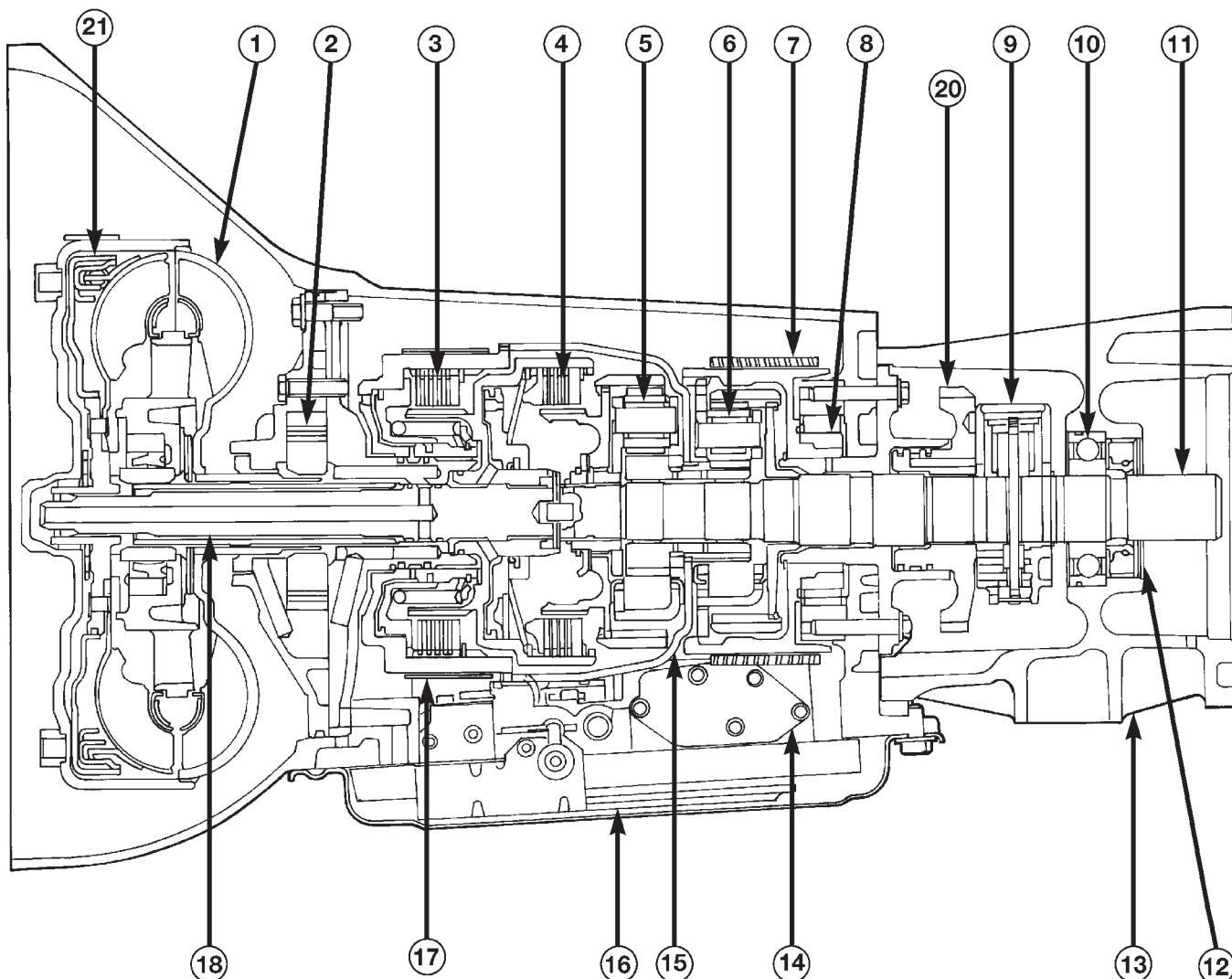
DESCRIPTION AND OPERATION

30RH AUTOMATIC TRANSMISSION

DESCRIPTION

The 30RH automatic transmission is used with the 2.5L engine (Fig. 1). The 30RH is three speed transmissions with a lock-up clutch in the torque converter. The transmissions contain a front and rear clutch which function as the input driving components. They also contain the kickdown (front) and the low/reverse (rear) bands which, along with the overrunning clutch, serve as the holding components. The driving and holding components combine to select the necessary planetary gear components, in the front and rear planetary gear set, transfer the engine power from the input shaft through to the output shaft. The transmissions contain a governor that is mounted on the output shaft and supplies pressure to the valve body based on the output shaft speed. The valve body is mounted to the lower side of the transmission and contains the valves to control pressure regulation, fluid flow control, and clutch/band application. The oil pump is mounted at the front of the transmission and is driven by the torque converter hub. The pump supplies the oil pressure necessary for clutch/band actuation and transmission lubrication. The 30RH transmission is cooled by an integral fluid cooler inside the radiator.

DESCRIPTION AND OPERATION (Continued)



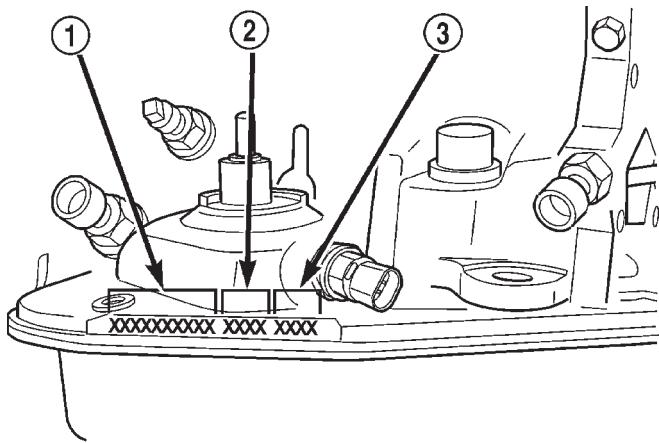
- | | |
|---------------------------------|-----------------------------|
| (1) CONVERTER | (11) OUTPUT SHAFT |
| (2) OIL PUMP | (12) SEAL |
| (3) FRONT CLUTCH | (13) ADAPTER HOUSING |
| (4) REAR CLUTCH | (14) VALVE BODY |
| (5) FRONT PLANETARY GEAR SET | (15) SUN GEAR DRIVING SHELL |
| (6) REAR PLANETARY GEAR SET | (16) OIL FILTER |
| (7) LOW AND REVERSE (REAR) BAND | (17) KICK DOWN (FRONT) BAND |
| (8) OVERRUNNING CLUTCH | (18) INPUT SHAFT |
| (9) GOVERNOR | (19) PARK GEAR |
| (10) BEARING | (20) CONVERTER CLUTCH |

Fig. 1 30RH Automatic Transmission

DESCRIPTION AND OPERATION (Continued)

TRANSMISSION IDENTIFICATION

Transmission identification numbers are stamped on the left side of the case just above the oil pan gasket surface (Fig. 2). Refer to this information when ordering replacement parts.



80b11960

Fig. 2 Transmission Part Number And Serial Number Location

- 1 – PART NUMBER
- 2 – BUILD DATE
- 3 – SERIAL NUMBER

OPERATION

The application of each driving or holding component is controlled by the valve body based upon the manual lever position and governor pressure. The governor pressure is a variable pressure input to the valve body and is one of the signals that a shift is necessary. First through third gear are obtained by selectively applying and releasing the different clutches and bands. Engine power is thereby routed to the various planetary gear assemblies which combine with the overrunning clutch assembly to generate the different gear ratios. The torque converter clutch is hydraulically applied and is released when fluid is vented from the hydraulic circuit by the torque converter control (TCC) solenoid on the valve body. The torque converter clutch is controlled by the Powertrain Control Module (PCM). The torque converter clutch engages in third gear when the vehicle is cruising on a level plane after the vehicle has warmed up. The torque converter clutch will disengage momentarily when an increase in engine load is sensed by the PCM, such as when the vehicle begins to go uphill or the throttle pressure is increased. The torque converter clutch feature increases fuel economy and reduces the transmission fluid temperature.

TRANSMISSION GEAR RATIOS

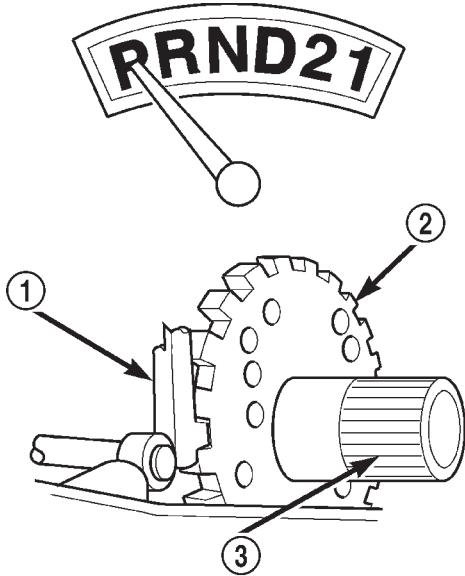
Forward gear ratios are:

- 2.74:1 (first gear)
- 1.54:1 (second gear)
- 1.00:1 (third gear)

DESCRIPTION AND OPERATION (Continued)

PARK POWERFLOW

As the engine is running and the crankshaft is rotating, the flexplate and torque converter, which are also bolted to it, are all rotating in a clockwise direction as viewed from the front of the engine. The notched hub of the torque converter is connected to the oil pump's internal gear, supplying the transmission with oil pressure. As the converter turns, it turns the input shaft in a clockwise direction. As the input shaft is rotating, the front clutch hub-rear clutch retainer and all their associated parts are also rotating, all being directly connected to the input shaft. The power flow from the engine through the front-clutch-hub and rear-clutch-retainer stops at the rear-clutch-retainer. Therefore, no power flow to the output shaft, occurs because no clutches are applied. The only mechanism in use at this time is the parking sprag (Fig. 3), which locks the parking gear on the output shaft to the transmission case.



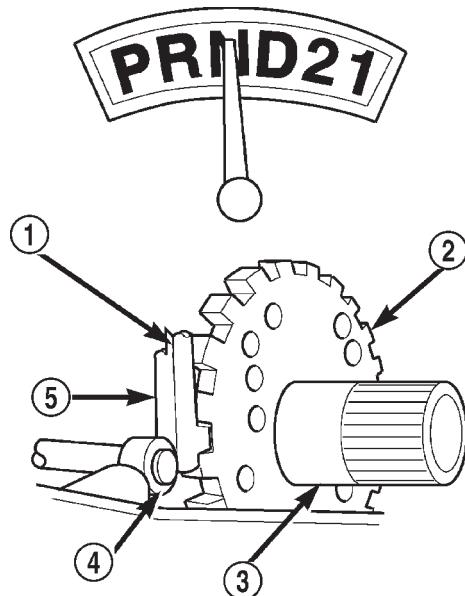
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Fig. 3 Park Powerflow

- 1 – LEVER ENGAGED FOR PARK
- 2 – PARK SPRAG
- 3 – OUTPUT SHAFT

NEUTRAL POWERFLOW

With the gear selector in the neutral position (Fig. 4), the power flow of the transmission is essentially the same as in the park position. The only operational difference is that the parking sprag has been disengaged, unlocking the output shaft from the transmission case and allowing it to move freely.



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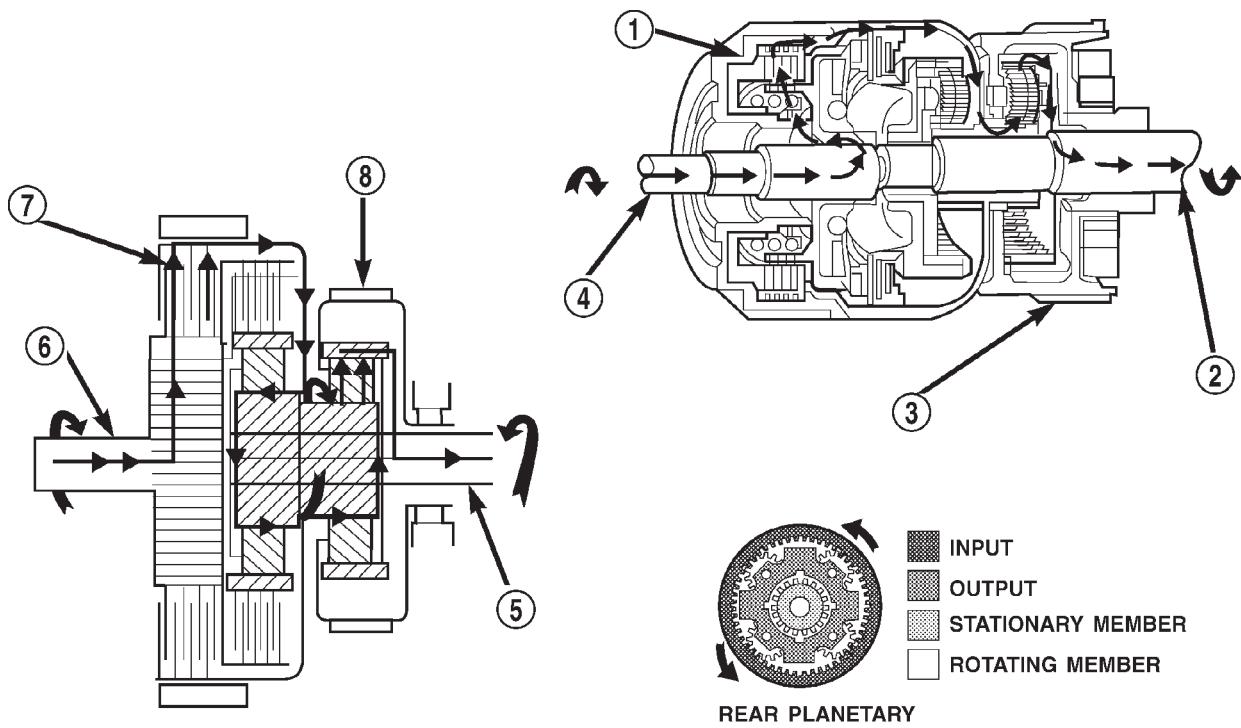
Fig. 4 Neutral Powerflow

- 1 – LEVER DISENGAGED FOR NEUTRAL
- 2 – PARK SPRAG
- 3 – OUTPUT SHAFT
- 4 – CAM
- 5 – LEVER

DESCRIPTION AND OPERATION (Continued)

REVERSE POWERFLOW

When the gear selector is moved into the reverse position (Fig. 5), the front clutch and the rear band are applied. With the application of the front clutch, engine torque is applied to the sun gear, turning it in a clockwise direction. The clockwise rotation of the sun gear causes the rear planet pinions to rotate against engine rotation in a counterclockwise direction. The rear band is holding the low reverse drum, which is splined to the rear carrier. Since the rear carrier is being held, the torque from the planet pinions is transferred to the rear annulus gear, which is splined to the output shaft. The output shaft in turn rotates with the annulus gear in a counterclockwise direction giving a reverse gear output. The entire transmission of torque is applied to the rear planetary gearset only. Although there is torque input to the front gearset through the sun gear, no other member of the gearset is being held. During the entire reverse stage of operation, the front planetary gears are in an idling condition.



80c070a8

Fig. 5 Reverse Powerflow

- 1 – FRONT CLUTCH ENGAGED
- 2 – OUTPUT SHAFT
- 3 – LOW/REVERSE BAND APPLIED
- 4 – INPUT SHAFT

- 5 – OUTPUT SHAFT
- 6 – INPUT SHAFT
- 7 – FRONT CLUTCH ENGAGED
- 8 – LOW/REVERSE BAND APPLIED

DESCRIPTION AND OPERATION (Continued)

FIRST GEAR POWERFLOW

When the gearshift lever is moved into the drive position the transmission goes into first gear (Fig. 6). As soon as the transmission is shifted from park or neutral to drive, the rear clutch applies, applying the rear clutch pack to the front annulus gear. Engine torque is now applied to the front annulus gear turning it in a clockwise direction. With the front annulus gear turning in a clockwise direction, it causes the front planets to turn in a clockwise direction. The rotation of the front planets cause the sun to revolve in a counterclockwise direction. The sun gear now transfers its counterclockwise rotation to the rear planets which rotate back in a clockwise direction. With the rear annulus gear stationary, the rear planet rotation on the annulus gear causes the rear planet carrier to revolve in a counterclockwise direction. The rear planet carrier is splined into the low-reverse drum, and the low reverse drum is splined to the inner race of the over-running clutch. With the over-running clutch locked, the planet carrier is held, and the resulting torque provided by the planet pinions is transferred to the rear annulus gear. The rear annulus gear is splined to the output shaft and rotated along with it (clockwise) in an underdrive gear reduction mode.

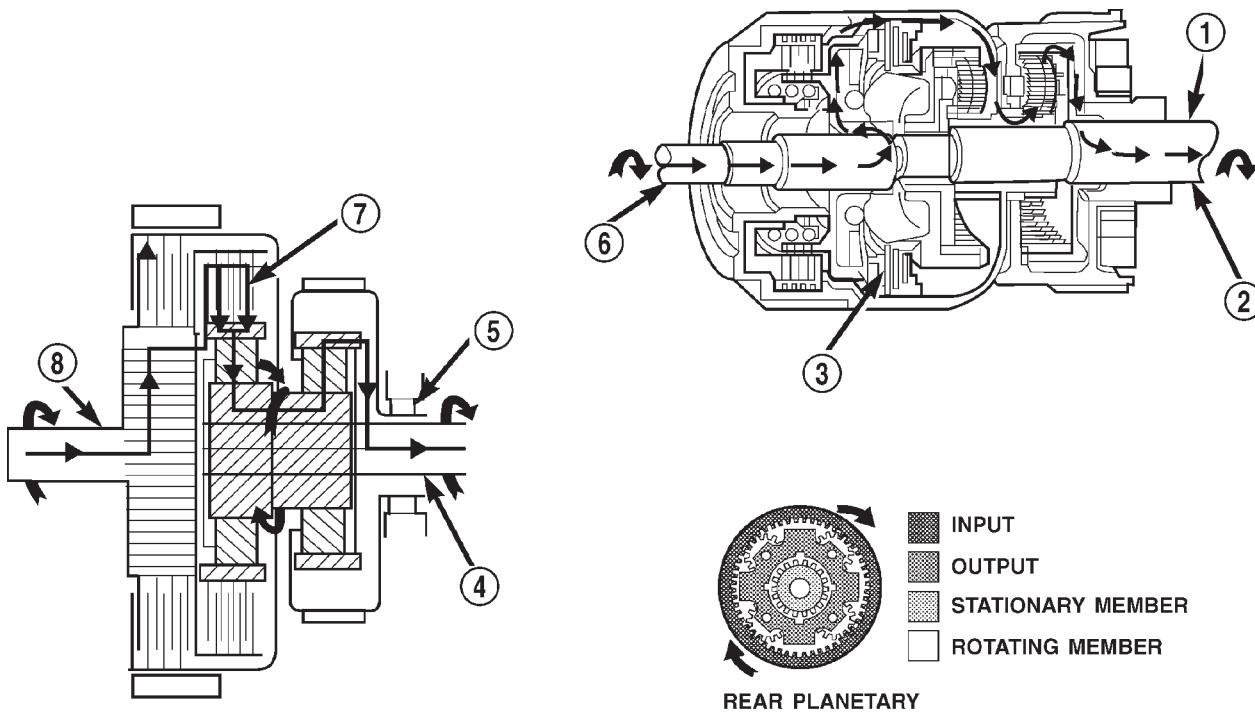


Fig. 6 First Gear Powerflow

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- 1 – OUTPUT SHAFT
- 2 – OVER-RUNNING CLUTCH HOLDING
- 3 – REAR CLUTCH APPLIED
- 4 – OUTPUT SHAFT

- 5 – OVER-RUNNING CLUTCH HOLDING
- 6 – INPUT SHAFT
- 7 – REAR CLUTCH APPLIED
- 8 – INPUT SHAFT

DESCRIPTION AND OPERATION (Continued)

SECOND GEAR POWERFLOW

In drive-second (Fig. 7), the same elements are applied as in manual-second. Therefore, the power flow will be the same, and both gears will be discussed as one in the same. In drive-second, the transmission has proceeded from first gear to its shift point, and is shifting from first gear to second. The second gear shift is obtained by keeping the rear clutch applied and applying the front (kickdown) band. The front band holds the front clutch retainer that is locked to the sun gear driving shell. With the rear clutch still applied, the input is still on the front annulus gear turning it clockwise at engine speed. Now that the front band is holding the sun gear stationary, the annulus rotation causes the front planets to rotate in a clockwise direction. The front carrier is then also made to rotate in a clockwise direction but at a reduced speed. This will transmit the torque to the output shaft, which is directly connected to the front planet carrier. The rear planetary annulus gear will also be turning because it is directly splined to the output shaft. All power flow has occurred in the front planetary gear set during the drive-second stage of operation, and now the over-running clutch, in the rear of the transmission, is disengaged and freewheeling on its hub.

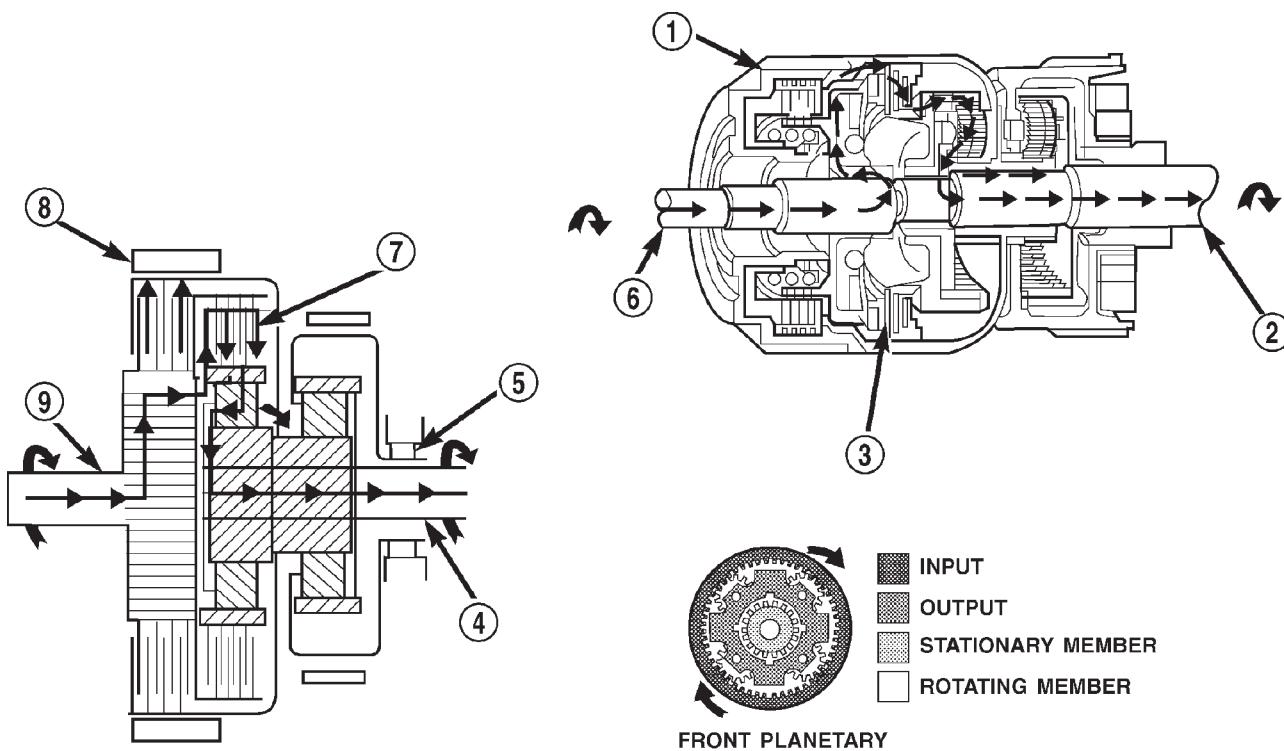


Fig. 7 Second Gear Powerflow

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- 1 – KICKDOWN BAND APPLIED
- 2 – OUTPUT SHAFT
- 3 – REAR CLUTCH ENGAGED
- 4 – OUTPUT SHAFT
- 5 – OVER-RUNNING CLUTCH FREE-WHEELING

- 6 – INPUT SHAFT
- 7 – REAR CLUTCH APPLIED
- 8 – KICKDOWN BAND APPLIED
- 9 – INPUT SHAFT

DESCRIPTION AND OPERATION (Continued)

DIRECT DRIVE POWERFLOW

The vehicle has accelerated and reached the shift point for the 2-3 upshift into direct drive (Fig. 8). When the shift takes place, the front band is released, and the front clutch is applied. The rear clutch stays applied as it has been in all the forward gears. With the front clutch now applied, engine torque is now on the front clutch retainer, which is locked to the sun gear driving shell. This means that the sun gear is now turning in engine rotation (clockwise) and at engine speed. The rear clutch is still applied so engine torque is also still on the front annulus gear. If two members of the same planetary set are driven, direct drive results. Therefore, when two members are rotating at the same speed and in the same direction, it is the same as being locked up. The rear planetary set is also locked up, given the sun gear is still the input, and the rear annulus gear must turn with the output shaft. Both gears are turning in the same direction and at the same speed. The front and rear planet pinions do not turn at all in direct drive. The only rotation is the input from the engine to the connected parts, which are acting as one common unit, to the output shaft.

FLUID

NOTE: Refer to the maintenance schedules in Group 0, Lubrication and Maintenance for the recommended maintenance (fluid/filter change) intervals for this transmission.

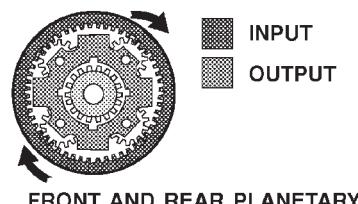
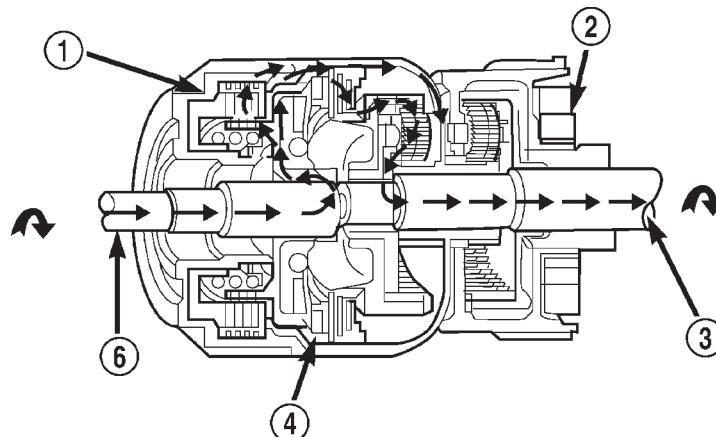
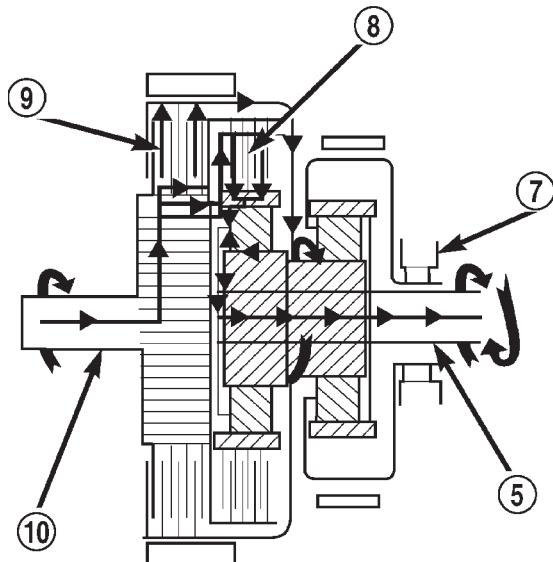
NOTE: Refer to Service Procedures in this group for fluid level checking procedures.

DESCRIPTION

Mopar® ATF Plus 3, Type 7176, automatic transmission fluid is the recommended fluid for Daimler-Chrysler automatic transmissions.

Dexron II fluid IS NOT recommended. Clutch chatter can result from the use of improper fluid.

Mopar® ATF Plus 3, Type 7176, automatic transmission fluid when new is red in color. The ATF is dyed red so it can be identified from other fluids used in the vehicle such as engine oil or antifreeze. The red color is not permanent and is not an indicator of



FRONT AND REAR PLANETARY

Fig. 8 Direct Drive Powerflow

80c070ab

- 1 – FRONT CLUTCH APPLIED
- 2 – OVER-RUNNING CLUTCH FREE-WHEELING
- 3 – OUTPUT SHAFT
- 4 – REAR CLUTCH APPLIED
- 5 – OUTPUT SHAFT

- 6 – INPUT SHAFT
- 7 – OVER-RUNNING CLUTCH FREE-WHEELING
- 8 – REAR CLUTCH APPLIED
- 9 – FRONT CLUTCH APPLIED
- 10 – INPUT SHAFT

DESCRIPTION AND OPERATION (Continued)

fluid condition. As the vehicle is driven, the ATF will begin to look darker in color and may eventually become brown. **This is normal.** A dark brown/black fluid accompanied with a burnt odor and/or deterioration in shift quality may indicate fluid deterioration or transmission component failure.

FLUID ADDITIVES

DaimlerChrysler 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 and/or quality. These additives and others also claim to improve converter clutch operation and inhibit overheating, oxidation, varnish, and sludge. These claims have not been supported to the satisfaction of DaimlerChrysler 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.

OPERATION

The automatic transmission fluid is selected based upon several qualities. The fluid must provide a high level of protection for the internal components by providing a lubricating film between adjacent metal components. The fluid must also be thermally stable so that it can maintain a consistent viscosity through a large temperature range. If the viscosity stays constant through the temperature range of operation, transmission operation and shift feel will remain consistent. Transmission fluid must also be a good conductor of heat. The fluid must absorb heat from the internal transmission components and transfer that heat to the transmission case.

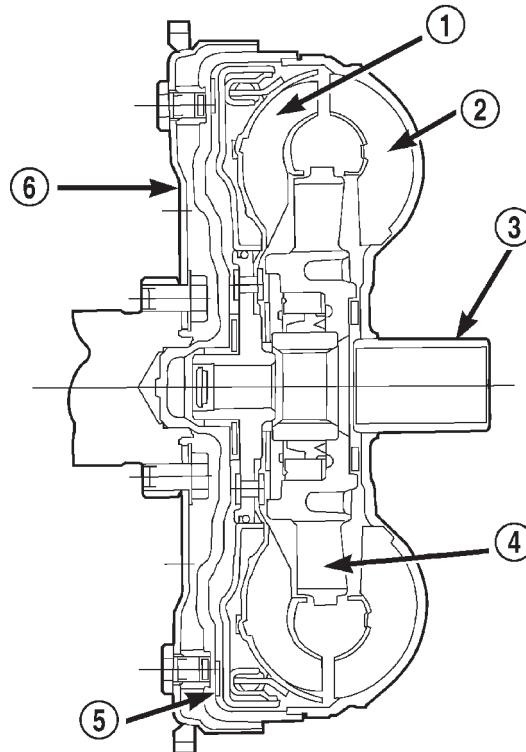
TORQUE CONVERTER

DESCRIPTION

The torque converter (Fig. 9) is a hydraulic device that couples the engine crankshaft to the transmission. The torque converter consists of an outer shell with an internal turbine, a stator, an overrunning clutch, an impeller and an electronically applied converter clutch. The converter clutch provides reduced engine speed and greater fuel economy when engaged. Clutch engagement also provides reduced transmission fluid temperatures. The converter clutch engages in third gear. The torque converter hub drives the transmission oil (fluid) pump.

The torque converter is a sealed, welded unit that is not repairable and is serviced as an assembly.

CAUTION: The torque converter must be replaced if a transmission failure resulted in large amounts of metal or fiber contamination in the fluid. If the fluid is contaminated, flush the fluid cooler and lines.



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Fig. 9 Torque Converter Assembly

- 1 - TURBINE
- 2 - IMPELLER
- 3 - HUB
- 4 - STATOR
- 5 - CONVERTER CLUTCH DISC
- 6 - DRIVE PLATE

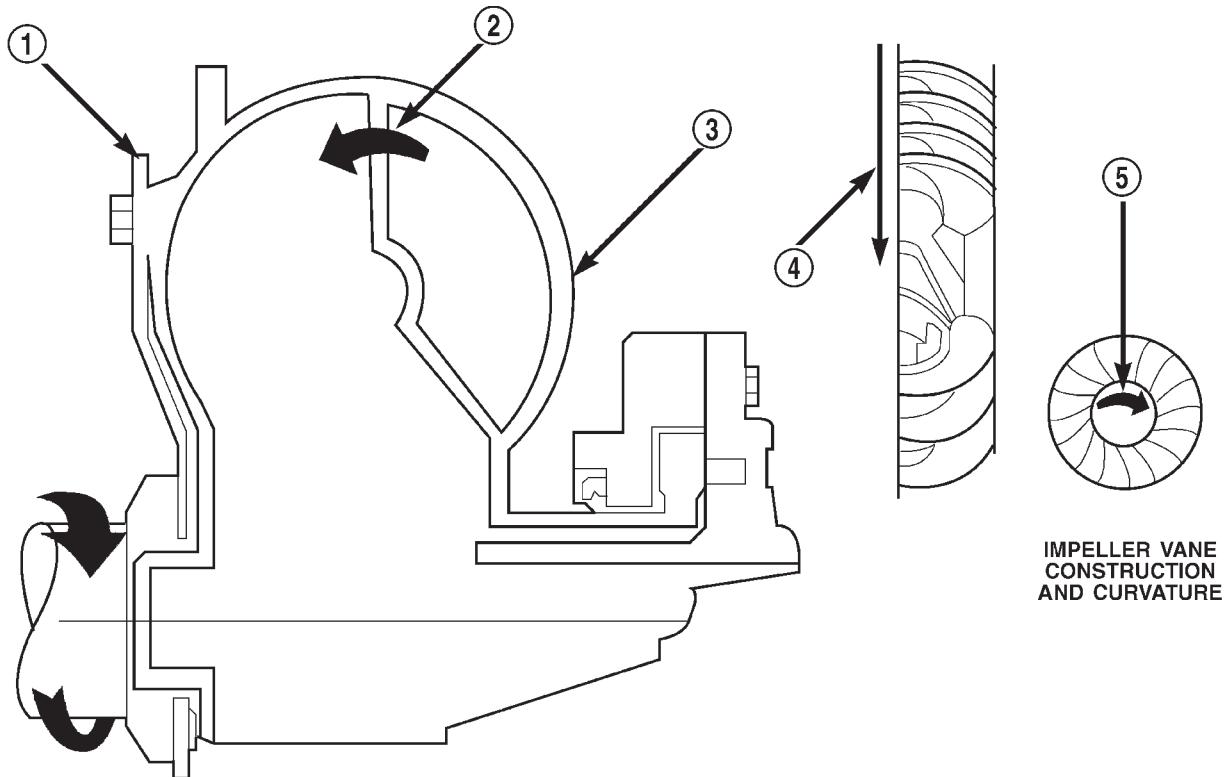
DESCRIPTION AND OPERATION (Continued)

IMPELLER

The impeller (Fig. 10) is an integral part of the converter housing. The impeller consists of curved blades placed radially along the inside of the housing on the transmission side of the converter. As the converter housing is rotated by the engine, so is the impeller, because they are one and the same and are the driving member of the system.

TURBINE

The turbine (Fig. 11) is the output, or driven, member of the converter. The turbine is mounted within the housing opposite the impeller, but is not attached to the housing. The input shaft is inserted through the center of the impeller and splined into the turbine. The design of the turbine is similar to the impeller, except the blades of the turbine are curved in the opposite direction.



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Fig. 10 Impeller

1 – ENGINE FLEXPLATE

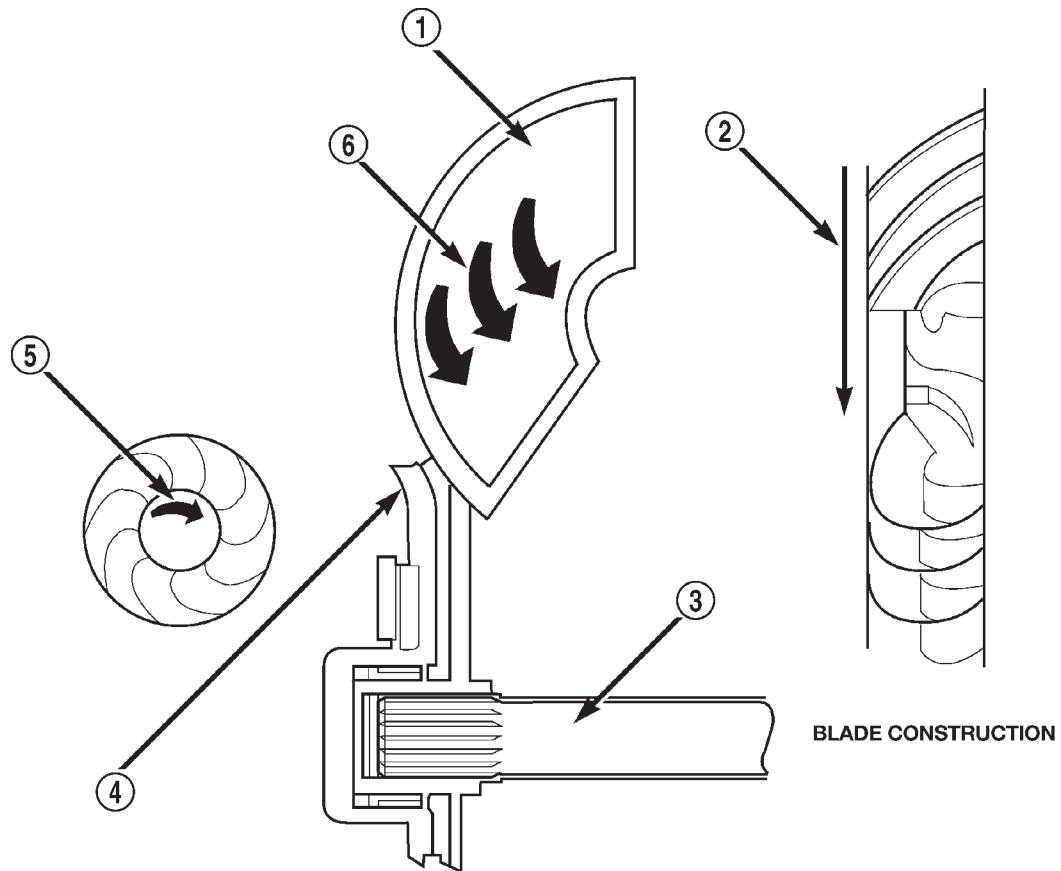
2 – OIL FLOW FROM IMPELLER SECTION INTO TURBINE SECTION

3 – IMPELLER VANES AND COVER ARE INTEGRAL

4 – ENGINE ROTATION

5 – ENGINE ROTATION

DESCRIPTION AND OPERATION (Continued)

**Fig. 11 Turbine**

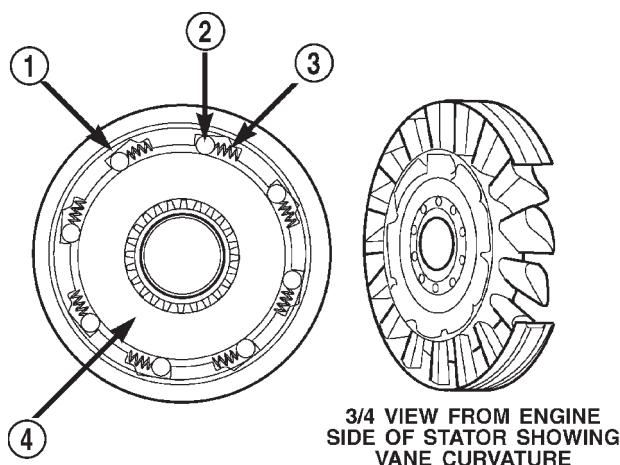
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- 1 – TURBINE VANE
2 – ENGINE ROTATION
3 – INPUT SHAFT

- 4 – PORTION OF TORQUE CONVERTER COVER
5 – ENGINE ROTATION
6 – OIL FLOW WITHIN TURBINE SECTION

STATOR

The stator assembly (Fig. 12) is mounted on a stationary shaft which is an integral part of the oil pump. The stator is located between the impeller and turbine within the torque converter case (Fig. 13). The stator contains an over-running clutch, which allows the stator to rotate only in a clockwise direction. When the stator is locked against the over-running clutch, the torque multiplication feature of the torque converter is operational.



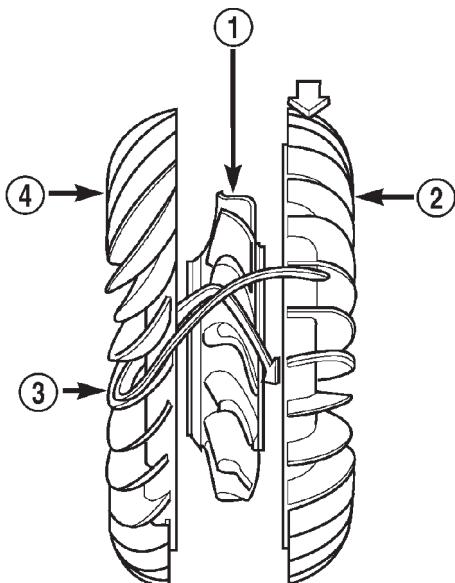
VIEW FROM ENGINE SIDE

Fig. 12 Stator Components

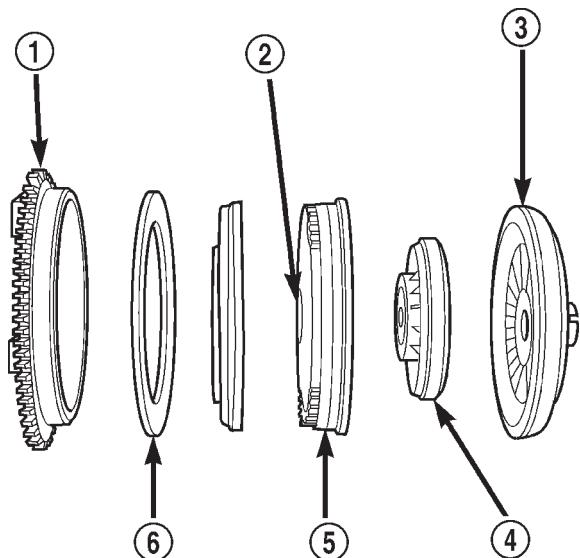
80bfe26c

- 1 – CAM (OUTER RACE)
2 – ROLLER
3 – SPRING
4 – INNER RACE

DESCRIPTION AND OPERATION (Continued)

**Fig. 13 Stator Location**

- 1 – STATOR
- 2 – IMPELLER
- 3 – FLUID FLOW
- 4 – TURBINE

**Fig. 14 Torque Converter Clutch (TCC)**

- 1 – IMPELLER FRONT COVER
- 2 – THRUST WASHER ASSEMBLY
- 3 – IMPELLER
- 4 – STATOR
- 5 – TURBINE
- 6 – FRICTION DISC

TORQUE CONVERTER CLUTCH (TCC)

The TCC (Fig. 14) was installed to improve the efficiency of the torque converter that is lost to the slippage of the fluid coupling. Although the fluid coupling provides smooth, shock-free power transfer, it is natural for all fluid couplings to slip. If the impeller and turbine were mechanically locked together, a zero slippage condition could be obtained. A hydraulic piston was added to the turbine, and a friction material was added to the inside of the front cover to provide this mechanical lock-up.

OPERATION

The converter impeller (Fig. 15) (driving member), which is integral to the converter housing and bolted to the engine drive plate, rotates at engine speed. The converter turbine (driven member), which reacts from fluid pressure generated by the impeller, rotates and turns the transmission input shaft.

TURBINE

As the fluid that was put into motion by the impeller blades strikes the blades of the turbine, some of the energy and rotational force is transferred into the turbine and the input shaft. This causes both of them (turbine and input shaft) to rotate in a clockwise direction following the impeller. As the fluid is leaving the trailing edges of the turbine's blades it continues in a "hindering" direction back toward the

impeller. If the fluid is not redirected before it strikes the impeller, it will strike the impeller in such a direction that it would tend to slow it down.

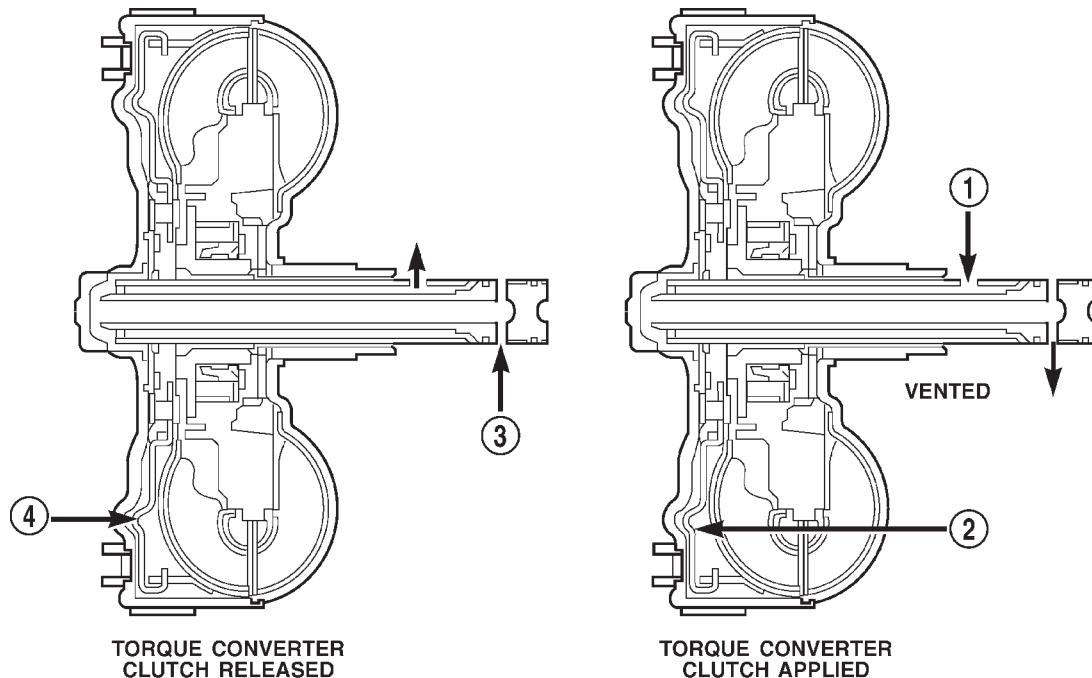
STATOR

Torque multiplication is achieved by locking the stator's over-running clutch to its shaft (Fig. 16). Under stall conditions (the turbine is stationary), the oil leaving the turbine blades strikes the face of the stator blades and tries to rotate them in a counter-clockwise direction. When this happens the over-running clutch of the stator locks and holds the stator from rotating. With the stator locked, the oil strikes the stator blades and is redirected into a "helping" direction before it enters the impeller. This circulation of oil from impeller to turbine, turbine to stator, and stator to impeller, can produce a maximum torque multiplication of about 2.4:1. As the turbine begins to match the speed of the impeller, the fluid that was hitting the stator in such a way as to cause it to lock-up is no longer doing so. In this condition of operation, the stator begins to free wheel and the converter acts as a fluid coupling.

TORQUE CONVERTER CLUTCH (TCC)

In a standard torque converter, the impeller and turbine are rotating at about the same speed and the

DESCRIPTION AND OPERATION (Continued)



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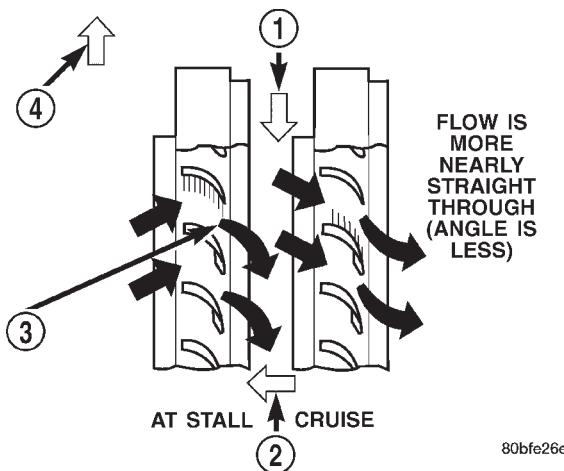
Fig. 15 Torque Converter Fluid Operation

1 – APPLY PRESSURE

2 – THE PISTON MOVES SLIGHTLY FORWARD

3 – RELEASE PRESSURE

4 – THE PISTON MOVES SLIGHTLY REARWARD



80bfe26e

Fig. 16 Stator Operation

1 – DIRECTION STATOR WILL FREE WHEEL DUE TO OIL PUSHING ON BACKSIDE OF VANES

2 – FRONT OF ENGINE

3 – INCREASED ANGLE AS OIL STRIKES VANES

4 – DIRECTION STATOR IS LOCKED UP DUE TO OIL PUSHING AGAINST STATOR VANES

stator is freewheeling, providing no torque multiplication. By applying the turbine's piston to the front cover's friction material, a total converter engagement can be obtained. The result of this engagement

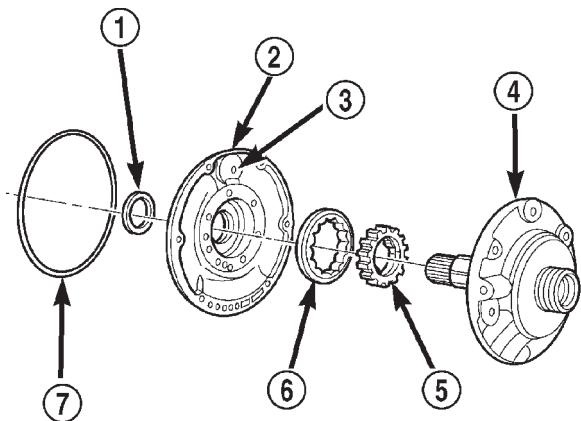
is a direct 1:1 mechanical link between the engine and the transmission.

The engagement and disengagement of the TCC are automatic and controlled by the Powertrain Control Module (PCM). The engagement cannot be activated in the lower gears because it eliminates the torque multiplication effect of the torque converter necessary for acceleration. Inputs that determine clutch engagement are: coolant temperature, vehicle speed and throttle position. The torque converter clutch is engaged by the clutch solenoid on the valve body. The clutch will engage at approximately 56 km/h (35 mph) with light throttle, after the shift to third gear.

OIL PUMP**DESCRIPTION**

The oil pump (Fig. 17) is located in the pump housing inside the bell housing of the transmission case. The oil pump consists of an inner and outer gear, a housing, and a cover that also serves as the reaction shaft support.

DESCRIPTION AND OPERATION (Continued)



80be45f7

Fig. 17 Oil Pump Assembly

- 1 – OIL SEAL
- 2 – OIL PUMP BODY
- 3 – VENT
- 4 – REACTION SHAFT SUPPORT
- 5 – INNER ROTOR
- 6 – OUTER ROTOR
- 7 – “O” RING

OPERATION

As the torque converter rotates, the converter hub rotates the inner and outer gears. As the gears rotate, the clearance between the gear teeth increases in the crescent area, and creates a suction at the inlet side of the pump. This suction draws fluid through the pump inlet from the oil pan. As the clearance between the gear teeth in the crescent area decreases, it forces pressurized fluid into the pump outlet and to the valve body.

VALVE BODY**DESCRIPTION**

The valve body consists of a cast aluminum valve body, a separator plate, and transfer plate. The valve body contains valves and check balls that control fluid delivery to the torque converter clutch, bands, and frictional clutches. The valve body contains the following components (Fig. 18) and (Fig. 19):

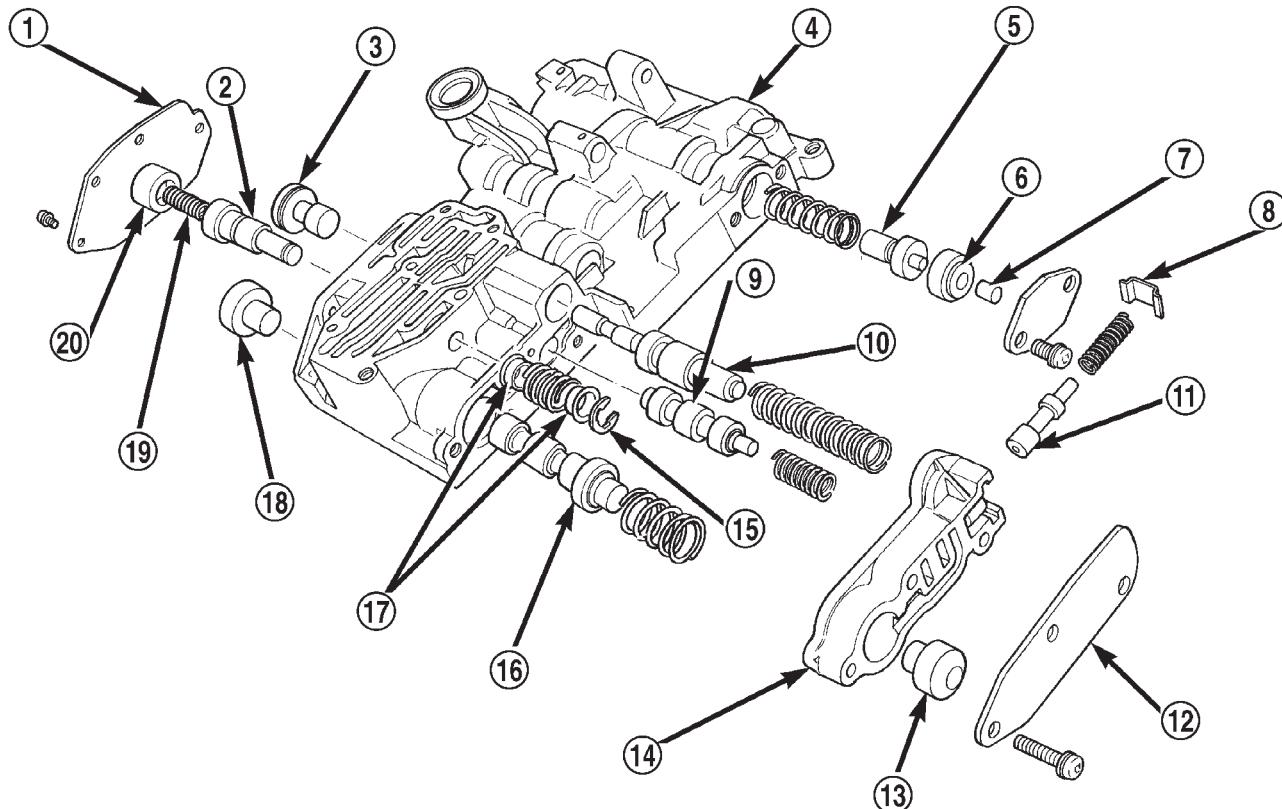
- Regulator valve
- Regulator valve throttle pressure plug
- Line pressure plug and sleeve
- Kickdown valve
- Kickdown limit valve
- 1-2 shift valve
- 1-2 control valve
- 2-3 shift valve
- 2-3 governor plug
- Throttle valve
- Throttle pressure plug
- Switch valve
- Manual valve
- Converter clutch control valve
- Fail-safe valve
- Shuttle valve
- Shuttle valve throttle plug
- 9 check balls

By adjusting the spring pressure acting on the regulator valve, transmission line pressure can be adjusted.

OPERATION

NOTE: Refer to the Hydraulic Schematics for a visual aid in determining valve location, operation and design.

DESCRIPTION AND OPERATION (Continued)



80a13872

Fig. 18 Valve Body Assembly

- 1 – GOVERNOR PLUG END PLATE
- 2 – SHUTTLE VALVE
- 3 – 1-2 GOVERNOR PLUG
- 4 – VALVE BODY
- 5 – REGULATOR VALVE THROTTLE PRESSURE PLUG
- 6 – SLEEVE
- 7 – LINE PRESSURE PLUG
- 8 – RETAINER
- 9 – 1-2 SHIFT VALVE
- 10 – 1-2 SHIFT CONTROL VALVE

- 11 – KICKDOWN LIMIT VALVE
- 12 – END PLATE
- 13 – THROTTLE PRESSURE PLUG
- 14 – KICKDOWN LIMIT VALVE BODY
- 15 – E-RING
- 16 – 2-3 SHIFT VALVE
- 17 – GUIDES
- 18 – 2-3 GOVERNOR PLUG
- 19 – PRIMARY SPRING
- 20 – SHUTTLE VALVE THROTTLE PLUG

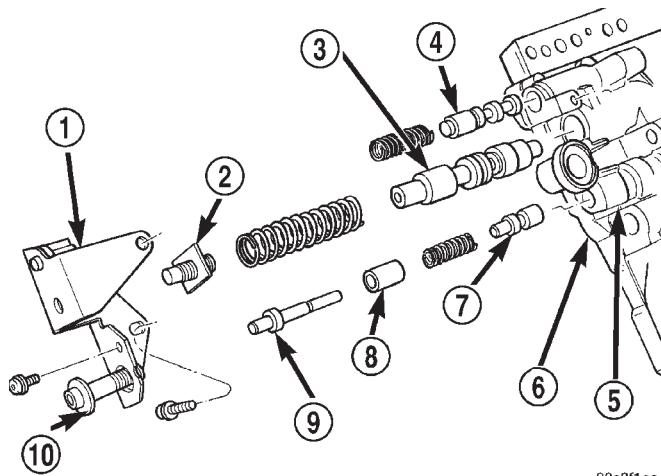
REGULATOR VALVE

The pressure regulator valve is needed to control the hydraulic pressure within the system and reduce the amount of heat produced in the fluid. The pressure regulator valve is located in the valve body near the manual valve. The pressure regulator valve train controls the maximum pressure in the lines by metering the dumping of fluid back into the sump. Regulated pressure is referred to as "line pressure."

The regulator valve (Fig. 20) has a spring on one end that pushes the valve to the left. This closes a dump (vent) that is used to lower pressure. The closing of the dump will cause the oil pressure to increase. Oil pressure on the opposite end of the valve pushes the valve to the right, opening the dump and lowering oil pressure. The result is spring pressure working against oil pressure to maintain

the oil at specific pressures. With the engine running, fluid flows from the pump to the pressure regulator valve, manual valve, and the interconnected circuits. As fluid is sent through passages to the regulator valve, the pressure pushes the valve to the right against the large spring. It is also sent to the reaction areas on the left side of the throttle pressure plug and the line pressure plug. With the gear selector in the park position, fluid recirculates through the regulator and manual valves back to the sump.

DESCRIPTION AND OPERATION (Continued)

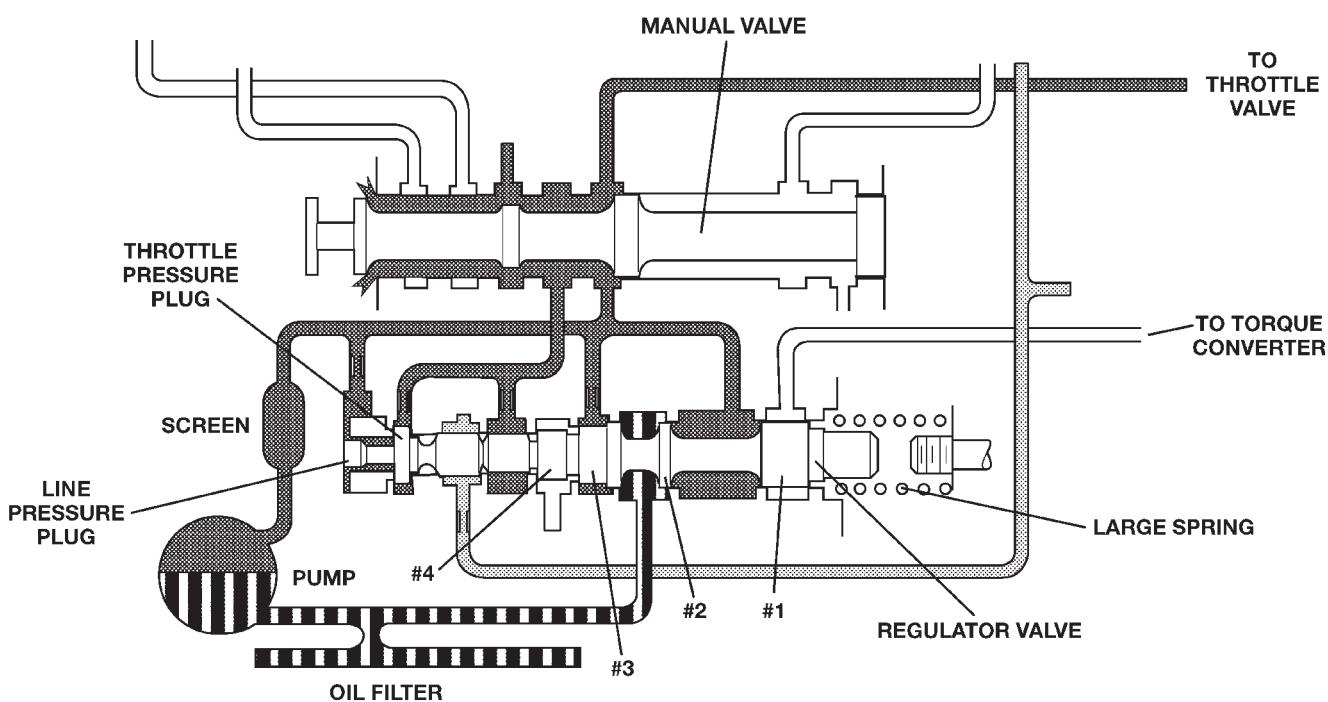


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Fig. 19 Valve Body Assembly

- 1 – ADJUSTER BRACKET
- 2 – LINE PRESSURE ADJUSTER
- 3 – PRESSURE REGULATOR VALVE
- 4 – SWITCH VALVE
- 5 – VALVE BODY
- 6 – TRANSFER PLATE
- 7 – THROTTLE VALVE
- 8 – SLEEVE
- 9 – KICKDOWN VALVE
- 10 – THROTTLE PRESSURE ADJUSTER

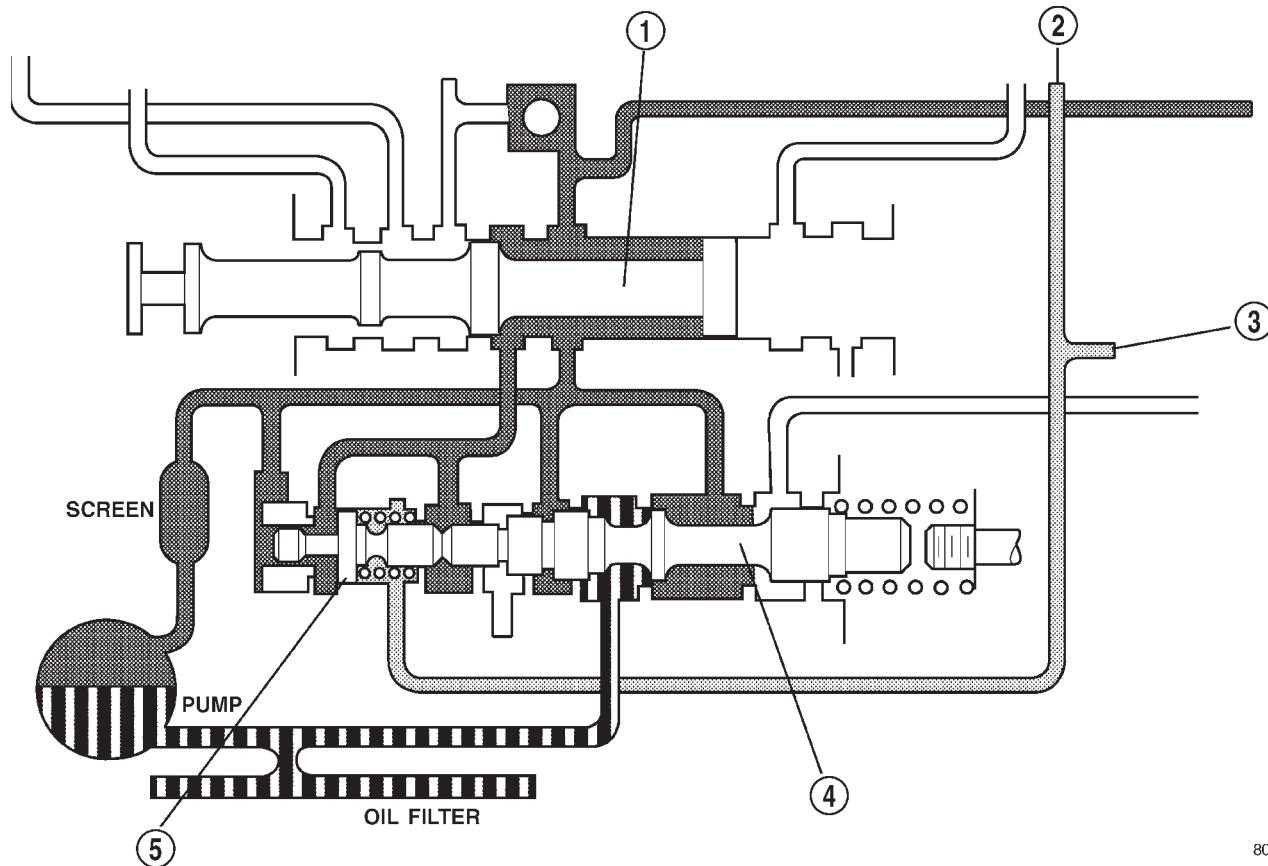
Meanwhile, the torque converter is filled slowly. In all other gear positions (Fig. 21), fluid flows between two right side lands to the switch valve and torque converter. At low pump speeds, the flow is controlled by the pressure valve groove to reduce pressure to the torque converter. After the torque converter and switch valve fill with fluid, the switch valve becomes the controlling metering device for torque converter pressure. The regulator valve then begins to control the line pressure for the other transmission circuits. The balance of the fluid pressure pushing the valve to the right and the spring pressure pushing to the left determines the size of the metering passage at land #2 (land #1 being at the far right of the valve in the diagram). As fluid leaks past the land, it moves into a groove connected to the filter or sump. As the land meters the fluid to the sump, it causes the pressure to reduce and the spring decreases the size of the metering passage. When the size of the metering passage is reduced, the pressure rises again and the size of the land is increased again. Pressure is regulated by this constant balance of hydraulic and spring pressure.



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Fig. 20 Regulator Valve in Park Position

DESCRIPTION AND OPERATION (Continued)



80be4609

Fig. 21 Regulator Valve in Neutral Position

- 1 – MANUAL VALVE
2 – TO SHIFT VALVE
3 – FROM THROTTLE VALVE

- 4 – REGULATOR VALVE
5 – THROTTLE PRESSURE PLUG

The metering at land #2 establishes the line pressure throughout the transmission. It is varied according to changes in throttle position, engine speed, and transmission condition within a range of 57–94 psi (except in reverse) (Fig. 22). The regulated line pressure in reverse (Fig. 23) is held at much higher pressures than in the other gear positions: 145–280 psi. The higher pressure for reverse is achieved by the manual valve blocking the supply of line pressure to the reaction area left of land #4. With this pressure blocked, there is less area for pressure to act on to balance the force of the spring on the right. This allows line pressure to push the valve train to the right, reducing the amount of fluid returned to the pump's inlet, increasing line pressure.

DESCRIPTION AND OPERATION (Continued)

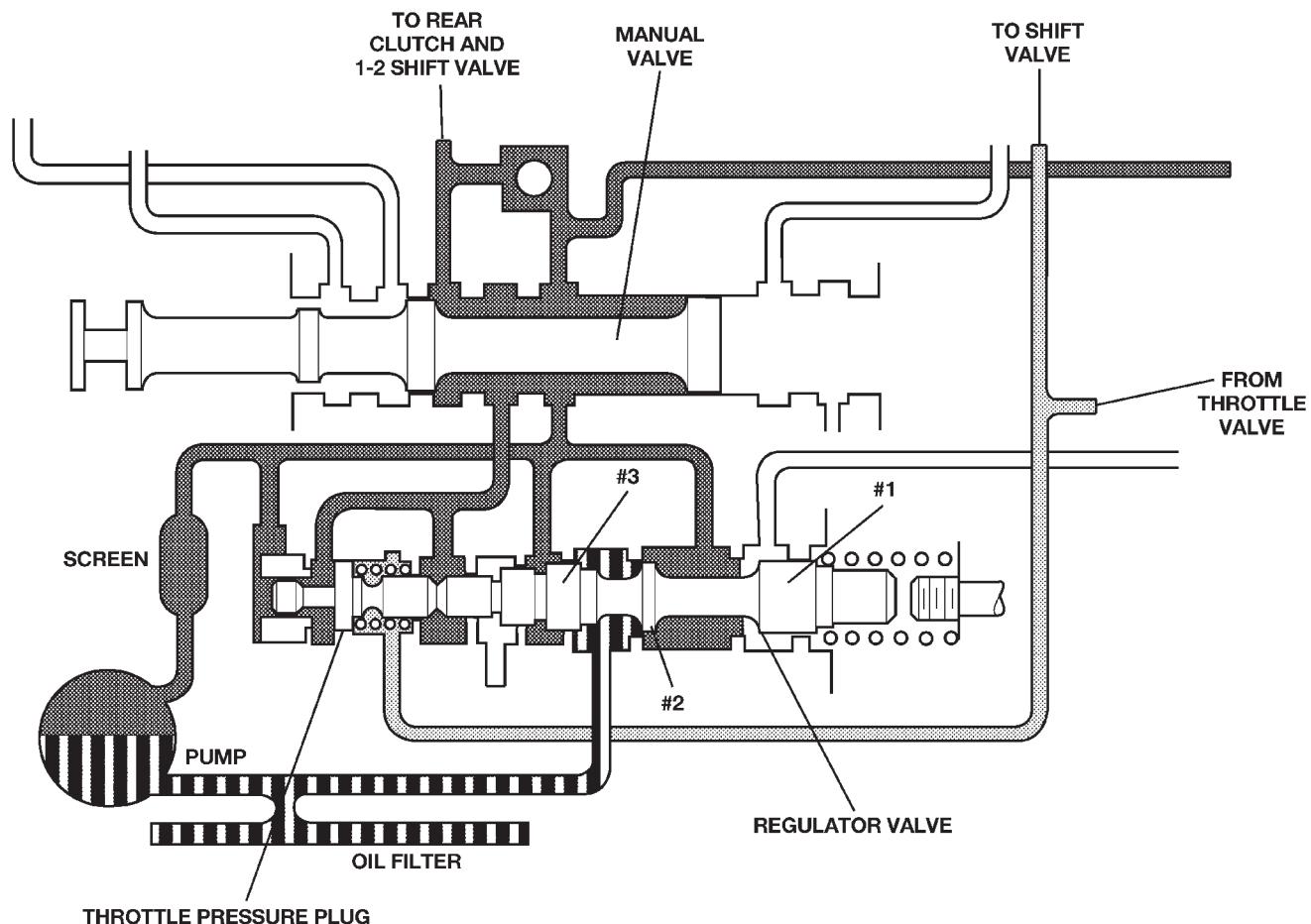


Fig. 22 Regulator Valve in Drive Position

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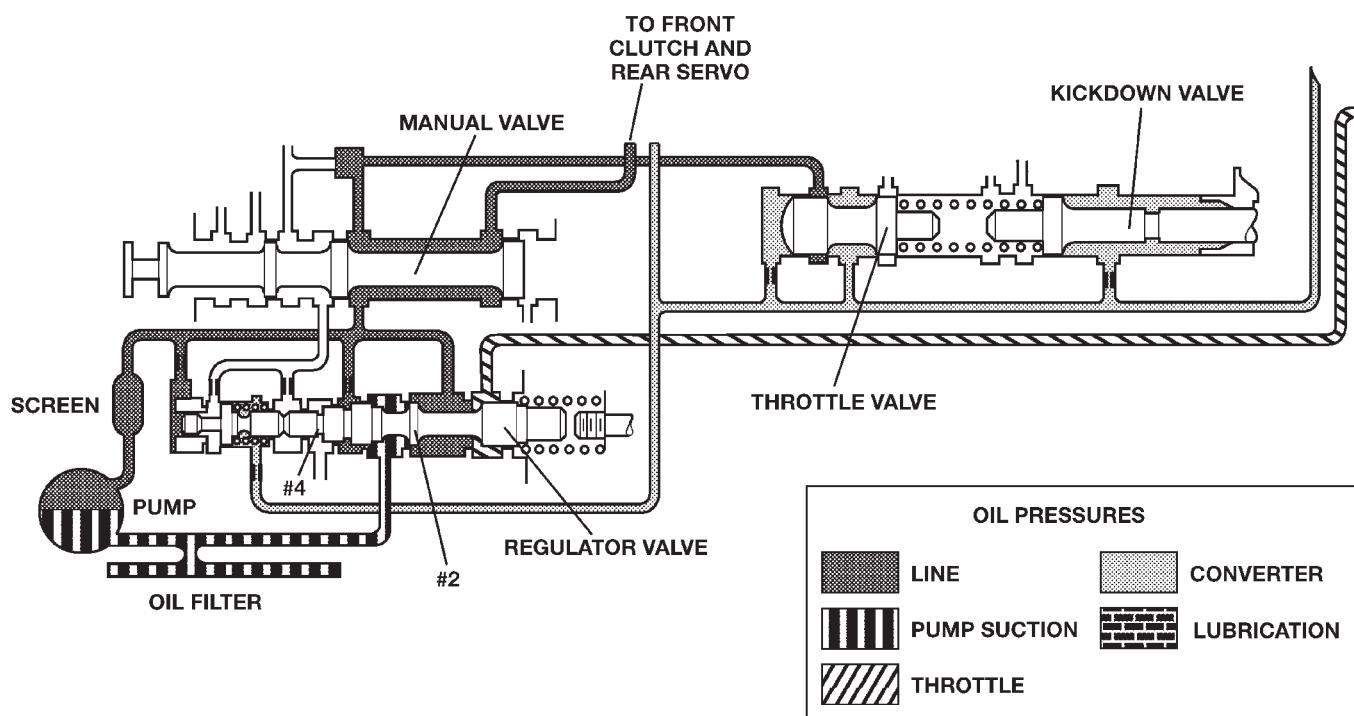
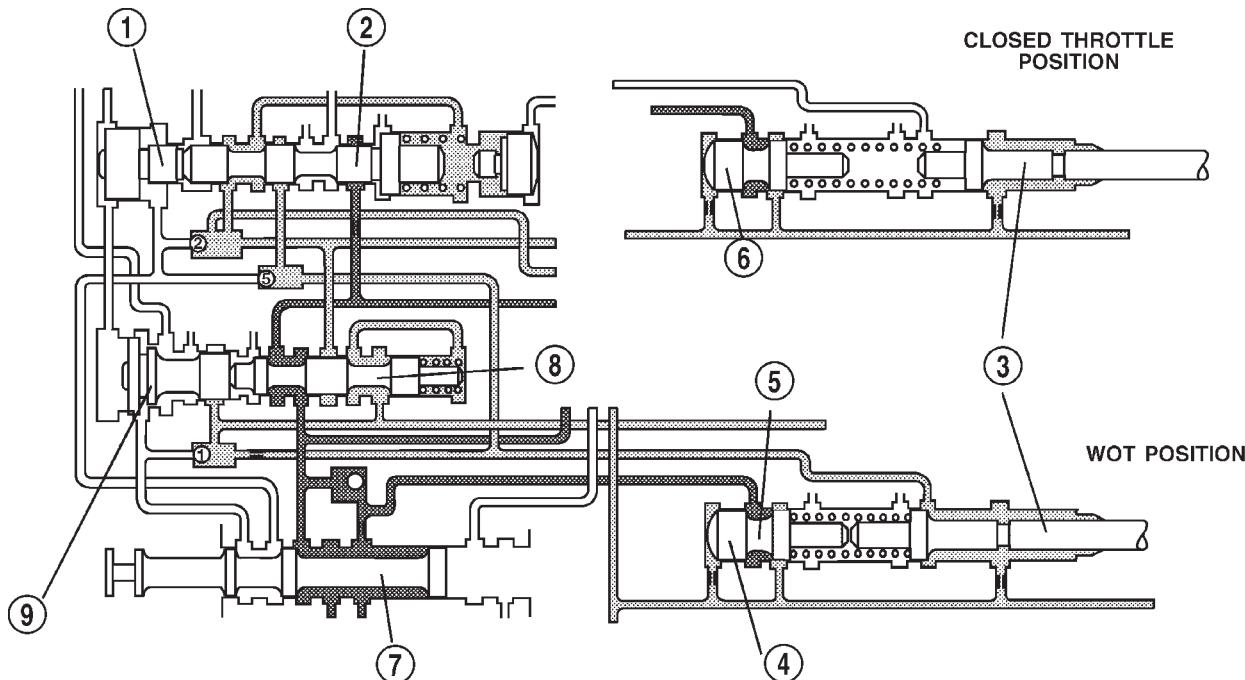


Fig. 23 Regulator Valve in Reverse Position

80be460b

DESCRIPTION AND OPERATION (Continued)



80be460c

Fig. 24 Kickdown Valve

1 – GOVERNOR PLUG

2 – 2-3 SHIFT VALVE

3 – KICKDOWN VALVE

4 – THROTTLE VALVE

5 – MAXIMUM THROTTLE PRESSURE

6 – THROTTLE VALVE

7 – MANUAL VALVE

8 – 1-2 SHIFT VALVE

9 – GOVERNOR PLUG

KICKDOWN VALVE

When the throttle valve is as far over to the left as it can go, the maximum line pressure possible will enter the throttle pressure circuit. In this case, throttle pressure will equal line pressure. With the kickdown valve (Fig. 24) pushed into the bore as far as it will go, fluid initially flows through the annular groove of the 2-3 shift valve (which will be in the direct drive position to the right).

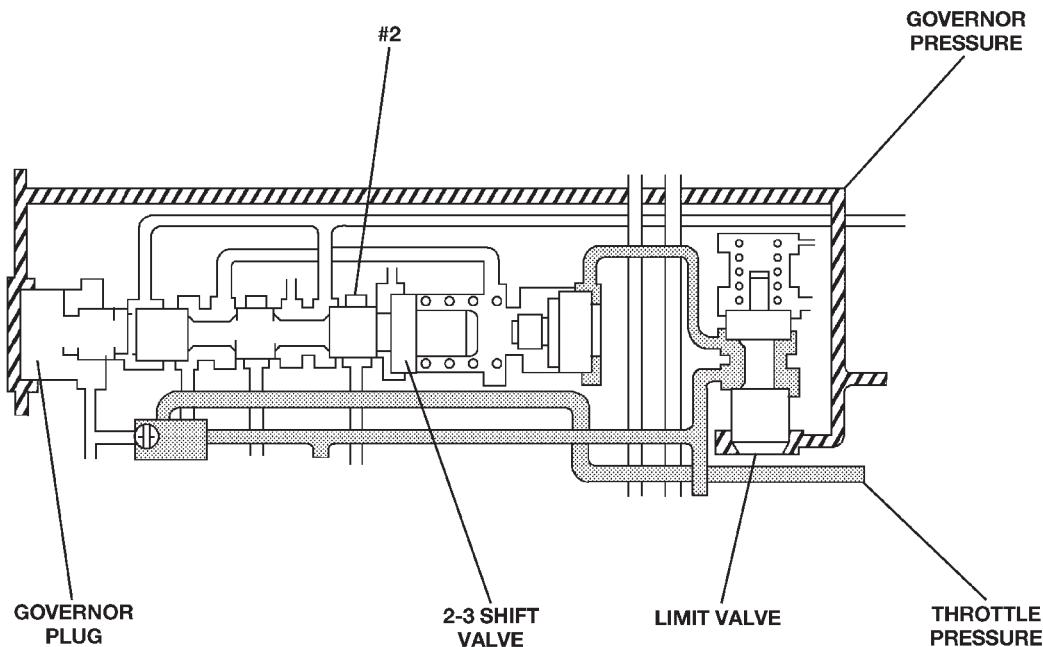
After passing the annular groove, the fluid is routed to the spring end of the 2-3 shift valve. Fluid pressure reacting on the area of land #1 overcomes governor pressure, downshifting the 2-3 shift valve into the kickdown, or second gear stage of operation. The valve is held in the kickdown position by throttle pressure routed from a seated check ball (#2). Again, if vehicle speed is low enough, throttle pressure will also push the 1-2 shift valve left to seat its governor plug, and downshift to drive breakaway.

KICKDOWN LIMIT VALVE

The purpose of the limit valve is to prevent a 3-2 downshift at higher speeds when a part-throttle downshift is not desirable. At these higher speeds only a full throttle 3-2 downshift will occur. At low road speeds (Fig. 25) the limit valve does not come into play and does not affect the downshifts. As the vehicle's speed increases (Fig. 26), the governor pressure also increases. The increased governor pressure acts on the reaction area of the bottom land of the limit valve overcoming the spring force trying to push the valve toward the bottom of its bore. This pushes the valve upward against the spring and bottoms the valve against the top of the housing. With the valve bottomed against the housing, the throttle pressure supplied to the valve will be closed off by the bottom land of the limit valve. When the supply of throttle pressure has been shut off, the 3-2 part throttle downshift plug becomes inoperative, because no pressure is acting on its reaction area.

DESCRIPTION AND OPERATION (Continued)

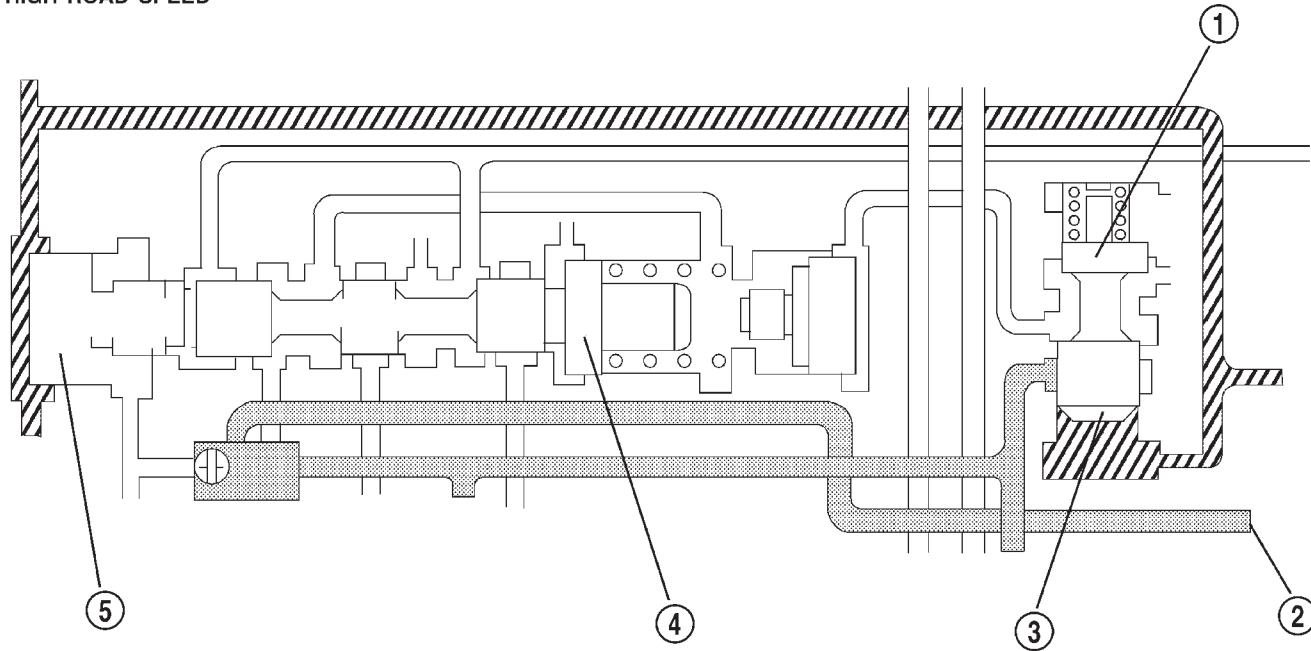
LOW ROAD SPEED



80be460d

Fig. 25 Kickdown Limit Valve-Low Speeds

HIGH ROAD SPEED



80be460f

Fig. 26 Kickdown Limit Valve-High Speeds

1 – GOVERNOR PRESSURE CLOSES LIMIT VALVE

2 – THROTTLE PRESSURE

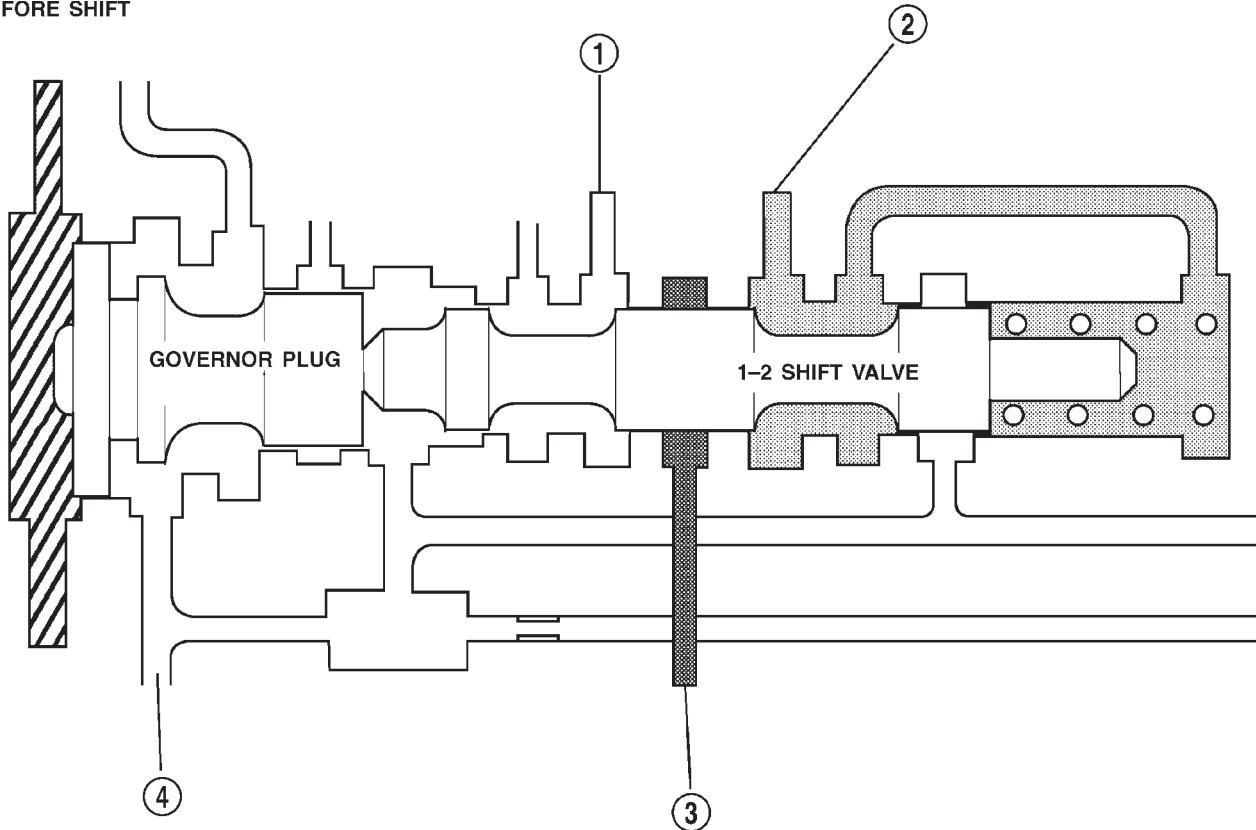
3 – LIMIT VALVE

4 – 2-3 SHIFT VALVE

5 – GOVERNOR PLUG

DESCRIPTION AND OPERATION (Continued)

BEFORE SHIFT



80be4611

Fig. 27 1-2 Shift Valve-Before Shift

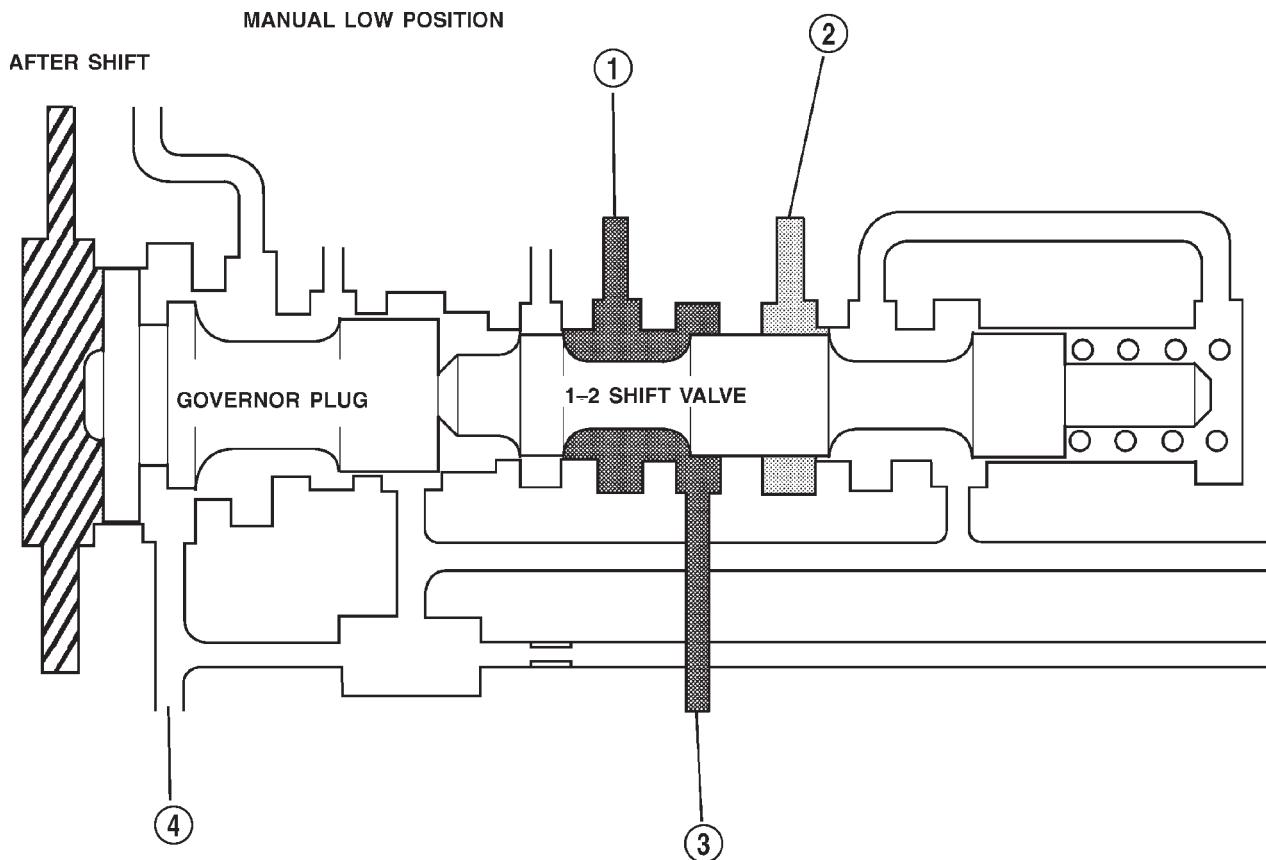
- 1 – TO FRONT SERVO AND 2-3 SHIFT VALVE
2 – THROTTLE PRESSURE

- 3 – LINE PRESSURE
4 – LINE PRESSURE PASSAGE FOR MANUAL LOW POSITION

1-2 SHIFT VALVE

The 1-2 shift valve assembly (Fig. 27), or mechanism, consists of: the 1-2 shift valve, governor plug, and a spring on the end of the valve. After the manual valve has been placed into a forward gear range, line pressure is directed to the 1-2 shift valve. As the throttle is depressed, throttle pressure is applied to the right side of the 1-2 shift valve assembly. With throttle pressure applied to the right side of the valve, there is now both spring pressure and throttle pressure acting on the valve, holding it against the governor plug. As the vehicle begins to move and build speed, governor pressure is created and is applied to the left of the valve at the governor plug.

DESCRIPTION AND OPERATION (Continued)



80be4612

Fig. 28 1-2 Shift Valve-After Shift

1 – TO FRONT SERVO AND 2-3 SHIFT VALVE

2 – THROTTLE PRESSURE

3 – LINE PRESSURE

4 – LINE PRESSURE PASSAGE FOR MANUAL LOW POSITION

When governor pressure builds to a point where it can overcome the combined force of the spring and throttle pressure on the other side of the valve, the valve will begin to move over to the right. As the valve moves to the right, the middle land of the valve will close off the circuit supplying the throttle pressure to the right side of the valve. When the throttle pressure is closed off, the valve will move even farther to the right, allowing line pressure to enter another circuit and energize the front servo, applying the front band (Fig. 28).

The governor plug serves a dual purpose: [0001]

- It allows the shift valves to move either left or right, allowing both upshifts and downshifts.
- When in a manual selection position, it will be hydraulically "blocked" into position so no upshift can occur.

The physical blocking of the upshift while in the manual "1" position is accomplished by the directing of line pressure between both lands of the governor plug. The line pressure reacts against the larger land of the plug, pushing the plug back against the end

plate overcoming governor pressure. With the combination of the line pressure and spring pressure, the valve cannot move, preventing any upshift.

1-2 SHIFT CONTROL VALVE

It contains a valve with four lands and a spring. It is used as both a "relay" and "balanced" valve.

The valve has two specific operations (Fig. 29):

- Aid in quality of the 1-2 upshift.
- Aid in the quality and timing of the 3-2 kickdown ranges.

When the manual valve is set to the Drive position and the transmission is in the first or second gear range, 1-2 shift control or "modulated throttle pressure" is supplied to the middle of the accumulator piston by the 1-2 shift control valve. During the 1-2 upshift, this pressure is used to control the kickdown servo apply pressure that is needed to apply the kickdown and accumulator pistons. Thus, the 1-2 shift point is "cushioned" and the quality is improved. During a WOT kickdown, kickdown pressure is applied between the kickdown valve and the 1-2

DESCRIPTION AND OPERATION (Continued)

shift control valve. This additional pressure is directed to the 1-2 shift control's spring cavity, adding to the spring load on the valve. The result of this increased "modulated" throttle pressure is a firmer WOT upshift.

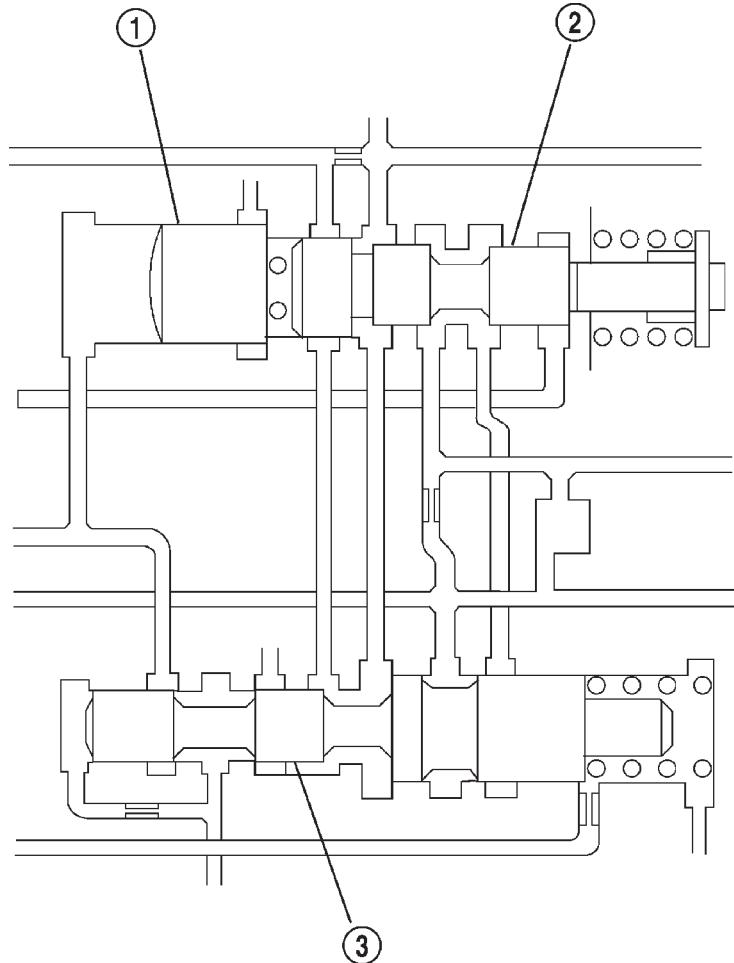
SHUTTLE VALVE

The assembly is contained in a bore in the valve body above the shift valves. When the manual valve is positioned in the Drive range, throttle pressure acts on the throttle plug of the shuttle valve (Fig. 29) to move it against a spring, increasing the spring force on the shuttle valve. During a part or full throttle 1-2 upshift, the throttle plug is bottomed by throttle pressure, holding the shuttle valve to the right against governor pressure, and opening a by-pass circuit. The shuttle valve controls the quality of the kickdown shift by restricting the rate of

fluid discharge from the front clutch and servo release circuits. During a 3-2 kickdown, fluid discharges through the shuttle by-pass circuit. When the shuttle valve closes the by-pass circuit, fluid discharge is restricted and controlled for the application of the front band. During a 2-3 "lift foot" upshift, the shuttle valve by-passes the restriction to allow full fluid flow through the by-pass groove for a faster release of the band.

2-3 SHIFT VALVE

The 2-3 shift valve mechanism (Fig. 30) consists of the 2-3 shift valve, governor plug and spring, and a throttle plug. After the 1-2 shift valve has completed its operation and applied the front band, line pressure is directed to the 2-3 shift valve through the connecting passages from the 1-2 shift valve. The line pressure will then dead-end at land #2 until the



80be4613

Fig. 29 1-2 Shift Control Valve

1 - THROTTLE PLUG

2 - SHUTTLE VALVE

3 - 1-2 SHIFT CONTROL VALVE

DESCRIPTION AND OPERATION (Continued)

2-3 valve is ready to make its shift. Now that the vehicle is in motion and under acceleration, there is throttle pressure being applied to the spring side of the valve and between lands #3 and #4.

As vehicle speed increases, governor pressure increases proportionately, until it becomes great enough to overcome the combined throttle and spring pressure on the right side of the valve. When this happens, the governor plug is forced against the shift valve moving it to the right. The shift valve causes land #4 to close the passage supplying throttle pressure to the 2-3 shift valve. Without throttle pressure present in the circuit now, the governor plug will push the valve over far enough to bottom the valve in its bore. This allows land #2 to direct line pressure to the front clutch.

After the shift (Fig. 31), line pressure is directed to the land between the shift valve and the governor plug, and to the release side of the kickdown servo. This releases the front band and applies the front clutch, shifting into third gear or direct drive. The rear clutch remains applied, as it has been in the other gears. During a manual "1" or manual "2" gear selection, line pressure is sent between the two lands

of the 2-3 governor plug. This line pressure at the governor plug locks the shift valve into the second gear position, preventing an upshift into direct drive. The theory for the blocking of the valve is the same as that of the 1-2 shift valve.

THROTTLE VALVE

In all gear positions the throttle valve (Fig. 32) is being supplied with line pressure. The throttle valve meters and reduces the line pressure that now becomes throttle pressure. The throttle valve is moved by a spring and the kickdown valve, which is mechanically connected to the throttle. The larger the throttle opening, the higher the throttle pressure (to a maximum of line pressure). The smaller the throttle opening, the lower the throttle pressure (to a minimum of zero at idle). As engine speed increases, the increase in pump speed increases pump output. The increase in pressure and volume must be regulated to maintain the balance within the transmission. To do this, throttle pressure is routed to the reaction area on the right side of the throttle pressure plug (in the regulator valve).

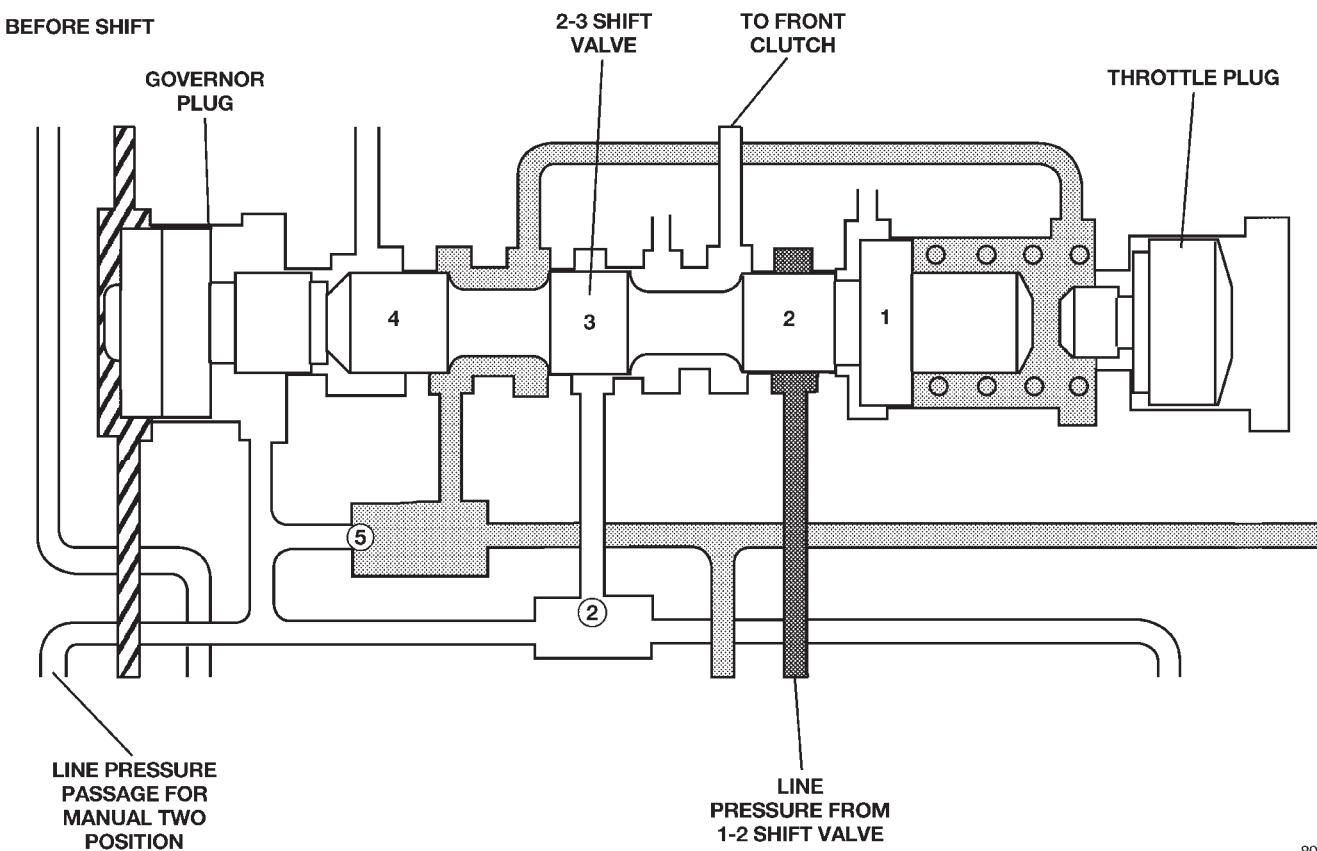


Fig. 30 2-3 Shift Valve-Before Shift

DESCRIPTION AND OPERATION (Continued)

AFTER SHIFT

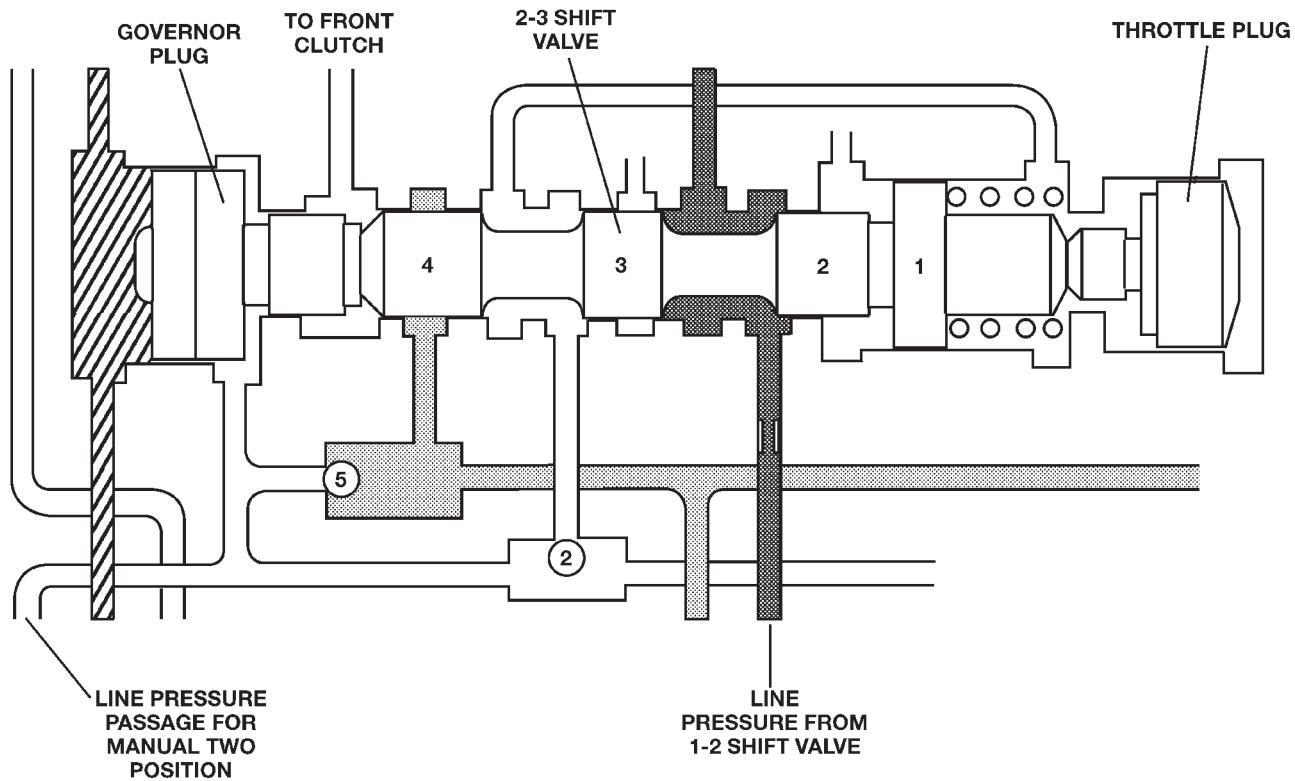


Fig. 31 2-3 Shift Valve-After Shift

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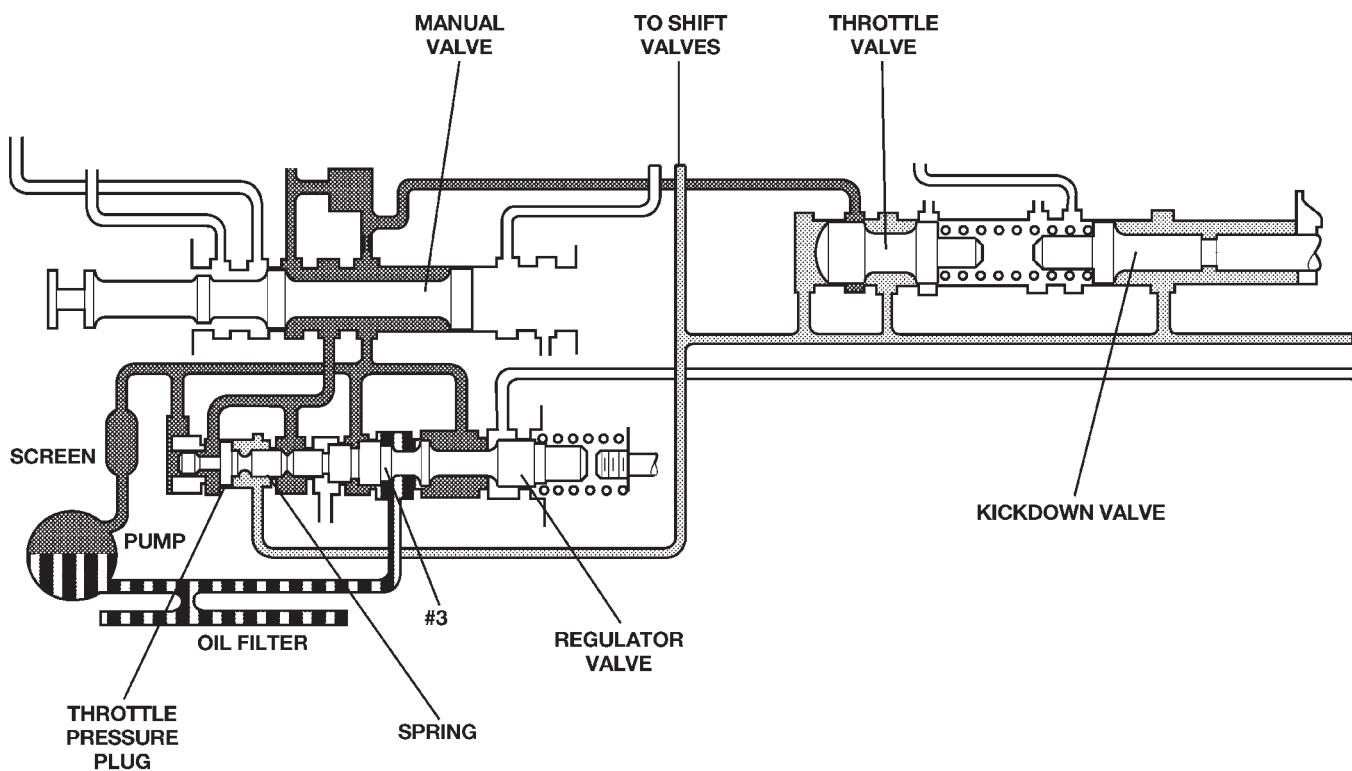


Fig. 32 Throttle Valve

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DESCRIPTION AND OPERATION (Continued)

The higher engine speed and line pressure would open the vent too far and reduce line pressure too much. Throttle pressure, which increases with engine speed (throttle opening), is used to oppose the movement of the pressure valve to help control the metering passage at the vent. The throttle pressure is combined with spring pressure to reduce the force of the throttle pressure plug on the pressure valve. The larger spring at the right closes the regulator valve passage and maintains or increases line pressure. The increased line pressure works against the reaction area of the line pressure plug and the reaction area left of land #3 simultaneously moves the regulator valve train to the right and controls the metering passage.

The kickdown valve, along with the throttle valve, serve to delay upshifts until the correct vehicle and engine speed have been reached. It also controls downshifts upon driver demand, or increased engine load. If these valves were not in place, the shift points would be at the same speed for all throttle positions. The kickdown valve is actuated by a cam connected to the throttle. This is accomplished through either a linkage or a cable. The cam forces the kickdown valve toward the throttle valve compressing the spring between them and moving the throttle valve. As the throttle valve land starts to uncover its port, line pressure is "metered" out into the circuits and viewed as throttle pressure. This increased throttle pressure is metered out into the circuits it is applied to: the 1-2 and 2-3 shift valves. When the throttle pressure is high enough, a 3-2 downshift will occur. If the vehicle speed is low enough, a 2-1 downshift will occur.

SWITCH VALVE

When the transmission is in Drive Second just before the TCC application occurs (Fig. 33), the pressure regulator valve is supplying torque converter

pressure to the switch valve. The switch valve directs this pressure through the transmission input shaft, into the converter, through the converter, back out between the input shaft and the reaction shaft, and back up to the switch valve. From the switch valve, the fluid pressure is directed to the transmission cooler, and lubrication pressure returns from the cooler to lubricate different portions of the transmission.

Once the TCC control valve has moved to the left (Fig. 34), line pressure is directed to the fail-safe valve, and then to the tip of the switch valve, forcing the valve downward. The switch valve now vents oil from the front of the piston in the torque converter, and supplies line pressure to the (rear) apply side of the torque converter piston. This pressure differential causes the piston to apply against the friction material, cutting off any further flow of line pressure oil. After the switch valve is shuttled downward allowing line pressure to engage the TCC, torque converter pressure is directed past the switch valve into the transmission cooler and lubrication circuits.

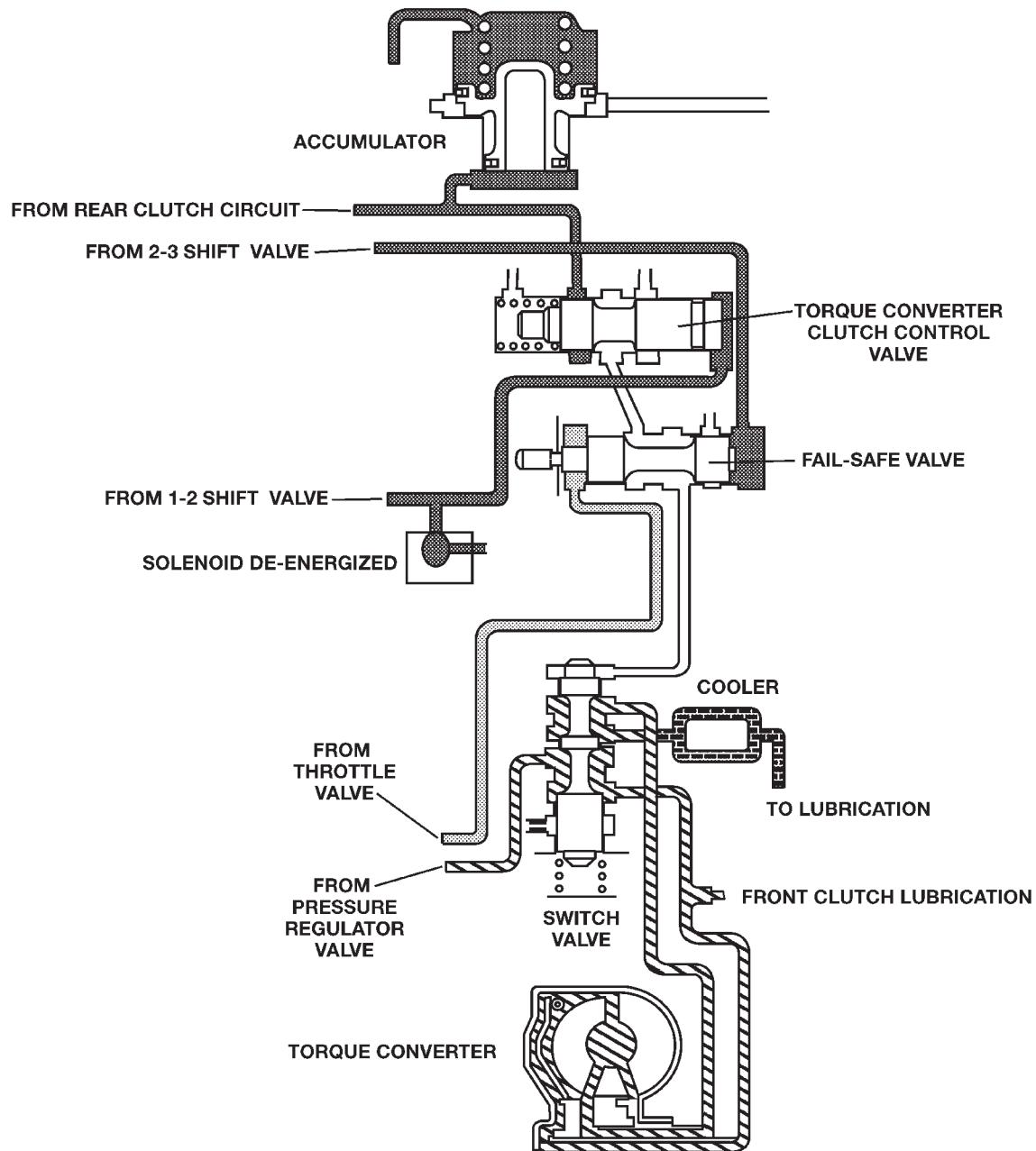
CONVERTER CLUTCH CONTROL VALVE

The torque converter clutch (TCC) control valve controls the back (ON) side of the torque converter clutch. When the PCM energizes the TCC solenoid to engage the converter clutch piston, pressure is applied to the TCC control valve which moves to the left and applies pressure to the fail-safe valve.

FAIL-SAFE VALVE

The pressure coming from the TCC control valve dead-ends at the fail-safe valve until governor pressure on the right side of the valve increases. The pressure must be high enough to overcome the throttle and spring pressure on the left side of the valve and push the valve to the left. The pressure will then flow to the switch valve.

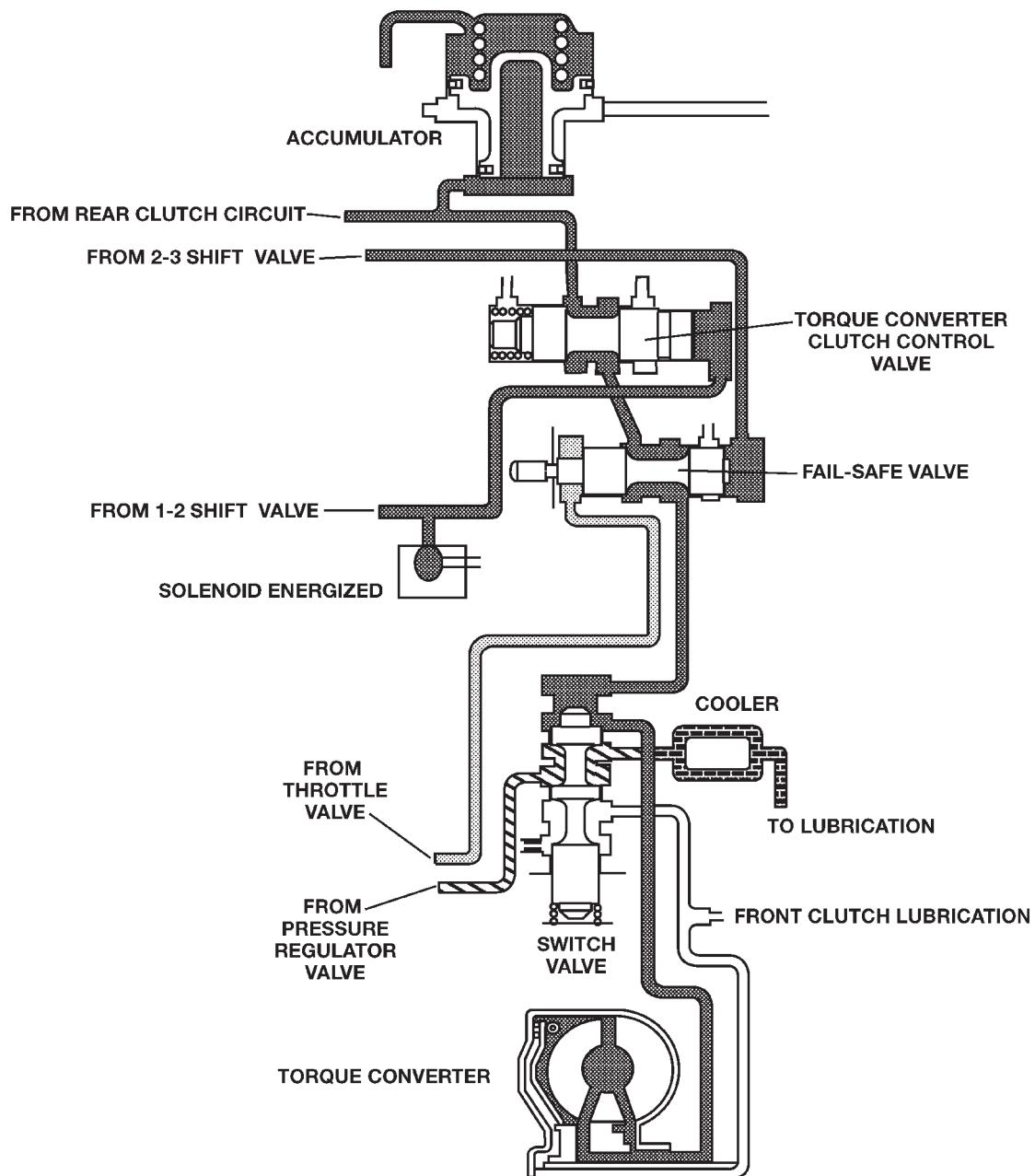
DESCRIPTION AND OPERATION (Continued)



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Fig. 33 Switch Valve-Torque Converter Unlocked

DESCRIPTION AND OPERATION (Continued)



80bfe265

Fig. 34 Switch Valve-Torque Converter Locked

DESCRIPTION AND OPERATION (Continued)

MANUAL VALVE

The manual valve (Fig. 35) is a relay valve. The purpose of the manual valve is to direct fluid to the correct circuit needed for a specific gear or driving range. The manual valve, as the name implies, is manually operated by the driver with a lever located on the side of the valve body. The valve is connected mechanically by either a cable or linkage to the gear-shift mechanism. The valve is held in each of its positions by a spring-loaded roller or ball that engages the "roostercomb" of the manual valve.

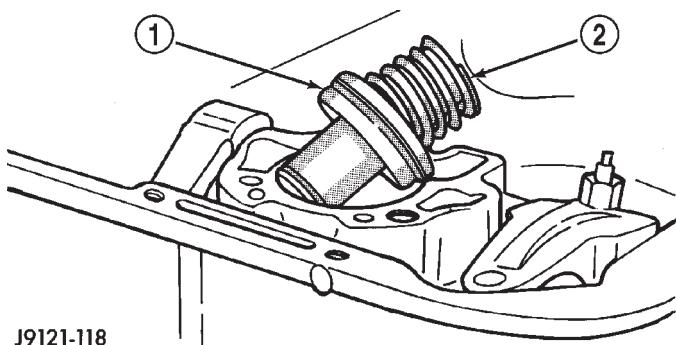
ACCUMULATOR

DESCRIPTION

The accumulator (Fig. 36) is a hydraulic device that has the sole purpose of cushioning the application of a band or clutch. The accumulator consists of a dual-land piston and a spring located in a bore in the transmission case.

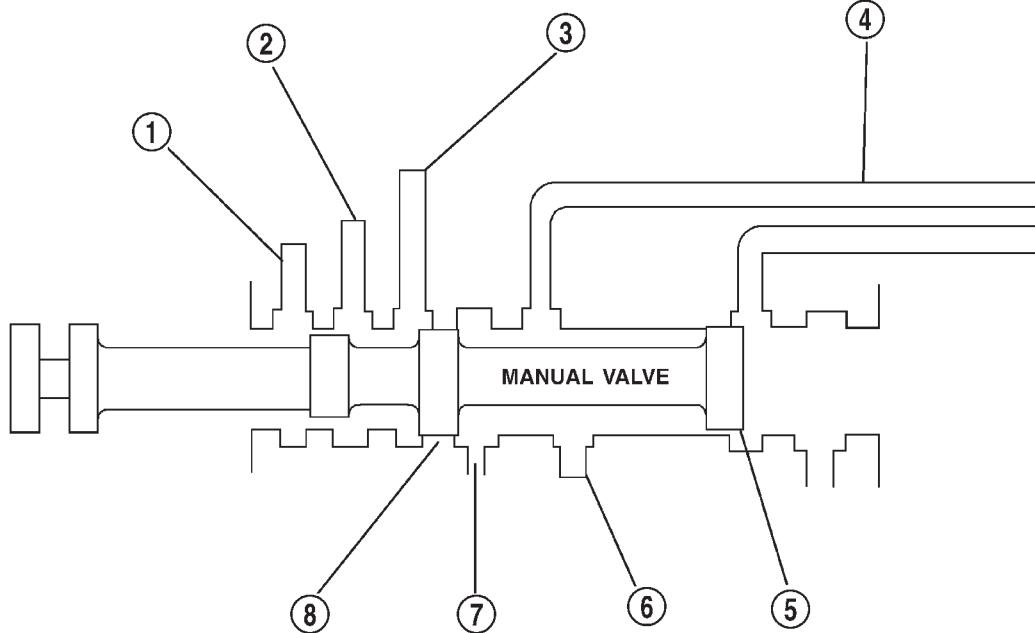
OPERATION

Line pressure is directed between the lands of the piston (Fig. 37), bottoming it against the accumulator plate. The accumulator stays in this position after the transmission is placed into a Drive position. When the 1-2 upshift occurs (Fig. 38), line pressure

**Fig. 36 Accumulator**

- 1 – ACCUMULATOR PISTON
2 – PISTON SPRING

is directed to the large end of the piston and then to the kickdown servo. As the line pressure reaches the accumulator, the combination of spring pressure and line pressure forces the piston away from the accumulator plate. This causes a balanced pressure situation, which results in a cushioned band application. After the kickdown servo has become immovable, line pressure will finish pushing the accumulator up into its bore. When the large end of the accumulator piston is seated in its bore, the band or clutch is fully applied.



80bfe266

Fig. 35 Manual Valve

- | | |
|--------------------------------------|------------------------|
| 1 – 1-2 GOVERNOR PLUG | 5 – LAND #1 |
| 2 – 2-3 GOVERNOR PLUG | 6 – PUMP |
| 3 – GOVERNOR REAR CLUTCH ACCUMULATOR | 7 – PRESSURE REGULATOR |
| 4 – THROTTLE VALVE | 8 – LAND #2 |

DESCRIPTION AND OPERATION (Continued)

NOTE: The accumulator is shown in the inverted position for illustrative purposes.

**BOTTOMED
AGAINST ACCUMULATOR
PLATE**

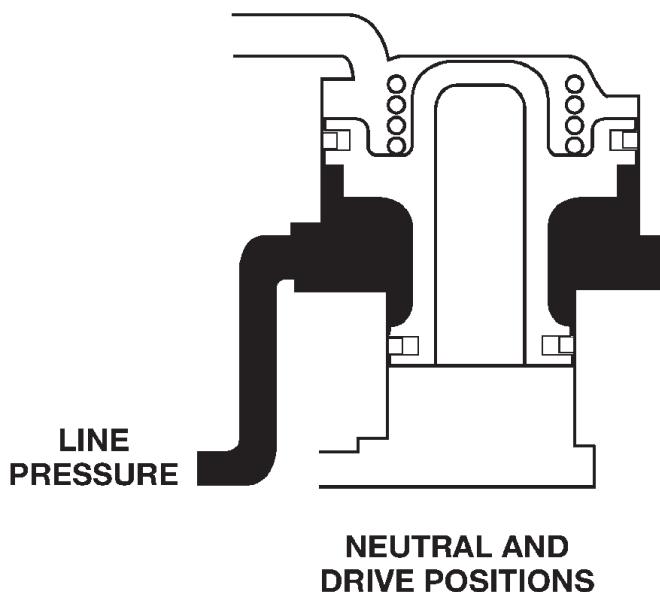


Fig. 37 Accumulator in Neutral and Drive Positions

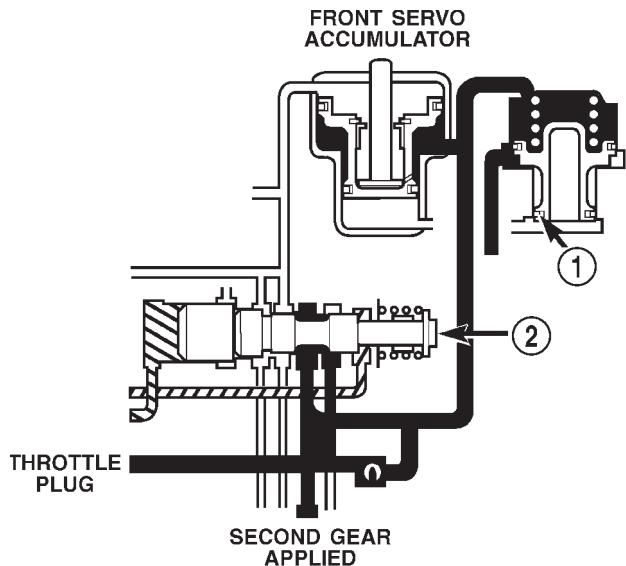


Fig. 38 Accumulator in Second Gear Position

- 1 - BOTTOM IN BORE
- 2 - SHUTTLE VALVE

PISTONS

DESCRIPTION

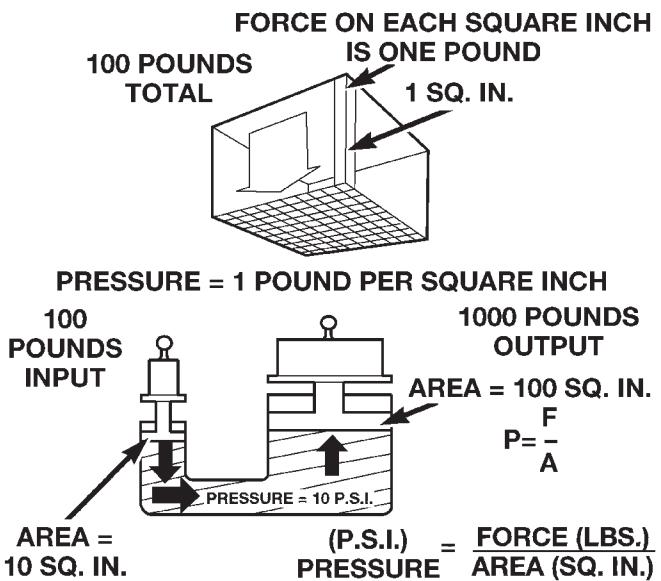
There are several sizes and types of pistons used in an automatic transmission. Some pistons are used to apply clutches, while others are used to apply bands. They all have in common the fact that they are round or circular in shape, located within a smooth walled cylinder, which is closed at one end and converts fluid pressure into mechanical movement. The fluid pressure exerted on the piston is contained within the system through the use of piston rings or seals.

OPERATION

The principal which makes this operation possible is known as Pascal's Law. Pascal's Law can be stated as: "Pressure on a confined fluid is transmitted equally in all directions and acts with equal force on equal areas."

PRESSURE

Pressure (Fig. 39) is nothing more than force (lbs.) divided by area (in or ft.), or force per unit area. Given a 100 lb. block and an area of 100 sq. in. on the floor, the pressure exerted by the block is: 100 lbs. 100 in or 1 pound per square inch, or PSI as it is commonly referred to.



$$\text{FORCE ON LARGE PISTON} = 1000 \text{ LBS.}$$

80bfe272

Fig. 39 Force and Pressure Relationship

PRESSURE ON A CONFINED FLUID

Pressure is exerted on a confined fluid (Fig. 40) by applying a force to some given area in contact with the fluid. A good example of this is a cylinder filled with fluid and equipped with a piston that is closely fitted to the cylinder wall. If a force is applied to the piston, pressure will be developed in the fluid. Of course, no

DESCRIPTION AND OPERATION (Continued)

pressure will be created if the fluid is not confined. It will simply "leak" past the piston. There must be a resistance to flow in order to create pressure. Piston sealing is extremely important in hydraulic operation. Several kinds of seals are used to accomplish this within a transmission. These include but are not limited to O-rings, D-rings, lip seals, sealing rings, or extremely close tolerances between the piston and the cylinder wall. The force exerted is downward (gravity), however, the principle remains the same no matter which direction is taken. The pressure created in the fluid is equal to the force applied, divided by the piston area. If the force is 100 lbs., and the piston area is 10 sq. in., then the pressure created equals 10 PSI. Another interpretation of Pascal's Law is that regardless of container shape or size, the pressure will be maintained throughout, as long as the fluid is confined. In other words, the pressure in the fluid is the same everywhere within the container.

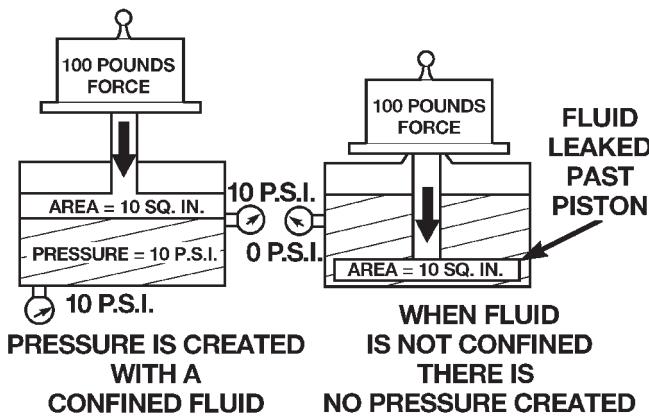
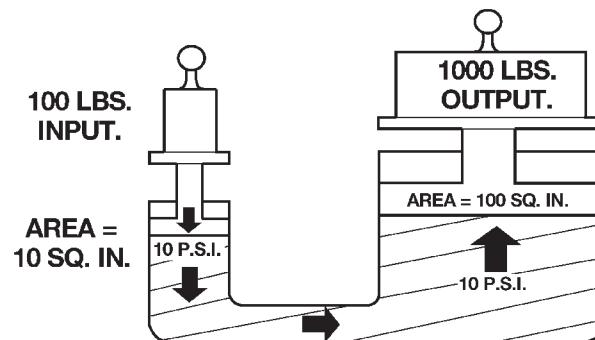


Fig. 40 Pressure on a Confined Fluid

FORCE MULTIPLICATION

Using the 10 PSI example used in the illustration (Fig. 41), a force of 1000 lbs. can be moved with a force of only 100 lbs. The secret of force multiplication in hydraulic systems is the total fluid contact area employed. The illustration, (Fig. 41), shows an area that is ten times larger than the original area. The pressure created with the smaller 100 lb. input is 10 PSI. The concept "pressure is the same everywhere" means that the pressure underneath the larger piston is also 10 PSI. Pressure is equal to the force applied divided by the contact area. Therefore, by means of simple algebra, the output force may be found. This concept is extremely important, as it is also used in the design and operation of all shift valves and limiting valves in the valve body, as well as the pistons, of the transmission, which activate the clutches and bands. It is nothing more than

using a difference of area to create a difference in pressure to move an object.

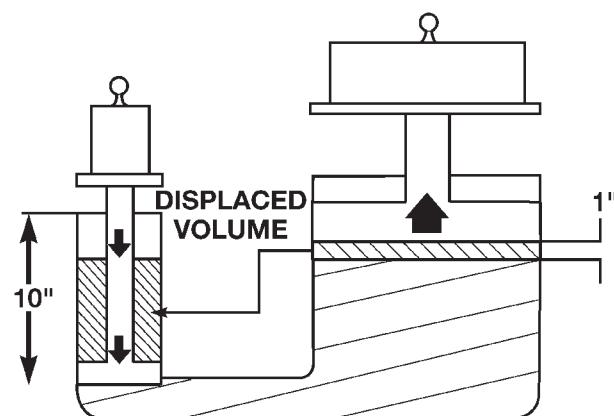


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Fig. 41 Force Multiplication

PISTON TRAVEL

The relationship between hydraulic lever and a mechanical lever is the same. With a mechanical lever it's a weight-to-distance output rather than a pressure-to-area output. Using the same forces and areas as in the previous example, the smaller piston (Fig. 42) has to move ten times the distance required to move the larger piston one inch. Therefore, for every inch the larger piston moves, the smaller piston moves ten inches. This principle is true in other instances also. A common garage floor jack is a good example. To raise a car weighing 2000 lbs., an effort of only 100 lbs. may be required. For every inch the car moves upward, the input piston at the jack handle must move 20 inches downward.



80bfe275

Fig. 42 Piston Travel

DESCRIPTION AND OPERATION (Continued)

FRONT CLUTCH

DESCRIPTION

The front clutch assembly (Fig. 43) is composed of the front clutch retainer, pressure plate, four clutch plates, four driving discs, piston, piston return spring, return spring retainer, and snap rings. The front clutch is the forwardmost component in the transmission geartrain and is directly behind the oil pump and is considered a driving component.

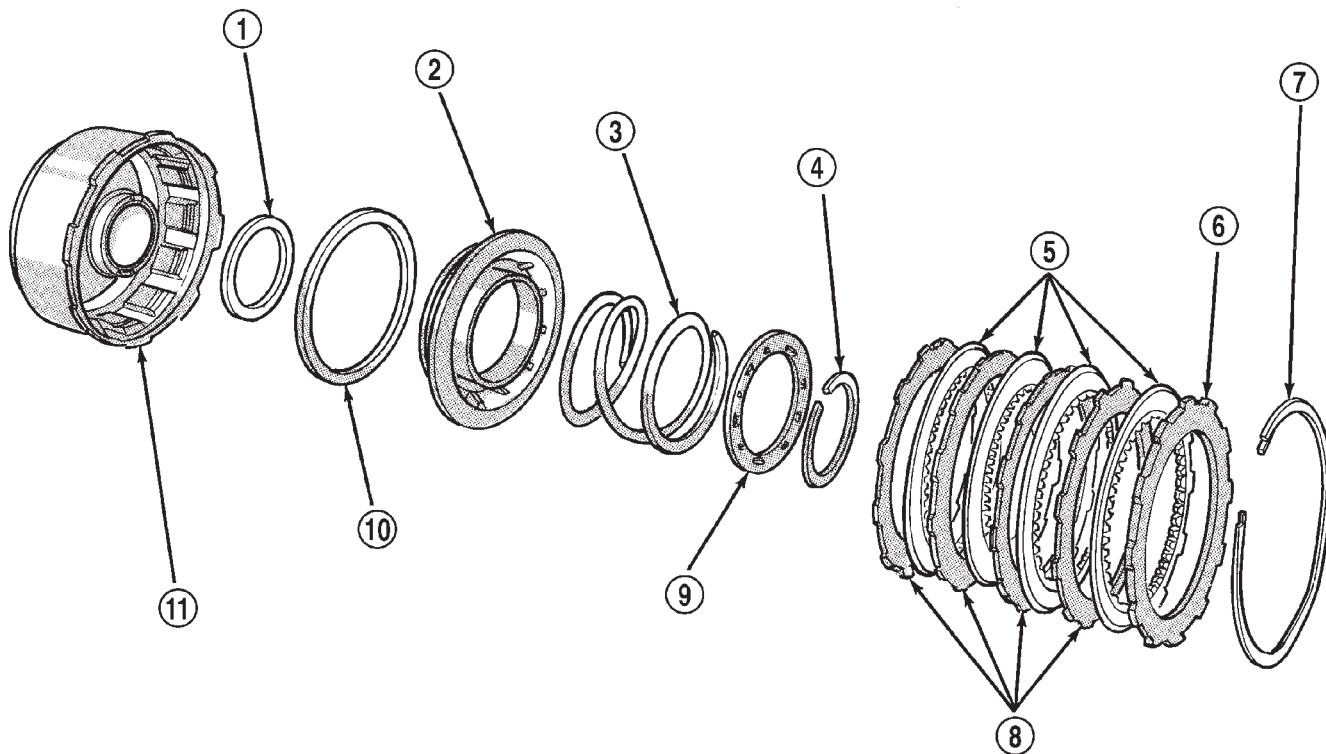
NOTE: The number of discs and plates may vary with each engine and vehicle combination.

OPERATION

To apply the clutch, pressure is applied between the clutch retainer and piston. The fluid pressure is provided by the oil pump, transferred through the control valves and passageways, and enters the clutch through the hub of the reaction shaft support.

With pressure applied between the clutch retainer and piston, the piston moves away from the clutch retainer and compresses the clutch pack. This action applies the clutch pack, allowing torque to flow through the input shaft into the driving discs, and into the clutch plates and pressure plate that are lugged to the clutch retainer. The waved snap ring is used to cushion the application of the clutch pack. In some transmissions, the snap ring is selective and used to adjust clutch pack clearance.

When pressure is released from the piston, the spring returns the piston to its fully released position and disengages the clutch. The release spring also helps to cushion the application of the clutch assembly. When the clutch is in the process of being released by the release spring, fluid flows through a vent and one-way ball-check-valve located in the clutch retainer. The check-valve is needed to eliminate the possibility of plate drag caused by centrifugal force acting on the residual fluid trapped in the clutch piston retainer.



J9321-222

Fig. 43 Front Clutch

- 1 – RETAINER HUB SEAL
- 2 – CLUTCH PISTON
- 3 – PISTON SPRING
- 4 – SPRING RETAINER SNAP RING
- 5 – CLUTCH DISCS
- 6 – PRESSURE PLATE

- 7 – SNAP RING (WAVED)
- 8 – CLUTCH PLATES
- 9 – SPRING RETAINER
- 10 – PISTON SEAL
- 11 – FRONT CLUTCH RETAINER

DESCRIPTION AND OPERATION (Continued)

REAR CLUTCH

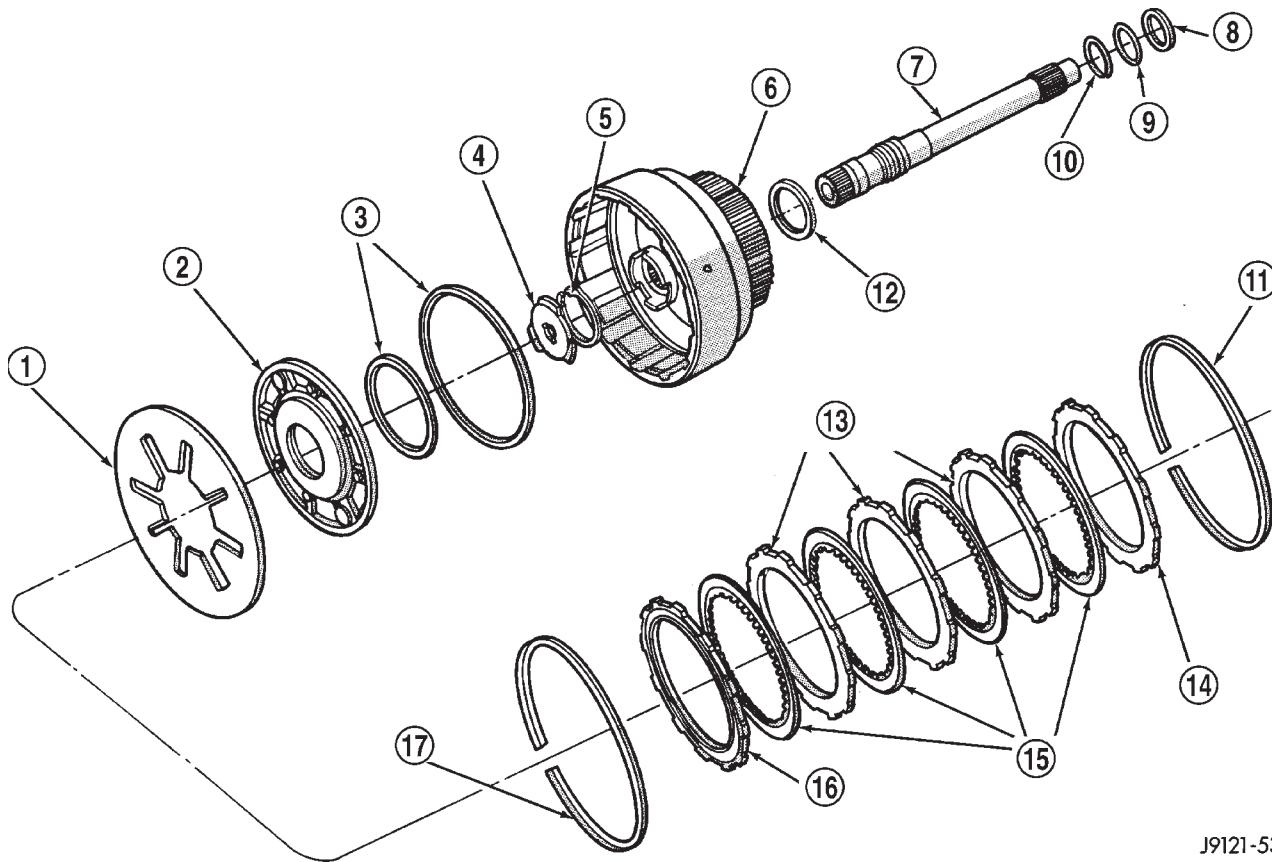
DESCRIPTION

The rear clutch assembly (Fig. 44) is composed of the rear clutch retainer, pressure plate, three clutch plates, four driving discs, piston, Belleville spring, and snap rings. The Belleville spring acts as a lever to multiply the force applied on to it by the apply piston. The increased apply force on the rear clutch pack, in comparison to the front clutch pack, is needed to hold against the greater torque load imposed onto the rear pack. The rear clutch is directly behind the front clutch and is considered a driving component.

NOTE: The number of discs and plates may vary with each engine and vehicle combination.

OPERATION

To apply the clutch, pressure is applied between the clutch retainer and piston. The fluid pressure is provided by the oil pump, transferred through the control valves and passageways, and enters the clutch through the hub of the reaction shaft support. With pressure applied between the clutch retainer and piston, the piston moves away from the clutch retainer and compresses the clutch pack. This action applies the clutch pack, allowing torque to flow through the input shaft into the driving discs, and into the clutch plates and pressure plate that are lugged to the clutch retainer. The waved snap ring is used to cushion the application of the clutch pack. In some transmissions, the snap ring is selective and used to adjust clutch pack clearance.



J9121-539

Fig. 44 Rear Clutch

- 1 - PISTON SPRING
- 2 - REAR CLUTCH PISTON
- 3 - CLUTCH PISTON SEALS
- 4 - OUTPUT SHAFT THRUST WASHER (METAL)
- 5 - INPUT SHAFT SNAP RING
- 6 - REAR CLUTCH RETAINER
- 7 - INPUT SHAFT
- 8 - REAR CLUTCH THRUST WASHER (FIBER)
- 9 - SHAFT FRONT SEAL RING (TEFLON)

- 10 - SHAFT REAR SEAL RING (METAL)
- 11 - CLUTCH PACK SNAP RING (SELECTIVE)
- 12 - RETAINER SEAL RING
- 13 - CLUTCH PLATES (3)
- 14 - TOP PRESSURE PLATE
- 15 - CLUTCH DISCS (4)
- 16 - BOTTOM PRESSURE PLATE
- 17 - WAVE SPRING

DESCRIPTION AND OPERATION (Continued)

When pressure is released from the piston, the spring returns the piston to its fully released position and disengages the clutch. The release spring also helps to cushion the application of the clutch assembly. When the clutch is in the process of being released by the release spring, fluid flows through a vent and one-way ball-check-valve located in the clutch retainer. The check-valve is needed to eliminate the possibility of plate drag caused by centrifugal force acting on the residual fluid trapped in the clutch piston retainer.

OVERRUNNING CLUTCH

DESCRIPTION

The overrunning clutch (Fig. 45) consists of an inner race, an outer race (or cam), rollers and springs, and the spring retainer. The number of rollers and springs depends on what transmission and which overrunning clutch is being dealt with.

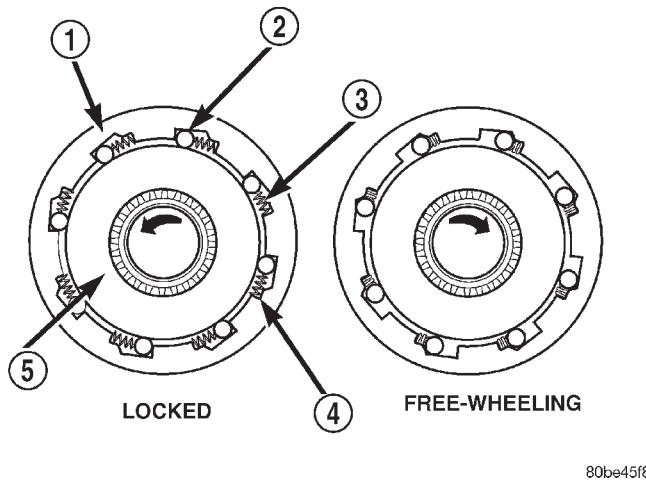


Fig. 45 Overrunning Clutch

- 1 – OUTER RACE (CAM)
- 2 – ROLLER
- 3 – SPRING
- 4 – SPRING RETAINER
- 5 – INNER RACE (HUB)

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OPERATION

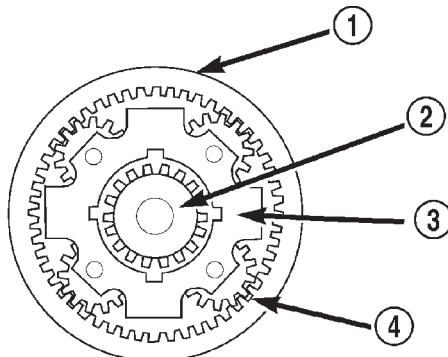
As the inner race is rotated in a clockwise direction (as viewed from the front of the transmission), the race causes the rollers to roll toward the springs, causing them to compress against their retainer. The compression of the springs increases the clearance between the rollers and cam. This increased clearance between the rollers and cam results in a free-wheeling condition. When the inner race attempts to rotate counterclockwise, the action causes the rollers to roll in the same direction as the race, aided by the pushing of the springs. As the rollers try to move in the same direction as the inner race, they are

wedged between the inner and outer races due to the design of the cam. In this condition, the clutch is locked and acts as one unit.

PLANETARY GEARSET

DESCRIPTION

The planetary gearsets (Fig. 46) are designated as the front and rear planetary gear assemblies and located in such order. A simple planetary gearset consists of three main members:



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Fig. 46 Planetary Gearset

- 1 – ANNULUS GEAR
- 2 – SUN GEAR
- 3 – PLANET CARRIER
- 4 – PLANET PINIONS (4)

- The sun gear which is at the center of the system.
- The planet carrier with planet pinion gears which are free to rotate on their own shafts and are in mesh with the sun gear.
- The annulus gear, which rotates around and is in mesh with the planet pinion gears.

NOTE: The number of pinion gears does not affect the gear ratio, only the duty rating.

OPERATION

With any given planetary gearset, several conditions must be met for power to be able to flow:

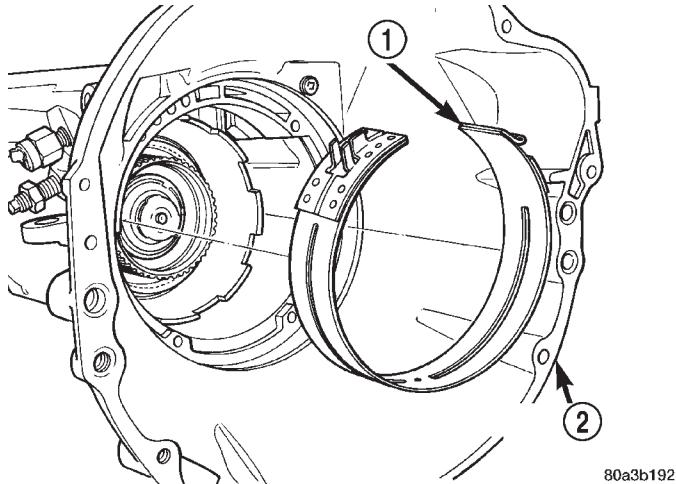
- One member must be held.
- Another member must be driven or used as an input.
- The third member may be used as an output for power flow.
- For direct drive to occur, two gear members in the front planetary gearset must be driven.

NOTE: Gear ratios are dependent on the number of teeth on the annulus and sun gears.

DESCRIPTION AND OPERATION (Continued)

BANDS**DESCRIPTION****KICKDOWN (FRONT) BAND**

The kickdown, or "front", band (Fig. 47) holds the common sun gear of the planetary gear sets. The front (kickdown) band is made of steel, and faced on its inner circumference with a friction-type lining. One end of the band is anchored to the transmission case, and the other is acted on with a pushing force by a servo piston. The front band is a single-wrap design (the band does not completely encompass/wrap the drum that it holds).

**Fig. 47 Front Band**

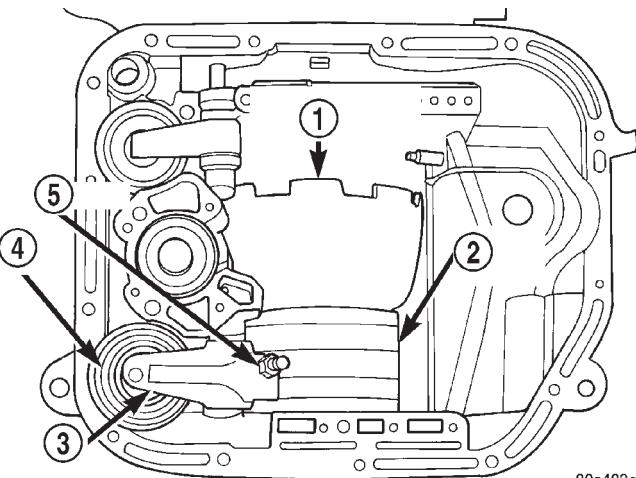
- 1 – FRONT BAND
- 2 – TRANSMISSION HOUSING

LOW/REVERSE (REAR) BAND

The low/reverse band, or "rear", band (Fig. 48) is similar in appearance and operation to the front band. The rear band of the 32RH is slightly different in that it does not use a link bar, but is acted directly on by the apply lever. This is referred to as a double-wrap band design (the drum is completely encompassed/wrapped by the band). The double-wrap band provides a greater holding power in comparison to the single-wrap design.

OPERATION**KICKDOWN (FRONT) BAND**

The kickdown band holds the common sun gear of the planetary gear sets by applying and holding the front clutch retainer, which is splined to the sun gear driving shell, and in turn splined directly to the sun gear. The application of the band by the servo is typically done by an apply lever and link bar.



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Fig. 48 Rear Band

- 1 – PLANETARY GEARTRAIN
- 2 – REAR BAND
- 3 – LEVER
- 4 – SERVO
- 5 – ADJUSTER

LOW/REVERSE (REAR) BAND

The rear band holds the rear planet carrier stationary by being mounted around and applied to the low/reverse drum.

SERVOS**DESCRIPTION****KICKDOWN (FRONT) SERVO**

The kickdown servo (Fig. 49) consists of a two-land piston with an inner piston, a piston rod and guide, and a return spring. The dual-land piston uses seal rings on its outer diameters and an O-ring for the inner piston.

LOW/REVERSE (REAR) SERVO

The rear (low/reverse) servo consists of a single stage or diameter piston and a spring loaded plug. The spring is used to cushion the application of the rear (low/reverse) band.

OPERATION**KICKDOWN (FRONT) SERVO**

The application of the piston is accomplished by applying pressure between the two lands of the piston. The pressure acts against the larger lower land to push the piston downward, allowing the piston rod to extend through its guide against the apply lever. Release of the servo at the 2-3 upshift is accomplished by a combination of spring and line pressure, acting on the bottom of the larger land of the piston.

DESCRIPTION AND OPERATION (Continued)

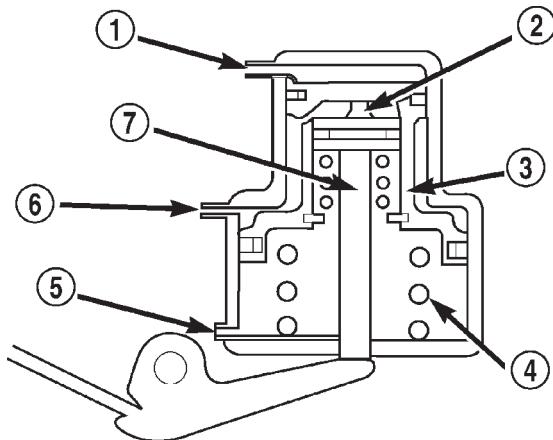


Fig. 49 Front Servo

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- 1 - VENT
 2 - INNER PISTON
 3 - PISTON
 4 - SPRING
 5 - RELEASE PRESSURE
 6 - APPLY PRESSURE
 7 - PISTON ROD

The small piston is used to cushion the application of the band by bleeding oil through a small orifice in the larger piston. The release timing of the kickdown servo is very important to obtain a smooth but firm shift. The release has to be very quick, just as the front clutch application is taking place. Otherwise, engine runaway or a shift hesitation will occur. To accomplish this, the band retains its holding capacity until the front clutch is applied, giving a small amount of overlap between them.

LOW/REVERSE (REAR) SERVO

While in the de-energized state (no pressure applied), the piston is held up in its bore by the piston spring. The plug is held down in its bore, in the piston, by the plug spring. When pressure is applied to the top of the piston, the plug is forced down in its bore, taking up any clearance. As the piston moves, it causes the plug spring to compress, and the piston moves down over the plug. The piston continues to move down until it hits the shoulder of the plug and fully applies the band. The period of time from the initial application, until the piston is against the shoulder of the plug, represents a reduced shocking of the band that cushions the shift.

GOVERNOR

DESCRIPTION

The governor (Fig. 50) valve body is attached to the output shaft of the transmission.

OPERATION

The governor meters hydraulic pressure (Fig. 51), and this metered pressure is used to signal the transmission when it is time for a shift to occur. It does this by balancing governor pressure on one side of a shift valve, and throttle pressure on the other. When governor pressure increases far enough to overcome the throttle pressure on the valve, a shift occurs.

With the gearshift selector in a forward driving range, line pressure flows from the manual valve and down to the governor valve. When the output shaft starts to rotate with vehicle motion (Fig. 52), the governor weight assembly will start to move outward due to centrifugal force. As the weight is moved outward, it will pull the valve with it until the land of the valve uncovers the line pressure port. As the port begins to become uncovered, governor pressure is metered. As the vehicle's speed continues to increase (Fig. 53), the weight assembly will be at a point at which governor pressure is acting on the left side of the reaction area of the valve. This produces sufficient force to compress the spring and allow the outer weight to move out against the outer governor body retaining ring. At a very high speed, the governor valve will be opened as far as possible. In this condition, it is possible for governor pressure to meet, but not to exceed, line pressure. Generally governor pressure ranges from 0-100 psi from idle to maximum speed, and rises proportionally with the increase in output shaft speed. Governor pressure and throttle pressure are acting upon the shift valves to determine when a shift will occur. Governor pressure is a direct indication of road speed, and throttle pressure is an indication of engine load. When both parameters have been met by the throttle and governor pressures, an upshift or downshift will occur.

GEARSHIFT MECHANISM

DESCRIPTION

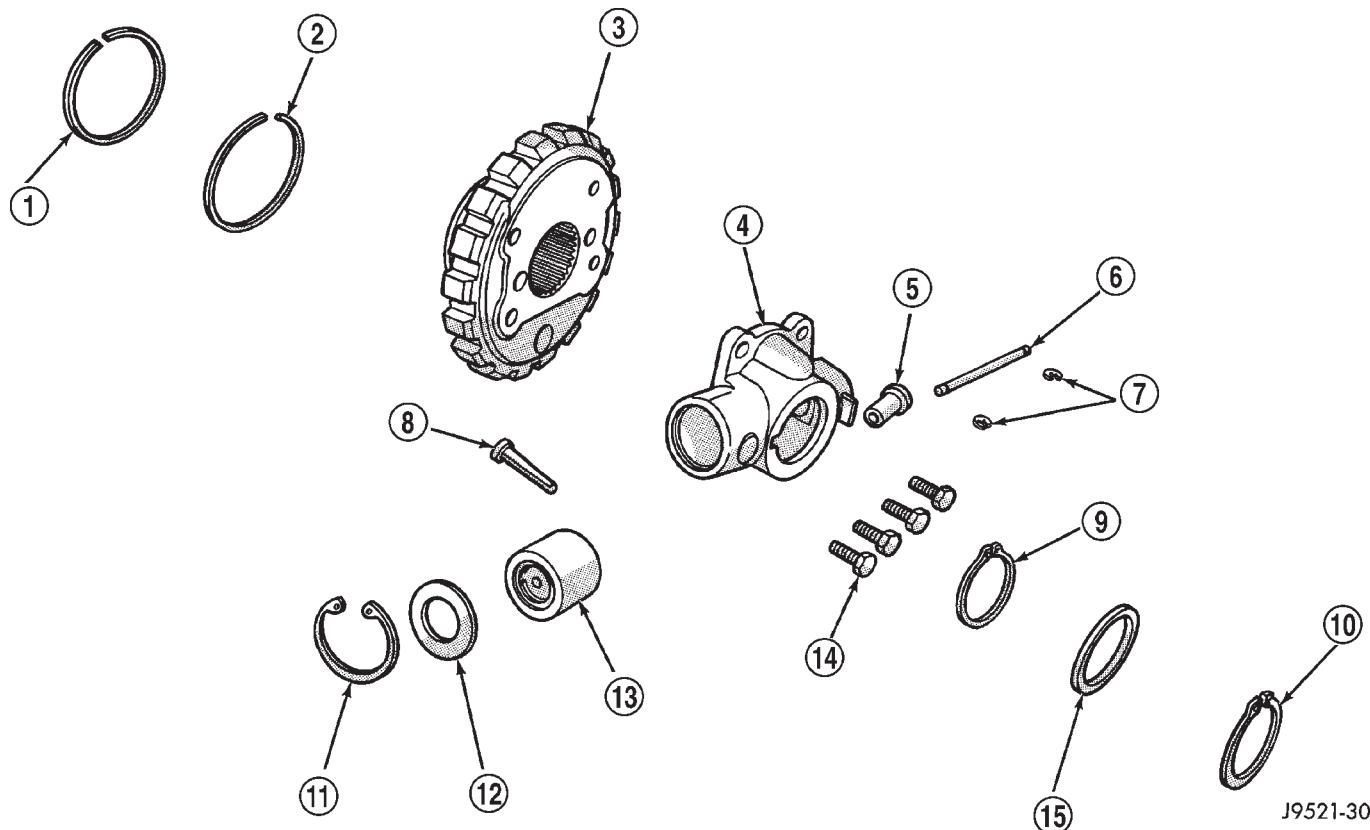
The shift mechanism is cable operated and provides six shift positions. The shift indicator is located on the console next to the gear shift. The shift positions are:

- Park (P)
- Reverse (R)
- Neutral (N)
- Drive (D)
- Manual Second (2)
- Manual Low (1)

OPERATION

Manual low (1) range provides first gear only. Overrun braking is also provided in this range. Manual second (2) range provides first and second gear only.

DESCRIPTION AND OPERATION (Continued)

**Fig. 50 Governor**

- 1 – SEAL RING (PLAIN END)
- 2 – SEAL RING (HOOK END)
- 3 – PARK GEAR
- 4 – GOVERNOR BODY
- 5 – GOVERNOR VALVE
- 6 – VALVE SHAFT
- 7 – E-CLIPS (2)
- 8 – FILTER

- 9 – SNAP RING (THIN)
- 10 – SNAP RING (THICK)
- 11 – SNAP RING
- 12 – RETAINER WASHER
- 13 – GOVERNOR WEIGHT ASSEMBLY
- 14 – GOVERNOR BODY BOLTS (4)
- 15 – WASHER

Drive range provides first, second, and third gear ranges.

CONVERTER DRAINBACK VALVE

DESCRIPTION

The drainback valve is located in the transmission cooler outlet (pressure) line.

OPERATION

The valve prevents fluid from draining from the converter into the cooler and lines when the vehicle is shut down for lengthy periods. Production valves have a hose nipple at one end, while the opposite end is threaded for a flare fitting. All valves have an arrow (or similar mark) to indicate direction of flow through the valve.

BRAKE TRANSMISSION SHIFT INTERLOCK MECHANISM

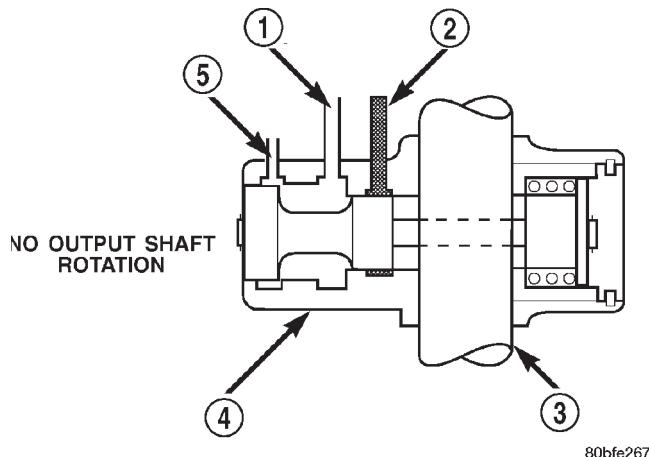
DESCRIPTION

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 (Fig. 54).

OPERATION

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 an inch. A magnetic holding device in line with the park/brake interlock cable is energized when the ignition is in

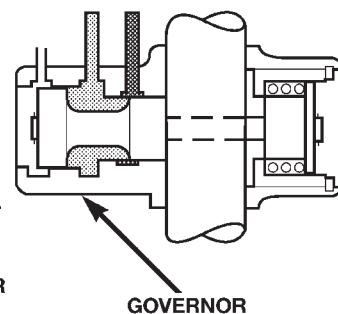
DESCRIPTION AND OPERATION (Continued)

**Fig. 51 Governor—No Output Shaft Rotation**

- 1 – GOVERNOR PRESSURE
- 2 – LINE PRESSURE
- 3 – OUTPUT SHAFT
- 4 – GOVERNOR
- 5 – VENT

HIGH OUTPUT SHAFT ROTATION

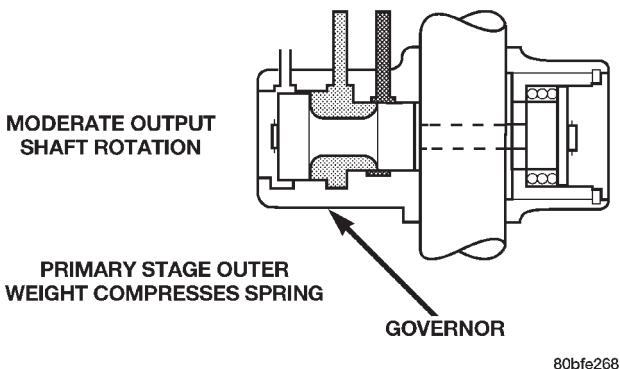
SECONDARY STAGE SPRING FORCE AND INNER WEIGHT MASS COUNTERACT VALVE MASS AND GOVERNOR PRESSURE TO REDUCE RATE OF GOVERNOR PRESSURE INCREASE



80bfe269

Fig. 53 Governor—High Output Shaft Rotation

functions. Begin diagnosis by checking the easily accessible items such as: fluid level and condition, linkage adjustments and electrical connections. A road test will determine if further diagnosis is necessary.

**Fig. 52 Governor—Moderate Output Shaft Rotation**

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 (Fig. 55) unless the shifter is fully locked into the PARK position.

DIAGNOSIS AND TESTING

AUTOMATIC TRANSMISSION DIAGNOSIS

Automatic transmission problems can be a result of poor engine performance, incorrect fluid level, incorrect linkage or cable adjustment, band or hydraulic control pressure adjustments, hydraulic system malfunctions or electrical/mechanical component mal-

EFFECTS OF INCORRECT FLUID LEVEL

A low fluid level allows the pump to take in air along with the fluid. Air in the fluid will cause fluid pressures to be low and develop slower than normal. If the transmission is overfilled, the gears churn the fluid into foam. This aerates the fluid and causing the same conditions occurring with a low level. In either case, air bubbles cause fluid overheating, oxidation and varnish buildup which interferes with valve, clutch and servo operation. Foaming also causes fluid expansion which can result in fluid overflow from the transmission vent or fill tube. Fluid overflow can easily be mistaken for a leak if inspection is not careful.

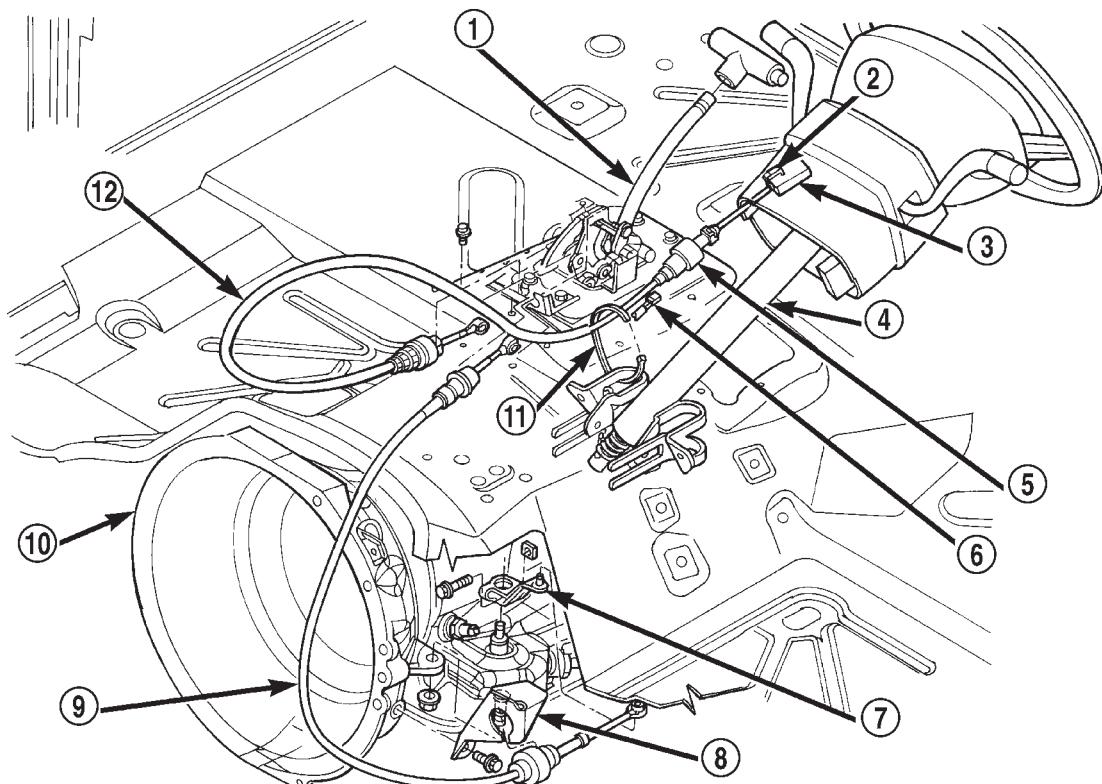
CAUSES OF BURNT FLUID

Burnt, discolored fluid is a result of overheating which has two primary causes.

(1) A result of restricted fluid flow through the main and/or auxiliary cooler. This condition is usually the result of a faulty or improperly installed drainback valve, a damaged main cooler, or severe restrictions in the coolers and lines caused by debris or kinked lines.

(2) Heavy duty operation with a vehicle not properly equipped for this type of operation. Trailer towing or similar high load operation will overheat the transmission fluid if the vehicle is improperly equipped. Such vehicles should have an auxiliary transmission fluid cooler, a heavy duty cooling system, and the engine/axle ratio combination needed to handle heavy loads.

DIAGNOSIS AND TESTING (Continued)

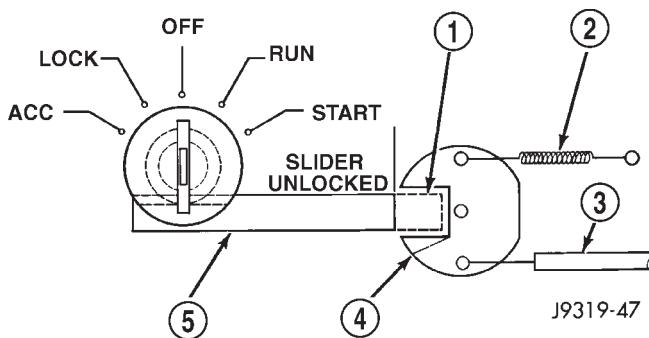


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Fig. 54 Ignition Interlock Cable Routing

- 1 – SHIFT MECHANISM
 2 – LOCK-TAB
 3 – IGNITION LOCK INTERLOCK
 4 – STEERING COLUMN
 5 – SOLENOID
 6 – WIRE CONNECTOR

- 7 – LEVER
 8 – MOUNT BRACKET
 9 – SHIFT CABLE
 10 – AUTOMATIC TRANSMISSION
 11 – TIE STRAP
 12 – PARK/BRAKE INTERLOCK CABLE

**Fig. 55 Ignition Key Cylinder Actuation**

- 1 – SLIDER LOCKED
 2 – CAM RETURN SPRING
 3 – INTERLOCK CABLE
 4 – CAM
 5 – SLIDER

FLUID CONTAMINATION

Transmission fluid contamination is generally a result of:

- adding incorrect fluid
- failure to clean dipstick and fill tube when checking level
- engine coolant entering the fluid
- internal failure that generates debris
- overheating that generates sludge (fluid breakdown)
- failure to reverse flush cooler and lines after repair

DIAGNOSIS AND TESTING (Continued)

- failure to replace contaminated converter after repair

The use of non recommended fluids can result in transmission failure. The usual results are erratic shifts, slippage, abnormal wear and eventual failure due to fluid breakdown and sludge formation. Avoid this condition by using recommended fluids only.

The dipstick cap and fill tube should be wiped clean before checking fluid level. Dirt, grease and other foreign material on the cap and tube could fall into the tube if not removed beforehand. Take the time to wipe the cap and tube clean before withdrawing the dipstick.

Engine coolant in the transmission fluid is generally caused by a cooler malfunction. The only remedy is to replace the radiator as the cooler in the radiator is not a serviceable part. If coolant has circulated through the transmission for some time, an overhaul may also be necessary; especially if shift problems had developed.

The transmission cooler and lines should be reverse flushed whenever a malfunction generates sludge and/or debris. The torque converter should also be replaced at the same time.

Failure to flush the cooler and lines will result in recontamination. Flushing applies to auxiliary coolers as well. The torque converter should also be replaced whenever a failure generates sludge and debris. This is necessary because normal converter flushing procedures will not remove all contaminants.

PRELIMINARY DIAGNOSIS

Two basic procedures are required. One procedure for vehicles that are drivable and an alternate procedure for disabled vehicles (will not back up or move forward).

VEHICLE IS DRIVEABLE

- (1) Check for transmission fault codes using DRB scan tool.
- (2) Check fluid level and condition.
- (3) Adjust throttle and gearshift linkage if complaint was based on delayed, erratic, or harsh shifts.
- (4) Road test and note how transmission upshifts, downshifts, and engages.
- (5) Perform stall test if complaint is based on sluggish acceleration. Or, if abnormal throttle opening is needed to maintain normal speeds with a properly tuned engine.
- (6) Perform hydraulic pressure test if shift problems were noted during road test.
- (7) Perform air-pressure test to check clutch-band operation.

VEHICLE IS DISABLED

- (1) Check fluid level and condition.
- (2) Check for broken or disconnected gearshift or throttle linkage.
- (3) Check for cracked, leaking cooler lines, or loose or missing pressure-port plugs.
- (4) Raise and support vehicle on safety stands, start engine, shift transmission into gear, and note following:
 - (a) If propeller shaft turns but wheels do not, problem is with differential or axle shafts.
 - (b) If propeller shaft does not turn and transmission is noisy, stop engine. Remove oil pan, and check for debris. If pan is clear, remove transmission and check for damaged drive plate, converter, oil pump, or input shaft.
 - (c) If propeller shaft does not turn and transmission is not noisy, perform hydraulic-pressure test to determine if problem is hydraulic or mechanical.

PARK/NEUTRAL POSITION SWITCH

The center terminal of the park/neutral position switch is the starter-circuit terminal. It provides the ground for the starter solenoid circuit through the selector lever in PARK and NEUTRAL positions only. The outer terminals on the switch are for the backup lamp circuit.

SWITCH TEST

To test the switch, remove the wiring connector. Test for continuity between the center terminal and the transmission case. Continuity should exist only when the transmission is in PARK or NEUTRAL.

Shift the transmission into REVERSE and test continuity at the switch outer terminals. Continuity should exist only when the transmission is in REVERSE. Continuity should not exist between the outer terminals and the case.

Check gearshift linkage adjustment before replacing a switch that tests faulty.

GEARSHIFT CABLE

- (1) The floor shifter lever and gate positions should be in alignment with all transmission PARK, NEUTRAL, and gear detent positions.
- (2) Engine starts must be possible with floor shift lever in PARK or NEUTRAL gate positions only. Engine starts must not be possible in any other gear position.
- (3) With floor shift lever handle push-button not depressed and lever in:
 - (a) PARK position—Apply forward force on center of handle and remove pressure. Engine starts must be possible.

DIAGNOSIS AND TESTING (Continued)

(b) PARK position—Apply rearward force on center of handle and remove pressure. Engine starts must be possible.

(c) NEUTRAL position—Normal position. Engine starts must be possible.

(d) NEUTRAL position—Engine running and brakes applied, apply forward force on center of shift handle. Transmission shall not be able to shift from neutral to reverse.

THROTTLE VALVE CABLE

Transmission throttle valve cable adjustment is extremely important to proper operation. This adjustment positions the throttle valve, which controls shift speed, quality, and part-throttle downshift sensitivity.

If cable setting is too loose, early shifts and slippage between shifts may occur. If the setting is too tight, shifts may be delayed and part throttle downshifts may be very sensitive. Refer to the Adjustments section for the proper adjustment procedure.

ROAD TESTING

Before road testing, be sure the fluid level and control cable adjustments have been checked and adjusted if necessary. Verify that diagnostic trouble codes have been resolved.

Observe engine performance during the road test. A poorly tuned engine will not allow accurate analysis of transmission operation.

Operate the transmission in all gear ranges. Check for shift variations and engine flare which indicates slippage. Note if shifts are harsh, spongy, delayed, early, or if part throttle downshifts are sensitive.

Slippage indicated by engine flare, usually means clutch, band or overrunning clutch problems. If the condition is advanced, an overhaul will be necessary to restore normal operation.

A slipping clutch or band can often be determined by comparing which internal units are applied in the various gear ranges. The Clutch and Band Application chart provides a basis for analyzing road test results.

ANALYZING ROAD TEST

Refer to the Clutch and Band Application chart and note which elements are in use in the various gear ranges.

Verify that the rear clutch is applied in all forward ranges (D, 2, 1). The transmission overrunning clutch is applied in first gear (D, 2 and 1 ranges) only. The rear band is applied in 1 and R range only.

Verify that the overdrive clutch is applied only in fourth gear and the overdrive direct clutch and overrunning clutch are applied in all ranges except fourth gear. For example: If slippage occurs in first gear in D and 2 range but not in 1 range, the transmission

DRIVE ELEMENTS	Gearshift Lever Position						
	P	R	N	D		2	1
				1	2	3	1
FRONT CLUTCH	•					•	
FRONT BAND (KICKDOWN)					•		•
REAR CLUTCH				•	•	•	•
REAR BAND (LOW-REV.)	•						•
OVER-RUNNING CLUTCH				•		•	•

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Fig. 56 Clutch And Band Application

overrunning clutch is faulty. Similarly, if slippage occurs in any two forward gears, the rear clutch is slipping.

Applying the same method of analysis, verify that the front and rear clutches are applied simultaneously only in D range third gear. If the transmission slips in third gear, either the front clutch or the rear clutch is slipping.

If slippage occurs during the third gear and the direct clutch were to fail, the transmission would lose both reverse gear and overrun braking in 2 position (manual second gear). If the transmission slips in any other forward gears, the transmission rear clutch is probably slipping.

This process of elimination can be used to identify a slipping unit and check operation. Proper use of the Clutch and Band Application Chart is the key.

Although road test analysis will help determine the slipping unit, the actual cause of a malfunction usually cannot be determined until hydraulic and air pressure tests are performed. Practically any condition can be caused by leaking hydraulic circuits or sticking valves.

Unless a malfunction is obvious, such as no drive in D range first gear, do not disassemble the transmission. Perform the hydraulic and air pressure tests to help determine the probable cause.

HYDRAULIC PRESSURE TEST

Hydraulic test pressures range from a low of one psi (6.895 kPa) governor pressure, to 300 psi (2068 kPa) at the rear servo pressure port in reverse.

An accurate tachometer and two test gauges are required for the pressure test. Test Gauge C-3292 has a 100 psi range and is used at the accumulator,

DIAGNOSIS AND TESTING (Continued)

governor, and front servo pressure ports. Test Gauge C-3293-SP has a 300 psi range and is used at the rear servo port and overdrive test ports where pressures are higher. In cases where two test gauges are required, the 300 psi gauge can be used at any of the other test ports.

Pressure Test Port Locations

Pressure test ports locations are provided at the accumulator, front servo, and rear servo, governor passage, and overdrive clutch pressure passage (Fig. 57), (Fig. 58) and (Fig. 59).

Line pressure is checked at the accumulator port on the right side of the case. The front servo pressure port is at the right side of the case just behind the filler tube opening.

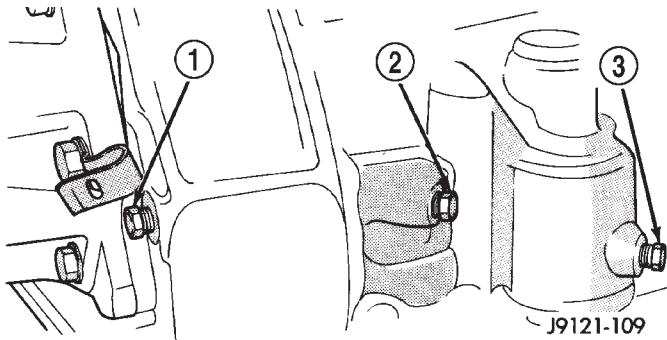


Fig. 57 Pressure Test Ports At Side Of Case

- 1 - REAR SERVO PORT
- 2 - LINE PRESSURE PORT
- 3 - FRONT SERVO PORT

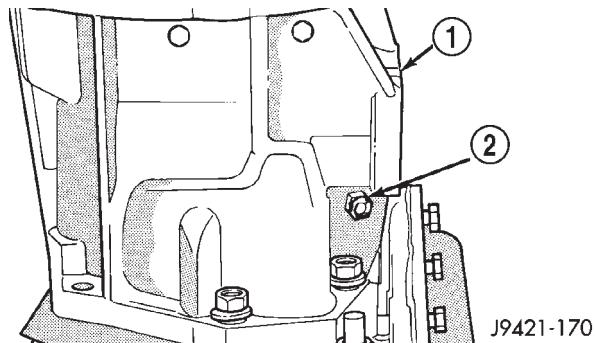


Fig. 59 Pressure Test Ports At Rear Of Case—4WD

- 1 - ADAPTER HOUSING
- 2 - GOVERNOR PRESSURE PORT PLUG

PRESSURE TEST PROCEDURE

Test One - Transmission In 1 Range

This test checks pump output, pressure regulation, and condition of the rear clutch and servo circuit. Test Gauges C-3292 and C-3293-SP are required for this test. Gauge C-3292 has a 100 psi range. Gauge C-3293-SP has a 300 psi range.

- (1) Connect 100 psi Gauge C-3292 to accumulator port.
- (2) Connect 300 psi Gauge C-3293-SP to rear servo port (Fig. 57) and (Fig. 58).
- (3) Disconnect throttle and gearshift rods from manual and throttle levers.
- (4) Start and run engine at 1000 rpm.
- (5) Move shift lever (on manual lever shaft) all the way forward into 1 range.
- (6) Move transmission throttle lever from full forward to full rearward position and note pressures on both gauges.
- (7) Line pressure at accumulator port should be 54-60 psi (372-414 kPa) with throttle lever forward and gradually increase to 90-96 psi (621-662 kPa) as lever is moved rearward.
- (8) Rear servo pressure should be same as line pressure within 3 psi (20.68 kPa).

Test Two - Transmission In 2 Range

This test checks pump output and pressure regulation. Use 100 psi Test Gauge C-3292 for this test.

- (1) Connect test gauge to accumulator pressure port (Fig. 57) and (Fig. 58).
- (2) Start and run engine at 1000 rpm.
- (3) Move shift lever on valve body manual lever shaft, one detent rearward from full forward position. This is 2 range.
- (4) Move transmission throttle lever from full forward to full rearward position and read pressure at both gauges.

Fig. 58 Pressure Test Ports At Rear Of Case—2WD

- 1 - GOVERNOR PRESSURE PORT
- 2 - REAR SERVO PRESSURE PORT

Connect a tachometer to the engine. Position the tachometer so it can be observed from under the vehicle. Raise the vehicle on a hoist that will allow the wheels to rotate freely.

DIAGNOSIS AND TESTING (Continued)

(5) Line pressure should be 54-60 psi (372-414 kPa) with throttle lever forward and gradually increase to 90-96 psi (621-662 kPa) as lever is moved rearward.

Test Three - Transmission In D Range

This test checks pressure regulation and condition of the clutch circuits. Use both pressure Test Gauges C-3292 and C-3293-SP for this test.

(1) Connect test gauges to accumulator and front servo ports (Fig. 57) and (Fig. 58). Use either test gauge at the two ports.

(2) Start and run engine at 1600 rpm for this test.

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

(4) Read pressures on both gauges as transmission throttle lever is moved from full forward to full rearward position.

(5) Line pressure should be 54-60 psi (372-414 kPa) with throttle lever forward and gradually increase as lever is moved rearward.

(6) Front servo is pressurized only in D range and should be same as line pressure within 3 psi (21 kPa) up to downshift point.

Test Four - Transmission In Reverse

This test checks pump output, pressure regulation and the front clutch and rear servo circuits. Use 300 psi Test Gauge C-3293-SP for this test.

(1) Connect 300 psi gauge to rear servo port (Fig. 57) and (Fig. 58).

(2) Start and run engine at 1600 rpm for test.

(3) Move valve body selector lever four detents rearward from the full forward position. This is Reverse range.

(4) Move throttle lever all way forward then all way rearward and note gauge readings.

(5) Pressure should be 145 - 175 psi (1000-1207 kPa) with lever forward and increase to 230 - 280 psi (1586-1931 kPa) as lever is moved rearward.

Test Five - Governor Pressure

This test checks governor operation by measuring governor pressure response to changes in engine speed. It is usually not necessary to check governor operation unless shift speeds are incorrect or if the transmission will not downshift.

(1) Connect 100 psi Test Gauge C-3292 to governor pressure port (Fig. 57) and (Fig. 58).

(2) Move shift lever to D range.

(3) Start and run engine at curb idle speed and note pressure. At idle and with vehicle stopped, pressure should be zero to 1.5 psi maximum. If pressure exceeds this figure, governor valve or weights are sticking open.

