

TRANSMISSION AND TRANSFER CASE

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NV3500 MANUAL TRANSMISSION

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GENERAL INFORMATION

NV3500 MANUAL TRANSMISSION

The NV3500 is a medium-duty, 5-speed, constant mesh, fully synchronized manual transmission. Fifth gear is an overdrive range with a ratio of 0.729:1. The NV3500 is available in two and four-wheel drive configurations.

The transmission gear case consists of two aluminum housings (Fig. 1). The clutch housing is not a removable component. It is 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 NV3500 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. 2).

TRANSMISSION LUBRICANT

Required lubricant for the NV3500 is Mopar® Manual Transmission Lubricant, P/N 4761526. This is the **only** lubricant to be used in NV3500 transmissions. No other lubricants are acceptable, or recommended.

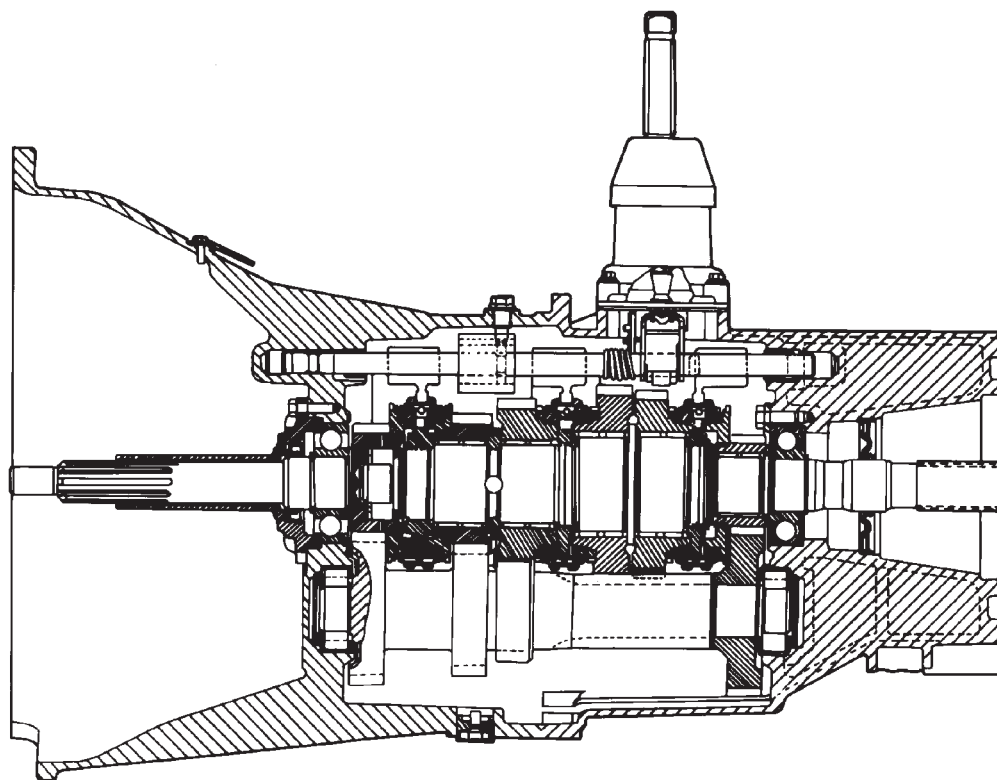
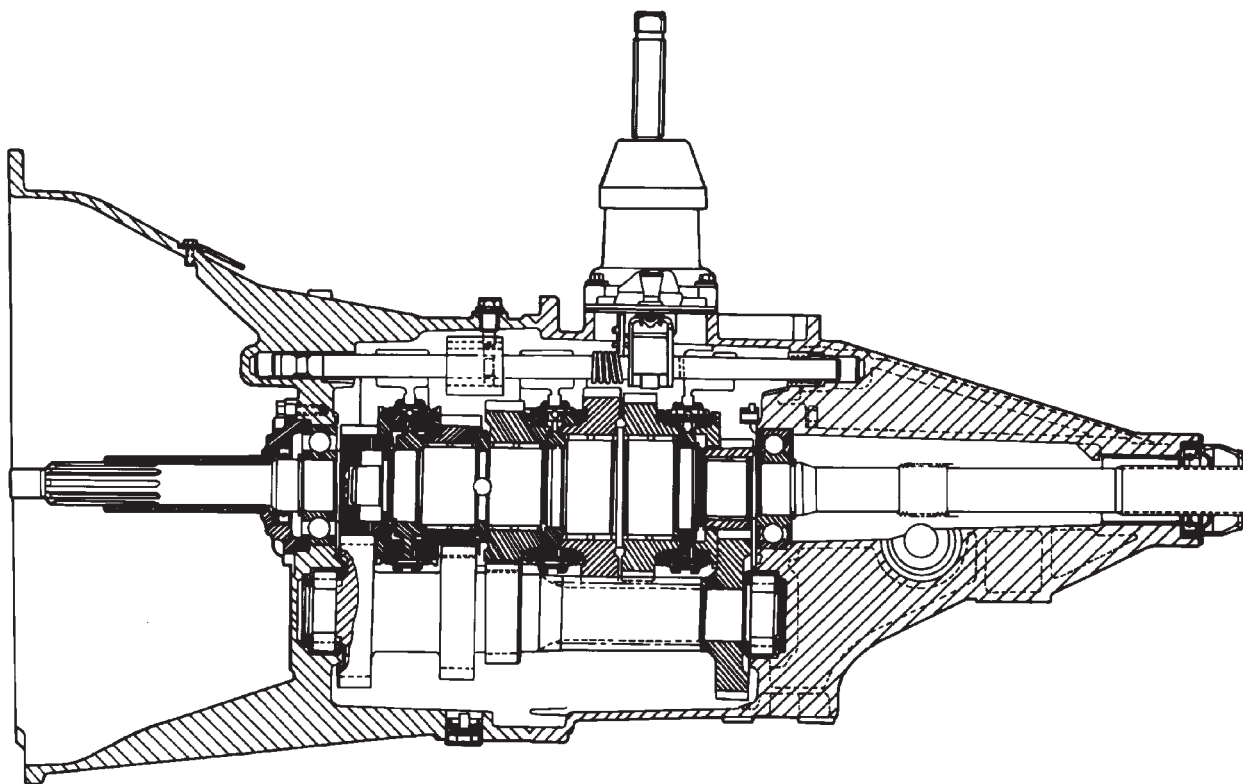
TRANSMISSION LUBRICANT LEVEL AND CAPACITY

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

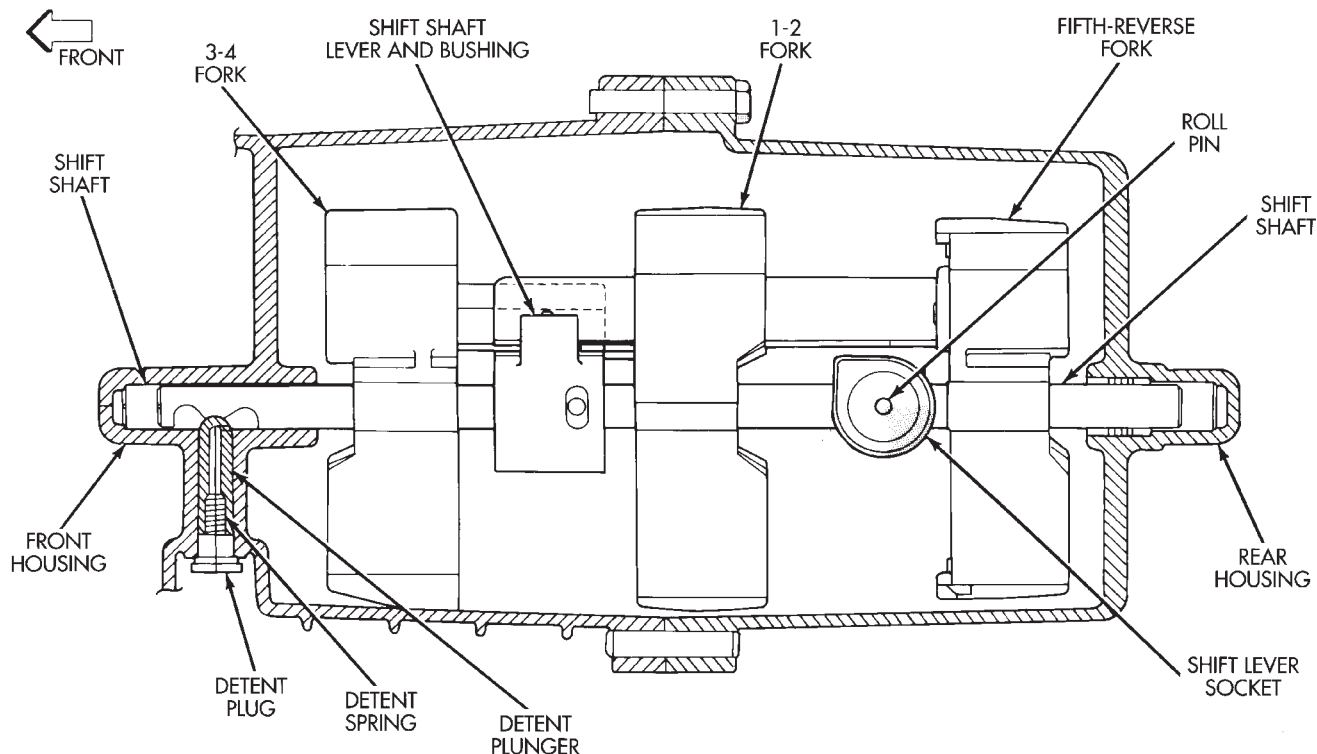
The transmission must be level to obtain an accurate lubricant level check. A drive-on type of hoist is recommended for this purpose.

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.

GENERAL INFORMATION (Continued)

*Fig. 1 NV3500 Manual Transmission*

GENERAL INFORMATION (Continued)



J9521-147

Fig. 2 NV3500 Shift Mechanism**DRAIN AND FILL PLUG LOCATIONS**

The NV3500 fill and drain plugs are both located in the front housing. The fill plug is at the passenger side of the housing. The drain plug is at the bottom of the housing (Fig. 3).

TRANSMISSION GEAR RATIOS

Two versions of the NV3500 are available. The wide ratio version has a 4.01 first gear and 2.32 second gear. The close ratio NV3500 has a 3.49 first gear and 2.16 second gear.

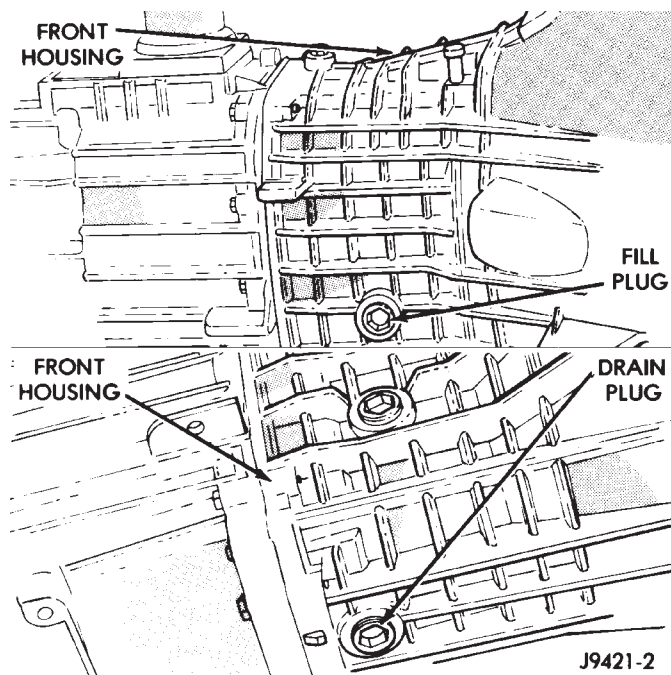
DIAGNOSIS AND TESTING**LOW LUBRICANT LEVEL**

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



J9421-2

Fig. 3 Drain and Fill Plug Locations

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.

DIAGNOSIS AND TESTING (Continued)

WIDE RATIO VERSION

RANGE	RATIO
FIRST	4.01:1
SECOND	2.32:1
THIRD =	1.40:1
FOURTH =	1:1
FIFTH =	0.73:1
REVERSE =	3.55:1

CLOSE RATIO VERSION

RANGE	RATIO
FIRST	3.48:1
SECOND	2.16:1
THIRD =	1.40:1
FOURTH =	1:1
FIFTH =	0.73:1
REVERSE =	3.55:1

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

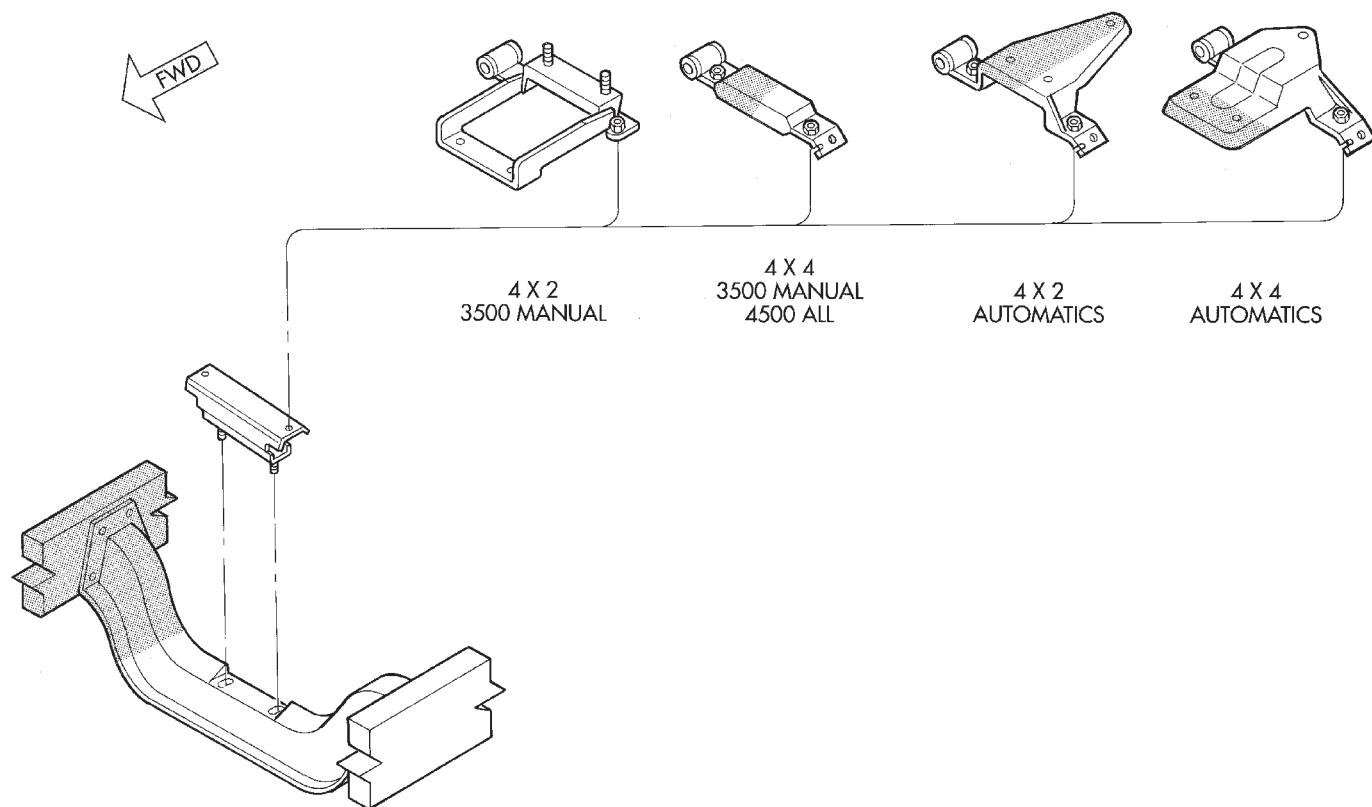
Most manual transmissions make some noise during normal operation. Rotating gears can generate a mild whine that may only be audible at extreme speeds.

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—2WD****REMOVAL**

- (1) Disconnect battery negative cable.
- (2) Shift transmission into Neutral.
- (3) Remove shift boot bezel screws and slide boot upward on shift lever extension.
- (4) Remove bolts attaching shift tower and lever assembly to rear case. Then remove shift tower and shift lever assembly.
- (5) Raise vehicle on hoist.
- (6) Remove crankshaft position sensor. Retain sensor attaching bolts.
- (7) Remove skid plate, if equipped.
- (8) Drain transmission lubricant if transmission will be disassembled for service.
- (9) Mark propeller shaft and U-joint for installation reference. Then disconnect and remove propeller shaft.
- (10) Disengage harness from clips on transmission housing.
- (11) Support engine with adjustable jack stand.
- (12) Remove nuts attaching rear mount to crossmember (Fig. 4). Then remove insulator from extension housing if necessary.
- (13) Remove bolts and nuts attaching crossmember to frame rails. Rotate crossmember diagonally and remove crossmember.
- (14) Disconnect exhaust as necessary.
- (15) Remove slave cylinder attaching nuts and remove cylinder from clutch housing.
- (16) Remove starter motor.
- (17) Support transmission with transmission jack. Secure transmission to jack with safety chains.
- (18) Remove nuts/bolts attaching transmission front housing to engine.
- (19) Remove transmission dust shield.

REMOVAL AND INSTALLATION (Continued)



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Fig. 4 Transmission Rear Support Brackets

(20) Move transmission rearward until input shaft is clear of clutch disc and cover. Then lower jack and remove transmission from under vehicle.

INSTALLATION

(1) Make sure transmission front housing mounting surface is clean before installation.

(2) Apply light coat of Mopar® high temperature bearing grease to contact surfaces of following components:

- input shaft splines and pilot bearing hub.
- release bearing slide surface of front retainer.
- pilot bearing.
- release bearing bore.
- release fork.
- release ball stud.
- propeller shaft slip yoke.

(3) Mount transmission on jack. Secure transmission to jack with safety chains.

(4) Align transmission input shaft with clutch disc. Then slide transmission into place on engine block.

(5) Install and tighten transmission attaching bolts to 54-61 N·m (40-45 ft. lbs.) torque. Be sure front housing is fully seated before tightening bolts. Install front dust cover after all bolts are tightened.

(6) Fill transmission with Mopar® lubricant P/N 4761526. Correct fill level is to bottom edge of fill plug hole.

(7) Connect backup lamp switch wires.

(8) Connect transmission harnesses to clips on case.

(9) Install crossmember. Tighten crossmember-to-frame bolts to 68 N·m (50 ft. lbs.) torque.

(10) Tighten crossmember-to-transmission insulator nuts to 68 N·m (50 ft. lbs.) torque.

(11) Install slave cylinder. Tighten cylinder nuts to 23 N·m (200 in. lbs.) torque.

(12) Remove jack used to support transmission.

(13) Install strut bolts/nuts, if removed. Also install oil filter if removal was necessary.

(14) Install and connect exhaust system. Align exhaust components before tightening clamp and bracket bolts and nuts. Be sure exhaust components are clear of all chassis and driveline components.

(15) Align and install propeller shaft. Tighten U-joint clamp bolts to 19 N·m (170 in. lbs.) torque.

(16) Verify that all linkage components, hoses and electrical wires have been connected.

(17) Remove any remaining support stands and lower vehicle.

(18) Install crankshaft position sensor.

(19) Connect battery negative cable.

(20) Install shift tower and lever assembly. Tighten shift tower bolts to 7-10 N·m (5-7 ft. lbs.) torque.

(21) Install shift boot and bezel.

REMOVAL AND INSTALLATION (Continued)

TRANSMISSION—4WD

REMOVAL

- (1) Disconnect battery negative cable.
- (2) Shift transmission into Neutral.
- (3) Remove screws attaching shift boot bezel and slide boot upward on shift lever extension.
- (4) Remove bolts attaching shift tower and lever assembly to rear case. Then remove shift tower and lever as an assembly.
- (5) Remove crankshaft position sensor. Retain sensor attaching bolts.
- (6) Raise vehicle on hoist.
- (7) Remove skid plate, if equipped.
- (8) Drain transmission lubricant if transmission will be disassembled for service.
- (9) Mark propeller shafts and U-joints for installation reference. Then disconnect and remove propeller shafts.
- (10) Disconnect transfer case shift linkage at transfer case range lever.
- (11) Remove bolts attaching shift linkage bracket to transfer case and move linkage and bracket aside.
- (12) Support transfer case with transmission jack.
- (13) Remove nuts attaching transfer case to transmission adapter housing.
- (14) Remove transfer case with aid of helper.
- (15) Support engine with adjustable jack stand.
- (16) Remove nuts and bolts attaching support bracket and cushions to fixed crossmember.
- (17) Remove nuts and bolts attaching removable crossmember to frame rails.
- (18) Remove crossmember.
- (19) Disconnect exhaust as necessary.
- (20) Remove slave cylinder attaching nuts and remove cylinder from clutch housing. Move cylinder aside for working clearance.
- (21) Remove clutch housing dust cover.
- (22) On some models, it may be necessary to remove front axle struts and oil filter for access and removal clearance. Remove these components if necessary.
- (23) Support transmission with transmission jack. Secure transmission to jack with safety chains.
- (24) Remove bolts attaching transmission clutch housing to engine block.
- (25) Move transmission rearward until transmission input shaft is clear of clutch disc and cover. Then lower jack and remove transmission from under vehicle.

INSTALLATION

- (1) Make sure transmission front housing and engine block contact surfaces are clean.
- (2) Apply light coat of Mopar® high temperature bearing grease to contact surfaces of following components:

- input shaft splines and pilot bearing hub.
- release bearing slide surface of front retainer.
- pilot bearing.
- release bearing bore.
- release fork.
- release ball stud.
- propeller shaft slip yoke.

(3) Mount transmission on jack. Secure transmission to jack with safety chains.

(4) Align transmission input shaft with clutch disc. Then slide clutch housing into place on engine block.

(5) Install and tighten transmission attaching bolts to 54-61 N·m (40-45 ft. lbs.) torque. Be sure housing is fully seated before tightening bolts. If equipped, install dust cover after tightening housing bolts.

(6) Fill transmission with Mopar® lubricant, P/N 4761526. Correct fill level is to bottom edge of fill plug hole.

(7) Connect backup lamp switch wires.

(8) Connect transmission harnesses and vent line to retainer clips on housing.

(9) Install center crossmember. Tighten crossmember-to-frame bolts to 67 N·m (50 ft. lbs.) torque.

(10) Tighten crossmember-to-support bracket nuts to 54-61 N·m (40-45 ft. lbs.) torque.

(11) Install slave cylinder in transmission clutch housing. Tighten cylinder attaching nuts to 23 N·m (200 in. lbs.) torque.

(12) Remove jack used to support transmission.

(13) Install strut bolts/nuts, if removed.

(14) Install transfer case. Align and position transfer case with transmission jack or aid of helper.

(15) Install and tighten transfer case attaching nuts to 47 N·m (35 ft. lbs.) torque.

(16) Install and connect transfer case shift linkage.

(17) Align and connect exhaust system components. Be sure exhaust components are clear of all chassis and driveline components.

(18) Align and install front and rear propeller shafts. Tighten U-joint clamp bolts to 19 N·m (170 in. lbs.) torque.

(19) Verify that all linkage components, hoses and electrical wires have been connected.

(20) Check transfer case fluid level. Add Mopar® Dexron II, or ATF Plus if necessary. Correct level is to edge of fill plug hole. Be sure transfer case is level before checking or adding fluid.

(21) Check and adjust transfer case shift linkage if necessary.

(22) Install transfer case skid plate, if equipped.

(23) Install crankshaft position sensor.

(24) Remove any remaining support stands and lower vehicle.

(25) Connect battery negative cable.

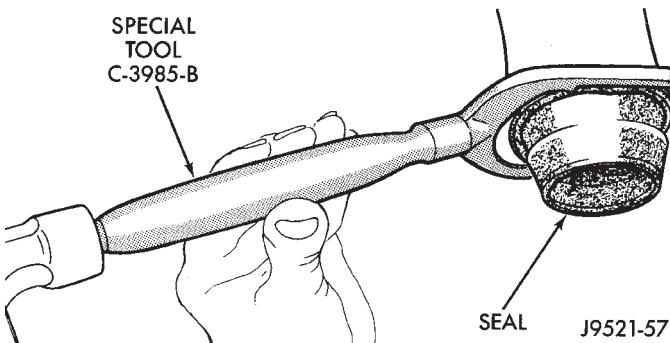
REMOVAL AND INSTALLATION (Continued)

- (26) Install shift tower and lever assembly. Tighten shift tower bolts to 7-10 N·m (5-7 ft. lbs.) torque.
- (27) Install shift boot and bezel.

YOKE SEAL REPLACEMENT

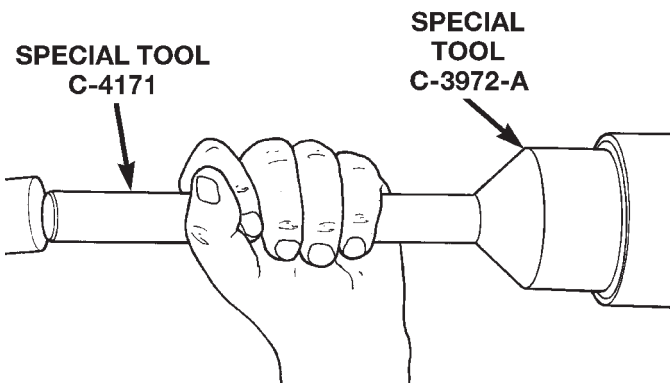
REMOVAL

- (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. 5) from extension housing.

**Fig. 5 Removing Extension Housing Yoke Seal**

INSTALLATION

- (1) Place seal in position on extension housing.
- (2) Drive seal into extension housing with Seal Installer C-3972-A (Fig. 6).
- (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.

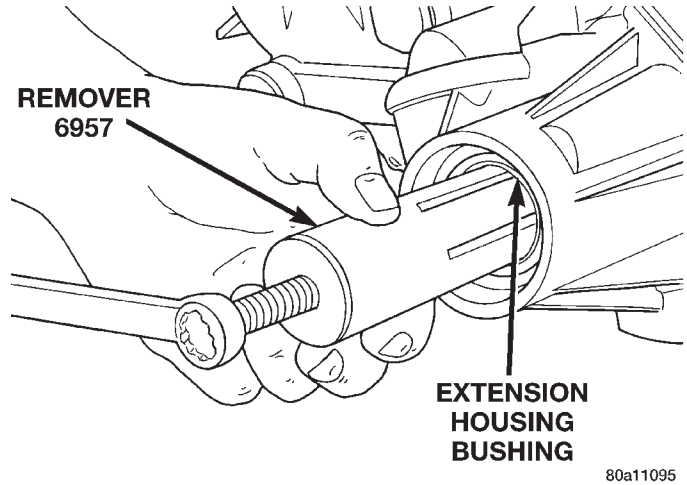
**Fig. 6 Installing Extension Housing Yoke Seal**

REAR HOUSING YOKE BUSHING

REMOVAL

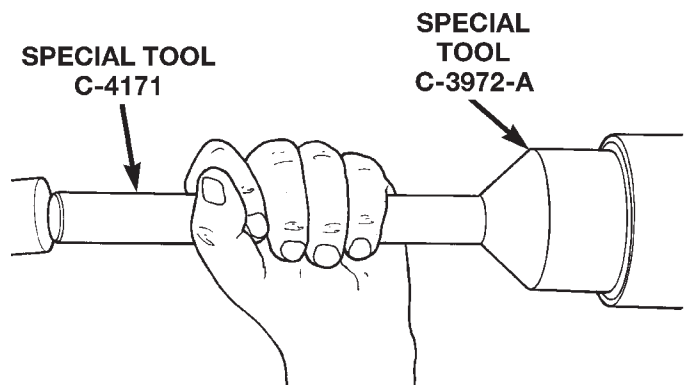
- (1) Remove housing yoke seal.

- (2) Insert Remover 6957 into rear housing. Tighten tool to bushing and remove bushing (Fig. 7).

**Fig. 7 Bushing Removal—Typical**

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. 8).

**Fig. 8 Rear Housing Seal Installation**

DISASSEMBLY AND ASSEMBLY

TRANSMISSION

FRONT HOUSING REMOVAL

- (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.

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Remove backup light switch. Switch is located on driver side of rear housing (Fig. 9).

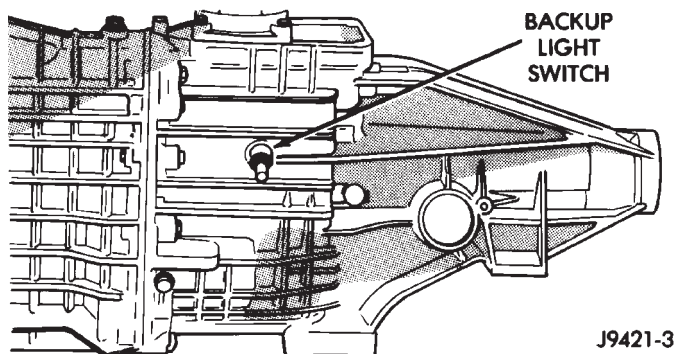


Fig. 9 Backup Light Switch Location

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

(6) Remove shift shaft lock bolt (Fig. 10). 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.

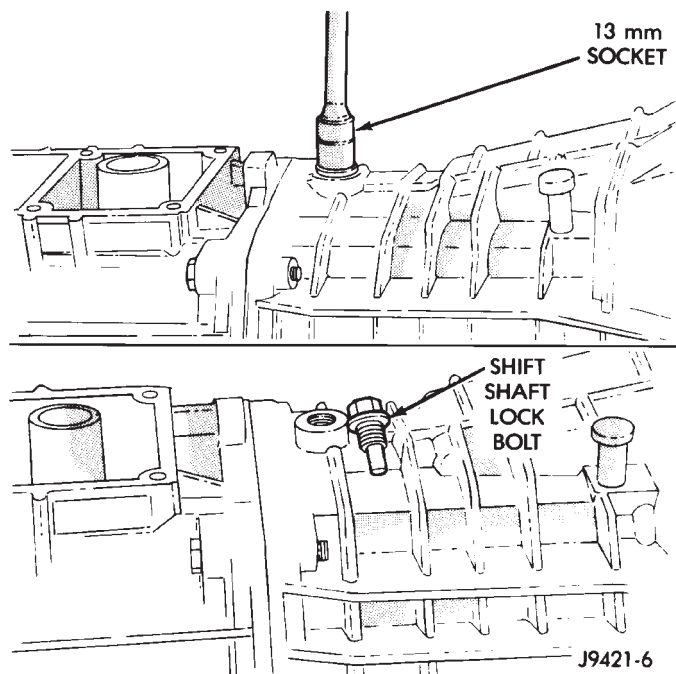


Fig. 10 Shift Shaft Lock Bolt Removal

(7) Remove bolts attaching input shaft bearing retainer in front housing (Fig. 11). Note location of oil feed formation on retainer for installation reference.

(8) Remove input shaft bearing retainer. Use pry tool to carefully lift retainer and break sealer bead (Fig. 12).

(9) Remove bearing retainer from input shaft (Fig. 13).

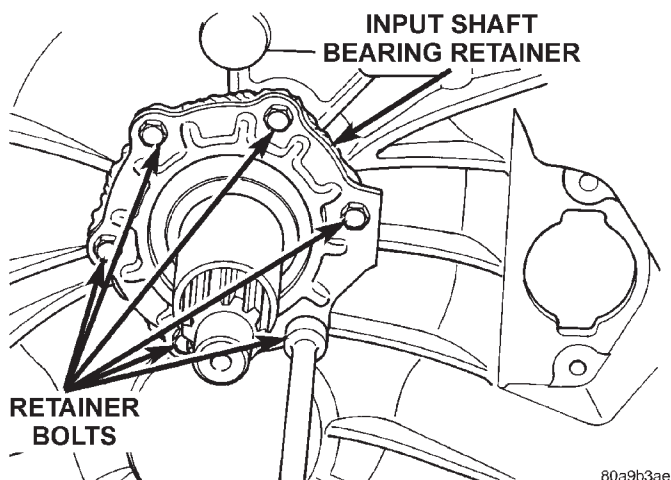


Fig. 11 Input Shaft Bearing Retainer Bolt Removal

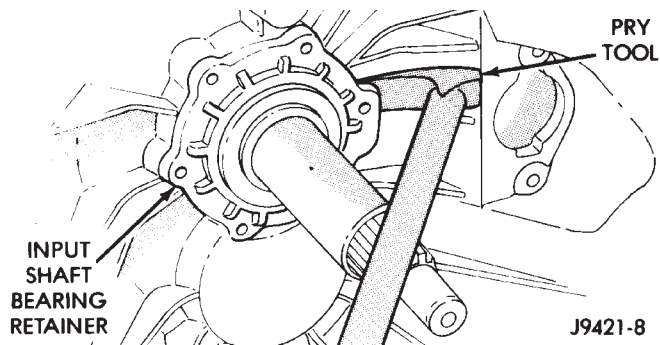


Fig. 12 Loosening Bearing Retainer Sealer Bead

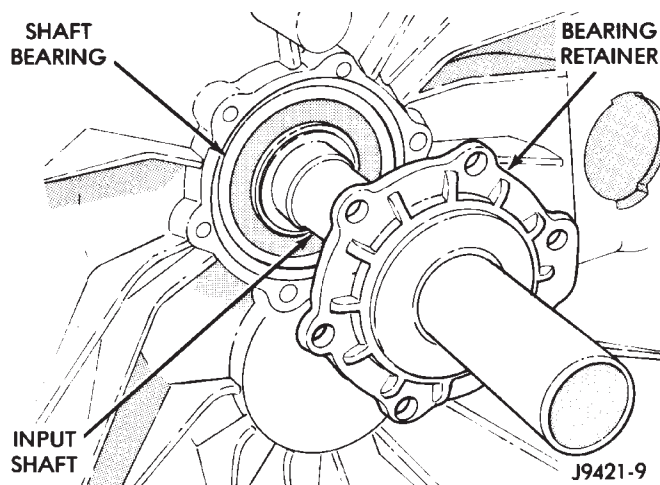


Fig. 13 Input Shaft Bearing Retainer Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(10) Remove snap ring that secures input shaft in front bearing (Fig. 14).

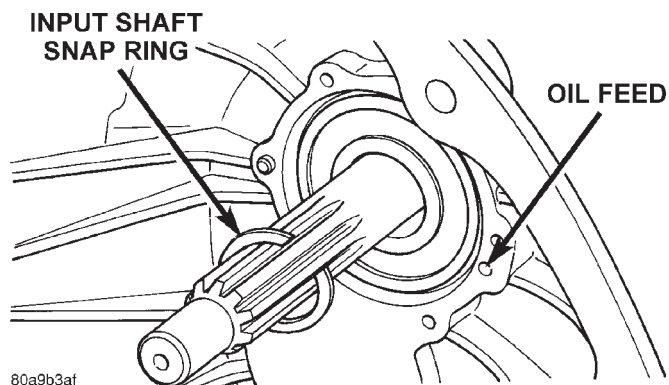


Fig. 14 Input Shaft Snap Ring Removal

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

(12) Remove shift shaft detent plunger and spring (Fig. 15). Use pencil magnet to remove spring then plunger, if necessary.

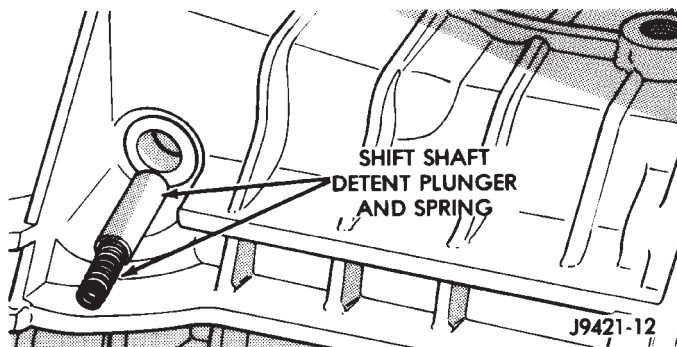


Fig. 15 Detent Plunger And Spring Removal

(13) Remove bolts that attach front housing to rear housing (Fig. 16). 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 rear case is ready to be removed.

(14) Separate front housing from rear housing (Fig. 17). Use plastic mallet to tap front housing off alignment dowels.

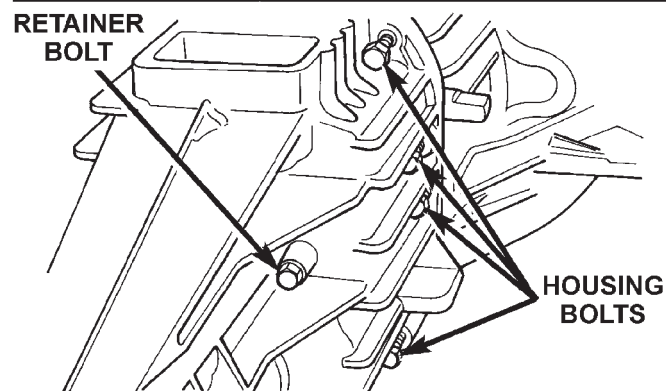
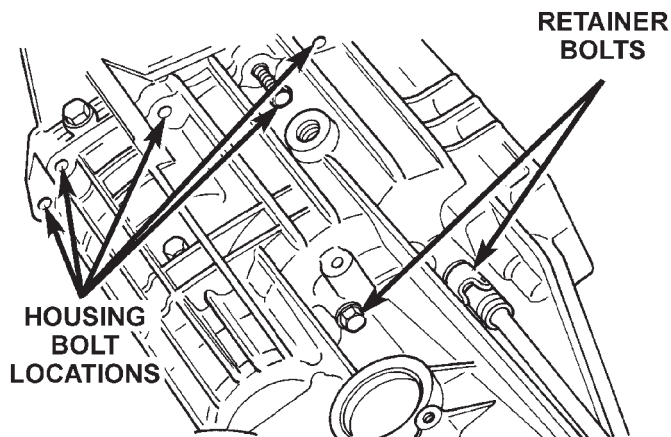


Fig. 16 Housing And Bearing Retainer Bolt Locations

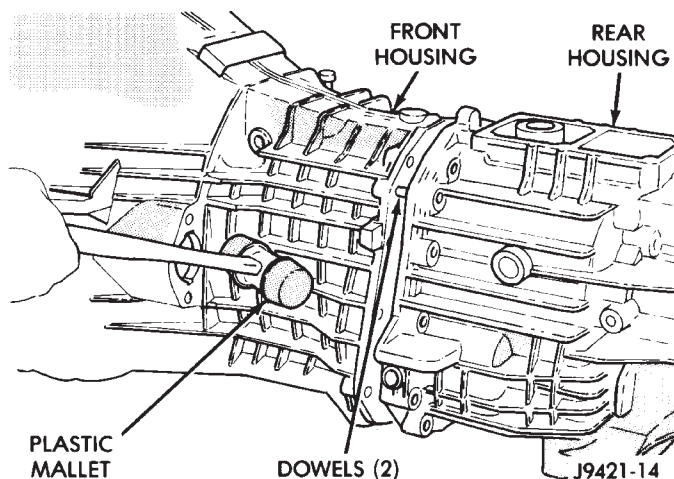


Fig. 17 Front Housing Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(15) Remove input shaft bearing and countershaft front bearing from front case (Fig. 18). Countershaft bearing can be removed by hand.

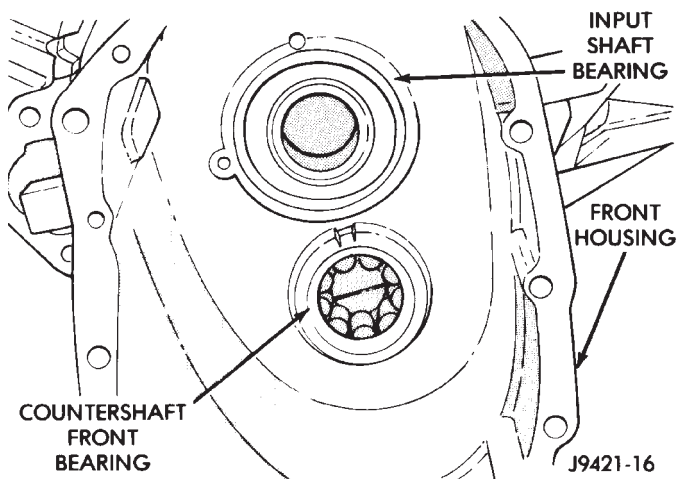


Fig. 18 Input Shaft And Countershaft Front Bearing Location

(16) Note position of input shaft, shift shaft and forks, and geartrain components in housing (Fig. 19).

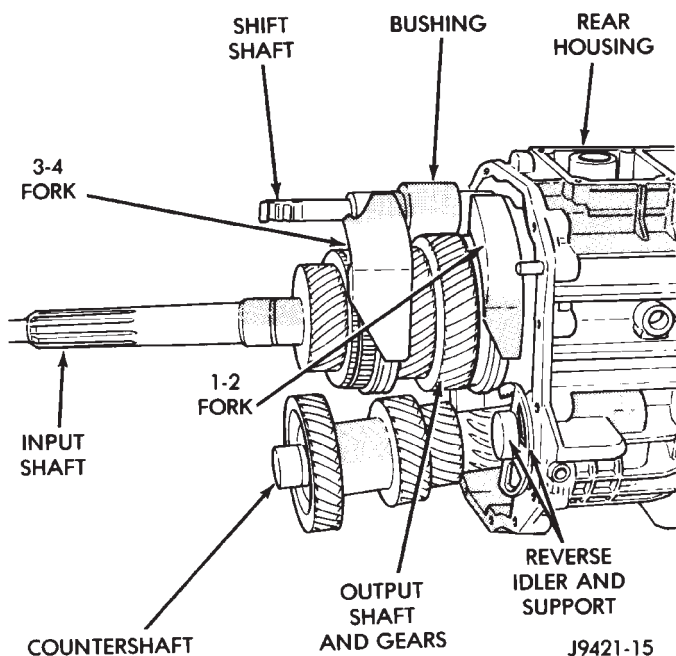


Fig. 19 Geartrain And Shift Component Identification

SHIFT SHAFT, SHIFT FORKS AND REVERSE IDLER SEGMENT REMOVAL

(1) Place shop towel over shaft lever and bushing to contain lever detent ball and spring.

(2) Rotate lever and bushing upward out of shift forks and catch ball and spring as they exit shaft lever (Fig. 20).

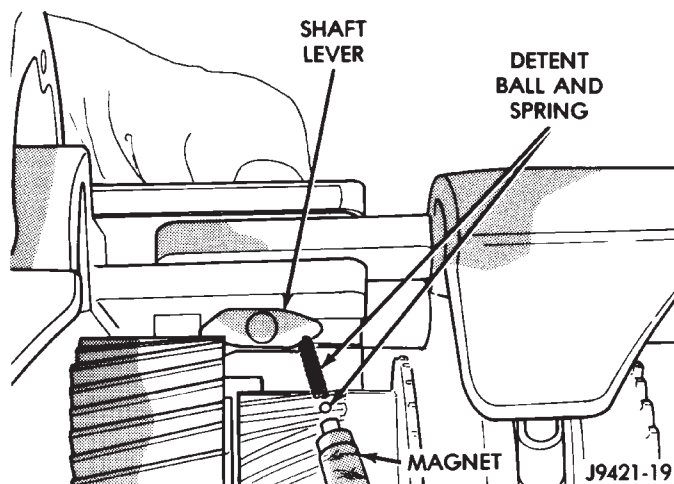


Fig. 20 Removing Shift Shaft Lever Detent Ball And Spring

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

(a) Position Tool 6858 on shift socket. Then center tool over roll pin. Be sure tool legs are firmly seated on shift socket (Fig. 21).

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

(c) Tighten tool punch to press roll pin downward and out of shift socket (Fig. 21). Roll pin does not have to come completely out of shift shaft; it only has to clear shift socket. Be careful not to drive roll pin out of shaft far enough to jam into the geartrain.

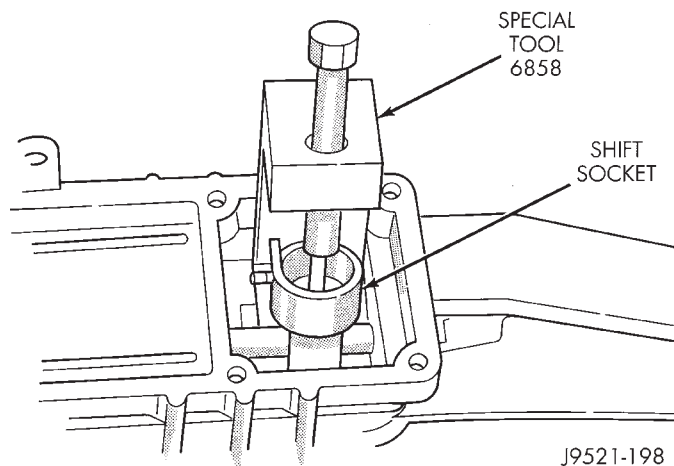


Fig. 21 Unseating Shift Socket Roll Pin With Tool 6858

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Drive out roll pin that secures shift bushing and lever to shift shaft (Fig. 22).

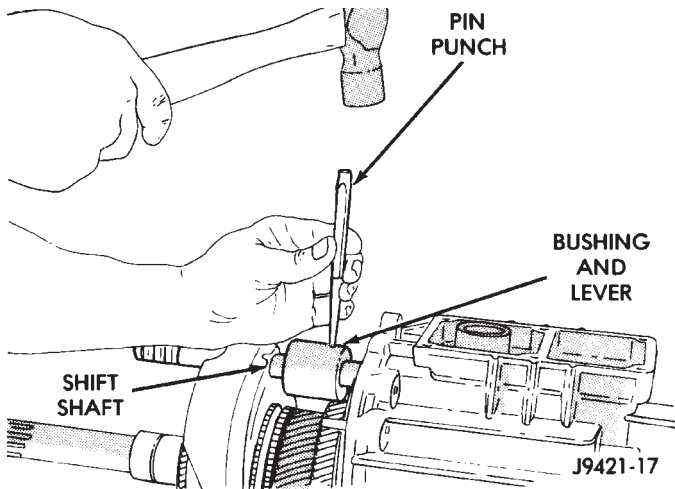


Fig. 22 Removing Shift Shaft Lever And Bushing Roll Pin

(5) Pull shift shaft straight out of rear housing, shift socket, fifth-reverse fork, and 1-2 fork (Fig. 23).

(6) Remove shift socket from rear housing (Fig. 24).

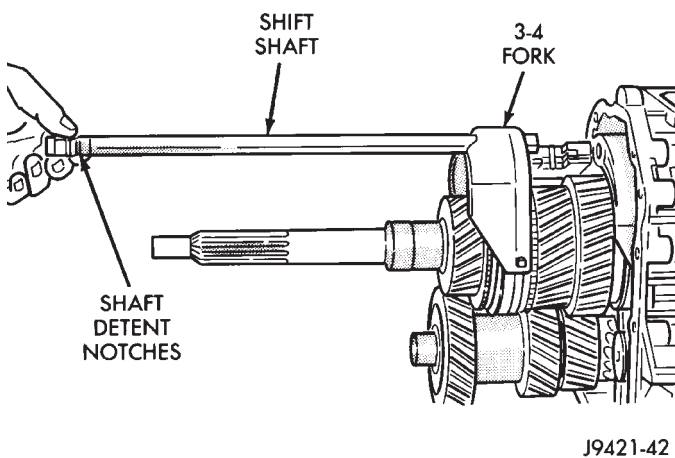


Fig. 23 Shift Shaft Removal

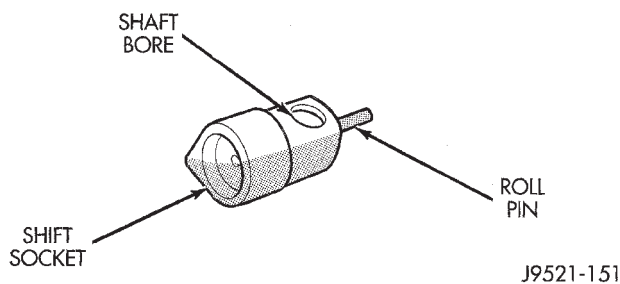


Fig. 24 Shift Socket And Roll Pin

(7) Remove lever and bushing (Fig. 25).

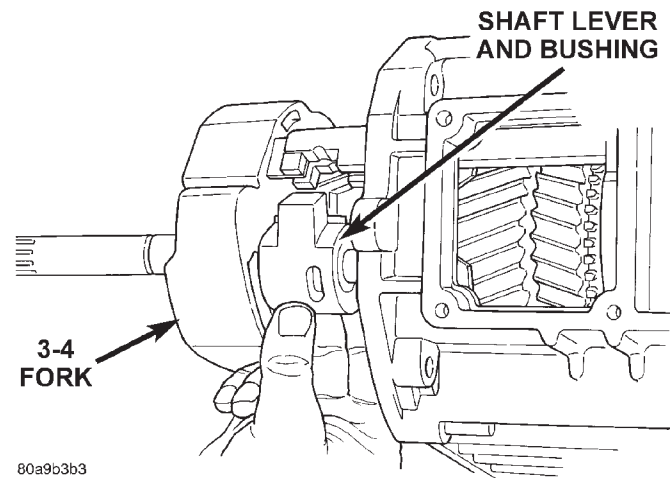


Fig. 25 Removing Shift Shaft Lever And Bushing

(8) 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. 26).

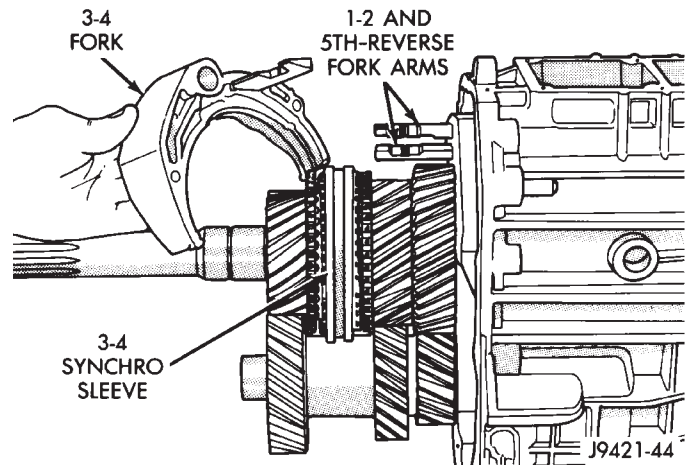


Fig. 26 Removing 3-4 Shift Fork

DISASSEMBLY AND ASSEMBLY (Continued)

- (9) Remove the front reverse idler shaft bolt.
- (10) Loosen rear reverse idler shaft bolt.
- (11) Remove reverse idler shaft support segment by sliding it straight out of housing.
- (12) 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, countershaft and idler gear (Fig. 27).
 - (d) Stand geartrain and rear housing upright on fixture (Fig. 28). Have helper hold fixture tool in place while housing and geartrain is being rotated into upright position.

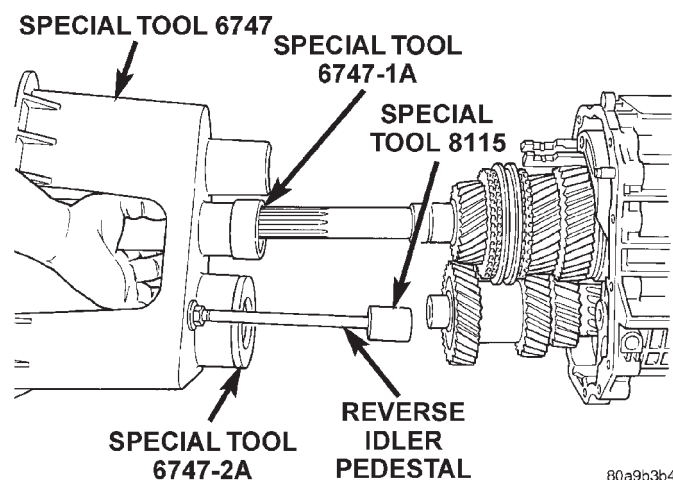


Fig. 27 Installing Assembly Fixture On Geartrain

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

REAR HOUSING REMOVAL—2WD

- (1) On 2-wheel drive transmission, remove three bolts that attach output shaft bearing retainer to rear case (Fig. 29). Bolts are rear of shift tower opening.
- (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. 30).
- (3) Lift rear housing up and off geartrain (Fig. 31).
- (4) Remove countershaft rear bearing from countershaft (Fig. 32).
- (5) Examine condition of bearing bore and idler shaft notch in rear housing. Replace housing if any of these components are damaged.

REAR ADAPTER HOUSING REMOVAL—4WD

- (1) Locate dimples in face of rear seal (Fig. 33). Use a suitable slide hammer mounted screw to remove seal by inserting screw into seal at dimple locations (Fig. 34).

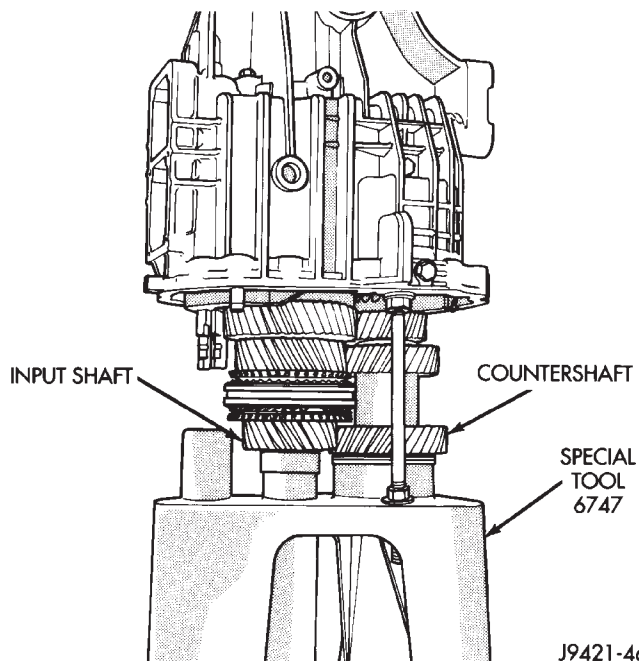


Fig. 28 Geartrain And Housing Mounted On Fixture Tool

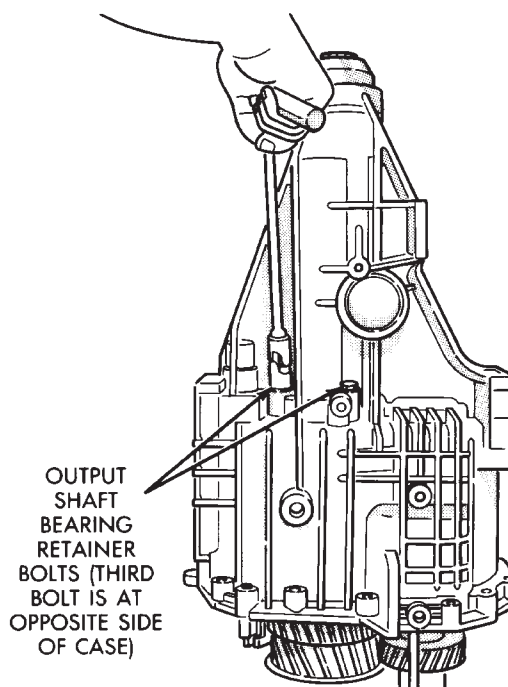


Fig. 29 Removing/Installing Output Shaft Bearing Retainer Bolts—2WD

DISASSEMBLY AND ASSEMBLY (Continued)

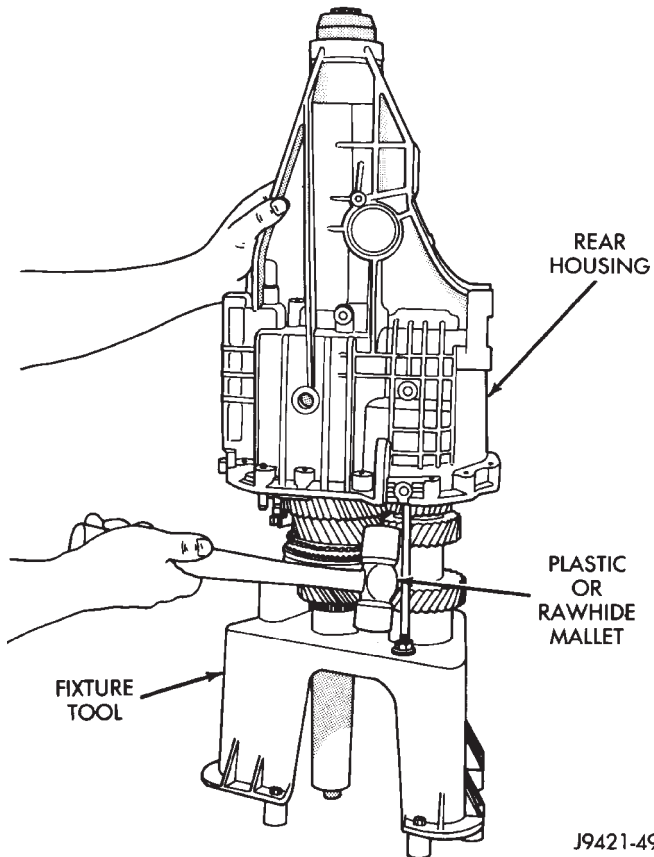


Fig. 30 Unseating Rear Housing From Output Shaft Bearing—2WD

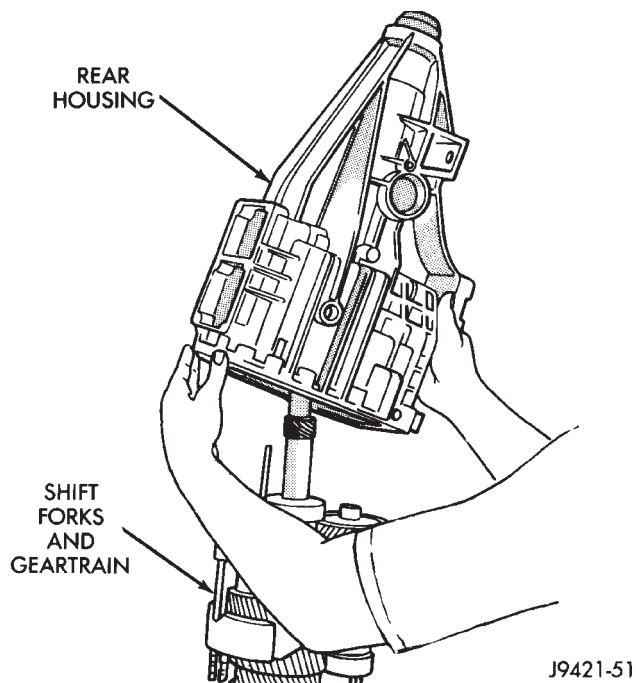


Fig. 31 Rear Housing Removal—2WD

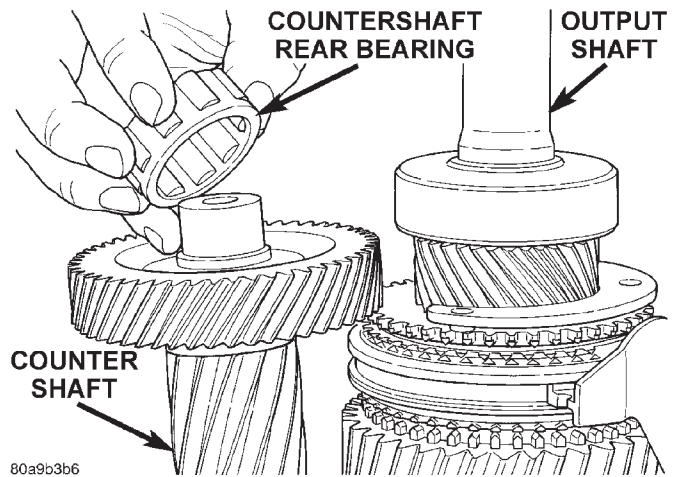


Fig. 32 Remove Countershaft Rear Bearing

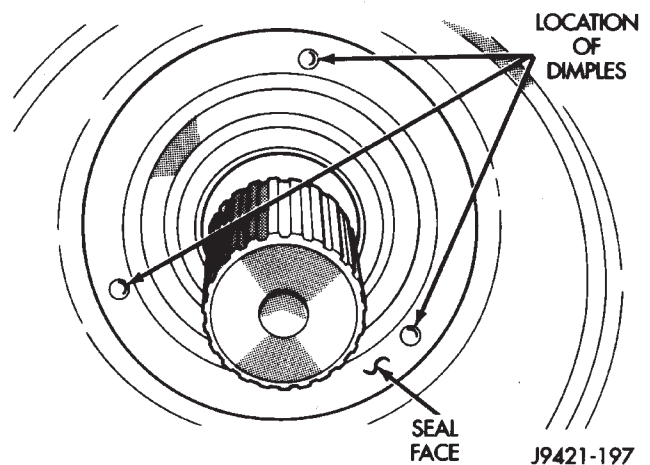


Fig. 33 Location Of Dimples In Seal Face—4WD

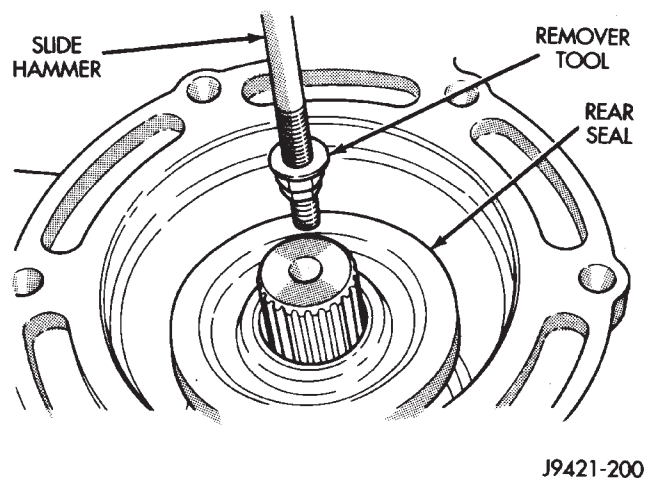


Fig. 34 Rear Seal Removal—4WD

DISASSEMBLY AND ASSEMBLY (Continued)

(2) Remove rear bearing snap ring from output shaft with heavy duty snap ring pliers (Fig. 35).

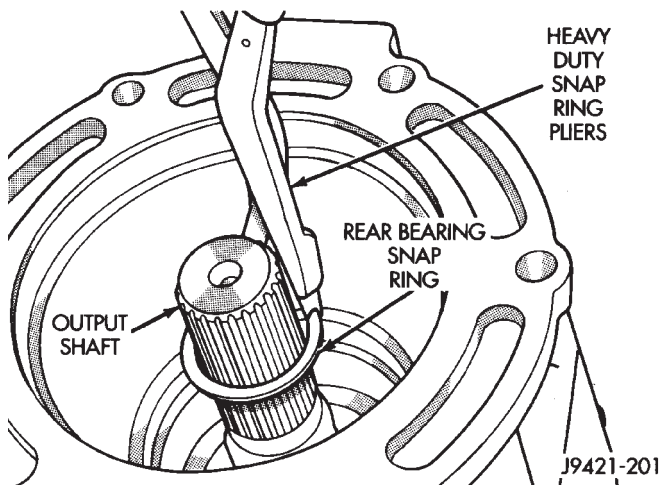


Fig. 35 Rear Bearing Snap Ring Removal—4WD

(3) Lift rear adapter housing upward and off geartrain (Fig. 36).

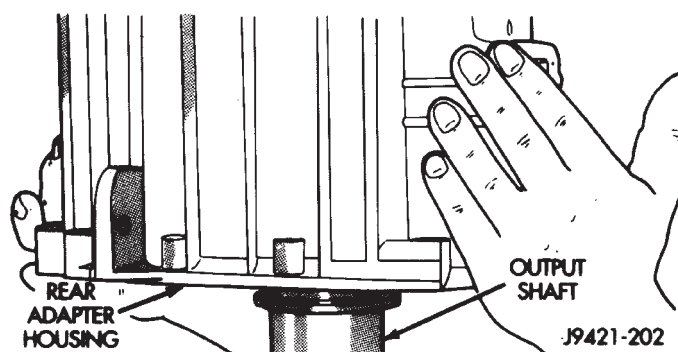


Fig. 36 Rear Adapter Housing Removal

(4) Remove bearing retainer bolts and remove rear bearing retainer and rear bearing (Fig. 37). 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.

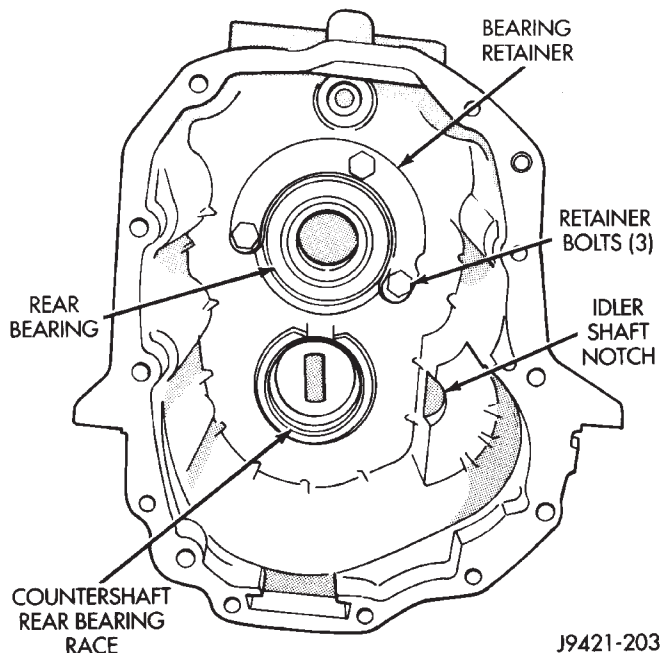


Fig. 37 Rear Adapter Housing Components

OUTPUT SHAFT DISASSEMBLY

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. 38).

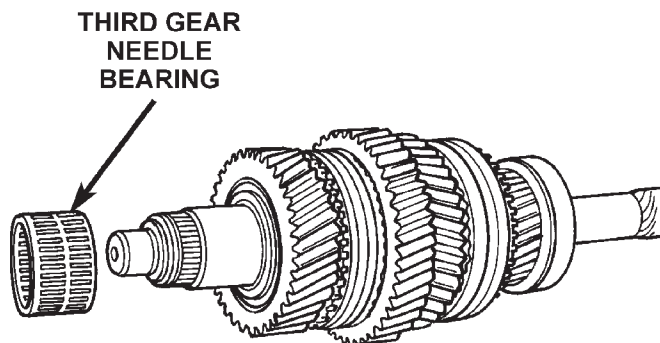


Fig. 38 Third Gear Needle Bearing Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Remove retaining ring that secures two-piece thrust washer on shaft (Fig. 39). Use small pry tool to remove retaining ring.

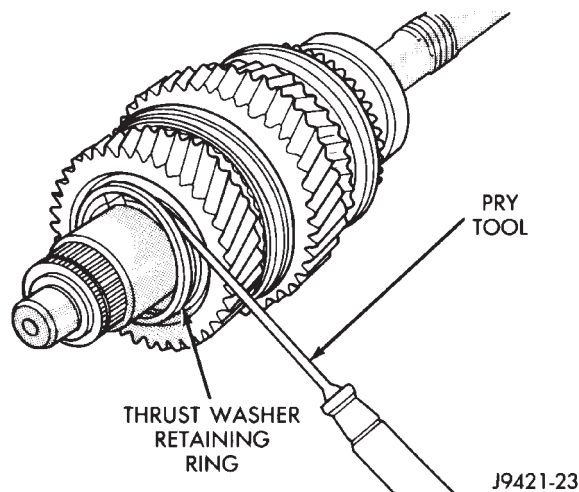


Fig. 39 Thrust Washer Retaining Ring Removal

(5) Remove two-piece thrust washer (Fig. 40). Note position of washer locating lugs in shaft notches for installation reference.

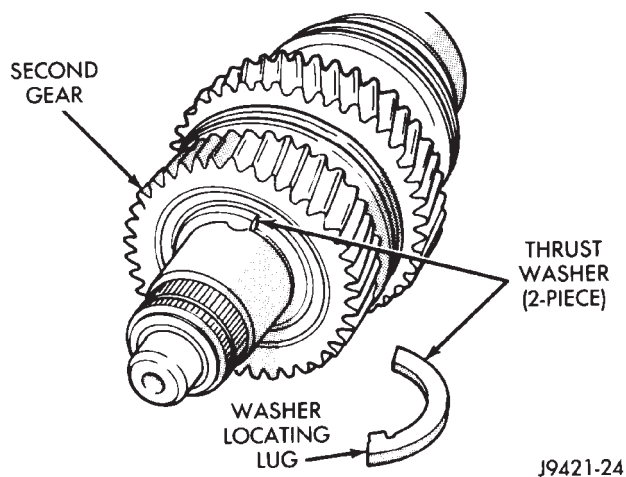


Fig. 40 Two-Piece Thrust Washer Removal

(6) Remove second gear and needle bearing (Fig. 41).

(7) Remove second gear synchro ring (Fig. 42). Then remove the 1-2 synchro hub snap ring.

(8) Remove 1-2 synchro hub and sleeve and first gear from output shaft with shop press and Remover Tool 1130 (Fig. 43). Position Tool 1130 between first and reverse gears.

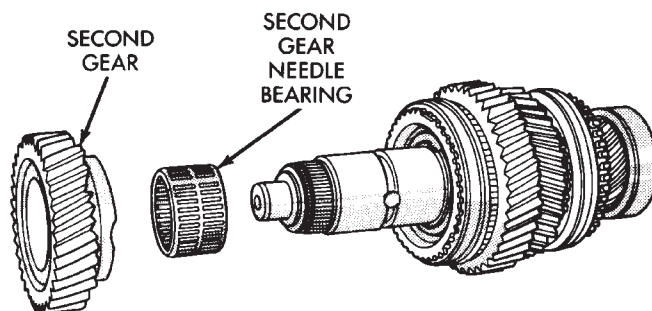


Fig. 41 Second Gear And Needle Bearing Removal

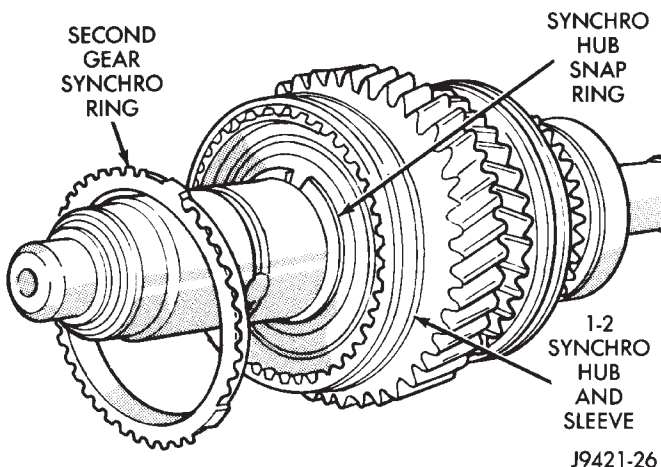


Fig. 42 Second Gear Synchro Ring Removal

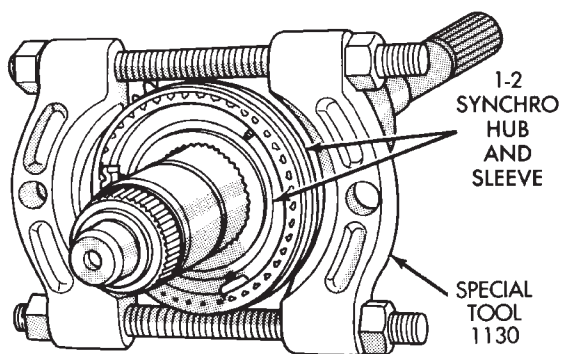
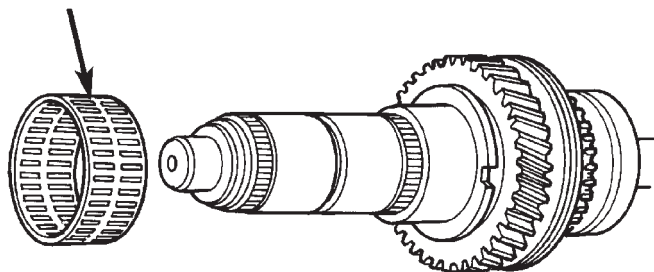


Fig. 43 Hub And Sleeve Removal—1-2 Synchro

DISASSEMBLY AND ASSEMBLY (Continued)

(9) Remove first gear needle bearing (Fig. 44).

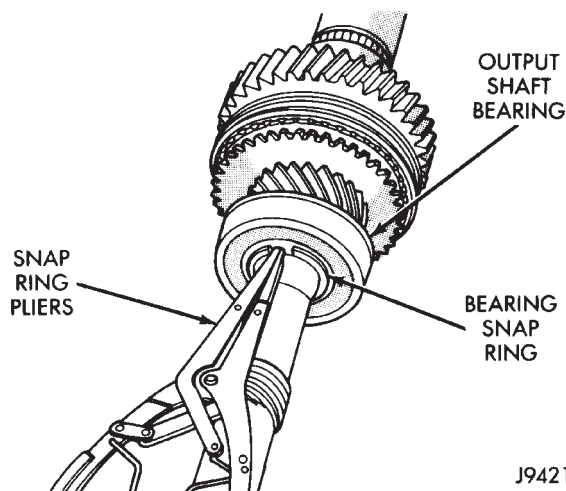
**FIRST GEAR
NEEDLE
BEARING**



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Fig. 44 First Gear Needle Bearing Removal

(10) Remove output shaft bearing snap ring (Fig. 45).

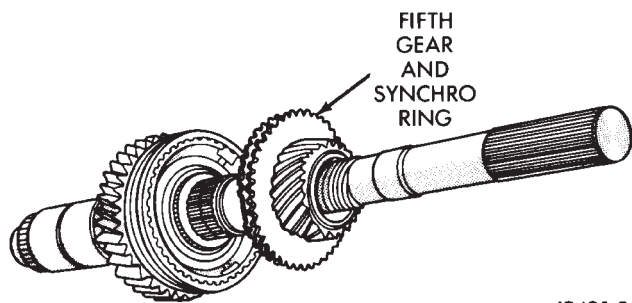


J9421-29

Fig. 45 Output Shaft Bearing Snap Ring Removal

(11) On 2-wheel drive models, remove output shaft bearing.

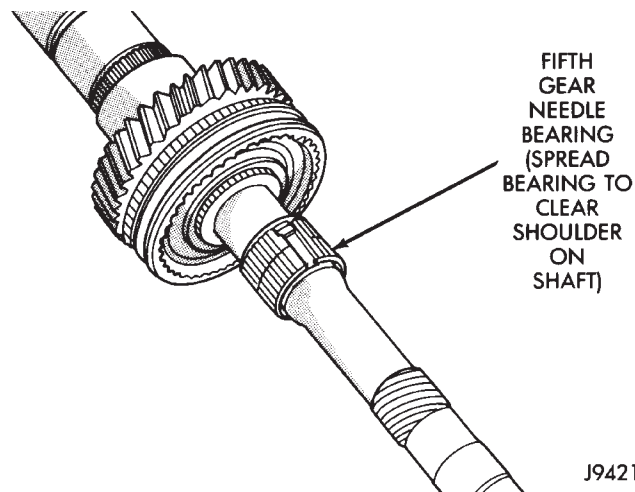
(12) Remove fifth gear (Fig. 46).



J9421-31

Fig. 46 Fifth Gear Removal

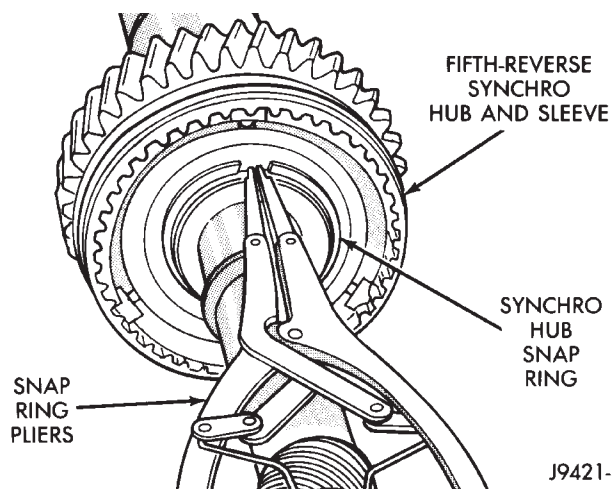
(13) Remove fifth gear needle bearing. Spread bearing apart just enough to clear shoulder on output shaft (Fig. 47).



J9421-32

Fig. 47 Fifth Gear Needle Bearing Removal

(14) Remove fifth-reverse synchro hub snap ring (Fig. 48).



J9421-33

Fig. 48 Fifth-Reverse Synchro Hub Snap Ring Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(15) Remove fifth-reverse synchro hub and sleeve with shop press and Remover 1130 (Fig. 49).

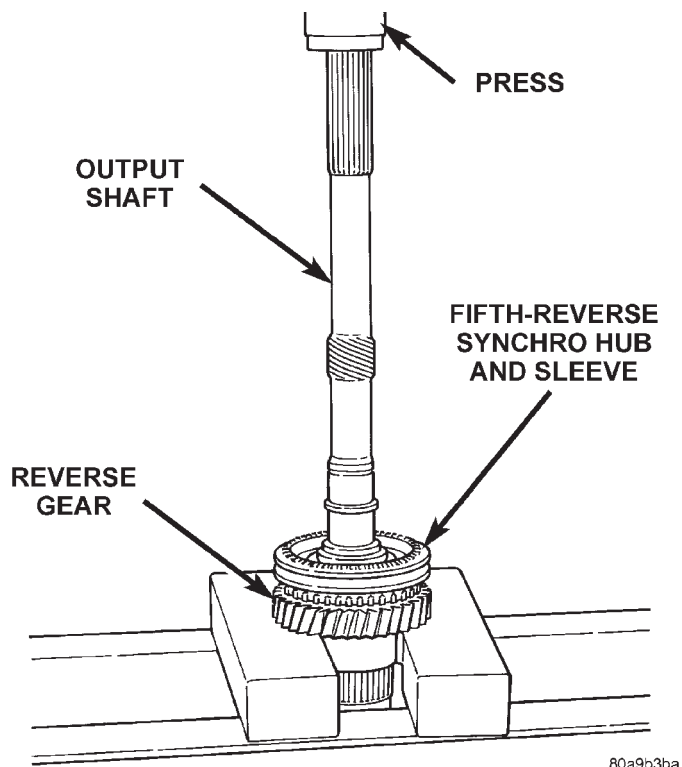


Fig. 49 Fifth-Reverse Synchro Hub And Sleeve Removal

(16) Remove reverse gear and needle bearing (Fig. 50).

REVERSE IDLER DISASSEMBLY

- (1) Remove idler gear snap rings (Fig. 51).
- (2) Remove thrust washer, wave washer, thrust plate and idler gear from shaft.
- (3) Remove idler gear needle bearing from shaft.

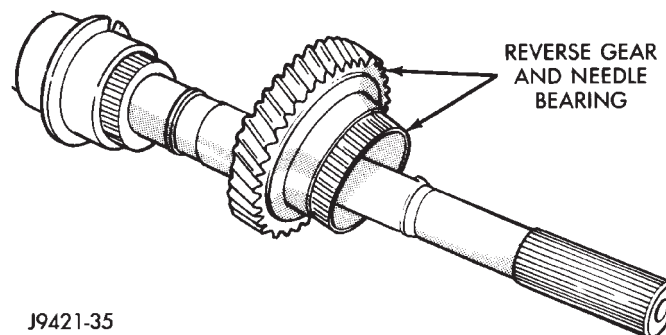


Fig. 50 Reverse Gear And Needle Bearing Removal
ASSEMBLY

Gaskets are not used in the NV3500 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.

SYNCHRO COMPONENT ASSEMBLY

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

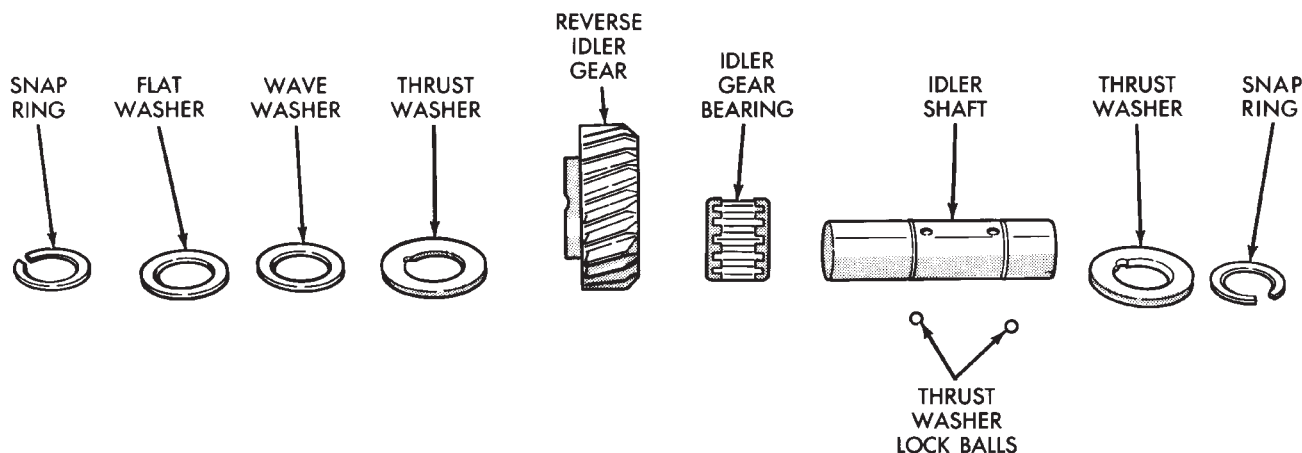


Fig. 51 Reverse Idler Components

DISASSEMBLY AND ASSEMBLY (Continued)

(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.

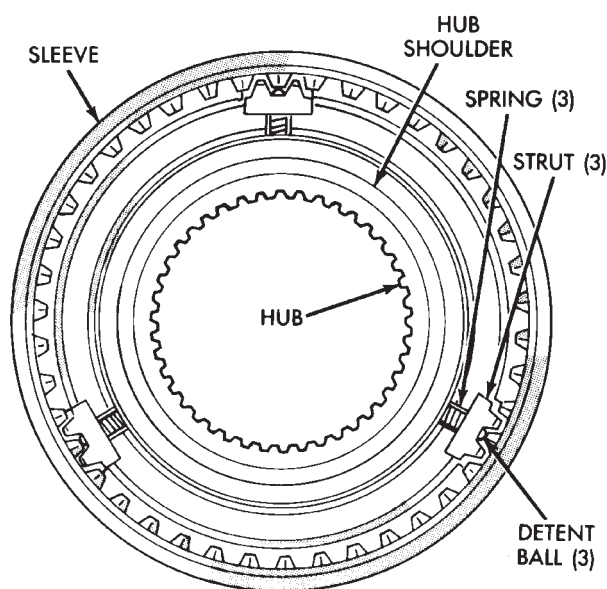
(2) Install the first spring in the hub. Then install a strut over the spring. Be sure the spring is seated in the spring bore in the strut.

(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. 52).



J9421-57

Fig. 52 Assembled View Of Synchro Components

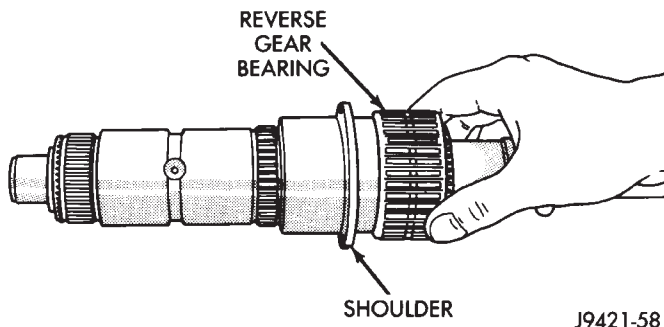
OUTPUT SHAFT ASSEMBLY

(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.

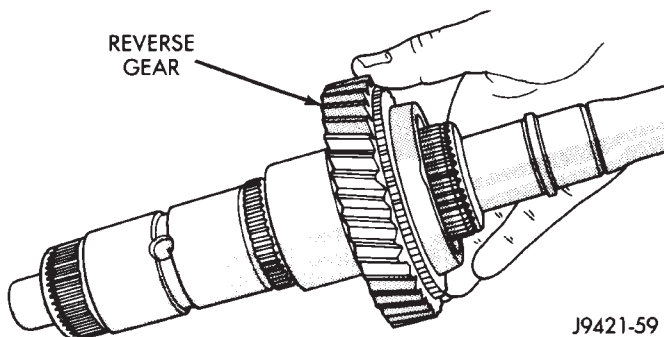
(4) Lubricate and install reverse gear needle bearing on shaft (Fig. 53). Slide bearing up against shoulder on output shaft.



J9421-58

Fig. 53 Reverse Gear Bearing Installation

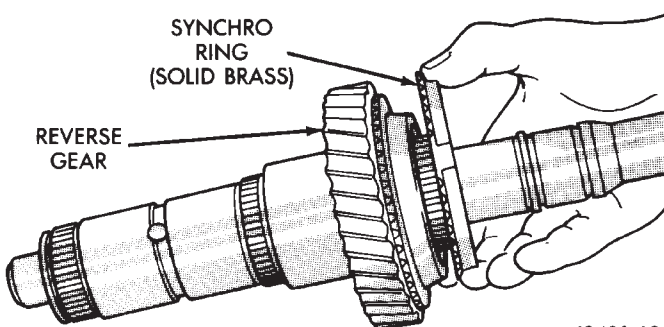
(5) Install reverse gear over needle bearing (Fig. 54).



J9421-59

Fig. 54 Reverse Gear Installation

(6) Install solid brass synchro ring on reverse gear (Fig. 55).



J9421-60

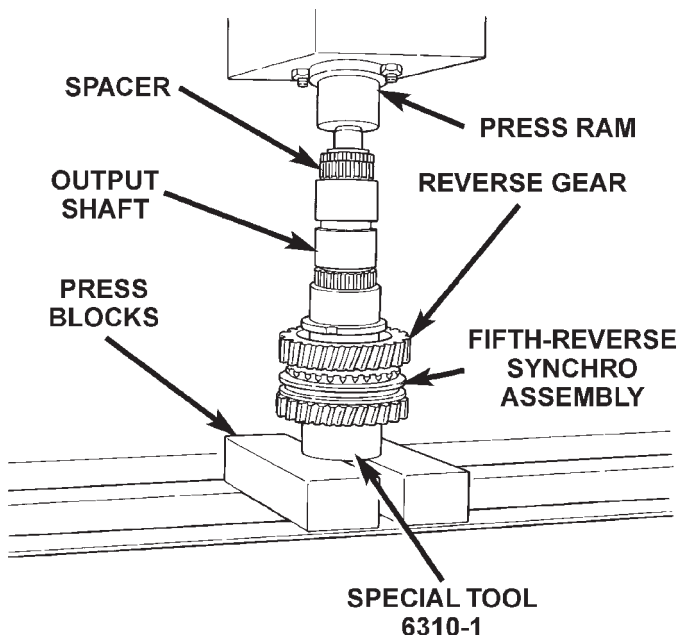
Fig. 55 Reverse Gear Synchro Ring Installation

(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 rear 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.

DISASSEMBLY AND ASSEMBLY (Continued)

(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. 56).



80a9b3bb

Fig. 56 Fifth-Reverse Synchro Assembly Installation

(9) Install new fifth-reverse hub snap ring (Fig. 57) as follows:

(a) Snap rings are available in thicknesses from 2.00 mm to 2.20 mm (0.078 to 0.086 in.).

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

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

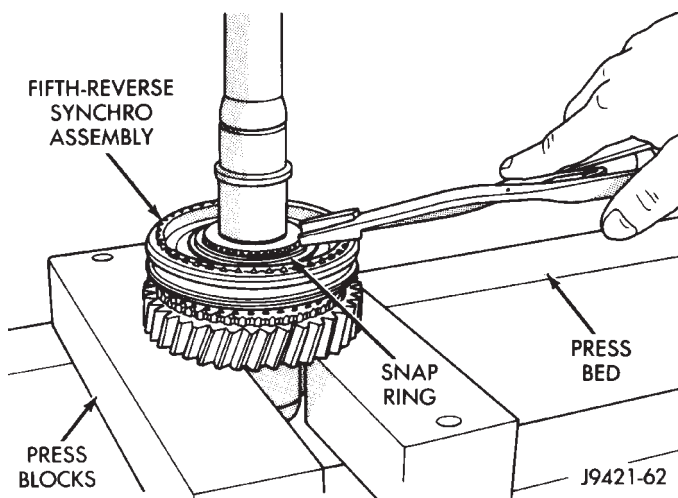


Fig. 57 Installing Fifth-Reverse Synchro Hub Snap Ring

(10) Install fifth gear synchro ring in synchro hub and sleeve (Fig. 58).

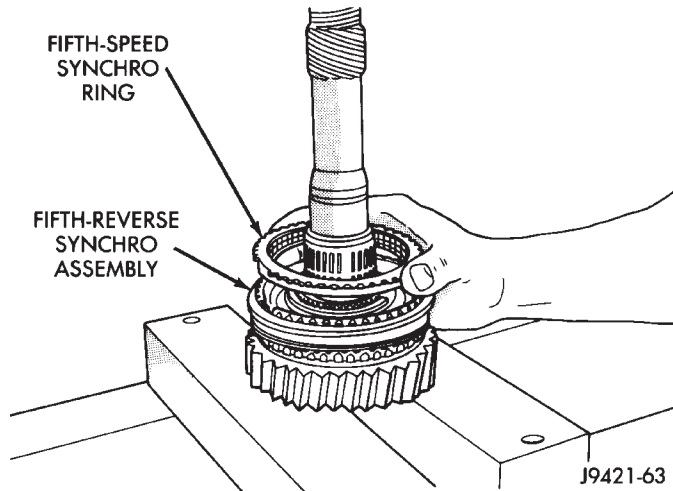


Fig. 58 Installing Fifth Gear Synchro Ring

(11) Install fifth gear bearing. Spread bearing only enough to clear shoulder on output shaft (Fig. 59). Be sure bearing is properly seated after installation.

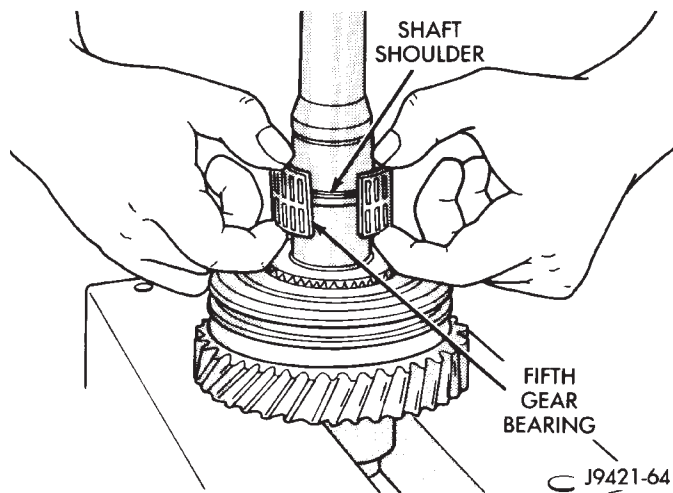


Fig. 59 Installing Fifth Gear Bearing

DISASSEMBLY AND ASSEMBLY (Continued)

(12) Install fifth gear on shaft and onto bearing (Fig. 60).

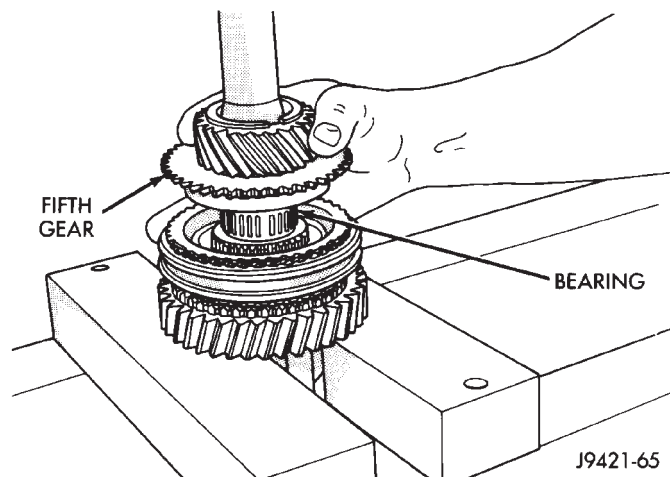


Fig. 60 Fifth Gear Installation

(13) Invert output shaft and set the shaft in Remover 6310-1 so that fifth gear is seated on the tool (Fig. 61).

(14) Install first gear bearing on output shaft (Fig. 61). Be sure bearing is seated on shaft shoulder and is properly joined.

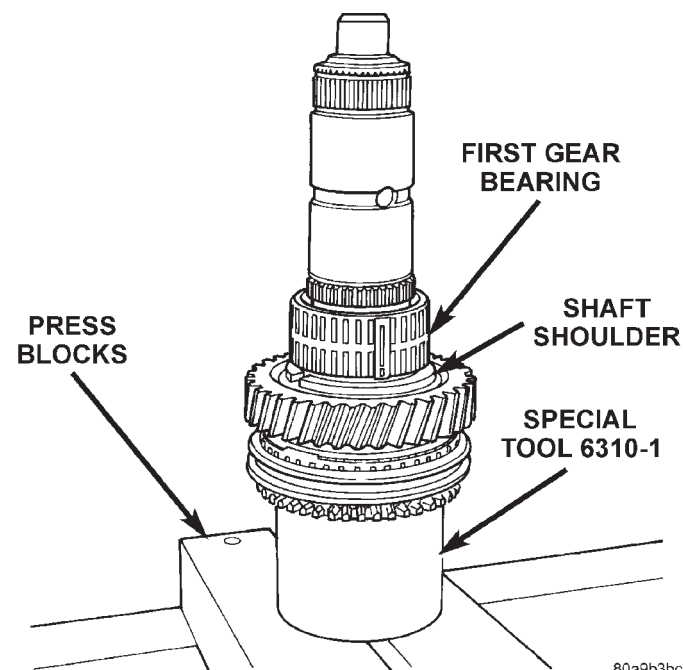


Fig. 61 First Gear Bearing Installation

(15) Install first gear on shaft and over bearing (Fig. 62). Make sure bearing synchro cone is facing up as shown.

(16) Install first gear synchro ring (Fig. 63).

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

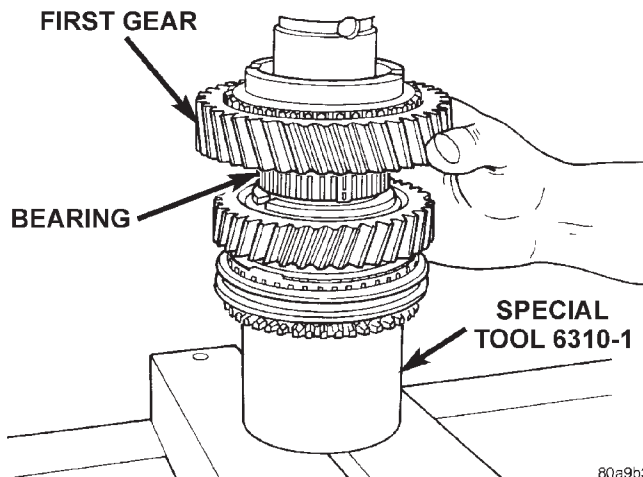


Fig. 62 First Gear Installation

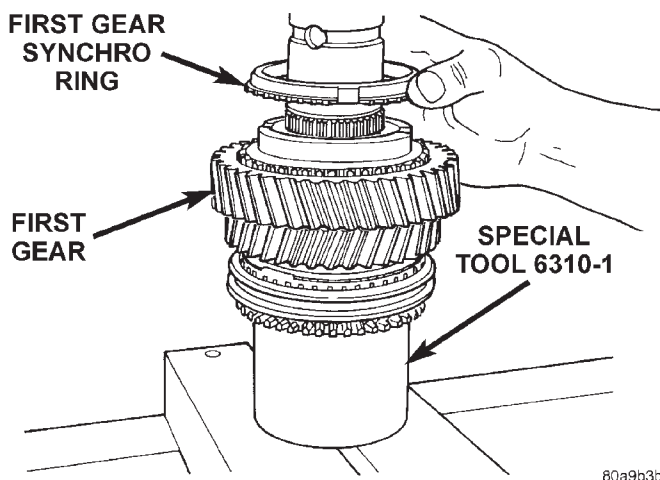


Fig. 63 First Gear Synchro Ring Installation

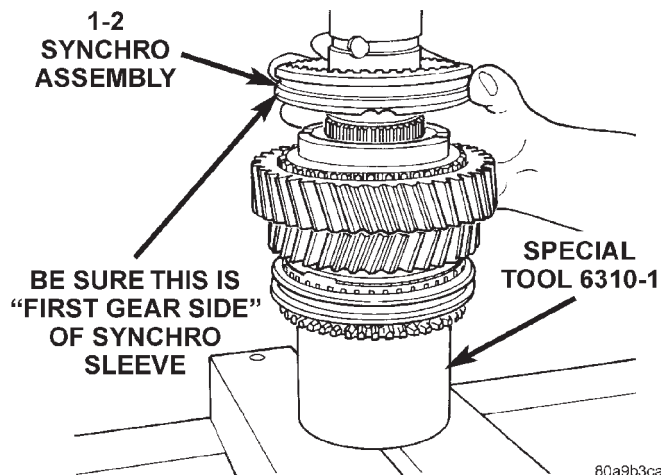
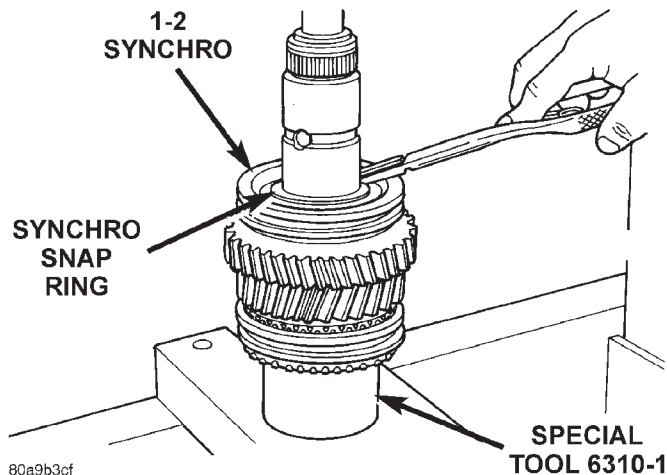
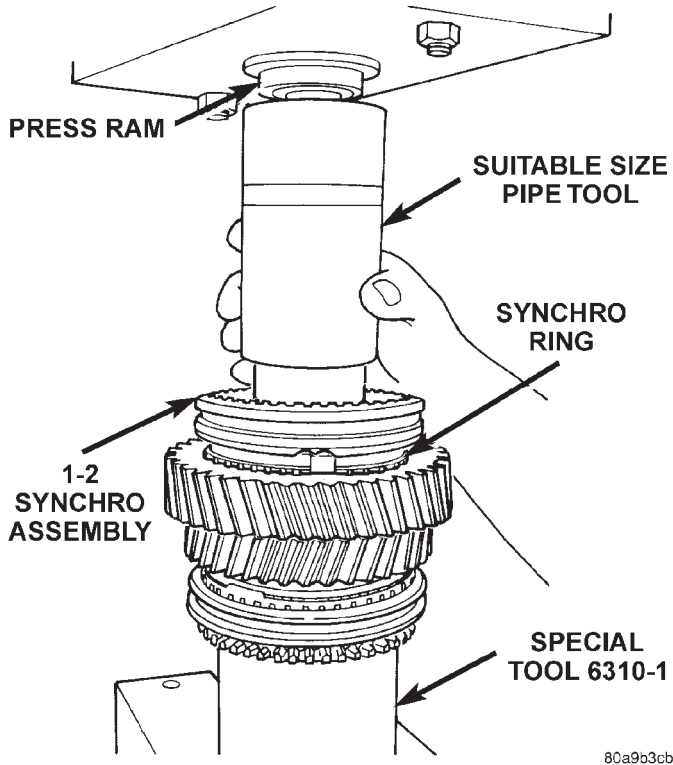
CAUTION: The 1-2 synchro hub and sleeve can be installed backwards if care is not exercised. One side of the hub has a small diameter shoulder around the hub bore. Make sure this side of the hub faces the forward end of the output shaft. In addition, one side of the synchro sleeve is marked First Gear 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. 64). Be sure synchro sleeve is properly positioned. Side marked first side must be facing first gear.

(19) Press 1-2 synchro onto output shaft using suitable size pipe tool and shop press (Fig. 65).

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.

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 64 Starting 1-2 Synchro On Shaft****Fig. 66 Installing 1-2 Synchro Hub Snap Ring****Fig. 65 Pressing 1-2 Synchro Assembly Onto Output Shaft**

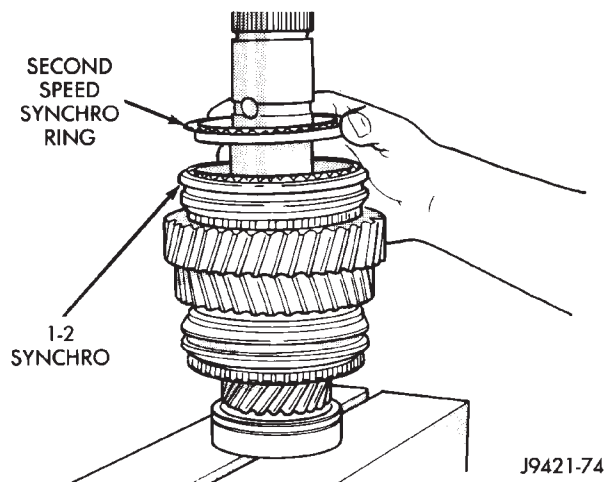
(20) Install new 1-2 synchro hub snap ring (Fig. 66) as follows:

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

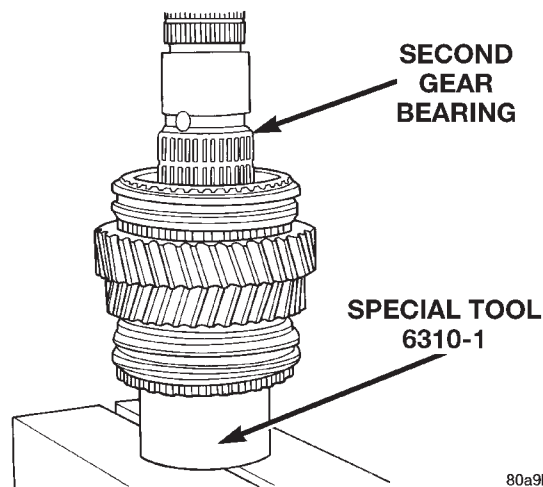
(b) Install thickest snap ring that will fit in shaft groove.

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

(21) Install second gear synchro ring in 1-2 synchro hub and sleeve (Fig. 67). Be sure synchro ring is properly seated in sleeve.

**Fig. 67 Second Gear Synchro Ring Installation**

(22) Install second gear needle bearing on shaft (Fig. 68).

**Fig. 68 Second Gear Bearing Installation**

DISASSEMBLY AND ASSEMBLY (Continued)

(23) Install second gear onto shaft and bearing (Fig. 69). Make sure that second gear is fully seated on synchro components.

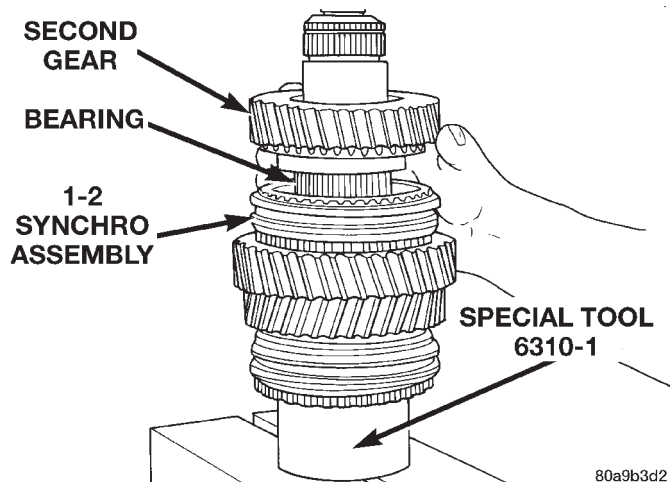


Fig. 69 Second Gear Installation

(24) Install two-piece thrust washer (Fig. 70). 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.

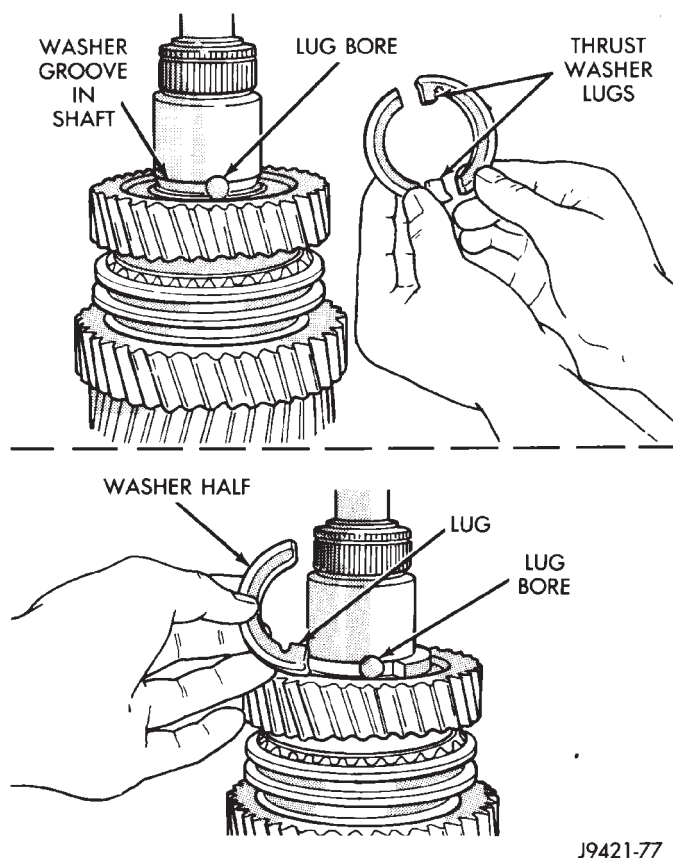


Fig. 70 Installing Two-Piece Thrust Washer

(25) Start retaining ring around two-piece thrust washer (Fig. 71). Make sure that the locating dimple is between the thrust washer halves.

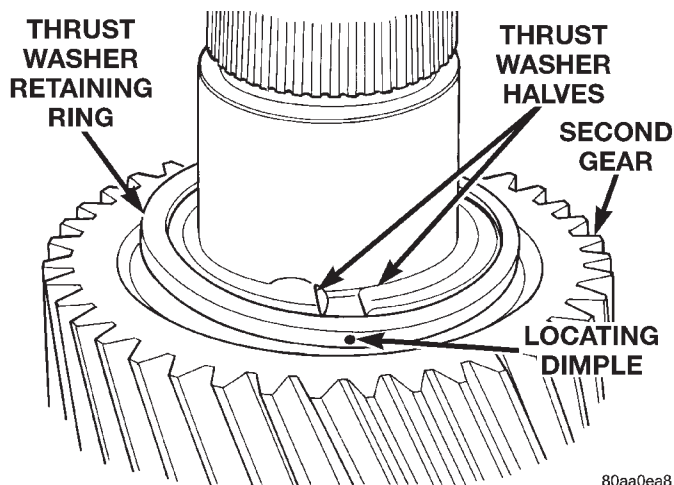


Fig. 71 Starting Retaining Ring Over Two-Piece Thrust Washer

(26) Seat thrust washer retaining ring with plastic mallet (Fig. 72).

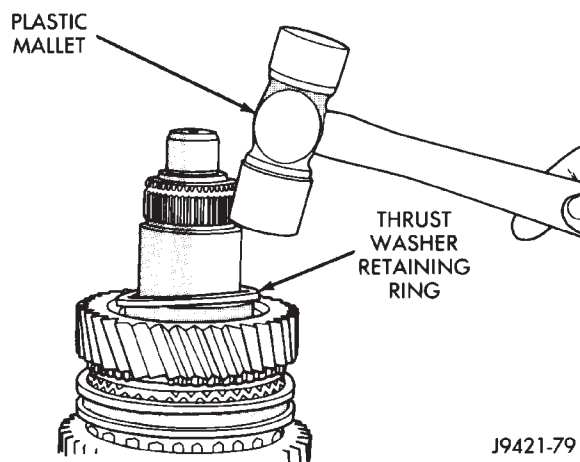


Fig. 72 Seating Thrust Washer Retaining Ring

DISASSEMBLY AND ASSEMBLY (Continued)

(27) Install third gear needle bearing on shaft (Fig. 73).

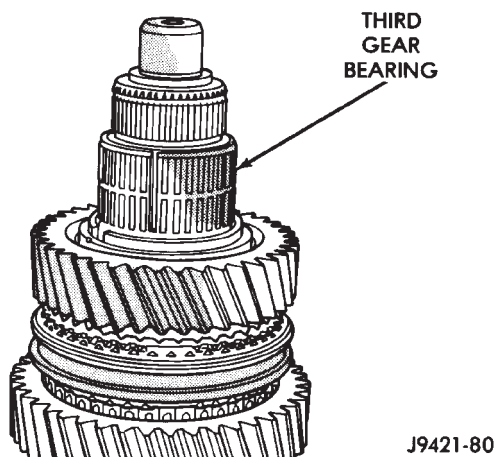


Fig. 73 Third Gear Bearing Installation

(28) Install third gear on shaft and bearing (Fig. 74).

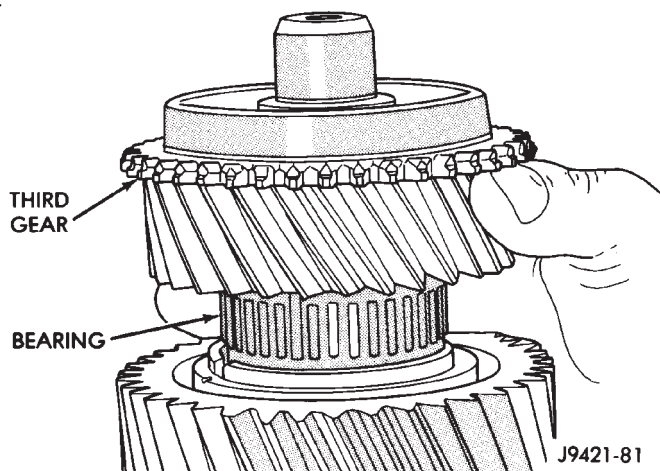


Fig. 74 Installing Third Gear

(29) Install third gear synchro ring on third gear (Fig. 75).

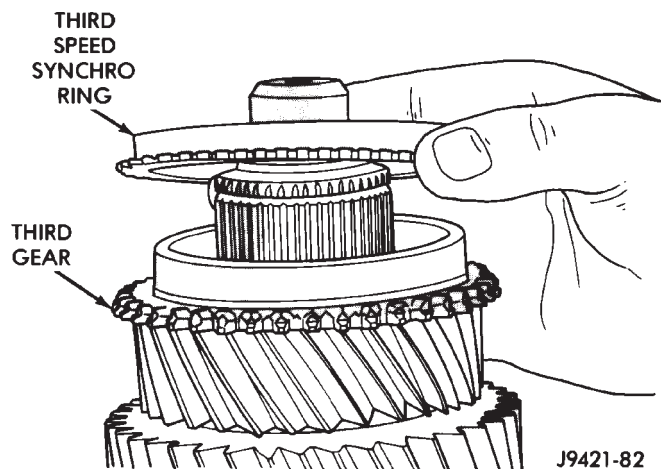


Fig. 75 Third Gear Synchro Ring Installation

(30) 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 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 has grooves in it. Be sure this side of sleeve is also facing the front of the shaft.

(31) Start 3-4 synchro hub on output shaft splines by hand (Fig. 76).

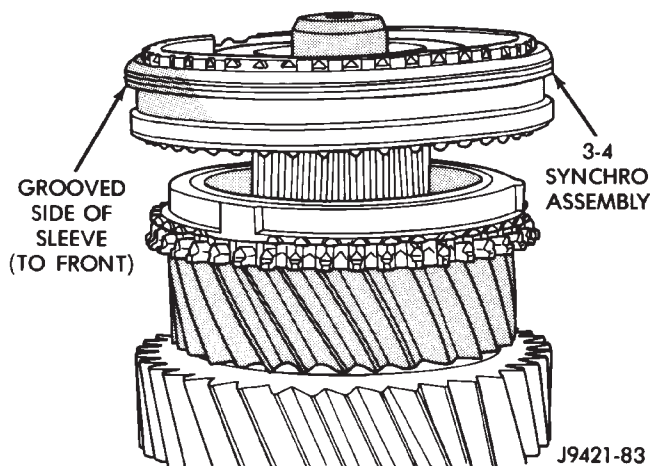


Fig. 76 Starting 3-4 Synchro Hub On Output Shaft

(32) Press 3-4 synchro assembly onto output shaft with shop press and suitable size pipe tool (Fig. 77). Make sure that the tool presses on hub as close to output shaft as possible but does not contact the shaft splines.

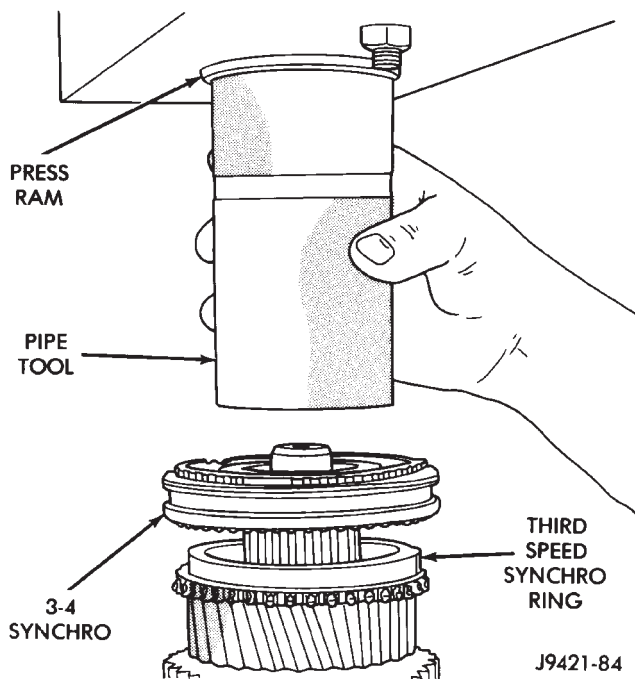


Fig. 77 Pressing 3-4 Synchro Assembly On Output Shaft

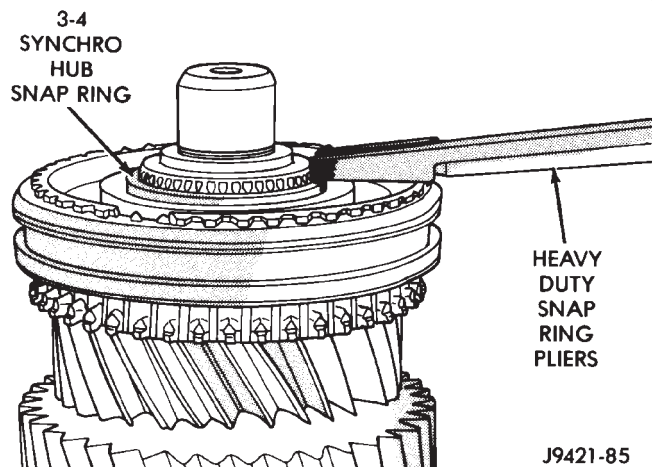


Fig. 78 Installing 3-4 Synchro Hub Snap Ring

(33) Install 3-4 synchro hub snap ring (Fig. 78) as follows:

(a) Snap rings are available in thicknesses from 2.00 mm to 2.30 mm (0.078 to 0.090 in.).

(b) Install thickest snap ring that will fit in shaft groove. Use heavy duty snap ring pliers to install new ring.

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

(34) Install output shaft bearing.

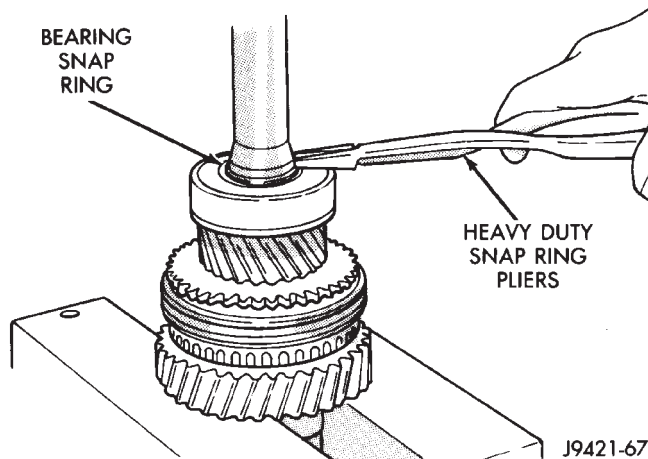


Fig. 79 Installing Output Shaft Bearing Snap Ring

(35) Install output shaft bearing snap ring (Fig. 79). 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.

(36) Verify correct position of synchro sleeves before proceeding with assembly operations (Fig. 80). 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.

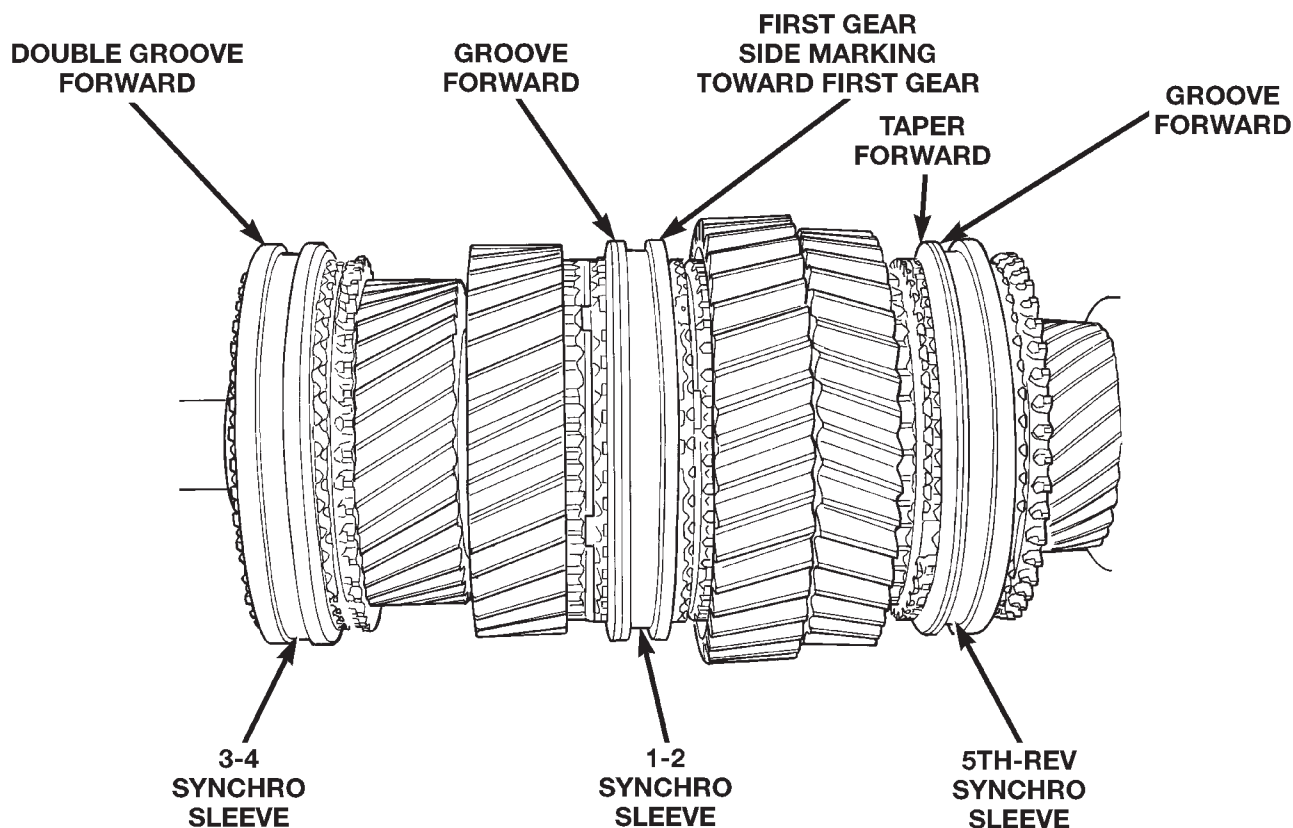
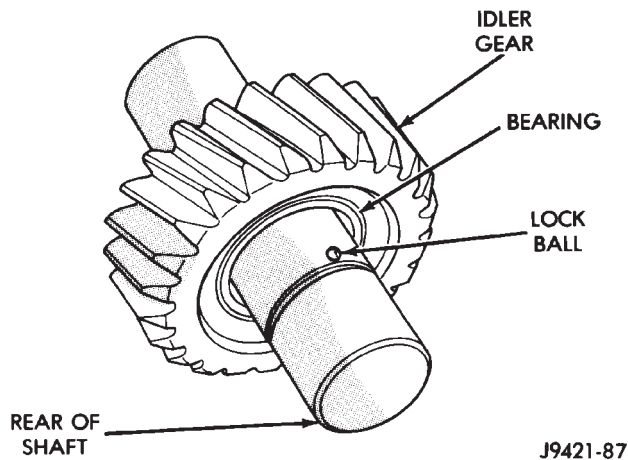


Fig. 80 Correct Synchro Sleeve Position

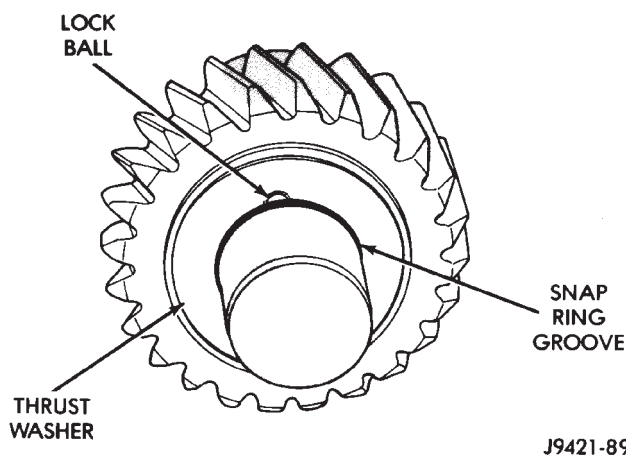
DISASSEMBLY AND ASSEMBLY (Continued)

REVERSE IDLER ASSEMBLY

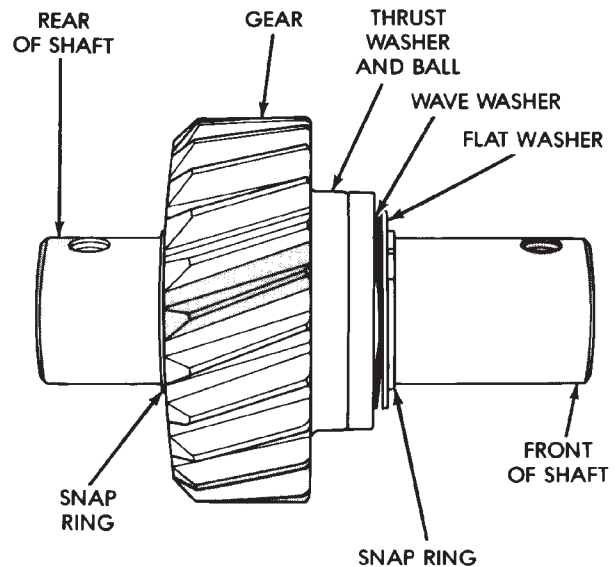
- (1) Lubricate idler components with gear lube.
- (2) Slide idler gear bearing on shaft (Fig. 81). Bearing fits either way on shaft.
- (3) Slide gear onto shaft. Side of gear with recess goes to rear (Fig. 81).
- (4) Place first lock ball in dimple at rear end of idler shaft (Fig. 81). Petroleum jelly can be used to hold ball in place if desired.

**Fig. 81 Idler Gear And Bearing Installation**

- (5) Slide thrust rear thrust washer onto shaft and over lock ball (Fig. 82).
- (6) Install snap ring in groove at rear of shaft (Fig. 82).

**Fig. 82 Idler Gear Rear Thrust Washer Installation**

- (7) Install lock ball in dimple at front of shaft. Hold ball in place with petroleum jelly if desired.
- (8) Install front thrust washer on shaft and slide washer up against gear and over lock ball (Fig. 83).
- (9) Install wave washer, flat washer and remaining snap ring on idler shaft (Fig. 83). Be sure snap ring is fully seated.

**Fig. 83 Idler Gear And Shaft Assembly**

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.

DISASSEMBLY AND ASSEMBLY (Continued)

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.

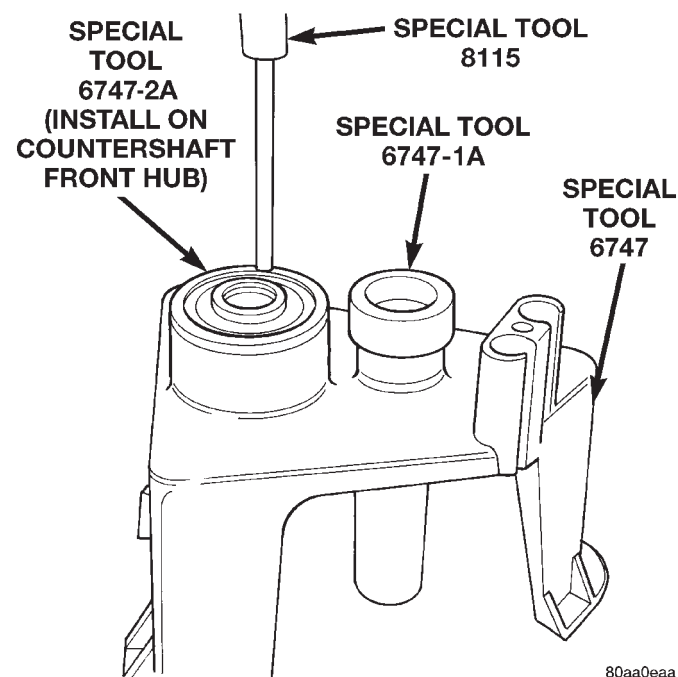
(f) Install a new detent plunger bushing on the short end of Installer 8118.

(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 IN FIXTURE

(1) Install Adapter 6747-1A on input shaft hub of fixture tool (Fig. 84). 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.

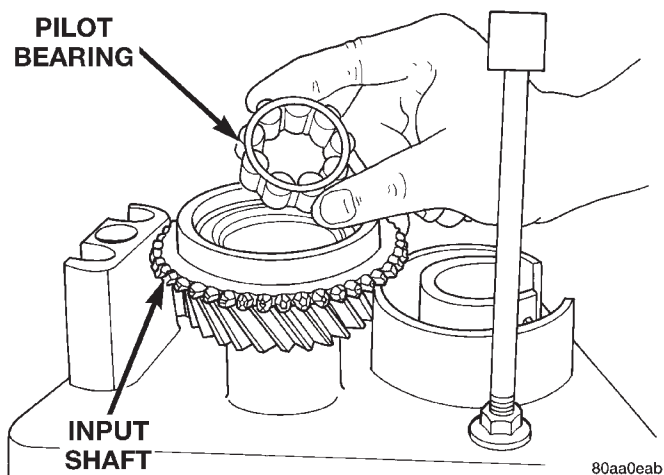


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Fig. 84 Preparing Assembly Fixture For Geartrain Build-up

(2) Install input shaft in fixture tool. Make sure Adapter Tool 6747-1A is positioned under shaft as shown (Fig. 85).

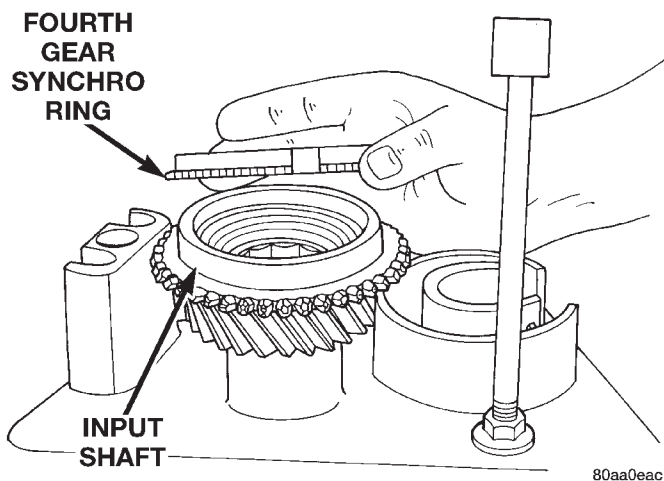
(3) Install pilot bearing in input shaft (Fig. 85).



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Fig. 85 Installing Pilot Bearing In Input Shaft

(4) Install fourth gear synchro ring on input shaft (Fig. 86).



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Fig. 86 Installing Fourth Gear Synchro Ring On Input Shaft

DISASSEMBLY AND ASSEMBLY (Continued)

(5) Adjust height of idler gear pedestal on assembly fixture (Fig. 87). Start with a basic height of 18.4 cm (7-1/4 in.). Final adjustment can be made after gear is positioned on pedestal.

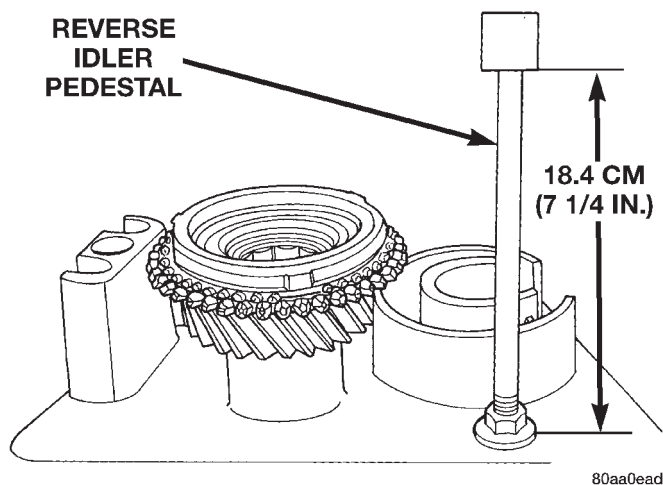


Fig. 87 Idler Pedestal Basic Height Adjustment

(6) Install assembled output shaft and geartrain in input shaft (Fig. 88). Carefully rotate output shaft until the 3-4 synchro ring seats in synchro hub and sleeve.

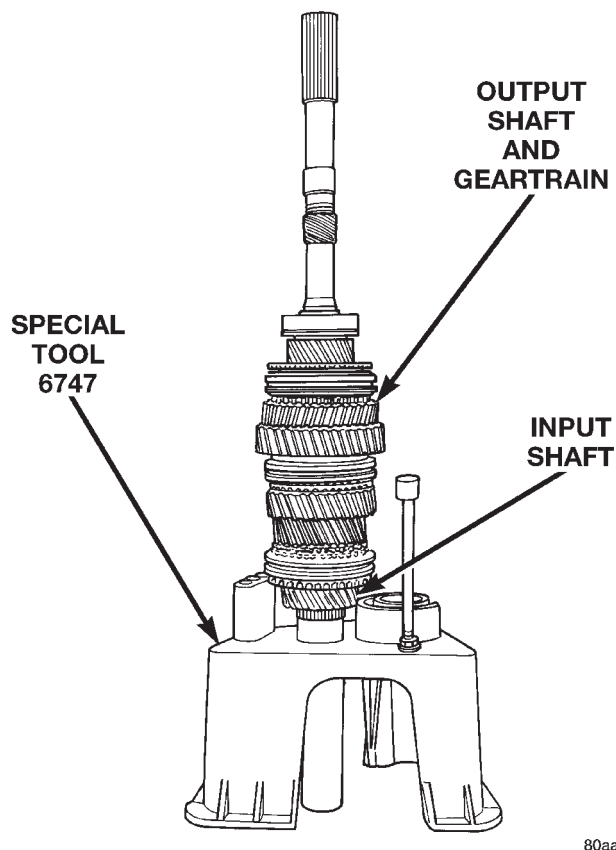


Fig. 88 Output Shaft And Geartrain Installed In Input Shaft

(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. 89).

(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.

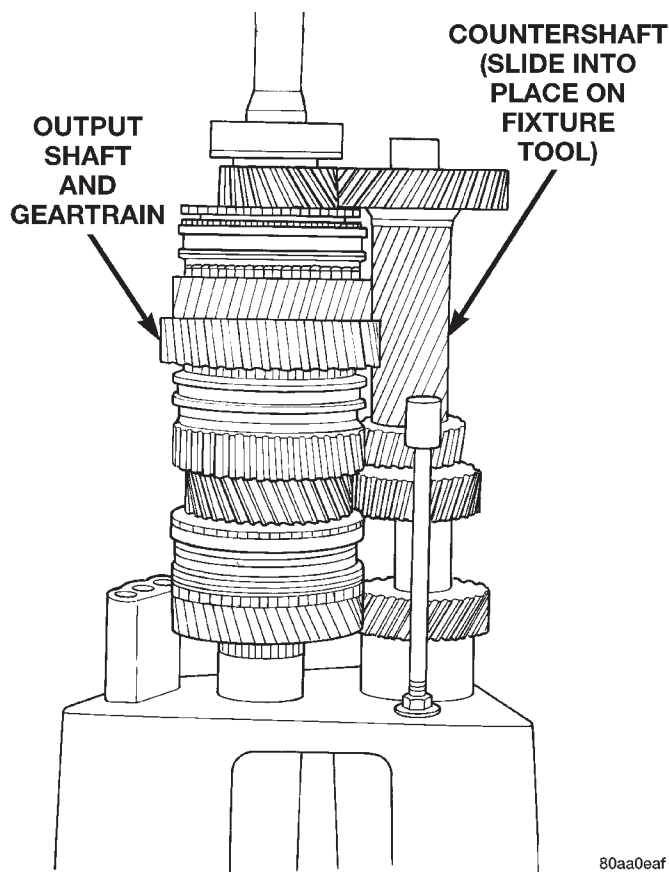


Fig. 89 Countershaft Installed On Fixture Tool

DISASSEMBLY AND ASSEMBLY (Continued)

(10) Position reverse idler in support cup of assembly fixture (Fig. 90). 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.

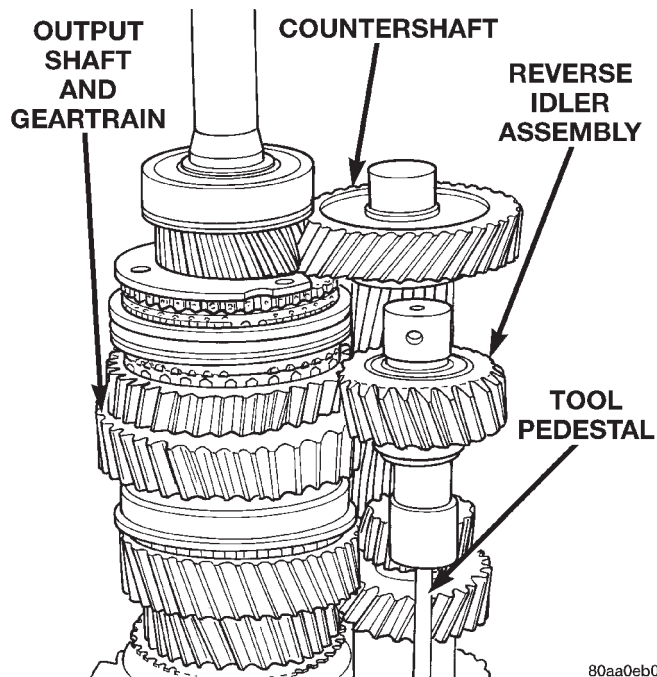


Fig. 90 Reverse Idler Assembly Positioned On Assembly Fixture Pedestal

(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. 91).

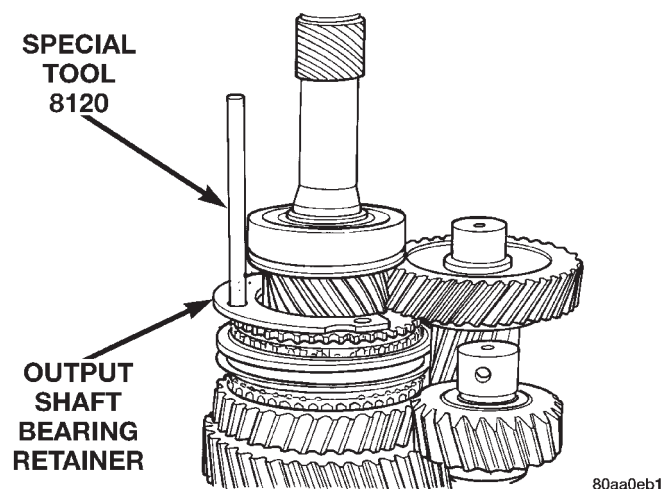


Fig. 91 Positioning Output Shaft Bearing Retainer For Rear Housing Installation

(12) Assemble 1-2 and fifth reverse-shift forks (Fig. 92). Arm of fifth-reverse fork goes through slot in 1-2 fork.

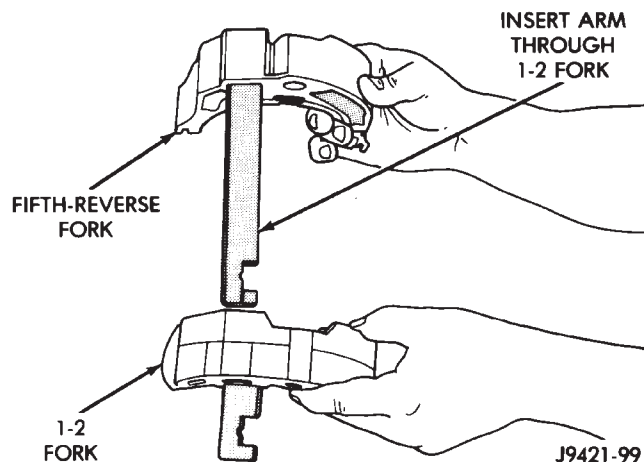


Fig. 92 Assembling 1-2 And Fifth-Reverse Shift Forks

(13) Install assembled shift forks in synchro sleeves (Fig. 93). Be sure forks are properly seated in sleeves.

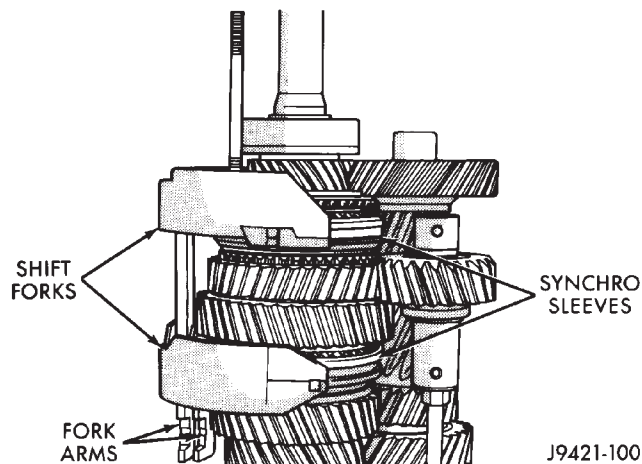


Fig. 93 Shift Forks Installed In Synchro Sleeves

DISASSEMBLY AND ASSEMBLY (Continued)

REAR HOUSING INSTALLATION—2WD

(1) Drive adapter housing alignment dowels back into housing until dowels are flush with mounting surface (Fig. 94).

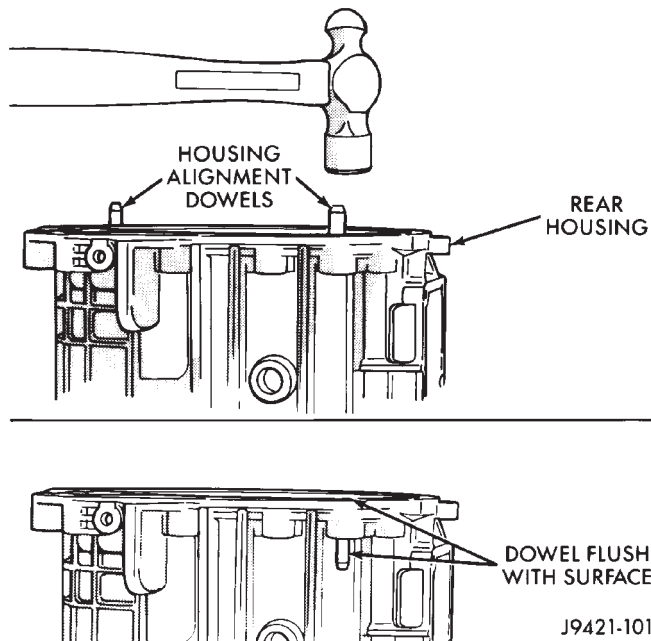


Fig. 94 Preparing Rear Housing Dowels For Installation

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

(3) Install countershaft rear bearing in bearing race (Fig. 95).

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. 96).

(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. 96).

(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.

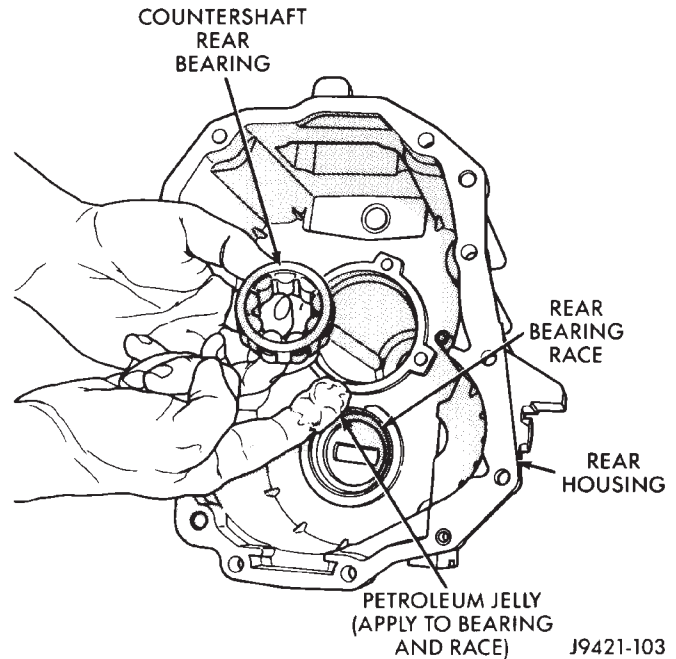


Fig. 95 Lubricating Countershaft Rear Bearing

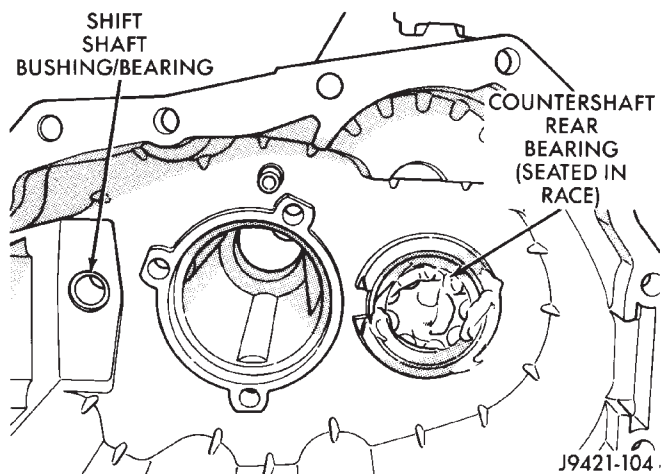


Fig. 96 Countershaft Rear Bearing Seated In Seated in Race

DISASSEMBLY AND ASSEMBLY (Continued)

(7) Install rear housing onto geartrain (Fig. 97). 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.

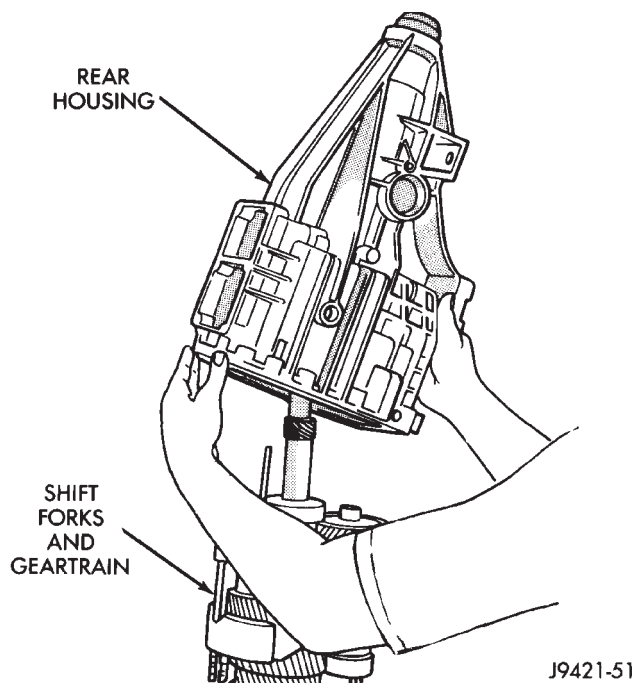


Fig. 97 Rear Housing Installation—2WD

(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:

(a) Apply Mopar® Gasket Maker, or equivalent, to bolt threads, bolt shanks and under bolt heads (Fig. 98).

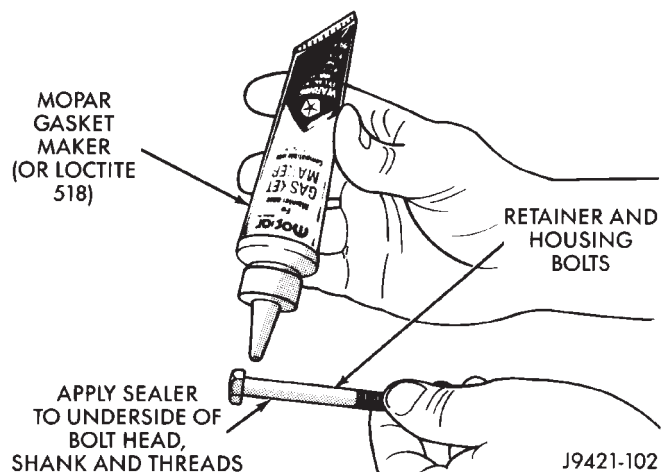


Fig. 98 Applying Sealer To Retainer And Housing Bolts

(b) Start first two bolts in retainer (Fig. 99). It may be necessary to move retainer rearward (with pilot stud) in order to start bolts in retainer.

(c) Remove Pilot Stud 8120 and install last retainer bolt (Fig. 99).

(d) Tighten all three retainer bolts to 30-35 N·m (22-26 ft. lbs.) torque.

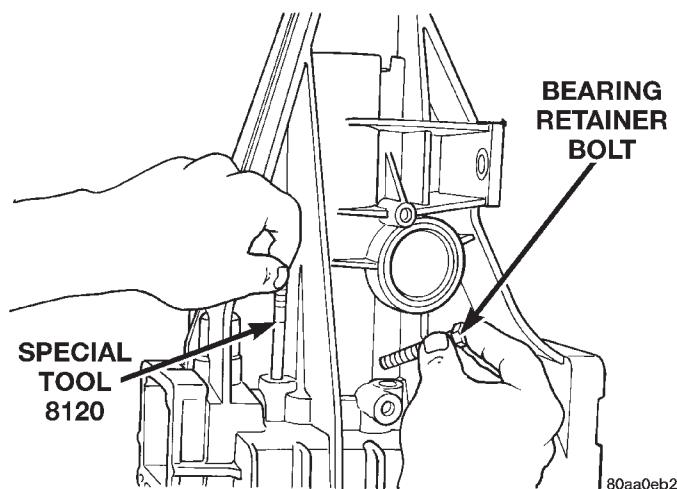


Fig. 99 Removing Pilot Stud Tool And Installing Retainer Bolts—2WD

ADAPTER HOUSING INSTALLATION—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. 100).

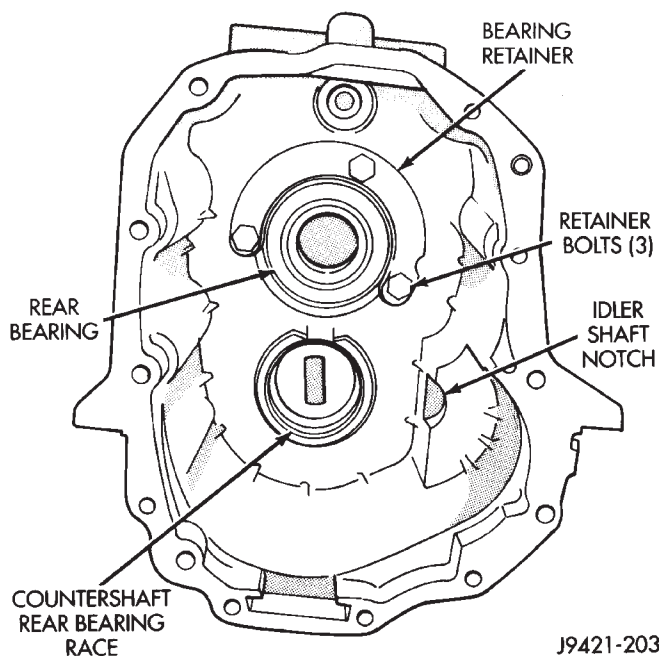


Fig. 100 Preparing Adapter Housing For Installation—4WD

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Apply Mopar® Gasket Maker, or equivalent, to threads, bolt shanks and under hex heads of bearing retainer bolts (Fig. 101).

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

(5) Install countershaft rear bearing in bearing race (Fig. 96).

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. 96).

(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. 96).

(8) Install adapter housing on geartrain.

(9) Install rear bearing snap ring on output shaft (Fig. 101).

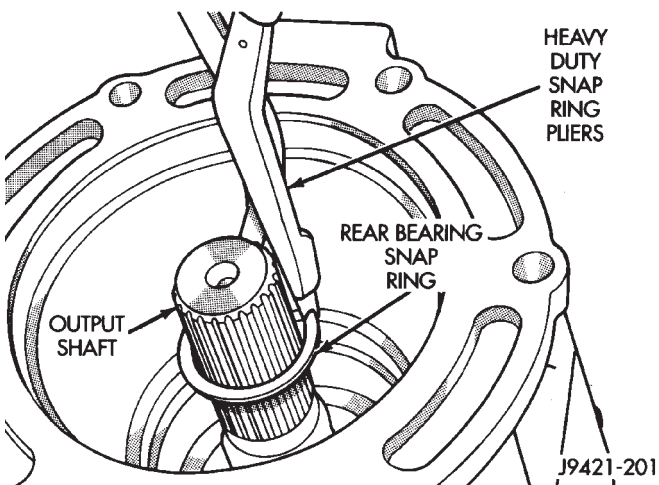


Fig. 101 Installing Rear Bearing Snap Ring—4WD

(10) Lubricate lip of new rear seal (Fig. 102) 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. 102).

REVERSE IDLER SEGMENT INSTALLATION

(1) Remove geartrain and housing assembly from fixture with aid of helper.

(2) Apply Mopar® Gasket Maker, or equivalent, sealer to underside of idler shaft bolt heads, bolt shanks and bolt threads (Fig. 98).

(3) Align idler shaft and rear housing bolt holes with drift, pin punch, or Phillips screwdriver.

(4) Work segment upward into housing and onto idler shaft.

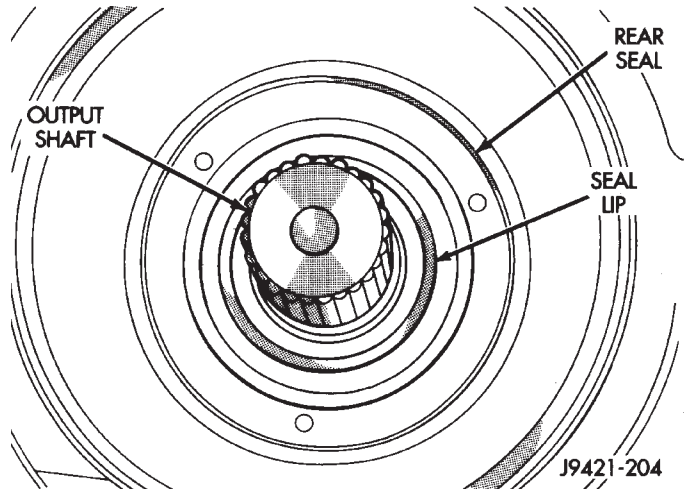


Fig. 102 Rear Seal Installation—4WD

(5) Verify that idler shaft is seated in housing notch before proceeding. Segment and housing can be damaged if idler shaft is misaligned.

(6) Insert idler shaft retaining bolts through housing and segment and into shaft. Long bolt goes through segment and short bolt goes through housing and directly into rear of shaft.

(7) Tighten idler shaft bolts to 19-25 N·m (14-18 ft. lbs.) torque.

CAUTION: Make sure the idler shaft and support segment are properly seated and held firmly in place while tightening the shaft bolts. The segment, housing or shaft threads can be damaged if the idler shaft is allowed to shift out of position in the housing.

SHIFT SHAFT, SHAFT LEVER AND BUSHING AND SHIFT SOCKET INSTALLATION

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

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. 103). Verify that groove in fork arm is aligned with grooves in 1-2 and fifth-reverse fork arms as shown.

(3) Slide shift shaft through 3-4 shift fork (Fig. 104). Be sure shaft detent notches are to front.

(4) Assemble shift shaft shift lever and bushing (Fig. 105). Be sure slot in bushing is facing up and roll pin hole for lever is aligned with hole in shaft.

(5) Install assembled lever and bushing on shift shaft (Fig. 106).

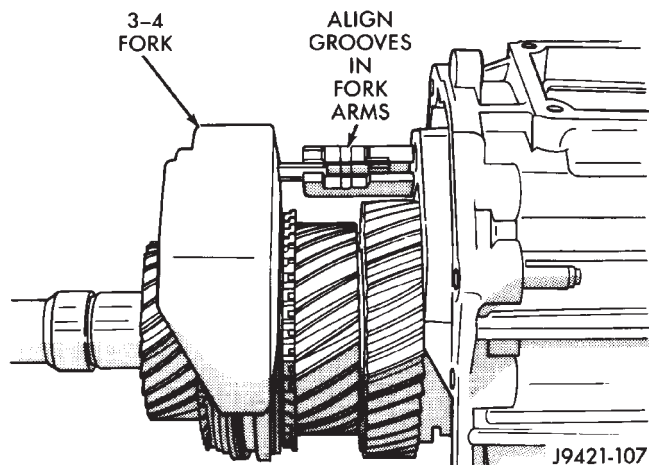


Fig. 103 Installing 3-4 Shift Fork

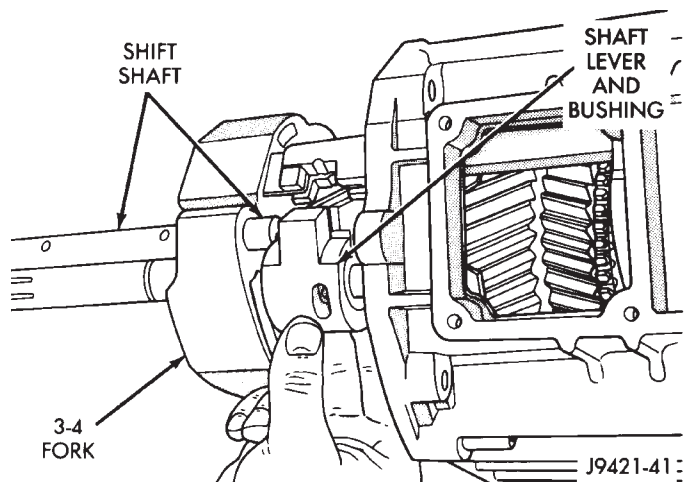


Fig. 106 Installing Shift Shaft Lever And Bushing

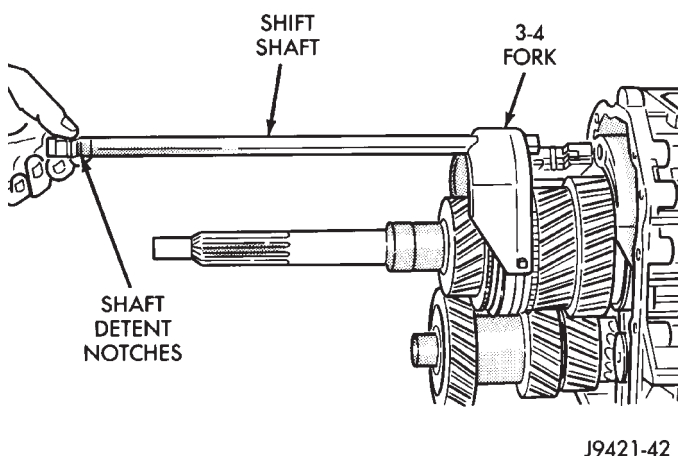


Fig. 104 Shift Shaft Installation

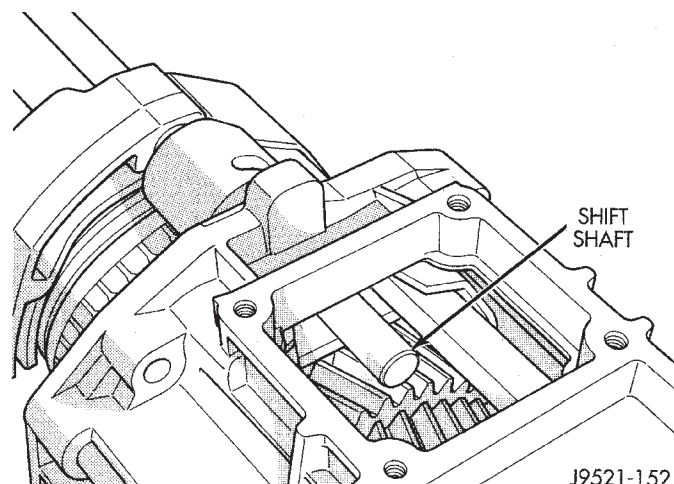


Fig. 107 Inserting Shaft Into Lever Opening In Housing

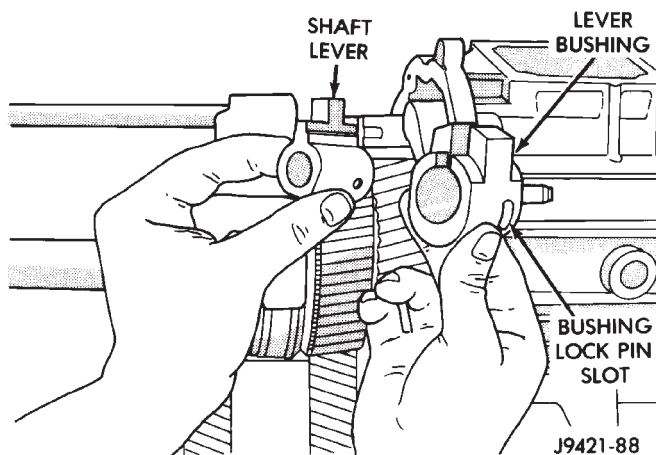


Fig. 105 Assembling Shift Shaft Lever And Bushing

(6) Slide shift shaft through 1-2 and fifth-reverse fork and into shift lever opening in rear housing (Fig. 107).

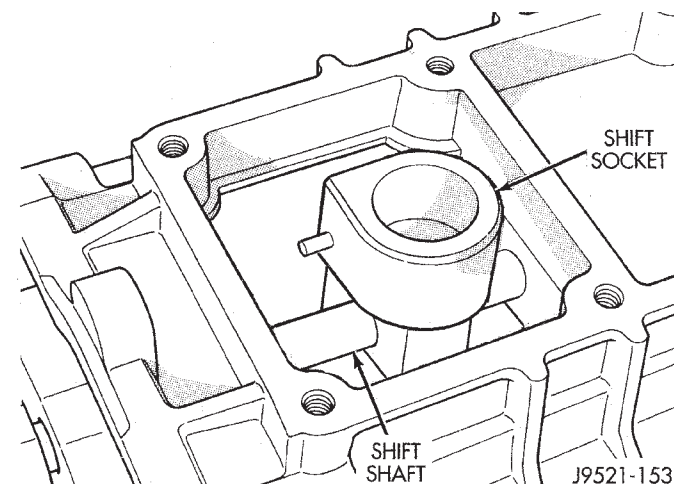


Fig. 108 Shift Socket Installation

(7) Align shift socket with shaft and slide shaft through socket and into shift shaft bearing in rear housing (Fig. 108).

DISASSEMBLY AND ASSEMBLY (Continued)

(8) Rotate shift shaft so detent notches in shaft are facing driver side of housing.

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. 109). 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.

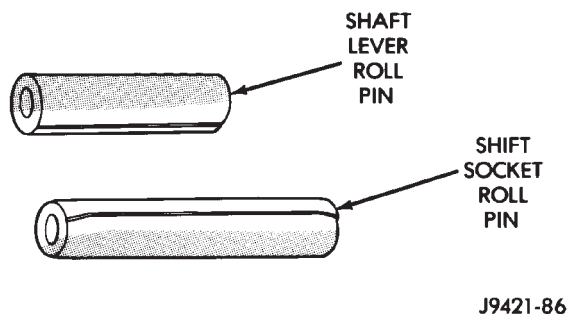


Fig. 109 Roll Pin Identification—Shaft Lever And Shift Socket

(10) Align roll pin holes in shift shaft, lever and bushing. Then start roll pin into shaft lever by hand (Fig. 110).

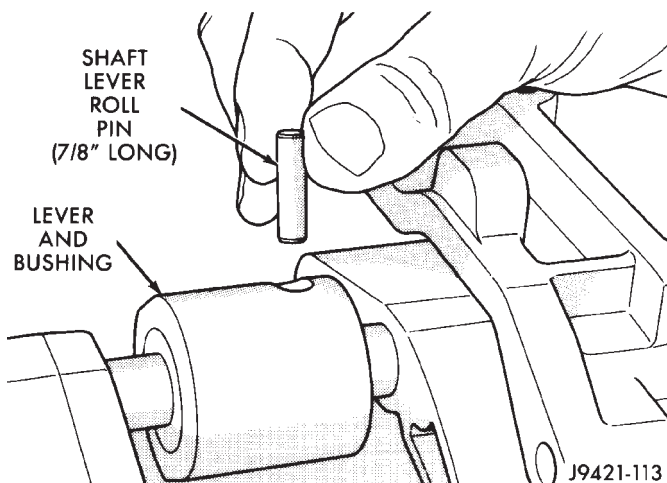


Fig. 110 Starting Roll Pin In Shift Shaft Lever

(11) Seat shaft lever roll pin with pin punch (Fig. 111).

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. 111).

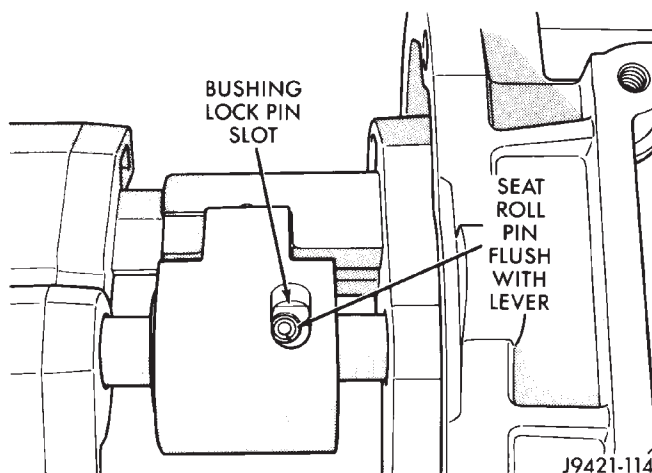


Fig. 111 Correct Seating Of Shift Shaft Lever Roll Pin

(13) Align roll pin holes in shift socket and shift shaft. Then start roll pin into shift shaft by hand (Fig. 112).

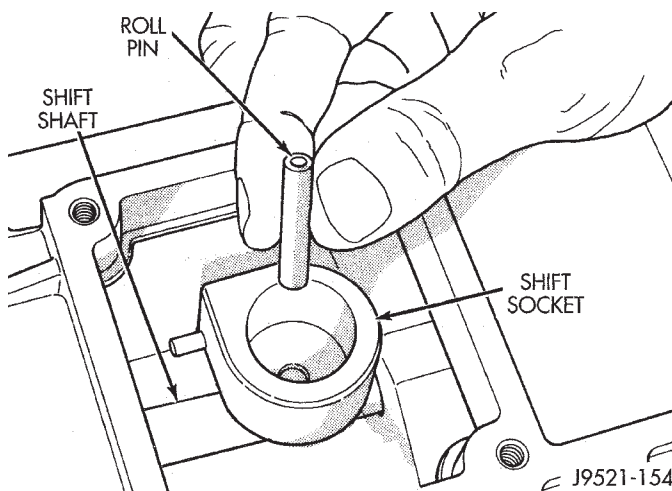


Fig. 112 Starting Roll Pin In Shift Socket

DISASSEMBLY AND ASSEMBLY (Continued)

(14) Seat roll pin in shift socket with pin punch. Roll pin must be flush with socket after installation (Fig. 113).

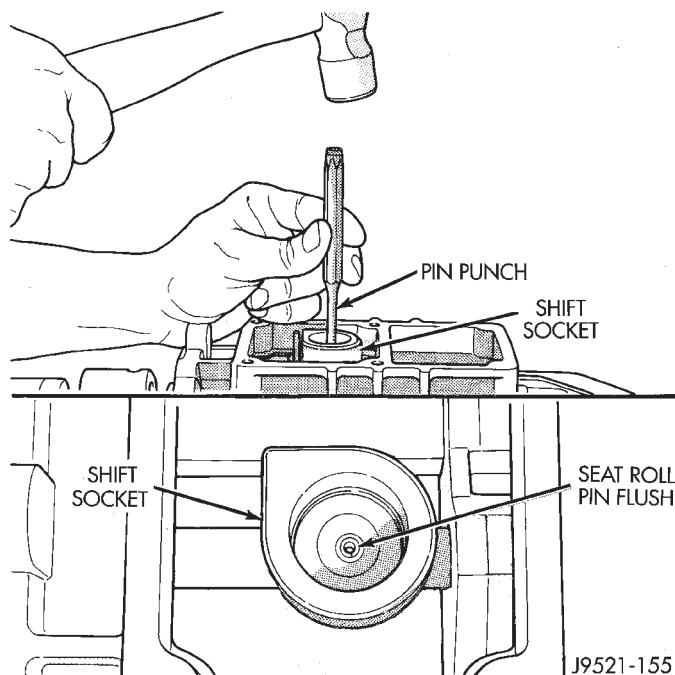


Fig. 113 Seating Shift Socket Roll Pin

(15) Verify that notches in shift fork arms are aligned (Fig. 114). Realign arms if necessary.

(16) Rotate shaft lever and bushing downward (out of fork arms), to expose detent bore in lever (Fig. 114).

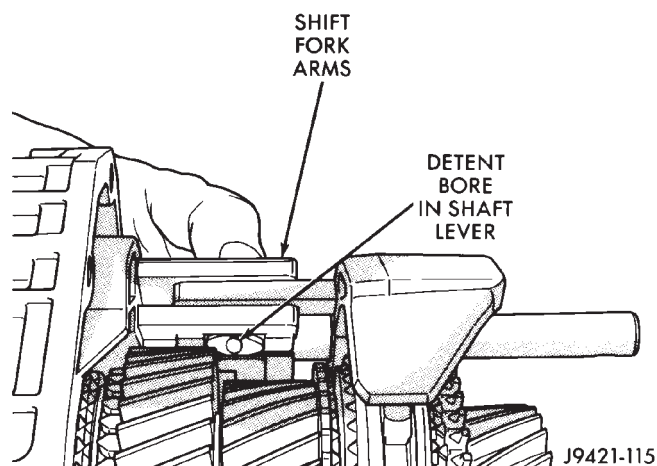


Fig. 114 Shaft Lever Positioned For Detent Ball and Spring Installation

(17) Insert detent spring in lever bore (Fig. 115).

(18) Install detent ball on top of spring in lever bore (Fig. 116).

(19) Press and hold detent ball in lever. Then carefully rotate lever upward into fork arm notches. Be

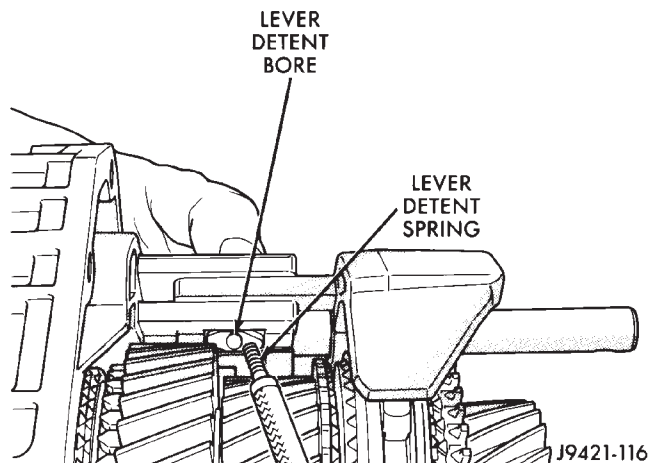


Fig. 115 Installing Detent Spring In Shaft Lever

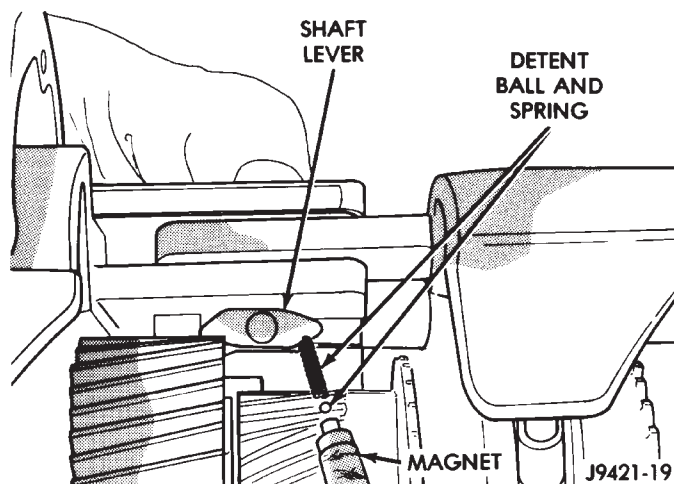


Fig. 116 Installing Detent Ball In Shaft Lever

sure ball is seated in fork arms before proceeding (Fig. 117).

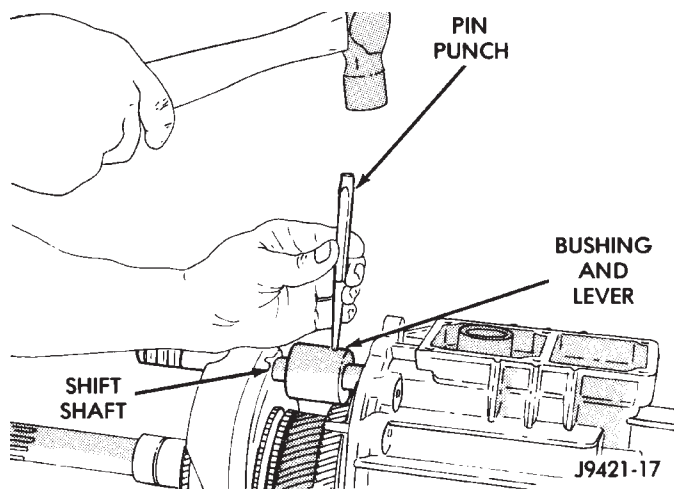


Fig. 117 Correct Seating Of Lever Detent Ball In Shift Fork Arms

DISASSEMBLY AND ASSEMBLY (Continued)

FRONT HOUSING AND INPUT SHAFT BEARING RETAINER INSTALLATION

(1) Install input shaft bearing in front housing bore (Fig. 118). Use plastic mallet to seat bearing. Bearing goes in from front side of housing only.

(2) Apply liberal quantity of petroleum jelly to countershaft front bearing. Then insert bearing in front housing race (Fig. 119). Large diameter side of bearing cage goes toward countershaft (Fig. 118). 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.

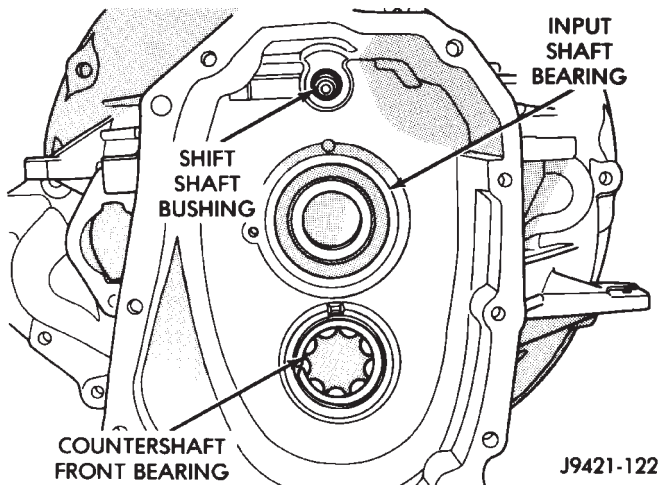


Fig. 118 Input Shaft Bearing And Countershaft Front Bearing Installation

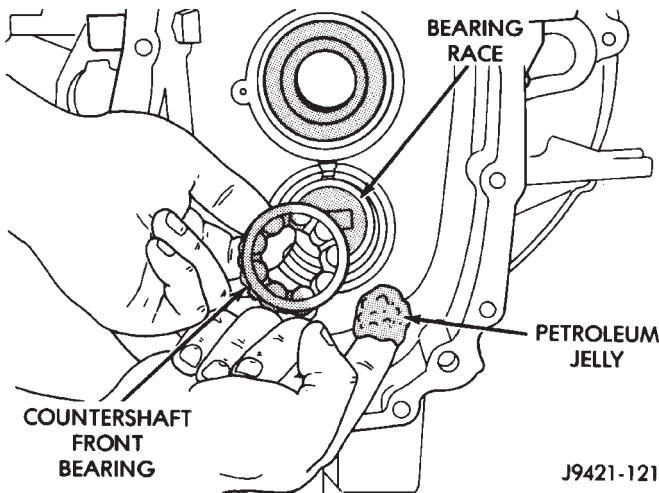


Fig. 119 Lubricating/Positioning Countershaft Front Bearing

(4) Apply small amount of petroleum jelly to shift shaft bushing in front housing (Fig. 120).

(5) Apply 1/8 in. wide bead of Mopar® Gasket Maker, or equivalent, to mating surfaces of front and rear housings (Fig. 120).

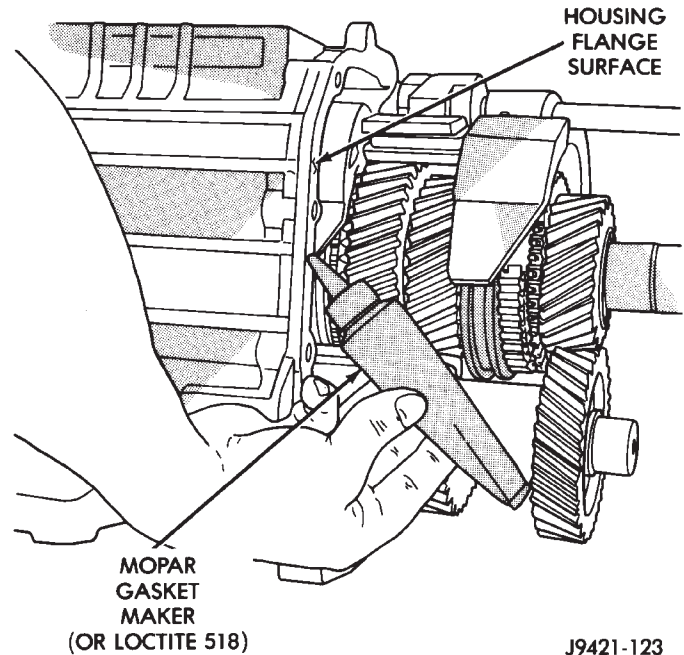


Fig. 120 Applying Sealer To Front/Rear Housings

(6) Have helper hold rear housing and geartrain in upright position. Then install front housing on rear housing and geartrain (Fig. 121).

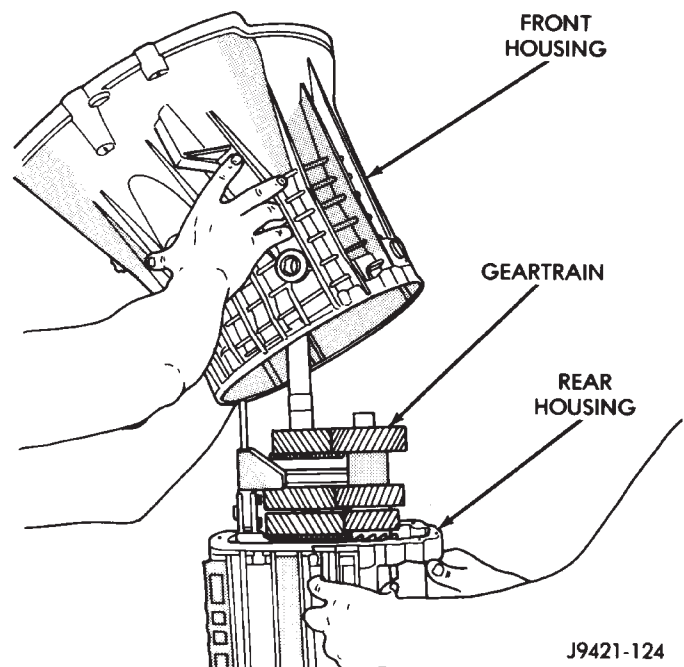


Fig. 121 Front Housing Installation

DISASSEMBLY AND ASSEMBLY (Continued)

(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 (Fig. 122). Both dowels should be flush fit in each housing. Have helper hold transmission upright while dowels are tapped back into place.

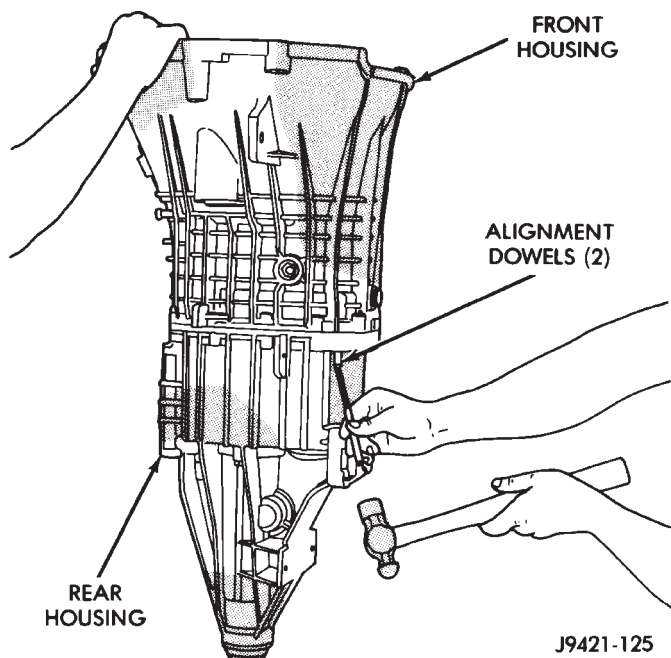


Fig. 122 Reseating Housing Alignment Dowels

(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 30-35 N·m (22-26 ft. lbs.) torque.

(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. 125).

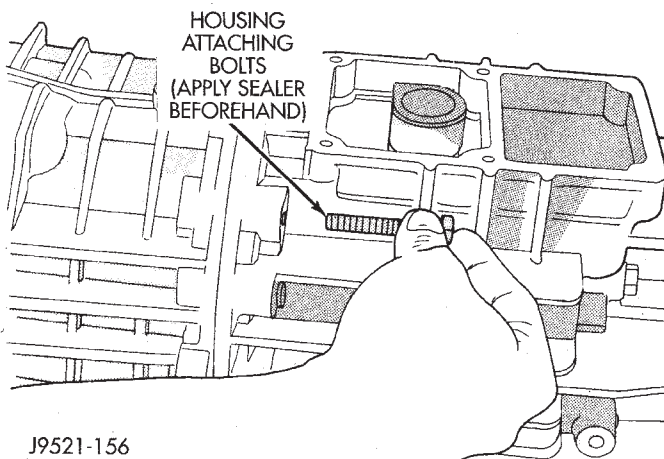


Fig. 123 Installing Housing Attaching Bolts

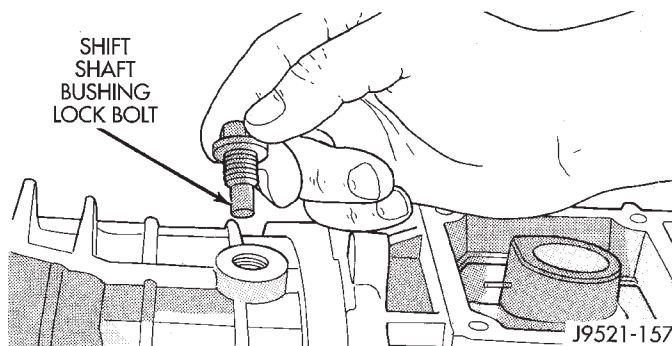


Fig. 124 Installing Shift Shaft Bushing Lock Bolt

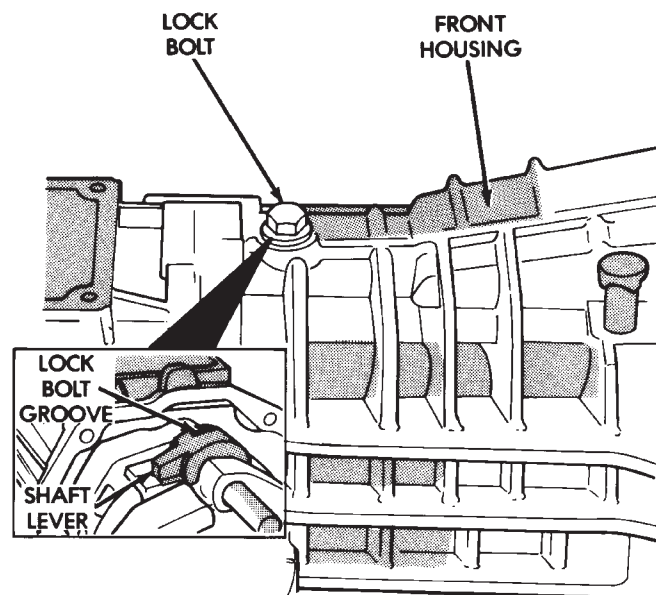


Fig. 125 Correct Alignment Of Lock Bolt And Shaft Bushing

DISASSEMBLY AND ASSEMBLY (Continued)

(13) Lubricate then install shift shaft detent plunger in housing bore (Fig. 126). Lubricate plunger with petroleum jelly or gear lubricant. **Be sure plunger is fully seated in detent notch in shift shaft.**

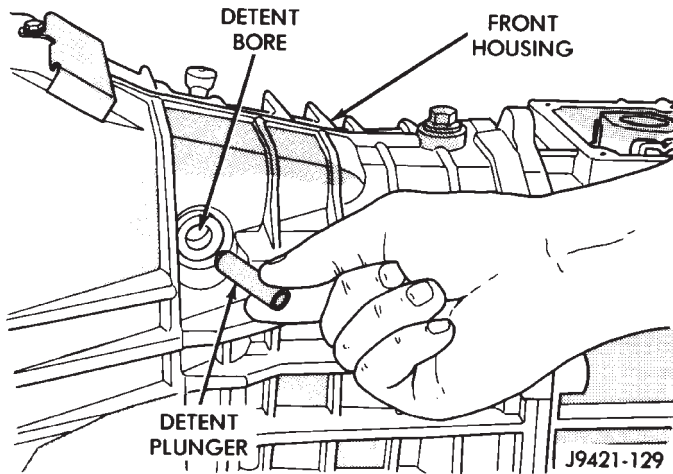


Fig. 126 Installing Shift Shaft Detent Plunger

(14) Install detent spring inside plunger (Fig. 127).

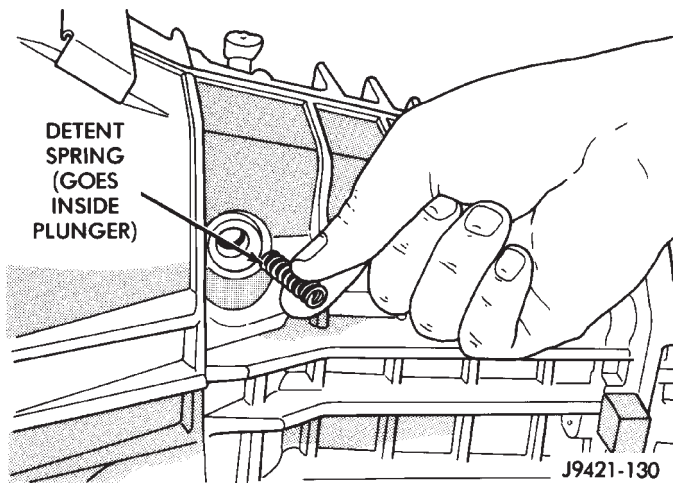


Fig. 127 Installing Detent Plunger Spring

(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. 128).

(17) Install input shaft snap ring (Fig. 129).

(18) Install new oil seal in front bearing retainer with Installer Tool 6448 (Fig. 130).

(19) Apply bead of Mopar® silicone sealer, or equivalent, to flange surface of front bearing retainer (Fig. 131).

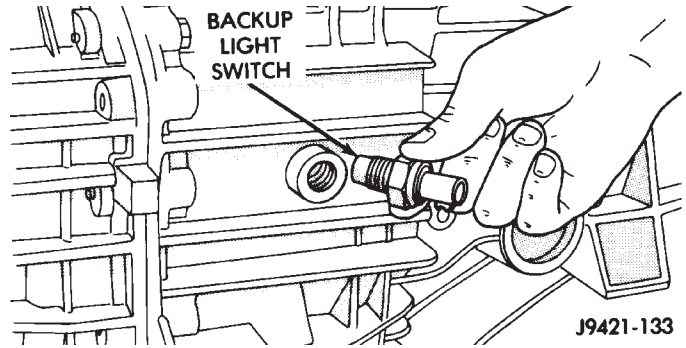


Fig. 128 Installing Backup Light Switch

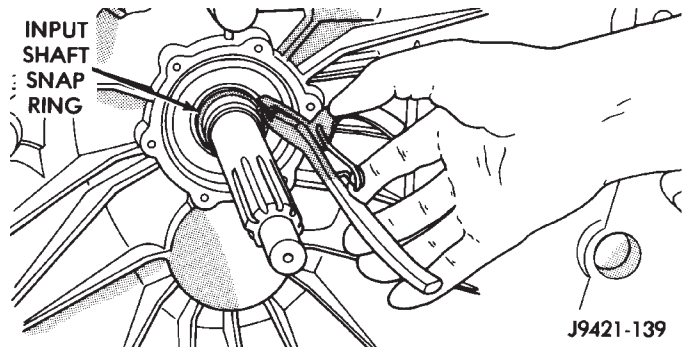


Fig. 129 Installing Input Shaft Snap Ring

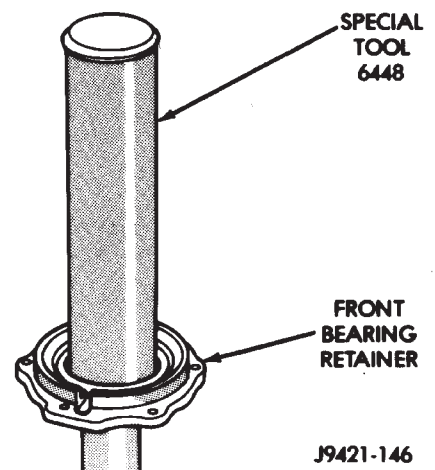


Fig. 130 Installing Oil Seal In Front Bearing Retainer

(20) Align and install front bearing retainer over input shaft and onto housing mounting surface (Fig. 132). Although retainer is one-way fit on housing, be sure bolt holes are aligned before seating retainer. 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. 133).

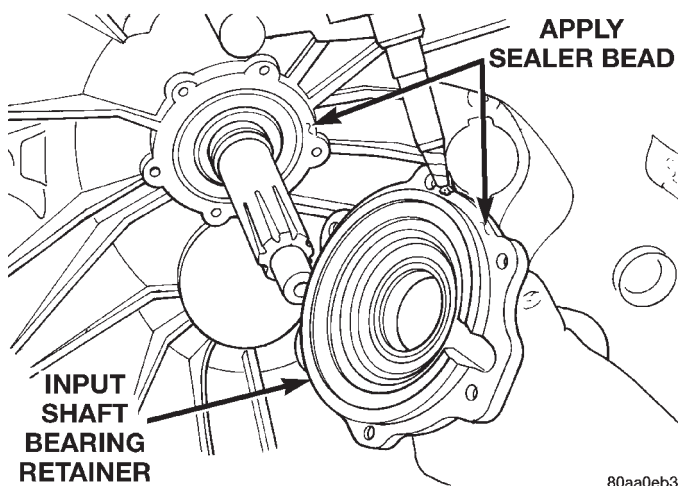


Fig. 131 Applying Sealer To Bearing Retainer And Housing

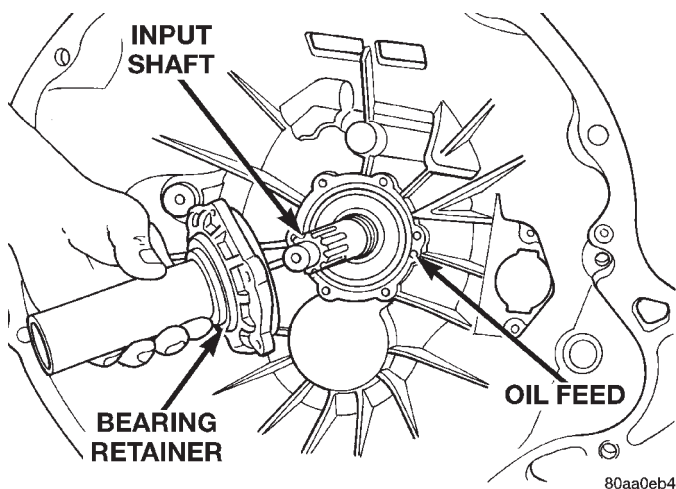


Fig. 132 Installing Input Shaft Bearing Retainer

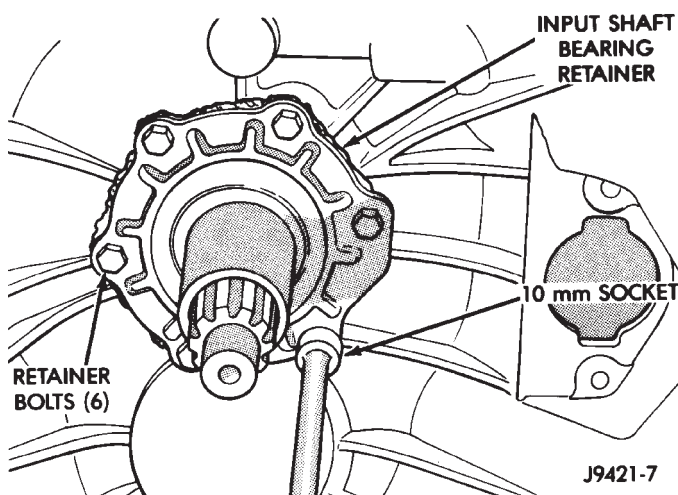


Fig. 133 Installing Input Shaft Bearing Retainer Bolts

SHIFT TOWER AND LEVER ASSEMBLY INSTALLATION

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

(2) Align and install shift tower and lever assembly. 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.

(3) Install shift tower bolts (Fig. 134). Tighten bolts to 7-10 N·m (5-7 ft. lbs.) torque.

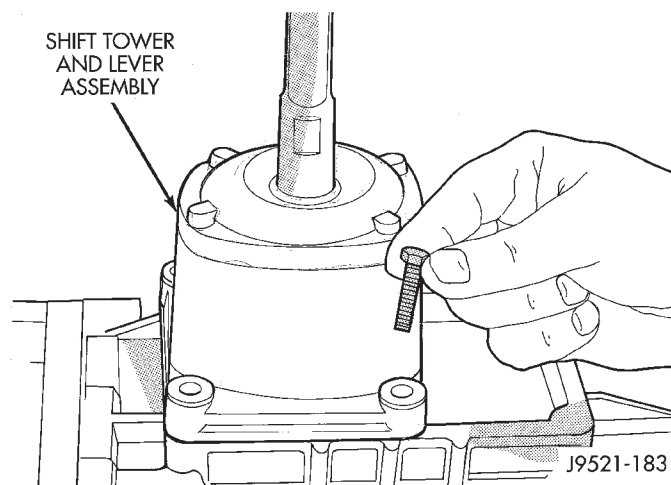


Fig. 134 Shift Tower Bolt Installation

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

(5) Install and tighten fill plug to 19-27 N·m (14-20 ft. lbs.) torque.

(6) Check transmission vent (Fig. 135). Be sure vent is open and not restricted.

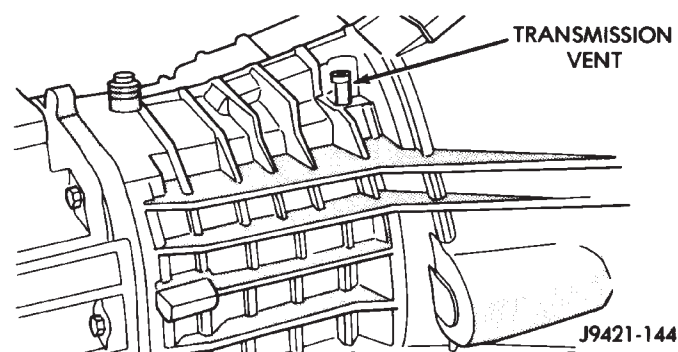


Fig. 135 Vent Location

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.

CLEANING AND INSPECTION (Continued)

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. 136). 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.

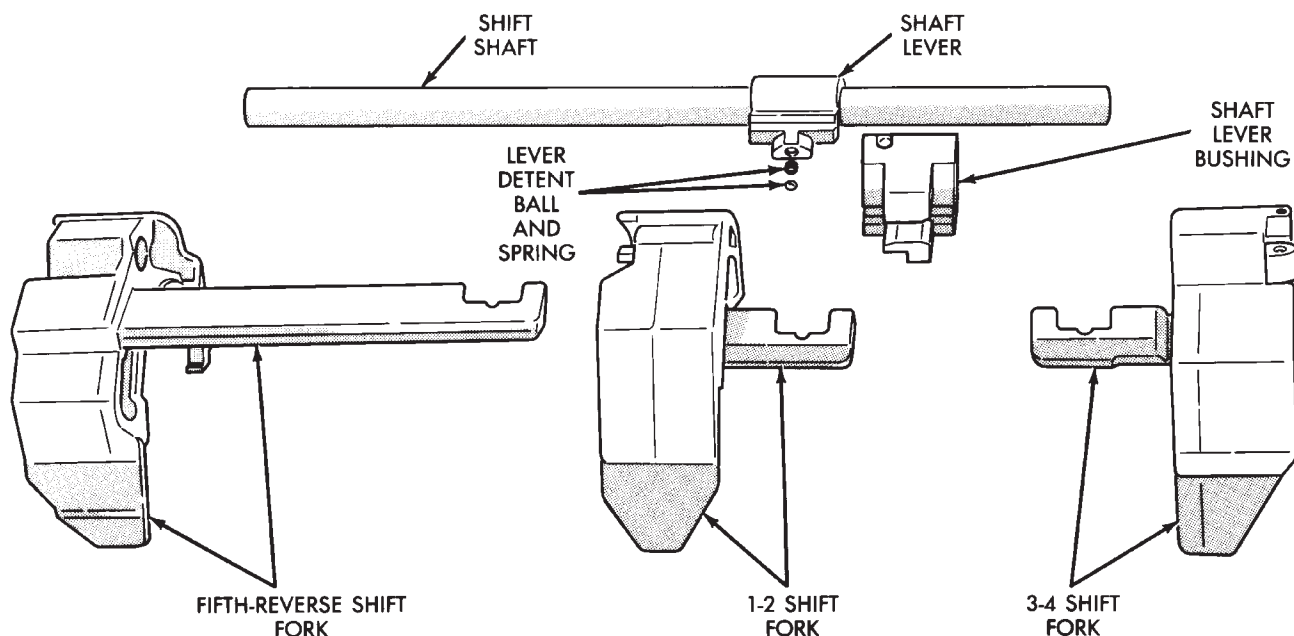
Replace the shaft lever and bushing if either part is deformed, or worn. Do not attempt to salvage these parts as shift fork binding will occur. Replace the small detent ball and spring that goes in the lever if the ball is worn, or if the spring is bent or collapsed. Replace the roll pin that secures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

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.



J9421-54

Fig. 136 Shift Forks And Shaft

CLEANING AND INSPECTION (Continued)

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 bearing 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. 137). The small diameter side goes in the bearing race.

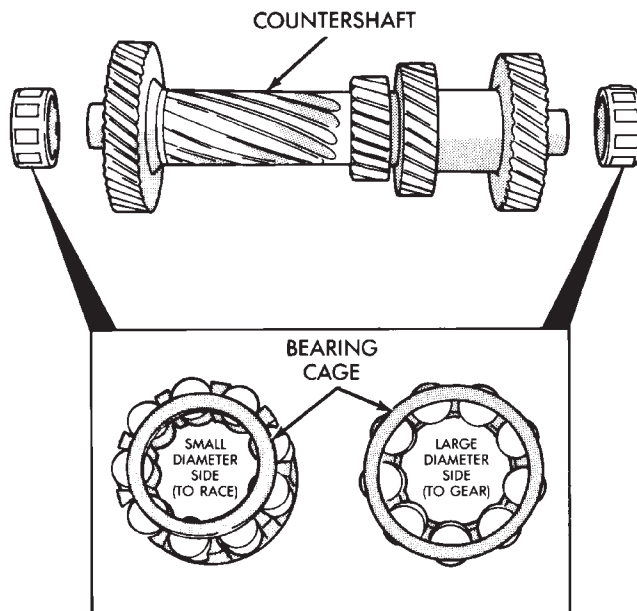
REVERSE IDLER COMPONENTS

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 brinnelled. 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.

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



J9421-55

Fig. 137 Correct Countershaft Bearing Installation

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 brinnelled 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 brinnelled.

SPECIFICATIONS

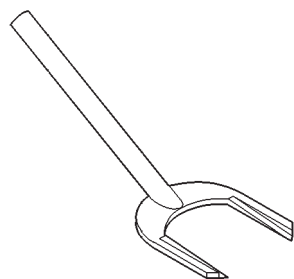
TORQUE

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.)

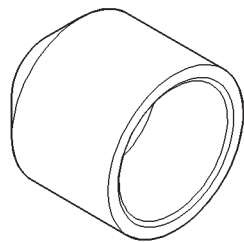
J9421-212

SPECIAL TOOLS

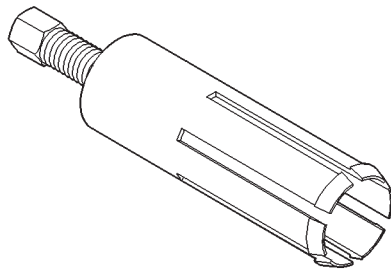
NV3500 MANUAL TRANSMISSION



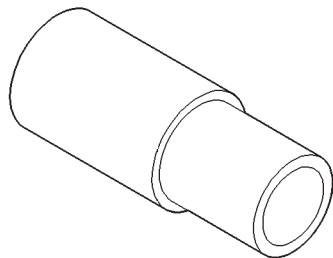
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Installer, Seal—C-3972-A

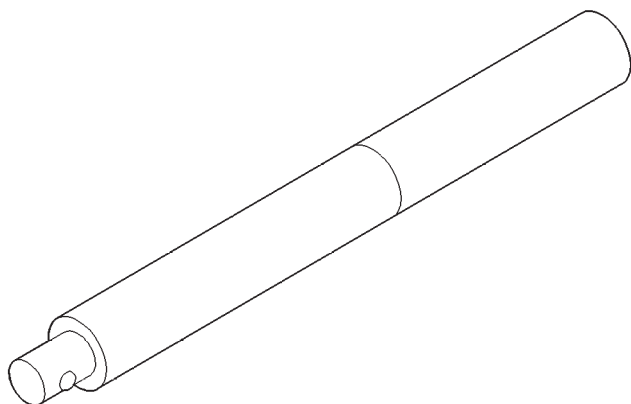
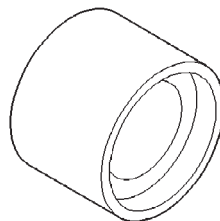
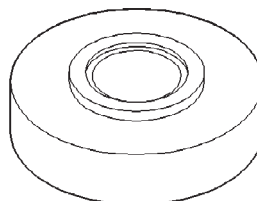
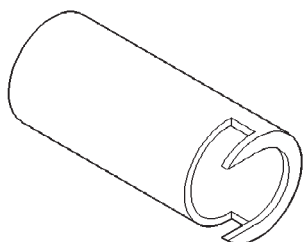
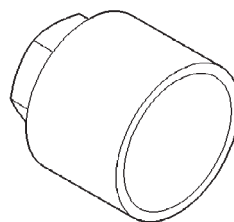
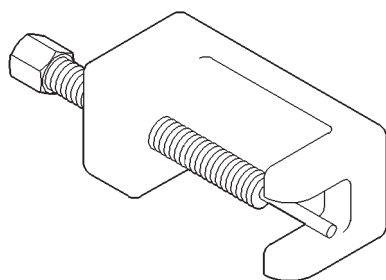
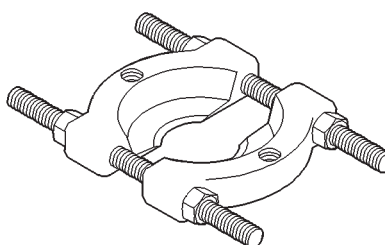
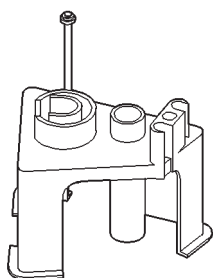
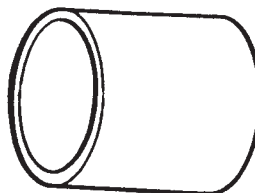


Remover, Bushing—6957

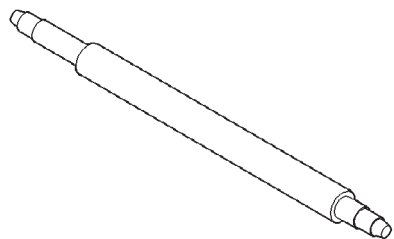


Installer, Bushing—6951

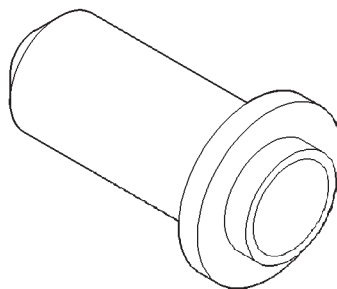
SPECIAL TOOLS (Continued)

**Handle—C-4171****Adapter, Fixture—6747-1A****Adapter, Fixture—6747-2A****Remover—8117****Cup, Fixture—8115****Remover/Installer, NV3500 Shift Rail Roll Pin—6858****Splitter, Bearing—1130****Fixture, NV3500—6747****Tube—6310-1**

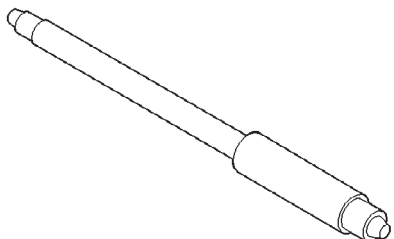
SPECIAL TOOLS (Continued)



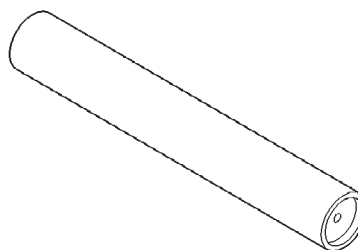
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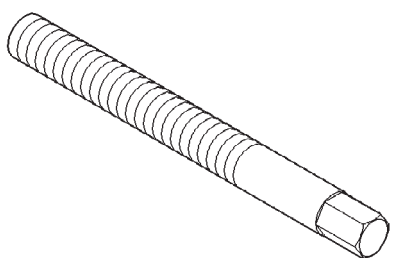
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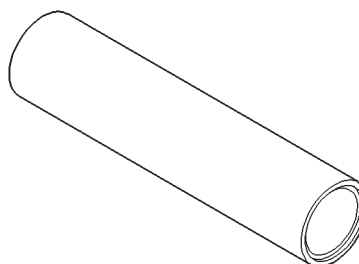
Remover/Installer—8119



Installer—8123



Stud, Alignment—8120



Installer, Bearing Cone—6448

NV4500 MANUAL TRANSMISSION

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GENERAL INFORMATION

NV4500 INTRODUCTION

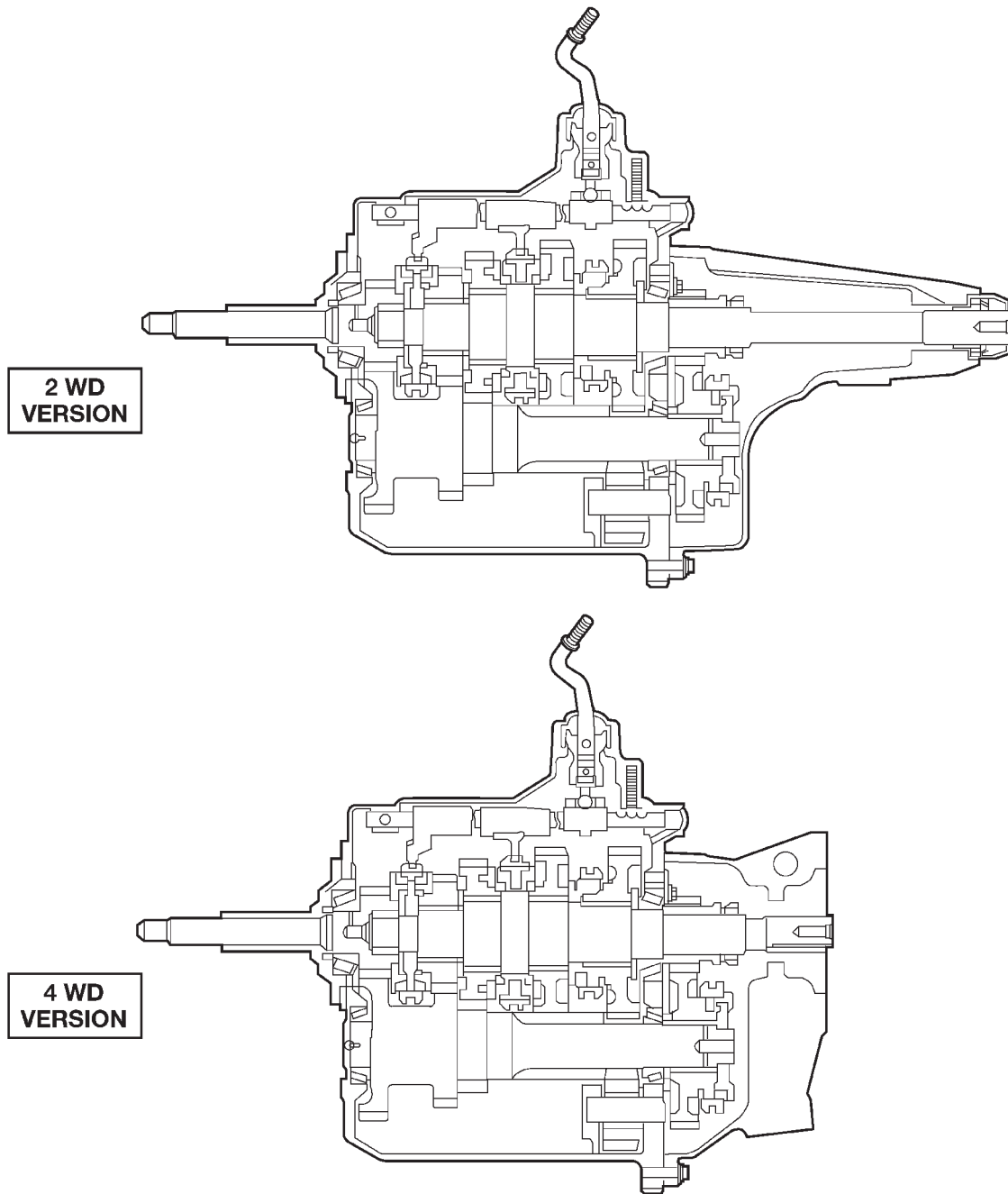
The NV4500 is a five-speed, constant mesh manual transmission (Fig. 1). All gear ranges including reverse are synchronized. Fifth gear is an overdrive range with a ratio of 0.75:1. The transmission has a cast iron gear case and aluminum shift cover.

Two versions of the NV4500 are used. A standard duty version is used for 5.2L and 5.9L applications and a heavy duty version for V10 and Cummins diesel applications. Main differences are the larger diameter input shaft, output shaft, and mainshaft fifth gear in the heavy duty model.

The NV4500 is a top loader style transmission. The shift lever is located in a shifter tower which is bolted to the shift cover and operates the shift forks and rails directly. The shift forks and rails are all located within the aluminum cover which is bolted to the top of the gear case.

Tapered roller bearings support the drive gear, mainshaft and countershaft in the gear case. Pilot roller bearings in the drive gear support the forward end of the mainshaft. The mainshaft gears are all supported on caged type roller bearings. Drive gear thrust reaction is controlled by a needle type thrust bearing. The bearing is located at the forward end of the mainshaft.

GENERAL INFORMATION (Continued)



80b171e7

Fig. 1 NV4500 Manual Transmission

GENERAL INFORMATION (Continued)

TRANSMISSION IDENTIFICATION

The NV4500 transmission identification tag is attached to the driver side PTO cover (Fig. 2).

The tag provides the transmission model number, build date and part number. Be sure to reinstall the I.D. tag if removed during service. The information on the tag is essential to correct parts ordering.

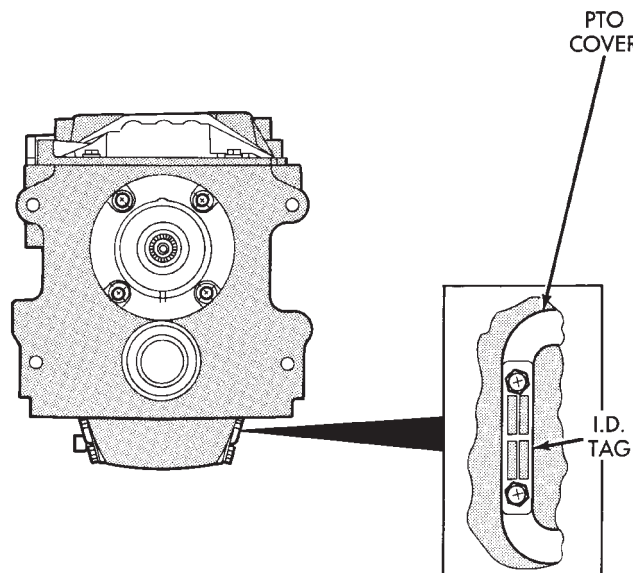


Fig. 2 NV4500 Identification Tag Location J9221-14

LUBRICANT LEVEL AND CAPACITY

Required lubricant for the NV4500 is Mopar Manual Transmission Lubricant, P/N 4637579. This is the only lubricant recommended for use.

Dry fill lubricant capacity is approximately 3.78 liters (8 pints).

Correct lubricant fill level is to the bottom edge of the fill plug hole (Fig. 3). Check fill level only when the transmission is level.

The transmission lubricant is drained through the PTO cover bottom bolt hole (Fig. 3). It will be necessary to apply sealer to the bolt threads before installing it during a lubricant change.

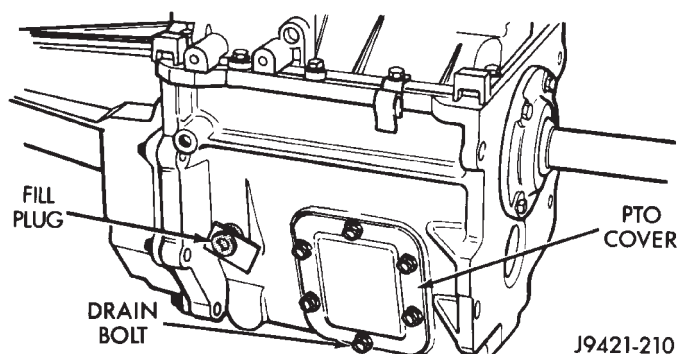


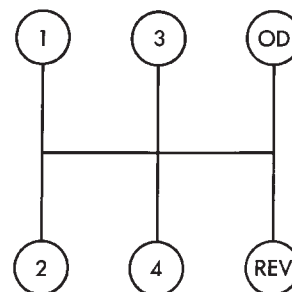
Fig. 3 NV4500 Fill Plug And Drain Bolt J9421-210

GEAR RATIOS

RANGE	RATIO
First gear	5.61:1
Second Gear	3.04:1
Third Gear	1.67:1
Fourth Gear	1.00:1
Fifth Gear	0.75:1
Reverse gear	5.04:1

SHIFT PATTERN

The NV4500 shift pattern is in a modified H pattern (Fig. 4). Overdrive fifth and reverse gears are in line and outboard of the first through fourth gear positions.



J9221-13

Fig. 4 NV4500 Shift Pattern

DIAGNOSIS AND TESTING

COMMON PROBLEM CAUSES

The majority of transmission malfunctions are a result of:

- insufficient lubricant.
- incorrect lubricant.
- misassembled or damaged internal components.
- improper operation.

HARD SHIFTING

A low lubricant level, loose or worn shift lever, or loose, damaged shift housing components are common causes of hard shifting. If hard shifting is also accompanied by gear clash, synchronizer clutch and stop rings, or mainshaft gear teeth may be worn or damaged.

Hard shifting may also be caused by a loose, or misaligned shift cover, or alignment dowels. Worn, or damaged shift cover components will also cause hard shifting. Any of the foregoing faults will cause component bind and high shift efforts.

Misassembled synchro components will also cause shift problems. Incorrectly installed synchro sleeves, struts, or springs will all cause shift problems.

DIAGNOSIS AND TESTING (Continued)

NOISY OPERATION

Transmission noise is most often a result of worn or damaged components. Chipped, broken gear or synchronizer teeth and brinnelled, spalled bearings all cause noise.

Abnormal wear and damage to internal components is frequently the end result of insufficient lubricant, non-recommended lubricants, or improper operation.

SLIPS OUT OF GEAR

Transmission disengagement may be caused by misaligned or damaged shift components, or worn teeth on the mainshaft gears or synchro components. Incorrect assembly will also contribute to gear disengagement.

LOW LUBRICANT LEVEL

Insufficient transmission lubricant is usually the result of leaks, or inaccurate fluid level check or refill method.

Leaks will be evident by the presence of gear oil around the leak point. If leakage is not evident, the condition is probably the result of an under fill condition.

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

CLUTCH PROBLEMS

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

A damaged pilot bearing will cause noise. If bearing damage is severe, drive gear misalignment and hard shifting can also occur.

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

Damaged or worn clutch hydraulic components, or leaks in the fluid lines or cylinders will cause hard shifting and gear clash. Failure of one of the clutch hydraulic cylinders can result in incomplete clutch release or engagement.

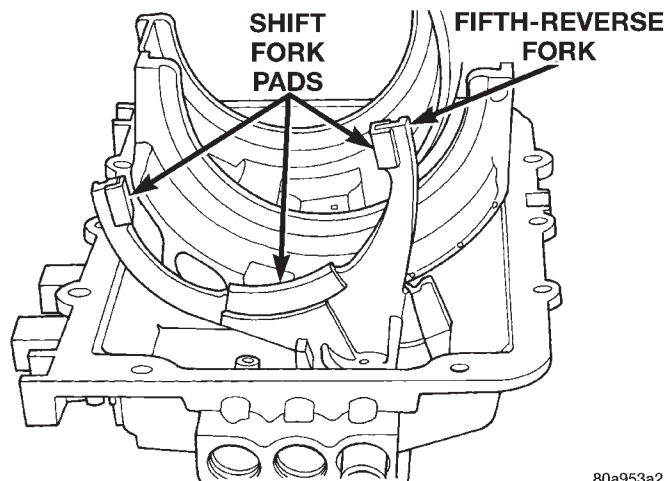
Verify that clutch components are all in good condition before removing the transmission for repair.

SERVICE PROCEDURES**FIFTH-REVERSE SHIFT FORK PADS**

The plastic shift fork pads are held in place by a combination of tension and a small locating tang. Three pads are used on the fork (Fig. 5).

The pads can be removed either by hand or with a narrow blade screwdriver. To remove the pads by hand, grasp each pad and tilt it out and off the fork.

If the pads prove difficult to remove by hand, insert a screwdriver blade between the pad and fork and pry the pad off.

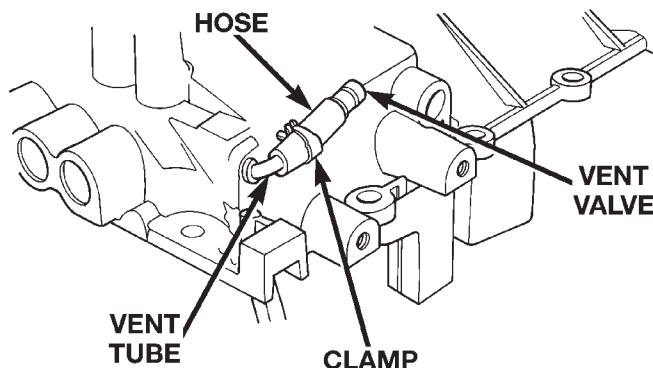


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Fig. 5 Shift Fork Pad Locations

SHIFT COVER VENT

The shift cover vent assembly consists of the vent tube, connecting hose, hose clamps, and vent valve (Fig. 6).



80a953a1

Fig. 6 Shift Cover Vent Components

If the vent tube is removed for replacement or service access, apply Mopar® silicone adhesive/sealer, or equivalent, to the tube to help secure it in the cover. Ensure that the vent is positioned 15–35° from horizontal in order to prevent leaks.

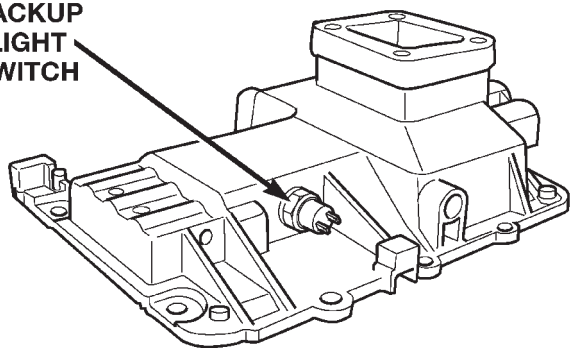
BACKUP LAMP SWITCH REPLACEMENT

The backup light switch is located at the left (driver) side of the cover (Fig. 7). The switch plunger is operated by the fifth-reverse shift rail.

The switch can be replaced with the transmission in, or out of the vehicle. A gasket must be used with the switch.

Apply sealer to the switch threads before installation. Tightening torque for the switch is 22–34 N·m (192–300 in. lbs.).

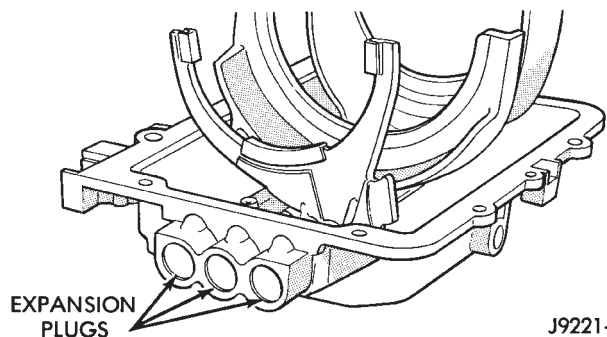
SERVICE PROCEDURES (Continued)

**BACKUP
LIGHT
SWITCH**

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Fig. 7 Backup Light Switch Location**EXPANSION PLUG REPLACEMENT**

The expansion plugs at the rear of the shift rail bores (Fig. 8) can be replaced if loose and/or leaking. Replacement procedure is as follows:



J9221-258

Fig. 8 Expansion Plug Location

- (1) Drill 6 mm (1/4 in.) diameter hole in center of each plug to be removed.
- (2) Pry plug out of cover with tapered punch.
- (3) Clean all chips from shift cover and plug bores. Then clean plug bores with solvent and dry with clean shop towel.
- (4) Apply small bead of sealer to outer edge of each new plug. Use Mopar® silicone adhesive/sealer, or equivalent.
- (5) Position each new plug in bore and tap into place with hammer and suitable size punch or socket.

REMOVAL AND INSTALLATION**TRANSMISSION—2WD****REMOVAL**

- (1) Disconnect battery negative cable.
- (2) Shift transmission into Neutral.
- (3) Remove screws attaching shift boot to floorpan. Then slide boot upward on the shift lever.
- (4) Remove the bolts holding the shift tower to the isolator plate and transmission shift cover.

(5) Remove the shift tower and isolator plate from the transmission shift cover.

(6) Raise and support vehicle.

(7) Mark propeller shaft and axle yokes for alignment reference. Use paint, scribe, or chalk to mark yokes.

(8) Remove universal joint strap screws and remove straps.

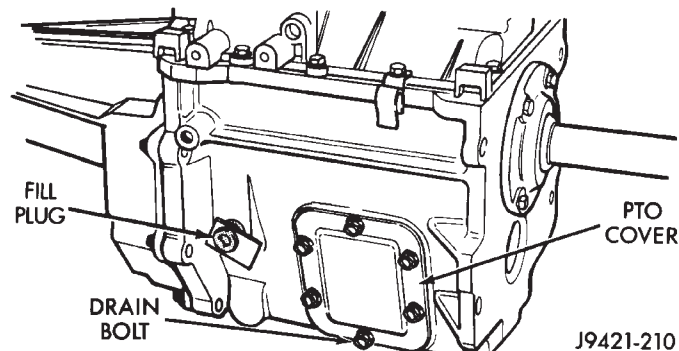
(9) Remove propeller shaft.

(10) Disconnect and remove exhaust system Y-pipe.

(11) Disconnect wires at speed sensor and backup light switch.

(12) Support engine with adjustable safety stand and wood block.

(13) If transmission is to be disassembled for repair, remove drain bolt at bottom of PTO cover and drain lubricant from transmission (Fig. 9).



J9421-210

Fig. 9 NV4500 Drain Bolt

(14) Remove bolts/nuts attaching transmission to rear mount.

(15) Support transmission with a transmission jack. Secure transmission to jack with safety chains.

(16) Remove rear crossmember.

(17) Remove bolts attaching clutch slave cylinder to clutch housing. Then move cylinder aside for working clearance.

(18) Remove transmission harness wires from clips on transmission shift cover.

(19) Remove bolts attaching transmission to clutch housing.

(20) Slide transmission and jack rearward until input shaft clears clutch housing.

(21) Lower transmission jack and remove transmission from under vehicle.

INSTALLATION

(1) Apply light coat of Mopar® high temperature bearing grease to contact surfaces of following components:

- input shaft splines and pilot bearing hub.
- release bearing slide surface of front retainer.
- pilot bearing.
- release bearing bore.
- release fork.

REMOVAL AND INSTALLATION (Continued)

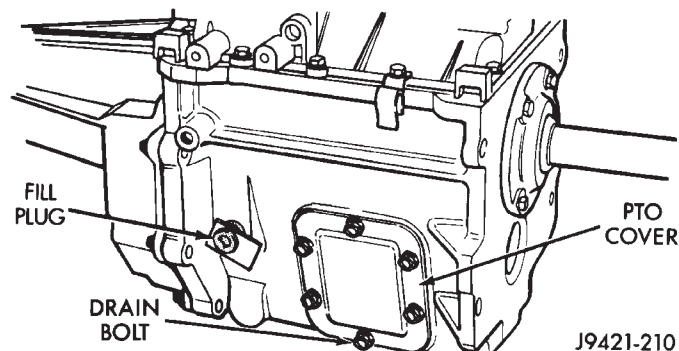
- release fork ball stud.
 - propeller shaft slip yoke.
- (2) Apply sealer to threads of bottom PTO cover bolt and install bolt in case.
 - (3) Mount transmission on jack and position transmission under vehicle.
 - (4) Raise transmission until input shaft is centered in release bearing and clutch disc hub.
 - (5) Move transmission forward and start input shaft in release bearing, clutch disc and pilot bushing.
 - (6) Work transmission forward until seated against clutch housing. Do not allow transmission to remain unsupported after input shaft has entered clutch disc.
 - (7) Install and tighten transmission-to-clutch housing bolts to 108 N·m (80 ft. lbs.) torque.
 - (8) Install clutch slave cylinder.
 - (9) Connect speed sensor and backup light switch wires.
 - (10) Fill transmission with recommended lubricant. Correct fill level is bottom edge of fill plug hole.
 - (11) Position transmission harness wires in clips on shift cover.
 - (12) Install transmission mount on transmission or rear crossmember.
 - (13) Install rear crossmember.
 - (14) Remove transmission jack and engine support fixture.
 - (15) Align and install propeller shaft.
 - (16) Lower vehicle.
 - (17) Clean the mating surfaces of shift tower, isolator plate, and shift cover with suitable wax and grease remover.
 - (18) Apply Mopar® Gasket Maker, or equivalent, to the sealing surface of the shift cover. Do not over apply sealant.
 - (19) Install the isolator plate onto the shift cover, metal side down.
 - (20) Install the shift tower onto the isolator plate. No sealant is necessary between the shift tower and the isolator plate.
 - (21) Verify that the shift tower, isolator plate, and the shift tower bushings are properly aligned.
 - (22) Install the bolts to hold the shift tower to the isolator plate and the shift cover. Tighten the shift tower bolts to 10.2–11.25 N·m (7.5–8.3 ft. lbs.).
 - (23) Install shift boot and bezel.
 - (24) Connect battery negative cable.

TRANSMISSION—4WD

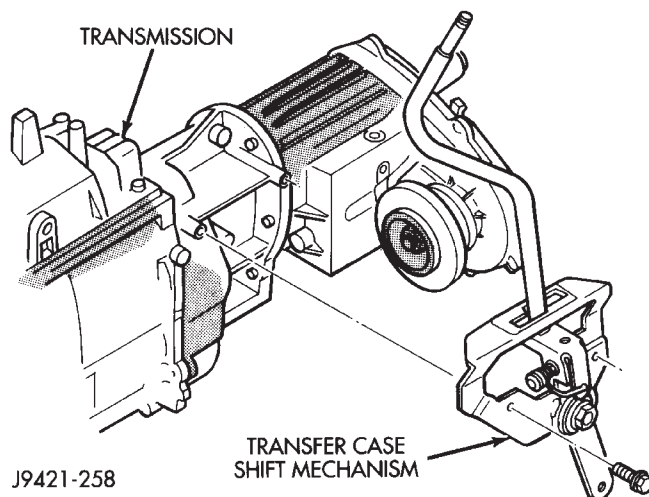
REMOVAL

- (1) Disconnect battery negative cable.
- (2) Shift transmission into Neutral.
- (3) Remove screws attaching shift boot to floorpan. Then slide boot upward on the shift lever.

- (4) Remove the bolts holding the shift tower to the isolator plate and transmission shift cover.
- (5) Remove the shift tower and isolator plate from the transmission shift cover.
- (6) Raise and support vehicle.
- (7) Remove skid plate, if equipped.
- (8) If transmission will be disassembled for repair, remove drain bolt at bottom of PTO cover and drain lubricant from transmission (Fig. 10).

**Fig. 10 NV4500 Drain Bolt**

- (9) Mark propeller shafts and yokes for assembly reference.
- (10) Disconnect propeller shafts and remove propeller shafts.
- (11) Disconnect and remove exhaust system Y-pipe. Then disconnect and lower remaining exhaust pipes for clearance as necessary.
- (12) Support engine with adjustable safety stand.
- (13) Disconnect speed sensor wires.
- (14) Disconnect backup lamp switch wires.
- (15) Disconnect transfer case shift linkage at transfer case range lever. Then remove transfer case shift mechanism from transmission (Fig. 11).

**Fig. 11 Transfer Case Shift Mechanism—Typical**

- (16) Support transfer case with transmission jack. Secure transfer case to jack with safety chains.

REMOVAL AND INSTALLATION (Continued)

- (17) Remove transfer case attaching nuts.
- (18) Move transfer case rearward until input gear clears transmission mainshaft.
- (19) Lower transfer case assembly and move it from under vehicle.
- (20) Support transmission with transmission jack. Secure transmission to jack with safety chains.
- (21) Remove transmission harness from retaining clips on transmission shift cover.
- (22) Remove bolts/nuts attaching transmission mount to rear crossmember.
- (23) Remove rear crossmember.
- (24) Remove clutch slave cylinder splash shield, if equipped.
- (25) Loosen clutch slave cylinder attaching nuts until cylinder piston rod is clear of release lever. This reduces pressure on lever and release bearing making transmission removal/installation easier. Cylinder does not have to be removed completely.
- (26) Remove bolts attaching transmission to clutch housing.
- (27) Move transmission rearward until input shaft clears clutch disc and release bearing.
- (28) Lower transmission and remove it from under vehicle.

INSTALLATION

(1) Apply light coat of Mopar® high temperature bearing grease to contact surfaces of following components:

- input shaft splines and pilot bearing hub.
- release bearing slide surface of front retainer.
- pilot bearing.
- release bearing bore.
- release fork.
- release fork ball stud.
- propeller shaft slip yoke.

(2) Apply sealer to threads of PTO cover bottom drain bolt then install bolt in case.

(3) Mount transmission on jack and position transmission under vehicle. Secure transmission to jack with safety chains.

(4) Raise transmission until input shaft is centered in release bearing and clutch disc hub.

(5) Move transmission forward and start input shaft in release bearing, clutch disc, and pilot bearing.

(6) Work transmission forward until seated against clutch housing. Do not allow transmission to remain unsupported after input shaft has entered clutch disc.

(7) Install and tighten transmission-to-clutch housing bolts to 108 N·m (80 ft. lbs.) torque.

(8) Install transmission mount on transmission or rear crossmember.

(9) Install rear crossmember.

(10) Remove transmission jack and engine support fixture.

(11) Position transmission harness wires in clips on shift cover.

(12) Tighten slave cylinder attaching nuts and install slave cylinder shield, if equipped.

(13) Install transfer case shift mechanism on transmission (Fig. 11).

(14) Install transfer case on transmission jack. Secure transfer case to jack with safety chains.

(15) Raise jack and align transfer case input gear with transmission mainshaft.

(16) Move transfer case forward and seat it on adapter.

(17) Install and tighten transfer case attaching nuts. Tighten nuts to 41-47 N·m (30-35 ft. lbs.) if case has 3/8 studs, or 30-41 N·m (22-30 ft. lbs.) if case has 5/16 studs.

(18) Connect speed sensor and backup lamp switch wires.

(19) Install transfer case shift mechanism to side of transfer case.

(20) Connect transfer case shift lever to range lever on transfer case.

(21) Align and connect propeller shafts. Tighten universal joint clamp strap bolts to 19 N·m (170 in. lbs.) torque.

(22) Fill transmission with required lubricant. Check lubricant level in transfer case and add lubricant if necessary.

(23) Install transfer case skid plate, if equipped, and crossmember. Tighten attaching bolts/nuts to 41 N·m (30 ft. lbs.) torque.

(24) Install exhaust system components.

(25) Lower vehicle.

(26) Clean the mating surfaces of shift tower, isolator plate, and shift cover with suitable wax and grease remover.

(27) Apply Mopar® Gasket Maker, or equivalent, to the sealing surface of the shift cover. Do not over apply sealant.

(28) Install the isolator plate onto the shift cover, metal side down.

(29) Install the shift tower onto the isolator plate. No sealant is necessary between the shift tower and the isolator plate.

(30) Verify that the shift tower, isolator plate, and the shift tower bushings are properly aligned.

(31) Install the bolts to hold the shift tower to the isolator plate and the shift cover. Tighten the shift tower bolts to 10.2-11.25 N·m (7.5-8.3 ft. lbs.).

(32) Install shift lever boot and bezel.

(33) Connect battery negative cable.

REMOVAL AND INSTALLATION (Continued)

SHIFT TOWER

REMOVAL

- (1) Shift transmission into Neutral.
- (2) Unscrew and remove the shift lever extension from the shift
- (3) Remove screws attaching shift boot to floorpan. Then slide boot upward on the shift lever.
- (4) Remove the bolts holding the shift tower to the isolator plate and transmission shift cover.
- (5) Remove the shift tower and isolator plate from the transmission shift cover.