(4) Slowly increase engine speed and observe speedometer and pressure test gauge. Governor pressure should increase in proportion to vehicle speed.

(5) Pressure rise should be smooth and drop back to 0 to 1.5 psi when wheels stop rotating.

(6) Compare results of pressure tests with analysis charts (Fig. 60).

TEST CONDITION	INDICATION
Line pressure OK during any one test	Pump and regulator valve OK
Line pressure OK in R but low in D, 2, 1	Leakage in rear clutch area (servo, clutch seals, governor support seal rings on park gear)
Pressure OK in 1, 2 but low in D3 and R	Leakage in front clutch area (servo, clutch seals, retainer bore, pump seal rings)
Pressure OK in 2 but low in R and 1	Leakage in rear servo
Front servo pressure in 2	Leakage in servo (broken servo ring or cracked servo piston)
Pressure low in all positions	Clogged filter, stuck pressure regulator valve, worn or defective pump
Governor pressure too high at idle speed	Governor valve sticking open
Governor pressure low at all mph figures	Governor valve sticking closed
Lubrication pressure low at all throttle positions	Clogged drainback valve, oil cooler or lines, seal rings leaking, output shaft plugged with devris, worn bushings in pump or clutch retainer

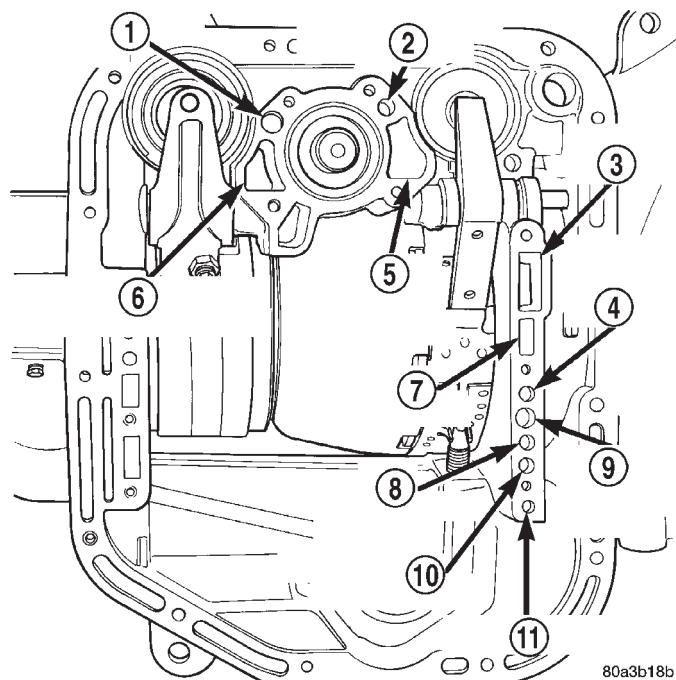
Fig. 60 Pressure Test Analysis

AIR TESTING TRANSMISSION CLUTCH AND BAND OPERATION

Air-pressure testing can be used to check transmission front/rear clutch and band operation. The test can be conducted with the transmission either in the vehicle or on the work bench, as a final check, after overhaul.

Air-pressure testing requires that the oil pan and valve body be removed from the transmission. The servo and clutch apply passages are shown (Fig. 61).

DIAGNOSIS AND TESTING (Continued)

**Fig. 61 Air Pressure Test Passages**

- 1 – REAR SERVO APPLY
- 2 – FRONT SERVO APPLY
- 3 – PUMP SUCTION
- 4 – FRONT CLUTCH APPLY
- 5 – FRONT SERVO RELEASE
- 6 – LINE PRESSURE TO ACCUMULATOR
- 7 – PUMP PRESSURE
- 8 – TO CONVERTER
- 9 – REAR CLUTCH APPLY
- 10 – FROM CONVERTER
- 11 – TO COOLER

Front Clutch Air Test

Place one or two fingers on the clutch housing and apply air pressure through front clutch apply passage. Piston movement can be felt and a soft thump heard as the clutch applies.

Rear Clutch Air Test

Place one or two fingers on the clutch housing and apply air pressure through rear clutch apply passage. Piston movement can be felt and a soft thump heard as the clutch applies.

Front Servo Apply Air Test

Apply air pressure to the front servo apply passage. The servo rod should extend and cause the band to tighten around the drum. Spring pressure should release the servo when air pressure is removed.

Rear Servo Air Test

Apply air pressure to the rear servo apply passage. The servo rod should extend and cause the band to

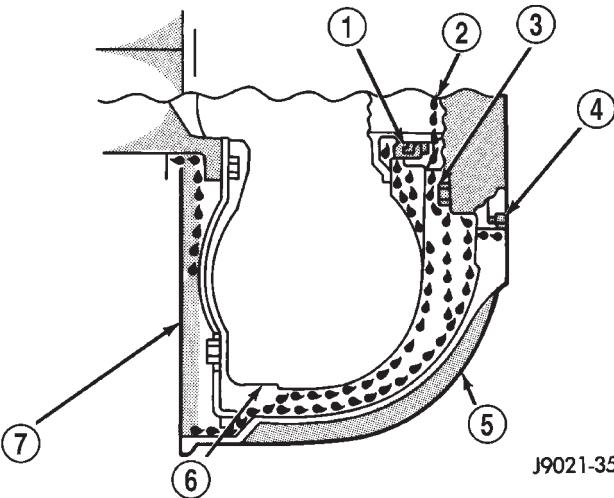
tighten around the drum. Spring pressure should release the servo when air pressure is removed.

**CONVERTER HOUSING FLUID LEAK
DIAGNOSIS**

When diagnosing converter housing fluid leaks, two items must be established before repair.

- (1) Verify that a leak condition actually exists.
- (2) Determined the true source of the leak.

Some suspected converter housing fluid leaks may not be leaks at all. They may only be the result of residual fluid in the converter housing, or excess fluid spilled during factory fill or fill after repair. Converter housing leaks have several potential sources. Through careful observation, a leak source can be identified before removing the transmission for repair. Pump seal leaks tend to move along the drive hub and onto the rear of the converter. Pump O-ring or pump body leaks follow the same path as a seal leak (Fig. 62). Pump vent or pump attaching bolt leaks are generally deposited on the inside of the converter housing and not on the converter itself (Fig. 62). Pump seal or gasket leaks usually travel down the inside of the converter housing. Front band lever pin plug leaks are generally deposited on the housing and not on the converter.

**Fig. 62 Converter Housing Leak Paths**

- 1 – PUMP SEAL
- 2 – PUMP VENT
- 3 – PUMP BOLT
- 4 – PUMP GASKET
- 5 – CONVERTER HOUSING
- 6 – CONVERTER
- 7 – REAR MAIN SEAL LEAK

TORQUE CONVERTER LEAK POINTS

Possible sources of converter leaks are:

- (1) Leaks at the weld joint around the outside diameter weld (Fig. 63).

DIAGNOSIS AND TESTING (Continued)

- (2) Leaks at the converter hub weld (Fig. 63).

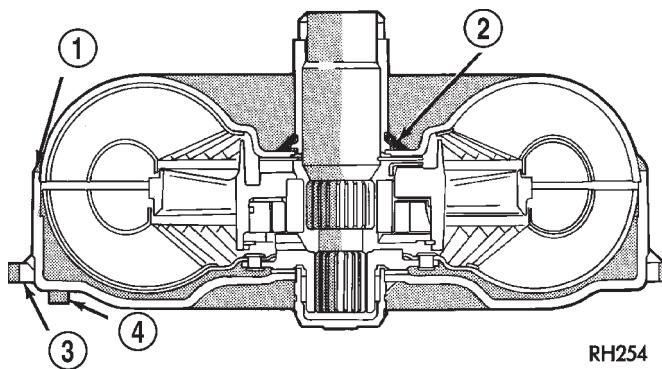


Fig. 63 Converter Leak Points—Typical

- 1 – OUTSIDE DIAMETER WELD
- 2 – TORQUE CONVERTER HUB WELD
- 3 – STARTER RING GEAR
- 4 – LUG

CONVERTER HOUSING AREA LEAK CORRECTION

- (1) Remove converter.
- (2) Tighten front band adjusting screw until band is tight around front clutch retainer. This prevents front/rear clutches from coming out when oil pump is removed.
- (3) Remove oil pump and remove pump seal. Inspect pump housing drainback and vent holes for obstructions. Clear holes with solvent and wire.
- (4) Inspect pump bushing and converter hub. If bushing is scored, replace it. If converter hub is

scored, either polish it with crocus cloth or replace converter.

(5) Install new pump seal, O-ring, and gasket. Replace oil pump if cracked, porous or damaged in any way. Be sure to loosen the front band before installing the oil pump, damage to the oil pump seal may occur if the band is still tightened to the front clutch retainer.

(6) Loosen kickdown lever pin access plug three turns. Apply Loctite 592, or Permatex No. 2 to plug threads and tighten plug to 17 N·m (150 in. lbs.) torque.

(7) Adjust front band.

(8) Lubricate pump seal and converter hub with transmission fluid or petroleum jelly and install converter.

(9) Install transmission and converter housing dust shield.

(10) Lower vehicle.

DIAGNOSIS CHARTS

The diagnosis charts provide additional reference when diagnosing a transmission fault. The charts provide general information on a variety of transmission, overdrive unit and converter clutch fault conditions.

The hydraulic flow charts, in the Schematics and Diagrams section of this group, outline fluid flow and hydraulic circuitry. Circuit operation is provided for neutral, third, fourth and reverse gear ranges. Normal working pressures are also supplied for each of the gear ranges.

DIAGNOSIS AND TESTING (Continued)

DIAGNOSIS CHART

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. Mount and Driveline Bolts Loose	3. Check engine mount, transmission mount, propeller shaft, rear spring to body bolts, rear control arms, crossmember and axle bolt torque. Tighten loose bolts and replace missing bolts.
	4. U-Joint Worn/Broken	4. Remove propeller shaft and replace U-Joint.
	5. Axle Backlash Incorrect	5. Check per Service Manual. Correct as needed.
	6. Hydraulic Pressure Incorrect	6. Check pressure. Remove, overhaul or adjust valve body as needed.
	7. Band Misadjusted.	7. Adjust rear band.
	8. Valve Body Check Balls Missing.	8. Inspect valve body for proper check ball installation.
	9. Axle Pinion Flange Loose.	9. Replace nut and check pinion threads before installing new nut. Replace pinion gear if threads are damaged.
	10. Clutch, band or planetary component Damaged.	10. Remove, disassemble and repair transmission as necessary.
	11. Converter Clutch (if equipped) Faulty.	11. 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.
	12. Cooler Plugged.	12. Flush transmission cooler and inspect convertor drainback valve.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO DRIVE RANGE (REVERSE OK)	1. Fluid Level Low. 2. Gearshift Linkage/Cable Loose/Misadjusted. 3. Rear Clutch Burnt. 4. Valve Body Malfunction. 5. Transmission Overrunning Clutch Broken. 6. Input Shaft Seal Rings Worn/Damaged. 7. Front Planetary Failed Broken.	1. Add fluid and check for leaks if drive is restored. 2. Repair or replace linkage components. 3. Remove and disassemble transmission and rear clutch and seals. Repair/replace worn or damaged parts as needed. 4. Remove and disassemble valve body. Replace assembly if any valves or bores are damaged. 5. Remove and disassemble transmission. Replace overrunning clutch. 6. Remove and disassemble transmission. Replace seal rings and any other worn or damaged parts. 7. Remove and repair.
NO DRIVE OR REVERSE (VEHICLE WILL NOT MOVE)	1. Fluid Level Low. 2. Gearshift Linkage/Cable Loose/Misadjusted. 3. U-Joint/Axle/Transfer Case Broken. 4. Filter Plugged. 5. Oil Pump Damaged. 6. Valve Body Malfunctioned. 7. Transmission Internal Component Damaged. 8. Park Sprag not Releasing 9. Torque Converter Damage.	1. Add fluid and check for leaks if drive is restored. 2. Inspect, adjust and reassemble linkage as needed. Replace worn/damaged parts. 3. Perform preliminary inspection procedure for vehicle that will not move. Refer to procedure in diagnosis section. 4. 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. 5. Perform pressure test to confirm low pressure. Replace pump body assembly if necessary. 6. 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. 7. Remove and disassemble transmission. Repair or replace failed components as needed. Remove and disassemble transmission. Repair or replace failed components as needed. 8. Remove, disassemble, repair. 9. Check Stall Speed, Worn/Damaged/Stuck. Inspect and replace as required.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
SHIFTS DELAYED OR ERRATIC (SHIFTS ALSO HARSH AT TIMES)	1. Fluid Level Low/High. 2. Throttle Linkage Misadjusted. 3. Throttle Linkage Binding. 4. Gearshift Linkage/Cable Misadjusted. 5. Fluid Filter Clogged. 6. Governor Valve Sticking. 7. Governor Seal Rings Worn/Damaged. 8. Clutch or Servo Failure. 9. Front Band Misadjusted. 10. Pump Suction Passage Leak.	1. Correct fluid level and check for leaks if low. 2. Adjust linkage as described in service section. 3. Check cable for binding. Check for return to closed throttle at transmission. 4. Adjust linkage/cable as described in service section. 5. Replace filter. If filter and fluid contained clutch material or metal particles, an overhaul may be necessary. Perform lube flow test. 6. Inspect, clean or repair. 7. Inspect/replace. 8. Remove valve body and air test clutch, and band servo operation. Disassemble and repair transmission as needed. 9. Adjust band. 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. 2. Park Sprag Sticking. 3. Rear Band Misadjusted/Worn. 4. Valve Body Malfunction. 5. Rear Servo Malfunction. 6. Front Clutch Burnt.	1. Repair or replace linkage parts as needed. 2. Inspect and replace as necessary. 3. Adjust band; replace. 4. Remove and service valve body. Replace valve body if any valves or valve bores are worn or damaged. 5. Remove and disassemble transmission. Replace worn/damaged servo parts as necessary. 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. 2. Valve Body Malfunction. 3. Front Servo/Kickdown Band Damaged/Burned.	1. Remove governor assembly and clean or repair as necessary. 2. Stuck 1-2 shift valve or governor plug. 3. Repair/replace.
MOVES IN 2ND OR 3RD GEAR, ABRUPTLY DOWNSHIFTS TO LOW	1. Valve Body Malfunction. 2. Governor Valve Sticking.	1. Remove, clean and inspect. Look for stuck 1-2 valve or governor plug. 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. 2. Valve Body Malfunction. 3. Front Servo Piston Cocked in Bore. 4. Front Band Linkage Malfunction	1. Remove governor, clean, inspect and repair as required. 2. Remove, clean and inspect. Look for sticking 1-2 shift valve, 2-3 shift valve, governor plug or broken springs. 3. Inspect servo and repair as required. 4. Inspect linkage and look for bind in linkage.
NO KICKDOWN OR NORMAL DOWNSHIFT	1. Throttle Linkage Misadjusted. 2. Accelerator Pedal Travel Restricted. 3. Governor/Valve Body Hydraulic Pressures Too High or Too Low Due to Sticking Governor, Valve Body Malfunction or Incorrect Hydraulic Control Pressure Adjustments. 4. Valve Body Malfunction. 5. Valve Body Malfunction.	1. Adjust linkage. 2. Floor mat under pedal, accelerator cable worn or brackets bent. 3. Perform hydraulic pressure tests to determine cause and repair as required. Correct valve body pressure adjustments as required. 4. Perform hydraulic pressure tests to determine cause and repair as required. Correct valve body pressure adjustments as required. 5. Sticking 1-2, 2-3 shift valves, or governor plugs.
STUCK IN LOW GEAR (WILL NOT UPSHIFT)	1. Throttle Linkage Misadjusted/ Stuck. 2. Gearshift Linkage Misadjusted. 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). 4. Front Band Out of Adjustment. 5. Clutch or Servo Malfunction.	1. Adjust linkage and repair linkage if worn or damaged. Check for binding cable or missing return spring. 2. Adjust linkage and repair linkage if worn or damaged. 3. Check line and governor pressures to determine cause. Correct as required. 4. Adjust Band. 5. Air pressure check operation of clutches and bands. Repair faulty component.
CREEPS IN NEUTRAL	1. Gearshift Linkage Misadjusted. 2. Rear Clutch Dragging/Warped Welded. 3. Valve Body Malfunction.	1. Adjust linkage. 2. Disassemble and repair. 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 2. Shift Cable Misassembled. 3. Valve Body Misassembled. 4. Pump Passages Leaking 5. Cooling System Cooler Plugged. 6. Overrunning Clutch Damaged.	1. Add fluid and check for leaks. 2. Route cable away from engine and bell housing. 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. Check pump for porous casting, scores on mating surfaces and excess rotor clearance. Repair as required. Loose pump bolts. 5. Flow check cooler circuit. Repair as needed. 6. Replace clutch.
SLIPS IN REVERSE ONLY	1. Fluid Level Low. 2. Gearshift Linkage Misadjusted. 3. Rear Band Misadjusted. 4. Rear Band Worn. 5. Hydraulic Pressure Too Low. 6. Rear Servo Leaking. 7. Band Linkage Binding.	1. Add fluid and check for leaks. 2. Adjust linkage. 3. Adjust band. 4. Replace as required. 5. Perform hydraulic pressure tests to determine cause. 6. Air pressure check clutch-servo operation and repair as required. 7. Inspect and repair as required.
SLIPS IN FORWARD DRIVE RANGES	1. Fluid Level Low. 2. Fluid Foaming. 3. Throttle Linkage Misadjusted. 4. Gearshift Linkage Misadjusted. 5. Rear Clutch Worn. 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 7. Rear Clutch Malfunction, Leaking Seals or Worn Plates. 8. Overrunning Clutch Worn, Not Holding (Slips in 1 Only).	1. Add fluid and check for leaks. 2. Check for high oil level, bad pump gasket or seals, dirt between pump halves and loose pump bolts. Replace pump if necessary. 3. Adjust linkage. 4. Adjust linkage. 5. Inspect and replace as needed. 6. Perform hydraulic and air pressure tests to determine cause. 7. Air pressure check clutch-servo operation and repair as required. 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. 2. Torque Converter Bolts Hitting Dust Shield. 3. Planetary Gear Set Broken/Seized. 4. Overrunning Clutch Worn/Broken. 5. Oil Pump Components Scored/Binding. 6. Output Shaft Bearing or Bushing Damaged. 7. Clutch Operation Faulty. 8. Front and Rear Bands Misadjusted.	1. Replace. 2. Dust shield bent. Replace or repair. 3. Check for debris in oil pan and repair as required. 4. Inspect and check for debris in oil pan. Repair as required. 5. Remove, inspect and repair as required. 6. Remove, inspect and repair as required. 7. Perform air pressure check and repair as required. 8. Adjust bands.
DRAGS OR LOCKS UP	1. Fluid Level Low. 2. Clutch Dragging/Failed 3. Front or Rear Band Misadjusted. 4. Case Leaks Internally. 5. Servo Band or Linkage Malfunction. 6. Overrunning Clutch Worn. 7. Planetary Gears Broken. 8. Converter Clutch Dragging.	1. Check and adjust level. 2. Air pressure check clutch operation and repair as required. 3. Adjust bands. 4. Check for leakage between passages in case. 5. Air pressure check servo operation and repair as required. 6. Remove and inspect clutch. Repair as required. 7. Remove, inspect and repair as required (look for debris in oil pan). 8. Check for plugged cooler. Perform flow check. Inspect pump for excessive side clearance. Replace pump as required.
WHINE/NOISE RELATED TO ENGINE SPEED	1. Fluid Level Low. 2. Shift Cable Incorrect Routing.	1. Add fluid and check for leaks. 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.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO START IN PARK OR NEUTRAL	1. Gearshift Linkage/Cable Misadjusted. 2. Neutral Switch Wire Open/Cut. 3. Neutral Switch Faulty. 4. Neutral Switch Connect Faulty. 5. Valve Body Manual Lever Assembly Bent/Worn/Broken.	1. Adjust linkage/cable. 2. Check continuity with test lamp. Repair as required. 3. Refer to service section for test and replacement procedure. 4. Connectors spread open. Repair. 5. Inspect lever assembly and replace if damaged.
NO REVERSE (OR SLIPS IN REVERSE)	1. Direct Clutch Pack (front clutch) Worn. 2. Rear Band Misadjusted. 3. Front Clutch Malfunctioned/Burnt.	1. Disassemble unit and rebuild clutch pack. 2. Adjust band. 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. Speedometer Adapter Leaks. 2. Fluid Lines and Fittings Loose/Leaks/Damaged. 3. Filler Tube (where tube enters case) Leaks/Damaged. 4. Pressure Port Plug Loose Loose/Damaged. 5. Pan Gasket Leaks. 6. Valve Body Manual Lever Shaft Seal Leaks/Worn. 7. Rear Bearing Access Plate Leaks. 8. Gasket Damaged or Bolts are Loose. 9. Adapter/Extension Gasket Damaged Leaks/Damaged. 10. Neutral Switch Leaks/Damaged. 11. Converter Housing Area Leaks. 12. Pump Seal Leaks/Worn/ Damaged. 13. Torque Converter Weld Leak/Cracked Hub. 14. Case Porosity Leaks.	1. Replace both adapter seals. 2. Tighten fittings. If leaks persist, replace fittings and lines if necessary. 3. Replace O-ring seal. Inspect tube for cracks in tube. 4. Tighten to correct torque. Replace plug or reseal if leak persists. 5. Tighten pan screws to 150 inch pounds. If leaks persist, replace gasket. Do no over tighten screws. 6. Replace shaft seal. 7. Replace gasket. Tighten screws. 8. Replace bolts or gasket or tighten both. 9. Replace gasket. 10. Replace switch and gasket. 11. 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. 12. Replace seal. 13. Replace converter. 14. Replace case.

SERVICE PROCEDURES

FLUID LEVEL CHECK

Transmission fluid level should be checked monthly under normal operation. If the vehicle is used for trailer towing or similar heavy load hauling, check fluid level and condition weekly. Fluid level is checked with the engine running at curb idle speed, the transmission in NEUTRAL and the transmission fluid at normal operating temperature.

FLUID LEVEL CHECK PROCEDURE

- (1) Transmission fluid must be at normal operating temperature for accurate fluid level check. Drive vehicle if necessary to bring fluid temperature up to normal hot operating temperature of 82°C (180°F).
- (2) Position vehicle on level surface.
- (3) Start and run engine at curb idle speed.
- (4) Apply parking brakes.
- (5) Shift transmission momentarily into all gear ranges. Then shift transmission back to Neutral.
- (6) Clean top of filler tube and dipstick to keep dirt from entering tube.
- (7) Remove dipstick (Fig. 64) and check fluid level as follows:
 - (a) Correct acceptable level is in crosshatch area.
 - (b) Correct maximum level is to MAX arrow mark.
 - (c) Incorrect level is at or below MIN line.
 - (d) If fluid is low, add only enough Mopar® ATF Plus 3 to restore correct level. Do not overfill.

CAUTION: Do not overfill the transmission. Overfilling may cause leakage out the pump vent which can be mistaken for a pump seal leak. Overfilling will also cause fluid aeration and foaming as the excess fluid is picked up and churned by the gear train. This will significantly reduce fluid life.

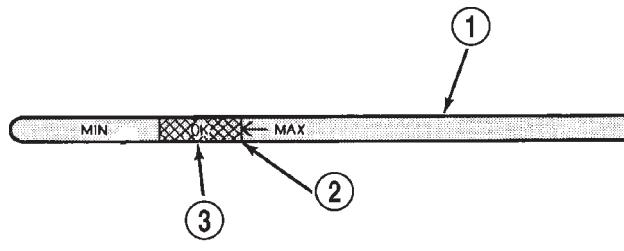


Fig. 64 Dipstick Fluid Level Marks—Typical

- 1 – DIPSTICK
2 – MAXIMUM CORRECT FLUID LEVEL
3 – ACCEPTABLE FLUID LEVEL

FLUID AND FILTER REPLACEMENT

Refer to the Maintenance Schedules in Group 0, Lubrication and Maintenance, for proper service

intervals. The service fluid fill after a filter change is approximately 3.8 liters (4.0 quarts).

REMOVAL

- (1) Hoist and support vehicle on safety stands.
- (2) Remove the transmission/skip plate as necessary to access the transmission oil pan.
- (3) Place a large diameter shallow drain pan beneath the transmission pan.
- (4) Remove bolts holding front and sides of pan to transmission (Fig. 65).
- (5) Loosen bolts holding rear of pan to transmission.
- (6) Slowly separate front of pan away from transmission allowing the fluid to drain into drain pan.
- (7) Hold up pan and remove remaining bolts holding pan to transmission.
- (8) While holding pan level, lower pan away from transmission.
- (9) Pour remaining fluid in pan into drain pan.
- (10) Remove screws holding filter to valve body (Fig. 66).
- (11) Separate filter from valve body and pour fluid in filter into drain pan.
- (12) Dispose used trans fluid and filter properly.

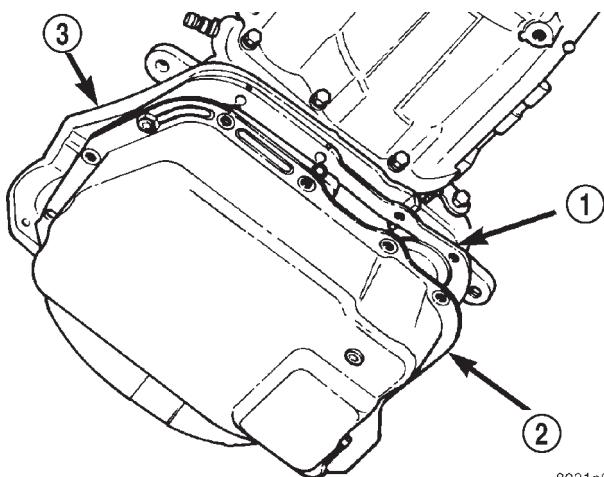


Fig. 65 Transmission Pan—Typical 8031e88b

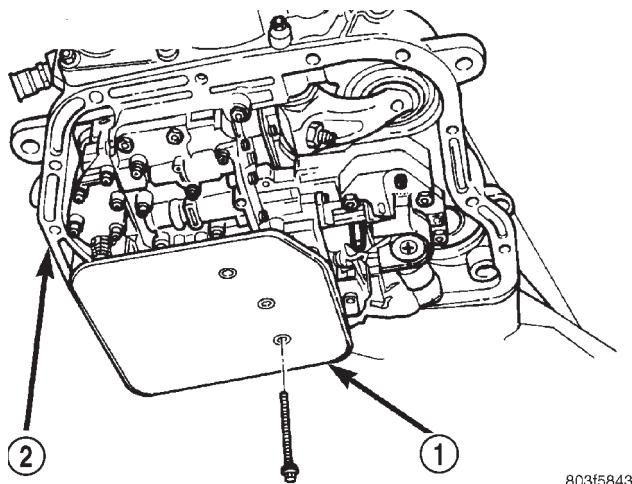
- 1 – GASKET
2 – PAN
3 – TRANSMISSION

INSPECTION

Inspect bottom of pan and magnet for excessive amounts of metal or fiber contamination. A light coating of clutch or band material on the bottom of the pan does not indicate a problem unless accompanied by slipping condition or shift lag. If fluid and pan are contaminated with excessive amounts or debris, refer to the diagnosis section of this group.

Check the adjustment of the front and rear bands, adjust if necessary. Refer to Adjustment section of this group for proper procedure.

SERVICE PROCEDURES (Continued)

**Fig. 66 Transmission Filter—Typical**

- 1 – FILTER
2 – TRANSMISSION

CLEANING

- (1) Using a suitable solvent, clean pan and magnet.
- (2) Using a suitable gasket scraper, clean gasket material from gasket surface of transmission case and the gasket flange around the pan.

INSTALLATION

- (1) Place replacement filter in position on valve body.
- (2) Install screws to hold filter to valve body (Fig. 66). Tighten screws to 4 N·m (35 in. lbs.) torque.
- (3) Place new gasket in position on pan, and install pan on transmission.
- (4) Place pan in position on transmission.
- (5) Install screws to hold pan to transmission (Fig. 65). Tighten bolts to 17 N·m (150 in. lbs.) torque.
- (6) Install the transmission/skip plate.
- (7) Lower vehicle and fill transmission with Mopar® ATF Plus 3, type 7176 fluid.

TRANSMISSION FILL PROCEDURE

To avoid overfilling transmission after a fluid change or overhaul, perform the following procedure:

- (1) Remove dipstick and insert clean funnel in transmission fill tube.
- (2) Add following initial quantity of Mopar® ATF Plus 3 to transmission:
 - (a) If only fluid and filter were changed, add **3 pints (1-1/2 quarts)** of ATF Plus 3 to transmission.
 - (b) If transmission was completely overhauled, torque converter was replaced or drained, and cooler was flushed, add **12 pints (6 quarts)** of ATF Plus 3 to transmission.
- (3) Apply parking brakes.
- (4) Start and run engine at normal curb idle speed.

(5) Apply service brakes, shift transmission through all gear ranges then back to NEUTRAL, set parking brake, and leave engine running at curb idle speed.

(6) Remove funnel, insert dipstick and check fluid level. If level is low, **add fluid to bring level to MIN mark on dipstick**. Check to see if the oil level is equal on both sides of the dipstick. If one side is noticeably higher than the other, the dipstick has picked up some oil from the dipstick tube. Allow the oil to drain down the dipstick tube and re-check.

(7) Drive vehicle until transmission fluid is at normal operating temperature.

(8) With the engine running at curb idle speed, the gear selector in NEUTRAL, and the parking brake applied, check the transmission fluid level.

CAUTION: Do not overfill transmission, fluid foaming and shifting problems can result.

(9) Add fluid to bring level up to MAX arrow mark.

When fluid level is correct, shut engine off, release park brake, remove funnel, and install dipstick in fill tube.

CONVERTER DRAINBACK CHECK VALVE SERVICE

The converter drainback check valve is located in the cooler outlet (pressure) line near the radiator tank. The valve prevents fluid drainback when the vehicle is parked for lengthy periods. The valve check ball is spring loaded and has an opening pressure of approximately 2 psi.

The valve is serviced as an assembly; it is not repairable. Do not clean the valve if restricted, or contaminated by sludge, or debris. If the valve fails, or if a transmission malfunction occurs that generates significant amounts of sludge and/or clutch particles and metal shavings, the valve must be replaced.

The valve must be removed whenever the cooler and lines are reverse flushed. The valve can be flow tested when necessary. The procedure is exactly the same as for flow testing a cooler.

If the valve is restricted, installed backwards, or in the wrong line, it will cause an overheating condition and possible transmission failure.

CAUTION: The drainback valve is a one-way flow device. It must be properly oriented in terms of flow direction for the cooler to function properly. The valve must be installed in the pressure line. Otherwise flow will be blocked and would cause an overheating condition and eventual transmission failure.

OIL PUMP VOLUME CHECK

Measuring the oil pump output volume will determine if sufficient oil flow to the transmission oil

SERVICE PROCEDURES (Continued)

cooler exists, and whether or not an internal transmission failure is present.

Verify that the transmission fluid is at the proper level. Refer to the Fluid Level Check procedure in this section. If necessary, fill the transmission to the proper level with Mopar® ATF+3, type 7176, Automatic Transmission Fluid.

(1) Disconnect the **To cooler** line at the cooler inlet 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 one quart of transmission fluid is collected in the container in 20 seconds or less, oil pump flow volume is within acceptable limits. If fluid flow is intermittent, or it takes more than 20 seconds to collect one quart of fluid, refer to the Hydraulic Pressure tests in this section for further diagnosis.

(4) Re-connect the **To cooler** line to the transmission cooler inlet.

(5) Refill the transmission to proper level.

FLUSHING COOLERS AND TUBES

When a transmission failure has contaminated the fluid, the oil cooler(s) must be flushed. The torque converter must also be replaced. This will insure that metal particles or sludged oil are not later transferred back into the reconditioned (or replaced) transmission.

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

CAUTION: The transmission oil cooler requires a two stage flushing procedure due to an internally mounted thermostat. Failure to follow the procedure can result in severe transmission damage.

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

KEEP LIGHTED 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.

NOTE: The converter drainback valve must be removed and an appropriate replacement hose installed to bridge the space between the transmission cooler line and the cooler fitting. Failure to remove the drainback valve will prevent reverse flushing the system. A suitable replacement hose can be found in the adapter kit supplied with the flushing tool.

(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) Remove the transmission oil cooler from the vehicle. Refer to the Group 7, Cooling System, for the proper procedures.

(8) Remove the transmission oil cooler thermostat. Refer to the Group 7, Cooling System, for the proper procedures.

(9) Re-install the thermostat cover onto the oil cooler and install the snap ring.

(10) Re-connect the oil cooler to the transmission cooler lines.

(11) Turn pump ON for two to three minutes to flush cooler(s) and lines.

NOTE: This flushes the bypass circuit of the cooler only.

(12) Turn pump OFF.

(13) Remove the thermostat cover from the oil cooler.

(14) Install Special Tool Cooler Plug 8414 into the transmission oil cooler.

(15) Turn pump ON for two to three minutes to flush cooler(s) and lines.

SERVICE PROCEDURES (Continued)

NOTE: This flushes the main oil cooler core passages only.

- (16) Turn pump OFF.
- (17) Remove the thermostat cover from the oil cooler.
- (18) Remove Special Tool Cooler Plug 8414 from the transmission oil cooler.
- (19) Install a new thermostat spring, thermostat, cover, and snap-ring into the transmission oil cooler.
- (20) Install the transmission oil cooler onto the vehicle.
- (21) Disconnect CLEAR suction line from reservoir at cover plate. Disconnect CLEAR return line at cover plate, and place it in a drain pan.
- (22) Turn pump ON for 30 seconds to purge flushing solution from cooler and lines. Turn pump OFF.
- (23) Place CLEAR suction line into a one quart container of Mopar® ATF Plus 3, type 7176 automatic transmission fluid.
- (24) 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.
- (25) Disconnect alligator clips from battery. Reconnect flusher lines to cover plate, and remove flushing adapters from cooler lines.

ALUMINUM THREAD REPAIR

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

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

REMOVAL AND INSTALLATION

TRANSMISSION

CAUTION: The transmission and torque converter must be removed as an assembly to avoid component damage. The converter drive plate, pump bushing, or oil seal can be damaged if the converter is left attached to the driveplate during removal.

REMOVAL

- (1) Disconnect battery negative cable.
- (2) Disconnect and lower or remove necessary exhaust components.
- (3) Remove engine-to-transmission bending braces.

- (4) Disconnect fluid cooler lines at transmission.
- (5) Remove starter motor.
- (6) Disconnect and remove crankshaft position sensor (Fig. 67). Retain sensor attaching bolts.

CAUTION: The crankshaft position sensor can be damaged during transmission removal (or installation) if the sensor is left in place. To avoid damage, remove the sensor before removing the transmission.

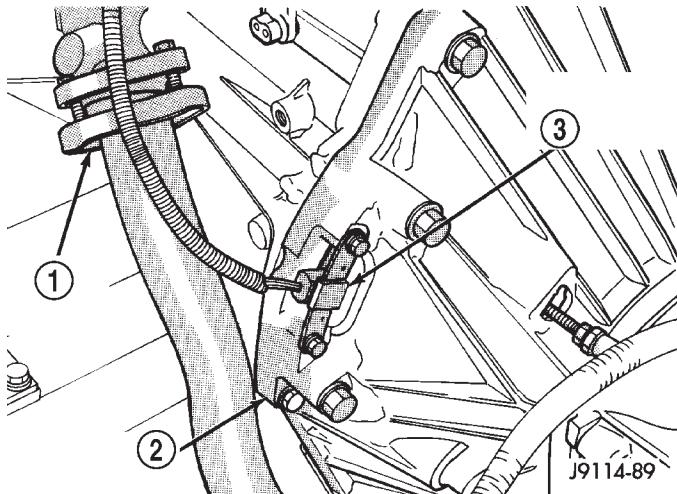


Fig. 67 Crankshaft Position Sensor—2.5L Engine

- 1 – EXHAUST DOWN PIPE
2 – TRANSMISSION HOUSING
3 – CRANKSHAFT POSITION SENSOR

- (7) Remove torque converter access cover.
- (8) If transmission is being removed for overhaul, remove transmission oil pan, drain fluid and reinstall pan.
- (9) Remove skid plate for access.
- (10) Remove the fill tube bracket bolts and pull tube out of transmission. Retain fill tube seal. On 4 x 4 models, it will also be necessary to remove bolt attaching transfer case vent tube to converter housing.
- (11) Rotate crankshaft in clockwise direction until converter bolts are accessible. Then remove bolts one at a time. Rotate crankshaft with socket wrench on dampener bolt.
- (12) Mark propeller shaft and axle yokes for assembly alignment. Then disconnect and remove propeller shafts.
- (13) Disconnect wires from park/neutral position switch and vehicle speed sensor.
- (14) Disconnect gearshift cable from transmission manual valve lever.
- (15) Disconnect throttle valve cable from transmission bracket and throttle valve lever.
- (16) Disconnect shift rod from transfer case shift lever or remove shift lever from transfer case.

REMOVAL AND INSTALLATION (Continued)

(17) Support rear of engine with safety stand or jack.

(18) Raise transmission slightly with service jack to relieve load on crossmember and supports.

(19) Remove bolts securing rear support and cushion to transmission and crossmember. Raise transmission slightly, slide exhaust hanger arm from bracket and remove rear support.

(20) Remove bolts attaching crossmember to frame and remove crossmember.

(21) Disconnect transfer case vent hose. Then disconnect vacuum switch harness.

(22) Remove transfer case.

(23) Remove all converter housing bolts.

(24) Carefully work transmission and torque converter assembly rearward off engine block dowels.

(25) Hold torque converter in place during transmission removal.

(26) Lower transmission and remove assembly from under the vehicle.

(27) To remove torque converter, carefully slide torque converter out of the transmission.

INSTALLATION

(1) Check torque converter hub and hub drive notches for sharp edges burrs, scratches, or nicks. Polish the hub and notches with 320/400 grit paper and crocus cloth if necessary. The hub must be smooth to avoid damaging pump seal at installation.

(2) Lubricate converter drive hub and oil pump seal lip with transmission fluid.

(3) Align converter and oil pump.

(4) Carefully insert converter in oil pump. Then rotate converter back and forth until fully seated in pump gears.

(5) Check converter seating with steel scale and straightedge (Fig. 68). Surface of converter lugs should be 1/2 in. to rear of straightedge when converter is fully seated.

(6) Temporarily secure converter with C-clamp.

(7) Lubricate the pocket in the rear of the crankshaft, in which the converter pilot hub rides, with a light coating of Mopar® High-Temp Grease.

(8) Position transmission on jack and secure it with safety chains.

(9) Check condition of converter driveplate. Replace the plate if cracked, distorted or damaged. **Also be sure transmission dowel pins are seated in engine block and protrude far enough to hold transmission in alignment.**

(10) Raise transmission and align converter with drive plate and converter housing with engine block.

(11) Move transmission forward. Then raise, lower or tilt transmission to align converter housing with engine block dowels.

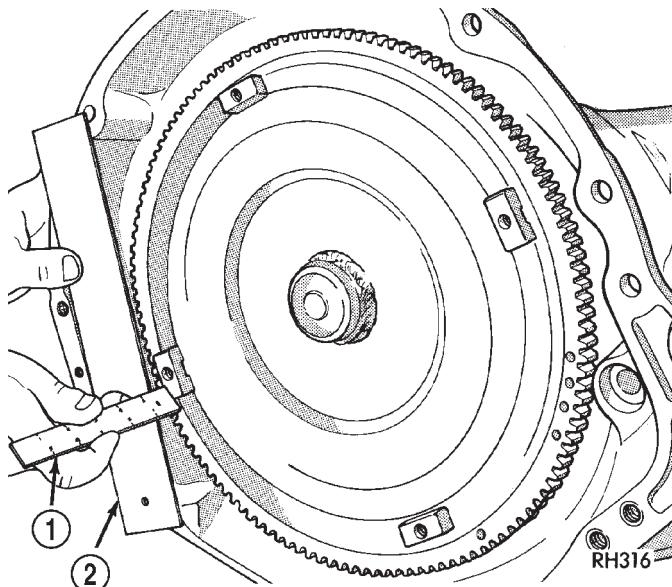


Fig. 68 Typical Method Of Checking Converter Seating

1 – SCALE

2 – STRAIGHTEDGE

(12) Carefully work transmission forward and over engine block dowels until converter hub is seated in crankshaft.

(13) Install and tighten bolts that attach transmission converter housing to engine block (Fig. 69).

CAUTION: Be sure the converter housing is fully seated on the engine block dowels before tightening any bolts.

(14) Install torque converter attaching bolts. Tighten bolts to following torque.

- 54 N·m (40 ft. lbs.) with 9.5 in. 3-lug converter
- 74 N·m (55 ft. lbs.) with 9.5 in. 4-lug converter
- 74 N·m (55 ft. lbs.) with 10.0 in. 4-lug converter
- 31 N·m (270 in. lbs.) with 10.75 in. 4-lug converter

(15) Install crankshaft position sensor.

(16) Install transmission fill tube and seal. Install new fill tube seal in transmission before installation.

(17) Connect transmission cooler lines to transmission.

(18) Install transfer case onto transmission.

(19) Install rear crossmember and attach transmission rear support to crossmember.

(20) Remove engine support fixture.

(21) Remove transmission jack.

(22) Connect vehicle speed sensor wires.

(23) Connect wires to park/neutral position switch.

(24) Install crankshaft position sensor.

(25) Install converter housing access cover.

(26) Install exhaust pipes and support brackets, if removed.

REMOVAL AND INSTALLATION (Continued)

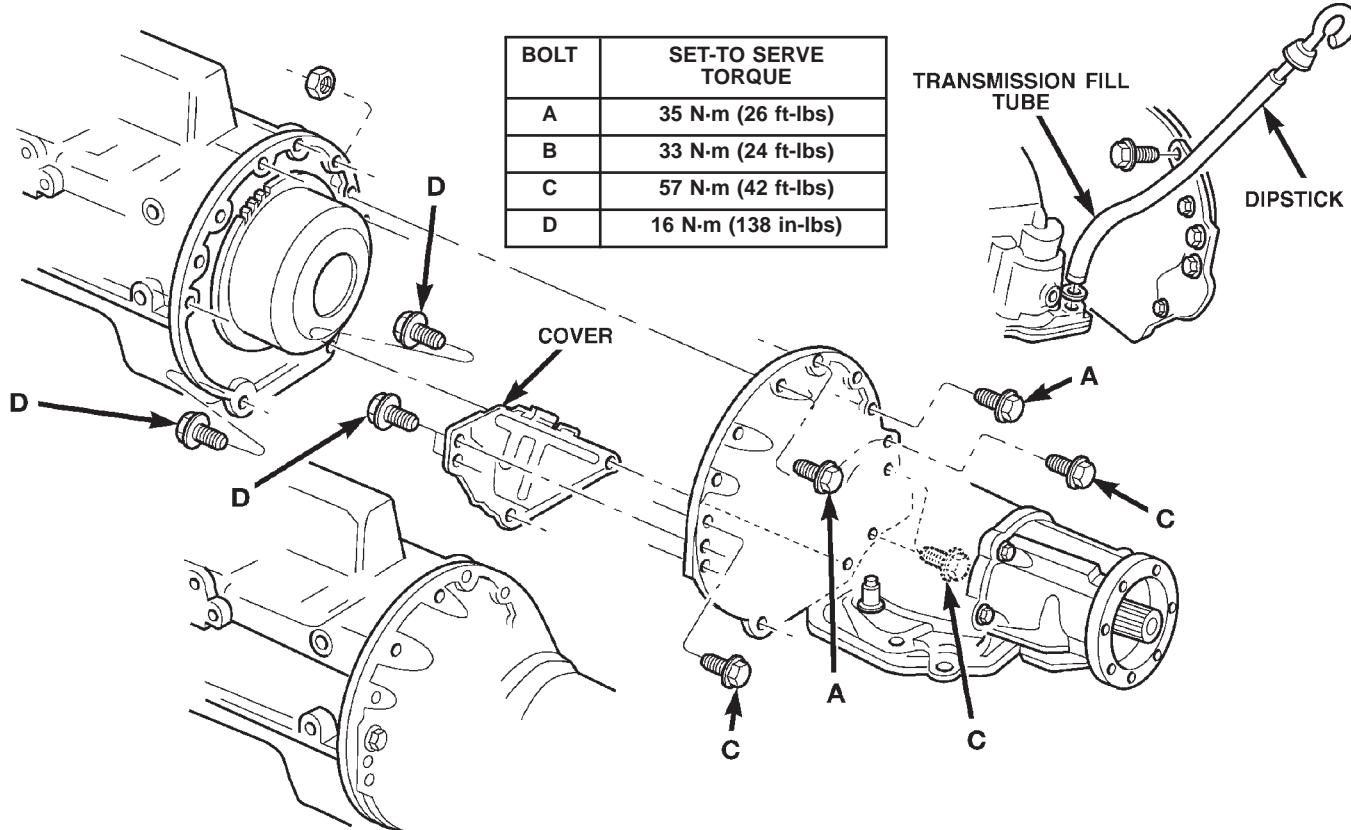


Fig. 69 Transmission Attachment

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- (27) Install starter motor and cooler line bracket.
- (28) Install new plastic retainer grommet on any shift linkage rod or lever that was disconnected. Grommets should not be reused. Use pry tool to remove rod from grommet and cut away old grommet. Use pliers to snap new grommet into lever and to snap rod into grommet at assembly.

(29) Connect gearshift and linkage and throttle cable.

(30) Connect transfer case shift linkage.
(31) Adjust gearshift linkage and throttle valve cable if necessary.

(32) Align and connect propeller shaft(s).
(33) Install skid plate, rear cushion and bracket, if removed.

(34) Fill transfer case to bottom edge of fill plug hole.

(35) Lower vehicle and fill transmission to correct level with Mopar® ATF Plus 3, type 7176 fluid.

TORQUE CONVERTER

REMOVAL

- (1) Remove transmission and torque converter from vehicle.
- (2) Place a suitable drain pan under the converter housing end of the transmission.

CAUTION: Verify that transmission is secure on the lifting device or work surface, the center of gravity of the transmission will shift when the torque converter is removed creating an unstable condition.

The torque converter is a heavy unit. Use caution when separating the torque converter from the transmission.

(3) Pull the torque converter forward until the center hub clears the oil pump seal.

(4) Separate the torque converter from the transmission.

INSTALLATION

Check converter hub and drive notches for sharp edges, burrs, scratches, or nicks. Polish the hub and notches with 320/400 grit paper or crocus cloth if necessary. The hub must be smooth to avoid damaging the pump seal at installation.

(1) Lubricate converter hub and oil pump seal lip with transmission fluid.

(2) Place torque converter in position on transmission.

CAUTION: Do not damage oil pump seal or bushing while inserting torque converter into the front of the transmission.

REMOVAL AND INSTALLATION (Continued)

(3) Align torque converter to oil pump seal opening.

(4) Insert torque converter hub into oil pump.

(5) While pushing torque converter inward, rotate converter until converter is fully seated in the oil pump gears.

(6) Check converter seating with a scale and straightedge (Fig. 70). Surface of converter lugs should be 1/2 in. to rear of straightedge when converter is fully seated.

(7) If necessary, temporarily secure converter with C-clamp attached to the converter housing.

(8) Install the transmission in the vehicle.

(9) Fill the transmission with the recommended fluid.

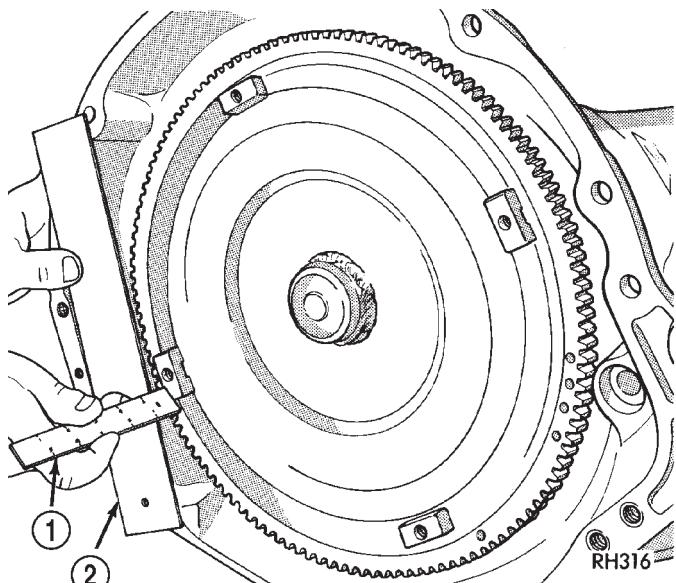


Fig. 70 Checking Torque Converter Seating

1 – SCALE

2 – STRAIGHTEDGE

YOKE SEAL REPLACEMENT

REMOVAL

(1) Raise vehicle.

(2) Mark propeller shaft and axle yoke for alignment reference.

(3) Disconnect and remove propeller shaft.

(4) Remove old seal with Seal Remover C-3985-B (Fig. 71) from extension housing.

INSTALLATION

(1) Place seal in position on extension housing.

(2) Drive seal into extension housing with Seal Installer C-3995-A or C-3972 (Fig. 72).

(3) Carefully guide propeller shaft slip yoke into housing and onto output shaft splines. Align marks made at removal and connect propeller shaft to rear axle pinion yoke.

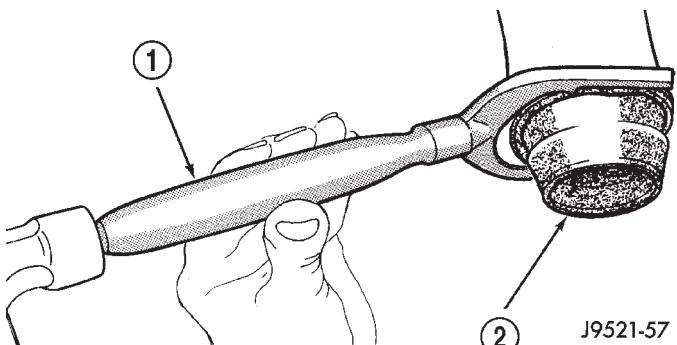


Fig. 71 Removing Extension Housing Yoke Seal

1 – SPECIAL TOOL C-3985-B

2 – SEAL

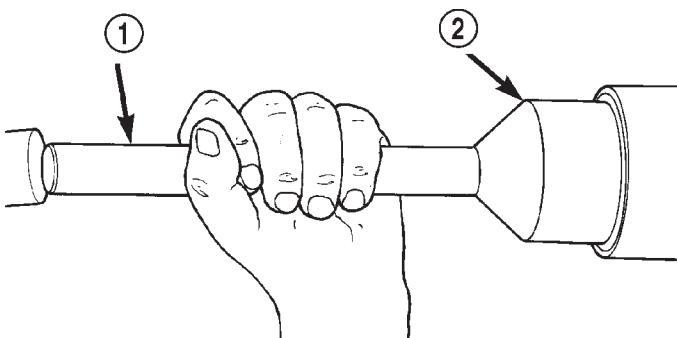


Fig. 72 Installing Extension Housing Yoke Seal

1 – SPECIAL TOOL C-4171

2 – SPECIAL TOOL C-3995-A

EXTENSION HOUSING BUSHING

REMOVAL

(1) Remove housing yoke seal.

(2) Insert Remover 6957 into extension housing. Tighten tool to bushing and remove bushing (Fig. 73).

INSTALLATION

(1) Align bushing oil hole with oil slot in extension housing.

(2) Tap bushing into place with Installer 6951 and Handle C-4171.

(3) Install new oil seal in housing using Seal Installer C-3995-A (Fig. 74).

ADAPTER HOUSING

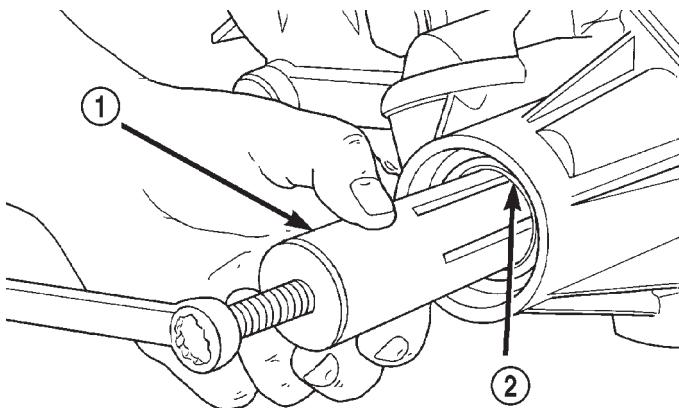
REMOVAL

(1) Hoist and support vehicle on safety stands.

(2) Support transmission with a suitable lifting device.

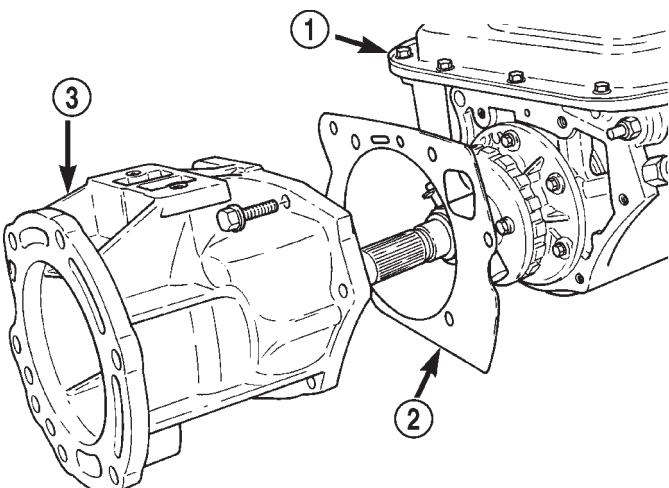
(3) Remove transmission skid plate. Refer to Group 13, Frame and Bumpers, for proper procedure.

REMOVAL AND INSTALLATION (Continued)

**Fig. 73 Bushing Removal—Typical**

- 1 – REMOVER 6957
2 – EXTENSION HOUSING BUSHING

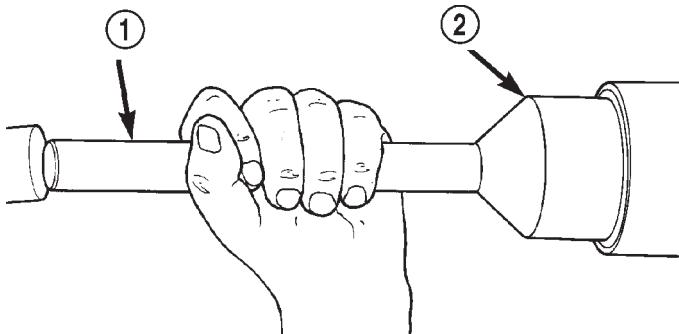
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Fig. 75 Adapter Housing

- 1 – TRANSMISSION
2 – GASKET
3 – ADAPTER HOUSING



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Fig. 74 Extension Housing Seal Installation

- 1 – SPECIAL TOOL C-4171
2 – SPECIAL TOOL C-3995-A

- (4) Remove propeller shafts. Refer to Group 3, Differential and Driveline, for proper procedure.
- (5) Remove transfer case.
- (6) Remove bolts holding adapter housing to transmission case (Fig. 75).
- (7) Separate adapter housing from transmission.
- (8) Slide adapter housing rearward and off output shaft (Fig. 75).

INSTALLATION

Clear gasket material from sealing surfaces on adapter housing and rear of transmission. Replace output shaft bearing, if necessary.

(1) Install new rear seal in adapter housing. Use Tool Handle C-4171 and Seal Installer C-3860-A to install seal.

(2) Place adapter housing gasket in position on rear of transmission.

(3) Slide adapter housing forward and over output shaft (Fig. 75).

(4) Guide park shaft into park sprag and push adapter housing forward until rod passes through opening behind sprag. It may be necessary to use a wire to hold sprag to the side for rod to pass through.

(5) Install bolts to hold adapter housing to rear of transmission.

(6) Install transfer case.

(7) Install propeller shafts.

(8) Install rear transmission mount and skid plate.

(9) Lower vehicle and verify transmission fluid level. Add fluid as necessary.

SPEEDOMETER ADAPTER

Rear axle gear ratio and tire size determine speedometer pinion requirements.

REMOVAL

- (1) Raise vehicle.
- (2) Disconnect wires from vehicle speed sensor.
- (3) Remove adapter clamp and screw (Fig. 76).

(4) Remove speed sensor and speedometer adapter as assembly.

(5) Remove speed sensor retaining screw and remove sensor from adapter.

(6) Remove speedometer pinion from adapter.

(7) Inspect sensor and adapter O-rings (Fig. 76). Remove and discard O-rings if worn or damaged.

(8) Inspect terminal pins in speed sensor. Clean pins with Mopar® electrical spray cleaner if dirty or oxidized. Replace sensor if faulty, or pins are loose, severely corroded, or damaged.

INSTALLATION

- (1) Thoroughly clean adapter flange and adapter mounting surface in housing. Surfaces must be clean

REMOVAL AND INSTALLATION (Continued)

for proper adapter alignment and speedometer operation.

(2) Install new O-rings on speed sensor and speedometer adapter if necessary (Fig. 76).

(3) Lubricate sensor and adapter O-rings with transmission fluid.

(4) Install vehicle speed sensor in speedometer adapter. Tighten sensor attaching screw to 2-3 N·m (15-27 in. lbs.) torque.

(5) Install speedometer pinion in adapter.

(6) Count number of teeth on speedometer pinion. Do this before installing assembly in housing. Then lubricate pinion teeth with transmission fluid.

(7) Note index numbers on adapter body (Fig. 77). These numbers will correspond to number of teeth on pinion.

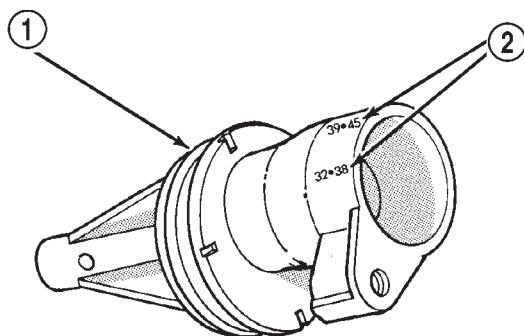
(8) Install speedometer assembly in housing.

(9) Rotate adapter until required range numbers are at 6 o'clock position. Be sure range index numbers correspond to number of teeth on pinion gear.

(10) Install speedometer adapter clamp and retaining screw. Tighten clamp screw to 10-12 N·m (90-110 in. lbs.) torque.

(11) Connect wires to vehicle speed sensor.

(12) Lower vehicle and top off transmission fluid level, if necessary.



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Fig. 77 Index Numbers On Speedometer Pinion Adapter

- 1 – SPEEDOMETER ADAPTER
2 – INDEX NUMBER LOCATION

PARK/NEUTRAL POSITION SWITCH

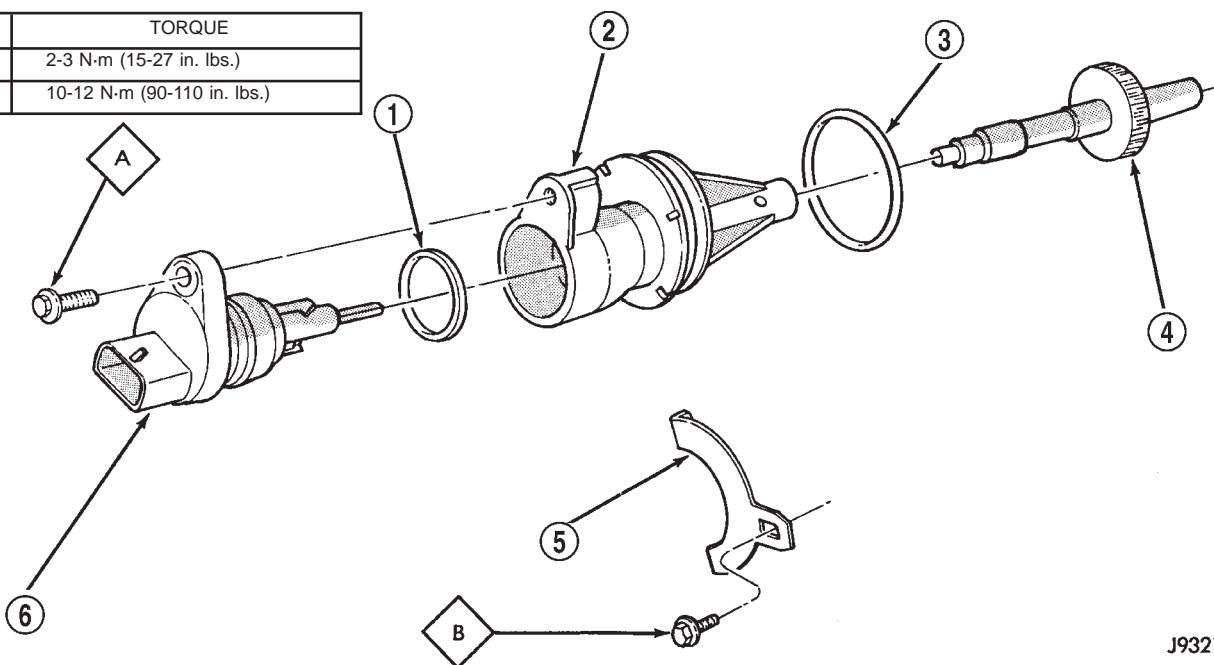
REMOVAL

(1) Raise vehicle and position drain pan under switch.

(2) Disconnect switch wires.

(3) Remove switch from case.

ITEM	TORQUE
A	2-3 N·m (15-27 in. lbs.)
B	10-12 N·m (90-110 in. lbs.)



J9321-385

Fig. 76 Speedometer Pinion Adapter Components

- 1 – SENSOR O-RING
2 – SPEEDOMETER ADAPTER
3 – ADAPTER O-RING

- 4 – SPEEDOMETER PINION
5 – ADAPTER CLAMP
6 – VEHICLE SPEED SENSOR

REMOVAL AND INSTALLATION (Continued)

INSTALLATION

(1) Move shift lever to Park and Neutral positions. Verify that switch operating lever fingers are centered in switch opening in case (Fig. 78).

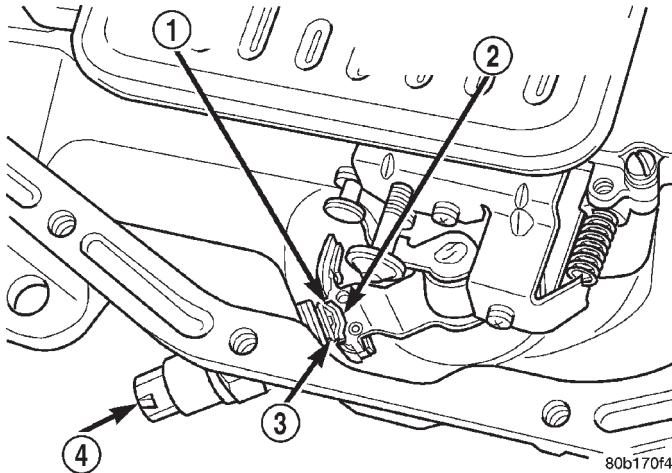


Fig. 78 Park/Neutral Position Switch

- 1 – NEUTRAL CONTACT
- 2 – MANUAL LEVER AND SWITCH PLUNGER IN REVERSE POSITION
- 3 – PARK CONTACT
- 4 – SWITCH

(2) Install new seal on switch and install switch in case. Tighten switch to 34 N·m (25 ft. lbs.) torque.

(3) Test continuity of new switch with 12V test lamp.

(4) Connect switch wires and lower vehicle.

(5) Top off transmission fluid level.

GEARSHIFT CABLE

REMOVAL

- (1) Shift transmission into Park.
- (2) Remove shift lever bezel and necessary console parts for access to shift lever assembly.
- (3) Disconnect cable at shift lever and feed cable through dash panel opening to underside of vehicle.
- (4) Raise vehicle.
- (5) Disengage cable eyelet at transmission shift lever and pull cable adjuster out of mounting bracket. Then remove old cable from vehicle.

INSTALLATION

(1) Route cable through hole in dash panel. Fully seat cable grommet into dash panel.

(2) Place the auto transmission manual shift control lever in "Park" detent (rearmost) position and rotate prop shaft to ensure transmission is in park.

(3) Connect shift cable to shifter mechanism by snapping cable retaining ears into shifter bracket and press cable end fitting onto lever ball stud.

(4) Place the floor shifter lever in park position. Ensure that the pawl is seated within the confines of the adjustment gauge clip.

(5) Snap the cable into the transmission bracket so the retaining ears are engaged and connect cable end fitting onto the manual control lever ball stud.

(6) Lock shift cable into position by pushing upward on the adjusting lock button.

(7) Remove and discard the shift cable adjustment gauge clip from the park gate of the shifter.

BRAKE TRANSMISSION SHIFT INTERLOCK

REMOVAL

(1) Remove lower steering column cover. Refer to Group 8E, Instrument Panel and Gauges, for proper procedure.

(2) Remove lower steering column shroud. Refer to Group 19, Steering, for proper procedure.

(3) Remove tie strap near the solenoid retaining the brake transmission interlock cable to the steering column.

(4) Disengage wire connector from solenoid.

(5) With the ignition removed or in the unlocked position, disengage lock tab holding cable end to steering column (Fig. 79).

(6) Pull cable end from steering column.

(7) Remove the floor console and related trim. Refer to Group 23, Body, for proper procedure.

(8) Disconnect the cable eyelet from the bellcrank (Fig. 80).

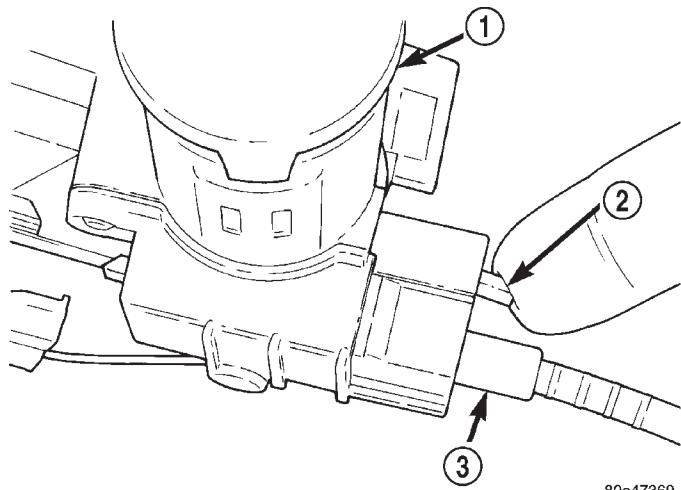
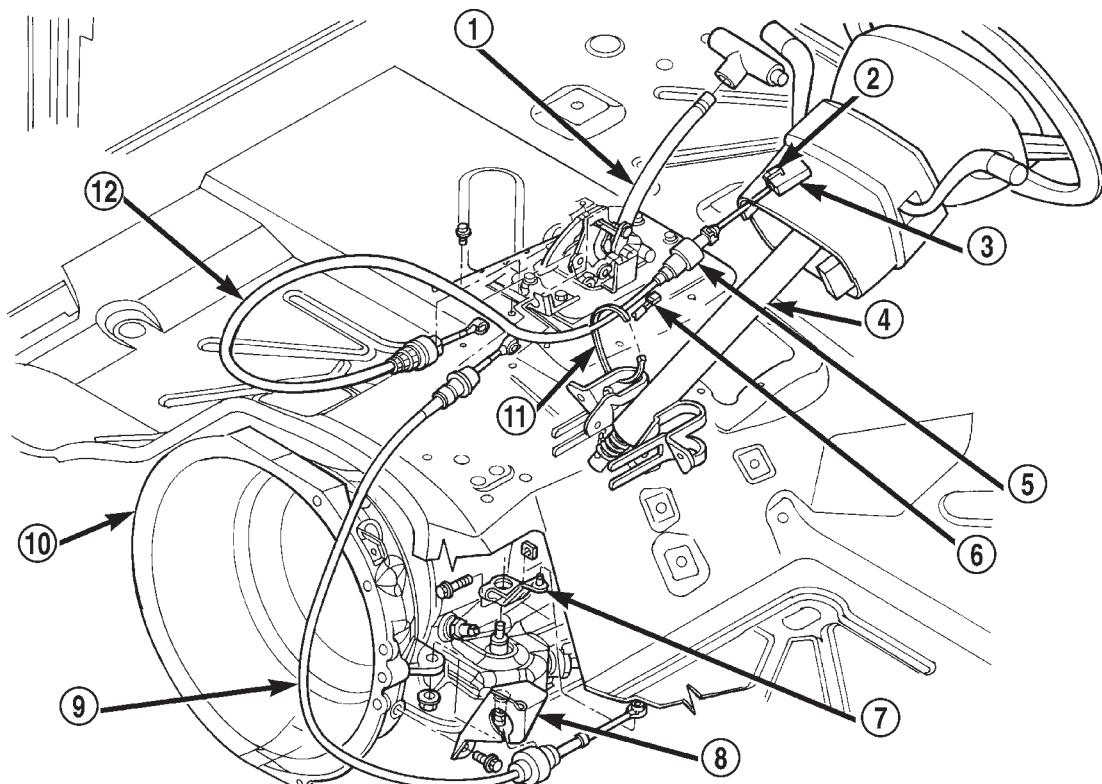


Fig. 79 Brake/Park Interlock Cable

- 1 – IGNITION LOCK
- 2 – LOCK TAB
- 3 – CABLE END

(9) Disconnect and remove the cable from the shift bracket.

REMOVAL AND INSTALLATION (Continued)



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Fig. 80 Cable and Shifter

- 1 – SHIFT MECHANISM
- 2 – LOCK-TAB
- 3 – IGNITION LOCK INTERLOCK
- 4 – STEERING COLUMN
- 5 – SOLENOID
- 6 – WIRE CONNECTOR

- 7 – LEVER
- 8 – MOUNT BRACKET
- 9 – SHIFT CABLE
- 10 – AUTOMATIC TRANSMISSION
- 11 – TIE STRAP
- 12 – PARK/BRAKE INTERLOCK CABLE

INSTALLATION

(1) Route replacement cable behind instrument panel and under floor console area to shift mechanism (Fig. 80).

(2) Insert cable end into opening in steering column hub under ignition lock. Push cable inward until lock tab engages.

(3) Connect the cable end eyelet onto shifter bellcrank pin.

(4) Place gear selector in PARK.

(5) Push the spring-loaded cable adjuster forward and snap cable into bracket.

(6) Adjust the brake transmission shifter interlock cable. Refer to the Adjustment portion of this section for proper procedures.

(7) Verify that the cable adjuster lock clamp is pushed downward to the locked position.

(8) Test the park-lock cable operation.

(9) Install the floor console and related trim.

(10) Install tie strap to hold cable to base of steering column.

(11) Install lower steering column shroud and ignition lock.

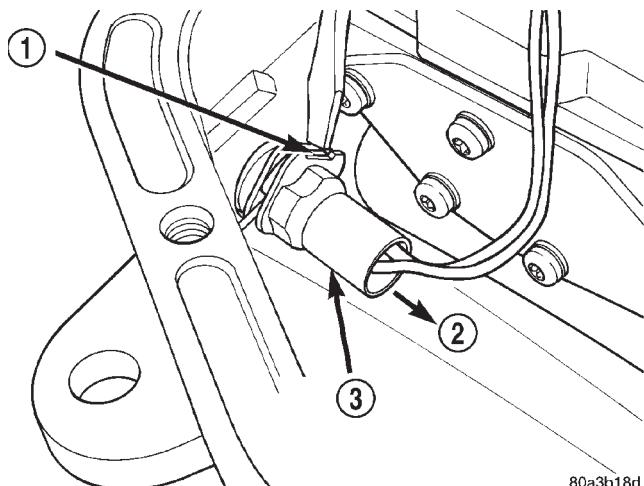
(12) Install lower steering column cover.

VALVE BODY**REMOVAL**

(1) Raise vehicle.
 (2) Remove oil pan and drain fluid.
 (3) Loosen clamp bolts and remove throttle and manual valve levers from manual lever shaft.

- (4) Remove park/neutral position switch.
- (5) Remove filter from valve body.
- (6) Depress retaining clip and pull solenoid wire from case connector (Fig. 81).
- (7) Remove valve body attaching screws.
- (8) Lower valve body enough to remove accumulator piston and piston spring (Fig. 82).

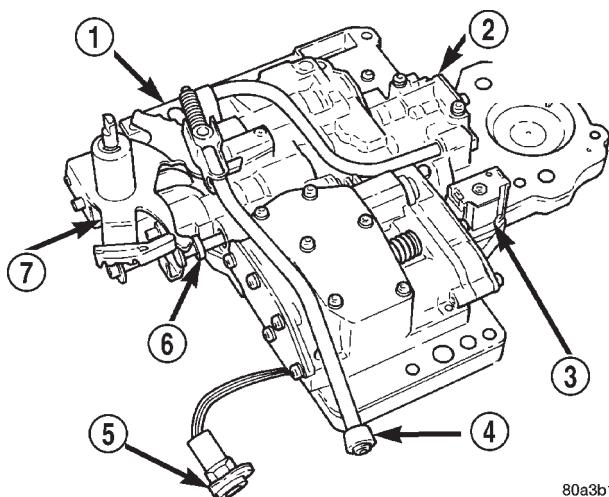
REMOVAL AND INSTALLATION (Continued)



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Fig. 81 Solenoid Wire Connector

- 1 – PUSH CLIP IN
2 – PULL
3 – CONVERTER CLUTCH SOLENOID CONNECTOR



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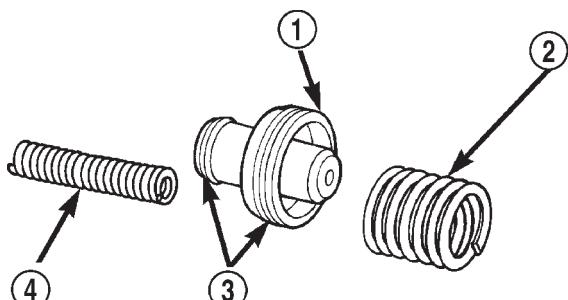
Fig. 83 Valve Body

- 1 – VALVE BODY
2 – CONVERTER CLUTCH MODULE
3 – SOLENOID
4 – PARK ROD
5 – CONVERTER CLUTCH SOLENOID CONNECTOR
6 – MANUAL VALVE
7 – MANUAL LEVER

(9) Pull valve body forward to disengage park rod.

(10) Push manual lever shaft and solenoid case connector out of transmission case.

(11) Lower valve body, rotate it away from case, pull park lock rod out of sprag, and remove valve body (Fig. 83).



80a3b190

Fig. 82 Accumulator Piston And Springs

- 1 – ACCUMULATOR PISTON
2 – OUTER SPRING
3 – PISTON SEAL RINGS
4 – INNER SPRING (32RH)

INSTALLATION

(1) Verify that park/neutral position switch is **NOT** installed. Valve body cannot be installed with switch in place. Remove switch if necessary.

(2) Install new seals on accumulator piston if necessary, and install piston in case. Use small amount of petroleum jelly to hold piston in place.

(3) Place valve body manual lever in low (1 position) to ease inserting park rod into sprag.

(4) Use screwdriver to push park sprag into engagement with park gear. This makes clearance for knob on lock rod to move past sprag when valve body is installed. Rotate output shaft to verify sprag engagement.

(5) Position accumulator spring between accumulator piston and valve body.

(6) Position valve body on transmission and work knob on park lock rod past sprag. Be sure accumulator piston and spring remain in position.

(7) Hold valve body in position and install valve body screws finger tight.

(8) Install park/neutral position switch.

(9) Tighten valve body screws alternately and evenly to 11 N·m (100 in. lbs.) torque.

(10) Install new fluid filter on valve body. Install and tighten filter screws to 4 N·m (35 in. lbs.) torque.

(11) Connect solenoid wire to case connector.

(12) Install manual and throttle levers on throttle lever shaft. Tighten lever clamp screws and check for free operation. Shaft and levers must operate freely without any bind.

(13) Install oil pan and new gasket. Tighten pan bolts to 17 N·m (150 in. lbs.) torque. Install gasket dry; do not use sealer.

(14) Connect park/neutral position switch and converter clutch solenoid wires.

(15) Install speedometer pinion gear, adapter and speed sensor.

(16) Lower vehicle.

REMOVAL AND INSTALLATION (Continued)

(17) Fill transmission with Mopar® ATF Plus 3, Type 7176 fluid.

(18) Adjust gearshift and throttle cable if necessary.

OUTPUT SHAFT REAR BEARING

REMOVAL

- (1) Remove extension housing.
- (2) Remove snap ring that retains rear bearing on output shaft (Fig. 84).
- (3) Remove bearing from output shaft.

INSTALLATION

- (1) Install bearing on output shaft. Be sure retaining ring groove in outer circumference of bearing is toward the governor.
- (2) Install rear bearing retaining snap ring (Fig. 84).
- (3) Install extension housing.

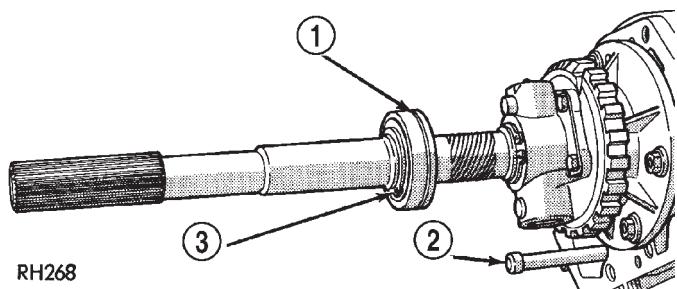


Fig. 84 Output Shaft Rear Bearing—Typical

- 1 – BEARING SNAP RING GROOVE
2 – PARK LOCK CONTROL ROD
3 – REAR SNAP RING

GOVERNOR AND PARK GEAR

REMOVAL

- (1) Hoist and support vehicle on safety stands.
- (2) Mark propeller shaft and axle yoke for assembly reference. Then disconnect and remove shaft.
- (3) Disconnect parking brake cable at equalizer and disconnect exhaust components as necessary.
- (4) Support transmission on a suitable lifting device.
- (5) Remove skid plate and rear transmission mount.
- (6) Remove extension housing.
- (7) Loosen but do not remove bolts that hold governor body to park gear.
- (8) Rotate transmission output shaft until governor weight assembly is accessible.
- (9) Remove E-clip at end of governor valve shaft (Fig. 85).

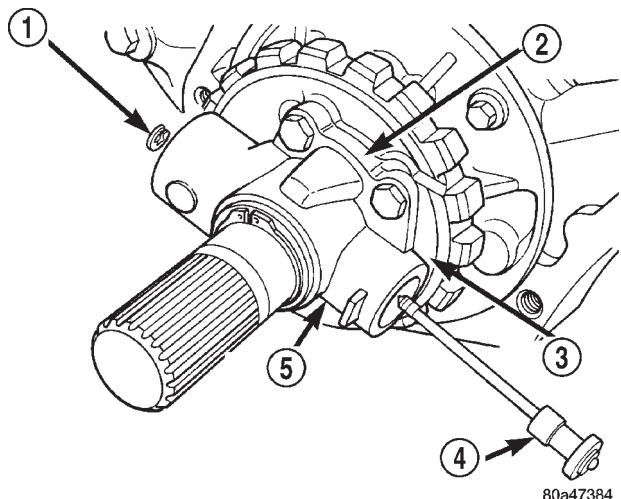


Fig. 85 Governor Valve

- 1 – E-CLIP
2 – PARK GEAR
3 – CURVER BOSS
4 – GOVERNOR VALVE
5 – GOVERNOR

- (10) Remove governor valve and shaft from governor body (Fig. 85).
- (11) Remove snap rings and spacer that retain governor body and park gear assembly on output shaft (Fig. 86).
- (12) Remove bolts holding governor body to park gear (Fig. 87).
- (13) Separate governor from park gear.
- (14) Pull park gear from rear support.

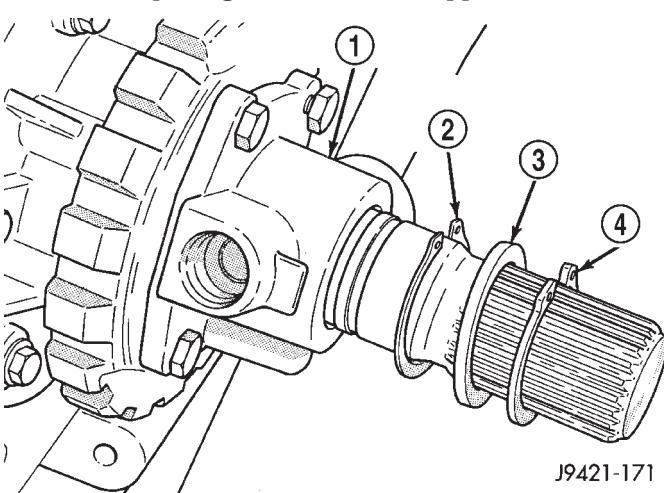
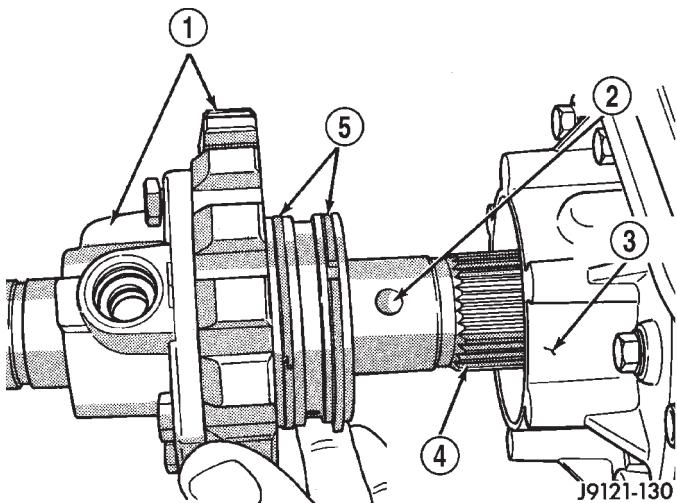


Fig. 86 Snap Rings And Spacer

- 1 – GOVERNOR BODY
2 – THIN SNAP RING
3 – THRUST WASHER
4 – THICK SNAP RING

REMOVAL AND INSTALLATION (Continued)

**Fig. 87 Governor Body**

- 1 – GOVERNOR/PARK ASSEMBLY
 2 – GOVERNOR VALVE SHAFT BORE
 3 – REAR SUPPORT
 4 – OUTPUT SHAFT SPLINES
 5 – SEAL RINGS

INSTALLATION

- (1) Install park gear into rear support so crown on curved boss is in line with hole through output shaft.
- (2) Install governor filter in park gear.
- (3) Slip governor body over output shaft and align port to filter.
- (4) Install bolts to hold governor body to park gear. Tighten bolts to 11 N·m (95 in. lbs.) torque (Fig. 87).
- (5) Install governor body-park gear snap rings and washer on output shaft as follows:
 - (a) Install thin snap ring first. Then install thrust washer second, and thick snap ring last (Fig. 86).
 - (b) Verify correct position of snap rings. **Be sure flat side of each snap ring is toward governor body.**
- (6) Insert governor valve and shaft through governor and install E-clip (Fig. 85).
- (7) Install extension housing and gasket on transmission. Tighten housing bolts to 32 N·m (24 ft. lbs.).
- (8) Install rear transmission mount and skid plate.
- (9) Install speed sensor and speedometer components and connect speed sensor wires.
- (10) Connect exhaust components and brake cable, if removed.
- (11) Install propeller shaft.
- (12) Remove supports and lower vehicle.
- (13) Check transmission fluid level. Add fluid if necessary.

PARK LOCK**REMOVAL**

- (1) Raise vehicle and remove propeller shaft.
- (2) Remove extension housing.
- (3) Slide sprag shaft out of extension housing and remove sprag and spring (Fig. 88).
- (4) Remove snap ring and slide reaction plug and pin assembly out of housing.
- (5) If park rod requires service, it will be necessary to remove valve body.

INSTALLATION

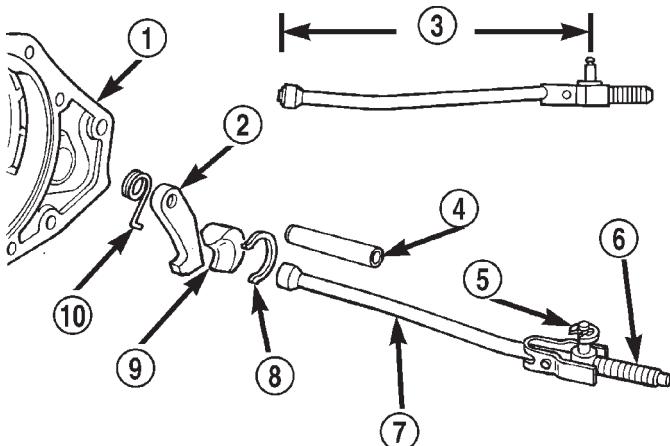
- (1) Inspect sprag shaft for scores and free movement in housing and sprag. Inspect sprag and control rod springs for distortion and loss of tension. replace worn, damaged parts as necessary.
- (2) Inspect square lug on sprag for broken edges. Check lugs on park gear for damage. Inspect knob on end of control rod for wear grooves, or being seized on rod. Replace rod if bent, if knob is worn/grooved, or it has seized on rod. Replace park gear if lugs are damaged. Replace the park lock rod if it is suspected that the rod is not the correct length.

- (3) Install reaction plug and pin assembly in housing and secure with new snap ring (Fig. 88).
- (4) Position sprag and spring in housing and insert sprag shaft. Be sure square lug on sprag is toward park gear. Also be sure spring is positioned so it moves sprag away from gear.
- (5) Install extension housing.
- (6) Install propeller shaft and lower vehicle.
- (7) Check transmission fluid level. Add fluid if necessary.

DISASSEMBLY AND ASSEMBLY**GOVERNOR AND PARK GEAR****DISASSEMBLY**

- (1) Remove governor body from transmission.
- (2) Clean and inspect governor filter (Fig. 89).
- (3) Remove snap ring and washer that secure governor weight assembly in body (Fig. 90).
- (4) Remove governor weight assembly from governor body bore.
- (5) Slide intermediate and inner weight from outer weight.
- (6) Position intermediate weight on suitable size socket (Fig. 91).
- (7) Push inner weight downward with nut driver. Then remove inner weight snap ring with Miller Plier Tool 6823 (Fig. 91).
- (8) Remove inner weight and spring from intermediate weight.

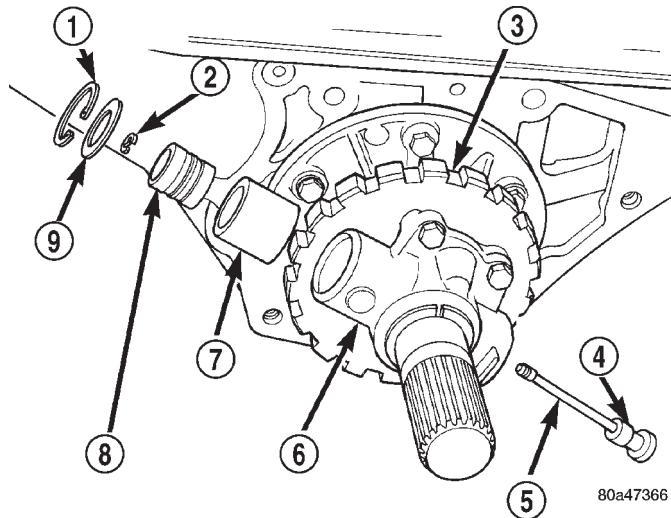
DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 88 Park Lock

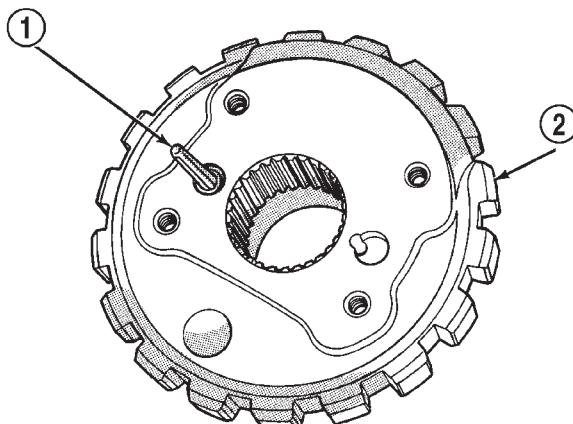
- 1 – EXTENSION HOUSING
- 2 – SPRAG
- 3 – 8"
- 4 – SHAFT
- 5 – E-CLIP
- 6 – SPRING
- 7 – CONTROL ROD
- 8 – SNAP RING
- 9 – PLUG AND PIN
- 10 – SPRING



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Fig. 90 Snap Ring, Washer, and Outer Weight

- 1 – SNAP-RING
- 2 – E-CLIP
- 3 – PARK GEAR
- 4 – GOVERNOR VALVE
- 5 – SHAFT
- 6 – GOVERNOR
- 7 – OUTER WEIGHT
- 8 – INTERMEDIATE WEIGHT
- 9 – WASHER



J9521-31

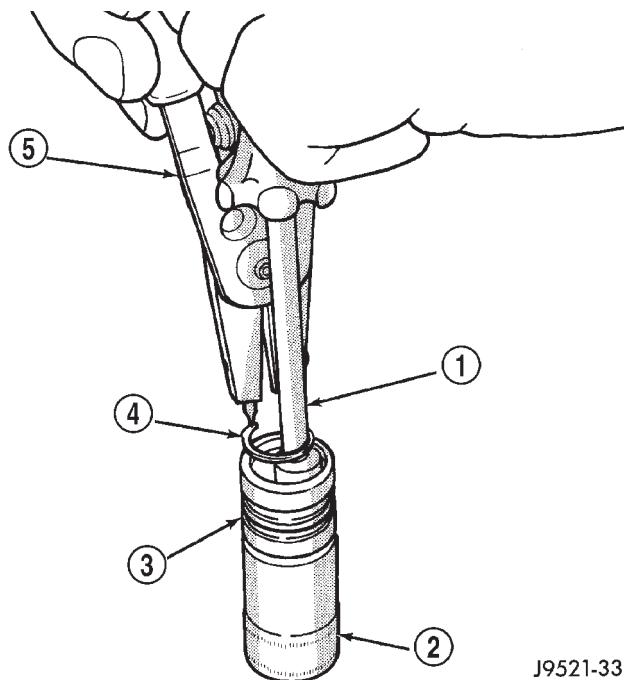
Fig. 89 Governor Filter

- 1 – GOVERNOR FILTER
- 2 – PARK GEAR

ASSEMBLY

CAUTION: Exercise care when installing the rings. They are easily broken if overspread or twisted during installation.

If it was necessary to remove the park gear, inspect the seal rings and bore in rear support.

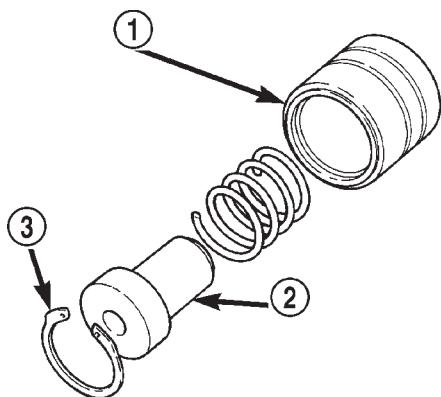


J9521-33

Fig. 91 Inner Weight Snap Ring

- 1 – NUT DRIVER
- 2 – SUITABLE SIZE SOCKET
- 3 – INTERMEDIATE WEIGHT
- 4 – INNER WEIGHT SNAP RING
- 5 – SPECIAL TOOL 6823

DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 92 Intermediate and Inner Governor Weights

- 1 – INTERMEDIATE WEIGHT
- 2 – INNER WEIGHT
- 3 – SNAP-RING

Install new seal rings on park gear hub only if original rings are damaged, or worn. Install ring with interlock ends first and ring with plain ends last. Slip each ring on hub and seat them in grooves. Verify that rear ring ends are securely interlocked before proceeding. If the bore in rear support is damaged, replace the rear support.

(1) Lubricate governor components with Mopar® ATF Plus 3, Type 7176 transmission fluid before assembly.

(2) Clean and inspect governor weights and bores for scoring or wear. Replace the governor body and weights if damaged. Refer to Cleaning and Inspection section of this group for proper procedure.

(3) Insert spring into intermediate weight.

(4) Insert inner weight into intermediate weight and install snap-ring (Fig. 92). Verify snap-ring is fully seated in groove in intermediate weight (Fig. 91).

(5) Assemble governor weights into governor body (Fig. 90).

(6) Install washer and snap ring to hold weights in governor body.

(7) Install governor body in transmission

VALVE BODY**DISASSEMBLY**

Position the valve body on a clean work surface to avoid contamination.

CAUTION: Do not clamp any part of the valve body assembly (Fig. 93) in a vise. This practice will distort the valve body and transfer plate resulting in valve bind. Slide valves and plugs out carefully. Do not use force at any time. The valves and valve

body will be damaged if force is used. Also tag or mark the valve body springs for reference as they are removed. Do not allow them to become intermixed.

(1) Remove screws attaching adjusting screw bracket to valve body and transfer plate. Hold bracket firmly against spring force while removing last screw.

(2) Remove adjusting screw bracket, line pressure adjusting screw (Fig. 94).

(3) Remove switch valve and spring, pressure regulator valve and spring, kickdown valve and spring, and throttle valve from valve body (Fig. 94).

(4) Secure detent ball and spring in housing with Retainer Tool 6583 (Fig. 95).

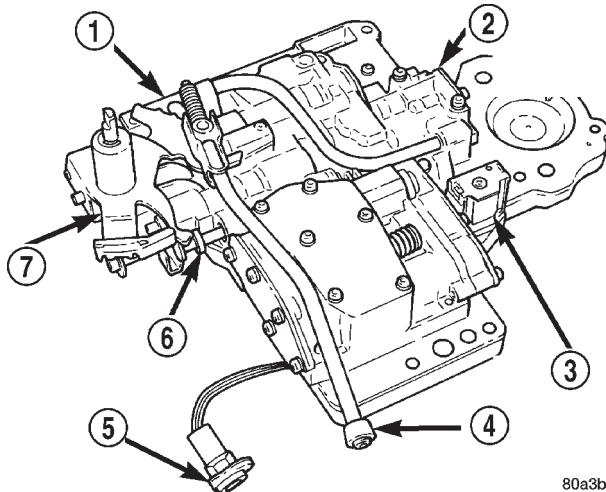
(5) Remove manual shaft E-clip, washer, and seal (Fig. 96).

(6) Pull manual shaft and park rod assembly upward out of valve body and off throttle lever (Fig. 96).

(7) Remove manual valve from valve body (Fig. 97)

(8) Remove Retainer Tool 6583. Then remove and retain detent ball and spring (Fig. 96).

(9) Remove throttle lever (Fig. 96).



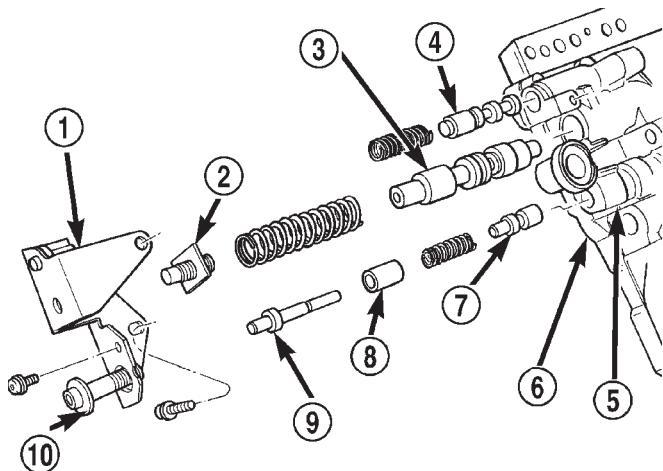
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Fig. 93 Valve Body Assembly

- 1 – VALVE BODY
- 2 – CONVERTER CLUTCH MODULE
- 3 – SOLENOID
- 4 – PARK ROD
- 5 – CONVERTER CLUTCH SOLENOID CONNECTOR
- 6 – MANUAL VALVE
- 7 – MANUAL LEVER

(10) Remove park rod E-clip and separate rod from manual lever (Fig. 98).

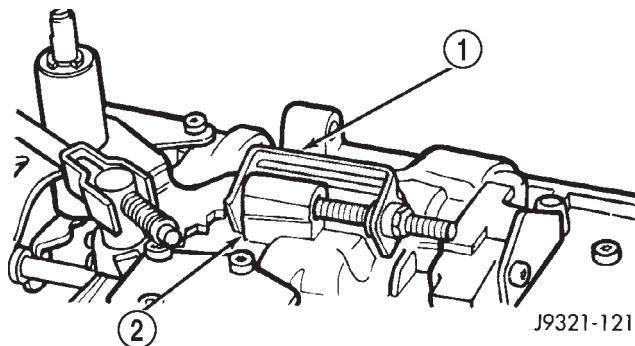
DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 94 Adjusting Screw Bracket, Springs, Valve Removal

- 1 – ADJUSTER BRACKET
2 – LINE PRESSURE ADJUSTER
3 – PRESSURE REGULATOR VALVE
4 – SWITCH VALVE
5 – VALVE BODY
6 – TRANSFER PLATE
7 – THROTTLE VALVE
8 – SLEEVE
9 – KICKDOWN VALVE
10 – THROTTLE PRESSURE ADJUSTER



J9321-121

Fig. 95 Securing Detent Ball And Spring With Retainer Tool

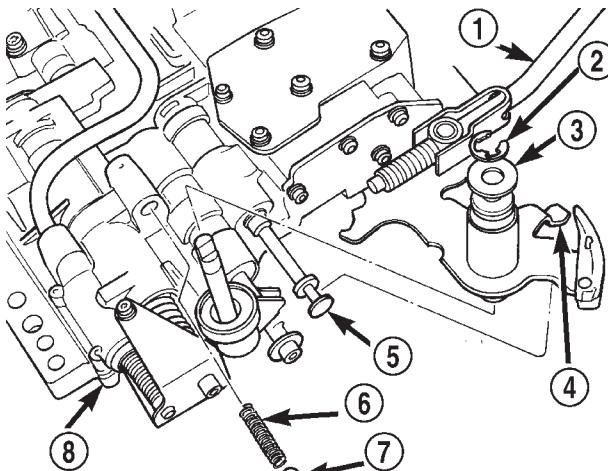
- 1 – SPECIAL TOOL 6583
2 – DETENT BALL AND SPRING HOUSING

(11) Remove converter clutch solenoid from separator plate (Fig. 99). A T25 torx bit is required to remove solenoid attaching screw.

(12) Remove screws attaching converter clutch module to valve body and remove module and connecting tube (Fig. 100).

(13) Remove screws attaching end cover plate to torque converter module (Fig. 101).

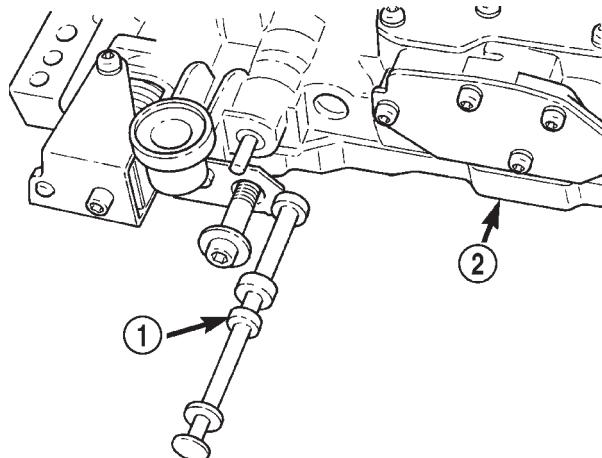
(14) Remove converter clutch valve, fail safe valve, and springs (Fig. 101)



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Fig. 96 Manual And Throttle Levers

- 1 – PARK ROD
2 – E-RING
3 – WASHER
4 – MANUAL LEVER
5 – MANUAL VALVE
6 – SPRING
7 – DETENT BALL
8 – VALVE BODY



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Fig. 97 Manual Valve

- 1 – MANUAL VALVE
2 – VALVE BODY

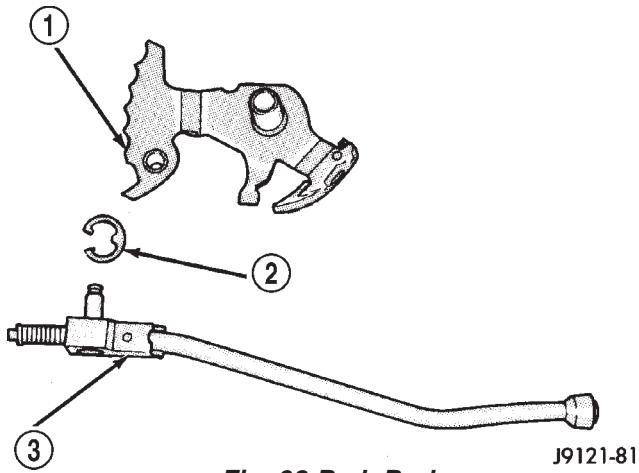
(15) Turn valve body over so transfer plate is facing upward (Fig. 102). With valve body in this position, valve body check balls will remain in place and not fall out when transfer plate is removed.

(16) Remove screws attaching transfer plate to valve body (Fig. 102).

(17) Remove transfer plate and separator plate from valve body (Fig. 102). Note position of filter and clutch solenoid for reference. Remove valve body check balls.

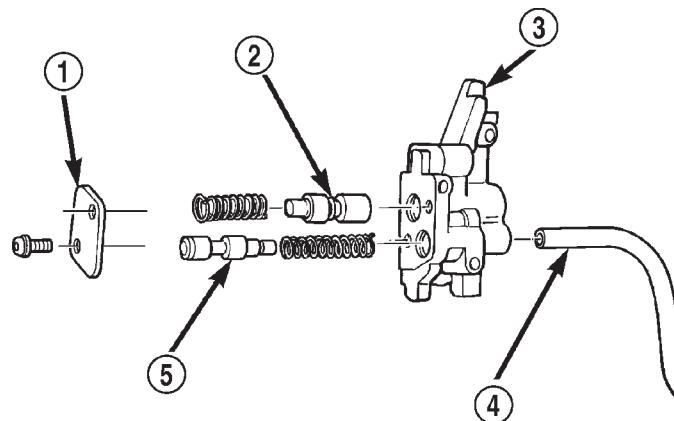
DISASSEMBLY AND ASSEMBLY (Continued)

(18) Position transfer plate on bench so separator plate, and filter are facing up. This will avoid having rear clutch and rear servo check balls fall out when plates are separated.

**Fig. 98 Park Rod**

- 1 – MANUAL LEVER
2 – E-CLIP
3 – PARK ROD

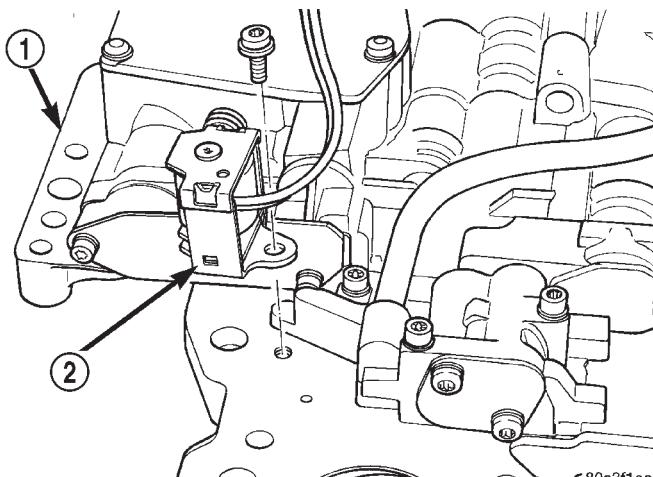
J9121-81



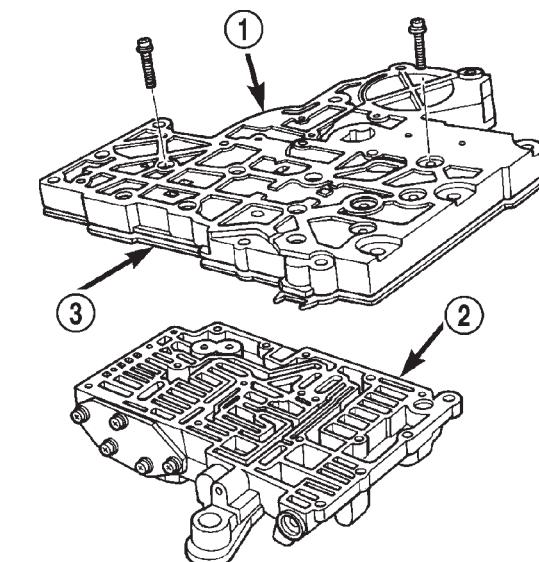
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Fig. 101 Converter Clutch and Fail Safe Valves

- 1 – COVER PLATE
2 – CONVERTER CLUTCH VALVE
3 – TORQUE CONVERTER CLUTCH MODULE
4 – MODULE CONNECTING TUBE
5 – FAIL-SAFE VALVE

**Fig. 99 Converter Clutch Solenoid**

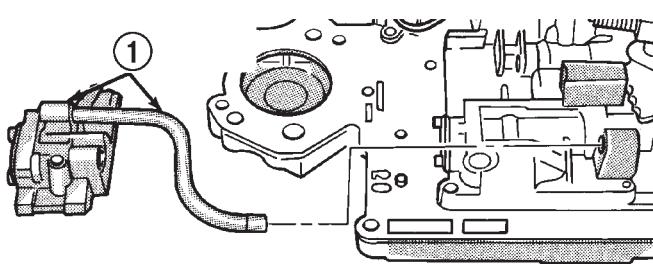
- 1 – VALVE BODY
2 – TORQUE CONVERTER CLUTCH SOLENOID



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Fig. 102 Valve Body Transfer Plate Screws

- 1 – TRANSFER PLATE
2 – VALVE BODY
3 – SEPARATOR PLATE



J9121-178

Fig. 100 Clutch Module And Connecting Tube

- 1 – MODULE AND CONNECTING TUBE

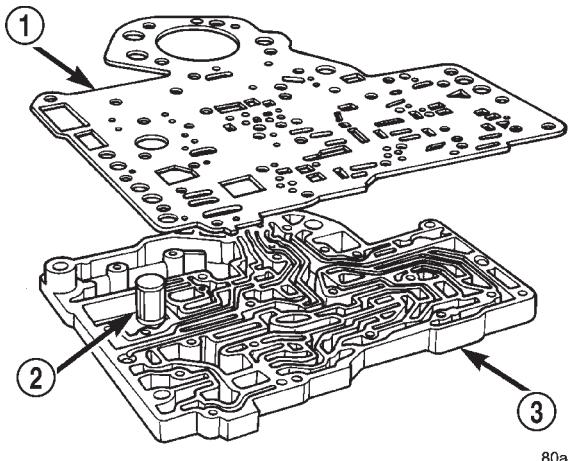
(19) Remove screws attaching separator plate to transfer plate (Fig. 103).

(20) Note position of filter, rear clutch servo and rear servo check balls for assembly reference (Fig. 103) and (Fig. 104).

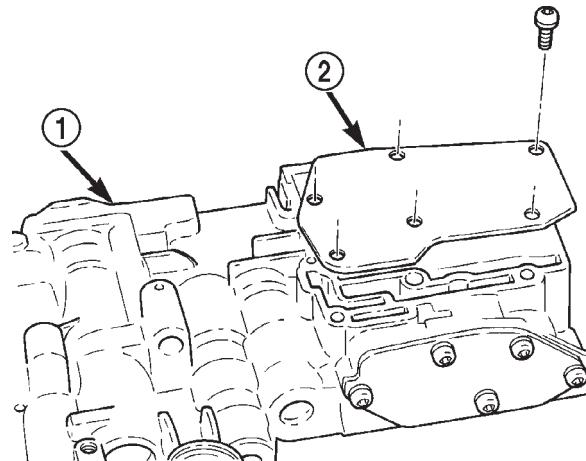
(21) Remove shuttle valve end plate (Fig. 105).

(22) Remove shuttle valve E-clip and remove secondary spring and spring guides from end of valve (Fig. 106).

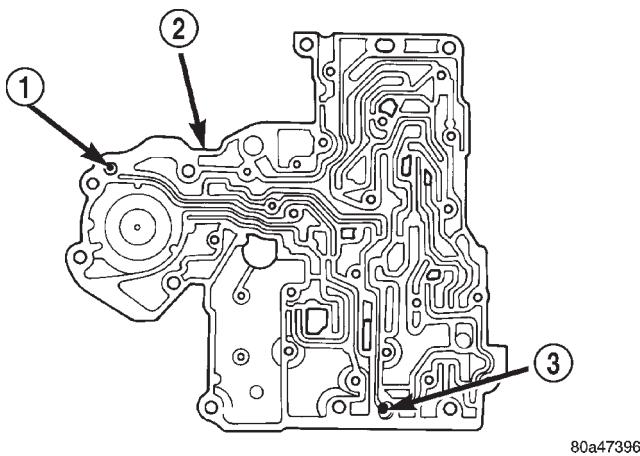
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 103 Transfer And Separator Plates**

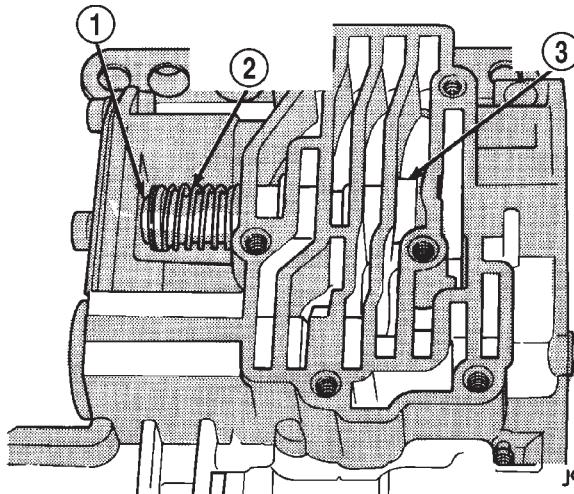
- 1 – SEPARATOR PLATE
- 2 – FILTER
- 3 – TRANSFER PLATE

**Fig. 105 Shuttle Valve End Plate**

- 1 – VALVE BODY
- 2 – SHUTTLE VALVE END PLATE

**Fig. 104 Rear Servo and Rear Clutch Check Balls**

- 1 – REAR SERVO CHECK BALL
- 2 – TRANSFER PLATE
- 3 – REAR CLUTCH CHECK BALL

**Fig. 106 Shuttle Valve E-Clip And Secondary Spring**

- 1 – E-CLIP
- 2 – SECONDARY SPRING AND GUIDES
- 3 – SHUTTLE VALVE

- (23) Remove governor plug end plate (Fig. 107).
- (24) Remove 1-2 and 2-3 shift valve governor plugs from valve body (Fig. 107).
- (25) Remove shuttle valve throttle plug, primary spring and shuttle valve from valve body (Fig. 107).
- (26) Remove screws attaching kickdown limit valve body to valve body (Fig. 107).
- (27) Remove 1-2 shift control valve and spring from valve body (Fig. 107).
- (28) Remove 2-3 shift valve and spring from valve body (Fig. 107).
- (29) Remove 1-2 shift valve and spring from valve body (Fig. 107).
- (30) Remove throttle pressure plug from kickdown limit valve body (Fig. 107).

- (31) Remove retainer from end of kickdown limit valve body (Fig. 107).
- (32) Remove kickdown limit valve and spring from kickdown limit valve body (Fig. 107).
- (33) Remove regulator valve end plate from valve body (Fig. 107).
- (34) Remove regulator valve line pressure plug, pressure plug sleeve, regulator valve throttle pressure plug and spring (Fig. 107).

ASSEMBLY

Clean and inspect all valve body components for damage or wear. Refer to the Cleaning and Inspection section of this group for proper procedure.

DISASSEMBLY AND ASSEMBLY (Continued)

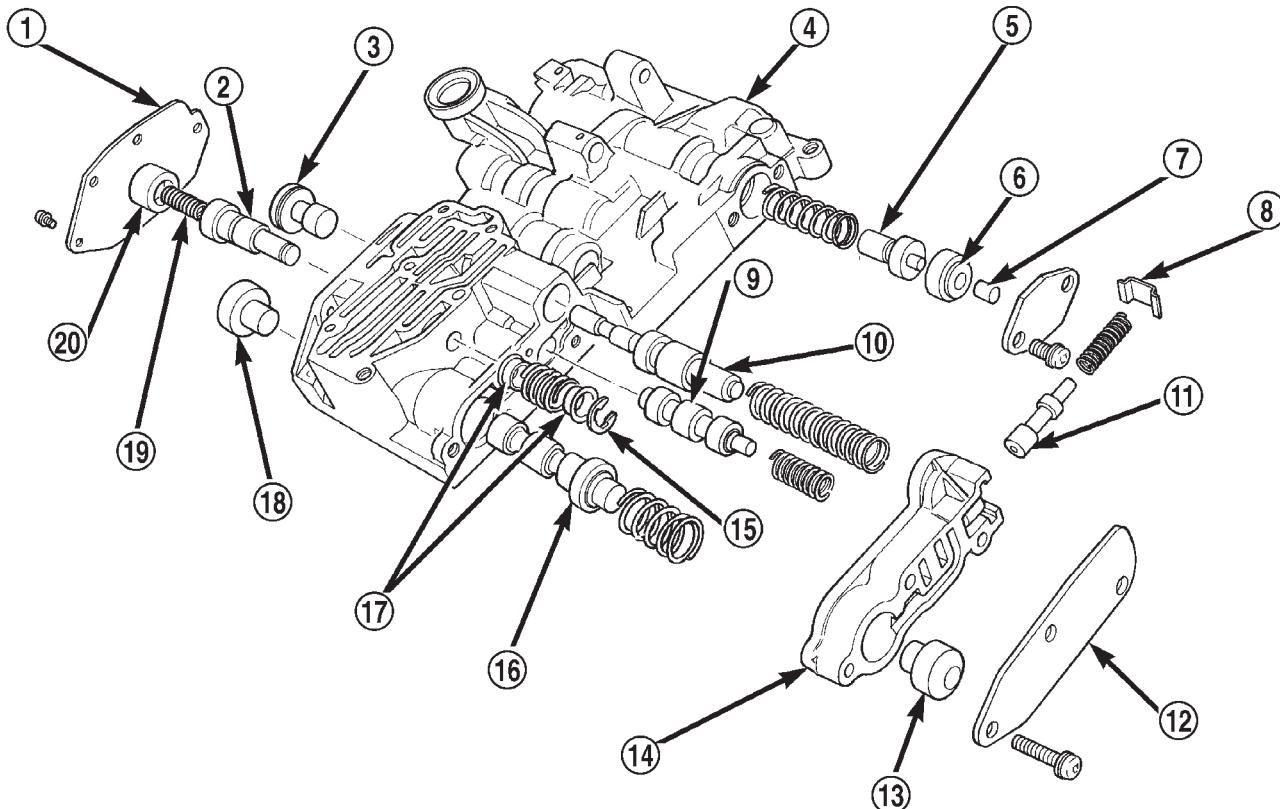


Fig. 107 Control Valves, Shift Valves, And Governor Plugs

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1 – GOVERNOR PLUG END PLATE

2 – SHUTTLE VALVE

3 – 1-2 GOVERNOR PLUG

4 – VALVE BODY

5 – REGULATOR VALVE THROTTLE PRESSURE PLUG

6 – SLEEVE

7 – LINE PRESSURE PLUG

8 – RETAINER

9 – 1-2 SHIFT VALVE

10 – 1-2 SHIFT CONTROL VALVE

11 – KICKDOWN LIMIT VALVE

12 – END PLATE

13 – THROTTLE PRESSURE PLUG

14 – KICKDOWN LIMIT VALVE BODY

15 – E-RING

16 – 2-3 SHIFT VALVE

17 – GUIDES

18 – 2-3 GOVERNOR PLUG

19 – PRIMARY SPRING

20 – SHUTTLE VALVE THROTTLE PLUG

CAUTION: Do not force valves or plugs into place during reassembly. If the valve body bores, valves, and plugs are free of distortion or burrs, the valve body components should all slide into place easily. In addition, do not overtighten the transfer plate and valve body screws during reassembly. Overtightening can distort the valve body resulting in valve sticking, cross leakage and unsatisfactory operation. Tighten valve body screws to recommended torque only.

(1) Lubricate valve body bores, valves and plugs with Mopar® ATF Plus 3, Type 7176, transmission fluid.

(2) Install regulator valve line pressure plug, pressure plug sleeve, regulator valve throttle pressure plug, and spring into valve body (Fig. 107). Verify valve components slide freely.

(3) Install regulator valve end plate on valve body (Fig. 107).

(4) Install kickdown limit valve and spring in kickdown limit valve body (Fig. 107). Verify valve components slide freely.

(5) Compress spring into kickdown limit valve body.

(6) Install retainer in grooves at end of kickdown limit valve body (Fig. 107).

(7) Install throttle pressure plug in kickdown limit valve body (Fig. 107).

(8) Install 1-2 shift valve and spring into valve body (Fig. 107).

(9) Install 2-3 shift valve and spring into valve body (Fig. 107).

(10) Install 1-2 shift control valve and spring into valve body (Fig. 107).

(11) Verify valve components slide freely.

DISASSEMBLY AND ASSEMBLY (Continued)

(12) Place kickdown limit valve body and end plate in position on valve body and compress springs (Fig. 107).

(13) Install screws to attach kickdown limit valve body to valve body (Fig. 107).

(14) Install shuttle valve throttle plug, primary spring and shuttle valve into valve body (Fig. 107). Verify valve components slide freely.

(15) Install 1-2 and 2-3 shift valve governor plugs into valve body (Fig. 107). Verify valve components slide freely.

(16) Place governor plug end plate in position on valve body and compress spring.

(17) Install screws to attach governor plug end plate to valve body (Fig. 107).

(18) Assemble shuttle valve spring and guides (Fig. 107). Place spring and guides in position on shuttle valve stem.

(19) Compress spring and install E-clip in groove on shuttle valve stem (Fig. 108).

(20) Place shuttle valve end plate in position on valve body (Fig. 109).

(21) Install screws to attach shuttle valve end plate to valve body (Fig. 109).

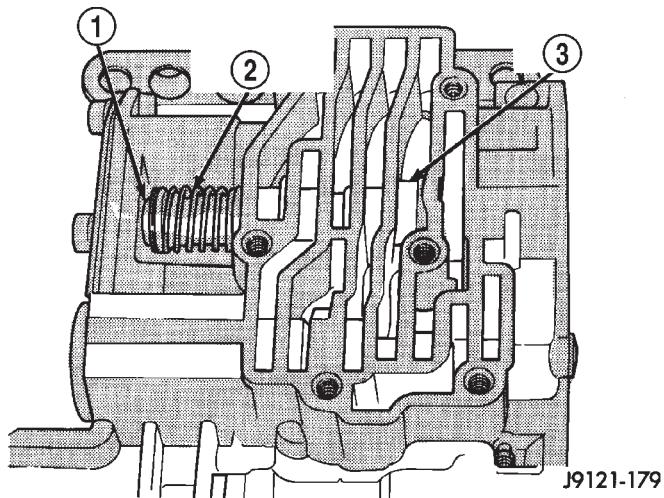


Fig. 108 Shuttle Valve E-Clip And Secondary Spring

1 – E-CLIP

2 – SECONDARY SPRING AND GUIDES

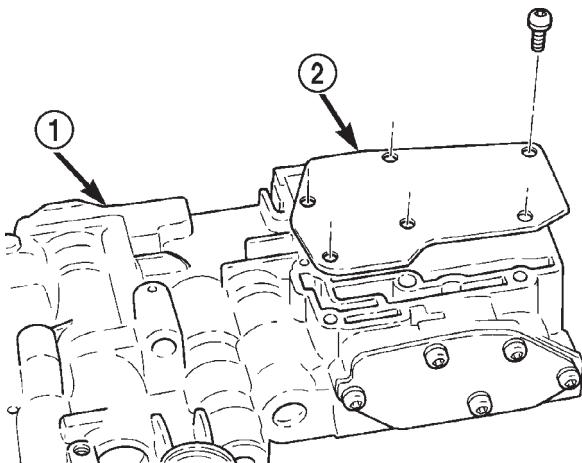
3 – SHUTTLE VALVE

(22) Install rear clutch servo and rear servo check balls in proper cavities in transfer plate (Fig. 110).

(23) Insert filter into opening in separator plate (Fig. 111).

(24) Place separator plate in position on transfer plate and install screws to attach separator plate to transfer plate (Fig. 111).

(25) Place one 11/32 in. check ball and six 1/4 in. check balls in the proper cavities in the valve body (Fig. 112).

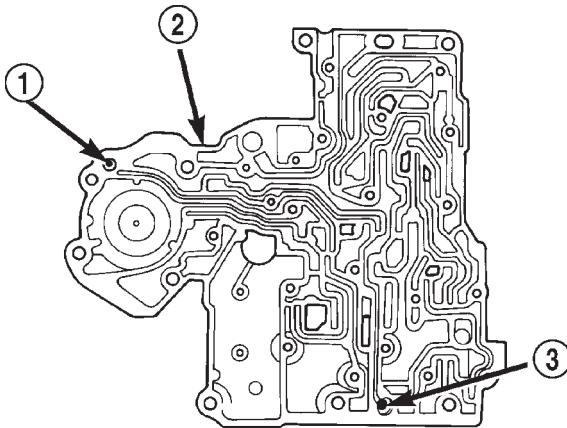


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Fig. 109 Shuttle Valve End Plate

1 – VALVE BODY

2 – SHUTTLE VALVE END PLATE



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Fig. 110 Rear Servo and Rear Clutch Check Balls

1 – REAR SERVO CHECK BALL

2 – TRANSFER PLATE

3 – REAR CLUTCH CHECK BALL

(26) Place transfer plate in position on valve body (Fig. 113).

(27) Install screws to attach transfer plate to valve body (Fig. 113).

(28) Turn valve body over to expose the separator plate.

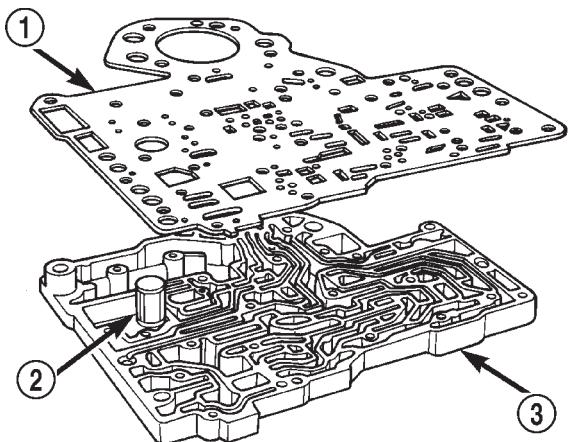
(29) Insert converter clutch valve and spring into converter clutch valve module (Fig. 114). Verify valve components slide freely.

(30) Insert spring and fail-safe valve into converter clutch valve module (Fig. 114). Verify valve components slide freely.

(31) Place cover plate in position on converter clutch valve module (Fig. 114).

(32) Install screws to attach cover to converter clutch valve module (Fig. 114).

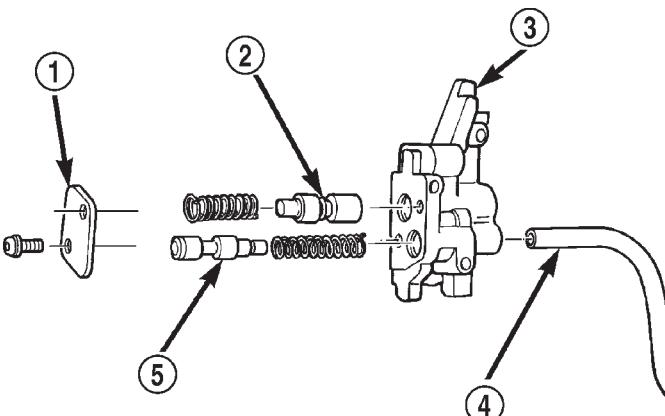
DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 111 Transfer And Separator Plates

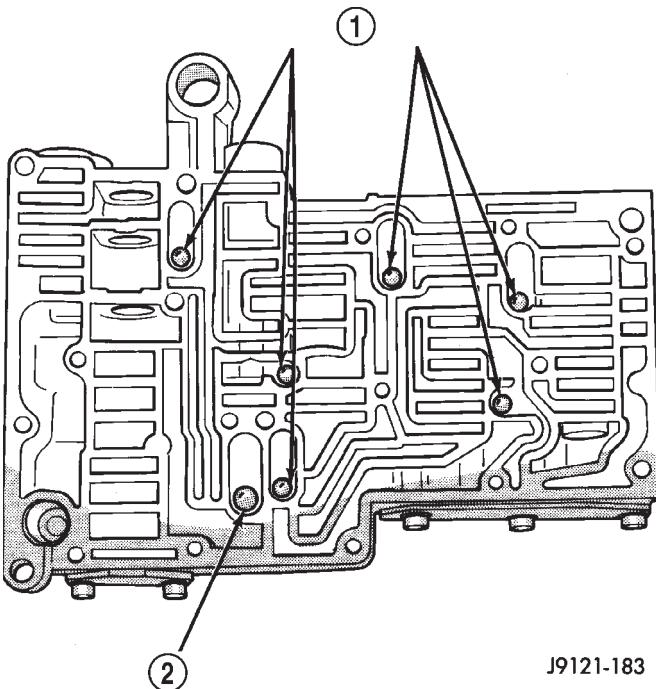
- 1 – SEPARATOR PLATE
- 2 – FILTER
- 3 – TRANSFER PLATE



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Fig. 114 Converter Clutch Valve Module

- 1 – COVER PLATE
- 2 – CONVERTER CLUTCH VALVE
- 3 – TORQUE CONVERTER CLUTCH MODULE
- 4 – MODULE CONNECTING TUBE
- 5 – FAIL-SAFE VALVE



J9121-183

Fig. 112 Correct Position Of Valve Body Check Balls

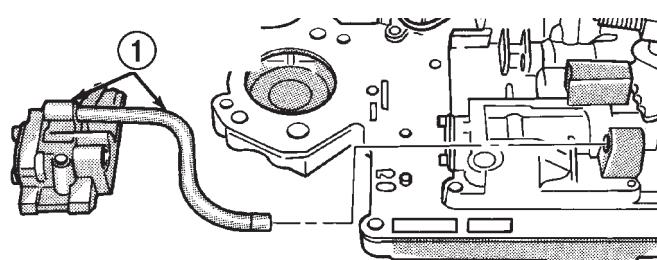
- 1 – 1/4" CHECK BALLS (6)
- 2 – 11/32" CHECK BALL (1)

(33) Insert connecting tube into converter clutch valve module (Fig. 114).

(34) Insert connecting tube into valve body opening (Fig. 115).

(35) Place converter clutch valve module in position on separator plate. Install screws to attach converter clutch module to valve body (Fig. 115).

(36) If necessary, install a new O-ring on converter clutch solenoid (Fig. 116).



J9121-178

Fig. 115 Clutch Module And Connecting Tube

- 1 – MODULE AND CONNECTING TUBE

(37) Insert converter clutch solenoid into transfer plate (Fig. 116).

(38) Install screw to attach solenoid to transfer plate (Fig. 116).

(39) If necessary, insert park rod end into manual lever and install E-clip (Fig. 117).

(40) Insert detent spring and ball into opening in valve body and install Retainer Tool 6583 (Fig. 118).

(41) Install manual valve into valve body (Fig. 119).

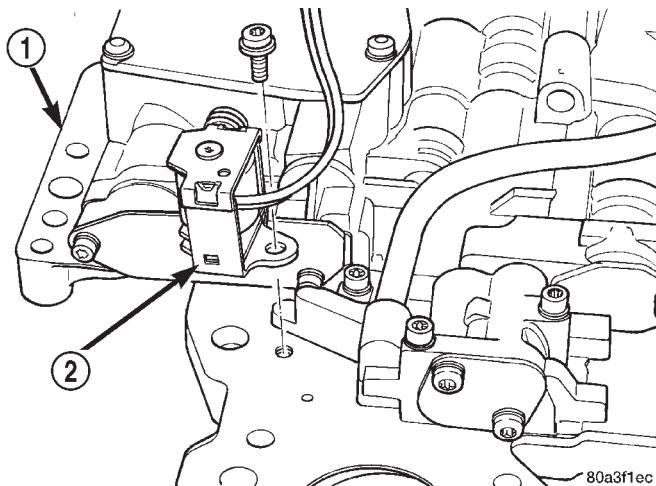
(42) Insert throttle lever through transfer plate side of valve body and upward (Fig. 120).

(43) Insert throttle lever into groove in manual valve (Fig. 121).

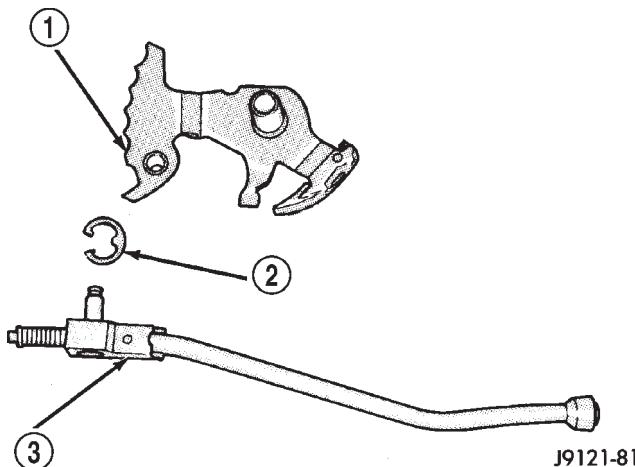
(44) Install seal, washer, and E-clip to retain manual shaft to valve body (Fig. 120).

(45) Install switch valve and spring, pressure regulator valve and spring, kickdown valve and spring, and throttle valve into valve body (Fig. 122).

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 116 Converter Clutch Solenoid**

- 1 – VALVE BODY
2 – TORQUE CONVERTER CLUTCH SOLENOID

**Fig. 117 Park Rod**

- 1 – MANUAL LEVER
2 – E-CLIP
3 – PARK ROD

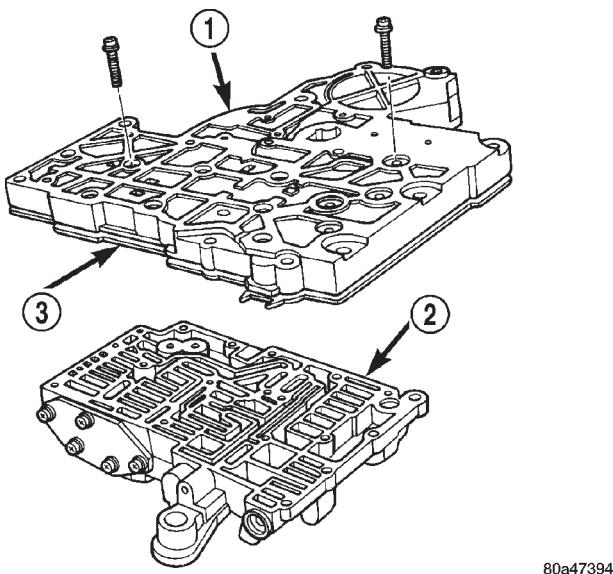
(46) Place adjusting screw bracket and line pressure adjusting screw in position on valve body and compress springs (Fig. 94).

(47) Install screws to attach adjuster bracket to valve body.

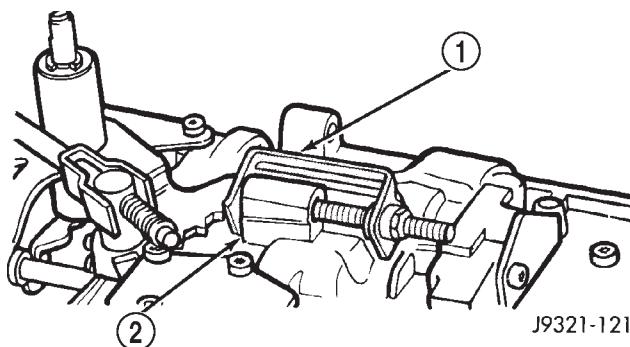
TRANSMISSION

DISASSEMBLY

(1) Remove transmission from vehicle.

**Fig. 113 Valve Body Transfer Plate Screws**

- 1 – TRANSFER PLATE
2 – VALVE BODY
3 – SEPARATOR PLATE

**Fig. 118 Securing Detent Ball And Spring With Retainer Tool**

- 1 – SPECIAL TOOL 6583
2 – DETENT BALL AND SPRING HOUSING

(2) Install a suitable tail shaft housing plug to avoid contaminating internal components with cleaning solvents.

(3) Clean exterior of transmission with suitable solvent or pressure washer.

(4) Remove torque converter from transmission.

(5) Remove throttle and shift levers from valve body manual shaft and throttle lever shaft.

(6) Mount transmission in repair stand C-3750-B or similar type stand (Fig. 123).

(7) Remove extension housing.

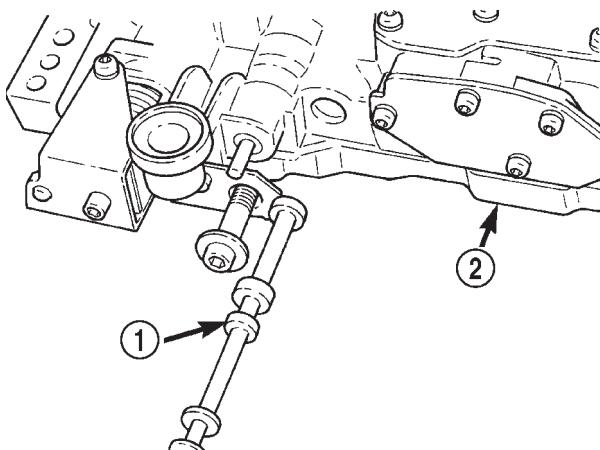
(8) Remove fluid pan.

(9) Remove park/neutral position switch and seal (Fig. 124).

(10) Remove valve body.

(11) Remove accumulator spring and piston (Fig. 125).

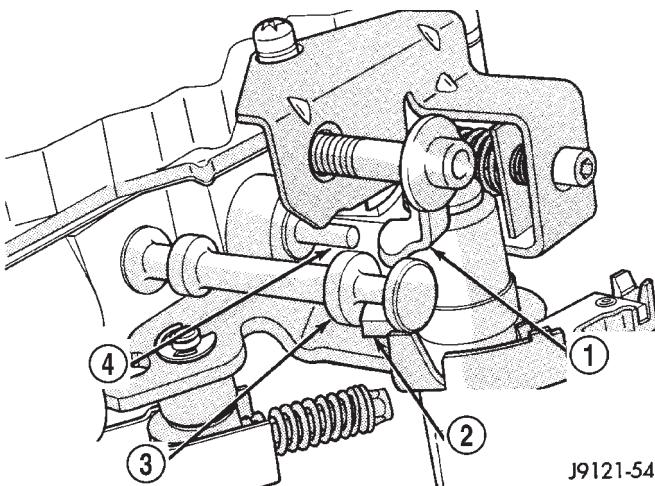
(12) Loosen front band adjusting screw lock nut (Fig. 126) 4-5 turns. Then tighten band adjusting



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Fig. 119 Manual Valve

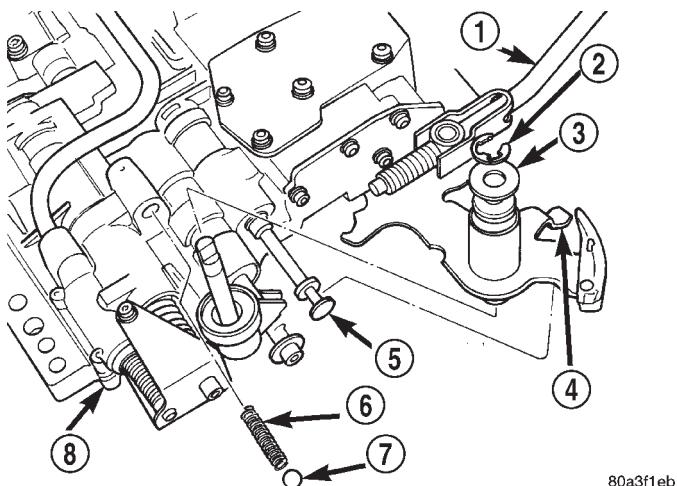
- 1 – MANUAL VALVE
- 2 – VALVE BODY



J9121-54

Fig. 121 Manual Valve And Throttle Lever Alignment

- 1 – THROTTLE LEVER
- 2 – MANUAL LEVER VALVE ARM
- 3 – MANUAL VALVE
- 4 – KICKDOWN VALVE



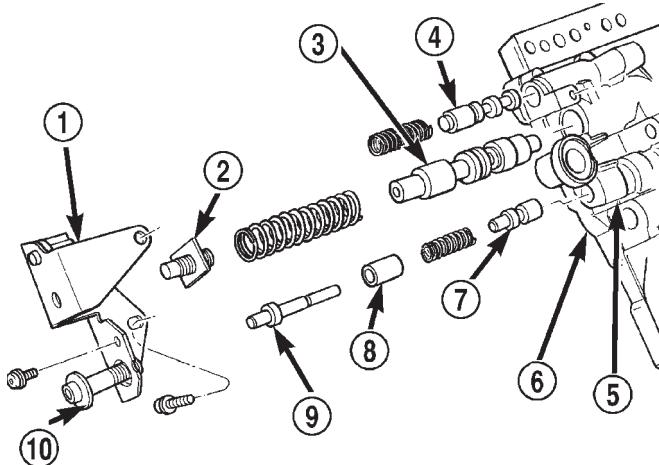
80a3f1eb

Fig. 120 Manual And Throttle Levers

- 1 – PARK ROD
- 2 – E-RING
- 3 – WASHER
- 4 – MANUAL LEVER
- 5 – MANUAL VALVE
- 6 – SPRING
- 7 – DETENT BALL
- 8 – VALVE BODY

screw until band is tight around front clutch. This prevents front/rear clutches from coming out with pump and possibly damaging clutch or pump components.

- (13) Remove oil pump bolts.
- (14) Thread bolts of Slide Hammer Tools C-3752 into threaded holes in pump body flange (Fig. 127).
- (15) Bump slide hammer weights outward to remove pump and reaction shaft support assembly from case (Fig. 127).



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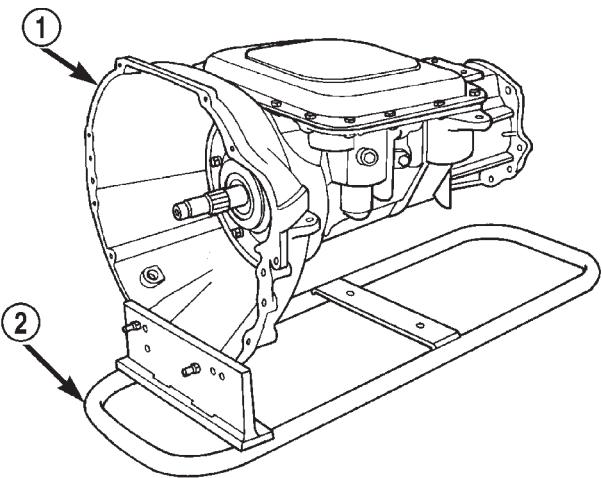
Fig. 122 Adjusting Screw Bracket, Springs, and Valves

- 1 – ADJUSTER BRACKET
- 2 – LINE PRESSURE ADJUSTER
- 3 – PRESSURE REGULATOR VALVE
- 4 – SWITCH VALVE
- 5 – VALVE BODY
- 6 – TRANSFER PLATE
- 7 – THROTTLE VALVE
- 8 – SLEEVE
- 9 – KICKDOWN VALVE
- 10 – THROTTLE PRESSURE ADJUSTER

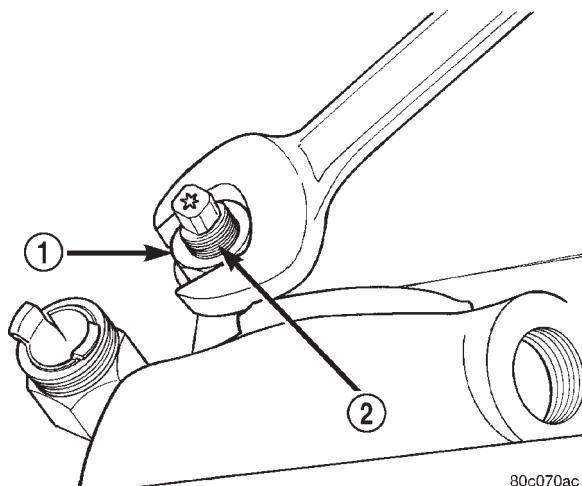
(16) Loosen front band adjusting screw until band is completely loose (Fig. 126).

(17) Squeeze front band together and remove band strut (Fig. 128).

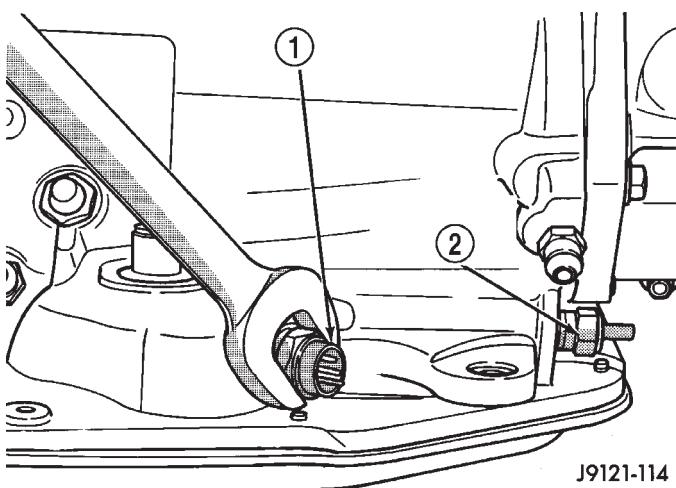
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 123 Repair Stand**

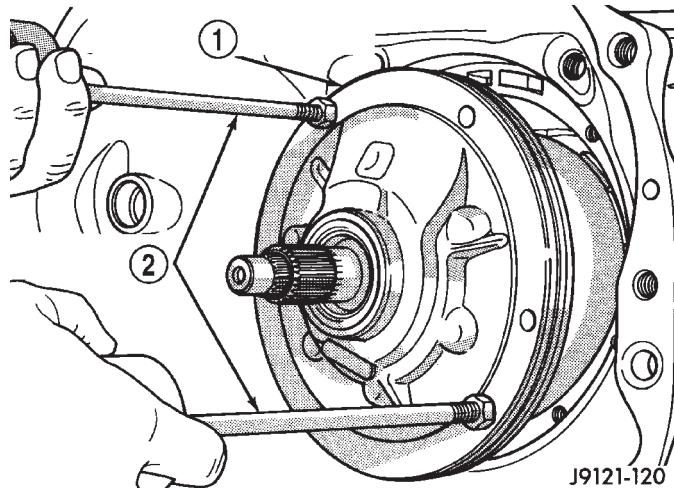
- 1 – TRANSMISSION
2 – STAND

**Fig. 126 Front Band Adjusting Screw Lock Nut**

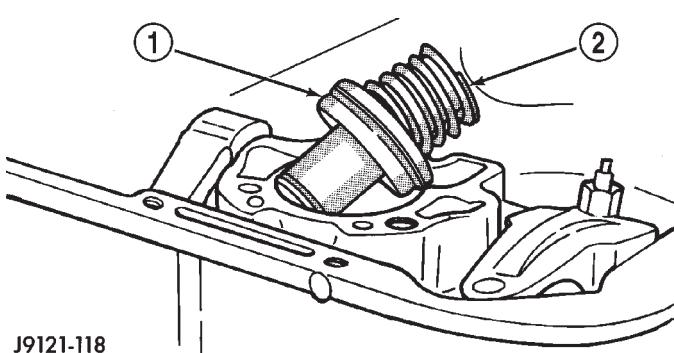
- 1 – LOCK-NUT
2 – FRONT BAND ADJUSTER

**Fig. 124 Park/Neutral Position Switch**

- 1 – NEUTRAL SWITCH
2 – SOLENOID CONNECTOR

**Fig. 127 Oil Pump/Reaction Shaft Support**

- 1 – OIL PUMP AND REACTION SHAFT SUPPORT ASSEMBLY
2 – SLIDE HAMMER TOOLS C-3752

**Fig. 125 Accumulator Piston And Spring**

- 1 – ACCUMULATOR PISTON
2 – PISTON SPRING

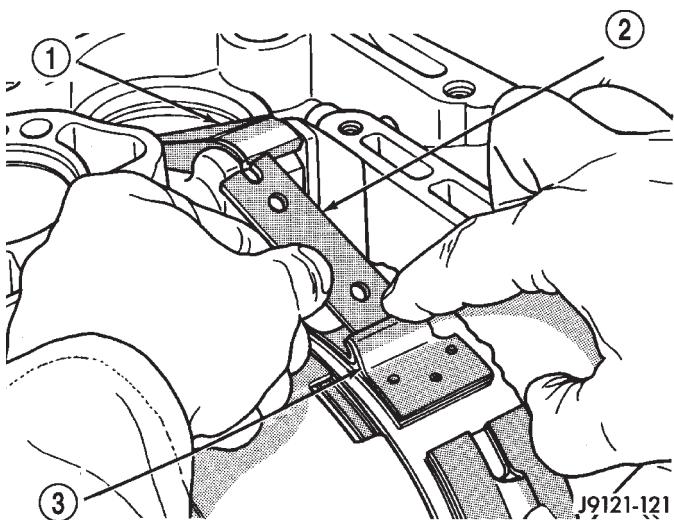


Fig. 128 Front Band Strut

- 1 – BAND LEVER
2 – BAND STRUT
3 – FRONT BAND

(24) Remove governor body and park gear from output shaft.

(25) Remove output shaft and planetary geartrain as assembly (Fig. 133). Support geartrain with both hands during removal. Do not allow machined surfaces on output shaft to become nicked or scratched.

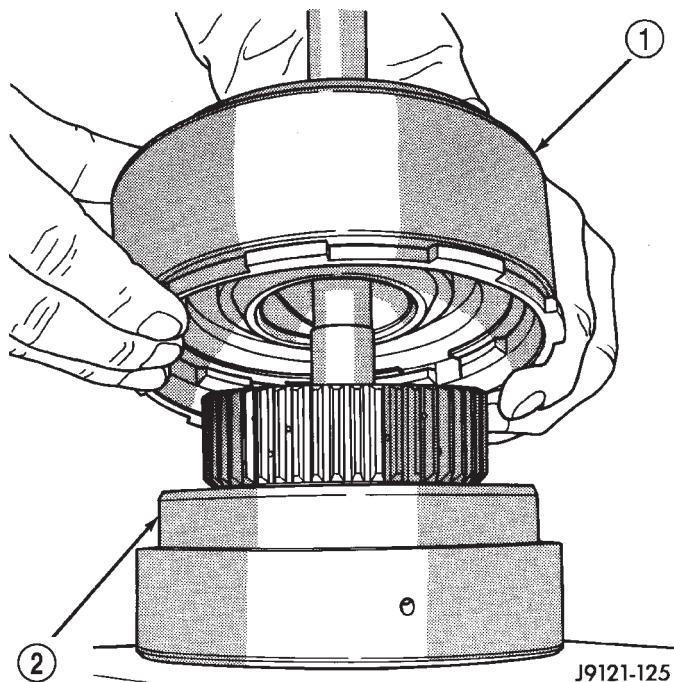
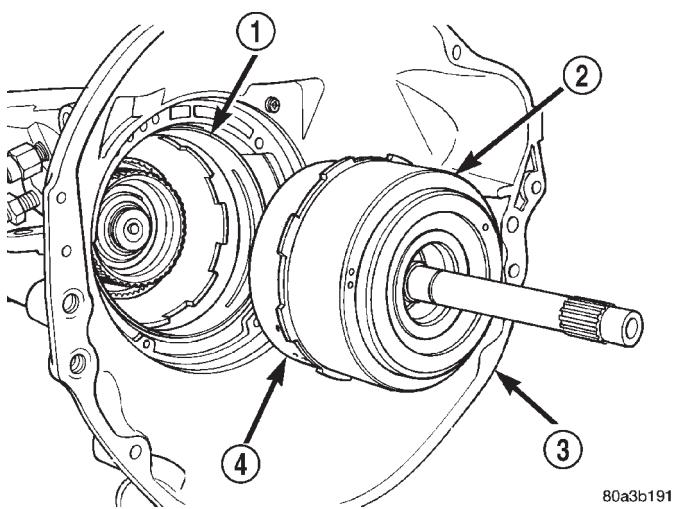


Fig. 130 Separating Front Clutch From Rear Clutch

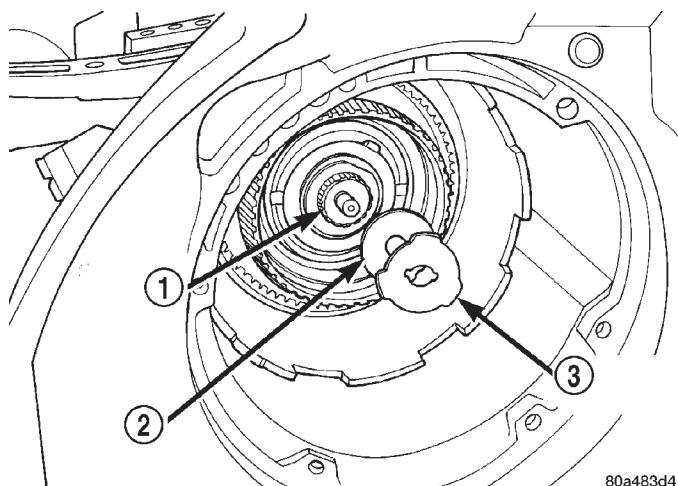
- 1 – FRONT CLUTCH
2 – REAR CLUTCH



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Fig. 129 Front/Rear Clutch Assemblies

- 1 – FRONT BAND
2 – FRONT CLUTCH AND DRUM
3 – TRANSMISSION HOUSING
4 – REAR CLUTCH

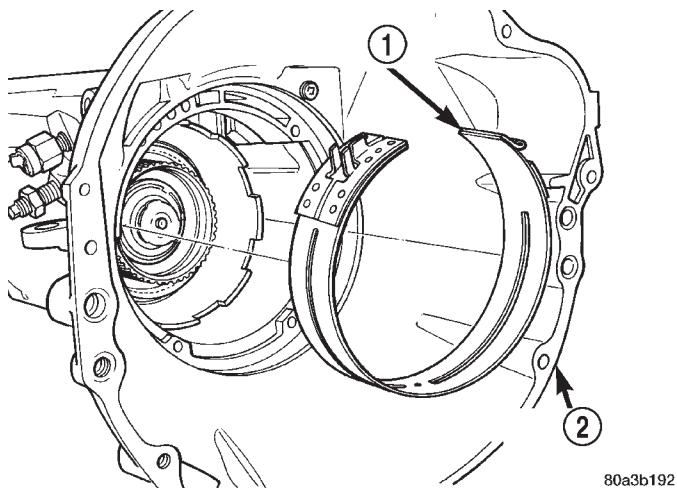


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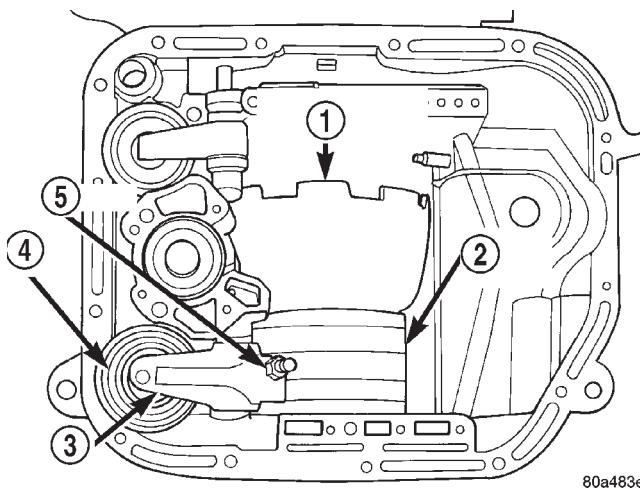
Fig. 131 Output Shaft Thrust Plate and Washer

- 1 – OUTPUT SHAFT
2 – THRUST PLATE
3 – THRUST WASHER

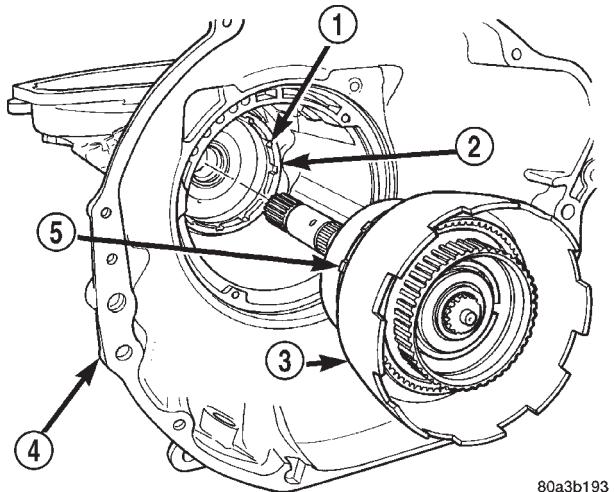
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 132 Front Band**

- 1 – FRONT BAND
2 – TRANSMISSION HOUSING

**Fig. 134 Rear Band Adjuster Location**

- 1 – PLANETARY GEARTRAIN
2 – REAR BAND
3 – LEVER
4 – SERVO
5 – ADJUSTER

**Fig. 133 Planetary Geartrain**

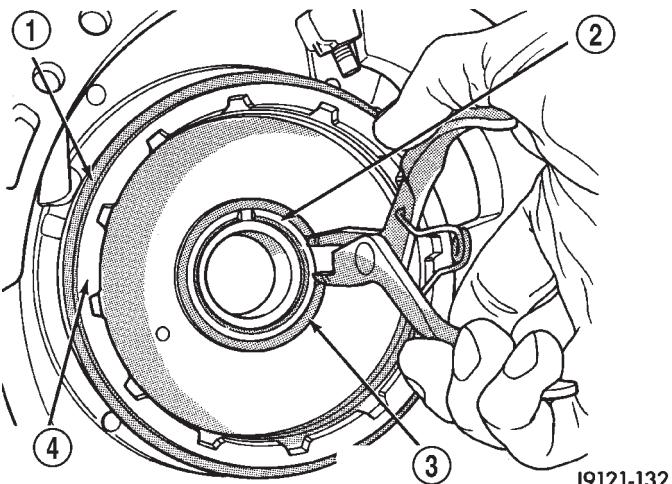
- 1 – SLOTS
2 – LOW-REVERSE DRUM
3 – PLANETARY GEARTRAIN
4 – TRANSMISSION HOUSING
5 – LUGS

(26) Loosen rear band adjusting screw 4-5 turns (Fig. 134).

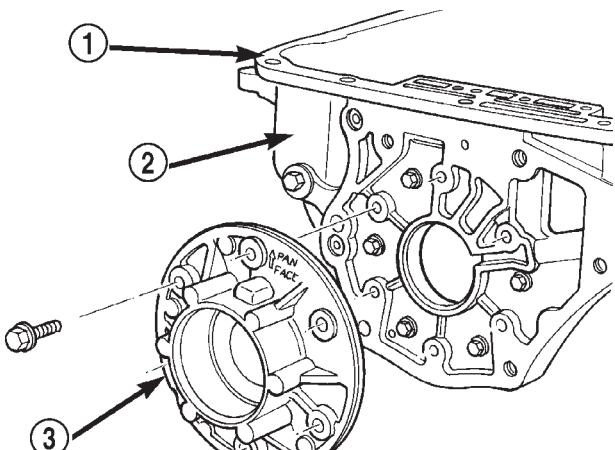
(27) Remove snap ring that secures low-reverse drum to rear support hub, however do not remove drum (Fig. 135).

(28) Remove bolts attaching rear support to transmission case and pull support from low-reverse drum (Fig. 136).

(29) Remove bolts attaching overrunning clutch cam and low-reverse drum to transmission case (Fig. 137).

**Fig. 135 Low-Reverse Drum Snap Ring**

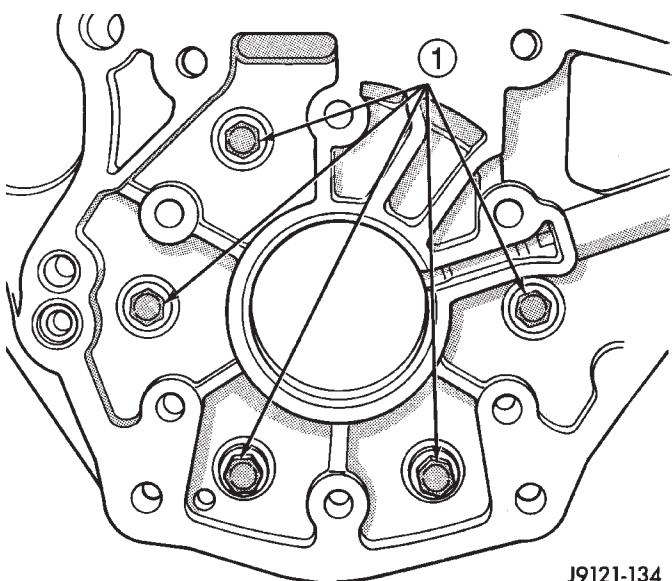
- 1 – REAR BAND
2 – REAR SUPPORT HUB
3 – LOW-REVERSE DRUM SNAP RING
4 – LOW-REVERSE DRUM



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Fig. 136 Rear Support

- 1 – OIL PAN FACE
- 2 – TRANSMISSION HOUSING
- 3 – REAR SUPPORT



J9121-134

Fig. 137 Overrunning Clutch Cam Bolt Locations

- 1 – OVERRUNNING CLUTCH CAM BOLTS

(30) Using snap-ring plier, pull rear band anchor pin (located on the servo side of the rear support) from transmission case.

(31) Remove rear band and link from transmission (Fig. 138).

(32) Separate link from rear band (Fig. 139).

(33) If necessary remove front and rear band servo levers. All transmission components can be serviced without removing the levers.

(a) Using a 1/4 inch drive extension remove front band reaction pin access plug (Fig. 140).

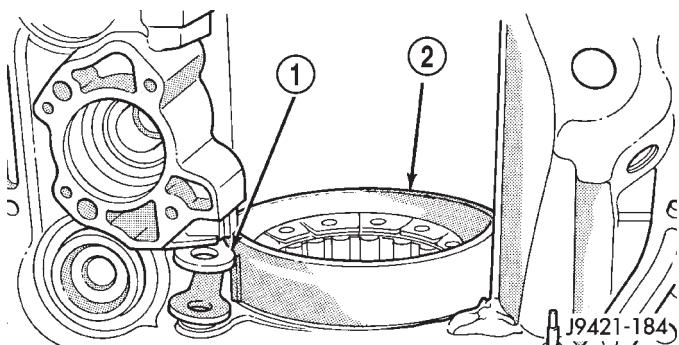
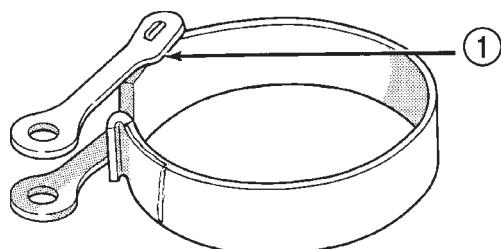


Fig. 138 Rear Band and Link

- 1 – LINK
- 2 – REAR BAND



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Fig. 139 Rear Band and Link

- 1 – NOTCHED SIDE OF LINK GOES TOWARD BAND

(b) Remove front band reaction pin with pencil magnet. Pin is accessible from converter housing side of case (Fig. 141).

(c) Remove front band lever (Fig. 142).

(d) Using snap-ring plier, pull rear band lever pivot from transmission case (Fig. 143).

(e) Separate rear band servo lever from transmission.

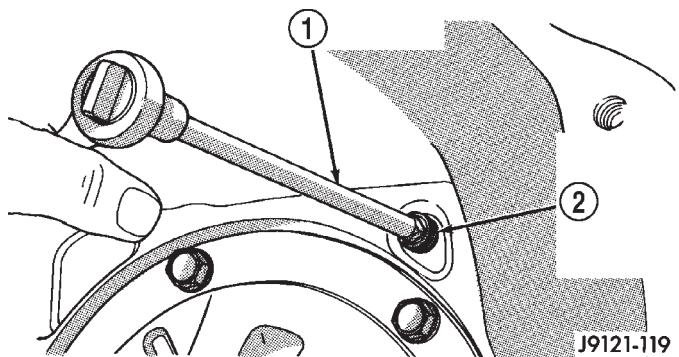
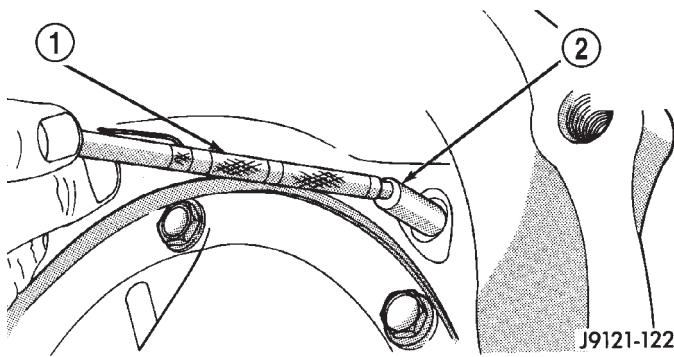


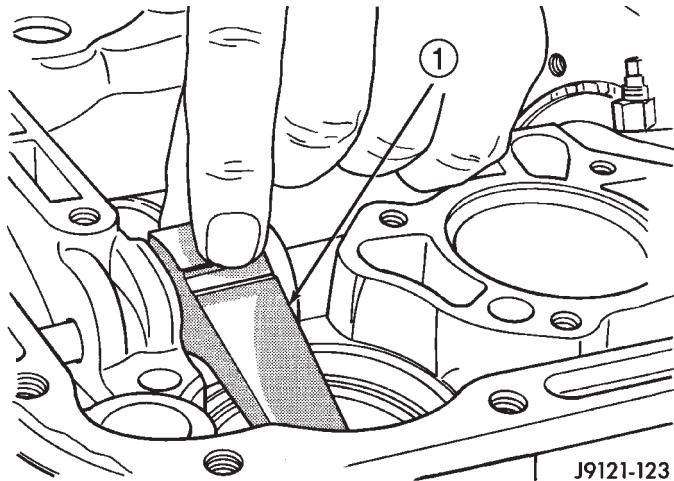
Fig. 140 Front Band Reaction Pin Access Plug

- 1 – 1/4" DRIVE EXTENSION
- 2 – FRONT BAND REACTION PIN ACCESS PLUG

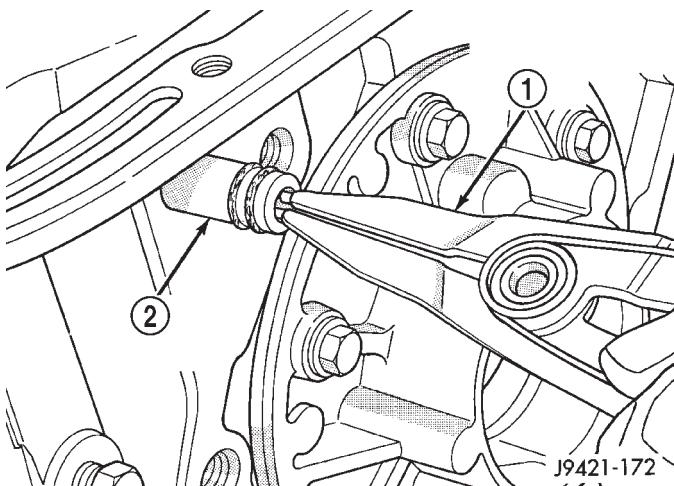
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 141 Front Band Reaction Pin**

- 1 – PENCIL MAGNET
2 – FRONT BAND REACTION PIN

**Fig. 142 Front Band Lever**

- 1 – FRONT BAND LEVER

**Fig. 143 Rear Band Servo Lever Pin**

- 1 – PARALLEL JAW SNAP RING PLIERS
2 – REAR BAND LEVER PIVOT PIN

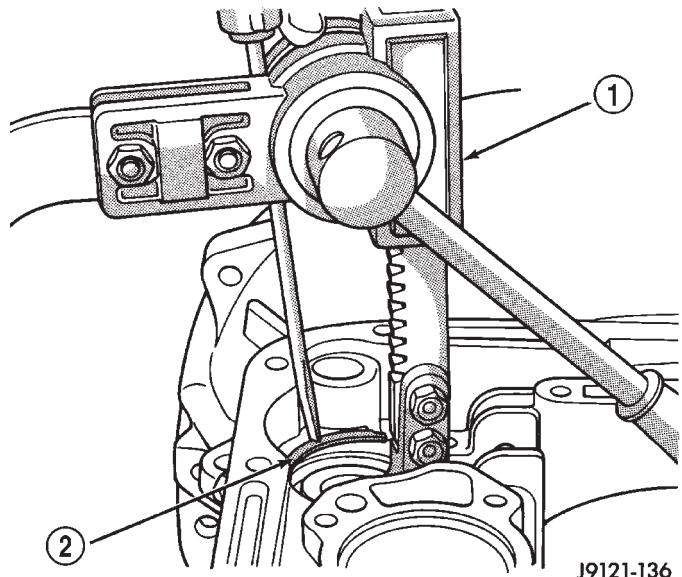
(34) Compress front servo rod guide about 1/8 in. with large C-clamp and Tool C-4470, or Spring Compressor Tool C-3422-B (Fig. 144).

(35) Remove front servo rod guide snap ring (Fig. 144). **Exercise caution when removing snap ring. Servo bore can be scratched or nicked if care is not exercised.**

(36) Remove compressor tools and remove front servo rod guide, spring and servo piston.

(37) Compress rear servo spring retainer about 1/16 in. with C-clamp and Tool C-4470 or SP-5560 (Fig. 145). Valve Spring Compressor C-3422-B can also be used to compress spring retainer.

(38) Remove rear servo spring retainer snap ring. Then remove compressor tools and remove rear servo spring and piston.

**Fig. 144 Compressing Front Servo**

- 1 – SPRING COMPRESSOR TOOL C-3422-B
2 – ROD GUIDE SNAP RING

ASSEMBLY

(1) Install rear servo piston, spring and spring retainer. Compress rear servo spring and retainer with Compressor Tool C-3422-B (Fig. 145) or a large C-clamp.

(2) Install front servo piston, spring, and rod guide. Compress front servo rod guide with Valve Spring Compressor C-3422-B and install servo snap ring (Fig. 144).

(3) Assemble link bar to band. Notched side of link toward band (Fig. 143).

(4) Insert rear band through pan opening in transmission case.

(5) Insert hook on band onto adjuster lever.

(6) Align holes in link bar with hole in transmission case outboard of rear support opening (Fig. 142).

(7) Insert anchor pin into case through link bar.

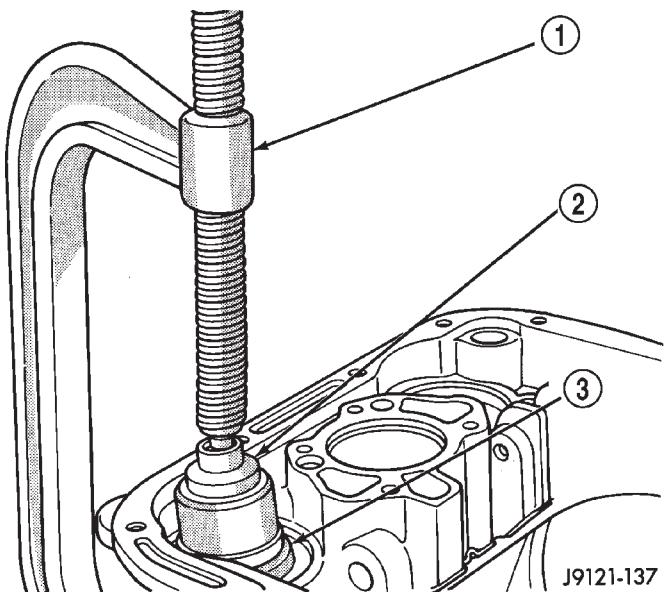


Fig. 145 Compressing Rear Servo Spring

- 1 – LARGE C-CLAMP
- 2 – TOOL C-4470 OR SP5560
- 3 – SERVO SPRING RETAINER

(8) Examine bolt holes in overrunning clutch cam. Note that one hole is **not threaded** (Fig. 146). This hole must align with blank area in clutch cam bolt circle.

NOTE: The bolt holes in cam are slightly countersunk on one side. This side of cam faces rearward (toward rear support).

(9) Lubricate overrunning clutch rollers, springs and cam with Mopar® ATF Plus 3, type 7176, transmission fluid.

(10) Position overrunning clutch on a clean, flat work surface with countersunk holes downward.

(11) Place rear of low-reverse drum over overrunning clutch and align clutch rollers to hub of drum.

(12) While slightly pivoting low-reverse drum, push hub of drum into overrunning clutch. Verify that countersunk holes are facing outward. **Cam should be able to rotate in the drum clockwise only.**

(13) Insert a suitable awl through the rear support mounting hole closest to the pan sealing face. The awl should be next to the wide space area at the back of transmission case.

(14) Insert low-reverse drum and overrunning clutch into front of transmission case and into rear band.

(15) Insert awl tip into the threaded hole next to the non-threaded hole in the overrunning clutch cam. Verify that non-threaded hole is aligned with wide space area on transmission case.

(16) Push low-reverse drum rearward to close gap between cam and case.

(17) Install overrunning clutch cam bolts. **Clutch cam bolts are shorter than rear support bolts.** Tighten cam bolts to 17 N·m (150 in. lbs. or 13 ft. lbs.) torque.

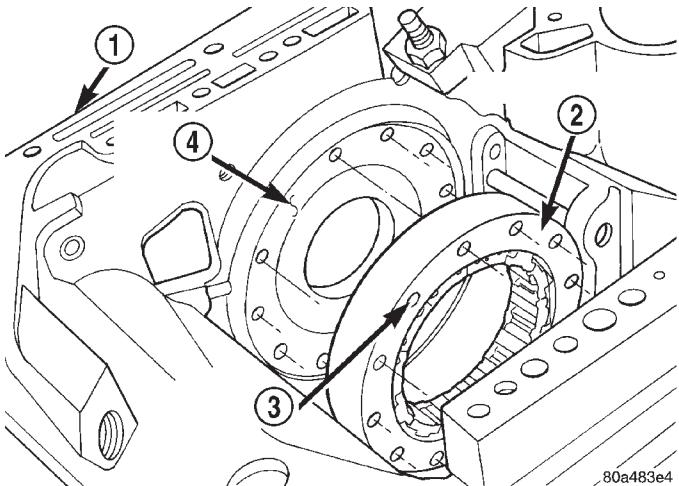


Fig. 146 Clutch Cam Alignment

- 1 – TRANSMISSION CASE
- 2 – OVERRUNNING CLUTCH
- 3 – NON-THREADER HOLE
- 4 – WIDE SPACE AREA

(18) Hold low-reverse drum in position so rear support will not push it out of overrunning clutch.

(19) Insert rear support into opening at rear of transmission case (Fig. 147).

(20) Align support with the embossed arrow in the direction of the pan face.

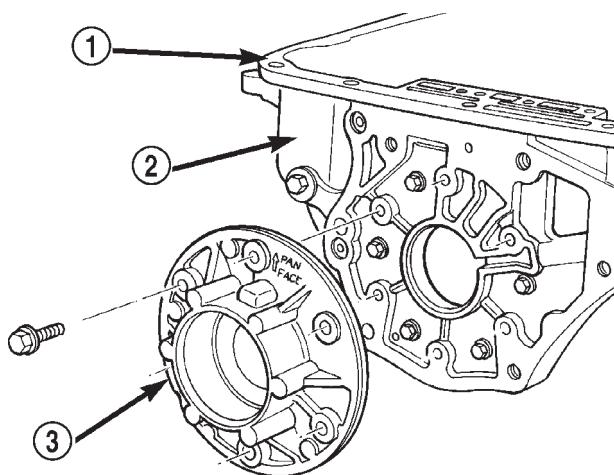


Fig. 147 Rear Support

- 1 – OIL PAN FACE
- 2 – TRANSMISSION HOUSING
- 3 – REAR SUPPORT

DISASSEMBLY AND ASSEMBLY (Continued)

(21) Install and tighten rear support bolts to 17 N·m (150 in. lbs.) torque.

(22) Install snap ring to retain low-reverse drum to hub of rear support (Fig. 148).

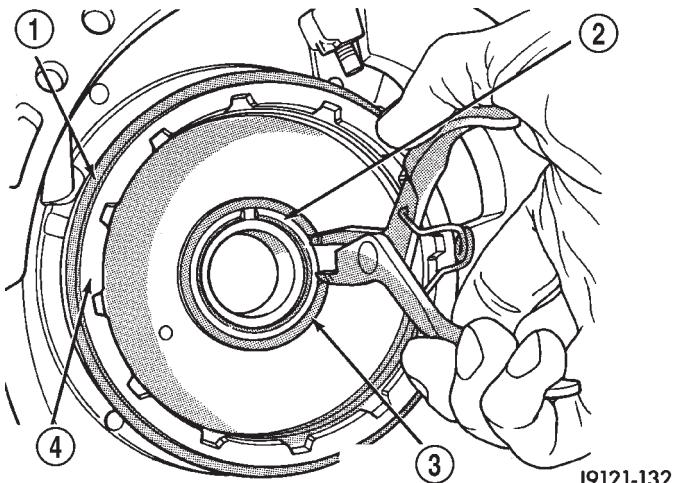


Fig. 148 Low-Reverse Drum Snap Ring

- 1 – REAR BAND
- 2 – REAR SUPPORT HUB
- 3 – LOW-REVERSE DRUM SNAP RING
- 4 – LOW-REVERSE DRUM

(23) Lubricate output shaft, rear support bore and low-reverse drum hub with transmission fluid.

(24) Install assembled output shaft and planetary geartrain in case (Fig. 149).

(25) Align drive lugs on rear planetary gear with slots in low-reverse drum (Fig. 149). Then seat planetary assembly in drum.

(26) Install governor on output shaft.

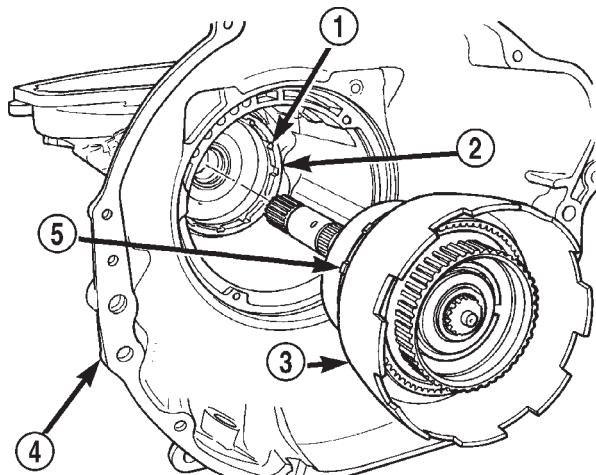


Fig. 149 Output Shaft And Planetary Geartrain

- 1 – SLOTS
- 2 – LOW-REVERSE DRUM
- 3 – PLANETARY GEARTRAIN
- 4 – TRANSMISSION HOUSING
- 5 – LUGS

(27) Turn and secure transmission so that front opening is upward.

(28) Assemble front and rear clutches together.

(a) Check input shaft seal rings (Fig. 150). Verify that diagonal-cut ends of Teflon™ seal ring are properly joined and ends of metal ring are correctly hooked together. Also be sure rings are installed in sequence shown.

(b) Align teeth on clutch discs in line.

(c) Insert input shaft on rear clutch into center of front clutch (Fig. 151).

(d) Engage teeth on rear clutch hub into teeth on clutch (Fig. 153). Rotate front clutch retainer back and forth until completely seated on rear clutch.

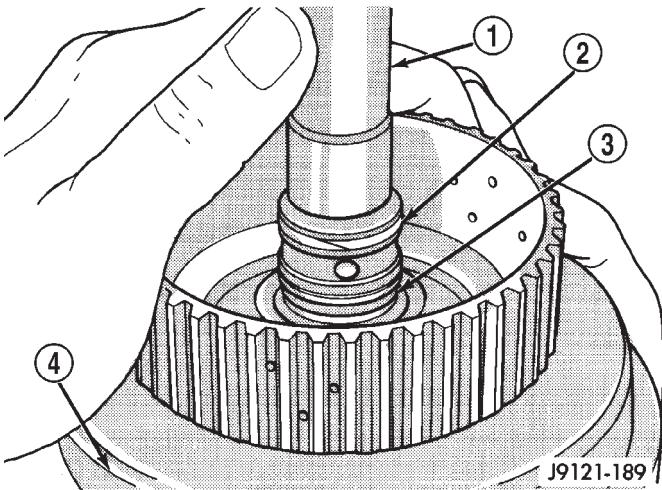


Fig. 150 Input Shaft Seal Ring Location

- 1 – INPUT SHAFT
- 2 – TEFLON SEAL RING
- 3 – METAL SEAL RING
- 4 – REAR CLUTCH RETAINER

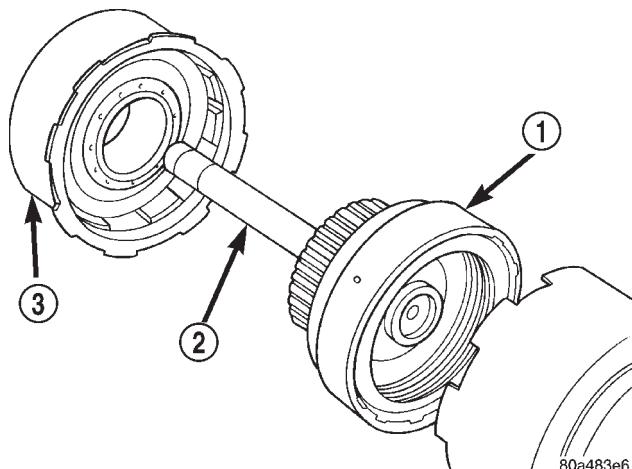


Fig. 151 Front and Rear Clutches

- 1 – REAR CLUTCH
- 2 – INPUT SHAFT
- 3 – FRONT CLUTCH

DISASSEMBLY AND ASSEMBLY (Continued)

(29) Install output shaft thrust plate on shaft hub in planetary geartrain driving shell (Fig. 152). Use petroleum jelly to hold thrust plate in place.

(30) Check rear clutch thrust washer. Use additional petroleum jelly to hold washer in place if necessary.

(31) Coat output shaft thrust washer with petroleum jelly. Install washer in rear clutch hub (Fig. 154). Use enough petroleum jelly to hold washer in place. **Be sure grooved side of washer faces rearward (toward output shaft) as shown. Also note that washer only fits one way in clutch hub.**

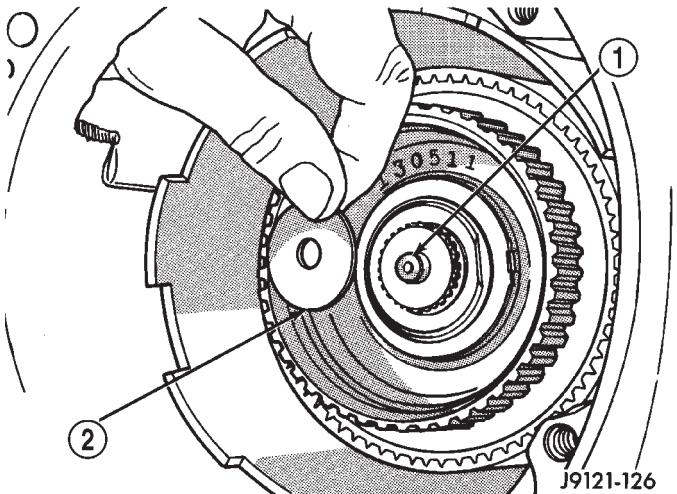


Fig. 152 Output Shaft Thrust Plate

- 1 – OUTPUT SHAFT HUB
2 – OUTPUT SHAFT THRUST PLATE

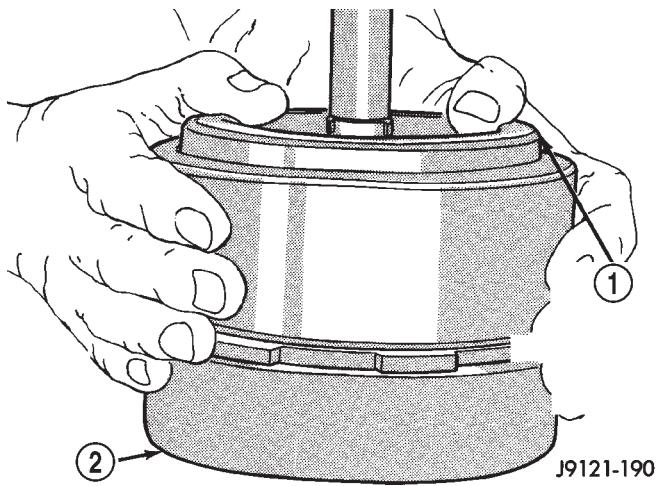


Fig. 153 Assembling Front And Rear Clutch Units

- 1 – TURN FRONT CLUTCH BACK & FORTH UNTIL SEATED
2 – REAR CLUTCH ASSEMBLY

(32) Align drive teeth on rear clutch discs with small screwdriver (Fig. 155). This will make installation into front of planetary geartrain easier.

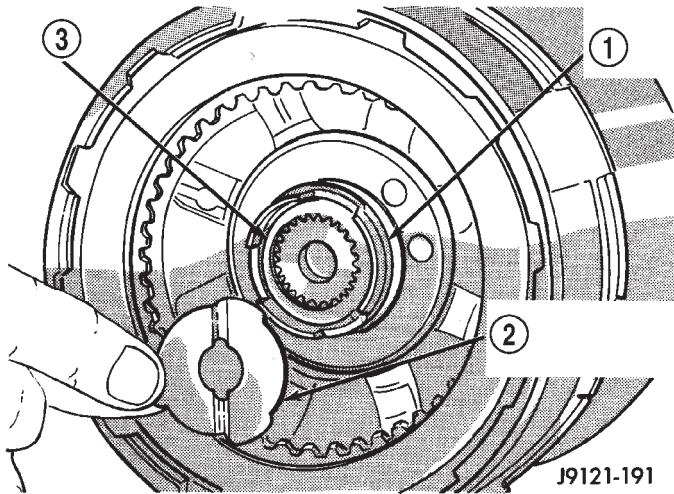


Fig. 154 Output Shaft Thrust Washer

- 1 – REAR CLUTCH HUB
2 – OUTPUT SHAFT THRUST WASHER
3 – OUTPUT SHAFT

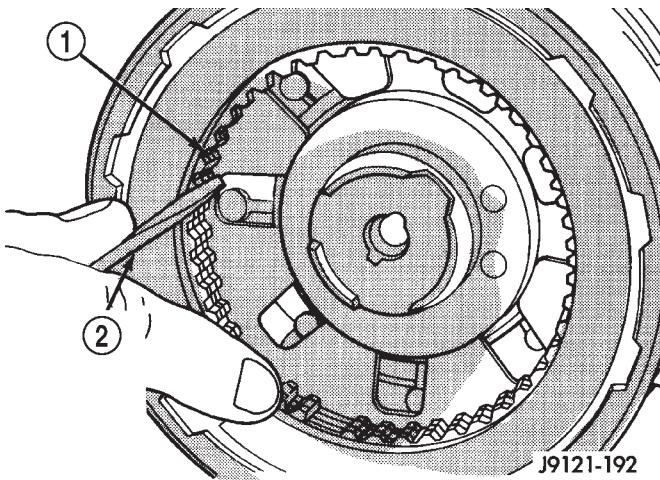


Fig. 155 Aligning Rear Clutch Disc Lugs

- 1 – REAR CLUTCH DISCS
2 – USE SMALL SCREWDRIVER TO ALIGN CLUTCH DISC TEETH

(33) Insert front band into opening at front of transmission case (Fig. 156).

(34) Install front and rear clutch units as assembly (Fig. 157). Align rear clutch with front annulus gear and install assembly in driving shell. **Be sure output shaft thrust washer and thrust plate are not displaced during installation.**

(35) Carefully work assembled clutches back and forth to engage and seat rear clutch discs on front annulus gear. Verify that front clutch drive lugs are

DISASSEMBLY AND ASSEMBLY (Continued)

fully engaged in slots of driving shell after installation.

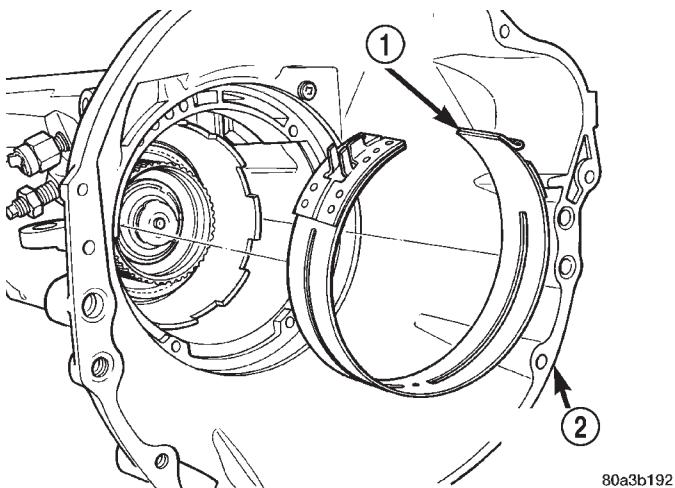


Fig. 156 Front Band

- 1 – FRONT BAND
- 2 – TRANSMISSION HOUSING

over reaction shaft hub and seat it on pump (Fig. 160).