INSTALLATION

- (1) Clean the mating surfaces of shift tower, isolator plate, and shift cover with suitable wax and grease remover.
- (2) Apply Mopar® Gasket Maker, or equivalent, to the sealing surface of the shift cover. Do not over apply sealant.
- (3) Install the isolator plate onto the shift cover, metal side down.
- (4) Install the shift tower onto the isolator plate. No sealant is necessary between the shift tower and the isolator plate.
- (5) Verify that the shift tower, isolator plate, and the shift tower bushings are properly aligned.
- (6) Install the bolts to hold the shift tower to the isolator plate and the shift cover. Tighten the shift tower bolts to 10.2–11.25 N·m (7.5–8.3 ft. lbs.).
- (7) Install the shift lever extension, shift boot, and bezel.

SHIFT COVER

REMOVAL

- (1) Remove transmission from vehicle.
- (2) Remove shift cover bolts (Fig. 12).
- (3) Loosen shift cover with pry tool. To avoid damaging cover seal surface, insert pry tool only in slots provided in cover (Fig. 13).
- (4) Raise cover enough to disengage it from alignment dowels in gear case (Fig. 14).
- (5) Raise front of shift cover and lift cover up and off gear case (Fig. 14).

INSTALLATION

- (1) Clean mating surfaces of shift cover and gear case with wax and grease remover.
- (2) Apply Mopar® Gasket Maker, or equivalent, to sealing surface of shift cover or gear case. Do not over-apply sealer material. Excess can be squeezed into gear case and could block lubricant feed holes in time.
- (3) Lubricate synchro sleeves with Castrol Syntorq gear lubricant. Then apply light coat of petroleum jelly to shift fork contact surfaces.

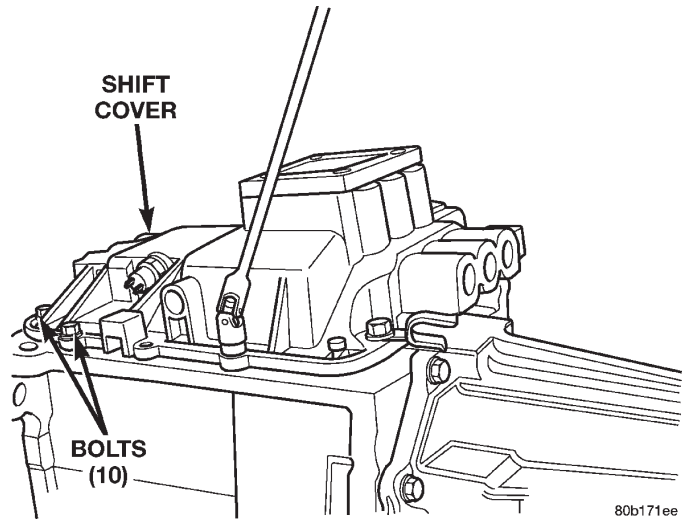


Fig. 12 Shift Cover Bolts

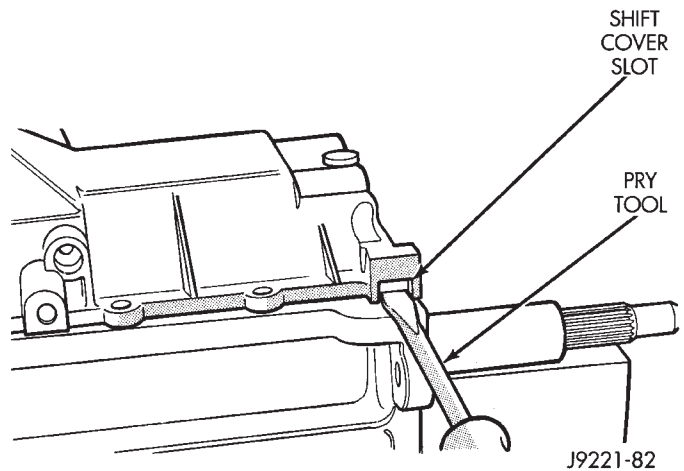
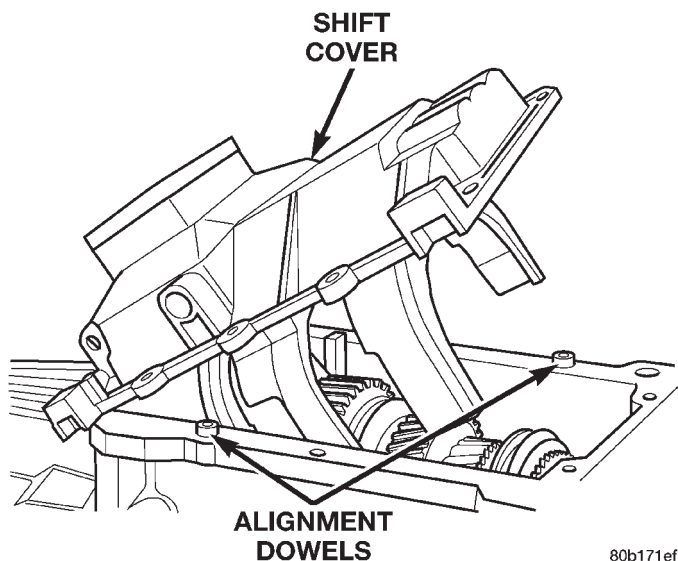


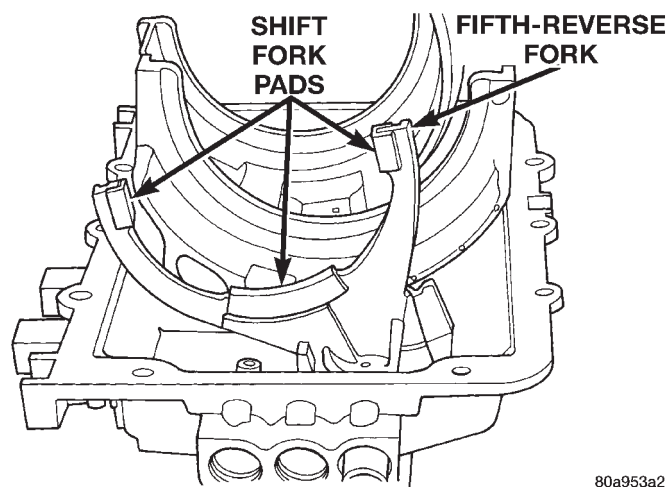
Fig. 13 Loosening Shift Cover

- (4) Verify that the shift fork pads (Fig. 15) are properly and securely positioned on the fifth-reverse fork
- (5) Verify that 1–2 and 3–4 synchro sleeves are in neutral position. Also verify that forks in shift cover are in neutral position.
- (6) Align and install shift cover (Fig. 14). If cover will not seat, it is either not aligned on gear case dowels, or shift forks are not aligned with sleeves and shift lug.
- (7) Apply Mopar® Lock N' Seal, or equivalent, to threads of shift cover bolts.
- (8) Install and tighten shift cover bolts to 27–31 N·m (216–276 in. lbs.) torque.
- (9) Install backup lamp switch and gasket in cover. Apply sealer to switch threads before installation and tighten switch to 22–34 N·m (193–265 in. lbs.).
- (10) Install vent assembly, if removed. Apply an adhesive/sealer to vent tube to help secure it in cover.

REMOVAL AND INSTALLATION (Continued)



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Fig. 14 Shift Cover

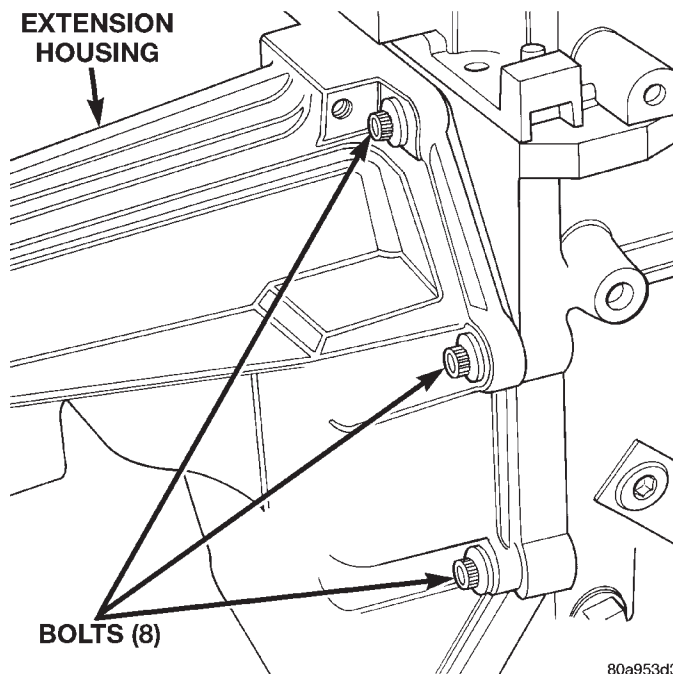
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Fig. 15 Fifth-Reverse Shift Fork Pads

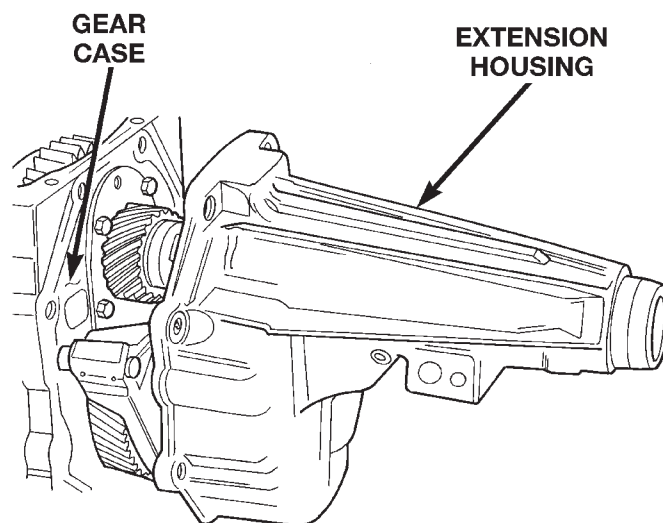
(11) Install transmission.

EXTENSION/ADAPTER HOUSING**REMOVAL**

- (1) Raise and support vehicle.
- (2) Remove rear propeller shaft.
- (3) Support transmission with suitable transmission jack.
- (4) Remove engine rear support. Refer to Group 9, Engine, for proper procedures.
- (5) Remove transfer case, if equipped.
- (6) Remove bolts attaching extension/adapter housing to gear case (Fig. 16).
- (7) Remove extension/adapter housing (Fig. 17). There is one alignment dowel in the gear case and one in the extension/adapter housing.
- (8) Remove rubber spline seal from end of mainshaft (Fig. 18). The seal can be reused or discarded



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Fig. 16 Extension/Adapter Housing Bolts

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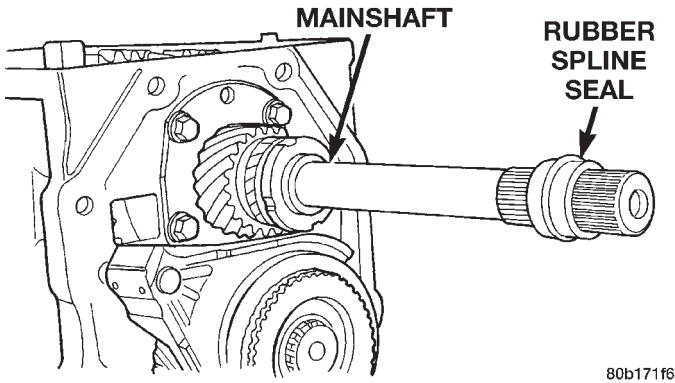
Fig. 17 Extension/Adapter Housing

as desired. The seal is not an essential part and can be reused or discarded as desired. The seal is mainly used to prevent lubricant loss during shipping and does not have to be replaced if damaged.

INSTALLATION

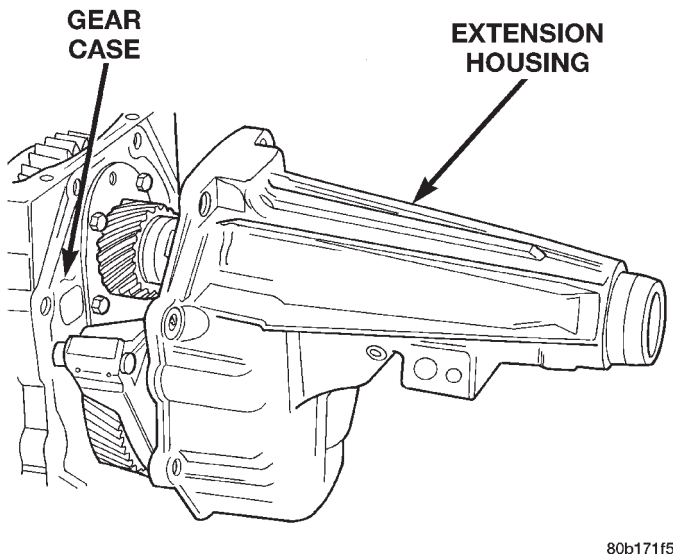
- (1) Clean mating surfaces of extension/adapter housing and gear case with a wax and grease remover.
- (2) Check alignment dowels in gear case and housing or adapter. Be sure dowels are in position and seated.

REMOVAL AND INSTALLATION (Continued)

**Fig. 18 Mainshaft Spline Seal**

(3) Apply Mopar® Gasket Maker to gear case and housing mating surfaces.

(4) Align and install extension/adapter housing on gear case (Fig. 19).

**Fig. 19 Installing Extension/Adapter Housing**

(5) Apply Mopar® Lock N' Seal, or equivalent, to threads of extension/adapter housing bolts.

(6) Install and tighten housing bolts to 54 N·m (40 ft. lbs.) torque.

(7) Install transfer case, if equipped.

(8) Install engine rear support. Refer to Group 9, Engine, for proper procedures.

(9) Install propeller shaft(s).

(10) Remove transmission support stand and lower vehicle.

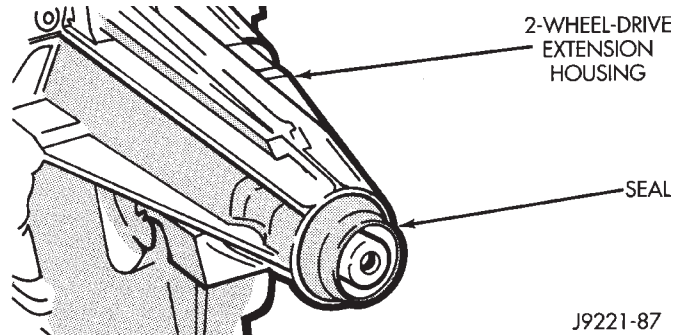
EXTENSION/ADAPTER HOUSING SEAL AND BUSHING**REMOVAL**

(1) On 4X2 vehicles, remove the propeller shaft.

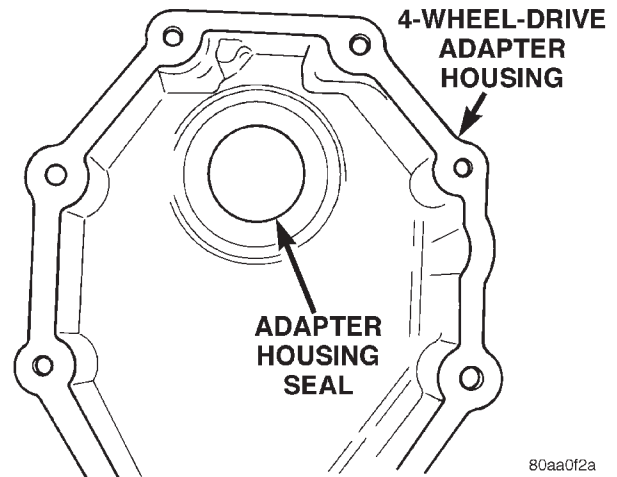
(2) On 4X4 vehicles, remove the transfer case.

(3) On light duty 4X2 vehicles, remove extension housing seal (Fig. 20) using Remover C-3985-B.

(4) On heavy duty 4X2 vehicles, remove extension housing seal with a suitable pry tool or a slide hammer mounted screw.

**Fig. 20 Extension Housing And Seal (2-Wheel Drive Models)**

(5) On 4X4 vehicles, use a suitable pry tool, or a slide hammer mounted screw, to remove the adapter housing seal (Fig. 21).

**Fig. 21 Adapter Housing (4-Wheel Drive Models)**

(6) On light duty transmissions, remove the extension housing bushing with Remover 6957.

(7) On heavy duty transmissions, remove the extension housing bushing with Remover 8155.

INSTALLATION

(1) On light duty transmissions, install the extension housing bushing with Installer 6951 and Handle C-4171 (Fig. 22).

(2) On heavy duty transmissions, install the extension housing bushing with Installer 8156 and Handle C-4171.

(3) On light duty 4X2 transmissions, install the extension housing seal with Installer C-3972-A and Handle C-4171 (Fig. 23).

REMOVAL AND INSTALLATION (Continued)

(4) On heavy duty 4X2 transmissions, install the extension housing seal with Installer 8154 and Handle C-4171.

(5) On 4X4 transmissions, install the adapter housing seal with Installer C-3860-A and Handle C-4171.

(6) Install transfer case, if necessary, and propeller shaft(s).

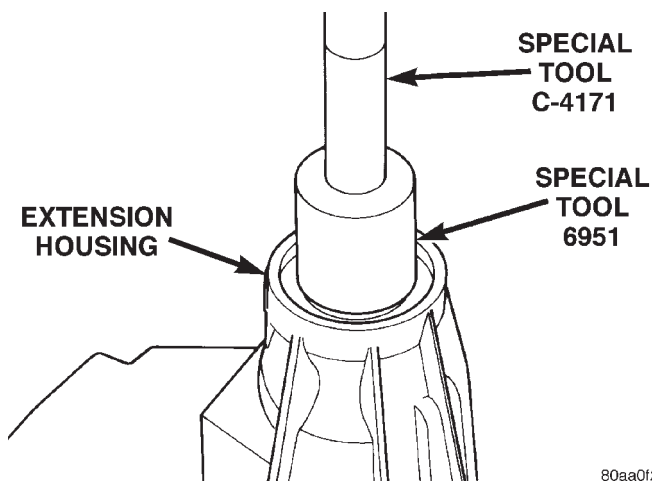


Fig. 22 Install Extension Housing Bushing

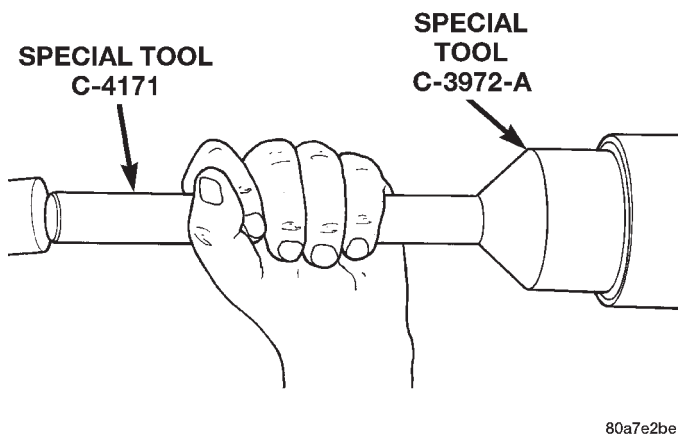


Fig. 23 Install Extension Housing Seal

DISASSEMBLY AND ASSEMBLY

TRANSMISSION

DISASSEMBLY

FIFTH GEAR REMOVAL

(1) Remove mainshaft fifth gear nut as follows:

(a) Install nut wrench on fifth gear nut (Fig. 24). Use Nut Wrench 6443 on standard duty models and Wrench 6743 on heavy duty models.

(b) Note that wrench only fits one way on nut. Be sure wrench is fully engaged in nut slots and is not cocked.

(c) There are four splined sockets available to retain the mainshaft while removing the fifth gear nut.

- Socket 6441 fits light duty 4X2 mainshafts.
- Socket 6442 fits light duty 4X4 mainshafts.
- Socket 6993 fits heavy duty 4X2 mainshafts.
- Socket 6984 fits heavy duty 4X4 mainshafts.

(d) Install breaker bar in appropriate socket wrench (Fig. 25).

(e) Wedge breaker bar handle against workbench. Purpose of socket wrench and breaker bar is to prevent mainshaft from turning while nut is loosened.

(f) Position small end of Nut Wrench 6443 at approximately 10 o'clock position (Fig. 24).

(g) Strike small end of nut wrench with heavy copper hammer to break nut loose. Nut is secured by interference fit thread plus Loctite adhesive and will require several firm blows to loosen it (nut torque is in 300 ft. lb. range).

(h) Once nut is loose, it can be removed by holding nut wrench with breaker bar and rotating output shaft with socket wrench and ratchet.

(i) Remove and discard fifth gear nut (Fig. 26).

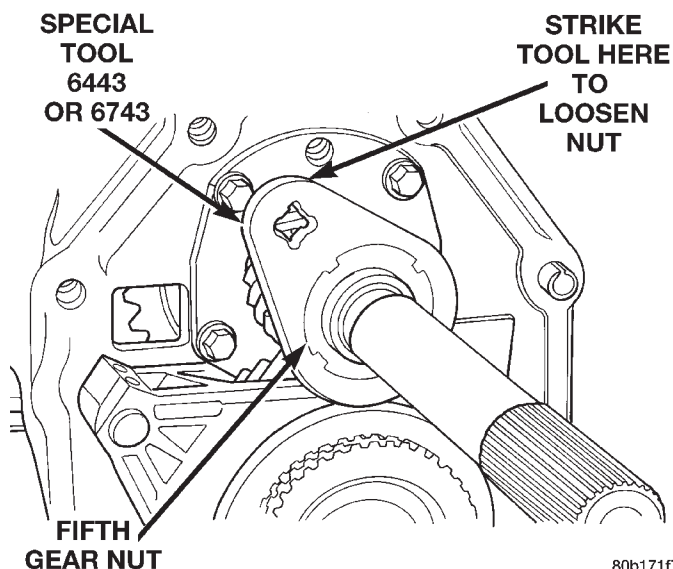


Fig. 24 Installing Nut Wrench On Mainshaft Fifth Gear

DISASSEMBLY AND ASSEMBLY (Continued)

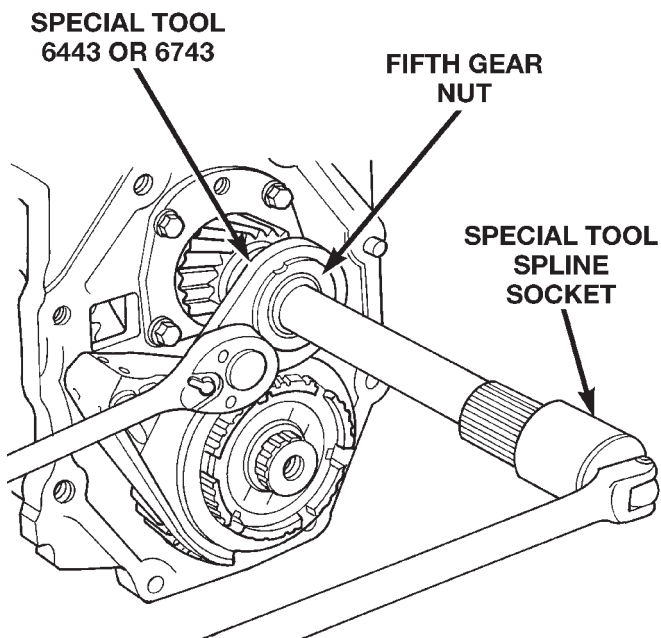


Fig. 25 Remove Mainshaft Fifth Gear Nut

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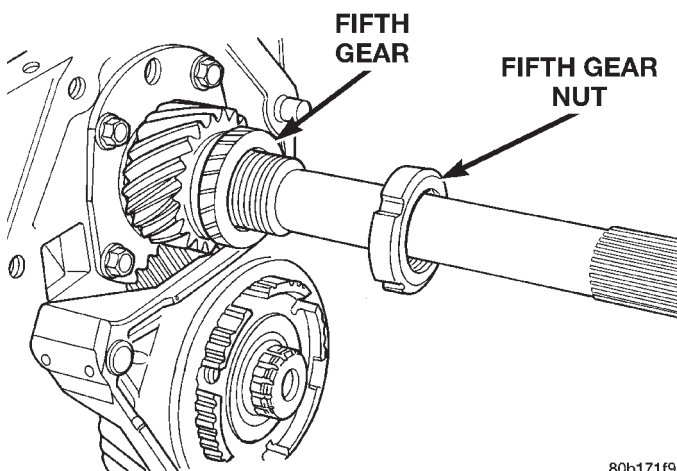


Fig. 26 Mainshaft Fifth Gear Nut Removal

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(2) Remove roll pins that secure countershaft fifth gear shift fork to shift rail with pin punch (Fig. 27). Roll pins are driven out from bottom of fork and not from top.

(3) Remove snap ring that secures fifth gear clutch hub and gear on countershaft (Fig. 28).

(4) Remove fifth gear shift fork and gear assembly. Remove assembly by tapping fork off rail with plastic mallet.

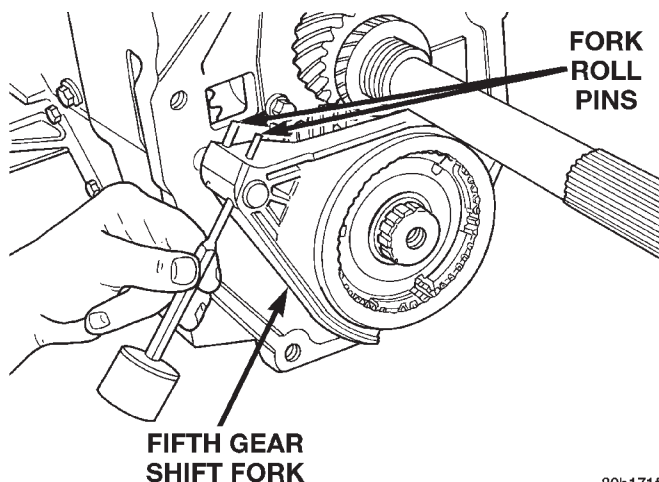
(5) Remove countershaft fifth gear clutch gear and stop ring.

(6) Remove fifth gear shift fork from sleeve.

(7) Remove sleeve, struts, and strut springs from countershaft fifth gear hub, if necessary.

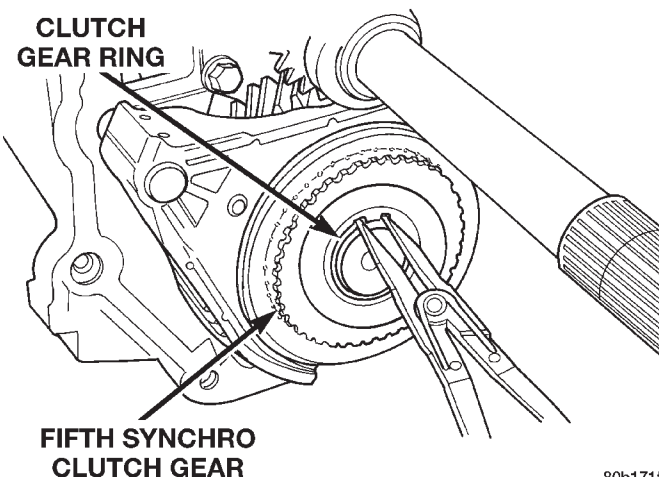
(8) Remove countershaft fifth gear needle bearing assembly (Fig. 29).

(9) Remove cone shaped rear bearing thrust washer from end of countershaft (Fig. 30). Note posi-



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Fig. 27 Removing Fifth Gear Shift Fork Roll Pins

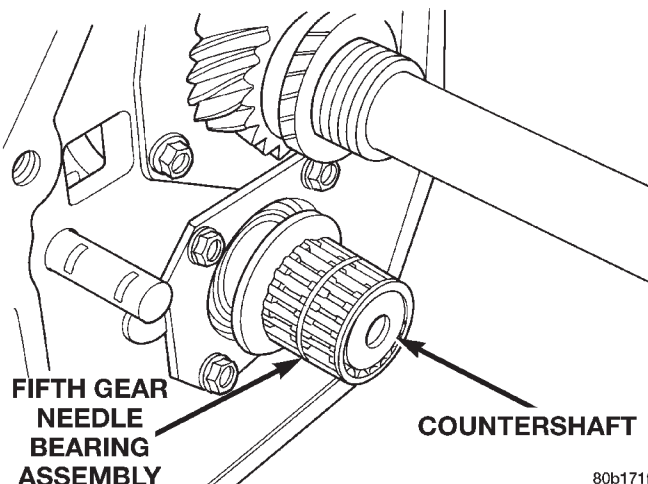


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Fig. 28 Removing Countershaft Fifth Gear Clutch Gear Snap Ring

tion of washer for assembly reference. Also note that washer bore has notch for locating pin.

(10) Remove and retain thrust washer locating pin from countershaft.



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Fig. 29 Countershaft Fifth Gear Needle Bearing Removal

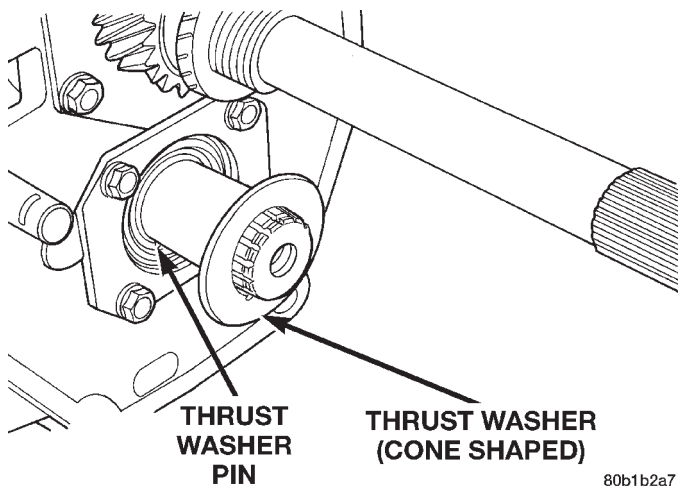


Fig. 30 Countershaft Rear Bearing Thrust Washer Removal

(11) Remove mainshaft overdrive fifth gear with Puller Tool Set 6444. Note that puller set can be used on both standard and heavy duty transmissions.

(12) Gear removal procedure is as follows:

(a) Position first puller jaw on gear (Fig. 31). Use Puller Jaws 6459 on standard duty models and Puller Jaws 6820 on heavy duty models.

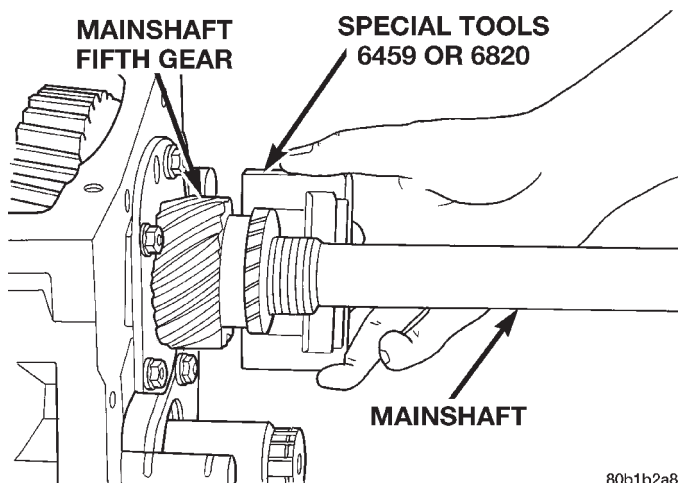


Fig. 31 Installing First Puller Jaw On Mainshaft Fifth (Overdrive) Gear

(b) Assemble Puller Flange 6444-1 and Puller Rods 6444-3 for 4X2 vehicles, or 6444-4 for 4X4 vehicles, (Fig. 32).

(c) Slide assembled puller flange and rods onto output shaft. Then seat flange in notch of puller jaw (Fig. 32).

(d) Position second puller jaw (6459 or 6820) on gear and in notch of puller flange (Fig. 33).

(e) Slide Retaining Collar 6444-8 over puller jaws to hold them in place (Fig. 33).

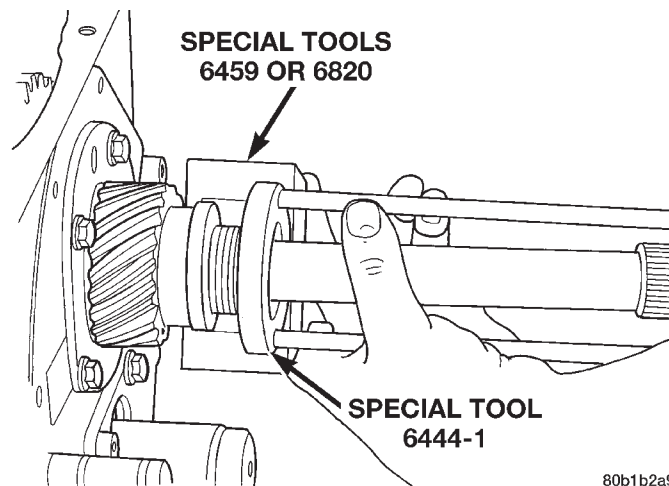


Fig. 32 Seating Puller Flange In First Puller Jaw

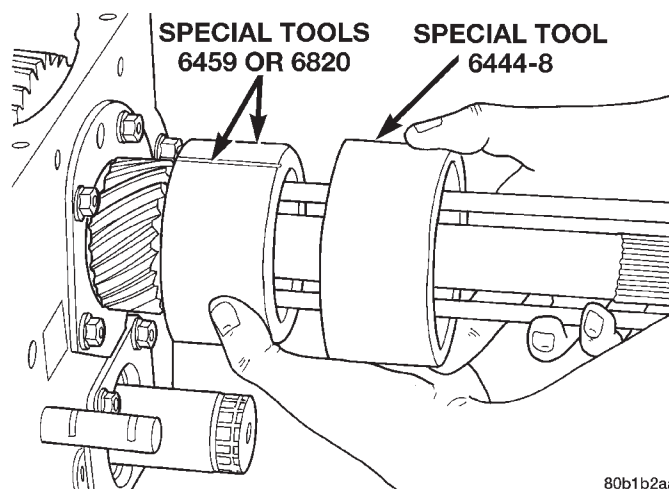


Fig. 33 Installing Retaining Collar Over Puller Jaws

(f) Install Puller and Bolt 6444 on puller rods. Then secure puller to rods with retaining nuts (Fig. 34).

(g) Tighten puller bolt to remove gear from shaft splines (Fig. 34).

(13) Remove bolts attaching mainshaft rear bearing plate to gear case and remove fifth gear plate end play shims and bearing cup (Fig. 35).

FRONT RETAINER REMOVAL

(1) Remove front retainer bolts (Fig. 36). Discard retainer bolts. They should not be reused.

(2) Remove front retainer by lightly tapping it back and forth with plastic mallet to loosen it. Then rock retainer back and forth by hand to work it out of gear case. Note that retainer flange extends into the transmission case and is a snug fit into case bore.

(3) Remove seal from front retainer (Fig. 37). Use small chisel to collapse one side of seal then pry it out with suitable tool.

(4) Remove bearing cup from front retainer as follows:

DISASSEMBLY AND ASSEMBLY (Continued)

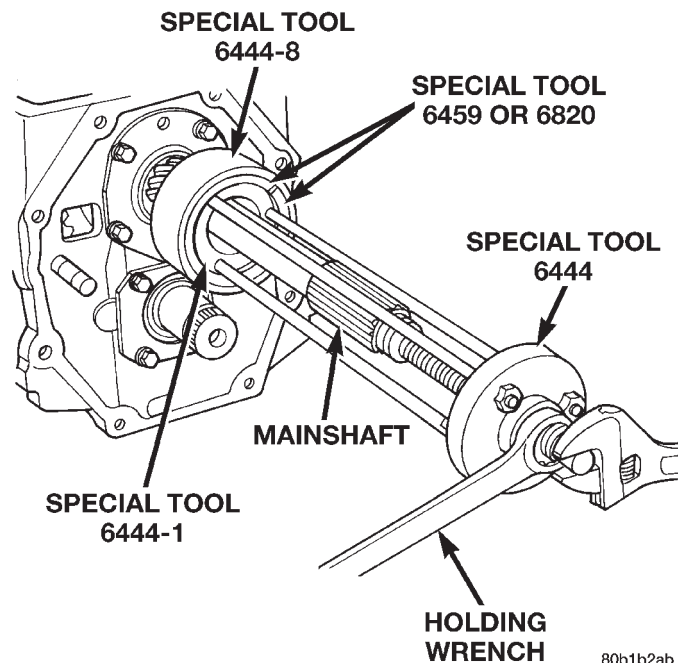


Fig. 34 Removing Fifth Gear From Mainshaft Splines

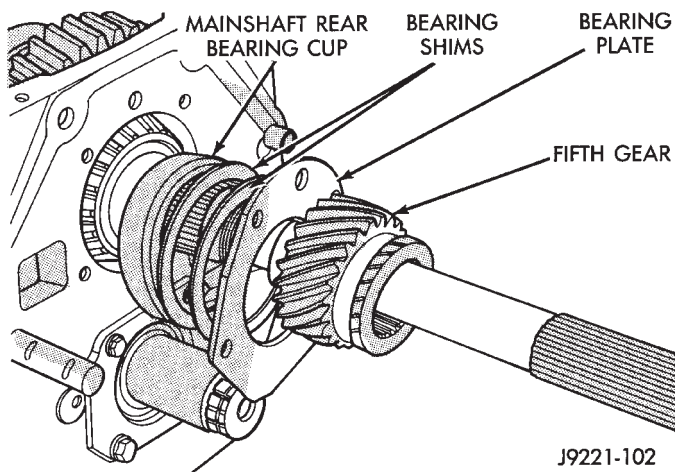


Fig. 35 Removing Mainshaft Fifth Gear Bearing Plate, Bearing Shims, And Rear Bearing Cup

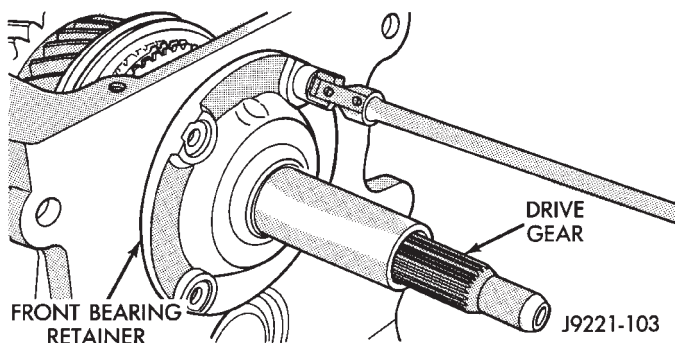


Fig. 36 Removing Front Bearing Retainer Bolts

(a) Assemble Puller Flange 6444-1 and Puller Rods 6444-4 (Fig. 38).

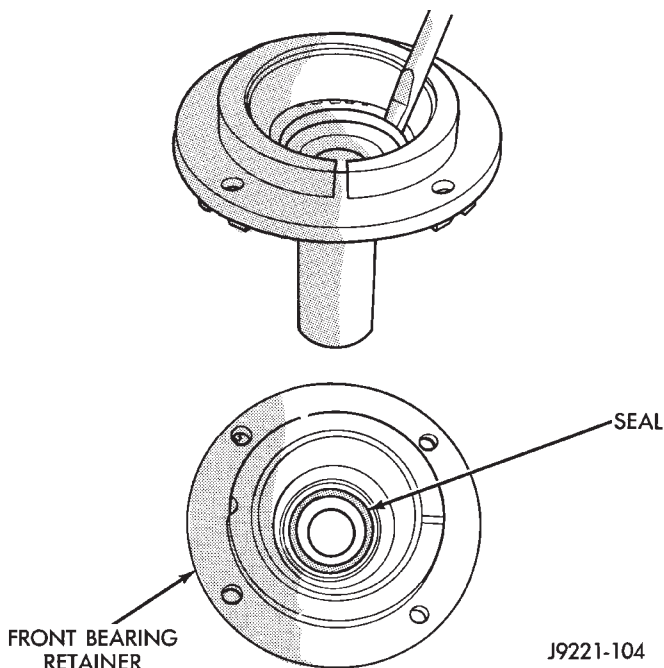


Fig. 37 Removing Bearing Retainer Seal

(b) Insert Puller Jaws 6453-1 in puller flange (Fig. 38). Narrow lip of puller jaws will go under bearing cup.

(c) Install Disc C-4487-1 into bearing retainer on heavy duty transmissions for Insert 6453-2 to rest upon.

(d) Install assembled tools in front retainer (Fig. 39). Be sure puller jaws are seated under bearing cup.

(e) Place Insert Tool 6453-2 in center of puller jaws (Fig. 39). Insert tool is used to hold puller jaws in place.

(f) Install Puller 6444 on puller rods (Fig. 40). Then install retaining nuts on puller rods.

(g) Tighten puller bolt to draw bearing cup out of retainer (Fig. 40).

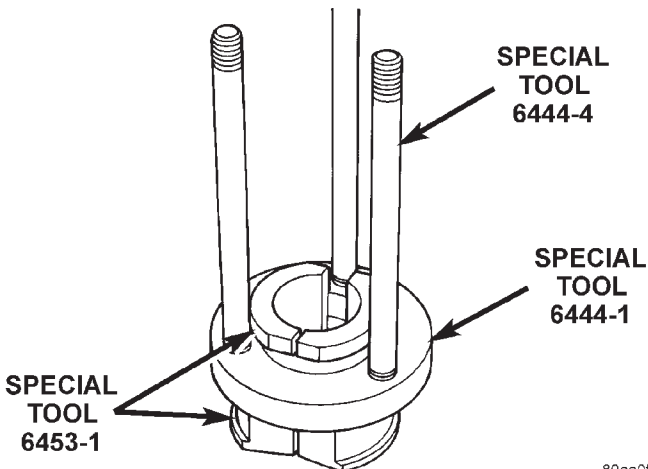


Fig. 38 Assembling Puller Rods, Flange And Jaws

DISASSEMBLY AND ASSEMBLY (Continued)

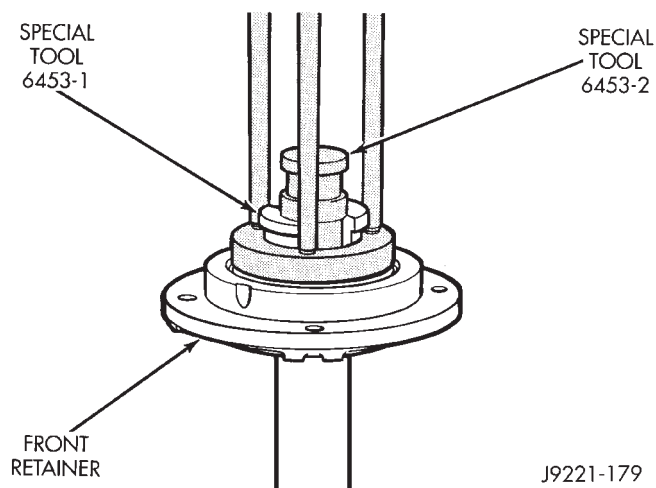


Fig. 39 Installing Puller Tools In Front Retainer

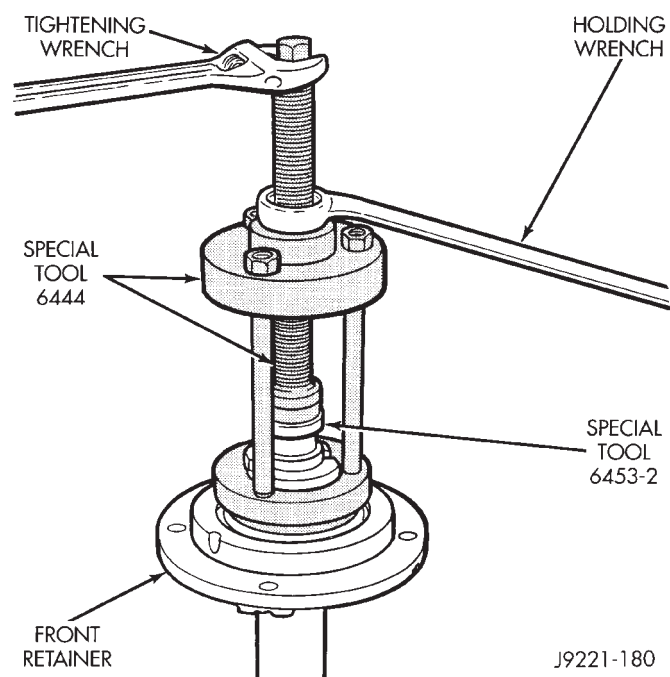


Fig. 40 Removing Bearing Cup From Front Retainer

DRIVE GEAR REMOVAL

- (1) Remove drive gear (Fig. 41).
- (2) Remove pilot bearing from drive gear (Fig. 42).
- (3) Remove tapered bearing from drive gear as follows:

(a) Assemble Puller Flange 6444-1 and Puller Rods 6444-6. Then position first Puller Jaw 6447 on bearing (Fig. 43).

(b) Slide assembled puller flange and rod tools onto input shaft. Then seat flange in notch of puller jaw (Fig. 43).

(c) Position second Puller Jaw 6447 on gear and in notch of puller flange (Fig. 43).

(d) Slide Retaining Collar 6444-8 over puller jaws to hold them in place (Fig. 43).

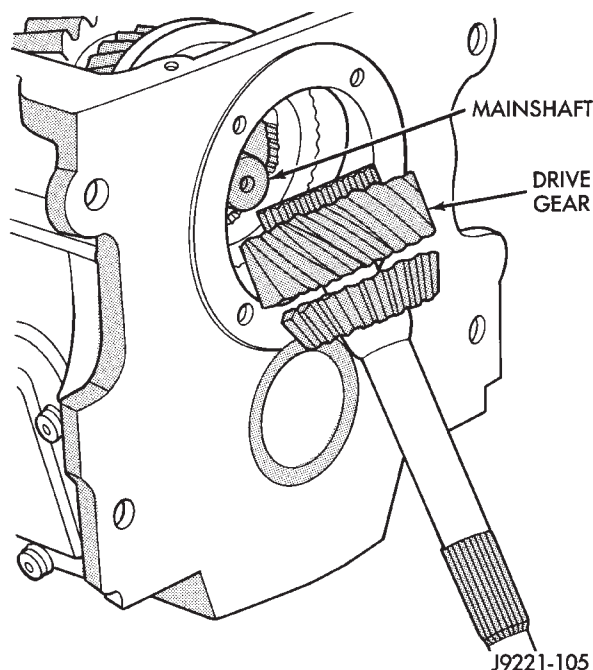


Fig. 41 Drive Gear Removal

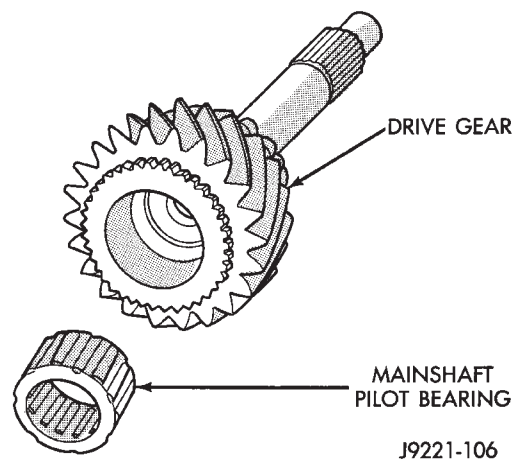


Fig. 42 Pilot Bearing Removal/Installation

(e) Install Puller 6444 on puller rods. Then secure puller to rods with retaining nuts (Fig. 43).

(f) Tighten puller bolt to remove bearing cone from drive gear (Fig. 43).

MAINSHAFT AND GEARTRAIN REMOVAL

(1) Move 1-2 and 3-4 synchro sleeves into Neutral, if necessary.

(2) Remove drive gear thrust bearing from forward end of mainshaft (Fig. 44).

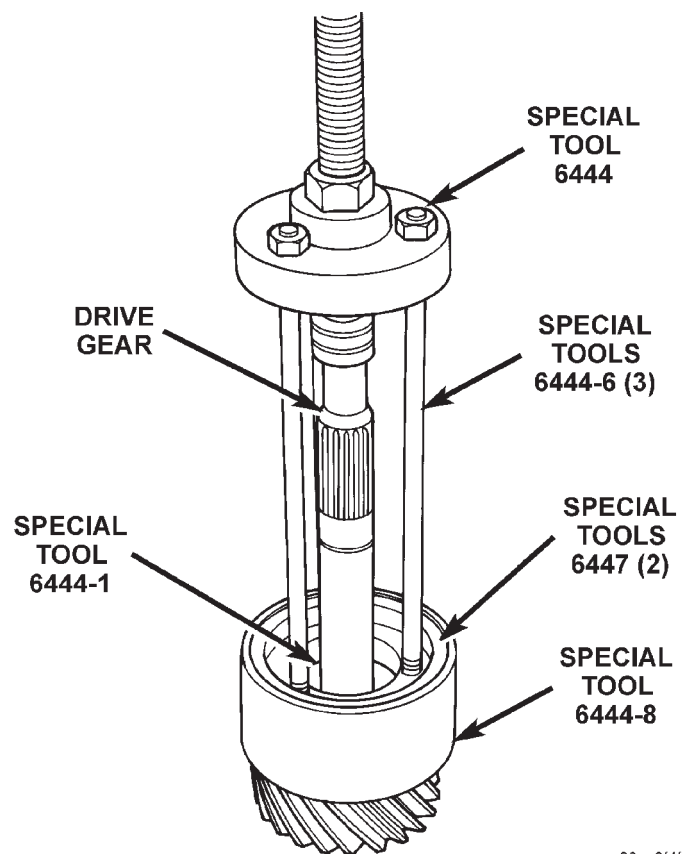
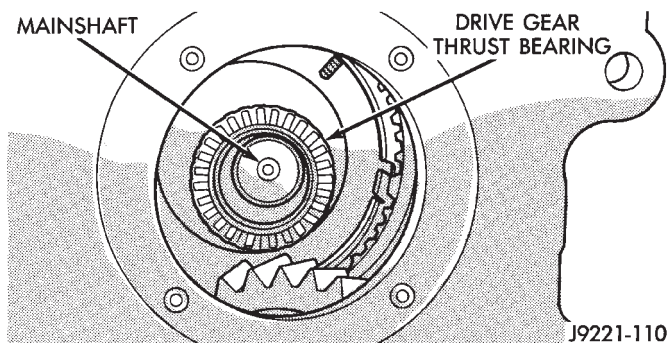
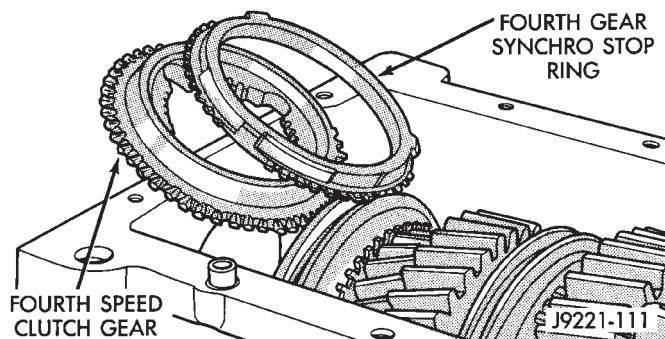
(3) Remove fourth gear clutch gear and synchro stop ring from mainshaft (Fig. 45).

(4) Roll gear case onto left side (Fig. 46).

(5) Remove rear mainshaft rear bearing.

(6) Remove mainshaft assembly as follows (Fig. 46):

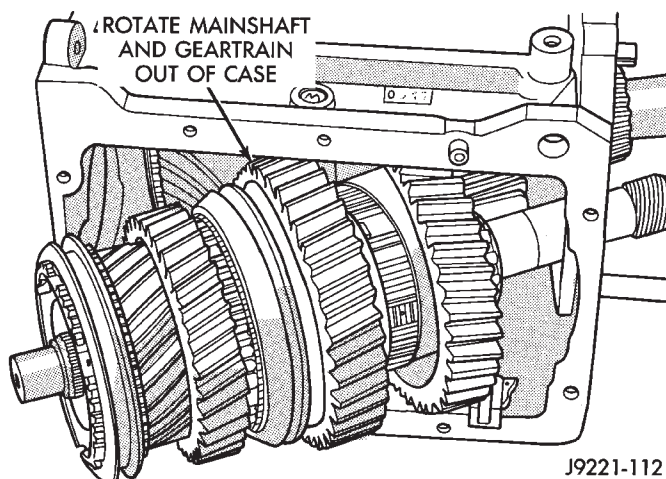
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 43 Removing Front Bearing From Drive Gear****Fig. 44 Drive Gear Thrust Bearing Removal****Fig. 45 Fourth Gear Clutch Gear Stop Ring Removal**

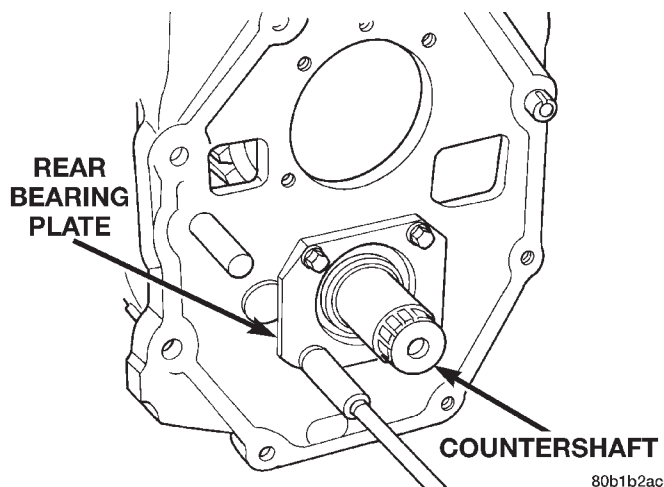
(a) Lift front end of mainshaft slightly. Use care when handling the mainshaft because the gears will be loose on the mainshaft.

(b) Grasp mainshaft rear splines. Then turn spline end of mainshaft in counterclockwise direction to rotate shaft and geartrain out of case.

(c) Once mainshaft gears roll clear of countershaft gears, shaft and gear assembly can be tilted outward and removed from gear case (Fig. 46).

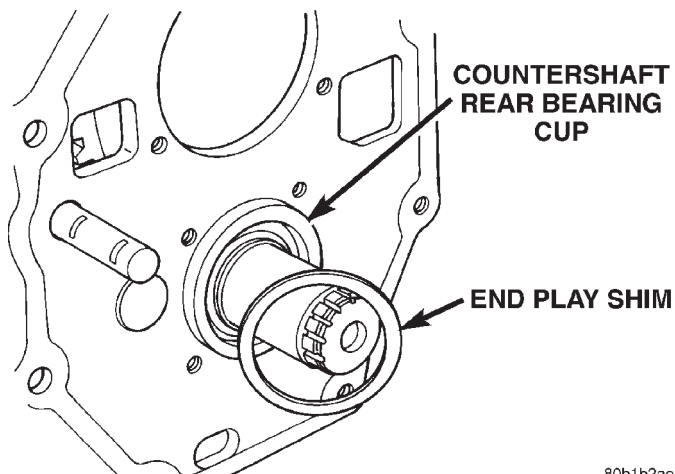
**Fig. 46 Mainshaft And Geartrain Removal****REVERSE IDLER AND COUNTERSHAFT REMOVAL**

(1) Remove countershaft rear bearing plate (Fig. 47).

**Fig. 47 Removing Countershaft Rear Bearing Plate**

DISASSEMBLY AND ASSEMBLY (Continued)

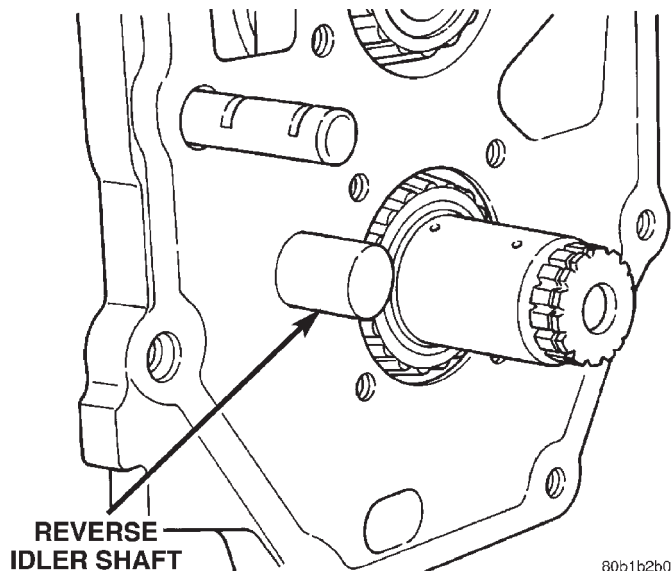
(2) Remove countershaft end play shim and rear bearing cup (Fig. 48).



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Fig. 48 Countershaft End Play Shim And Rear Bearing Cup Removal

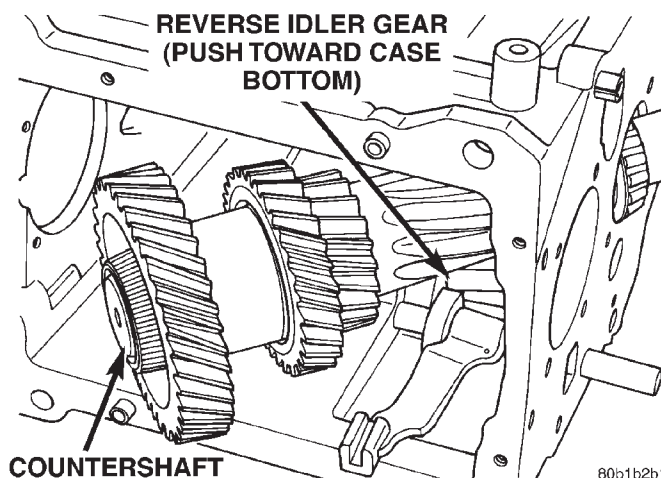
(3) Remove reverse idler shaft (Fig. 49).



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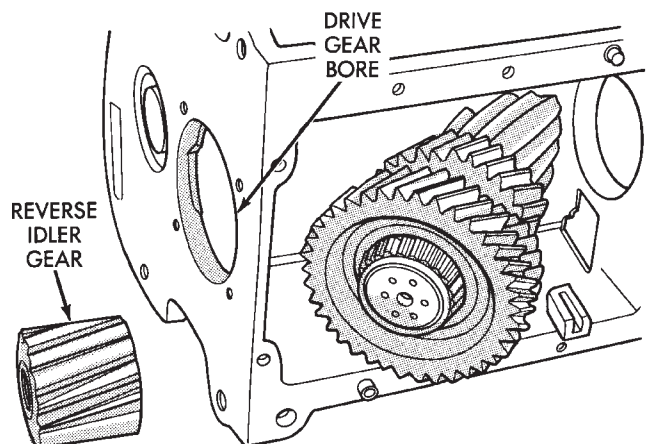
Fig. 49 Removing Reverse Idler Shaft

(4) Rotate countershaft outward and push reverse idler gear away from countershaft and toward front of case (Fig. 50).



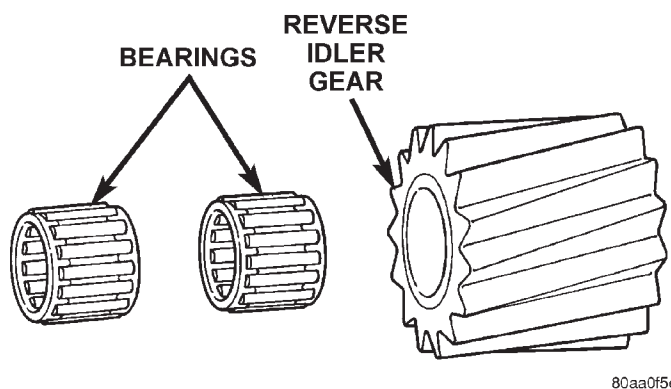
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Fig. 50 Idler Gear Moved Away From Countershaft



J9221-114

Fig. 51 Reverse Idler Gear Removal



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Fig. 52 Reverse Idler Gear Components

(5) Remove idler gear (Fig. 51).

(6) Keep reverse idler gear bearings and spacer together for cleaning and inspection (Fig. 52). Insert idler shaft through gear and bearings to keep them in place.

(7) Remove idler gear thrust washers from gear case. Install washers on idler shaft to keep them together for cleaning and inspection.

DISASSEMBLY AND ASSEMBLY (Continued)

(8) Remove countershaft rear bearing. Shaft cannot be removed from case until rear bearing has been removed. Bearing removal procedure is as follows:

(a) Assemble Puller Flange 6444-1 and Puller Rods 6444-4 (Fig. 53).

(b) Position first Puller Jaw 6449 on bearing cone (Fig. 53).

(c) Seat puller flange in notch of puller jaw just installed on bearing cone (Fig. 53).

(d) Install second Puller Jaw 6449 on bearing and in notch of puller flange (Fig. 53).

(e) Slide Retaining Collar 6444-8 over puller jaws to hold them in place (Fig. 53). Note that retaining collar has small lip on one end and only fits one way over jaws.

(f) Install Puller 6444 on puller rods. Then secure puller to rods with retaining nuts (Fig. 53).

(g) Tighten puller bolt to remove bearing from shaft (Fig. 53). If bearing is exceptionally tight, tap end of puller bolt with copper mallet to help loosen bearing.

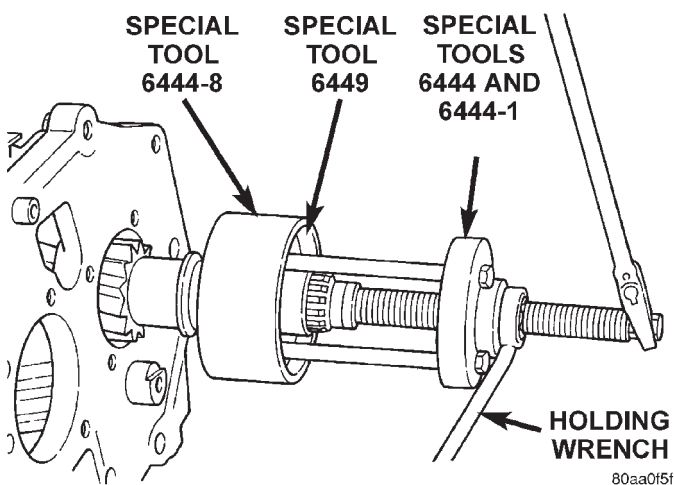


Fig. 53 Removing Countershaft Rear Bearing

(9) Remove bearing puller tools.

(10) Rotate countershaft out of gear case (Fig. 54).

(11) Remove countershaft front bearing as follows:

(a) Assemble Puller Flange 6444-1 and Puller Bolts 6444-4 (Fig. 55).

(b) Position first Puller Jaw 6451 on bearing.

(c) Seat puller flange in notch of puller jaw.

(d) Install second Puller Jaw 6451 on bearing and in notch of puller flange.

(e) Slide Retaining Collar 6444-8 over puller jaws to hold them in place (Fig. 55). Note that retaining collar has small lip on one end and only fits one way over jaws.

(f) Install Puller Bridge And Bolt Assembly 6444 on puller bolts. Then secure bridge to bolts with retaining nuts (Fig. 55).

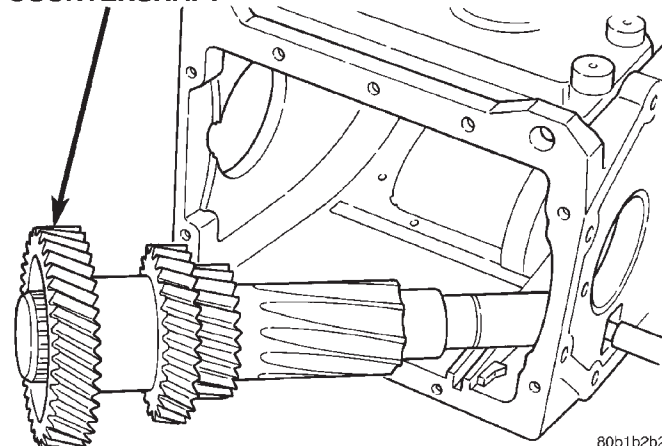
COUNTERSHAFT

Fig. 54 Removing Countershaft From Gear Case

(g) Tighten puller bolt to remove bearing from shaft (Fig. 55). If bearing is exceptionally tight, tap end of puller bolt with mallet to help loosen bearing.

(12) Remove bearing puller tools.

(13) Set countershaft and idler gear aside for cleaning and inspection.

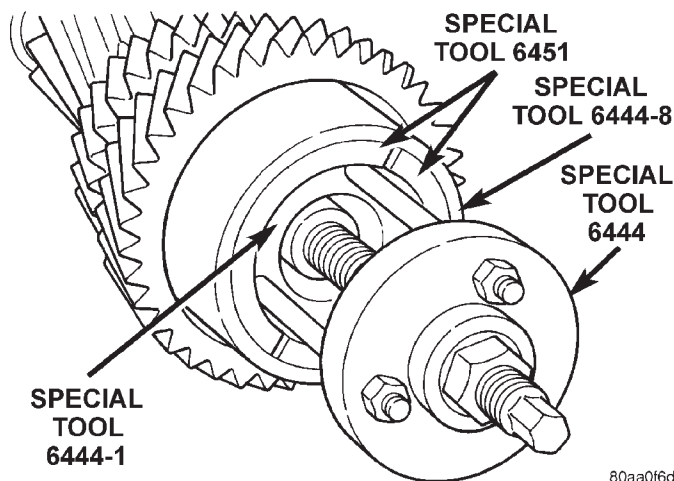


Fig. 55 Removing Countershaft Front Bearing

GEAR CASE DISASSEMBLY

(1) Remove countershaft front bearing cap. Use mallet or hammer to remove cap from inside case (Fig. 56).

(2) Remove countershaft front bearing cup with Remover Tool 6454 and Tool Handle C-4171 (Fig. 57).

(3) Remove roll pin that secures shift lug on shift rail in case (Fig. 58). A small pin punch can be modified by putting a slight bend in it to drive pin completely out of shift rail (Fig. 58).

(4) Remove shift lug rail.

DISASSEMBLY AND ASSEMBLY (Continued)

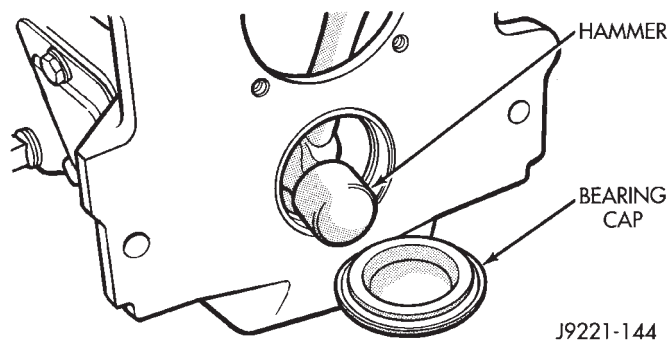


Fig. 56 Countershaft Front Bearing Cap Removal

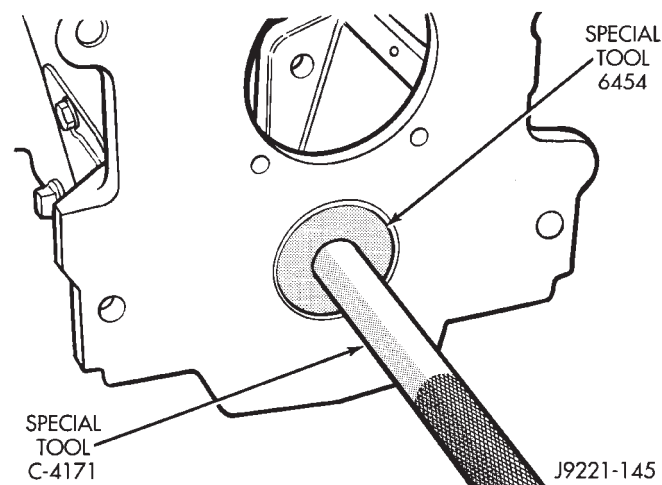


Fig. 57 Countershaft Front Bearing Cup Removal

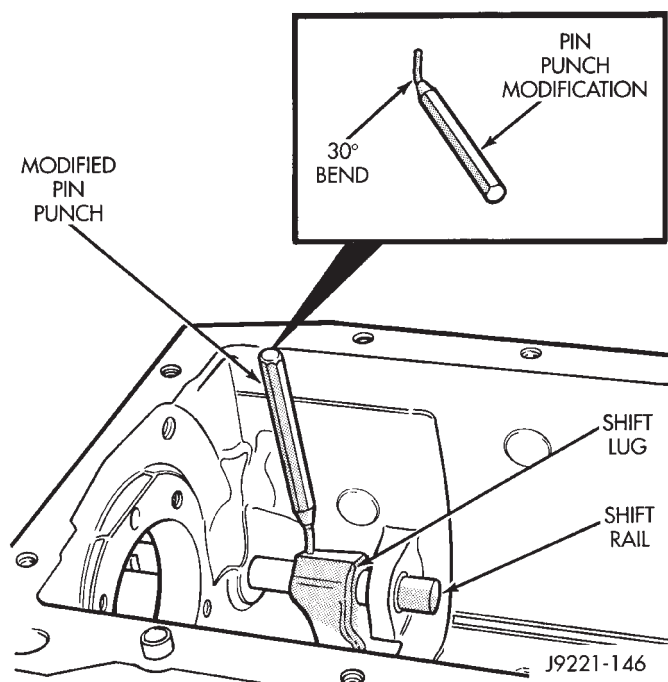


Fig. 58 Removing Shift Lug Roll Pin

MAINSHAFT DISASSEMBLY

NOTE: Not all of the mainshaft gear and synchro components are a one-way fit. Some gear and synchro components can be installed backwards. To avoid reassembly problems, mark the gear gears, clutch gears, synchro hubs, and sleeves for reference during teardown. Use paint or a scribe for marking purposes. Then stack the geartrain parts in order of removal. This practice will help avoid incorrect assembly and lost time.

- (1) Remove drive gear thrust bearing from end of mainshaft, if not previously removed.
- (2) Remove 3-4 synchro hub, third gear stop ring and third gear as an assembly (Fig. 59). It is not necessary to disassemble the synchronizer components unless worn or damaged.

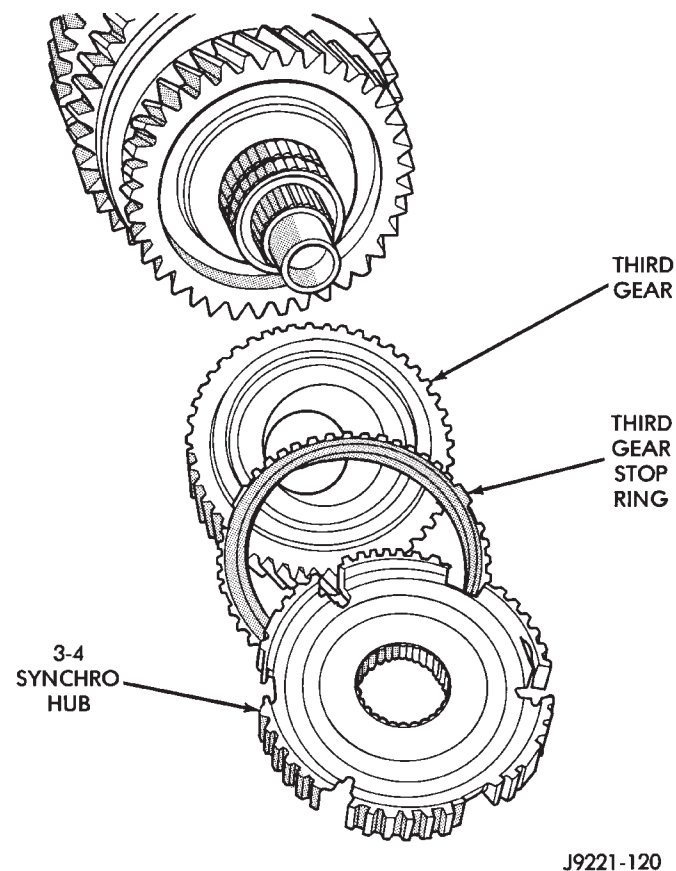


Fig. 59 Third Gear, Stop Ring, And 3-4 Hub Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Remove third gear bearing from mainshaft (Fig. 60).

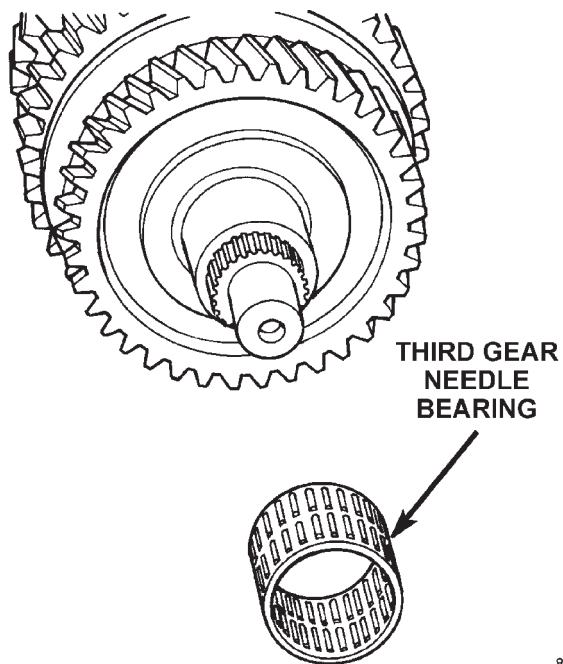


Fig. 60 Third Gear Needle Bearing Removal

(4) Remove third gear bearing spacer (Fig. 61).
 (5) Remove snap ring that retains second gear thrust washer on mainshaft (Fig. 61).

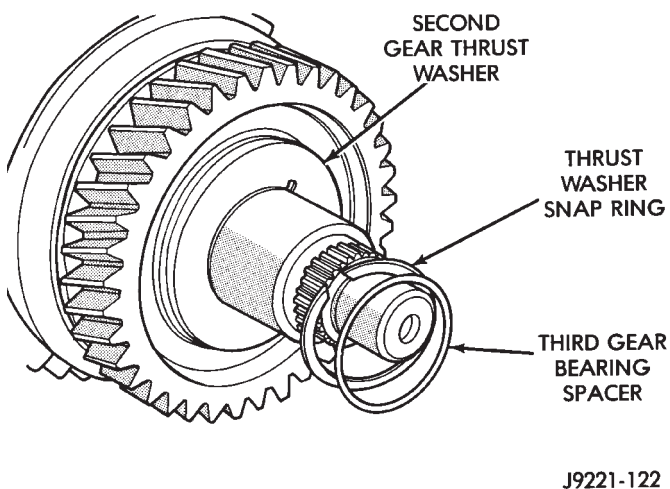


Fig. 61 Bearing Spacer And Snap Ring Location

(6) Remove second gear thrust washer (Fig. 62). Note that washer is notched for locating pin.
 (7) Remove thrust washer locating pin (Fig. 63). Use needle nose pliers to grip and remove pin.
 (8) Remove second gear (Fig. 64).

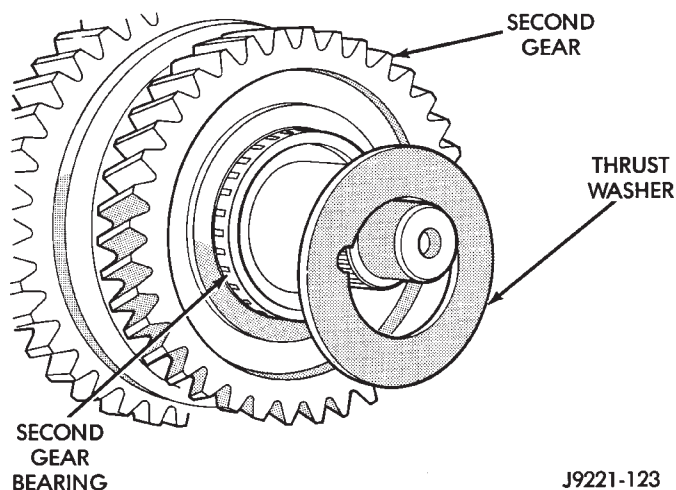


Fig. 62 Second Gear Thrust Washer Removal

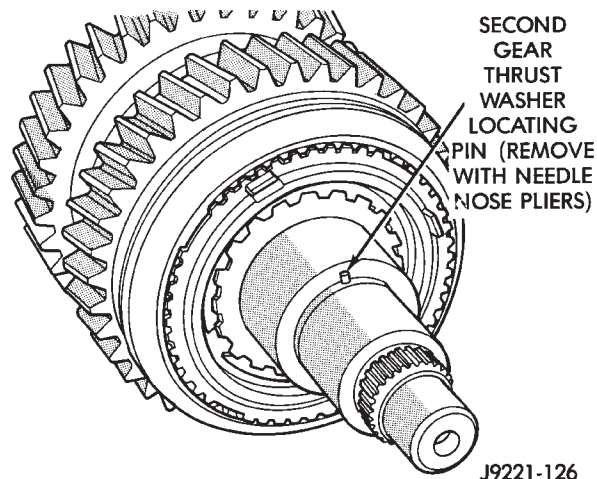


Fig. 63 Thrust Washer Locating Pin Removal

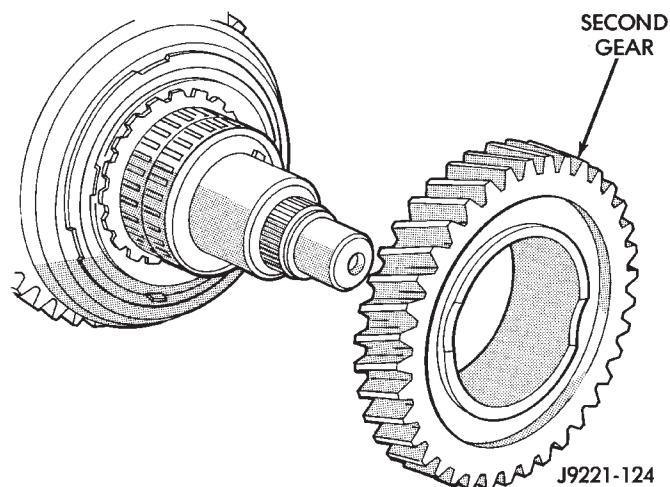
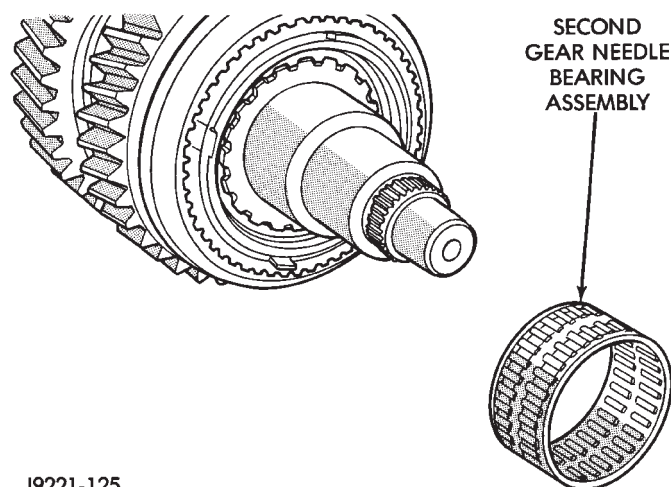


Fig. 64 Second Gear Removal

DISASSEMBLY AND ASSEMBLY (Continued)

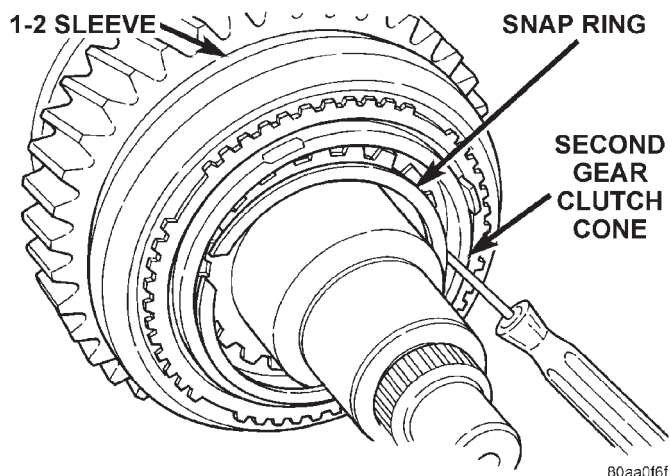
(9) Remove second gear bearing (Fig. 65).



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Fig. 65 Second Gear Bearing Removal

(10) Remove snap ring that retains second gear clutch cone (Fig. 66). Snap ring is seated in mainshaft synchro hub groove.



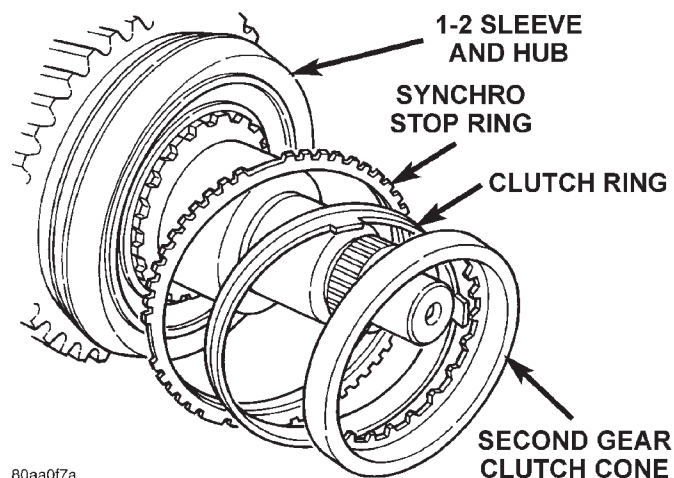
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Fig. 66 Removing Second Gear Clutch Cone Snap Ring

(11) Remove second gear clutch cone, synchro clutch ring and synchro stop ring (Fig. 67).

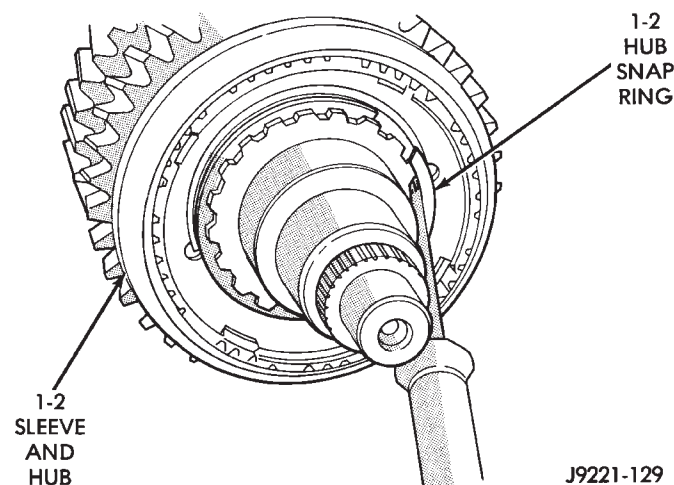
(12) Remove 1-2 synchro hub snap ring (Fig. 68).

(13) Remove 1-2 synchro sleeve, hub, struts and springs as an assembly (Fig. 69). Note that tapered side of sleeve also goes toward front. It is not necessary to disassemble synchro components unless worn, or damaged.



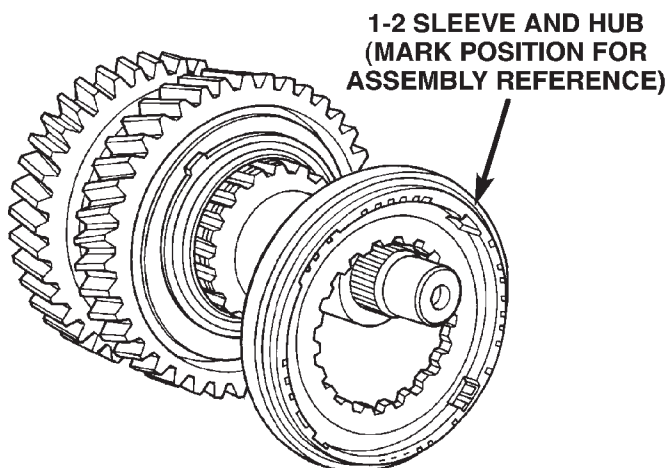
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Fig. 67 Second Gear Clutch Cone, Clutch Ring, And Stop Ring Removal



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Fig. 68 Removing 1-2 Sleeve And Hub Snap Ring



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Fig. 69 Removing 1-2 Synchro Sleeve And Hub

DISASSEMBLY AND ASSEMBLY (Continued)

(14) Remove first gear synchro stop ring and clutch ring (Fig. 70).

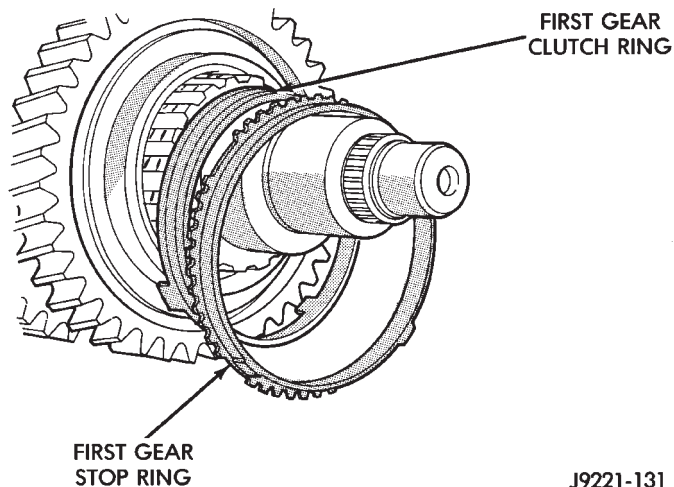


Fig. 70 First Gear Stop And Clutch Ring Removal

(15) Remove first gear clutch cone front snap ring from mainshaft hub (Fig. 71).

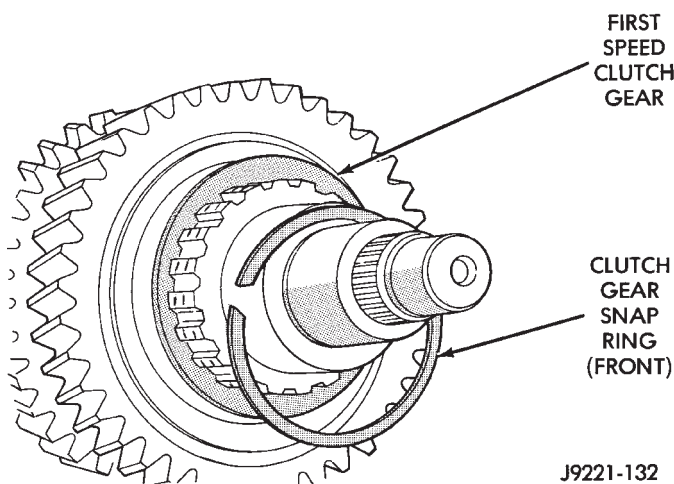


Fig. 71 First Gear Clutch Gear Front Snap Ring Removal

(16) Remove first gear clutch cone (Fig. 72).

(17) Remove first gear clutch gear rear snap ring from mainshaft hub (Fig. 72). It is not really necessary to remove this snap ring unless it, or the mainshaft is to be replaced.

(18) Remove reverse gear thrust washer (Fig. 73).

(19) Remove reverse gear and synchro components as assembly (Fig. 74). It is not necessary to remove or disassemble synchro components unless they are damaged and need to be replaced. If synchro sleeve or struts require service, mark position of sleeve on hub before removal. Correct sleeve position is important as sleeve can be installed backwards causing shift problems.

(20) Remove reverse gear bearing assembly from mainshaft (Fig. 74).

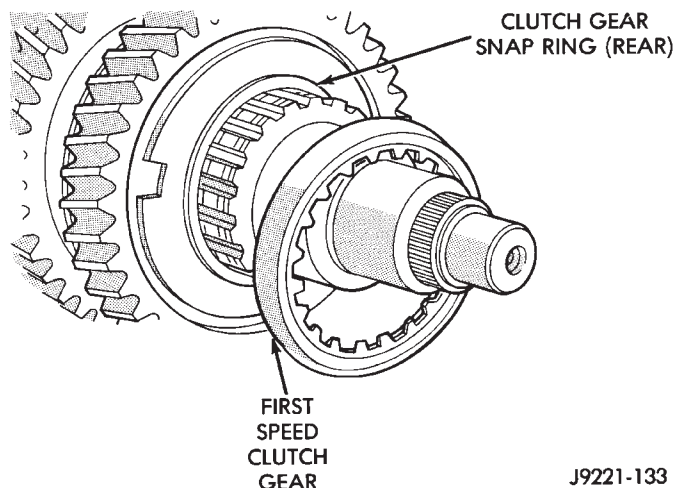


Fig. 72 First Gear Clutch Gear Removal

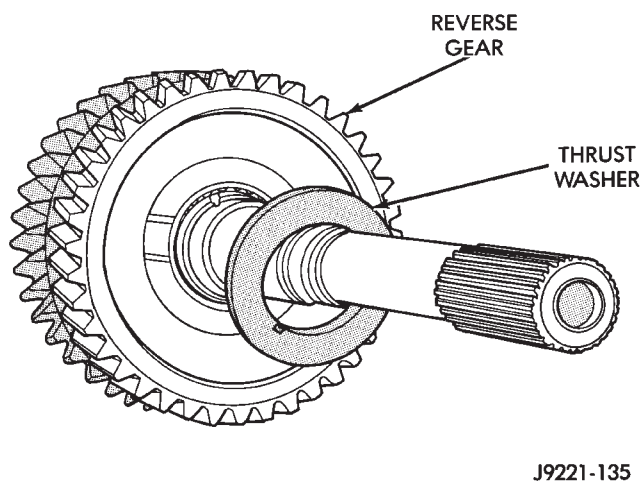


Fig. 73 Reverse Gear Thrust Washer Removal

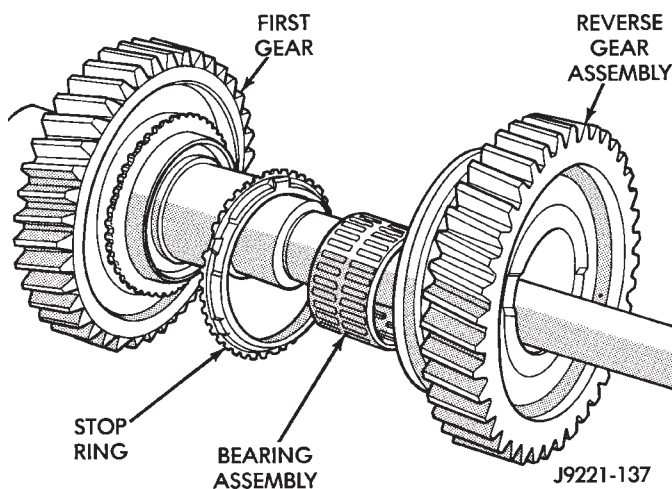
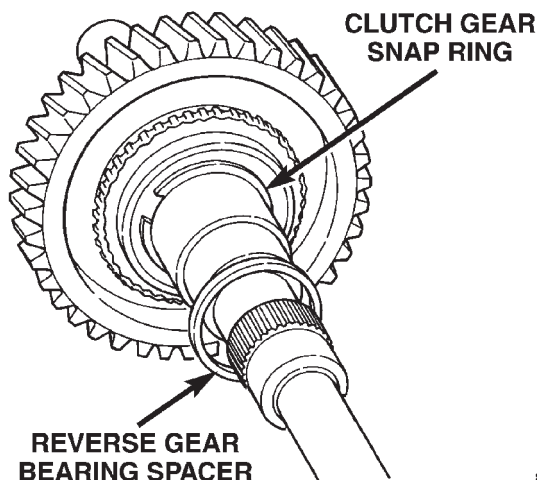


Fig. 74 Reverse Gear, Bearing, And Stop Ring Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(21) Remove reverse gear bearing spacer from mainshaft (Fig. 75).

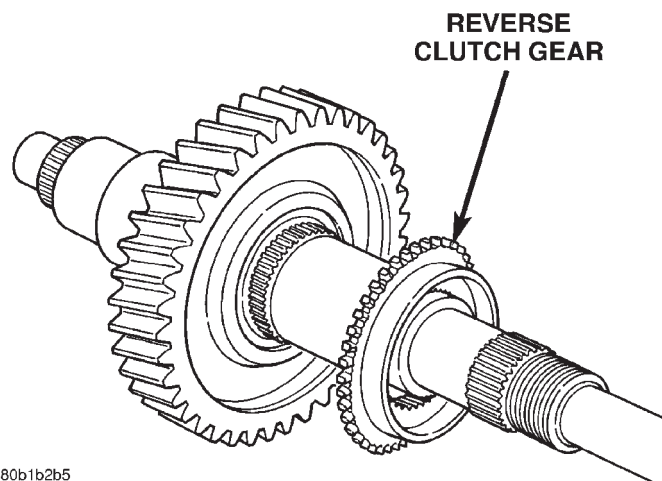
(22) Remove reverse clutch gear snap ring (Fig. 75). Tension of this snap ring is considerable. Heavy duty snap ring pliers will be required to spread the ring far enough to remove it.



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Fig. 75 Reverse Gear Bearing Spacer And First Gear Snap Ring Removal

(23) Remove reverse clutch gear (Fig. 76).



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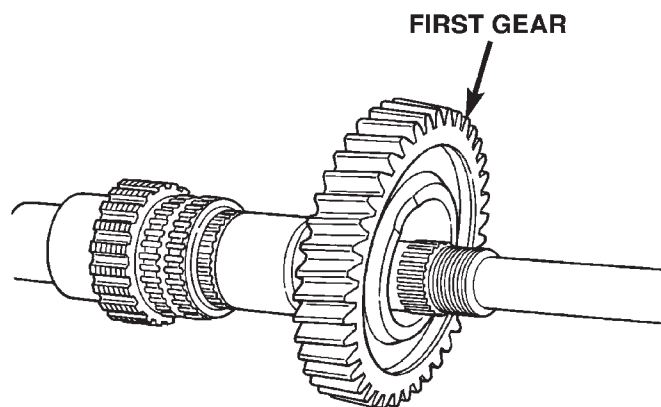
Fig. 76 Removing Reverse Clutch Gear

(24) Remove first gear from bearing and mainshaft (Fig. 77).

(25) Remove first gear bearing from mainshaft (Fig. 78).

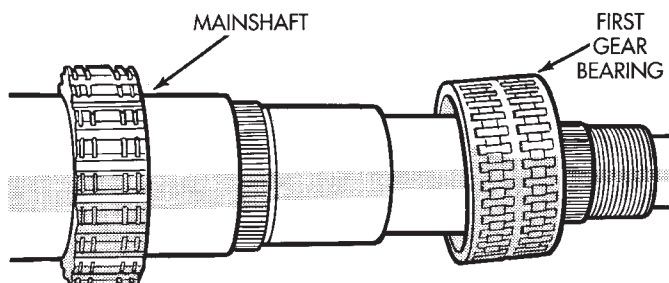
ASSEMBLY

NOTE: Gaskets are not used in the NV4500 transmission. Use Mopar® Gasket Maker, or equivalent, on all gear case and extension housing sealing surfaces.



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Fig. 77 Removing First Gear



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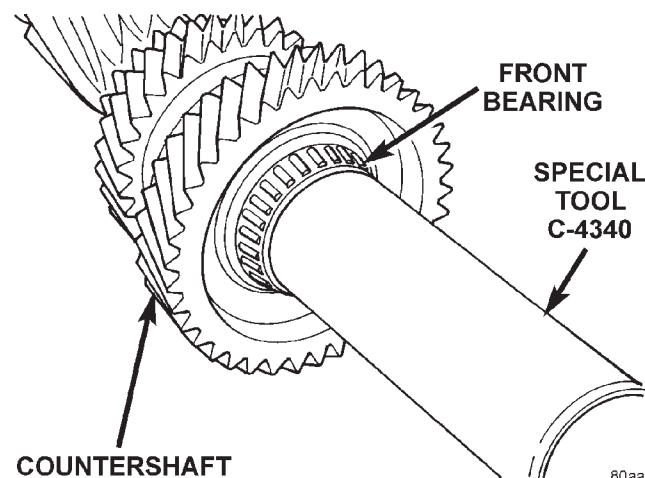
Fig. 78 Removing First Gear Bearing

GEAR CASE ASSEMBLY

(1) Install countershaft front bearing cup in case with Tool Handle C-4171 and Installer Tool 6061-1.

COUNTERSHAFT AND REVERSE IDLER GEAR INSTALLATION

(1) Install front bearing on countershaft with Installer Tool C-4340 (Fig. 79).



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Fig. 79 Countershaft Front Bearing Installation

DISASSEMBLY AND ASSEMBLY (Continued)

(2) Lubricate countershaft front bearing cup and cone with petroleum jelly.

(3) Position gear case on end with rear of case facing up (Fig. 80).

(4) Install countershaft in gear case (Fig. 80). Do not install rear countershaft bearing on countershaft at this time.

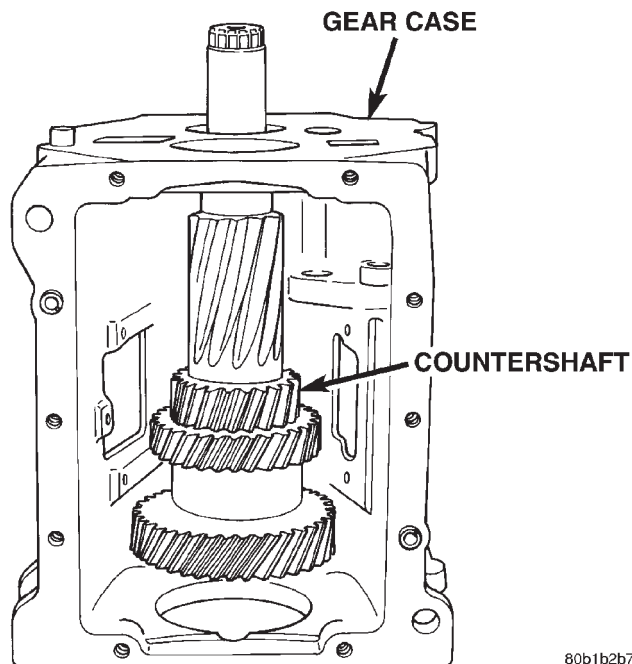


Fig. 80 Positioning Countershaft In Gear Case

(5) Lubricate reverse idler gear bearings with petroleum jelly and install first bearing and second bearing (Fig. 81).

(6) Install idler gear front thrust washer on boss in gear case (Fig. 81). Coat thrust washer with liberal quantity of petroleum jelly to hold it in place.

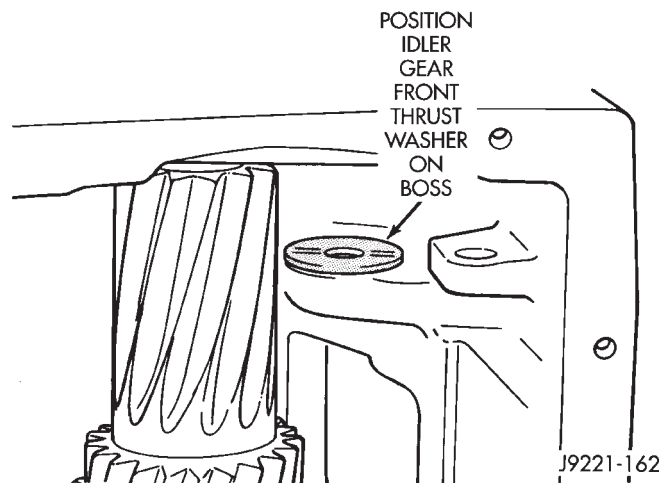


Fig. 81 Positioning Idler Gear Front Thrust Washer In Case

(7) Install reverse idler gear in case (Fig. 82).

(8) Install idler gear rear thrust washer between idler gear and case boss (Fig. 82).

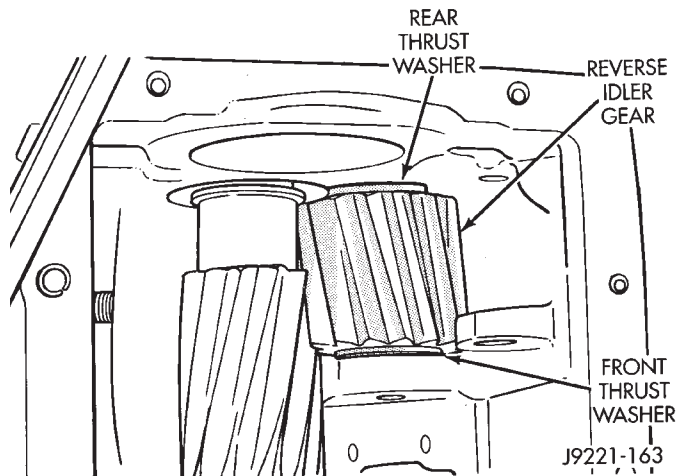


Fig. 82 Idler Gear And Thrust Washer Installation

(9) Align idler gear bearings and thrust washers with drift.

(10) Install reverse idler shaft (Fig. 83). Be sure notched end of shaft is facing countershaft as shown.

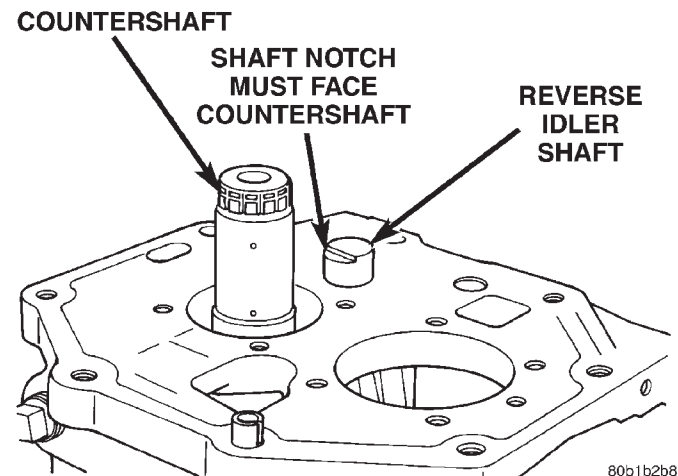
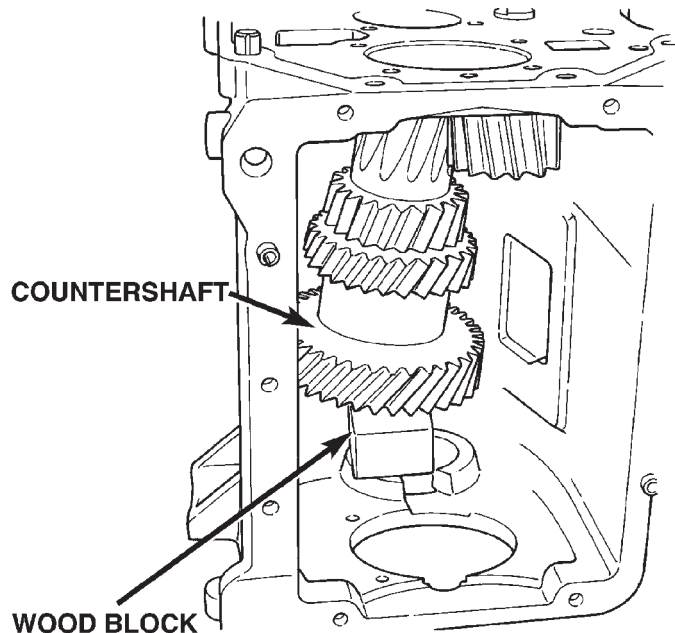


Fig. 83 Reverse Idler Shaft Installation

DISASSEMBLY AND ASSEMBLY (Continued)

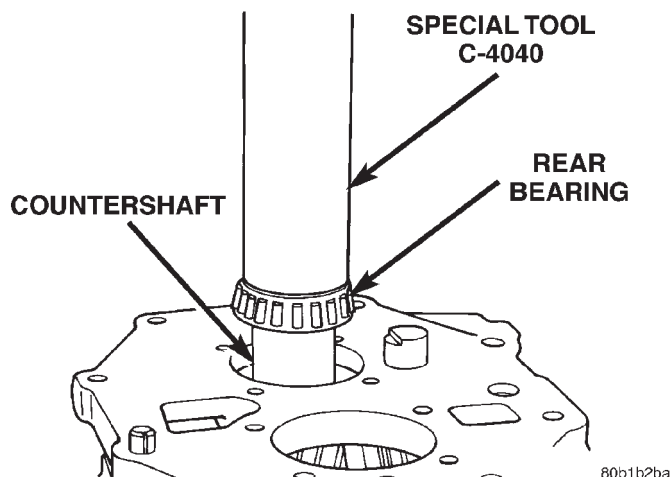
(11) Lift countershaft upward and position wood block between front of shaft and case (Fig. 84).



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Fig. 84 Supporting Countershaft With Wood Block

(12) Install rear bearing cone on countershaft with Installer Tool C-4040 (Fig. 85).



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Fig. 85 Installing Countershaft Rear Bearing

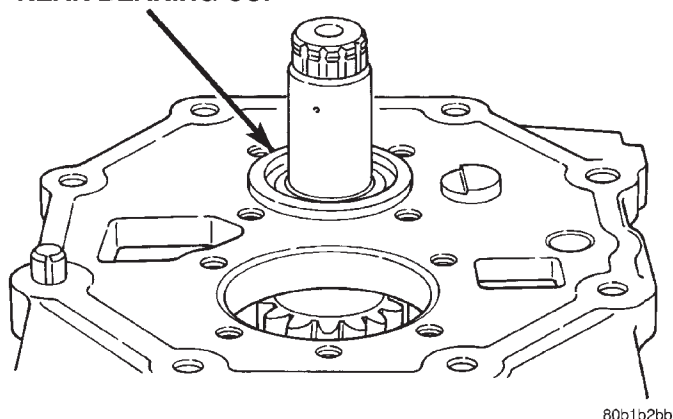
(13) Remove wood block from under countershaft and lower countershaft front bearing into front bearing cup.

(14) Lubricate countershaft rear bearing cup and cone with petroleum jelly.

(15) Install countershaft rear bearing cup in gear case and over rear bearing (Fig. 86). Tap cup into place with plastic mallet if necessary.

(16) Install countershaft rear bearing plate (Fig. 88). Be sure plate is seated in notch in reverse idler shaft before tightening bearing plate bolts.

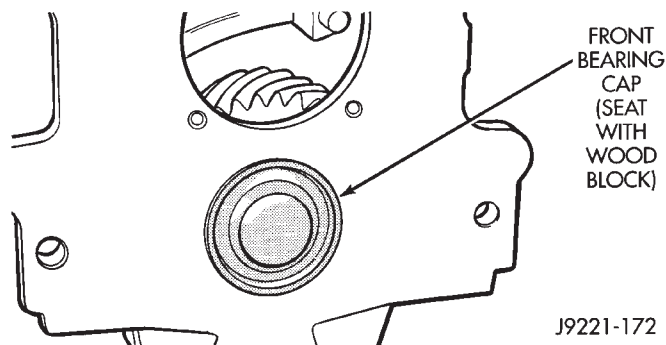
COUNTERSHAFT REAR BEARING CUP



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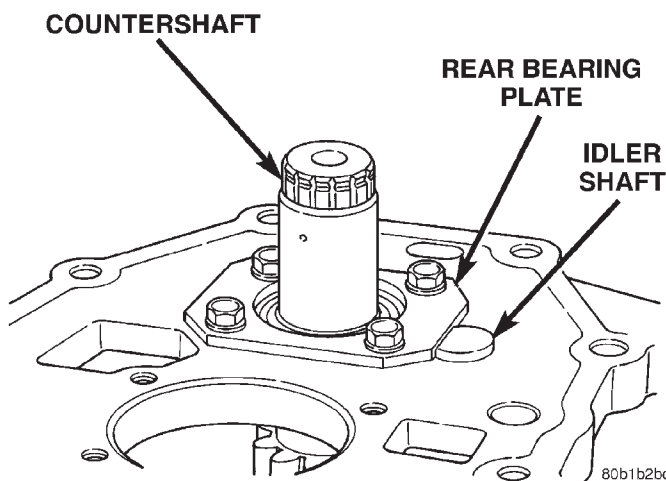
Fig. 86 Countershaft Rear Bearing Cup Installation

(17) Apply Mopar® silicone adhesive/sealer to flange and lip of new cap. Install new front bearing cap in gear case (Fig. 87) with Handle C-4171 and Installer C-3972-A.



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Fig. 87 Countershaft Front Bearing Cap Installation



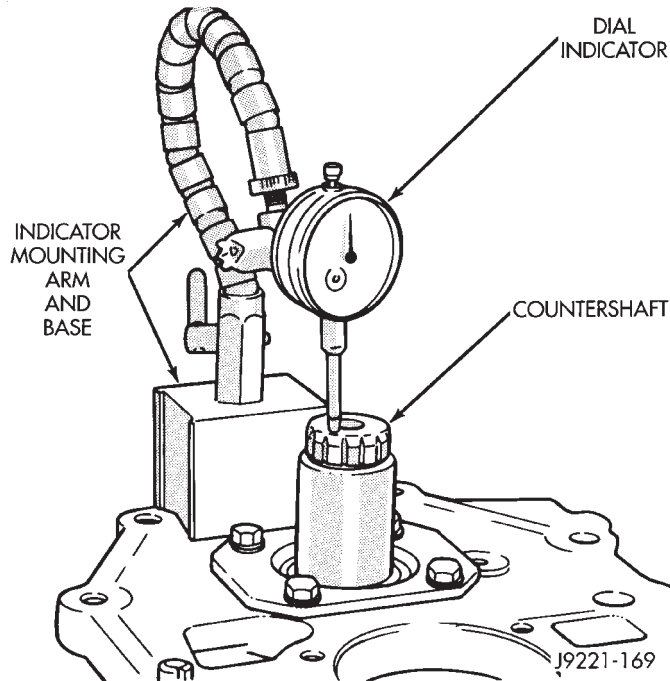
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Fig. 88 Countershaft Rear Bearing Plate Installation

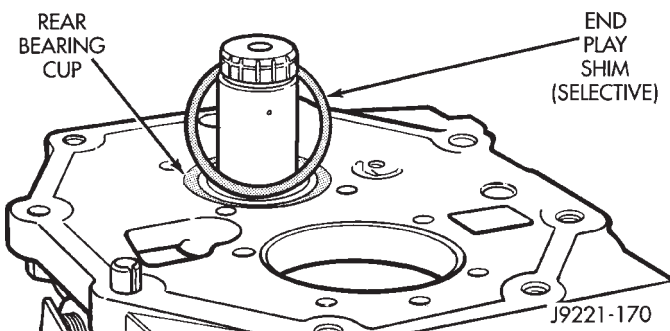
DISASSEMBLY AND ASSEMBLY (Continued)

ADJUSTING COUNTERSHAFT END PLAY

- (1) Rotate countershaft 4-5 times to seat bearings.
- (2) Mount dial indicator on case. Then position indicator plunger on end of countershaft and zero indicator dial needle (Fig. 89).
- (3) Raise countershaft with screwdriver and note end play reading on dial indicator. End play should be 0.051 - 0.15 mm (0.002 - 0.006 in.).

**Fig. 89 Measuring Countershaft End Play**

- (4) Remove countershaft rear bearing plate.
- (5) Select and install end play shim that will provide minimum countershaft end play. Position shim on rear bearing cup (Fig. 90).

**Fig. 90 Installing Countershaft End Play Shim**

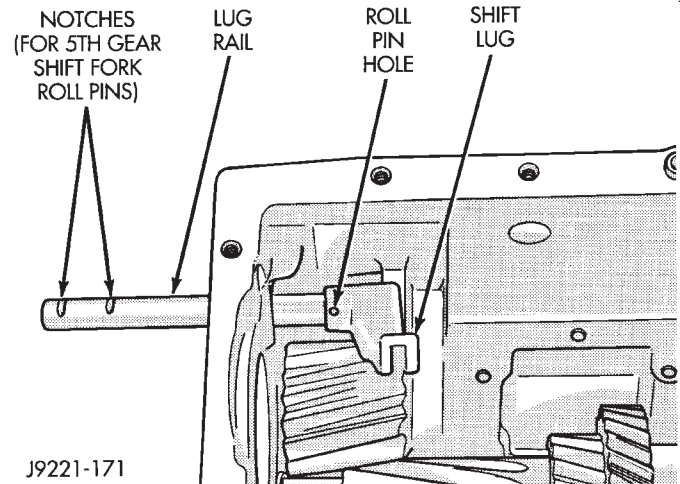
- (6) Reinstall countershaft rear bearing plate (Fig. 88). Be sure plate is seated in reverse idler shaft notch before installing bolts. Also be sure end play shims are still in position before tightening bearing plate bolts.

- (7) Apply 1-2 drops Mopar® Loc N' Seal, or equivalent, to threads of rear bearing plate bolts. Then

install and tighten bearing plate bolts to 23 N·m (200 in. lbs.) torque.

SHIFT LUG AND RAIL INSTALLATION

- (1) Lubricate shift lug and rail with Castrol Syntorq.
- (2) Insert shift lug rail part way into case.
- (3) Install shift lug on rail.
- (4) Position shift rail so roll pin notches are toward outside of case (Fig. 91).
- (5) Install roll pin that secures lug to rail (Fig. 91).

**Fig. 91 Shift Lug And Rail Installation**

MAINSHAFT AND GEARTRAIN ASSEMBLY

CAUTION: The reverse, 1-2 and 3-4 synchro components can be assembled and installed incorrectly if care is not exercised. Some components can be installed backwards resulting in shift problems. Refer to the assembly procedures for component identification and location.

Lubricate mainshaft bearing surfaces and all bearing assemblies with Castrol Syntorq or with petroleum jelly.

- (1) Install first snap ring in rearmost groove of mainshaft hub (Fig. 92). This snap ring locates first gear clutch gear on shaft. A total of four of these snap rings are used to secure various components on the mainshaft 1-2 synchro hub. The snap rings are all the same size and are interchangeable.

- (2) Install first gear clutch cone on mainshaft 1-2 synchro hub (Fig. 93). Recessed side of cone faces front. Be sure cone is seated against snap ring previously installed on hub.

- (3) Install snap ring on mainshaft 1-2 synchro hub to secure clutch cone (Fig. 94). Be sure snap ring is fully seated in hub groove and against clutch cone. Note that this is second of four snap rings used to secure synchro components on shaft hub.

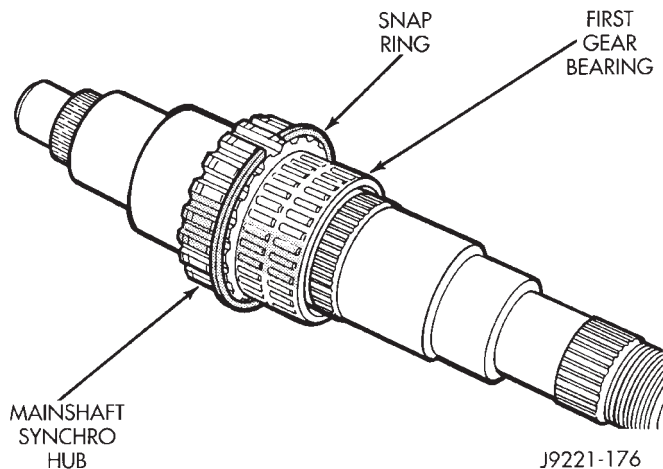


Fig. 92 First Gear Bearing and Snap Ring Installation

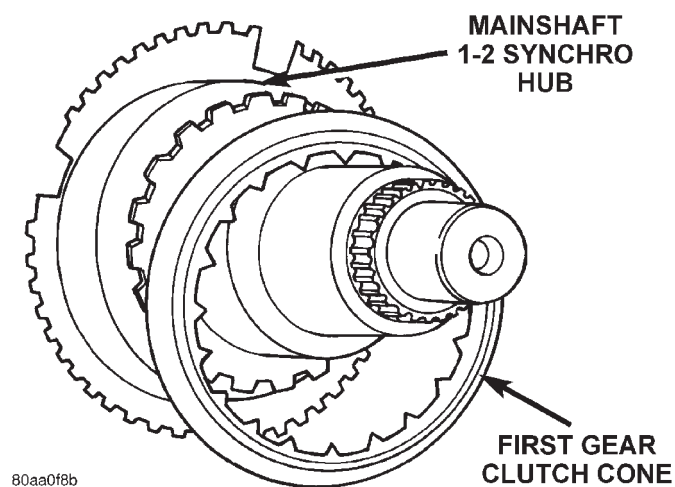


Fig. 93 Installing First Gear Clutch Cone

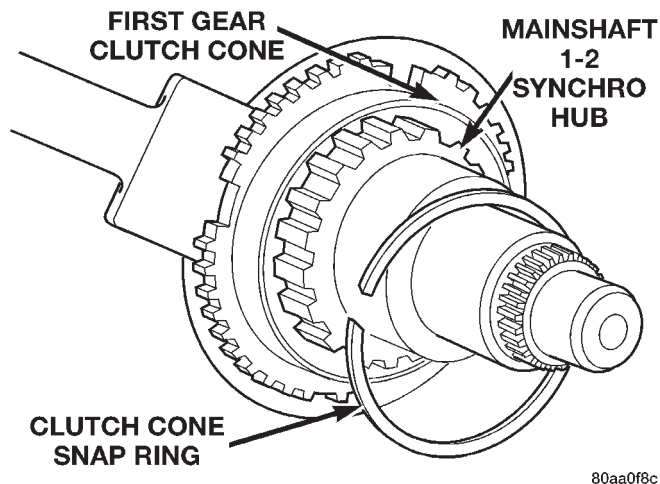


Fig. 94 Installing First Gear Clutch Cone Snap Ring

(4) Support mainshaft in upright position. Remaining gears, snap rings and synchro components are easier to install with shaft in upright position. Shaft

can be supported in gear case, or hole can be cut in workbench to support shaft.

(5) If 1-2 synchro hub and sleeve were disassembled for service, reassemble hub, sleeve, struts and springs as follows:

(a) Align and install sleeve on hub. Rotate sleeve until it slides onto hub. Sleeve only fits one way and will easily slide onto hub when long slot in sleeve, aligns with long shoulder on hub (Fig. 95).

(b) Place wood blocks under hub that will raise hub about 3.5 cm (1.375 in.) above surface of workbench. Then allow sleeve to drop down on hub (Fig. 96).

(c) Install springs and struts in hub (Fig. 96). Use lots of petroleum jelly to hold them in place. Then compress struts with your fingers and move sleeve upward until struts are started in sleeve. Verify that struts are engaged in sleeve before proceeding.

(d) Turn synchro assembly upright. Then move sleeve into neutral position on hub and work struts into sleeve at same time. Be sure struts are seated and springs are not displaced during assembly.

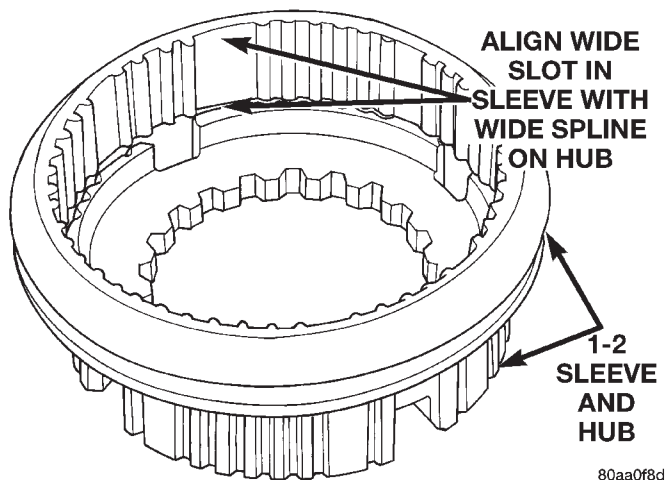


Fig. 95 Installing 1-2 Synchro Sleeve On Hub

(6) Install first gear stop ring in 1-2 synchro hub and sleeve (Fig. 97). Be sure stop ring is fully seated and engaged in hub and sleeve.

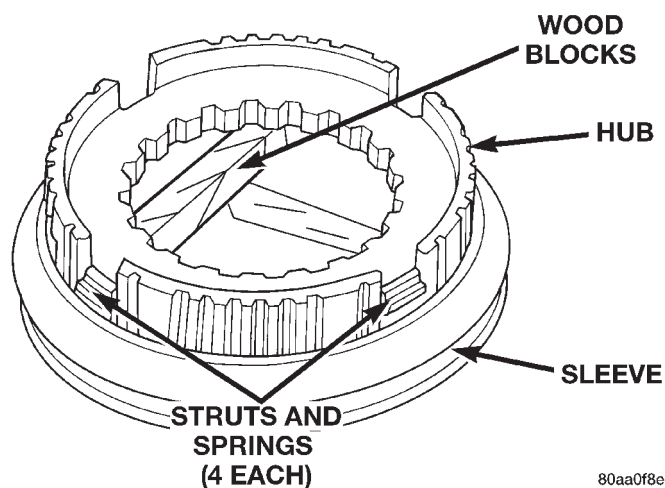
(7) Install 1-2 synchro assembly and stop ring on mainshaft. Ensure that the taper on the sleeve is facing forward. Then seat assembly on shaft (Fig. 98).

(8) Install snap ring that secures 1-2 synchro on mainshaft hub (Fig. 99). Be sure snap ring is fully seated in ring groove in mainshaft hub.

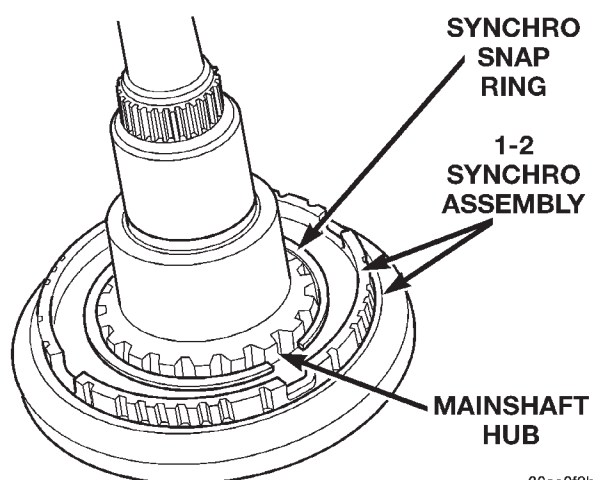
(9) Assemble second gear clutch cone, clutch ring and stop ring (Fig. 100).

(10) Install assembled second gear clutch cone and rings on mainshaft and in 1-2 synchro hub (Fig. 101).

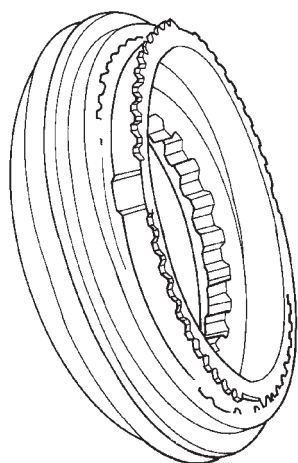
DISASSEMBLY AND ASSEMBLY (Continued)



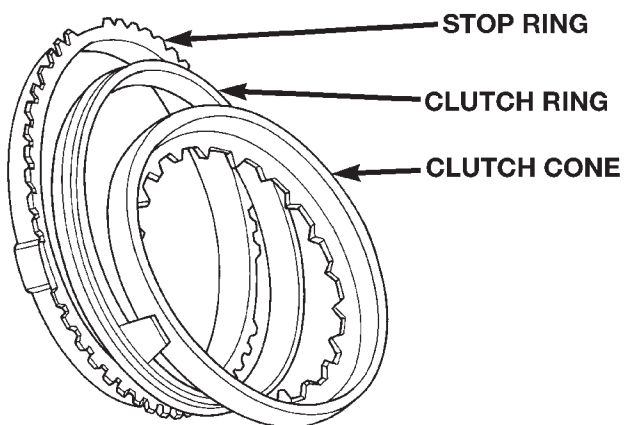
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Fig. 96 Installing 1-2 Synchro Struts And Springs

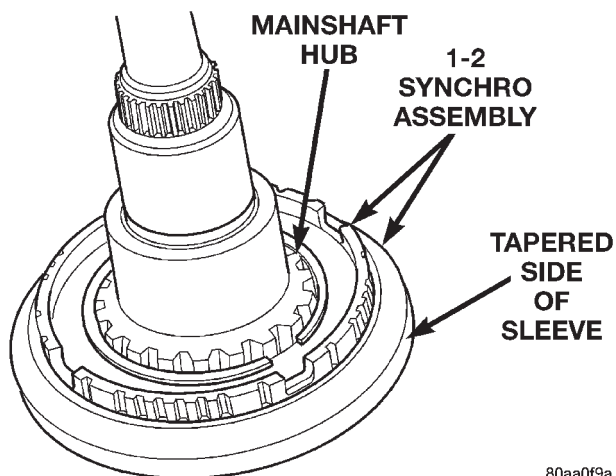
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Fig. 99 Installing 1-2 Synchro Snap Ring

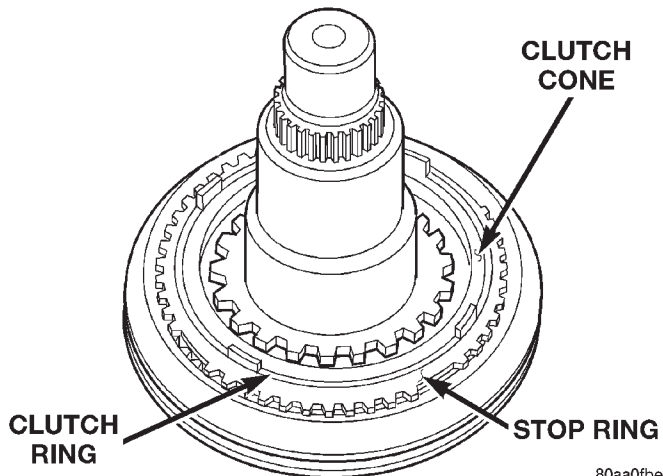
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Fig. 97 Installing First Gear Stop Ring In Synchro Hub

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Fig. 100 Assembling Second Gear Clutch Cone, Clutch Ring, And Stop Ring

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Fig. 98 1-2 Synchro Installation

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Fig. 101 Second Gear Clutch Cone, Clutch Ring, And Stop Ring Installation

DISASSEMBLY AND ASSEMBLY (Continued)

(11) Install snap ring that secures second gear clutch cone on mainshaft (Fig. 102). Use narrow blade screwdriver to work snap ring into hub groove as shown. **Be sure snap ring is fully engaged in mainshaft groove before proceeding. If snap ring will not fit in groove, clutch cone is slightly misaligned.**

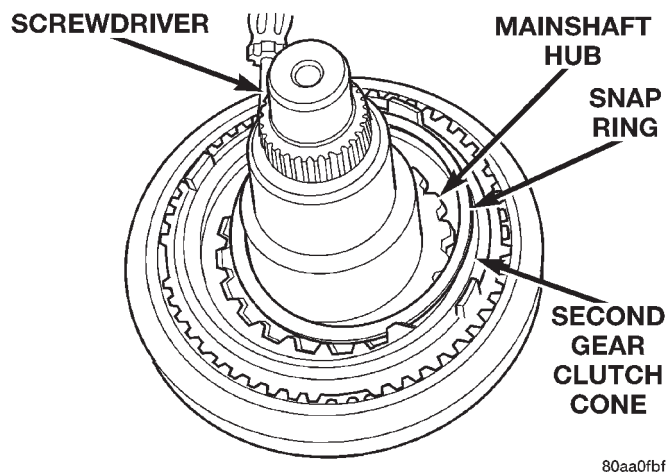


Fig. 102 Installing Second Gear Clutch Cone Snap Ring

(12) Install second gear bearing on mainshaft (Fig. 103).

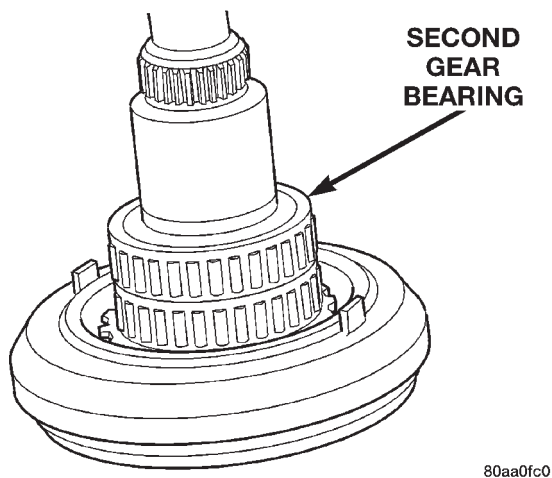


Fig. 103 Second Gear Bearing Installation

(13) Install second gear on mainshaft and bearing. Rotate gear until tabs of second gear clutch ring are fully seated in tab slots in gear (Fig. 104).

(14) Install thrust washer pin in shaft (Fig. 105).

(15) Install second gear thrust washer. Be sure washer is seated on gear and pin (Fig. 106).

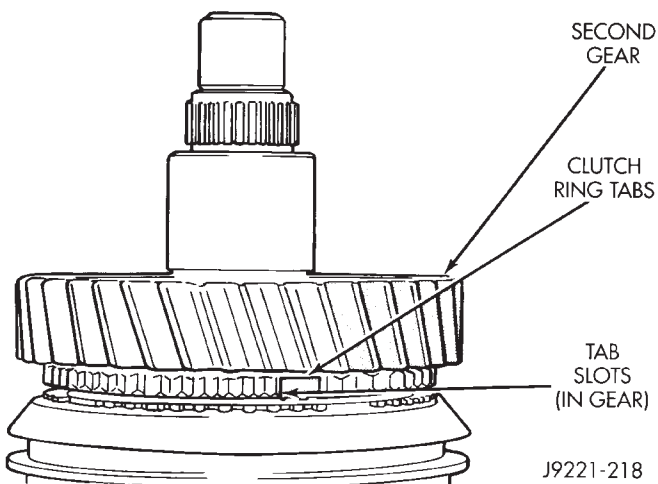


Fig. 104 Second Gear Installation

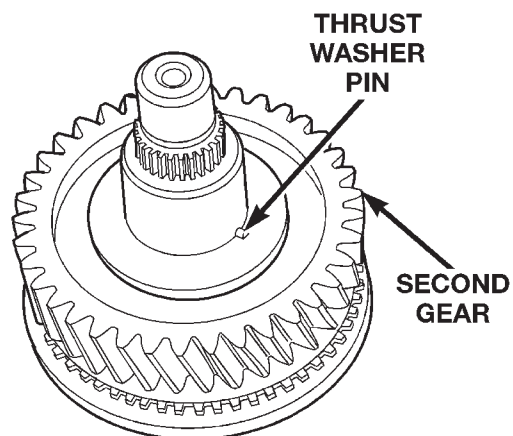


Fig. 105 Thrust Washer Pin Installation

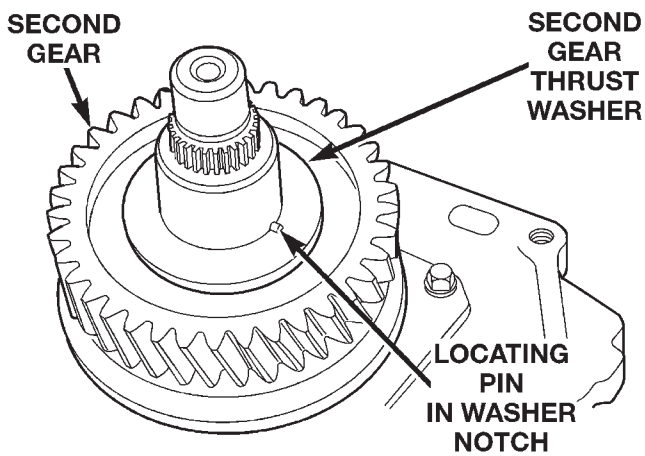
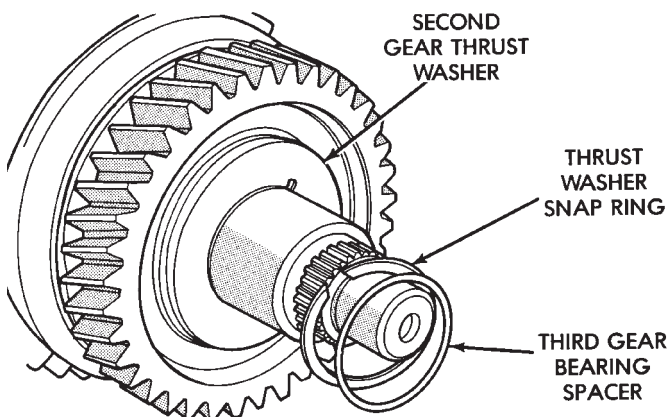


Fig. 106 Second Gear Thrust Washer Installation

DISASSEMBLY AND ASSEMBLY (Continued)

(16) Install second gear thrust washer snap ring (Fig. 107). Be sure snap ring is fully seated in mainshaft groove.

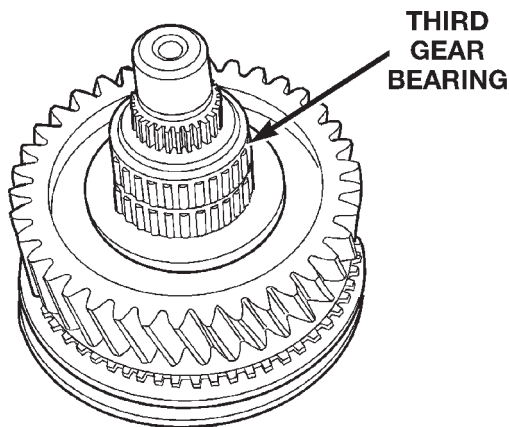
(17) Install third gear bearing spacer on shaft and seat it against thrust washer snap ring (Fig. 107).



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Fig. 107 Installing Snap Ring And Third Gear Bearing Spacer

(18) Install third gear bearing on mainshaft (Fig. 108). Bearing should be flush with mainshaft hub. If bearing is not flush with hub, either bearing spacer or snap ring was not installed. Check and correct if necessary.



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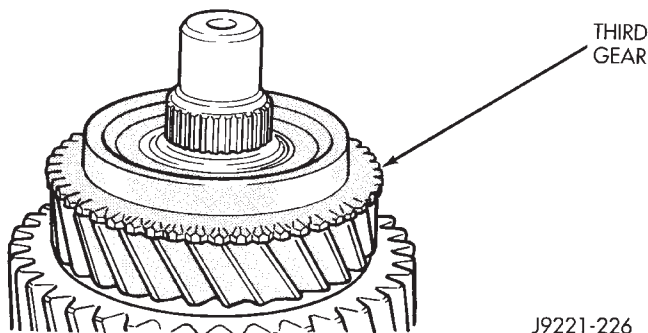
Fig. 108 Third Gear Bearing Installation

(19) Install third gear over bearing and onto mainshaft (Fig. 109).

(20) Install synchro stop ring on third gear (Fig. 110). Be sure stop ring is fully seated on cone taper.

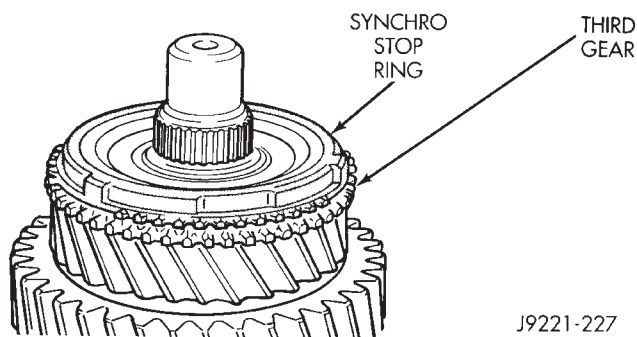
(21) If 3-4 synchro was disassembled for service, reassemble synchro components as follows:

(a) Align and install synchro sleeve on hub (Fig. 111). **Front side of hub has a narrow groove machined in it.**



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Fig. 109 Third Gear Installation

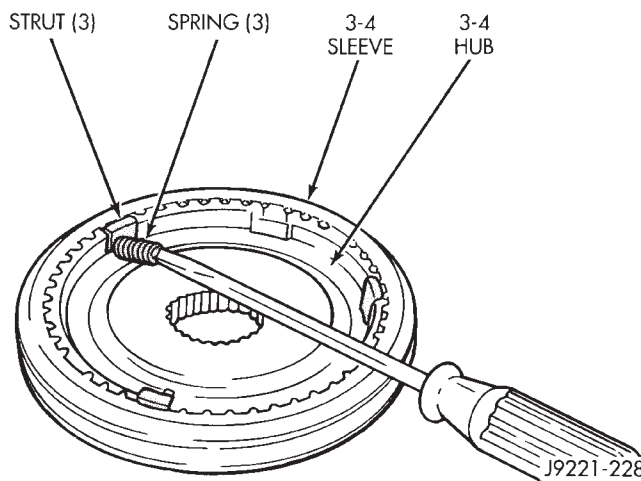


J9221-227

Fig. 110 Third Gear Stop Ring Installation

(b) Insert all three synchro struts in slots machined in sleeve and hub (Fig. 111).

(c) Install and seat synchro springs (Fig. 111). Use flat blade or Phillips screwdriver to compress springs and seat them in struts and hub as shown.



J9221-228

Fig. 111 Synchro Assembly (3-4)

DISASSEMBLY AND ASSEMBLY (Continued)

(22) Start 3-4 synchro assembly on mainshaft. Ensure that the hub groove and the sleeve groove both face forward. Tap assembly onto shaft splines until hub is about 3 mm (0.125 in.) away from third gear stop ring. Then align stop ring with synchro sleeve and hub and seat synchro assembly with Tool C-4040 (Fig. 112).

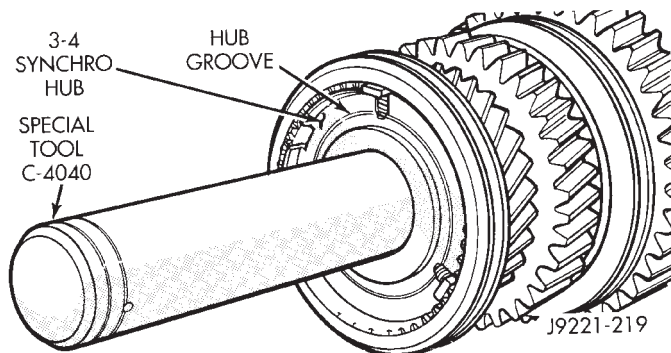


Fig. 112 Seating 3-4 Synchro Assembly On Mainshaft

(23) Verify that 3-4 synchro hub is fully seated on shaft. Approximately 3 mm (0.125 in.) of shaft spline should be visible. If hub is not seated, stop ring lugs are misaligned. Rotate ring until lugs are fully engaged in 3-4 hub slots.

(24) Verify that second and third gear rotate freely at this point. If not, determine the cause and correct.

(25) Invert mainshaft in case or bench. Reverse gear components are easier to install with shaft upright.

(26) Install first gear bearing on mainshaft.

(27) Install first gear on shaft (Fig. 113). Clutch hub side of gear faces front of shaft. Be sure tabs on clutch ring are aligned and seated in first gear hub. 1-2 synchro hub will not seat properly if clutch ring tabs are misaligned.

(28) Install reverse clutch gear on first gear (Fig. 113). Be sure clutch gear is seated on shaft splines.

(29) Install reverse clutch gear snap ring (Fig. 113). Use heavy duty snap ring pliers to install this snap ring as ring tension is considerable. Do not overspread snap ring and make sure it is fully seated in groove. Reverse gear will not fit properly if snap ring is not fully seated.

(30) Install stop ring on clutch cone (Fig. 114). Be sure stop ring is fully seated on cone taper.

(31) Install reverse gear bearing spacer on mainshaft (Fig. 115). Bearing spacer seats against reverse clutch gear snap ring.

(32) Install reverse gear bearing on mainshaft (Fig. 115).

CAUTION: The reverse sleeve will fit either way on the hub. This means the sleeve can be installed backwards if care is not exercised. Be sure the

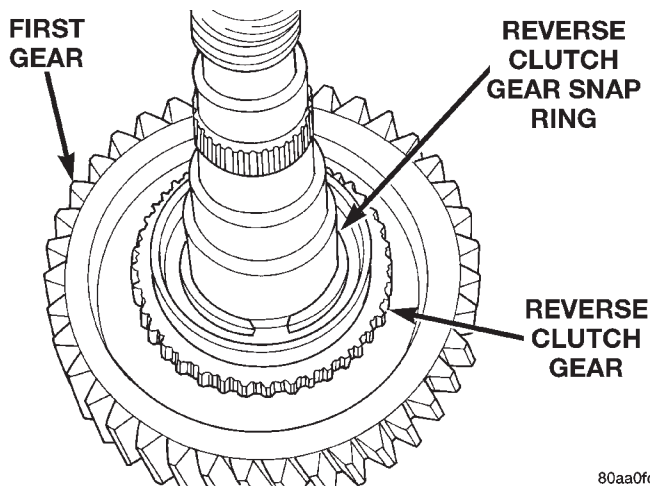


Fig. 113 First Gear, Clutch Gear, And Snap Ring Installation

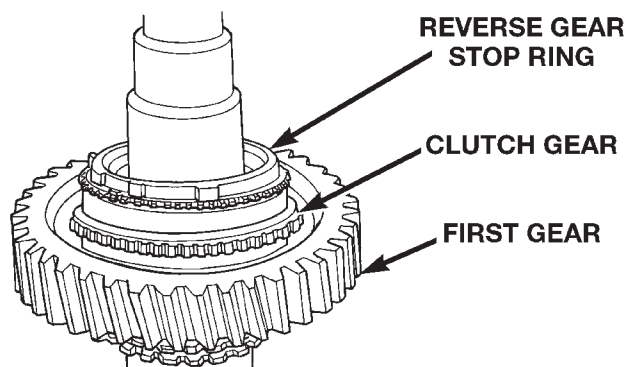


Fig. 114 Clutch Gear Stop Ring Installation

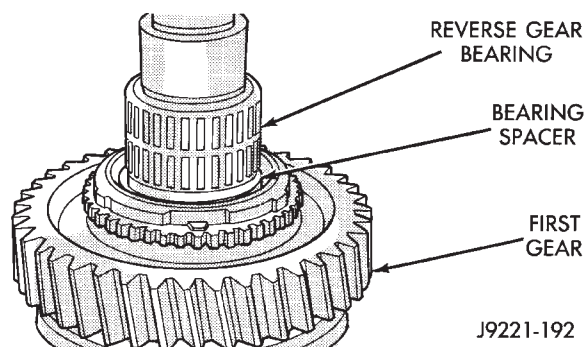


Fig. 115 Reverse Gear Bearing And Spacer Installation

tapered side of the sleeve faces rearward after installation.

(33) If reverse gear sleeve and struts were disassembled for service, reassemble sleeve, struts and springs as follows:

(a) Position sleeve on hub so tapered side of sleeve faces rearward. Sleeve will fit either way

DISASSEMBLY AND ASSEMBLY (Continued)

but will cause shift problems if installed backwards (Fig. 116).

(b) Rotate sleeve to align teeth on sleeve and hub. Sleeve will slide easily into place on hub when properly aligned.

(c) Install springs in gear hub (Fig. 116). Use petroleum jelly to hold springs in place if desired.

(d) Compress first spring with flat blade screwdriver and slide strut into position in hub slot. Then work spring into seat in strut with small hooked tool, or screwdriver.

(e) Install second and third struts in same manner as described in step (d).

(f) Work sleeve upward on hub until struts are centered and seated in sleeve. Sleeve should be in neutral position after seating struts.

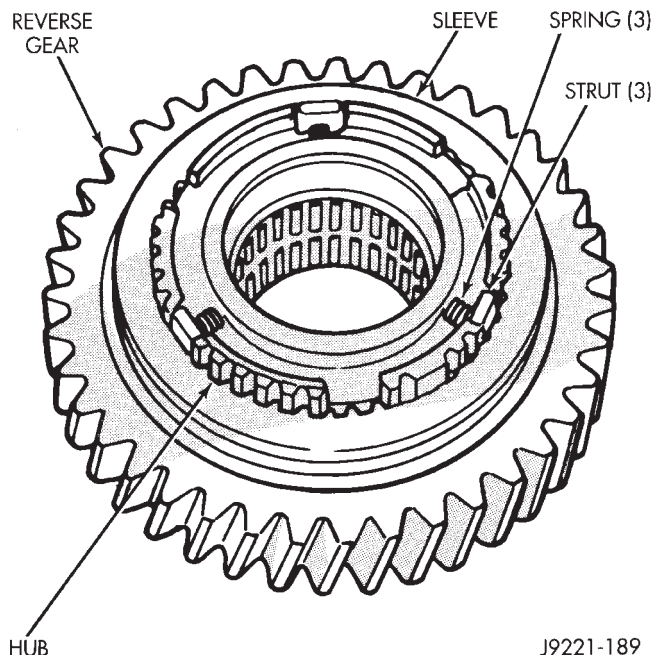


Fig. 116 Reverse Gear Synchro Assembly

(34) Install reverse gear and synchro assembly on mainshaft (Fig. 117). Rotate assembly until stop ring lugs engage in hub slots and gear drops into fully seated position.

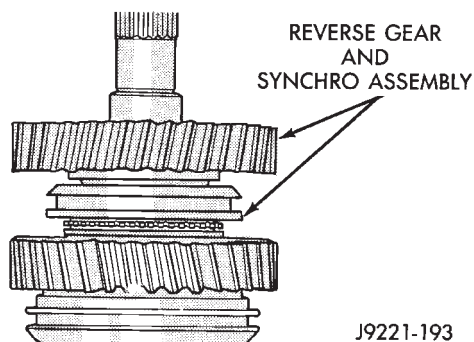


Fig. 117 Reverse Gear Installation

(35) Install reverse gear thrust washer (Fig. 118).

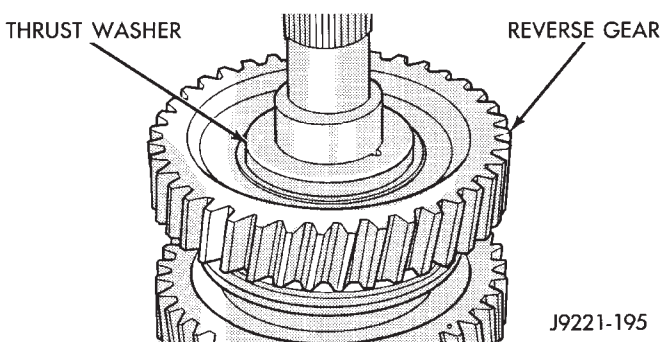


Fig. 118 Reverse Gear Thrust Washer Installation

(36) Install rear bearing on mainshaft.

(37) Install fourth gear stop ring in 3-4 synchro sleeve (Fig. 119).

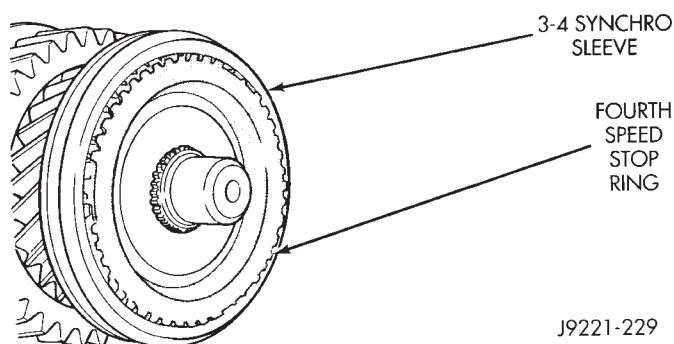


Fig. 119 Fourth gear Stop Ring Installation

(38) Install fourth gear clutch gear in stop ring (Fig. 120).

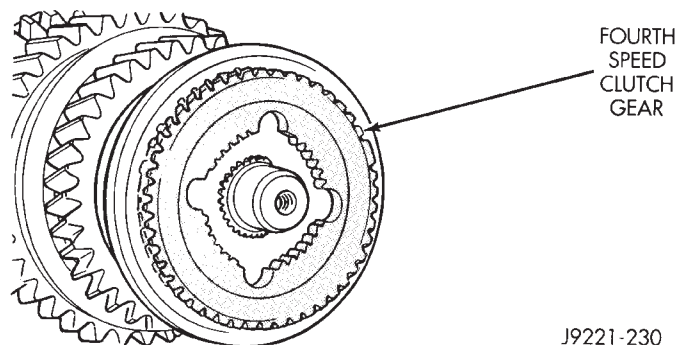


Fig. 120 Fourth gear Clutch Gear Installation

MAINSHAFT AND GEARTRAIN INSTALLATION

- (1) Roll gear case onto its left side.
- (2) Grip mainshaft at pilot bearing hub and just behind reverse gear. Then lift assembly and guide rear of shaft through bearing bore at rear of case.
- (3) Continue holding front of shaft but switch grip at rear to shaft output splines. Lift mainshaft assembly slightly, align gears and seat assembly in case.
- (4) Set transmission case upright (Fig. 121).

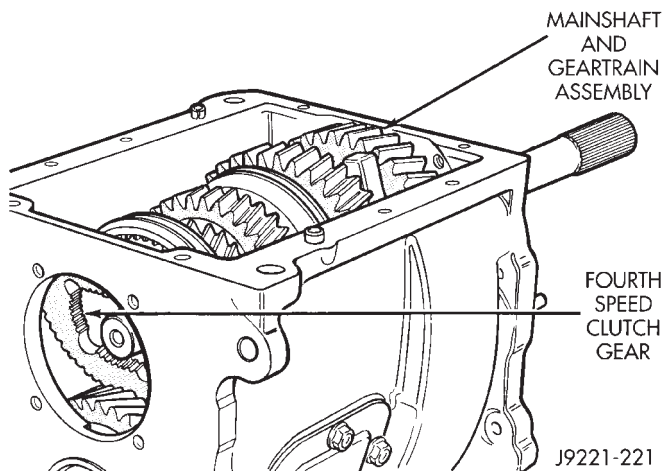


Fig. 121 Mainshaft And Geartrain Installed In Case

(5) Install drive gear thrust bearing on mainshaft (Fig. 122). Use plenty of petroleum jelly to hold bearing in place.

(6) Check alignment and mesh of mainshaft gears. If gears are not aligned, roll case on side and realign shaft and gears in case.

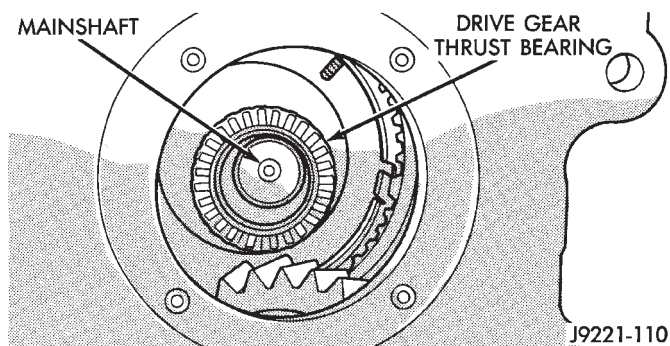


Fig. 122 Drive Gear Thrust Bearing Installation

DRIVE GEAR AND RETAINER INSTALLATION

(1) Install bearing on drive gear with Installer Tool 6448 (Fig. 123).

(2) Lubricate pilot bearing with petroleum jelly and install it in drive gear bore.

(3) Install drive gear on mainshaft. Work gear rearward until mainshaft hub is fully seated in pilot bearing.

(4) Install bearing cup in front retainer with Driver Handle C-4171 and Installer C-4308 (Fig. 124).

(5) Install new oil seal in front bearing retainer with Tool 6052 (Fig. 125). Use one or two wood blocks to support retainer as shown. Lubricate seal lip with petroleum jelly after installation.

(6) Clean contact surfaces of gear case and front bearing retainer with a wax and grease remover.

(7) Apply Mopar® Gasket Maker to flange surface of front bearing retainer (Fig. 126).

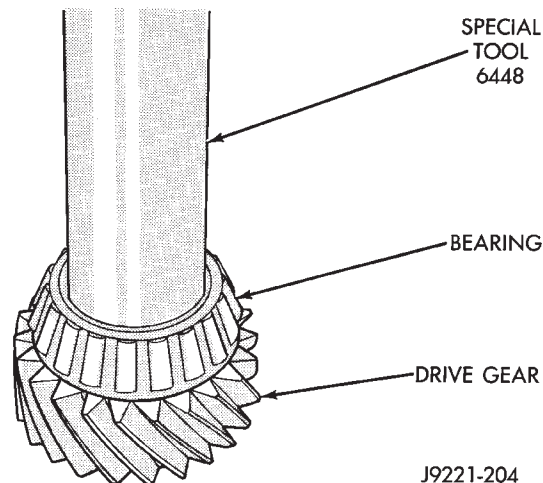


Fig. 123 Installing Front Bearing On Drive Gear

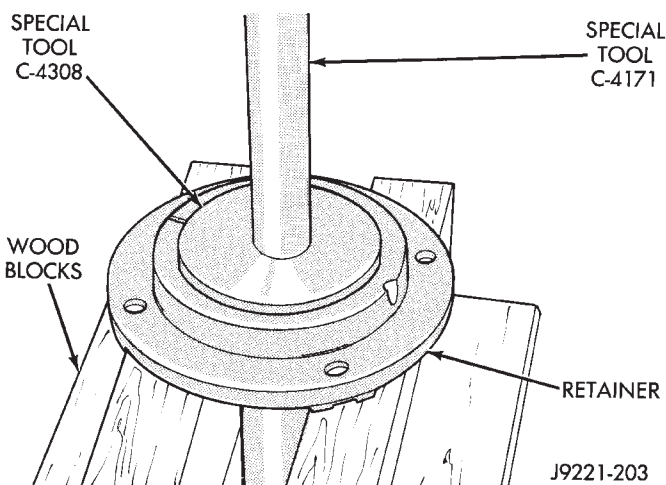


Fig. 124 Installing Front Bearing Cup In Retainer

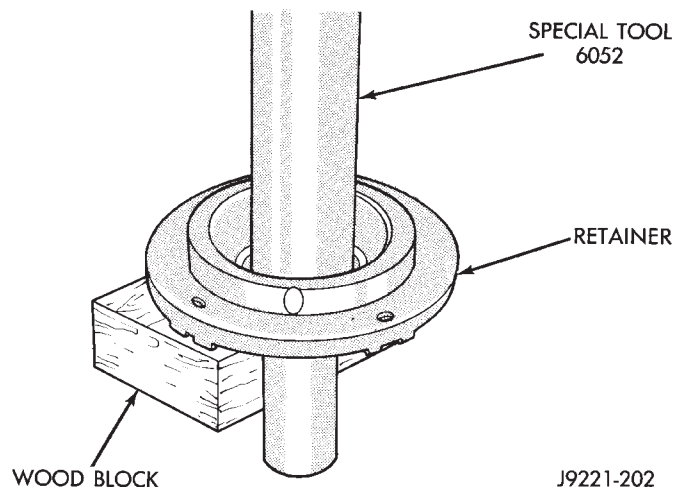


Fig. 125 Installing Bearing Retainer Oil Seal

(8) Install front bearing retainer over drive gear and start it into case.

DISASSEMBLY AND ASSEMBLY (Continued)

(9) Start front bearing retainer in gear case. Verify that retainer lube channel is at top-center (12 O'clock) position (Fig. 126). Adjust retainer position before proceeding, if necessary.

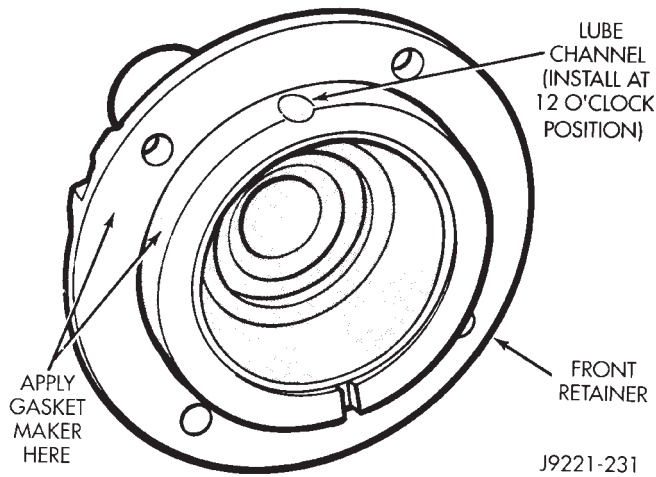


Fig. 126 Location Of Front Retainer Lube Channel

(10) Align front bearing retainer bolt holes and tap retainer into place with plastic mallet. Install and tighten retainer bolts to 30 N·m (265 in. lbs.) torque (Fig. 127). **Use new retainer bolts. Do not reuse the old ones.**

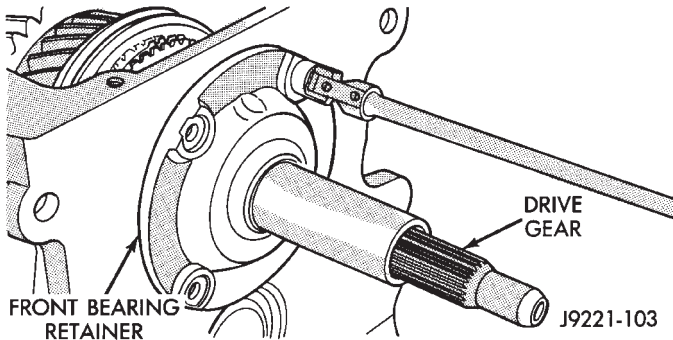


Fig. 127 Installing Front Bearing Retainer

MAINSHAFT END PLAY ADJUSTMENT

- (1) Install mainshaft rear bearing.
- (2) Install mainshaft rear bearing cup in case and over bearing. Tap bearing cup into place with plastic mallet.
- (3) Install rear bearing plate to hold mainshaft and rear bearing in position (Fig. 128). Do not install any end play shims at this time.
- (4) Tighten rear bearing plate bolts securely.
- (5) Place gear case in upright position on bench. Either cut hole in bench to accept drive gear and front retainer, or use C-clamps to secure transmission on bench. Do not leave transmission unsupported.
- (6) Install Extension Rod 8161 into a suitable threaded hole in rear of case.

(7) Mount dial indicator on extension rod and position indicator plunger against end of mainshaft.

(8) Move mainshaft forward to remove all play. Then zero dial indicator.

(9) Move mainshaft upward and observe dial indicator reading. Move mainshaft with pry tool positioned between drive gear and case.

(10) End play should be 0.051-0.15 mm (0.002-0.006 in.). Select fit shims are available to adjust end play, if necessary.

(11) If end play adjustment is required, remove bearing plate and install necessary shim.

(12) Reinstall rear bearing plate (Fig. 128).

(13) Apply Mopar® Lock N' Seal, or equivalent, bearing plate bolt threads. Then install and tighten bolts to 23 N·m (200 in. lbs.) torque. Be sure oil hole in bearing plate is at top as shown.

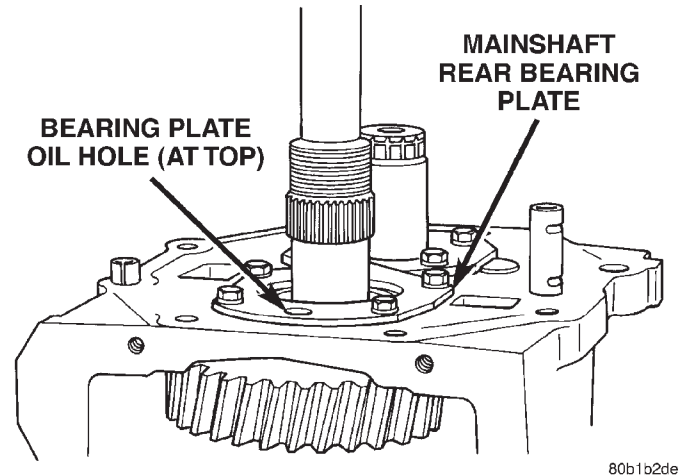


Fig. 128 Rear Bearing Plate Installation

COUNTERSHAFT FIFTH GEAR SYNCHRO INSTALLATION

(1) Install thrust washer pin in countershaft (Fig. 129).

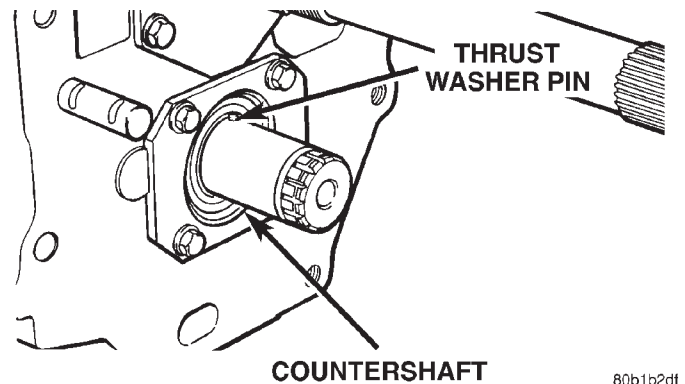
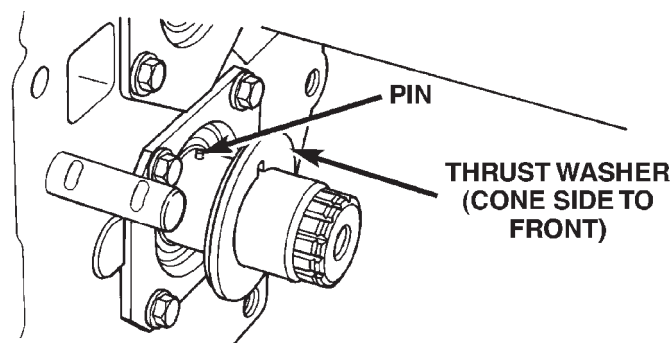


Fig. 129 Installing Fifth Gear Thrust Washer Pin

DISASSEMBLY AND ASSEMBLY (Continued)

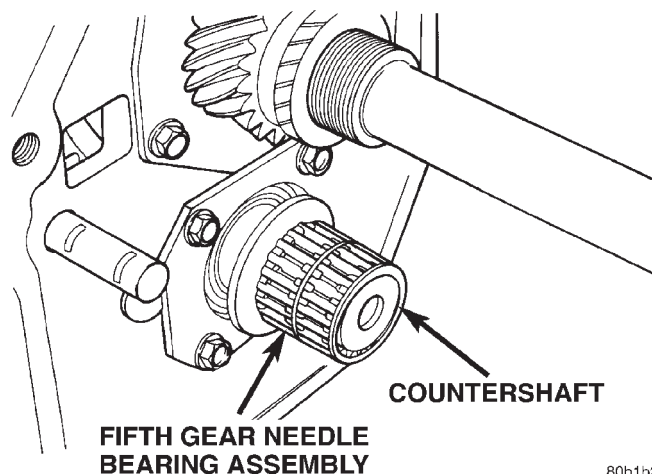
(2) Install thrust washer on countershaft. Turn washer until pin engages in washer notch (Fig. 130). Flat side of washer faces rear and cone side to front as shown.



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Fig. 130 Installing Fifth Gear Thrust Washer

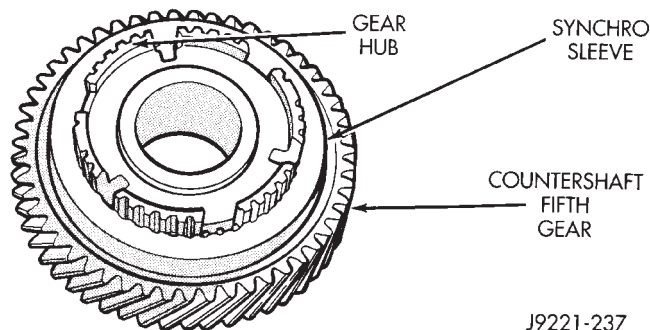
(3) Lubricate and install fifth gear bearing on countershaft (Fig. 131).



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Fig. 131 Countershaft Fifth Gear Bearing Installation

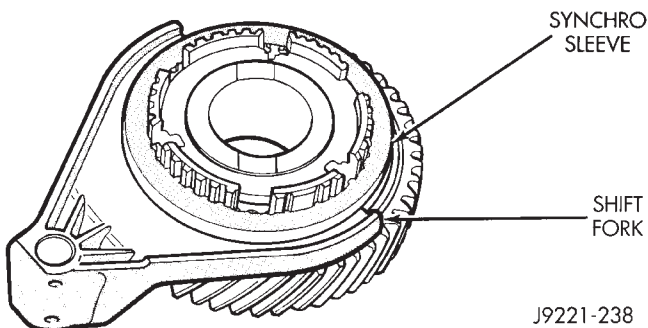
(4) Install synchro sleeve on hub of countershaft fifth gear. Tapered side of sleeve faces front and flat side faces rear (Fig. 132).



J9221-237

Fig. 132 Installing Synchro Sleeve On Countershaft Fifth Gear Hub

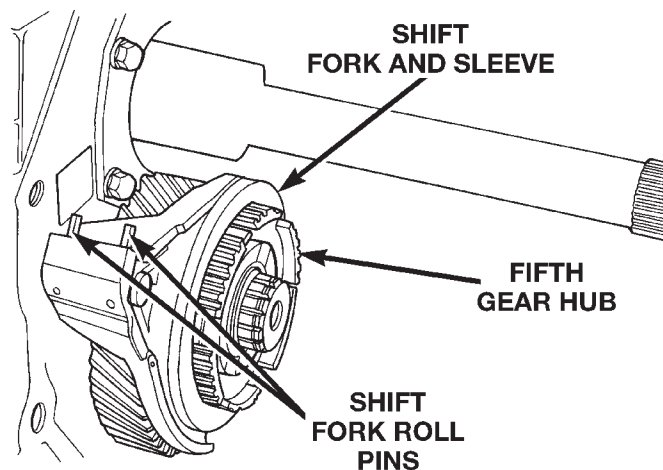
(5) Install shift fork in synchro sleeve (Fig. 133).



J9221-238

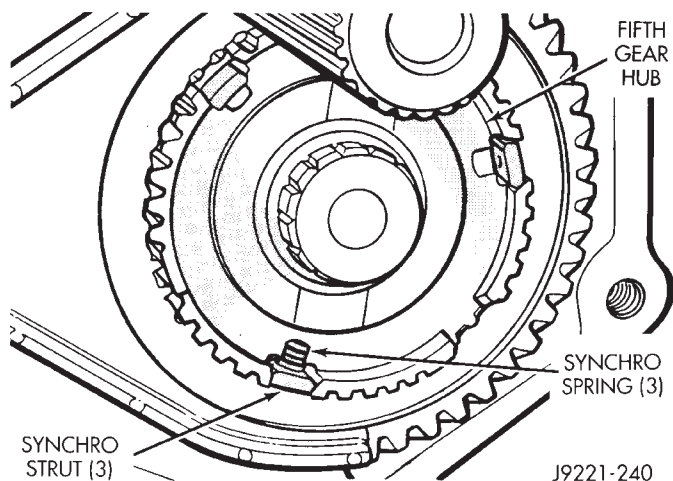
Fig. 133 Installing Fifth Gear Shift Fork In Synchro Sleeve

(6) Install assembled fifth gear, synchro sleeve and shift fork (Fig. 134). Align fork with shift lug rail and align gear with bearings and countershaft. Start components onto shaft and rail. Then tap gear and fork into place with plastic or rawhide mallet.



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Fig. 134 Installing Assembled Countershaft Fifth Gear, Shift Fork And Synchro Sleeve

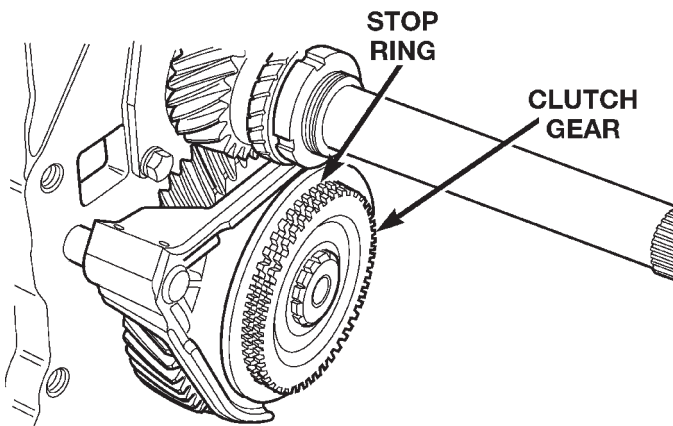


J9221-240

Fig. 135 Installing Fifth Gear Synchro Struts And Springs

DISASSEMBLY AND ASSEMBLY (Continued)

(7) Assemble and install fifth synchro clutch gear and stop ring in fifth gear hub (Fig. 136). Make sure both parts are seated in fifth gear hub.

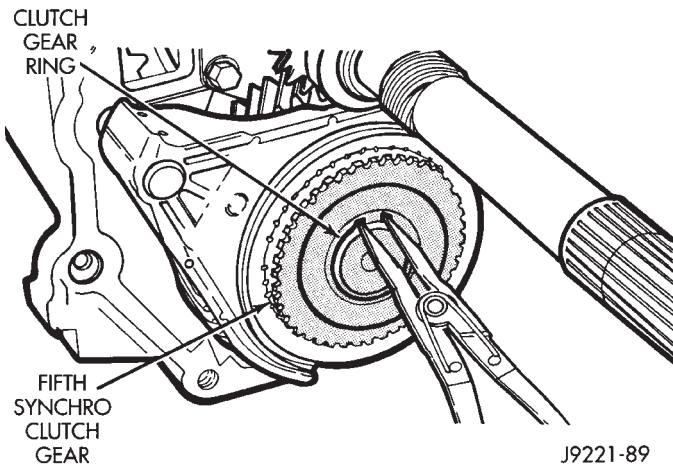


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Fig. 136 Fifth Synchro Clutch Gear And Stop Ring Installation

(8) Install clutch gear snap ring (Fig. 137).

(9) Align roll pin holes in shift fork with notches in shift lug rail. Then install roll pins from top side of fork (Fig. 134). Note that roll pins are one way fit due to small shoulder at one end of each pin.



J9221-89

Fig. 137 Installing Fifth Synchro Clutch Snap Ring

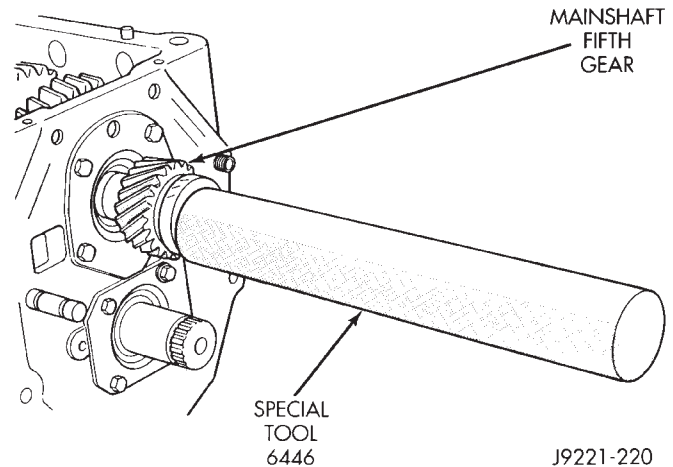
MAINSHAFT FIFTH GEAR INSTALLATION

(1) Install mainshaft fifth gear. Use Installer Tool 6446 to seat gear on shaft (Fig. 138). Gear is seated when it contacts rear bearing.

(2) Install new fifth gear nut on mainshaft (Fig. 139).

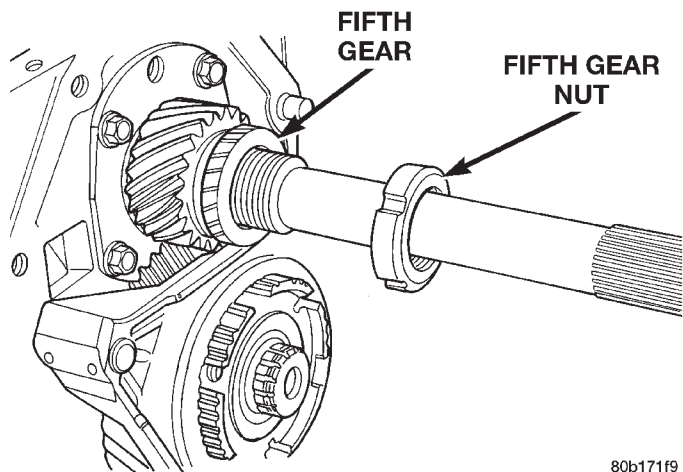
(3) There are four splined sockets available to retain the mainshaft while installing the fifth gear nut.

- Socket 6441 fits light duty 4X2 mainshafts.
- Socket 6442 fits light duty 4X4 mainshafts.
- Socket 6993 fits heavy duty 4X2 mainshafts.



J9221-220

Fig. 138 Installing Mainshaft Fifth Gear



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Fig. 139 Installing Fifth Gear Nut

- Socket 6984 fits heavy duty 4X4 mainshafts.

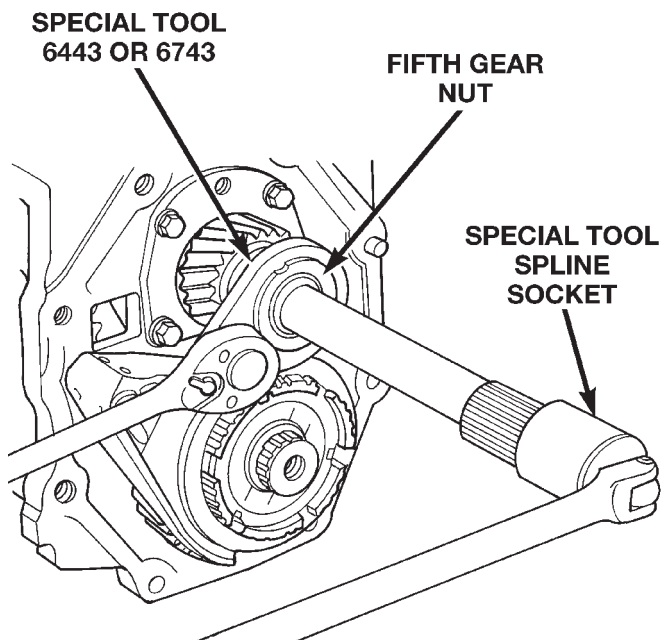
(4) Tighten fifth gear nut as much as possible with Nut Wrench 6443 or 6743, long handle ratchet, breaker bar and applicable socket wrench (Fig. 140).

(5) Lock mainshaft gears by shifting all synchro sleeves into engaged position.

(6) Tighten fifth gear nut with Nut Wrench 6443 or 6743 and high capacity torque wrench. Required torque on nut is 339-475 N·m (250-350 ft. lbs.). Have helper hold transmission steady if necessary.

(7) Use Staking Tool 8213 to stake the fifth gear nut to the mainshaft. The tool is designed to function on both the light duty and heavy duty versions of the NV4500. Ensure that the tool is configured properly for the transmission being serviced.

NOTE: It may be necessary to remove the fifth gear fork and countershaft fifth gear components in order to install the Staking Tool 8213 onto the fifth gear nut.



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Fig. 140 Fifth Gear Nut Installation

CLEANING AND INSPECTION

SHIFT COVER INSPECTION

Inspect the cover and shift components whenever the cover is removed from the gear case or whenever diagnosis indicates inspection is necessary.

Check the forks for wear, distortion, cracks, or being loose on the shift rails. Also check fit of the shift rails in the cover. Replace the cover assembly if the rails are loose in the cover bores.

Inspect and replace the pads on the fifth-reverse shift fork if worn. The expansion plugs at the rear of the cover can be replaced if loose or leaking.

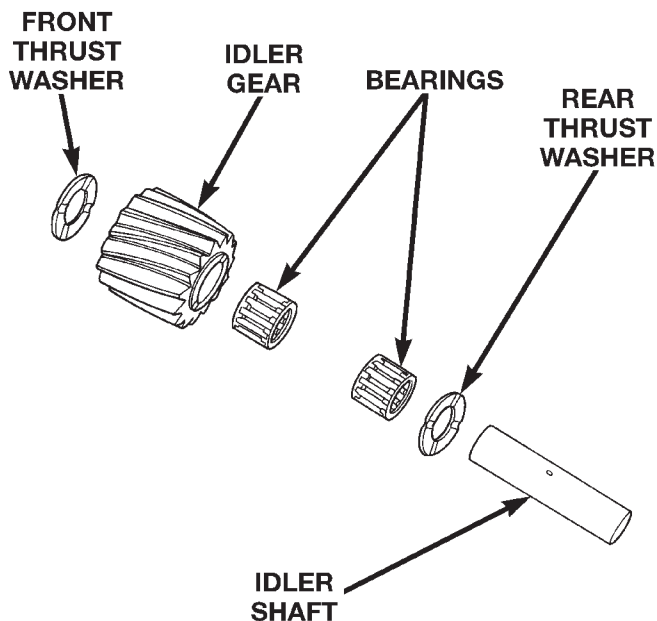
A gasket is not used between the shift cover and gear case. Use Mopar® Gasket Maker, or equivalent, to seal the cover.

TRANSMISSION

Clean the gears, bearings shafts, extension/adaptor housing and gear case with solvent. Dry all parts except the bearings with compressed air. Allow the bearings to either air dry or wipe them dry with clean shop towels.

Inspect the reverse idler gear, bearings, shaft and thrust washers (Fig. 141). Replace the bearings if the rollers are worn, chipped, cracked, flat-spotted, or brinnelled. Or if the bearing cage is damaged or distorted. Replace the thrust washers if cracked, chipped, or worn. Replace the gear if the teeth are chipped, cracked or worn thin.

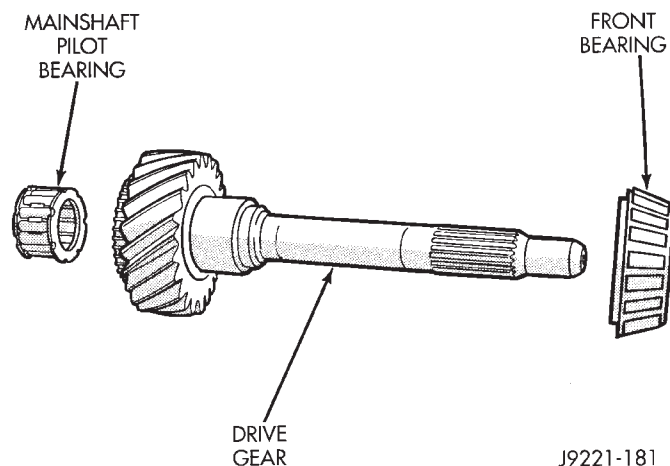
Inspect the drive gear and bearings (Fig. 142). Minor scratches and burrs on the gear surfaces can be reduced with an oil stone and 400 grit paper wet-



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Fig. 141 Reverse Idler Components

ted with oil. Replace either bearing if worn, or damaged. Replace the gear if any teeth, splines, or bearing surfaces are also worn or damaged.



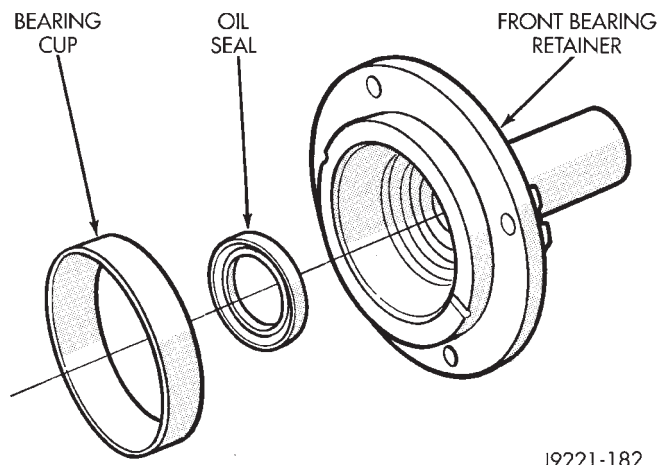
J9221-181

Fig. 142 Drive Gear Components

Inspect the front bearing retainer and bearing cup (Fig. 143). Replace the bearing cup if scored, cracked, brinnelled, or rough. Check the release bearing slide surface of the retainer carefully. Minor corrosion, nicks, or pitting can be smoothed with 400 grit emery and polished out with crocus cloth. Wet the abrasive paper and crocus cloth with oil when smoothing/polishing. Replace the retainer if worn or damaged in any way. Do not reuse the original retainer bolts. Install new bolts during assembly.

Inspect the countershaft and bearings (Fig. 144). Replace the bearings if worn, rough, flat spotted, or

CLEANING AND INSPECTION (Continued)

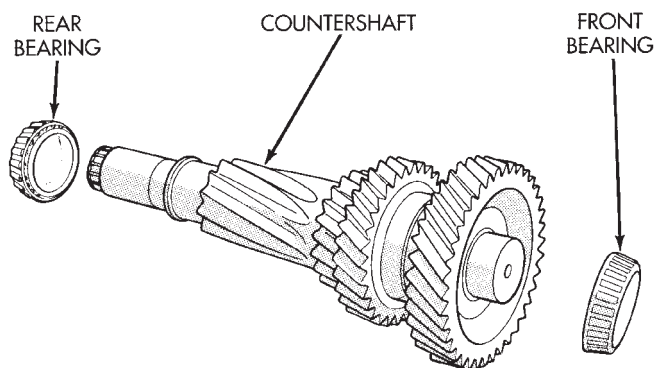


J9221-182

Fig. 143 Front Bearing Retainer Components

heat checked. Check the countershaft gear teeth carefully. Small nicks, scratches, or burrs can be removed with an oil stone and 400 grit paper wetted with oil. Replace the shaft if any of the teeth are worn, cracked, broken, or severely chipped.

Be sure to check condition of the countershaft bearing cups. Replace either bearings cup if worn, or damaged.



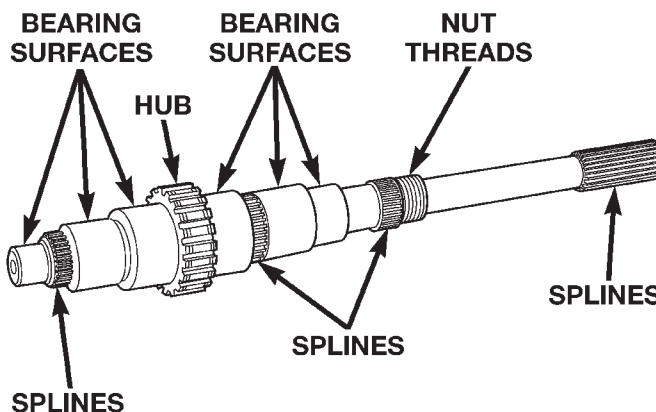
J9221-184

Fig. 144 Countershaft And Bearings

Check condition of the mainshaft. Inspect all the bearing surfaces, splines and threads. Also check condition of the snap ring grooves in the hub area and the speedometer drive gear teeth (Fig. 145). Minor scratches or burrs can be removed with an oil stone and polished with crocus cloth. However, replace the shaft if any surfaces exhibit considerable wear or damage.

Check condition of the gear case and extension or adapter housing. Be sure the alignment dowels in the case top surface and in the housing/adapter are tight and in good condition.

Run a tap through the gear case bolt holes if the threads need minor cleanup. Helicoil inserts can be



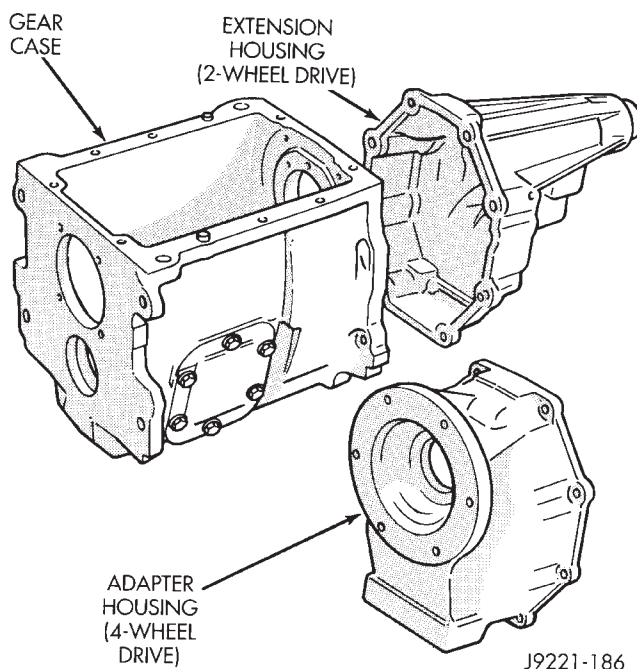
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Fig. 145 Mainshaft Bearing And Spline Surfaces

used to repair seriously damaged threaded holes if necessary.

Be sure all case and housing/adapter sealing and mating surfaces are free of burrs and nicks. This is especially important as gaskets are not used in the NV4500. Minor nicks and scratches on the sealing surfaces can be dressed off with a fine tooth file or oil stone.

Replace the gear case or housing/adapter if cracked or broken. Do not attempt to repair this type of damage by welding or brazing.



J9221-186

Fig. 146 Gear Case And Extension/Adapter Housings

Check condition of the countershaft fifth gear components (Fig. 147). This includes the shift lug and rail located in the gear case and the rail bushings.

CLEANING AND INSPECTION (Continued)

Inspect the gear and hub assembly. Minor burrs can be cleaned up with an oil stone. However, the gear and hub assembly should be replaced if the teeth or splines are excessively worn, or damaged. The synchro sleeve should also be replaced if worn or damaged in any way. Do not reuse synchro struts that are worn, or springs that are collapsed or severely distorted. Replace worn distorted synchro parts to avoid shift problems after assembly and installation.

The shift fork should be inspected for evidence of wear and distortion. Check fit of the sleeve in the fork to be sure the two parts fit and work smoothly. Replace the fork if the roll pin holes are worn over-size or damaged. Do not attempt to salvage a worn fork. It will cause shift problems later on. Replace the shift fork roll pins if necessary, or if doubt exists about their condition.

The bearings should be examined carefully for wear, roughness, flat spots, pitting, or other damage. Replace the bearings if necessary.

Inspect the stop ring and clutch gear. replace either part if worn or damaged in any way. Also be sure replacement parts fit properly before proceeding with assembly.

Examine the 1-2 synchro hub and sleeve for wear or damage. Replace the sleeve and hub if the splines are worn, chipped or damaged.

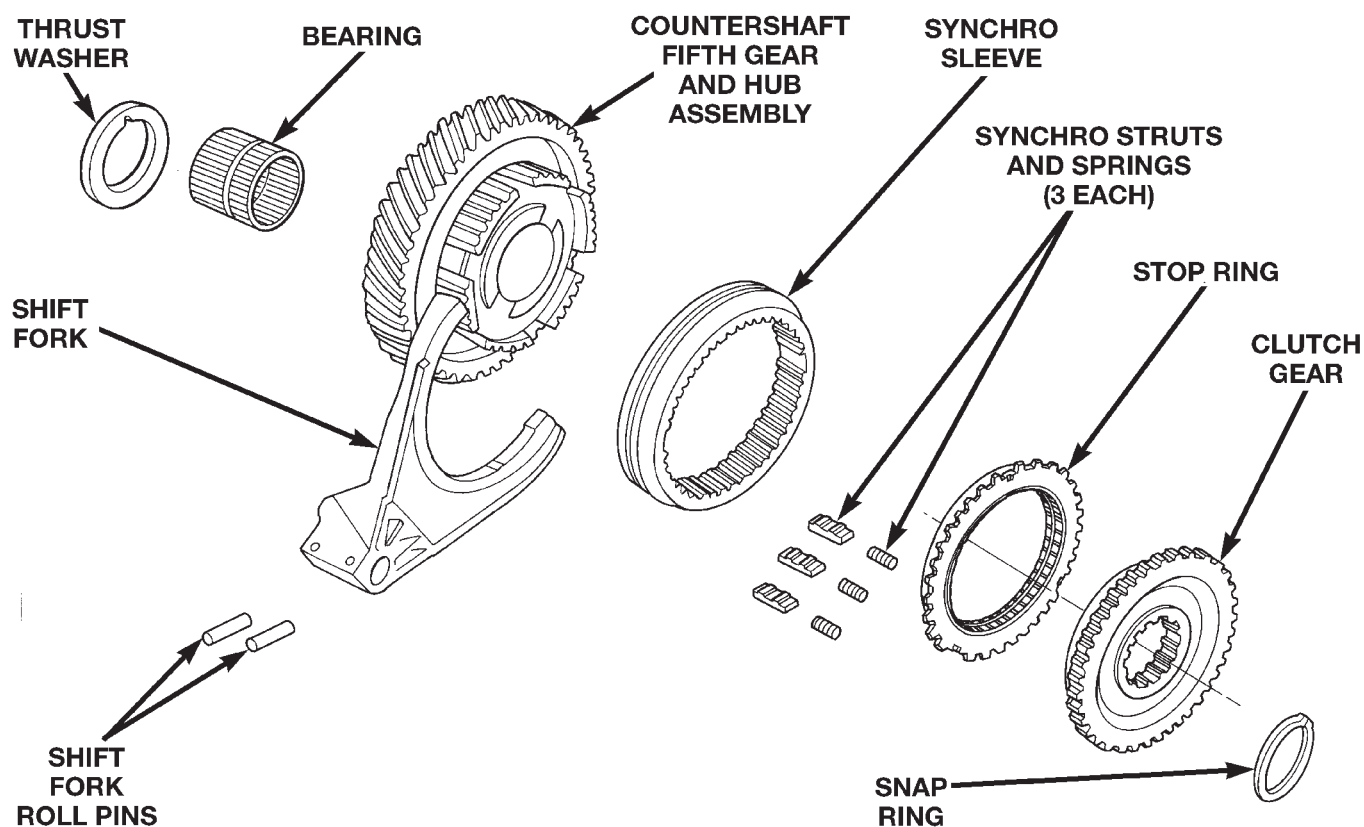
Replace the synchro struts if worn, or chipped. Also replace the springs if collapsed, distorted, or broken.

Inspect the mainshaft geartrain components. Check the teeth on all gears, hubs, clutch gears, stop rings and clutch rings. The teeth must be in good condition and not worn, cracked, or chipped. Replace any component that exhibits wear or damage.

Examine the synchro stop rings, clutch rings and clutch gears. Replace any part that exhibits wear, distortion, or damage. Replace the clutch rings if the friction material is burned, flaking off, or worn.

Inspect all of the thrust washers and locating pins. Replace the pins if bent, or worn. Replace the washers if worn, or the locating pin notches are distorted.

Check condition of the synchro struts and springs. Replace these parts if worn, cracked, or distorted.



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Fig. 147 Countershaft Fifth Gear Components

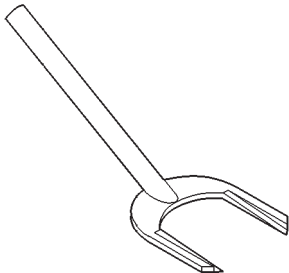
SPECIFICATIONS

TORQUE

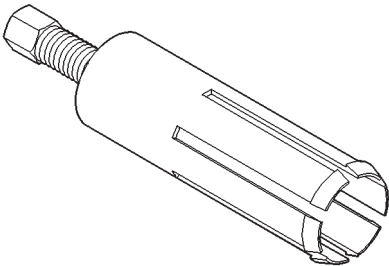
DESCRIPTION	TORQUE
Backup Light Switch	22-34 N·m (193-300 in. lbs.)
Countershaft Bearing Plate Bolts	19-26 N·m (170-230 in. lbs.)
Fifth Gear Nut	339-475 N·m (250-350 ft. lbs.)
Drain and Fill Plugs	34-47 N·m (25-35 ft. lbs.)
Front Bearing Retainer Bolts	27-34 N·m (235-305 in. lbs.)
Mainshaft Bearing Plate Bolts	19-26 N·m (170-230 in. lbs.)
PTO Cover Bolts	27-54 N·m (20-40 ft. lbs.)
Extension/Adapter Housing Bolts	41-68 N·m (30-50 ft. lbs.)
Reverse Inhibitor Screws	8-14 N·m (75-115 in. lbs.)
Shift Cover Bolts	27-31 N·m (216-276 in. lbs.)
	J9221-12

SPECIAL TOOLS

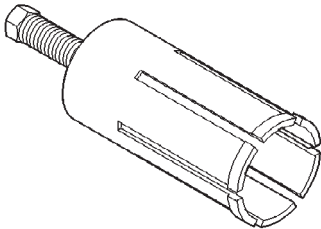
NV4500 MANUAL TRANSMISSION



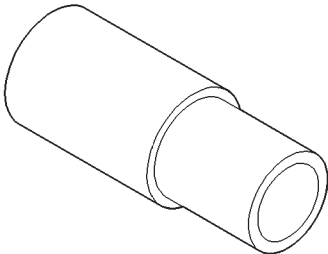
Remover, Seal—C-3985-B



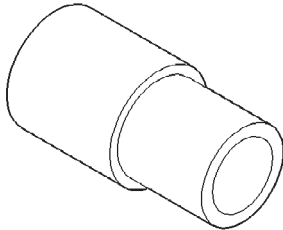
Remover, Bushing—6957



Remover, Bushing—8155

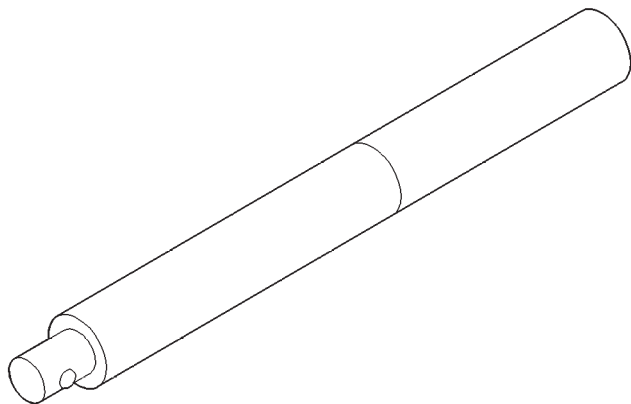
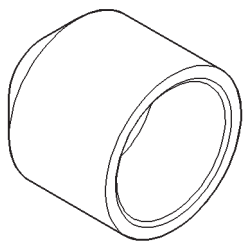
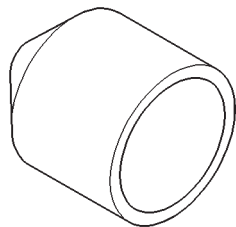
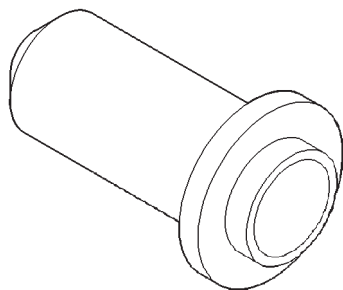
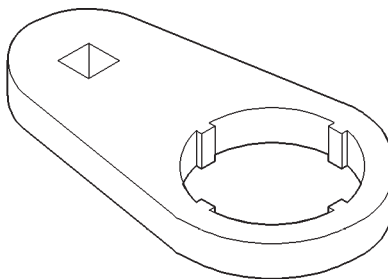
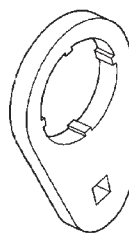
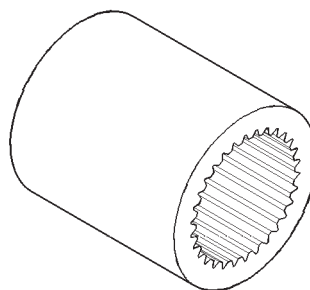
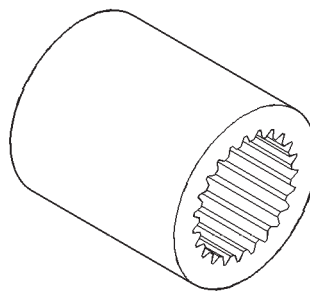


Installer, Bushing—6951

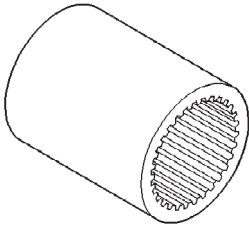


Installer, Bushing—8156

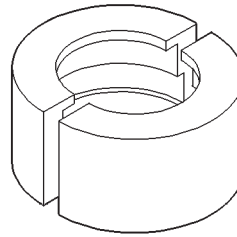
SPECIAL TOOLS (Continued)

***Handle Universal—C-4171******Installer, Seal—C-3972-A******Installer, Seal—8154******Installer, Seal—C-3860-A******Wrench, 5th Gear Nut—6443******Wrench, Fifth Gear Nut—6743******Wrench, Splined Socket—6441******Wrench, Splined Socket—6442***

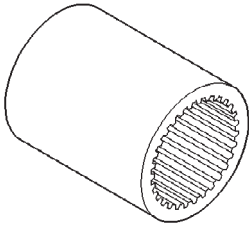
SPECIAL TOOLS (Continued)



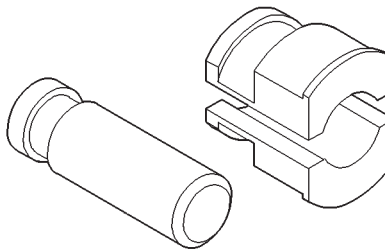
Wrench, Splined Socket—6993



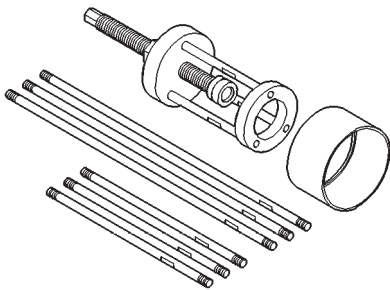
Jaws, Sprocket Remover (Use With 6444)—6820



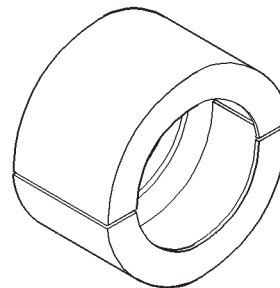
Wrench, Splined Socket—6984



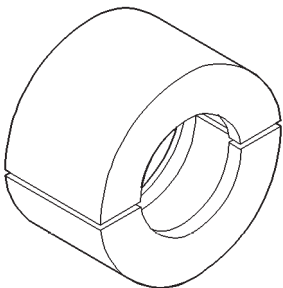
Jaws and Insert, Sprocket Remover—6453



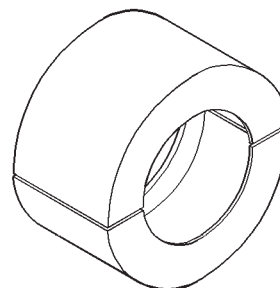
Puller, Bearing and Gear—6444



Jaws, Bearing Cone (For Puller 6444)—6447

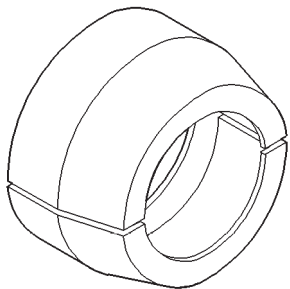
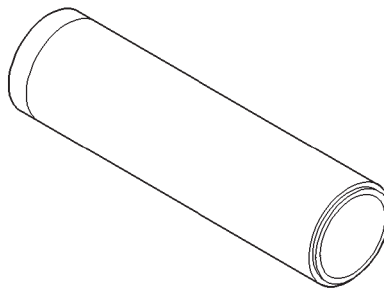
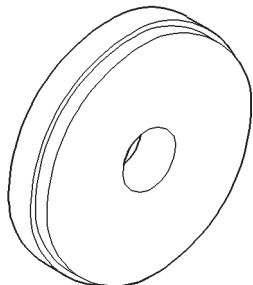
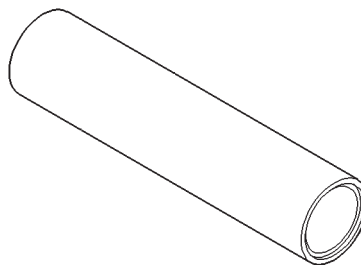
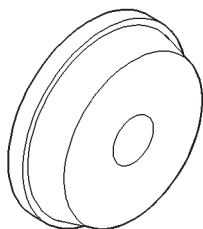
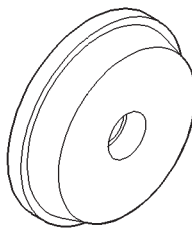
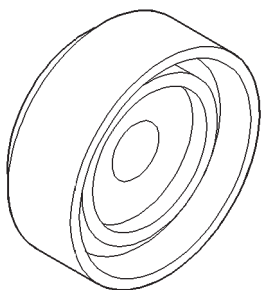
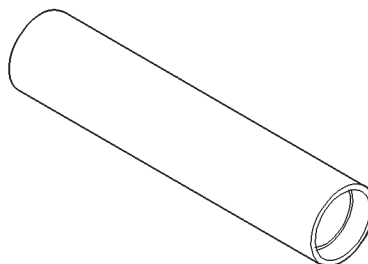


Jaws, 5th Gear (For Puller 6444)—6459

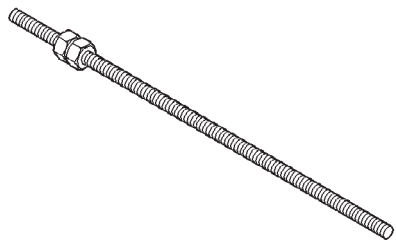


Jaws, Bearing Cone (For Puller 6444)—6449

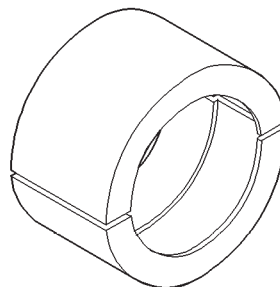
SPECIAL TOOLS (Continued)

**Jaws, Bearing Cone (For Puller 6444)—6451****Installer—C-4040****Remover, Countershaft Bearing Cup—6454****Installer, Bearing Cone—6448****Installer—6061****Installer, Bearing Cup—C-4308****Installer—C-4340****Installer, Bearing Cone—6052**

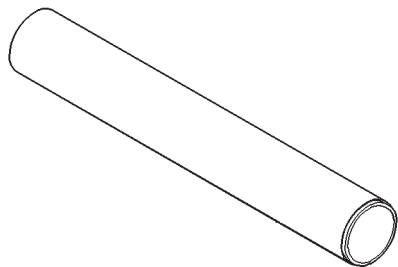
SPECIAL TOOLS (Continued)



Rod, Extension—8161



Jaws, Bearing Cone (For Puller 6444)—6445



Installer, Bearing Cone & 5th Gear—6446

AUTOMATIC TRANSMISSION-42RE

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GENERAL INFORMATION

42RE TRANSMISSION

The 42RE is a four speed fully automatic transmission (Fig. 1) with an electronic governor. First through third gear ranges are provided by the clutches, bands, overrunning clutch, and planetary gear sets in the transmission. Fourth gear range is provided by the overdrive unit that contains an overdrive clutch, direct clutch, planetary gear set, and overrunning clutch. The overdrive clutch is applied in fourth gear only. The direct clutch is applied in all ranges except fourth gear. The 42RE is equipped with a lock-up clutch in the torque converter. The

torque converter clutch is controlled by the Powertrain Control Module (PCM). 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 engages in fourth gear, and in third gear when the O/D switch is OFF. Engagement occurs when the vehicle is cruising on a level plane after the vehicle has warmed up. The torque converter clutch disengages when the accelerator is applied. The torque converter clutch feature increases fuel economy and reduces the transmission fluid temperature. The 42RE transmission is cooled by an integral fluid cooler inside the radiator.

GENERAL INFORMATION (Continued)

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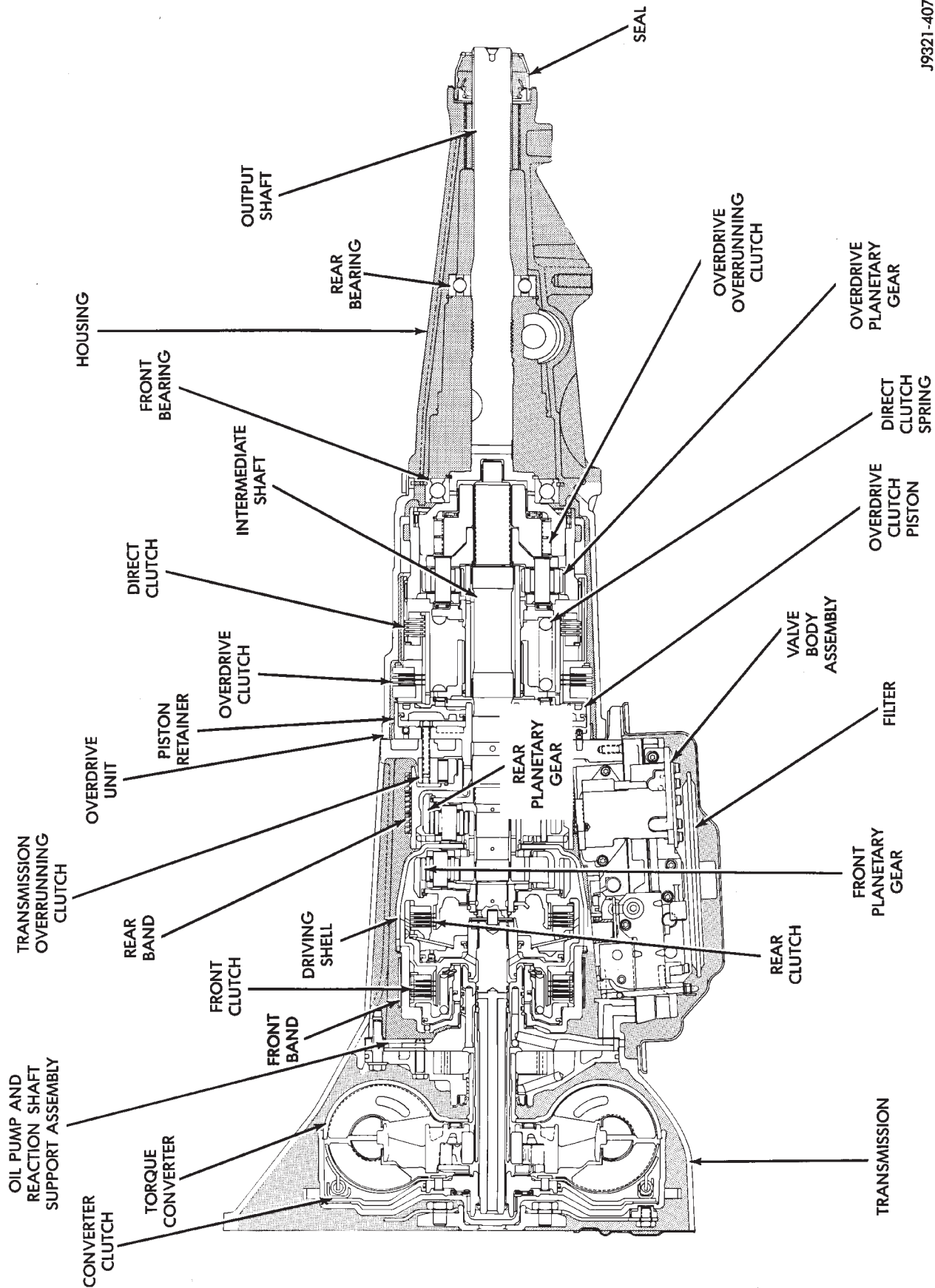


Fig. 1 42RE Transmission

GENERAL INFORMATION (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.

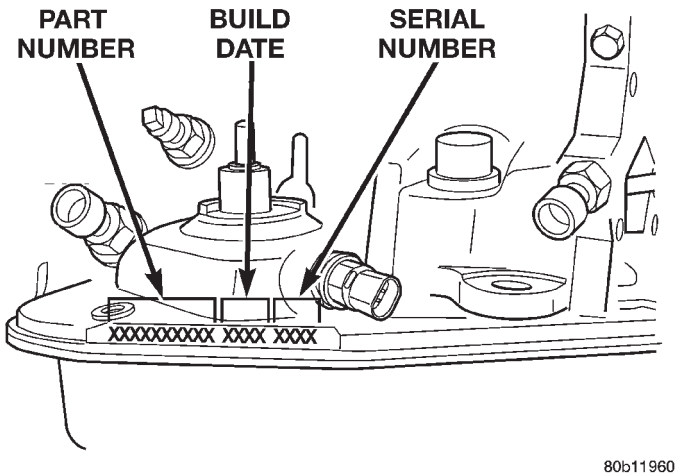


Fig. 2 Transmission Part And Serial Number Location

RECOMMENDED FLUID

Mopar® ATF Plus 3, Type 7176 automatic transmission fluid is the recommended fluid for Chrysler automatic transmissions.

Dexron II fluid IS NOT recommended. Clutch chatter can result from the use of improper fluid.

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.

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
- 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.

ELECTRONIC LOCK-UP TORQUE CONVERTER

The torque converter is a hydraulic device that couples the engine crankshaft to the transmission.

GENERAL INFORMATION (Continued)

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. Torque multiplication is created when the stator directs the hydraulic flow from the turbine to rotate the impeller in the direction the engine crankshaft is turning. The turbine transfers power to the planetary gear sets in the transmission. The transfer of power into the impeller assists torque multiplication. At low vehicle-speed, the overrunning clutch holds the stator stationary (during torque multiplication) and allows the stator to freewheel at high vehicle speed. The converter clutch engagement reduces engine speed. Clutch engagement also provides reduced transmission fluid temperatures. 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 results in large amounts of metal or fiber contamination in the fluid.

TRANSMISSION GEAR RATIOS

Gear ratios are:

- **1st** 2.74:1
- **2nd** 1.54:1
- **3rd** 1.00:1
- **4th** 0.69:1
- **Rev.** 2.21

GEARSHIFT MECHANISM

The gear shift mechanism provides six shift positions which are:

- park (P)
- reverse (R)
- neutral (N)
- drive (D)
- manual second (2)
- manual low (1)

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.

Drive range provides first, second third and overdrive fourth gear ranges. The shift into overdrive fourth gear range occurs only after the transmission has completed the shift into D third gear range. No further movement of the shift mechanism is required to complete the 3-4 shift.

The fourth gear upshift occurs automatically when the overdrive selector switch is in the ON position.

DESCRIPTION AND OPERATION

ELECTRONIC GOVERNOR

Governor pressure is controlled electronically. Components used for governor pressure control include:

- Governor body
- Valve body transfer plate
- Governor pressure solenoid valve
- Governor pressure sensor
- Fluid temperature thermistor
- Throttle position sensor (TPS)
- Transmission speed sensor
- Powertrain control module (PCM)

GOVERNOR PRESSURE SOLENOID VALVE

The solenoid valve is a duty-cycle solenoid which regulates the governor pressure needed for upshifts and downshifts. It is an electro-hydraulic device located in the governor body on the valve body transfer plate (Fig. 3).

The inlet side of the solenoid valve is exposed to normal transmission line pressure. The outlet side of the valve leads to the valve body governor circuit.

The solenoid valve regulates line pressure to produce governor pressure. The average current supplied to the solenoid controls governor pressure. One amp current produces zero kPa/psi governor pressure. Zero amps sets the maximum governor pressure.

The powertrain control module (PCM) turns on the trans control relay which supplies electrical power to the solenoid valve. Operating voltage is 12 volts (DC). The PCM controls the ground side of the solenoid using the governor pressure solenoid control circuit.

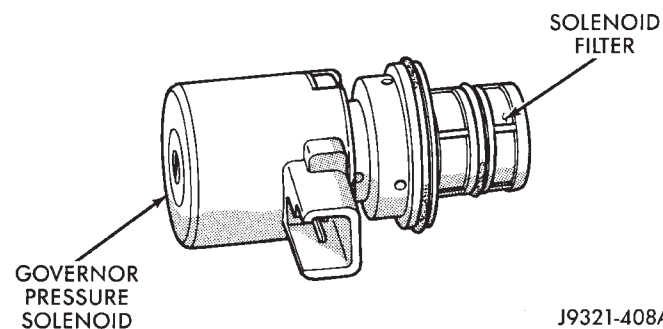


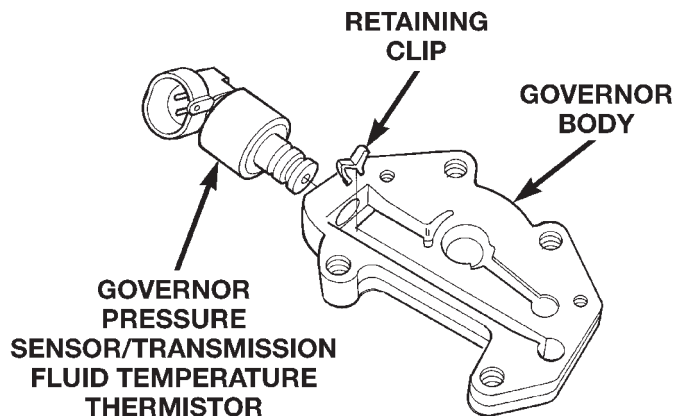
Fig. 3 Governor Pressure Solenoid Valve

GOVERNOR PRESSURE SENSOR

The governor pressure sensor measures output pressure of the governor pressure solenoid valve (Fig. 4).

The sensor output signal provides the necessary feedback to the PCM. This feedback is needed to adequately control governor pressure.

DESCRIPTION AND OPERATION (Continued)



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Fig. 4 Governor Pressure Sensor**GOVERNOR BODY AND TRANSFER PLATE**

The transfer plate is designed to supply transmission line pressure to the governor pressure solenoid valve and to return governor pressure.

The governor pressure solenoid valve is mounted in the governor body. The body is bolted to the lower side of the transfer plate (Fig. 4). The transfer plate channels line pressure to the solenoid valve through the governor body. It also channels governor pressure from the solenoid valve to the governor circuit. It is the solenoid valve that develops the necessary governor pressure.

TRANSMISSION FLUID TEMPERATURE THERMISTOR

Transmission fluid temperature readings are supplied to the transmission control module by the thermistor. The temperature readings are used to control engagement of the fourth gear overdrive clutch, the converter clutch, and governor pressure. Normal resistance value for the thermistor at room temperature is approximately 1000 ohms.

The PCM prevents engagement of the converter clutch and overdrive clutch, when fluid temperature is below approximately 10°C (50°F).

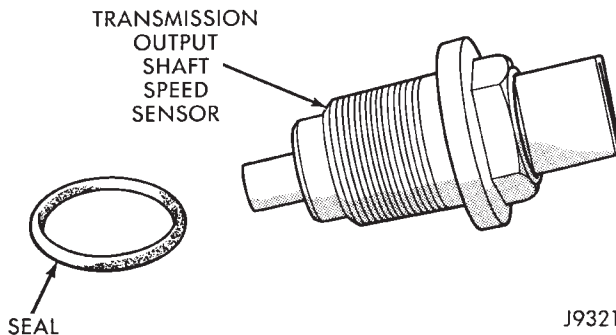
If fluid temperature exceeds 126°C (260°F), the PCM causes a 4-3 downshift and engage the converter clutch. Engagement is according to the third gear converter clutch engagement schedule.

The overdrive OFF lamp in the instrument panel illuminates when the shift back to third occurs. The transmission will not allow fourth gear operation until fluid temperature decreases to approximately 110°C (230°F).

The thermistor is part of the governor pressure sensor assembly and is immersed in transmission fluid at all times.

TRANSMISSION SPEED SENSOR

The speed sensor (Fig. 5) is located in the overdrive gear case. The sensor is positioned over the park gear and monitors transmission output shaft rotating speed. Speed sensor signals are triggered by the park gear lugs as they rotate past the sensor pickup face. Input signals from the sensor are sent to the transmission control module for processing. The vehicle speed sensor also serves as a backup for the transmission speed sensor. Signals from this sensor are shared with the powertrain control module.



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Fig. 5 Transmission Output Speed Sensor**THROTTLE POSITION SENSOR (TPS)**

The TPS provides throttle position input signals to the PCM. This input signal is used to determine overdrive and converter clutch shift schedule and to select the proper governor curve.

POWERTRAIN CONTROL MODULE (PCM)

The PCM controls operation of the converter clutch, overdrive clutch, and governor pressure solenoid.

The control module determines transmission shift points based on input signals from the transmission thermistor, transmission output shaft speed sensor, crankshaft position sensor, vehicle speed sensor, throttle position sensor, and battery temperature sensor.

GOVERNOR PRESSURE CURVES

There are four governor pressure curves programmed into the transmission control module. The different curves allow the control module to adjust governor pressure for varying conditions. One curve is used for operation when fluid temperature is at, or below, 1°C (30°F). A second curve is used when fluid temperature is at, or above, 10°C (50°F) during normal city or highway driving. A third curve is used during wide-open throttle operation. The fourth curve is used when driving with the transfer case in low range.

DESCRIPTION AND OPERATION (Continued)

SHIFT VALVE OPERATION

The shift valves are moved by a combination of throttle and governor pressure. The governor pressure is generated by electrical components.

The conditions under which a shift to fourth will not occur are:

- Overdrive switch is Off
- Transmission fluid temperature is below 10° C (50° F) or above 121° C (250° F)
- Shift to third not yet completed
- Vehicle speed too low for 3-4 shift to occur
- Battery temperature below -5° F.

HYDRAULIC CONTROL SYSTEM

The hydraulic control system provides fully automatic operation. The system performs five basic functions which are: pressure supply, pressure regulation, flow control, clutch/band application, and lubrication.

PRESSURE REGULATION

The pressure regulator valve maintains line pressure. The amount of pressure developed is controlled by throttle pressure which is dependent on the degree of throttle opening. The regulator valve is located in the valve body.

The throttle valve determines line pressure and shift speed. Governor pressure increases in proportion to vehicle speed. The throttle valve controls upshift and downshift speeds by regulating pressure according to throttle position.

Shift Valve Flow Control

The manual valve is operated by the gearshift linkage and provides the operating range selected by the driver.

The 1-2 shift valve provides 1-2 or 2-1 shifts and the 2-3 shift valve provides 2-3 or 3-2 shifts.

The kickdown valve provides forced 3-2 or 3-1 downshifts depending on vehicle speed. Downshifts occur when the throttle is opened beyond downshift detent position. Detent is reached just before wide open throttle position.

The 2-3 valve throttle pressure plug provides 3-2 downshifts at varying throttle openings depending on vehicle speed.

The 1-2 shift control valve transmits 1-2 shift pressure to the accumulator piston. This controls kickdown band capacity on 1-2 upshifts and 3-2 downshifts.

The 3-4 shift, quick fill, and timing valves plus the 3-4 accumulator, are only actuated when the overdrive solenoid is energized. The solenoid contains a check ball that controls a vent port to the 3-4 valves. The check ball either diverts line pressure away from or directly to the 3-4 valves.

The limit valve determines maximum speed at which a 3-2 part throttle kickdown can be made. On

transmissions without a limit valve, maximum speed for a 3-2 kickdown is at detent position.

The 2-3 shuttle valve has two functions. The first is fast front band release and smooth engagement during lift-foot 2-3 upshifts. The second is to regulate front clutch and band application during 3-2 downshifts.

The 3-4 timing valve is moved by line pressure coming through the 3-4 shift valve. The timing valve holds the 2-3 shift valve in an upshift position. The purpose is to prevent the 2-3 valve from up or downshifting before the 3-4 valve.

The 3-4 accumulator is mounted on the overdrive housing and performs the same function as the 2-3 accumulator; it is used to smooth engagement during a 3-4 shift.

The switch valve directs fluid apply pressure to the converter clutch in one position and releases it in the opposite position. It also directs oil to the cooling and lube circuits. The switch valve regulates oil pressure to the torque converter by limiting maximum oil pressure to 130 psi.

OVERDRIVE OFF SWITCH

The overdrive OFF (control) switch is located in the shift lever arm. The switch is a momentary contact device that signals the PCM to toggle current status of the overdrive function. At key-on, overdrive operation is allowed. Pressing the switch once causes the overdrive OFF mode to be entered and the overdrive OFF switch lamp to be illuminated. Pressing the switch a second time causes normal overdrive operation to be restored and the overdrive lamp to be turned off. The overdrive OFF mode defaults to ON after the ignition switch is cycled OFF and ON. The normal position for the control switch is the ON position. The switch must be in this position to energize the solenoid and allow a 3-4 upshift. The control switch indicator light illuminates only when the overdrive switch is turned to the OFF position, or when illuminated by the transmission control module.

3-4 SHIFT SEQUENCE

The overdrive clutch is applied in fourth gear only. The direct clutch is applied in all ranges except fourth gear. Fourth gear overdrive range is electronically controlled and hydraulically activated. Various sensor inputs are supplied to the powertrain control module to operate the overdrive solenoid on the valve body. The solenoid contains a check ball that opens and closes a vent port in the 3-4 shift valve feed passage. The overdrive solenoid (and check ball) are not energized in first, second, third, or reverse gear. The vent port remains open, diverting line pressure from the 2-3 shift valve away from the 3-4 shift valve. The overdrive control switch must be in the ON position

DESCRIPTION AND OPERATION (Continued)

to transmit overdrive status to the PCM. A 3-4 upshift occurs only when the overdrive solenoid is energized by the PCM. The PCM energizes the overdrive solenoid during the 3-4 upshift. This causes the solenoid check ball to close the vent port allowing line pressure from the 2-3 shift valve to act directly on the 3-4 upshift valve. Line pressure on the 3-4 shift valve overcomes valve spring pressure moving the valve to the upshift position. This action exposes the feed passages to the 3-4 timing valve, 3-4 quick fill valve, 3-4 accumulator, and ultimately to the overdrive piston. Line pressure through the timing valve moves the overdrive piston into contact with the overdrive clutch. The direct clutch is disengaged before the overdrive clutch is engaged. The boost valve provides increased fluid apply pressure to the overdrive clutch during 3-4 upshifts, and when accelerating in fourth gear. The 3-4 accumulator cushions overdrive clutch engagement to smooth 3-4 upshifts. The accumulator is charged at the same time as apply pressure acts against the overdrive piston.

CONVERTER CLUTCH ENGAGEMENT

Converter clutch engagement in third or fourth gear range is controlled by sensor inputs to the powertrain control module. Inputs that determine clutch engagement are: coolant temperature, engine rpm, vehicle speed, throttle position, and manifold vacuum. The torque converter clutch is engaged by the clutch solenoid on the valve body. The clutch can be engaged in third and fourth gear ranges depending on overdrive control switch position. If the overdrive control switch is in the normal ON position, the clutch will engage after the shift to fourth gear, and above approximately 72 km/h (45 mph). If the control switch is in the OFF position, the clutch will engage after the shift to third gear, at approximately 56 km/h (35 mph) at light throttle.

QUICK FILL VALVE

The 3-4 quick fill valve provides faster engagement of the overdrive clutch during 3-4 upshifts. The valve temporarily bypasses the clutch piston feed orifice at the start of a 3-4 upshift. This exposes a larger passage into the piston retainer resulting in a much faster clutch fill and apply sequence. The quick fill valve does not bypass the regular clutch feed orifice throughout the 3-4 upshift. Instead, once a predetermined pressure develops within the clutch, the valve closes the bypass. Clutch fill is then completed through the regular feed orifice.

CONVERTER DRAINBACK VALVE

The drainback valve is located in the transmission cooler outlet (pressure) line. 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.

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 malfunctions. 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.

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

DIAGNOSIS AND TESTING (Continued)

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.

OVERDRIVE ELECTRICAL CONTROLS

The overdrive off switch, valve body solenoid, case connectors and related wiring can all be tested with a 12 volt test lamp or a volt/ohmmeter. Check continuity of each component when diagnosis indicates this is necessary. Refer to Group 8W, Wiring Diagrams, for component locations and circuit information.

Switch and solenoid continuity should be checked whenever the transmission fails to shift into fourth gear range.

GEARSHIFT LINKAGE AND THROTTLE CABLE**GEARSHIFT LINKAGE**

Gearshift linkage adjustment is important because it positions the valve body manual valve. Incorrect adjustment will cause creeping in Neutral, premature clutch wear, delayed engagement in any gear, or a no-start in Park or Neutral position.

Proper operation of the park/neutral position switch will provide a quick check of linkage adjustment.

THROTTLE VALVE CABLE ADJUSTMENT

Throttle valve cable adjustment is 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 short, early shifts and slippage between shifts may occur. If the setting is too long, shifts may be delayed and part throttle downshifts may be very sensitive.

ROAD 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.

Note 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.

Note 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 overrunning clutch is faulty. Similarly, if slippage occurs in any two forward gears, the rear clutch is slipping.

Applying the same method of analysis, note that the front and rear clutches are applied simultaneously only in D range third and fourth gear. If the transmission slips in third gear, either the front clutch or the rear clutch is slipping.

If the transmission slips in fourth gear but not in third gear, the overdrive clutch is slipping. By selecting another gear which does not use these clutches, the slipping unit can be determined. For example, if the transmission also slips in Reverse, the front clutch is slipping. If the transmission does not slip in Reverse, the rear clutch is slipping.

DIAGNOSIS AND TESTING (Continued)

SHIFT LEVER POSITION	TRANSMISSION CLUTCHES AND BANDS					OVERDRIVE CLUTCHES		
	FRONT CLUTCH	FRONT BAND	REAR CLUTCH	REAR BAND	OVERRUN. CLUTCH	OVERDRIVE CLUTCH	DIRECT CLUTCH	OVERRUN. CLUTCH
Reverse	X			X			X	
Drive Range								
First			X		X		X	X
Second		X	X				X	X
Third	X		X				X	X
Fourth	X		X			X		
2-Range (Manual Second)		X	X		X		X	X
1-Range (Manual Low)			X	X	X		X	X

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Clutch And Band Application Chart

If slippage occurs during the 3-4 shift or only in fourth gear, the overdrive clutch is slipping. Similarly, if 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 will not shift to fourth gear, the control switch, overdrive solenoid or related wiring may also be the problem cause.

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 pressure test gauges are required. Test Gauge C-3292 has a 100 psi range and is used at the accumulator, governor, and front servo ports. Test Gauge C-3293-SP has a 300 psi range and is used at the rear servo and overdrive ports where pressures exceed 100 psi.

Pressure Test Port Locations

Test ports are located at both sides of the transmission case (Fig. 6).

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.

The rear servo and governor pressure ports are at the right rear of the transmission case. The overdrive clutch pressure port is at the left rear of the case.

Test One - Transmission In Manual Low

NOTE: This test checks pump output, pressure regulation, and condition of the rear clutch and servo circuit. Both test gauges are required for this test.

(1) Connect tachometer to engine. Position tachometer so it can be observed from driver seat if helper will be operating engine. Raise vehicle on hoist that will allow rear wheels to rotate freely.

(2) Connect 100 psi Gauge C-3292 to accumulator port. Then connect 300 psi Gauge C-3293-SP to rear servo port.

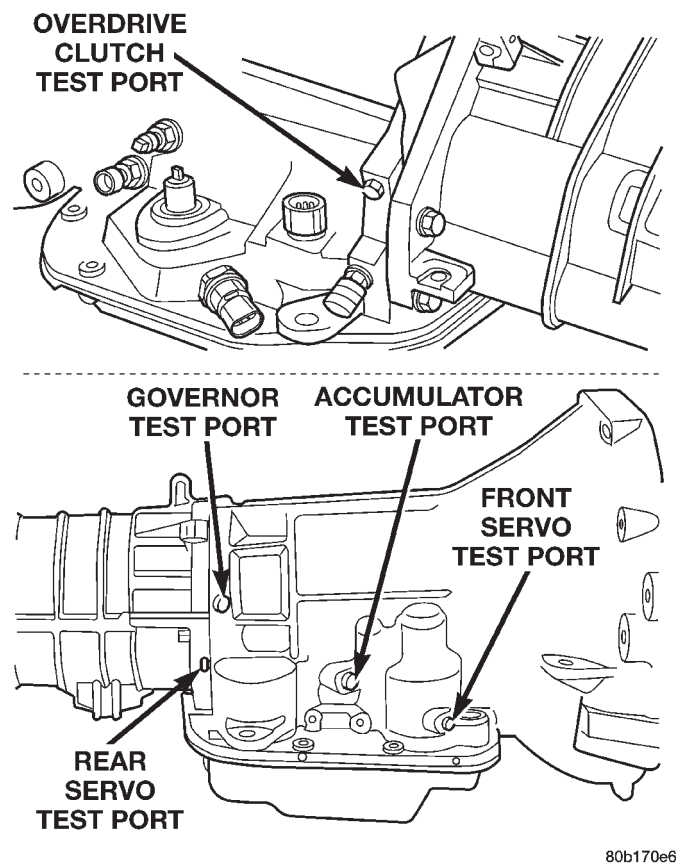
(3) Disconnect throttle and gearshift cables from levers on transmission valve body manual shaft.

(4) Have helper start and run engine at 1000 rpm.

(5) Move transmission shift lever fully forward into 1 range.

(6) Gradually move transmission throttle lever from full forward to full rearward position and note pressures on both gauges:

DIAGNOSIS AND TESTING (Continued)

**Fig. 6 Pressure Test Port Locations**

- 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 throttle lever is moved rearward.
- Rear servo pressure should be same as line pressure within 3 psi (20.68 kPa).

Test Two—Transmission In 2 Range

NOTE: This test checks pump output, line pressure and pressure regulation. Use 100 psi Test Gauge C-3292 for this test.

- (1) Leave vehicle in place on hoist and leave Test Gauge C-3292 connected to accumulator port.
- (2) Have helper start and run engine at 1000 rpm.
- (3) Move transmission shift lever 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 on gauge.
- (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 Third Gear

NOTE: This test checks pressure regulation and condition of the clutch circuits. Both test gauges are required for this test.

- (1) Turn OD switch off.
- (2) Leave vehicle on hoist and leave Gauge C-3292 in place at accumulator port.
- (3) Move Gauge C-3293-SP over to front servo port for this test.
- (4) Have helper start and run engine at 1600 rpm for this test.
- (5) Move transmission shift lever two detents rearward from full forward position. This is D range.
- (6) Read pressures on both gauges as transmission throttle lever is gradually moved from full forward to full rearward position:
 - Line pressure at accumulator in D range third gear, should be 54-60 psi (372-414 kPa) with throttle lever forward and increase as lever is moved rearward.
 - Front servo pressure in D range third gear, should be within 3 psi (21 kPa) of line pressure up to kickdown point.

Test Four—Transmission In Reverse

NOTE: 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) Leave vehicle on hoist and leave gauge C3292 in place at accumulator port.
- (2) Move 300 psi Gauge C-3293-SP back to rear servo port.
- (3) Have helper start and run engine at 1600 rpm for test.
- (4) Move transmission shift lever four detents rearward from full forward position. This is Reverse range.
- (5) Move transmission throttle lever fully forward then fully rearward and note reading at Gauge C-3293-SP.
- (6) Pressure should be 145 - 175 psi (1000-1207 kPa) with throttle lever forward and increase to 230 - 280 psi (1586-1931 kPa) as lever is gradually moved rearward.

DIAGNOSIS AND TESTING (Continued)

Test Five—Governor Pressure

NOTE: This test checks governor operation by measuring governor pressure response to changes in vehicle speed. It is usually not necessary to check governor operation unless shift speeds are incorrect or if the transmission will not downshift. The test should be performed on the road or on a hoist that will allow the rear wheels to rotate freely.

(1) Move 100 psi Test Gauge C-3292 to governor pressure port.

(2) Move transmission shift lever two detents rearward from full forward position. This is D range.

(3) Have helper start and run engine at curb idle speed. Then firmly apply service brakes so wheels will not rotate.

(4) Note governor pressure:

- Governor pressure should be no more than 20.6 kPa (3 psi) at curb idle speed and wheels not rotating.

- If pressure exceeds 20.6 kPa (3 psi), a fault exists in governor pressure control system.

(5) Release brakes, slowly increase engine speed, and observe speedometer and pressure test gauge (do not exceed 30 mph on speedometer). Governor pressure should increase in proportion to vehicle speed. Or approximately 6.89 kPa (1 psi) for every 1 mph.

(6) Governor pressure rise should be smooth and drop back to no more than 20.6 kPa (3 psi), after engine returns to curb idle and brakes are applied to prevent wheels from rotating.

(7) Compare results of pressure test with analysis chart.

Test Six—Transmission In Overdrive Fourth Gear

NOTE: This test checks line pressure at the overdrive clutch in fourth gear range. Use 300 psi Test Gauge C-3292 for this test. The test should be performed on the road or on a chassis dyno.

(1) Remove tachometer; it is not needed for this test.

(2) Move 300 psi Gauge to overdrive clutch pressure test port. Then remove other gauge and reinstall test port plug.

(3) Lower vehicle.

(4) Turn OD switch on.

(5) Secure test gauge so it can be viewed from drivers seat.

(6) Start engine and shift into D range.

(7) Increase vehicle speed gradually until 3-4 shift occurs and note gauge pressure.

(8) Pressure should be 469-496 kPa (68-72 psi) with closed throttle and increase to 620-827 kPa (90-120 psi) at 1/2 to 3/4 throttle. Note that pressure can increase to around 896 kPa (130 psi) at full throttle.

(9) Return to shop or move vehicle off chassis dyno.

PRESSURE TEST ANALYSIS CHART

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 (seal rings, clutch seals)
Pressure low in D Fourth Gear Range	Overdrive clutch piston seal, or check ball problem
Pressure OK in 1, 2 but low in D3 and R	Leakage in front clutch area
Pressure OK in 2 but low in R and 1	Leakage in rear servo
Front servo pressure low in 2	Leakage in servo; broken servo ring or cracked servo piston
Pressure low in all positions	Clogged filter, stuck regulator valve, worn or faulty pump, low oil level
Governor pressure too high at idle speed	Governor pressure solenoid valve system fault. Refer to diagnostic book.
Governor pressure low at all mph figures	Faulty governor pressure solenoid, transmission control module, or governor pressure sensor
Lubrication pressure low at all throttle positions	Clogged fluid cooler or lines, seal rings leaking, worn pump bushings, pump, clutch retainer, or clogged filter.
Line pressure high	Output shaft plugged, sticky regulator valve
Line pressure low	Sticky regulator valve, clogged filter, worn pump

CONVERTER STALL TEST

Stall testing involves determining maximum engine speed obtainable at full throttle with the rear wheels locked and the transmission in D range. This test checks the holding ability of the converter overrunning and transmission clutches.

WARNING: NEVER ALLOW ANYONE TO STAND DIRECTLY IN LINE WITH THE VEHICLE FRONT OR REAR DURING A STALL TEST. ALWAYS BLOCK THE WHEELS AND FULLY APPLY THE SERVICE AND PARKING BRAKES DURING THE TEST.

DIAGNOSIS AND TESTING (Continued)

STALL TEST PROCEDURE

- (1) Connect tachometer to engine. Position tachometer so it can be viewed from driver's seat.
- (2) Drive vehicle to bring transmission fluid up to normal operating temperature. Vehicle can be driven on road or on chassis dynamometer, if available.
- (3) Check transmission fluid level. Add fluid if necessary.
- (4) Block front wheels.
- (5) Fully apply service and parking brakes.
- (6) Open throttle completely and record maximum engine speed registered on tachometer. It takes 4-10 seconds to reach max rpm. **Once max rpm has been achieved, do not hold wide open throttle for more than 4-5 seconds.**

CAUTION: Stalling the converter causes a rapid increase in fluid temperature. To avoid fluid overheating, hold the engine at maximum rpm for no more than 5 seconds. If engine exceeds 2500 rpm during the test, release the accelerator pedal immediately; transmission clutch slippage is occurring.

- (7) If a second stall test is required, cool down fluid before proceeding. Shift into NEUTRAL and run engine at 1000 rpm for 20-30 seconds to cool fluid.

STALL TEST ANALYSIS

Stall Speed Too High

If the stall speed exceeds 2500 rpm, transmission clutch slippage is indicated.

Stall Speed Low

Low stall speed with a properly tuned engine indicate a torque converter overrunning clutch problem. The condition should be confirmed by road testing. A stall speed 250-350 rpm below normal indicates the converter overrunning clutch is slipping. The vehicle also exhibits poor acceleration but operates normally once highway cruise speeds are reached. Torque converter replacement will be necessary.

Stall Speed Normal But Acceleration Poor

If stall speeds are normal (1800-2300 rpm) but abnormal throttle opening is required for acceleration, or to maintain cruise speed, the converter overrunning clutch is seized. The torque converter will have to be replaced.

Converter Noise During Test

A whining noise caused by fluid flow is normal during a stall test. However, loud metallic noises indicate a damaged converter. To confirm that the noise is originating from the converter, operate the vehicle at light throttle in DRIVE and NEUTRAL on a hoist

and listen for noise coming from the converter housing.

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. 7).

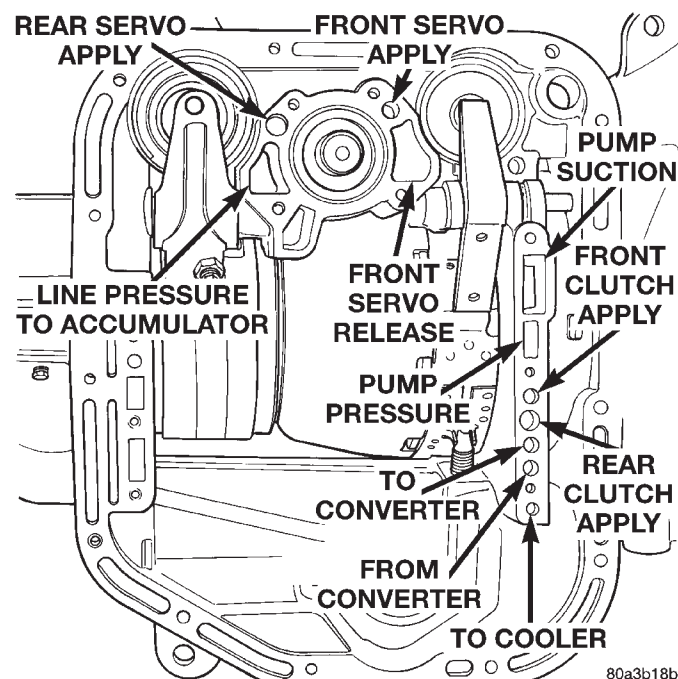


Fig. 7 Air Pressure Test Passages

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.

DIAGNOSIS AND TESTING (Continued)

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. 8). Pump vent or pump attaching bolt leaks are generally deposited on the inside of the converter housing and not on the converter itself (Fig. 8). 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.

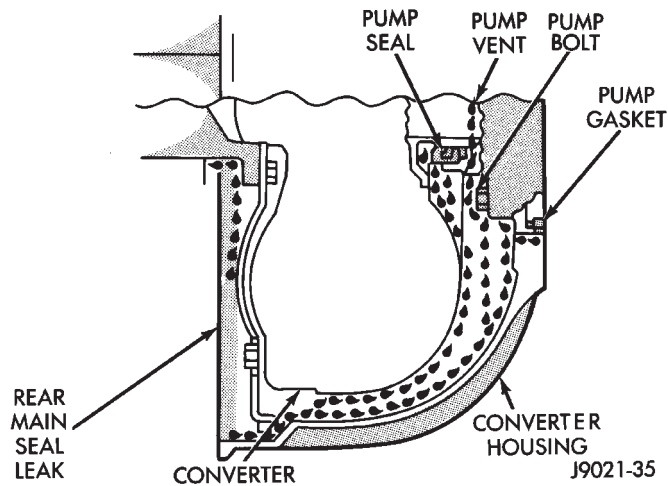


Fig. 8 Converter Housing Leak Paths

TORQUE CONVERTER LEAK POINTS

Possible sources of converter leaks are:

- (1) Leaks at the weld joint around the outside diameter weld (Fig. 9).
- (2) Leaks at the converter hub weld (Fig. 9).

CONVERTER HOUSING AREA LEAK CORRECTION

- (1) Remove converter.

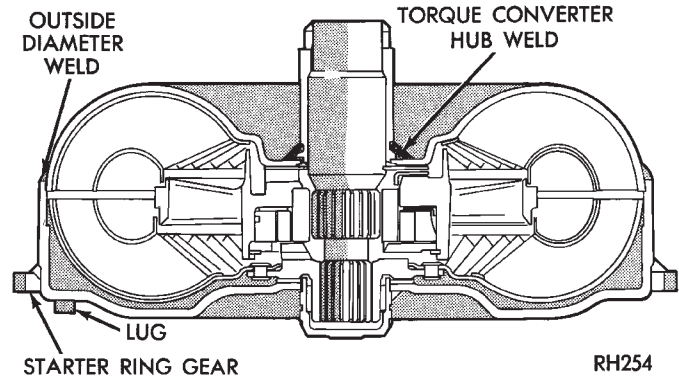


Fig. 9 Converter Leak Points—Typical

(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 TABLES AND CHARTS—RE TRANSMISSION

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 CHARTS

CONDITION	POSSIBLE CAUSES	CORRECTION
HARSH ENGAGEMENT (FROM NEUTRAL TO DRIVE OR REVERSE)	1. Fluid Level Low	1. Add Fluid
	2. Throttle Linkage Misadjusted	2. Adjust linkage - setting may be too long.
	3. 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 Faulty.	11. Replace converter and flush cooler and line before installing new converter.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
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. Torque Converter Drain Back (Oil drains from torque converter into transmission sump)	4. If vehicle moves normally after 5 seconds after shifting into gear, no repair is necessary. If longer, inspect pump bushing for wear. Replace pump house.
	5. Rear Band Misadjusted.	5. Adjust band.
	6. Valve Body Filter Plugged.	6. Replace fluid and filter. If oil pan and old fluid were full of clutch disc material and/or metal particles, overhaul will be necessary.
	7. Oil Pump Gears Worn/Damaged.	7. Remove transmission and replace oil pump.
	8. Governor Circuit and Solenoid Valve Electrical Fault.	8. Test with DRB scan tool and repair as required.
	9. Hydraulic Pressure Incorrect.	9. Perform pressure test, remove transmission and repair as needed.
	10. Reaction Shaft Seal Rings Worn/Broken.	10. Remove transmission, remove oil pump and replace seal rings.
	11. Rear Clutch/Input Shaft, Rear Clutch Seal Rings Damaged.	11. Remove and disassemble transmission and repair as necessary.
	12. Regulator Valve Stuck.	12. Clean.
	13. Cooler Plugged.	13. Transfer case failure can plug cooler.
NO DRIVE RANGE (REVERSE OK)	1. Fluid Level Low.	1. Add fluid and check for leaks if drive is restored.
	2. Gearshift Linkage/Cable Loose/Misadjusted.	2. Repair or replace linkage components.
	3. Rear Clutch Burnt.	3. Remove and disassemble transmission and rear clutch and seals. Repair/replace worn or damaged parts as needed.
	4. Valve Body Malfunction.	4. Remove and disassemble valve body. Replace assembly if any valves or bores are damaged.
	5. Transmission Overrunning Clutch Broken.	5. Remove and disassemble transmission. Replace overrunning clutch.
	6. Input Shaft Seal Rings Worn/Damaged.	6. Remove and disassemble transmission. Replace seal rings and any other worn or damaged parts.
	7. Front Planetary Failed Broken.	7. Remove and repair.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO DRIVE OR REVERSE (VEHICLE WILL NOT MOVE)	1. Fluid Level Low.	1. Add fluid and check for leaks if drive is restored.
	2. Gearshift Linkage/Cable Loose/Misadjusted.	2. Inspect, adjust and reassemble linkage as needed. Replace worn/damaged parts.
	3. U-Joint/Axle/Transfer Case Broken.	3. Perform preliminary inspection procedure for vehicle that will not move. Refer to procedure in diagnosis section.
	4. Filter Plugged.	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. Oil Pump Damaged.	5. Perform pressure test to confirm low pressure. Replace pump body assembly if necessary.
	6. Valve Body Malfunctioned.	6. Check 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. Transmission Internal Component Damaged.	7. Remove and disassemble transmission. Repair or replace failed components as needed.
	8. Park Sprag not Releasing - Check Stall Speed, Worn/Damaged/Stuck.	8. Remove, disassemble, repair.
	9. Torque Converter Damage.	9. 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.	1. Correct fluid level and check for leaks if low.
	2. Fluid Filter Clogged.	2. Replace filter. If filter and fluid contained clutch material or metal particles, an overhaul may be necessary. Perform lube flow test.
	3. Throttle Linkage Misadjusted.	3. Adjust linkage as described in service section.
	4. Throttle Linkage Binding.	4. Check cable for binding. Check for return to closed throttle at transmission.
	5. Gearshift Linkage/Cable Misadjusted.	5. Adjust linkage/cable as described in service section.
	6. Clutch or Servo Failure.	6. Remove valve body and air test clutch, and band servo operation. Disassemble and repair transmission as needed.
	7. Governor Circuit Electrical Fault.	7. Test using DRB scan tool and repair as required.
	8. Front Band Misadjusted.	8. Adjust band.
	9. Pump Suction Passage Leak.	9. Check for excessive foam on dipstick after normal driving. Check for loose pump bolts, defective gasket. Replace pump assembly if needed.
NO REVERSE (D RANGES OK)	1. Gearshift Linkage/Cable Misadjusted/Damaged.	1. Repair or replace linkage parts as needed.
	2. Park Sprag Sticking.	2. Replace overdrive annulus gear.
	3. Rear Band Misadjusted/Worn.	3. Adjust band; replace.
	4. Valve Body Malfunction.	4. Remove and service valve body. Replace valve body if any valves or valve bores are worn or damaged.
	5. Rear Servo Malfunction.	5. Remove and disassemble transmission. Replace worn/damaged servo parts as necessary.
	6. Direct Clutch in Overdrive Worn	6. Disassemble overdrive. Replace worn or damaged parts.
	7. Front Clutch Burnt.	7. Remove and disassemble transmission. Replace worn, damaged clutch parts as required.
HAS FIRST/REVERSE ONLY (NO 1-2 OR 2-3 UPSHIFT)	1. Governor Circuit Electrical Fault.	1. Test using DRB scan tool and repair as required.
	2. Valve Body Malfunction.	2. Repair stuck 1-2 shift valve or governor plug.
	3. Front Servo/Kickdown Band Damaged/Burned.	3. Repair/replace.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
MOVES IN 2ND OR 3RD GEAR, ABRUPTLY DOWNSHIFTS TO LOW	1. Valve Body Malfunction.	1. Remove, clean and inspect. Look for stuck 1-2 valve or governor plug.
	2. Governor Valve Sticking.	2. Remove, clean and inspect. Replace faulty parts.
NO LOW GEAR (MOVES IN 2ND OR 3RD GEAR ONLY)	1. Governor Valve Sticking.	1. Remove governor, clean, inspect and repair as required.
	2. Governor Circuit Electrical Fault.	2. Test with DRB scan tool and repair as required.
	3. Valve Body Malfunction.	3. Remove, clean and inspect. Look for sticking 1-2 shift valve, 2-3 shift valve, governor plug or broken springs.
	4. Front Servo Piston Cocked in Bore.	4. Inspect servo and repair as required.
	5. Front Band Linkage Malfunction	5. Inspect linkage and look for bind in linkage.
NO KICKDOWN OR NORMAL DOWNSHIFT	1. Throttle Linkage Misadjusted.	1. Adjust linkage.
	2. Accelerator Pedal Travel Restricted.	2. Verify floor mat is not under pedal, repair worn accelerator cable or bent brackets.
	3. Valve Body Hydraulic Pressures Too High or Too Low Due to Valve Body Malfunction or Incorrect Hydraulic Control Pressure Adjustments.	3. Perform hydraulic pressure tests to determine cause and repair as required. Correct valve body pressure adjustments as required.
	4. Governor Circuit Electrical Fault.	4. Test with DRB scan tool and repair as required.
	5. Valve Body Malfunction.	5. Perform hydraulic pressure tests to determine cause and repair as required. Correct valve body pressure adjustments as required.
	6. TPS Malfunction.	6. Replace sensor, check with DRB scan tool.
	7. PCM Malfunction.	7. Check with DRB scan tool and replace if required.
	8. Valve Body Malfunction.	8. Repair sticking 1-2, 2-3 shift valves, governor plugs, 3-4 solenoid, 3-4 shift valve, 3-4 timing valve.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
STUCK IN LOW GEAR (WILL NOT UPSHIFT)	1. Throttle Linkage Misadjusted/ Stuck.	1. Adjust linkage and repair linkage if worn or damaged. Check for binding cable or missing return spring.
	2. Gearshift Linkage Misadjusted.	2. Adjust linkage and repair linkage if worn or damaged.
	3. Governor Component Electrical Fault.	3. Check operating pressures and test with DRB scan tool, repair faulty component.
	4. Front Band Out of Adjustment.	4. Adjust Band.
	5. Clutch or Servo Malfunction.	5. Air pressure check operation of clutches and bands. Repair faulty component.
CREEPS IN NEUTRAL	1. Gearshift Linkage Misadjusted.	1. Adjust linkage.
	2. Rear Clutch Dragging/Warped.	2. Disassemble and repair.
	3. Valve Body Malfunction.	3. Perform hydraulic pressure test to determine cause and repair as required.
BUZZING NOISE	1. Fluid Level Low	1. Add fluid and check for leaks.
	2. Shift Cable Misassembled.	2. Route cable away from engine and bell housing.
	3. Valve Body Misassembled.	3. Remove, disassemble, inspect valve body. Reassemble correctly if necessary. Replace assembly if valves or springs are damaged. Check for loose bolts or screws.
	4. Pump Passages Leaking	4. Check pump for porous casting, scores on mating surfaces and excess rotor clearance. Repair as required. Loose pump bolts.
	5. Cooling System Cooler Plugged.	5. Flow check cooler circuit. Repair as needed.
	6. Overrunning Clutch Damaged.	6. Replace clutch.
SLIPS IN REVERSE ONLY	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Gearshift Linkage Misadjusted.	2. Adjust linkage.
	3. Rear Band Misadjusted.	3. Adjust band.
	4. Rear Band Worn.	4. Replace as required.
	5. Overdrive Direct Clutch Worn.	5. Disassemble overdrive. Repair as needed.
	6. Hydraulic Pressure Too Low.	6. Perform hydraulic pressure tests to determine cause.
	7. Rear Servo Leaking.	7. Air pressure check clutch-servo operation and repair as required.
	8. Band Linkage Binding.	8. Inspect and repair as required.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
SLIPS IN FORWARD DRIVE RANGES	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Fluid Foaming.	2. Check for high oil level, bad pump gasket or seals, dirt between pump halves and loose pump bolts. Replace pump if necessary.
	3. Throttle Linkage Misadjusted.	3. Adjust linkage.
	4. Gearshift Linkage Misadjusted.	4. Adjust linkage.
	5. Rear Clutch Worn.	5. Inspect and replace as needed.
	6. Low Hydraulic Pressure Due to Worn Pump, Incorrect Control Pressure Adjustments, Valve Body Warpage or Malfunction, Sticking, Leaking Seal Rings, Clutch Seals Leaking, Servo Leaks, Clogged Filter or Cooler Lines	6. Perform hydraulic and air pressure tests to determine cause.
	7. Rear Clutch Malfunction, Leaking Seals or Worn Plates.	7. Air pressure check clutch-servo operation and repair as required.
	8. Overrunning Clutch Worn, Not Holding (Slips in 1 Only).	8. Replace Clutch.
SLIPS IN LOW GEAR "D" ONLY, BUT NO IN 1 POSITION	Overrunning Clutch Faulty.	Replace overrunning clutch.
GROWLING, GRATING OR SCRAPING NOISES	1. Drive Plate Broken.	1. Replace.
	2. Torque Converter Bolts Hitting Dust Shield.	2. Dust shield bent. Replace or repair.
	3. Planetary Gear Set Broken/ Seized.	3. Check for debris in oil pan and repair as required.
	4. Overrunning Clutch Worn/Broken.	4. Inspect and check for debris in oil pan. Repair as required.
	5. Oil Pump Components Scored/ Binding.	5. Remove, inspect and repair as required.
	6. Output Shaft Bearing or Bushing Damaged.	6. Remove, inspect and repair as required.
	7. Clutch Operation Faulty.	7. Perform air pressure check and repair as required.
	8. Front and Rear Bands Misadjusted.	8. Adjust bands.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
DRAGS OR LOCKS UP	1. Fluid Level Low.	1. Check and adjust level.
	2. Clutch Dragging/Failed	2. Air pressure check clutch operation and repair as required.
	3. Front or Rear Band Misadjusted.	3. Adjust bands.
	4. Case Leaks Internally.	4. Check for leakage between passages in case.
	5. Servo Band or Linkage Malfunction.	5. Air pressure check servo operation and repair as required.
	6. Overrunning Clutch Worn.	6. Remove and inspect clutch. Repair as required.
	7. Planetary Gears Broken.	7. Remove, inspect and repair as required (look for debris in oil pan).
	8. Converter Clutch Dragging.	8. Check for plugged cooler. Perform flow check. Inspect pump for excessive side clearance. Replace pump as required.
NO 4-3 DOWNSHIFT	1. Circuit Wiring and/or Connectors Shorted.	1. Test wiring and connectors with test lamp and volt/ohmmeter. Repair wiring as necessary. Replace connectors and/or harnesses as required.
	2. PCM Malfunction.	2. Check PCM operation with DRB scan tool. Replace PCM only if faulty.
	3. TPS Malfunction	3. Check TPS with DRB scan tool at PCM.
	4. Lockup Solenoid Not Venting.	4. Remove valve body and replace solenoid assembly if plugged or shorted.
	5. Overdrive Solenoid Not Venting.	5. Remove valve body and replace solenoid if plugged or shorted.
	6. Valve Body Valve Sticking.	6. Repair stuck 3-4 shift valve or lockup timing valve.
NO 4-3 DOWNSHIFT WHEN CONTROL SWITCH IS TURNED OFF	1. Control Switch Open/Shorted.	1. Test and replace switch if faulty.
	2. Overdrive Solenoid Connector Shorted.	2. Test solenoids and replace if seized or shorted.
	3. PCM Malfunction.	3. Test with DRB scan tool. Replace PCM if faulty.
	4. Valve Body Stuck Valves.	4. Repair stuck 3-4, lockup or lockup timing valve.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
CLUNK NOISE FROM DRIVELINE ON CLOSED THROTTLE 4-3 DOWNSHIFT	1. Transmission Fluid Low.	1. Add Fluid.
	2. Throttle Cable Misadjusted.	2. Adjust cable.
	3. Overdrive Clutch Select Spacer Wrong Spacer.	3. Replace overdrive piston thrust plate spacer.
3-4 UPSHIFT OCCURS IMMEDIATELY AFTER 2-3 SHIFT	1. Overdrive Solenoid Connector or Wiring Shorted.	1. Test connector and wiring for loose connections, shorts or ground and repair as needed.
	2. TPS Malfunction.	2. Test TPS and replace as necessary. Check with DRB scan tool.
	3. PCM Malfunction.	3. Test PCM with DRB scan tool and replace controller if faulty.
	4. Overdrive Solenoid Malfunction.	4. Replace solenoid.
	5. Valve Body Malfunction.	5. Remove, disassemble, clean and inspect valve body components. Make sure all valves and plugs slide freely in bores. Polish valves with crocus cloth if needed.
WHINE/NOISE RELATED TO ENGINE SPEED	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Shift Cable Incorrect Routing.	2. Check shift cable for correct routing. Should not touch engine or bell housing.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO 3-4 UPSHIFT	1. Dash O/D Switch In OFF Position.	1. Turn control switch to ON position.
	2. Overdrive Circuit Fuse Blown.	2. Replace fuse. Determine why fuse failed and repair as necessary (i.e., shorts or grounds in circuit).
	3. O/D Switch Wire Shorted/Open Cut.	3. Check wires/connections with 12V test lamp and voltmeter. Repair damaged or loose wire/connection as necessary.
	4. Distance or Coolant Sensor Malfunction.	4. Check with DRB scan tool and repair or replace as necessary.
	5. TPS Malfunction.	5. Check with DRB scan tool and replace if necessary.
	6. Neutral Switch to PCM Wire Shorted/Cut.	6. Test switch as described in service section and replace if necessary. Engine no start.
	7. PCM Malfunction.	7. Check with DRB scan tool and replace if necessary.
	8. Overdrive Solenoid Shorted/Open.	8. Replace solenoid if shorted or open and repair loose or damaged wires (DRB scan tool).
	9. Solenoid Feed Orifice in Valve Body Blocked.	9. Remove, disassemble, and clean valve body thoroughly. Check feed orifice.
	10. Overdrive Clutch Failed.	10. Disassemble overdrive and repair as needed.
	11. Hydraulic Pressure Low.	11. Pressure test transmission to determine cause.
	12. Valve Body Valve Stuck.	12. Repair stuck 3-4 shift valve, 3-4 timing valve.
	13. O/D Piston Incorrect Spacer.	13. Remove unit, check end play and install correct spacer.
	14. Overdrive Piston Seal Failure.	14. Replace both seals.
	15. O/D Check Valve/Orifice Failed.	15. Check for free movement and secure assembly (in piston retainer). Check ball bleed orifice.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
SLIPS IN OVERDRIVE FOURTH GEAR	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Overdrive Clutch Pack Worn.	2. Remove overdrive unit and rebuild clutch pack.
	3. Overdrive Piston Retainer Bleed Orifice Blown Out.	3. Disassemble transmission, remove retainer and replace orifice.
	4. Overdrive Piston or Seal Malfunction.	4. Remove overdrive unit. Replace seals if worn. Replace piston if damaged. If piston retainer is damaged, remove and disassemble the transmission.
	5. 3-4 Shift Valve, Timing Valve or Accumulator Malfunction.	5. Remove and overhaul valve body. Replace accumulator seals. Make sure all valves operate freely in bores and do not bind or stick. Make sure valve body screws are correctly tightened and separator plates are properly positioned.
	6. Overdrive Unit Thrust Bearing Failure.	6. Disassemble overdrive unit and replace thrust bearing (NO. 1 thrust bearing is between overdrive piston and clutch hub; NO. 2 thrust bearing is between the planetary gear and the direct clutch spring plate; NO. 3 thrust bearing is between overrunning clutch hub and output shaft).
	7. O/D Check Valve/Bleed Orifice Failure.	7. Check for function/secure orifice insert in O/D piston retainer.
DELAYED 3-4 UPSHIFT (SLOW TO ENGAGE)	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Throttle Valve Cable Misadjusted.	2. Adjust throttle valve cable.
	3. Overdrive Clutch Pack Worn/Burnt.	3. Remove unit and rebuild clutch pack.
	4. TPS Faulty.	4. Test with DRB scan tool and replace as necessary
	5. Overdrive Clutch Bleed Orifice Plugged.	5. Disassemble transmission and replace orifice.
	6. Overdrive Solenoid or Wiring Shorted/Open.	6. Test solenoid and check wiring for loose/corroded connections or shorts/grounds. Replace solenoid if faulty and repair wiring if necessary.
	7. Overdrive Excess Clearance	7. Remove unit. Measure end play and select proper spacer.
	8. O/D Check Valve Missing or Stuck.	8. Check for presence of check valve. Repair or replace as required.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
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, 2-3, 3-4 OR 3-2 SHIFTS	Lockup Solenoid Malfunction.	Remove valve body and replace solenoid assembly.
NO START IN PARK OR NEUTRAL	1. Gearshift Linkage/Cable Misadjusted.	1. Adjust linkage/cable.
	2. Neutral Switch Wire Open/Cut.	2. Check continuity with test lamp. Repair as required.
	3. Neutral Switch Faulty.	3. Refer to service section for test and replacement procedure.
	4. Neutral Switch Connect Faulty.	4. Connectors spread open. Repair.
	5. Valve Body Manual Lever Assembly Bent/Worn/Broken.	5. Inspect lever assembly and replace if damaged.
NO REVERSE (OR SLIPS IN REVERSE)	1. Direct Clutch Pack (front clutch) Worn.	1. Disassemble unit and rebuild clutch pack.
	2. Rear Band Misadjusted.	2. Adjust band.
	3. Front Clutch Malfunctioned/ Burned.	3. Air-pressure test clutch operation. Remove and rebuild if necessary.
	4. Overdrive Thrust Bearing Failure.	4. Disassemble geartrain and replace bearings.
	5. Direct Clutch Spring Collapsed/ Broken.	5. Remove and disassemble unit. Check clutch position and replace spring.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL LEAKS.	1. Fluid Lines and Fittings Loose/Leaks/Damaged.	1. Tighten fittings. If leaks persist, replace fittings and lines if necessary.
	2. Fill Tube (where tube enters case) Leaks/Damaged.	2. Replace tube seal. Inspect tube for cracks in fill tube.
	3. Pressure Port Plug Loose Loose/Damaged.	3. Tighten to correct torque. Replace plug or reseal if leak persists.
	4. Pan Gasket Leaks.	4. Tighten pan screws (150 in. lbs.). If leaks persist, replace gasket.
	5. Valve Body Manual Lever Shaft Seal Leaks/Worn.	5. Replace shaft seal.
	6. Rear Bearing Access Plate Leaks.	6. Replace gasket. Tighten screws.
	7. Gasket Damaged or Bolts are Loose.	7. Replace bolts or gasket or tighten both.
	8. Adapter/Extension Gasket Damaged Leaks/Damaged.	8. Replace gasket.
	9. Neutral Switch Leaks/Damaged.	9. Replace switch and gasket.
	10. Converter Housing Area Leaks.	10. Check for leaks at seal caused by worn seal or burr on converter hub (cutting seal), worn bushing, missing oil return, oil in front pump housing or hole plugged. Check for leaks past O-ring seal on pump or past pump-to-case bolts; pump housing porous, oil coming out vent due to overfill or leak past front band shaft access plug.
	11. Pump Seal Leaks/Worn/Damaged.	11. Replace seal.
	12. Torque Converter Weld Leak/Cracked Hub.	12. Replace converter.
	13. Case Porosity Leaks.	13. Replace case.
NOISY OPERATION IN FOURTH GEAR ONLY	1. Overdrive Clutch Discs, Plates or Snap Rings Damaged.	1. Remove unit and rebuild clutch pack.
	2. Overdrive Piston or Planetary Thrust Bearing Damaged.	2. Remove and disassemble unit. Replace either thrust bearing if damaged.
	3. Output Shaft Bearings Scored/Damaged.	3. Remove and disassemble unit. Replace either bearing if damaged.
	4. Planetary Gears Worn/Chipped.	4. Remove and overhaul overdrive unit.
	5. Overdrive Unit Overrunning Clutch Rollers Worn/Scored.	5. Remove and overhaul overdrive unit.

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. 10) 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.

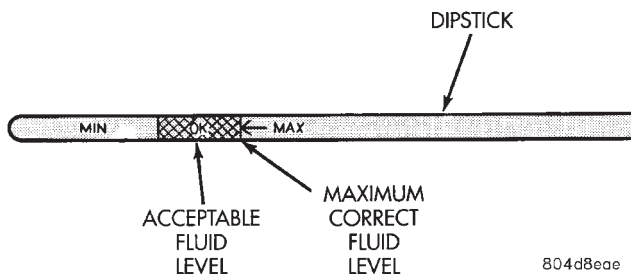


Fig. 10 Dipstick Fluid Level Marks—Typical

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) Place a large diameter shallow drain pan beneath the transmission pan.
- (3) Remove bolts holding front and sides of pan to transmission (Fig. 11).
- (4) Loosen bolts holding rear of pan to transmission.
- (5) Slowly separate front of pan away from transmission allowing the fluid to drain into drain pan.
- (6) Hold up pan and remove remaining bolt holding pan to transmission.
- (7) While holding pan level, lower pan away from transmission.
- (8) Pour remaining fluid in pan into drain pan.
- (9) Remove screws holding filter to valve body (Fig. 12).
- (10) Separate filter from valve body and pour fluid in filter into drain pan.
- (11) Dispose of used trans fluid and filter properly.

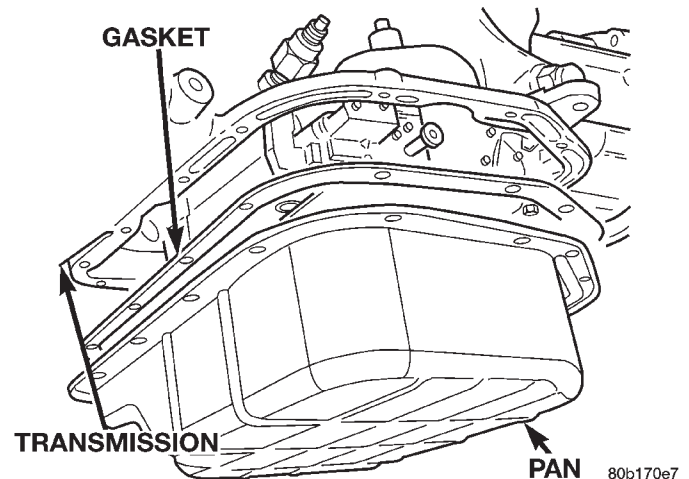


Fig. 11 Transmission Pan—Typical

INSPECTION

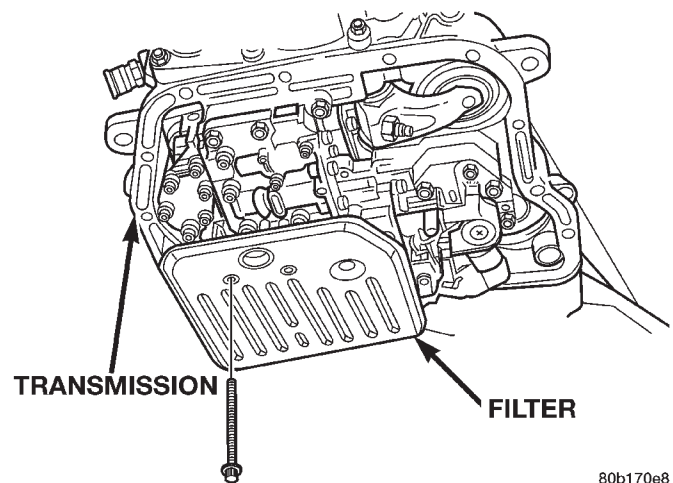


Fig. 12 Transmission Filter—Typical

Inspect bottom of pan and magnet for excessive amounts of metal. A light coating of clutch or band

SERVICE PROCEDURES (Continued)

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.

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. 12). 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. 11). Tighten bolts to 17 N·m (150 in. lbs.) torque.

(6) 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 lower 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 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

After the new or repaired transmission has been installed, fill to the proper level with Mopar® ATF PLUS 3 (Type 7176) automatic transmission fluid. The volume should be checked using the following procedure:

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

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

SERVICE PROCEDURES (Continued)

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

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

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

(5) If flow is found to be within acceptable limits, replace the cooler. Then fill transmission to the proper level, using Mopar® ATF PLUS 3 (Type 7176) automatic transmission fluid.

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

FLUSHING COOLERS AND TUBES

When a transmission failure has contaminated the fluid, the oil cooler(s) must be flushed. The cooler bypass valve in the transmission must be replaced also. 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 6906 Cooler Flusher.

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 6906

(1) Remove cover plate filler plug on Tool 6906. 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 6906.

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

(4) Disconnect the cooler lines at the transmission.

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

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

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

(7) Turn pump ON for two to three minutes to flush cooler(s) and lines. Monitor pressure readings and clear return lines. Pressure readings should stabilize below 20 psi. for vehicles equipped with a single cooler and 30 psi. for vehicles equipped with dual coolers. If flow is intermittent or exceeds these pressures, replace cooler.

(8) Turn pump OFF.

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

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

(11) Place CLEAR suction line into a one quart container of Mopar® ATF Plus 3, type 7176 automatic transmission fluid.

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

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

ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum transaxle 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

The overdrive unit can be removed and serviced separately. It is not necessary to remove the entire transmission assembly to perform overdrive unit repairs.

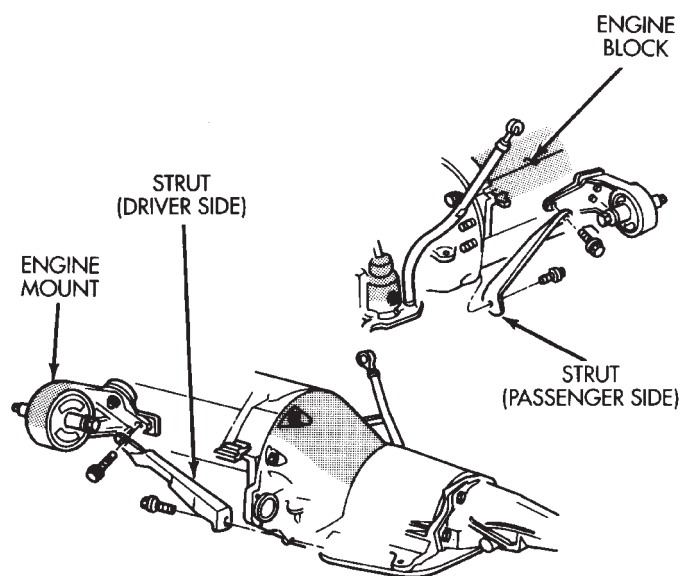
If only the overdrive unit requires service, refer to the overdrive unit removal and installation procedures.

REMOVAL AND INSTALLATION (Continued)

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. Be sure to remove the transmission and converter as an assembly.

REMOVAL

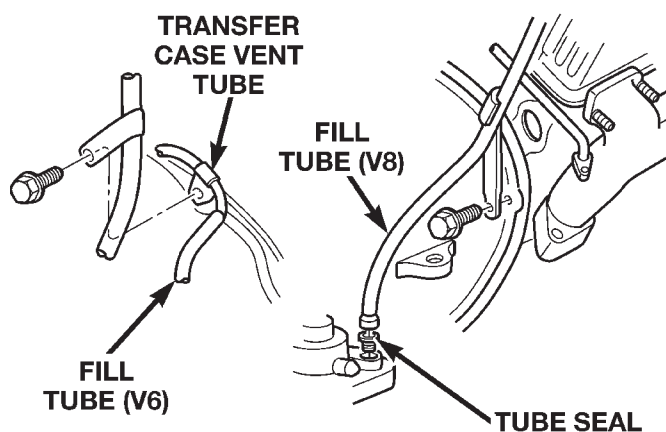
- (1) Disconnect battery negative cable.
- (2) Disconnect and lower or remove necessary exhaust components.
- (3) Remove engine-to-transmission struts, if equipped (Fig. 13).



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Fig. 13 Transmission-To-Engine Strut Attachment

- (4) Disconnect fluid cooler lines at transmission.
- (5) Remove starter motor.
- (6) Disconnect and remove the crankshaft position sensor. Retain the sensor attaching bolts.
- (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 fill tube bracket bolts and pull tube out of transmission. Retain fill tube seal (Fig. 13). On 4 x 4 models, it will also be necessary to remove bolt attaching transfer case vent tube to converter housing (Fig. 14).
- (10) Mark torque converter and drive plate for assembly alignment. Note that bolt holes in crankshaft flange, drive plate and torque converter all have one offset hole.

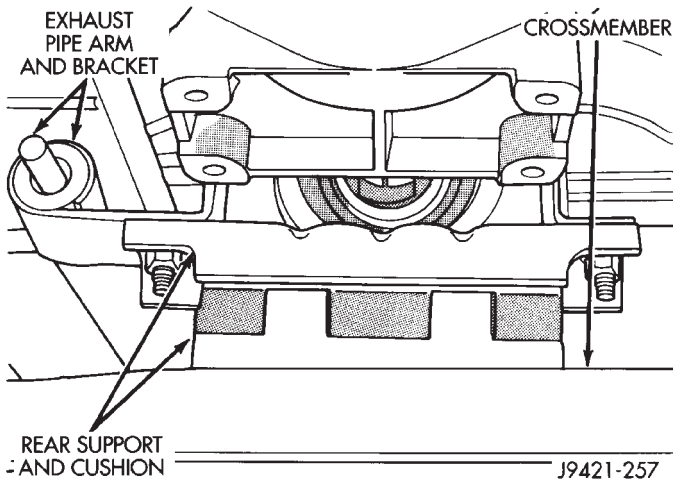


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Fig. 14 Fill Tube Attachment

- (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 shaft. On 4 x 4 models, remove both propeller shafts.
- (13) Disconnect wires from park/neutral position switch and transmission solenoid.
- (14) Disconnect gearshift rod and torque shaft assembly from transmission.
- (15) Disconnect throttle valve cable from transmission bracket and throttle valve lever.
- (16) On 4 x 4 models, disconnect shift rod from transfer case shift lever.
- (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 (Fig. 15) and remove rear support.
- (20) Remove bolts attaching crossmember to frame and remove crossmember.
- (21) On 4 x 4 models, remove transfer case with transmission jack or aid of helper.
- (22) Remove all converter housing bolts.
- (23) Carefully work transmission and torque converter assembly rearward off engine block dowels.
- (24) Lower transmission and remove assembly from under the vehicle.
- (25) To remove torque converter, remove C-clamp from edge of bell housing and carefully slide torque converter out of the transmission.

REMOVAL AND INSTALLATION (Continued)

**Fig. 15 Rear Support Cushion****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) Lubricate converter pilot hub with transmission fluid.

(4) Align and install converter in oil pump.

(5) Carefully insert converter in oil pump. Then rotate converter back and forth until fully seated in pump gears.

(6) Check converter seating with steel scale and straightedge (Fig. 16). Surface of converter lugs should be 1/2 in. to rear of straightedge when converter is fully seated.

(7) Temporarily secure converter with C-clamp.

(8) Position transmission on jack and secure it with 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.**

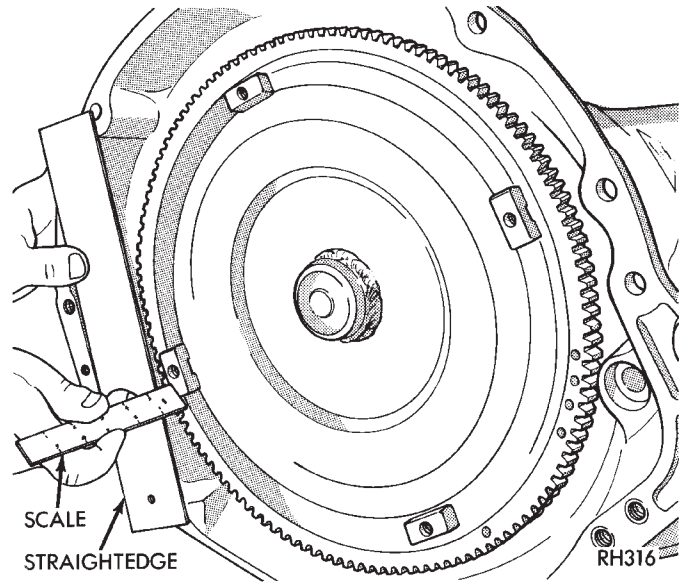
(10) Raise transmission and align converter with drive plate and converter housing with engine block.

(11) Move transmission forward. Then raise, lower or tilt transmission to align converter housing with engine block dowels.

(12) Rotate converter so alignment marks scribed on converter are aligned with mark on driveplate.

(13) Carefully work transmission forward and over engine block dowels until converter hub is seated in crankshaft.

(14) Install bolts attaching converter housing to engine.

**Fig. 16 Typical Method Of Checking Converter Seating**

(15) Install rear support. Then lower transmission onto crossmember and install bolts attaching transmission mount to crossmember.

(16) Remove engine support fixture.

(17) Install crankshaft position sensor.

(18) 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.

(19) Connect gearshift and throttle cable to transmission.

(20) Connect wires to park/neutral position switch, transmission solenoid(s) and oxygen sensor. Be sure transmission harnesses are properly routed.

CAUTION: It is essential that correct length bolts be used to attach the converter to the driveplate. Bolts that are too long will damage the clutch surface inside the converter.

(21) Install torque converter-to-driveplate bolts. On models with 10.75 in. converter, tighten bolts to 31 N·m (270 in. lbs.). On models with 12.2 in. converter, tighten bolts to 47 N·m (35 ft. lbs.).

(22) Install converter housing access cover.

(23) Install starter motor and cooler line bracket.

(24) Connect cooler lines to transmission.

(25) Install transmission fill tube. Install new seal on tube before installation.

(26) Install exhaust components.

(27) Align and connect propeller shaft.

(28) Adjust gearshift linkage and throttle valve cable if necessary.

REMOVAL AND INSTALLATION (Continued)

(29) Lower vehicle.

(30) Fill transmission 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.

(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. 17). 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.

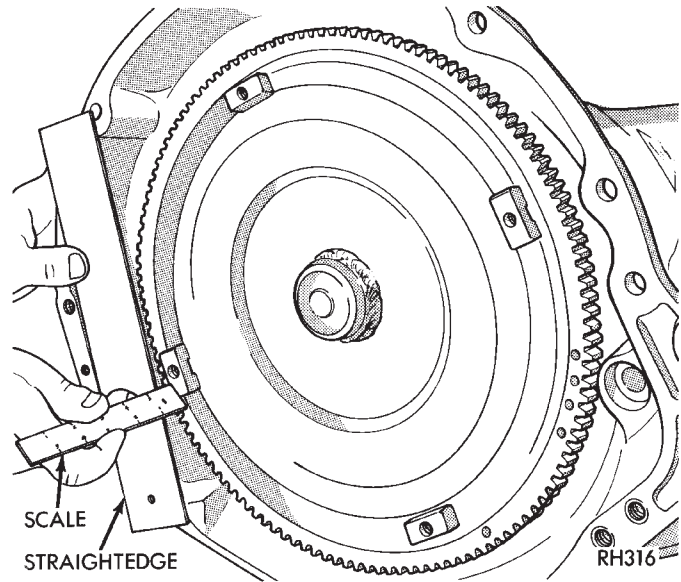


Fig. 17 Checking Torque Converter Seating
YOKE SEAL REPLACEMENT

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. 18) from overdrive housing.

INSTALLATION

(1) Place seal in position on overdrive housing.

(2) Drive seal into overdrive housing with Seal Installer C-3995-A (Fig. 19).

(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.

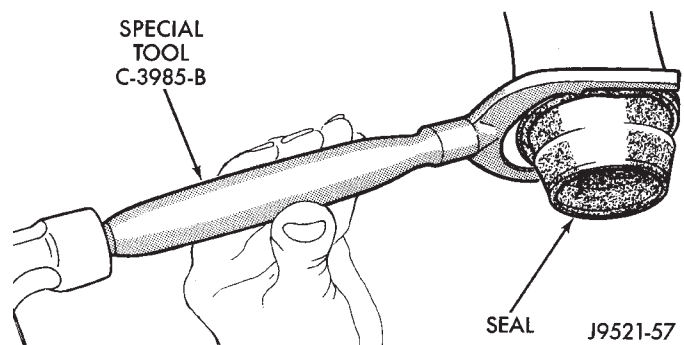
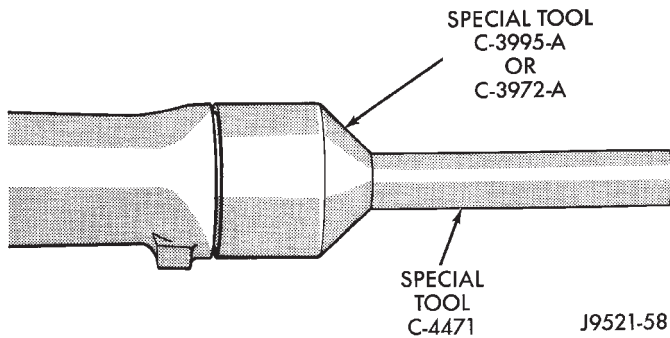


Fig. 18 Removing Overdrive Housing Yoke Seal
PARK/NEUTRAL POSITION SWITCH

REMOVAL

(1) Raise vehicle and position drain pan under switch.

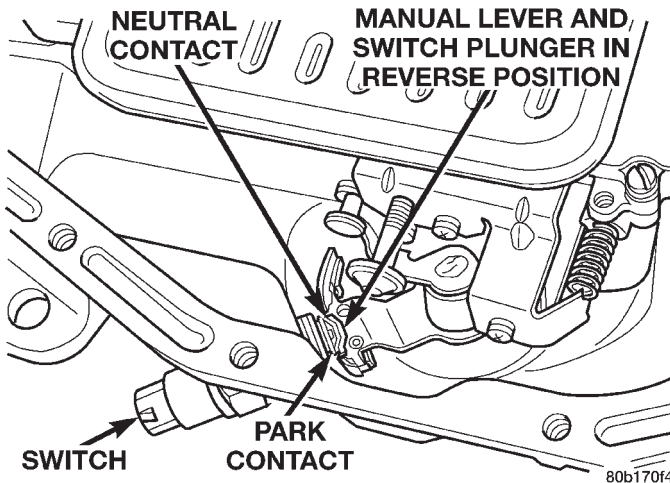
REMOVAL AND INSTALLATION (Continued)

**Fig. 19 Installing Overdrive Housing Yoke Seal**

- (2) Disconnect switch wires.
- (3) Remove switch from case.

INSTALLATION

- (1) Move shift lever to Park and Neutral positions. Verify that switch operating lever fingers are centered in switch opening in case (Fig. 20).

**Fig. 20 Park/Neutral Position 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.

GOVERNOR SOLENOID AND PRESSURE SENSOR**REMOVAL**

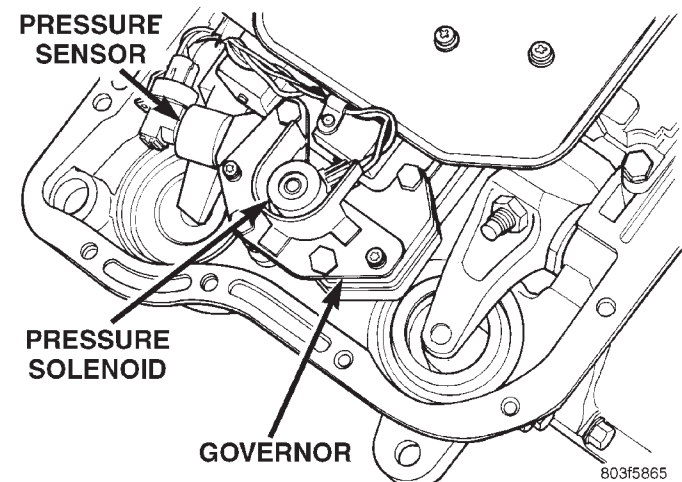
- (1) Hoist and support vehicle on safety stands.
- (2) Remove transmission fluid pan and filter.
- (3) Disengage wire connectors from pressure sensor and solenoid (Fig. 21).
- (4) Remove screws holding pressure solenoid retainer to governor body.
- (5) Separate solenoid retainer from governor (Fig. 22).
- (6) Pull solenoid from governor body (Fig. 23).

- (7) Remove bolts holding governor body to valve body.
- (8) Separate governor body from valve body (Fig. 24).
- (9) Remove governor body gasket.
- (10) Remove retainer holding pressure sensor to governor body.
- (11) Pull pressure sensor from governor body (Fig. 25).

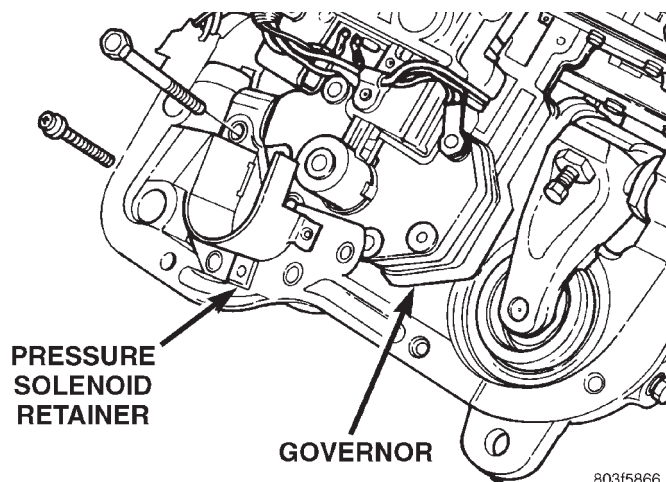
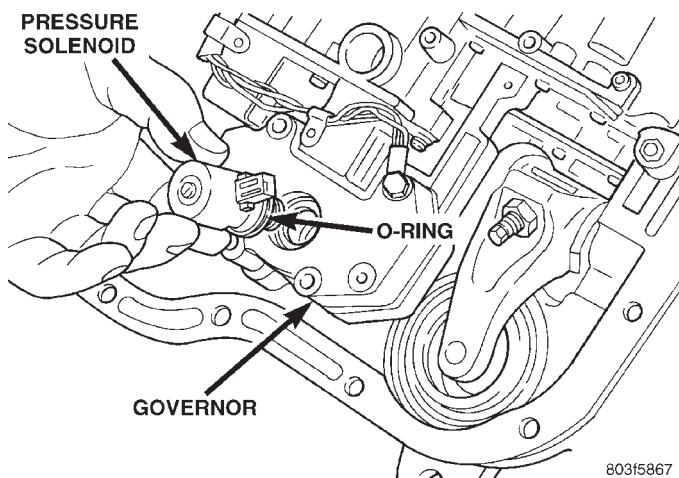
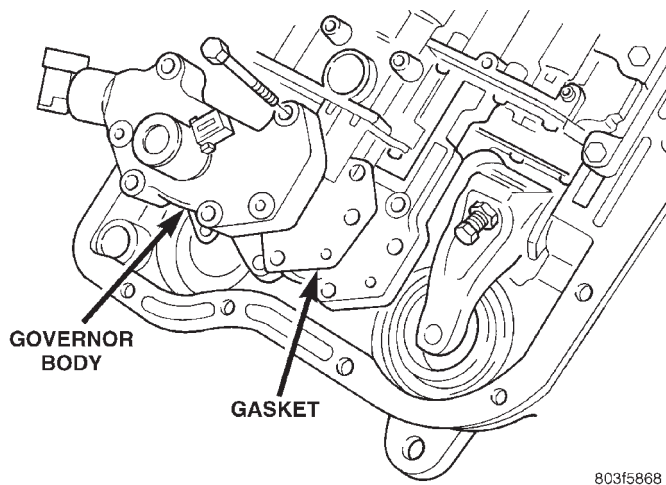
INSTALLATION

Before installing the pressure sensor and solenoid in the governor body, replace O-ring seals, clean the gasket surfaces and replace gasket.

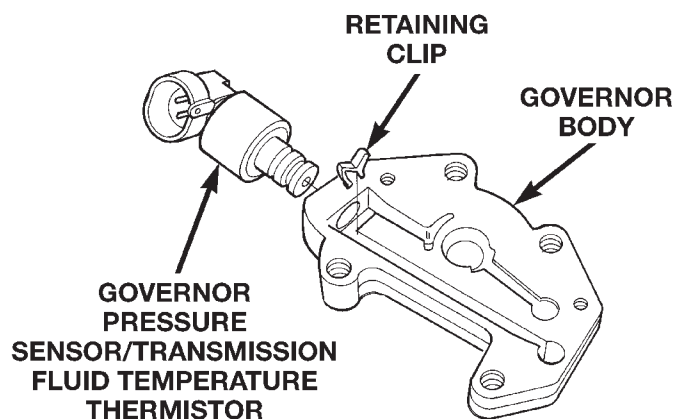
- (1) Lubricate O-ring on pressure sensor with transmission fluid.
- (2) Align pressure sensor to bore in governor body (Fig. 25).
- (3) Push pressure sensor into governor body.
- (4) Install retainer to hold pressure sensor to governor body.
- (5) Place gasket in position on back of governor body (Fig. 24).
- (6) Place governor body in position on valve body.
- (7) Install bolts to hold governor body to valve body.
- (8) Lubricate O-ring, on pressure solenoid, with transmission fluid.
- (9) Align pressure solenoid to bore in governor body (Fig. 23).
- (10) Push solenoid into governor body.
- (11) Place solenoid retainer in position on governor (Fig. 22).
- (12) Install screws to hold pressure solenoid retainer to governor body.
- (13) Engage wire connectors into pressure sensor and solenoid (Fig. 21).
- (14) Install transmission fluid pan and (new) filter.
- (15) Lower vehicle and road test to verify repair.

**Fig. 21 Governor Solenoid And Pressure Sensor**

REMOVAL AND INSTALLATION (Continued)

**Fig. 22 Pressure Solenoid Retainer****Fig. 23 Pressure Solenoid and O-ring****Fig. 24 Governor Body and Gasket****VALVE BODY**

The valve body can be removed for service without having to remove the transmission assembly.

**Fig. 25 Pressure Sensor and Retainer**

The valve body can be disassembled for cleaning and inspection of the individual components. Refer to Disassembly and Assembly section for proper procedures.

The only replaceable valve body components are:

- Manual lever.
- Manual lever washer, seal, E-clip, and shaft seal.
- Manual lever detent ball.
- Throttle lever.
- Fluid filter.
- Pressure adjusting screw bracket.
- Governor pressure solenoid.
- Governor pressure sensor.
- Converter clutch/overdrive solenoid assembly and harness (includes sump temperature thermistor).
- Governor housing gasket.
- Solenoid case connector O-rings.

The remaining valve body components are serviced only as part of a complete valve body assembly.

REMOVAL

- (1) Shift transmission into NEUTRAL.
- (2) Raise vehicle.
- (3) Remove gearshift and throttle levers from shaft of valve body manual lever.
- (4) Disconnect wires at solenoid case connector (Fig. 26).
- (5) Position drain pan under transmission oil pan.
- (6) Remove transmission oil pan and gasket.
- (7) Remove fluid filter from valve body.
- (8) Remove bolts attaching valve body to transmission case.
- (9) Lower valve body enough to remove accumulator piston and springs.
- (10) Work manual lever shaft and electrical connector out of transmission case.

REMOVAL AND INSTALLATION (Continued)

(11) Lower valve body, rotate valve body away from case, pull park rod out of sprag, and remove valve body (Fig. 27).

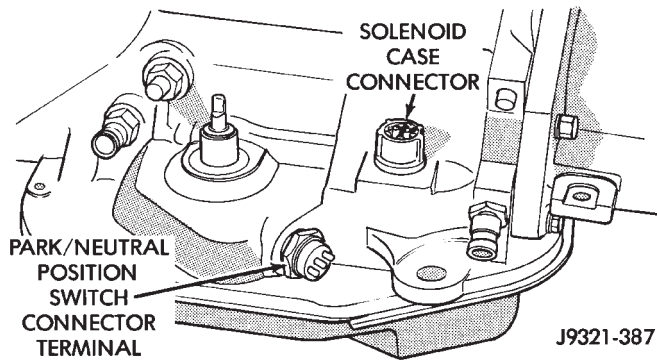


Fig. 26 Transmission Case Connector

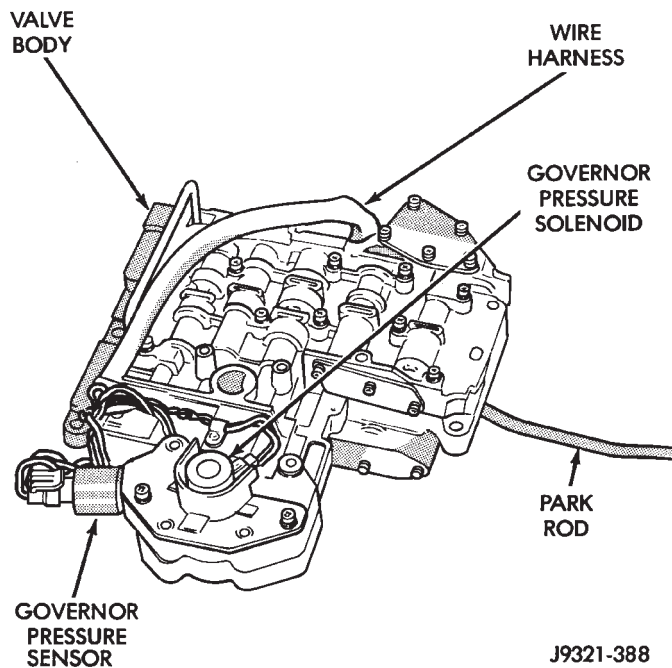


Fig. 27 Valve Body

INSTALLATION

(1) Check condition of O-ring seals on valve body harness connector (Fig. 28). Replace seals on connector body if cut or worn.

(2) Check condition of manual lever shaft seal in transmission case. Replace seal if lip is cut or worn. Install new seal with 15/16 deep well socket (Fig. 29).

(3) Check condition of seals on accumulator piston (Fig. 30). Install new piston seals, if necessary.

(4) Place valve body manual lever in low (1 position) so ball on park lock rod will be easier to install in sprag.

(5) Lubricate shaft of manual lever with petroleum jelly. This will ease inserting shaft through seal in case.

(6) Lubricate seal rings on valve body harness connector with petroleum jelly.

(7) Position valve body in case and work end of park lock rod into and through pawl sprag. Turn propeller shaft to align sprag and park lock teeth if necessary. The rod will click as it enters pawl. Move rod to check engagement.

CAUTION: It is possible for the park rod to displace into a cavity just above the pawl sprag during installation. Make sure the rod is actually engaged in the pawl and has not displaced into this cavity.

(8) Install accumulator springs and piston into case. Then swing valve body over piston and outer spring to hold it in place.

(9) Align accumulator piston and outer spring, manual lever shaft and electrical connector in case.

(10) Then seat valve body in case and install one or two bolts to hold valve body in place.

(11) Tighten valve body bolts alternately and evenly to 11 N·m (100 in. lbs.) torque.

(12) Install new fluid filter on valve body. Tighten filter screws to 4 N·m (35 in. lbs.) torque.

(13) Install throttle and gearshift levers on valve body manual lever shaft.

(14) Check and adjust front and rear bands if necessary.

(15) Connect solenoid case connector wires.

(16) Install oil pan and new gasket. Tighten pan bolts to 17 N·m (13 ft. lbs.) torque.

(17) Lower vehicle and fill transmission with Mopar® ATF Plus 3, type 7176 fluid.

(18) Check and adjust gearshift and throttle valve cables, if necessary.

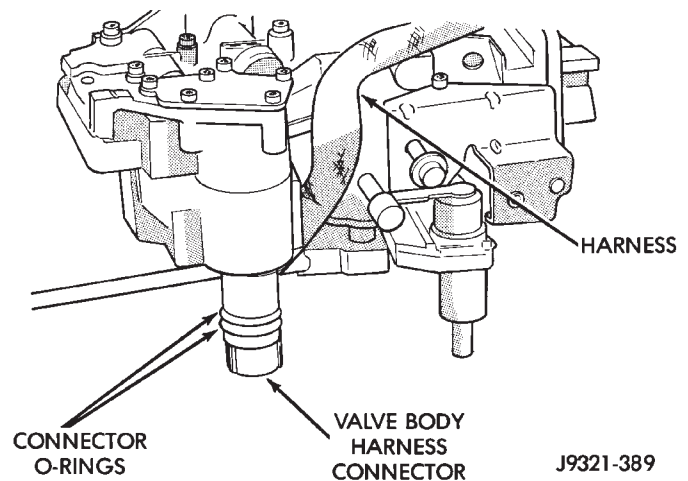


Fig. 28 Valve Body Harness Connector O-Ring Seal

REMOVAL AND INSTALLATION (Continued)

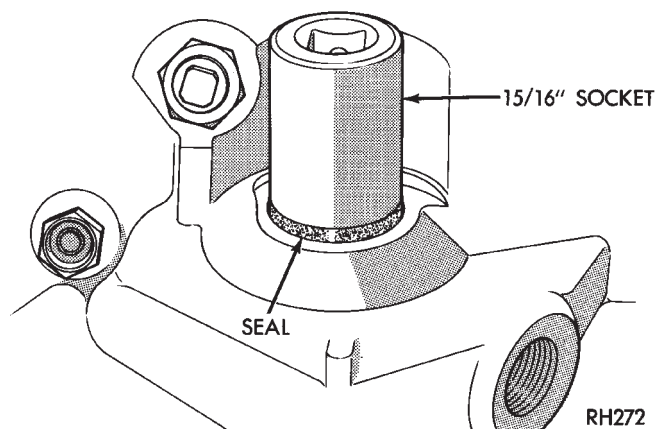


Fig. 29 Manual Lever Shaft Seal

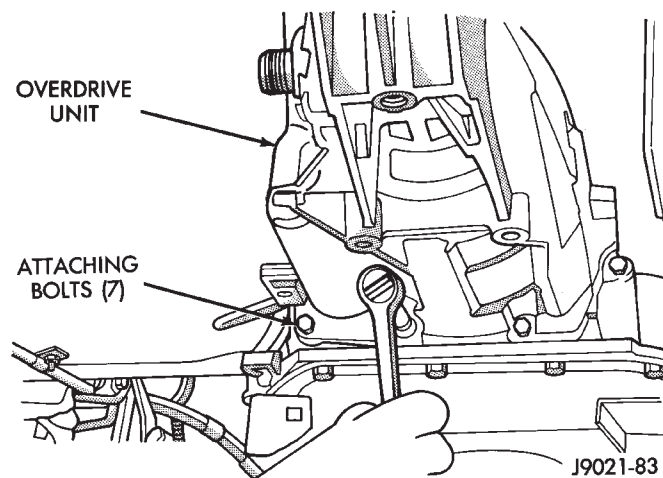


Fig. 31 Overdrive Unit Bolts

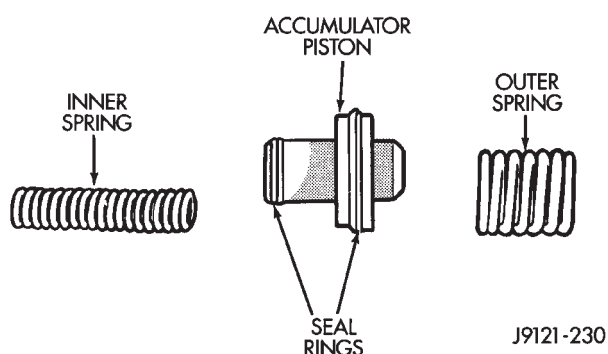


Fig. 30 Accumulator Piston Components

OVERDRIVE UNIT

REMOVAL

- (1) Shift transmission into Park.
- (2) Raise vehicle.
- (3) Mark propeller shaft universal joint(s) and axle pinion yoke for alignment reference at installation.
- (4) Disconnect and remove propeller shaft(s).
- (5) Remove transmission oil pan, remove gasket, drain oil and reinstall pan.
- (6) If overdrive unit had malfunctioned, or if fluid is contaminated, remove entire transmission. If diagnosis indicated overdrive problems only, remove just the overdrive unit.
- (7) Support transmission with transmission jack.
- (8) Remove bolts attaching overdrive unit to transmission (Fig. 31).

CAUTION: Support the overdrive unit with a jack before moving it rearward. This is necessary to prevent damaging the intermediate shaft. Do not allow the shaft to support the entire weight of the overdrive unit.

- (9) Carefully work overdrive unit off intermediate shaft. Do not tilt unit during removal. Keep it as level as possible.

(10) If overdrive unit does not require service, immediately insert Alignment Tool 6227-2 in splines of planetary gear and overrunning clutch to prevent splines from rotating out of alignment. If misalignment occurs, overdrive unit will have to be disassembled in order to realign splines.

(11) Remove and retain overdrive piston thrust bearing. Bearing may remain on piston or in clutch hub during removal.

(12) Position drain pan on workbench.

(13) Place overdrive unit over drain pan. Tilt unit to drain residual fluid from case.

(14) Examine fluid for clutch material or metal fragments. If fluid contains these items, overhaul will be necessary.

(15) If overdrive unit does not require any service, leave alignment tool in position. Tool will prevent accidental misalignment of planetary gear and overrunning clutch splines.

INSTALLATION

(1) Be sure overdrive unit Alignment Tool 6227-2 is fully seated before moving unit. If tool is not seated and gear splines rotate out of alignment, overdrive unit will have to be disassembled in order to realign splines.

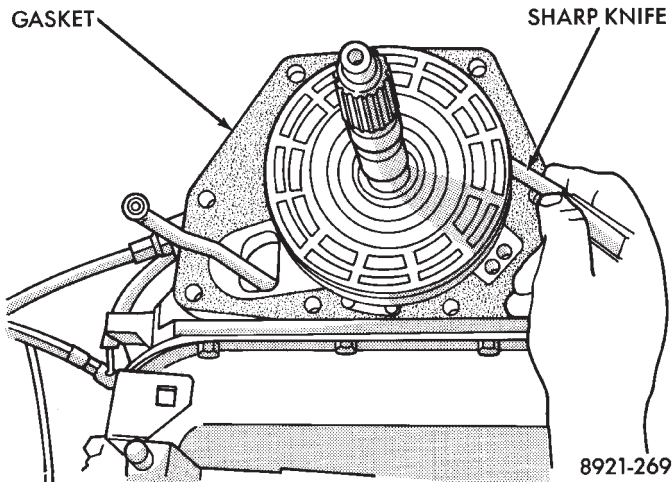
(2) If overdrive piston retainer was not removed during service and original case gasket is no longer reusable, prepare new gasket by trimming it.

(3) Cut out old case gasket around piston retainer with razor knife (Fig. 32).

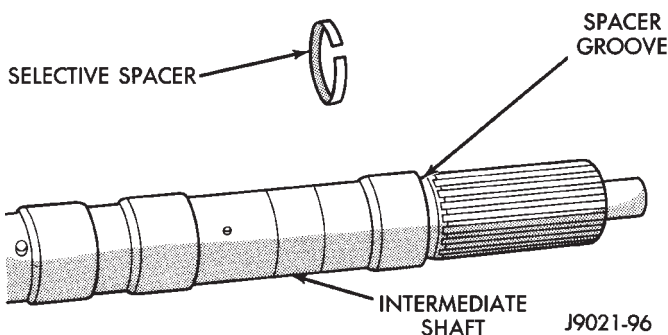
(4) Use old gasket as template and trim new gasket to fit.

(5) Position new gasket over piston retainer and on transmission case. Use petroleum jelly to hold gasket in place if necessary. Do not use any type of sealer to secure gasket. Use petroleum jelly only.

REMOVAL AND INSTALLATION (Continued)

**Fig. 32 Trimming Overdrive Case Gasket**

(6) Install selective spacer on intermediate shaft, if removed. Spacer goes in groove just rearward of shaft rear splines (Fig. 33).

**Fig. 33 Intermediate Shaft Selective Spacer Location**

(7) Install thrust bearing in overdrive unit sliding hub. Use petroleum jelly to hold bearing in position.

CAUTION: Be sure the shoulder on the inside diameter of the bearing is facing forward.

(8) Verify that splines in overdrive planetary gear and overrunning clutch hub are aligned with Alignment Tool 6227-2. Overdrive unit cannot be installed if splines are not aligned. If splines have rotated out of alignment, unit will have to be disassembled to realign splines.

(9) Carefully slide Alignment Tool 6227-2 out of overdrive planetary gear and overrunning clutch splines.

(10) Raise overdrive unit and carefully slide it straight onto intermediate shaft. Insert park rod into park lock reaction plug at same time. Avoid tilting overdrive during installation as this could cause planetary gear and overrunning clutch splines to rotate out of alignment. If this occurs, it will be necessary to remove and disassemble overdrive unit to realign splines.

(11) Work overdrive unit forward on intermediate shaft until seated against transmission case.

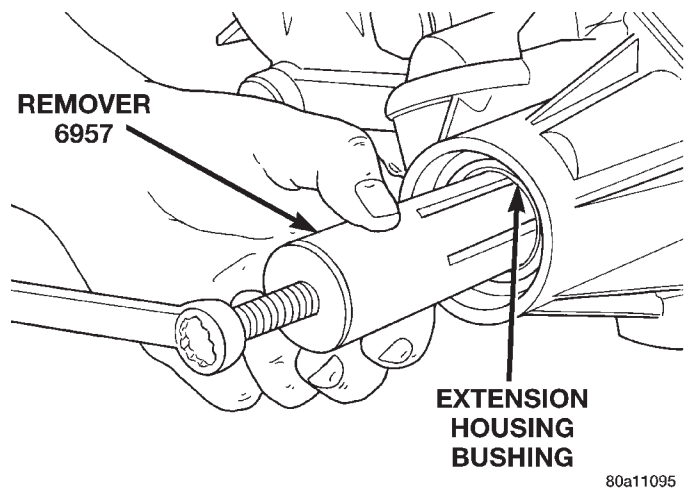
(12) Install bolts attaching overdrive unit to transmission unit. Tighten bolts in diagonal pattern to 34 N·m (25 ft-lbs).

(13) Align and install propeller shaft(s).

OVERDRIVE HOUSING BUSHING**REMOVAL**

(1) Remove overdrive housing yoke seal.

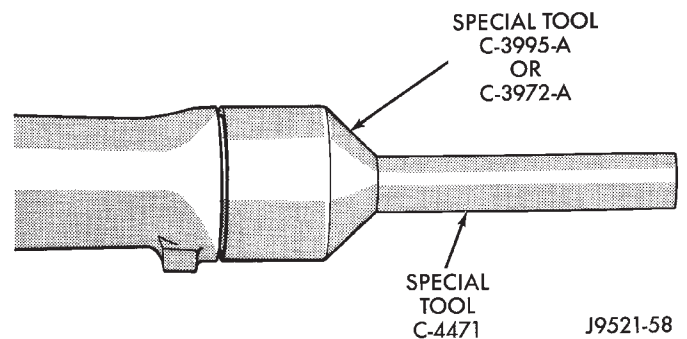
(2) Insert Remover 6957 into overdrive housing. Tighten tool to bushing and remove bushing (Fig. 34).

**Fig. 34 Bushing Removal—Typical****INSTALLATION**

(1) Align bushing oil hole with oil slot in overdrive 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. 35).

**Fig. 35 Overdrive Housing Seal Installation****OUTPUT SHAFT REAR BEARING****REMOVAL**

(1) Remove overdrive unit from the vehicle.

(2) Remove overdrive geartrain from housing.

REMOVAL AND INSTALLATION (Continued)

(3) Remove snap ring holding output shaft rear bearing into overdrive housing (Fig. 36).

(4) Using a suitable driver inserted through the rear end of housing, drive bearing from housing.

INSTALLATION

(1) Place replacement bearing in position in housing.

(2) Using a suitable driver, drive bearing into housing until the snap ring groove is visible.

(3) Install snap ring to hold bearing into housing (Fig. 36).

(4) Install overdrive geartrain into housing.

(5) Install overdrive unit in vehicle.

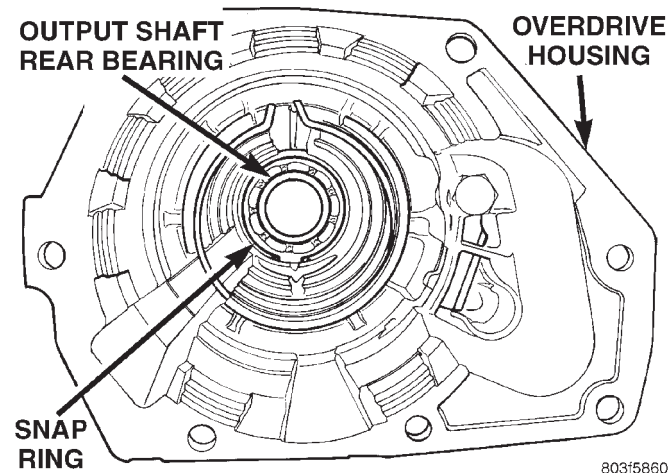


Fig. 36 Output Shaft Rear Bearing

OUTPUT SHAFT FRONT BEARING

REMOVAL

(1) Remove overdrive unit from the vehicle.

(2) Remove overdrive geartrain from housing.

(3) Remove snap ring holding output shaft front bearing to overdrive geartrain. (Fig. 37).

(4) Pull bearing from output shaft.

INSTALLATION

(1) Place replacement bearing in position on geartrain with locating retainer groove toward the rear.

(2) Push bearing onto shaft until the snap ring groove is visible.

(3) Install snap ring to hold bearing onto output shaft (Fig. 37).

(4) Install overdrive geartrain into housing.

(5) Install overdrive unit in vehicle.

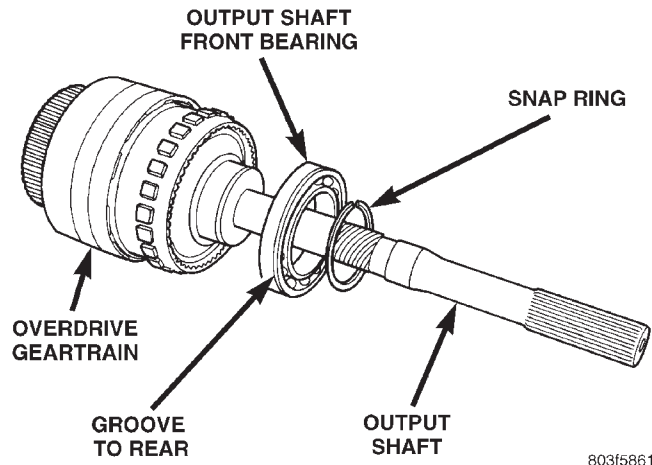


Fig. 37 Output Shaft Front Bearing

DISASSEMBLY AND ASSEMBLY

VALVE BODY

Remove the valve body from the transmission, refer to Removal and Installation procedures section in this group.

DISASSEMBLY

CAUTION: Do not clamp any valve body component in a vise. This practice can damage the component resulting in unsatisfactory operation after assembly and installation. Do not use pliers to remove any of the valves, plugs or springs and do not force any of the components out or into place. The valves and valve body housings will be damaged if force is used. Tag or mark the valve body springs for reference as they are removed. Do not allow them to become intermixed.

(1) Remove fluid filter.

(2) Disconnect wires from governor pressure sensor and solenoid.

(3) Remove screws attaching governor body and retainer plate to transfer plate.

(4) Remove retainer plate, governor body and gasket from transfer plate.

(5) Disconnect wires from governor pressure sensor, if not done previously.

(6) Remove governor pressure sensor from governor body. Sensor is retained in body with M-shaped spring clip. Remove clip with small pointed tool and slide sensor out of body.

(7) Remove governor pressure solenoid by pulling it straight out of bore in governor body. Remove and discard solenoid O-rings if worn, cut, or torn.

(8) Remove small shoulder bolt that secures solenoid harness case connector to 3-4 accumulator housing (Fig. 38). **Retain shoulder bolt. Either tape it**

DISASSEMBLY AND ASSEMBLY (Continued)

to harness or thread it back into accumulator housing after connector removal.

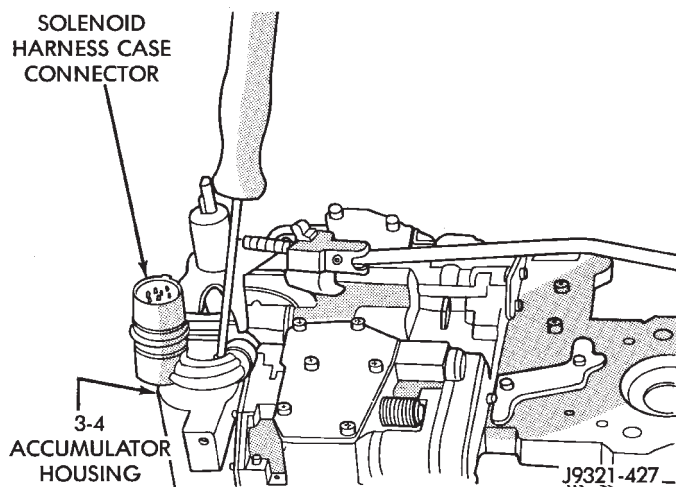


Fig. 38 Solenoid Harness Case Connector Shoulder Bolt

(9) Unhook overdrive/converter solenoid harness from 3-4 accumulator cover plate (Fig. 39).

(10) Turn valve body over and remove screws that attach overdrive/converter solenoid assembly to valve body (Fig. 40).

(11) Remove solenoid and harness assembly from valve body (Fig. 41).

(12) Remove boost valve cover (Fig. 42).

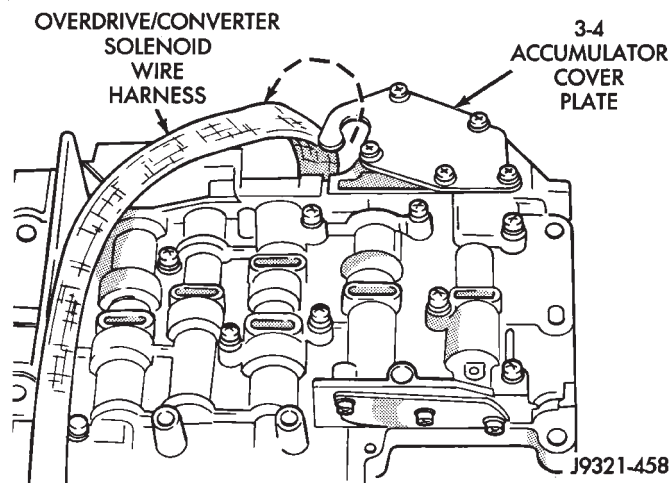


Fig. 39 Unhooking Solenoid Harness From Accumulator Cover Plate

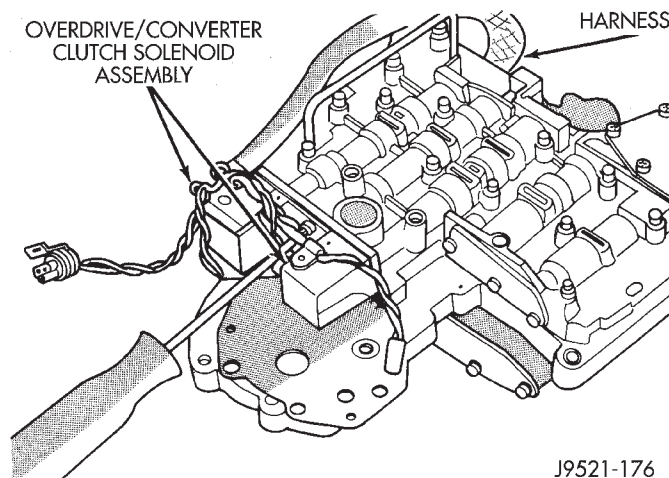


Fig. 40 Solenoid Assembly Screws

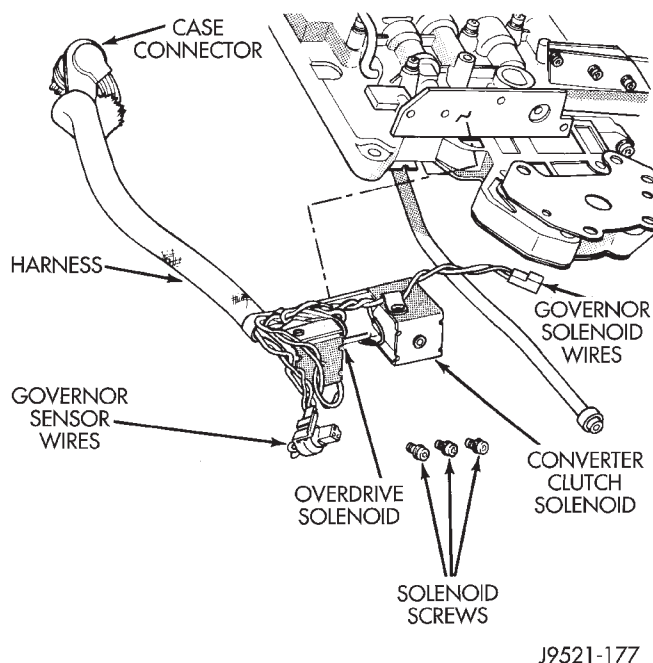


Fig. 41 Solenoid Assembly

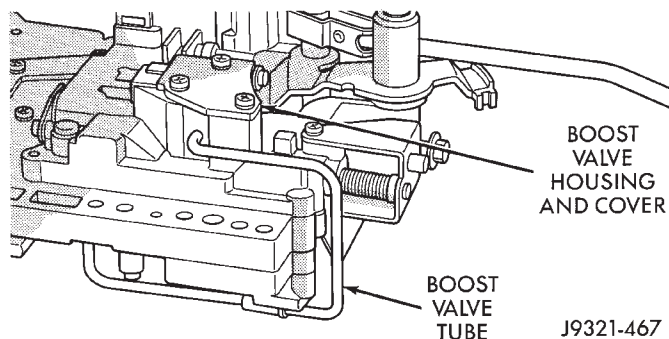


Fig. 42 Boost Valve Cover Location

DISASSEMBLY AND ASSEMBLY (Continued)

(13) Remove boost valve retainer, valve spring and boost valve (Fig. 43).

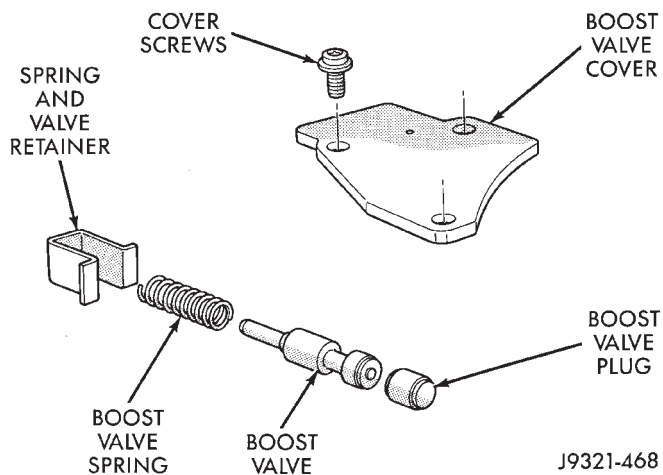


Fig. 43 Boost Valve Components

(14) Secure detent ball and spring with Retainer Tool 6583 (Fig. 44).

(15) Remove park rod E-clip and separate rod from manual lever (Fig. 45).

(16) Remove E-clip and washer that retains throttle lever shaft in manual lever (Fig. 46).

(17) Remove manual lever and throttle lever (Fig. 47). Rotate and lift manual lever off valve body and throttle lever shaft. Then slide throttle lever out of valve body.

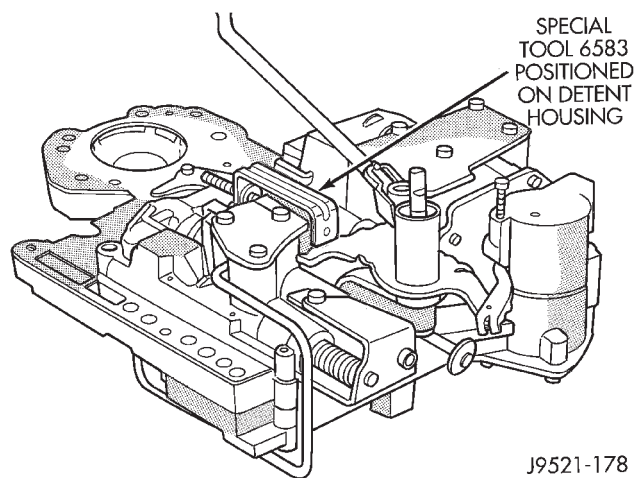


Fig. 44 Detent Ball And Spring

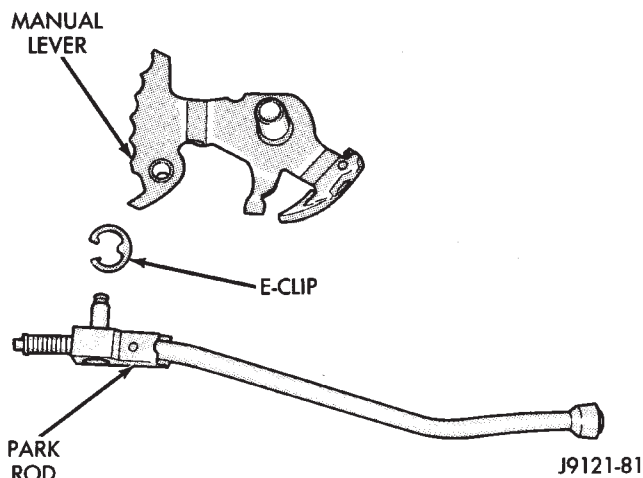


Fig. 45 Park Rod

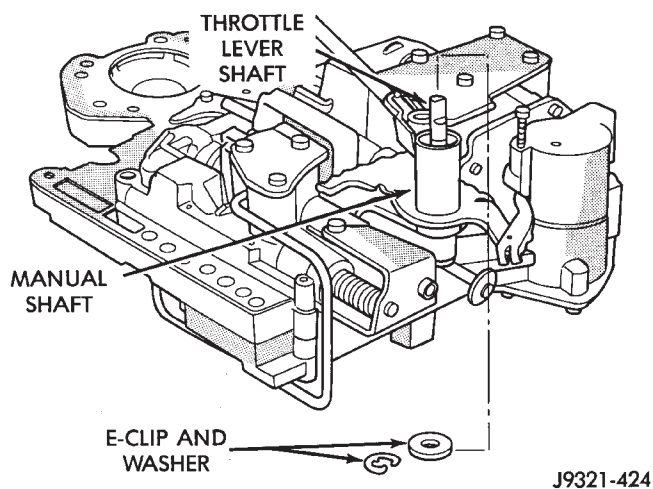


Fig. 46 Throttle Lever E-Clip And Washer

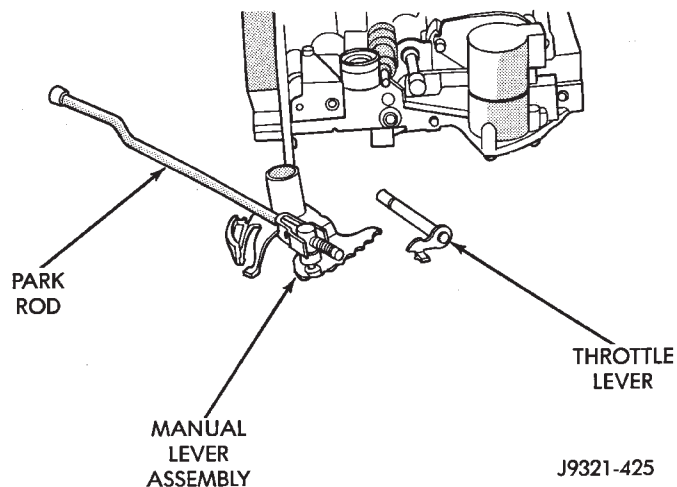


Fig. 47 Manual And Throttle Lever

DISASSEMBLY AND ASSEMBLY (Continued)

(18) Position pencil magnet next to detent housing to catch detent ball and spring. Then carefully remove Retainer Tool 6583 and remove detent ball and spring (Fig. 48).

(19) Remove screws attaching pressure adjusting screw bracket to valve body and transfer plate (Fig. 49). Hold bracket firmly against spring tension while removing last screw.

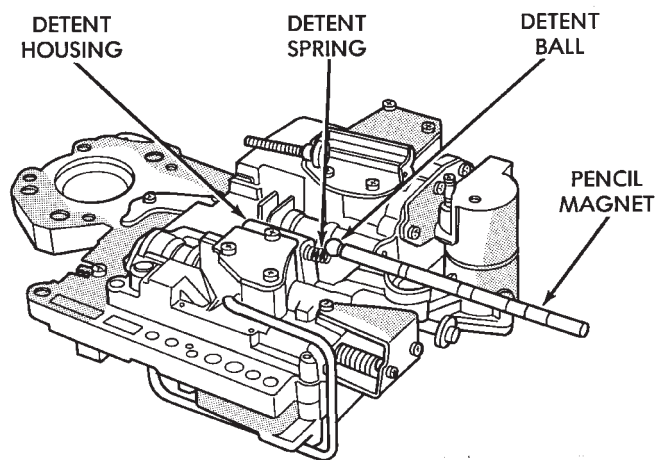


Fig. 48 Detent Ball And Spring

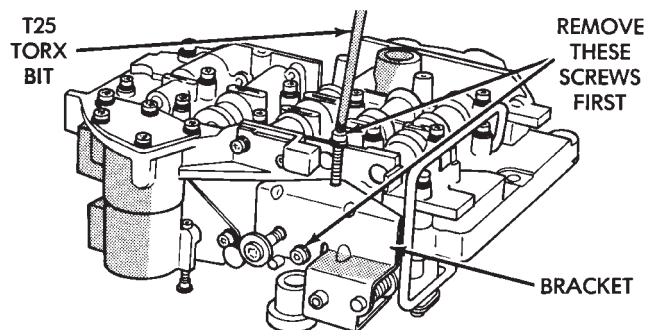


Fig. 49 Adjusting Screw Bracket Fastener

(20) Remove adjusting screw bracket, line pressure adjusting screw, pressure regulator valve spring and switch valve spring (Fig. 50). **Do not remove throttle pressure adjusting screw from bracket and do not disturb setting of either adjusting screw during removal.**

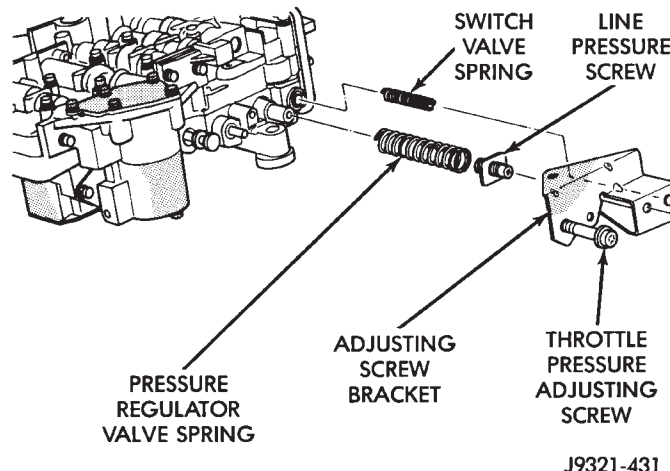


Fig. 50 Adjusting Screw Bracket And Spring

(21) Turn upper housing over and remove switch valve, regulator valve and spring, and manual valve (Fig. 51).

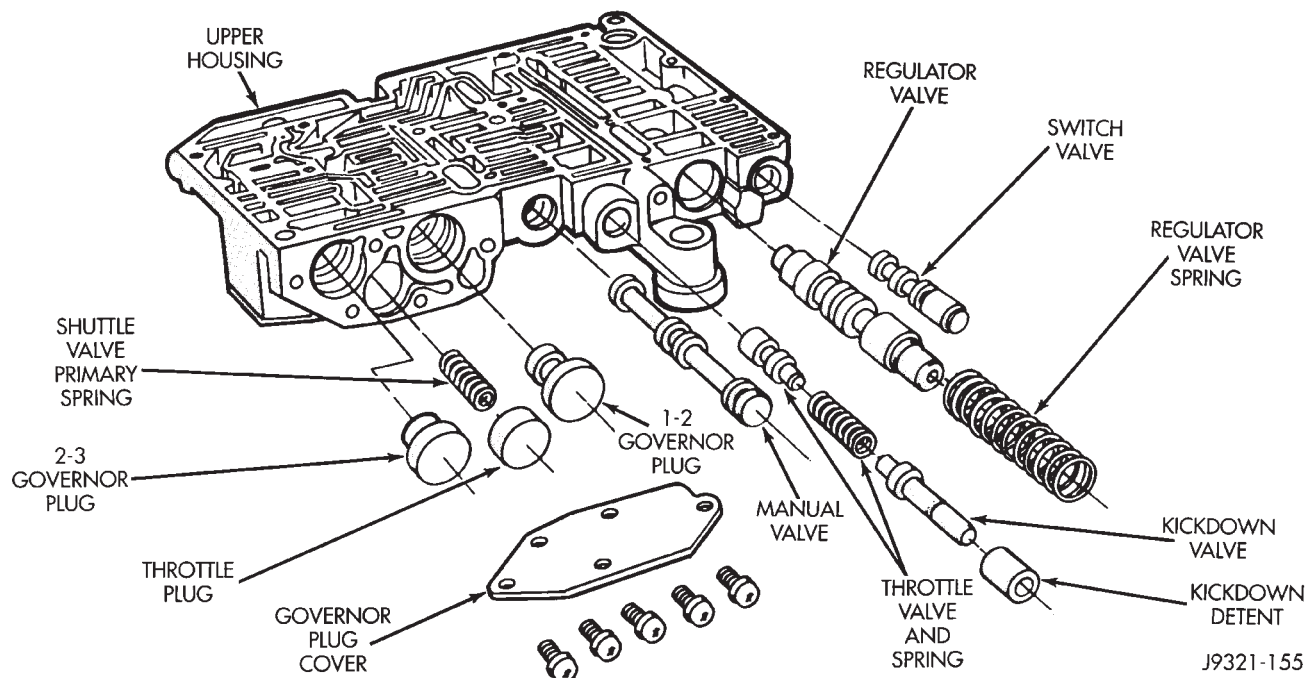
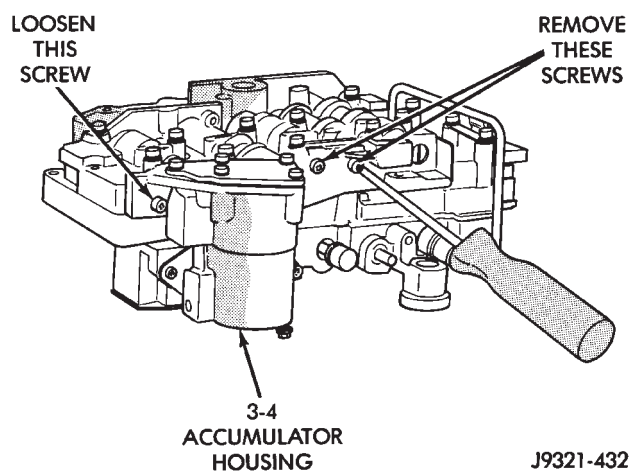
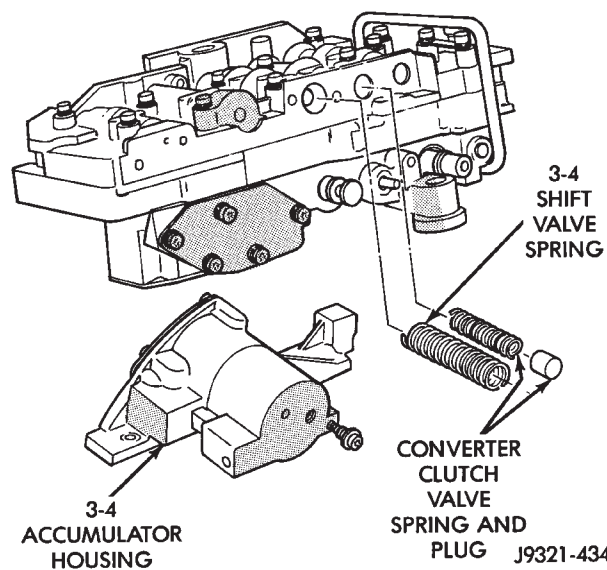
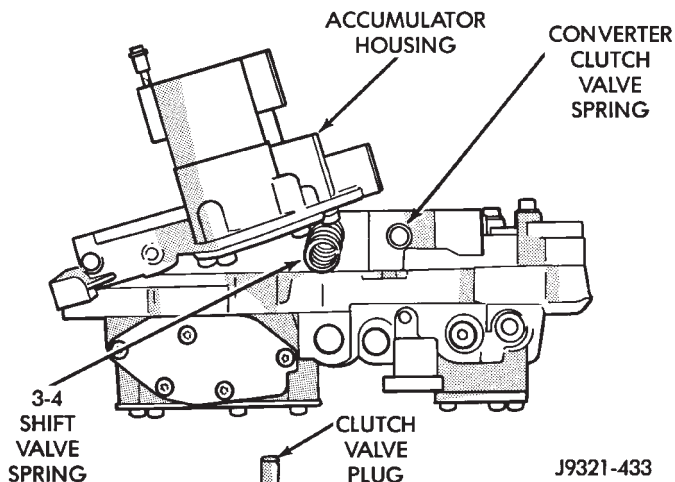
(22) Remove kickdown detent, kickdown valve, and throttle valve and spring (Fig. 51).

(23) Loosen left-side 3-4 accumulator housing attaching screw about 2-3 threads. Then remove center and right-side housing attaching screws (Fig. 52).

(24) Carefully rotate 3-4 accumulator housing upward and remove 3-4 shift valve spring and converter clutch valve plug and spring (Fig. 53).

(25) Remove left-side screw and remove 3-4 accumulator housing from valve body (Fig. 54).

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 51 Upper Housing Control Valve Locations****Fig. 52 Accumulator Housing Screw Locations****Fig. 54 Accumulator Housing, Valve Springs And Plug****Fig. 53 3-4 Shift And Converter Clutch Valve Springs And Plug**

DISASSEMBLY AND ASSEMBLY (Continued)

(26) Bend back tabs on boost valve tube brace (Fig. 55).

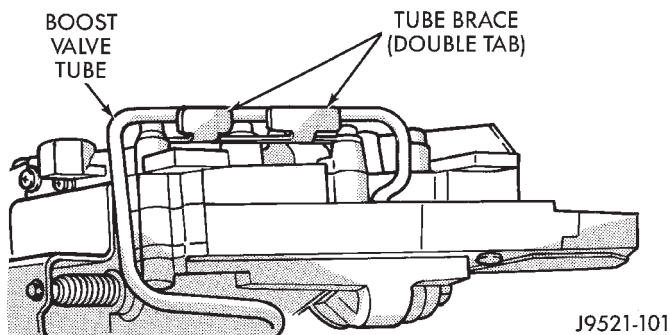


Fig. 55 Boost Valve Tube Brace

(27) Remove boost valve connecting tube (Fig. 56). Disengage tube from upper housing port first. Then rock opposite end of tube back and forth to work it out of lower housing.

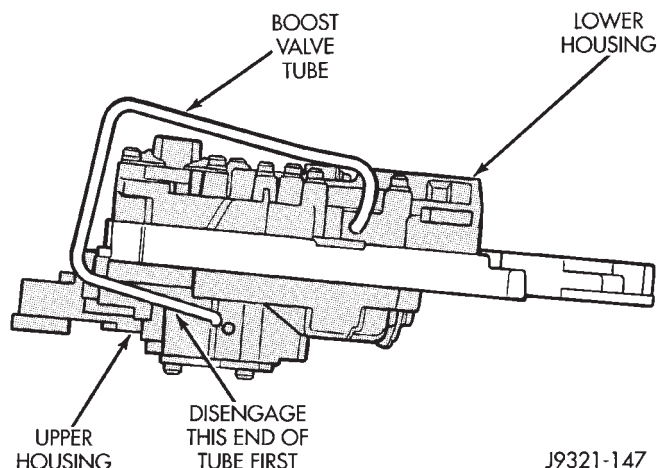


Fig. 56 Boost Valve Tube

CAUTION: Do not use tools to loosen or pry the connecting tube out of the valve body housings. Loosen and remove the tube by hand only.

(28) Turn valve body over so lower housing is facing upward (Fig. 57). In this position, the two check balls in upper housing will remain in place and not fall out when lower housing and separator plate are removed.

(29) Remove screws attaching valve body lower housing to upper housing and transfer plate (Fig. 57). **Note position of boost valve tube brace for assembly reference.**

(30) Remove lower housing and overdrive separator plate from transfer plate (Fig. 57).

(31) Remove the ECE check ball from the transfer plate (Fig. 58). The ECE check ball is approximately 4.8 mm (3/16 in.) in diameter.

(32) Remove transfer plate from upper housing (Fig. 59).

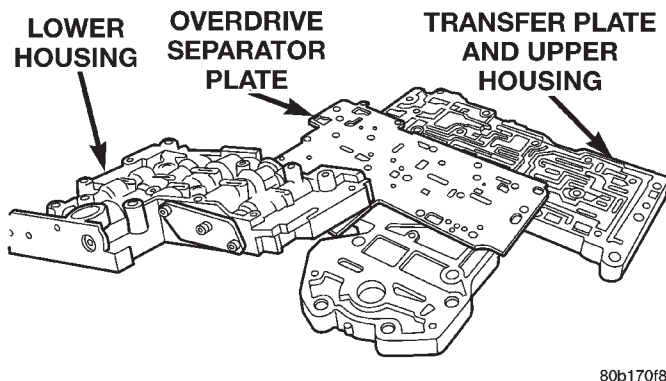


Fig. 57 Lower Housing

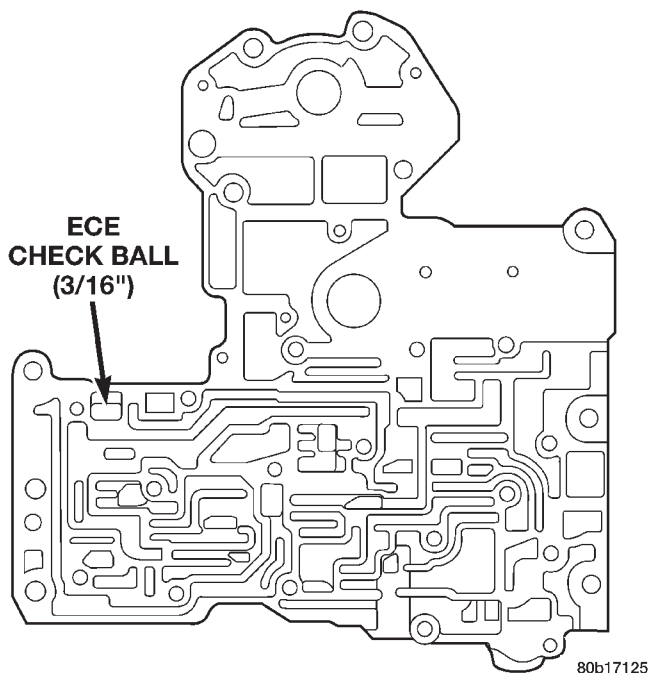


Fig. 58 ECE Check Ball

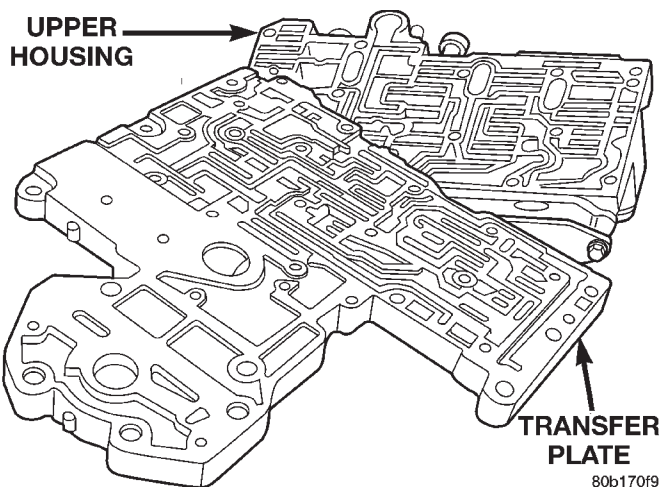


Fig. 59 Transfer Plate

DISASSEMBLY AND ASSEMBLY (Continued)

(33) Turn transfer plate over so upper housing separator plate is facing upward.

(34) Remove upper housing separator plate from transfer plate (Fig. 60). Note position of filter in separator plate for assembly reference.

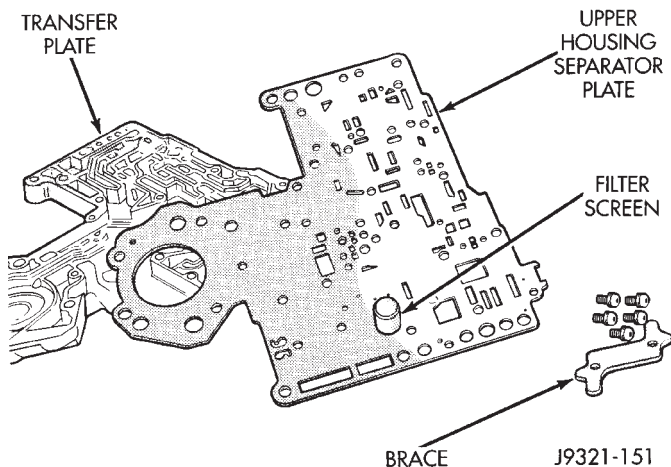


Fig. 60 Upper Housing Separator Plate

(35) Remove rear clutch and rear servo check balls from transfer plate. Note check ball location for assembly reference (Fig. 61).

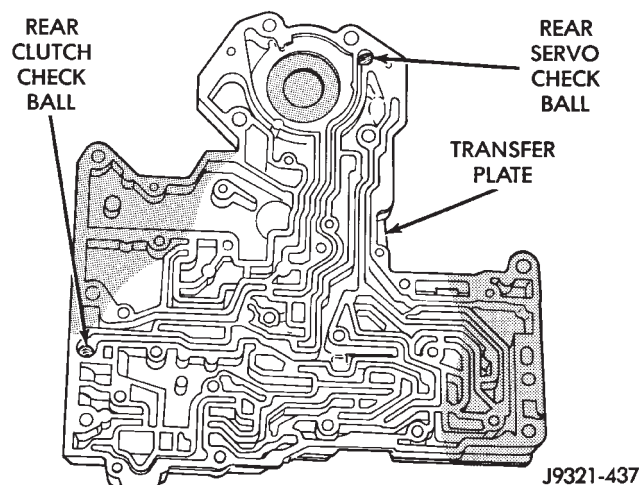


Fig. 61 Rear Clutch And Rear Servo Check Ball Locations

VALVE BODY UPPER HOUSING

(1) Note location of check balls in valve body upper housing (Fig. 62). Then remove the one large diameter and the six smaller diameter check balls.

(2) Remove governor plug and shuttle valve covers (Fig. 64).

(3) Remove E-clip that secures shuttle valve secondary spring on valve stem (Fig. 63).

(4) Remove throttle plug, primary spring, shuttle valve, secondary spring, and spring guides (Fig. 64).

(5) Remove boost valve retainer, spring and valve if not previously removed.

(6) Remove throttle plug and 1-2 and 2-3 governor plugs (Fig. 51).

(7) Turn upper housing around and remove limit valve and shift valve covers (Fig. 65).

(8) Remove limit valve housing. Then remove retainer, spring, limit valve, and 2-3 throttle plug from limit valve housing (Fig. 65).

(9) Remove 1-2 shift control valve and spring (Fig. 65).

(10) Remove 1-2 shift valve and spring (Fig. 65).

(11) Remove 2-3 shift valve and spring from valve body (Fig. 65).

(12) Remove pressure plug cover (Fig. 65).

(13) Remove line pressure plug, sleeve, throttle pressure plug and spring (Fig. 65).

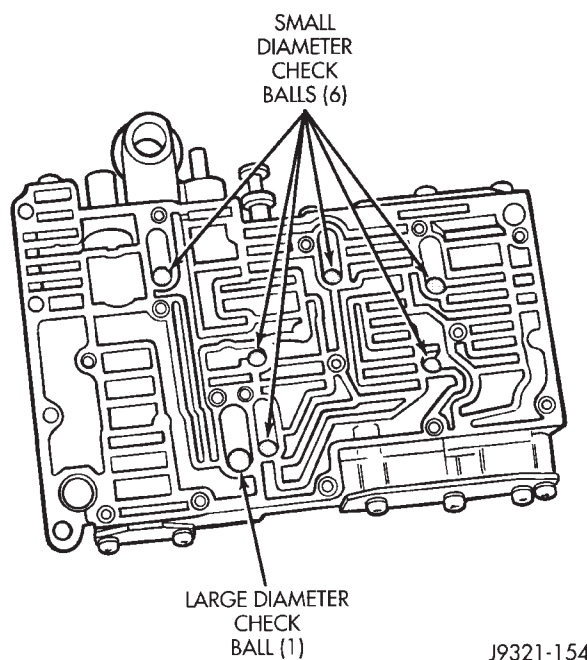


Fig. 62 Check Ball Locations In Upper Housing

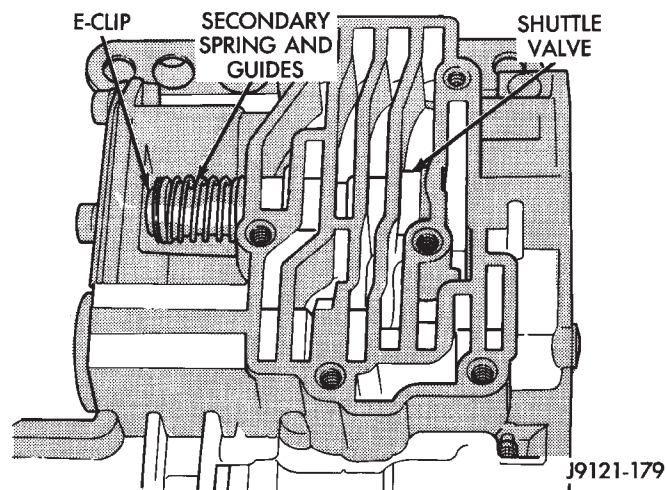


Fig. 63 Shuttle Valve E-Clip And Secondary Spring Location

DISASSEMBLY AND ASSEMBLY (Continued)

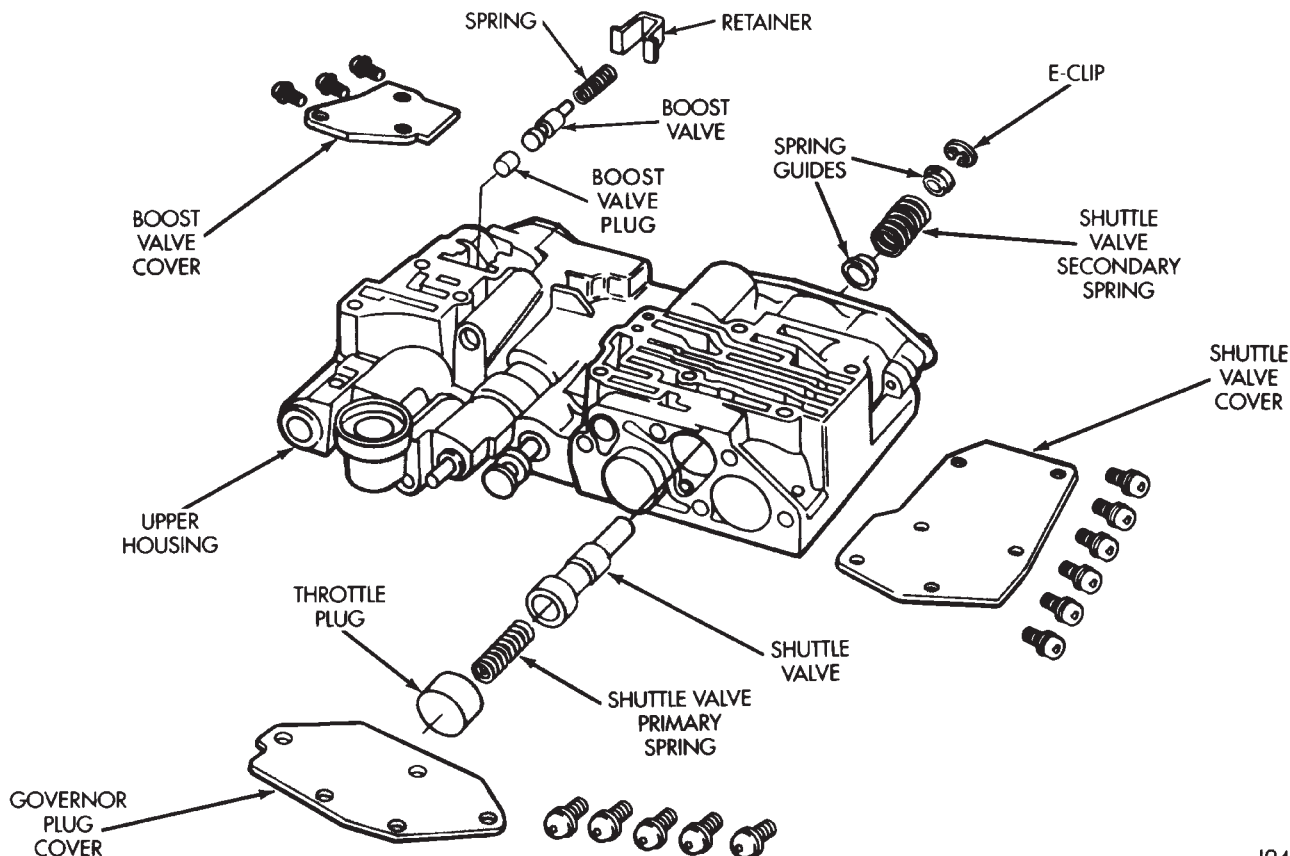


Fig. 64 Shuttle And Boost Valve Components

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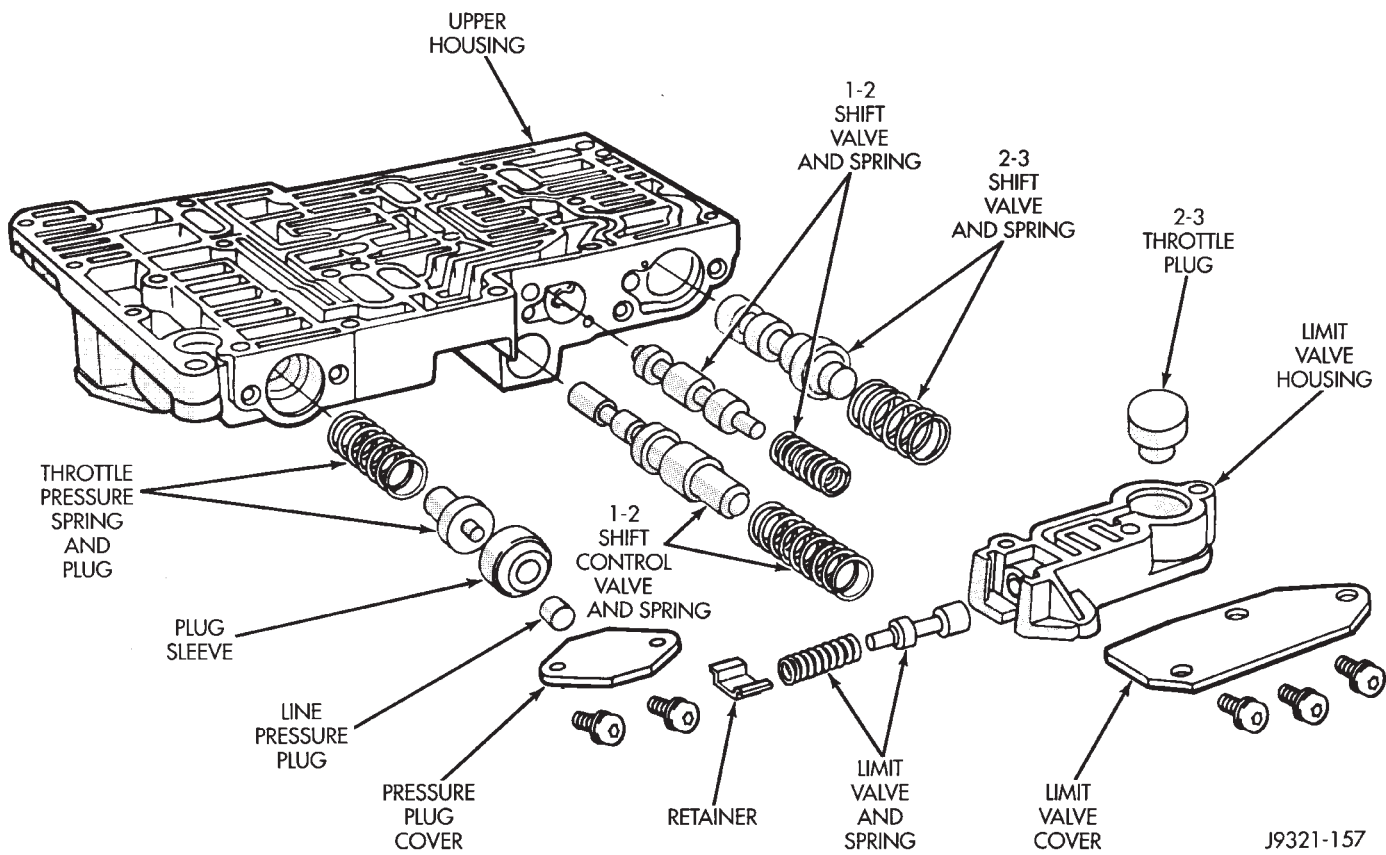


Fig. 65 Upper Housing Shift Valve And Pressure Plug Locations

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DISASSEMBLY AND ASSEMBLY (Continued)

VALVE BODY LOWER HOUSING

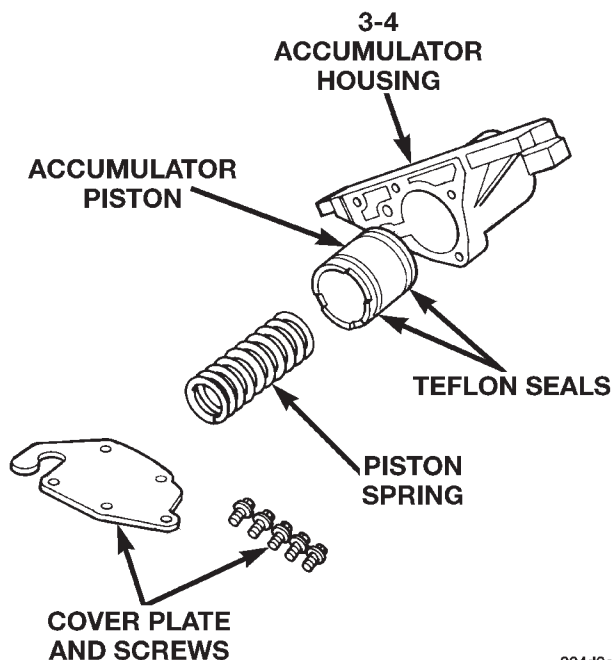
- (1) Remove timing valve cover.
- (2) Remove 3-4 timing valve and spring.
- (3) Remove 3-4 quick fill valve, spring and plug.
- (4) Remove 3-4 shift valve and spring.
- (5) Remove converter clutch valve, spring and plug (Fig. 66).
- (6) Remove converter clutch timing valve, retainer and valve spring.

3-4 ACCUMULATOR HOUSING

- (1) Remove end plate from housing.
- (2) Remove piston spring.
- (3) Remove piston. Remove and discard piston seals (Fig. 67).

ASSEMBLY

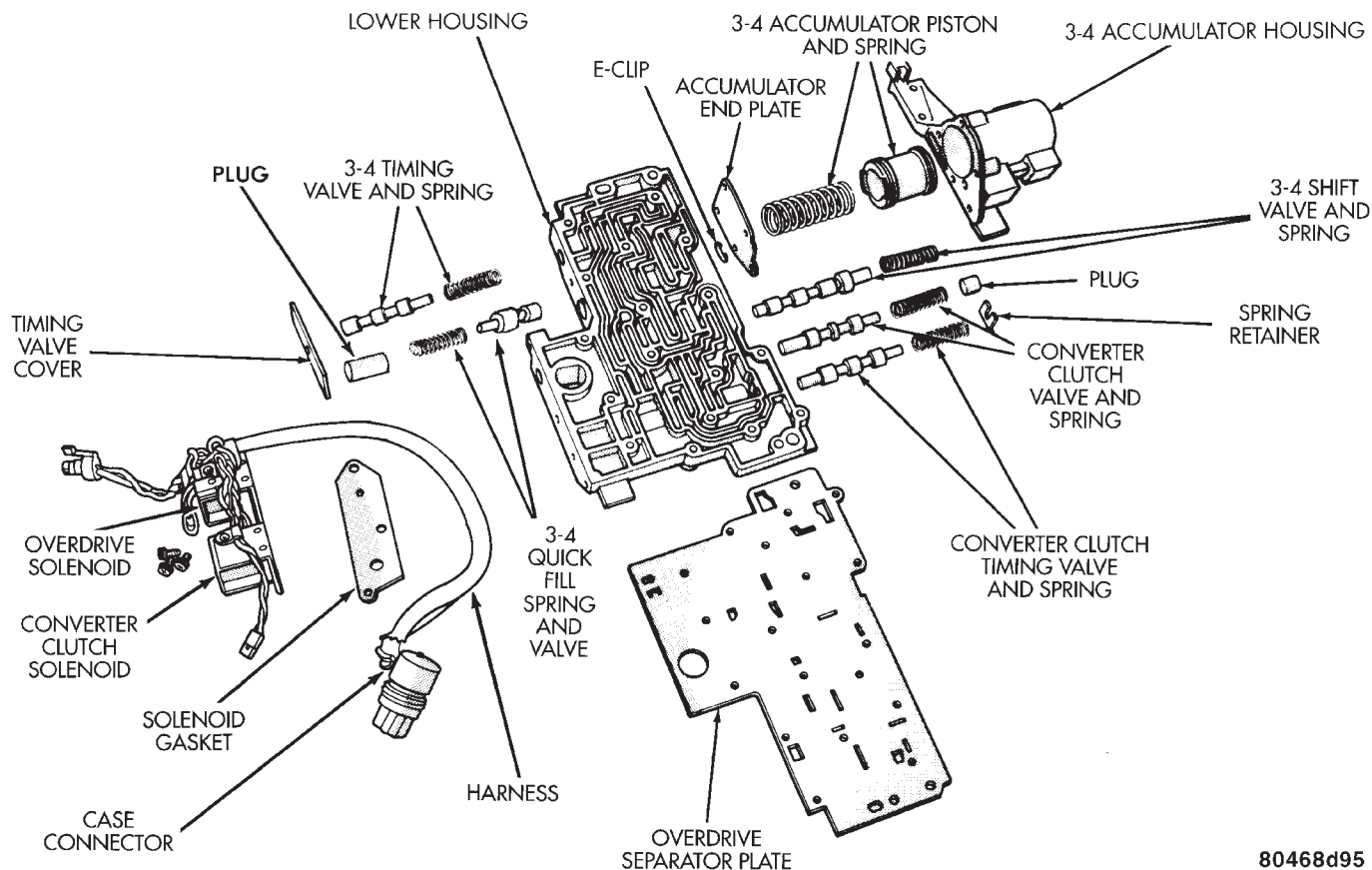
CAUTION: Do not force valves or plugs into place during reassembly. If the valve body bores, valves and plugs are free of distortion or burrs, the valve body components should all slide into place easily. In addition, do not overtighten the transfer plate and valve body screws during reassembly. Overtightening can distort the housings resulting in valve sticking, cross leakage and unsatisfactory



804d8eb9

Fig. 67 Accumulator Housing Components

operation. Tighten valve body screws to recommended torque only.



80468d95

Fig. 66 Lower Housing Shift Valves And Springs

DISASSEMBLY AND ASSEMBLY (Continued)

LOWER HOUSING

- (1) Lubricate valves, springs, and the housing valve and plug bores with clean transmission fluid (Fig. 66).
- (2) Install 3-4 timing valve spring and valve in lower housing.
- (3) Install 3-4 quick fill valve in lower housing.
- (4) Install 3-4 quick fill valve spring and plug in housing.
- (5) Install timing valve end plate. Tighten end plate screws to 4 N·m (35 in. lbs.) torque.

3-4 ACCUMULATOR

- (1) Lubricate accumulator piston, seals and housing piston bore with clean transmission fluid (Fig. 67).
- (2) Install new seal rings on accumulator piston.
- (3) Install piston and spring in housing.
- (4) Install end plate on housing.

TRANSFER PLATE

- (1) Install rear clutch and rear servo check balls in transfer plate (Fig. 68).
- (2) Install filter screen in upper housing separator plate (Fig. 69).
- (3) Align and position upper housing separator plate on transfer plate (Fig. 70).
- (4) Install brace plate (Fig. 70). Tighten brace attaching screws to 4 N·m (35 in. lbs.) torque.
- (5) Install remaining separator plate attaching screws. Tighten screws to 4 N·m (35 in. lbs.) torque.

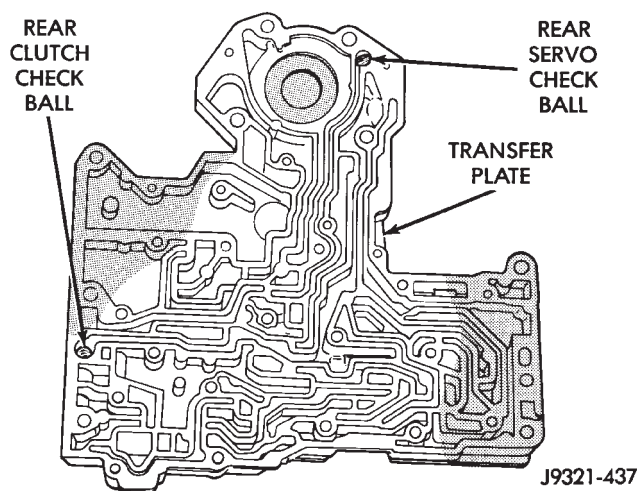


Fig. 68 Rear Clutch And Rear Servo Check Ball Locations

UPPER AND LOWER HOUSING

- (1) Position upper housing so internal passages and check ball seats are facing upward. Then install check balls in housing (Fig. 71). Seven check balls are used. The single large check ball is approximately 8.7 mm (11/32 in.) diameter. The single small

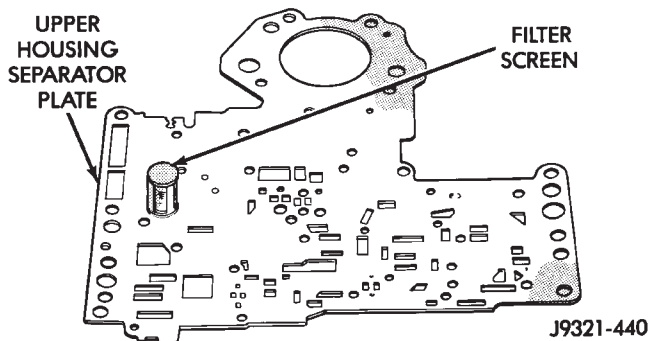


Fig. 69 Separator Plate Filter Screen Installation

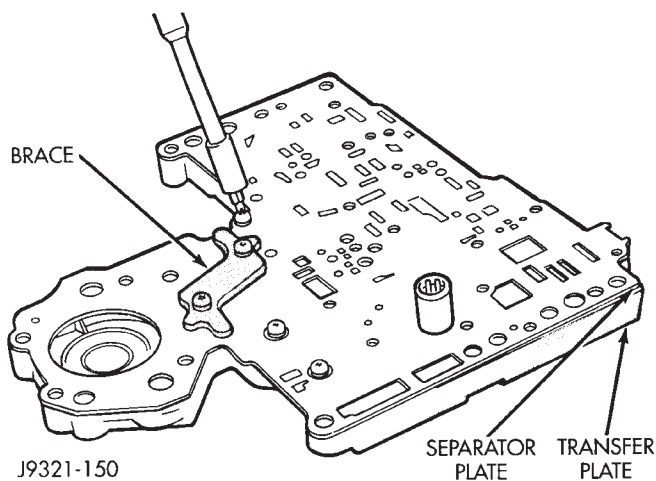


Fig. 70 Brace Plate

check ball is approximately 4.8 mm (3/16 in.) in diameter. The remaining 6 check balls are approximately 6.3 mm (1/4 in.) in diameter.

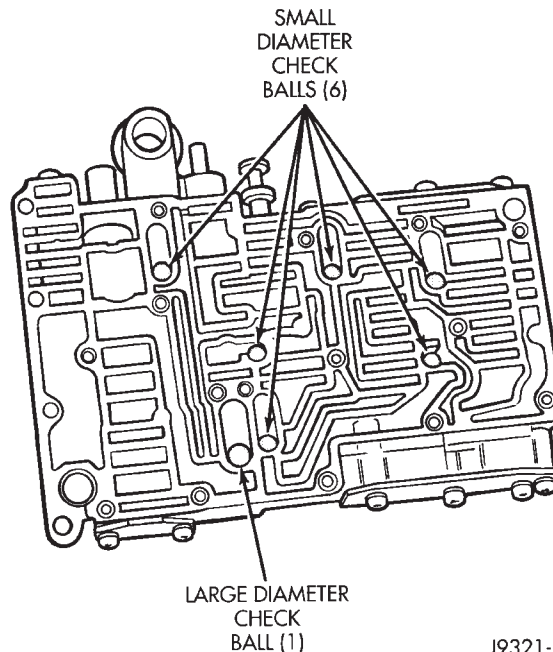


Fig. 71 Check Ball Locations In Upper Housing

DISASSEMBLY AND ASSEMBLY (Continued)

(2) Position assembled transfer plate and upper housing separator plate on upper housing (Fig. 72). Be sure filter screen is seated in proper housing recess.

(3) Install the ECE check ball into the transfer plate (Fig. 58). The ECE check ball is approximately 4.8 mm (3/16 in.) in diameter.

(4) Position lower housing separator plate on transfer plate (Fig. 73).

(5) Install lower housing on assembled transfer plate and upper housing (Fig. 74).

(6) Install and start all valve body screws by hand except for the screws to hold the boost valve tube brace. Save those screws for later installation. Then tighten screws evenly to 4 N·m (35 in. lbs.) torque. Start at center and work out to sides when tightening screws (Fig. 74).

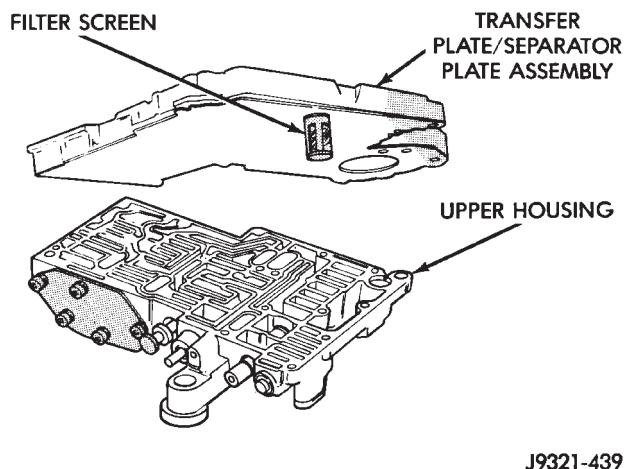


Fig. 72 Installing Transfer Plate On Upper Housing

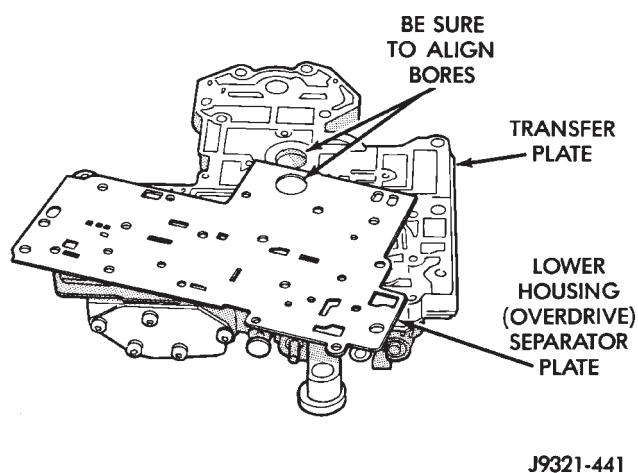


Fig. 73 Lower Housing Separator Plate

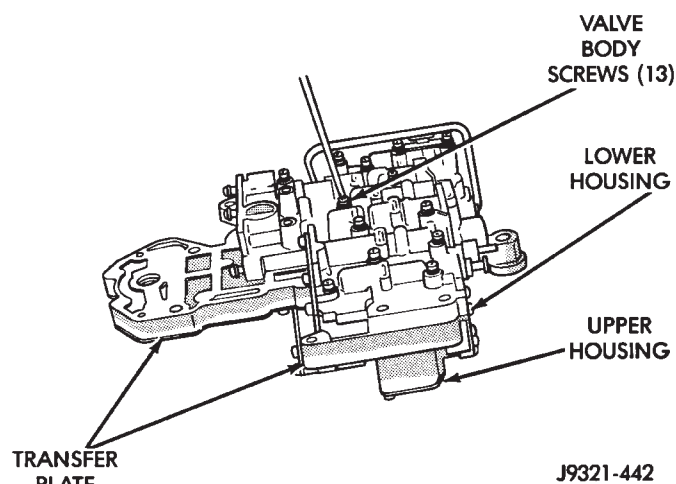


Fig. 74 Installing Lower Housing On Transfer Plate And Upper Housing

UPPER HOUSING VALVE AND PLUG

Refer to (Fig. 75), (Fig. 76) and (Fig. 77) to perform the following steps.

(1) Lubricate valves, plugs, springs with clean transmission fluid.

(2) Assemble regulator valve line pressure plug, sleeve, throttle plug and spring. Insert assembly in upper housing and install cover plate. Tighten cover plate screws to 4 N·m (35 in. lbs.) torque.

(3) Install 1-2 and 2-3 shift valves and springs.

(4) Install 1-2 shift control valve and spring.

(5) Install retainer, spring, limit valve, and 2-3 throttle plug from limit valve housing.

(6) Install limit valve housing and cover plate. Tighten screws to 4 N·m (35 in. lbs.).

(7) Install shuttle valve as follows:

(a) Insert plastic guides in shuttle valve secondary spring and install spring on end of valve.

(b) Install shuttle valve into housing.

(c) Hold shuttle valve in place.

(d) Compress secondary spring and install E-clip in groove at end of shuttle valve.

(e) Verify that spring and E-clip are properly seated before proceeding.

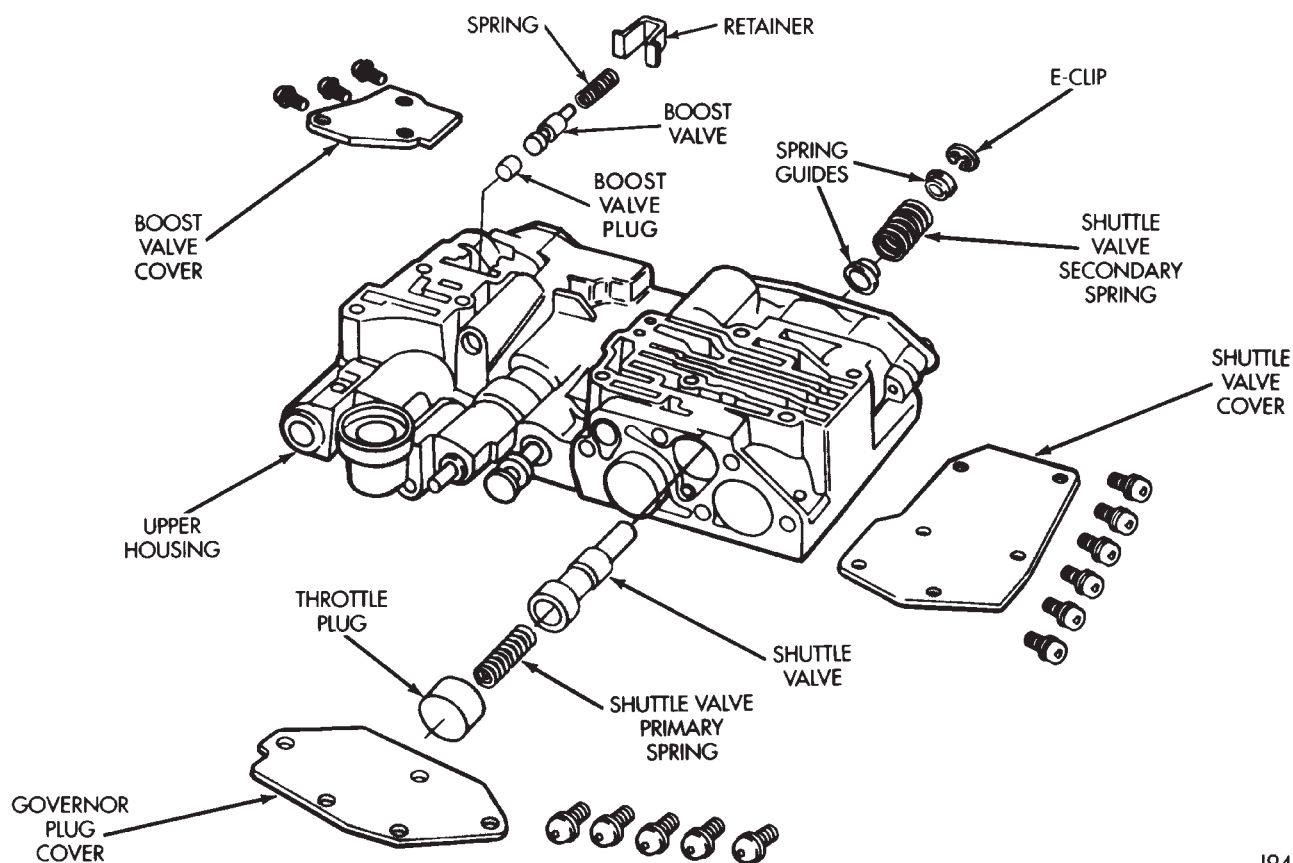
(8) Install shuttle valve cover plate. Tighten cover plate screws to 4 N·m (35 in. lbs.) torque.

(9) Install 1-2 and 2-3 valve governor plugs in valve body.

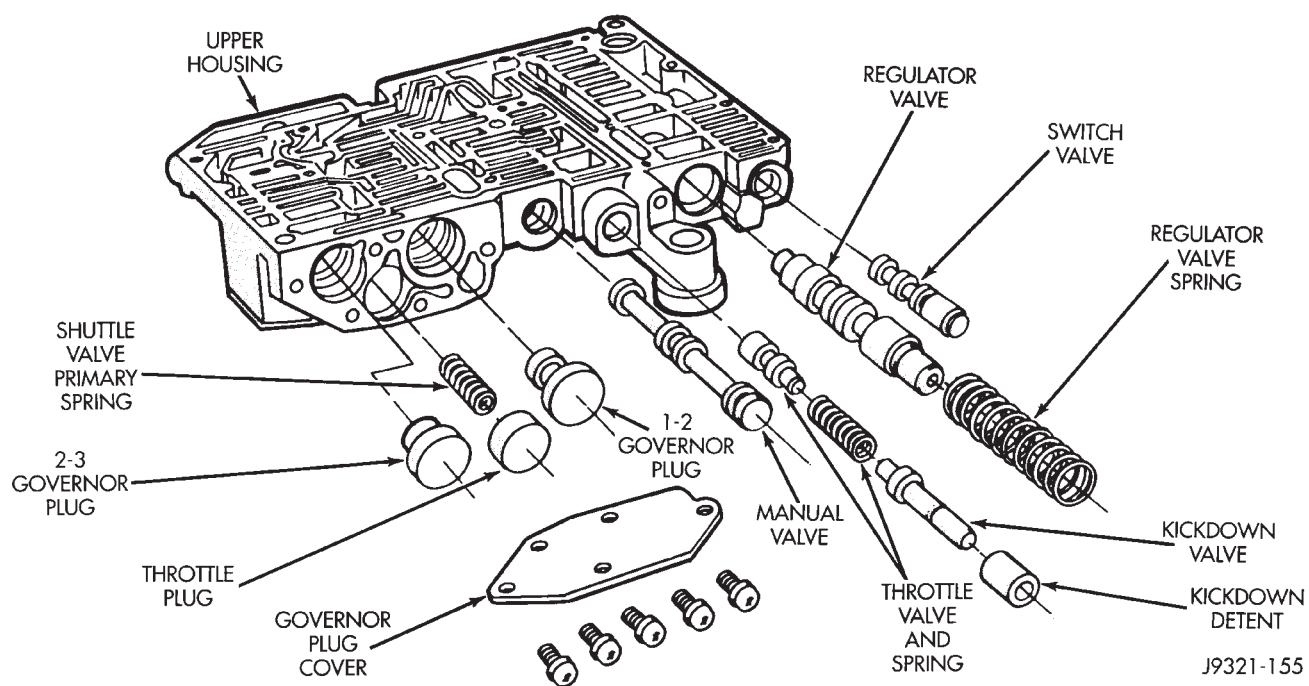
(10) Install shuttle valve primary spring and throttle plug.

(11) Align and install governor plug cover. Tighten cover screws to 4 N·m (35 in. lbs.) torque.

DISASSEMBLY AND ASSEMBLY (Continued)



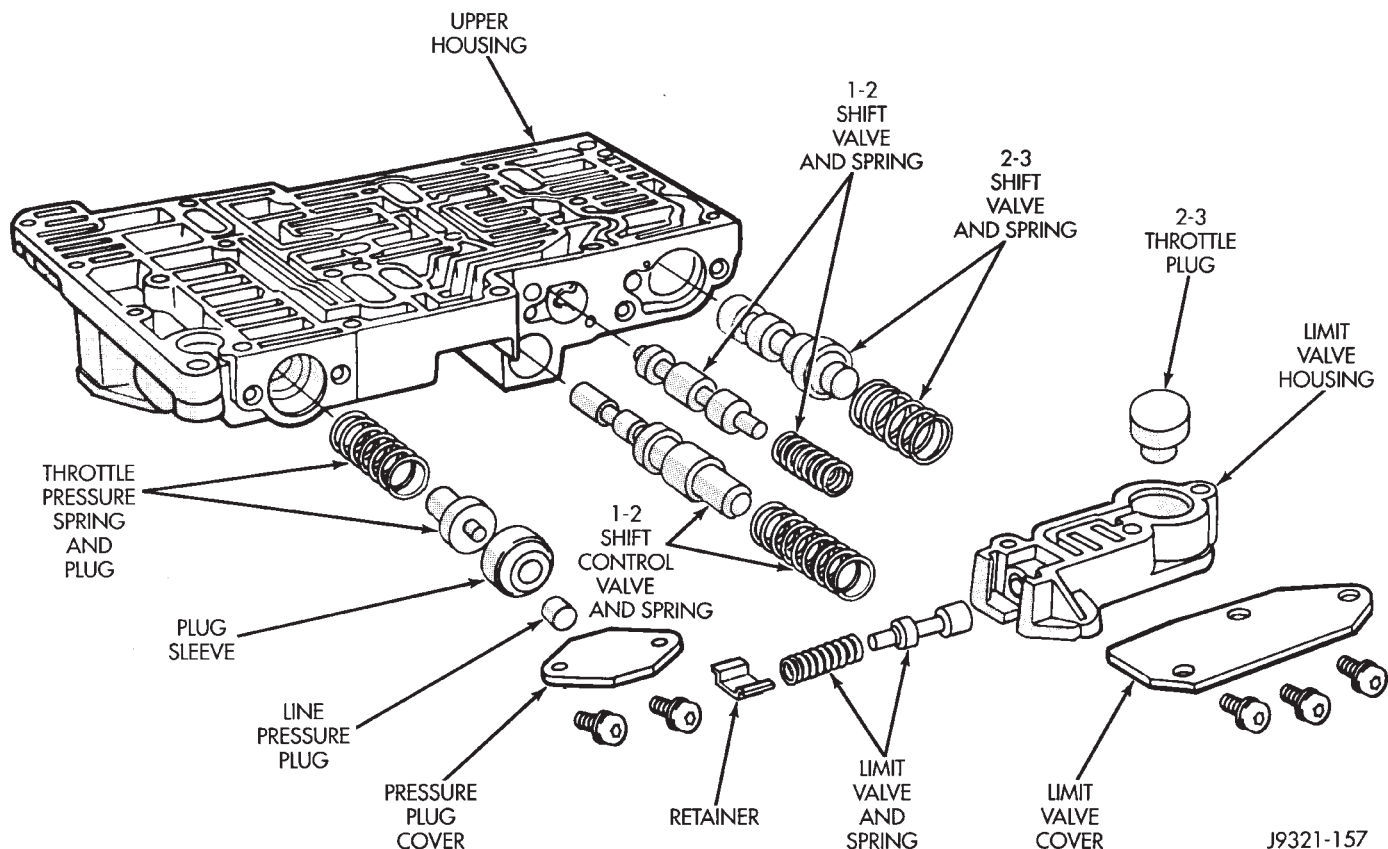
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Fig. 75 Shuttle And Boost Valve Components

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Fig. 76 Upper Housing Control Valve Locations

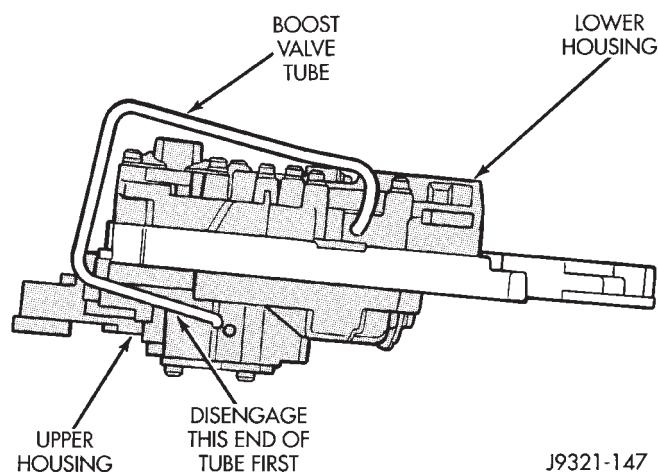
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 77 Upper Housing Shift Valve And Pressure Plug Locations****BOOST VALVE TUBE AND BRACE**

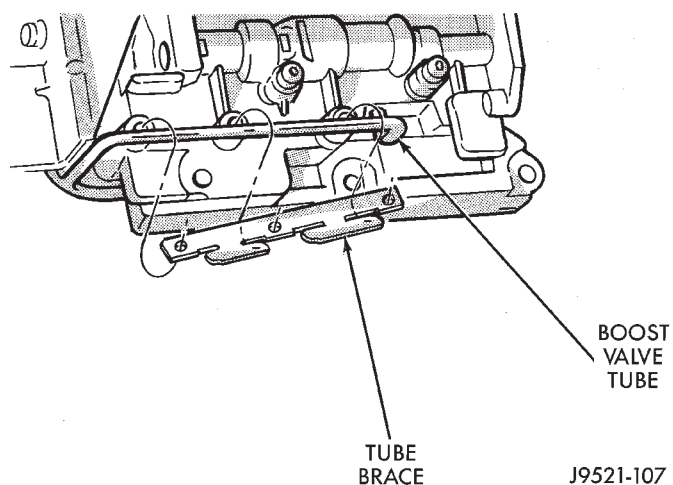
(1) Position valve body assembly so lower housing is facing upward (Fig. 78).

(2) Lubricate tube ends and housing ports with transmission fluid or petroleum jelly.

(3) Start tube in lower housing port first. Then swing tube downward and work opposite end of tube into upper housing port (Fig. 78).

**Fig. 78 Boost Valve Tube**

- (4) Insert and seat each end of tube in housings.
 (5) Slide tube brace under tube and into alignment with valve body screw holes (Fig. 79).
 (6) Install and finger tighten three screws that secure tube brace to valve body housings (Fig. 79).

**Fig. 79 Boost Valve Tube And Brace**

DISASSEMBLY AND ASSEMBLY (Continued)

(7) Bend tube brace tabs up and against tube to hold it in position (Fig. 80).

(8) Tighten all valve body housing screws to 4 N·m (35 in. lbs.) torque after tube and brace are installed. Tighten screws in diagonal pattern starting at center and working outward.

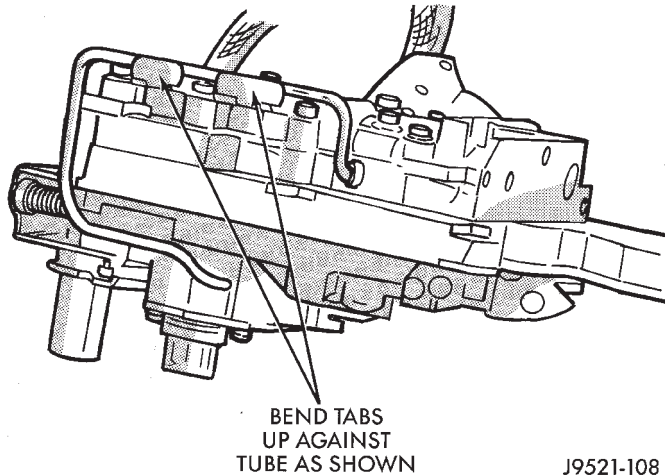


Fig. 80 Securing Boost Valve Tube With Brace Tabs

3-4 ACCUMULATOR

(1) Position converter clutch valve and 3-4 shift valve springs in housing (Fig. 81).

(2) Loosely attach accumulator housing with right-side screw (Fig. 81). Install only one screw at this time as accumulator must be free to pivot upward for ease of installation.

(3) Install 3-4 shift valve and spring.

(4) Install converter clutch timing valve and spring.

(5) Position plug on end of converter clutch valve spring. Then compress and hold springs and plug in place with fingers of one hand.

(6) Swing accumulator housing upward over valve springs and plug.

(7) Hold accumulator housing firmly in place and install remaining two attaching screws. Be sure springs and clutch valve plug are properly seated (Fig. 82). Tighten screws to 4 N·m (35 in. lbs.).

VALVE BODY FINAL

(1) Install boost valve, valve spring, retainer and cover plate. Tighten cover plate screws to 4 N·m (35 in. lbs.) torque.

(2) Insert manual lever detent spring in upper housing.

(3) Position detent ball on end of spring. Then hold detent ball and spring in detent housing with Retainer Tool 6583 (Fig. 83).

(4) Install throttle lever in upper housing. Then install manual lever over throttle lever and start manual lever into housing.

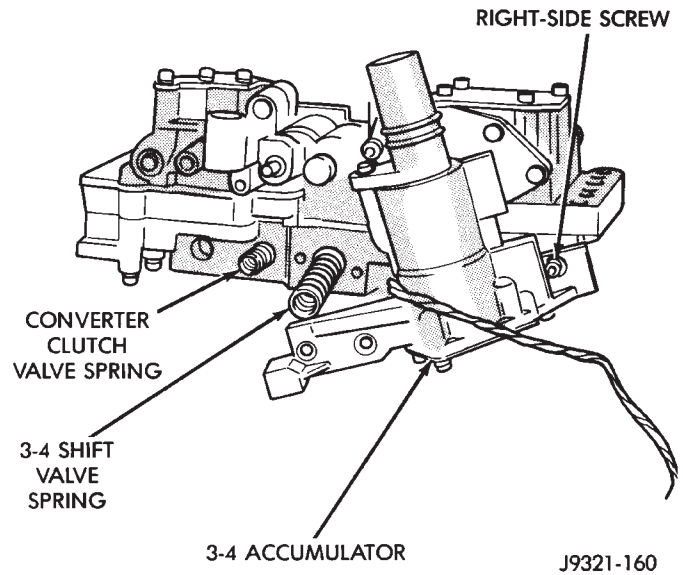


Fig. 81 Converter Clutch And 3-4 Shift Valve Springs

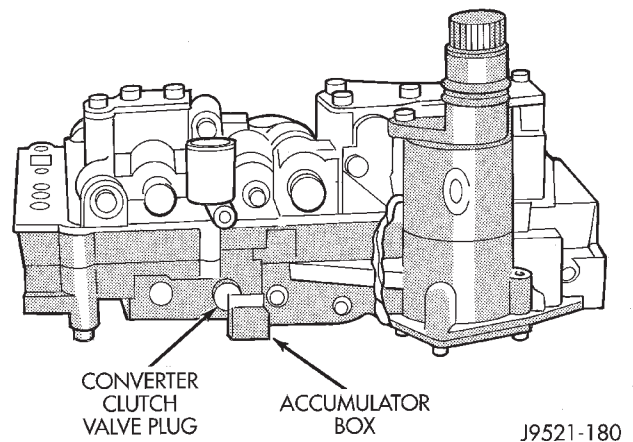


Fig. 82 Seating 3-4 Accumulator On Lower Housing

(5) Align manual lever with detent ball and manual valve. Hold throttle lever upward. Then press down on manual lever until fully seated. Remove detent ball retainer tool after lever is seated.

(6) Then install manual lever seal, washer and E-clip.

(7) Verify that throttle lever is aligned with end of kickdown valve stem and that manual lever arm is engaged in manual valve (Fig. 84).

(8) Position line pressure adjusting screw in adjusting screw bracket.

(9) Install spring on end of line pressure regulator valve.

(10) Install switch valve spring on tang at end of adjusting screw bracket.

(11) Install manual valve.

(12) Install throttle valve and spring.

(13) Install kickdown valve and detent.

DISASSEMBLY AND ASSEMBLY (Continued)

(14) Install pressure regulator valve.

(15) Install switch valve.

(16) Position adjusting screw bracket on valve body. Align valve springs and press bracket into place. Install short, upper bracket screws first and long bottom screw last. Verify that valve springs and bracket are properly aligned. Then tighten all three bracket screws to 4 N·m (35 in. lbs.) torque.

(17) Lubricate solenoid case connector O-rings and shaft of manual lever with light coat of petroleum jelly.

(18) Obtain new fluid filter for valve body but do not install filter at this time.

(19) If line pressure and/or throttle pressure adjustment screw settings were not disturbed, continue with overhaul or reassembly. However, if adjustment screw settings **were** moved or changed, readjust as described in Valve Body Control Pressure Adjustment procedure.

(20) Attach solenoid case connector to 3-4 accumulator with shoulder-type screw. Connector has small locating tang that fits in dimple at top of accumulator housing (Fig. 85). Seat tang in dimple before tightening connector screw.

(21) Install solenoid assembly and gasket. Tighten solenoid attaching screws to 8 N·m (72 in. lbs.) torque.

(22) Verify that solenoid wire harness is properly routed (Fig. 86). **Solenoid harness must be clear of manual lever and park rod and not be pinched between accumulator housing and cover.**

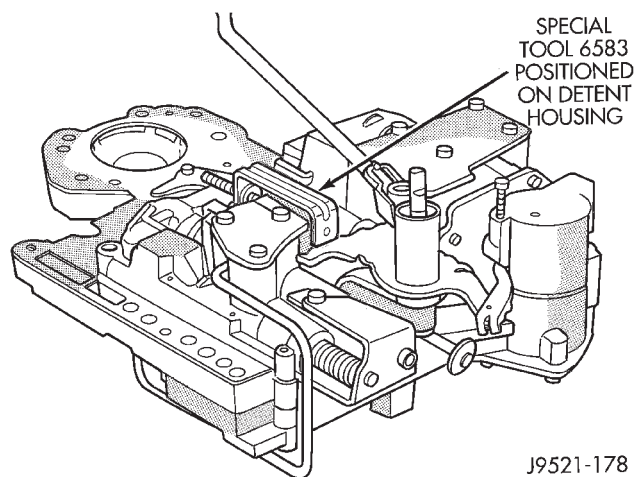


Fig. 83 Detent Ball Spring

GOVERNOR BODY, SENSOR AND SOLENOID

(1) Turn valve body assembly over so accumulator side of transfer plate is facing down.

(2) Install new O-rings on governor pressure solenoid and sensor.

(3) Lubricate solenoid and sensor O-rings with clean transmission fluid.

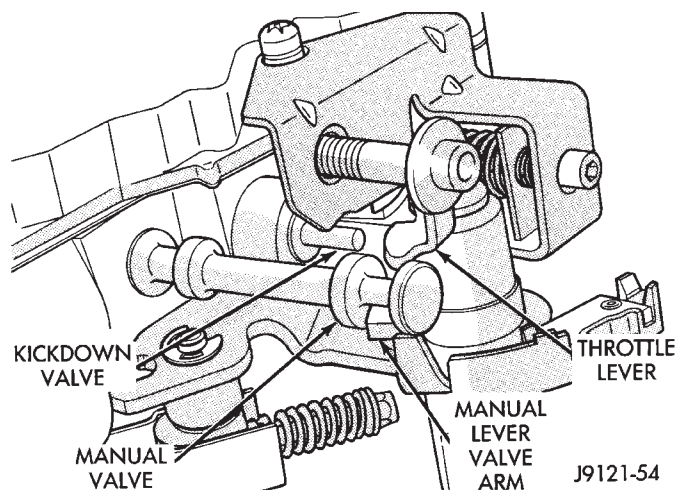


Fig. 84 Manual And Throttle Lever Alignment

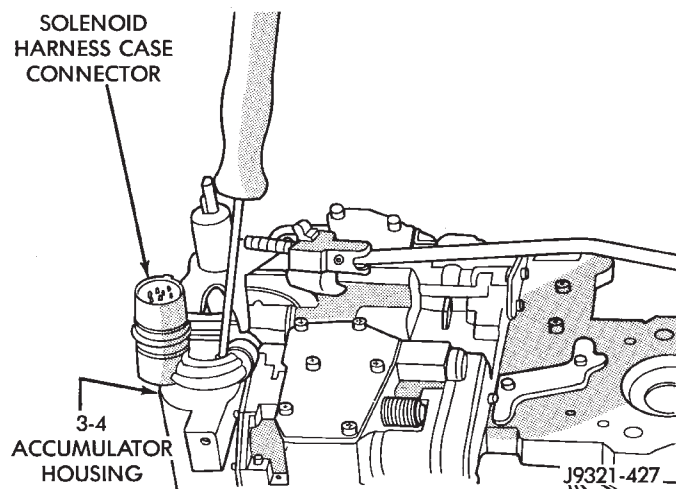


Fig. 85 Solenoid Harness Case Connector Shoulder Bolt

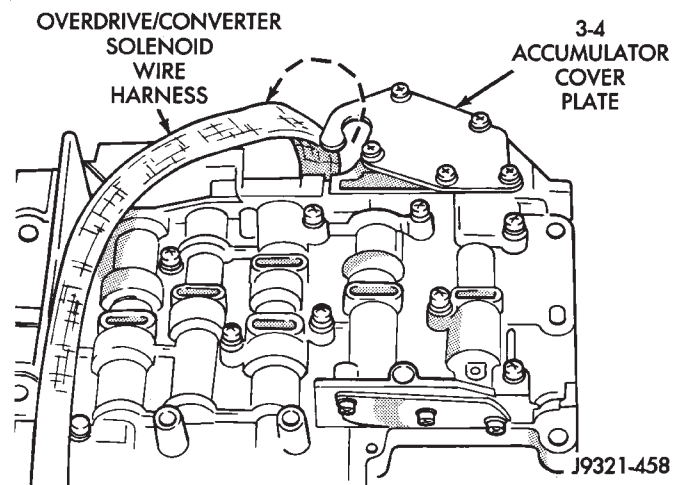


Fig. 86 Solenoid Harness Routing

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Install governor pressure sensor in governor body. Then secure sensor with M-shaped retaining clip.

(5) Install governor pressure solenoid in governor body. Push solenoid in until it snaps into place in body.

(6) Position governor body gasket on transfer plate.

(7) Install retainer plate on governor body and around solenoid. Be sure solenoid connector is positioned in retainer cutout.

(8) Align screw holes in governor body and transfer plate. Then install and tighten governor body screws to 4 N·m (35 in. lbs.) torque.

(9) Connect harness wires to governor pressure solenoid and governor pressure sensor.

(10) Perform Line Pressure and Throttle Pressure adjustments. Refer to adjustment section of this group for proper procedures.

(11) Install fluid filter and pan.

(12) Lower vehicle.

(13) Fill transmission with recommended fluid and road test vehicle to verify repair.

TRANSMISSION

DISASSEMBLY

(1) Clean transmission exterior with steam gun or with solvent. Wear eye protection during cleaning operations.

(2) Place transmission in a vertical position.

(3) Measure and record input shaft end play readings.

(4) Remove shift and throttle levers from valve body manual lever shaft.

(5) Place transmission in horizontal position.

(6) Remove transmission oil pan and gasket.

(7) Remove filter from valve body (Fig. 87). Keep filter screws separate from other valve body screws. Filter screws are longer and should be kept with filter.

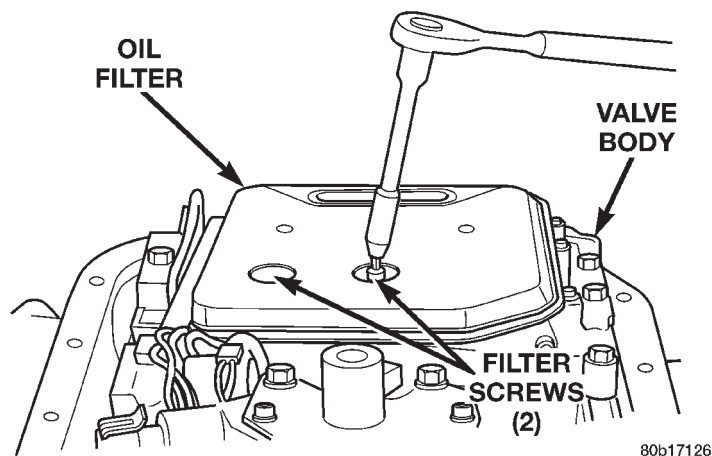


Fig. 87 Oil Filter Removal

(8) Remove park/neutral position switch.

(9) Remove hex head bolts attaching valve body to transmission case (Fig. 88). A total of 10 bolts are used. Note different bolt lengths for assembly reference.

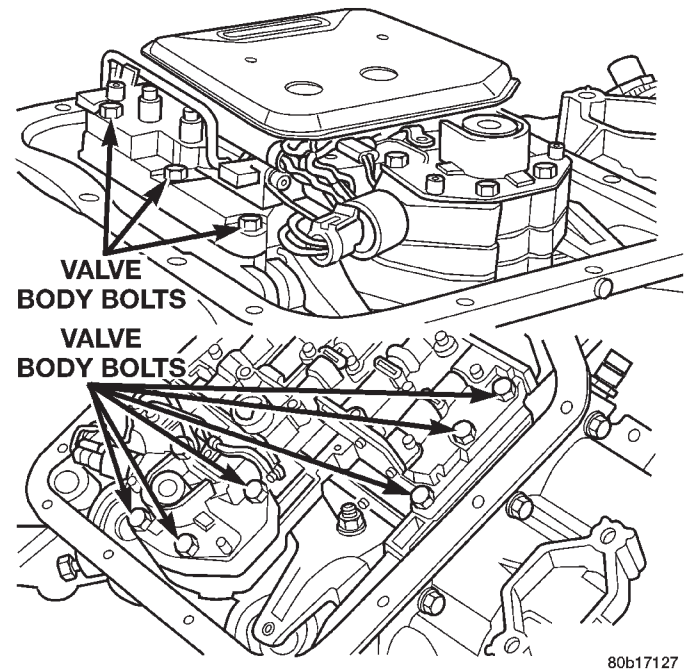


Fig. 88 Valve Body Bolt Locations

(10) Remove valve body assembly. Push valve body harness connector out of case. Then work park rod and valve body out of case (Fig. 89).

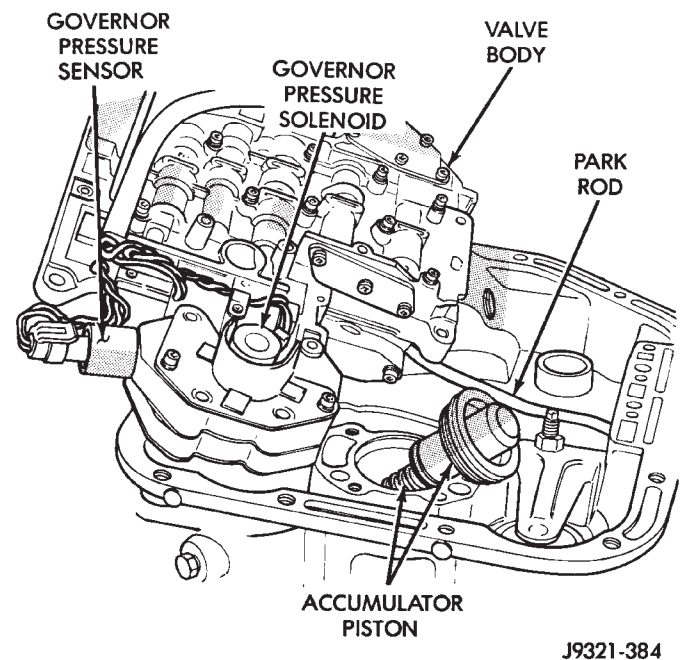


Fig. 89 Valve Body Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(11) Remove accumulator piston and inner and outer springs (Fig. 90).

(12) Remove pump oil seal with suitable pry tool or slide-hammer mounted screw.

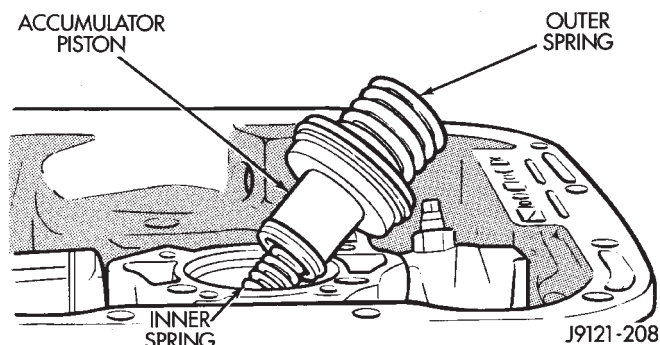


Fig. 90 Accumulator Piston And Springs

(13) Loosen front band adjusting screw locknut 4-5 turns. Then tighten band adjusting screw until band is tight around front clutch retainer. This prevents front/rear clutches from coming out with pump and possibly damaging clutch or pump components.

(14) Remove oil pump bolts.

(15) Thread bolts of Slide Hammer Tools C-3752 into threaded holes in pump body flange (Fig. 91).

(16) Bump slide hammer weights outward to remove pump and reaction shaft support assembly from case (Fig. 91).

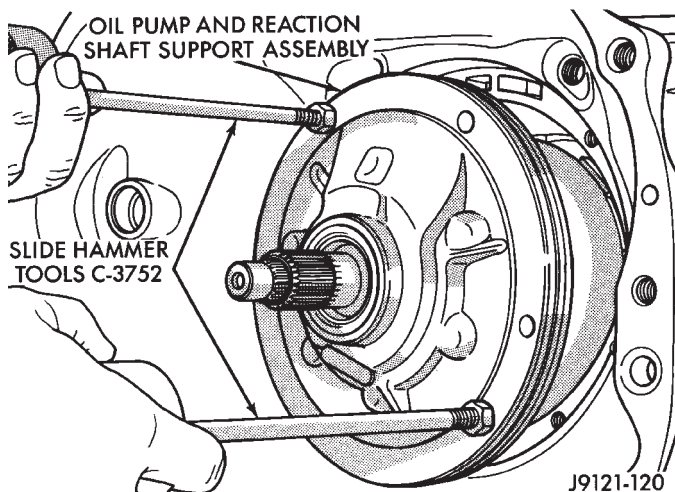


Fig. 91 Removing Oil Pump And Reaction Shaft Support Assembly

(17) Loosen front band adjusting screw until band is completely loose.

(18) Squeeze front band together and remove band strut (Fig. 92).

(19) Remove front band lever (Fig. 93).

(20) Remove front band lever shaft plug, if necessary, from converter housing.

(21) Remove front band lever shaft.

(22) Remove front and rear clutch units as assembly. Grasp input shaft, hold clutch units together and remove them from case (Fig. 94).

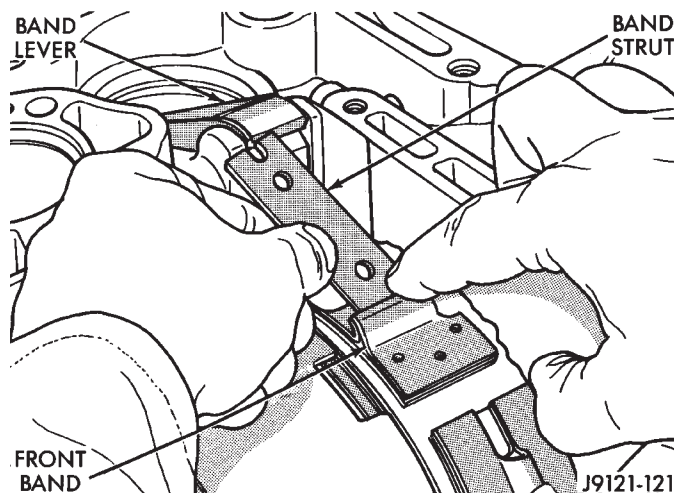


Fig. 92 Removing/Installing Front Band Strut

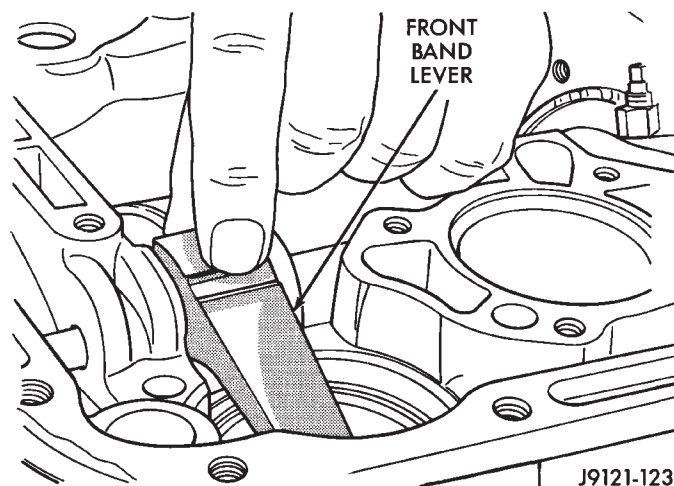


Fig. 93 Removing/Installing Front Band Lever

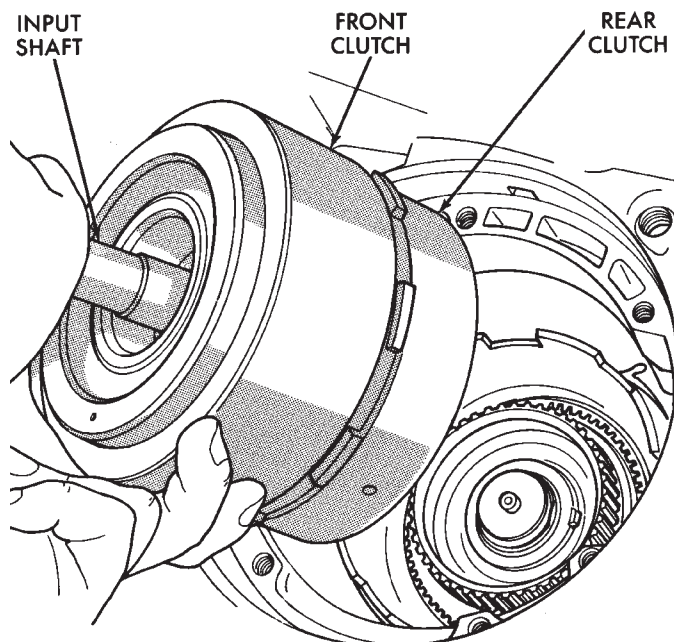


Fig. 94 Removing Front/Rear Clutch Assemblies

DISASSEMBLY AND ASSEMBLY (Continued)

(23) Lift front clutch off rear clutch (Fig. 95). Set clutch units aside for overhaul.

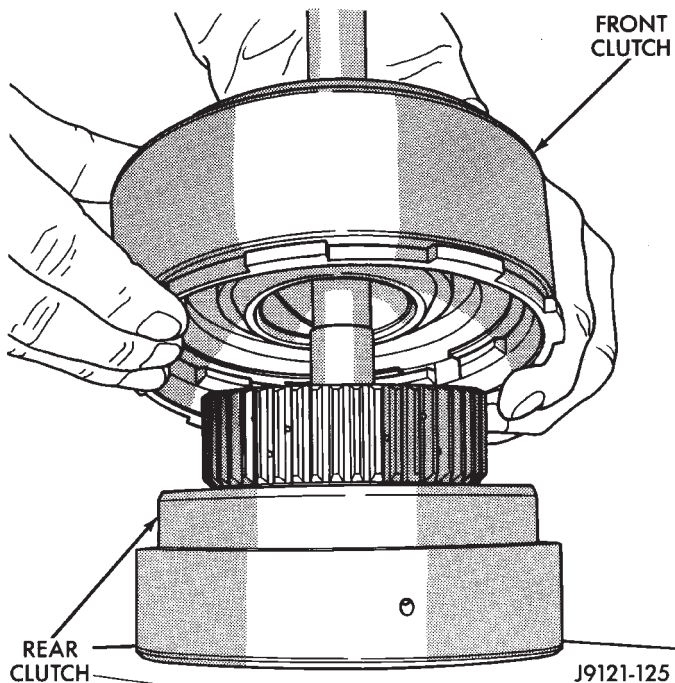


Fig. 95 Separating Front/Rear Clutch Assemblies

(24) Remove intermediate shaft thrust washer from front end of shaft or from rear clutch hub (Fig. 96).

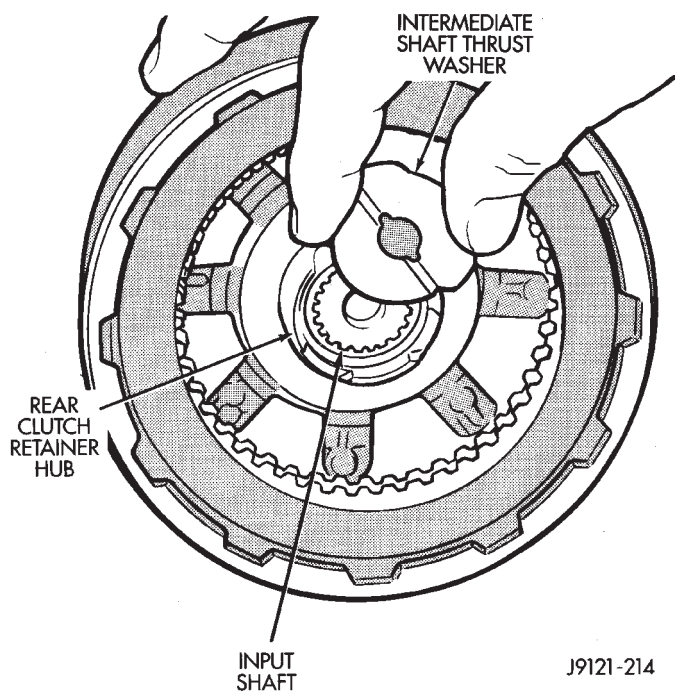


Fig. 96 Removing Intermediate Shaft Thrust Washer

(25) Remove output shaft thrust plate from intermediate shaft hub (Fig. 97).

(26) Slide front band off driving shell (Fig. 98) and remove band from case.

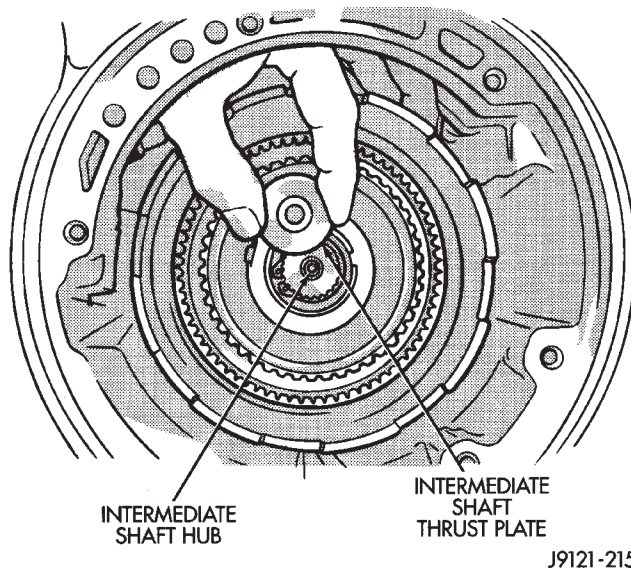


Fig. 97 Removing Intermediate Shaft Thrust Plate

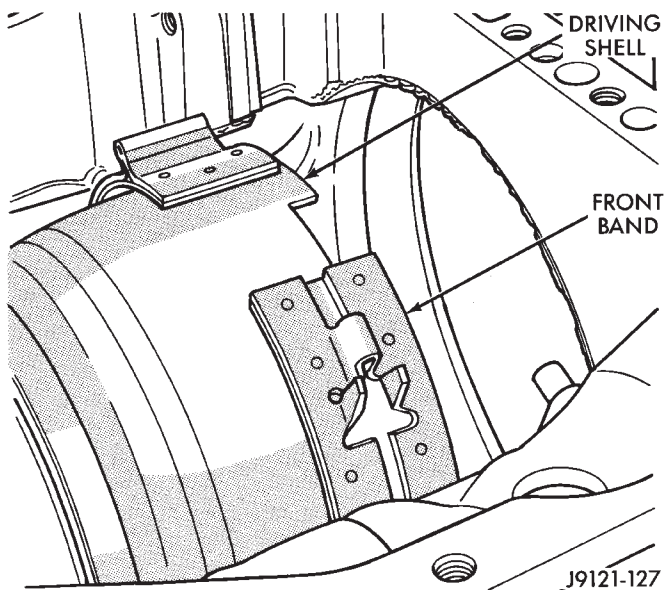


Fig. 98 Front Band Removal/Installation

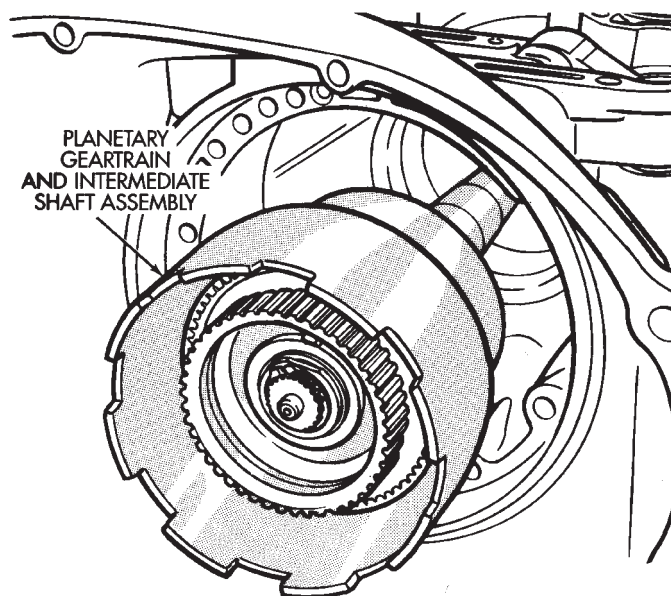
DISASSEMBLY AND ASSEMBLY (Continued)

(27) Remove planetary geartrain as assembly (Fig. 99). Support geartrain with both hands during removal. Do not allow machined surfaces on intermediate shaft or overdrive piston retainer to become nicked or scratched.

(28) If overdrive unit is not to be serviced, install Alignment Shaft 6227-2 into the overdrive unit to prevent misalignment of the overdrive clutches during service of main transmission components.

(29) Loosen rear band adjusting screw 4-5 turns.

(30) Remove low-reverse drum snap ring (Fig. 100).



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Fig. 99 Removing Planetary Geartrain And Intermediate Shaft Assembly

(31) Remove low-reverse drum and reverse band.

(32) Remove overrunning clutch roller and spring assembly as a unit (Fig. 101).

(33) Compress front servo rod guide about 1/8 inch with Valve Spring Compressor C-3422-B (Fig. 102).

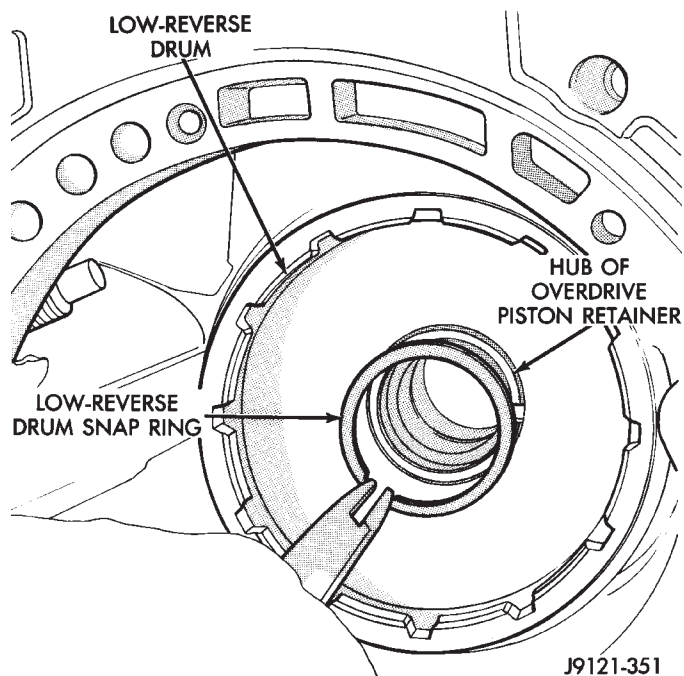
(34) Remove front servo rod guide snap ring. **Exercise caution when removing snap ring. Servo bore can be scratched or nicked if care is not exercised.**

(35) Remove compressor tools and remove front servo rod guide, spring and servo piston.

(36) Compress rear servo spring retainer about 1/16 inch with Valve Spring Compressor C-3422-B (Fig. 103).

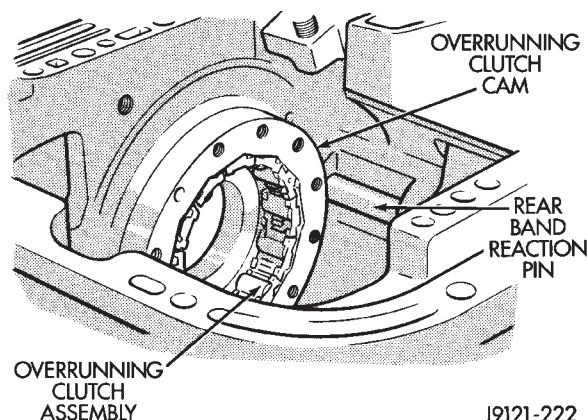
(37) Remove rear servo spring retainer snap ring. Then remove compressor tools and remove rear servo spring and piston.

(38) Inspect transmission components.



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Fig. 100 Removing Low-Reverse Drum Snap Ring



J9121-222

Fig. 101 Overrunning Clutch Assembly Removal

NOTE: TO SERVICE THE OVERRUNNING CLUTCH CAM OR OVERDRIVE PISTON RETAINER, REFER TO OVERRUNNING CLUTCH CAM SERVICE IN THIS SECTION.

ASSEMBLY

Do not allow dirt, grease, or foreign material to enter the case or transmission components during assembly. Keep the transmission case and components clean. Also make sure the tools and workbench area used for assembly operations are equally clean.

Shop towels used for wiping off tools and hands must be made from **lint free** material. Lint will stick to transmission parts and could interfere with valve operation, or even restrict fluid passages.

Lubricate the transmission components with Mopar® transmission fluid during reassembly. Use

DISASSEMBLY AND ASSEMBLY (Continued)

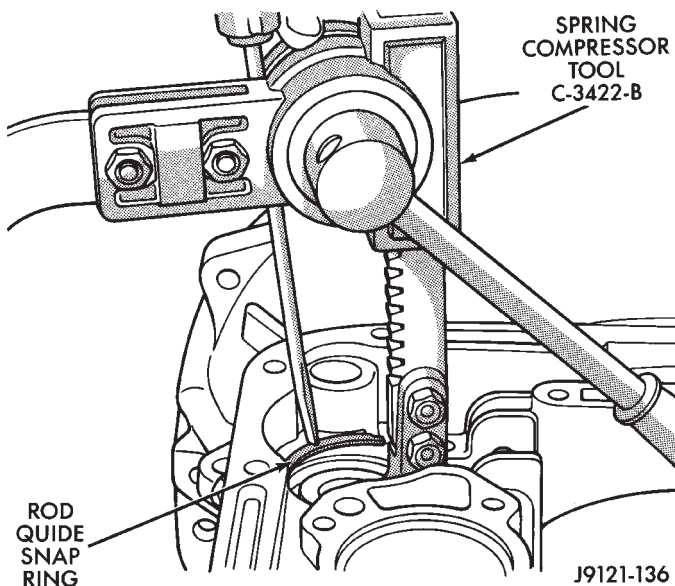


Fig. 102 Compressing Front Servo Rod Guide

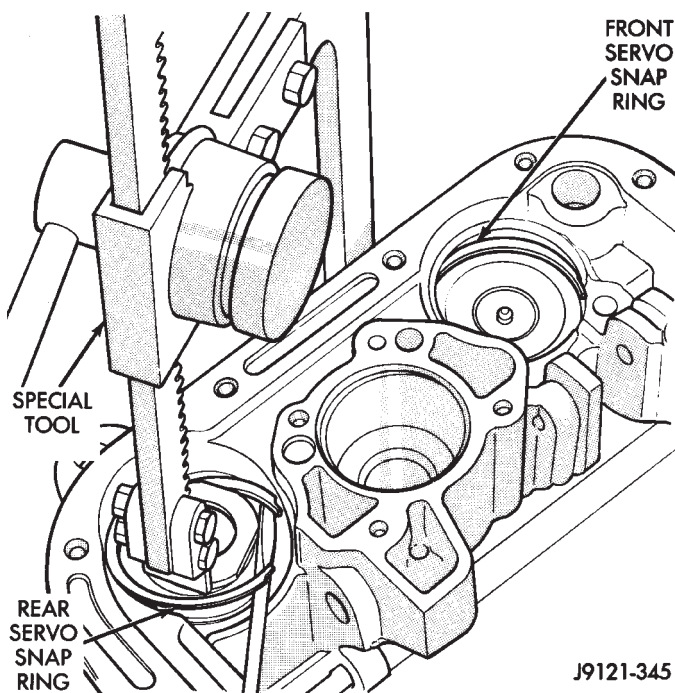


Fig. 103 Compressing Rear Servo Spring

Mopar® Door Ease, or Ru-Glyde on seals and O-rings to ease installation.

Petroleum jelly can also be used to hold thrust washers, thrust plates and gaskets in position during assembly. However, **do not** use chassis grease, bearing grease, white grease, or similar lubricants on any transmission part. These types of lubricants can eventually block or restrict fluid passages and interfere with valve operation. Use petroleum jelly only.

Do not force parts into place. The transmission components and subassemblies are easily installed by hand when properly aligned.

If a part seems extremely difficult to install, it is either misaligned or incorrectly assembled. Also verify that thrust washers, thrust plates and seal rings are correctly positioned before assembly. These parts can interfere with proper assembly if mis-positioned.

The planetary geartrain, front/rear clutch assemblies and oil pump are all much easier to install when the transmission case is upright.

(1) Install rear servo piston, spring and retainer (Fig. 104). Install spring on top of servo piston and install retainer on top of spring.

(2) Install front servo piston assembly, servo spring and rod guide (Fig. 105).

(3) Compress front/rear servo springs with Valve Spring Compressor C-3422-B and install each servo snap ring (Fig. 106).

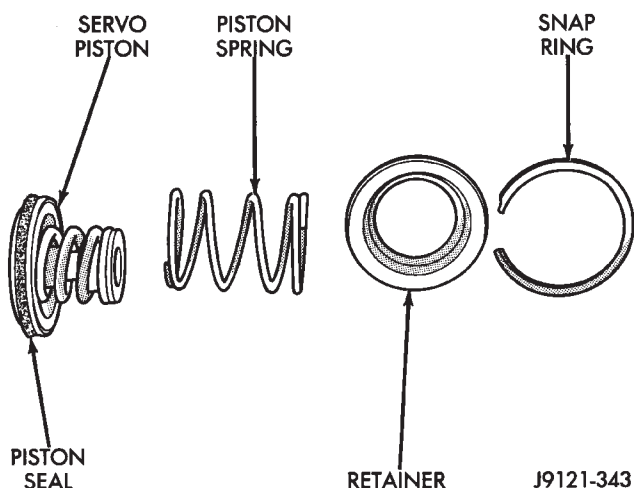


Fig. 104 Rear Servo Components

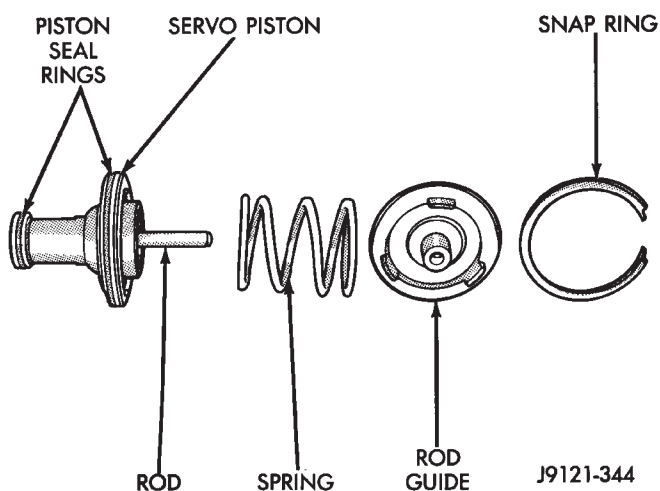


Fig. 105 Front Servo Components

(4) Lubricate clutch cam rollers with transmission fluid.

(5) Install rear band in case (Fig. 107). Be sure twin lugs on band are seated against reaction pin.

DISASSEMBLY AND ASSEMBLY (Continued)

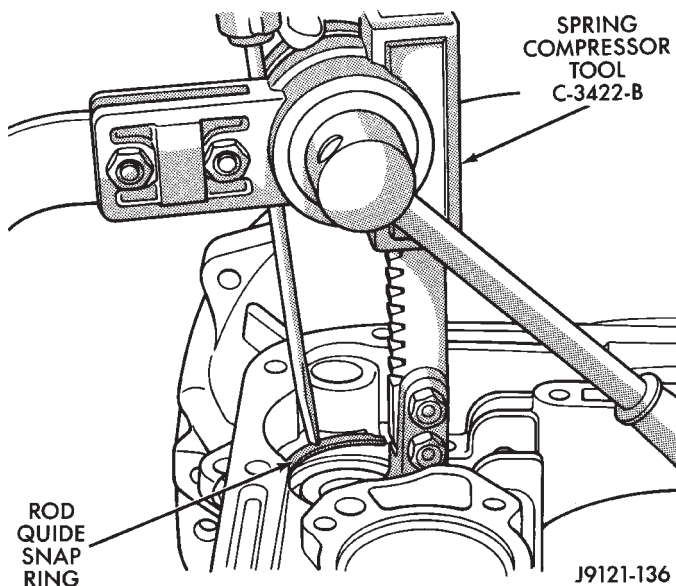


Fig. 106 Compressing Front/Rear Servo Springs

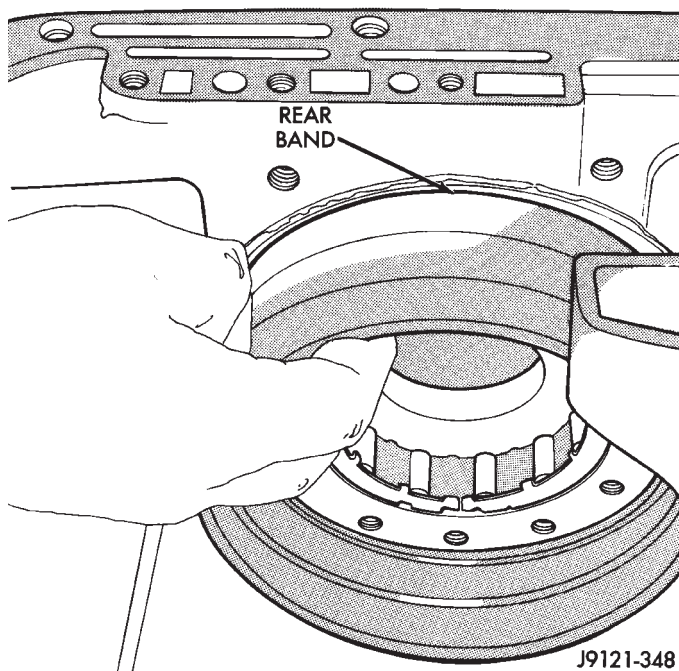


Fig. 107 Rear Band Installation

(6) Install low-reverse drum and check overrunning clutch operation as follows:

- (a) Lubricate overrunning clutch race (on drum hub) with transmission fluid.
- (b) Guide drum through rear band.
- (c) Tilt drum slightly and start race (on drum hub) into overrunning clutch rollers.

(d) Press drum rearward and turn it in clockwise direction until drum seats in overrunning clutch (Fig. 108).

(e) Turn drum back and forth. **Drum should rotate freely in clockwise direction and lock in counterclockwise direction (as viewed from front of case).**

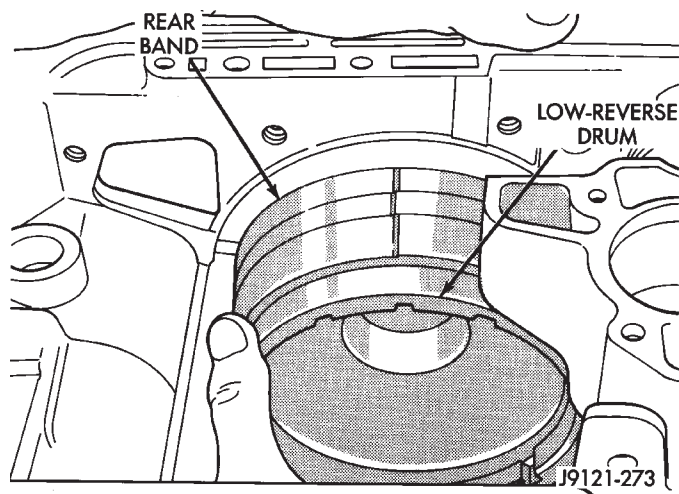


Fig. 108 Installing Low-Reverse Drum

(7) Install snap ring that secures low-reverse drum to hub of overdrive piston retainer (Fig. 109).

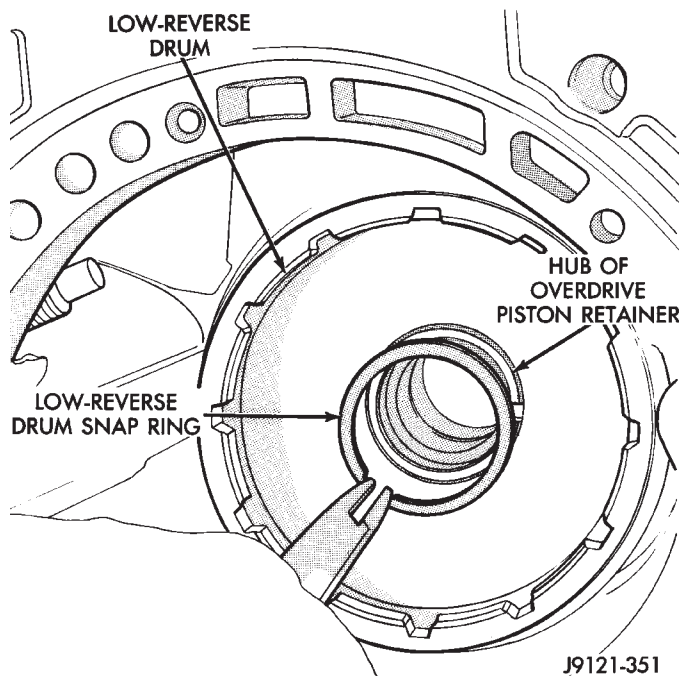


Fig. 109 Installing Low-Reverse Drum Retaining Snap Ring

DISASSEMBLY AND ASSEMBLY (Continued)

(8) Install rear band lever and pivot pin (Fig. 110). Align lever with pin bores in case and push pivot pin into place.

(9) Install planetary geartrain assembly (Fig. 111).

(10) Install thrust plate on intermediate shaft hub

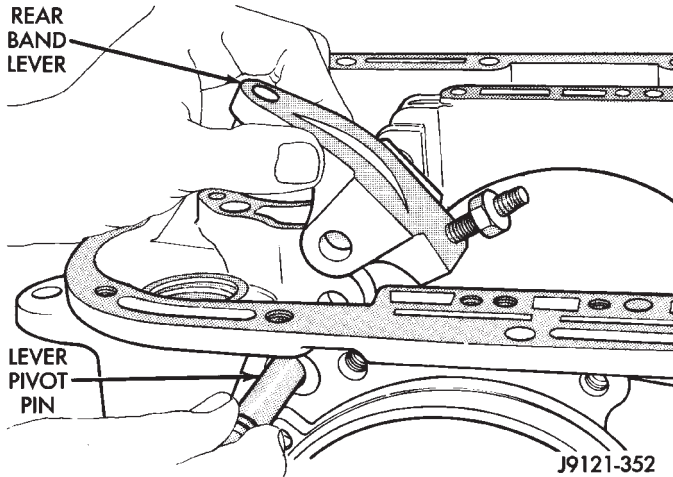


Fig. 110 Rear Band Lever And Pivot Pin Installation

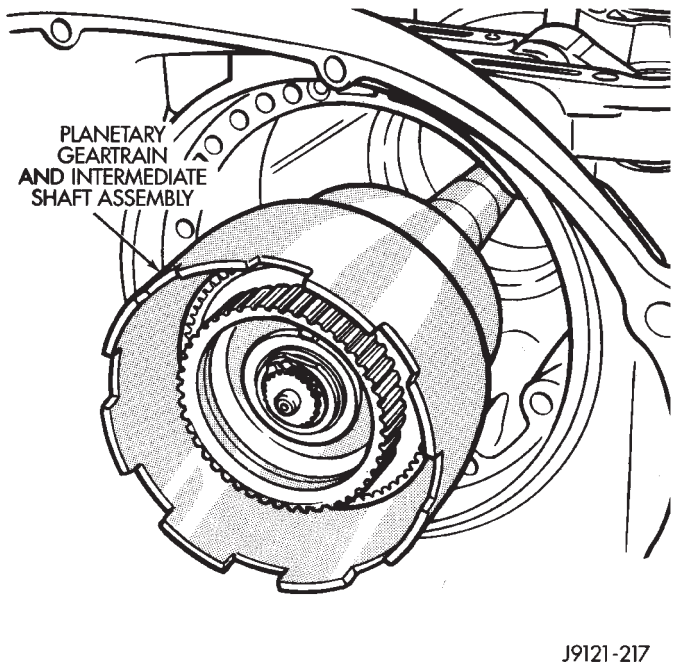


Fig. 111 Installing Planetary Geartrain

(Fig. 112). Use petroleum jelly to hold thrust plate in place.

(11) Check seal ring on rear clutch retainer hub and seal rings on input shaft (Fig. 113). Also verify that shaft seal rings are installed in sequence shown.

(12) Install rear clutch thrust washer (Fig. 114). Use additional petroleum jelly to hold washer in place if necessary.

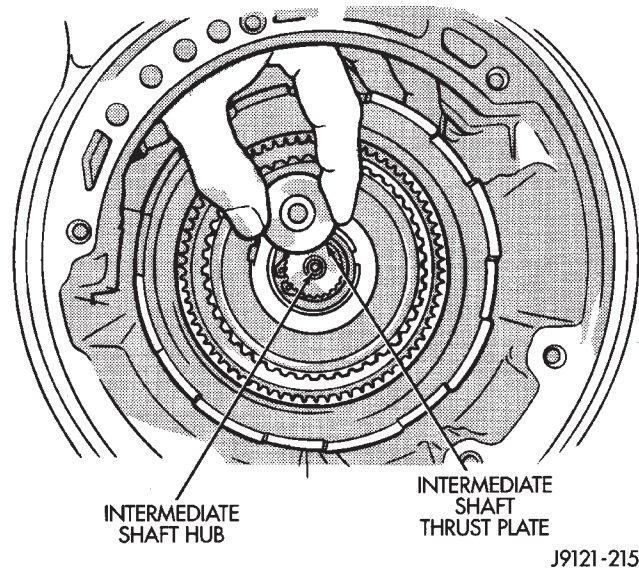


Fig. 112 Installing Intermediate Shaft Thrust Plate

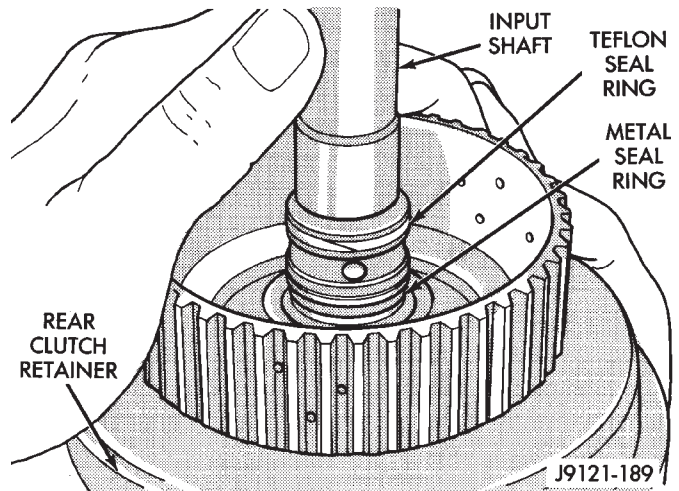


Fig. 113 Input Shaft Seal Ring Location

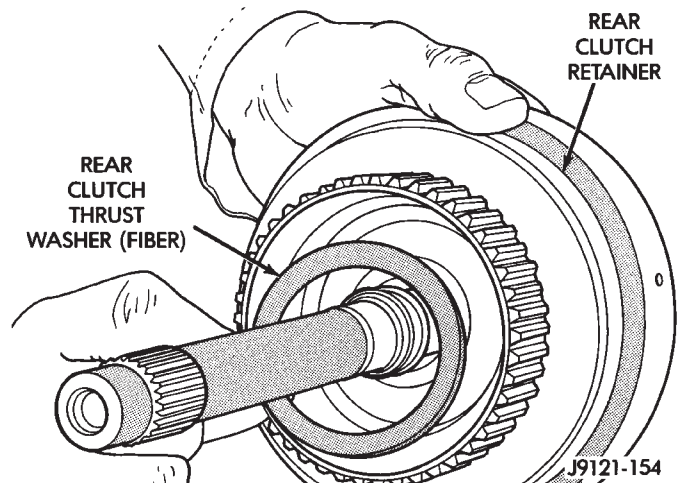


Fig. 114 Installing Rear Clutch Thrust Washer

DISASSEMBLY AND ASSEMBLY (Continued)

(13) Align clutch discs in front clutch and install front clutch on rear clutch (Fig. 115). Rotate front clutch retainer back and forth until completely seated on rear clutch retainer.

(14) Coat intermediate shaft thrust washer with petroleum jelly. Then install washer in rear clutch hub (Fig. 116). 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.** Note thickness of this washer. It is a select fit part and is used to control transmission end play.

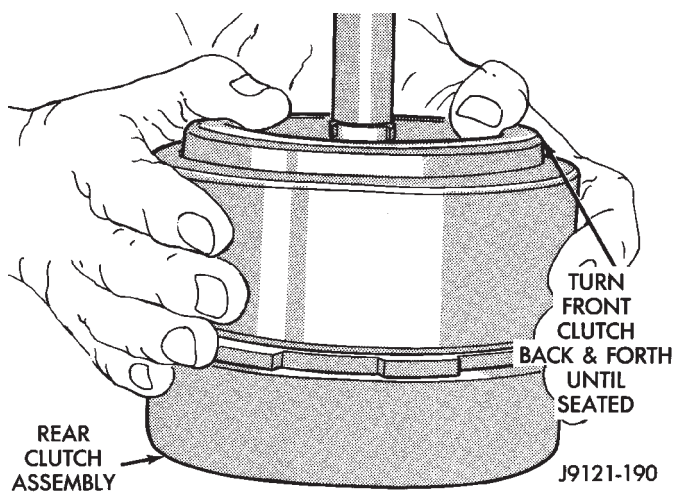


Fig. 115 Assembling Front And Rear Clutch Units

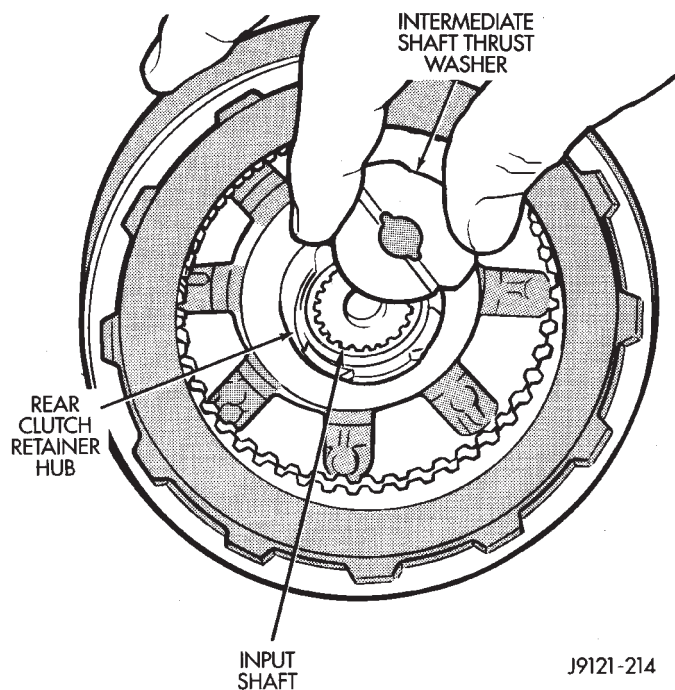


Fig. 116 Installing Intermediate Shaft Thrust Plate

(15) Align drive teeth on rear clutch discs with small screwdriver (Fig. 117). This makes installation on front planetary easier.

(16) Raise front end of transmission upward as far as possible and support case with wood blocks. Front/rear clutch and oil pump assemblies are easier to install if transmission is as close to upright position as possible.

(17) Slide front band into case.

(18) Install front and rear clutch units as assembly (Fig. 118). 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.**

(19) Carefully work assembled clutches back and forth to engage and seat rear clutch discs on front annulus gear. Also be sure front clutch drive lugs are fully engaged in slots of driving shell after installation.

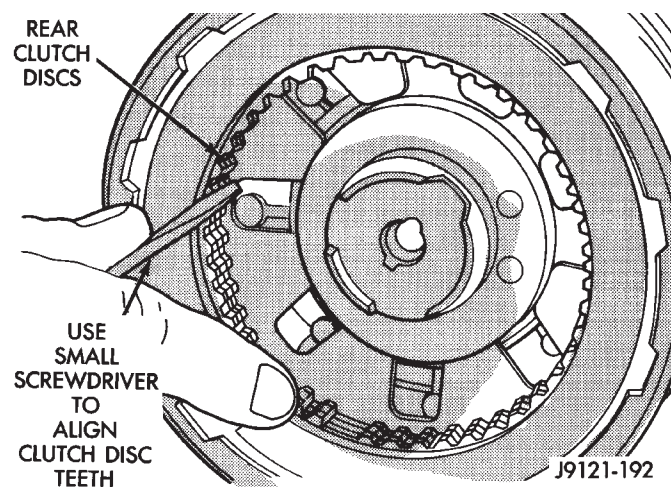
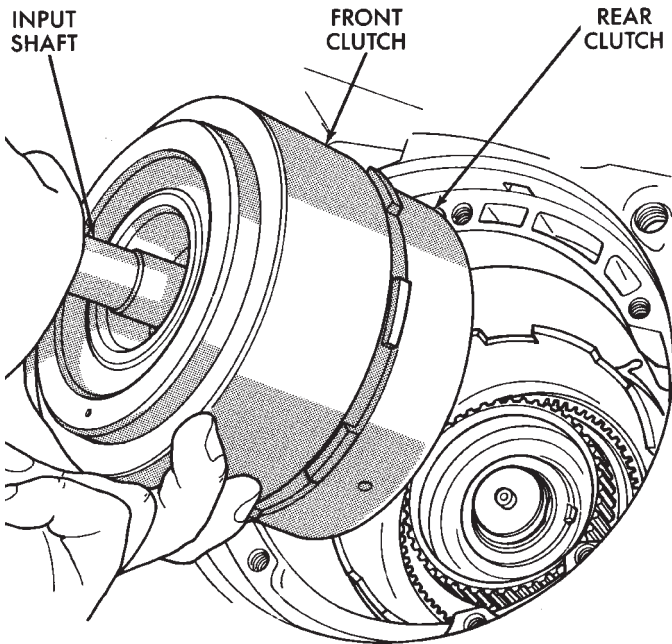


Fig. 117 Aligning Rear Clutch Disc Lugs

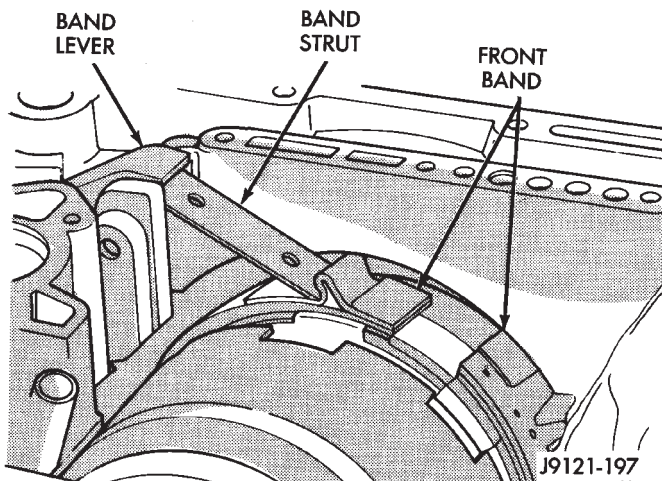
DISASSEMBLY AND ASSEMBLY (Continued)



J9121-124

Fig. 118 Installing Front/Rear Clutch Assemblies

- (20) Assemble front band strut.
- (21) Install front band adjuster, strut and adjusting screw (Fig. 119).
- (22) Tighten band adjusting screw until band just grips clutch retainer. Verify that front/rear clutches are still seated before continuing.



J9121-197

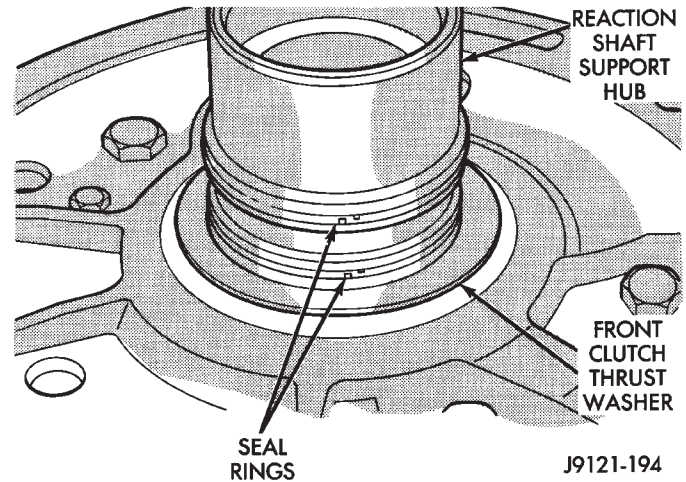
Fig. 119 Front Band Linkage Installation

- (23) Check seal rings on reaction shaft support hub. Verify that seal rings are hooked together and that front clutch thrust washer is properly positioned (Fig. 120). Use petroleum jelly to hold thrust washer in place if necessary.

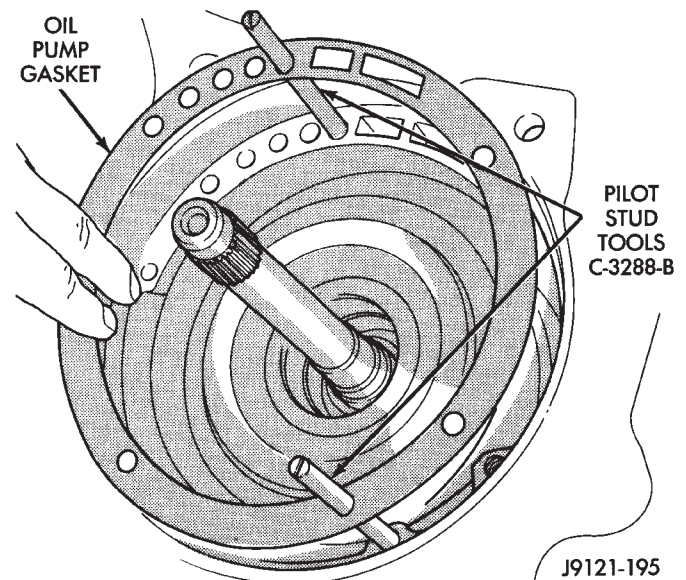
- (24) Lubricate oil pump body seal with petroleum jelly. Lubricate pump shaft seal lip with petroleum jelly.

- (25) Thread two Pilot Stud Tools C-3288-B into bolt holes in oil pump bore flange (Fig. 121).

- (26) Align and install oil pump gasket (Fig. 121).



J9121-194

Fig. 120 Reaction Shaft Support Seal Rings And Front Clutch Thrust Washer

J9121-195

Fig. 121 Installing Pilot Studs And Oil Pump Gasket

DISASSEMBLY AND ASSEMBLY (Continued)

(27) Install oil pump (Fig. 122). Align and position pump on pilot studs. Slide pump down studs and work it into front clutch hub and case by hand. Then install 2 or 3 pump bolts to hold pump in place.

(28) Remove pilot stud tools and install remaining oil pump bolts. Tighten bolts alternately in diagonal pattern to 20 N·m (15 ft. lbs.).

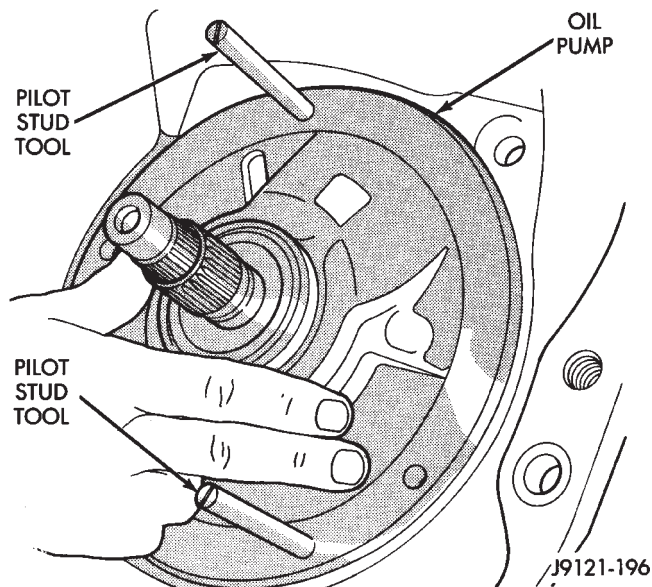


Fig. 122 Installing Oil Pump Assembly In Case

(29) Measure and if necessary, correct input shaft end play as follows (Fig. 123):

(a) Attach dial indicator to converter housing.

(b) Position indicator plunger against input shaft and zero indicator.

(c) Move input shaft in and out and record reading. End play should be 0.56 - 2.31 mm (0.022 - 0.091 in.). Proceed to next step if end play is not within specified limits.

(d) Intermediate shaft thrust washer (in hub of rear clutch retainer) controls end play. Washer is a select fit part and can be changed to adjust end play. If end play turns out to be incorrect, remove oil pump, and clutches. Then install thinner/thicker thrust washer as necessary.

(30) Install accumulator piston and inner and outer springs (Fig. 124).

(31) Verify that valve body solenoid harness is secured in 3-4 accumulator housing cover plate.

(32) Install valve body as follows:

(a) Align and carefully insert park rod into pawl. Rod will make click noise as it enters pawl. Move rod slightly to check engagement.

(b) Align and seat valve body on case. Be sure manual lever shaft and overdrive connector are fully seated in case. Also be sure valve body wiring is not pinched or kinked.

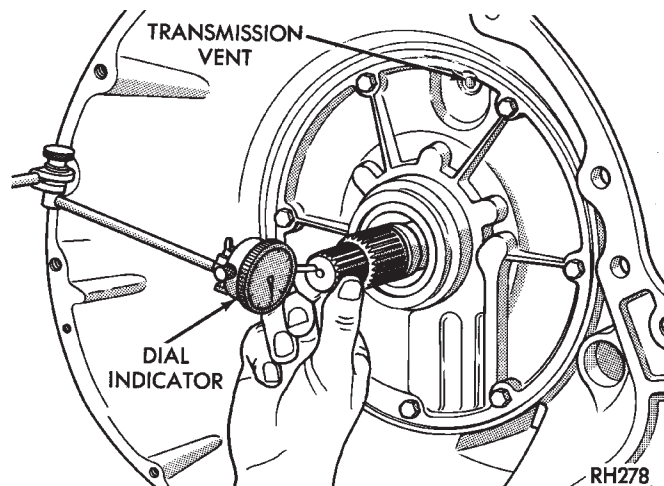


Fig. 123 Measuring Input Shaft End Play

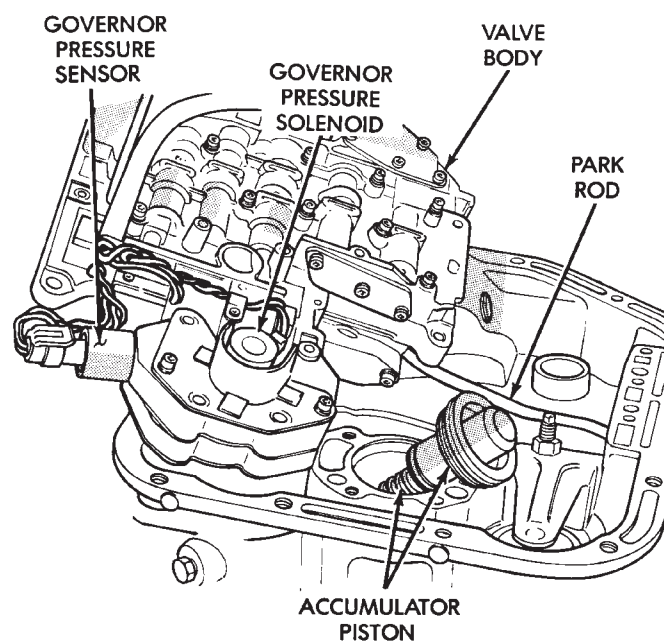


Fig. 124 Accumulator Piston And Springs

(c) Install and start all valve body attaching bolts by hand. Then tighten bolts evenly, in a diagonal pattern to 12 N·m (105 in. lbs.) torque. **Do not overtighten valve body bolts. This could result in distortion and cross leakage after installation.**

CAUTION: It is possible for the park rod to displace into a cavity just above the pawl sprag during installation. Make sure the rod is actually engaged in the pawl and has not displaced into the cavity.

(33) Install new filter on valve body. Tighten filter screws to 4 N·m (35 in. lbs.).

(34) Adjust front and rear bands.

DISASSEMBLY AND ASSEMBLY (Continued)

(35) Install seal on park/neutral position switch (Fig. 125). Then install and tighten switch to 34 N·m (25 ft. lbs.).

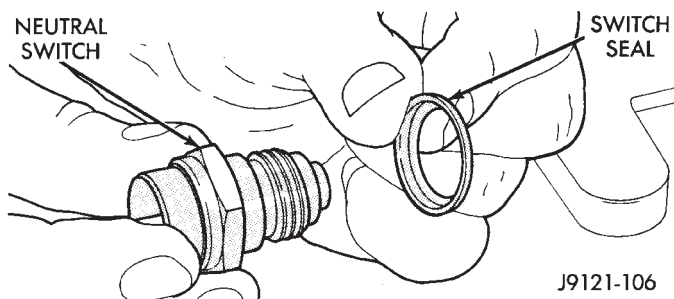


Fig. 125 Park/Neutral Position Switch Seal Position

(36) Install magnet in oil pan. Magnet goes on small protrusion at corner of pan.

(37) Position new oil pan gasket on case and install oil pan. Tighten pan bolts to 17 N·m (13 ft. lbs.).

(38) Install new valve body manual shaft seal in case (Fig. 126). Lubricate seal lip and manual shaft with petroleum jelly. Start seal over shaft and into case. Seat seal with 15/16 inch, deep well socket.

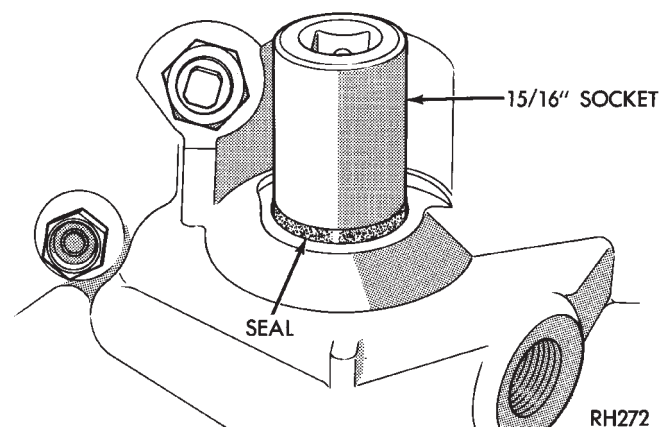


Fig. 126 Installing Manual Lever Shaft Seal

(39) Install throttle valve and shift selector levers on valve body manual lever shaft.

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER

DISASSEMBLY

NOTE: TO SERVICE THE OVERRUNNING CLUTCH CAM AND THE OVERDRIVE PISTON RETAINER, THE TRANSMISSION GEARTRAIN AND OVERDRIVE UNIT MUST BE REMOVED FROM THE TRANSMISSION.

- (1) Remove the overdrive piston (Fig. 127).
- (2) Remove the overdrive piston retainer bolts.
- (3) Remove overdrive piston retainer.
- (4) Remove case gasket.
- (5) Mark the position of the overrunning clutch cam in the case (Fig. 128).
- (6) Remove the overrunning clutch cam bolts.
- (7) Remove the overrunning clutch cam.

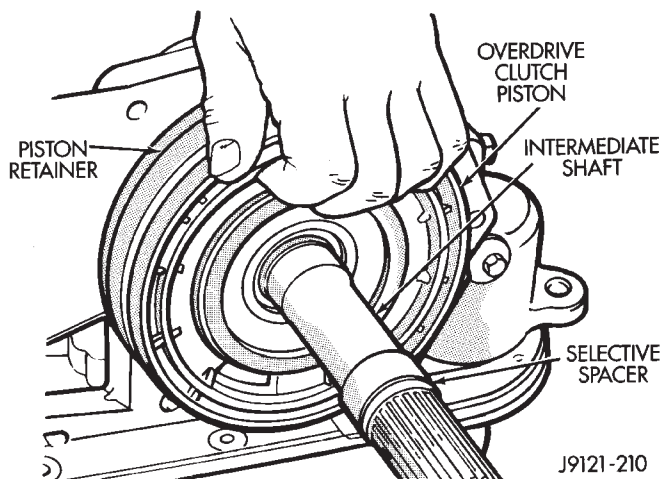


Fig. 127 Overdrive Piston Removal

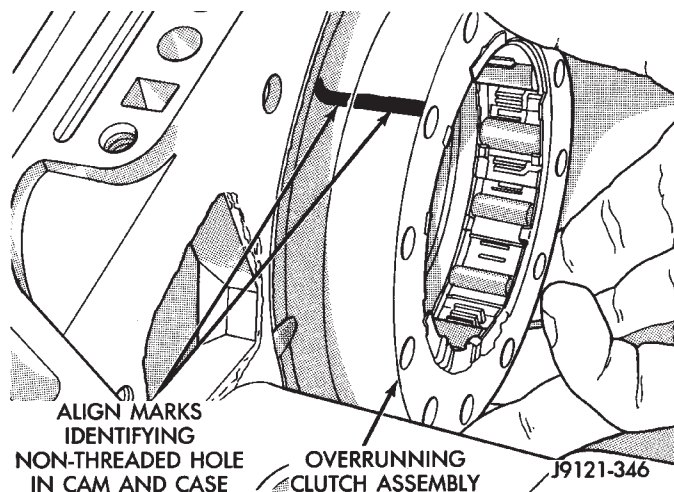


Fig. 128 Overrunning Clutch Cam Removal

DISASSEMBLY AND ASSEMBLY (Continued)

ASSEMBLY

(1) Examine bolt holes in overrunning clutch cam. Note that one hole is **not threaded** (Fig. 129). This hole must align with blank area in clutch cam bolt circle (Fig. 130). Mark hole location on clutch cam and blank area in case with grease pencil, paint stripe, or scribe mark for assembly reference.

(2) Mark location of non-threaded hole in clutch cam and blank area in bolt circle with grease pencil.

(3) Align and install overrunning clutch and cam in case (Fig. 131). **Be sure cam is correctly installed. Bolt holes in cam are slightly counter-sunk on one side. Be sure this side of cam faces rearward (toward piston retainer).**

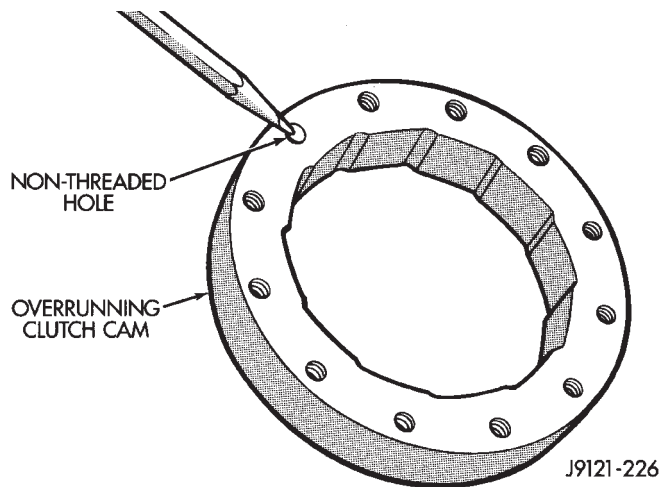


Fig. 129 Location Of Non-Threaded Hole In Clutch Cam

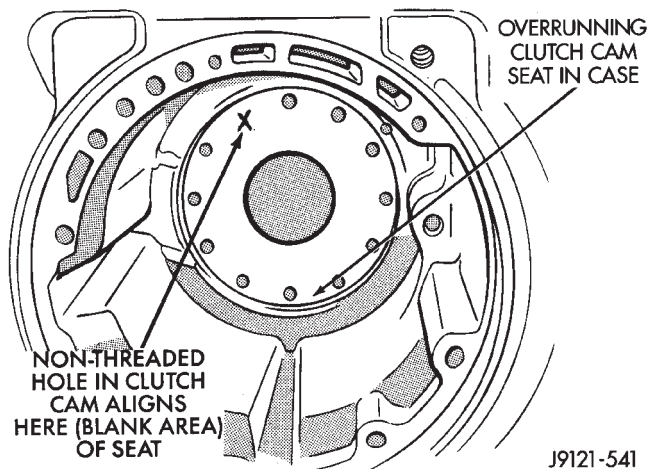


Fig. 130 Location Of Blank Area In Clutch Cam Bolt Circle

(4) Verify that non-threaded hole in clutch cam is properly aligned. Check alignment by threading a bolt into each bolt hole. Adjust clutch cam position if necessary.

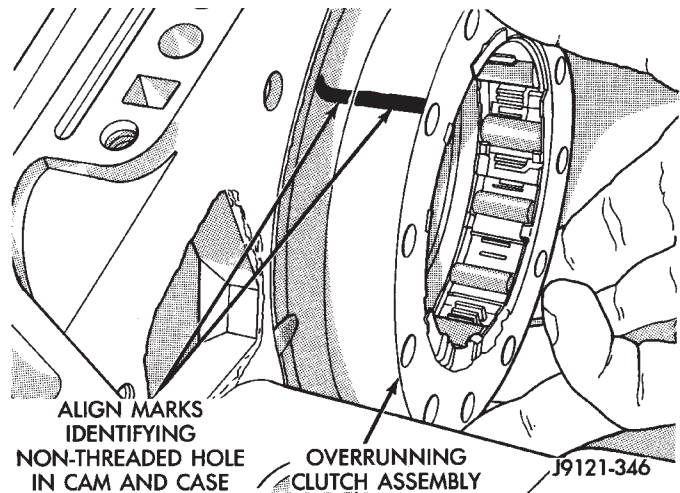


Fig. 131 Overrunning Clutch Installation

(5) Install and tighten overrunning clutch cam bolts to 17 N·m (13 ft. lbs.) torque. Note that clutch cam bolts are shorter than piston retainer bolts.

(6) Install new gasket at rear of transmission case. Use petroleum jelly to hold gasket in place. Be sure to align governor feed holes in gasket with feed passages in case (Fig. 132). Also install gasket before overdrive piston retainer. Center hole in gasket is smaller than retainer and cannot be installed over retainer.

(7) Position overdrive piston retainer on transmission case and align bolt holes in retainer, gasket and case (Fig. 133). Then install and tighten retainer bolts to 17 N·m (13 ft. lbs.) torque.

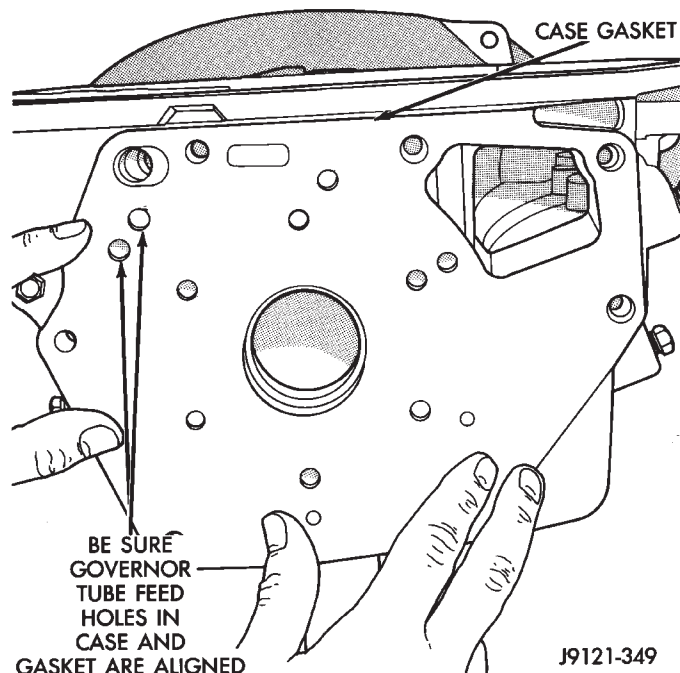
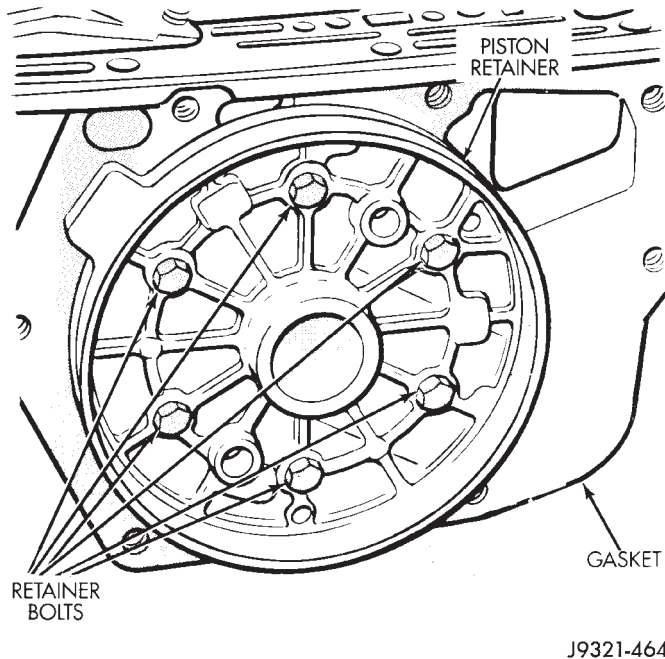


Fig. 132 Installing/Aligning Case Gasket

(8) Install new seals on over drive piston.