CAUTION: The thrust washer bore (I. D.), is chamfered on one side. Make sure the chamfered side is installed so it faces the pump.

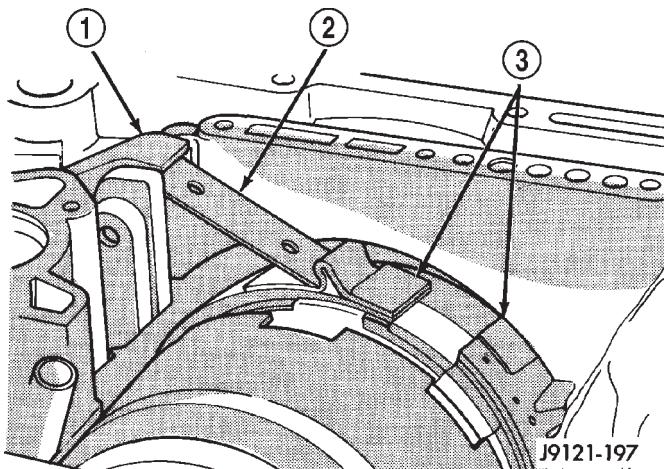


Fig. 158 Front Band Linkage Installation

- 1 – BAND LEVER
- 2 – BAND STRUT
- 3 – FRONT BAND

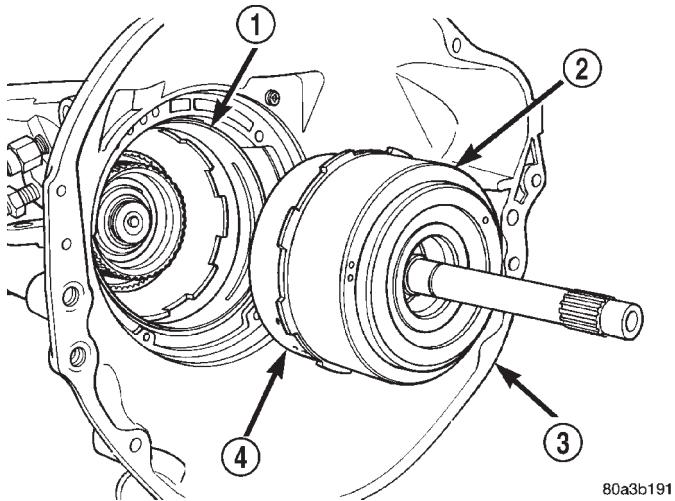


Fig. 157 Installing Front/Rear Clutch

- 1 – FRONT BAND
- 2 – FRONT CLUTCH AND DRUM
- 3 – TRANSMISSION HOUSING
- 4 – REAR CLUTCH

(36) Engage front band on adjusting screw and hold band in place.

(37) Install strut between band lever and front band (Fig. 158).

(38) Tighten front band adjusting screw until band just grips clutch retainer. Verify that front/rear clutches are still seated before continuing.

(39) Verify that reaction shaft support hub seal rings are hooked together (Fig. 159).

(40) Coat front clutch thrust washer with petroleum jelly to hold it in place. Then install washer

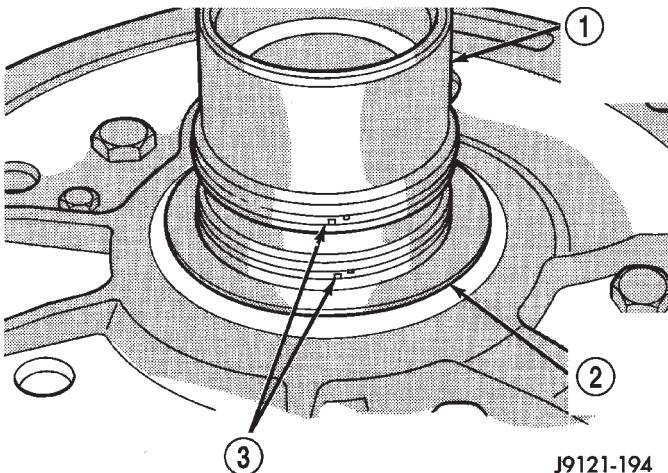


Fig. 159 Reaction Shaft Support Seal Rings

- 1 – REACTION SHAFT SUPPORT HUB
- 2 – FRONT CLUTCH THRUST WASHER
- 3 – SEAL RINGS

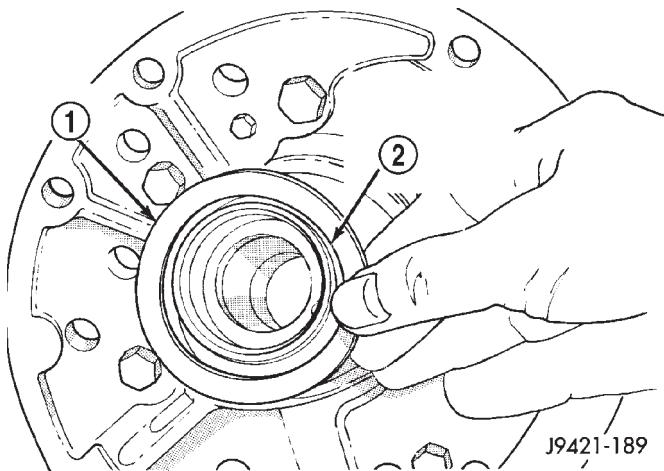


Fig. 160 Front Clutch Thrust Washer Installation

- 1 – THRUST WASHER
- 2 – CHAMFERED SIDE OF WASHER BORE GOES TOWARD PUMP

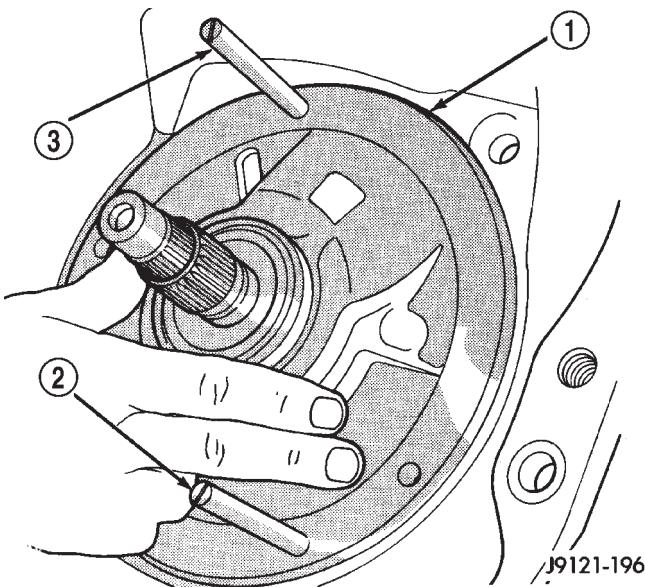


Fig. 162 Installing Oil Pump And Reaction Shaft Support

- 1 – OIL PUMP
- 2 – PILOT STUD TOOL
- 3 – PILOT STUD TOOL

(41) Thread two Pilot Stud Tools C-3288-B into bolt holes in oil pump flange (Fig. 161).

(42) Align and install oil pump gasket (Fig. 161).

(43) Lubricate oil pump seals with Mopar® Door Ease, or Ru-Glyde, Door Eze, or ATF Plus 3.

(44) Install oil pump (Fig. 162). Align and position pump on pilot studs. Slide pump down studs and work it into front clutch hub and case by hand. Then install two or three pump bolts to hold pump in place.

(45) Remove pilot stud tools and install remaining oil pump bolts. Tighten bolts alternately in diagonal pattern to 20 N·m (15 ft. lbs.).

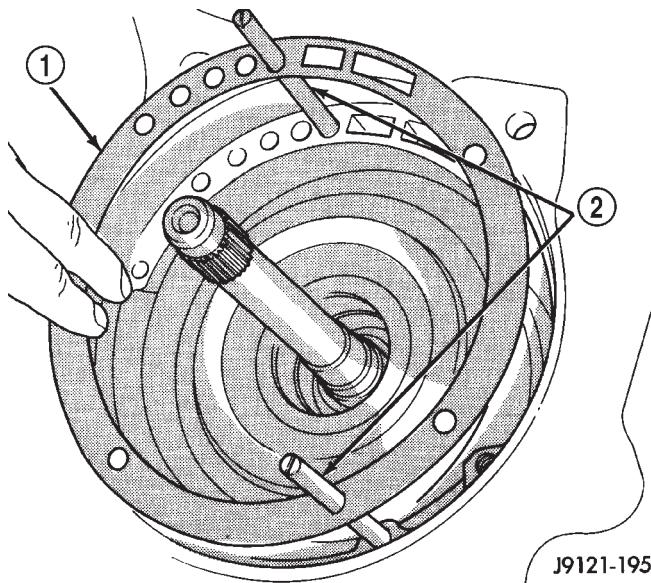


Fig. 161 Installing Pilot Studs And Oil Pump Gasket

- 1 – OIL PUMP GASKET
- 2 – PILOT STUD TOOLS C-3288-B

(46) Measure input shaft end play (Fig. 163).

NOTE: If end play is incorrect, transmission is incorrectly assembled, or output shaft thrust washer and/or thrust plate are worn and need to be changed.

(a) Attach Adapter 8266-7 to Handle 8266-8.
(b) Attach dial indicator C-3339 to Handle 8266-8.

(c) Install the assembled tool onto the input shaft of the transmission and tighten the retaining screw on Adapter 8266-7 to secure it to the input shaft.

(d) Position the dial indicator plunger against a flat spot on the oil pump and zero the dial indicator.

(e) Move input shaft in and out and record reading. End play should be 0.56 - 2.31 mm (0.022 - 0.091 in.).

(47) Position transmission on work surface with pan face upward.

(48) Install valve body.

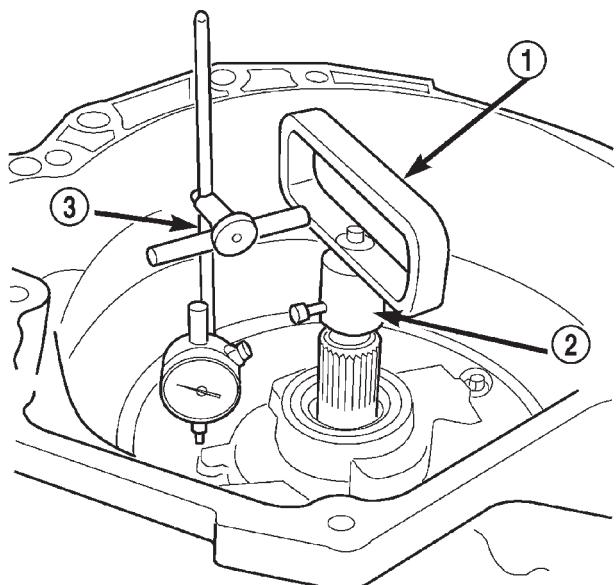
(49) Adjust front and rear bands.

(50) Install fluid filter and pan.

(51) Install rear extension housing.

(52) Install torque converter.

DISASSEMBLY AND ASSEMBLY (Continued)



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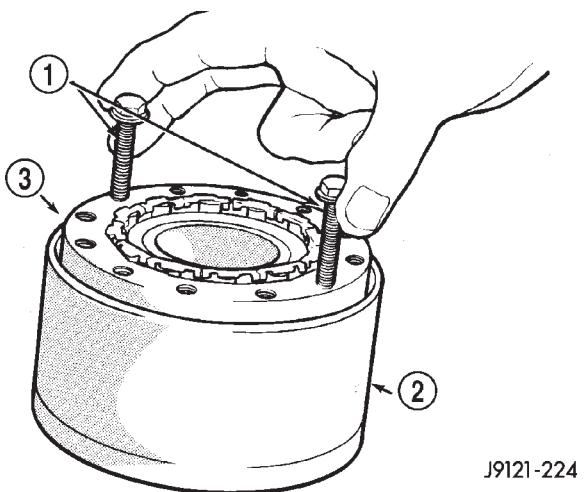
Fig. 163 Checking Input Shaft End Play

- 1 – TOOL 8266-8
2 – TOOL 8266-7
3 – TOOL C-3339

OVERRUNNING CLUTCH/LOW-REVERSE DRUM

DISASSEMBLY

(1) If the clutch assembly came out with the low-reverse drum, thread two clutch cam bolts into the cam. Then lift the cam out of the drum with the bolts (Fig. 164). Rotate the cam back and forth to ease removal if necessary.



J9121-224

Fig. 164 Removing Overrunning Clutch From Low-Reverse Drum

- 1 – CAM BOLTS
2 – LOW-REVERSE DRUM
3 – OVERRUNNING CLUTCH AND CAM

(2) Remove the clutch roller and spring assembly from the overrunning clutch race.

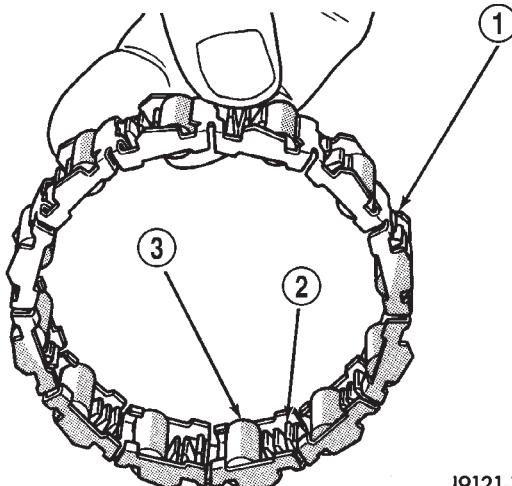
ASSEMBLY

(1) Assemble clutch rollers and springs in retainer if necessary (Fig. 165).

(2) Install overrunning clutch roller, spring and retainer assembly in clutch cam (Fig. 166).

(3) Temporarily assemble and check overrunning clutch operation as follows:

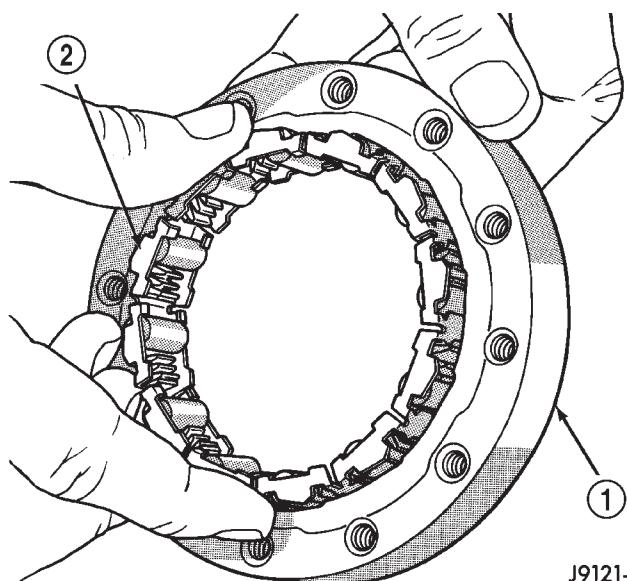
(a) Assemble cam and clutch.



J9121-139

Fig. 165 Overrunning Clutch Rollers, Springs, Retainer

- 1 – RETAINER
2 – SPRING
3 – ROLLER



J9121-138

Fig. 166 Assembling Overrunning Clutch And Cam

- 1 – CLUTCH CAM
2 – CLUTCH ROLL ASSEMBLY

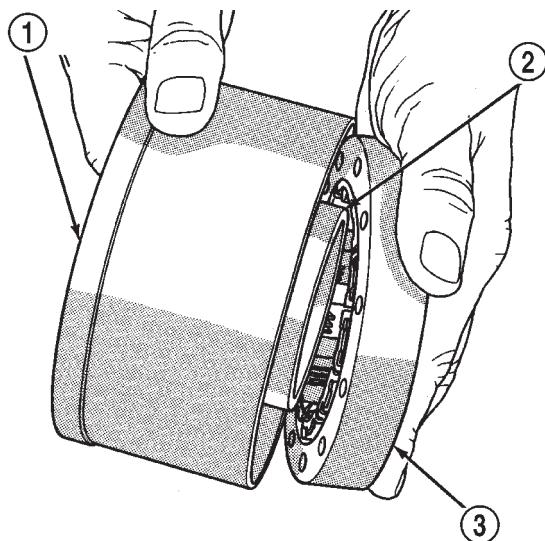
DISASSEMBLY AND ASSEMBLY (Continued)

(b) Install clutch assembly on low-reverse drum with twisting motion (Fig. 167).

(c) Install drum-clutch assembly in case and install clutch cam bolts.

(d) Install rear support and support attaching bolts.

(e) Check low-reverse drum rotation. **Drum should rotate freely in clockwise direction and lock when turned in counterclockwise direction (as viewed from front of case).**



J9121-135

Fig. 167 Temporary Assembly Of Clutch And Drum To Check Operation

- 1 – LOW-REVERSE DRUM
- 2 – CLUTCH RACE (ON HUB OF DRUM)
- 3 – OVERRUNNING CLUTCH

FRONT SERVO PISTON

DISASSEMBLY

(1) Remove seal ring from rod guide (Fig. 169).
 (2) Remove small snap ring from servo piston rod. Then remove piston rod, spring and washer from piston.

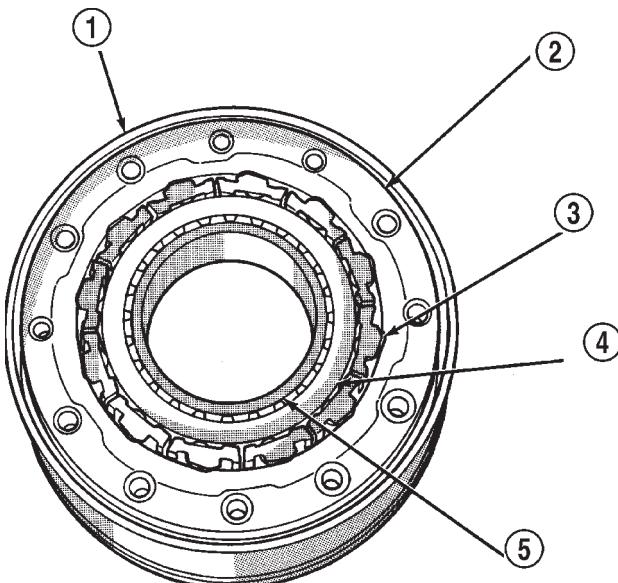
(3) Remove and discard servo component O-ring and seal rings.

ASSEMBLY

(1) Lubricate new O-ring and seal rings with petroleum jelly and install them on piston, guide and rod.

(2) Install rod in piston. Install spring and washer on rod. Compress spring and install snap ring (Fig. 169).

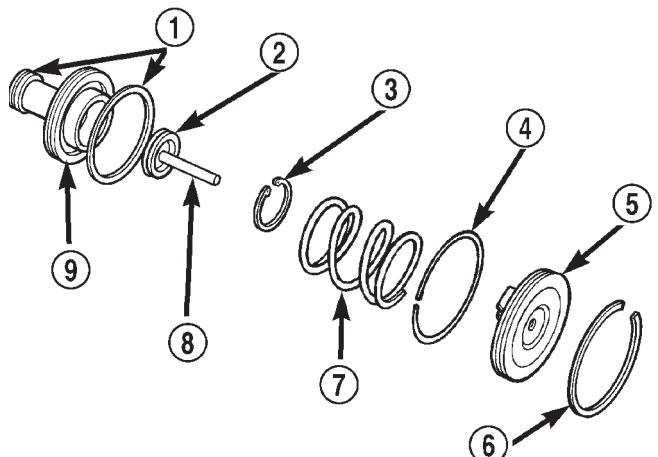
(3) Set servo components aside for installation during transmission reassembly.



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Fig. 168 Assembled Overrunning Clutch

- 1 – LOW-REVERSE DRUM
- 2 – OVERRUNNING CLUTCH CAM
- 3 – ROLLER AND SPRING ASSEMBLY
- 4 – CLUTCH RACE
- 5 – HUB OF LOW-REVERSE DRUM



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Fig. 169 Front Servo

- 1 – PISTON RINGS
- 2 – O-RING
- 3 – SNAP-RING
- 4 – SEAL RING
- 5 – PISTON ROD GUIDE
- 6 – SNAP-RING
- 7 – SERVO SPRING
- 8 – PISTON ROD
- 9 – SERVO PISTON

DISASSEMBLY AND ASSEMBLY (Continued)

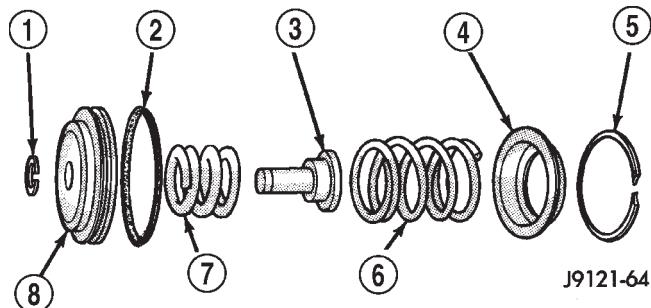
REAR SERVO PISTON

DISASSEMBLY

- (1) Remove small snap ring and remove plug and spring from servo piston (Fig. 170).
- (2) Remove and discard servo piston seal ring.

ASSEMBLY

- (1) Lubricate piston and guide seals with petroleum jelly. Lubricate other servo parts with Mopar® ATF Plus 3, Type 7176, transmission fluid.
- (2) Install new seal ring on servo piston.
- (3) Assemble piston, plug, spring and new snap ring.
- (4) Lubricate piston seal lip with petroleum jelly.

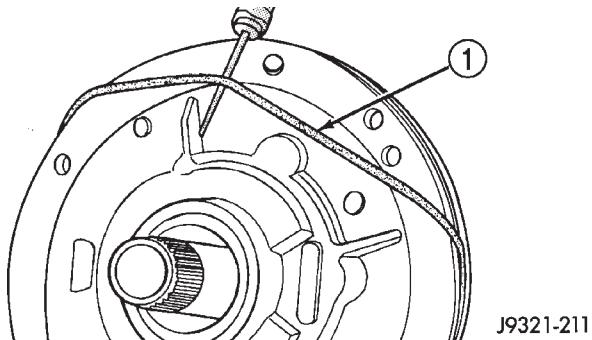
**Fig. 170 Rear Servo Components**

- 1 – SNAP RING
2 – PISTON SEAL
3 – PISTON PLUG
4 – SPRING RETAINER
5 – SNAP RING
6 – PISTON SPRING
7 – CUSHION SPRING
8 – PISTON

OIL PUMP AND REACTION SHAFT SUPPORT

DISASSEMBLY

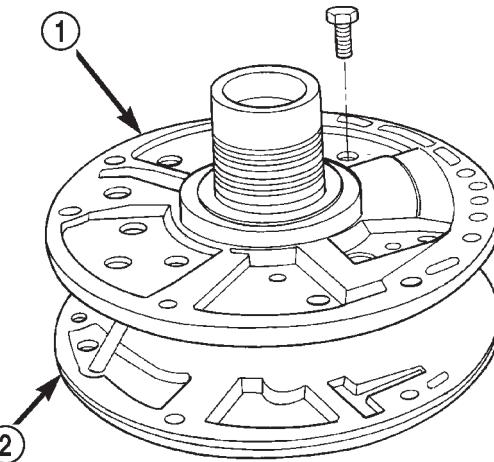
- (1) Remove seal ring from housing and reaction shaft support (Fig. 171).

**Fig. 171 Removing Pump Seal Ring**

- 1 – PUMP HOUSING SEAL RING

- (2) Mark pump housing and support assembly for alignment reference.

- (3) Remove bolts attaching pump body to support (Fig. 172).



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Fig. 172 Pump Support Bolts

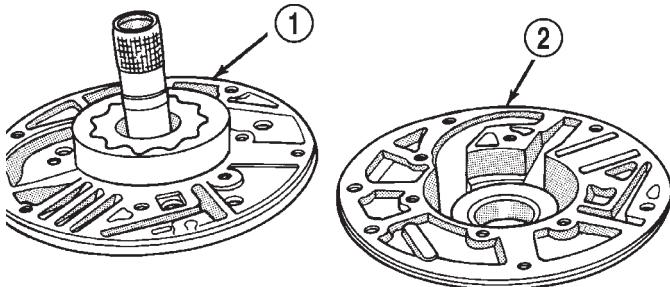
- 1 – REACTION SHAFT SUPPORT
2 – PUMP

- (4) Separate support from pump housing (Fig. 173).

- (5) Remove inner and outer gears from reaction shaft support (Fig. 174).

- (6) If pump seal was not removed during transmission disassembly, remove seal with punch and hammer.

- (7) Remove front clutch thrust washer from support hub (Fig. 175).

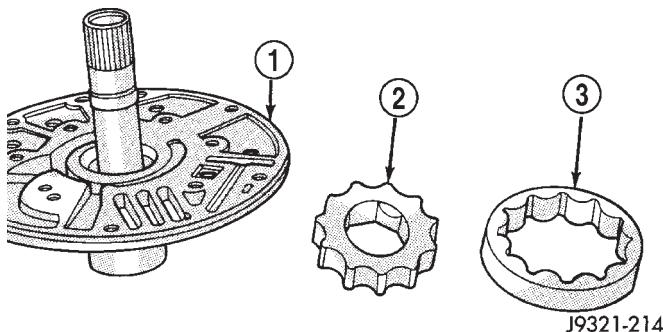


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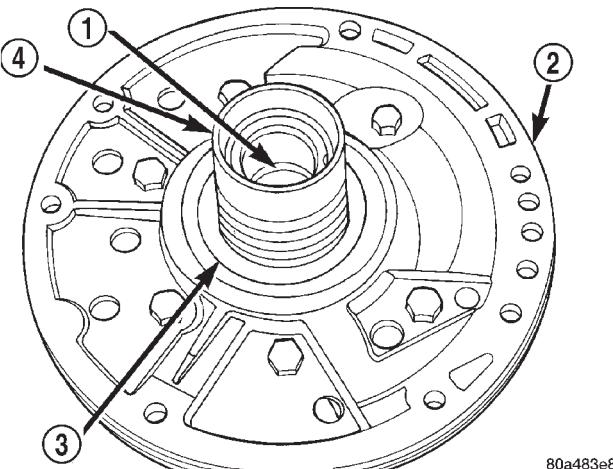
Fig. 173 Separating Pump Housing From Reaction Shaft Support

- 1 – REACTION SHAFT SUPPORT
2 – PUMP HOUSING

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 174 Pump Gear Removal**

- 1 – REACTION SHAFT SUPPORT
2 – INNER GEAR
3 – OUTER GEAR

**Fig. 175 Support Hub Thrust Washer**

- 1 – BUSHING
2 – REACTION SHAFT SUPPORT
3 – THRUST WASHER
4 – HUB

OIL PUMP BUSHING REPLACEMENT

(1) Remove pump bushing with Tool Handle C-4171 and Bushing Remover SP-3551 from Tool Set C-3887-J (Fig. 176).

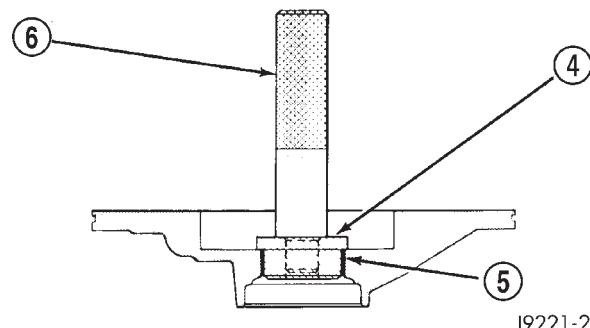
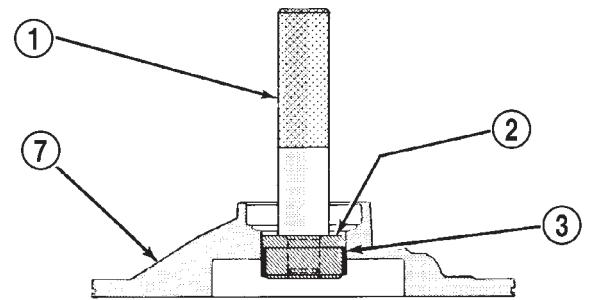
(2) Install new pump bushing with Tool Handle C-4171 and Bushing Installer SP-5117 (Fig. 176). Bushing should be flush with pump housing bore.

(3) Stake new pump bushing in two places with blunt punch (Fig. 177). Remove burrs from stake points with knife blade afterward.

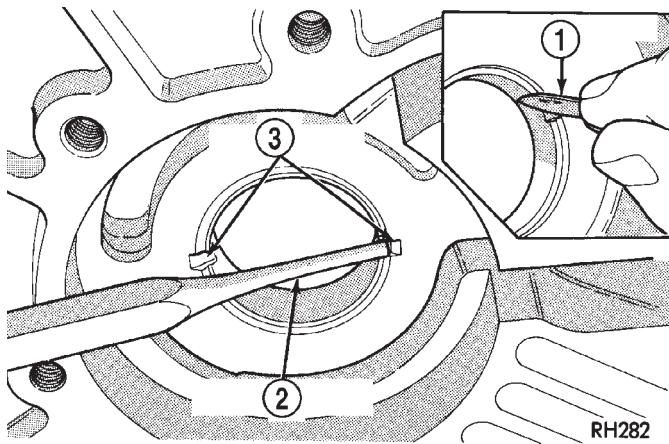
REACTION SHAFT SUPPORT BUSHING REMOVAL

(1) Assemble Bushing Remover Tools SP-1191, 3633 and 5324 (Fig. 178). **Do not clamp any part of reaction shaft or support in vise.**

(2) Hold Cup Tool SP-3633 firmly against reaction shaft and thread remover SP-5324 into bushing as

**Fig. 176 Removing Oil Pump Bushing**

- 1 – SPECIAL TOOL C-4171
2 – SPECIAL TOOL SP-3551
3 – BUSHING
4 – SPECIAL TOOL SP-5117
5 – BUSHING
6 – SPECIAL TOOL C-4171
7 – PUMP HOUSING

**Fig. 177 Staking Oil Pump Bushing**

- 1 – NARROW BLADE
2 – BLUNT PUNCH
3 – TWO STAKES

far as possible by hand. Then thread remover tool 3-4 additional turns into bushing with a wrench.

(3) Turn remover tool hex nut down against remover cup to pull bushing from shaft. Clean all chips from shaft after bushing removal.

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Lightly grip old bushing in vise or with pliers and back remover tool out of bushing.

(5) Assemble Bushing Installer Tools C-4171 and SP-5325 (Fig. 178).

(6) Slide new bushing onto Installer Tool SP-5325.

(7) Position reaction shaft support upright on a clean smooth surface.

(8) Align bushing in bore. Then tap bushing into place until Bushing Installer SP-5325 bottoms.

(9) Clean reaction shaft support thoroughly after installing bushing.

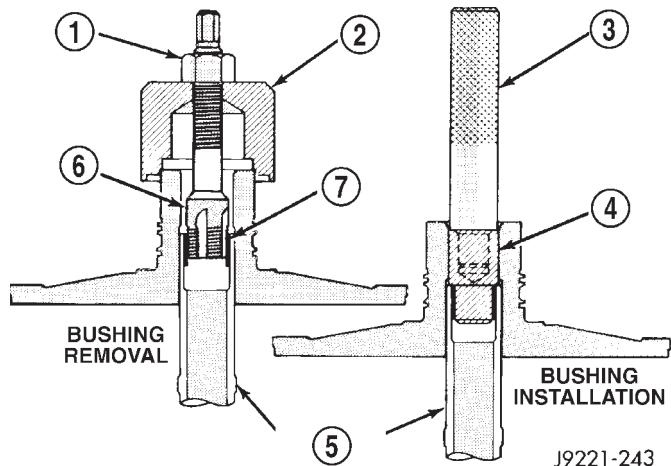


Fig. 178 Replacing Reaction Shaft Support Bushing

- 1 – SPECIAL TOOL SP-1191
- 2 – SPECIAL TOOL SP-3633
- 3 – SPECIAL TOOL C-4171
- 4 – SPECIAL TOOL SP-5325
- 5 – REACTION SHAFT
- 6 – SPECIAL TOOL SP-5324
- 7 – BUSHING

ASSEMBLY

(1) Lubricate gear bore in pump housing with transmission fluid.

(2) Lubricate pump gears with transmission fluid.

(3) Support pump housing on wood blocks (Fig. 179).

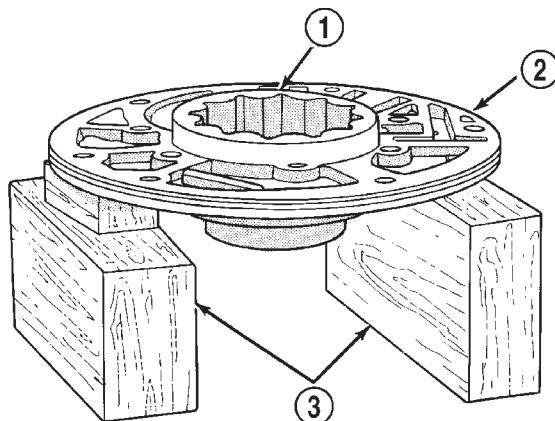
(4) Install outer gear in pump housing (Fig. 179). Gear can be installed either way (it is not a one-way fit).

(5) Install pump inner gear (Fig. 180).

CAUTION: The pump inner gear is a one way fit. The bore on one side of the gear inside diameter (I.D.) is chamfered. Be sure the chamfered side faces forward (to front of pump).

(6) Install new thrust washer on hub of reaction shaft support. Lubricate washer with transmission fluid or petroleum jelly.

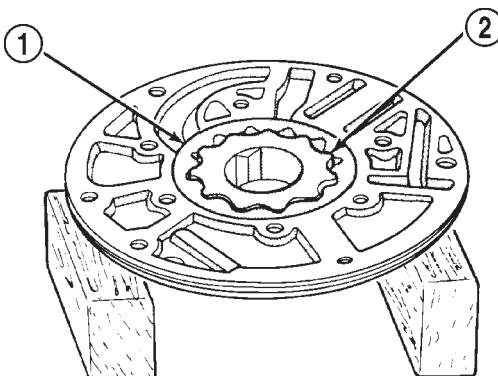
(7) If reaction shaft seal rings are being replaced, install new seal rings on support hub (Fig. 181).



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Fig. 179 Supporting Pump And Installing Outer Gear

- 1 – OUTER GEAR
- 2 – PUMP HOUSING
- 3 – WOOD BLOCKS



J9321-465

Fig. 180 Pump Inner Gear Installation

- 1 – OUTER GEAR
- 2 – INNER GEAR

Lubricate seal rings with transmission fluid or petroleum jelly after installation. Squeeze each ring until ring ends are securely hooked together.

CAUTION: The reaction shaft support seal rings will break if overspread, or twisted. If new rings are being installed, spread them only enough for installation. Also be very sure the ring ends are securely hooked together after installation. Otherwise, the rings will either prevent pump installation, or break during installation.

(8) Install reaction shaft support on pump housing (Fig. 182).

(9) Align reaction support on pump housing. Use alignment marks made at disassembly. Or, rotate support until bolt holes in support and pump housing are all aligned (holes are offset for one-way fit).

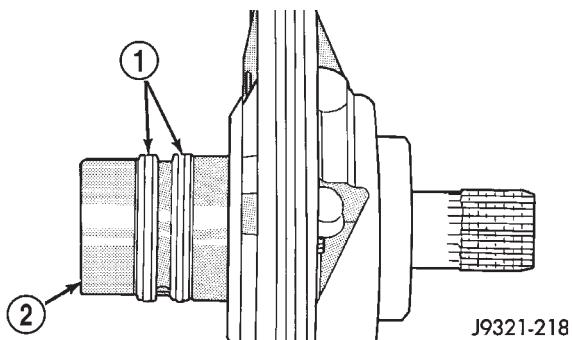


Fig. 181 Hub Seal Ring Position

- 1 – SEAL RINGS
2 – SUPPORT HUB

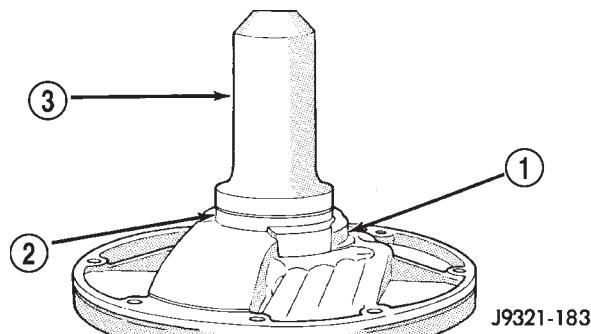


Fig. 183 Pump Oil Seal Installation

- 1 – PUMP BODY
2 – PUMP SEAL
3 – SPECIAL TOOL C-4193

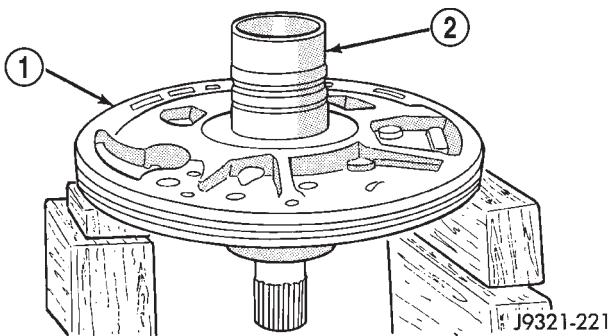


Fig. 182 Assembling Reaction Shaft Support And Pump Housing

- 1 – PUMP HOUSING
2 – REACTION SHAFT SUPPORT

(10) Install all bolts that attach support to pump housing. Then tighten bolts finger tight.

(11) Tighten support-to-pump bolts to required torque as follows:

(a) Reverse pump assembly and install it in transmission case. Position pump so bolts are facing out and are accessible.

(b) Secure pump assembly in case with 2 or 3 bolts, or with pilot studs.

(c) Tighten support-to-pump bolts to 20 N·m (15 ft. lbs.).

(d) Remove pump assembly from transmission case.

(12) Install new oil seal in pump with Special Tool C-4193 and Tool Handle C-4171 (Fig. 183). Be sure seal lip faces inward.

(13) Install new seal ring around pump housing. Be sure seal is properly seated in groove.

(14) Lubricate lip of pump oil seal and O-ring seal with transmission fluid.

FRONT CLUTCH

DISASSEMBLY

(1) Remove waved snap ring and remove pressure plate, clutch plates and clutch discs (Fig. 184).

(2) Compress clutch piston spring with Compressor Tool C-3575-A (Fig. 185). Be sure legs of tool are seated squarely on spring retainer before compressing spring.

(3) Remove retainer snap ring and remove compressor tool.

(4) Remove spring retainer and clutch spring. Note position of retainer on spring for assembly reference.

(5) Remove clutch piston from clutch retainer. Remove piston by rotating it up and out of retainer.

(6) Remove seals from clutch piston and clutch retainer hub. Discard both seals as they are not reusable.

ASSEMBLY

(1) Soak clutch discs in transmission fluid while assembling other clutch parts.

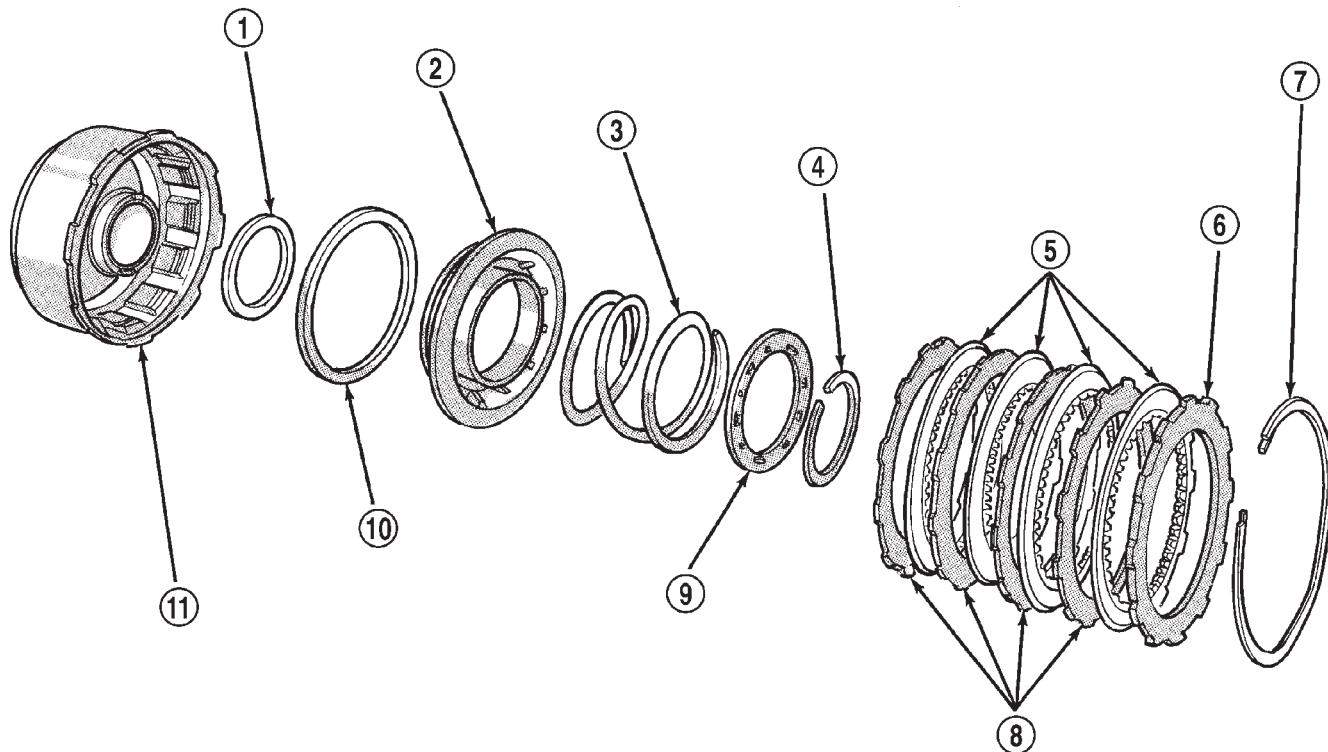
(2) Install new seals on piston and in hub of retainer. Be sure lip of each seal faces interior of clutch retainer.

(3) Lubricate lips of piston and retainer seals with liberal quantity of Mopar® Door Ease, or Ru-Glyde. Then lubricate retainer hub, bore and piston with light coat of transmission fluid.

(4) Install clutch piston in retainer (Fig. 186). Use twisting motion to seat piston in bottom of retainer. A thin strip of plastic (about 0.020" thick), can be used to guide seals into place if necessary.

CAUTION: Never push the clutch piston straight in. This will fold the seals over causing leakage and clutch slip. In addition, never use any type of metal tool to help ease the piston seals into place. Metal tools will cut, shave, or score the seals.

DISASSEMBLY AND ASSEMBLY (Continued)



J9321-222

Fig. 184 Front Clutch Components

- 1 – RETAINER HUB SEAL
 2 – CLUTCH PISTON
 3 – PISTON SPRING
 4 – SPRING RETAINER SNAP RING
 5 – CLUTCH DISCS
 6 – PRESSURE PLATE

- 7 – SNAP RING (WAVED)
 8 – CLUTCH PLATES
 9 – SPRING RETAINER
 10 – PISTON SEAL
 11 – FRONT CLUTCH RETAINER

(5) Position spring in clutch piston (Fig. 187).
 (6) Position spring retainer on top of piston spring (Fig. 188). **Make sure retainer is properly installed. Small raised tabs should be facing upward. Semicircular lugs on underside of retainer are for positioning retainer in spring.**

(7) Compress piston spring and retainer with Compressor Tool C-3575-A (Fig. 185). Then install new snap ring to secure spring retainer and spring.

(8) Install clutch plates and discs (Fig. 184). Install steel plate then disc until all plates and discs are installed. The front clutch uses 4 clutch discs.

(9) Install pressure plate and waved snap ring (Fig. 184).

(10) Using a suitable gauge bar and dial indicator, measure clutch plate clearance (Fig. 189).

(a) Position gauge bar across the clutch drum with the dial indicator pointer on the pressure plate (Fig. 189).

(b) Using two small screw drivers, lift the pressure plate and compress the waved snap-ring. This

will assure that the snap-ring is at the top of the groove.

(c) Release the pressure plate and zero the dial indicator.

(d) Lift the pressure plate until it contacts the waved snap-ring and record the dial indicator reading.

Clearance should be 1.70 to 3.40 mm (0.067 to 0.134 in.). If clearance is incorrect, clutch discs, plates pressure plates and snap ring may have to be changed.

REAR CLUTCH**DISASSEMBLY**

(1) Remove thrust washer from forward side of clutch retainer.

(2) Remove input shaft front/rear seal rings.

(3) Remove selective clutch pack snap ring (Fig. 190).

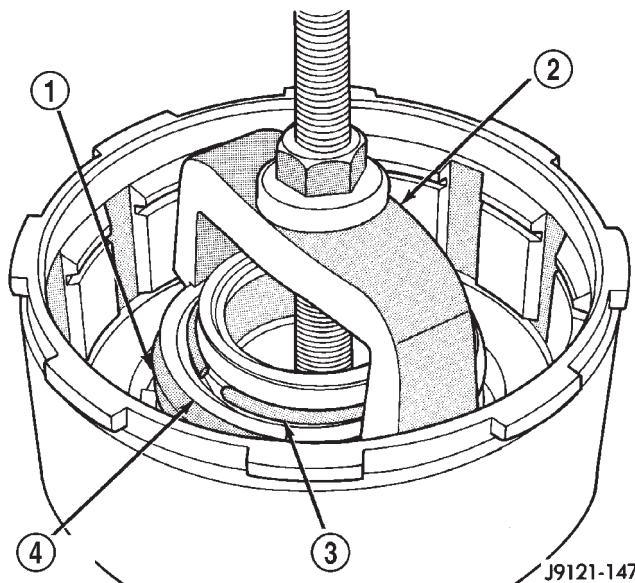


Fig. 185 Compressing Front Clutch Piston Spring

- 1 – FRONT CLUTCH SPRING
- 2 – COMPRESSOR TOOL C-3575-A
- 3 – RETAINER SNAP RING
- 4 – SPRING RETAINER

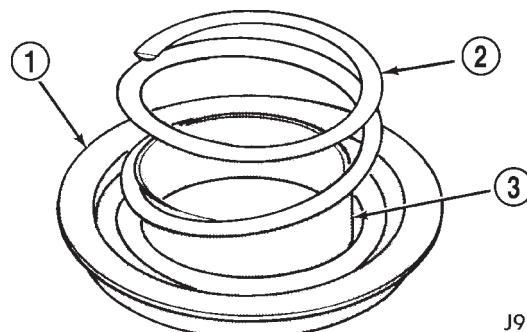


Fig. 187 Clutch Piston Spring Installation

- 1 – RETAINER
- 2 – CLUTCH SPRING
- 3 – PISTON

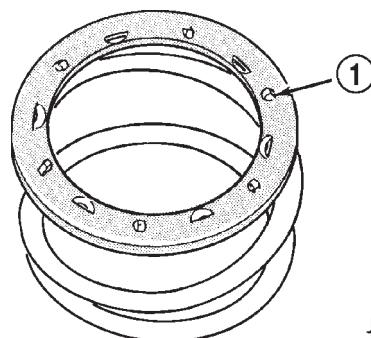


Fig. 188 Correct Spring Retainer Installed Position

- 1 – SMALL TABS ON RETAINER FACE UPWARD

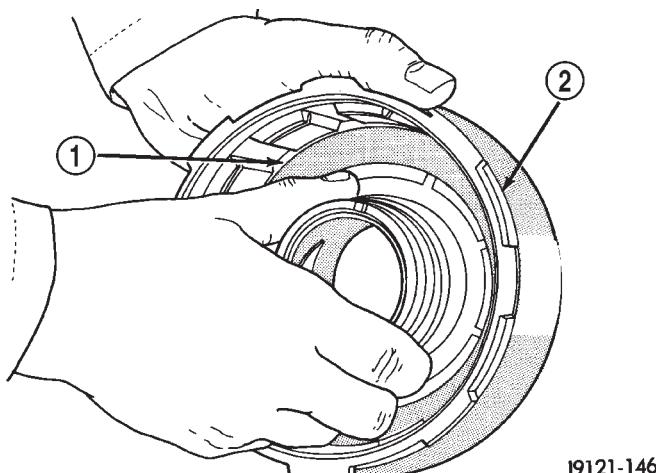


Fig. 186 Front Clutch Piston Installation

- 1 – CLUTCH PISTON
- 2 – FRONT CLUTCH RETAINER

(4) Remove top pressure plate, clutch discs, steel plates, bottom pressure plate and wave snap ring and wave spring (Fig. 190).

(5) Remove clutch piston with rotating motion.

(6) Remove and discard piston seals.

(7) Remove input shaft snap-ring (Fig. 191). It may be necessary to press the input shaft in slightly to relieve tension on the snap-ring.

(8) Press input shaft out of retainer with shop press and suitable size press tool. Use a suitably

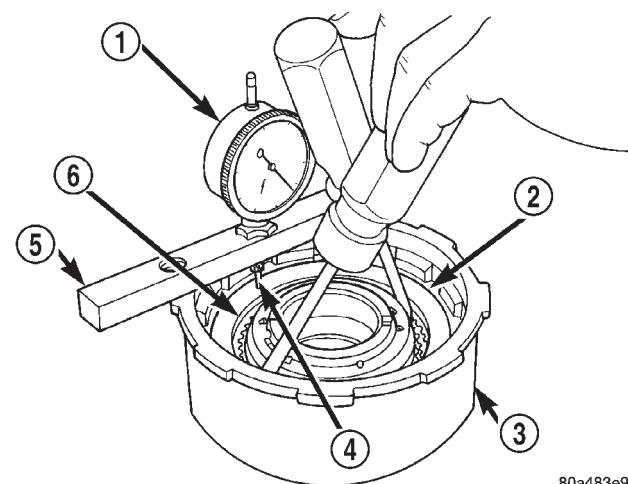


Fig. 189 Measuring Front Clutch Pack Clearance

- 1 – DIAL INDICATOR
- 2 – WAVED SNAP-RING
- 3 – FRONT CLUTCH
- 4 – POINTER
- 5 – GAUGE BAR
- 6 – PRESSURE PLATE

DISASSEMBLY AND ASSEMBLY (Continued)

sized press tool to support the retainer as close to the input shaft as possible.

ASSEMBLY

(1) Soak clutch discs in transmission fluid while assembling other clutch parts.

(2) Install new seal rings on clutch retainer hub and input shaft if necessary (Fig. 192).

(a) Be sure clutch hub seal ring is fully seated in groove and is not twisted.

(3) Lubricate splined end of input shaft and clutch retainer with transmission fluid. Then press input shaft into retainer. Use a suitably sized press tool to support retainer as close to input shaft as possible.

(4) Install input shaft snap-ring (Fig. 191).

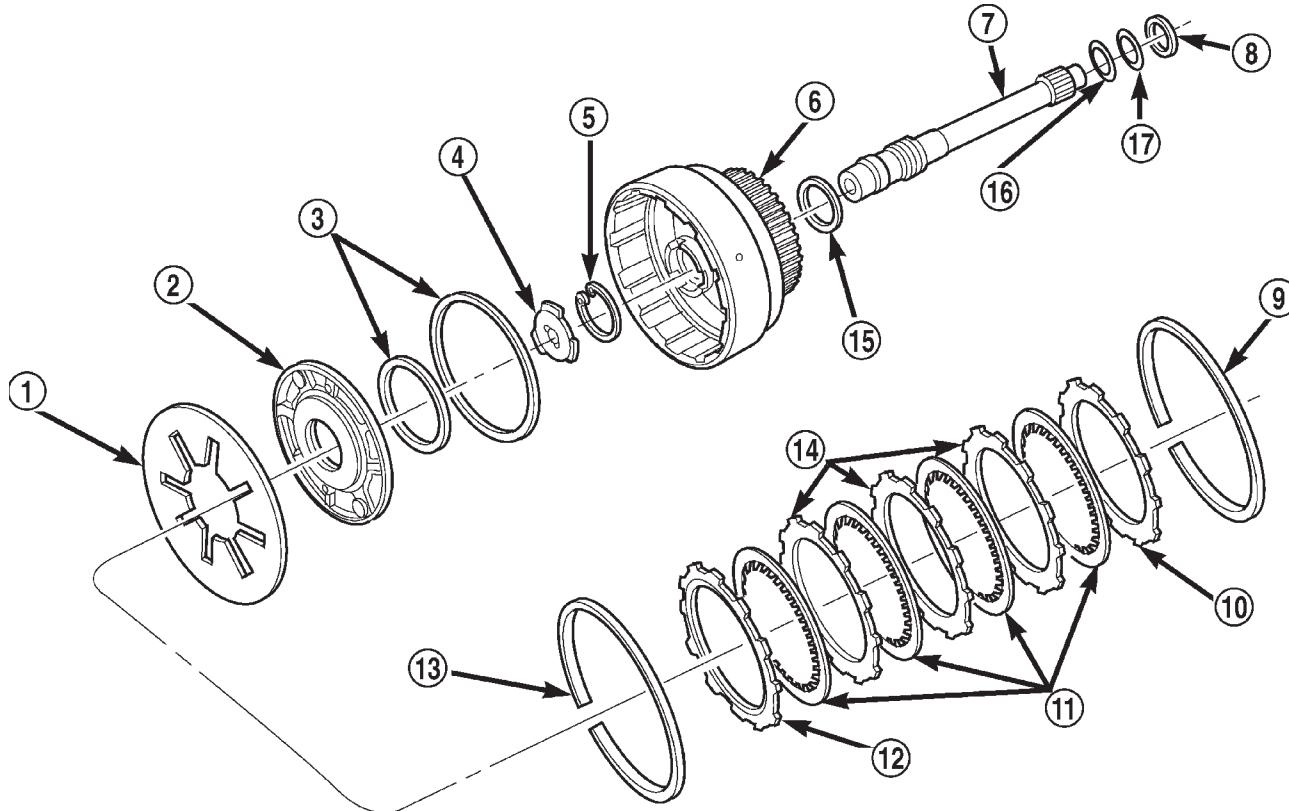
(5) Invert retainer and press input shaft in opposite direction until snap-ring is seated.

(6) Install new seals on clutch piston. Be sure lip of each seal faces interior of clutch retainer.

(7) Lubricate lip of piston seals with generous quantity of Mopar® Door Ease. Then lubricate retainer hub and bore with light coat of transmission fluid.

(8) Install clutch piston in retainer. Use twisting motion to seat piston in bottom of retainer. A thin strip of plastic (about 0.020" thick), can be used to guide seals into place if necessary.

CAUTION: Never push the clutch piston straight in. This will fold the seals over causing leakage and clutch slip. In addition, never use any type of metal tool to help ease the piston seals into place. Metal tools will cut, shave, or score the seals.



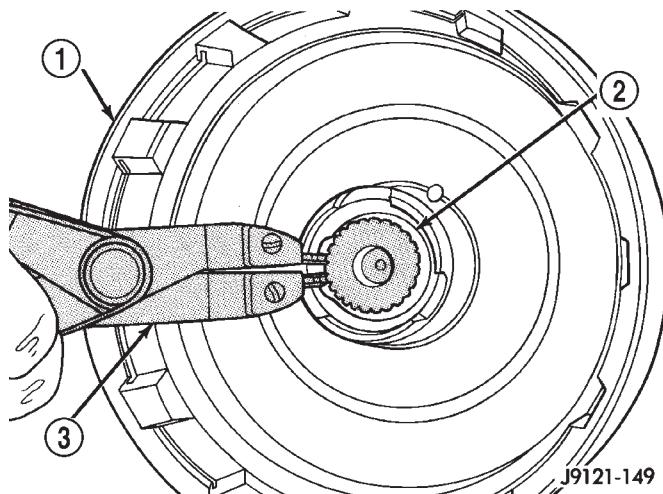
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Fig. 190 Rear Clutch Components

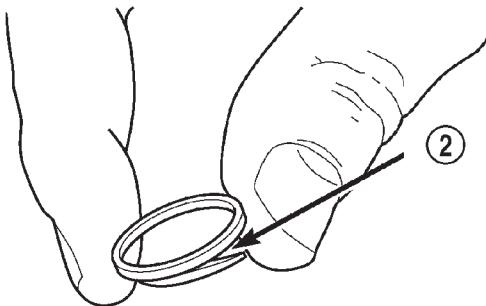
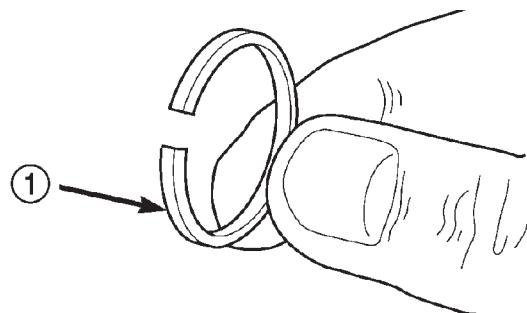
- 1 – PISTON SPRING
- 2 – REAR CLUTCH PISTON
- 3 – CLUTCH PISTON SEALS
- 4 – OUTPUT SHAFT THRUST WASHER (METAL)
- 5 – INPUT SHAFT SNAP RING
- 6 – REAR CLUTCH RETAINER
- 7 – INPUT SHAFT
- 8 – REAR CLUTCH THRUST WASHER (FIBER)
- 9 – CLUTCH PACK SNAP RING (SELECTIVE)

- 10 – TOP PRESSURE PLATE
- 11 – CLUTCH DISCS (4)
- 12 – BOTTOM PRESSURE PLATE
- 13 – WAVE SPRING
- 14 – CLUTCH PLATES (3)
- 15 – RETAINER SEAL RING
- 16 – SHAFT REAR SEAL RING (PLASTIC)
- 17 – SHAFT FRONT SEAL RING (TEFLON)

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 191 Removing/Installing Input Shaft Snap-Ring**

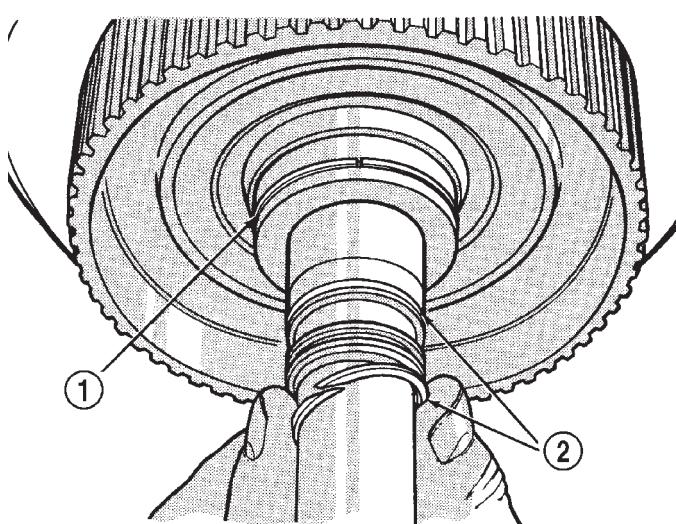
- 1 – REAR CLUTCH RETAINER
2 – INPUT SHAFT SNAP RING
3 – SNAP RING PLIERS



80c070a5

Fig. 193 Input Shaft Seal Ring Identification

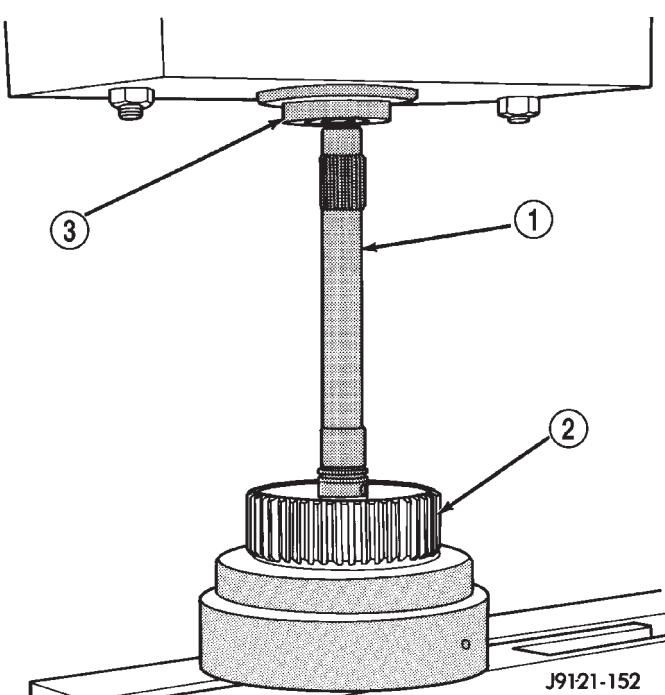
- 1 – PLASTIC REAR SEAL RING
2 – TEFLON FRONT SEAL RING (SQUEEZE RING TOGETHER SLIGHTLY BEFORE INSTALLATION FOR BETTER FIT)



J9121-538

Fig. 192 Rear Clutch Retainer And Input Shaft Seal Ring Installation

- 1 – REAR CLUTCH RETAINER HUB SEAL RING
2 – INPUT SHAFT SEAL RINGS



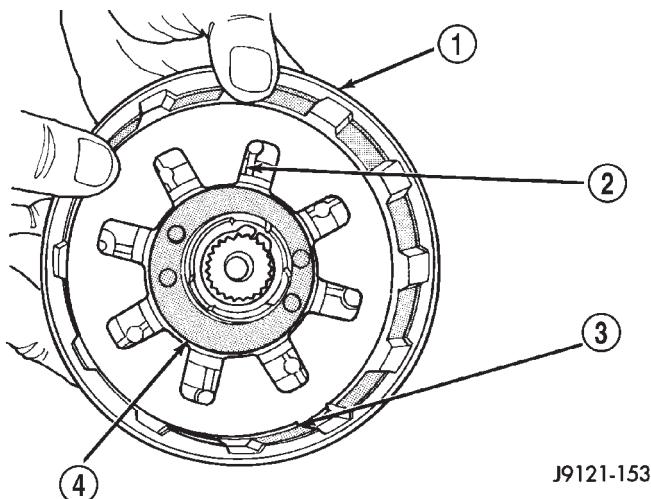
J9121-152

Fig. 194 Pressing Input Shaft Into Rear Clutch Retainer

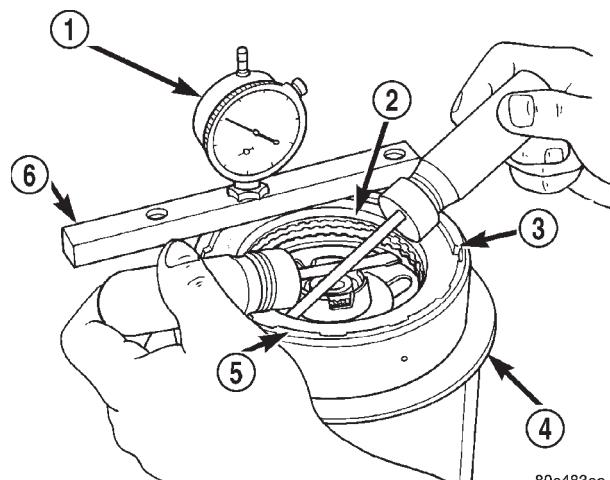
- 1 – INPUT SHAFT
2 – REAR CLUTCH RETAINER
3 – PRESS RAM

(11) Install bottom pressure plate (Fig. 190). Ridged side of plate faces downward (toward piston) and flat side toward clutch pack.

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 195 Piston Spring/Wave Spring Position**

- 1 – REAR CLUTCH RETAINER
2 – PISTON SPRING
3 – WAVE SPRING
4 – CLUTCH PISTON

**Fig. 196 Checking Rear Clutch Pack Clearance**

- 1 – DIAL INDICATOR
2 – PRESSURE PLATE
3 – SNAP RING
4 – STAND
5 – REAR CLUTCH
6 – GAUGE BAR

(12) Install first clutch disc in retainer on top of bottom pressure plate. Then install a clutch plate followed by a clutch disc until entire clutch pack is installed (4 discs and 3 plates are required) (Fig. 190).

(13) Install top pressure plate.

(14) Install selective snap ring. Be sure snap ring is fully seated in retainer groove.

(15) Using a suitable gauge bar and dial indicator, measure clutch pack clearance (Fig. 196).

(a) Position gauge bar across the clutch drum with the dial indicator pointer on the pressure plate (Fig. 196).

(b) Using two small screw drivers, lift the pressure plate and release it.

(c) Zero the dial indicator.

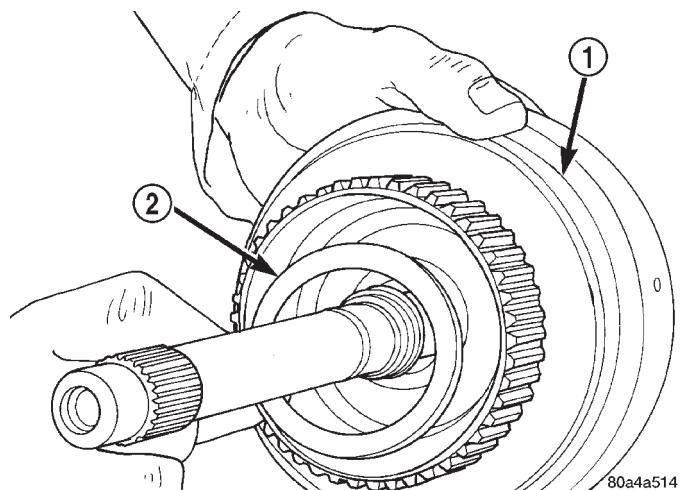
(d) Lift the pressure plate until it contacts the snap-ring and record the dial indicator reading.

Clearance should be 0.64 - 1.14 mm (0.025 - 0.045 in.). If clearance is incorrect, steel plates, discs, selective snap ring and pressure plates may have to be changed.

The selective snap ring thicknesses are:

- .107-.109 in.
- .098-.100 in.
- .095-.097 in.
- .083-.085 in.
- .076-.078 in.
- .071-.073 in.
- .060-.062 in.

(16) Coat rear clutch thrust washer with petroleum jelly and install washer over input shaft and into clutch retainer (Fig. 197). Use enough petroleum jelly to hold washer in place.

**Fig. 197 Installing Rear Clutch Thrust Washer**

- 1 – REAR CLUTCH RETAINER
2 – REAR CLUTCH THRUST WASHER

PLANETARY GEARTRAIN/OUTPUT SHAFT**DISASSEMBLY**

- (1) Remove planetary snap ring (Fig. 198).
- (2) Remove front annulus and planetary assembly from driving shell (Fig. 198).
- (3) Remove snap ring that retains front planetary gear in annulus gear (Fig. 199).
- (4) Remove tabbed thrust washer and tabbed thrust plate from hub of front annulus (Fig. 200).
- (5) Separate front annulus and planetary gears (Fig. 200).

DISASSEMBLY AND ASSEMBLY (Continued)

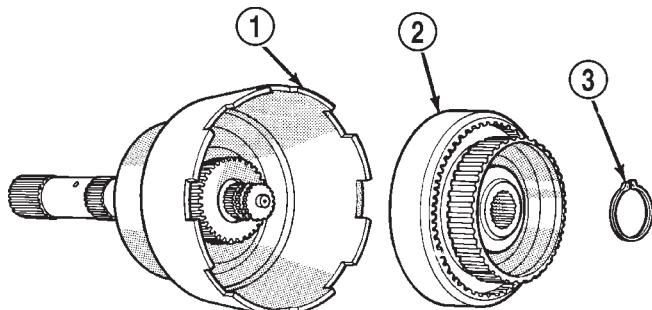
(6) Remove front planetary gear front thrust washer from annulus gear hub.

(7) Separate and remove driving shell, rear planetary and rear annulus from output shaft (Fig. 201).

(8) Remove front planetary rear thrust washer from driving shell.

(9) Remove tabbed thrust washers from rear planetary gear.

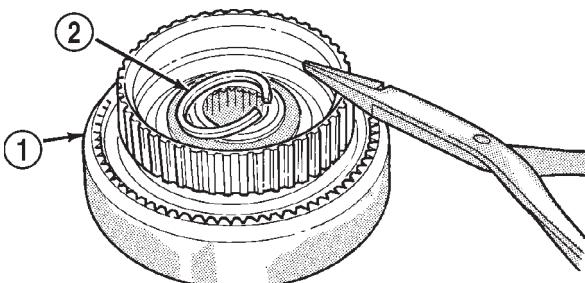
(10) Remove lock ring that retains sun gear in driving shell. Then remove sun gear, spacer and thrust plates.



J9421-175

Fig. 198 Front Annulus And Planetary Assembly Removal

- 1 – DRIVING SHELL
- 2 – FRONT ANNULUS AND PLANETARY ASSEMBLY
- 3 – PLANETARY SNAP RING



J9421-176

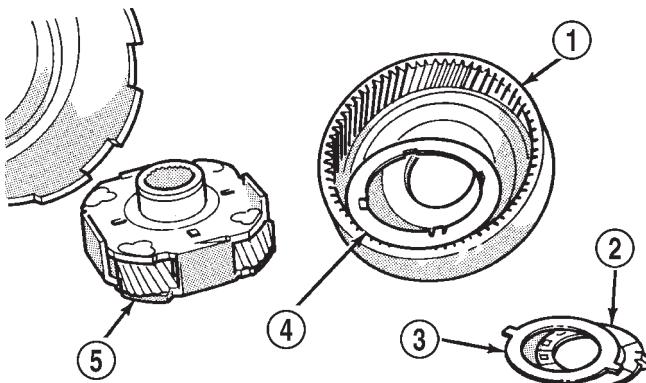
Fig. 199 Front Planetary Snap Ring Removal

- 1 – FRONT ANNULUS GEAR
- 2 – PLANETARY SNAP RING

ASSEMBLY

(1) Lubricate output shaft and planetary components with transmission fluid. Use petroleum jelly to lubricate and hold thrust washers and plates in position.

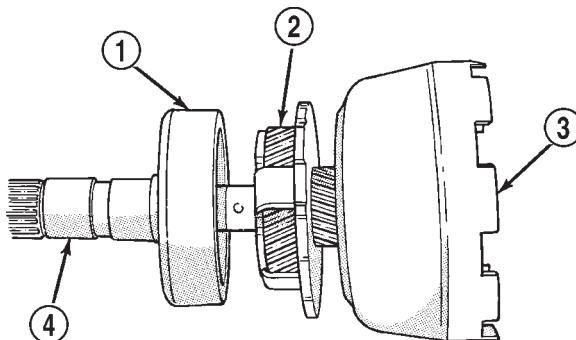
(2) Assemble rear annulus gear and support if disassembled. Be sure support snap ring is seated and that shoulder-side of support faces rearward (Fig. 202).



J9421-177

Fig. 200 Front Planetary And Annulus Gear Disassembly

- 1 – FRONT ANNULUS
- 2 – THRUST WASHER
- 3 – THRUST PLATE
- 4 – FRONT THRUST WASHER
- 5 – FRONT PLANETARY



J9421-178

Fig. 201 Removing Driving Shell, Rear Planetary And Rear Annulus

- 1 – REAR ANNULUS
- 2 – REAR PLANETARY
- 3 – DRIVING SHELL
- 4 – OUTPUT SHAFT

(3) Install rear thrust washer on rear planetary gear. Use enough petroleum jelly to hold washer in place. Also be sure all four washer tabs are properly engaged in gear slots.

(4) Install rear annulus over and onto rear planetary gear (Fig. 202).

(5) Install assembled rear planetary and annulus gear on output shaft (Fig. 203). Verify that assembly is fully seated on shaft.

(6) Install front thrust washer on rear planetary gear (Fig. 204). Use enough petroleum jelly to hold

DISASSEMBLY AND ASSEMBLY (Continued)

washer on gear. Be sure all four washer tabs are seated in slots.

(7) Install spacer on sun gear (Fig. 205).

(8) Install thrust plate on sun gear (Fig. 206). Note that driving shell thrust plates are interchangeable. Use either plate on sun gear and at front/rear of shell.

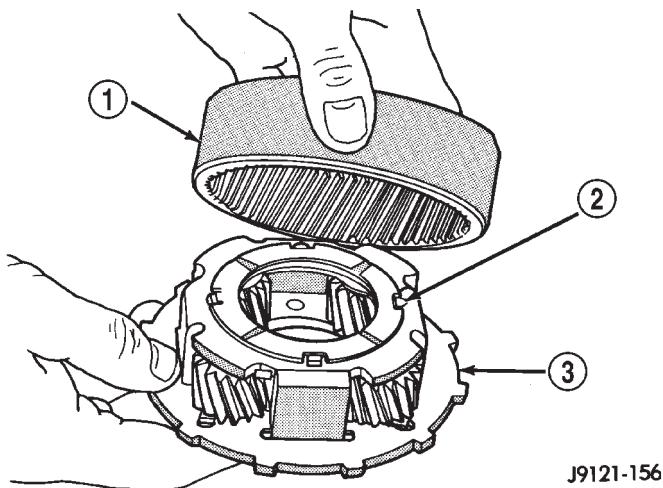


Fig. 202 Assembling Rear Annulus And Planetary Gear

- 1 – REAR ANNULUS GEAR
- 2 – TABBED THRUST WASHER
- 3 – REAR PLANETARY

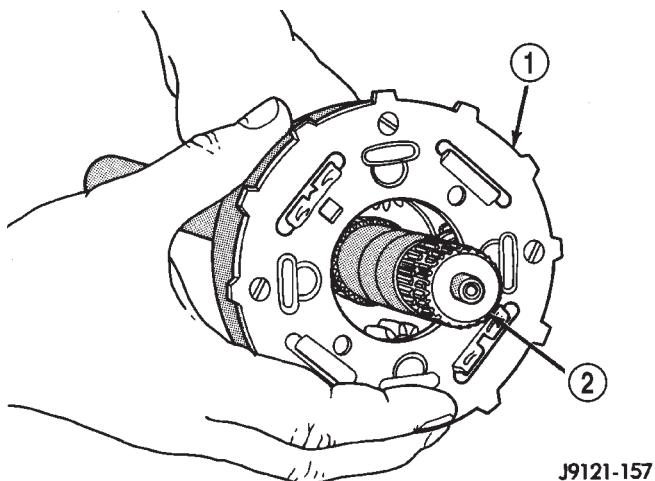
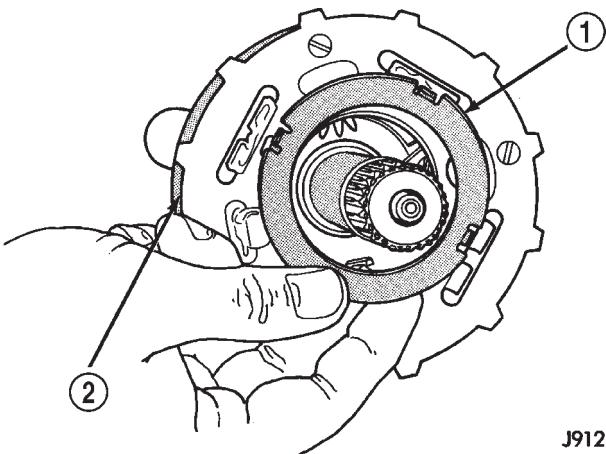


Fig. 203 Installing Rear Annulus And Planetary On Output Shaft

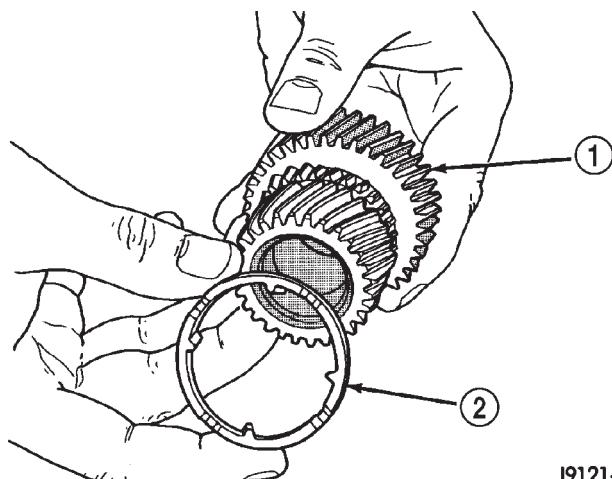
- 1 – REAR ANNULUS AND PLANETARY GEAR ASSEMBLY
- 2 – OUTPUT SHAFT



J9121-158

Fig. 204 Installing Rear Planetary Front Thrust Washer

- 1 – FRONT TABBED THRUST WASHER
- 2 – REAR PLANETARY GEAR



J9121-159

Fig. 205 Installing Spacer On Sun Gear

- 1 – SUN GEAR
- 2 – SUN GEAR SPACER

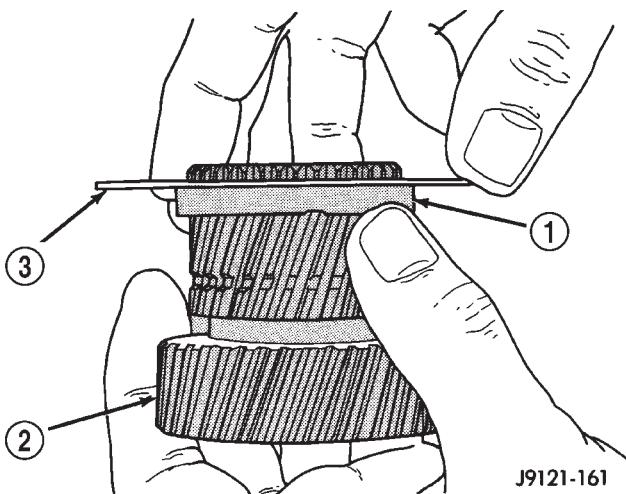


Fig. 206 Installing Driving Shell Front Thrust Plate On Sun Gear

- 1 – SPACER
- 2 – SUN GEAR
- 3 – THRUST PLATE

(13) Install rear thrust washer on front planetary gear (Fig. 211). Use enough petroleum jelly to hold washer in place and be sure all four washer tabs are seated.

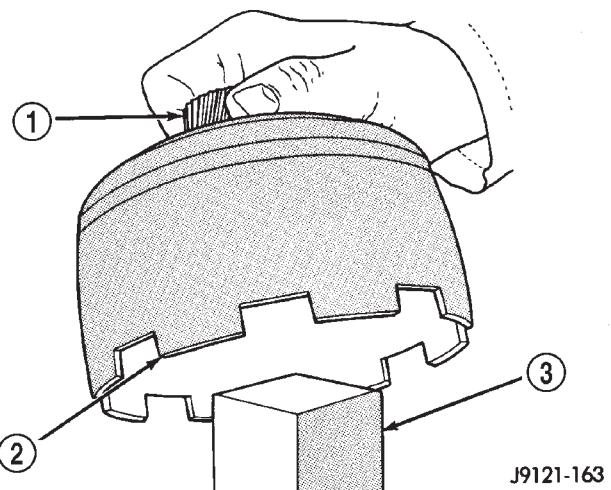


Fig. 208 Supporting Sun Gear On Wood Block

- 1 – SUN GEAR
- 2 – DRIVING SHELL
- 3 – WOOD BLOCK

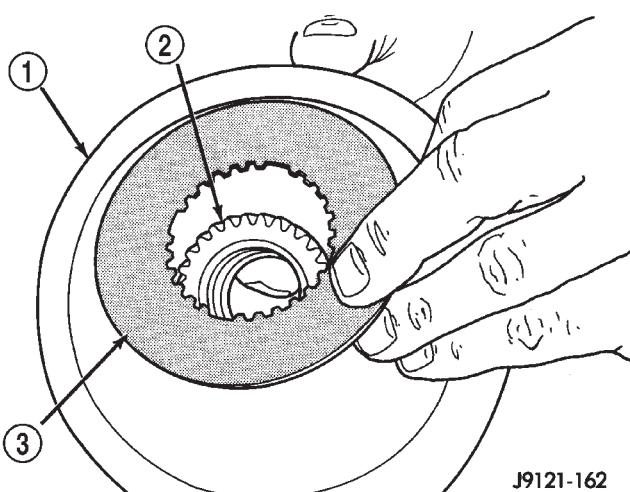


Fig. 207 Installing Driving Shell Rear Thrust Plate

- 1 – DRIVING SHELL
- 2 – SUN GEAR
- 3 – REAR THRUST PLATE

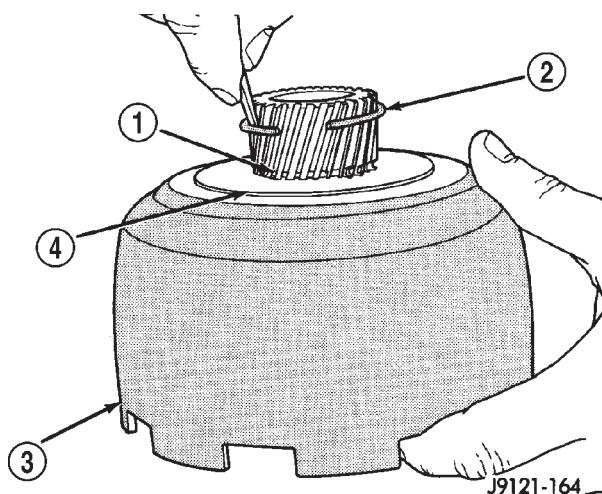
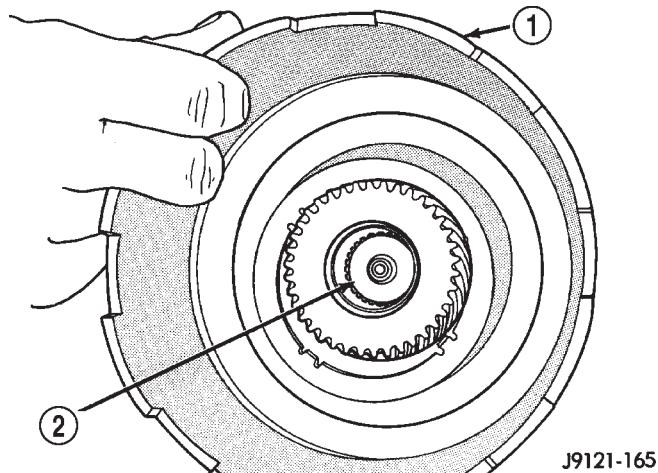


Fig. 209 Installing Sun Gear Lock Ring

- 1 – LOCK RING GROOVE
- 2 – SUN GEAR LOCK RING
- 3 – DRIVING SHELL
- 4 – REAR THRUST PLATE

DISASSEMBLY AND ASSEMBLY (Continued)

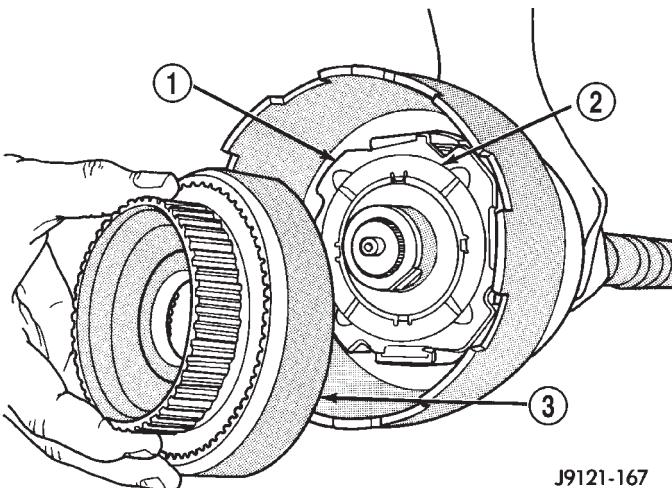


J9121-165

Fig. 210 Installing Assembled Sun Gear And Driving Shell On Output Shaft

1 – SUN GEAR/DRIVING SHELL ASSEMBLY

2 – OUTPUT SHAFT



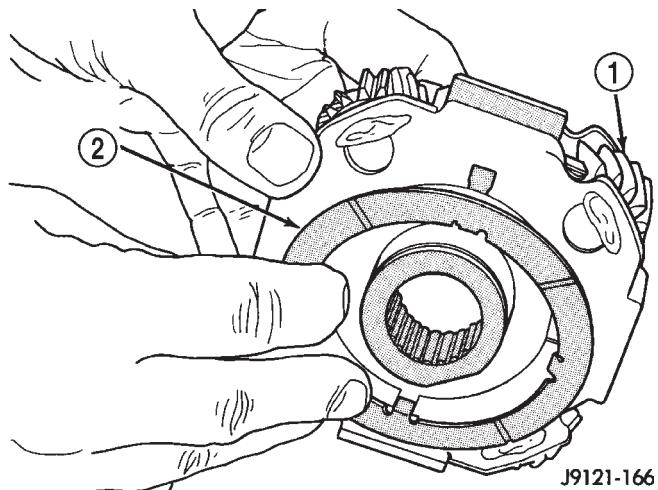
J9121-167

Fig. 212 Installing Front Planetary And Annulus Gears

1 – FRONT PLANETARY GEAR

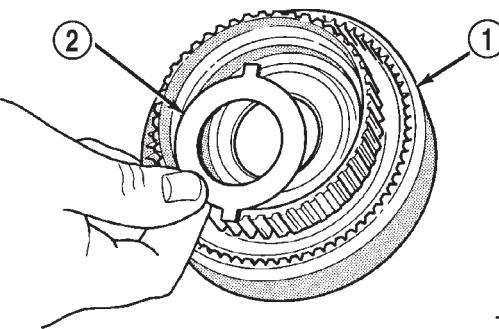
2 – FRONT THRUST WASHER

3 – FRONT ANNULUS GEAR

**Fig. 211 Installing Rear Thrust Washer On Front Planetary Gear**

1 – FRONT PLANETARY GEAR

2 – REAR TABBED THRUST WASHER



J9421-179

Fig. 213 Positioning Thrust Plate On Front Annulus Support

1 – FRONT ANNULUS

2 – THRUST PLATE

(14) Install front planetary gear on output shaft and in driving shell (Fig. 212).

(15) Install front thrust washer on front planetary gear. Use enough petroleum jelly to hold washer in place and be sure all four washer tabs are seated.

(16) Assemble front annulus gear and support, if necessary. Be sure support snap ring is seated.

(17) Install front annulus on front planetary (Fig. 212).

(18) Position thrust plate on front annulus gear support (Fig. 213). **Note that plate has two tabs on it. These tabs fit in notches of annulus hub.**

(19) Install thrust washer in front annulus (Fig. 214). **Align flat on washer with flat on planetary hub. Also be sure washer tab is facing up.**

(20) Install front annulus snap ring (Fig. 215). Use snap ring pliers to avoid distorting ring during installation. Also be sure ring is fully seated.

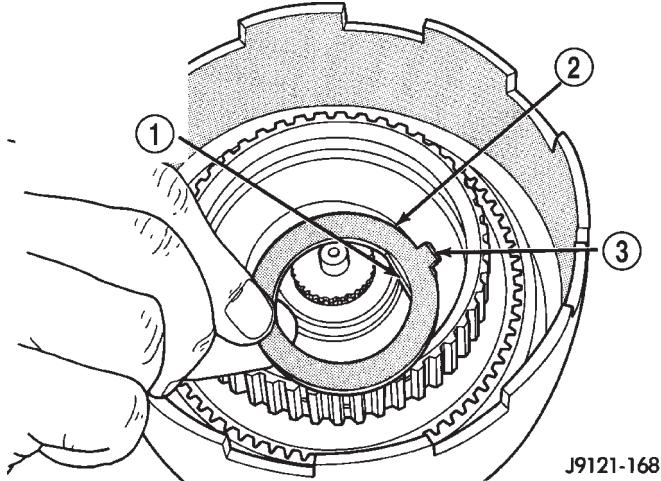
(21) Install planetary selective snap ring with snap ring pliers (Fig. 216). Be sure ring is fully seated.

(22) Turn planetary geartrain assembly over so driving shell is facing workbench. Then support geartrain on wood block positioned under forward end of output shaft. This allows geartrain components to move forward for accurate end play check.

(23) Check planetary geartrain end play with feeler gauge (Fig. 217). Gauge goes between shoulder on output shaft and end of rear annulus support.

DISASSEMBLY AND ASSEMBLY (Continued)

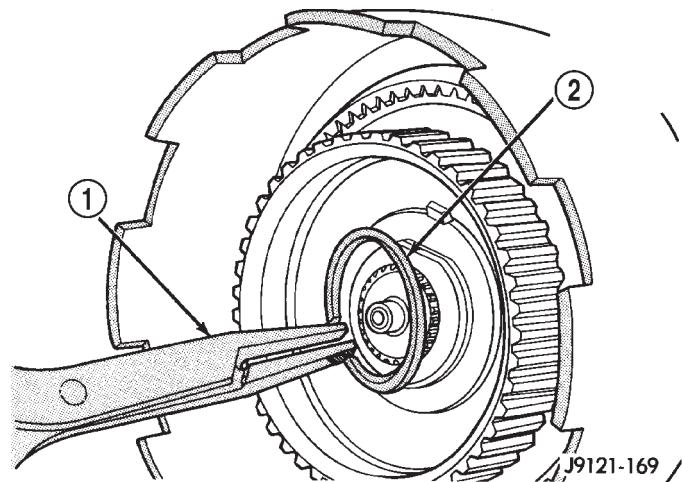
(24) Geartrain end play should be 0.12 to 1.22 mm (0.005 to 0.048 in.). If end play is incorrect, snap ring (or thrust washers) may have to be replaced. Snap ring is available in three different thicknesses for adjustment purposes.



J9121-168

Fig. 214 Installing Front Annulus Thrust Washer

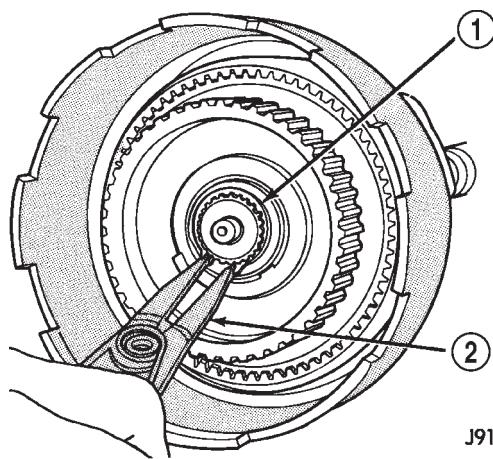
- 1 – WASHER FLAT ALIGNS WITH FLAT ON PLANETARY HUB
- 2 – FRONT ANNULUS THRUST WASHER
- 3 – TAB FACES FRONT



J9121-169

Fig. 215 Installing Front Annulus Snap Ring

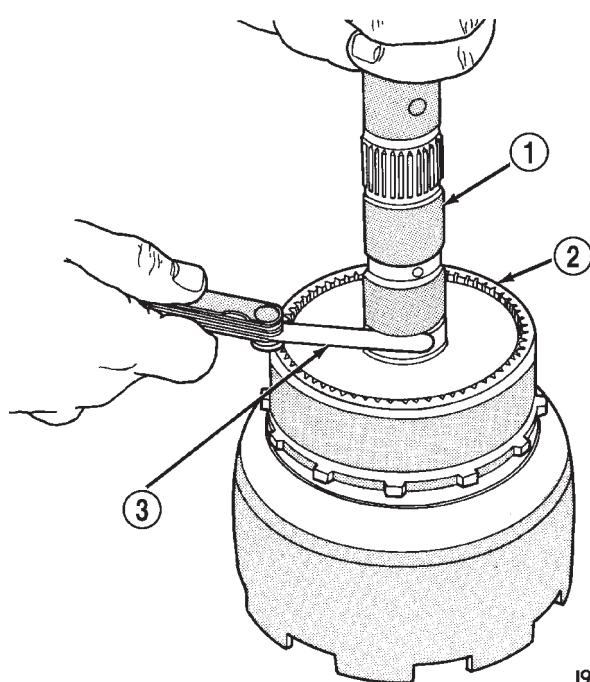
- 1 – SNAP RING PLIERS
- 2 – FRONT ANNULUS SNAP RING



J9121-170

Fig. 216 Installing Planetary Selective Snap Ring

- 1 – SELECTIVE SNAP RING
- 2 – SNAP RING PLIERS



J9121-171

Fig. 217 Checking Planetary Geartrain End Play

- 1 – OUTPUT SHAFT
- 2 – REAR ANNULUS GEAR
- 3 – FEELER GAUGE

CLEANING AND INSPECTION

GOVERNOR AND PARK GEAR

Thoroughly clean all the governor parts in a suitable cleaning solution but do not use any type of caustic cleaning agents.

The governor weight components (Fig. 218) and the governor valve (Fig. 219), must slide freely in their bores when clean and dry. Minor surface scratches and burrs can be smoothed with crocus cloth.

The aluminum governor valve and outer weight have a hard coating on them. Check condition of this coating carefully. Do not reuse either part if the coating is damaged.

Inspect the governor weight spring for distortion. Replace the spring, if distorted, collapsed, or broken. Clean the filter in solvent and dry it with compressed air. Replace the filter, if damaged. Inspect the park gear for chipped or worn gear teeth or damaged ring grooves. Replace the gear, if damaged.

Check the teeth on the park gear for wear or damage. Replace the gear if necessary. Inspect the metal seal rings on the park gear hub. Replace the rings only if severely worn, or broken.

EXTENSION HOUSING AND PARK LOCK

Clean the housing and park lock components in solvent and dry them with compressed air.

Examine the park lock components in the housing. If replacement is necessary, remove the shaft with parallel jaw snap ring pliers (Fig. 220) and remove the sprag and spring. Then remove the spring clip and reaction plug (Fig. 221). **Compress the reaction plug spring clip only enough to remove and install it. Do not distort the clip during removal or installation.**

Be sure a replacement sprag is installed so the sprag locking lug will face the park gear (Fig. 222). Also be sure the spring is correctly positioned as shown (Fig. 222). The sprag may not retract if the spring is improperly installed.

VALVE BODY

Serviceable valve body components are:

- park lock rod and E-clip
- switch valve and spring
- pressure adjusting screw bracket
- throttle valve lever
- manual lever
- manual lever shaft seal, washer, E-clip and detent ball
- fluid filter
- converter clutch solenoid

The remaining valve body components are serviced only as part of a complete valve body assembly.

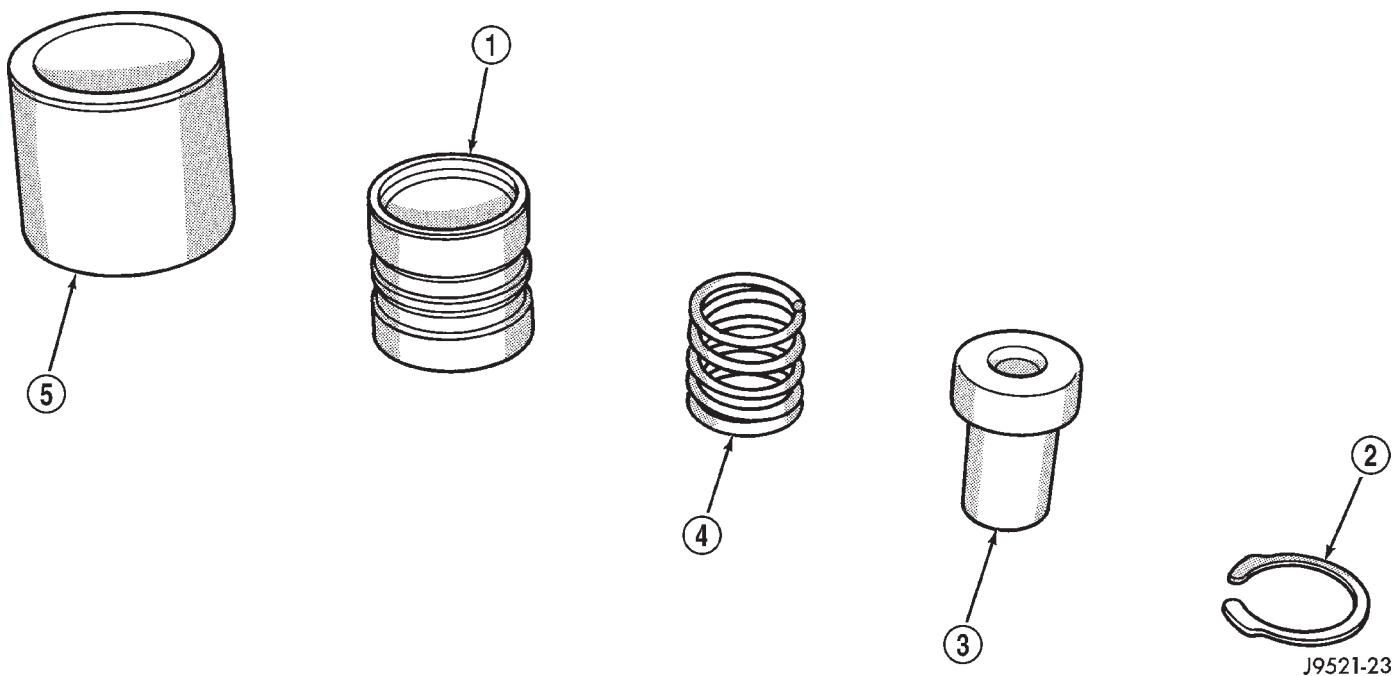


Fig. 218 Governor Weights

1 – INTERMEDIATE WEIGHT

2 – SNAP RING

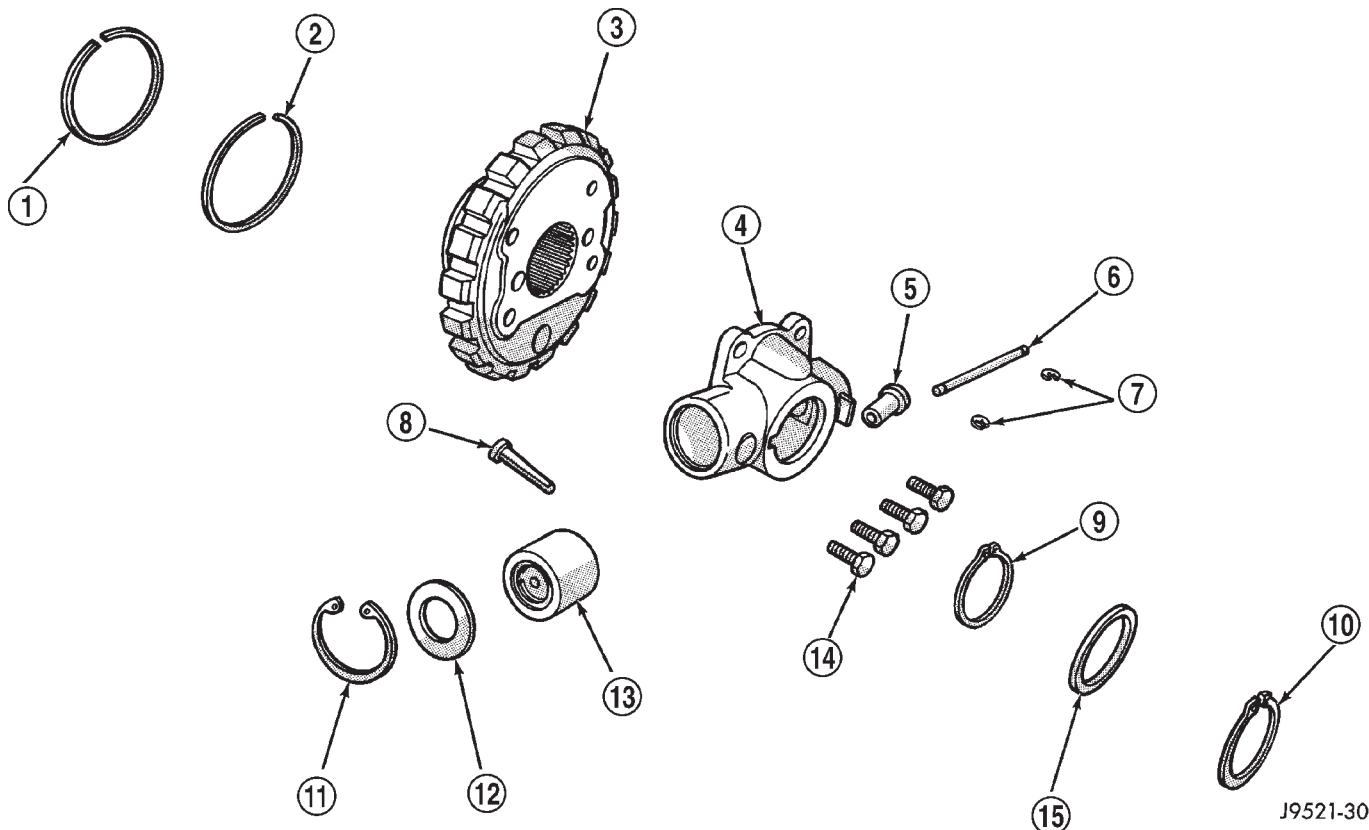
3 – INNER WEIGHT

4 – INNER WEIGHT SPRING

5 – OUTER WEIGHT

J9521-23

CLEANING AND INSPECTION (Continued)

**Fig. 219 Governor Components**

- 1 – SEAL RING (PLAIN END)
- 2 – SEAL RING (HOOK END)
- 3 – PARK GEAR
- 4 – GOVERNOR BODY
- 5 – GOVERNOR VALVE
- 6 – VALVE SHAFT
- 7 – E-CLIPS (2)
- 8 – FILTER

- 9 – SNAP RING (THIN)
- 10 – SNAP RING (THICK)
- 11 – SNAP RING
- 12 – RETAINER WASHER
- 13 – GOVERNOR WEIGHT ASSEMBLY
- 14 – GOVERNOR BODY BOLTS (4)
- 15 – WASHER

Clean the valve body components in a parts cleaning solution only. Do not use gasoline, kerosene, or any type of caustic solution. Dry the parts with compressed air. Make sure all passages are clean and free from obstructions.

NOTE: Do not use rags or shop towels to wipe off valve body components. Lint from these materials will adhere to the valve body components. Lint will interfere with valve operation and may clog filters and fluid passages.

Inspect the throttle and manual valve levers and shafts. Do not attempt to straighten a bent shaft or correct a loose lever. Replace these components if worn, bent, loose or damaged in any way.

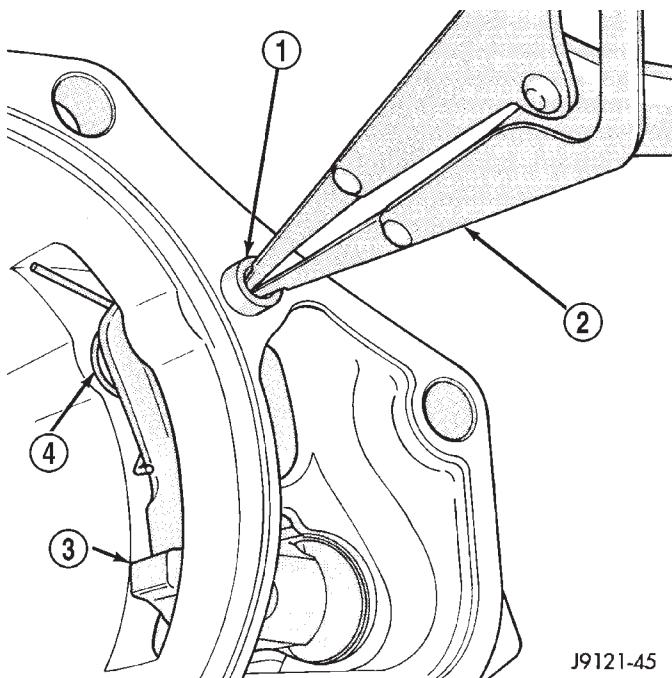
Inspect all of the valve body mating surfaces for scratches, nicks, burrs, or distortion. Use a straight-edge to check surface flatness. Minor scratches may

be removed with crocus cloth using only very light pressure.

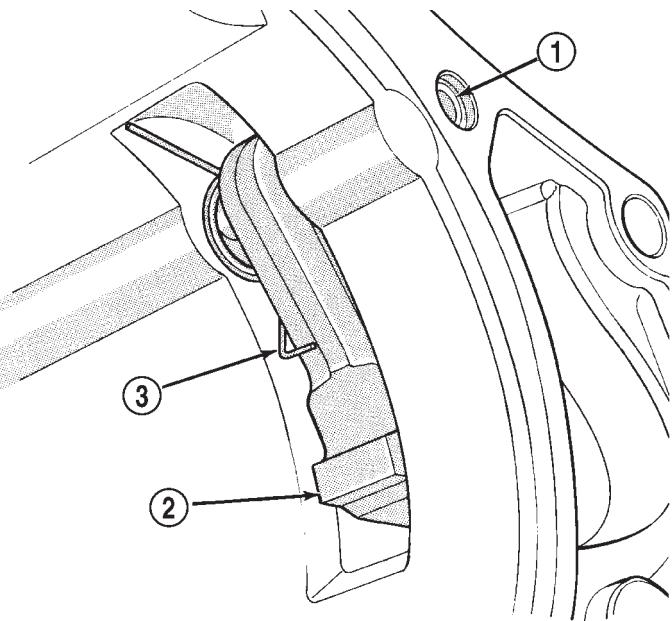
Minor distortion of a valve body mating surface may be corrected by smoothing the surface with crocus cloth. The cloth should be in sheet form and be positioned on a surface plate, sheet of plate glass, or equally flat surface. However, if distortion is severe or any surfaces are heavily scored, the valve body will have to be replaced.

CAUTION: Many of the valve body valves and plugs are made of coated aluminum. Aluminum components can be identified by the dark color of the special coating applied to the surface (or by testing with a magnet). DO NOT polish or sand aluminum valves or plugs with any type of material, or under any circumstances. This practice might damage the special coating and cause the valves and plugs to stick and bind.

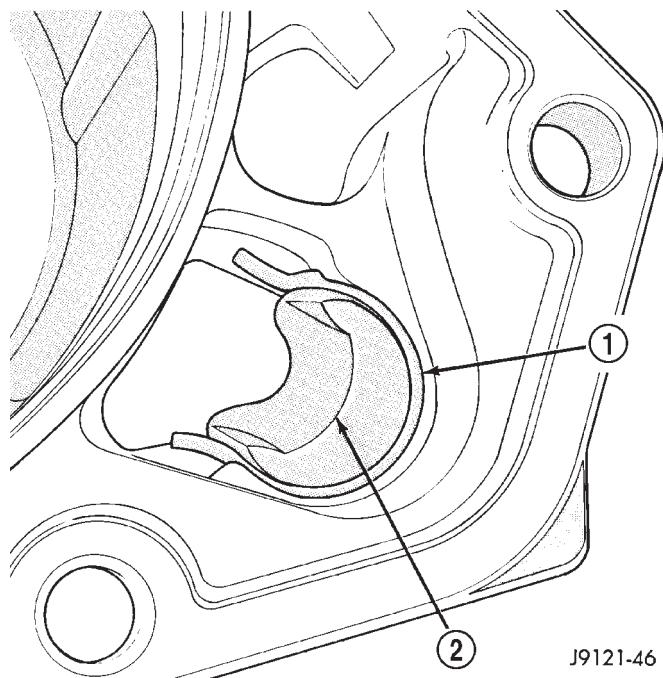
CLEANING AND INSPECTION (Continued)

**Fig. 220 Park Sprag, Shaft And Spring**

- 1 – SPRAG SHAFT
- 2 – PARALLEL JAW SNAP RING PLIERS
- 3 – SPRAG
- 4 – SPRING

**Fig. 222 Correct Position Of Sprag And Spring**

- 1 – SPRAG SHAFT
- 2 – SPRAG LOCKING LUG
- 3 – SPRING

**Fig. 221 Park Sprag Reaction Plug And Spring Location**

- 1 – SPRING CLIP
- 2 – REACTION PLUG

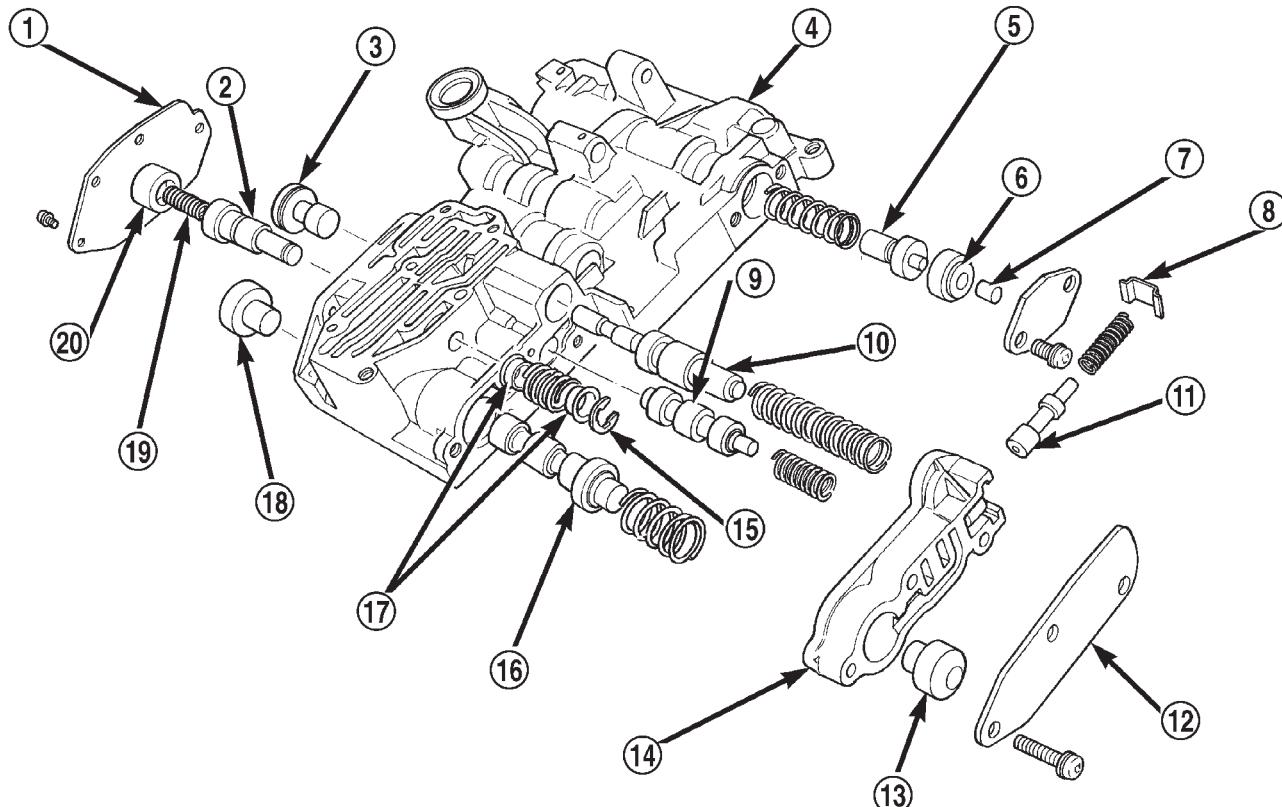
Inspect the valves and plugs for scratches, burrs, nicks, or scores. Also inspect the coating on the aluminum valves and plugs (Fig. 223). If the coating is damaged or worn through, the valve (or valve body) should be replaced.

Aluminum valves and plugs should not be sanded or polished under any circumstances. However, minor burrs or scratches on steel valves and plugs can be removed with crocus cloth but do not round off the valve or plug edges. Squareness of these edges is vitally important. These edges prevent foreign matter from lodging between the valves, plugs and bore.

Inspect all the valve and plug bores in the valve body. Use a penlight to view the bore interiors. Replace the valve body if any bores are distorted or scored. Inspect all of the valve body springs. The springs must be free of distortion, warpage or broken coils.

Trial fit each valve and plug in its bore to check freedom of operation. When clean and dry, the valves and plugs should drop freely into the bores. Valve body bores do not change dimensionally with use. If the valve body functioned correctly when new, it will continue to operate properly after cleaning and inspection. It should not be necessary to replace a valve body assembly unless it is damaged in handling.

CLEANING AND INSPECTION (Continued)



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Fig. 223 Valve Body Components

1 – GOVERNOR PLUG END PLATE

2 – SHUTTLE VALVE

3 – 1-2 GOVERNOR PLUG

4 – VALVE BODY

5 – REGULATOR VALVE THROTTLE PRESSURE PLUG

6 – SLEEVE

7 – LINE PRESSURE PLUG

8 – RETAINER

9 – 1-2 SHIFT VALVE

10 – 1-2 SHIFT CONTROL VALVE

11 – KICKDOWN LIMIT VALVE

12 – END PLATE

13 – THROTTLE PRESSURE PLUG

14 – KICKDOWN LIMIT VALVE BODY

15 – E-RING

16 – 2-3 SHIFT VALVE

17 – GUIDES

18 – 2-3 GOVERNOR PLUG

19 – PRIMARY SPRING

20 – SHUTTLE VALVE THROTTLE PLUG

TRANSMISSION

Clean the case in a solvent tank. Flush the case bores and fluid passages thoroughly with solvent. Dry the case and all fluid passages with compressed air. Be sure all solvent is removed from the case and that all fluid passages are clear.

NOTE: Do not use shop towels or rags to dry the case (or any other transmission component) unless they are made from lint-free materials. Lint will readily adhere to case surfaces and transmission components and will circulate throughout the transmission after assembly. A sufficient quantity of lint can block fluid passages and interfere with valve body operation.

Inspect the case for cracks, porous spots, worn servo bores, or damaged threads. However, the case will have to be replaced if it exhibits damage or wear.

Lubricate the front band adjusting screw and locknut with petroleum jelly and thread it part way into the case. Be sure the screw turns freely and does not bind. Install the locknut on the screw after checking screw thread operation.

Inspect all the transmission bushings during overhaul. Bushing condition is important as worn, scored bushings contribute to low pressures, clutch slip and accelerated wear of other components. Replace worn, or scored bushings, or if doubt exists about bushing condition.

Use recommended tools to replace bushings. The tools are sized and designed to remove, install and seat bushings correctly. The bushing replacement

CLEANING AND INSPECTION (Continued)

tools are included in Bushing Tool Sets C-3887-B, or C-3887-J.

Pre-sized service bushings are available for replacement purposes. Only the sun gear bushings are not serviced. Replace the gear as an assembly if the bushings are severely scored, or worn.

Heli-Coil inserts are recommended for repairing damaged, stripped or worn threads in aluminum parts. Stainless steel inserts are preferred.

The use of crocus cloth is permissible where necessary, providing it is used carefully. When used on valves, use extreme care to avoid rounding off sharp edges. Sharp edges are vital as they prevent foreign matter from getting between the valve and valve bore.

Do not reuse oil seals, gaskets, seal rings, or O-rings during overhaul. Replace these parts as a matter of course. Also do not reuse snap rings or E-clips that are bent or distorted. Replace these parts as well.

Lubricate transmission parts with Mopar® ATF Plus 3, Type 7176 transmission fluid during assembly. Use Mopar® Door Ease, or Ru-Glyde to lubricate piston seals and O-rings. Use petroleum jelly on thrust washers and to hold parts in place during reassembly.

OVERRUNNING CLUTCH/LOW-REVERSE DRUM/OVERDRIVE PISTON RETAINER

Clean the overrunning clutch assembly, clutch cam, low-reverse drum, and overdrive piston retainer in solvent. Dry them with compressed air after cleaning.

Inspect condition of each clutch part after cleaning. Replace the overrunning clutch roller and spring assembly if any rollers or springs are worn or damaged, or if the roller cage is distorted, or damaged. Replace the cam if worn, cracked or damaged.

Replace the low-reverse drum if the clutch race, roller surface or inside diameter is scored, worn or damaged. **Do not remove the clutch race from the low-reverse drum under any circumstances. Replace the drum and race as an assembly if either component is damaged.**

Examine the overdrive piston retainer carefully for wear, cracks, scoring or other damage. Be sure the retainer hub is a snug fit in the case and drum. Replace the retainer if worn or damaged.

FRONT SERVO

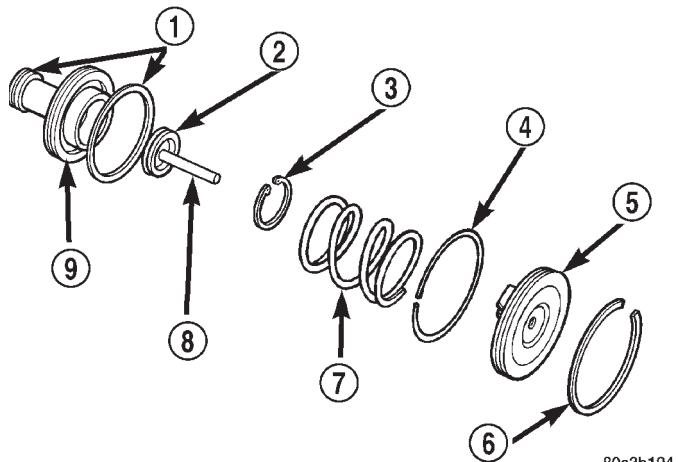
Clean the servo piston components with solvent and dry them with compressed air. Wipe the band clean with lint free shop towels.

Replace the front band if distorted, lining is burned, flaking off, or worn to the point where the grooves in the lining material are no longer visible.

Inspect the servo components (Fig. 224). Replace the springs if collapsed, distorted or broken. Replace the guide, rod and piston if cracked, bent, or worn. Discard the servo snap ring if distorted or warped.

Check the servo piston bore for wear. If the bore is severely scored, or damaged, it will be necessary to replace the case.

Replace any servo component if doubt exists about condition. Do not reuse suspect parts.



80a3b194

Fig. 224

- 1 – PISTON RINGS
- 2 – O-RING
- 3 – SNAP-RING
- 4 – SEAL RING
- 5 – PISTON ROD GUIDE
- 6 – SNAP-RING
- 7 – SERVO SPRING
- 8 – PISTON ROD
- 9 – SERVO PISTON

REAR SERVO

Remove and discard the servo piston seal ring (Fig. 225). Then clean the servo components with solvent and dry with compressed air. Replace either spring if collapsed, distorted or broken. Replace the plug and piston if cracked, bent, or worn. Discard the servo snap rings and use a new ones at assembly.

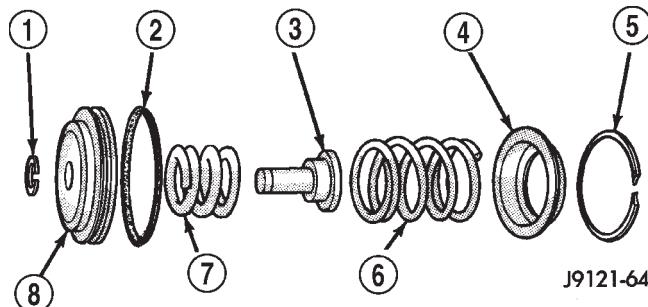
OIL PUMP AND REACTION SHAFT SUPPORT

(1) Clean pump and support components with solvent and dry them with compressed air.

(2) Check condition of the seal rings and thrust washer on the reaction shaft support. The seal rings do not need to be replaced unless cracked, broken, or severely worn.

(3) Inspect the pump and support components. Replace the pump or support if the seal ring grooves or machined surfaces are worn, scored, pitted, or damaged. Replace the pump gears if pitted, worn chipped, or damaged.

CLEANING AND INSPECTION (Continued)



J9121-64

Fig. 225 Rear Servo Components

- 1 – SNAP RING
- 2 – PISTON SEAL
- 3 – PISTON PLUG
- 4 – SPRING RETAINER
- 5 – SNAP RING
- 6 – PISTON SPRING
- 7 – CUSHION SPRING
- 8 – PISTON

(4) Inspect the pump bushing. Then check the reaction shaft support bushing. Replace either bushing only if heavily worn, scored or damaged. It is not necessary to replace the bushings unless they are actually damaged.

(5) Install the gears in the pump body and measure pump component clearances as follows:

(a) Clearance between outer gear and reaction shaft housing should be 0.010 to 0.063 mm (0.0004 to 0.0025 in.). Clearance between inner gear and reaction shaft housing should be 0.010 to 0.063 mm (0.0004 to 0.0025 in.). Both clearances can be measured at the same time by:

(I) Installing the pump gears in the pump housing.

(II) Position an appropriate piece of Plastigage™ across both gears.

(III) Align the plastigage to a flat area on the reaction shaft housing.

(IV) Install the reaction shaft to the pump housing.

(V) Separate the reaction shaft housing from the pump housing and measure the Plastigage™ following the instructions supplied with it.

(b) Clearance between inner gear tooth and outer gear should be 0.08 to 0.19 mm (0.0035 to 0.0075 in.). Measure clearance with an appropriate feeler gauge.

(c) Clearance between outer gear and pump housing should also be 0.010 to 0.19 mm (0.0035 to 0.0075 in.). Measure clearance with an appropriate feeler gauge.

FRONT CLUTCH

Clean and inspect the front clutch components. Replace the clutch discs if warped, worn, scored,

burned or charred, or if the facing is flaking off. Replace the steel plates if heavily scored, warped, or broken. Be sure the driving lugs on the plates are in good condition. The lugs must not be bent, cracked or damaged in any way.

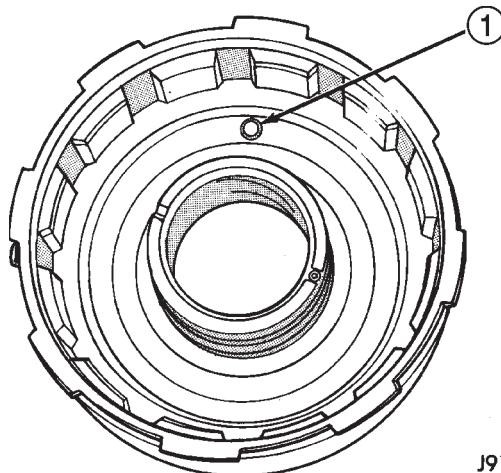
Replace the clutch spring and spring retainer if either is distorted, warped or broken.

Check the lug grooves in the clutch retainer. The steel plates should slide freely in the slots. Replace the retainer if the grooves are worn or damaged.

Check action of the check ball in the retainer (Fig. 226). The ball must move freely and not stick.

NOTE: Inspect the clutch retainer bushings carefully (Fig. 227). The retainer bushings are NOT serviceable. It will be necessary to replace the retainer if either bushing is scored, or worn.

Inspect the piston and retainer seal surfaces for nicks or scratches. Minor scratches can be removed with crocus cloth. However, replace the piston and/or retainer if the seal surfaces are seriously scored.



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Fig. 226 Front Clutch Piston Retainer Check Ball Location

- 1 – RETAINER CHECK BALL

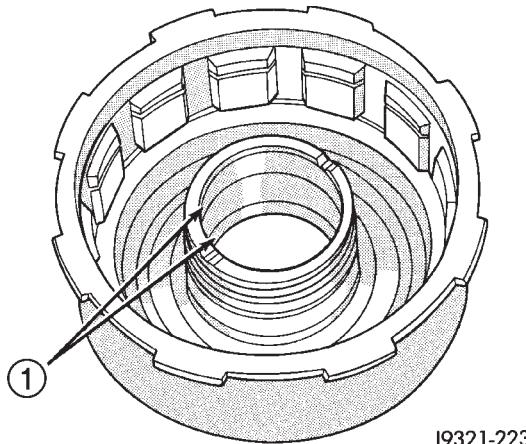
REAR CLUTCH

Clean the clutch components with solvent and dry them with compressed air.

Check condition of the input shaft seal rings. It is not necessary to remove or replace rings unless they are broken, cracked, or no longer securely hooked together.

Inspect the input shaft splines and machined surfaces. Very minor nicks or scratches can be smoothed off with crocus cloth. Replace the shaft if the splines are damaged, or any of the machined surfaces are severely scored.

CLEANING AND INSPECTION (Continued)

**Fig. 227 Retainer Bushing Location/Inspection**

1 – FRONT CLUTCH RETAINER BUSHINGS (NON-SERVICEABLE)

Replace the clutch discs if warped, worn, scored, burned/charred, the lugs are damaged, or if the facing is flaking off.

Replace the steel plates and the pressure plate if heavily scored, warped, or broken. Be sure the driving lugs on the discs and plates are also in good condition. The lugs must not be bent, cracked or damaged in any way.

Replace the piston spring and wave spring if either part is distorted, warped or broken.

Check the lug grooves in the clutch retainer. The steel plates should slide freely in the slots. Replace the retainer if the grooves are worn or damaged. Also check action of the retainer check ball. The ball must move freely and not stick.

Inspect the piston and retainer seal surfaces for nicks or scratches. Minor scratches can be removed with crocus cloth. However, replace the piston and/or retainer if the seal surfaces are seriously damaged.

Check thrust washer condition. Washer thickness should be 1.55 to 1.60 mm (0.061 to 0.063 in.). Replace the washer if worn or damaged.

Check condition of the two seal rings on the input shaft and the single seal ring on the piston retainer hub. Replace the seal rings only if severely worn, cracked, or cannot be hooked together.

PLANETARY GEARTRAIN/OUTPUT SHAFT

Clean the intermediate shaft and planetary components in solvent and dry them with compressed air. Do not spin the planetary pinion gears with compressed air.

Inspect the planetary gear sets and annulus gears. The planetary pinions, shafts, washers, and retaining pins are serviceable. However, if a pinion carrier is damaged, the entire planetary gear set must be replaced as an assembly.

Replace the annulus gears if the teeth are chipped, broken, or worn, or the gear is cracked. Replace the planetary thrust plates and the tabbed thrust washers if cracked, scored or worn.

Inspect the machined surfaces of the output shaft. Be sure the oil passages are open and clear. Replace the shaft if scored, pitted, or damaged.

Inspect the sun gear and driving shell. If either component is worn or damaged, remove the sun gear rear retaining ring and separate the sun gear and thrust plate from the driving shell. Then replace the necessary component.

Replace the sun gear as an assembly if the gear teeth are chipped or worn. Also replace the gear as an assembly if the bushings are scored or worn. The sun gear bushings are not serviceable. Replace the thrust plate if worn, or severely scored. Replace the driving shell if distorted, cracked, or damaged in any way.

Replace all snap rings during geartrain assembly. Reusing snap rings is not recommended.

ADJUSTMENTS**GEARSHIFT CABLE**

Check adjustment by starting the engine in Park and Neutral. Adjustment is OK if the engine starts only in these positions. Adjustment is incorrect if the engine starts in one but not both positions. If the engine starts in any position other than Park or Neutral, or if the engine will not start at all, the park/neutral position switch may be faulty.

Gearshift Adjustment Procedure

- (1) Shift transmission into Park.
- (2) Raise vehicle.
- (3) Release cable adjuster clamp (at transmission end of cable) to unlock cable.
- (4) Unsnap cable from cable mounting bracket on transmission (Fig. 228).
- (5) Slide cable eyelet off transmission shift lever.
- (6) Verify transmission shift lever is in Park detent by moving lever fully rearward. Last rearward detent is Park position.
- (7) Verify positive engagement of transmission park lock by attempting to rotate propeller shaft. Shaft will not rotate when park lock is engaged.
- (8) Slide cable eyelet onto transmission shift lever.
- (9) Snap shift cable adjuster into mounting bracket on transmission.
- (10) Lock shift cable by pressing cable adjuster clamp down until it snaps into place.
- (11) Lower vehicle and check engine starting. Engine should start only in Park and Neutral.

ADJUSTMENTS (Continued)

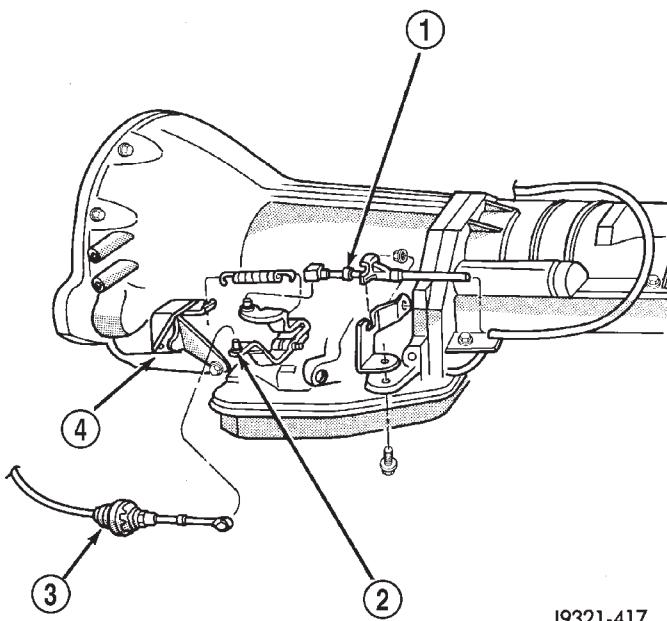


Fig. 228 Shift Cable Attachment At Transmission-Typical

- 1 – THROTTLE VALVE CABLE
- 2 – TRANSMISSION SHIFT LEVER
- 3 – SHIFT CABLE
- 4 – SHIFT CABLE BRACKET

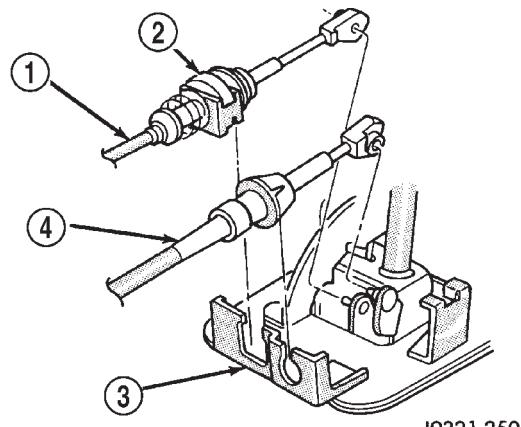


Fig. 229 Park Lock Cable Attachment

- 1 – PARK LOCK CABLE
- 2 – CABLE LOCK BUTTON
- 3 – SHIFT LEVER ASSEMBLY
- 4 – SHIFT CABLE

(f) Return transmission to the PARK position without applying the brake.

(g) Move shift lever back to PARK and check ignition switch operation. You should be able to turn switch to LOCK position and shift lever release button/lever should not move.

TRANSMISSION THROTTLE VALVE CABLE ADJUSTMENT

The transmission throttle valve is operated by a cam on the throttle lever. The throttle lever is operated by an adjustable cable (Fig. 230). The cable is attached to an arm mounted on the throttle lever shaft. A retaining clip at the engine-end of the cable is removed to provide for cable adjustment. The retaining clip is then installed back onto the throttle valve cable to lock in the adjustment.

A correctly adjusted throttle valve cable will cause the throttle lever on the transmission to move simultaneously with the throttle body lever from the idle position. Proper adjustment will allow simultaneous movement without causing the transmission throttle lever to either move ahead of, or lag behind the lever on the throttle body.

Checking Throttle Valve Cable Adjustment

- (1) Shift transmission into PARK.
- (2) Remove shift lever bezel and console screws. Raise bezel and console for access to cable.
- (3) Pull cable lock button up to release cable (Fig. 229).
- (4) Turn ignition switch to LOCK position.
- (5) Use a spacer to create a one millimeter gap between the shifter pawl and top of the shift gate.
- (6) Pull cable forward. Then release cable and press cable lock button down until it snaps in place.
- (7) Check adjustment as follows:
 - (a) Check movement of release shift handle button (floor shift) or release lever (column shift). You should not be able to press button inward or move column lever.
 - (b) Turn ignition switch to RUN position.
 - (c) Shifting out of park should not be possible.
 - (d) Apply the brake and attempt to shift out of PARK. Shifting should be possible.
 - (e) While the transmission is shifted out of PARK, release the brake and attempt to shift through all gears. Release the shift button at least once during this procedure. The ignition key should not go to the LOCK position.

(1) Turn ignition key to OFF position.

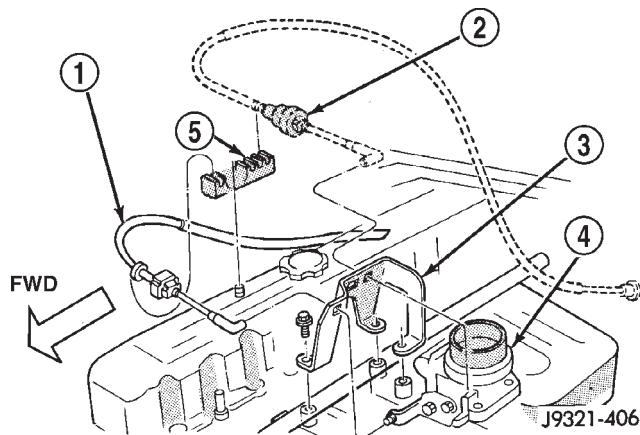
(2) Remove air cleaner.

(3) Verify that lever on throttle body is at curb idle position. Then verify that transmission throttle lever (Fig. 231) is also at idle (fully forward) position.

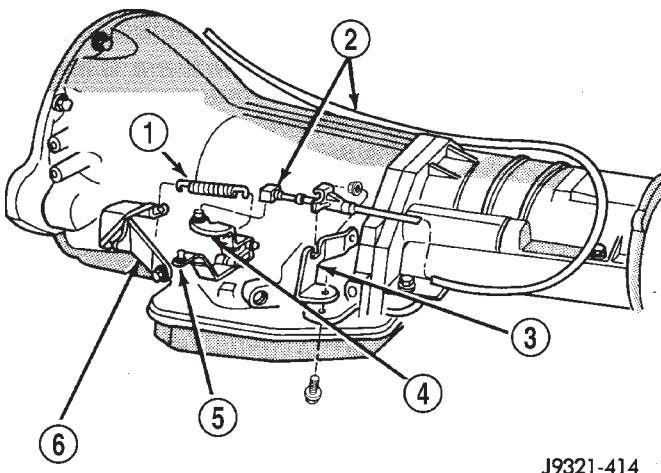
(4) Slide cable off attachment stud on throttle body lever.

(5) Compare position of cable end to attachment stud on throttle body lever:

ADJUSTMENTS (Continued)

**Fig. 230 Throttle Cable Attachment At Engine**

- 1 - TRANSMISSION THROTTLE VALVE CABLE
 2 - ACCELERATOR CABLE
 3 - CABLE ENGINE BRACKET
 4 - THROTTLE BODY
 5 - CABLE GUIDE

**Fig. 231 Throttle Cable Attachment At Transmission**

- 1 - RETURN SPRING
 2 - THROTTLE VALVE CABLE
 3 - THROTTLE VALVE CABLE BRACKET
 4 - THROTTLE VALVE LEVER
 5 - GEAR SELECTOR LEVER
 6 - SHIFT CABLE BRACKET

- Cable end and attachment stud should be aligned (or centered on one another) to within 1 mm (0.039 in.) in either direction.

- If cable end and attachment stud are misaligned (off center), cable will have to be adjusted as described in Throttle Valve Cable Adjustment procedure.

(6) Reconnect cable end to attachment stud. Then with aid of a helper, observe movement of transmission throttle lever and lever on throttle body.

- If both levers move simultaneously from idle to half-throttle and back to idle position, adjustment is correct.

- If transmission throttle lever moves ahead of, or lags behind throttle body lever, cable adjustment will be necessary. Or, if throttle body lever prevents transmission lever from returning to closed position, cable adjustment will be necessary.

Throttle Valve Cable Adjustment Procedure

- Turn ignition switch to OFF position.
- Remove air cleaner if necessary.
- Disconnect cable end from attachment stud. **Carefully slide cable off stud. Do not pry or pull cable off.**
- Verify that transmission throttle lever is in fully closed position. Then be sure lever on throttle body is at curb idle position.
- Insert a small screwdriver under edge of retaining clip and remove retaining clip.
- Center cable end on attachment stud to within 1 mm (0.039 in.).

NOTE: Be sure that as the cable is pulled forward and centered on the throttle lever stud, the cable housing moves smoothly with the cable. Due to the angle at which the cable housing enters the spring housing, the cable housing may bind slightly and create an incorrect adjustment.

- Install retaining clip onto cable housing.

- Check cable adjustment. Verify transmission throttle lever and lever on throttle body move simultaneously.

FRONT BAND ADJUSTMENT

The front (kickdown) band adjusting screw is located on the left side of the transmission case above the manual valve and throttle valve levers.

- Raise vehicle.
- Loosen band adjusting screw locknut (Fig. 232). Then back locknut off 3-5 turns. Be sure adjusting screw turns freely in case. Apply lubricant to screw threads if necessary.

- Tighten band adjusting screw to 8 N·m (72 in. lbs.) torque with Inch Pound Torque Wrench C-3380-A, a 3-in. extension and appropriate Torx socket.

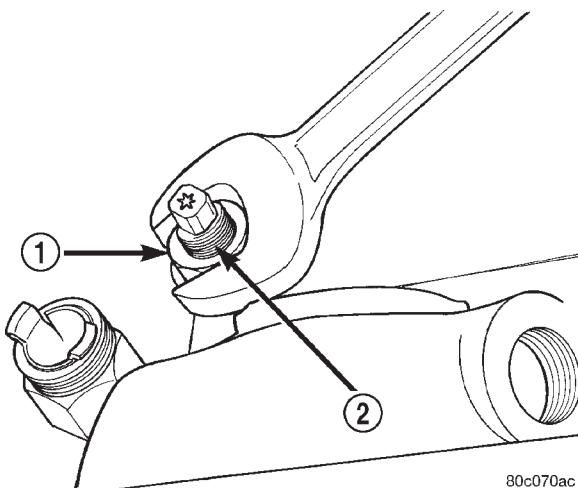
CAUTION: If Adapter C-3705 is needed to reach the adjusting screw, tighten the screw to only 5 N·m (47-50 in. lbs.) torque.

- Back off front band adjusting screw 2-1/2 turns.

- Hold adjuster screw in position and tighten locknut to 41 N·m (30 ft. lbs.) torque.

- Lower vehicle.

ADJUSTMENTS (Continued)

**Fig. 232 Front Band Adjustment Screw Location**

- 1 – LOCK-NUT
2 – FRONT BAND ADJUSTER

REAR BAND ADJUSTMENT

The transmission oil pan must be removed for access to the rear band adjusting screw.

- (1) Raise vehicle.
- (2) Remove transmission oil pan and drain fluid.
- (3) Loosen band adjusting screw locknut 5-6 turns. Be sure adjusting screw turns freely in lever.
- (4) Tighten adjusting screw to 5 N·m (41 in. lbs.) (Fig. 233).
- (5) Back off adjusting screw 7 turns.
- (6) Hold adjusting screw in place and tighten locknut to 34 N·m (25 ft. lbs.) torque.
- (7) Position new gasket on oil pan and install pan on transmission. Tighten pan bolts to 17 N·m (13 ft. lbs.) torque.
- (8) Lower vehicle and refill transmission with Mopar® ATF Plus 3, Type 7176, fluid.

VALVE BODY**CONTROL PRESSURE ADJUSTMENTS**

There are two control pressure adjustments on the valve body;

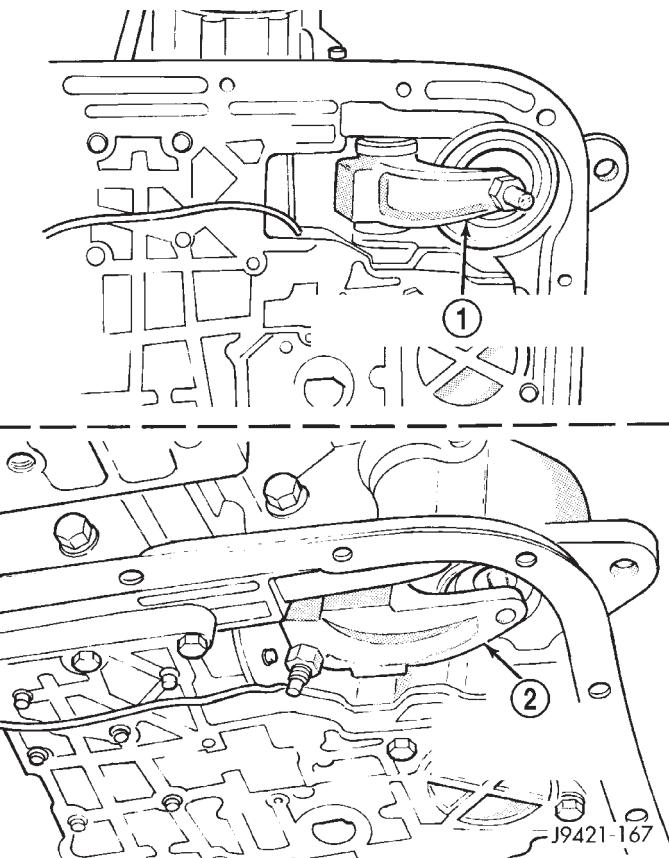
- Line Pressure
- Throttle Pressure

Line and throttle pressures are interdependent because each affects shift quality and timing. As a result, both adjustments must be performed properly and in the correct sequence. Adjust line pressure first and throttle pressure last.

LINE PRESSURE ADJUSTMENT

Measure distance from the valve body to the inner edge of the adjusting screw with an accurate steel scale (Fig. 234).

Distance should be 33.4 mm (1-5/16 in.).

**Fig. 233 Rear Band Adjustment Screw Location**

- 1 – 30RH REAR BAND LEVER AND ADJUSTING SCREW
2 – 32RH REAR BAND LEVER AND ADJUSTING SCREW

If adjustment is required, turn the adjusting screw in, or out, to obtain required distance setting.

NOTE: The 33.4 mm (1-5/16 in.) setting is an approximate setting. Manufacturing tolerances may make it necessary to vary from this dimension to obtain desired pressure.

One complete turn of the adjusting screw changes line pressure approximately 1-2/3 psi (9 kPa).

Turning the adjusting screw counterclockwise increases pressure while turning the screw clockwise decreases pressure.

THROTTLE PRESSURE ADJUSTMENT

Insert Gauge Tool C-3763 between the throttle lever cam and the kickdown valve stem (Fig. 235).

Push the gauge tool inward to compress the kickdown valve against the spring and bottom the throttle valve.

Maintain pressure against kickdown valve spring. Turn throttle lever stop screw until the screw head touches throttle lever tang and the throttle lever cam touches gauge tool.

ADJUSTMENTS (Continued)

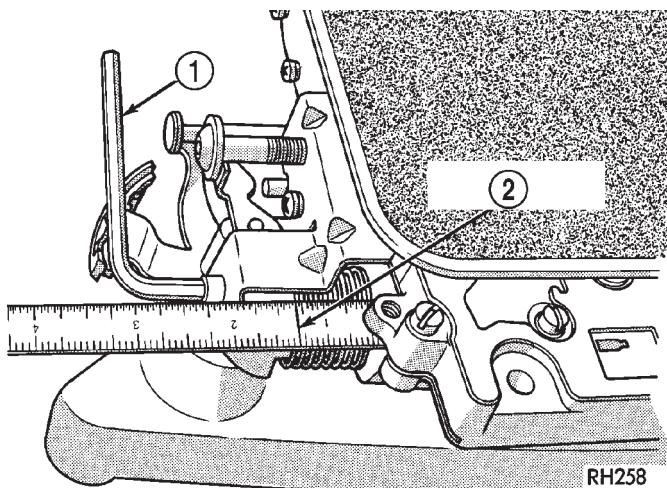
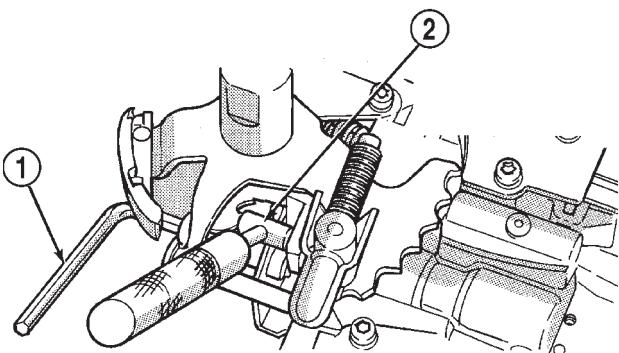


Fig. 234 Line Pressure Adjustment

- 1 – WRENCH
2 – 1-5/16 INCH



J9521-109

Fig. 235 Throttle Pressure Adjustment

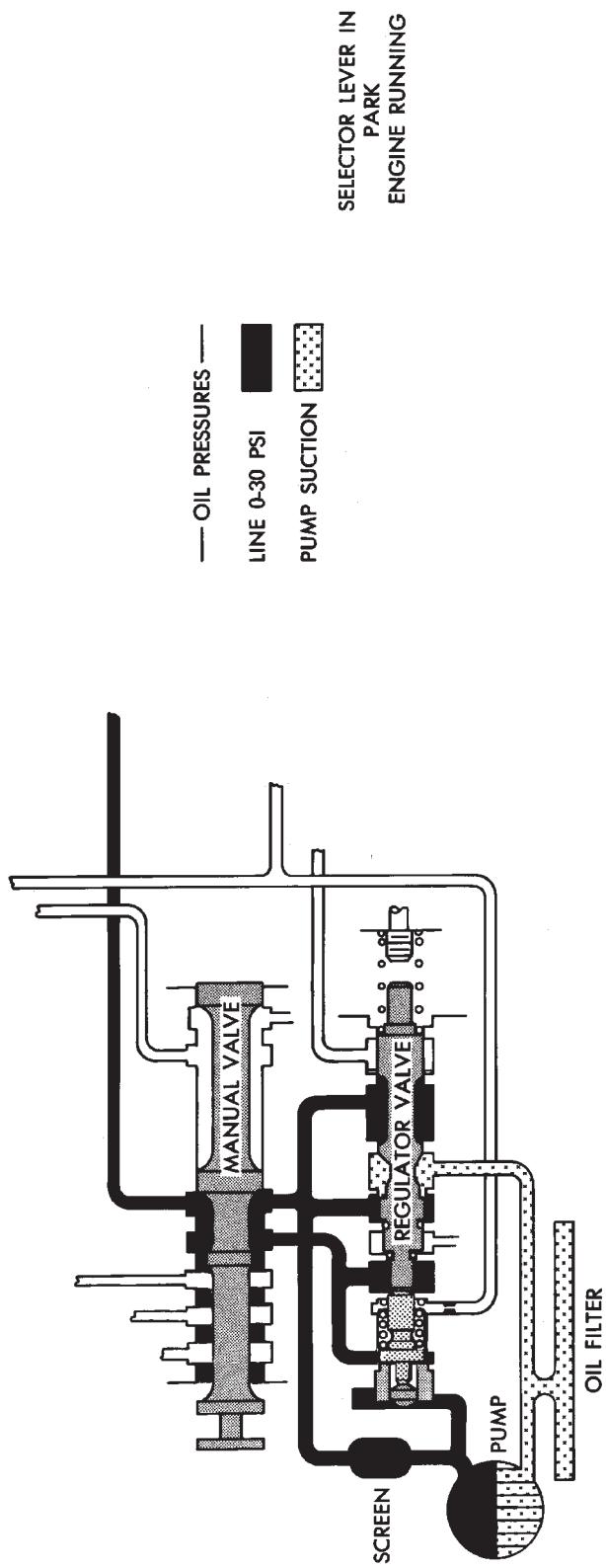
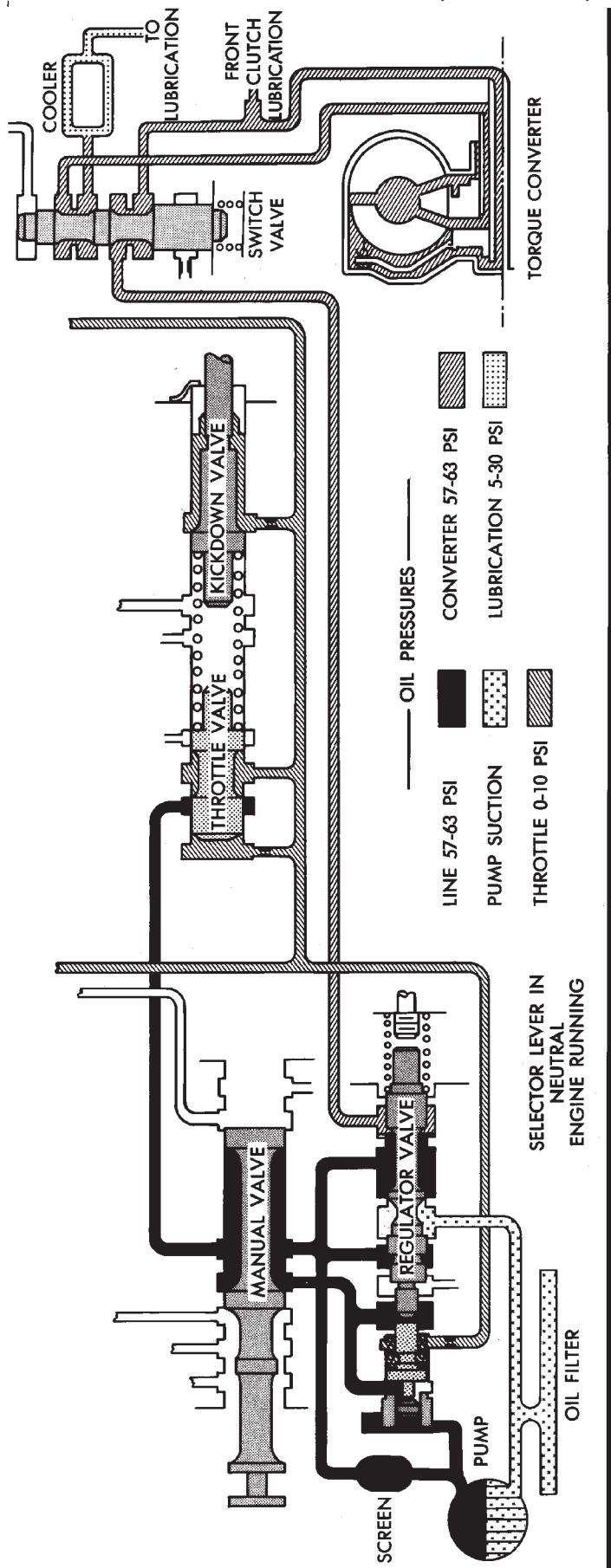
- 1 – HEX WRENCH (IN THROTTLE LEVER ADJUSTING SCREW)
2 – SPECIAL TOOL C-3763 (POSITIONED BETWEEN THROTTLE LEVER AND KICKDOWN VALVE)

NOTE: The kickdown valve spring must be fully compressed and the kickdown valve completely bottomed to obtain correct adjustment.

SCHEMATICS AND DIAGRAMS

HYDRAULIC SCHEMATICS

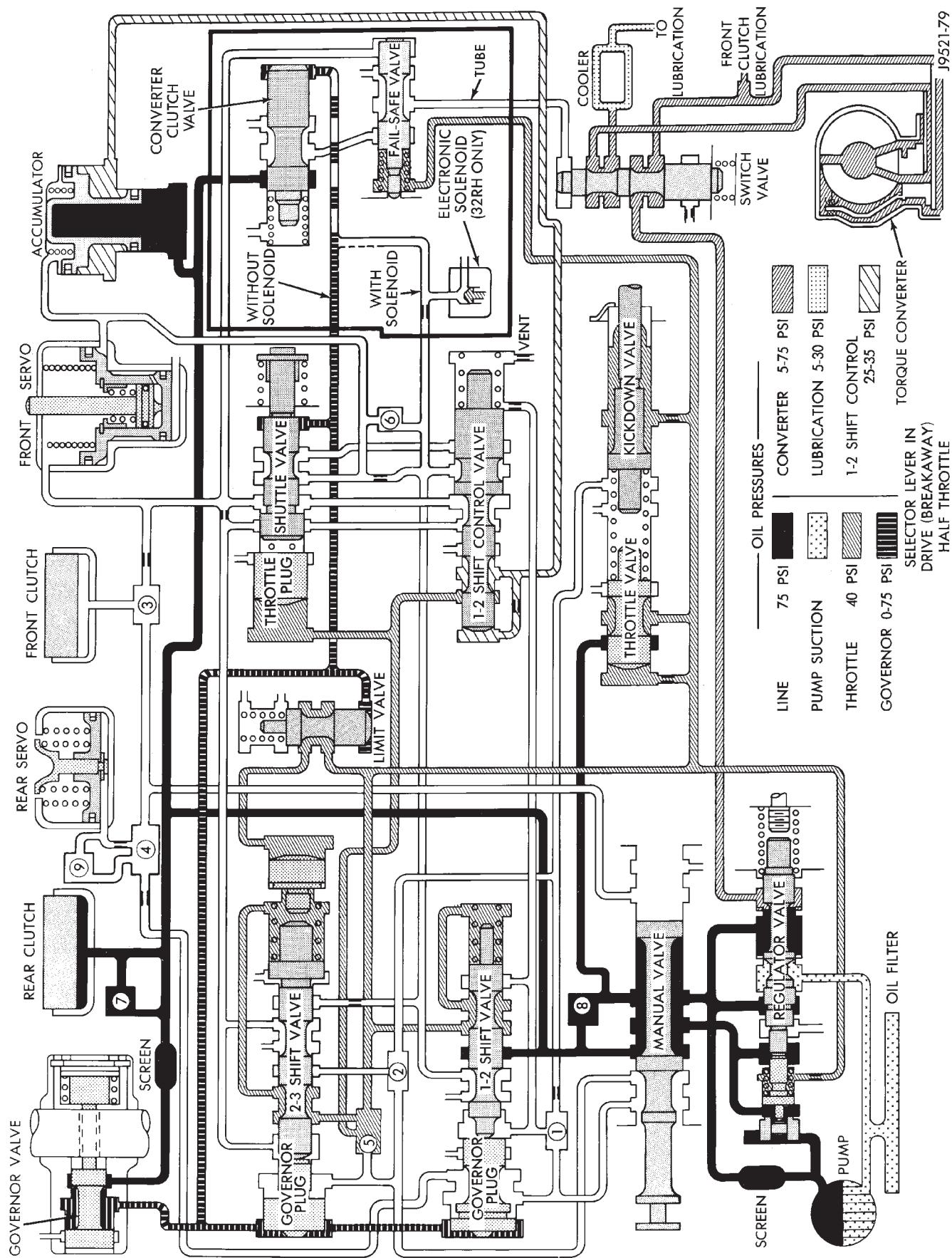
SCHEMATICS AND DIAGRAMS (Continued)



HYDRAULIC FLOW IN PARK/NEUTRAL

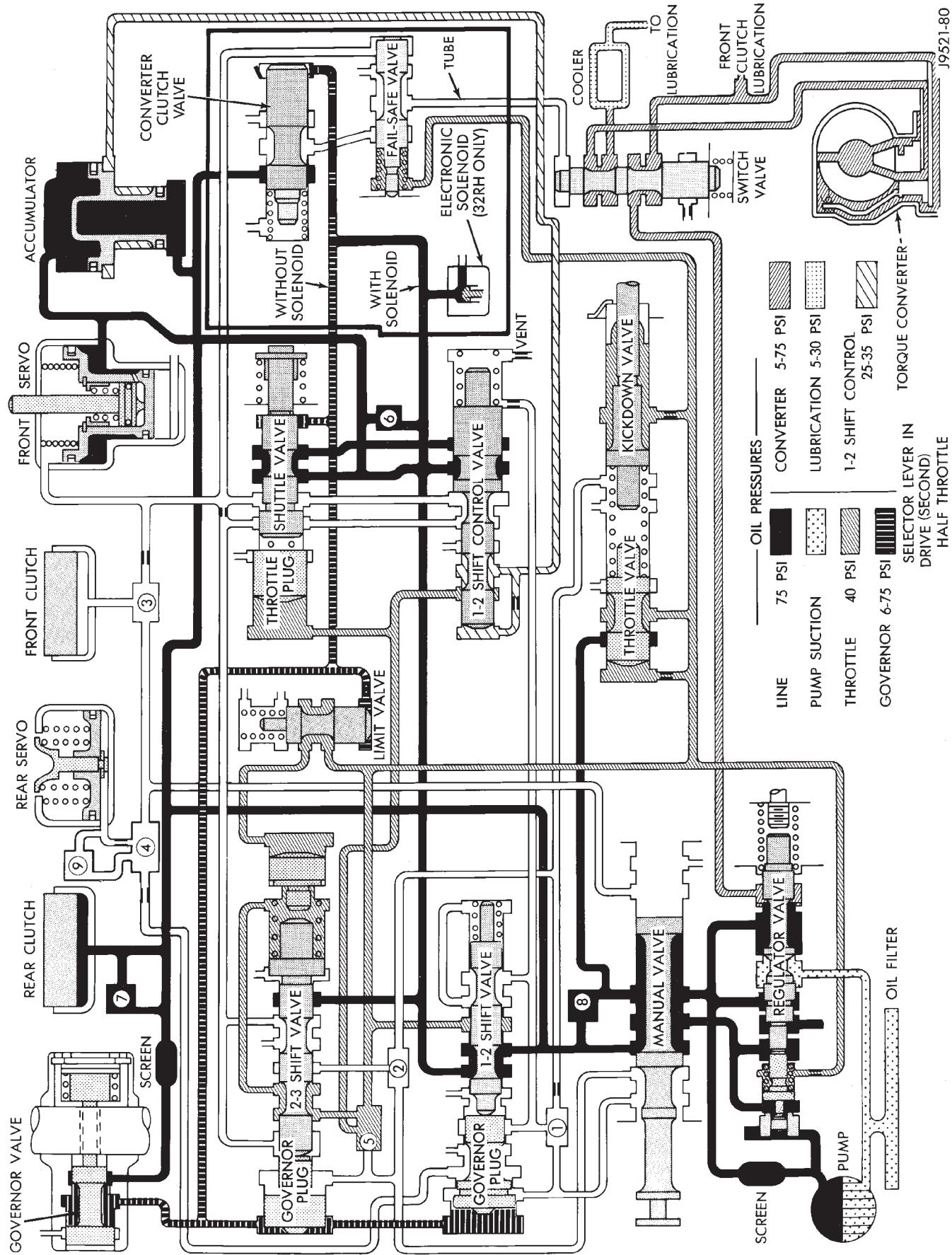
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SCHEMATICS AND DIAGRAMS (Continued)



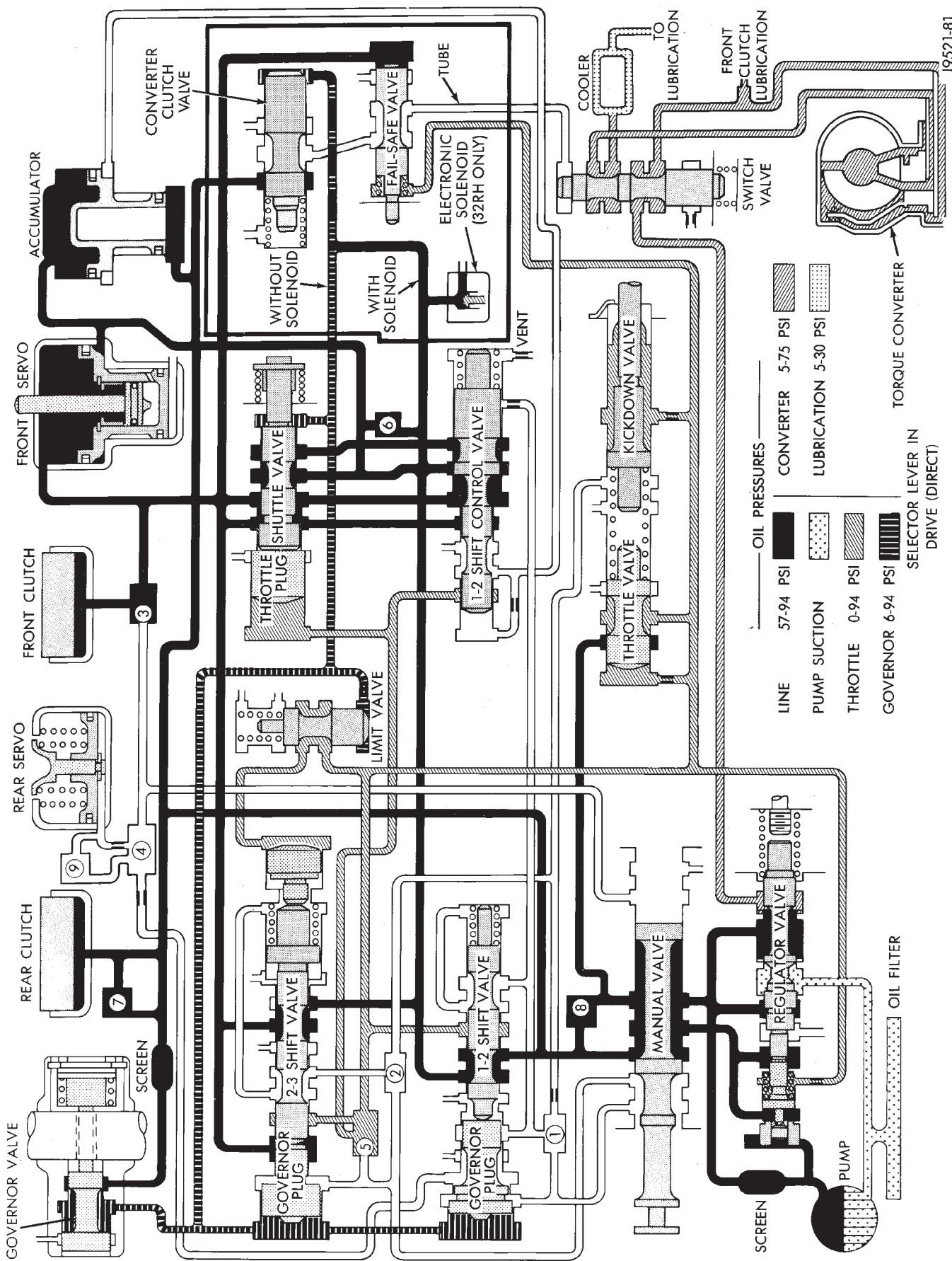
HYDRAULIC FLOW IN D-FIRST GEAR

SCHEMATICS AND DIAGRAMS (Continued)

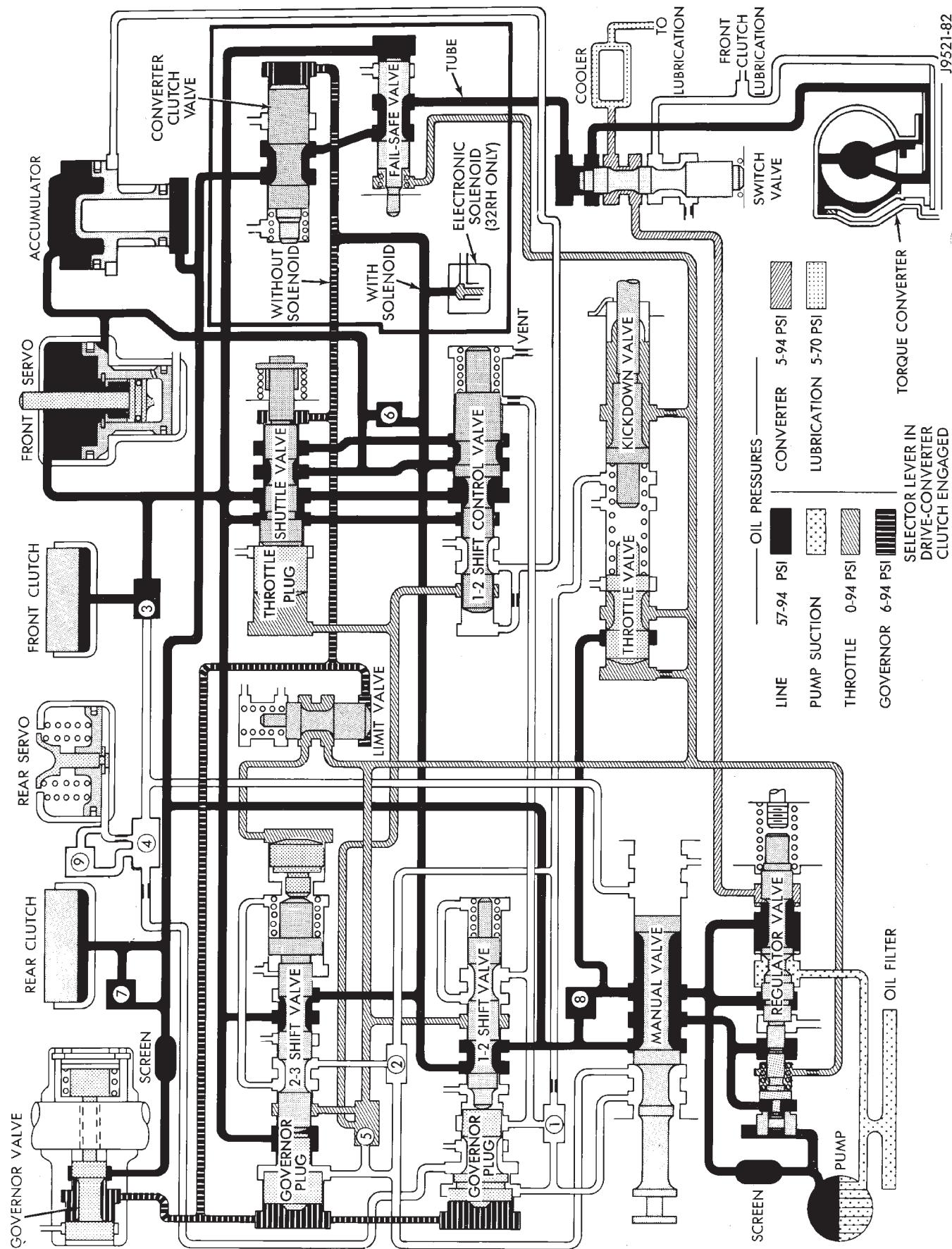


HYDRAULIC FLOW IN D-SECOND GEAR

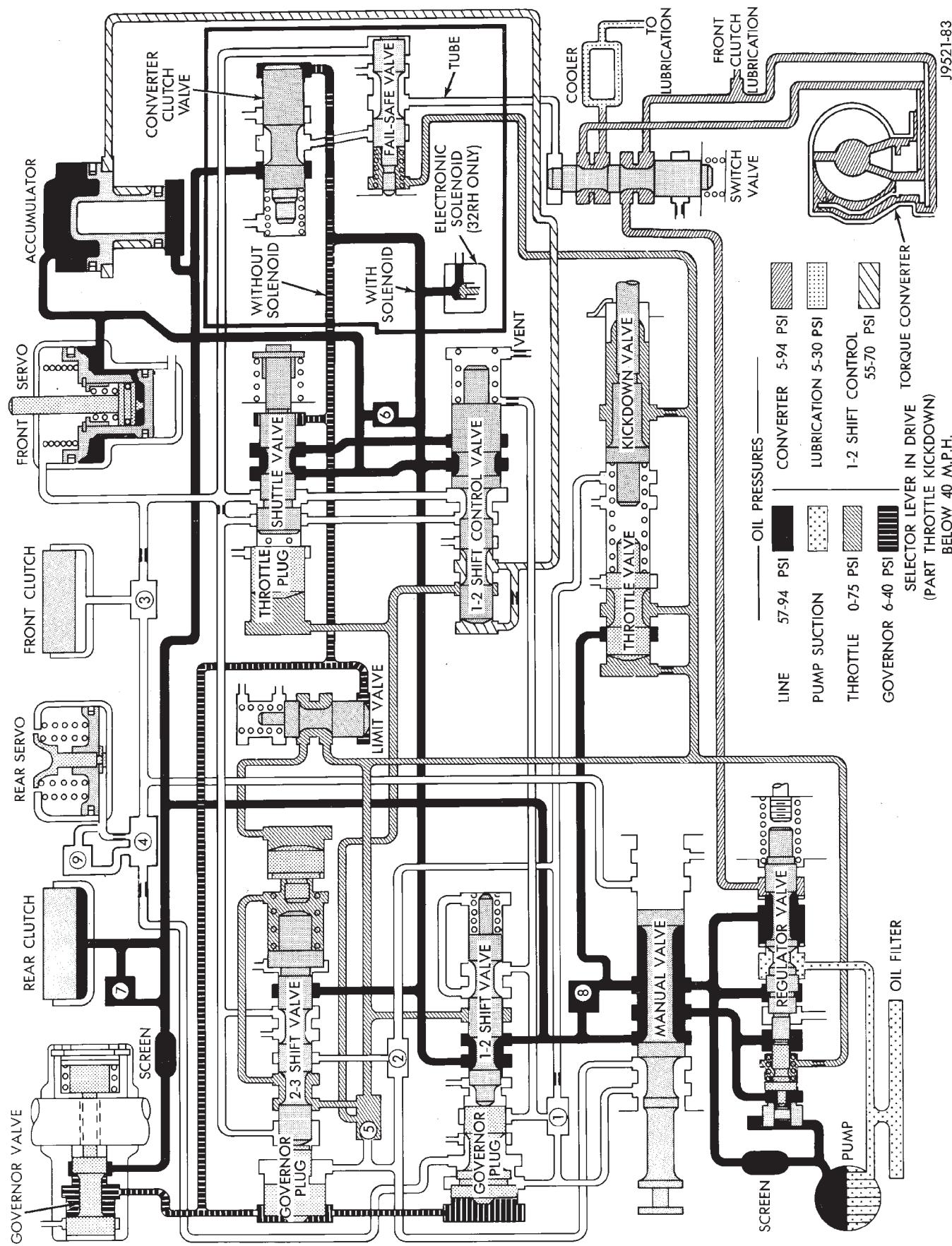
SCHEMATICS AND DIAGRAMS (Continued)



SCHEMATICS AND DIAGRAMS (Continued)

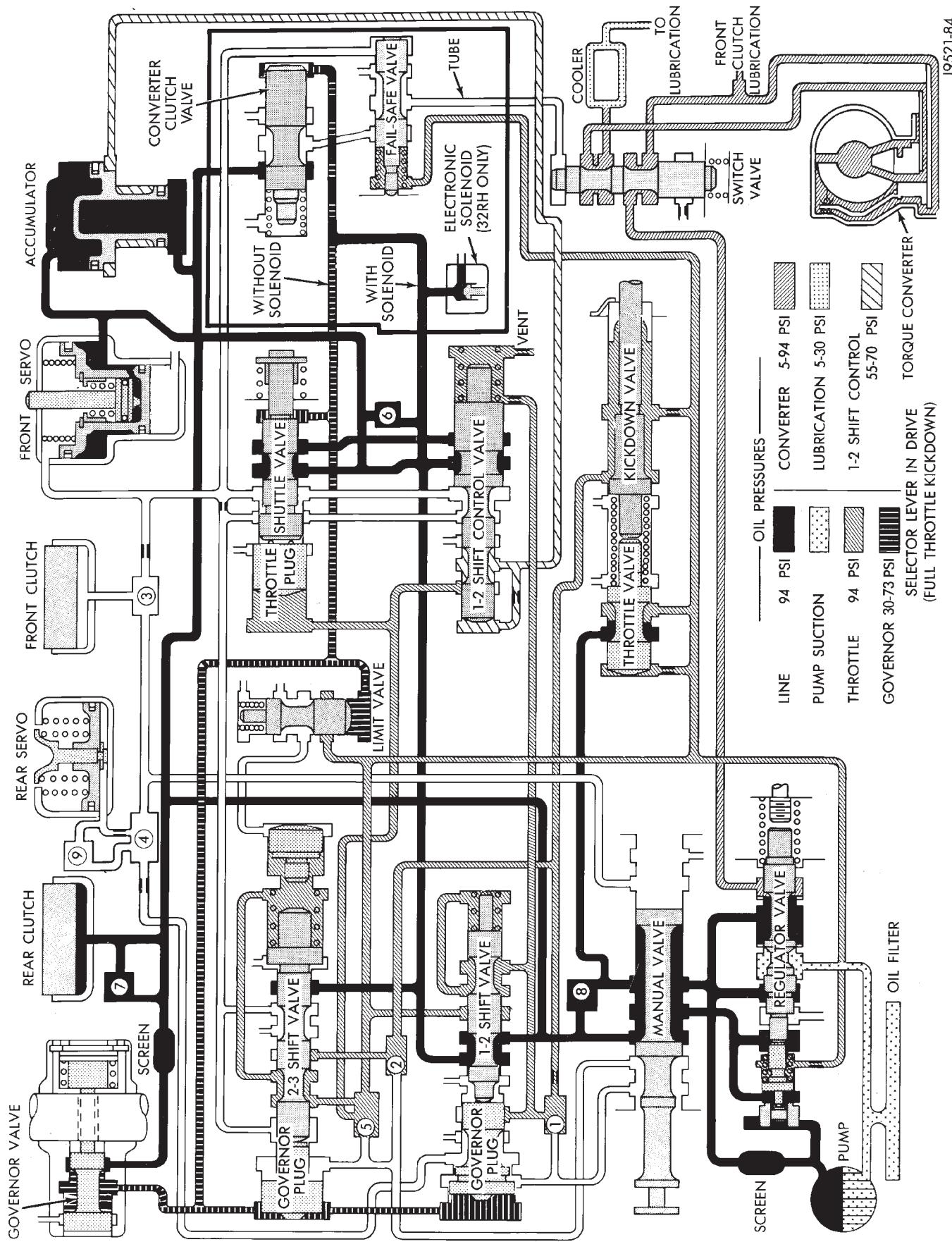


SCHEMATICS AND DIAGRAMS (Continued)



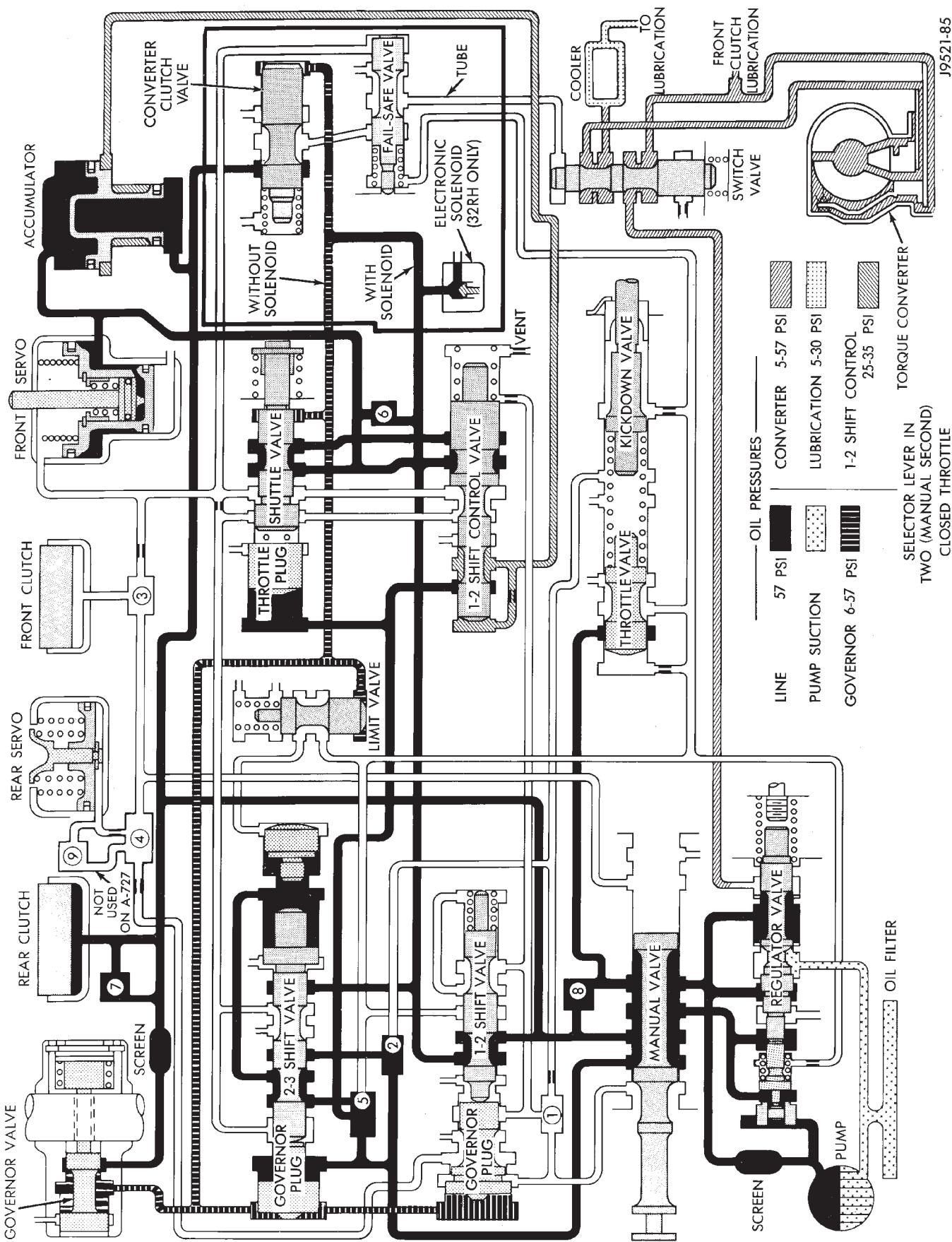
HYDRAULIC FLOW AT PART THROTTLE 3-2 KICKDOWN

SCHEMATICS AND DIAGRAMS (Continued)



HYDRAULIC FLOW AT FULL THROTTLE 3-2 KICKDOWN

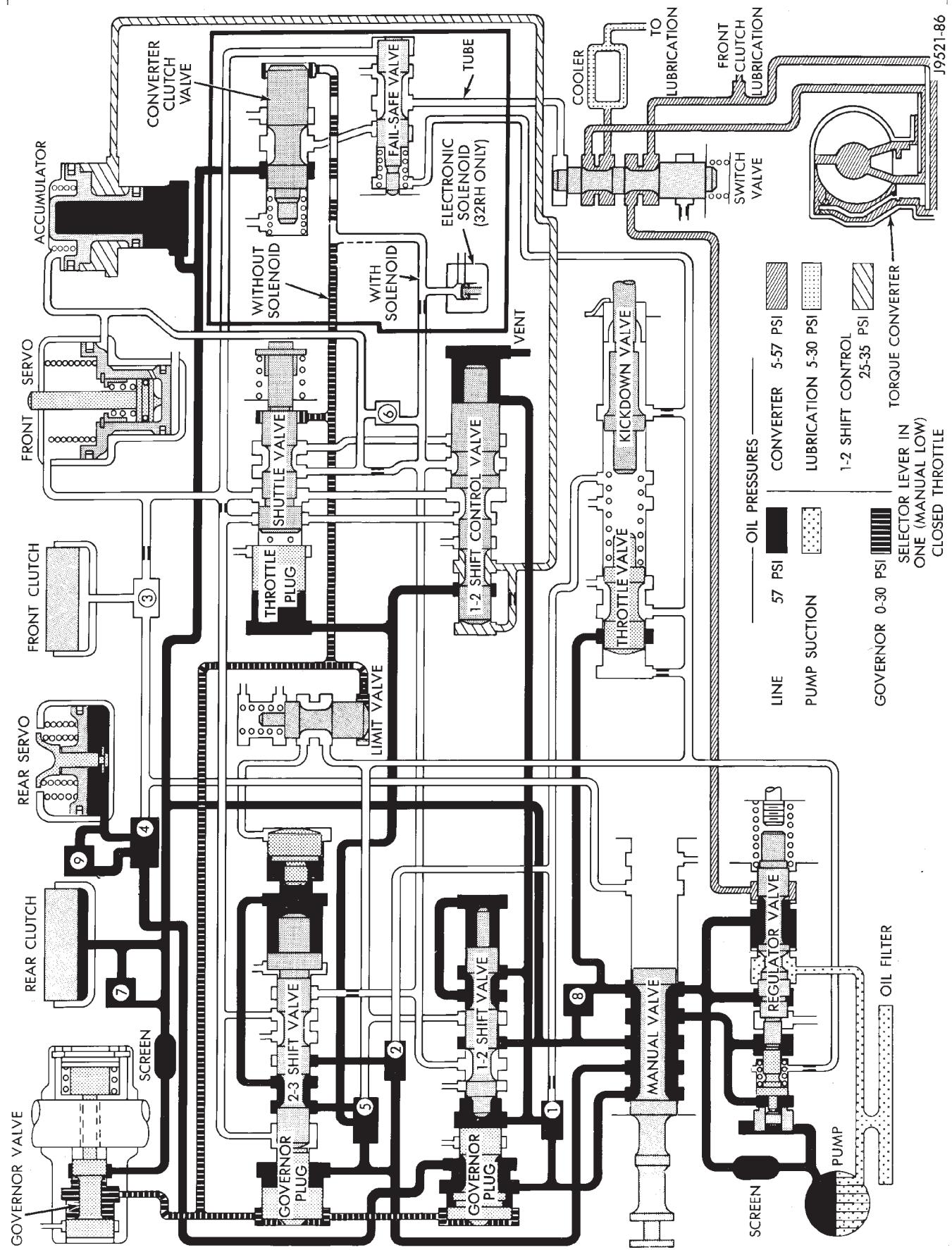
SCHEMATICS AND DIAGRAMS (Continued)



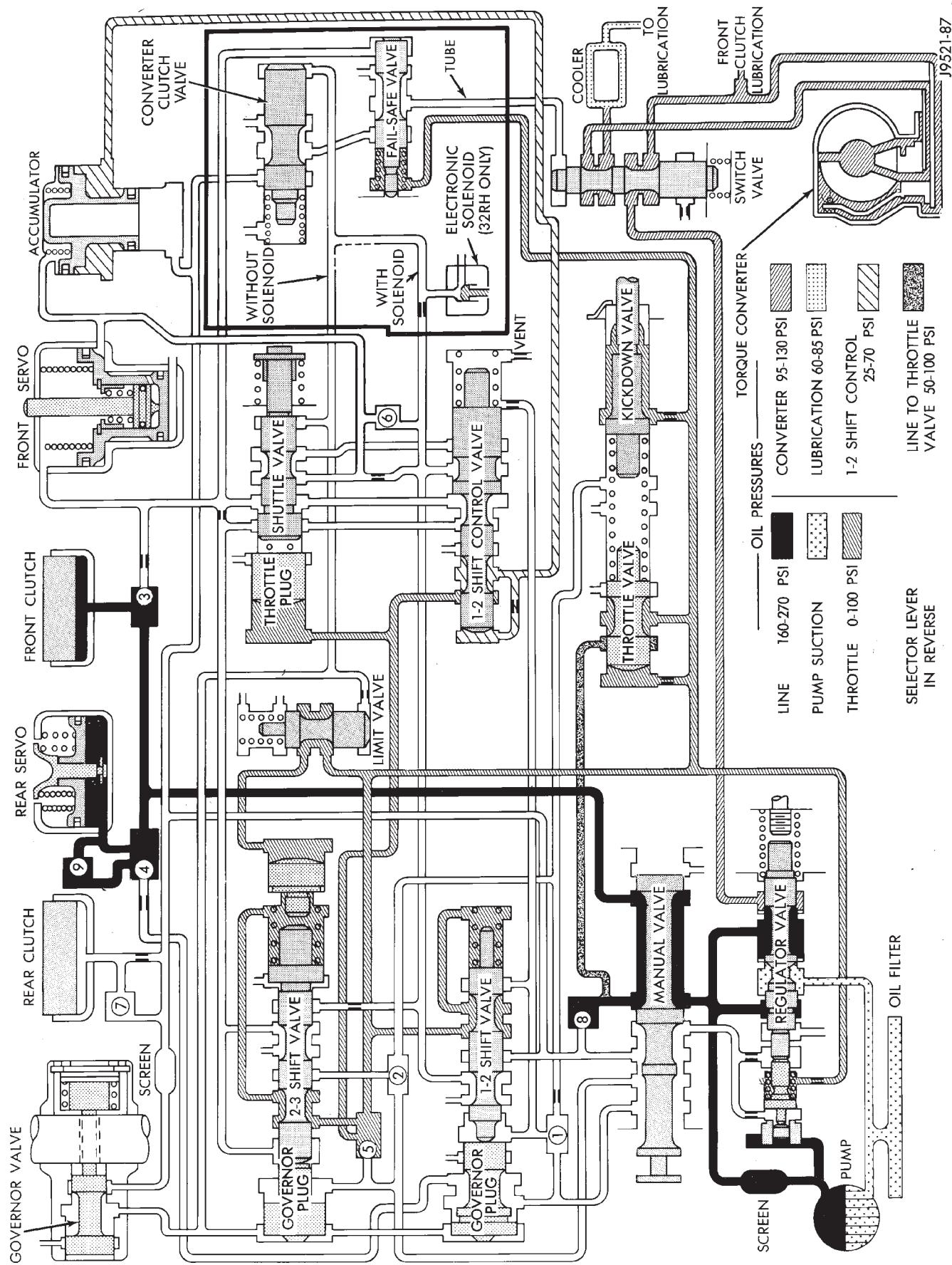
HYDRAULIC FLOW IN MANUAL SECOND

J9521-85

SCHEMATICS AND DIAGRAMS (Continued)



SCHEMATICS AND DIAGRAMS (Continued)



HYDRAULIC FLOW IN REVERSE

SPECIFICATIONS**30RH AUTOMATIC TRANSMISSION****GENERAL**

COMPONENT	METRIC	INCH
Oil pump gear tip clearance	0.089-0.190 mm	0.0035-0.0075 in.
Planetary end play	0.125-1.19 mm	0.001-0.047 in.
Input shaft end play	0.56-2.31 mm	0.022-0.091 in.
Clutch pack clearance/Front 4-disc.	1.70-3.40 mm	0.067-0.134 in.
Clutch pack clearance/Rear 4-disc.	0.559-0.940 mm	0.022-0.037 in.
Front clutch spring usage	1 spring	
30RH-Front Band adjustment from 72 in. lbs.	Back off 2.5 turns	
30RH-Rear Band adjustment from 41 in. lbs.	Back off 7 turns	
Recommended fluid	Mopar®, ATF Plus 3, Type 7176	

THRUST WASHER/SPACER/SNAP RING DIMENSIONS

COMPONENT	METRIC	INCH
Front clutch thrust washer (reaction shaft support hub)	1.55 mm	0.061 in.
Rear clutch thrust washer (clutch retainer)	1.55 mm	0.061 in.
Output shaft thrust plate (output shaft pilot hub)	1.5-1.6mm	0.060-0.063 in.
Output shaft thrust washer (rear clutch hub)	1.3-1.4 mm 1.7-1.8 mm 2.1-2.2 mm	0.052-0.054 in. 0.068-0.070 in. 0.083-0.086 in.
Rear clutch pack snap ring	1.5-1.6 mm 1.7-1.8 mm 1.9-2.0 mm	0.06-0.062 in. 0.068-0.070 in. 0.076-0.078 in.
Planetary geartrain snap ring (at front of output shaft)	1.0-1.1 mm 1.6-1.7 mm 2.1-2.2 mm	0.040-0.044 in. 0.062-0.066 in. 0.082-0.086 in.