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 133 Aligning Overdrive Piston Retainer**

(9) Stand transmission case upright on bellhousing.

(10) Position Guide Ring 8114-1 on outer edge of overdrive piston retainer.

(11) Position Seal Guide 8114-2 on inner edge of overdrive piston retainer.

(12) Install overdrive piston in overdrive piston retainer by: aligning locating lugs on overdrive piston to the two mating holes in retainer.

(a) Aligning locating lugs on overdrive piston to the two mating holes in retainer.

(b) Lubricate overdrive piston seals with Mopar® Door Ease, or equivalent.

(c) Install piston over Seal Guide 8114-2 and inside Guide Ring 8114-1.

(d) Push overdrive piston into position in retainer.

(e) Verify that the locating lugs entered the lug bores in the retainer.

NOTE: INSTALL THE REMAINING TRANSMISSION COMPONENTS AND OVERDRIVE UNIT.

FRONT SERVO PISTON**DISASSEMBLY**

(1) Remove seal ring from rod guide (Fig. 134).

(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.

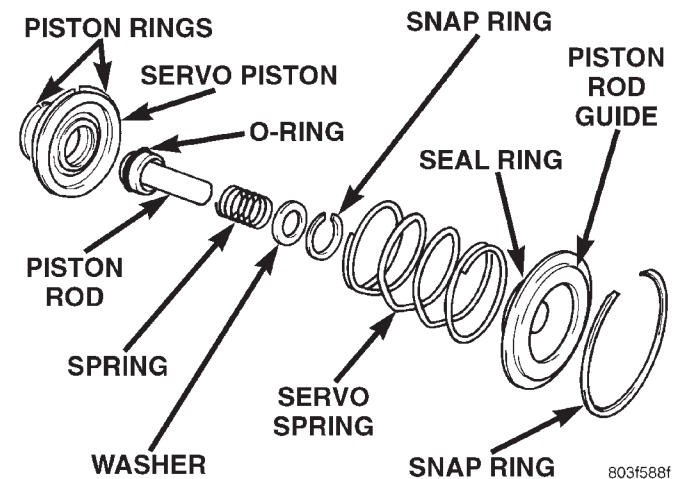
ASSEMBLY

Clean and inspect front servo components.

(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. 134).

(3) Set servo components aside for installation during transmission reassembly.

**Fig. 134 Front Servo****REAR SERVO PISTON****DISASSEMBLY**

(1) Remove small snap ring and remove plug and spring from servo piston (Fig. 135).

(2) Remove and discard servo piston seal ring.

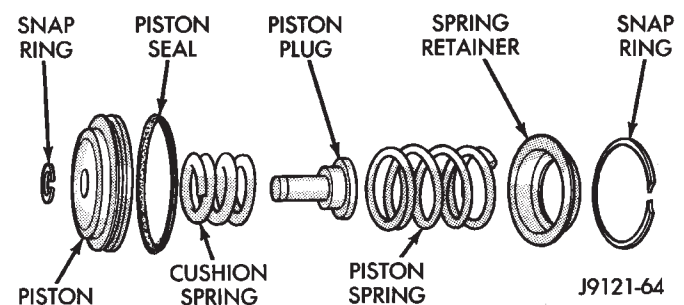
ASSEMBLY

(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. 135 Rear Servo Components**

DISASSEMBLY AND ASSEMBLY (Continued)

OIL PUMP AND REACTION SHAFT SUPPORT

DISASSEMBLY

- (1) Remove seal ring from housing and reaction shaft support (Fig. 136).
- (2) Mark pump housing and support assembly for alignment reference.
- (3) Remove bolts attaching pump body to support (Fig. 137).

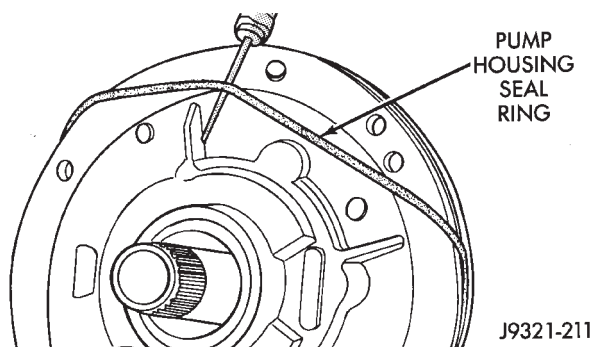


Fig. 136 Removing Pump Seal Ring

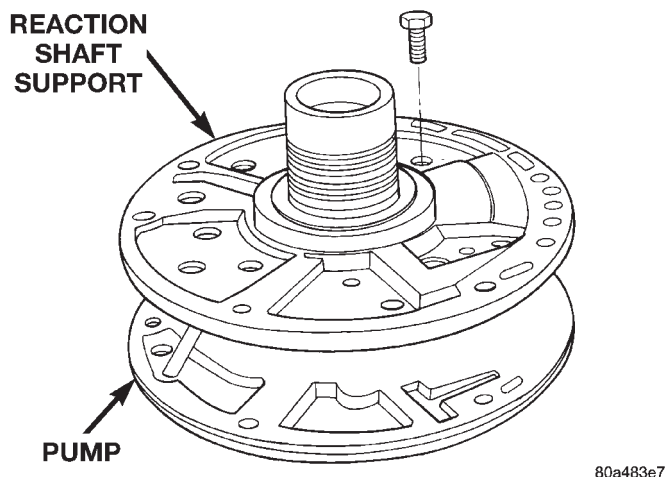
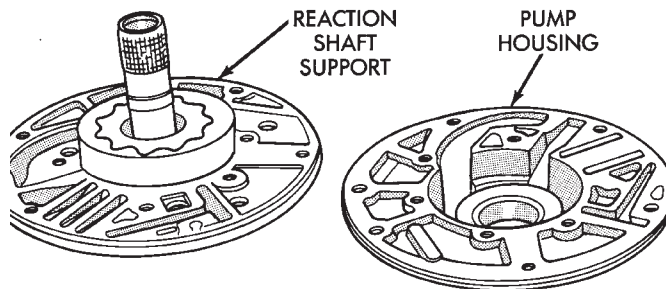


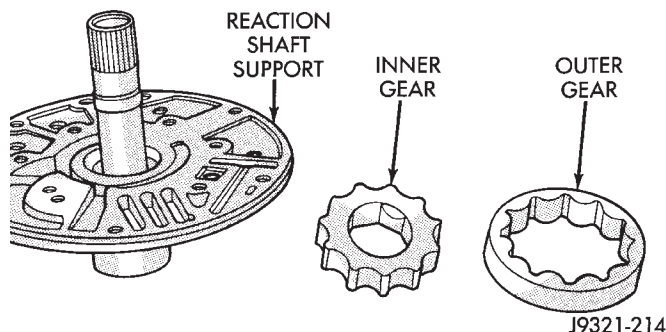
Fig. 137 Pump Support Bolts

- (4) Separate support from pump housing (Fig. 138).
- (5) Remove inner and outer gears from reaction shaft support (Fig. 139).
- (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. 140).



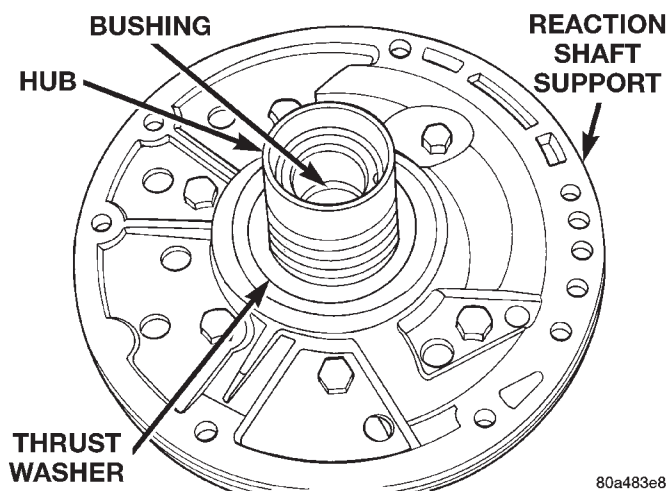
J9321-213

Fig. 138 Separating Pump Housing From Reaction Shaft Support



J9321-214

Fig. 139 Pump Gear Removal



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Fig. 140 Support Hub Thrust Washer

DISASSEMBLY AND ASSEMBLY (Continued)

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. 141).

(2) Install new pump bushing with Tool Handle C-4171 and Bushing Installer SP-5117 (Fig. 141). Bushing should be flush with pump housing bore.

(3) Stake new pump bushing in two places with blunt punch (Fig. 142). Remove burrs from stake points with knife blade afterward.

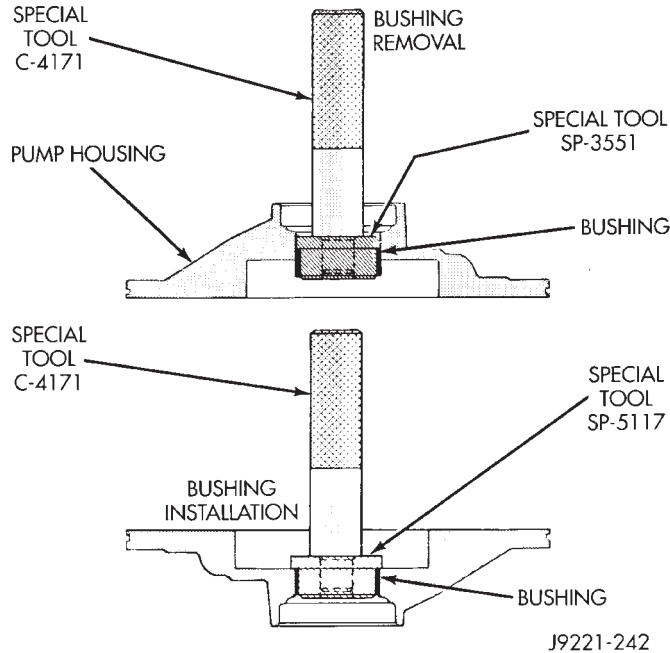


Fig. 141 Removing Oil Pump Bushing

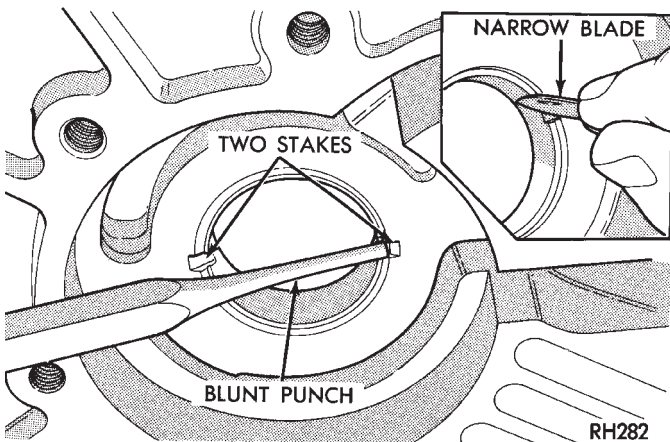


Fig. 142 Staking Oil Pump Bushing

REACTION SHAFT SUPPORT BUSHING REMOVAL

(1) Assemble Bushing Remover Tools SP-1191, 3633 and 5324 (Fig. 143). **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

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.

(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. 143).

(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.

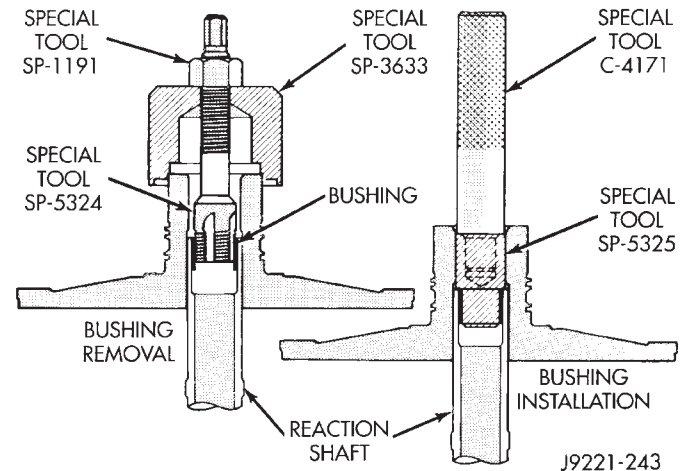


Fig. 143 Replacing Reaction Shaft Support Bushing

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. 144).

(4) Install outer gear in pump housing (Fig. 144). Gear can be installed either way (it is not a one-way fit).

(5) Install pump inner gear (Fig. 145).

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. 146). Lubricate seal rings with transmission fluid or petro-

DISASSEMBLY AND ASSEMBLY (Continued)

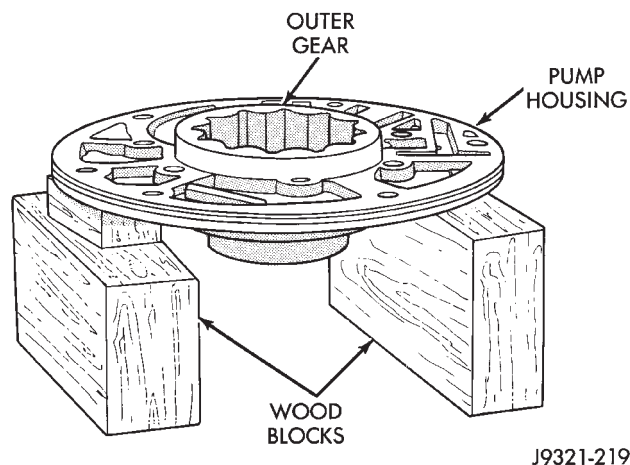


Fig. 144 Supporting Pump And Installing Outer Gear

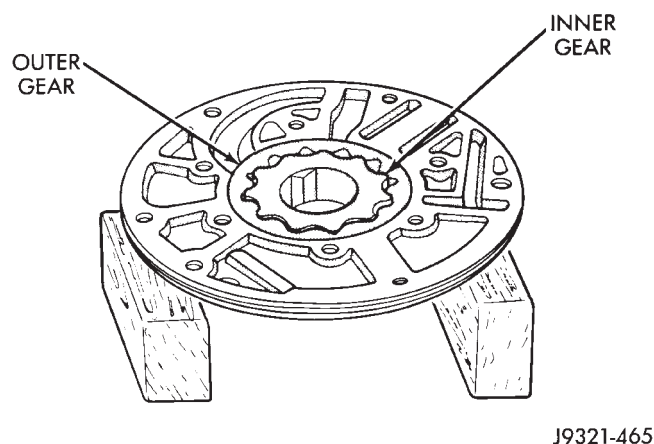


Fig. 145 Pump Inner Gear Installation

leum 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. 147).

(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).

(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:

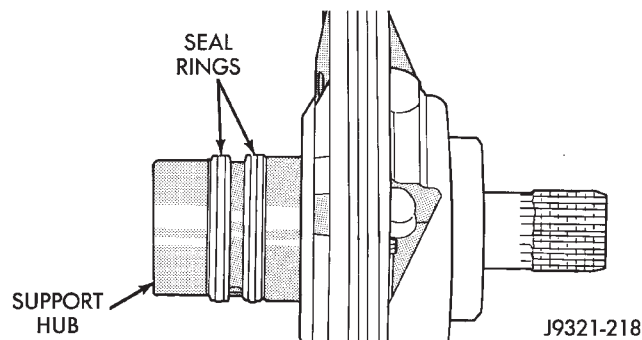


Fig. 146 Hub Seal Ring Position

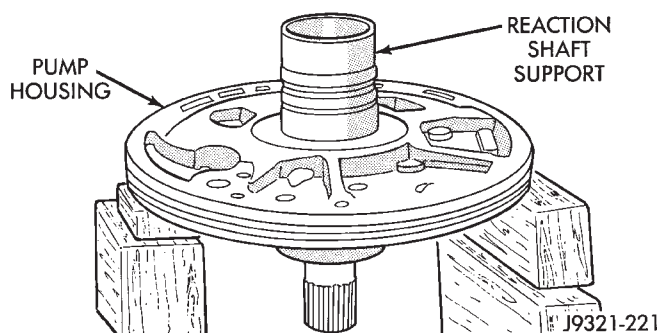


Fig. 147 Assembling Reaction Shaft Support And Pump Housing

(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. 148). 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.

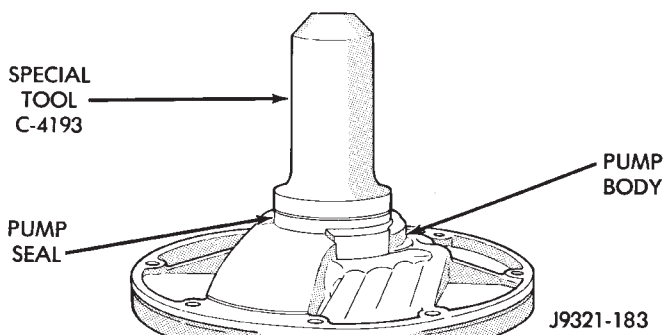


Fig. 148 Pump Oil Seal Installation

DISASSEMBLY AND ASSEMBLY (Continued)

FRONT CLUTCH

NOTE: The 42RE transmission uses four plates and discs for the front clutch.

DISASSEMBLY

(1) Remove waved snap ring and remove pressure plate, clutch plates and clutch discs (Fig. 149).

(2) Compress clutch piston spring with Compressor Tool C-3575-A (Fig. 150). 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.

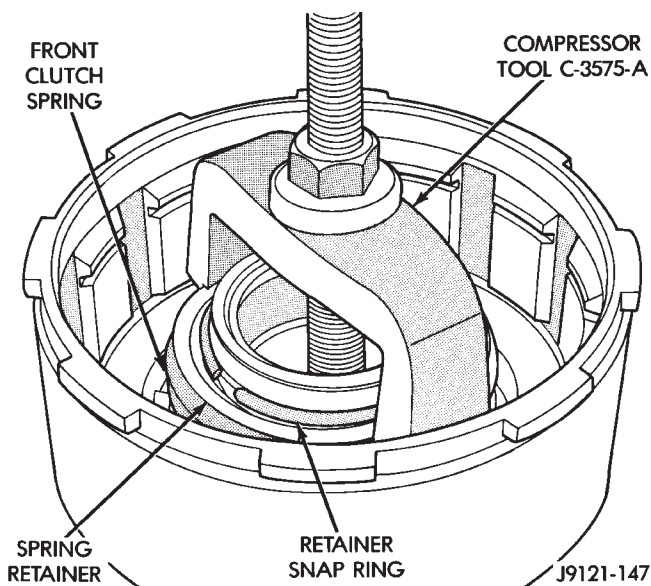
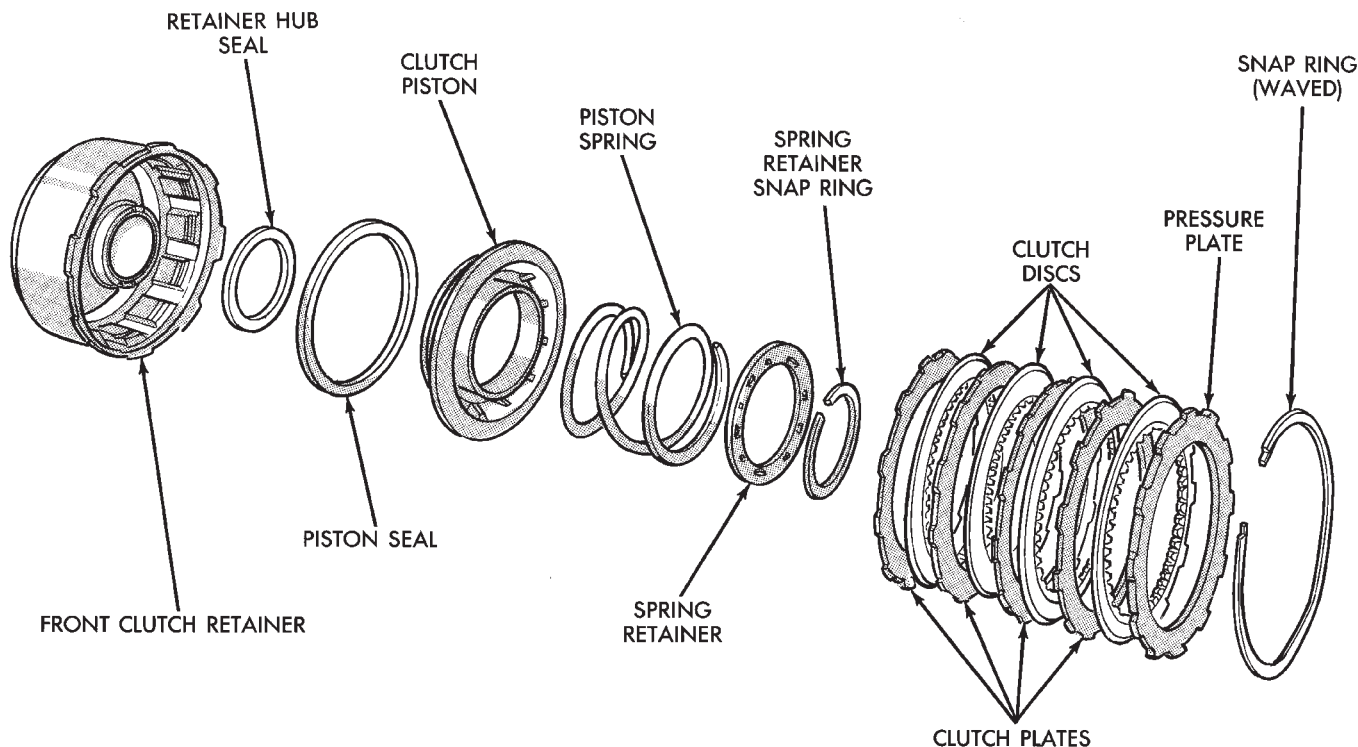


Fig. 150 Compressing Front Clutch Piston Spring

(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. Then lubricate



J9321-222

Fig. 149 42RE Front Clutch Components

DISASSEMBLY AND ASSEMBLY (Continued)

retainer hub, bore and piston with light coat of transmission fluid.

(4) Install clutch piston in retainer (Fig. 151). Use twisting motion to seat piston in bottom of retainer.

CAUTION: Never push the clutch piston straight in. This will fold the seals over causing leakage and clutch slip.

(5) Position spring in clutch piston (Fig. 152).

(6) Position spring retainer on top of piston spring (Fig. 153). **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.**

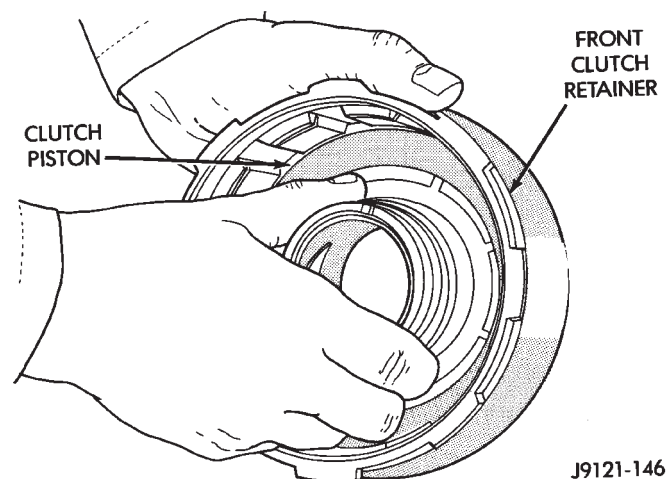


Fig. 151 Front Clutch Piston Installation

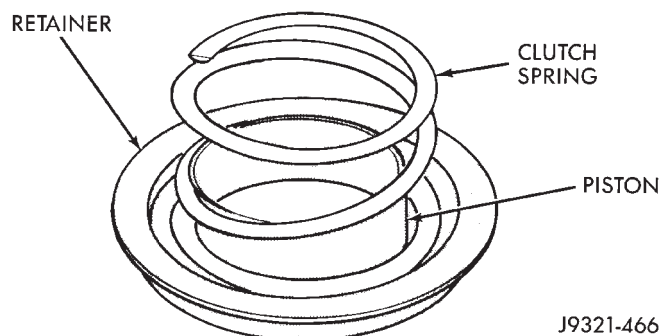


Fig. 152 Clutch Piston Spring Installation

(7) Compress piston spring and retainer with Compressor Tool C-3575-A (Fig. 150). Then install new snap ring to secure spring retainer and spring.

(8) Install clutch plates and discs (Fig. 149). Install steel plate then disc until all plates and discs are installed. The front clutch uses 4 clutch discs and plates in a 42RE transmission.

(9) Install pressure plate and waved snap ring (Fig. 149).

Clearance should be 1.70 to 3.40 mm (0.067 to 0.134 in.). If clearance is incorrect, clutch discs,

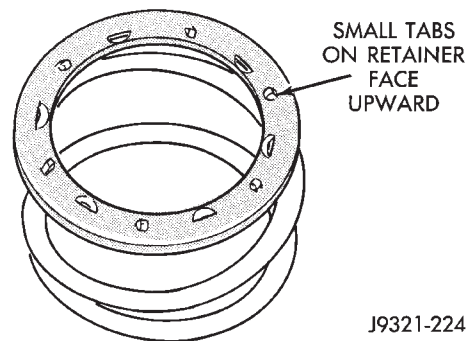


Fig. 153 Correct Spring Retainer Installed Position

plates, pressure plates and snap ring may have to be changed.

REAR CLUTCH

DISASSEMBLY

(1) Remove fiber thrust washer from forward side of clutch retainer.

(2) Remove input shaft front/rear seal rings.

(3) Remove selective clutch pack snap ring (Fig. 154).

(4) Remove top pressure plate, clutch discs, steel plates, bottom pressure plate and wave snap ring and wave spring (Fig. 154).

(5) Remove clutch piston with rotating motion.

(6) Remove and discard piston seals.

(7) Remove input shaft snap-ring (Fig. 155). 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 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. 156).

(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.

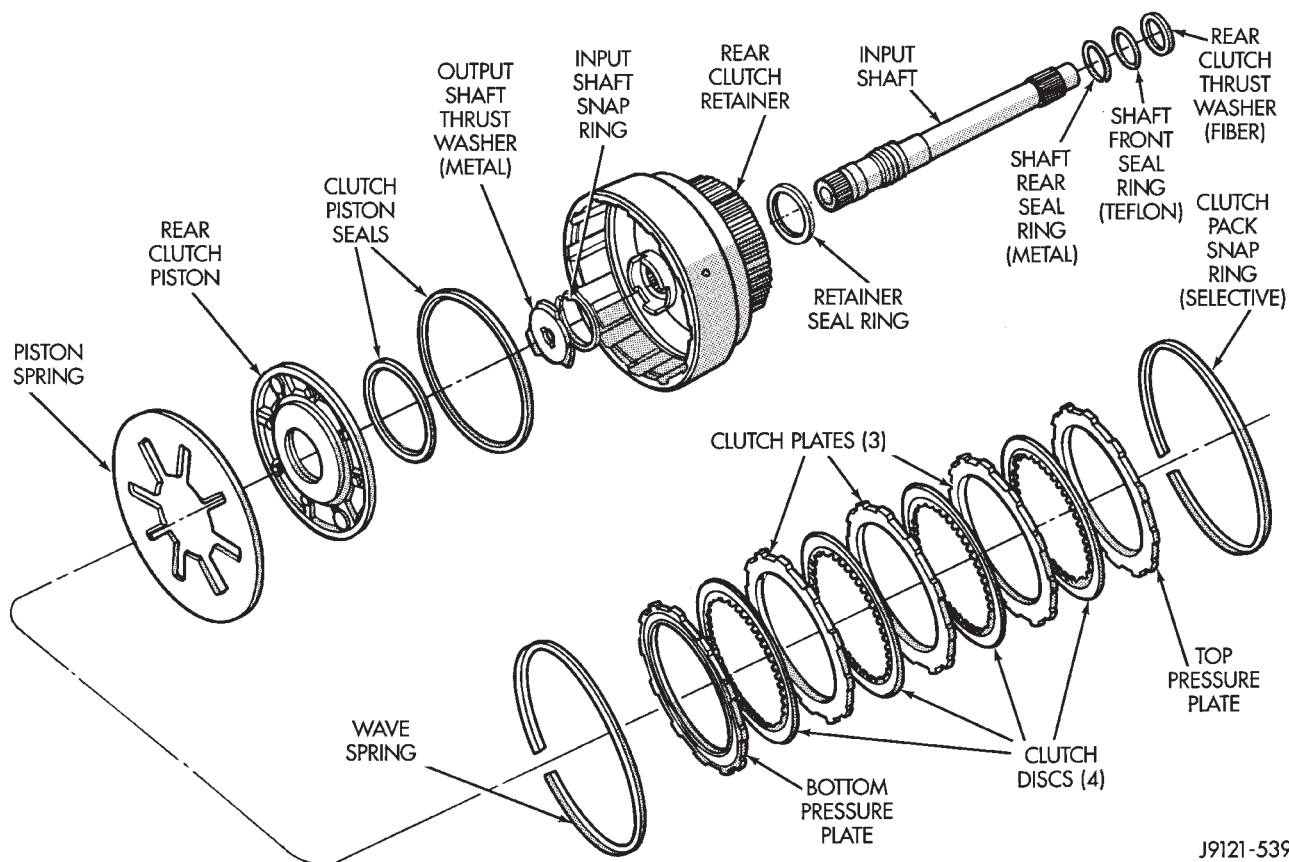
(4) Install input shaft snap-ring (Fig. 155).

(5) Invert retainer and press input shaft in opposite direction until snap-ring is seated.

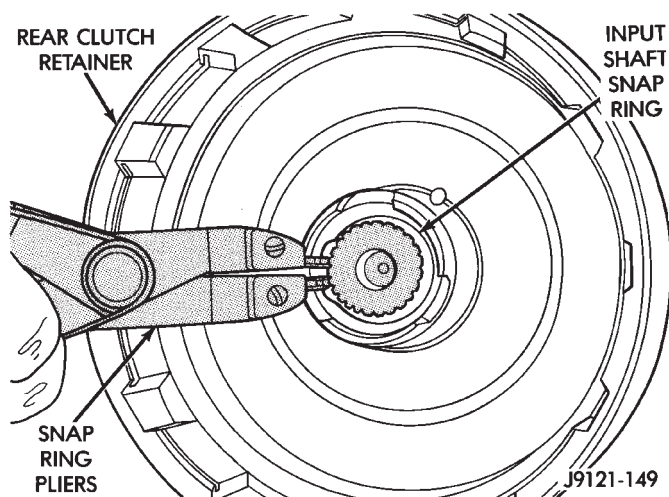
(6) Install new seals on clutch piston. Be sure lip of each seal faces interior of clutch retainer.

(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.

DISASSEMBLY AND ASSEMBLY (Continued)



J9121-539

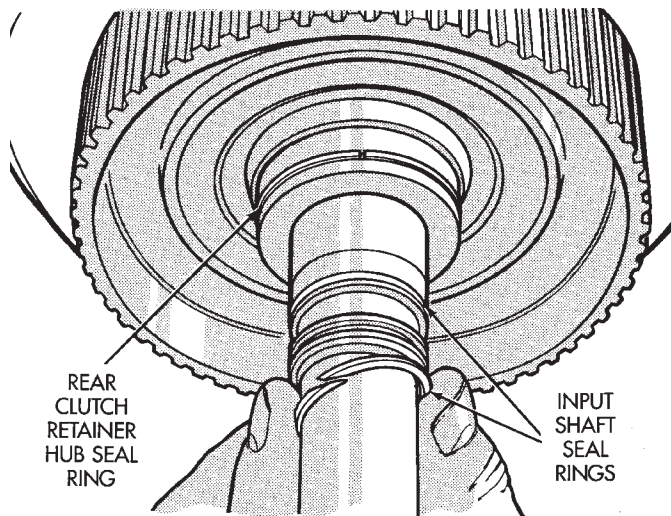
Fig. 154 Rear Clutch Components

J9121-149

Fig. 155 Removing/Installing Input Shaft Snap-Ring

(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



J9121-538

Fig. 156 Rear Clutch Retainer And Input Shaft Seal Ring Installation

tool to help ease the piston seals into place. Metal tools will cut, shave, or score the seals.

DISASSEMBLY AND ASSEMBLY (Continued)

(9) Install piston spring in retainer and on top of piston (Fig. 159). Concave side of spring faces downward (toward piston).

(10) Install wave spring in retainer (Fig. 159). Be sure spring is completely seated in retainer groove.

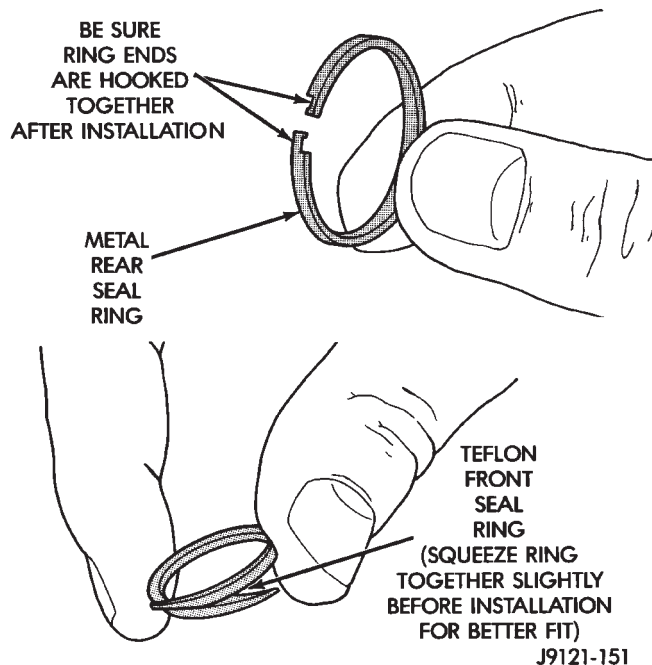


Fig. 157 Input Shaft Seal Ring Identification

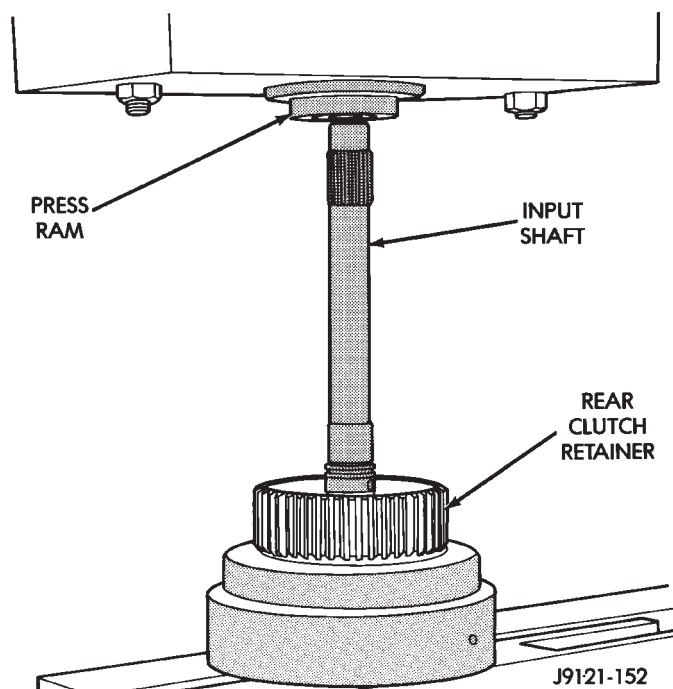


Fig. 158 Pressing Input Shaft Into Rear Clutch Retainer

(11) Install bottom pressure plate (Fig. 154). Ridged side of plate faces downward (toward piston) and flat side toward clutch pack.

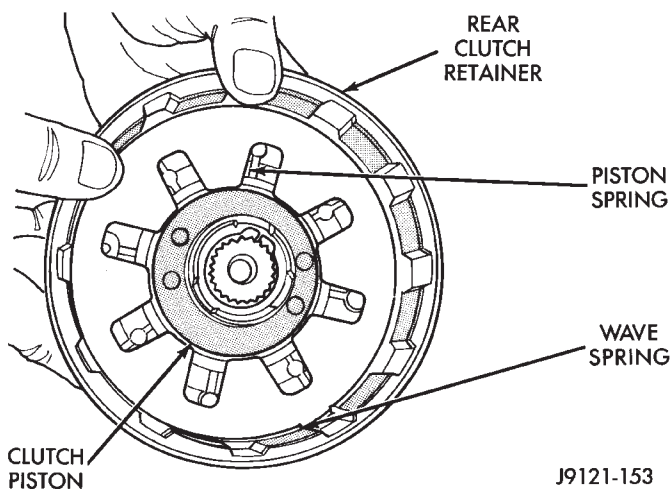


Fig. 159 Piston Spring/Wave Spring Position

(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. 154).

(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. 160).

(a) Position gauge bar across the clutch drum with the dial indicator pointer on the pressure plate (Fig. 160).

(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. 161). Use enough petroleum jelly to hold washer in place.

(17) Set rear clutch aside for installation during final assembly.

DISASSEMBLY AND ASSEMBLY (Continued)

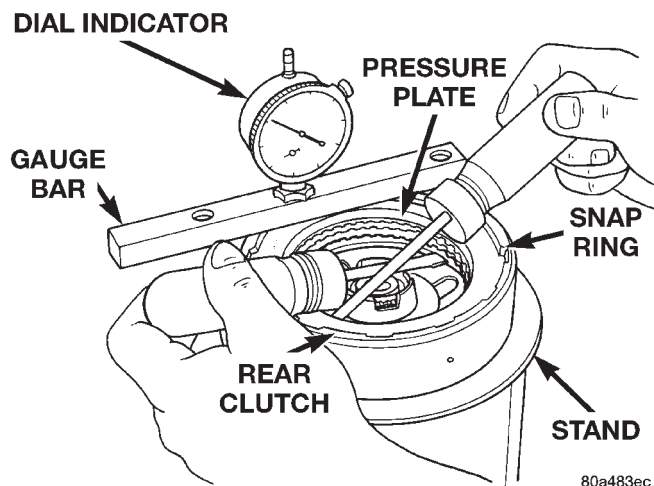


Fig. 160 Checking Rear Clutch Pack Clearance

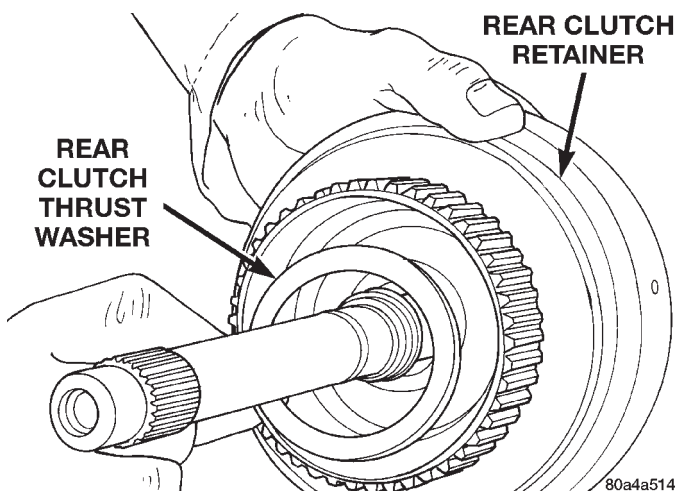


Fig. 161 Installing Rear Clutch Thrust Washer
PLANETARY GEARTRAIN/OUTPUT SHAFT

DISASSEMBLY

- (1) Remove planetary snap ring (Fig. 162).
- (2) Remove front annulus and planetary assembly from driving shell (Fig. 162).
- (3) Remove snap ring that retains front planetary gear in annulus gear (Fig. 163).
- (4) Remove tabbed thrust washer and tabbed thrust plate from hub of front annulus (Fig. 164).
- (5) Separate front annulus and planetary gears (Fig. 164).
- (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. 165).
- (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.

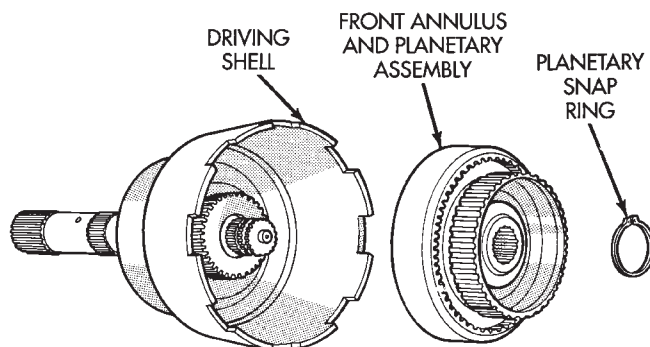


Fig. 162 Front Annulus And Planetary Assembly Removal

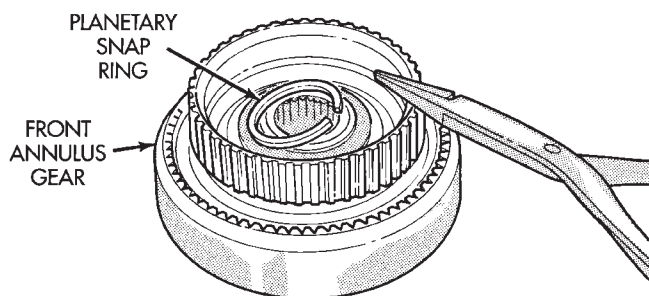


Fig. 163 Front Planetary Snap Ring Removal

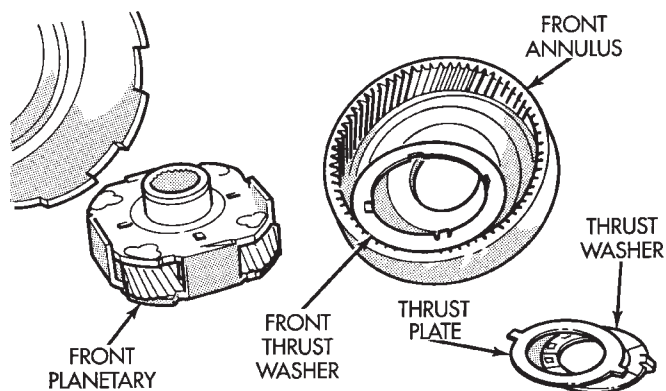
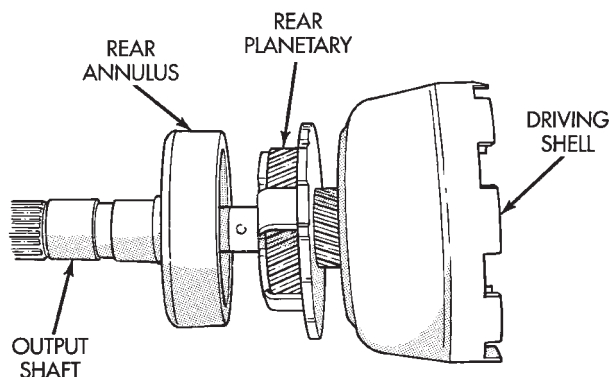


Fig. 164 Front Planetary And Annulus Gear Disassembly

ASSEMBLY

- (1) Lubricate output shaft and planetary components with transmission fluid. Use petroleum jelly to

DISASSEMBLY AND ASSEMBLY (Continued)

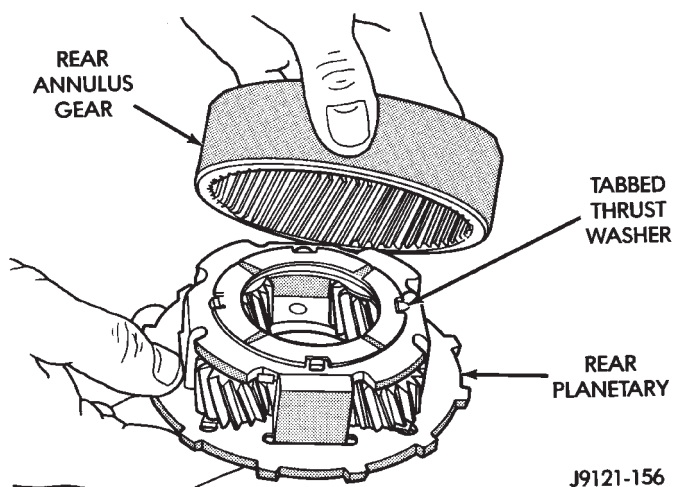


J9421-178

Fig. 165 Removing Driving Shell, Rear Planetary And Rear Annulus

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. 166).



J9121-156

Fig. 166 Assembling Rear Annulus And Planetary Gear

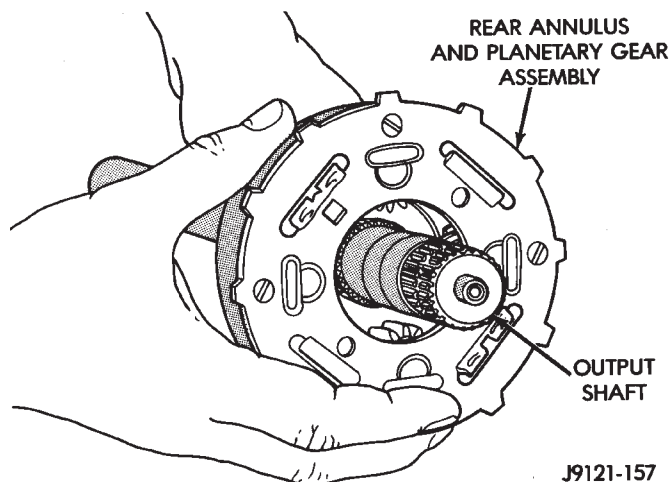
(3) Install rear thrust washer on rear planetary gear. Use enough petroleum jelly to hold washer in place. Also be sure all four washer tabs are properly engaged in gear slots.

(4) Install rear annulus over and onto rear planetary gear (Fig. 166).

(5) Install assembled rear planetary and annulus gear on output shaft (Fig. 167). Verify that assembly is fully seated on shaft.

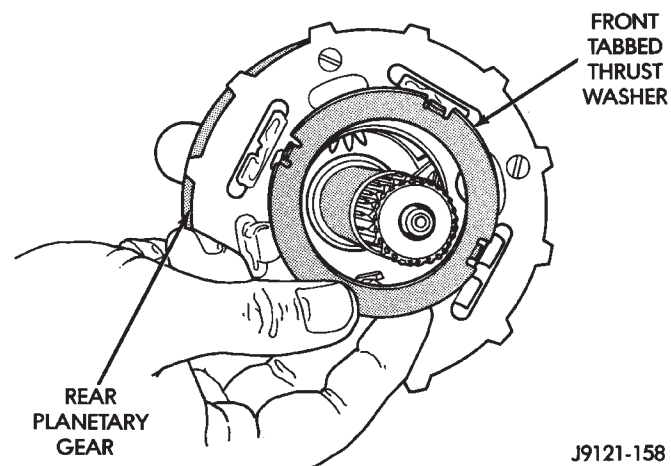
(6) Install front thrust washer on rear planetary gear (Fig. 168). Use enough petroleum jelly to hold washer on gear. Be sure all four washer tabs are seated in slots.

(7) Install spacer on sun gear (Fig. 169).



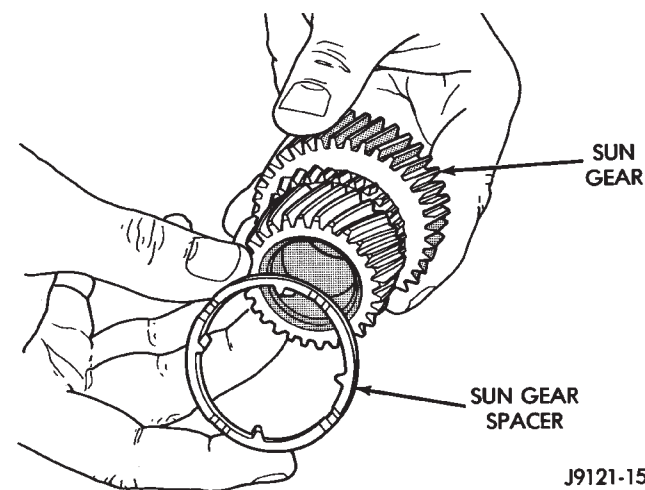
J9121-157

Fig. 167 Installing Rear Annulus And Planetary On Output Shaft



J9121-158

Fig. 168 Installing Rear Planetary Front Thrust Washer



J9121-159

Fig. 169 Installing Spacer On Sun Gear

DISASSEMBLY AND ASSEMBLY (Continued)

(8) Install thrust plate on sun gear (Fig. 170). Note that driving shell thrust plates are interchangeable. Use either plate on sun gear and at front/rear of shell.

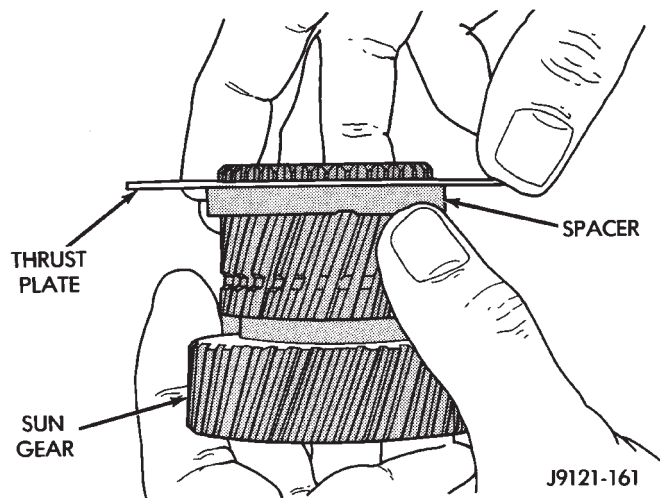


Fig. 170 Installing Driving Shell Front Thrust Plate On Sun Gear

(9) Hold sun gear in place and install thrust plate over sun gear at rear of driving shell (Fig. 171).

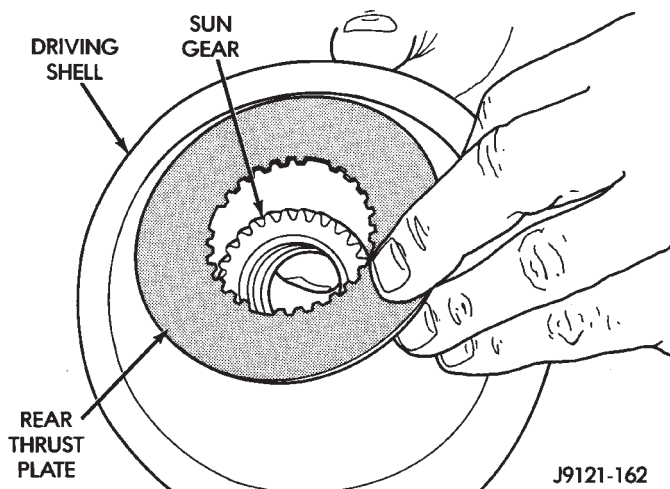


Fig. 171 Installing Driving Shell Rear Thrust Plate

(10) Position wood block on bench and support sun gear on block (Fig. 172). This makes it easier to align and install sun gear lock ring. Keep wood block handy as it will also be used for geartrain end play check.

(11) Align rear thrust plate on driving shell and install sun gear lock ring. Be sure ring is fully seated in sun gear ring groove (Fig. 173).

(12) Install assembled driving shell and sun gear on output shaft (Fig. 174).

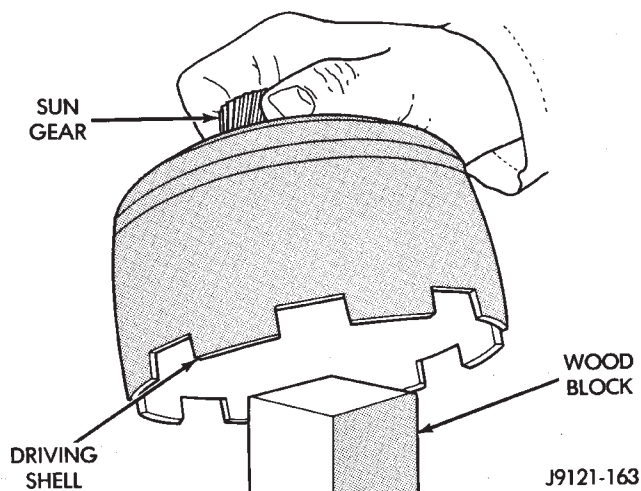


Fig. 172 Supporting Sun Gear On Wood Block

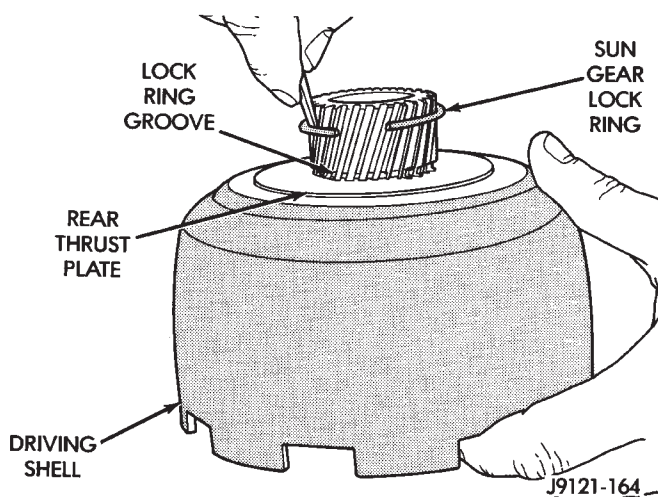


Fig. 173 Installing Sun Gear Lock Ring

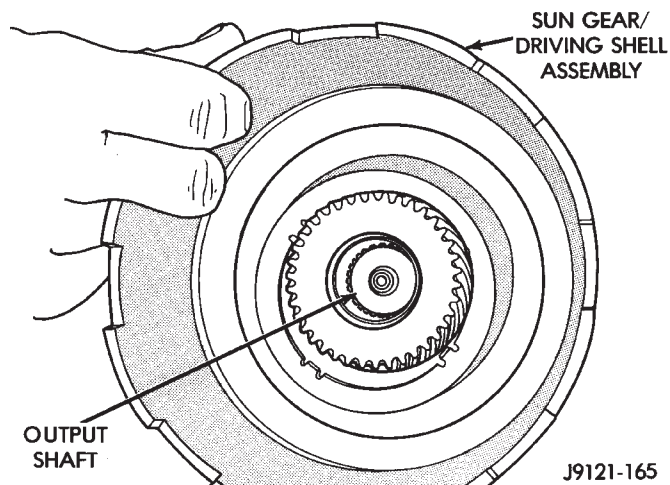


Fig. 174 Installing Assembled Sun Gear And Driving Shell On Output Shaft

DISASSEMBLY AND ASSEMBLY (Continued)

(13) Install rear thrust washer on front planetary gear (Fig. 175). Use enough petroleum jelly to hold washer in place and be sure all four washer tabs are seated.

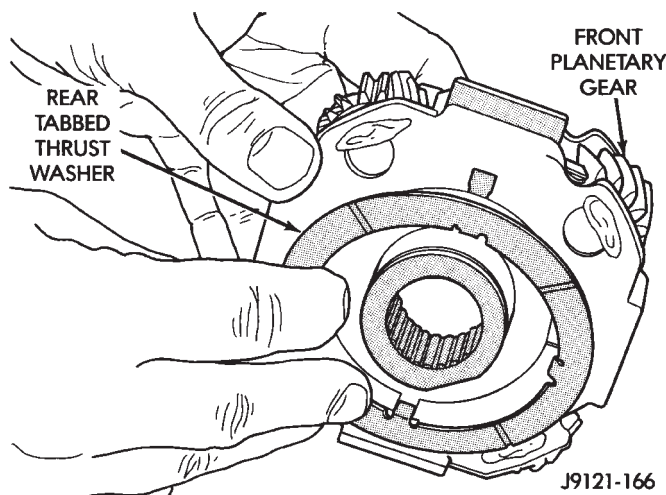


Fig. 175 Installing Rear Thrust Washer On Front Planetary Gear

(14) Install front planetary gear on output shaft and in driving shell (Fig. 176).

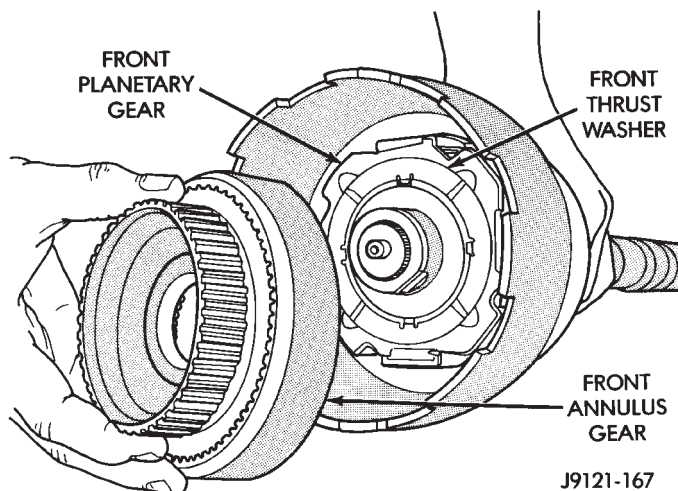


Fig. 176 Installing Front Planetary And Annulus Gears

(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. 176).

(18) Position thrust plate on front annulus gear support (Fig. 177). **Note that plate has two tabs on it. These tabs fit in notches of annulus hub.**

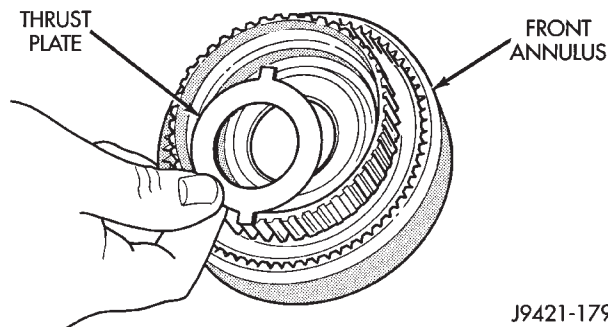


Fig. 177 Positioning Thrust Plate On Front Annulus Support

(19) Install thrust washer in front annulus (Fig. 178). **Align flat on washer with flat on planetary hub. Also be sure washer tab is facing up.**

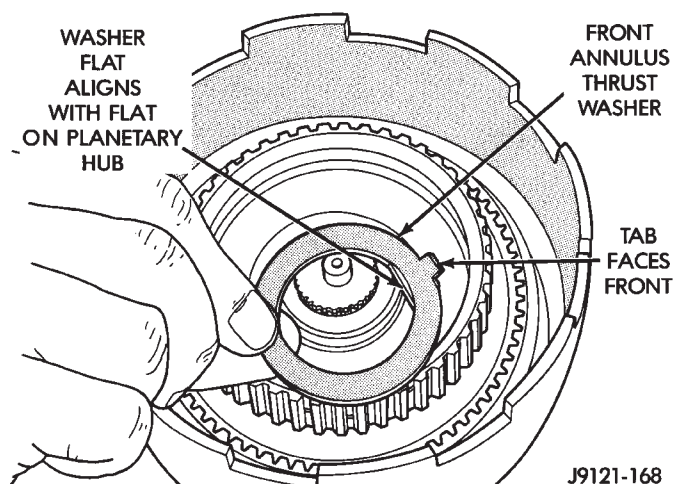


Fig. 178 Installing Front Annulus Thrust Washer

(20) Install front annulus snap ring (Fig. 179). Use snap ring pliers to avoid distorting ring during installation. Also be sure ring is fully seated.

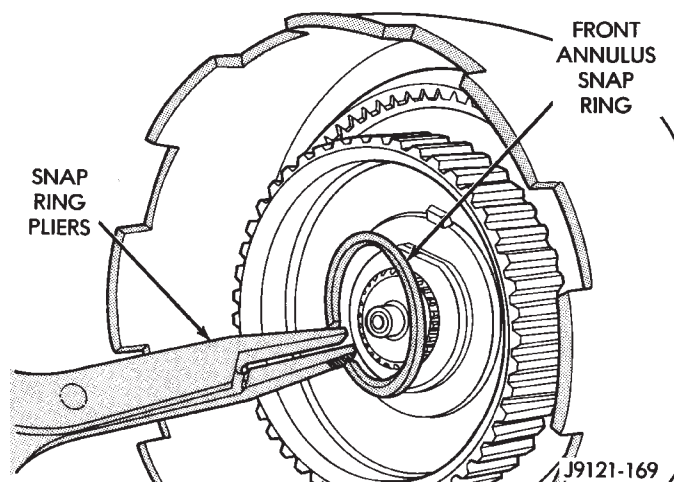


Fig. 179 Installing Front Annulus Snap Ring

DISASSEMBLY AND ASSEMBLY (Continued)

(21) Install planetary selective snap ring with snap ring pliers (Fig. 180). Be sure ring is fully seated.

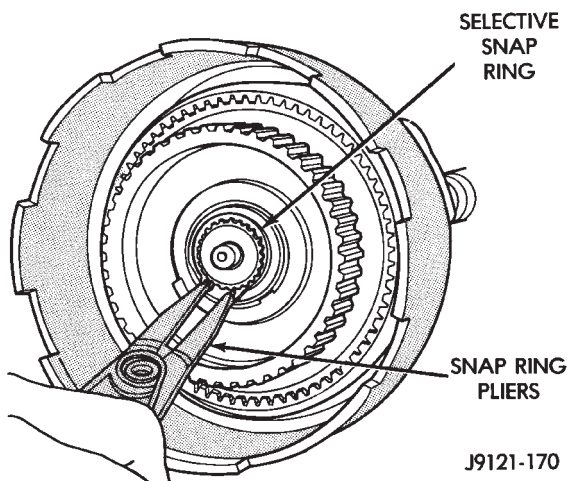


Fig. 180 Installing Planetary Selective Snap Ring

(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. 181). Gauge goes between shoulder on output shaft and end of rear annulus support.

(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.

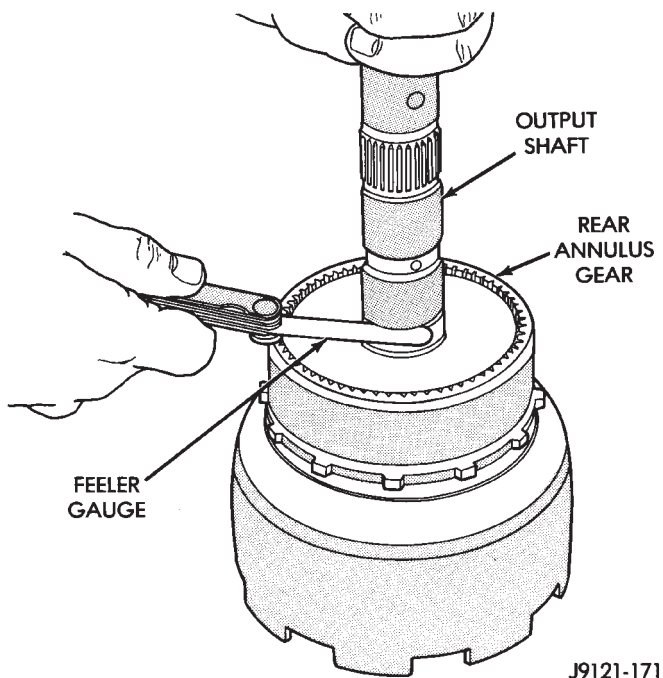


Fig. 181 Checking Planetary Geartrain End Play

OVERDRIVE UNIT

DISASSEMBLY

(1) Remove transmission speed sensor and O-ring seal from overdrive case (Fig. 182).

(2) Remove overdrive piston thrust bearing (Fig. 183).

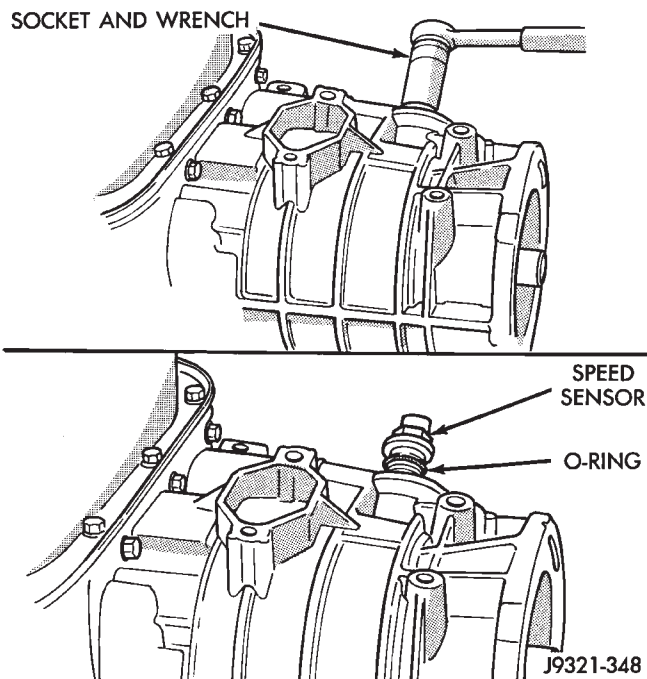


Fig. 182 Transmission Speed Sensor Removal/Installation

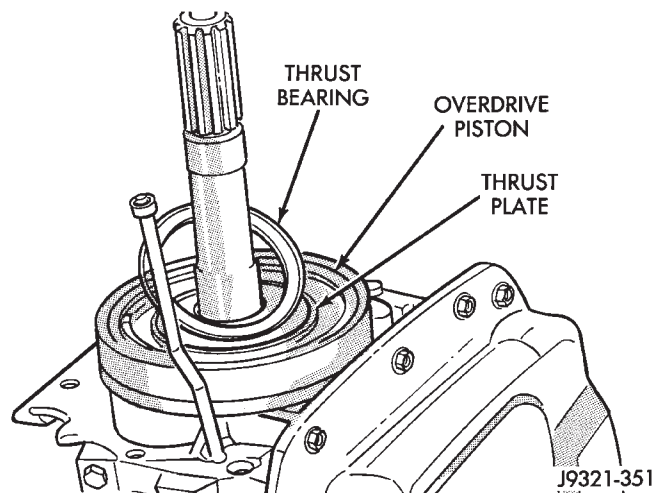


Fig. 183 Overdrive Piston Thrust Bearing Removal/Installation

DISASSEMBLY AND ASSEMBLY (Continued)

OVERDRIVE PISTON DISASSEMBLY

(1) Remove overdrive piston thrust plate (Fig. 184). Retain thrust plate. It is a select fit part and may possibly be reused.

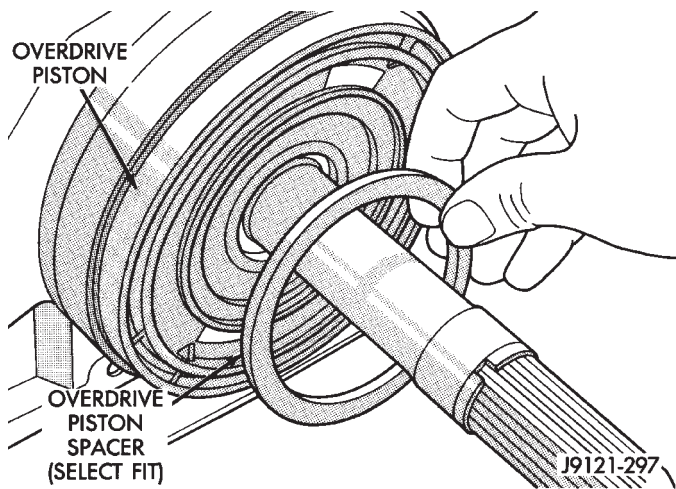


Fig. 184 Overdrive Piston Thrust Plate Removal/Installation

(2) Remove intermediate shaft spacer (Fig. 185). Retain spacer. It is a select fit part and may possibly be reused.

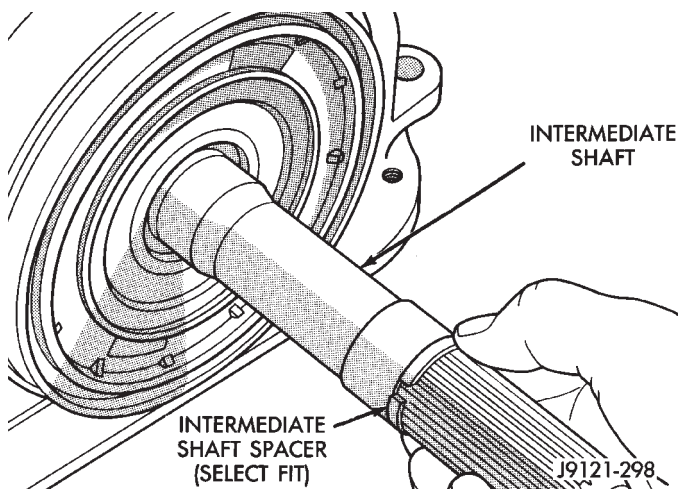


Fig. 185 Intermediate Shaft Spacer Location

(3) Remove overdrive piston from retainer (Fig. 186).

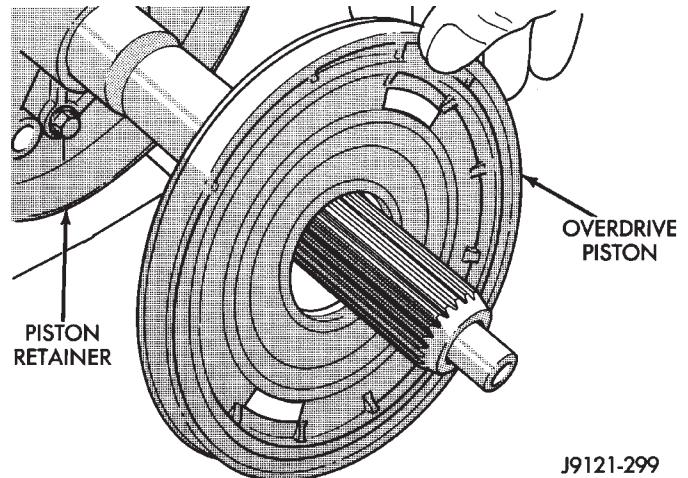


Fig. 186 Overdrive Piston Removal

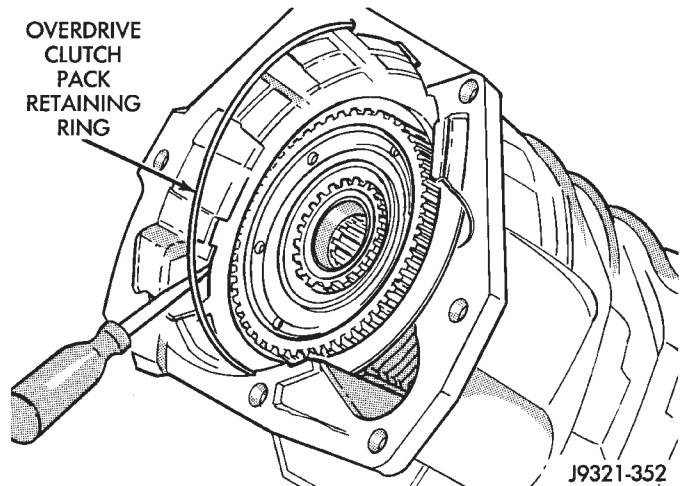


Fig. 187 Removing Overdrive Clutch Pack Retaining Ring

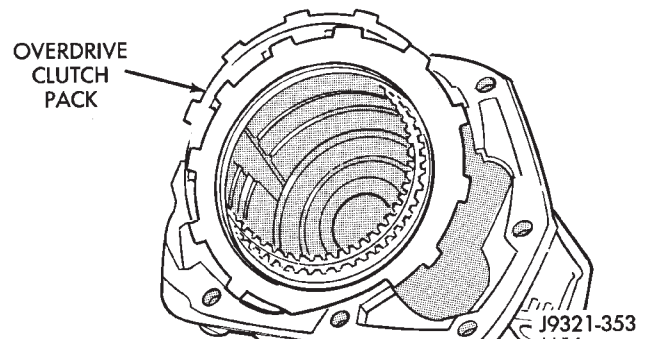


Fig. 188 Overdrive Clutch Pack Removal

OVERDRIVE CLUTCH PACK DISASSEMBLY

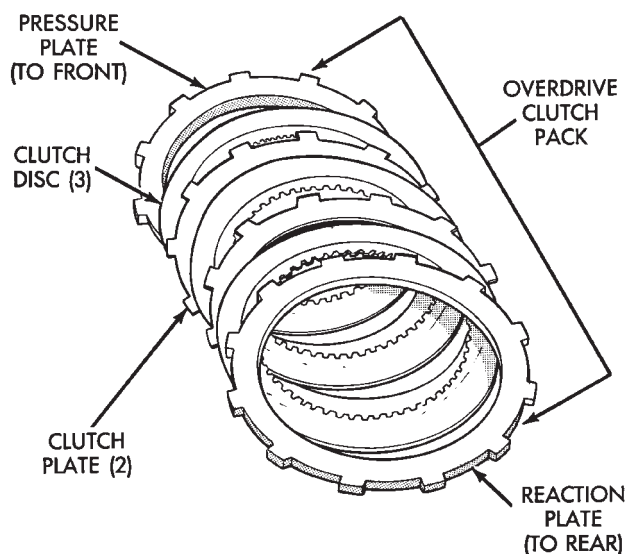
(1) Remove overdrive clutch pack wire retaining ring (Fig. 187).

(2) Remove overdrive clutch pack (Fig. 188).

NOTE: The 42RE transmission has three clutch discs and two clutch plates.

(3) Note position of clutch pack components for assembly reference (Fig. 189).

DISASSEMBLY AND ASSEMBLY (Continued)

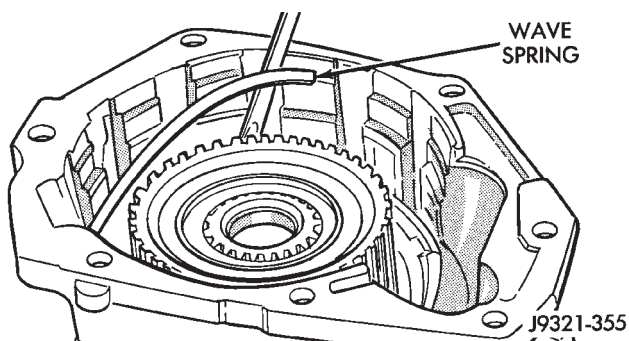


J9321-354

Fig. 189 42RE Overdrive Clutch Component Position

OVERDRIVE GEARTRAIN DISASSEMBLY

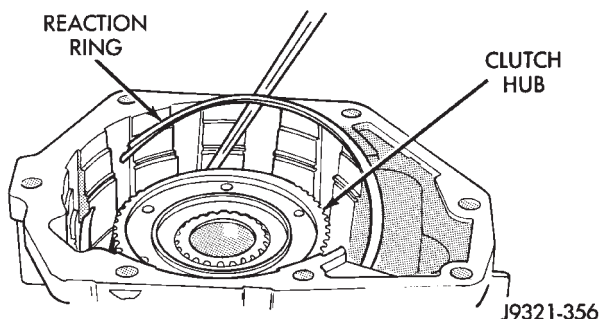
- (1) Remove overdrive clutch wave spring (Fig. 190).



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Fig. 190 Overdrive Clutch Wave Spring Removal/Installation

- (2) Remove overdrive clutch reaction snap ring (Fig. 191). Note that snap ring is located in same groove as wave spring.

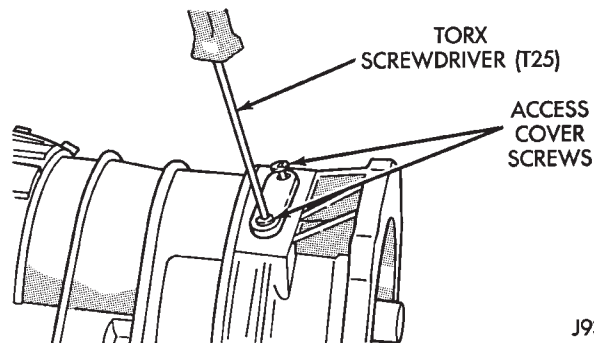


J9321-356

Fig. 191 Overdrive Clutch Reaction Snap Ring Removal/Installation

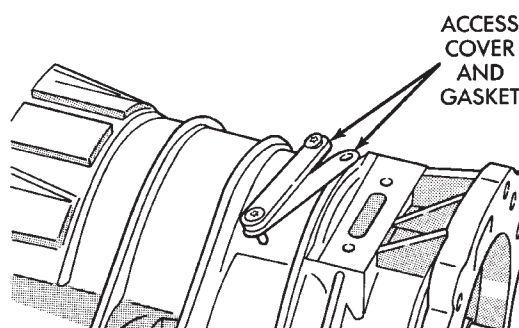
- (3) Remove Torx head screws that attach access cover and gasket to overdrive case (Fig. 192).

- (4) Remove access cover and gasket (Fig. 193).



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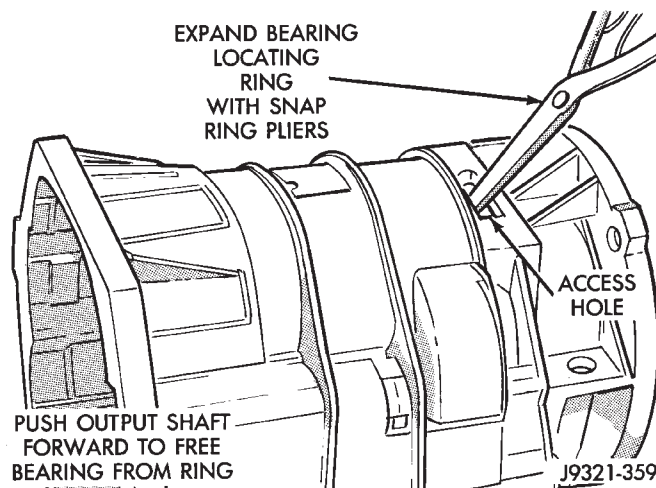
Fig. 192 Access Cover Screw Removal/Installation



J9321-358

Fig. 193 Access Cover And Gasket Removal/Installation

- (5) Expand output shaft bearing snap ring with expanding-type snap ring pliers. Then push output shaft forward to release shaft bearing from locating ring (Fig. 194).



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Fig. 194 Releasing Bearing From Locating Ring

DISASSEMBLY AND ASSEMBLY (Continued)

(6) Lift gear case up and off geartrain assembly (Fig. 195).

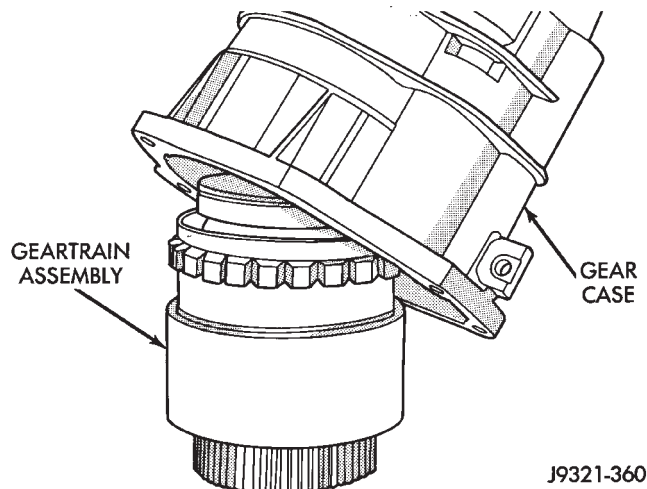


Fig. 195 Removing Gear Case From Geartrain Assembly

(7) Remove snap ring that retains rear bearing on output shaft.

(8) Remove rear bearing from output shaft (Fig. 196).

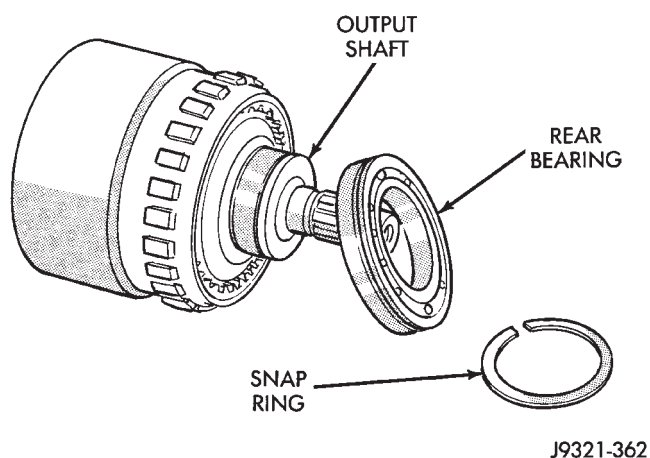


Fig. 196 Rear Bearing Removal

DIRECT CLUTCH, HUB AND SPRING DISASSEMBLY

WARNING: THE NEXT STEP IN DISASSEMBLY INVOLVES COMPRESSING THE DIRECT CLUTCH SPRING. IT IS EXTREMELY IMPORTANT THAT PROPER EQUIPMENT BE USED TO COMPRESS THE SPRING AS SPRING FORCE IS APPROXIMATELY 830 POUNDS. USE SPRING COMPRESSOR TOOL 6227-1 AND A HYDRAULIC SHOP PRESS WITH A MINIMUM RAM TRAVEL OF 5-6 INCHES. THE PRESS MUST ALSO HAVE A BED THAT CAN BE ADJUSTED UP OR DOWN AS REQUIRED. RELEASE CLUTCH SPRING

TENSION SLOWLY AND COMPLETELY TO AVOID PERSONAL INJURY.

(1) Mount geartrain assembly in shop press (Fig. 197).

(2) Position Compressor Tool 6227-1 on clutch hub (Fig. 197). Support output shaft flange with steel press plates as shown and center assembly under press ram.

(3) Apply press pressure slowly. Compress hub and spring far enough to expose clutch hub retaining ring and relieve spring pressure on clutch pack snap ring (Fig. 197).

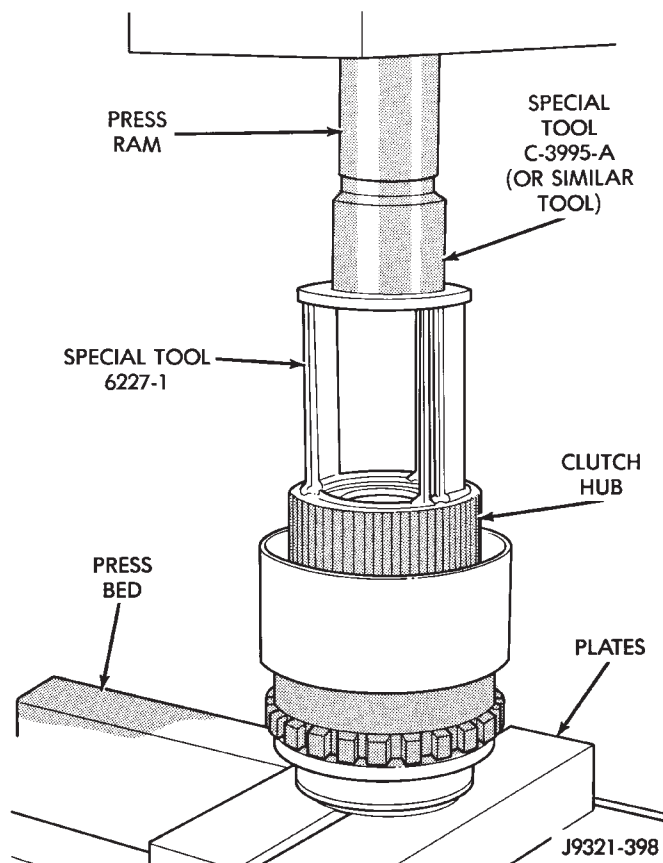


Fig. 197 Geartrain Mounted In Shop Press

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Remove direct clutch pack snap ring (Fig. 198).

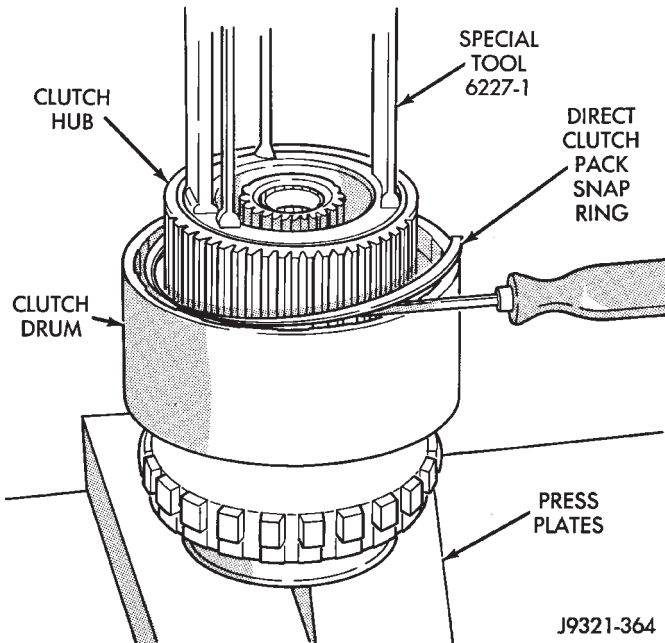


Fig. 198 Direct Clutch Pack Snap Ring Removal

(5) Remove direct clutch hub retaining ring (Fig. 199).

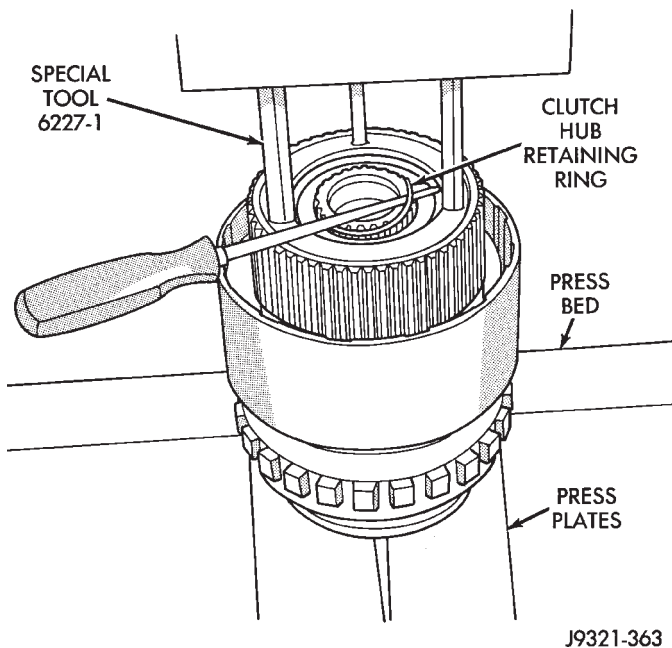


Fig. 199 Direct Clutch Hub Retaining Ring Removal

(6) Release press load slowly and completely (Fig. 200).

(7) Remove Special Tool 6227-1. Then remove clutch pack from hub (Fig. 200).

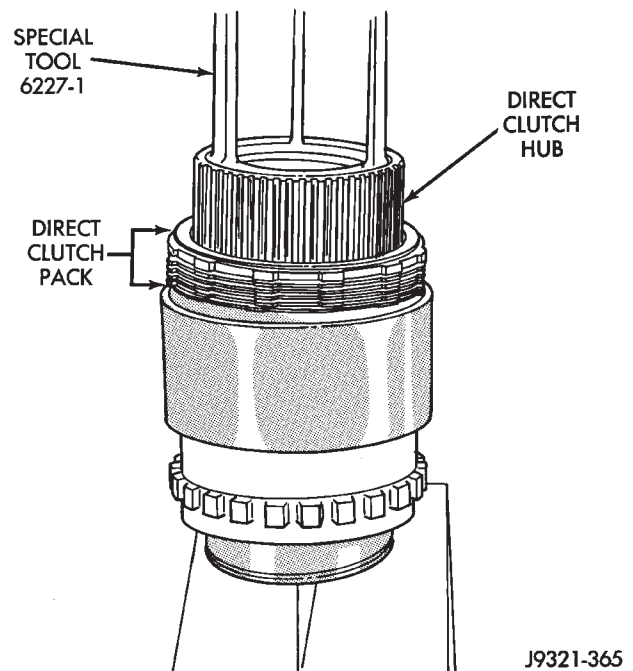


Fig. 200 Direct Clutch Pack Removal

Geartrain Disassembly

(1) Remove direct clutch hub and spring (Fig. 201).

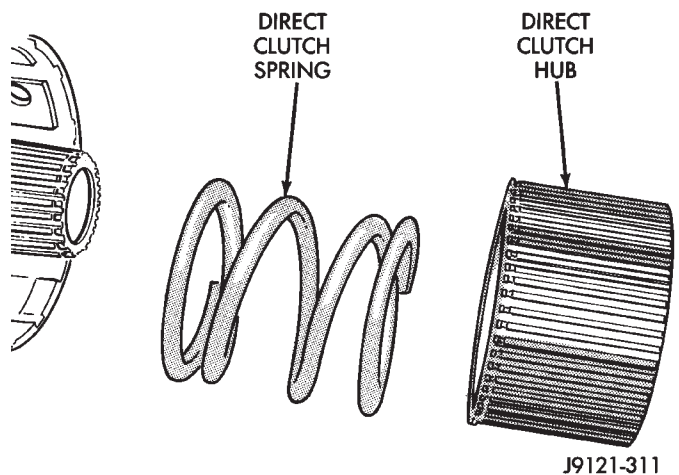


Fig. 201 Direct Clutch Hub And Spring Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(2) Remove sun gear and spring plate. Then remove planetary thrust bearing and planetary gear (Fig. 202).

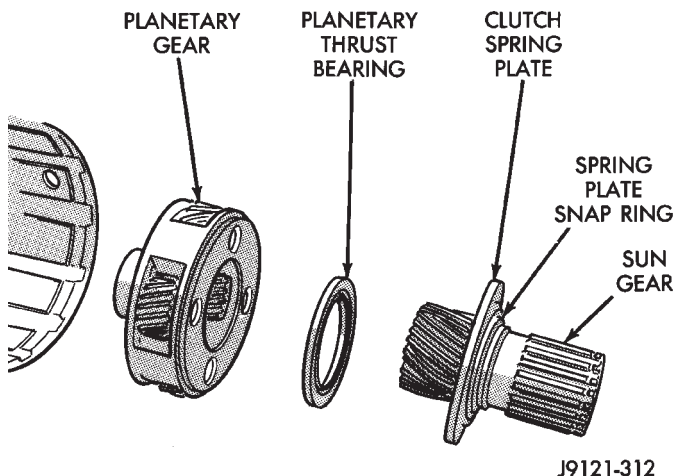


Fig. 202 Removing Sun Gear, Thrust Bearing And Planetary Gear

(3) Remove overrunning clutch assembly with expanding type snap ring pliers (Fig. 203). Insert pliers into clutch hub. Expand pliers to grip hub splines and remove clutch with counterclockwise, twisting motion.

(4) Remove thrust bearing from overrunning clutch hub.

(5) Remove overrunning clutch from hub.

(6) Mark position of annulus gear and direct clutch drum for assembly alignment reference (Fig. 204). Use small center punch or scribe to make alignment marks.

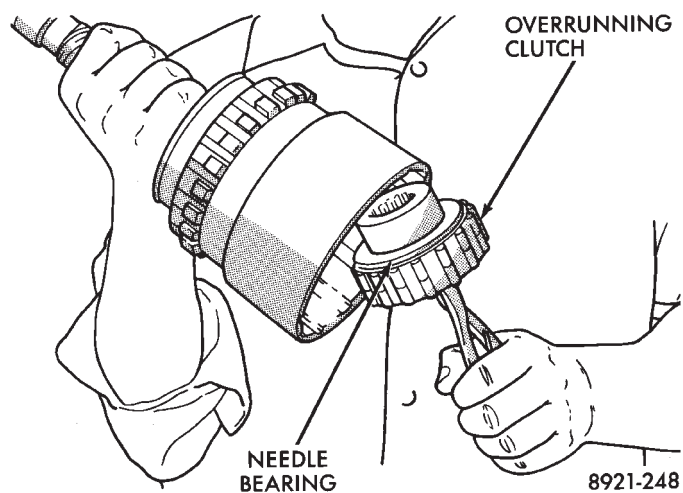


Fig. 203 Overrunning Clutch Assembly Removal/Installation

(7) Remove direct clutch drum rear retaining ring (Fig. 205).

(8) Remove direct clutch drum outer retaining ring (Fig. 206).

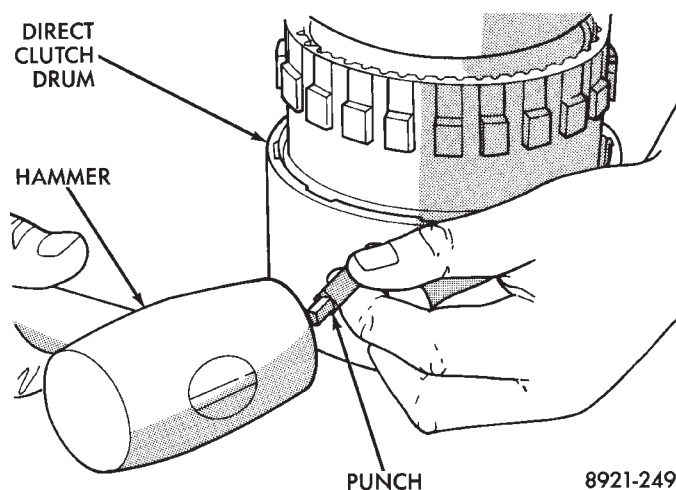


Fig. 204 Marking Direct Clutch Drum And Annulus Gear For Assembly Alignment

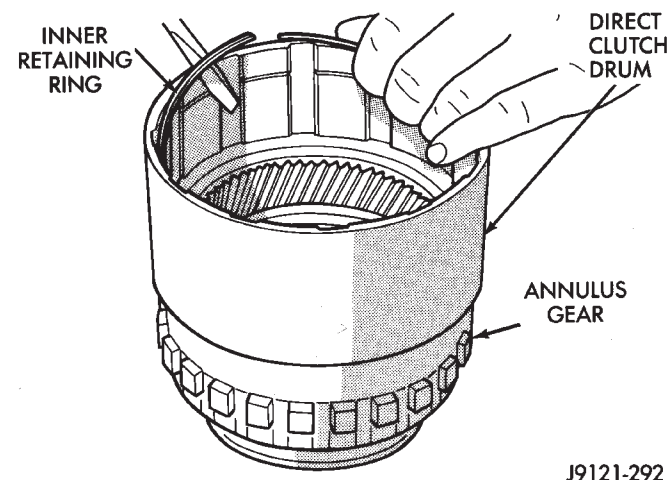


Fig. 205 Clutch Drum Inner Retaining Ring Removal

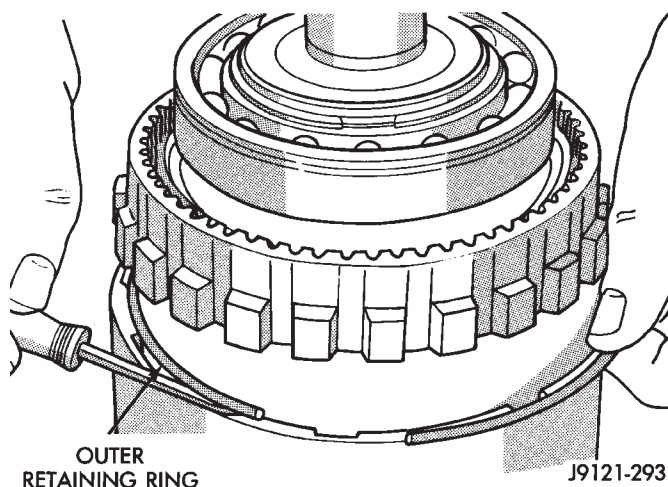


Fig. 206 Clutch Drum Outer Retaining Ring Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(9) Mark annulus gear and output shaft for assembly alignment reference (Fig. 207). Use punch or scriber to mark gear and shaft.

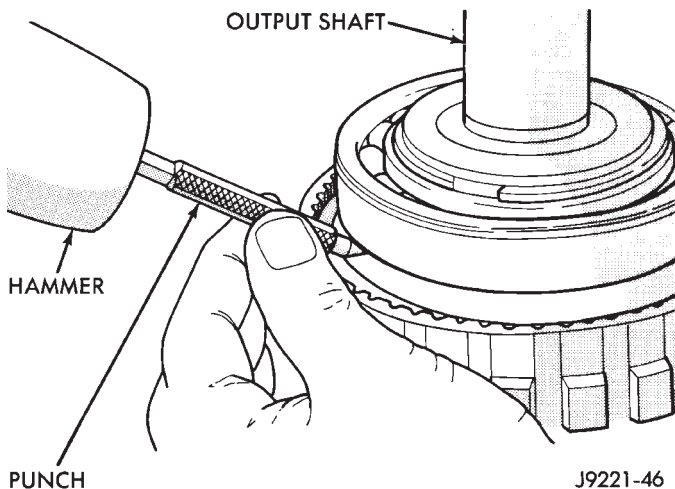


Fig. 207 Marking Annulus Gear And Output Shaft For Assembly Alignment

(10) Remove snap ring that secures annulus gear on output shaft (Fig. 208). Use two screwdrivers to unseat and work snap ring out of groove as shown.

(11) Remove annulus gear from output shaft (Fig. 209). Use rawhide or plastic mallet to tap gear off shaft.

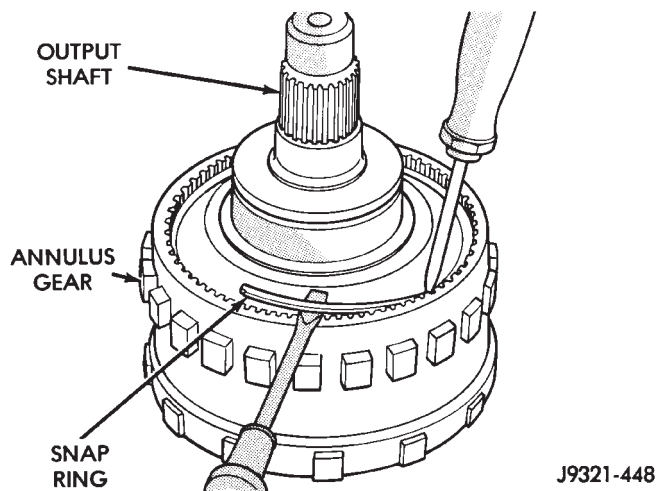


Fig. 208 Annulus Gear Snap Ring Removal

GEAR CASE AND PARK LOCK DISASSEMBLY

- (1) Remove locating ring from gear case.
- (2) Remove park pawl shaft retaining bolt and remove shaft, pawl and spring.
- (3) Remove reaction plug snap ring and remove reaction plug.
- (4) Remove output shaft seal.

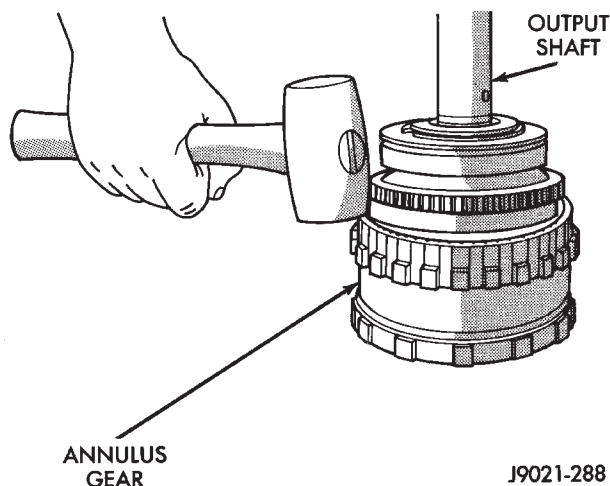


Fig. 209 Annulus Gear Removal

ASSEMBLY

GEARTRAIN AND DIRECT CLUTCH ASSEMBLY

(1) Soak direct clutch and overdrive clutch discs in Mopar® ATF Plus 3, type 7176, transmission fluid. Allow discs to soak for 10-20 minutes.

(2) Install new pilot bushing and clutch hub bushing in output shaft if necessary (Fig. 210). Lubricate bushings with petroleum jelly, or transmission fluid.

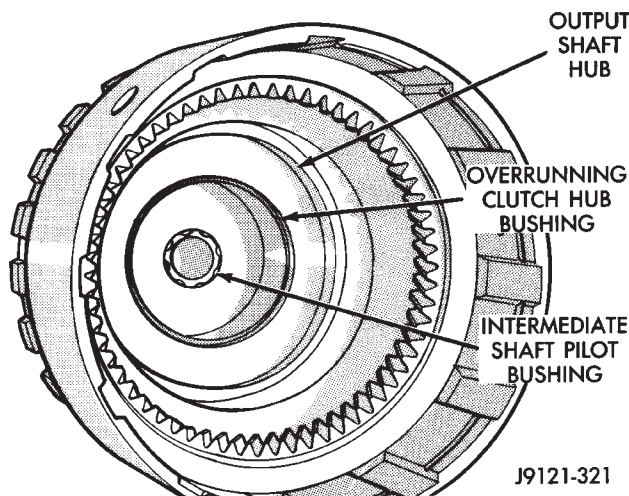


Fig. 210 Output Shaft Pilot Bushing

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Install annulus gear on output shaft, if removed. Then install annulus gear retaining snap ring (Fig. 211).

(4) Align and install clutch drum on annulus gear (Fig. 212). Be sure drum is engaged in annulus gear lugs.

(5) Install clutch drum outer retaining ring (Fig. 212).

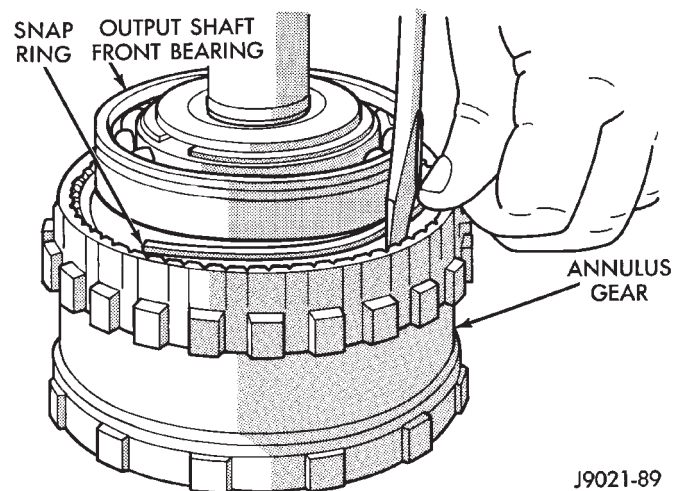


Fig. 211 Annulus Gear Installation

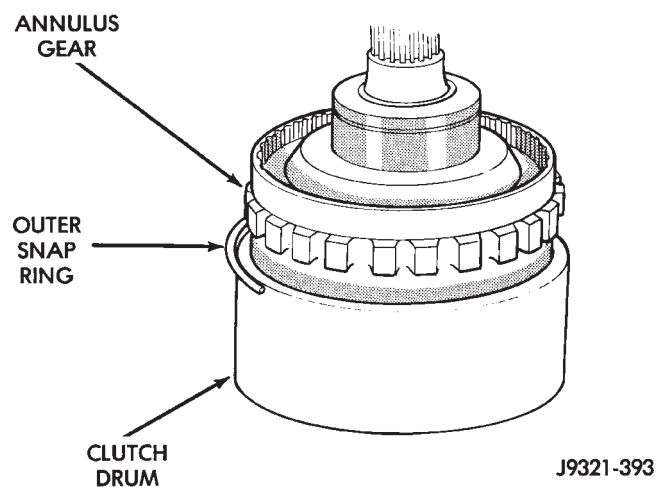


Fig. 212 Clutch Drum And Outer Retaining Ring Installation

(6) Slide clutch drum forward and install inner retaining ring (Fig. 213).

(7) Install rear bearing and snap ring on output shaft (Fig. 214). Be sure locating ring groove in bearing is toward rear.

(8) Install overrunning clutch on hub (Fig. 215). **Note that clutch only fits one way. Shoulder on clutch should seat in small recess at edge of hub.**

(9) Install thrust bearing on overrunning clutch hub. Use generous amount of petroleum jelly to hold

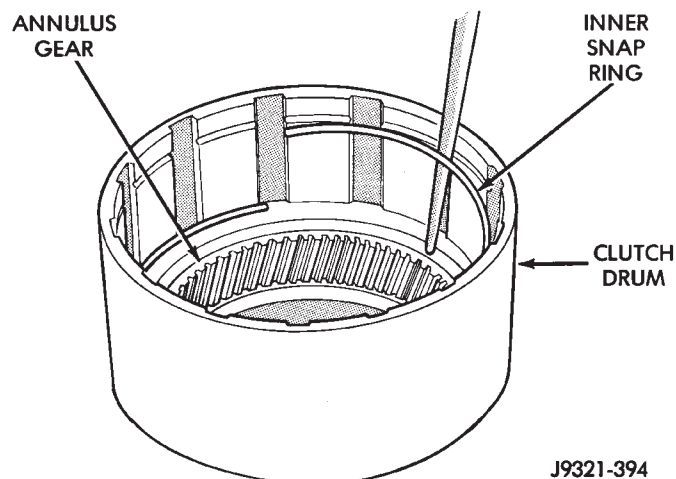


Fig. 213 Clutch Drum Inner Retaining Ring Installation

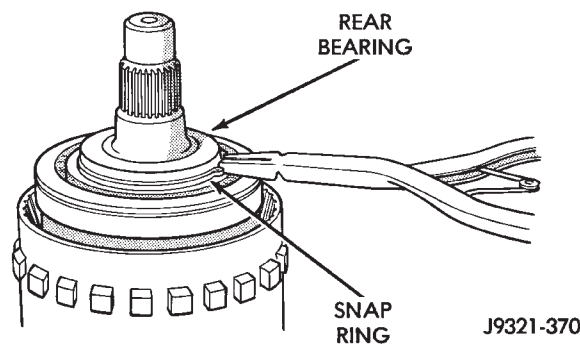


Fig. 214 Rear Bearing And Snap Ring Installation

bearing in place for installation. **Bearing fits one way only. Be sure bearing is seated squarely against hub. Reinstall bearing if it does not seat squarely.**

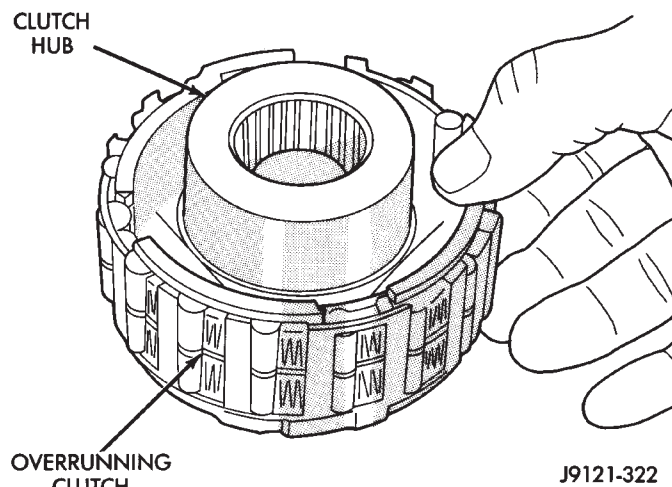


Fig. 215 Assembling Overrunning Clutch And Hub

DISASSEMBLY AND ASSEMBLY (Continued)

(10) Install overrunning clutch in output shaft (Fig. 216). Insert snap ring pliers in hub splines. Expand pliers to grip hub. Then install assembly with counterclockwise, twisting motion.

(11) Install planetary gear in annulus gear (Fig. 217). **Be sure planetary pinions are fully seated in annulus gear before proceeding.**

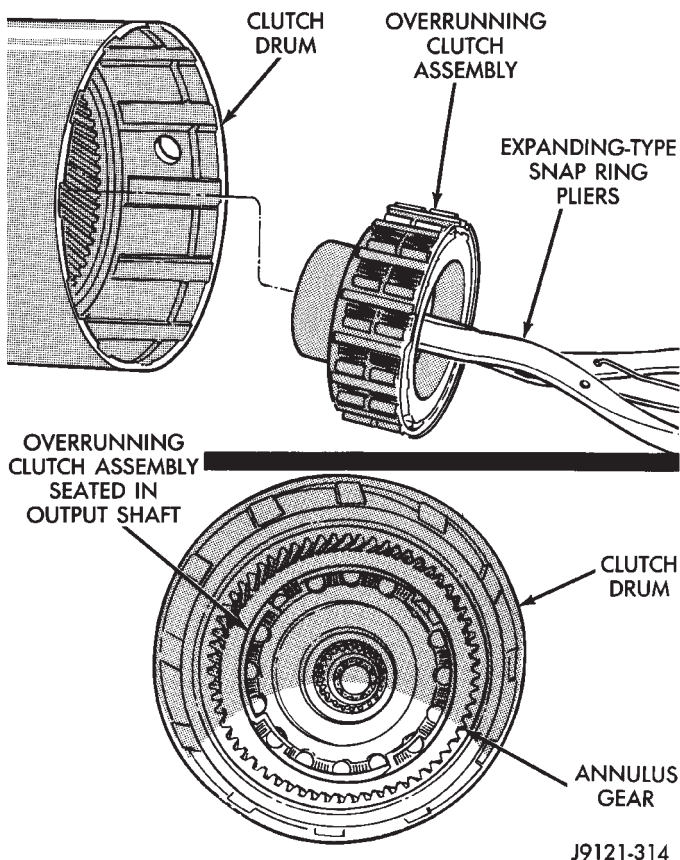


Fig. 216 Overrunning Clutch Installation

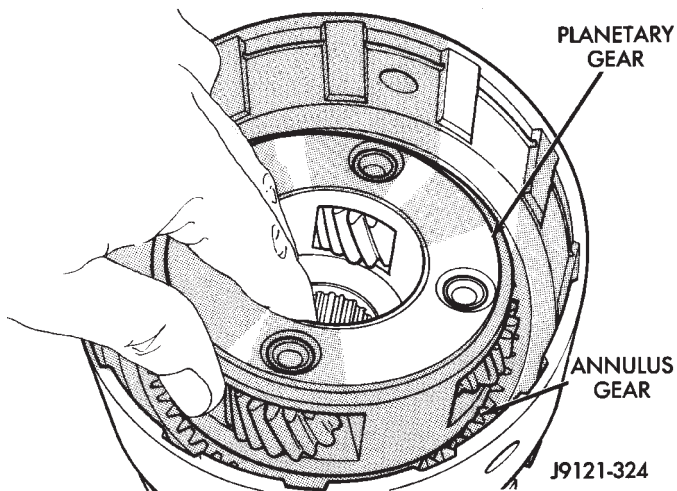


Fig. 217 Planetary Gear Installation

(12) Coat planetary thrust bearing and bearing contact surface of spring plate with generous amount

of petroleum jelly. This will help hold bearing in place during installation.

(13) Install planetary thrust bearing on sun gear (Fig. 218). Slide bearing onto gear and seat it against spring plate as shown. **Bearing fits one way only. If it does not seat squarely against spring plate, remove and reposition bearing.**

(14) Install assembled sun gear, spring plate and thrust bearing (Fig. 219). Be sure sun gear and thrust bearing are fully seated before proceeding.

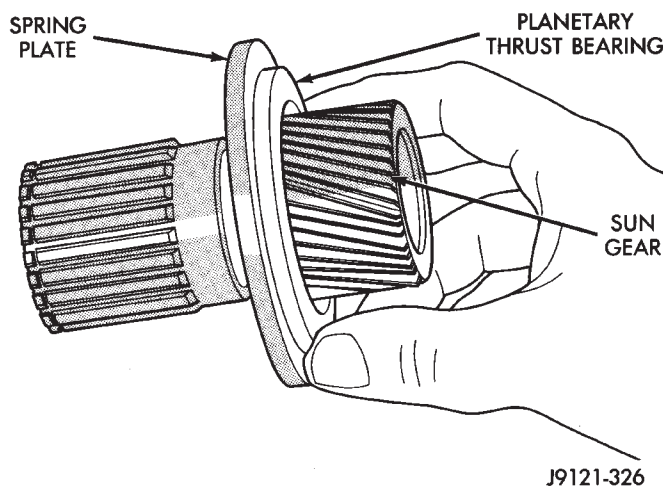


Fig. 218 Planetary Thrust Bearing Installation

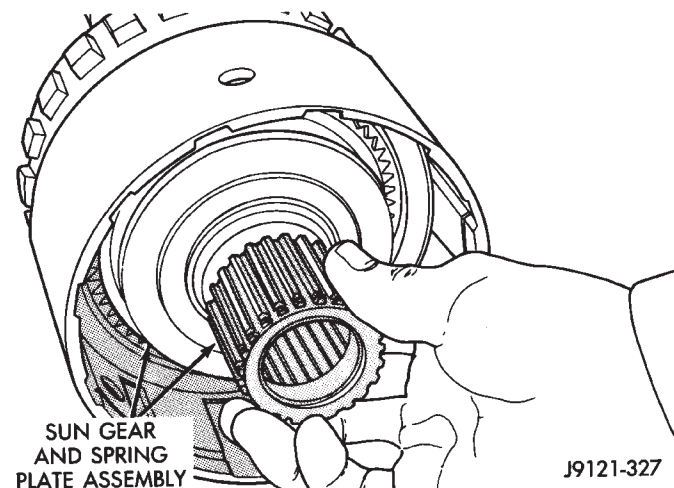


Fig. 219 Sun Gear Installation

(15) Mount assembled output shaft, annulus gear, and clutch drum in shop press. Direct clutch spring, hub and clutch pack are easier to install with assembly mounted in press.

(16) Align splines in hubs of planetary gear and overrunning clutch with Alignment tool 6227-2 (Fig. 220). Insert tool through sun gear and into splines of both hubs. Be sure alignment tool is fully seated before proceeding.

(17) Install direct clutch spring (Fig. 221). Be sure spring is properly seated on spring plate.

DISASSEMBLY AND ASSEMBLY (Continued)

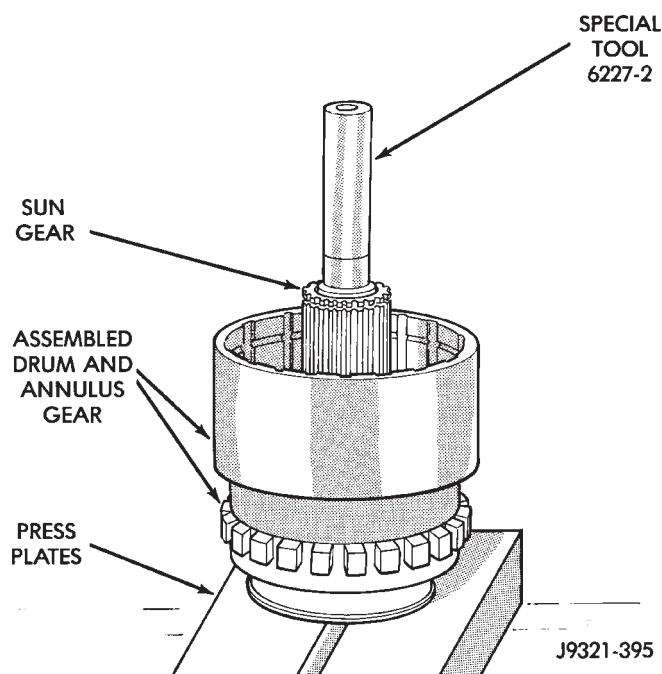


Fig. 220 Alignment Tool Installation

NOTE: The 42RE transmission has 6 direct clutch discs and 5 clutch plates.

(18) Assemble and install direct clutch pack on hub as follows:

(a) Assemble clutch pack components (Fig. 222).

(b) Install direct clutch reaction plate on clutch hub first. **Note that one side of reaction plate is counterbored. Be sure this side faces rear-**

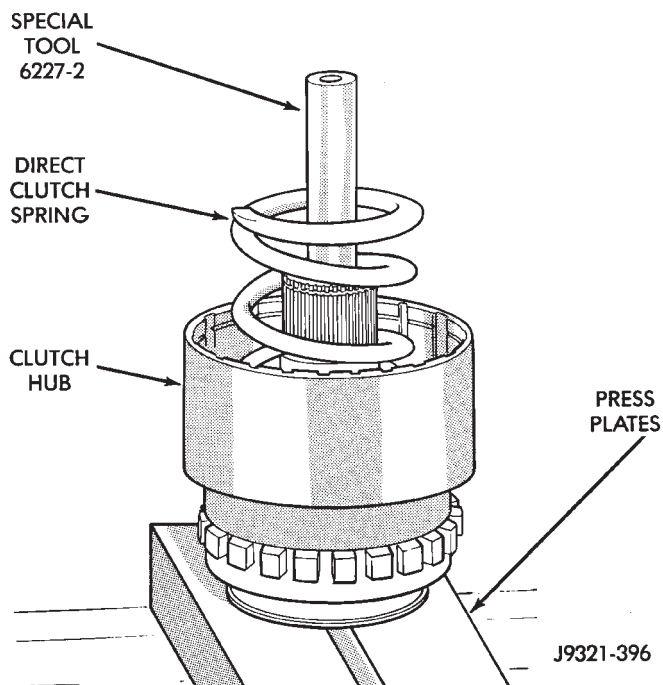


Fig. 221 Direct Clutch Spring Installation

ward. Splines at rear of hub are raised slightly. Counterbore in plate fits over raised splines. Plate should be flush with this end of hub (Fig. 223).

(c) Install first clutch disc followed by a steel plate until all discs and plates have been installed.

(d) Install pressure plate. This is last clutch pack item to be installed. **Be sure plate is**

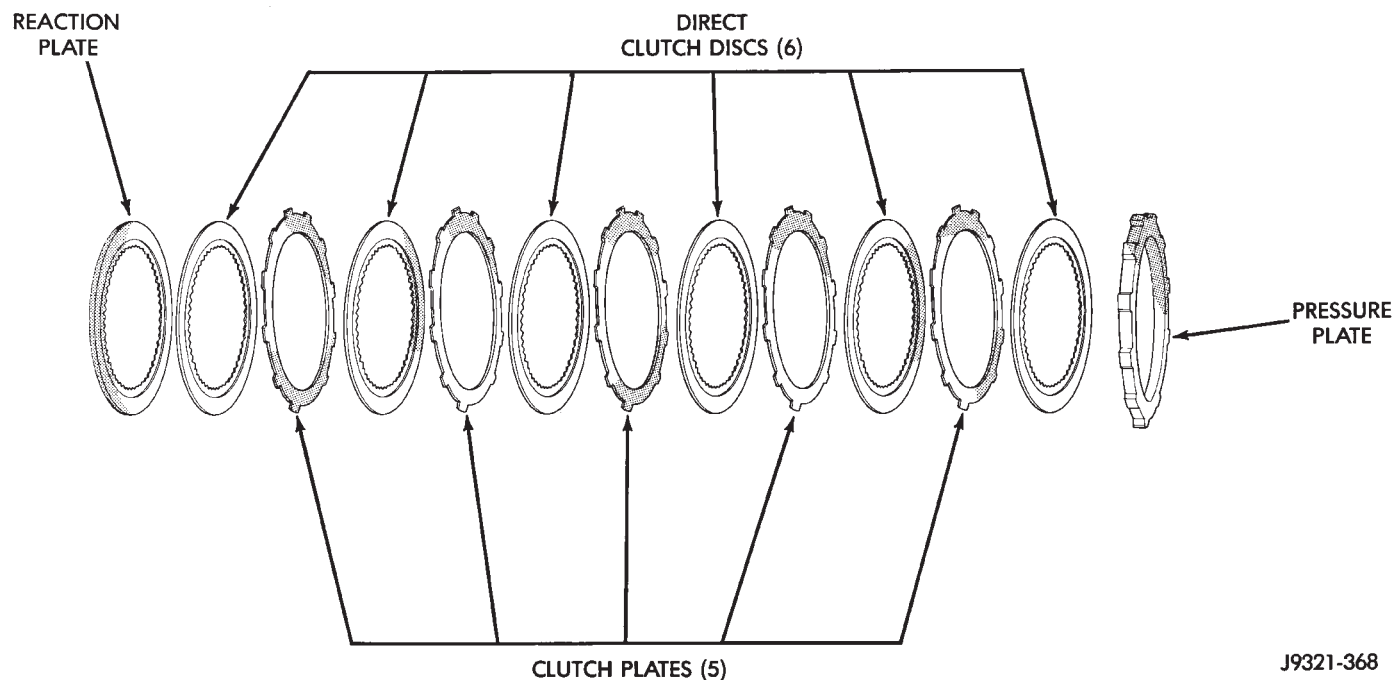


Fig. 222 42RE Direct Clutch Pack Components

DISASSEMBLY AND ASSEMBLY (Continued)

installed with shoulder side facing upward (Fig. 224).

(19) Install clutch hub and clutch pack on direct clutch spring (Fig. 225). **Be sure hub is started on sun gear splines before proceeding.**

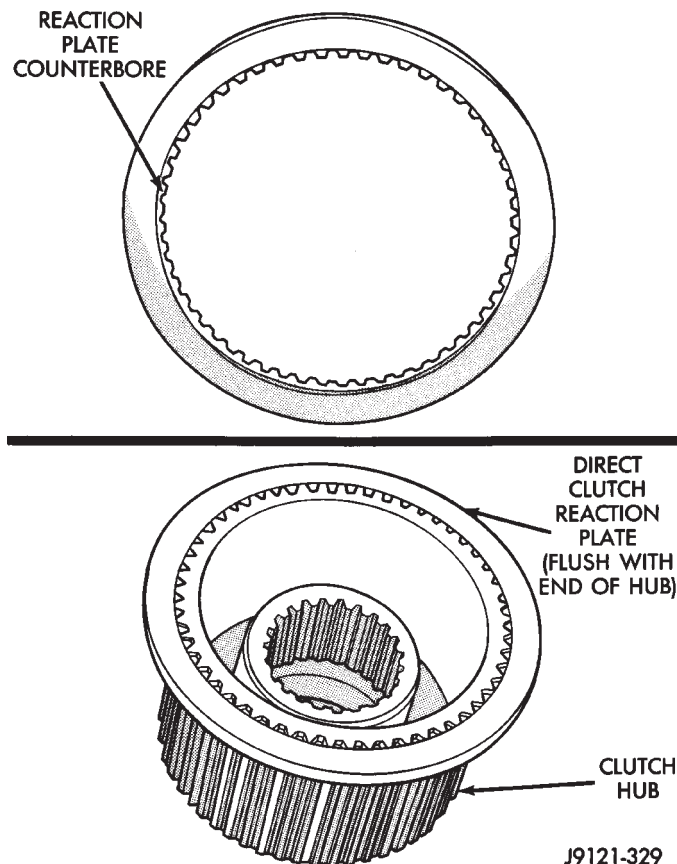


Fig. 223 Correct Position Of Direct Clutch Reaction Plate

WARNING: THE NEXT STEP IN GEARTRAIN ASSEMBLY INVOLVES COMPRESSING THE DIRECT CLUTCH HUB AND SPRING. IT IS EXTREMELY IMPORTANT THAT PROPER EQUIPMENT BE USED TO COMPRESS THE SPRING AS SPRING FORCE IS APPROXIMATELY 830 POUNDS. USE COMPRESSOR TOOL C-6227-1 AND A HYDRAULIC-TYPE SHOP PRESS WITH A MINIMUM RAM TRAVEL OF 6 INCHES. THE PRESS MUST ALSO HAVE A BED THAT CAN BE ADJUSTED UP OR DOWN AS REQUIRED. RELEASE CLUTCH SPRING TENSION SLOWLY AND COMPLETELY TO AVOID PERSONAL INJURY.

(20) Position Compressor Tool 6227-1 on clutch hub.

(21) Compress clutch hub and spring just enough to place tension on hub and hold it in place.

(22) Slowly compress clutch hub and spring. Compress spring and hub only enough to expose ring

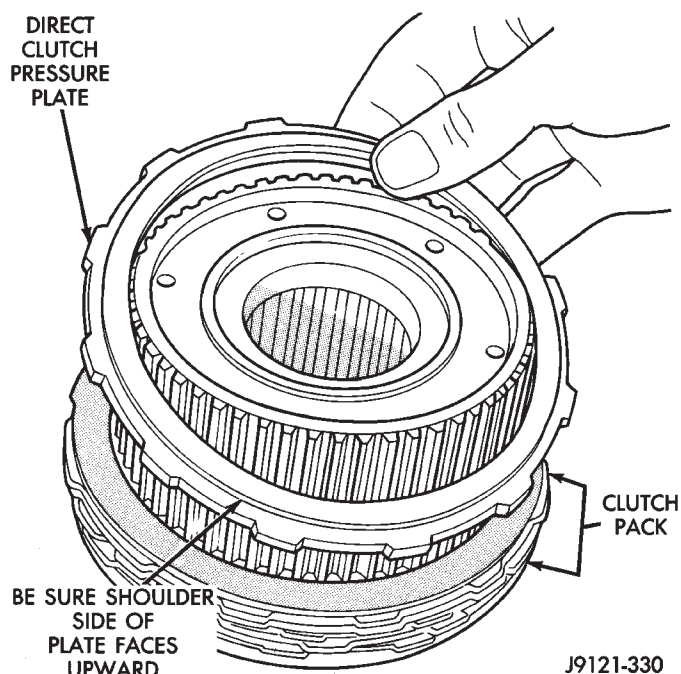


Fig. 224 Correct Position Of Direct Clutch Pressure Plate

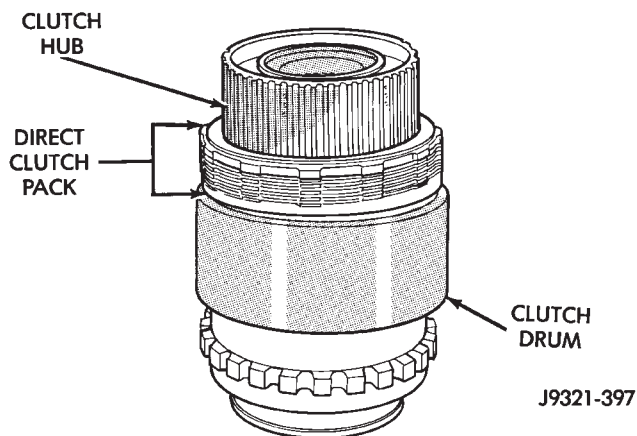


Fig. 225 Direct Clutch Pack And Clutch Hub Installation

grooves for clutch pack snap ring and clutch hub retaining ring.

(23) Realign clutch pack on hub and seat clutch discs and plates in clutch drum.

(24) Install direct clutch pack snap ring (Fig. 226). **Be very sure snap ring is fully seated in clutch drum ring groove.**

(25) Install clutch hub retaining ring (Fig. 227). **Be very sure retaining ring is fully seated in sun gear ring groove.**

(26) Slowly release press ram, remove compressor tools and remove geartrain assembly.

DISASSEMBLY AND ASSEMBLY (Continued)

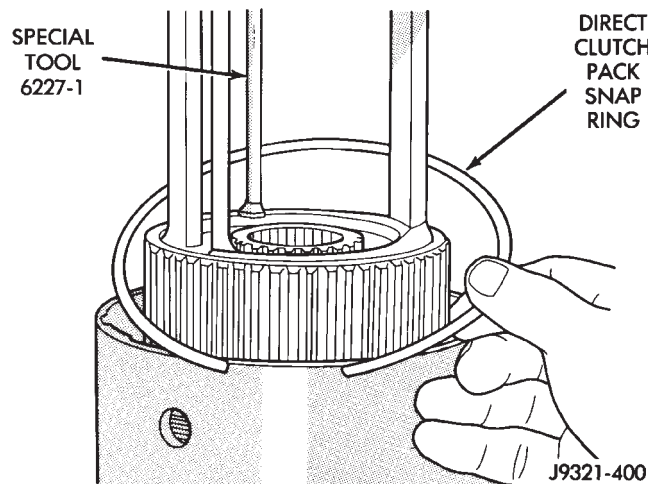


Fig. 226 Direct Clutch Pack Snap Ring Installation

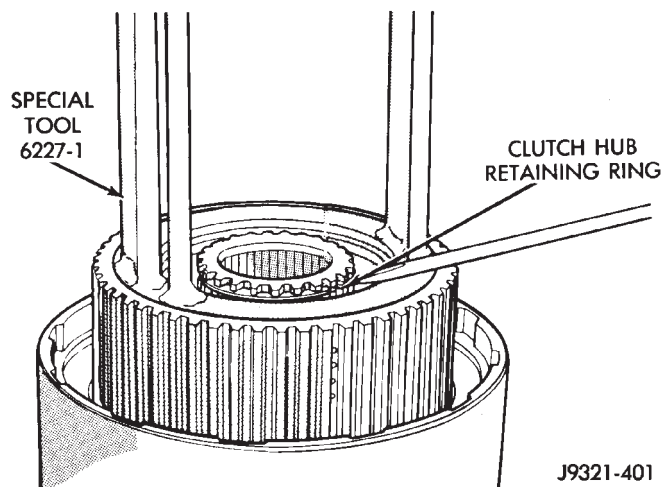


Fig. 227 Clutch Hub Retaining Ring Installation

GEAR CASE ASSEMBLY

(1) Position park pawl and spring in case and install park pawl shaft. Verify that end of spring with 90° bend is hooked to pawl and straight end of spring is seated against case.

(2) Install pawl shaft retaining bolt. Tighten bolt to 27 N·m (20 ft. lbs.) torque.

(3) Install park lock reaction plug. **Note that plug has locating pin at rear (Fig. 228). Be sure pin is seated in hole in case before installing snap ring.**

(4) Install reaction plug snap-ring (Fig. 229). **Compress snap ring only enough for installation; do not distort it.**

(5) Install new seal in gear case. On 4x4 gear case, use Tool Handle C-4171 and Installer C-3860-A to seat seal in case. On 4 x 2 gear case, use same Handle C-4171 and Installer C-3995-A to seat seal in case.

(6) Verify that tab ends of rear bearing locating ring extend into access hole in gear case (Fig. 230).

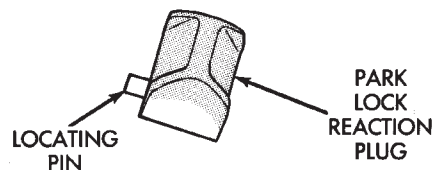


Fig. 228 Reaction Plug Locating Pin And Snap-Ring

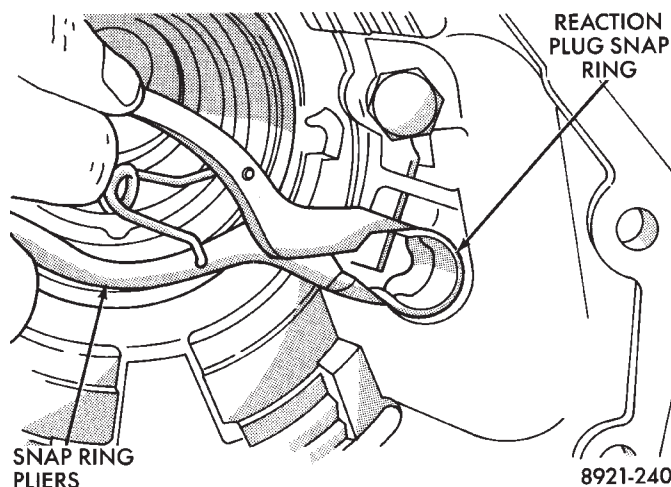


Fig. 229 Reaction Plug And Snap-Ring Installation

(7) Support geartrain on Tool 6227-1 (Fig. 231). Be sure tool is securely seated in clutch hub.

(8) Install overdrive gear case on geartrain (Fig. 231).

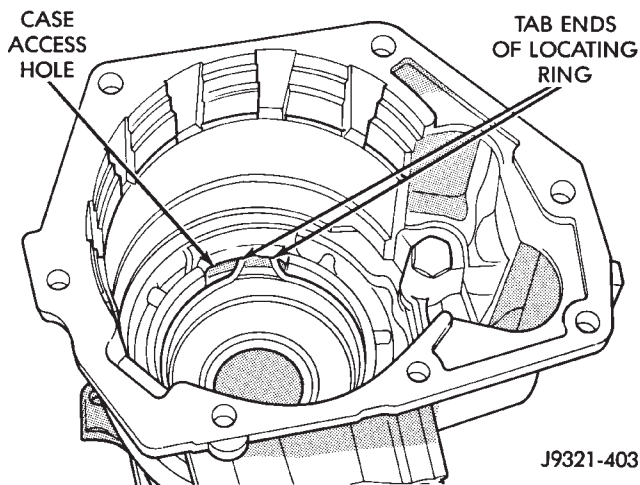


Fig. 230 Correct Rear Bearing Locating Ring Position

(9) Expand front bearing locating ring with snap ring pliers (Fig. 232). Then slide case downward until

DISASSEMBLY AND ASSEMBLY (Continued)

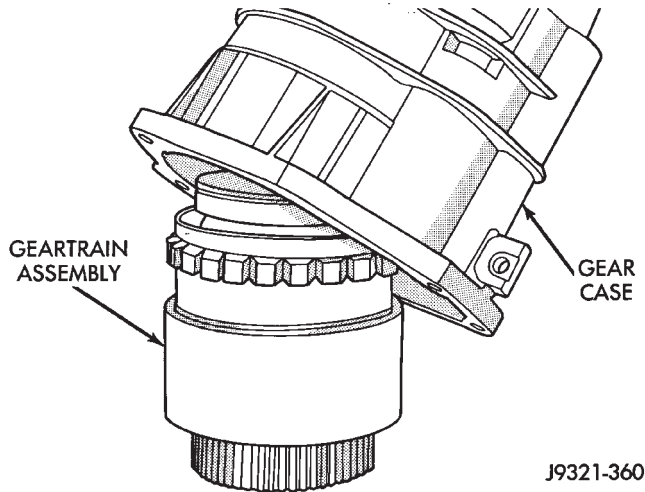


Fig. 231 Overdrive Gear Case Installation

locating ring locks in bearing groove and release snap ring.

(10) Install locating ring access cover and gasket in overdrive unit case (Fig. 233).

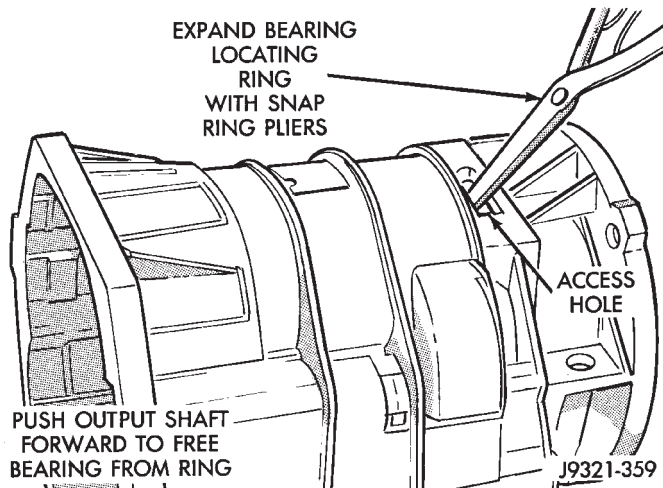


Fig. 232 Seating Locating Ring In Rear Bearing

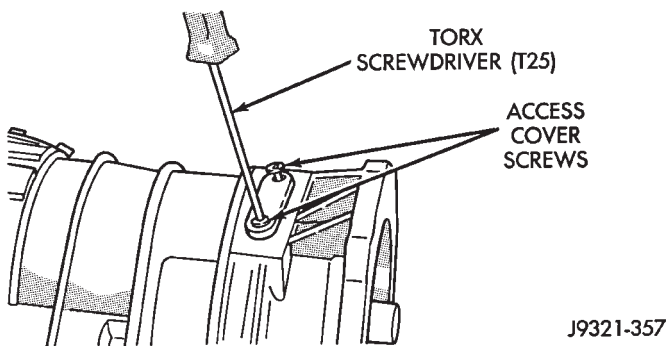


Fig. 233 Locating Ring Access Cover And Gasket Installation

OVERDRIVE CLUTCH ASSEMBLY

(1) Install overdrive clutch reaction ring first. Reaction ring is flat with notched ends (Fig. 234).

(2) Install wave spring on top of reaction ring (Fig. 235). **Reaction ring and wave ring both fit in same ring groove.** Use screwdriver to seat each ring securely in groove. Also ensure that the ends of the two rings are offset from each other.

NOTE: The 42RE transmission has 3 overdrive clutch discs and 2 plates.

(3) Assemble overdrive clutch pack (Fig. 236).

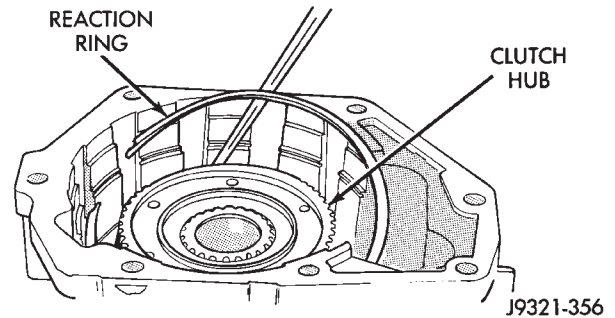


Fig. 234 Overdrive Clutch Reaction Ring Installation

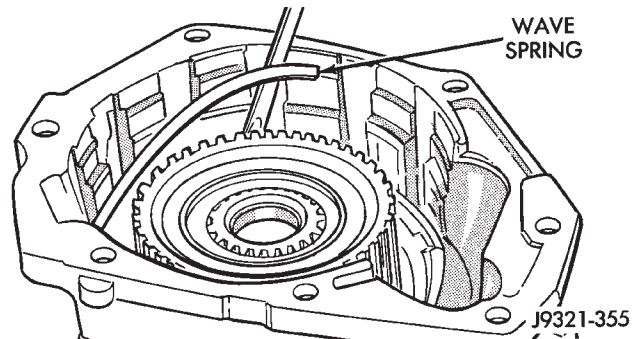


Fig. 235 Overdrive Clutch Wave Spring Installation

- (4) Install overdrive clutch reaction plate first.
- (5) Install first clutch disc followed by first clutch plate. Then install remaining clutch discs and plates in same order.
- (6) Install clutch pack pressure plate.
- (7) Install clutch pack wire-type retaining ring (Fig. 237).

INTERMEDIATE SHAFT SPACER SELECTION

(1) Place overdrive unit in vertical position. Mount it on blocks, or in workbench with appropriate size mounting hole cut into it. Be sure unit is facing upward for access to direct clutch hub. Also be sure output shaft is not loaded and internal components are moved rearward for accurate measurement.

(2) Determine correct thickness intermediate shaft spacer as follows:

- (a) Insert Special Tool 6312 through sun gear, planetary gear and into pilot bushing in output shaft. Be sure tool bottoms against planetary shoulder.

DISASSEMBLY AND ASSEMBLY (Continued)

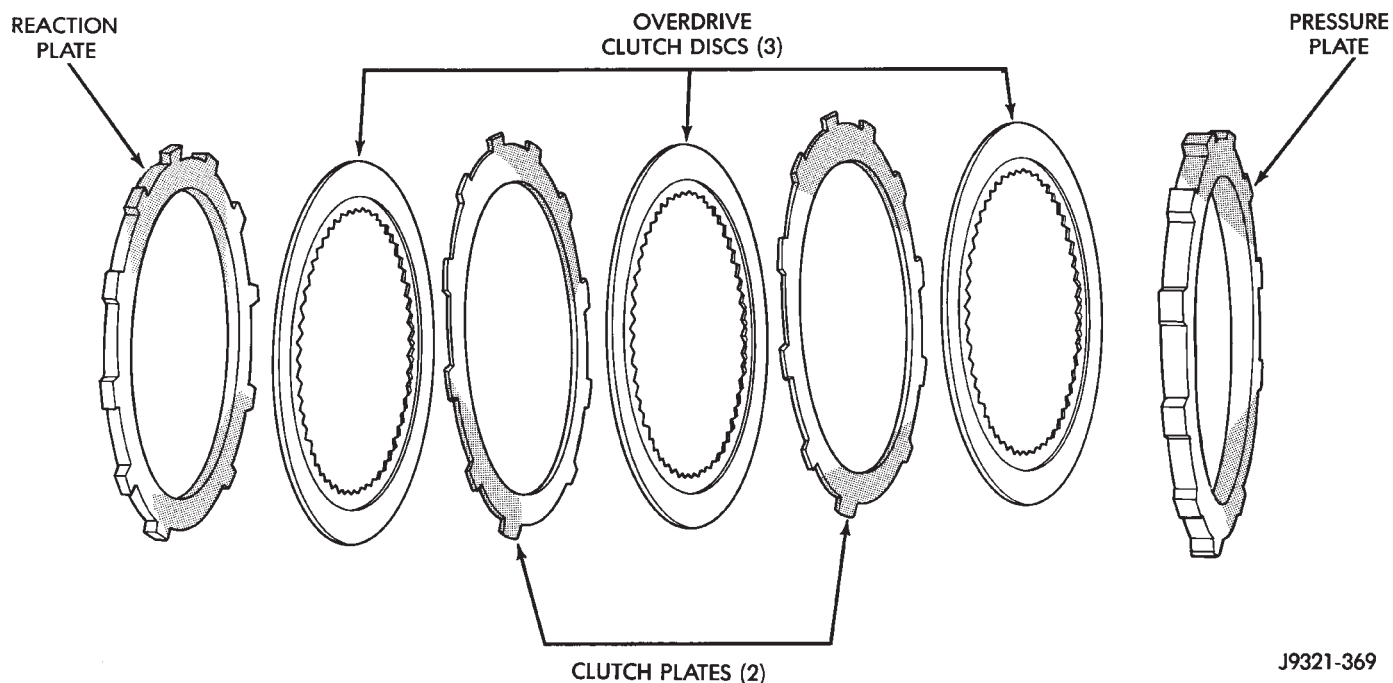


Fig. 236 42RE Overdrive Clutch Components

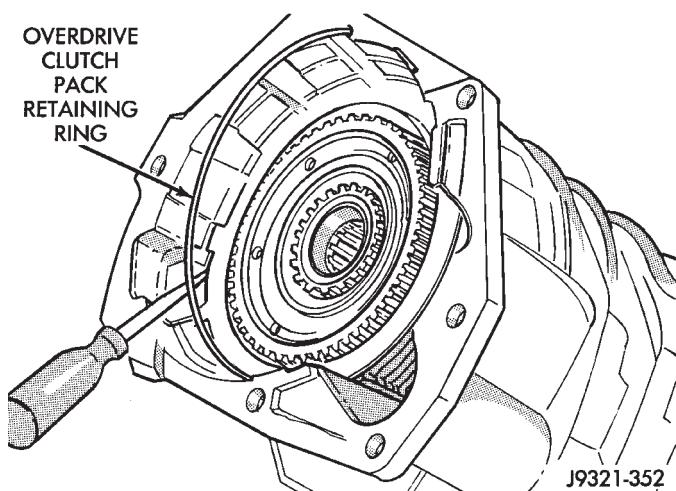


Fig. 237 Overdrive Clutch Pack Retaining Ring Installation

(b) Position Gauge Tool 6311 across face of overdrive case (Fig. 238). Then position Dial Caliper C-4962 over gauge tool.

(c) Extend sliding scale of dial caliper downward through gauge tool slot until scale contacts end of Gauge Alignment Tool 6312. Lock scale in place. Remove dial caliper tool and note distance measured (Fig. 238).

(d) Select proper thickness end play spacer from spacer chart based on distance measured (Fig. 239).

(e) Remove Gauge Alignment Tool 6312.

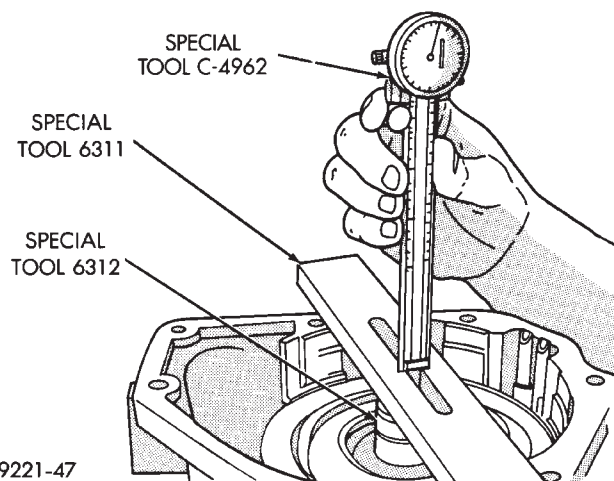


Fig. 238 Shaft End Play Measurement

End Play Measurement (Inches)	Spacer Thickness (Inches)
.7336 - .7505	.158 - .159
.7506 - .7675	.175 - .176
.7676 - .7855	.193 - .194
.7856 - .8011	.211 - .212

J9121-341

Fig. 239 Intermediate Shaft End Play Spacer Selection

DISASSEMBLY AND ASSEMBLY (Continued)

OD THRUST PLATE SELECTION

(1) Place overdrive unit in vertical position. Mount it on blocks, or in workbench with appropriate size mounting hole cut into it. Be sure unit is facing upward for access to direct clutch hub. Also be sure output shaft is not loaded and internal components are moved rearward for accurate measurement.

(2) Determine correct thickness overdrive piston thrust plate as follows:

(a) Position Gauge Tool 6311 across face of overdrive case. Then position Dial Caliper C-4962 over gauge tool (Fig. 240).

(b) Measure distance to clutch hub thrust bearing seat at four points 90° apart. Then average measurements by adding them and dividing by 4.

(c) Select and install required thrust plate from information in thrust plate chart (Fig. 241).

(3) Leave Alignment Tool 6227-2 in place. Tool will keep planetary and clutch hub splines in alignment until overdrive unit is ready for installation on transmission.

(4) Transmission speed sensor can be installed at this time if desired. However, it is recommended that sensor not be installed until after overdrive unit is secured to transmission.

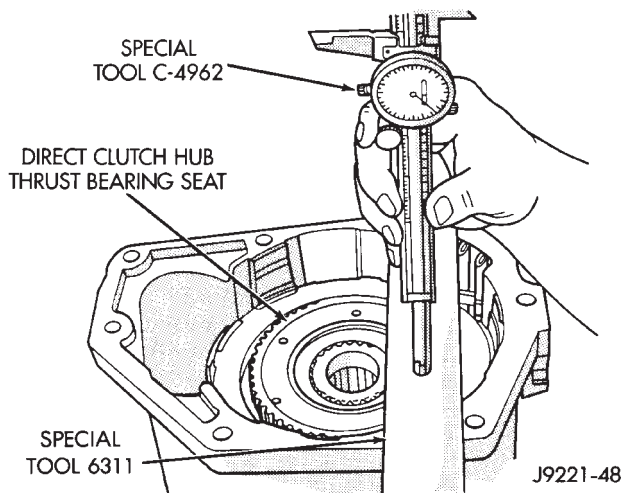


Fig. 240 Overdrive Piston Thrust Plate Measurement
OVERDRIVE PISTON ASSEMBLY

(1) Install new seals on over drive piston.
(2) Stand transmission case upright on bellhousing.

(3) Position Guide Ring 8114-1 on outer edge of overdrive piston retainer.

(4) Position Seal Guide 8114-2 on inner edge of overdrive piston retainer.

(5) Install overdrive piston in overdrive piston retainer by: aligning locating lugs on overdrive piston to the two mating holes in retainer.

(a) Aligning locating lugs on overdrive piston to the two mating holes in retainer.

End Play Measurement (Inches)	Spacer Thickness (Inches)
1.7500 - 1.7649	.108 - .110
1.7650 - 1.7799	.123 - .125
1.7800 - 1.7949	.138 - .140
1.7950 - 1.8099	.153 - .155
1.8100 - 1.8249	.168 - .170
1.8250 - 1.8399	.183 - .185
1.8400 - 1.8549	.198 - .200
1.8550 - 1.8699	.213 - .215
1.8700 - 1.8849	.228 - .230
1.8850 - 1.8999	.243 - .245

J9121-342

Fig. 241 Overdrive Piston Thrust Plate Selection

(b) Lubricate overdrive piston seals with Mopar® Door Ease, or equivalent.

(c) Install piston over Seal Guide 8114-2 and inside Guide Ring 8114-1.

(d) Push overdrive piston into position in retainer.

(e) Verify that the locating lugs entered the lug bores in the retainer.

(6) Install intermediate shaft spacer on intermediate shaft.

(7) Install overdrive piston thrust plate on overdrive piston.

(8) Install overdrive piston thrust bearing on overdrive piston.

(9) Install transmission speed sensor and O-ring seal in overdrive case (Fig. 182).

CLEANING AND INSPECTION

VALVE BODY

Clean the valve housings, valves, plugs, springs, and separator plates with a standard parts cleaning solution only. Do not use gasoline, kerosene, or any type of caustic solution.

Do not immerse any of the electrical components in cleaning solution. Clean the governor solenoid and sensor and the dual solenoid and harness assembly by wiping them off with dry shop towels only.

Dry all except the electrical parts with compressed air. Make sure all passages are clean and free from obstructions. **Do not use rags or shop towels to dry or wipe off valve body components. Lint from these materials can stick to valve body parts, interfere with valve operation, and clog filters and fluid passages.**

Wipe the governor pressure sensor and solenoid valve with dry, lint free shop towels only. The O-rings on the sensor and solenoid valve are the only service-

CLEANING AND INSPECTION (Continued)

able components. Be sure the vent ports in the solenoid valve are open and not blocked by dirt or debris. Replace the valve and/or sensor only when DRB scan tool diagnosis indicates this is necessary. Or, if either part has sustained physical damage (dented, deformed, broken, etc.).

CAUTION: Do not turn the small screw at the end of the solenoid valve for any reason. Turning the screw in either direction will ruin solenoid calibration and result in solenoid failure. In addition, the filter on the solenoid valve is **NOT** serviceable. Do not try to remove the filter as this will damage the valve housing.

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 a sheet of crocus cloth. Position the crocus cloth on a surface plate, sheet of plate glass or equally flat surface. If distortion is severe or any surfaces are heavily scored, the valve body will have to be replaced.

CAUTION: Many of the valves and plugs, such as the throttle valve, shuttle valve plug, 1-2 shift valve and 1-2 governor plug, are made of coated aluminum. Aluminum components are identified by the dark color of the special coating applied to the surface (or by testing with a magnet). Do not sand aluminum valves or plugs under any circumstances. This practice could damage the special coating causing the valves/plugs to stick and bind.

Inspect the valves and plugs for scratches, burrs, nicks, or scores. Minor surface scratches on steel valves and plugs can be removed with crocus cloth but **do not round off the edges of the valve or plug lands**. Maintaining sharpness of these edges is vitally important. The edges prevent foreign matter from lodging between the valves and plugs and the 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.

Check the two separator plates for distortion or damage of any kind. Inspect the upper housing, lower housing, 3-4 accumulator housing, and transfer plate carefully. Be sure all fluid passages are clean and clear. Check condition of the upper housing and transfer plate check balls as well. The check balls and ball seats must not be worn or damaged.

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.

The only serviceable valve body components are listed below. The remaining valve body components are serviced only as part of a complete valve body assembly. Serviceable parts are:

- dual solenoid and harness assembly
- solenoid gasket
- solenoid case connector O-rings and shoulder bolt
- switch valve and spring
- pressure adjusting screw and bracket assembly
- throttle lever
- manual lever and shaft seal
- throttle lever shaft seal, washer, and E-clip
- fluid filter and screws
- detent ball and spring
- valve body screws
- governor pressure solenoid
- governor pressure sensor and retaining clip
- park lock rod and E-clip

TRANSMISSION

GENERAL INFORMATION

Inspect 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. However, do not replace bushings as a matter of course. Replace bushings only when they are actually worn, or scored.

Use recommended tools to replace bushings. The tools are sized and designed to remove, install, and seat bushings correctly. The bushing replacement tools are included in Bushing Tool Set C-3887-B.

Pre-sized service bushings are available for replacement purposes. Only the sun gear bushings are not serviced. Low cost of the sun gear assembly makes it easier to simply replace the gear and bushings as an assembly.

Heli-Coil inserts can be used to repair damaged, stripped or worn threads in aluminum parts. These

CLEANING AND INSPECTION (Continued)

inserts are available from most automotive parts suppliers. Stainless steel inserts are recommended.

The use of crocus cloth is permissible where necessary, providing it is used carefully. When used on shafts, or 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, Type 7176, transmission fluid during overhaul and assembly. Use petroleum jelly, Mopar® Door Ease, or Ru-Glyde to prelubricate seals, O-rings, and thrust washers. Petroleum jelly can also be used to hold parts in place during reassembly.

TRANSMISSION CASE CLEANING AND INSPECTION

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 stick to case surfaces and transmission components and 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 bores, or damaged threads. Damaged threads can be repaired with Helicoil thread inserts. However, the case will have to be replaced if it exhibits any type of damage or wear.

Lubricate the front band adjusting screw threads with petroleum jelly and thread the screw part-way into the case. Be sure the screw turns freely.

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.

ACCUMULATOR

Inspect the accumulator piston and seal rings (Fig. 242). Replace the seal rings if worn or cut. Replace the piston if chipped or cracked.

Check condition of the accumulator inner and outer springs (Fig. 242). Replace the springs if the coils are cracked, distorted or collapsed.

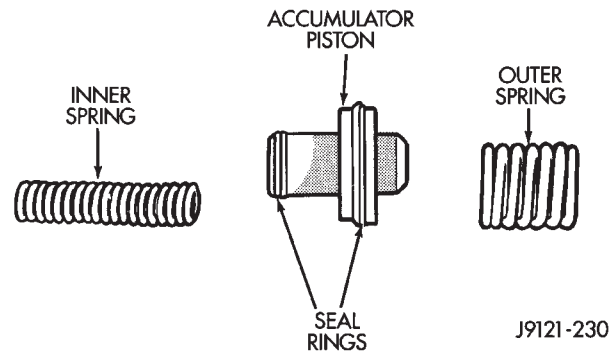


Fig. 242 Accumulator Components

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. 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.

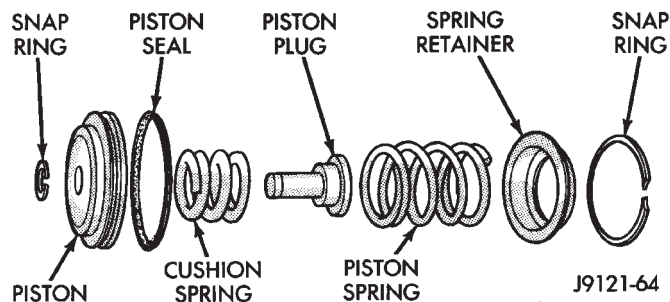
Check the servo piston bore for wear. If the bore is severely scored, or damaged, it will be necessary to replace the case.

Replace any servo component if doubt exists about condition. Do not reuse suspect parts.

REAR SERVO

Remove and discard the servo piston seal ring (Fig. 243). 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.

CLEANING AND INSPECTION (Continued)

**Fig. 243 Rear Servo Components****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.

(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.

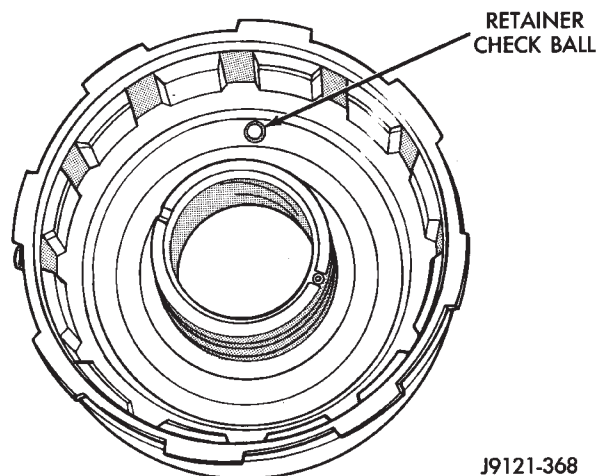
Replace the clutch spring and spring retainer if either is distorted, warped or broken.

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. 244). The ball must move freely and not stick.

NOTE: Inspect the clutch retainer bushings carefully (Fig. 245). The retainer bushings are **NOT** serviceable. It will be necessary to replace the retainer if either bushing is scored, or worn.

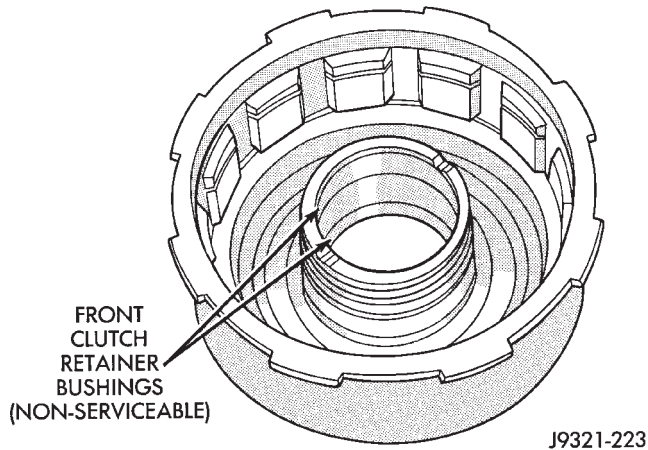
Inspect the piston and retainer seal surfaces for nicks or scratches. Minor scratches can be removed with crocus cloth. However, replace the piston and/or retainer if the seal surfaces are seriously scored.

**Fig. 244 Front Clutch Piston Retainer Check Ball Location****REAR CLUTCH**

Clean the clutch components with solvent and dry them with compressed air. Do not use rags or shop towels to dry any of the clutch parts. Lint from such materials will adhere to component surfaces and could restrict or block fluid passages after assembly.

Replace the clutch discs if warped, worn, scored, burned/charred, the lugs are damaged, or if the facing is flaking off. Replace the top and bottom pressure plates if scored, warped, or cracked. Be sure the driving lugs on the pressure and clutch plates are also in good condition. The lugs must not be bent, cracked or damaged in any way.

CLEANING AND INSPECTION (Continued)

**Fig. 245 Retainer Bushing Location/Inspection**

Replace the piston spring and wave spring if either part is distorted, warped or broken.

Check the lug grooves in the clutch retainer. The clutch and pressure plates should slide freely in the slots. Replace the retainer if the grooves are worn or damaged. Also check action of the check balls in the retainer and piston. Each check ball must move freely and not stick.

Replace the retainer bushing if worn, scored, or doubt exists about bushing condition.

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.

Check condition of the fiber thrust washer and metal output shaft thrust washer. Replace either washer if worn or damaged.

Check condition of the seal rings on the input shaft and clutch retainer hub. Replace the seal rings only if worn, distorted, or damaged. The input shaft front seal ring is teflon with chamfered ends. The rear ring is metal with interlocking ends.

Check the input shaft for wear, or damage. Replace the shaft if worn, scored or damaged in any way.

PLANETARY GEARTRAIN

Clean the planetary components in solvent and dry them with compressed air.

Check sun gear and driving shell condition. Replace the gear if damaged or if the bushings are scored or worn. The bushings are not serviceable. Replace the driving shell if worn, cracked or damaged.

Replace planetary gear sets if gears, pinion pins, or carrier are damaged in any way. Replace the annulus gears and supports if either component is worn or damaged.

Inspect the geartrain spacers, thrust plates, snap rings, and thrust washers. Replace any of these parts

that are worn, distorted or damaged. Do not attempt to reuse these parts.

The planetary gear thrust washers are different sizes. The large diameter washers go on the front planetary and the smaller washers go on the rear planetary. All the washers have four locating tabs on them. These tabs fit in the holes or slots provided in each planetary gear.

Inspect the output shaft carefully. Pay particular attention to the machined bushing/bearing surfaces on the shaft and the governor valve shaft bore at the shaft rear.

Replace the output shaft if the machined surfaces are scored, pitted, or damaged in any way. Also replace the shaft if the splines are damaged, or exhibits cracks at any location (especially at the governor valve shaft bore).

The annulus gears can be removed from their supports if necessary. Just remove the snap rings and separate the two parts when replacement is necessary. In addition, the annulus gear bushings can be replaced if severely worn, or scored. However it is not necessary to replace the bushings if they only exhibit normal wear. Check bushing fit on the output shaft to be sure.

OVERDRIVE UNIT

Clean the geartrain and case components with solvent. Dry all parts except the bearings with compressed air. Allow bearings to air dry.

Do not use shop towels for wiping parts dry unless the towels are made from a lint-free material. A sufficient quantity of lint (from shop towels, cloths, rags, etc.) could plug the transmission filter and fluid passages.

Discard the old case gasket and seals. Do not attempt to salvage these parts. They are not reusable. Replace any of the overdrive unit snap rings if distorted or damaged.

Minor nicks or scratches on components can be smoothed with crocus cloth. However, do not attempt to reduce severe scoring on any components with abrasive materials. Replace severely scored components; do not try to salvage them.

Check condition of the park lock components and the overdrive case.

Replace the case if cracked, scored, or damaged. Replace the park lock pawl, plug, or spring if worn or damaged. Be sure the bullet at the end of the park lock rod is in good condition. Replace the rod if the bullet is worn or the rod itself is bent or distorted. Do not attempt to straighten the rod.

Check the bushings in the overdrive case. Replace the bushings if severely scored or worn. Also replace the case seal if loose, distorted, or damaged.

CLEANING AND INSPECTION (Continued)

Examine the overdrive and direct clutch discs and plates. Replace the discs if the facing is worn, severely scored, or burned and flaking off. Replace the clutch plates if worn, heavily scored, or cracked. Check the lugs on the clutch plates for wear. The plates should slide freely in the drum. Replace the plates or drum if binding occurs.

Check condition of the annulus gear, direct clutch hub, clutch drum and clutch spring. Replace the gear, hub and drum if worn or damaged. Replace the spring if collapsed, distorted, or cracked.

Be sure the splines and lugs on the gear, drum and hub are in good condition. The clutch plates and discs should slide freely in these components.

Inspect the thrust bearings and spring plate. Replace the plate if worn or scored. Replace the bearings if rough, noisy, brinnelled, or worn.

Inspect the planetary gear assembly and the sun gear and bushings. If either the sun gear or the bushings are damaged, replace the gear and bushings as an assembly. The gear and bushings are not serviced separately.

The planetary carrier and pinions must be in good condition. Also be sure the pinion pins are secure and in good condition. Replace the carrier if worn or damaged.

Inspect the overrunning clutch and race. The race surface should be smooth and free of scores. Replace the overrunning clutch assembly or the race if either assembly is worn or damaged in any way.

Inspect the output shaft and governor components. Replace the shaft pilot bushing and inner bushing if damaged. Replace either shaft bearing if rough or noisy. Replace the bearing snap rings if distorted or cracked.

Check the machined surfaces on the output shaft. These surfaces should be clean and smooth. Very minor nicks or scratches can be smoothed with crocus cloth. Replace the shaft if worn, scored or damaged in any way.

Inspect the output shaft bushings. The small bushing is the intermediate shaft pilot bushing. The large bushing is the overrunning clutch hub bushing. Replace either bushing if scored, pitted, cracked, or worn.

ADJUSTMENTS

TRANSMISSION THROTTLE VALVE CABLE ADJUSTMENT

The transmission throttle valve is operated by a cam on the valve body throttle lever. The throttle lever is actuated by a cable connected to the engine throttle body lever (Fig. 246). 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 allows simultaneous movement without causing the transmission throttle lever to move ahead of, or lag behind the throttle body lever.

THROTTLE VALVE CABLE ADJUSTMENT CHECK

- (1) Turn ignition key to OFF position.
- (2) Remove air cleaner.
- (3) Verify that throttle body lever is at curb idle position. Then verify that transmission throttle lever (Fig. 246) is also at idle (full forward) position.
- (4) Slide cable off attachment stud on throttle body lever (Fig. 246).
- (5) Compare position of cable end to attachment stud on throttle body lever:
 - (a) Cable end and attachment stud should be aligned (or centered on one another) to within 1 mm (0.039 in.) in either direction.
 - (b) If cable end and attachment stud are misaligned (off center), cable will have to be adjusted as described in following 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.
 - (a) If both levers move simultaneously from idle to half-throttle and back to idle position, adjustment is correct.
 - (b) 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

- (1) Turn ignition switch to OFF position and shift into Park.
- (2) Remove air cleaner.
- (3) Disconnect cable end from attachment stud on throttle body. **Carefully slide cable off stud. Do not pull or pry cable off.**
- (4) Verify that transmission throttle lever is in idle (full forward) position. Then be sure lever on throttle body is at curb idle position.
- (5) Insert a small screwdriver under edge of retaining clip and remove retaining clip.
- (6) Center cable end on attachment stud to within 1 mm (0.039 in.).
- (7) Install retaining clip onto cable housing.
- (8) Check cable adjustment. Be sure transmission throttle lever and lever on throttle body move simul-

ADJUSTMENTS (Continued)

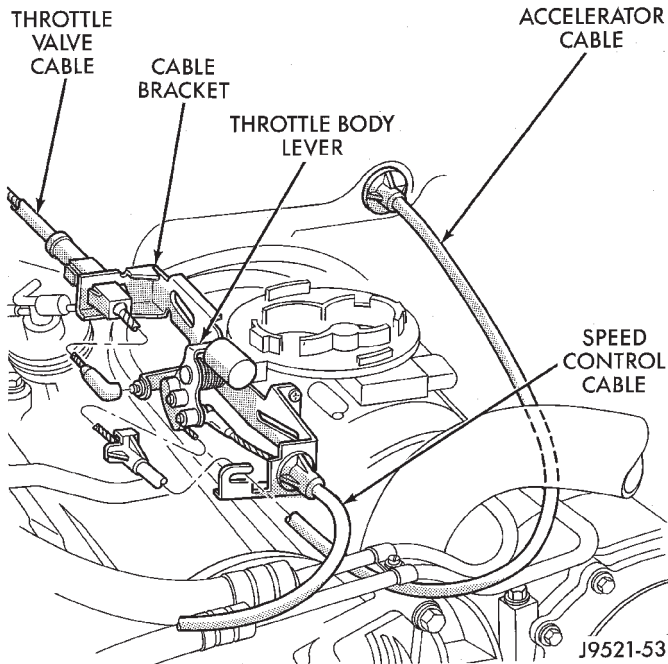


Fig. 246 Throttle Valve Cable Attachment —At Engine

taneously and as described in cable adjustment checking procedure.

GEARSHIFT LINKAGE ADJUSTMENT

Check linkage adjustment by starting engine in Park and Neutral. Adjustment is acceptable if the engine starts in only these two positions. Adjustment is incorrect if the engine starts in one position but not both positions.

If the engine starts in any other position, or if the engine will not start in any position, the park/neutral switch is probably faulty.

LINKAGE ADJUSTMENT

Check condition of the shift linkage (Fig. 247). Do not attempt adjustment if any component is loose, worn, or bent. Replace any suspect components.

Replace the grommet securing the shift rod or torque rod in place if either rod was removed from the grommet. Remove the old grommet as necessary and use suitable pliers to install the new grommet.

- (1) Shift transmission into Park.
- (2) Raise and support vehicle.
- (3) Loosen lock bolt in front shift rod adjusting swivel (Fig. 247).
- (4) Ensure that the shift rod slides freely in the swivel. Lube rod and swivel as necessary.
- (5) Move transmission shift lever fully rearward to the Park detent.
- (6) Center adjusting swivel on shift rod.
- (7) Tighten swivel lock bolt to 10 N·m (90 in. lbs.).
- (8) Lower vehicle and verify proper adjustment.

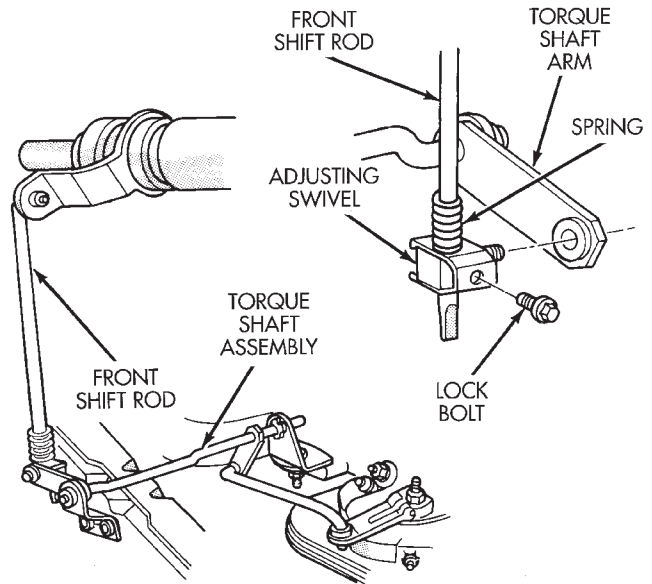


Fig. 247 Linkage Adjustment Components

BAND ADJUSTMENTS

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.

- (1) Raise vehicle.
- (2) Loosen band adjusting screw locknut (Fig. 248). Then back locknut off 3-5 turns. Be sure adjusting screw turns freely in case. Apply lubricant to screw threads if necessary.
- (3) 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 5/16 socket.

CAUTION: If Adapter C-3705 is needed to reach the adjusting screw (Fig. 249), tighten the screw to only 5 N·m (47-50 in. lbs.) torque.

- (4) Back off front band adjusting screw 3-5/8 turns.
- (5) Hold adjuster screw in position and tighten locknut to 41 N·m (30 ft. lbs.) torque.
- (6) Lower vehicle.

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 (Fig. 250). Be sure adjusting screw turns freely in lever.

ADJUSTMENTS (Continued)

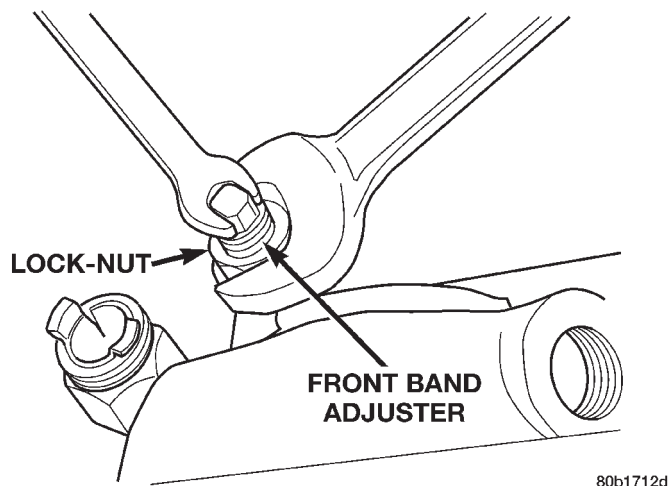


Fig. 248 Front Band Adjustment Screw Location

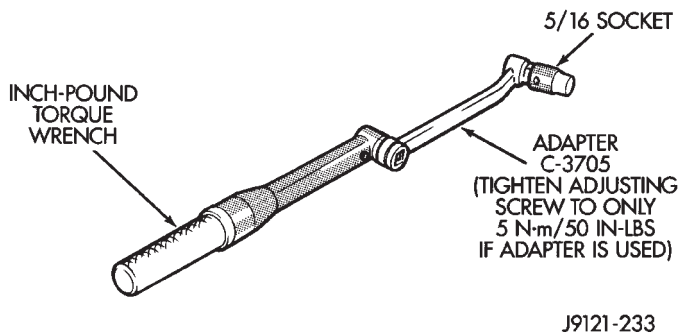


Fig. 249 Band Adjustment Adapter Tool

(4) Tighten adjusting screw to 8 N·m (72 in. lbs.) torque.

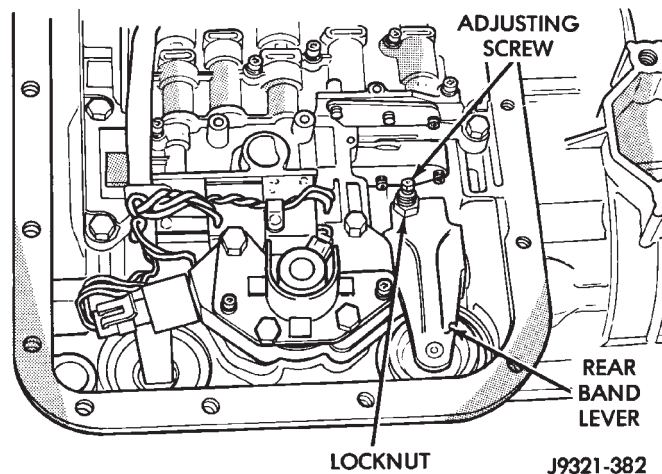


Fig. 250 Rear Band Adjusting Screw Location

(5) Back off adjusting screw 4 turns.

(6) Hold adjusting screw in place and tighten lock-nut 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. 251).

Distance should be 33.4 mm (1-5/16 in.).

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.

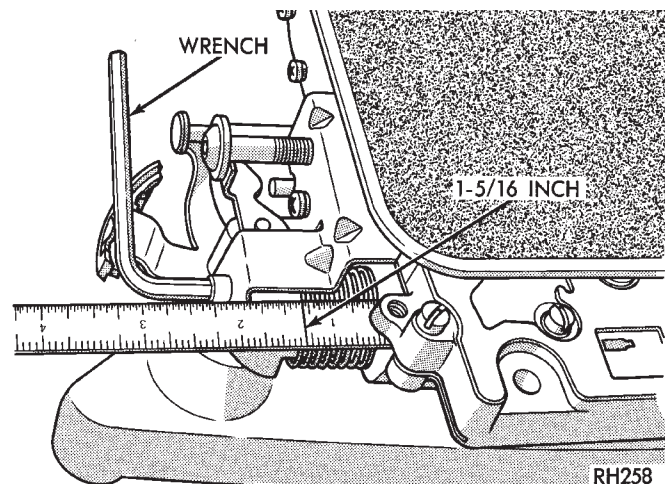


Fig. 251 Line Pressure Adjustment

THROTTLE PRESSURE ADJUSTMENT

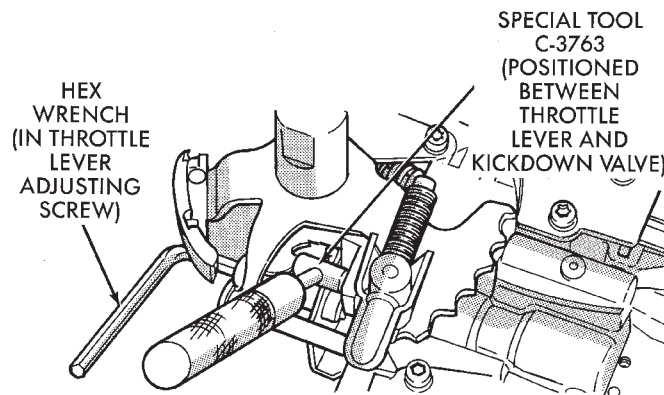
Insert Gauge Tool C-3763 between the throttle lever cam and the kickdown valve stem (Fig. 252).

ADJUSTMENTS (Continued)

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.

NOTE: The kickdown valve spring must be fully compressed and the kickdown valve completely bottomed to obtain correct adjustment.



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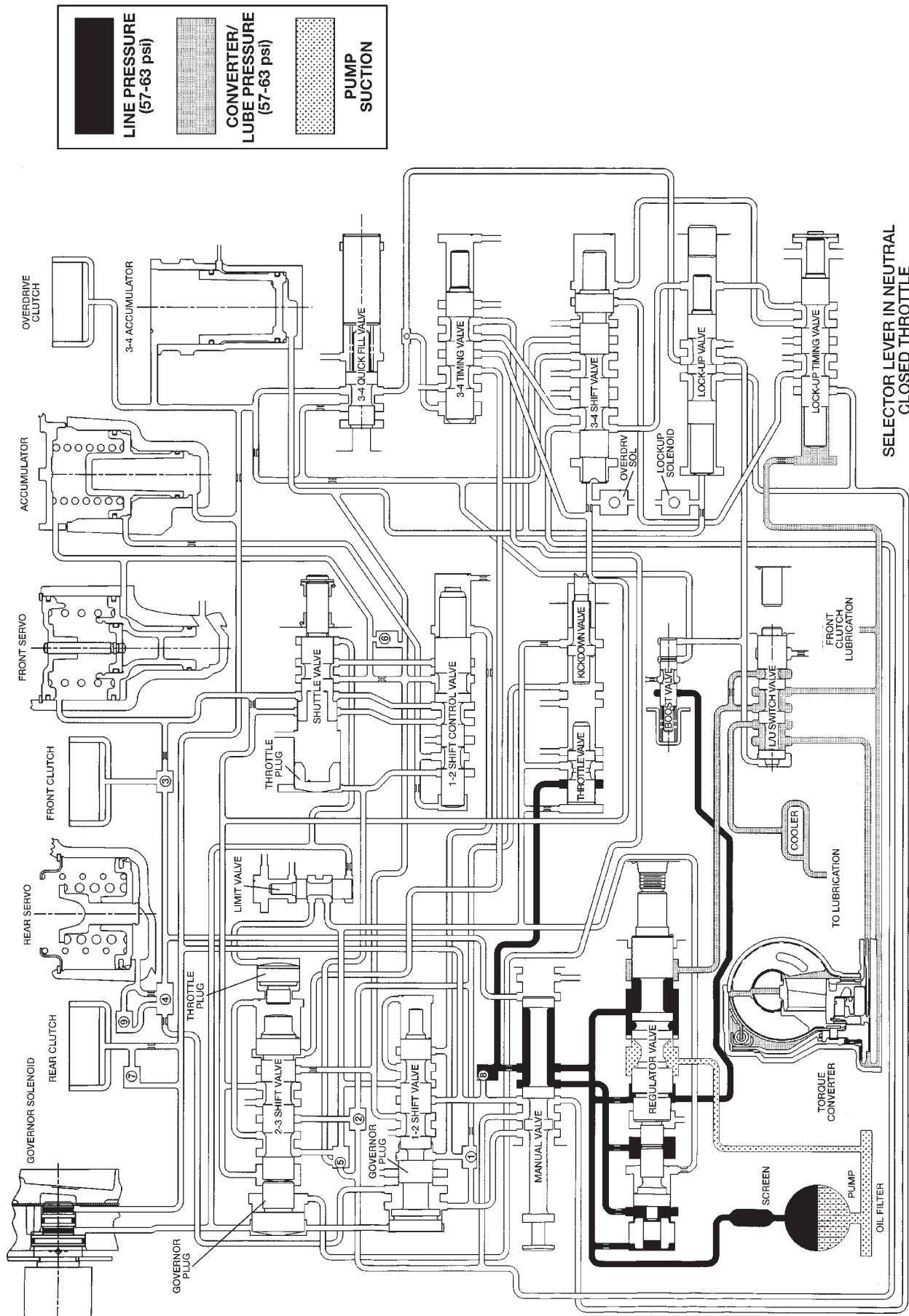
SCHEMATICS AND DIAGRAMS

HYDRAULIC SCHEMATICS

Fig. 252 Throttle Pressure Adjustment

SCHEMATICS AN DIAGRAMS (Continued)

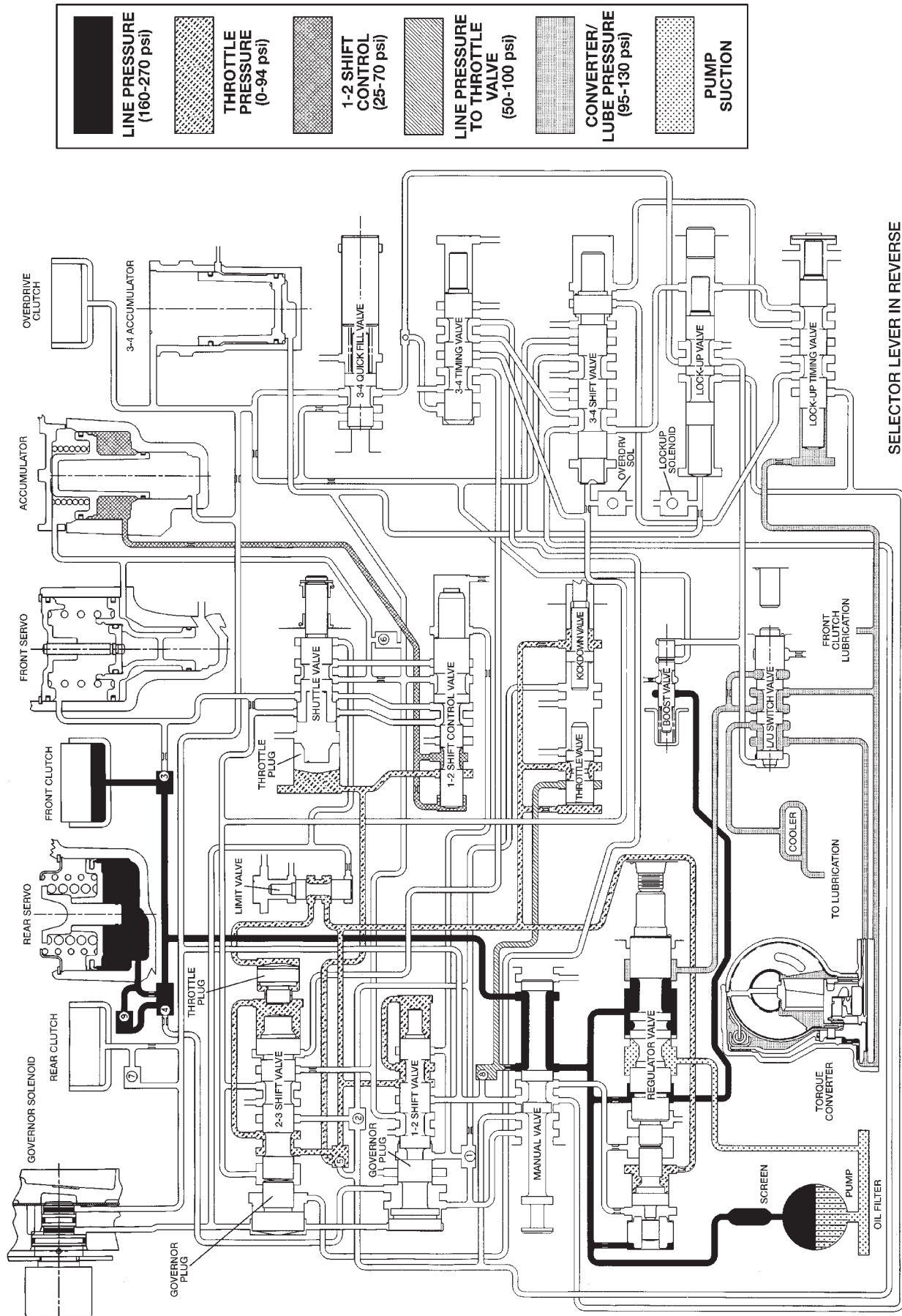
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HYDRAULIC FLOW IN NEUTRAL

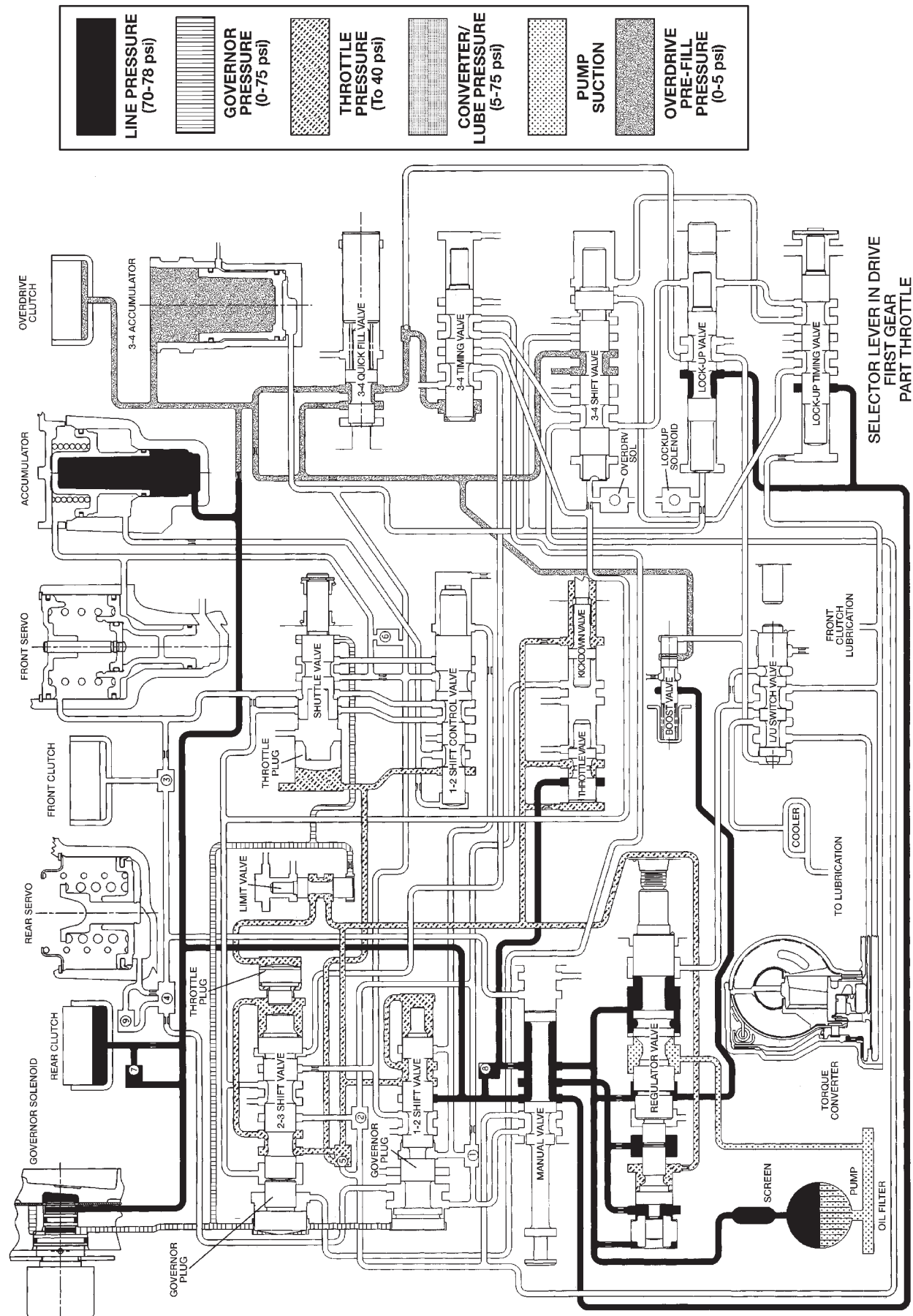
SCHEMATICS AND DIAGRAMS (Continued)

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HYDRAULIC FLOW IN REVERSE

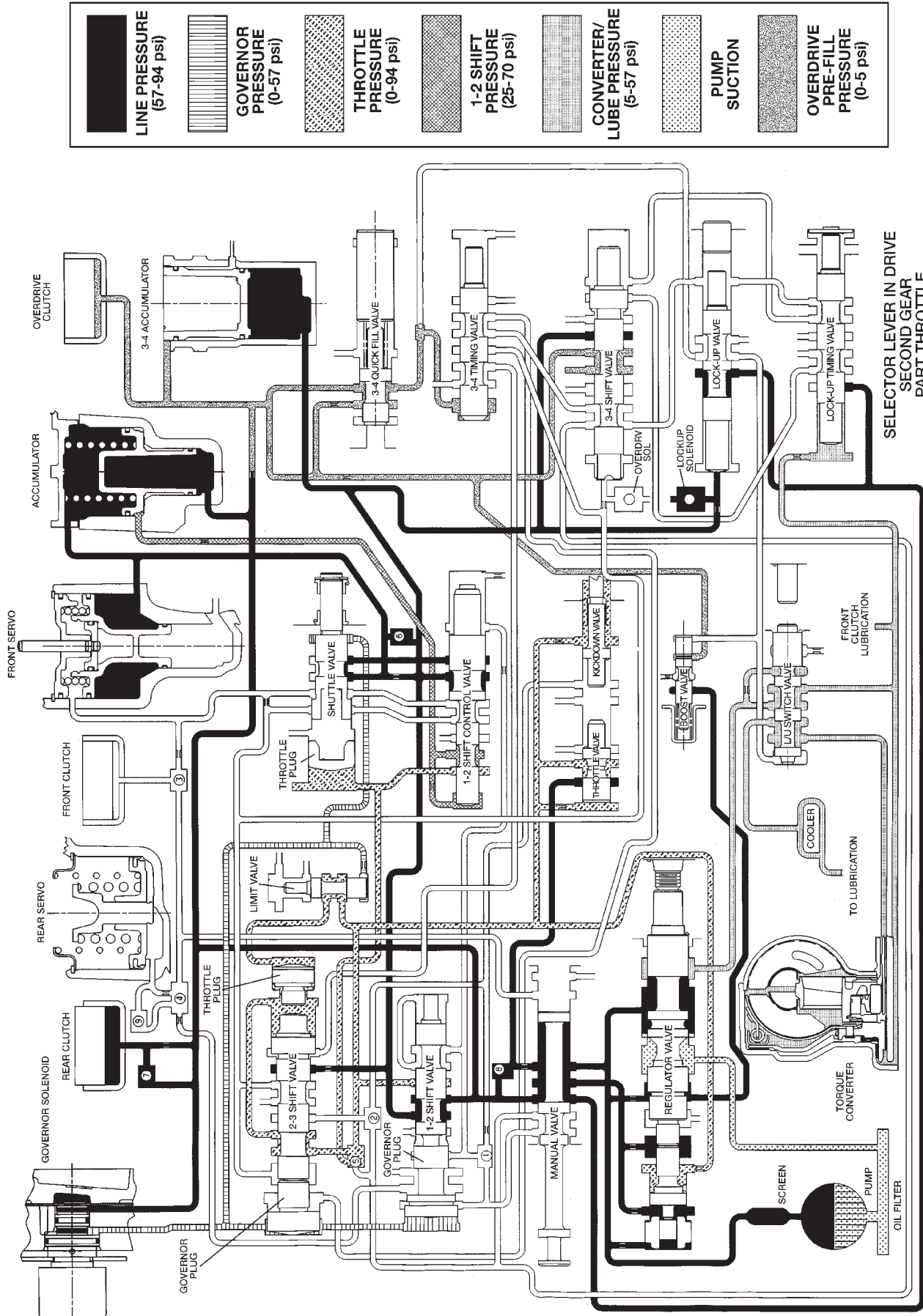
SCHEMATICS AN DIAGRAMS (Continued)



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HYDRAULIC FLOW IN DRIVE FIRST GEAR

SCHEMATICS AND DIAGRAMS (Continued)

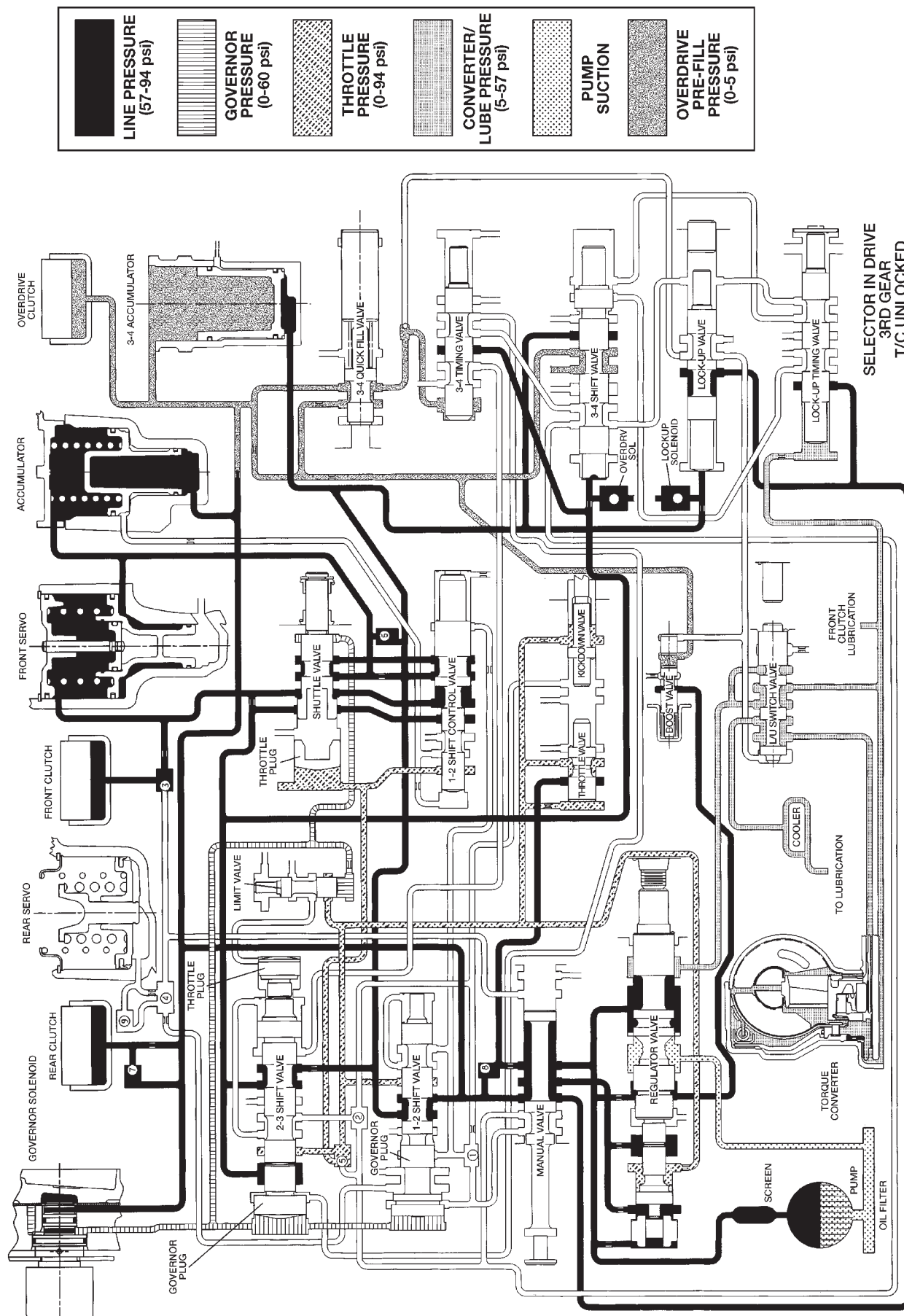


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HYDRAULIC FLOW IN DRIVE SECOND GEAR

SCHEMATICS AND DIAGRAMS (Continued)

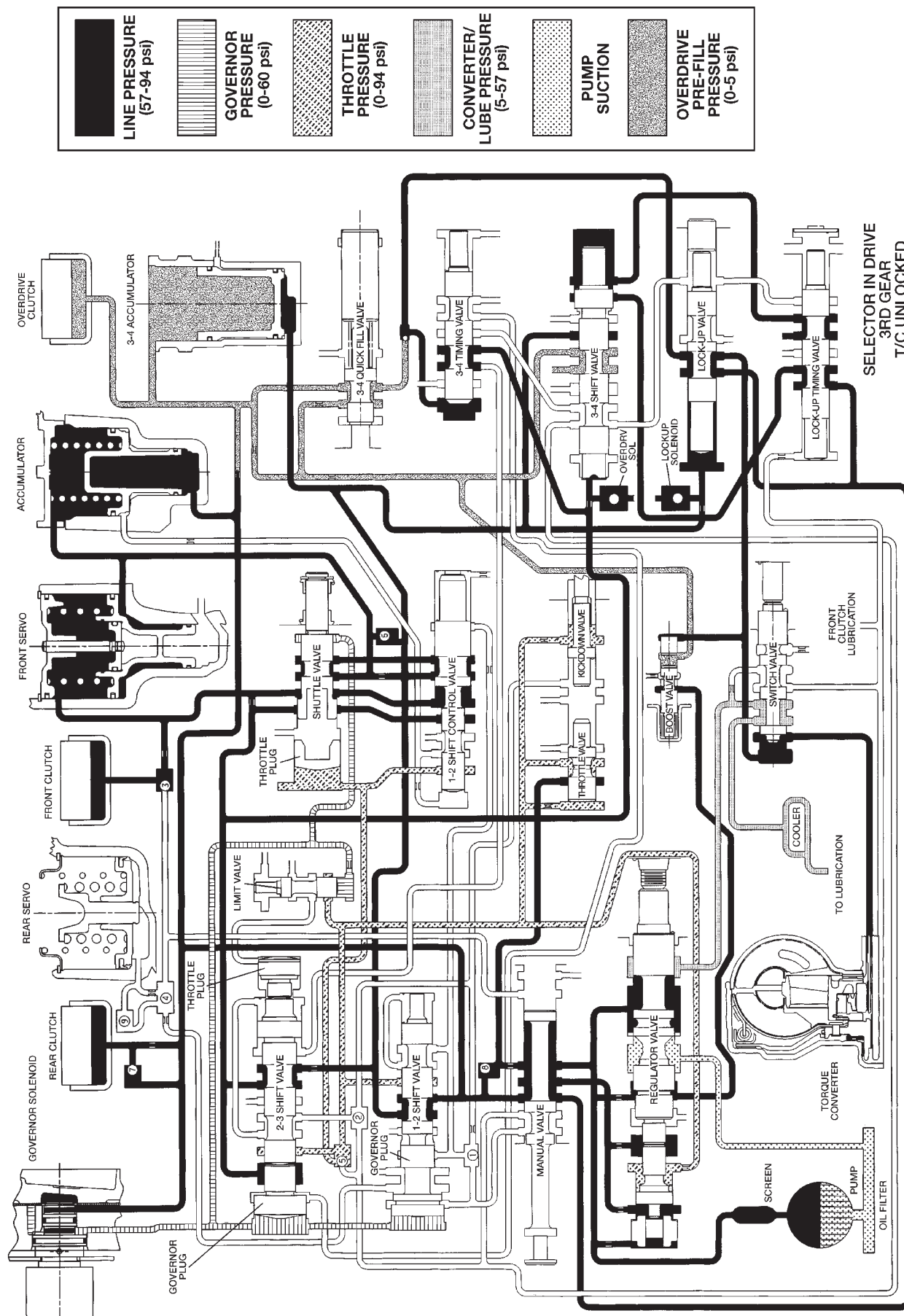
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HYDRAULIC FLOW IN DRIVE THIRD GEAR (CONVERTER CLUTCH NOT APPLIED)

SCHEMATICS AND DIAGRAMS (Continued)

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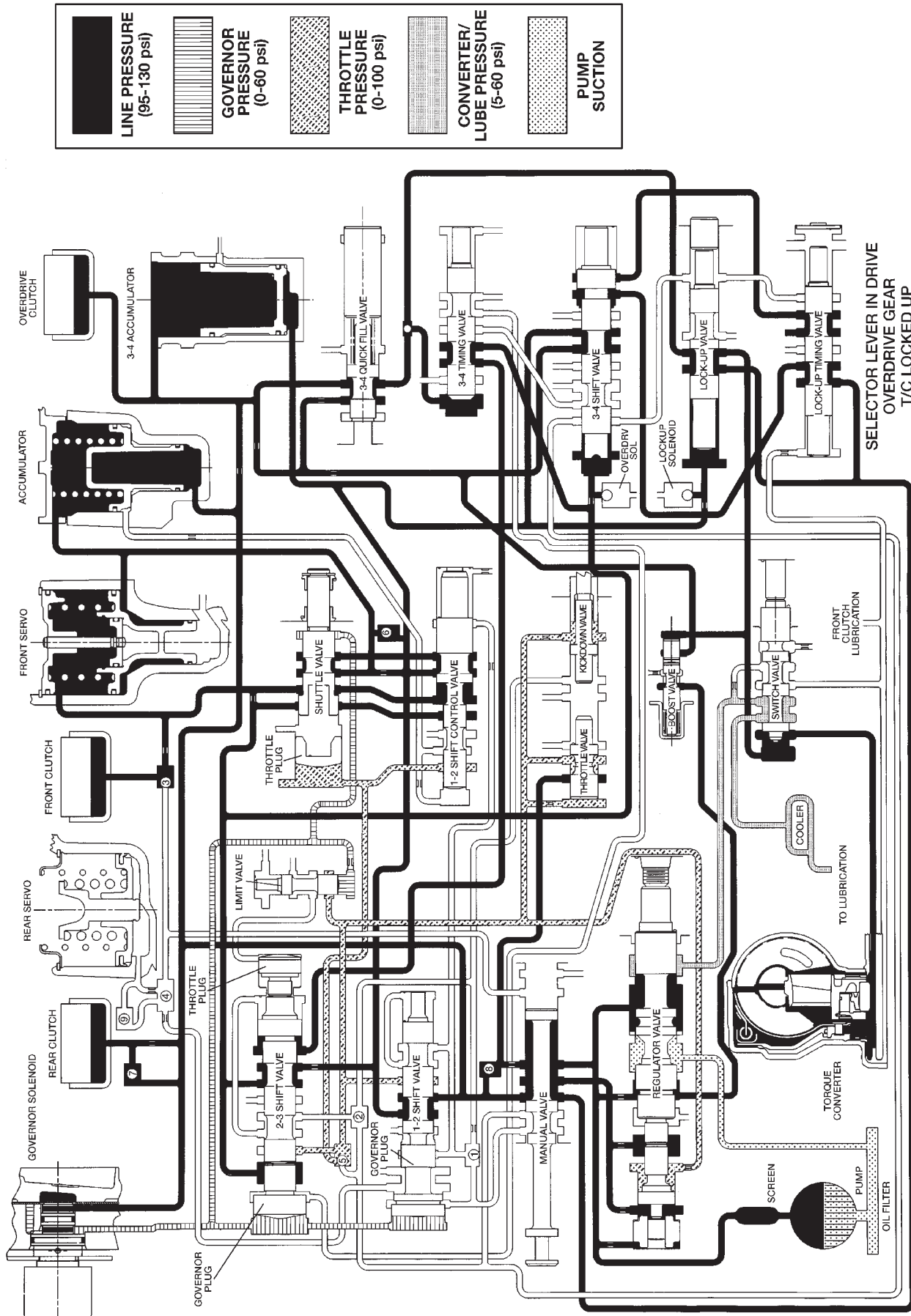
HYDRAULIC FLOW IN DRIVE THIRD GEAR (CONVERTER CLUTCH APPLIED)



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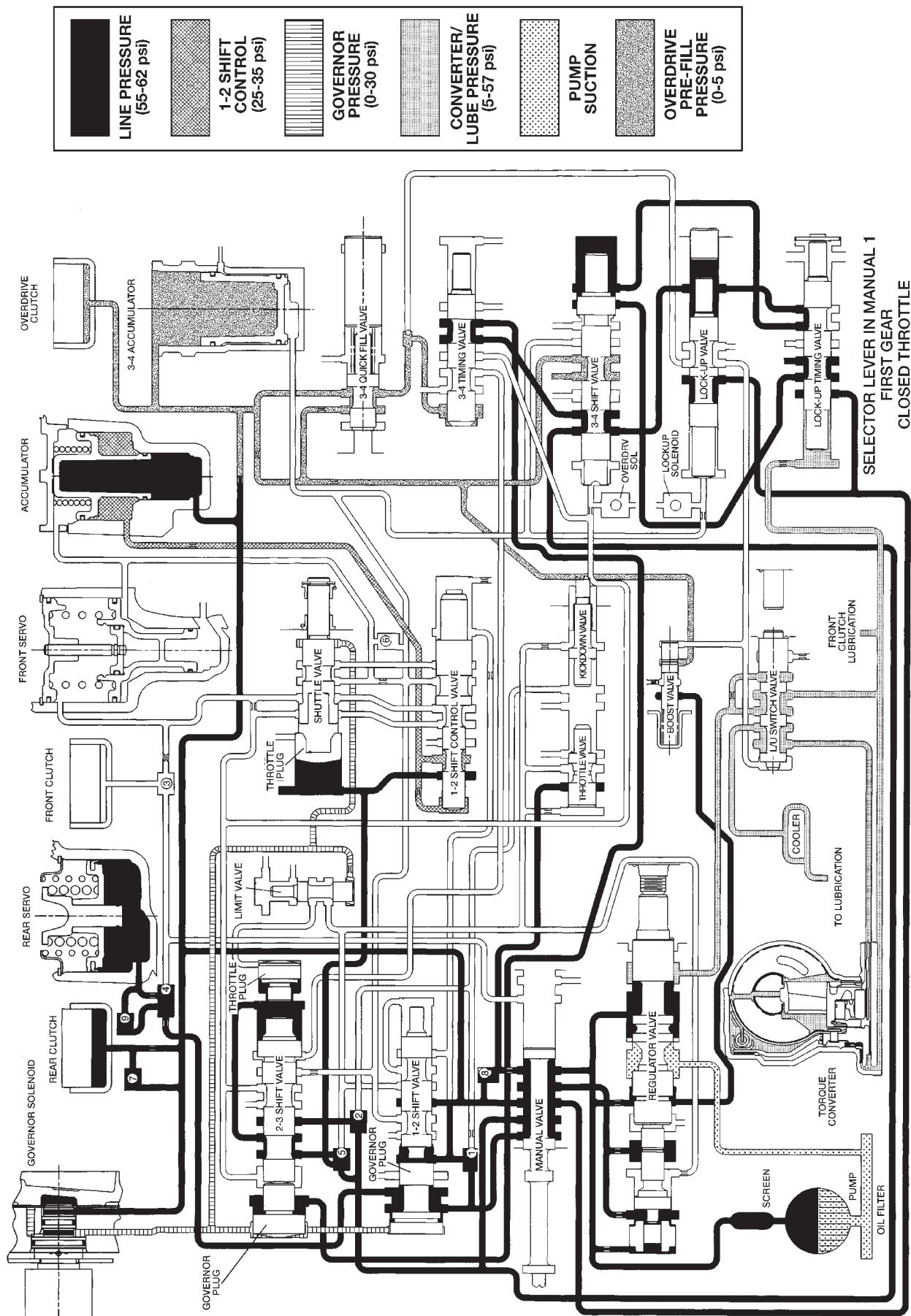
SCHEMATICS AND DIAGRAMS (Continued)

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HYDRAULIC FLOW IN DRIVE FOURTH GEAR (CONVERTER CLUTCH APPLIED)

SCHEMATICS AN DIAGRAMS (Continued)

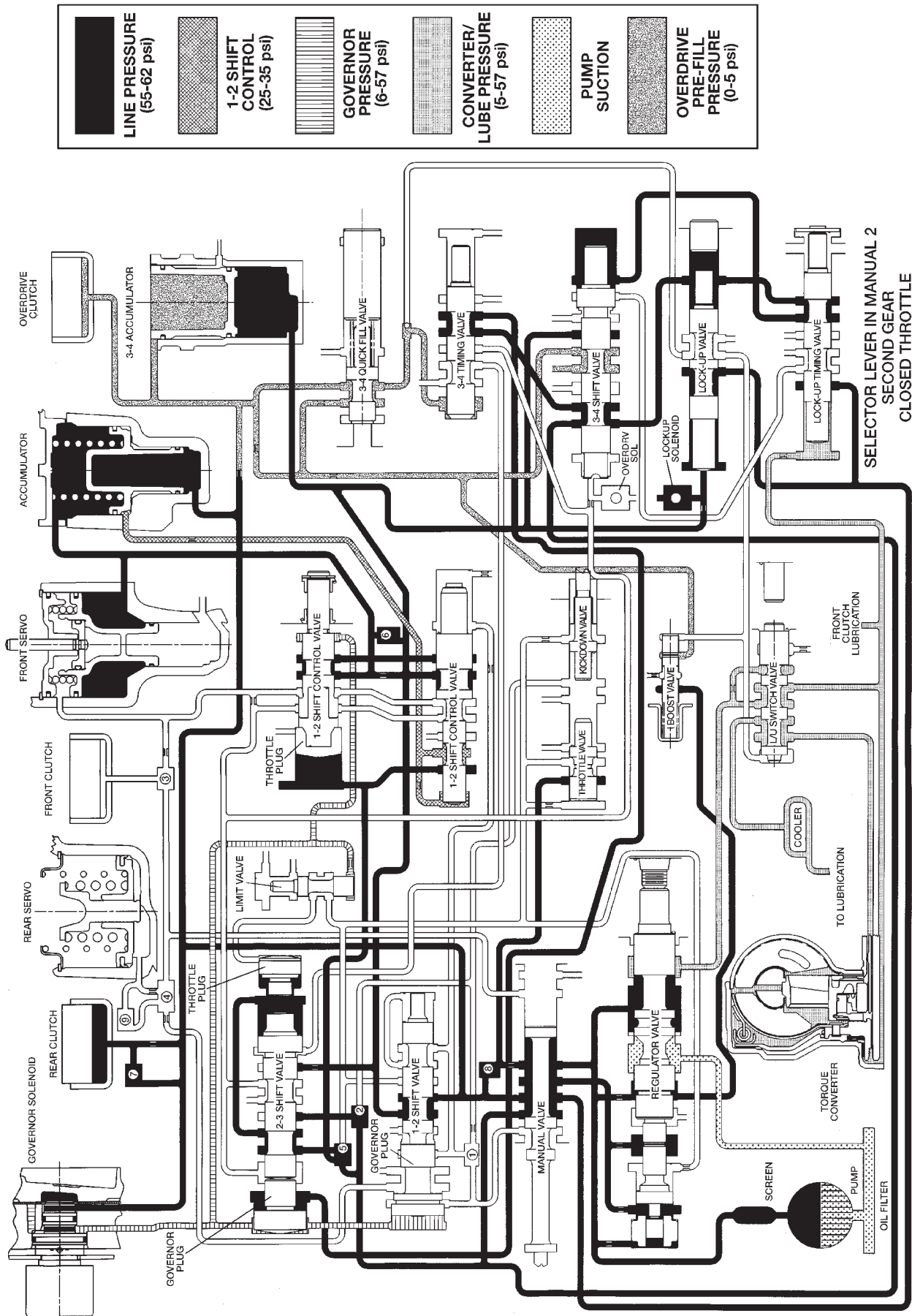


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HYDRAULIC FLOW IN MANUAL LOW (1)

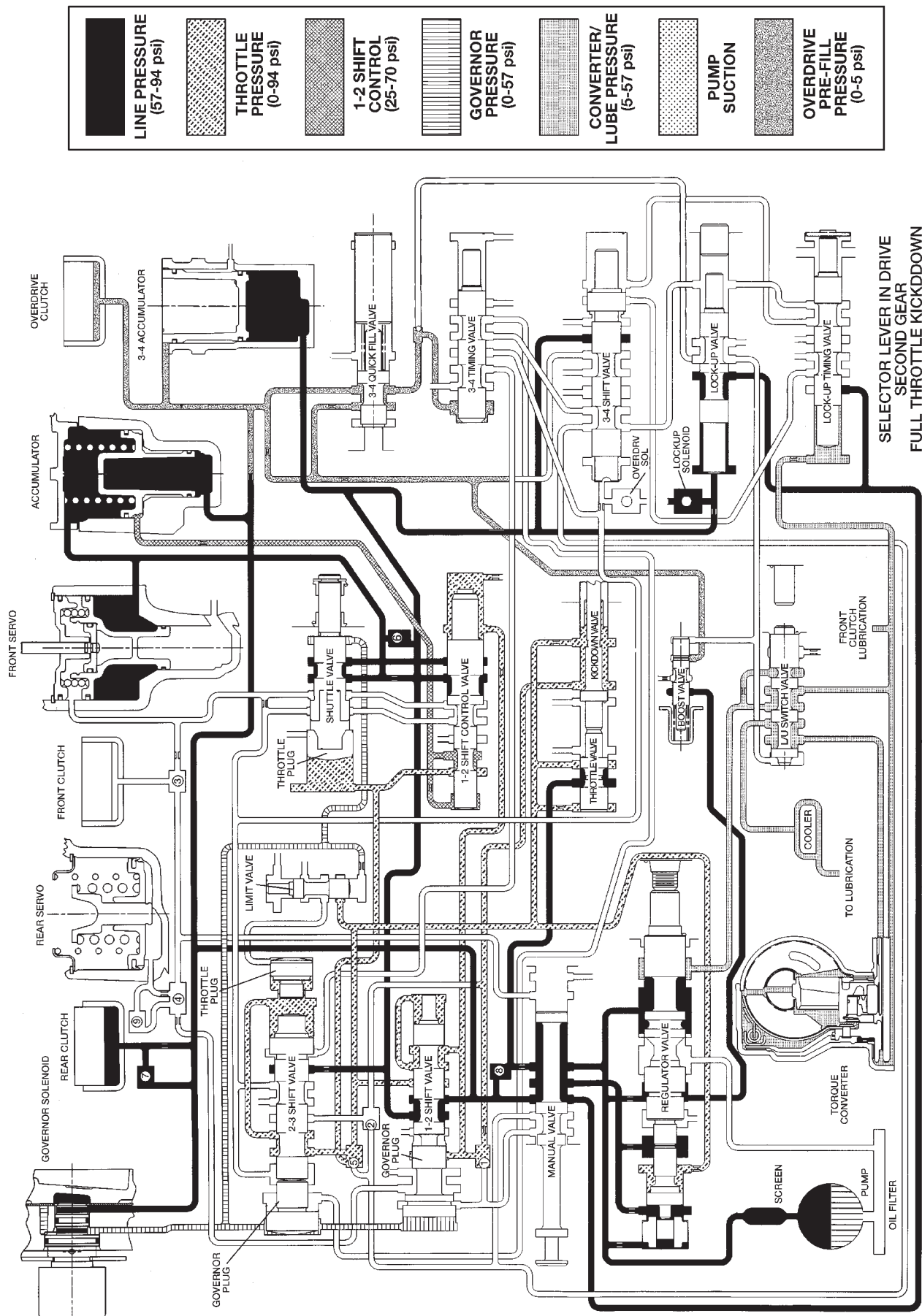
SCHEMATICS AND DIAGRAMS (Continued)

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HYDRAULIC FLOW IN MANUAL SECOND (2)

SCHEMATICS AND DIAGRAMS (Continued)



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HYDRAULIC FLOW DURING FULL THROTTLE 3-2 DOWNSHIFT (PASSING GEAR)

SPECIFICATIONS

TRANSMISSION

GENERAL

Component	Metric	Inch
Planetary end play	0.127-1.22 mm	0.005-0.048 in.
Input shaft end play	0.56-2.31 mm	0.022-0.091 in.
Clutch pack clearance/Front.	1.70-3.40mm	0.067-0.134 in.
Clutch pack clearance/Rear.	0.81-1.40 mm	0.022-0.037 in.
Front clutch	4 discs	
Rear clutch	4 discs	
Overdrive clutch	3 discs	
Direct clutch	6 discs	
42RE Band adjustment from 72 in. lbs.		
Front band	Back off 3-5/8 turns	
Rear band	Back off 4 turns	
Recommended fluid	Mopar® ATF Plus 3,type 7176	

GEAR RATIOS

- 1ST GEAR-2.74
- 2ND GEAR-1.54
- 3RD GEAR-1.00
- 4TH GEAR-0.69
- REV.GEAR-2.21

TORQUE

DESCRIPTION

TORQUE

Fitting, cooler line at trans.	18 N·m (13 ft. lbs.)
Bolt, torque convertor	31 N·m (23 ft. lbs.)
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.)
Screws, fluid filter	4 N·m (35 in. lbs.)
Bolt, oil pump	20 N·m (15 ft. lbs.)
Bolt, overrunning clutch cam . . .	17 N·m (13 ft. lbs.)
Bolt, O/D to trans.	34 N·m (25 ft. lbs.)
Bolt, O/D piston retainer	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.)
Bolt, valve body to case	12 N·m (100 in. lbs.)
Sensor, trans speed.	27 N·m (20 ft. lbs.)
Screw, solenoid wiring connector .	4 N·m (35 in. lbs.)
Screw, solenoid to transfer plate .	4 N·m (35 in. lbs.)

SPECIFICATIONS (Continued)

THRUST WASHER/SPACER/SNAP RING DIMENSIONS

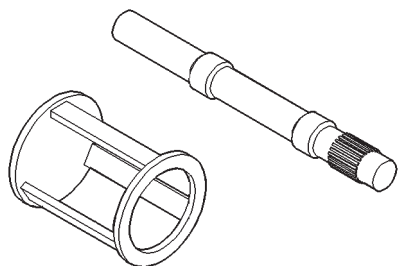
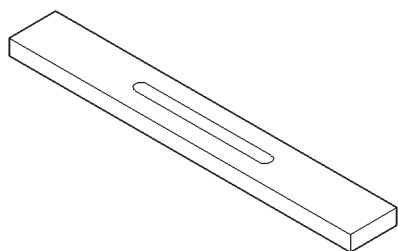
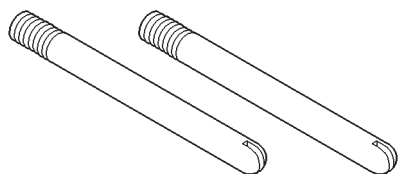
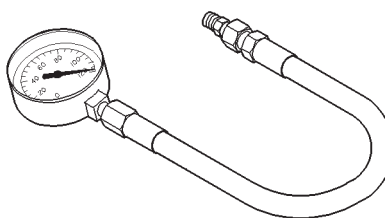
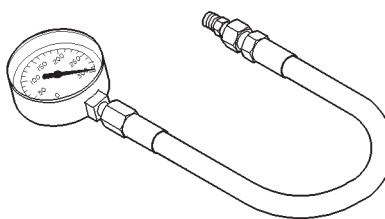
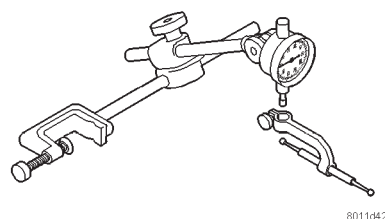
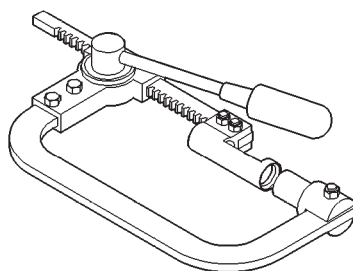
Component	Metric	Inch
Front clutch thrust washer (reaction shaft support hub)	1.55 mm	0.061 in.
Rear clutch thrust washer (clutch retainer)	1.55 mm	0.061 in.
Intermediate shaft thrust plate (shaft hub pilot)	1.5-1.6 mm	0.060-0.063 in.
Output shaft thrust washer (rear clutch hub)	Select fit to set end play	
Rear clutch pack snap ring	1.5 mm	0.060 in.
	1.95 mm	0.076 in.
	2.45 mm	0.098 in.
Planetary geartrain snap ring (at front of output shaft)	Select fit (three thicknesses available)	
Overdrive piston thrust plate	Thrust plate and spacer are select fit. Refer to size charts and selection procedures in Overdrive Unit D&A procedures	
Intermediate shaft spacer		

PRESSURE TEST

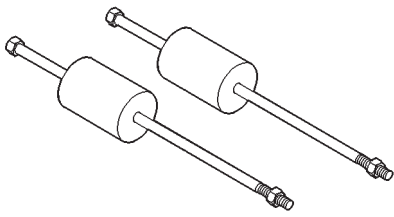
Overdrive clutch	Fourth gear only	Pressure should be 469-496 kPa (68-72 psi) with closed throttle and increase to 620-896 kPa (90-130 psi) at 1/2 to 3/4 throttle.
Line pressure (at accumulator)	Closed throttle	372-414 kPa (54-60 psi).
Front servo	Third gear only	No more than 21 kPa (3 psi) lower than 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.
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.

SPECIAL TOOLS

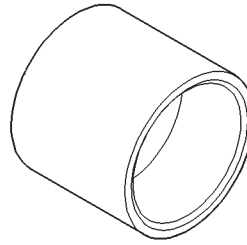
RE TRANSMISSIONS

**Spring Compressor and Alignment Shaft—6227****Gauge Bar—6311****Extension Housing Pilot—C-3288-B****Pressure Gauge—C-3292****Pressure Gauge—C-3293SP****Dial Indicator—C-3339****Spring Compressor—C-3422-B**

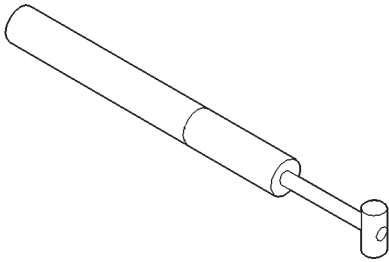
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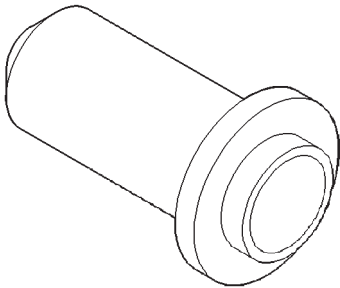
Puller, Slide Hammer—C-3752



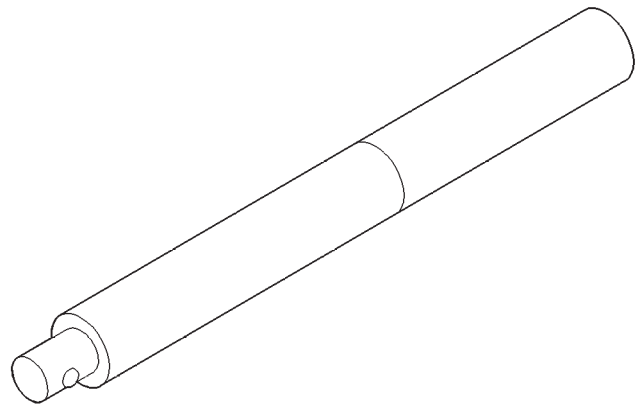
Installer—C-3995-A



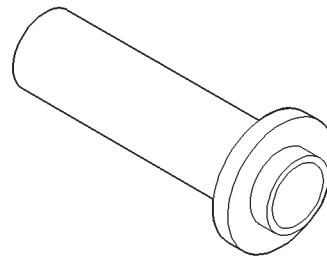
Gauge, Throttle Setting—C-3763



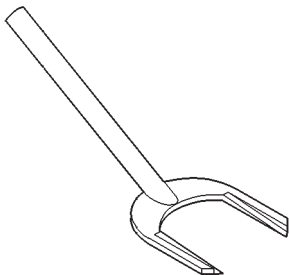
Seal Installer—C-3860-A



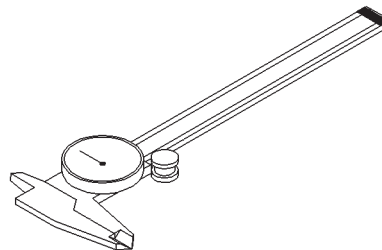
Universal Handle—C-4171



Seal Installer—C-4193-A

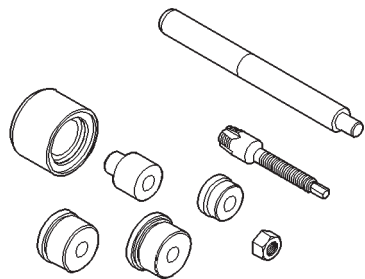
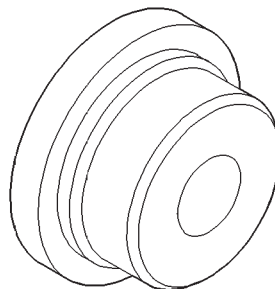
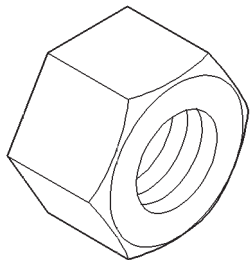
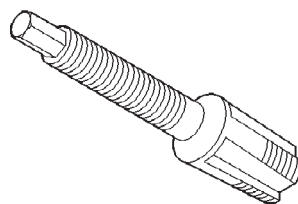
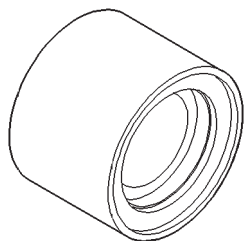
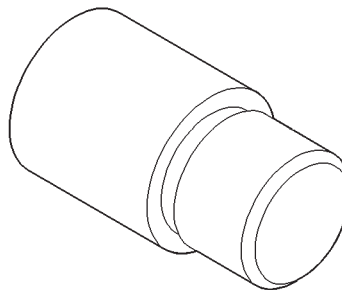
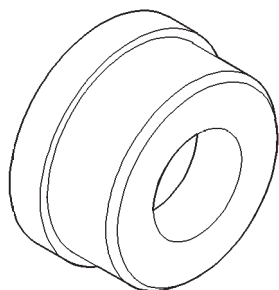
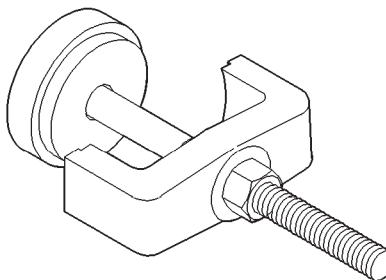


Seal Remover—C-3985-B

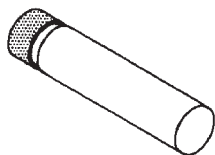


Dial Caliper—C-4962

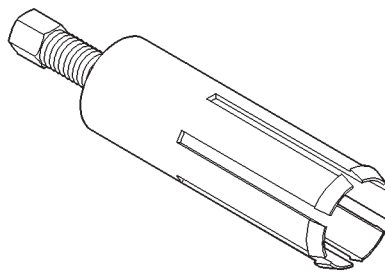
SPECIAL TOOLS (Continued)

***Bushing Remover/Installer Set—C-3887-J******Installer, Bushing—SP-5117******Nut, Bushing Remover—SP-1191, From kit C-3887-J******Remover, Bushing—SP-5324******Cup, Bushing Remover—SP-3633, From kit C-3887-J******Installer, Bushing—SP-5325******Remover, Bushing—SP-3551******Compressor, Spring—C-3575-A***

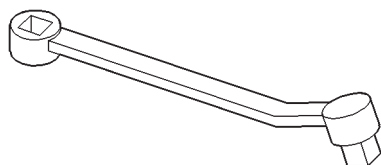
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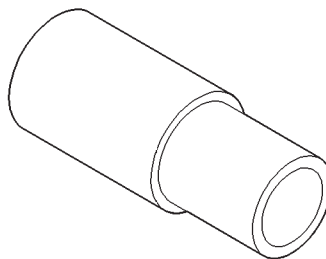
Gauge—6312



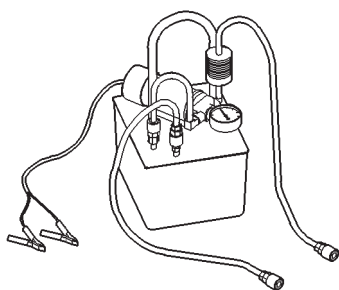
Remover—6957



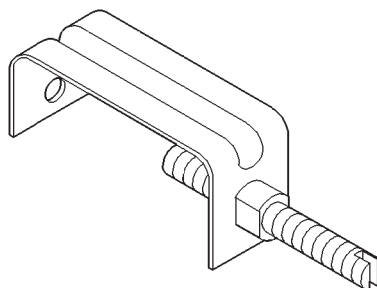
Adapter—C-3705



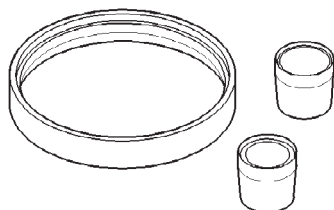
Installer—6951



Flusher—6906



Retainer—6583



Installer—8114

AUTOMATIC TRANSMISSION—46/47RE

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GENERAL INFORMATION

46/47RE TRANSMISSION

The 46/47RE transmissions are four speed fully automatic transmissions with an electronic governor (Fig. 1) and (Fig. 2). First through third gear ranges are provided by the clutches, bands, overrunning clutch, and planetary gear sets in the transmission. Fourth gear range is provided by the overdrive unit that contains an overdrive clutch, direct clutch, planetary gear set, and overrunning clutch. The overdrive clutch is applied in fourth gear only. The direct clutch is applied in all ranges except fourth gear. The transmissions are equipped with a lock-up clutch in the torque converter. The torque converter clutch is

controlled by the Powertrain Control Module (PCM). 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 engages in fourth gear, and in third gear when the O/D switch is OFF. Engagement occurs when the vehicle is cruising on a level plane after the vehicle has warmed up. The torque converter clutch disengages when the vehicle begins to go uphill or the accelerator is applied. The torque converter clutch feature increases fuel economy and reduces the transmission fluid temperature. Both transmissions are cooled by an integral fluid cooler inside the radiator.

GENERAL INFORMATION (Continued)

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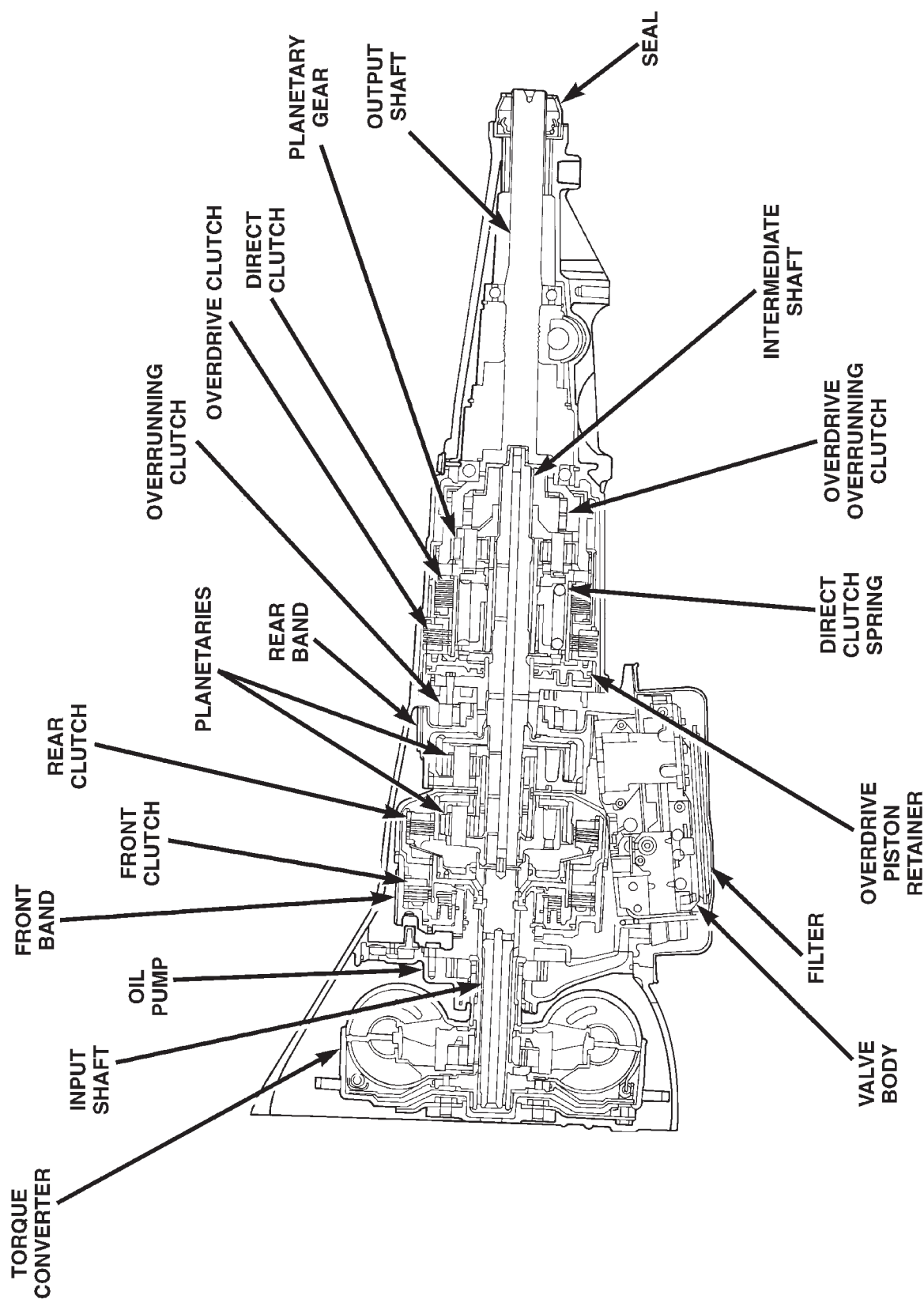


Fig. 1 46RE Transmission

GENERAL INFORMATION (Continued)

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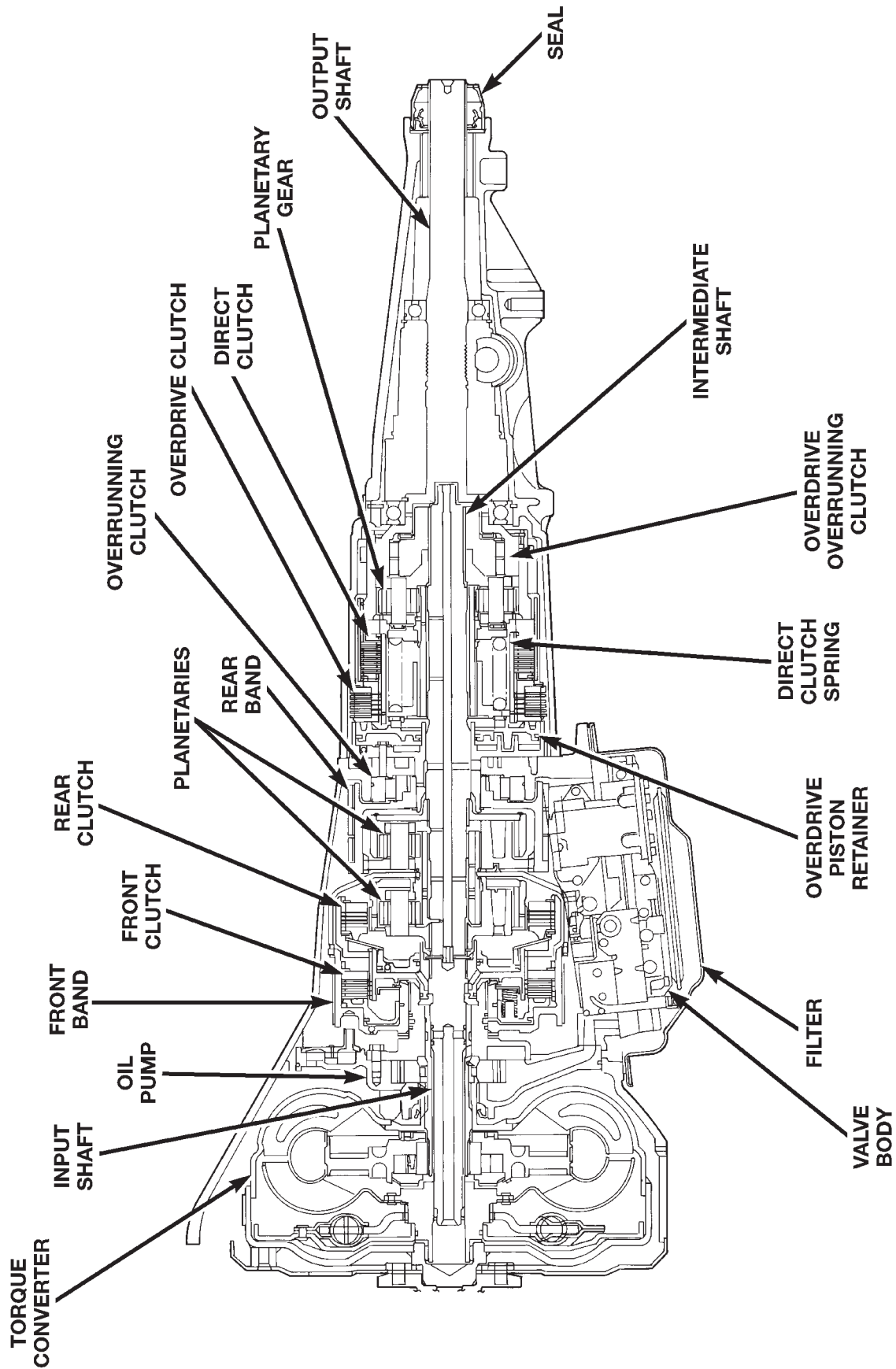


Fig. 2 47RE Transmission

GENERAL INFORMATION (Continued)

TRANSMISSION IDENTIFICATION

Transmission identification numbers are stamped on the left side of the case just above the oil pan gasket surface (Fig. 3). Refer to this information when ordering replacement parts.