PRESSURE TEST—ALL

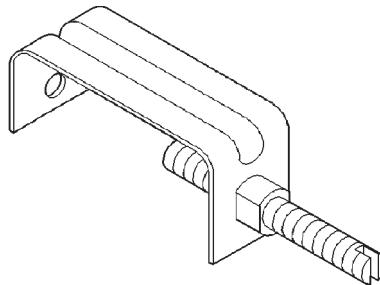
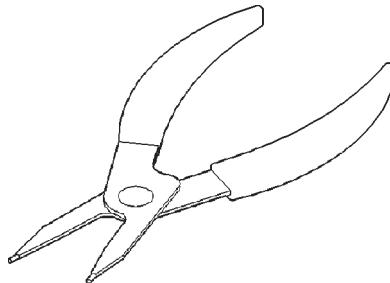
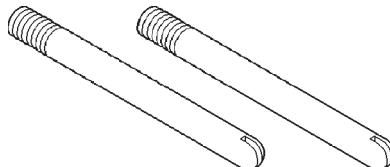
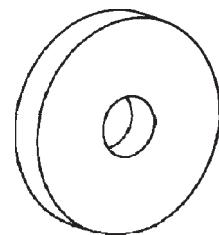
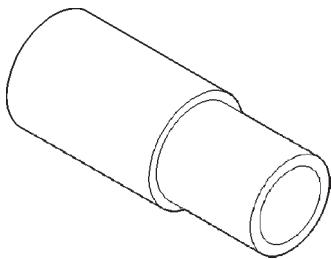
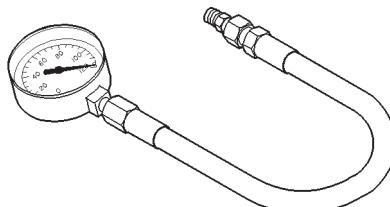
ITEM	RANGE	PRESSURE
Line pressure (at accumulator)	Closed throttle	372-414 kPa (54-60 psi).
Front servo	Third gear only	No more than 21 kPa (3 psi) lower than line pressure.
Rear servo	1 range R range	No more than 21 kPa (3 psi) lower than line pressure. 1103 kPa (160 psi) at idle, builds to 1862 kPa (270 psi) at 1600 rpm.

SPECIFICATIONS (Continued)

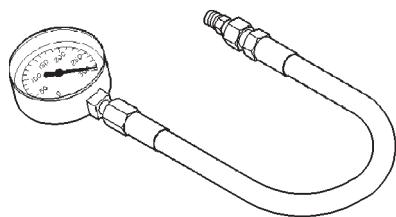
ITEM	RANGE	PRESSURE
Governor	D range closed throttle	Pressure should respond smoothly to changes in mph and return to 0-7 kPa (0-1.5 psi) when stopped with transmission in D, 1, 2. Pressure above 7 kPa (1.5 psi) at stand still will prevent transmission from downshifting.

TORQUE

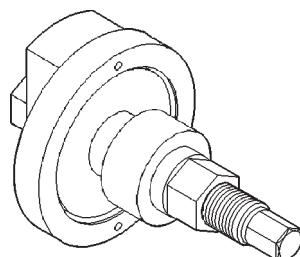
DESCRIPTION	TORQUE
Bolt/nut, crossmember	68 N·m (50 ft. lbs.)
Bolt, driveplate to crankshaft . .	75 N·m (55 ft. lbs.)
Plug, front band reaction	17 N·m (13 ft. lbs.)
Locknut, front band adj.	34 N·m (25 ft. lbs.)
Switch, park/neutral	34 N·m (25 ft. lbs.)
Bolt, fluid pan	17 N·m (13 ft. lbs.)
Bolt, oil pump	20 N·m (15 ft. lbs.)
Bolt, overrunning clutch cam . .	17 N·m (13 ft. lbs.)
Plug, pressure test port	14 N·m (10 ft. lbs.)
Bolt, reaction shaft support . . .	20 N·m (15 ft. lbs.)
Locknut, rear band	41 N·m (30 ft. lbs.)
Bolt, speedometer adapter	11 N·m (8 ft. lbs.)
Screw, fluid filter	4 N·m (35 in. lbs.)
Bolt, valve body to case	12 N·m (100 in. lbs.)

*Retainer, Detent Ball and Spring—6583**Snap-ring Plier—6823**Pilot Stud—C-3288-B**Remover—6957**Installer—6951**Pressure Gauge—C-3292*

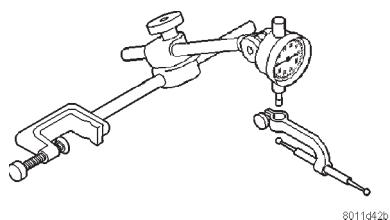
SPECIAL TOOLS (Continued)



Pressure Gauge—C-3293SP

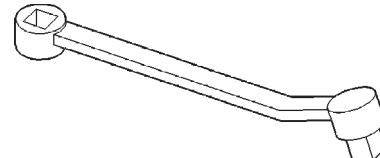


Spring Compressor—C-3863-A

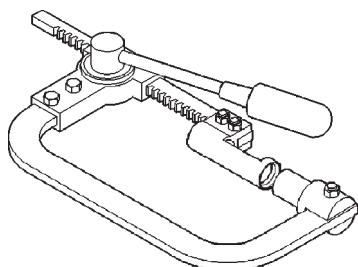


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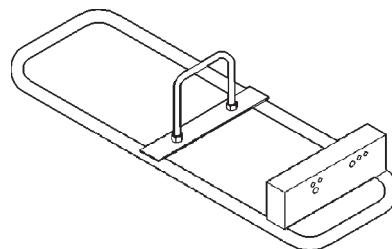
Dial Indicator—C-3339



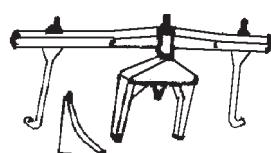
Adapter, Band Adjuster—C-3705



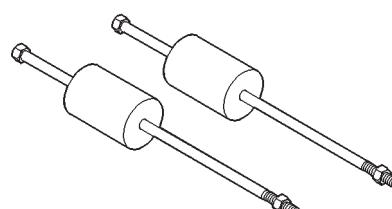
Spring Compressor—C-3422-B



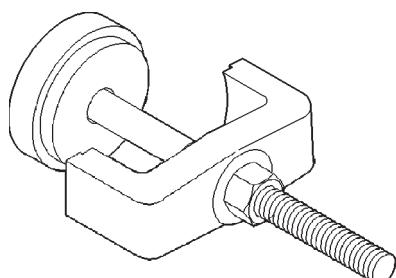
Transmission Repair Stand—C-3750-B



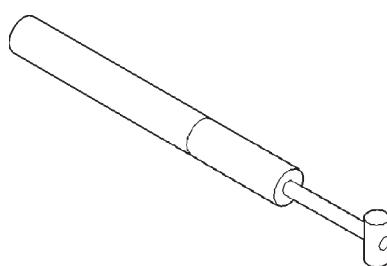
Fixture, Engine Support—C-3487-A



Puller, Slide Hammer—C-3752

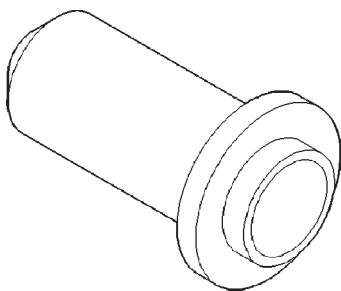


Spring Compressor—C-3575-A

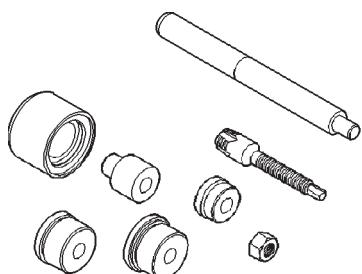


Gauge, Throttle Setting—C-3763

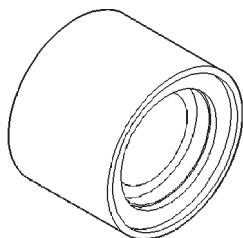
SPECIAL TOOLS (Continued)



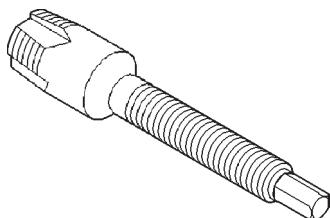
Seal Installer—C-3860-A



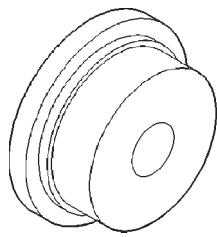
Bushing Remover/Installer—C-3887-J



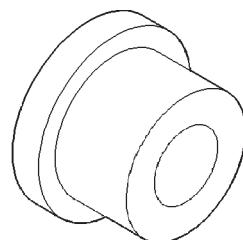
Cup, Remover—SP-3633



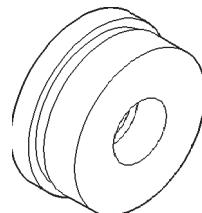
Remover, Bushing—SP-5301



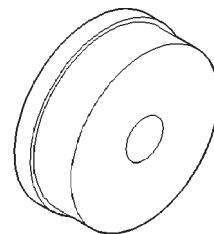
Installer, Bushing—SP-5118



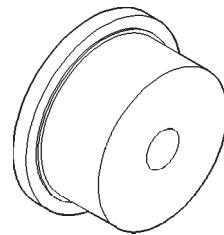
Installer, Bushing—SP-5302



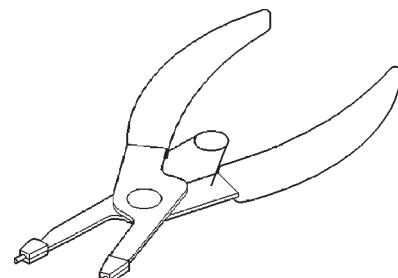
Remover, Bushing—SP-3550



Remover, Bushing—SP-3629

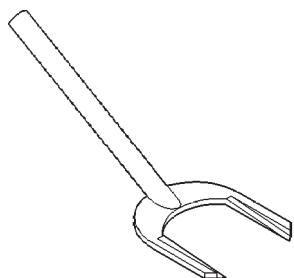


Installer, Bushing—SP-5511

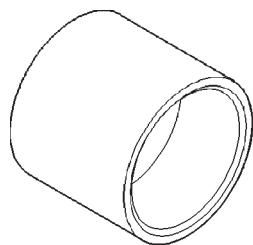


Snap-ring Plier—C-3915

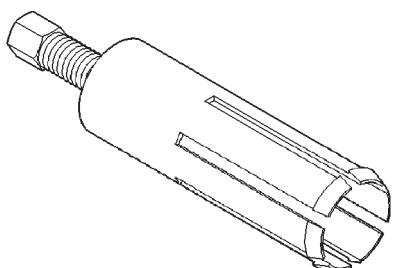
SPECIAL TOOLS (Continued)



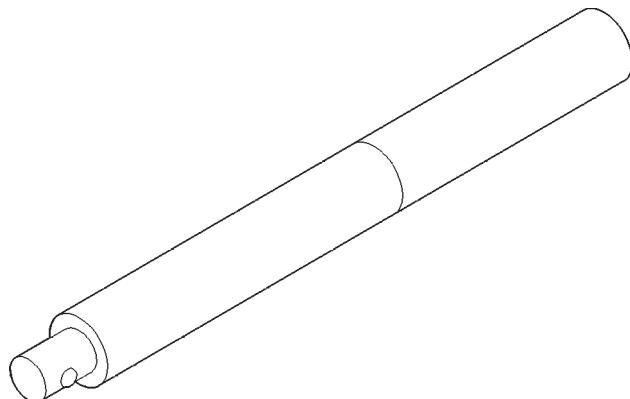
Seal Remover—C-3985-B



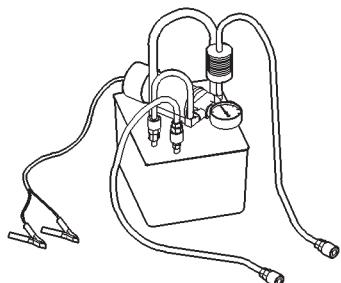
Installer—C-3995-A



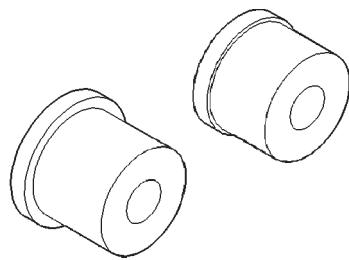
Bushing, Remover—6957



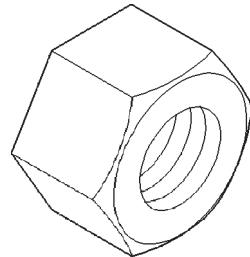
Universal Handle—C-4171



Flusher, Oil Cooler—6906



Remover/Installer—C-4470



Nut, Bushing Remover—SP-1191

AW-4 AUTOMATIC TRANSMISSION

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DESCRIPTION AND OPERATION

AW-4 AUTOMATIC TRANSMISSION

DESCRIPTION

The AW-4 is a 4-speed, electronically controlled automatic transmission (Fig. 1).

The running gear consists of an oil pump, planetary gear sets, clutch and brake units, hydraulic accumulators, a valve body with electrical solenoids, and a transmission control module (TCM). Cables are used to provide shift and throttle pressure control information. A park/neutral position switch permits engine starting in the Park and Neutral ranges only.

TRANSMISSION IDENTIFICATION

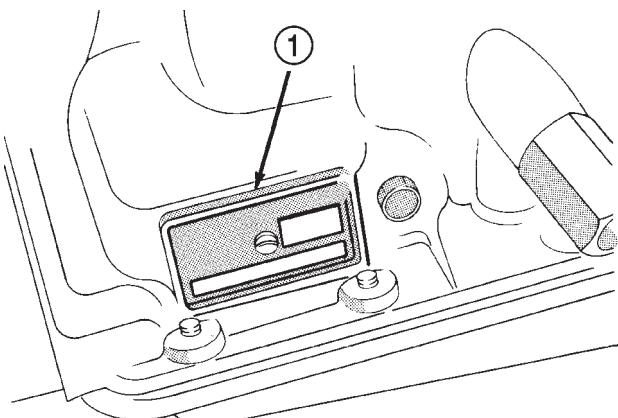
The transmission I. D. plate is attached to the case (Fig. 2). The plate contains the transmission serial and model numbers. Refer to the information on this plate when ordering service parts.

ELECTRONIC CONTROLS

The AW-4 is electronically controlled in 1, 2, 3 and D ranges. Controls consist of the transmission control module (TCM), valve body solenoids and various sensors. The sensors monitor vehicle speed, throttle opening, shift lever position and brake pedal application.

TRANSMISSION GEAR RATIOS

Fourth gear is an 0.75:1 ratio overdrive range. First, second, third and reverse gear are conventional ranges. Third gear ratio is 1:1. A separate planetary gear set provides overdrive operation in fourth gear.



J8921-400

Fig. 2 Transmission Identification

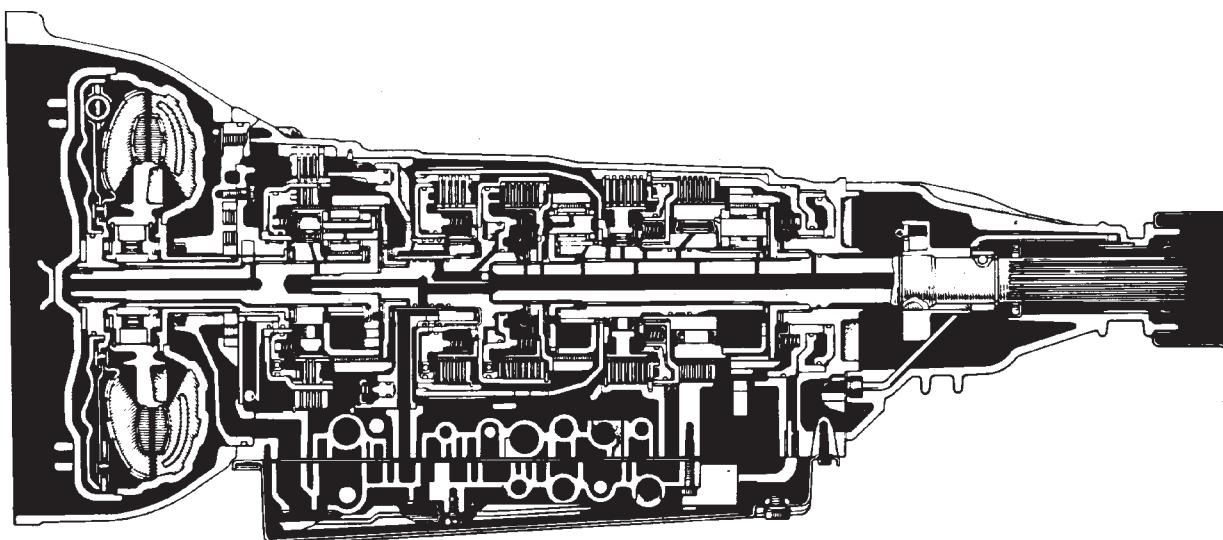
1 – TRANSMISSION I. D. PLATE

OPERATION

GEARTRAIN OPERATION AND APPLICATION CHARTS

Operation and application of the first through fourth and reverse gear elements are outlined in the function and application charts.

The Component Function Chart describes basic function of various geartrain elements. The Component Application Chart indicates which elements (including valve body solenoids), are applied in the various gear ranges.



J8921-398

Fig. 1 AW-4 Automatic Transmission

DESCRIPTION AND OPERATION (Continued)

COMPONENT FUNCTION CHART

COMPONENT NAME	COMPONENT FUNCTION
Overdrive Direct Clutch	Connects overdrive sun gear and overdrive carrier.
Overdrive Brake	Prevents overdrive sun gear from turning either clockwise or counter-clockwise.
Overdrive One-Way Clutch	When transmission is driven by engine, connects overdrive sun gear and overdrive carrier.
Forward Clutch	Connects input shaft and front ring gear.
Direct Clutch	Connects input shaft to the front and rear ring gears.
Second Coast Brake	Prevents front and rear sun gear from turning either clockwise or counter-clockwise.
Second Brake	Prevents outer race of number 1 one-way clutch from turning either clockwise or counter-clockwise, thus preventing the front and rear sun gears from turning counter-clockwise.
First/Reverse Brake	Prevents the rear planetary carrier from turning either clockwise or counter-clockwise.
Number 1 One-way Clutch	When second brake is operating, prevents the front and rear sun gears from turning counter-clockwise.
Number 2 One-Way Clutch	Prevents the rear planetary carrier from turning counter-clockwise.

COMPONENT APPLICATION CHART

Shift Lever Position	Gear	Valve Body Solenoid No. 1	Valve Body Solenoid No. 2	OVERRIDE CLUTCH	FORWARD CLUTCH	DIRECT CLUTCH	OVERRIDE BRAKE	SECOND COAST BRAKE	SECOND BRAKE	FIRST/REVERSE BRAKE	OVERRIDE ONE-WAY CLUTCH	NO.1 ONE-WAY CLUTCH	NO.2 ONE-WAY CLUTCH
P	Park	ON	OFF	•									
R	Reverse	ON	OFF	•		•				•	•		
N	Neutral	ON	OFF	•									
D	First	ON	OFF	•	•						•		•
	Second	ON	ON	•	•				•		•	•	
	Third	OFF	ON	•	•	•			•		•		
	OD	OFF	OFF		•	•	•		•				
3	First	ON	OFF	•	•						•		•
	Second	ON	ON	•	•			•	•		•	•	
	Third	OFF	ON	•	•	•			•		•		
1-2	First	ON	OFF	•	•					•	•		•
	Second	ON	ON	•	•			•	•		•	•	

● = Applied

J8921-405

DESCRIPTION AND OPERATION (Continued)

FIRST/SECOND/THIRD/REVERSE GEAR COMPONENTS

First through third and reverse gear components are outlined in (Fig. 3).

The input shaft is meshed with the direct clutch hub and the forward clutch drum. These elements rotate as a unit. The forward clutch hub rotates as a unit with the front planetary ring gear. The direct clutch drum is meshed with the forward end of the planetary sun gear.

The second brake hub serves as the outer race of one-way clutch No. 1. The clutch inner race is locked with the front/rear sun gear. The inner race of one-way clutch No. 2 is splined to the transmission case and is locked. The outer race rotates as a unit with the rear planetary carrier.

The rear planetary ring gear is splined to the output shaft. The front planetary carrier and rear carrier ring gear are meshed and rotate as a unit with the output shaft.

FOURTH GEAR OVERDRIVE COMPONENTS

The overdrive system consists of the input shaft, one-way clutch, planetary sun gear, ring gear, planetary carrier, overdrive clutch and overdrive brake (Fig. 4). The overdrive elements are controlled and

applied through transmission valve body solenoid number two.

In fourth gear, the overdrive brake prevents the overdrive sun gear from turning. The overdrive input shaft and planetary carrier rotate as a unit. The sun gear and overdrive direct clutch drum are in mesh and operate as a single unit. The direct clutch splines function as the hub for the overdrive brake. The one-way clutch outer race is in mesh with the planetary carrier. The inner race is fixed to the sun gear shaft.

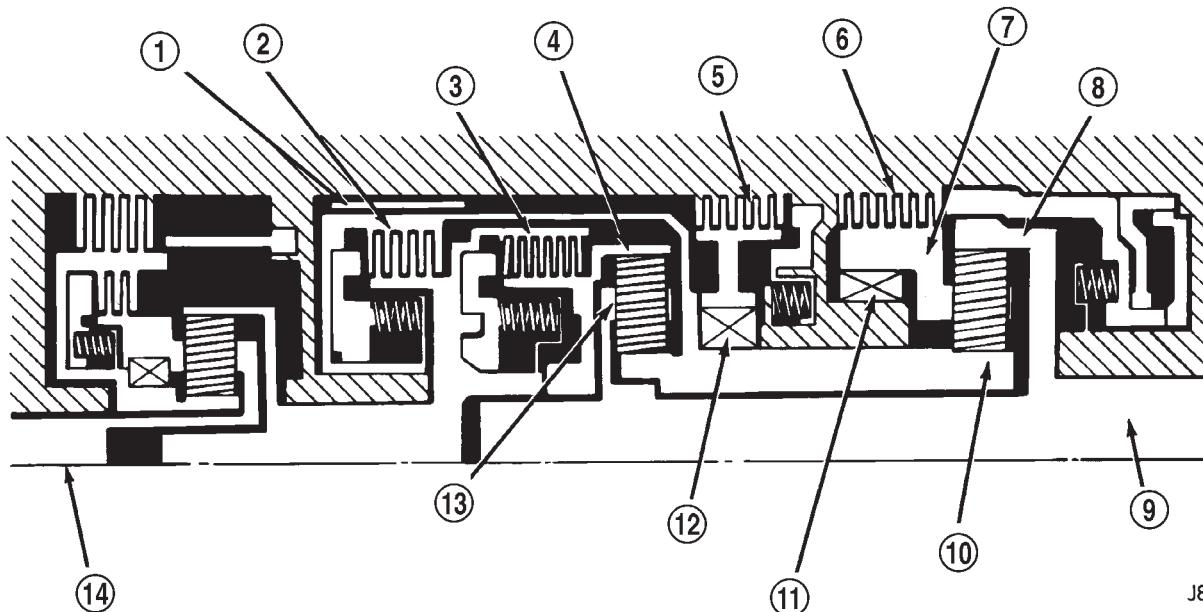
FLUID

NOTE: Refer to the maintenance schedules in Group 0, Lubrication and Maintenance for the recommended maintenance (fluid/filter change) intervals for this transmission.

NOTE: Refer to Service Procedures in this group for fluid level checking procedures.

DESCRIPTION

Mopar® Dexron IIE/Mercon is the recommended fluid for the AW-4 automatic transmissions.



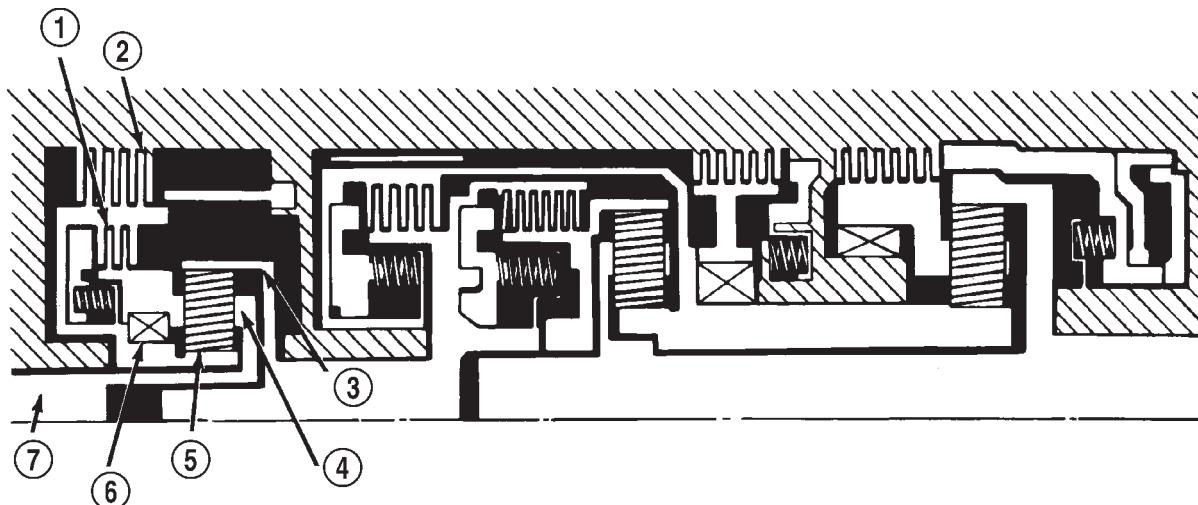
J8921-403

Fig. 3 First/Second/Third/Reverse Gear Components

- 1 – 2ND COAST BRAKE
- 2 – DIRECT CLUTCH
- 3 – FORWARD CLUTCH
- 4 – FRONT PLANETARY RING GEAR
- 5 – SECOND BRAKE
- 6 – FIRST/REVERSE BRAKE
- 7 – REAR PLANETARY CARRIER

- 8 – REAR PLANETARY RING GEAR
- 9 – OUTPUT SHAFT
- 10 – FRONT & REAR PLANETARY SUN GEAR
- 11 – ONE-WAY CLUTCH NO. 2
- 12 – ONE-WAY CLUTCH NO. 1
- 13 – FRONT PLANETARY CARRIER
- 14 – INPUT SHAFT

DESCRIPTION AND OPERATION (Continued)



J8921-402

Fig. 4 Fourth Gear Overdrive Components

- 1 - CLUTCH
- 2 - BRAKE
- 3 - RING GEAR
- 4 - PLANETARY CARRIER

- 5 - SUN GEAR
- 6 - ONE-WAY CLUTCH
- 7 - INPUT SHAFT

Dexron II fluid IS NOT recommended. Clutch chatter can result from the use of improper fluid.

Mopar® Dexron IIE/Mercon automatic transmission fluid when new is red in color. The ATF is dyed red so it can be identified from other fluids used in the vehicle such as engine oil or antifreeze. The red color is not permanent and is not an indicator of fluid condition. As the vehicle is driven, the ATF will begin to look darker in color and may eventually become brown. **This is normal.** A dark brown/black fluid accompanied with a burnt odor and/or deterioration in shift quality may indicate fluid deterioration or transmission component failure.

FLUID ADDITIVES

DaimlerChrysler 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 and/or quality. These additives and others also claim to improve converter

clutch operation and inhibit overheating, oxidation, varnish, and sludge. These claims have not been supported to the satisfaction of DaimlerChrysler 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.

OPERATION

The automatic transmission fluid is selected based upon several qualities. The fluid must provide a high level of protection for the internal components by providing a lubricating film between adjacent metal components. The fluid must also be thermally stable so that it can maintain a consistent viscosity through a large temperature range. If the viscosity stays constant through the temperature range of operation, transmission operation and shift feel will remain consistent. Transmission fluid must also be a good conductor of heat. The fluid must absorb heat from the internal transmission components and transfer that heat to the transmission case.

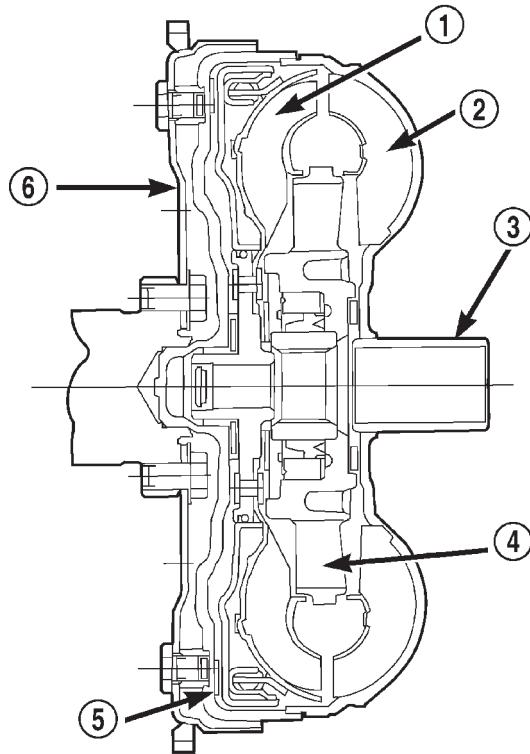
DESCRIPTION AND OPERATION (Continued)

TORQUE CONVERTER**DESCRIPTION**

The torque converter (Fig. 5) is a hydraulic device that couples the engine crankshaft to the transmission. The torque converter consists of an outer shell with an internal turbine, a stator, an overrunning clutch, an impeller and an electronically applied converter clutch. The converter clutch provides reduced engine speed and greater fuel economy when engaged. Clutch engagement also provides reduced transmission fluid temperatures. Torque converter clutch engagement occurs in second gear in 1-2 position; third gear in 3 position and third and fourth gear in D position. The torque converter hub drives the transmission oil (fluid) pump.

The torque converter is a sealed, welded unit that is not repairable and is serviced as an assembly.

CAUTION: The torque converter must be replaced if a transmission failure resulted in large amounts of metal or fiber contamination in the fluid. If the fluid is contaminated, flush the fluid cooler and lines.



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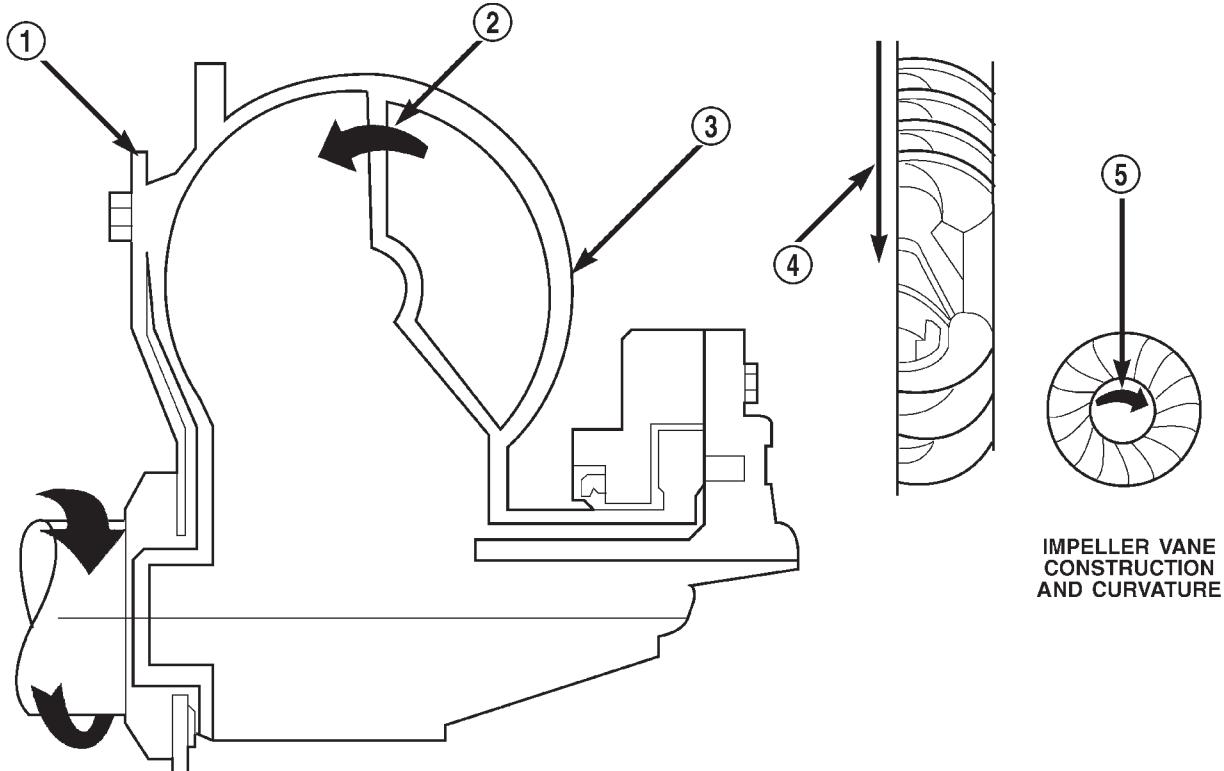
Fig. 5 Torque Converter Assembly

- 1 - TURBINE
- 2 - IMPELLER
- 3 - HUB
- 4 - STATOR
- 5 - CONVERTER CLUTCH DISC
- 6 - DRIVE PLATE

DESCRIPTION AND OPERATION (Continued)

IMPELLER

The impeller (Fig. 6) is an integral part of the converter housing. The impeller consists of curved vanes placed radially along the inside of the housing on the transmission side of the converter. As the converter housing is rotated by the engine, so is the impeller, because they are one in the same and are the driving member of the system.



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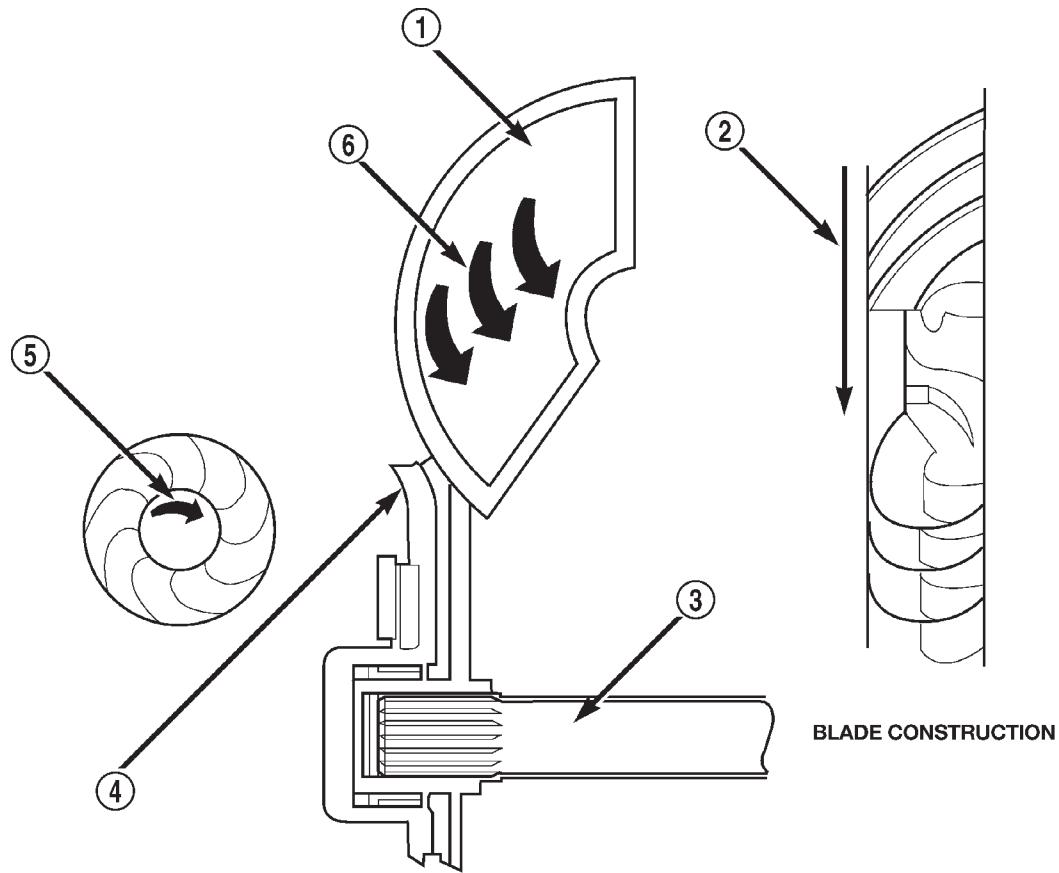
Fig. 6 Impeller

- | | |
|---|---------------------|
| 1 – ENGINE FLEXPLATE | 4 – ENGINE ROTATION |
| 2 – OIL FLOW FROM IMPELLER SECTION INTO TURBINE SECTION | 5 – ENGINE ROTATION |
| 3 – IMPELLER VANES AND COVER ARE INTEGRAL | |

DESCRIPTION AND OPERATION (Continued)

TURBINE

The turbine (Fig. 7) is the output, or driven, member of the converter. The turbine is mounted within the housing opposite the impeller, but is not mounted to the housing. The input shaft is inserted through the center of the impeller and splined into the turbine. The design of the turbine is similar to the impeller, except the blades of the turbine are curved in the opposite direction.



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Fig. 7 Turbine

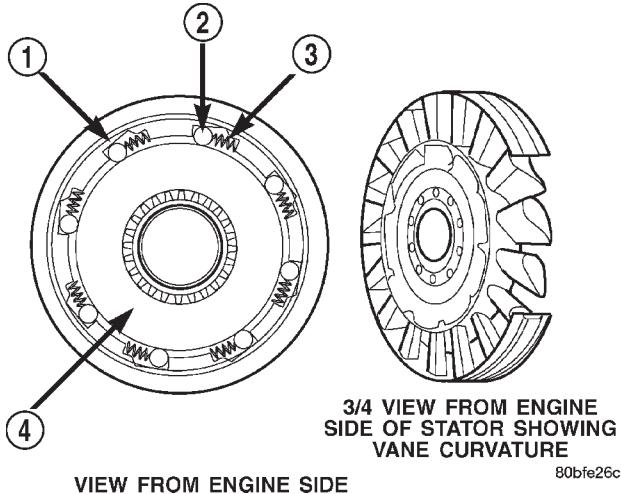
- 1 – TURBINE VANE
- 2 – ENGINE ROTATION
- 3 – INPUT SHAFT

- 4 – PORTION OF TORQUE CONVERTER COVER
- 5 – ENGINE ROTATION
- 6 – OIL FLOW WITHIN TURBINE SECTION

DESCRIPTION AND OPERATION (Continued)

STATOR

The stator assembly (Fig. 8) is mounted on a stationary shaft which is an integral part of the oil pump. The stator also contains an over-running clutch. The stator is located between the impeller and turbine within the torque converter case (Fig. 9). The over-running clutch of the stator allows the stator to rotate only in a clockwise direction.

**Fig. 8 Stator Components**

- 1 – CAM (OUTER RACE)
- 2 – ROLLER
- 3 – SPRING
- 4 – INNER RACE

TORQUE CONVERTER CLUTCH (TCC)

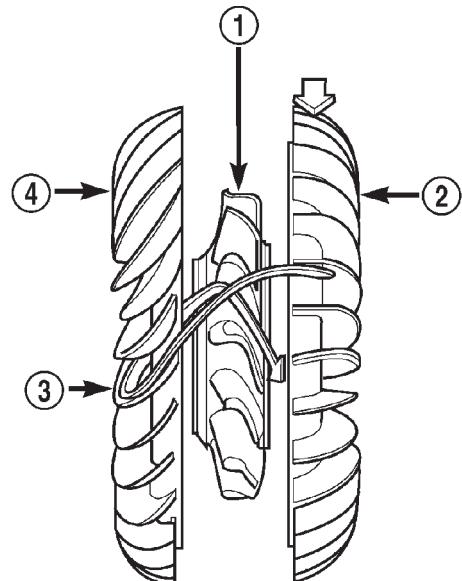
The TCC (Fig. 10) was installed to improve the efficiency of the torque converter that is lost to the slippage of the fluid coupling. Although the fluid coupling provides smooth, shock-free power transfer, it is natural for all fluid couplings to slip. If the impeller and turbine were mechanically locked together, a zero slippage condition could be obtained. A hydraulic piston was added to the turbine, and a friction material was added to the inside of the impeller housing to provide this mechanical lock-up.

OPERATION

The converter impeller (Fig. 11) (driving member), which is integral to the converter housing and bolted to the engine drive plate, rotates at engine speed. The converter turbine (driven member), which reacts from fluid pressure generated by the impeller, rotates and turns the transmission input shaft.

TURBINE

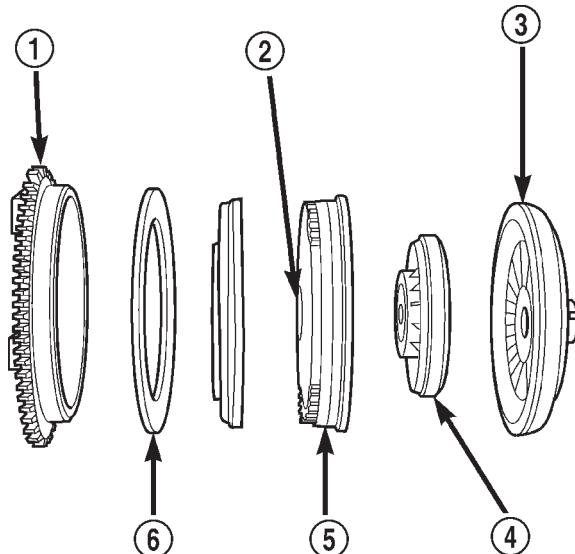
As the fluid that was put into motion by the impeller blades strikes the blades of the turbine, some of the energy and rotational force is transferred into the turbine and the input shaft. This causes both of them



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Fig. 9 Stator Location

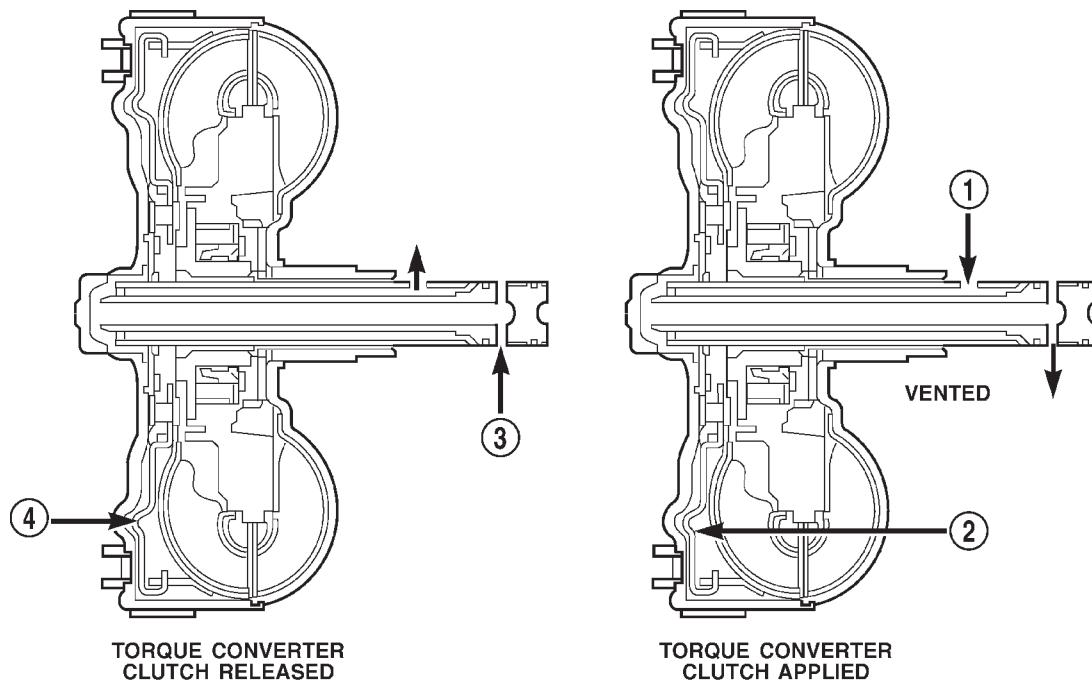
- 1 – STATOR
- 2 – IMPELLER
- 3 – FLUID FLOW
- 4 – TURBINE



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Fig. 10 Torque Converter Clutch (TCC)

- 1 – IMPELLER FRONT COVER
- 2 – THRUST WASHER ASSEMBLY
- 3 – IMPELLER
- 4 – STATOR
- 5 – TURBINE
- 6 – FRICTION DISC



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Fig. 11 Torque Converter Fluid Operation

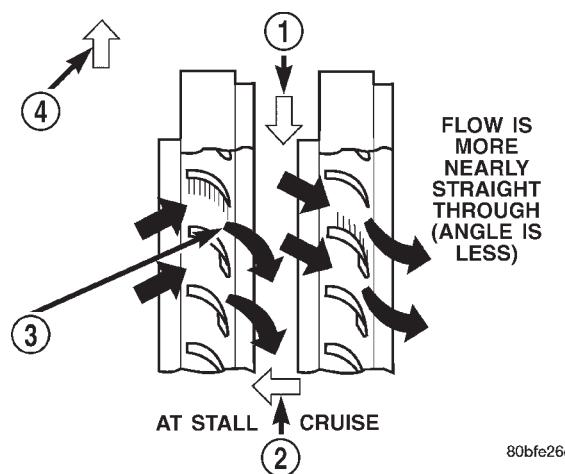
- 1 – APPLY PRESSURE
2 – THE PISTON MOVES SLIGHTLY FORWARD

- 3 – RELEASE PRESSURE
4 – THE PISTON MOVES SLIGHTLY REARWARD

(turbine and input shaft) to rotate in a clockwise direction following the impeller. As the fluid is leaving the trailing edges of the turbine's vanes it continues in a "hindering" direction back toward the impeller. If the fluid is not redirected before it strikes the impeller, it will strike the impeller in such a direction that it would tend to slow it down.

STATOR

Torque multiplication is achieved by locking the clutch to its shaft (Fig. 12). Under stall conditions (the turbine is stationary), the oil leaving the turbine vanes strikes the face of the stator vanes and tries to rotate them in a counterclockwise direction. When this happens the over-running clutch of the stator locks and holds the stator from rotating. With the stator locked, the oil strikes the stator vanes and is redirected into a "helping" direction before it enters the impeller. This circulation of oil from impeller to turbine, turbine to stator, and stator to impeller, can produce a maximum torque multiplication of about 2.2:1. As the turbine begins to match the speed of the impeller, the fluid that was hitting the stator in such a way as to cause it to lock-up is no longer doing so. In this condition of operation, the stator begins to free wheel and the converter acts as a fluid coupling.



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Fig. 12 Stator Operation

- 1 – DIRECTION STATOR WILL FREE WHEEL DUE TO OIL PUSHING ON BACKSIDE OF VANES
2 – FRONT OF ENGINE
3 – INCREASED ANGLE AS OIL STRIKES VANES
4 – DIRECTION STATOR IS LOCKED UP DUE TO OIL PUSHING AGAINST STATOR VANES

DESCRIPTION AND OPERATION (Continued)

TORQUE CONVERTER CLUTCH (TCC)

In a standard torque converter, the impeller and turbine are rotating at about the same speed and the stator is freewheeling, providing no torque multiplication. By applying the turbine's piston to the impeller's friction material, a total converter engagement can be obtained. The result of this engagement is a direct 1:1 mechanical link between the engine and the transmission.

The engagement and disengagement of the TCC are automatic and controlled by the Transmission Control Module (TCM). Inputs that determine clutch engagement are: coolant temperature, vehicle speed and throttle position. Clutch engagement is controlled by transmission valve body solenoid number three and by the converter clutch relay valve. The solenoid channels line pressure to the clutch through the relay valve at clutch engagement speeds.

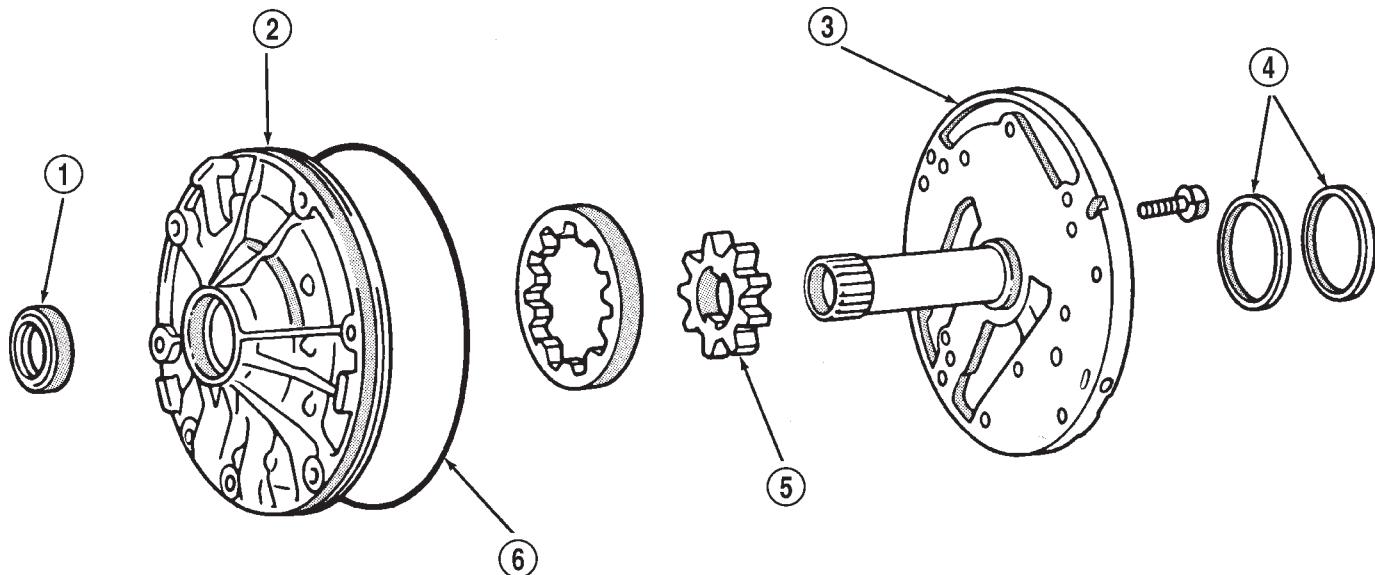
OIL PUMP

DESCRIPTION

The oil pump (Fig. 13) is located in the pump housing inside the bell housing of the transmission case. The oil pump consists of an inner and outer gear, a housing, and a cover that also serves as the reaction shaft support.

OPERATION

As the torque converter rotates, the converter hub rotates the inner and outer gears. As the gears rotate, the clearance between the gear teeth increases in the crescent area, and creates a suction at the inlet side of the pump. This suction draws fluid through the pump inlet from the oil pan. As the clearance between the gear teeth in the crescent area decreases, it forces pressurized fluid into the pump outlet and to the valve body.



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Fig. 13 Oil Pump Assembly

- 1 - PUMP SEAL
- 2 - PUMP BODY
- 3 - STATOR SHAFT

- 4 - SEAL RINGS
- 5 - GEAR
- 6 - O-RING

DESCRIPTION AND OPERATION (Continued)

TRANSMISSION VALVE BODY COMPONENTS

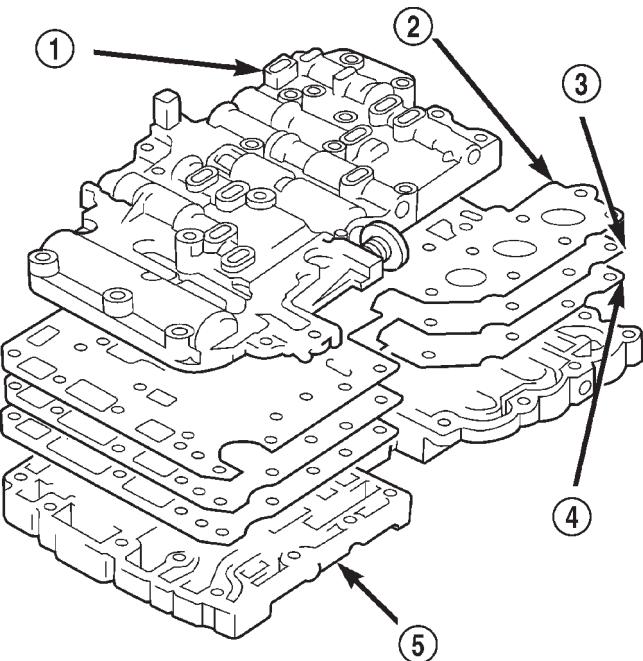
DESCRIPTION

Transmission operating pressure is supplied to the clutch and brake apply circuits through the transmission valve body. The valve body consists of an upper body, lower body, separator plate and upper and lower gaskets (Fig. 14). The various spool valves, sleeves, plugs and springs are located within the two body sections.

The manual valve, 1-2 shift valve, primary regulator valve, accumulator control valve, check balls, and oil strainers are located in the lower body section (Fig. 15). The remaining control and shift valves plus check balls and one additional oil strainer are located in the upper body section (Fig. 16).

TRANSMISSION VALVE BODY SOLENOIDS

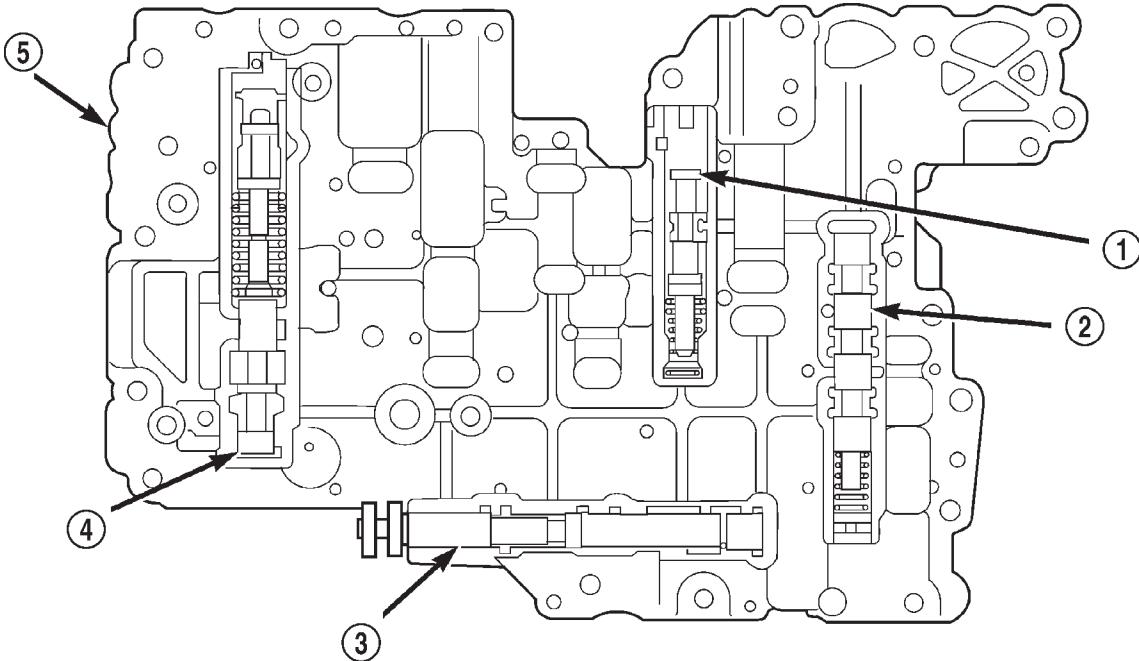
The solenoids are mounted on the valve body and operated by the TCM. The solenoids control operation of the converter clutch and shift valves in response to input signals from the module.



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Fig. 14 Two-Section Transmission Valve Body

- 1 – UPPER BODY
- 2 – UPPER GASKET
- 3 – SEPARATOR PLATE
- 4 – LOWER GASKET
- 5 – LOWER BODY

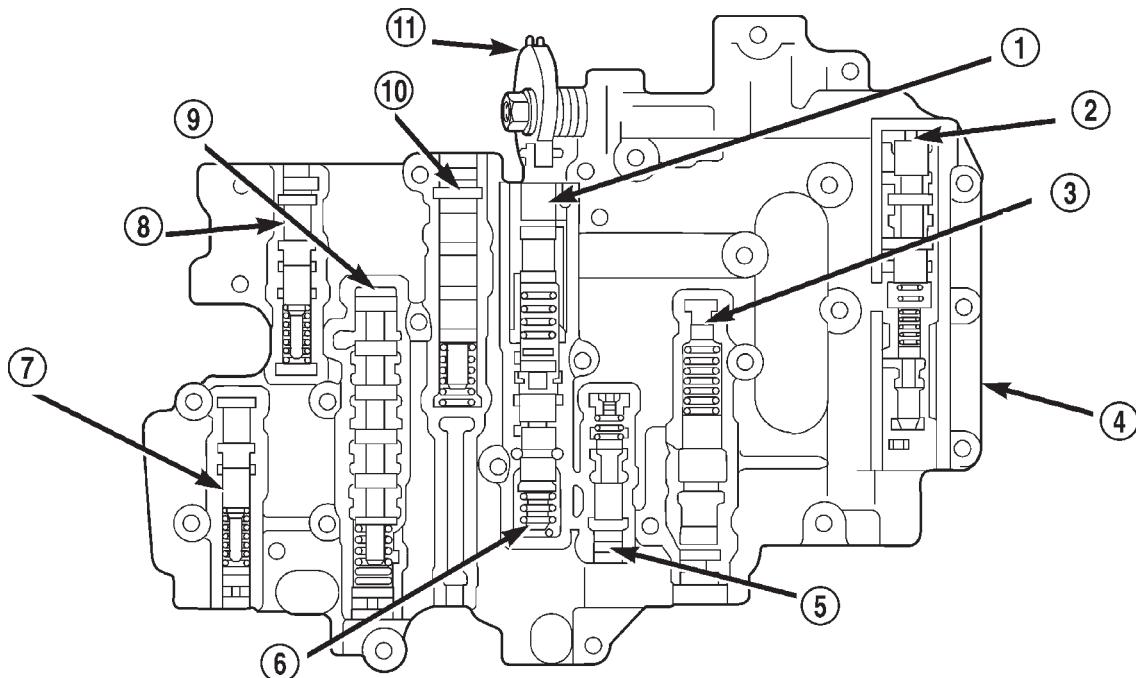


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Fig. 15 Upper Body Components

- 1 – ACCUMULATOR CONTROL VALVE
- 2 – 1-2 SHIFT VALVE
- 3 – MANUAL VALVE
- 4 – PRIMARY REGULATOR VALVE
- 5 – LOWER BODY

DESCRIPTION AND OPERATION (Continued)



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Fig. 16 Lower Body Components

1 - DOWNSHIFT PLUG

2 - LOCK-UP RELAY VALVE

3 - SECONDARY REGULATOR VALVE

4 - UPPER BODY

5 - CUT-BACK VALVE

6 - THROTTLE VALVE

7 - LOW COAST MODULATOR VALVE

8 - SECONDARY COAST MODULATOR VALVE

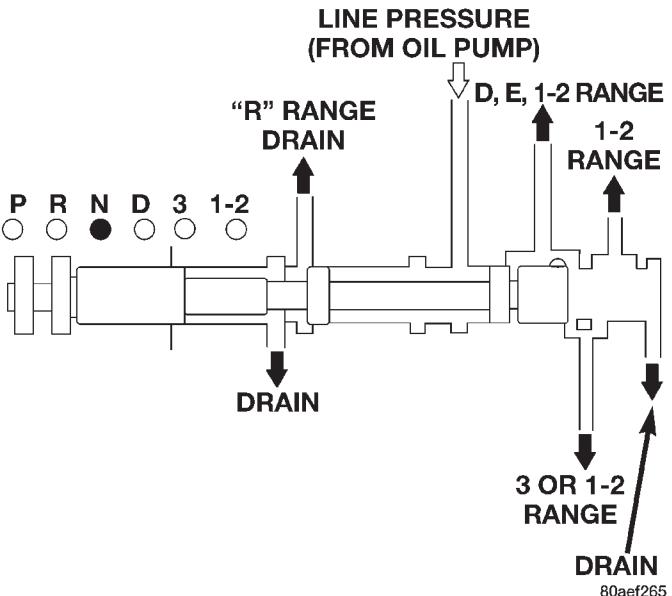
9 - 2-3 SHIFT VALVE

10 - 3-4 SHIFT VALVE

11 - THROTTLE CAM

OPERATION**MANUAL VALVE**

The manual valve is operated by the gearshift linkage. The valve diverts fluid to the apply circuits according to shift lever position (Fig. 17).

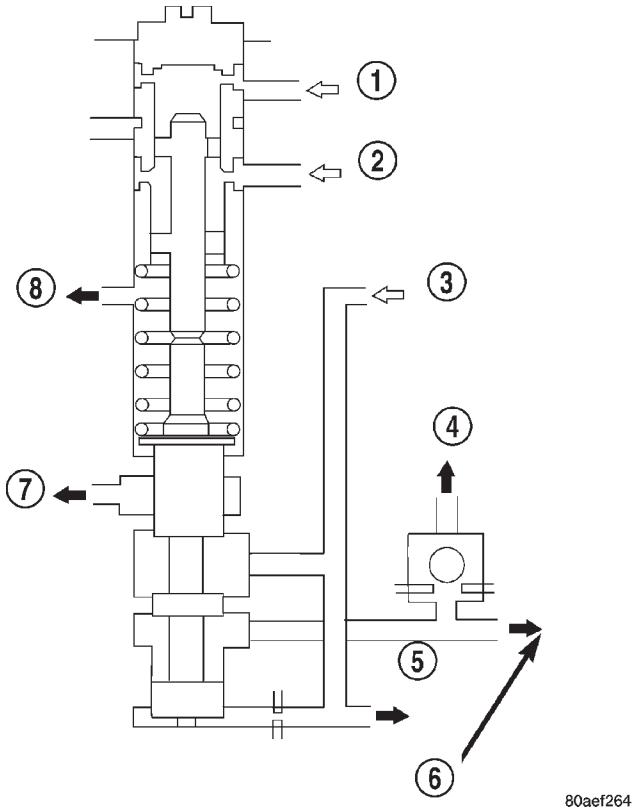
***Fig. 17 Manual Valve***

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DESCRIPTION AND OPERATION (Continued)

PRIMARY REGULATOR VALVE

The primary regulator valve (Fig. 18) modulates line pressure to the clutches and brakes according to engine load. The valve is actuated by throttle valve pressure.

**Fig. 18 Primary Regulator Valve**

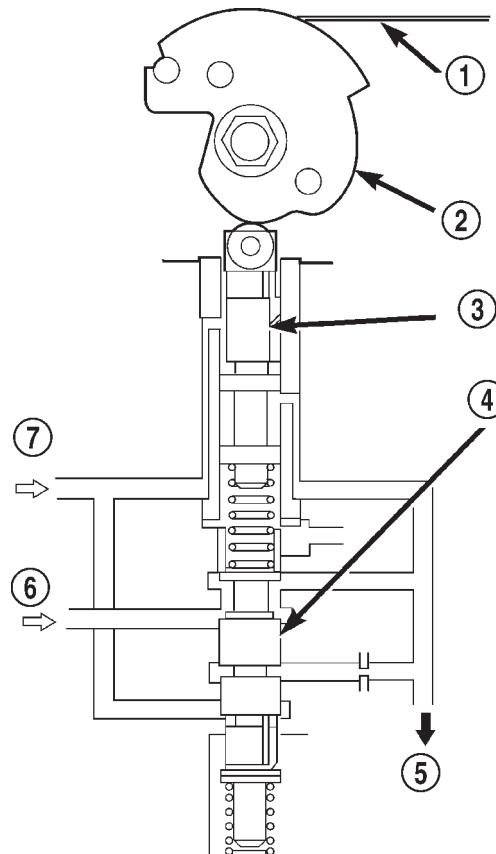
- 1 – THROTTLE PRESSURE
- 2 – LINE PRESSURE (FROM MANUAL VALVE "R" RANGE)
- 3 – LINE PRESSURE (FROM PUMP)
- 4 – CONVERTER PRESSURE TO CONVERTER CLUTCH RELAY VALVE
- 5 – LINE PRESSURE
- 6 – CONVERTER PRESSURE (TO SECONDARY REGULATOR VALVE)
- 7 – DRAIN
- 8 – DRAIN

During high load operation, the valve increases line pressure to maintain positive clutch and brake engagement. At light load, the valve decreases line pressure just enough to maintain smooth engagement.

THROTTLE VALVE AND DOWNSHIFT PLUG

The throttle valve and downshift plug (Fig. 19) control throttle pressure to the primary regulator valve.

The downshift plug and throttle valve are operated by the throttle valve cam and throttle cable in response to engine throttle position. Throttle valve

**Fig. 19 Throttle Valve And Downshift Plug**

- 1 – LINE PRESSURE CABLE
- 2 – THROTTLE VALVE CAM
- 3 – DOWNSHIFT PLUG
- 4 – THROTTLE VALVE
- 5 – THROTTLE PRESSURE (TO PRIMARY REGULATOR VALVE)
- 6 – LINE PRESSURE
- 7 – CUT-BACK PRESSURE (FROM CUT-BACK VALVE)

pressure is also modulated by the cut-back valve in second, third and fourth gear ranges.

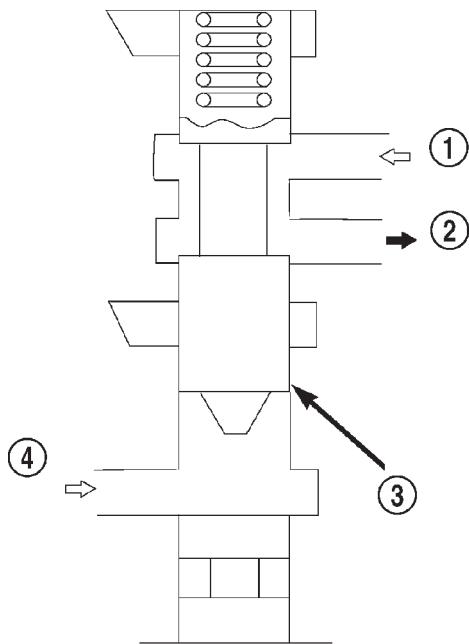
CUT-BACK VALVE

The cut-back valve (Fig. 20) helps prevent excessive pump pressure buildup in second, third and fourth gear. The valve is actuated by throttle pressure and by line pressure from the second brake. The valve also helps regulate line pressure by controlling the amount of cut-back pressure to the throttle valve.

SECONDARY REGULATOR VALVE

The secondary regulator valve (Fig. 21) regulates converter clutch and transmission lubrication pressure. When primary regulator valve pressure exceeds requirements for clutch engagement or transmission lubrication, the secondary regulator valve is moved upward exposing the drain port. Excess pressure then bleeds off as needed. As pressure drops, spring

DESCRIPTION AND OPERATION (Continued)

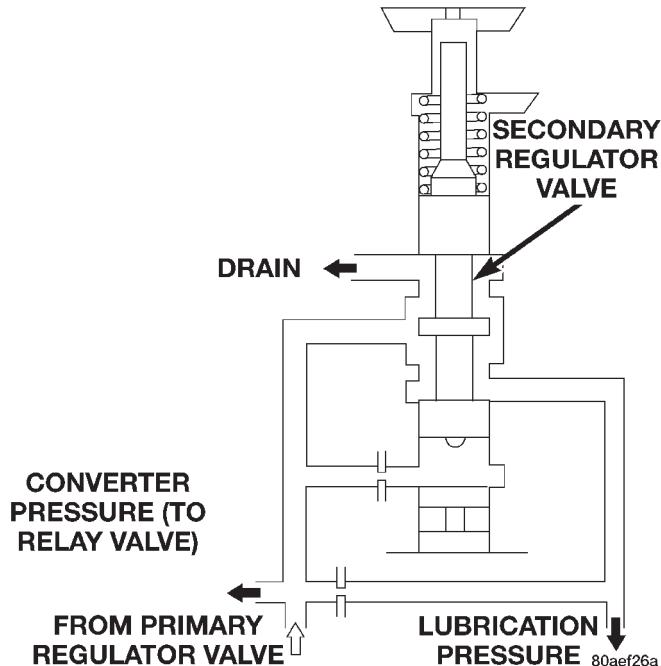


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Fig. 20 Cut-Back Valve

- 1 – THROTTLE PRESSURE
- 2 – CUT-BACK PRESSURE TO THROTTLE VALVE
- 3 – CUT-BACK VALVE
- 4 – SECOND BRAKE LINE PRESSURE

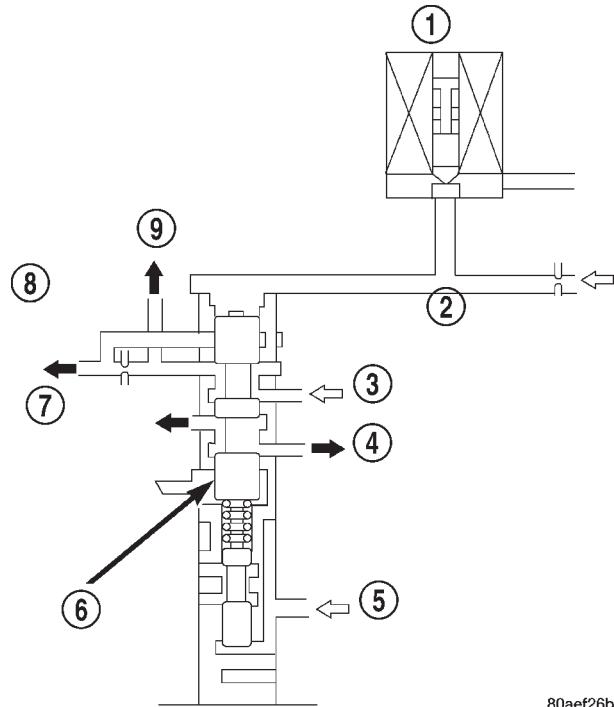
tension moves the valve downward closing the drain port.

**Fig. 21 Secondary Regulator Valve**

CONVERTER CLUTCH RELAY VALVE

The converter clutch relay valve (Fig. 22) controls fluid flow to the converter clutch. The valve is oper-

ated by line pressure from the 1-2 shift valve and is controlled by solenoid valve number three.



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Fig. 22 Converter Clutch Relay Valve

- 1 – SOLENOID VALVE NO. 3
- 2 – LINE PRESSURE (FROM 1-2 SHIFT VALVE)
- 3 – CONVERTER PRESSURE
- 4 – DRAIN
- 5 – LINE PRESSURE (FROM PUMP)
- 6 – CONVERTER CLUTCH RELAY VALVE
- 7 – TO CONVERTER CLUTCH (DISENGAGED)
- 8 – TO OIL COOLER
- 9 – TO CONVERTER CLUTCH (ENGAGED)

1-2 SHIFT VALVE

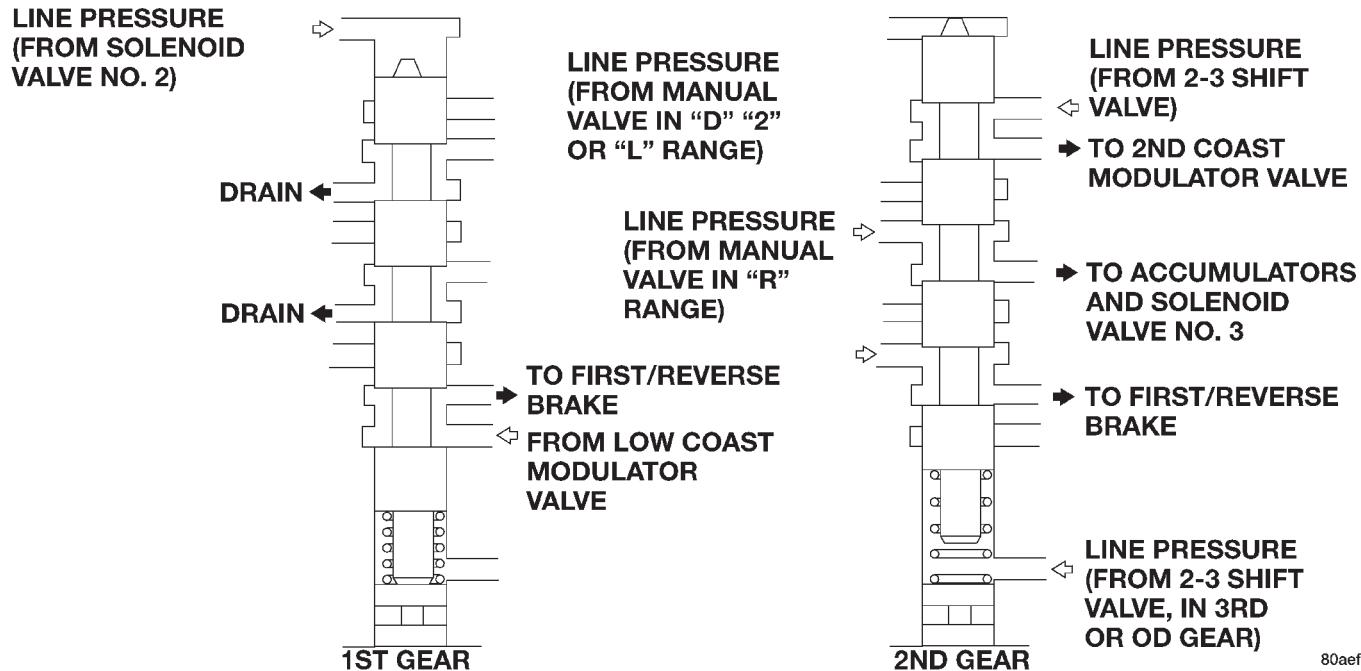
The 1-2 shift valve (Fig. 23) controls the 1-2 upshifts and downshifts. The valve is operated by the No. 2 valve body solenoid and line pressure from the manual valve, second coast modulator valve and the 2-3 shift valve.

When the transmission control module deactivates the solenoid, line pressure at the top of the valve moves the valve down closing the second brake accumulator feed port. As the solenoid is activated and the drain port opens, spring force moves the valve up exposing the second brake feed port for the shift to second gear.

2-3 SHIFT VALVE

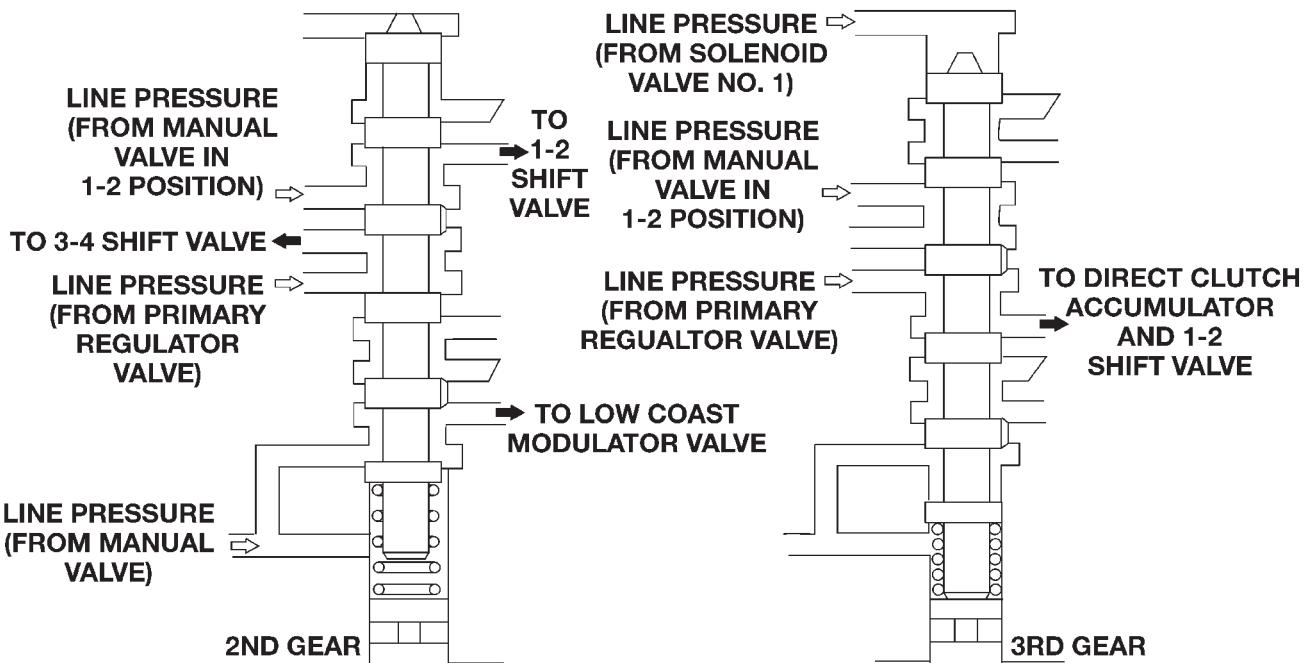
The 2-3 shift valve (Fig. 24) controls the 2-3 upshifts and downshifts. The valve is actuated by the No. 1 valve body solenoid and by line pressure from the manual valve and primary regulator valve.

DESCRIPTION AND OPERATION (Continued)



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Fig. 23 1-2 Shift Valve



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Fig. 24 2-3 Shift Valve

When the TCM activates solenoid No. 1, line pressure at the top of the 2-3 valve is released through the solenoid drain port. Spring tension moves the valve up to hold the valve in second gear position. As the solenoid is deactivated, line pressure then moves the valve down exposing the direct clutch feed port for the shift to third gear.

DESCRIPTION AND OPERATION (Continued)

3-4 SHIFT VALVE

The 3-4 shift valve (Fig. 25) is operated by the No. 2 solenoid and by line pressure from the manual valve, 2-3 valve and primary regulator valve.

Energizing the No. 2 solenoid causes line pressure at the top of the 3-4 valve to be released through the solenoid valve drain port. Spring tension moves the valve up exposing the overdrive clutch accumulator feed port to apply the clutch.

De-energizing the solenoid causes the drain port to close. Line pressure then moves the valve down exposing the overdrive brake accumulator feed port for the shift to fourth gear.

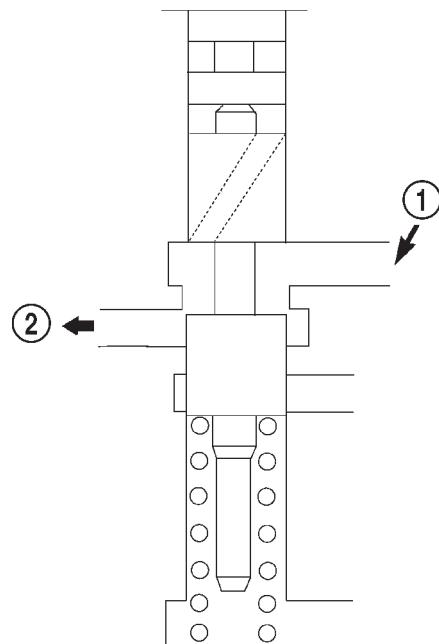
In the 1-2 or 3 gearshift lever positions, line pressure from the 2-3 shift valve is applied to the lower end of the 3-4 valve. This holds the valve upward, closing off the overdrive brake feed port preventing a shift into fourth gear.

SECOND COAST MODULATOR VALVE

The second coast modulator valve (Fig. 26) momentarily reduces line pressure from the 1-2 shift valve. This cushions application of the second coast brake. The valve is operative when the shift lever and manual valve are in the 3 position.

LOW COAST MODULATOR VALVE

The low coast modulator valve (Fig. 27) momentarily reduces line pressure from the 2-3 shift valve;

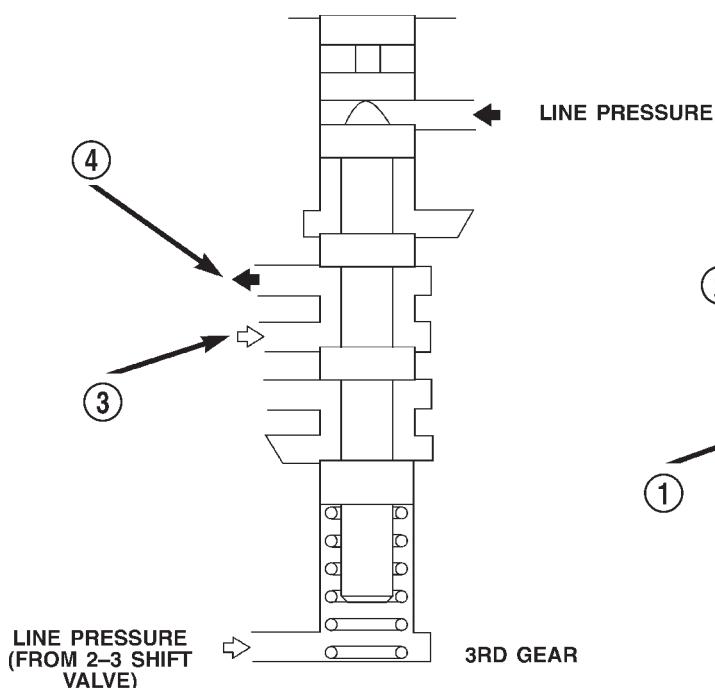


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Fig. 26 Second Coast Modulator Valve

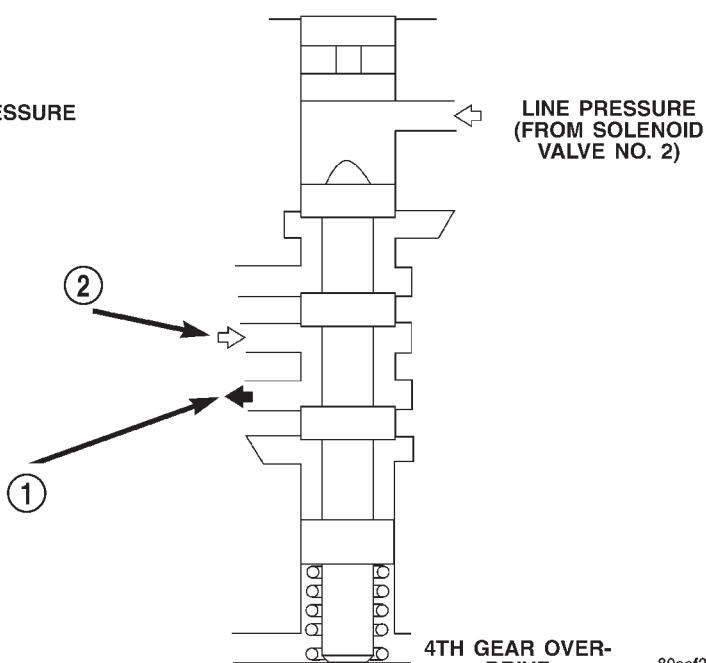
- 1 – LINE PRESSURE (FROM 1-2 SHIFT VALVE)
2 – LOW COAST MODULATOR PRESSURE SECOND COAST BRAKE

this action cushions application of the first/reverse



1 – TO OVER DRIVE BRAKE ACCUMULATOR

2 – LINE PRESSURE (FROM PRIMARY REGULATOR VALVE)



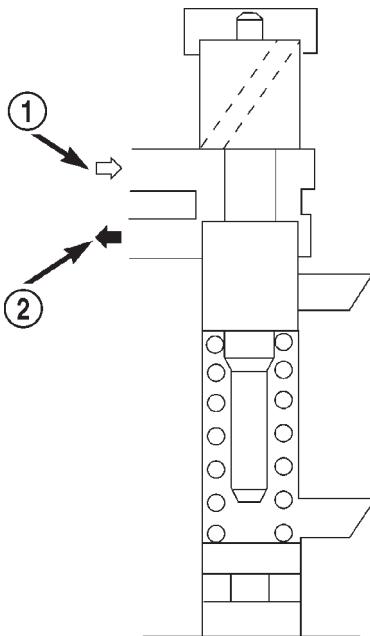
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Fig. 25 3-4 Shift Valve

- 3 – LINE PRESSURE (FROM PRIMARY REGULATOR VALVE)
4 – TO OVERDRIVE CLUTCH ACCUMULATOR

DESCRIPTION AND OPERATION (Continued)

brake. The modulator valve operates when the shift lever and manual valve are in the 1-2 position.



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Fig. 27 Low Coast Modulator Valve

- 1 – LINE PRESSURE (FROM 2-3 SHIFT VALVE)
- 2 – LOW COAST MODULATOR PRESSURE TO FIRST/REVERSE BRAKE

ACCUMULATOR CONTROL VALVE

The accumulator control valve (Fig. 28) cushions the transmission clutch and brake applications. This is achieved by reducing back pressure to the accumulators when throttle opening is small. The valve is operated by line and throttle pressure.

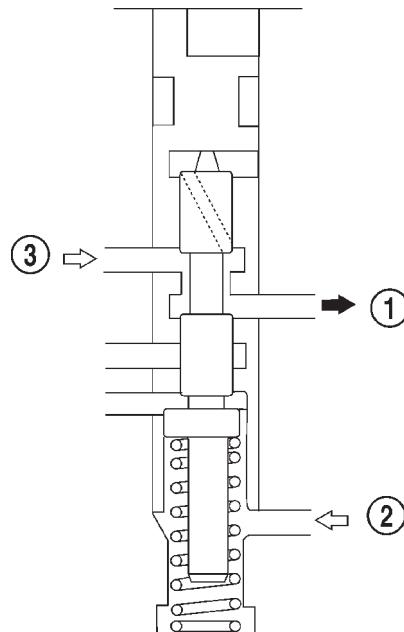
ACCUMULATORS

Four accumulators are used to cushion clutch and brake application. The accumulators (Fig. 29), consist of spring loaded pistons. The pistons dampen the initial surge of apply pressure to provide smooth engagement during shifts.

Control pressure from the accumulator control valve is continuously applied to the back pressure side of the accumulator pistons. This pressure plus spring tension holds the pistons down. As line pressure from the shift valves enters the opposite end of the piston bore, control pressure and spring tension momentarily delay application of full line pressure to cushion engagement. The accumulators are all located in the transmission case (Fig. 29).

TRANSMISSION VALVE BODY SOLENOIDS

Three solenoids are used (Fig. 30). The No. 1 and 2 solenoids control shift valve operation by applying or releasing line pressure. The signal to apply or release



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Fig. 28 Accumulator Control Valve

- 1 – ACCUMULATOR CONTROL PRESSURE (TO ACCUMULATORS)
- 2 – THROTTLE PRESSURE
- 3 – LINE PRESSURE (FROM PUMP)

pressure is provided by the transmission control module.

The No. 3 solenoid controls operation of the torque converter clutch. The solenoid operates in response to signals from the transmission control module.

When the No. 1 and 2 solenoids are activated, the solenoid plunger is moved off its seat opening the drain port to release line pressure. When either solenoid is deactivated, the plunger closes the drain port.

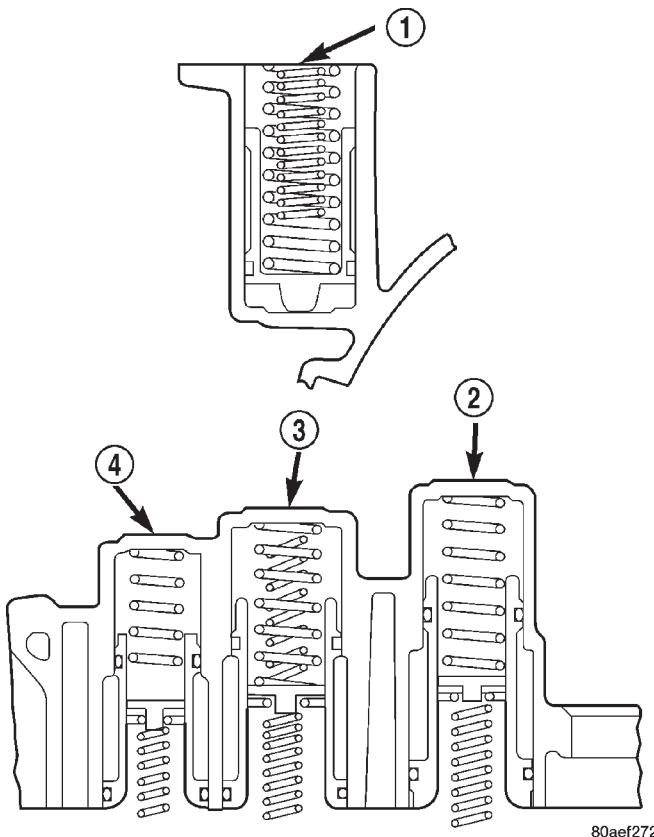
The No. 3 solenoid operates in reverse. When the solenoid is deactivated, the solenoid plunger is moved off its seat opening the drain port to release line pressure. When the solenoid is activated, the plunger closes the drain port.

PISTONS

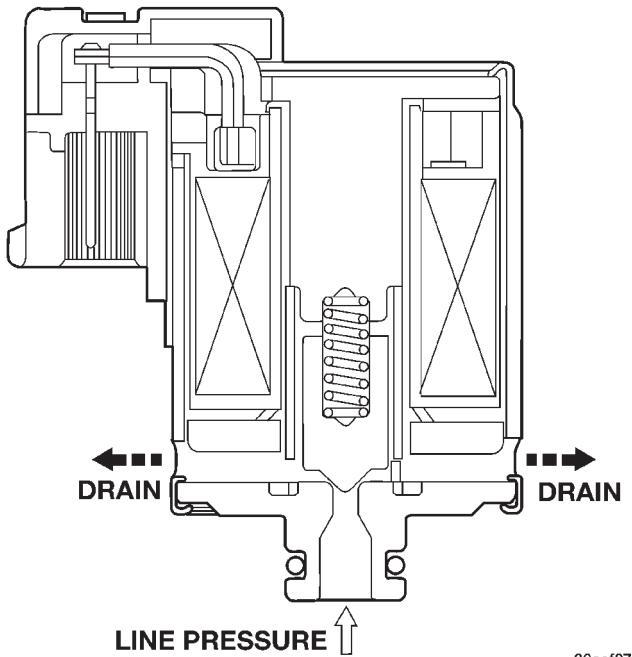
DESCRIPTION

There are several sizes and types of pistons used in an automatic transmission. Some pistons are used to apply clutches, while others are used to apply bands. They all have in common the fact that they are round or circular in shape, located within a smooth walled cylinder, which is closed at one end and converts fluid pressure into mechanical movement. The fluid pressure exerted on the piston is contained within the system through the use of piston rings or seals.

DESCRIPTION AND OPERATION (Continued)

**Fig. 29 Accumulators**

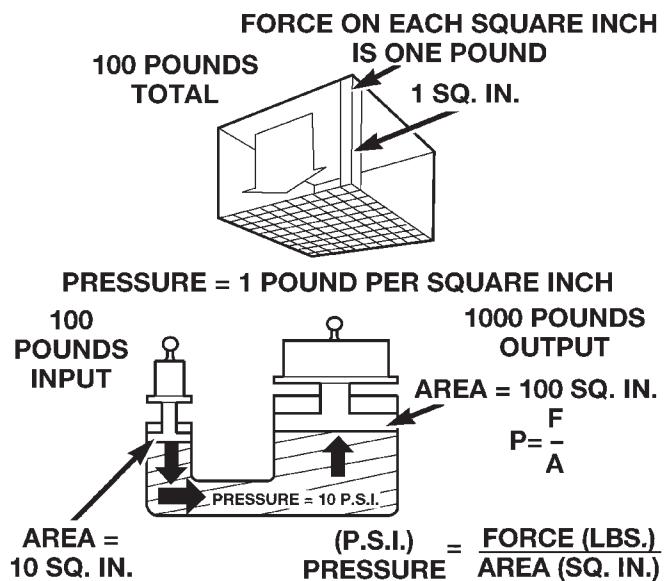
- 1 - OVERDRIVE CLUTCH
2 - SECOND BRAKE
3 - DIRECT CLUTCH
4 - OVERDRIVE BRAKE

**Fig. 30 Transmission Valve Body Solenoids****OPERATION**

The principal which makes this operation possible is known as Pascal's Law. Pascal's Law can be stated as: "Pressure on a confined fluid is transmitted equally in all directions and acts with equal force on equal areas."

PRESSURE

Pressure (Fig. 31) is nothing more than force (lbs.) divided by area (in or ft.), or force per unit area. Given a 100 lb. block and an area of 100 sq. in. on the floor, the pressure exerted by the block is: 100 lbs. 100 in or 1 pound per square inch, or PSI as it is commonly referred to.



$$\text{FORCE ON LARGE PISTON} = 1000 \text{ LBS.}$$

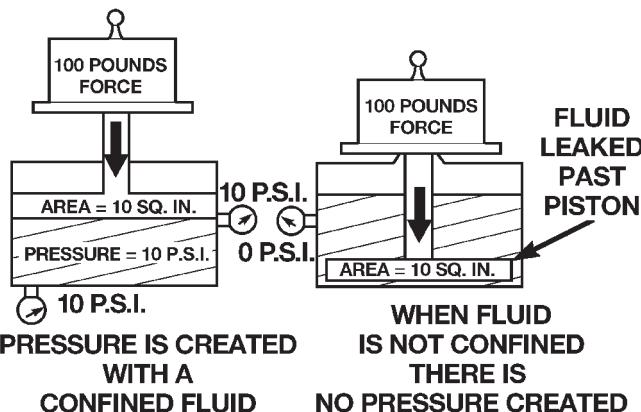
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Fig. 31 Force and Pressure Relationship**PRESSURE ON A CONFINED FLUID**

Pressure is exerted on a confined fluid (Fig. 32) by applying a force to some given area in contact with the fluid. A good example of this is a cylinder filled with fluid and equipped with a piston that is closely fitted to the cylinder wall. If a force is applied to the piston, pressure will be developed in the fluid. Of course, no pressure will be created if the fluid is not confined. It will simply "leak" past the piston. There must be a resistance to flow in order to create pressure. Piston sealing is extremely important in hydraulic operation. Several kinds of seals are used to accomplish this within a transmission. These include but are not limited to O-rings, D-rings, lip seals, sealing rings, or extremely close tolerances between the piston and the cylinder wall. The force exerted is downward (gravity), however, the principle remains the same no matter which direction is taken.

DESCRIPTION AND OPERATION (Continued)

The pressure created in the fluid is equal to the force applied, divided by the piston area. If the force is 100 lbs., and the piston area is 10 sq. in., then the pressure created equals 10 PSI. Another interpretation of Pascal's Law is that regardless of container shape or size, the pressure will be maintained throughout, as long as the fluid is confined. In other words, the pressure in the fluid is the same everywhere within the container.



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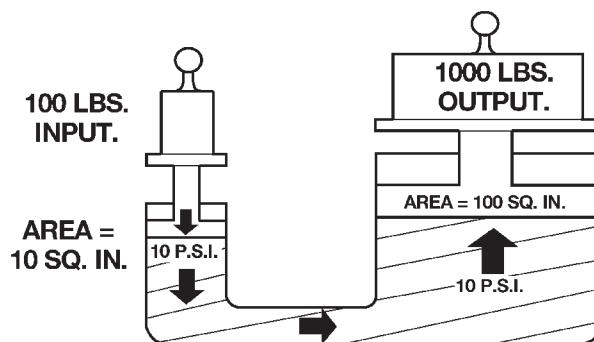
Fig. 32 Pressure on a Confined Fluid

FORCE MULTIPLICATION

Using the 10 PSI example used in the illustration (Fig. 33), a force of 1000 lbs. can be moved with a force of only 100 lbs. The secret of force multiplication in hydraulic systems is the total fluid contact area employed. The illustration, (Fig. 33), shows an area that is ten times larger than the original area. The pressure created with the smaller 100 lb. input is 10 PSI. The concept "pressure is the same everywhere" means that the pressure underneath the larger piston is also 10 PSI. Pressure is equal to the force applied divided by the contact area. Therefore, by means of simple algebra, the output force may be found. This concept is extremely important, as it is also used in the design and operation of all shift valves and limiting valves in the valve body, as well as the pistons, of the transmission, which activate the clutches and bands. It is nothing more than using a difference of area to create a difference in pressure to move an object.

PISTON TRAVEL

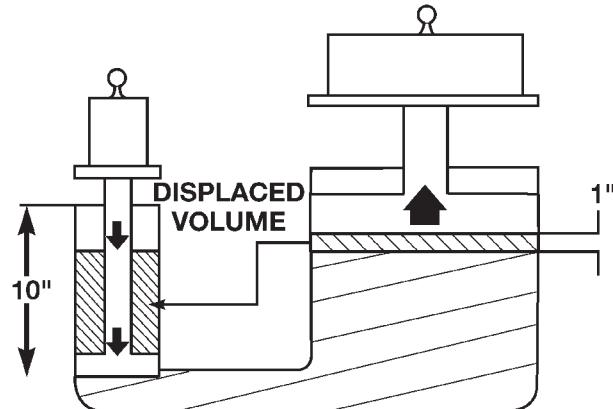
The relationship between hydraulic lever and a mechanical lever is the same. With a mechanical lever it's a weight-to-distance output rather than a pressure-to-area output. Using the same forces and areas as in the previous example, the smaller piston (Fig. 34) has to move ten times the distance required to move the larger piston one inch. Therefore, for every inch the larger piston moves, the smaller pis-



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Fig. 33 Force Multiplication

ton moves ten inches. This principle is true in other instances also. A common garage floor jack is a good example. To raise a car weighing 2000 lbs., an effort of only 100 lbs. may be required. For every inch the car moves upward, the input piston at the jack handle must move 20 inches downward.



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Fig. 34 Piston Travel

TRANSMISSION RANGES AND SHIFT LEVER POSITIONS

The AW-4 transmission has six ranges and shift lever positions. Park, Reverse and Neutral are conventional and mechanically operated. The 1-2, 3 and D ranges provide electronically controlled shifting.

The 1-2 position provides first and second gear only. The 3 position provides first, second and third gear.

DESCRIPTION AND OPERATION (Continued)

The D range provides first through fourth gear. Overdrive fourth gear range is available only when the shift lever is in D position (Fig. 35).

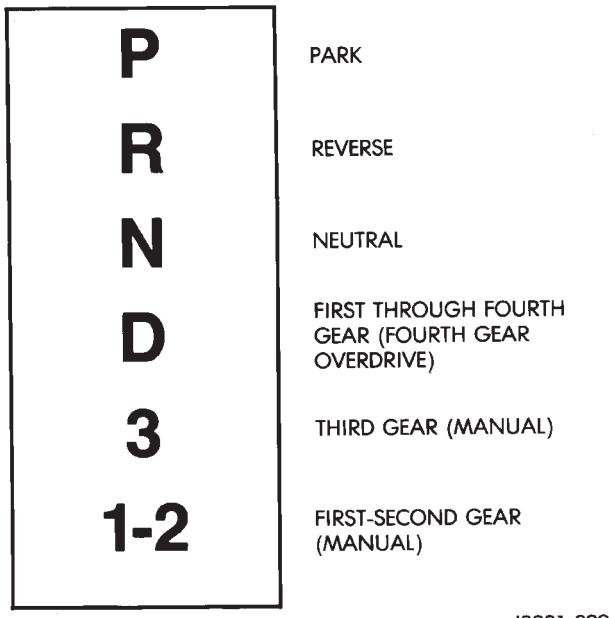


Fig. 35 AW-4 Shift Lever Positions And Transmission Ranges

TRANSMISSION CONTROL MODULE (TCM)

DESCRIPTION

The module determines shift and converter clutch engagement timing based on signals from sensors. The valve body solenoids are activated, or deactivated accordingly.

The TCM has a self diagnostic program. Component and circuitry malfunctions can be diagnosed with the DRB scan tool. Once a malfunction is noted and stored in control module memory, it is retained even after the problem has been corrected. To cancel a stored malfunction, disconnect and reconnect the "Trans." fuse in the module harness.

SENSORS

Sensors include:

- throttle position sensor (TPS)
- transmission speed sensor
- vehicle speed sensor
- park/neutral position switch
- brake switch

OPERATION

The throttle position sensor is mounted on the throttle body. It electronically determines throttle position and relays this information to the transmission control module to determine shift points and converter clutch engagement.

The transmission speed sensor consists of a rotor and magnet on the transmission output shaft and a switch in the extension housing or adapter. The sensor switch is activated each time the rotor and magnet complete one revolution. Sensor signals are sent to the transmission control module.

The park/neutral position switch is mounted on the valve body manual shaft. The switch signals shift linkage and manual valve position to the transmission control module through an interconnecting harness. The switch prevents engine starting in all gears other than Park or Neutral.

The brake switch is in circuit with the torque converter clutch solenoid. The switch disengages the converter clutch whenever the brakes are applied. The switch is mounted on the brake pedal bracket and signals the transmission control module when the pedal is pressed or released.

HYDRAULIC SYSTEM

DESCRIPTION

The hydraulic system consists of the pump, valve body and solenoids, and four hydraulic accumulators. The oil pump provides lubrication and operating pressure.

The valve body controls application of the clutches, brakes, second coast band, and the converter clutch. The valve body solenoids control sequencing of the 1-2, 2-3 and 3-4 shift valves. The solenoids are activated by signals from the transmission control module.

The accumulators are used in the clutch and brake feed circuits to control initial apply pressure. Spring loaded accumulator pistons modulate the initial surge of apply pressure for smooth engagement.

TRANSMISSION COOLER

DESCRIPTION

MAIN COOLER

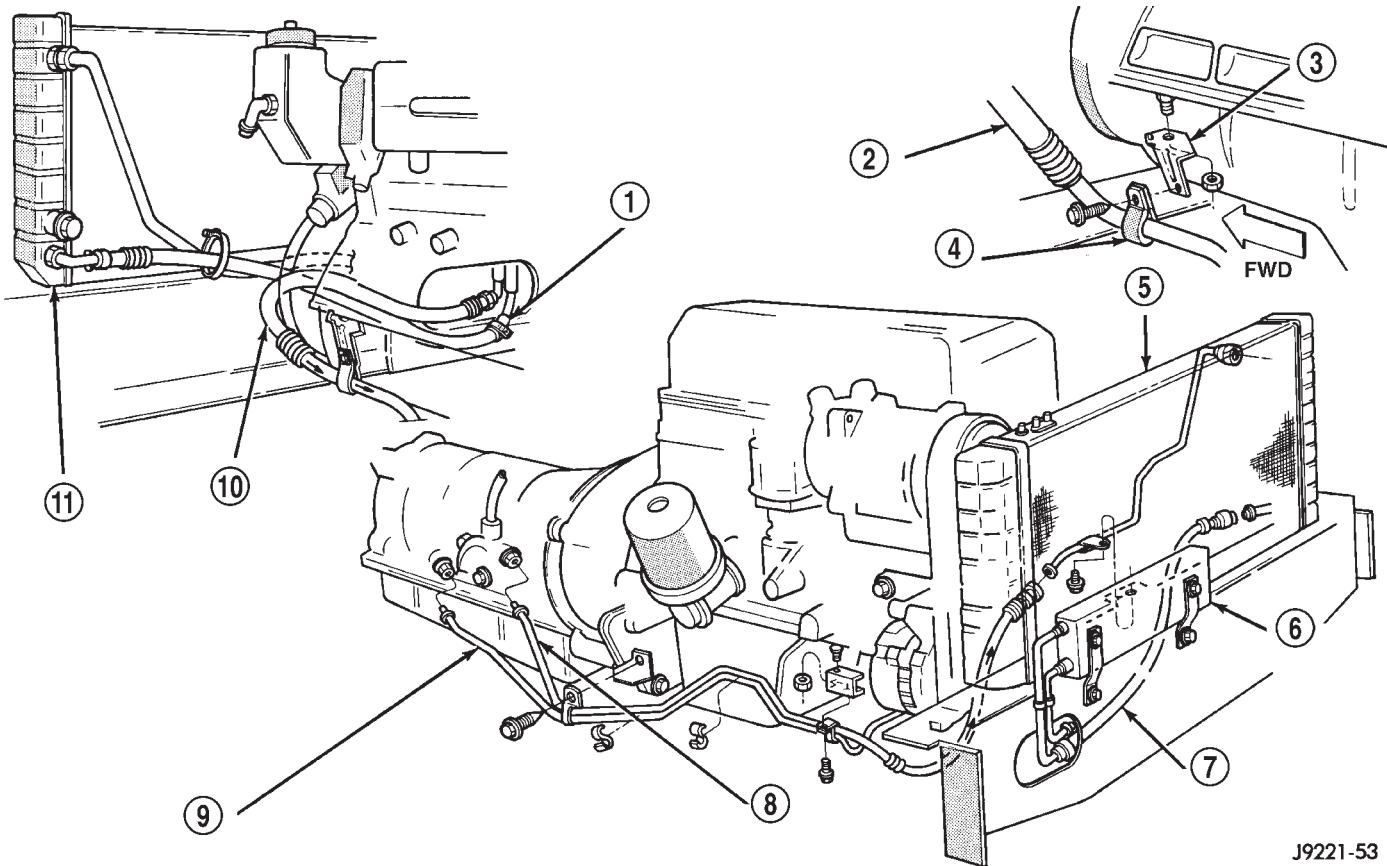
The transmission main cooler is located in the radiator. The main cooler can be flushed when necessary, however, the cooler is not a repairable component. If the cooler is damaged, plugged, or leaking, the radiator will have to be replaced.

AUXILIARY COOLER

The auxiliary cooler is mounted in front of the radiator at the driver side of the vehicle (Fig. 36). The cooler can be flushed when necessary, while mounted in the vehicle. The cooler can also be removed for access, repair, or replacement as needed.

The main and auxiliary coolers should both be flushed whenever a transmission or converter clutch

DESCRIPTION AND OPERATION (Continued)



J9221-53

Fig. 36 Auxiliary Cooler Mounting (Left Hand Drive)

- 1 – COOLER INLET LINE
- 2 – COOLER RETURN LINE
- 3 – COOLER LINE BRACKET
- 4 – CLIP
- 5 – RADIATOR
- 6 – AUXILIARY COOLER

- 7 – COOLER RETURN LINE
- 8 – OUTLET LINE (FROM TRANSMISSION)
- 9 – RETURN LINE (TO TRANSMISSION)
- 10 – COOLER RETURN LINE
- 11 – RADIATOR

malfunction generates sludge, debris, or particles of clutch friction material.

COOLER SERVICE

The main cooler (and radiator) and the auxiliary cooler can be removed for service or access to other components. Auxiliary cooler removal requires that the front bumper and radiator support be removed for access to the cooler lines and attaching bracket.

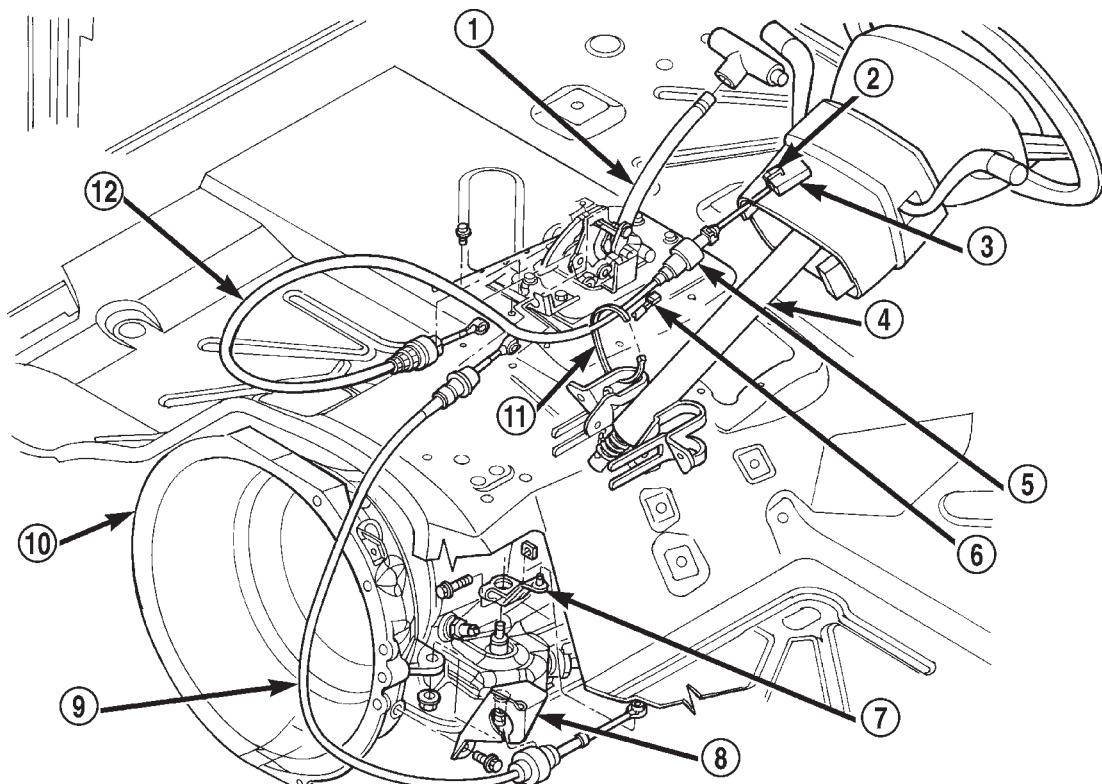
BRAKE TRANSMISSION SHIFT INTERLOCK MECHANISM**DESCRIPTION**

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 (Fig. 37).

OPERATION

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 an inch. A magnetic holding device in line with the park/brake 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 (Fig. 38) unless the shifter is fully locked into the PARK position.

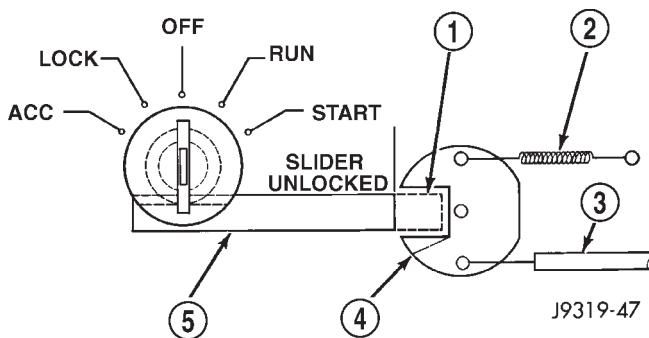
DIAGNOSIS AND TESTING (Continued)



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Fig. 37 Ignition Interlock Cable Routing

- | | |
|-----------------------------|---------------------------------|
| 1 – SHIFT MECHANISM | 7 – LEVER |
| 2 – LOCK-TAB | 8 – MOUNT BRACKET |
| 3 – IGNITION LOCK INTERLOCK | 9 – SHIFT CABLE |
| 4 – STEERING COLUMN | 10 – AUTOMATIC TRANSMISSION |
| 5 – SOLENOID | 11 – TIE STRAP |
| 6 – WIRE CONNECTOR | 12 – PARK/BRAKE INTERLOCK CABLE |

**Fig. 38 Ignition Key Cylinder Actuation**

- 1 – SLIDER LOCKED
- 2 – CAM RETURN SPRING
- 3 – INTERLOCK CABLE
- 4 – CAM
- 5 – SLIDER

DIAGNOSIS AND TESTING

GENERAL DIAGNOSIS INFORMATION

Shift points are controlled by the transmission control module (TCM). Before attempting repair, determine if a malfunction is electrical or mechanical.

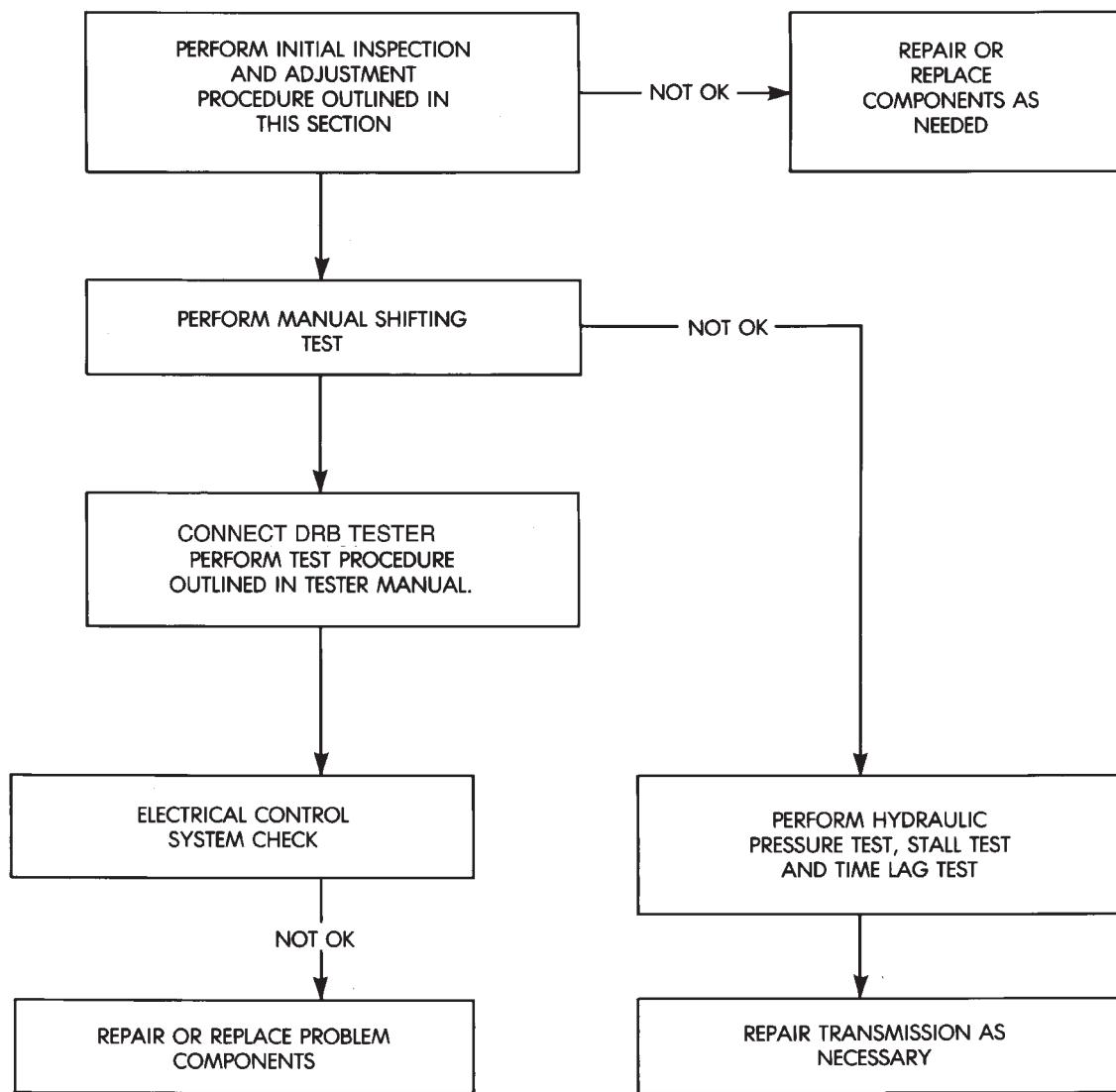
The TCM used with the AW-4 transmission has a self-diagnostic program compatible with the DRBIII scan tool. The tester will identify faults in the electrical control system.

Diagnosis should begin with the Preliminary Inspection And Adjustment procedure. It will help determine if a problem is mechanical or electrical. The first procedure step is Initial Inspection and Adjustment.

EFFECTS OF INCORRECT FLUID LEVEL

A low fluid level allows the pump to take in air along with the fluid. Air in the fluid will cause fluid pressures to be low and develop slower than normal.

DIAGNOSIS AND TESTING (Continued)



J8921-423

Preliminary Diagnosis Check Procedure

If the transmission is overfilled, the gears churn the fluid into foam. This aerates the fluid and causing the same conditions occurring with a low level. In either case, air bubbles cause fluid overheating, oxidation and varnish buildup which interferes with valve, clutch and servo operation. Foaming also causes fluid expansion which can result in fluid overflow from the transmission vent or fill tube. Fluid overflow can easily be mistaken for a leak if inspection is not careful.

CAUSES OF BURNT FLUID

Burnt, discolored fluid is a result of overheating which has two primary causes.

(1) A result of restricted fluid flow through the main and/or auxiliary cooler. This condition is usually the result of a faulty or improperly installed

drainback valve, a damaged main cooler, or severe restrictions in the coolers and lines caused by debris or kinked lines.

(2) Heavy duty operation with a vehicle not properly equipped for this type of operation. Trailer towing or similar high load operation will overheat the transmission fluid if the vehicle is improperly equipped. Such vehicles should have an auxiliary transmission fluid cooler, a heavy duty cooling system, and the engine/axle ratio combination needed to handle heavy loads.

FLUID CONTAMINATION

Transmission fluid contamination is generally a result of:

- adding incorrect fluid

DIAGNOSIS AND TESTING (Continued)

- failure to clean dipstick and fill tube when checking level
- engine coolant entering the fluid
- internal failure that generates debris
- overheat that generates sludge (fluid breakdown)
 - failure to reverse flush cooler and lines after repair
 - failure to replace contaminated converter after repair

The use of non recommended fluids can result in transmission failure. The usual results are erratic shifts, slippage, abnormal wear and eventual failure due to fluid breakdown and sludge formation. Avoid this condition by using recommended fluids only.

The dipstick cap and fill tube should be wiped clean before checking fluid level. Dirt, grease and other foreign material on the cap and tube could fall into the tube if not removed beforehand. Take the time to wipe the cap and tube clean before withdrawing the dipstick.

Engine coolant in the transmission fluid is generally caused by a cooler malfunction. The only remedy is to replace the radiator as the cooler in the radiator is not a serviceable part. If coolant has circulated through the transmission for some time, an overhaul may also be necessary; especially if shift problems had developed.

The transmission cooler and lines should be reverse flushed whenever a malfunction generates sludge and/or debris. The torque converter should also be replaced at the same time.

Failure to flush the cooler and lines will result in recontamination. Flushing applies to auxiliary coolers as well. The torque converter should also be replaced whenever a failure generates sludge and debris. This is necessary because normal converter flushing procedures will not remove all contaminants.

PRELIMINARY INSPECTION AND ADJUSTMENT

(1) Check and adjust transmission shift cable if necessary.

(2) Verify transmission throttle cable operation. Repair or replace cable if necessary.

(3) Check engine throttle operation. Operate accelerator pedal and observe injector throttle plate movement. Adjust linkage if throttle plate does not reach wide open position.

(4) Check transmission fluid level when fluid is at normal operating temperature. Start engine. Shift transmission through all gear ranges then back to Neutral. Correct level is to Full or Add mark on dipstick with engine at curb idle speed.

(5) Check and adjust park/neutral position switch if necessary.

(6) Check throttle position sensor adjustment and operation. Adjust the sensor if necessary.

MANUAL SHIFTING TEST

(1) This test determines if problem is related to mechanical or electrical component.

(2) Stop engine and disconnect transmission control module or module fuse.

(3) Road test vehicle. Shift transmission into each gear range. Transmission should operate as follows:

- lock in Park
- back up in Reverse
- not move in Neutral
- provide first gear only with shift lever in 1-2 position
- operate in third gear only with shift lever in 3 position
- operate in overdrive fourth gear in D position

(4) If transmission operates as described, proceed to next step. However, if forward gear ranges were difficult to distinguish (all feel the same), or vehicle would not back up, refer to diagnosis charts. Do not perform stall or time lag tests.

CAUTION: Do not over speed the engine during the next test step. Ease off the throttle and allow the vehicle to slow before downshifting.

(5) Continue road test. Manually downshift transmission from D to 3, and from 3 to 1-2 position. Then manually upshift transmission through forward ranges again.

(6) If transmission operation is OK, perform stall, time lag and pressure tests. If transmission shifting problem is encountered, refer to diagnosis charts.

(7) If a problem still exists, continue testing with DRB scan tool.

HYDRAULIC PRESSURE TEST

Pressure Test Procedure

(1) Connect pressure test gauge to test port on passenger side of transmission (Fig. 39). Use Adapter 7554 to connect gauge. Be sure test gauge has minimum capacity of 300 psi (2100 kPa).

(2) Be sure transmission fluid is at normal operating temperature.

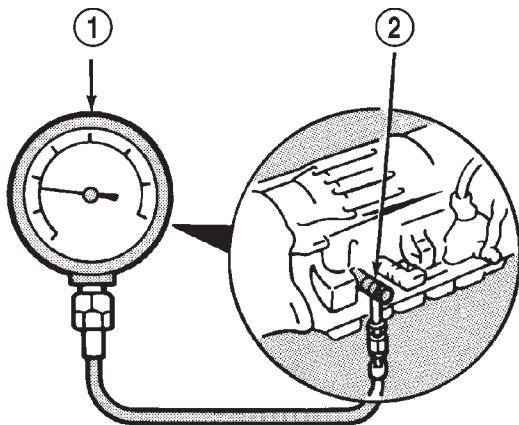
(3) Apply parking brakes and block wheels.

WARNING: DO NOT ALLOW ANYONE TO STAND AT THE FRONT OR REAR OF THE VEHICLE WHILE PERFORMING THE FOLLOWING STEPS IN THE PRESSURE TEST.

(4) Check and adjust engine curb idle speed.

(5) Apply (and hold) service brakes.

DIAGNOSIS AND TESTING (Continued)



J8921-424

Fig. 39 Pressure Test Gauge Connection

- 1 – PRESSURE GAUGE
2 – TEST PORT

(6) Shift transmission into D range and note line pressure with engine at curb idle speed. Pressure should be 61-to-70 psi (421-to-481 kPa).

(7) Press accelerator pedal to wide open throttle position and note line pressure. Pressure should be 173-to-209 psi (1196-to-1442 kPa).

CAUTION: Do not hold wide open throttle for more than 3-4 seconds at a time.

(8) Shift transmission into Reverse and note line pressure with engine at curb idle speed. Pressure should be 75-to-90 psi (519-to-618 kPa).

(9) Press accelerator to wide open throttle position and note line pressure in Reverse. Pressure should be 213-to-263 psi (1471-to-1814 kPa).

CAUTION: Do not hold wide open throttle for more than 4 seconds.

(10) If line pressure is not within specifications, adjust transmission throttle cable and repeat pressure test.

PRESSURE TEST ANALYSIS

If pressures in D and Reverse are higher than specified in test, check for the following:

- throttle cable loose, worn, binding or out of adjustment
- throttle valve, downshift plug, throttle cam, or primary regulator valve are sticking, worn or damaged

If pressures in D and Reverse are lower than specified in test, check for following:

- throttle cable loose, worn, binding or out of adjustment
- throttle valve, downshift plug, or throttle cam sticking, worn or damaged
- primary regulator valve sticking, worn, or damaged
- oil pump gears or housing worn, or damaged
- overdrive clutch worn, or damaged

If pressures are low in D range only, check for following:

- forward clutch worn or damaged
- fluid leakage in D range circuit (component seal and O-rings)

If pressures are low in Reverse only, check for following:

- shift cable and manual valve out of adjustment
- fluid leakage in reverse circuit (component seal and O-rings)
- direct clutch worn or damaged
- first/reverse brake worn or damaged

TIME LAG TEST

This test checks general condition of the overdrive clutch, forward clutch, rear clutch and first/reverse brake. Condition is indicated by the amount of time required for clutch/brake engagement with the engine at curb idle speed. Engagement time is measured for D and Reverse positions. A stop watch is recommended for test accuracy.

TEST PROCEDURE

(1) Check and adjust transmission fluid level if necessary.

(2) Bring transmission to normal operating temperature.

(3) Apply parking brakes and turn off air conditioning unit.

(4) Shift transfer case into 2H range.

(5) Start engine and check curb idle speed. Adjust speed if necessary. Curb idle must be correct to ensure accurate test results.

(6) Shift transmission into Neutral and set stop watch.

(7) During following test steps, start stop watch as soon as shift lever reaches D and Reverse ranges.

(8) Shift transmission into D range and record time it takes for engagement. Repeat test two more times.

(9) Reset stop watch and shift transmission back to Neutral.

(10) Shift transmission into Reverse and record time it takes for engagement. Repeat test two more times.

DIAGNOSIS AND TESTING (Continued)

(11) Engagement time in D range should be a maximum of 1.2 seconds. Engagement time for Reverse should be a maximum of 1.5 seconds.

TIME LAG TEST ANALYSIS

If engagement time is longer than specified for D range, check for the following:

- shift cable misadjusted
- line pressure low

- forward clutch worn
 - overdrive clutch worn or damaged
- If engagement time is longer than specified for Reverse, check for the following:
- shift cable misadjusted
 - line pressure low
 - direct clutch worn
 - first/reverse brake worn
 - overdrive clutch worn or damaged

SERVICE DIAGNOSIS

DIAGNOSIS TABLE

CONDITION	POSSIBLE CAUSE	CORRECTION
VEHICLE WILL NOT BACK UP OR MOVE FORWARD	Shift cable out of adjustment or damaged Valve body or primary regulator faulty Park lock pawl faulty Torque converter faulty Converter drive plate broken Oil pump intake screen blocked Transmission faulty	Adjust cable or replace cable Inspect/repair valve body Repair park pawl Replace torque converter Replace drive plate Clean screen Disassemble and repair transmission
SHIFT LEVER POSITION INCORRECT	Shift cable out of adjustment Manual valve and lever faulty	Adjust cable Repair valve body
HARSH ENGAGEMENT	Throttle cable out of adjustment Valve body or primary regulator faulty Accumulator pistons faulty Transmission faulty	Adjust throttle cable Repair valve body Repair pistons Disassemble and repair transmission
DELAYED 1-2, 2-3 OR 3-4 UP-SHIFT, OR DOWN-SHIFTS FROM 4-3 OR 3-2 AND SHIFTS BACK TO 4 OR 3	Electronic control problem Valve body faulty Solenoid faulty	Locate problem with DRB Tester Repair valve body Repair solenoid
SLIPS ON 1-2, 2-3 OR 3-4 UP-SHIFT, OR SLIPS OR SHUDDERS DURING ACCELERATION	Shift cable out of adjustment Throttle cable out of adjustment Valve body faulty Solenoid faulty Transmission faulty	Adjust cable Adjust cable Repair valve body Replace solenoid Disassemble and repair transmission

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
DRAG OR BIND ON 1-2, 2-3 OR 3-4 UP-SHIFT	Shift cable out of adjustment Valve body faulty Transmission faulty	Adjust cable Repair valve body Disassemble and repair transmission
CONVERTER CLUTCH DOES NOT ENGAGE IN 2ND, 3RD OR 4TH	Electronic control problem Valve body faulty Solenoid faulty Transmission faulty	Check with DRB Tester Repair valve body Replace solenoid Disassemble and repair transmission
HARSH DOWN-SHIFT	Throttle cable out of adjustment Throttle cable and cam faulty Accumulator pistons faulty Valve body faulty Transmission faulty	Adjust cable Replace cable and cam Repair pistons Repair valve body Disassemble and repair transmission
NO DOWN-SHIFT WHEN COASTING	Valve body faulty Solenoid faulty Electronic control problem	Repair valve body Replace solenoid Locate problem with DRB Tester
DOWN-SHIFT LATE OR EARLY DURING COAST	Throttle cable faulty Valve body faulty Transmission faulty Solenoid faulty Electronic control problem	Replace cable Repair valve body Disassembly and repair transmission Replace solenoid Locate problem with DRB Tester
NO 4-3, 3-2 OR 2-1 KICKDOWN	Solenoid faulty Electronic control problem Valve body faulty Solenoid faulty Electronic control problem	Replace solenoid Locate problem with DRB Tester Repair valve body Replace solenoid Locate problem with DRB Tester
NO ENGINE BRAKING IN 1-2 POSITION	Valve body faulty Solenoid faulty Electronic control problem Valve body faulty Transmission faulty	Repair valve body Replace solenoid Locate problem with DRB Tester Repair valve body Disassemble and repair transmission
VEHICLE DOES NOT HOLD IN PARK	Shift cable out of adjustment Parking lock pawl cam and spring faulty	Adjust cable Replace cam and spring
OVERHEAT DURING NORMAL OPERATION (FLUID DISCOLORED, SMELLS BURNED)	Low fluid level Fluid cooler, lines blocked, or cooler cracked (oil in engine coolant)	Add fluid and check for leaks Flush cooler and lines and replace radiator if transmission fluid has entered coolant

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
OVERHEAT DURING COMMERCIAL OPERATION OR WHILE TRAILER TOWING (FLUID DARK AND BURNED WITH SOME SLUDGE FORMATION)	Vehicle not properly equipped for trailer towing or commercial use Vehicle not equipped with auxiliary fluid cooler Extensive idling time or operation in heavy traffic in hot weather Tow vehicle overloaded (exceeding vehicle tow capacity) Air flow to auxiliary cooler blocked by snow plow, front mounted spare tire, bug screen, or similar item	Be sure vehicle is equipped with recommended optional components (i.e. HD springs, transmission, axle, larger CID engine, auxiliary cooler, correct axle ratio, etc.). If vehicle is not so equipped, it should not be used for severe service operation Drain fluid, change filter, and install auxiliary cooler Cut down on idling time; shift into neutral every so often and run engine at 1000 rpm to help circulate fluid through cooler Be sure vehicle is properly equipped to handle load; do not tow Class III-type loads with a vehicle that is only rated for Class I or II operation Remove or reposition item causing air flow blockage
OIL COMES OUT FILLER TUBE	Transmission overfilled Breather vent in oil pump blocked Fluid cooler or cooler lines plugged	Drain fluid to correct level; remove neutral switch and drain through switch hole with suction gun Inspect and clear blockage Flush cooler and lines

TRANSMISSION SOLENOID TESTING

Test solenoid resistance with an ohmmeter. Connect the ohmmeter leads to the solenoid mounting bracket and to the solenoid wire terminal (Fig. 40).

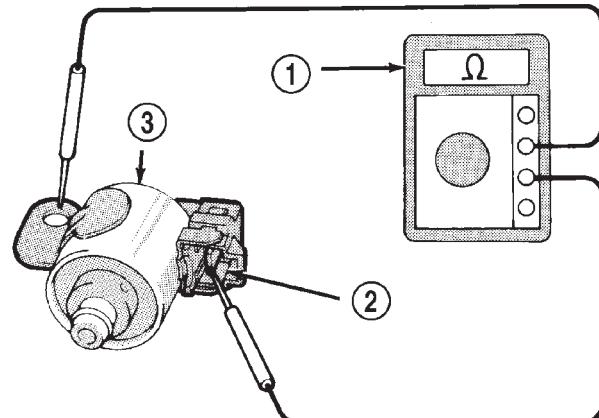
Solenoid resistance should be 11–15 ohms. Replace the solenoid if resistance is above or below the specified range.

PARK/NEUTRAL POSITION SWITCH

SWITCH TESTING

Test switch continuity with an ohmmeter. Disconnect the switch and check continuity at the connector terminal positions and in the gear ranges indicated in Figure 3. Switch continuity should be as follows:

- Continuity should exist between terminals B and C with the transmission in Park and Neutral only (Fig. 41).
- Continuity should exist between terminals A and E with the transmission in Reverse (Fig. 41).
- Continuity should exist between terminals A and G with the transmission in third gear (Fig. 41).
- Continuity should exist between terminals A and H with the transmission in first and/or second gear (Fig. 41).



J8921-435

Fig. 40 Testing Transmission Valve Body Solenoid

- 1 – OHMMETER
- 2 – WIRE TERMINAL
- 3 – SOLENOID

- Continuity should not exist in D position.

DIAGNOSIS AND TESTING (Continued)

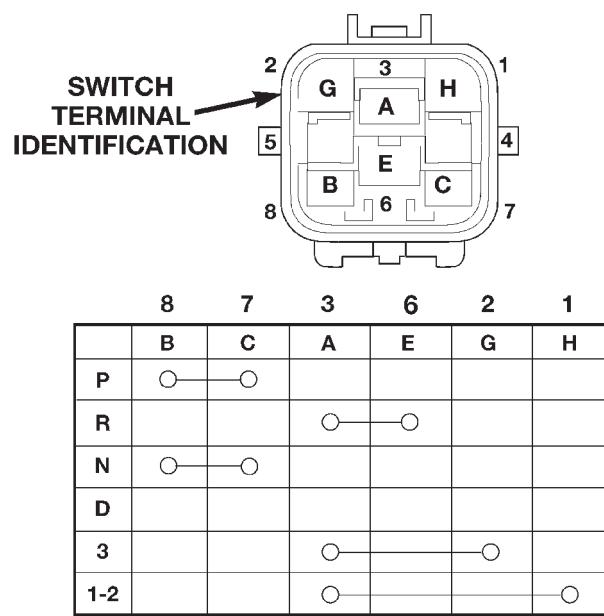


Fig. 41 Park/Neutral Position Switch Terminals And Testing

GEARSHIFT CABLE

(1) The floor shifter lever and gate positions should be in alignment with all transmission PARK, NEUTRAL, and gear detent positions.

(2) Engine starts must be possible with floor shift lever in PARK or NEUTRAL gate positions only. Engine starts must not be possible in any other gear position.

(3) With floor shift lever handle push-button not depressed and lever in:

(a) PARK position—Apply forward force on center of handle and remove pressure. Engine starts must be possible.

(b) PARK position—Apply rearward force on center of handle and remove pressure. Engine starts must be possible.

(c) NEUTRAL position—Normal position. Engine starts must be possible.

(d) NEUTRAL position—Engine running and brakes applied, apply forward force on center of shift handle. Transmission shall not be able to shift from neutral to reverse.

THROTTLE VALVE CABLE

Transmission throttle valve cable adjustment is extremely important to proper operation. This adjustment positions the throttle valve, which controls shift speed, quality, and part-throttle downshift sensitivity.

If cable setting is too loose, early shifts and slippage between shifts may occur. If the setting is too tight, shifts may be delayed and part throttle down-

shifts may be very sensitive. Refer to the Adjustments section for the proper adjustment procedure.

SPEED SENSOR TESTING

Test the speed sensor with an ohmmeter. Place the ohmmeter leads on the terminals in the sensor connector (Fig. 42).

Rotate the transmission output shaft and observe the ohmmeter needle. The needle should deflect indicating the switch is opening/closing as the rotor moves past the sensor (Fig. 42). Replace the sensor if the ohmmeter does not display any kind of reading.

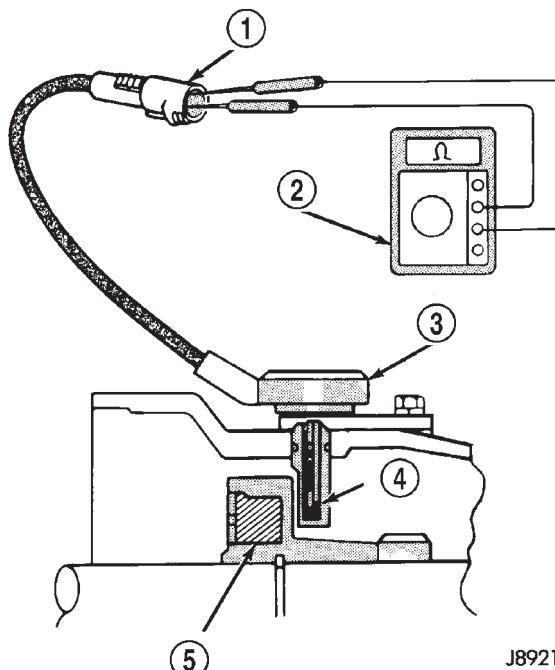


Fig. 42 Speed Sensor Testing

- 1 – CONNECTOR
- 2 – OHMMETER
- 3 – SENSOR
- 4 – SENSOR SWITCH
- 5 – ROTOR

If a digital ohmmeter is being used, the sensor should generate an ohmmeter readout each time the switch opens and closes.

FLOW TESTING TRANSMISSION MAIN COOLER

Cooler flow is checked by measuring the amount of fluid flow through the cooler in a 20 second time period. The test is performed with the engine running and transmission in neutral. Fluid is then pumped through the cooler by the transmission oil pump.

(1) Disconnect cooler inlet line at transmission fitting.

DIAGNOSIS AND TESTING (Continued)

(2) Securely attach hose to end of inlet line and position line in a one quart test container.

(3) Add extra quart of fluid to transmission.

(4) Use stopwatch to check flow test time.

(5) Shift transmission into neutral and set parking brake.

(6) Start and run engine at curb idle speed and immediately note cooler flow. Approximately one quart of fluid should flow into test container in 20 second period.

(7) If cooler flow is intermittent, flows less than one quart in 20 seconds, or does not flow at all, cooler is faulty and must be replaced.

TORQUE CONVERTER STATOR CLUTCH INSPECTION

(1) Insert Rotating Tool 7547 into converter hub and seat tool in one-way clutch (Fig. 43).

(2) Insert Stopper Tool 7548 in one converter hub notch and into outer race of rotating tool.

(3) Turn rotating tool clockwise. Converter clutch should rotate freely and smoothly. Less than 2.5 N·m (22 in. lbs.) of torque should be required to rotate clutch in clockwise direction.

(4) Turn rotating tool in counterclockwise direction. Converter clutch should lock.

(5) Replace converter if clutch binds or will not lock.

SERVICE PROCEDURES

CHECKING FLUID LEVEL

(1) Be sure transmission fluid is at normal operating temperature. Normal operating temperature is reached after approximately 15 miles (25 km) of operation.

(2) Position vehicle on level surface. This is important for an accurate fluid level check.

(3) Shift transmission through all gear ranges and back to Park.

(4) Apply parking brakes.

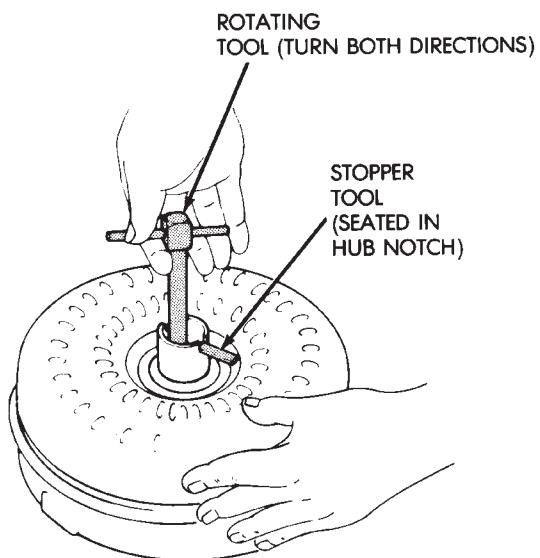
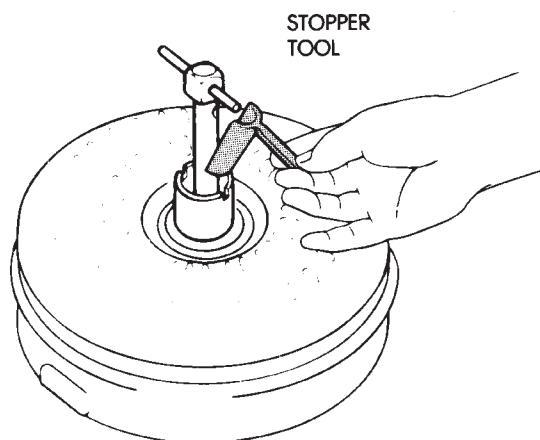
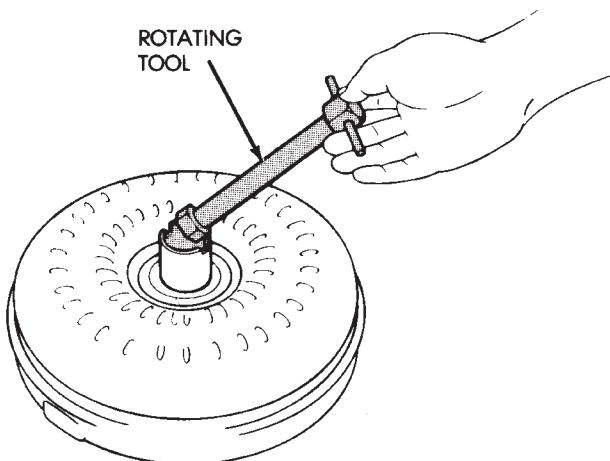
(5) Verify that transmission is in Park.

(6) Wipe off dipstick handle to prevent dirt from entering fill tube. Then remove dipstick and check fluid level and condition.

(7) **Correct fluid level is to FULL mark on dipstick when fluid is at normal operating temperature (Fig. 44).**

(8) If fluid level is low, top off level with Mopar Dexron II/Mercon. Mopar Dexron II can be used but only if Mercon is not available. **Do not overfill transmission. Add only enough fluid to bring level to Full mark.**

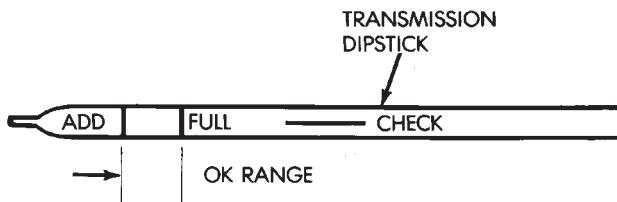
(9) If too much fluid was added, excess amount can be removed with suction gun and appropriate diameter



J8921-470

Fig. 43 Checking Operation Of Torque Converter Stator One-Way Clutch

SERVICE PROCEDURES (Continued)



J8921-427

Fig. 44 Transmission Fluid Level

ter plastic tubing. Tubing only has to be long enough to extend into oil pan.

CHECKING FLUID CONDITION

Inspect the appearance of the fluid during the fluid level check. Fluid color should range from dark red to pink and be free of foreign material, or particles. If the fluid is dark brown or black in color and smells burnt, the fluid has been overheated and must be changed.

Transmission operation should also be checked if the fluid is severely discolored and contains quantities of foreign material, metal particles, or clutch disc friction material.

A small quantity of friction material or metal particles in the oil pan is normal. The particles are usually generated during the break-in period and indicate normal seating of the various transmission components.

REFILLING AFTER OVERHAUL OR FLUID/FILTER CHANGE

The best way to refill the transmission after a fluid change or overhaul is as follows:

(1) If transmission has been overhauled, install transmission in vehicle.

(2) Remove dipstick and insert clean funnel in transmission fill tube.

(3) Add following initial quantity of Mopar Dexron IIE/Mercon to transmission:

(4) If fluid/filter change was performed, add **4 pints (2 quarts)** of fluid to transmission.

(a) If transmission was completely overhauled and torque converter was replaced or drained, add **10 pints (5 quarts)** of fluid to transmission.

(b) Remove funnel and install dipstick.

(5) Operate vehicle until fluid reaches normal operating temperature.

(6) Apply parking brakes.

(7) Let engine run at normal curb idle speed, apply service brakes. Then shift transmission through all gear ranges and back to PARK (leave engine running).

(8) Remove dipstick and check fluid level. Add only enough fluid to bring level to Full mark on dipstick.

Do not overfill. If too much fluid is added, excess amount can be removed with suction gun and plastic tubing. Tubing only has to be long enough to extend into oil pan.

(9) When fluid level is correct, shut engine off, release park brake, remove funnel, and reseat dipstick in fill tube.

TRANSMISSION CONTROL MODULE (TCM) SERVICE

Use the DRB scan tool to diagnose transmission control module function whenever a fault is suspected. Replace the module only when the scan tool indicates the module is actually faulty.

OIL PUMP VOLUME CHECK

Measuring the oil pump output volume will determine if sufficient oil flow to the transmission oil cooler exists, and whether or not an internal transmission failure is present.

Verify that the transmission fluid is at the proper level. Refer to the Fluid Level Check procedure in this section. If necessary, fill the transmission to the proper level with Mopar® ATF+3, type 7176, Automatic Transmission Fluid.

(1) Disconnect the **To cooler** line at the cooler inlet 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 one quart of transmission fluid is collected in the container in 20 seconds or less, oil pump flow volume is within acceptable limits. If fluid flow is intermittent, or it takes more than 20 seconds to collect one quart of fluid, refer to the Hydraulic Pressure tests in this section for further diagnosis.

(4) Re-connect the **To cooler** line to the transmission cooler inlet.

(5) Refill the transmission to proper level.

FLUSHING COOLERS AND TUBES

When a transmission failure has contaminated the fluid, the oil cooler(s) must be flushed. The torque converter must also be replaced. This will insure that metal particles or sludged oil are not later transferred back into the reconditioned (or replaced) transmission.

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

SERVICE PROCEDURES (Continued)

CAUTION: The transmission oil cooler requires a two stage flushing procedure due to an internally mounted thermostat. Failure to follow the procedure can result in severe transmission damage.

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

KEEP LIGHTED 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.

NOTE: The converter drainback valve must be removed and an appropriate replacement hose installed to bridge the space between the transmission cooler line and the cooler fitting. Failure to remove the drainback valve will prevent reverse flushing the system. A suitable replacement hose can be found in the adapter kit supplied with the flushing tool.

(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) Remove the transmission oil cooler from the vehicle. Refer to the Group 7, Cooling System, for the proper procedures.

(8) Remove the transmission oil cooler thermostat. Refer to the Group 7, Cooling System, for the proper procedures.

(9) Re-install the thermostat cover onto the oil cooler and install the snap ring.

(10) Re-connect the oil cooler to the transmission cooler lines.

(11) Turn pump ON for two to three minutes to flush cooler(s) and lines.

NOTE: This flushes the bypass circuit of the cooler only.

(12) Turn pump OFF.

(13) Remove the thermostat cover from the oil cooler.

(14) Install Special Tool Cooler Plug 8414 into the transmission oil cooler.

(15) Turn pump ON for two to three minutes to flush cooler(s) and lines.

NOTE: This flushes the main oil cooler core passages only.

(16) Turn pump OFF.

(17) Remove the thermostat cover from the oil cooler.

(18) Remove Special Tool Cooler Plug 8414 from the transmission oil cooler.

(19) Install a new thermostat spring, thermostat, cover, and snap-ring into the transmission oil cooler.

(20) Install the transmission oil cooler onto the vehicle.

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

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

(23) Place CLEAR suction line into a one quart container of Mopar® ATF Plus 3, type 7176 automatic transmission fluid.

(24) 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.

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

ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum transmission case and valve body can be repaired by the use of Heli-Coils, or equivalent. This repair consists of drilling out the worn-out damaged threads. Then tap the hole with a special Heli-Coil tap, or equivalent, and installing a Heli-Coil insert, or equivalent,

SERVICE PROCEDURES (Continued)

into the hole. This brings the hole back to its original thread size.

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

REMOVAL AND INSTALLATION

TRANSMISSION AND TORQUE CONVERTER

REMOVAL

- (1) Raise vehicle.
- (2) Drain transmission fluid and reinstall oil pan drain plug.
- (3) On models with 2-piece fill tube, remove upper half of tube (Fig. 45).

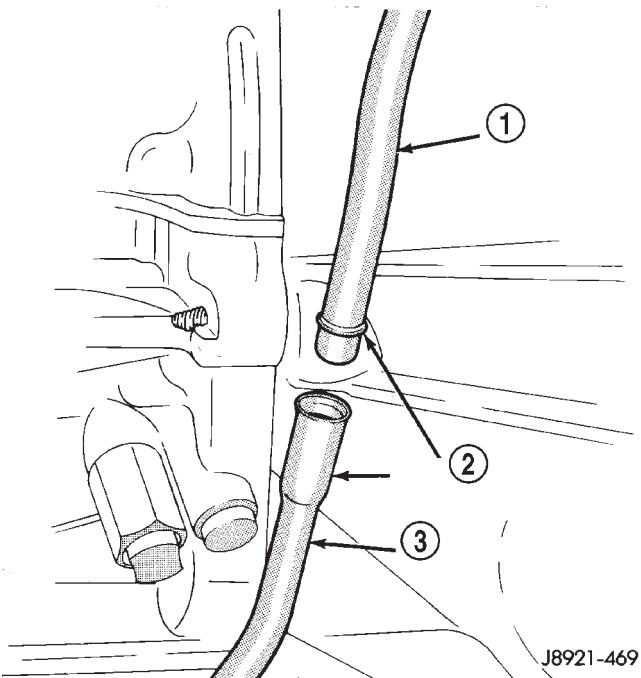


Fig. 45 Transmission Fill Tube (Two-Piece)

- 1 – UPPER HALF
- 2 – TRANSMISSION FILL TUBE
- 3 – LOWER HALF

- (4) Disconnect cooler lines at transmission.
- (5) Support engine with safety stand and support transmission with jack.

- (6) Disconnect transmission and transfer case shift linkage.

(7) Remove necessary exhaust components.

(8) Disconnect vehicle speed sensor wires

(9) Mark position of front and rear propeller shafts for alignment reference. Then remove shafts from vehicle.

(10) Remove rear crossmember.

(11) Disconnect transmission shift cable at transmission. Then disconnect transmission throttle valve cable at engine.

(12) Disconnect necessary vacuum and fluid hoses.

(13) Remove transfer case from transmission.

(14) Disconnect and remove crankshaft position sensor (Fig. 46).

CAUTION: The crankshaft position sensor can be damaged during transmission removal (or installation) if the sensor is still bolted to the engine block. To avoid damage, remove the sensor before removing the transmission.

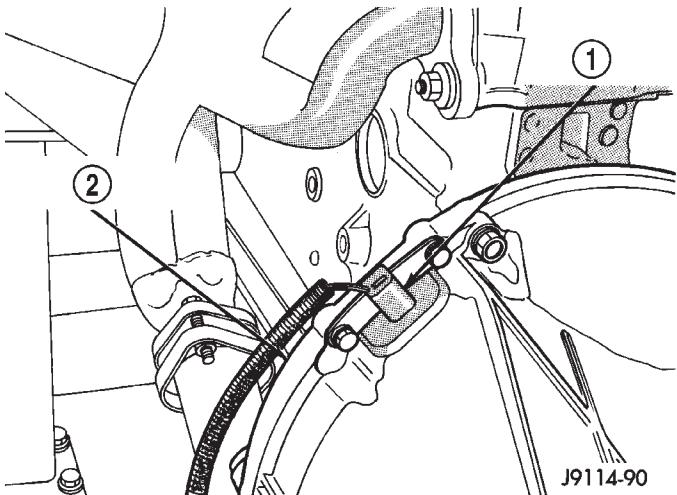


Fig. 46 Crankshaft Position Sensor

1 – CRANKSHAFT POSITION SENSOR

2 – TRANSMISSION HOUSING

- (15) Remove starter motor.

- (16) Remove bolts attaching converter to drive plate.

- (17) Remove bolts attaching converter housing to engine.

REMOVAL AND INSTALLATION (Continued)

(18) Secure transmission to jack with safety chains.

(19) Pull transmission rearward for access to converter. Then secure converter in pump with C-clamp or strap bolted to converter housing.

(20) Remove transmission from under vehicle.

(21) Remove torque converter if converter or oil pump seal are to be serviced.

INSTALLATION

(1) Mount transmission on transmission jack. Then secure transmission to jack with safety chains.

(2) Lubricate converter drive hub and oil pump seal lip with transmission fluid. Then install converter. Be sure converter is fully seated in oil pump gears before proceeding. Hold converter in place with C-clamp or strap attached to converter housing.

(3) Lubricate the pocket in the rear of the crankshaft, in which the converter pilot hub rides, with a light coating of Mopar® High-Temp Grease.

(4) Align and position transmission and converter on engine.

(5) Remove clamp or strap used to hold torque converter in place.

(6) Move transmission forward seat it on engine. Be sure torque converter hub is fully seated.

(7) Install converter housing-to-engine bolts (Fig. 47).

(8) Install converter-to-drive plate bolts.

(9) Install and connect starter motor.

(10) Install and connect crankshaft position sensor.

(11) Install transfer case on transmission.

(12) Connect transfer case shift linkage and vacuum hoses.

(13) Connect exhaust components.

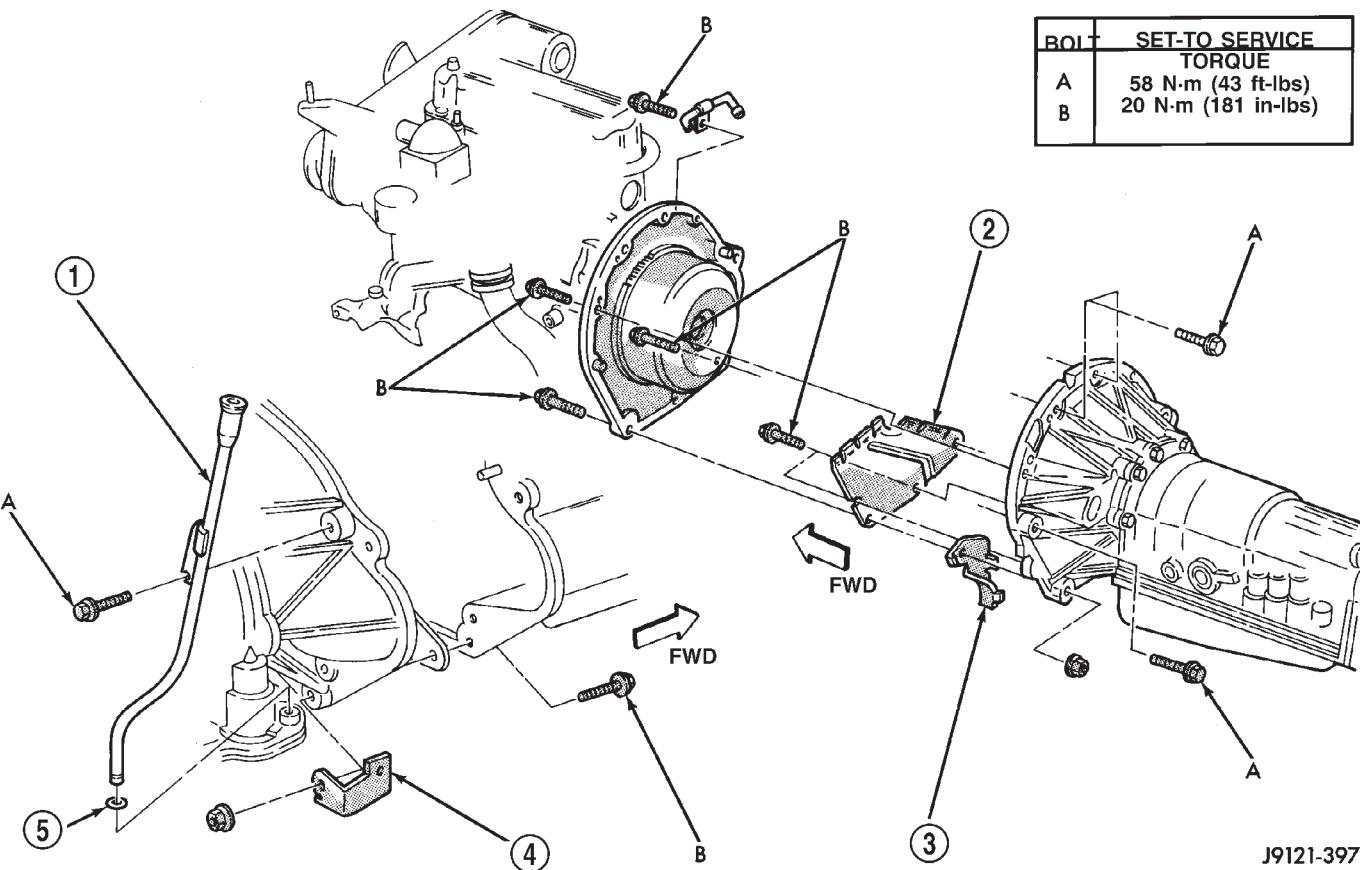
(14) Install rear crossmember and remove jack used to support transmission assembly.

(15) Connect speed sensor wire harness to sensor.

(16) Connect wire harness to park/neutral position switch.

(17) Align and connect front and rear propeller shafts.

(18) Connect transmission wire harnesses and transfer case vacuum and wire harnesses.



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Fig. 47 Transmission Mounting

1 – TRANSMISSION FILL TUBE

2 – COVER

3 – BRACKET

4 – BRACKET

5 – FILL TUBE O-RING

REMOVAL AND INSTALLATION (Continued)

- (19) Connect transmission cooler lines.
- (20) Connect transmission throttle cable at engine.
- (21) Install new O-ring seal on upper half of transmission fill tube. Then connect upper and lower tube halves.
- (22) Lower vehicle.
- (23) Fill transmission with Mopar® Dexron IIE/Mercon automatic transmission fluid.

TORQUE CONVERTER

REMOVAL

- (1) Remove transmission and torque converter from vehicle.
- (2) Place a suitable drain pan under the converter housing end of the transmission.

CAUTION: Verify that transmission is secure on the lifting device or work surface, the center of gravity of the transmission will shift when the torque converter is removed creating an unstable condition.

The torque converter is a heavy unit. Use caution when separating the torque converter from the transmission.

- (3) Pull the torque converter forward until the center hub clears the oil pump seal.
- (4) Separate the torque converter from the transmission.

INSTALLATION

Check converter hub and drive notches for sharp edges, burrs, scratches, or nicks. Polish the hub and notches with 320/400 grit paper or crocus cloth if necessary. The hub must be smooth to avoid damaging the pump seal at installation.

(1) Lubricate converter hub and oil pump seal lip with transmission fluid.

(2) Place torque converter in position on transmission.

CAUTION: Do not damage oil pump seal or bushing while inserting torque converter into the front of the transmission.

- (3) Align torque converter to oil pump seal opening.
- (4) Insert torque converter hub into oil pump.
- (5) While pushing torque converter inward, rotate converter until converter is fully seated in the oil pump gears.
- (6) Check converter seating with a scale and straightedge (Fig. 48). Surface of converter lugs should be 1/2 in. to rear of straightedge when converter is fully seated.
- (7) If necessary, temporarily secure converter with C-clamp attached to the converter housing.

- (8) Install the transmission in the vehicle.
- (9) Fill the transmission with the recommended fluid.

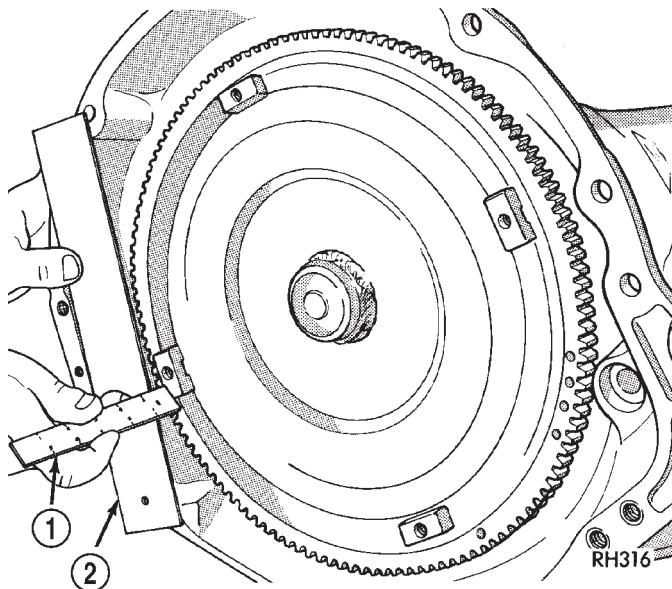


Fig. 48 Checking Torque Converter Seating

- 1 – SCALE
2 – STRAIGHTEDGE

ADAPTER HOUSING SEAL

REMOVAL

- (1) Raise vehicle.
- (2) Disconnect or remove components necessary to gain access to seal (e.g. propeller shaft, crossmember, shift linkage, transfer case, exhaust components, hoses, wires).

(3) On 4X2 vehicles, remove dust shield from the adapter housing by tapping gently with a brass drift and hammer (Fig. 49).

(4) On 4X2 vehicles, remove the adapter housing seal with Seal Puller 7550.

(5) On 4X4 vehicles, remove the adapter housing seal using a slide hammer mounted screw.

INSTALLATION

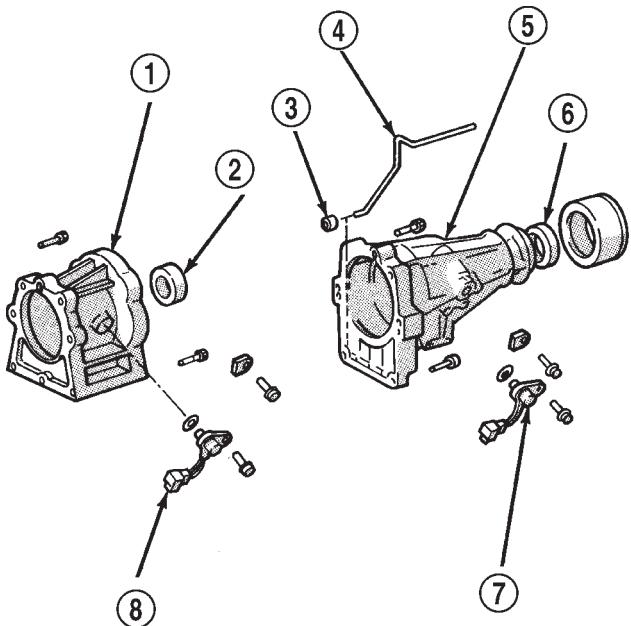
- (1) Install new adapter housing seal with Seal Installer 7888.
- (2) On 4X2 vehicles, install dust shield using Special Tool D-187-B.
- (3) Reinstall components removed to gain access to seal.
- (4) Top off transmission fluid if necessary.

SPEED SENSOR

REMOVAL

- (1) Disconnect sensor wire harness connector.

REMOVAL AND INSTALLATION (Continued)



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Fig. 49 Adapter Housing Seals

1 – 4WD ADAPTER HOUSING

2 – SEAL

3 – BUSHING

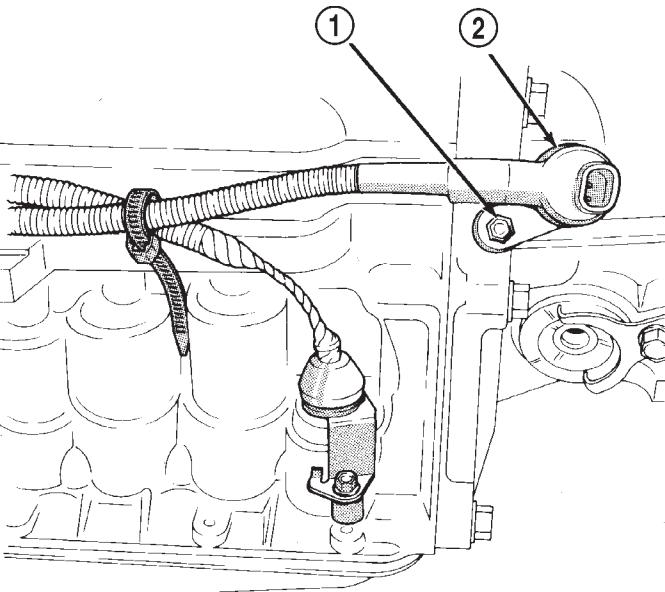
4 – OIL TUBE

5 – 2WD EXTENSION HOUSING

6 – SEAL

7 – SPEED SENSOR

8 – SPEED SENSOR O-RING



J8921-463

Fig. 50 Transmission Speed Sensor Removal/Installation

1 – RETAINER BOLT

2 – SPEED SENSOR

(7) Inspect sensor and adapter O-rings (Fig. 51). Remove and discard O-rings if worn or damaged.

(8) Inspect terminal pins in speed sensor. Clean pins with Mopar® electrical spray cleaner if dirty or oxidized. Replace sensor if faulty, or pins are loose, severely corroded, or damaged.

INSTALLATION

(1) Thoroughly clean adapter flange and adapter mounting surface in housing. Surfaces must be clean for proper adapter alignment and speedometer operation.

(2) Install new O-rings on speed sensor and speedometer adapter if necessary (Fig. 51).

(3) Lubricate sensor and adapter O-rings with transmission fluid.

(4) Install vehicle speed sensor in speedometer adapter. Tighten sensor attaching screw to 2-3 N·m (15-27 in. lbs.) torque.

(5) Install speedometer pinion in adapter.

(6) Count number of teeth on speedometer pinion. Do this before installing assembly in housing. Then lubricate pinion teeth with transmission fluid.

(7) Note index numbers on adapter body (Fig. 52). These numbers will correspond to number of teeth on pinion.

(8) Install speedometer assembly in housing.

(9) Rotate adapter until required range numbers are at 6 o'clock position. Be sure range index numbers correspond to number of teeth on pinion gear.

(2) Remove sensor retainer bolt and remove sensor (Fig. 50).

(3) Remove and discard speed sensor O-ring.

INSTALLATION

(1) Install new O-ring on speed sensor and install sensor in transmission case.

(2) Install sensor bracket and retainer bolt. Tighten bolt to 7.4 N·m (65 in. lbs.) torque.

(3) Connect sensor wire harness connector.

SPEEDOMETER ADAPTER

Rear axle gear ratio and tire size determine speedometer pinion requirements.

REMOVAL

(1) Raise vehicle.

(2) Disconnect wires from vehicle speed sensor.

(3) Remove adapter clamp and screw (Fig. 51).

(4) Remove speed sensor and speedometer adapter as assembly.

(5) Remove speed sensor retaining screw and remove sensor from adapter.

(6) Remove speedometer pinion from adapter.

REMOVAL AND INSTALLATION (Continued)

(10) Install speedometer adapter clamp and retaining screw. Tighten clamp screw to 10-12 N·m (90-110 in. lbs.) torque.

(11) Connect wires to vehicle speed sensor.

(12) Lower vehicle and top off transmission fluid level, if necessary.

SPEED SENSOR ROTOR-SPEEDOMETER DRIVE GEAR

REMOVAL

(1) Raise vehicle.

(2) Remove components necessary to gain access to rotor and drive gear such as propeller shaft, transfer case, crossmember, and shift linkage.

(3) Disengage wire connector from the output speed sensor.

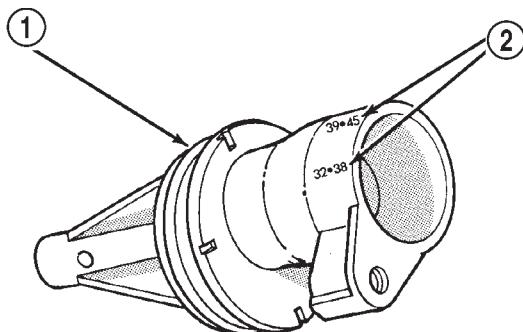
(4) Remove the bolt holding the output speed sensor to the adapter housing.

(5) Remove the output speed sensor from the adapter housing.

(6) Remove the bolts holding the adapter housing to the transmission case.

(7) Tap the adapter housing at the joint line gently with a rubber mallet to separate the adapter housing from the transmission case.

(8) Remove the adapter housing from the transmission case.



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Fig. 52 Index Numbers On Speedometer Pinion Adapter

1 – SPEEDOMETER ADAPTER

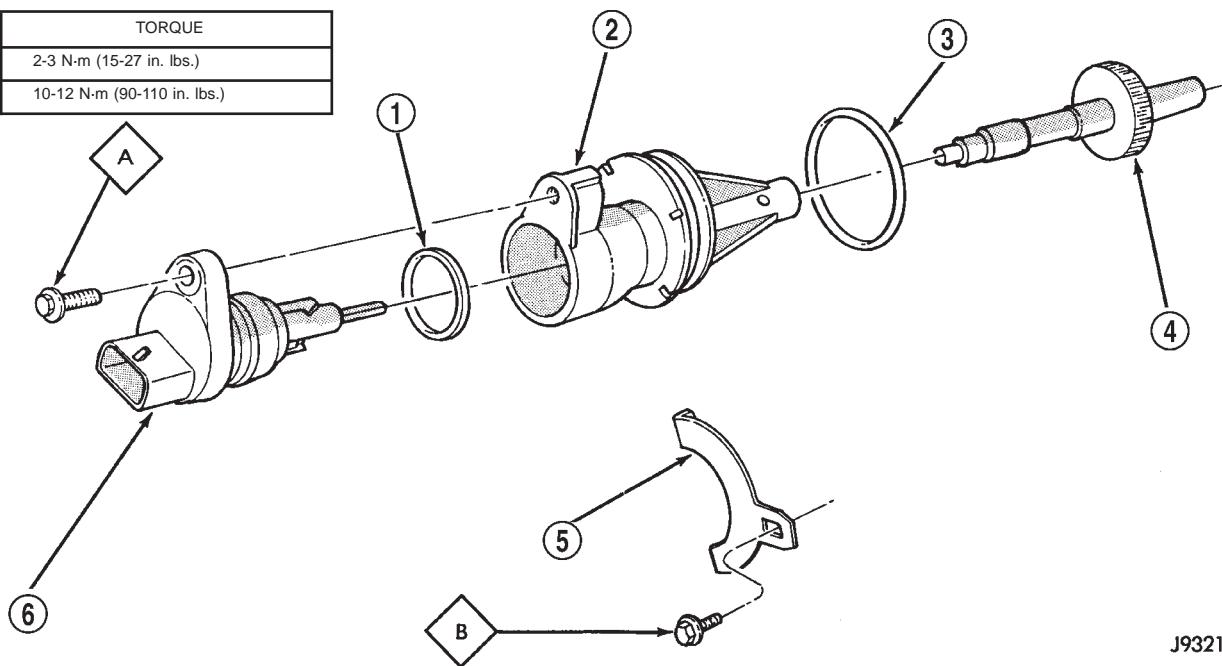
2 – INDEX NUMBER LOCATION

(9) Remove speedometer drive gear snap ring (Fig. 53).

(10) Remove the speedometer drive gear and spacer, if equipped.

(11) Remove rotor from the output shaft. It may be necessary to use a wood dowel or hammer handle (Fig. 54) to gently pry the rotor from the output

ITEM	TORQUE
A	2-3 N·m (15-27 in. lbs.)
B	10-12 N·m (90-110 in. lbs.)



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Fig. 51 Speedometer Pinion Adapter Components

1 – SENSOR O-RING

2 – SPEEDOMETER ADAPTER

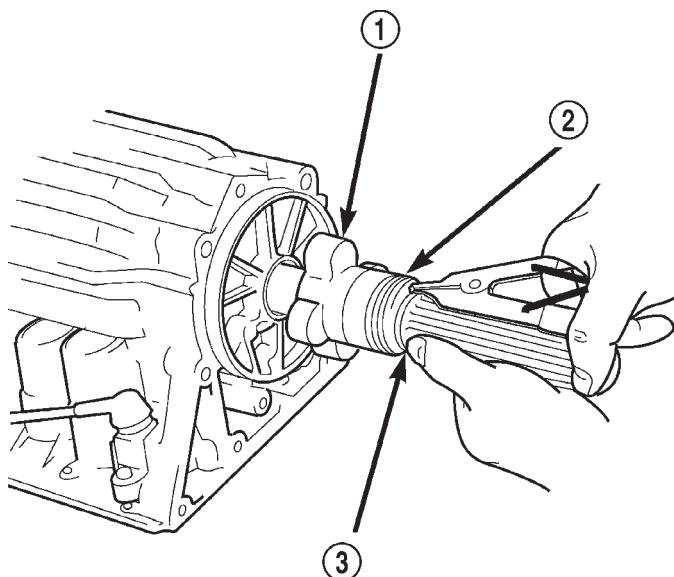
3 – ADAPTER O-RING

4 – SPEEDOMETER PINION

5 – ADAPTER CLAMP

6 – VEHICLE SPEED SENSOR

REMOVAL AND INSTALLATION (Continued)

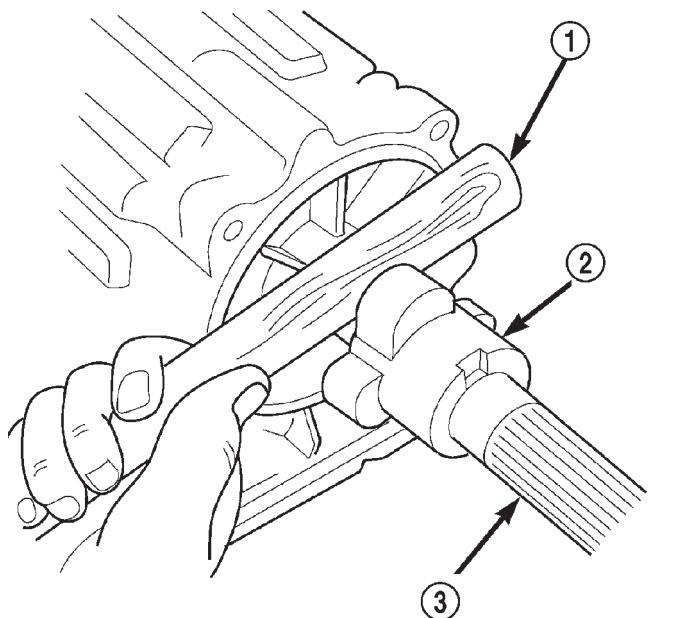


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Fig. 53 Removing/Installation Speedometer Drive Gear

- 1 – ROTOR
2 – SPEEDOMETER DRIVE GEAR
3 – SNAP RING

shaft. Be sure to retrieve the rotor locating key from the output shaft or rotor.



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Fig. 54 Removing Speed Sensor Rotor

- 1 – WOOD DOWEL OR HAMMER HANDLE
2 – ROTOR
3 – OUTPUT SHAFT

INSTALLATION

(1) Clean sealing surfaces of transmission case and extension/adaptor housing.

(2) Install rotor, spacer (if equipped) and drive gear on output shaft. Then install drive gear snap ring (Fig. 53).

(3) Apply 1/8 3/16 inch wide bead of Threebond® Liquid Gasket TB1281, P/N 83504038, to transmission case sealing surface and install extension/adapter housing on case.

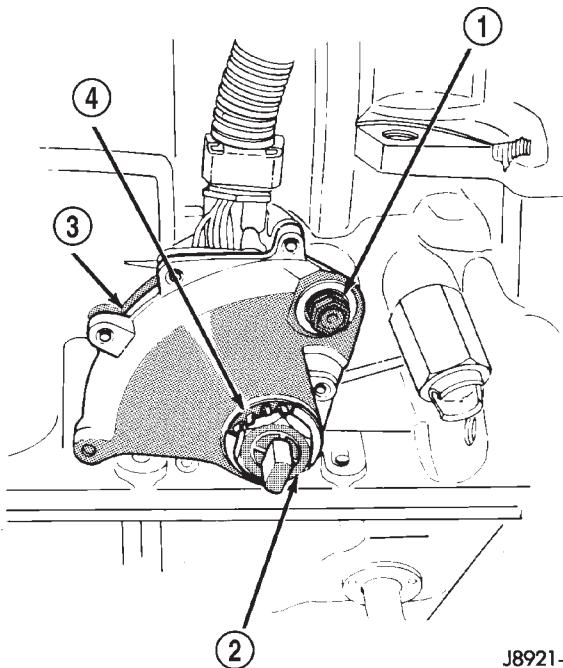
(4) Tighten adaptor housing bolts to 34 N·m (25 ft. lbs.) torque.

(5) Install components removed to gain access to rotor and drive gear.

PARK/NEUTRAL POSITION SWITCH

REMOVAL

- (1) Raise vehicle.
(2) Disconnect switch wire harness connector.
(3) Pry washer lock tabs upward and remove switch attaching nut and tabbed washer (Fig. 55).
(4) Remove switch adjusting bolt (Fig. 55).
(5) Slide switch off manual valve shaft.



J8921-430

Fig. 55 Park/Neutral Position Switch Removal/Installation

- 1 – ADJUSTING BOLT
2 – ATTACHING NUT
3 – NEUTRAL SWITCH
4 – TABBED WASHER

REMOVAL AND INSTALLATION (Continued)

INSTALLATION

(1) Disconnect shift linkage rod from shift lever on left side of transmission.

(2) Rotate manual shift lever all the way rearward. Then rotate lever forward two detent positions to Neutral.

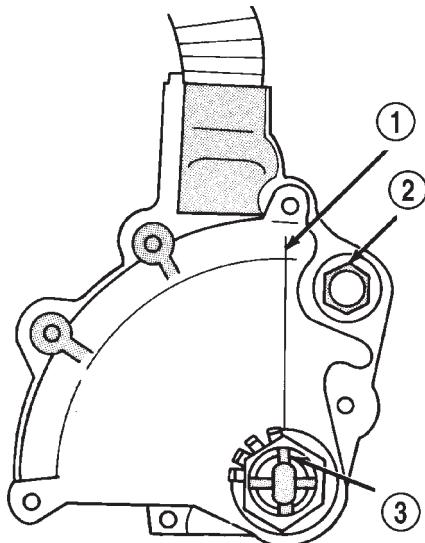
(3) Install switch on manual valve shaft and install switch adjusting bolt finger tight. Do not tighten bolt at this time.

(4) Install tabbed washer on manual valve shaft and install switch attaching nut. Tighten nut to 6.9 N·m (61 in. lbs.) torque but do not bend washer lock tabs over nut at this time.

(5) Verify that transmission is in Neutral.

(6) Rotate switch to align neutral standard line with vertical groove on manual valve shaft (Fig. 56).

(7) Align switch standard line with groove or flat



J8921-431

Fig. 56 Park/Neutral Position Switch Adjustment

1 - NEUTRAL STANDARD LINE

2 - ADJUSTING BOLT

3 - VERTICAL GROOVE ON MANUAL VALVE SHAFT

on manual valve shaft.

(8) Tighten switch adjusting bolt to 13 N·m (9 ft. lbs.) torque.

(9) Bend at least two washer lock tabs over switch attaching nut to secure it.

(10) Connect shift linkage rod to shift lever on left side of case.

(11) Connect switch wires to harness and lower vehicle.

(12) Check switch operation. Engine should start in Park and Neutral only.

GEARSHIFT CABLE

REMOVAL

(1) Shift transmission into Park.

(2) Remove shift lever bezel and necessary console parts for access to shift lever assembly.

(3) Disconnect cable at shift lever and feed cable through dash panel opening to underside of vehicle.

(4) Raise vehicle.

(5) Disengage cable eyelet at transmission shift lever and pull cable adjuster out of mounting bracket. Then remove old cable from vehicle.

INSTALLATION

(1) Route cable through hole in dash panel. Fully seat cable grommet into dash panel.

(2) Place the auto transmission manual shift control lever in "Park" detent (rearmost) position and rotate prop shaft to ensure transmission is in park.

(3) Connect shift cable to shifter mechanism by snapping cable retaining ears into shifter bracket and press cable end fitting onto lever ball stud.

(4) Place the floor shifter lever in park position. Ensure that the pawl is seated within the confines of the adjustment gauge clip.

(5) Snap the cable into the transmission bracket so the retaining ears are engaged and connect cable end fitting onto the manual control lever ball stud.

(6) Lock shift cable into position by pushing upward on the adjusting lock button.

(7) Remove and discard the shift cable adjustment gauge clip from the park gate of the shifter.

BRAKE TRANSMISSION SHIFT INTERLOCK

REMOVAL

(1) Remove lower steering column cover. Refer to Group 8E, Instrument Panel and Gauges, for proper procedure.

(2) Remove lower steering column shroud. Refer to Group 19, Steering, for proper procedure.

(3) Remove tie strap near the solenoid retaining the brake transmission interlock cable to the steering column.

(4) Disengage wire connector from solenoid.

(5) With the ignition removed or in the unlocked position, disengage lock tab holding cable end to steering column (Fig. 57).

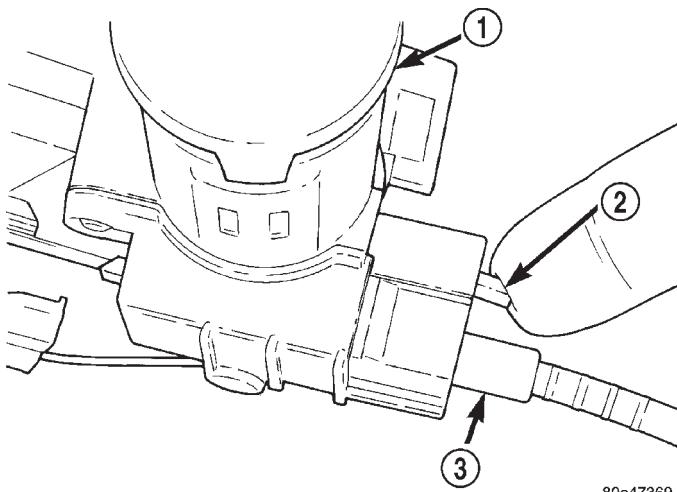
(6) Pull cable end from steering column.

(7) Remove the floor console and related trim. Refer to Group 23, Body, for proper procedure.

(8) Disconnect the cable eyelet from the bellcrank (Fig. 58).

(9) Disconnect and remove the cable from the shift bracket.

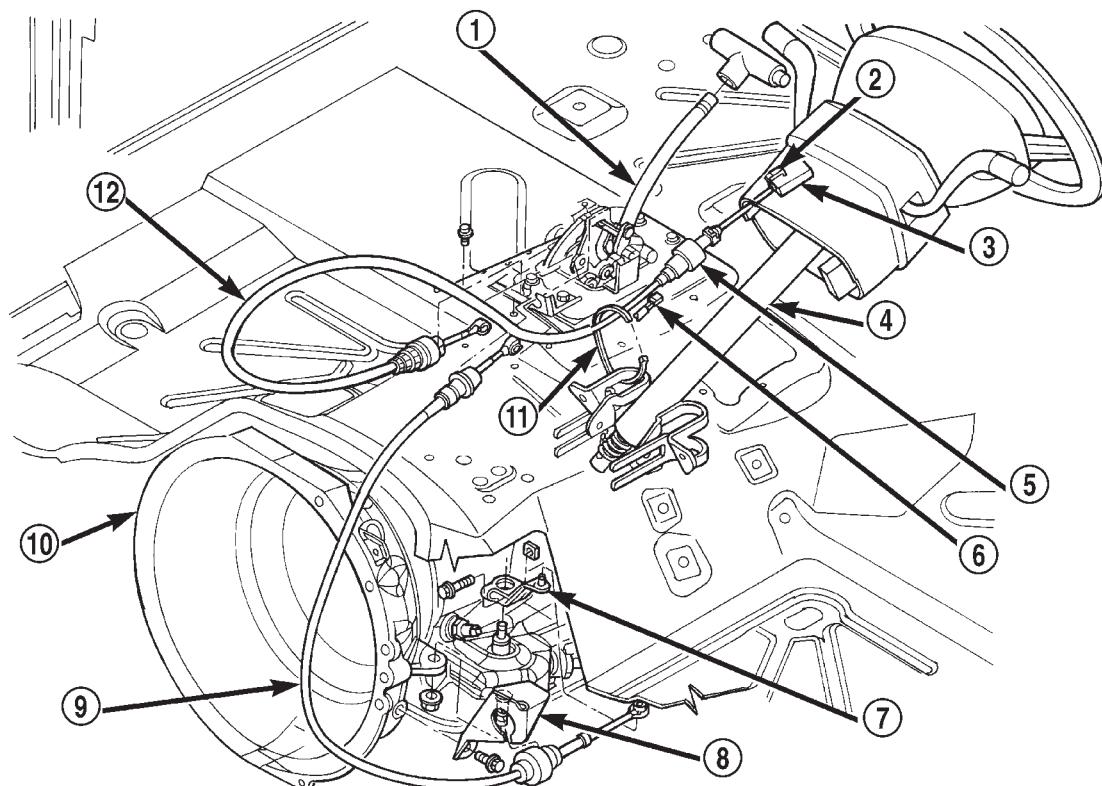
REMOVAL AND INSTALLATION (Continued)

**Fig. 57 Brake/Park Interlock Cable**

- 1 – IGNITION LOCK
2 – LOCK TAB
3 – CABLE END

INSTALLATION

- (1) Route replacement cable behind instrument panel and under floor console area to shift mechanism (Fig. 58).
- (2) Insert cable end into opening in steering column hub under ignition lock. Push cable inward until lock tab engages.
- (3) Connect the cable end eyelet onto shifter bellcrank pin.
- (4) Place gear selector in PARK.
- (5) Push the spring-loaded cable adjuster forward and snap cable into bracket.
- (6) Adjust the brake transmission shifter interlock cable. Refer to the Adjustment portion of this section for proper procedures.
- (7) Verify that the cable adjuster lock clamp is pushed downward to the locked position.
- (8) Test the park-lock cable operation.
- (9) Install the floor console and related trim.

**Fig. 58 Cable and Shifter**

- | | |
|-----------------------------|---------------------------------|
| 1 – SHIFT MECHANISM | 7 – LEVER |
| 2 – LOCK-TAB | 8 – MOUNT BRACKET |
| 3 – IGNITION LOCK INTERLOCK | 9 – SHIFT CABLE |
| 4 – STEERING COLUMN | 10 – AUTOMATIC TRANSMISSION |
| 5 – SOLENOID | 11 – TIE STRAP |
| 6 – WIRE CONNECTOR | 12 – PARK/BRAKE INTERLOCK CABLE |

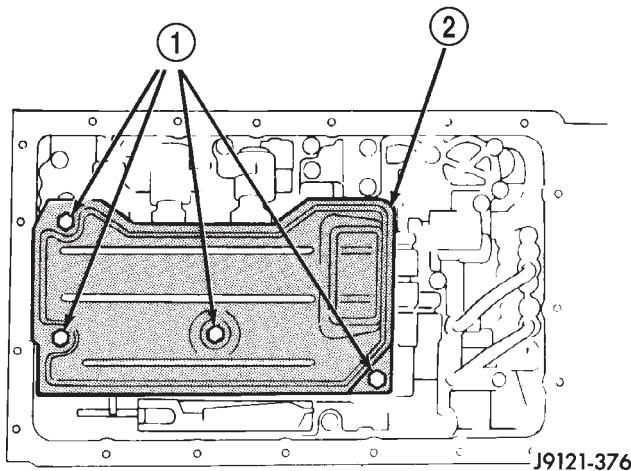
REMOVAL AND INSTALLATION (Continued)

- (10) Install tie strap to hold cable to base of steering column.
- (11) Install lower steering column shroud and ignition lock.
- (12) Install lower steering column cover.

TRANSMISSION VALVE BODY SOLENOIDS

REMOVAL

- (1) Remove transmission oil pan drain plug and drain fluid.
- (2) Remove pan bolts and remove oil pan.
- (3) Remove oil screen bolts and remove screen (Fig. 59) and gasket. Discard the gasket.

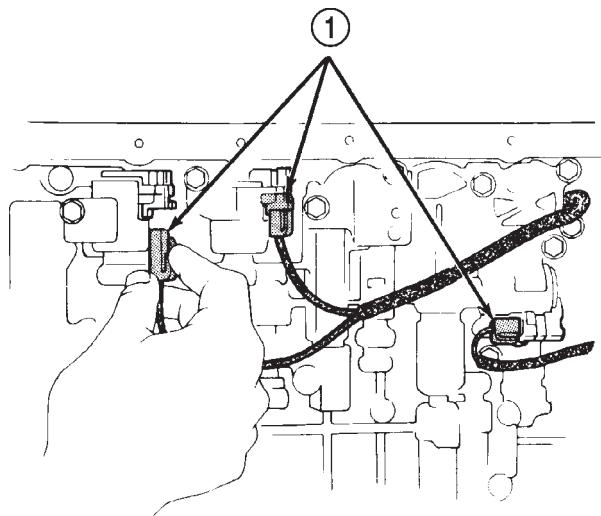
**Fig. 59 Oil Screen Removal/Installation**

1 – OIL SCREEN BOLTS
2 – OIL SCREEN

- (4) Disconnect solenoid wire connector (Fig. 60).
- (5) If all solenoids are being removed, mark or tag wires for assembly reference before disconnecting them.
- (6) Remove bolt attaching solenoids to valve body and remove solenoids (Fig. 61). Do not allow any valve body components to fall out when solenoids are removed.
- (7) Clean oil filter and pan with solvent and dry with compressed air.
- (8) Remove old sealer material from oil pan and transmission case.

INSTALLATION

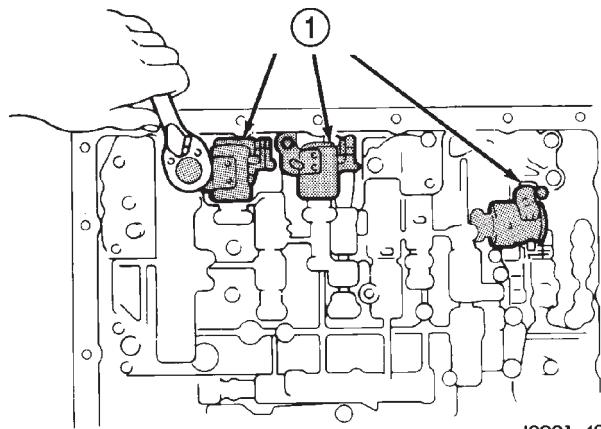
- (1) Position solenoids on valve body and install solenoid bolts. Tighten bolts to 10 N·m (7 ft. lbs.) torque.
- (2) Connect feed wires to solenoids.
- (3) Install new gaskets on oil screen and install screen. Tighten screen bolts to 10 N·m (7 ft. lbs.) torque.



J8921-433

Fig. 60 Solenoid Wire Connectors

1 – SOLENOID WIRE CONNECTORS



J8921-434

Fig. 61 Transmission Valve Body Solenoids

1 – VALVE BODY SOLENOIDS

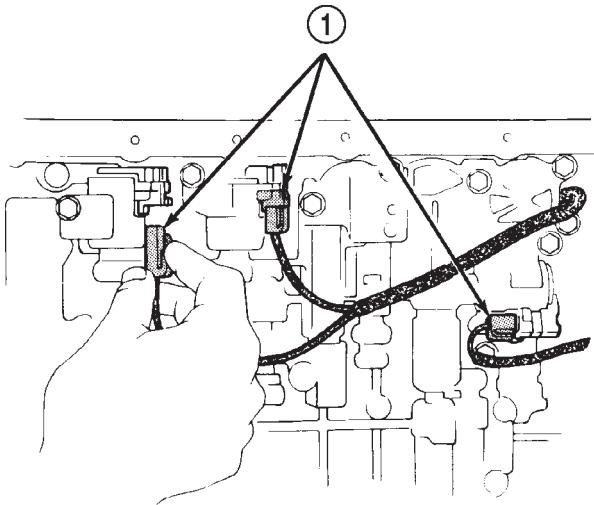
- (4) Apply bead of Threeebond® Liquid Gasket TB1281, P/N 83504038, sealer to oil pan sealing surface. Sealer bead should be at least 3.0 mm (1/8 in.) wide.
- (5) Install oil pan on transmission. Tighten pan bolts to 7 N·m (65 in. lbs.) torque.
- (6) Install and tighten oil pan drain plug to 20 N·m (15 ft. lbs.) torque.
- (7) Fill transmission with Mopar® Dexron IIIE/Mercon.

REMOVAL AND INSTALLATION (Continued)

TRANSMISSION VALVE BODY

REMOVAL

- (1) Remove oil pan plug and drain transmission fluid.
- (2) Remove oil pan and oil screen. Clean pan and screen in solvent and dry them with compressed air.
- (3) Disconnect solenoid wire connectors (Fig. 62). Mark wires for assembly reference.



J8921-433

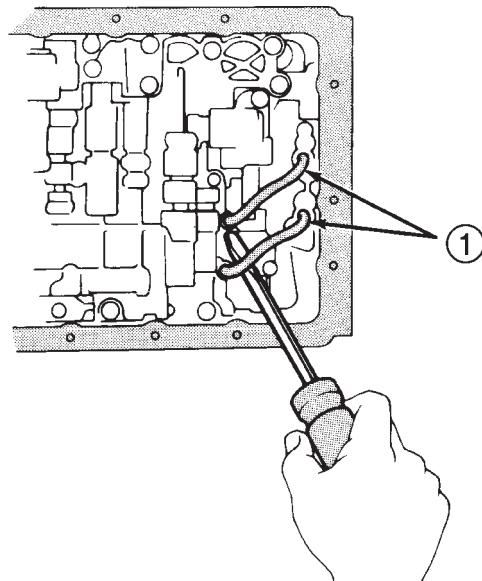
Fig. 62 Solenoid Wire Connectors

1 – SOLENOID WIRE CONNECTORS

- (4) Remove valve body oil tubes (Fig. 63). Carefully pry tubes out of valve body with screwdriver.
- (5) Disconnect throttle cable from throttle cam (Fig. 64).
- (6) Remove valve body bolts. Bolt locations are outlined in (Fig. 65).
- (7) Lower valve body and remove overdrive clutch accumulator springs, direct clutch accumulator springs and second brake accumulator spring (Fig. 66).
- (8) Remove valve body and check ball and spring (Fig. 67).

INSTALLATION

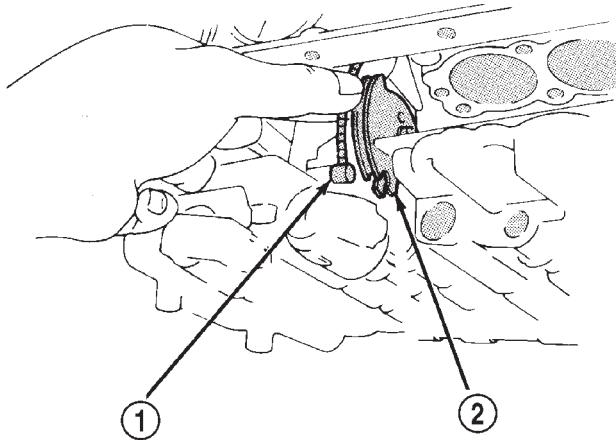
- (1) Connect cable to throttle cam (Fig. 64).
- (2) Install check ball and spring (Fig. 67).
- (3) Position accumulator springs and spacers on valve body.
- (4) Align valve body manual valve with shift sector (Fig. 68) and carefully position valve body on case.
- (5) Install valve body bolts (Fig. 65). Tighten bolts evenly to 10 N·m (7 ft. lbs.) torque.



J8921-437

Fig. 63 Removing Transmission Valve Body Oil Tubes

1 – OIL TUBES



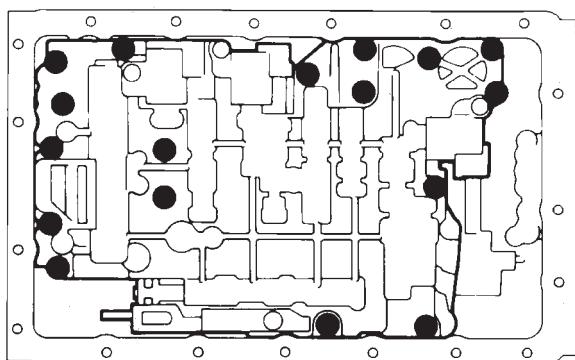
J8921-438

Fig. 64 Removing/Installing Throttle Cable

1 – THROTTLE CABLE
2 – CABLE BRACKET

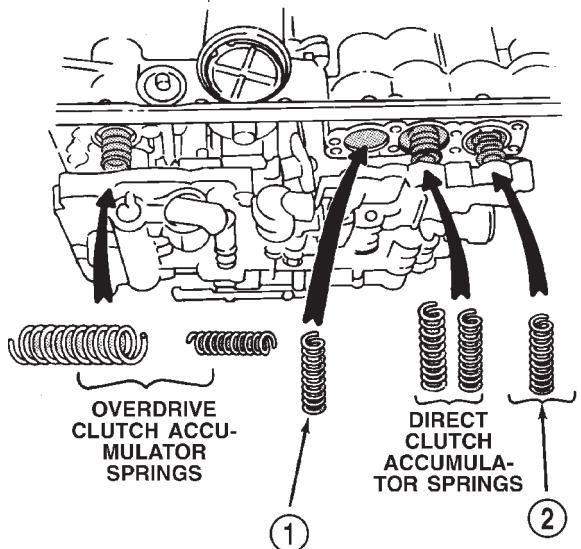
- (6) Install valve body oil tubes. Be sure tube ends (L) and (M) are installed as shown in (Fig. 69).
- (7) Remove old sealer material from oil pan and transmission case.
- (8) Clean oil screen and oil pan with solvent (if not done previously). Dry both components with compressed air only. Do not use shop towels.
- (9) Install new gaskets on oil screen and install screen on case. Tighten screen attaching bolts to 10 N·m (7 ft. lbs.) torque.

● = BOLT LOCATIONS



J8921-439

Fig. 65 Transmission Valve Body Bolt Locations



J9121-377

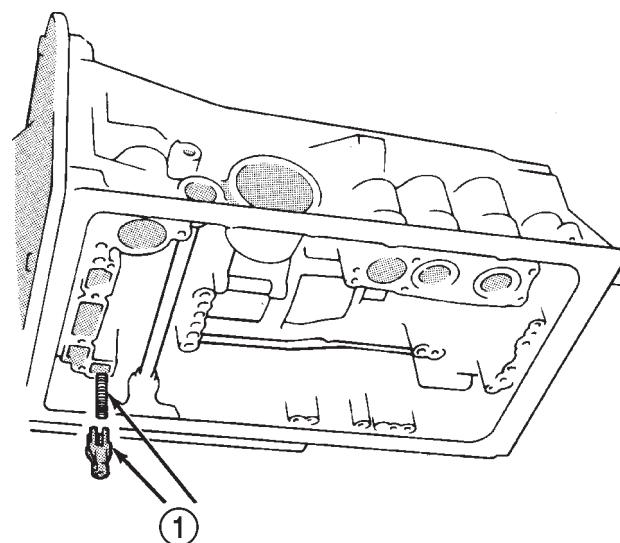
Fig. 66 Accumulator Springs

- 1 – OVERDRIVE BRAKE ACCUMULATOR SPRING
2 – SECOND BRAKE ACCUMULATOR SPRING

(10) Apply bead of Threebond® Liquid Gasket TB1281, P/N 83504038 to sealing surface of oil pan. Sealer bead should be at least 3 mm (1/8 in.) wide. Then install oil pan and tighten pan bolts to 7.4 N·m (65 in. lbs.) torque.

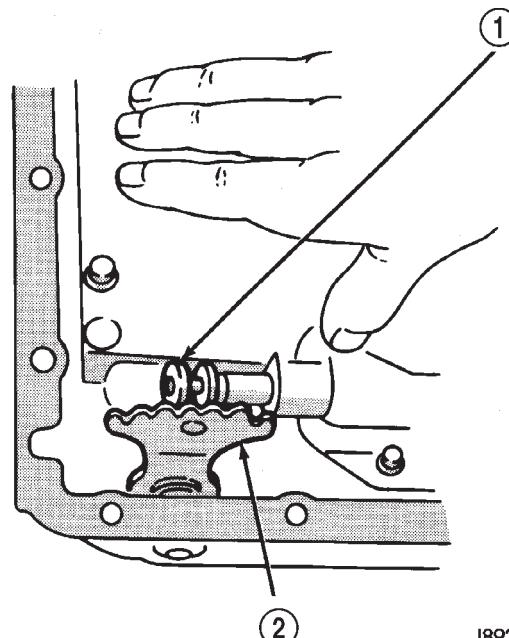
(11) Install new gasket on oil pan drain plug and install plug in pan. Tighten plug to 20 N·m (15 ft. lbs.) torque.

(12) Fill transmission with Mopar® Dexron IIE/Mercon.



J8921-441

Fig. 67 Removing/Installing Check Ball And Spring
1 – CHECK BALL AND SPRING



J8921-442

Fig. 68 Shift Sector And Manual Valve Alignment

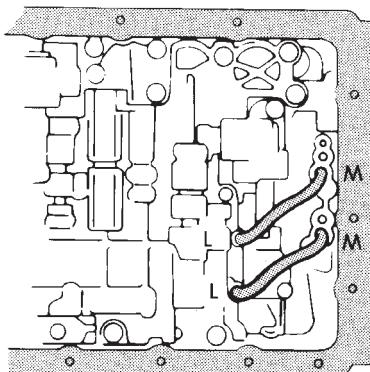
- 1 – MANUAL VALVE
2 – SHIFT SECTOR

TRANSMISSION CONTROL MODULE

The transmission control module is mounted under the instrument panel. On left hand drive models, it is at the driver side of the lower finish panel (Fig. 70). On right hand drive models, it is at the passenger side of the lower finish panel (Fig. 71).

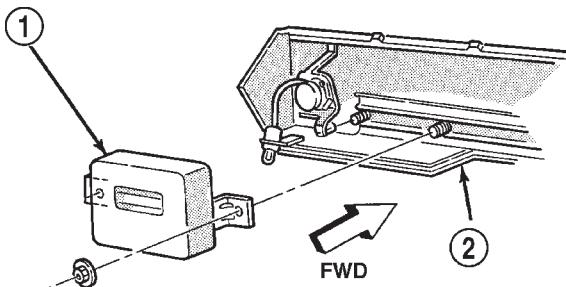
To remove the module, disconnect the wire harness, remove the mounting screws and remove the

REMOVAL AND INSTALLATION (Continued)



J8921-443

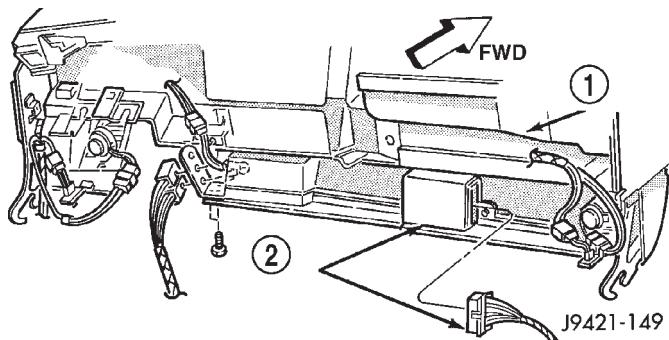
Fig. 69 Installing Transmission Valve Body Oil Tubes



J9421-150

Fig. 70 TCM Location (Left Hand Drive)

- 1 – TCM
2 – LOWER FINISH PANEL



J9421-149

Fig. 71 TCM Location (Right Hand Drive)

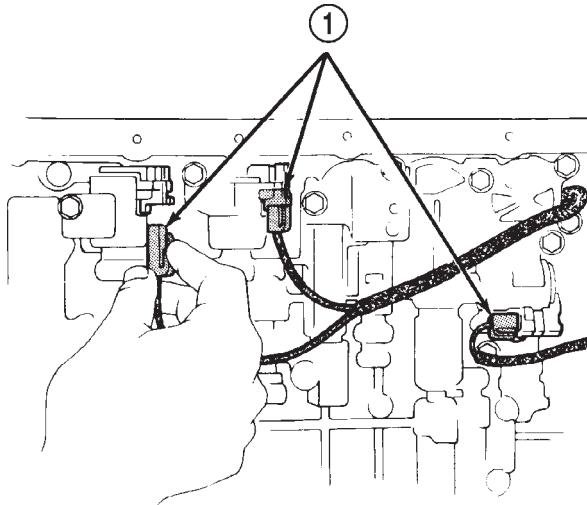
- 1 – REAR SIDE OF INSTRUMENT PANEL
2 – TCM AND HARNESS

module from the finish panel. Tighten the module mounting screws securely after installation. Also be sure the wire harness is not twisted, kinked or touching any body panels.

SOLENOID HARNESS ADAPTER SEAL

REMOVAL

- (1) Remove oil pan and oil screen.
- (2) Disconnect solenoid wire connectors (Fig. 72).

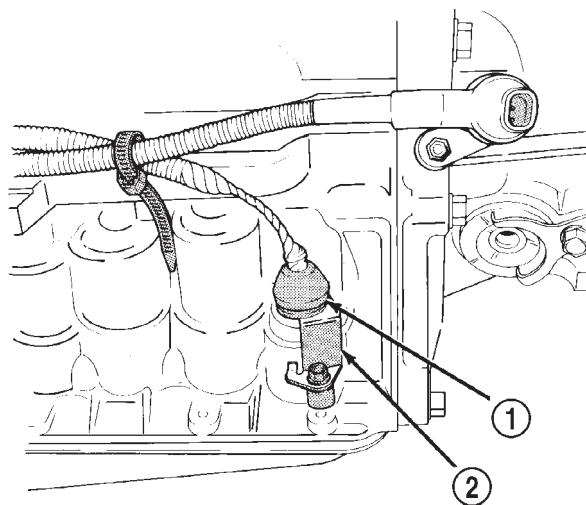


J8921-433

Fig. 72 Solenoid Wire Connectors

- 1 – SOLENOID WIRE CONNECTORS

- (3) Remove bracket securing solenoid harness adaptor (Fig. 73) to case.



J8921-436

Fig. 73 Harness Adapter Removal/Installation

- 1 – HARNESS ADAPTER
2 – BRACKET

- (4) Pull harness adapter and wires out of case.

REMOVAL AND INSTALLATION (Continued)

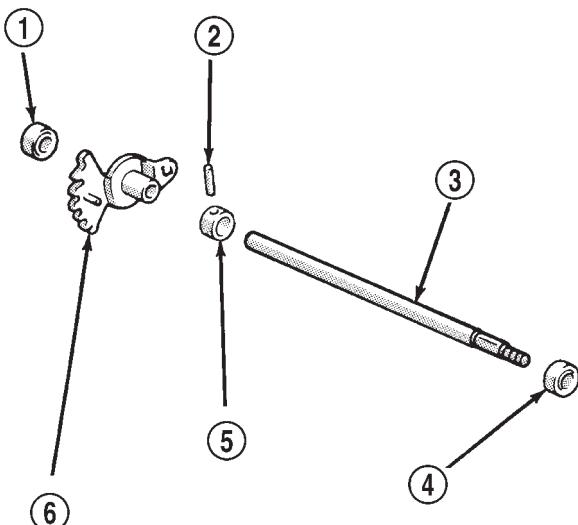
(5) Remove and discard adapter O-ring.

INSTALLATION

- (1) Lubricate new O-ring and install it on adapter.
- (2) Install solenoid wire harness and adapter in case.
- (3) Install adapter bracket and bracket bolt.
- (4) Connect wires to solenoids.
- (5) Install oil screen.
- (6) Apply bead of Threeebond® Liquid Gasket TB1281, P/N 83504038, to oil pan seal surface. Sealer bead should be at least 3 mm (1/8 in.) wide.
- (7) Install oil pan on transmission. Tighten pan bolts to 7 N·m (65 in. lbs.) torque.
- (8) Install and tighten oil pan drain plug to 20 N·m (15 ft. lbs.) torque.
- (9) Fill transmission with Mopar Dexron IIIE/Mercon.

MANUAL VALVE SHAFT SEAL

REMOVAL

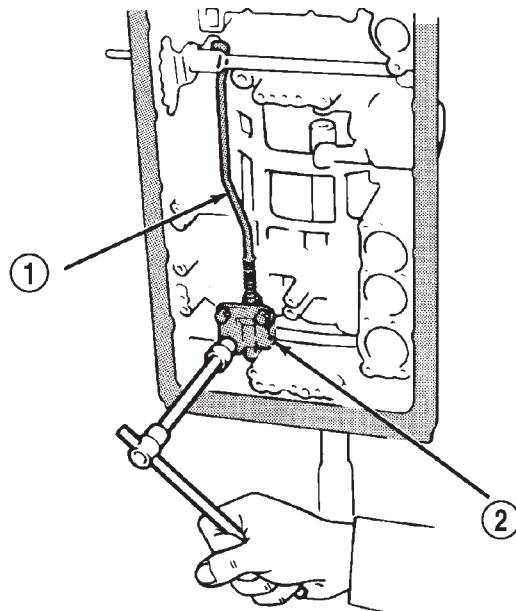


J8921-444

Fig. 74 Manual Valve Shaft And Seals

- 1 - SHAFT SEAL
- 2 - PIN
- 3 - MANUAL VALVE SHAFT
- 4 - SHAFT SEAL
- 5 - SPACER SLEEVE
- 6 - SHIFT SECTOR

- (1) Remove park/neutral position switch and disconnect transmission shift lever (Fig. 74).
- (2) Remove oil pan and valve body.
- (3) Remove bolts attaching park rod bracket to case (Fig. 75).

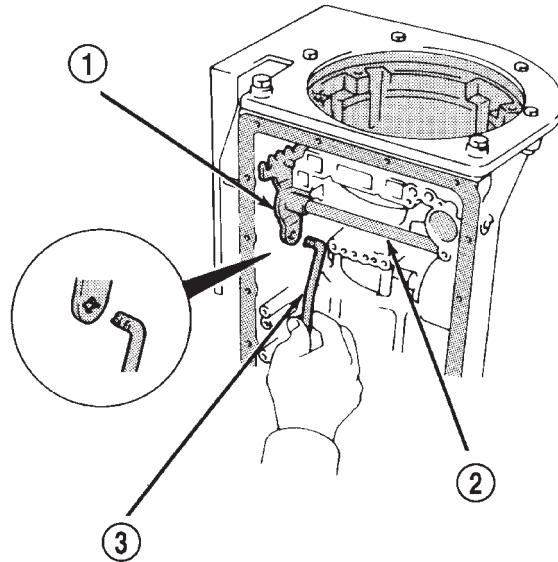


J8921-445

Fig. 75 Removing/Installing Park Rod Bracket

- 1 - PARK ROD
- 2 - PARK ROD BRACKET

(4) Remove park rod from shift sector (Fig. 76).



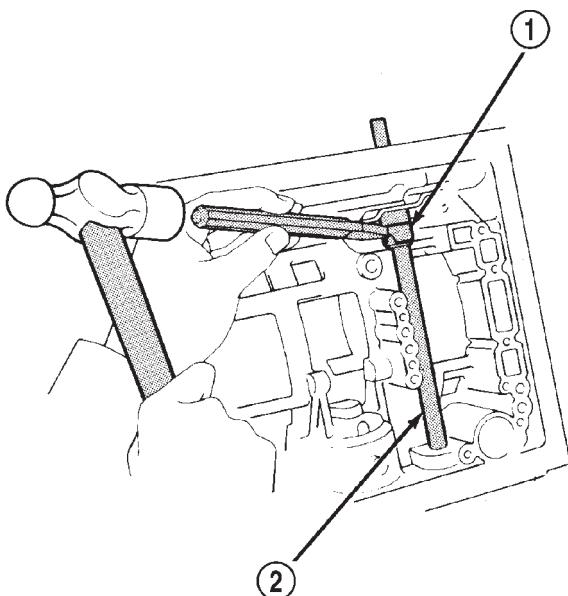
J8921-446

Fig. 76 Removing/Installing Park Rod

- 1 - SHIFT SECTOR
- 2 - MANUAL VALVE SHAFT
- 3 - PARK ROD

- (5) Cut spacer sleeve with chisel and remove it from manual valve shaft (Fig. 77).
- (6) Remove pin from shaft and sector with pin punch.
- (7) Remove shaft and sector from case.

REMOVAL AND INSTALLATION (Continued)

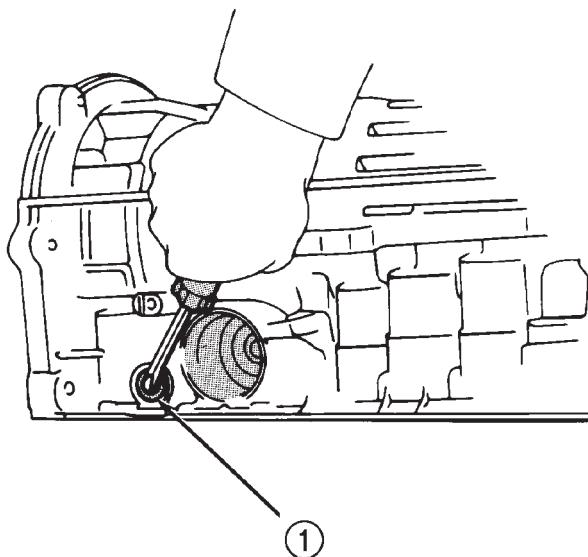


J8921-447

Fig. 77 Cutting Spacer Sleeve

- 1 – SPACER
2 – MANUAL VALVE SHAFT

(8) Pry shaft seals out of case (Fig. 78).



J8921-448

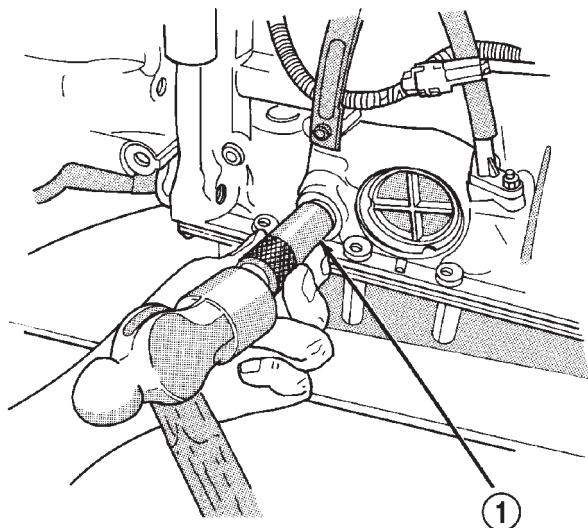
Fig. 78 Removing Manual Valve Shaft Seals

- 1 – MANUAL VALVE SHAFT SEAL

INSTALLATION

(1) Inspect the manual valve shaft and sector. Replace either component if worn or damaged.

(2) Coat replacement shaft seals with petroleum jelly and seat them in the case using an appropriately sized driver/socket (Fig. 79).

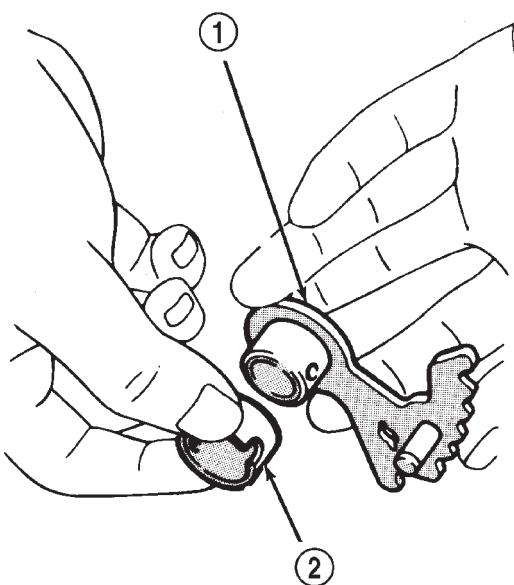


J8921-449

Fig. 79 Installing Manual Valve Shaft Seals

- 1 – SHAFT SEAL INSTALLER

(3) Install new spacer sleeve on sector (Fig. 80).



J8921-450

Fig. 80 Installing Spacer Sleeve On Sector

- 1 – SHIFT SECTOR
2 – SPACER SLEEVE

(4) Lubricate manual valve shaft with petroleum jelly and install it through the left side of the transmission case.

REMOVAL AND INSTALLATION (Continued)

(5) Lubricate sector and sleeve with petroleum jelly and install them on shaft.

(6) Install the manual valve shaft through the remainder of the transmission case.

(7) Align hole in spacer sleeve with notch in sector. Then install shift sector roll pin. Tap pin into sector and shaft and securely stake sleeve to sector and shaft.

(8) Connect park rod to sector (Fig. 76).

(9) Install park rod bracket (Fig. 81). Tighten bracket bolts to 10 N·m (7 ft. lbs.) torque.

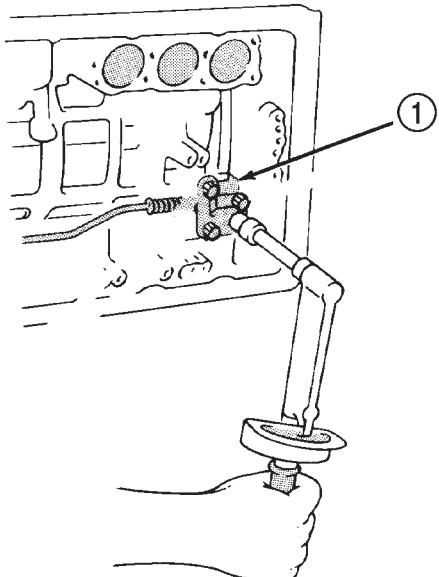


Fig. 81 Installing Park Rod Bracket

1 – PARK ROD BRACKET

(10) Install valve body, oil screen and oil pan.

(11) Install park/neutral position switch.

ACCUMULATOR PISTONS AND SPRINGS

REMOVAL

(1) Remove valve body.

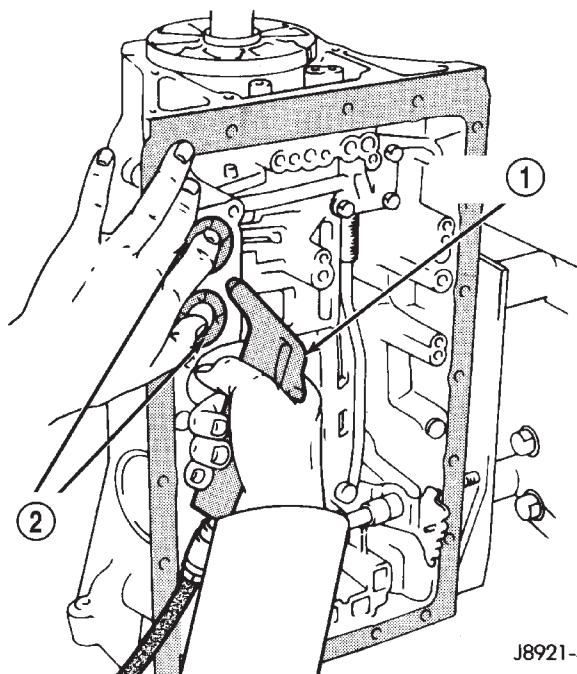
(2) Remove accumulator pistons with compressed air (Fig. 82). Apply air through small feed hole next to each piston bore. Catch each piston in a shop towel as it exits bore.

CAUTION: Use only enough air pressure to ease each piston out of the bore. In addition, remove the pistons one at a time and tag the pistons and springs for assembly reference. Do not intermix them.

(3) Remove and discard piston O-ring seals. Then clean pistons and springs with solvent.

INSTALLATION

(1) Inspect pistons, springs and piston bores. Replace worn damaged pistons. Replace broken, col-



J8921-455

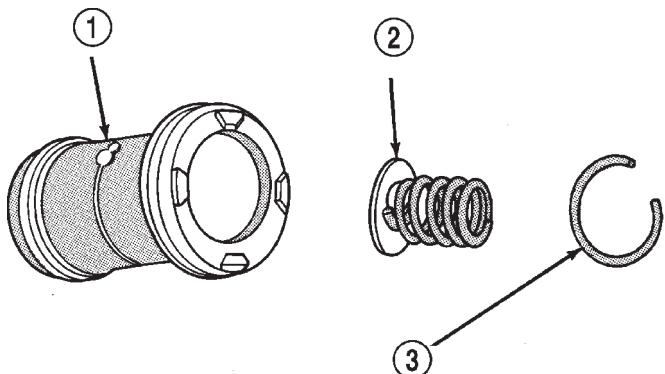
Fig. 82 Accumulator Piston Removal

1 – AIR GUN NOZZLE IN FEED HOLE

2 – PISTONS

lapsed or distorted springs. Replace case if piston bores are damaged.

(2) If small cushion spring in any piston must be replaced, remove spring retainer clip and remove spring from piston (Fig. 83). A small hooked tool or small thin blade screwdriver can be used to remove clip. A thin wall, deep socket, or pin punch can be used to seat clip after spring replacement.



J9121-414

Fig. 83 Small Cushion Spring Retention

1 – ACCUMULATOR PISTON (TYPICAL)

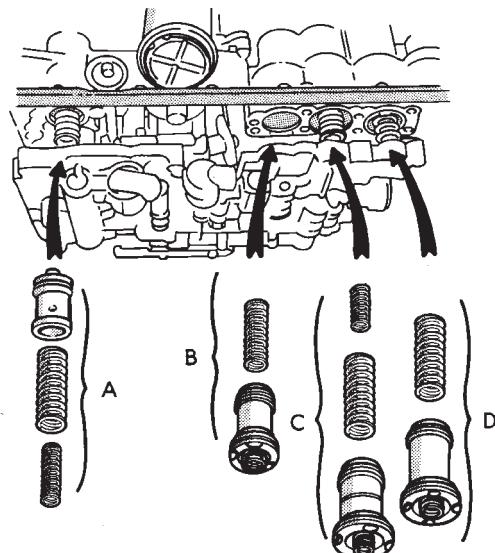
2 – SMALL CUSHION SPRING

3 – RETAINER CLIP

REMOVAL AND INSTALLATION (Continued)

(3) Install new O-ring seals on pistons. Lubricate seals and pistons and piston bores with transmission fluid.

(4) Install pistons and springs (Fig. 84).



- A. OVERDRIVE CLUTCH ACCUMULATOR PISTON AND SPRINGS
- B. OVERDRIVE BRAKE ACCUMULATOR PISTON AND SPRINGS
- C. DIRECT CLUTCH ACCUMULATOR PISTON AND SPRINGS
- D. SECOND BRAKE ACCUMULATOR PISTON AND SPRINGS

J9121-378

Fig. 84 Accumulator Pistons, Springs And Spacers

(5) Install valve body, oil screen and oil pan.

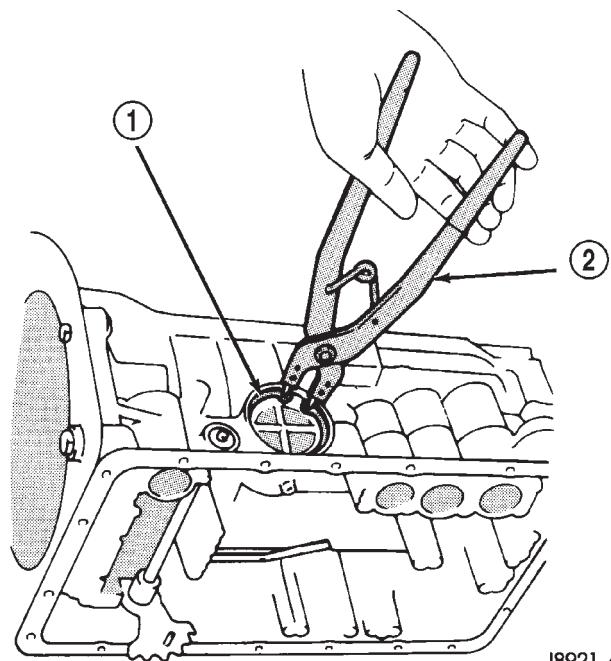
SECOND COAST BRAKE SERVO

REMOVAL

(1) Remove valve body.

(2) Remove servo piston cover snap ring with snap ring pliers (Fig. 85).

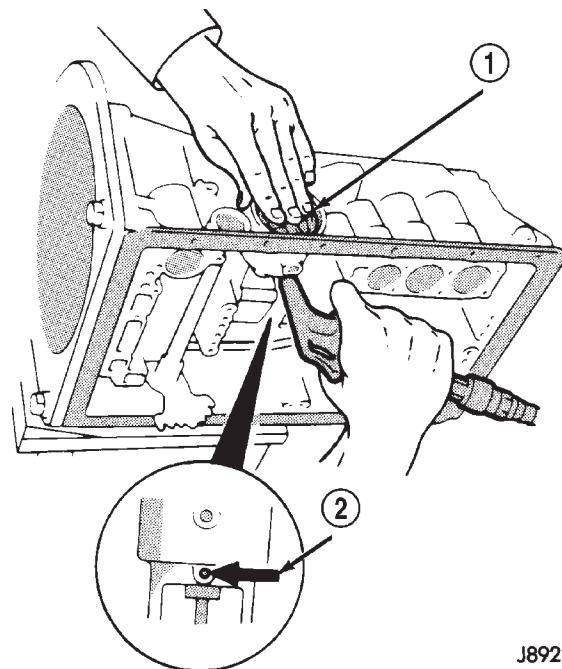
(3) Remove servo piston and cover with compressed air. Apply compressed air through oil hole in servo boss to ease piston out of bore (Fig. 86).



J8921-457

Fig. 85 Removing/Installing Servo Piston Cover Snap Ring

- 1 – SERVO PISTON COVER SNAP RING
- 2 – SNAP RING PLIERS



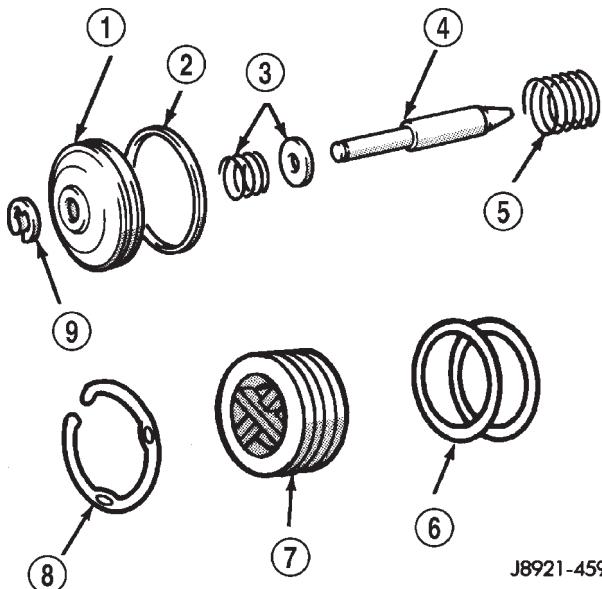
J8921-458

Fig. 86 Removing Servo Cover And Piston

- 1 – PISTON AND COVER
- 2 – OIL HOLE

REMOVAL AND INSTALLATION (Continued)

(4) Remove and discard seal and O-rings from cover and piston (Fig. 87). Inspect E-ring, piston, spring and retainer, piston rod and piston spring. Replace worn or damaged parts.



J8921-459

Fig. 87 Second Coast Brake Servo Components

- 1 - SERVO PISTON
- 2 - SEAL RING
- 3 - SPRING AND RETAINER
- 4 - PISTON ROD
- 5 - PISTON SPRING
- 6 - SERVO COVER O-RINGS
- 7 - SERVO COVER
- 8 - SNAP RING
- 9 - E-RING

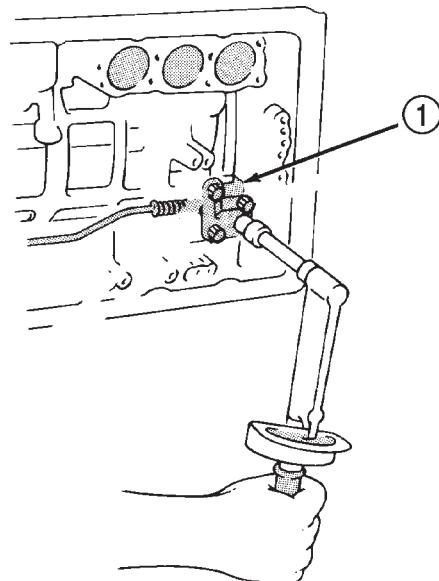
INSTALLATION

- (1) Install new seals on cover and piston.
- (2) Lubricate servo components with transmission fluid.
- (3) Assemble and install servo components in case. Be sure servo piston rod is properly engaged in the second coast brake band.
- (4) Compress cover and piston and install cover snap ring.
- (5) Install valve body, oil screen and oil pan.

PARK ROD AND PAWL

REMOVAL

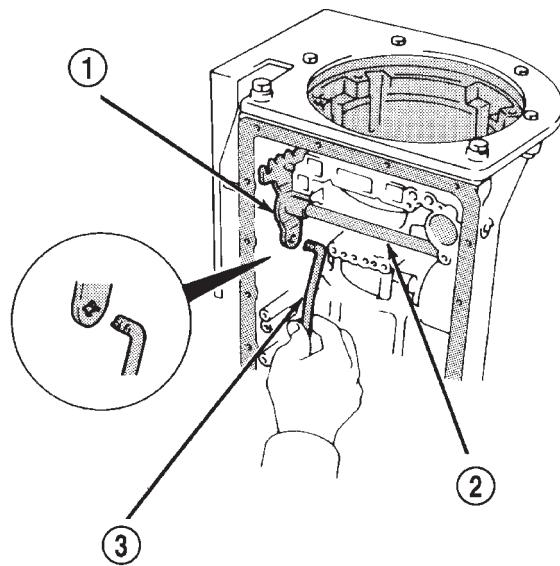
- (1) Remove valve body as outlined in this section.
- (2) Remove bolts attaching park rod bracket to case (Fig. 88).
- (3) Remove park rod from manual valve shaft sector (Fig. 89).
- (4) Remove park rod.



J8921-451

Fig. 88 Removing/Installing Park Rod Bracket

- 1 - PARK ROD BRACKET



J8921-446

Fig. 89 Removing/Installing Park Rod

- 1 - SHIFT SECTOR
- 2 - MANUAL VALVE SHAFT
- 3 - PARK ROD

REMOVAL AND INSTALLATION (Continued)

(5) Remove park pawl, pin and spring (Fig. 90).

INSTALLATION

(1) Examine park rod, pawl, pin and spring. Replace any component that is worn or damaged.

(2) Install pawl in case. Insert pin and install spring. Be sure spring is positioned as shown in Figure 35.

(3) Install park rod and bracket (Fig. 88). Tighten bracket bolts to 10 N·m (7 ft. lbs.) torque.

(4) Install valve body, oil screen and oil pan.

TRANSMISSION THROTTLE CABLE

REMOVAL

(1) In engine compartment, disconnect cable from throttle linkage. Then compress cable mounting ears and remove cable from engine bracket (Fig. 91).

(2) Raise vehicle.

(3) Remove transmission oil pan.

(4) Disengage cable from throttle valve cam (Fig. 92).

(5) Remove cable bracket bolt and remove cable and bracket from case (Fig. 93).

(6) Remove and discard cable seal.

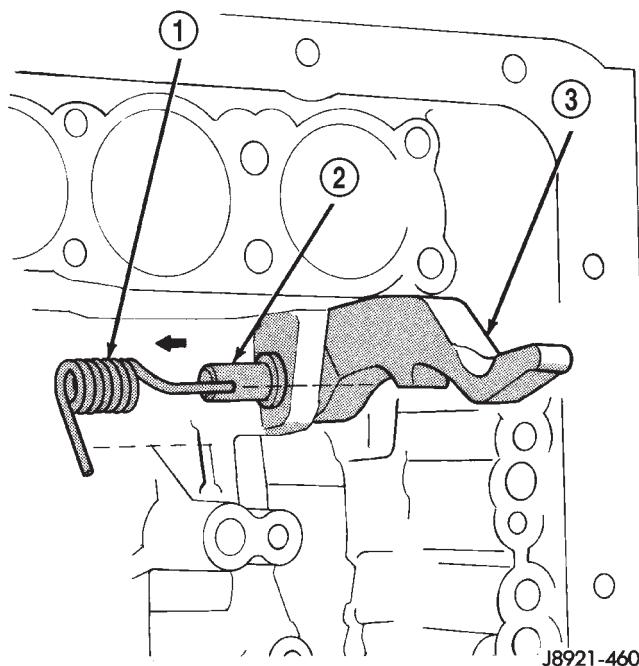


Fig. 90 Removing/Installing Park Pawl, Pin And Spring

1 - SPRING

2 - PIN

3 - PARK PAWL

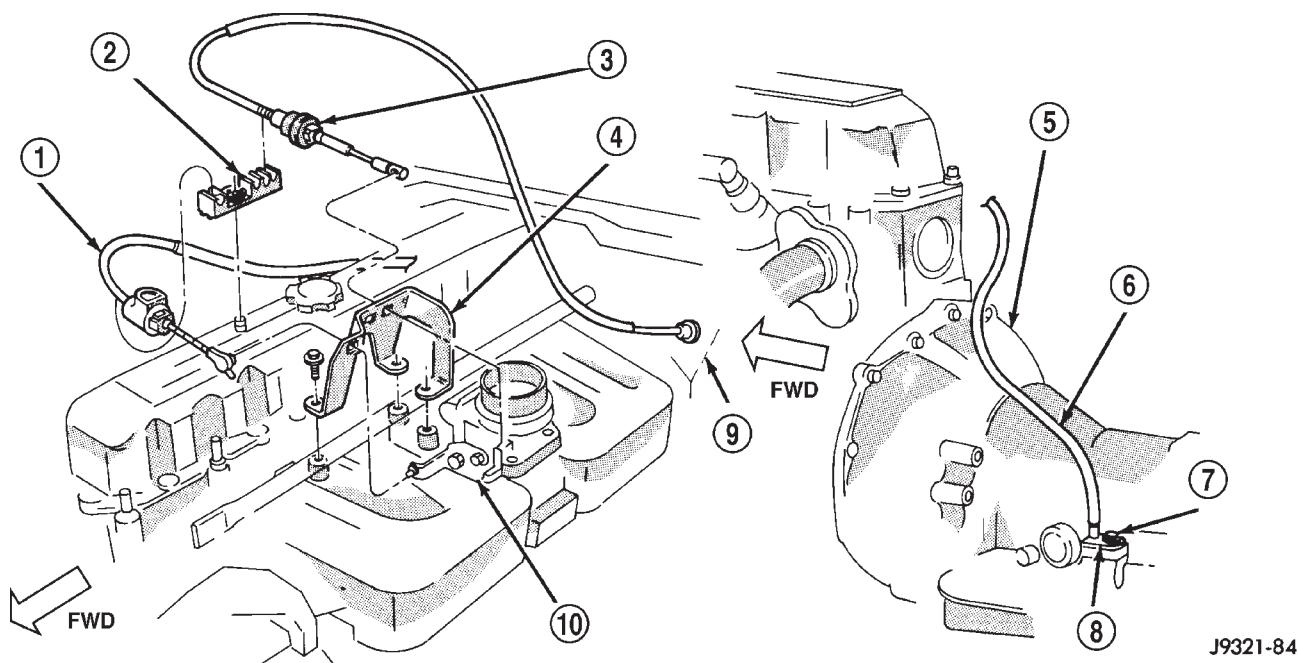


Fig. 91 Transmission Throttle Cable Attachment

1 - THROTTLE CABLE

2 - CABLE GUIDE

3 - ACCELERATOR CABLE

4 - CABLE ENGINE BRACKET

5 - CONVERTER HOUSING

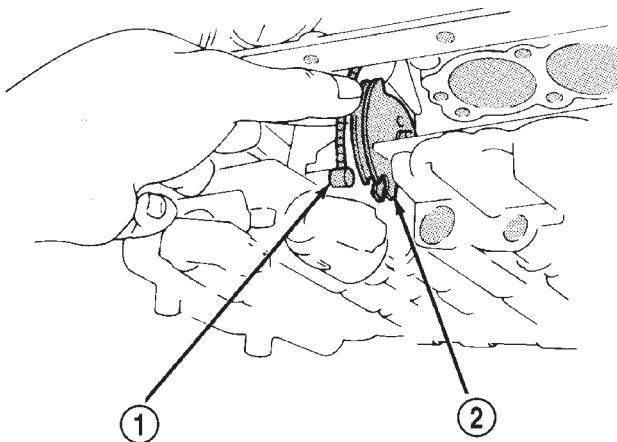
6 - THROTTLE CABLE

7 - CABLE RETAINER SCREW

8 - CABLE BRACKET

9 - DASH PANEL

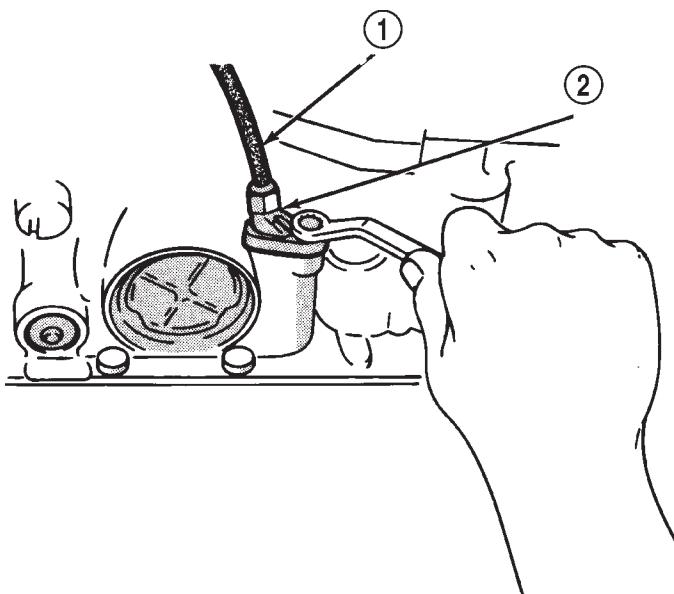
10 - THROTTLE BODY



J8921-438

Fig. 92 Removing/Installing Transmission Throttle Cable

- 1 – THROTTLE CABLE
2 – CABLE BRACKET



J8921-452

Fig. 93 Removing/Installing Transmission Throttle Cable And Bracket

- 1 – THROTTLE CABLE
2 – CABLE BRACKET

INSTALLATION

- (1) Lubricate and install new seal on cable.
- (2) Insert cable in transmission case.
- (3) Attach cable to throttle cam (Fig. 92).
- (4) Install cable bracket on case and tighten attaching bolt to 10 N·m (7 ft. lbs.) torque (Fig. 93).
- (5) Install pan and tighten pan bolts to 7 N·m (65 in. lbs.) torque.

(6) Install new gasket on oil pan drain plug. Install and tighten plug to 20 N·m (15 ft. lbs.) torque.

(7) Connect cable to engine bracket and throttle linkage.

(8) Fill transmission with Mopar® Dexron/Mercon IIIE.

(9) Adjust the cable as described in cable adjustment procedure.

OIL PUMP SEAL

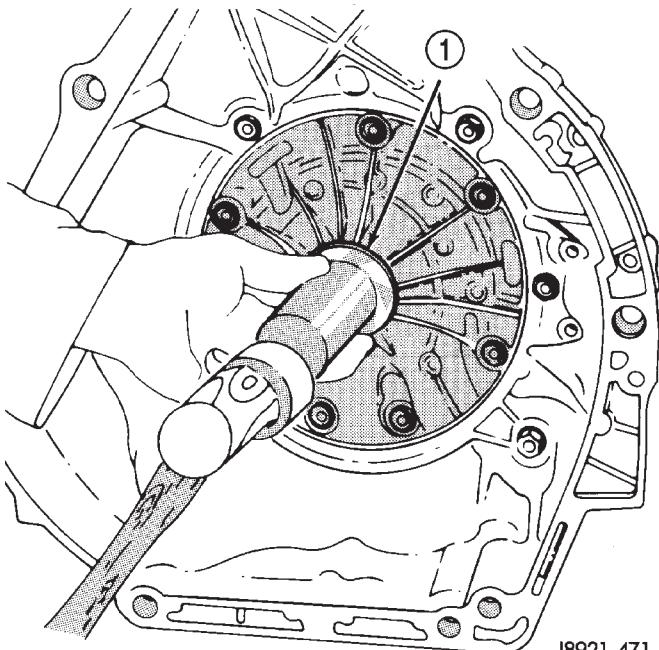
REMOVAL

(1) Remove converter.

(2) Remove old seal. Use blunt punch to collapse seal and pry seal out of pump housing. Do not scratch or damage seal bore.

INSTALLATION

(1) Lubricate lip of new seal with transmission fluid and install seal in pump with tool 7549 (Fig. 94).



J8921-471

Fig. 94 Installing Oil Pump Seal

- 1 – PUMP SEALER INSTALLER

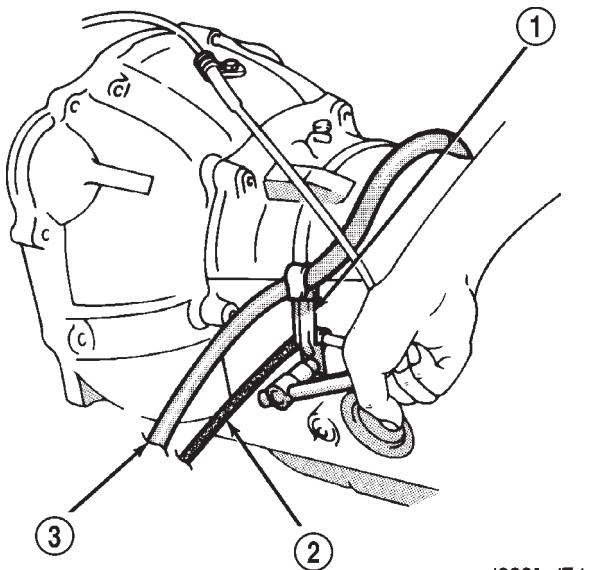
(2) Lubricate converter drive hub with transmission fluid.

(3) Align and install converter in oil pump.

DISASSEMBLY AND ASSEMBLY TRANSMISSION

DISASSEMBLY

- (1) Remove torque converter.
- (2) Remove clamps attaching wire harness and throttle cable (Fig. 95) to transmission.

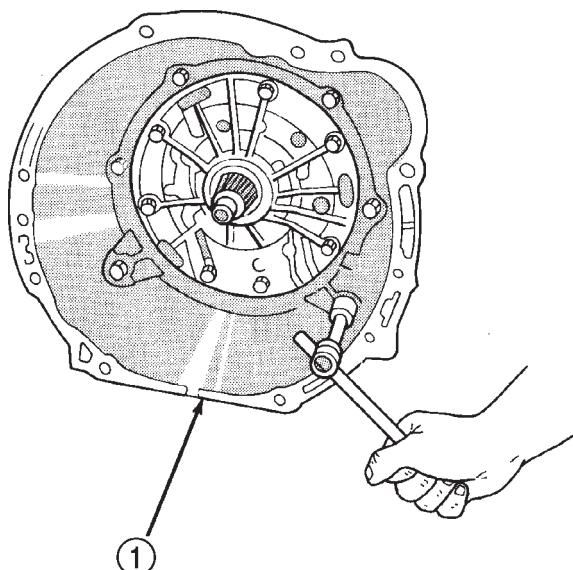


J8921-474

Fig. 95 Typical Harness And Cable Clamp Attachment

- 1 – CLAMP
- 2 – THROTTLE CABLE
- 3 – TRANSMISSION HARNESS

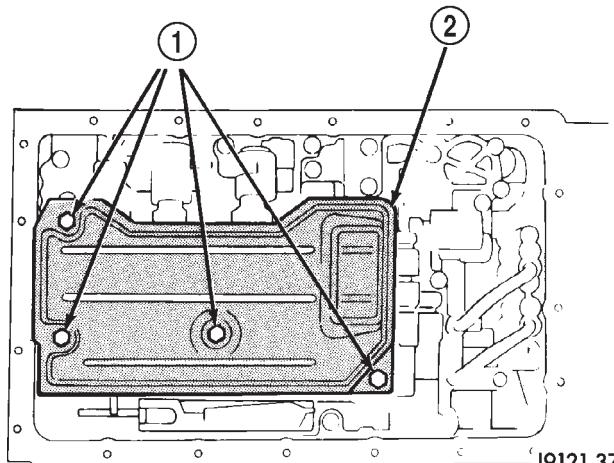
- (3) Remove shift lever from manual valve shaft at left side of transmission.
- (4) Remove park/neutral position switch.
- (5) Remove speed sensor.
- (6) Remove converter housing bolts and remove housing (Fig. 96) from case.
- (7) Remove adapter housing, speedometer drive gear, and speed sensor rotor.
- (8) Remove transmission oil pan, oil screen and screen gaskets (Fig. 97).



J8921-476

Fig. 96 Converter Housing Removal

- 1 – CONVERTER HOUSING

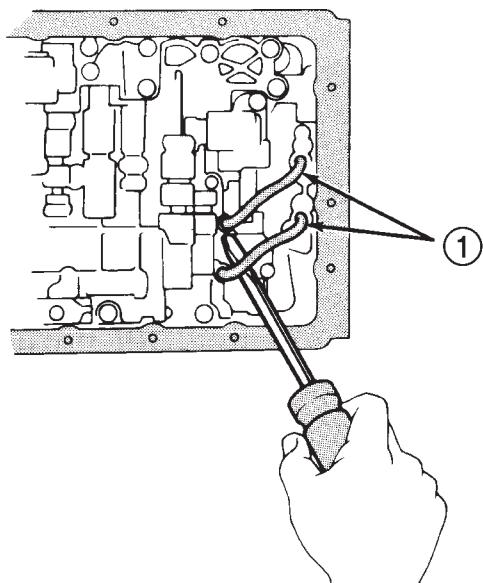


J9121-376

Fig. 97 Removing Oil Screen

- 1 – OIL SCREEN BOLTS
- 2 – OIL SCREEN

(9) Remove valve body oil feed tubes (Fig. 98).

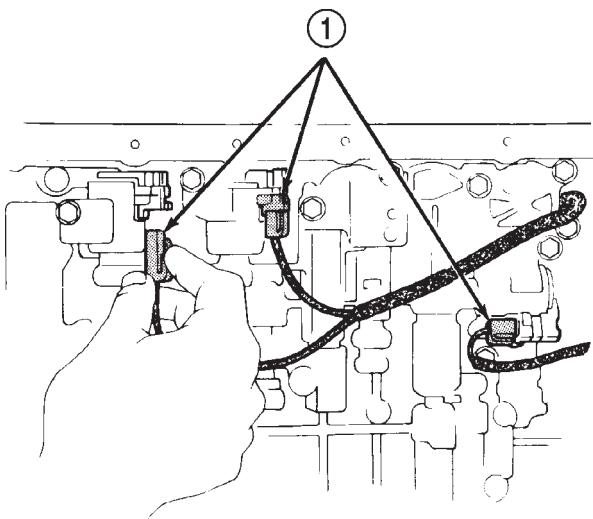


J8921-437

Fig. 98 Valve Body Oil Tube Removal

1 – OIL TUBES

(10) Disconnect valve body solenoid wires (Fig. 99).

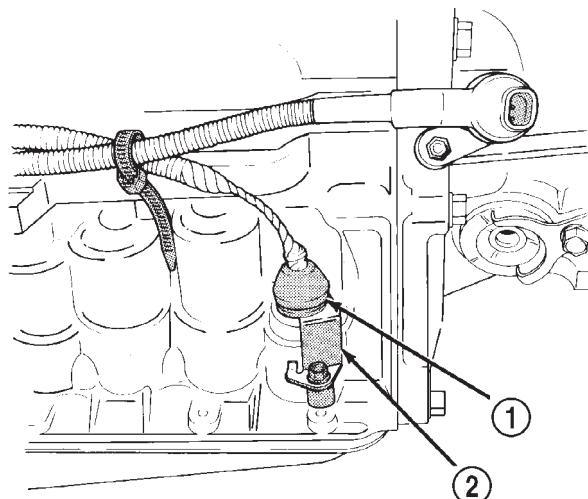


J8921-433

Fig. 99 Solenoid Wire Location

1 – SOLENOID WIRE CONNECTORS

(11) Remove harness bracket bolt and remove harness and bracket (Fig. 100).



J8921-436

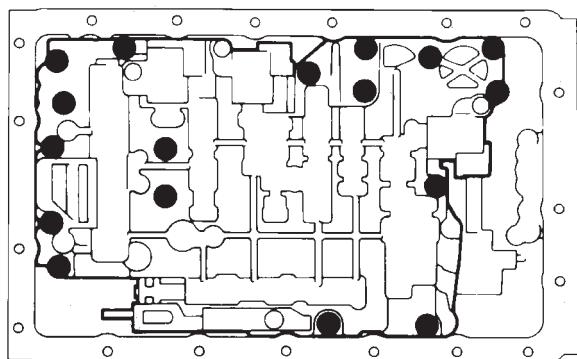
Fig. 100 Removing Bracket And Harness

1 – HARNESS ADAPTER

2 – BRACKET

(12) Remove valve body bolts (Fig. 101).

● = BOLT LOCATIONS



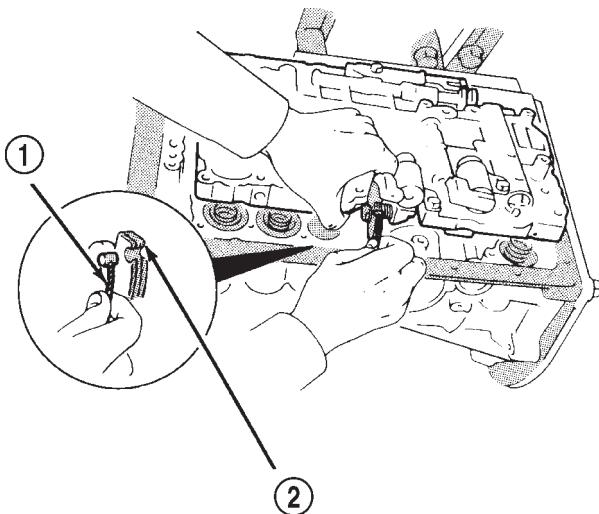
J8921-439

Fig. 101 Valve Body Bolt Locations

(13) Disconnect throttle cable from throttle cam (Fig. 102).

(14) Remove valve body from case. Then remove accumulator springs, check ball, and spring (Fig. 103).

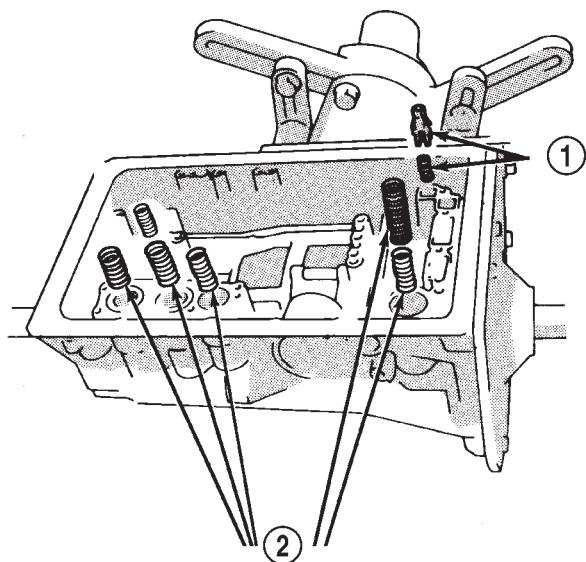
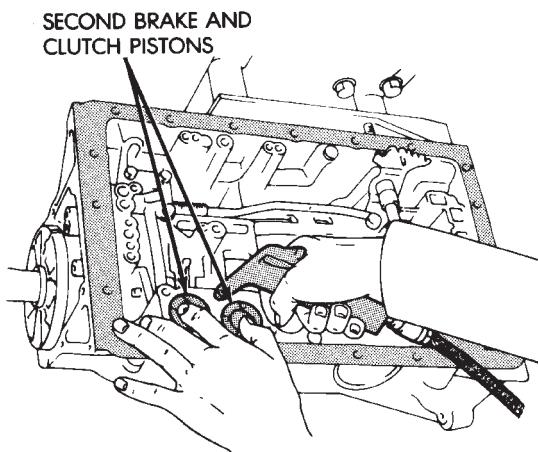
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-478

Fig. 102 Disconnecting Throttle Cable

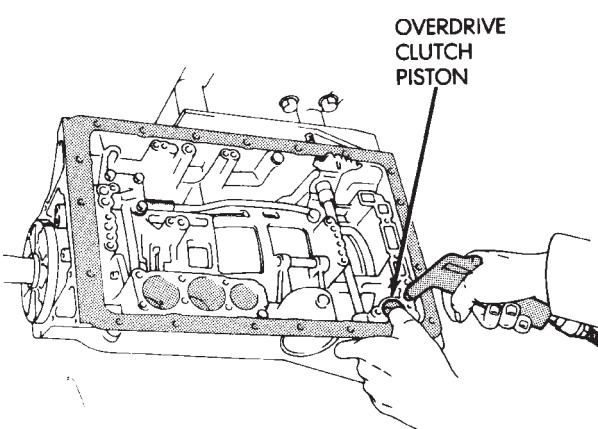
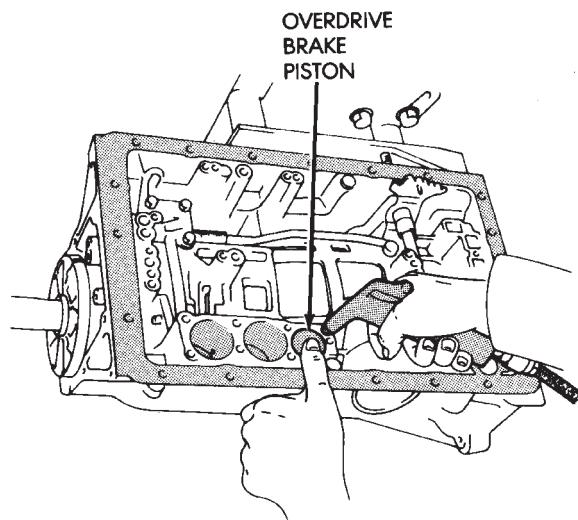
- 1 – THROTTLE CABLE
2 – THROTTLE CAM



J9121-381

Fig. 103 Removing Accumulator Springs, Spacers And Check Ball

- 1 – CHECK BALL AND SPRING
2 – ACCUMULATOR SPRINGS



(15) Remove second brake and clutch accumulator pistons with compressed air (Fig. 104). Apply air pressure through feed port and ease the pistons and springs out of the bore. Note and identify the original location of all springs.

(16) Remove overdrive brake accumulator piston with compressed air (Fig. 104). Note and identify the original location of all springs.

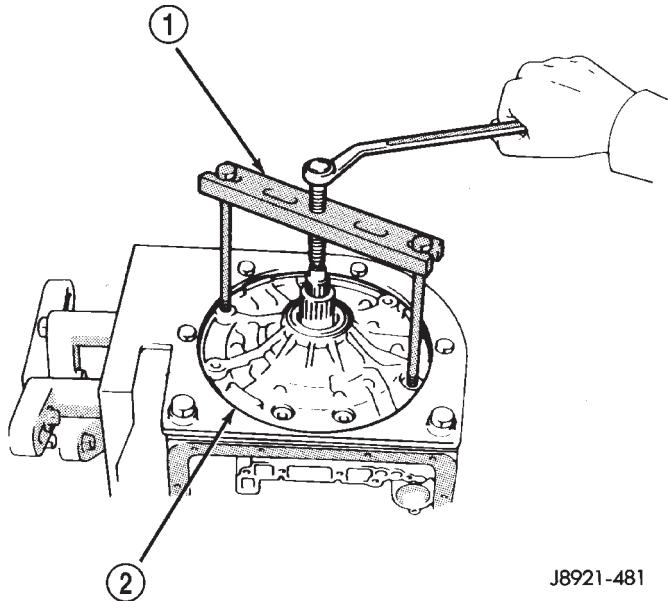
(17) Remove overdrive clutch accumulator piston with compressed air (Fig. 104).

(18) Remove throttle cable.

J8921-480

Fig. 104 Accumulator Piston Removal

(19) Remove oil pump bolts and remove pump with bridge-type Puller 7536 (Fig. 105).

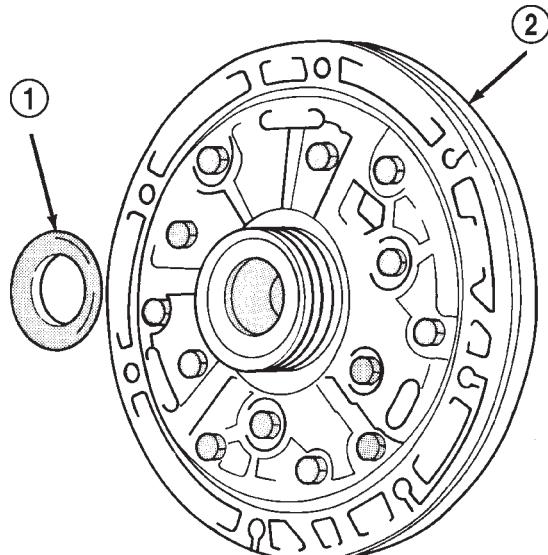


J8921-481

Fig. 105 Oil Pump Removal

- 1 – PULLER TOOL
2 – OIL PUMP

(20) Remove race from oil pump (Fig. 106).

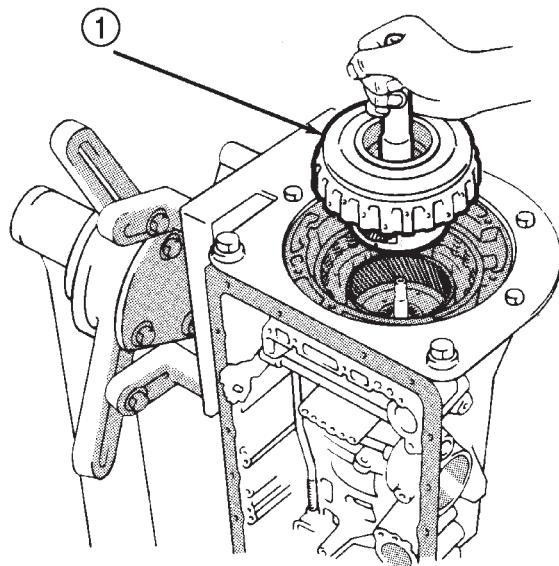


J8921-482

Fig. 106 Oil Pump Race Removal

- 1 – OIL PUMP RACE
2 – OIL PUMP

(21) Remove overdrive planetary gear and clutch assembly (Fig. 107).

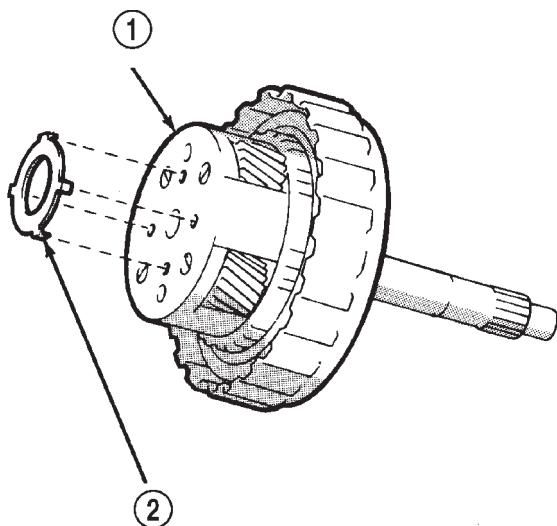


J8921-483

Fig. 107 Removing Overdrive Planetary And Clutch Assembly

- 1 – PLANETARY AND CLUTCH ASSEMBLY

(22) Remove race from overdrive planetary (Fig. 108).



J8921-484

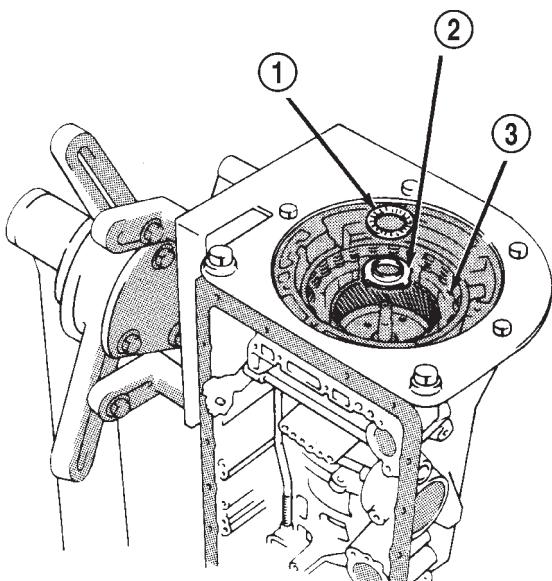
Fig. 108 Fourth Gear Planetary Race Removal

- 1 – PLANETARY (OVERDRIVE)
2 – RACE

(23) Remove thrust bearing, race and overdrive planetary ring gear (Fig. 109).

(24) Measure stroke length of overdrive brake piston as follows:

DISASSEMBLY AND ASSEMBLY (Continued)

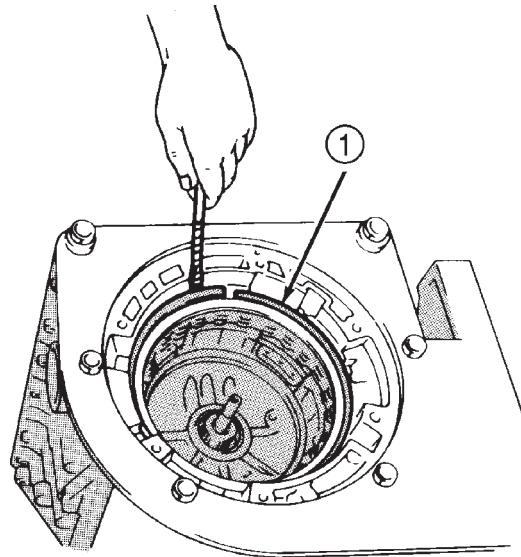


J8921-485

Fig. 109 Removing Bearing, Race And Planetary Ring Gear

- 1 - THRUST BEARING
- 2 - RACE
- 3 - OVERDRIVE PLANETARY RING GEAR

(28) Remove overdrive brake pack snap ring (Fig. 110).



J8921-487

Fig. 110 Removing Overdrive Brake Pack Snap Ring

- 1 - OVERDRIVE BRAKE SNAP RING

(a) Mount dial indicator on case using Miller Tool C-3339 and a suitable bolt threaded into the transmission case.

(b) Verify that the dial indicator is mounted solidly and square to the direction of the piston travel.

(c) Apply 57–114 psi air pressure through piston apply port and note piston stroke on dial indicator. Stroke length should be: 1.40 – 1.70 mm (0.055 – 0.0699 in.).

(d) Record the reading for use during re-assembly.

(e) Remove the dial indicator set-up from the transmission.

(25) Measure stroke length of second coast brake piston rod as follows:

(a) Install a small wire tie strap around the second coast brake piston rod tight against the transmission case.

(b) Apply 57–114 psi air pressure through piston feed hole and check stroke length with Gauge Tool 7552.

(c) Stroke length should be 1.5 – 3.0 mm (0.059 – 0.118 in.).

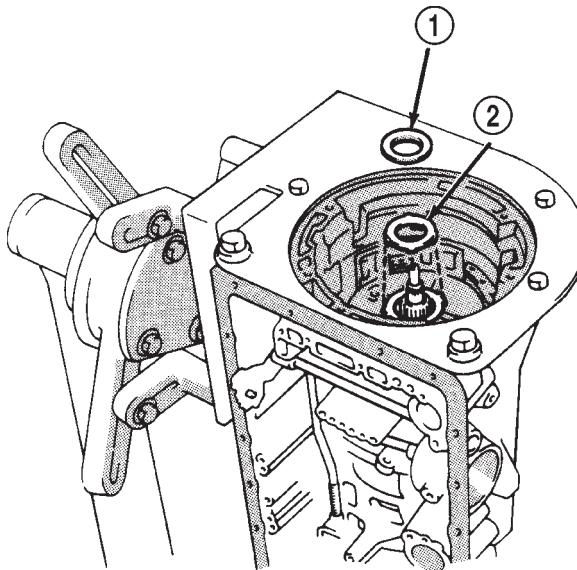
(d) Record the reading for use during re-assembly.

(26) Remove the bolt holding the input speed sensor to the transmission case.

(27) Remove the input speed sensor from the transmission case.

(29) Remove overdrive brake pack discs and plates. Inspect and replace as necessary.

(30) Remove overdrive support lower race and upper bearing and race assembly (Fig. 111).



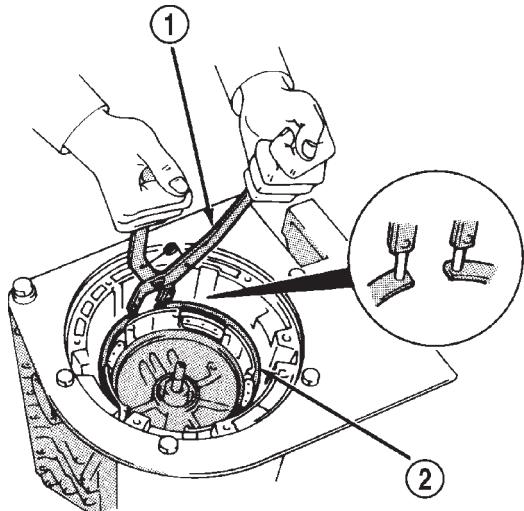
J8921-489

Fig. 111 Overdrive Support Bearing/Race Removal

- 1 - UPPER BEARING AND RACE
- 2 - LOWER RACE

DISASSEMBLY AND ASSEMBLY (Continued)

(31) Remove overdrive support snap ring with Snap Ring Plier Tool 7540 (Fig. 112).

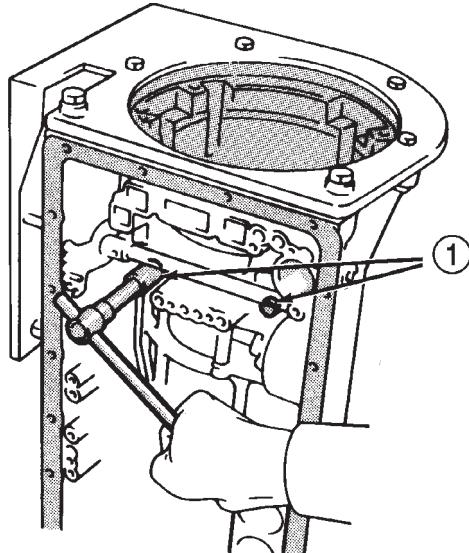


J8921-491

Fig. 112 Overdrive Support Snap Ring Removal/Installation

- 1 – SNAP RING PLIERS
2 – SUPPORT SNAP RING

(32) Remove overdrive support bolts (Fig. 113).



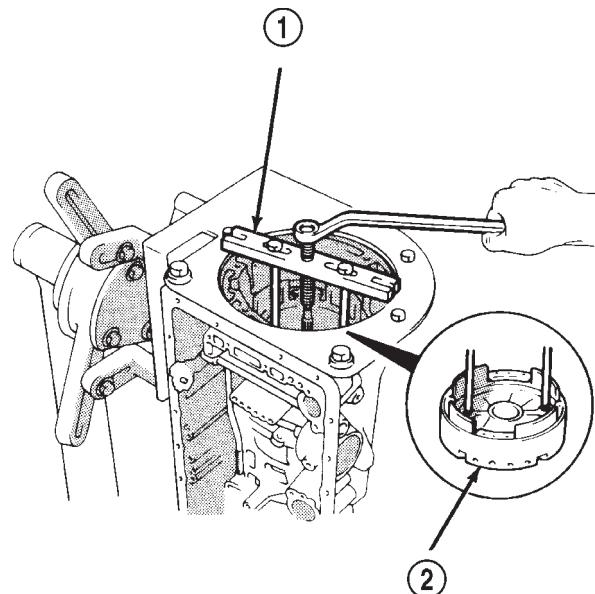
J8921-490

Fig. 113 Overdrive Support Bolt Removal

- 1 – SUPPORT BOLTS

(33) Remove overdrive support (Fig. 114) with bridge-type Puller 7536.

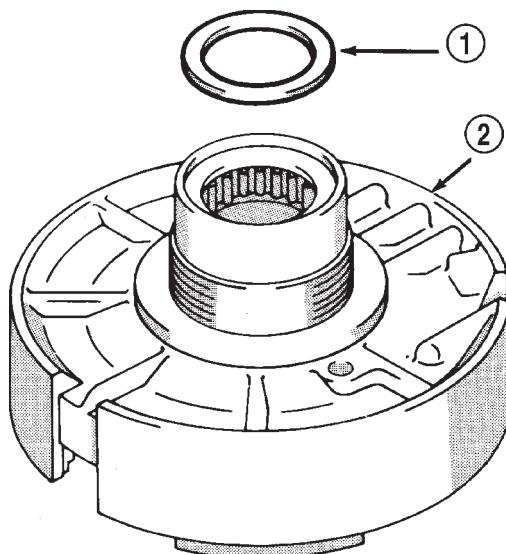
(34) Remove race from hub of overdrive support (Fig. 115).



J8921-492

Fig. 114 Removing Overdrive Support

- 1 – BRIDGE-TYPE PULLER TOOL
2 – OVERDRIVE SUPPORT



J8921-493

Fig. 115 Remove Overdrive Support Race

- 1 – RACE
2 – OVERDRIVE SUPPORT

(35) Remove second coast brake piston snap ring with Snap Ring Plier Tool 7540. Then remove piston cover and piston assembly.

(36) Disassemble second coast brake piston (Fig. 116), if necessary.

(37) Remove direct and forward clutch assembly (Fig. 117).

DISASSEMBLY AND ASSEMBLY (Continued)

(38) Remove thrust bearing and race from clutch hub (Fig. 118).

(39) Remove second coast brake band E-ring from band pin and remove pin and brake band (Fig. 119).

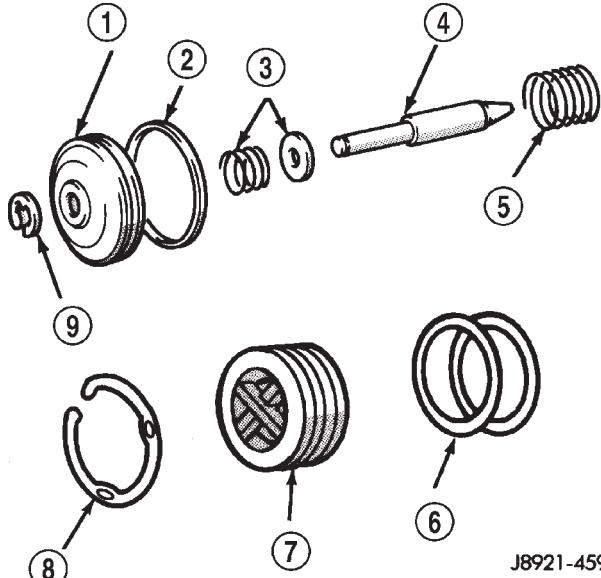
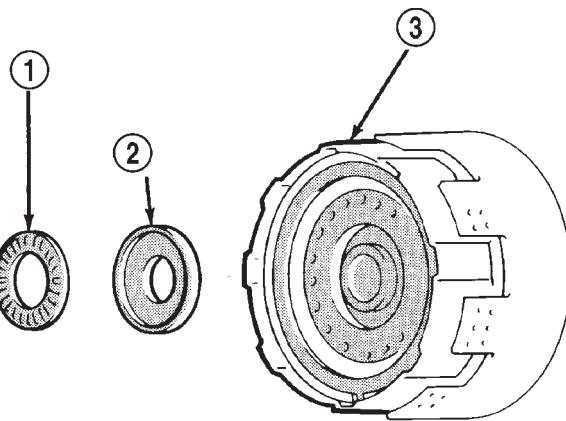


Fig. 116 Second Coast Brake Piston Components

- 1 - SERVO PISTON
- 2 - SEAL RING
- 3 - SPRING AND RETAINER
- 4 - PISTON ROD
- 5 - PISTON SPRING
- 6 - SERVO COVER O-RINGS
- 7 - SERVO COVER
- 8 - SNAP RING
- 9 - E-RING



J8921-497

Fig. 118 Bearing And Race Removal From Clutch Hub

- 1 - BEARING
- 2 - RACE
- 3 - DIRECT CLUTCH

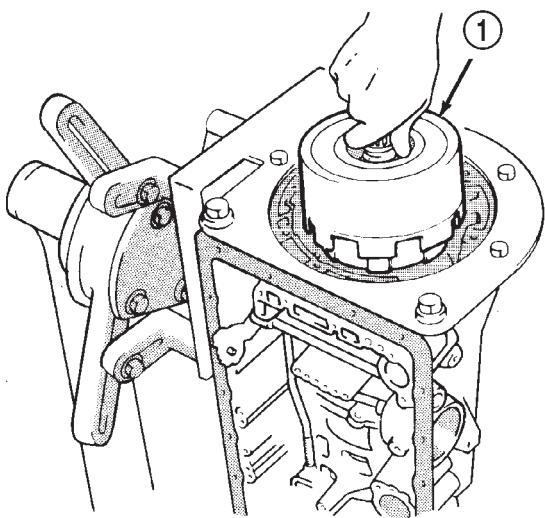
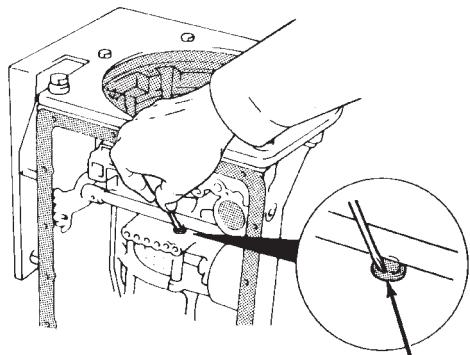


Fig. 117 Removing Direct And Forward Clutch Assembly

- 1 - DIRECT AND FORWARD CLUTCH ASSEMBLY

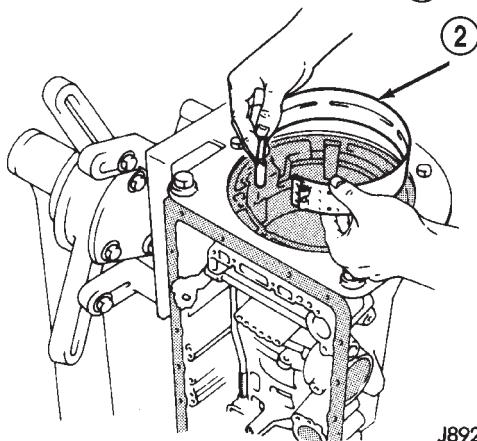


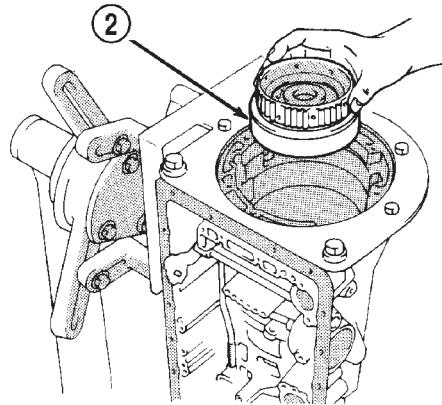
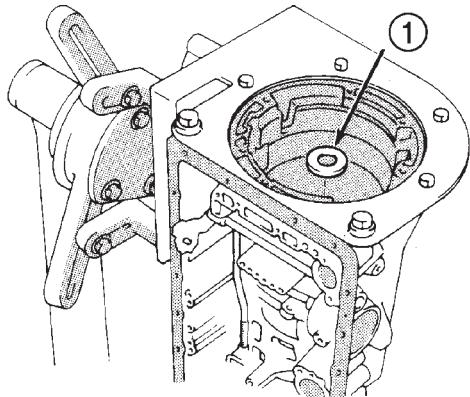
Fig. 119 Second Coast Brake Band Removal

- 1 - BRAKE BAND E-RING
- 2 - SECOND COAST BRAKE BAND

J8921-498

DISASSEMBLY AND ASSEMBLY (Continued)

- (40) Remove front planetary bearing race and remove front planetary ring gear (Fig. 120).



J8921-499

Fig. 120 Front Planetary Ring Gear Removal

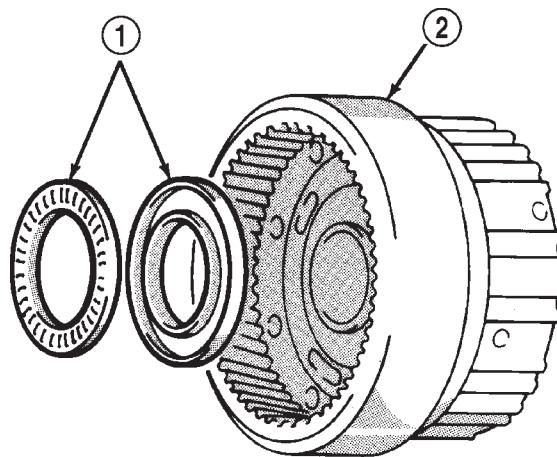
- 1 – RING GEAR BEARING RACE (FRONT)
2 – FRONT PLANETARY RING GEAR

- (41) Remove thrust bearing and rear race from ring gear (Fig. 121).

- (42) Remove planetary thrust race.

- (43) Push forward on output shaft to relieve the load on the planetary snap ring.

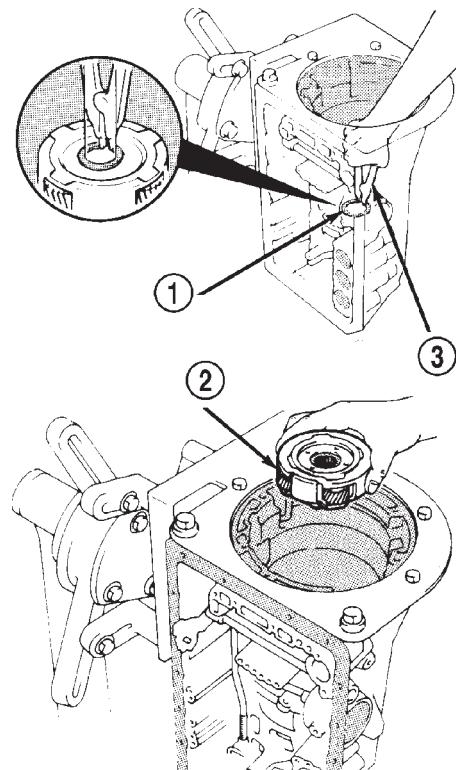
- (44) Remove planetary snap ring and remove planetary gear (Fig. 122).



J8921-500

Fig. 121 Removing Ring Gear Bearing And Rear Race

- 1 – BEARING AND REAR RACE
2 – FRONT PLANETARY RING GEAR



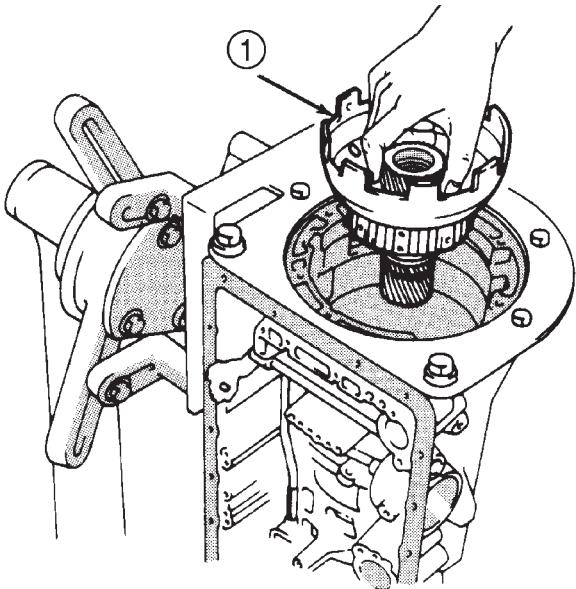
J8921-502

Fig. 122 Removing Planetary Snap Ring And Gear

- 1 – PLANETARY SNAP RING
2 – PLANETARY GEAR
3 – SNAP RING PLIERS

DISASSEMBLY AND ASSEMBLY (Continued)

(45) Remove sun gear, input drum, one-way clutch, and thrust washer as assembly (Fig. 123).

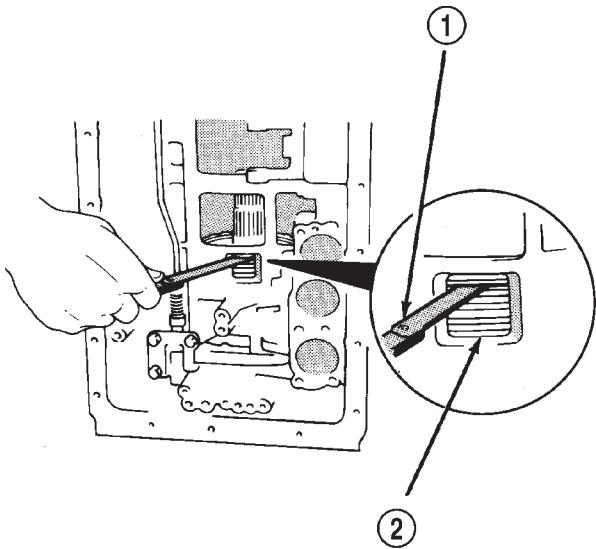


J8921-503

Fig. 123 Removing Sun Gear, Input Drum And One-Way Clutch

1 – SUN GEAR INPUT DRUM, ONE-WAY CLUTCH ASSEMBLY

(46) Measure second brake clutch pack clearance (Fig. 124). Clearance should be 0.62 – 1.98 mm (0.0244 – 0.0780 in.). Record measurement for use during re-assembly.



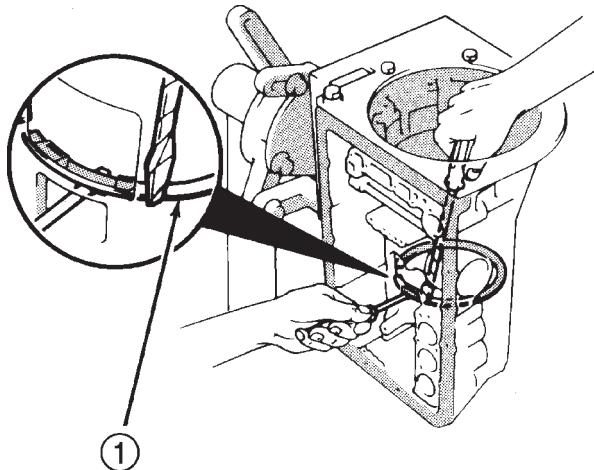
J8921-504

Fig. 124 Checking Second Brake Clutch Pack Clearance

1 – FEELER GAUGE

2 – SECOND BRAKE CLUTCH PACK

(47) Remove second brake clutch pack snap ring (Fig. 125).

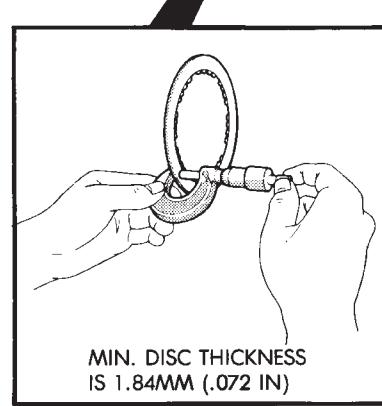
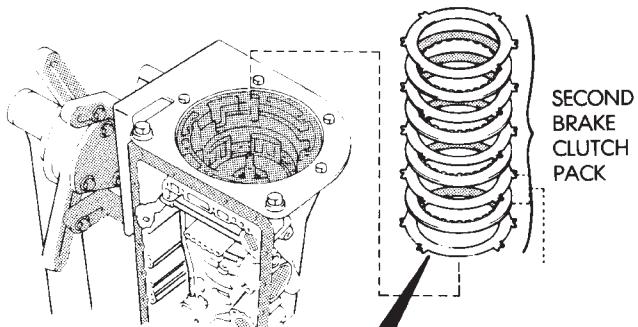


J8921-505

Fig. 125 Removing Second Brake Clutch Pack Snap Ring

1 – CLUTCH PACK SNAP RING

(48) Remove second brake clutch pack (Fig. 126). Inspect and replace as necessary.



MIN. DISC THICKNESS IS 1.84MM (.072 IN)

J8921-506

Fig. 126 Removing/Measuring Second Brake Clutch Disc Thickness

(49) Remove bolts attaching park rod bracket to case. Then disconnect park rod from manual shaft lever and remove rod and bracket (Fig. 127).

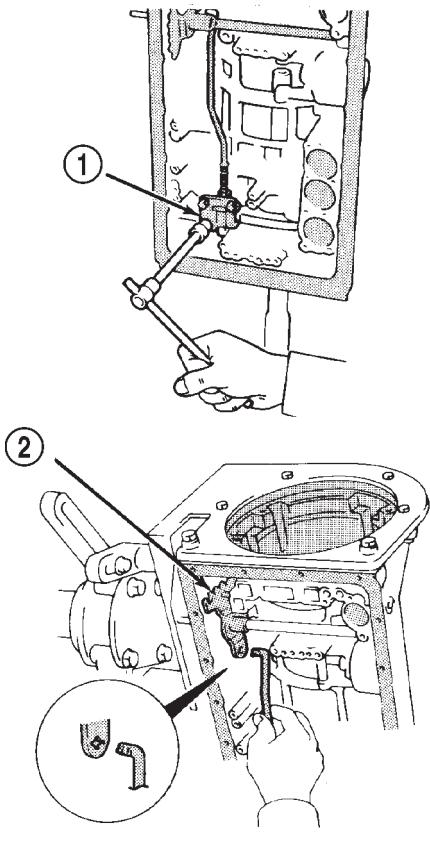


Fig. 127 Removing Park Rod And Bracket

- 1 – PARK ROD BRACKET
2 – SHIFT SETOR

(50) Remove park pawl spring, pin and pawl (Fig. 128).

(51) Measure clearance of first-reverse brake clutch pack (Fig. 129). Clearance should be: 0.70 – 1.2 mm (0.028 – 0.047 in.). record measurement for use during re-assembly.

(52) Remove second brake piston sleeve (Fig. 130).

(53) Remove second brake snap-ring.

(54) Remove rear planetary gear, second brake drum and output shaft as an assembly (Fig. 131).

(55) Remove planetary and brake drum thrust bearing and race assembly (Fig. 132).

(56) Remove second brake drum gasket from case with screwdriver.

(57) Measure inside diameter of transmission case rear bushing with bore gauge or inside micrometer (Fig. 133). Maximum allowable diameter is 38.18 mm (1.5031 in.). **Replace transmission case if bushing I. D. is greater than specified. Bushing is not serviceable.**

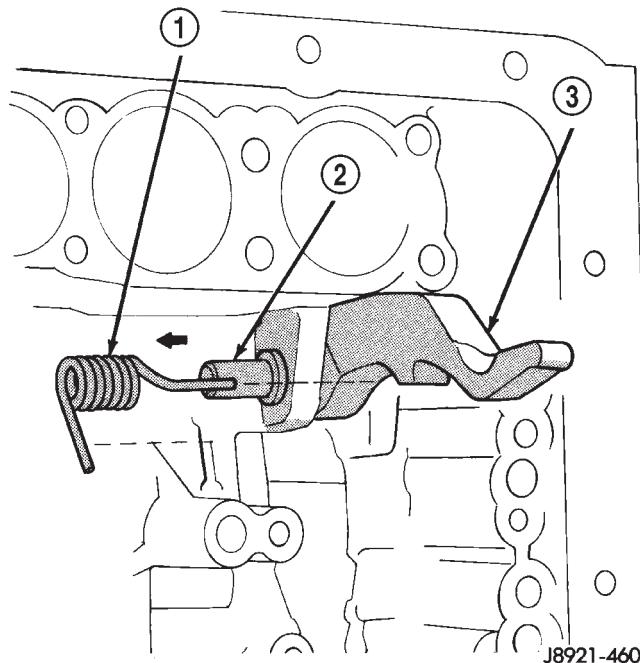


Fig. 128 Removing Park Pawl, Pin And Spring

- 1 – SPRING
2 – PIN
3 – PARK PAWL

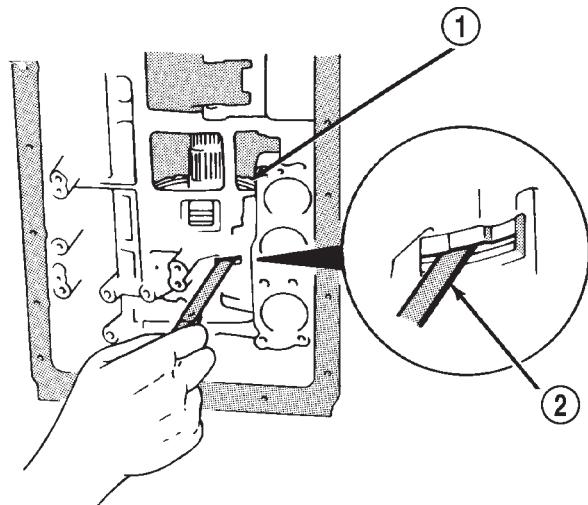
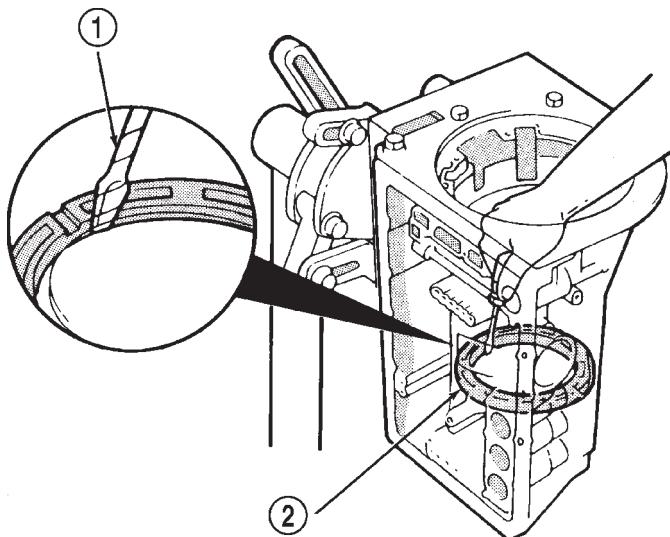


Fig. 129 Checking First-Reverse Brake Clutch Pack Clearance

- 1 – FIRST-REVERSE CLUTCH PACK
2 – FEELER GAUGE

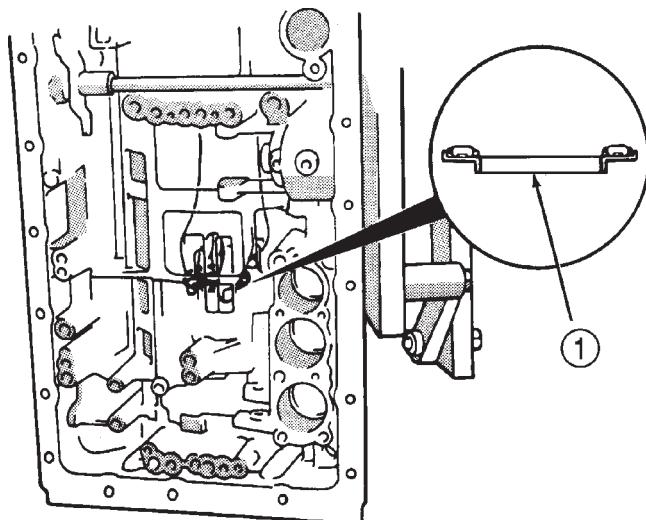
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-509

Fig. 130 Removing Second Brake Piston Sleeve

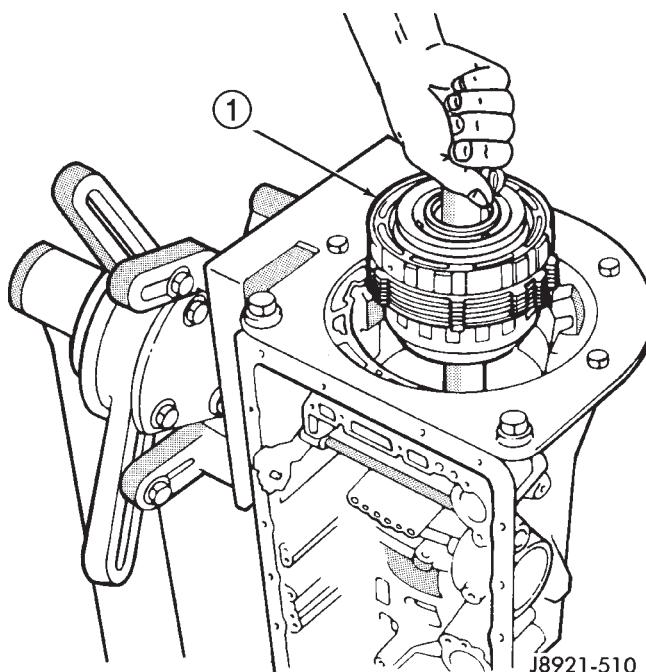
- 1 – REMOVER TOOL
2 – PISTON SLEEVE



J8921-616

Fig. 132 Removing/Installing Bearing And Race Assembly

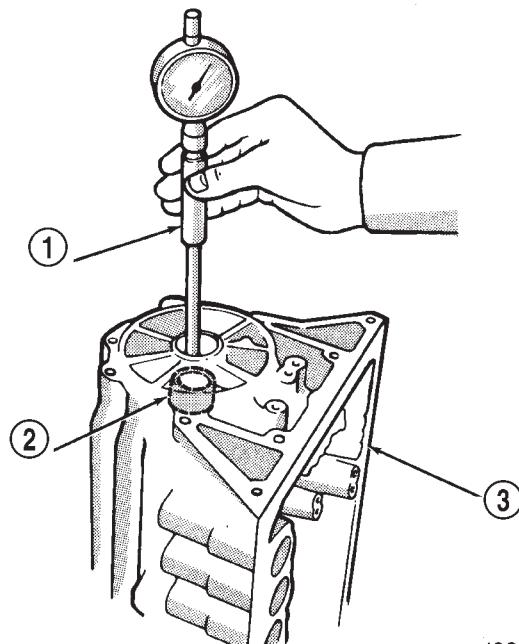
- 1 – BEARING AND RACE ASSEMBLY



J8921-510

Fig. 131 Removing Rear Planetary, Second Brake Drum And Output Shaft

- 1 – PLANETARY, BRAKE DRUM AND OUTPUT SHAFT ASSEMBLY



J8921-512

Fig. 133 Checking Rear Bushing Inside Diameter

- 1 – BORE GAUGE
2 – REAR BUSHING
3 – TRANSMISSION CASE

(58) Check first/reverse brake piston operation with compressed air (Fig. 134). Piston should move smoothly and not bind or stick. If piston operation is incorrect, case or piston may require replacement.

(59) Compress piston return springs with Tool 7539 and remove piston snap ring (Fig. 135).

(60) Remove Tool 7539 and remove piston return springs.

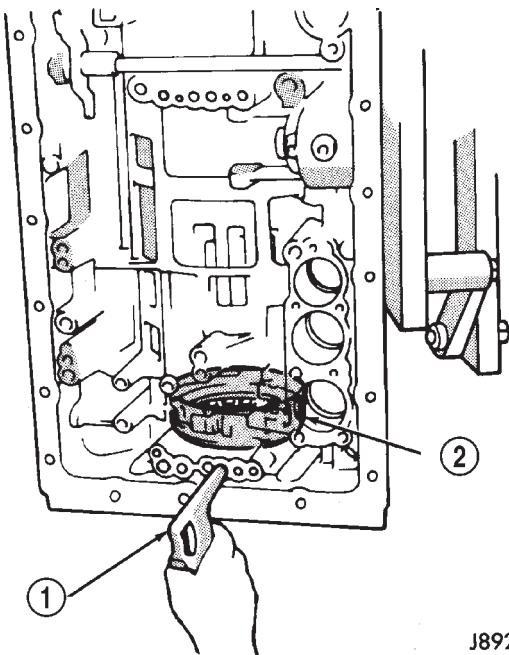
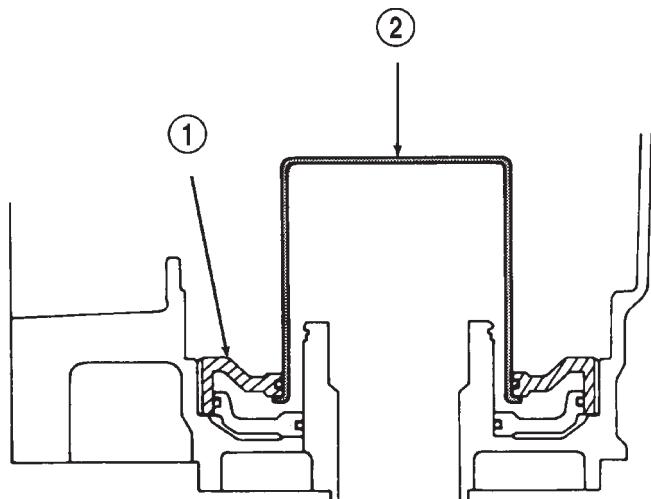


Fig. 134 Checking First-Reverse Brake Piston Operation

1 – LOW-PRESSURE AIR
2 – FIRST-REVERSE BRAKE (IN CASE)

J8921-617



J8921-619

Fig. 136 Removing/Installing Reaction Sleeve

1 – REACTION SLEEVE
2 – TOOL

(61) Remove No. 2 first-reverse brake piston with compressed air. Apply air through same transmission feed hole used for checking piston operation.

(62) Remove reaction sleeve with Sleeve Remover Tool 7542 (Fig. 136). Insert tool flanges under sleeve and lift tool and sleeve out of case.

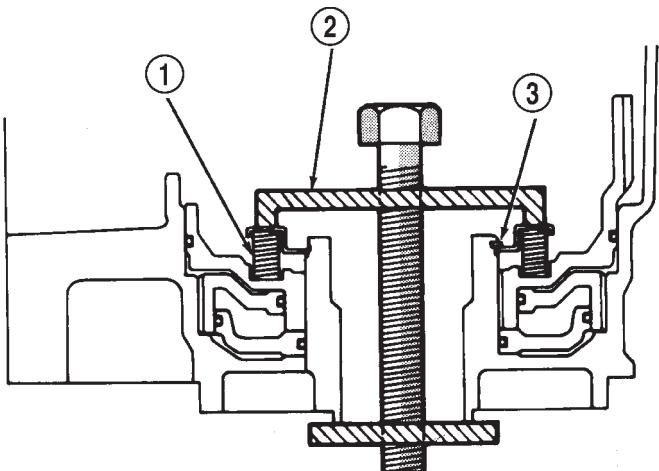
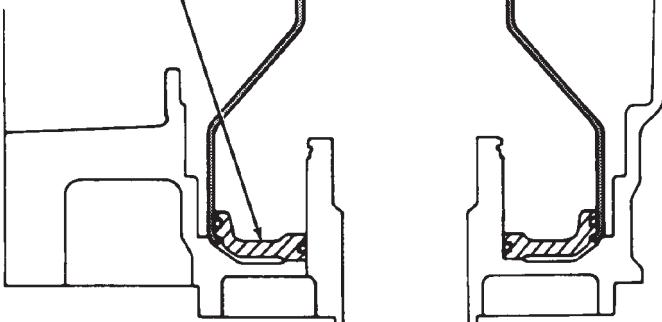


Fig. 135 Removing/Installing Piston Snap Ring

1 – RETURN SPRINGS
2 – COMPRESSOR TOOL
3 – PISTON SNAP RING

J8921-618



J8921-620

Fig. 137 Removing/Installing First-Reverse Brake No.1 Piston

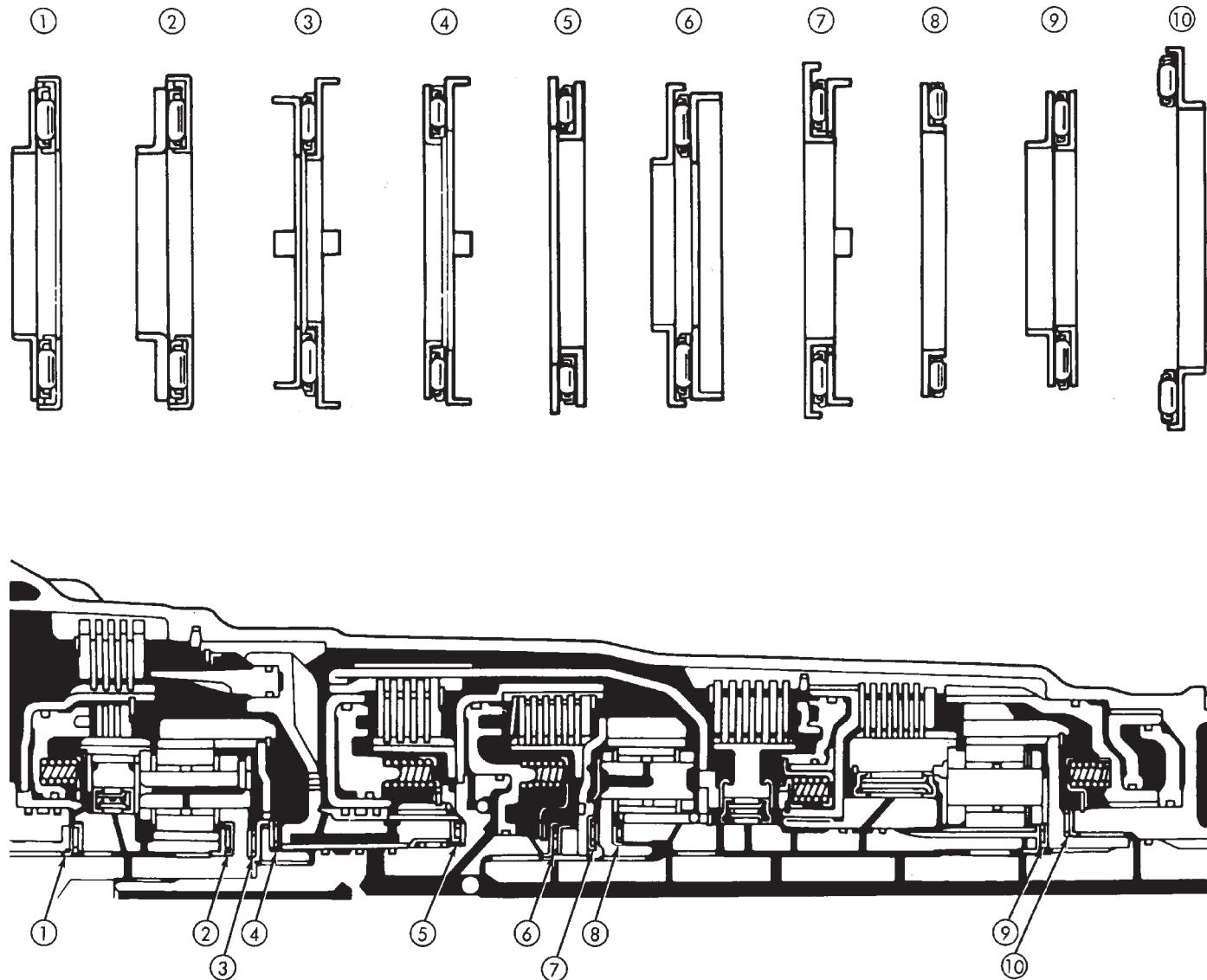
1 – NO. 1 PISTON
2 – TOOL

ASSEMBLY

(1) During assembly, lubricate components with transmission fluid or petroleum jelly as indicated.

(2) Verify thrust bearing and race installation during assembly. Refer to the Thrust Bearing Chart (Fig.

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-669

Fig. 138 Thrust Bearing Chart

138) for bearing and race location and correct positioning.

(3) Install new seals onto the No.1 first-reverse brake piston. Lubricate seals with transmission fluid.

(4) Install the No.1 first-reverse brake piston into the transmission case.

(5) Install new seal onto the first-reverse brake piston reaction sleeve. Lubricate seals with transmission fluid.

(6) Install the first-reverse brake piston reaction sleeve into the transmission case.

(7) Install new seal onto the No.2 first-reverse brake piston. Lubricate seals with transmission fluid.

(8) Install the No.2 first-reverse brake piston into the transmission case.

(9) Install the spring plate into the No.2 first-reverse brake piston.

(10) Install Spring Compressor 7539 onto the first-reverse brake piston.

(11) Compress the first-reverse brake piston spring and install the first-reverse brake piston snap-ring.

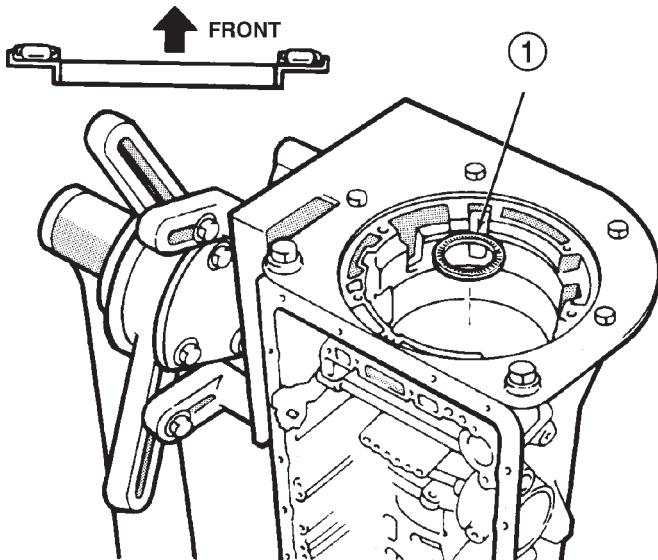
(12) Remove Spring Compressor 7539.

(13) Install rear planetary gear, second brake drum and output shaft as outlined in following steps:

(14) Verify No. 10 thrust bearing and race (Fig. 138). Bearing and race outer diameter is 57.7 mm (2.272 in.) and inside diameter is 39.2 mm (1.543 in.).

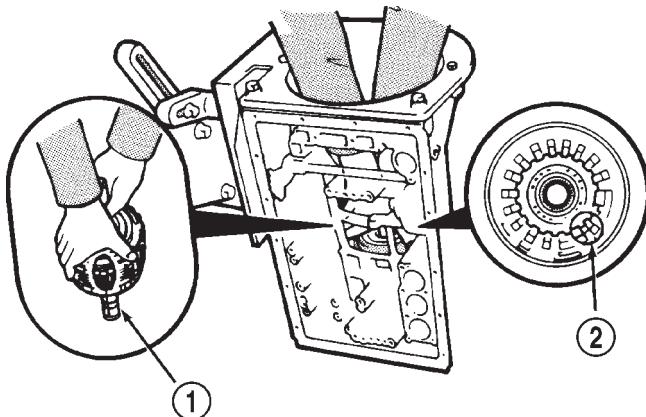
(15) Coat thrust bearing and race assembly with petroleum jelly and install in case (Fig. 139). Race faces down. Bearing rollers face up.

(16) Align teeth of second brake drum and clutch pack (Fig. 140).



J8921-670

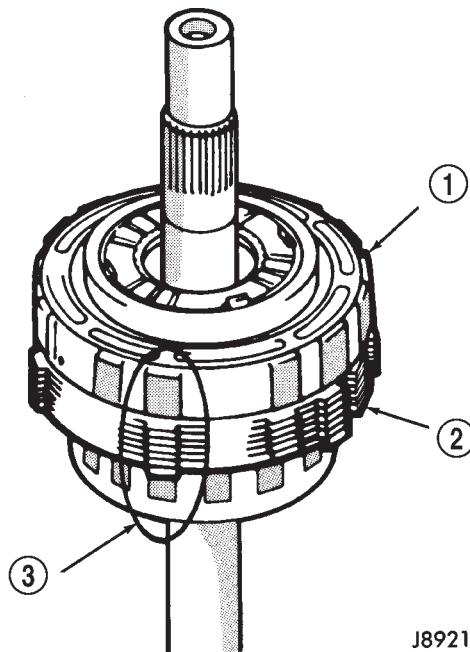
Fig. 139 Installing Thrust Bearing And No. 10 Race
1 – THRUST BEARING AND RACE



J8921-672

Fig. 141 Output Shaft/Rear Planetary Assembly Installation

1 – ALIGN CLUTCH/DRUM TEETH WITH CASE SLOTS
2 – CASE SLOTS



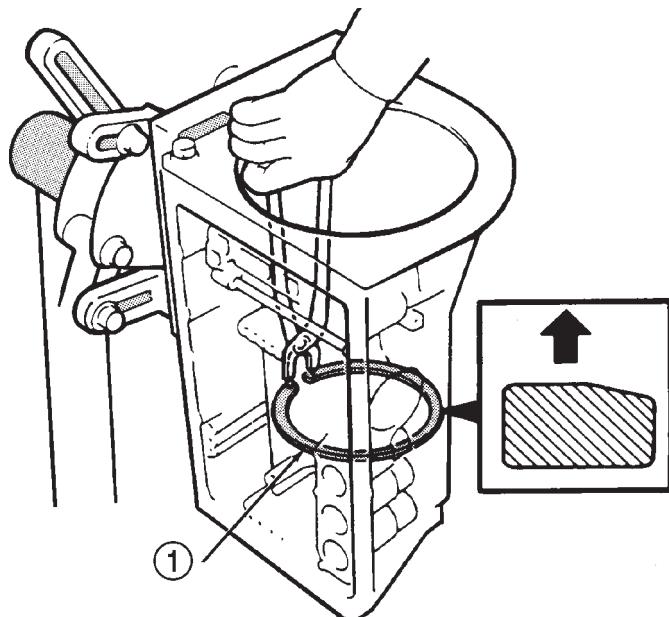
J8921-671

Fig. 140 Aligning Second Brake Drum And Clutch Pack Teeth

1 – SECOND BRAKE DRUM
2 – CLUTCH PACK
3 – ALIGN DRUM AND CLUTCH PACK TEETH

(17) Align rear planetary-output shaft assembly teeth with case slots and install assembly in case (Fig. 141).

(18) Install rear planetary snap ring with snap ring pliers. Chamfered side of snap ring faces up and toward case front (Fig. 142).



J8921-673

Fig. 142 Planetary Snap Ring Installation

1 – REAR PLANETARY SNAP RING

(19) Check first-reverse brake pack clearance with feeler gauge (Fig. 143). Clearance should be 0.70 – 1.20 mm (0.028 – 0.047 in.). If clearance is incorrect, planetary assembly, thrust bearing or snap ring is not properly seated in case. Remove and reinstall components if necessary.

(20) Install second brake piston sleeve (Fig. 144). Sleeve lip faces up and toward case front as shown.

(21) Install second brake drum gasket.

DISASSEMBLY AND ASSEMBLY (Continued)

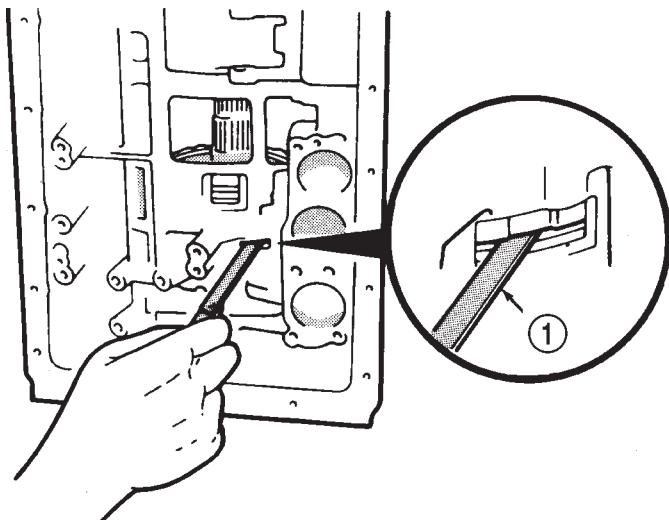


Fig. 143 Checking First-Reverse Brake Pack Clearance

1 – FEELER GAUGE

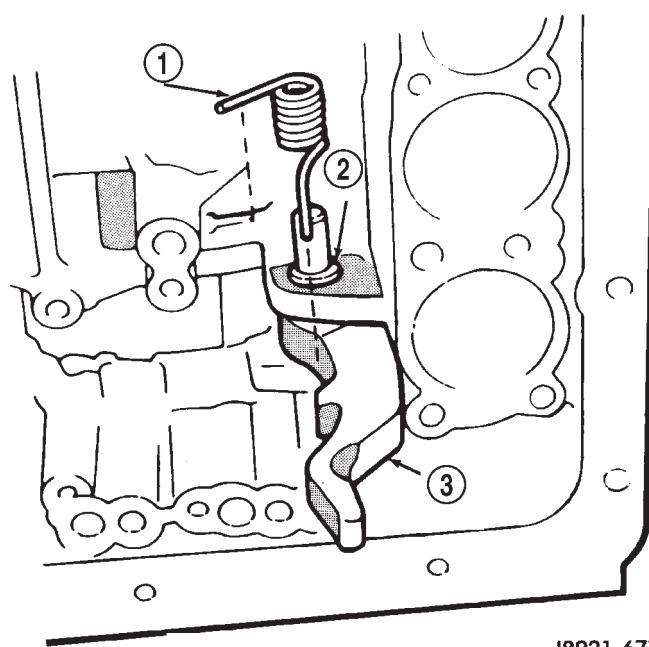


Fig. 145 Park Lock Pin, Spring And Pawl Installation

1 – SPRING

2 – PIN

3 – PAWL

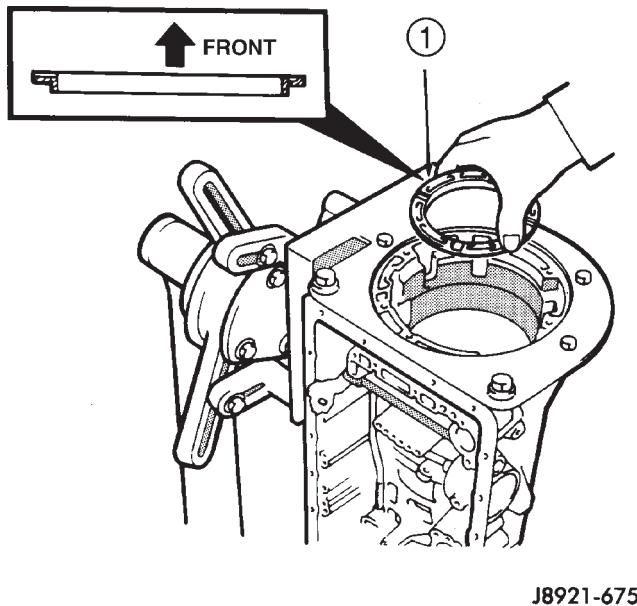


Fig. 144 Second Brake Piston Sleeve Installation

1 – PISTON SLEEVE

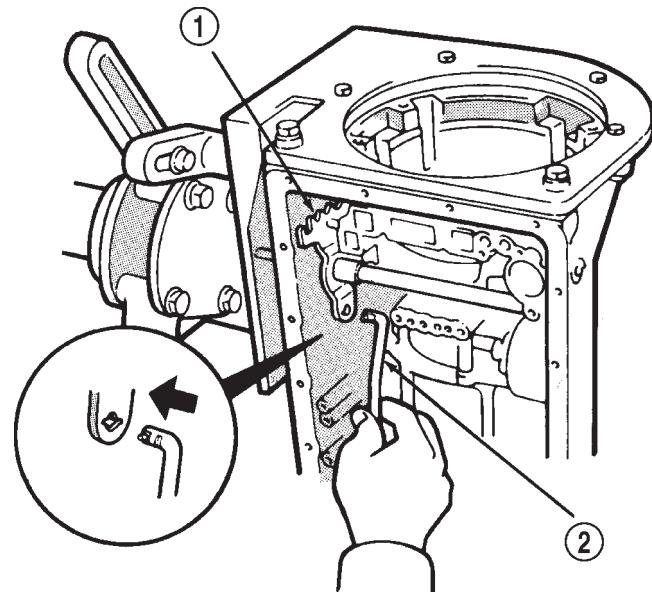


Fig. 146 Park Lock Rod Installation

1 – SHIFT SECTOR

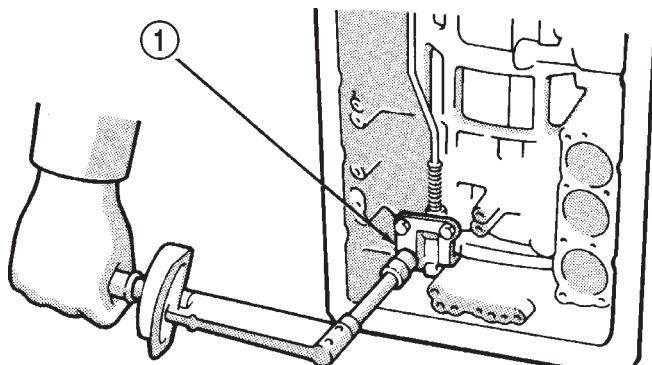
2 – PARK LOCK ROD

(22) Install park lock pawl, spring and pin (Fig. 145).

(23) Install the manual valve shift assembly.

(24) Connect park lock rod to manual valve shift sector (Fig. 146).

(25) Position park lock rod bracket on case and tighten bracket attaching bolts to 10 N·m (7 ft. lbs.) torque (Fig. 147).

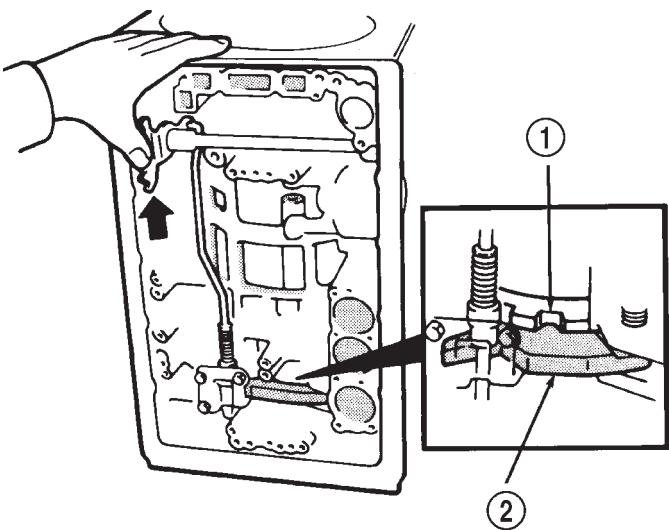


J8921-679

Fig. 147 Park Rod Bracket Installation

1 – PARK ROD BRACKET

(26) Verify park lock operation. Move shift sector to Park position. Park pawl should be firmly engaged (locked) in planetary ring gear (Fig. 148).



J8921-680

Fig. 148 Checking Park Pawl Engagement

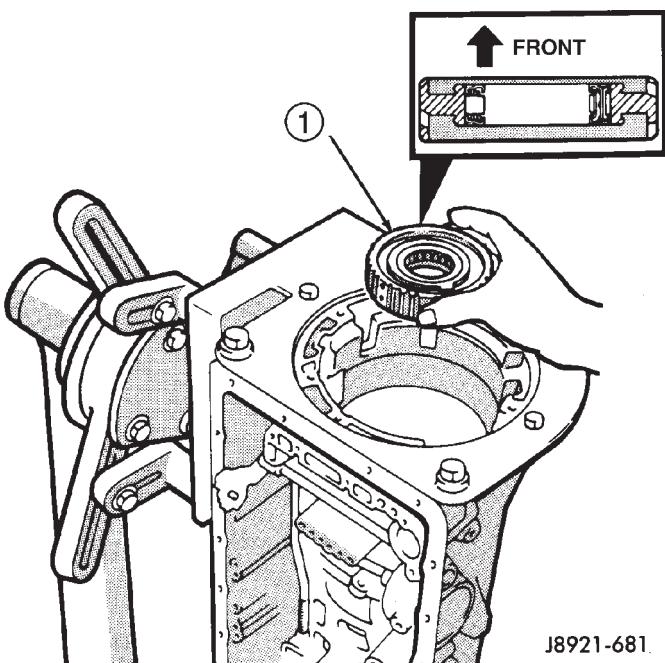
1 – REAR PLANETARY RING GEAR
2 – PARK PAWL

(27) Install No. 1 one-way clutch (Fig. 149). Short flanged side of clutch faces up and toward case front.

(28) Install second brake pack (Fig. 150). Install disc then plate. Continue installation sequence until five discs and five plates are installed.

(29) Install second brake pack retainer with rounded edge of retainer facing disc.

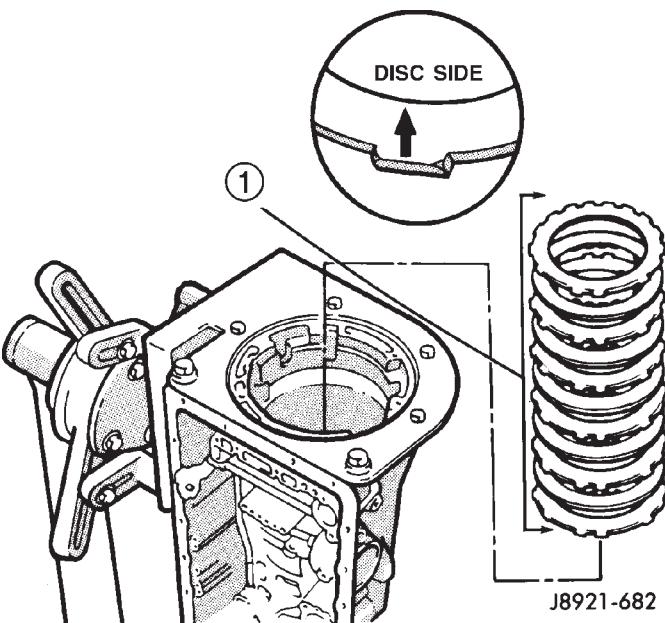
(30) Install second brake pack snap ring.



J8921-681

Fig. 149 Installing No. 1 One-Way Clutch

1 – NO. 1 ONE-WAY CLUTCH



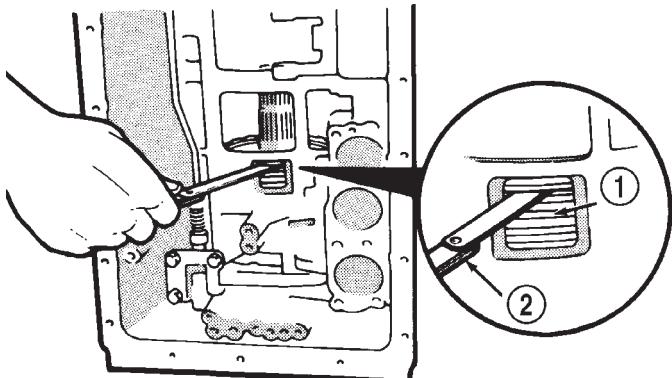
J8921-682

Fig. 150 Second Brake Pack Installation

1 – SECOND BRAKE PACK

DISASSEMBLY AND ASSEMBLY (Continued)

(31) Check brake pack clearance with feeler gauge (Fig. 151). Clearance should be 0.062 – 1.98 mm (0.024 – 0.078 in.). If brake pack clearance is not correct, brake pack components are not seated. Reassemble brake pack if necessary.

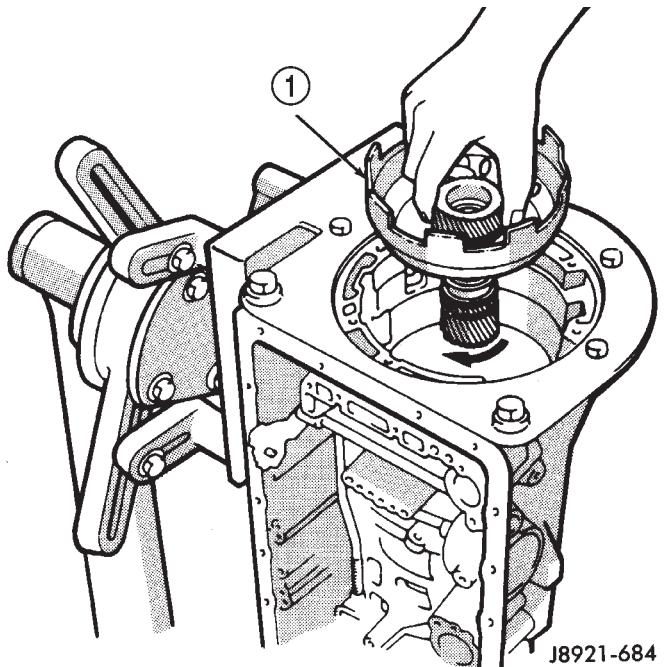


J8921-683

Fig. 151 Checking Second Brake Pack Clearance

- 1 – BRAKE PACK
2 – FEELER GAUGE

(32) Install planetary sun gear and input drum (Fig. 152). Be sure drum thrust washer tabs are seated in drum. Use petroleum jelly to hold thrust washer in position if necessary.

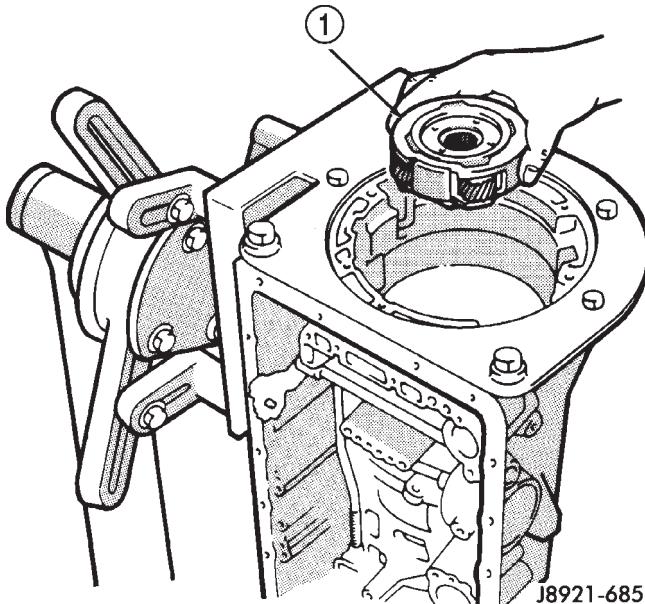


J8921-684

Fig. 152 Installing Sun Gear And Input Drum

- 1 – SUN GEAR AND INPUT DRUM

(33) Install front planetary gear on sun gear (Fig. 153).

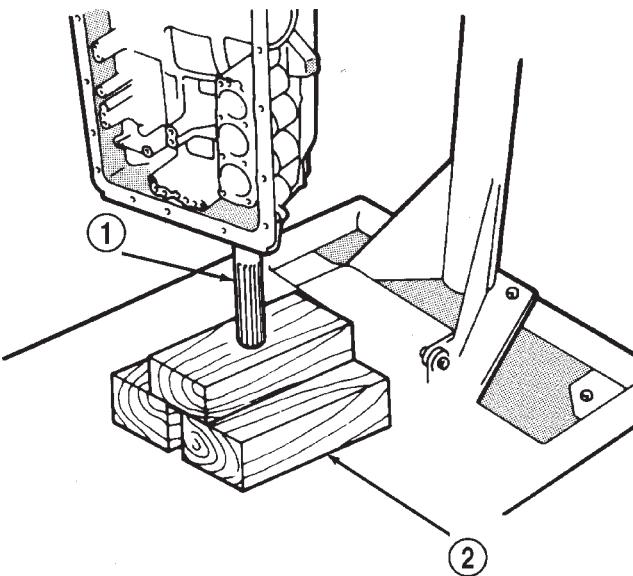


J8921-685

Fig. 153 Installing Front Planetary Gear

- 1 – FRONT PLANETARY GEAR

(34) Support output shaft with wood blocks (Fig. 154).

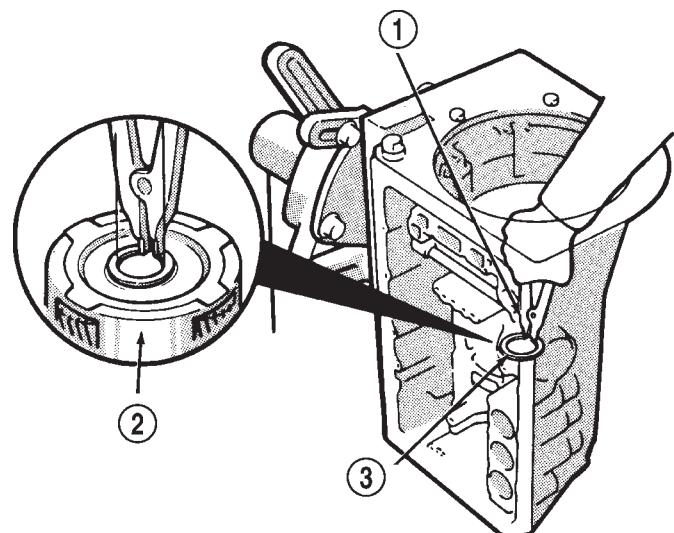


J8921-686

Fig. 154 Supporting Output Shaft

- 1 – OUTPUT SHAFT
2 – WOOD BLOCKS

(35) Install planetary snap ring on sun gear with snap ring plier tool 7541 (Fig. 155).



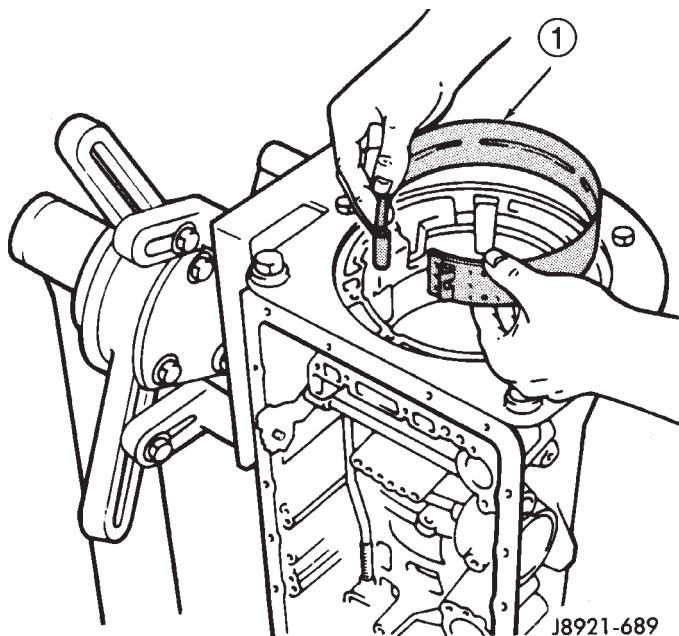
J8921-687

Fig. 155 Installing Front Planetary Snap Ring

- 1 – SNAP RING PLIER TOOL
- 2 – FRONT PLANETARY
- 3 – SNAP RING

(36) Install tabbed thrust race on front planetary gear. Washer tabs face down and toward gear. Race outer diameter is 47.8 mm (1.882 in.). Inside diameter is 34.3 mm (1.350 in.).

(37) Install second coast brake band (Fig. 156).

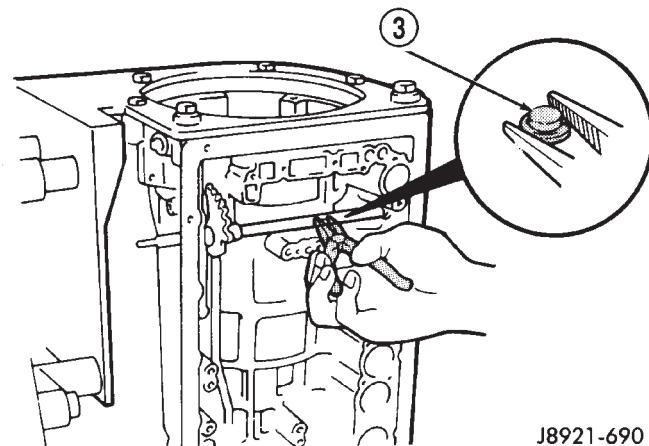
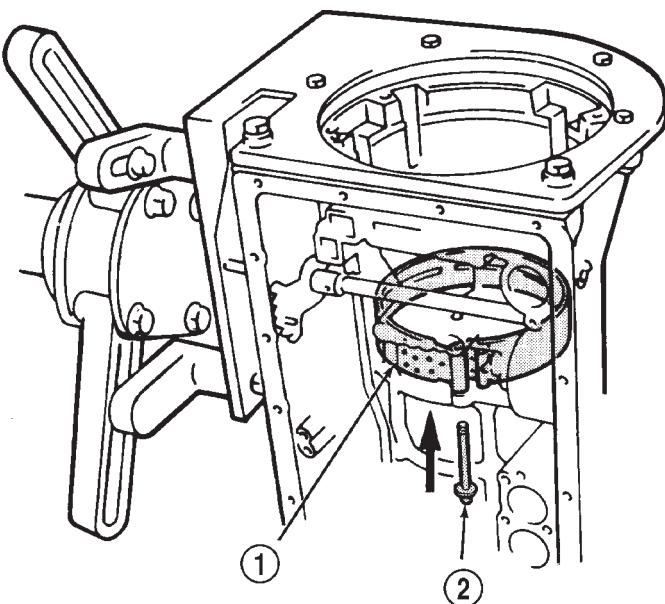


J8921-689

Fig. 156 Installing Second Coast Brake Band

- 1 – SECOND COAST BRAKE BAND

(38) Install pin in second coast brake band. Then install retaining ring on pin (Fig. 157).



J8921-690

Fig. 157 Installing Second Coast Brake Band Retaining Pin

- 1 – SECOND COAST BRAKE BAND
- 2 – BAND RETAINING PIN
- 3 – RETAINING RING (INSTALL ON PIN)

(39) Install thrust bearing and race in forward-direct clutch (Fig. 158). Coat bearing/race with petroleum jelly to hold them in place.

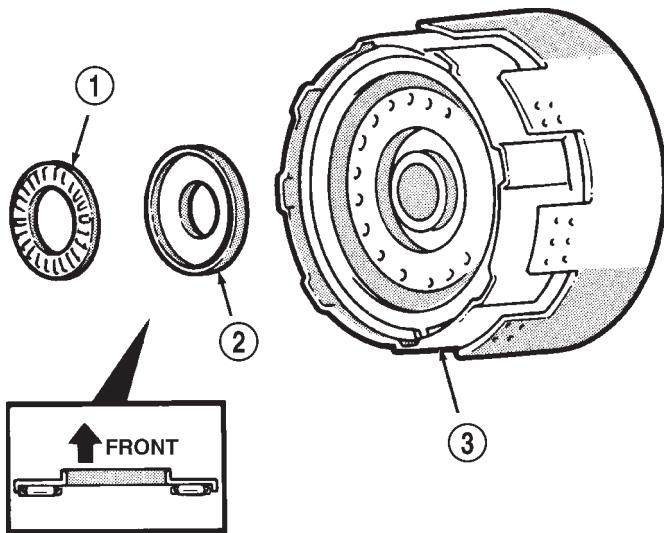
(40) Verify forward-direct clutch thrust bearing size.

- Race outer diameter is 48.9 mm (1.925 in.) and inside diameter is 26.0 mm (1.024 in.).

- Bearing outer diameter is 46.7 mm (1.839 in.) and inside diameter is 26.0 mm (1.024 in.).

(41) Coat front planetary ring gear race with petroleum jelly and install it in ring gear (Fig. 159).

DISASSEMBLY AND ASSEMBLY (Continued)

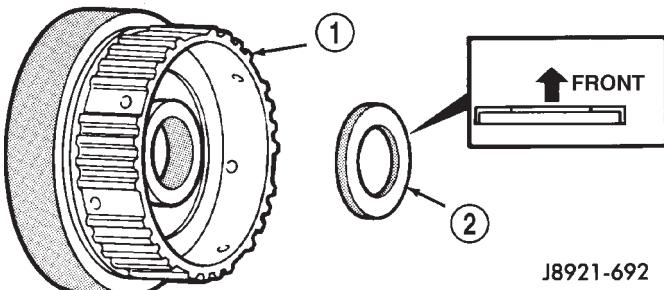


J8921-691

Fig. 158 Installing Forward-Direct Clutch Thrust Bearing And Race

- 1 – THRUST BEARING
2 – RACE
3 – FORWARD-DIRECT CLUTCH ASSEMBLY

(42) Verify ring gear race size. Outer diameter is 47.0 mm (1.850 in.) and inside diameter is 26.5 mm (1.045 in.).



J8921-692

Fig. 159 Installing Planetary Ring Gear Race

- 1 – PLANETARY RING GEAR
2 – THRUST RACE

(43) Align forward-direct clutch disc splines with screwdriver (Fig. 160).

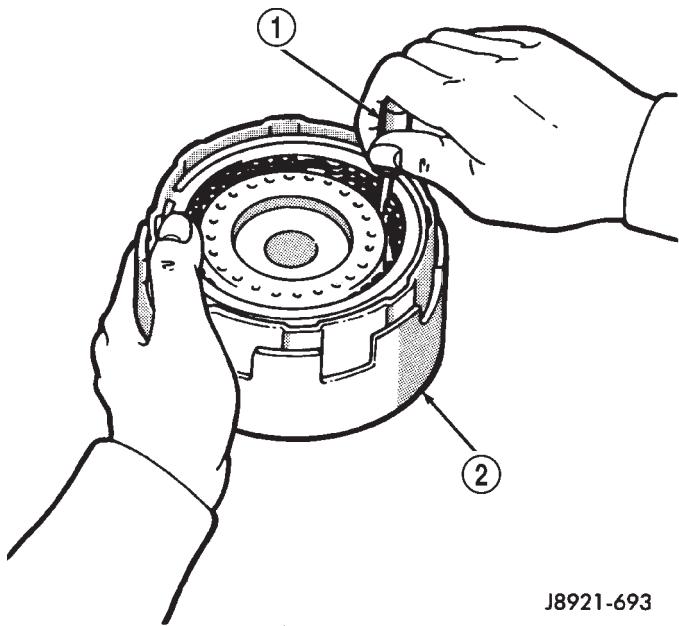
(44) Align and install front planetary ring gear in forward-direct clutch (Fig. 161).

(45) Coat bearing and race with petroleum jelly and install them in ring gear (Fig. 162). Verify bearing/race size.

- Bearing outer diameter is 47.7 mm (1.878 in.) and inside diameter is 32.6 mm (1.283 in.).

- Race outer diameter is 53.6 mm (2.110 in.) and inside diameter is 30.6 mm (1.205 in.).

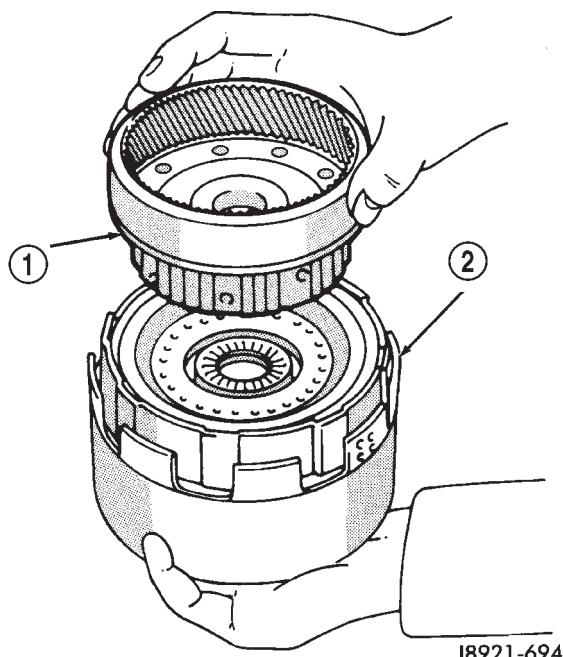
(46) Install assembled planetary gear/forward-direct clutch (Fig. 163).



J8921-693

Fig. 160 Aligning Forward-Direct Clutch Splines

- 1 – CLUTCH SPLINE ALIGNING TOOL
2 – FORWARD-DIRECT CLUTCH

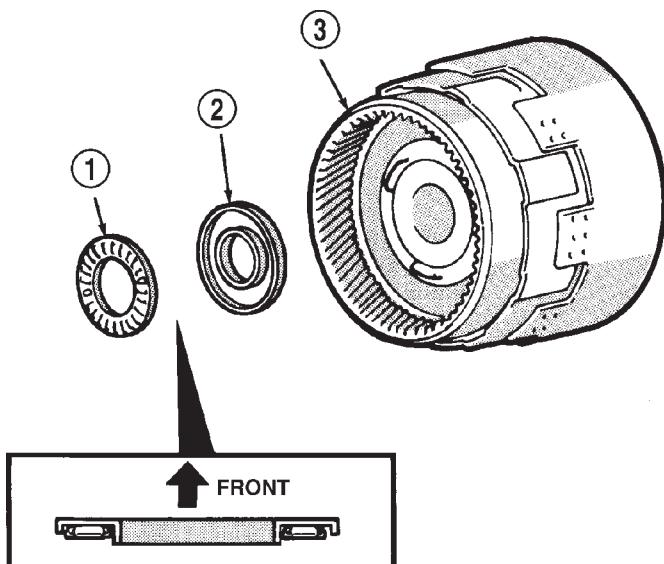


J8921-694

Fig. 161 Installing Front Planetary Ring Gear

- 1 – RING GEAR
2 – FORWARD-DIRECT CLUTCH

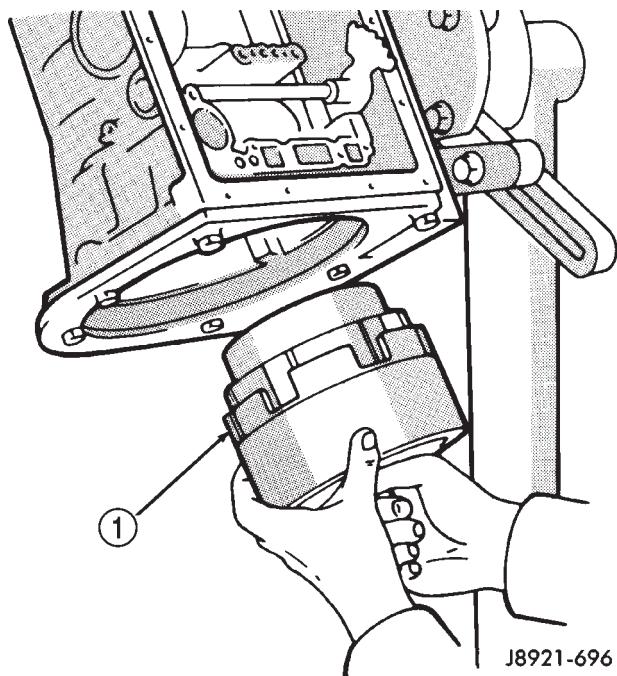
(47) Check clearance between sun gear input drum and direct clutch drum (Fig. 164). Clearance should be 9.8 – 11.8 mm (0.386 – 0.465 in.). If clearance is incorrect, planetary gear/forward-direct clutch assembly is not seated or is improperly assembled. Remove, and correct if necessary.



J8921-695

Fig. 162 Installing Ring Gear Bearing And Race

- 1 – THRUST BEARING
- 2 – RACE
- 3 – PLANETARY RING GEAR

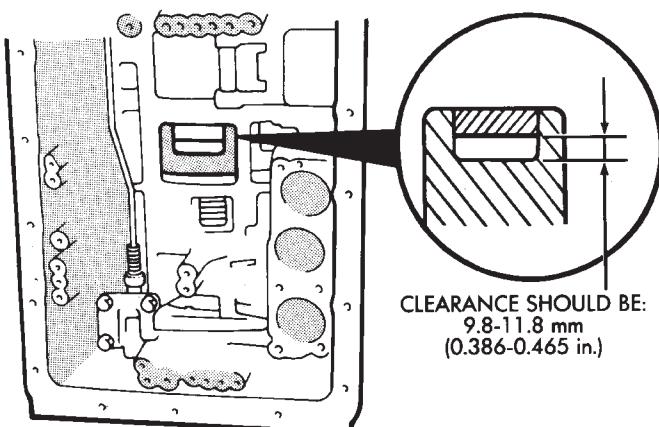


J8921-696

Fig. 163 Installing Front Planetary And Forward-Direct Clutch Assembly

- 1 – FRONT PLANETARY AND FORWARD-DIRECT CLUTCH ASSEMBLY

(48) Coat thrust bearing and race assembly with petroleum jelly and install it on clutch shaft. Bearing faces up and toward case front as shown. Verify bearing/race size. Bearing and race outer diameter is 47.8



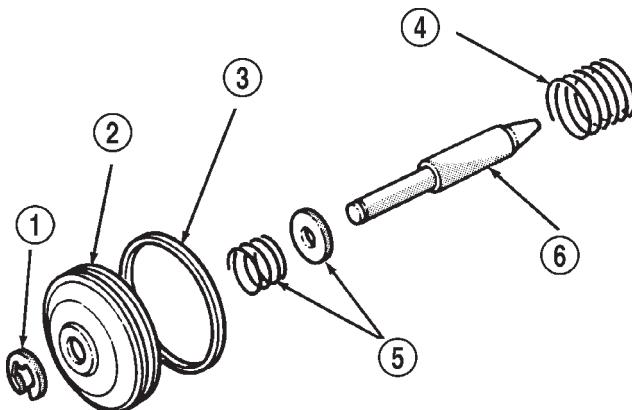
CLEARANCE SHOULD BE:
9.8-11.8 mm
(0.386-0.465 in.)

J8921-697

Fig. 164 Checking Input Drum-To-Direct Clutch Drum Clearance

mm (1.882 in.) and inside diameter is 33.6 mm (1.301 in.).

(49) Assemble second coast brake piston components (Fig. 165).



J8921-699

Fig. 165 Assembling Second Coast Brake Piston

- 1 – E-CLIP
- 2 – PISTON
- 3 – O-RING
- 4 – PISTON SPRING
- 5 – SPRING AND RETAINER
- 6 – PISTON ROD

(50) Install assembled second coast brake piston in case. Verify that the piston rod contacts the second coast brake band.

(51) Install replacement seals on second coast brake piston cover and install cover in case.

(52) Install second coast brake piston snap ring with snap ring plier tool (Fig. 166).

(53) Check second coast brake piston stroke as follows:

DISASSEMBLY AND ASSEMBLY (Continued)

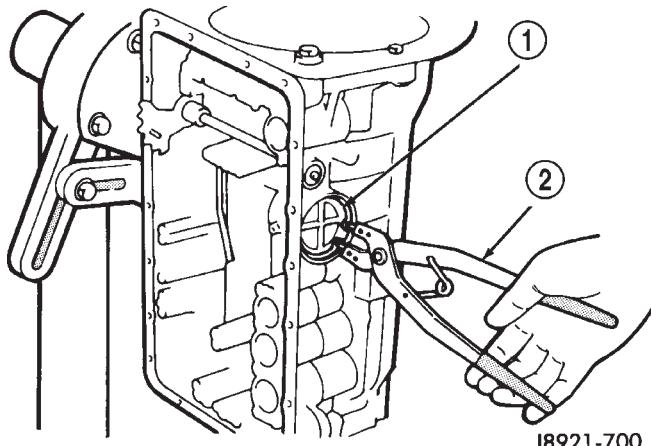


Fig. 166 Installing Second Coast Brake Piston Snap Ring

- 1 – PISTON SNAP RING
2 – SNAP RING TOOL

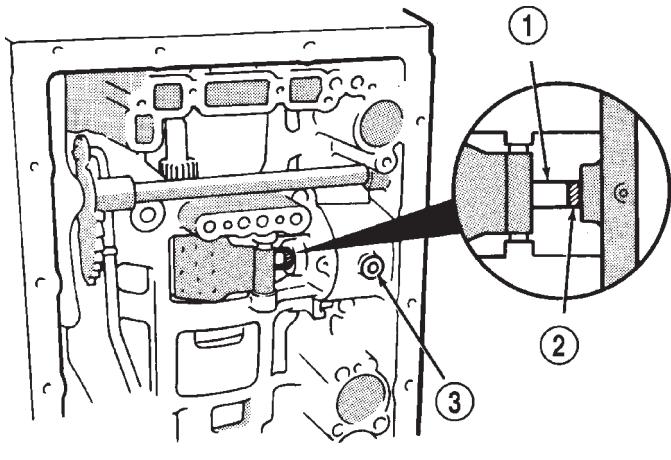


Fig. 167 Marking Brake Piston Rod

- 1 – BRAKE PISTON ROD
2 – REFERENCE MARK
3 – PISTON FEED HOLE

- (a) Install a small wire tie strap around the second coast brake piston rod tight against the transmission case.
- (b) Apply 57–114 psi air pressure through piston feed hole and check stroke length with Gauge Tool 7552.
- (c) Stroke length should be 1.5 – 3.0 mm (0.059 – 0.118 in.).
- (d) If stroke length is incorrect, piston, cover or snap ring is not seated. Reassemble and check stroke again if necessary.

(54) Coat thrust race and tabbed washer with petroleum jelly and install them on overdrive support (Fig. 169). Verify race size. Race outer diameter is 50.9 mm (2.004 in.) and inside diameter is 36.2 mm (1.426 in.).

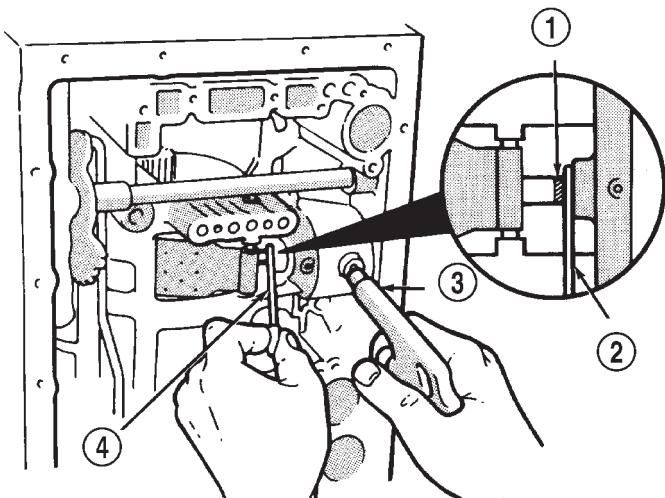


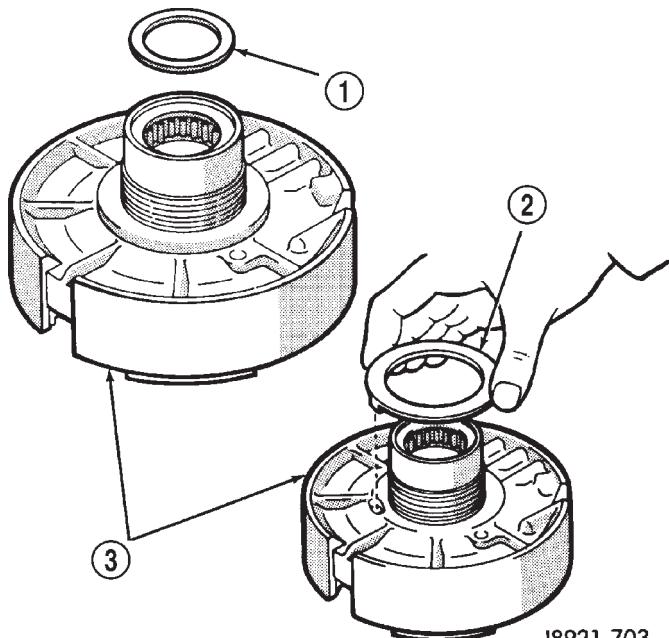
Fig. 168 Checking Second Coast Brake Piston Stroke

- 1 – PISTON ROD REFERENCE MARK
2 – GAUGE TOOL
3 – AIR GUN
4 – GAUGE TOOL

(55) Install overdrive support in case. Use two long bolts to help align and guide support into position (Fig. 170).

(56) Install overdrive support snap ring with Snap Ring Plier Tool 7540 (Fig. 171). Chamfered side of snap ring faces up and toward case front. **Snap ring ends must be aligned with case opening with ring ends approximately 24 mm (0.94 in.) from center line of case opening.**

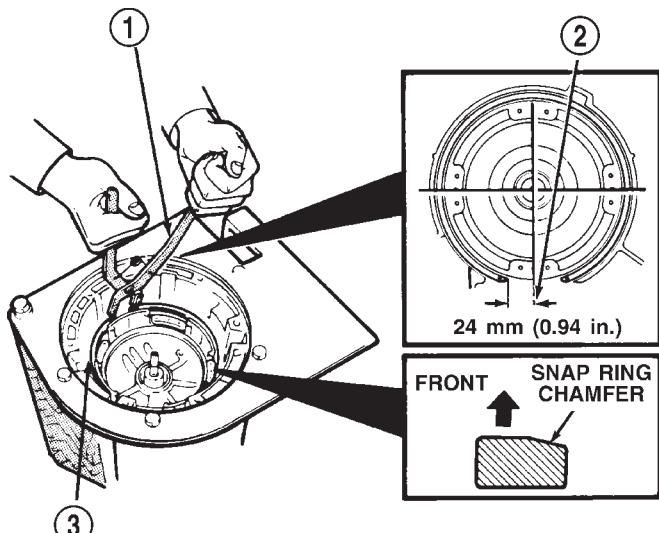
(57) Install and tighten overdrive support bolts to 25 N·m (19 ft. lbs.) torque (Fig. 172).



J8921-703

Fig. 169 Installing Overdrive Support Thrust Race And Washer

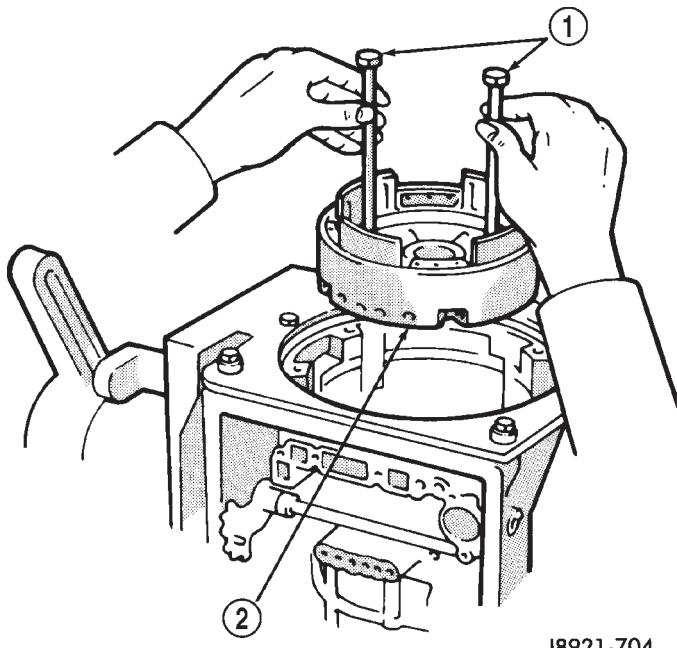
- 1 – THRUST RACE
- 2 – TABBED THRUST WASHER
- 3 – OVERDRIVE SUPPORT



J8921-705

Fig. 171 Installing Overdrive Support Snap Ring

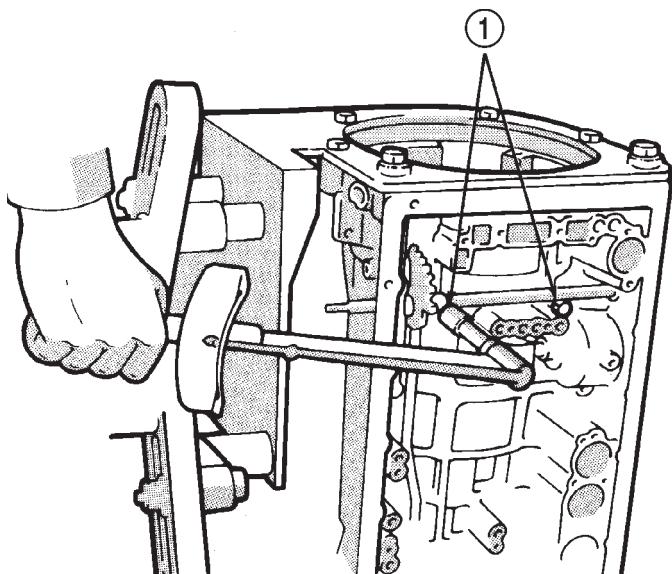
- 1 – SNAP RING TOOL
- 2 – SNAP RING ENDS CENTERED IN CASE OPENING
- 3 – SNAP RING



J8921-704

Fig. 170 Installing Overdrive Support

- 1 – USE LONG BOLTS TO INSTALL SUPPORT
- 2 – OVERDRIVE SUPPORT



J8921-706

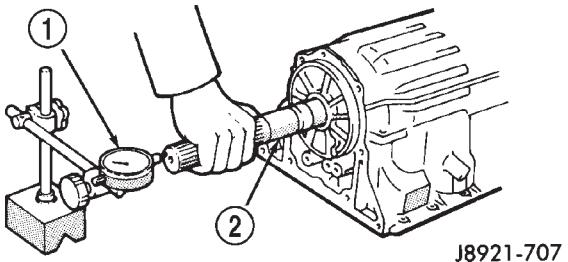
Fig. 172 Installing Overdrive Support Bolts

- 1 – OVERDRIVE SUPPORT BOLTS

DISASSEMBLY AND ASSEMBLY (Continued)

(58) Check output shaft end play with dial indicator (Fig. 173). End play should be 0.27 – 0.86 mm (0.0106 – 0.0339 in.).

(59) If output shaft end play is incorrect, one or more of installed components is not seated. Reassemble as necessary and check end play again.

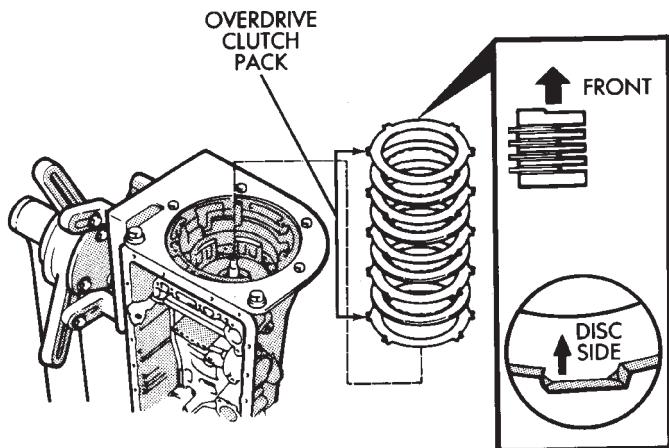


J8921-707

Fig. 173 Checking Output Shaft End Play

- 1 – DIAL INDICATOR
2 – OUTPUT SHAFT

(60) Install overdrive brake clutch pack (Fig. 174). Install thickest clutch plate first. Rounded edge of plate faces up. Install first disc followed by another plate until four discs and three plates are installed.



J8921-708

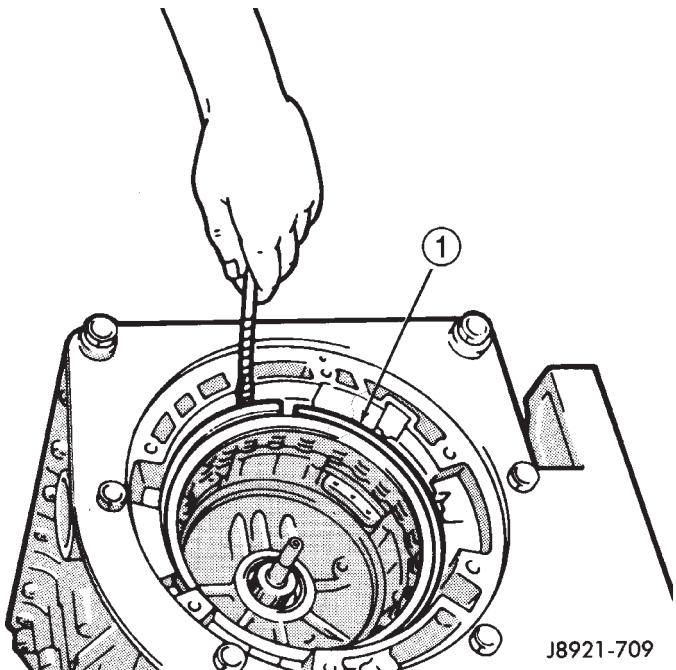
Fig. 174 Installing Overdrive Brake Clutch Pack

(61) Install stepped ring retainer plate with flat side facing disc. Then install brake pack snap ring (Fig. 175).

(62) Check overdrive brake piston stroke as follows:

(a) Mount dial indicator on case using Miller Tool C-3339 and a suitable bolt threaded into the transmission case.

(b) Verify that the dial indicator is mounted solidly and square to the direction of the piston travel.



J8921-709

Fig. 175 Installing Overdrive Brake Snap Ring

- 1 – CLUTCH PACK SNAP RING

(c) Apply 57–114 psi air pressure through piston apply port and note piston stroke on dial indicator. Stroke length should be: 1.40 – 1.70 mm (0.055 – 0.0699 in.).

(d) If stroke is incorrect, brake pack or piston is installed incorrectly. Check and correct as necessary and measure piston stroke again.

(e) Remove the dial indicator set-up from the transmission.

(63) Coat overdrive lower race, thrust bearing and upper race with petroleum jelly and install them in overdrive support (Fig. 176). Be sure races and bearing are assembled and installed as shown.

(64) Verify bearing/race sizes before proceeding. Bearing race sizes are:

- Outer diameter of lower race is 47.8 mm (1.882 in.) and inside diameter is 34.3 mm (1.350 in.).

- Outer diameter of bearing is 47.7 mm (1.878 in.) and inside diameter is 32.7 mm (1.287 in.).

- Outer diameter of upper race is 47.8 mm (1.882 in.) and inside diameter is 30.7 mm (1.209 in.).

(65) Install overdrive planetary ring gear in support (Fig. 177).

(66) Coat ring gear thrust race and thrust bearing assembly with petroleum jelly and install them in gear (Fig. 178).

(67) Verify bearing/race size before proceeding.

- Outer diameter of ring gear race-bearing is 47.8 mm (1.882 in.) and inside diameter is 24.2 mm (0.953 in.).

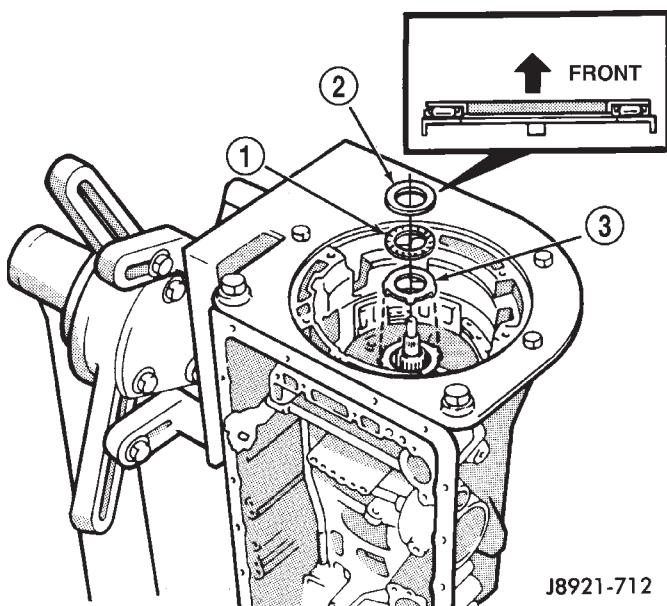


Fig. 176 Installing Overdrive Support Thrust Bearing And Races

- 1 - THRUST BEARING
- 2 - UPPER RACE
- 3 - LOWER RACE

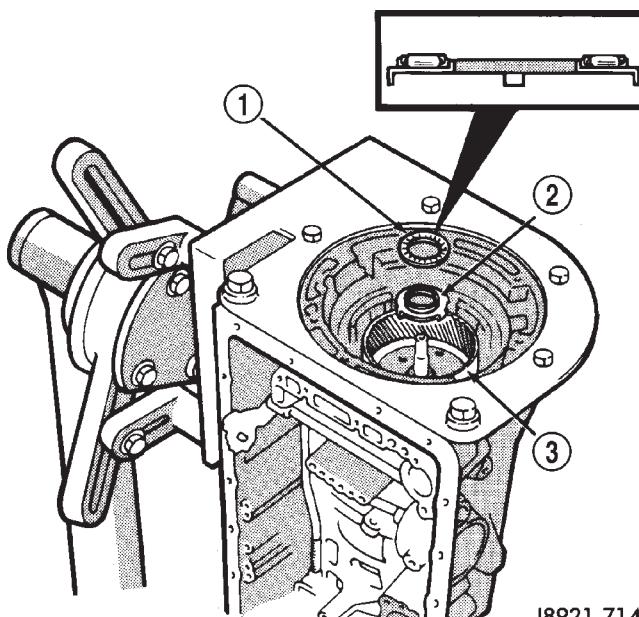
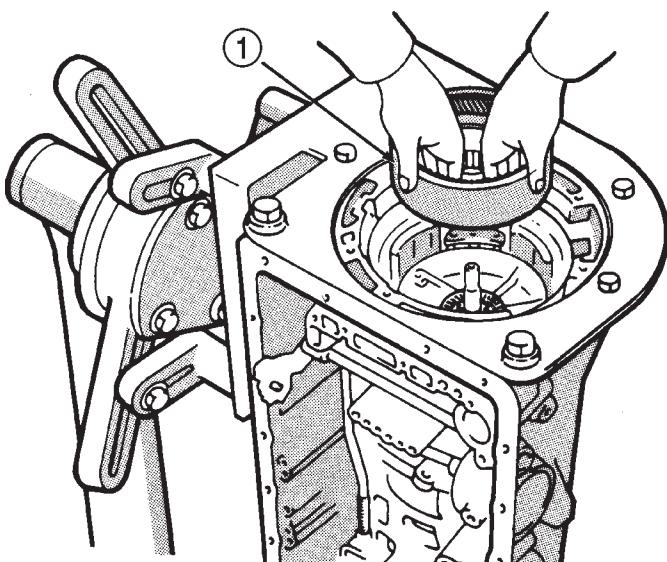


Fig. 178 Installing Ring Gear Thrust Bearing And Race

- 1 - THRUST BEARING-RACE ASSEMBLY
- 2 - THRUST RACE (TABBED)
- 3 - OVERDRIVE PLANETARY RING GEAR



J8921-713

Fig. 177 Installing Overdrive Planetary Ring Gear
1 - OVERDRIVE PLANETARY RING GEAR

- Outer diameter of bearing is 46.8 mm (1.844 in.) and inside diameter is 26.0 mm (1.024 in.).

(68) Coat tabbed thrust race with petroleum jelly and install it on planetary gear (Fig. 179). Race outer diameter is 41.8 mm (1.646 in.) and inside diameter is 27.1 mm (1.067 in.).

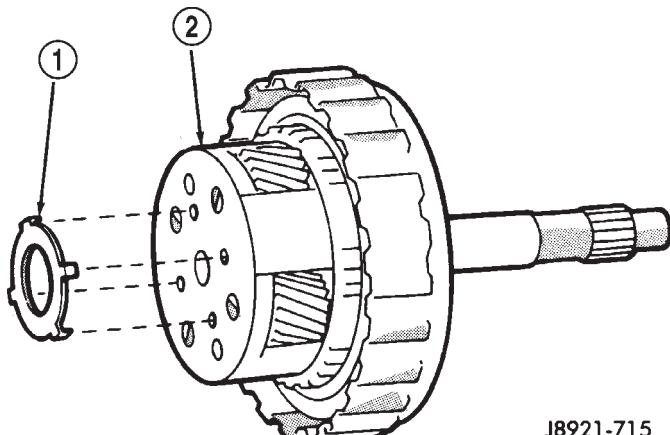


Fig. 179 Installing Planetary Thrust Race

- 1 - THRUST RACE (TABBED)
- 2 - OVERDRIVE PLANETARY

(69) Install assembled overdrive planetary gear and clutch (Fig. 180).

(70) Coat thrust bearing and race assembly with petroleum jelly and install it on clutch input shaft (Fig. 181). Bearing and race outer diameter is 50.2 mm (1.976 in.) and inside diameter is 28.9 mm (1.138 in.).

(71) Coat thrust bearing race with petroleum jelly and install it in oil pump (Fig. 182). Bearing race outer diameter is 47.2 mm (1.858 in.) and inside diameter is 28.1 mm (1.106 in.).

DISASSEMBLY AND ASSEMBLY (Continued)

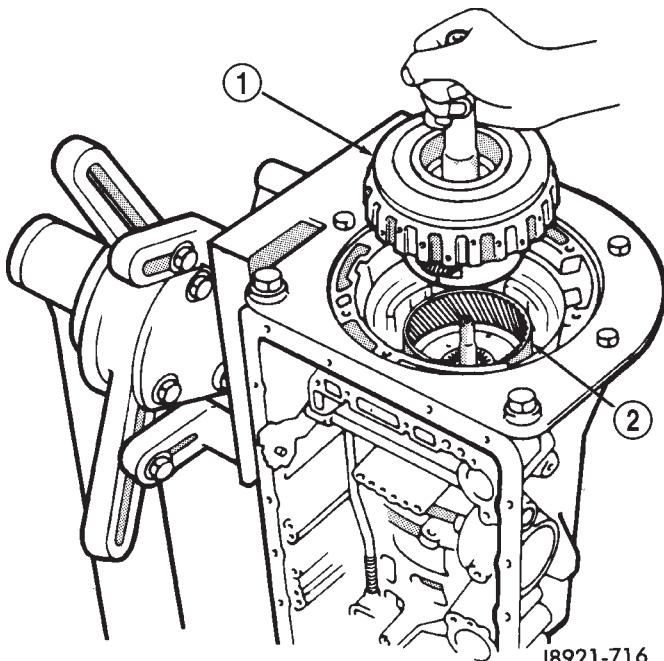
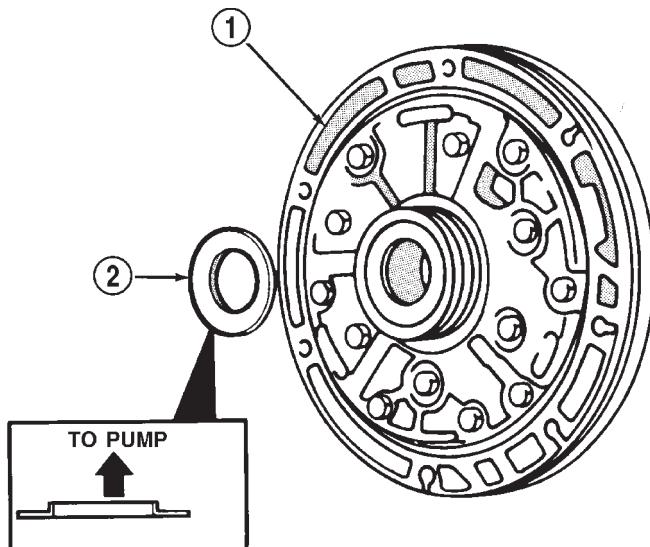


Fig. 180 Installing Overdrive Planetary And Clutch Assembly

- 1 – OVERDRIVE PLANETARY AND CLUTCH ASSEMBLY
2 – RING GEAR



J8921-720

Fig. 182 Installing Oil Pump Thrust Race

- 1 – OIL PUMP
2 – PUMP THRUST RACE

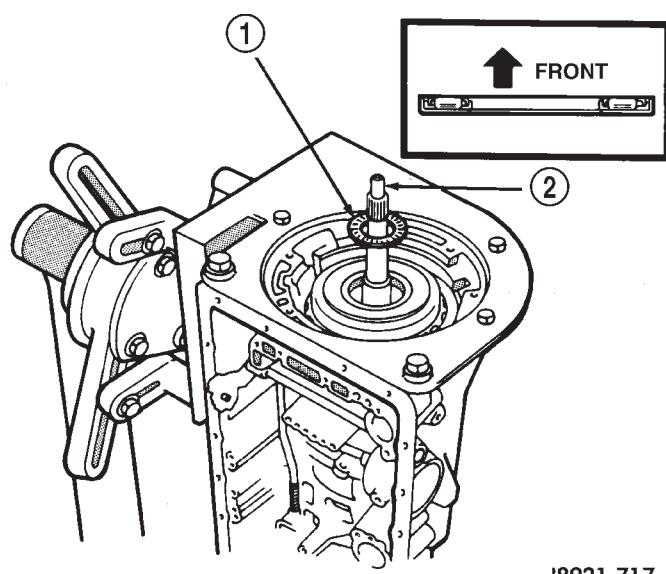


Fig. 181 Installing Input Shaft Thrust Bearing And Race Assembly

- 1 – THRUST BEARING AND RACE ASSEMBLY
2 – CLUTCH INPUT SHAFT

(72) Lubricate and install replacement O-ring on oil pump body.