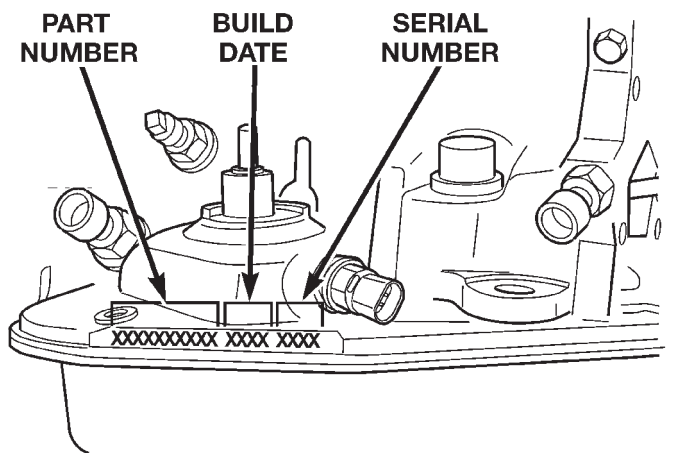


Fig. 3 Transmission Part And Serial Number Location

RECOMMENDED FLUID

Mopar® ATF Plus 3, Type 7176 automatic transmission fluid is the recommended fluid for Chrysler automatic transmissions.

Dexron II fluid IS NOT recommended. Clutch chatter can result from the use of improper fluid.

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.

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
- 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.

ELECTRONIC LOCK-UP TORQUE CONVERTER

The torque converter is a hydraulic device that couples the engine crankshaft to the transmission.

GENERAL INFORMATION (Continued)

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. Torque multiplication is created when the stator directs the hydraulic flow from the turbine to rotate the impeller in the direction the engine crankshaft is turning. The turbine transfers power to the planetary gear sets in the transmission. The transfer of power into the impeller assists torque multiplication. At low vehicle-speed, the overrunning clutch holds the stator stationary (during torque multiplication) and allows the stator to freewheel at high vehicle speed. The converter clutch engagement reduces engine speed. Clutch engagement also provides reduced transmission fluid temperatures. 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 results in large amounts of metal or fiber contamination in the fluid.

TRANSMISSION GEAR RATIOS

46/47RE gear ratios are:

- 2.45:1 (first gear)
- 1.45:1 (second gear)
- 1.00:1 (third gear)
- 0.69:1 (fourth gear)
- 2.21 (reverse)

GEARSHIFT MECHANISM

The gear shift mechanism provides six shift positions which are:

- park (P)
- reverse (R)
- neutral (N)
- drive (D)
- manual second (2)
- manual low (1)

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.

Drive range provides first, second third and overdrive fourth gear ranges. The shift into overdrive fourth gear range occurs only after the transmission has completed the shift into D third gear range. No further movement of the shift mechanism is required to complete the 3-4 shift.

The fourth gear upshift occurs automatically when the overdrive selector switch is in the ON position.

DESCRIPTION AND OPERATION

ELECTRONIC GOVERNOR

Governor pressure is controlled electronically. Components used for governor pressure control include:

- Governor body
- Valve body transfer plate
- Governor pressure solenoid valve
- Governor pressure sensor
- Fluid temperature thermistor
- Throttle position sensor (TPS)
- Transmission speed sensor
- Powertrain control module (PCM)

GOVERNOR PRESSURE SOLENOID VALVE

The solenoid valve is a duty-cycle solenoid which regulates the governor pressure needed for upshifts and downshifts. It is an electro-hydraulic device located in the governor body on the valve body transfer plate (Fig. 4).

The inlet side of the solenoid valve is exposed to normal transmission line pressure. The outlet side of the valve leads to the valve body governor circuit.

The solenoid valve regulates line pressure to produce governor pressure. The average current supplied to the solenoid controls governor pressure. One amp current produces zero kPa/psi governor pressure. Zero amps sets the maximum governor pressure.

The powertrain control module (PCM) turns on the trans control relay which supplies electrical power to the solenoid valve. Operating voltage is 12 volts (DC). The PCM controls the ground side of the solenoid using the governor pressure solenoid control circuit.

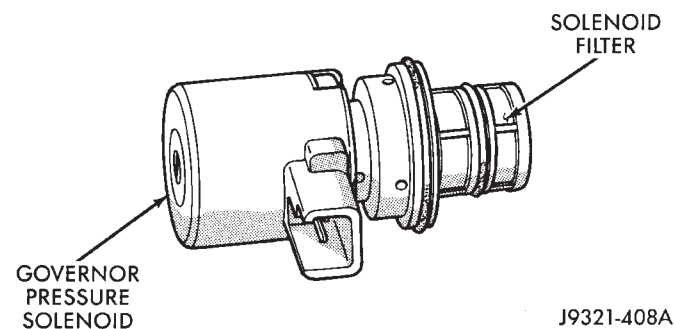


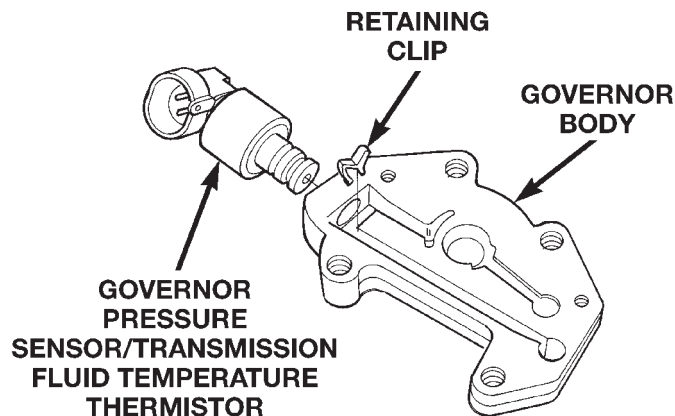
Fig. 4 Governor Pressure Solenoid Valve

GOVERNOR PRESSURE SENSOR

The governor pressure sensor measures output pressure of the governor pressure solenoid valve (Fig. 5).

The sensor output signal provides the necessary feedback to the PCM. This feedback is needed to adequately control governor pressure.

DESCRIPTION AND OPERATION (Continued)



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Fig. 5 Governor Pressure Sensor**GOVERNOR BODY AND TRANSFER PLATE**

The transfer plate is designed to supply transmission line pressure to the governor pressure solenoid valve and to return governor pressure.

The governor pressure solenoid valve is mounted in the governor body. The body is bolted to the lower side of the transfer plate (Fig. 5). The transfer plate channels line pressure to the solenoid valve through the governor body. It also channels governor pressure from the solenoid valve to the governor circuit. It is the solenoid valve that develops the necessary governor pressure.

TRANSMISSION FLUID TEMPERATURE THERMISTOR

Transmission fluid temperature readings are supplied to the transmission control module by the thermistor. The temperature readings are used to control engagement of the fourth gear overdrive clutch, the converter clutch, and governor pressure. Normal resistance value for the thermistor at room temperature is approximately 1000 ohms.

The PCM prevents engagement of the converter clutch and overdrive clutch, when fluid temperature is below approximately 10°C (50°F).

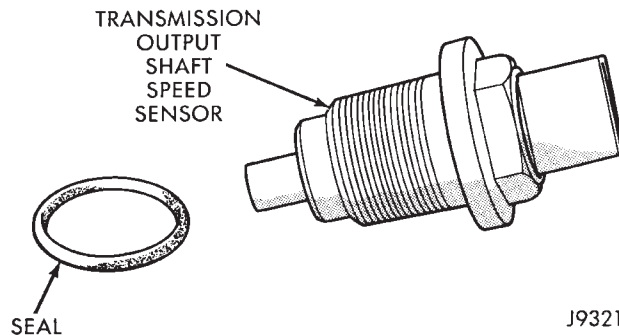
If fluid temperature exceeds 126°C (260°F), the PCM causes a 4-3 downshift and engage the converter clutch. Engagement is according to the third gear converter clutch engagement schedule.

The overdrive OFF lamp in the instrument panel illuminates when the shift back to third occurs. The transmission will not allow fourth gear operation until fluid temperature decreases to approximately 110°C (230°F).

The thermistor is part of the governor pressure sensor assembly and is immersed in transmission fluid at all times.

TRANSMISSION SPEED SENSOR

The speed sensor (Fig. 6) is located in the overdrive gear case. The sensor is positioned over the park gear and monitors transmission output shaft rotating speed. Speed sensor signals are triggered by the park gear lugs as they rotate past the sensor pickup face. Input signals from the sensor are sent to the transmission control module for processing. The vehicle speed sensor also serves as a backup for the transmission speed sensor. Signals from this sensor are shared with the powertrain control module.



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Fig. 6 Transmission Output Speed Sensor**THROTTLE POSITION SENSOR (TPS)**

The TPS provides throttle position input signals to the PCM. This input signal is used to determine overdrive and converter clutch shift schedule and to select the proper governor curve.

POWERTRAIN CONTROL MODULE (PCM)

The PCM controls operation of the converter clutch, overdrive clutch, and governor pressure solenoid.

The control module determines transmission shift points based on input signals from the transmission thermistor, transmission output shaft speed sensor, crankshaft position sensor, vehicle speed sensor, throttle position sensor, and battery temperature sensor.

GOVERNOR PRESSURE CURVES

There are four governor pressure curves programmed into the transmission control module. The different curves allow the control module to adjust governor pressure for varying conditions. One curve is used for operation when fluid temperature is at, or below, 1°C (30°F). A second curve is used when fluid temperature is at, or above, 10°C (50°F) during normal city or highway driving. A third curve is used during wide-open throttle operation. The fourth curve is used when driving with the transfer case in low range.

DESCRIPTION AND OPERATION (Continued)

SHIFT VALVE OPERATION

The shift valves are moved by a combination of throttle and governor pressure. The governor pressure is generated by electrical components.

The conditions under which a shift to fourth will not occur are:

- Overdrive switch is Off
- Transmission fluid temperature is below 10° C (50° F) or above 121° C (250° F)
- Shift to third not yet completed
- Vehicle speed too low for 3-4 shift to occur
- Battery temperature below -5° F.

HYDRAULIC CONTROL SYSTEM

The hydraulic control system provides fully automatic operation. The system performs five basic functions which are: pressure supply, pressure regulation, flow control, clutch/band application, and lubrication.

PRESSURE REGULATION

The pressure regulator valve maintains line pressure. The amount of pressure developed is controlled by throttle pressure which is dependent on the degree of throttle opening. The regulator valve is located in the valve body.

The throttle valve determines line pressure and shift speed. Governor pressure increases in proportion to vehicle speed. The throttle valve controls upshift and downshift speeds by regulating pressure according to throttle position.

Shift Valve Flow Control

The manual valve is operated by the gearshift linkage and provides the operating range selected by the driver.

The 1-2 shift valve provides 1-2 or 2-1 shifts and the 2-3 shift valve provides 2-3 or 3-2 shifts.

The kickdown valve provides forced 3-2 or 3-1 downshifts depending on vehicle speed. Downshifts occur when the throttle is opened beyond downshift detent position. Detent is reached just before wide open throttle position.

The 2-3 valve throttle pressure plug provides 3-2 downshifts at varying throttle openings depending on vehicle speed.

The 1-2 shift control valve transmits 1-2 shift pressure to the accumulator piston. This controls kickdown band capacity on 1-2 upshifts and 3-2 downshifts.

The 3-4 shift, quick fill, and timing valves plus the 3-4 accumulator, are only actuated when the overdrive solenoid is energized. The solenoid contains a check ball that controls a vent port to the 3-4 valves. The check ball either diverts line pressure away from or directly to the 3-4 valves.

The limit valve determines maximum speed at which a 3-2 part throttle kickdown can be made. On

transmissions without a limit valve, maximum speed for a 3-2 kickdown is at detent position.

The 2-3 shuttle valve has two functions. The first is fast front band release and smooth engagement during lift-foot 2-3 upshifts. The second is to regulate front clutch and band application during 3-2 downshifts.

The 3-4 timing valve is moved by line pressure coming through the 3-4 shift valve. The timing valve holds the 2-3 shift valve in an upshift position. The purpose is to prevent the 2-3 valve from up or downshifting before the 3-4 valve.

The 3-4 accumulator is mounted on the overdrive housing and performs the same function as the 2-3 accumulator; it is used to smooth engagement during a 3-4 shift.

The switch valve directs fluid apply pressure to the converter clutch in one position and releases it in the opposite position. It also directs oil to the cooling and lube circuits. The switch valve regulates oil pressure to the torque converter by limiting maximum oil pressure to 130 psi.

OVERDRIVE OFF SWITCH

The overdrive OFF (control) switch is located in the instrument panel. The switch is a momentary contact device that signals the PCM to toggle current status of the overdrive function. At key-on, overdrive operation is allowed. Pressing the switch once causes the overdrive OFF mode to be entered and the overdrive OFF switch lamp to be illuminated. Pressing the switch a second time causes normal overdrive operation to be restored and the overdrive lamp to be turned off. The overdrive OFF mode defaults to ON after the ignition switch is cycled OFF and ON. The normal position for the control switch is the ON position. The switch must be in this position to energize the solenoid and allow a 3-4 upshift. The control switch indicator light illuminates only when the overdrive switch is turned to the OFF position, or when illuminated by the transmission control module.

3-4 SHIFT SEQUENCE

The overdrive clutch is applied in fourth gear only. The direct clutch is applied in all ranges except fourth gear. Fourth gear overdrive range is electronically controlled and hydraulically activated. Various sensor inputs are supplied to the powertrain control module to operate the overdrive solenoid on the valve body. The solenoid contains a check ball that opens and closes a vent port in the 3-4 shift valve feed passage. The overdrive solenoid (and check ball) are not energized in first, second, third, or reverse gear. The vent port remains open, diverting line pressure from the 2-3 shift valve away from the 3-4 shift valve. The overdrive control switch must be in the ON position

DESCRIPTION AND OPERATION (Continued)

to transmit overdrive status to the PCM. A 3-4 upshift occurs only when the overdrive solenoid is energized by the PCM. The PCM energizes the overdrive solenoid during the 3-4 upshift. This causes the solenoid check ball to close the vent port allowing line pressure from the 2-3 shift valve to act directly on the 3-4 upshift valve. Line pressure on the 3-4 shift valve overcomes valve spring pressure moving the valve to the upshift position. This action exposes the feed passages to the 3-4 timing valve, 3-4 quick fill valve, 3-4 accumulator, and ultimately to the overdrive piston. Line pressure through the timing valve moves the overdrive piston into contact with the overdrive clutch. The direct clutch is disengaged before the overdrive clutch is engaged. The boost valve provides increased fluid apply pressure to the overdrive clutch during 3-4 upshifts, and when accelerating in fourth gear. The 3-4 accumulator cushions overdrive clutch engagement to smooth 3-4 upshifts. The accumulator is charged at the same time as apply pressure acts against the overdrive piston.

CONVERTER CLUTCH ENGAGEMENT

Converter clutch engagement in third or fourth gear range is controlled by sensor inputs to the powertrain control module. Inputs that determine clutch engagement are: coolant temperature, engine rpm, vehicle speed, throttle position, and manifold vacuum. The torque converter clutch is engaged by the clutch solenoid on the valve body. The clutch can be engaged in third and fourth gear ranges depending on overdrive control switch position. If the overdrive control switch is in the normal ON position, the clutch will engage after the shift to fourth gear, and above approximately 72 km/h (45 mph). If the control switch is in the OFF position, the clutch will engage after the shift to third gear, at approximately 56 km/h (35 mph) at light throttle.

QUICK FILL VALVE

The 3-4 quick fill valve provides faster engagement of the overdrive clutch during 3-4 upshifts. The valve temporarily bypasses the clutch piston feed orifice at the start of a 3-4 upshift. This exposes a larger passage into the piston retainer resulting in a much faster clutch fill and apply sequence. The quick fill valve does not bypass the regular clutch feed orifice throughout the 3-4 upshift. Instead, once a predetermined pressure develops within the clutch, the valve closes the bypass. Clutch fill is then completed through the regular feed orifice.

CONVERTER DRAINBACK VALVE

The drainback valve is located in the transmission cooler outlet (pressure) line. 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.

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 malfunctions. 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.

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

DIAGNOSIS AND TESTING (Continued)

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.

OVERDRIVE ELECTRICAL CONTROLS

The overdrive off switch, valve body solenoid, case connectors and related wiring can all be tested with a 12 volt test lamp or a volt/ohmmeter. Check continuity of each component when diagnosis indicates this is necessary. Refer to Group 8W, Wiring Diagrams, for component locations and circuit information.

Switch and solenoid continuity should be checked whenever the transmission fails to shift into fourth gear range.

GEARSHIFT LINKAGE AND THROTTLE CABLE

GEARSHIFT LINKAGE

Gearshift linkage adjustment is important because it positions the valve body manual valve. Incorrect adjustment will cause creeping in Neutral, premature clutch wear, delayed engagement in any gear, or a no-start in Park or Neutral position.

Proper operation of the park/neutral position switch will provide a quick check of linkage adjustment.

THROTTLE VALVE CABLE ADJUSTMENT

Throttle valve cable adjustment is 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 short, early shifts and slippage between shifts may occur. If the setting is too long, shifts may be delayed and part throttle downshifts may be very sensitive.

ROAD 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.

Note 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.

Note 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 overrunning clutch is faulty. Similarly, if slippage occurs in any two forward gears, the rear clutch is slipping.

Applying the same method of analysis, note that the front and rear clutches are applied simultaneously only in D range third and fourth gear. If the transmission slips in third gear, either the front clutch or the rear clutch is slipping.

If the transmission slips in fourth gear but not in third gear, the overdrive clutch is slipping. By selecting another gear which does not use these clutches, the slipping unit can be determined. For example, if the transmission also slips in Reverse, the front clutch is slipping. If the transmission does not slip in Reverse, the rear clutch is slipping.

DIAGNOSIS AND TESTING (Continued)

SHIFT LEVER POSITION	TRANSMISSION CLUTCHES AND BANDS					OVERDRIVE CLUTCHES		
	FRONT CLUTCH	FRONT BAND	REAR CLUTCH	REAR BAND	OVERRUN. CLUTCH	OVERDRIVE CLUTCH	DIRECT CLUTCH	OVERRUN. CLUTCH
Reverse	X			X			X	
Drive Range								
First			X		X		X	X
Second		X	X				X	X
Third	X		X				X	X
Fourth	X		X			X		
2-Range (Manual Second)		X	X		X		X	X
1-Range (Manual Low)			X	X	X		X	X

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Clutch And Band Application Chart

If slippage occurs during the 3-4 shift or only in fourth gear, the overdrive clutch is slipping. Similarly, if 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 will not shift to fourth gear, the control switch, overdrive solenoid or related wiring may also be the problem cause.

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 pressure test gauges are required. Test Gauge C-3292 has a 100 psi range and is used at the accumulator, governor, and front servo ports. Test Gauge C-3293-SP has a 300 psi range and is used at the rear servo and overdrive ports where pressures exceed 100 psi.

Pressure Test Port Locations

Test ports are located at both sides of the transmission case (Fig. 7).

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.

The rear servo and governor pressure ports are at the right rear of the transmission case. The overdrive clutch pressure port is at the left rear of the case.

Test One - Transmission In Manual Low

NOTE: This test checks pump output, pressure regulation, and condition of the rear clutch and servo circuit. Both test gauges are required for this test.

(1) Connect tachometer to engine. Position tachometer so it can be observed from driver seat if helper will be operating engine. Raise vehicle on hoist that will allow rear wheels to rotate freely.

(2) Connect 100 psi Gauge C-3292 to accumulator port. Then connect 300 psi Gauge C-3293-SP to rear servo port.

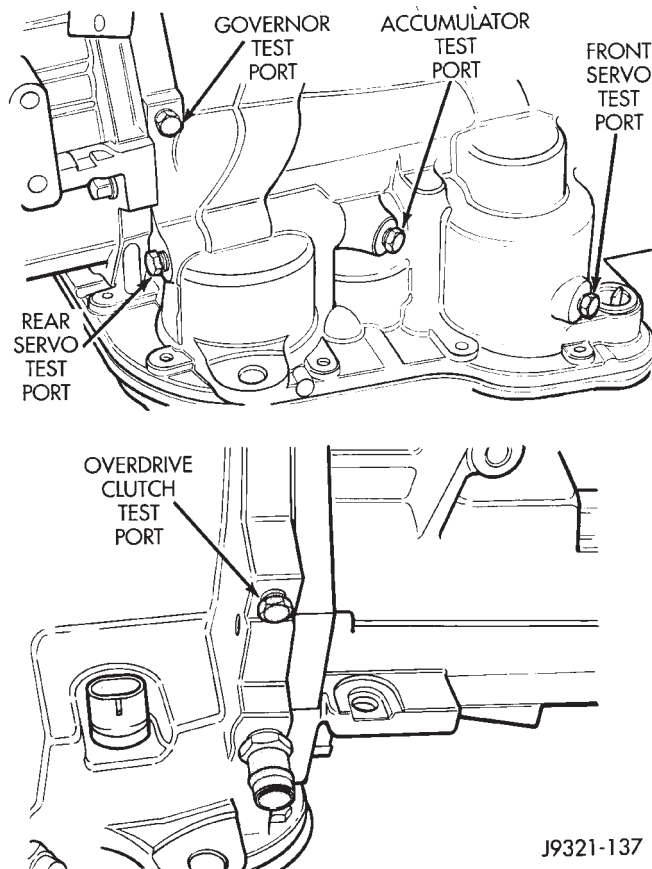
(3) Disconnect throttle and gearshift cables from levers on transmission valve body manual shaft.

(4) Have helper start and run engine at 1000 rpm.

(5) Move transmission shift lever fully forward into 1 range.

(6) Gradually move transmission throttle lever from full forward to full rearward position and note pressures on both gauges:

DIAGNOSIS AND TESTING (Continued)

**Fig. 7 Pressure Test Port Locations**

- 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 throttle lever is moved rearward.
- Rear servo pressure should be same as line pressure within 3 psi (20.68 kPa).

Test Two—Transmission In 2 Range

NOTE: This test checks pump output, line pressure and pressure regulation. Use 100 psi Test Gauge C-3292 for this test.

- (1) Leave vehicle in place on hoist and leave Test Gauge C-3292 connected to accumulator port.
- (2) Have helper start and run engine at 1000 rpm.
- (3) Move transmission shift lever 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 on gauge.
- (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 Third Gear

NOTE: This test checks pressure regulation and condition of the clutch circuits. Both test gauges are required for this test.

- (1) Turn OD switch off.
- (2) Leave vehicle on hoist and leave Gauge C-3292 in place at accumulator port.
- (3) Move Gauge C-3293-SP over to front servo port for this test.
- (4) Have helper start and run engine at 1600 rpm for this test.
- (5) Move transmission shift lever two detents rearward from full forward position. This is D range.
- (6) Read pressures on both gauges as transmission throttle lever is gradually moved from full forward to full rearward position:
 - Line pressure at accumulator in D range third gear, should be 54-60 psi (372-414 kPa) with throttle lever forward and increase as lever is moved rearward.
 - Front servo pressure in D range third gear, should be within 3 psi (21 kPa) of line pressure up to kickdown point.

Test Four—Transmission In Reverse

NOTE: 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) Leave vehicle on hoist and leave gauge C3292 in place at accumulator port.
- (2) Move 300 psi Gauge C-3293-SP back to rear servo port.
- (3) Have helper start and run engine at 1600 rpm for test.
- (4) Move transmission shift lever four detents rearward from full forward position. This is Reverse range.
- (5) Move transmission throttle lever fully forward then fully rearward and note reading at Gauge C-3293-SP.
- (6) Pressure should be 145 - 175 psi (1000-1207 kPa) with throttle lever forward and increase to 230 - 280 psi (1586-1931 kPa) as lever is gradually moved rearward.

DIAGNOSIS AND TESTING (Continued)

Test Five—Governor Pressure

NOTE: This test checks governor operation by measuring governor pressure response to changes in vehicle speed. It is usually not necessary to check governor operation unless shift speeds are incorrect or if the transmission will not downshift. The test should be performed on the road or on a hoist that will allow the rear wheels to rotate freely.

(1) Move 100 psi Test Gauge C-3292 to governor pressure port.

(2) Move transmission shift lever two detents rearward from full forward position. This is D range.

(3) Have helper start and run engine at curb idle speed. Then firmly apply service brakes so wheels will not rotate.

(4) Note governor pressure:

- Governor pressure should be no more than 20.6 kPa (3 psi) at curb idle speed and wheels not rotating.

- If pressure exceeds 20.6 kPa (3 psi), a fault exists in governor pressure control system.

(5) Release brakes, slowly increase engine speed, and observe speedometer and pressure test gauge (do not exceed 30 mph on speedometer). Governor pressure should increase in proportion to vehicle speed. Or approximately 6.89 kPa (1 psi) for every 1 mph.

(6) Governor pressure rise should be smooth and drop back to no more than 20.6 kPa (3 psi), after engine returns to curb idle and brakes are applied to prevent wheels from rotating.

(7) Compare results of pressure test with analysis chart.

Test Six—Transmission In Overdrive Fourth Gear

NOTE: This test checks line pressure at the overdrive clutch in fourth gear range. Use 300 psi Test Gauge C-3292 for this test. The test should be performed on the road or on a chassis dyno.

(1) Remove tachometer; it is not needed for this test.

(2) Move 300 psi Gauge to overdrive clutch pressure test port. Then remove other gauge and reinstall test port plug.

(3) Lower vehicle.

(4) Turn OD switch on.

(5) Secure test gauge so it can be viewed from drivers seat.

(6) Start engine and shift into D range.

(7) Increase vehicle speed gradually until 3-4 shift occurs and note gauge pressure.

(8) Pressure should be 469-496 kPa (68-72 psi) with closed throttle and increase to 620-827 kPa (90-120 psi) at 1/2 to 3/4 throttle. Note that pressure can increase to around 896 kPa (130 psi) at full throttle.

(9) Return to shop or move vehicle off chassis dyno.

PRESSURE TEST ANALYSIS CHART

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 (seal rings, clutch seals)
Pressure low in D Fourth Gear Range	Overdrive clutch piston seal, or check ball problem
Pressure OK in 1, 2 but low in D3 and R	Leakage in front clutch area
Pressure OK in 2 but low in R and 1	Leakage in rear servo
Front servo pressure low in 2	Leakage in servo; broken servo ring or cracked servo piston
Pressure low in all positions	Clogged filter, stuck regulator valve, worn or faulty pump, low oil level
Governor pressure too high at idle speed	Governor pressure solenoid valve system fault. Refer to diagnostic book.
Governor pressure low at all mph figures	Faulty governor pressure solenoid, transmission control module, or governor pressure sensor
Lubrication pressure low at all throttle positions	Clogged fluid cooler or lines, seal rings leaking, worn pump bushings, pump, clutch retainer, or clogged filter.
Line pressure high	Output shaft plugged, sticky regulator valve
Line pressure low	Sticky regulator valve, clogged filter, worn pump

CONVERTER STALL TEST

Stall testing involves determining maximum engine speed obtainable at full throttle with the rear wheels locked and the transmission in D range. This test checks the holding ability of the converter overrunning and transmission clutches.

WARNING: NEVER ALLOW ANYONE TO STAND DIRECTLY IN LINE WITH THE VEHICLE FRONT OR REAR DURING A STALL TEST. ALWAYS BLOCK THE WHEELS AND FULLY APPLY THE SERVICE AND PARKING BRAKES DURING THE TEST.

DIAGNOSIS AND TESTING (Continued)

STALL TEST PROCEDURE

- (1) Connect tachometer to engine. Position tachometer so it can be viewed from driver's seat.
- (2) Drive vehicle to bring transmission fluid up to normal operating temperature. Vehicle can be driven on road or on chassis dynamometer, if available.
- (3) Check transmission fluid level. Add fluid if necessary.
- (4) Block front wheels.
- (5) Fully apply service and parking brakes.
- (6) Open throttle completely and record maximum engine speed registered on tachometer. It takes 4-10 seconds to reach max rpm. **Once max rpm has been achieved, do not hold wide open throttle for more than 4-5 seconds.**

CAUTION: Stalling the converter causes a rapid increase in fluid temperature. To avoid fluid overheating, hold the engine at maximum rpm for no more than 5 seconds. If engine exceeds 2500 rpm during the test, release the accelerator pedal immediately; transmission clutch slippage is occurring.

- (7) If a second stall test is required, cool down fluid before proceeding. Shift into NEUTRAL and run engine at 1000 rpm for 20-30 seconds to cool fluid.

STALL TEST ANALYSIS

Stall Speed Too High

If the stall speed exceeds 2500 rpm, transmission clutch slippage is indicated.

Stall Speed Low

Low stall speed with a properly tuned engine indicate a torque converter overrunning clutch problem. The condition should be confirmed by road testing. A stall speed 250-350 rpm below normal indicates the converter overrunning clutch is slipping. The vehicle also exhibits poor acceleration but operates normally once highway cruise speeds are reached. Torque converter replacement will be necessary.

Stall Speed Normal But Acceleration Poor

If stall speeds are normal (1800-2300 rpm) but abnormal throttle opening is required for acceleration, or to maintain cruise speed, the converter overrunning clutch is seized. The torque converter will have to be replaced.

Converter Noise During Test

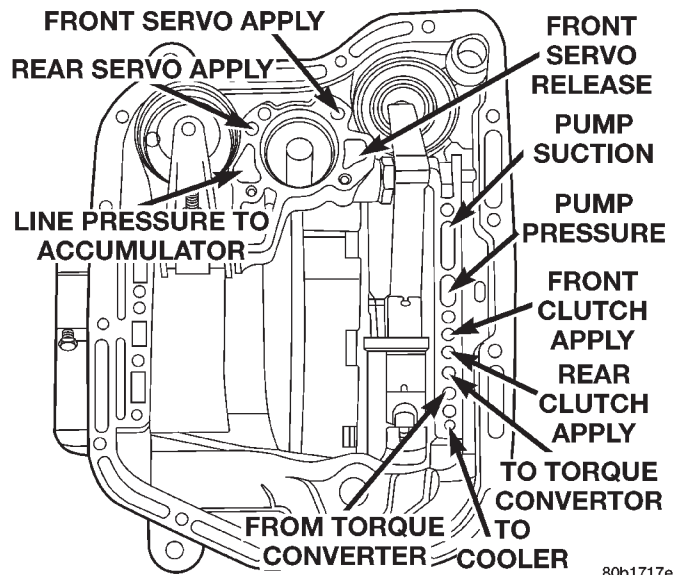
A whining noise caused by fluid flow is normal during a stall test. However, loud metallic noises indicate a damaged converter. To confirm that the noise is originating from the converter, operate the vehicle at light throttle in DRIVE and NEUTRAL on a hoist

and listen for noise coming from the converter housing.

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. 8).



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Fig. 8 Air Pressure Test Passages

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 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

DIAGNOSIS AND TESTING (Continued)

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. 9). Pump vent or pump attaching bolt leaks are generally deposited on the inside of the converter housing and not on the converter itself (Fig. 9). 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.

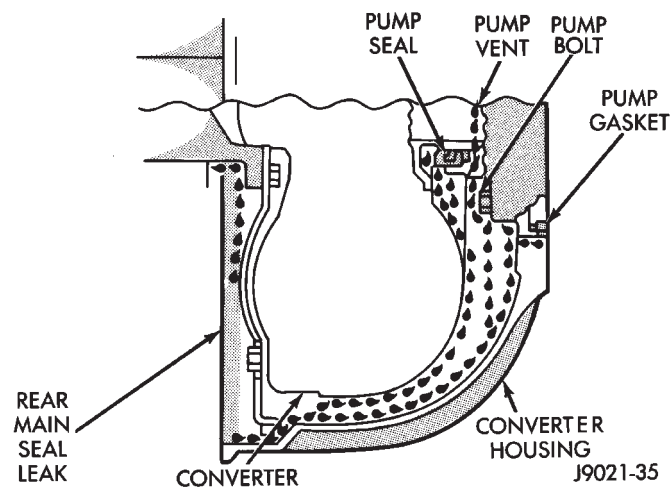


Fig. 9 Converter Housing Leak Paths

TORQUE CONVERTER LEAK POINTS

Possible sources of converter leaks are:

- (1) Leaks at the weld joint around the outside diameter weld (Fig. 10).
- (2) Leaks at the converter hub weld (Fig. 10).

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.

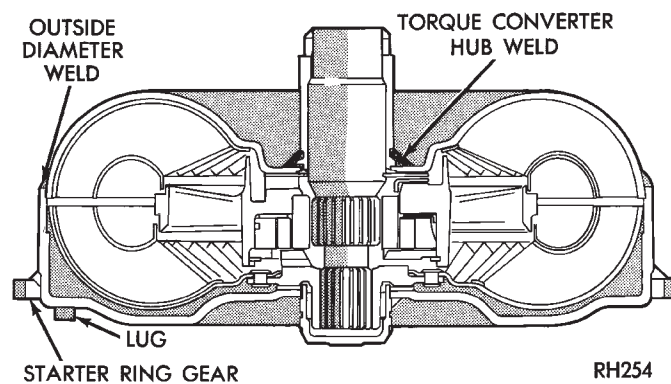


Fig. 10 Converter Leak Points—Typical

(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 TABLES AND CHARTS—RE TRANSMISSION

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 CHARTS

CONDITION	POSSIBLE CAUSES	CORRECTION
HARSH ENGAGEMENT (FROM NEUTRAL TO DRIVE OR REVERSE)	1. Fluid Level Low	1. Add Fluid
	2. Throttle Linkage Misadjusted	2. Adjust linkage - setting may be too long.
	3. 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 Faulty.	11. Replace converter and flush cooler and line before installing new converter.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
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. Torque Converter Drain Back (Oil drains from torque converter into transmission sump)	4. If vehicle moves normally after 5 seconds after shifting into gear, no repair is necessary. If longer, inspect pump bushing for wear. Replace pump house.
	5. Rear Band Misadjusted.	5. Adjust band.
	6. Valve Body Filter Plugged.	6. Replace fluid and filter. If oil pan and old fluid were full of clutch disc material and/or metal particles, overhaul will be necessary.
	7. Oil Pump Gears Worn/Damaged.	7. Remove transmission and replace oil pump.
	8. Governor Circuit and Solenoid Valve Electrical Fault.	8. Test with DRB scan tool and repair as required.
	9. Hydraulic Pressure Incorrect.	9. Perform pressure test, remove transmission and repair as needed.
	10. Reaction Shaft Seal Rings Worn/Broken.	10. Remove transmission, remove oil pump and replace seal rings.
	11. Rear Clutch/Input Shaft, Rear Clutch Seal Rings Damaged.	11. Remove and disassemble transmission and repair as necessary.
	12. Regulator Valve Stuck.	12. Clean.
	13. Cooler Plugged.	13. Transfer case failure can plug cooler.
NO DRIVE RANGE (REVERSE OK)	1. Fluid Level Low.	1. Add fluid and check for leaks if drive is restored.
	2. Gearshift Linkage/Cable Loose/Misadjusted.	2. Repair or replace linkage components.
	3. Rear Clutch Burnt.	3. Remove and disassemble transmission and rear clutch and seals. Repair/replace worn or damaged parts as needed.
	4. Valve Body Malfunction.	4. Remove and disassemble valve body. Replace assembly if any valves or bores are damaged.
	5. Transmission Overrunning Clutch Broken.	5. Remove and disassemble transmission. Replace overrunning clutch.
	6. Input Shaft Seal Rings Worn/Damaged.	6. Remove and disassemble transmission. Replace seal rings and any other worn or damaged parts.
	7. Front Planetary Failed Broken.	7. Remove and repair.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO DRIVE OR REVERSE (VEHICLE WILL NOT MOVE)	1. Fluid Level Low.	1. Add fluid and check for leaks if drive is restored.
	2. Gearshift Linkage/Cable Loose/Misadjusted.	2. Inspect, adjust and reassemble linkage as needed. Replace worn/damaged parts.
	3. U-Joint/Axle/Transfer Case Broken.	3. Perform preliminary inspection procedure for vehicle that will not move. Refer to procedure in diagnosis section.
	4. Filter Plugged.	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. Oil Pump Damaged.	5. Perform pressure test to confirm low pressure. Replace pump body assembly if necessary.
	6. Valve Body Malfunctioned.	6. Check 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. Transmission Internal Component Damaged.	7. Remove and disassemble transmission. Repair or replace failed components as needed.
	8. Park Sprag not Releasing - Check Stall Speed, Worn/Damaged/Stuck.	8. Remove, disassemble, repair.
	9. Torque Converter Damage.	9. 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.	1. Correct fluid level and check for leaks if low.
	2. Fluid Filter Clogged.	2. Replace filter. If filter and fluid contained clutch material or metal particles, an overhaul may be necessary. Perform lube flow test.
	3. Throttle Linkage Misadjusted.	3. Adjust linkage as described in service section.
	4. Throttle Linkage Binding.	4. Check cable for binding. Check for return to closed throttle at transmission.
	5. Gearshift Linkage/Cable Misadjusted.	5. Adjust linkage/cable as described in service section.
	6. Clutch or Servo Failure.	6. Remove valve body and air test clutch, and band servo operation. Disassemble and repair transmission as needed.
	7. Governor Circuit Electrical Fault.	7. Test using DRB scan tool and repair as required.
	8. Front Band Misadjusted.	8. Adjust band.
	9. Pump Suction Passage Leak.	9. Check for excessive foam on dipstick after normal driving. Check for loose pump bolts, defective gasket. Replace pump assembly if needed.
NO REVERSE (D RANGES OK)	1. Gearshift Linkage/Cable Misadjusted/Damaged.	1. Repair or replace linkage parts as needed.
	2. Park Sprag Sticking.	2. Replace overdrive annulus gear.
	3. Rear Band Misadjusted/Worn.	3. Adjust band; replace.
	4. Valve Body Malfunction.	4. Remove and service valve body. Replace valve body if any valves or valve bores are worn or damaged.
	5. Rear Servo Malfunction.	5. Remove and disassemble transmission. Replace worn/damaged servo parts as necessary.
	6. Direct Clutch in Overdrive Worn	6. Disassemble overdrive. Replace worn or damaged parts.
	7. Front Clutch Burnt.	7. Remove and disassemble transmission. Replace worn, damaged clutch parts as required.
HAS FIRST/REVERSE ONLY (NO 1-2 OR 2-3 UPSHIFT)	1. Governor Circuit Electrical Fault.	1. Test using DRB scan tool and repair as required.
	2. Valve Body Malfunction.	2. Repair stuck 1-2 shift valve or governor plug.
	3. Front Servo/Kickdown Band Damaged/Burned.	3. Repair/replace.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
MOVES IN 2ND OR 3RD GEAR, ABRUPTLY DOWNSHIFTS TO LOW	1. Valve Body Malfunction.	1. Remove, clean and inspect. Look for stuck 1-2 valve or governor plug.
	2. Governor Valve Sticking.	2. Remove, clean and inspect. Replace faulty parts.
NO LOW GEAR (MOVES IN 2ND OR 3RD GEAR ONLY)	1. Governor Valve Sticking.	1. Remove governor, clean, inspect and repair as required.
	2. Governor Circuit Electrical Fault.	2. Test with DRB scan tool and repair as required.
	3. Valve Body Malfunction.	3. Remove, clean and inspect. Look for sticking 1-2 shift valve, 2-3 shift valve, governor plug or broken springs.
	4. Front Servo Piston Cocked in Bore.	4. Inspect servo and repair as required.
	5. Front Band Linkage Malfunction	5. Inspect linkage and look for bind in linkage.
NO KICKDOWN OR NORMAL DOWNSHIFT	1. Throttle Linkage Misadjusted.	1. Adjust linkage.
	2. Accelerator Pedal Travel Restricted.	2. Verify floor mat is not under pedal, repair worn accelerator cable or bent brackets.
	3. Valve Body Hydraulic Pressures Too High or Too Low Due to Valve Body Malfunction or Incorrect Hydraulic Control Pressure Adjustments.	3. Perform hydraulic pressure tests to determine cause and repair as required. Correct valve body pressure adjustments as required.
	4. Governor Circuit Electrical Fault.	4. Test with DRB scan tool and repair as required.
	5. Valve Body Malfunction.	5. Perform hydraulic pressure tests to determine cause and repair as required. Correct valve body pressure adjustments as required.
	6. TPS Malfunction.	6. Replace sensor, check with DRB scan tool.
	7. PCM Malfunction.	7. Check with DRB scan tool and replace if required.
	8. Valve Body Malfunction.	8. Repair sticking 1-2, 2-3 shift valves, governor plugs, 3-4 solenoid, 3-4 shift valve, 3-4 timing valve.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
STUCK IN LOW GEAR (WILL NOT UPSHIFT)	1. Throttle Linkage Misadjusted/Stuck.	1. Adjust linkage and repair linkage if worn or damaged. Check for binding cable or missing return spring.
	2. Gearshift Linkage Misadjusted.	2. Adjust linkage and repair linkage if worn or damaged.
	3. Governor Component Electrical Fault.	3. Check operating pressures and test with DRB scan tool, repair faulty component.
	4. Front Band Out of Adjustment.	4. Adjust Band.
	5. Clutch or Servo Malfunction.	5. Air pressure check operation of clutches and bands. Repair faulty component.
CREEPS IN NEUTRAL	1. Gearshift Linkage Misadjusted.	1. Adjust linkage.
	2. Rear Clutch Dragging/Warped.	2. Disassemble and repair.
	3. Valve Body Malfunction.	3. Perform hydraulic pressure test to determine cause and repair as required.
BUZZING NOISE	1. Fluid Level Low	1. Add fluid and check for leaks.
	2. Shift Cable Misassembled.	2. Route cable away from engine and bell housing.
	3. Valve Body Misassembled.	3. Remove, disassemble, inspect valve body. Reassemble correctly if necessary. Replace assembly if valves or springs are damaged. Check for loose bolts or screws.
	4. Pump Passages Leaking	4. Check pump for porous casting, scores on mating surfaces and excess rotor clearance. Repair as required. Loose pump bolts.
	5. Cooling System Cooler Plugged.	5. Flow check cooler circuit. Repair as needed.
	6. Overrunning Clutch Damaged.	6. Replace clutch.
SLIPS IN REVERSE ONLY	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Gearshift Linkage Misadjusted.	2. Adjust linkage.
	3. Rear Band Misadjusted.	3. Adjust band.
	4. Rear Band Worn.	4. Replace as required.
	5. Overdrive Direct Clutch Worn.	5. Disassemble overdrive. Repair as needed.
	6. Hydraulic Pressure Too Low.	6. Perform hydraulic pressure tests to determine cause.
	7. Rear Servo Leaking.	7. Air pressure check clutch-servo operation and repair as required.
	8. Band Linkage Binding.	8. Inspect and repair as required.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
SLIPS IN FORWARD DRIVE RANGES	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Fluid Foaming.	2. Check for high oil level, bad pump gasket or seals, dirt between pump halves and loose pump bolts. Replace pump if necessary.
	3. Throttle Linkage Misadjusted.	3. Adjust linkage.
	4. Gearshift Linkage Misadjusted.	4. Adjust linkage.
	5. Rear Clutch Worn.	5. Inspect and replace as needed.
	6. Low Hydraulic Pressure Due to Worn Pump, Incorrect Control Pressure Adjustments, Valve Body Warpage or Malfunction, Sticking, Leaking Seal Rings, Clutch Seals Leaking, Servo Leaks, Clogged Filter or Cooler Lines	6. Perform hydraulic and air pressure tests to determine cause.
	7. Rear Clutch Malfunction, Leaking Seals or Worn Plates.	7. Air pressure check clutch-servo operation and repair as required.
	8. Overrunning Clutch Worn, Not Holding (Slips in 1 Only).	8. Replace Clutch.
SLIPS IN LOW GEAR "D" ONLY, BUT NO IN 1 POSITION	Overrunning Clutch Faulty.	Replace overrunning clutch.
GROWLING, GRATING OR SCRAPING NOISES	1. Drive Plate Broken.	1. Replace.
	2. Torque Converter Bolts Hitting Dust Shield.	2. Dust shield bent. Replace or repair.
	3. Planetary Gear Set Broken/ Seized.	3. Check for debris in oil pan and repair as required.
	4. Overrunning Clutch Worn/Broken.	4. Inspect and check for debris in oil pan. Repair as required.
	5. Oil Pump Components Scored/ Binding.	5. Remove, inspect and repair as required.
	6. Output Shaft Bearing or Bushing Damaged.	6. Remove, inspect and repair as required.
	7. Clutch Operation Faulty.	7. Perform air pressure check and repair as required.
	8. Front and Rear Bands Misadjusted.	8. Adjust bands.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
DRAGS OR LOCKS UP	1. Fluid Level Low.	1. Check and adjust level.
	2. Clutch Dragging/Failed	2. Air pressure check clutch operation and repair as required.
	3. Front or Rear Band Misadjusted.	3. Adjust bands.
	4. Case Leaks Internally.	4. Check for leakage between passages in case.
	5. Servo Band or Linkage Malfunction.	5. Air pressure check servo operation and repair as required.
	6. Overrunning Clutch Worn.	6. Remove and inspect clutch. Repair as required.
	7. Planetary Gears Broken.	7. Remove, inspect and repair as required (look for debris in oil pan).
	8. Converter Clutch Dragging.	8. Check for plugged cooler. Perform flow check. Inspect pump for excessive side clearance. Replace pump as required.
NO 4-3 DOWNSHIFT	1. Circuit Wiring and/or Connectors Shorted.	1. Test wiring and connectors with test lamp and volt/ohmmeter. Repair wiring as necessary. Replace connectors and/or harnesses as required.
	2. PCM Malfunction.	2. Check PCM operation with DRB scan tool. Replace PCM only if faulty.
	3. TPS Malfunction	3. Check TPS with DRB scan tool at PCM.
	4. Lockup Solenoid Not Venting.	4. Remove valve body and replace solenoid assembly if plugged or shorted.
	5. Overdrive Solenoid Not Venting.	5. Remove valve body and replace solenoid if plugged or shorted.
	6. Valve Body Valve Sticking.	6. Repair stuck 3-4 shift valve or lockup timing valve.
NO 4-3 DOWNSHIFT WHEN CONTROL SWITCH IS TURNED OFF	1. Control Switch Open/Shorted.	1. Test and replace switch if faulty.
	2. Overdrive Solenoid Connector Shorted.	2. Test solenoids and replace if seized or shorted.
	3. PCM Malfunction.	3. Test with DRB scan tool. Replace PCM if faulty.
	4. Valve Body Stuck Valves.	4. Repair stuck 3-4, lockup or lockup timing valve.
CLUNK NOISE FROM DRIVELINE ON CLOSED THROTTLE 4-3 DOWNSHIFT	1. Transmission Fluid Low.	1. Add Fluid.
	2. Throttle Cable Misadjusted.	2. Adjust cable.
	3. Overdrive Clutch Select Spacer Wrong Spacer.	3. Replace overdrive piston thrust plate spacer.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
3-4 UPSHIFT OCCURS IMMEDIATELY AFTER 2-3 SHIFT	1. Overdrive Solenoid Connector or Wiring Shorted.	1. Test connector and wiring for loose connections, shorts or ground and repair as needed.
	2. TPS Malfunction.	2. Test TPS and replace as necessary. Check with DRB scan tool.
	3. PCM Malfunction.	3. Test PCM with DRB scan tool and replace controller if faulty.
	4. Overdrive Solenoid Malfunction.	4. Replace solenoid.
	5. Valve Body Malfunction.	5. Remove, disassemble, clean and inspect valve body components. Make sure all valves and plugs slide freely in bores. Polish valves with crocus cloth if needed.
WHINE/NOISE RELATED TO ENGINE SPEED	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Shift Cable Incorrect Routing.	2. Check shift cable for correct routing. Should not touch engine or bell housing.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO 3-4 UPSHIFT	1. Dash O/D Switch In OFF Position.	1. Turn control switch to ON position.
	2. Overdrive Circuit Fuse Blown.	2. Replace fuse. Determine why fuse failed and repair as necessary (i.e., shorts or grounds in circuit).
	3. O/D Switch Wire Shorted/Open Cut.	3. Check wires/connections with 12V test lamp and voltmeter. Repair damaged or loose wire/connection as necessary.
	4. Distance or Coolant Sensor Malfunction.	4. Check with DRB scan tool and repair or replace as necessary.
	5. TPS Malfunction.	5. Check with DRB scan tool and replace if necessary.
	6. Neutral Switch to PCM Wire Shorted/Cut.	6. Test switch as described in service section and replace if necessary. Engine no start.
	7. PCM Malfunction.	7. Check with DRB scan tool and replace if necessary.
	8. Overdrive Solenoid Shorted/Open.	8. Replace solenoid if shorted or open and repair loose or damaged wires (DRB scan tool).
	9. Solenoid Feed Orifice in Valve Body Blocked.	9. Remove, disassemble, and clean valve body thoroughly. Check feed orifice.
	10. Overdrive Clutch Failed.	10. Disassemble overdrive and repair as needed.
	11. Hydraulic Pressure Low.	11. Pressure test transmission to determine cause.
	12. Valve Body Valve Stuck.	12. Repair stuck 3-4 shift valve, 3-4 timing valve.
	13. O/D Piston Incorrect Spacer.	13. Remove unit, check end play and install correct spacer.
	14. Overdrive Piston Seal Failure.	14. Replace both seals.
	15. O/D Check Valve/Orifice Failed.	15. Check for free movement and secure assembly (in piston retainer). Check ball bleed orifice.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
SLIPS IN OVERDRIVE FOURTH GEAR	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Overdrive Clutch Pack Worn.	2. Remove overdrive unit and rebuild clutch pack.
	3. Overdrive Piston Retainer Bleed Orifice Blown Out.	3. Disassemble transmission, remove retainer and replace orifice.
	4. Overdrive Piston or Seal Malfunction.	4. Remove overdrive unit. Replace seals if worn. Replace piston if damaged. If piston retainer is damaged, remove and disassemble the transmission.
	5. 3-4 Shift Valve, Timing Valve or Accumulator Malfunction.	5. Remove and overhaul valve body. Replace accumulator seals. Make sure all valves operate freely in bores and do not bind or stick. Make sure valve body screws are correctly tightened and separator plates are properly positioned.
	6. Overdrive Unit Thrust Bearing Failure.	6. Disassemble overdrive unit and replace thrust bearing (NO. 1 thrust bearing is between overdrive piston and clutch hub; NO. 2 thrust bearing is between the planetary gear and the direct clutch spring plate; NO. 3 thrust bearing is between overrunning clutch hub and output shaft).
	7. O/D Check Valve/Bleed Orifice Failure.	7. Check for function/secure orifice insert in O/D piston retainer.
DELAYED 3-4 UPSHIFT (SLOW TO ENGAGE)	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Throttle Valve Cable Misadjusted.	2. Adjust throttle valve cable.
	3. Overdrive Clutch Pack Worn/Burnt.	3. Remove unit and rebuild clutch pack.
	4. TPS Faulty.	4. Test with DRB scan tool and replace as necessary
	5. Overdrive Clutch Bleed Orifice Plugged.	5. Disassemble transmission and replace orifice.
	6. Overdrive Solenoid or Wiring Shorted/Open.	6. Test solenoid and check wiring for loose/corroded connections or shorts/grounds. Replace solenoid if faulty and repair wiring if necessary.
	7. Overdrive Excess Clearance	7. Remove unit. Measure end play and select proper spacer.
	8. O/D Check Valve Missing or Stuck.	8. Check for presence of check valve. Repair or replace as required.
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.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
HARSH 1-2, 2-3, 3-4 OR 3-2 SHIFTS	Lockup Solenoid Malfunction.	Remove valve body and replace solenoid assembly.
NO START IN PARK OR NEUTRAL	1. Gearshift Linkage/Cable Misadjusted.	1. Adjust linkage/cable.
	2. Neutral Switch Wire Open/Cut.	2. Check continuity with test lamp. Repair as required.
	3. Neutral Switch Faulty.	3. Refer to service section for test and replacement procedure.
	4. Neutral Switch Connect Faulty.	4. Connectors spread open. Repair.
	5. Valve Body Manual Lever Assembly Bent/Worn/Broken.	5. Inspect lever assembly and replace if damaged.
NO REVERSE (OR SLIPS IN REVERSE)	1. Direct Clutch Pack (front clutch) Worn.	1. Disassemble unit and rebuild clutch pack.
	2. Rear Band Misadjusted.	2. Adjust band.
	3. Front Clutch Malfunctioned/ Burned.	3. Air-pressure test clutch operation. Remove and rebuild if necessary.
	4. Overdrive Thrust Bearing Failure.	4. Disassemble geartrain and replace bearings.
	5. Direct Clutch Spring Collapsed/ Broken.	5. Remove and disassemble unit. Check clutch position and replace spring.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL LEAKS.	1. Fluid Lines and Fittings Loose/Leaks/Damaged.	1. Tighten fittings. If leaks persist, replace fittings and lines if necessary.
	2. Fill Tube (where tube enters case) Leaks/Damaged.	2. Replace tube seal. Inspect tube for cracks in fill tube.
	3. Pressure Port Plug Loose Loose/Damaged.	3. Tighten to correct torque. Replace plug or reseal if leak persists.
	4. Pan Gasket Leaks.	4. Tighten pan screws (150 in. lbs.). If leaks persist, replace gasket.
	5. Valve Body Manual Lever Shaft Seal Leaks/Worn.	5. Replace shaft seal.
	6. Rear Bearing Access Plate Leaks.	6. Replace gasket. Tighten screws.
	7. Gasket Damaged or Bolts are Loose.	7. Replace bolts or gasket or tighten both.
	8. Adapter/Extension Gasket Damaged Leaks/Damaged.	8. Replace gasket.
	9. Neutral Switch Leaks/Damaged.	9. Replace switch and gasket.
	10. Converter Housing Area Leaks.	10. Check for leaks at seal caused by worn seal or burr on converter hub (cutting seal), worn bushing, missing oil return, oil in front pump housing or hole plugged. Check for leaks past O-ring seal on pump or past pump-to-case bolts; pump housing porous, oil coming out vent due to overfill or leak past front band shaft access plug.
	11. Pump Seal Leaks/Worn/Damaged.	11. Replace seal.
	12. Torque Converter Weld Leak/Cracked Hub.	12. Replace converter.
	13. Case Porosity Leaks.	13. Replace case.
NOISY OPERATION IN FOURTH GEAR ONLY	1. Overdrive Clutch Discs, Plates or Snap Rings Damaged.	1. Remove unit and rebuild clutch pack.
	2. Overdrive Piston or Planetary Thrust Bearing Damaged.	2. Remove and disassemble unit. Replace either thrust bearing if damaged.
	3. Output Shaft Bearings Scored/Damaged.	3. Remove and disassemble unit. Replace either bearing if damaged.
	4. Planetary Gears Worn/Chipped.	4. Remove and overhaul overdrive unit.
	5. Overdrive Unit Overrunning Clutch Rollers Worn/Scored.	5. Remove and overhaul overdrive unit.

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. 11) 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.

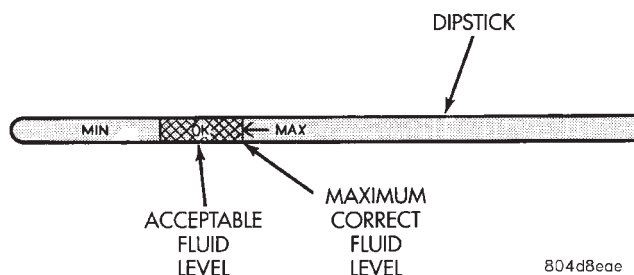


Fig. 11 Dipstick Fluid Level Marks—Typical

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) Place a large diameter shallow drain pan beneath the transmission pan.
- (3) Remove bolts holding front and sides of pan to transmission (Fig. 12).
- (4) Loosen bolts holding rear of pan to transmission.
- (5) Slowly separate front of pan away from transmission allowing the fluid to drain into drain pan.
- (6) Hold up pan and remove remaining bolt holding pan to transmission.
- (7) While holding pan level, lower pan away from transmission.
- (8) Pour remaining fluid in pan into drain pan.
- (9) Remove screws holding filter to valve body (Fig. 13).
- (10) Separate filter from valve body and pour fluid in filter into drain pan.
- (11) Dispose of used trans fluid and filter properly.

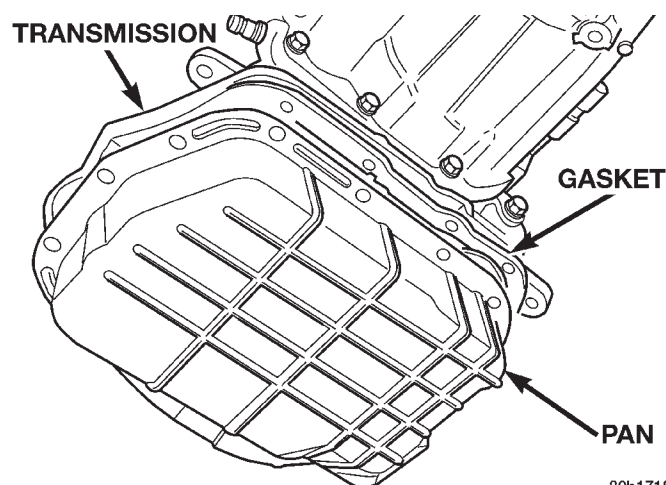


Fig. 12 Transmission Pan

INSPECTION

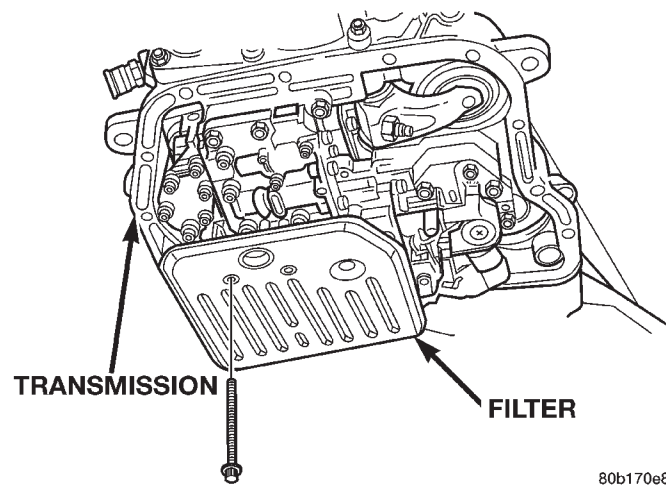


Fig. 13 Transmission Filter

Inspect bottom of pan and magnet for excessive amounts of metal or fiber contamination. A light

SERVICE PROCEDURES (Continued)

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.

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. 13). 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. 12). Tighten bolts to 17 N·m (150 in. lbs.) torque.

(6) 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 lower 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 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

After the new or repaired transmission has been installed, fill to the proper level with Mopar® ATF PLUS 3 (Type 7176) automatic transmission fluid. The volume should be checked using the following procedure:

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

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

SERVICE PROCEDURES (Continued)

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

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

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

(5) If flow is found to be within acceptable limits, replace the cooler. Then fill transmission to the proper level, using Mopar® ATF PLUS 3 (Type 7176) automatic transmission fluid.

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

FLUSHING COOLERS AND TUBES

When a transmission failure has contaminated the fluid, the oil cooler(s) must be flushed. The cooler bypass valve in the transmission must be replaced also. 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 6906 Cooler Flusher.

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 6906

(1) Remove cover plate filler plug on Tool 6906. 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 6906.

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

(4) Disconnect the cooler lines at the transmission.

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

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

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

(7) Turn pump ON for two to three minutes to flush cooler(s) and lines. Monitor pressure readings and clear return lines. Pressure readings should stabilize below 20 psi. for vehicles equipped with a single cooler and 30 psi. for vehicles equipped with dual coolers. If flow is intermittent or exceeds these pressures, replace cooler.

(8) Turn pump OFF.

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

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

(11) Place CLEAR suction line into a one quart container of Mopar® ATF Plus 3, type 7176 automatic transmission fluid.

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

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

ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum transaxle 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

The overdrive unit can be removed and serviced separately. It is not necessary to remove the entire transmission assembly to perform overdrive unit repairs.

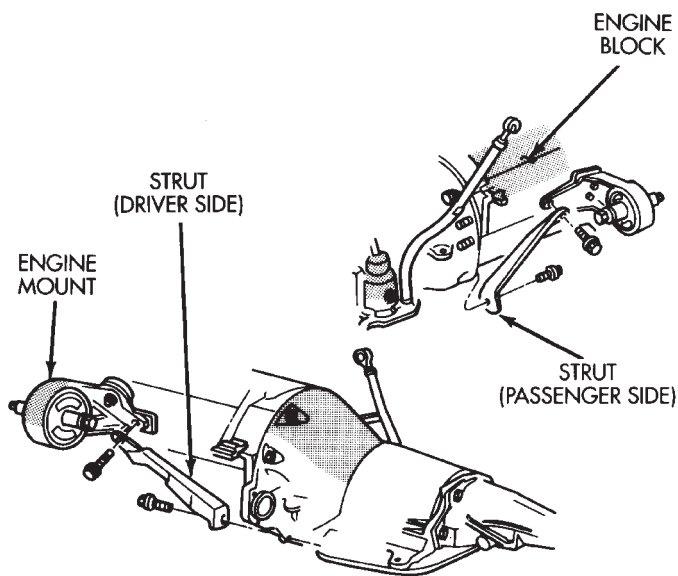
If only the overdrive unit requires service, refer to the overdrive unit removal and installation procedures.

REMOVAL AND INSTALLATION (Continued)

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. Be sure to remove the transmission and converter as an assembly.

REMOVAL

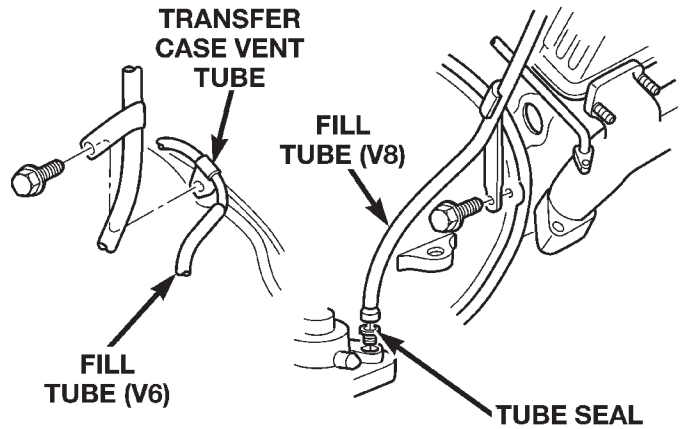
- (1) Disconnect battery negative cable.
- (2) Disconnect and lower or remove necessary exhaust components.
- (3) Remove engine-to-transmission struts, if equipped (Fig. 14).



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Fig. 14 Transmission-To-Engine Strut Attachment

- (4) Disconnect fluid cooler lines at transmission.
- (5) Remove starter motor.
- (6) Disconnect and remove the crankshaft position sensor. Retain the sensor attaching bolts.
- (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 fill tube bracket bolts and pull tube out of transmission. Retain fill tube seal (Fig. 14). On 4 x 4 models, it will also be necessary to remove bolt attaching transfer case vent tube to converter housing (Fig. 15).
- (10) Mark torque converter and drive plate for assembly alignment. Note that bolt holes in crankshaft flange, drive plate and torque converter all have one offset hole.

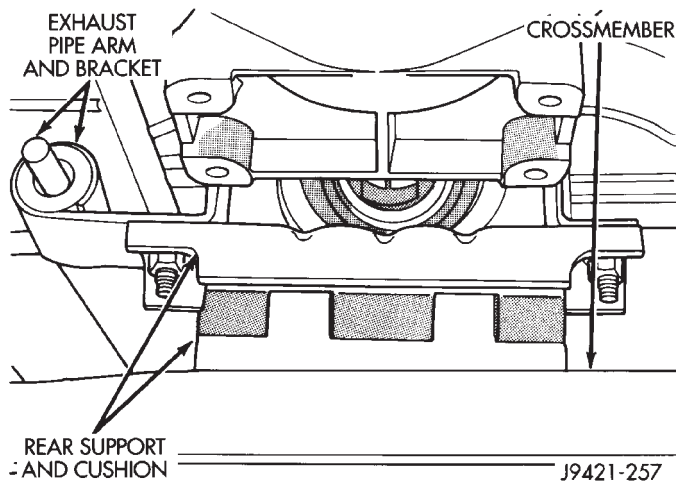


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Fig. 15 Fill Tube Attachment

- (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 shaft. On 4 x 4 models, remove both propeller shafts.
- (13) Disconnect wires from park/neutral position switch and transmission solenoid.
- (14) Disconnect gearshift rod and torque shaft assembly from transmission.
- (15) Disconnect throttle valve cable from transmission bracket and throttle valve lever.
- (16) On 4 x 4 models, disconnect shift rod from transfer case shift lever.
- (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 (Fig. 16) and remove rear support.
- (20) Remove bolts attaching crossmember to frame and remove crossmember.
- (21) On 4 x 4 models, remove transfer case with transmission jack or aid of helper.
- (22) Remove all converter housing bolts.
- (23) Carefully work transmission and torque converter assembly rearward off engine block dowels.
- (24) Lower transmission and remove assembly from under the vehicle.
- (25) To remove torque converter, remove C-clamp from edge of bell housing and carefully slide torque converter out of the transmission.

REMOVAL AND INSTALLATION (Continued)

**Fig. 16 Rear Support Cushion****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) Lubricate converter pilot hub with transmission fluid.

(4) Align and install converter in oil pump.

(5) Carefully insert converter in oil pump. Then rotate converter back and forth until fully seated in pump gears.

(6) Check converter seating with steel scale and straightedge (Fig. 17). Surface of converter lugs should be 1/2 in. to rear of straightedge when converter is fully seated.

(7) Temporarily secure converter with C-clamp.

(8) Position transmission on jack and secure it with 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.**

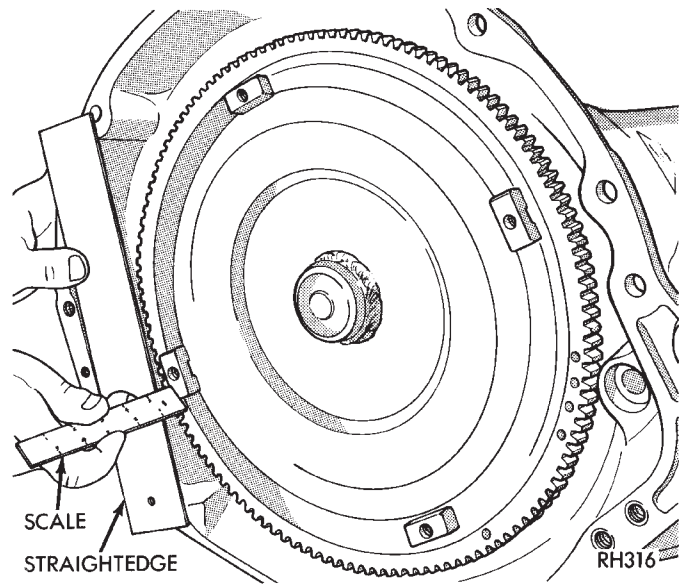
(10) Raise transmission and align converter with drive plate and converter housing with engine block.

(11) Move transmission forward. Then raise, lower or tilt transmission to align converter housing with engine block dowels.

(12) Rotate converter so alignment marks scribed on converter are aligned with mark on driveplate.

(13) Carefully work transmission forward and over engine block dowels until converter hub is seated in crankshaft.

(14) Install bolts attaching converter housing to engine.

**Fig. 17 Typical Method Of Checking Converter Seating**

(15) Install rear support. Then lower transmission onto crossmember and install bolts attaching transmission mount to crossmember.

(16) Remove engine support fixture.

(17) Install crankshaft position sensor.

(18) 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.

(19) Connect gearshift and throttle cable to transmission.

(20) Connect wires to park/neutral position switch, transmission solenoid(s) and oxygen sensor. Be sure transmission harnesses are properly routed.

CAUTION: It is essential that correct length bolts be used to attach the converter to the driveplate. Bolts that are too long will damage the clutch surface inside the converter.

(21) Install torque converter-to-driveplate bolts. On models with 10.75 in. converter, tighten bolts to 31 N·m (270 in. lbs.). On models with 12.2 in. converter, tighten bolts to 47 N·m (35 ft. lbs.).

(22) Install converter housing access cover.

(23) Install starter motor and cooler line bracket.

(24) Connect cooler lines to transmission.

(25) Install transmission fill tube. Install new seal on tube before installation.

(26) Install exhaust components.

(27) Align and connect propeller shaft.

(28) Adjust gearshift linkage and throttle valve cable if necessary.

REMOVAL AND INSTALLATION (Continued)

- (29) Lower vehicle.
- (30) Fill transmission 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.

- (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. 18). 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.

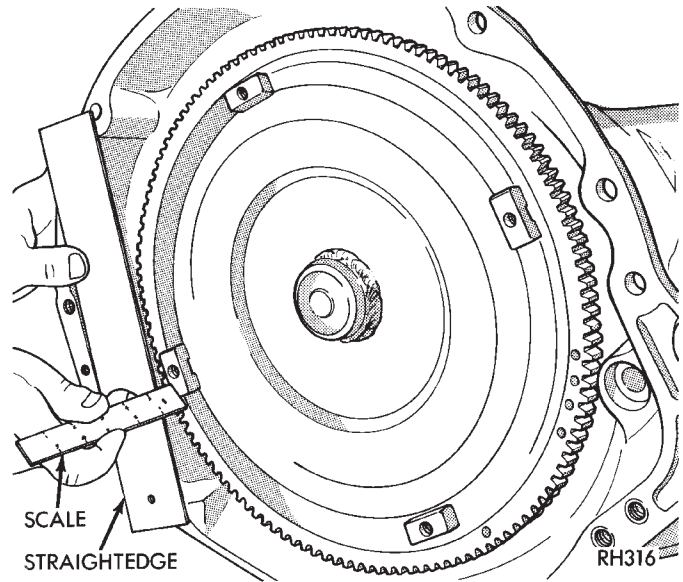


Fig. 18 Checking Torque Converter Seating
YOKE SEAL REPLACEMENT

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. 19) from overdrive housing.

INSTALLATION

- (1) Place seal in position on overdrive housing.
- (2) Drive seal into overdrive housing with Seal Installer C-3995-A (Fig. 20).
- (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.

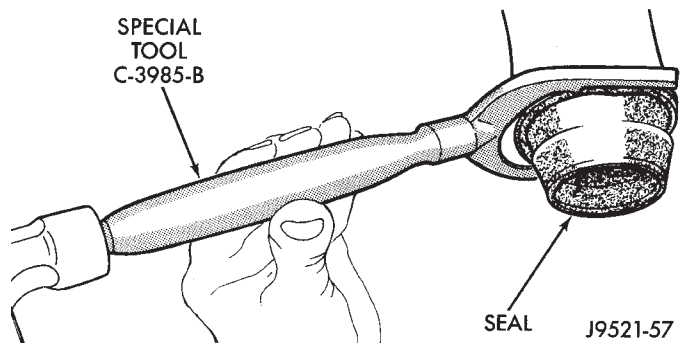
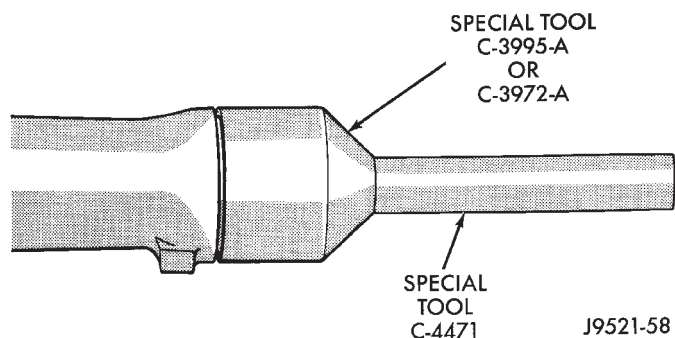


Fig. 19 Removing Overdrive Housing Yoke Seal
PARK/NEUTRAL POSITION SWITCH

REMOVAL

- (1) Raise vehicle and position drain pan under switch.

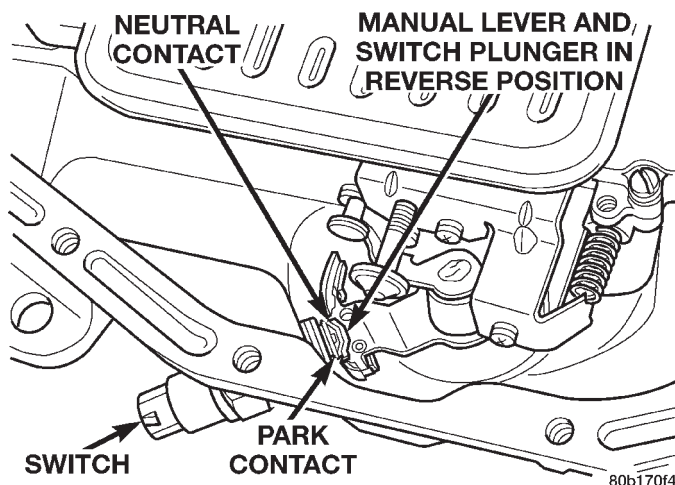
REMOVAL AND INSTALLATION (Continued)

**Fig. 20 Installing Overdrive Housing Yoke Seal**

- (2) Disconnect switch wires.
- (3) Remove switch from case.

INSTALLATION

- (1) Move shift lever to Park and Neutral positions. Verify that switch operating lever fingers are centered in switch opening in case (Fig. 21).

**Fig. 21 Park/Neutral Position 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.

GOVERNOR SOLENOID AND PRESSURE SENSOR**REMOVAL**

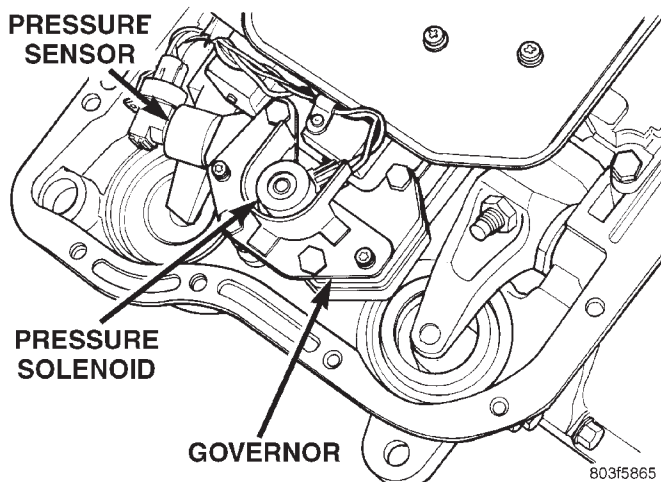
- (1) Hoist and support vehicle on safety stands.
- (2) Remove transmission fluid pan and filter.
- (3) Disengage wire connectors from pressure sensor and solenoid (Fig. 22).
- (4) Remove screws holding pressure solenoid retainer to governor body.
- (5) Separate solenoid retainer from governor (Fig. 23).
- (6) Pull solenoid from governor body (Fig. 24).

- (7) Remove bolts holding governor body to valve body.
- (8) Separate governor body from valve body (Fig. 25).
- (9) Remove governor body gasket.
- (10) Remove retainer holding pressure sensor to governor body.
- (11) Pull pressure sensor from governor body (Fig. 26).

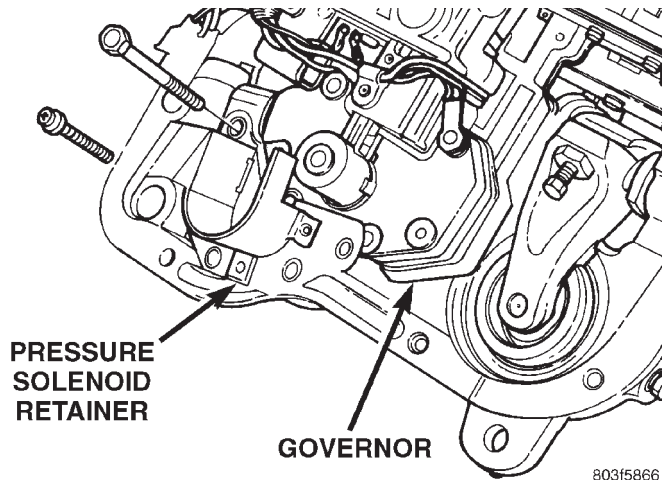
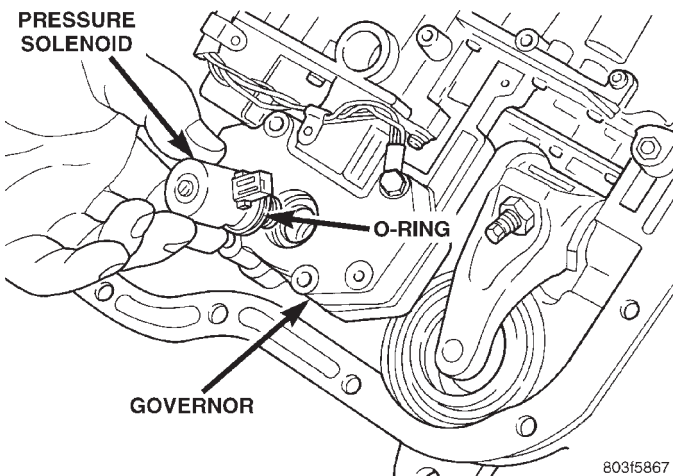
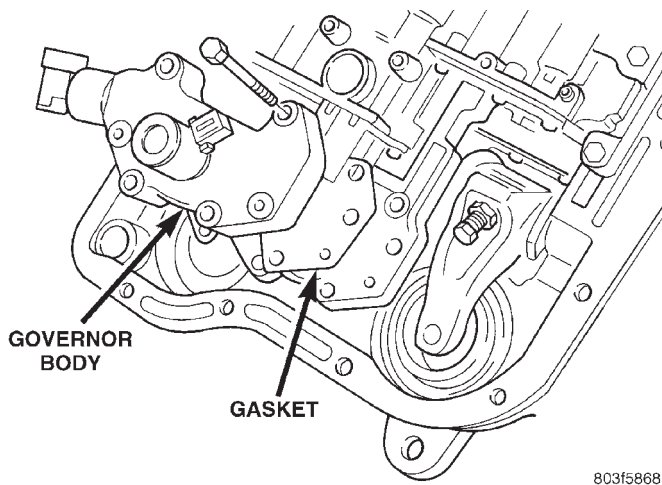
INSTALLATION

Before installing the pressure sensor and solenoid in the governor body, replace O-ring seals, clean the gasket surfaces and replace gasket.

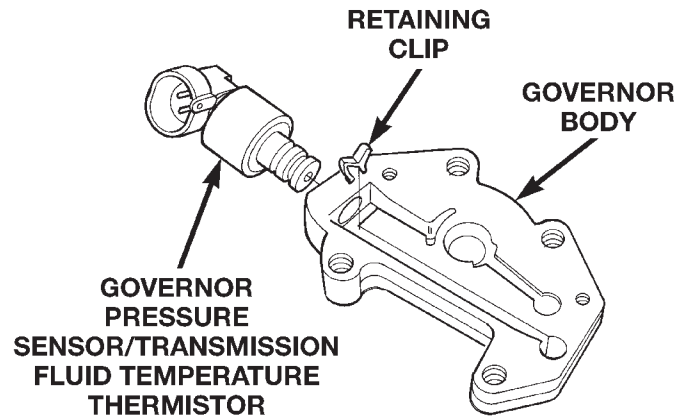
- (1) Lubricate O-ring on pressure sensor with transmission fluid.
- (2) Align pressure sensor to bore in governor body (Fig. 26).
- (3) Push pressure sensor into governor body.
- (4) Install retainer to hold pressure sensor to governor body.
- (5) Place gasket in position on back of governor body (Fig. 25).
- (6) Place governor body in position on valve body.
- (7) Install bolts to hold governor body to valve body.
- (8) Lubricate O-ring, on pressure solenoid, with transmission fluid.
- (9) Align pressure solenoid to bore in governor body (Fig. 24).
- (10) Push solenoid into governor body.
- (11) Place solenoid retainer in position on governor (Fig. 23).
- (12) Install screws to hold pressure solenoid retainer to governor body.
- (13) Engage wire connectors into pressure sensor and solenoid (Fig. 22).
- (14) Install transmission fluid pan and (new) filter.
- (15) Lower vehicle and road test to verify repair.

**Fig. 22 Governor Solenoid And Pressure Sensor**

REMOVAL AND INSTALLATION (Continued)

**Fig. 23 Pressure Solenoid Retainer****Fig. 24 Pressure Solenoid and O-ring****Fig. 25 Governor Body and Gasket****VALVE BODY**

The valve body can be removed for service without having to remove the transmission assembly.

**Fig. 26 Pressure Sensor and Retainer**

The valve body can be disassembled for cleaning and inspection of the individual components. Refer to Disassembly and Assembly section for proper procedures.

The only replaceable valve body components are:

- Manual lever.
- Manual lever washer, seal, E-clip, and shaft seal.
- Manual lever detent ball.
- Throttle lever.
- Fluid filter.
- Pressure adjusting screw bracket.
- Governor pressure solenoid.
- Governor pressure sensor.
- Converter clutch/overdrive solenoid assembly and harness (includes sump temperature thermistor).
- Governor housing gasket.
- Solenoid case connector O-rings.

The remaining valve body components are serviced only as part of a complete valve body assembly.

REMOVAL

- (1) Shift transmission into NEUTRAL.
- (2) Raise vehicle.
- (3) Remove gearshift and throttle levers from shaft of valve body manual lever.
- (4) Disconnect wires at solenoid case connector (Fig. 27).
- (5) Position drain pan under transmission oil pan.
- (6) Remove transmission oil pan and gasket.
- (7) Remove fluid filter from valve body.
- (8) Remove bolts attaching valve body to transmission case.
- (9) Lower valve body enough to remove accumulator piston and springs.
- (10) Work manual lever shaft and electrical connector out of transmission case.

REMOVAL AND INSTALLATION (Continued)

(11) Lower valve body, rotate valve body away from case, pull park rod out of sprag, and remove valve body (Fig. 28).

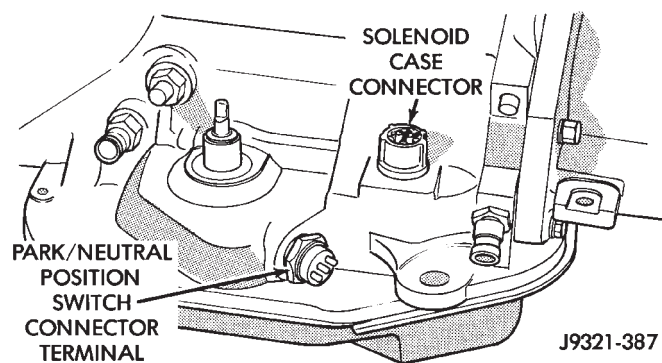


Fig. 27 Transmission Case Connector

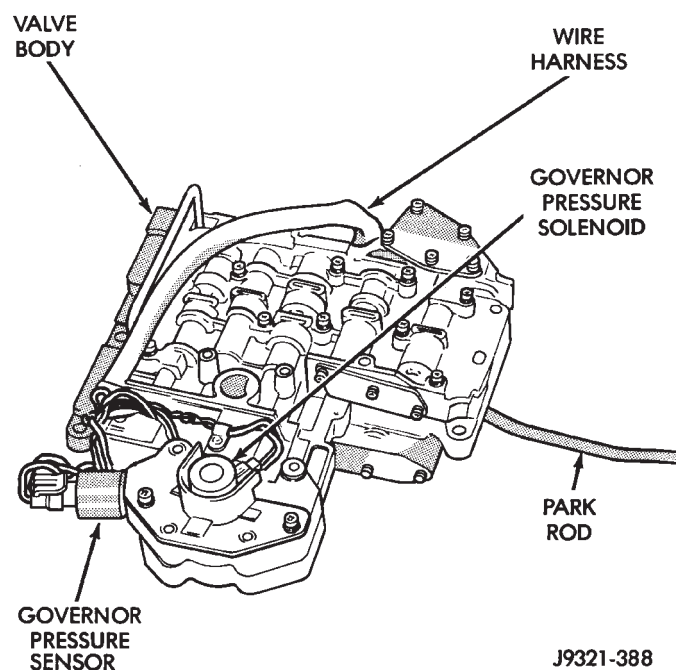


Fig. 28 Valve Body

INSTALLATION

(1) Check condition of O-ring seals on valve body harness connector (Fig. 29). Replace seals on connector body if cut or worn.

(2) Check condition of manual lever shaft seal in transmission case. Replace seal if lip is cut or worn. Install new seal with 15/16 deep well socket (Fig. 30).

(3) Check condition of seals on accumulator piston (Fig. 31). Install new piston seals, if necessary.

(4) Place valve body manual lever in low (1 position) so ball on park lock rod will be easier to install in sprag.

(5) Lubricate shaft of manual lever with petroleum jelly. This will ease inserting shaft through seal in case.

(6) Lubricate seal rings on valve body harness connector with petroleum jelly.

(7) Position valve body in case and work end of park lock rod into and through pawl sprag. Turn propeller shaft to align sprag and park lock teeth if necessary. The rod will click as it enters pawl. Move rod to check engagement.

CAUTION: It is possible for the park rod to displace into a cavity just above the pawl sprag during installation. Make sure the rod is actually engaged in the pawl and has not displaced into this cavity.

(8) Install accumulator springs and piston into case. Then swing valve body over piston and outer spring to hold it in place.

(9) Align accumulator piston and outer spring, manual lever shaft and electrical connector in case.

(10) Then seat valve body in case and install one or two bolts to hold valve body in place.

(11) Tighten valve body bolts alternately and evenly to 11 N·m (100 in. lbs.) torque.

(12) Install new fluid filter on valve body. Tighten filter screws to 4 N·m (35 in. lbs.) torque.

(13) Install throttle and gearshift levers on valve body manual lever shaft.

(14) Check and adjust front and rear bands if necessary.

(15) Connect solenoid case connector wires.

(16) Install oil pan and new gasket. Tighten pan bolts to 17 N·m (13 ft. lbs.) torque.

(17) Lower vehicle and fill transmission with Mopar® ATF Plus 3, type 7176 fluid.

(18) Check and adjust gearshift and throttle valve cables, if necessary.

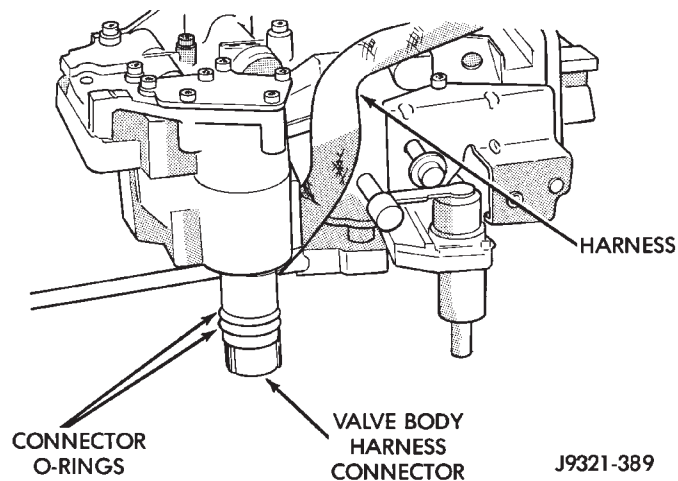
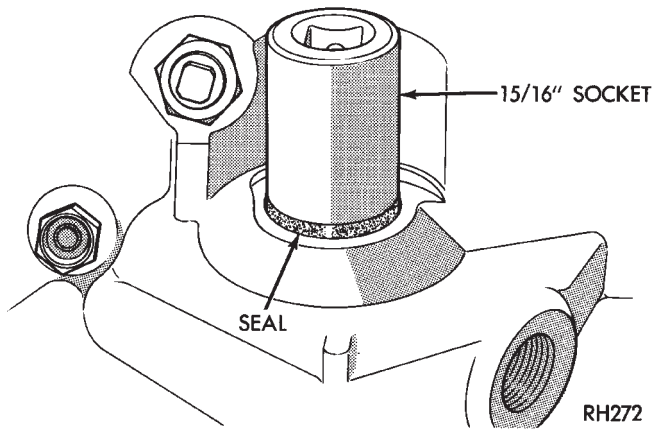
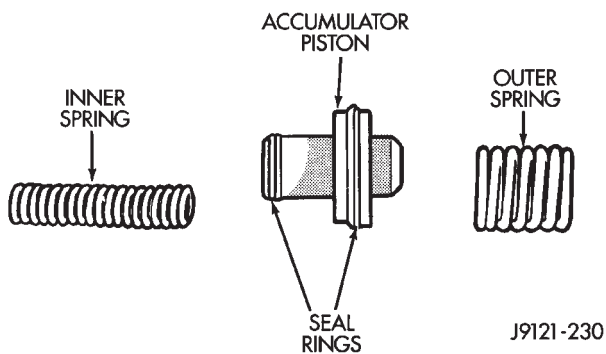


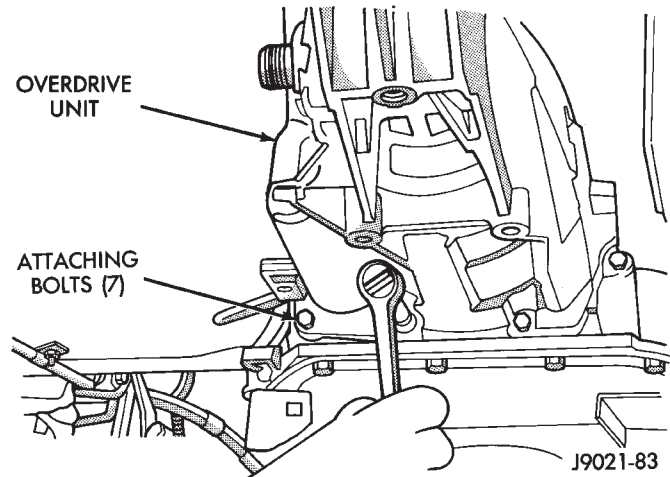
Fig. 29 Valve Body Harness Connector O-Ring Seal

REMOVAL AND INSTALLATION (Continued)

**Fig. 30 Manual Lever Shaft Seal****Fig. 31 Accumulator Piston Components****OVERDRIVE UNIT****REMOVAL**

- (1) Shift transmission into Park.
- (2) Raise vehicle.
- (3) Mark propeller shaft universal joint(s) and axle pinion yoke for alignment reference at installation.
- (4) Disconnect and remove propeller shaft(s).
- (5) Remove transmission oil pan, remove gasket, drain oil and reinstall pan.
- (6) If overdrive unit had malfunctioned, or if fluid is contaminated, remove entire transmission. If diagnosis indicated overdrive problems only, remove just the overdrive unit.
- (7) Support transmission with transmission jack.
- (8) Remove vehicle speed sensor and speedometer adapter, if necessary.
- (9) Remove bolts attaching overdrive unit to transmission (Fig. 32).

CAUTION: Support the overdrive unit with a jack before moving it rearward. This is necessary to prevent damaging the intermediate shaft. Do not allow the shaft to support the entire weight of the overdrive unit.

**Fig. 32 Overdrive Unit Bolts**

(10) Carefully work overdrive unit off intermediate shaft. Do not tilt unit during removal. Keep it as level as possible.

(11) If overdrive unit does not require service, immediately insert Alignment Tool 6227-2 in splines of planetary gear and overrunning clutch to prevent splines from rotating out of alignment. If misalignment occurs, overdrive unit will have to be disassembled in order to realign splines.

(12) Remove and retain overdrive piston thrust bearing. Bearing may remain on piston or in clutch hub during removal.

(13) Position drain pan on workbench.

(14) Place overdrive unit over drain pan. Tilt unit to drain residual fluid from case.

(15) Examine fluid for clutch material or metal fragments. If fluid contains these items, overhaul will be necessary.

(16) If overdrive unit does not require any service, leave alignment tool in position. Tool will prevent accidental misalignment of planetary gear and overrunning clutch splines.

INSTALLATION

(1) Be sure overdrive unit Alignment Tool 6227-2 is fully seated before moving unit. If tool is not seated and gear splines rotate out of alignment, overdrive unit will have to be disassembled in order to realign splines.

(2) If overdrive piston retainer was not removed during service and original case gasket is no longer reusable, prepare new gasket by trimming it.

(3) Cut out old case gasket around piston retainer with razor knife (Fig. 33).

(4) Use old gasket as template and trim new gasket to fit.

(5) Position new gasket over piston retainer and on transmission case. Use petroleum jelly to hold

REMOVAL AND INSTALLATION (Continued)

gasket in place if necessary. Do not use any type of sealer to secure gasket. Use petroleum jelly only.

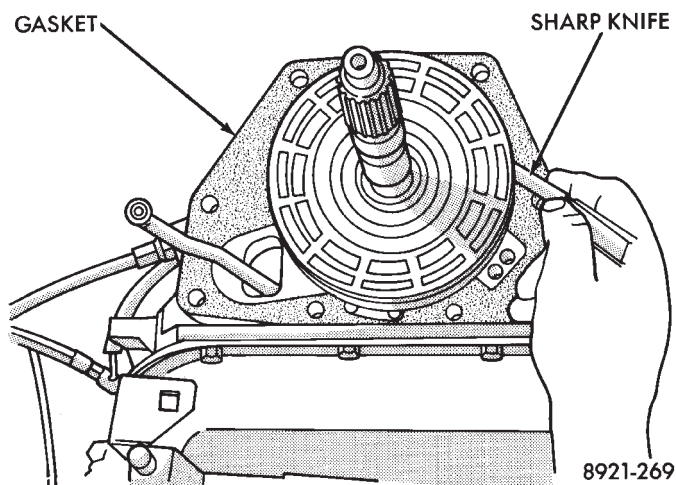


Fig. 33 Trimming Overdrive Case Gasket

(6) Install selective spacer on intermediate shaft, if removed. Spacer goes in groove just rearward of shaft rear splines (Fig. 34).

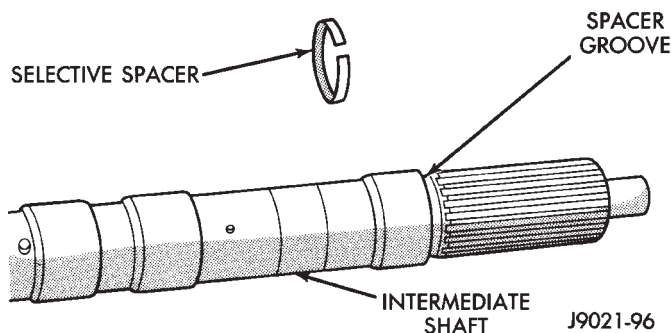


Fig. 34 Intermediate Shaft Selective Spacer Location

(7) Install thrust bearing in overdrive unit sliding hub. Use petroleum jelly to hold bearing in position.

CAUTION: Be sure the shoulder on the inside diameter of the bearing is facing forward.

(8) Verify that splines in overdrive planetary gear and overrunning clutch hub are aligned with Alignment Tool 6227-2. Overdrive unit cannot be installed if splines are not aligned. If splines have rotated out of alignment, unit will have to be disassembled to realign splines.

(9) Carefully slide Alignment Tool 6227-2 out of overdrive planetary gear and overrunning clutch splines.

(10) Raise overdrive unit and carefully slide it straight onto intermediate shaft. Insert park rod into park lock reaction plug at same time. Avoid tilting overdrive during installation as this could cause planetary gear and overrunning clutch splines to

rotate out of alignment. If this occurs, it will be necessary to remove and disassemble overdrive unit to realign splines.

(11) Work overdrive unit forward on intermediate shaft until seated against transmission case.

(12) Install bolts attaching overdrive unit to transmission unit. Tighten bolts in diagonal pattern to 34 N·m (25 ft-lbs).

(13) Install speed sensor and speedometer adapter. Be sure to index adapter.

(14) Connect speed sensor and overdrive wires.

(15) Align and install propeller shaft.

OVERDRIVE HOUSING BUSHING

REMOVAL

(1) Remove overdrive housing yoke seal.

(2) Insert Remover 6957 into overdrive housing. Tighten tool to bushing and remove bushing (Fig. 35).

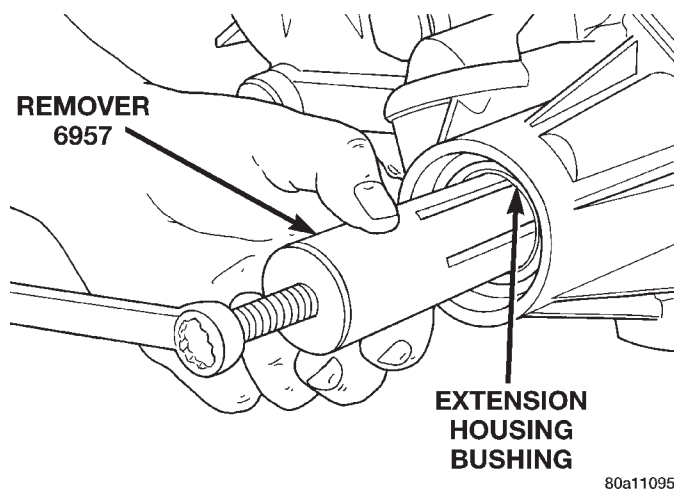


Fig. 35 Bushing Removal—Typical

INSTALLATION

(1) Align bushing oil hole with oil slot in overdrive 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. 36).

OUTPUT SHAFT REAR BEARING

REMOVAL

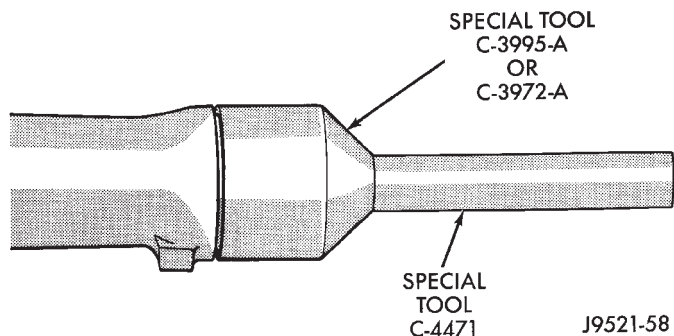
(1) Remove overdrive unit from the vehicle.

(2) Remove overdrive geartrain from housing.

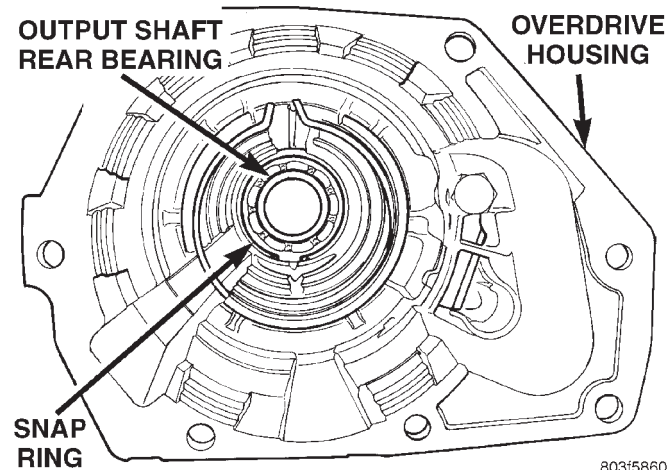
(3) Remove snap ring holding output shaft rear bearing into overdrive housing (Fig. 37).

(4) Using a suitable driver inserted through the rear end of housing, drive bearing from housing.

REMOVAL AND INSTALLATION (Continued)

**Fig. 36 Overdrive Housing Seal Installation****INSTALLATION**

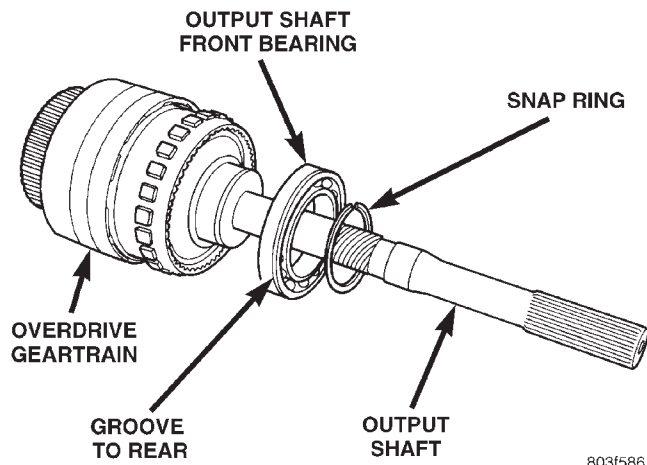
- (1) Place replacement bearing in position in housing.
- (2) Using a suitable driver, drive bearing into housing until the snap ring groove is visible.
- (3) Install snap ring to hold bearing into housing (Fig. 37).
- (4) Install overdrive geartrain into housing.
- (5) Install overdrive unit in vehicle.

**Fig. 37 Output Shaft Rear Bearing****OUTPUT SHAFT FRONT BEARING****REMOVAL**

- (1) Remove overdrive unit from the vehicle.
- (2) Remove overdrive geartrain from housing.
- (3) Remove snap ring holding output shaft front bearing to overdrive geartrain. (Fig. 38).
- (4) Pull bearing from output shaft.

INSTALLATION

- (1) Place replacement bearing in position on geartrain with locating retainer groove toward the rear.
- (2) Push bearing onto shaft until the snap ring groove is visible.
- (3) Install snap ring to hold bearing onto output shaft (Fig. 38).
- (4) Install overdrive geartrain into housing.
- (5) Install overdrive unit in vehicle.

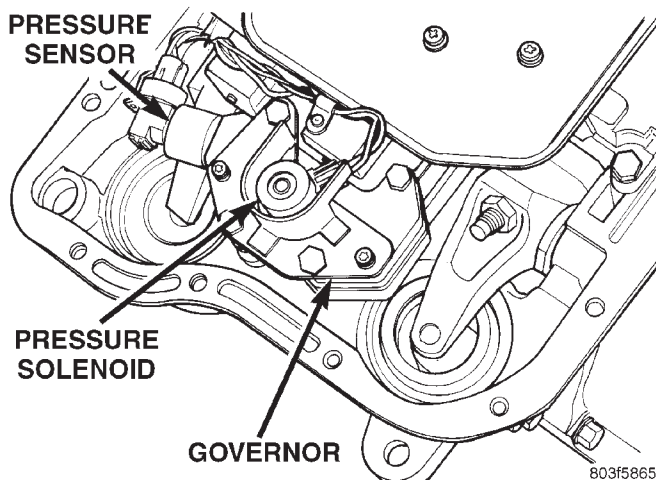
**Fig. 38 Output Shaft Front Bearing****DISASSEMBLY AND ASSEMBLY****VALVE BODY**

Remove the valve body from the transmission, refer to Removal and Installation procedures section in this group.

DISASSEMBLY

CAUTION: Do not clamp any valve body component in a vise. This practice can damage the component resulting in unsatisfactory operation after assembly and installation. Do not use pliers to remove any of the valves, plugs or springs and do not force any of the components out or into place. The valves and valve body housings will be damaged if force is used. Tag or mark the valve body springs for reference as they are removed. Do not allow them to become intermixed.

- (1) Remove fluid filter.
- (2) Disconnect wires from governor pressure sensor and solenoid (Fig. 39).

**Fig. 39 Governor Pressure Solenoid And Sensor Wire Locations**

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Remove screws attaching governor body and retainer plate to transfer plate (Fig. 40).

(4) Remove retainer plate, governor body and gasket from transfer plate (Fig. 41).

(5) Disconnect wires from governor pressure sensor, if not done previously.

(6) Remove governor pressure sensor from governor body. Sensor is retained in body with M-shaped spring clip (Fig. 42). Remove clip with small pointed tool and slide sensor out of body.

(7) Remove governor pressure solenoid by pulling it straight out of bore in governor body (Fig. 43). Remove and discard solenoid O-rings if worn, cut, or torn.

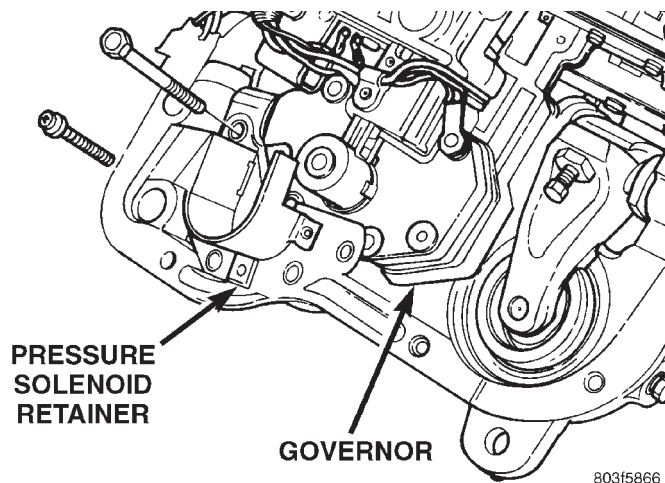


Fig. 40 Governor Body And Retainer Plate Attaching Screw

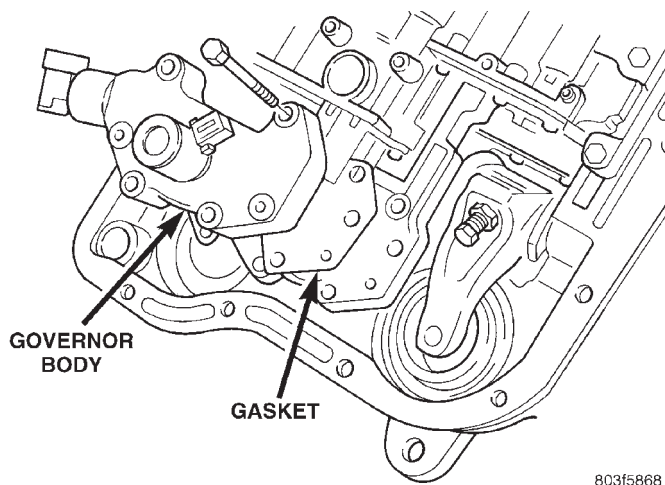


Fig. 41 Governor Body And Gasket

(8) Remove transmission fluid filter.

(9) Remove small shoulder bolt that secures solenoid harness case connector to 3-4 accumulator housing (Fig. 44). **Retain shoulder bolt. Either tape it to harness or thread it back into accumulator housing after connector removal.**

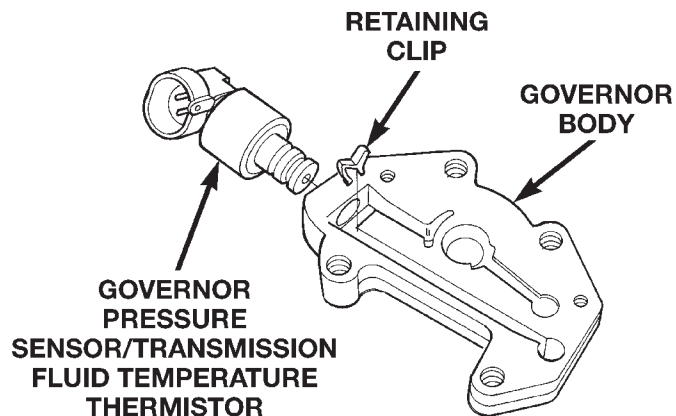


Fig. 42 Governor Pressure Sensor

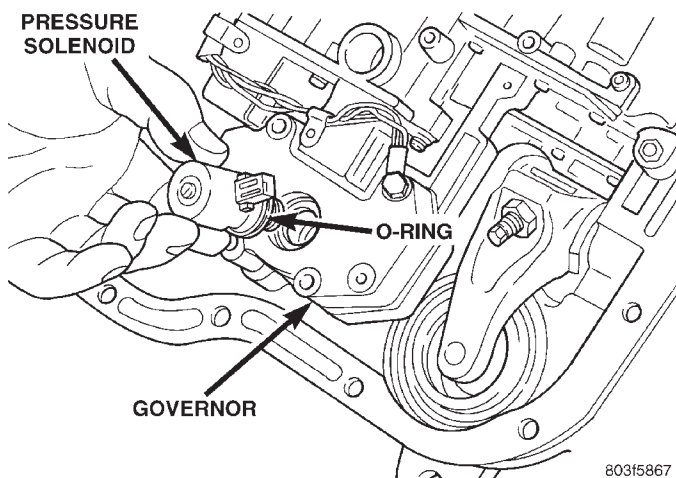


Fig. 43 Governor Pressure Solenoid

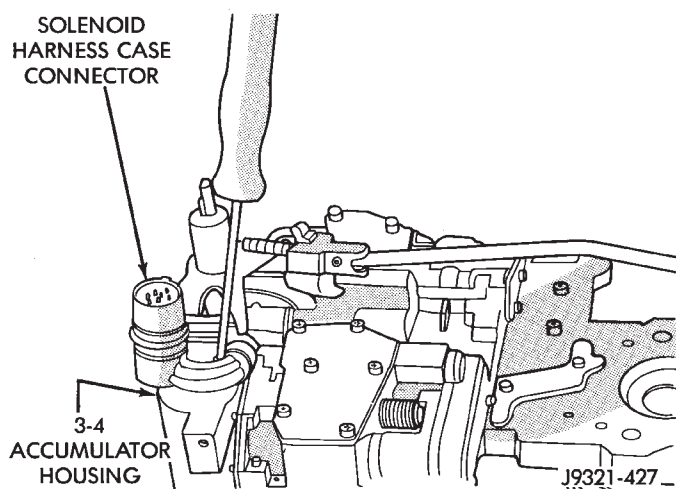


Fig. 44 Solenoid Harness Case Connector Shoulder Bolt

DISASSEMBLY AND ASSEMBLY (Continued)

(10) Unhook overdrive/converter solenoid harness from 3-4 accumulator cover plate (Fig. 45).

(11) Turn valve body over and remove screws that attach overdrive/converter solenoid assembly to valve body (Fig. 46).

(12) Remove solenoid and harness assembly from valve body (Fig. 47).

(13) Remove boost valve cover (Fig. 48).

(14) Remove boost valve retainer, valve spring and boost valve (Fig. 49).

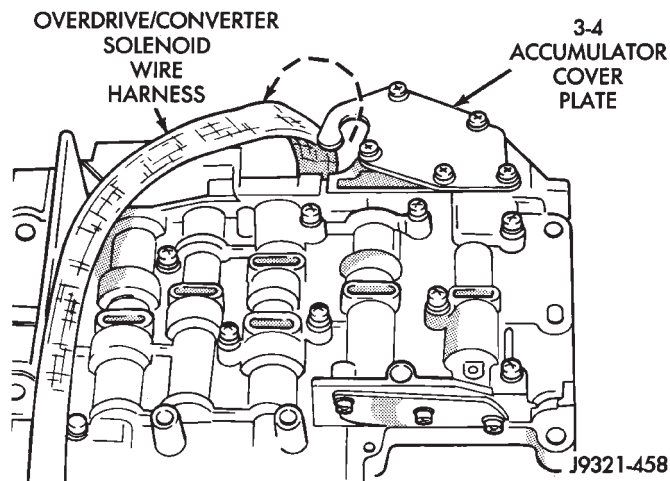


Fig. 45 Unhooking Solenoid Harness From Accumulator Cover Plate

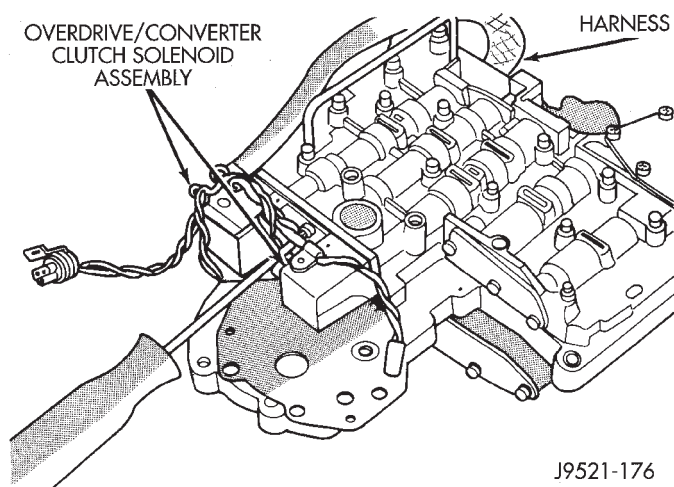


Fig. 46 Solenoid Assembly Screws

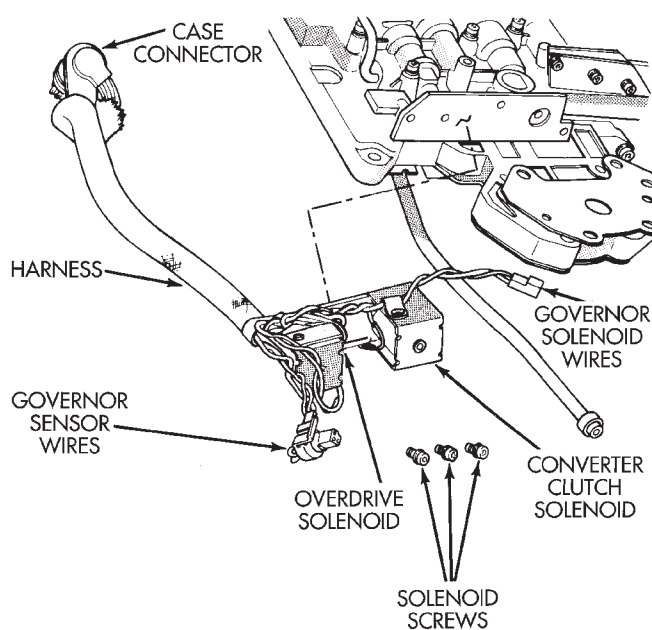


Fig. 47 Solenoid Assembly

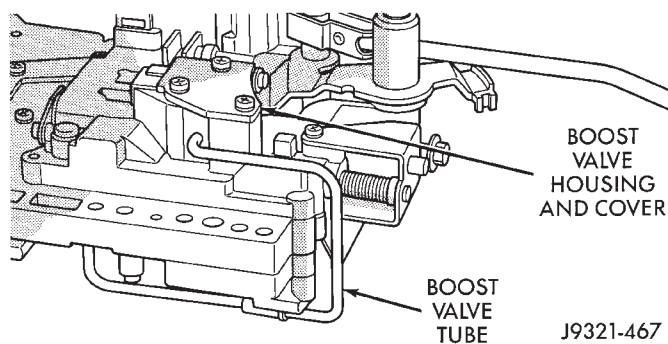


Fig. 48 Boost Valve Cover Location

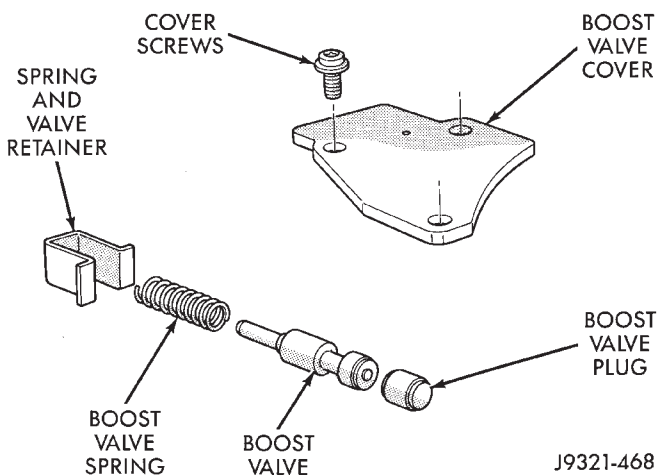


Fig. 49 Boost Valve Components

DISASSEMBLY AND ASSEMBLY (Continued)

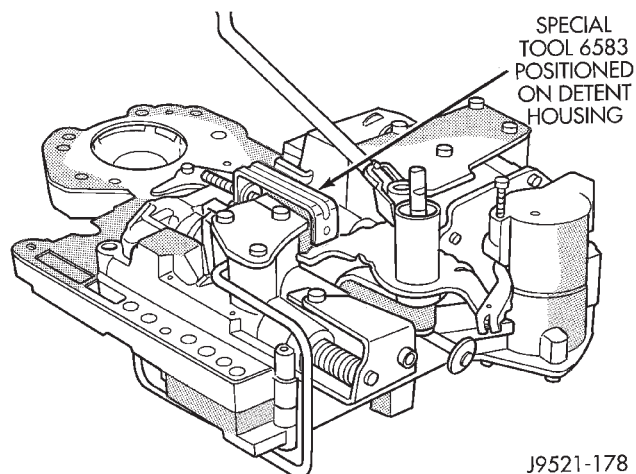
(15) Secure detent ball and spring with Retainer Tool 6583 (Fig. 50).

(16) Remove park rod E-clip and separate rod from manual lever (Fig. 51).

(17) Remove E-clip and washer that retains throttle lever shaft in manual lever (Fig. 52).

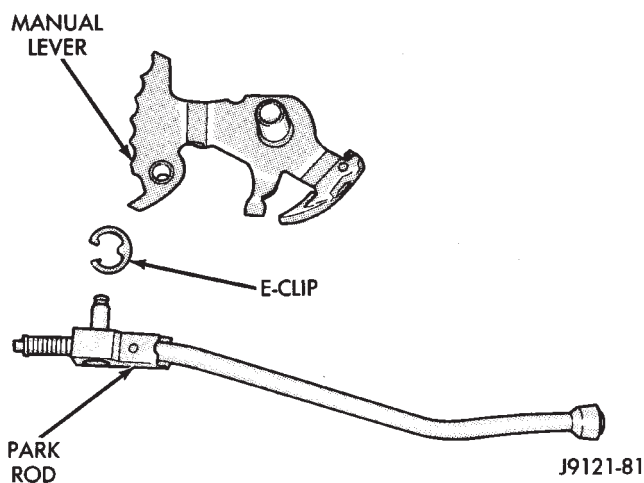
(18) Remove manual lever and throttle lever (Fig. 53). Rotate and lift manual lever off valve body and throttle lever shaft. Then slide throttle lever out of valve body.

(19) Position pencil magnet next to detent housing to catch detent ball and spring. Then carefully remove Retainer Tool 6583 and remove detent ball and spring (Fig. 54).



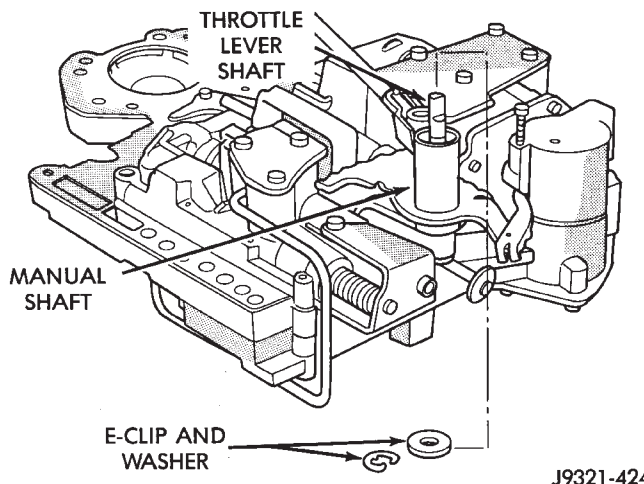
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Fig. 50 Detent Ball And Spring



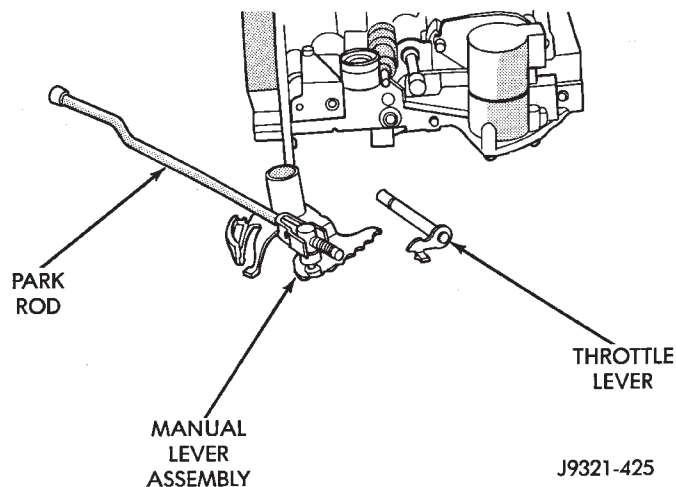
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Fig. 51 Park Rod



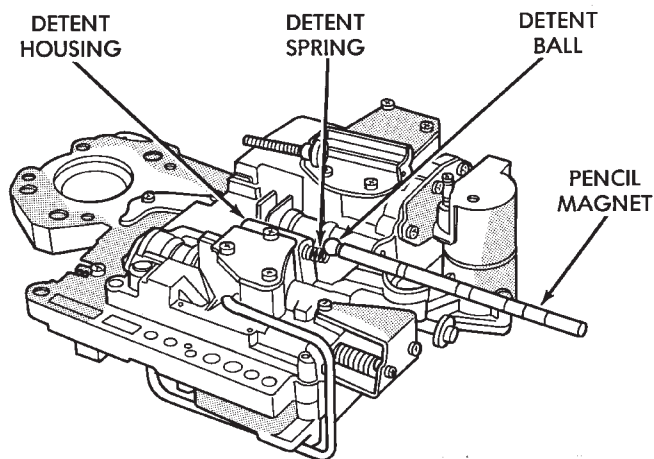
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Fig. 52 Throttle Lever E-Clip And Washer



J9321-425

Fig. 53 Manual And Throttle Lever



J9321-426

Fig. 54 Detent Ball And Spring

DISASSEMBLY AND ASSEMBLY (Continued)

(20) Remove screws attaching pressure adjusting screw bracket to valve body and transfer plate (Fig. 55). Hold bracket firmly against spring tension while removing last screw.

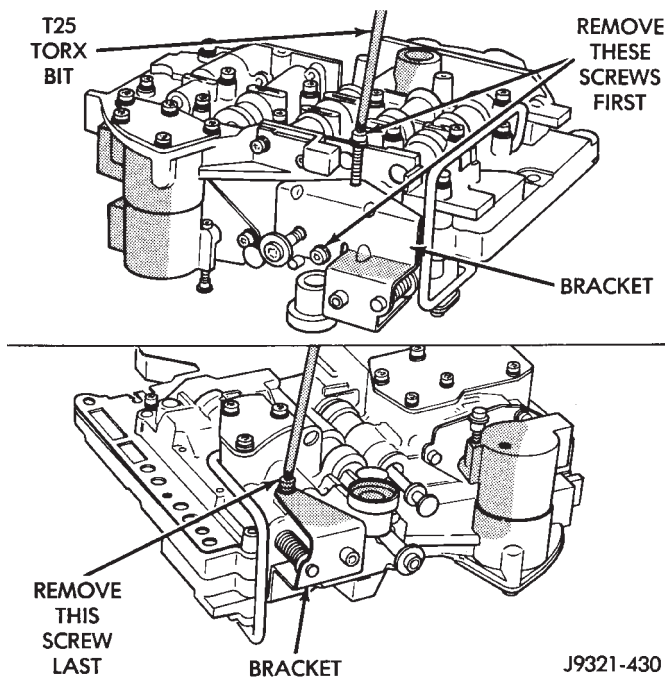


Fig. 55 Adjusting Screw Bracket Fastener

(21) Remove adjusting screw bracket, line pressure adjusting screw, pressure regulator valve spring and switch valve spring (Fig. 56). **Do not remove throttle pressure adjusting screw from bracket and do not disturb setting of either adjusting screw during removal.**

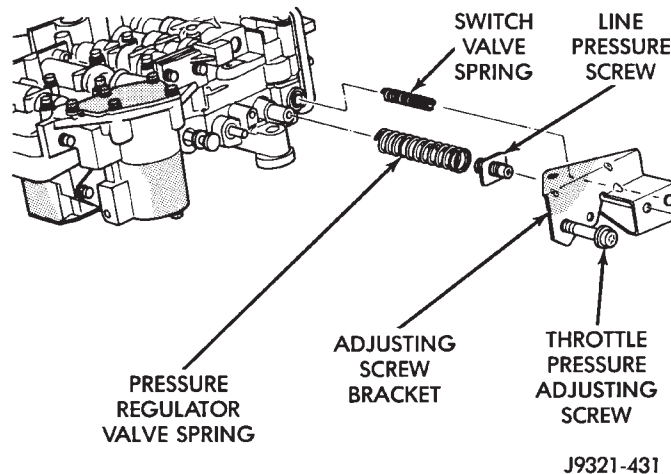


Fig. 56 Adjusting Screw Bracket And Spring

(22) Turn upper housing over and remove switch valve, regulator valve and spring, and manual valve (Fig. 57).

(23) Remove kickdown detent, kickdown valve, and throttle valve and spring (Fig. 57).

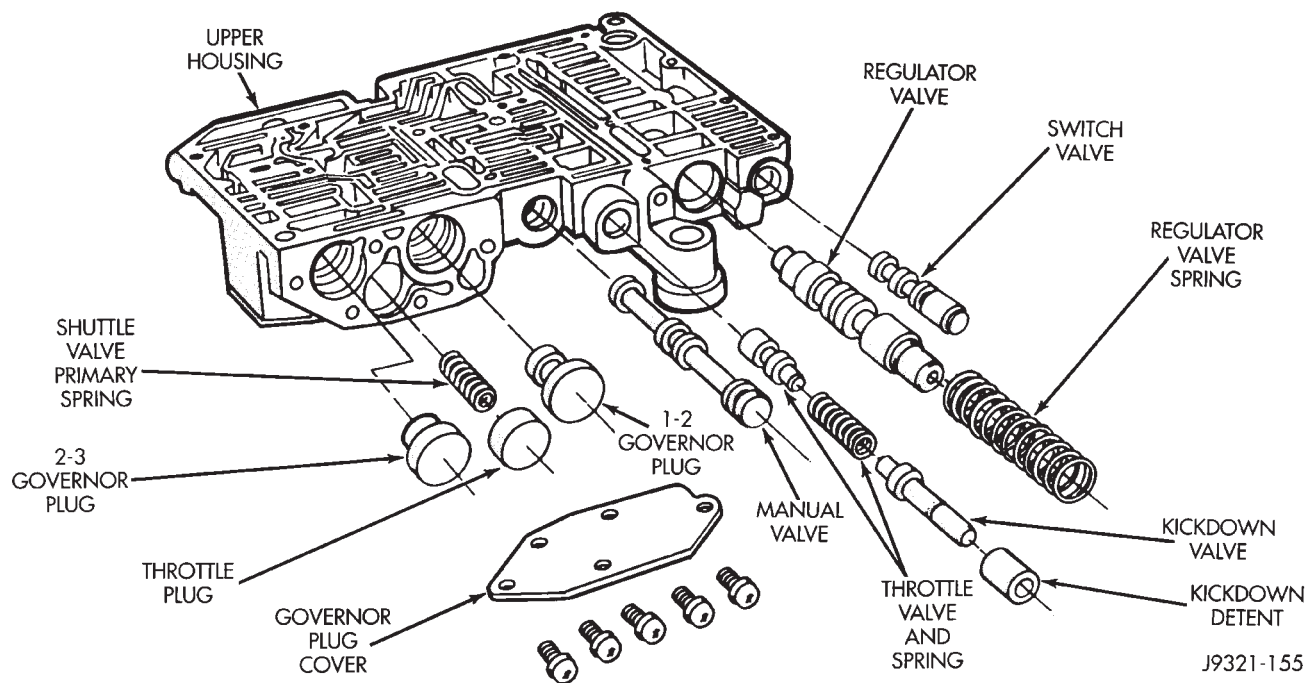


Fig. 57 Upper Housing Control Valve Locations

DISASSEMBLY AND ASSEMBLY (Continued)

(24) Loosen left-side 3-4 accumulator housing attaching screw about 2-3 threads. Then remove center and right-side housing attaching screws (Fig. 58).

(25) Carefully rotate 3-4 accumulator housing upward and remove 3-4 shift valve spring and converter clutch valve plug and spring (Fig. 59).

(26) Remove left-side screw and remove 3-4 accumulator housing from valve body (Fig. 60).

(27) Bend back tabs on boost valve tube brace (Fig. 61).

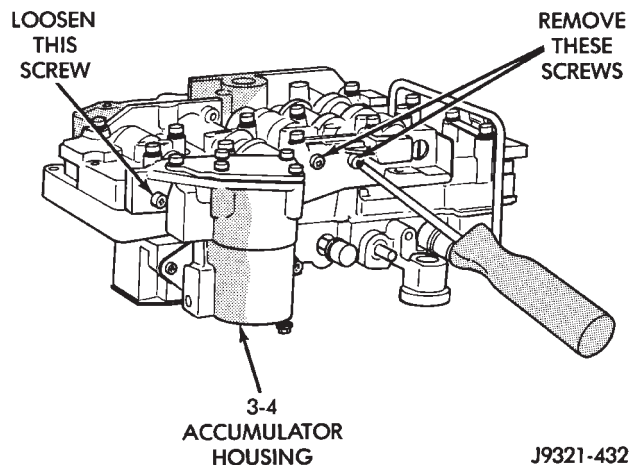


Fig. 58 Accumulator Housing Screw Locations

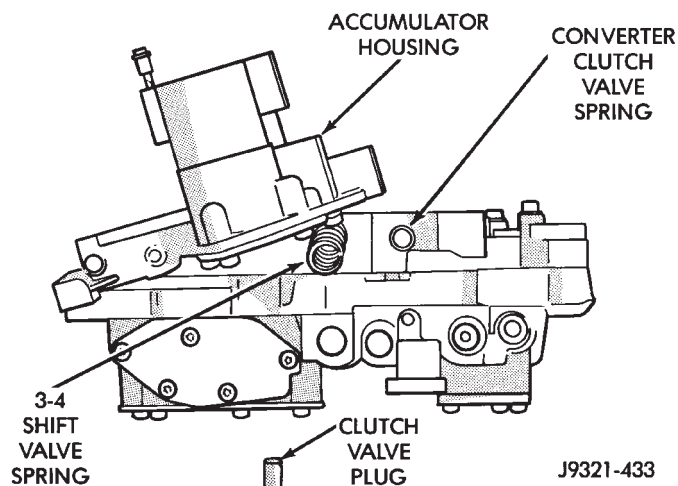


Fig. 59 3-4 Shift And Converter Clutch Valve Springs And Plug

(28) Remove boost valve connecting tube (Fig. 62). Disengage tube from upper housing port first. Then rock opposite end of tube back and forth to work it out of lower housing.

CAUTION: Do not use tools to loosen or pry the connecting tube out of the valve body housings. Loosen and remove the tube by hand only.

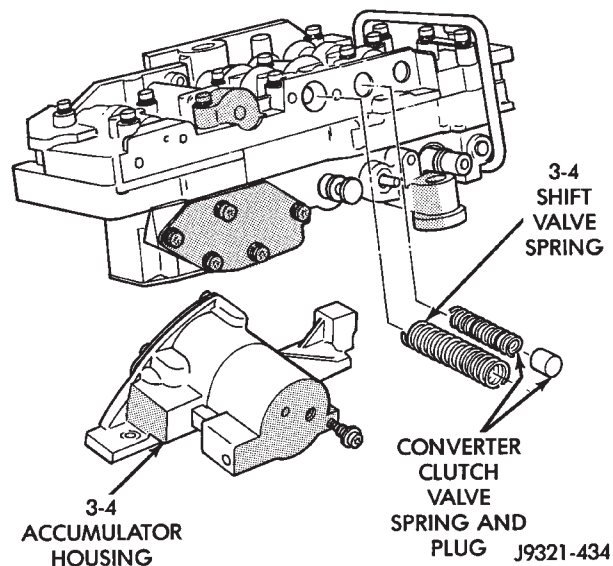


Fig. 60 Accumulator Housing, Valve Springs And Plug

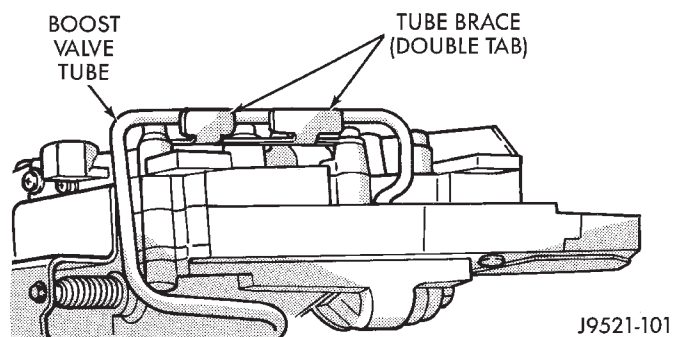


Fig. 61 Boost Valve Tube Brace

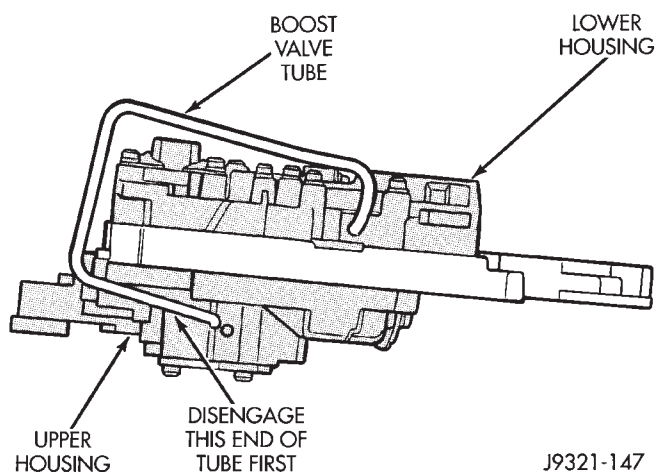


Fig. 62 Boost Valve Tube

DISASSEMBLY AND ASSEMBLY (Continued)

(29) Turn valve body over so lower housing is facing upward (Fig. 63). In this position, the two check balls in upper housing will remain in place and not fall out when lower housing and separator plate are removed.

(30) Remove screws attaching valve body lower housing to upper housing and transfer plate (Fig. 63). **Note position of boost valve tube brace for assembly reference.**

(31) Remove lower housing and overdrive separator plate from transfer plate (Fig. 63).

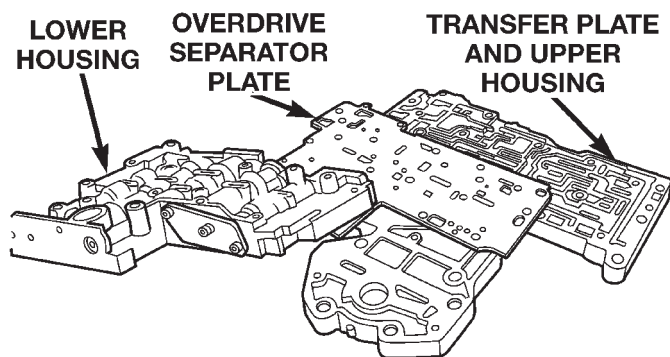


Fig. 63 Lower Housing

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(32) Remove the ECE check ball from the transfer plate (Fig. 64). The ECE check ball is approximately 4.8 mm (3/16 in.) in diameter.

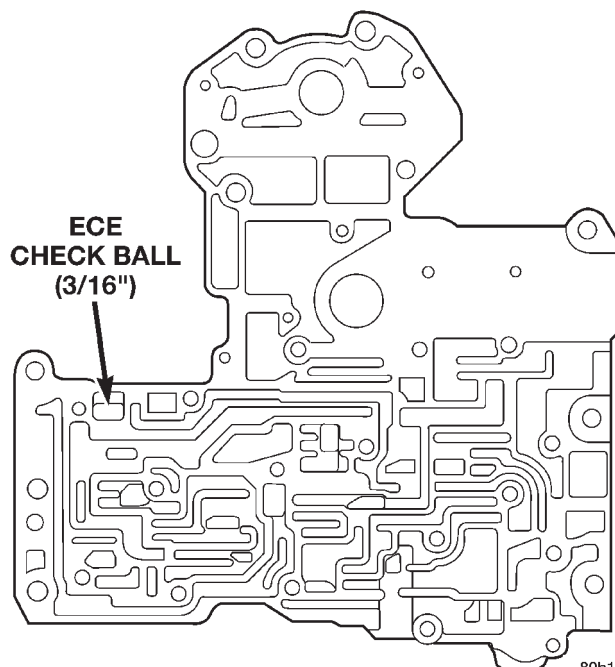


Fig. 64 ECE Check Ball

(33) Remove transfer plate from upper housing (Fig. 65).

(34) Turn transfer plate over so upper housing separator plate is facing upward.

(35) Remove upper housing separator plate from transfer plate (Fig. 66). Note position of filter in separator plate for assembly reference.

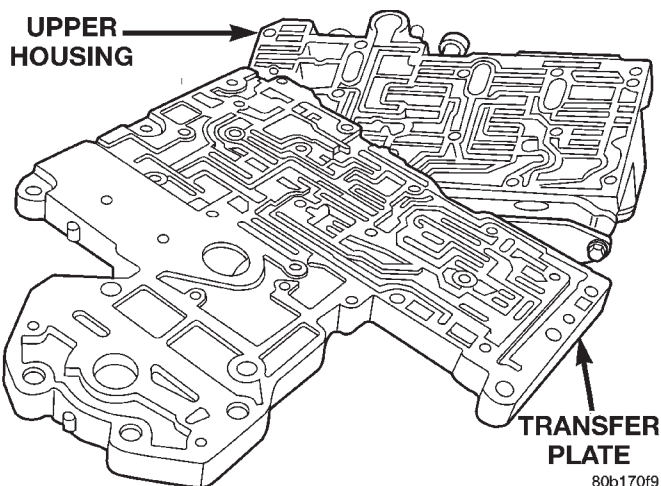


Fig. 65 Transfer Plate

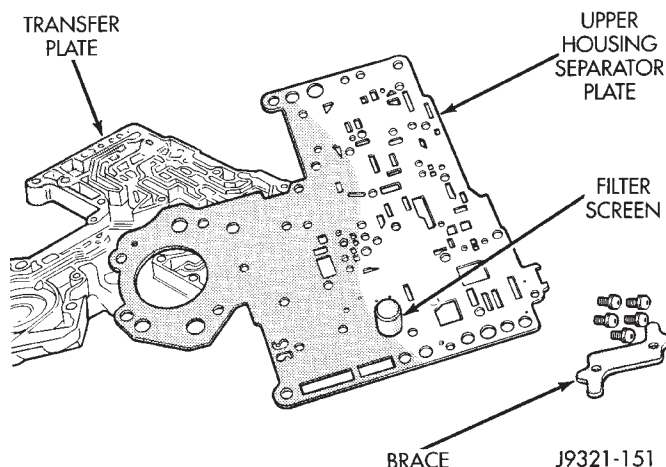


Fig. 66 Upper Housing Separator Plate

(36) Remove rear clutch and rear servo check balls from transfer plate. Note check ball location for assembly reference (Fig. 67).

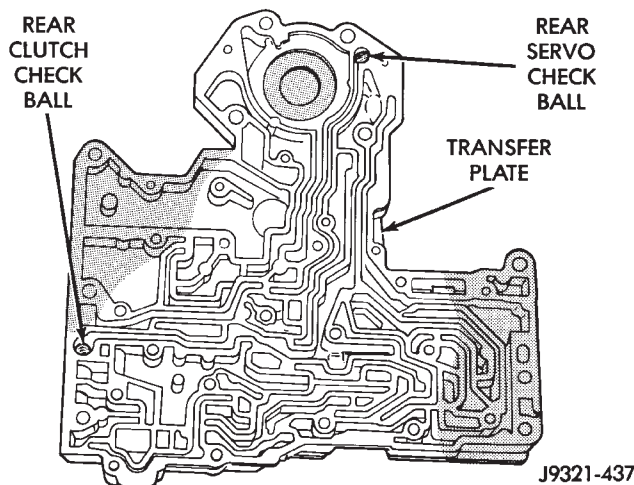


Fig. 67 Rear Clutch And Rear Servo Check Ball Locations

DISASSEMBLY AND ASSEMBLY (Continued)

VALVE BODY UPPER HOUSING

(1) Note location of check balls in valve body upper housing (Fig. 68). Then remove the one large diameter and the six smaller diameter check balls.

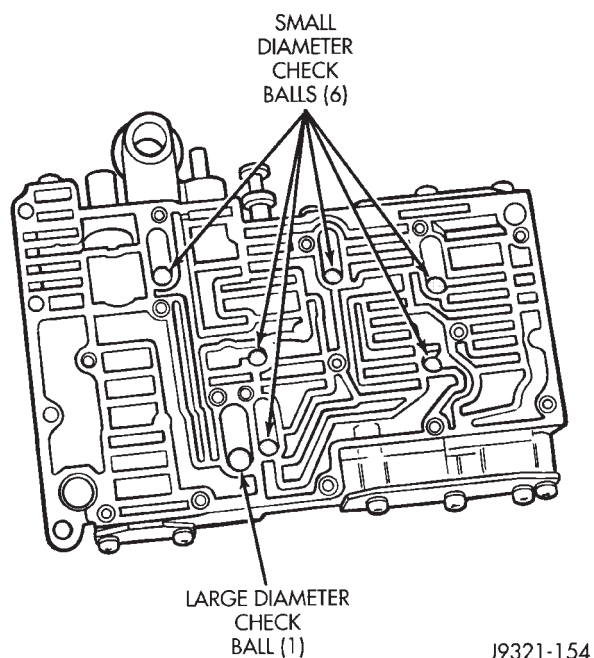


Fig. 68 Check Ball Locations In Upper Housing

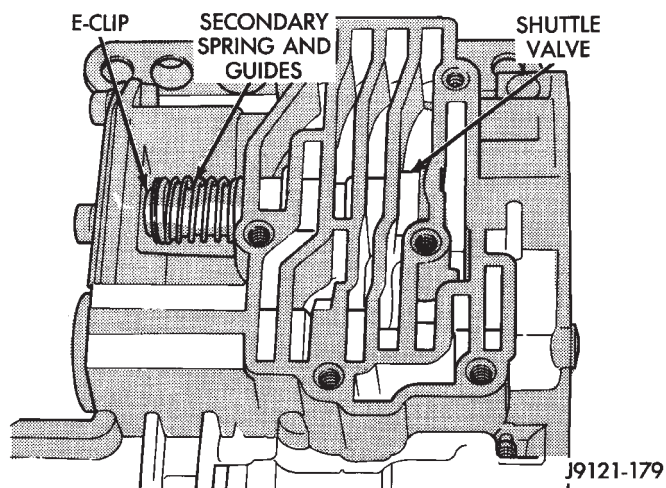


Fig. 69 Shuttle Valve E-Clip And Secondary Spring Location

(2) Remove governor plug and shuttle valve covers (Fig. 70).

(3) Remove E-clip that secures shuttle valve secondary spring on valve stem (Fig. 69).

(4) Remove throttle plug, primary spring, shuttle valve, secondary spring, and spring guides (Fig. 70).

(5) Remove boost valve retainer, spring and valve if not previously removed.

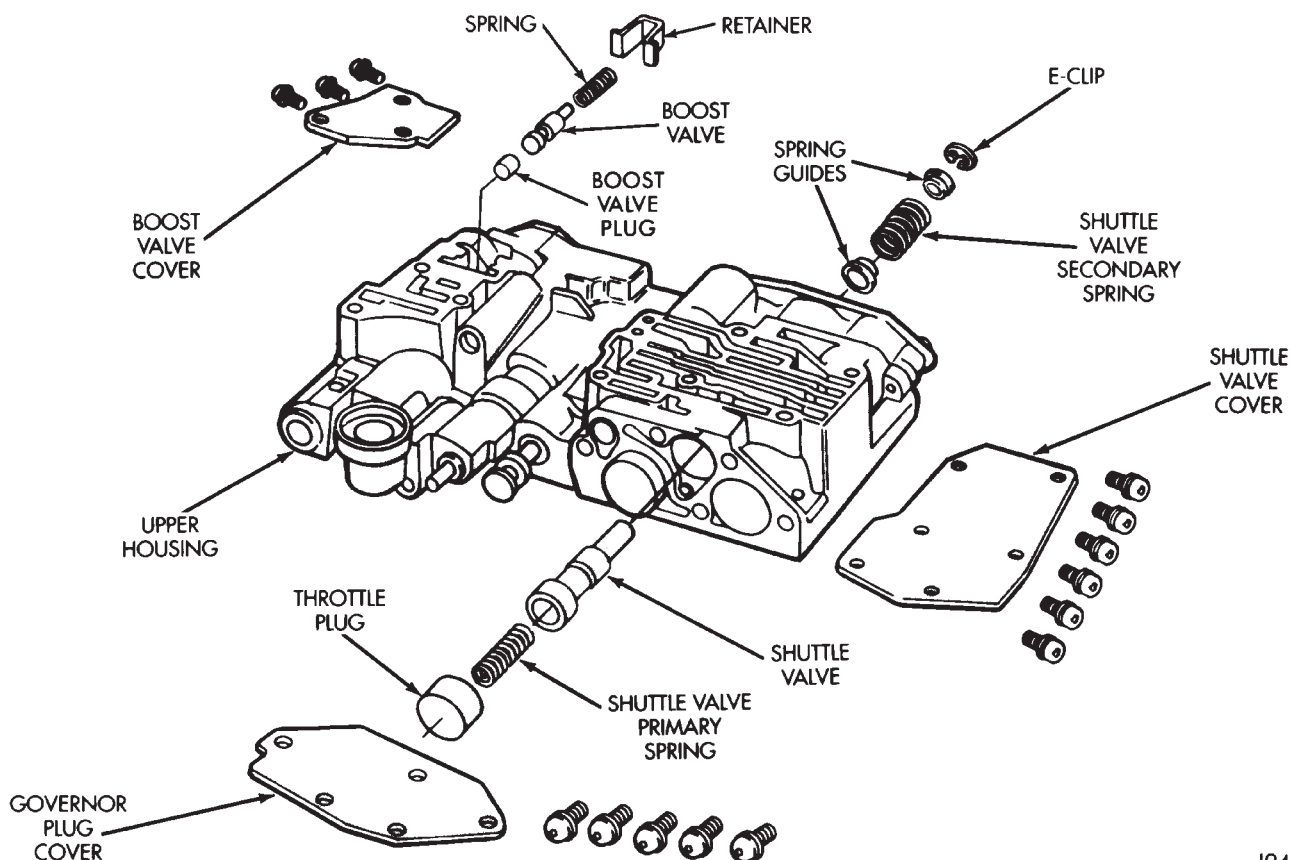


Fig. 70 Shuttle And Boost Valve Components

DISASSEMBLY AND ASSEMBLY (Continued)

(6) Remove throttle plug and 1-2 and 2-3 governor plugs (Fig. 57).

(7) Turn upper housing around and remove limit valve and shift valve covers (Fig. 71).

(8) Remove limit valve housing. Then remove retainer, spring, limit valve, and 2-3 throttle plug from limit valve housing (Fig. 71).

(9) Remove 1-2 shift control valve and spring (Fig. 71).

(10) Remove 1-2 shift valve and spring (Fig. 71).

(11) Remove 2-3 shift valve and spring from valve body (Fig. 71).

(12) Remove pressure plug cover (Fig. 71).

(13) Remove line pressure plug, sleeve, throttle pressure plug and spring (Fig. 71).

VALVE BODY LOWER HOUSING

(1) Remove timing valve cover.

(2) Remove 3-4 timing valve and spring.

(3) Remove 3-4 quick fill valve, spring and plug.

(4) Remove 3-4 shift valve and spring.

(5) Remove converter clutch valve, spring and plug (Fig. 72).

(6) Remove converter clutch timing valve, retainer and valve spring.

3-4 ACCUMULATOR HOUSING

(1) Remove end plate from housing.

(2) Remove piston spring.

(3) Remove piston. Remove and discard piston seals (Fig. 73).

ASSEMBLY

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 housings resulting in valve sticking, cross leakage and unsatisfactory operation. Tighten valve body screws to recommended torque only.

LOWER HOUSING

(1) Lubricate valves, springs, and the housing valve and plug bores with clean transmission fluid (Fig. 72).

(2) Install 3-4 timing valve spring and valve in lower housing.

(3) Install 3-4 quick fill valve in lower housing.

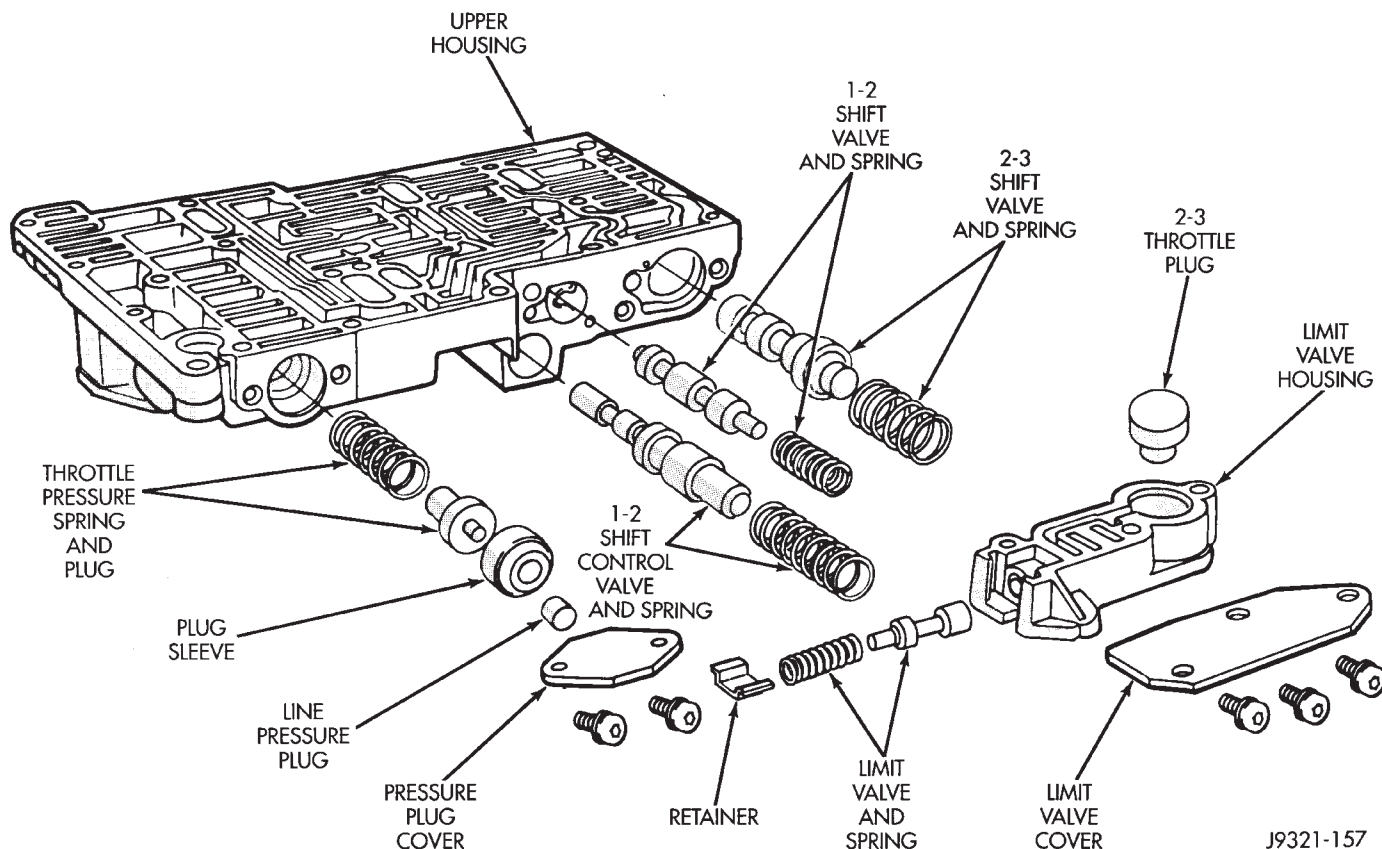
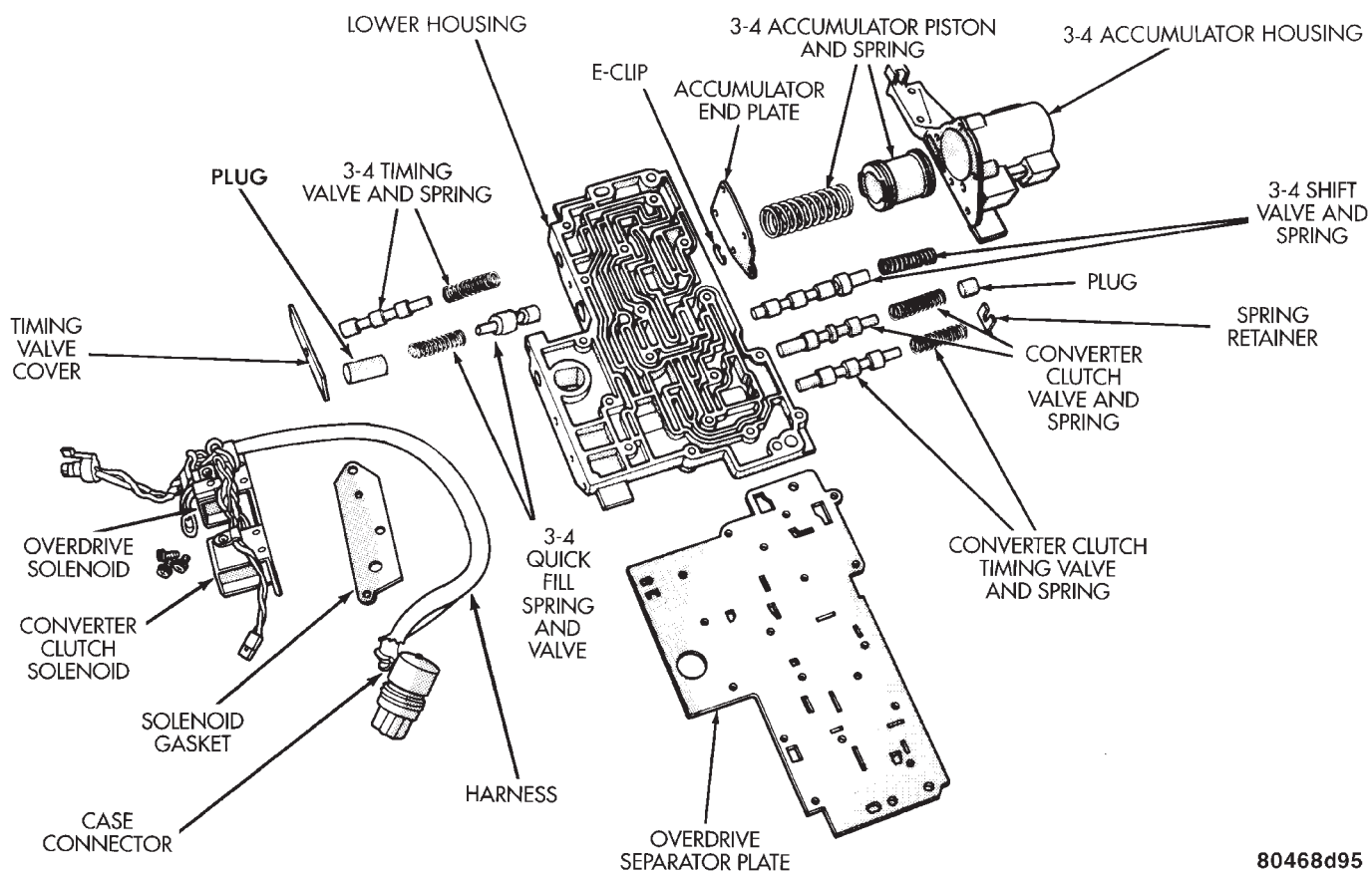


Fig. 71 Upper Housing Shift Valve And Pressure Plug Locations

DISASSEMBLY AND ASSEMBLY (Continued)



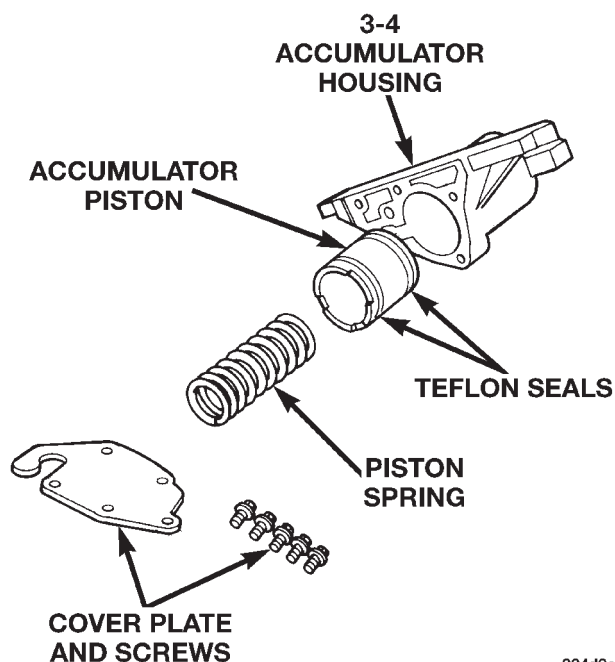
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Fig. 72 Lower Housing Shift Valves And Springs

(5) Install timing valve end plate. Tighten end plate screws to 4 N·m (35 in. lbs.) torque.

3-4 ACCUMULATOR

- (1) Lubricate accumulator piston, seals and housing piston bore with clean transmission fluid (Fig. 73).
- (2) Install new seal rings on accumulator piston.
- (3) Install piston and spring in housing.
- (4) Install end plate on housing.



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Fig. 73 Accumulator Housing Components

(4) Install 3-4 quick fill valve spring and plug in housing.

DISASSEMBLY AND ASSEMBLY (Continued)

TRANSFER PLATE

- (1) Install rear clutch and rear servo check balls in transfer plate (Fig. 74).
- (2) Install filter screen in upper housing separator plate (Fig. 75).
- (3) Align and position upper housing separator plate on transfer plate (Fig. 76).
- (4) Install brace plate (Fig. 76). Tighten brace attaching screws to 4 N·m (35 in. lbs.) torque.
- (5) Install remaining separator plate attaching screws. Tighten screws to 4 N·m (35 in. lbs.) torque.

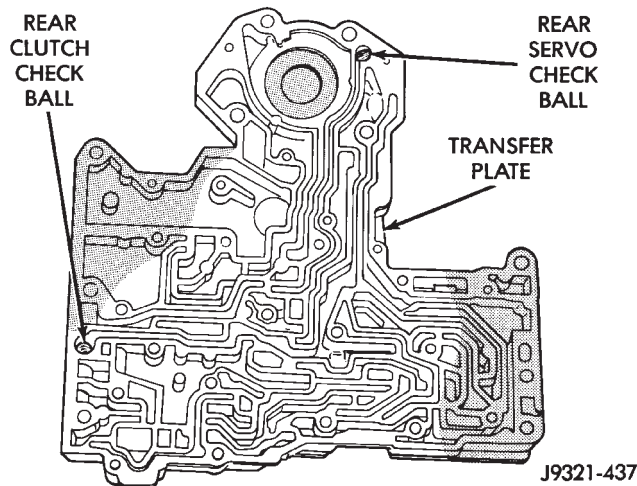


Fig. 74 Rear Clutch And Rear Servo Check Ball Locations

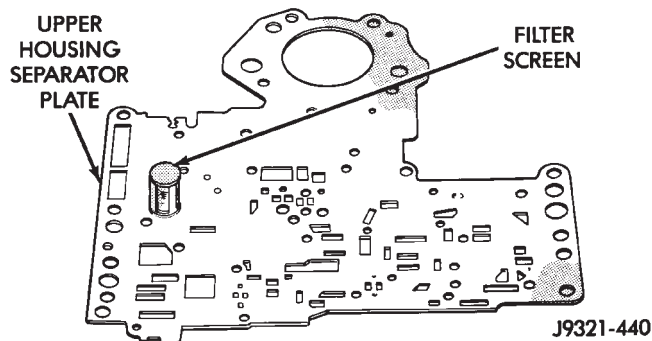


Fig. 75 Separator Plate Filter Screen Installation

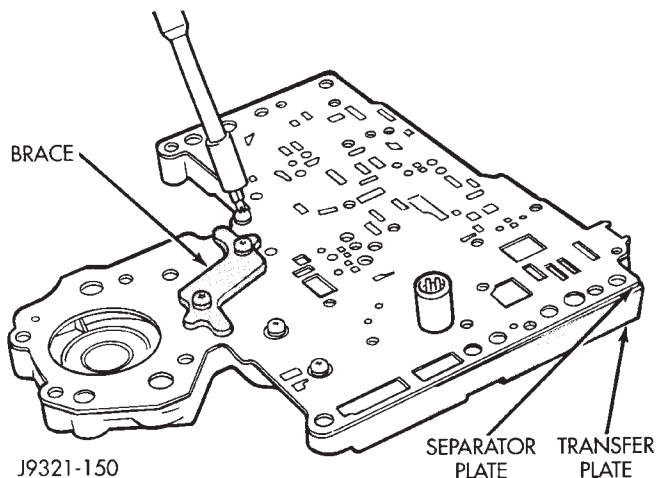


Fig. 76 Brace Plate

UPPER AND LOWER HOUSING

- (1) Position upper housing so internal passages and check ball seats are facing upward. Then install check balls in housing (Fig. 77). Eight check balls are used. The single large check ball is approximately 8.7 mm (11/32 in.) diameter. The single small check ball is approximately 4.8 mm (3/16 in.) in diameter. The remaining 6 check balls are approximately 6.3 mm (1/4 in.) in diameter.

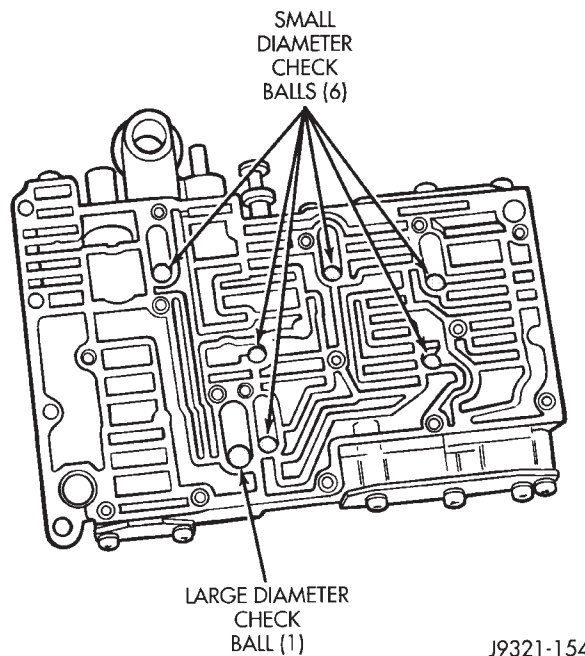
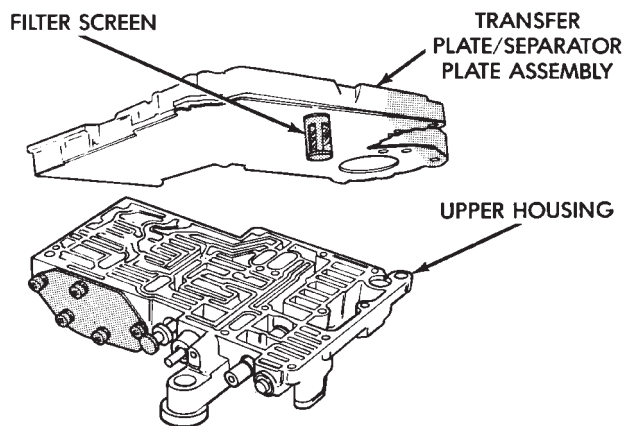


Fig. 77 Check Ball Locations In Upper Housing

DISASSEMBLY AND ASSEMBLY (Continued)

(2) Position assembled transfer plate and upper housing separator plate on upper housing (Fig. 78). Be sure filter screen is seated in proper housing recess.



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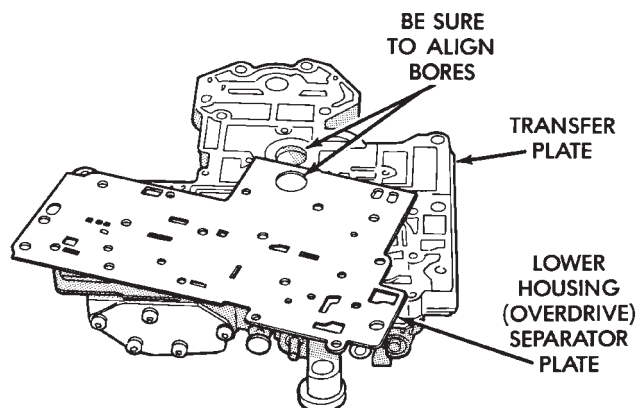
Fig. 78 Installing Transfer Plate On Upper Housing

(3) Install the ECE check ball into the transfer plate (Fig. 64). The ECE check ball is approximately 4.8 mm (3/16 in.) in diameter.

(4) Position lower housing separator plate on transfer plate (Fig. 79).

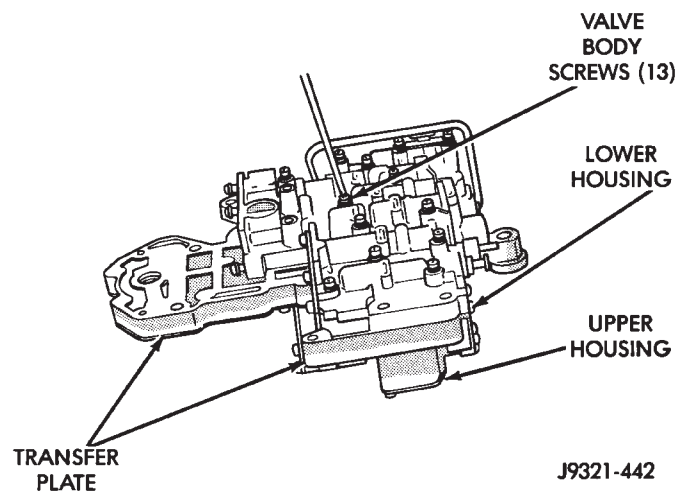
(5) Install lower housing on assembled transfer plate and upper housing (Fig. 80).

(6) Install and start all valve body screws by hand except for the screws to hold the boost valve tube brace. Save those screws for later installation. Then tighten screws evenly to 4 N·m (35 in. lbs.) torque. Start at center and work out to sides when tightening screws (Fig. 80).



J9321-441

Fig. 79 Lower Housing Separator Plate



J9321-442

Fig. 80 Installing Lower Housing On Transfer Plate And Upper Housing

UPPER HOUSING VALVE AND PLUG

Refer to (Fig. 81), (Fig. 82) and (Fig. 83) to perform the following steps.

(1) Lubricate valves, plugs, springs with clean transmission fluid.

(2) Assemble regulator valve line pressure plug, sleeve, throttle plug and spring. Insert assembly in upper housing and install cover plate. Tighten cover plate screws to 4 N·m (35 in. lbs.) torque.

(3) Install 1-2 and 2-3 shift valves and springs.

(4) Install 1-2 shift control valve and spring.

(5) Install retainer, spring, limit valve, and 2-3 throttle plug from limit valve housing.

(6) Install limit valve housing and cover plate. Tighten screws to 4 N·m (35 in. lbs.).

(7) Install shuttle valve as follows:

(a) Insert plastic guides in shuttle valve secondary spring and install spring on end of valve.

(b) Install shuttle valve into housing.

(c) Hold shuttle valve in place.

(d) Compress secondary spring and install E-clip in groove at end of shuttle valve.

(e) Verify that spring and E-clip are properly seated before proceeding.

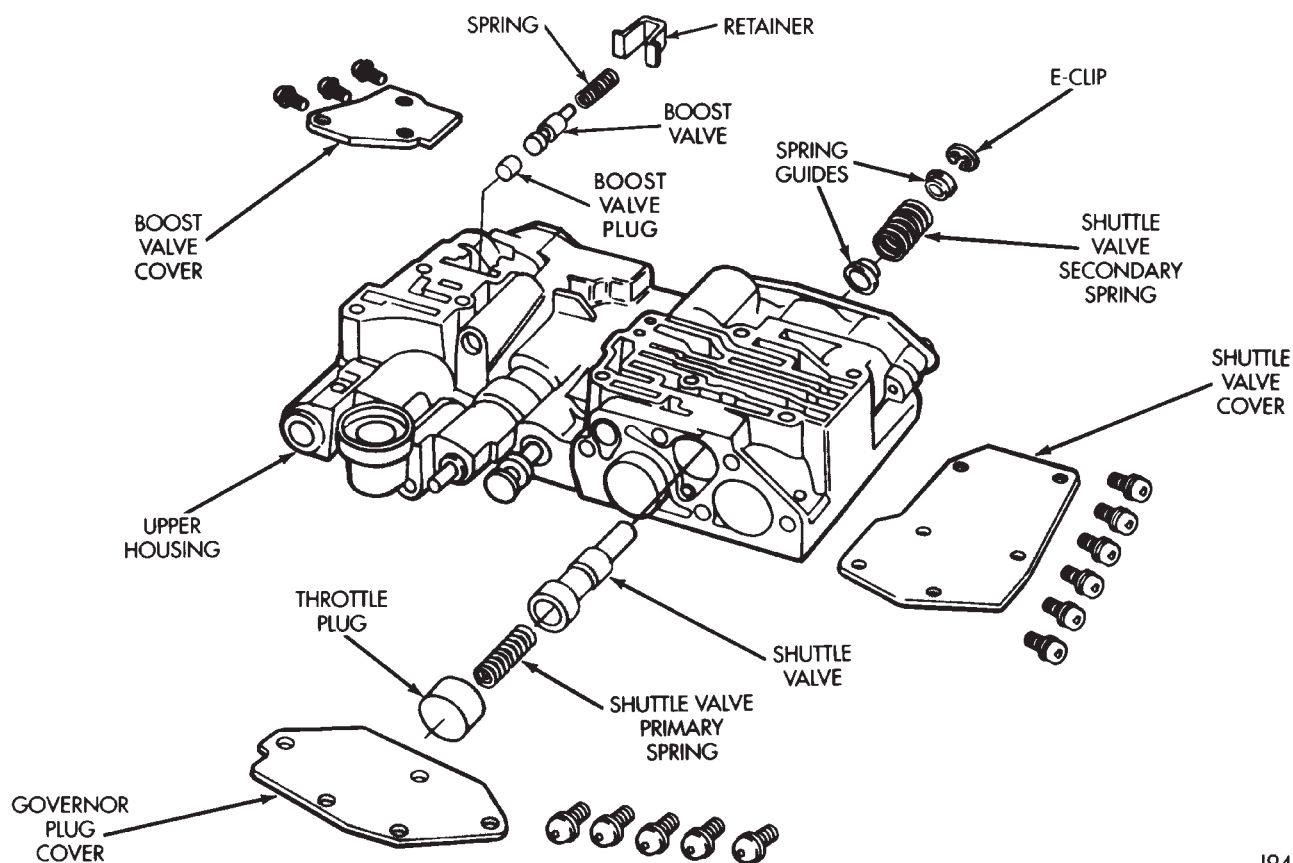
(8) Install shuttle valve cover plate. Tighten cover plate screws to 4 N·m (35 in. lbs.) torque.

(9) Install 1-2 and 2-3 valve governor plugs in valve body.

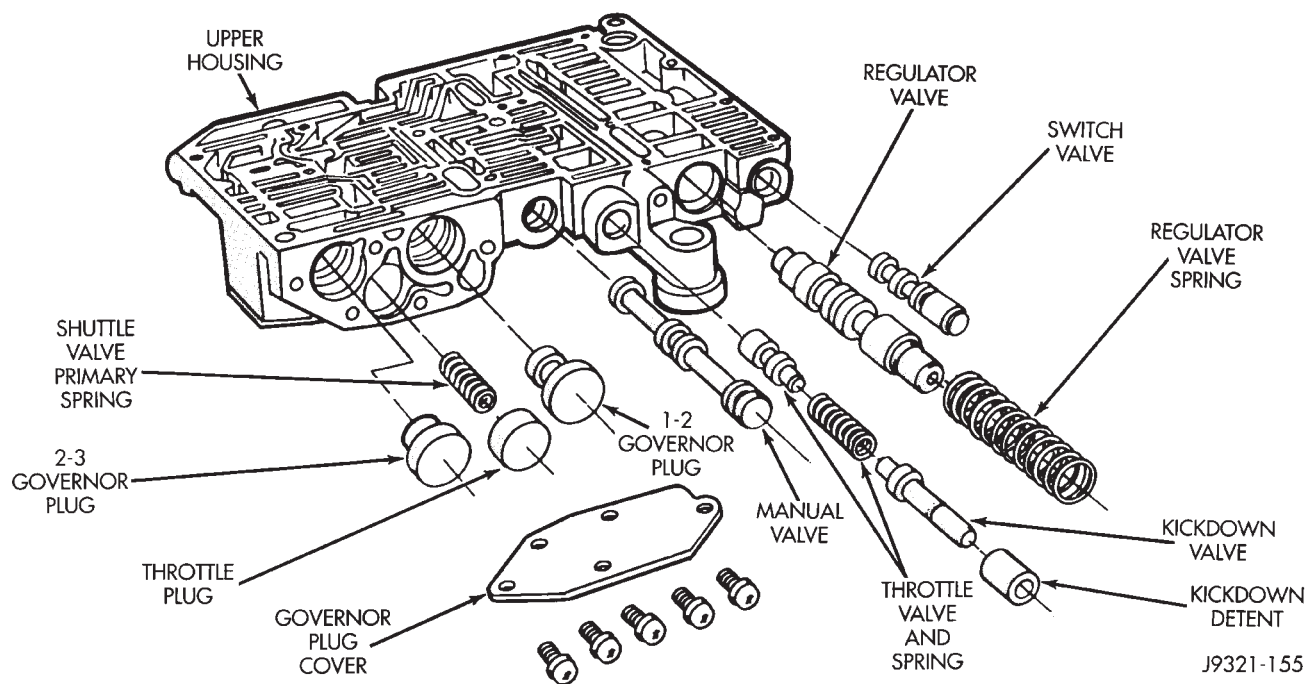
(10) Install shuttle valve primary spring and throttle plug.

(11) Align and install governor plug cover. Tighten cover screws to 4 N·m (35 in. lbs.) torque.

DISASSEMBLY AND ASSEMBLY (Continued)



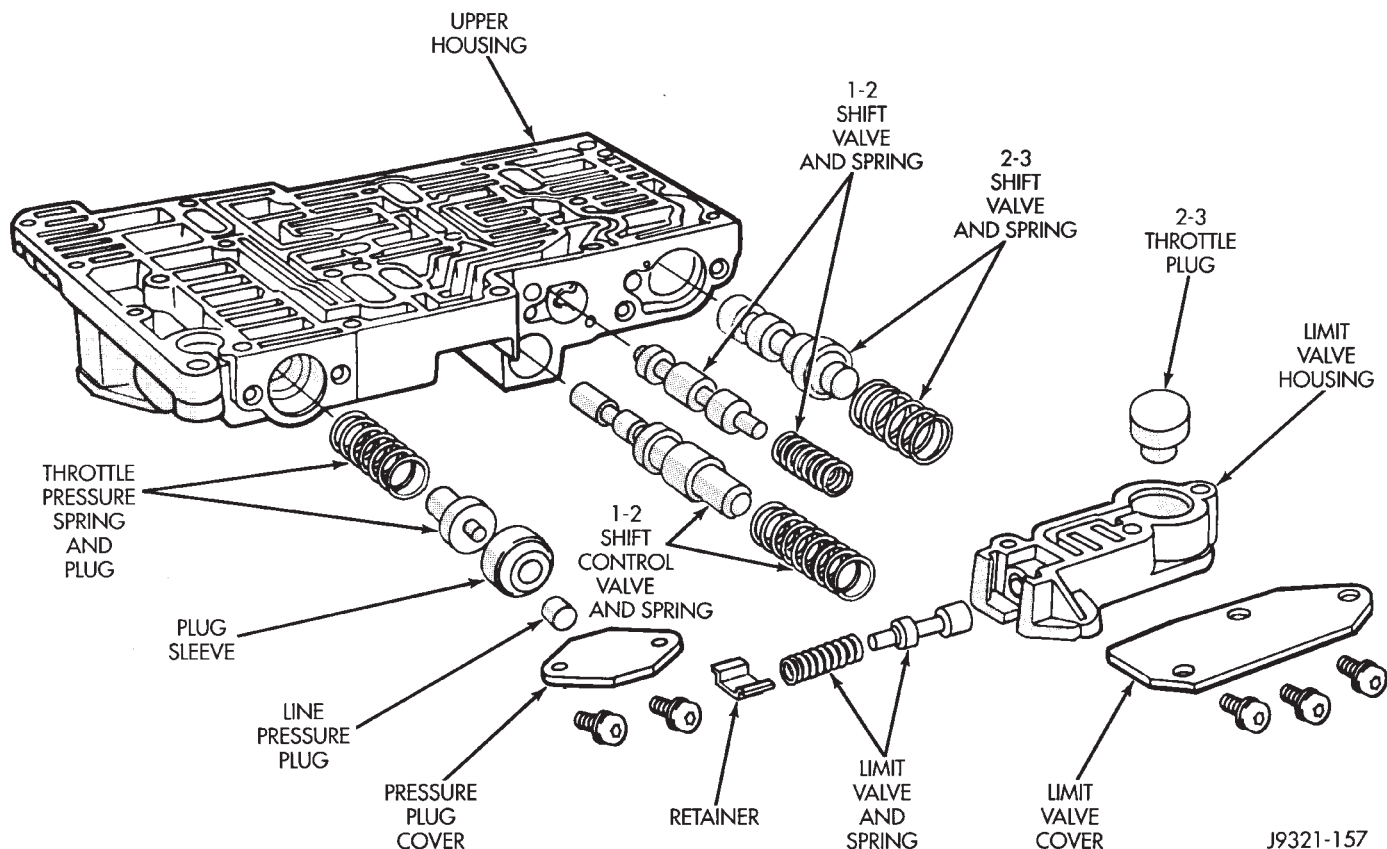
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Fig. 81 Shuttle And Boost Valve Components

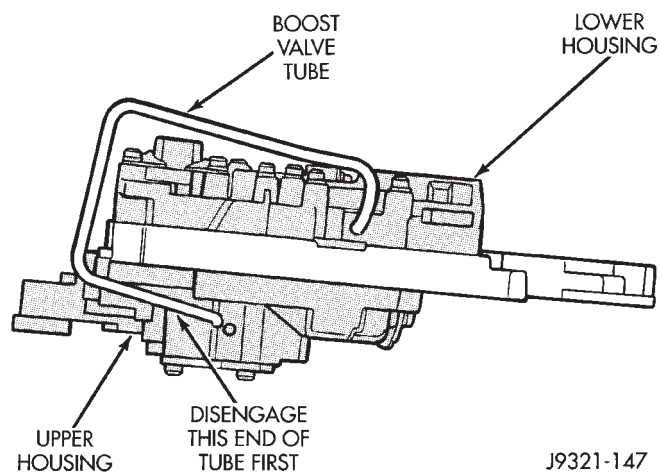
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Fig. 82 Upper Housing Control Valve Locations

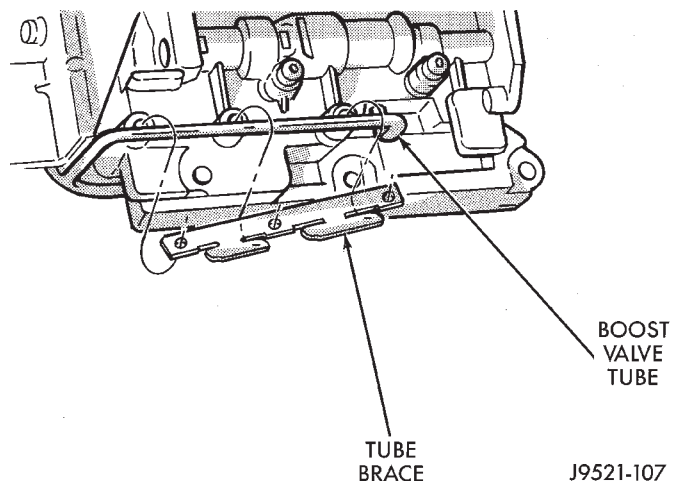
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 83 Upper Housing Shift Valve And Pressure Plug Locations****BOOST VALVE TUBE AND BRACE**

- (1) Position valve body assembly so lower housing is facing upward (Fig. 84).
- (2) Lubricate tube ends and housing ports with transmission fluid or petroleum jelly.
- (3) Start tube in lower housing port first. Then swing tube downward and work opposite end of tube into upper housing port (Fig. 84).

**Fig. 84 Boost Valve Tube**

- (4) Insert and seat each end of tube in housings.
- (5) Slide tube brace under tube and into alignment with valve body screw holes (Fig. 85).
- (6) Install and finger tighten three screws that secure tube brace to valve body housings (Fig. 85).

**Fig. 85 Boost Valve Tube And Brace**

DISASSEMBLY AND ASSEMBLY (Continued)

(7) Bend tube brace tabs up and against tube to hold it in position (Fig. 86).

(8) Tighten all valve body housing screws to 4 N·m (35 in. lbs.) torque after tube and brace are installed. Tighten screws in diagonal pattern starting at center and working outward.

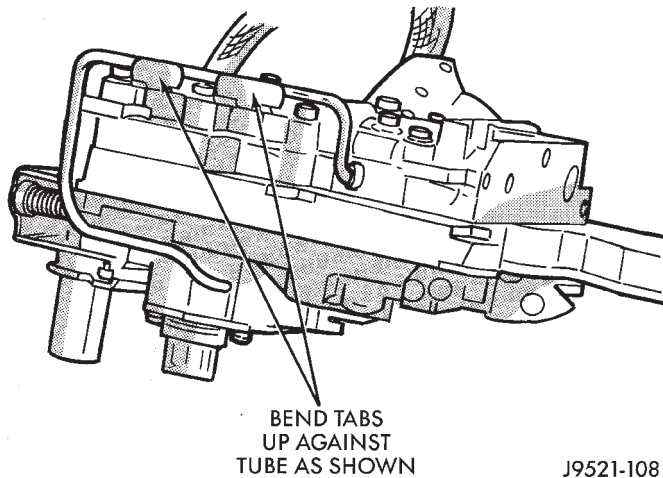


Fig. 86 Securing Boost Valve Tube With Brace Tabs

3-4 ACCUMULATOR

(1) Position converter clutch valve and 3-4 shift valve springs in housing (Fig. 87).

(2) Loosely attach accumulator housing with right-side screw (Fig. 87). Install only one screw at this time as accumulator must be free to pivot upward for ease of installation.

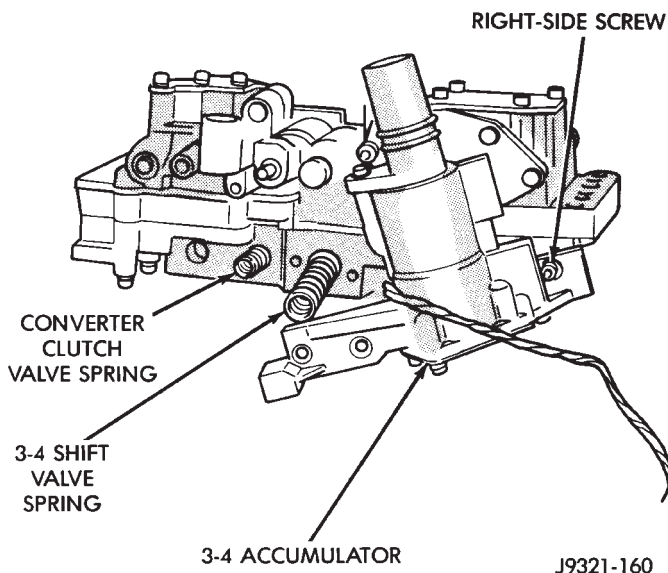


Fig. 87 Converter Clutch And 3-4 Shift Valve Springs

(3) Install 3-4 shift valve and spring.

(4) Install converter clutch timing valve and spring.

(5) Position plug on end of converter clutch valve spring. Then compress and hold springs and plug in place with fingers of one hand.

(6) Swing accumulator housing upward over valve springs and plug.

(7) Hold accumulator housing firmly in place and install remaining two attaching screws. Be sure springs and clutch valve plug are properly seated (Fig. 88). Tighten screws to 4 N·m (35 in. lbs.).

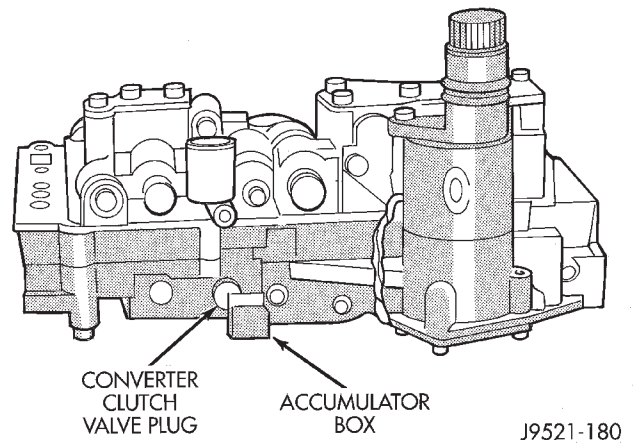


Fig. 88 Seating 3-4 Accumulator On Lower Housing VALVE BODY FINAL

(1) Install boost valve, valve spring, retainer and cover plate. Tighten cover plate screws to 4 N·m (35 in. lbs.) torque.

(2) Insert manual lever detent spring in upper housing.

(3) Position detent ball on end of spring. Then hold detent ball and spring in detent housing with Retainer Tool 6583 (Fig. 89).

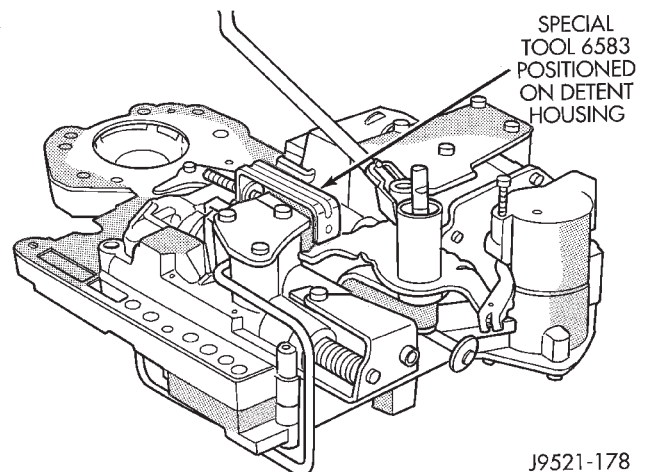


Fig. 89 Detent Ball Spring

(4) Install throttle lever in upper housing. Then install manual lever over throttle lever and start manual lever into housing.

DISASSEMBLY AND ASSEMBLY (Continued)

(5) Align manual lever with detent ball and manual valve. Hold throttle lever upward. Then press down on manual lever until fully seated. Remove detent ball retainer tool after lever is seated.

(6) Then install manual lever seal, washer and E-clip.

(7) Verify that throttle lever is aligned with end of kickdown valve stem and that manual lever arm is engaged in manual valve (Fig. 90).

(8) Position line pressure adjusting screw in adjusting screw bracket.

(9) Install spring on end of line pressure regulator valve.

(10) Install switch valve spring on tang at end of adjusting screw bracket.

(11) Install manual valve.

(12) Install throttle valve and spring.

(13) Install kickdown valve and detent.

(14) Install pressure regulator valve.

(15) Install switch valve.

(16) Position adjusting screw bracket on valve body. Align valve springs and press bracket into place. Install short, upper bracket screws first and long bottom screw last. Verify that valve springs and bracket are properly aligned. Then tighten all three bracket screws to 4 N·m (35 in. lbs.) torque.

(17) Lubricate solenoid case connector O-rings and shaft of manual lever with light coat of petroleum jelly.

(18) Obtain new fluid filter for valve body but do not install filter at this time.

(19) If line pressure and/or throttle pressure adjustment screw settings were not disturbed, continue with overhaul or reassembly. However, if adjustment screw settings **were** moved or changed, readjust as described in Valve Body Control Pressure Adjustment procedure.

(20) Attach solenoid case connector to 3-4 accumulator with shoulder-type screw. Connector has small locating tang that fits in dimple at top of accumulator housing (Fig. 91). Seat tang in dimple before tightening connector screw.

(21) Install solenoid assembly and gasket. Tighten solenoid attaching screws to 8 N·m (72 in. lbs.) torque.

(22) Verify that solenoid wire harness is properly routed (Fig. 92). **Solenoid harness must be clear of manual lever and park rod and not be pinched between accumulator housing and cover.**

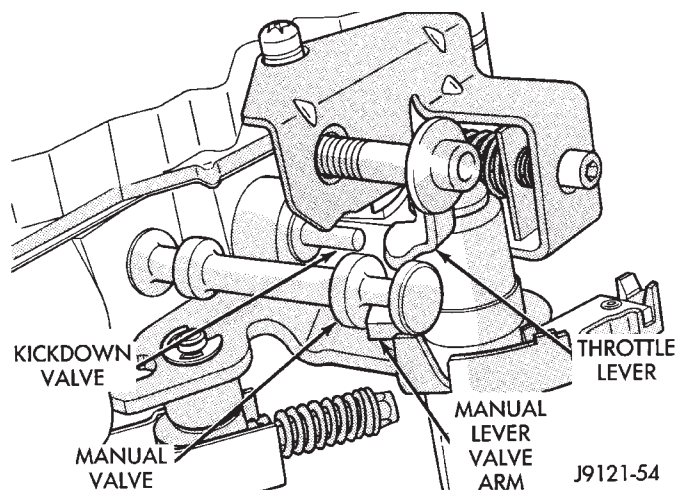


Fig. 90 Manual And Throttle Lever Alignment

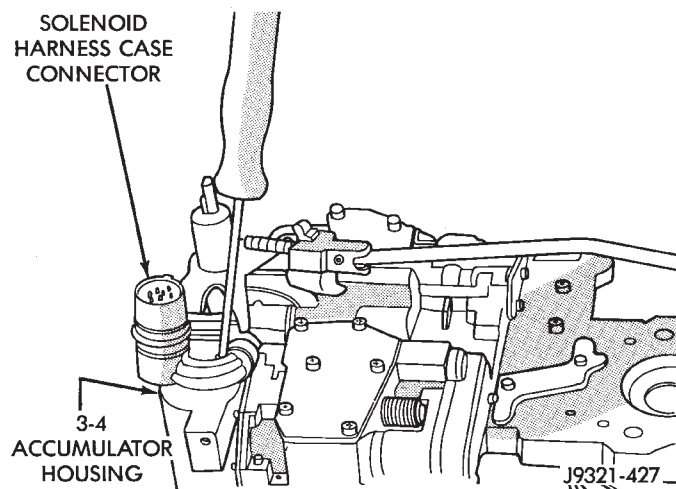


Fig. 91 Solenoid Harness Case Connector Shoulder Bolt

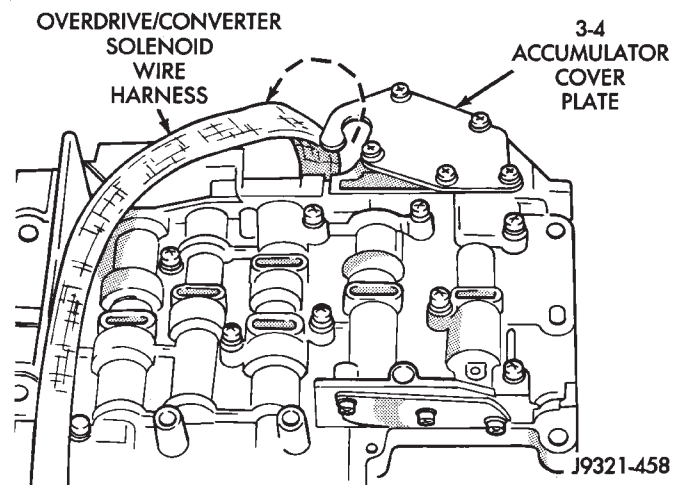
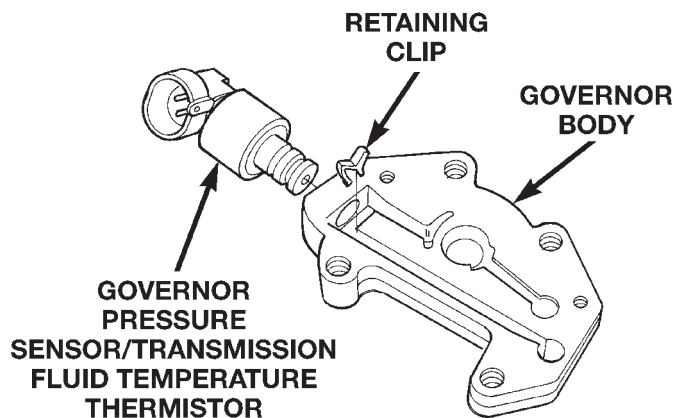


Fig. 92 Solenoid Harness Routing

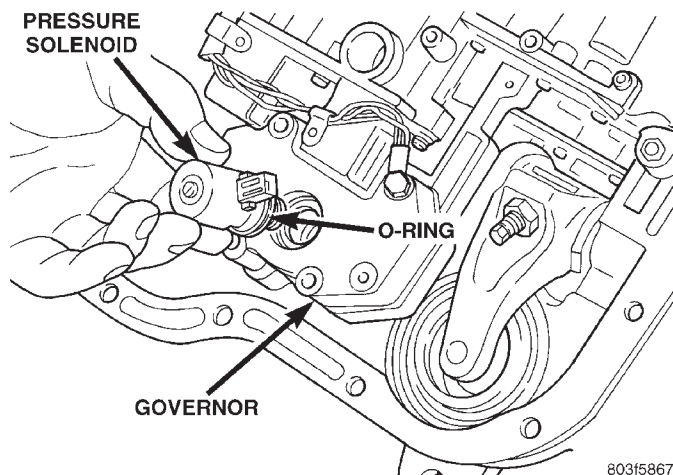
DISASSEMBLY AND ASSEMBLY (Continued)

GOVERNOR BODY, SENSOR AND SOLENOID

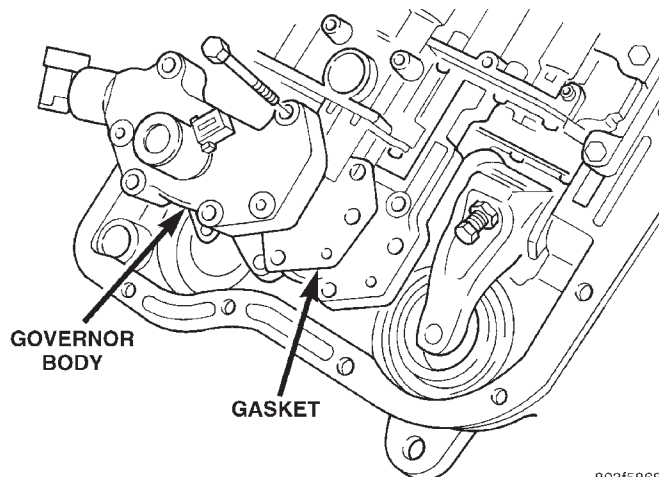
- (1) Turn valve body assembly over so accumulator side of transfer plate is facing down.
- (2) Install new O-rings on governor pressure solenoid and sensor (Fig. 93).
- (3) Lubricate solenoid and sensor O-rings with clean transmission fluid.
- (4) Install governor pressure sensor in governor body. Then secure sensor with M-shaped retaining clip (Fig. 93).
- (5) Install governor pressure solenoid in governor body (Fig. 94). Push solenoid in until it snaps into place in body.
- (6) Position governor body gasket on transfer plate (Fig. 95).
- (7) Install retainer plate on governor body and around solenoid (Fig. 96). Be sure solenoid connector is positioned in retainer cutout.
- (8) Align screw holes in governor body and transfer plate. Then install and tighten governor body screws to 4 N·m (35 in. lbs.) torque.
- (9) Connect harness wires to governor pressure solenoid and governor pressure sensor (Fig. 97).
- (10) Perform Line Pressure and Throttle Pressure adjustments, refer to adjustment section of this group for proper procedures.
- (11) Install fluid filter and pan.
- (12) Lower vehicle.
- (13) Fill transmission with recommended fluid and road test vehicle to verify repair.



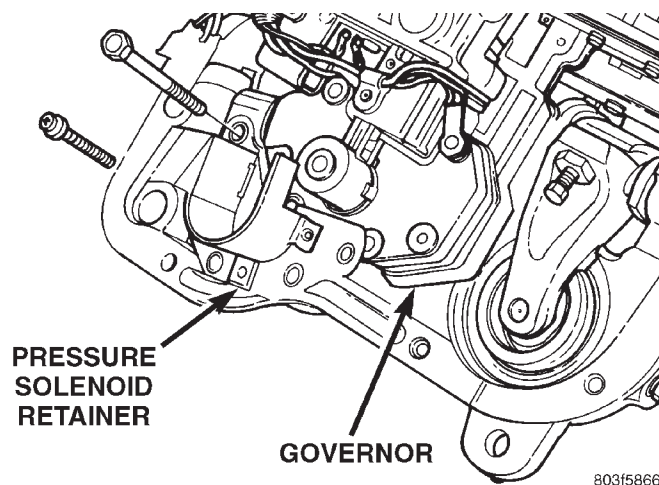
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Fig. 93 Governor Pressure Sensor

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Fig. 94 Governor Pressure Solenoid

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Fig. 95 Governor Body And Gasket

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Fig. 96 Pressure Solenoid Retainer

DISASSEMBLY AND ASSEMBLY (Continued)

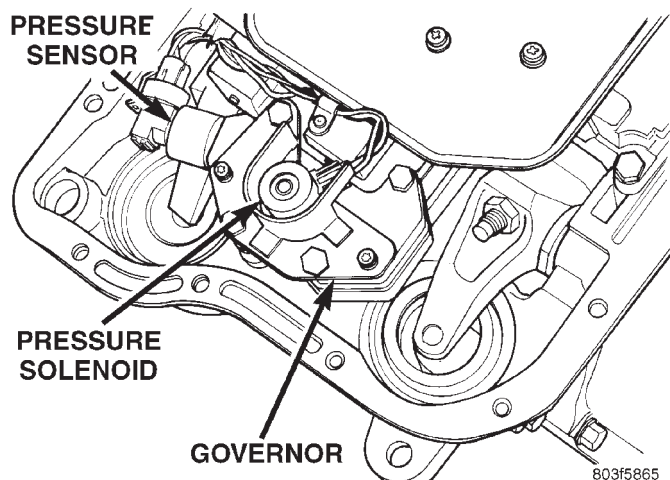


Fig. 97 Governor Pressure Sensor And Solenoid Connectors

TRANSMISSION

DISASSEMBLY

- (1) Drain fluid from transmission.
- (2) Clean exterior of transmission with suitable solvent or pressure washer.
- (3) Remove torque converter from front of transmission.
- (4) Remove throttle and shift levers from valve body manual shaft and throttle lever shaft.
- (5) Place transmission in vertical position.
- (6) Measure and record the input shaft end-play measurement.
- (7) Mount transmission in repair stand C-3750-B or similar type stand (Fig. 98).

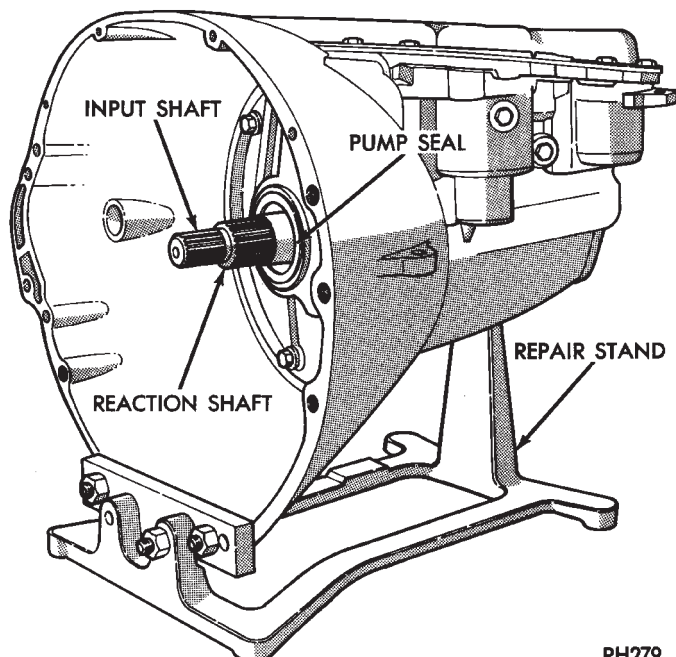


Fig. 98 Repair Stand

- (8) Remove fluid pan and filter.
- (9) Remove park/neutral position switch and seal (Fig. 99).
- (10) Remove valve body and electronic governor.
- (11) Remove accumulator outer spring, piston and inner spring (Fig. 100). Note position of piston and springs for assembly reference. Remove and discard piston seals if worn or cut.

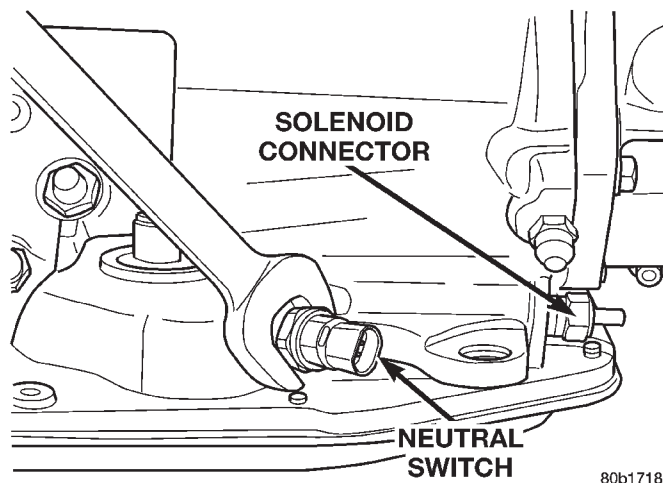


Fig. 99 Park/Neutral Position Switch

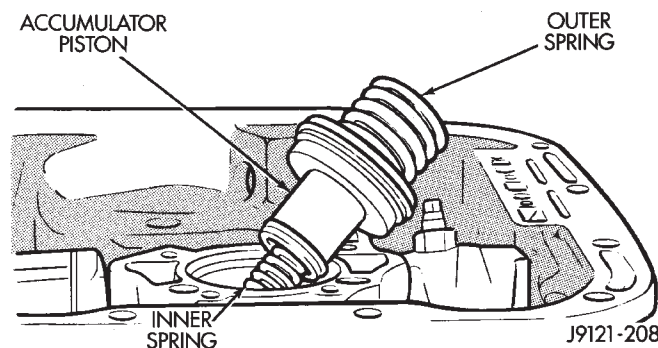


Fig. 100 Accumulator Component Removal

- (12) Remove pump oil seal with suitable pry tool or slide-hammer mounted screw.

DISASSEMBLY AND ASSEMBLY (Continued)

(13) Remove front band lever pin access plug (Fig. 101). Use square end of 1/4 in. drive extension to remove plug as shown.

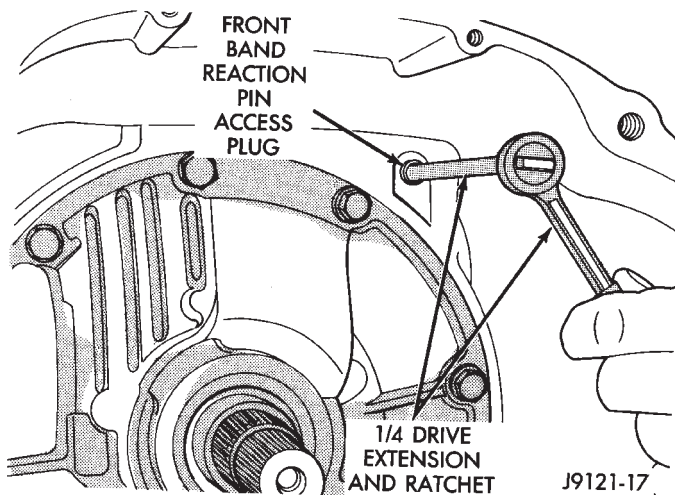


Fig. 101 Front Band Lever Pin Access Plug

(14) Remove oil pump and reaction shaft support assembly as follows:

(a) Tighten front band adjusting screw until band is tight around front clutch retainer (Fig. 102). This will prevent retainer from coming out with pump and possibly damaging clutch or pump components.

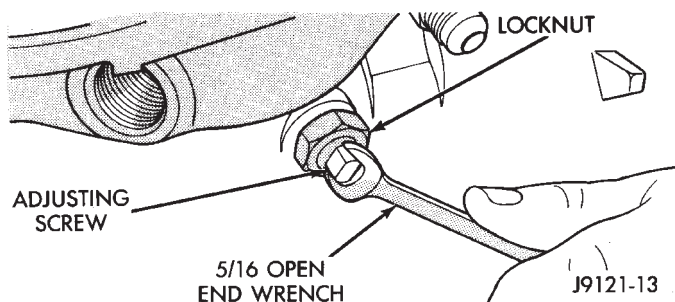


Fig. 102 Tightening Front Band To Hold Front Clutch In Place

- (b) Remove oil pump bolts.
- (c) Thread Slide Hammer Tools C-3752 into threaded holes in flange of oil pump housing (Fig. 103).
- (d) Remove oil pump and reaction shaft support by bumping slide hammers outward alternately to pull pump from case (Fig. 104).

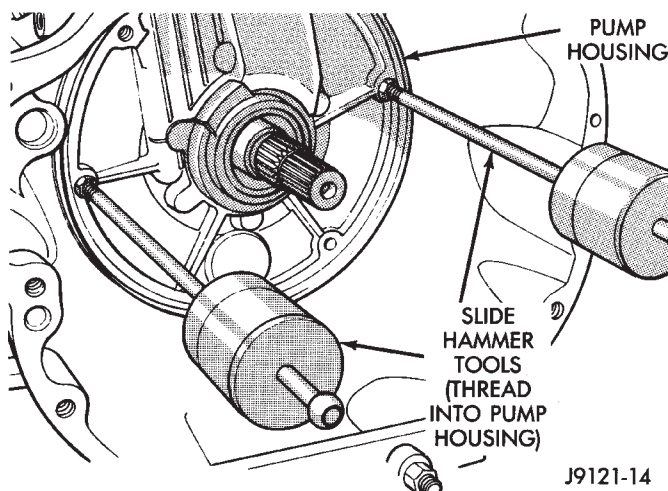


Fig. 103 Oil Pump Removal Tools

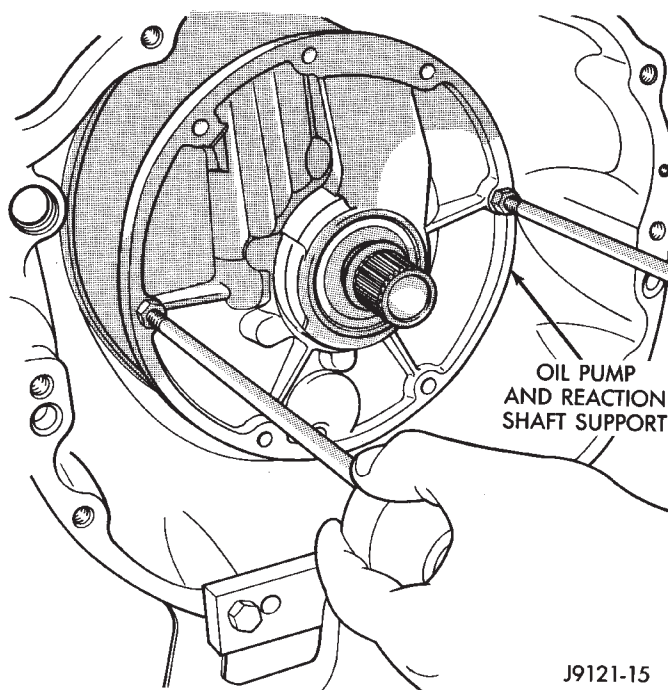


Fig. 104 Oil Pump Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(15) Remove oil pump gasket (Fig. 105). Note gasket position in case for assembly reference.

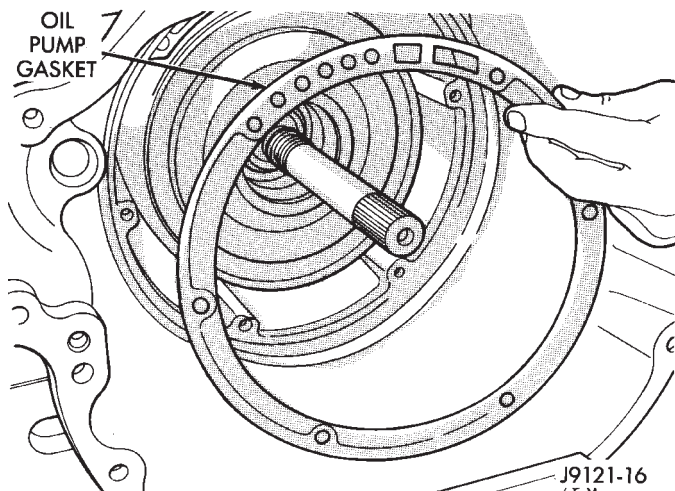


Fig. 105 Oil Pump Gasket

(16) Loosen front band adjusting screw until band is completely loose.

(17) Remove front band strut and anchor (Fig. 106).

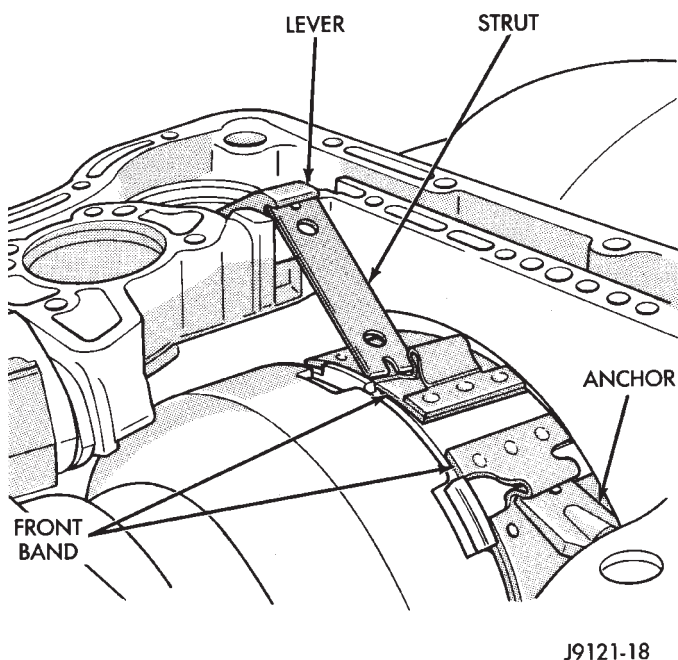


Fig. 106 Front Band Linkage

(18) Squeeze front band together slightly and slide band over front clutch retainer and out of case (Fig. 107).

(19) Remove front and rear clutch assemblies as a unit (Fig. 108).

(20) Remove front band reaction pin and lever. Start pin through lever and out of case bore with drift or punch. Then use pencil magnet to withdraw pin completely (Fig. 109).

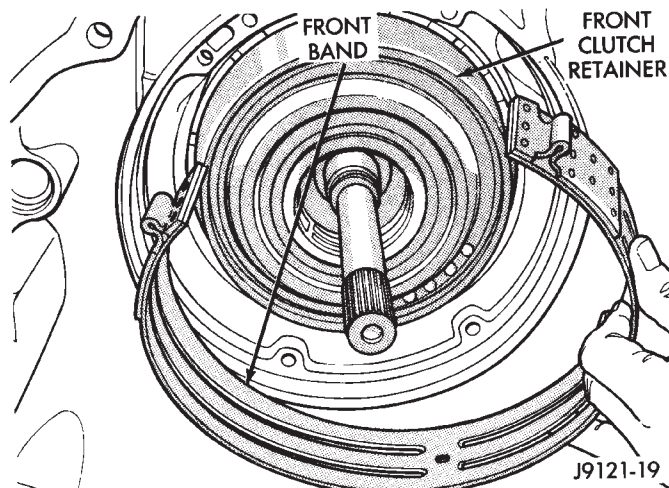


Fig. 107 Front Band

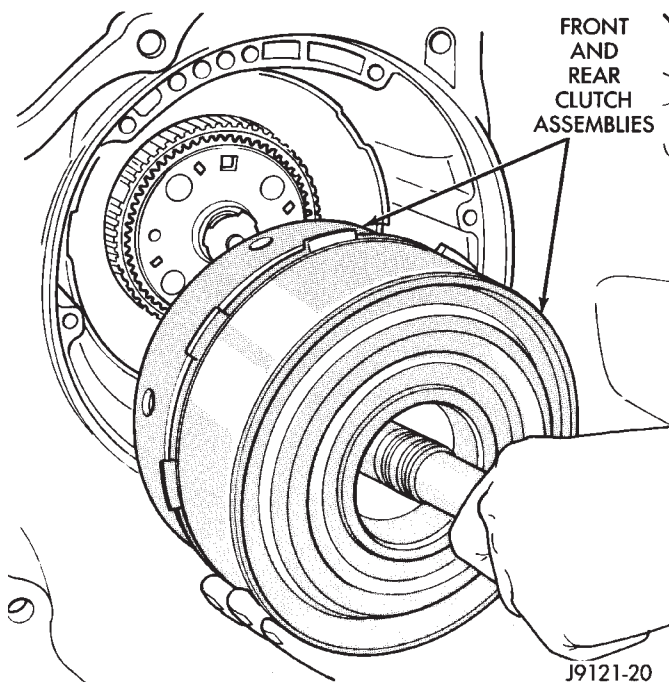


Fig. 108 Removing Front/Rear Clutch Assemblies

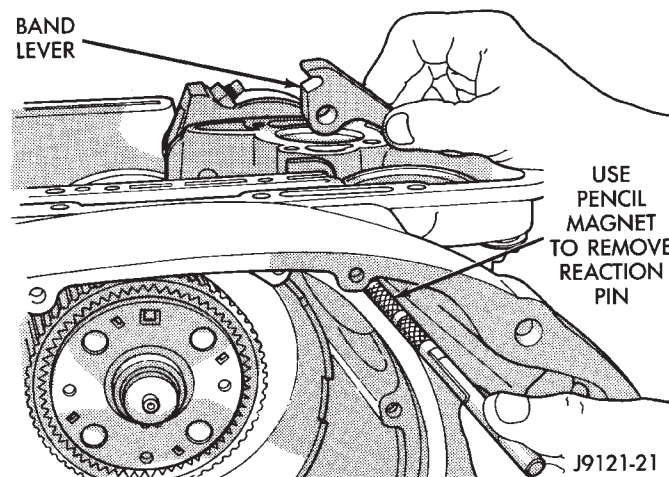


Fig. 109 Front Band Lever And Pin

DISASSEMBLY AND ASSEMBLY (Continued)

(21) Remove intermediate shaft thrust washer. Triangular shaped washer will either be on shaft pilot hub or in rear clutch retainer (Fig. 110).

(22) Remove thrust plate from intermediate shaft hub (Fig. 111).

(23) Remove intermediate shaft-planetary geartrain assembly (Fig. 112).

(24) If overdrive unit is not to be serviced, install Alignment Shaft 6227-2 into the overdrive unit to prevent misalignment of the overdrive clutches during service of main transmission components.

(25) Loosen rear band locknut and loosen adjusting screw 3-4 turns.

(26) Remove snap ring that retains low-reverse drum on overdrive piston retainer hub (Fig. 113).

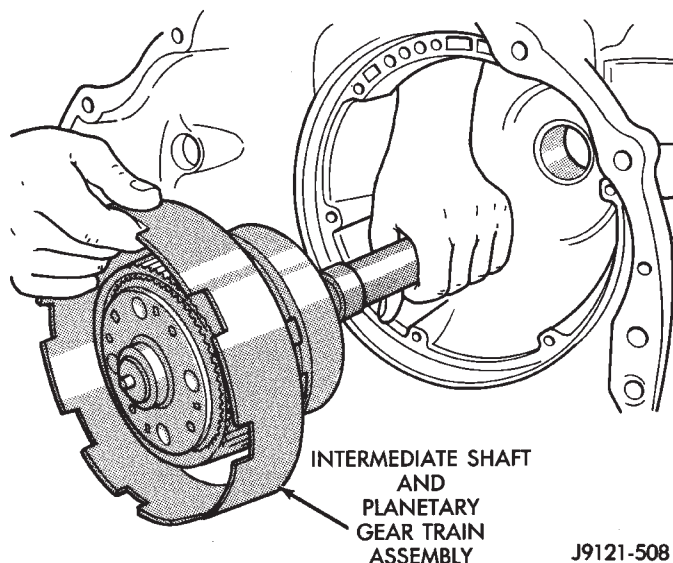


Fig. 112 Intermediate Shaft And Planetary Geartrain

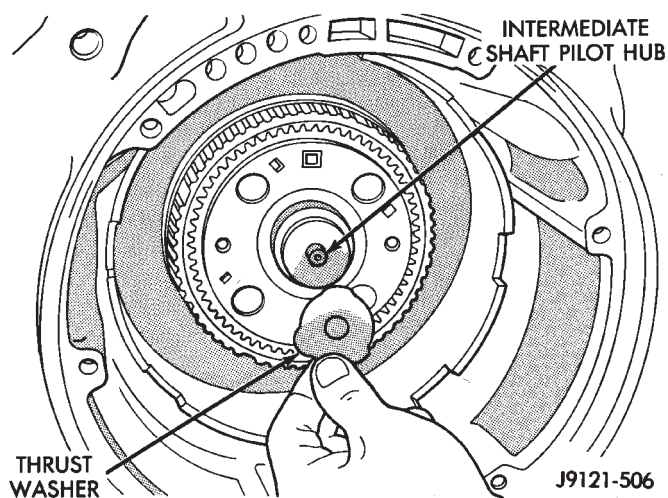


Fig. 110 Intermediate Shaft Thrust Washer

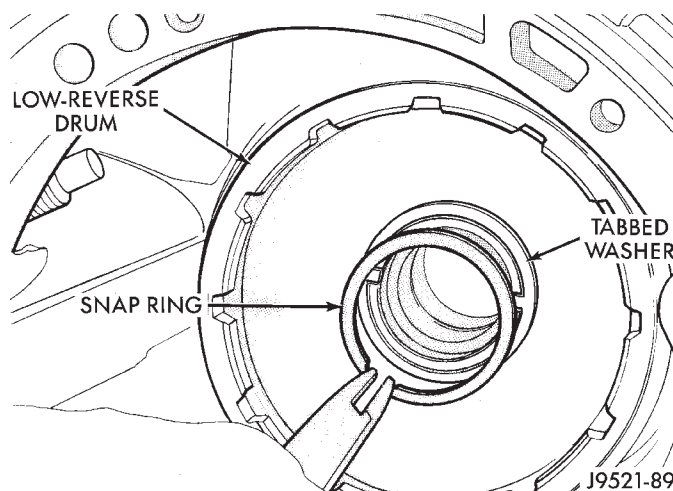


Fig. 113 Low-Reverse Drum Snap Ring

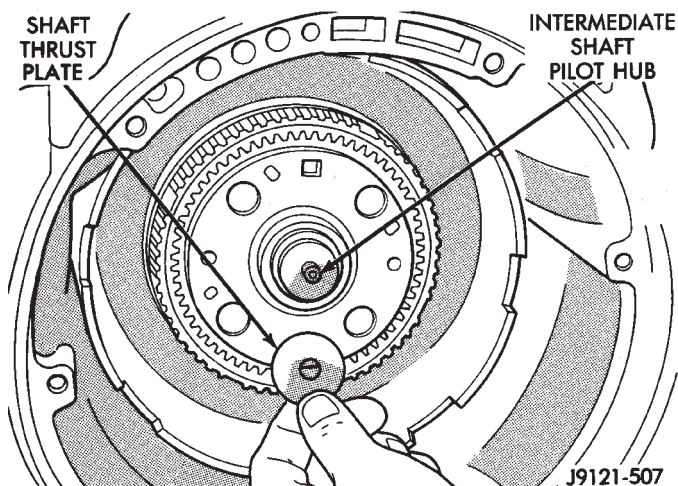


Fig. 111 Intermediate Shaft Thrust Plate

(27) Slide low-reverse drum and thrust washer off piston retainer hub and out of rear band (Fig. 114).

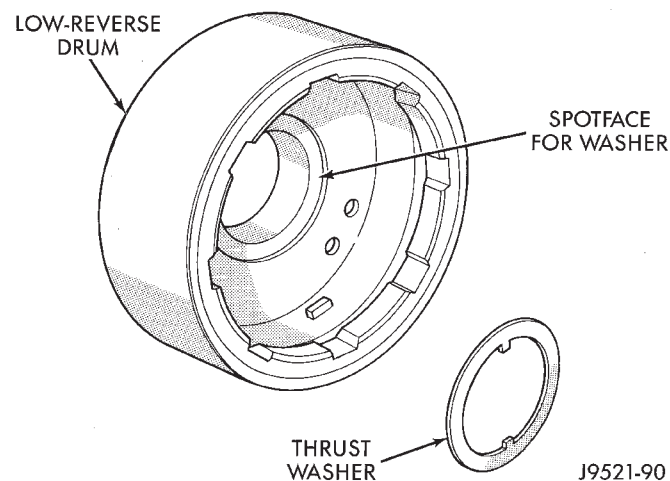


Fig. 114 Low-Reverse Drum And Thrust Washer

DISASSEMBLY AND ASSEMBLY (Continued)

(28) Note that overrunning clutch race will remain on splines of low-reverse drum after removal (Fig. 115). **The race is a permanent press fit on the hub splines. Do not attempt to remove the race.**

(29) Remove overrunning clutch assembly (Fig. 116). Assembly can be removed without displacing rollers and springs if care is exercised. Note position of rollers and springs for assembly reference.

(30) Remove rear band adjusting lever, reaction lever and pin (Fig. 117).

(31) Remove strut from rear band. Keep strut with levers and pin for cleaning, inspection and assembly reference.

(32) Remove rear band and link (Fig. 118).

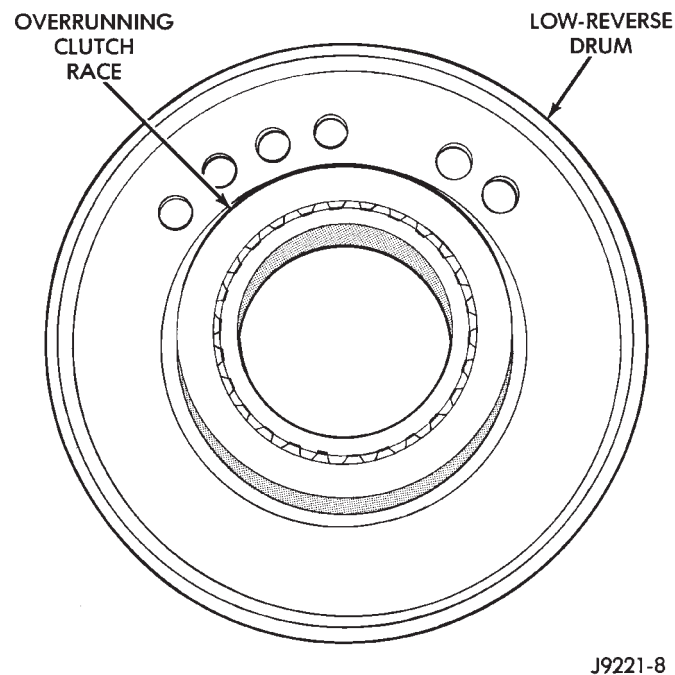


Fig. 115 Overrunning Clutch Race Position On Low-Reverse Drum

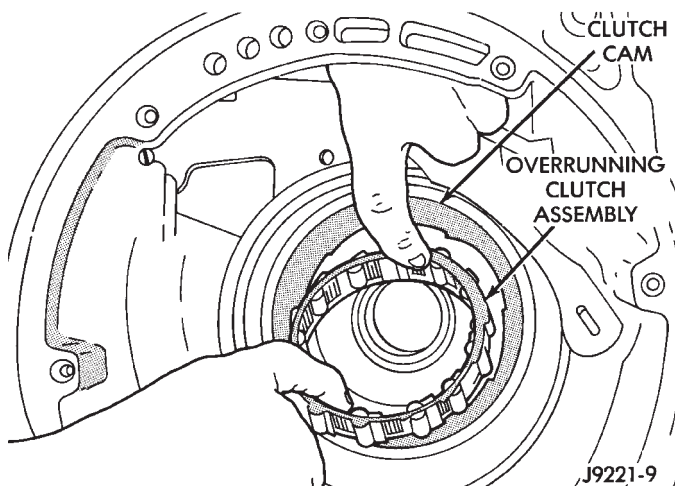


Fig. 116 Overrunning Clutch

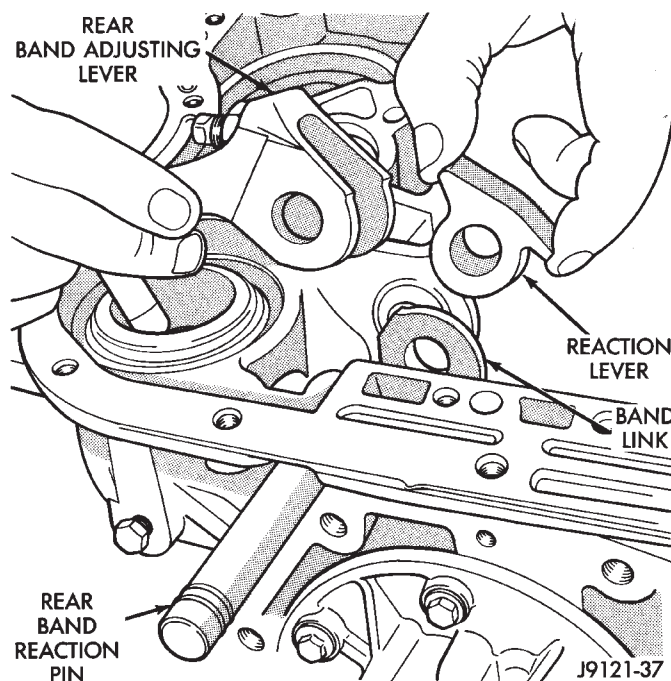


Fig. 117 Rear Band Levers And Pins

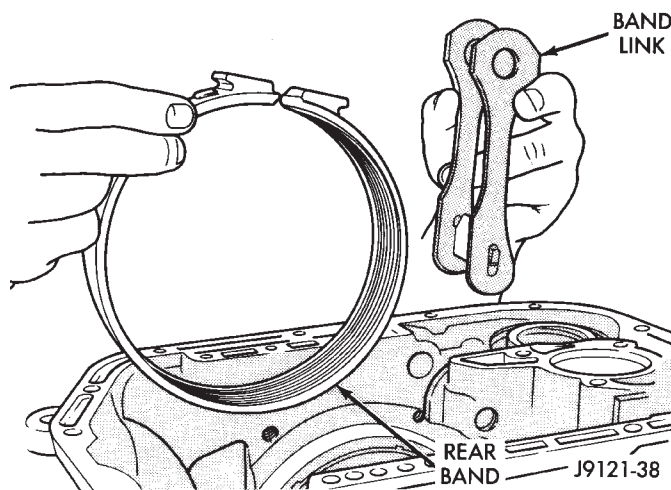


Fig. 118 Rear Band And Link

DISASSEMBLY AND ASSEMBLY (Continued)

(33) Compress front servo rod guide with large C-clamp and Tool C-4470, or Compressor Tool C-3422-B (Fig. 119). Compress guide only enough to permit snap ring removal (about 1/8 in.).

(34) Remove servo piston snap ring (Fig. 119). Unseat one end of ring. Then carefully work removal tool around back of ring until free of ring groove. **Exercise caution when removing snap ring. Servo bore can be scratched or nicked if care is not exercised.**

(35) Remove tools and remove servo piston and spring.

(36) Compress rear servo piston with C-clamp and Tool C-4470, or Valve Spring Compressor C-3422-B (Fig. 120). Compress servo spring retainer only enough to permit snap ring removal.

(37) Remove servo piston snap ring (Fig. 120). Start one end of ring out of bore. Then carefully work removal tool around back of snap ring until free of ring groove. **Exercise caution when removing snap ring. Servo bore can be scratched or nicked if care is not exercised.**

(38) Remove tools and remove rear servo retainer, spring and piston assembly.

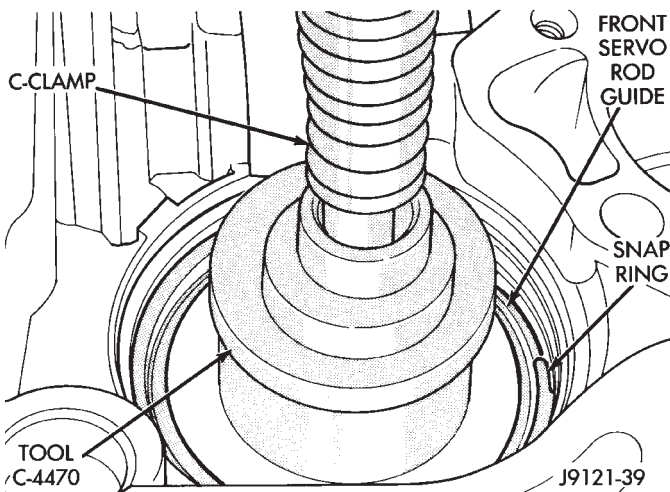


Fig. 119 Front Servo Retaining Snap Ring

ASSEMBLY

Do not allow dirt, grease, or foreign material to enter the case or transmission components during assembly. Keep the transmission case and components clean. Also make sure the tools and workbench area used for reassembly operations are equally clean.

Shop towels used for wiping off tools and your hands must be made from **lint free** materials. Lint will stick to transmission parts and could interfere with valve operation or even restrict fluid passages.

Lubricate transmission clutch and gear components with Mopar® ATF Plus 3, type 7176, during

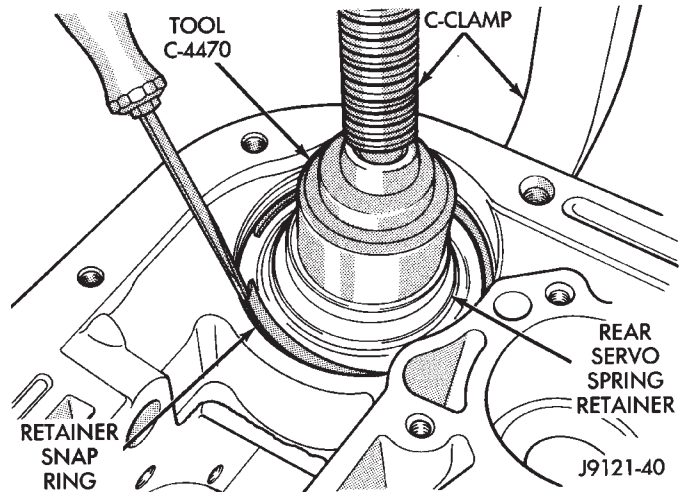


Fig. 120 Rear Servo Retaining Snap Ring

reassembly. Soak clutch discs in transmission fluid before installation.