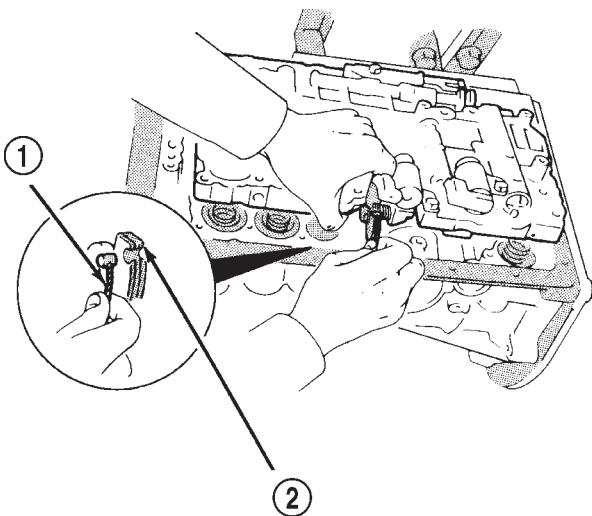
(73) Install oil pump in case. Align pump and case bolt holes and carefully ease pump into place.

CAUTION: Do not use force to seat the pump. The seal rings on the stator shaft could be damaged if they bind or stick to the direct clutch drum.

(74) Tighten oil pump bolts to 22 N·m (16 ft. lbs.) torque.

(75) Verify input shaft rotation. Shaft should rotate smoothly and not bind.

(76) Lubricate and install new O-ring on transmission throttle cable adapter and install cable in case (Fig. 183).

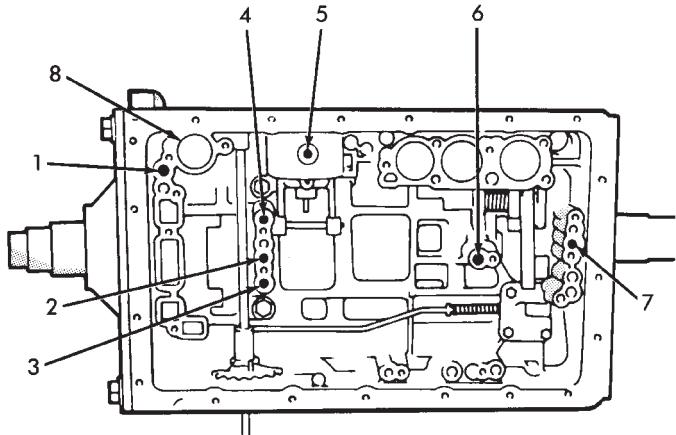


J8921-478

Fig. 183 Installing Transmission Throttle Cable

- 1 – THROTTLE CABLE
2 – THROTTLE CAM

(77) Check clutch and brake operation. Operate clutches and brakes with compressed air applied through feed holes in case (Fig. 184). Listen for clutch and brake application. If you do not hear a clutch or brake apply, disassemble transmission and repair fault before proceeding. **It is necessary to block the overdrive clutch accumulator feed hole No. 8 (Fig. 184) in order to check direct clutch operation.**



1. OVERDRIVE DIRECT CLUTCH FEED
2. DIRECT CLUTCH FEED
3. FORWARD CLUTCH FEED
4. OVERDRIVE BRAKE FEED
5. SECOND COAST BRAKE FEED
6. SECOND BRAKE FEED
7. FIRST-REVERSE BRAKE FEED
8. OVERDRIVE CLUTCH ACCUMULATOR PISTON HOLE (BLOCK THIS HOLE WHEN CHECKING DIRECT CLUTCH OPERATION)

J8921-721

Fig. 184 Clutch And Brake Feed Hole Locations

(78) Lubricate and install new O-rings on accumulator pistons (Fig. 185).

(79) Assemble and install accumulator pistons and springs (Fig. 185).

(80) Install new check ball body and spring (Fig. 186).

(81) Position valve body on case (Fig. 187).

(82) Install detent spring (Fig. 187).

(83) Align manual valve, detent spring and shift sector (Fig. 187).

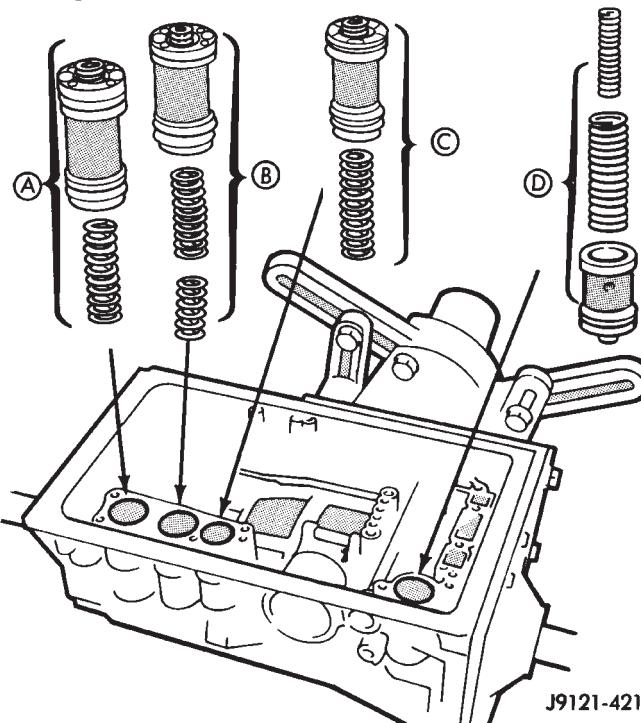
(84) Connect transmission throttle cable to throttle valve cam (Fig. 188).

(85) Install and tighten valve body-to-case bolts to 10 N·m (7 ft. lbs.) torque.

(86) Connect valve body solenoid wires to solenoids (Fig. 189).

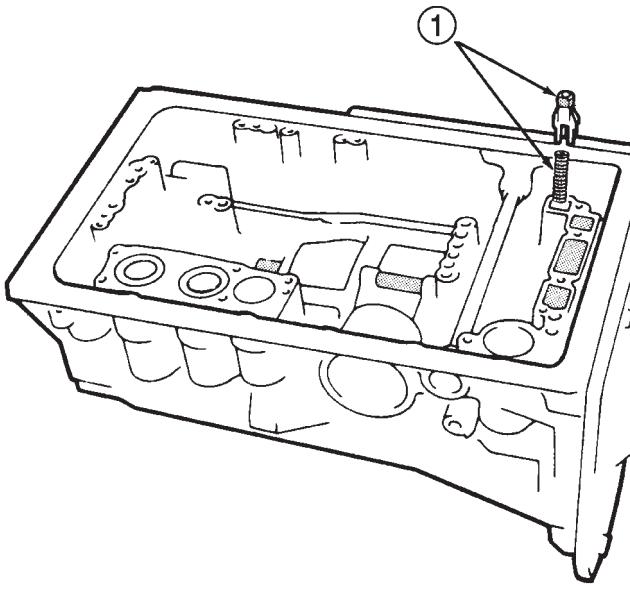
(87) Install new O-ring on solenoid harness adapter and secure adapter to case.

- (A) SECOND BRAKE ACCUMULATOR PISTON
- (B) DIRECT CLUTCH ACCUMULATOR PISTON
- (C) OVERDRIVE BRAKE ACCUMULATOR PISTON
- (D) OVERDRIVE CLUTCH ACCUMULATOR PISTON



J9121-421

Fig. 185 Accumulator Piston And Spring Installation



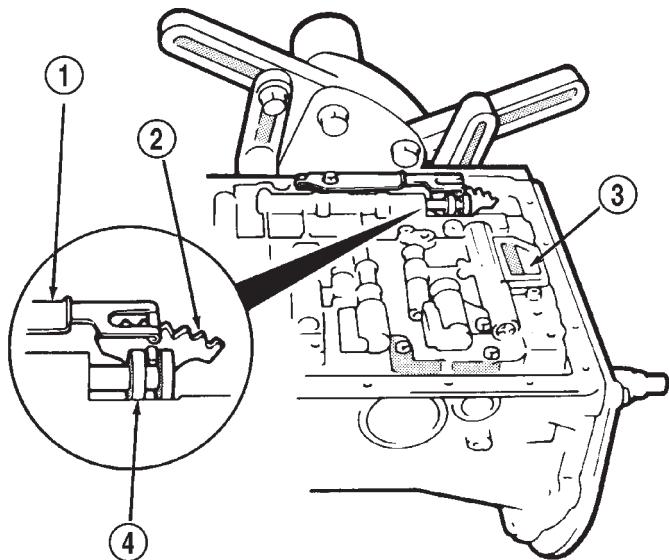
J8921-723

Fig. 186 Installing Check Ball Body And Spring

- 1 – CHECK BALL BODY AND SPRING

(88) Install valve body oil tubes (Fig. 190). Tap tubes into place with a plastic mallet. Be sure the

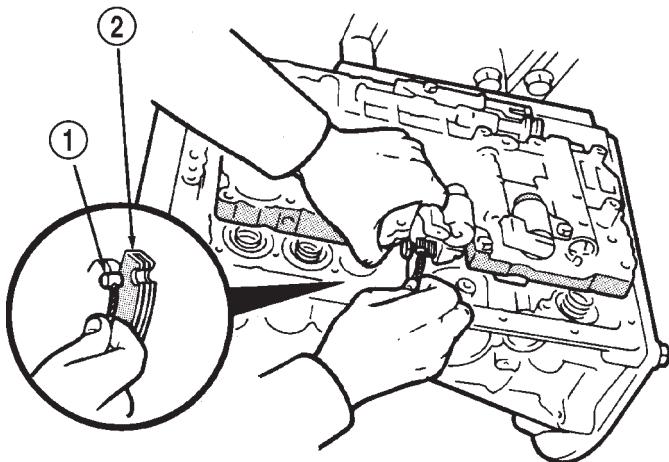
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-724

Fig. 187 Aligning Manual Valve, Shift Sector And Detent Spring

- 1 – DETENT SPRING
- 2 – SHIFT SECTOR
- 3 – VALVE BODY
- 4 – MANUAL VALVE



J8921-725

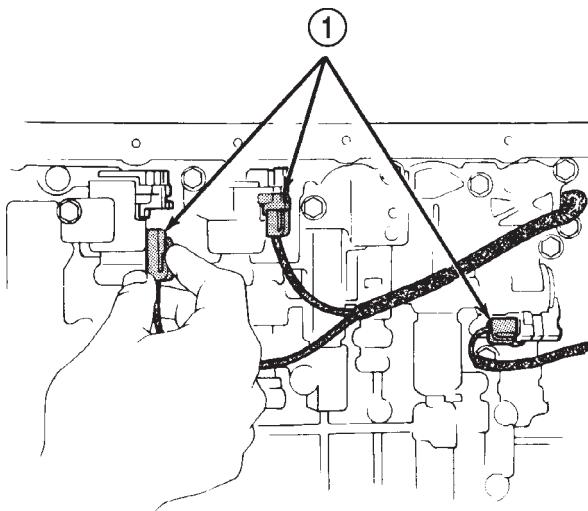
Fig. 188 Connecting Transmission Throttle Cable

- 1 – THROTTLE CABLE
- 2 – THROTTLE CAM

flanged tube ends and straight tube ends are installed as shown.

(89) Install new gaskets on oil screen and install screen on valve body. Tighten screen bolts to 10 N·m (7 ft. lbs.) torque.

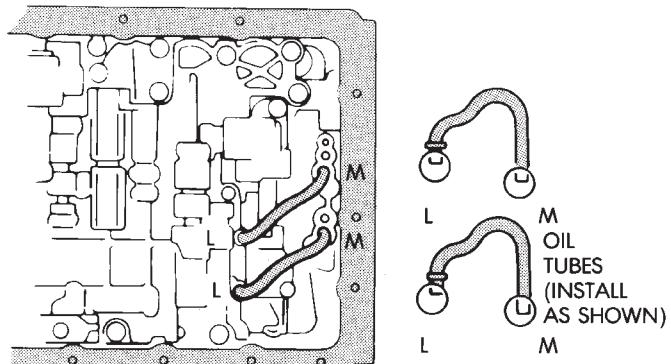
(90) Install magnet in oil pan. Be sure magnet does not interfere with valve body oil tubes.



J8921-433

Fig. 189 Connecting Valve Body Solenoid Wires

- 1 – SOLENOID WIRE CONNECTORS



J8921-443

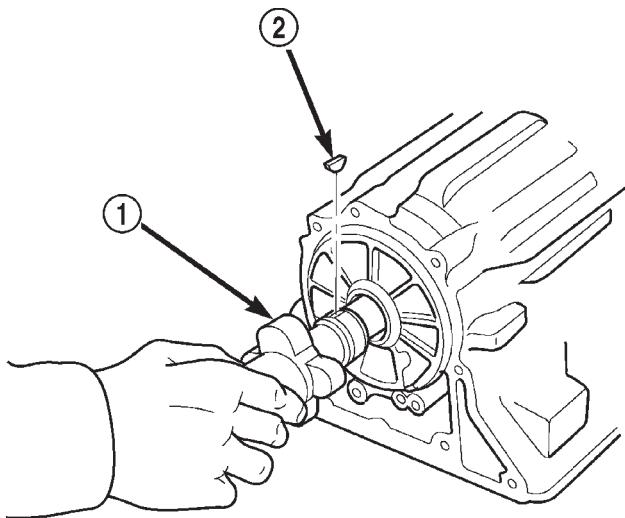
Fig. 190 Installing Valve Body Oil Tubes

(91) Apply Threebond® Liquid Gasket TB1281, P/N 83504038, to sealing surface of oil pan. Sealer bead should be at least 3 mm (1/8 in.) wide. Install pan on case and tighten pan bolts to 7 N·m (65 in. lbs.) torque.

(92) Install transmission speed sensor rotor and key on output shaft (Fig. 191).

(93) Install spacer and speedometer drive gear on output shaft. Then install retaining snap ring (Fig. 192).

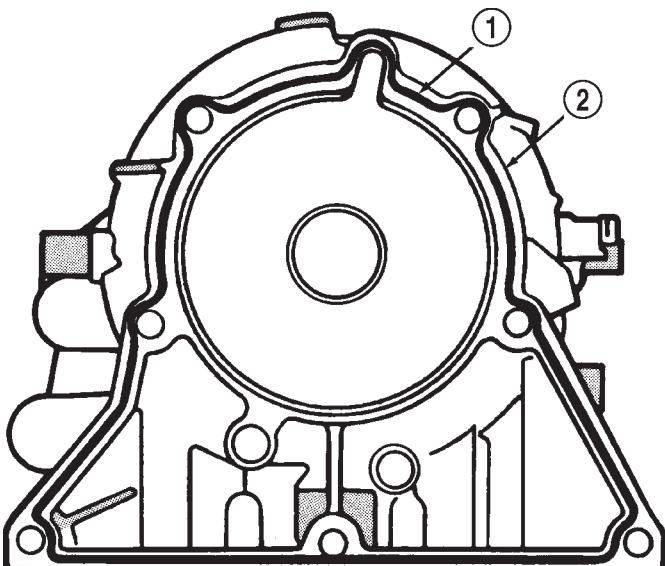
(94) Apply bead of Threebond® Liquid Gasket TB1281, P/N 83504038, to sealing surface at rear of case (Fig. 193).



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Fig. 191 Installing Transmission Speed Sensor Rotor And Key

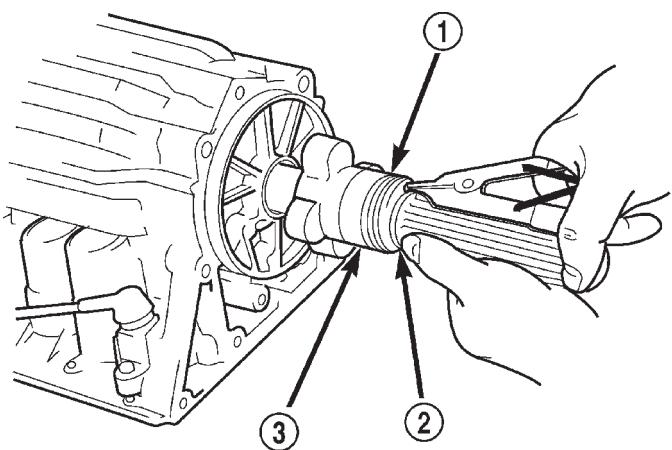
- 1 – SPEED SENSOR ROTOR
- 2 – ROTOR KEY



J8921-728

Fig. 193 Applying Sealer To Case Rear Flange

- 1 – SEALER BEAD
- 2 – CASE REAR FLANGE



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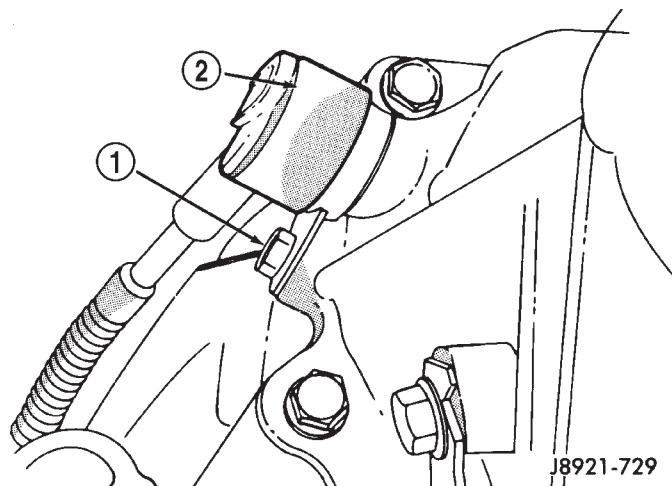
Fig. 192 Installing Spacer And Speedometer Drive Gear

- 1 – SPEEDOMETER DRIVE GEAR
- 2 – SNAP RING
- 3 – SPACER

(95) Install adapter housing on transmission. Tighten adapter bolts to 34 N·m (25 ft. lbs.) torque.

(96) Install transmission speed sensor (Fig. 194). Tighten sensor bolt to 7.4 N·m (65 in. lbs.) torque and connect sensor wire harness connector.

(97) Install converter housing (Fig. 195). Tighten 12 mm diameter housing bolts to 57 N·m (42 ft. lbs.) torque. Tighten 10 mm diameter housing bolts to 34 N·m (25 ft. lbs.) torque.



J8921-729

Fig. 194 Installing Transmission Speed Sensor

- 1 – SENSOR BOLT
- 2 – SPEED SENSOR

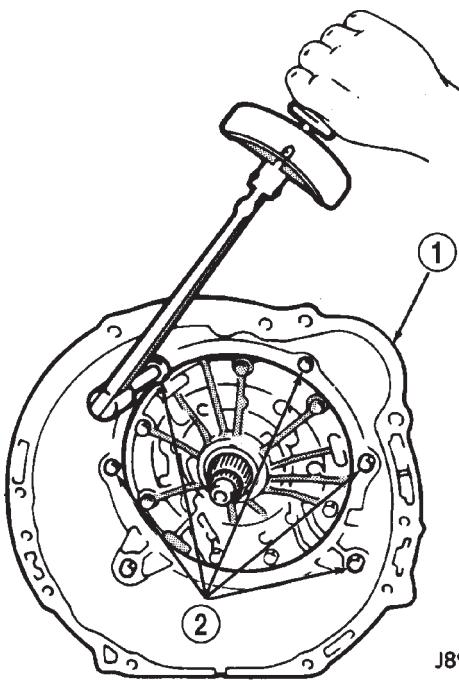
(98) Install transmission shift lever on manual valve shaft. Do not install lever attaching nut at this time.

(99) Move transmission shift lever fully rearward. Then move lever two detent positions forward.

(100) Mount park/neutral position switch on manual valve shaft and tighten switch adjusting bolt just enough to keep switch from moving (Fig. 196).

(101) Install park/neutral position switch tabbed washer and retaining nut (Fig. 196). Tighten nut to

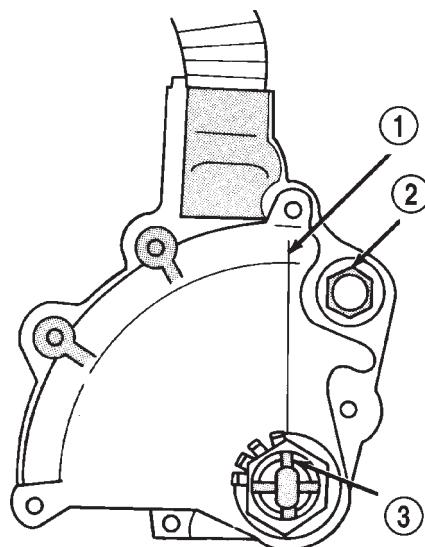
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-731

Fig. 195 Installing Converter Housing

- 1 – CONVERTER HOUSING
2 – HOUSING BOLTS



J8921-431

Fig. 196 Park/Neutral Position Switch Installation/Adjustment

- 1 – NEUTRAL STANDARD LINE
2 – ADJUSTING BOLT
3 – VERTICAL GROOVE ON MANUAL VALVE SHAFT

6.9 N·m (61 in. lbs.) torque, but do not bend any of the washer tabs against the nut at this time.

(102) Align park/neutral position switch standard line with groove or flat on manual shaft (Fig. 196).

(103) Tighten park/neutral position switch adjusting bolt to 13 N·m (9 ft. lbs.) torque.

(104) Install transmission shift lever on manual valve shaft. Tighten lever attaching nut to 16 N·m (12 ft. lbs.) torque.

(105) Install retaining clamp for wire harness and throttle cable (Fig. 197).

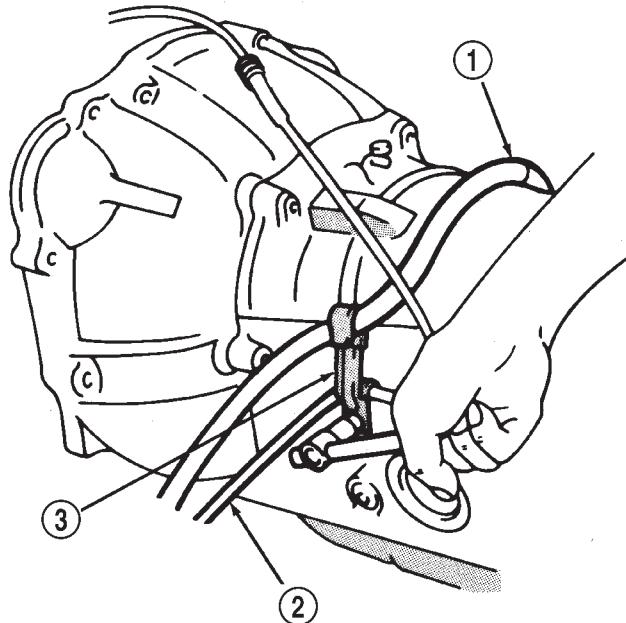
(106) Install torque converter.

(107) Verify that converter is seated by measuring distance between converter housing flange and one of the converter mounting pads (Fig. 198). Use straight-edge and vernier calipers to measure distance. On 6-cyl. transmissions, distance should be 16.5 mm (0.650 in.).

(108) Secure converter in transmission with C-clamp or metal strapping. Do this before mounting transmission on jack or moving transmission under vehicle.

(109) Install lower half of transmission fill tube (install upper half after transmission is in vehicle).

CAUTION: The transmission cooler and lines must be reverse flushed if overhaul corrected a malfunction that generated sludge, metal particles, or clutch friction material. The torque converter should also be replaced if contaminated by the same mal-



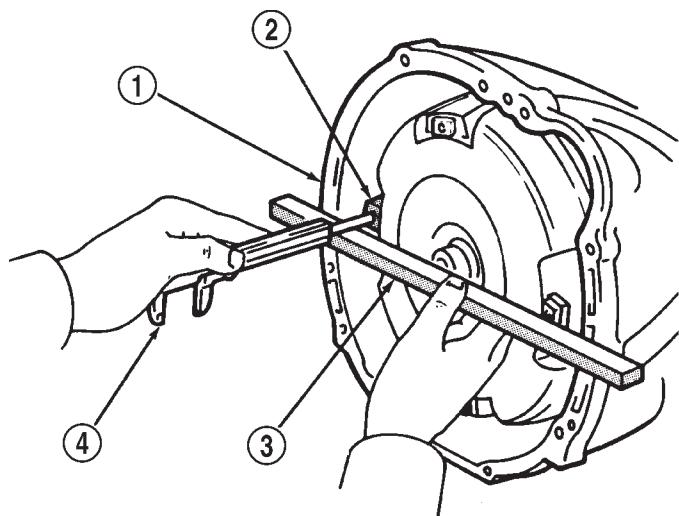
J8921-732

Fig. 197 Installing Cable/Harness Clamps

- 1 – TRANSMISSION HARNESS
2 – THROTTLE CABLE
3 – RETAINING CLAMPS

function. Debris and residue not flushed from the cooler and lines will flow back into the transmission and converter. The result will be a repeat failure and shop comeback.

DISASSEMBLY AND ASSEMBLY (Continued)



OIL PUMP

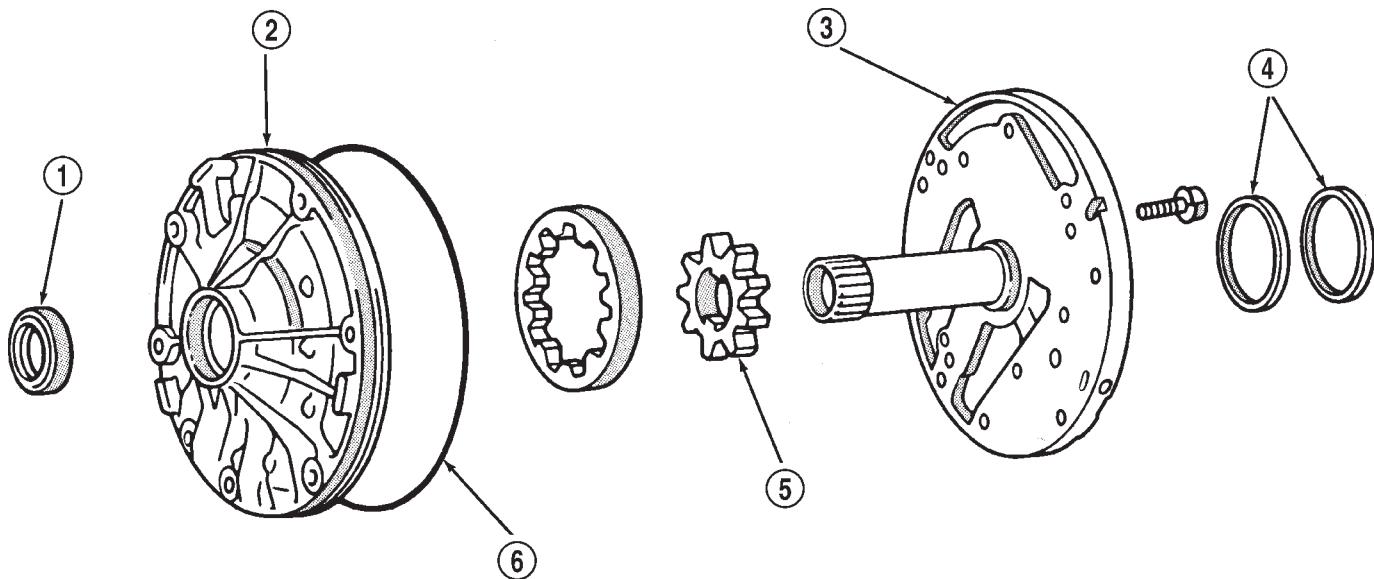
DISASSEMBLY

- (1) Remove pump body O-ring (Fig. 199).
- (2) Remove pump seal.
- (3) Remove pump seal rings (Fig. 199).
- (4) Remove bolts attaching stator shaft to pump body and separate components.
- (5) Remove drive gear and driven gear from pump body (Fig. 199).

J8921-733

Fig. 198 Checking Converter Installation

- 1 – HOUSING FLANGE
 2 – CONVERTER MOUNTING PAD
 3 – STRAIGHTEDGE
 4 – VERNIER CALIPERS



J8921-516

Fig. 199 Oil Pump Components

- 1 – PUMP SEAL
 2 – PUMP BODY
 3 – STATOR SHAFT

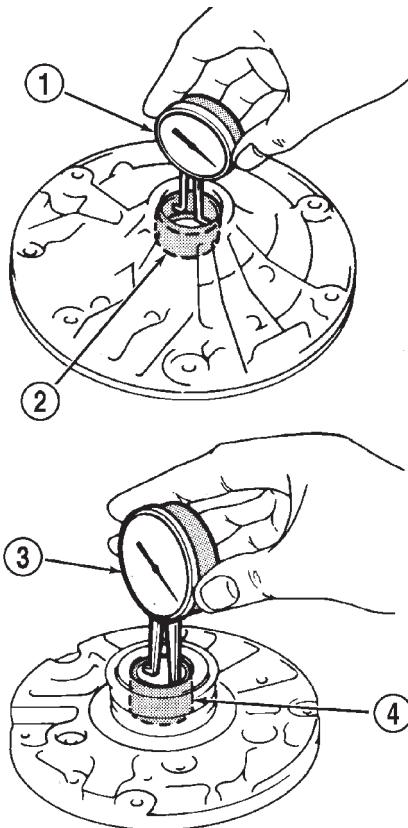
- 4 – SEAL RINGS
 5 – GEAR
 6 – O-RING

DISASSEMBLY AND ASSEMBLY (Continued)

ASSEMBLY

(1) Measure inside diameter of pump body bushing with bore gauge or inside micrometer (Fig. 200). Diameter should be maximum of 38.19 mm (1.5035 in.). Replace pump body if bushing I. D. is greater than specified.

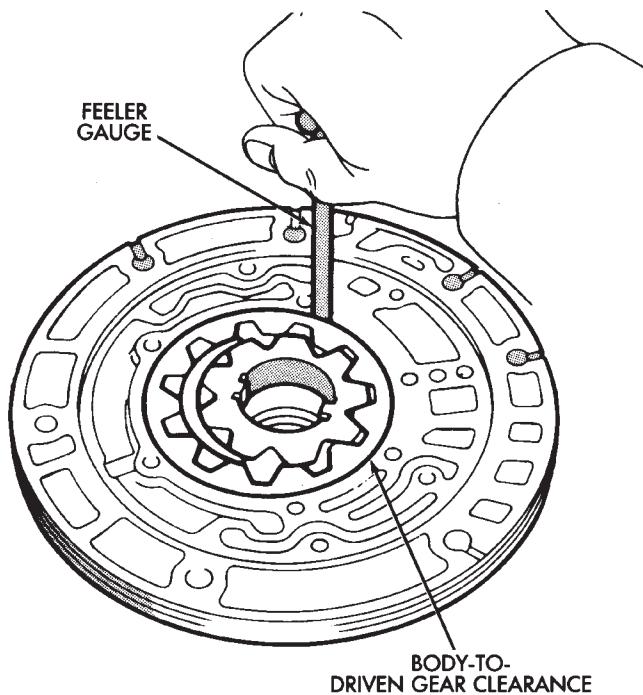
(2) Measure inside diameter of stator shaft bushing (Fig. 200). Take measurements at front and rear of bushing. Diameter should be maximum of 21.58 mm (0.08496 in.) at front and 27.08 mm (1.0661 in.) at rear. Replace stator shaft if bushing diameter is greater than specified.



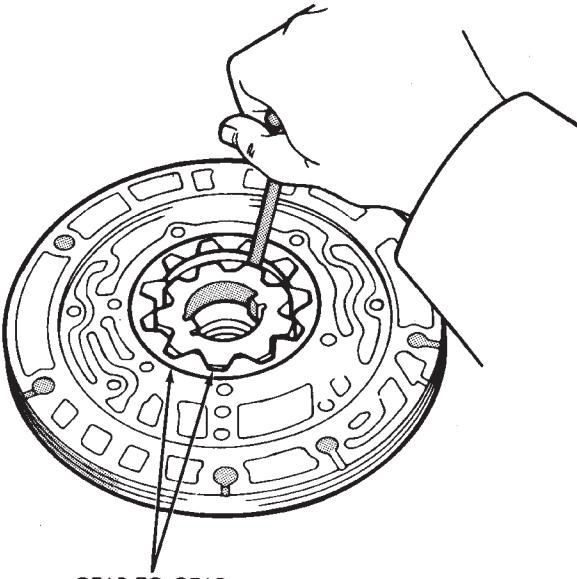
J8921-517

Fig. 200 Checking Pump/Stator Shaft Bushings

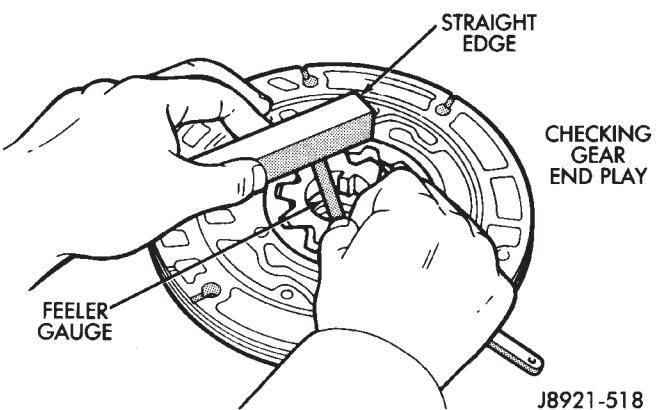
- 1 – BORE GAUGE
- 2 – PUMP BODY BUSHING
- 3 – BORE GAUGE
- 4 – STATOR SHAFT BUSHING



BODY-TO-DRIVEN GEAR CLEARANCE



GEAR-TO-GEAR TOOTH CLEARANCE



J8921-518

Fig. 201 Checking Pump Gear Clearances

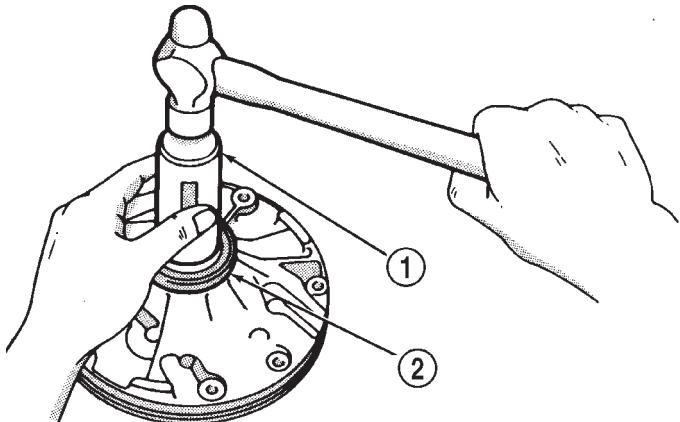
(3) Measure oil pump clearances (Fig. 201).

- Clearance between pump driven gear and pump body should be maximum of 0.3 mm (0.012 in.).
- Clearance between tips of pump gear teeth should be maximum of 0.3 mm (0.012 in.).
- Clearance between rear surface of pump housing and pump gears should be maximum of 0.1 mm (0.004 in.).

(4) Replace pump body and gears if any clearance is greater than specified.

DISASSEMBLY AND ASSEMBLY (Continued)

- (5) Install new seal with Seal Installer 7549 (Fig. 202).

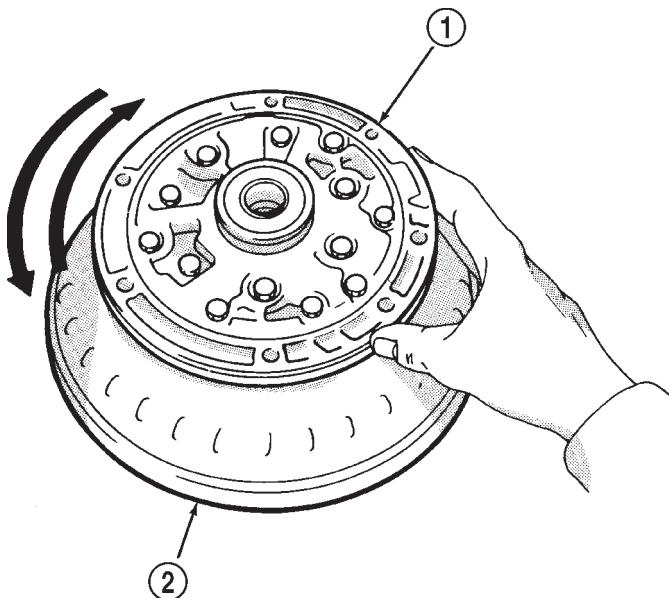


J8921-519

Fig. 202 Installing Pump Seal

- 1 – SEAL INSTALLER TOOL
2 – PUMP SEAL

- (6) Lubricate and install gears in pump body.
 (7) Assemble stator shaft and pump body. Tighten shaft-to-body bolts to 10 N·m (7 ft. lbs.) torque.
 (8) Install new O-ring on pump body and new seal rings on stator shaft.
 (9) Install pump in torque converter and check pump gear rotation (Fig. 203). Gears must rotate smoothly when turned clockwise and counterclockwise.
 (10) Lubricate pump O-ring and seal rings with petroleum jelly.



J8921-520

Fig. 203 Checking Pump Gear Rotation

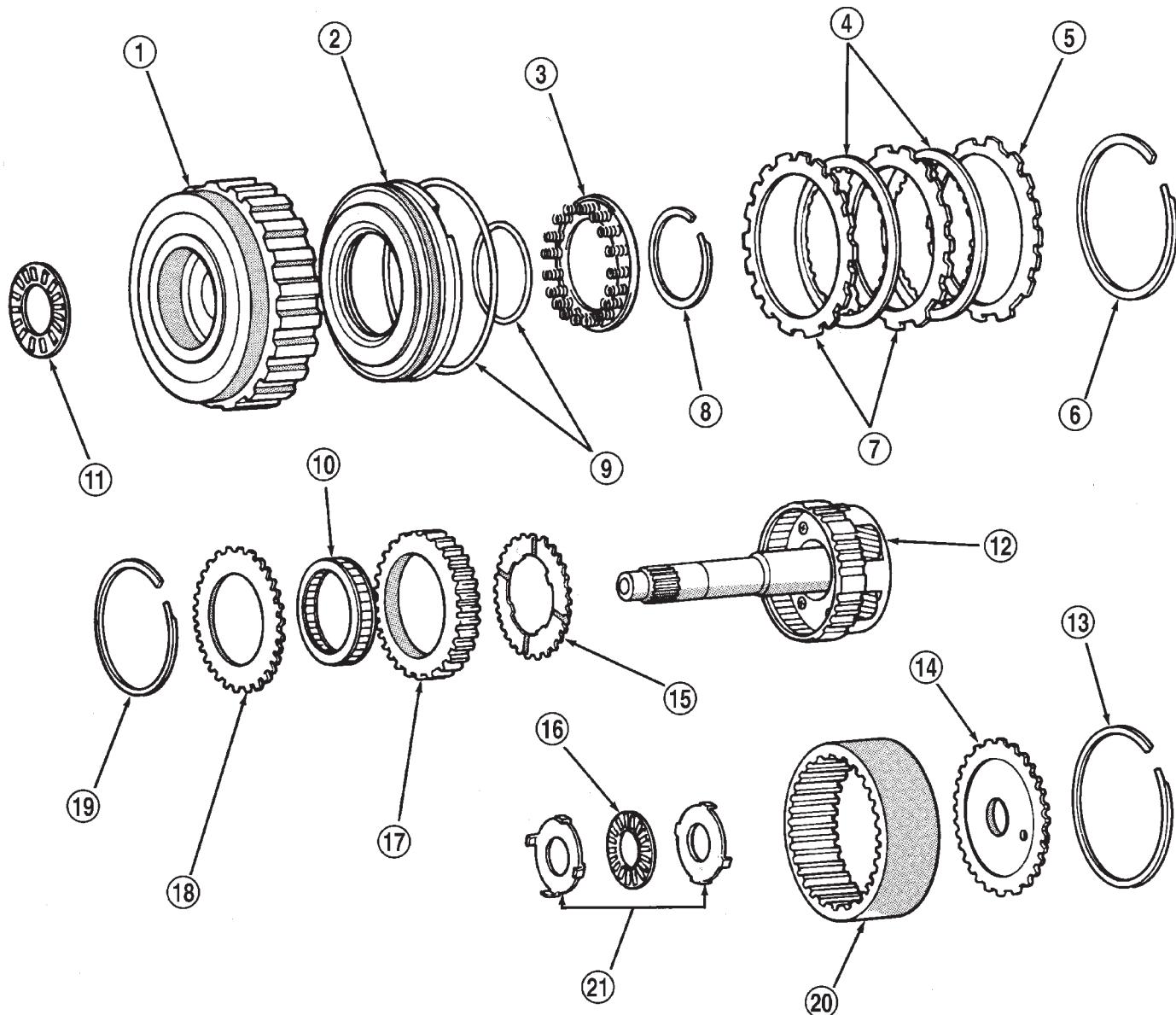
- 1 – OIL PUMP
2 – TORQUE CONVERTER

DISASSEMBLY AND ASSEMBLY (Continued)

OVERDRIVE PLANETARY GEAR AND CLUTCH

DISASSEMBLY

(1) Check operation of one-way clutch in clutch drum (Fig. 204). Hold drum and turn planetary shaft clockwise and counterclockwise. Shaft should turn



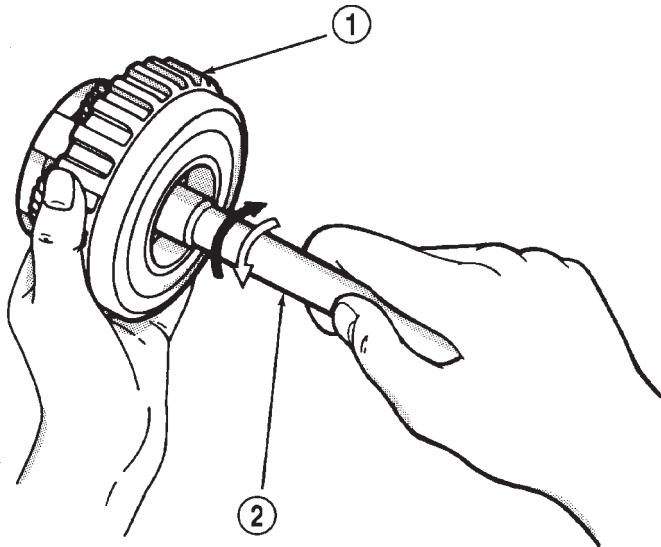
J8921-521

Overdrive Planetary Gear And Clutch Components

- | | |
|--|--------------------------------|
| 1 - CLUTCH DRUM | 12 - PLANETARY GEAR |
| 2 - CLUTCH PISTON | 13 - SNAP RING |
| 3 - PISTON RETURN SPRING | 14 - RING GEAR HUB |
| 4 - CLUTCH DISCS | 15 - THRUST WASHER |
| 5 - RETAINER PLATE | 16 - BEARING |
| 6 - CLUTCH PACK SNAP RING | 17 - ONE-WAY CLUTCH OUTER RACE |
| 7 - CLUTCH PLATES | 18 - RETAINING PLATE |
| 8 - PISTON SNAP RING | 19 - SNAP RING |
| 9 - O-RINGS | 20 - PLANETARY RING GEAR |
| 10 - ONE-WAY CLUTCH | 21 - RACE |
| 11 - CLUTCH DRUM BEARING AND RACE ASSEMBLY | |

DISASSEMBLY AND ASSEMBLY (Continued)

clockwise freely but lock when turned counterclockwise. Replace one-way clutch if necessary.

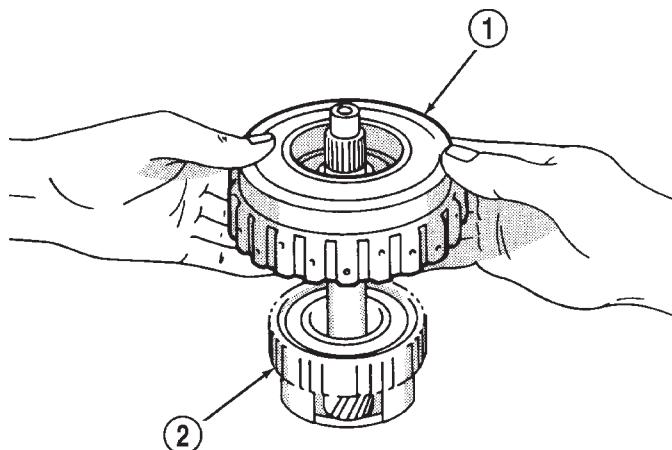


J8921-522

Fig. 204 Checking One-Way Clutch

- 1 – CLUTCH DRUM
2 – PLANETARY SHAFT

(2) Remove overdrive clutch from planetary gear (Fig. 205).



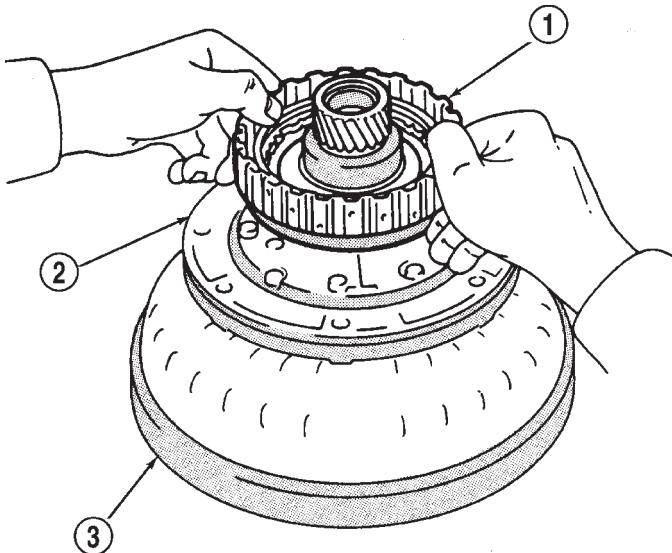
J8921-523

Fig. 205 Removing Overdrive Clutch From Gear

- 1 – OVERDRIVE CLUTCH
2 – PLANETARY GEAR

(3) Measure stroke length of overdrive clutch piston as follows:

(a) Mount oil pump on torque converter. Then mount clutch on oil pump (Fig. 206).



J8921-525

Fig. 206 Assembling Converter, Pump And Clutch For Test

- 1 – OVERDRIVE CLUTCH
2 – OIL PUMP
3 – TORQUE CONVERTER

(b) Install a suitable threaded bolt/rod into oil pump for use in mounting Miller Tool C-3339 dial indicator components securely.

(c) Mount dial indicator on the bolt/rod and position the dial indicator squarely on the clutch piston.

(d) Apply compressed air through clutch feed hole in oil pump and note piston stroke length. Stroke length should be 1.85 – 2.15 mm (0.0728 – 0.0846 in.).

(4) Remove thrust bearing and race assembly from clutch drum (Fig. 207).

(5) Remove clutch pack snap ring and remove the clutch pack (Fig. 208).

(6) Measure overdrive clutch disc thickness. Minimum allowable thickness is 1.84 mm (0.0724 in.).

(7) If the clutch pack stroke length is out of specification or any clutch disc fails to meet the minimum thickness, new discs will need to be installed during assembly.

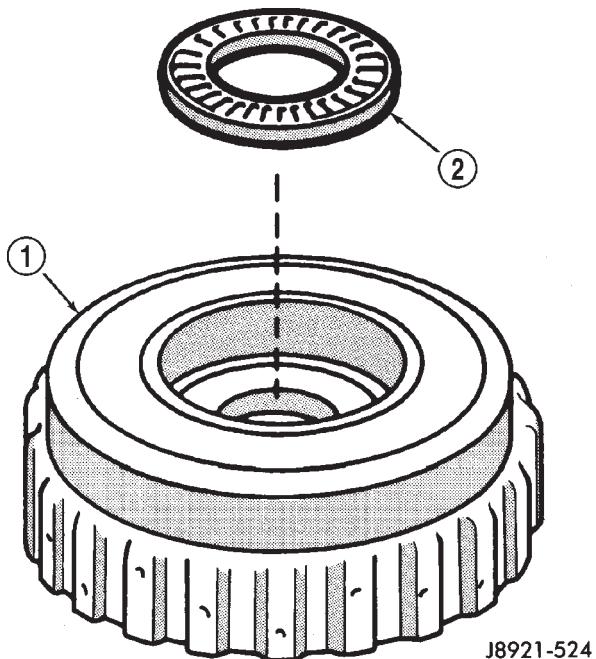
(8) Compress piston return spring with Tool 7538 (Fig. 209). Remove snap ring and remove compressor tool.

(9) Remove the piston return springs.

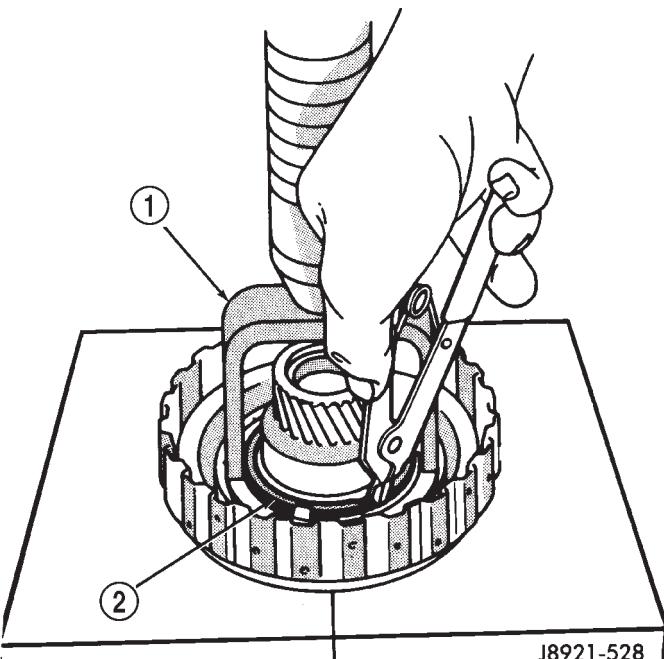
(10) Mount oil pump on converter. Then mount clutch on oil pump (Fig. 210).

(11) Hold clutch piston by hand and apply compressed air through oil pump feed hole to ease piston

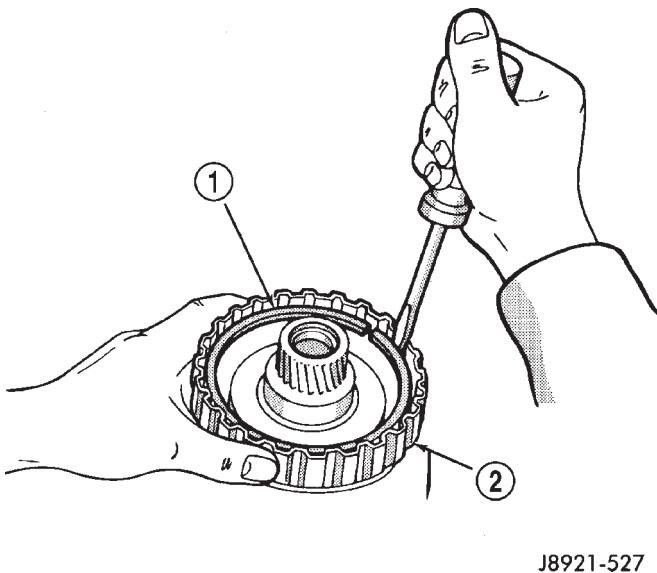
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 207 Removing Clutch Drum Bearing And Race**

- 1 – CLUTCH DRUM
2 – THRUST BEARING AND RACE

**Fig. 209 Removing Clutch Piston Snap Ring**

- 1 – COMPRESSOR TOOL
2 – CLUTCH PISTON SNAP RING

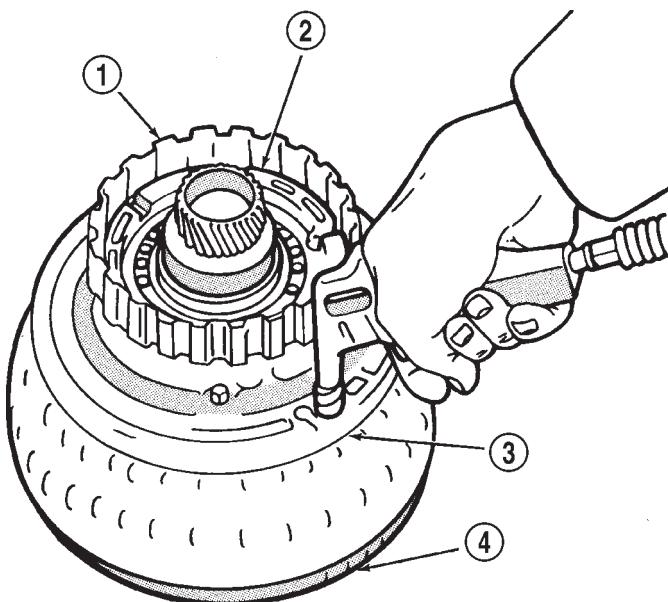
**Fig. 208 Removing Clutch Pack Snap Ring**

- 1 – SNAP RING
2 – CLUTCH RETAINER

out (Fig. 210). Apply only enough air pressure to remove piston.

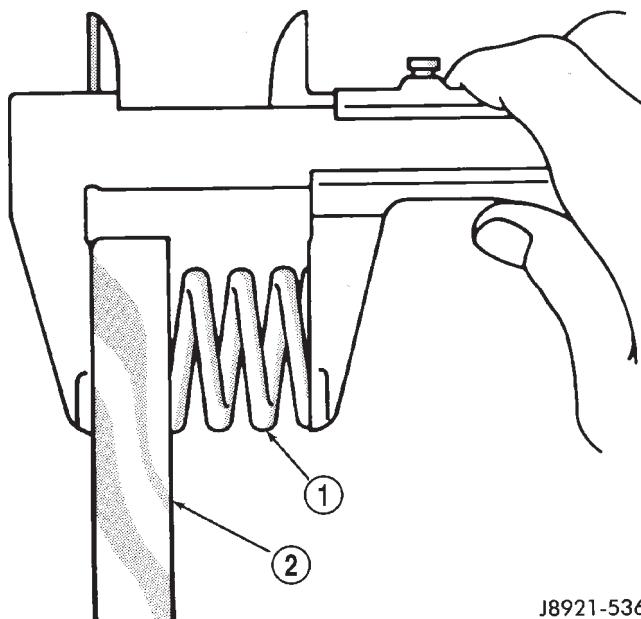
(12) Measure free length of piston return springs with springs in retainer (Fig. 211). Length should be 16.8 mm (0.661 in.). Replace spring and retainer assembly if necessary.

(13) Check clutch piston check ball (Fig. 212). Shake piston to see if ball moves freely. Then check

**Fig. 210 Removing Overdrive Clutch Piston**

- 1 – CLUTCH RETAINER
2 – CLUTCH PISTON
3 – OIL PUMP
4 – CONVERTER

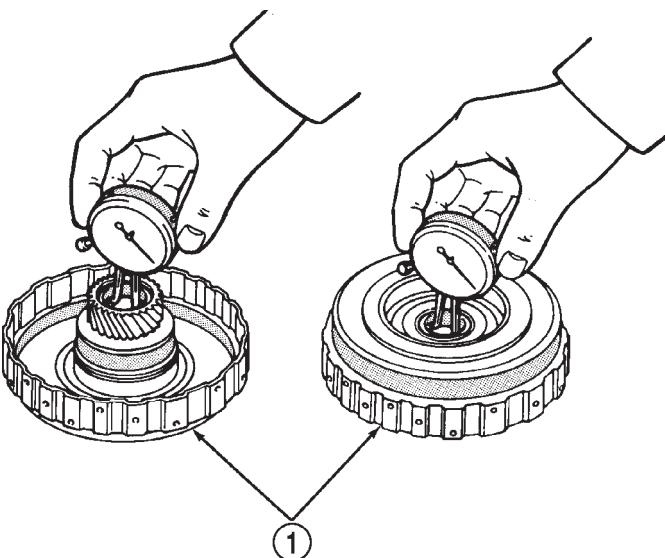
ball sealing by applying low pressure compressed air to ball inlet as shown. Air should not leak past check ball.



J8921-536

Fig. 211 Checking Piston Return Spring Length

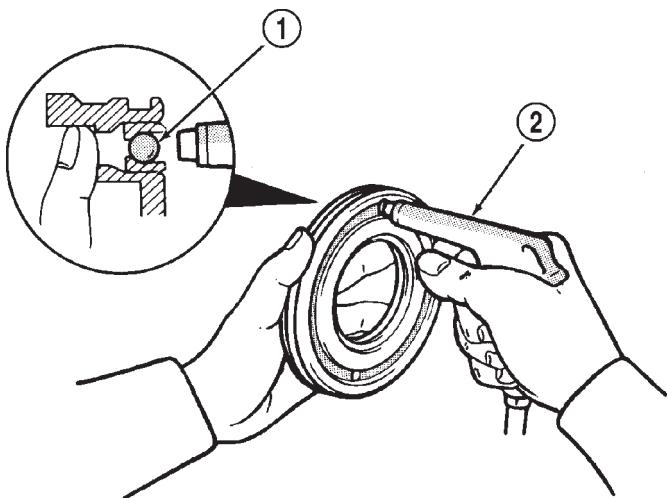
1 – PISTON RETURN SPRINGS
2 – SPRING RETAINER



J8921-538

Fig. 213 Checking Clutch Drum Bushings

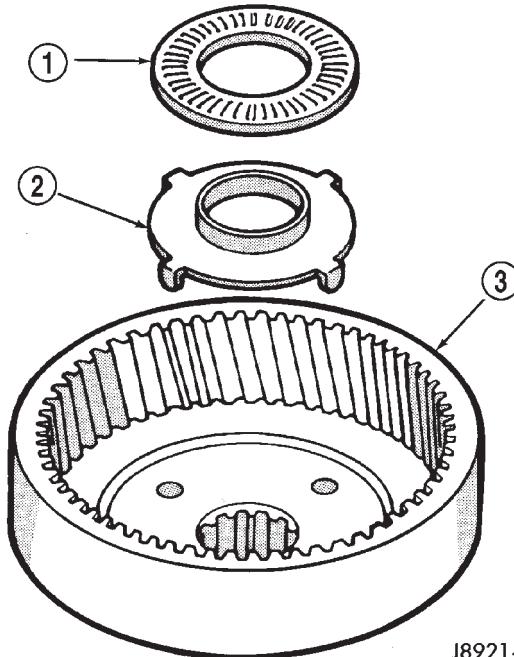
1 – CLUTCH DRUM



J8921-537

Fig. 212 Testing Clutch Piston Check Ball

1 – CLUTCH PISTON CHECK BALL
2 – USE LOW-PRESSURE COMPRESSED AIR TO TEST BALL SEATING



J8921-530

Fig. 214 Removing Ring Gear Bearing And Race

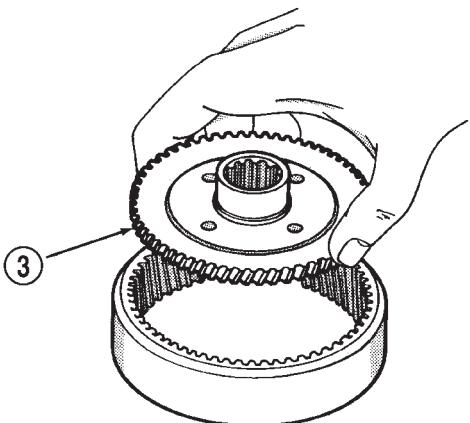
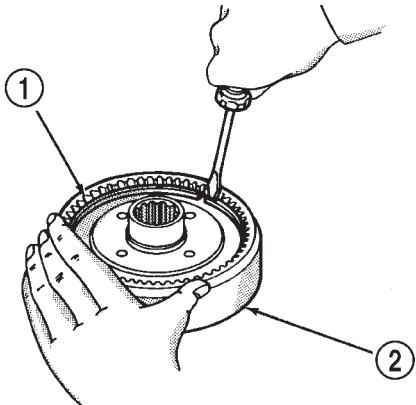
1 – BEARING
2 – RACE
3 – RING GEAR

(14) Check inside diameter of clutch drum bushings with bore gauge or inside micrometer (Fig. 213). Maximum inside diameter is 27.11 mm (1.0673 in.). Replace drum if bushing inside diameter is greater than specified.

(15) Remove bearing and race from ring gear (Fig. 214).

DISASSEMBLY AND ASSEMBLY (Continued)

(16) Remove snap ring from ring gear and remove ring gear hub (Fig. 215).

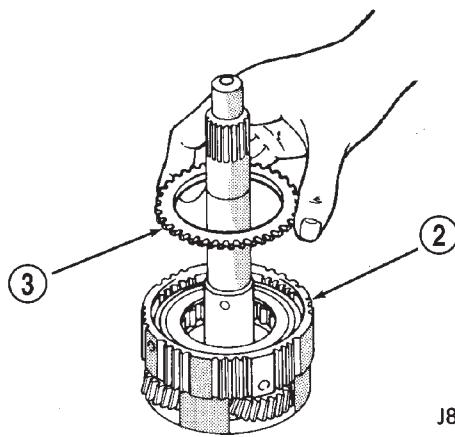
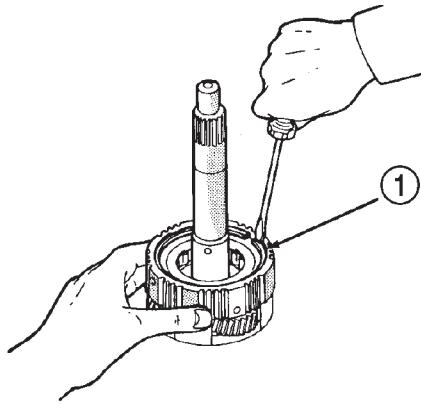


J8921-531

Fig. 215 Removing Ring Gear Hub

- 1 – SNAP RING
- 2 – RING GEAR
- 3 – RING GEAR HUB

(18) Remove snap ring and remove retaining plate (Fig. 217).

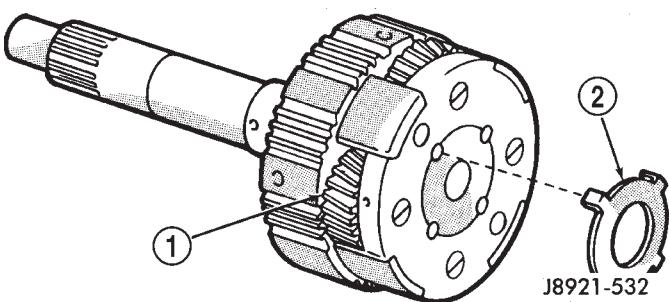


J8921-533

Fig. 217 Removing Snap Ring And Retaining Plate

- 1 – SNAP RING
- 2 – PLANETARY GEAR
- 3 – RETAINING PLATE

(17) Remove race from planetary gear (Fig. 216).

**Fig. 216 Remove Planetary Gear Race**

- 1 – PLANETARY GEAR
- 2 – RACE

(19) Remove one-way clutch and outer race as assembly. Then separate race from clutch (Fig. 218).

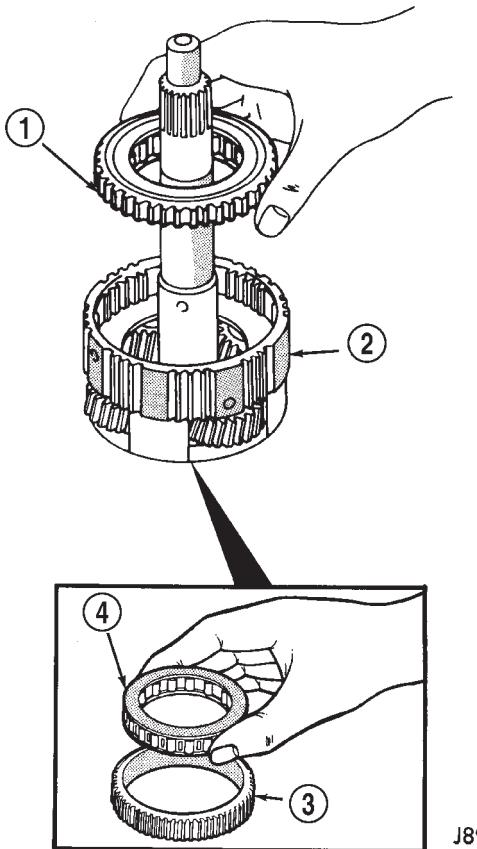
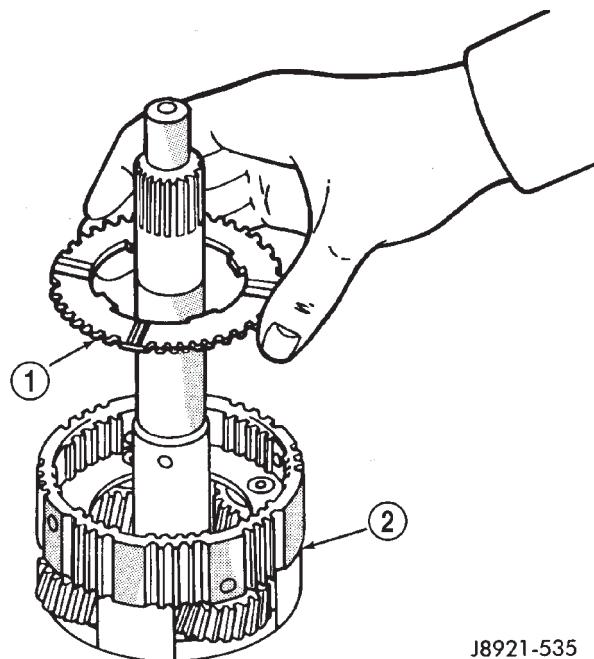


Fig. 218 Removing One-Way Clutch

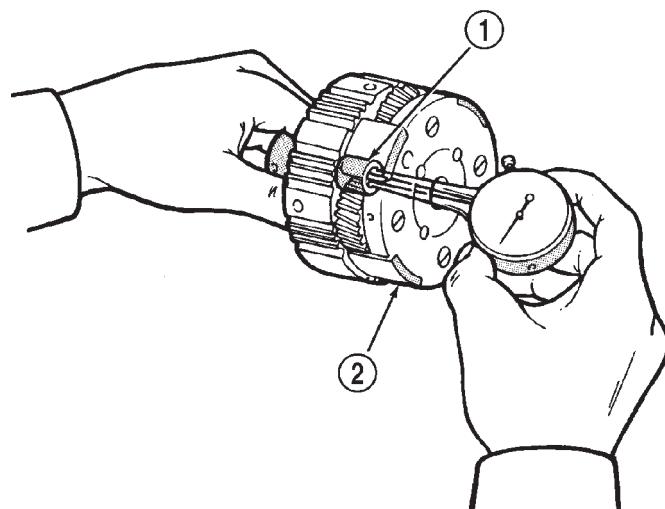
- 1 – ONE-WAY CLUTCH AND OUTER RACE ASSEMBLY
- 2 – PLANETARY GEAR
- 3 – RACE
- 4 – CLUTCH



J8921-535

Fig. 219 Removing Planetary Thrust Washer

- 1 – THRUST WASHER
- 2 – PLANETARY GEAR



J8921-539

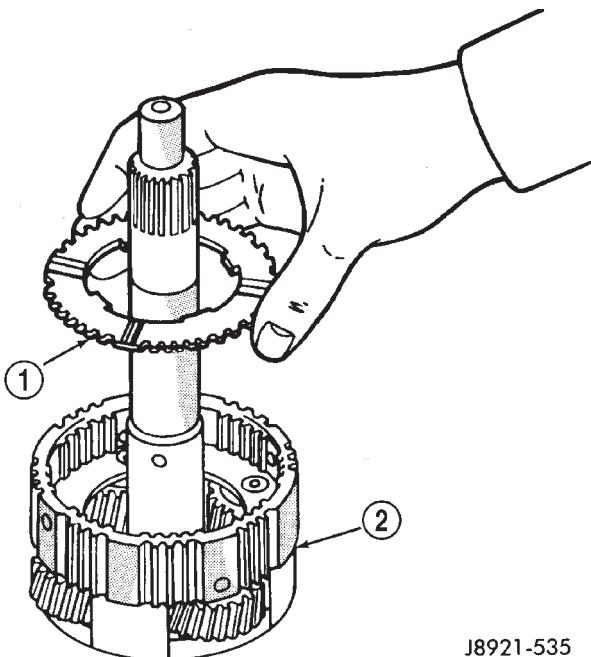
Fig. 220 Checking Planetary Bushing

- 1 – PLANETARY BUSHING
- 2 – PLANETARY GEAR

DISASSEMBLY AND ASSEMBLY (Continued)

ASSEMBLY

(1) Install thrust washer in planetary gear (Fig. 221). **Grooved side of washer faces up and toward front.**



J8921-535

Fig. 221 Install Planetary Thrust Washer

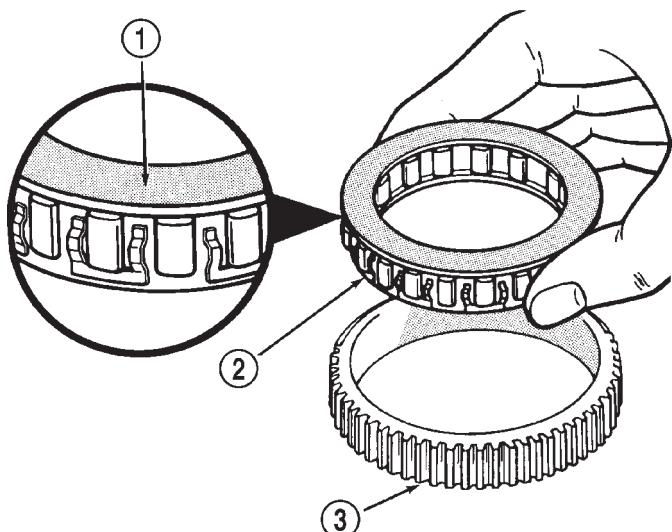
- 1 – THRUST WASHER
- 2 – PLANETARY GEAR

- (2) Install clutch race into planetary gear.
- (3) Install one-way clutch into the outer race (Fig. 222). Be sure flanged side of clutch is facing upward.
- (4) Install clutch retaining plate and snap ring in planetary gear.
- (5) Coat planetary race with petroleum jelly and install it on planetary gear. Outside diameter of race should be 41.8 mm (1.646 in.); inside diameter is 27.1 mm (1.067 in.).
- (6) Install hub in planetary ring gear and install snap ring.
- (7) Coat race and bearing with petroleum jelly and install in planetary ring gear (Fig. 223).
- (8) Verify bearing/race size. Outside diameter of race is 47.8 mm (1.882 in.) and inside diameter is 24.2 mm (0.953 in.). Outside diameter of bearing is 46.8 mm (1.843 in.) and inside diameter is 26 mm (1.024 in.).

(9) Lubricate new clutch piston O-rings with Mopar® Door Ease, or Ru-Glyde. Then install rings on clutch piston and install piston in clutch drum.

(10) Install piston return springs in clutch piston (Fig. 224).

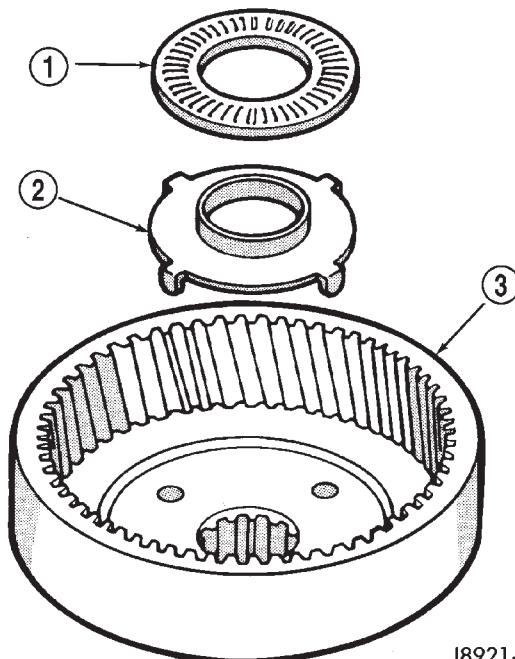
(11) Install piston snap ring. Compress piston return springs with Tool 7538 and shop press (Fig. 225).



J8921-540

Fig. 222 Assembling One-Way Clutch And Race

- 1 – FLANGED SIDE OF CLUTCH FACES UP
- 2 – ONE-WAY CLUTCH
- 3 – CLUTCH RACE



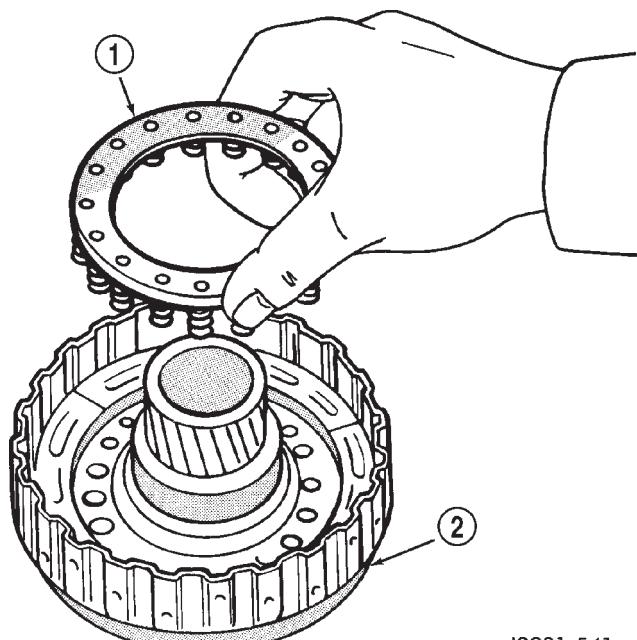
J8921-530

Fig. 223 Install Ring Gear Bearing And Race

- 1 – BEARING
- 2 – RACE
- 3 – RING GEAR

- (12) Install overdrive clutch pack in drum. Install steel plate first, then a disc (Fig. 226). Continue

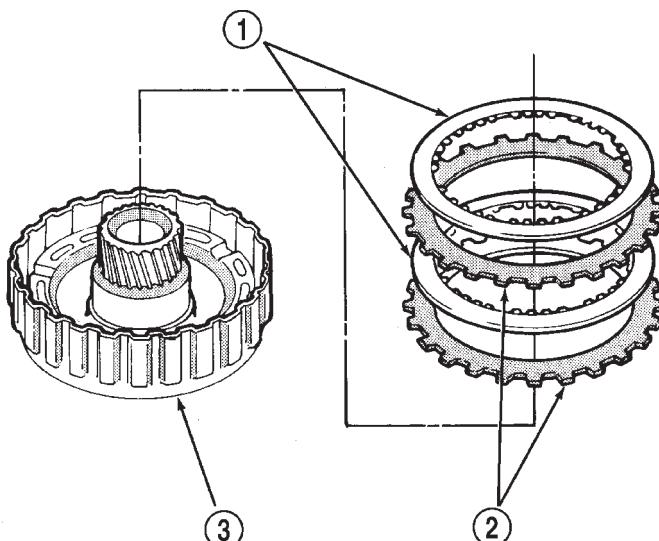
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-541

Fig. 224 Installing Piston Return Springs

- 1 – RETURN SPRINGS
2 – CLUTCH PISTON



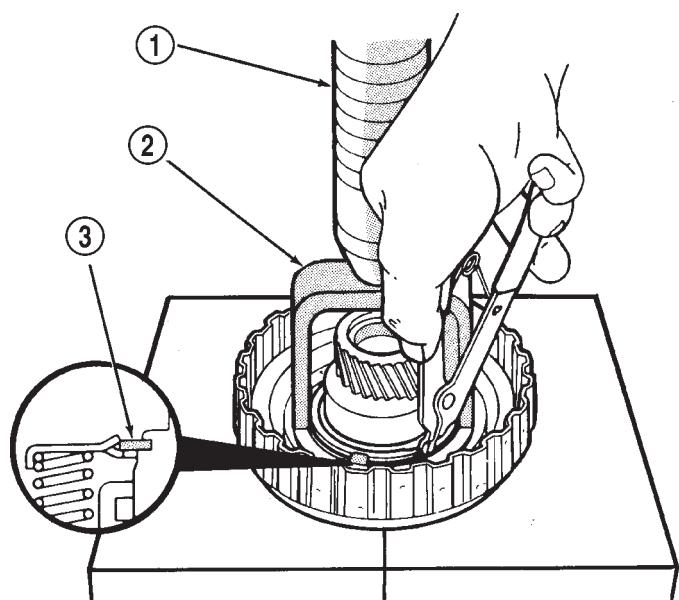
J8921-543

Fig. 226 Installing Overdrive Clutch Discs And Plates

- 1 – CLUTCH DISC
2 – STEEL PLATE
3 – CLUTCH DRUM

installation sequence until required number of discs and plates have been installed.

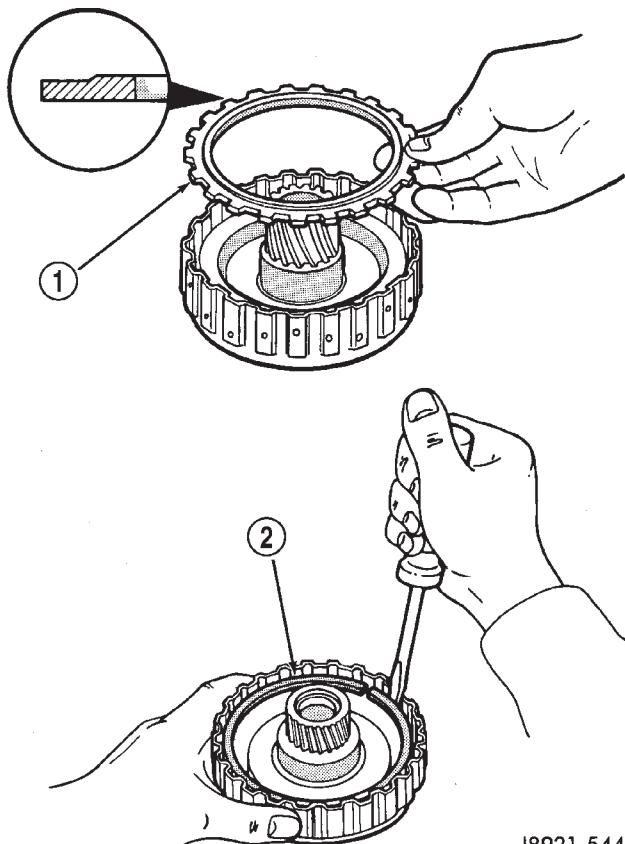
(13) Install clutch pack retainer with flat side facing downward. Then install retainer snap ring (Fig. 227). Compress springs with suitable tool.



J8921-542

Fig. 225 Installing Clutch Piston Snap Ring

- 1 – PRESS RAM
2 – COMPRESSOR TOOL
3 – SNAP RING



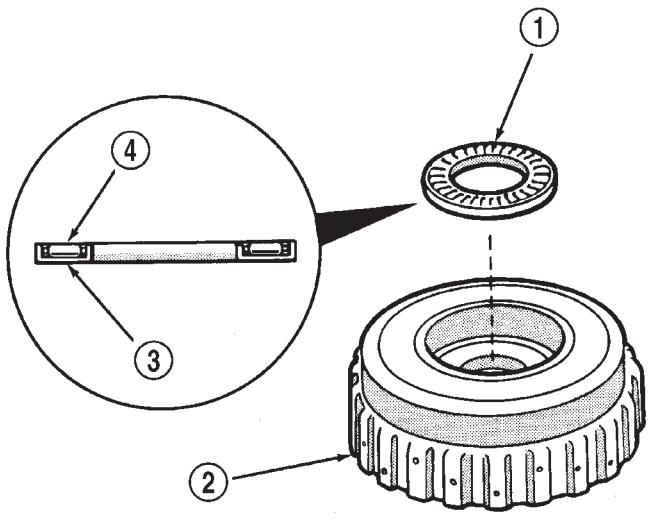
J8921-544

Fig. 227 Installing Retainer And Snap Ring

- 1 – CLUTCH PACK RETAINER
2 – RETAINER SNAP RING

DISASSEMBLY AND ASSEMBLY (Continued)

(14) Install clutch drum bearing and race assembly (Fig. 228). Be sure bearing rollers face upward as shown. Outside diameter of assembled bearing and race is 50.2 mm (1.976 in.). Inside diameter is 28.9 mm (1.138 in.).



J8921-545

Fig. 228 Installing Clutch Drum Bearing And Race Assembly

- 1 – BEARING AND RACE ASSEMBLY
- 2 – CLUTCH DRUM
- 3 – RACE
- 4 – ROLLERS

(15) Install clutch on planetary gear.

(16) Verify one-way clutch operation. Hold drum and turn planetary shaft clockwise and counterclockwise. Shaft should turn clockwise freely but lock when turned counterclockwise.

OVERDRIVE SUPPORT

DISASSEMBLY

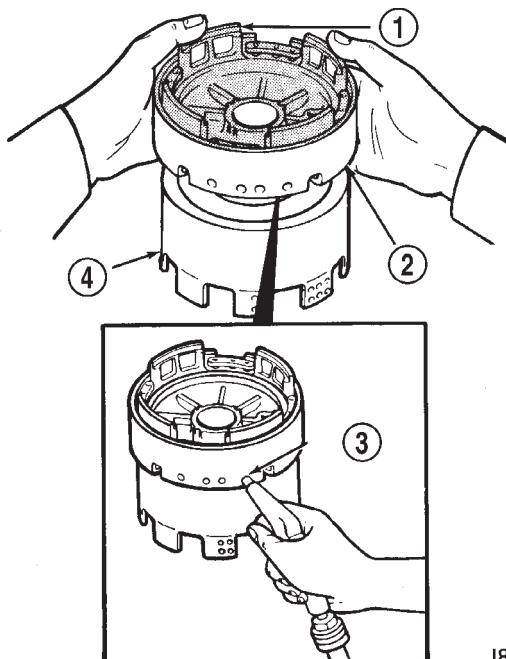
(1) Check brake piston operation. Mount support on clutch (Fig. 229).

(2) Apply compressed air through support feed hole and observe brake piston movement (Fig. 229). Piston should move smoothly and not bind or stick. If operation is incorrect, replace piston and support.

(3) Remove thrust bearing front race, thrust bearing and rear race (Fig. 230).

(4) Turn overdrive support over and remove bearing race and clutch drum thrust washer (Fig. 231).

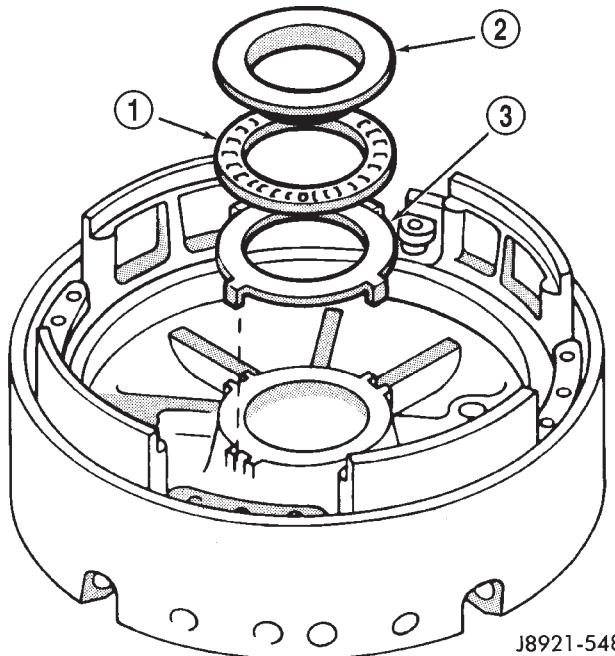
(5) Compress piston return spring with Spring Compressor 7537 and remove piston snap ring (Fig. 232).



J8921-547

Fig. 229 Checking Brake Piston Movement

- 1 – BRAKE PISTON
- 2 – OVERDRIVE SUPPORT
- 3 – SUPPORT FEED HOLE
- 4 – CLUTCH

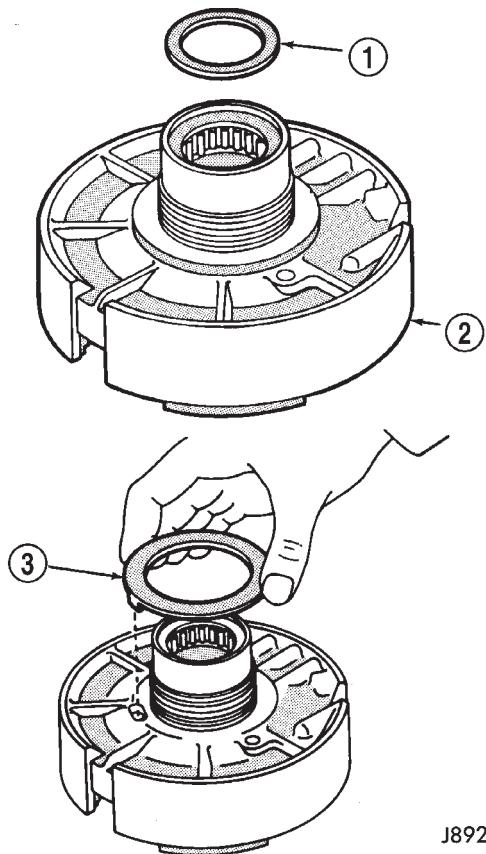


J8921-548

Fig. 230 Removing Support Thrust Bearing And Races

- 1 – THRUST BEARING
- 2 – FRONT RACE
- 3 – REAR RACE

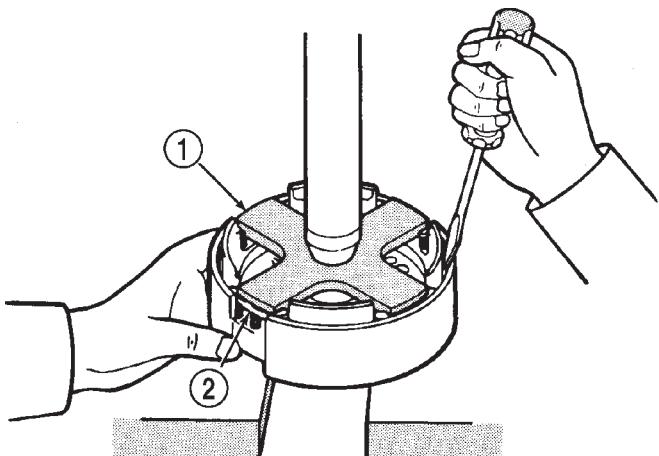
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-549

Fig. 231 Removing Clutch Drum Thrust Washer And Race

- 1 – BEARING RACE
2 – OVERDRIVE SUPPORT
3 – THRUST WASHER



J8921-550

Fig. 232 Removing/Installing Piston Snap Ring

- 1 – COMPRESSOR TOOL
2 – SNAP RING

(6) Mount support in direct clutch and remove brake piston with compressed air. Apply air to same feed hole used when checking piston operation.

(7) Remove and discard support O-rings (Fig. 233).

(8) Remove support seal rings (Fig. 234).

(9) Measure free length of piston return springs with springs mounted in retainer (Fig. 235). Length should be 17.23 mm (0.678 in.).

(10) Clean support components and dry them with compressed air.

(11) Inspect overdrive support and brake piston. Replace support and piston if either part is worn or damaged.

ASSEMBLY

(1) Lubricate new support seal rings. Then compress rings and install them on support (Fig. 236).

(2) Lubricate and install new O-rings on brake piston. Then carefully seat piston in support.

(3) Install return springs on brake piston.

(4) Compress return springs with Spring Compressor 7537 (Fig. 232) and install piston snap ring.

(5) Install support bearing race and clutch drum thrust washer (Fig. 231).

(6) Install thrust bearing and front and rear bearing races. Thrust bearing rollers should face upward as shown (Fig. 236).

(7) Verify thrust bearing/race sizes (Fig. 237).

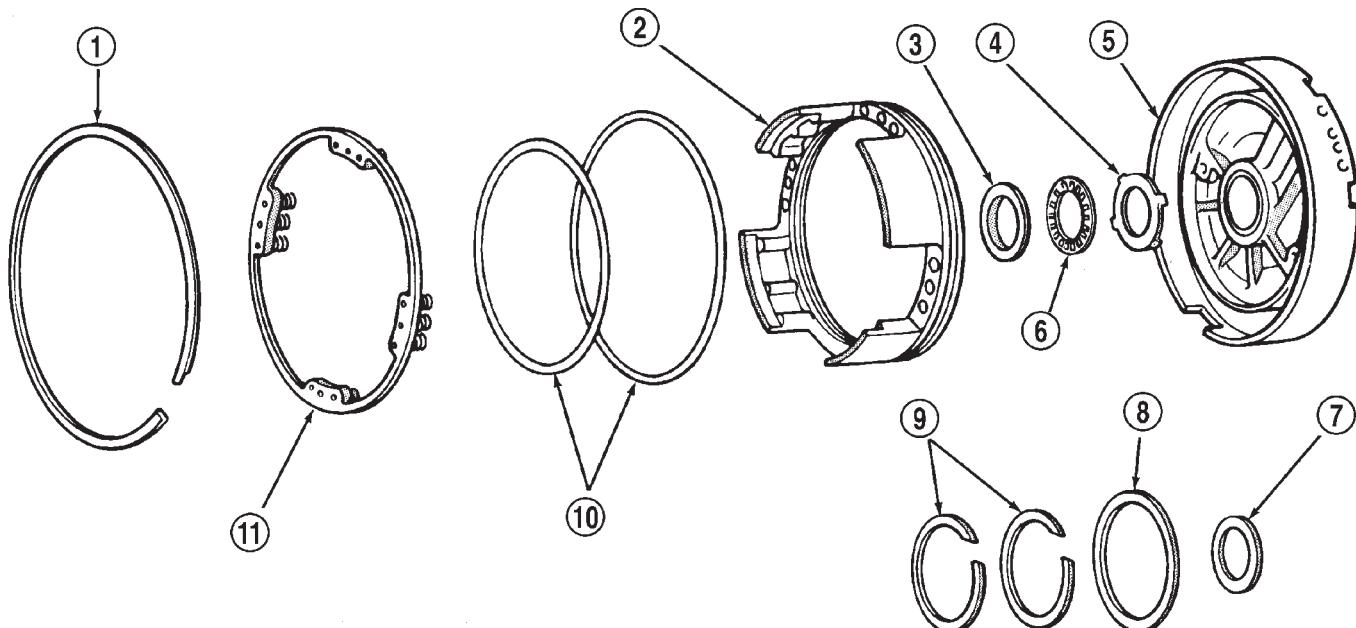
- Front race outer diameter is 47.8 mm (1.882 in.) and inside diameter is 30.7 mm (1.209 in.).

- Rear race outer diameter is 47.8 mm (1.882 in.) and inside diameter is 34.3 mm (1.350 in.).

- Bearing outer diameter is 47.7 mm (1.878 in.) and inside diameter is 32.7 mm (1.287 in.).

(8) Verify brake piston operation. Use same procedure described at beginning of disassembly. Piston should operate smoothly and not bind or stick.

DISASSEMBLY AND ASSEMBLY (Continued)

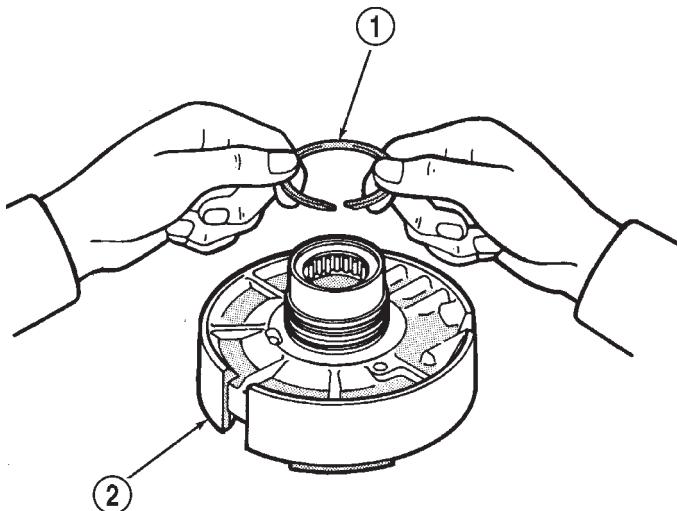


J8921-546

Fig. 233 Overdrive Support Components

- 1 - PISTON SNAP RING
 2 - BRAKE PISTON
 3 - FRONT RACE
 4 - REAR RACE
 5 - OVERDRIVE SUPPORT
 6 - THRUST BEARING

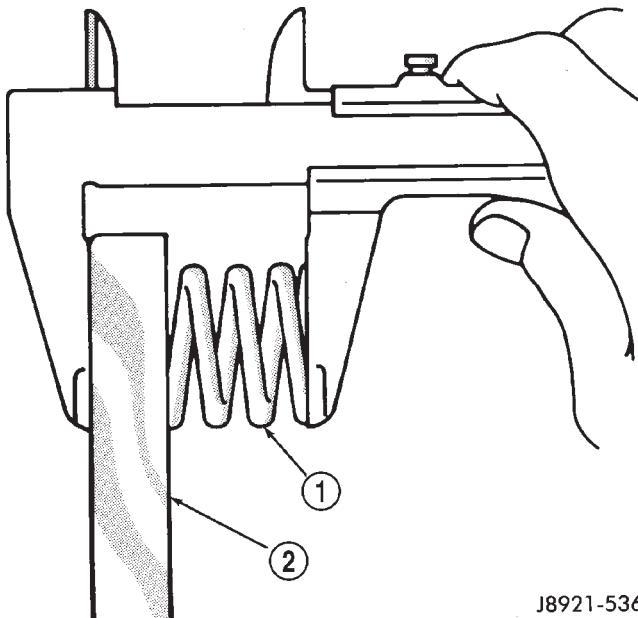
- 7 - BEARING RACE
 8 - CLUTCH DRUM THRUST WASHER
 9 - SUPPORT SEAL RINGS
 10 - BRAKE PISTON O-RINGS
 11 - PISTON RETURN SPRING



J8921-551

Fig. 234 Removing Support Seal Rings

- 1 - SEAL RINGS (2)
 2 - SUPPORT

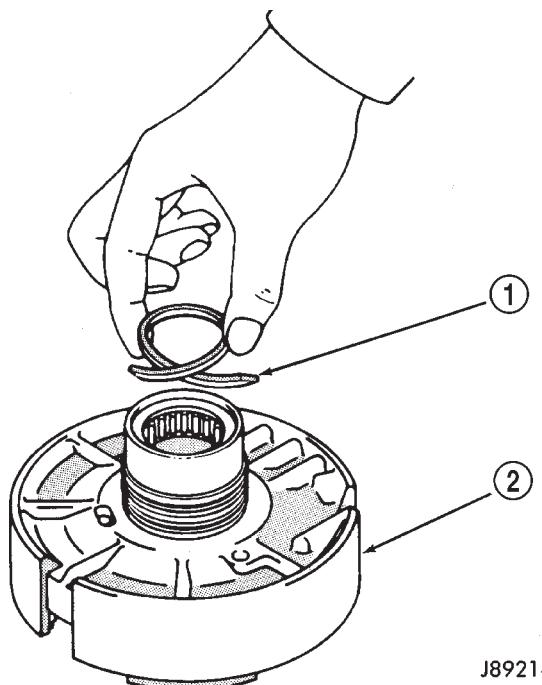


J8921-536

Fig. 235 Checking Piston Return Spring Length

- 1 - PISTON RETURN SPRINGS
 2 - SPRING RETAINER

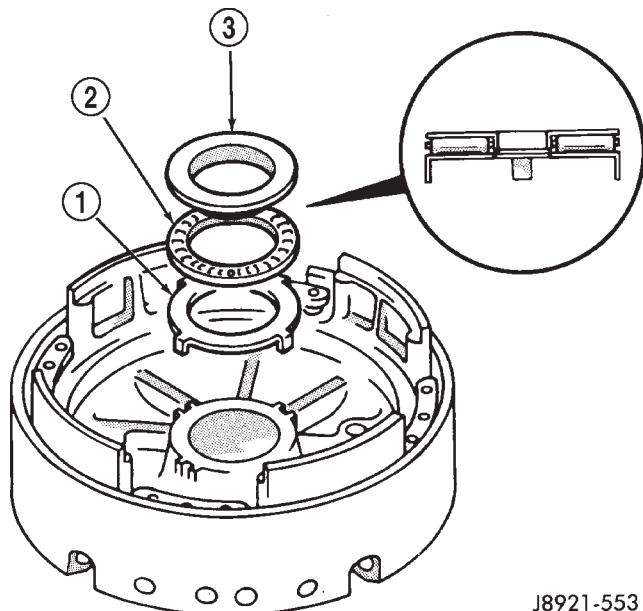
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-552

Fig. 236 Installing Support Seal Rings

- 1 – COMPRESS SEAL RINGS BEFORE INSTALLATION
2 – OVERDRIVE SUPPORT



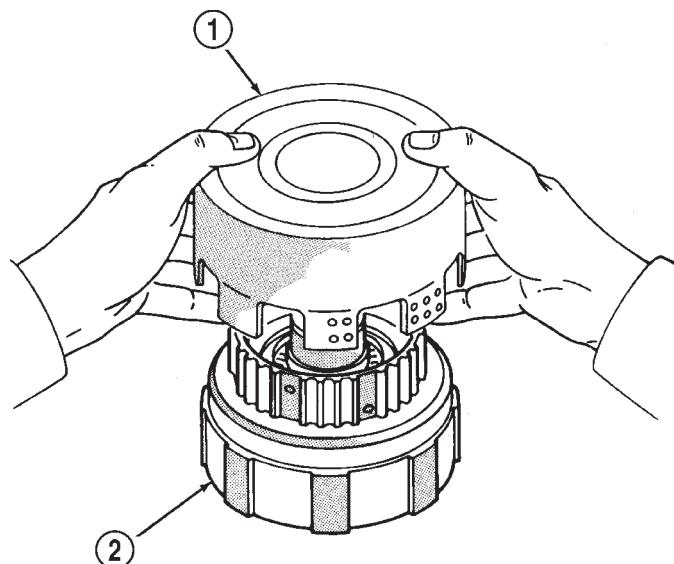
J8921-553

Fig. 237 Installing Support Thrust Bearing And Races

- 1 – REAR RACE
2 – THRUST BEARING
3 – FRONT RACE

DIRECT CLUTCH**DISASSEMBLY**

- (1) Remove direct clutch from forward clutch (Fig. 238).

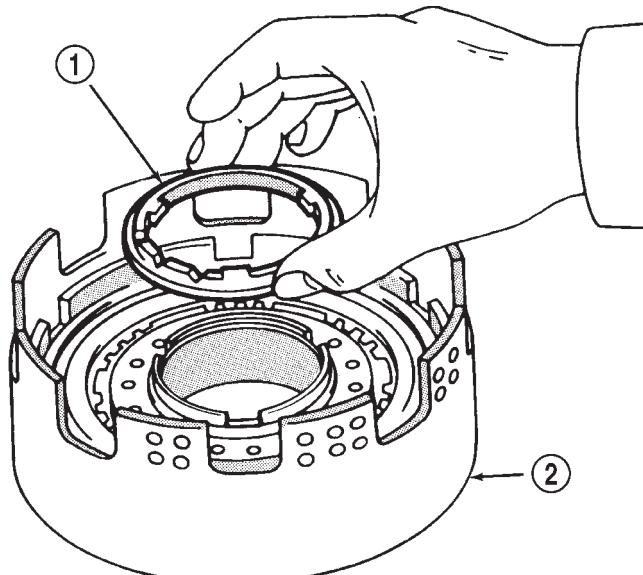


J8921-555

Fig. 238 Separate Direct Clutch From Forward Clutch

- 1 – DIRECT CLUTCH
2 – FORWARD CLUTCH

- (2) Remove clutch drum thrust washer (Fig. 239).



J8921-556

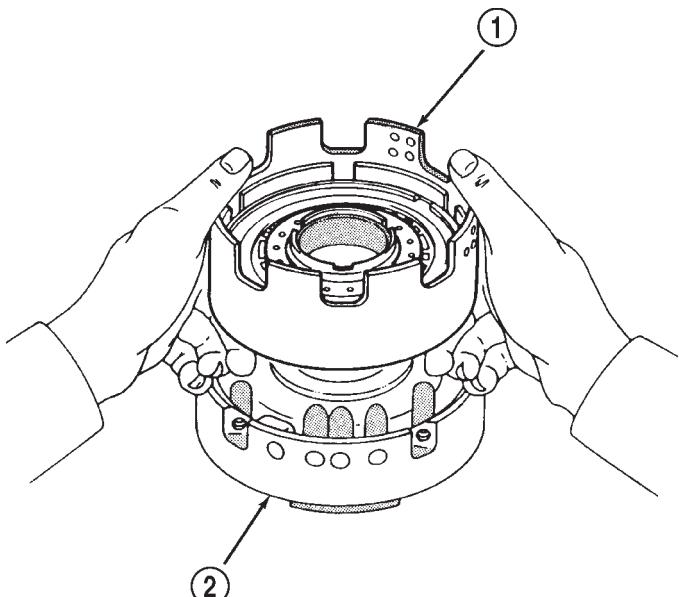
Fig. 239 Removing Clutch Drum Thrust Washer

- 1 – THRUST WASHER
2 – CLUTCH DRUM

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Check clutch piston stroke length as outlined in following steps.

(4) Mount direct clutch on overdrive support assembly (Fig. 240).



J8921-557

Fig. 240 Mount Direct Clutch On Overdrive Support

1 – DIRECT CLUTCH

2 – OVERDRIVE SUPPORT

(5) Mount dial indicator on clutch and position indicator plunger on clutch piston (Fig. 241).

(6) Apply 57–114 psi air pressure through feed hole in overdrive support and note piston stroke length (Fig. 241). Check stroke at least twice.

(7) Piston stroke length should be 1.37 mm – 1.67 mm (0.054 – 0.065 in.). If stroke length is incorrect, either the clutch pack retainer or clutch discs will have to be replaced.

(8) Remove clutch pack snap ring and remove retainer and clutch pack from drum (Fig. 242).

(9) Compress clutch piston return springs with tool 7538 and remove clutch piston snap ring (Fig. 243).

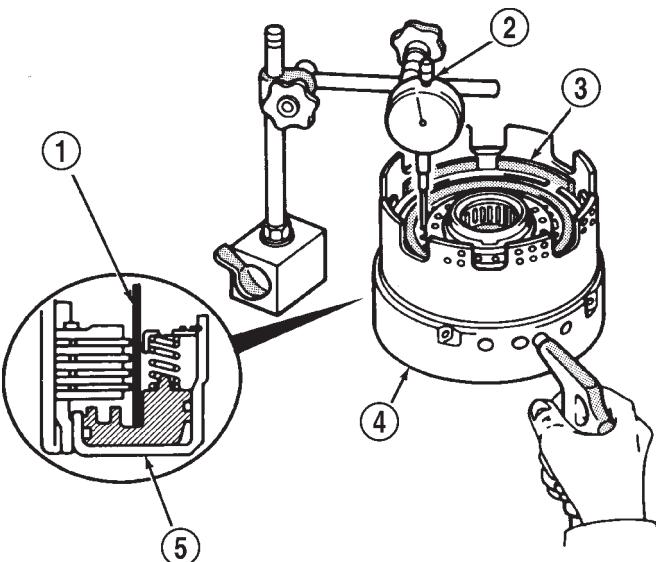
(10) Remove compressor tool and return spring.

(11) Remove clutch piston. Remount clutch on overdrive support (Fig. 244). Apply compressed air through piston feed hole in support to remove piston. Use only enough air to ease piston out.

(12) Remove and discard clutch piston O-rings.

(13) Measure clutch disc thickness. Minimum allowable thickness is 1.84 mm (0.0724 in.). Replace clutch pack if any disc is below minimum thickness.

(14) Measure free length of piston return springs with springs in retainer (Fig. 245). Length should be 21.32 mm (0.839 in.). Replace return springs if not within specification.



J8921-558

Fig. 241 Checking Direct Clutch Piston Stroke Length

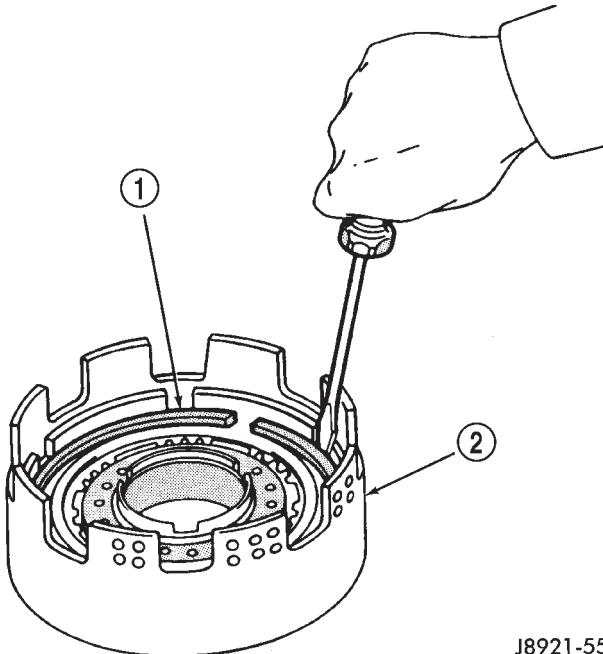
1 – INDICATOR PLUNGER

2 – DIAL INDICATOR

3 – CLUTCH PISTON

4 – OVERDRIVE SUPPORT

5 – CLUTCH PISTON



J8921-559

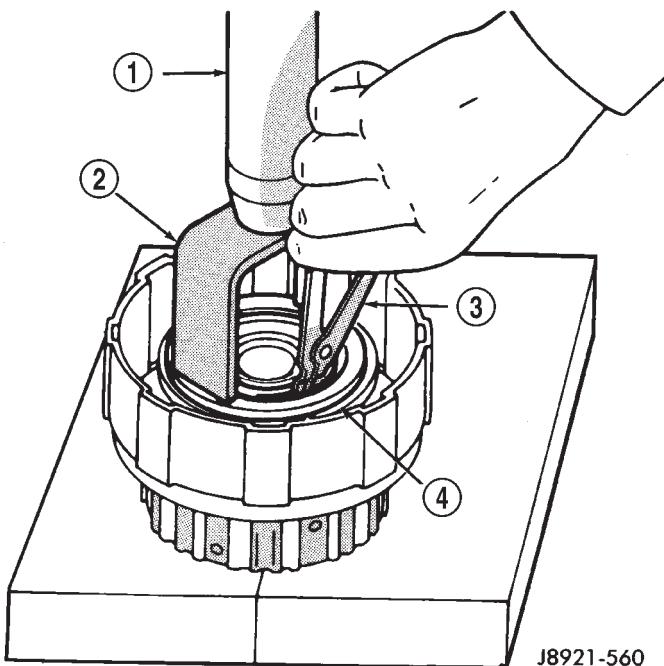
Fig. 242 Removing Clutch Pack Snap Ring

1 – CLUTCH PACK SNAP RING

2 – DIRECT CLUTCH DRUM

(15) Check clutch piston check ball (Fig. 246). Shake piston to see if ball moves freely. Then check ball seating by applying low pressure compressed air

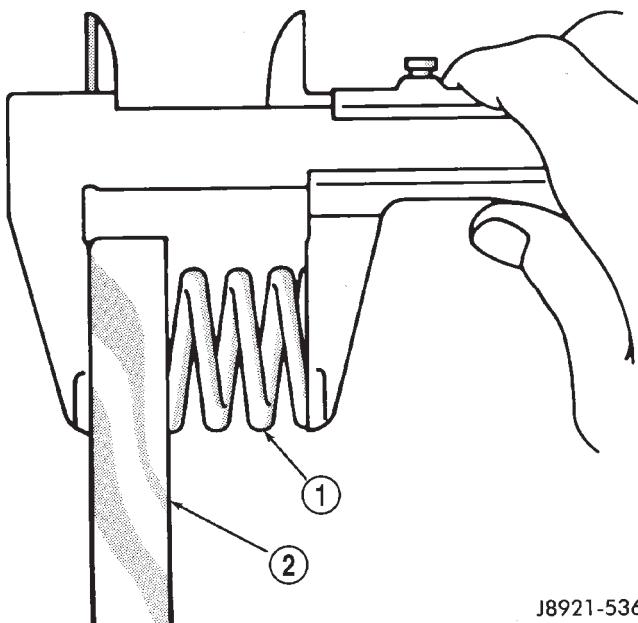
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-560

Fig. 243 Removing Piston Return Spring

- 1 – PRESS RAM
- 2 – COMPRESSOR TOOL
- 3 – SNAP RING PLIERS
- 4 – RETURN SPRING

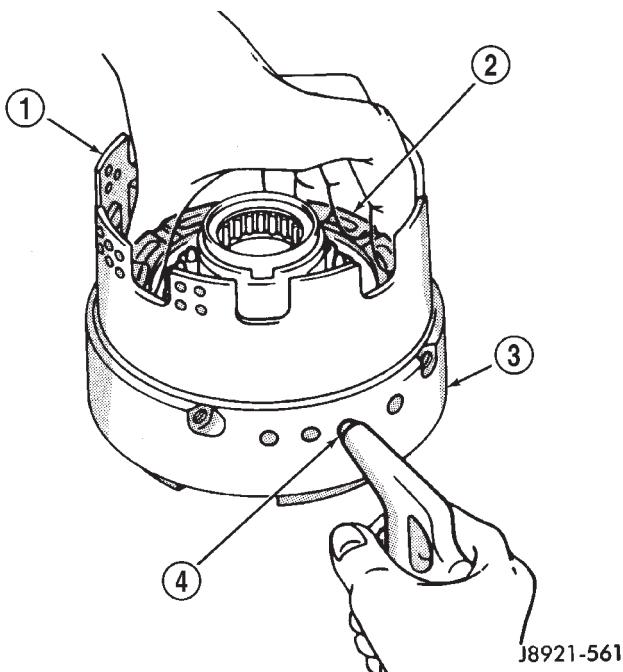


J8921-536

Fig. 245 Checking Piston Return Spring Length

- 1 – PISTON RETURN SPRINGS
- 2 – SPRING RETAINER

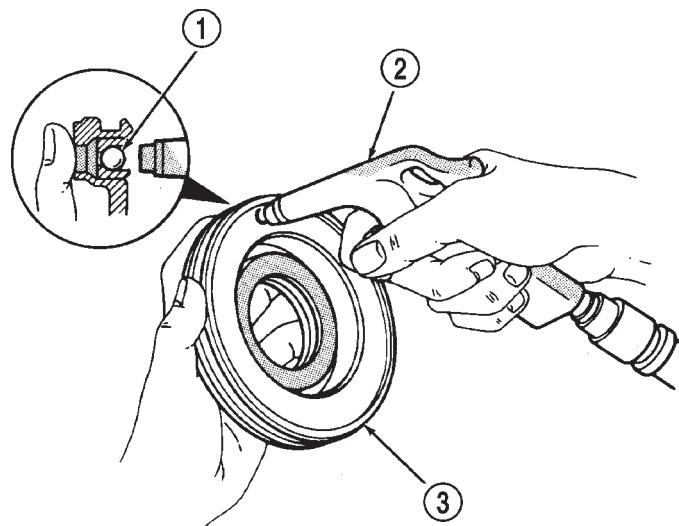
to ball inlet as shown. Air should not leak past check ball.



J8921-561

Fig. 244 Removing Direct Clutch Piston

- 1 – DIRECT CLUTCH DRUM
- 2 – CLUTCH PISTON
- 3 – OVERDRIVE SUPPORT
- 4 – SUPPORT FEED HOLE



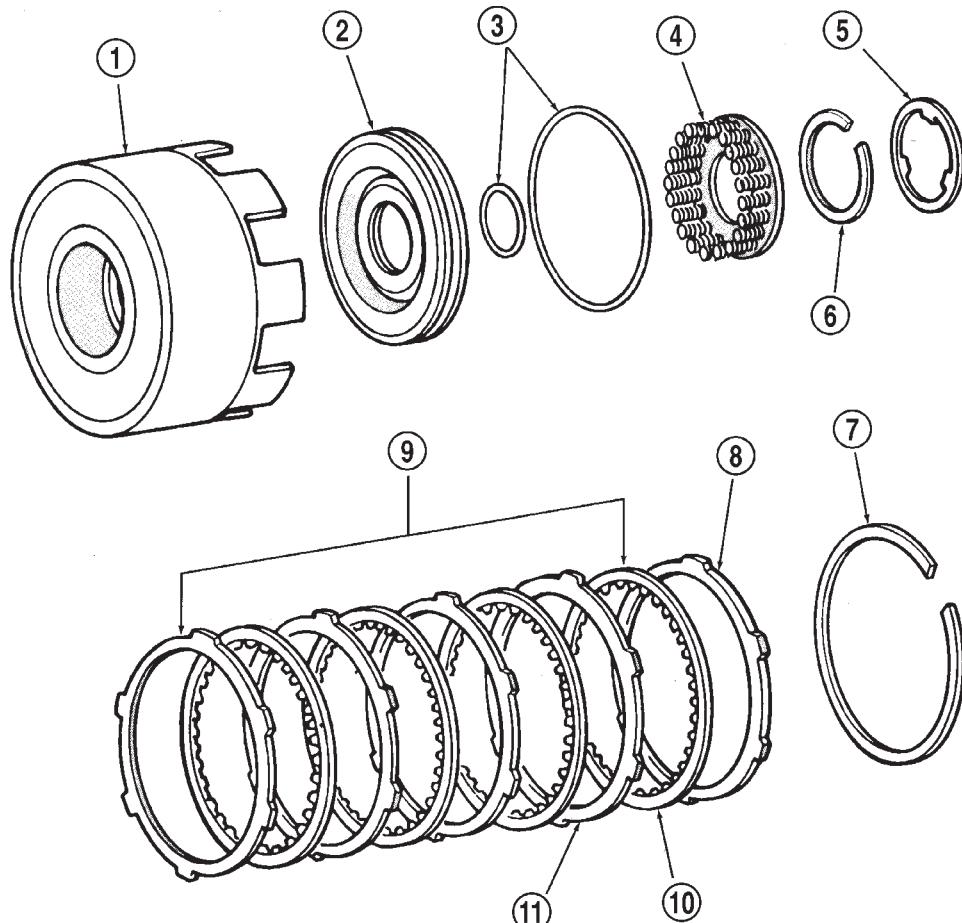
J8921-562

Fig. 246 Testing Piston Check Ball Seating

- 1 – PISTON CHECK BALL
- 2 – USE LOW-PRESSURE AIR TO CHECK SEATING
- 3 – DIRECT CLUTCH PISTON

(16) Measure inside diameter of clutch drum bushing. Inside diameter should be no more than 53.97 mm (2.1248 in.). Replace drum if bushing inside diameter is greater than specified.

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-554

Fig. 247 Direct Clutch Components

1 - DIRECT CLUTCH DRUM

2 - DIRECT CLUTCH PISTON

3 - O-RINGS

4 - PISTON RETURN SPRINGS

5 - CLUTCH DRUM THRUST WASHER

6 - CLUTCH PISTON SNAP RING

7 - CLUTCH PACK SNAP RING

8 - RETAINER

9 - CLUTCH PACK

10 - CLUTCH DISC*

11 - CLUTCH PLATE*

ASSEMBLY

(1) Lubricate and install replacement O-rings on clutch piston (Fig. 247).

(2) Install clutch piston in drum and install return springs on piston.

(3) Compress piston return springs with Tool 7538 and install snap ring (Fig. 243). Be sure snap ring end gap is not aligned with spring retainer tab.

(4) Install clutch discs and plates (Fig. 248). Install plate then disc until all plates and discs are installed. Four plates and discs are required.

(5) Install clutch pack retainer in drum (Fig. 249).

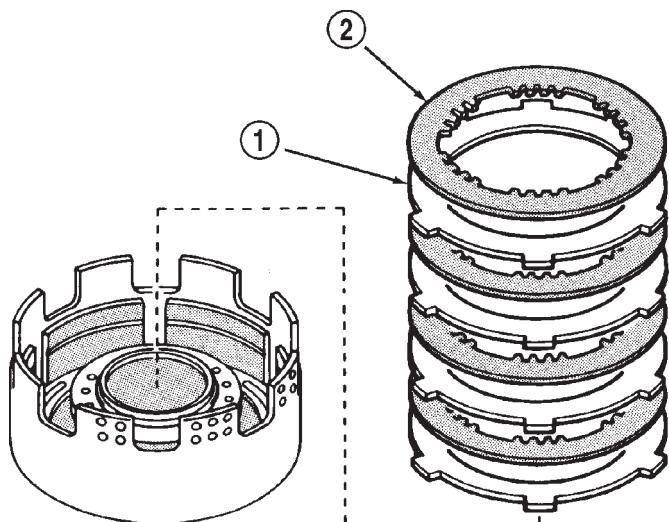
(6) Install clutch pack snap ring (Fig. 249).

(7) Check snap ring position. If necessary, shift snap ring until end gap is **not** aligned with any notches in clutch drum (Fig. 250).

(8) Lubricate clutch drum thrust washer with petroleum jelly and install it in drum (Fig. 240).

(9) Mount direct clutch assembly on forward clutch assembly and check assembled height (Fig. 251). Height should be 70.3 to 71.5 mm (2.767 to 2.815 in.).

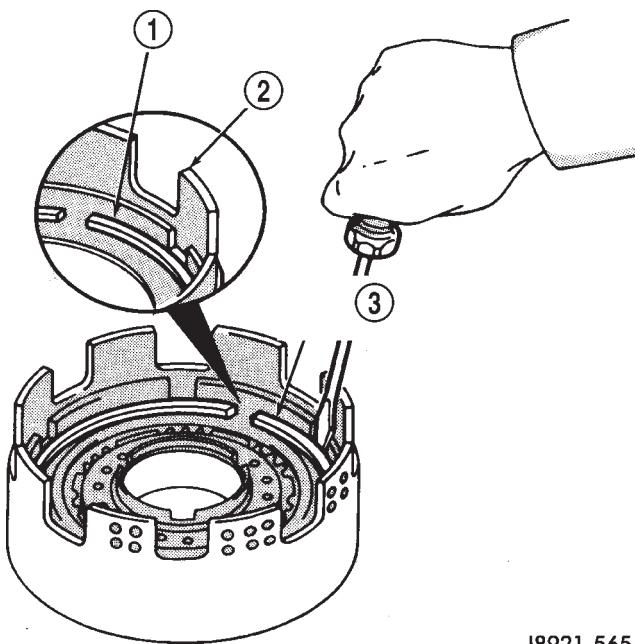
(10) If assembled height is incorrect, clutches are not seated.



J8921-563

Fig. 248 Installing Direct Clutch Discs And Plates

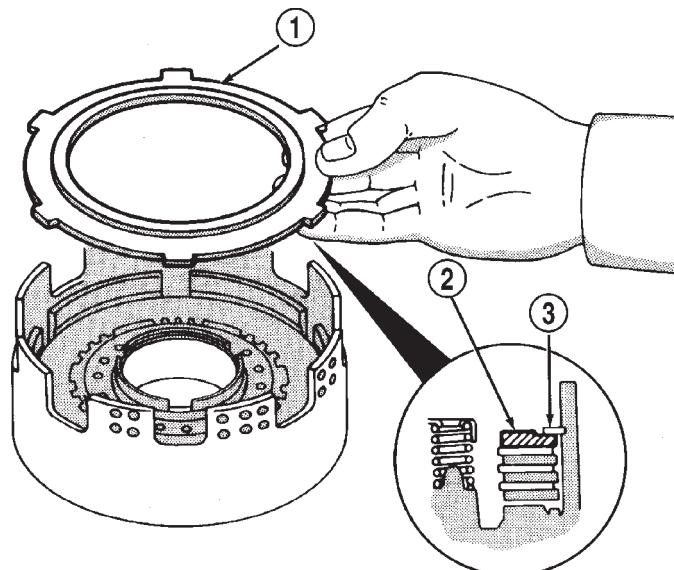
- 1 – CLUTCH PLATES
- 2 – CLUTCH DISCS



J8921-565

Fig. 250 Adjusting Clutch Pack Snap Ring Position

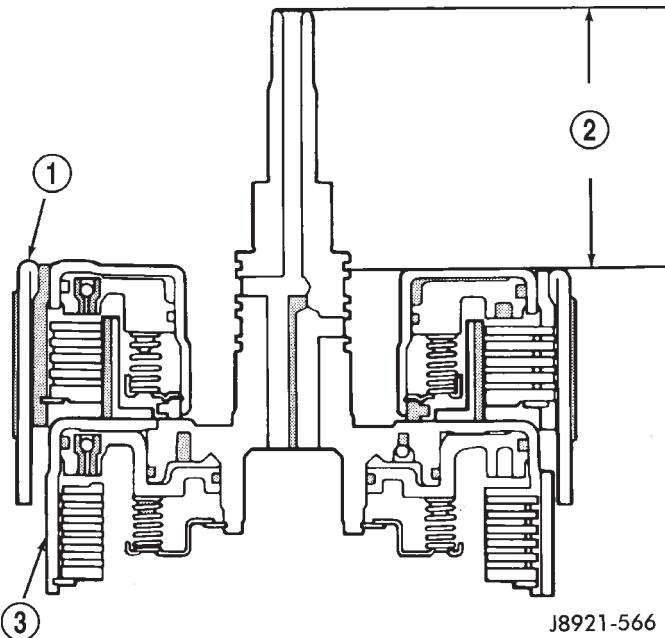
- 1 – CLUTCH PACK SNAP RING
- 2 – DRUM NOTCH
- 3 – SHIFT SNAP RING END GAP AWAY FROM DRUM NOTCHES



J8921-564

Fig. 249 Install Clutch Pack Retainer

- 1 – CLUTCH PACK RETAINER
- 2 – RETAINER
- 3 – SNAP RING



J8921-566

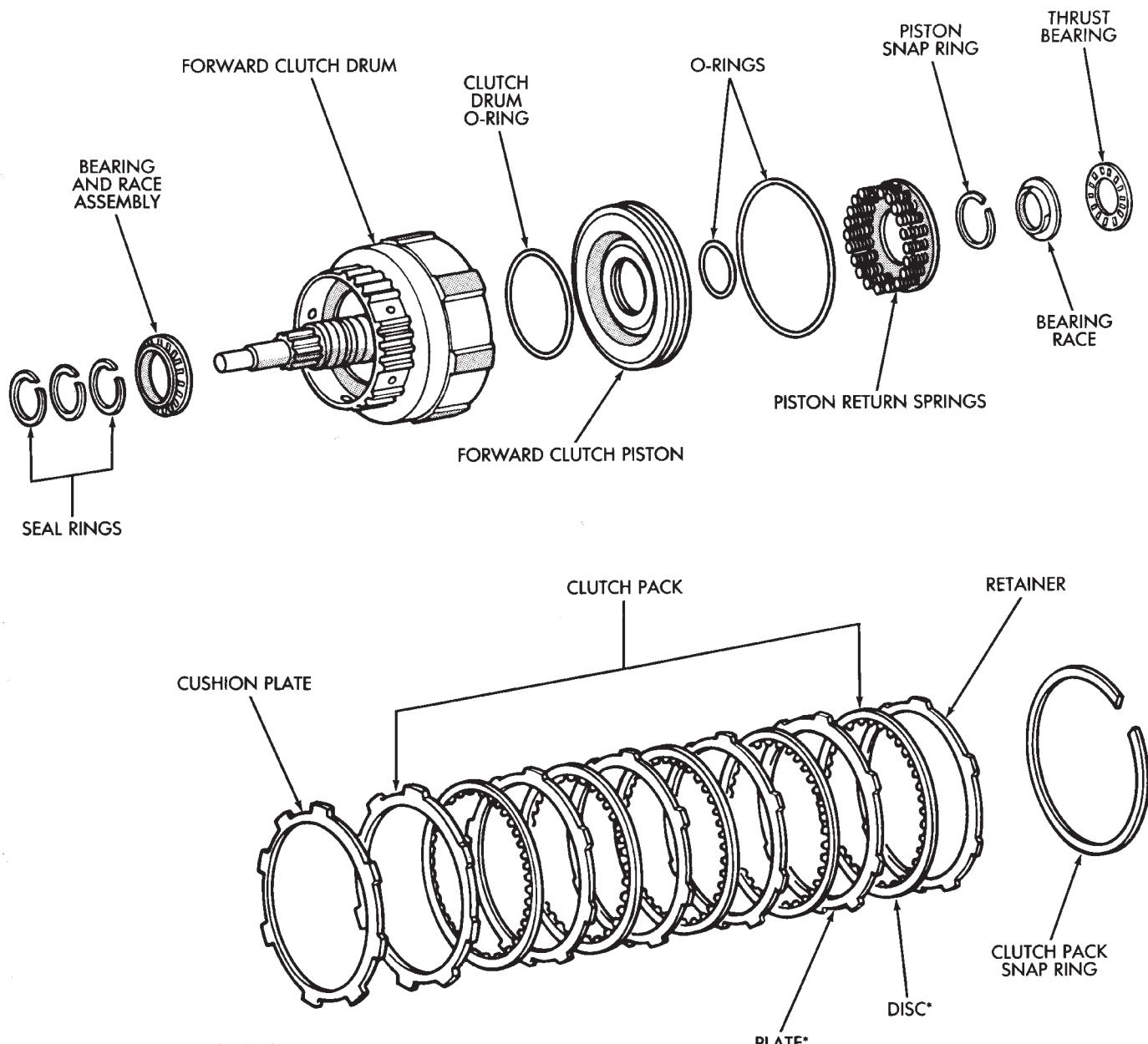
Fig. 251 Checking Direct Clutch Assembled Height

- 1 – DIRECT CLUTCH
- 2 – HEIGHT SHOULD BE 70.3-71.5 mm (2.767-2.815 in.)
- 3 – FORWARD CLUTCH

DISASSEMBLY AND ASSEMBLY (Continued)

FORWARD CLUTCH

DISASSEMBLY



*6-CYLINDER MODELS USE SIX PLATES AND DISCS.

J8921-567

Fig. 252 Forward Clutch Components

- (1) Check clutch piston stroke as outlined in following steps.
- (2) Position overdrive support on wood blocks and mount forward clutch drum on support (Fig. 253).
- (3) Remove bearing and race from forward clutch drum (Fig. 253).
- (4) Install a suitable threaded bolt/rod into the side of the overdrive support.
- (5) Mount Miller Tool C-3339 dial indicator components onto the threaded rod as necessary.
- (6) Position dial indicator plunger squarely against clutch piston.

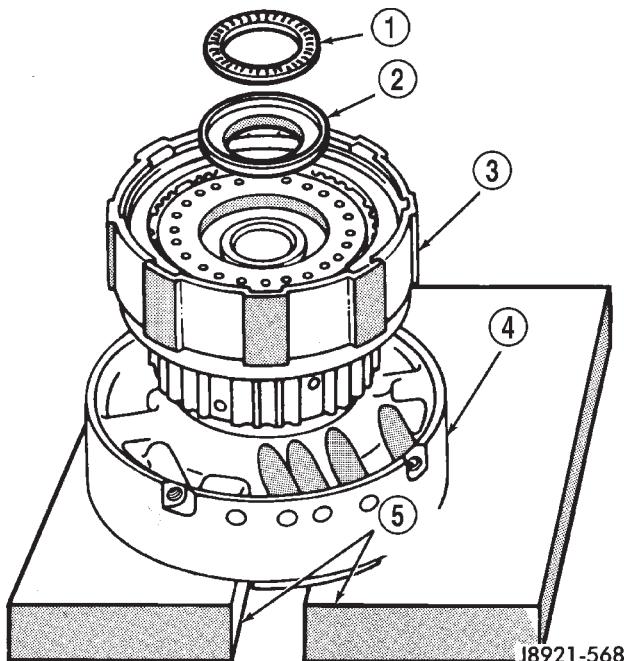
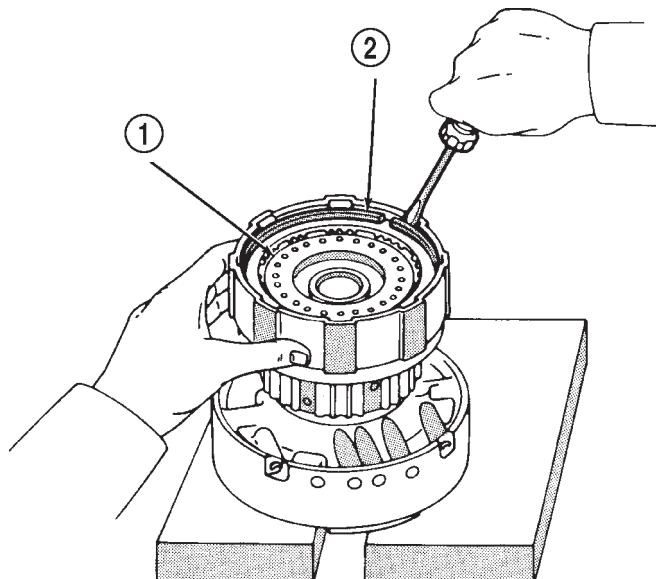


Fig. 253 Positioning Drum And Support On Wood Blocks

- 1 – THRUST BEARING
- 2 – BEARING RACE
- 3 – FORWARD CLUTCH DRUM
- 4 – OVERDRIVE SUPPORT
- 5 – WOOD BLOCKS

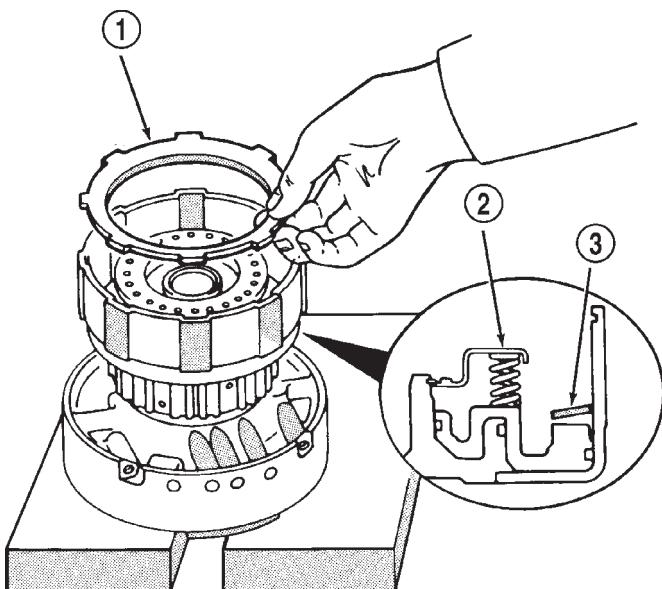
J8921-568



J8921-570

Fig. 254 Removing Retainer And Clutch Pack

- 1 – RETAINER AND CLUTCH PACK
- 2 – SNAP RING



J8921-571

Fig. 255 Removing Cushion Plate

- 1 – CUSHION PLATE
- 2 – RETURN SPRINGS
- 3 – CUSHION PLATE

(7) Apply compressed air through right side feed hole in support and note piston stroke length on dial indicator.

(8) Stroke length should be 3.55 – 3.73 mm (0.1348 – 0.1469 in.).

(9) Replace clutch discs if stroke length is incorrect.

(10) Remove clutch pack snap ring and remove retainer and clutch pack (Fig. 254).

(11) Remove clutch pack cushion plate (Fig. 255).

(12) Compress clutch springs with Tool 7538 and remove piston snap ring.

(13) Remove spring compressor tool and piston return springs.

(14) Remount forward clutch drum on overdrive support (Fig. 256).

(15) Apply compressed air through feed hole in support to remove piston (Fig. 256). Use only enough air pressure to ease piston out of drum.

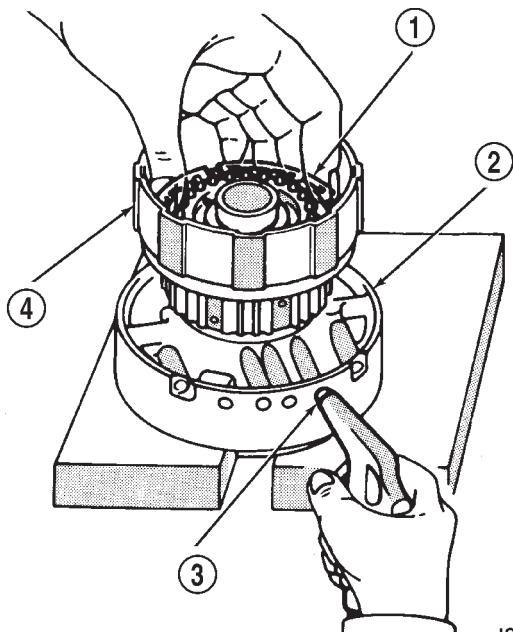
(16) Remove and discard clutch piston O-rings (Fig. 257).

(17) Remove clutch drum O-ring from rear hub of drum.

(18) Remove three seal rings from clutch drum shaft (Fig. 258).

(19) Remove thrust bearing and race assembly from clutch drum (Fig. 259).

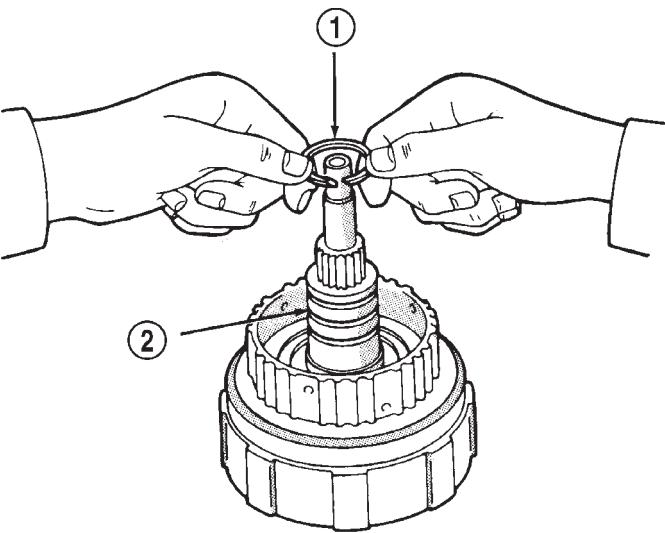
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-572

Fig. 256 Removing Forward Clutch Piston

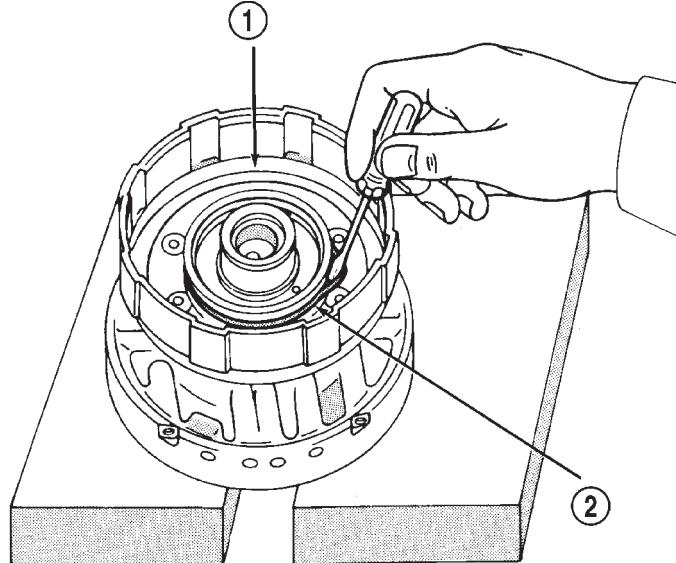
- 1 – CLUTCH PISTON
- 2 – OVERDRIVE SUPPORT
- 3 – FEED HOLE
- 4 – CLUTCH DRUM



J8921-574

Fig. 258 Removing Clutch Drum Seal Rings

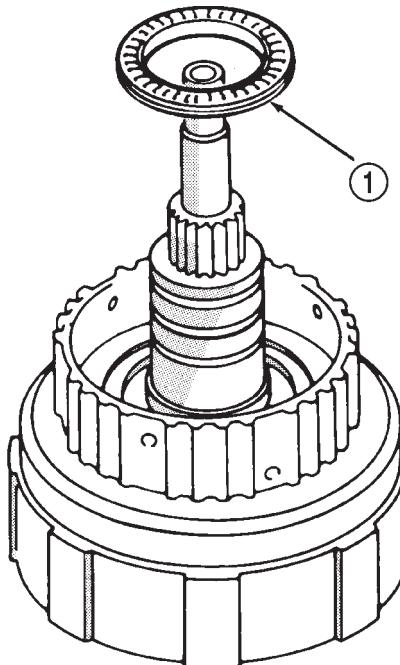
- 1 – SEAL RINGS
- 2 – CLUTCH DRUM SHAFT



J8921-573

Fig. 257 Removing/Installing Clutch Drum O-Ring

- 1 – CLUTCH DRUM HUB
- 2 – O-RING

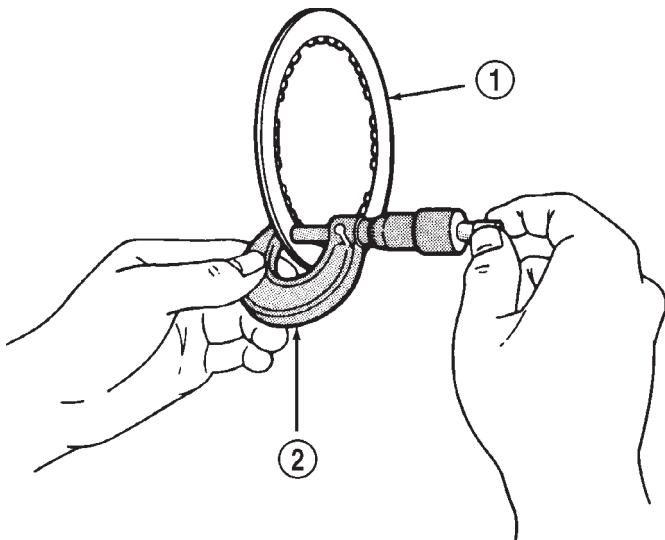


J8921-575

Fig. 259 Removing Clutch Drum Thrust Bearing Assembly

- 1 – THRUST BEARING AND RACE ASSEMBLY

(20) Measure clutch disc thickness (Fig. 260). Minimum allowable thickness is 1.51 mm (0.0595 in.). Replace clutch pack if any disc falls below specified minimum thickness.



J8921-576

Fig. 260 Measuring Clutch Disc Thickness

- 1 – CLUTCH DISC
2 – MICROMETER

(21) Measure free length of piston return springs with springs mounted in retainer (Fig. 261). Length should be 19.47 mm (0.767 in.). Replace springs and retainer if length is incorrect.

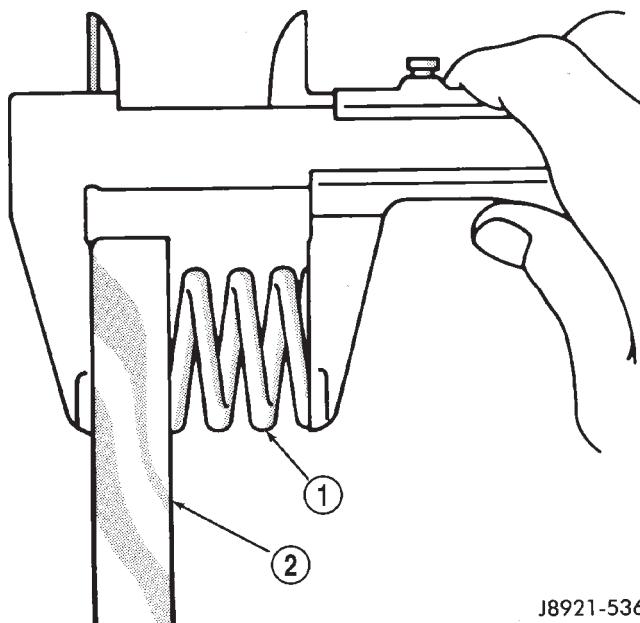
(22) Inspect clutch piston check ball (Fig. 262). Ball should move freely within piston. Check ball seating by applying low pressure compressed air to ball feed hole. Ball should seat firmly and not leak air.

(23) Measure inside diameter of bushing in clutch drum hub. Maximum allowable diameter is 24.08 mm (0.9480 in.). Replace clutch drum if bushing inside diameter is greater than specified.

ASSEMBLY

(1) Lubricate bearing and race assembly with petroleum jelly and install it in clutch drum (Fig. 263). Race side of assembly faces downward and toward drum. Bearing rollers face up (Fig. 263).

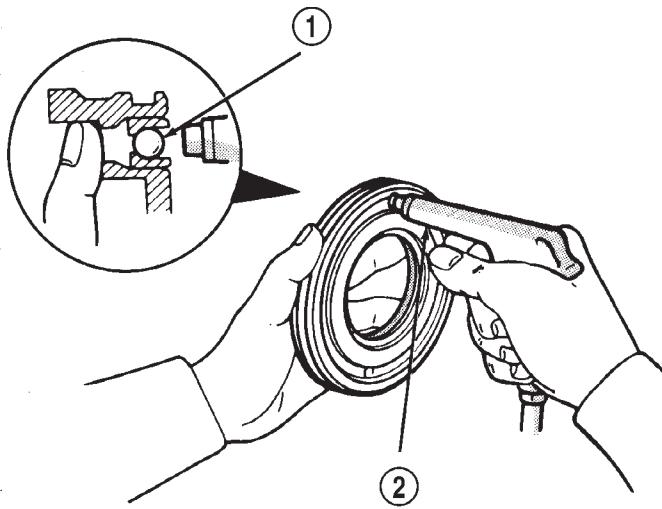
(2) Coat new clutch drum shaft seal rings with petroleum jelly. Before installing drum shaft seal rings, squeeze each ring so ring ends overlap (Fig. 264). This tightens ring making clutch installation easier.



J8921-536

Fig. 261 Checking Return Spring Length

- 1 – PISTON RETURN SPRINGS
2 – SPRING RETAINER



J8921-577

Fig. 262 Testing Piston Check Ball

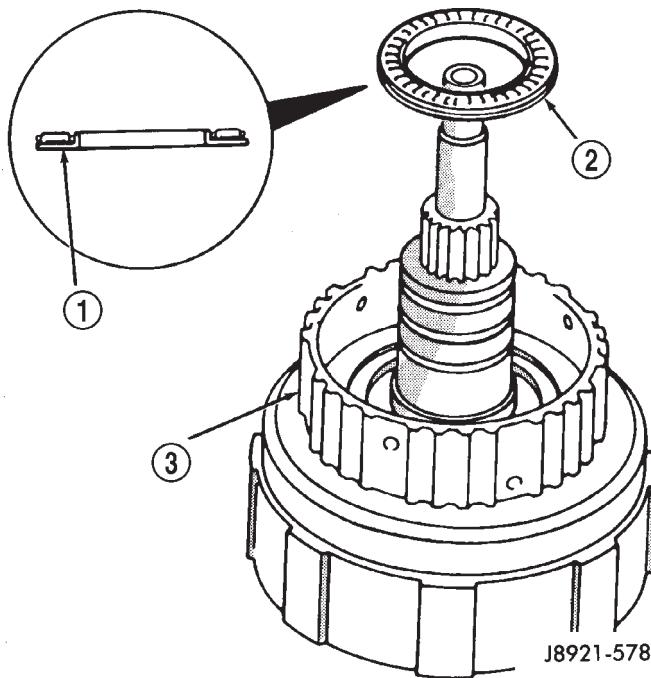
- 1 – PISTON CHECK BALL
2 – USE LOW AIR PRESSURE FOR TEST

(3) Install seal rings on shaft. Keep rings closed as tightly as possible during installation. Avoid over-spreading them.

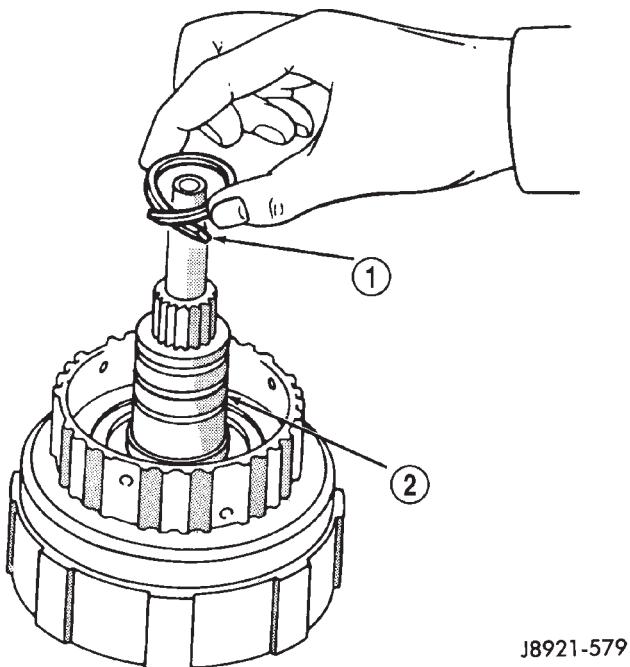
(4) Mount clutch drum on overdrive support.

(5) Lubricate and install new O-ring on clutch drum hub (Fig. 257).

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 263 Installing Thrust Bearing And Race**

- 1 - BEARING ROLLERS FACE UP
2 - THRUST BEARING AND RACE
3 - FORWARD CLUTCH

**Fig. 264 Installing Clutch Drum Shaft Seal Rings**

- 1 - SEAL RINGS (COMPRESS BEFORE INSTALLATION)
2 - CLUTCH DRUM SHAFT

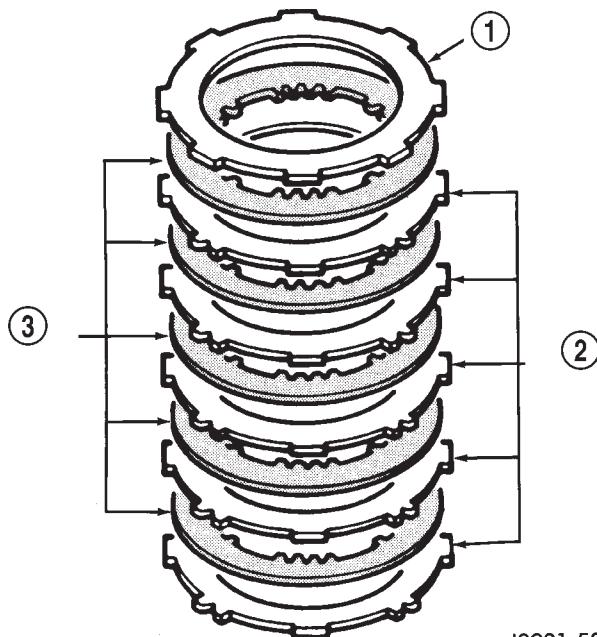
(6) Lubricate new clutch piston O-rings with Mopar Door Ease, or Ru-Glyde. Install rings on clutch piston and install piston in drum.

(7) Install piston return springs.

(8) Compress piston return springs with Tool 7538 and shop press and install piston snap ring. Be sure snap ring end gap is not aligned with any notches in drum.

(9) Install cushion plate in drum. Concave side of plate faces downward (Fig. 255).

(10) Install clutch discs, plates and retainer (Fig. 265). Install tabbed plate followed by disc until required number of plates and discs are installed. Use six plates and discs.

**Fig. 265 Installing Forward Clutch Discs And Plates**

- 1 - RETAINER
2 - CLUTCH PLATES
3 - CLUTCH DISCS

(11) Install clutch pack snap ring.

(12) Recheck clutch piston stroke length using same method outlined at beginning of disassembly procedure. If stroke length is not within specified limits, replace clutch discs.

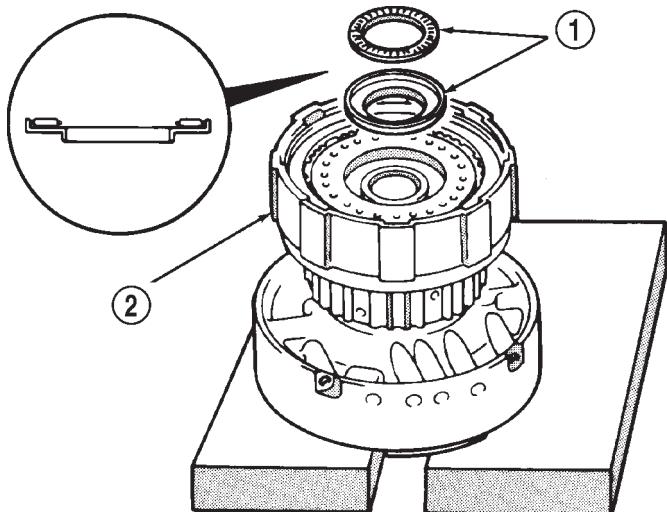
(13) Lubricate race and bearing with petroleum jelly and install them in clutch drum (Fig. 266). Be sure bearing rollers face up and race lip seats in drum as shown.

(14) Verify bearing and race size.

- Outer diameter of bearing is 46.7 mm (1.839 in.).
- Outer diameter of race is 48.9 mm (1.925 in.).
- Inner diameter of bearing and race is 26.0 mm (1.024 in.).

(15) Mount forward clutch on direct clutch and check assembled height (Fig. 267). Height should be 70.3 - 71.5 mm (2.767 - 2.815 in.).

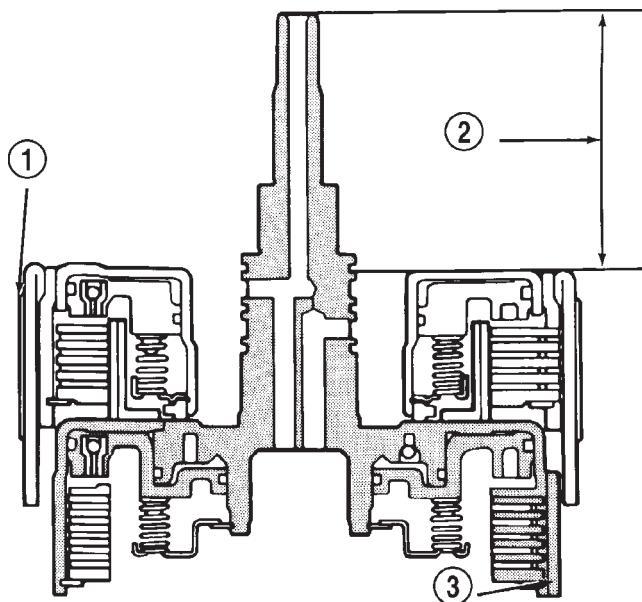
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-581

Fig. 266 Installing Thrust Bearing And Race

- 1 – THRUST BEARING AND RACE
2 – CLUTCH DRUM



J8921-582

Fig. 267 Checking Forward Clutch Assembled Height

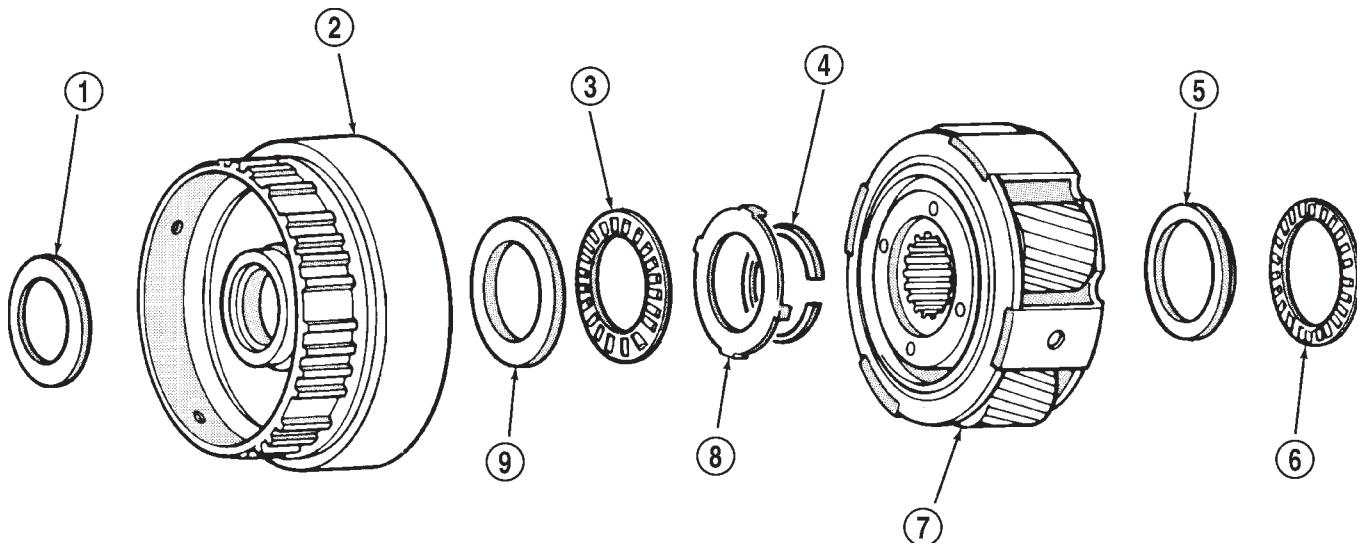
- 1 – DIRECT CLUTCH
2 – APPROXIMATELY 71.2 mm (2.80 in.)
3 – FORWARD CLUTCH

FRONT PLANETARY GEAR

DISASSEMBLY

- (1) Remove ring gear from planetary gear (Fig. 268).
(2) Remove front bearing and the two races from ring gear (Fig. 268).

- (3) Remove tabbed thrust race from planetary gear (Fig. 268).
(4) Remove snap ring attaching planetary gear to shaft and remove gear.



J8921-583

Fig. 268 Front Planetary Gear Components

- 1 – FORWARD RACE
2 – FRONT PLANETARY RING GEAR
3 – FRONT BEARING
4 – SNAP RING
5 – REAR RACE
6 – REAR BEARING
7 – FRONT PLANETARY GEAR
8 – THRUST RACE
9 – FRONT RACE

DISASSEMBLY AND ASSEMBLY (Continued)

(5) Remove rear bearing and race from planetary gear.

(6) Measure inside diameter of ring gear bushing. Maximum allowable diameter is 24.08 mm (0.9480 in.). Replace ring gear if bushing inside diameter is greater than specified.

(7) Check condition of planetary gear. Replace gear if teeth are worn, pins are loose, or carrier is cracked, distorted, or worn.

ASSEMBLY

(1) Lubricate planetary and ring gear bearings and races with petroleum jelly.

(2) Identify planetary bearings and races before installation. (Fig. 268). Bearings and races can be identified by following dimensions:

- Outer diameter of rear bearing is 47.7 mm (1.878 in.). Inner diameter is 35.5 mm (1.398 in.).

- Outer diameter of rear race 47.6 mm (1.874 in.). Inner diameter is 33.7 mm (1.327 in.).

- Outer diameter of front race is 53.6 mm (2.110 in.). Inner diameter is 30.5 mm (1.201 in.).

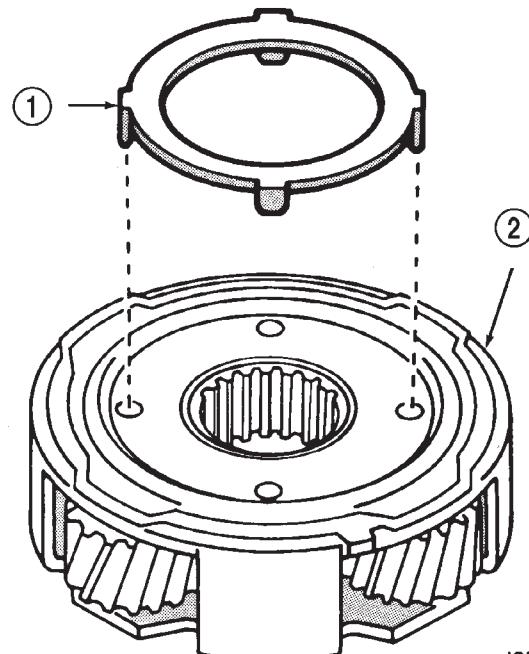
- Outer diameter of front bearing is 47.7 mm (1.878 in.). Inner diameter is 32.6 (1.283 in.).

- Outer diameter of forward race is 47.0 mm (1.850 in.). Inner diameter is 26.5 mm (1.043 in.).

(3) Install rear race and bearing in gear (Fig. 269).

(4) Turn planetary over and install thrust race (Fig. 270).

(5) Install front race and bearing and forward race in ring gear (Fig. 271).

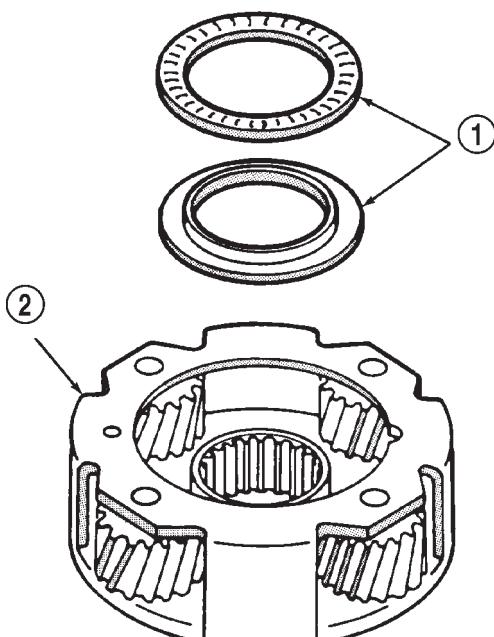


J9121-399

Fig. 270 Front Planetary Thrust Race Installation

1 – TABBED THRUST RACE

2 – PLANETARY GEAR

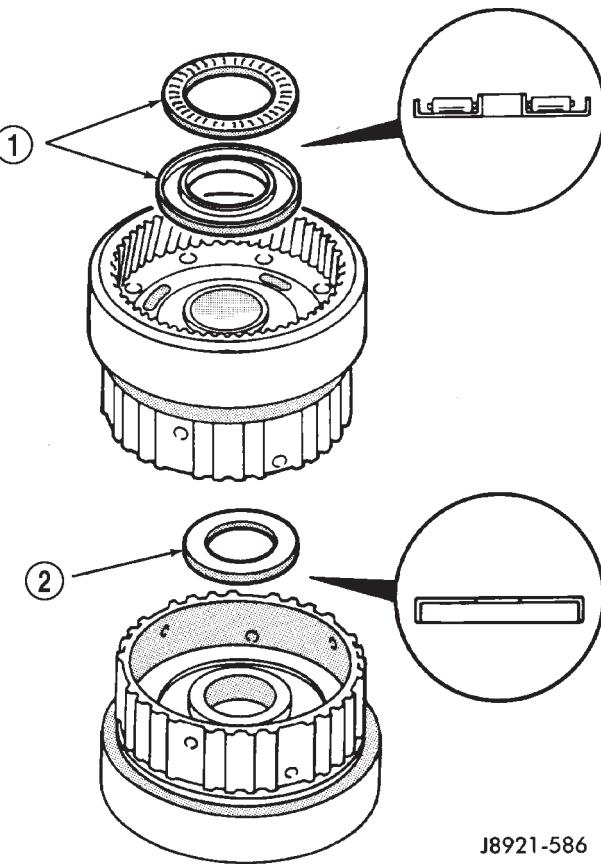


J8921-584

Fig. 269 Front Planetary Rear Bearing and Race Installation

1 – REAR BEARING AND RACE

2 – PLANETARY GEAR



J8921-586

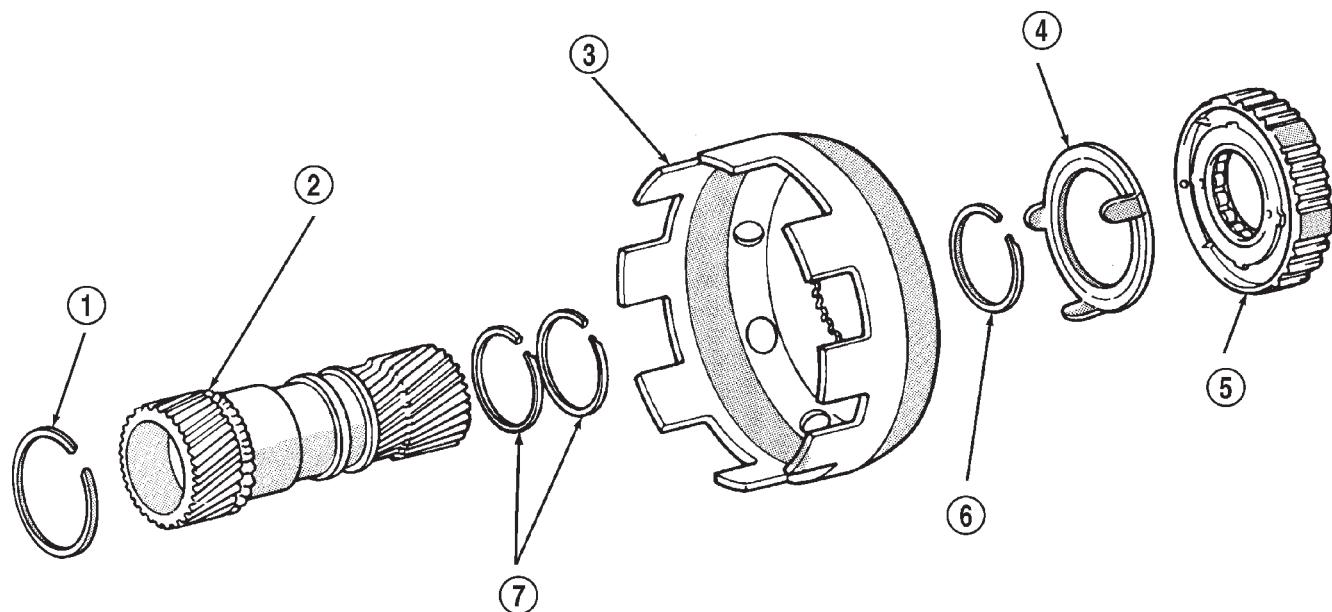
Fig. 271 Front Planetary Front Bearing And Races Installation

1 – FRONT BEARING AND RACE

2 – FORWARD RACE

DISASSEMBLY AND ASSEMBLY (Continued)

SUN GEAR AND NO. 1 ONE-WAY CLUTCH



J9121-400

Sun Gear And One-Way Clutch Components

- 1 – SNAP RING
2 – SUN GEAR
3 – SUN GEAR INPUT DRUM
4 – THRUST WASHER

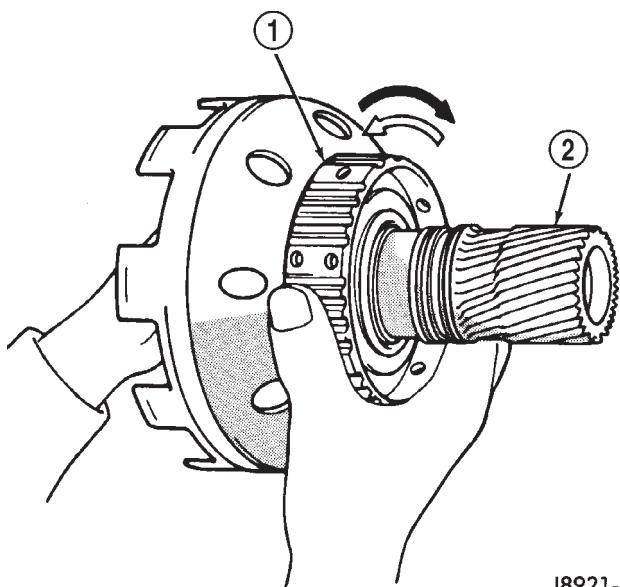
- 5 – ONE-WAY CLUTCH AND SECOND BRAKE HUB ASSEMBLY
6 – SNAP RING
7 – SEAL RINGS

DISASSEMBLY

(1) Hold sun gear and turn second brake hub clockwise and counterclockwise (Fig. 272). Hub should rotate freely clockwise but lock when turned

counterclockwise. Replace one-way clutch and hub if they do not operate properly.

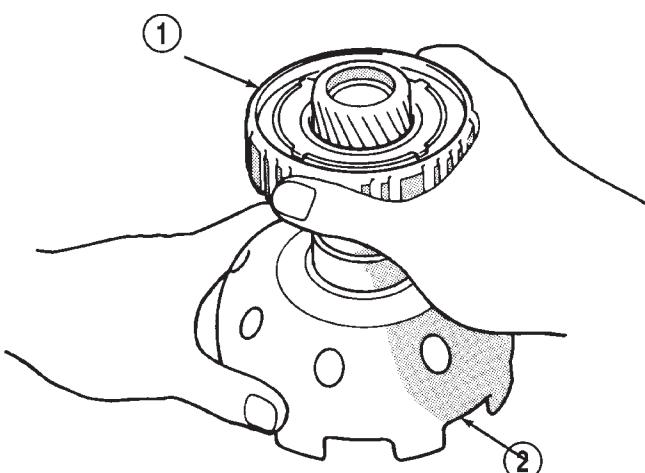
(2) Remove one-way clutch/second brake hub assembly from drum (Fig. 273).



J8921-588

Fig. 272 Checking One-Way Clutch Operation

- 1 – SECOND BRAKE HUB
2 – SUN GEAR



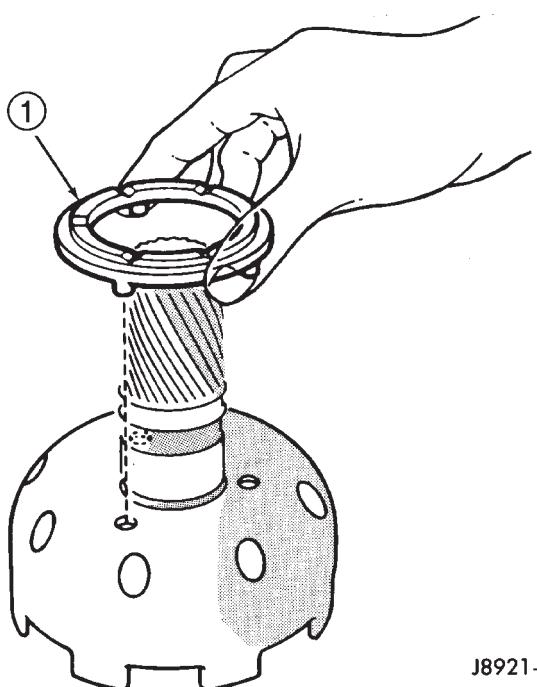
J8921-589

Fig. 273 Removing/Installing Brake Hub And Clutch Assembly

- 1 – HUB AND CLUTCH ASSEMBLY
2 – DRUM

DISASSEMBLY AND ASSEMBLY (Continued)

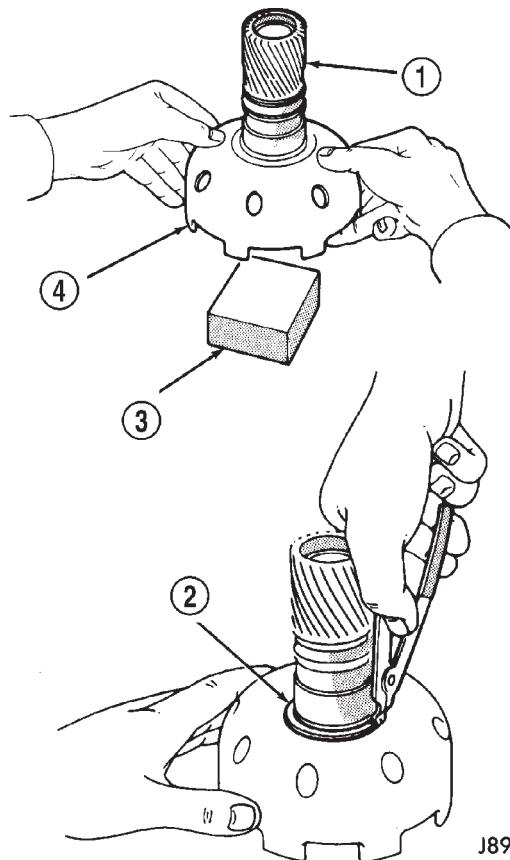
(3) Remove thrust washer from drum (Fig. 274).



J8921-590

Fig. 274 Removing/Installing Thrust Washer

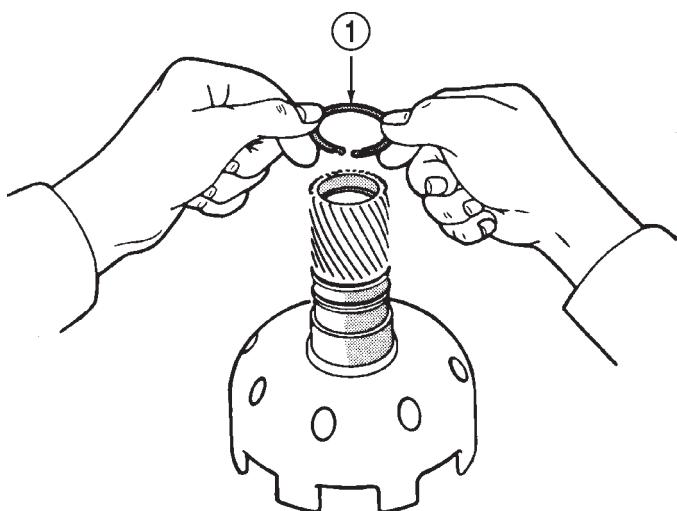
1 – THRUST WASHER



J8921-592

Fig. 276 Removing/Installing Sun Gear

1 – SUN GEAR
2 – SNAP RING
3 – WOOD BLOCK
4 – INPUT DRUM



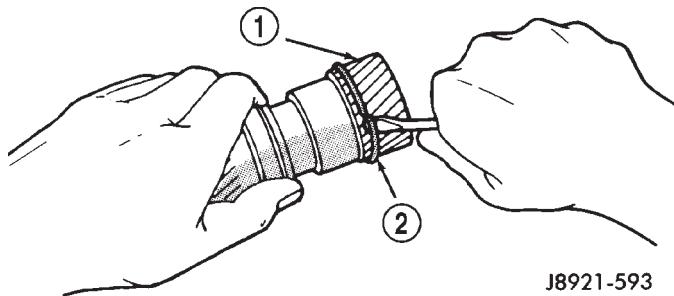
J8921-591

Fig. 275 Removing/Installing Sun Gear Seal Rings

1 – SEALS RINGS (2)

(5) Support sun gear on wood block (Fig. 276). Then remove first sun gear snap ring and separate drum from gear.

(6) Remove remaining snap ring from sun gear (Fig. 277).



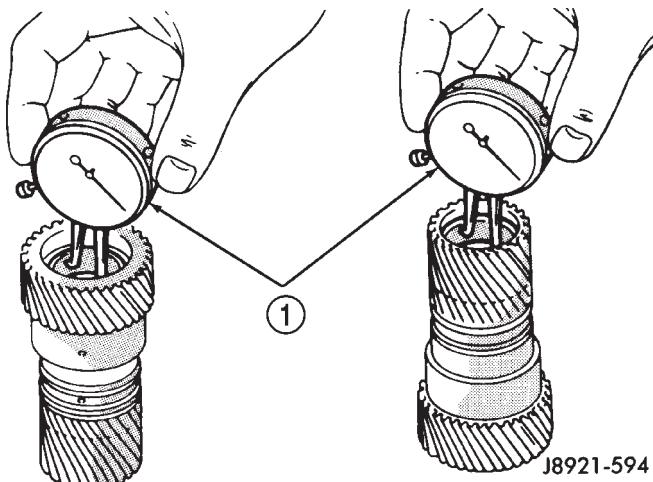
J8921-593

Fig. 277 Removing/Installing Second Snap Ring

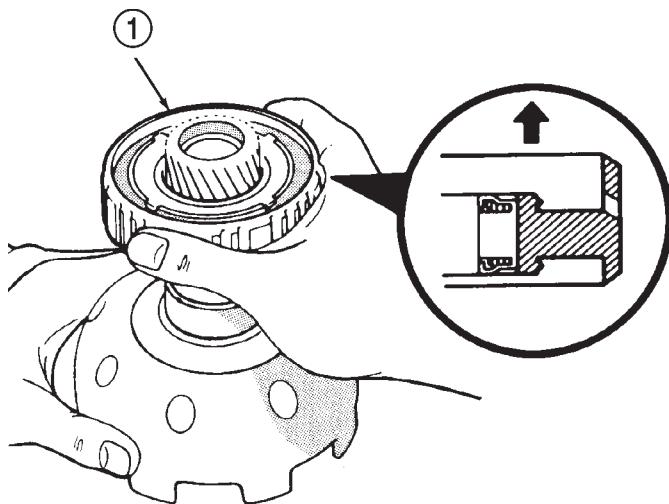
1 – SUN GEAR
2 – SECOND SNAP RING

(7) Measure inside diameter of sun gear bushings with bore gauge or inside micrometer (Fig. 278). Maximum allowable diameter is 27.08 mm (1.0661 in.). Replace sun gear if bushing inside diameter is greater than specified.

DISASSEMBLY AND ASSEMBLY (Continued)

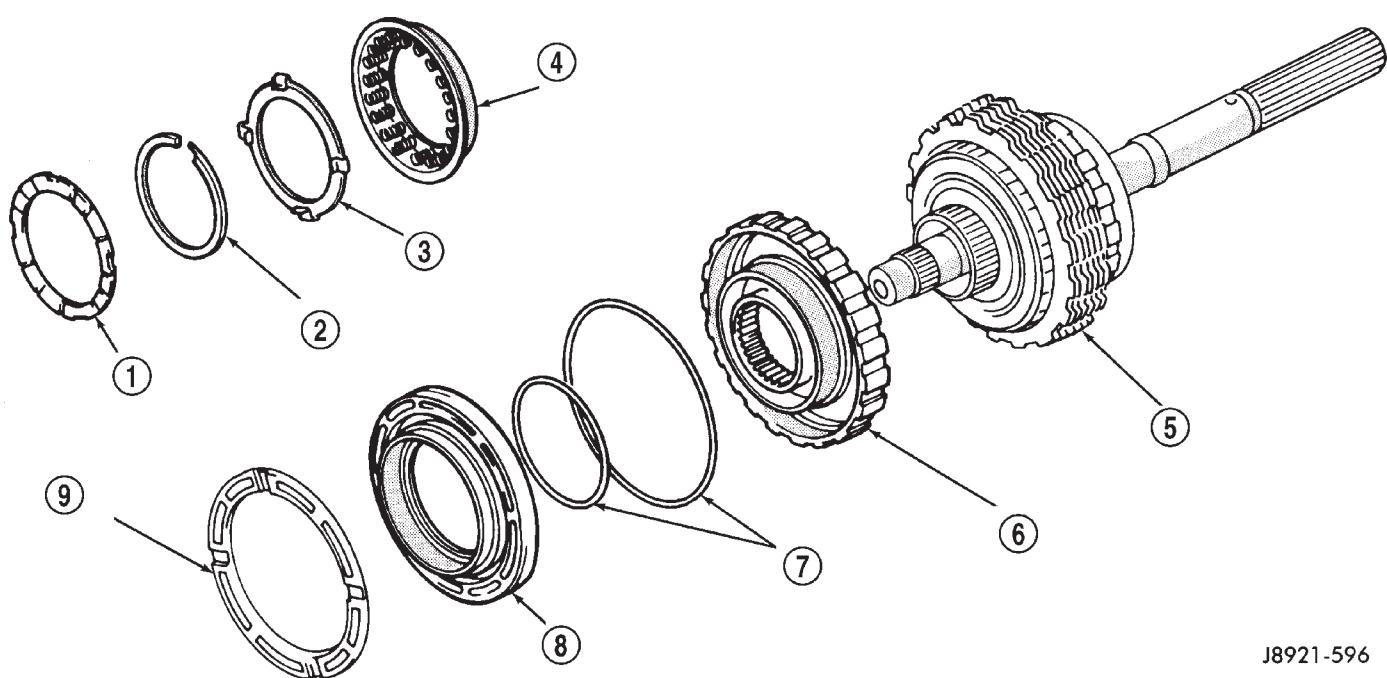
**Fig. 278 Checking Sun Gear Bushings**

1 – BORE GAUGE

**Fig. 279 Installing Clutch And Hub Assembly On Sun Gear**

1 – CLUTCH AND HUB ASSEMBLY

- (1) Install first snap ring on sun gear.
 (2) Install sun gear in drum and install remaining snap ring.
 (3) Coat replacement seal rings with petroleum jelly and install them on sun gear. **Be sure seal ring ends are interlocked.**
 (4) Install thrust washer. Be sure washer tabs are seated in drum slots.

**Second Brake Components**

- 1 – THRUST WASHER
 2 – SNAP RING
 3 – SPRING RETAINER
 4 – PISTON RETURN SPRINGS
 5 – REAR PLANETARY/OUTPUT SHAFT/FIRST-REVERSE BRAKE

- 6 – SECOND BRAKE DRUM
 7 – O-RINGS
 8 – SECOND BRAKE PISTON
 9 – PISTON SLEEVE

J8921-596

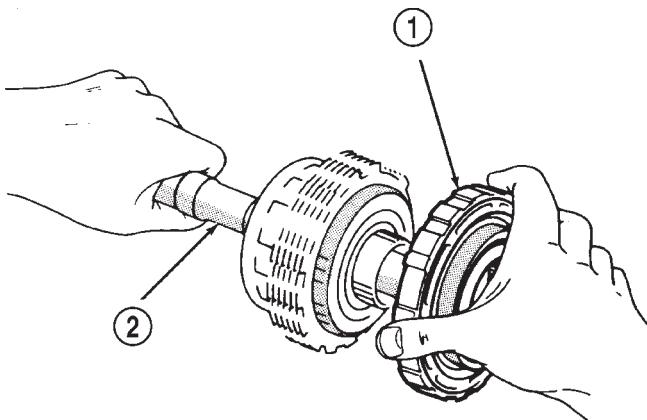
DISASSEMBLY AND ASSEMBLY (Continued)

(6) Check one-way clutch operation again (Fig. 272). Hold sun gear and turn second brake hub clockwise and counterclockwise. Hub should turn clockwise freely, but lock when turned counterclockwise.

SECOND BRAKE

DISASSEMBLY

(1) Remove second brake drum from output shaft (Fig. 280).



J8921-597

Fig. 280 Removing/Installing Second Brake Assembly

- 1 – SECOND BRAKE ASSEMBLY
2 – OUTPUT SHAFT

(2) Remove thrust washer from second brake drum (Fig. 281).

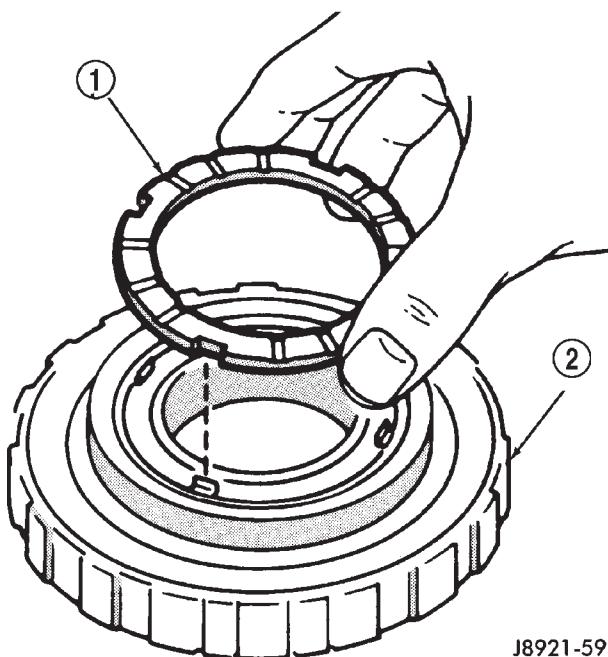
(3) Compress piston return springs with shop press and tool 7538. Then remove piston snap ring (Fig. 282).

(4) Remove compressor tool and remove spring retainer and return springs.

(5) Remove second brake piston and sleeve from drum with compressed air (Fig. 283). Use only enough air pressure to ease piston out of drum.

(6) Remove and discard brake piston O-rings.

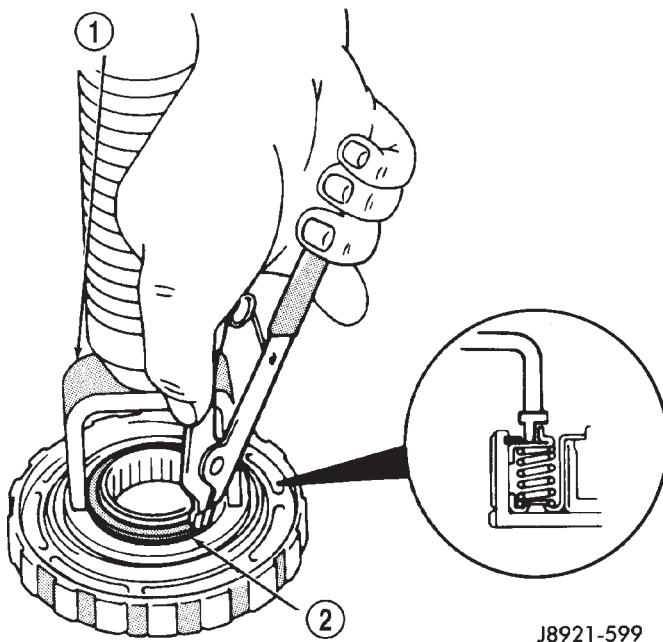
(7) Measure free length of piston return springs with springs mounted in retainer (Fig. 284). Length should be approximately 16.05 mm (0.632 in.). Replace return springs if length is less than specified.



J8921-598

Fig. 281 Removing/Installing Second Brake Drum Thrust Washer

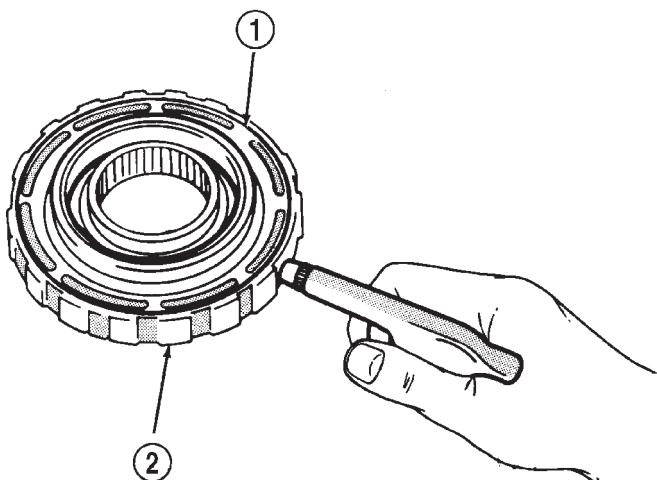
- 1 – THRUST WASHER
2 – SECOND BRAKE DRUM



J8921-599

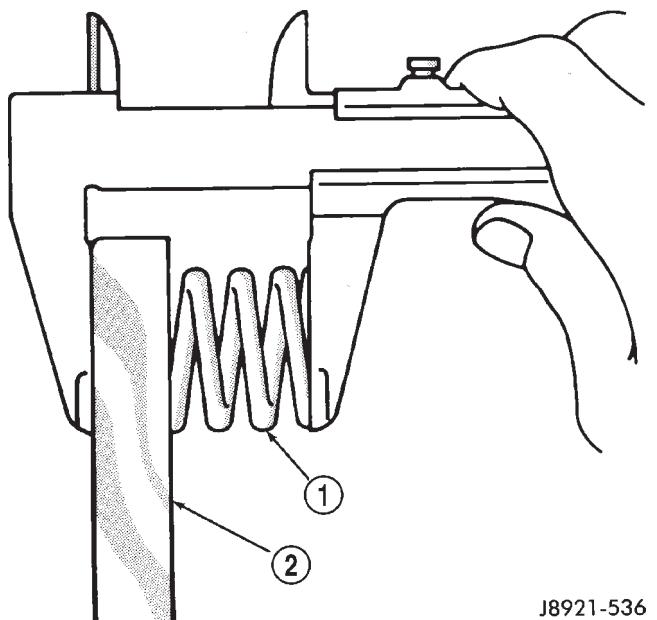
Fig. 282 Removing/Installing Second Brake Piston Snap Ring

- 1 – COMPRESSOR TOOL
2 – PISTON SNAP RING



J8921-600
Fig. 283 Removing/Installing Piston And Sleeve

1 – PISTON AND SLEEVE
2 – DRUM



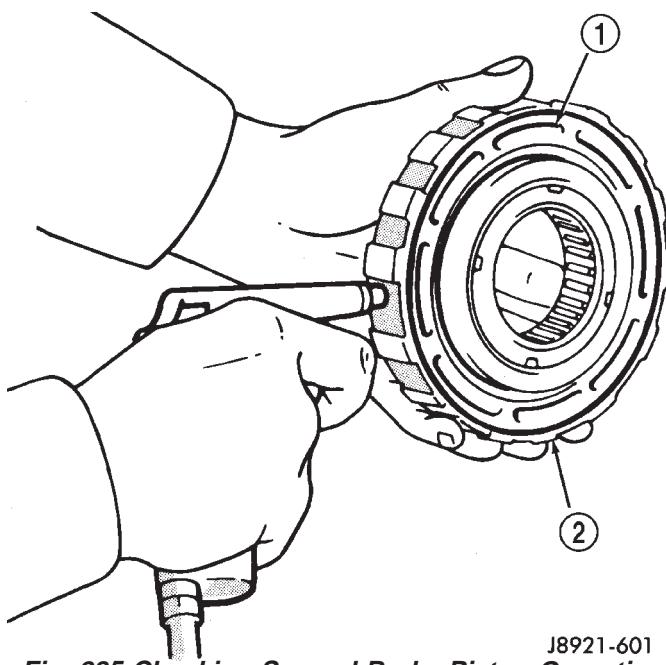
J8921-536
Fig. 284 Measuring Second Brake Piston Return Springs

1 – PISTON RETURN SPRINGS
2 – SPRING RETAINER

ASSEMBLY

- (1) Lubricate and install new O-rings on brake piston. Then install brake piston in drum.
- (2) Install return springs and retainer on brake piston.
- (3) Compress return springs with shop press and Compressor Tool 7538. Install piston snap ring and remove brake assembly from press.