Use Mopar® Door Ease, or Ru-Glyde on piston seals and O-rings to ease installation. Petroleum jelly can also be used to lubricate and hold thrust washers and plates in position during assembly.

Do not use chassis grease, bearing grease, white grease, or similar lubricants on any part. These types of lubricants can eventually block or restrict fluid passages and valve operation. Use petroleum jelly only.

Do not force parts into place. The transmission components and sub-assemblies are easily installed by hand when properly aligned. If a part seems difficult to install, it is either misaligned or incorrectly assembled. Verify that thrust washers, thrust plates and seal rings are correctly positioned.

The planetary geartrain, front/rear clutch assemblies and oil pump are all much easier to install when the transmission case is upright. Either tilt the case upward with wood blocks, or cut a hole in the bench large enough for the intermediate shaft and rear support. Then lower the shaft and support into the hole and support the rear of the case directly on the bench.

FRONT/REAR SERVO

(1) Lubricate rear servo piston seal with Mopar® Door Ease or ATF Plus 3. Lubricate servo bore in case with ATF Plus 3.

(2) Install rear servo piston in case. Position piston at slight angle to bore and insert piston with twisting motion (Fig. 121).

(3) Install rear servo spring and retainer in case bore (Fig. 122). Be sure spring is seated on piston.

(4) Compress rear servo piston with C-clamp or Valve Spring Compressor C-3422-B and install servo piston snap ring (Fig. 123).

DISASSEMBLY AND ASSEMBLY (Continued)

(5) Lubricate front servo piston components and servo bore in case with transmission fluid.

(6) Install front servo piston in bore. Carefully "run" small, suitable tool around piston ring to press it back into groove and ease installation (Fig. 124). Rotate piston into bore at same time. Rock piston slightly to ease piston ring past snap ring groove and into bore.

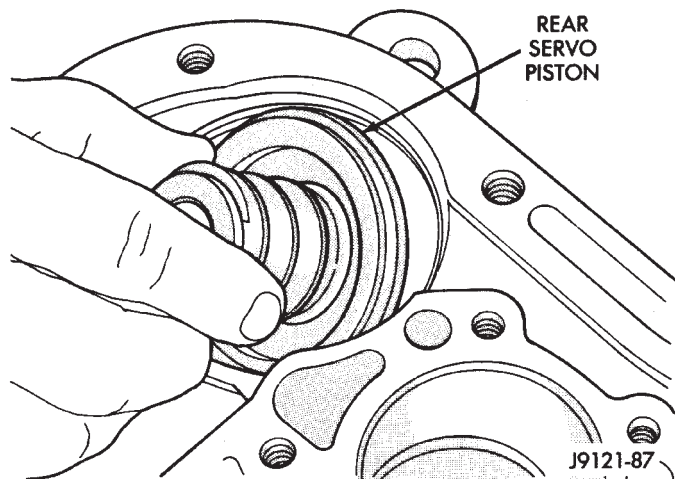


Fig. 121 Rear Servo Piston

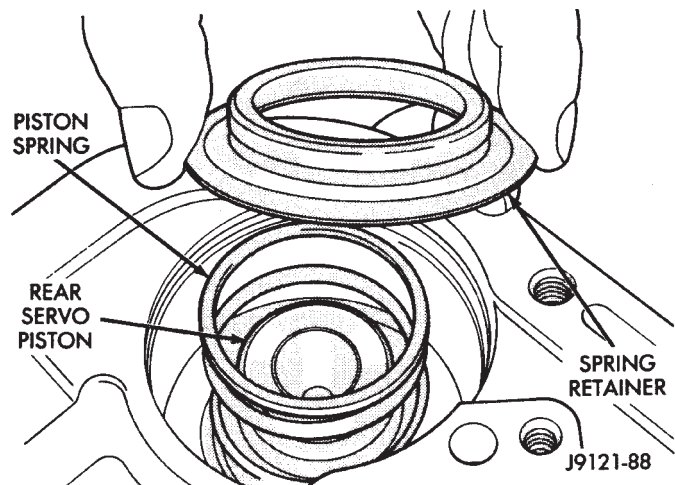


Fig. 122 Rear Servo Piston Spring And Retainer

(7) Bottom front servo piston in bore and install servo spring.

(8) Install front servo piston rod guide as follows:

(a) Place Tool SP-5560 (or similar size tool) on guide and position C-clamp on tool and case (Fig. 125).

(b) Slowly compress rod guide while simultaneously easing seal ring into bore with suitable tool.

(9) Install rod guide snap ring (Fig. 125).

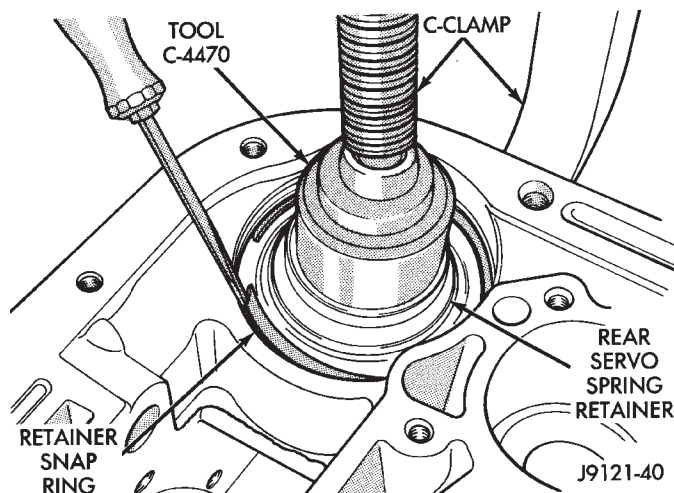


Fig. 123 Rear Servo Snap Ring

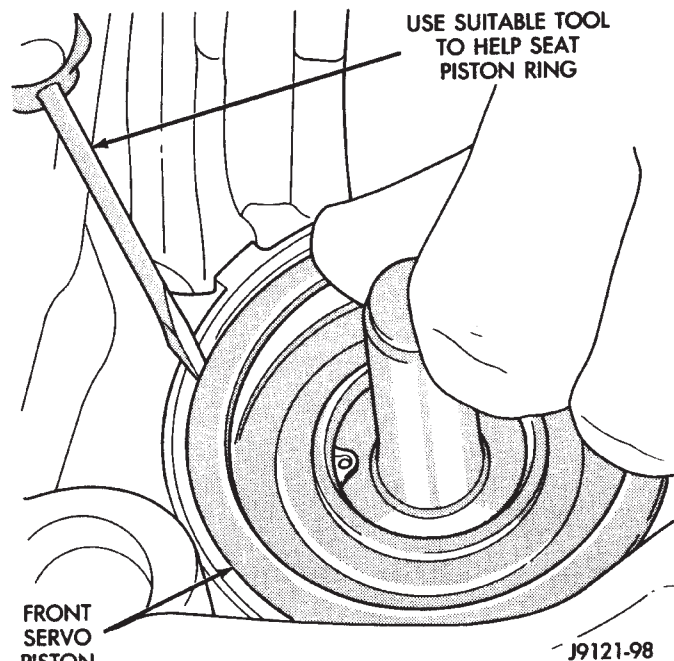


Fig. 124 Front Servo Piston

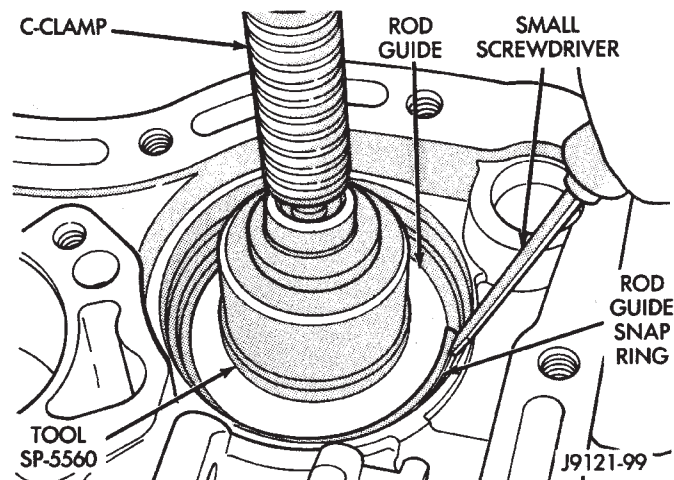


Fig. 125 Front Servo Rod Guide And Snap Ring

DISASSEMBLY AND ASSEMBLY (Continued)

OVERRUNNING CLUTCH, REAR BAND, AND LOW-REVERSE DRUM

(1) Install overrunning clutch components if not yet installed.

(2) Position rear band and link in case (Fig. 126).

(3) Install low-reverse drum (Fig. 127). Slide drum through rear band, onto piston retainer hub and into engagement with overrunning clutch and race.

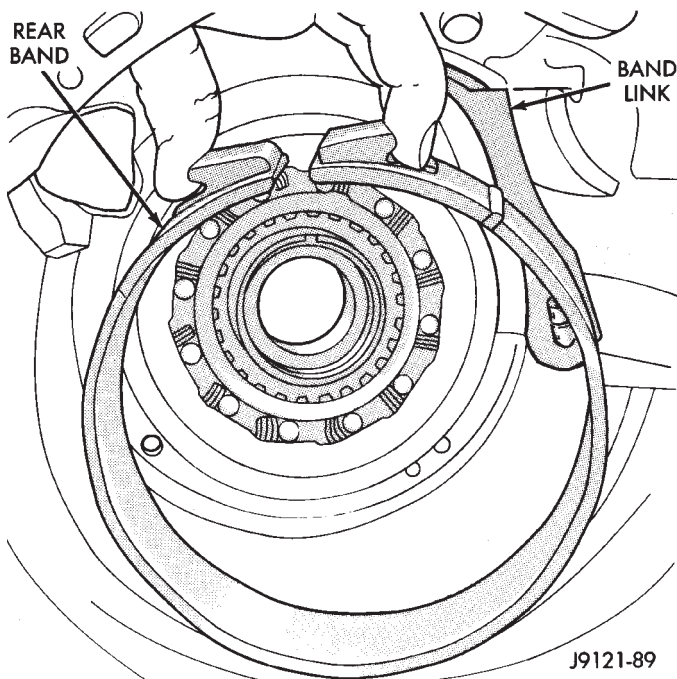


Fig. 126 Rear Band And Link

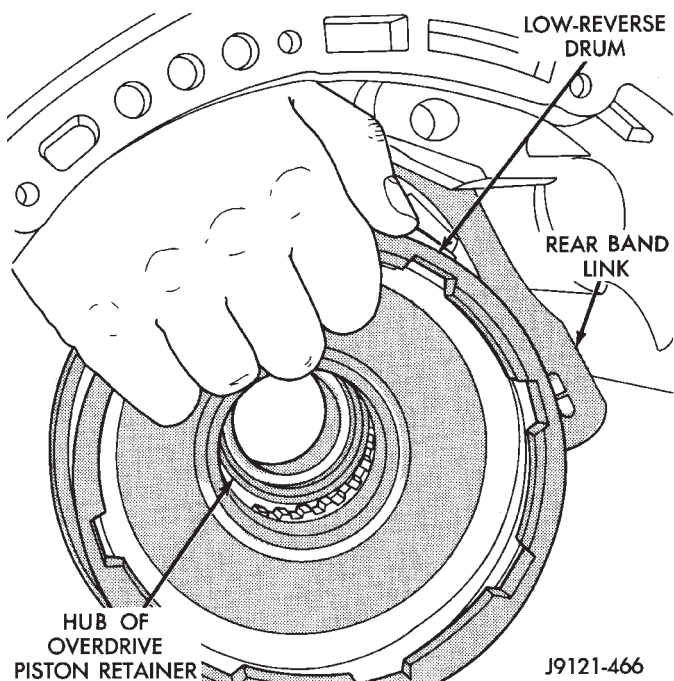


Fig. 127 Low-Reverse Drum

(4) Install thrust washer in low-reverse drum spot-face (Fig. 128). Use petroleum jelly to hold washer in place.

(5) Install snap ring that secures low-reverse drum to piston retainer hub (Fig. 128).

(6) Insert band reaction pin part way into case and band link (Fig. 129).

(7) Install rear band adjusting lever, reaction lever, and strut (Fig. 130). Be sure levers and strut are aligned and engaged before seating band reaction pin in case.

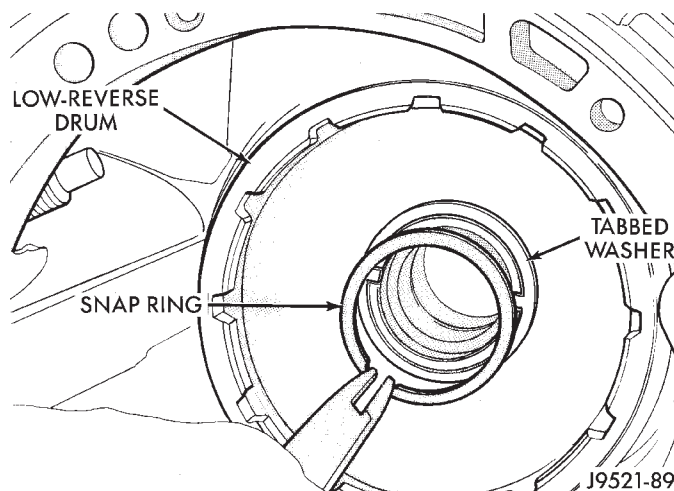


Fig. 128 Low-Reverse Drum Snap Ring

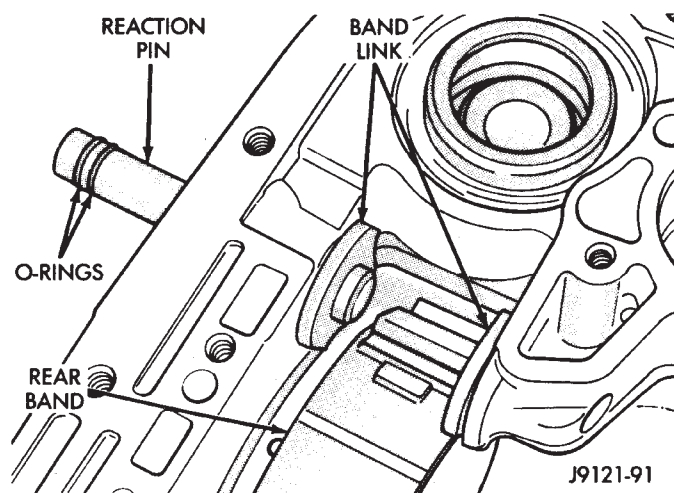
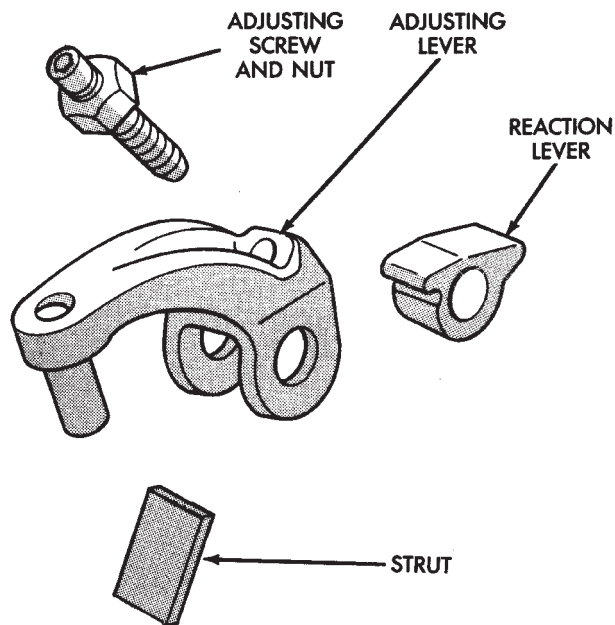


Fig. 129 Rear Band Reaction Pin

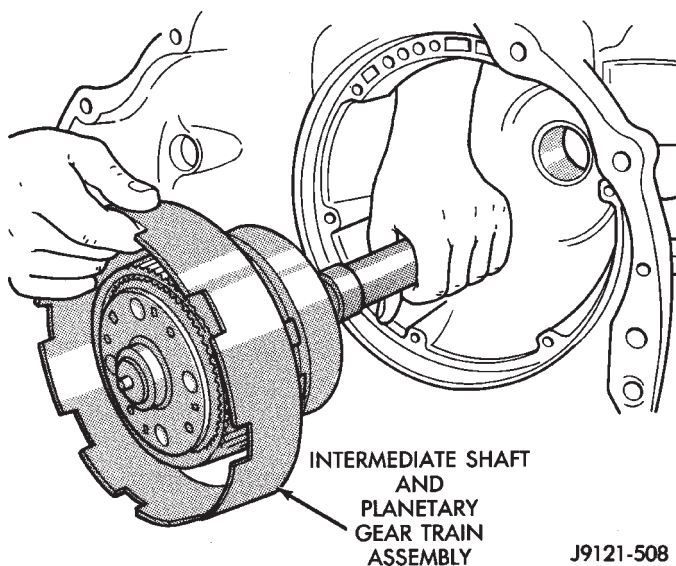


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Fig. 130 Rear Band Levers And Strut
PLANETARY GEARTRAIN, FRONT/REAR CLUTCH, AND FRONT BAND

(1) Remove Alignment Shaft 6227-2, if installed previously.

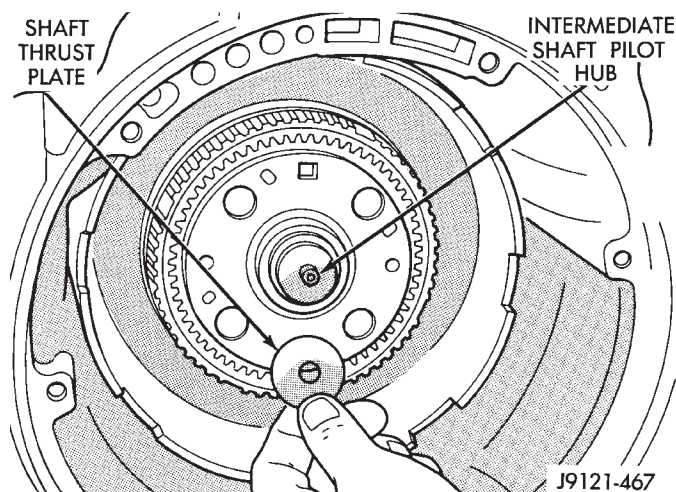
(2) Install assembled intermediate shaft and planetary geartrain (Fig. 131). **Support shaft carefully during installation. Do not allow shaft bearing/bushing surfaces to become nicked or scratched.**



J9121-508

Fig. 131 Intermediate Shaft And Planetary Geartrain

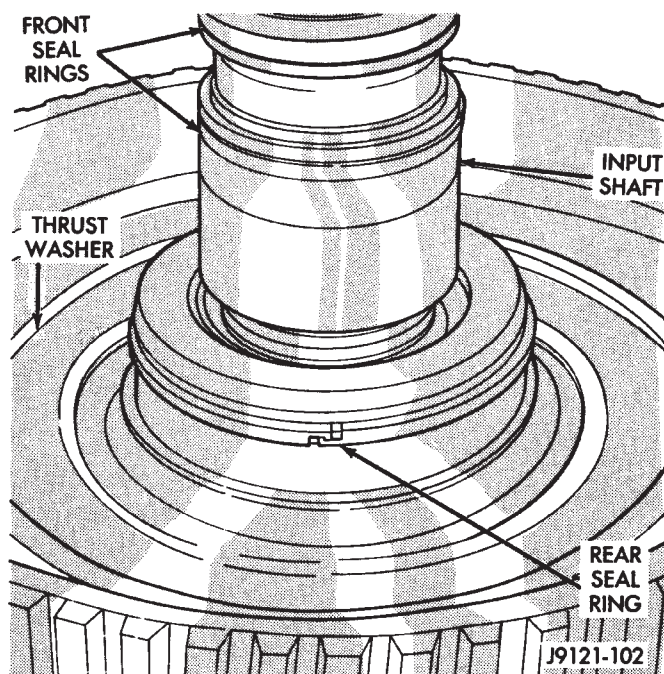
(3) Lubricate intermediate shaft thrust plate with petroleum jelly and install plate on shaft pilot hub (Fig. 132).



J9121-467

Fig. 132 Intermediate Shaft Thrust Plate

(4) Check input shaft front seal rings, fiber thrust washer and rear seal ring (Fig. 133). Be ends of rear seal ring are hooked together and diagonal cut ends of front seal rings are firmly seated against each other as shown. Lubricate seal rings with petroleum jelly after checking them.



J9121-102

Fig. 133 Input Shaft Seal Ring And Thrust Washer

DISASSEMBLY AND ASSEMBLY (Continued)

(5) Assemble front and rear clutches (Fig. 134). Align lugs on front clutch discs. Mount front clutch on rear clutch. Turn front clutch retainer back and forth until front clutch discs are fully seated on rear clutch splined hub.

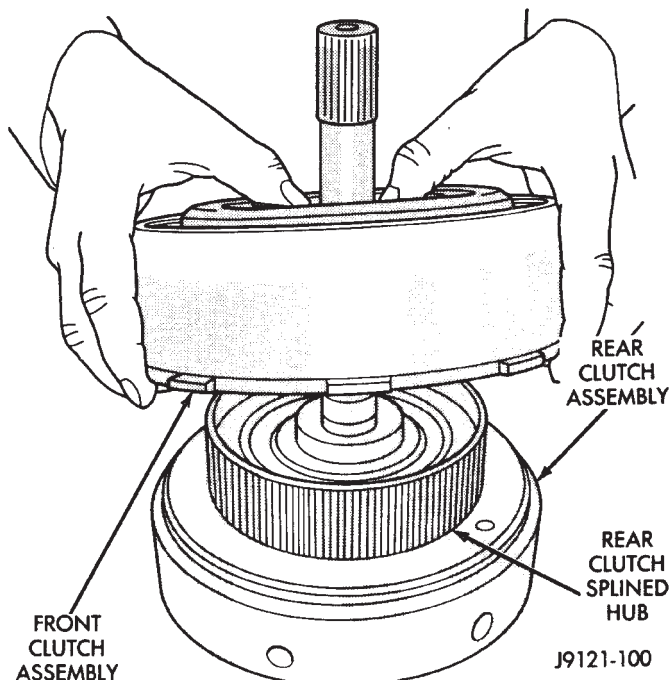


Fig. 134 Assembling Front And Rear Clutches

(6) Install intermediate shaft thrust washer in hub of rear clutch retainer (Fig. 135). Use petroleum jelly to hold washer in place. Position washer so grooves are facing outward. **Washer only fits one way in clutch retainer hub.**

(7) Place transmission case in upright position, or place blocks under front end of transmission repair stand to tilt case rearward. This makes it easier to install front/rear clutch assembly.

(8) Align discs in rear clutch. Then install and engage assembly in front planetary and driving shell (Fig. 136). Turn clutch retainers back and forth until both clutches are seated.

(9) Position front band lever in case and over servo rod guide. Then install front band lever pin in case and slide it through lever.

(10) Coat threads of front band pin access plug with sealer and install it in case. Tighten plug to 17 N·m (13 ft. lbs.) torque.

(11) Slide front band over front clutch retainer and install front band strut and anchor (Fig. 137).

(12) Tighten front band adjusting screw until band is tight on clutch retainer. This will hold clutches in place while oil pump is being installed. **Verify that front/rear clutch assembly is still properly seated before tightening band.**

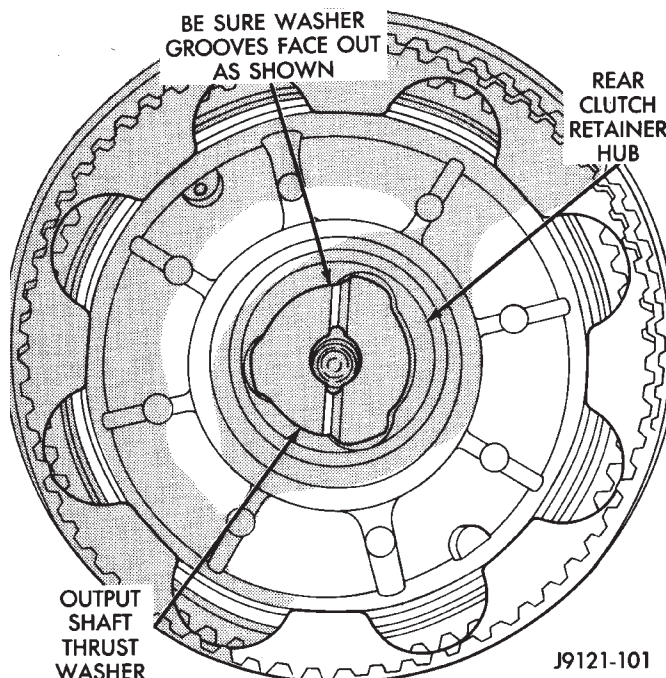


Fig. 135 Intermediate Shaft Thrust Washer

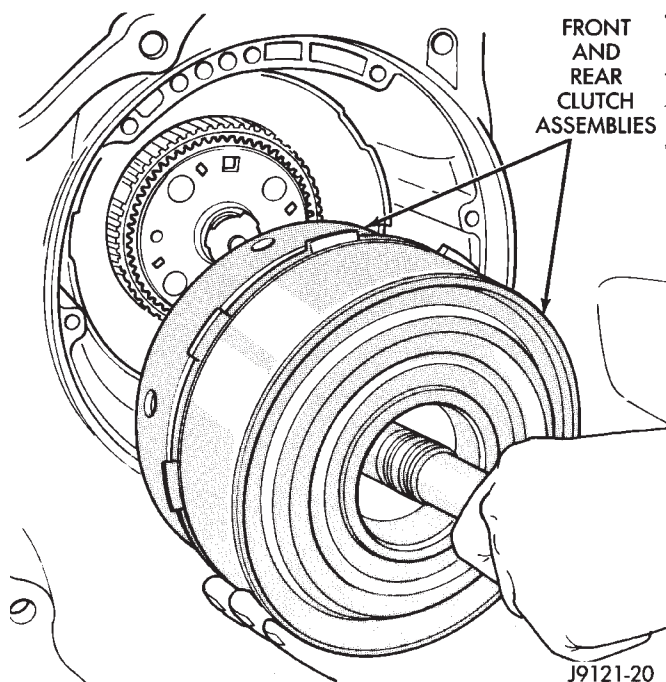
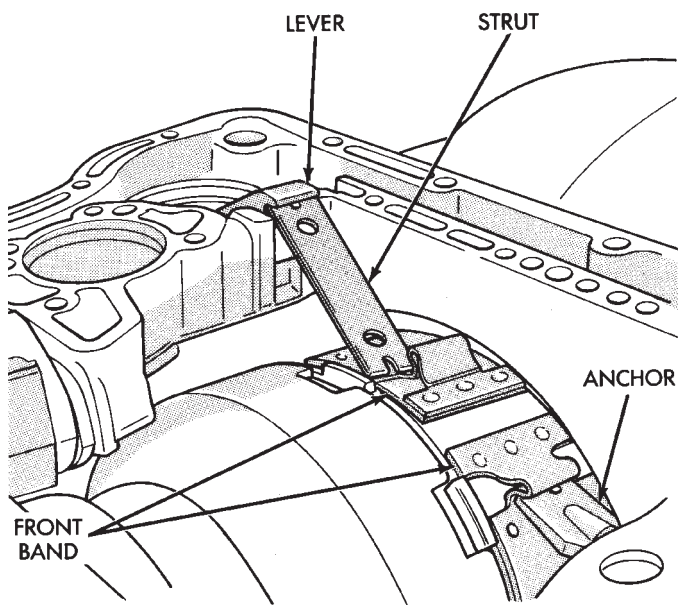


Fig. 136 Front/Rear Clutch Assemblies

DISASSEMBLY AND ASSEMBLY (Continued)

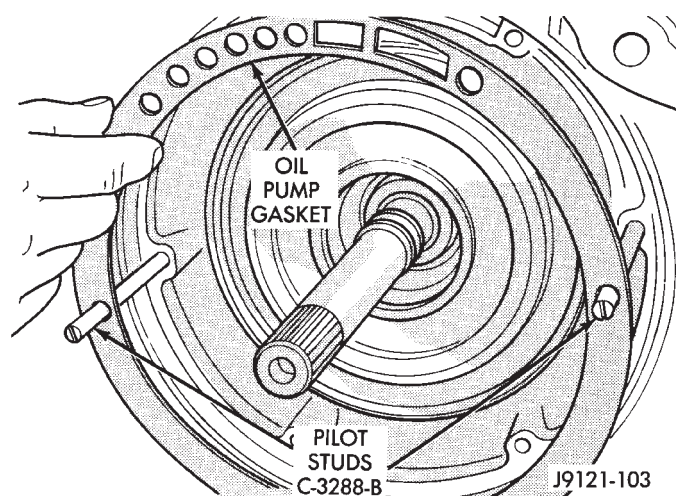


J9121-18

Fig. 137 Front Band And Linkage**OIL PUMP**

(1) Install oil pump Pilot Studs C-3288-B in case (Fig. 138).

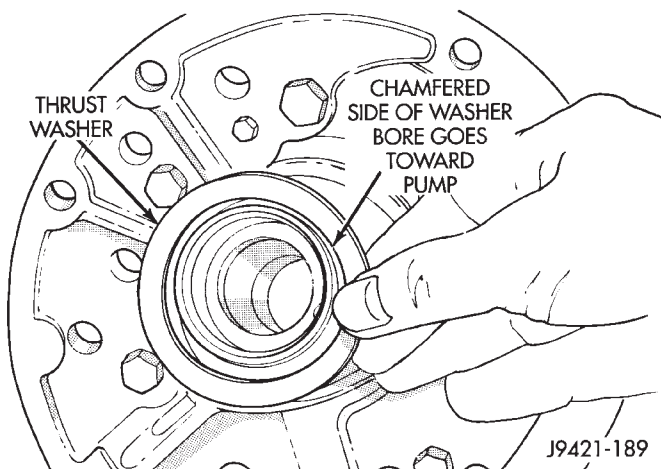
(2) Install new oil pump gasket on pilot studs and seat it in case. Be sure gasket is properly aligned with fluid passages in case (Fig. 138).

**Fig. 138 Oil Pump Gasket And Pilot Studs**

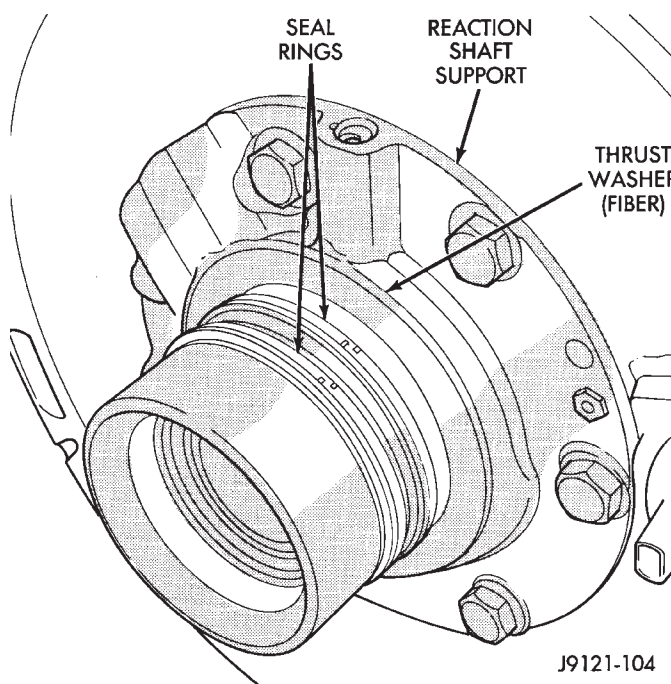
(3) Coat front clutch thrust washer with petroleum jelly to hold it in place. Then install washer over reaction shaft hub and seat it on pump (Fig. 139).

CAUTION: The thrust washer bore (I.D.), is chamfered on one side. Make sure the chamfered side is installed so it faces the pump.

(4) Check seal rings on reaction shaft support. Be sure rings are hooked together correctly. Also be sure

**Fig. 139 Front Clutch Thrust Washer**

fiber thrust washer is in position (Fig. 140). Use extra petroleum jelly to hold washer in place if necessary.

**Fig. 140 Reaction Shaft Seal Ring And Thrust Washer**

(5) Lubricate oil pump seals with petroleum Mopar® ATF Plus 3, type 7176.

(6) Mount oil pump on pilot studs and slide pump into case opening (Fig. 141). **Work pump into case by hand. Do not use a mallet or similar tools to seat pump.**

(7) Remove pilot studs and install oil pump bolts. Tighten pump bolts alternately and evenly to fully seat pump in case. Then final-tighten pump bolts to 20 N·m (15 ft. lbs.) torque.

DISASSEMBLY AND ASSEMBLY (Continued)

(8) Verify correct installation. Rotate input and intermediate shafts and check for bind. If bind exists, components are either mis-assembled, or not seated. Disassemble and correct as necessary before proceeding.

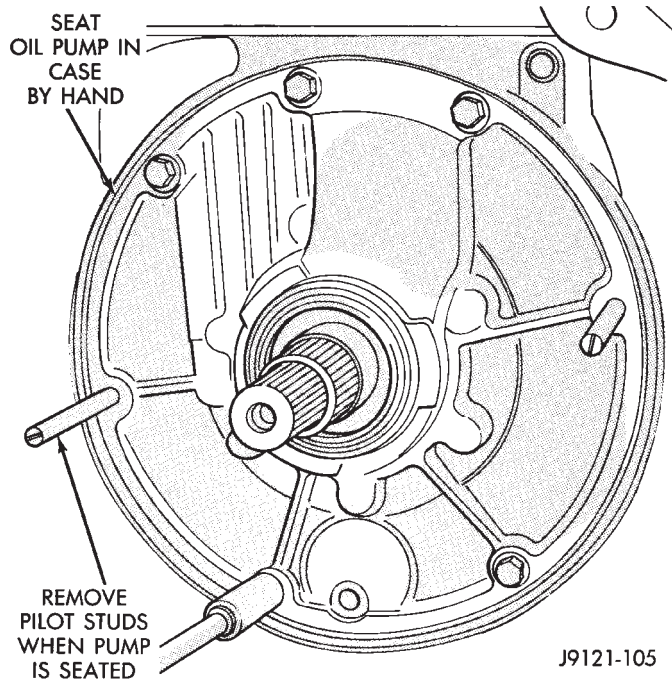


Fig. 141 Oil Pump

INPUT SHAFT END PLAY CHECK

NOTE: Overdrive unit must be installed in order to correctly measure the input shaft end-play.

- (1) Check input shaft end play as follows.
- (2) Attach dial indicator to converter housing (Fig. 142). Position indicator plunger against input shaft and zero indicator.
- (3) Move input shaft in and out and record reading.
- (4) End play should be 0.86 - 2.13 mm (0.034 - 0.084 in.).
- (5) If end play is incorrect, change intermediate shaft thrust washer. The thrust washer controls end play and is available in three thicknesses for adjustment purposes.

ACCUMULATOR, VALVE BODY, OIL PAN, AND TORQUE CONVERTER

- (1) Install accumulator inner spring, piston and outer spring (Fig. 143).
- (2) Verify that park/neutral position switch has **not** been installed in case. Valve body can not be installed if switch is in position.
- (3) Install new valve body manual shaft seal in case (Fig. 144). Lubricate seal lip and manual shaft

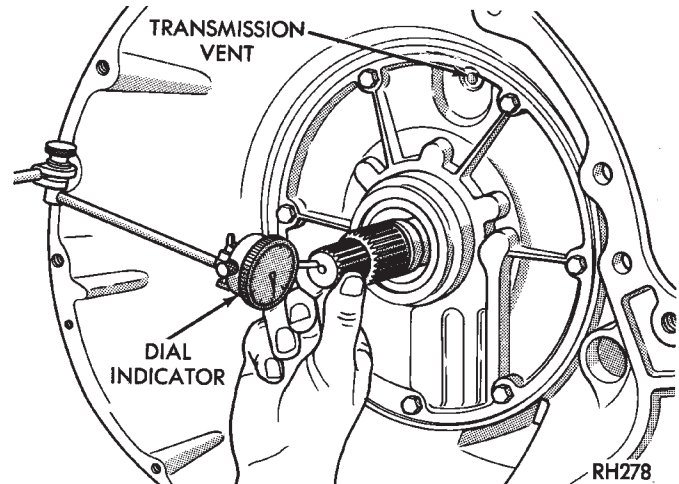


Fig. 142 Checking Input Shaft End Play

with petroleum jelly. Start seal over shaft and into case. Seat seal with 15/16 inch, deep well socket.

- (4) Install valve body as follows:

(a) Start park rod into park pawl. If rod will not slide past park pawl, pawl is engaged in park gear. Rotate overdrive output shaft with suitable size 12 point socket; this will free pawl and allow rod to engage.

(b) Align and seat valve body on case. Be sure manual lever shaft and overdrive connector are fully seated in case.

(c) Install and start all valve body attaching bolts by hand. Then tighten bolts evenly, in a diagonal pattern to 12 N·m (105 in. lbs.) torque. **Do not overtighten valve body bolts. This could result in distortion and cross leakage after installation..**

(5) Install new filter on valve body. Tighten filter screws to 4 N·m (35 in. lbs.).

(6) Install seal on park/neutral position switch. Then install and tighten switch to 34 N·m (25 ft. lbs.).

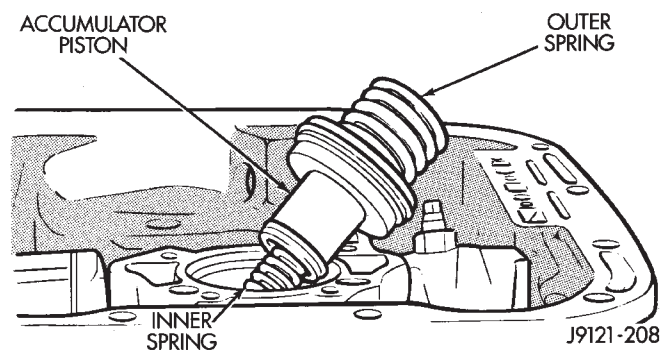


Fig. 143 Accumulator Piston And Springs

DISASSEMBLY AND ASSEMBLY (Continued)

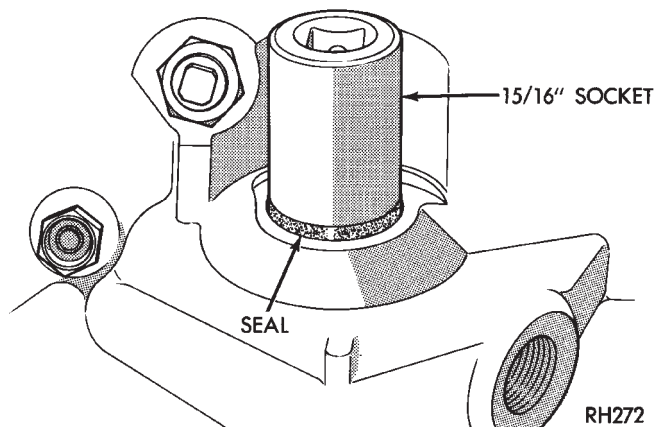


Fig. 144 Manual Lever Shaft Seal

CAUTION: If the condition of the transmission before the overhaul procedure caused excessive metallic or fiber contamination in the fluid, replace the torque converter and reverse flush the cooler(s) and cooler lines. Fluid contamination and transmission failure can result if not done.

(7) Install torque converter. Use C-clamp or metal strap to hold converter in place for installation.

BAND ADJUSTMENT AND FINAL

- (1) Adjust front and rear bands as follows:
 - (a) Loosen locknut on each band adjusting screw 4-5 turns.
 - (b) Tighten both adjusting screws to 8 N·m (72 in. lbs.).
 - (c) Back off front band adjusting screw 2-7/8 turns.
 - (d) Back off rear band adjusting screw 2 turns.
 - (e) Hold each adjusting screw in position and tighten locknut to 34 N·m (25 ft. lbs.) torque.
- (2) Install magnet in oil pan. Magnet seats on small protrusion at corner of pan.
- (3) Position new oil pan gasket on case and install oil pan. Tighten pan bolts to 17 N·m (13 ft. lbs.).
- (4) Install throttle valve and shift selector levers on valve body manual lever shaft.
- (5) Apply small quantity of dielectric grease to terminal pins of solenoid case connector and neutral switch.
- (6) Fill transmission with recommended fluid. Refer to Service Procedures section of this group.
- (7) Road test vehicle to verify repair.

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER

NOTE: TO SERVICE THE OVERRUNNING CLUTCH CAM AND THE OVERDRIVE PISTON RETAINER, THE TRANSMISSION GEARTRAIN AND OVERDRIVE

UNIT MUST BE REMOVED FROM THE TRANSMISSION.

DISASSEMBLY

- (1) Remove the overdrive piston (Fig. 145).
- (2) Remove the overdrive piston retainer bolts.
- (3) Remove overdrive piston retainer.
- (4) Remove case gasket.
- (5) Tap old cam out of case with pin punch. Insert punch through bolt holes at rear of case (Fig. 146). Alternate position of punch to avoid cocking cam during removal.
- (6) Clean clutch cam bore and case. Be sure to remove all chips/shavings generated during cam removal.

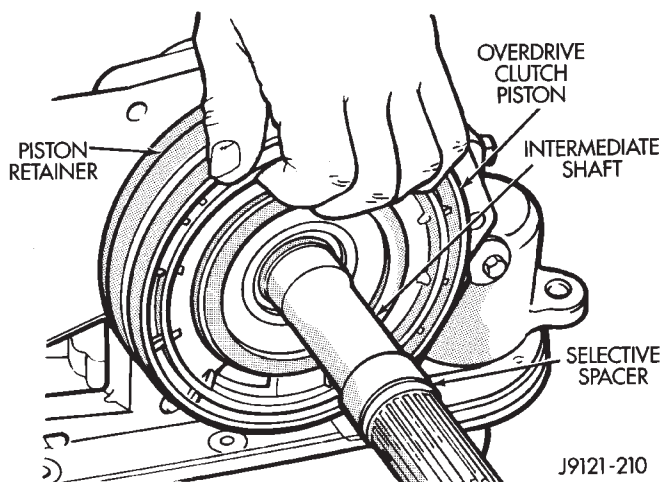


Fig. 145 Overdrive Piston Removal

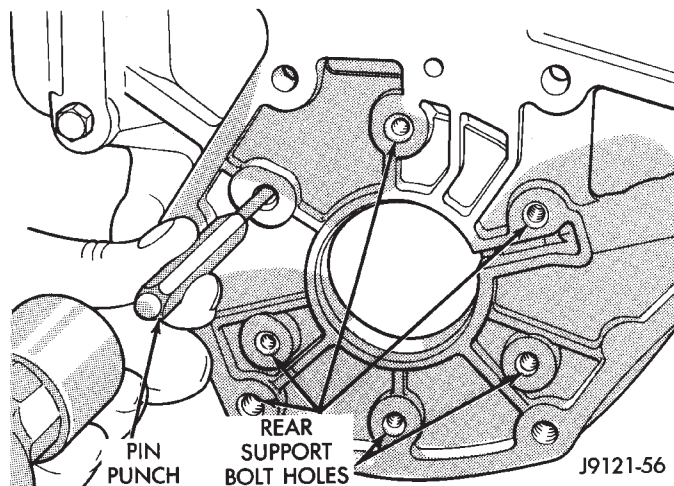


Fig. 146 Overrunning Clutch Cam

ASSEMBLY

- (1) Temporarily install overdrive piston retainer in case. Use 3-4 bolts to secure retainer.
- (2) Align and start new clutch cam and spring retainer in case. Be sure serrations on cam and in

DISASSEMBLY AND ASSEMBLY (Continued)

case are aligned (Fig. 147). Then tap cam into case just enough to hold it in place.

(3) **Verify that cam is correctly positioned before proceeding any further. Narrow ends of cam ramps should be to left when cam is viewed from front end of case (Fig. 147).**

(4) Insert Adapter Tool SP-5124 into piston retainer (Fig. 148).

(5) Assemble Puller Bolt SP-3701 and Press Plate SP-3583-A (Fig. 149).

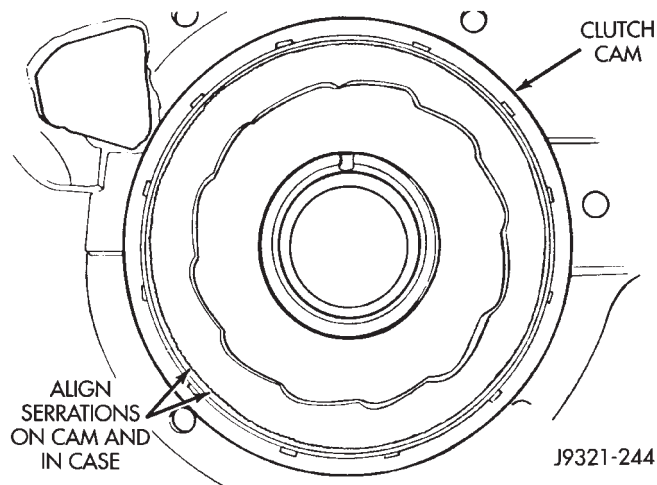


Fig. 147 Positioning Replacement Clutch Cam In Case

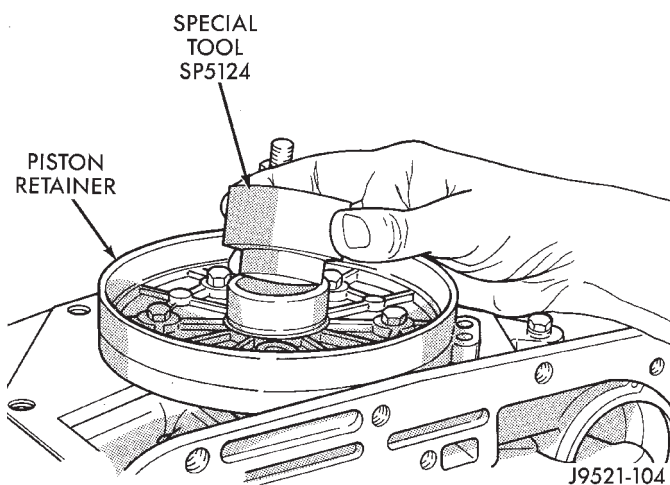


Fig. 148 Positioning Adapter Tool In Overdrive Piston Retainer

(6) Install assembled puller plate and bolt (Fig. 150). Insert bolt through cam, case and adapter tool. Be sure plate is seated squarely on cam.

(7) Hold puller plate and bolt in place and install puller nut SP-3701 on puller bolt (Fig. 151).

(8) Tighten puller nut to press clutch cam into case (Fig. 151). **Be sure cam is pressed into case evenly and does not become cocked.**

(9) Remove clutch cam installer tools.

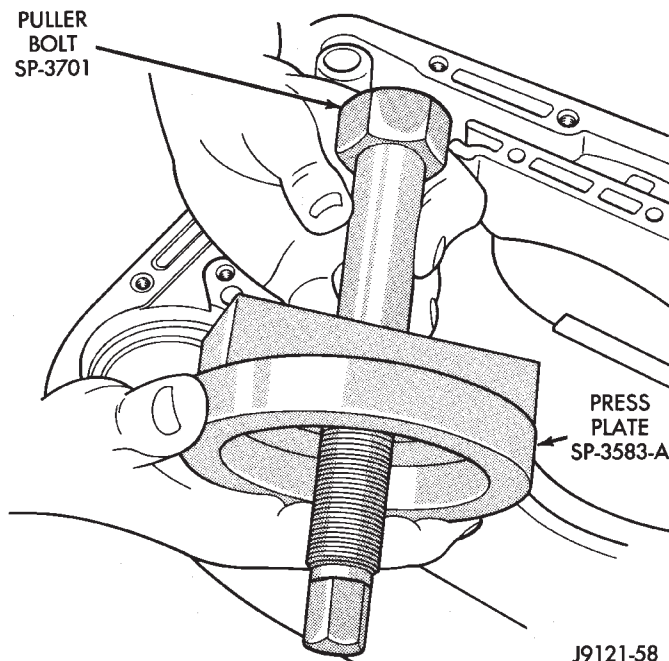


Fig. 149 Assembling Clutch Cam Puller Bolt And Press Plate

(10) Stake case in 12 places around clutch cam to help secure cam in case. Use blunt punch or chisel to stake case.

(11) Remove piston retainer from case. Cover retainer with plastic sheeting, or paper to keep it dust free.

(12) Clean case and cam thoroughly. Be sure any chips/shavings generated during cam installation are removed from case.

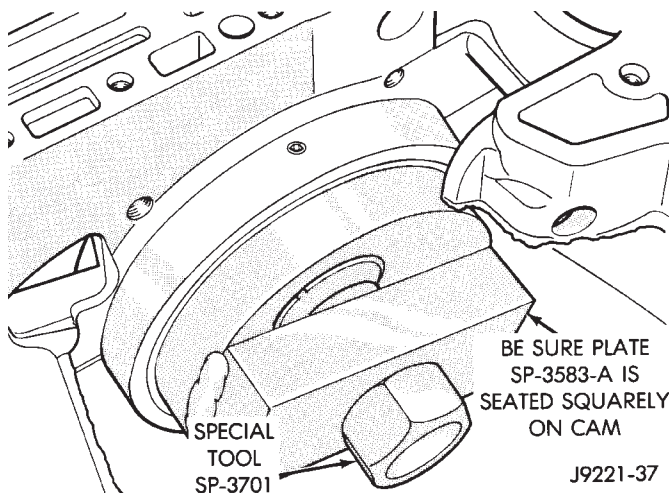


Fig. 150 Positioning Puller Plate On Clutch Cam

(13) Install new gasket at rear of transmission case. Use petroleum jelly to hold gasket in place. Be sure to align governor feed holes in gasket with feed passages in case (Fig. 152). Also install gasket before overdrive piston retainer. Center hole in gasket is

DISASSEMBLY AND ASSEMBLY (Continued)

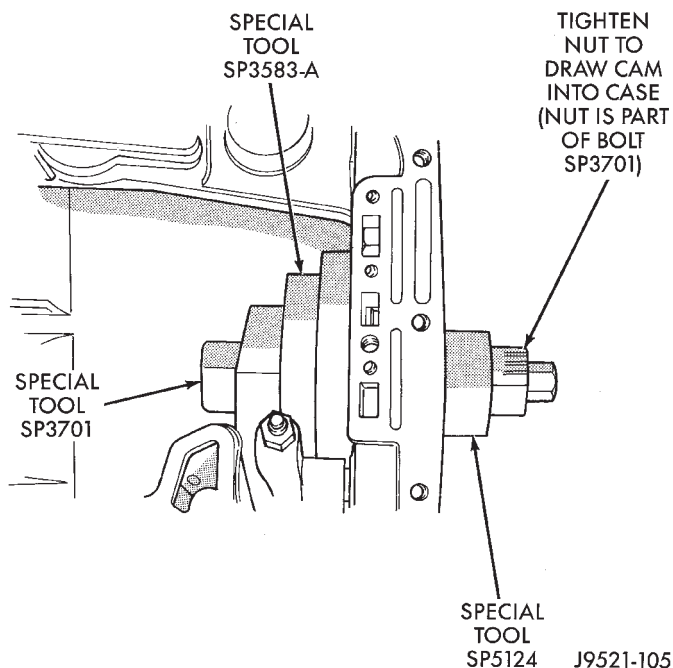


Fig. 151 Pressing Overrunning Clutch Cam Into Case

smaller than retainer and cannot be installed over retainer.

(14) Position overdrive piston retainer on transmission case and align bolt holes in retainer, gasket and case (Fig. 153). Then install and tighten retainer bolts to 17 N·m (13 ft. lbs.) torque.

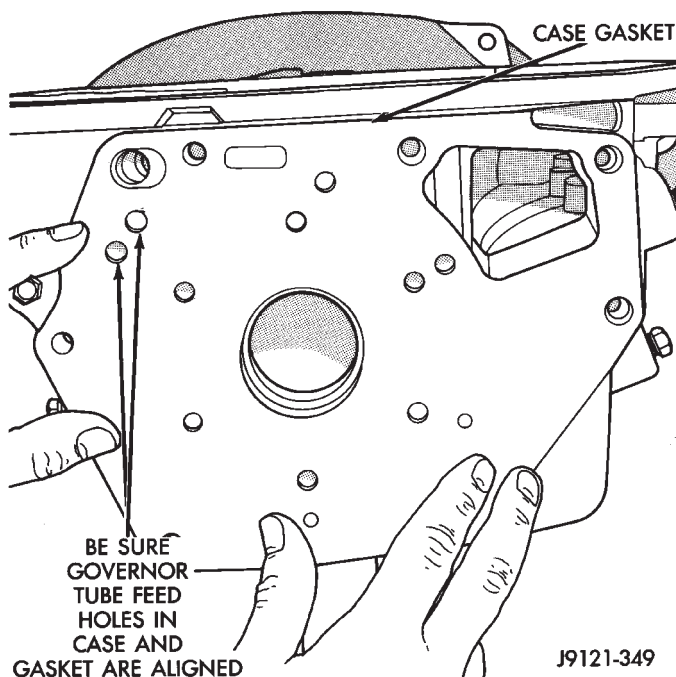


Fig. 152 Installing/Aligning Case Gasket

(15) Install new seals on overdrive piston.

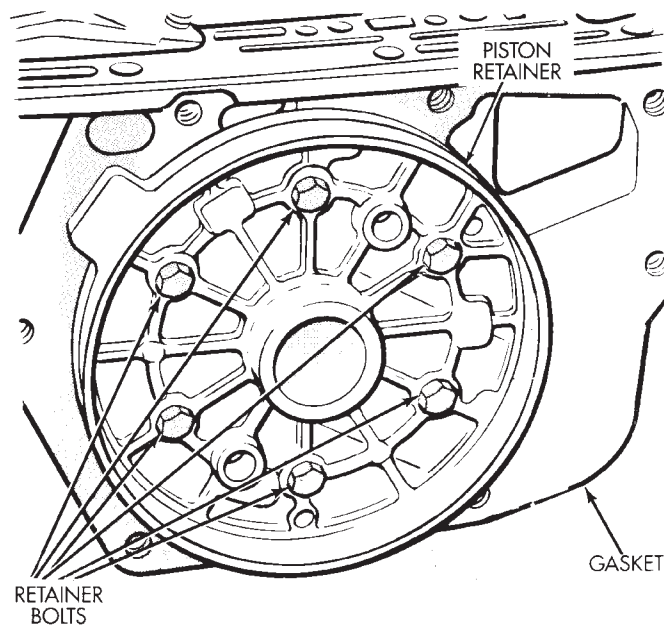


Fig. 153 Aligning Overdrive Piston Retainer

(16) Stand transmission case upright on bellhousing.

(17) Position Guide Ring 8114-1 on outer edge of overdrive piston retainer.

(18) Position Seal Guide 8114-3 on inner edge of overdrive piston retainer.

(19) Install overdrive piston in overdrive piston retainer by: aligning locating lugs on overdrive piston to the two mating holes in retainer.

(a) Aligning locating lugs on overdrive piston to the two mating holes in retainer.

(b) Lubricate overdrive piston seals with Mopar® Door Ease, or equivalent.

(c) Install piston over Seal Guide 8114-3 and inside Guide Ring 8114-1.

(d) Push overdrive piston into position in retainer.

(e) Verify that the locating lugs entered the lug bores in the retainer.

NOTE: INSTALL THE REMAINING TRANSMISSION COMPONENTS AND OVERDRIVE UNIT.

FRONT SERVO PISTON

DISASSEMBLY

(1) Remove seal ring from rod guide (Fig. 154).

(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.

DISASSEMBLY AND ASSEMBLY (Continued)

ASSEMBLY

Clean and inspect front servo components.

(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. 154).

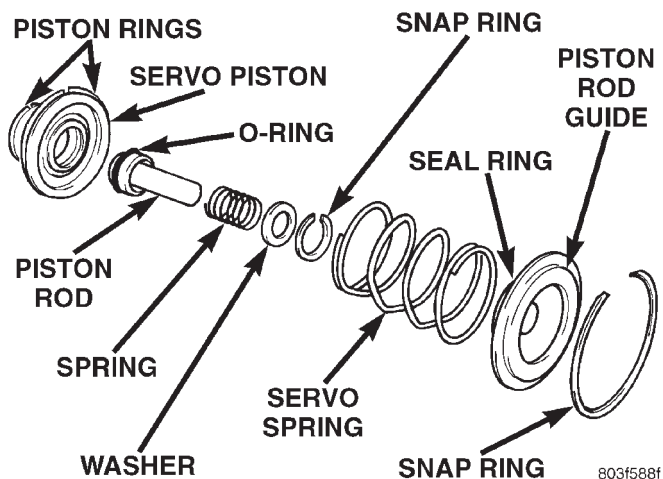


Fig. 154 Front Servo

REAR SERVO PISTON

DISASSEMBLY

(1) Remove small snap ring and remove plug and spring from servo piston (Fig. 155).

(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.

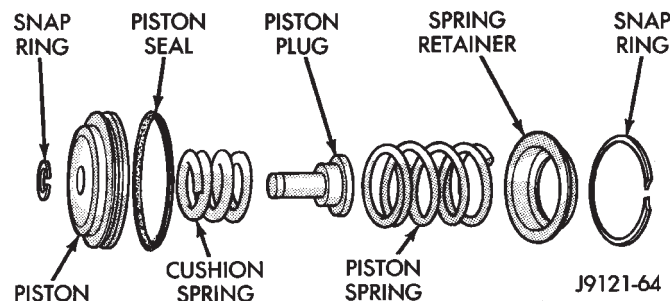


Fig. 155 Rear Servo Components

OIL PUMP AND REACTION SHAFT SUPPORT

DISASSEMBLY

(1) Mark position of support in oil pump body for assembly alignment reference. Use scribe or paint to make alignment marks.

(2) Place pump body on two wood blocks.

(3) Remove reaction shaft support bolts and separate support from pump body (Fig. 156).

(4) Remove pump inner and outer gears (Fig. 157).

(5) Remove O-ring seal from pump body (Fig. 158). Discard seal after removal.

(6) Remove oil pump seal with Remover Tool C-3981. Discard seal after removal.

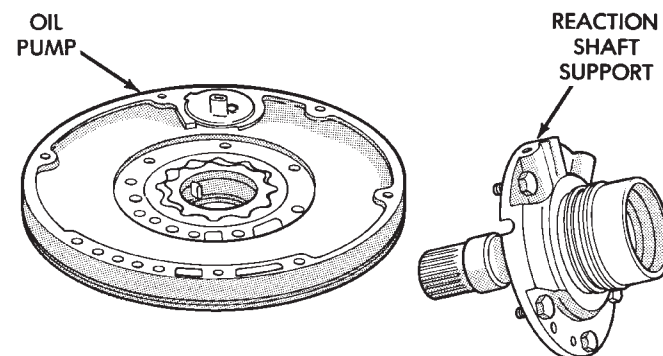


Fig. 156 Reaction Shaft Support

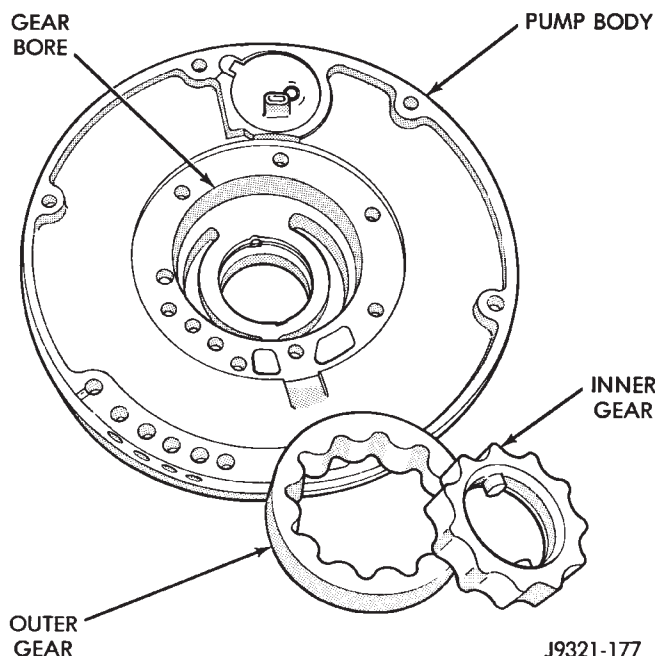


Fig. 157 Pump Gear

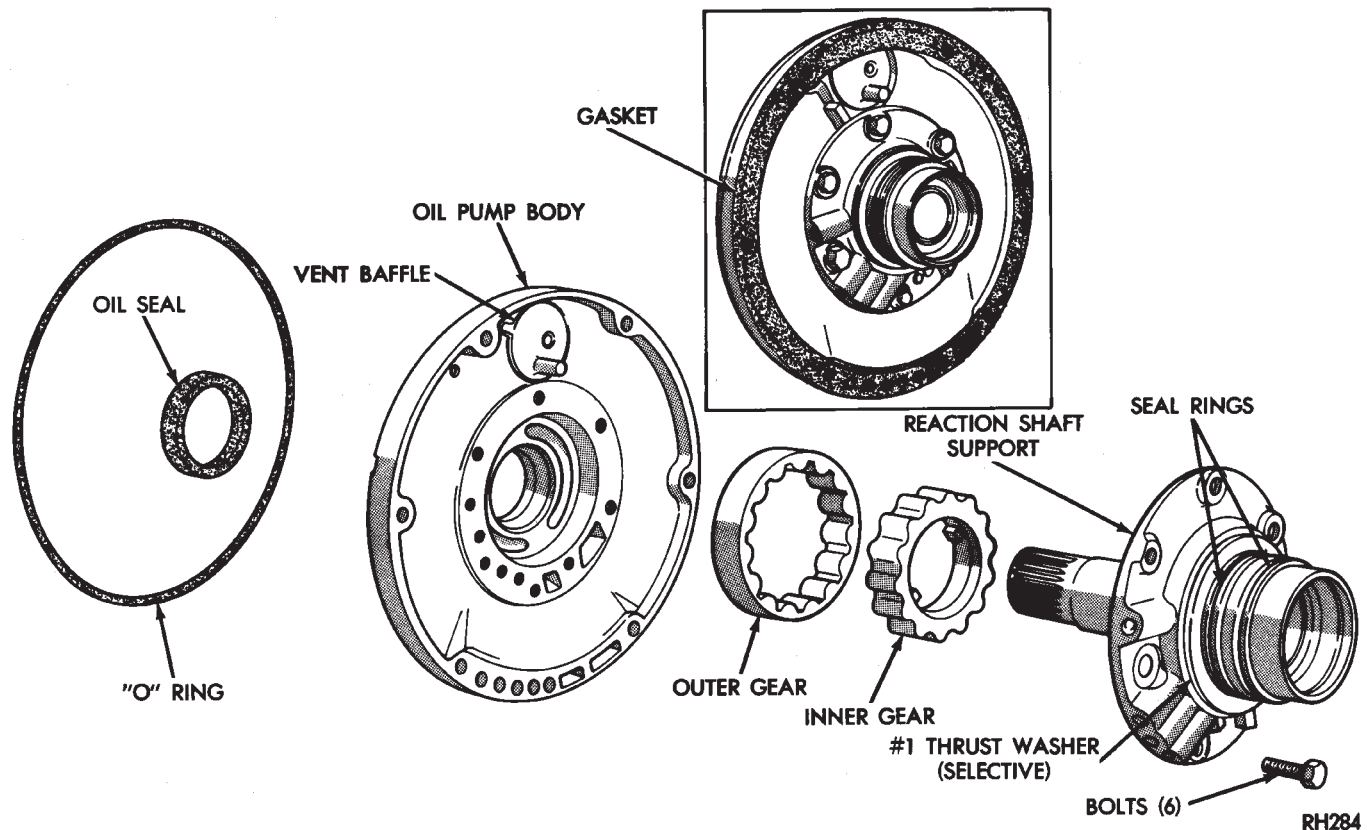


Fig. 158 Oil Pump And Reaction Shaft Components

OIL PUMP BUSHING REMOVAL

- (1) Position pump housing on clean, smooth surface with gear cavity facing down.
- (2) Remove bushing with Tool Handle C-4171 and Bushing Remover SP-3550 (Fig. 159).

REACTION SHAFT SUPPORT BUSHING REMOVAL

- (1) Assemble Cup Tool SP-3633, Nut SP-1191 and Bushing Remover SP-5301 (Fig. 161).
- (2) Hold cup tool firmly against reaction shaft. Thread remover tool into bushing as far as possible by hand.
- (3) Using wrench, thread remover tool an additional 3-4 turns into bushing to firmly engage tool.
- (4) Tighten tool hex nut against cup tool to pull bushing from shaft. Clean all chips from shaft and support after bushing removal.

ASSEMBLY

OIL PUMP BUSHING INSTALLATION

- (1) Assemble Tool Handle C-4171 and Bushing Installer SP-5118.
- (2) Place bushing on installer tool and start bushing into shaft.
- (3) Tap bushing into place until Installer Tool SP-5118 bottoms in pump cavity. Keep tool and bush-

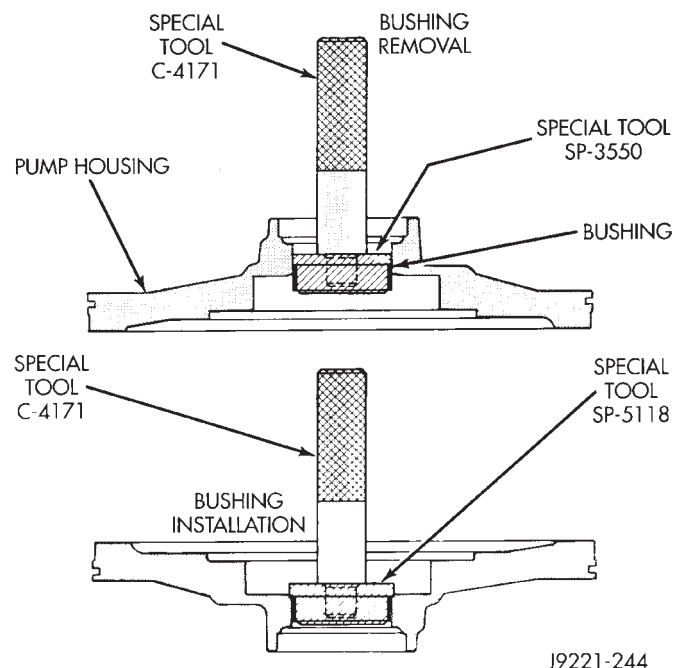
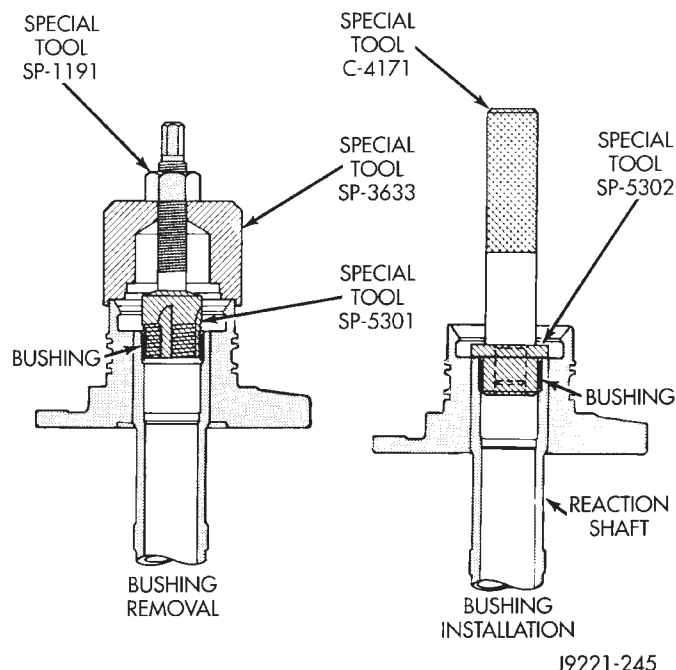
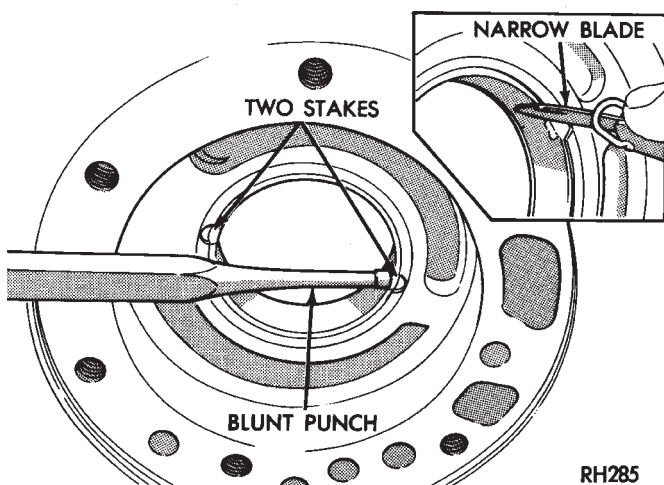
ing square with bore. Do not allow bushing to become cocked during installation.

- (4) Stake pump bushing in two places with blunt punch. Remove burrs from stake points with knife blade (Fig. 160).

REACTION SHAFT SUPPORT BUSHING INSTALLATION

- (1) Place reaction shaft support upright on a clean, smooth surface.
- (2) Assemble Bushing Installer Tools C-4171 and SP-5302. Then slide new bushing onto installer tool (Fig. 161).
- (3) Start bushing in shaft. Tap bushing into shaft until installer tool bottoms against support flange.
- (4) Clean reaction shaft support thoroughly after bushing replacement (to remove any chips).
- (1) Lubricate pump gears with transmission fluid and install them in pump body.
- (2) Install thrust washer on reaction shaft support hub. Lubricate washer with petroleum jelly or transmission fluid before installation.
- (3) If reaction shaft seal rings are being replaced, install new seal rings on support hub. Lubricate seal rings with transmission fluid or petroleum jelly after installation. Squeeze each ring until ring ends are securely hooked together.

DISASSEMBLY AND ASSEMBLY (Continued)

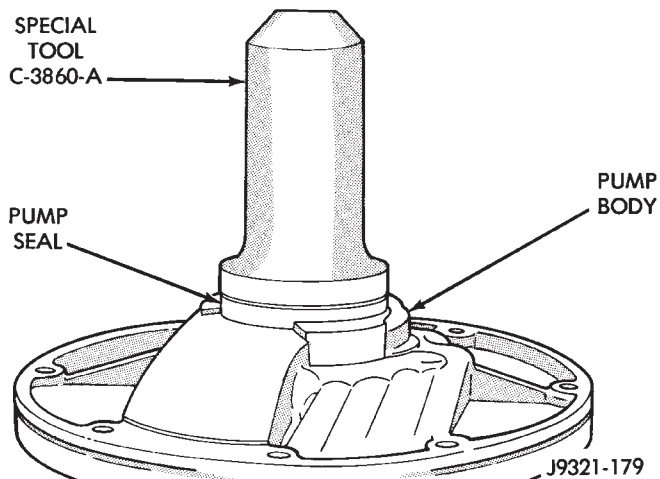
**Fig. 159 Oil Pump Bushing****Fig. 161 Reaction Shaft Bushing****Fig. 160 Staking-Deburring Oil Pump Bushing**

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.

(4) Align and install reaction shaft support on pump body.

(5) Install bolts attaching reaction shaft support to pump. Tighten bolts to 20 N·m (175 in. lbs.) torque.

(6) Install new pump seal with Installer Tool C-3860-A (Fig. 162). Use hammer or mallet to tap seal into place.

**Fig. 162 Oil Pump Seal****FRONT CLUTCH****DISASSEMBLY**

(1) Remove waved snap ring and remove reaction plate, clutch plates and clutch discs.

(2) Compress clutch piston retainer and piston springs with Compressor Tool C-3863-A (Fig. 163).

(3) Remove retainer snap ring and remove compressor tool.

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Remove clutch piston springs (Fig. 164). **Note position of piston springs for assembly reference.**

(5) Remove clutch piston from retainer with a twisting motion.

(6) Remove and discard clutch piston inner and outer seals.

(7) Assemble Tool Handle C-4171 and Bushing Remover SP-3629 (Fig. 165).

(8) Insert remover tool in bushing and drive bushing straight out of clutch retainer.

ASSEMBLY

NOTE: The 46RE transmission uses 3 discs in the front clutch. The 47RE transmission uses 4 discs.

(1) Mount Bushing Installer SP-5511 on tool handle (Fig. 165).

(2) Slide new bushing onto installer tool and start bushing into retainer.

(3) Tap new bushing into place until installer tool bottoms against clutch retainer.

(4) Remove installer tools and clean retainer thoroughly.

(5) Soak clutch discs in transmission fluid.

(6) Install new inner and outer seals on clutch piston. Be sure seal lips face interior of retainer.

(7) Lubricate new inner and outer piston seals with Ru-Glyde, or Mopar® Door Ease.

(8) Install clutch piston in retainer. Use twisting motion to seat piston in bottom of retainer. A thin strip of plastic (about 0.015 - 0.020 in. 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.

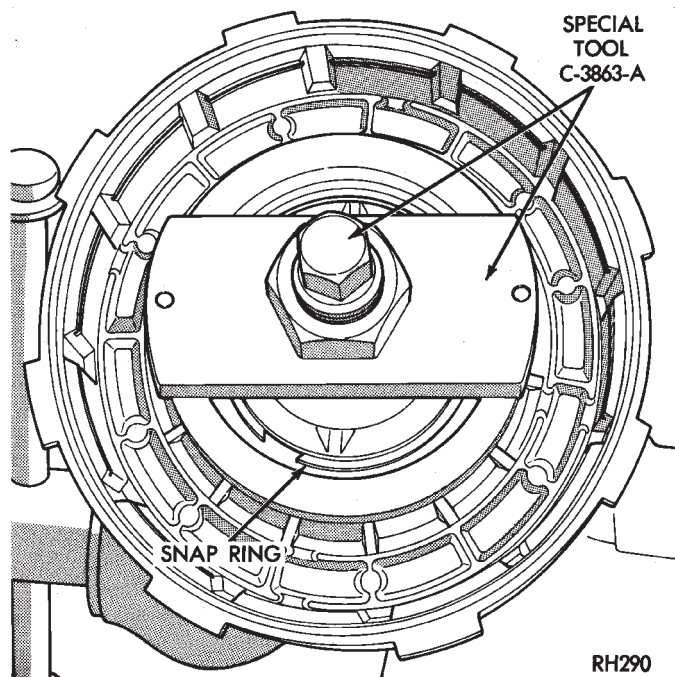


Fig. 163 Removing Front Clutch Spring Retainer Snap Ring

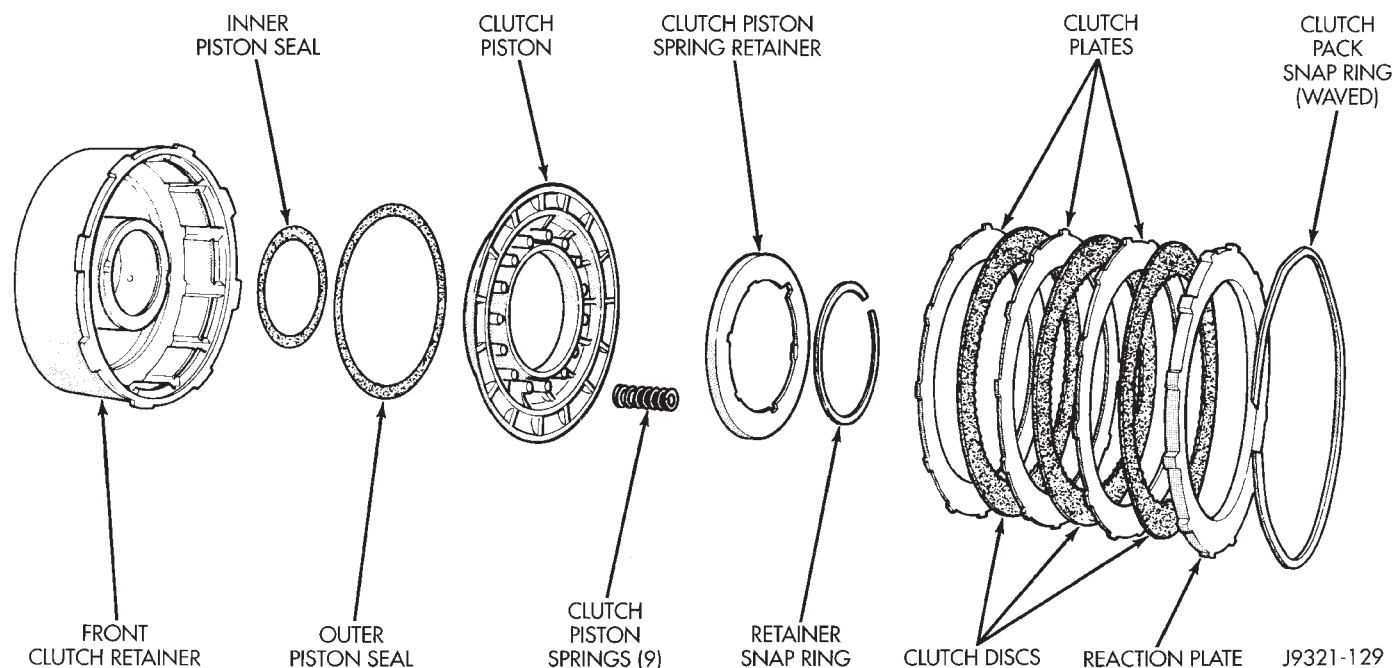


Fig. 164 46RE Front Clutch Components

DISASSEMBLY AND ASSEMBLY (Continued)

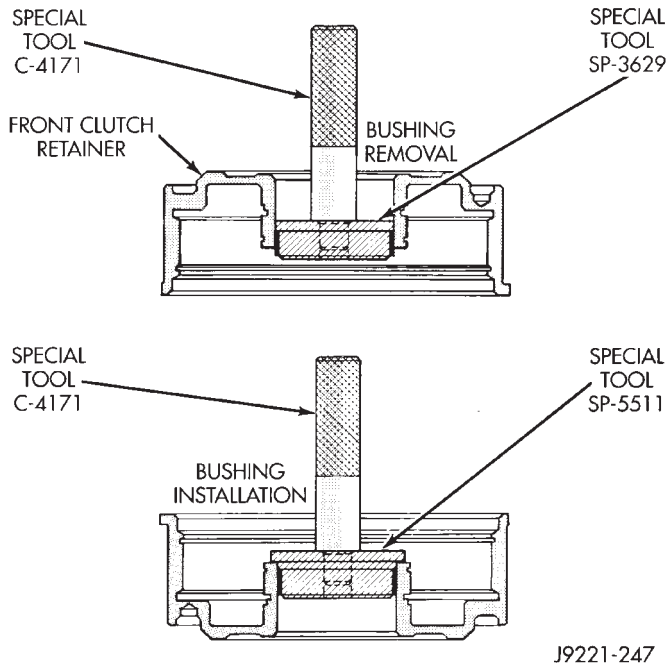


Fig. 165 Front Clutch Retainer Bushing Replacement Tools

(9) Install and position nine clutch piston springs (Fig. 166).

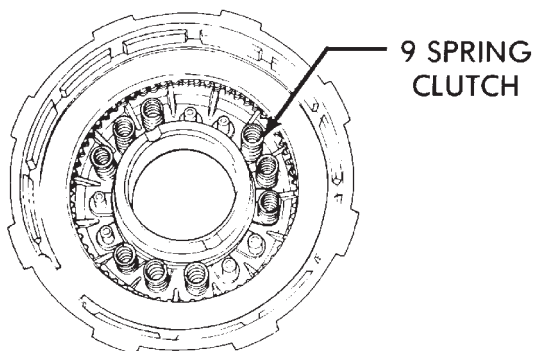


Fig. 166 Front Clutch Spring Position

(10) Install spring retainer on top of piston springs.

(11) Compress spring retainer and piston springs with Tool C-3863-A.

(12) Install spring retainer snap ring and remove compressor tool.

(13) Install clutch plates and discs (Fig. 164). Three clutch discs, three steel plates and one reaction plate are required.

(14) Install reaction plate followed by waved snap ring.

(15) Check clutch pack clearance with feeler gauge (Fig. 167). Clearance between waved spring and pressure plate should 1.78 - 3.28 mm (0.070 - 0.129 in.).

If clearance is incorrect, clutch plates, clutch discs, snap ring, or pressure plate may have to be changed.

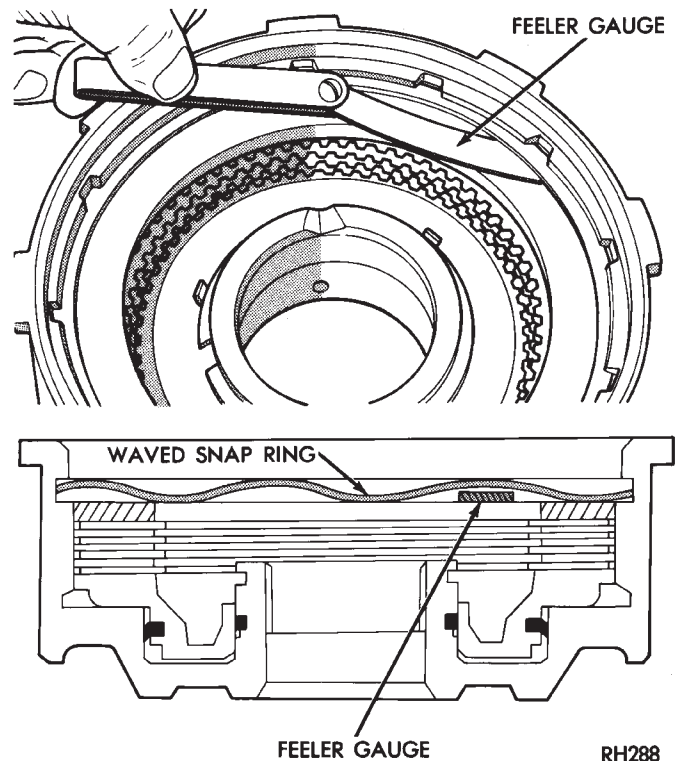


Fig. 167 Typical Method Of Measuring Front Clutch Pack Clearance

REAR CLUTCH

DISASSEMBLY

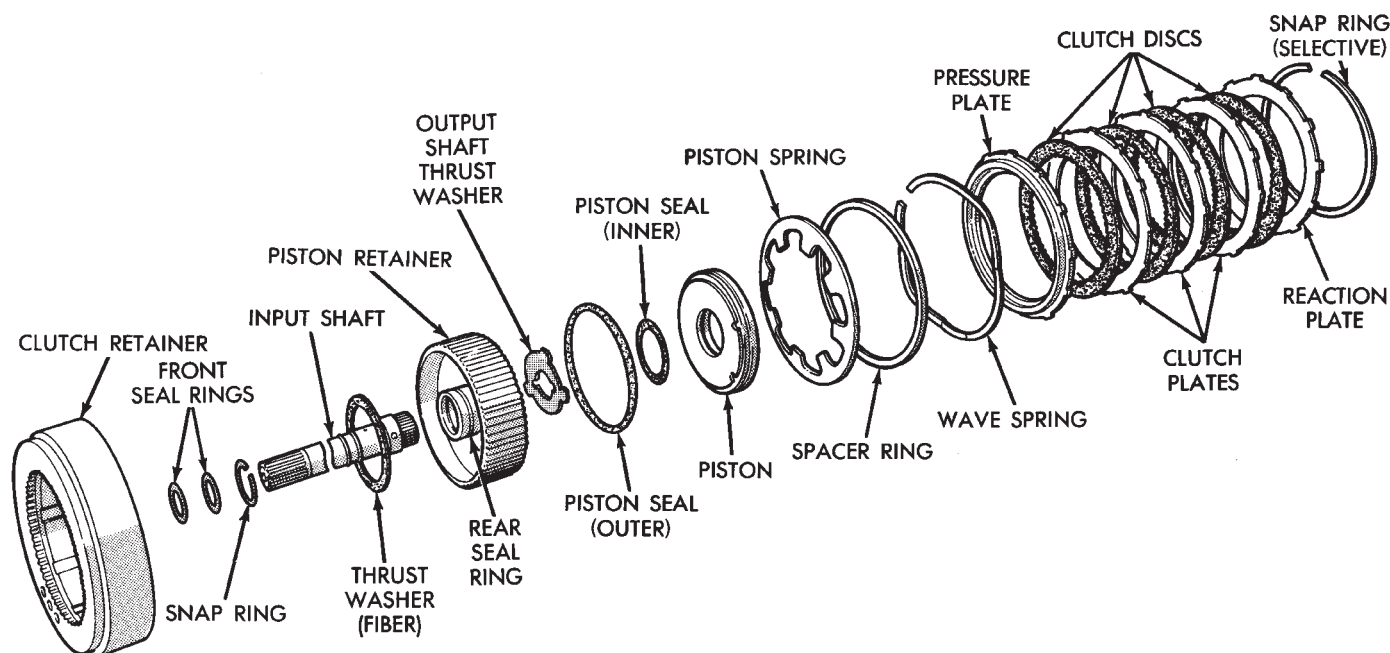
- (1) Remove clutch pack select fit snap ring.
- (2) Remove reaction plate and remove clutch plates and discs (Fig. 168).
- (3) Remove pressure plate, wave spring, spacer ring and piston spring from clutch retainer.
- (4) Remove clutch piston from piston retainer with a twisting motion.
- (5) Remove input shaft thrust washer, if washer remained in piston retainer hub during removal.
- (6) Remove seals from clutch piston. Discard seals after removal.

If the input shaft must be replaced, first remove the retaining ring that secures the shaft in the piston retainer hub. Then press the old shaft out of the retainer with a shop press using suitable press tools to press on the shaft and to support the retainer hub as close to the shaft as possible.

ASSEMBLY

- (1) Lubricate the splines of the new shaft with petroleum jelly or Mopar® ATF Plus 3, type 7176. Then align the shaft in the piston retainer and carefully press it into place using suitable press tools to press the shaft and to support the retainer hub as

DISASSEMBLY AND ASSEMBLY (Continued)



J9121-66

Fig. 168 Rear Clutch Components

close to the shaft as possible. Do not allow the shaft to become cocked during installation. The retainer can be cracked if misalignment occurs.

(2) Install the shaft retaining ring after pressing the shaft into place. Be sure the ring is fully seated before proceeding with clutch assembly.

(3) Invert the input shaft in the press and using the same tools as in removal, press on shaft enough to seat the snap-ring into the retainer.

(4) Soak clutch discs in transmission fluid before assembly.

(5) Install new seals on clutch piston. Lubricate piston seals with Mopar® Door Ease, or Ru-Glyde to ease installation. **Be sure seal lips face input shaft.**

(6) 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.

(7) Assemble piston retainer and clutch retainer.

(8) Support clutch retainer with wood blocks, or insert input shaft through pre-drilled hole in workbench. Clutch pack components are easier to install if retainers are properly supported.

(9) Install piston spring in clutch retainer. Concave side of spring faces upward and away from clutch piston.

(10) Install spacer ring on top of piston spring.

(11) Install wave spring on top of spacer ring. Then seat wave spring in retainer groove. **If wave spring will not seat properly, spacer ring has probably shifted over and into wave spring groove in retainer. Use small screwdriver to realign spacer ring if necessary.**

(12) Install inner pressure plate in clutch retainer.

(13) Install first clutch disc followed by steel plate until all discs and plates are installed. 4 clutch discs and steel plates are required (Fig. 168).

(14) Install reaction plate on top of last clutch disc.

(15) Install selective snap ring to secure clutch pack in retainer.

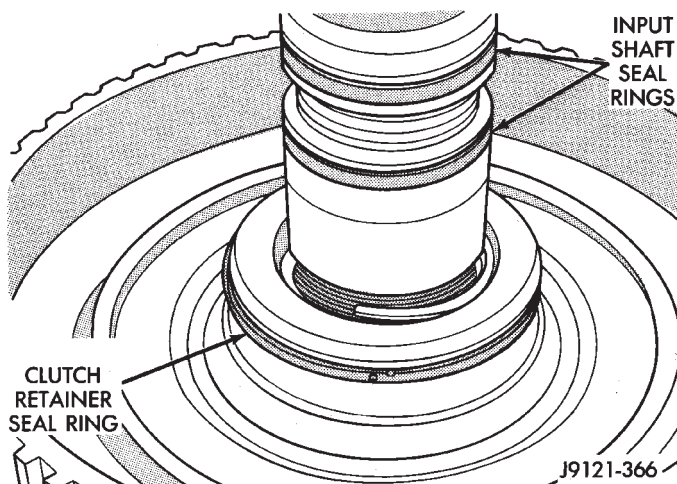
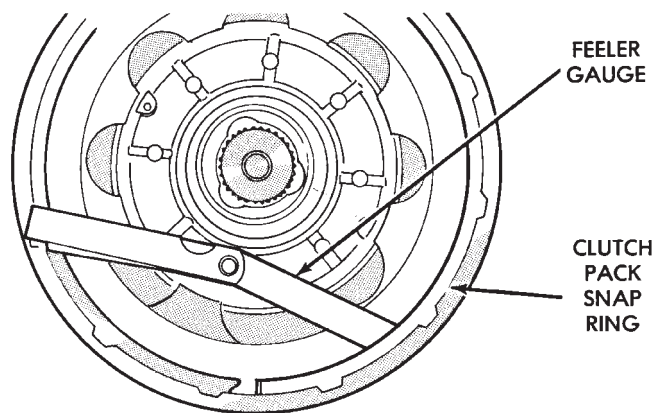
(16) Install new seal rings on input shaft if necessary (Fig. 169). Be very sure ring ends are all securely hooked together before proceeding.

(17) Check clutch pack clearance with feeler gauge (Fig. 170). Clearance should be 0.63 to 1.14 mm (0.025 to 0.045 in.).

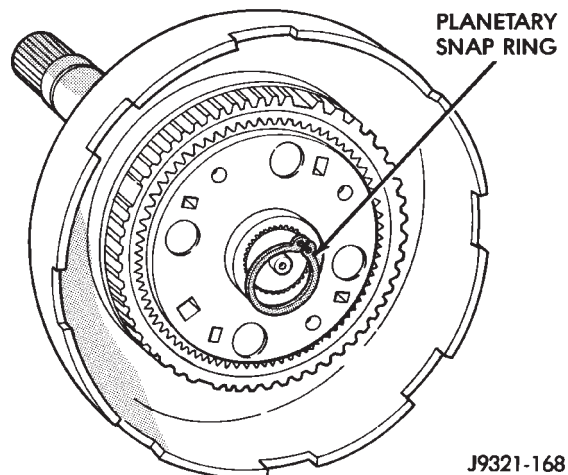
(18) If clutch pack clearance is incorrect, clutch pack snap ring, may have to be replaced.

(19) Install thrust washer on piston retainer hub. Use petroleum jelly to hold thrust washer in place.

DISASSEMBLY AND ASSEMBLY (Continued)

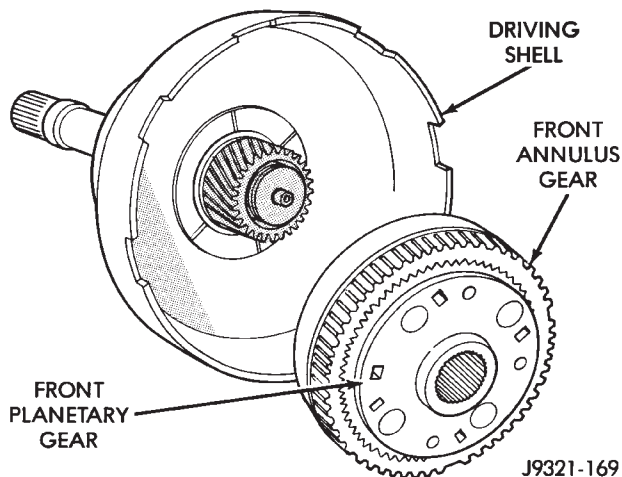
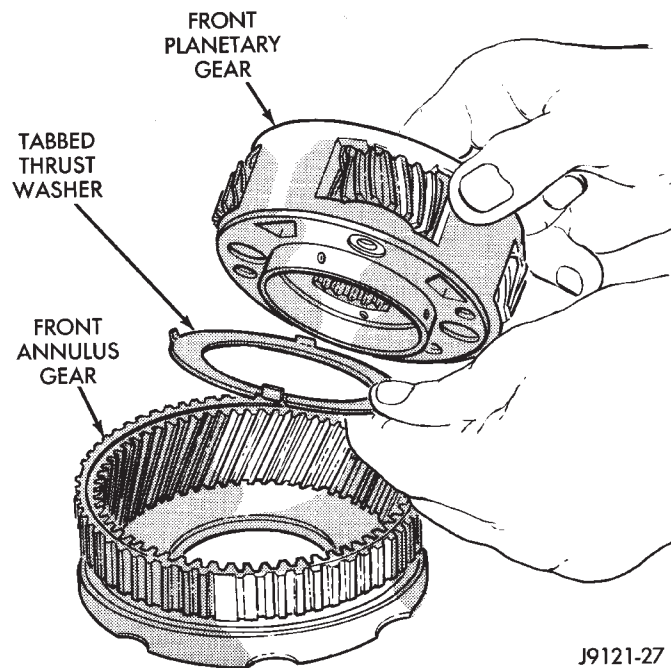
**Fig. 169 Input Shaft Seal Ring Locations****Fig. 170 Measuring Rear Clutch Pack Clearance**
PLANETARY GEARTRAIN/OUTPUT SHAFT**DISASSEMBLY**

(1) Remove planetary snap ring from intermediate shaft (Fig. 171). Discard snap ring as it is not reusable.

**Fig. 171 Removing Planetary Snap Ring**

(2) Remove front planetary gear and front annulus gear as assembly (Fig. 172).

(3) Remove front planetary gear and thrust washer from front annulus gear (Fig. 173). Note thrust washer position for assembly reference.

**Fig. 172 Removing Front Planetary And Annulus Gears****Fig. 173 Disassembling Front Planetary And Annulus Gears**

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Remove tabbed thrust washer from driving shell (Fig. 174). Note washer position for assembly reference.

(5) Remove sun gear and driving shell as assembly (Fig. 175).

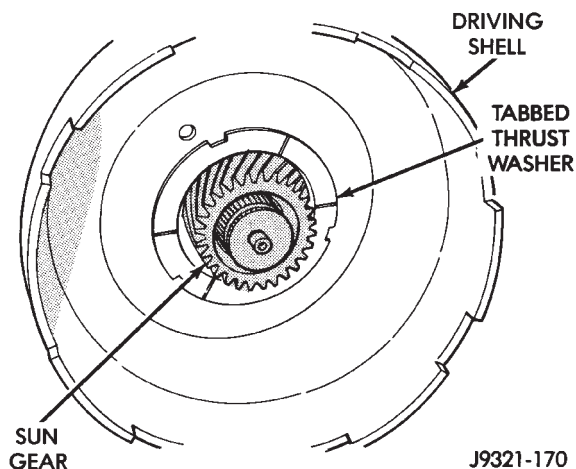


Fig. 174 Driving Shell Thrust Washer Removal

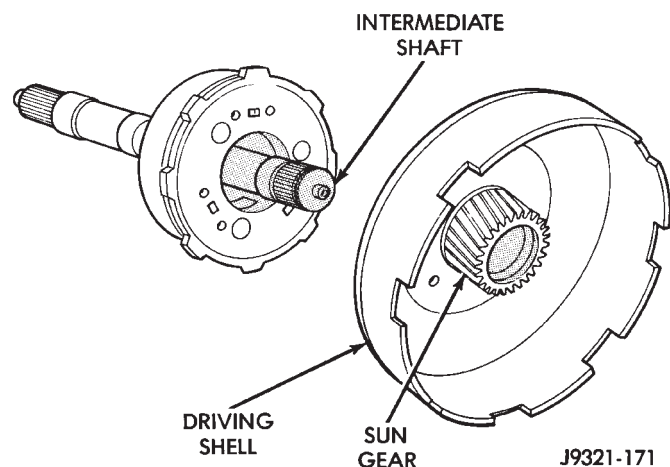


Fig. 175 Sun Gear And Driving Shell Removal

(6) Remove tabbed thrust washer from rear planetary gear (Fig. 176). Note washer position on gear for assembly reference.

(7) Remove rear planetary gear and rear annulus gear from intermediate shaft (Fig. 177).

(8) Remove thrust plate from rear annulus gear (Fig. 178).

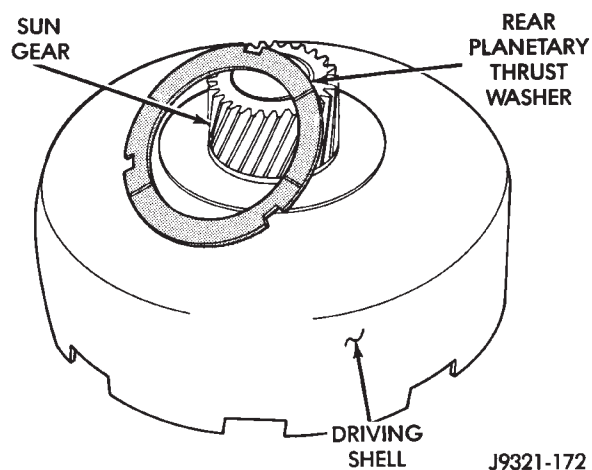


Fig. 176 Rear Planetary Thrust Washer Removal

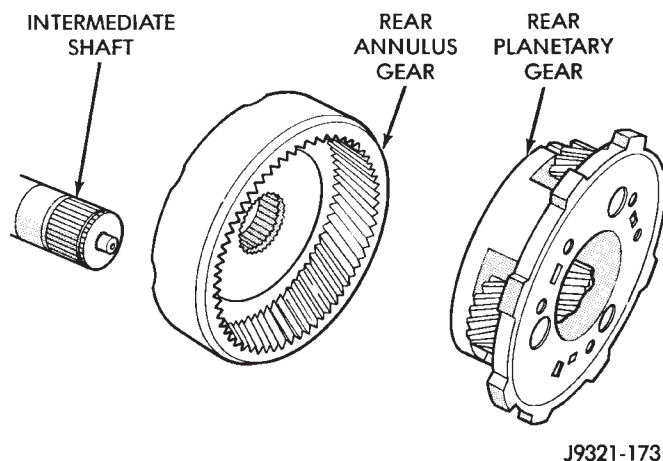


Fig. 177 Rear Planetary And Annulus Gear Removal

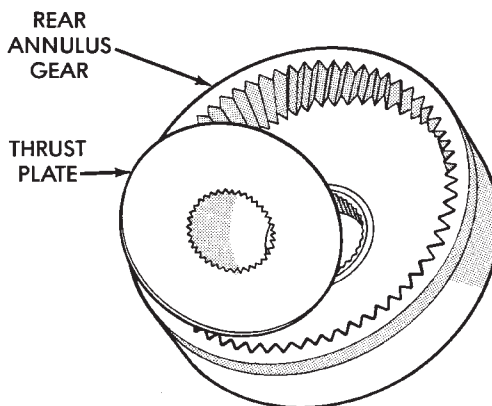


Fig. 178 Rear Annulus Thrust Plate Removal

DISASSEMBLY AND ASSEMBLY (Continued)

ASSEMBLY

(1) Lubricate sun gear and planetary gears with transmission fluid during assembly. Use petroleum jelly to lubricate intermediate shaft bushing surfaces, thrust washers and thrust plates and to hold these parts in place during assembly.

(2) Install front snap ring on sun gear and install gear in driving shell. Then install thrust plate over sun gear and against rear side of driving shell (Fig. 179). Install rear snap ring to secure sun gear and thrust plate in driving shell.

(3) Install rear annulus gear on intermediate shaft (Fig. 180).

(4) Install thrust plate in annulus gear (Fig. 181). Be sure plate is seated on shaft splines and against gear.

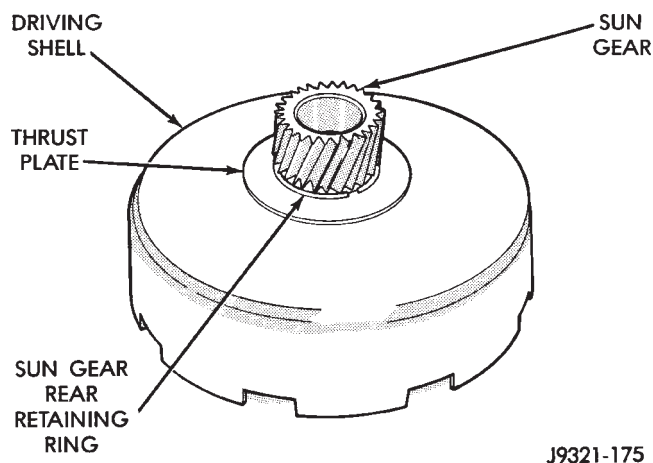


Fig. 179 Sun Gear Installation

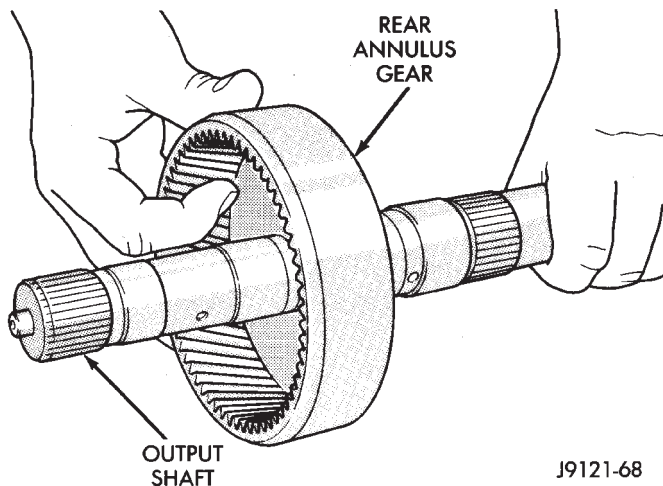


Fig. 180 Installing Rear Annulus Gear On Intermediate Shaft

(5) Install rear planetary gear in rear annulus gear (Fig. 182). Be sure planetary carrier is seated against annulus gear.

(6) Install tabbed thrust washer on front face of rear planetary gear (Fig. 183). Seat washer tabs in

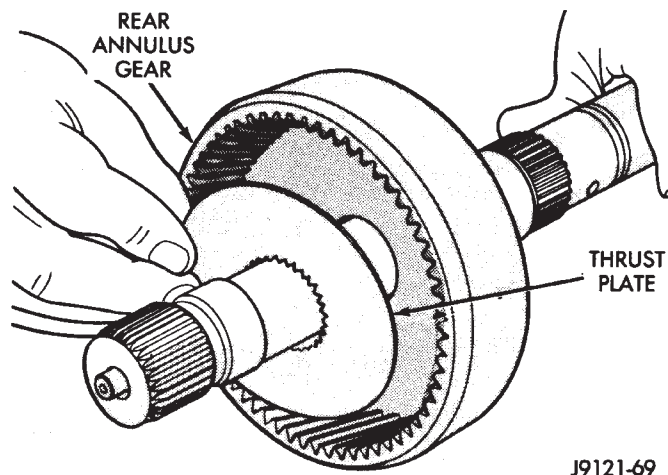


Fig. 181 Installing Rear Annulus Thrust Plate

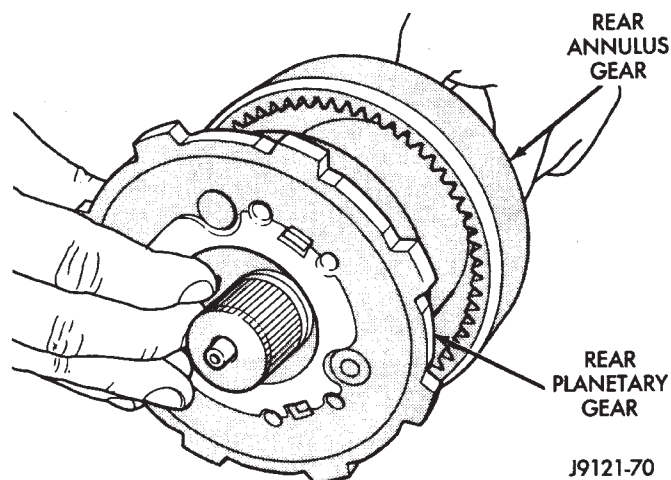


Fig. 182 Installing Rear Planetary Gear

matching slots in face of gear carrier. Use extra petroleum jelly to hold washer in place if desired.

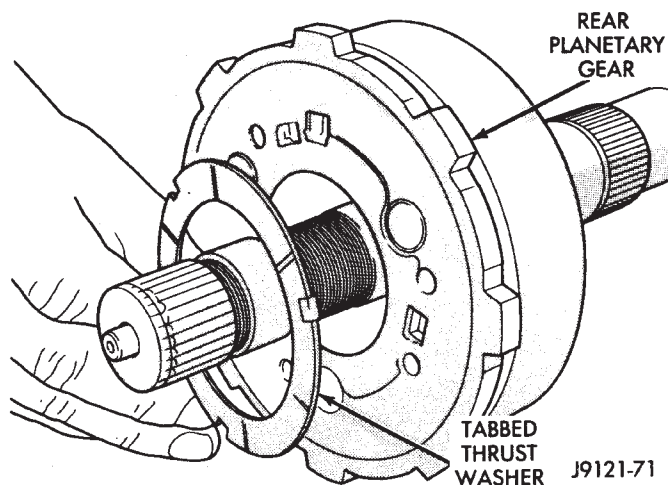


Fig. 183 Installing Rear Planetary Thrust Washer

DISASSEMBLY AND ASSEMBLY (Continued)

(7) Lubricate sun gear bushings with petroleum jelly or transmission fluid.

(8) Install sun gear and driving shell on intermediate shaft (Fig. 184). Seat shell against rear planetary gear. Verify that thrust washer on planetary gear was not displaced during installation.

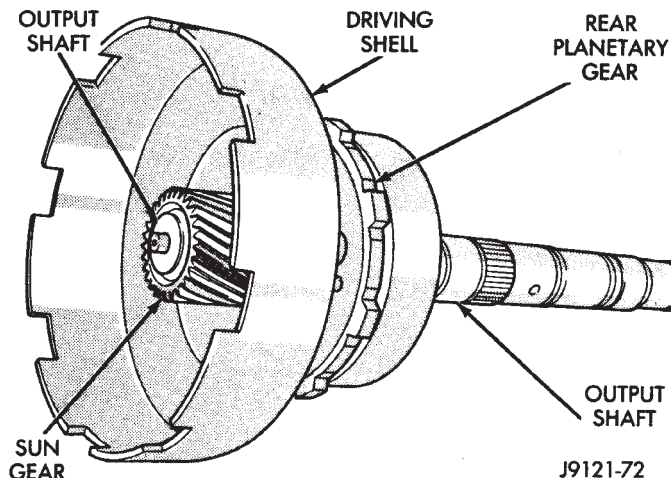


Fig. 184 Installing Sun Gear And Driving Shell

(9) Install tabbed thrust washer in driving shell (Fig. 185), be sure washer tabs are seated in tab slots of driving shell. Use extra petroleum jelly to hold washer in place if desired.

(10) Install tabbed thrust washer on front planetary gear (Fig. 186). Seat washer tabs in matching slots in face of gear carrier. Use extra petroleum jelly to hold washer in place if desired.

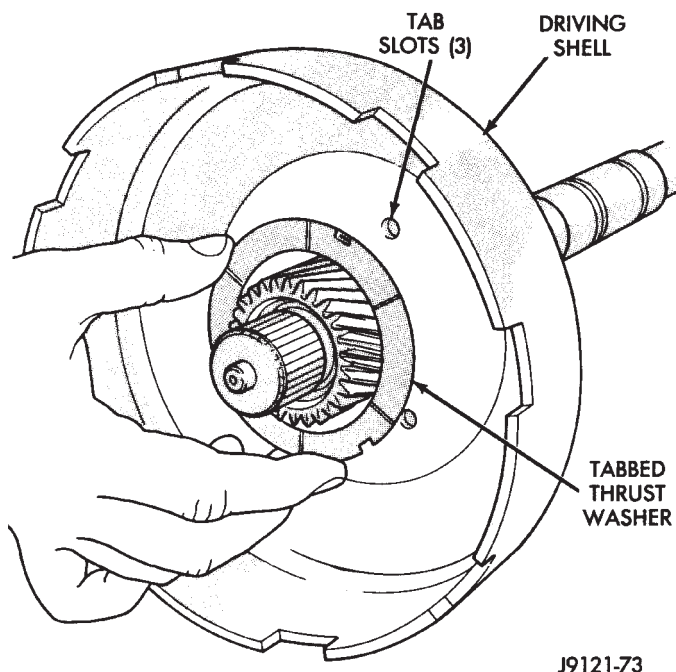


Fig. 185 Installing Driving Shell Thrust Washer

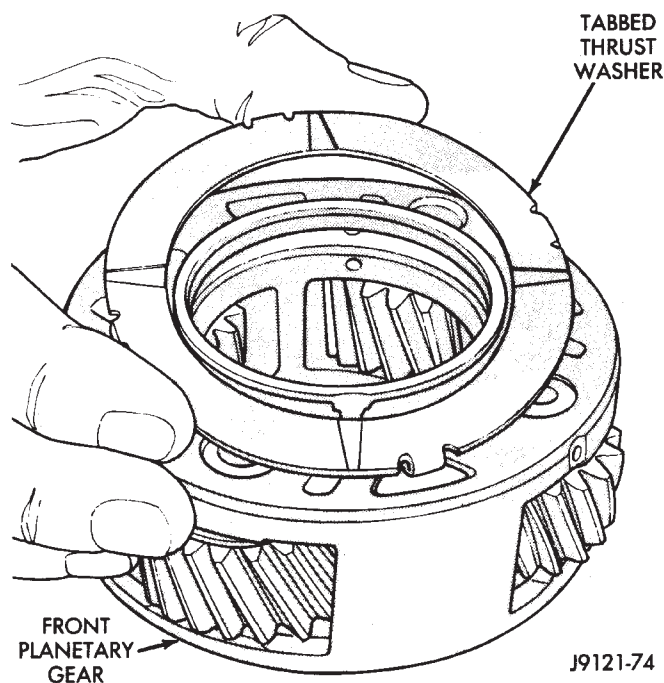


Fig. 186 Installing Thrust Washer On Front Planetary Gear

(11) Install front annulus gear over and onto front planetary gear (Fig. 187). Be sure gears are fully meshed and seated.

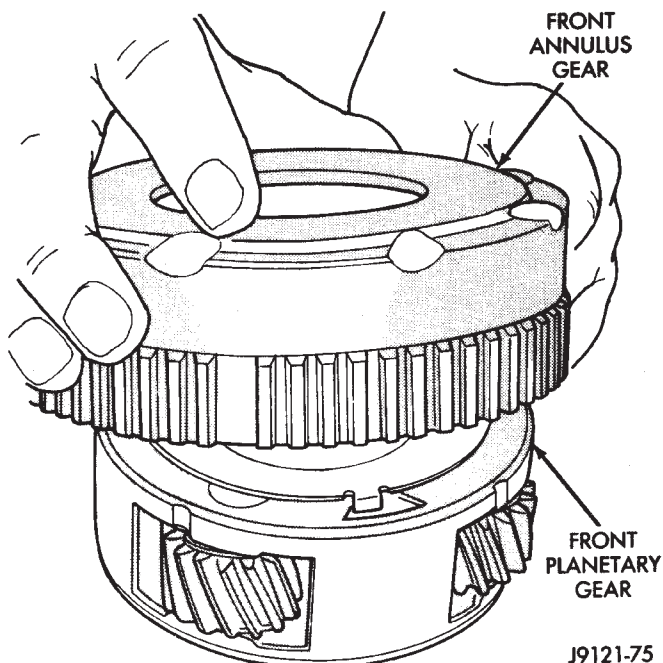


Fig. 187 Assembling Front Planetary And Annulus Gears

DISASSEMBLY AND ASSEMBLY (Continued)

(12) Install front planetary and annulus gear assembly (Fig. 188). Hold gears together and slide them onto shaft. Be sure planetary pinions are seated on sun gear and that planetary carrier is seated on intermediate shaft.

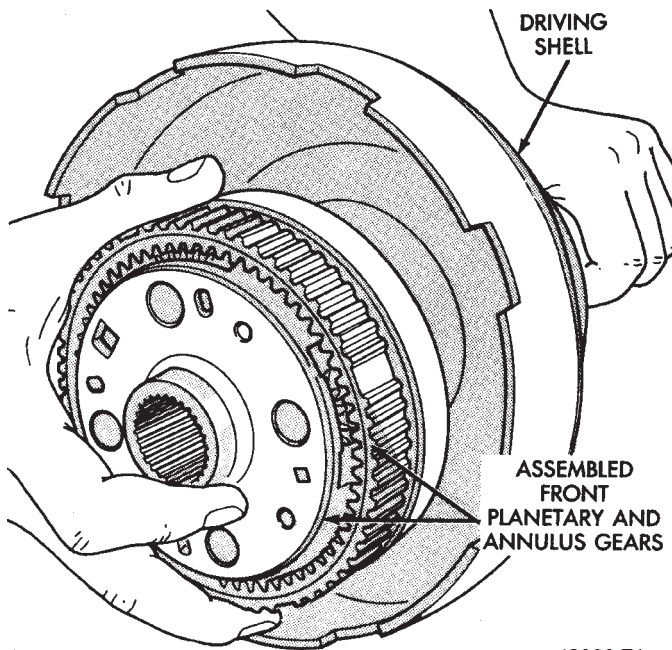
(13) Place geartrain in upright position. Rotate gears to be sure all components are seated and properly assembled. Snap ring groove at forward end of intermediate shaft will be completely exposed when components are assembled correctly.

(14) Install new planetary snap ring in groove at end of intermediate shaft (Fig. 189).

(15) Turn planetary geartrain over. Position wood block under front end of intermediate shaft and support geartrain on shaft. Be sure all geartrain parts have moved forward against planetary snap ring. This is important for accurate end play check.

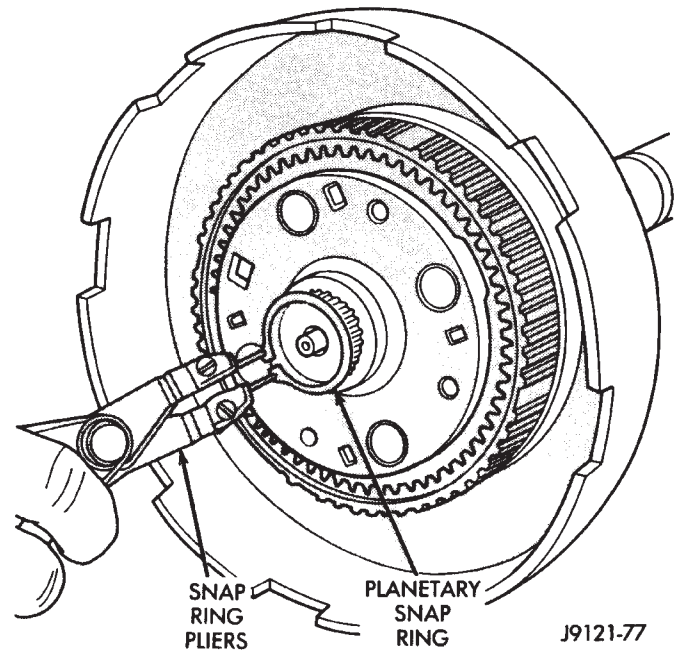
(16) Check planetary geartrain end play with feeler gauge (Fig. 190). Insert gauge between rear annulus gear and shoulder on intermediate shaft as shown. End play should be 0.15 to 1.22 mm (0.006 to 0.048 in.).

(17) If end play is incorrect, install thinner/thicker planetary snap ring as needed.



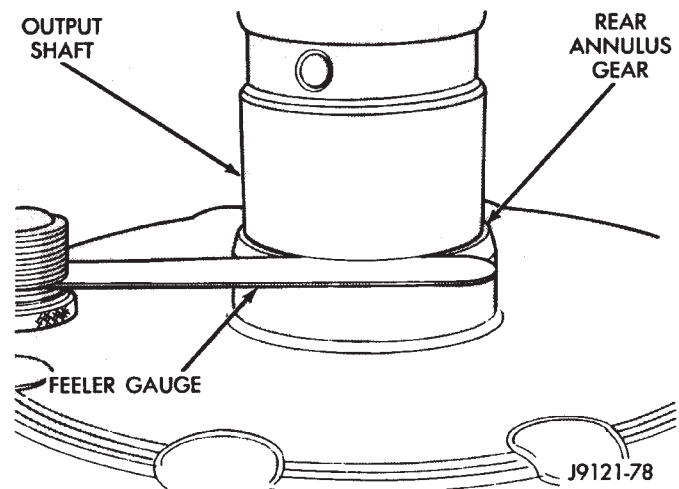
J9121-76

Fig. 188 Installing Front Planetary And Annulus Gear Assembly



J9121-77

Fig. 189 Installing Planetary Snap Ring



J9121-78

Fig. 190 Checking Planetary Geartrain End Play

DISASSEMBLY AND ASSEMBLY (Continued)

OVERDRIVE UNIT

DISASSEMBLY

(1) Remove transmission speed sensor and O-ring seal from overdrive case (Fig. 191).

(2) Remove overdrive piston thrust bearing (Fig. 192).

SOCKET AND WRENCH

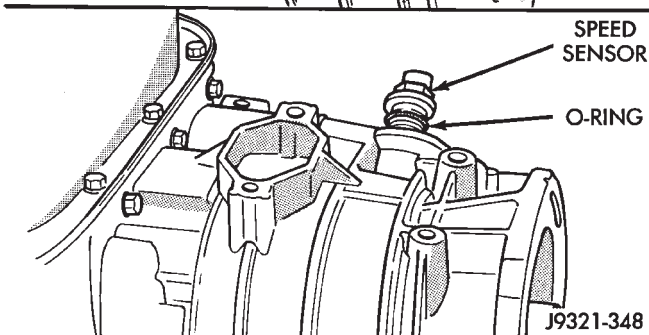
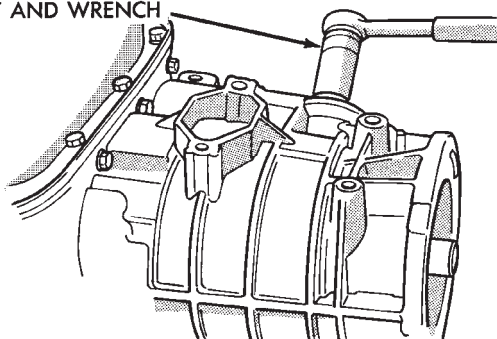


Fig. 191 Transmission Speed Sensor Removal/Installation

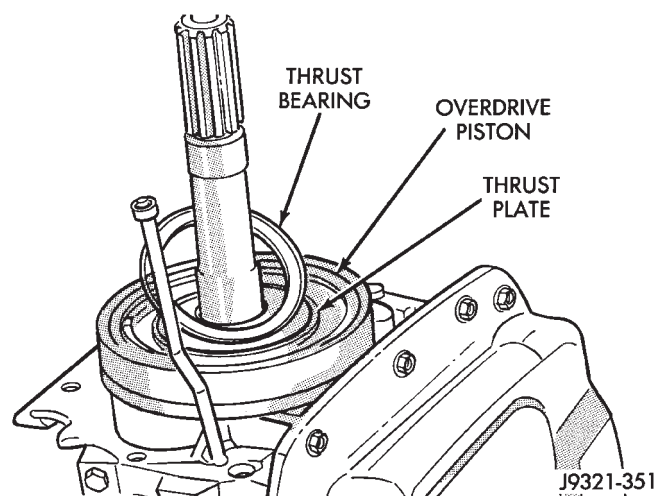


Fig. 192 Overdrive Piston Thrust Bearing Removal/Installation

OVERDRIVE PISTON

(1) Remove overdrive piston thrust plate (Fig. 193). Retain thrust plate. It is a select fit part and may possibly be reused.

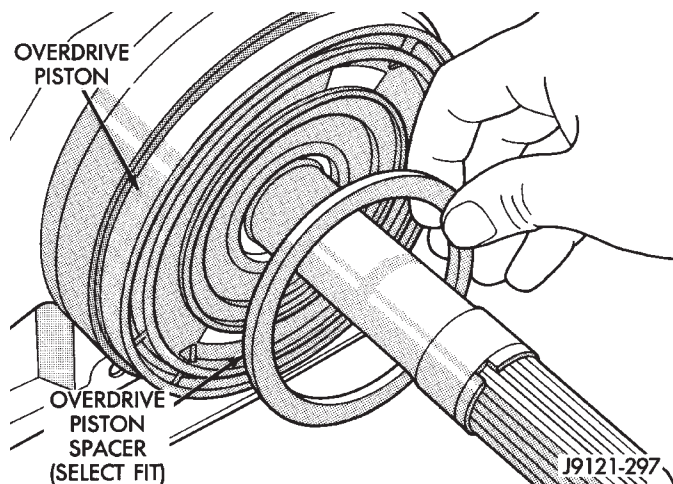


Fig. 193 Overdrive Piston Thrust Plate Removal/Installation

(2) Remove intermediate shaft spacer (Fig. 194). Retain spacer. It is a select fit part and may possibly be reused.

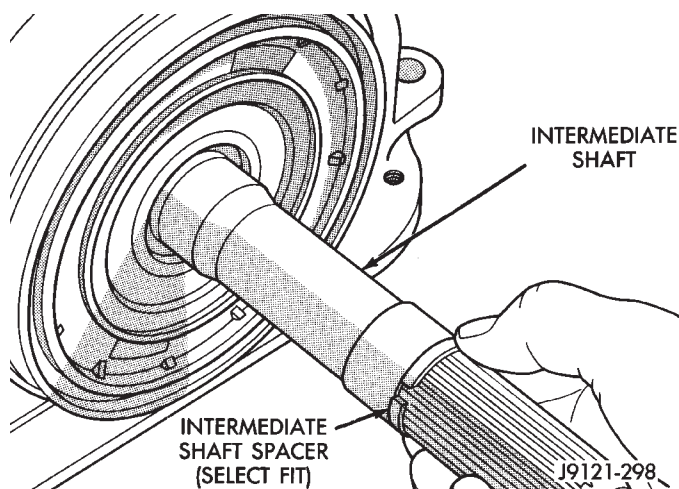


Fig. 194 Intermediate Shaft Spacer Location

(3) Remove overdrive piston from retainer (Fig. 195).

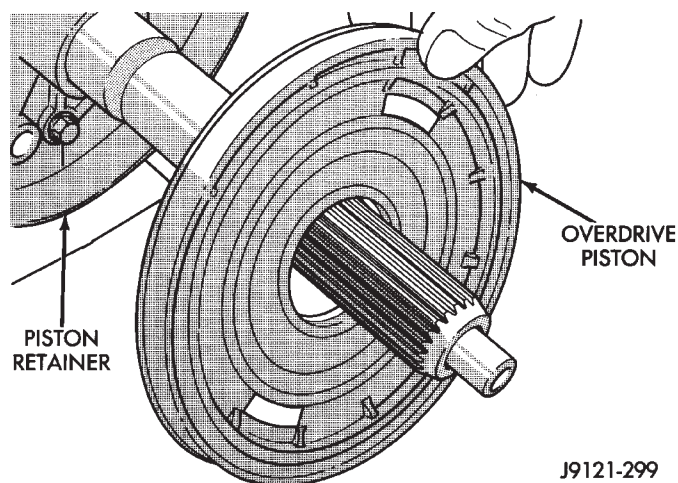


Fig. 195 Overdrive Piston Removal

DISASSEMBLY AND ASSEMBLY (Continued)

OVERDRIVE CLUTCH PACK

NOTE: The overdrive clutch pack in the 46RE transmission uses 4 clutch discs. The overdrive clutch pack in the 47RE uses 5 discs.

- (1) Remove overdrive clutch pack wire retaining ring (Fig. 196).
- (2) Remove overdrive clutch pack (Fig. 197).
- (3) Note position of clutch pack components for assembly reference (Fig. 198).

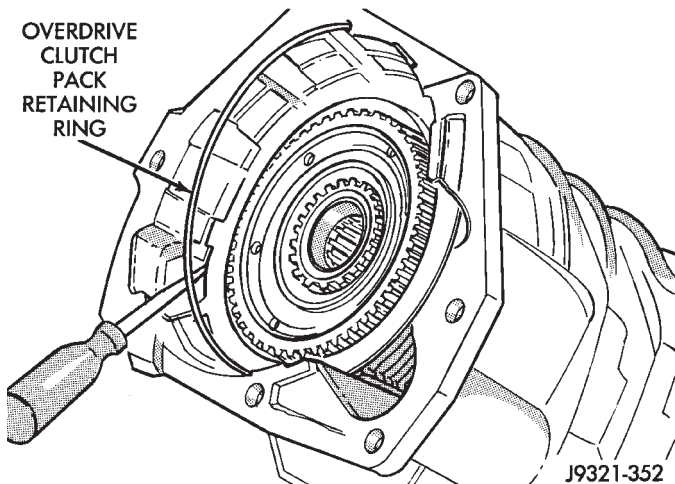


Fig. 196 Removing Overdrive Clutch Pack Retaining Ring

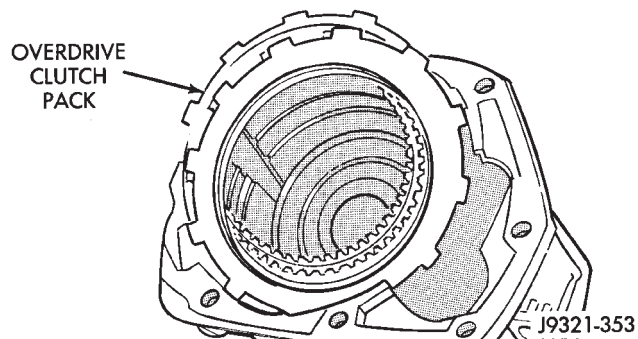


Fig. 197 Overdrive Clutch Pack Removal

OVERDRIVE GEARTRAIN

- (1) Remove overdrive clutch wave spring (Fig. 199).
- (2) Remove overdrive clutch reaction snap ring (Fig. 200). Note that snap ring is located in same groove as wave spring.

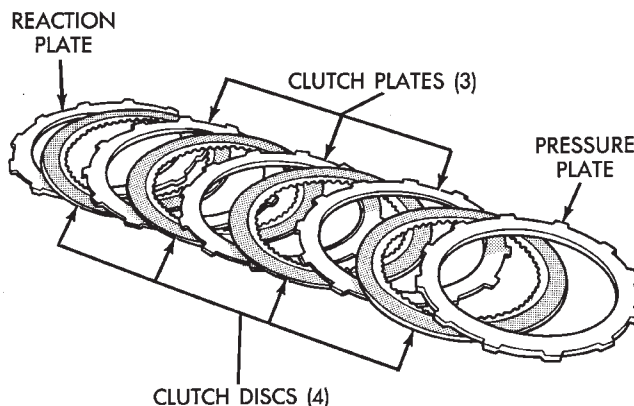


Fig. 198 46RE Overdrive Clutch Component Position

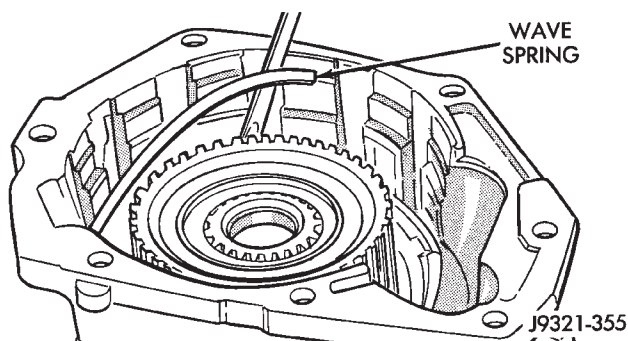


Fig. 199 Overdrive Clutch Wave Spring Removal/Installation

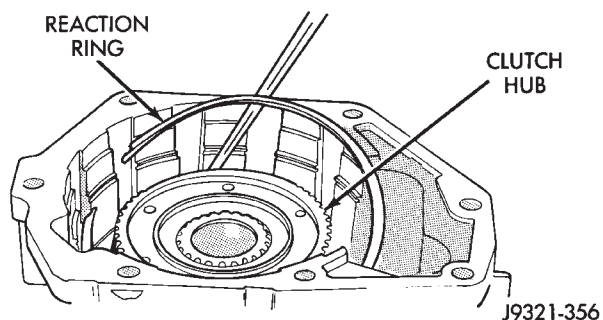


Fig. 200 Overdrive Clutch Reaction Snap Ring Removal/Installation

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Remove Torx head screws that attach access cover and gasket to overdrive case (Fig. 201).

(4) Remove access cover and gasket (Fig. 202).

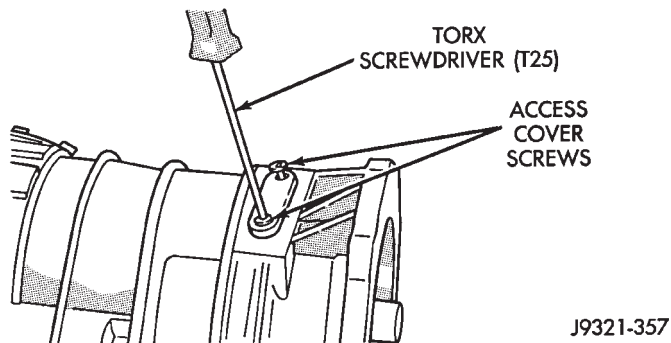


Fig. 201 Access Cover Screw Removal/Installation

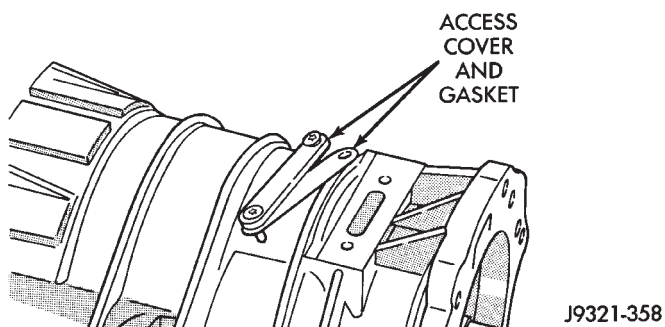


Fig. 202 Access Cover And Gasket Removal/Installation

(5) Expand output shaft bearing snap ring with expanding-type snap ring pliers. Then push output shaft forward to release shaft bearing from locating ring (Fig. 203).

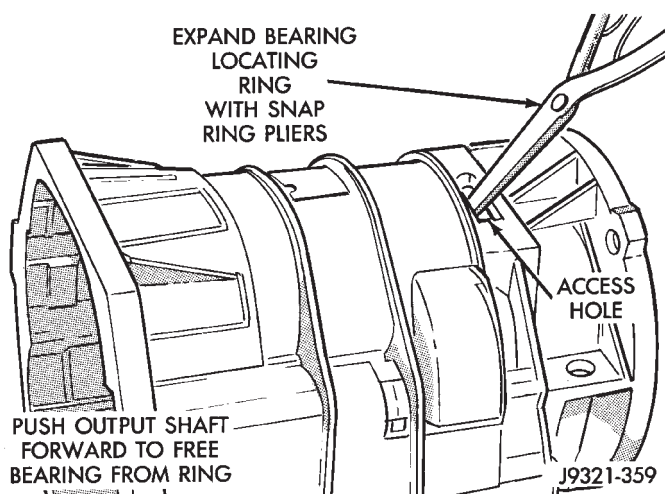


Fig. 203 Releasing Bearing From Locating Ring

(6) Lift gear case up and off geartrain assembly (Fig. 204).

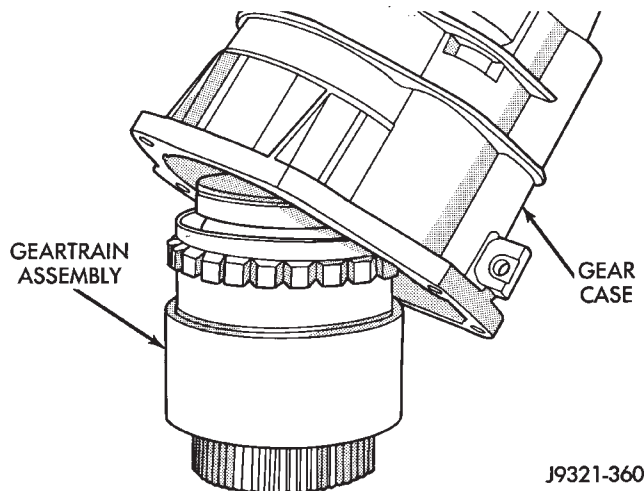


Fig. 204 Removing Gear Case From Geartrain Assembly

(7) Remove snap ring that retains rear bearing on output shaft.

(8) Remove rear bearing from output shaft (Fig. 205).

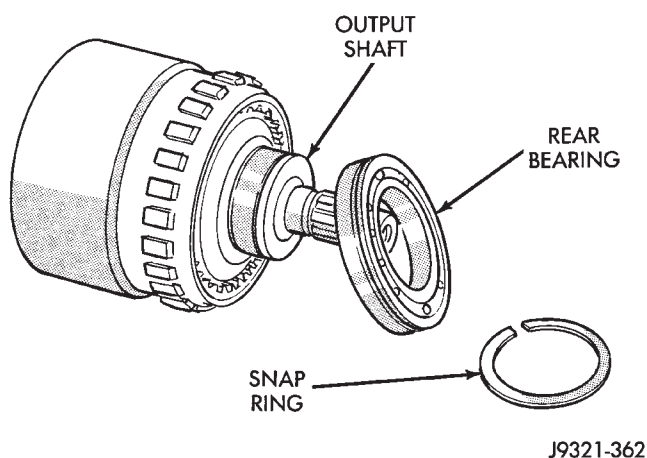


Fig. 205 Rear Bearing Removal

DISASSEMBLY AND ASSEMBLY (Continued)

DIRECT CLUTCH, HUB AND SPRING

NOTE: The direct clutch in the 46RE uses 8 clutch discs. The direct clutch in the 47RE uses 10 clutch discs.

WARNING: THE NEXT STEP IN DISASSEMBLY INVOLVES COMPRESSING THE DIRECT CLUTCH SPRING. IT IS EXTREMELY IMPORTANT THAT PROPER EQUIPMENT BE USED TO COMPRESS THE SPRING AS SPRING FORCE IS APPROXIMATELY 830 POUNDS. USE SPRING COMPRESSOR TOOL 6227-1 AND A HYDRAULIC SHOP PRESS WITH A MINIMUM RAM TRAVEL OF 5-6 INCHES. THE PRESS MUST ALSO HAVE A BED THAT CAN BE ADJUSTED UP OR DOWN AS REQUIRED. RELEASE CLUTCH SPRING TENSION SLOWLY AND COMPLETELY TO AVOID PERSONAL INJURY.

(1) Mount geartrain assembly in shop press (Fig. 206).

(2) Position Compressor Tool 6227-1 on clutch hub (Fig. 206). Support output shaft flange with steel press plates as shown and center assembly under press ram.

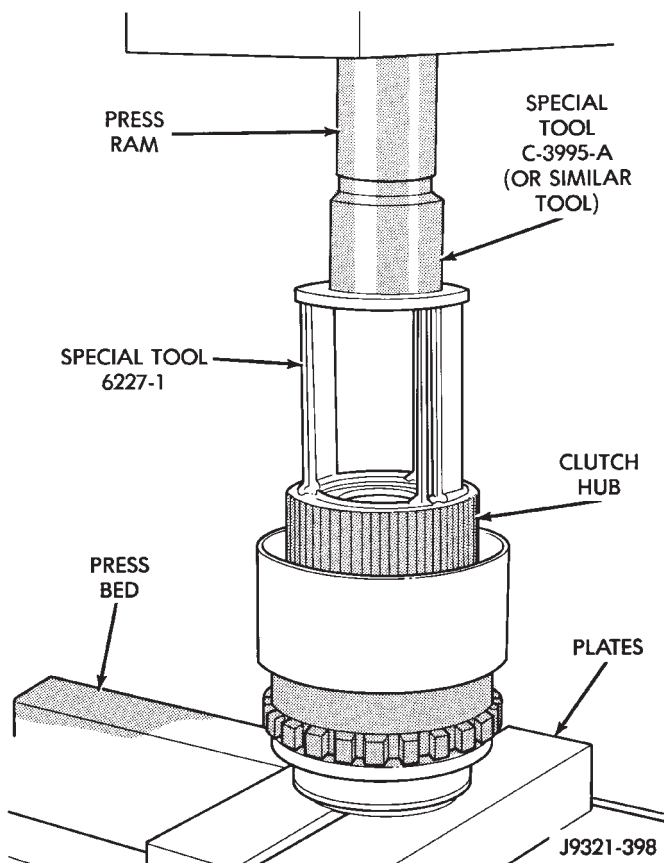


Fig. 206 Geartrain Mounted In Shop Press

(3) Apply press pressure slowly. Compress hub and spring far enough to expose clutch hub retaining ring and relieve spring pressure on clutch pack snap ring (Fig. 206).

(4) Remove direct clutch pack snap ring (Fig. 207).

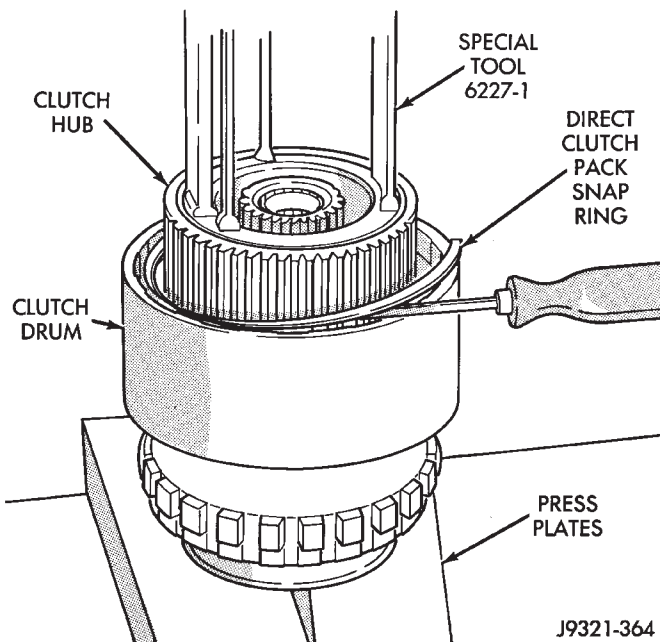


Fig. 207 Direct Clutch Pack Snap Ring Removal

(5) Remove direct clutch hub retaining ring (Fig. 208).

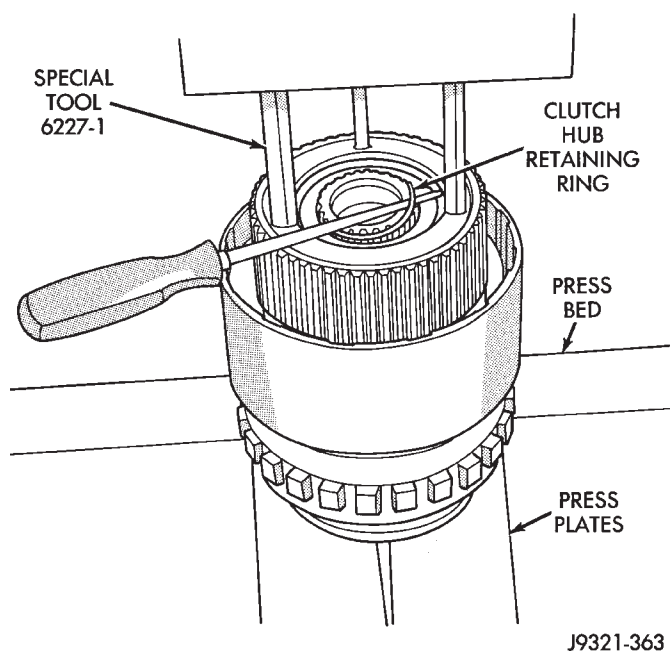


Fig. 208 Direct Clutch Hub Retaining Ring Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(6) Release press load slowly and completely (Fig. 209).

(7) Remove Special Tool 6227-1. Then remove clutch pack from hub (Fig. 209).

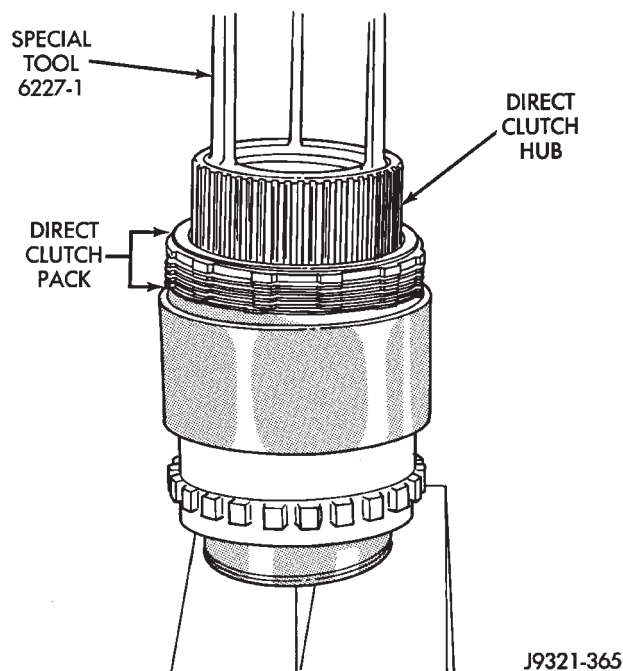


Fig. 209 Direct Clutch Pack Removal

Geartrain

(1) Remove direct clutch hub and spring (Fig. 210).

(2) Remove sun gear and spring plate. Then remove planetary thrust bearing and planetary gear (Fig. 211).

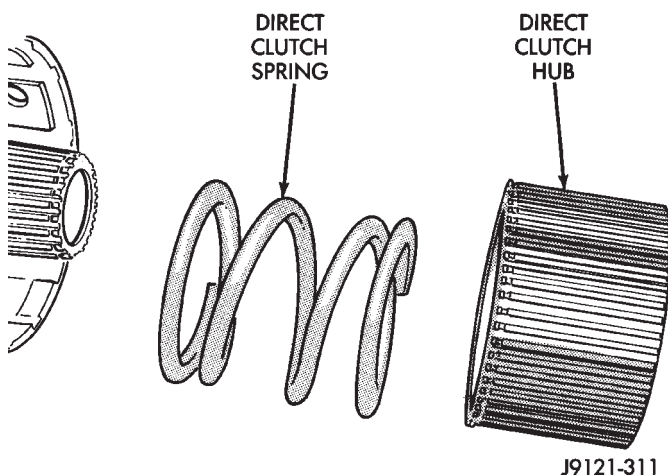


Fig. 210 Direct Clutch Hub And Spring Removal

(3) Remove overrunning clutch assembly with expanding type snap ring pliers (Fig. 212). Insert pliers into clutch hub. Expand pliers to grip hub splines and remove clutch with counterclockwise, twisting motion.

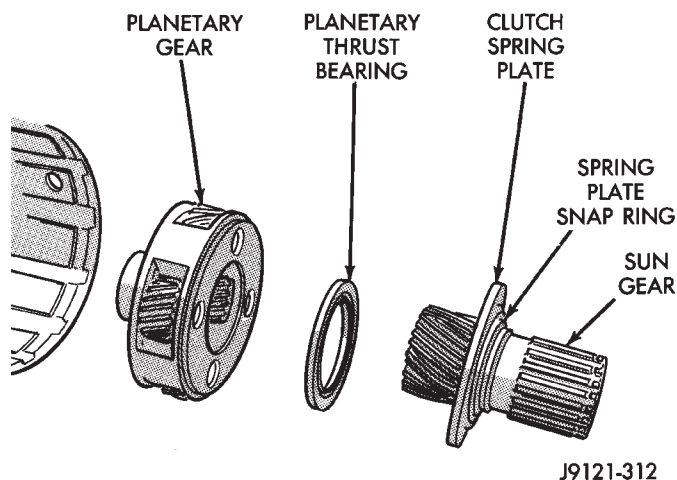


Fig. 211 Removing Sun Gear, Thrust Bearing And Planetary Gear

(4) Remove thrust bearing from overrunning clutch hub.

(5) Remove overrunning clutch from hub.

(6) Mark position of annulus gear and direct clutch drum for assembly alignment reference (Fig. 213). Use small center punch or scribe to make alignment marks.

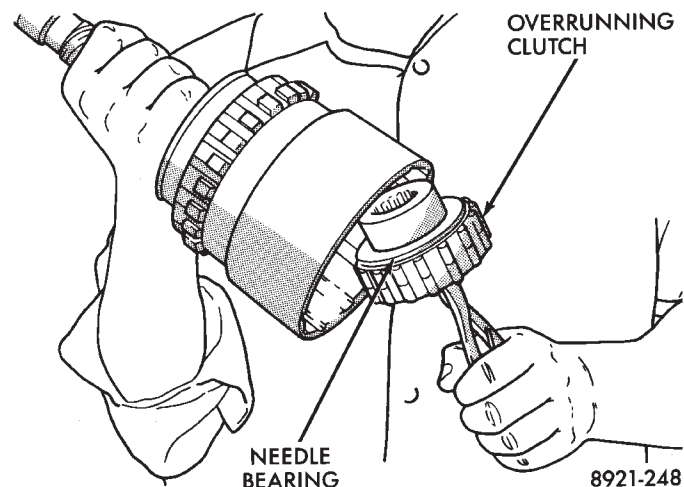


Fig. 212 Overrunning Clutch Assembly Removal/Installation

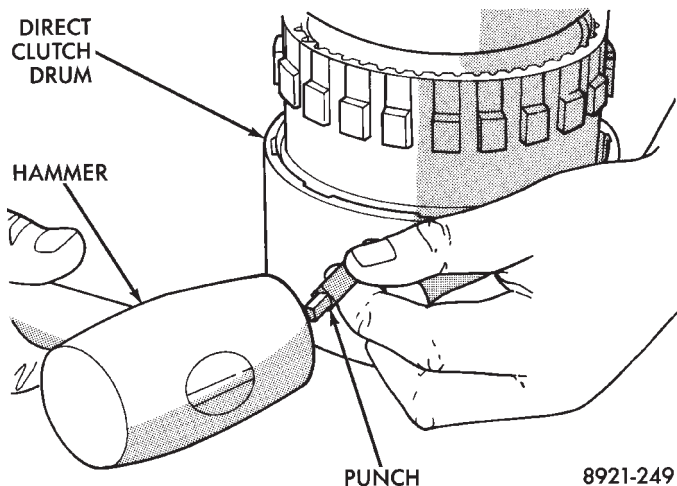
(7) Remove direct clutch drum rear retaining ring (Fig. 214).

(8) Remove direct clutch drum outer retaining ring (Fig. 215).

(9) Mark annulus gear and output shaft for assembly alignment reference (Fig. 216). Use punch or scribe to mark gear and shaft.

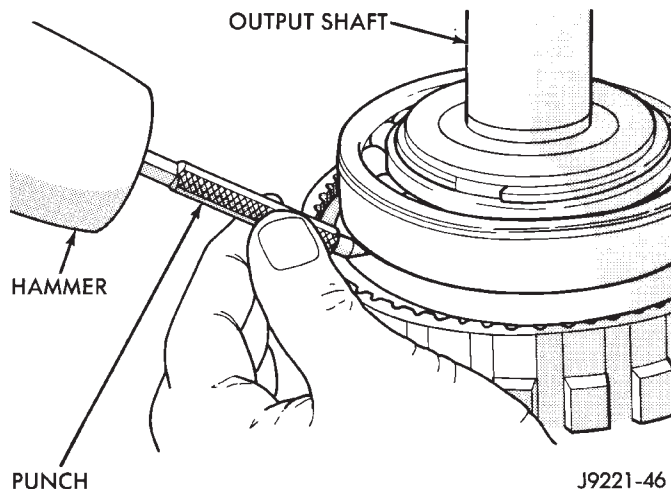
(10) Remove snap ring that secures annulus gear on output shaft (Fig. 217). Use two screwdrivers to unseat and work snap ring out of groove as shown.

DISASSEMBLY AND ASSEMBLY (Continued)



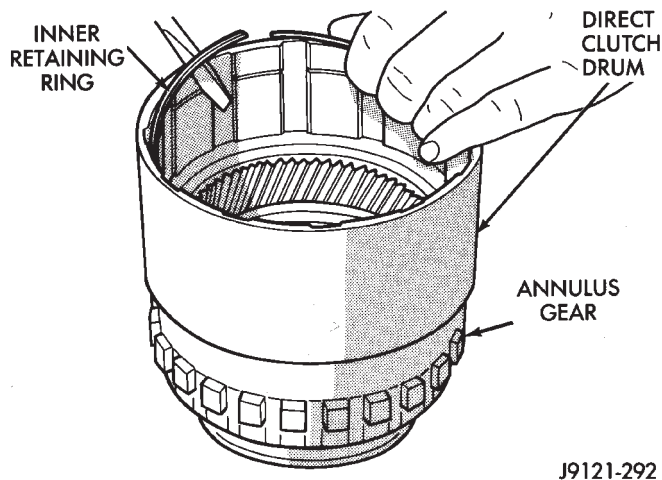
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Fig. 213 Marking Direct Clutch Drum And Annulus Gear For Assembly Alignment



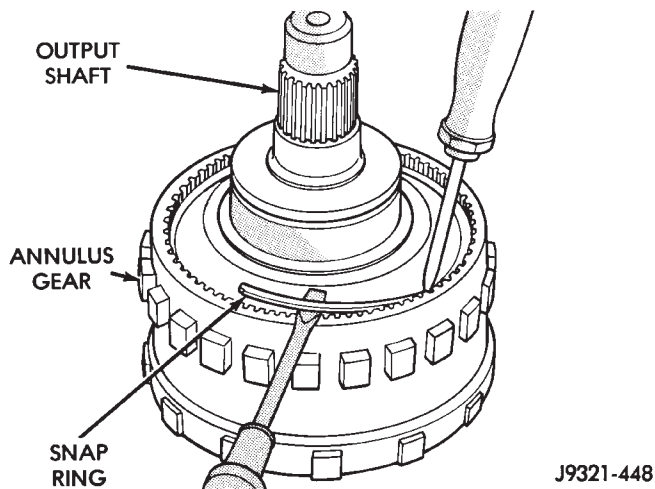
J9221-46

Fig. 216 Marking Annulus Gear And Output Shaft For Assembly Alignment



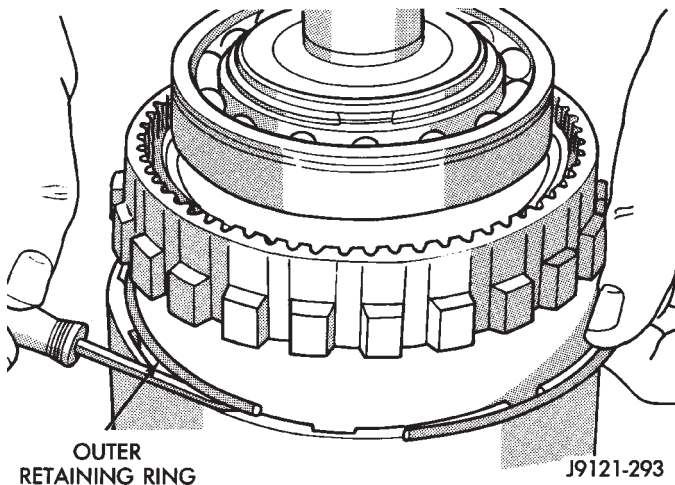
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Fig. 214 Clutch Drum Inner Retaining Ring Removal



J9321-448

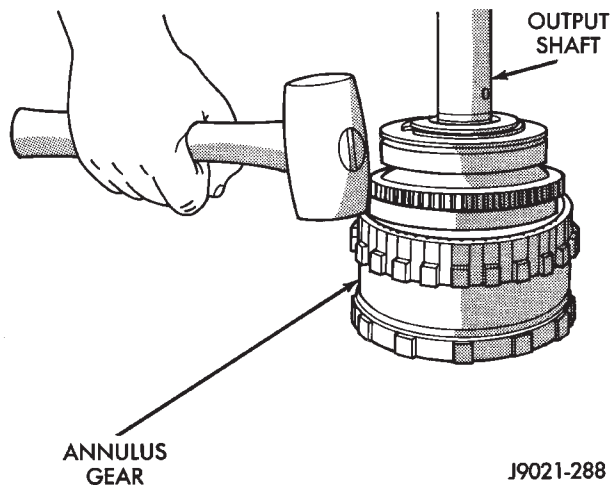
Fig. 217 Annulus Gear Snap Ring Removal



J9121-293

Fig. 215 Clutch Drum Outer Retaining Ring Removal

(11) Remove annulus gear from output shaft (Fig. 218). Use rawhide or plastic mallet to tap gear off shaft.



J9021-288

Fig. 218 Annulus Gear Removal

DISASSEMBLY AND ASSEMBLY (Continued)

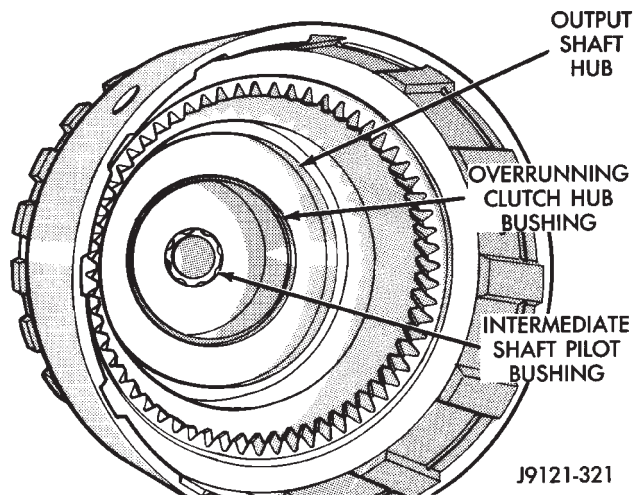
GEAR CASE AND PARK LOCK

- (1) Remove locating ring from gear case.
- (2) Remove park pawl shaft retaining bolt and remove shaft, pawl and spring.
- (3) Remove reaction plug snap ring and remove reaction plug.
- (4) Remove output shaft seal.

ASSEMBLY

GEARTRAIN AND DIRECT CLUTCH

- (1) Soak direct clutch and overdrive clutch discs in Mopar® ATF Plus transmission fluid. Allow discs to soak for 10-20 minutes.
- (2) Install new pilot bushing and clutch hub bushing in output shaft if necessary (Fig. 219). Lubricate bushings with petroleum jelly, or transmission fluid.



J9121-321

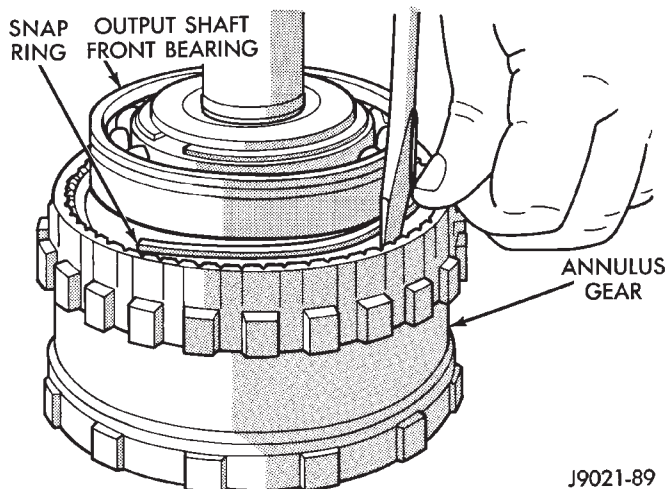
Fig. 219 Output Shaft Pilot Bushing

- (3) Install annulus gear on output shaft, if removed. Then install annulus gear retaining snap ring (Fig. 220).

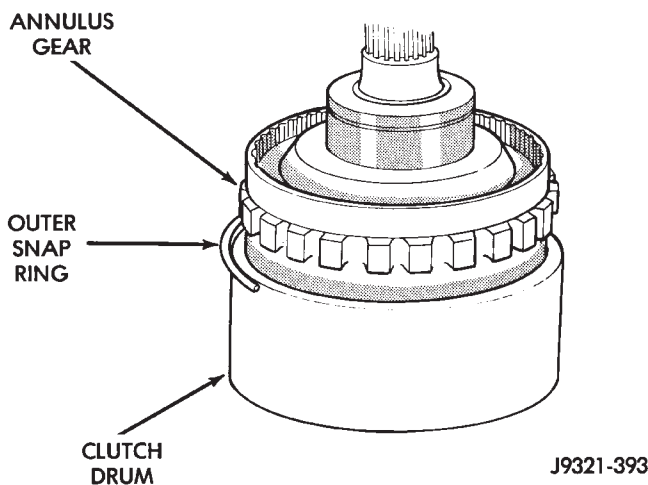
- (4) Align and install clutch drum on annulus gear (Fig. 221). Be sure drum is engaged in annulus gear lugs.

- (5) Install clutch drum outer retaining ring (Fig. 221).

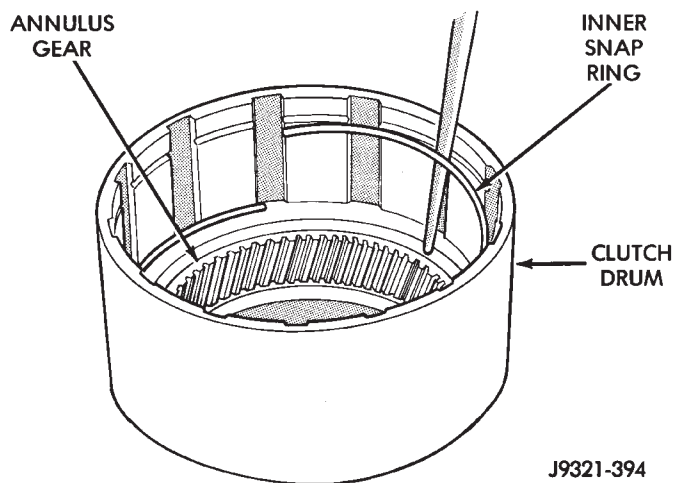
- (6) Slide clutch drum forward and install inner retaining ring (Fig. 222).



J9021-89

Fig. 220 Annulus Gear Installation

J9321-393

Fig. 221 Clutch Drum And Outer Retaining Ring Installation

J9321-394

Fig. 222 Clutch Drum Inner Retaining Ring Installation

DISASSEMBLY AND ASSEMBLY (Continued)

(7) Install rear bearing and snap ring on output shaft (Fig. 223). Be sure locating ring groove in bearing is toward rear.

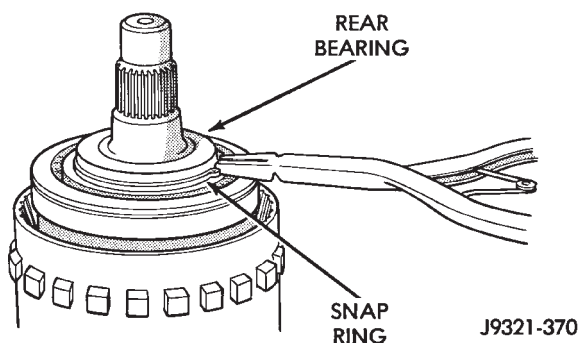


Fig. 223 Rear Bearing And Snap Ring Installation

(8) Install overrunning clutch on hub (Fig. 224). **Note that clutch only fits one way. Shoulder on clutch should seat in small recess at edge of hub.**

(9) Install thrust bearing on overrunning clutch hub. Use generous amount of petroleum jelly to hold bearing in place for installation. **Bearing fits one way only. Be sure bearing is seated squarely against hub. Reinstall bearing if it does not seat squarely.**

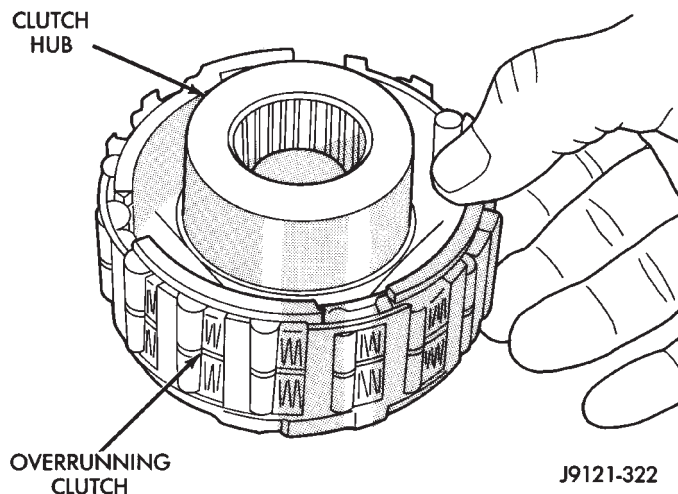


Fig. 224 Assembling Overrunning Clutch And Hub

(10) Install overrunning clutch in output shaft (Fig. 225). Insert snap ring pliers in hub splines. Expand pliers to grip hub. Then install assembly with counterclockwise, twisting motion.

(11) Install planetary gear in annulus gear (Fig. 226). **Be sure planetary pinions are fully seated in annulus gear before proceeding.**

(12) Coat planetary thrust bearing and bearing contact surface of spring plate with generous amount of petroleum jelly. This will help hold bearing in place during installation.

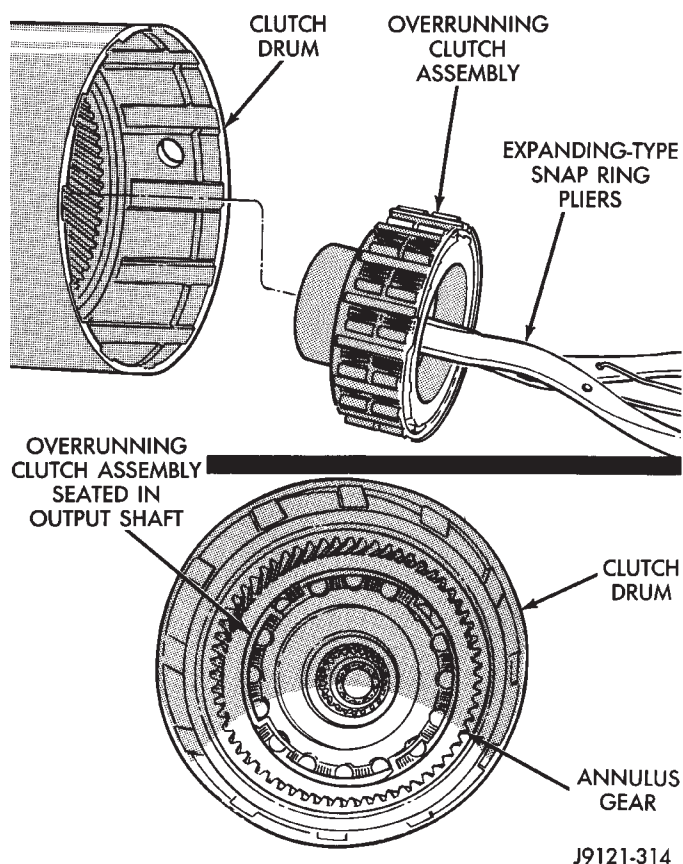


Fig. 225 Overrunning Clutch Installation

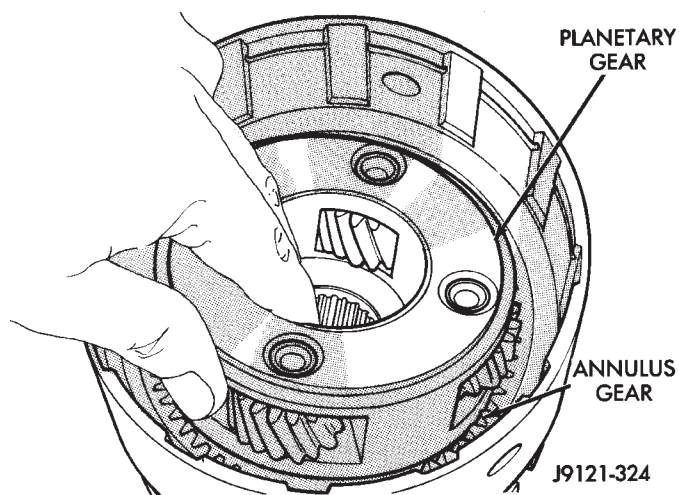


Fig. 226 Planetary Gear Installation

DISASSEMBLY AND ASSEMBLY (Continued)

(13) Install planetary thrust bearing on sun gear (Fig. 227). Slide bearing onto gear and seat it against spring plate as shown. **Bearing fits one way only. If it does not seat squarely against spring plate, remove and reposition bearing.**

(14) Install assembled sun gear, spring plate and thrust bearing (Fig. 228). Be sure sun gear and thrust bearing are fully seated before proceeding.

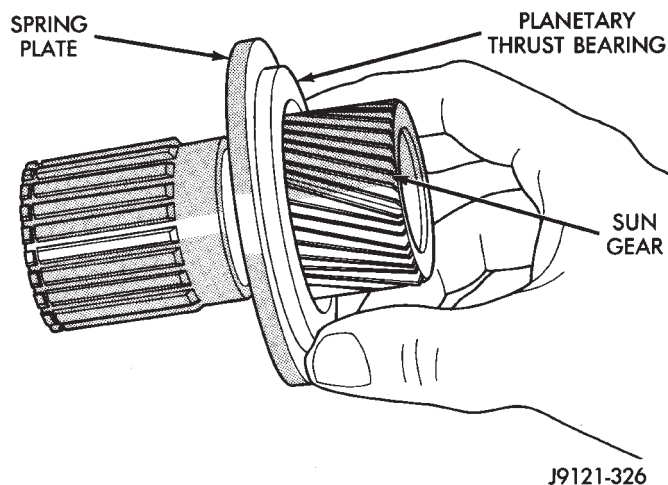


Fig. 227 Planetary Thrust Bearing Installation

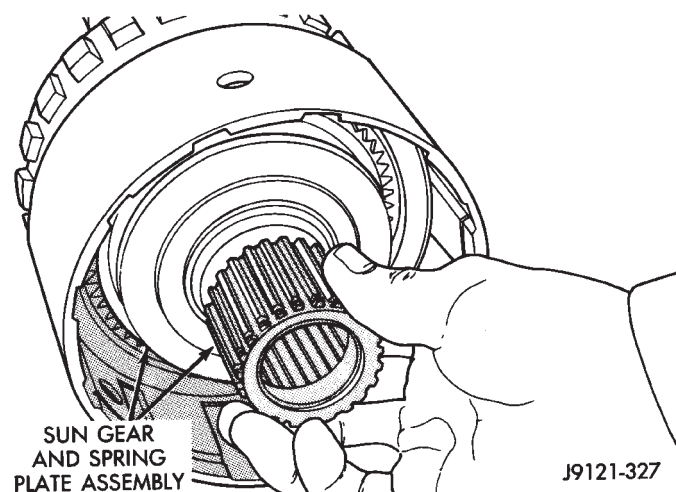


Fig. 228 Sun Gear Installation

(15) Mount assembled output shaft, annulus gear, and clutch drum in shop press. Direct clutch spring, hub and clutch pack are easier to install with assembly mounted in press.

(16) Align splines in hubs of planetary gear and overrunning clutch with Alignment tool 6227-2 (Fig. 229). Insert tool through sun gear and into splines of both hubs. Be sure alignment tool is fully seated before proceeding.

(17) Install direct clutch spring (Fig. 230). Be sure spring is properly seated on spring plate.

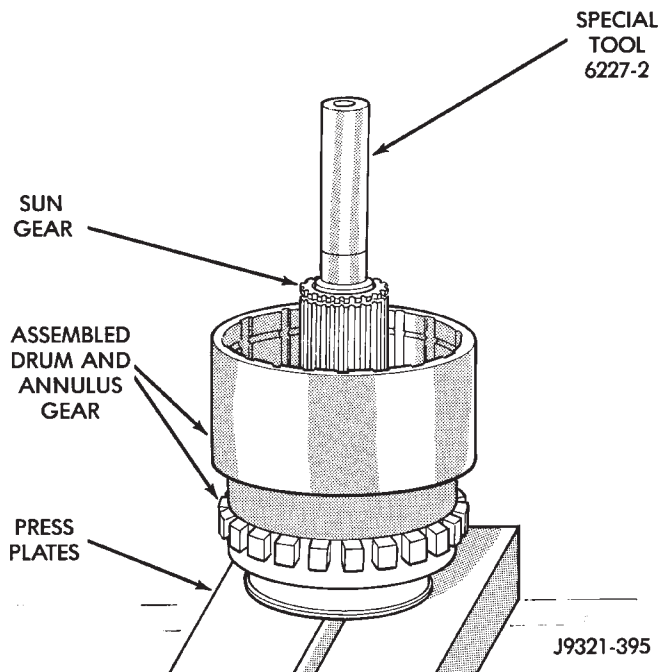


Fig. 229 Alignment Tool Installation

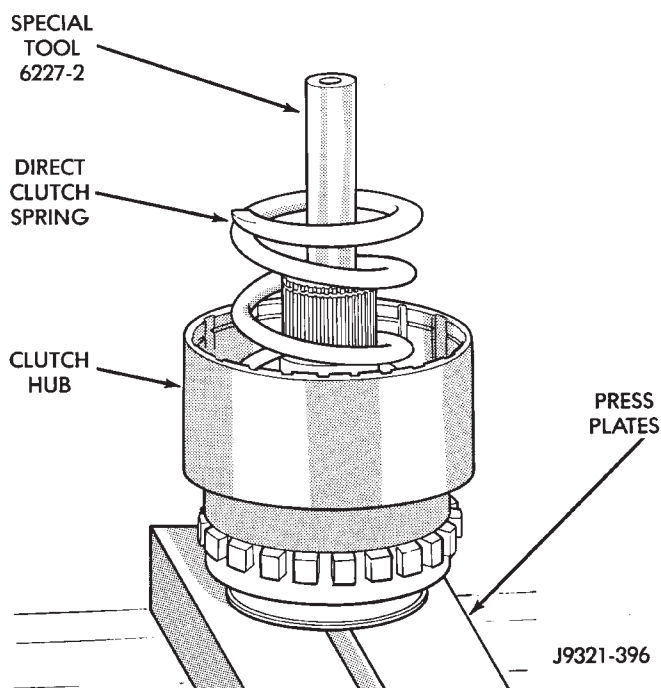


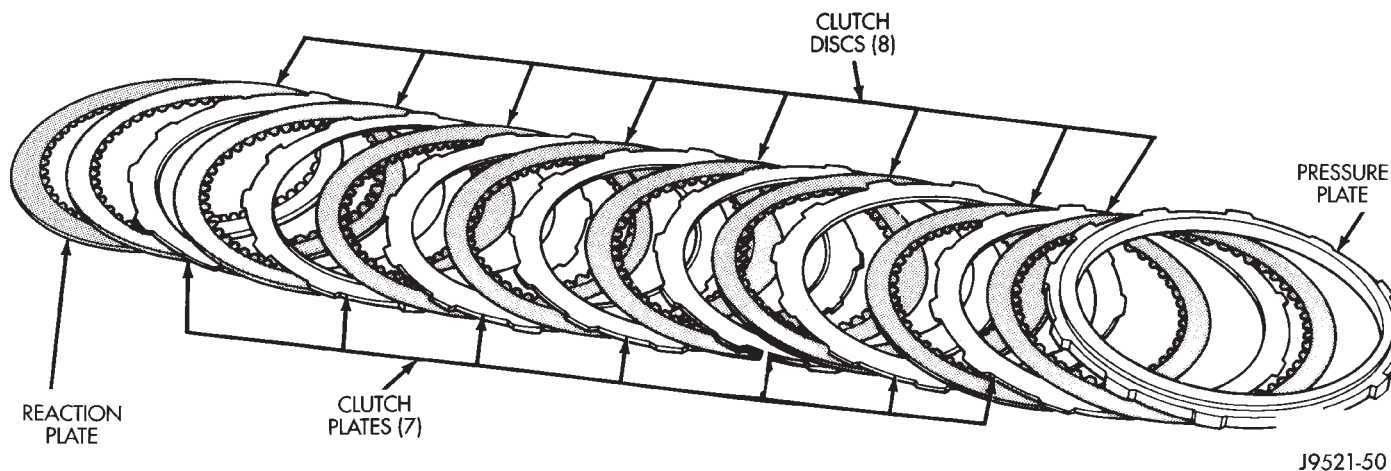
Fig. 230 Direct Clutch Spring Installation

NOTE: The direct clutch in the 46RE uses 8 clutch discs. The direct clutch in the 47RE uses 10 clutch discs.

(18) Assemble and install direct clutch pack on hub as follows:

- (a) Assemble clutch pack components (Fig. 231).
- (b) Install direct clutch reaction plate on clutch hub first. **Note that one side of reaction plate**

DISASSEMBLY AND ASSEMBLY (Continued)

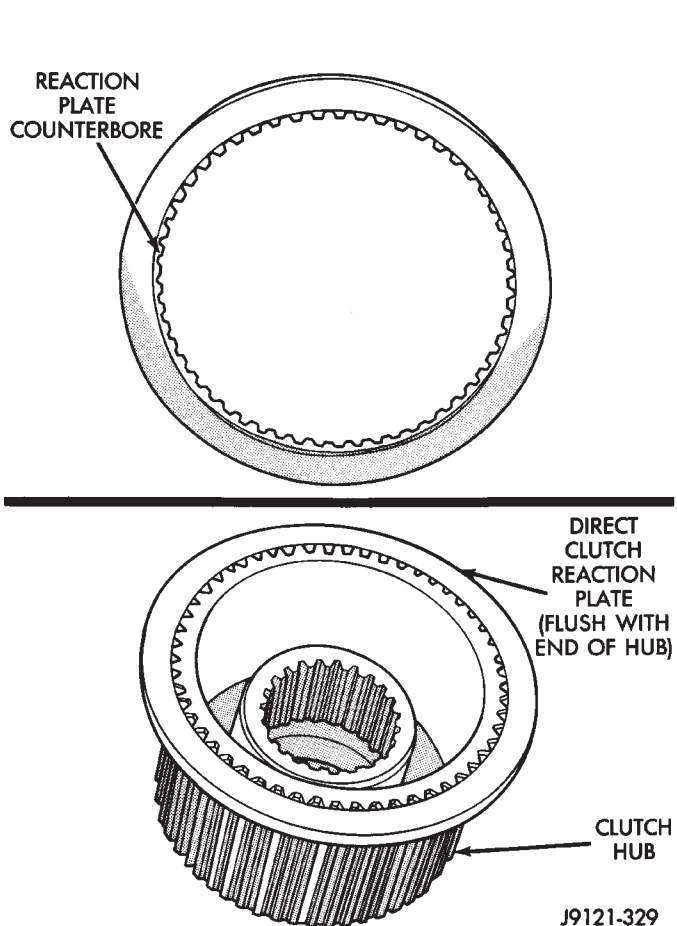
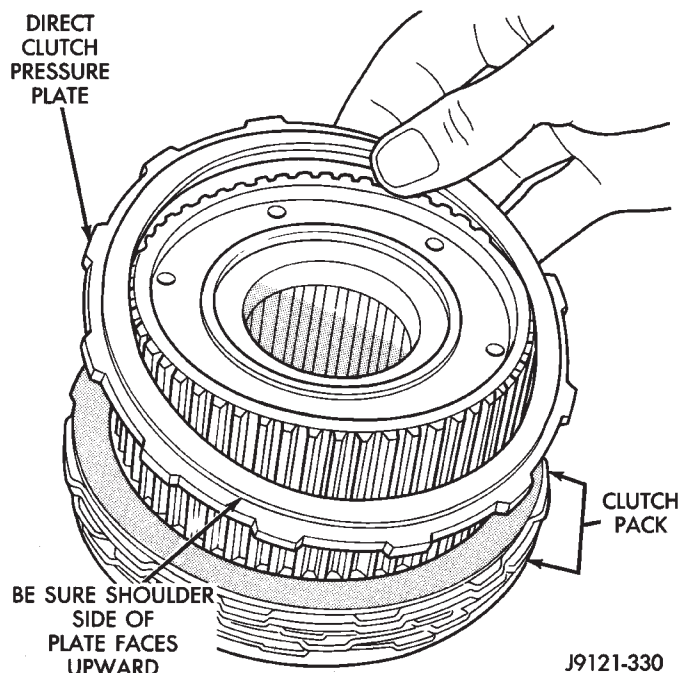
**Fig. 231 46RE Direct Clutch Pack Components**

is counterbored. Be sure this side faces rearward. Splines at rear of hub are raised slightly. Counterbore in plate fits over raised splines. Plate should be flush with this end of hub (Fig. 232).

(c) Install first clutch disc followed by a steel plate until all discs and plates have been installed.

(d) Install pressure plate. This is last clutch pack item to be installed. Be sure plate is installed with shoulder side facing upward (Fig. 233).

(19) Install clutch hub and clutch pack on direct clutch spring (Fig. 234). Be sure hub is started on sun gear splines before proceeding.

**Fig. 232 Correct Position Of Direct Clutch Reaction Plate****Fig. 233 Correct Position Of Direct Clutch Pressure Plate**

DISASSEMBLY AND ASSEMBLY (Continued)

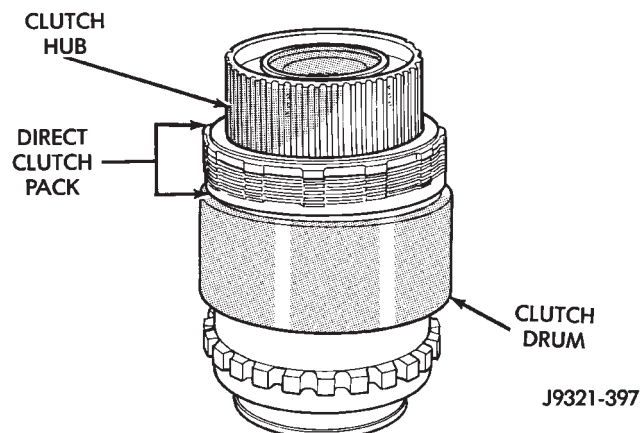


Fig. 234 Direct Clutch Pack And Clutch Hub Installation

WARNING: THE NEXT STEP IN GEARTRAIN ASSEMBLY INVOLVES COMPRESSING THE DIRECT CLUTCH HUB AND SPRING. IT IS EXTREMELY IMPORTANT THAT PROPER EQUIPMENT BE USED TO COMPRESS THE SPRING AS SPRING FORCE IS APPROXIMATELY 830 POUNDS. USE COMPRESSOR TOOL C-6227-1 AND A HYDRAULIC-TYPE SHOP PRESS WITH A MINIMUM RAM TRAVEL OF 6 INCHES. THE PRESS MUST ALSO HAVE A BED THAT CAN BE ADJUSTED UP OR DOWN AS REQUIRED. RELEASE CLUTCH SPRING TENSION SLOWLY AND COMPLETELY TO AVOID PERSONAL INJURY.

(20) Position Compressor Tool 6227-1 on clutch hub.

(21) Compress clutch hub and spring just enough to place tension on hub and hold it in place.

(22) Slowly compress clutch hub and spring. Compress spring and hub only enough to expose ring grooves for clutch pack snap ring and clutch hub retaining ring.

(23) Realign clutch pack on hub and seat clutch discs and plates in clutch drum.

(24) Install direct clutch pack snap ring (Fig. 235). **Be very sure snap ring is fully seated in clutch drum ring groove.**

(25) Install clutch hub retaining ring (Fig. 236). **Be very sure retaining ring is fully seated in sun gear ring groove.**

(26) Slowly release press ram, remove compressor tools and remove geartrain assembly.

GEAR CASE

(1) Position park pawl and spring in case and install park pawl shaft. Verify that end of spring with 90° bend is hooked to pawl and straight end of spring is seated against case.

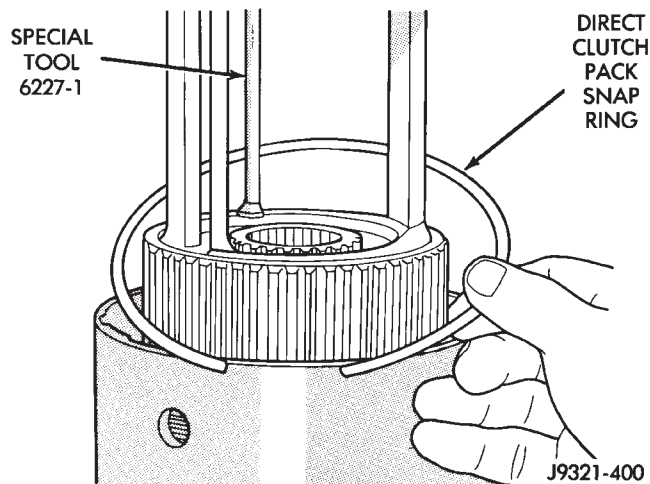


Fig. 235 Direct Clutch Pack Snap Ring Installation

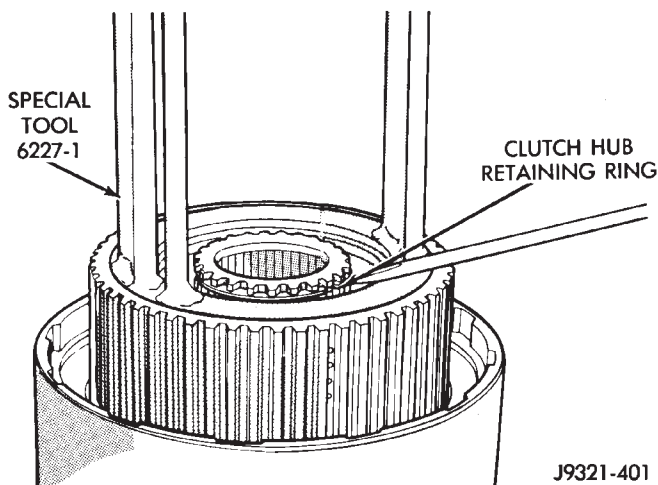


Fig. 236 Clutch Hub Retaining Ring Installation

(2) Install pawl shaft retaining bolt. Tighten bolt to 27 N·m (20 ft. lbs.) torque.

(3) Install park lock reaction plug. **Note that plug has locating pin at rear (Fig. 237). Be sure pin is seated in hole in case before installing snap ring.**

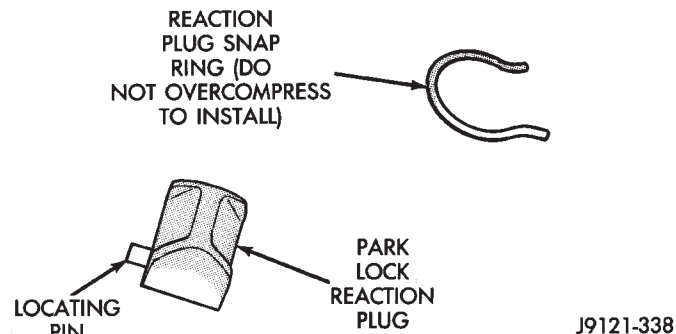


Fig. 237 Reaction Plug Locating Pin And Snap-Ring

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Install reaction plug snap-ring (Fig. 238). **Compress snap ring only enough for installation; do not distort it.**

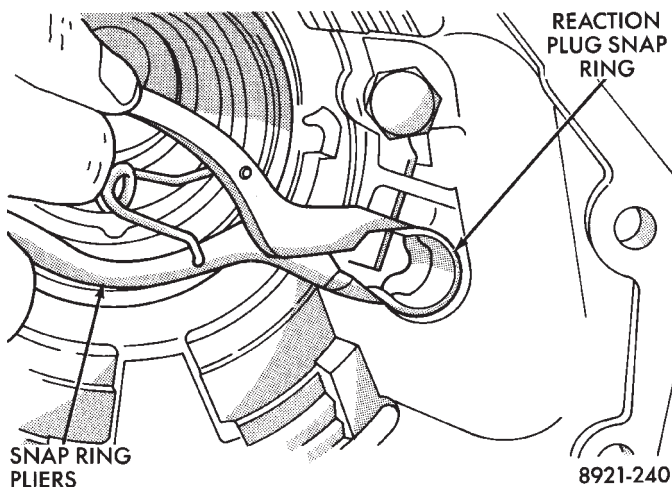


Fig. 238 Reaction Plug And Snap-Ring Installation

(5) Install new seal in gear case. Use Handle C-4171 and Installer C-3995-A to seat seal in case.

(6) Verify that tab ends of rear bearing locating ring extend into access hole in gear case (Fig. 239).

(7) Support geartrain on Tool 6227-1 (Fig. 240). Be sure tool is securely seated in clutch hub.

(8) Install overdrive gear case on geartrain (Fig. 240).

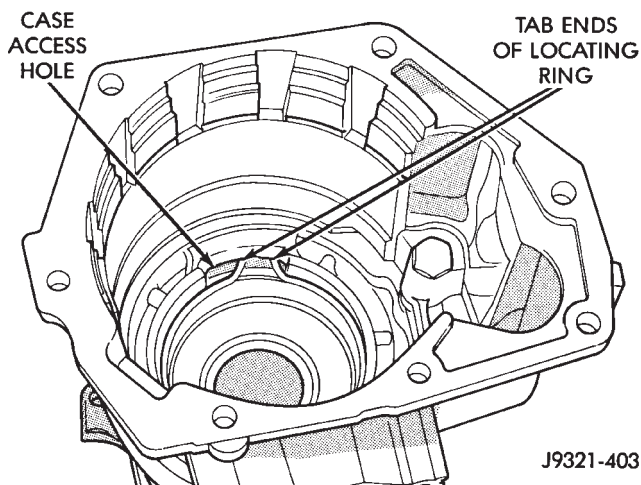


Fig. 239 Correct Rear Bearing Locating Ring Position

(9) Expand front bearing locating ring with snap ring pliers (Fig. 241). Then slide case downward until locating ring locks in bearing groove and release snap ring.

(10) Install locating ring access cover and gasket in overdrive unit case (Fig. 242).

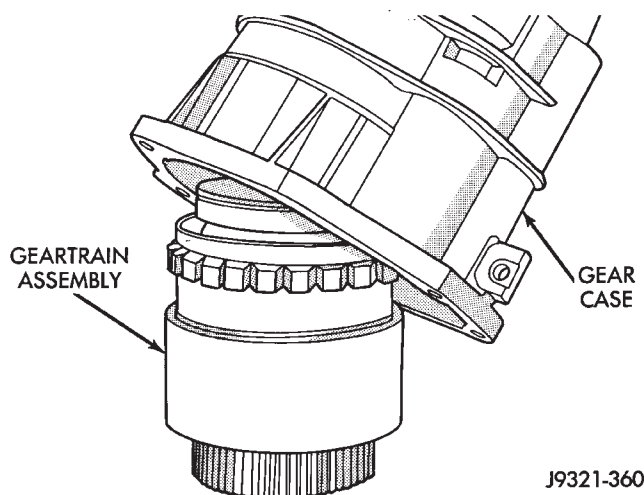


Fig. 240 Overdrive Gear Case Installation

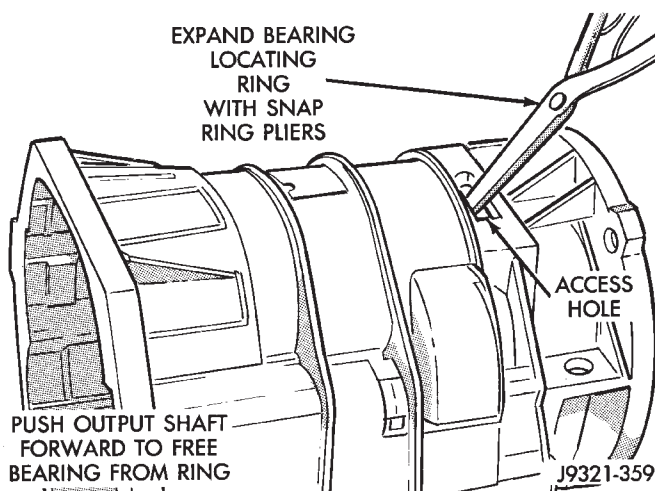


Fig. 241 Seating Locating Ring In Rear Bearing

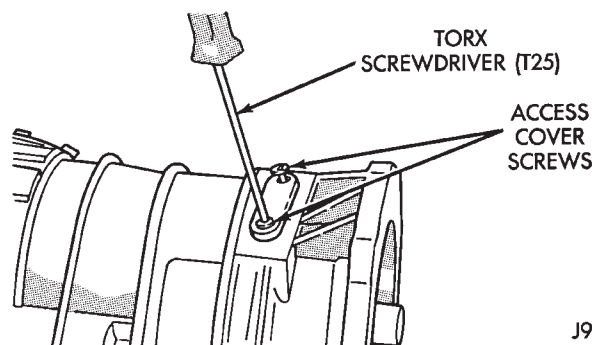


Fig. 242 Locating Ring Access Cover And Gasket Installation

OVERDRIVE CLUTCH

NOTE: The overdrive clutch pack in the 46RE transmission uses 4 clutch discs. The overdrive clutch pack in the 47RE uses 5 discs.

DISASSEMBLY AND ASSEMBLY (Continued)

(1) Install overdrive clutch reaction ring first. Reaction ring is flat with notched ends (Fig. 243).

(2) Install wave spring on top of reaction ring (Fig. 244). **Reaction ring and wave ring both fit in same ring groove.** Use screwdriver to seat each ring securely in groove. Also ensure that the ends of the two rings are offset from each other.

(3) Assemble overdrive clutch pack (Fig. 245).

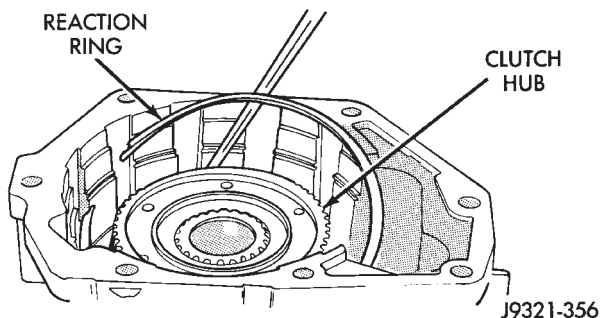


Fig. 243 Overdrive Clutch Reaction Ring Installation

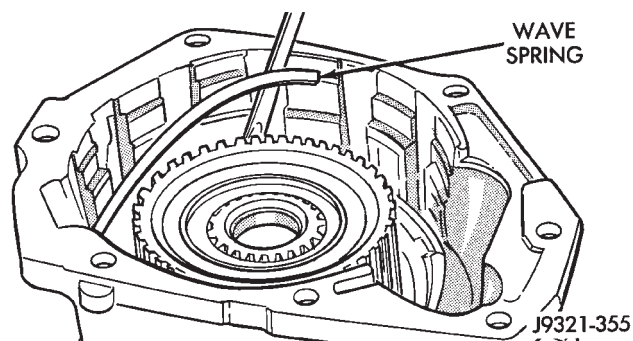


Fig. 244 Overdrive Clutch Wave Spring Installation

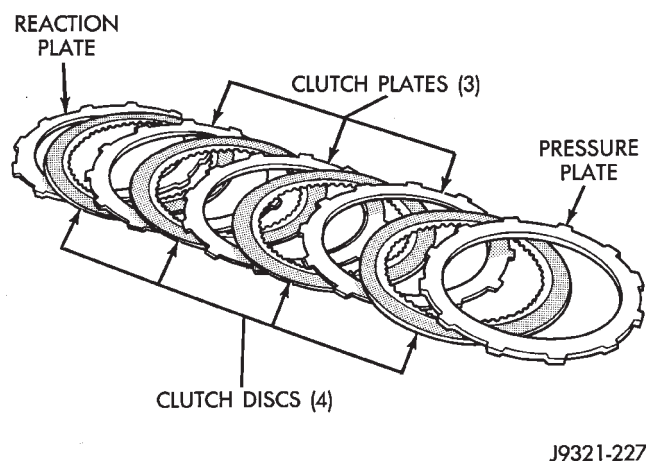


Fig. 245 46RE Overdrive Clutch Components

(4) Install overdrive clutch reaction plate first.
 (5) Install first clutch disc followed by first clutch plate. Then install remaining clutch discs and plates in same order.

(6) Install clutch pack pressure plate.

(7) Install clutch pack wire-type retaining ring (Fig. 246).

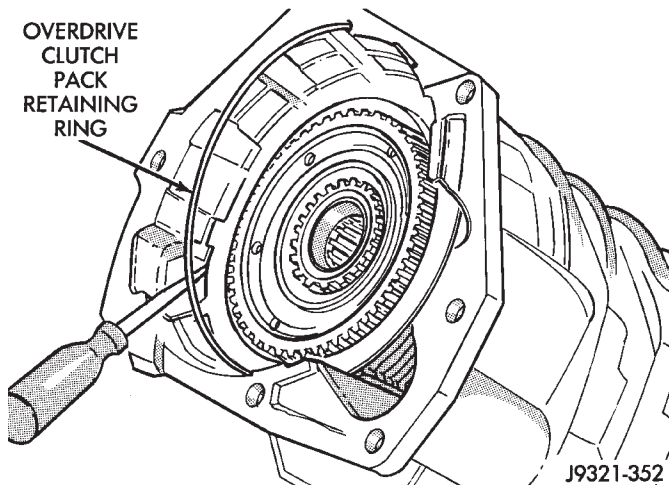


Fig. 246 Overdrive Clutch Pack Retaining Ring Installation

INTERMEDIATE SHAFT SPACER SELECTION

(1) Place overdrive unit in vertical position. Mount it on blocks, or in workbench with appropriate size mounting hole cut into it. Be sure unit is facing upward for access to direct clutch hub. Also be sure output shaft is not loaded and internal components are moved rearward for accurate measurement.

(2) Determine correct thickness intermediate shaft spacer as follows:

(a) Insert Special Tool 6312 through sun gear, planetary gear and into pilot bushing in output shaft. Be sure tool bottoms against planetary shoulder.

(b) Position Gauge Tool 6311 across face of overdrive case (Fig. 247). Then position Dial Caliper C-4962 over gauge tool.

(c) Extend sliding scale of dial caliper downward through gauge tool slot until scale contacts end of Gauge Alignment Tool 6312. Lock scale in place. Remove dial caliper tool and note distance measured (Fig. 247).

(d) Select proper thickness end play spacer from spacer chart based on distance measured (Fig. 248).

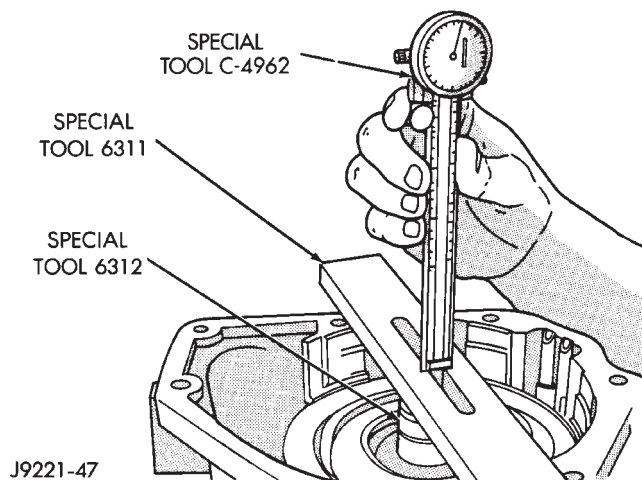
(e) Remove Gauge Alignment Tool 6312.

OD THRUST PLATE SELECTION

(1) Place overdrive unit in vertical position. Mount it on blocks, or in workbench with appropriate size mounting hole cut into it. Be sure unit is facing upward for access to direct clutch hub. Also be sure output shaft is not loaded and internal components are moved rearward for accurate measurement.

(2) Determine correct thickness overdrive piston thrust plate as follows:

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 247 Shaft End Play Measurement**

End Play Measurement (Inches)	Spacer Thickness (Inches)
.7336 - .7505	.158 - .159
.7506 - .7675	.175 - .176
.7676 - .7855	.193 - .194
.7856 - .8011	.211 - .212

J9121-341

Fig. 248 Intermediate Shaft End Play Spacer Selection

(a) Position Gauge Tool 6311 across face of overdrive case. Then position Dial Caliper C-4962 over gauge tool (Fig. 249).

(b) Measure distance to clutch hub thrust bearing seat at four points 90° apart. Then average measurements by adding them and dividing by 4.

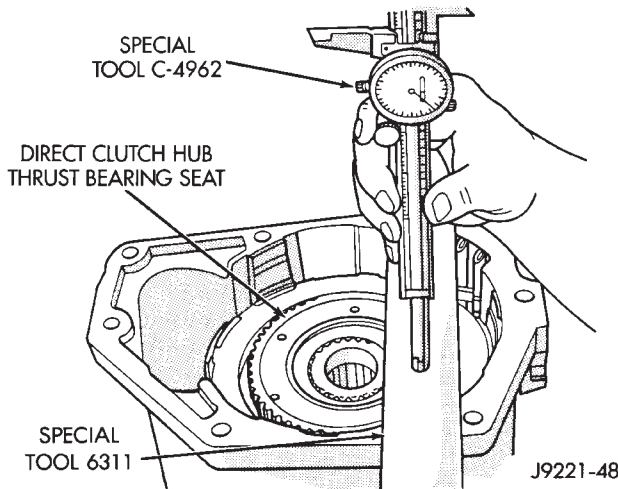
(c) Select and install required thrust plate from information in thrust plate chart (Fig. 250).

(3) Leave Alignment Tool 6227-2 in place. Tool will keep planetary and clutch hub splines in alignment until overdrive unit is ready for installation on transmission.

(4) Transmission speed sensor can be installed at this time if desired. However, it is recommended that sensor not be installed until after overdrive unit is secured to transmission.

OVERDRIVE PISTON

- (1) Install new seals on overdrive piston.
- (2) Stand transmission case upright on bellhousing.
- (3) Position Guide Ring 8114-1 on outer edge of overdrive piston retainer.
- (4) Position Seal Guide 8114-3 on inner edge of overdrive piston retainer.

**Fig. 249 Overdrive Piston Thrust Plate Measurement**

End Play Measurement (Inches)	Spacer Thickness (Inches)
1.7500 - 1.7649	.108 - .110
1.7650 - 1.7799	.123 - .125
1.7800 - 1.7949	.138 - .140
1.7950 - 1.8099	.153 - .155
1.8100 - 1.8249	.168 - .170
1.8250 - 1.8399	.183 - .185
1.8400 - 1.8549	.198 - .200
1.8550 - 1.8699	.213 - .215
1.8700 - 1.8849	.228 - .230
1.8850 - 1.8999	.243 - .245

J9121-342

Fig. 250 Overdrive Piston Thrust Plate Selection

(5) Install overdrive piston in overdrive piston retainer by:

(a) Aligning locating lugs on overdrive piston to the two mating holes in retainer.

(b) Lubricate overdrive piston seals with Mopar® Door Ease, or equivalent.

(c) Install piston over Seal Guide 8114-3 and inside Guide Ring 8114-1.

(d) Push overdrive piston into position in retainer.

(e) Verify that the locating lugs entered the lug bores in the retainer.

(6) Install intermediate shaft spacer on intermediate shaft.

(7) Install overdrive piston thrust plate on overdrive piston.

(8) Install overdrive piston thrust bearing on overdrive piston.

(9) Install transmission speed sensor and O-ring seal in overdrive case.

CLEANING AND INSPECTION

VALVE BODY

Clean the valve housings, valves, plugs, springs, and separator plates with a standard parts cleaning solution only. Do not use gasoline, kerosene, or any type of caustic solution.

Do not immerse any of the electrical components in cleaning solution. Clean the governor solenoid and sensor and the dual solenoid and harness assembly by wiping them off with dry shop towels only.

Dry all except the electrical parts with compressed air. Make sure all passages are clean and free from obstructions. **Do not use rags or shop towels to dry or wipe off valve body components. Lint from these materials can stick to valve body parts, interfere with valve operation, and clog filters and fluid passages.**

Wipe the governor pressure sensor and solenoid valve with dry, lint free shop towels only. The O-rings on the sensor and solenoid valve are the only serviceable components. Be sure the vent ports in the solenoid valve are open and not blocked by dirt or debris. Replace the valve and/or sensor only when DRB scan tool diagnosis indicates this is necessary. Or, if either part has sustained physical damage (dented, deformed, broken, etc.).

CAUTION: Do not turn the small screw at the end of the solenoid valve for any reason. Turning the screw in either direction will ruin solenoid calibration and result in solenoid failure. In addition, the filter on the solenoid valve is NOT serviceable. Do not try to remove the filter as this will damage the valve housing.

Inspect the throttle and manual valve levers and shafts (Fig. 251). 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 a sheet of crocus cloth. Position the crocus cloth on a surface plate, sheet of plate glass or equally flat surface. If distortion is severe or any surfaces are heavily scored, the valve body will have to be replaced.

CAUTION: Many of the valves and plugs, such as the throttle valve, shuttle valve plug, 1-2 shift valve and 1-2 governor plug, are made of coated aluminum. Aluminum components are identified by the

dark color of the special coating applied to the surface (or by testing with a magnet). Do not sand aluminum valves or plugs under any circumstances. This practice could damage the special coating causing the valves/plugs to stick and bind.

Inspect the valves and plugs for scratches, burrs, nicks, or scores. Minor surface scratches on steel valves and plugs can be removed with crocus cloth but **do not round off the edges of the valve or plug lands**. Maintaining sharpness of these edges is vitally important. The edges prevent foreign matter from lodging between the valves and plugs and the 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.

Check the two separator plates for distortion or damage of any kind. Inspect the upper housing, lower housing, 3-4 accumulator housing, and transfer plate carefully. Be sure all fluid passages are clean and clear. Check condition of the upper housing and transfer plate check balls as well. The check balls and ball seats must not be worn or damaged.

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.

The only serviceable valve body components are listed below. The remaining valve body components are serviced only as part of a complete valve body assembly. Serviceable parts are:

- dual solenoid and harness assembly
- solenoid gasket
- solenoid case connector O-rings and shoulder bolt
- switch valve and spring
- pressure adjusting screw and bracket assembly
- throttle lever
- manual lever and shaft seal
- throttle lever shaft seal, washer, and E-clip
- fluid filter and screws
- detent ball and spring
- valve body screws
- governor pressure solenoid
- governor pressure sensor and retaining clip
- park lock rod and E-clip

CLEANING AND INSPECTION (Continued)

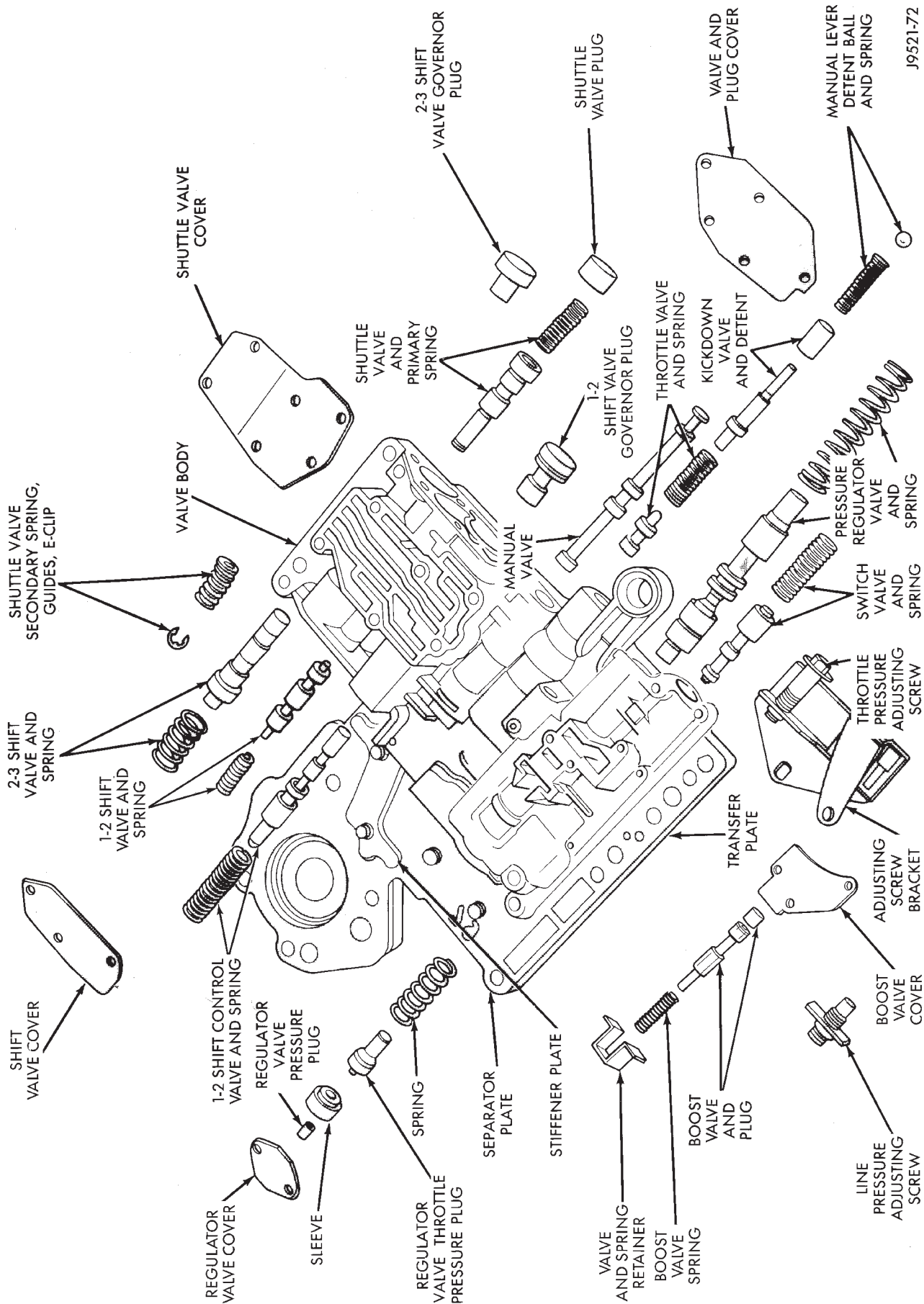


Fig. 251 Upper Housing Valves, Plug, Springs And Brackets

CLEANING AND INSPECTION (Continued)

TRANSMISSION

GENERAL INFORMATION

Inspect 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. However, do not replace bushings as a matter of course. Replace bushings only when they are actually worn, or scored.

Use recommended tools to replace bushings. The tools are sized and designed to remove, install, and seat bushings correctly. The bushing replacement tools are included in Bushing Tool Set C-3887-B.

Pre-sized service bushings are available for replacement purposes. Only the sun gear bushings are not serviced. Low cost of the sun gear assembly makes it easier to simply replace the gear and bushings as an assembly.

Heli-Coil inserts can be used to repair damaged, stripped or worn threads in aluminum parts. These inserts are available from most automotive parts suppliers. Stainless steel inserts are recommended.

The use of crocus cloth is permissible where necessary, providing it is used carefully. When used on shafts, or 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, Type 7176, transmission fluid during overhaul and assembly. Use petroleum jelly, Mopar® Door Ease, or Ru-Glyde to prelubricate seals, O-rings, and thrust washers. Petroleum jelly can also be used to hold parts in place during reassembly.

TRANSMISSION CASE CLEANING AND INSPECTION

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 stick to case surfaces and transmission components and 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 bores, or damaged threads. Damaged threads can be repaired with Helicoil thread inserts. However, the case will have to be replaced if it exhibits any type of damage or wear.

Lubricate the front band adjusting screw threads with petroleum jelly and thread the screw part-way into the case. Be sure the screw turns freely.

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.

ACCUMULATOR

Inspect the accumulator piston and seal rings (Fig. 252). Replace the seal rings if worn or cut. Replace the piston if chipped or cracked.

Check condition of the accumulator inner and outer springs (Fig. 252). Replace the springs if the coils are cracked, distorted or collapsed.

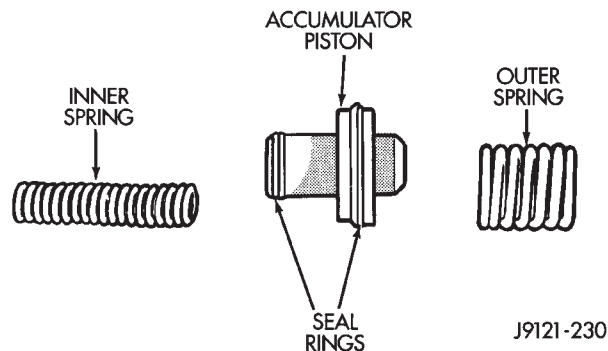


Fig. 252 Accumulator Components

FRONT SERVO

Clean the servo piston components with solvent and dry them with compressed air. Wipe the band clean with lint free shop towels.

CLEANING AND INSPECTION (Continued)

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. 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.

REAR SERVO

Remove and discard the servo piston seal ring (Fig. 253). 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.

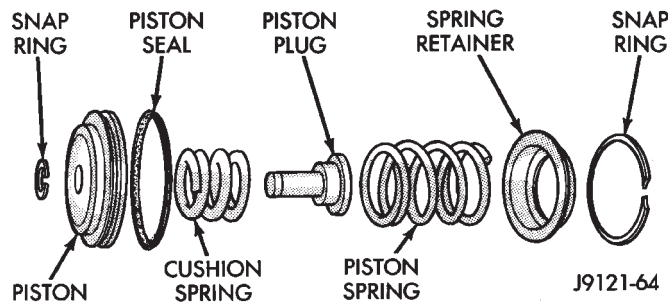


Fig. 253 Rear Servo Components

OIL PUMP AND REACTION SHAFT SUPPORT

Clean pump and support components with solvent and dry them with compressed air.

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.

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.

Check the pump vent. The vent must be secure. Replace the pump body if the vent is cracked, broken, or loose.

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.

(1) 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 (Fig. 254).

(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.

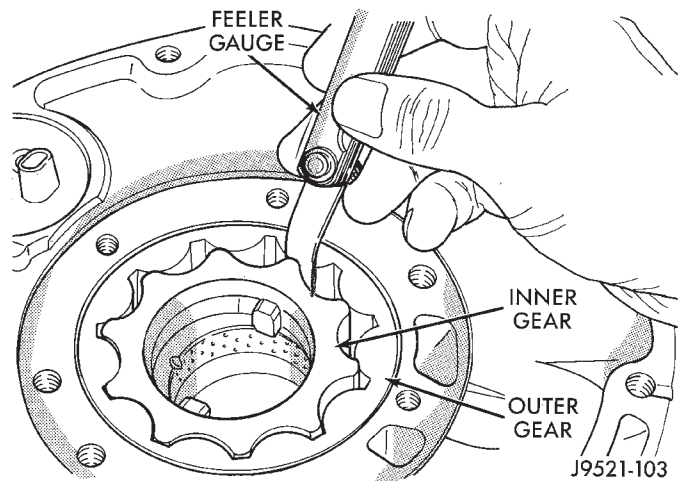


Fig. 254 Checking Pump Gear Tip Clearance

FRONT CLUTCH

Clean and inspect the front clutch components. Replace the clutch discs if warped, worn, scored, burned or charred, the lugs are damaged, or if the facing is flaking off. Replace the steel plates and reaction plate if heavily scored, warped, or broken. Be sure the driving lugs on the discs and plate are also in good condition. The lugs must not be bent, cracked or damaged in any way.

Replace the piston springs and spring retainer if either are distorted, warped or broken.

Check the lug grooves in the clutch piston retainer. The steel plates should slide freely in the slots. Replace the piston retainer if the grooves are worn or damaged. Also check action of the check ball in the

CLEANING AND INSPECTION (Continued)

piston retainer. The ball must move freely and not stick.

Replace the retainer bushing if worn, scored, or there is any doubt about bushing condition.

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.

Check the clutch piston check ball. The ball should be securely in place. Replace the piston if the ball is missing, or seized in place.

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.

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.

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 intermediate 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.

OVERDRIVE UNIT

Clean the geartrain and case components with solvent. Dry all parts except the bearings with compressed air. Allow bearings to air dry.

Do not use shop towels for wiping parts dry unless the towels are made from a lint-free material. A sufficient quantity of lint (from shop towels, cloths, rags, etc.) could plug the transmission filter and fluid passages.

Discard the old case gasket and seals. Do not attempt to salvage these parts. They are not reusable. Replace any of the overdrive unit snap rings if distorted or damaged.

Minor nicks or scratches on components can be smoothed with crocus cloth. However, do not attempt to reduce severe scoring on any components with abrasive materials. Replace severely scored components; do not try to salvage them.

Check condition of the park lock components and the overdrive case.

Replace the case if cracked, scored, or damaged. Replace the park lock pawl, plug, or spring if worn or damaged. Be sure the bullet at the end of the park lock rod is in good condition. Replace the rod if the bullet is worn or the rod itself is bent or distorted. Do not attempt to straighten the rod.

Check the bushings in the overdrive case. Replace the bushings if severely scored or worn. Also replace the case seal if loose, distorted, or damaged.

Examine the overdrive and direct clutch discs and plates. Replace the discs if the facing is worn,

CLEANING AND INSPECTION (Continued)

severely scored, or burned and flaking off. Replace the clutch plates if worn, heavily scored, or cracked. Check the lugs on the clutch plates for wear. The plates should slide freely in the drum. Replace the plates or drum if binding occurs.

Check condition of the annulus gear, direct clutch hub, clutch drum and clutch spring. Replace the gear, hub and drum if worn or damaged. Replace the spring if collapsed, distorted, or cracked.

Be sure the splines and lugs on the gear, drum and hub are in good condition. The clutch plates and discs should slide freely in these components.

Inspect the thrust bearings and spring plate. Replace the plate if worn or scored. Replace the bearings if rough, noisy, brinnelled, or worn.

Inspect the planetary gear assembly and the sun gear and bushings. If either the sun gear or the bushings are damaged, replace the gear and bushings as an assembly. The gear and bushings are not serviced separately.

The planetary carrier and pinions must be in good condition. Also be sure the pinion pins are secure and in good condition. Replace the carrier if worn or damaged.

Inspect the overrunning clutch and race. The race surface should be smooth and free of scores. Replace the overrunning clutch assembly or the race if either assembly is worn or damaged in any way.

Inspect the output shaft and governor components. Replace the shaft pilot bushing and inner bushing if damaged. Replace either shaft bearing if rough or noisy. Replace the bearing snap rings if distorted or cracked.

Check the machined surfaces on the output shaft. These surfaces should be clean and smooth. Very minor nicks or scratches can be smoothed with crocus cloth. Replace the shaft if worn, scored or damaged in any way.

Inspect the output shaft bushings. The small bushing is the intermediate shaft pilot bushing. The large bushing is the overrunning clutch hub bushing. Replace either bushing if scored, pitted, cracked, or worn.

ADJUSTMENTS

TRANSMISSION THROTTLE VALVE CABLE ADJUSTMENT

The transmission throttle valve is operated by a cam on the valve body throttle lever. The throttle lever is actuated by a cable connected to the engine throttle body lever (Fig. 255). 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 allows simultaneous movement without causing the transmission throttle lever to move ahead of, or lag behind the throttle body lever.

THROTTLE VALVE CABLE ADJUSTMENT CHECK

- (1) Turn ignition key to OFF position.
- (2) Remove air cleaner.
- (3) Verify that throttle body lever is at curb idle position. Then verify that transmission throttle lever (Fig. 255) is also at idle (full forward) position.
- (4) Slide cable off attachment stud on throttle body lever (Fig. 255).
- (5) Compare position of cable end to attachment stud on throttle body lever:
 - (a) Cable end and attachment stud should be aligned (or centered on one another) to within 1 mm (0.039 in.) in either direction.
 - (b) If cable end and attachment stud are misaligned (off center), cable will have to be adjusted as described in following 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.
 - (a) If both levers move simultaneously from idle to half-throttle and back to idle position, adjustment is correct.
 - (b) 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

- (1) Turn ignition switch to OFF position and shift into Park.
- (2) Remove air cleaner.
- (3) Disconnect cable end from attachment stud on throttle body. **Carefully slide cable off stud. Do not pull or pry cable off.**
- (4) Verify that transmission throttle lever is in idle (full forward) position. Then be sure lever on throttle body is at curb idle position.
- (5) Insert a small screwdriver under edge of retaining clip and remove retaining clip.
- (6) Center cable end on attachment stud to within 1 mm (0.039 in.).
- (7) Install retaining clip onto cable housing.
- (8) Check cable adjustment. Be sure transmission throttle lever and lever on throttle body move simultaneously and as described in cable adjustment checking procedure.

ADJUSTMENTS (Continued)

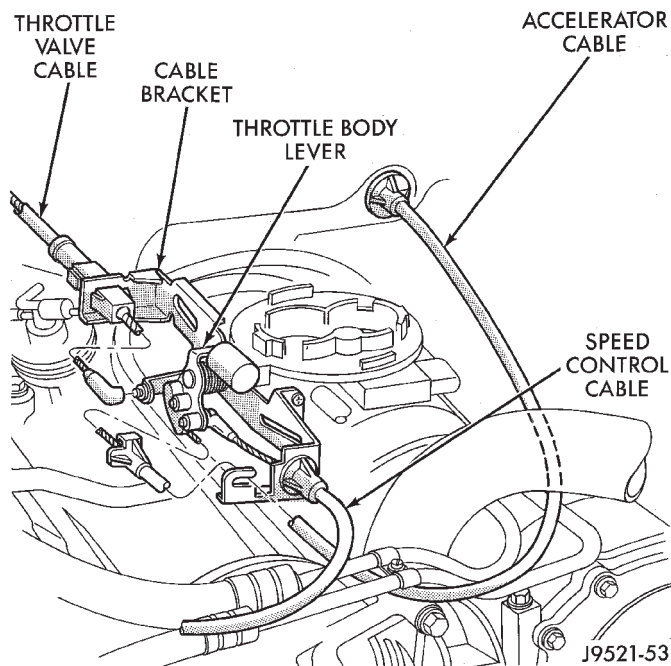


Fig. 255 Throttle Valve Cable Attachment —At Engine

GEARSHIFT LINKAGE ADJUSTMENT

Check linkage adjustment by starting engine in Park and Neutral. Adjustment is acceptable if the engine starts in only these two positions. Adjustment is incorrect if the engine starts in one position but not both positions.

If the engine starts in any other position, or if the engine will not start in any position, the park/neutral switch is probably faulty.

LINKAGE ADJUSTMENT

Check condition of the shift linkage (Fig. 256). Do not attempt adjustment if any component is loose, worn, or bent. Replace any suspect components.

Replace the grommet securing the shift rod or torque rod in place if either rod was removed from the grommet. Remove the old grommet as necessary and use suitable pliers to install the new grommet.

- (1) Shift transmission into Park.
- (2) Raise and support vehicle.
- (3) Loosen lock bolt in front shift rod adjusting swivel (Fig. 256).
- (4) Ensure that the shift rod slides freely in the swivel. Lube rod and swivel as necessary.
- (5) Move transmission shift lever fully rearward to the Park detent.
- (6) Center adjusting swivel on shift rod.
- (7) Tighten swivel lock bolt to 10 N·m (90 in. lbs.).
- (8) Lower vehicle and verify proper adjustment.

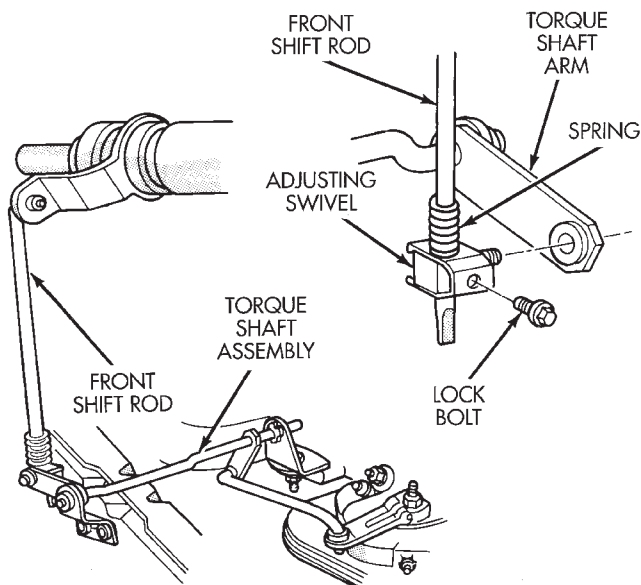


Fig. 256 Linkage Adjustment Components

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.

- (1) Raise vehicle.
- (2) Loosen band adjusting screw locknut (Fig. 257). Then back locknut off 3-5 turns. Be sure adjusting screw turns freely in case. Apply lubricant to screw threads if necessary.
- (3) 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 5/16 socket.

CAUTION: If Adapter C-3705 is needed to reach the adjusting screw (Fig. 258), tighten the screw to only 5 N·m (47-50 in. lbs.) torque.

46RE TRANSMISSION

- Back off front band adjusting screw 2-7/8 turns.
- Hold adjuster screw in position and tighten locknut to 41 N·m (30 ft. lbs.) torque.

47RE TRANSMISSION

- Back off front band adjusting screw 1-7/8 turns.
 - Hold adjuster screw in position and tighten locknut to 41 N·m (30 ft. lbs.) torque.
- (4) Lower vehicle.

ADJUSTMENTS (Continued)

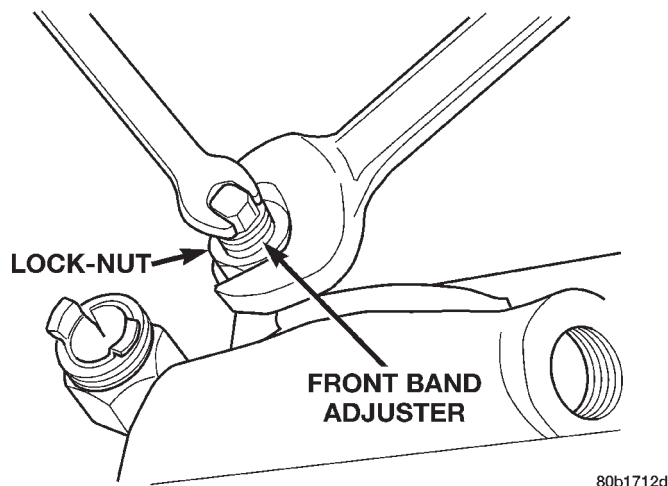


Fig. 257 Front Band Adjustment Screw Location

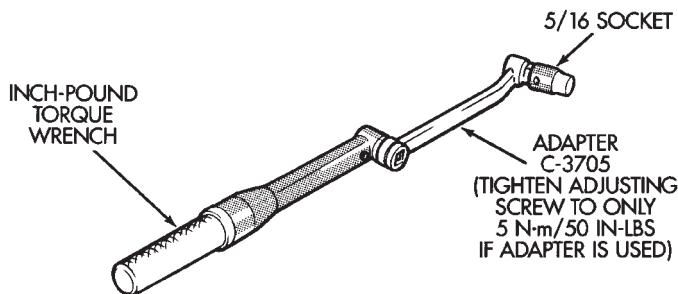


Fig. 258 Band Adjustment Adapter Tool

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 8 N·m (72 in. lbs.) torque (Fig. 259).

46RE TRANSMISSION

- Back off adjusting screw 2 turns.

- Hold adjusting screw in place and tighten lock-nut to 34 N·m (25 ft. lbs.) torque.

47RE TRANSMISSION

- Back off adjusting screw 3 turns.
- Hold adjusting screw in place and tighten lock-nut to 34 N·m (25 ft. lbs.) torque.

(5) Position new gasket on oil pan and install pan on transmission. Tighten pan bolts to 17 N·m (13 ft. lbs.) torque.

(6) Lower vehicle and refill transmission with Mopar® ATF Plus 3, Type 7176 fluid.

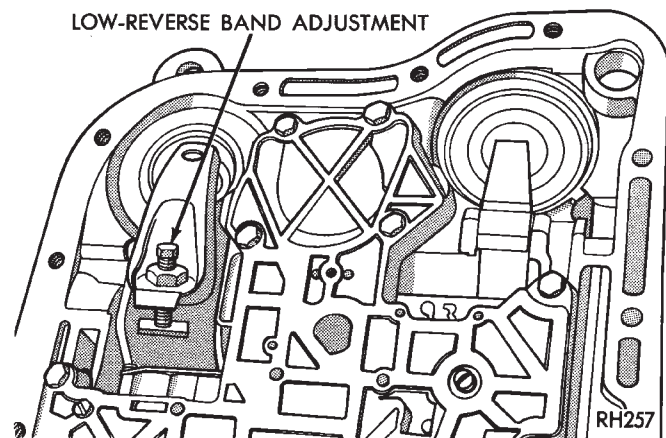


Fig. 259 Rear Band Adjustment Screw Location

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.

ADJUSTMENTS (Continued)

LINE PRESSURE ADJUSTMENT

Measure distance from the valve body to the inner edge of the adjusting screw with an accurate steel scale (Fig. 260).

Distance should be 33.4 mm (1-5/16 in.).

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.

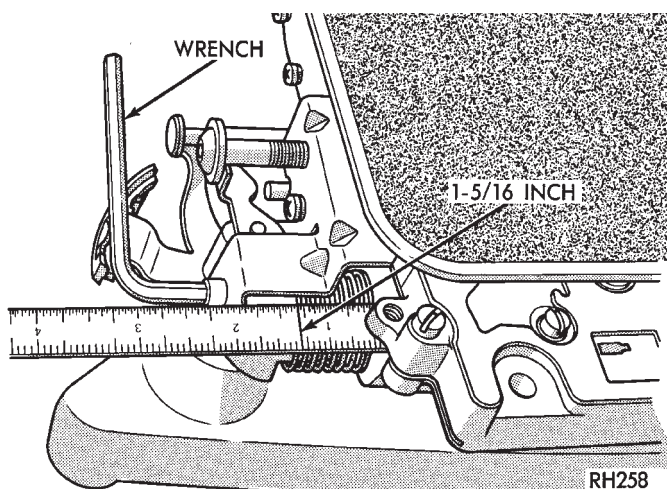


Fig. 260 Line Pressure Adjustment

THROTTLE PRESSURE ADJUSTMENT

Insert Gauge Tool C-3763 between the throttle lever cam and the kickdown valve stem (Fig. 261).

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.

NOTE: The kickdown valve spring must be fully compressed and the kickdown valve completely bottomed to obtain correct adjustment.