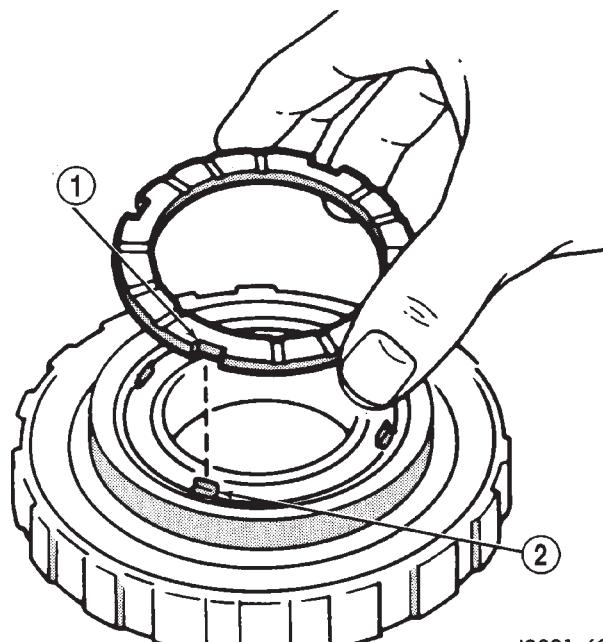
(4) Check brake piston operation with low pressure compressed air (Fig. 285). Apply air pressure through feed hole in drum. Piston should move smoothly when applying-releasing air pressure.



J8921-601
Fig. 285 Checking Second Brake Piston Operation

1 – PISTON
2 – DRUM

(5) Coat thrust washer with petroleum jelly and install it in drum. Be sure washer notches are aligned with tabs on spring retainer (Fig. 286).

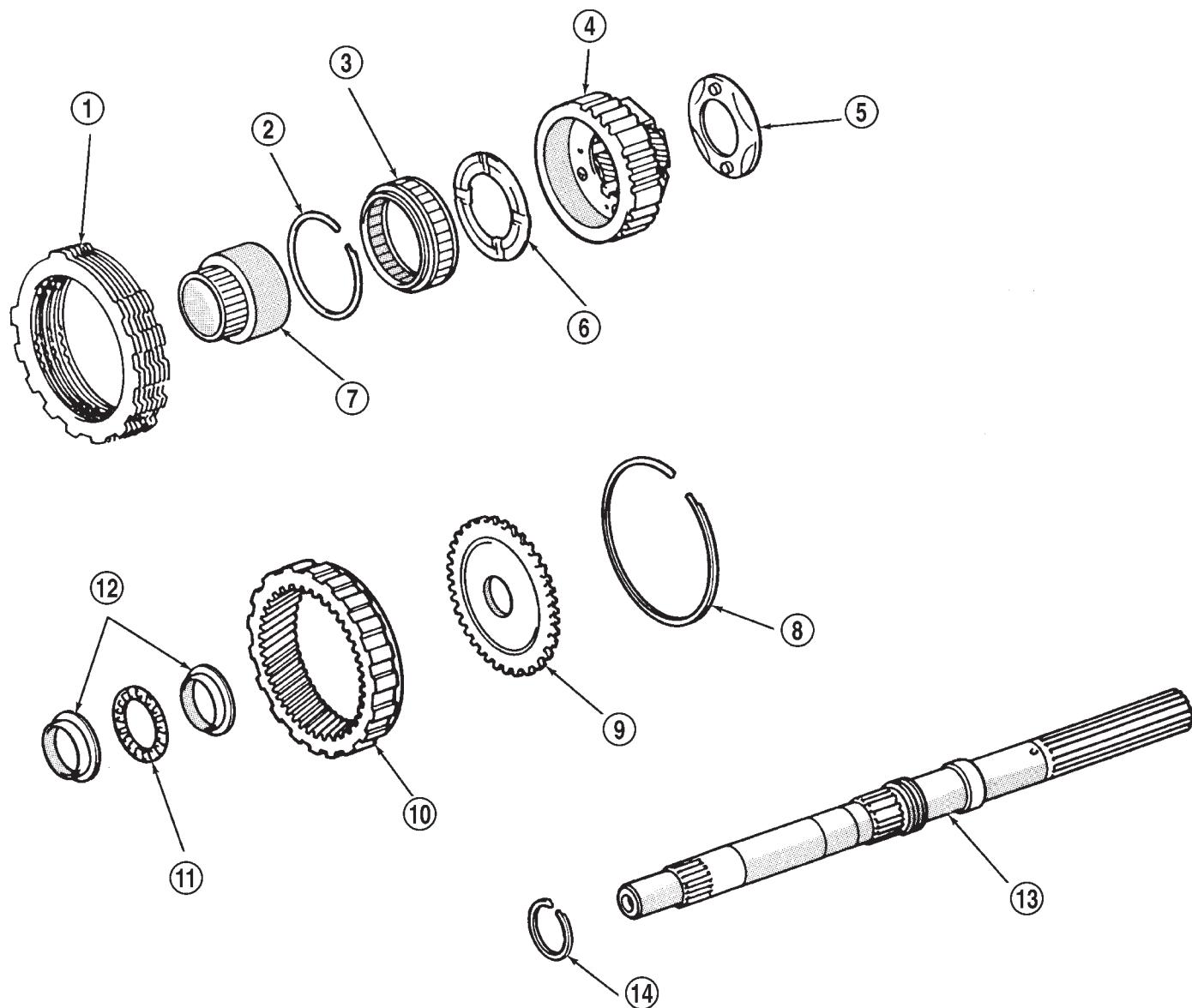


J8921-602
Fig. 286 Installing Second Brake Thrust Washer

1 – THRUST WASHER NOTCHES
2 – SPRING RETAINER TABS

DISASSEMBLY AND ASSEMBLY (Continued)

PLANETARY/BRAKE PACK/OUTPUT SHAFT



J8921-603

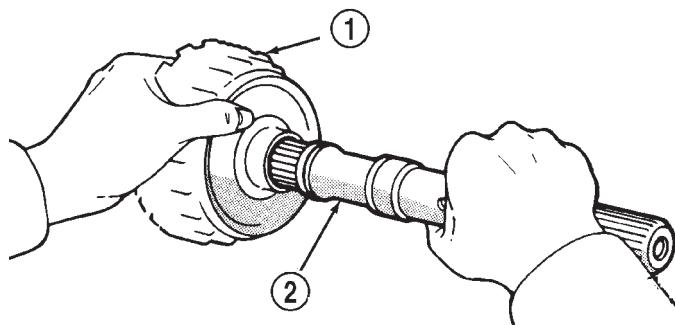
Rear Planetary, Brake Pack, Output Shaft Components

- | | |
|-------------------------------|-------------------------------|
| 1 - FIRST-REVERSE BRAKE PACK | 8 - SNAP RING |
| 2 - SNAP RING | 9 - RING GEAR HUB |
| 3 - NO. 2 ONE-WAY CLUTCH | 10 - REAR PLANETARY RING GEAR |
| 4 - REAR PLANETARY GEAR | 11 - THRUST BEARING |
| 5 - REAR THRUST WASHER | 12 - RACES |
| 6 - FRONT THRUST WASHER | 13 - OUTPUT SHAFT |
| 7 - ONE-WAY CLUTCH INNER RACE | 14 - SEAL RING |

DISASSEMBLY AND ASSEMBLY (Continued)

DISASSEMBLY

- (1) Remove output shaft from gear assembly (Fig. 287).

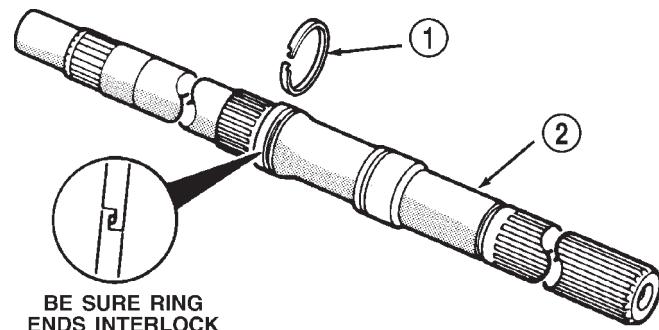


J8921-604

Fig. 287 Removing/Installing Output Shaft

- 1 – GEAR ASSEMBLY
2 – OUTPUT SHAFT

- (2) Remove and discard shaft seal ring (Fig. 288).



J8921-605

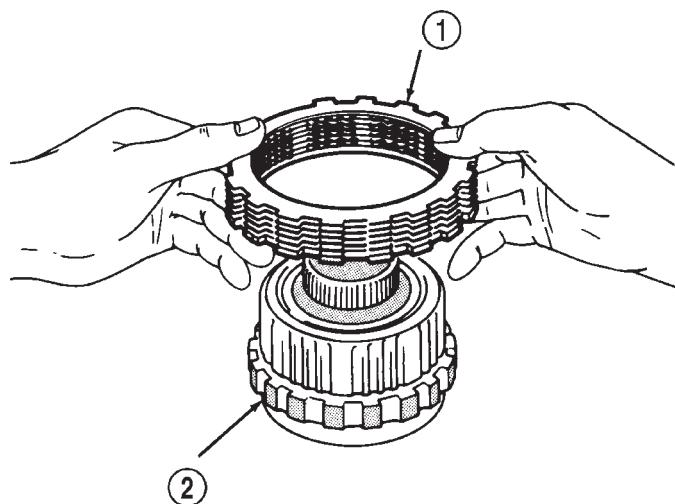
Fig. 288 Removing/Installing Shaft Seal Ring

- 1 – SEAL RING
2 – OUTPUT SHAFT

- (3) Remove brake pack from planetary gear (Fig. 289).

- (4) Remove planetary gear from ring gear (Fig. 290).

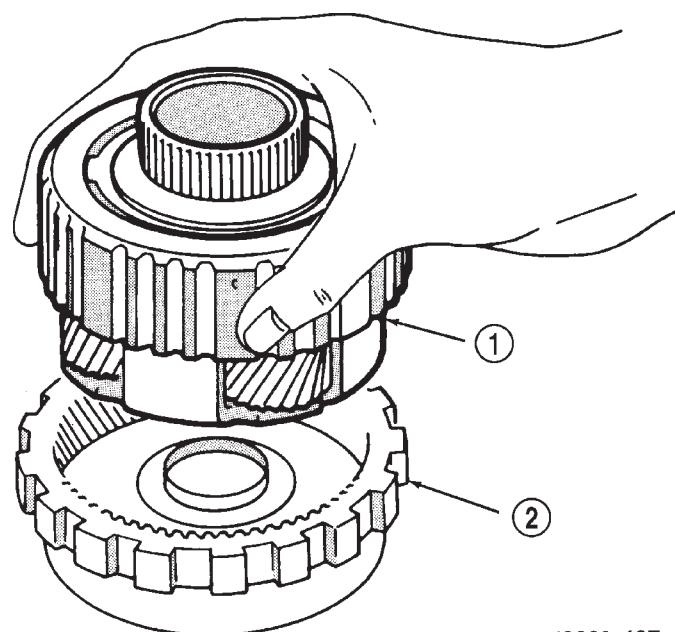
- (5) Check No. 2 one-way clutch (Fig. 291). Hold planetary gear and turn clutch inner race in both directions. Race should turn freely counterclockwise, but lock when turned clockwise. Replace one-way clutch if necessary.



J8921-606

Fig. 289 Removing/Installing First-Reverse Brake Pack

- 1 – FIRST-REVERSE BRAKE PACK
2 – REAR PLANETARY GEAR

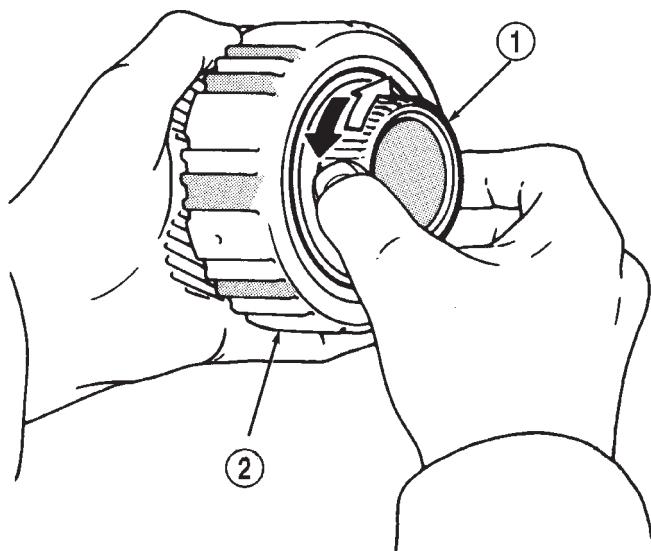


J8921-607

Fig. 290 Removing/Installing Rear Planetary

- 1 – REAR PLANETARY GEAR
2 – RING GEAR

DISASSEMBLY AND ASSEMBLY (Continued)

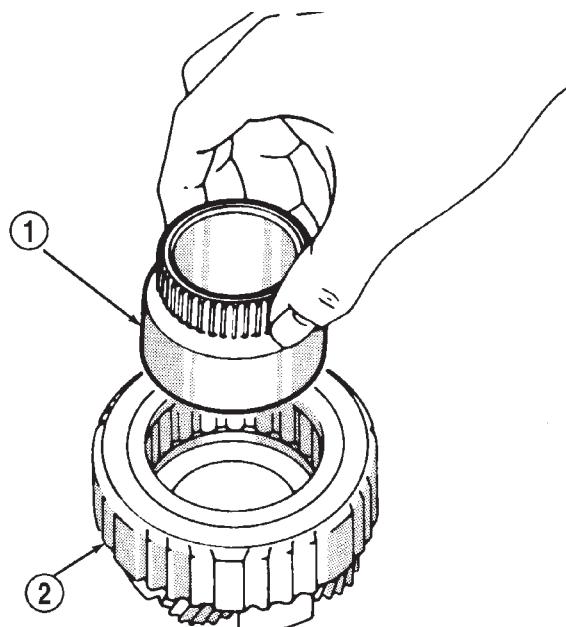


J8921-608

Fig. 291 Checking No. 2 One-Way Clutch Operation

- 1 – CLUTCH INNER RACE
2 – PLANETARY GEAR

(6) Remove clutch inner race from planetary gear (Fig. 292).

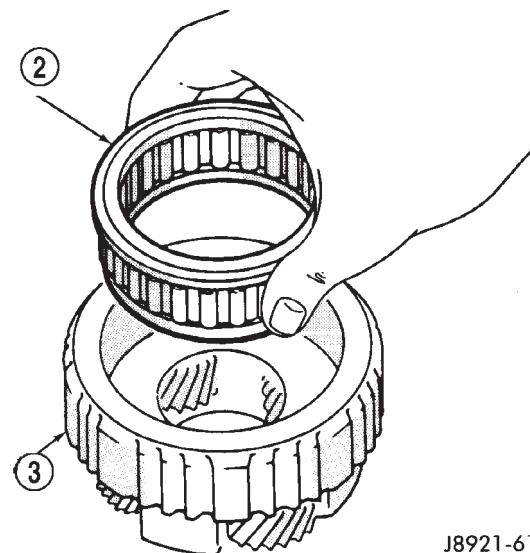
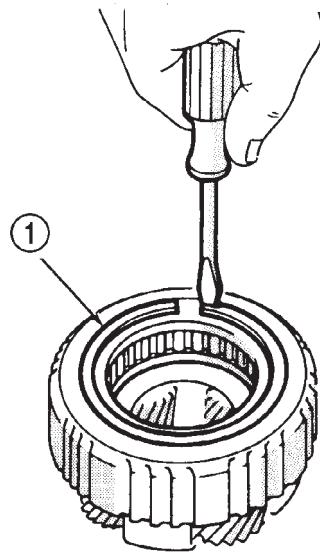


J8921-609

Fig. 292 Removing/Installing Clutch Inner Race

- 1 – CLUTCH INNER RACE
2 – REAR PLANETARY

- (7) Remove clutch snap ring and remove No. 2 one-way clutch top end cap from planetary.
 (8) Remove No. 2 one-way clutch from planetary (Fig. 293).
 (9) Remove No. 2 one-way clutch bottom end cap from planetary.



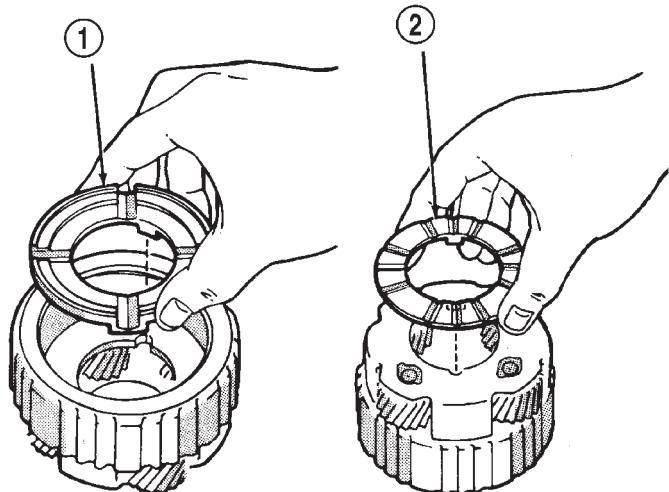
J8921-610

Fig. 293 Removing/Installing One-Way Clutch

- 1 – CLUTCH SNAP RING
2 – NO. 2 ONE-WAY CLUTCH
3 – PLANETARY GEAR

DISASSEMBLY AND ASSEMBLY (Continued)

(10) Remove front and rear thrust washers from planetary gear (Fig. 294).



(12) Remove ring gear snap ring and remove ring gear hub (Fig. 296).

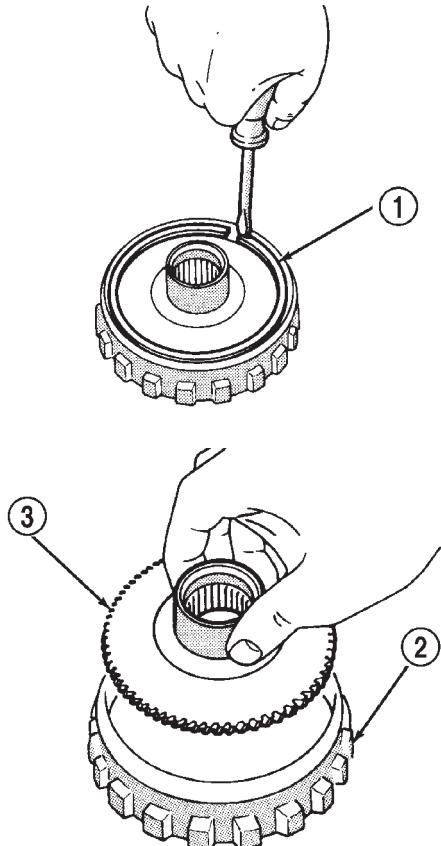


Fig. 294 Removing/Installing Rear Planetary Thrust Washers

- 1 – FRONT THRUST WASHER
2 – REAR THRUST WASHER

(11) Remove thrust bearing and washers from ring gear (Fig. 295).

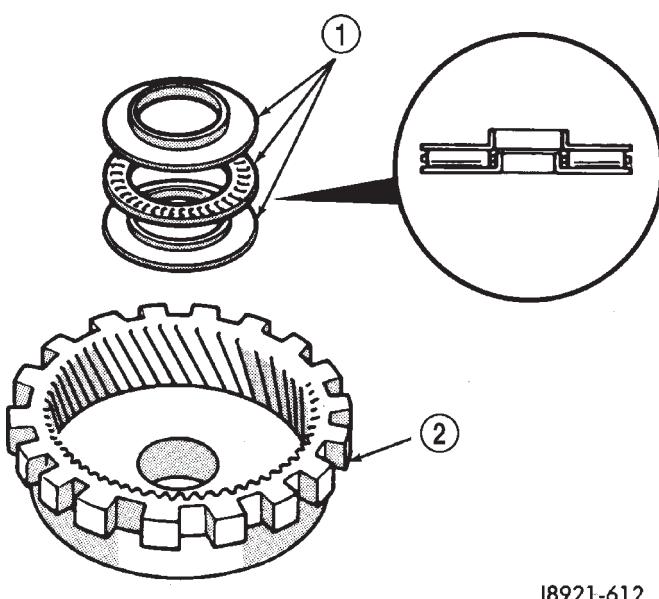


Fig. 295 Removing/Installing Ring Gear Thrust Bearing And Races

- 1 – THRUST BEARING AND RACES
2 – RING GEAR

Fig. 296 Removing/Installing Ring Gear Hub

- 1 – SNAP RING
2 – RING GEAR
3 – HUB

(13) Inspect and replace any worn or damaged planetary gear components.

ASSEMBLY

(1) Measure thickness of each brake pack disc. Minimum thickness is 1.51 mm (0.0594 in.). Replace all discs if any disc is thinner than specified.

(2) Install hub and snap ring in ring gear (Fig. 296).

(3) Identify ring gear thrust bearing and races by following dimensions (Fig. 295) :

- Outer diameter of bottom race is 44.8 mm (1.764 in.) and inner diameter is 27.6 mm (1.087 in.).

- Outer diameter of bearing is 44.7 mm (1.760 in.) and inner diameter is 30.1 mm (1.185 in.).

- Outer diameter of upper race is 44.8 mm (1.764 in.) and inner diameter is 28.8 mm (1.134 in.).

(4) Lubricate ring gear thrust bearing and races with petroleum jelly and install them in ring gear (Fig. 295).

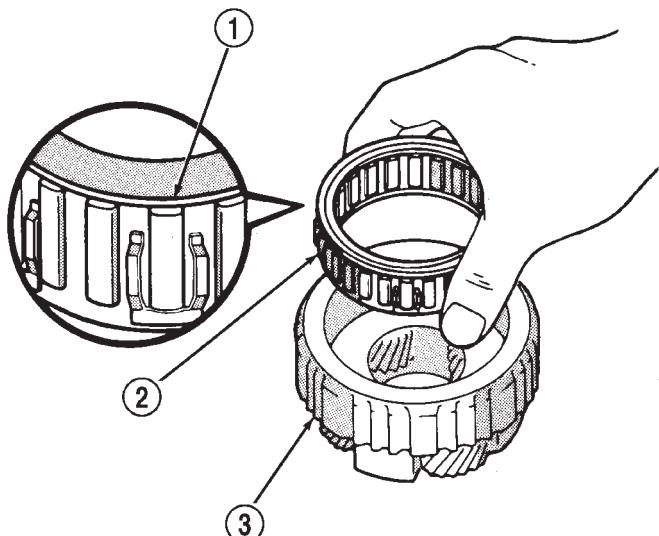
DISASSEMBLY AND ASSEMBLY (Continued)

(5) Coat planetary thrust washers with petroleum jelly and install them in gear (Fig. 294).

(6) Install No. 2 one-way clutch bottom end cap into the planetary gear.

(7) Install No. 2 one-way clutch in planetary gear. Be sure flanged side of clutch faces upward (Fig. 297).

(8) Install No. 2 one-way clutch top end cap into the planetary gear.



J8921-614

Fig. 297 Installing No. 2 One-Way Clutch

- 1 - FLANGED SIDE OF CLUTCH
- 2 - NO. 2 ONE-WAY CLUTCH
- 3 - REAR PLANETARY

(9) Install clutch retaining snap ring and install clutch inner race (Fig. 292). Turn race counterclockwise to ease installation.

(10) Verify one-way clutch operation. Hold gear and turn inner race in both directions. Race should turn freely counterclockwise, but lock when turned clockwise.

(11) Install planetary gear in ring gear.

(12) Install thrust bearing and washers onto the ring gear (Fig. 295).

(13) Assemble clutch discs and clutch plates (Fig. 289). Sequence is disc first, then a plate. Use seven discs and plates.

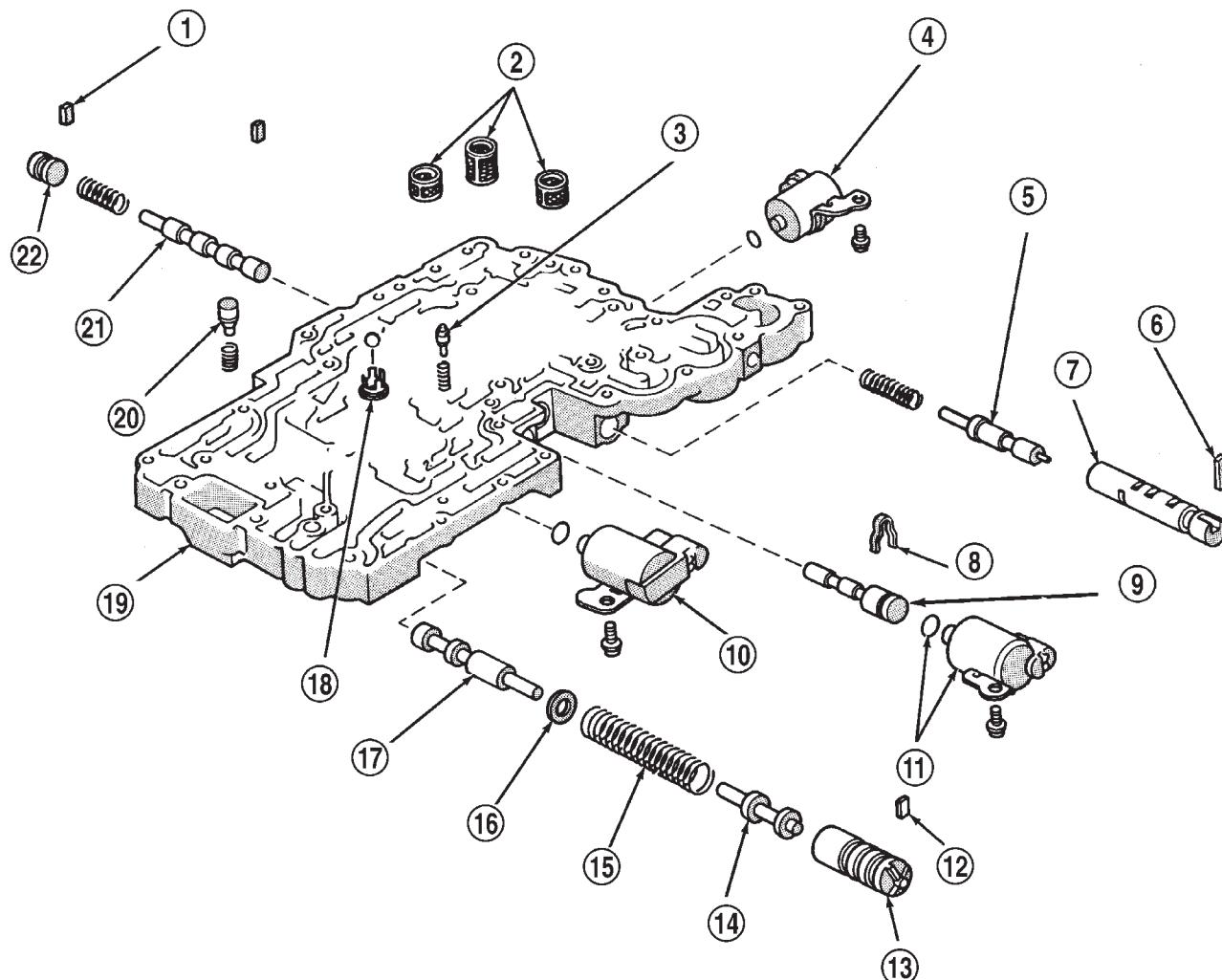
(14) Install brake pack on planetary gear (Fig. 289).

(15) Install new seal ring on output shaft (Fig. 288). Be sure ring ends are interlocked as shown.

TRANSMISSION VALVE BODY

The valve body assembly consists of two sections which are the upper body and lower body (Fig. 298) and (Fig. 299). Disassembly, inspection and overhaul procedures for each section are outlined separately. Refer to the appropriate procedure as needed.

DISASSEMBLY AND ASSEMBLY (Continued)



J9121-384

Fig. 298 Lower Body Components

- | | |
|--------------------------------|------------------------------|
| 1 - RETAINER | 12 - RETAINER |
| 2 - STRAINERS | 13 - SLEEVE |
| 3 - PRESSURE RELIEF VALVE | 14 - PLUNGER |
| 4 - NO. 2 SOLENOID AND O-RING | 15 - VALVE SPRING |
| 5 - ACCUMULATOR CONTROL VALVE | 16 - WASHER |
| 6 - RETAINER | 17 - PRIMARY REGULATOR VALVE |
| 7 - SLEEVE | 18 - CHECK VALVE AND BALL |
| 8 - CLIP | 19 - LOWER BODY |
| 9 - PRESSURE REDUCING PLUG | 20 - CHECK VALVE |
| 10 - NO. 3 SOLENOID AND O-RING | 21 - 1-2 SHIFT VALVE |
| 11 - NO. 1 SOLENOID AND O-RING | 22 - PLUG |

DISASSEMBLY AND ASSEMBLY (Continued)

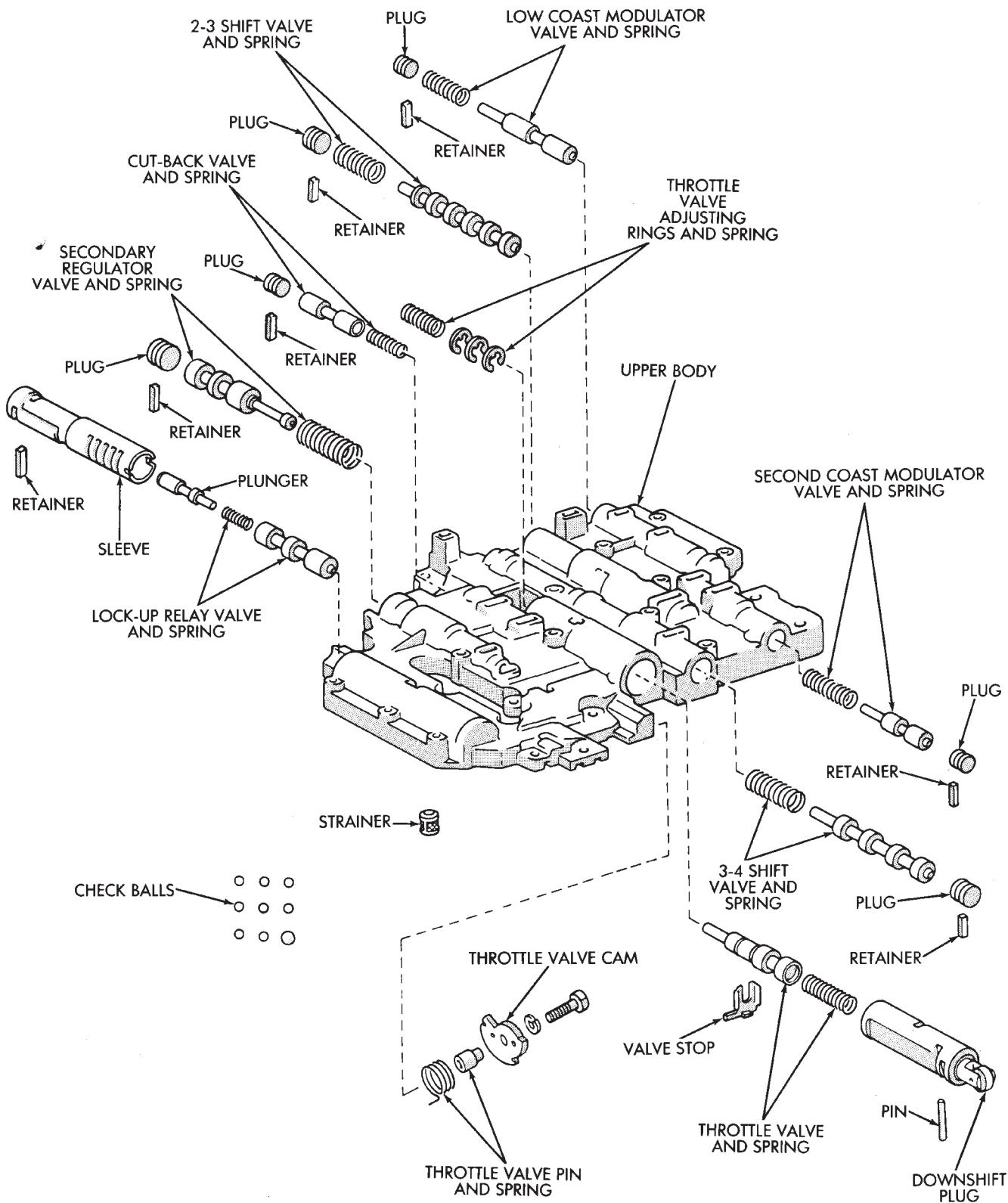


Fig. 299 Upper Body Components

J8921-625

CLEANING AND INSPECTION

TRANSMISSION PARTS CLEANING AND INSPECTION

Clean the transmission components with solvent and dry them with compressed air only. Do not use shop towels or rags.

Blow compressed air through all oil feed passages and channels to be sure they are clear. Inspect the transmission components for wear and damage. Replace components that are damaged or worn beyond the limits specified in the individual overhaul procedures.

Replace all O-rings, gaskets and seals. These components are not reusable. Also replace any snap ring that is distorted or damaged.

During overhaul assembly operations, lubricate the transmission components with Mopar Mercon™ automatic transmission fluid or petroleum jelly as indicated. Petroleum jelly should be used to prelubricate thrust bearings, washers and races. It can also be used to hold parts in position during assembly.

Soak replacement clutch and brake pack components in transmission fluid for at least 30 minutes before installation.

ADJUSTMENTS

GEARSHIFT CABLE

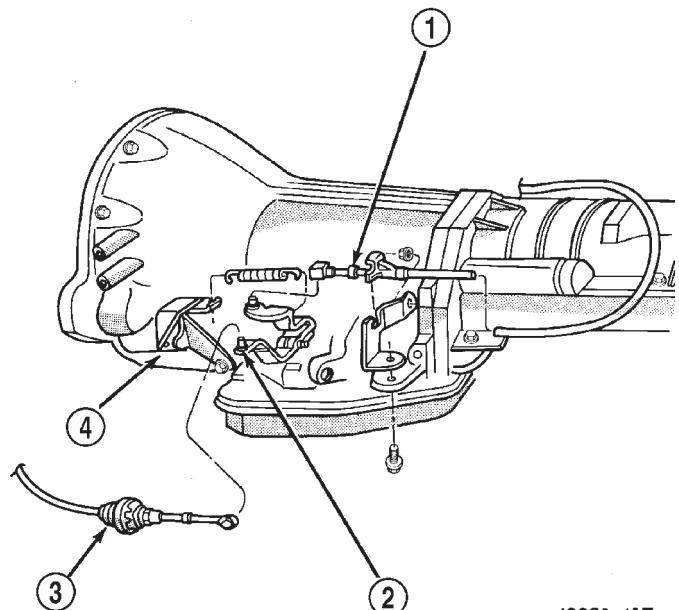
Check adjustment by starting the engine in Park and Neutral. Adjustment is OK if the engine starts only in these positions. Adjustment is incorrect if the engine starts in one but not both positions. If the engine starts in any position other than Park or Neutral, or if the engine will not start at all, the park/neutral position switch may be faulty.

Gearshift Adjustment Procedure

- (1) Shift transmission into Park.
- (2) Raise vehicle.
- (3) Release cable adjuster clamp (at transmission end of cable) to unlock cable.
- (4) Unsnap cable from cable mounting bracket on transmission (Fig. 300).
- (5) Slide cable eyelet off transmission shift lever.
- (6) Verify transmission shift lever is in Park detent by moving lever fully rearward. Last rearward detent is Park position.
- (7) Verify positive engagement of transmission park lock by attempting to rotate propeller shaft. Shaft will not rotate when park lock is engaged.
- (8) Slide cable eyelet onto transmission shift lever.
- (9) Snap shift cable adjuster into mounting bracket on transmission.

(10) Lock shift cable by pressing cable adjuster clamp down until it snaps into place.

(11) Lower vehicle and check engine starting. Engine should start only in Park and Neutral.



J9321-417

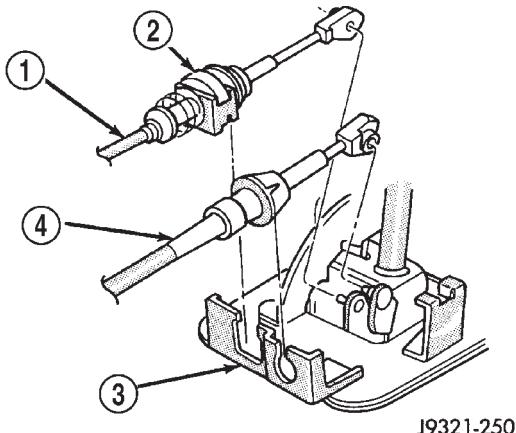
Fig. 300 Shift Cable Attachment At Transmission-Typical

-
- 1 – THROTTLE VALVE CABLE
 - 2 – TRANSMISSION SHIFT LEVER
 - 3 – SHIFT CABLE
 - 4 – SHIFT CABLE BRACKET
-

BRAKE TRANSMISSION SHIFT INTERLOCK CABLE ADJUSTMENT

- (1) Shift transmission into PARK.
- (2) Remove shift lever bezel and console screws. Raise bezel and console for access to cable.
- (3) Pull cable lock button up to release cable (Fig. 301).
- (4) Turn ignition switch to LOCK position.
- (5) Use a spacer to create a one millimeter gap between the shifter pawl and top of the shift gate.
- (6) Pull cable forward. Then release cable and press cable lock button down until it snaps in place.
- (7) Check adjustment as follows:
 - (a) Check movement of release shift handle button (floor shift) or release lever (column shift). You should not be able to press button inward or move column lever.
 - (b) Turn ignition switch to RUN position.
 - (c) Shifting out of park should not be possible.
 - (d) Apply the brake and attempt to shift out of PARK. Shifting should be possible.
 - (e) While the transmission is shifted out of PARK, release the brake and attempt to shift

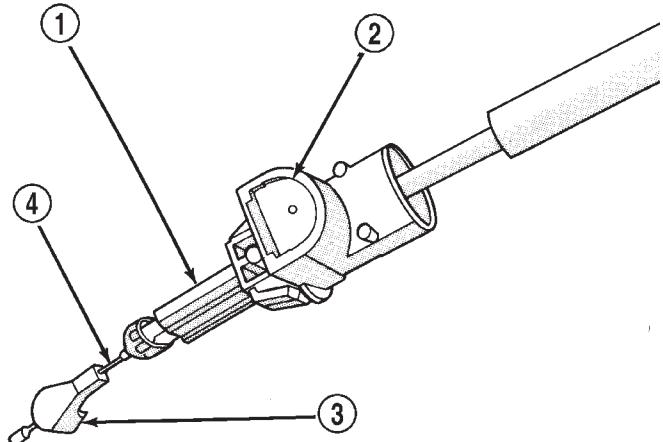
ADJUSTMENTS (Continued)



J9321-250

Fig. 301 Park Lock Cable Attachment

- 1 – PARK LOCK CABLE
- 2 – CABLE LOCK BUTTON
- 3 – SHIFT LEVER ASSEMBLY
- 4 – SHIFT CABLE



J9121-417

Fig. 302 Throttle Cable Components

- 1 – CONDUIT
- 2 – RELEASE BUTTON
- 3 – CABLE CONNECTOR
- 4 – CABLE

through all gears. Release the shift button at least once during this procedure. The ignition key should not go to the LOCK position.

(f) Return transmission to the PARK position without applying the brake.

(8) Move shift lever back to PARK and check ignition switch operation. You should be able to turn switch to LOCK position and shift lever release button/lever should not move.

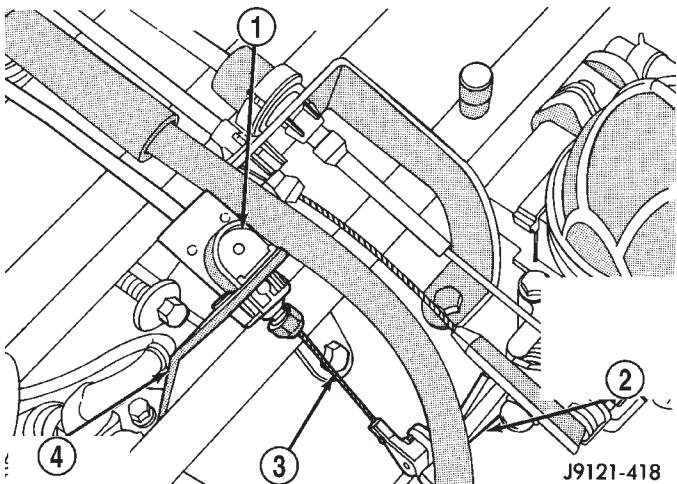
TRANSMISSION THROTTLE VALVE CABLE ADJUSTMENT

(1) Shift transmission into Park, shut engine off and raise hood.

(2) Press cable release button (Fig. 302).

(3) Push cable conduit back into cable sheath as far as possible (Fig. 303).

(4) Rotate lever on throttle body to wide open throttle position. Cable will ratchet to correct adjustment point as lever is rotated (Fig. 303).



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Fig. 303 Throttle Cable Adjustment

- 1 – RELEASE BUTTON
- 2 – ROTATE THROTTLE BODY LEVER TO W. O. T. POSITION
- 3 – CABLE
- 4 – CABLE BRACKET

SPECIFICATIONS**AW-4 AUTOMATIC TRANSMISSION****AW-4 GENERAL SPECIFICATIONS****Gear Ratios:**

First	2.804:1
Second	1.531:1
Third	1.000:1
Fourth (Overdrive)	0.753:1
Reverse	2.393:1

Transmission Fluid . . . Jeep automatic transmission fluid or DEXRON® II

Fluid Level . . To "Full" mark with fluid hot (normal operating temperature)

Fluid Capacity (all models) . . . 8.0 Liters (8.45 qts.)

Test Specifications**Stall Speed:**

In D Range and Reverse 2100-2400 rpm

Line Pressure

In D at Curb Idle 61-70 psi (421-481 kPa)

In D at WOT 173-209 psi (1196-1442 kPa)

In Reverse at Curb Idle 75-90 psi (519-618 kPa)

In Reverse at WOT 213-263 psi (1471-1814 kPa)

Time Lag Test:

Engagement in D Range 1.2 seconds

Engagement in Reverse 1.5 seconds

Valve Body Solenoid Resistance 11-15 ohms

Transmission Fluid Normal Operating

Temperature 50-80°C (122-176°F)

TPS Input Voltage (AU) 5.0 Volts (approx.)

TPS Output Voltage

4-Cylinder 0.2 Volts (approx.)

6-Cylinder 4.2 Volts (approx.)

AW-4 OIL PUMP WEAR LIMITS**Drive Gear**

Tip Clearance:

Standard 0.11-0.14 mm (0.0043 —0.0055 in.)

Maximum Allowance 0.3 mm (0.012 in.)

Gear-to-Pump Body**End Clearance:**

Standard 0.02-0.05 mm (0.0008—0.0020 in.)

Maximum Allowance 0.1 mm (0.004 in.)

Driven Gear-to-Pump**Body Clearance:**

Standard 0.07-0.15 mm (0.0028—0.0059 in.)

Maximum Allowance 0.3 mm (0.012 in.)

AW-4 CLUTCH DISC AND PLATE THICKNESS

Component	Minimum Allowable Thickness
Clutch Disc (all except first-reverse and forward clutch discs)	1.84 mm (0.0724 in.)
6-Cylinder Forward Clutch Disc	1.51 mm (0.0594 in.)
6-Cylinder Direct Clutch Plates:	
Thin Plate (1)	2.3 mm (0.905 in.)
Thick Plates (3)	3.0 mm (0.118 in.)
6-Cylinder Forward Clutch Plate	1.8 mm (0.070 in.)
First-Reverse Brake Disc (All)	1.51 mm (0.0594 in.)

SPECIFICATIONS (Continued)

AW-4 BUSHING AND PISTON CLEARANCE

BUSHING INSIDE DIAMETER (MAXIMUM)

Bushing Location	Maximum Allowance Inside Diameter
Extension Housing	38.09 mm (1.4996 in.)
Direct Clutch Drum	53.97 mm (2.1248 in.)
Overdrive Planetary Gear	11.27 mm (.4437 in.)
Overdrive Direct Clutch Drum	27.11 mm (1.0673 in.)
Stator Shaft (Front)	21.58 mm (.8496 in.)
Stator Shaft (Rear)	27.08 mm (1.0661 in.)
Oil Pump Body	38.19 mm (1.5035 in.)
Transmission Case	38.18 mm (1.5031 in.)

PISTON STROKE LENGTH

Piston Location	Specification
Direct Clutch (all)	1.37–1.67 mm (.0539–.0657 in.)
6-Cylinder Overdrive Brake	1.40–1.70 mm (.0551–.0669 in.)
Second Coast Brake (all)	1.5–3.0 mm (.059–.118 in.)
6-Cylinder Forward Clutch	3.55–3.73 (.1397–.1468 in.)
Overdrive Direct Clutch (all)	1.85–2.15 mm (.0728–.0846 in.)

END PLAY AND CLEARANCE

Component	Specification
Output Shaft End Play	.27–.86 mm (.0106–.0339 in.)
6-Cylinder First-Reverse Brake Pack Clearance	.70–1.20 mm (.028–.047 in.)
6-Cylinder Second Brake Pack Clearance	.62–1.98 mm (.024–.078 in.)

SPECIFICATIONS (Continued)

AW-4 RETAINER AND PISTON SPECIFICATIONS

OVERDRIVE BRAKE RETAINER SELECTION

Retainer No.	Thickness	Retainer No.	Thickness
26	3.3 mm (.130 in.)	11	3.8 mm (.150 in.)
25	3.5 mm (.138 in.)	23	3.9 mm (.154 in.)
12	3.6 mm (.142 in.)	Not Marked	4.0 mm (.157 in.)
24	3.7 mm (.146 in.)	—	—

DIRECT CLUTCH RETAINER SELECTION

Retainer No.	Thickness	Retainer No.	Thickness
33	3.0 mm (.118 in.)	29	3.4 mm (.134 in.)
32	3.1 mm (.122 in.)	28	3.5 mm (.138 in.)
31	3.2 mm (.126 in.)	27	3.6 mm (.142 in.)
30	3.3 mm (.130 in.)	34	3.7 mm (.146 in.)

OVERDRIVE CLUTCH RETAINER SELECTION

Retainer No.	Thickness	Retainer No.	Thickness
16	3.6 mm (.142 in.)	19	3.3 mm (.130 in.)
17	3.5 mm (.138 in.)	20	3.2 mm (.126 in.)
18	3.4 mm (.134 in.)	21	3.1 mm (.122 in.)

SECOND COAST BRAKE PISTON ROD SELECTION

Rod	Rod Length
No. 1	71.4 mm (2.811 in.)
No. 2	72.9 mm (2.870 in.)

FORWARD CLUTCH RETAINER SELECTION

Retainer No.	Thickness	Retainer No.	Thickness
42	4.0 mm (.157 in.)	61	3.0 mm (.118 in.)
44	3.8 mm (.149 in.)	62	3.6 mm (.142 in.)
45	3.4 mm (.134 in.)	63	4.2 mm (.165 in.)
60	3.2 mm (.126 in.)	64	4.4 mm (.173 in.)

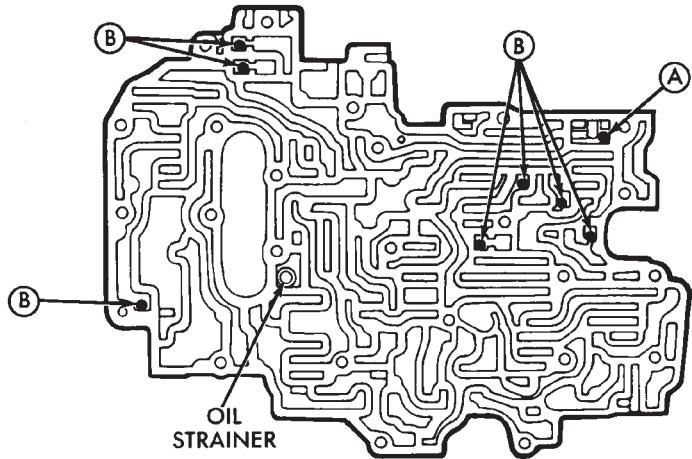
FIRST-REVERSE BRAKE CLEARANCE SELECTION

Retainer No.	Thickness	Retainer No.	Thickness
50	5.0 mm (.197 in.)	53	4.4 mm (.173 in.)
51	4.8 mm (.189 in.)	54	4.2 mm (.165 in.)
52	4.6 mm (.181 in.)	55	4.0 mm (.157 in.)

SPECIFICATIONS (Continued)

AW-4 VALVE BODY BALL DIMENSIONS

Check Ball	Diameter
(A) Rubber Ball	6.35 mm (0.250 in.)
(B) Rubber Ball	5.535 mm (.218 in.)



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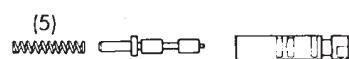
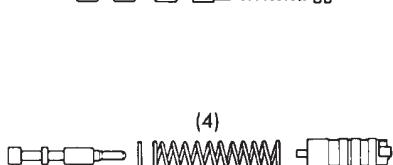
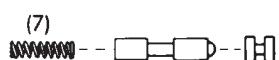
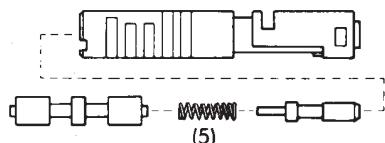
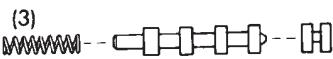
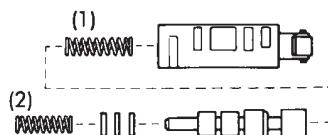
AW-4 CLUTCH AND BRAKE PACK REQUIREMENTS

Component	Discs Required	Plates Required	Retainers Required
6-Cylinder Overdrive Brake	4	3	2
6-Cylinder Second Brake	5	5	1
6-Cylinder Overdrive Direct Clutch	2	2	1
6-Cylinder Direct Clutch	4	4	1
6-Cylinder Forward Clutch	6	6	1
6-Cylinder First-Reverse Brake	7	7	1

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SPECIFICATIONS (Continued)

AW-4 VALVE AND SPRING IDENTIFICATION



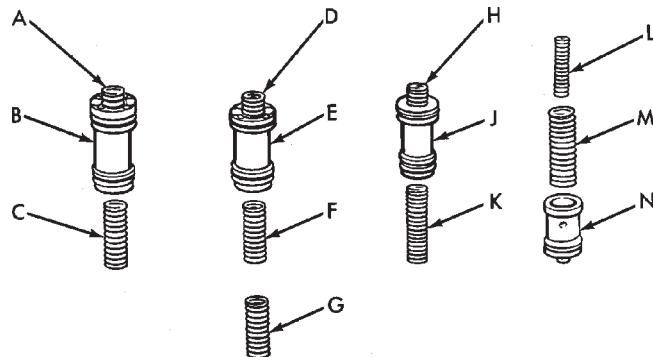
Spring	Free Length
(1) Downshift Plug	27.3 mm (1.074 in.)
(2) Throttle Valve	20.6 mm (.811 in.)
(3) 3-4 Shift Valve	30.8 mm (1.212 in.)
(4) Second Coast Modulator Valve	25.3 mm (.996 in.)
(5) Lockup Relay Valve	21.4 mm (.843 in.)
(6) Secondary Regulator Valve	30.9 mm (1.217 in.)
(7) Cut-Back Valve	21.8 mm (.858 in.)
(8) 2-3 Shift Valve	30.8 mm (1.212 in.)
(9) Low Coast Modulator Valve	27.8 mm (1.094 in.)

Spring	Spring Length
(1) Check Valve	20.2 mm (.797 in.)
(2) Pressure Relief Valve	11.2 mm (.441 in.)
(3) 1-2 Shift Valve	30.8 mm (1.213 in.)
(4) Primary Regulator Valve	62.3 mm (2.453 in.)
(5) Accumulator Control Valve	29.8 mm (1.173 in.)

SPECIFICATIONS (Continued)

AW-4 ACCUMULATOR COMPONENT IDENTIFICATION

	Component	Approximate Outside Diameter
SECOND BRAKE ACCUMULATOR	SPRING A PISTON B SPRING C	14.17 mm (.558 in.) 36.9 mm (1.453 in.) 19.91 mm (.784 in.)
DIRECT CLUTCH ACCUMULATOR	SPRING D PISTON E SPRING F SPRING G	12.07 mm (.475 in.) 36.9 mm (1.453 in.) 20.19 mm (.795 in.) 14.81 mm (.583 in.)
OVERDRIVE BRAKE ACCUMULATOR	SPRING H PISTON J SPRING K	14.10 mm (.555 in.) 31.9 mm (1.256 in.) 19.99 mm (.785 in.)
OVERDRIVE CLUTCH ACCUMULATOR	SPRING L SPRING M PISTON N	14.0 mm (0.551 in.) 20.3 mm (0.799 in.) 29.9 mm (1.177 in.)



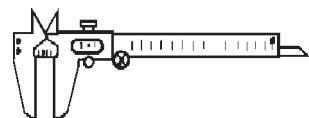
J9121-407

AW-4 TORQUE SPECIFICATIONS

Description	Torque	Description	Torque
Converter Housing Bolts		Oil Pan Bolts	6–8 N·m (53–70 in. lbs.)
10 mm	32–36 N·m (23–27 ft. lbs.)	Oil Pan Drain Plug	19–21 N·m (14–16 ft. lbs.)
12 mm	55–59 N·m (40–43 ft. lbs.)	Oil Pump Bolt (to case)	21–23 N·m (16–18 ft. lbs.)
Cooler Line Retaining Clip Nuts	2–4 N·m (18–35 in. lbs.)	Oil Pump Bolt (to stator shaft)	9–11 N·m (80–96 in. lbs.)
Cooler Line Bracket Nuts	5–11 N·m (48–96 in. lbs.)	Oil Screen Bolt	9–11 N·m (80–96 in. lbs.)
Cooler Line Fitting Nuts (at auto. trans. fittings)	18–23 N·m (160–200 in. lbs.)	Park Pawl Bracket	9–11 N·m (80–96 in. lbs.)
Detent Spring Bolt	9–11 N·m (80–96 in. lbs.)	Propeller Shaft Clamp Screws	16–23 N·m (140–200 in. lbs.)
Dust Cover Nuts/Bolts	18–23 N·m (159–203 in. lbs.)	Rear Mount-To-Transmission Bolts	60–81 N·m (44 ft. lbs.)
Extension Housing Bolts	32–36 N·m (23–27 ft. lbs.)	Rear Mount-To-Clevis Bracket Bolt/Nut	54–75 N·m (40–55 ft. lbs.)
Fill Tube Bracket Bolt	50–64 N·m (37–47 ft. lbs.)	Rear Mount Clevis Bracket-To-Crossmember Nuts	33–49 N·m (24–36 ft. lbs.)
Neutral Switch Bolt	12–14 N·m (8–10 ft. lbs.)	Shift Cable Bracket Screws At Transmission	25–39 N·m (221–345 in. lbs.)
Nut	6–8 N·m (53–70 ft. lbs.)	Shift Lever Mounting Cover Screws	1–2 N·m (9–20 in. lbs.)
OD Support Bolt (to case)	23–27 N·m (18–20 ft. lbs.)	Shift Lever Housing Nuts	16–26 N·m (141–230 in. lbs.)

SPECIFICATIONS (Continued)

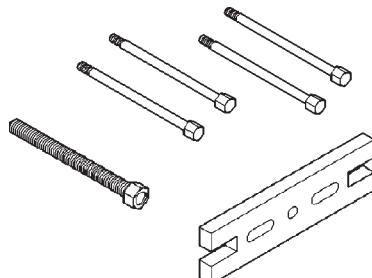
Description	Torque
Solenoid Harness Bolt	6–8 N·m (57–75 in. lbs.)
Speedometer Adapter Clamp Screw	10–12 N·m (90–110 in. lbs.)
Speed Sensor Coupling Nut	14–20 N·m (125–175 in. lbs.)
Throttle Cable Engine Bracket Screws . . .	7–11 N·m (63–94 in. lbs.)
Throttle Cable Retaining Screw (at transmission)	8–10 N·m (70–98 in. lbs.)
Transfer Case Mounting Nuts	30–41 N·m (22–30 ft. lbs.)
Transmission Shift Lever Nut	15–17 N·m (134–154 in. lbs.)
Transmission-To-Engine Block Bolts . . .	50–64 N·m (37–47 ft. lbs.)
Valve Body Bolts (to case)	9–11 N·m (80–96 in. lbs.)
Valve Body Bolts (to valve body)	6–7 N·m (54–58 in. lbs.)



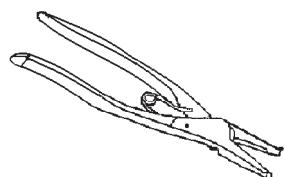
C-4959 Caliper, Metric Vernier



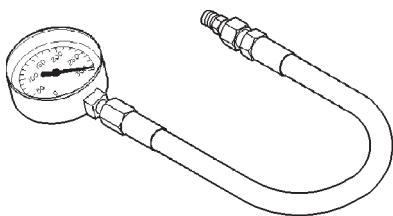
C-4960 Micrometer



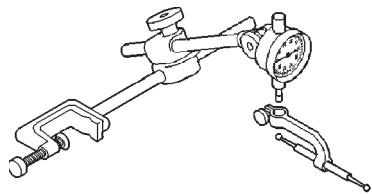
7536 Puller, Oil Pump



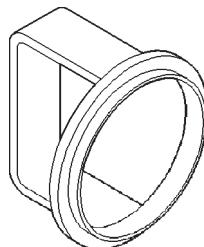
C-484 Snap Ring Plier



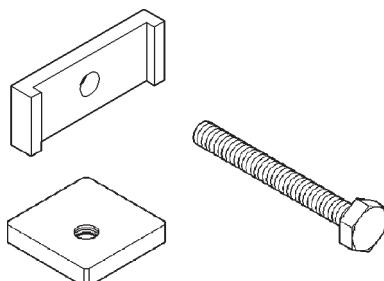
C-3293-SP Gauge



C-3339 Dial Indicator Set



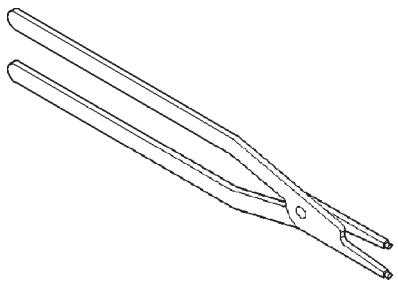
7538 Compressor, Piston #2 Spring



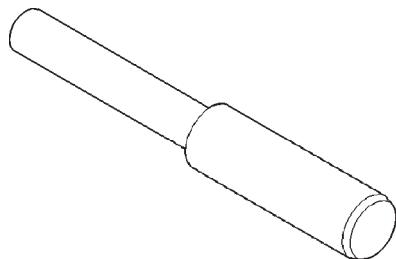
7539 Compressor, Piston #3 Spring

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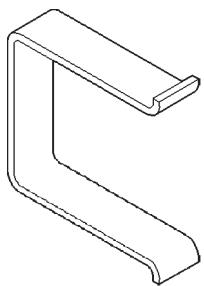
SPECIAL TOOLS (Continued)



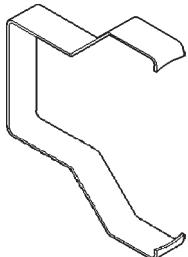
7540 Pliers, Large Snap Ring



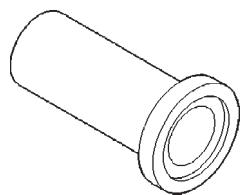
7544 Installer, Brake Drum Seal



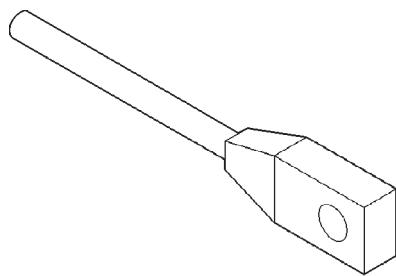
7542 Puller, Reaction Sleeve



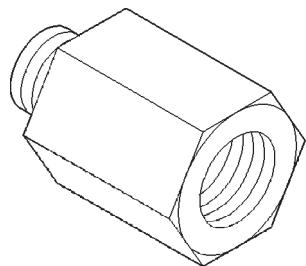
7543 Puller, Piston #1



7549 Installer, Seal



7552 Gauge, 3.0 mm Wire



7554 Adapter, Pressure Port

NV231 TRANSFER CASE

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DESCRIPTION AND OPERATION

NV231 TRANSFER CASE

DESCRIPTION

The NV231 is a part-time transfer case with a low range reduction gear system. The NV231 has three operating ranges plus a Neutral position. A low range system provides a reduction ratio for increased low speed torque capability.

The geartrain is mounted in two aluminum case halves attached with bolts. The mainshaft front and rear bearings are mounted in aluminum retainer housings bolted to the case halves.

OPERATING RANGES

Transfer case operating ranges are:

- 2WD (2-wheel drive)
- 4x4 (4-wheel drive)
- 4 Lo (4-wheel drive low range)

The 2WD range is for use on any road surface at any time.

The 4x4 and 4 Lo ranges are for off road use only. They are not for use on hard surface roads. The only exception being when the road surface is wet or slippery or covered by ice and snow.

The low range reduction gear system is operative in 4 Lo range only. This range is for extra pulling power in off road situations. Low range reduction ratio is 2.72:1.

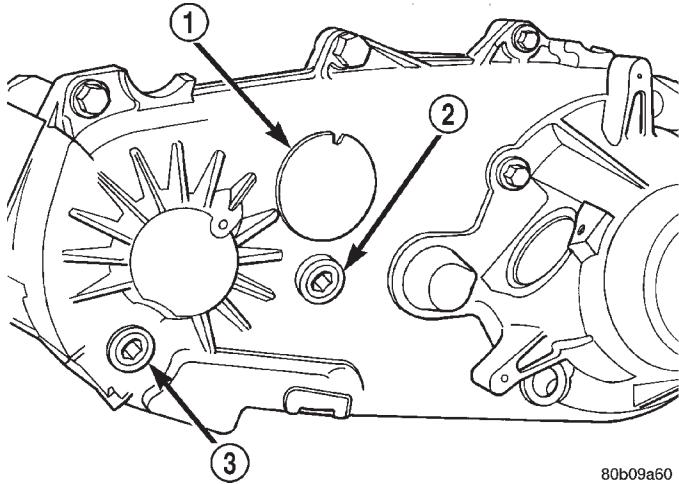
SHIFT MECHANISM

Operating ranges are selected with a floor mounted shift lever. The shift lever is connected to the transfer case range lever by an adjustable linkage rod. A straight line shift pattern is used. Range positions are marked on the shifter bezel cover plate.

IDENTIFICATION

A circular ID tag is attached to the rear case of each transfer case (Fig. 1). The ID tag provides the transfer case model number, assembly number, serial number, and low range ratio.

The transfer case serial number also represents the date of build.



80b09a60

Fig. 1 Fill/Drain Plug And I. D. Tag Locations

- 1 – I. D. TAG
- 2 – FILL PLUG
- 3 – DRAIN PLUG

OPERATION

The input gear is splined to the transmission output shaft. The input gear drives the mainshaft through the planetary assembly and range hub. The front output shaft is operated by a drive chain that connects the shaft to a drive sprocket on the mainshaft. The drive sprocket is engaged/disengaged by the mode fork, which operates the mode sleeve and

DESCRIPTION AND OPERATION (Continued)

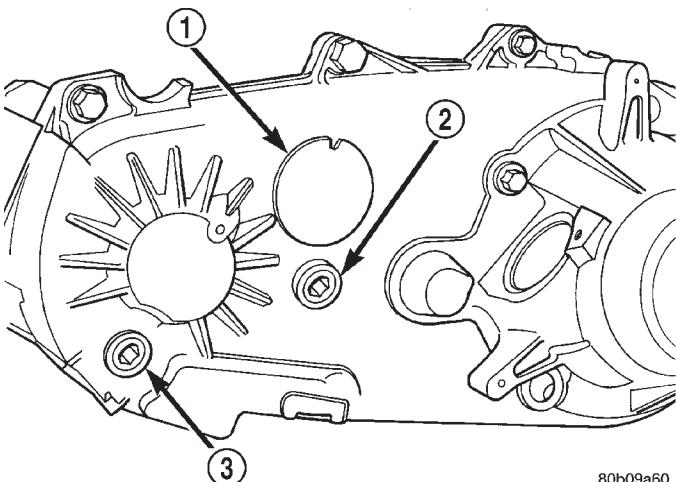
hub. The sleeve and hub are not equipped with a synchronizer mechanism for shifting.

LUBRICANT AND FILL LEVEL

DESCRIPTION

Recommended lubricant for the NV231 transfer case is Mopar® Dexron II, or ATF Plus 3, type 7176. Approximate lubricant fill capacity is 1.2 liters (2.5 pints).

The fill and drain plugs are both in the rear case (Fig. 2). Correct fill level is to the bottom edge of the fill plug hole. Be sure the vehicle is level to ensure an accurate fluid level check.



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Fig. 2 Fill/Drain Plug Locations

- 1 – I. D. TAG
- 2 – FILL PLUG
- 3 – DRAIN PLUG

DIAGNOSIS AND TESTING

NV231 DIAGNOSIS

DIAGNOSIS CHART

Condition	Possible Cause	Correction
Transfer case difficult to shift or will not shift into desired range.	1) Vehicle speed too great to permit shifting. 2) If vehicle was operated for an extended period in 4H mode on dry surface, driveline torque load may cause difficulty. 3) Transfer case shift linkage binding. 4) Insufficient or incorrect lubricant. 5) Internal transfer case components binding, worn, or damaged.	1) Slow vehicle and shift into desired range. 2) Stop vehicle and shift transfer case to Neutral position. Transfer case can then be shifted to the desired mode. 3) Repair or replace linkage as necessary. 4) Drain and refill transfer case with the correct type and quantity of lubricant. 5) Repair or replace components as necessary.
Transfer case noisy in all drive modes.	1) Insufficient or incorrect lubricant.	1) Drain and refill transfer case with the correct type and quantity of lubricant.

DIAGNOSIS AND TESTING (Continued)

Condition	Possible Cause	Correction
Transfer case noisy while in, or jumps out of, 4L mode.	1) Transfer case not completely engaged in 4L position.	1) Slow vehicle, shift transfer case to the Neutral position, and then shift into the 4L mode.
	2) Transfer case shift linkage out of adjustment.	2) Adjust linkage as necessary.
	3) Transfer case shift linkage loose or binding.	3) Repair, replace, or tighten linkage components as necessary.
	4) Range fork damaged, inserts worn, or fork is binding on the shift rail.	4) Repair or replace components as necessary.
	5) Low range gear worn or damaged.	5) Repair or replace components as necessary.
Lubricant leaking from transfer case seals or vent.	1) Transfer case overfilled.	1) Drain lubricant to the correct level.
	2) Transfer case vent closed or restricted.	2) Clean or replace vent as necessary.
	3) Transfer case seals damaged or installed incorrectly.	3) Replace suspect seal.
Abnormal tire wear.	1) Extended operation in 4H mode on dry surfaces,	1) Operate vehicle in 2H mode on dry surfaces.

REMOVAL AND INSTALLATION

TRANSFER CASE

REMOVAL

- (1) Shift transfer case into Neutral.
- (2) Raise vehicle.
- (3) Drain transfer case lubricant.
- (4) Mark front and rear propeller shaft yokes for alignment reference.
- (5) Support transmission with jack stand.
- (6) Remove rear crossmember, or skid plate.
- (7) Disconnect front/rear propeller shafts at transfer case.
- (8) Disconnect vehicle speed sensor wires.
- (9) Disconnect transfer case linkage rod from range lever.
- (10) Disconnect transfer case vent hose (Fig. 3) and indicator switch harness, if necessary.
- (11) Support transfer case with transmission jack.
- (12) Secure transfer case to jack with chains.
- (13) Remove nuts attaching transfer case to transmission.
- (14) Pull transfer case and jack rearward to disengage transfer case.
- (15) Remove transfer case from under vehicle.

INSTALLATION

- (1) Mount transfer case on a transmission jack.
- (2) Secure transfer case to jack with chains.

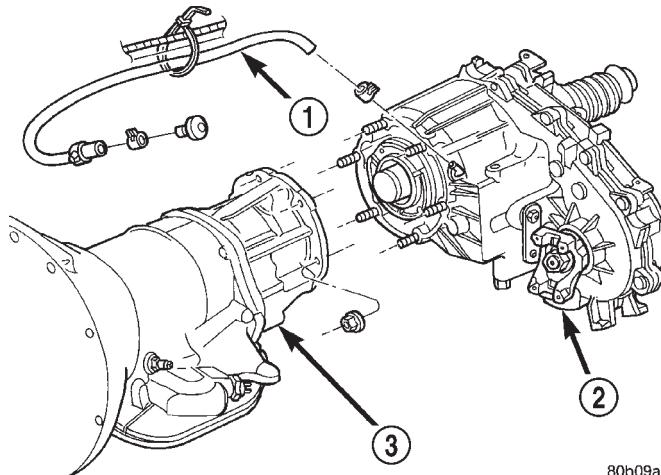


Fig. 3 Transfer Case Mounting

80b09a89

- 1 – VENT TUBE
2 – TRANSFER CASE
3 – TRANSMISSION

- (3) Position transfer case under vehicle.
- (4) Align transfer case and transmission shafts and install transfer case on transmission.
- (5) Install and tighten transfer case attaching nuts to 35 N·m (26 ft. lbs.) torque (Fig. 3).
- (6) Connect vehicle speed sensor wires, and vent hose.
- (7) Connect indicator switch harness to transfer case switch, if necessary. Secure wire harness to clips on transfer case.

REMOVAL AND INSTALLATION (Continued)

(8) Align and connect propeller shafts. Refer to Group 3, Differential and Driveline, for proper procedures and specifications.

(9) Fill transfer case with correct fluid. Check transmission fluid level. Correct as necessary.

(10) Install rear crossmember, or skid plate. Tighten crossmember bolts to 41 N·m (30 ft. lbs.) torque.

(11) Remove transmission jack and support stand.

(12) Connect shift rod to transfer case range lever.

(13) Adjust transfer case shift linkage.

(14) Lower vehicle and verify transfer case shift operation.

SHIFT LEVER

REMOVAL

(1) Shift transfer case into 4L.

(2) Raise vehicle.

(3) Loosen adjusting trunnion locknut and slide shift rod out of trunnion (Fig. 4). If rod lacks enough

travel to come out of trunnion, push trunnion out of torque shaft.

(4) Lower vehicle.

(5) Remove console. Refer to Group 23, Body, for proper procedures.

(6) Remove screws attaching lever assembly to floorpan and remove assembly and shift rod (if left attached).

INSTALLATION

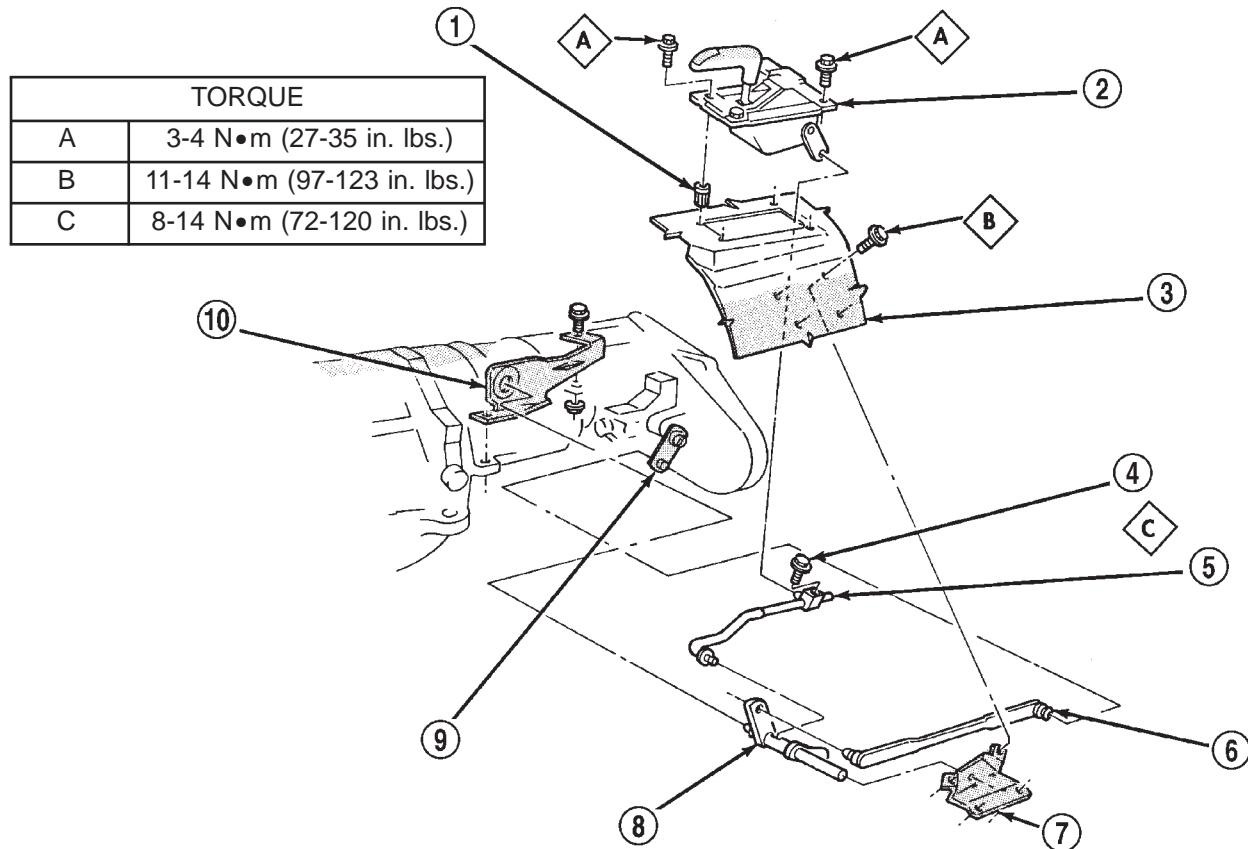
(1) If shift rod was not removed from lever assembly, work rod down through floorpan opening. Then position lever assembly on floorpan and install assembly attaching screws.

(2) Install console. Refer to Group 23, Body, for proper procedures.

(3) Raise vehicle.

(4) Connect trunnion to torque shaft arm. Or, slide shift rod into trunnion on range lever. Be sure shift rod slides freely in trunnion.

(5) Verify that range lever is in 4L position. Then tighten trunnion lock bolt.



J9321-185

Fig. 4 Shift Linkage

1 - RIVNUT (4)

2 - SHIFT LEVER ASSEMBLY

3 - FLOORPAN

4 - TRUNNION LOCK BOLT

5 - SELECTOR ROD AND TRUNNION

6 - SHIFT LEVER ROD

7 - TORQUE SHAFT FRAME BRACKET

8 - TORQUE SHAFT

9 - TRANSFER CASE SHIFT LEVER

10 - TORQUE SHAFT TRANSFER CASE BRACKET

REMOVAL AND INSTALLATION (Continued)

(6) Lower vehicle and check transfer case shift operation.

SPEEDOMETER

REMOVAL

- (1) Raise vehicle.
- (2) Disconnect wires from vehicle speed sensor.
- (3) Remove adapter clamp and screw (Fig. 5).
- (4) Remove speed sensor and speedometer adapter as an assembly.
- (5) Remove speed sensor retaining screw and remove sensor from adapter.
- (6) Remove speedometer pinion from adapter. Replace pinion if chipped, cracked, or worn.
- (7) Inspect sensor and adapter O-rings (Fig. 5). Remove and discard O-rings if worn or damaged.
- (8) Inspect terminal pins in speed sensor. Clean pins with Mopar® electrical spray cleaner if dirty or oxidized. Replace sensor if faulty, or if pins are loose, severely corroded, or damaged.

INSTALLATION AND INDEXING

- (1) Thoroughly clean adapter flange and adapter mounting surface in housing. Surfaces must be clean for proper adapter alignment and speedometer operation.
- (2) Install new O-rings on speed sensor and speedometer adapter (Fig. 5), if necessary.

(3) Lubricate sensor and adapter O-rings with transmission fluid.

(4) Install vehicle speed sensor in speedometer adapter. Tighten sensor attaching screw to 2-3 N·m (15-27 in. lbs.) torque.

(5) Install speedometer pinion in adapter.

(6) Count number of teeth on speedometer pinion. Do this before installing assembly in housing. Then lubricate pinion teeth with transmission fluid.

(7) Note index numbers on adapter body (Fig. 6). These numbers will correspond to number of teeth on pinion.

(8) Install speedometer assembly in housing.

(9) Rotate adapter until required range numbers are at 6 o-clock position. Be sure range index numbers correspond to number of teeth on pinion gear.

(10) Install speedometer adapter clamp and retaining screw. Tighten clamp screw to 10-12 N·m (90-110 in. lbs.) torque.

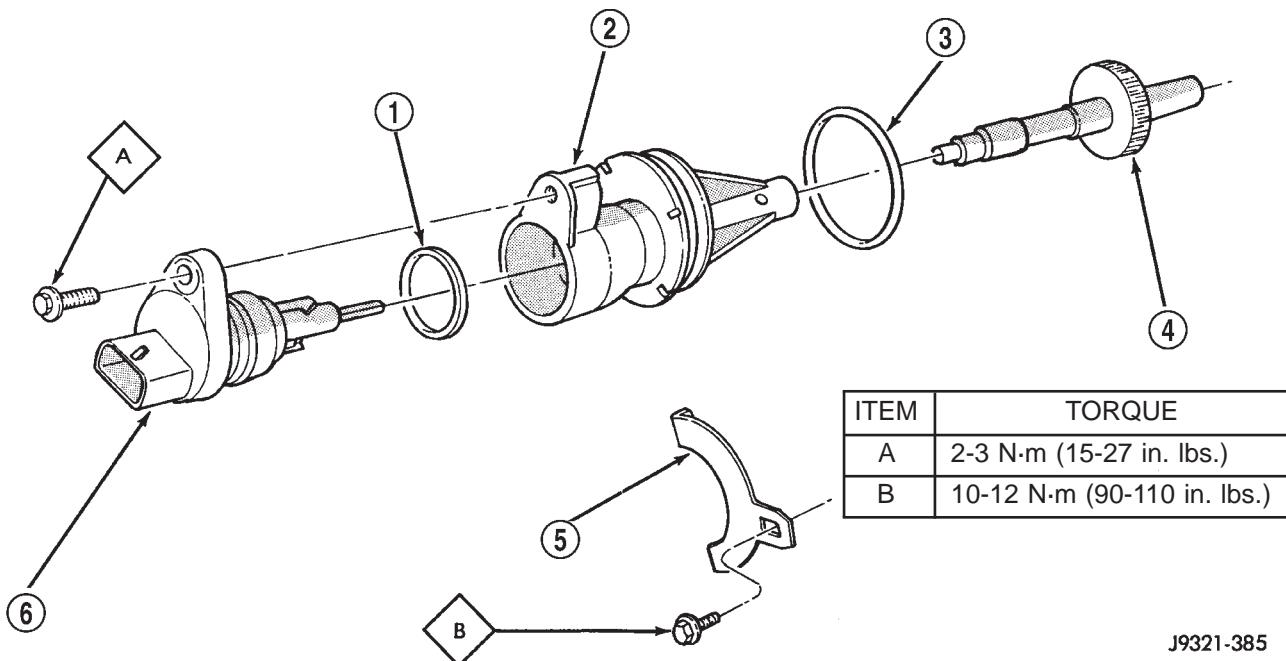
(11) Connect wires to vehicle speed sensor.

(12) Lower vehicle and top off transmission fluid level if necessary.

FRONT OUTPUT SHAFT SEAL

REMOVAL

- (1) Raise vehicle.
- (2) Remove front propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedure.



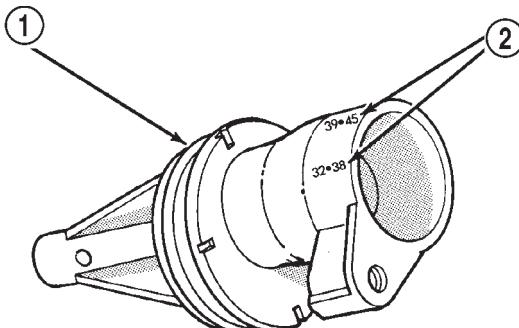
J9321-385

Fig. 5 Speedometer Components

- 1 – SENSOR O-RING
 2 – SPEEDOMETER ADAPTER
 3 – ADAPTER O-RING

- 4 – SPEEDOMETER PINION
 5 – ADAPTER CLAMP
 6 – VEHICLE SPEED SENSOR

REMOVAL AND INSTALLATION (Continued)



J9321-386
Fig. 6 Location Of Index Numbers On Speedometer Adapter

1 – SPEEDOMETER ADAPTER
2 – INDEX NUMBER LOCATION

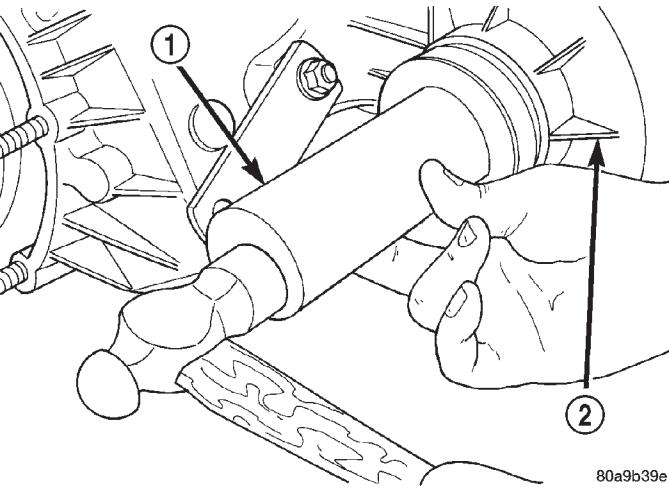


Fig. 8 Front Output Seal Installation

1 – INSTALLER 8143
2 – TRANSFER CASE

- (3) Remove front output shaft yoke.
- (4) Remove seal from front case with pry tool (Fig. 7).

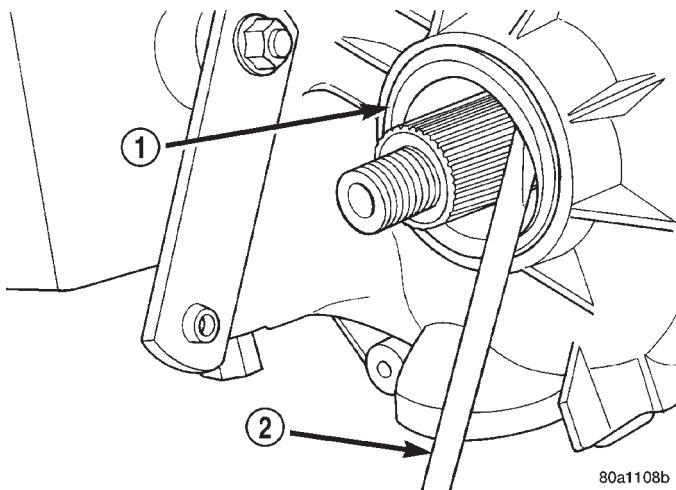


Fig. 7 Remove Front Output Shaft Seal

1 – OUTPUT SHAFT SEAL
2 – PRYBAR

INSTALLATION

- (1) Install new front output seal in front case with Installer Tool 8143 as follows:
 - (a) Place new seal on tool. Garter spring on seal goes toward interior of case.
 - (b) Start seal in bore with light taps from hammer (Fig. 8). Once seal is started, continue tapping seal into bore until installer tool seats against case.

DISASSEMBLY AND ASSEMBLY

NV231 TRANSFER CASE

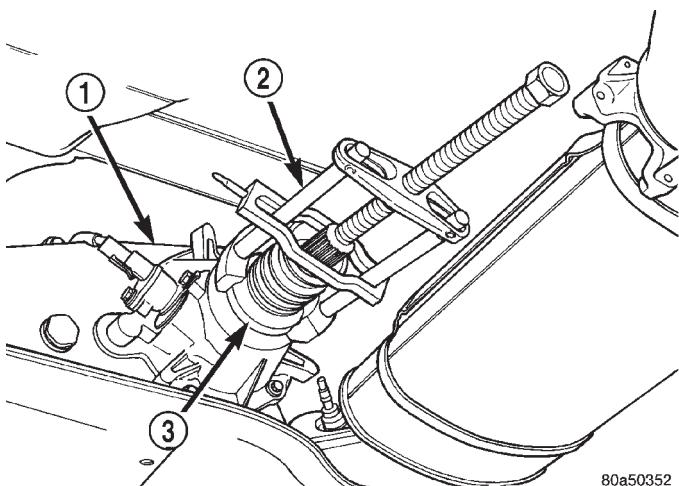
DISASSEMBLY

Position transfer case on shallow drain pan. Remove drain plug and drain lubricant remaining in case.

REAR RETAINER AND OIL PUMP REMOVAL

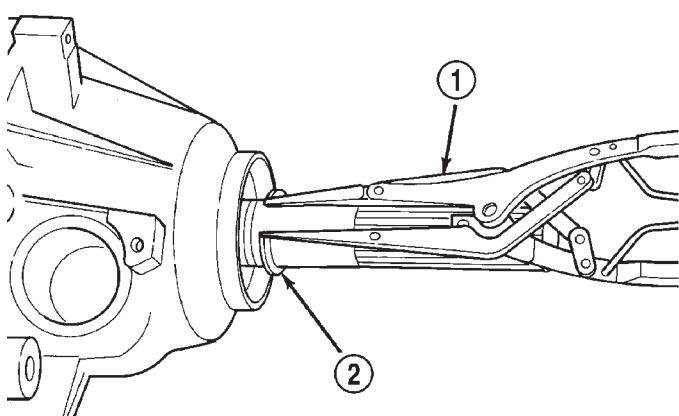
- (1) Remove the speedometer adapter.
- (2) Spread band clamp which holds output shaft boot to slinger with a suitable awl, or equivalent.
- (3) Remove output shaft boot from slinger and output shaft.
- (4) Using Puller MD-998056-A, remove rear slinger (Fig. 9).
- (5) Use a suitable pry tool, or a slide hammer mounted screw, to remove the seal from the rear retainer (Fig. 10).
- (6) Remove the rear output bearing I. D. retaining ring (Fig. 11).
- (7) Remove the bolts holding the rear retainer to the rear case half.
- (8) Tap rear retainer with rawhide or rubber mallet to loosen sealer bead.

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 9 Rear Slinger Removal**

- 1 – TRANSFER CASE
2 – SPECIAL TOOL MD998056-A
3 – SLINGER

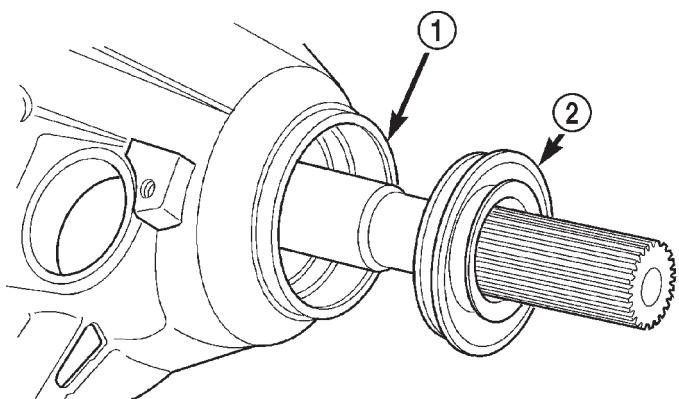
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Fig. 11 Output Shaft Rear Bearing Retaining Ring

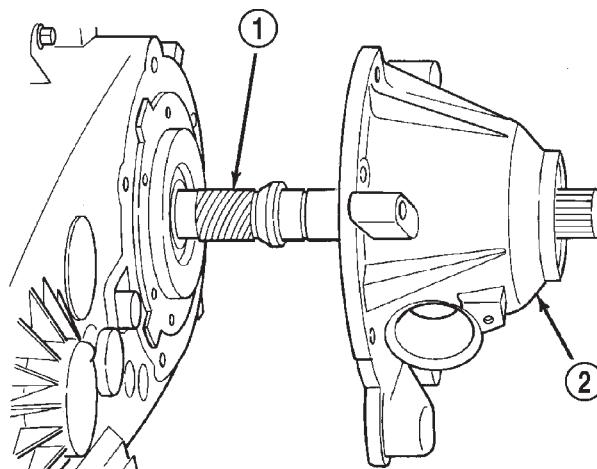
- 1 – REAR RETAINER
2 – OUTPUT SHAFT SEAL



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Fig. 10 Rear Retainer Seal

- 1 – REAR RETAINER
2 – OUTPUT SHAFT SEAL



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Fig. 12 Rear Retainer Removal

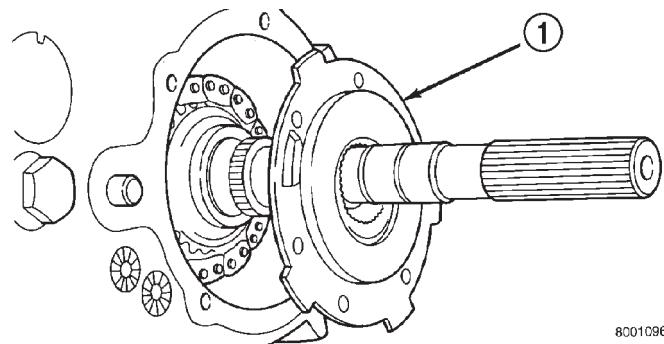
- 1 – MAINSHAFT
2 – REAR RETAINER

(9) Remove rear retainer from rear case half (Fig. 12).

(10) Remove snap-ring holding oil pump in position on output shaft.

(11) Disengage oil pickup tube from oil pump and remove oil pump assembly. Remove oil pump by tilting the edge of the oil pump from under the edge of the rear case half and sliding the pump (Fig. 13).

(12) Remove pick-up tube o-ring from oil pump (Fig. 14), if necessary. Do not disassemble the oil pump, it is not serviceable.

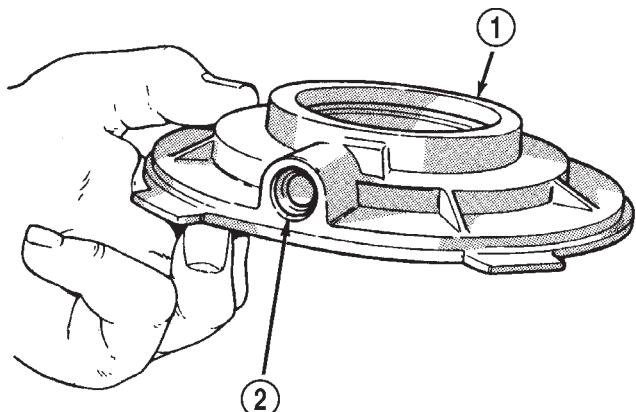


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Fig. 13 Oil Pump Removal

- 1 – OIL PUMP

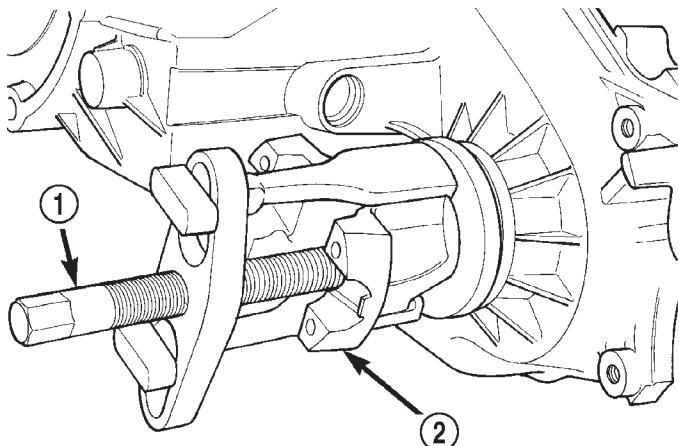
DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 14 Pick-up Tube O-ring Location

- 1 – OIL PUMP
2 – O-RING



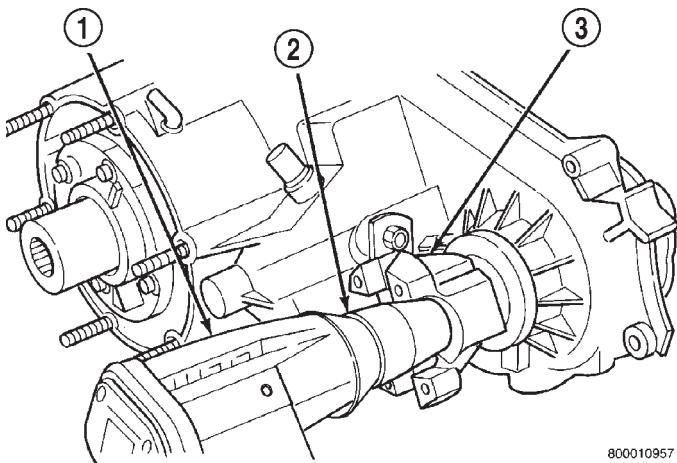
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Fig. 16 Yoke Removal

- 1 – PULLER TOOL
2 – YOKE

YOKE AND RANGE LEVER REMOVAL

- (1) Remove transfer case indicator switch.
- (2) Remove front yoke nut as follows:
 - (a) Move range lever to 4L position.
 - (b) Then remove nut with socket and impact wrench (Fig. 15).
- (3) Remove yoke. If yoke is difficult to remove by hand, remove it with bearing splitter, or with standard two jaw puller (Fig. 16). Be sure puller tool is positioned on yoke and not on slinger as slinger will be damaged.



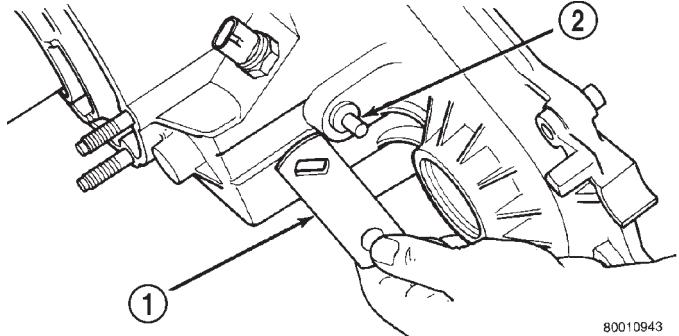
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Fig. 15 Yoke Nut Removal

- 1 – IMPACT WRENCH
2 – SOCKET
3 – YOKE

(4) Remove seal washer from front output shaft. Discard washer as it should not be reused.

(5) Remove nut and washer that attach range lever to sector shaft. Then move sector to neutral position and remove range lever from shaft (Fig. 17).



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Fig. 17 Range Lever Removal

- 1 – RANGE LEVER
2 – SECTOR SHAFT

DISASSEMBLY AND ASSEMBLY (Continued)

FRONT OUTPUT SHAFT AND DRIVE CHAIN REMOVAL

(1) Support transfer case so rear case is facing upward.

(2) Remove bolts holding front case to rear case. The case alignment bolts require flat washers (Fig. 18).

(3) Loosen rear case with flat blade screwdriver to break sealer bead. Insert pry tool blade only into notches provided at each end of case (Fig. 19).

(4) Remove rear case from front case.

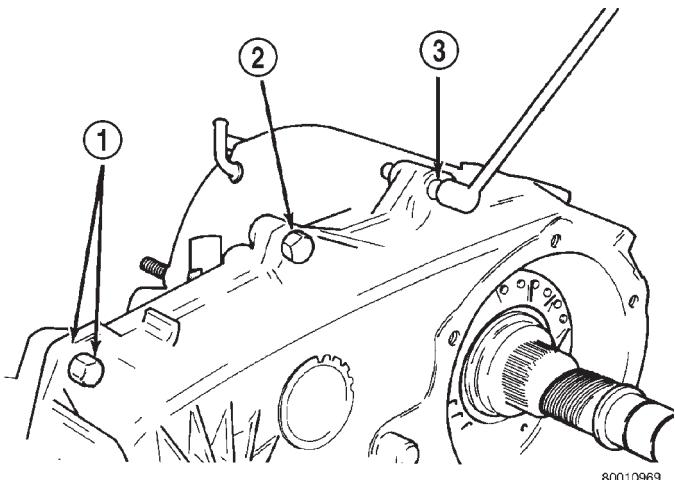


Fig. 18 Rear Case Alignment Bolt Locations

- 1 – DOWEL BOLT AND WASHER (2)
- 2 – CASE BOLT (5)
- 3 – SPLINE HEAD BOLT (1)

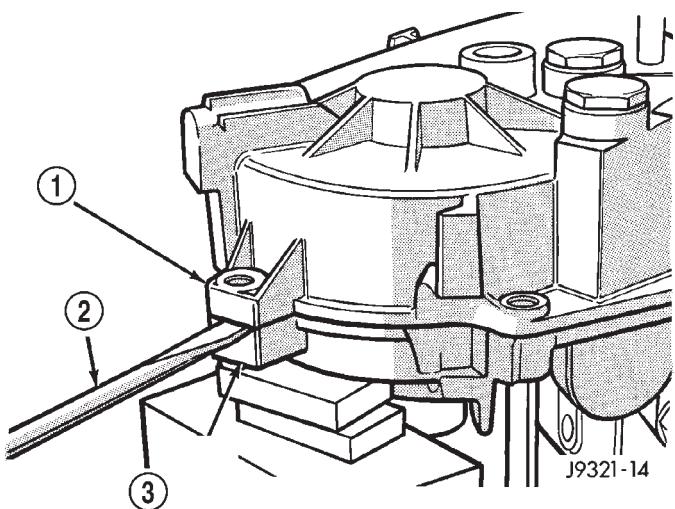


Fig. 19 Loosening Rear Case

- 1 – REAR CASE
- 2 – PRY TOOL (IN CASE SLOT)
- 3 – FRONT CASE

(5) Remove oil pickup tube from rear case (Fig. 20).

(6) Remove mode fork spring (Fig. 21).

(7) Pull front output shaft upward and out of front output shaft bearing (Fig. 22).

(8) Remove front output shaft and chain.

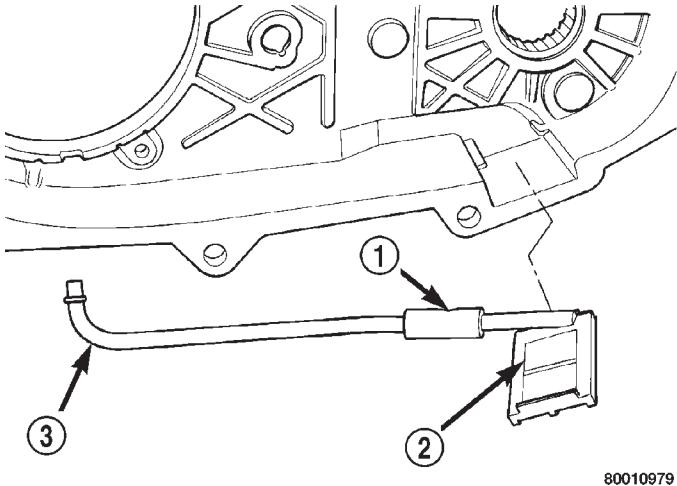


Fig. 20 Oil Pickup Tube Removal

- 1 – CONNECTING HOSE
- 2 – PICKUP SCREEN
- 3 – PICKUP TUBE

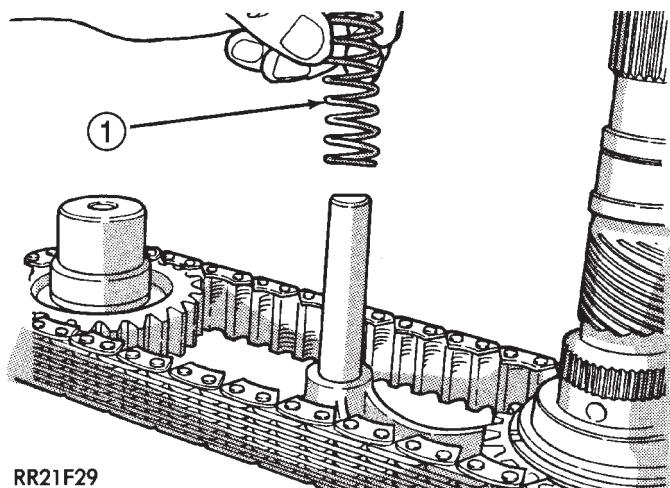
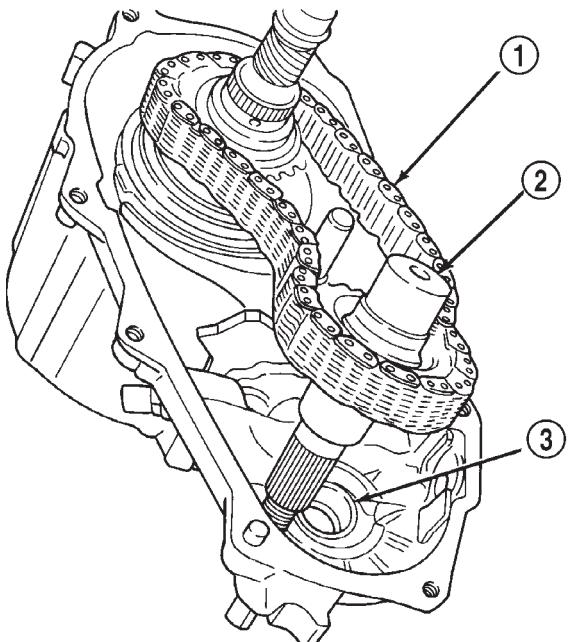


Fig. 21 Mode Fork Spring Removal

- 1 – MODE SPRING

DISASSEMBLY AND ASSEMBLY (Continued)



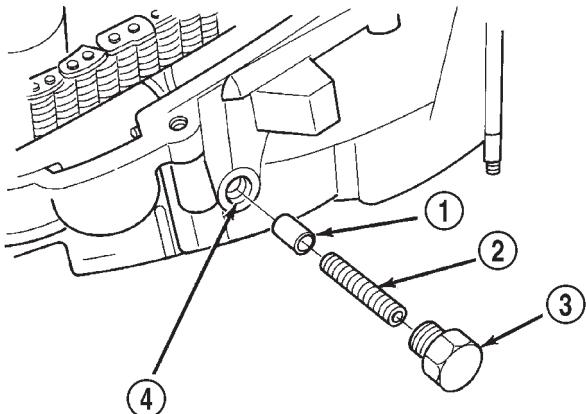
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Fig. 22 Remove Front Output Shaft And Chain

- 1 – DRIVE CHAIN
- 2 – FRONT OUTPUT SHAFT
- 3 – SHAFT FRONT BEARING

SHIFT FORKS AND MAINSHAFT REMOVAL

- (1) Remove detent plug, O-ring, detent spring and detent plunger (Fig. 23).
- (2) Remove mainshaft from mode sleeve and input gear pilot bearing.



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Fig. 23 Detent Plug, Spring And Plunger Removal

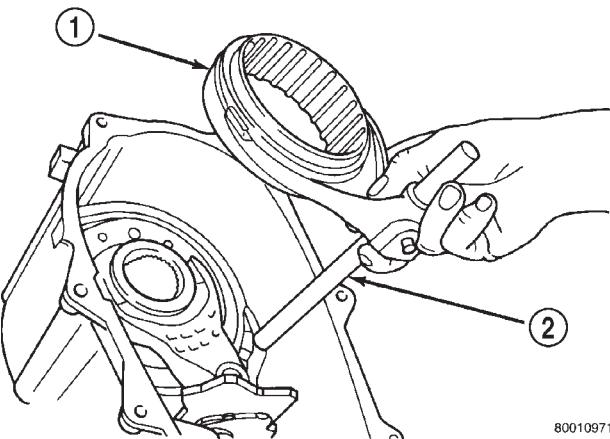
- 1 – POPPET
- 2 – SPRING
- 3 – SCREW
- 4 – POPPET BORE (IN CASE)

(3) Remove mode fork and sleeve as an assembly (Fig. 24). Note position of sleeve for assembly reference. The short side of the sleeve faces upward.

(4) Remove range fork and hub as an assembly (Fig. 25). Note fork position for installation reference.

(5) Remove shift sector from front case (Fig. 26).

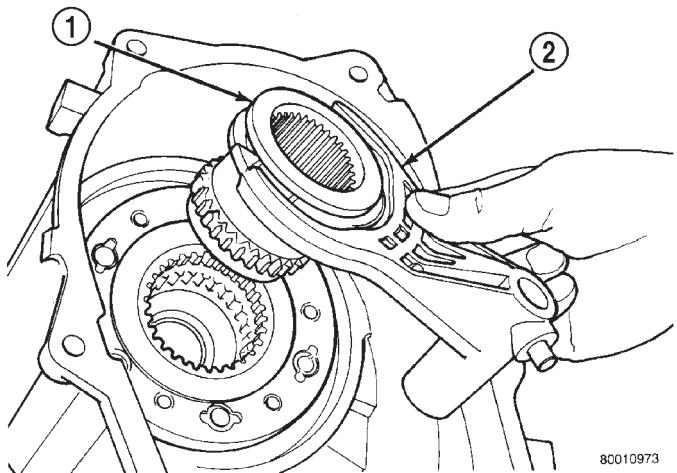
(6) Remove shift sector bushing and O-ring (Fig. 27).



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Fig. 24 Mode Fork And Sleeve Removal

- 1 – MODE SLEEVE
- 2 – MODE FORK AND RAIL

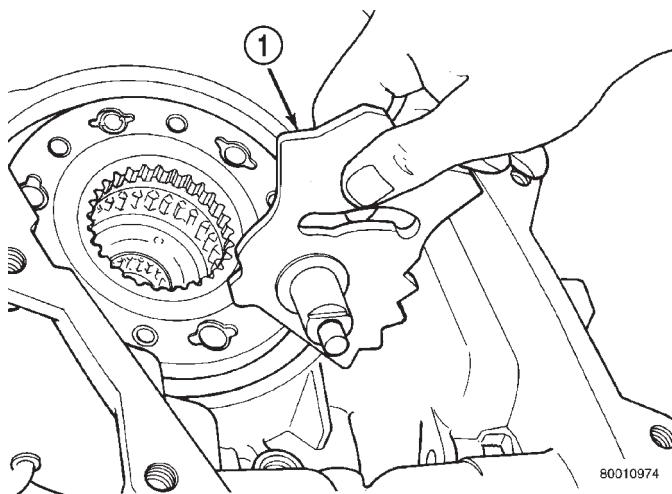


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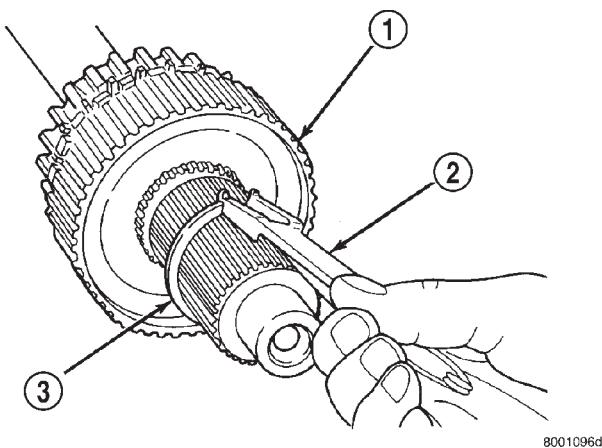
Fig. 25 Range Fork And Hub Removal

- 1 – RANGE HUB
- 2 – RANGE FORK

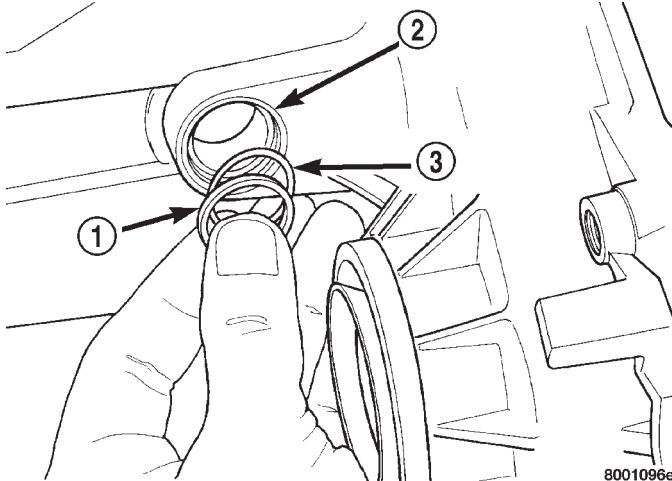
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 26 Shift Sector Removal**

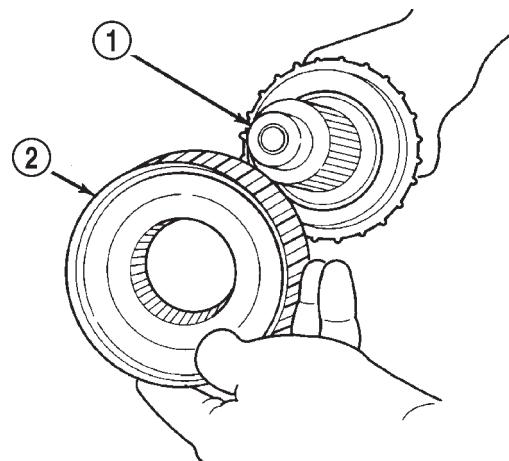
1 – SHIFT SECTOR

**Fig. 28 Mode Hub Retaining Ring Removal**

- 1 – MODE HUB
2 – SNAP RING PLIERS (HEAVY DUTY)
3 – MODE HUB RETAINING RING

**Fig. 27 Sector Bushing And O-Ring Removal**

- 1 – SEAL RETAINER
2 – SECTOR SHAFT BORE
3 – O-RING SEAL

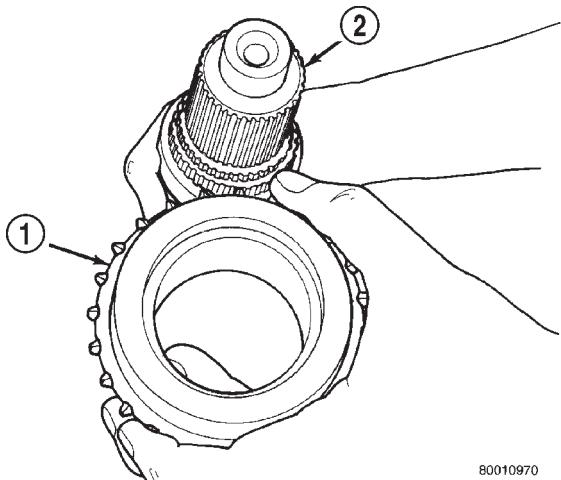
**Fig. 29 Mode Hub Removal**

- 1 – MAINSHAFT
2 – MODE HUB

MAINSHAFT DISASSEMBLY

- (1) Remove mode hub retaining ring with heavy duty snap-ring pliers (Fig. 28).
- (2) Slide mode hub off mainshaft (Fig. 29).
- (3) Slide drive sprocket off mainshaft (Fig. 30).

DISASSEMBLY AND ASSEMBLY (Continued)

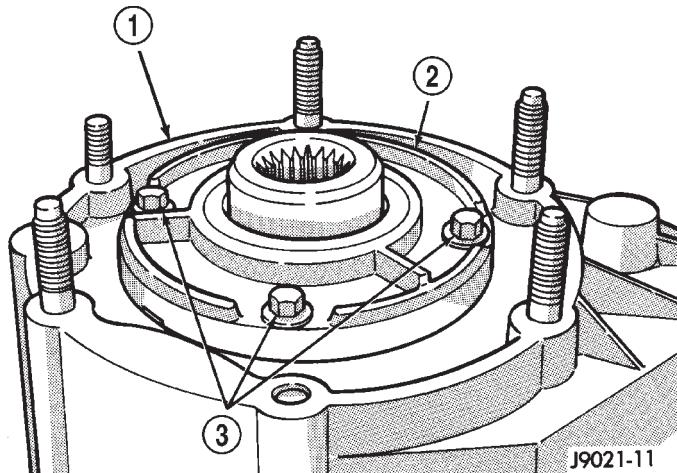
**Fig. 30 Drive Sprocket Removal**

- 1 – DRIVE SPROCKET
2 – MAINSHAFT

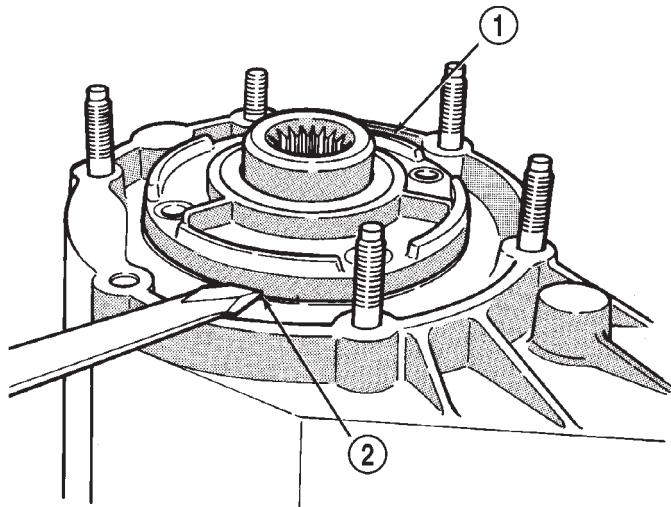
INPUT GEAR AND LOW RANGE GEAR REMOVAL

(1) Remove front bearing retainer attaching bolts (Fig. 31).

(2) Remove front bearing retainer. Pry retainer loose with pry tool positioned in slots at each end of retainer (Fig. 32).

**Fig. 31 Front Bearing Retainer Bolts**

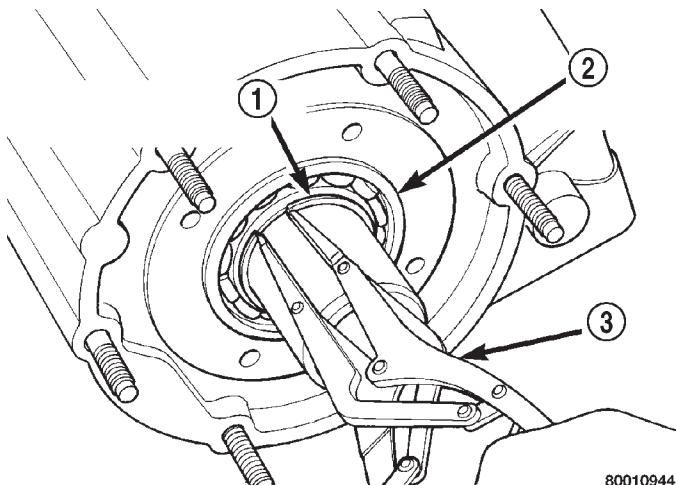
- 1 – FRONT CASE
2 – FRONT BEARING RETAINER
3 – RETAINER BOLTS

**Fig. 32 Front Bearing Retainer Removal**

- 1 – FRONT BEARING RETAINER
2 – RETAINER SLOT

(3) Remove front bearing retainer seal. Tap seal out with drift and hammer.

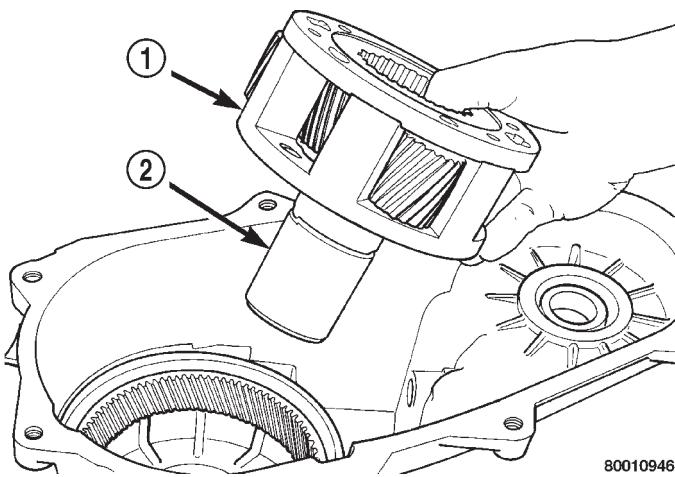
(4) Remove input gear retaining ring with heavy duty snap-ring pliers (Fig. 33)

**Fig. 33 Removing Input Gear Retaining Ring**

- 1 – INPUT GEAR BEARING RETAINING RING
2 – INPUT GEAR BEARING
3 – SNAP RING PLIERS

DISASSEMBLY AND ASSEMBLY (Continued)

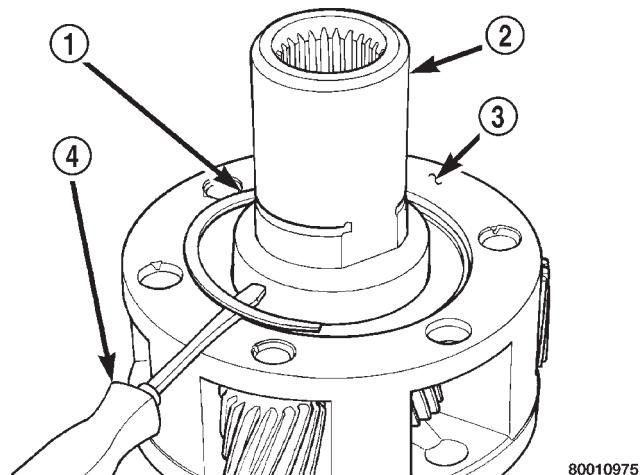
(5) Place front case in horizontal position. Then remove input gear and low range gear as an assembly (Fig. 34). Tap gear out of bearing with plastic mallet if necessary.

**Fig. 34 Input Gear And Planetary Carrier Removal**

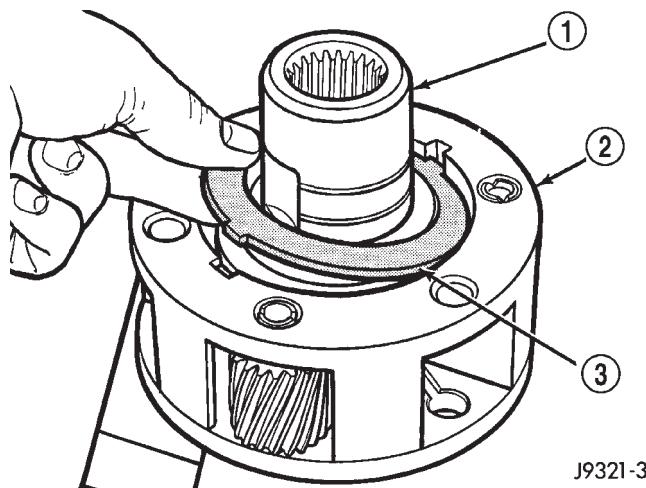
- 1 – PLANETARY ASSEMBLY
2 – INPUT GEAR

INPUT AND LOW RANGE GEAR DISASSEMBLY

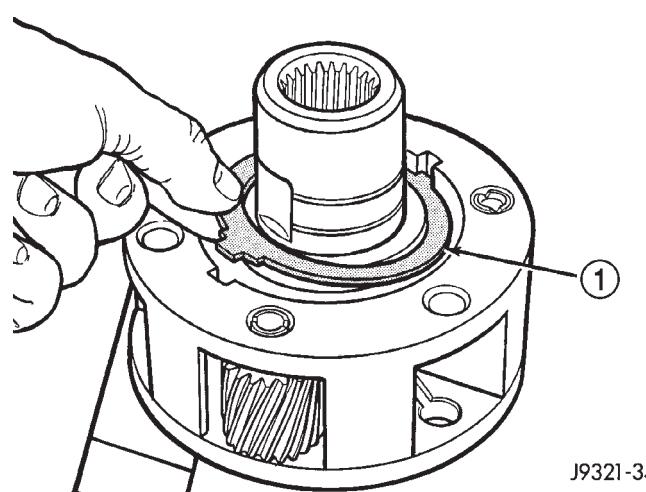
- (1) Remove snap-ring that retains input gear in low range gear (Fig. 35).
- (2) Remove retainer (Fig. 36).
- (3) Remove front tabbed thrust washer (Fig. 37).
- (4) Remove input gear (Fig. 38).
- (5) Remove rear tabbed thrust washer from low range gear (Fig. 39).

**Fig. 35 Input Gear Snap-Ring Removal**

- 1 – CARRIER LOCK RETAINING RING
2 – INPUT GEAR
3 – PLANETARY CARRIER
4 – SCREWDRIVER

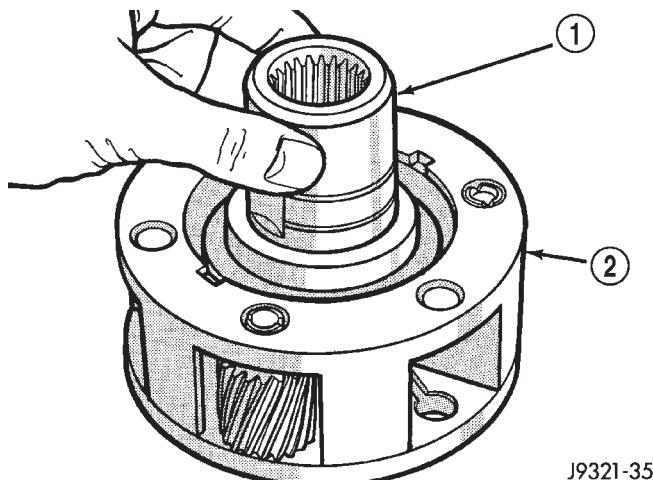
**Fig. 36 Input Gear Retainer Removal**

- 1 – INPUT GEAR
2 – LOW RANGE GEAR
3 – RETAINER

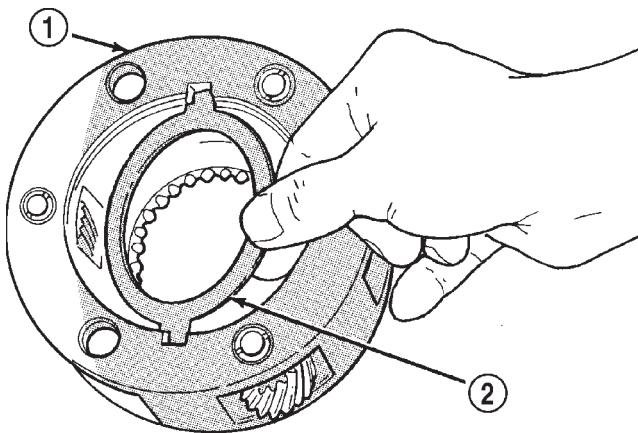
**Fig. 37 Front Tabbed Thrust Washer Removal**

- 1 – FRONT TABBED THRUST WASHER

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 38 Input Gear Removal**

1 – INPUT GEAR
2 – LOW RANGE GEAR

**Fig. 39 Rear Tabbed Thrust Washer Removal**

1 – LOW RANGE GEAR
2 – REAR TABBED THRUST WASHER

ASSEMBLY

Lubricate transfer case components with Mopar® Dexron II automatic transmission fluid or petroleum jelly (where indicated) during assembly.

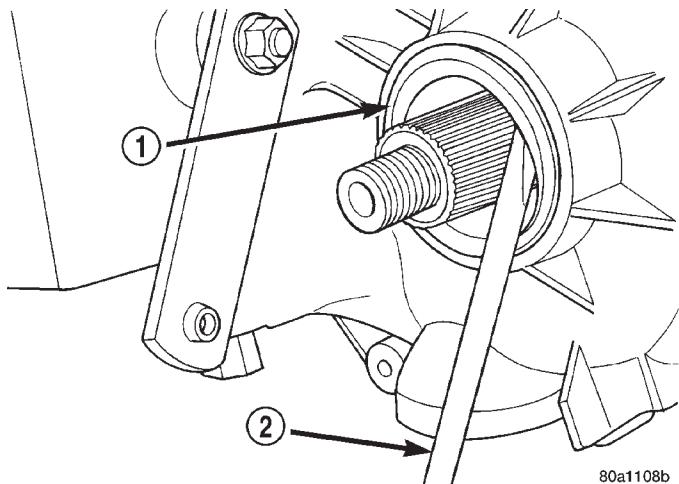
BEARING AND SEAL INSTALLATION

CAUTION: The bearing bores in various transfer case components contain oil feed holes. Make sure replacement bearings do not block the holes.

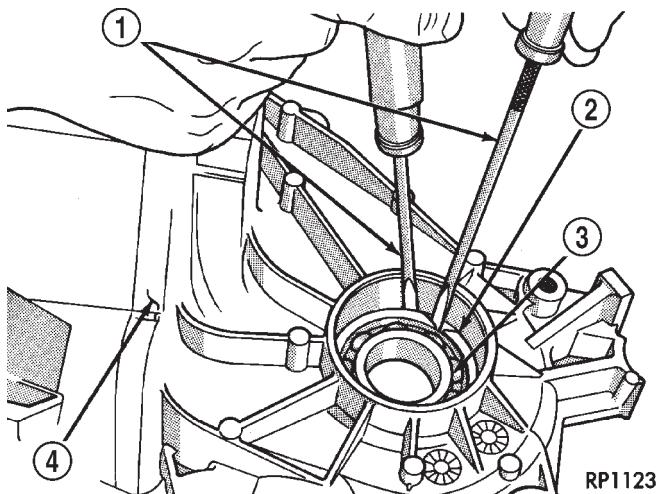
(1) Remove the front output shaft seal from case with pry tool (Fig. 40).

(2) Remove the front output shaft bearing retaining ring with screwdriver (Fig. 41).

(3) Remove bearing with Tool Handle C-4171 and Tool 5065 (Fig. 42).

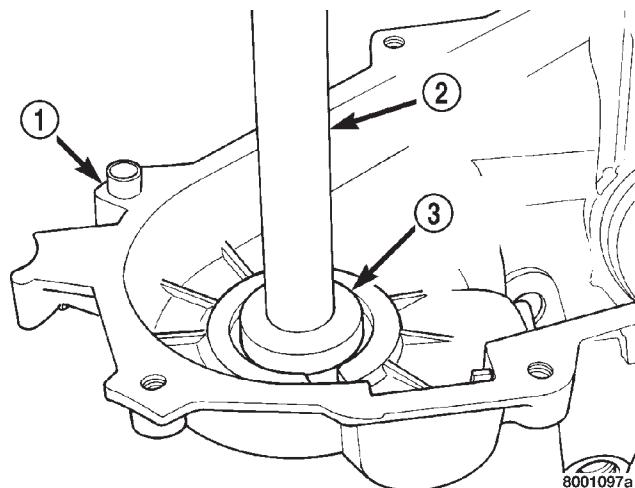
**Fig. 40 Front Output Seal Removal**

1 – OUTPUT SHAFT SEAL
2 – PRYBAR

**Fig. 41 Front Output Shaft Bearing Retaining Ring Removal**

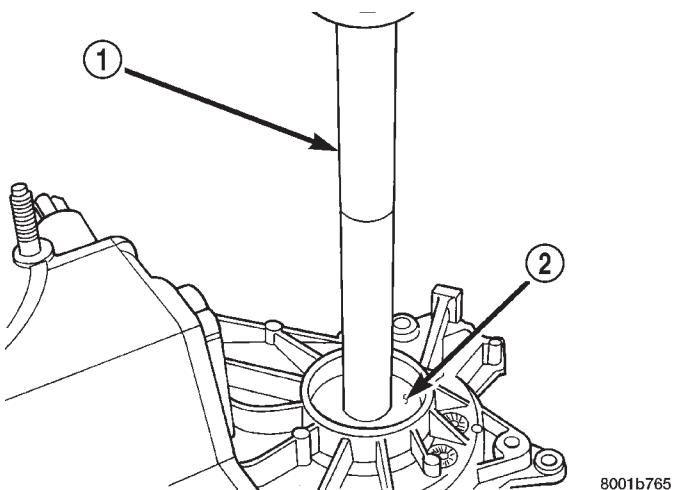
1 – SCREWDRIVERS
2 – SNAP RING
3 – FRONT OUTPUT SHAFT BEARING
4 – FRONT CASE

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 42 Front Output Shaft Bearing Removal**

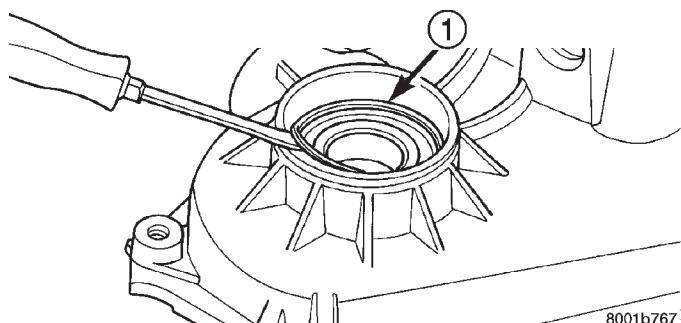
- 1 - FRONT CASE
- 2 - SPECIAL TOOL C-4171
- 3 - SPECIAL TOOL 5065

(4) Install front output shaft front bearing in case with Tool Handle C-4171 and Installer 5064 (Fig. 43).

**Fig. 43 Front Output Shaft Bearing Installation**

- 1 - SPECIAL TOOL C-4171
- 2 - SPECIAL TOOL 5064

(5) Install output shaft front bearing retaining ring (Fig. 44). Start ring into place by hand. Then use small screwdriver to work ring into case groove. Be sure ring is fully seated before proceeding.

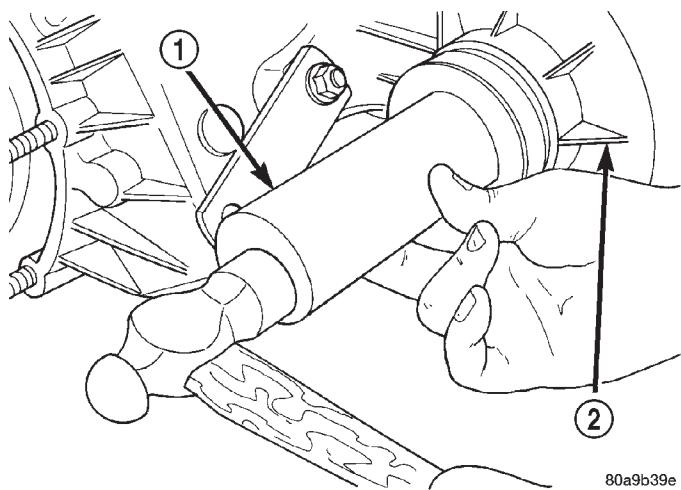
**Fig. 44 Installing Output Shaft Front Bearing Retaining Ring**

- 1 - WORK RETAINING RING INTO BORE GROOVE WITH SMALL SCREWDRIVER

(6) Install new front output seal in front case with Installer Tool 8143 as follows:

(a) Place new seal on tool. **Garter spring on seal goes toward interior of case.**

(b) Start seal in bore with light taps from hammer (Fig. 45). Once seal is started, continue tapping seal into bore until installer tool bottoms against case.

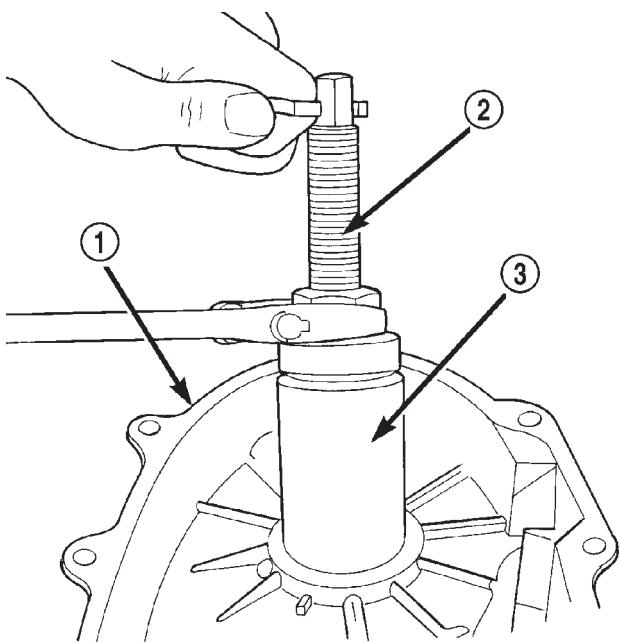
**Fig. 45 Front Output Seal Installation**

- 1 - INSTALLER 8143
- 2 - TRANSFER CASE

(7) Remove the output shaft rear bearing with the screw and jaws from Remover L-4454 and Cup 8148 (Fig. 46).

(8) Install new bearing with Tool Handle C-4171 and Installer 5066 (Fig. 47). The bearing bore is chamfered at the top. Install the bearing so it is flush with the lower edge of this chamfer (Fig. 48).

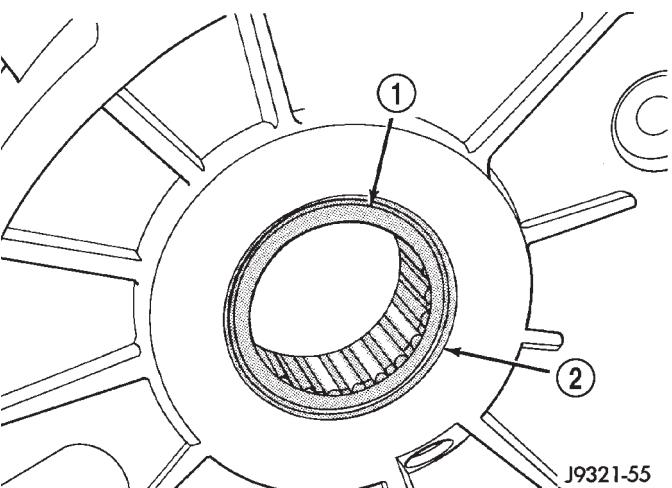
DISASSEMBLY AND ASSEMBLY (Continued)



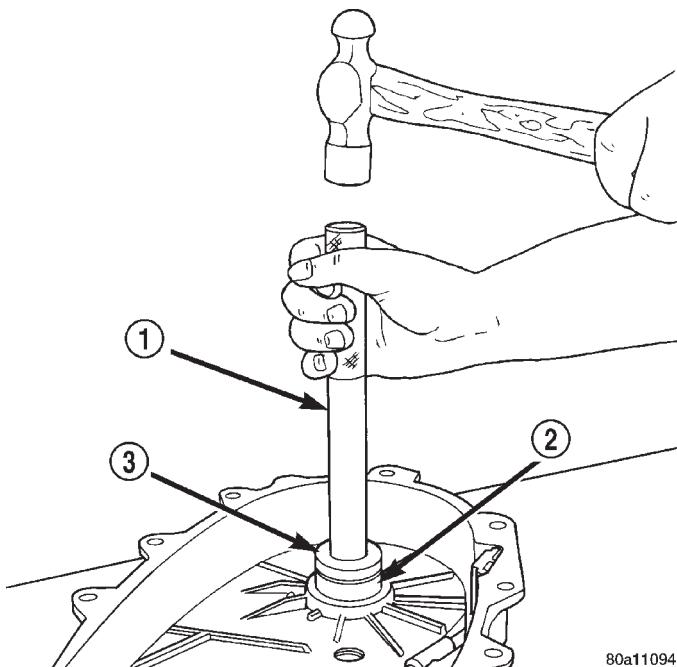
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Fig. 46 Output Shaft Rear Bearing Removal

- 1 - REAR CASE
- 2 - SPECIAL TOOL L-4454-1 AND L-4454-3
- 3 - SPECIAL TOOL 8148

**Fig. 48 Output Shaft Rear Bearing Installation Depth**

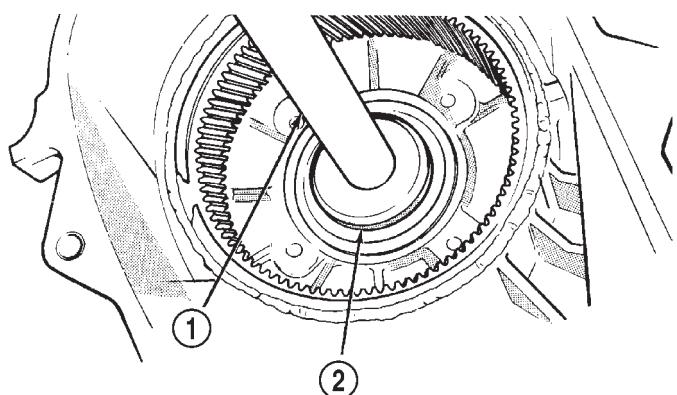
- 1 - BEARING (SEATED) AT LOWER EDGE OF CHAMFER
- 2 - CHAMFER



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Fig. 47 Output Shaft Rear Bearing Installation

- 1 - HANDLE C-4171
- 2 - OUTPUT SHAFT INNER BEARING
- 3 - INSTALLER 5066



J9521-43

Fig. 49 Input Shaft Bearing Removal

- 1 - SPECIAL TOOL C-4171
- 2 - SPECIAL TOOL C-4210

(10) Install locating ring on new bearing.

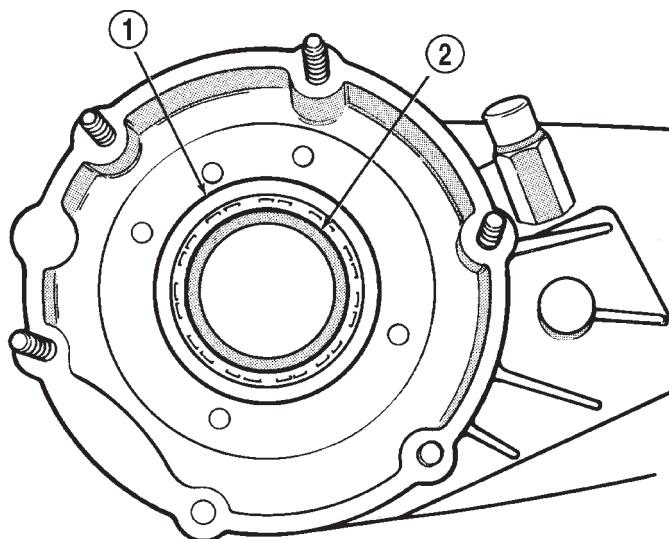
(11) Position case so forward end is facing upward.

(12) Using Remover C-4210 and Handle C-4171, drive input shaft bearing into case. The bearing locating ring must be fully seated against case surface (Fig. 50).

(13) Remove input gear pilot bearing by inserting a suitably sized drift into the splined end of the input gear and driving the bearing out with the drift and a hammer (Fig. 51).

(14) Install new pilot bearing with Installer 5065 and Handle C-4171 (Fig. 52).

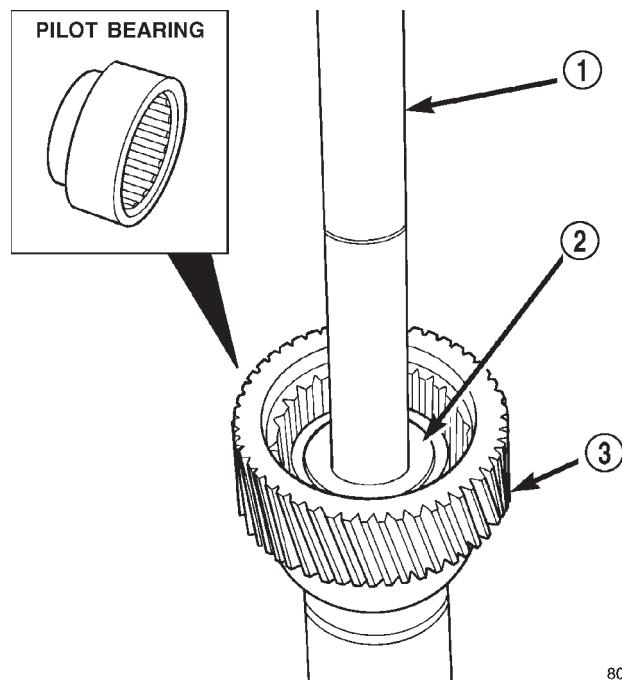
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-219

Fig. 50 Seating Input Shaft Bearing

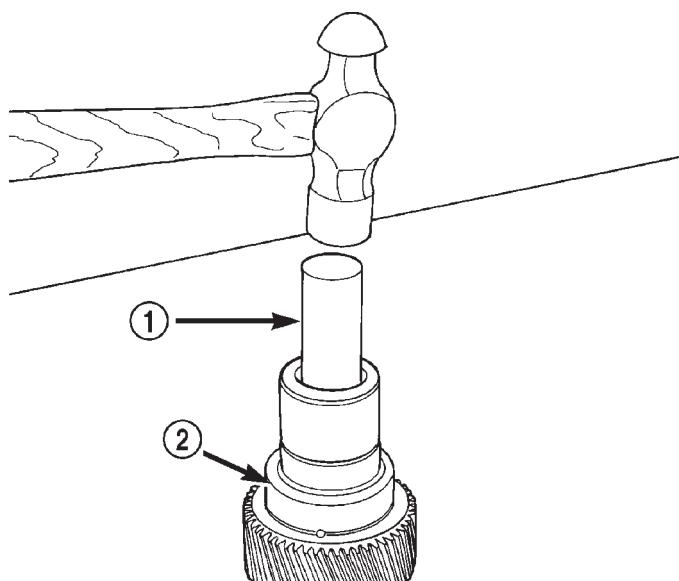
- 1 – SNAP RING
2 – INPUT SHAFT BEARING



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Fig. 52 Install Input Gear Pilot Bearing

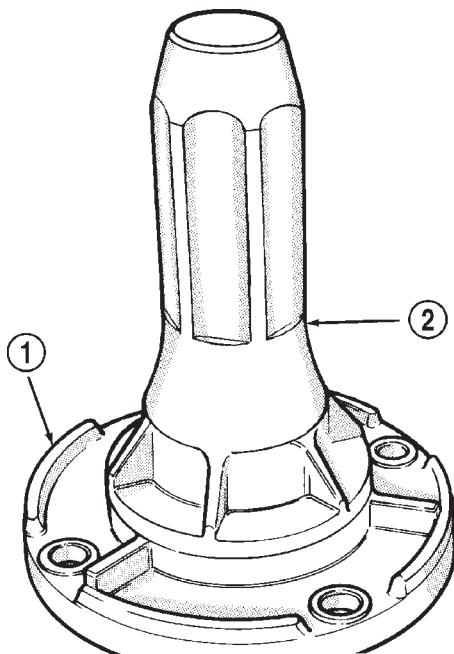
- 1 – SPECIAL TOOL C-4171
2 – SPECIAL TOOL 5065
3 – INPUT GEAR



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Fig. 51 Remove Input Gear Pilot Bearing

- 1 – DRIFT
2 – INPUT GEAR



J9521-41

Fig. 53 Install Front Bearing Retainer Seal

- 1 – FRONT BEARING RETAINER
2 – SPECIAL TOOL 7884

(15) Remove front bearing retainer seal with suitable pry tool.

(16) Install new front bearing retainer seal with Installer 7884 (Fig. 53).

(17) Remove seal from oil pump housing with a suitable pry tool

DISASSEMBLY AND ASSEMBLY (Continued)

(18) Install new seal in oil pump housing with Installer 7888 (Fig. 54).

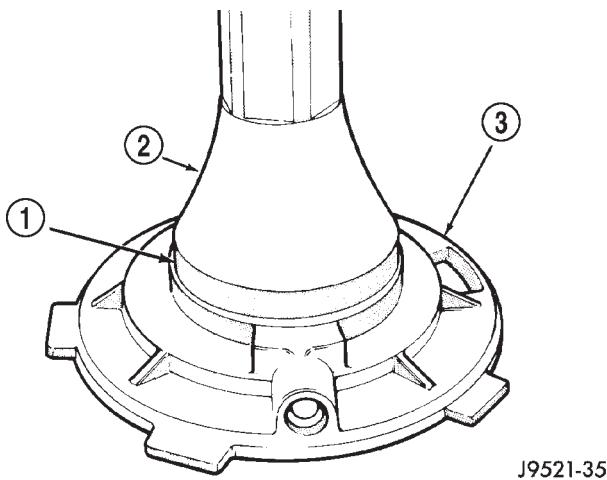


Fig. 54 Oil Pump Seal Installation

- 1 – HOUSING SEAL
- 2 – SPECIAL TOOL 7888
- 3 – OIL PUMP FEED HOUSING

(19) Remove rear retainer bearing with Installer 8128 and Handle C-4171.

(20) Install rear bearing in retainer with Handle C-4171 and Installer 5064 (Fig. 55).

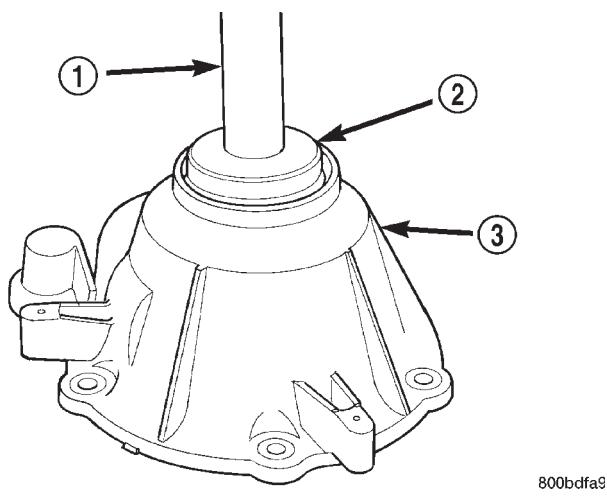


Fig. 55 Installing Rear Bearing In Retainer

- 1 – SPECIAL TOOL C-4171
- 2 – SPECIAL TOOL 5064
- 3 – REAR RETAINER

INPUT AND LOW RANGE GEAR ASSEMBLY

(1) Lubricate gears and thrust washers (Fig. 56) with recommended transmission fluid.

(2) Install first thrust washer in low range gear (Fig. 56). Be sure washer tabs are properly aligned in gear notches.

(3) Install input gear in low range gear. Be sure input gear is fully seated.

(4) Install remaining thrust washer in low range gear and on top of input gear. Be sure washer tabs are properly aligned in gear notches.

(5) Install retainer on input gear and install snap-ring.

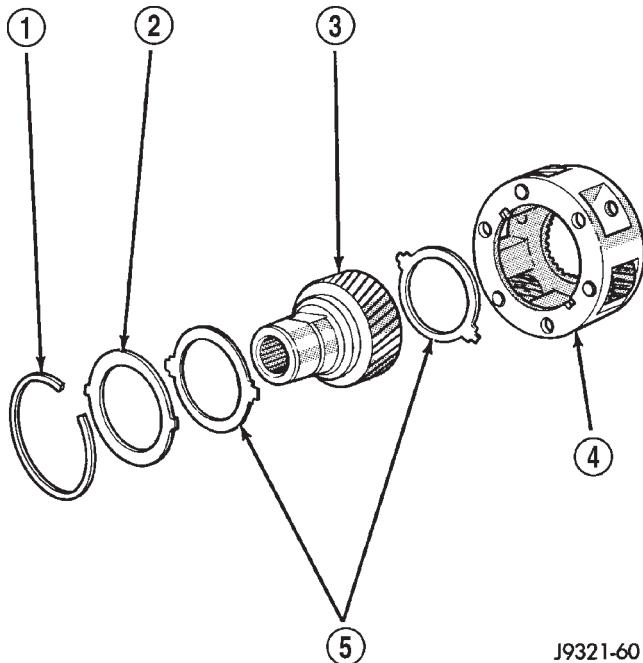


Fig. 56 Input/Low Range Gear Components

- 1 – SNAP RING
- 2 – RETAINER PLATE
- 3 – INPUT GEAR
- 4 – LOW RANGE GEAR
- 5 – THRUST WASHERS

INPUT GEAR AND LOW RANGE GEAR INSTALLATION

(1) Align and install low range/input gear assembly in front case (Fig. 57). Be sure low range gear pinions are engaged in annulus gear and that input gear shaft is fully seated in front bearing.

(2) Install snap-ring to hold input/low range gear into front bearing (Fig. 58).

(3) Clean gasket sealer residue from retainer and inspect retainer for cracks or other damage.

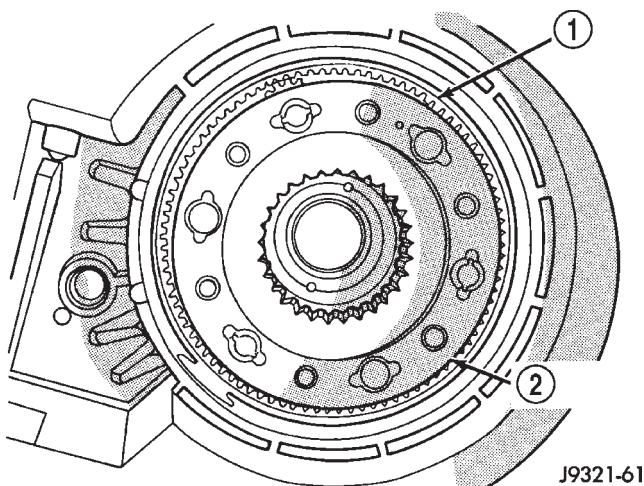
(4) Apply a 3 mm (1/8 in.) bead of Mopar® gasket maker or silicone adhesive to sealing surface of retainer.

(5) Align cavity in seal retainer with fluid return hole in front of case.

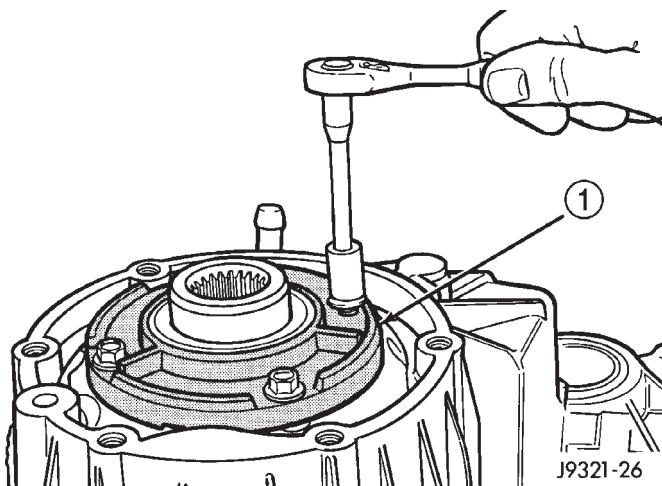
CAUTION: Do not block fluid return cavity on sealing surface of retainer when applying Mopar® gasket maker or silicone adhesive sealer. Seal failure and fluid leak can result.

(6) Install bolts to hold retainer to transfer case (Fig. 59). Tighten to 21 N·m (16 ft. lbs.) of torque.

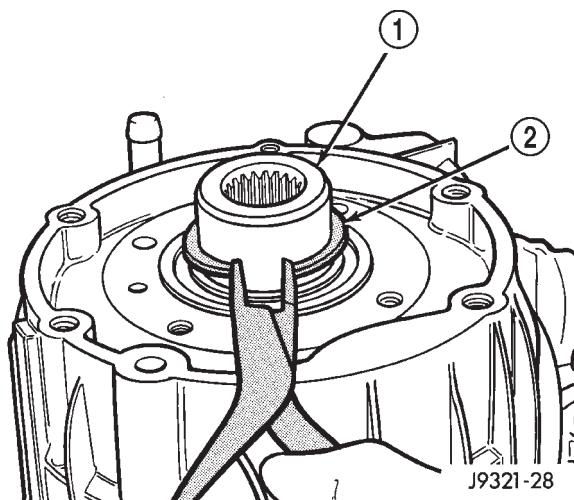
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 57 Input/Low Range Gear Installation**

- 1 – ANNULUS GEAR
2 – INPUT/LOW RANGE GEAR

**Fig. 59 Install Front Bearing Retainer**

- 1 – FRONT BEARING RETAINER

**Fig. 58 Install Snap-Ring**

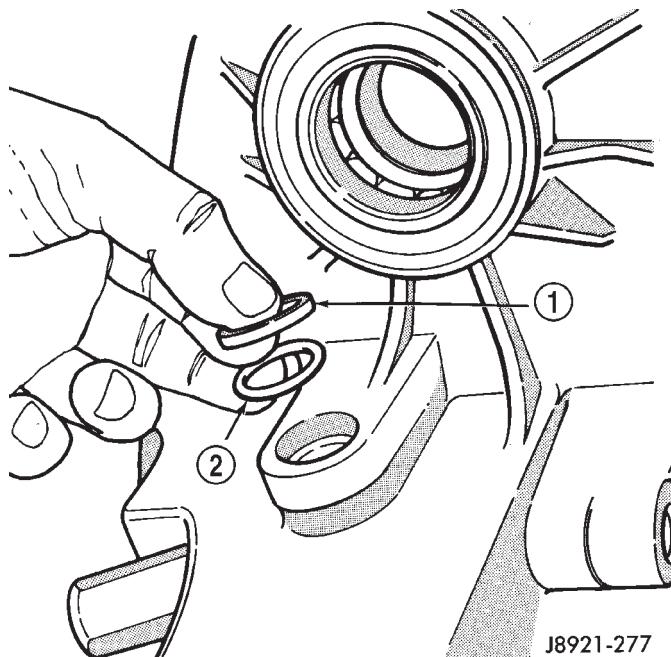
- 1 – INPUT GEAR
2 – SNAP RING

MAINSHAFT ASSEMBLY

- (1) Lubricate mainshaft splines with recommended transmission fluid.
- (2) Slide drive sprocket onto mainshaft.
- (3) Slide mode hub onto mainshaft.
- (4) Install mode hub retaining ring. Verify that the retaining ring is fully seated in mainshaft groove.

SHIFT FORKS AND MAINSHAFT INSTALLATION

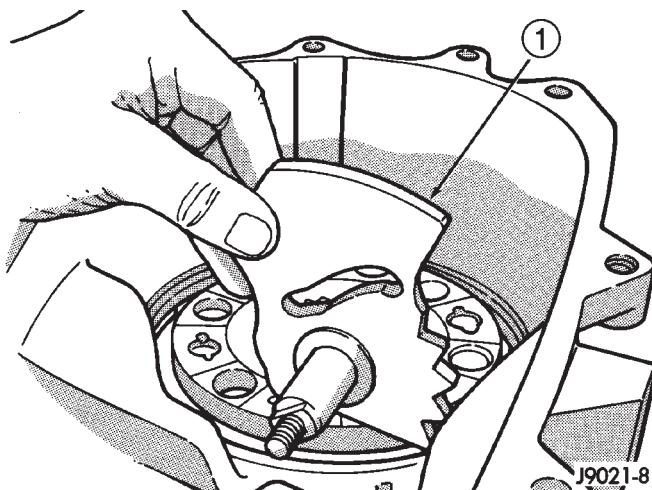
- (1) Install new sector shaft O-ring and bushing (Fig. 60).
- (2) Install shift sector in case (Fig. 61). Lubricate sector shaft with transmission fluid before installation.

**Fig. 60 Sector O-Ring And Bushing Installation**

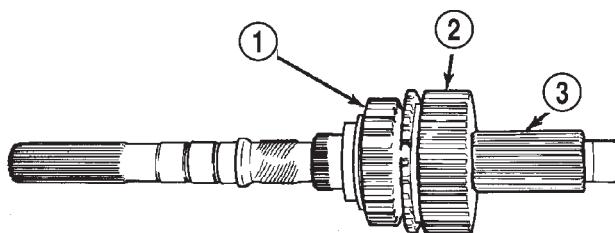
- 1 – SECTOR BUSHING
2 – O-RING

- (3) Install range lever, washer, and nut on sector shaft (Fig. 62). Tighten range lever nut to 27–34 N·m (20–25 ft. lbs.) torque.
- (4) Assemble and install range fork and hub (Fig. 63). Be sure hub is properly seated in low range gear and engaged to the input gear.
- (5) Align and insert range fork pin in shift sector slot.
- (6) Install assembled mainshaft (Fig. 64). Be sure shaft is seated in pilot bearing and input gear.
- (7) Install new pads on mode fork if necessary.

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 61 Shift Sector Installation**

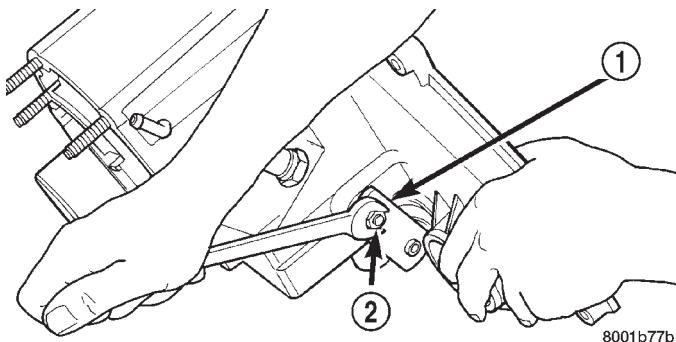
1 – SHIFT SECTOR



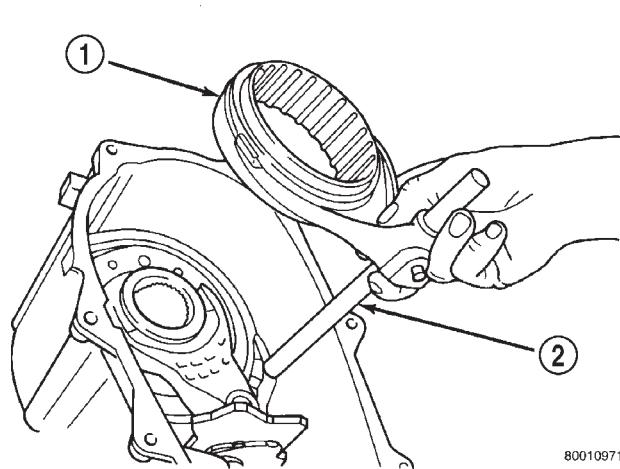
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Fig. 64 Mainshaft Assembly Installation

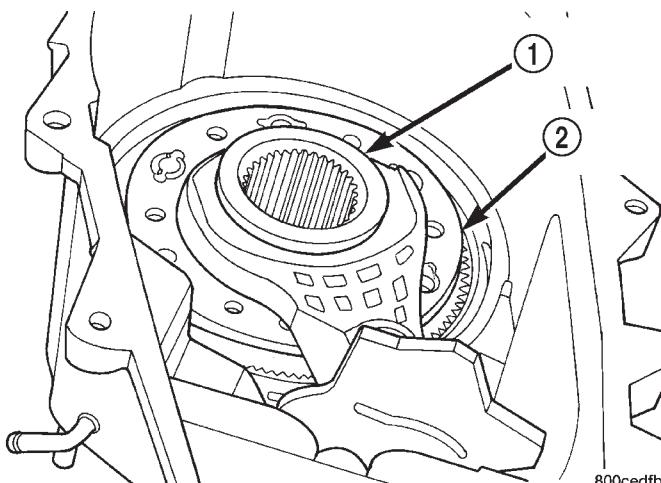
- 1 – DRIVE SPROCKET
- 2 – MODE HUB
- 3 – MAINSHAFT

**Fig. 62 Range Lever Installation**

- 1 – RANGE LEVER
- 2 – LEVER NUT

**Fig. 65 Assembling Mode Fork And Sleeve**

- 1 – MODE SLEEVE
- 2 – MODE FORK AND RAIL

**Fig. 63 Install Range Fork And Hub Assembly**

- 1 – RANGE HUB
- 2 – RANGE FORK

(9) Install assembled mode fork and sleeve (Fig. 66). Be sure fork rail goes through range fork and into case bore. Also be sure sleeve is aligned and seated on mainshaft hub.

(10) Rotate sector to Neutral position.

(11) Install new O-ring on detent plug (Fig. 67).

(12) Lubricate detent plunger with transmission fluid or light coat of petroleum jelly.

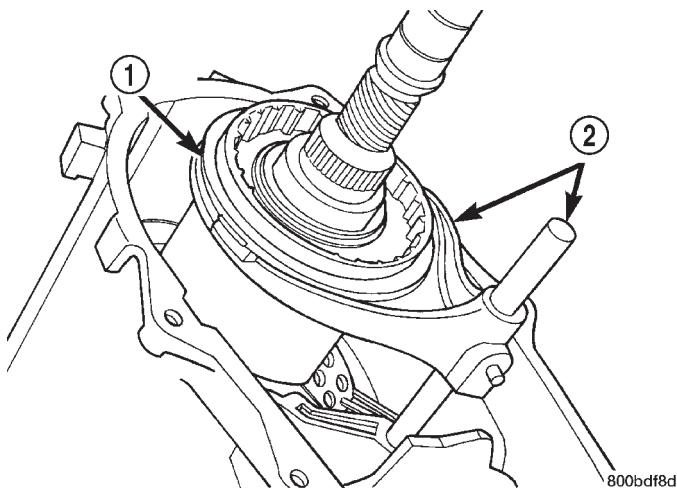
(13) Install detent plunger, spring and plug (Fig. 67).

(14) Verify that plunger is properly engaged in sector.

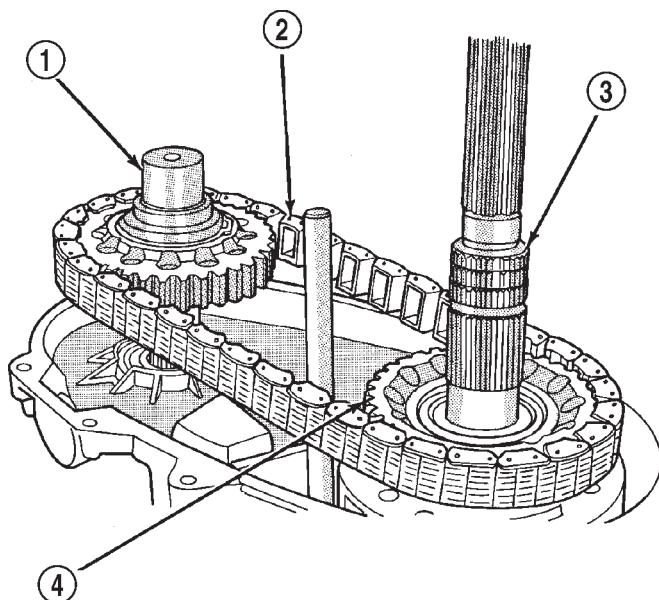
FRONT OUTPUT SHAFT AND DRIVE CHAIN INSTALLATION

(1) Lubricate front output shaft-sprocket assembly, drive chain, and drive sprocket with transmission fluid.

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 66 Mode Fork And Sleeve Installation**

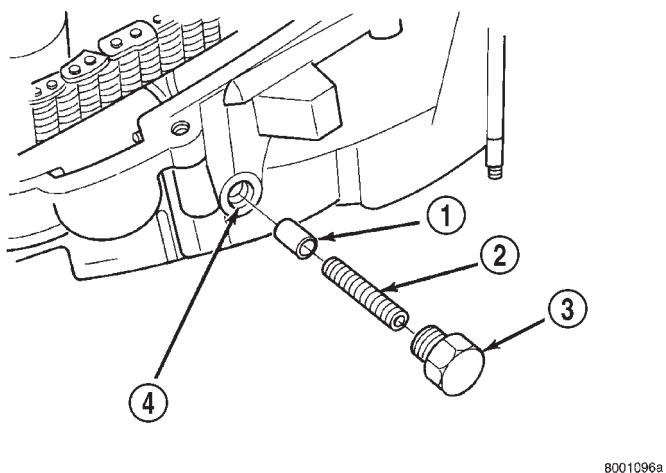
- 1 – MODE SLEEVE
2 – MODE FORK AND RAIL



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Fig. 68 Installing Drive Chain And Front Output Shaft

- 1 – FRONT OUTPUT SHAFT
2 – DRIVE CHAIN
3 – MAINSHAFT
4 – DRIVE SPROCKET

**Fig. 67 Shift Detent Components**

- 1 – POPPET
2 – SPRING
3 – SCREW
4 – POPPET BORE (IN CASE)

(2) Assemble drive chain and front output shaft (Fig. 68).

(3) Start chain on mainshaft drive sprocket.

(4) Guide front shaft into bearing and drive sprocket onto mainshaft drive gear (Fig. 68).

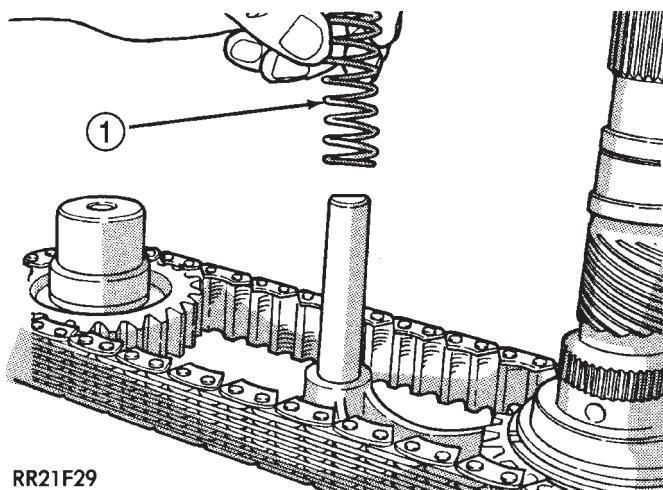
(5) Install mode spring on upper end of mode fork shift rail (Fig. 69).

OIL PUMP AND REAR CASE ASSEMBLY/INSTALLATION

(1) Install magnet in front case pocket (Fig. 70).

(2) Assemble oil pickup screen, connecting hose, and tube.

(3) Install new pickup tube O-ring in oil pump (Fig. 71).

**Fig. 69 Install Mode Fork Spring**

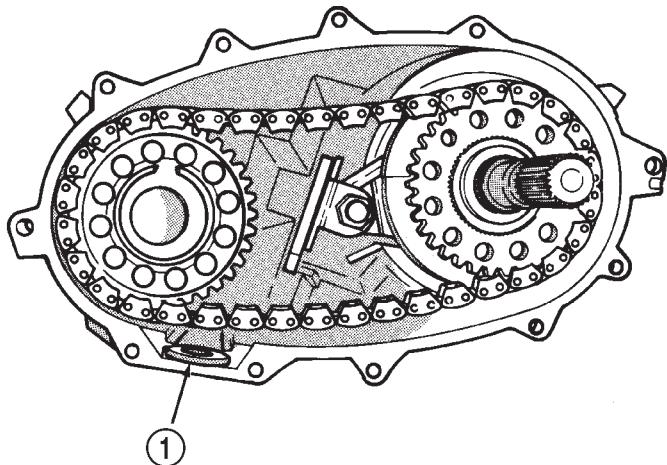
- 1 – MODE SPRING

(4) Insert oil pickup tube in oil pump inlet.

(5) Position assembled oil pump and pickup tube in rear case. Be sure pickup screen is securely seated in case slot. Also be sure oil pump locating tabs are outside rear case (Fig. 72).

(6) Apply 3 mm (1/8 in.) wide bead of Mopar® gasket maker or silicone adhesive sealer to mounting

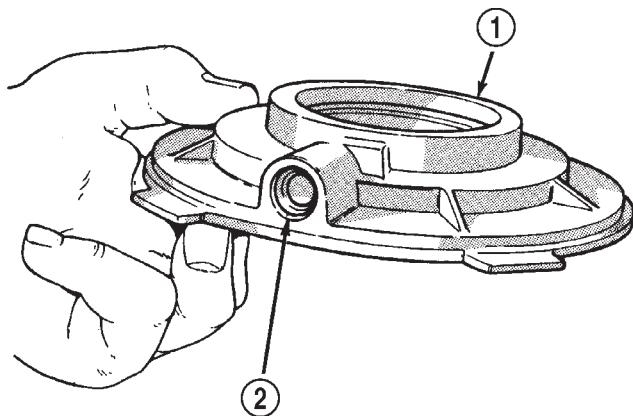
DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 70 Installing Case Magnet

1 – MAGNET



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Fig. 71 Pickup Tube O-Ring Position

1 – OIL PUMP

2 – O-RING

flange of front case. Work sealer bead around bolt holes.

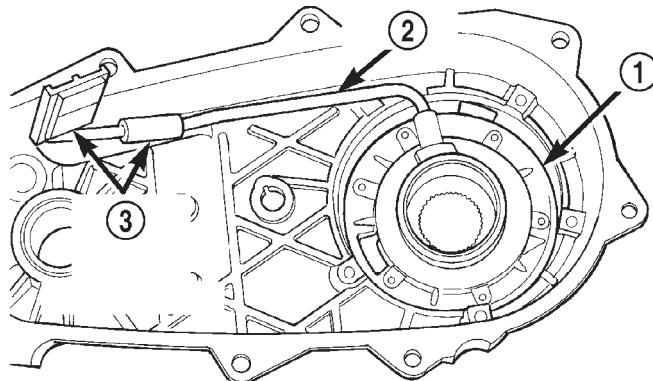
(7) Lift rear case and oil pump and carefully position assembly on front case. Be sure case dowels are aligned and that mode fork rail extends through rear case before seating rear case on front case.

(8) Install case attaching bolts. Alignment bolts at each end of case are only ones requiring washers (Fig. 73).

(9) Tighten case bolts to 27-34 N·m (20-25 ft. lbs.) torque.

YOKE AND RANGE LEVER INSTALLATION

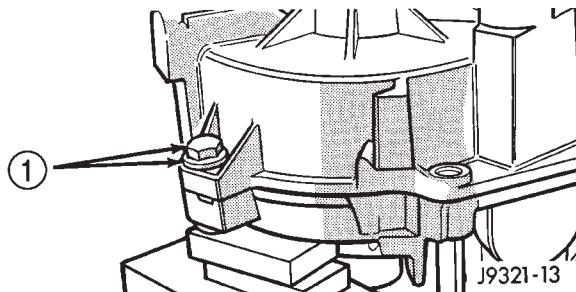
(1) Install indicator switch in front case. Tighten switch to 20-34 N·m (15-25 ft. lbs.) torque.



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Fig. 72 Oil Pump And Pickup Tube Installation

- 1 – OIL PUMP
- 2 – PICKUP TUBE
- 3 – PICKUP SCREEN AND CONNECTOR



J9321-13

Fig. 73 Alignment Bolt Location

1 – ALIGNMENT BOLT AND WASHER (AT EACH END OF CASE)

(2) Install range lever, washer and locknut on sector shaft (Fig. 74). Tighten locknut to 27-34 N·m (20-25 ft. lbs.) torque.

(3) Install new seal washer on front output shaft (Fig. 76).

(4) Lubricate yoke hub with transmission fluid and install yoke on front shaft.

(5) Install new seal washer on front shaft.

(6) Install yoke and new yoke nut on front output shaft (Fig. 75).

(7) Tighten yoke nut to 122-176 N·m (90-130 ft. lbs.) torque. Use Tool C-3281, or similar tool to hold yoke while tightening yoke nut.

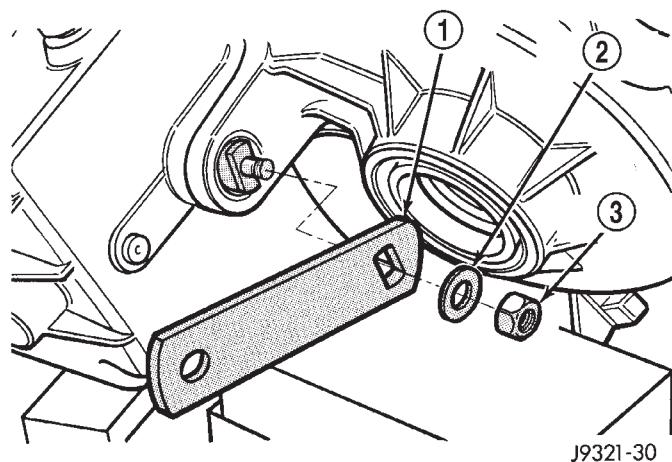
REAR RETAINER INSTALLATION

(1) Apply bead of Mopar® Sealer P/N 82300234, or Loctite™ Ultra Gray, to mating surface of rear retainer. Sealer bead should be a maximum of 3/16 inch.

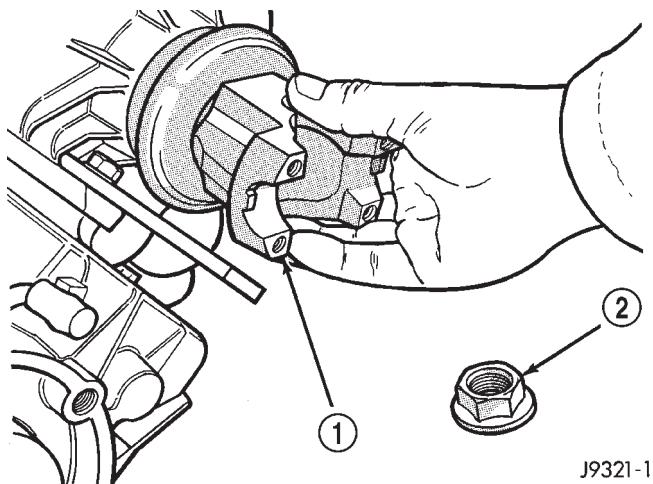
(2) Install rear retainer on rear case. Tighten retainer bolts to 20-27 N·m (15-20 ft. lbs.) torque.

(3) Install rear bearing I. D. retaining ring and spacer on output shaft.

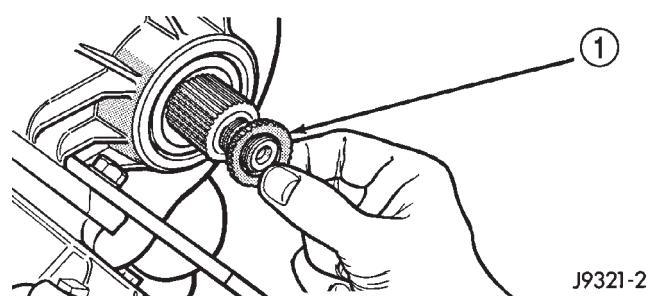
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 74 Range Lever Installation**

- 1 - RANGE LEVER
- 2 - WASHER
- 3 - LOCKNUT

**Fig. 75 Output Shaft Yoke Installation**

- 1 - OUTPUT SHAFT YOKE
- 2 - YOKE NUT

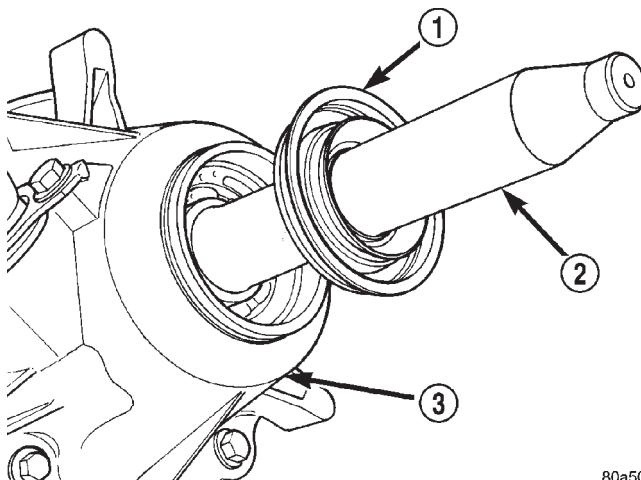
**Fig. 76 Yoke Seal Washer Installation**

- 1 - YOKE SEAL WASHER

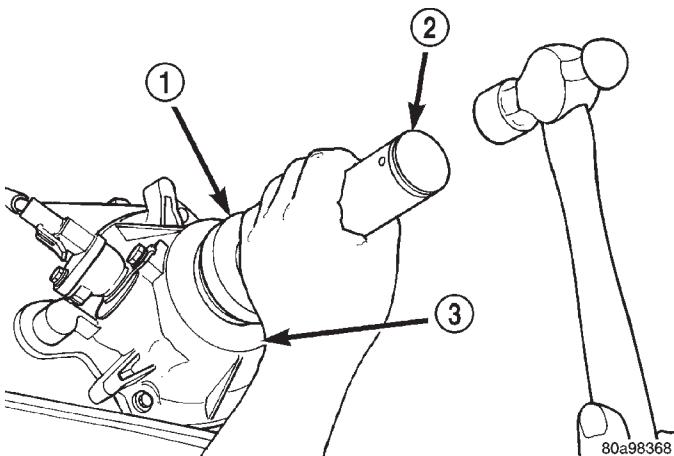
(4) Apply liberal quantity of petroleum jelly to new rear seal and to output shaft. Petroleum jelly is needed to protect seal lips during installation.

(5) Slide seal onto Seal Protector 6992 (Fig. 77). Slide seal protector and seal onto output shaft.

(6) Slide Installer C-4076-B onto seal protector with the recessed side of the tool toward the seal. Drive seal into rear bearing retainer with Installer C-4076-B and Handle MD-998323 (Fig. 78).

**Fig. 77 Output Shaft Seal and Protector**

- 1 - OUTPUT SHAFT SEAL
- 2 - SPECIAL TOOL 6992
- 3 - TRANSFER CASE

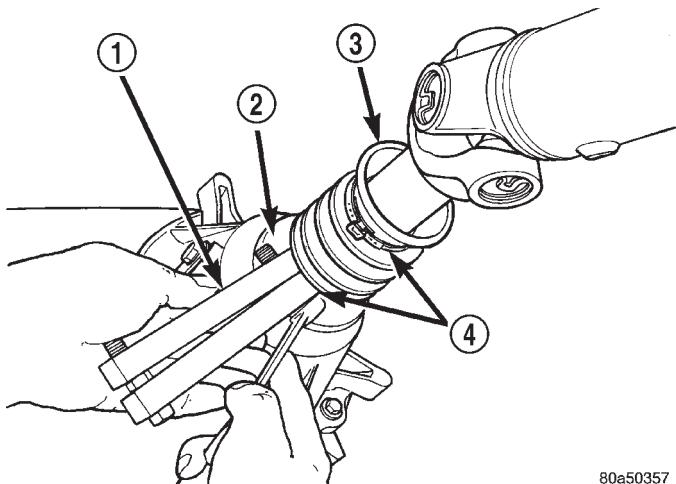
**Fig. 78 Rear Seal Installation**

- 1 - SPECIAL TOOL C-4076-B
- 2 - SPECIAL TOOL MD998323
- 3 - TRANSFER CASE

(7) Install rear slinger with Installer 8408.

(8) Install boot on output shaft slinger and crimp retaining clamp with tool C-4975-A (Fig. 79).

CLEANING AND INSPECTION (Continued)



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Fig. 79 Slinger Boot Installation

- 1 - SPECIAL TOOL C-4975-A
 2 - SLINGER
 3 - BOOT
 4 - CLAMP

CLEANING AND INSPECTION

NV231 TRANSFER CASE

Clean the transfer case parts with a standard parts cleaning solvent. Remove all traces of sealer from the cases and retainers with a scraper and 3M all purpose cleaner. Use compressed air to remove solvent residue from oil feed passages in the case halves, retainers, gears, and shafts.

The oil pickup screen can be cleaned with solvent. Shake excess solvent from the screen after cleaning and allow it to air dry. Do not use compressed air.

MAINSHAFT/SPROCKET/HUB INSPECTION

Inspect the splines on the hub and shaft and the teeth on the sprocket (Fig. 80). Minor nicks and scratches can be smoothed with an oilstone. However, replace any part that is damaged.

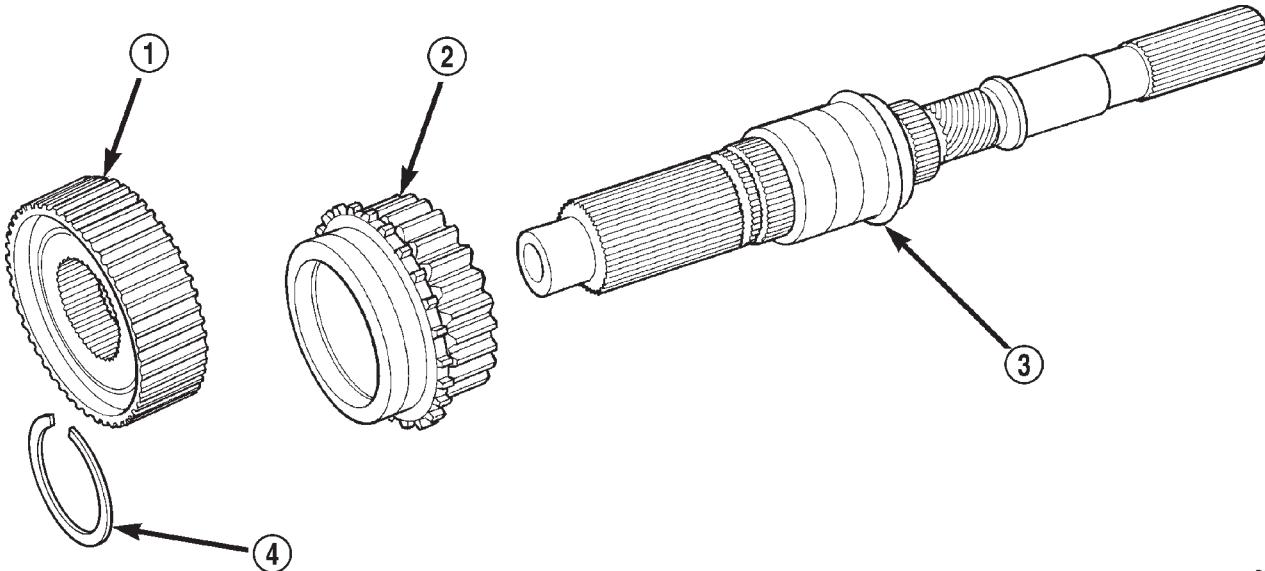
Check the contact surfaces in the sprocket bore and on the mainshaft. Minor nicks and scratches can be smoothed with 320–400 grit emery cloth but do not try to salvage the shaft if nicks or wear is severe.

INPUT GEAR AND PLANETARY CARRIER

Check the teeth on the gear (Fig. 81). Minor nicks can be dressed off with an oilstone but replace the gear if any teeth are broken, cracked, or chipped. The bearing surface on the gear can be smoothed with 300–400 grit emery cloth if necessary.

Examine the carrier body and pinion gears for wear or damage. The carrier will have to be replaced as an assembly if the body, pinion pins, or pinion gears are damaged.

Check the lock ring and both thrust washers for wear or cracks. Replace them if necessary. Also replace the lock retaining ring if bent, distorted, or broken.



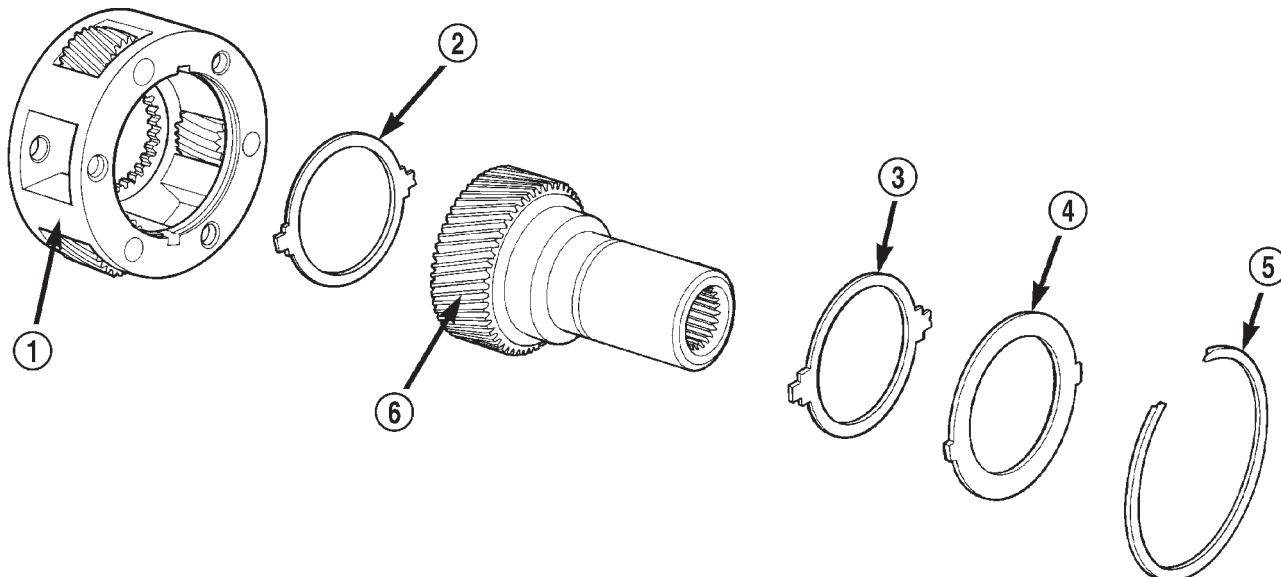
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Fig. 80 Mainshaft, Mode Hub, And Drive Sprocket

- 1 - MODE HUB
 2 - DRIVE SPROCKET

- 3 - MAINSHAFT
 4 - MODE HUB RETAINING RING

CLEANING AND INSPECTION (Continued)



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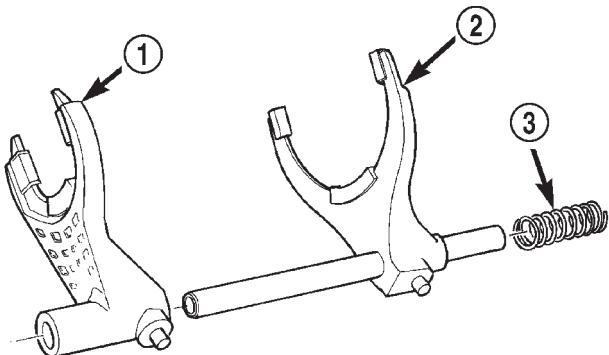
Fig. 81 Input Gear And Carrier Components

- 1 – PLANETARY CARRIER
 2 – REAR THRUST WASHER
 3 – FRONT THRUST WASHER

- 4 – CARRIER LOCK RING
 5 – CARRIER LOCK RETAINING RING
 6 – INPUT GEAR

SHIFT FORKS/HUBS/SLEEVES

Check condition of the shift forks and mode fork shift rail (Fig. 82). Minor nicks on the shift rail can be smoothed with 320–400 grit emery cloth.