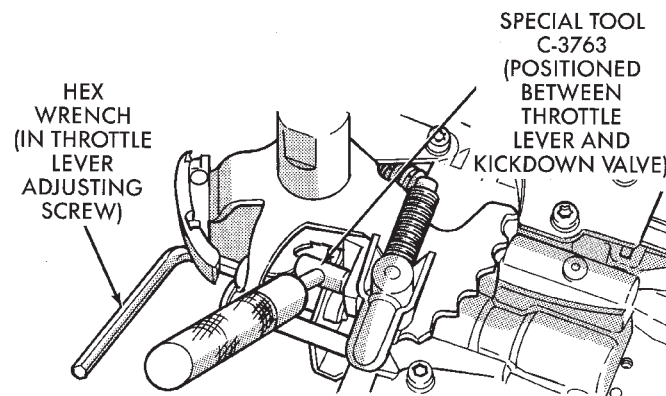
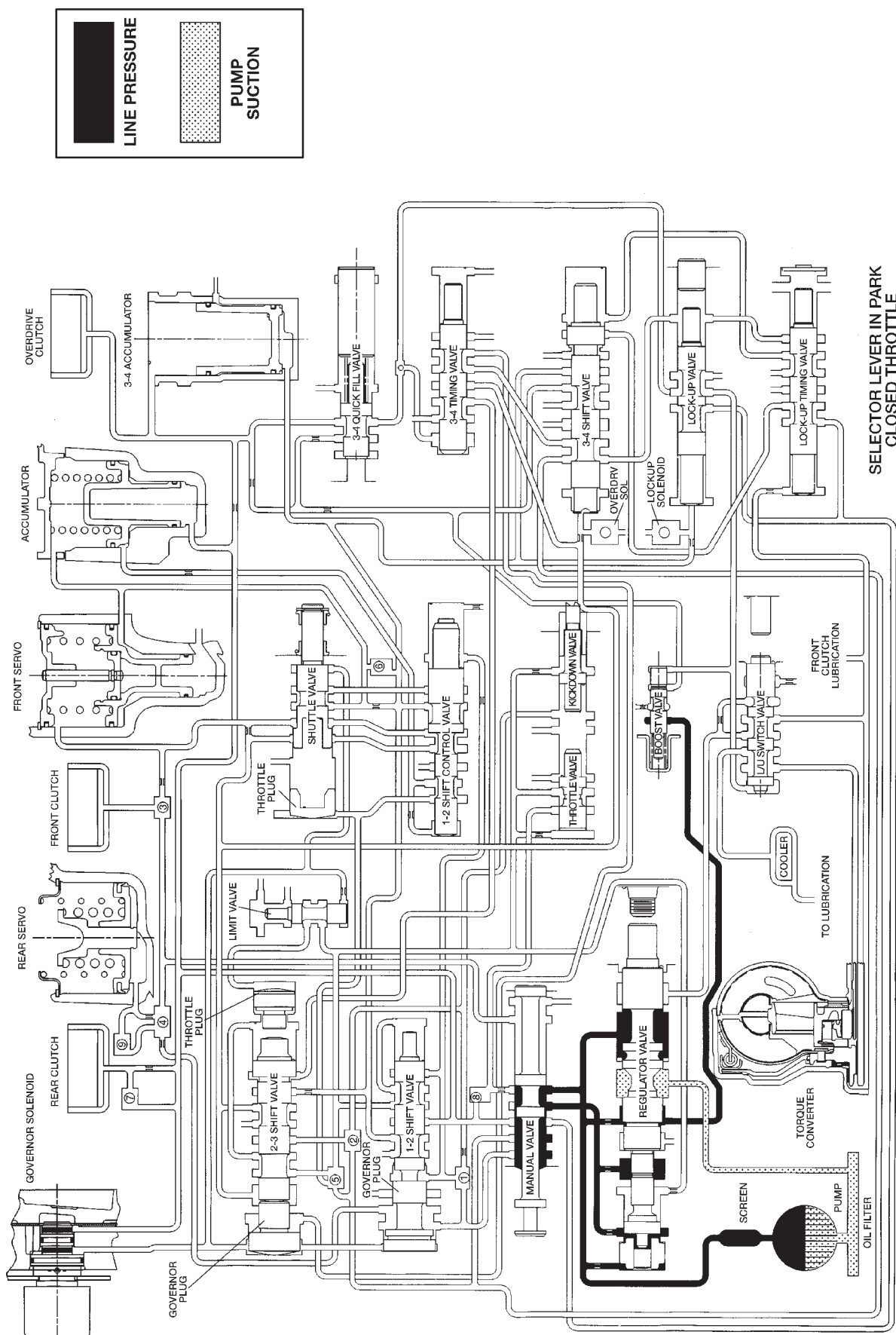


Fig. 261 Throttle Pressure Adjustment

SCHEMATICS AND DIAGRAMS

HYDRAULIC SCHEMATICS

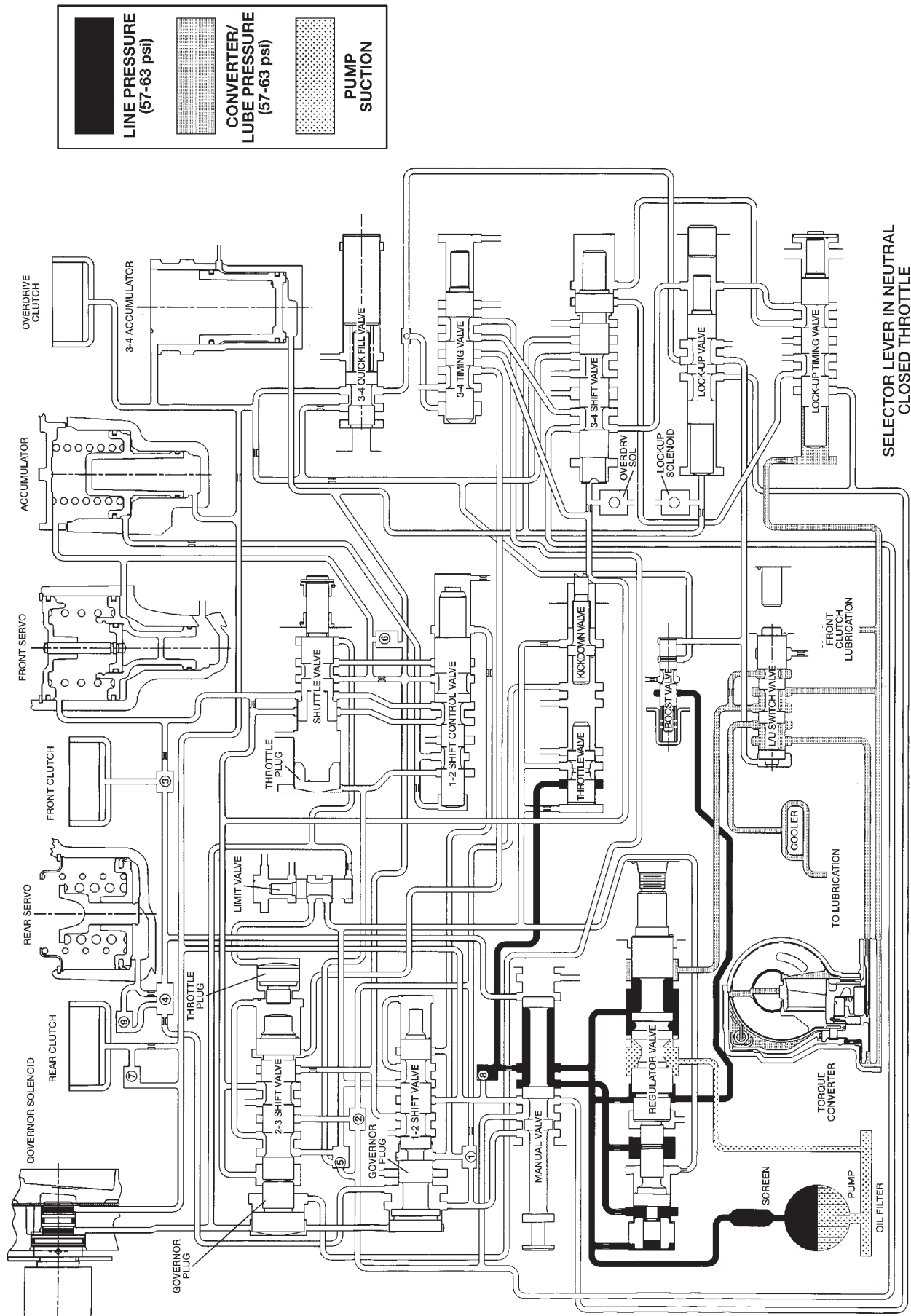


HYDRAULIC FLOW IN PARK

80abfd7e

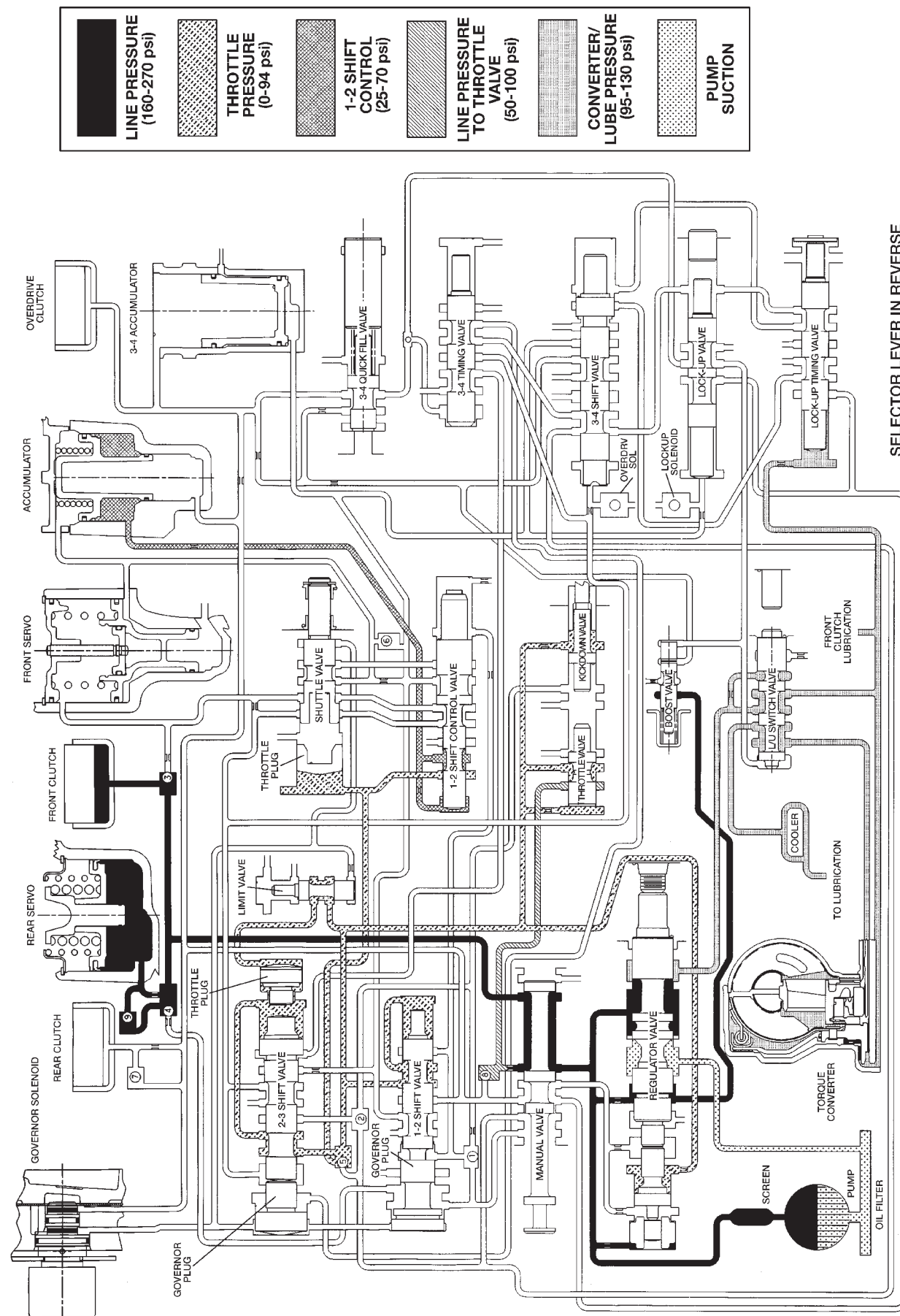
SCHEMATICS AND DIAGRAMS (Continued)

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HYDRAULIC FLOW IN NEUTRAL

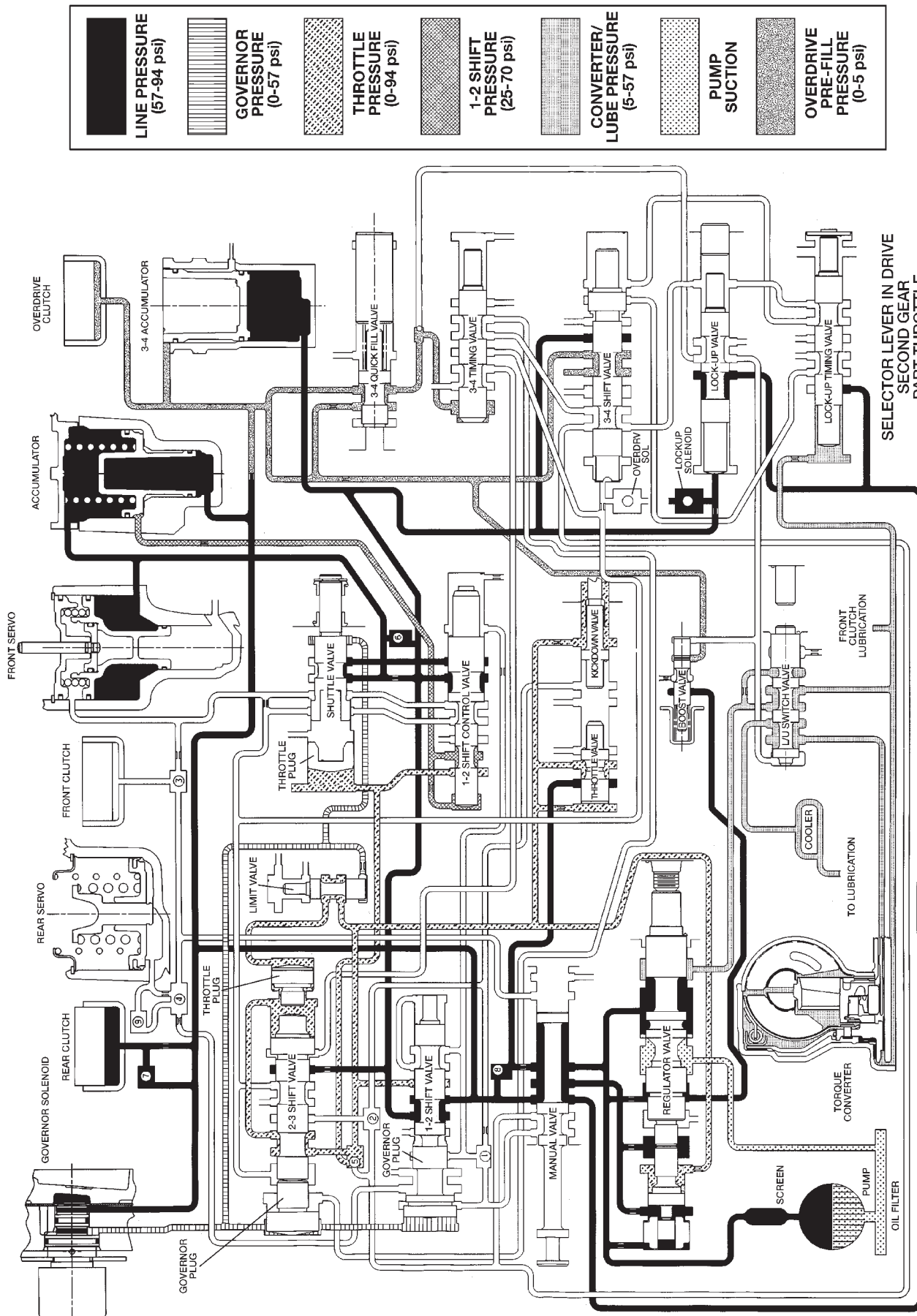
SCHEMATICS AND DIAGRAMS (Continued)



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HYDRAULIC FLOW IN REVERSE

SCHEMATICS AND DIAGRAMS (Continued)

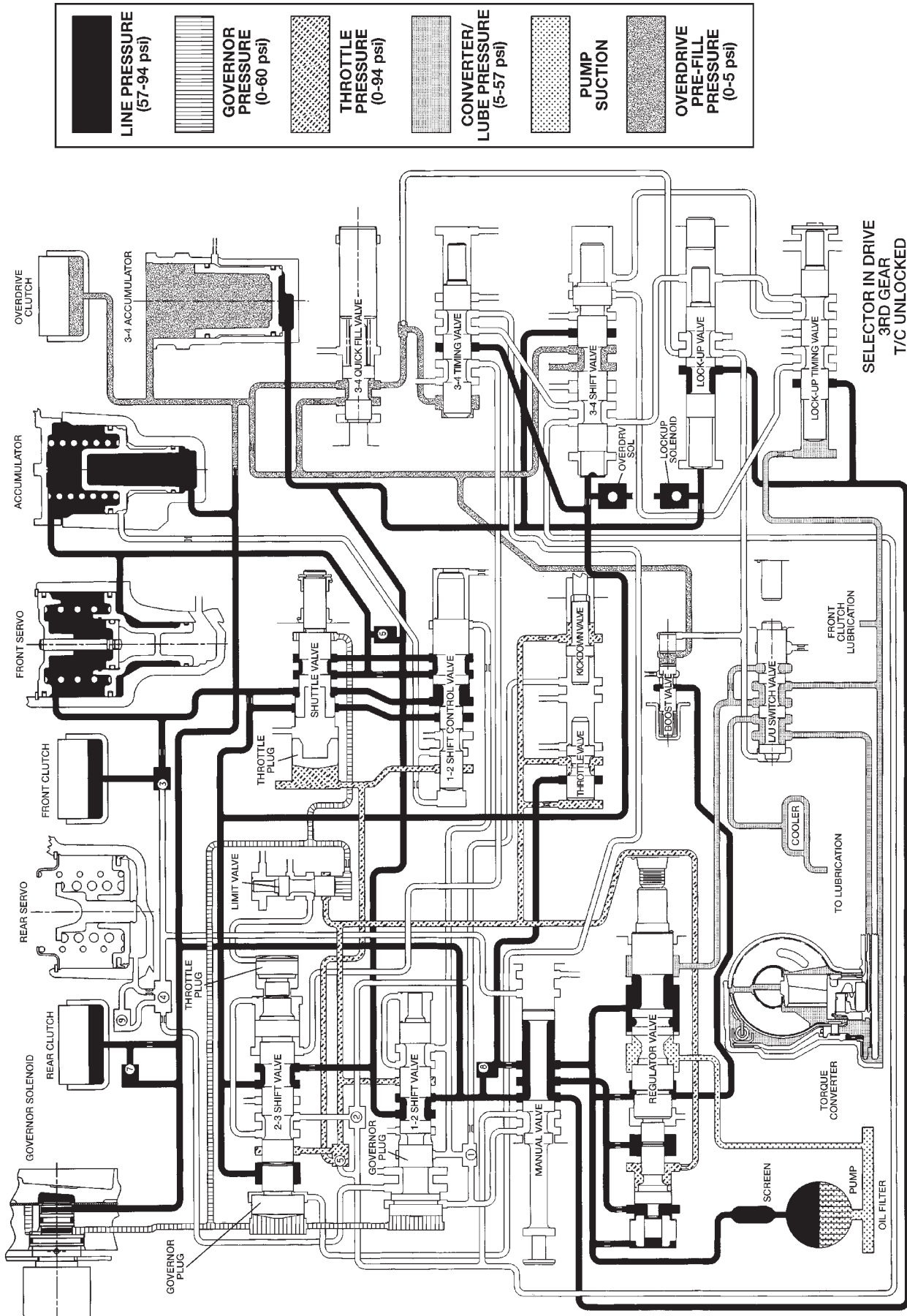


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HYDRAULIC FLOW IN DRIVE SECOND GEAR

SCHEMATICS AND DIAGRAMS (Continued)

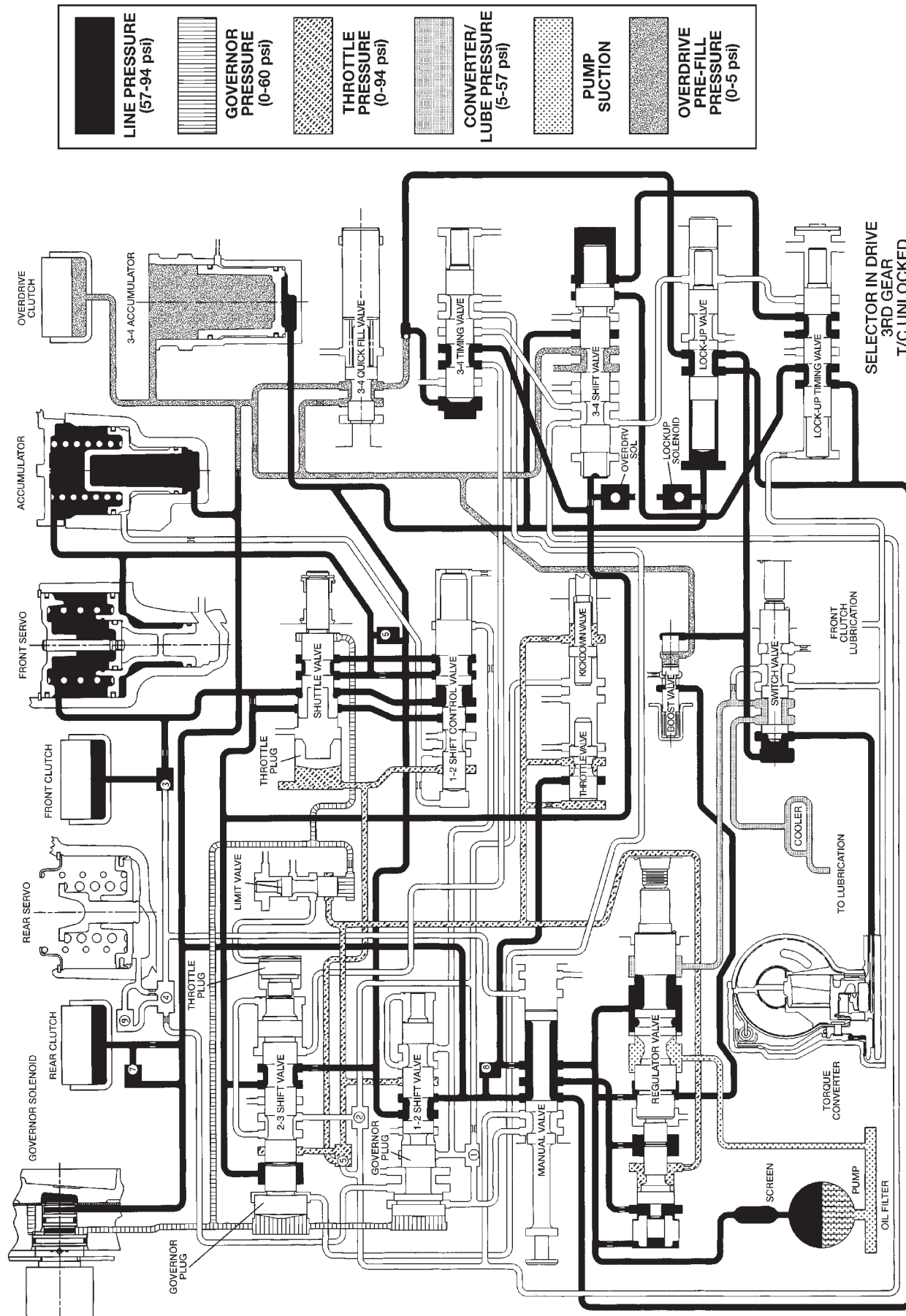
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HYDRAULIC FLOW IN DRIVE THIRD GEAR (CONVERTER CLUTCH NOT APPLIED)

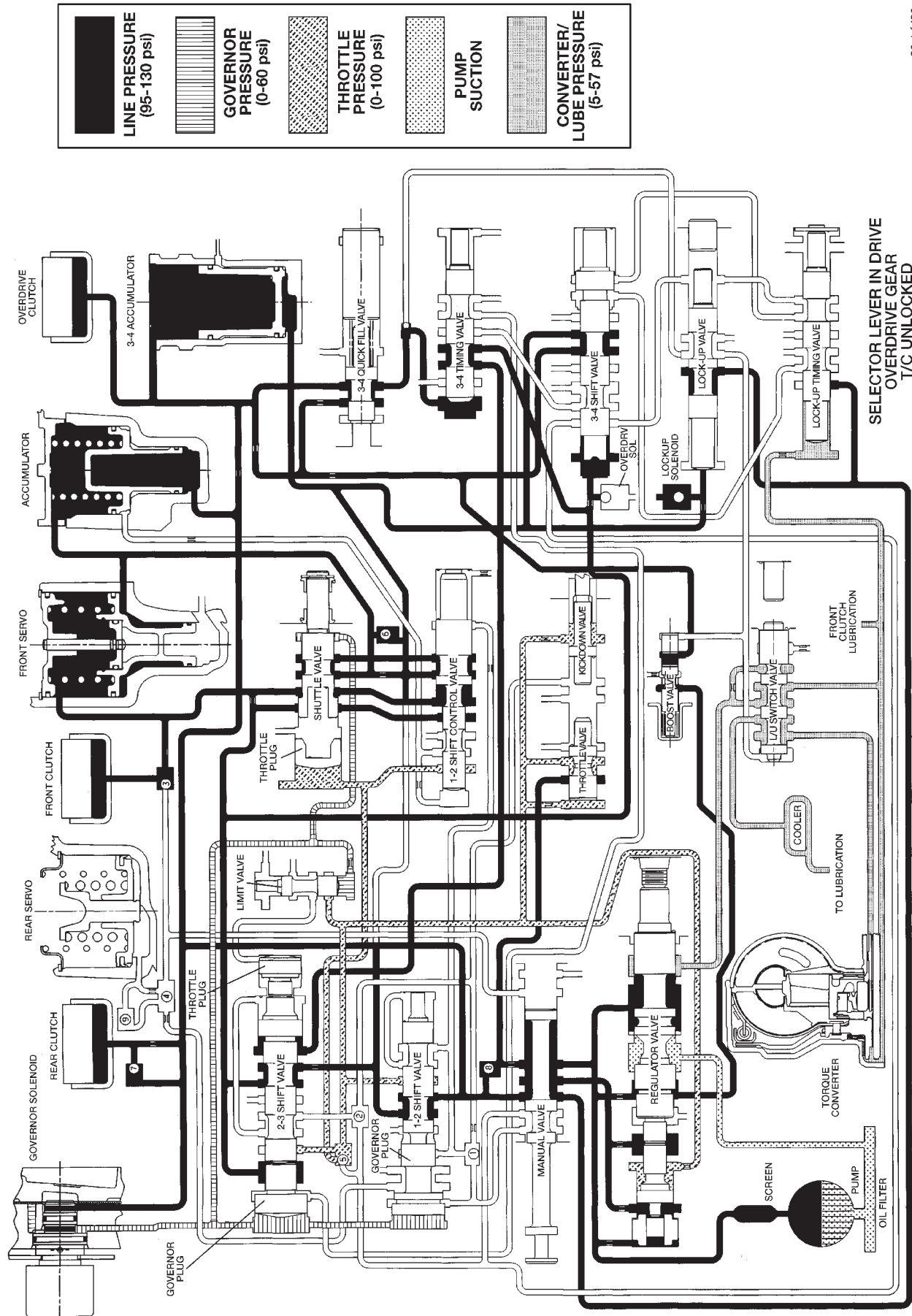
SCHEMATICS AND DIAGRAMS (Continued)

80abrd8c



HYDRAULIC FLOW IN DRIVE THIRD GEAR (CONVERTER CLUTCH APPLIED)

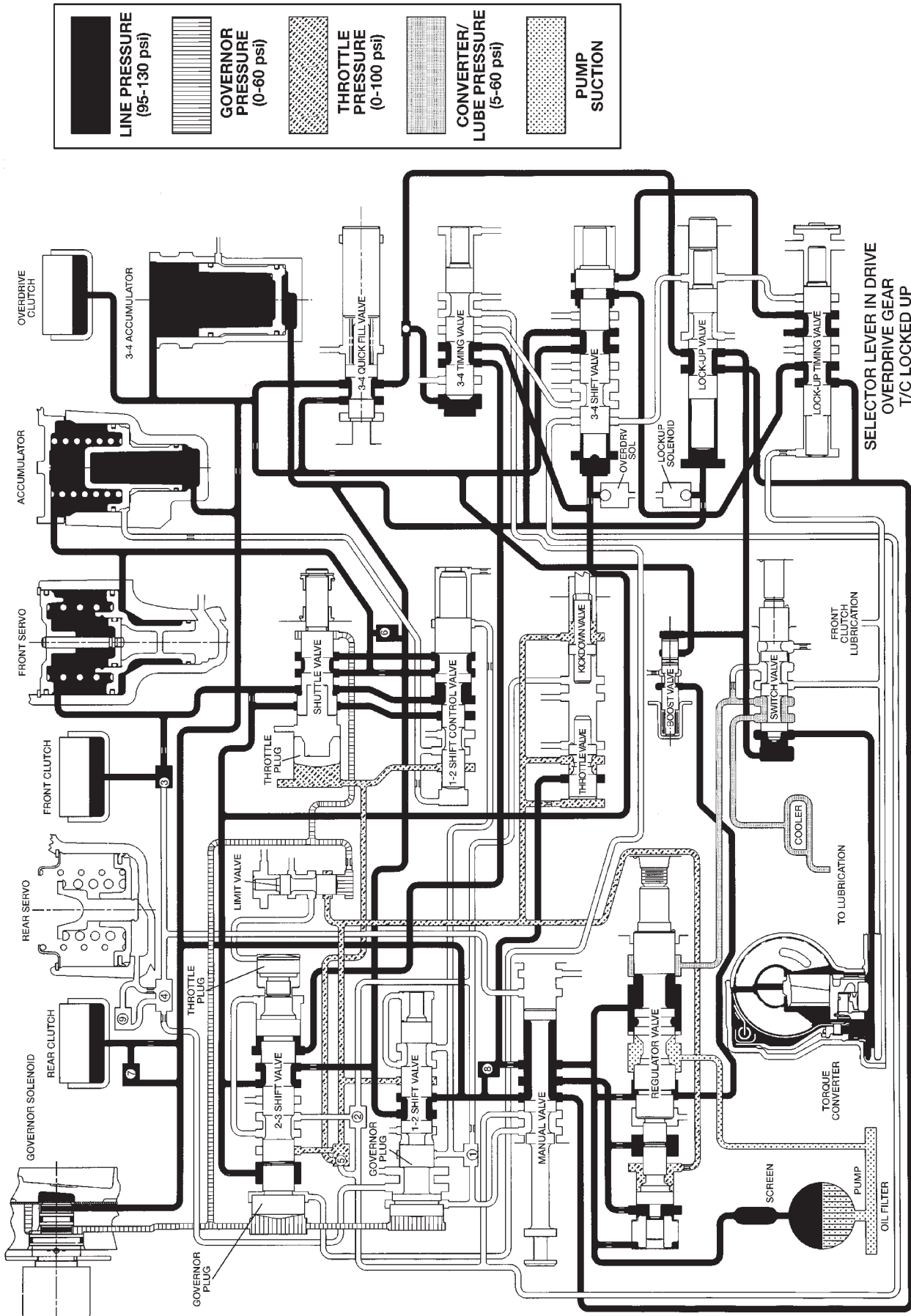
SCHEMATICS AND DIAGRAMS (Continued)



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HYDRAULIC FLOW IN DRIVE FOURTH GEAR (CONVERTER CLUTCH NOT APPLIED)

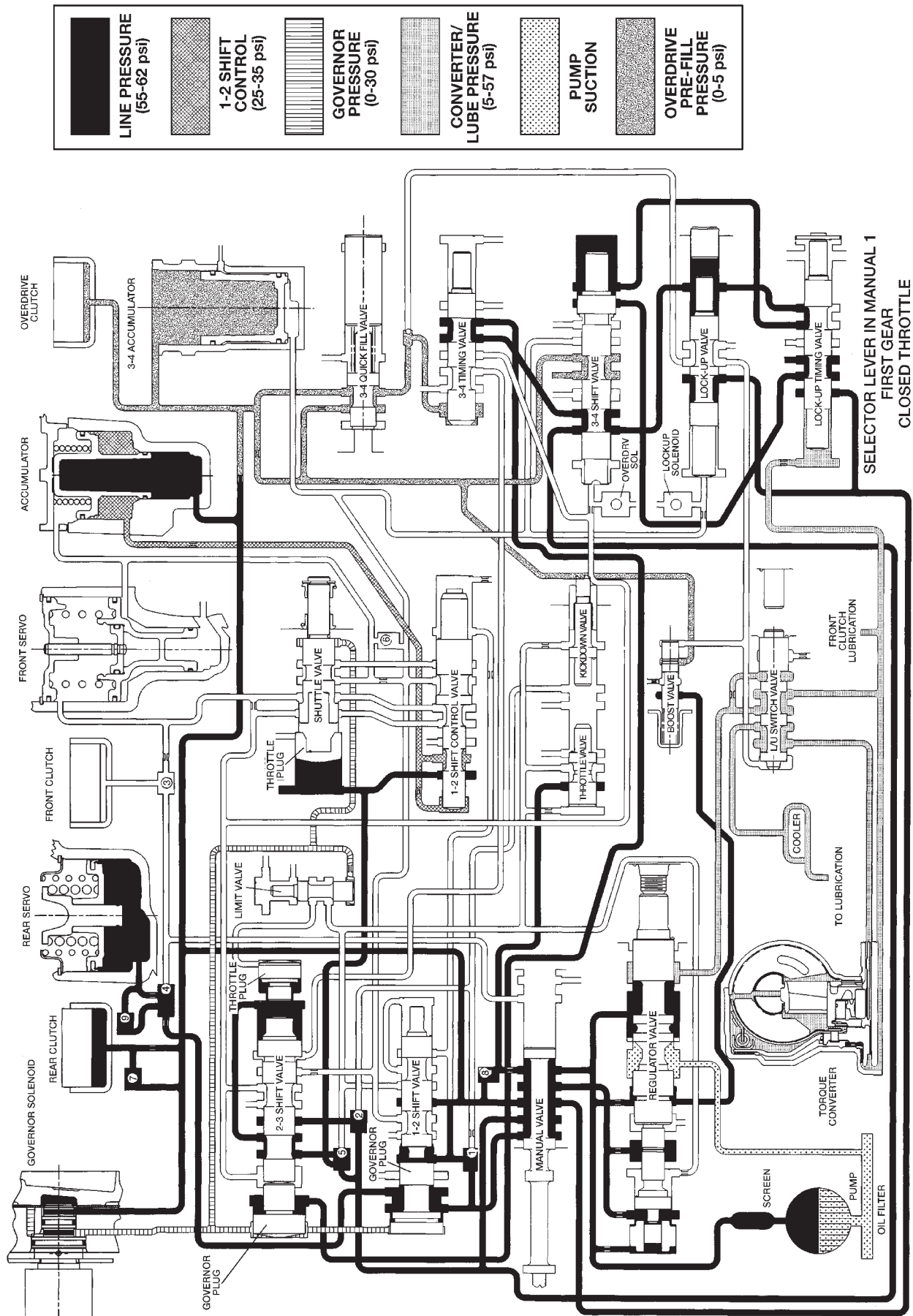
SCHEMATICS AND DIAGRAMS (Continued)



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HYDRAULIC FLOW IN DRIVE FOURTH GEAR (CONVERTER CLUTCH APPLIED)

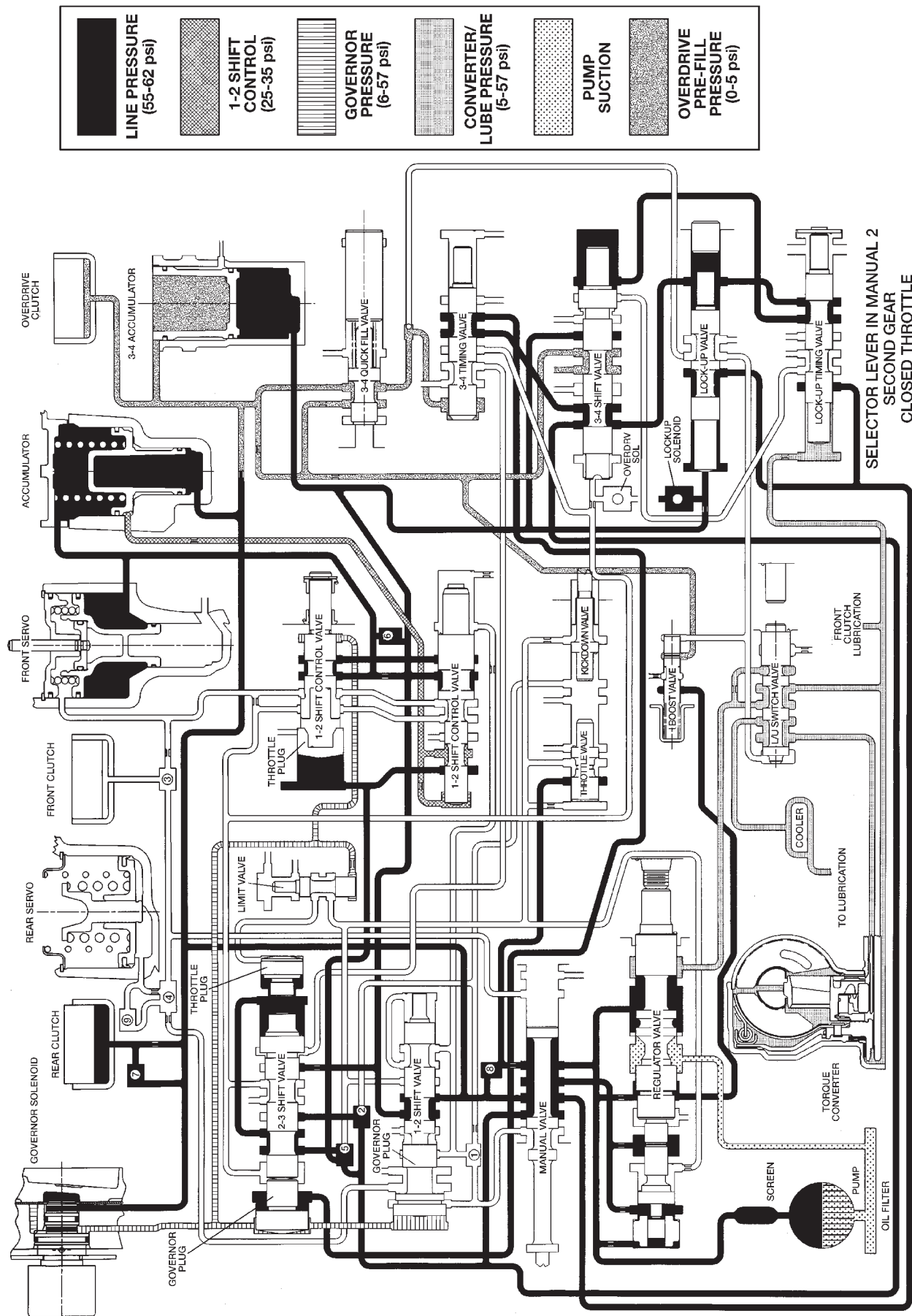
SCHEMATICS AND DIAGRAMS (Continued)



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HYDRAULIC FLOW IN MANUAL LOW (1)

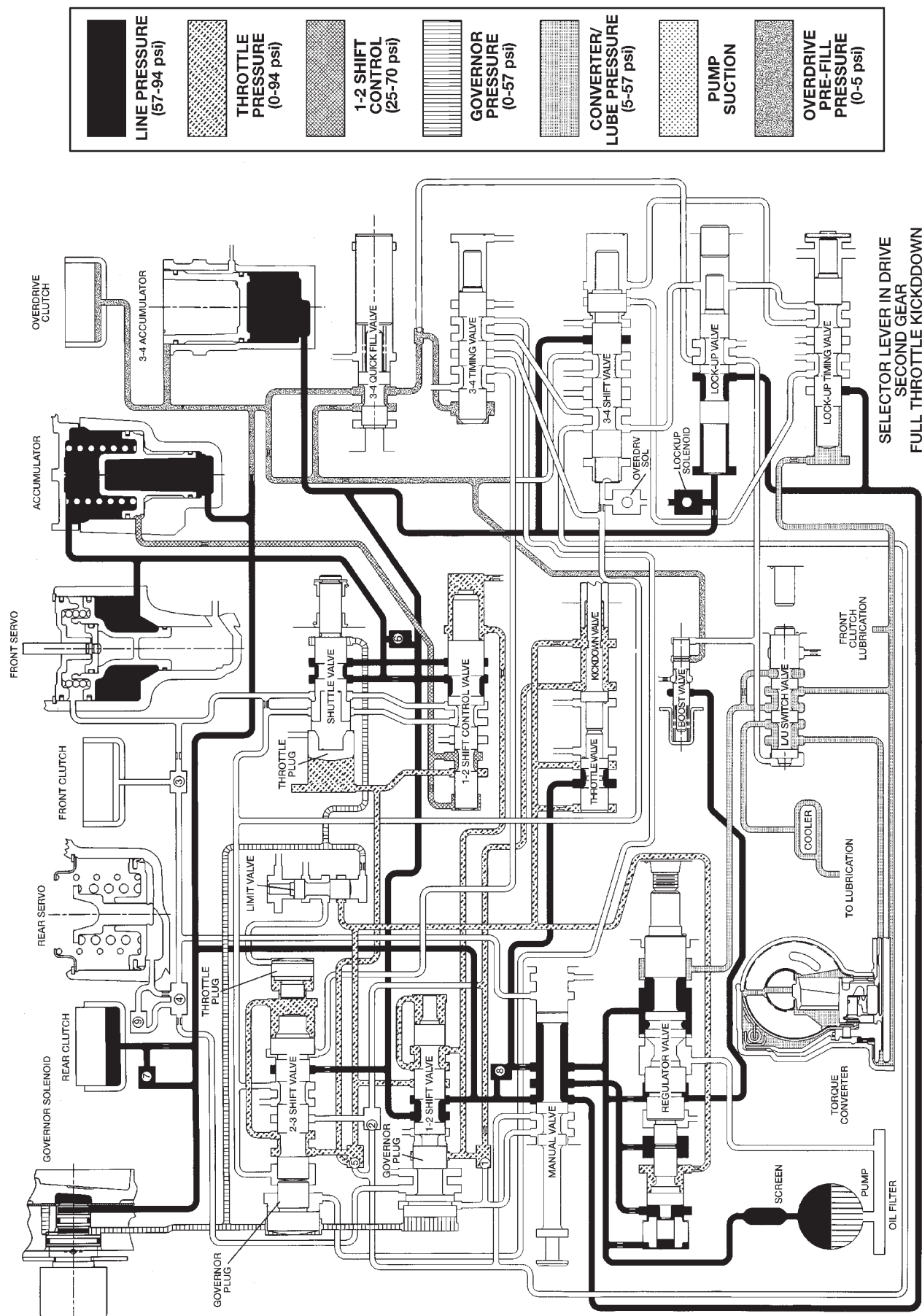
SCHEMATICS AND DIAGRAMS (Continued)



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HYDRAULIC FLOW IN MANUAL SECOND (2)

SCHEMATICS AND DIAGRAMS (Continued)



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HYDRAULIC FLOW DURING FULL THROTTLE 3-2 DOWNSHIFT (PASSING GEAR)

SPECIFICATIONS

46/47RE TRANSMISSION

GENERAL

Oil pump gear tip clearance	0.089-0.190 mm	0.004-0.008 in.
Planetary end play	0.150-1.22 mm	0.006-0.048 in.
Input shaft end play	0.86-2.13 mm	0.034-0.084 in.
Clutch pack clearance/ Front 3-disc.	1.78-3.28mm	0.070-0.129 in.
Clutch pack clearance/ Rear 4-disc.	0.64-1.14 mm	0.025-0.045 in.
46RE Overdrive clutch disc usage	4 discs	
47RE Overdrive clutch disc usage	5 discs	
46RE Direct clutch disc usage	8 discs	
47RE Direct clutch disc usage	10 discs	
46RE Front clutch disc usage	3 discs	
47RE Front clutch disc usage	4 discs	
Band adjustment from 72 in. lbs. 46RE Front band 46RE Rear band	Back off 2-7/8 turns Back off 2 turns	
Band adjustment from 72 in. lbs. 47RE Front band 47RE Rear band	Back off 1-7/8 turns Back off 3 turns	
Recommended fluid	Mopar® ATF Plus 3, type 7176	

TORQUE

DESCRIPTION

TORQUE

Bolt, torque convertor 46RE	31 N·m (23 ft. lbs.)
Bolt, torque convertor 47RE	47 N·m (35 ft. lbs.)
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.)
Bolt, O/D to trans.	34 N·m (25 ft. lbs.)
Bolt, O/D piston retainer	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.)

SPECIFICATIONS (Continued)

THRUST WASHER/SPACER/SNAP RING DIMENSIONS

Front clutch thrust washer (reaction shaft support hub)	1.55 mm 2.15 mm	0.061 in. 0.084 in. 0.102 in.
Rear clutch thrust washer (clutch retainer)	1.55 mm	0.061 in.
Output shaft thrust plate (output shaft pilot hub)	1.5-1.6 mm	0.060-0.063 in.
Output shaft thrust washer (rear clutch hub)	1.3-1.4 mm 1.75-1.8 mm 2.1-2.2 mm	0.052-0.054 in. 0.068-0.070 in. 0.083-0.085 in.
Rear clutch pack snap ring	1.5-1.6 mm 1.9-1.95 mm	0.060-0.062 in. 0.074-0.076 in.
Planetary geartrain snap ring (at front of output shaft)	1.4-1.5 mm 1.6-1.7 mm	0.055-0.059 in. 0.062-0.066 in.

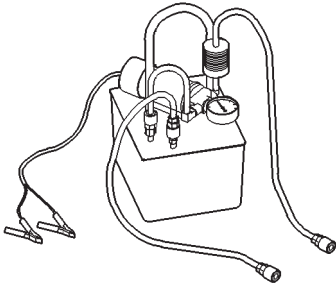
Overdrive piston thrust plate	Thrust plate and spacer are select fit components. Refer to size charts and
Intermediate shaft spacer	selection procedures in Overdrive Unit disassembly and assembly section.

PRESSURE TEST

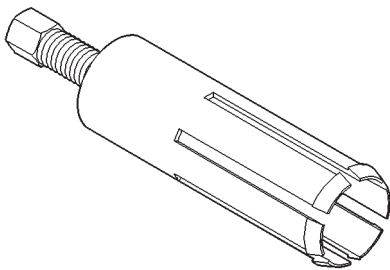
Overdrive clutch	Fourth gear only	Pressure should be 469-496 kPa (68-72 psi) with closed throttle and increase to 620-896 kPa (90-130 psi) at 1/2 to 3/4 throttle.
Line pressure (at accumulator)	Closed throttle	372-414 kPa (54-60 psi).
Front servo	Third gear only	No more than 21 kPa (3 psi) lower than 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.
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.

SPECIAL TOOLS

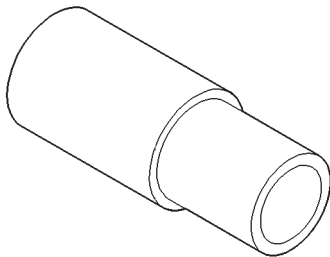
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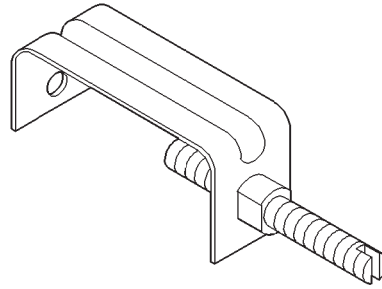
Oil Cooler Flusher—6906



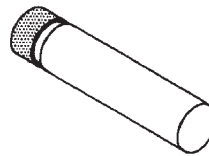
Remover—6957



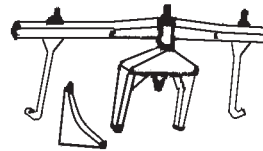
Installer—6951



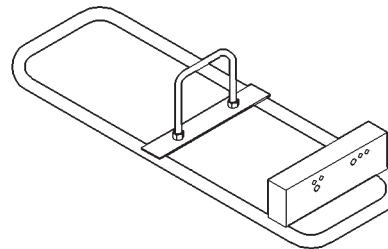
Retainer, Detent Ball and Spring—6583



Gauge Block—6312

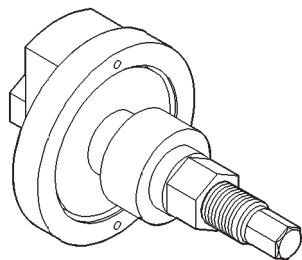
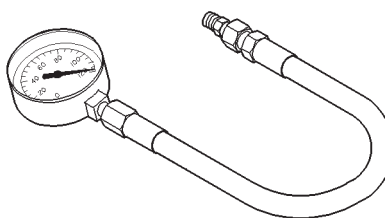
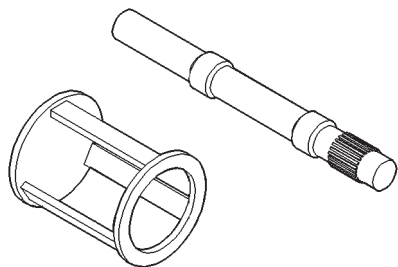
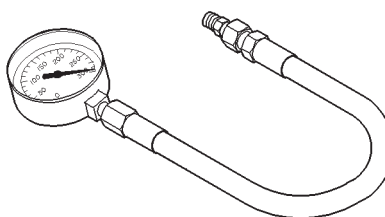
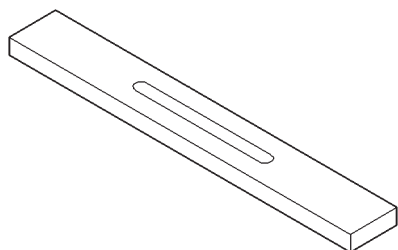
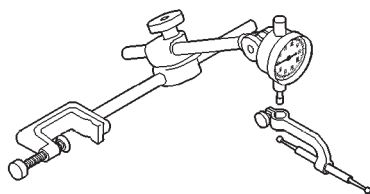
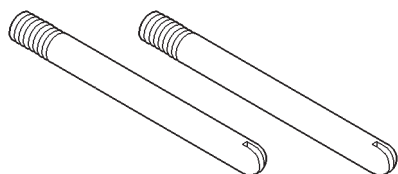
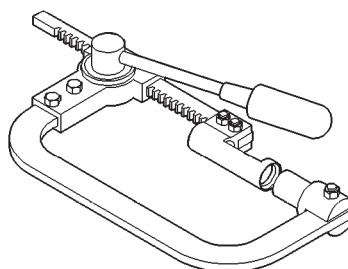


Fixture, Engine Support—C-3487-A

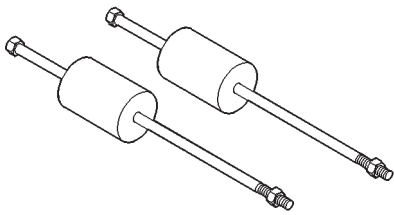


Transmission Repair Stand—C-3750-B

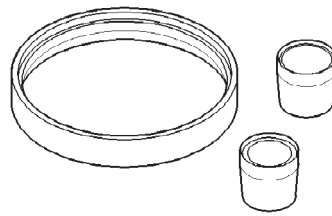
SPECIAL TOOLS (Continued)

**Spring Compressor—C-3863-A****Pressure Gauge—C-3292****Spring Compressor and Alignment Shaft—6227****Pressure Gauge—C-3293SP****Gauge Bar—6311****Dial Indicator—C-3339****Extension Housing Pilot—C-3288-B****Spring Compressor—C-3422-B**

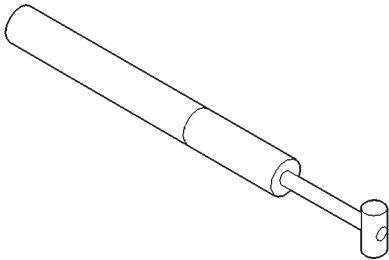
SPECIAL TOOLS (Continued)



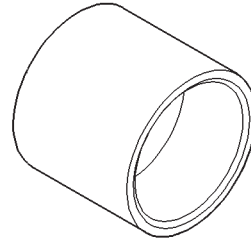
Puller, Slide Hammer—C-3752



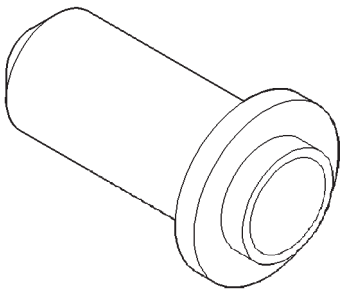
Overdrive Piston Seal Installer—8114



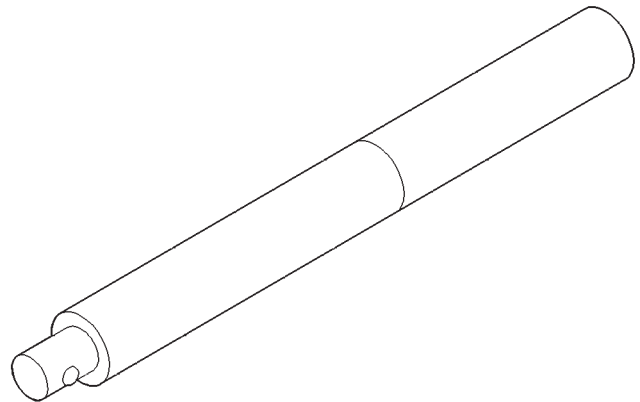
Gauge, Throttle Setting—C-3763



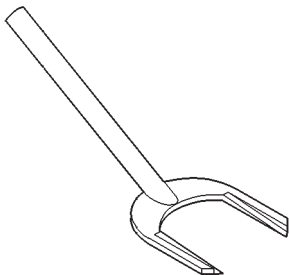
Installer—C-3995-A



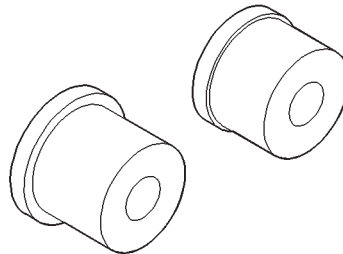
Seal Installer—C-3860-A



Universal Handle—C-4171

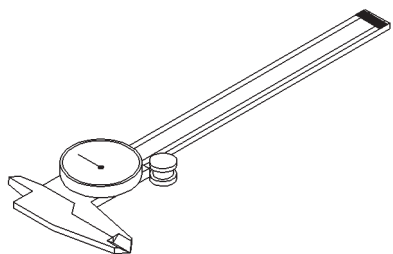
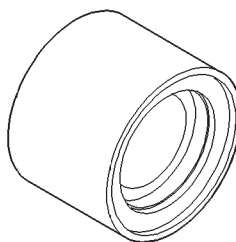
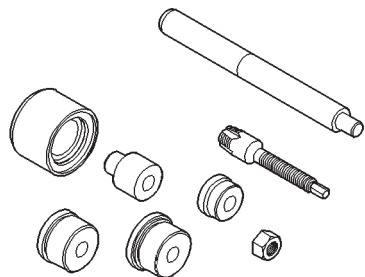
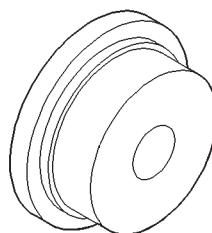
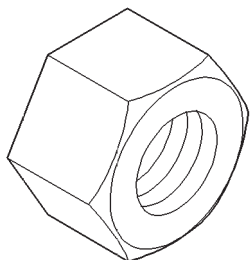
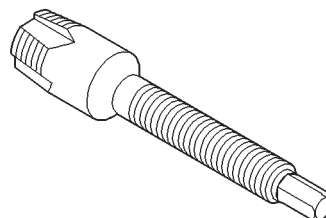
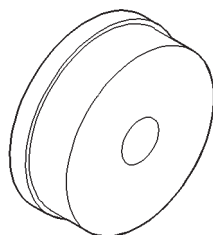
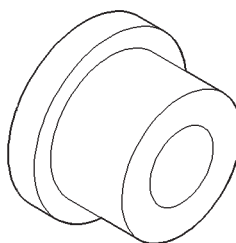


Seal Remover—C-3985-B

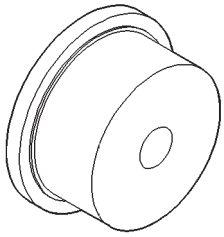


Remover/Installer—C-4470

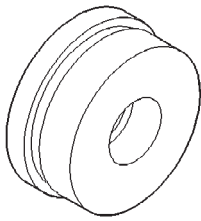
SPECIAL TOOLS (Continued)

**Dial Caliper—C-4962****Cup, Bushing Remover—SP-3633, From kit C-3887-J****Bushings Remover/Installer Set—C-3887-J****Installer, Oil Pump Bushing—SP-5118, From kit C-3887-J****Nut, Bushing Remover—SP-1191, From kit C-3887-J****Remover, Reaction Shaft Bushing—SP-5301, From kit C-3887-J****Remover, Front Clutch Bushing—SP-3629, From kit C-3887-J****Installer, Reaction Shaft Bushing—SP-5302, From kit C-3887-J**

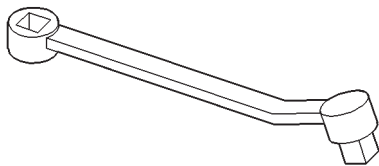
SPECIAL TOOLS (Continued)



Installer, Front Clutch Bushing—SP-5511, From kit C-3887-J



Remover, Bushing—SP-3550, From kit C-3887-J



Adapter, Band Adjuster—C-3705

NV231HD AND NV241LD TRANSFER CASE

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GENERAL INFORMATION

NV231HD AND NV241LD INTRODUCTION

The NV231HD and NV241LD are part-time transfer cases with a low-range gear system. They provide three operating ranges plus a Neutral position. The low range position provides a gear reduction ratio of 2.72:1 for increased low speed torque capability. Operating ranges are: 2-high, 4-high and 4-low.

The gear cases, retainer and extension are all of aluminum. Drive sprockets and an interconnecting drive chain are used to transmit engine torque to the front/rear propeller shafts. The mainshaft, input gear and front output shaft are supported by ball and needle bearings.

OPERATING RANGES

Transfer case operating ranges are:

- 4x2 (2-wheel drive)
- 4x4 (4-wheel drive)
- 4 Lo (4-wheel drive low range)

The 4x2 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 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.

A front axle disconnect system is used to achieve two-wheel drive mode. The axle disconnect vacuum motor is actuated by a vacuum switch on the transfer case. The switch is operated by the transfer case range rod.

SHIFT MECHANISM

The transfer case is operated by an adjustable floor mounted shift linkage. The transfer case shift lever is directly attached to the shift sector. The sector operates the range and mode forks within the transfer case.

A straight line shift pattern is used with a neutral detent. Lever range positions are imprinted in the shift knob.

TRANSFER CASE IDENTIFICATION

An identification tag (Fig. 1) is attached to the rear case of every transfer case. The 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.

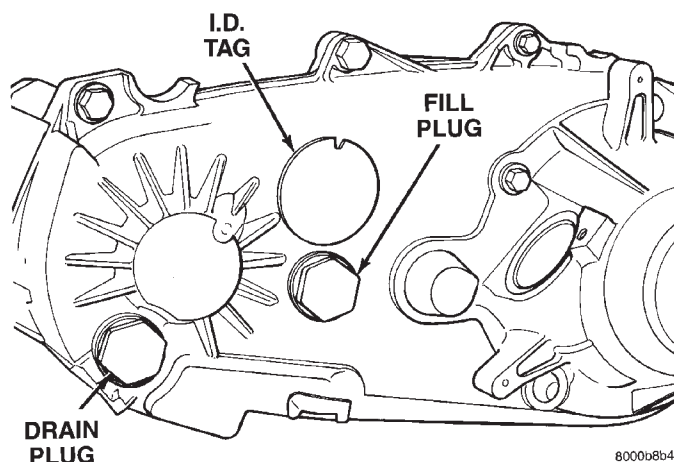


Fig. 1 Transfer Case Identification Tag—Typical

GENERAL INFORMATION (Continued)

RECOMMENDED LUBRICANT AND FILL LEVEL

Recommended lubricant for the NV231HD and NV241LD transfer case models is Mopar® Dexron II, or ATF Plus. Use this fluid for topping off the level, refilling after service, or normal fluid changes.

Do not use anti-friction additives or similar products in the NV231HD or NV241LD transfer cases. Use recommended lubricant only.

Approximate lubricant refill capacities are 1.5 to 2 liters (3 to 3.6 pints) for the NV231HD and 2.7 L (5.0 pts.) for the NV241LD.

Correct fluid level for the transfer cases is to the bottom edge of the fill plug hole. Be sure that the vehicle is level when checking the fill level.

DIAGNOSIS AND TESTING**SERVICE DIAGNOSIS**

Before beginning repair on a suspected transfer case malfunction, check all other driveline components beforehand.

The actual cause of a problem may be related to such items as: front hubs, axles, propeller shafts, wheels and tires, transmission, or clutch instead. If all other driveline components are in good condition and operating properly, refer to the Service Diagnosis chart for further information.

DIAGNOSIS AND TESTING (Continued)

SERVICE DIAGNOSIS

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 extended period in 4H mode on dry paved surface, driveline torque load may cause difficulty. (3) Transfer case external shift linkage binding. (4) Insufficient or incorrect lubricant. (5) Internal components binding, worn or damaged.	(1) Stop vehicle and shift into desired range. Or reduce speed to 3-4 km/h (2-3 mph) before attempting to shift. (2) Stop vehicle, shift transmission to Neutral, shift transfer case to 2H mode and operate vehicle in 2H on dry paved surfaces. (3) Lubricate, repair or replace linkage bushings or tighten loose components as necessary. (4) Drain and refill to edge of fill hole with DEXRON II® or MOPAR-MERCON® Automatic Transmission Fluid. (5) Disassemble unit and replace worn or damaged components as necessary.
TRANSFER CASE NOISY IN ALL DRIVE MODES	(1) Insufficient or incorrect lubricant.	(1) Drain and refill to edge of fill hole with DEXRON II® or MOPAR-MERCON® Automatic Transmission Fluid. Check for leaks and repair if necessary. Note: If unit is still noisy after drain and refill, disassembly and inspection may be required to locate source of noise.
NOISY IN – OR JUMPS OUT OF – FOUR WHEEL DRIVE LOW RANGE	(1) Transfer case not completely engaged in 4L position. (2) Shift linkage out of adjustment. (3) Shift linkage loose or binding. (4) Range fork damaged, inserts worn, or fork is binding on shift rail. (5) Low range gear worn or damaged.	(1) Stop vehicle, shift transfer case to Neutral, then shift back into 4L position. (2) Adjust linkage. (3) Tighten, lubricate or repair linkage as necessary. (4) Disassemble unit and repair as necessary. (5) Disassemble and repair as necessary.
LUBRICANT LEAKING FROM OUTPUT SHAFT SEALS OR FROM VENT	(1) Transfer case overfilled. (2) Vent closed or restricted. (3) Output shaft seals damaged or installed incorrectly.	(1) Drain to correct level. (2) Clear or replace vent if necessary. (3) Replace seals. Be sure seal lip faces interior of case when installed. Also be sure yoke seal surfaces are not scored or nicked. Remove scores and nicks with fine sandpaper or replace yoke(s) if necessary.
ABNORMAL TIRE WEAR	(1) Extended operation on dry hard surface (paved) roads in 4H range.	(1) Operate in 2H on hard surface (paved) roads.

SERVICE PROCEDURES

FLUID DRAIN/REFILL

- (1) Raise vehicle.
- (2) Position drain pan under transfer case.
- (3) Remove drain and fill plugs and drain lubricant completely.
- (4) Install drain plug. Tighten plug to 41-54 N·m (30-40 ft. lbs.).
- (5) Remove drain pan.
- (6) Fill transfer case to bottom edge of fill plug opening with Mopar® Dexron II.
- (7) Install and tighten fill plug to 41-54 N·m (30-40 ft. lbs.).
- (8) Lower vehicle.

REMOVAL AND INSTALLATION

TRANSFER CASE

REMOVAL

- (1) Raise and support vehicle.
- (2) Remove skid plate, if equipped.
- (3) Position drain oil container under transfer case.
- (4) Remove transfer case drain plug and drain lubricant into container.
- (5) Disconnect vent hose and vacuum harness at transfer case switch.
- (6) Disconnect shift rod from grommet in transfer case shift lever, or from floor shift arm whichever provides easy access. Use channel lock style pliers to press rod out of lever grommet.
- (7) Support transmission with jack stand.
- (8) Remove rear crossmember.
- (9) Mark front and rear propeller shafts for assembly reference.
- (10) Remove front and rear propeller shafts.
- (11) Support transfer case with suitable jack. Secure transfer case to jack with safety chains.
- (12) Remove nuts attaching transfer case to transmission.
- (13) Move transfer case assembly rearward until free of transmission output shaft.
- (14) Lower jack and move transfer case from under vehicle.

INSTALLATION

- (1) Align and seat transfer case on transmission. Be sure transfer case input gear splines are aligned with transmission output shaft. Align splines by rotating transfer case rear output shaft yoke if necessary. Do not install any transfer case attaching nuts until the transfer case is completely seated against the transmission.

- (2) Install and tighten transfer case attaching nuts. If case has 5/16 in. studs, tighten nuts to 30-41 N·m (22-30 ft.lbs.). If case has 3/8 studs, tighten nuts to 41-47 N·m (30-35 ft. lbs.).
- (3) Install rear crossmember.
- (4) Remove jack stand from under transmission.
- (5) Align and connect propeller shafts.
- (6) Connect vacuum harness and vent hose.
- (7) Connect shift rod to transfer case lever or floor shift arm. Use channel lock style pliers to press rod back into lever grommet.
- (8) Adjust shift linkage, if necessary.
- (9) Fill transfer case with recommended transmission fluid and install fill plug.
- (10) Install skid plate, if equipped.
- (11) Lower vehicle

SHIFT LEVER

REMOVAL

- (1) Shift transfer case into 4L.
- (2) Remove transfer case shifter knob cap.
- (3) Remove nut holding shifter knob to shift lever.
- (4) Remove shifter knob.
- (5) Raise and support vehicle.
- (6) Loosen adjusting trunnion lock bolt and slide shift rod out of trunnion. If rod lacks enough travel to come out of trunnion, push trunnion out of shift lever.
- (7) Remove bolts holding shift lever to the underside of the body.
- (8) Separate shift lever from vehicle.

INSTALLATION

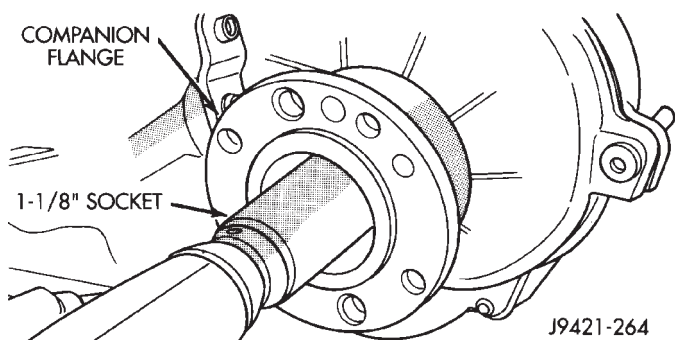
- (1) Position shift lever on vehicle. Use care when passing the shift lever through the shifter boot to prevent damage to the shifter boot.
- (2) Install bolts to hold shift lever to the underside of the body.
- (3) Install trunnion to shift lever, if necessary.
- (4) Install shift rod to trunnion, if necessary.
- (5) Lower vehicle.
- (6) Install shift knob on shift lever.
- (7) Install nut to hold shifter knob to shift lever.
- (8) Install shifter knob cap.
- (9) Adjust the transfer case shift linkage.
- (10) Verify transfer case operation.

FRONT OUTPUT SHAFT SEAL—NV231HD

REMOVAL

- (1) Raise vehicle.
- (2) Remove front propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedure.
- (3) Remove companion flange (Fig. 2).

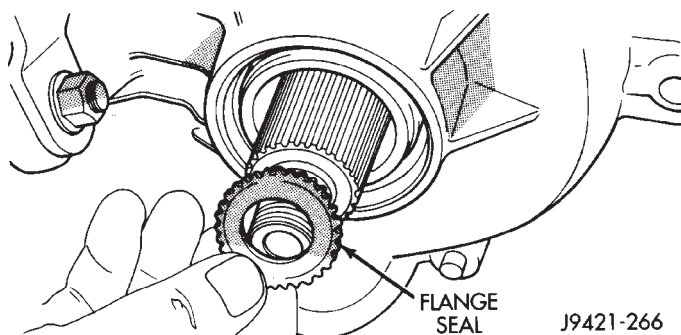
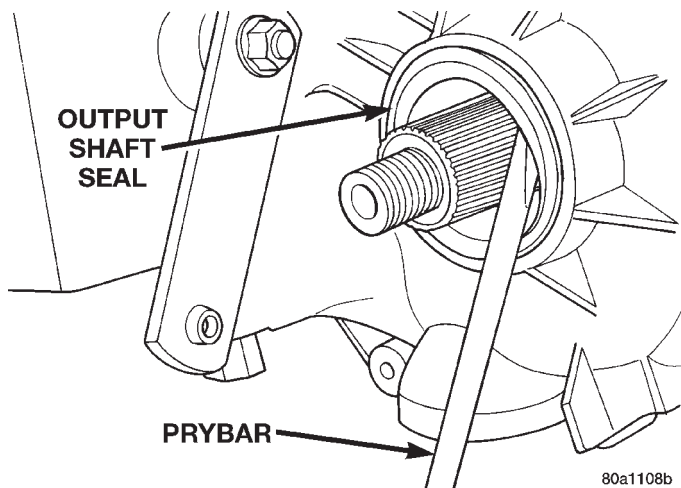
REMOVAL AND INSTALLATION (Continued)

**Fig. 2 Removing Companion Flange Nut**

(4) Remove companion flange from output shaft. Use a suitable puller if flange can not be removed by hand.

(5) Remove companion flange rubber seal from front output shaft (Fig. 3).

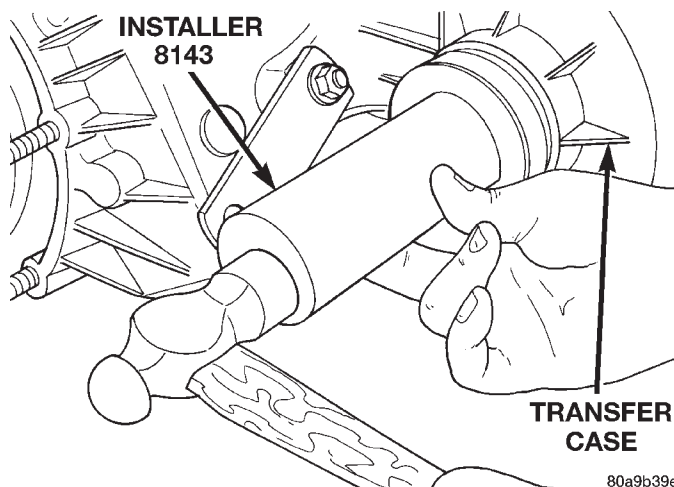
(6) Remove seal from front case with pry tool (Fig. 4).

**Fig. 3 Companion Flange Seal Removal****Fig. 4 Remove Front Output Shaft Seal****INSTALLATION**

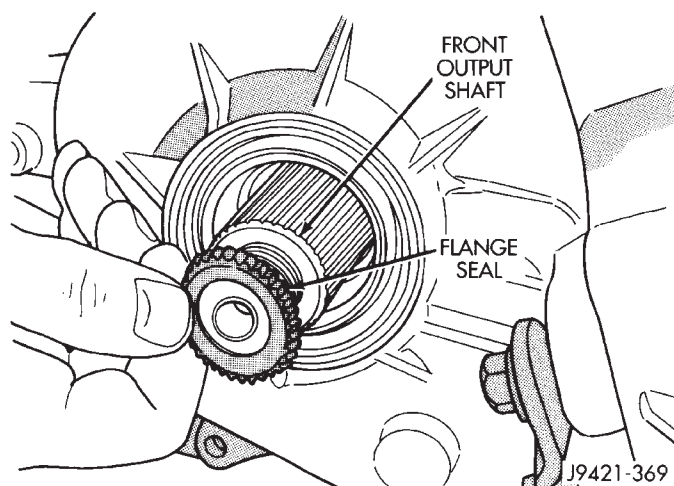
(1) Install new front output seal in front case with Installer Tool 8143 as follows:

(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. 5). Once seal is started, continue tapping seal into bore until installer tool seats against case.

**Fig. 5 Front Output Seal Installation**

(2) Install companion flange seal on front shaft (Fig. 6).

**Fig. 6 Installing Flange Seal On Front Shaft**

(3) Install companion flange on front shaft (Fig. 7). Then install and tighten flange nut to 176-271 N·m (130-200 ft. lbs.) torque.

(4) Install propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedures.

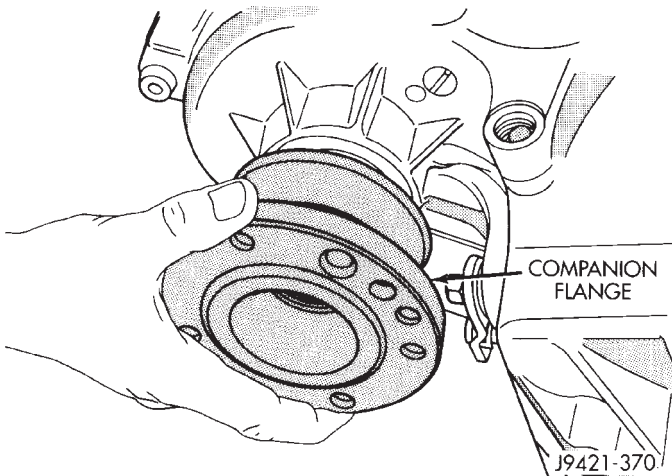
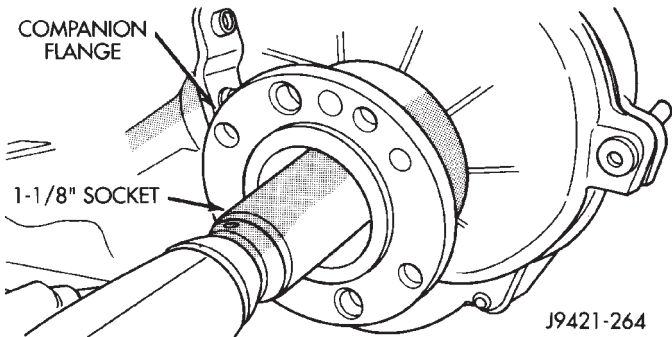
FRONT OUTPUT SHAFT SEAL—NV241LD**REMOVAL**

(1) Shift transfer case into neutral.

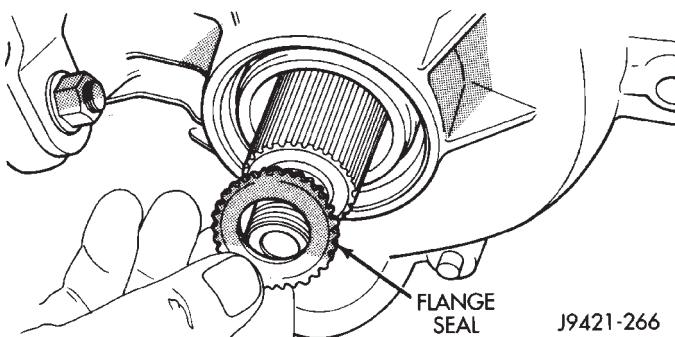
(2) Remove companion flange nut (Fig. 8). Discard nut after removal. It is not reusable.

(3) Remove companion flange from output shaft. Use a suitable puller if flange can not be removed by hand.

REMOVAL AND INSTALLATION (Continued)

**Fig. 7 Installing Companion Flange On Front Shaft****Fig. 8 Removing Companion Flange Nut**

(4) Remove companion flange rubber seal from front output shaft (Fig. 9).

**Fig. 9 Companion Flange Seal Removal**

(5) Remove front output shaft seal with suitable pry tool, or a slide hammer mounted screw.

INSTALLATION

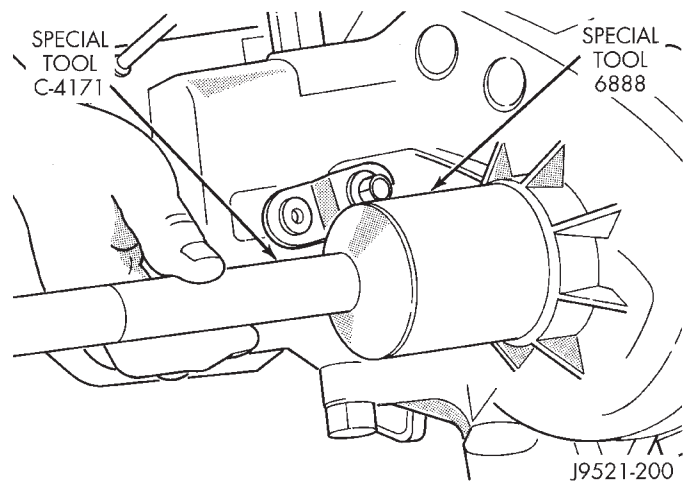
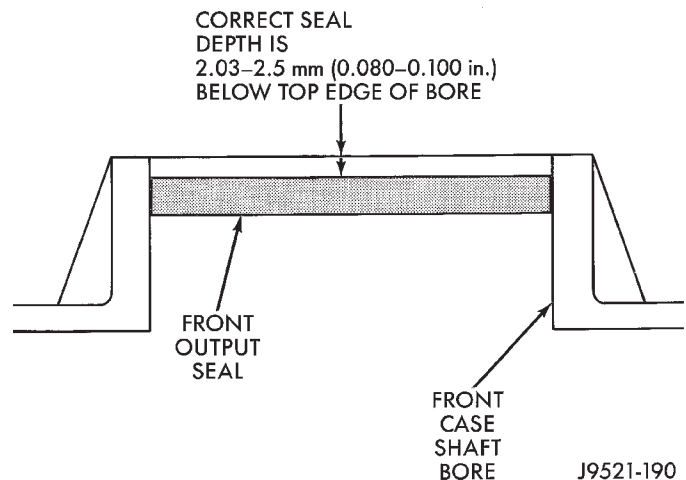
(1) Install new front output seal in front case with Installer Tool 6888 and Tool Handle C-4171 (Fig. 10) as follows:

(a) Place new seal on tool. Garter spring on seal goes toward interior of case.

(b) Start seal in bore. Once seal is started, continue tapping seal into bore until installer tool bottoms against case.

(c) Remove installer and verify that seal is recessed the proper amount. Seal should be 2.03 to 2.5 mm (0.080 to 0.100 in.) below top edge of seal bore in front case (Fig. 11). This is correct final seal position.

CAUTION: Be sure the front output seal is seated below the top edge of the case bore as shown. The seal could loosen, or become cocked if not seated to recommended depth.

**Fig. 10 Front Output Seal Installation****Fig. 11 Checking Front Output Seal Installation Depth**

REMOVAL AND INSTALLATION (Continued)

(2) Install companion flange seal on front shaft (Fig. 12).

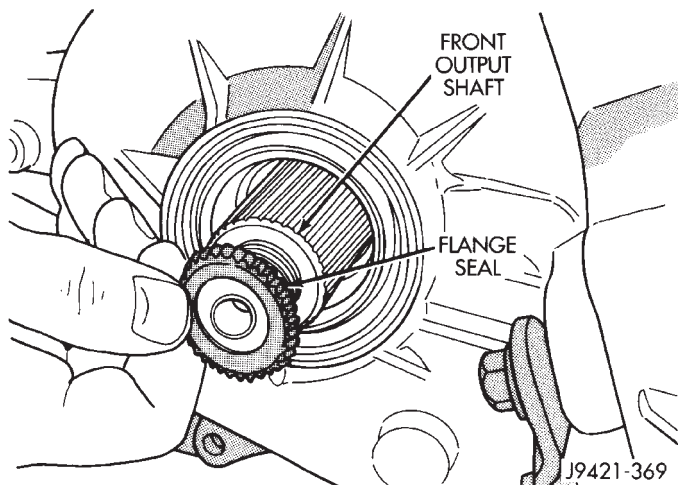


Fig. 12 Installing Flange Seal On Front Shaft

(3) Install companion flange on front shaft (Fig. 13). Then install and tighten flange nut to 176-271 N·m (130-200 ft. lbs.) torque.

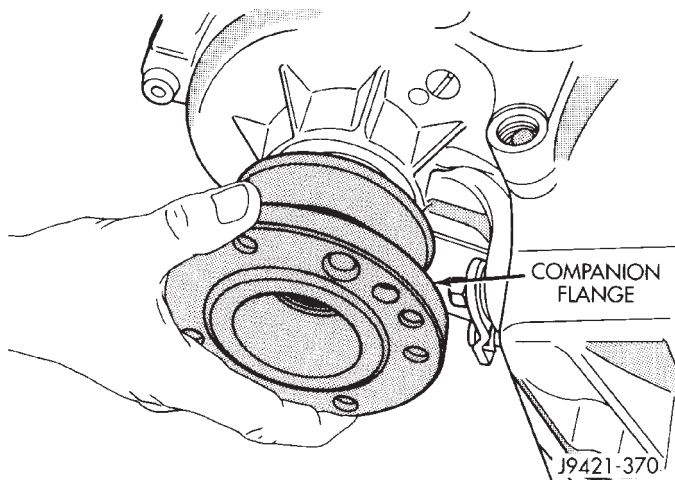


Fig. 13 Installing Companion Flange On Front Shaft

REMOVAL

- (1) Raise and support vehicle.
- (2) Remove rear propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedure.
- (3) Using a suitable pry tool or slide-hammer mounted screw, remove the rear retainer seal.
- (4) Using Remover 8158, remove bushing from rear retainer.

INSTALLATION

- (1) Clean fluid residue from sealing surface and inspect for defects.

(2) Position replacement bushing in rear retainer with fluid port in bushing aligned with slot in housing.

(3) Using Installer 8157, drive bushing into housing until installer seats against case.

(4) Using Installer D-163, install seal in rear retainer (Fig. 14).

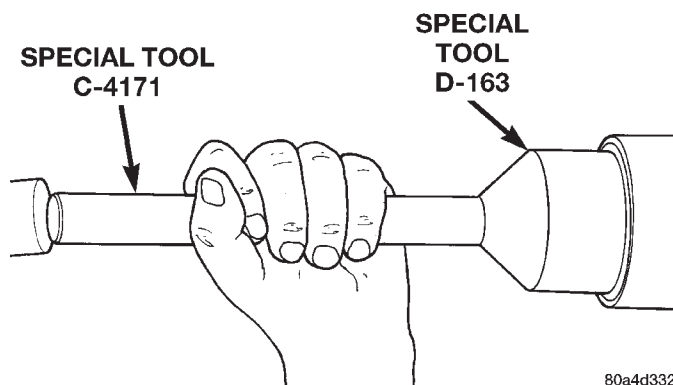


Fig. 14 Install Rear Retainer Seal

- (5) Install propeller shaft.
- (6) Verify proper fluid level.
- (7) Lower vehicle.

DISASSEMBLY AND ASSEMBLY

TRANSFER CASE

DISASSEMBLY

Position transfer case in a shallow drain pan. Remove drain plug and drain any remaining lubricant remaining in case.

REAR EXTENSION, RETAINER AND REAR CASE

- (1) Remove rear extension bolts (Fig. 15).

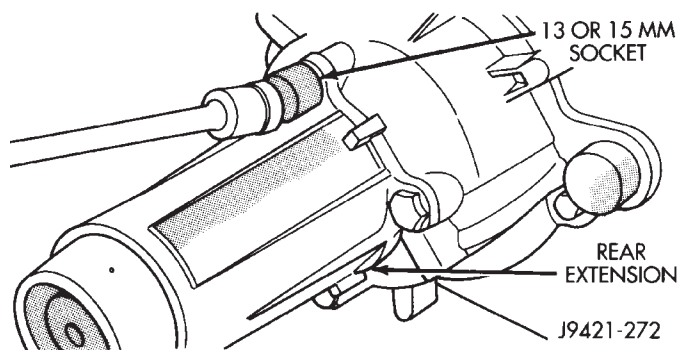
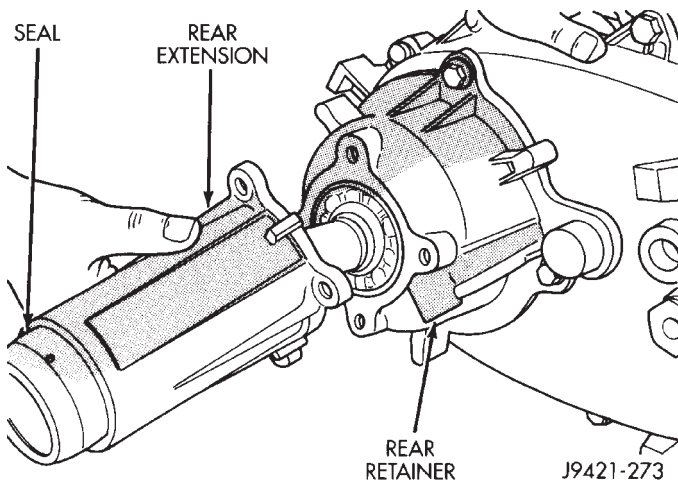


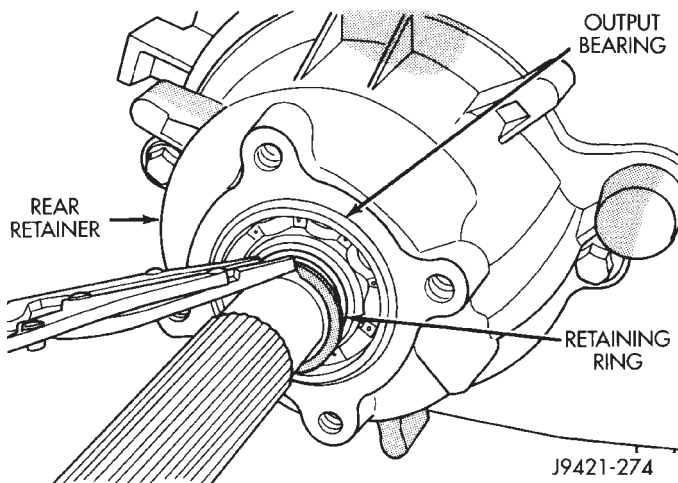
Fig. 15 Rear Extension Bolt Removal

(2) Remove rear extension (Fig. 16). Tap extension once or twice with a plastic mallet to break sealer bead and loosen it. Seal at rear of extension is serviceable. If seal is damaged, it can be removed with small chisel and punch.

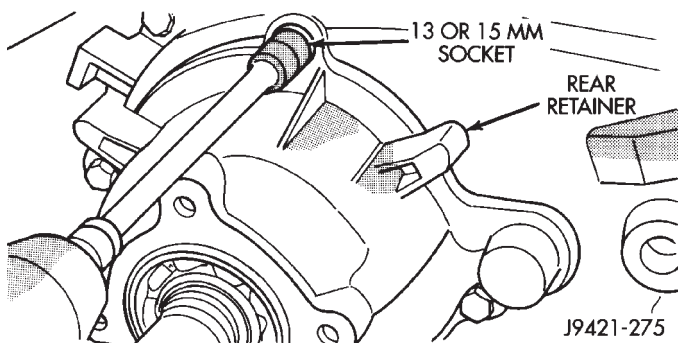
DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 16 Rear Extension Removal**

(3) Remove output bearing retaining ring with heavy duty snap ring pliers (Fig. 17).

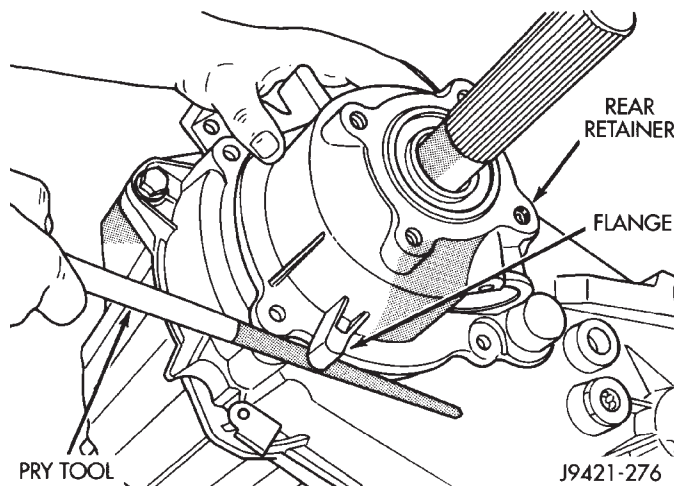
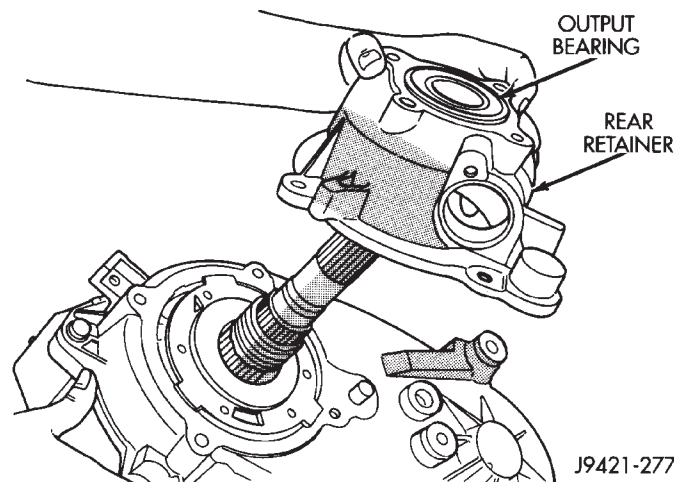
**Fig. 17 Removing Output Bearing Retaining Ring**

(4) Remove rear retainer bolts (Fig. 18).

**Fig. 18 Removing Rear Extension Bolts**

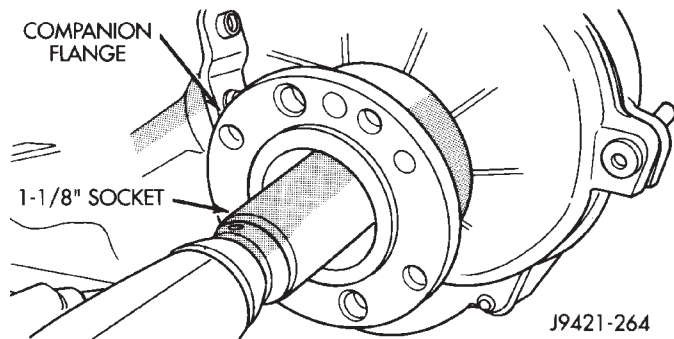
(5) Loosen rear retainer with pry bar placed under flange (Fig. 19).

(6) Remove rear retainer and output bearing assembly (Fig. 20).

**Fig. 19 Loosening Rear Retainer****Fig. 20 Rear Retainer Removal****COMPANION FLANGE AND SHIFT LEVER REMOVAL**

(1) Shift transfer case into neutral.

(2) Remove companion flange nut (Fig. 21). Discard nut after removal. It is not reusable.

**Fig. 21 Removing Companion Flange Nut**

(3) Remove companion flange from front output shaft. Use a suitable puller if flange can not be removed by hand.

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Remove companion flange rubber seal from front output shaft (Fig. 22).

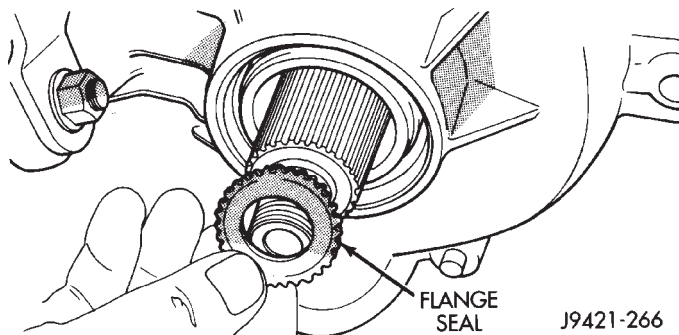


Fig. 22 Companion Flange Seal Removal

(5) Remove nut and washer that retain shift lever to sector shaft. Then remove shift lever from shaft (Fig. 23).

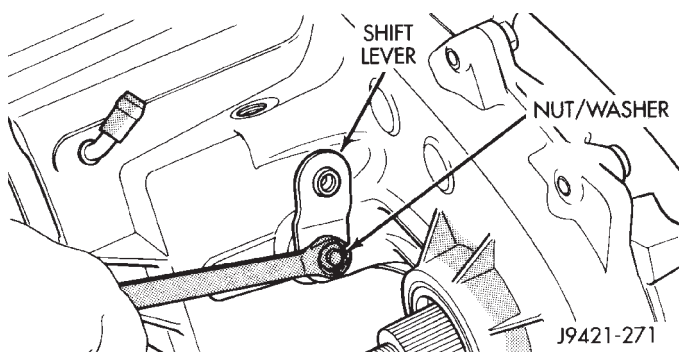


Fig. 23 Shift Lever Removal

FRONT OUTPUT SHAFT AND DRIVE CHAIN REMOVAL

(1) Remove output bearing retaining ring with heavy duty snap ring pliers.

(2) Remove output shaft bearing.

(3) Note position of bolts that attach rear case to front case (Fig. 24). Some bolts/studs at ends of case require flat washers. Mark position of these bolts with paint or scribe.

(4) Remove rear case-to-front case bolts.

(5) Loosen rear case with pry tool to break sealer bead. Insert tool in slot at each end of case (Fig. 25).

(6) Unseat rear case from alignment dowels (Fig. 26).

(7) Remove rear case and oil pump assembly from front case.

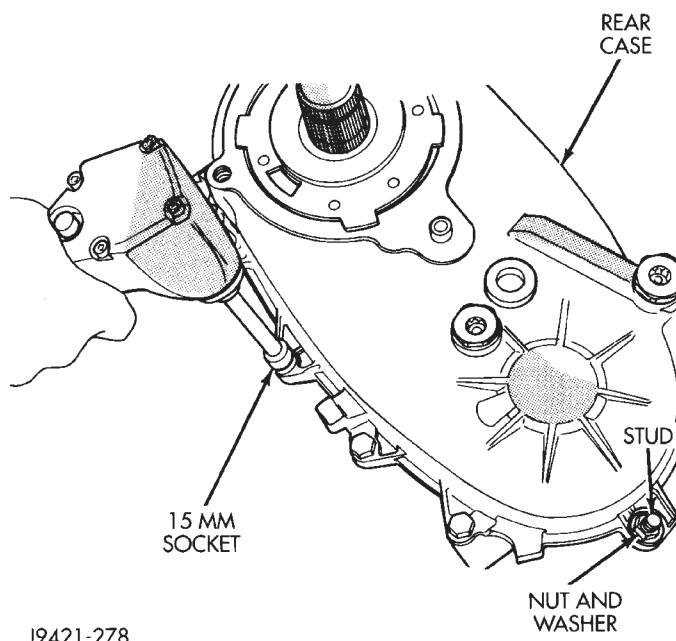


Fig. 24 Removing Case Attaching Bolts

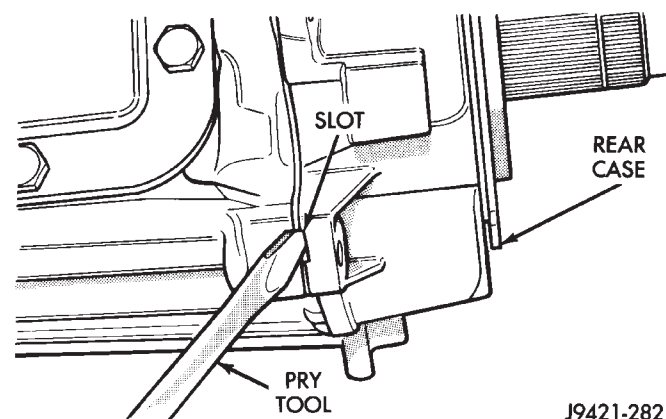


Fig. 25 Loosening Rear Case (Breaking Sealer Bead)

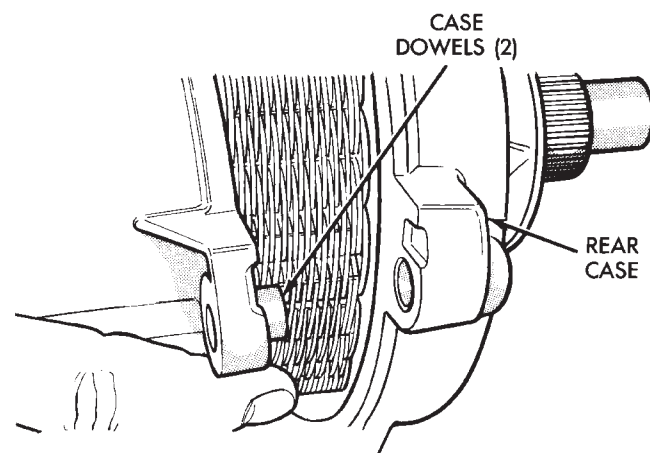


Fig. 26 Removing Rear Case From Alignment Dowels

DISASSEMBLY AND ASSEMBLY (Continued)

- (8) Remove shift rail cup and spring (Fig. 27).

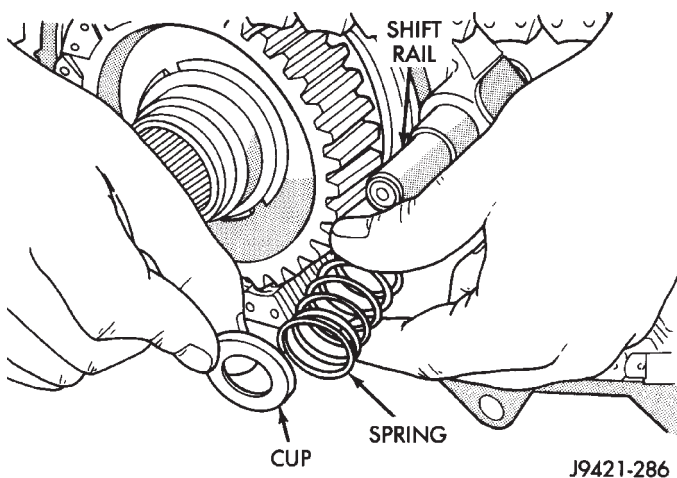


Fig. 27 Shift Rail Cup And Spring Removal

- (9) Remove front sprocket retaining ring (Fig. 28).

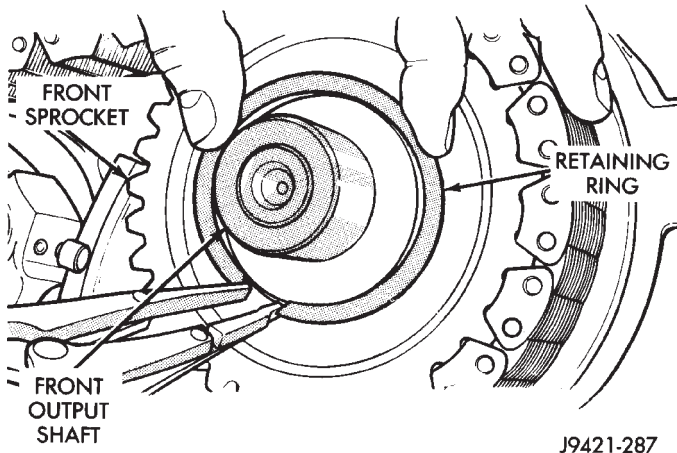


Fig. 28 Removing Front Sprocket Retaining Ring

- (10) Pull mainshaft, front sprocket and chain outward about 25.4 mm (1-inch) simultaneously (Fig. 29).

- (11) Remove chain from mainshaft drive sprocket and remove front sprocket and chain as assembly.

SHIFT FORK AND MAINSHAFT REMOVAL

- (1) Remove vacuum/indicator switch (Fig. 30).
- (2) Loosen poppet plunger screw (Fig. 31).
- (3) Remove poppet plunger screw and spring (Fig. 32). Note that screw has O-ring seal. Remove and discard seal this seal.

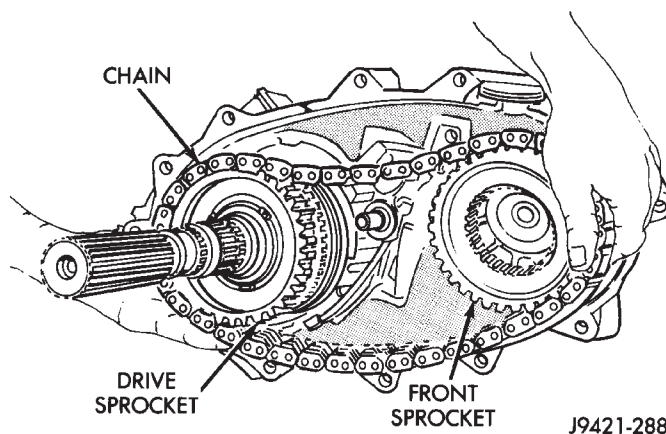


Fig. 29 Removing Drive Chain And Front Sprocket

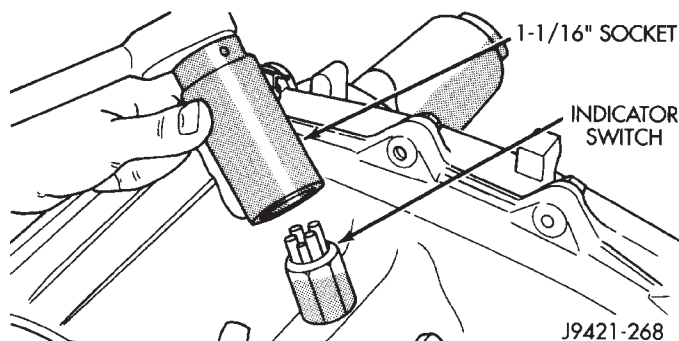


Fig. 30 Vacuum/Indicator Switch Removal

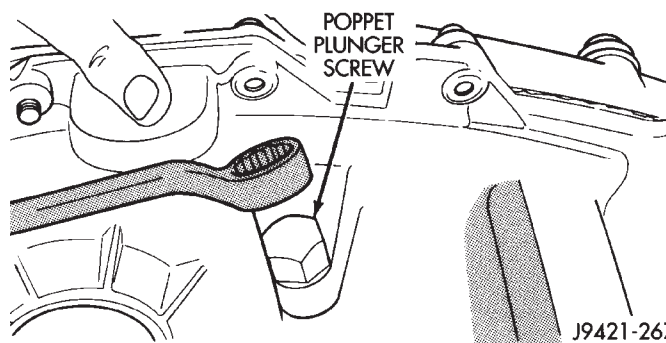


Fig. 31 Loosening Poppet Plunger Screw

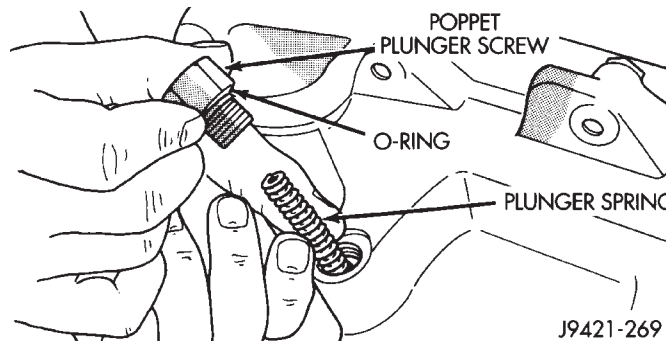


Fig. 32 Poppet Plunger Screw And Spring Removal

DISASSEMBLY AND ASSEMBLY (Continued)

- (4) Remove poppet plunger with magnet (Fig. 33).

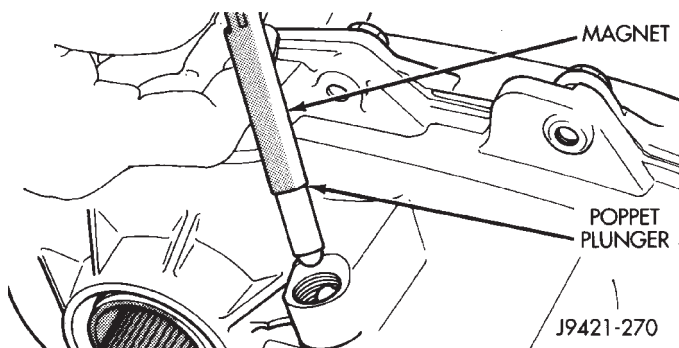


Fig. 33 Poppet Plunger Removal

- (5) Remove front output shaft from bearing in case (Fig. 34).

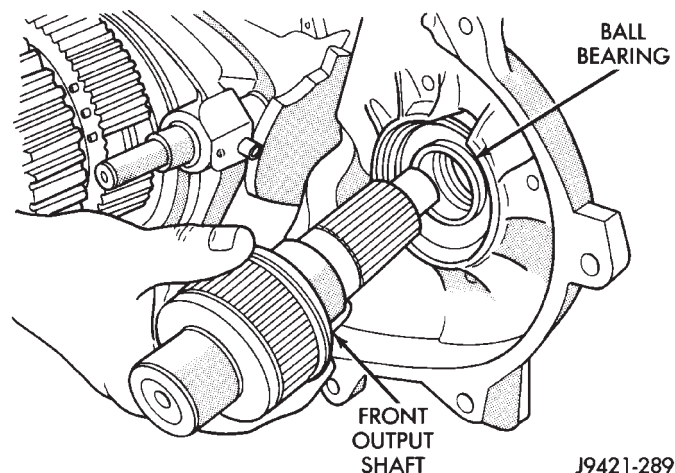


Fig. 34 Front Output Shaft Removal

- (6) Pull mainshaft assembly out of input gear, mode sleeve and case.

- (7) Remove mode fork, mode sleeve, and shift rail as assembly (Fig. 35). Note which way sleeve fits in fork (short side of sleeve goes to front).

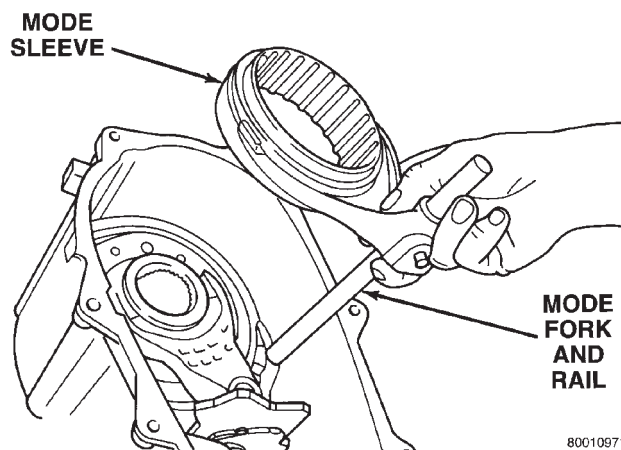


Fig. 35 Mode Fork And Sleeve Removal

- (8) Remove range fork retaining ring. Remove range fork and hub as an assembly (Fig. 36). Note fork position for installation reference.
- (9) Remove shift sector (Fig. 37).

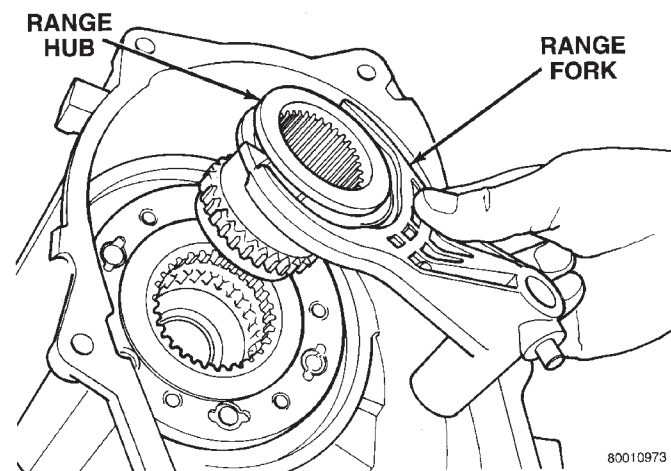


Fig. 36 Range Fork And Hub Removal

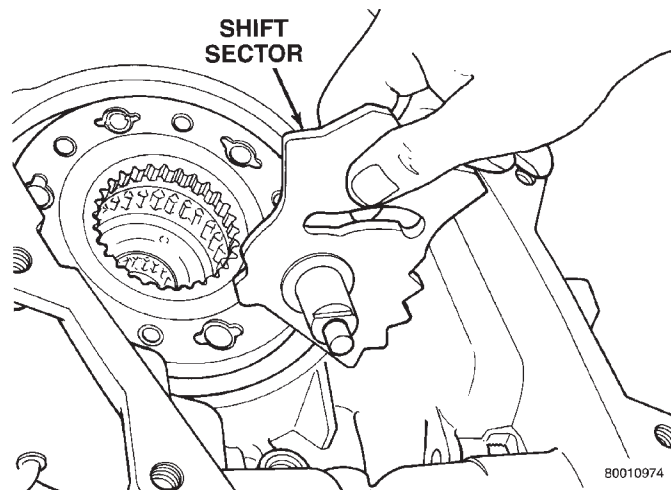


Fig. 37 Shift Sector Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(10) Remove shift sector shaft nylon retainer and O-ring from shaft bore in front case (Fig. 38).

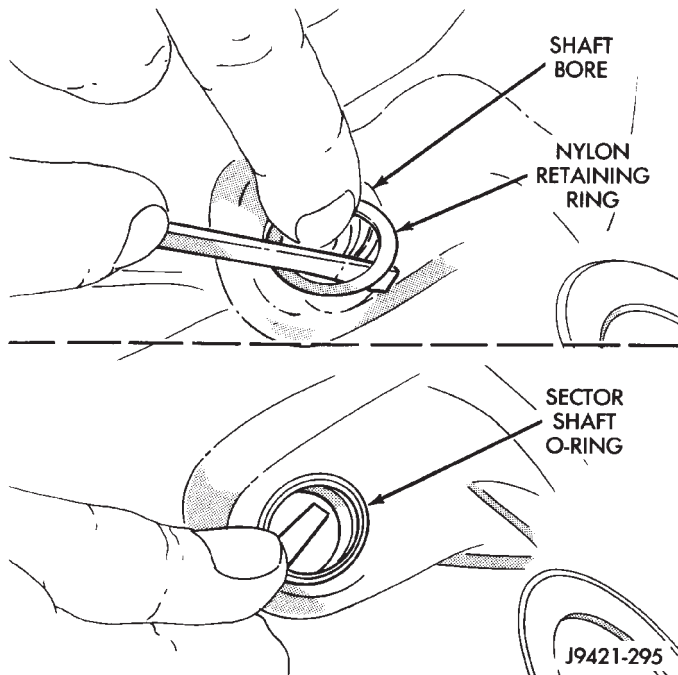


Fig. 38 Removing Sector Shaft O-Ring And Retainer

MAINSHAFT DISASSEMBLY

- (1) Remove mode hub retaining ring with heavy duty snap-ring pliers (Fig. 39).
- (2) Slide mode hub off mainshaft (Fig. 40).
- (3) Slide drive sprocket off mainshaft (Fig. 41).

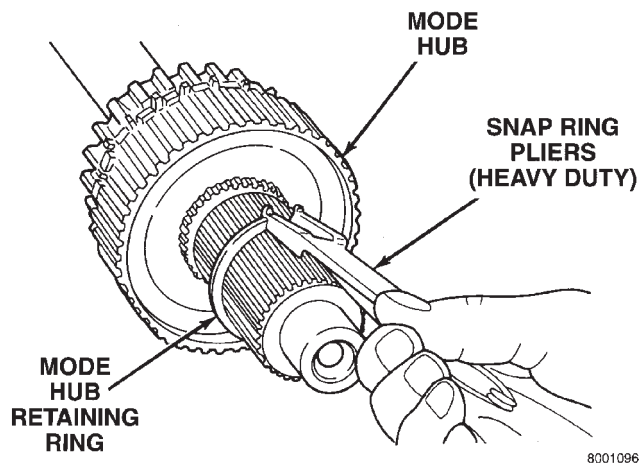


Fig. 39 Mode Hub Retaining Ring Removal

INPUT AND PLANETARY GEAR REMOVAL

- (1) Remove front bearing retainer attaching bolts (Fig. 42).
- (2) Remove front bearing retainer. Pry retainer loose with pry tool positioned in slots at each end of retainer (Fig. 43).

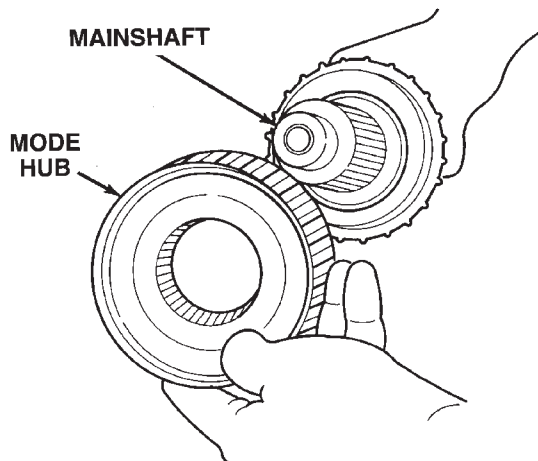


Fig. 40 Mode Hub Removal

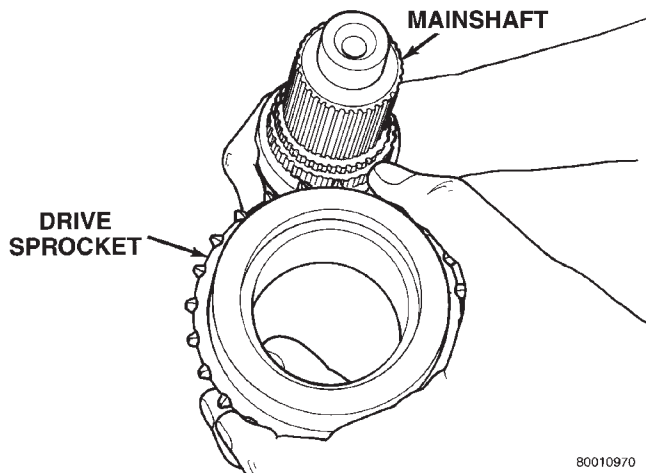


Fig. 41 Drive Sprocket Removal

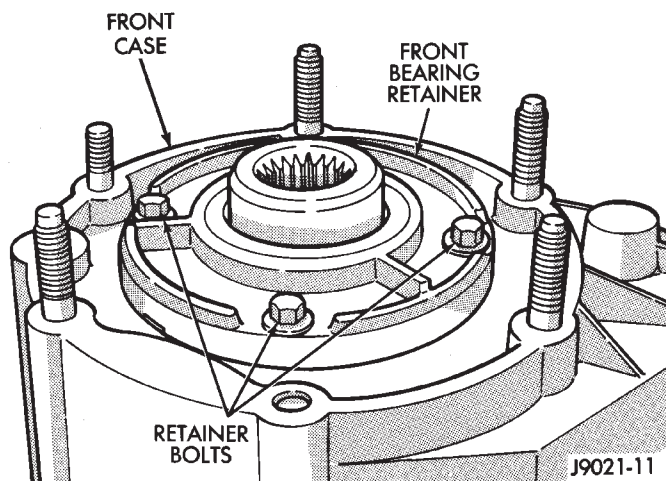
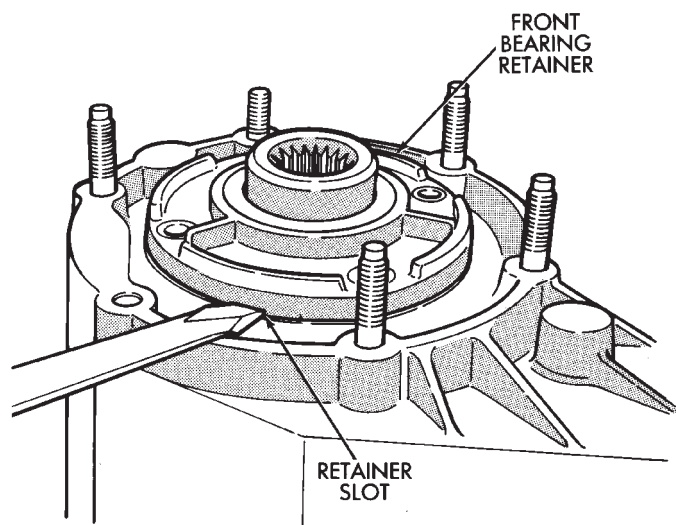


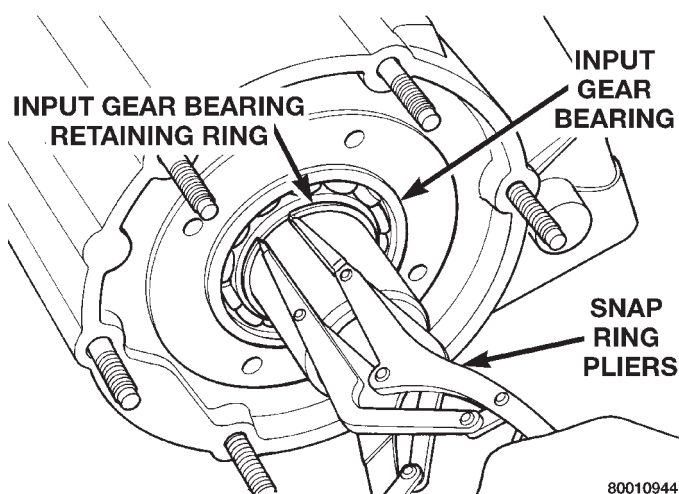
Fig. 42 Front Bearing Retainer Bolts

- (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. 44).

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-266

Fig. 43 Front Bearing Retainer Removal

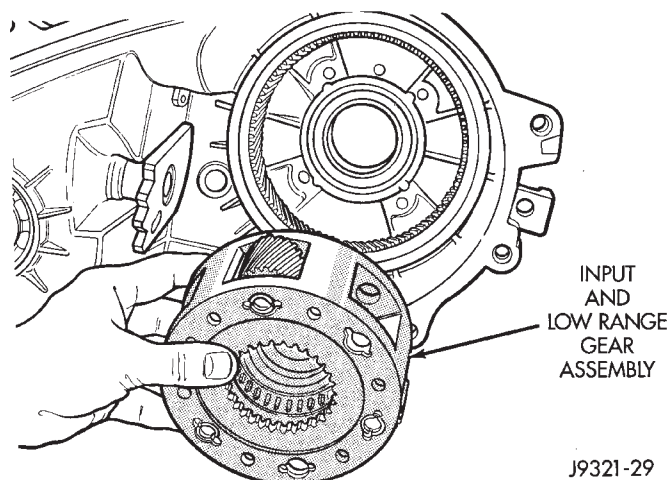
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Fig. 44 Removing Input Gear Retaining ring

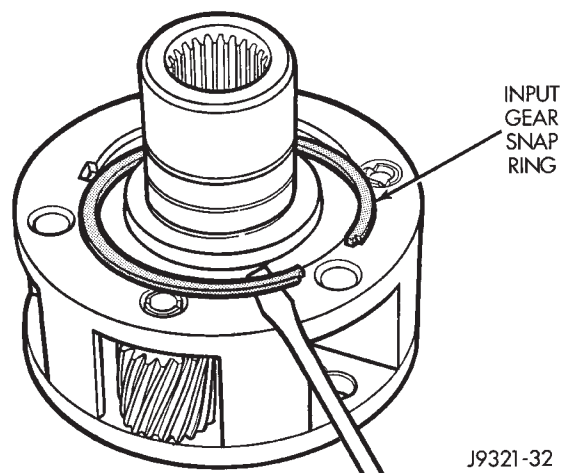
(5) Place front case in horizontal position. Then remove input gear and low range gear as an assembly (Fig. 45). Tap gear out of bearing with plastic mallet, if necessary.

INPUT AND PLANETARY GEAR DISASSEMBLY

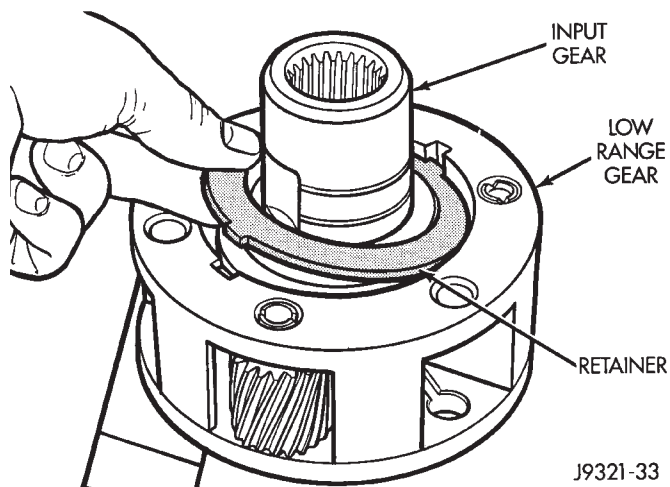
- (1) Remove snap-ring that retains input gear in low range gear (Fig. 46).
- (2) Remove retainer (Fig. 47).



J9321-29

Fig. 45 Input Gear And Planetary Carrier Removal

J9321-32

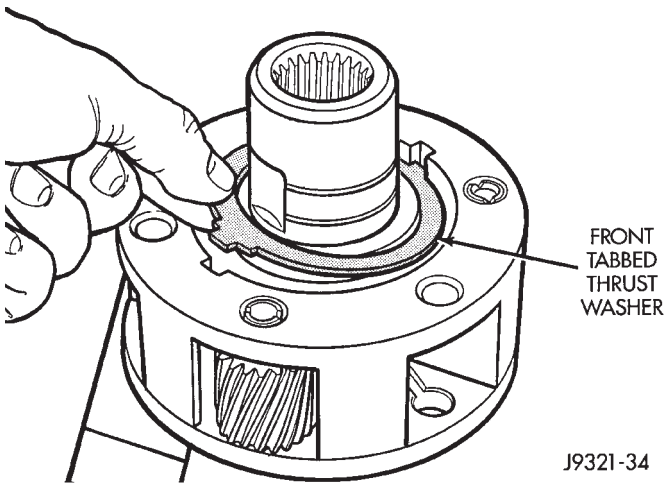
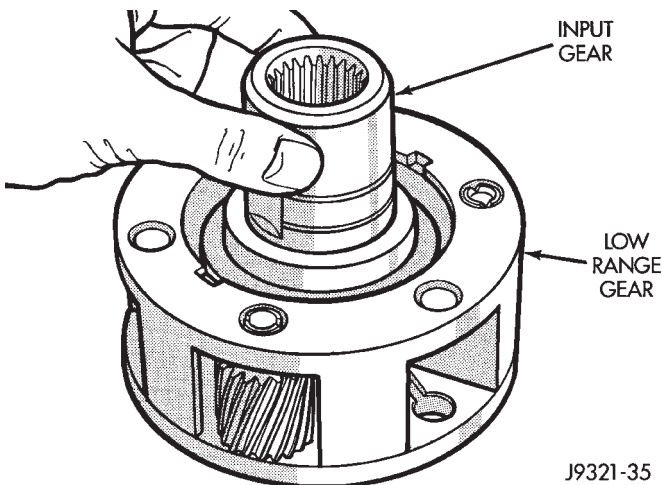
Fig. 46 Input Gear Snap-Ring Removal

J9321-33

Fig. 47 Input Gear Retainer Removal

DISASSEMBLY AND ASSEMBLY (Continued)

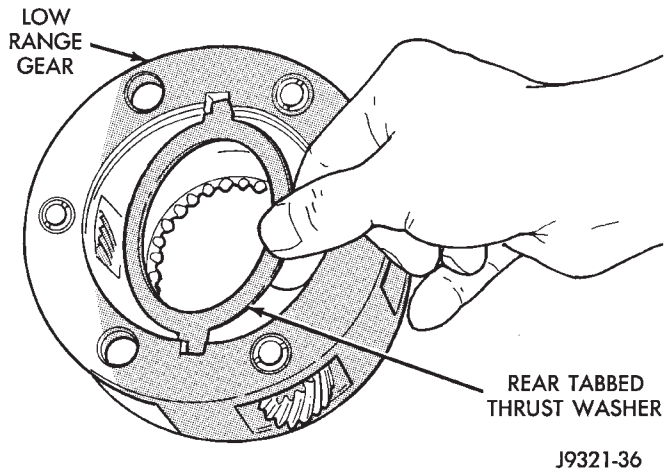
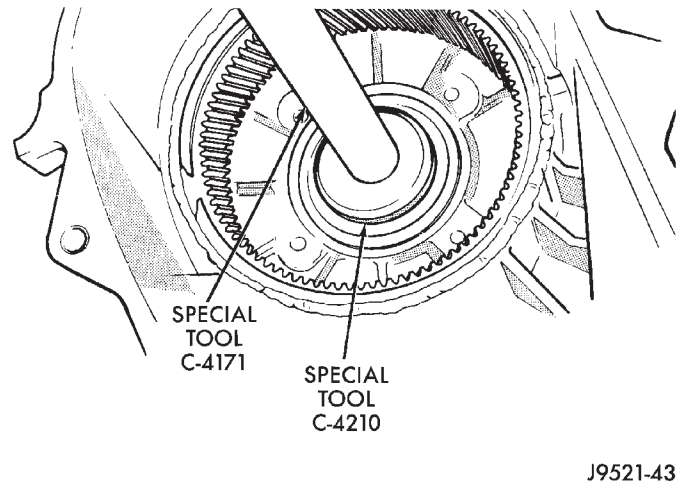
- (3) Remove front tabbed thrust washer (Fig. 48).
- (4) Remove input gear (Fig. 49).
- (5) Remove rear tabbed thrust washer from low range gear (Fig. 50).

**Fig. 48 Front Tabbed Thrust Washer Removal****Fig. 49 Input Gear Removal**

ASSEMBLY

BEARING AND SEAL REPLACEMENT

- (1) Using Remover C-4210 and Handle C-4171, drive input shaft bearing from case from inside annulus gear opening (Fig. 51).
- (2) Install locating ring on new bearing.
- (3) Position case so that the forward end is facing upward.
- (4) Using Remover C-4210 and Handle C-4171, drive input shaft bearing into case. The bearing locating ring must be fully seated on case (Fig. 52).
- (5) Using Installer 6953, remove front output shaft bearing.
- (6) Start front shaft output bearing in case (Fig. 53). Then seat bearing with Handle C-4171 and Installer 6953.

**Fig. 50 Rear Tabbed Thrust Washer Removal****Fig. 51 Input Shaft Bearing Removal**

- (7) Install front output bearing retaining ring.
- (8) Install new front output seal in NV241LD front case with Installer Tool 6888 and Tool Handle C-4171 as follows:

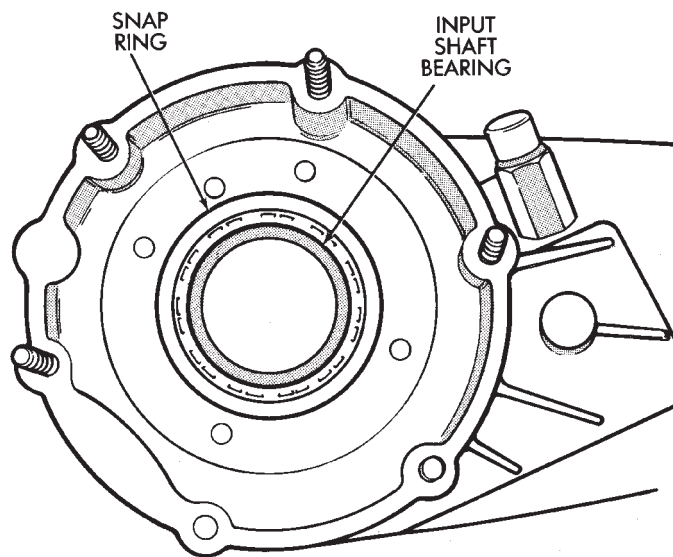
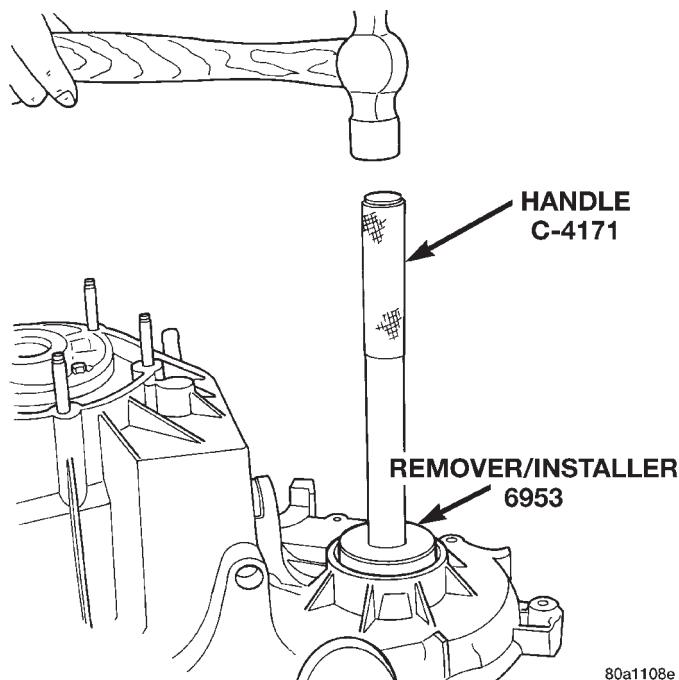
(a) Place new seal on tool. **Garter spring on seal goes toward interior of case.**

(b) Start seal in bore with light taps from hammer (Fig. 54). Once seal is started, continue tapping seal into bore until installer tool bottoms against case.

(c) Remove installer and verify that seal is recessed the proper amount (Fig. 55). Seal should be 2.03 to 2.5 mm (0.080 to 0.100 in.) below top edge of seal bore in front case. This is correct final seal position.

CAUTION: Be sure the front output seal is seated below the top edge of the case bore as shown. The seal could loosen, or become cocked if not seated to recommended depth.

DISASSEMBLY AND ASSEMBLY (Continued)

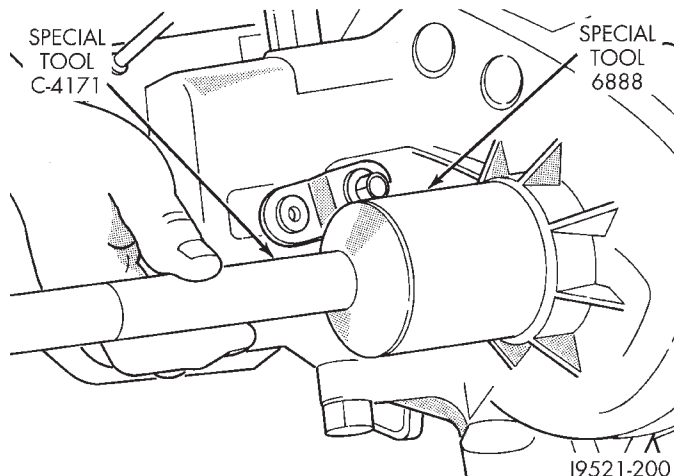
**Fig. 52 Seating Input Shaft Bearing****Fig. 53 Front Output Bearing Installation**

(9) Install new front output seal in NV231HD front case with Installer Tool 8143 as follows:

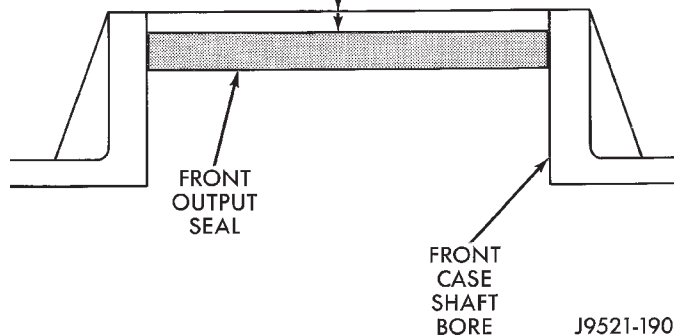
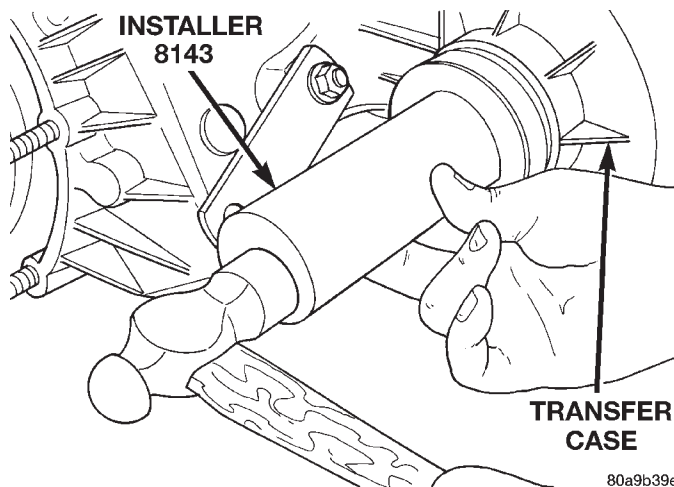
(a) Place new seal on tool. Garter spring on seal goes toward interior of case.

(b) Start seal in bore with light taps from hammer (Fig. 56). Once seal is started, continue tapping seal into bore until installer tool seats against case.

(10) Remove seal from front bearing retainer with suitable pry tool.

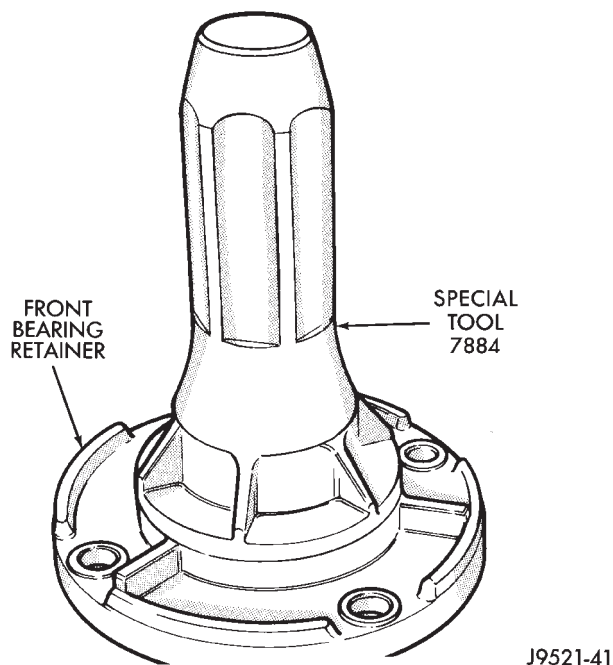
**Fig. 54 Front Output Seal Installation**

CORRECT SEAL
DEPTH IS
2.03–2.5 mm (0.080–0.100 in.)
BELOW TOP EDGE OF BORE

**Fig. 55 Checking Front Output Seal Installation Depth****Fig. 56 Front Output Seal Installation**

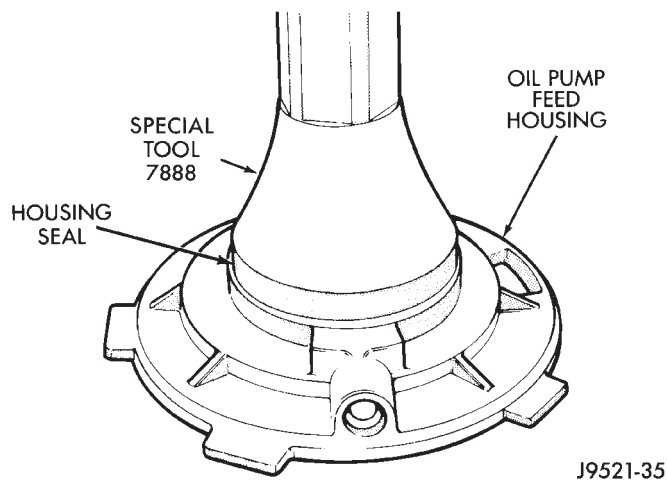
(11) Install new oil seal in front bearing retainer with Installer 7884 (Fig. 57).

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 57 Install Front Bearing Retainer Seal**

(12) Remove seal from oil pump with suitable pry tool.

(13) Install new seal in oil pump with Installer 7888 (Fig. 58).

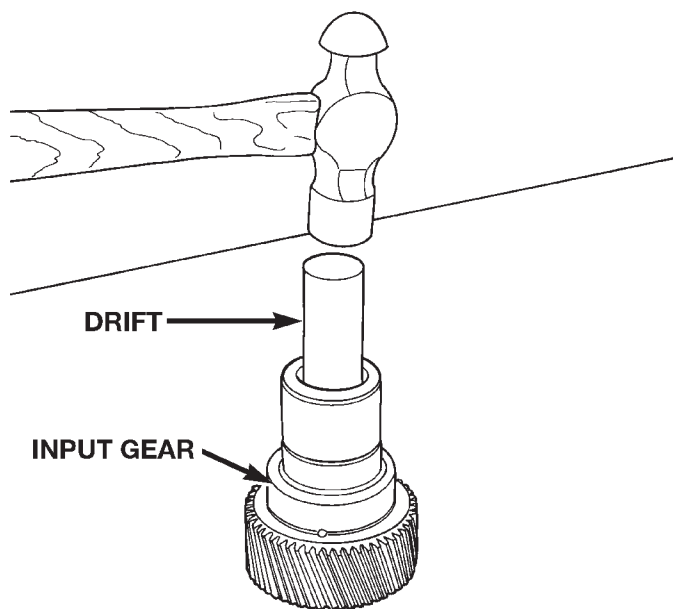
**Fig. 58 Install Oil Pump Seal**

(14) 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. 59).

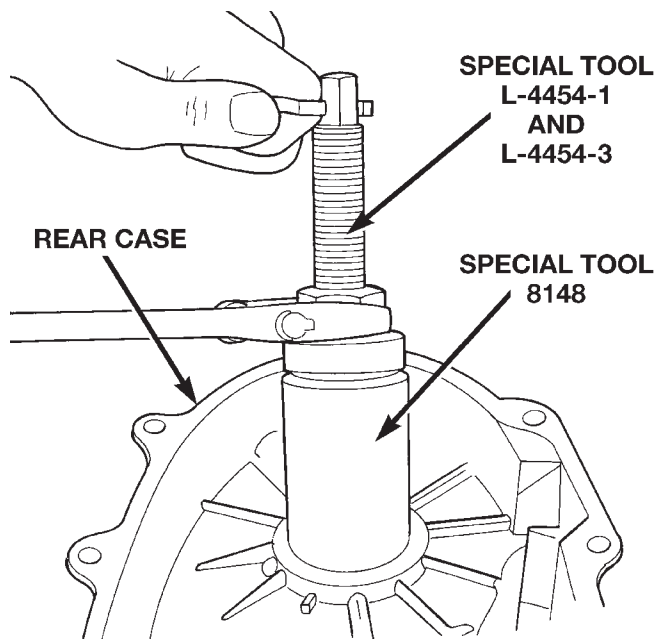
(15) Install new pilot bearing with Plug C-293-3.

(16) Remove the output shaft rear bearing with the screw and jaws from Remover L-4454 and Cup 8148 (Fig. 60).

(17) Install new bearing with Tool Handle C-4171 and Installer 5066 (Fig. 61). The bearing bore is

**Fig. 59 Remove Input Gear Pilot Bearing**

chamfered at the top. Install the bearing so it is flush with the lower edge of this chamfer (Fig. 62).

**Fig. 60 Output Shaft Rear Bearing Removal****INPUT AND PLANETARY GEAR ASSEMBLY**

(1) Lubricate gears and thrust washers (Fig. 63) with recommended transmission fluid.

(2) Install first thrust washer in low range gear (Fig. 63). Be sure washer tabs are properly aligned in gear notches.

DISASSEMBLY AND ASSEMBLY (Continued)

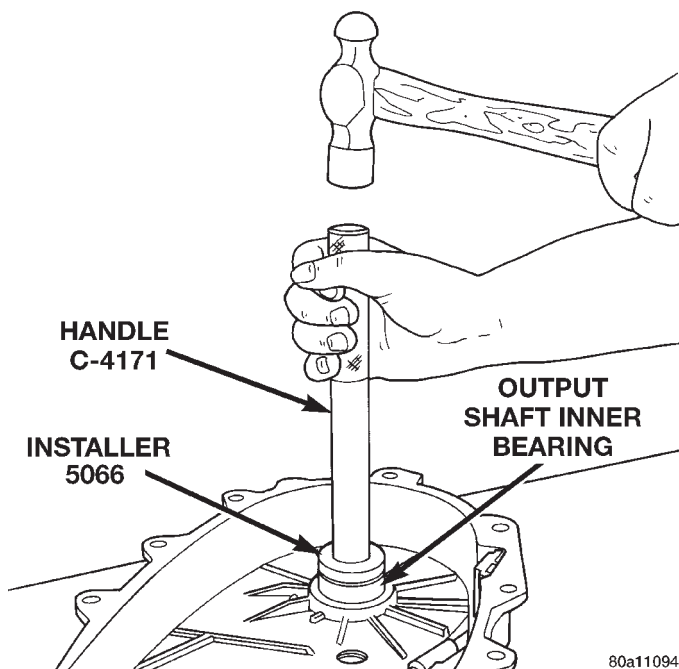


Fig. 61 Output Shaft Rear Bearing Installation

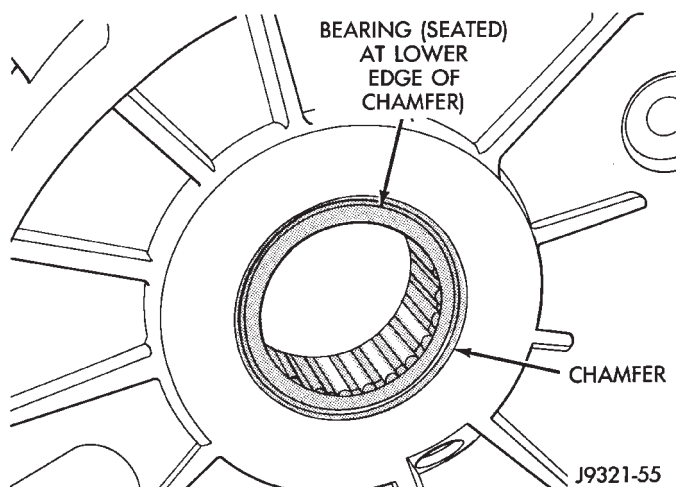


Fig. 62 Output Shaft Rear Bearing Installation Depth

(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.

INPUT AND PLANETARY GEAR INSTALLATION

(1) Align and install low range/input gear assembly in front case (Fig. 64). 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. 65).

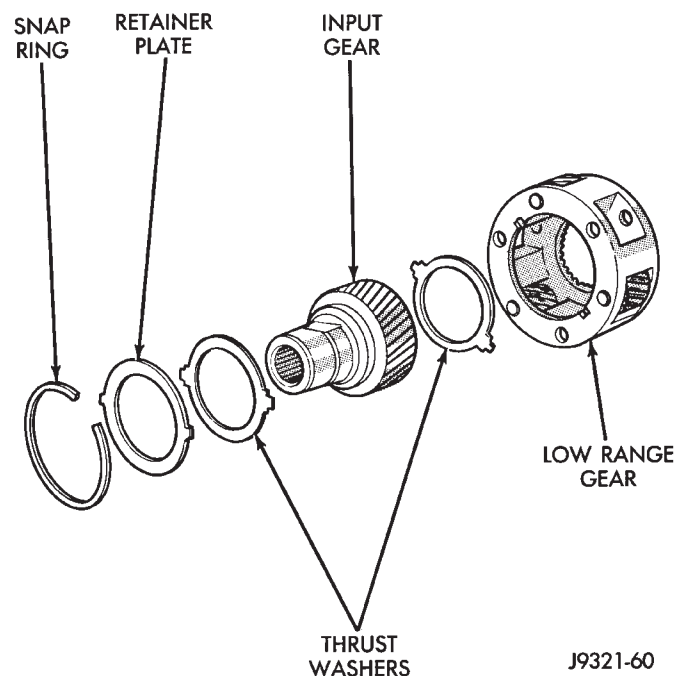


Fig. 63 Input/Low Range Gear Components

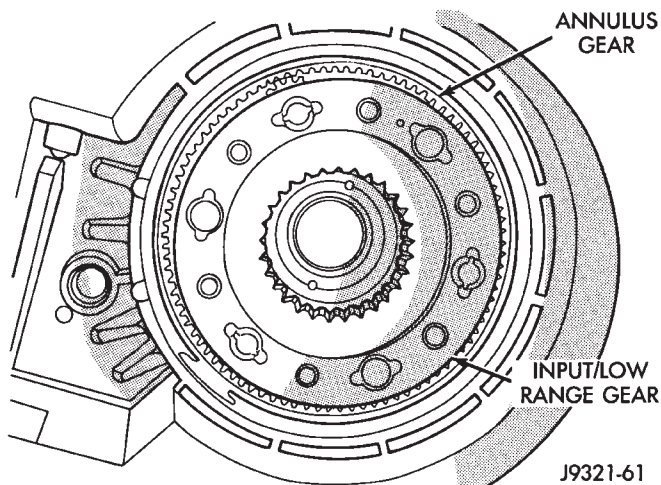


Fig. 64 Input/Low Range Gear Installation

(3) Clean gasket sealer residue from retainer and inspect retainer for cracks or other damage.

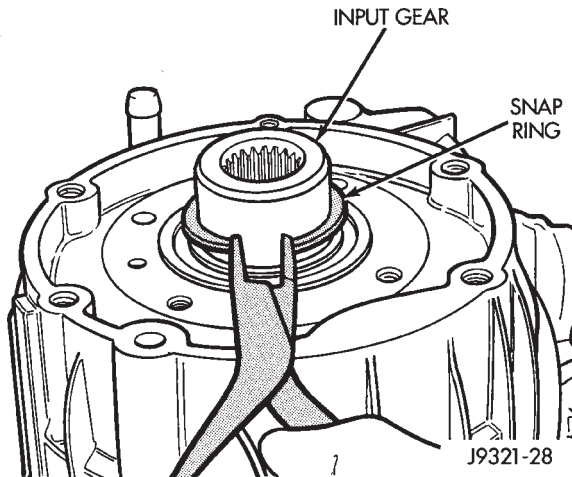
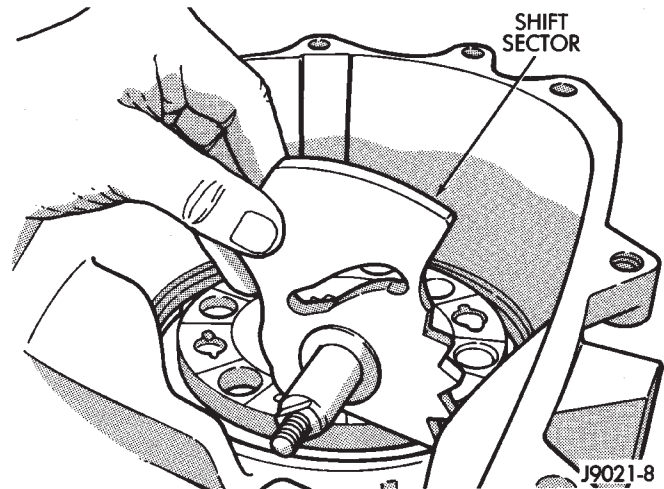
(4) Apply a 3 mm (1/8 in.) bead of Mopar® gasket maker or silicone adhesive to sealing surface of retainer.

(5) Align cavity in seal retainer with fluid return hole in front of case.

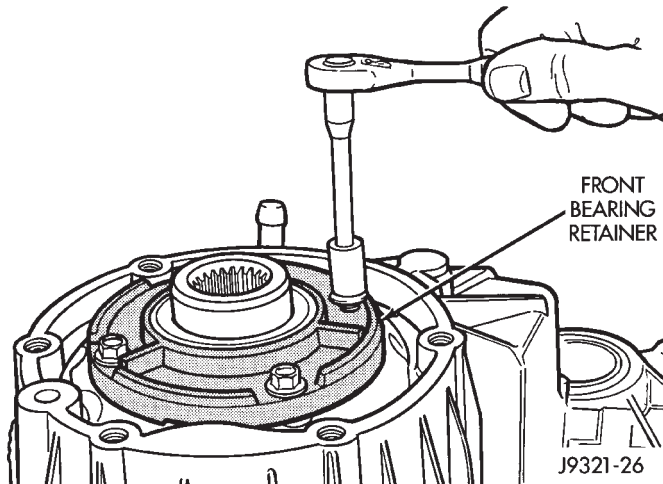
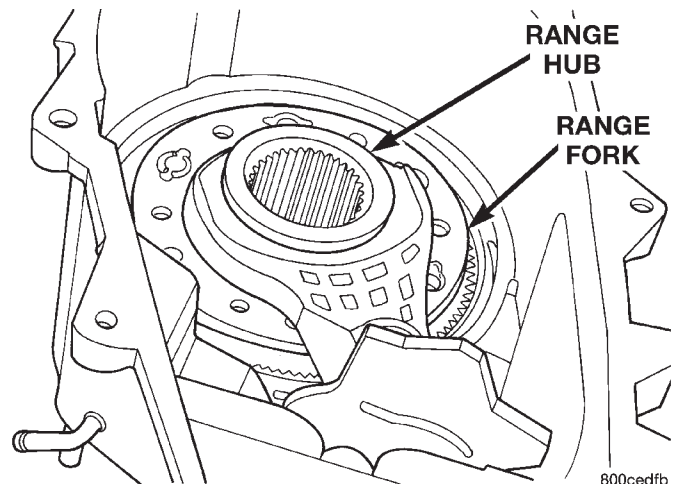
CAUTION: Do not block fluid return cavity on sealing surface of retainer when applying Mopar® gasket maker or silicone adhesive sealer. Seal failure and fluid leak can result.

(6) Install bolts to hold retainer to transfer case (Fig. 66). Tighten to 21 N·m (16 ft. lbs.) of torque.

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 65 Install Snap-Ring****Fig. 67 Shift Sector Installation**

(5) Align and insert range fork pin in shift sector slot.

**Fig. 66 Install Front Bearing Retainer****Fig. 68 Install Range Fork And Hub Assembly**

(6) Install assembled mainshaft (Fig. 69). Be sure shaft is seated in pilot bearing and input gear.

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.

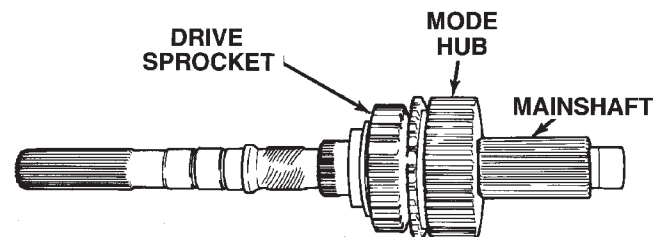
SHIFT FORKS AND MAINSHAFT INSTALLATION

(1) Support front case on wood blocks so case interior is facing up. Place blocks between mounting studs on forward surface of case. Be sure blocks will not interfere with input gear installation.

(2) Lubricate mainshaft components with Dexron II transmission fluid.

(3) Lubricate sector shaft with transmission fluid and install shift sector in case (Fig. 67). Position slot in sector so it will be aligned with shift fork pin when shift forks are installed.

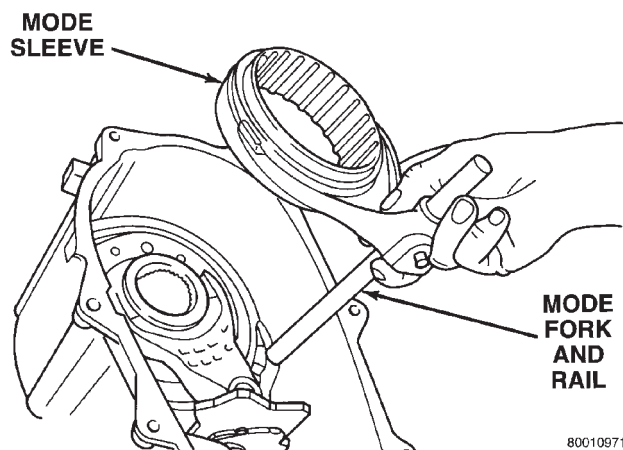
(4) Assemble and install range fork and hub (Fig. 68). Be sure hub is properly seated in low range gear and engaged to the input gear.

**Fig. 69 Mainshaft Assembly Installation**

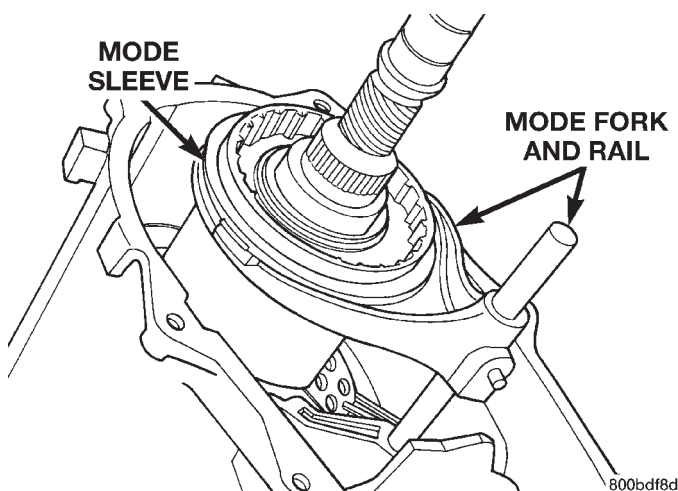
(7) Install new pads on mode fork if necessary.

(8) Insert mode sleeve in mode fork mode fork. Be sure long side of sleeve is toward long end of shift rail (Fig. 70).

DISASSEMBLY AND ASSEMBLY (Continued)

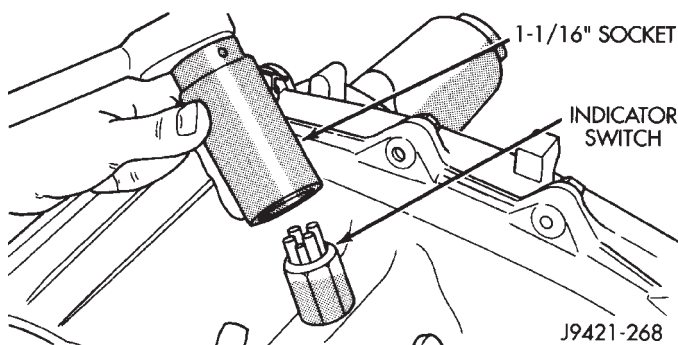
**Fig. 70 Assembling Mode Fork And Sleeve**

(9) Install assembled mode fork and sleeve (Fig. 71). Be sure fork rail goes through range fork and into case bore. Also be sure sleeve is aligned and seated on mainshaft hub.

**Fig. 71 Mode Fork And Sleeve Installation**

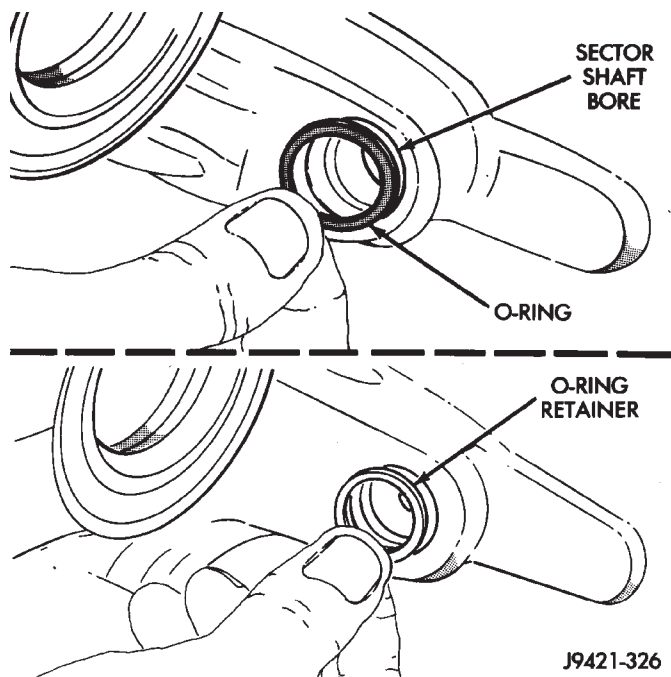
(10) Install vacuum/indicator switch (Fig. 72). Tighten switch to 20-34 N·m (15-25 ft. lbs.) torque. Install new O-ring on switch beforehand, if necessary.

(11) Install new sector shaft O-ring and O-ring

**Fig. 72 Vacuum/Indicator Switch Installation**

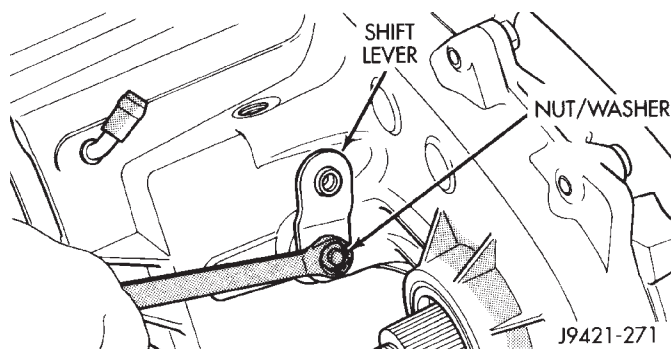
retainer in sector shaft bore (Fig. 73). Lubricate

O-ring with transmission fluid or petroleum jelly after installation.

**Fig. 73 Sector Shaft O-Ring And Retainer Installation**

(12) Install shift lever on sector shaft (Fig. 74).

(13) Install washer and nut on sector shaft to secure shift lever. Apply 1-2 drops Mopar® Lock N' Seal, or equivalent, to nut threads before installation. Then tighten nut to 27-34 N·m (20-25 ft. lbs.) torque.

**Fig. 74 Shift Lever Installation**

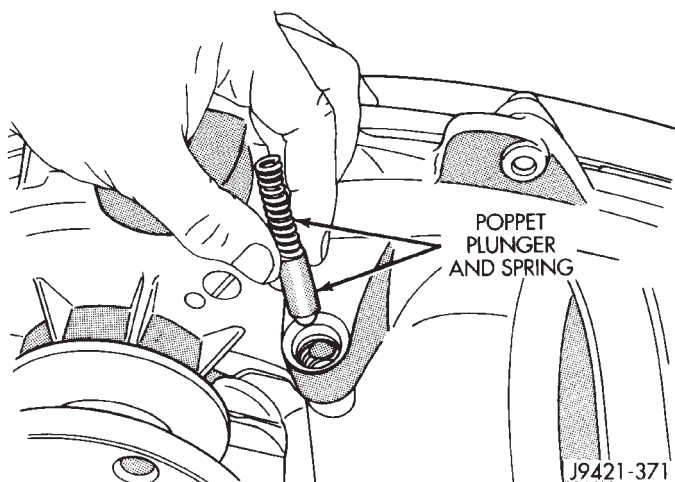
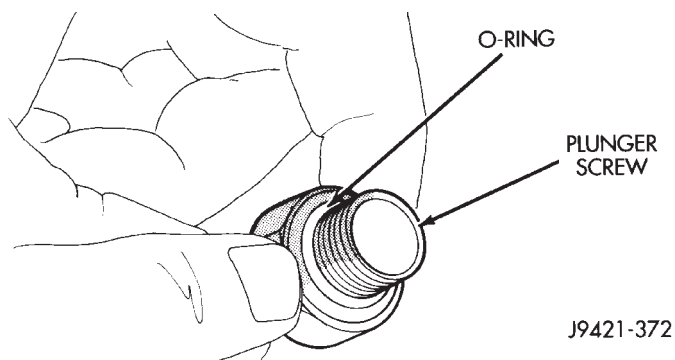
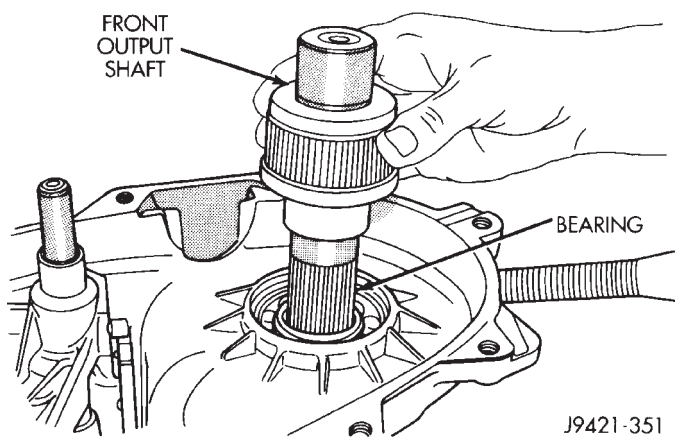
(14) Install poppet plunger and spring (Fig. 75).

(15) Install new O-ring on poppet screw and install screw in front case (Fig. 76). Tighten screw to 16-24 N·m (12-18 ft. lbs.).

FRONT OUTPUT SHAFT AND DRIVE CHAIN INSTALLATION

- (1) Install front output shaft in bearing (Fig. 77).
- (2) Insert front sprocket in drive chain (Fig. 78).
- (3) Install drive chain around mainshaft sprocket (Fig. 78). Then position front sprocket over front shaft.

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 75 Poppet Plunger And Spring Installation****Fig. 76 O-Ring Installation On Poppet Plunger Screw****Fig. 77 Front Output Shaft Installation**

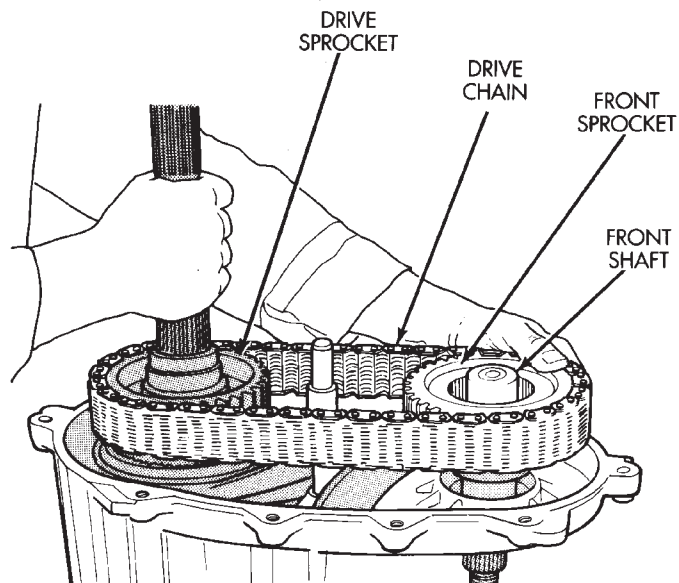
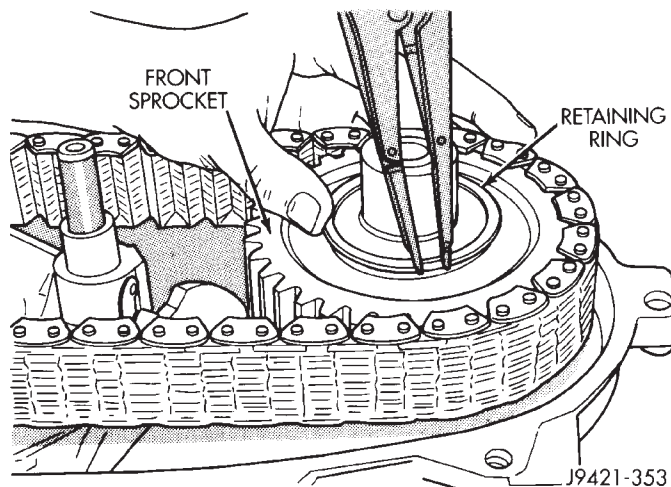
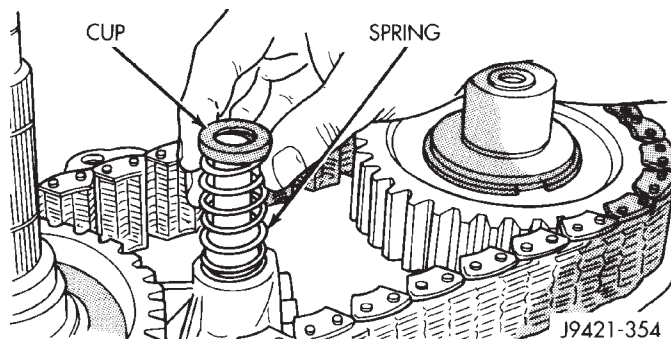
(4) Raise mainshaft about 2.54 cm (one inch) and seat front sprocket on front output shaft.

(5) If mainshaft and mode sleeve were unseated during chain installation, align and reseal mainshaft in input gear and hub.

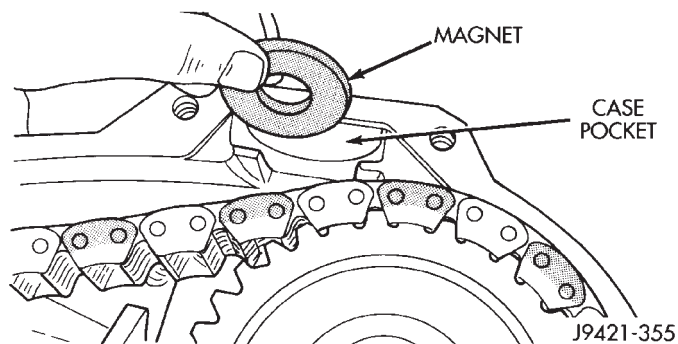
(6) Install front sprocket retaining ring (Fig. 79).

(7) Install spring and cup on shift rail (Fig. 80).

(8) Insert magnet in front case pocket (Fig. 81).

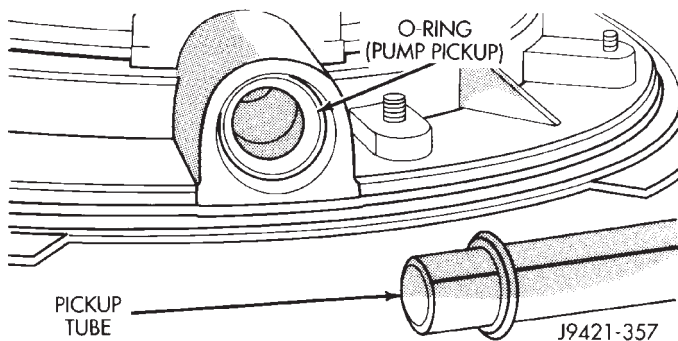
**Fig. 78 Drive Chain And Front Sprocket Installation****Fig. 79 Front Sprocket Retaining Ring Installation****Fig. 80 Shift Rail Spring And Cup Installation**

DISASSEMBLY AND ASSEMBLY (Continued)

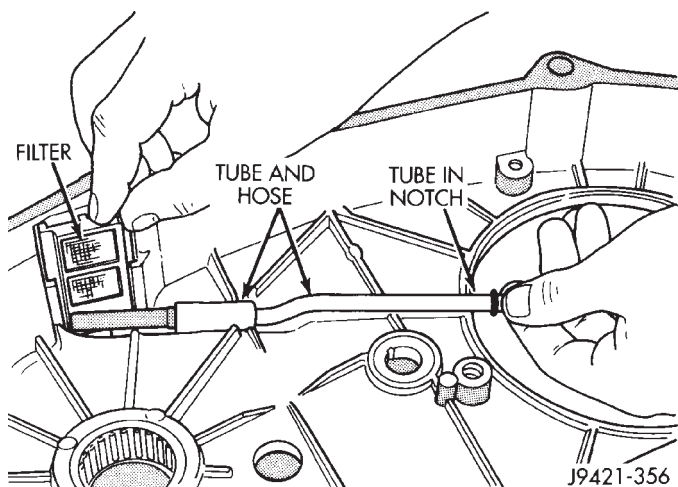
**Fig. 81 Case Magnet Installation****OIL PUMP AND REAR CASE ASSEMBLY/INSTALLATION**

Lubricate the oil pump components with Dexron II before installation. Prime the oil pickup tube by pouring a little oil into the tube before installation.

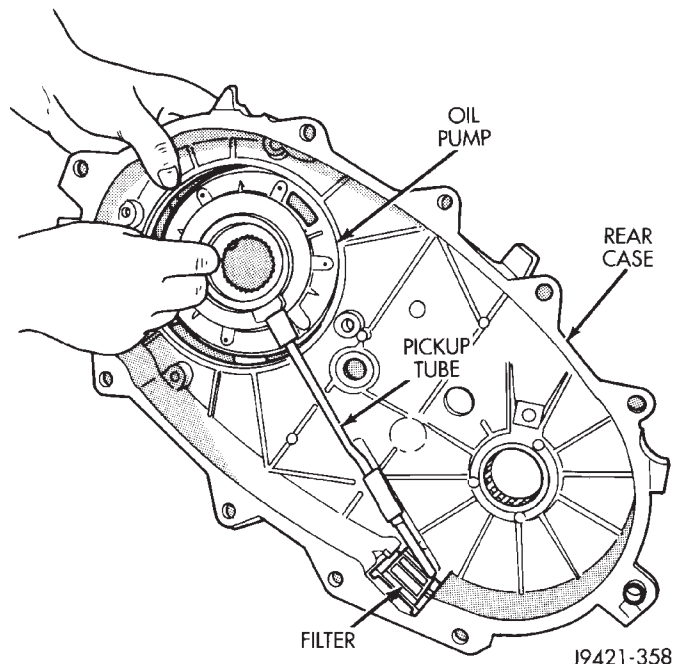
(1) Install new O-ring in pickup tube inlet of oil pump (Fig. 82).

**Fig. 82 Pickup Tube O-Ring Installation**

(2) Position oil pickup tube and filter in rear case. Be sure pickup filter is seated in case pocket and that pickup tube is aligned in case notches (Fig. 83). Be sure hose that connects tube to filter is securely positioned.

**Fig. 83 Oil Pickup Tube And Filter Position In Rear Case**

(3) Insert oil pickup tube in oil pump and position pump in rear case (Fig. 84).

**Fig. 84 Positioning Oil Pump In Rear Case**

(4) Apply bead of Mopar® Gasket Maker, or equivalent, to mating surface of front case. Keep sealer bead width to maximum of 3/16 inch. Do not use excessive amount of sealer as excess will be displaced into case interior.

(5) Align oil pump with mainshaft and align shift rail with bore in rear case. Then install rear case and oil pump assembly (Fig. 85). Be sure oil pump and pickup tube remain in position during case installation.

(6) Install 4-5 rear case-to-front case bolts to hold rear case in position. Tighten bolts snug but not to specified torque at this time.

CAUTION: Verify that shift rail (Fig. 86), and case alignment dowels are seated before installing any bolts. Case could be cracked if shaft rail or dowels are misaligned.

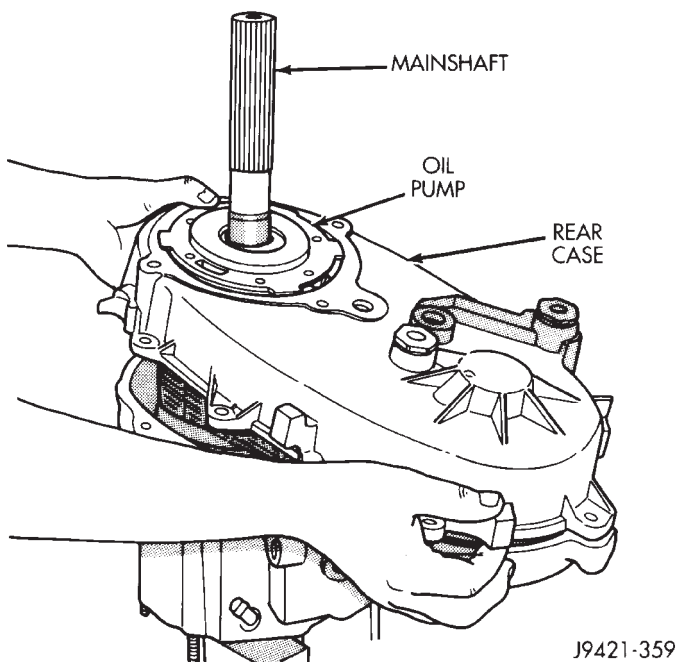
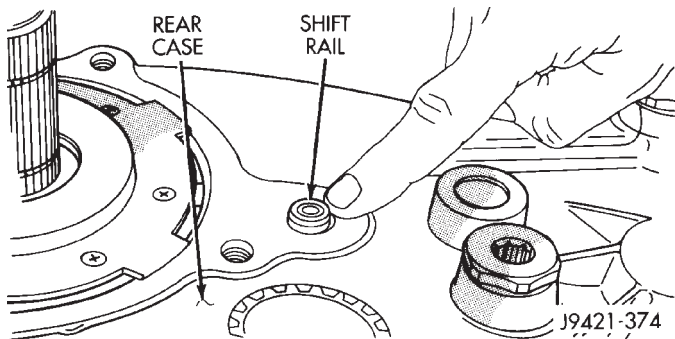
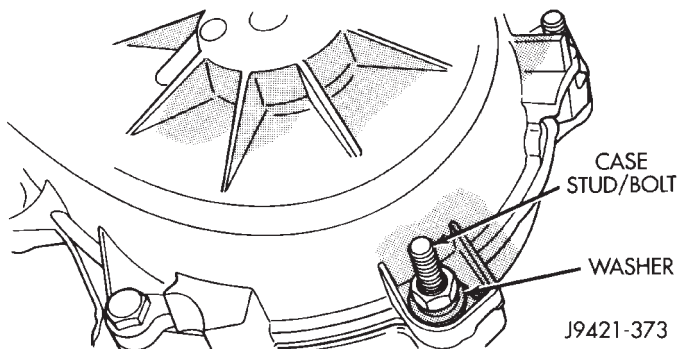
(7) Verify that oil pump is aligned and seated on rear case. Reposition pump if necessary.

(8) Check stud at end of case halves (Fig. 87). If stud was loosened or came out during disassembly, apply Loctite 242 to stud threads and reseal stud in case.

(9) Apply Loctite 242 to remainder of rear case-to-front case bolt threads and install bolts. Be sure lock washers are used on studs/bolts at case ends. Tighten bolts, or stud nuts as follows:

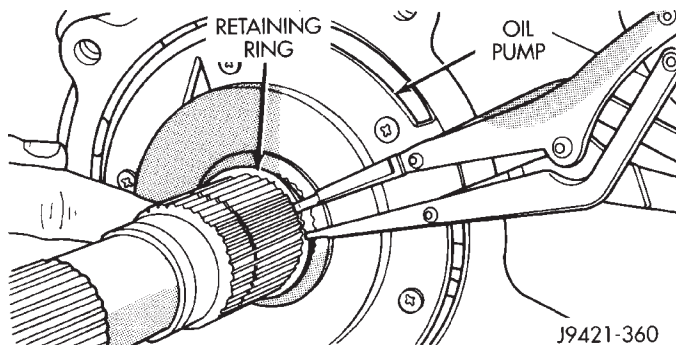
- flange head bolts to 47-61 N·m (35-45 ft. lbs.)
- all other bolts/nuts to 27-34 N·m (20-25 ft. lbs.)

DISASSEMBLY AND ASSEMBLY (Continued)

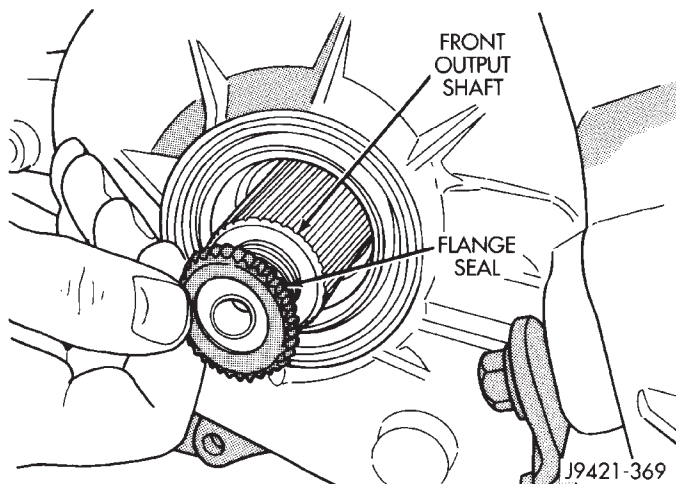
**Fig. 85 Rear Case And Oil Pump Installation****Fig. 86 Shift Rail Seated In Rear Case Bore****Fig. 87 Washer Installation On Case Stud And Dowel Bolts**

(10) Install oil pump retaining ring on mainshaft (Fig. 88).

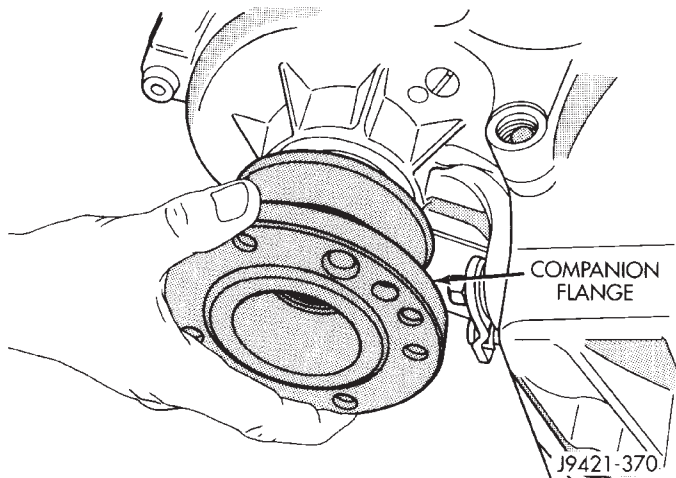
(11) Install rear output bearing and snap ring to output shaft.

**Fig. 88 Oil Pump Retaining Ring Installation****COMPANION FLANGE INSTALLATION**

(1) Install companion flange seal on front shaft (Fig. 89).

**Fig. 89 Installing Flange Seal On Front Shaft**

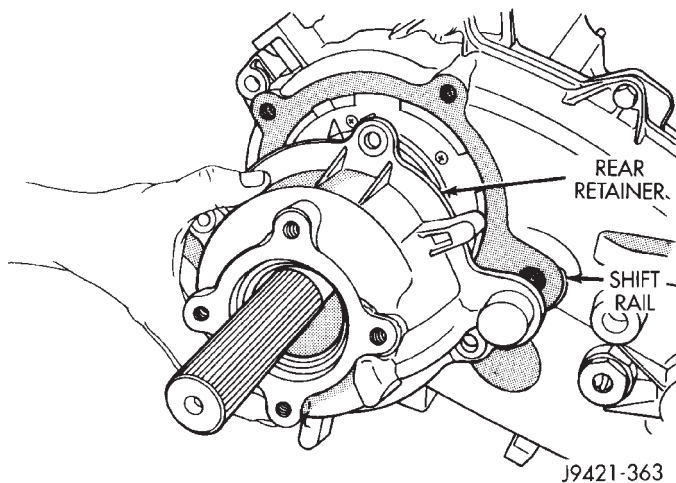
(2) Install companion flange on front shaft (Fig. 90). Then install and tighten flange nut to 176-271 N·m (130-200 ft. lbs.) torque.

**Fig. 90 Installing Companion Flange On Front Shaft**

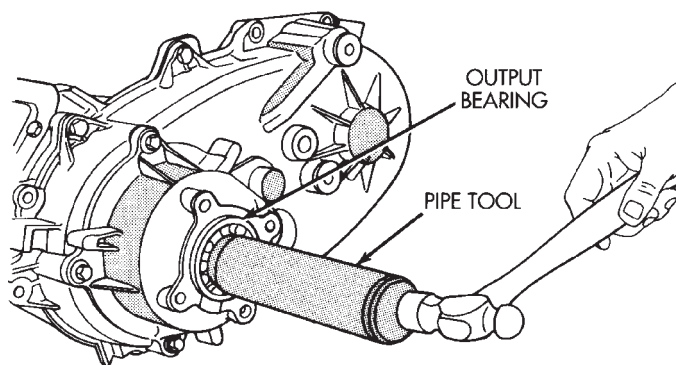
DISASSEMBLY AND ASSEMBLY (Continued)

REAR RETAINER AND EXTENSION INSTALLATION

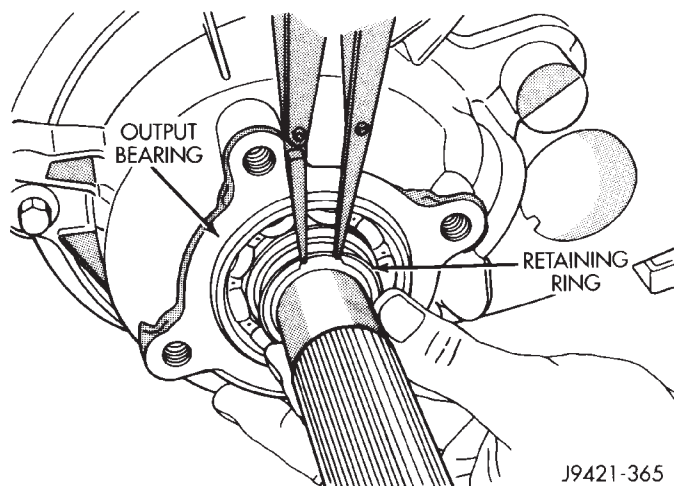
- (1) Clean mating surfaces of transfer case housing and the rear retainer of any original gasket material.
- (2) Install new rear retainer gasket onto the transfer case housing or rear retainer.
- (3) Align and install rear retainer on rear case (Fig. 91).

**Fig. 91 Rear Retainer Installation**

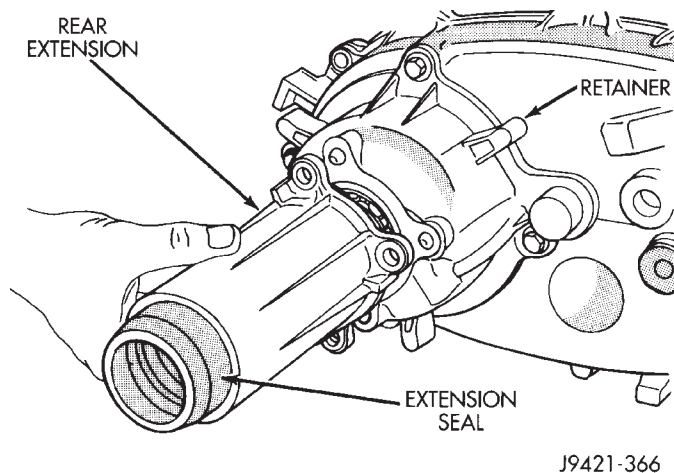
- (4) Apply Mopar® silicone sealer to threads of rear retainer bolts. Then install retainer bolts finger tight.
- (5) Install output bearing on mainshaft and seat it in rear retainer with suitable size pipe tool (Fig. 92).

**Fig. 92 Output Bearing Installation**

- (6) Install output bearing retaining ring (Fig. 93).
- (7) Tighten rear retainer bolts to 27-34 N·m (20-25 ft. lbs.) torque.
- (8) Install new seal in rear extension with suitable size installer tool.
- (9) Apply bead of Mopar® Gasket Maker, or equivalent, to mating surface of rear extension. Keep sealer bead width to maximum of 3/16 inch. Do not use excessive amount of sealer as excess could be displaced into output bearing.

**Fig. 93 Output Bearing Retaining Ring Installation**

- (10) Align and install rear extension on retainer (Fig. 94).

**Fig. 94 Rear Extension Installation**

- (11) Apply Mopar® silicone sealer to threads of rear extension bolts. Then install and tighten bolts to 27-34 N·m (20-25 ft. lbs.) torque.

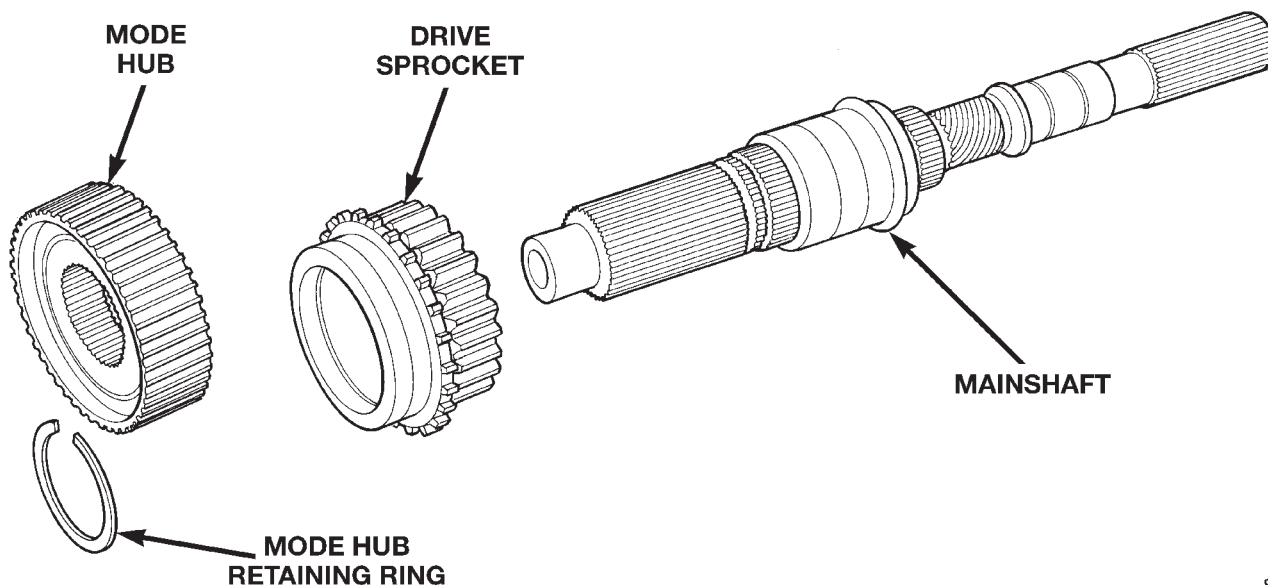
CLEANING AND INSPECTION

TRANSFER CASE CLEANING AND INSPECTION

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.

CLEANING AND INSPECTION (Continued)



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Fig. 95 Mainshaft, Mode Hub, And Drive Sprocket**MAINSHAFT/SPROCKET/HUB INSPECTION**

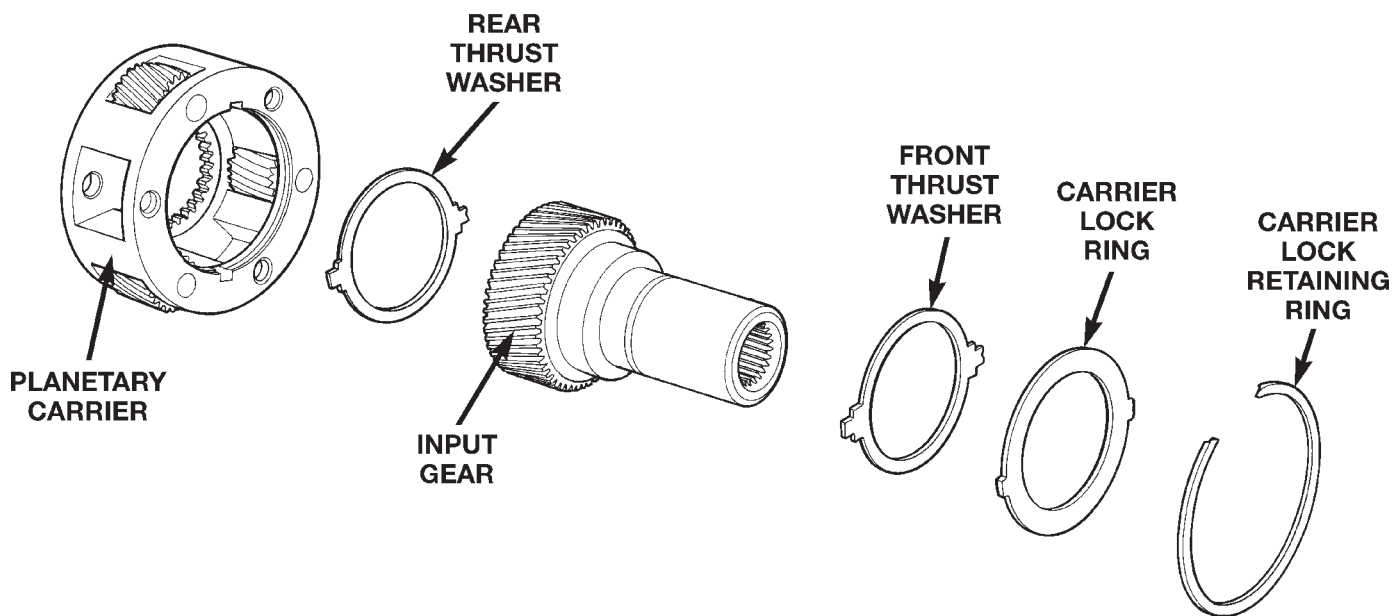
Inspect the splines on the hub and shaft and the teeth on the sprocket (Fig. 95). Minor nicks and scratches can be smoothed with an oilstone, however, replace any part is damaged.

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. 96). 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.



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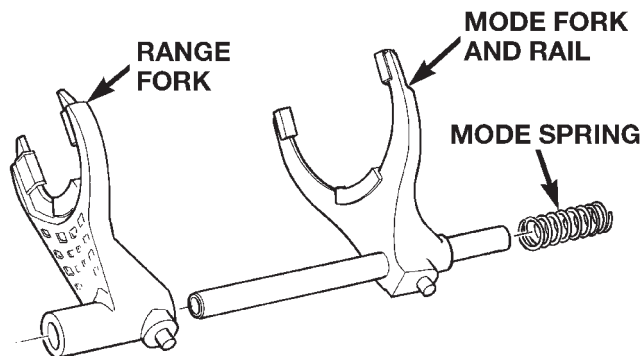
Fig. 96 Input Gear And Carrier Components

CLEANING AND INSPECTION (Continued)

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

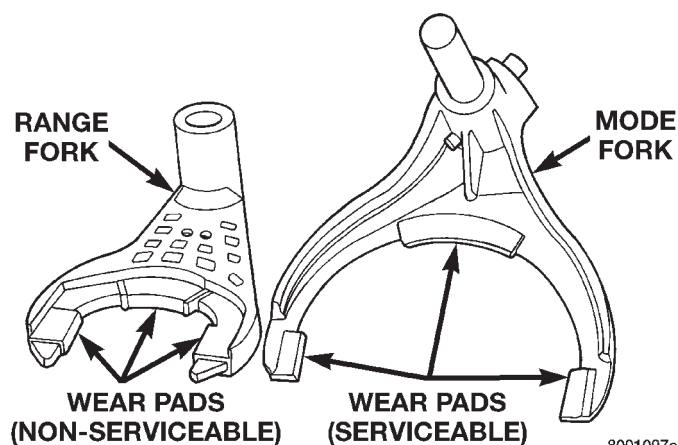
Check condition of the shift forks and mode fork shift rail (Fig. 97). Minor nicks on the shift rail can be smoothed with 320–400 grit emery cloth.



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Fig. 97 Shift forks

Inspect the shift fork wear pads (Fig. 98). 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.



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Fig. 98 Shift Fork And Wear Pad Locations

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 COMPONENTS

Inspect the retainer components. 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 3M all purpose cleaner. This will ensure proper adhesion of the sealer during reassembly.

Inspect the retaining rings and washers. Replace any part if distorted, bent, or broken. Reuse is not recommended.

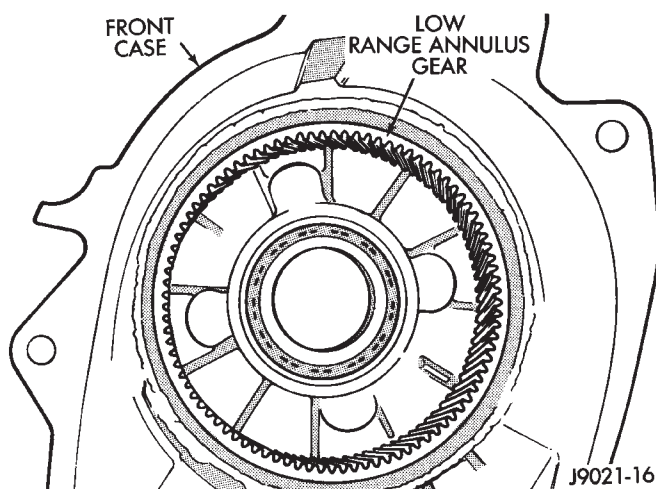
Inspect rear extension bushing. Replace if worn or scored.

DRIVE CHAIN

Examine the drive chain and shaft bearings. replace the chain if 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. 99)



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Fig. 99 Low Range Annulus Gear**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.

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.

CLEANING AND INSPECTION (Continued)

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

- Move shift lever into 2H position.
- Raise vehicle.
- Loosen shift rod lock bolt at trunnion (Fig. 100).

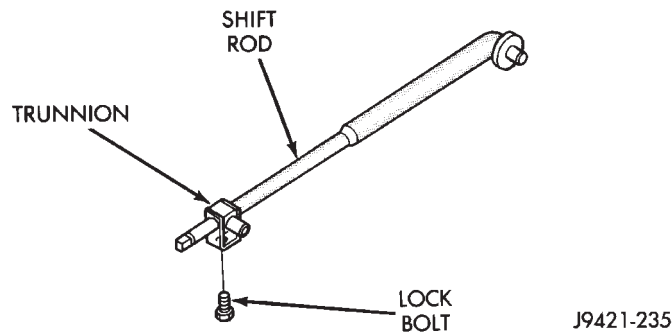


Fig. 100 Shift Rod Lock Bolt Location

- Check shift rod fit in trunnion. Be sure rod does not bind in trunnion.
- Verify that transfer case shift lever is in 2H position. The 2H position on the transfer case shift arm is the second position from full forward.
- Lower vehicle.
- Position the shift lever on the cab such that the distance from the instrument panel to the 2H position dot in the shift lever insert is 14.6 cm (5.75 in.). Ensure that the measurement is made parallel to the floor of the vehicle.
- Tighten shift rod lock bolt to 10 N·m (90 in. lbs.) torque.
- Check shift linkage operation. Be sure transfer case shifts into and operates properly in all ranges.

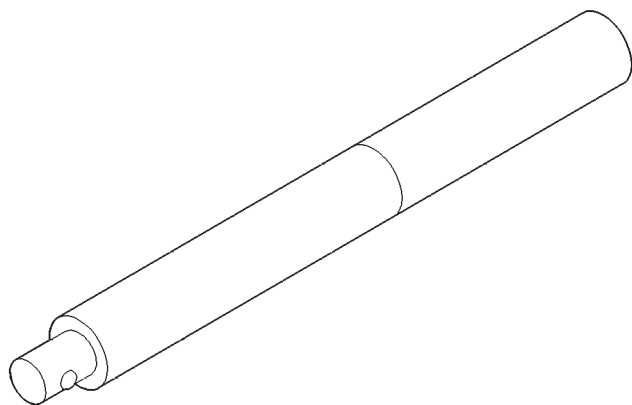
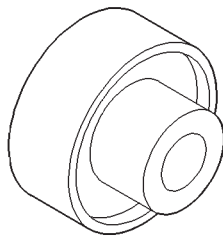
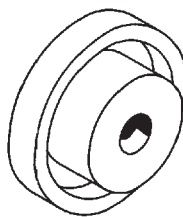
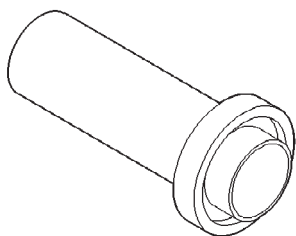
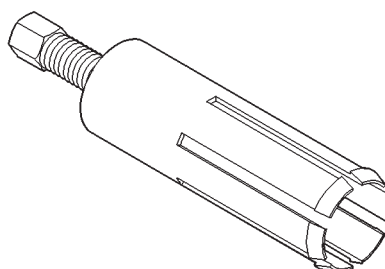
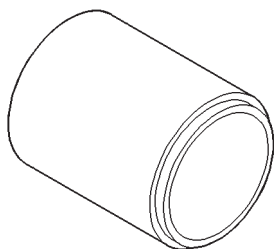
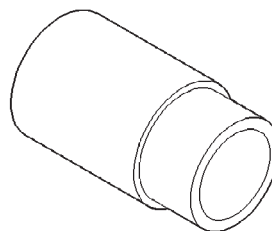
SPECIFICATIONS

TORQUE

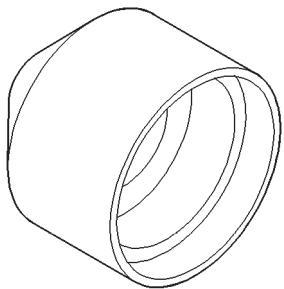
DESCRIPTION	TORQUE
Plug, Detent	16–24 N·m (12–18 ft. lbs.)
Bolt, Diff. Case	17–27 N·m (15–24 ft. lbs.)
Plug, Drain/Fill	40–45 N·m (30–40 ft. lbs.)
Bolt, Extension Housing . .	35–46 N·m (26–34 ft. lbs.)
Bolt, Front Brg. Retainer. .	16–27 N·m (12–20 ft. lbs.)
Bolt, Case Half	35–46 N·m (26–34 ft. lbs.)
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	35–47 N·m (26–35 ft. lbs.)
Bolts, U-Joint	19 N·m (17 ft. lbs.)
Vacuum Switch	20–34 N·m (15–25 ft. lbs.)

SPECIAL TOOLS

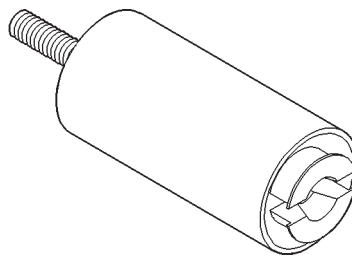
NV231HD AND NV241LD

**C-4171 Handle****6953 Installer, Bearing****C-4210 Installer, Seal****8143 Installer, Seal****8158 Remover, Bushing****6888 Installer, Seal****8157 Installer, Bushing**

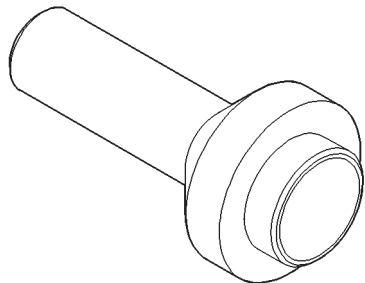
SPECIAL TOOLS (Continued)



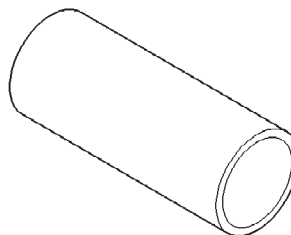
D-163 Installer, Seal



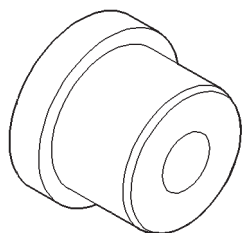
L-4454 Remover, Bearing



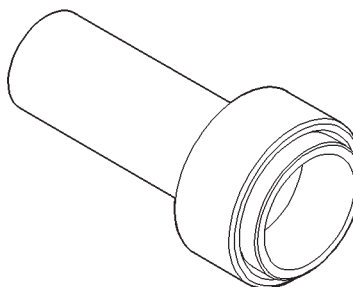
7884 Installer, Seal



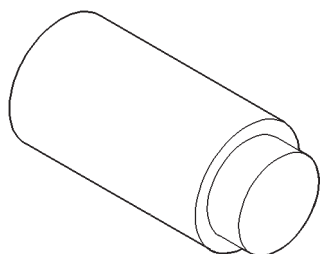
8148 Cup



5066 Installer, Bushing



7888 Installer, Pump Housing Seal



C-293-3 Plug, Extension

NV241HD TRANSFER CASE

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GENERAL INFORMATION

NV241HD INTRODUCTION

The NV241HD is a part-time transfer case with a low-range gear system. The transfer case provides three operating ranges plus a Neutral position. The low range position provides a gear reduction ratio of 2.72:1 for increased low speed torque capability. Operating ranges are: 2-high, 4-high and 4-low.

The gear cases, retainer and extension are all of aluminum. Drive sprockets and an interconnecting drive chain are used to transmit engine torque to the front/rear propeller shafts. The mainshaft, input gear and front output shaft are supported by ball and needle bearings.

The synchro mechanism consists of a brass stop ring, synchro hub with 3 struts and 2 retaining springs and the sliding clutch (Fig. 1). The synchro components allow the transfer case to be shifted between 2H and 4H ranges while the vehicle is in motion. However, the vehicle must be stopped in order to shift into 4L range.

OPERATING RANGES

Transfer case operating ranges are:

- 4x2 (2-wheel drive)
- 4x4 (4-wheel drive)

- 4 Lo (4-wheel drive low range)

The 4x2 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 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.

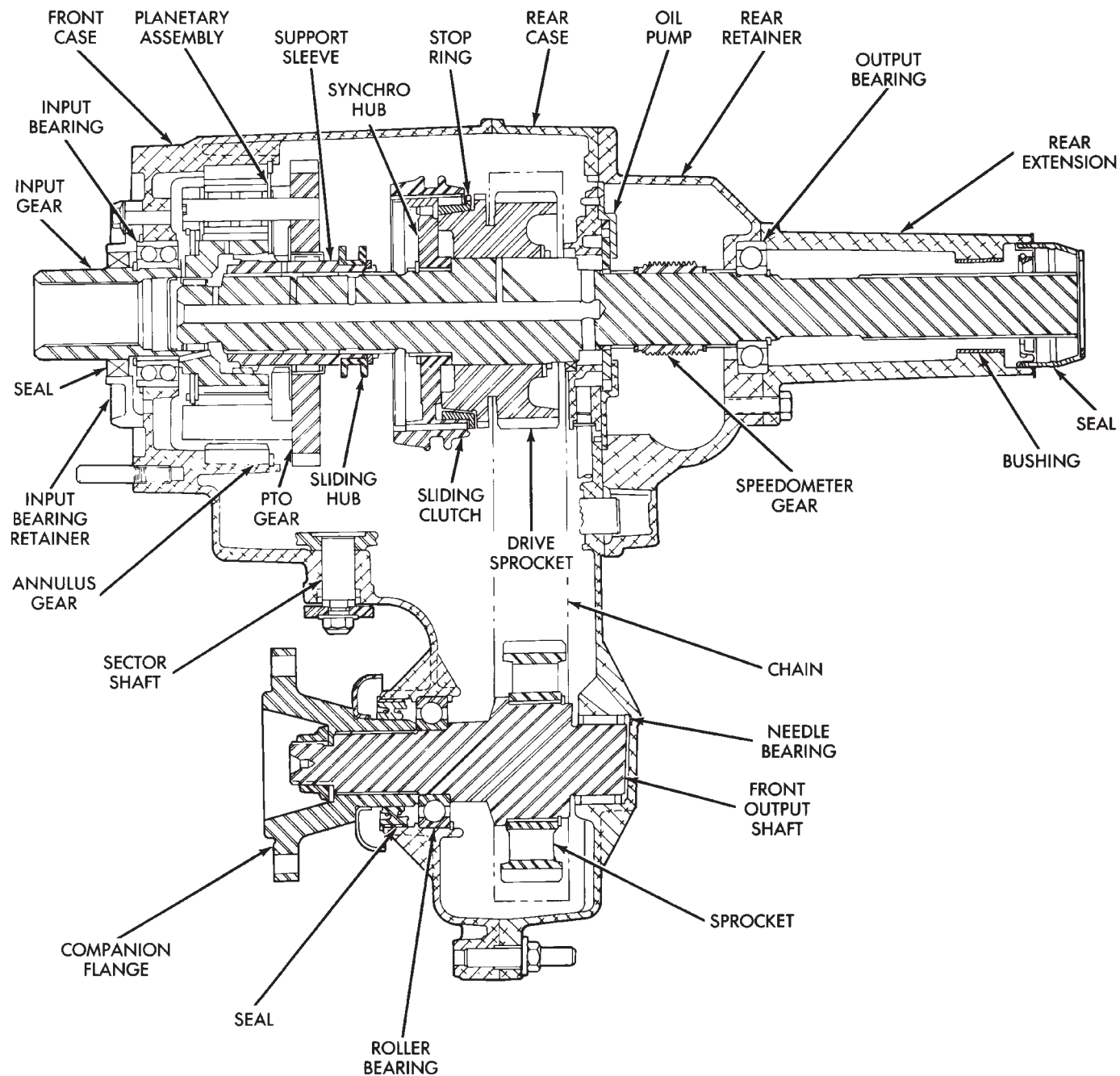
A front axle disconnect system is used to achieve two-wheel drive mode. The axle disconnect vacuum motor is actuated by a vacuum switch on the transfer case. The switch is operated by the transfer case range rod.

SHIFT MECHANISM

The transfer case is operated by an adjustable floor mounted shift linkage. The transfer case shift lever is directly attached to the shift sector. The sector operates the range and mode forks within the transfer case.

A straight line shift pattern is used with a neutral detent. Lever range positions are imprinted in the shift knob.

GENERAL INFORMATION (Continued)



J9421-230

Fig. 1 NV241HD Transfer Case

GENERAL INFORMATION (Continued)

PTO CAPABILITY

The NV241HD transfer case has power take-off capability. A PTO gear permanently attached to the planetary carrier, and a removable PTO cover are provided for this purpose.

TRANSFER CASE IDENTIFICATION

An identification tag (Fig. 2) is attached to the rear case of every transfer case. The 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.

RECOMMENDED LUBRICANT AND FILL LEVEL

Recommended lubricant for the NV241HD transfer case is Mopar® Dexron II, or ATF Plus. Use this fluid for topping off the level, refilling after service, or normal fluid changes.

Do not use anti-friction additives or similar products in the NV241HD transfer case. Use recommended lubricant only.

Approximate lubricant refill capacity is 3.1 liters (6.5 pints) for the NV241HD.

Correct fluid level for the transfer case is to the bottom edge of the fill plug hole. Be sure that the vehicle is level when checking the fill level.

DIAGNOSIS AND TESTING

SERVICE DIAGNOSIS

Before beginning repair on a suspected transfer case malfunction, check all other driveline components beforehand.

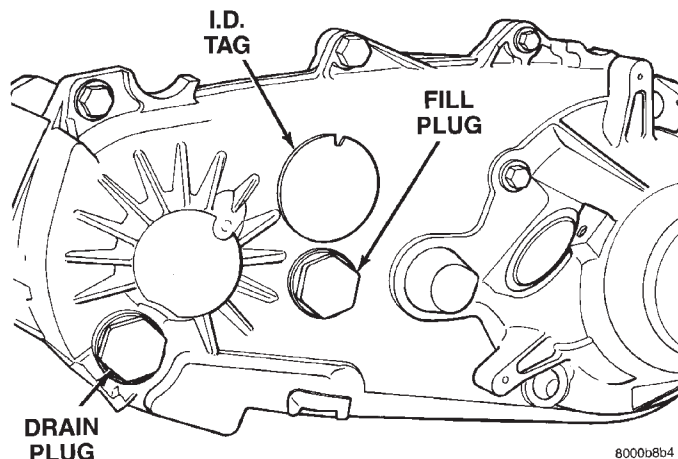


Fig. 2 Transfer Case Identification Tag—Typical

The actual cause of a problem may be related to such items as: front hubs, axles, propeller shafts, wheels and tires, transmission, or clutch instead. If all other driveline components are in good condition and operating properly, refer to the Service Diagnosis chart for further information.

DIAGNOSIS AND TESTING (Continued)

SERVICE DIAGNOSIS

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 extended period in 4H mode on dry paved surface, driveline torque load may cause difficulty. (3) Transfer case external shift linkage binding. (4) Insufficient or incorrect lubricant. (5) Internal components binding, worn or damaged.	(1) Stop vehicle and shift into desired range. Or reduce speed to 3-4 km/h (2-3 mph) before attempting to shift. (2) Stop vehicle, shift transmission to Neutral, shift transfer case to 2H mode and operate vehicle in 2H on dry paved surfaces. (3) Lubricate, repair or replace linkage bushings or tighten loose components as necessary. (4) Drain and refill to edge of fill hole with DEXRON II® or MOPAR-MERCON® Automatic Transmission Fluid. (5) Disassemble unit and replace worn or damaged components as necessary.
TRANSFER CASE NOISY IN ALL DRIVE MODES	(1) Insufficient or incorrect lubricant.	(1) Drain and refill to edge of fill hole with DEXRON II® or MOPAR-MERCON® Automatic Transmission Fluid. Check for leaks and repair if necessary. Note: If unit is still noisy after drain and refill, disassembly and inspection may be required to locate source of noise.
NOISY IN – OR JUMPS OUT OF – FOUR WHEEL DRIVE LOW RANGE	(1) Transfer case not completely engaged in 4L position. (2) Shift linkage out of adjustment. (3) Shift linkage loose or binding. (4) Range fork damaged, inserts worn, or fork is binding on shift rail. (5) Low range gear worn or damaged.	(1) Stop vehicle, shift transfer case to Neutral, then shift back into 4L position. (2) Adjust linkage. (3) Tighten, lubricate or repair linkage as necessary. (4) Disassemble unit and repair as necessary. (5) Disassemble and repair as necessary.
LUBRICANT LEAKING FROM OUTPUT SHAFT SEALS OR FROM VENT	(1) Transfer case overfilled. (2) Vent closed or restricted. (3) Output shaft seals damaged or installed incorrectly.	(1) Drain to correct level. (2) Clear or replace vent if necessary. (3) Replace seals. Be sure seal lip faces interior of case when installed. Also be sure yoke seal surfaces are not scored or nicked. Remove scores and nicks with fine sandpaper or replace yoke(s) if necessary.
ABNORMAL TIRE WEAR	(1) Extended operation on dry hard surface (paved) roads in 4H range.	(1) Operate in 2H on hard surface (paved) roads.

SERVICE PROCEDURES

FLUID DRAIN/REFILL

- (1) Raise vehicle.
- (2) Position drain pan under transfer case.
- (3) Remove drain and fill plugs and drain lubricant completely.
- (4) Install drain plug. Tighten plug to 41-54 N·m (30-40 ft. lbs.).
- (5) Remove drain pan.
- (6) Fill transfer case to bottom edge of fill plug opening with Mopar® Dexron II.
- (7) Install and tighten fill plug to 41-54 N·m (30-40 ft. lbs.).
- (8) Lower vehicle.

REMOVAL AND INSTALLATION

TRANSFER CASE

REMOVAL

- (1) Raise and support vehicle.
- (2) Remove skid plate, if equipped.
- (3) Position drain oil container under transfer case.
- (4) Remove transfer case drain plug and drain lubricant into container.
- (5) Disconnect vent hose and vacuum harness at transfer case switch.
- (6) Disconnect shift rod from grommet in transfer case shift lever, or from floor shift arm whichever provides easy access. Use channel lock style pliers to press rod out of lever grommet.
- (7) Support transmission with jack stand.
- (8) Remove rear crossmember.
- (9) Mark front and rear propeller shafts for assembly reference.
- (10) Remove front and rear propeller shafts.
- (11) Support transfer case with suitable jack. Secure transfer case to jack with safety chains.
- (12) Remove nuts attaching transfer case to transmission.
- (13) Move transfer case assembly rearward until free of transmission output shaft.
- (14) Lower jack and move transfer case from under vehicle.

INSTALLATION

- (1) Align and seat transfer case on transmission. Be sure transfer case input gear splines are aligned with transmission output shaft. Align splines by rotating transfer case rear output shaft yoke if necessary. Do not install any transfer case attaching nuts until the transfer case is completely seated against the transmission.

- (2) Install and tighten transfer case attaching nuts. If case has 5/16 in. studs, tighten nuts to 30-41 N·m (22-30 ft. lbs.). If case has 3/8 studs, tighten nuts to 41-47 N·m (30-35 ft. lbs.).
- (3) Install rear crossmember.
- (4) Remove jack stand from under transmission.
- (5) Align and connect propeller shafts.
- (6) Connect vacuum harness and vent hose.
- (7) Connect shift rod to transfer case lever or floor shift arm. Use channel lock style pliers to press rod back into lever grommet.
- (8) Adjust shift linkage, if necessary.
- (9) Fill transfer case with recommended transmission fluid and install fill plug.
- (10) Install skid plate, if equipped.
- (11) Lower vehicle

SHIFT LEVER

REMOVAL

- (1) Shift transfer case into 4L.
- (2) Remove transfer case shifter knob cap.
- (3) Remove nut holding shifter knob to shift lever.
- (4) Remove shifter knob.
- (5) Raise and support vehicle.
- (6) Loosen adjusting trunnion lock bolt and slide shift rod out of trunnion. If rod lacks enough travel to come out of trunnion, push trunnion out of shift lever.
- (7) Remove bolts holding shift lever to the underside of the body.
- (8) Separate shift lever from vehicle.

INSTALLATION

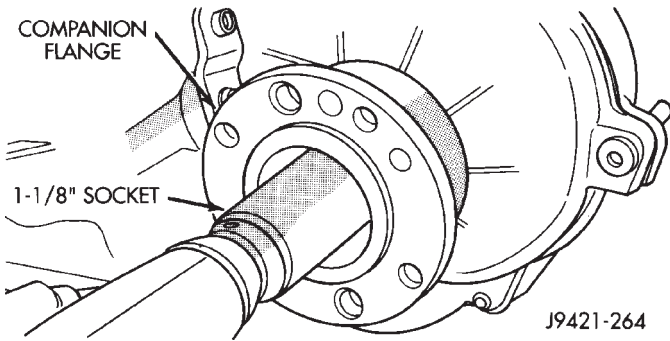
- (1) Position shift lever on vehicle. Use care when passing the shift lever through the shifter boot to prevent damage to the shifter boot.
- (2) Install bolts to hold shift lever to the underside of the body.
- (3) Install trunnion to shift lever, if necessary.
- (4) Install shift rod to trunnion, if necessary.
- (5) Lower vehicle.
- (6) Install shift knob on shift lever.
- (7) Install nut to hold shifter knob to shift lever.
- (8) Install shifter knob cap.
- (9) Adjust the transfer case shift linkage.
- (10) Verify transfer case operation.

FRONT OUTPUT SHAFT SEAL

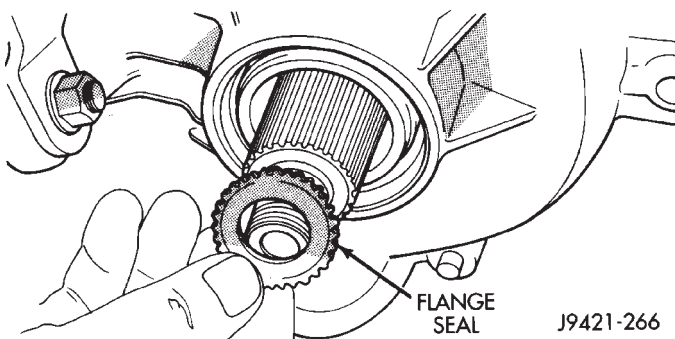
REMOVAL

- (1) Shift transfer case into neutral.
- (2) Remove companion flange nut (Fig. 3). Discard nut after removal. It is not reusable.
- (3) Remove companion flange from output shaft. Use a suitable puller if flange can not be removed by hand.

REMOVAL AND INSTALLATION (Continued)

**Fig. 3 Removing Companion Flange Nut**

(4) Remove companion flange rubber seal from front output shaft (Fig. 4).

**Fig. 4 Companion Flange Seal Removal**

(5) Remove front output shaft seal with suitable pry tool, or a slide hammer mounted screw.

INSTALLATION

(1) Install new front output seal in front case with Installer Tool 6888 and Tool Handle C-4171 (Fig. 5) as follows:

(a) Place new seal on tool. Garter spring on seal goes toward interior of case.

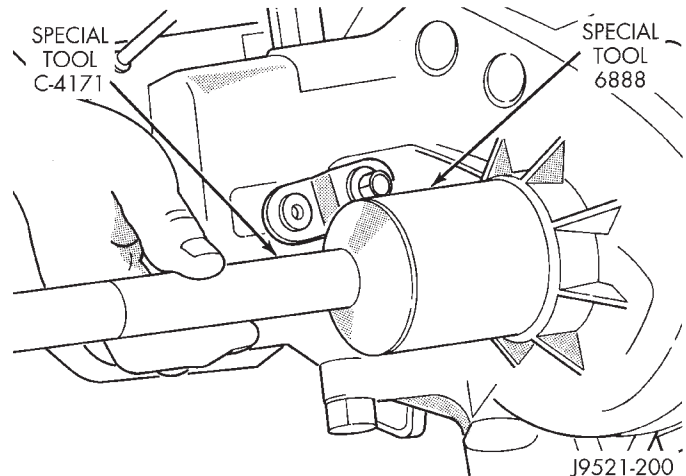
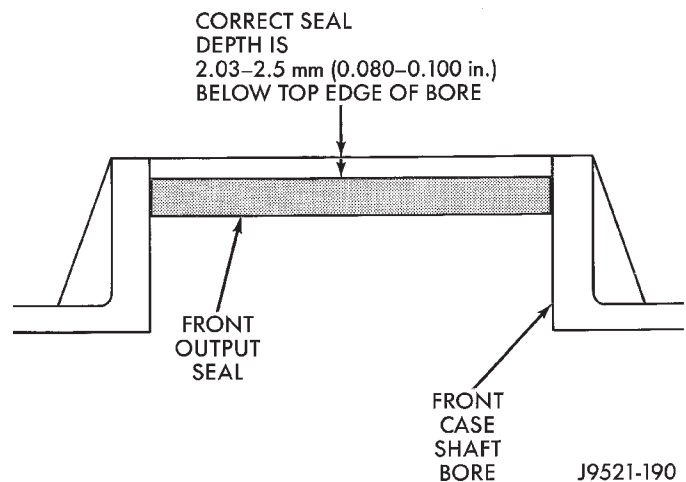
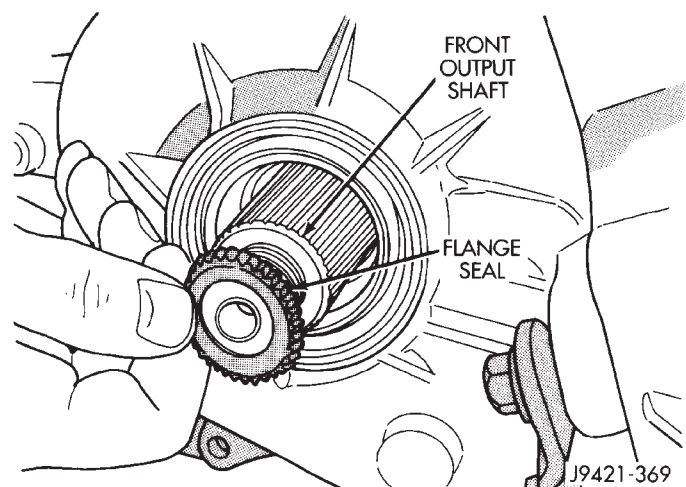
(b) Start seal in bore. Once seal is started, continue tapping seal into bore until installer tool bottoms against case.

(c) Remove installer and verify that seal is recessed the proper amount. Seal should be 2.03 to 2.5 mm (0.080 to 0.100 in.) below top edge of seal bore in front case (Fig. 6). This is correct final seal position.

CAUTION: Be sure the front output seal is seated below the top edge of the case bore as shown. The seal could loosen, or become cocked if not seated to recommended depth.

(2) Install companion flange seal on front shaft (Fig. 7).

(3) Install companion flange on front shaft (Fig. 8). Then install and tighten flange nut to 176-271 N·m (130-200 ft. lbs.) torque.

**Fig. 5 Front Output Seal Installation****Fig. 6 Checking Front Output Seal Installation Depth****Fig. 7 Installing Flange Seal On Front Shaft**

REMOVAL AND INSTALLATION (Continued)

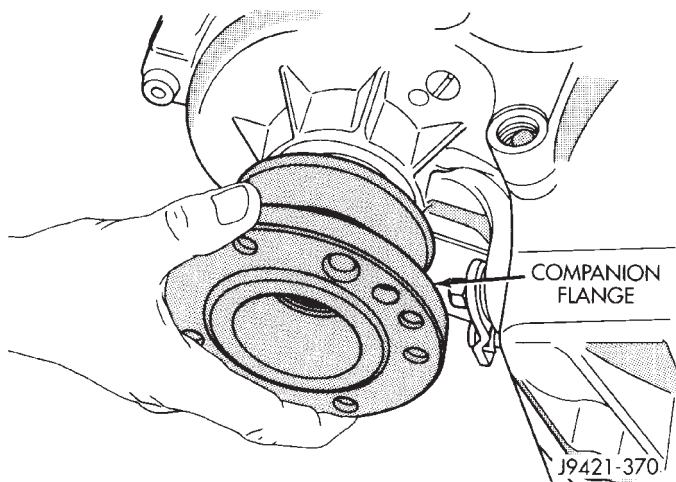


Fig. 8 Installing Companion Flange On Front Shaft
EXTENSION HOUSING BUSHING AND SEAL

REMOVAL

- (1) Raise and support vehicle.
- (2) Remove rear propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedure.
- (3) Using a suitable pry tool or slide-hammer mounted screw, remove the extension housing seal.
- (4) Using Remover 8155, remove bushing from extension housing (Fig. 9).

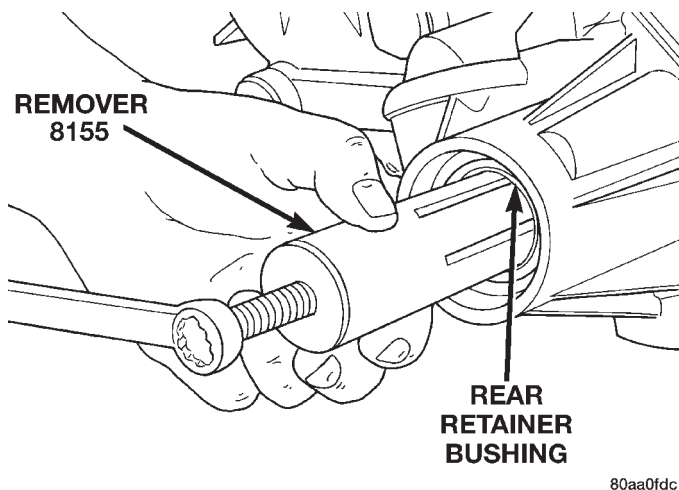


Fig. 9 Rear Retainer Bushing Removal

INSTALLATION

- (1) Clean fluid residue from sealing surface and inspect for defects.
- (2) Position replacement bushing in extension housing with fluid port in bushing aligned with slot in housing.
- (3) Using Installer 8156, drive bushing into housing until installer seats against case (Fig. 10).
- (4) Using Installer 8154, install seal in extension housing (Fig. 11).
- (5) Install propeller shaft.

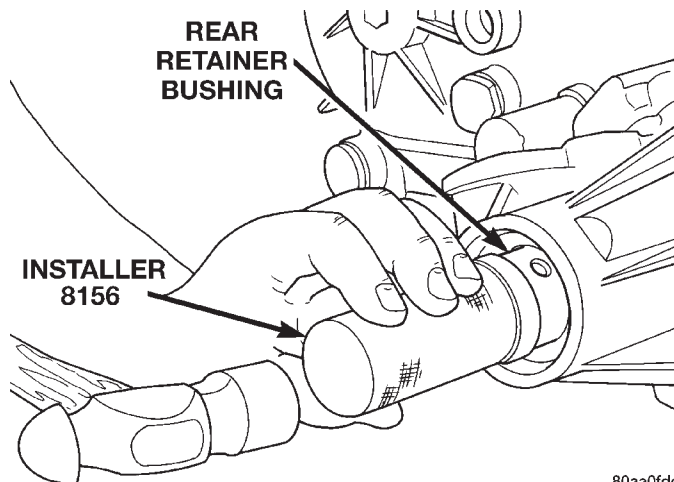


Fig. 10 Extension Housing Bushing Install

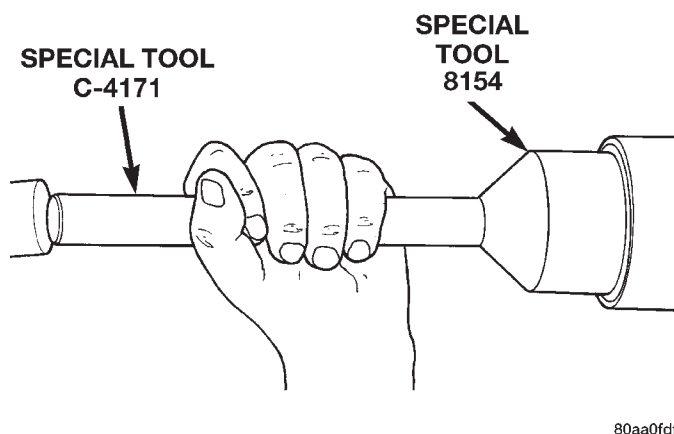


Fig. 11 Install Extension Housing Seal

- (6) Verify proper fluid level.
- (7) Lower vehicle.

DISASSEMBLY AND ASSEMBLY

TRANSFER CASE

DISASSEMBLY

Position transfer case in a shallow drain pan. Remove drain plug and drain any remaining lubricant remaining in case.

EXTENSION HOUSING REMOVAL

- (1) Remove extension housing snap ring access cover.
- (2) Remove bolts holding extension housing to rear case half.
- (3) Tap extension housing with plastic or rawhide hammer to loosen sealant.
- (4) Disengage extension housing snap ring from rear output shaft bearing.

DISASSEMBLY AND ASSEMBLY (Continued)

- (5) Separate extension housing from transfer case.

COMPANION FLANGE AND SHIFT LEVER REMOVAL

- (1) Shift transfer case into neutral.
 (2) Remove companion flange nut (Fig. 12). Discard nut after removal. It is not reusable.

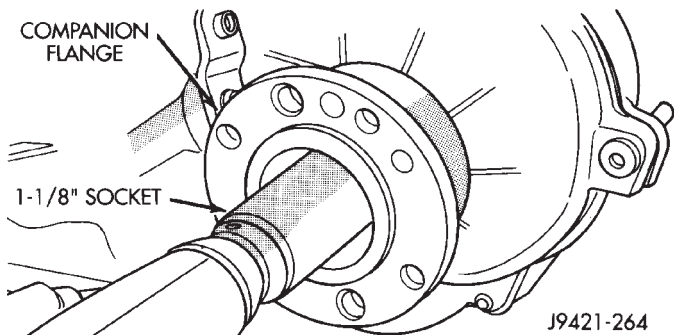


Fig. 12 Removing Companion Flange Nut

- (3) Remove companion flange from front output shaft. Use a suitable puller if flange can not be removed by hand.
 (4) Remove companion flange rubber seal from front output shaft (Fig. 13).

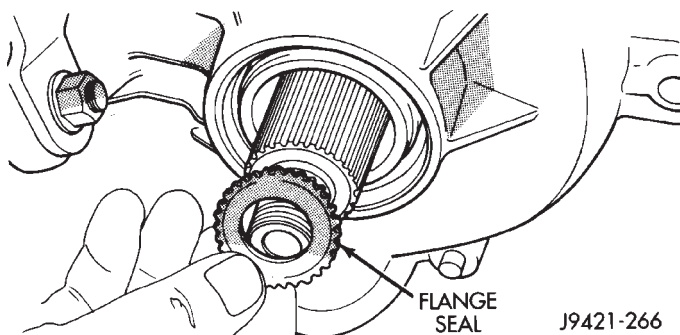


Fig. 13 Companion Flange Seal Removal

- (5) Remove nut and washer that retain shift lever to sector shaft. Then remove shift lever from shaft (Fig. 14).

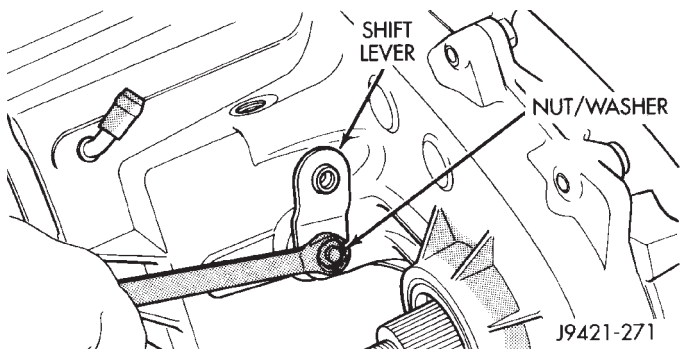


Fig. 14 Shift Lever Removal

FRONT OUTPUT SHAFT AND DRIVE CHAIN REMOVAL

- (1) Remove output bearing retaining ring with heavy duty snap ring pliers.
 (2) Remove output shaft bearing.
 (3) Note position of bolts that attach rear case to front case (Fig. 15). Some bolts/studs at ends of case require flat washers. Mark position of these bolts with paint or scribe.
 (4) Remove rear case-to-front case bolts.

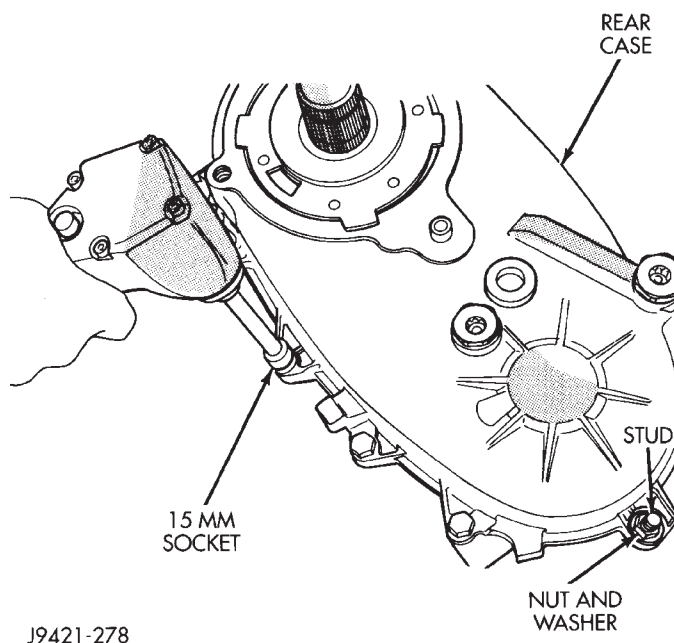


Fig. 15 Removing Case Attaching Bolts

- (5) Loosen rear case with pry tool to break sealer bead. Insert tool in slot at each end of case (Fig. 16).

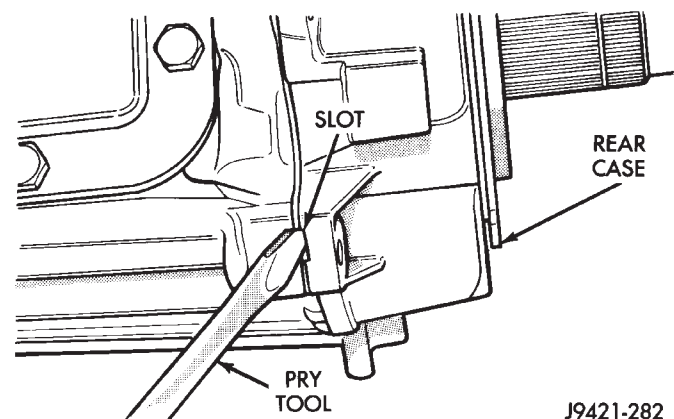
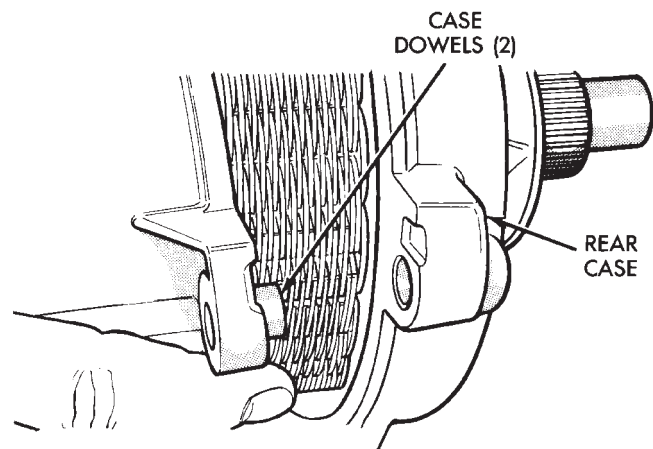


Fig. 16 Loosening Rear Case (Breaking Sealer Bead)

DISASSEMBLY AND ASSEMBLY (Continued)

- (6) Unseat rear case from alignment dowels (Fig. 17).

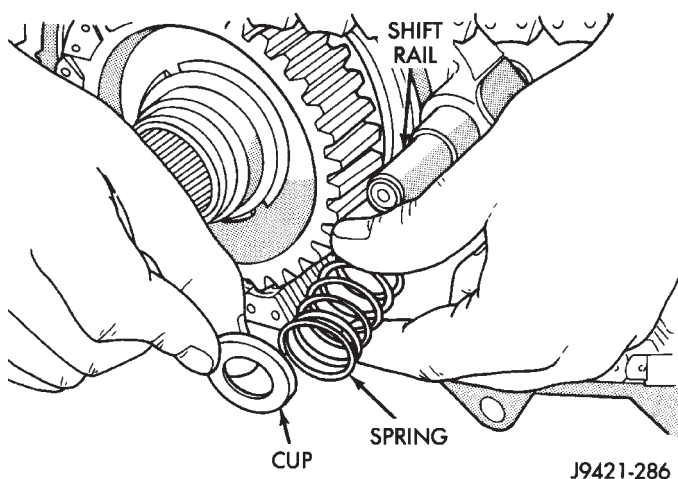


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Fig. 17 Removing Rear Case From Alignment Dowels

- (7) Remove rear case and oil pump assembly from front case.

- (8) Remove shift rail cup and spring (Fig. 18).



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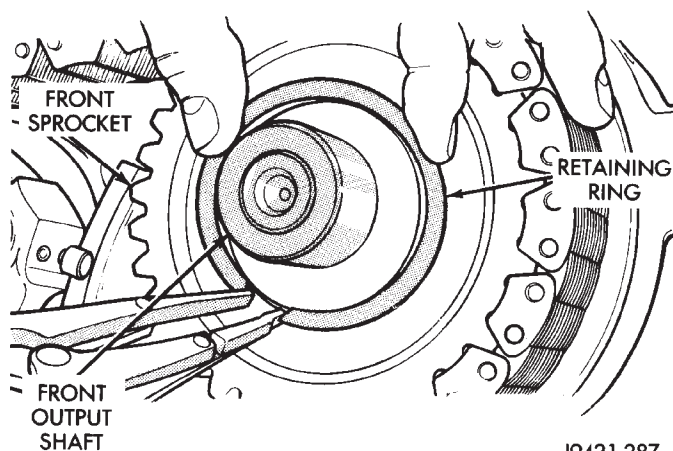
Fig. 18 Shift Rail Cup And Spring Removal

- (9) Remove front sprocket retaining ring (Fig. 19).
 (10) Pull mainshaft, front sprocket and chain outward about 25.4 mm (1-inch) simultaneously (Fig. 20).

- (11) Remove chain from mainshaft drive sprocket and remove front sprocket and chain as assembly.

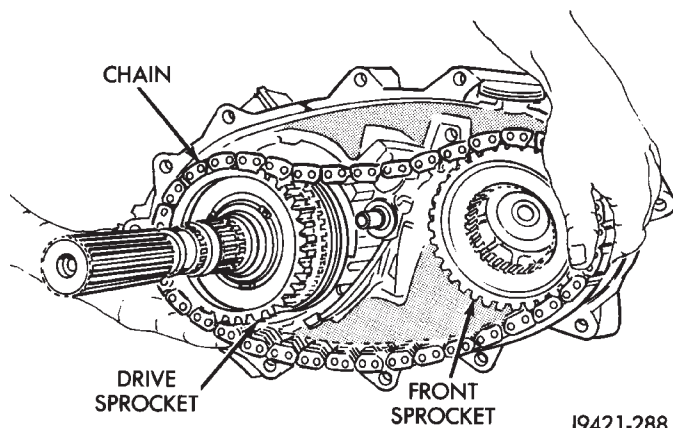
SHIFT FORK AND MAINSHAFT REMOVAL

- (1) Remove vacuum/indicator switch (Fig. 21).
 (2) Loosen poppet plunger screw (Fig. 22).



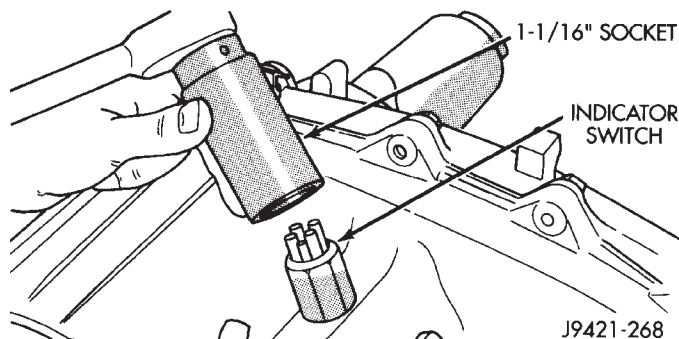
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Fig. 19 Removing Front Sprocket Retaining Ring



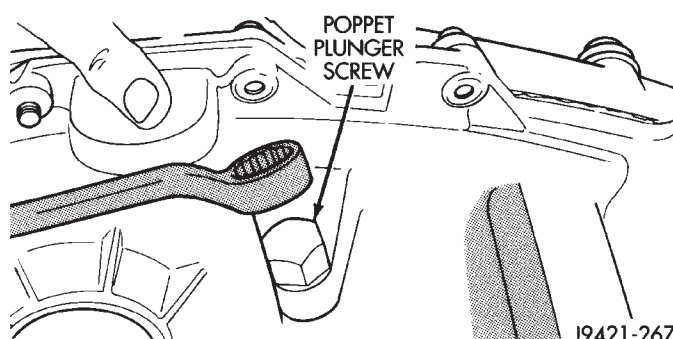
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Fig. 20 Removing Drive Chain And Front Sprocket



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Fig. 21 Vacuum/Indicator Switch Removal



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Fig. 22 Loosening Poppet Plunger Screw

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Remove poppet plunger screw and spring (Fig. 23). Note that screw has O-ring seal. Remove and discard this seal.

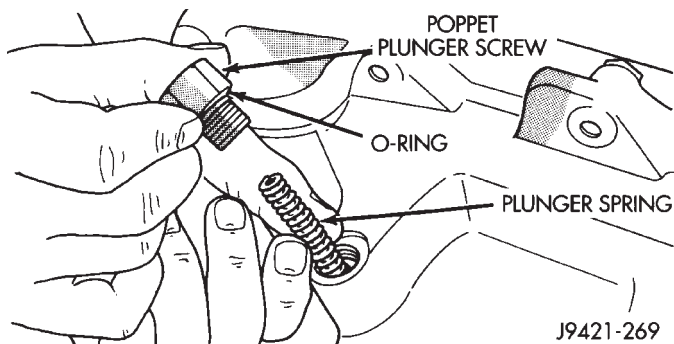


Fig. 23 Poppet Plunger Screw And Spring Removal

(4) Remove poppet plunger with magnet (Fig. 24).