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Fig. 82 Shift forks

- 1 – RANGE FORK
 2 – MODE FORK AND RAIL
 3 – MODE SPRING

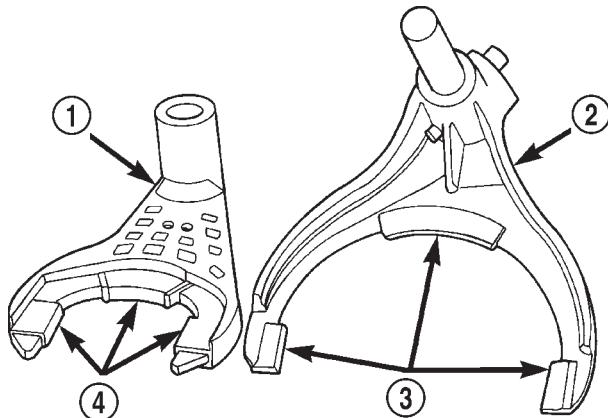
Inspect the shift fork wear pads (Fig. 83). The mode fork pads are serviceable and can be replaced if necessary. The range fork pads are not serviceable.

The fork must be replaced as an assembly if the pads are worn or damaged.

Check both of the sleeves for wear or damage, especially on the interior teeth. Replace the sleeves if wear or damage is evident.

REAR RETAINER/BEARING/ SEAL/SLINGER/BOOT

Inspect the retainer components (Fig. 84). Replace the bearing if rough or noisy. Check the retainer for



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Fig. 83 Shift Fork And Wear Pad Locations

- 1 – RANGE FORK
 2 – MODE FORK
 3 – WEAR PADS (SERVICEABLE)
 4 – WEAR PADS (NON-SERVICEABLE)

CLEANING AND INSPECTION (Continued)

cracks or wear in the bearing bore. Clean the retainer sealing surfaces with a scraper and 3M all purpose cleaner. This will ensure proper adhesion of the sealer during reassembly.

Replace the slinger and seal outright; do not reuse either part.

Replace any part if distorted, bent, or broken. Also replace the boot if cut or torn. Replace the boot band clamps, do not reuse them.

REAR OUTPUT SHAFT/YOKE/DRIVE CHAIN

Check condition of the seal contact surfaces of the yoke slinger (Fig. 85). This surface must be clean and smooth to ensure proper seal life. Replace the yoke nut and seal washer as neither part should be reused.

Inspect the shaft threads, sprocket teeth, and bearing surfaces. Minor nicks on the teeth can be smoothed with an oilstone. Use 320-400 grit emery to smooth minor scratches on the shaft bearing surfaces. Rough threads on the shaft can be chased if necessary. Replace the shaft if the threads are damaged, bearing surfaces are scored, or if any sprocket teeth are cracked or broken.

Examine the drive chain and shaft bearings. Replace the chain and both sprockets if the chain is stretched, distorted, or if any of the links bind. Replace the bearings if rough, or noisy.

LOW RANGE ANNULUS GEAR

Inspect annulus gear condition carefully. The gear is only serviced as part of the front case. If the gear is damaged, it will be necessary to replace the gear and front case as an assembly. Do not attempt to remove the gear (Fig. 86)

FRONT-REAR CASES AND FRONT RETAINER

Inspect the cases and retainer for wear and damage. Clean the sealing surfaces with a scraper and 3M all purpose cleaner. This will ensure proper sealer adhesion at assembly. Replace the input retainer seal; do not reuse it.

Check case condition. If leaks were a problem, look for gouges and severe scoring of case sealing surfaces. Also make sure the front case mounting studs are in good condition.

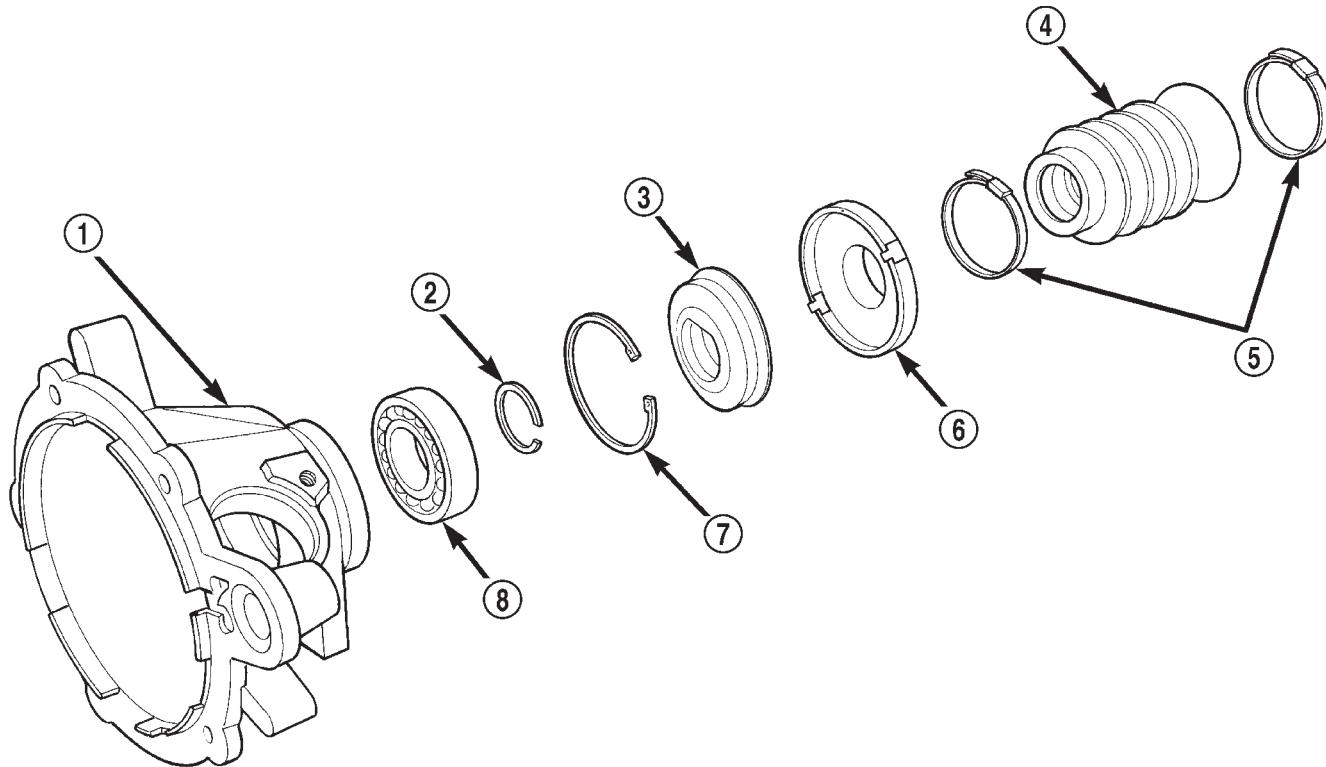


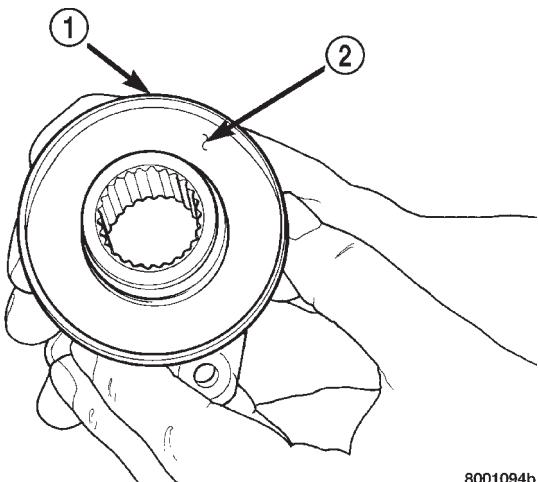
Fig. 84 Rear Retainer Components

80c070f4

- 1 – REAR RETAINER
- 2 – REAR BEARING I. D. RETAINING RING
- 3 – REAR SEAL
- 4 – BOOT

- 5 – BAND CLAMPS
- 6 – REAR SLINGER
- 7 – REAR BEARING O. D. RETAINING RING
- 8 – REAR BEARING

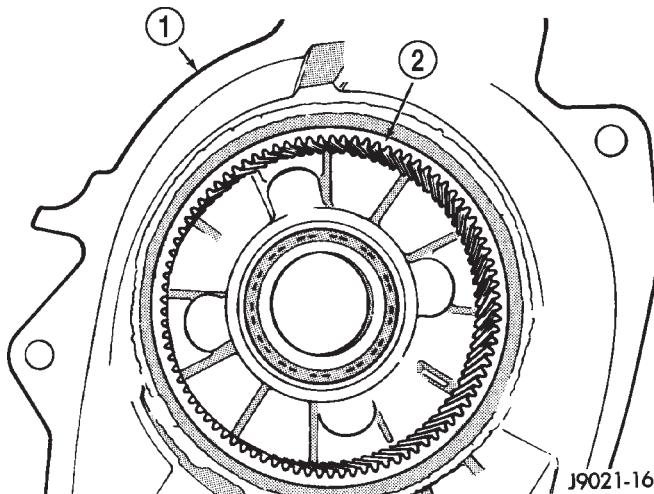
CLEANING AND INSPECTION (Continued)



8001094b

Fig. 85 Seal Contact Surface Of Yoke Slinger

- 1 – FRONT SLINGER (PART OF YOKE)
2 – SEAL CONTACT SURFACE MUST BE CLEAN AND SMOOTH

**Fig. 86 Low Range Annulus Gear**

- 1 – FRONT CASE
2 – LOW RANGE ANNULUS GEAR

Check the front case mounting studs and vent tube. The tube can be secured with Loctite 271 or 680 if loose. The stud threads can be cleaned up with a die if necessary. Also check condition of the fill/drain plug threads in the rear case. The threads can be repaired with a thread chaser or tap if necessary. Or the threads can be repaired with Helicoil stainless steel inserts if required.

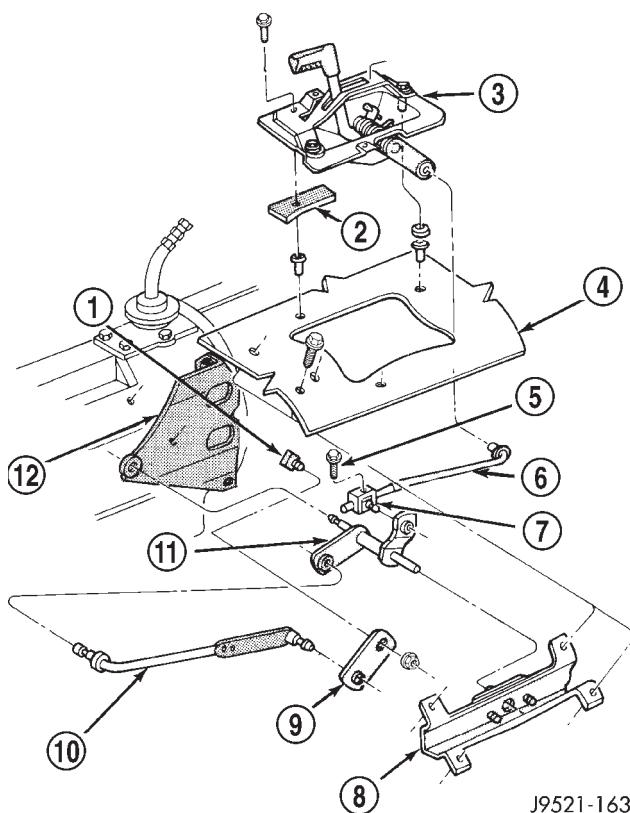
OIL PUMP/OIL PICKUP

Examine the oil pump pickup parts. Replace the pump if any part appears to be worn or damaged. Do not disassemble the pump as individual parts are not available. The pump is only available as a complete

assembly. The pickup screen, hose, and tube are the only serviceable parts and are available separately.

ADJUSTMENTS**SHIFT LINKAGE ADJUSTMENT**

- (1) Shift transfer case into 4L position.
- (2) Raise vehicle.
- (3) Loosen lock bolt on adjusting trunnion (Fig. 87).
- (4) Be sure linkage rod slides freely in trunnion. Clean rod and apply spray lube if necessary.
- (5) Verify that transfer case range lever is fully engaged in 4L position.
- (6) Tighten adjusting trunnion lock bolt.
- (7) Lower vehicle.

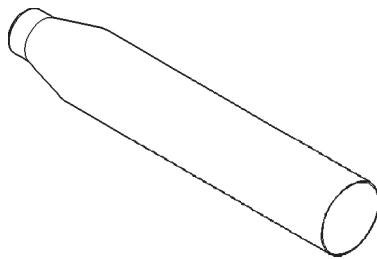
**Fig. 87 Shift Linkage**

- 1 – TRANSFER CASE SHIFT LEVER SHAFT
2 – SEAL
3 – TRANSFER CASE SHIFT LEVER ASSEMBLY
4 – FLOORPAN
5 – TRUNNION LOCK BOLT
6 – SHIFT ROD
7 – ADJUSTING TRUNNION
8 – TORQUE SHAFT BRACKET
9 – RANGE LEVER
10 – TORQUE SHAFT ROD
11 – TORQUE SHAFT
12 – LINKAGE BRACKET

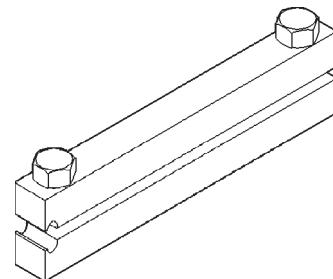
SPECIFICATIONS

TORQUE

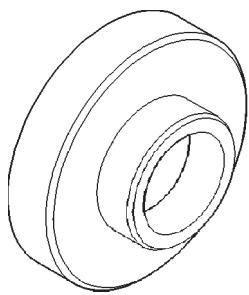
DESCRIPTION	TORQUE
Plug, Detent	16–24 N·m (12–18 ft. lbs.)
Plug, Drain/Fill	20–34 N·m (15–25 ft. lbs.)
Bolt, Front Brg. Retainer	21 N·m (16 ft. lbs.)
Bolt, Front Brg. Retainer	21 N·m (16 ft. lbs.)
Bolt, Case Half	27–34 N·m (20–25 ft. lbs.)
Nut, Front Yoke	122–176 N·m (90–130 ft. lbs.)
Nut, Range Lever	27–34 N·m (20–25 ft. lbs.)
Bolt, Rear Retainer	35–46 N·m (26–34 ft. lbs.)
Nuts, Mounting	35–47 N·m (26–35 ft. lbs.)
Switch, Indicator	20–34 N·m (15–25 ft. lbs.)



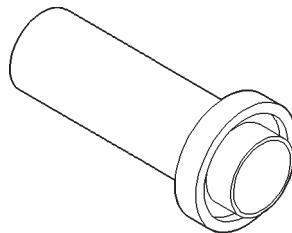
Seal Protector—6992



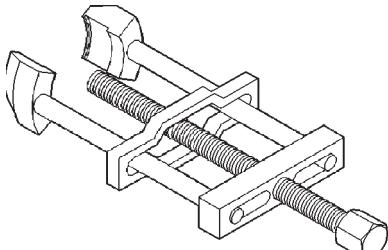
Installer, Boot Clamp—C-4975-A



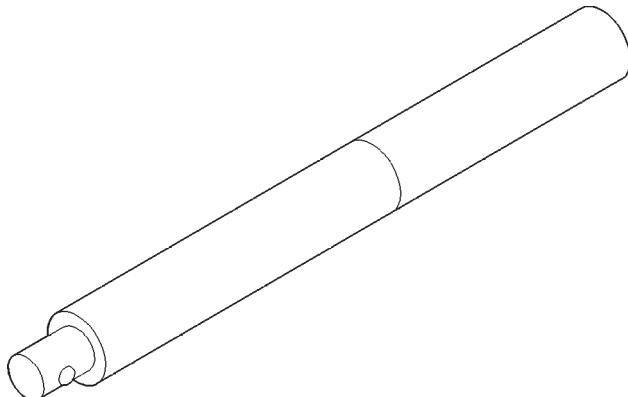
Installer—C-4076-B



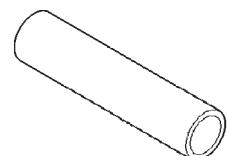
Installer, Seal—8143



Puller, Slinger—MD-998056-A

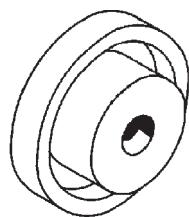


Handle, Universal—C-4171

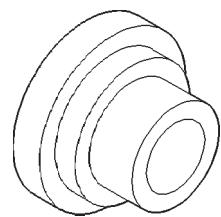


Installer—MD-998323

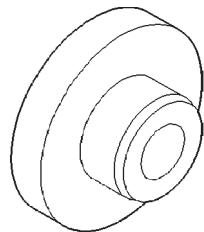
SPECIAL TOOLS (Continued)



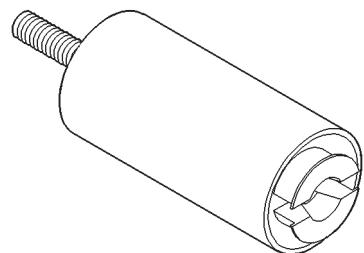
Installer, Seal—C-4210



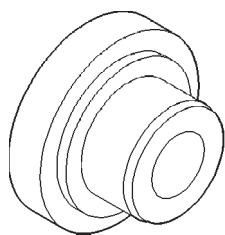
Installer, Bearing—8128



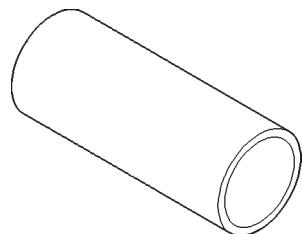
Installer, Bearing—5064



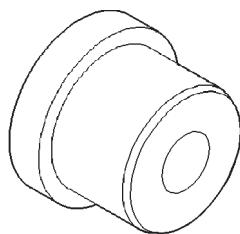
Remover—L-4454



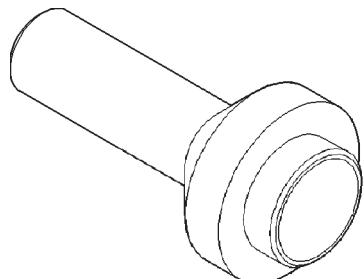
Installer, Bearing—5065



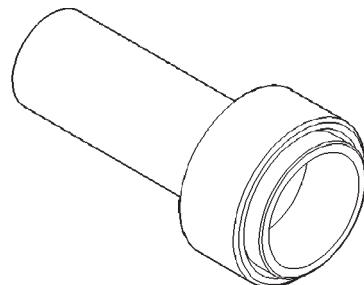
Cup—8148



Installer, Bushing—5066



Installer, Seal—7884



Installer, Pump Housing Seal—7888

NV242 TRANSFER CASE

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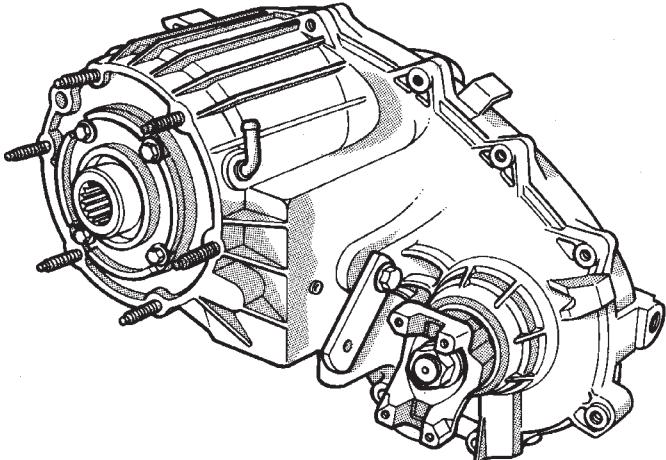
DESCRIPTION AND OPERATION

NV242 TRANSFER CASE

DESCRIPTION

The NV242 is a full-time transfer case (Fig. 1). It provides full time 2-wheel, or 4-wheel drive operation.

A differential in the transfer case is used to control torque transfer to the front and rear axles. A low range gear provides increased low speed torque capability for off road operation. The low range provides a 2.72:1 reduction ratio.



J8921-243

Fig. 1 NV242 Transfer Case

The input gear is splined to the transmission output shaft. It drives the mainshaft through the planetary gear and range hub. The front output shaft is operated by a drive chain that connects the shaft to a

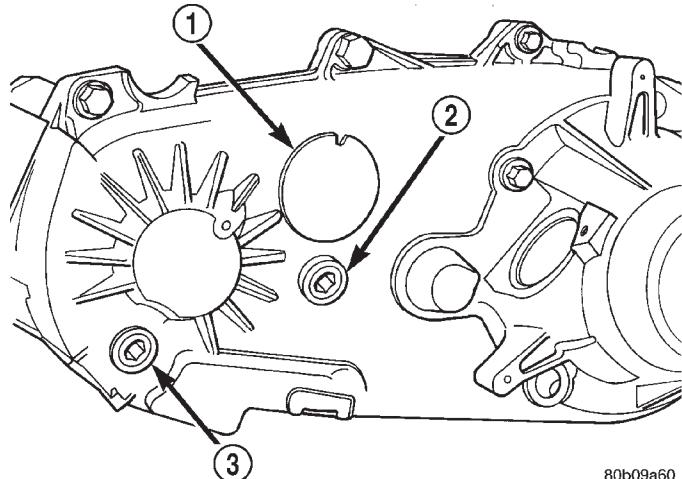
drive sprocket on the mainshaft. The drive sprocket is engaged/disengaged by the mode fork, which operates the mode sleeve and hub. The sleeve and hub are not equipped with a synchro mechanism for shifting.

The geartrain is mounted in two aluminum case halves attached with bolts. The mainshaft front and rear bearings are mounted in aluminum retainer housings bolted to the case halves.

TRANSFER CASE IDENTIFICATION

A circular ID tag is attached to the rear case of each transfer case (Fig. 2). The ID tag provides the transfer case model number, assembly number, serial number, and low range ratio.

The transfer case serial number also represents the date of build.



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Fig. 2 Fill/Drain Plug And I. D. Tag Locations

- 1 – I. D. TAG
- 2 – FILL PLUG
- 3 – DRAIN PLUG

DESCRIPTION AND OPERATION (Continued)

OPERATING RANGES

NV242 operating ranges are 2WD (2-wheel drive), 4x4 part-time, 4x4 full time, and 4 Lo.

The 2WD and 4x4 full time ranges can be used at any time and on any road surface.

The 4x4 part-time and 4 Lo ranges are for off road use only. The only time these ranges can be used on hard surface roads, is when the surface is covered with snow and ice.

SHIFT MECHANISM

Operating ranges are selected with a floor mounted shift lever. The shift lever is connected to the transfer case range lever by an adjustable linkage rod. A straight line shift pattern is used. Range positions are marked on the shifter bezel cover plate, or on the shift knob.

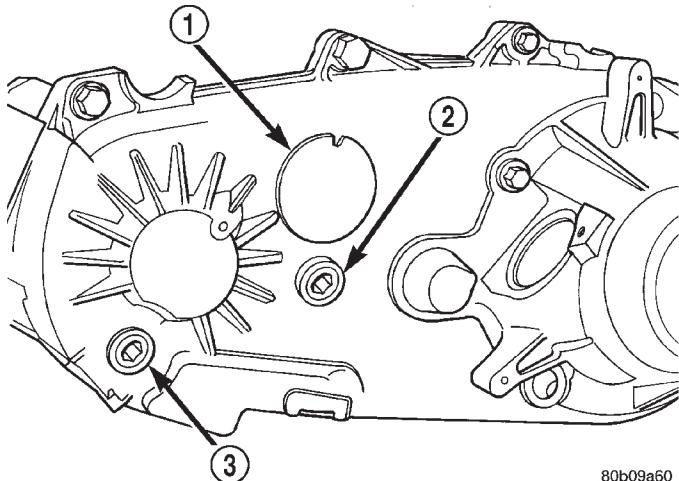
LUBRICANT AND FILL LEVEL

DESCRIPTION

Recommended lubricant for the NV242 transfer case is Mopar® Dexron II, or ATF Plus, type 7176. Approximate lubricant fill capacity is 1.35 liters (2.85 pints).

The fill and drain plugs are both in the rear case (Fig. 3). Correct fill level is to the bottom edge of the

fill plug hole. Be sure the vehicle is level to ensure an accurate fluid level check.



80b09a60

Fig. 3 Fill/Drain Plug Locations

- 1 – I. D. TAG
- 2 – FILL PLUG
- 3 – DRAIN PLUG

DIAGNOSIS AND TESTING

NV242 DIAGNOSIS

DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
Transfer case difficult to shift or will not shift into desired range.	1) Transfer case shift linkage binding. 2) Insufficient or incorrect lubricant. 3) Internal transfer case components binding, worn, or damaged.	1) Repair or replace linkage as necessary. 2) Drain and refill transfer case with the correct type and quantity of lubricant. 3) Repair or replace components as necessary.
Transfer case noisy in all drive modes.	1) Insufficient or incorrect lubricant.	1) Drain and refill transfer case with the correct type and quantity of lubricant.
Lubricant leaking from transfer case seals or vent.	1) Transfer case overfilled. 2) Transfer case vent closed or restricted. 3) Transfer case seals damaged or installed incorrectly.	1) Drain lubricant to the correct level. 2) Clean or replace vent as necessary. 3) Replace suspect seal.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
Transfer case will not shift through 4X4 part time range (light remains on)	1) Incomplete shift due to drivetrain torque load.	1) Momentarily release the accelerator pedal to complete the shift.
	2) Incorrect tire pressure.	2) Correct tire pressure as necessary.
	3) Excessive Tire wear.	3) Correct tire condition as necessary.
	4) Excessive vehicle loading.	4) Correct as necessary.

REMOVAL AND INSTALLATION

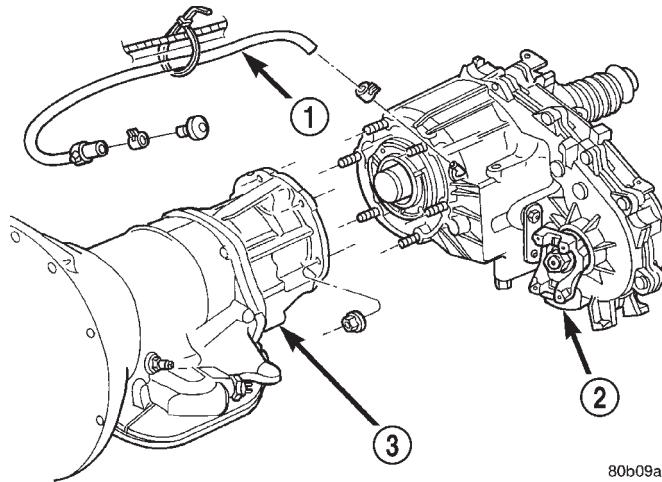
TRANSFER CASE

REMOVAL

- (1) Shift transfer case into Neutral.
- (2) Raise vehicle.
- (3) Drain transfer case lubricant.
- (4) Mark front and rear propeller shaft yokes for alignment reference.
- (5) Support transmission with jack stand.
- (6) Remove rear crossmember, or skid plate.
- (7) Disconnect front/rear propeller shafts at transfer case.
- (8) Disconnect vehicle speed sensor wires.
- (9) Disconnect transfer case linkage rod from range lever.
- (10) Disconnect transfer case vent hose (Fig. 4) and indicator switch harness, if necessary.
- (11) Support transfer case with transmission jack.
- (12) Secure transfer case to jack with chains.
- (13) Remove nuts attaching transfer case to transmission.
- (14) Pull transfer case and jack rearward to disengage transfer case.
- (15) Remove transfer case from under vehicle.

INSTALLATION

- (1) Mount transfer case on a transmission jack.
- (2) Secure transfer case to jack with chains.
- (3) Position transfer case under vehicle.
- (4) Align transfer case and transmission shafts and install transfer case on transmission.
- (5) Install and tighten transfer case attaching nuts to 35 N·m (26 ft. lbs.) torque (Fig. 4).
- (6) Connect vehicle speed sensor wires, and vent hose.
- (7) Connect indicator switch harness to transfer case switch, if necessary. Secure wire harness to clips on transfer case.
- (8) Align and connect propeller shafts. Refer to Group 3, Differential and Driveline, for proper procedures and specifications.



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Fig. 4 Transfer Case Mounting

- 1 – VENT TUBE
2 – TRANSFER CASE
3 – TRANSMISSION

(9) Fill transfer case with correct fluid. Check transmission fluid level. Correct as necessary.

(10) Install rear crossmember, or skid plate. Tighten crossmember bolts to 41 N·m (30 ft. lbs.) torque.

- (11) Remove transmission jack and support stand.
- (12) Connect shift rod to transfer case range lever.
- (13) Adjust transfer case shift linkage.
- (14) Lower vehicle and verify transfer case shift operation.

SHIFT LEVER

REMOVAL

- (1) Shift transfer case into 4L.
- (2) Raise vehicle.
- (3) Loosen adjusting trunnion locknut and slide shift rod out of trunnion (Fig. 5). If rod lacks enough travel to come out of trunnion, push trunnion out of torque shaft.
- (4) Lower vehicle.
- (5) Remove console. Refer to Group 23, Body, for proper procedures.

REMOVAL AND INSTALLATION (Continued)

(6) Remove screws attaching lever assembly to floorpan and remove assembly and shift rod (if left attached).

INSTALLATION

(1) If shift rod was not removed from lever assembly, work rod down through floorpan opening. Then position lever assembly on floorpan and install assembly attaching screws.

(2) Install console. Refer to Group 23, Body, for proper procedures.

(3) Raise vehicle.

(4) Connect trunnion to torque shaft arm. Or, slide shift rod into trunnion on range lever. Be sure shift rod slides freely in trunnion.

(5) Verify that range lever is in 4L position. Then tighten trunnion lock bolt.

(6) Lower vehicle and check transfer case shift operation.

SPEEDOMETER

REMOVAL

(1) Raise vehicle.

(2) Disconnect wires from vehicle speed sensor.

(3) Remove adapter clamp and screw (Fig. 6).

(4) Remove speed sensor and speedometer adapter as an assembly.

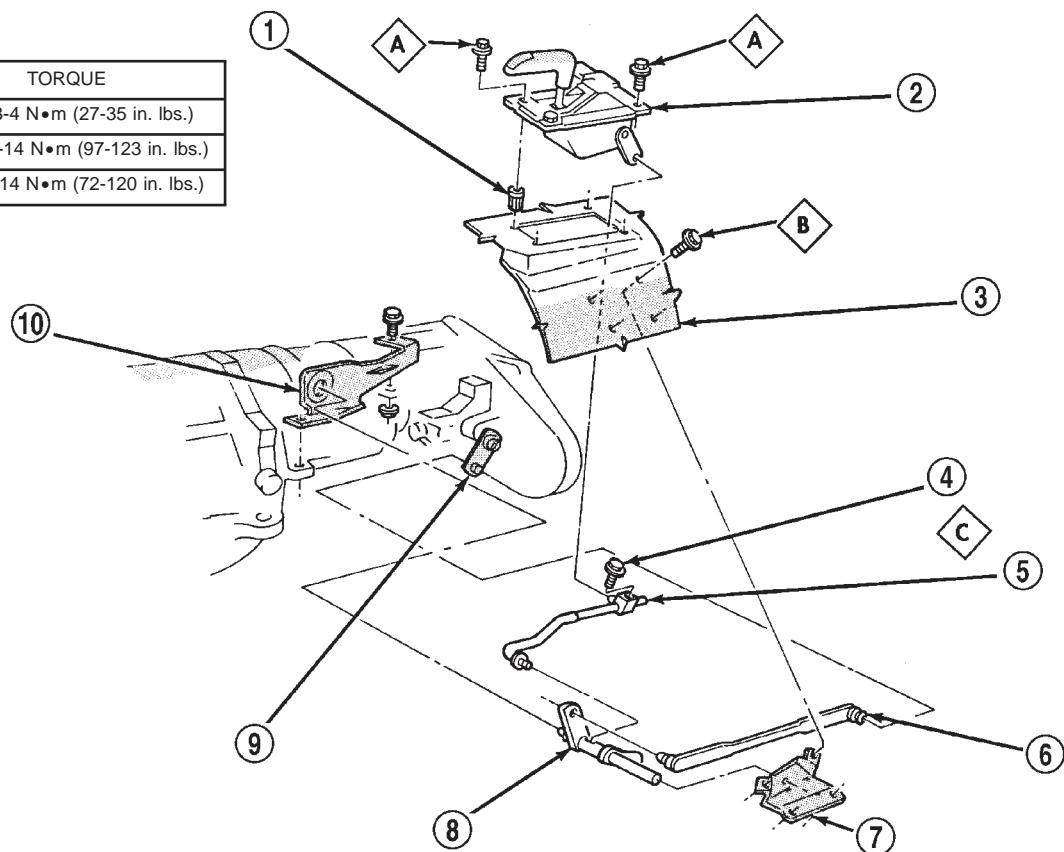
(5) Remove speed sensor retaining screw and remove sensor from adapter.

(6) Remove speedometer pinion from adapter. Replace pinion if chipped, cracked, or worn.

(7) Inspect sensor and adapter O-rings (Fig. 6). Remove and discard O-rings if worn or damaged.

(8) Inspect terminal pins in speed sensor. Clean pins with Mopar® electrical spray cleaner if dirty or oxidized. Replace sensor if faulty, or if pins are loose, severely corroded, or damaged.

TORQUE	
A	3-4 N•m (27-35 in. lbs.)
B	11-14 N•m (97-123 in. lbs.)
C	8-14 N•m (72-120 in. lbs.)



J9321-185

Fig. 5 Shift Linkage

1 - RIVNUT (4)

2 - SHIFT LEVER ASSEMBLY

3 - FLOORPAN

4 - TRUNNION LOCK BOLT

5 - SELECTOR ROD AND TRUNNION

6 - SHIFT LEVER ROD

7 - TORQUE SHAFT FRAME BRACKET

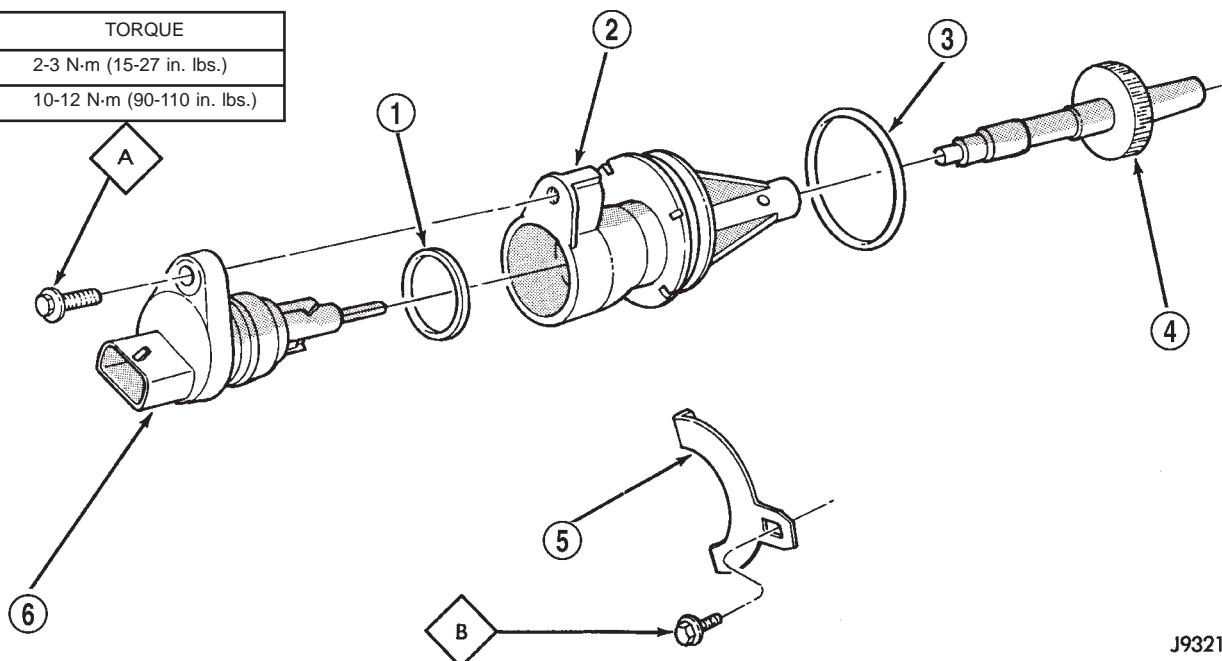
8 - TORQUE SHAFT

9 - TRANSFER CASE SHIFT LEVER

10 - TORQUE SHAFT TRANSFER CASE BRACKET

REMOVAL AND INSTALLATION (Continued)

ITEM	TORQUE
A	2-3 N·m (15-27 in. lbs.)
B	10-12 N·m (90-110 in. lbs.)



J9321-385

Fig. 6 Speedometer Components

- 1 – SENSOR O-RING
2 – SPEEDOMETER ADAPTER
3 – ADAPTER O-RING

- 4 – SPEEDOMETER PINION
5 – ADAPTER CLAMP
6 – VEHICLE SPEED SENSOR

INSTALLATION AND INDEXING

(1) Thoroughly clean adapter flange and adapter mounting surface in housing. Surfaces must be clean for proper adapter alignment and speedometer operation.

(2) Install new O-rings on speed sensor and speedometer adapter (Fig. 6), if necessary.

(3) Lubricate sensor and adapter O-rings with transmission fluid.

(4) Install vehicle speed sensor in speedometer adapter. Tighten sensor attaching screw to 2-3 N·m (15-27 in. lbs.) torque.

(5) Install speedometer pinion in adapter.

(6) Count number of teeth on speedometer pinion. Do this before installing assembly in housing. Then lubricate pinion teeth with transmission fluid.

(7) Note index numbers on adapter body (Fig. 7). These numbers will correspond to number of teeth on pinion.

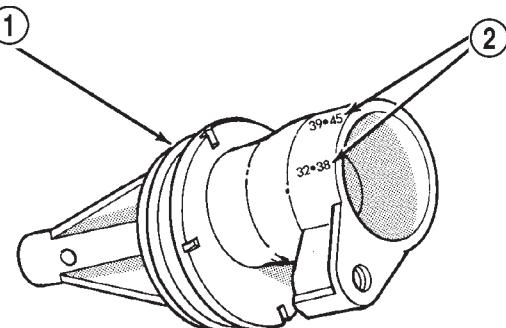
(8) Install speedometer assembly in housing.

(9) Rotate adapter until required range numbers are at 6 o-clock position. Be sure range index numbers correspond to number of teeth on pinion gear.

(10) Install speedometer adapter clamp and retaining screw. Tighten clamp screw to 10-12 N·m (90-110 in. lbs.) torque.

(11) Connect wires to vehicle speed sensor.

(12) Lower vehicle and top off transmission fluid level if necessary.



J9321-386

Fig. 7 Location Of Index Numbers On Speedometer Adapter

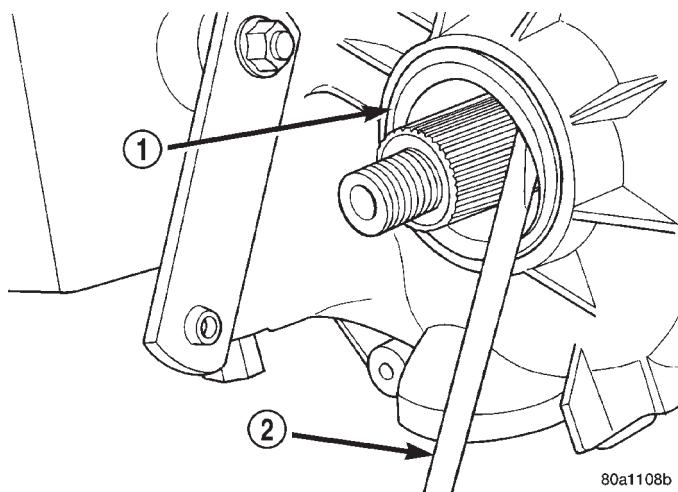
- 1 – SPEEDOMETER ADAPTER
2 – INDEX NUMBER LOCATION

FRONT OUTPUT SHAFT SEAL**REMOVAL**

- (1) Raise vehicle.
(2) Remove front propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedure.

REMOVAL AND INSTALLATION (Continued)

- (3) Remove front output shaft yoke.
 (4) Remove seal from front case with pry tool (Fig. 8).



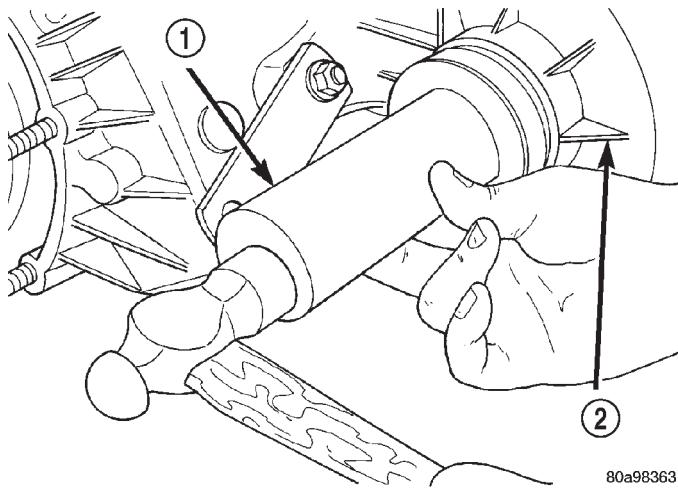
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Fig. 8 Remove Front Output Shaft Seal

- 1 – OUTPUT SHAFT SEAL
 2 – PRYBAR

INSTALLATION

- (1) Install new front output seal in front case with Installer Tool 6952-A as follows:
 (a) Place new seal on tool. Garter spring on seal goes toward interior of case.
 (b) Start seal in bore with light taps from hammer (Fig. 9). Once seal is started, continue tapping seal into bore until installer tool seats against case.



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Fig. 9 Front Output Seal Installation

- 1 – INSTALLER 6952-A
 2 – TRANSFER CASE

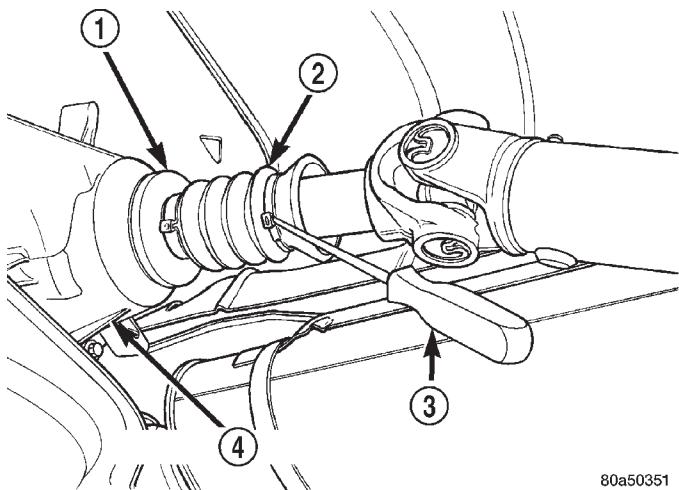
DISASSEMBLY AND ASSEMBLY

NV242 TRANSFER CASE

DISASSEMBLY

REAR RETAINER REMOVAL

- (1) Remove output shaft boot. Spread band clamp that secures boot on slinger with a suitable awl. Then slide boot off shaft (Fig. 10).

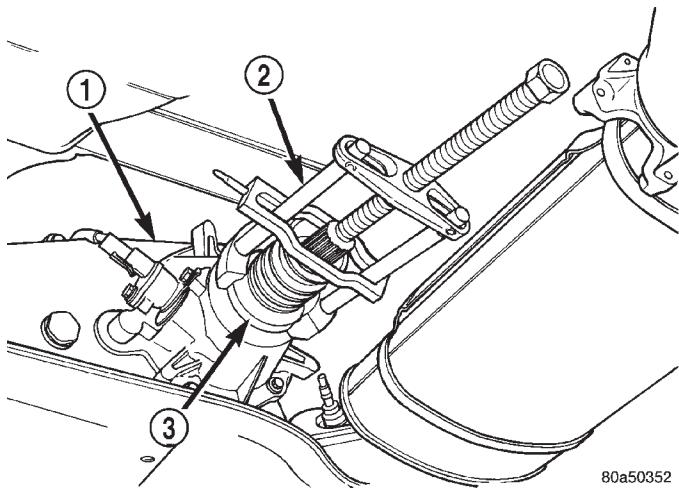


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Fig. 10 Output Boot—Typical

- 1 – SLINGER
 2 – BOOT
 3 – AWL
 4 – TRANSFER CASE

- (2) Using puller MD-998056-A, remove rear slinger (Fig. 11).



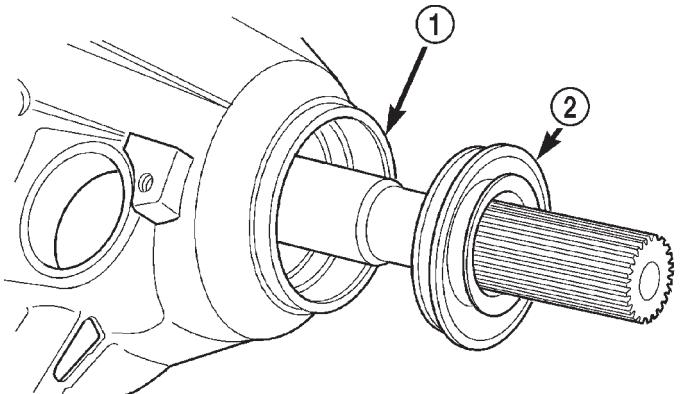
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Fig. 11 Rear Slinger Removal

- 1 – TRANSFER CASE
 2 – SPECIAL TOOL MD998056-A
 3 – SLINGER

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Remove rear seal from retainer (Fig. 12). Use pry tool, or collapse seal with punch to remove it.

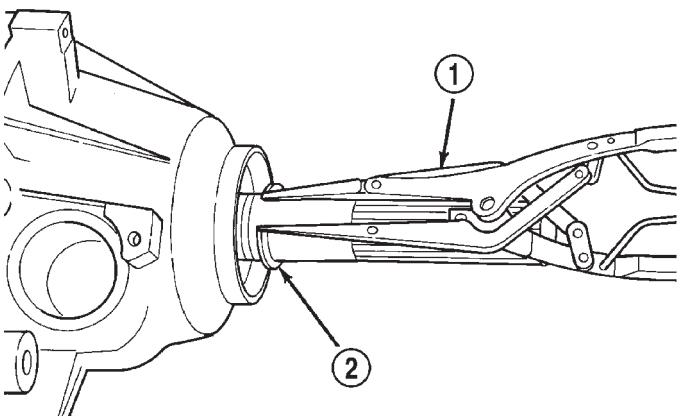


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Fig. 12 Rear Seal Removal

- 1 – REAR RETAINER
2 – OUTPUT SHAFT SEAL

(4) Remove rear output bearing I. D. retaining ring (Fig. 13).



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Fig. 13 Rear Bearing I. D. Retaining Ring Removal

- 1 – SNAP RING PLIERS
2 – REAR BEARING I. D. RETAINING RING

(5) Remove speedometer adapter.

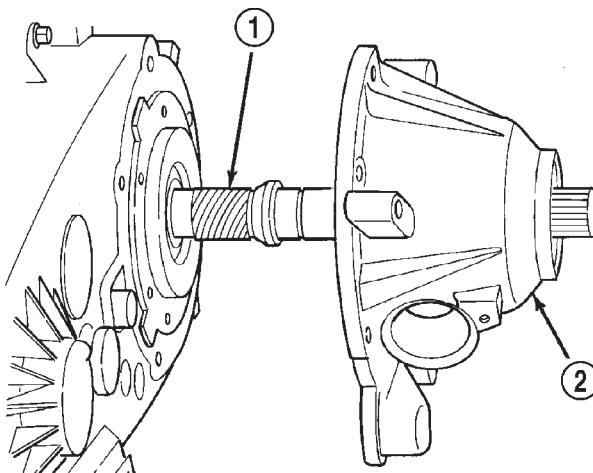
(6) Remove rear retainer bolts.

(7) Remove rear retainer. Tap retainer with mallet and pry upward to break sealer bead. Then slide retainer off case and output shaft (Fig. 14).

(8) Remove rear bearing O. D. retaining ring with snap ring pliers. Then tilt pump and slide it off output shaft (Fig. 15).

(9) Remove pickup tube O-ring from pump (Fig. 16) but do not disassemble pump; it is not a repairable part.

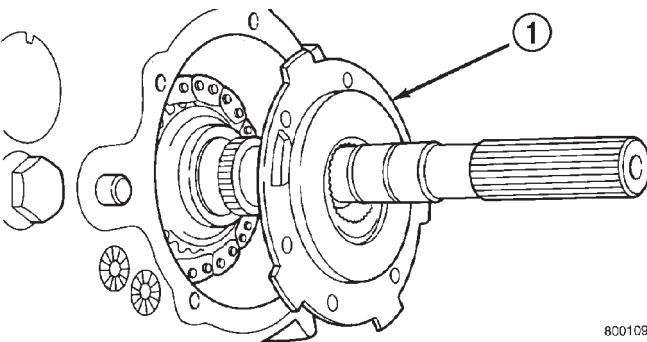
(10) Remove seal from oil pump with pry tool.



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Fig. 14 Rear Retainer Removal

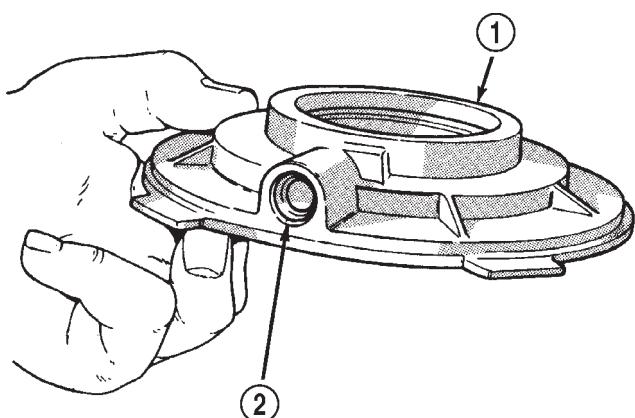
- 1 – MAINSHAFT
2 – REAR RETAINER



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Fig. 15 Oil Pump Removal

- 1 – OIL PUMP



RR21F27

Fig. 16 Pickup Tube O-Ring Location

- 1 – OIL PUMP
2 – O-RING

(11) Remove bolts attaching rear case to front case (Fig. 17). Note position of the two black finish bolts

DISASSEMBLY AND ASSEMBLY (Continued)

at each end of the case. These bolts go through the case dowels and require a washer under the bolt head.

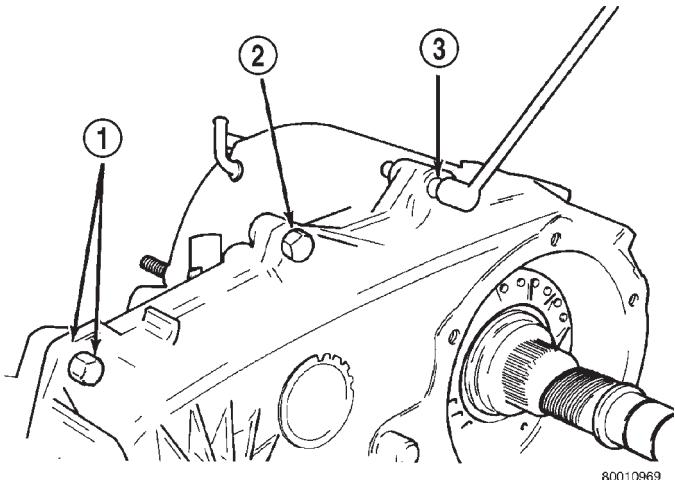


Fig. 17 Spline And Dowel Bolt Locations

- 1 – DOWEL BOLT AND WASHER (2)
- 2 – CASE BOLT (5)
- 3 – SPLINE HEAD BOLT (1)

(12) Remove rear case from front case (Fig. 18). Insert screwdrivers into slots cast into each end of case. Then pry upward to break sealer bead and remove rear case.

CAUTION: Do not pry on the sealing surface of either case half as the surfaces will become damaged.

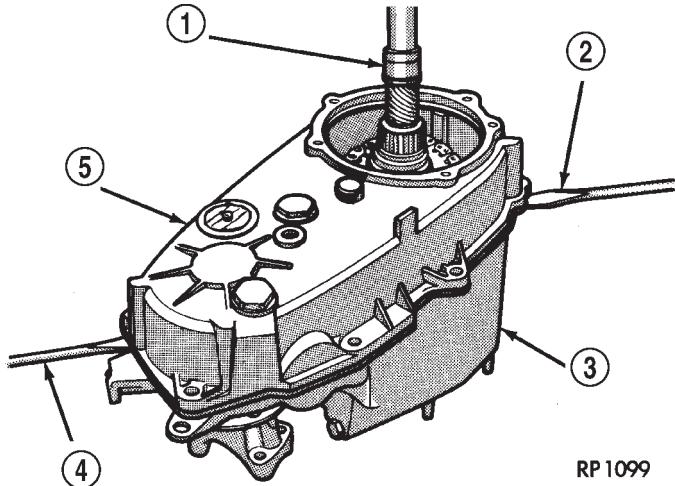


Fig. 18 Loosening/Removing Rear case

- 1 – MAINSHAFT
- 2 – SCREWDRIVER
- 3 – FRONT CASE
- 4 – SCREWDRIVER
- 5 – REAR CASE

(13) Remove oil pickup tube and screen from rear case (Fig. 19).

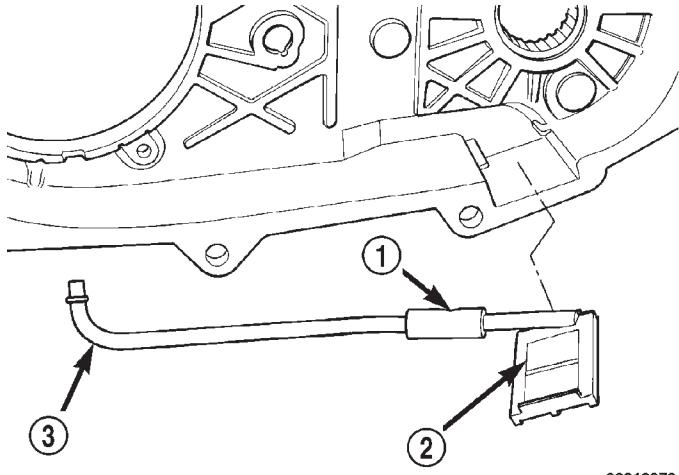


Fig. 19 Oil Pickup Screen, Hose And Tube Removal

- 1 – CONNECTING HOSE
- 2 – PICKUP SCREEN
- 3 – PICKUP TUBE

YOKE AND RANGE LEVER REMOVAL

(1) Remove front yoke nut:
 (a) Move range lever to 4L position.
 (b) Remove nut with socket and impact wrench (Fig. 20).

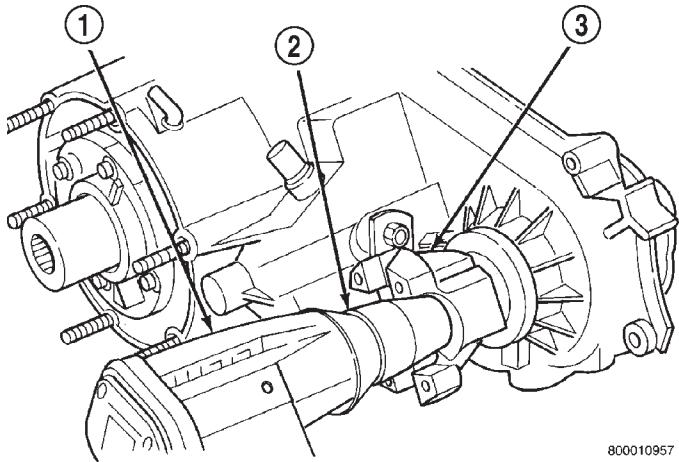
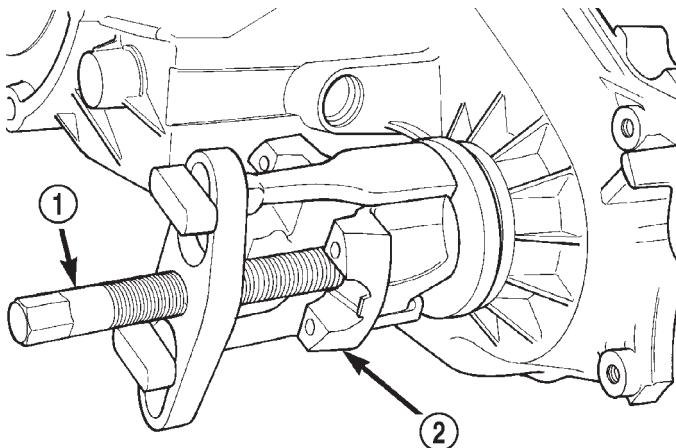


Fig. 20 Yoke Nut Removal

- 1 – IMPACT WRENCH
- 2 – SOCKET
- 3 – YOKE

(2) Remove yoke. If yoke is difficult to remove by hand, remove it with bearing splitter, or with standard two jaw puller (Fig. 21). Be sure puller tool is positioned on yoke and not on slinger as slinger will be damaged.

DISASSEMBLY AND ASSEMBLY (Continued)



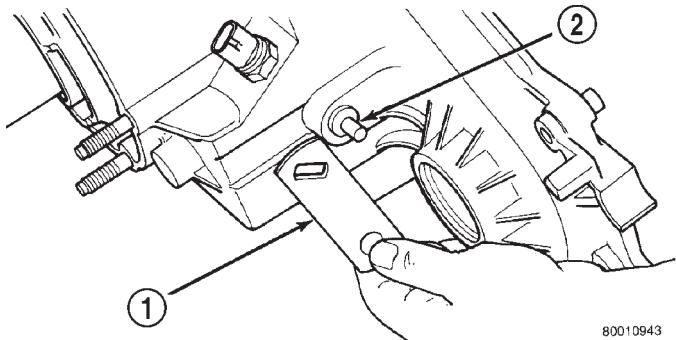
80010977

Fig. 21 Yoke Removal

- 1 – PULLER TOOL
2 – YOKE

(3) Remove seal washer from front output shaft. Discard washer as it should not be reused.

(4) Remove nut and washer that attach range lever to sector shaft. Then move sector to neutral position and remove range lever from shaft (Fig. 22).



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Fig. 22 Range Lever Removal

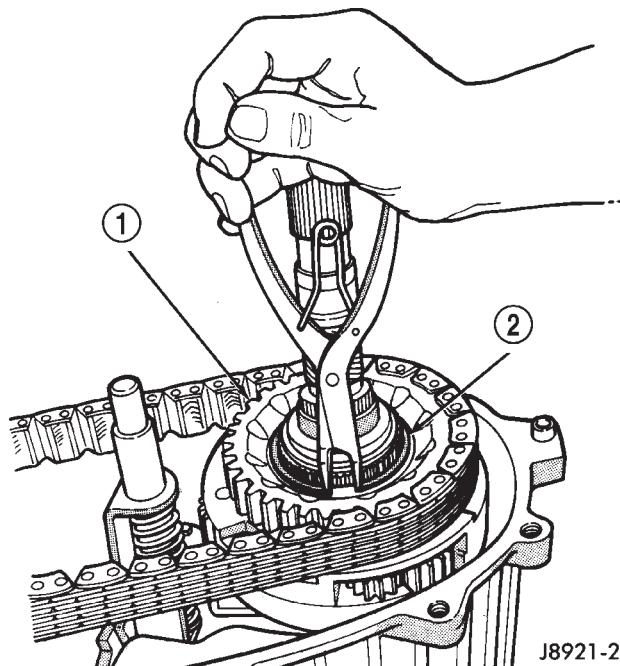
- 1 – RANGE LEVER
2 – SECTOR SHAFT

FRONT OUTPUT SHAFT AND DRIVE CHAIN REMOVAL

- (1) Remove drive sprocket snap-ring (Fig. 23).
- (2) Remove drive sprocket and chain (Fig. 24).
- (3) Remove front output shaft (Fig. 25).

SHIFT FORKS AND MAINSHAFT REMOVAL AND DISASSEMBLY

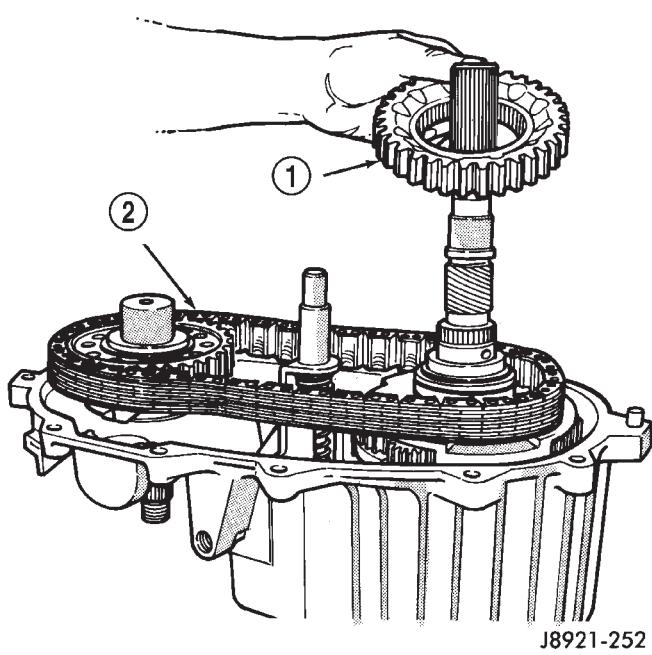
- (1) Remove shift detent plug, spring and pin (Fig. 26).
- (2) Remove seal plug from low range fork lockpin access hole. Then move shift sector to align low range fork lockpin with access hole.
- (3) Remove range fork lockpin with size number one easy-out tool as follows:



J8921-251

Fig. 23 Drive Sprocket Snap-Ring Removal

- 1 – DRIVE SPROCKET
2 – DRIVE SPROCKET SNAP RING



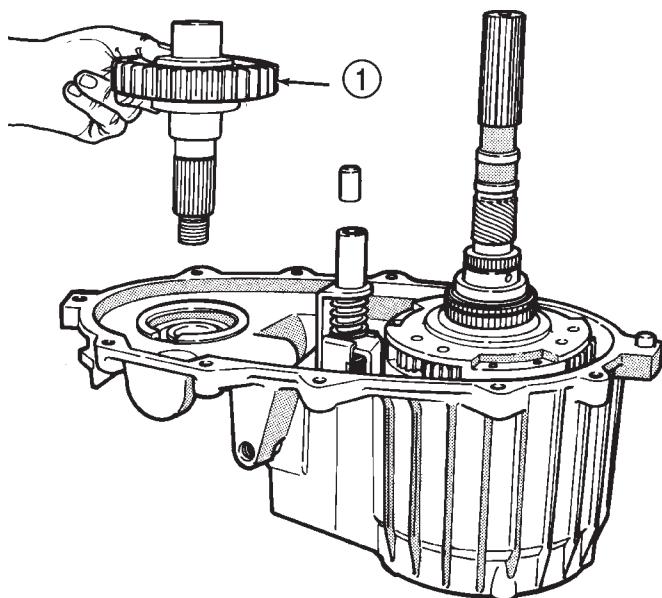
J8921-252

Fig. 24 Drive Sprocket And Chain Removal

- 1 – DRIVE SPROCKET
2 – DRIVE CHAIN

- (a) Insert easy-out tool through access hole in side of transfer case and into lock-pin.
- (b) Tap easy-out tool into lock-pin with hammer until tool is securely engaged into the lock-pin.

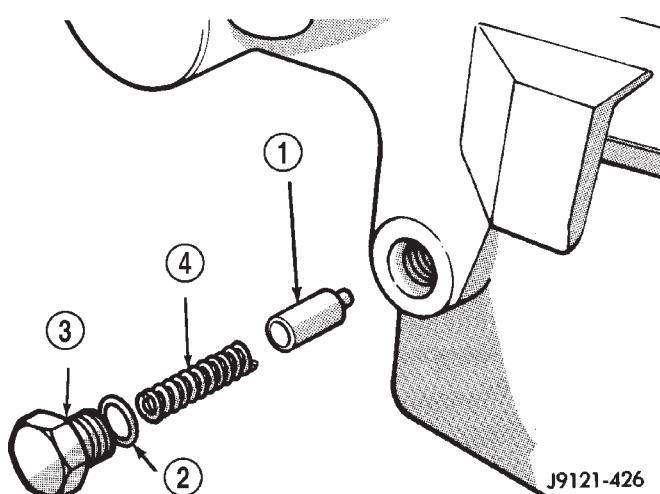
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-253

Fig. 25 Removing Front Output Shaft

1 – FRONT OUTPUT SHAFT



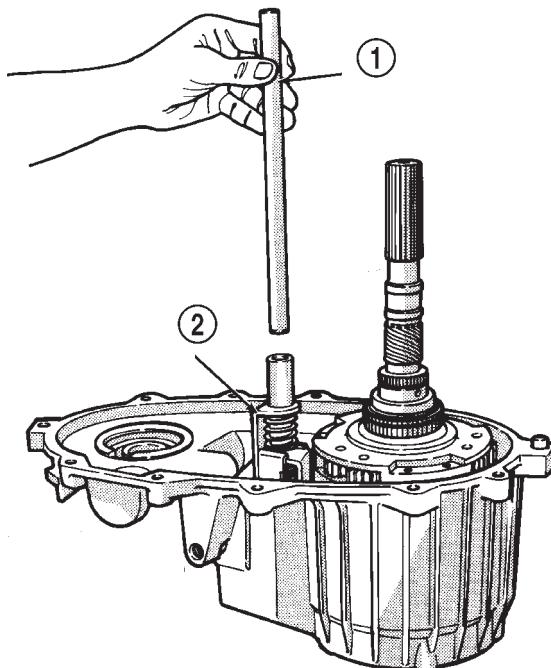
J9121-426

Fig. 26 Detent Component Removal

1 – PLUNGER
2 – O-RING
3 – PLUG
4 – SPRING

- (c) Install a t-handle, such as from a tap and die set, onto the easy-out tool.
- (d) Securely tighten the t-handle onto the tool.
- (e) In one motion, pull upward and turn the t-handle counter-clockwise to remove the lock-pin.
- (4) Remove shift rail by pulling it straight up and out of fork (Fig. 27).
- (5) Remove mode fork and mainshaft as assembly (Fig. 28).

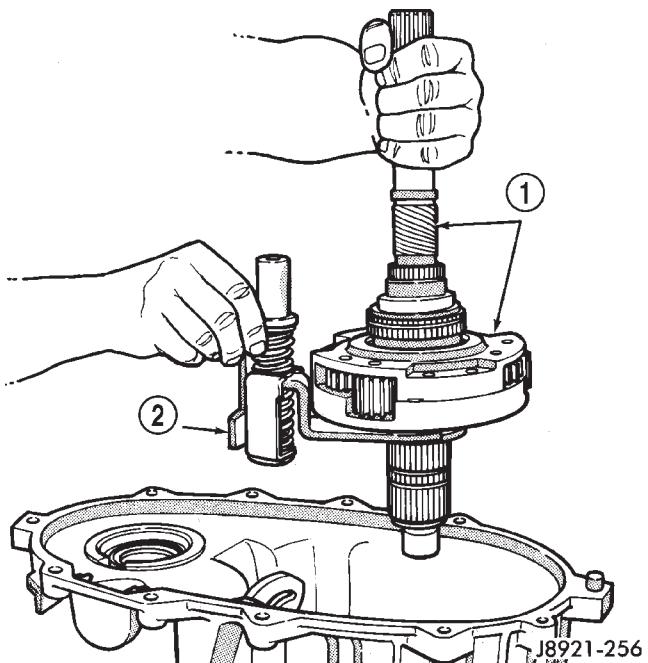
(6) Remove mode shift sleeve and mode fork assembly from mainshaft (Fig. 29). Note position of mode sleeve in fork and remove sleeve.



J8921-255

Fig. 27 Shift Rail Removal

1 – SHIFT RAIL
2 – MODE FORK

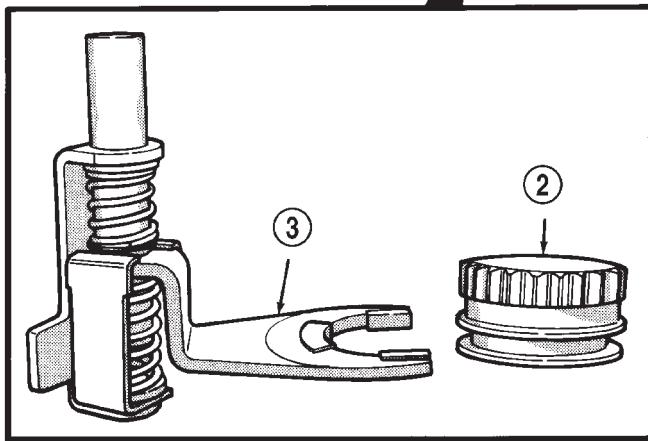
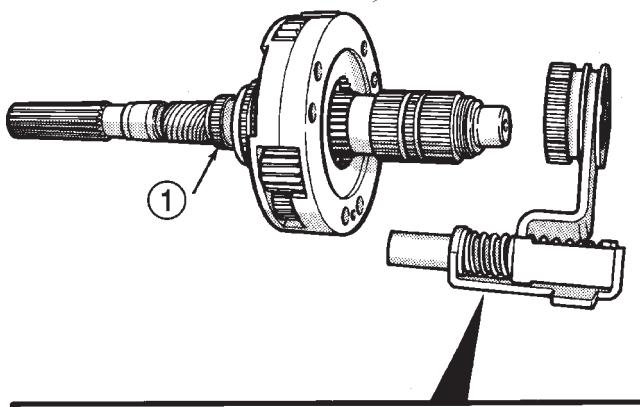


J8921-256

Fig. 28 Mode Fork And Mainshaft Removal

1 – MAINSHAFT ASSEMBLY
2 – MODE FORK

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-257

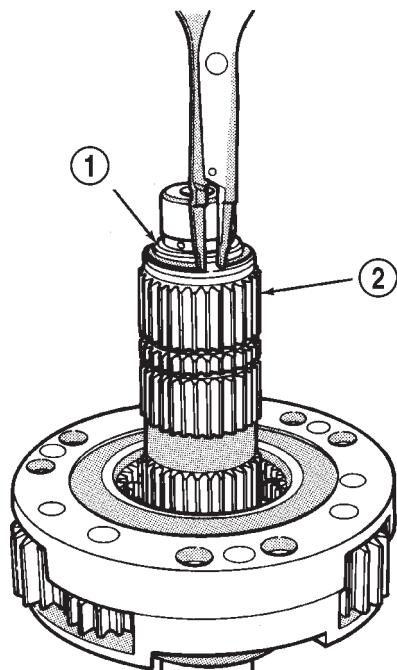
Fig. 29 Mode Fork And Sleeve Removal

- 1 - MAINSHAFT
- 2 - SLEEVE
- 3 - MODE FORK ASSEMBLY

(7) Remove intermediate clutch shaft snap-ring (Fig. 30).

(8) Remove clutch shaft thrust ring (Fig. 31).

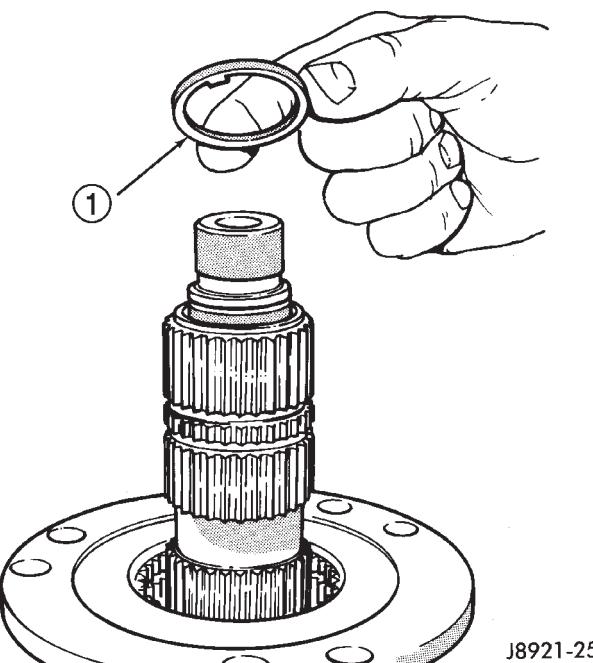
(9) Remove intermediate clutch shaft (Fig. 32).



J8921-258

Fig. 30 Intermediate Clutch Shaft Snap-Ring Removal

- 1 - SNAP RING
- 2 - INTERMEDIATE CLUTCH SHAFT

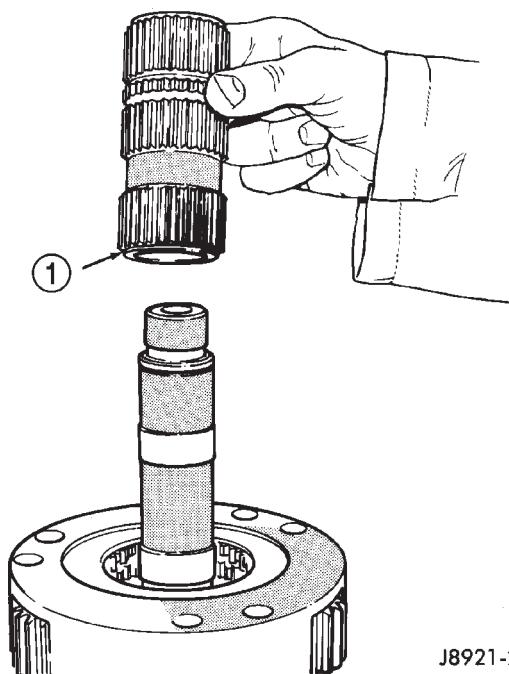


J8921-259

Fig. 31 Clutch Shaft Thrust Ring Removal

- 1 - CLUTCH SHAFT THRUST RING

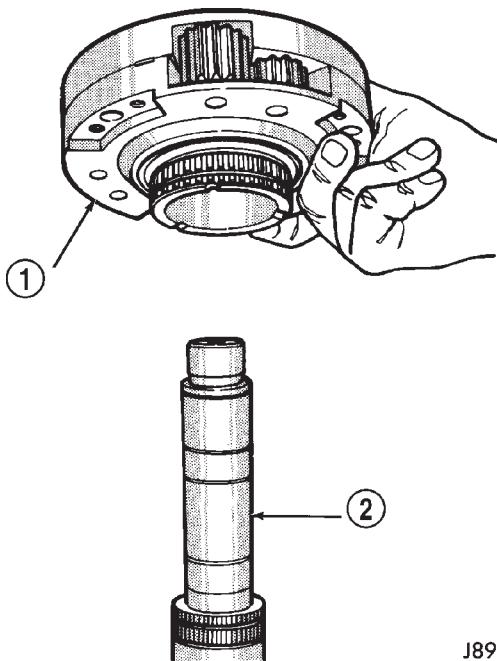
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-260

Fig. 32 Intermediate Clutch Shaft Removal

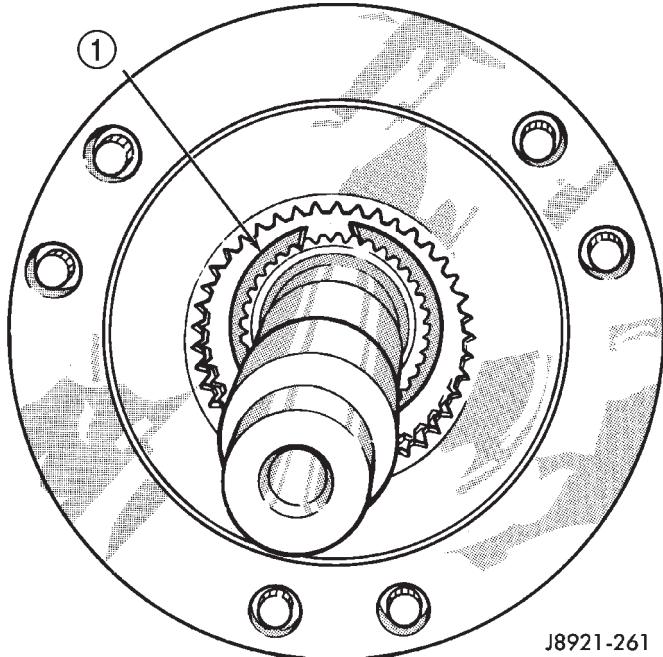
1 – INTERMEDIATE CLUTCH SHAFT



J8921-262

Fig. 34 Differential Removal1 – DIFFERENTIAL
2 – MAINSHAFT

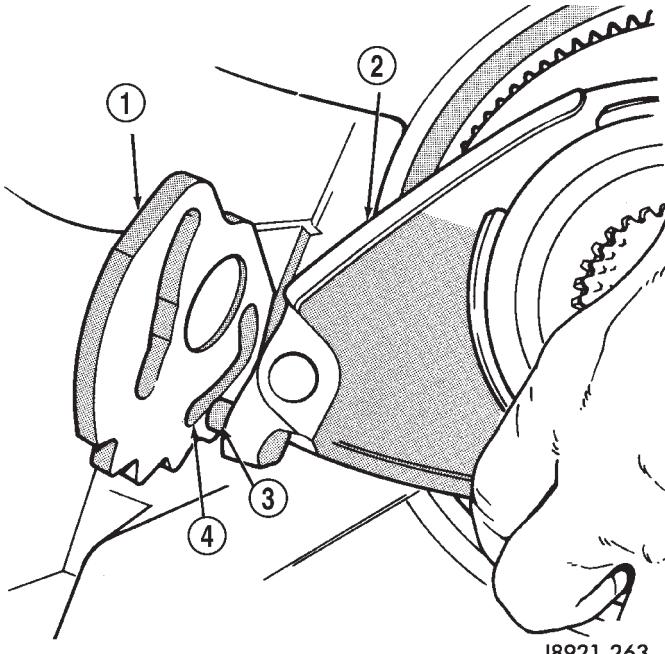
- (10) Remove differential snap-ring (Fig. 33).
- (11) Remove differential (Fig. 34).
- (12) Remove differential needle bearings and both needle bearing thrust washers from mainshaft.



J8921-261

Fig. 33 Differential Snap-Ring Removal

1 – DIFFERENTIAL SNAP RING

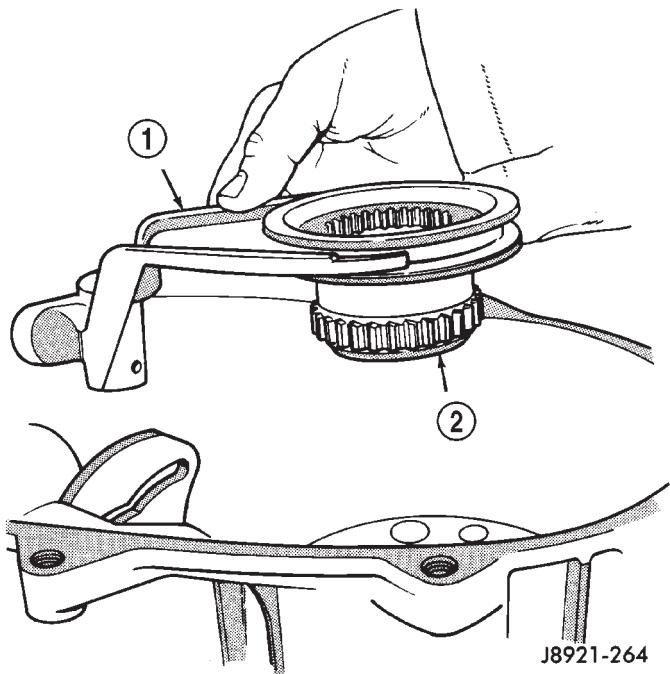


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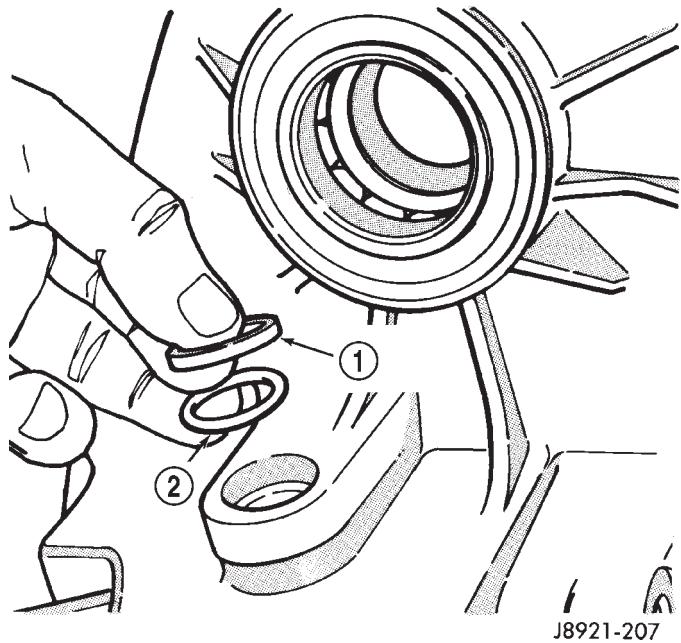
Fig. 35 Disengaging Low Range Fork1 – SHIFT SECTOR
2 – LOW RANGE FORK
3 – PIN
4 – SLOT

- (13) Slide low range fork pin out of shift sector slot (Fig. 35).
- (14) Remove low range fork and hub (Fig. 36).

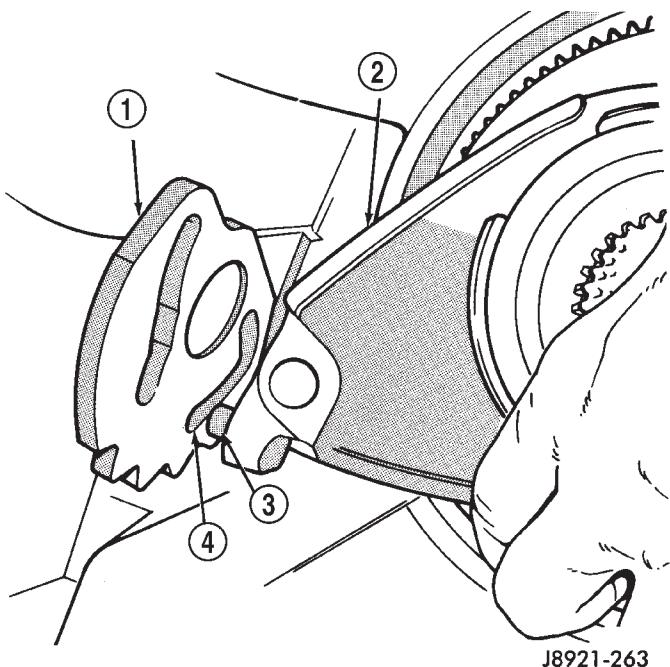
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 36 Low Range Fork And Hub Removal**

- 1 – LOW RANGE FORK
2 – FORK HUB

**Fig. 38 Sector Bushing And O-Ring Removal**

- 1 – SHIFT SECTOR BUSHING
2 – O-RING

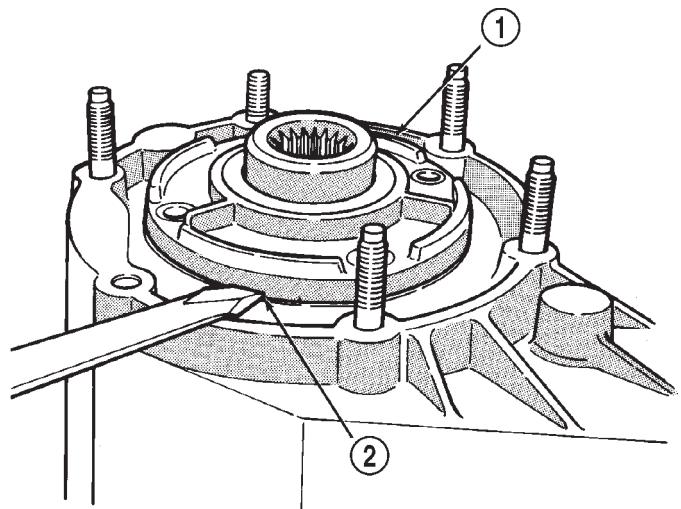
**Fig. 37 Shift Sector Position**

- 1 – SHIFT SECTOR
2 – LOW RANGE FORK
3 – PIN
4 – SLOT

(16) Remove shift sector bushing and O-ring (Fig. 38).

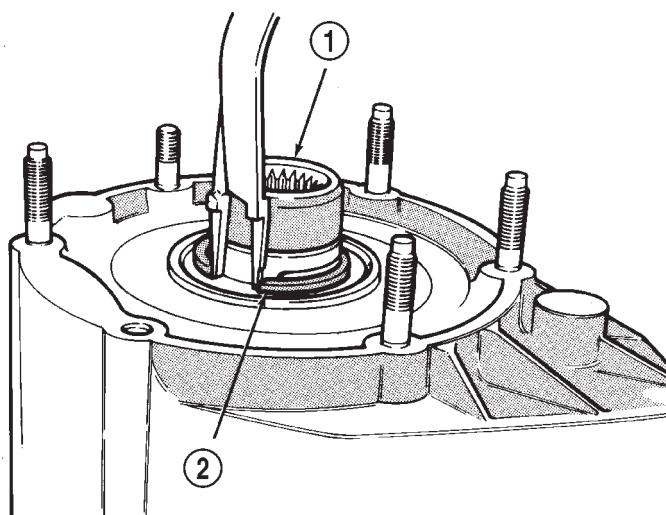
INPUT GEAR/LOW RANGE ASSEMBLY REMOVAL AND DISASSEMBLY

- (1) Remove front bearing retainer bolts.
- (2) Remove front bearing retainer. Carefully pry retainer loose with screwdriver (Fig. 39). Position screwdriver in slots cast into retainer.
- (3) Remove input gear snap-ring (Fig. 40).

**Fig. 39 Front Bearing Retainer Removal**

- 1 – FRONT BEARING RETAINER
2 – RETAINER SLOT

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-267

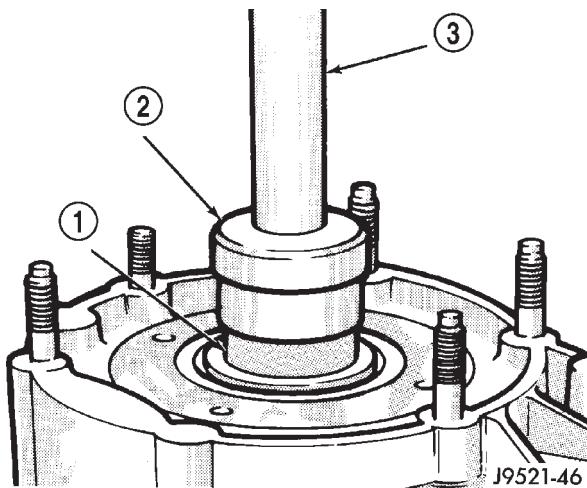
Fig. 40 Input Gear Snap-Ring Removal

- 1 – INPUT GEAR
2 – SNAP RING

(4) Remove input/low range gear assembly from bearing with Tool Handle C-4171 and Tool 7829A (Fig. 41).

(5) Remove low range gear snap-ring (Fig. 42).

(6) Remove input gear retainer, thrust washers and input gear from low range gear (Fig. 43).



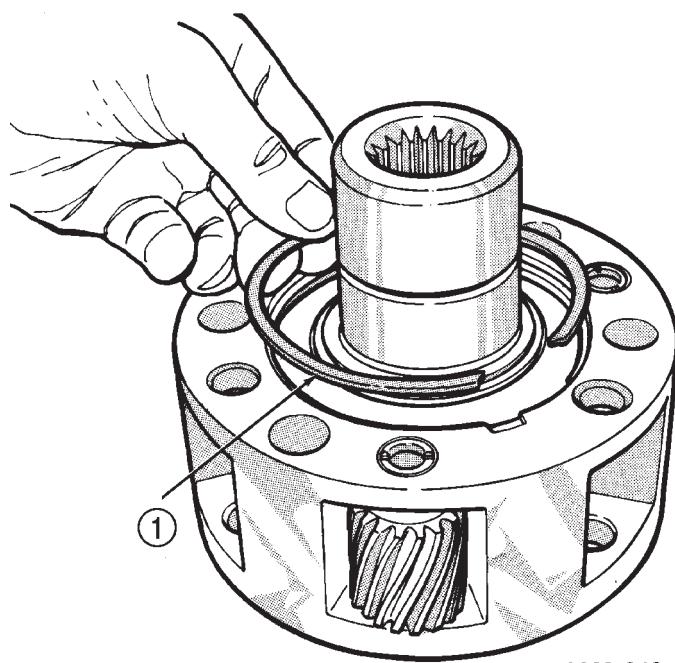
J9521-46

Fig. 41 Input And Low Range Gear Assembly Removal

- 1 – INPUT-LOW RANGE GEARS
2 – SPECIAL TOOL 7829A
3 – SPECIAL TOOL C-4171

(7) Inspect low range annulus gear (Fig. 44). **Gear is not a serviceable component. If damaged, replace gear and front case as assembly.**

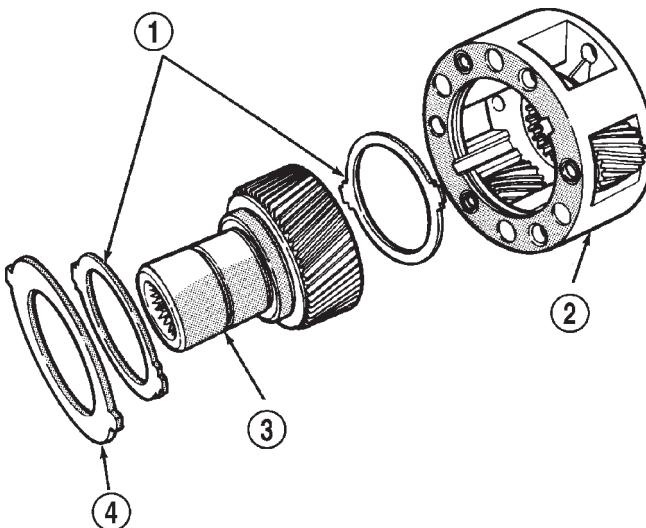
(8) Remove oil seals from following components:



J8921-269

Fig. 42 Low Range Gear Snap-Ring Removal/Installation

- 1 – LOW RANGE GEAR SNAP RING



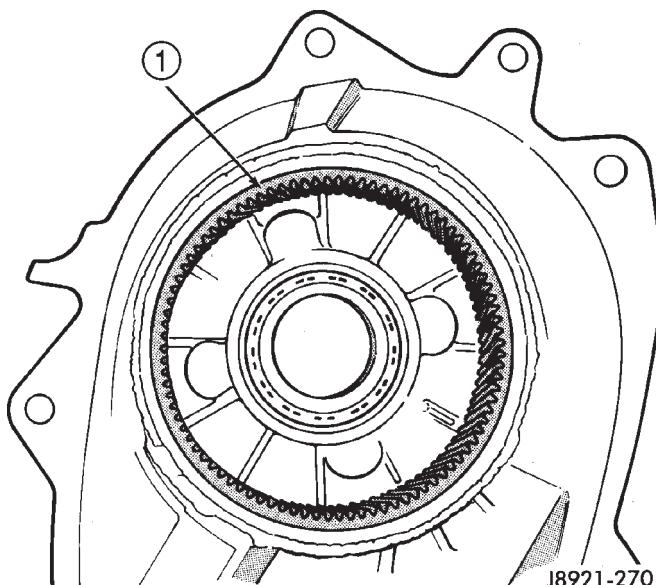
J8921-214

Fig. 43 Low Range Gear Disassembly

- 1 – THRUST WASHERS
2 – LOW RANGE GEAR
3 – INPUT GEAR
4 – RETAINER

- front bearing retainer.
- rear retainer.
- oil pump.
- case halves.

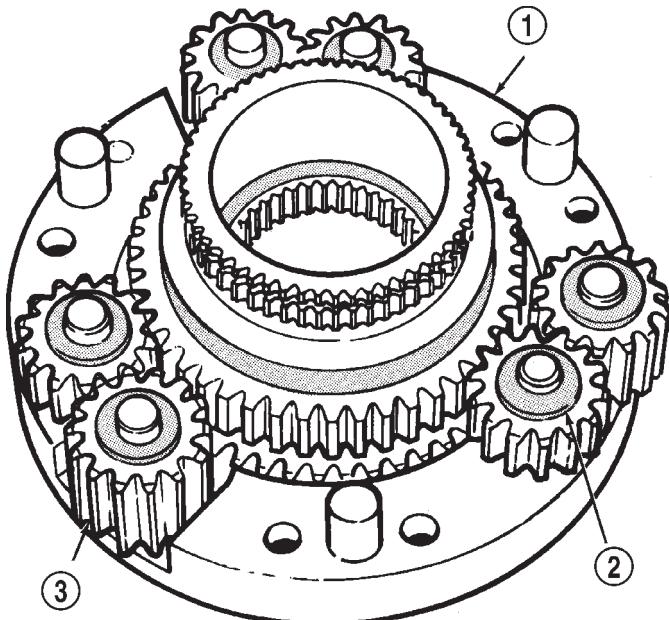
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 44 Inspecting Low Range Annulus Gear**

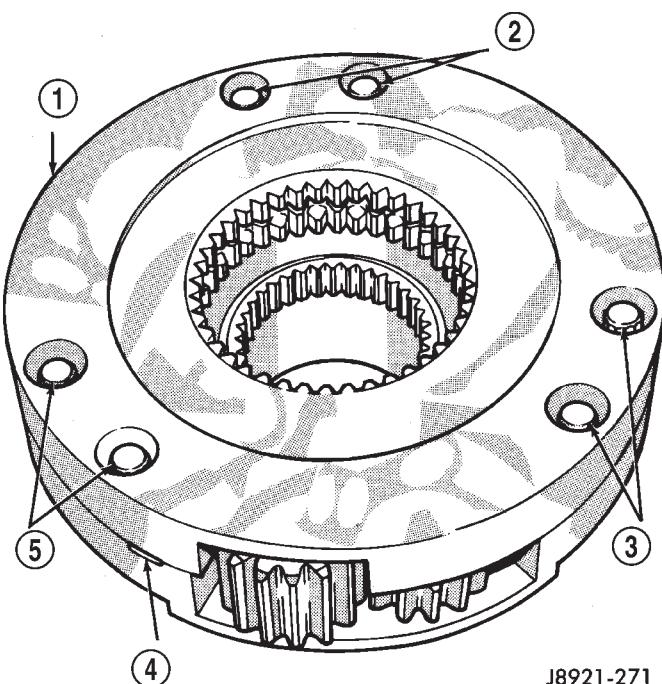
1 – LOW RANGE ANNULUS GEAR

(5) Remove thrust washers and planet gears from case pins (Fig. 46).

(6) Remove mainshaft and sprocket gears from bottom case (Fig. 47). Note gear position for reference before separating them.

**Fig. 46 Planet Gears And Thrust Washer Removal**

1 – BOTTOM CASE
2 – THRUST WASHERS (12)
3 – PLANET GEARS (6)

**Fig. 45 Separating Differential Case Halves**

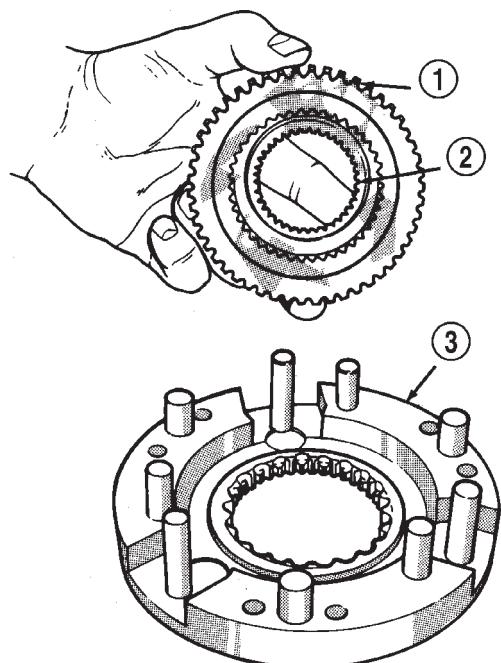
1 – TOP CASE
2 – CASE BOLTS
3 – CASE BOLTS
4 – CASE SLOTS
5 – CASE BOLTS

ASSEMBLY

Lubricate transfer case components with automatic transmission fluid or petroleum jelly (where indicated) during assembly.

CAUTION: The bearing bores in various transfer case components contain oil feed holes. Make sure replacement bearings do not block the holes.

DISASSEMBLY AND ASSEMBLY (Continued)



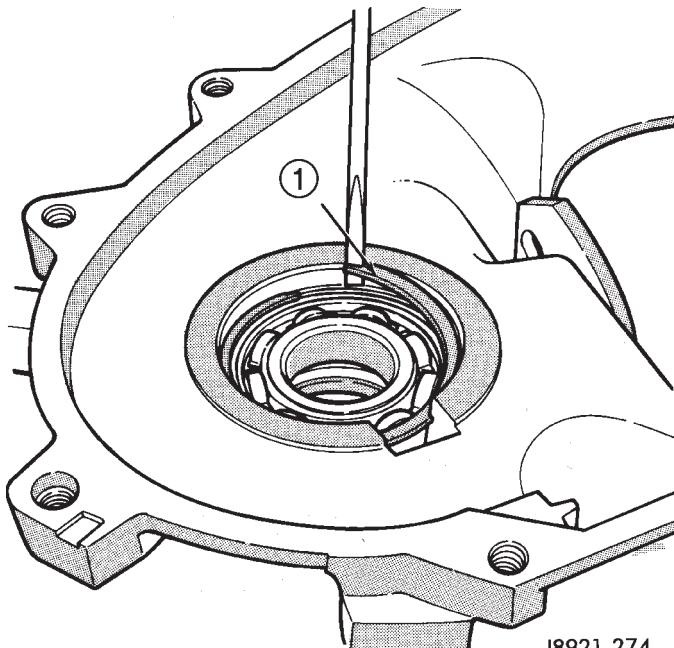
J8921-273

Fig. 47 Mainshaft And Sprocket Gear Removal

- 1 – MAINSHAFT GEAR
2 – SPROCKET GEAR
3 – BOTTOM CASE

BEARING AND SEAL INSTALLATION

(1) Remove snap-ring that retains front output shaft front bearing in case (Fig. 48). Then remove bearing. Use hammer handle, or hammer and brass punch to tap bearing out of case.

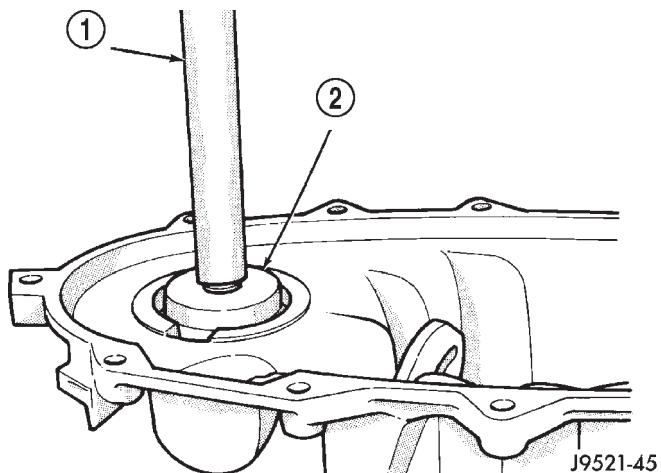


J8921-274

Fig. 48 Front Output Shaft Front Bearing Snap-Ring Removal

- 1 – FRONT BEARING SNAP RING

(2) Install new front output shaft front bearing with Tool Handle C-4171 and Installer 8033A with the tapered cone upward (Fig. 49).



J9521-45

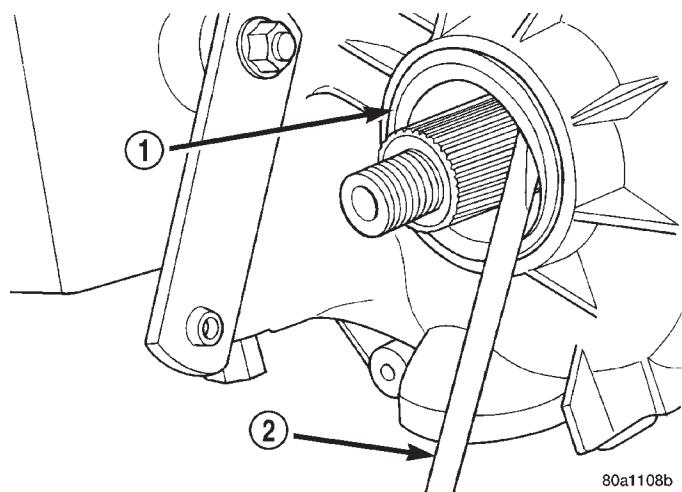
Fig. 49 Front Output Shaft Front Bearing Installation

- 1 – SPECIAL TOOL C-4171
2 – SPECIAL TOOL 8033A

(3) Install front bearing snap-ring (Fig. 48).

(4) Remove front output shaft seal using an appropriate pry tool (Fig. 50) or slide-hammer mounted screw.

(5) Install new front output shaft oil seal with Installer 6952-A (Fig. 51).

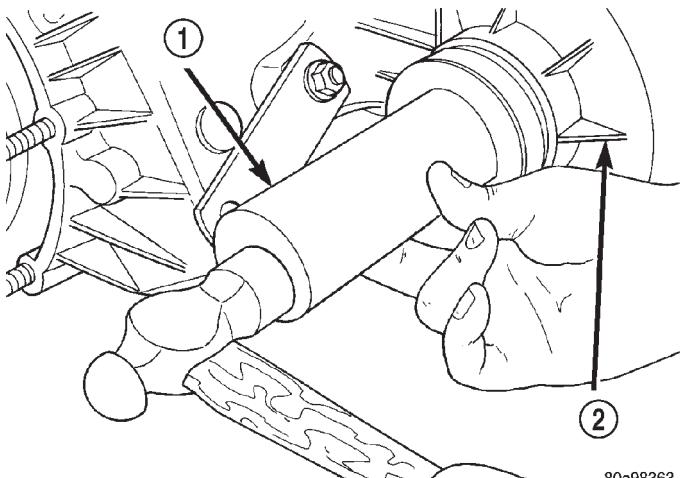


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Fig. 50 Remove Front Output Shaft Seal

- 1 – OUTPUT SHAFT SEAL
2 – PRYBAR

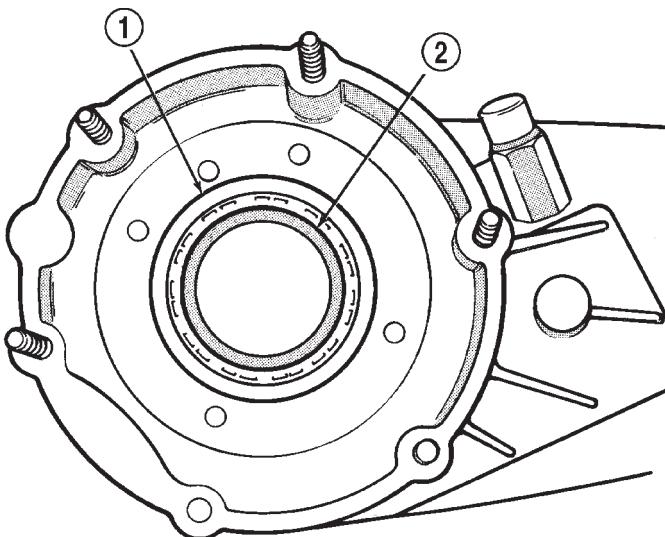
DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 51 Install Front Output Shaft Seal

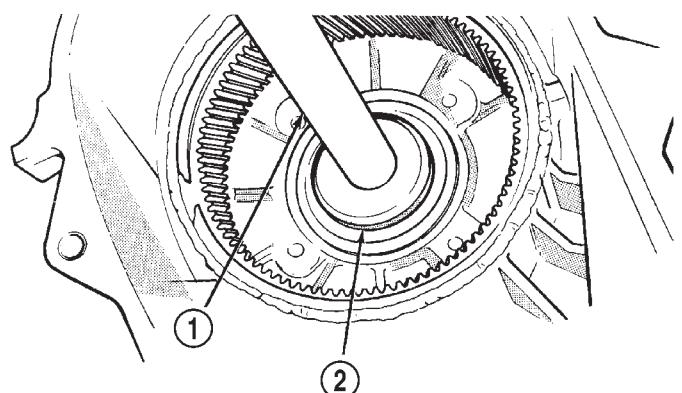
- 1 – INSTALLER 6952-A
2 – TRANSFER CASE



J8921-219

Fig. 53 Seating Input Gear Bearing

- 1 – SNAP RING
2 – INPUT SHAFT BEARING



J9521-43

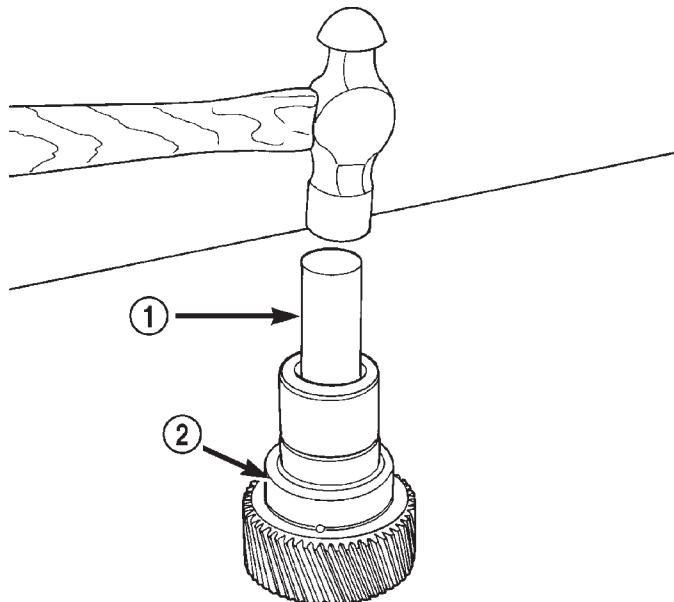
Fig. 52 Input Gear Bearing Removal

- 1 – SPECIAL TOOL C-4171
2 – SPECIAL TOOL C-4210

(9) Remove the input gear pilot bearing by inserting a suitably sized drift into the splined end of the input gear and driving the bearing out with the drift and a hammer (Fig. 54).

(10) Install new pilot bearing with Installer 8128 and Handle C-4171 (Fig. 55).

(11) Install new seal in front bearing retainer with Installer 7884 (Fig. 56).



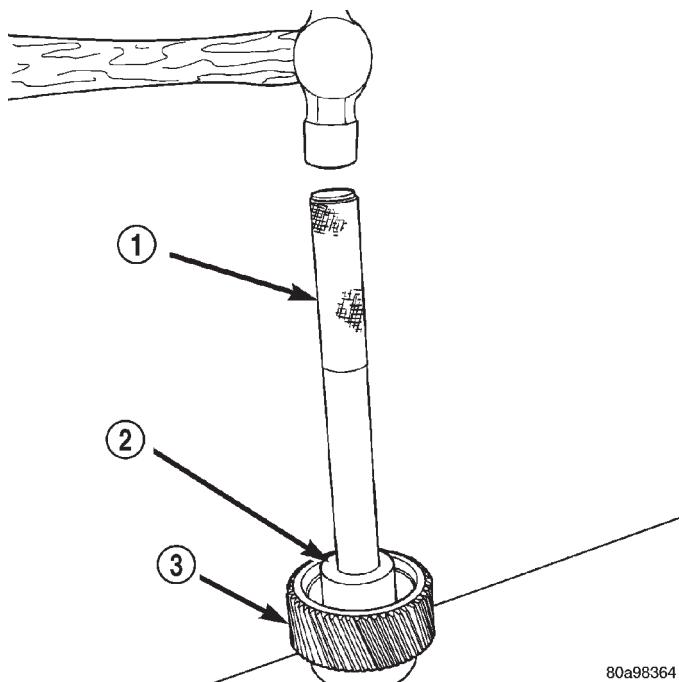
80a11090

Fig. 54 Remove Input Gear Pilot Bearing

- 1 – DRIFT
2 – INPUT GEAR

(12) Remove output shaft rear bearing with the screw and jaws from Remover L-4454 and Cup 8148 (Fig. 57).

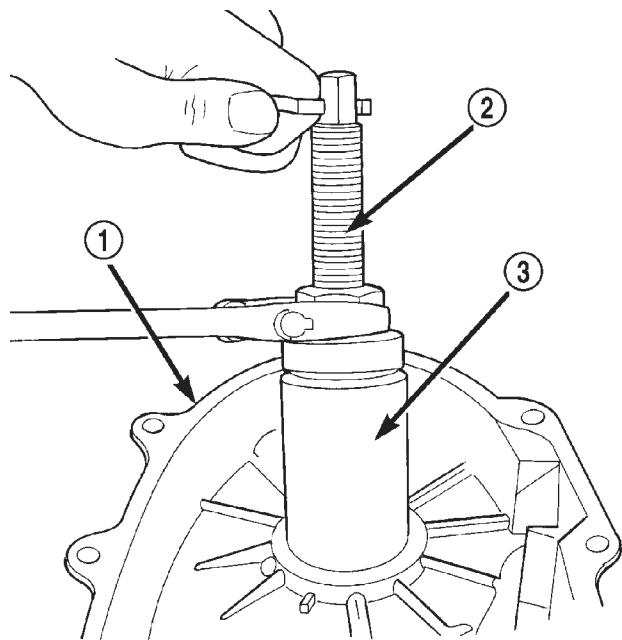
DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 55 Install Input Gear Pilot Bearing

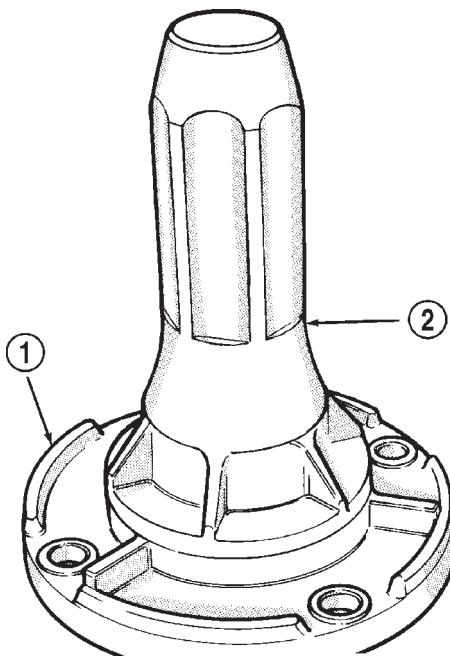
- 1 – HANDLE C-4171
2 – INSTALLER 8128
3 – INPUT GEAR



80a98366

Fig. 57 Remove Front Output Shaft Rear Bearing

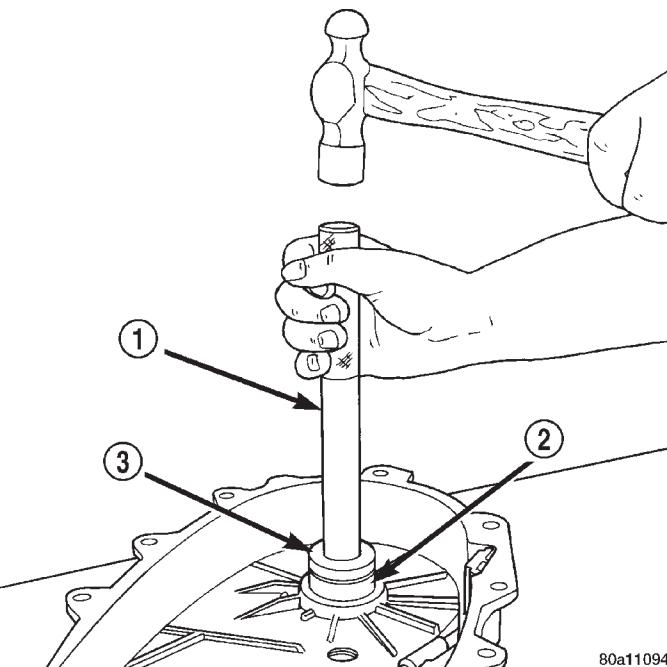
- 1 – REAR CASE
2 – SPECIAL TOOL L-4454-1 AND L-4454-3
3 – SPECIAL TOOL 8148



J9521-41

Fig. 56 Front Bearing Retainer Seal Installation

- 1 – FRONT BEARING RETAINER
2 – SPECIAL TOOL 7884



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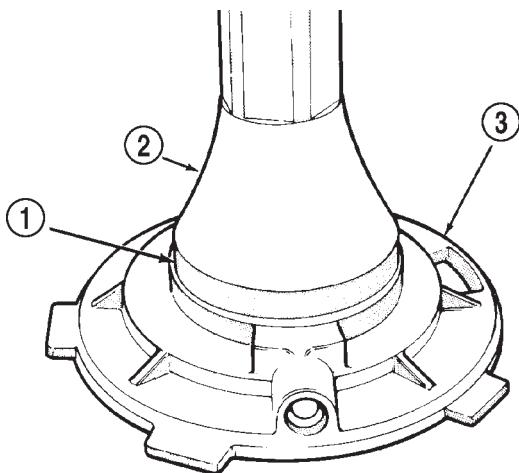
Fig. 58 Install Front Output Shaft Rear Bearing

- 1 – HANDLE C-4171
2 – OUTPUT SHAFT INNER BEARING
3 – INSTALLER 5066

(13) Install new bearing with Tool Handle C-4171 and Installer 5066 (Fig. 58). Lubricate bearing after installation.

(14) Install new seal in oil pump feed housing with Special Tool 7888 (Fig. 59).

DISASSEMBLY AND ASSEMBLY (Continued)

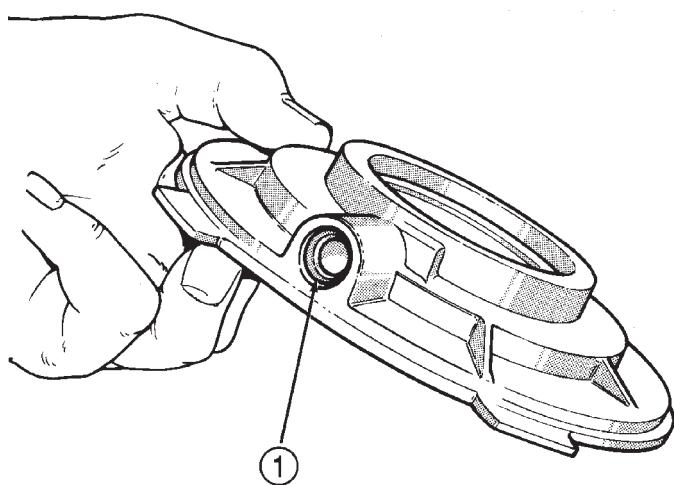


J9521-35

Fig. 59 Oil Pump Seal Installation

- 1 – HOUSING SEAL
2 – SPECIAL TOOL 7888
3 – OIL PUMP FEED HOUSING

- (15) Install new pickup tube O-ring in oil pump (Fig. 60).



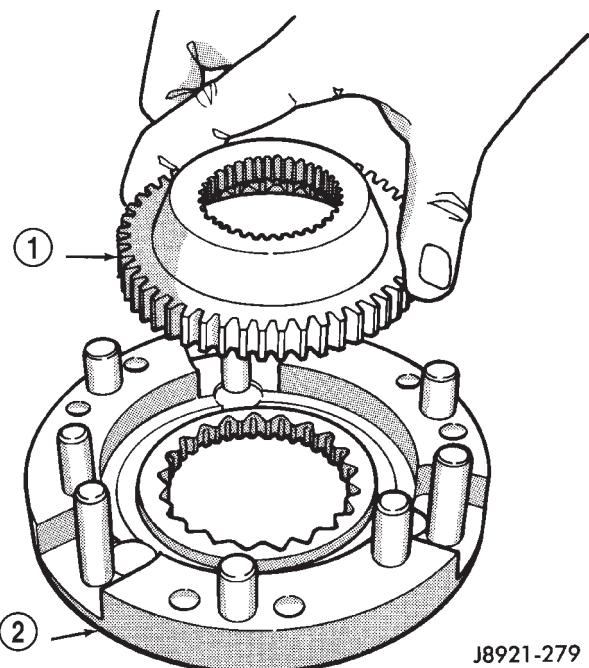
J8921-286

Fig. 60 Pickup Tube O-Ring Installation

- 1 – PICKUP TUBE O-RING

DIFFERENTIAL ASSEMBLY

- (1) Lubricate differential components with automatic transmission fluid.
- (2) Install sprocket gear in differential bottom case (Fig. 61).
- (3) Install differential planet gears and new thrust washers (Fig. 62). **Be sure thrust washers are installed at top and bottom of each planet gear.**



J8921-279

Fig. 61 Installing Differential Sprocket Gear

- 1 – SPROCKET GEAR
2 – BOTTOM CASE

- (4) Install differential mainshaft gear (Fig. 62).

(5) Align and position differential top case on bottom case (Fig. 63). Align using scribe marks made at disassembly.

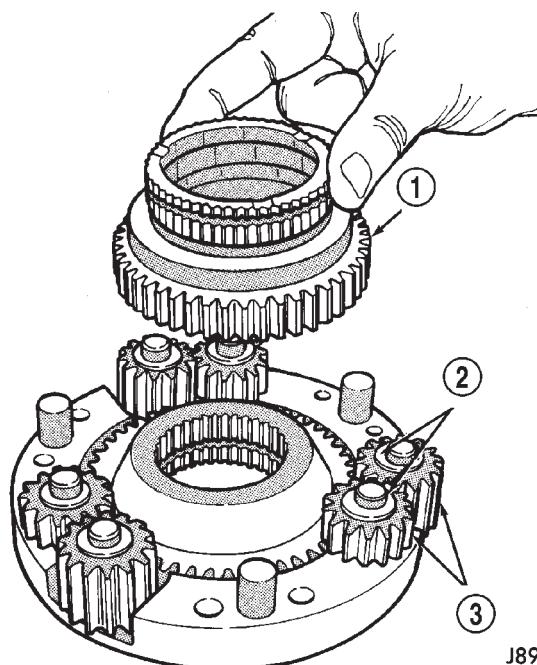
(6) While holding differential case halves together, invert the differential and start the differential case bolts.

(7) Tighten differential case bolts to specified torque.

INPUT GEAR/LOW RANGE ASSEMBLY

- (1) Assemble low range gear, input gear thrust washers, input gear and input gear retainer (Fig. 64).
- (2) Install low range gear snap ring (Fig. 65).

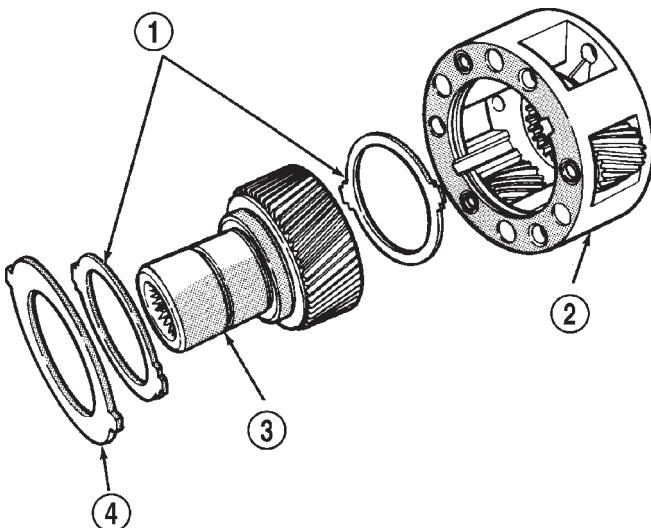
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-280

Fig. 62 Installing Mainshaft And Planet Gears

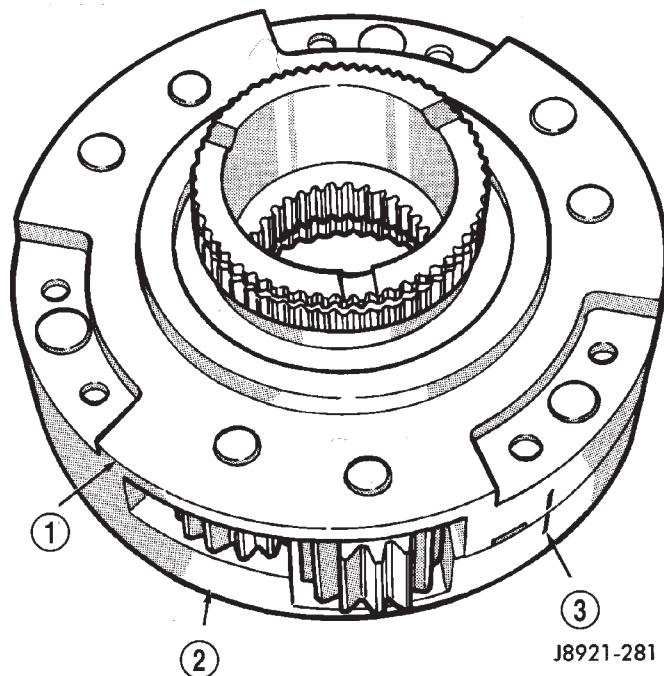
- 1 - MAINSHAFT GEAR
- 2 - THRUST WASHERS (12)
- 3 - PLANET GEARS (6)



J8921-214

Fig. 64 Low Range And Input Gear Assembly

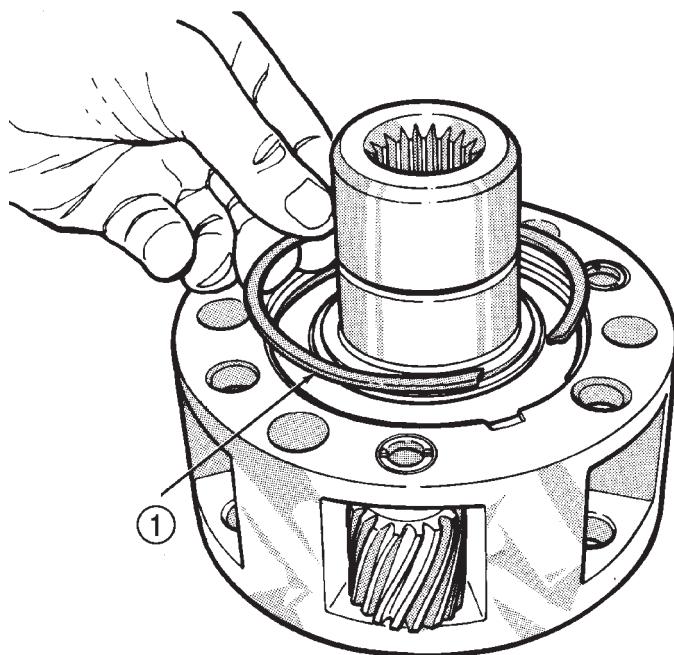
- 1 - THRUST WASHERS
- 2 - LOW RANGE GEAR
- 3 - INPUT GEAR
- 4 - RETAINER



J8921-281

Fig. 63 Differential Case Assembly

- 1 - TOP CASE
- 2 - BOTTOM CASE
- 3 - CASE ALIGNMENT MARKS



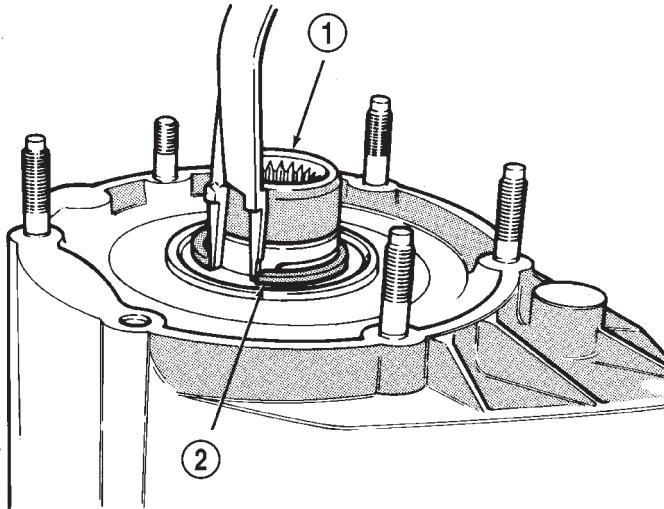
J8921-269

Fig. 65 Install Low Range Gear Snap Ring

- 1 - LOW RANGE GEAR SNAP RING

DISASSEMBLY AND ASSEMBLY (Continued)

- (3) Lubricate input gear and low range gears with automatic transmission fluid.
- (4) Start input gear shaft into front case bearing.
- (5) Press input gear shaft into front bearing.
- (6) Install new input gear snap ring (Fig. 66).



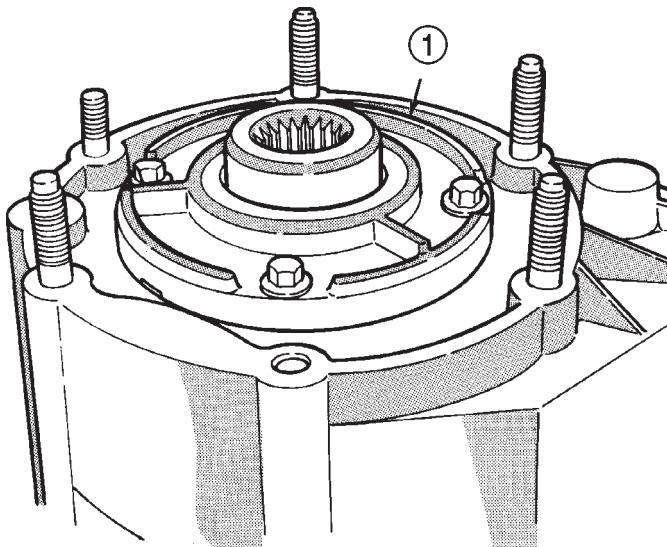
J8921-267

Fig. 66 Input Gear Snap Ring Installation

- 1 – INPUT GEAR
2 – SNAP RING

(7) Apply 3 mm (1/8 in.) wide bead of Mopar® gasket maker or silicone adhesive sealer to seal surface of front bearing retainer.

(8) Install front bearing retainer (Fig. 67). Tighten retainer bolts to 16 ft. lbs. (21 N·m) torque.



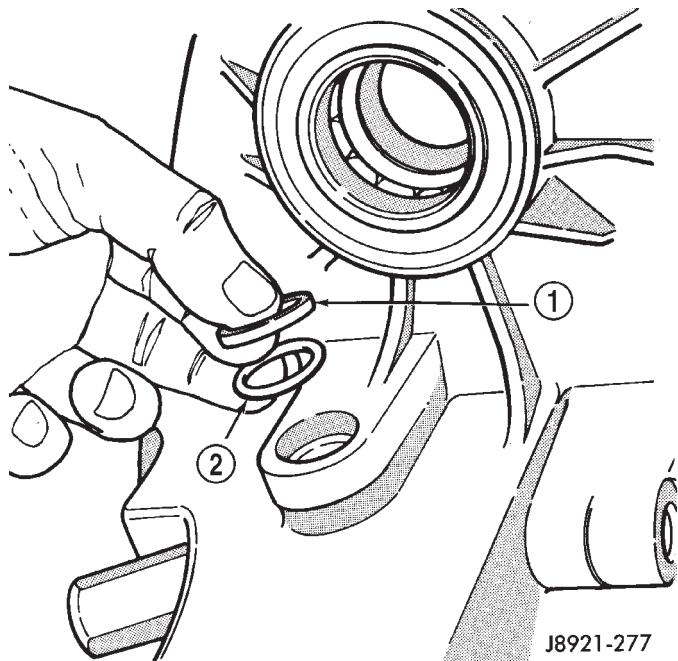
J8921-276

Fig. 67 Installing Front Bearing Retainer

- 1 – FRONT BEARING RETAINER

SHIFT FORKS AND MAINSHAFT INSTALLATION

- (1) Install new sector shaft O-ring and bushing (Fig. 68).

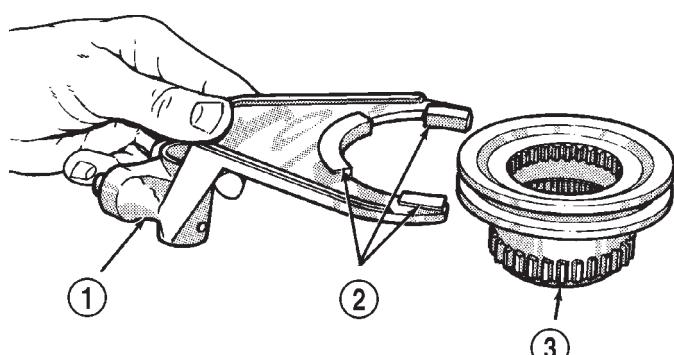


J8921-277

Fig. 68 Sector O-Ring And Bushing Installation

- 1 – SECTOR BUSHING
2 – O-RING

- (2) Install shift sector.
- (3) Install new pads on low range fork, if necessary, (Fig. 69).
- (4) Assemble low range fork and hub (Fig. 69).



J8921-278

Fig. 69 Assembling Low Range Fork And Hub

- 1 – LOW RANGE FORK
2 – PADS
3 – HUB

DISASSEMBLY AND ASSEMBLY (Continued)

(5) Position low range fork and hub in case. Be sure low range fork pin is engaged in shift sector slot (Fig. 70).

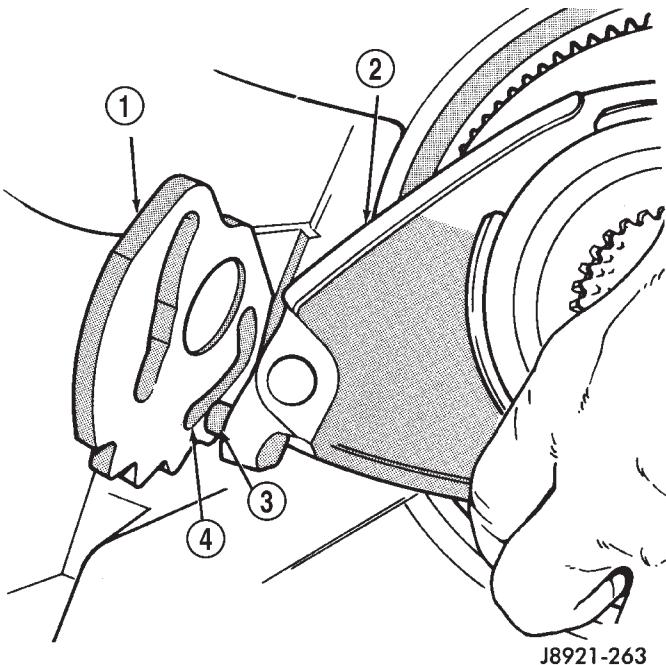


Fig. 70 Positioning Low Range Fork

- 1 – SHIFT SECTOR
- 2 – LOW RANGE FORK
- 3 – PIN
- 4 – SLOT

(6) Install first mainshaft bearing spacer on mainshaft (Fig. 71).

(7) Install bearing rollers on mainshaft (Fig. 71). **Coat bearing rollers with generous quantity of petroleum jelly to hold them in place.**

(8) Install remaining bearing spacer on mainshaft (Fig. 71). Do not displace any bearings while installing spacer.

(9) Install differential (Fig. 72). **Do not displace mainshaft bearings when installing differential.**

- (10) Install differential snap-ring (Fig. 73).
- (11) Install intermediate clutch shaft (Fig. 74).
- (12) Install clutch shaft thrust washer (Fig. 75).
- (13) Install clutch shaft snap-ring (Fig. 76).
- (14) Inspect mode fork assembly (Fig. 77). Replace pads and bushing if necessary. Replace fork tube if bushings inside tube are worn or damaged. Also check springs and slider bracket (Fig. 77). Replace worn, damaged components.

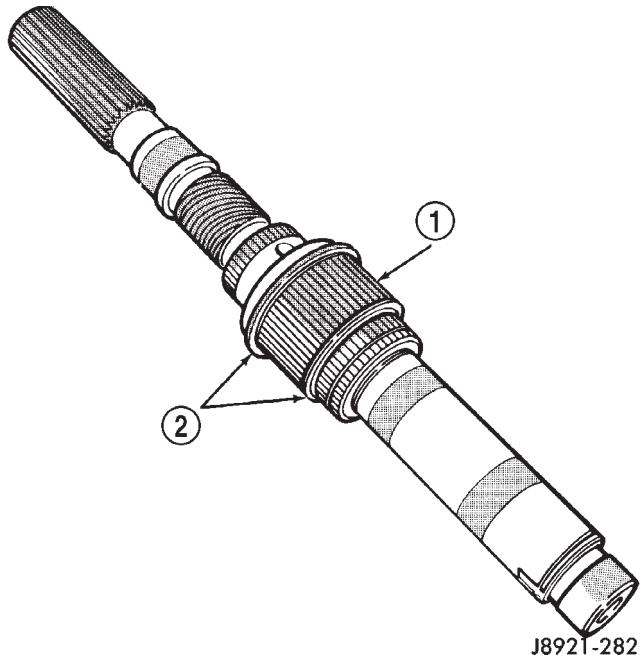
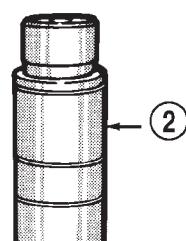
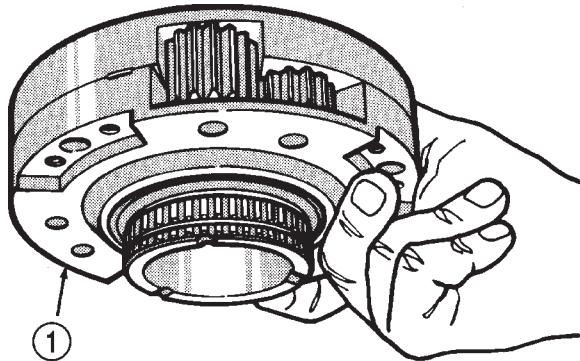


Fig. 71 Installing Mainshaft Bearing Rollers and Spacers

- 1 – MAINSHAFT BEARING ROLLERS
- 2 – BEARING SPACERS

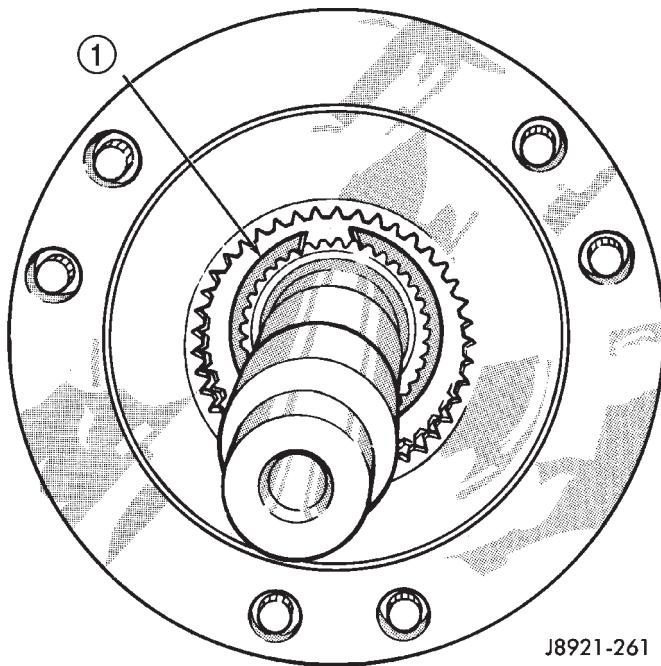


J8921-283

Fig. 72 Differential Installation

- 1 – DIFFERENTIAL
- 2 – MAINSHAFT

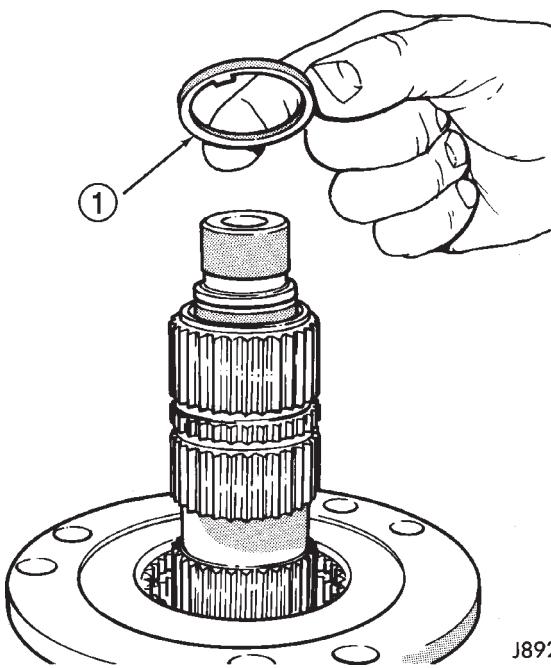
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-261

Fig. 73 Installing Differential Snap-Ring

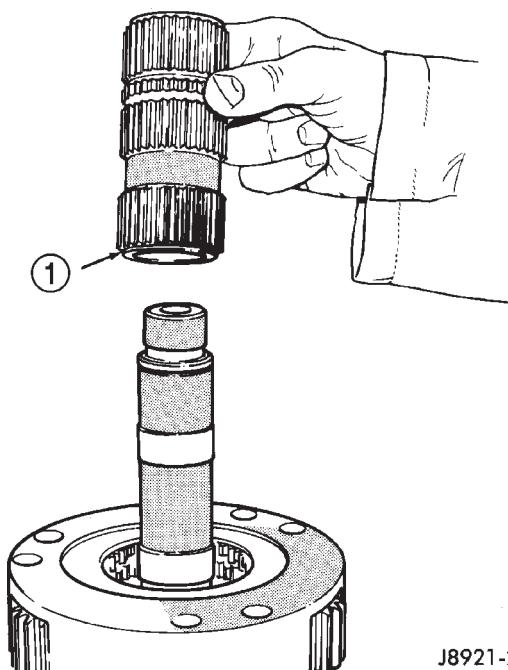
1 – DIFFERENTIAL SNAP RING



J8921-259

Fig. 75 Installing Clutch Shaft Thrust Washer

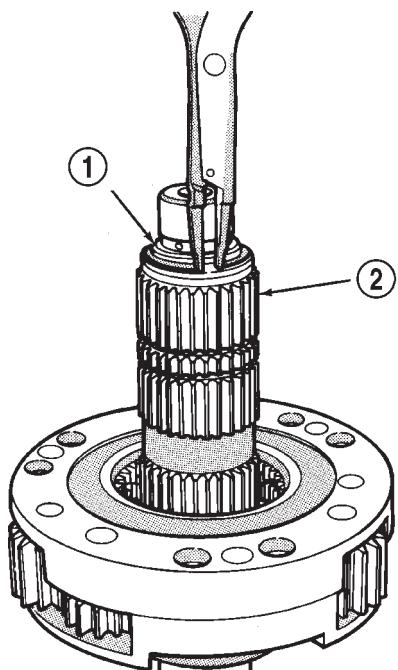
1 – CLUTCH SHAFT THRUST RING



J8921-260

Fig. 74 Installing Intermediate Clutch Shaft

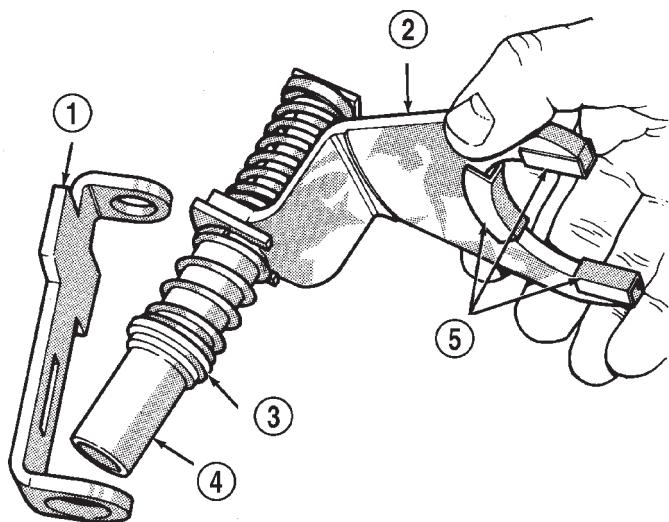
1 – INTERMEDIATE CLUTCH SHAFT



J8921-258

Fig. 76 Installing Clutch Shaft Snap-Ring1 – SNAP RING
2 – INTERMEDIATE CLUTCH SHAFT

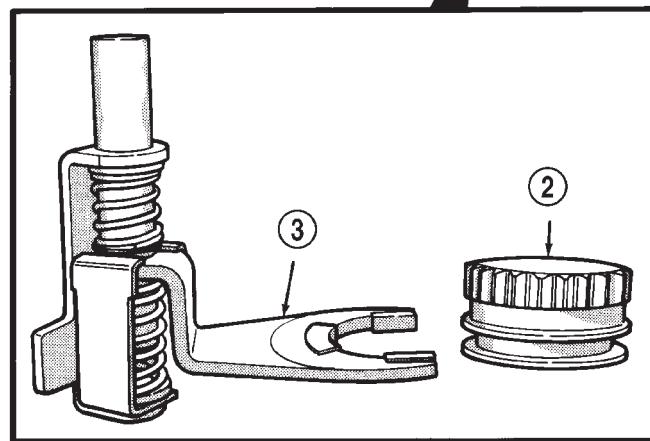
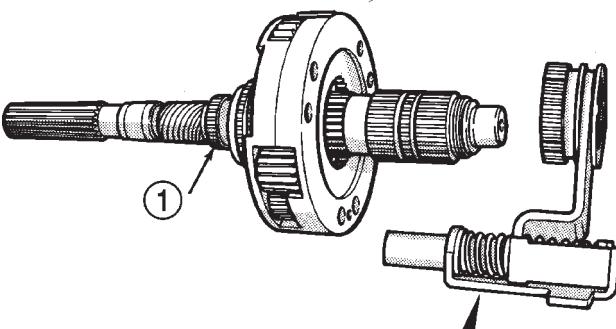
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-284

Fig. 77 Mode Fork Assembly Inspection

- 1 - SLIDER
- 2 - MODE FORK
- 3 - BUSHING/SPRING
- 4 - TUBE
- 5 - PADS



J8921-257

Fig. 78 Installing Mode Fork And Sleeve

- 1 - MAINSHAFT
- 2 - SLEEVE
- 3 - MODE FORK ASSEMBLY

(15) Install mode sleeve in mode fork (Fig. 78). Then install assembled sleeve and fork on mainshaft. Be sure mode sleeve splines are engaged in differential splines.

(16) Install mode fork and mainshaft assembly in case (Fig. 79). Rotate mainshaft slightly to engage shaft with low range gears.

(17) Rotate mode fork pin into shift sector slot.

(18) Install shift rail (Fig. 80). **Be sure rail is seated in both shift forks.**

(19) Rotate shift sector to align lockpin hole in low range fork with access hole in case.

(20) Insert an easy-out in range fork lockpin to hold it securely for installation (Fig. 81). **Lockpin is slightly tapered on one end. Insert tapered end into fork and rail.**

(21) Insert lockpin through access hole and into shift fork (Fig. 81). Then remove easy-out and seat the pin with pin punch.

(22) Install plug in lockpin access hole.

(23) Install detent plunger, detent spring and detent plug in case (Fig. 82).

FRONT OUTPUT SHAFT AND DRIVE CHAIN INSTALLATION

(1) Install front output shaft (Fig. 83).

(2) Install drive chain (Fig. 83). Engage chain with front output shaft sprocket teeth.

(3) Install drive sprocket (Fig. 83). Engage drive sprocket teeth with chain. Then engage sprocket splines with mainshaft splines.

DISASSEMBLY AND ASSEMBLY (Continued)

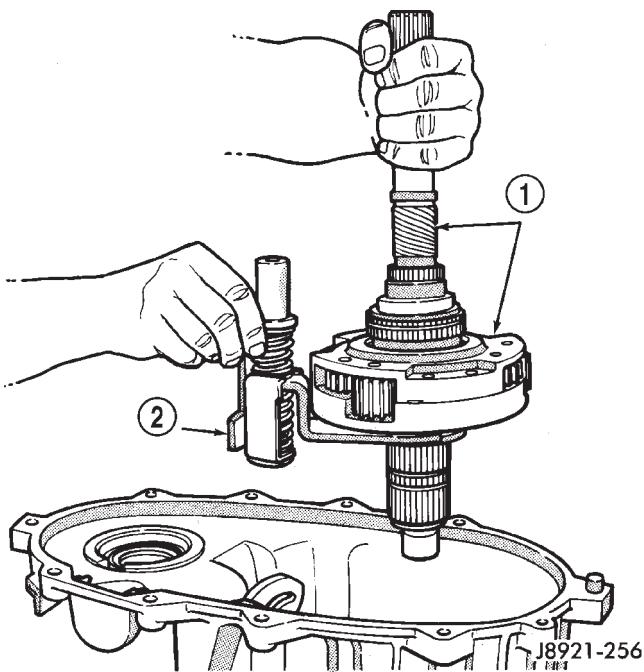


Fig. 79 Assembled Mainshaft And Mode Fork Installation

- 1 – MAINSHAFT ASSEMBLY
- 2 – MODE FORK

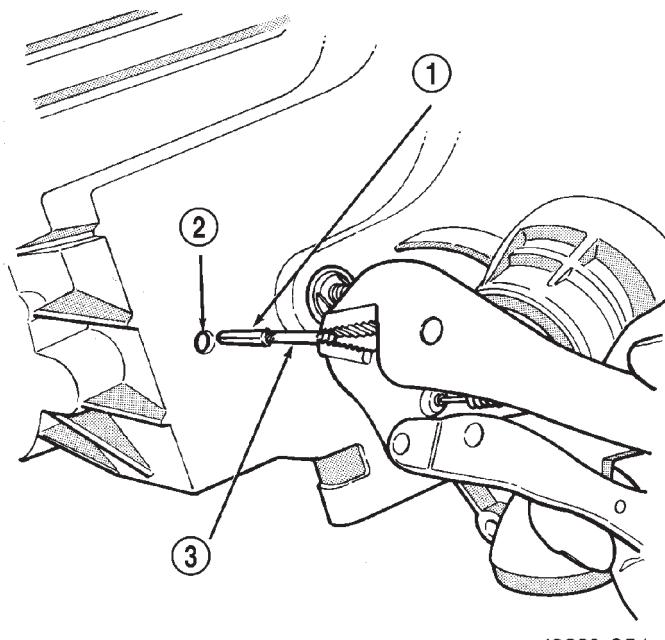


Fig. 81 Installing Low Range Fork Lockpin

- 1 – LOW RANGE FORK LOCK PIN
- 2 – ACCESS HOLE
- 3 – EASY-OUT

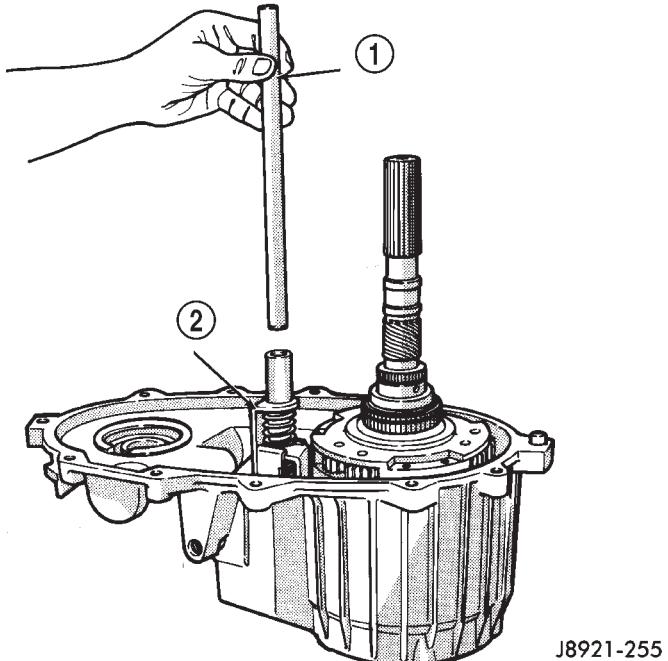


Fig. 80 Shift Rail Installation

- 1 – SHIFT RAIL
- 2 – MODE FORK

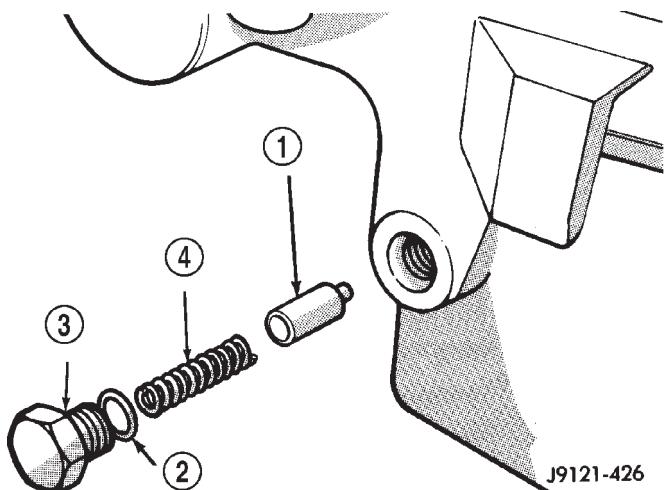
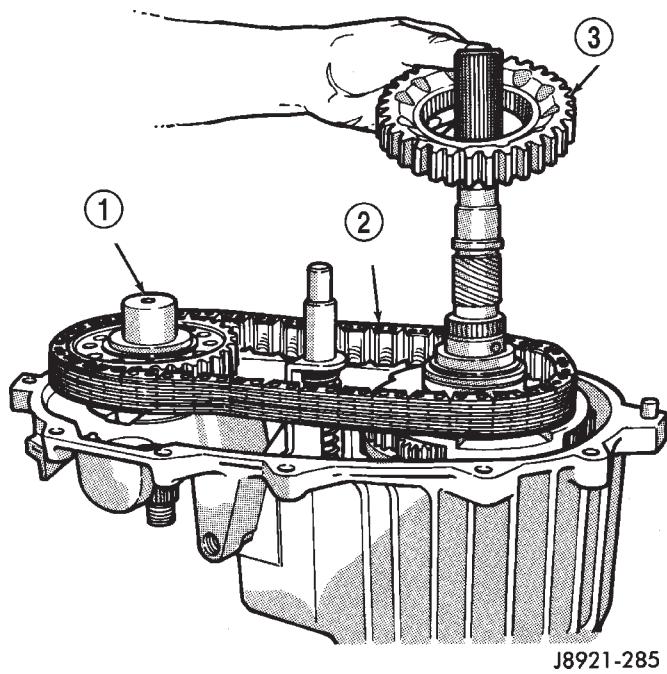


Fig. 82 Detent Pin, Spring And Plug Installation

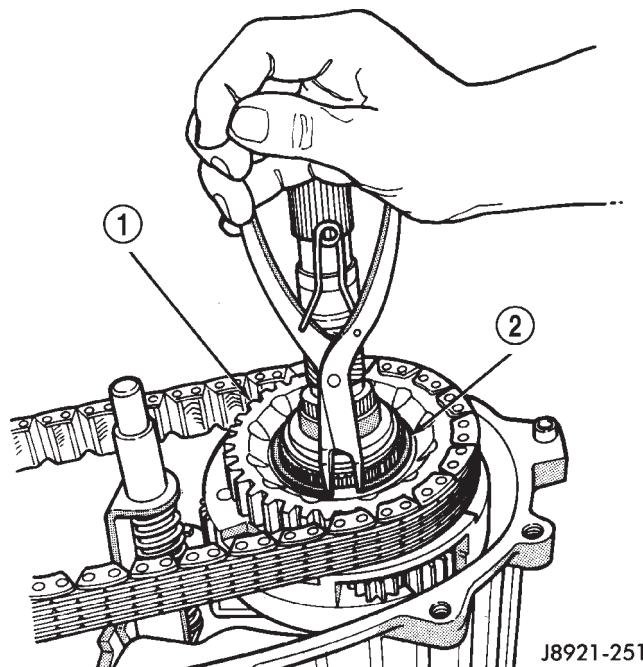
- 1 – PLUNGER
- 2 – O-RING
- 3 – PLUG
- 4 – SPRING

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 83 Drive Chain And Sprocket Installation**

- 1 – FRONT OUTPUT SHAFT
- 2 – DRIVE CHAIN
- 3 – DRIVE SPROCKET

(4) Install drive sprocket snap-ring (Fig. 84).

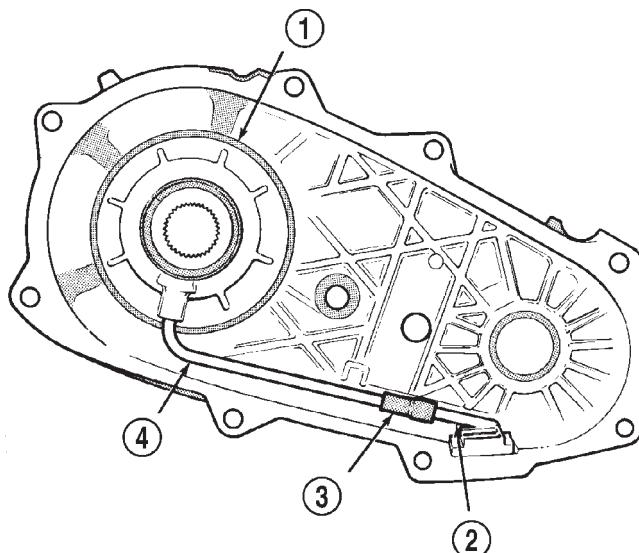
**Fig. 84 Drive Sprocket Snap-Ring Installation**

- 1 – DRIVE SPROCKET
- 2 – DRIVE SPROCKET SNAP RING

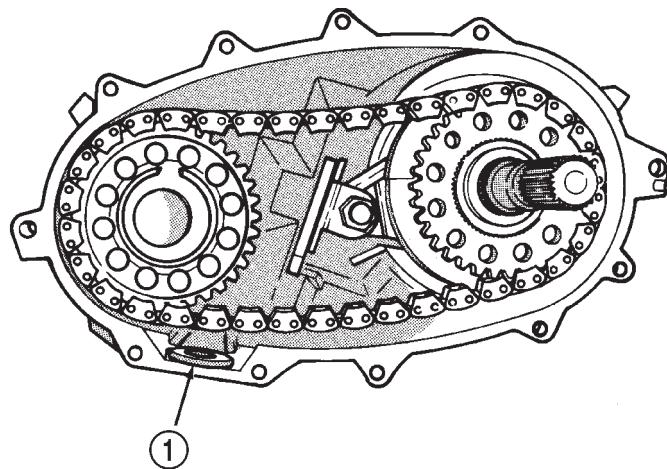
OIL PUMP AND REAR CASE INSTALLATION

(1) Insert oil pickup tube in oil pump and attach oil screen and connector hose to pickup tube. Then install assembled pump, tube and screen in rear case (Fig. 85). Be sure screen is seated in case slot as shown.

(2) Install magnet in front case pocket (Fig. 86).

**Fig. 85 Oil Screen And Pickup Tube Installation**

- 1 – OIL PUMP
- 2 – OIL SCREEN
- 3 – CONNECTOR
- 4 – PICKUP TUBE

**Fig. 86 Installing Case Magnet**

- 1 – MAGNET

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Apply 3 mm (1/8 in.) wide bead of Mopar gasket maker or silicone adhesive sealer to seal surface of front case.

(4) Align and install rear case on front case. Be sure case locating dowels are in place and that main-shaft splines are engaged in oil pump inner gear.

(5) Install and tighten front case-to-rear case bolts to 41 N·m (30 ft. lbs.) torque. **Be sure to install a washer under each bolt used at case dowel locations.**

REAR RETAINER INSTALLATION

(1) Remove rear bearing in retainer using Installer 8128 and Handle C-4171.

(2) Install rear bearing in retainer with Tools C-4171 and 5064 (Fig. 87).

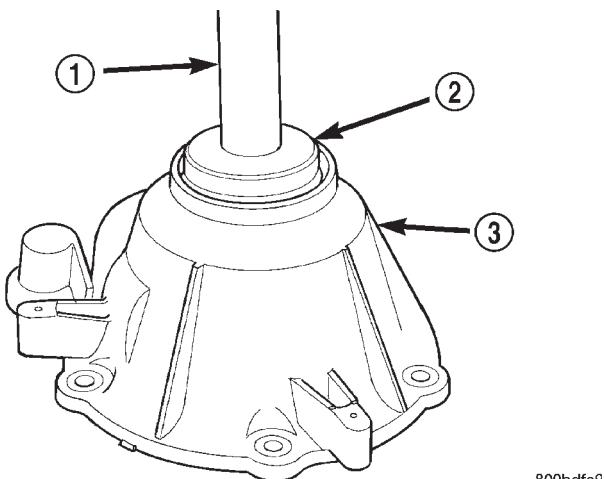


Fig. 87 Installing Rear Bearing In Retainer

- 1 – SPECIAL TOOL C-4171
- 2 – SPECIAL TOOL 5064
- 3 – REAR RETAINER

(3) Install rear bearing O. D. retaining ring with snap-ring pliers (Fig. 88). Be sure retaining ring is fully seated in retainer groove.

(4) Apply bead of Mopar® Sealer P/N 82300234, or Loctite™ Ultra Gray, to mating surface of rear retainer. Sealer bead should be a maximum of 3/16 in.

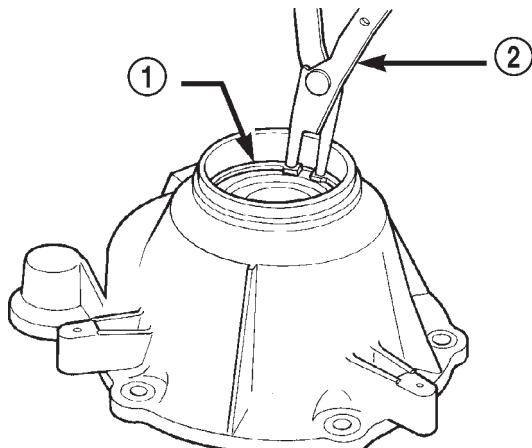
(5) Install rear retainer on rear case. Tighten retainer bolts to 20–27 N·m (15–20 ft. lbs.) torque.

(6) Install rear bearing I. D. retaining ring and spacer on output shaft.

(7) Apply liberal quantity of petroleum jelly to new rear seal and to output shaft. Petroleum jelly is needed to protect seal lips during installation.

(8) Slide seal onto Seal Protector 6992 (Fig. 89). Slide seal protector and seal onto output shaft.

(9) Slide Installer C-4076-B onto seal protector with the recessed side of the tool toward the seal.

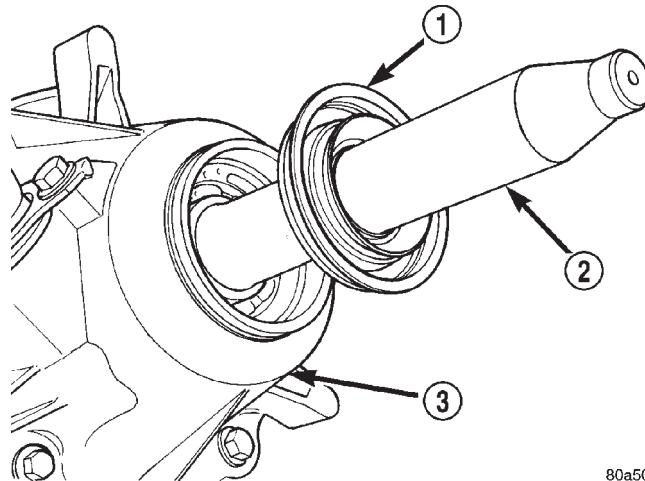


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Fig. 88 Rear Bearing Retaining Ring Installation

- 1 – REAR BEARING O. D. RETAINING RING
- 2 – SNAP RING PLIERS

Drive seal into rear bearing retainer with Installer C-4076-B and Handle MD-998323 (Fig. 90).



80a50355

Fig. 89 Output Shaft Seal and Protector

- 1 – OUTPUT SHAFT SEAL
- 2 – SPECIAL TOOL 6992
- 3 – TRANSFER CASE

(10) Install rear slinger with Installer 8408.

(11) Install boot on output shaft slinger and crimp retaining clamp with tool C-4975-A (Fig. 91).

FRONT YOKE AND SWITCH INSTALLATION

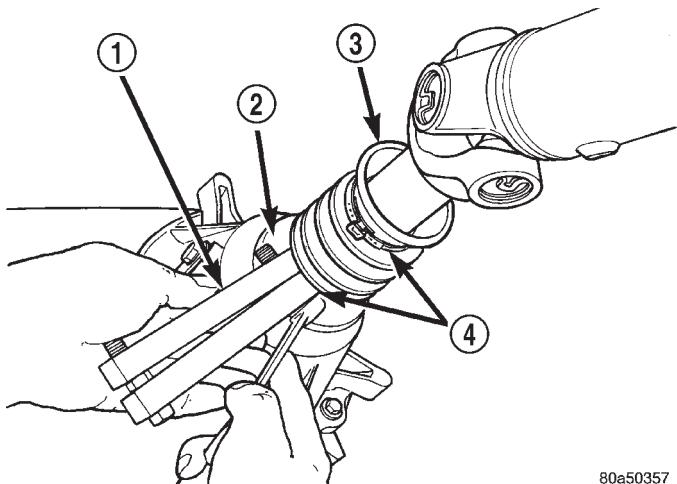
(1) Install indicator switch in front case. Tighten switch to 20–34 N·m (15–25 ft. lbs.) torque.

(2) Lubricate yoke hub with transmission fluid and install yoke on front shaft.

(3) Install new seal washer on front shaft.

(4) Install yoke on front shaft. Secure yoke with new nut.

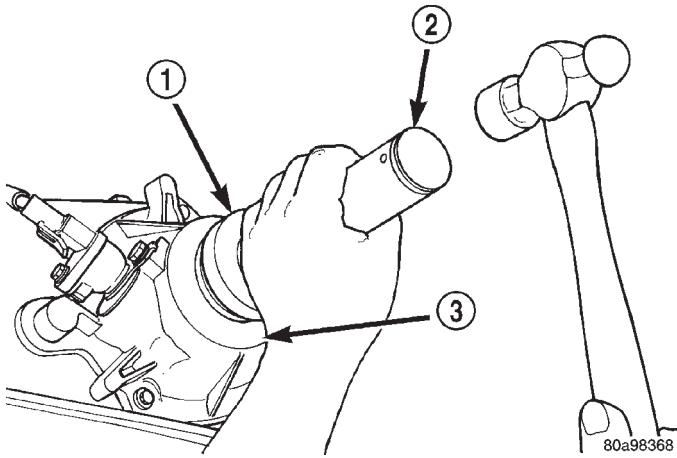
DISASSEMBLY AND ASSEMBLY (Continued)



80a50357

Fig. 91 Slinger Boot Installation

- 1 – SPECIAL TOOL C-4975-A
 2 – SLINGER
 3 – BOOT
 4 – CLAMP



80a98368

Fig. 90 Rear Seal Installation

- 1 – SPECIAL TOOL C-4076-B
 2 – SPECIAL TOOL MD998323
 3 – TRANSFER CASE

CLEANING AND INSPECTION

NV242 TRANSFER CASE

Clean the transfer case parts with a standard parts cleaning solvent. Remove all traces of sealer from the cases and retainers with a scraper and all purpose cleaner. Use compressed air to remove solvent residue from oil feed passages in the case halves, retainers, gears, and shafts.

The oil pickup screen can be cleaned with solvent. Shake excess solvent from the screen after cleaning and allow it to air dry. Do not use compressed air.

MAINSHAFT/SPROCKET/HUB INSPECTION

Inspect the splines on the hub and shaft and the teeth on the sprocket. Minor nicks and scratches can be smoothed with an oilstone. However, replace any part if damaged.

Check the contact surfaces in the sprocket bore and on the mainshaft. Minor nicks and scratches can be smoothed with 320–400 grit emery cloth but do not try to salvage the shaft if nicks or wear is severe.

INPUT GEAR AND PLANETARY CARRIER

Check the teeth on the gear (Fig. 92). Minor nicks can be dressed off with an oilstone but replace the gear if any teeth are broken, cracked, or chipped. The bearing surface on the gear can be smoothed with 300–400 grit emery cloth if necessary.

Examine the carrier body and pinion gears for wear or damage. The carrier will have to be replaced as an assembly if the body, pinion pins, or pinion gears are damaged.

Check the lock ring and both thrust washers for wear or cracks. Replace them if necessary. Also replace the lock retaining ring if bent, distorted, or broken.

SHIFT FORKS/HUBS/SLEEVES

Check condition of the shift forks and mode fork shift rail (Fig. 93). Minor nicks on the shift rail can be smoothed with 320–400 grit emery cloth.

Inspect the shift fork wear pads. The mode fork pads are serviceable and can be replaced if necessary. The range fork pads are also serviceable.

Check both of the sleeves for wear or damage, especially on the interior teeth. Replace the sleeves if wear or damage is evident.

REAR RETAINER/BEARING/ SEAL/SLINGER/BOOT

Inspect the retainer components (Fig. 94). Replace the bearing if rough or noisy. Check the retainer for cracks or wear in the bearing bore. Clean the retainer sealing surfaces with a scraper and all purpose cleaner. This will ensure proper adhesion of the sealer during reassembly.

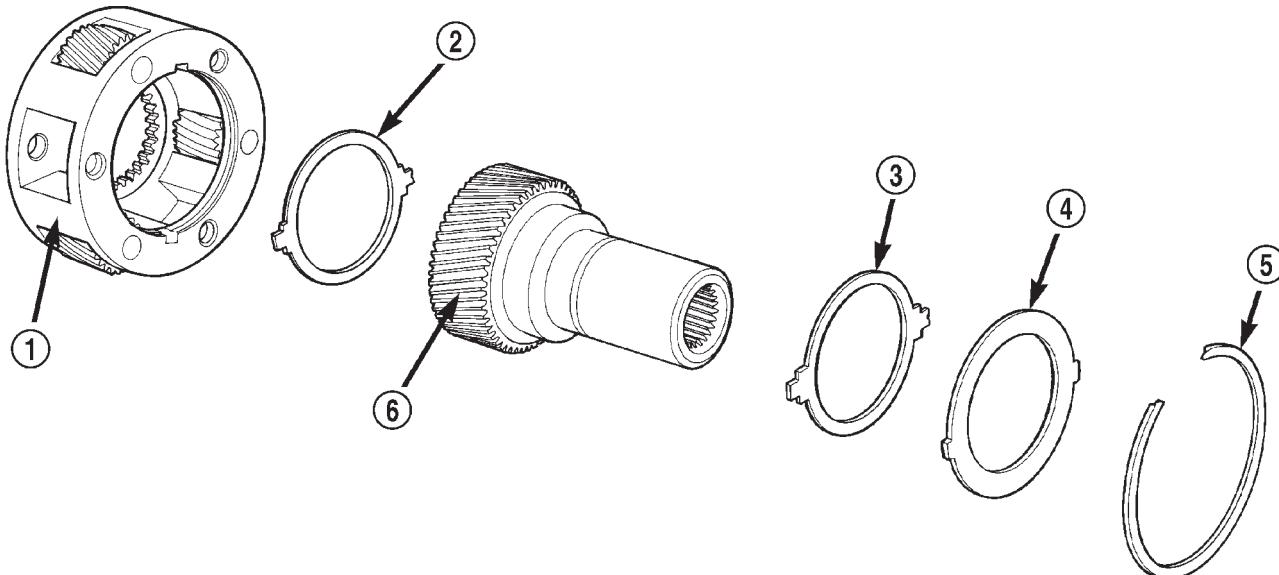
Replace the slinger and seal outright; do not reuse either part.

Inspect the retaining rings and washers. Replace any part if distorted, bent, or broken. Reuse is not recommended. Also replace the boot if cut or torn. Replace the boot band clamps, do not reuse them.

REAR OUTPUT SHAFT/YOKE/DRIVE CHAIN

Check condition of the seal contact surfaces of the yoke slinger (Fig. 95). This surface must be clean and smooth to ensure proper seal life. Replace the yoke nut and seal washer as neither part should be reused.

CLEANING AND INSPECTION (Continued)

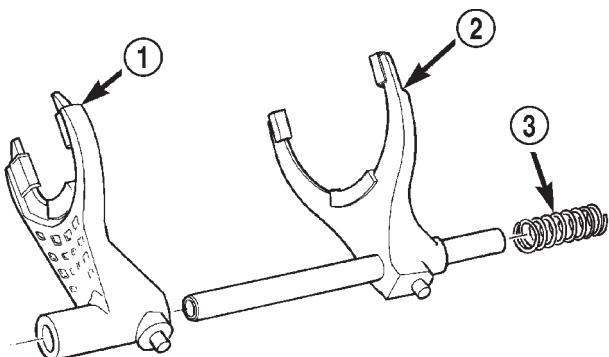


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Fig. 92 Input Gear And Carrier Components

- 1 – PLANETARY CARRIER
 2 – REAR THRUST WASHER
 3 – FRONT THRUST WASHER

- 4 – CARRIER LOCK RING
 5 – CARRIER LOCK RETAINING RING
 6 – INPUT GEAR



80010948

Fig. 93 Shift forks

- 1 – RANGE FORK
 2 – MODE FORK AND RAIL
 3 – MODE SPRING

Inspect the shaft threads, sprocket teeth, and bearing surfaces. Minor nicks on the teeth can be smoothed with an oilstone. Use 320–400 grit emery to smooth minor scratches on the shaft bearing surfaces. Rough threads on the shaft can be chased if necessary. Replace the shaft if the threads are damaged, bearing surfaces are scored, or if any sprocket teeth are cracked or broken.

Examine the drive chain and shaft bearings. Replace the chain and both sprockets if the chain is stretched, distorted, or if any of the links bind. Replace the bearings if rough, or noisy.

LOW RANGE ANNULUS GEAR

Inspect annulus gear condition carefully. The gear is only serviced as part of the front case. If the gear is damaged, it will be necessary to replace the gear and front case as an assembly. Do not attempt to remove the gear (Fig. 96).

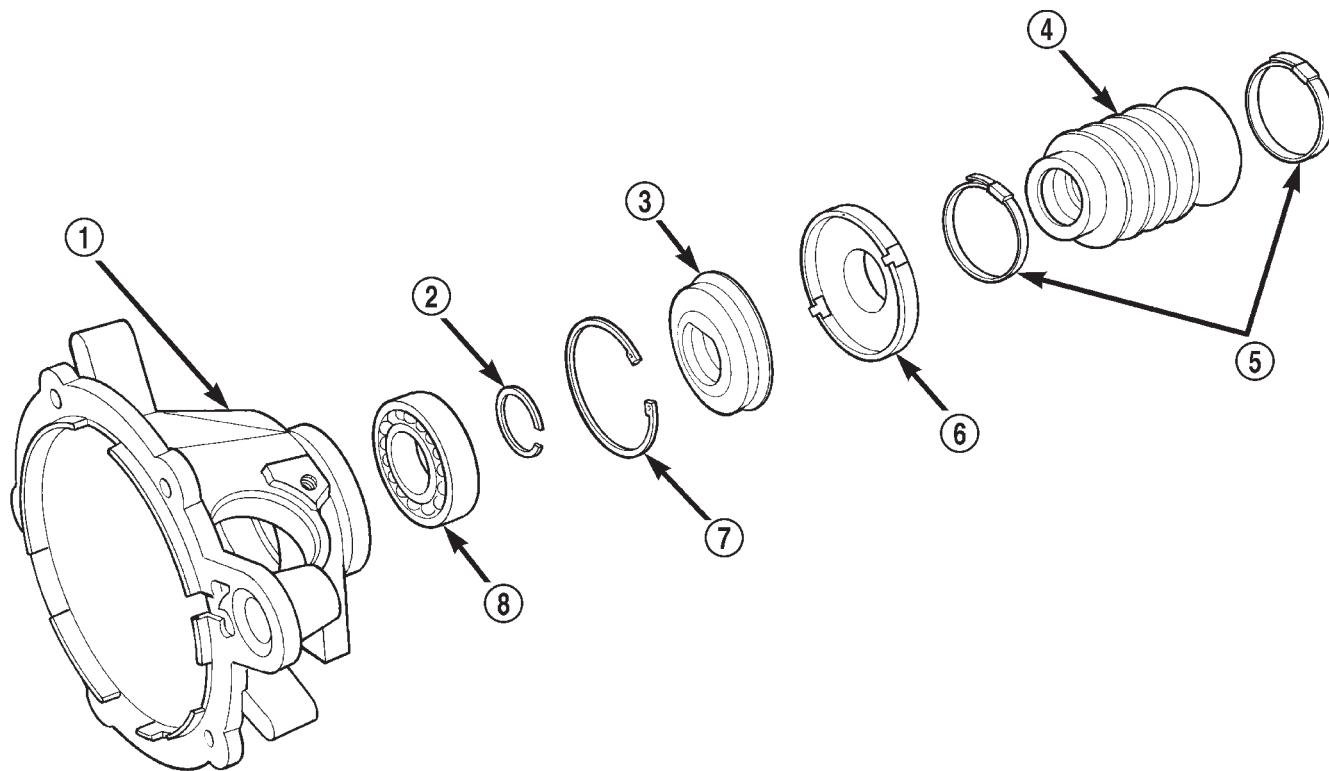
FRONT-REAR CASES AND FRONT RETAINER

Inspect the cases and retainer for wear and damage. Clean the sealing surfaces with a scraper and all purpose cleaner. This will ensure proper sealer adhesion at assembly. Replace the input retainer seal; do not reuse it.

Check case condition. If leaks were a problem, look for gouges and severe scoring of case sealing surfaces. Also make sure the front case mounting studs are in good condition.

Check the front case mounting studs and vent tube. The tube can be secured with Loctite™ 271 or 680 if loose. The stud threads can be cleaned up with a die if necessary. Also check condition of the fill/drain plug threads in the rear case. The threads can be repaired with a thread chaser or tap if necessary. Or the threads can be repaired with Helicoil stainless steel inserts if required.

CLEANING AND INSPECTION (Continued)



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Fig. 94 Rear Retainer Components

1 - REAR RETAINER

2 - REAR BEARING I. D. RETAINING RING

3 - REAR SEAL

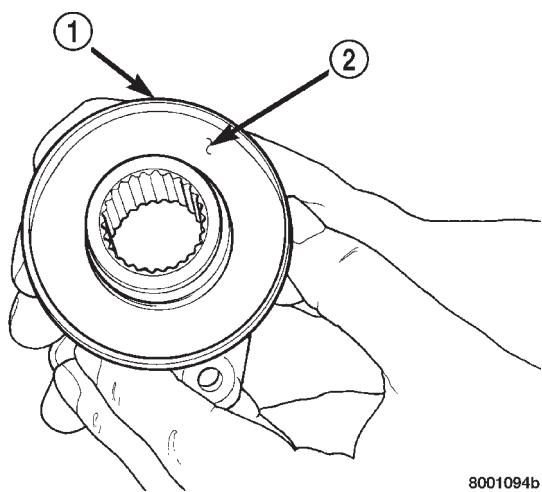
4 - BOOT

5 - BAND CLAMPS

6 - REAR SLINGER

7 - REAR BEARING O. D. RETAINING RING

8 - REAR BEARING

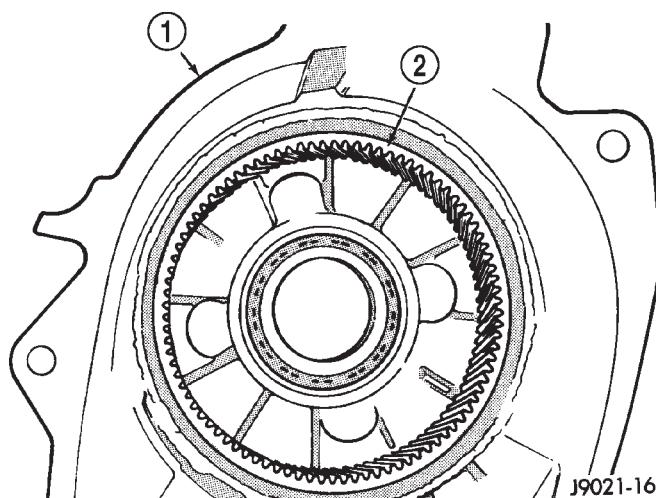


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Fig. 95 Seal Contact Surface Of Yoke Slinger

1 - FRONT SLINGER (PART OF YOKE)

2 - SEAL CONTACT SURFACE MUST BE CLEAN AND SMOOTH

**Fig. 96 Low Range Annulus Gear**

1 - FRONT CASE

2 - LOW RANGE ANNULUS GEAR

CLEANING AND INSPECTION (Continued)

OIL PUMP/OIL PICKUP

Examine the oil pump pickup parts. Replace the pump if any part appears to be worn or damaged. Do not disassemble the pump as individual parts are not available. The pump is only available as a complete assembly. The pickup screen, hose, and tube are the only serviceable parts and are available separately.

ADJUSTMENTS

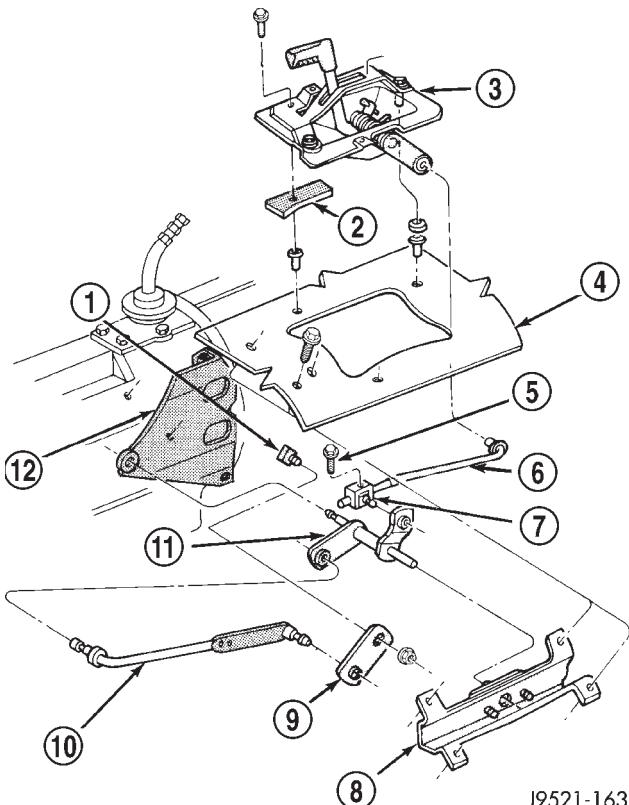
SHIFT LINKAGE ADJUSTMENT

- (1) Shift transfer case into 4L position.
- (2) Raise vehicle.
- (3) Loosen lock bolt on adjusting trunnion (Fig. 97).
- (4) Be sure linkage rod slides freely in trunnion. Clean rod and apply spray lube if necessary.
- (5) Verify that transfer case range lever is fully engaged in 4L position.
- (6) Tighten adjusting trunnion lock bolt.
- (7) Lower vehicle.

SPECIFICATIONS

TORQUE

DESCRIPTION	TORQUE
Plug, Detent	16–24 N·m (12–18 ft. lbs.)
Bolt, Diff. Case	17–27 N·m (15–24 ft. lbs.)
Plug, Drain/Fill	20–25 N·m (15–25 ft. lbs.)
Bolt, Front Brg. Retainer	16–27 N·m (12–20 ft. lbs.)
Bolt, Case Half	35–46 N·m (26–34 ft. lbs.)
Nut, Front Yoke	122–176 N·m (90–130 ft. lbs.)
Screw, Oil Pump	1.2–1.8 N·m (12–15 in. lbs.)
Nut, Range Lever	27–34 N·m (20–25 ft. lbs.)
Bolt, Rear Retainer	35–46 N·m (26–34 ft. lbs.)
Nuts, Mounting	35 N·m (26 ft. lbs.)
Bolts, U-Joint	19 N·m (17 ft. lbs.)



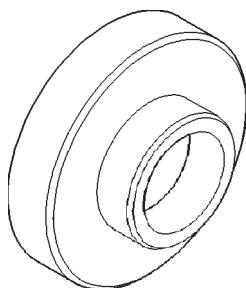
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Fig. 97 Shift Linkage

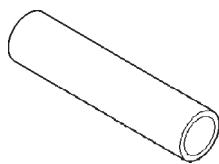
- 1 – TRANSFER CASE SHIFT LEVER SHAFT
- 2 – SEAL
- 3 – TRANSFER CASE SHIFT LEVER ASSEMBLY
- 4 – FLOORPAN
- 5 – TRUNNION LOCK BOLT
- 6 – SHIFT ROD
- 7 – ADJUSTING TRUNNION
- 8 – TORQUE SHAFT BRACKET
- 9 – RANGE LEVER
- 10 – TORQUE SHAFT ROD
- 11 – TORQUE SHAFT
- 12 – LINKAGE BRACKET

SPECIAL TOOLS

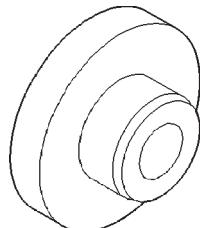
NV242



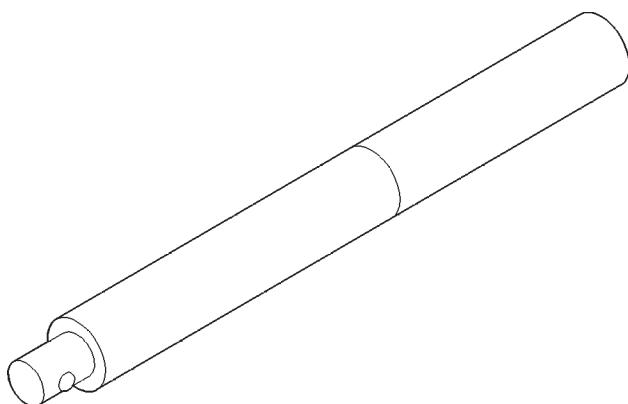
Installer—C-4076-B



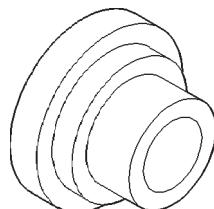
Installer—MD-998323



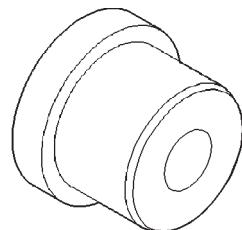
Installer, Bearing—5064



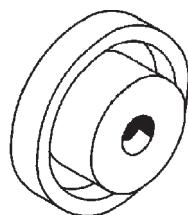
Handle, Universal—C-4171



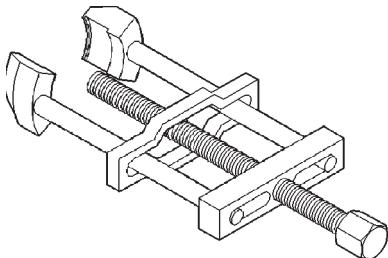
Installer—8128



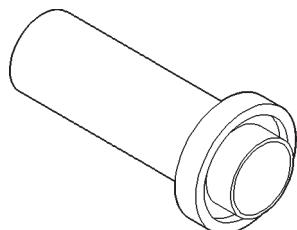
Installer—5066



Remover—C-4210

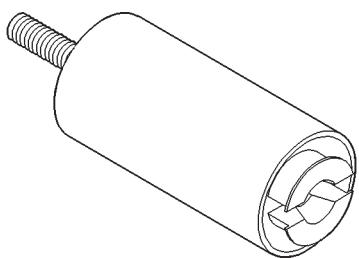


Puller, Slinger—MD-998056-A

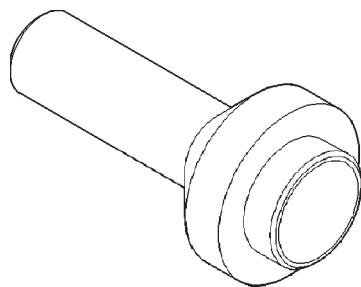


Installer—6952-A

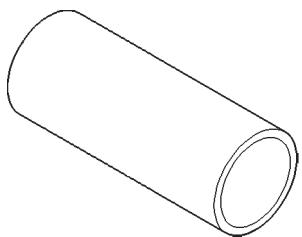
SPECIAL TOOLS (Continued)



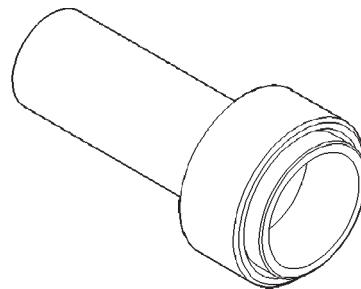
Remover—L-4454



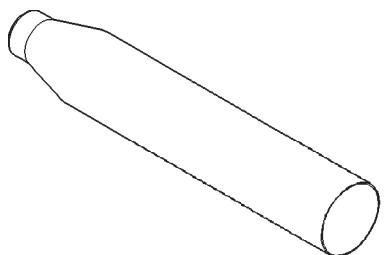
Installer, Seal—7884



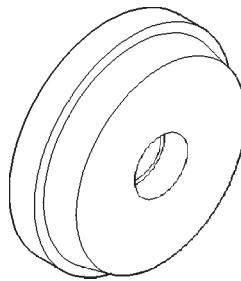
Cup—8148



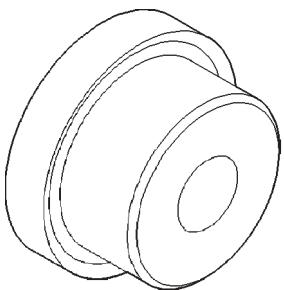
Installer, Pump Housing Seal—7888



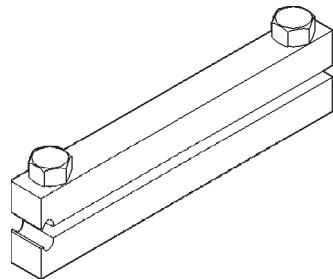
Seal Protector—6992



Installer, Bearing—8033-A



Installer, Input Gear Bearing—7829-A



Installer, Boot Clamp—C-4975-A