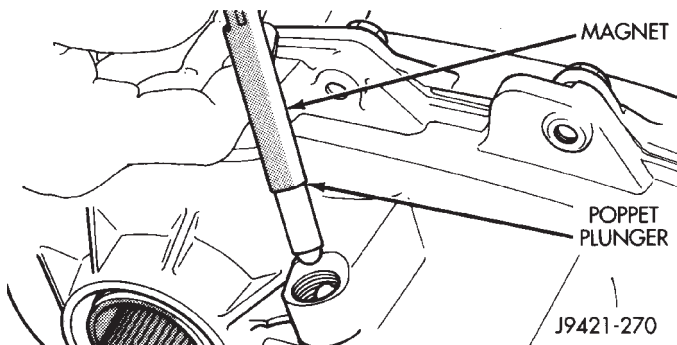


Fig. 24 Poppet Plunger Removal

(5) Remove front output shaft from bearing in case (Fig. 25).

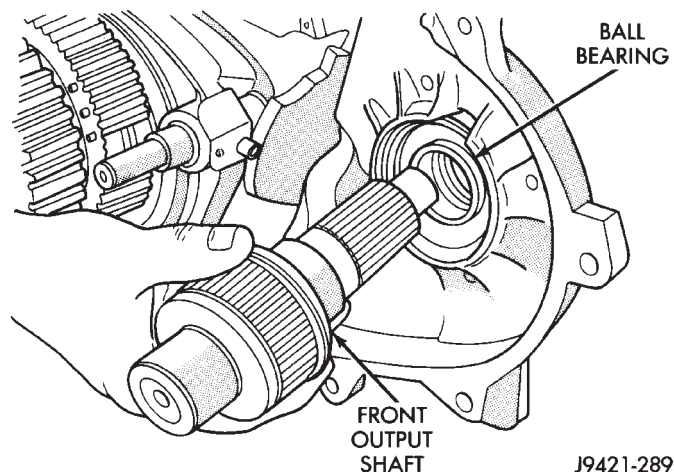


Fig. 25 Front Output Shaft Removal

(6) Pull mainshaft assembly out of input gear, sliding clutch and case (Fig. 26).

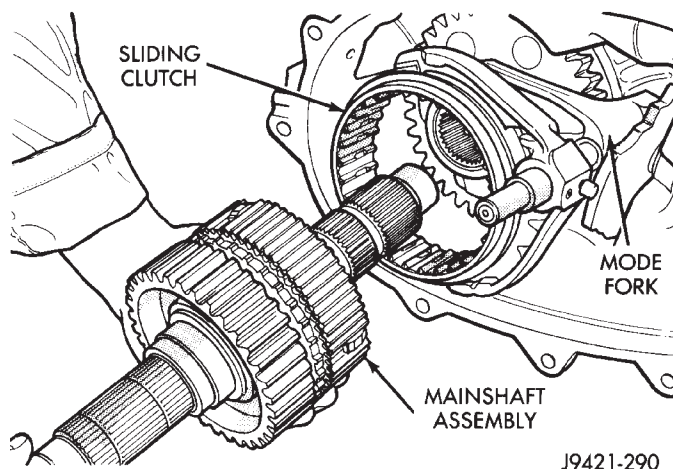


Fig. 26 Mainshaft Assembly Removal

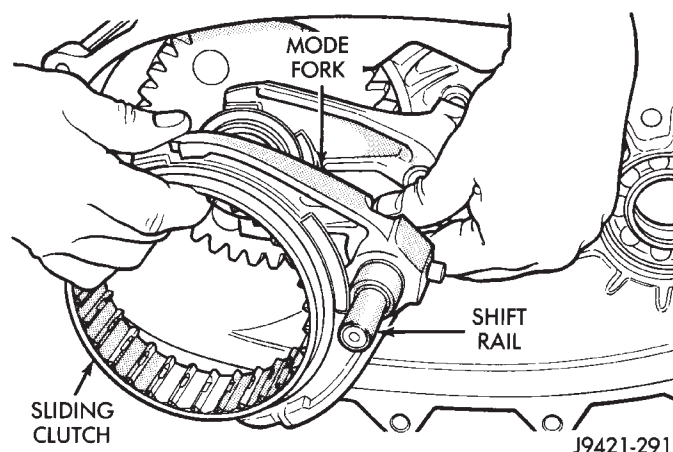


Fig. 27 Mode Fork, Shift Rail And Sliding Clutch Removal

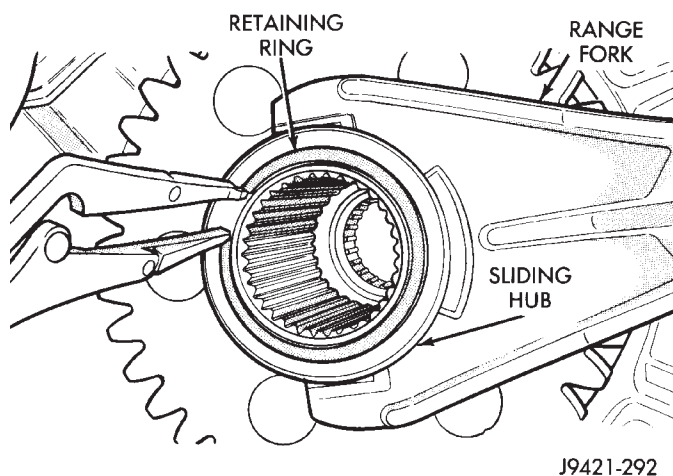


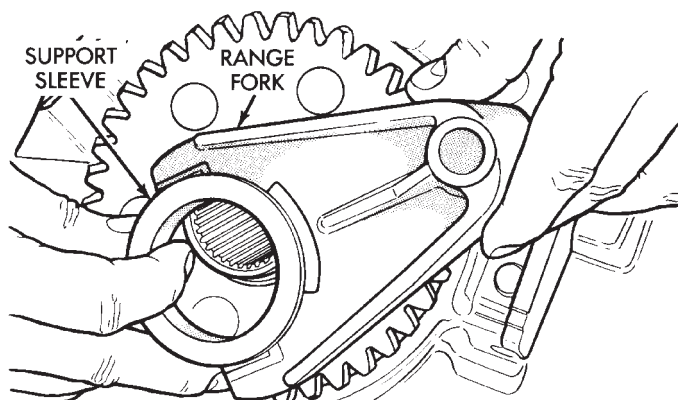
Fig. 28 Range Fork Retaining Ring Removal

(7) Remove mode fork, sliding clutch and shift rail as assembly (Fig. 27). Note which way clutch fits in fork (long side of clutch goes to front).

(8) Remove range fork retaining ring (Fig. 28).

DISASSEMBLY AND ASSEMBLY (Continued)

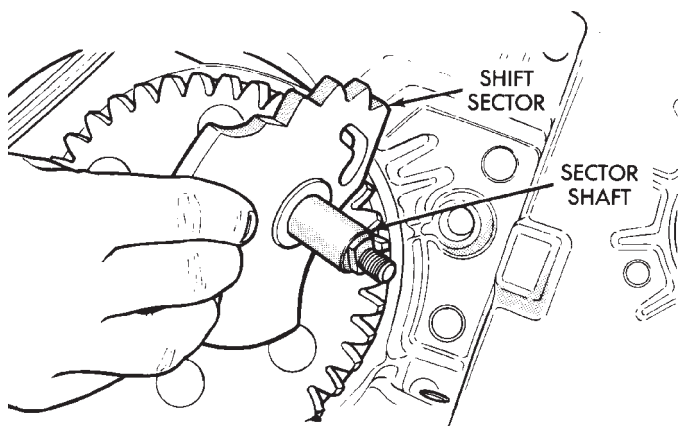
(9) Remove range fork and support sleeve assembly (Fig. 29).



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Fig. 29 Range Fork And Support Sleeve Removal

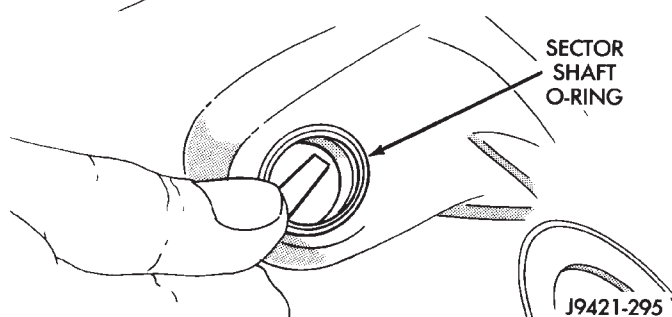
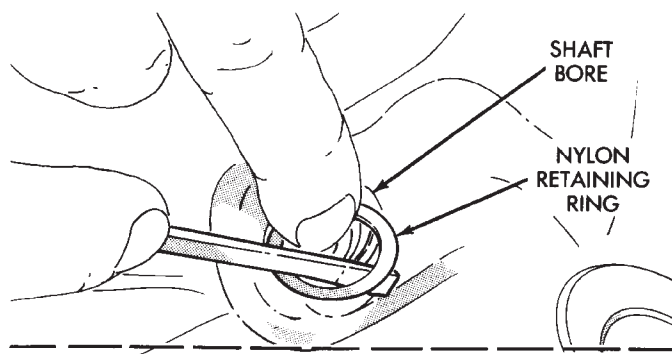
(10) Remove shift sector (Fig. 30).



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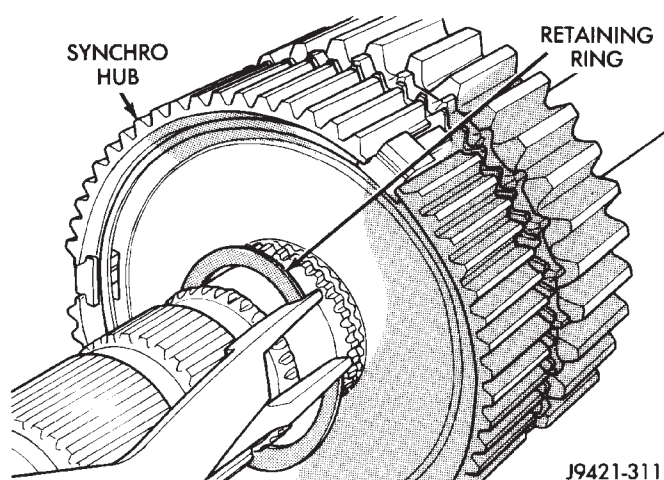
Fig. 30 Shift Sector Removal

(11) Remove shift sector shaft nylon retainer and O-ring from shaft bore in front case (Fig. 31).



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Fig. 31 Removing Sector Shaft O-Ring And Retainer



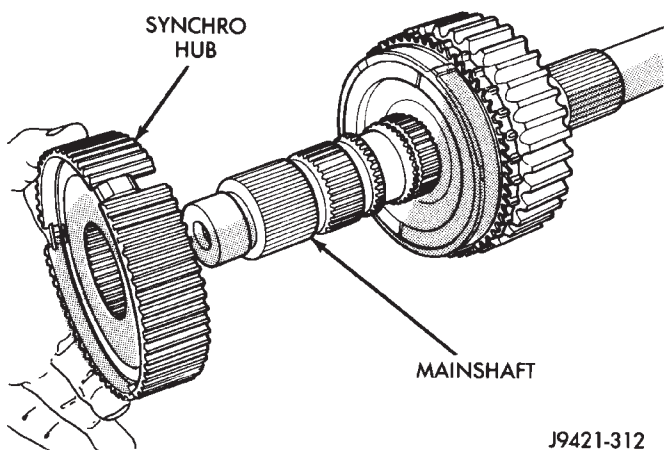
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Fig. 32 Synchro Hub Retaining Ring Removal

MAINSHAFT DISASSEMBLY

(1) Remove retaining ring that secures synchro hub on mainshaft (Fig. 32). Use standard (instead of parallel jaw) snap ring pliers to remove this retaining ring.

(2) Remove synchro hub (Fig. 33).



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Fig. 33 Synchro Hub Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Inspect synchro hub struts and springs. If struts appear worn, remove struts and springs from hub. Note position of springs for installation reference (Fig. 34).

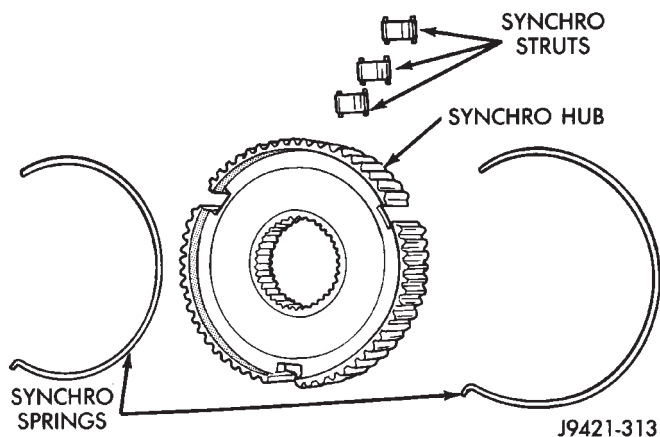


Fig. 34 Synchro Strut And Spring Removal

(4) Remove brass stop ring (Fig. 35). Discard stop ring if worn, cracked, or any teeth are missing.

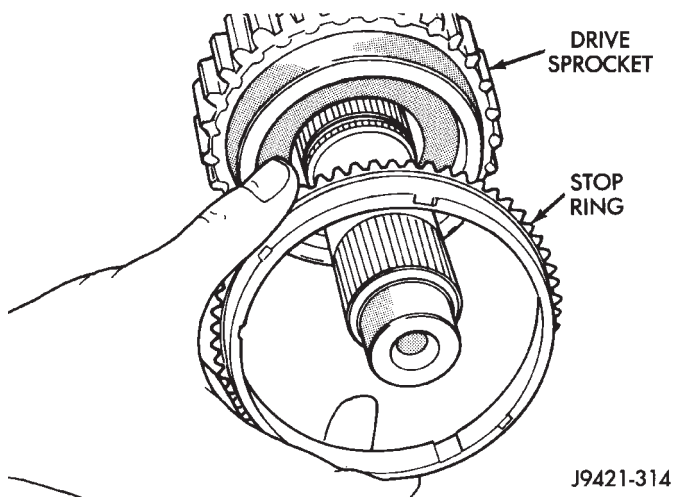


Fig. 35 Synchro Stop Ring Removal

(5) Remove drive sprocket (Fig. 36).

INPUT AND PLANETARY GEAR REMOVAL

(1) Remove input bearing retainer bolts (Fig. 37). A 10 mm socket is required.

(2) Loosen bearing retainer with pry tool. Insert tool in retainer slot as shown (Fig. 38). Then remove retainer.

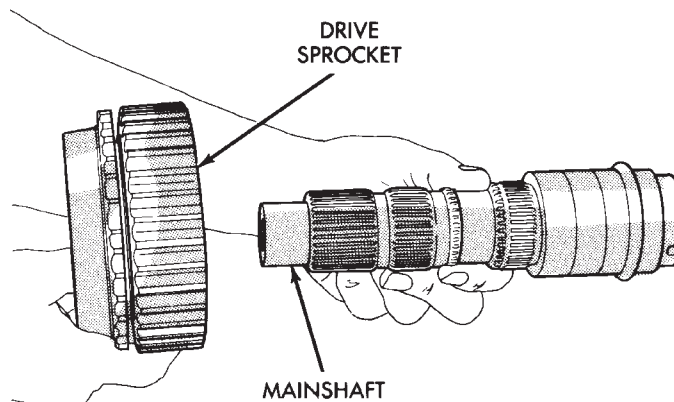


Fig. 36 Drive Sprocket Removal

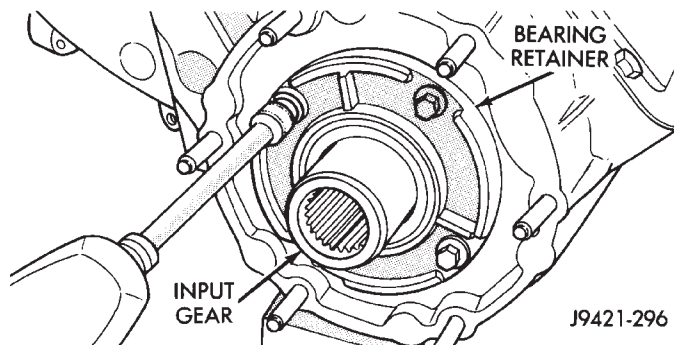


Fig. 37 Removing Input Bearing Retainer Bolts

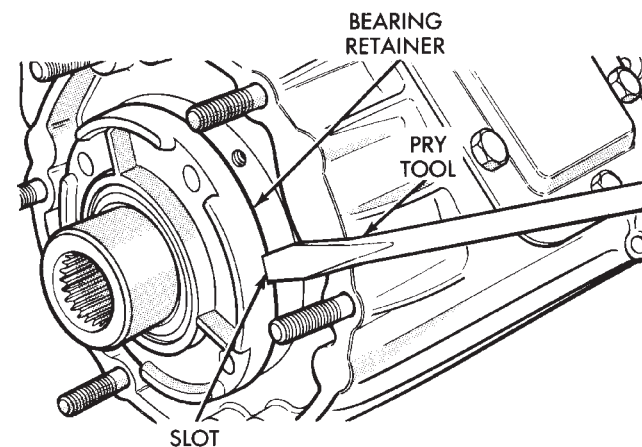


Fig. 38 Loosening/Removing Input Bearing Retainer

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Remove input gear retaining ring with heavy duty parallel jaw snap ring pliers (Fig. 39).

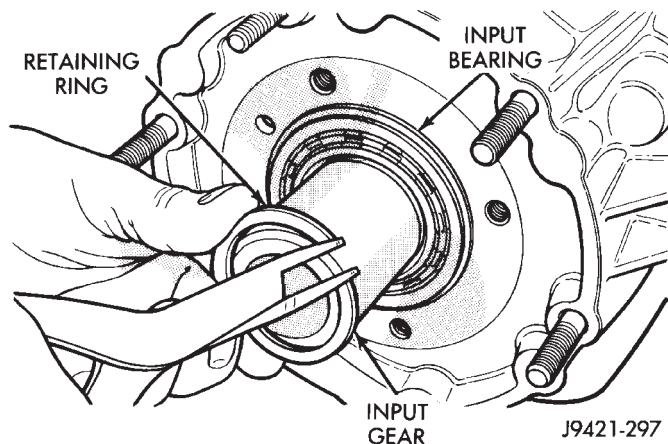


Fig. 39 Removing Input Gear Retaining Ring

(4) Tap input gear out of bearing with plastic mallet (Fig. 40).

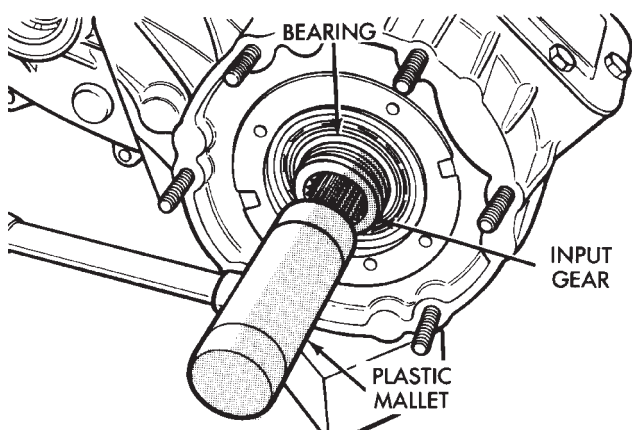


Fig. 40 Removing Input Gear Retaining Ring

(5) Remove input gear and planetary/PTO gear as assembly (Fig. 41).

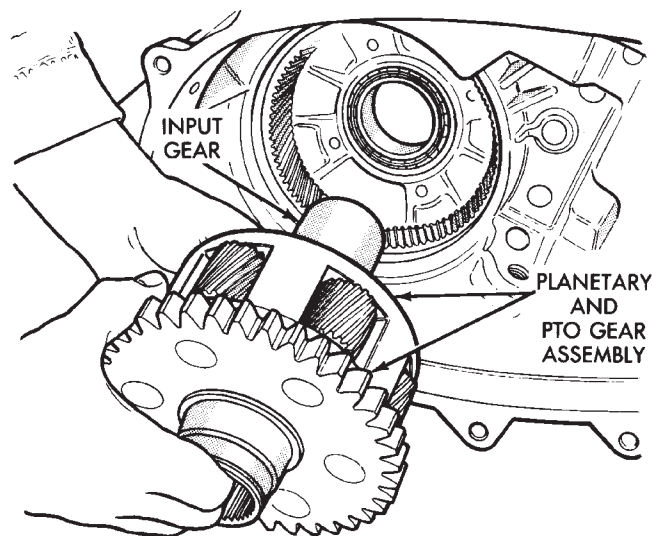


Fig. 41 Input Gear And Planetary Assembly Removal

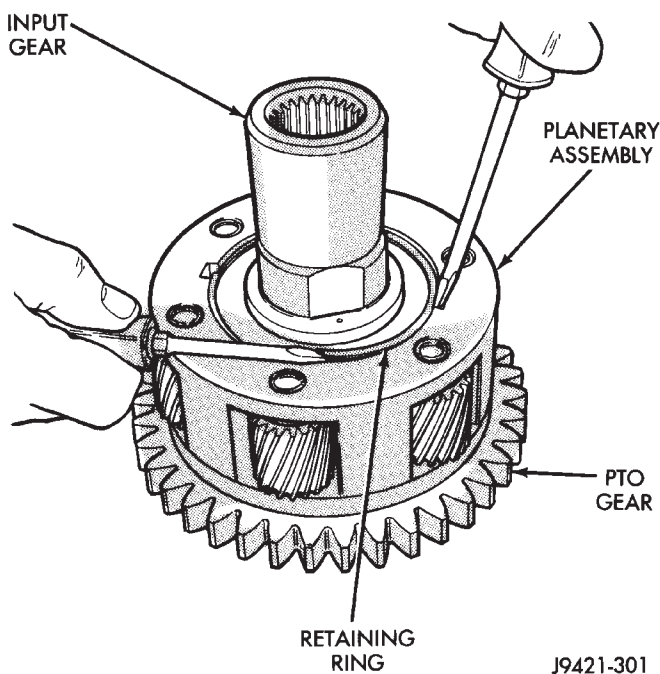


Fig. 42 Removing Lock Ring/Input Gear Retaining Ring

INPUT AND PLANETARY GEAR DISASSEMBLY

The only removable parts in the planetary assembly are the snap rings, needle bearing, thrust washers, lock ring, input gear, and support sleeve. **The planetary carrier, PTO gear, planetary pinions, and remaining planetary components are fixed parts and are serviced as an assembly.**

(1) Position planetary assembly so PTO gear is on bench (Fig. 42).

(2) Remove retaining ring that secures input gear and lock ring in planetary assembly.

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Remove lock ring and front thrust washer from carrier (Fig. 43). Note that lock ring and thrust washer are both tabbed.

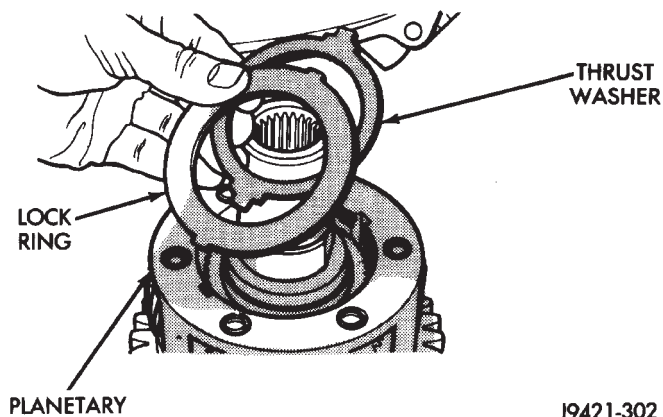


Fig. 43 Planetary Lock Ring And Front Thrust Washer Removal

(4) Remove input gear from planetary carrier (Fig. 44). Lift gear straight up and out of carrier.

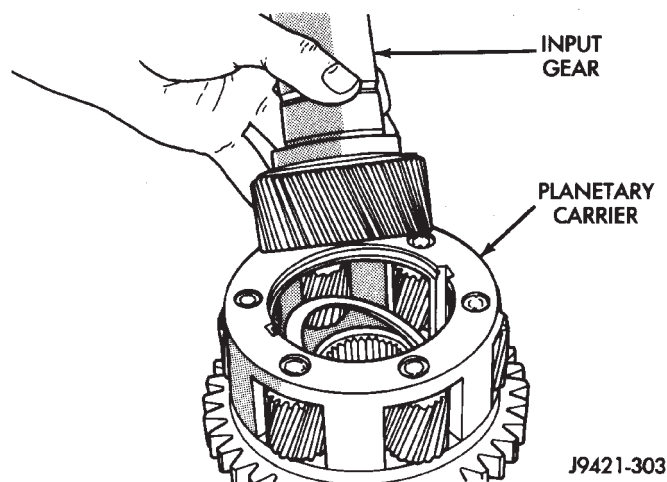


Fig. 44 Removing Input Gear From Planetary Carrier

- (5) Remove support sleeve from carrier (Fig. 45).
- (6) Remove rear thrust washer (Fig. 46).

ASSEMBLY

BEARING AND SEAL REPLACEMENT

(1) Using Remover C-4210 and Handle C-4171, drive input shaft bearing from case from inside annulus gear opening (Fig. 47).

(2) Install locating ring on new bearing.

(3) Position case so that the forward end is facing upward.

(4) Using Remover C-4210 and Handle C-4171, drive input shaft bearing into case. The bearing locating ring must be fully seated on case (Fig. 48).

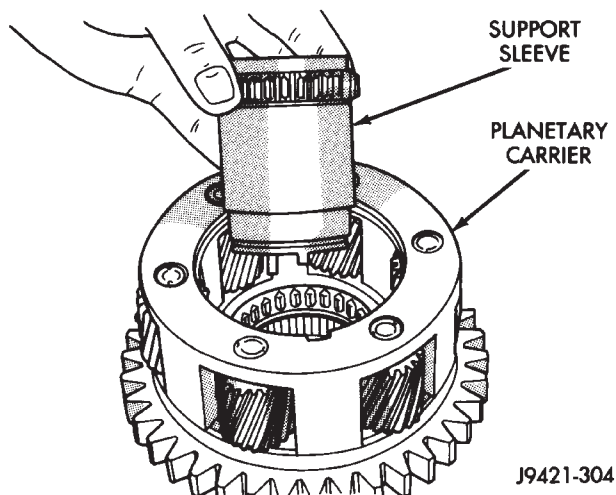


Fig. 45 Support Sleeve Removal

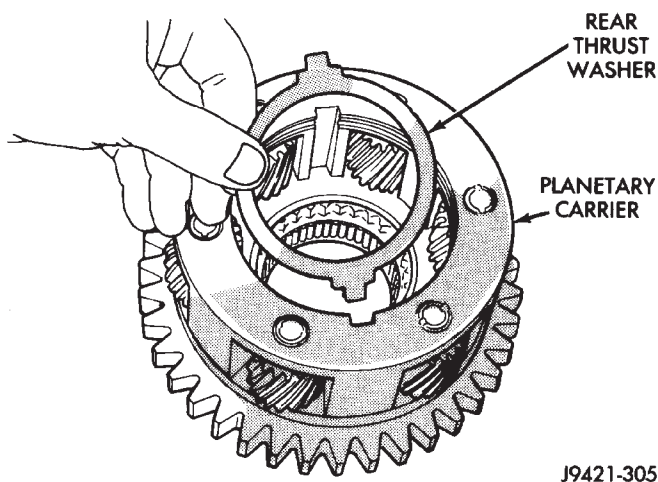


Fig. 46 Rear Thrust Washer Removal

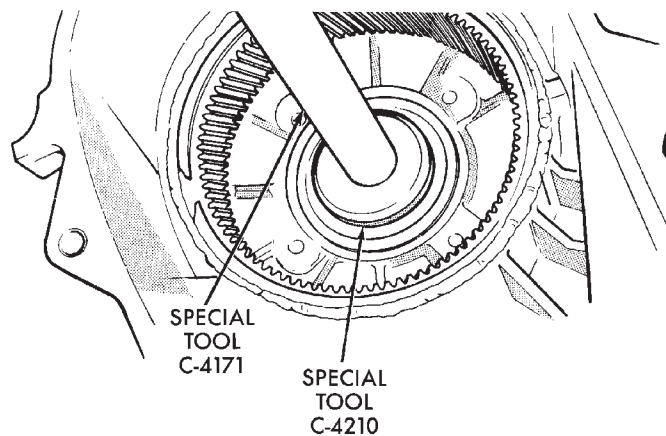
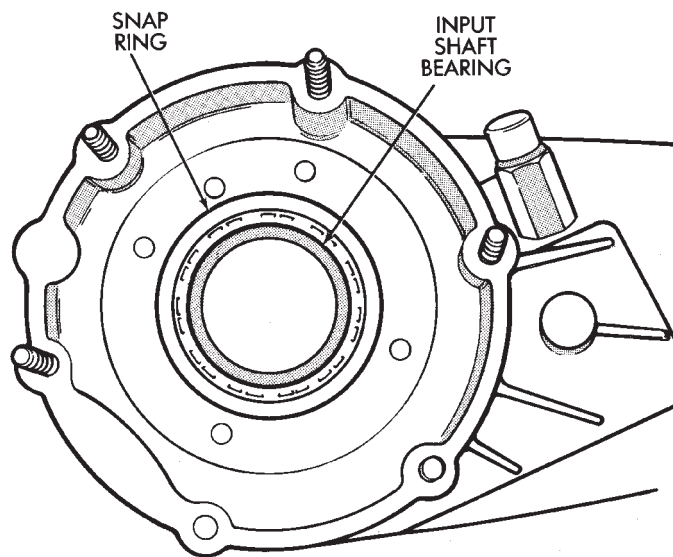


Fig. 47 Input Shaft Bearing Removal

(5) Using Installer 6953, remove front output shaft bearing.

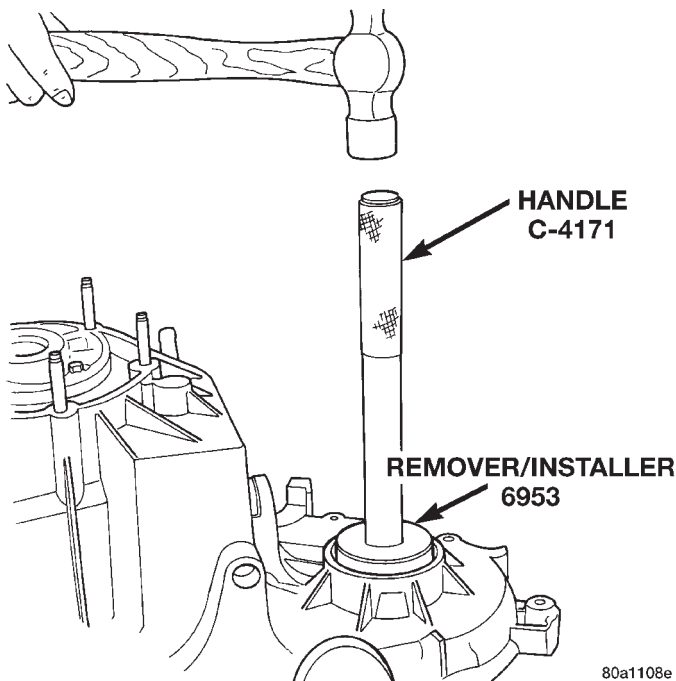
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-219

Fig. 48 Seating Input Shaft Bearing

5(6) Start front shaft output bearing in case (Fig. 49). Then seat bearing with Handle C-4171 and Installer 6953.



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Fig. 49 Front Output Bearing Installation

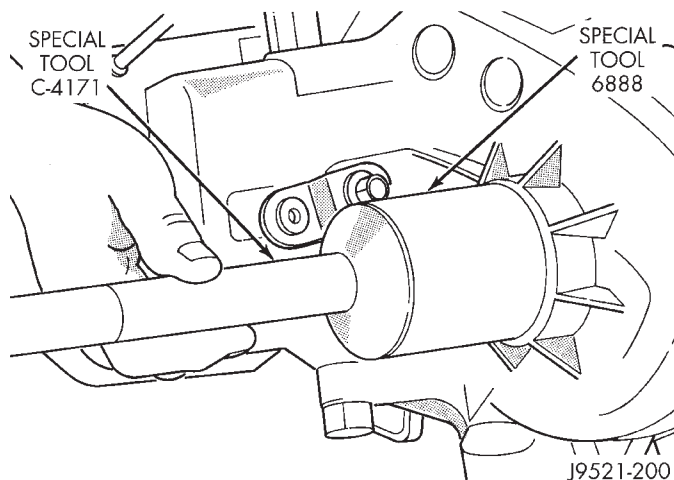
(7) Install front output bearing retaining ring.
 (8) Install new front output seal in front case with Installer Tool 6888 and Tool Handle C-4171 as follows:

(a) Place new seal on tool. **Garter spring on seal goes toward interior of case.**

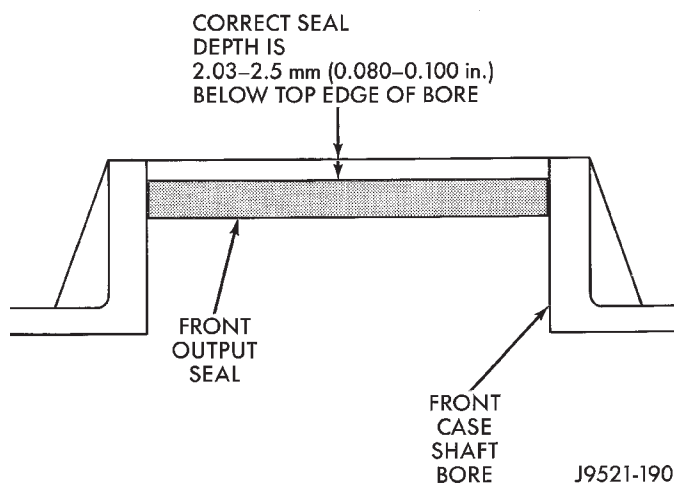
(b) Start seal in bore with light taps from hammer (Fig. 51). Once seal is started, continue tapping seal into bore until installer tool bottoms against case.

(c) Remove installer and verify that seal is recessed the proper amount. Seal should be 2.03 to 2.5 mm (0.080 to 0.100 in.) below top edge of seal bore in front case (Fig. 64). This is correct final seal position.

CAUTION: Be sure the front output seal is seated below the top edge of the case bore as shown. The seal could loosen, or become cocked if not seated to recommended depth.



J9521-200

Fig. 50 Front Output Seal Installation

J9521-190

Fig. 51 Checking Front Output Seal Installation Depth

DISASSEMBLY AND ASSEMBLY (Continued)

(9) Remove seal from front bearing retainer with suitable pry tool.

(10) Install new oil seal in front bearing retainer with Installer 7884 (Fig. 52).

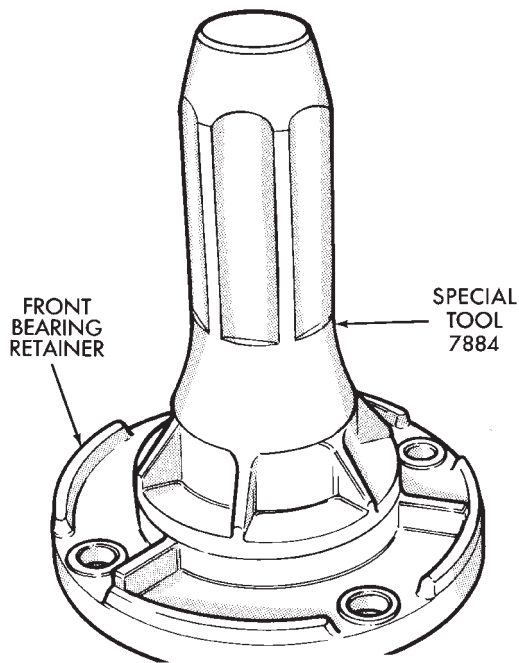


Fig. 52 Install Front Bearing Retainer Seal

(11) Remove seal from oil pump with suitable pry tool.

(12) Install new seal in oil pump with Installer 7888 (Fig. 53).

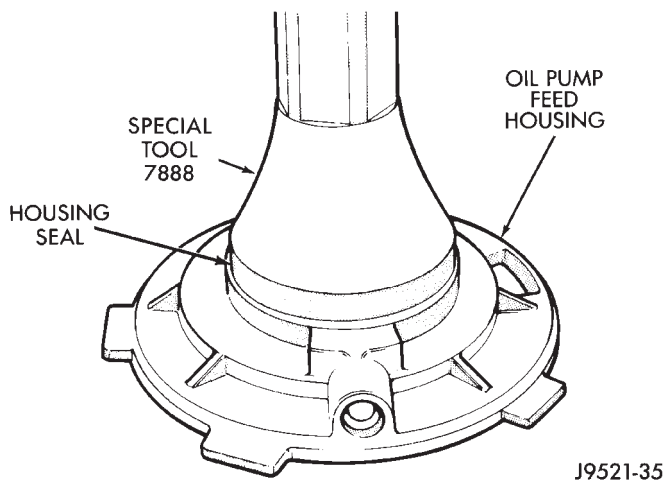


Fig. 53 Install Oil Pump Seal

(13) Inspect carrier needle bearing. If bearing is worn, rough, or damaged in any way, remove it with a brass punch and hammer (Fig. 54).

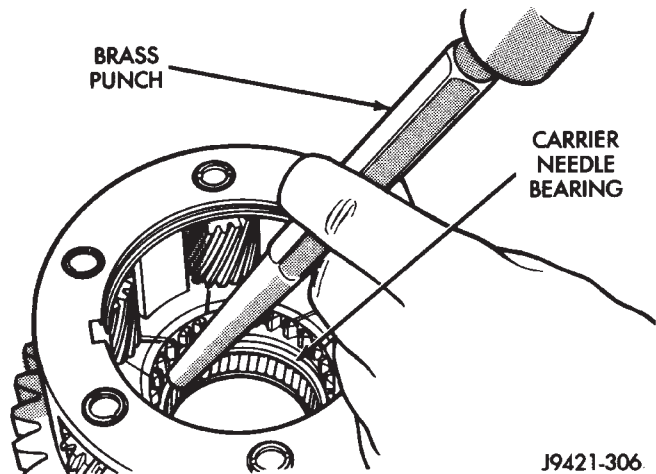


Fig. 54 Carrier Needle Bearing Removal

(14) Install new needle bearing in planetary carrier (Fig. 55). Use Handle C-4171 and Installer 5062 to install bearing.

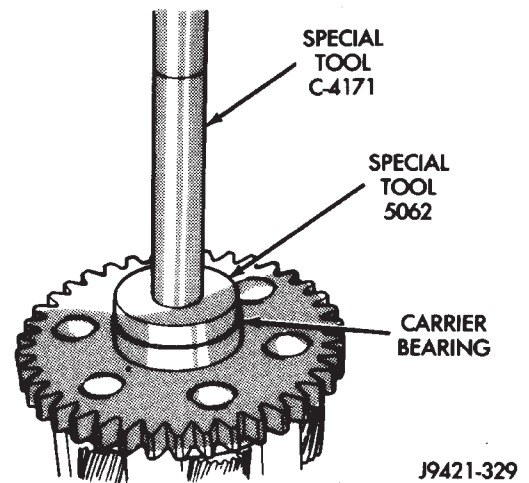
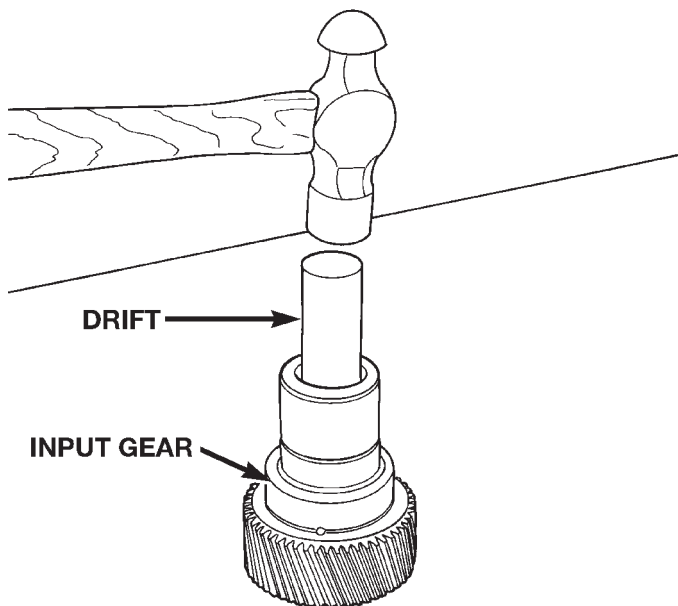


Fig. 55 Planetary Carrier Needle Bearing Installation

DISASSEMBLY AND ASSEMBLY (Continued)

(15) 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. 56).

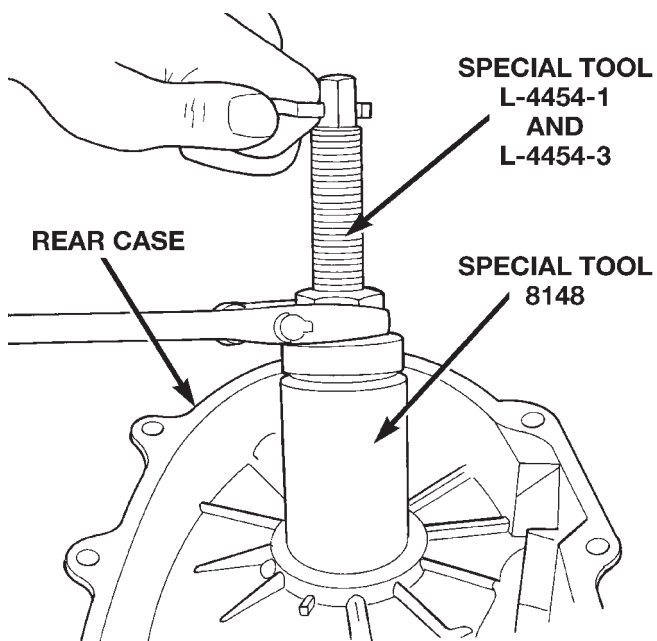
(16) Install new pilot bearing with Plug C-293-3.



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Fig. 56 Remove Input Gear Pilot Bearing

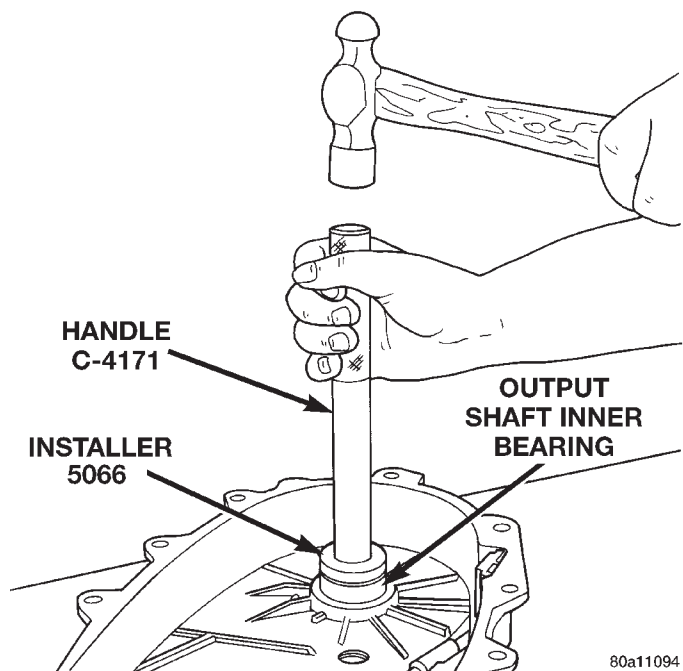
(17) Remove the output shaft rear bearing with the screw and jaws from Remover L-4454 and Cup 8148 (Fig. 57).



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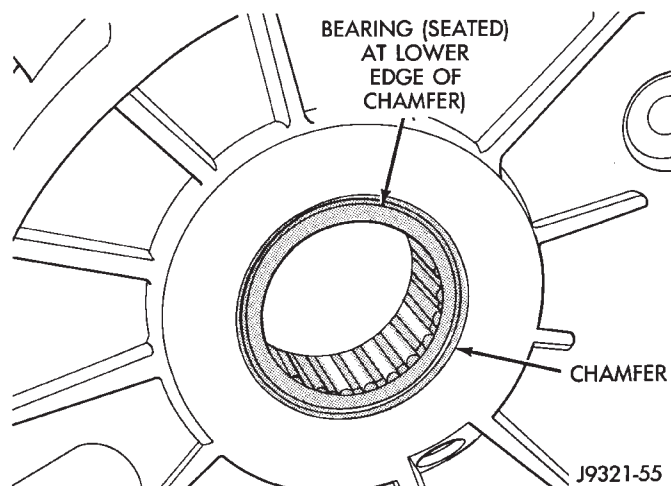
Fig. 57 Output Shaft Rear Bearing Removal

(18) Install new bearing with Tool Handle C-4171 and Installer 5066 (Fig. 58). The bearing bore is chamfered at the top. Install the bearing so it is flush with the lower edge of this chamfer (Fig. 59).



80a11094

Fig. 58 Output Shaft Rear Bearing Installation



J9321-55

Fig. 59 Output Shaft Rear Bearing Installation Depth

DISASSEMBLY AND ASSEMBLY (Continued)

INPUT AND PLANETARY GEAR ASSEMBLY

(1) Lubricate planetary components with transmission fluid.

(2) Install first thrust washer in carrier (Fig. 60). Lube washer with petroleum jelly before installation.

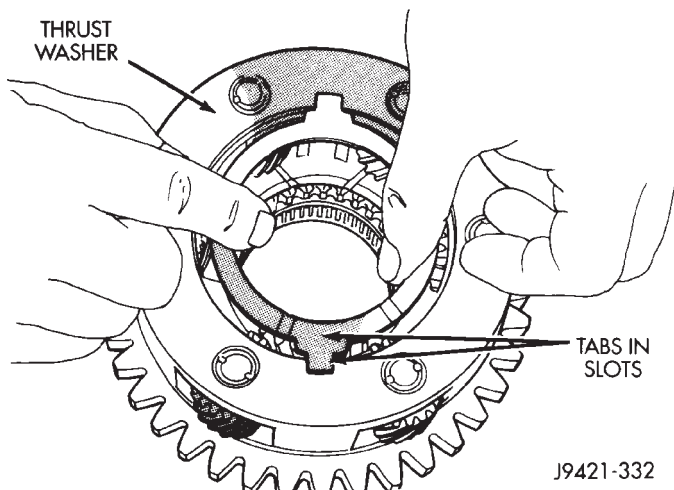


Fig. 60 Thrust Washer Installation

(3) Support carrier with wood blocks under PTO gear (Fig. 61).

(4) Install support sleeve in planetary carrier. Be sure sleeve is seated.

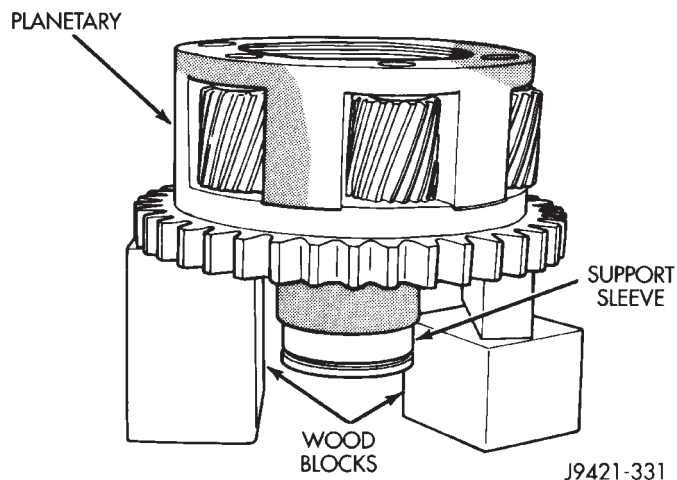


Fig. 61 Support Sleeve Installation

(5) Install input gear in planetary carrier (Fig. 62).

(6) Install second thrust washer in planetary carrier. Be sure washer tabs are seated in carrier slots.

(7) Install lock ring (Fig. 63).

(8) Install retaining ring (Fig. 64).

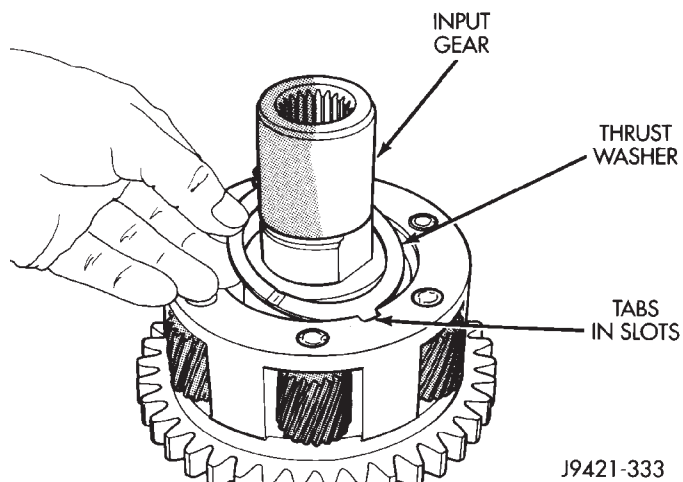


Fig. 62 Input Gear And Thrust Washer Installation

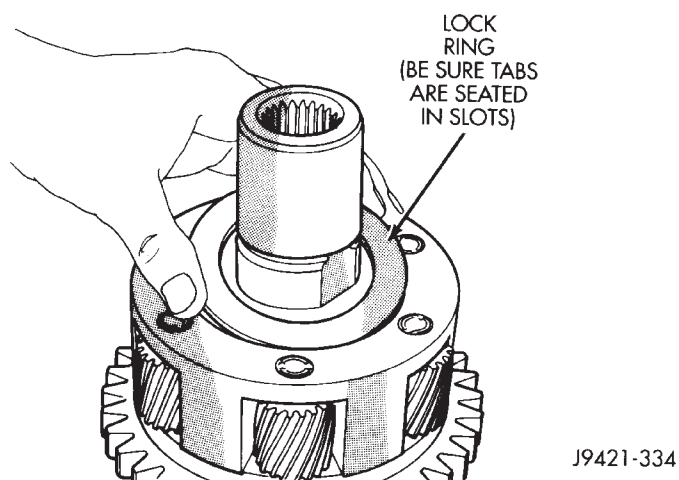


Fig. 63 Lock Ring Installation

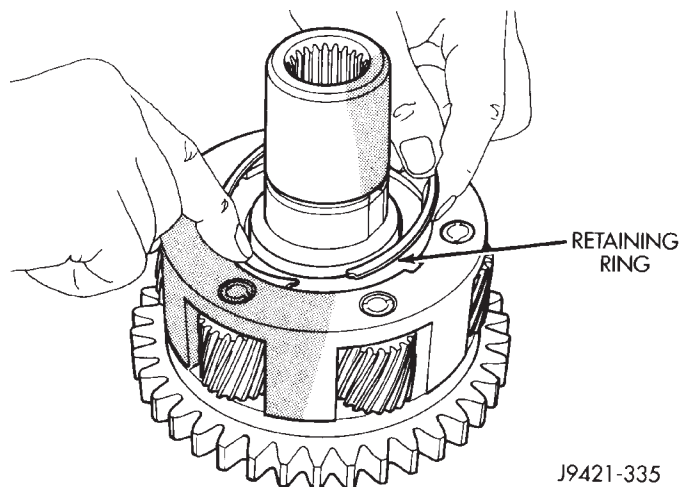
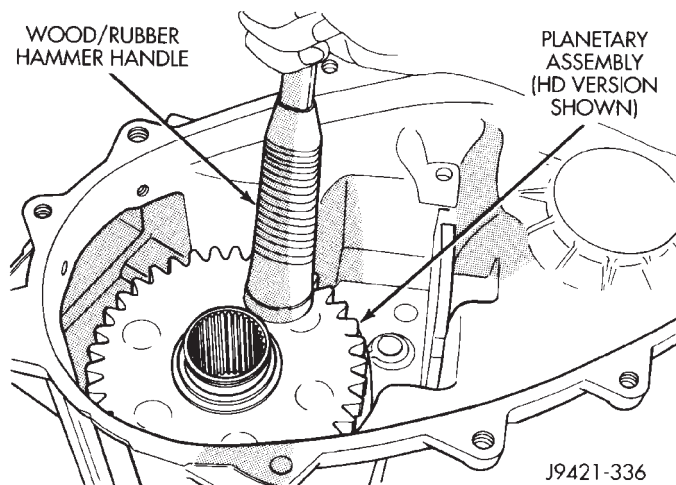


Fig. 64 Retaining Ring Installation

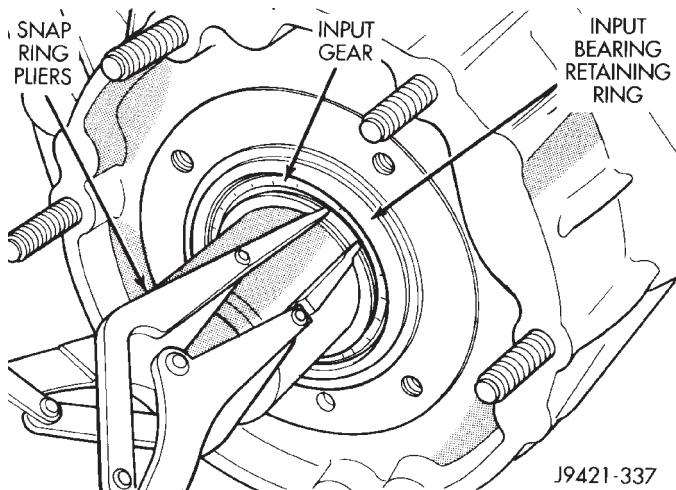
DISASSEMBLY AND ASSEMBLY (Continued)

INPUT AND PLANETARY GEAR INSTALLATION

- (1) Lubricate planetary pinions and annulus gear with transmission fluid.
- (2) Install planetary/input gear assembly in case (Fig. 65).
- (3) Start planetary pinions in low range annulus gear. Then tap PTO gear, with hammer handle to seat planetary pinions in annulus gear.

**Fig. 65 Planetary/Input Gear Assembly Installation**

- (4) Install retaining ring on input gear (Fig. 66).

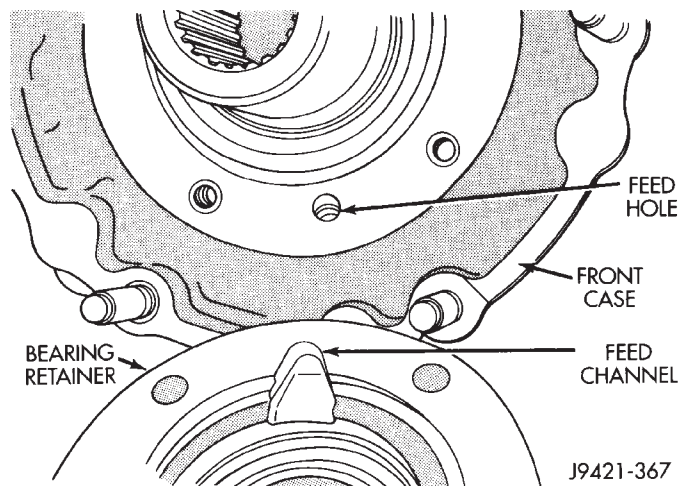
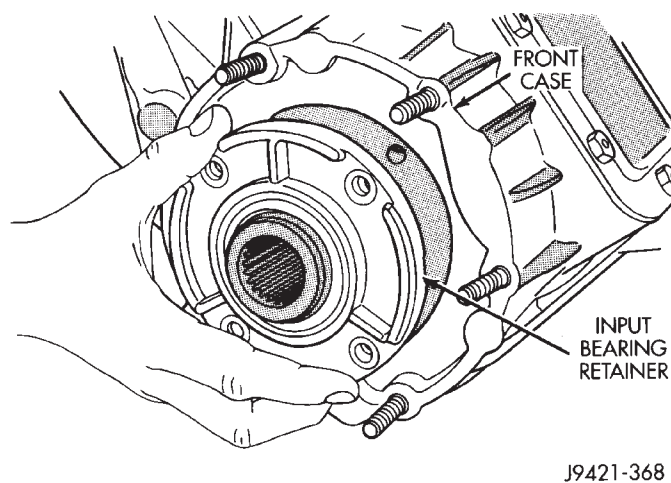
**Fig. 66 Installing Input Gear Retaining Ring**

- (5) Apply bead of Mopar® Gasket Maker, or equivalent, to mating surface of input retainer. Keep sealer bead width to maximum of 3/16 inch. Do not use excessive amount of sealer as excess could be displaced into oil channel and feed hole in case.

- (6) Align oil channel in retainer with oil feed hole in front case (Fig. 67).

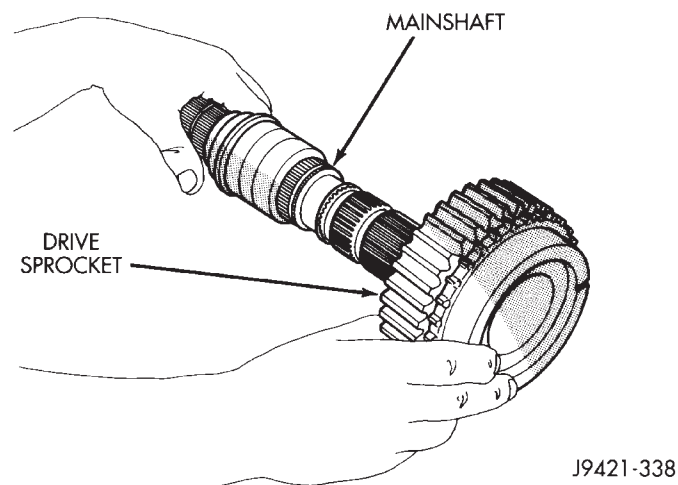
- (7) Install retainer on input gear shaft and front case (Fig. 68).

- (8) Apply Mopar® silicone sealer to threads of input retainer bolts. Then install and tighten bolts to 27-34 N·m (20-25 ft. lbs.) torque.

**Fig. 67 Aligning Retainer Oil Channel and Case Feed Holes****Fig. 68 Input Bearing Retainer Installation**

MAINSHAFT ASSEMBLY

- (1) Install drive sprocket on mainshaft (Fig. 69).

**Fig. 69 Drive Sprocket Installation**

DISASSEMBLY AND ASSEMBLY (Continued)

- (2) Install brass stop ring on drive sprocket (Fig. 70).

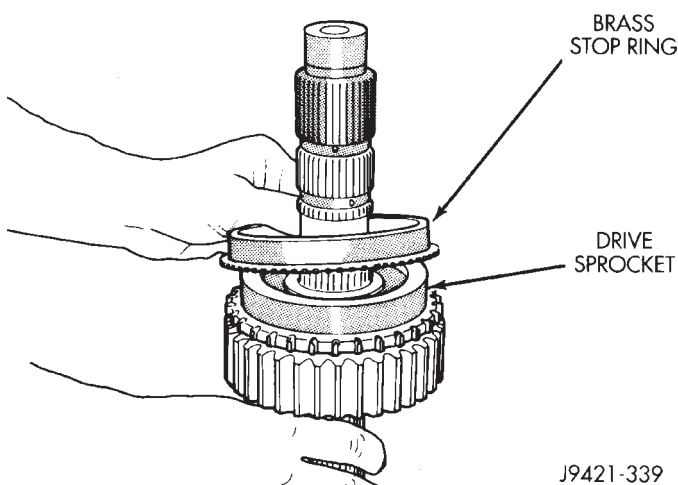


Fig. 70 Synchro Stop Ring Installation

- (3) Install 3 synchro struts and 2 springs in hub as follows:

- Insert first strut in hub (Fig. 71). Strut shoulders rest (and slide) on sides hub slot as shown.
- Insert hooked end of first spring in center of strut to secure it. Then work spring into hub (Fig. 72).
- Press spring inward and insert last two struts in hub slots. Be sure spring is positioned under struts to properly secure them (Fig. 73).
- Turn hub over and install remaining spring in hub. Position hooked end of second spring 180° away from first spring end.

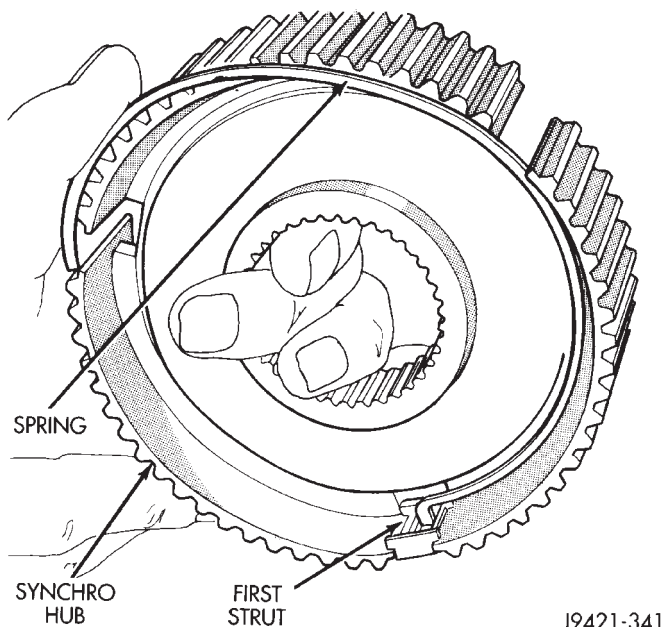


Fig. 71 Installing First Synchro Strut And Spring

- (4) Install assembled synchro hub on mainshaft (Fig. 74). Hub has shoulder on one side which goes toward sprocket (rear of shaft). Flat side of hub faces front of shaft.

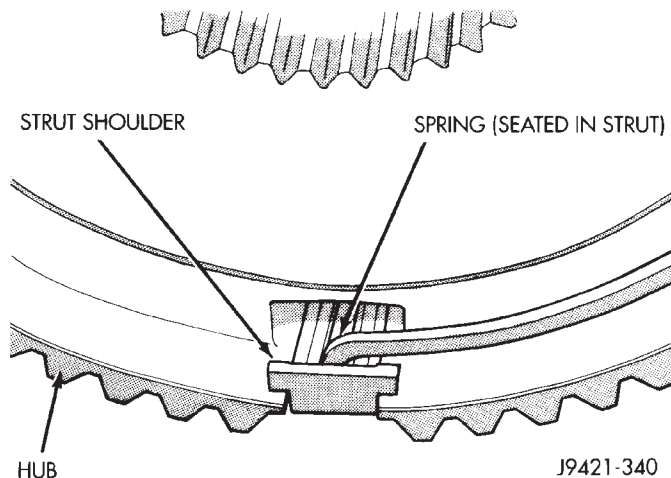


Fig. 72 Synchro Spring Installation

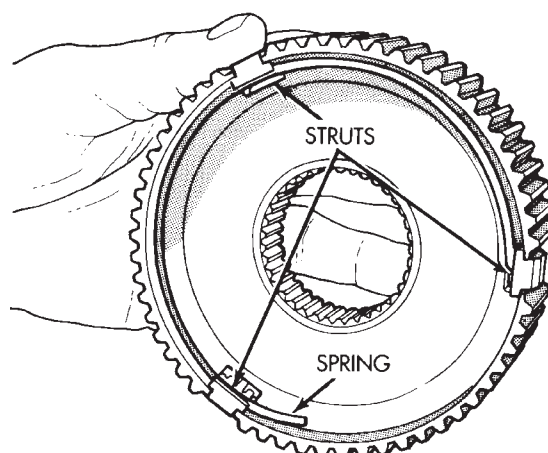


Fig. 73 Correct Position Of Struts And Springs

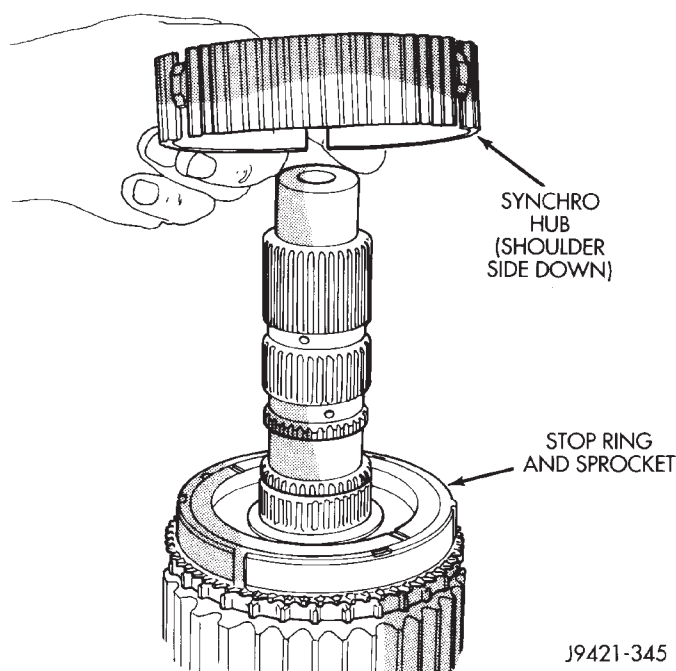


Fig. 74 Synchro Hub Installation

DISASSEMBLY AND ASSEMBLY (Continued)

(5) Install synchro hub retaining ring (Fig. 75). Be sure ring is fully seated before proceeding.

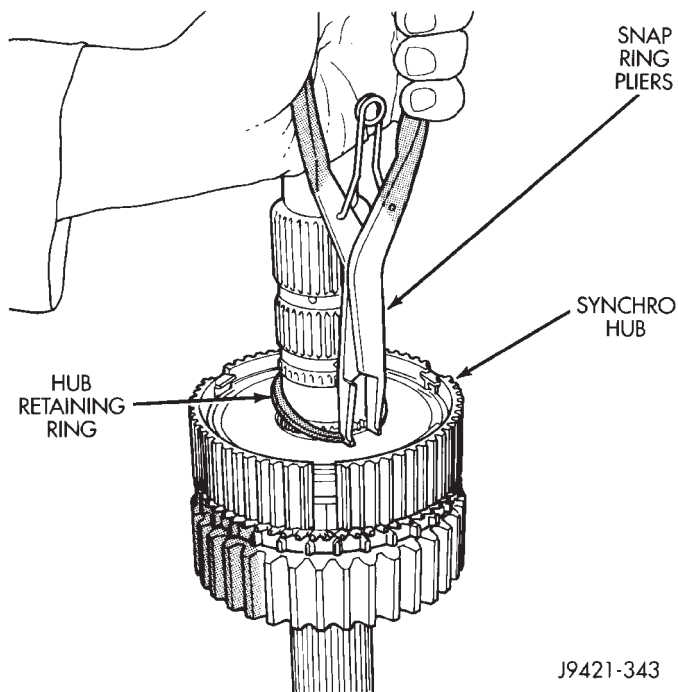


Fig. 75 Synchro Hub Retaining Ring Installation

(6) Install sliding clutch (sleeve) on synchro hub (Fig. 76).

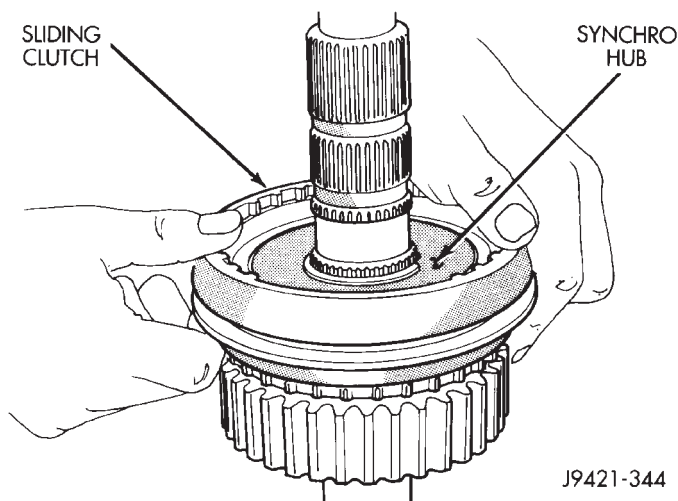


Fig. 76 Sliding Clutch Installation

CAUTION: The sliding clutch must be correctly positioned to ensure proper shifting. Position the clutch on the hub so a clutch spline is centered over each strut as shown (Fig. 77). If the clutch is installed so a gap between splines is aligned with one or more struts, gear clash will result.

SHIFT FORKS AND MAINSHAFT INSTALLATION

(1) Support front case on wood blocks so case interior is facing up. Place blocks between mounting

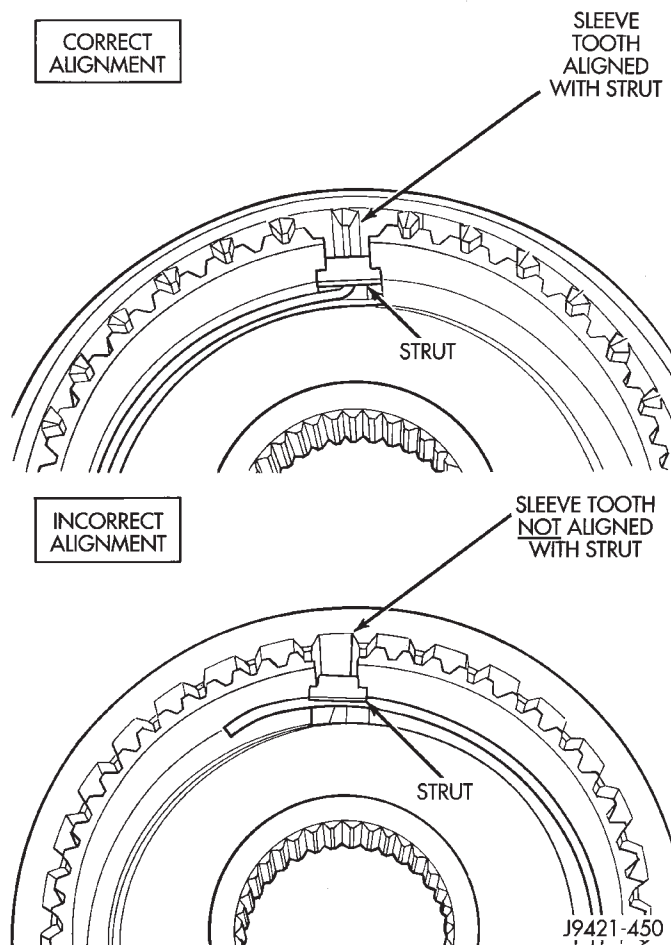


Fig. 77 Correct Alignment Of Struts And Sliding Clutch

studs on forward surface of case. Be sure blocks will not interfere with input gear installation.

(2) Lubricate mainshaft components with Dexron II transmission fluid.

(3) Lubricate sector shaft with transmission fluid and install shift sector in case (Fig. 78). Position slot in sector so it will be aligned with shift fork pin when shift forks are installed.

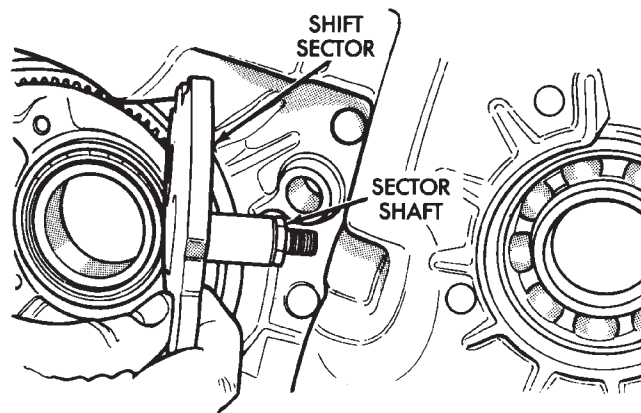


Fig. 78 Shift Sector Installation

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Assemble range fork and synchro clutch and hub (Fig. 79). Then install fork and hub in case. Seat hub on support sleeve and seat range fork pin in shift sector slot (Fig. 80).

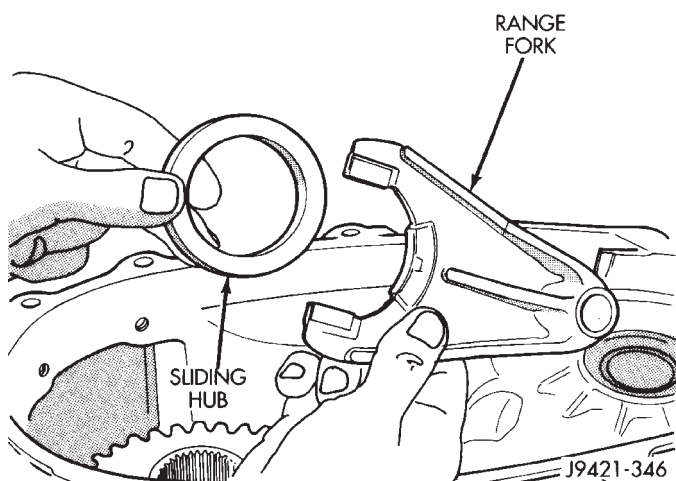


Fig. 79 Assembling Range Fork And Sliding Hub

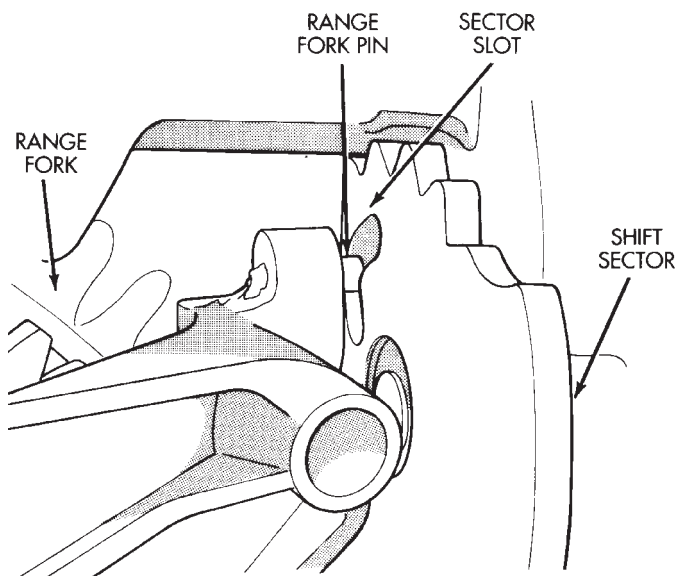


Fig. 80 Seating Range Fork And Hub

(5) Install sliding hub and retaining ring (Fig. 81). Be sure ring is fully seated before proceeding.

(6) Install mode fork and shift rail in sliding clutch (Fig. 82).

(7) Install mainshaft/mode fork assembly (Fig. 83). Guide mainshaft through hub and into input gear and shift rail through range fork and into case bore.

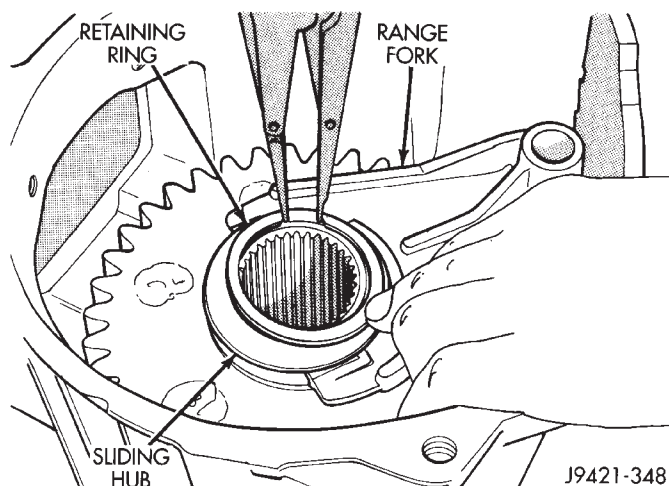


Fig. 81 Sliding Hub Retaining Ring Installation

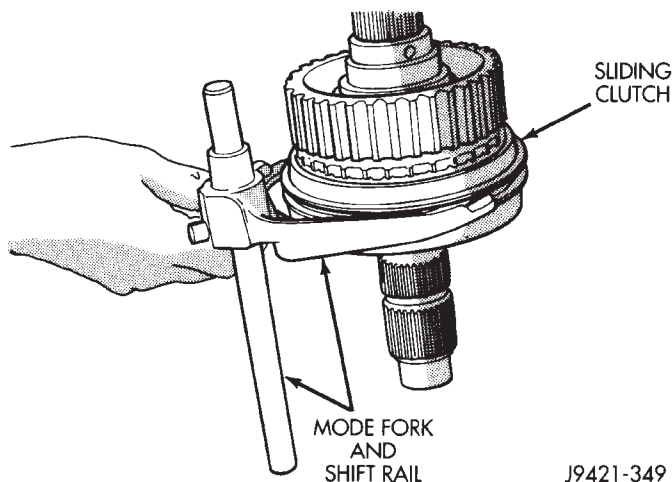


Fig. 82 Assembling Mode Fork And Mainshaft

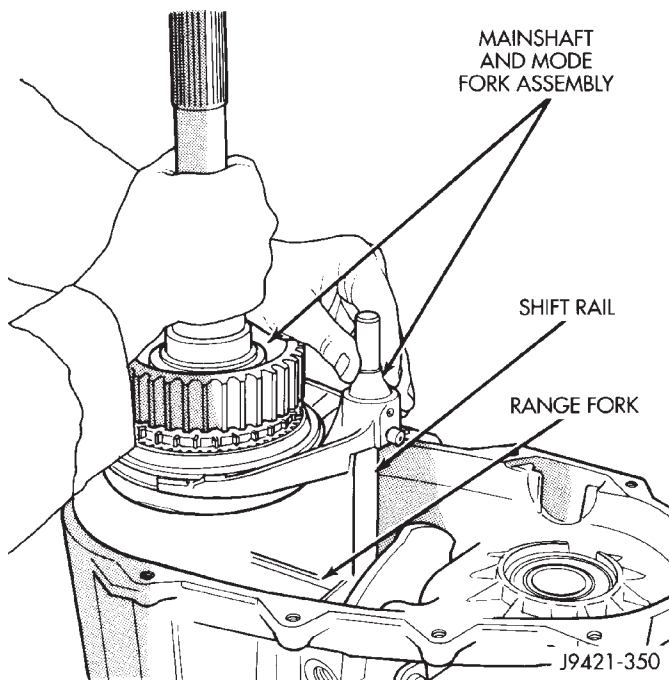


Fig. 83 Installing Mainshaft And Mode Fork Assembly

DISASSEMBLY AND ASSEMBLY (Continued)

(8) Install vacuum/indicator switch (Fig. 84). Tighten switch to 20-34 N·m (15-25 ft. lbs.) torque. Install new O-ring on switch beforehand, if necessary.

(9) Install new sector shaft O-ring and O-ring

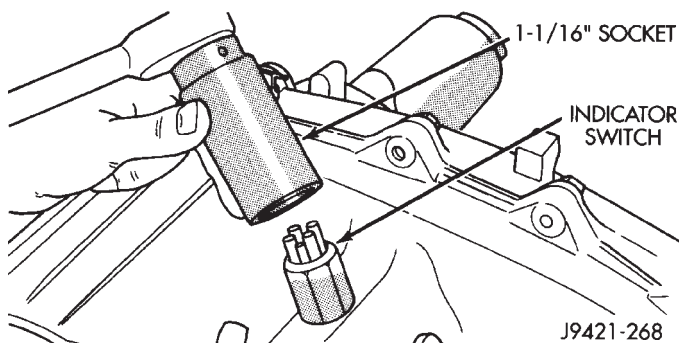


Fig. 84 Vacuum/Indicator Switch Installation

retainer in sector shaft bore (Fig. 85). Lubricate O-ring with transmission fluid or petroleum jelly after installation.

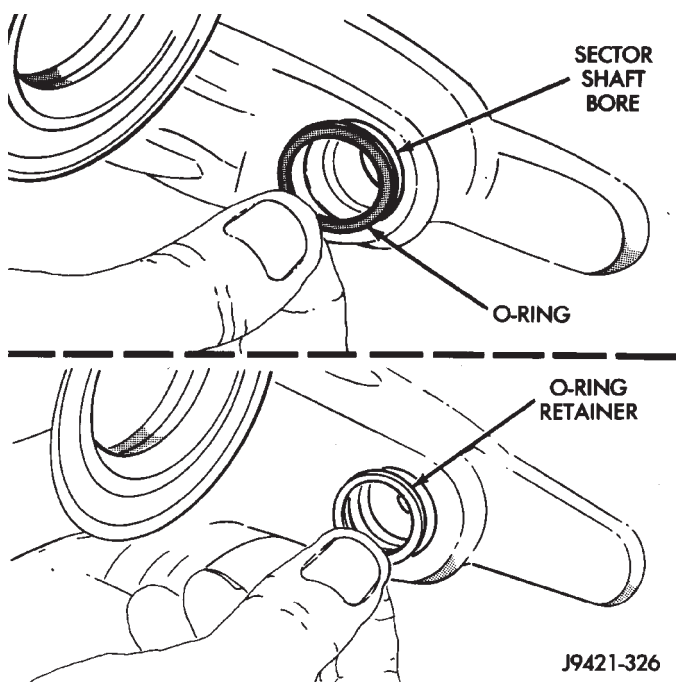


Fig. 85 Sector Shaft O-Ring And Retainer Installation

(10) Install shift lever on sector shaft (Fig. 86).

(11) Install washer and nut on sector shaft to secure shift lever. Apply 1-2 drops Mopar® Lock N' Seal, or equivalent, to nut threads before installation. Then tighten nut to 27-34 N·m (20-25 ft. lbs.) torque.

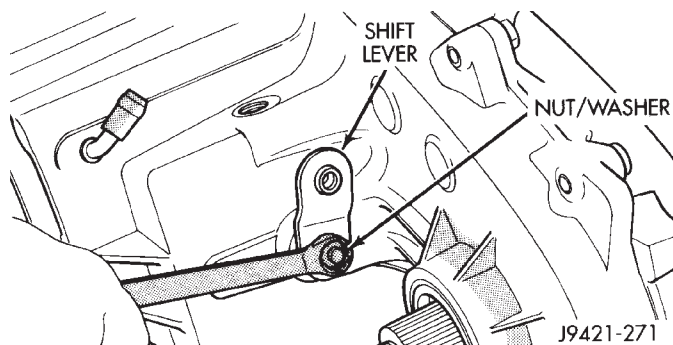


Fig. 86 Shift Lever Installation

(12) Install poppet plunger and spring (Fig. 87).

(13) Install new O-ring on poppet screw and install screw in front case (Fig. 88). Tighten screw to 16-24 N·m (12-18 ft. lbs.).

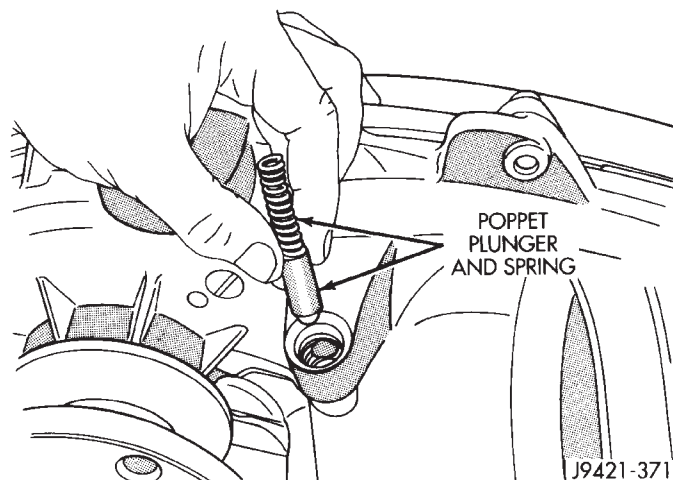


Fig. 87 Poppet Plunger And Spring Installation

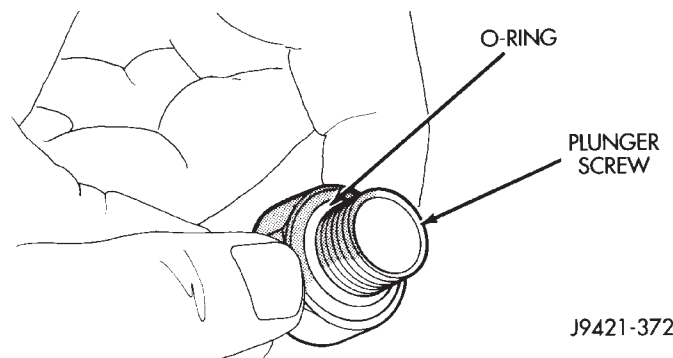


Fig. 88 O-Ring Installation On Poppet Plunger Screw

DISASSEMBLY AND ASSEMBLY (Continued)

FRONT OUTPUT SHAFT AND DRIVE CHAIN INSTALLATION

- (1) Install front output shaft in bearing (Fig. 89).

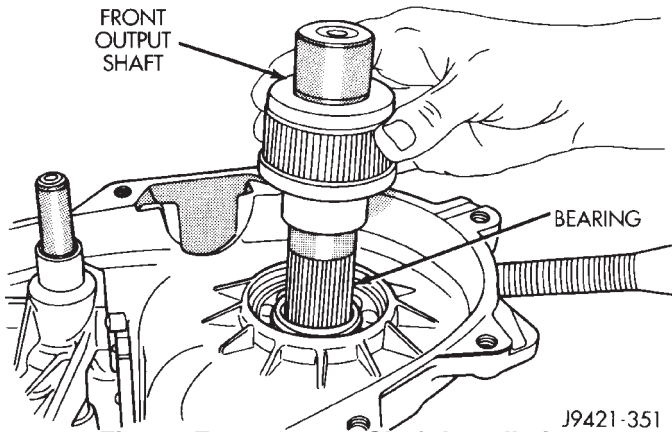


Fig. 89 Front Output Shaft Installation

- (2) Insert front sprocket in drive chain (Fig. 90).
 (3) Install drive chain around mainshaft sprocket (Fig. 90). Then position front sprocket over front shaft.
 (4) Raise mainshaft about 2.54 cm (one inch) and seat front sprocket on front output shaft.

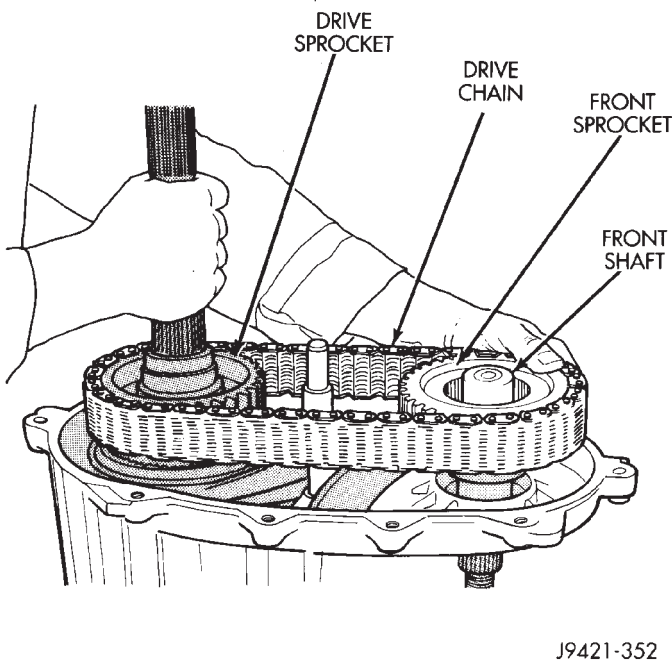


Fig. 90 Drive Chain And Front Sprocket Installation

- (5) If mainshaft and sliding clutch were unseated during chain installation, align and reseat mainshaft in input gear and hub. Then reseat synchro hub in sliding clutch. Press synchro struts inward to ease clutch back onto hub.

- (6) Install front sprocket retaining ring (Fig. 91).
 (7) Realign sliding clutch on synchro hub if necessary. Press synchro struts inward to ease realign-

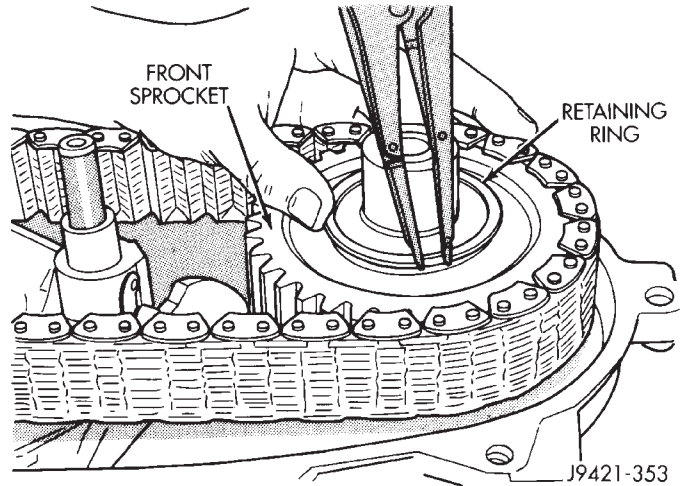


Fig. 91 Front Sprocket Retaining Ring Installation

ment. Be sure mainshaft is fully seated before proceeding.

- (8) Install spring and cup on shift rail (Fig. 92).

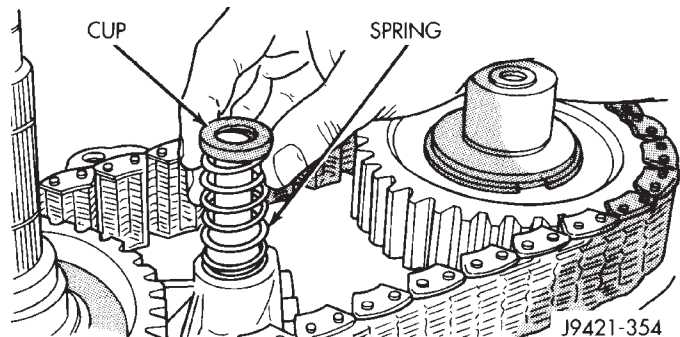


Fig. 92 Shift Rail Spring And Cup Installation

- (9) Insert magnet in front case pocket (Fig. 93).

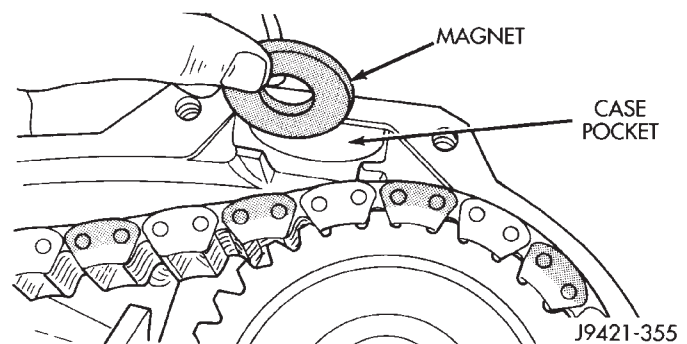


Fig. 93 Case Magnet Installation

OIL PUMP AND REAR CASE ASSEMBLY/INSTALLATION

Lubricate the oil pump components with Dexron II before installation. Prime the oil pickup tube by pouring a little oil into the tube before installation.

- (1) Install new O-ring in pickup tube inlet of oil pump (Fig. 94).

- (2) Position oil pickup tube and filter in rear case. Be sure pickup filter is seated in case pocket and

DISASSEMBLY AND ASSEMBLY (Continued)

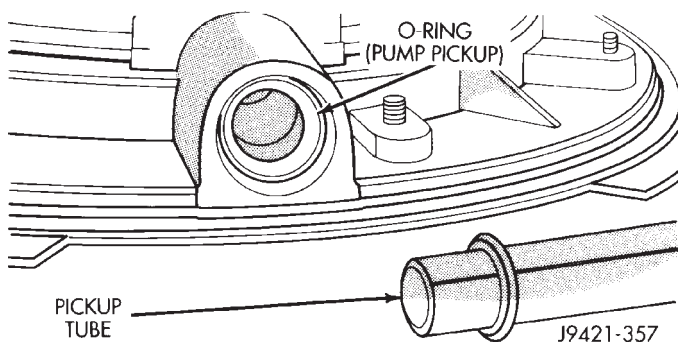


Fig. 94 Pickup Tube O-Ring Installation

that pickup tube is aligned in case notches (Fig. 95). Be sure hose that connects tube to filter is securely positioned.

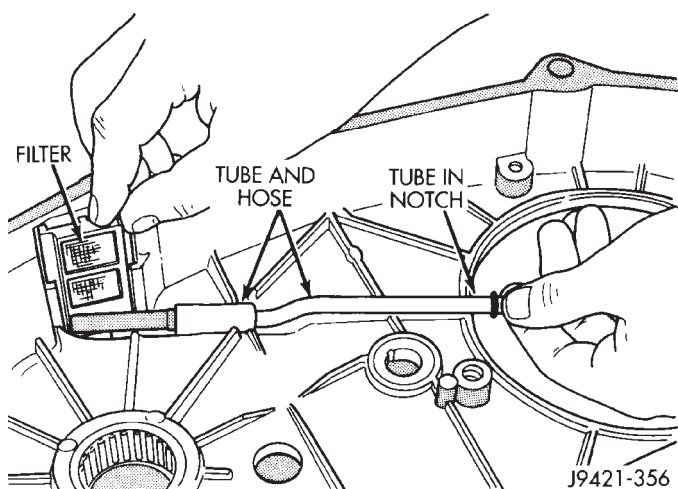


Fig. 95 Oil Pickup Tube And Filter Position In Rear Case

(3) Insert oil pickup tube in oil pump and position pump in rear case (Fig. 96).

(4) Apply bead of Mopar® Gasket Maker, or equivalent, to mating surface of front case. Keep sealer bead width to maximum of 3/16 inch. Do not use excessive amount of sealer as excess will be displaced into case interior.

(5) Align oil pump with mainshaft and align shift rail with bore in rear case. Then install rear case and oil pump assembly (Fig. 97). Be sure oil pump and pickup tube remain in position during case installation.

(6) Install 4-5 rear case-to front case bolts to hold rear case in position. Tighten bolts snug but not to specified torque at this time.

CAUTION: Verify that shift rail (Fig. 98), and case alignment dowels are seated before installing any bolts. Case could be cracked if shaft rail or dowels are misaligned.

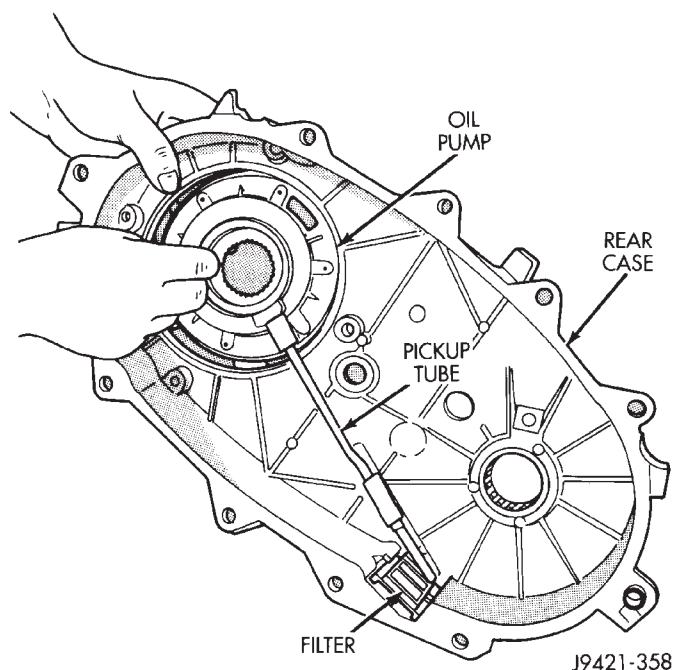


Fig. 96 Positioning Oil Pump In Rear Case

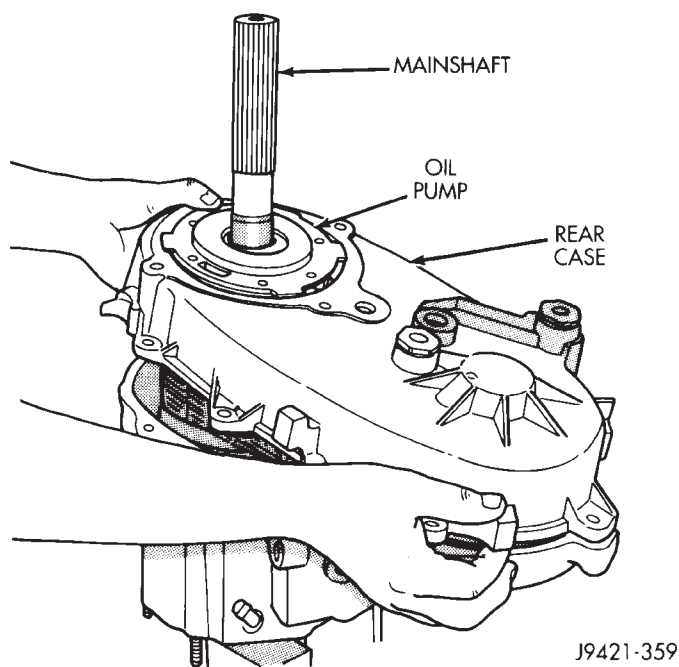


Fig. 97 Rear Case And Oil Pump Installation

(7) Verify that oil pump is aligned and seated on rear case. Reposition pump if necessary.

(8) Check stud at end of case halves (Fig. 99). If stud was loosened or came out during disassembly, apply Loctite 242 to stud threads and reseal stud in case.

(9) Apply Loctite 242 to remainder of rear case-to-front case bolt threads and install bolts. Be sure lock washers are used on studs/bolts at case ends. Tighten bolts, or stud nuts as follows:

DISASSEMBLY AND ASSEMBLY (Continued)

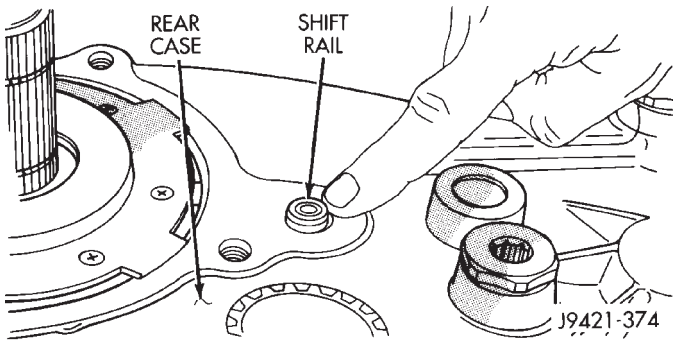


Fig. 98 Shift Rail Seated In Rear Case Bore

- flange head bolts to 47-61 N·m (35-45 ft. lbs.)
- all other bolts/nuts to 27-34 N·m (20-25 ft. lbs.)

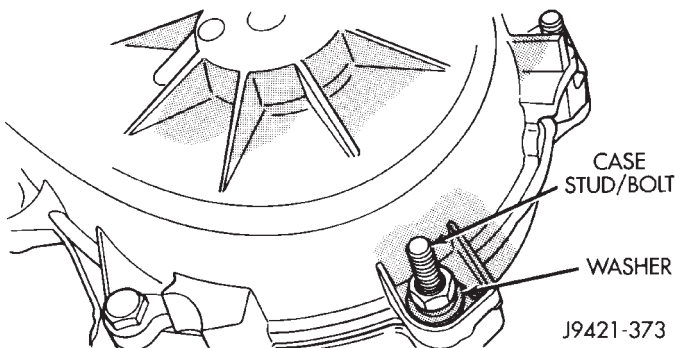


Fig. 99 Washer Installation On Case Stud And Dowel Bolts

(10) Install oil pump retaining ring on mainshaft (Fig. 100).

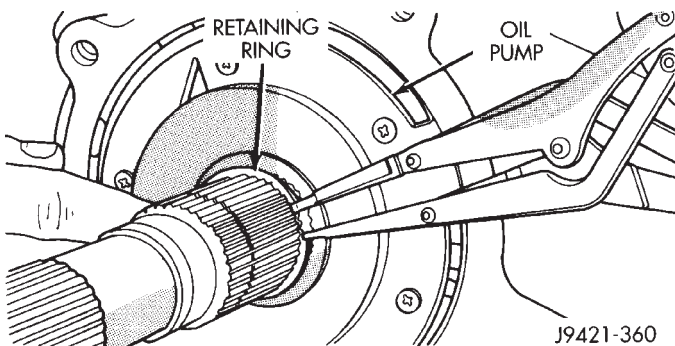


Fig. 100 Oil Pump Retaining Ring Installation

(11) Install rear output bearing and snap ring to output shaft.

COMPANION FLANGE INSTALLATION

(1) Install companion flange seal on front shaft (Fig. 101).

(2) Install companion flange on front shaft (Fig. 102). Then install and tighten flange nut to 176-271 N·m (130-200 ft. lbs.) torque.

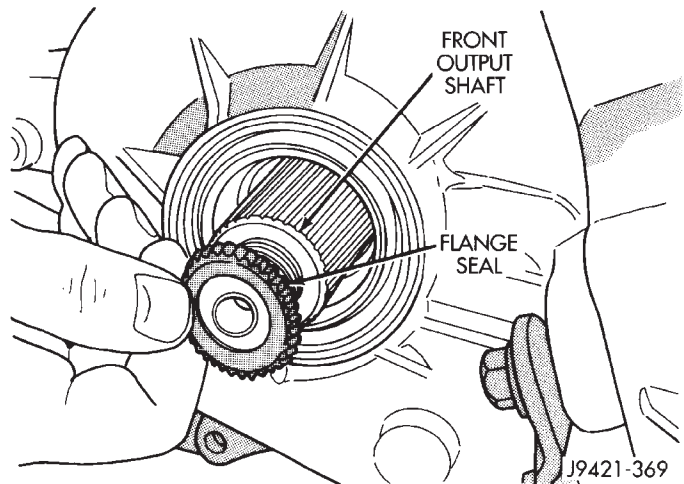


Fig. 101 Installing Flange Seal On Front Shaft

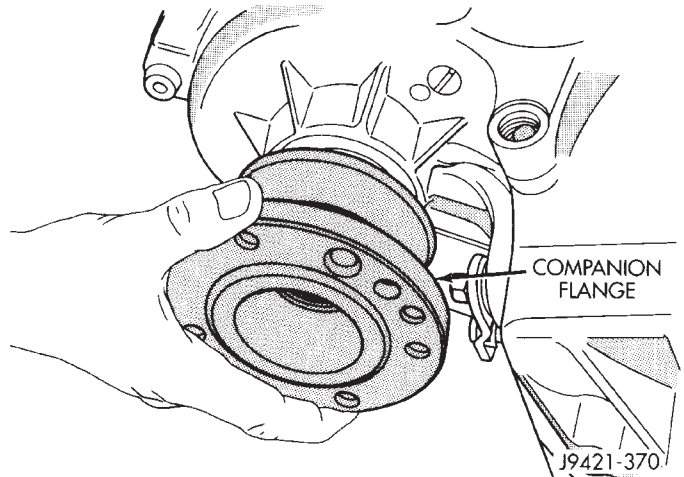


Fig. 102 Installing Companion Flange On Front Shaft

EXTENSION HOUSING AND PTO COVER

(1) Apply bead of Mopar® Gasket Maker, or equivalent, to mating surface of extension housing. Keep sealer bead width to maximum of 3/16 inch. Do not use excessive amount of sealer as excess could be displaced into oil pump.

(2) Position extension housing over output shaft.

(3) Spread extension housing retaining ring and seat extension housing on rear case. Verify that the retaining ring is seated in output shaft rear bearing.

(4) Install retaining ring access cover.

(5) Apply Mopar® silicone sealer, or equivalent, to threads of extension housing bolts. Then install bolts finger tight.

(6) Tighten extension housing bolts to 27-34 N·m (20-25 ft. lbs.) torque.

(7) Apply Mopar silicone adhesive/sealer to mating surface of PTO cover and to cover bolt shanks and underside of bolt heads. Then install and tighten bolts to 27-34 N·m (20-25 ft. lbs.) torque.

CLEANING AND INSPECTION

TRANSFER CASE CLEANING AND INSPECTION

Wash all parts thoroughly in clean solvent. Be sure all old lubricant, sealant, metal particles, dirt and foreign material are removed from the surfaces of every part.

Apply compressed air to each oil feed port and channel in both case halves to remove any foreign material or cleaning solvent residue.

If any pump component is worn, or damaged, the pump must be replaced as an assembly.

Inspect the spline teeth on the synchro hub (Fig. 103). If evidence of chipping or excessive wear is apparent, replace the hub. The hooked end of each synchro spring should be inserted in one of the struts. In addition, the springs should not interfere with the polished gear cone or inside diameters of the hub.

Inspect the stop ring for cracks and wear. Replace the ring if necessary or if doubt exists over condition. Check a replacement synchro ring for proper fit on the cone with a minimum of wobble. Also check the synchronizer struts for wear or damage.

Inspect all gear teeth and splines for wear or damage. Also check splines for burrs, or nicks. Remove minor nicks and scratches with an oil stone. Replace any part with damaged splines.

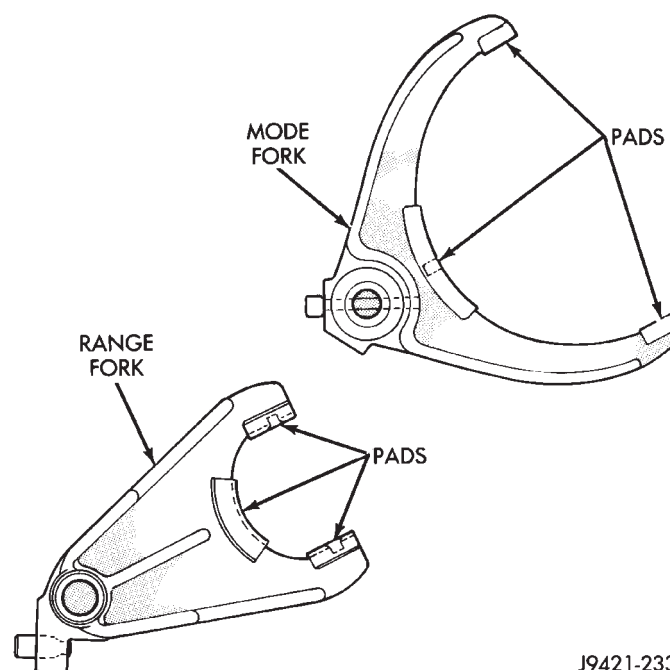
It is recommended that all retaining (snap) rings be replaced during overhaul. Most of the retaining rings can be distorted during removal and should not be reused.

Inspect the two case halves, for cracks, porosity, damaged mating surfaces, stripped bolt threads, or distortion. Replace either case half if necessary. How-

ever, stripped threads can be repaired with Heli-Coil stainless steel thread inserts. The case vent tube can be resecured with Loctite 680 if necessary.

Inspect the annulus gear. Be sure the gear teeth are in good condition. Replace the front case and annulus as an assembly if the gear is damaged.

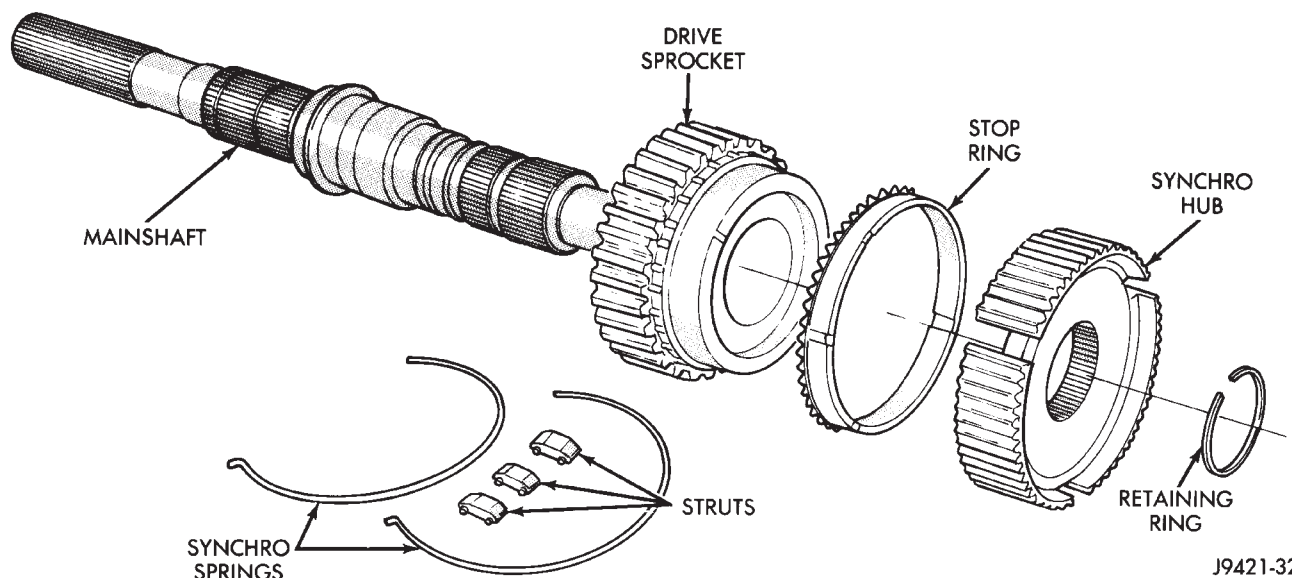
Check condition of the shift fork pads (Fig. 104). The pads should be replaced if cracked, worn, or loose (won't stay on fork).



J9421-233

Fig. 104 Shift Fork Pads

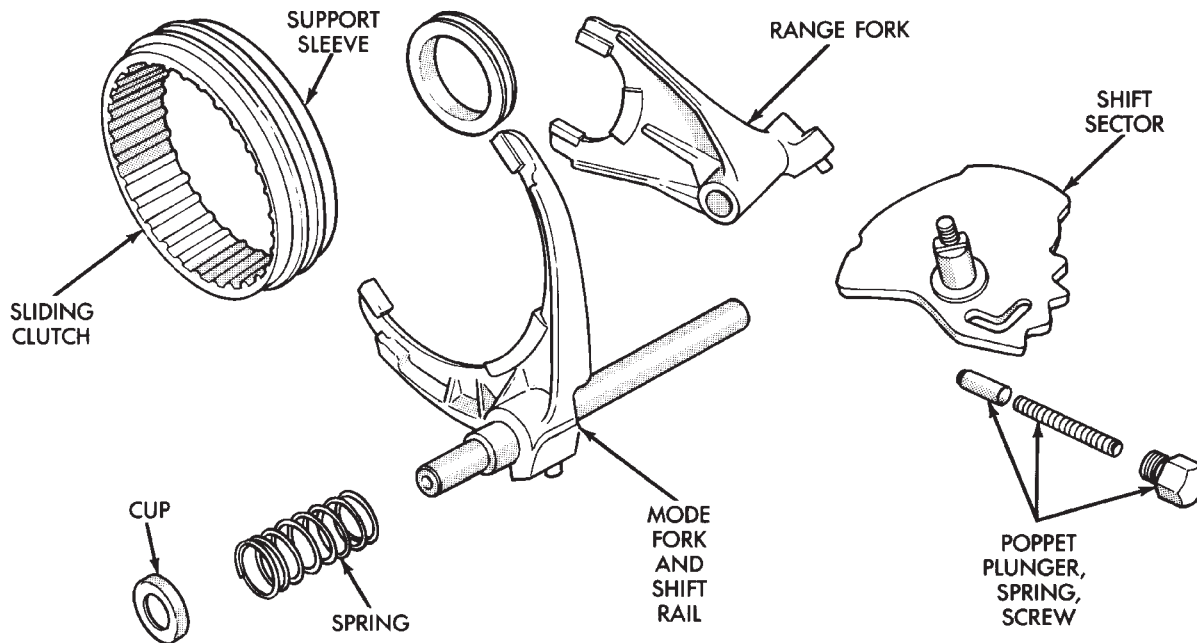
The shift forks, clutch and sleeve should all be checked for wear, cracks, or any type of damage



J9421-320

Fig. 103 Mainshaft Components

CLEANING AND INSPECTION (Continued)



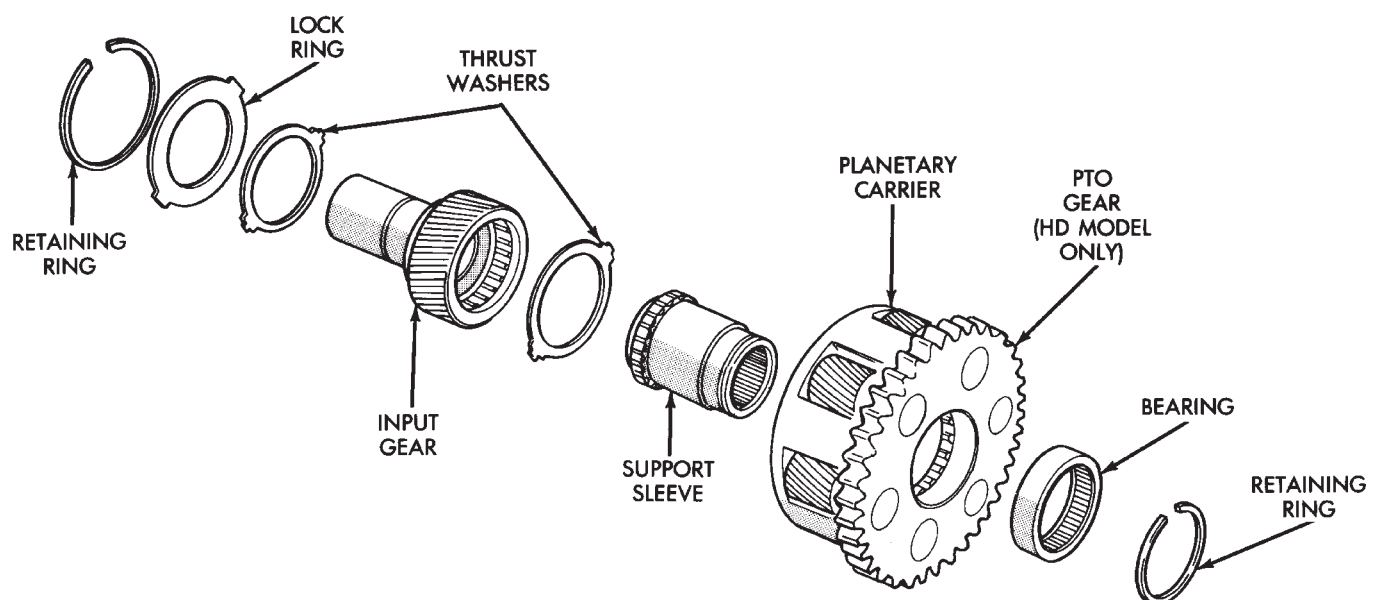
J9421-323

Fig. 105 Shift Fork Components

(Fig. 105). The shift sector shaft and detents should be inspected for wear. The mode fork and shift rail are a one-piece unit. If either part is damaged, replace the fork and rail as an assembly. Replace the shift rail cup and spring if they exhibit wear.

Inspect the planetary thrust washers (Fig. 106) carefully for wear or damage. Replace both washers if necessary.

The planetary carrier cannot be disassembled. It must be serviced as an assembly if damaged. Check condition of the pinion teeth and PTO gear teeth. If pinion tooth wear is evident, it will also be necessary to check condition of the annulus gear teeth.



J9421-322

Fig. 106 Planetary And Input Gear Components

ADJUSTMENTS

SHIFT LINKAGE ADJUSTMENT

- (1) Move shift lever into 2H position.
- (2) Raise vehicle.
- (3) Loosen shift rod lock bolt at trunnion (Fig. 107).

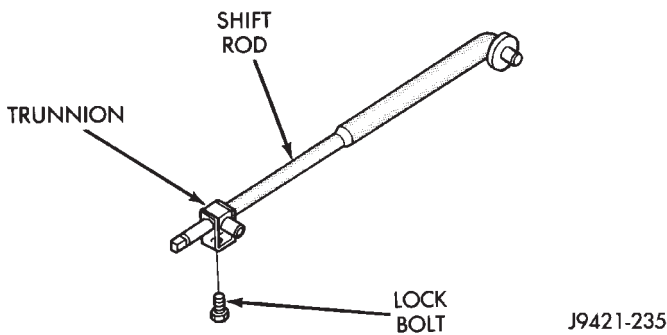


Fig. 107 Shift Rod Lock Bolt Location

- (4) Check shift rod fit in trunnion. Be sure rod does not bind in trunnion.
- (5) Verify that transfer case shift lever is in 2H position. The 2H position on the transfer case shift arm is the second position from full forward.
- (6) Lower vehicle.
- (7) Position the shift lever on the cab such that the distance from the instrument panel to the 2H position dot in the shift lever insert is 14.6 cm (5.75 in.). Ensure that the measurement is made parallel to the floor of the vehicle.
- (8) Tighten shift rod lock bolt to 10 N·m (90 in. lbs.) torque.
- (9) Check shift linkage operation. Be sure transfer case shifts into and operates properly in all ranges.

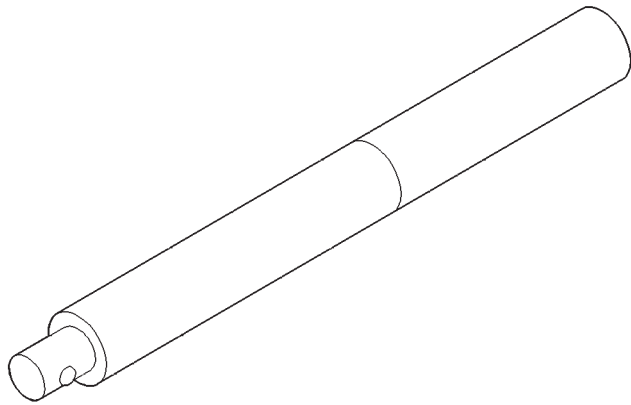
SPECIFICATIONS

TORQUE

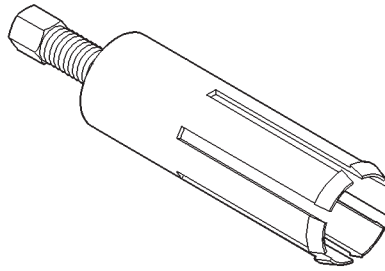
DESCRIPTION	TORQUE
Plug, Detent	16–24 N·m (12–18 ft. lbs.)
Bolt, Diff. Case	17–27 N·m (15–24 ft. lbs.)
Plug, Drain/Fill	40–45 N·m (30–40 ft. lbs.)
Bolt, Extension Housing . .	35–46 N·m (26–34 ft. lbs.)
Bolt, Front Brg. Retainer. .	16–27 N·m (12–20 ft. lbs.)
Bolt, Case Half	35–46 N·m (26–34 ft. lbs.)
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.)
Nuts, Mounting	35–47 N·m (26–35 ft. lbs.)
Bolts, U-Joint	19 N·m (17 ft. lbs.)
Vacuum Switch	20–34 N·m (15–25 ft. lbs.)

SPECIAL TOOLS

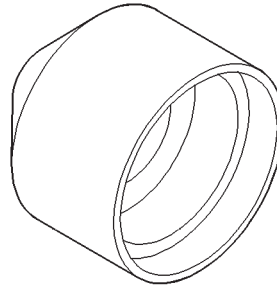
NV241HD



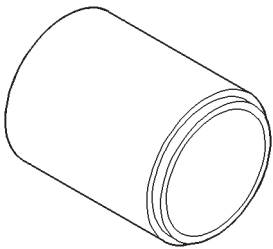
C-4171 Handle



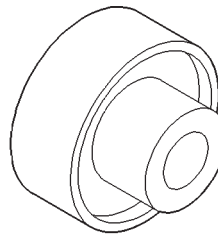
8158 Remover, Bushing



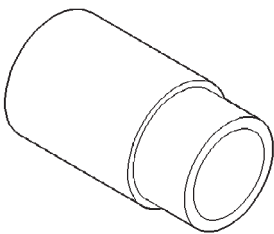
D-163 Installer, Seal



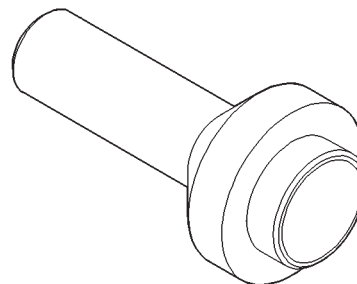
6888 Installer, Seal



6953 Installer, Bearing

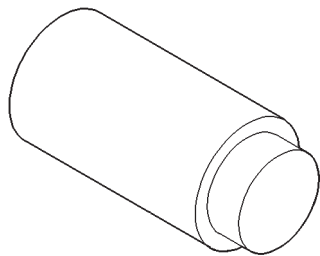
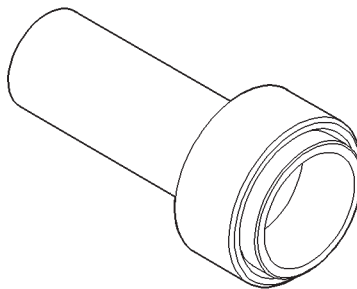
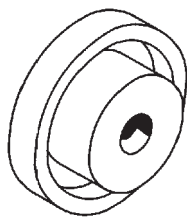
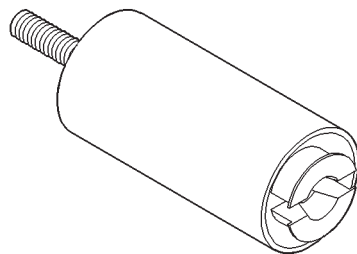
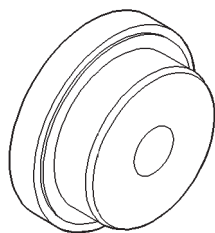
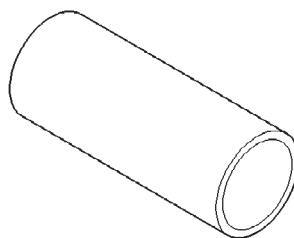
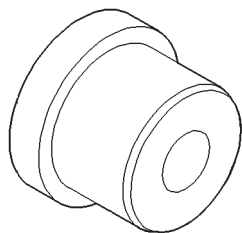


8157 Installer, Bushing



7884 Installer, Seal

SPECIAL TOOLS (Continued)

***C-293-3 Plug, Extension******7888 Installer, Pump Housing Seal******C-4210 Installer, Seal******L-4454 Remover, Bearing******5062 Installer, Bearing******8148 Cup******5066 Installer, Bushing***

NV021 PTO ADAPTER

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GENERAL INFORMATION

GENERAL INFORMATION

The NV 021 PTO adapter provides power take-off capability for BR models with an automatic transmission. The adapter is available as an option on 2-wheel drive 2500 and 3500 models.

The NV 021 adapter is similar in appearance and mounting to a small transfer case (Fig. 1). A 4-wheel drive automatic transmission is used to simplify adapter mounting. The adapter has mounting studs in the front case for attachment to the overdrive unit gear case.

Basic components consist of the front case and rear extension, mainshaft, input gear, PTO gear, shift sector, and shift fork, shift rail and sleeve.

The mainshaft is supported in by a needle bearing in the input gear hub and by a ball bearing in the rear extension. The input gear is supported by a

roller bearing in the front case. The PTO gear is splined to the input gear and is retained by a snap ring.

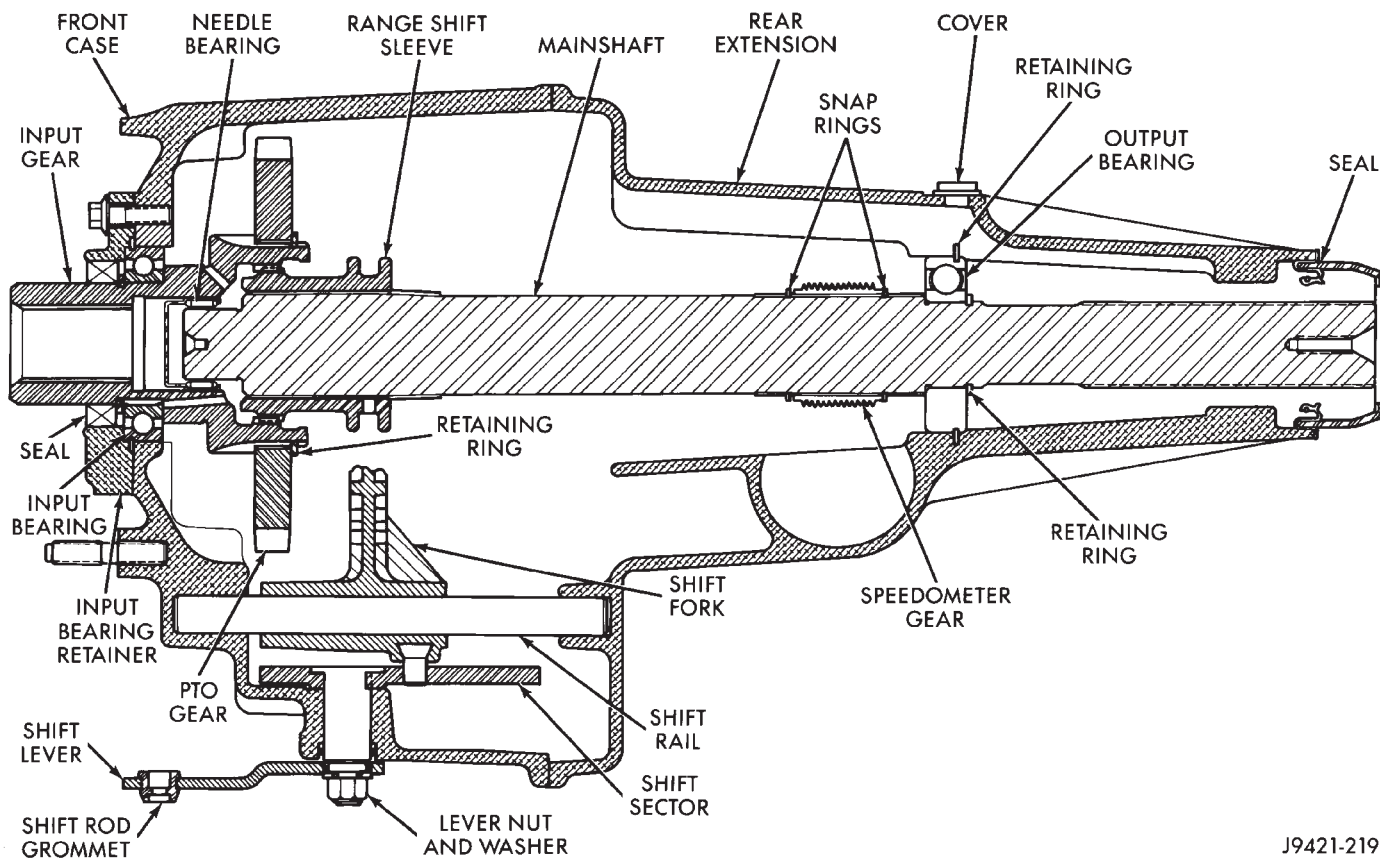
The input bearing is secured in the front case by a retainer. The output bearing is secured by a retaining ring on the mainshaft and by a second retaining ring in the rear extension.

The speedometer drive gear is located at the rear of the mainshaft. The gear is secured on the shaft with two snap rings.

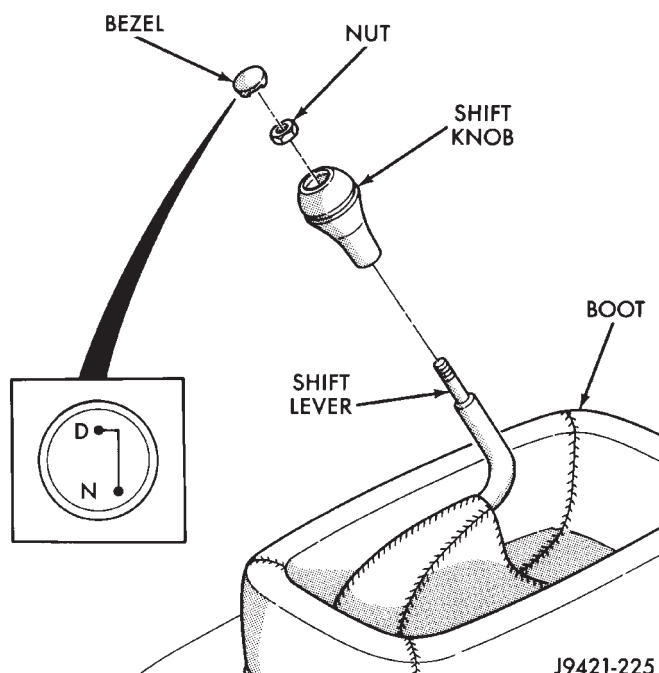
SHIFT LEVER AND LINKAGE

A floor mounted shift lever assembly (Fig. 2), is used for selecting desired operating range. The lever is attached to the adapter shift lever by a single shift rod (Fig. 3). The floor linkage assembly is the same as used on 4-wheel drive models with a transfer case.

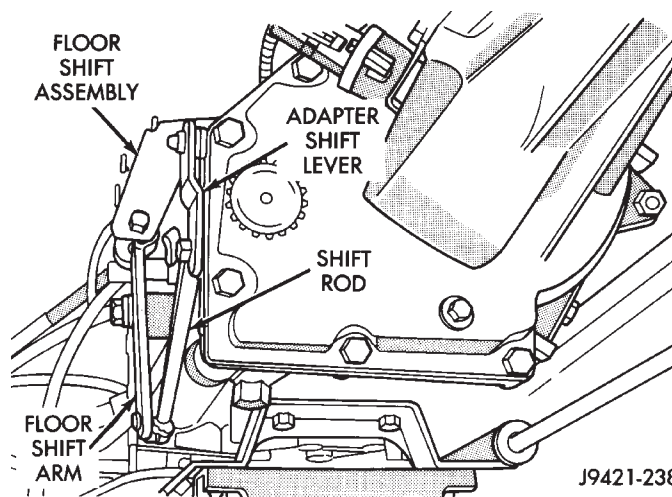
GENERAL INFORMATION (Continued)



J9421-219

Fig. 1 NV 021 PTO Adapter

J9421-225

Fig. 2 Adapter Shift Lever And Shift Pattern

J9421-238

Fig. 3 Floor Shift Linkage

GENERAL INFORMATION (Continued)

The adapter shift lever is attached directly to the shift sector shaft. Sector position is controlled by a detent poppet, spring and screw (Fig. 4). The poppet, under pressure from the spring, maintains sector detent position.

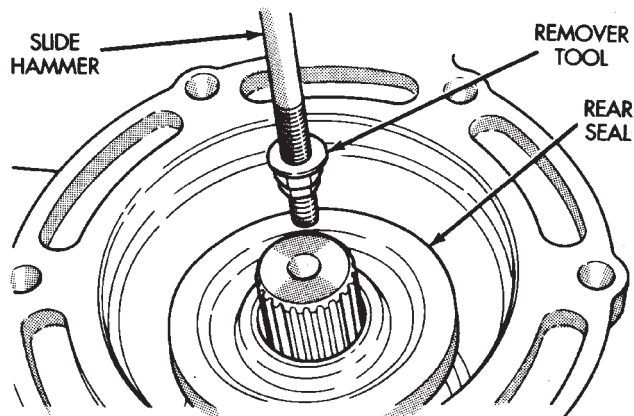


Fig. 4 Shift Sector Detent Controls

PTO ACCESSORY EQUIPMENT

Power take-off accessories such as pumps, gear drives, and towing equipment, are operated by a drive gear on the PTO adapter mainshaft.

The drive gear is accessible by removing the PTO access cover on the front case (Fig. 5). The auxiliary equipment to be operated is bolted directly to the adapter once the cover has been removed.

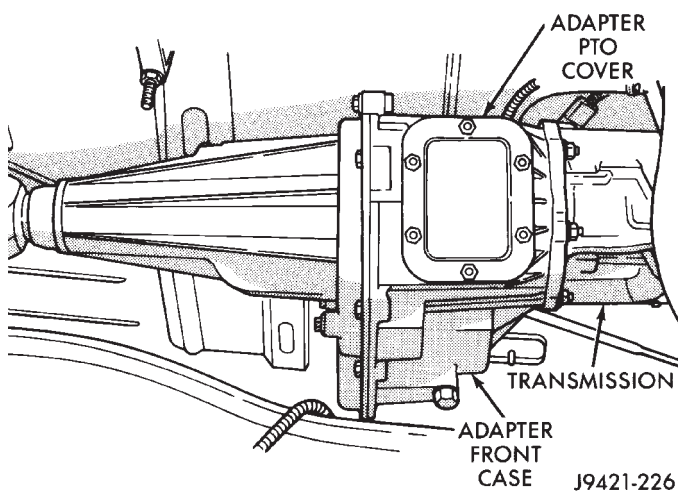


Fig. 5 PTO Access Cover Location

RECOMMENDED LUBRICANT AND FILL LEVEL

Recommended lubricant for the NV 021 is Mopar Dexron II, or ATF Plus transmission fluid.

Approximate fluid capacity is 2.17 liters (4.6 pints). The adapter fill and drain plugs are located in the rear extension (Fig. 6).

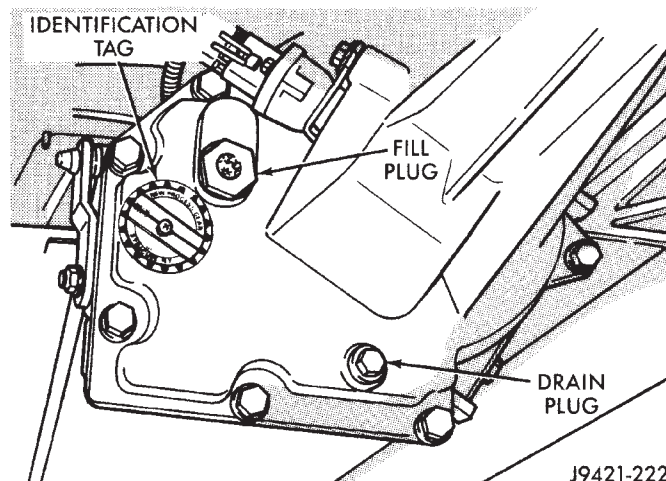


Fig. 6 Drain And Fill Plug Locations

The correct fill level is to the **bottom edge** of the fill plug hole.

ADAPTER IDENTIFICATION

A round, identification tag (Fig. 7) is attached to the rear extension. The tag provides the adapter model number, assembly number, serial number, and ratio.

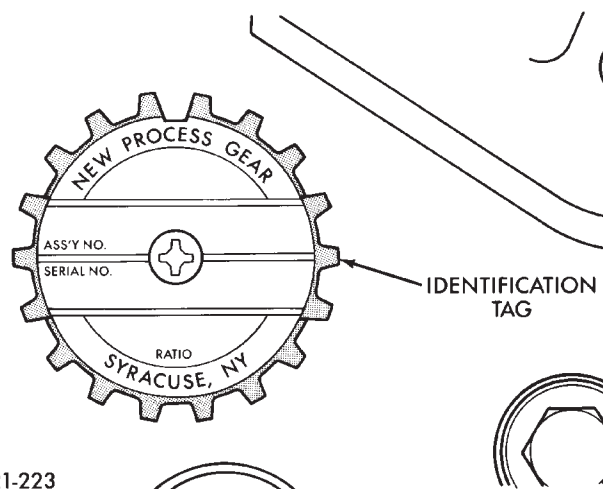


Fig. 7 Adapter I.D. Tag

The adapter serial number also represents the date of build. For example, a serial number of 9-10-93 would represent September 10, 1996.

DESCRIPTION AND OPERATION

PTO ADAPTER OPERATING RANGES AND SHIFTING

The NV 021 is a dual range unit. Operating ranges consist of drive (D) and neutral (N).

D range is used for normal driving and for PTO accessory operation while the vehicle is in motion.

DESCRIPTION AND OPERATION (Continued)

N range is used for PTO accessory operation when the vehicle is stopped.

N range is also used for breakdown towing with the front end raised. In this situation, the transmission must be shifted into Park and the PTO adapter into N range.

Operating/Shifting The PTO Adapter

To operate a PTO accessory while the vehicle is in motion:

- shift adapter into D range before engine start
- start engine
- shift transmission into D range and drive vehicle

- operate PTO accessory

To operate a PTO accessory while the vehicle is stopped:

- leave engine running
- shift transmission and adapter both into Neutral
- shift transmission back to Drive
- operate PTO accessory

To shift the adapter out of N and back to D range:

- leave engine running
- apply service brakes
- shift transmission into Reverse
- shift transmission back to Neutral and immediately shift adapter into D

To shift the adapter from D range into N:

- stop vehicle
- leave engine running
- shift transmission to Neutral
- shift adapter to N
- shift transmission back to D range
- operate accessory

Inoperative

If the adapter will not drive a PTO accessory, the most probable causes are:

- PTO accessory not compatible with adapter (no gear mesh)
- PTO accessory loose, or misaligned
- PTO accessory damaged/inoperative
- adapter shift lever or shift rod disconnected
- transmission not in drive range

Noisy Operation

The most probable causes of noise are:

- low lubricant level
- PTO accessory loose, misaligned, or not compatible
- misadjusted shift rod
- engine/transmission mounts loose/damaged
- loose linkage or adapter assembly bolts
- output bearing snap ring not seated in bearing groove
- damaged input/output bearing
- worn/damaged shift fork, sleeve, or input gear
- loose/missing poppet, spring, or screw
- PTO gear teeth damaged

Hard Shifting

The most probable causes of a hard shift condition are:

- incorrect shift technique
- transmission and adapter shaft speeds not matched
- PTO accessory misaligned, or loose
- low lubricant level (leak or underfilled)
- shift rod loose or misadjusted
- shift lever nut loose or missing
- engine/transmission mounts loose/damaged
- adapter shift fork or sleeve damaged

Fluid Leaks

Fluid leaks from the adapter will generally be from the vent, front/rear seal, front case-to-rear case joint, poppet plunger screw, or adapter-to-transmission joint.

A leak at the front end of the adapter may not always be from the input bearing retainer seal. Check front leaks carefully as the actual leak source may be the transmission.

DIAGNOSIS AND TESTING

ADAPTER SERVICE DIAGNOSIS

The PTO adapter should not be removed until diagnosis indicates a fault has actually occurred. Verify that the other driveline components (transmission, axle), are operating correctly before removing the adapter.

Begin diagnosis by checking fluid level and shift linkage adjustment. Have a helper observe linkage operation if necessary.

If auxiliary power take-off equipment is attached to the adapter, be sure the device is properly attached and in mesh with the PTO gear. Loose, misaligned, or incompatible auxiliary equipment will result in noise and unsatisfactory operation.

The following diagnosis information provides a listing of probable causes of an adapter malfunction. Use the lists as a guideline during diagnosis.

SERVICE PROCEDURES

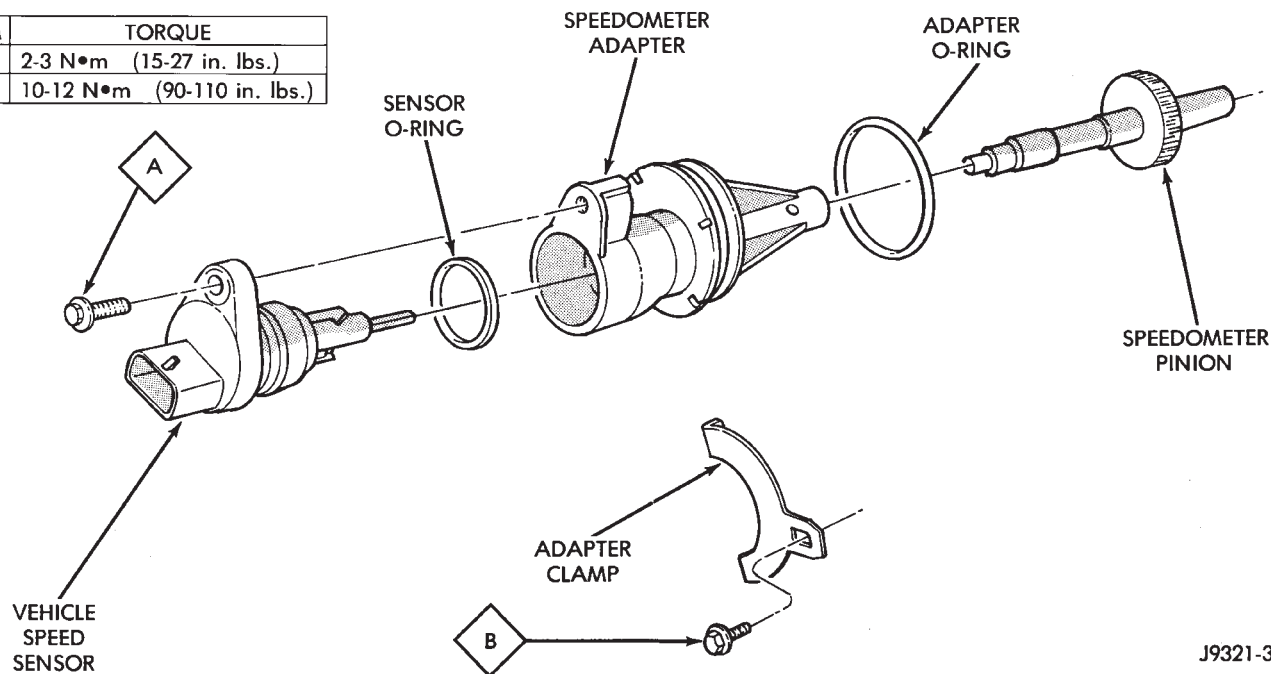
PTO ADAPTER SERVICE

The adapter can be removed and disassembled for service when necessary. Removal/installation and overhaul procedures are provided in this section.

Gaskets are not used in the PTO adapter. All mating surfaces are to be coated with Mopar Gasket Maker, Mopar Silicone Adhesive Sealer, or Loctite 518.

SERVICE PROCEDURES (Continued)

ITEM	TORQUE
A	2-3 N•m (15-27 in. lbs.)
B	10-12 N•m (90-110 in. lbs.)



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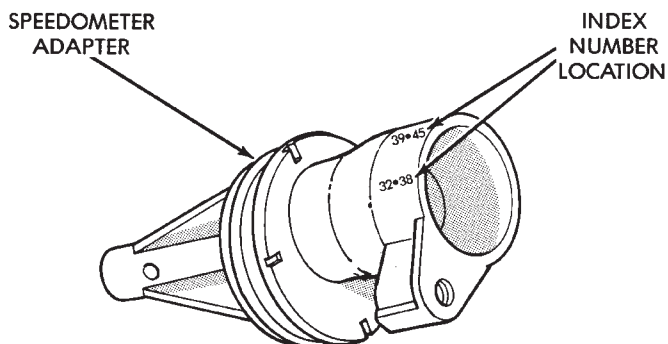
Fig. 8 Speedometer Components**SPEEDOMETER SERVICE**

- (1) Raise vehicle.
- (2) Disconnect wires from vehicle speed sensor.
- (3) Remove adapter clamp and screw (Fig. 8).
- (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. 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.

Speedometer 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 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. 9). These numbers will correspond to number of teeth on pinion.



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Fig. 9 Location Of Index Numbers On Speedometer Adapter

- (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.

REMOVAL AND INSTALLATION

ADAPTER

REMOVAL

- (1) Raise vehicle.
- (2) If adapter is to be removed for disassembly and overhaul, remove drain plug and drain lubricant from adapter.
- (3) Disconnect vehicle speed sensor wires at sensor (Fig. 10).

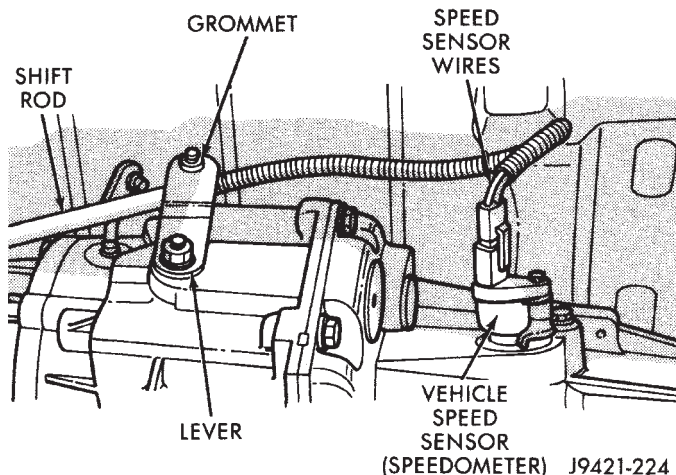


Fig. 10 Shift Rod And Speed Sensor Wire Attachment

- (4) Disconnect shift rod from grommet in adapter shift lever. Use channel lock-style pliers to press rod out of grommet.

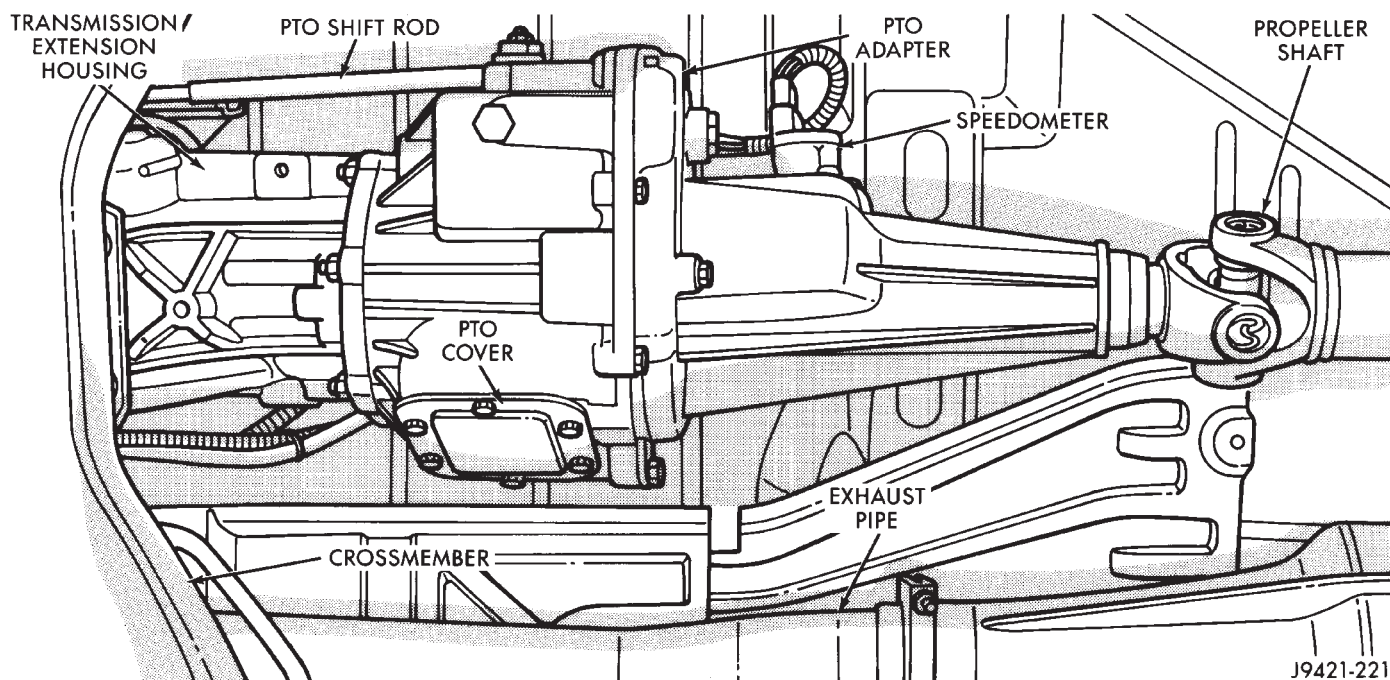


Fig. 11 PTO Adapter Mounting

- (5) Mark propeller shaft yoke for alignment reference. Then disconnect and remove propeller shaft.

- (6) Remove nuts securing adapter mounting studs to transmission extension (Fig. 11).

- (7) Slide adapter studs out of transmission extension and remove adapter from vehicle.

- (8) If a gasket is used between adapter and transmission, retain gasket if in good condition.

INSTALLATION

- (1) If adapter was overhauled, fill adapter to bottom edge of fill plug hole with Mopar Dexron II, or ATF Plus transmission fluid. Tighten fill plug to 41–54 N·m (30–40 ft. lbs.) torque.

- (2) Clean mounting surfaces of adapter and transmission extension with solvent.

- (3) Apply 2–3 drops of Mopar Lock N' Seal, or Loctite 242 to adapter mounting nuts.

- (4) Install gasket on adapter (if equipped). Apply thin bead of sealer to transmission extension and to gasket, if used.

- (5) Install adapter on transmission and install adapter mounting nuts. If adapter has 5/16 studs, tighten nuts to 30–41 N·m (22–30 ft. lbs.). If adapter has 3/8 studs, tighten nuts to 41–47 N·m (30–35 ft. lbs.).

- (6) Lubricate propeller shaft slip yoke with transmission fluid or petroleum jelly.

- (7) Align and install propeller shaft. Tighten shaft clamp bolts to 19 N·m (170 in. lbs.) torque.

REMOVAL AND INSTALLATION (Continued)

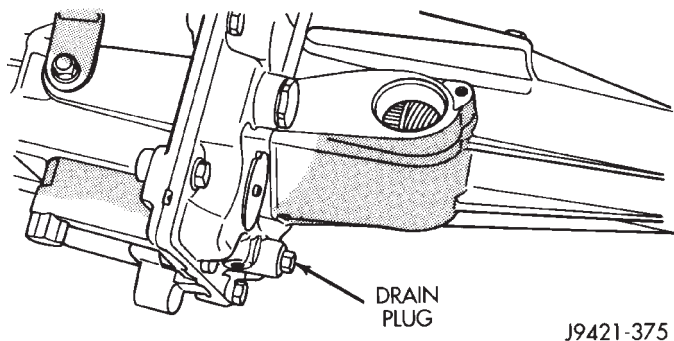
- (8) Connect shift rod to adapter shift lever. Be sure rod is fully seated in plastic grommet.
- (9) Adjust shift rod if necessary.
- (10) Lower vehicle.

DISASSEMBLY AND ASSEMBLY

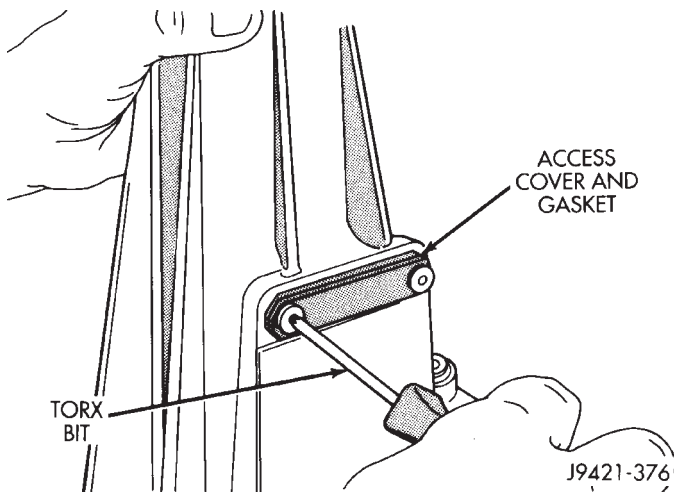
ADAPTER OVERHAUL

DISASSEMBLY

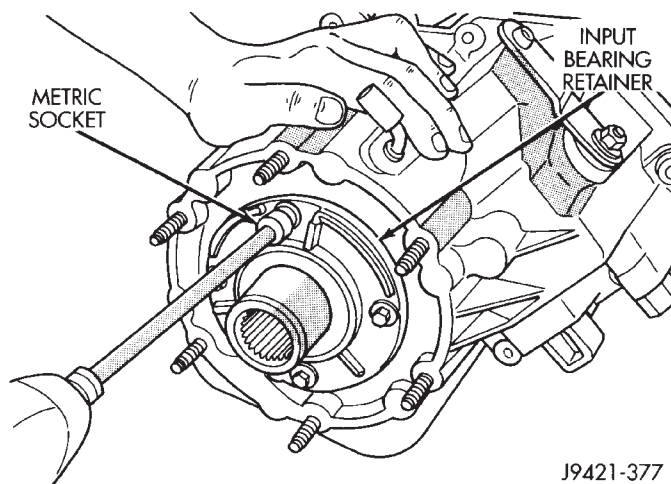
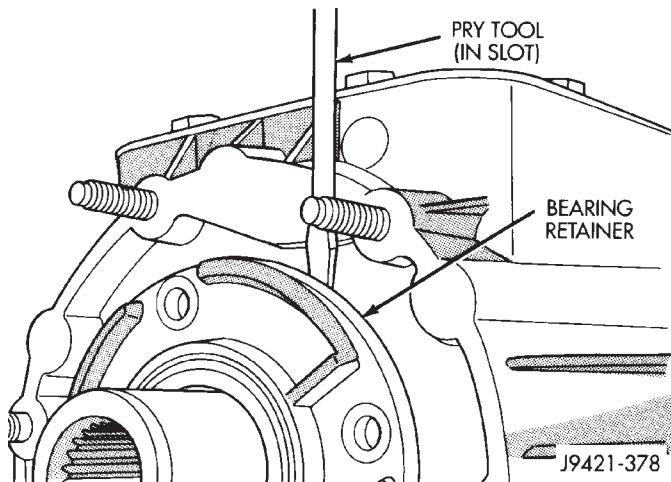
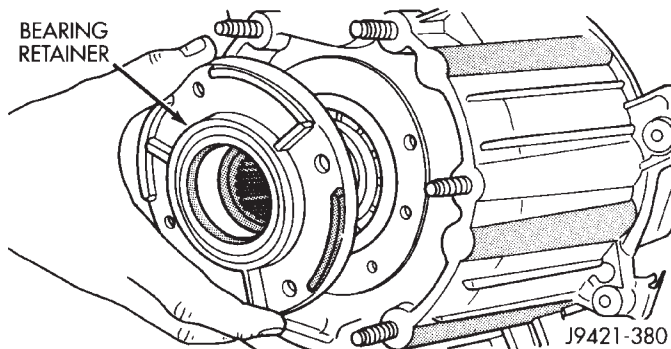
- (1) If adapter was not drained during removal, remove drain bolt at bottom of front housing and drain lubricant into drain pan (Fig. 12).

**Fig. 12 Drain Bolt Location**

- (2) Remove mainshaft bearing retaining ring access cover and gasket (Fig. 13). Cover must be removed from extension for access to retaining ring. A torx head bit is required to remove cover screws.

**Fig. 13 Retaining Ring Access Cover Removal**

- (3) Remove input bearing retainer bolts (Fig. 14).
- (4) Remove input bearing retainer as follows: Insert pry tool in retainer slot (Fig. 15). Then pry retainer outward to break sealer bead and remove retainer (Fig. 16).

**Fig. 14 Removing Input Bearing Retainer Bolts****Fig. 15 Loosening Bearing Retainer (Breaking Sealer Bead)****Fig. 16 Input Bearing Retainer Removal**

DISASSEMBLY AND ASSEMBLY (Continued)

- (5) Remove input gear retaining ring (Fig. 17).

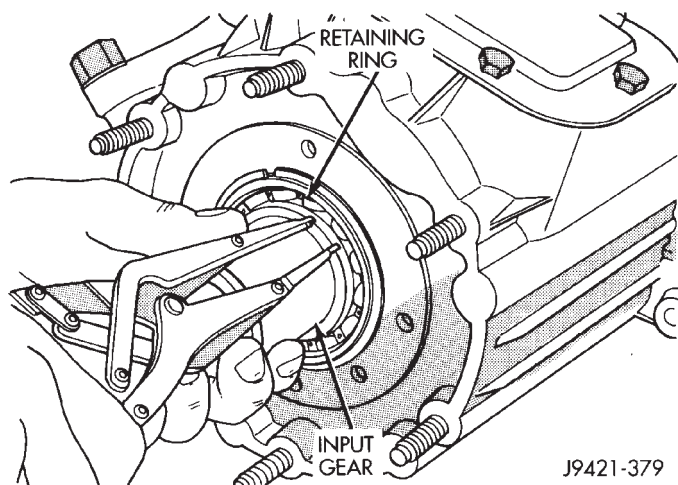


Fig. 17 Input Gear Retaining Ring Removal

- (6) Support adapter on 3-4 small wood blocks (Fig. 18). Position blocks under transmission mounting surface of front case and between studs.

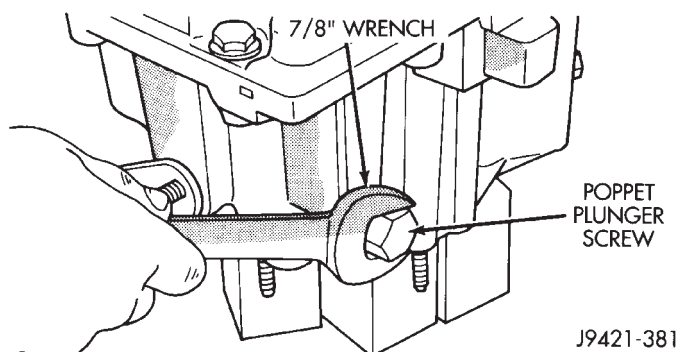


Fig. 18 Poppet Screw Removal

- (7) Remove poppet plunger screw.
 (8) Remove spring and poppet plunger (Fig. 19).

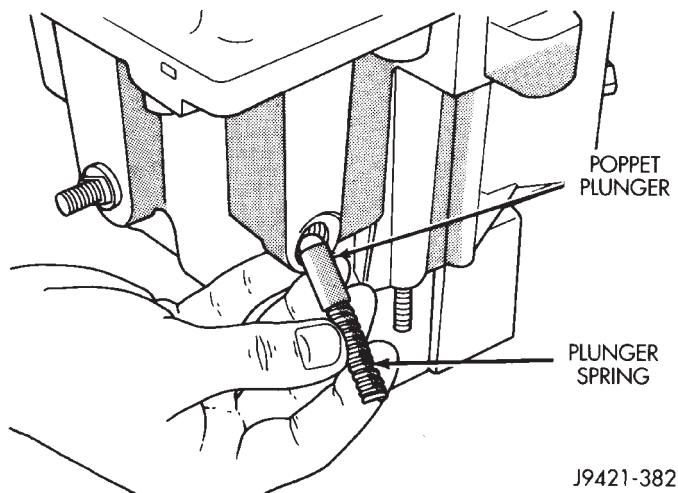


Fig. 19 Poppet And Spring Removal

- (9) Loosen nut and washer that attach shift lever to sector shaft (Fig. 20). Then remove, nut, washer and lever from sector shaft (Fig. 21).

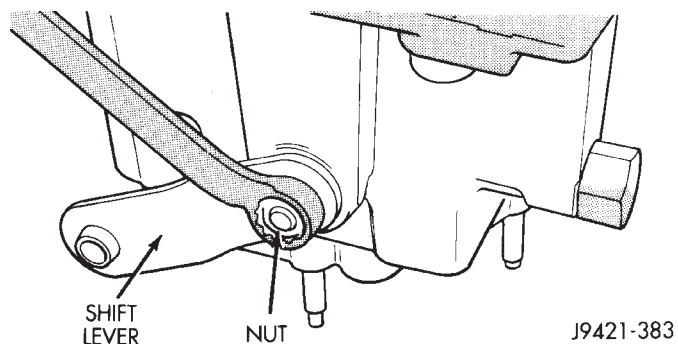


Fig. 20 Loosening Shift Lever Nut

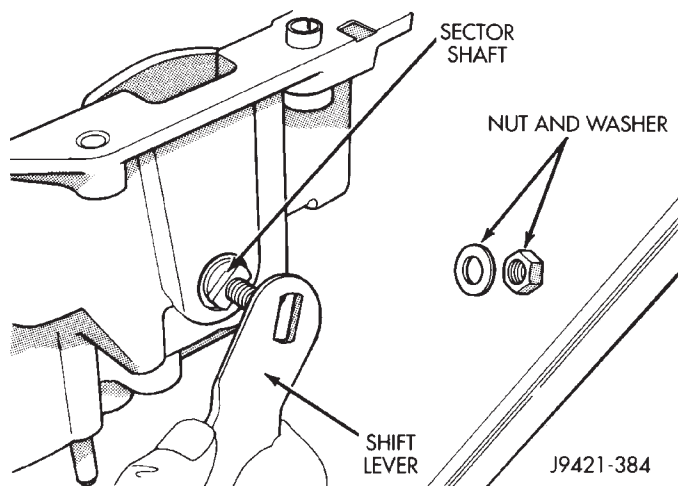


Fig. 21 Shift Lever, Nut And Washer Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(10) Remove bolts attaching front case to rear extension (Fig. 22). **Two attaching bolts require a flat washer (Fig. 23). Note position of these bolts for assembly reference. Mark bolt position with scribe or with paint stripe.**

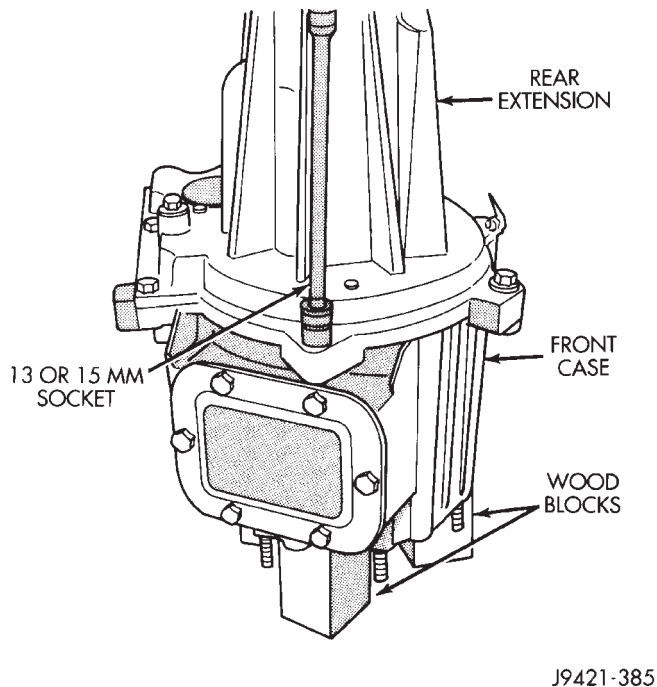


Fig. 22 Removing Rear Extension Attaching Bolts

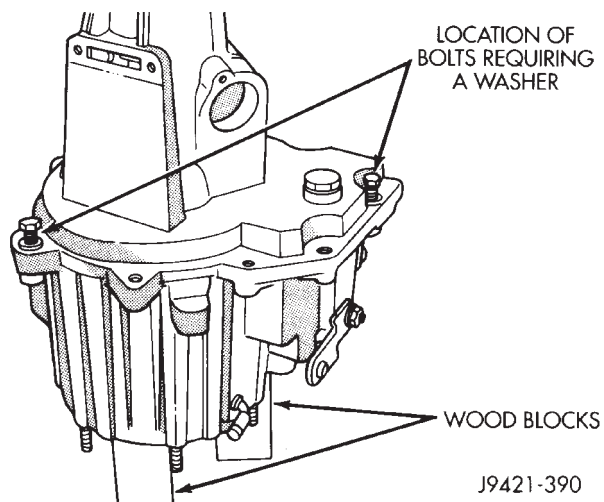


Fig. 23 Location Of Rear Extension Bolts Requiring Washers

(11) Pry extension away from front case with flat blade screwdriver. Position screwdriver in slots provided at each end of case and extension (Fig. 24).

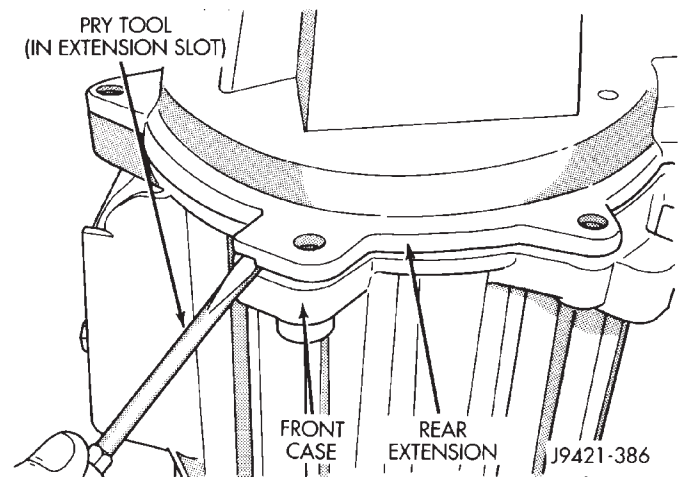


Fig. 24 Loosening Rear Extension (Breaking Sealer Bead)

(12) Remove rear extension as follows:

- (a) Spread mainshaft bearing retaining ring with snap ring pliers (Fig. 25).
- (b) Lift extension up and off mainshaft and front case (Fig. 26).

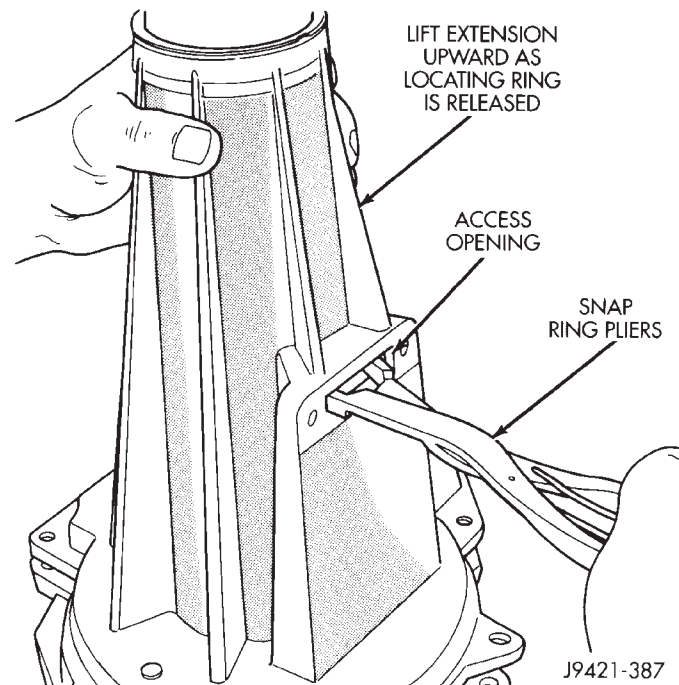


Fig. 25 Releasing Mainshaft Bearing Retaining Ring

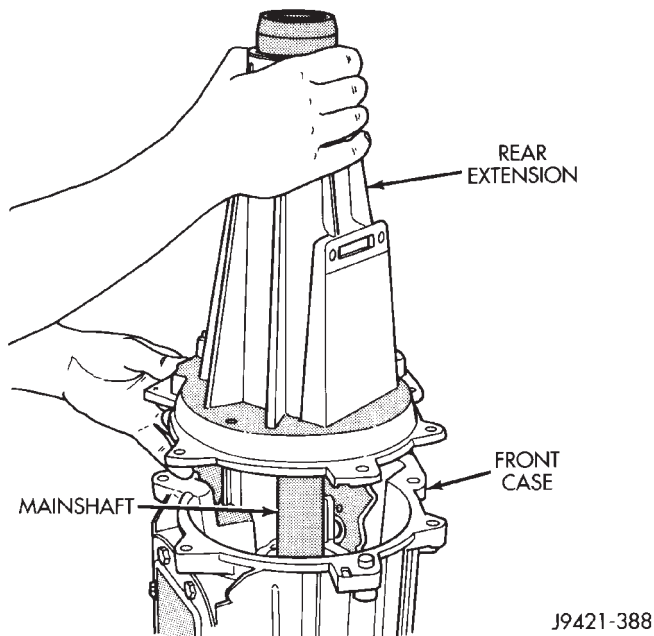


Fig. 26 Removing Rear Extension

(13) Remove mainshaft by lifting it straight up and out of input gear and shift sleeve (Fig. 27).

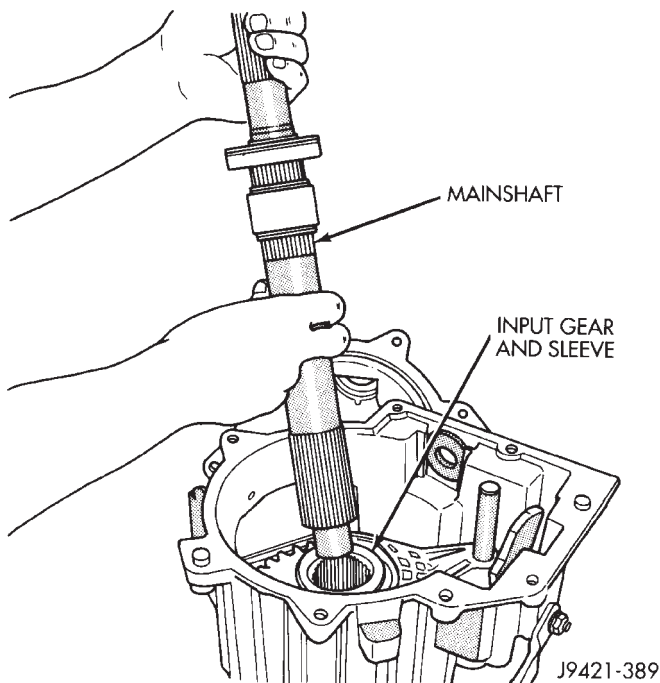


Fig. 27 Mainshaft Removal

(14) Remove rear output bearing retaining ring from mainshaft (Fig. 28).

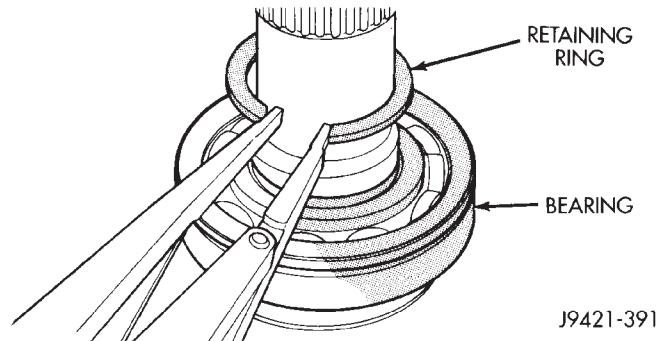


Fig. 28 Output Bearing Snap Ring Removal

(15) Remove output bearing from mainshaft. **Note position of snap ring groove in bearing for installation reference (Fig. 29).**

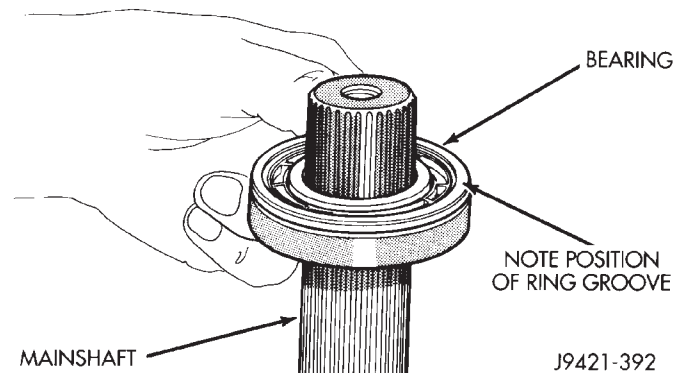


Fig. 29 Mainshaft Output Bearing Removal

(16) Remove speedometer gear rear retaining ring (Fig. 30).

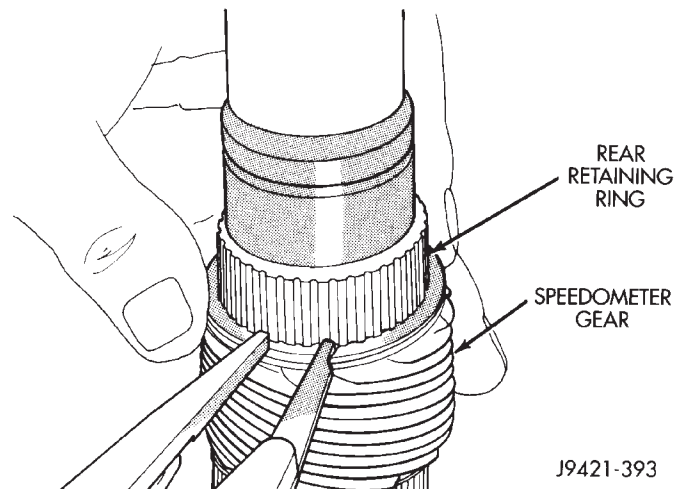


Fig. 30 Speedometer Gear Rear Snap Ring Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(17) Remove speedometer gear from mainshaft (Fig. 31).

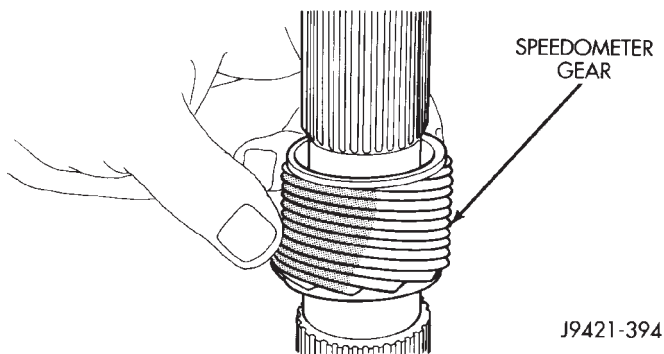


Fig. 31 Speedometer Gear Removal

(18) Remove speedometer gear front snap ring from mainshaft (Fig. 32).

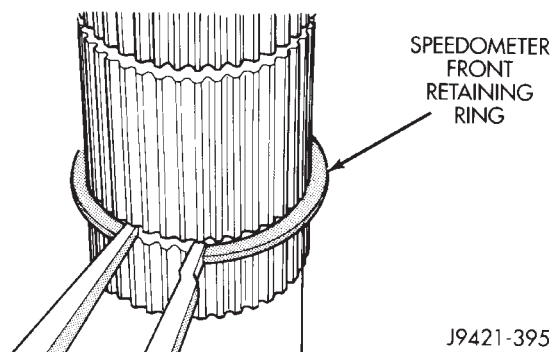


Fig. 32 Speedometer Gear Front Snap Ring Removal

(19) Remove shift rail by pulling it up and out of fork and case (Fig. 33).

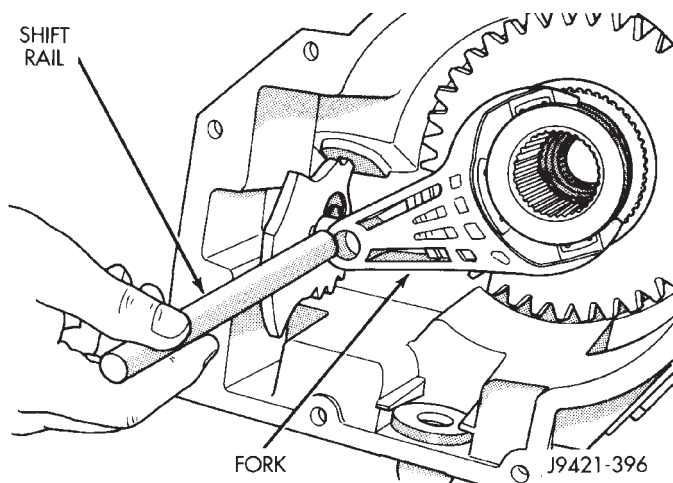


Fig. 33 Shift Rail Removal

(20) Remove shift fork and shift sleeve as assembly (Fig. 34).

(21) Separate shift fork and sleeve (Fig. 35). Note position of sleeve for installation reference.

(22) Roll case on side and off wood blocks.

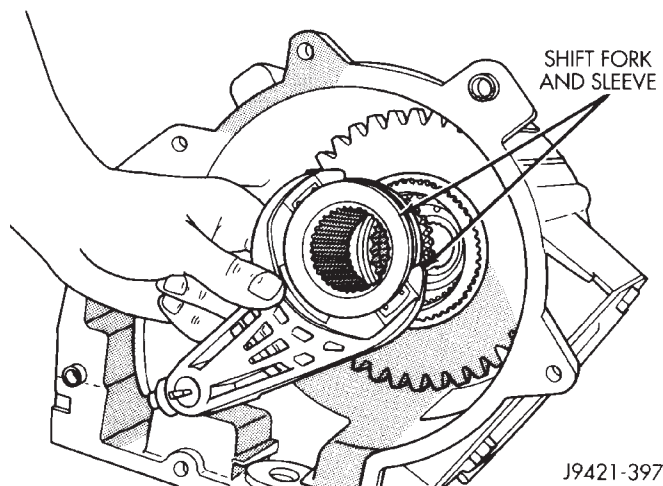


Fig. 34 Shift Fork And Sleeve Removal

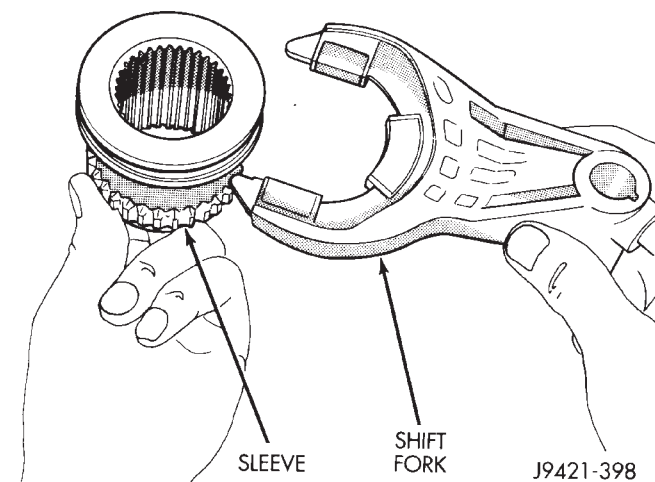


Fig. 35 Separating Shift Fork And Sleeve

(23) Tap input gear out of bearing with plastic mallet (Fig. 36).

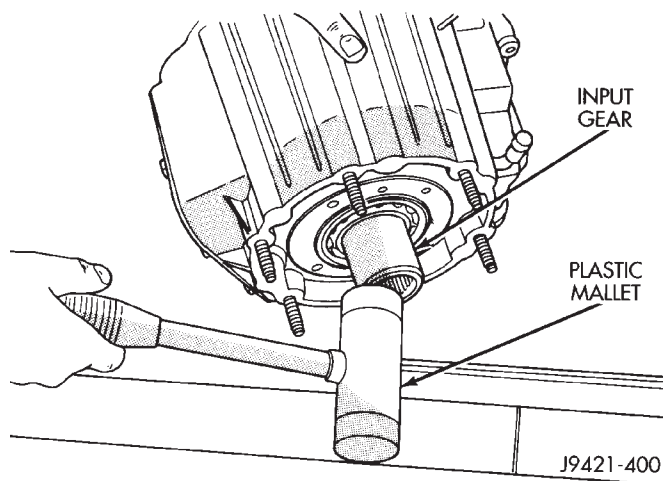


Fig. 36 Starting Input Gear Out of Bearing

DISASSEMBLY AND ASSEMBLY (Continued)

(24) Remove PTO and input gear assembly (Fig. 37). Lift assembly up and out of input bearing and case.

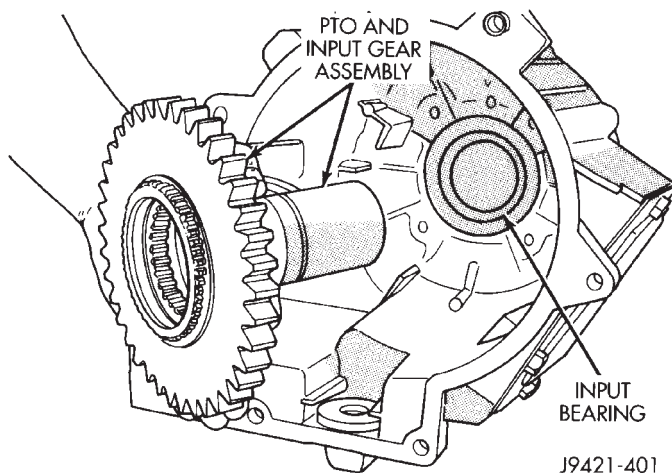


Fig. 37 Removing PTO/Input Gear Assembly

(25) Remove retaining ring that secures PTO gear on input gear (Fig. 38). Then slide PTO gear off input gear (Fig. 39).

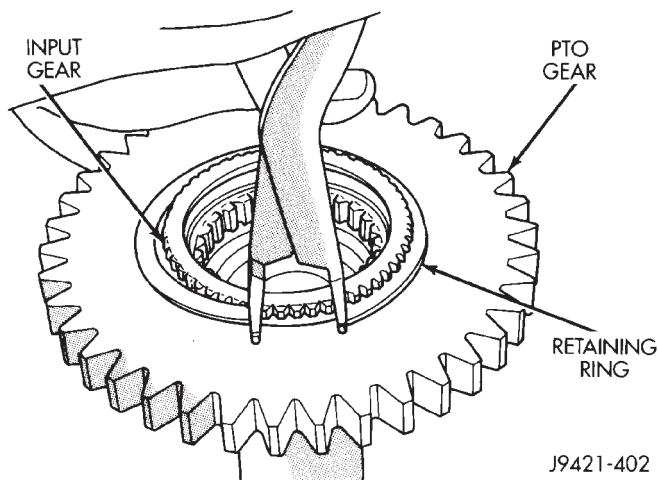


Fig. 38 Removing PTO Gear Retaining Ring

(26) Remove sector shaft O-ring retainer (Fig. 40), and O-ring (Fig. 41).

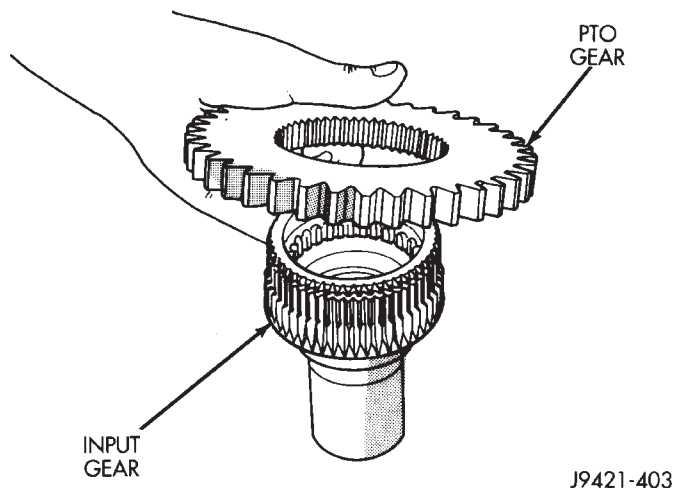


Fig. 39 Removing PTO Gear From Input Gear

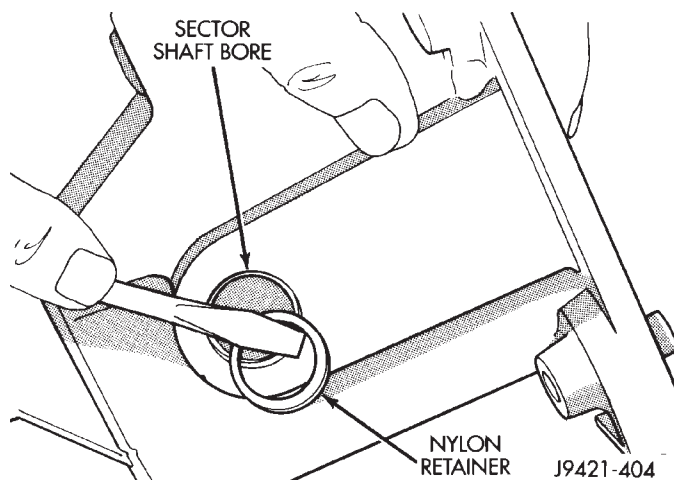


Fig. 40 Removing Shift Sector O-Ring Retainer

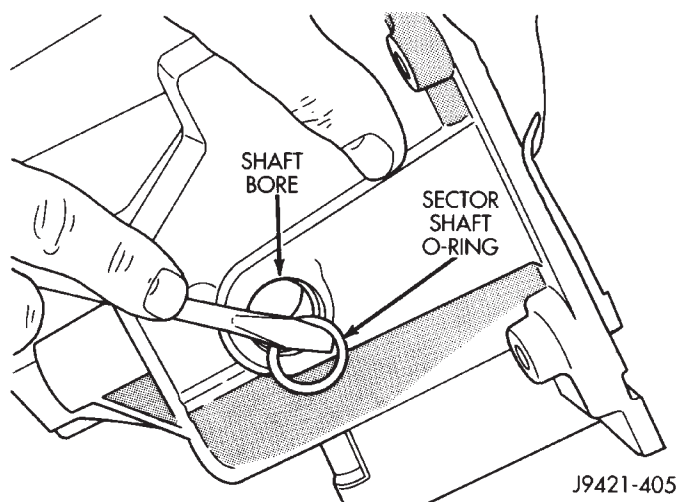


Fig. 41 Removing Shift Sector O-Ring

DISASSEMBLY AND ASSEMBLY (Continued)

(27) Remove input bearing from front case with Driver Handle C-4171 and Tool C-4210 or 7828, whichever fits best (Fig. 42). **Bearing can only be removed from case interior because of bearing locating ring.**

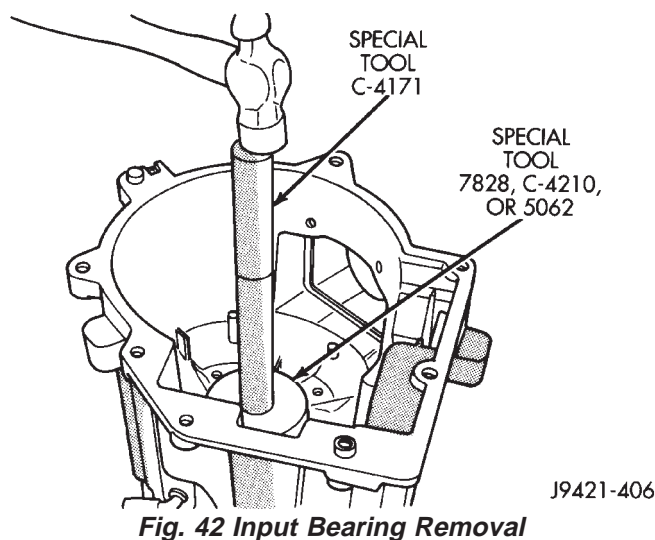


Fig. 42 Input Bearing Removal

(28) Inspect condition of needle bearing in input gear. If bearing is rough/noisy, worn, or brinnelled, remove bearing as follows:

- Turn bolt of Puller MD998346 to retract puller jaws. Then position puller jaws under bearing (Fig. 43).
- Tighten puller bolt to expand puller jaws and secure them under bearing.
- Grip puller bridge and turn puller nut clockwise to draw bearing out of gear (Fig. 44). **Note that bearing has built in cup plug (Fig. 45).**

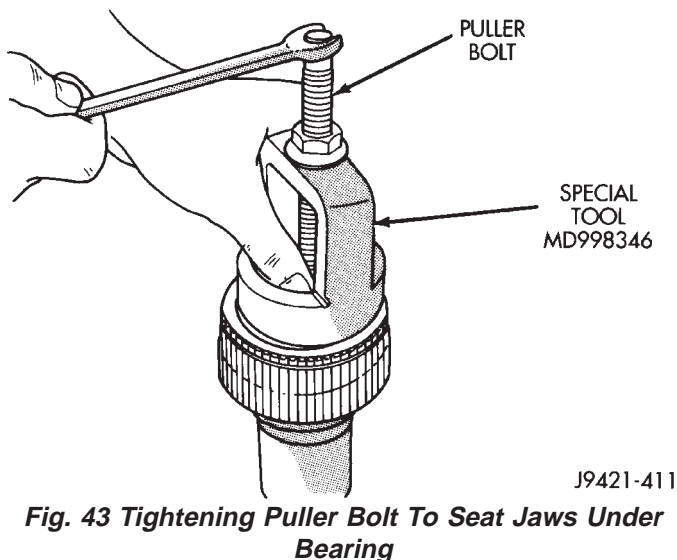


Fig. 43 Tightening Puller Bolt To Seat Jaws Under Bearing

ASSEMBLY

Lubricate the adapter components with Mopar Dexron II, or ATF Plus during assembly operations. In addition, since gaskets are not used in the

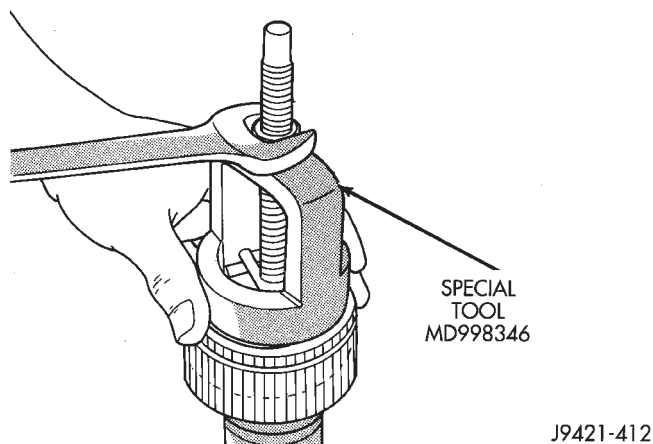


Fig. 44 Tightening Puller Nut To Pull Bearing From Gear

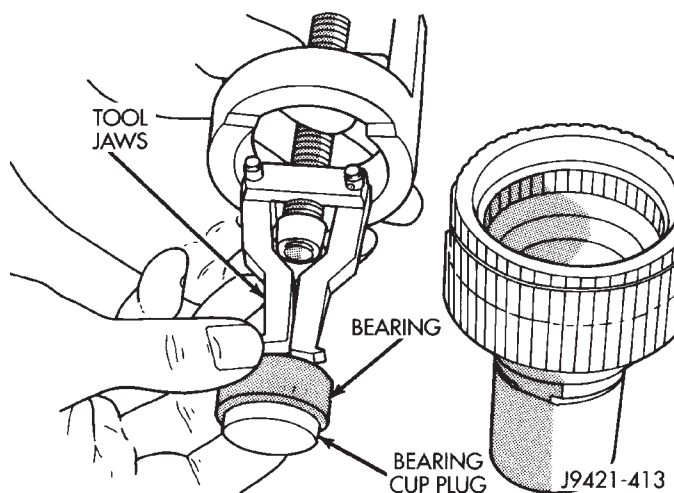


Fig. 45 Bearing Removed From Gear

adapter, sealing surfaces are to be coated with Mopar Gasket Maker, Loctite 518, or Mopar silicone adhesive/sealer. Therefore, it is important that all sealing surfaces be clean and free of grease and oil before applying sealers.

(1) Start input bearing in front case bore. Verify that locating ring is installed on bearing (Fig. 46). Note that bearing can only be installed from case exterior because of the ring which controls depth of installation.

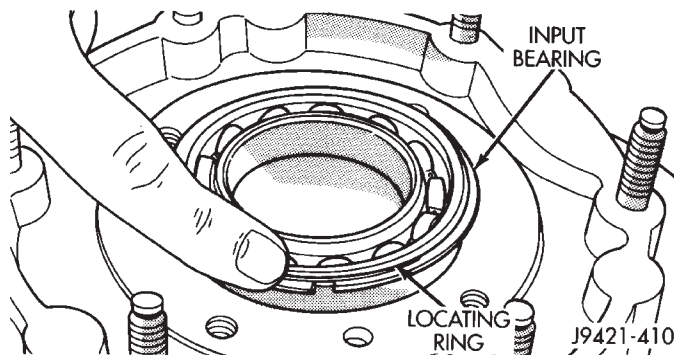


Fig. 46 Input Bearing Locating Ring Position

DISASSEMBLY AND ASSEMBLY (Continued)

(2) Seat input bearing in case (Fig. 47). Use driver Handle C- 4171 and Installer C-4210, 5062, or 7828 to install bearing. Seat bearing until locating ring is flush against case.

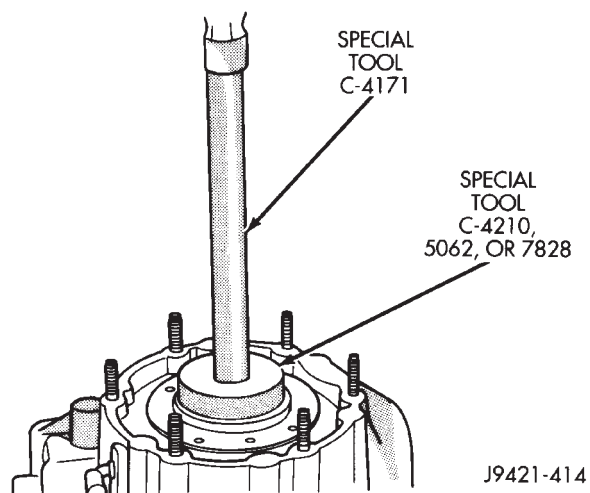


Fig. 47 Input Bearing Installation

(3) Install new needle bearing in input gear with Driver Handle C-4171 and Installer 5065 (Fig. 48).

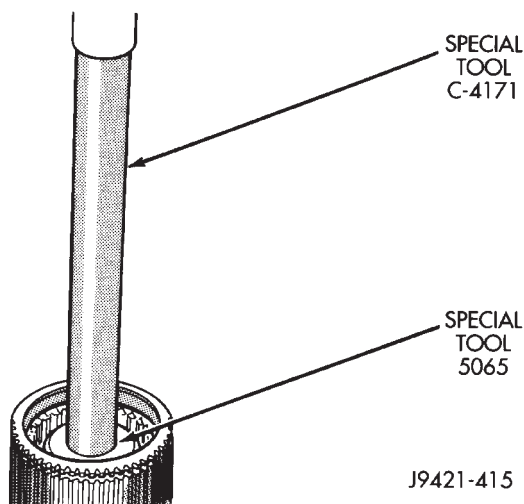


Fig. 48 Installing Needle Bearing In Input Gear

(4) Install new sector shaft O-ring (Fig. 49), and O-ring retainer (Fig. 50) in sector shaft bore.

(5) Install shift sector in front case (Fig. 51).

(6) Support front case on 3-4 small wood blocks so interior of case is facing up. Position blocks between studs on front case.

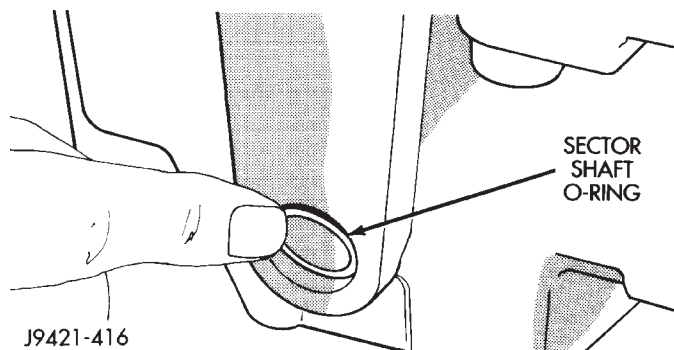


Fig. 49 Sector Shaft O-Ring Installation

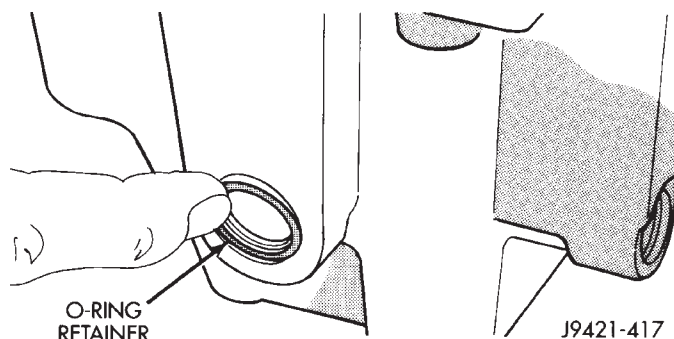


Fig. 50 Sector Shaft O-Ring Retainer Installation

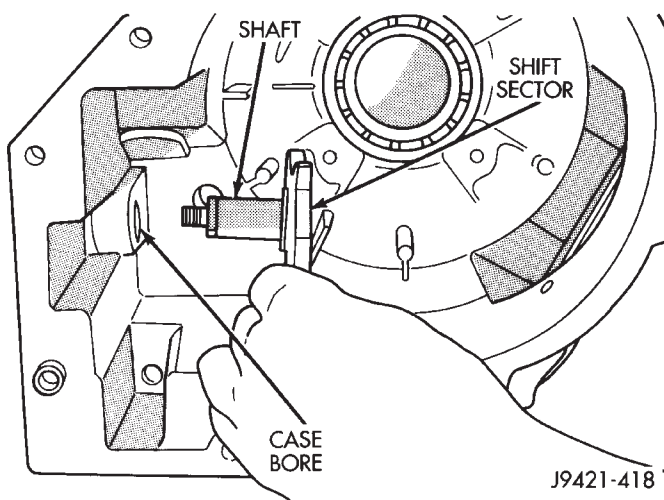


Fig. 51 Shift Sector Installation

DISASSEMBLY AND ASSEMBLY (Continued)

- (7) Install PTO gear on input gear (Fig. 52).
- (8) Install PTO gear retaining ring (Fig. 53).

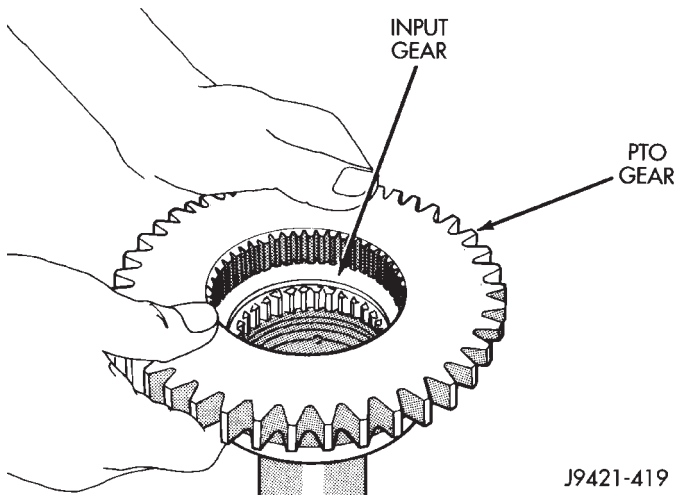


Fig. 52 Assembling Input And PTO Gears

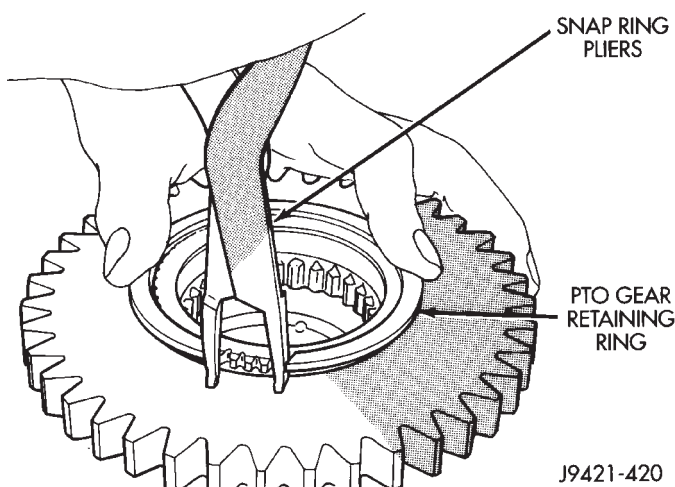


Fig. 53 Installing PTO Gear Retaining Ring

- (9) Install input/PTO gear assembly in case (Fig. 54).

(10) **Tap PTO gear with wood hammer handle until snap ring groove in input gear is accessible.**

- (11) Remove front case from wood blocks and position case so input gear is accessible.

- (12) Install retaining ring on input gear (Fig. 55). **Be sure ring is fully seated in gear groove.**

- (13) Remount front case on wood blocks.

- (14) Assemble shift fork and sleeve (Fig. 56). Then install fork and sleeve (Fig. 57). Be sure sleeve is seated in input gear.

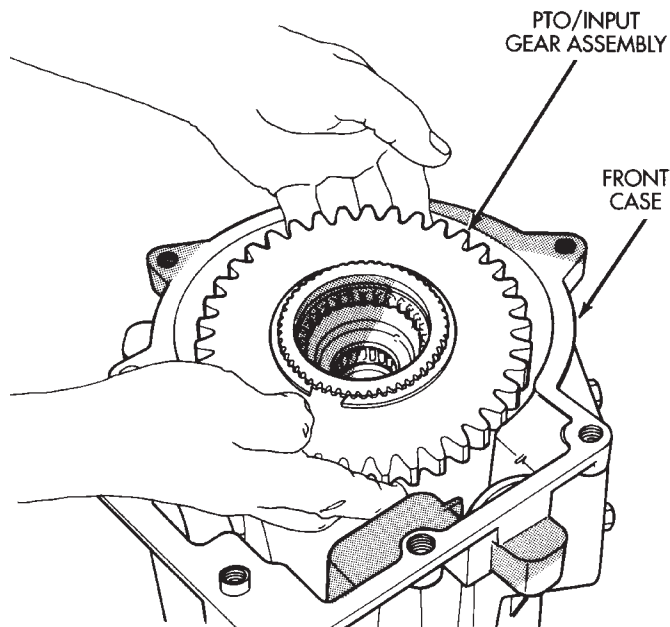


Fig. 54 Installing Input/PTO Gear Assembly In Case

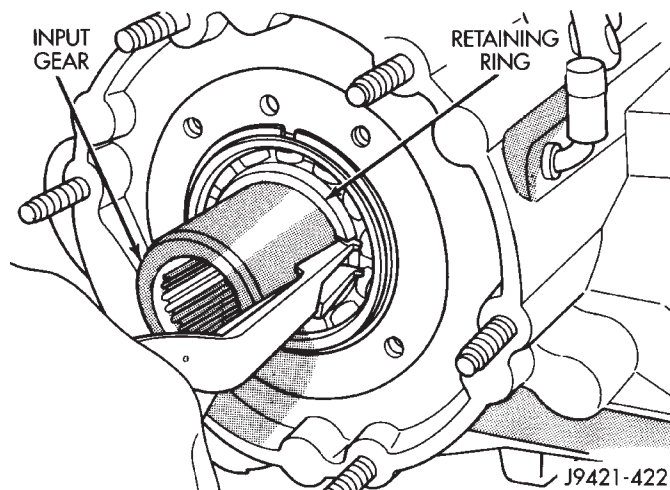


Fig. 55 Installing Input Gear Retaining Snap Ring

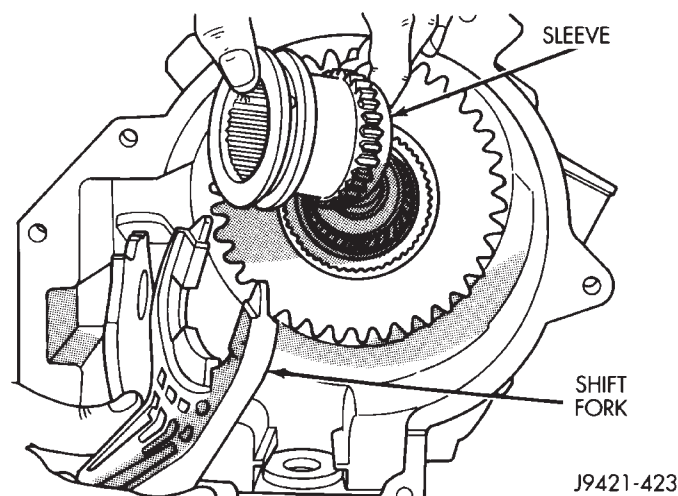
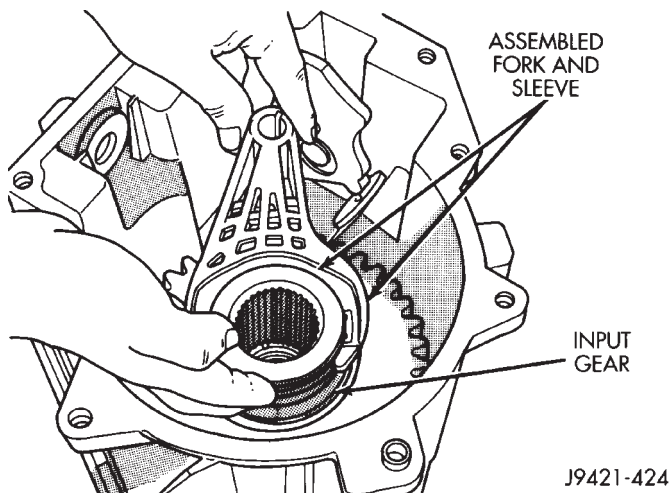
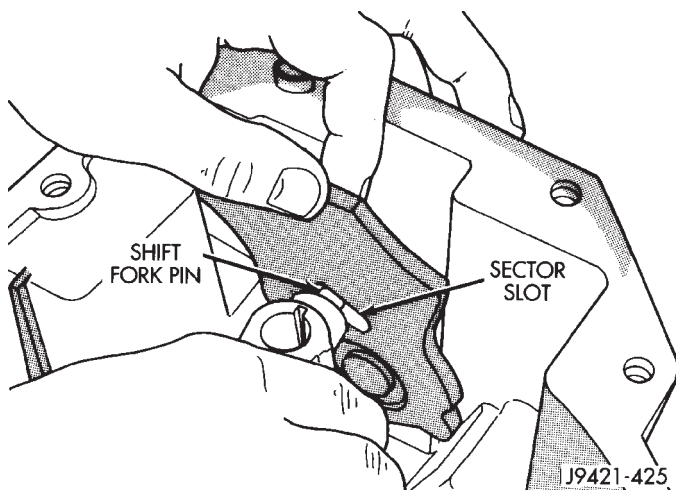


Fig. 56 Assembling Shift Fork And Sleeve

DISASSEMBLY AND ASSEMBLY (Continued)

**Fig. 57 Shift Fork And Sleeve Installation**

(15) Align and install shift fork pin in sector slot (Fig. 58).

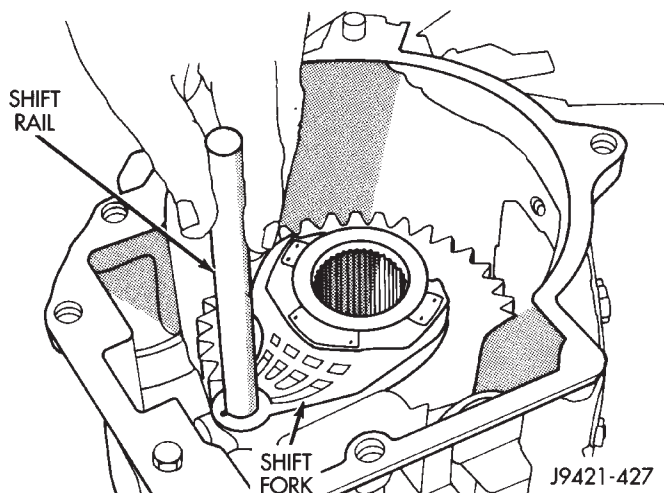
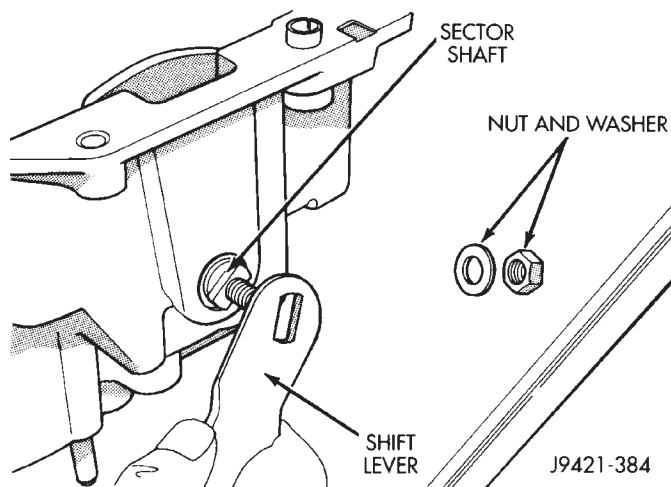
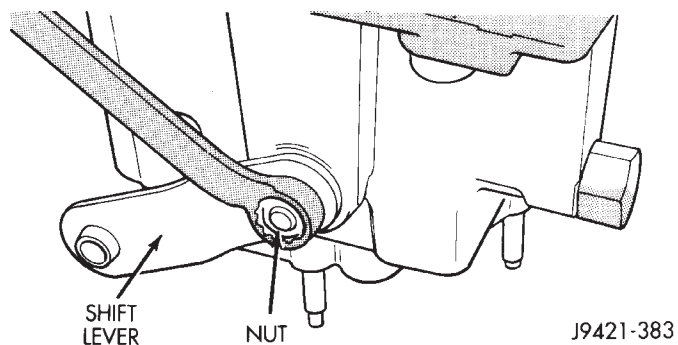
**Fig. 58 Inserting Shift Fork Pin In Sector Slot**

(16) Align shift sleeve in input gear and align shift fork with shift rail bore in case.

(17) Install shift rail through fork and into case bore (Fig. 59).

(18) Install shift lever on sector shaft (Fig. 60). Then install lever washer and nut on sector shaft (Fig. 61). Apply Loctite 242 to nut before installation and tighten nut to 27–34 N·m (20–25 ft. lbs.) torque.

(19) Install magnet in case pocket.

**Fig. 59 Shift Rail Installation****Fig. 60 Shift Lever Installation****Fig. 61 Installing/Tightening Shift Lever Nut And Washer**

DISASSEMBLY AND ASSEMBLY (Continued)

(20) Install mainshaft (Fig. 62). Guide shaft through sleeve and into input gear bearing.

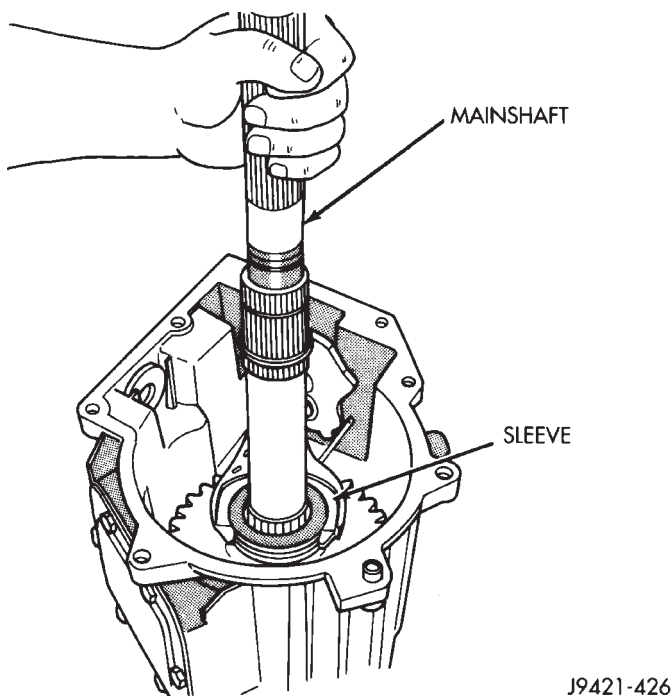


Fig. 62 Mainshaft Installation

(21) Install first speedometer snap ring on shaft (Fig. 63), followed by speedometer gear (Fig. 64). Then install second snap ring to secure gear on shaft (Fig. 65).

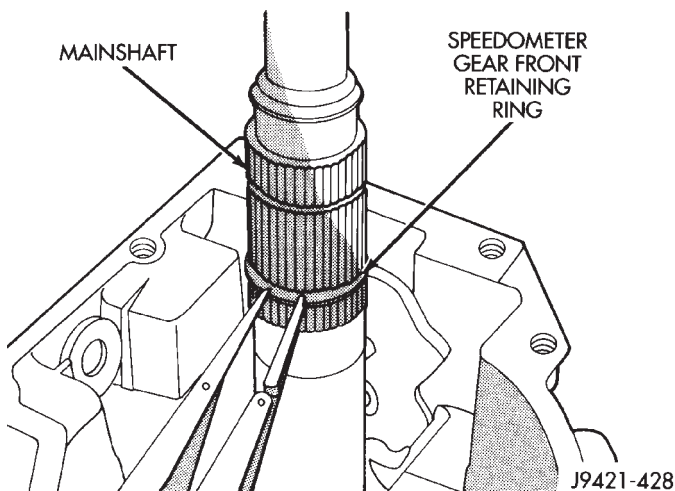


Fig. 63 Speedometer Front Ring installation

(22) Install output bearing on mainshaft (Fig. 66). Be sure groove in outer race of bearing is toward rear of shaft. If bearing is reversed, retaining ring (in extension) will not align bearing.

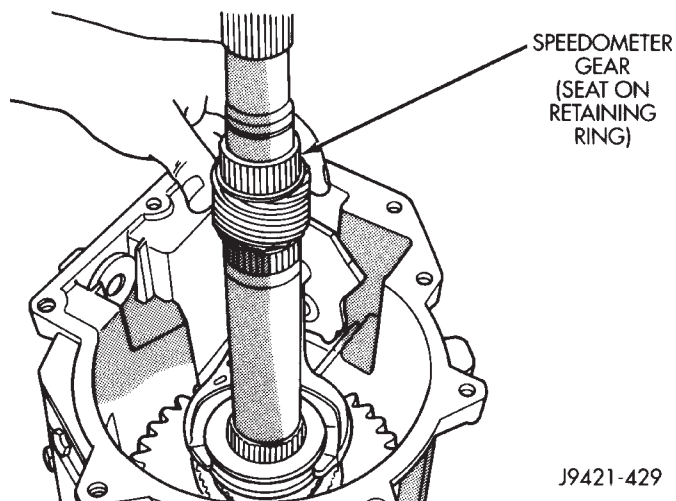


Fig. 64 Speedometer Gear installation

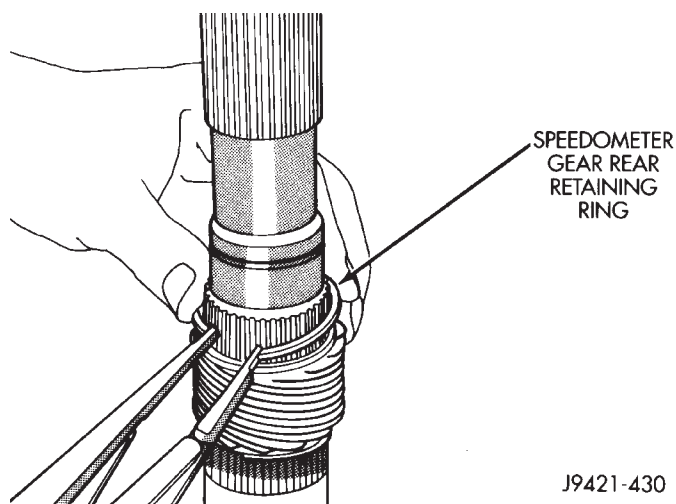


Fig. 65 Speedometer Front Ring installation

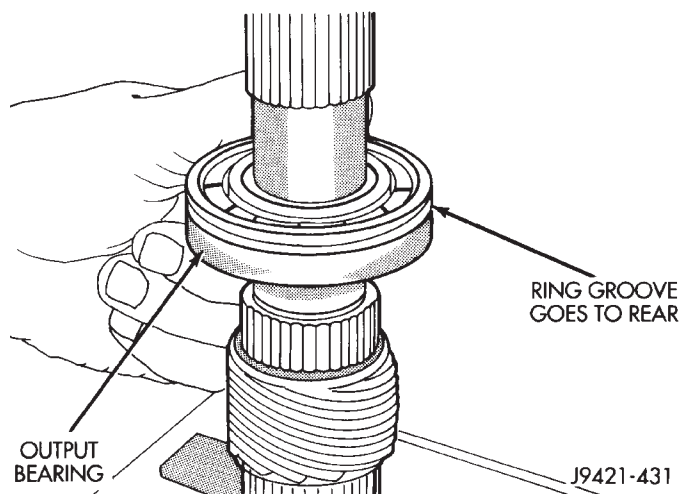


Fig. 66 Output Bearing Installation

DISASSEMBLY AND ASSEMBLY (Continued)

(23) Install output bearing retaining ring (Fig. 67). Use parallel jaw snap ring pliers to install ring.

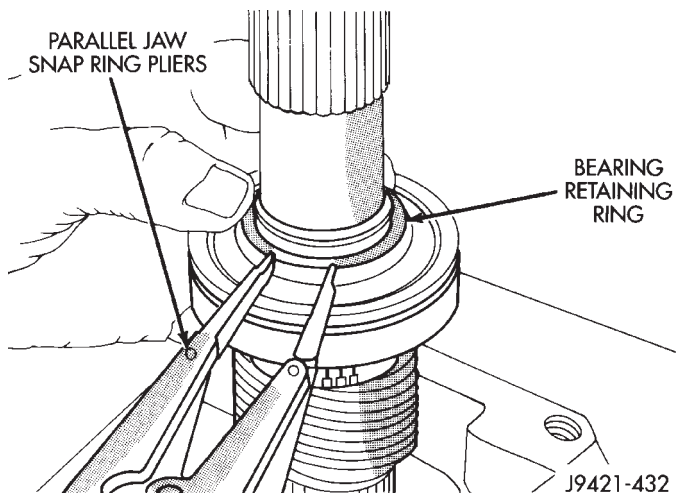


Fig. 67 Output Bearing Retaining Ring Installation

(24) Install new seal in rear extension if necessary. Use suitable size installer tool and be sure seal is fully seated.

(25) Apply bead of Mopar Gasket Maker, Loctite 518, or Mopar silicone adhesive sealer to mating surface of front case and rear extension. Sealer beads should be no more than 1/8 to 3/16 in. wide.

(26) Align and install rear extension on front case (Fig. 68).

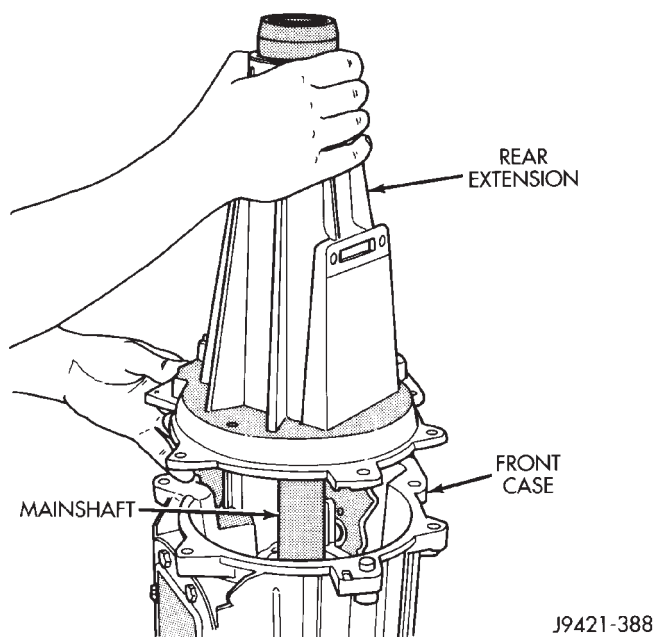


Fig. 68 Installing Rear Extension On Front Case

(27) Install one or two extension-to-front case bolts to hold assembly together. Be sure dowels are aligned in extension before hand tightening bolts.

(28) Remove adapter assembly from wood blocks and place assembly in horizontal position on workbench.

(29) Seat output bearing retaining ring as follows:

(a) Reach in access cover opening in rear extension with snap ring pliers (Fig. 69).

(b) Spread retaining ring with snap ring pliers and seat it in groove of output bearing. **If retaining ring is not aligned with bearing groove, tilt front case upward so mainshaft will move rearward for alignment.**

(c) Verify that retaining ring is fully seated in ring groove before proceeding (Fig. 70).

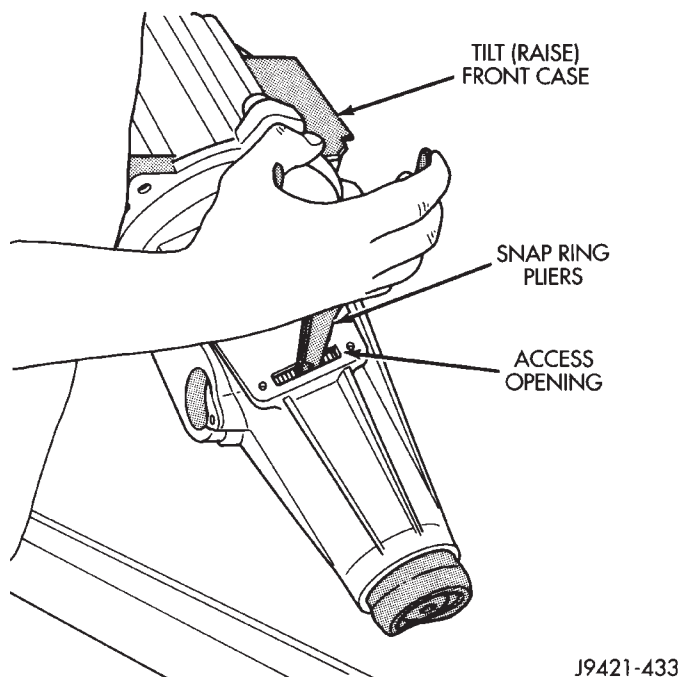


Fig. 69 Seating Output Bearing Retaining Ring

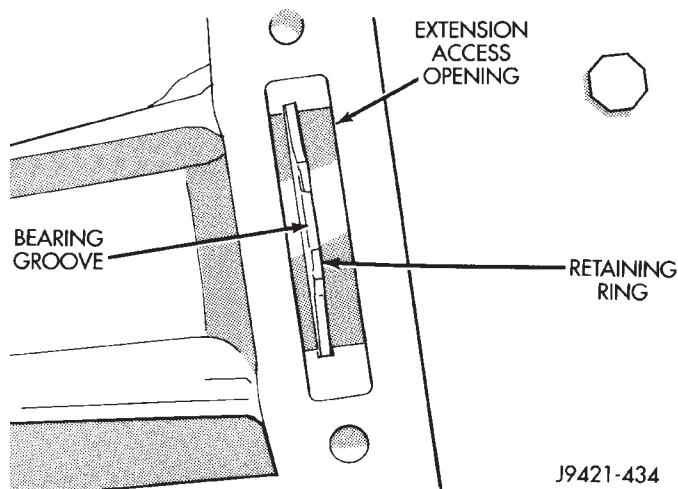


Fig. 70 Correct Seating Of Retaining Ring

DISASSEMBLY AND ASSEMBLY (Continued)

(30) Install access cover and gasket in rear extension (Fig. 71). Then install and tighten torx screws to 8–11 N·m (75–95 in. lbs.) (Fig. 72).

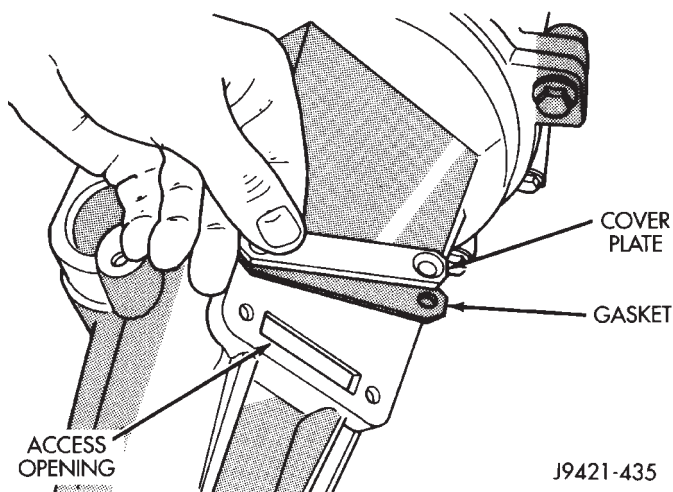


Fig. 71 Access Cover And Gasket Installation

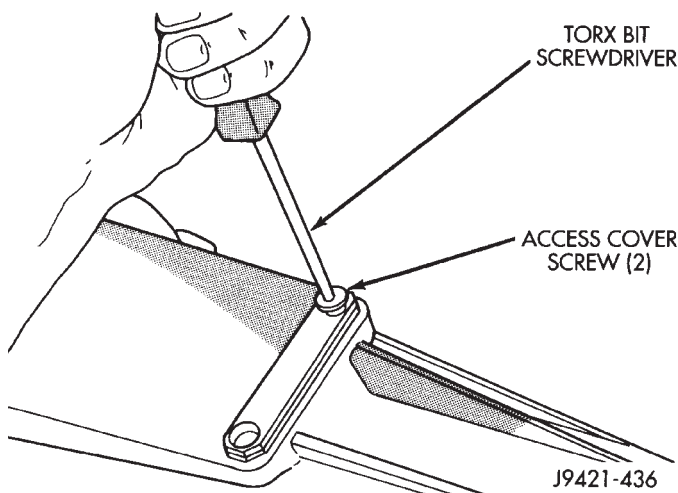


Fig. 72 Installing Access Cover Screws

(31) Install new seal in input bearing retainer with Handle C- 4171 and Installer 7828, C-4974, or similar size installer tool (Fig. 73).

(32) Install input bearing retainer as follows:

(a) Note position of oil channel in retainer and oil feed hole in front case (Fig. 74). Be sure retainer is installed so channel is aligned with feed hole.

(b) Apply bead of Mopar Gasket Maker, Loctite 518, or Mopar silicone adhesive sealer to seal surface of retainer. Sealer bead should be no more than 1/8 to 3/16 in. wide.

(c) Apply transmission fluid to input gear hub.

(d) Align retainer channel with feed hole in case and install retainer (Fig. 75).

(e) Apply sealer to retainer bolts. Then install and tighten bolts to 16–24 N·m (12–18 ft. lbs.) torque.

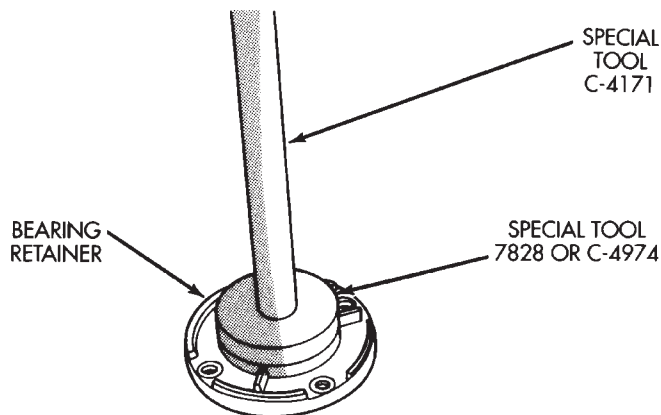


Fig. 73 Installing Input Bearing Retainer Seal

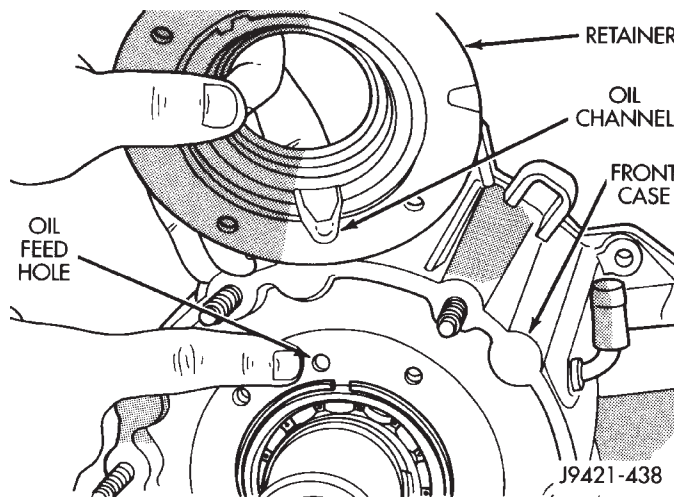


Fig. 74 Retainer Oil Channel And Case Oil Feed Hole Locations

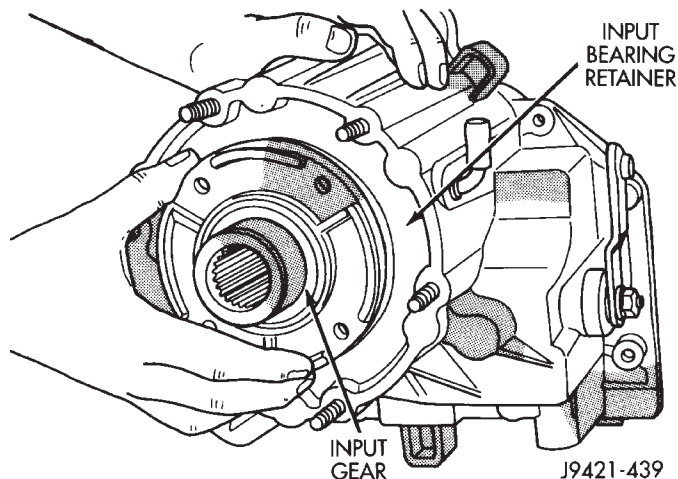


Fig. 75 Input Bearing Retainer Installation

DISASSEMBLY AND ASSEMBLY (Continued)

CAUTION: If a silicone sealer is used, do not use any more sealer than recommended. Excessive amounts of sealer will be displaced into the area between the retainer and case. This could result in partial or full blockage of the bearing oil feed hole in the front case.

(33) Install poppet plunger and spring in front case detent bore (Fig. 76).

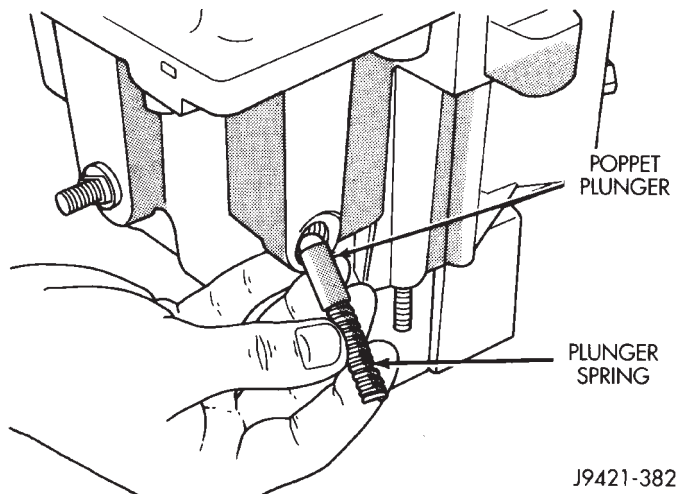


Fig. 76 Poppet Plunger And Spring Installation

(34) Install new O-ring on poppet plunger screw. Then install screw in front case (Fig. 77). Tighten screw to 16–24 N·m (12–18 ft. lbs.) torque.

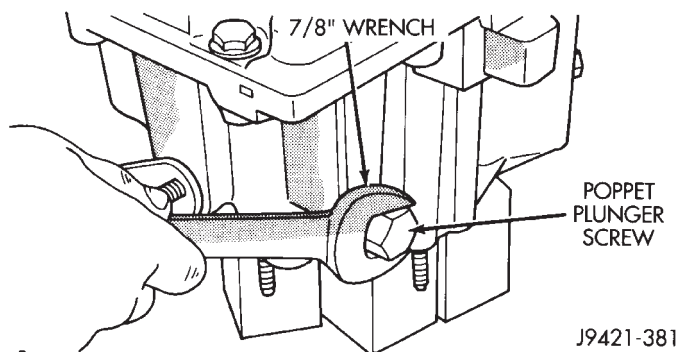


Fig. 77 Poppet Plunger Screw Installation

(35) Install indicator switch in front case. Tighten switch to 20–34 N·m (15–25 ft. lbs.) torque.

(36) Install and tighten drain plug to 41–54 N·m (30–40 ft. lbs.) torque.

(37) Fill adapter with 2.1 liters (4.6 pints) liters of Mopar Dexron II, or ATF Plus transmission fluid and install fill plug. Tighten fill plug to 41–54 N·m (30–40 ft. lbs.) torque.

(38) Apply Mopar silicone adhesive/sealer to PTO cover mating surface and to threads of cover bolts. Then install cover and tighten bolts to 27–34 N·m (20–25 ft. lbs.) torque.

CLEANING AND INSPECTION

ADAPTER

Clean the adapter components with solvent. Dry all the parts (except bearings) with compressed air. Allow bearings to air dry, or wipe them dry with clean shop towels.

Inspect the front case and rear extension (Fig. 78), for cracks, damaged threads, or scored mating surfaces. Minor scratches and nicks can be smoothed off with emery cloth. Damaged threads can be repaired with Heli-Coil, stainless steel thread inserts.

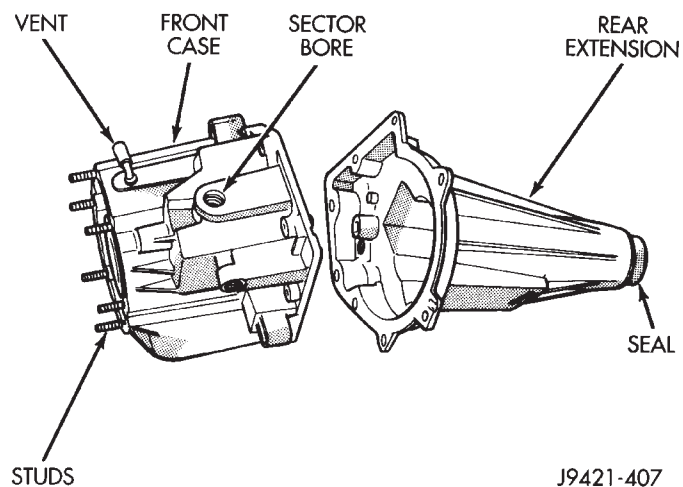


Fig. 78 Front Case And Extension

Be sure the front case sector bore, vent tube, and mounting studs are in good condition. Replace the extension oil seal if it is cut, or torn. Also check the retaining ring in the extension interior (Fig. 79). This ring secures the mainshaft output bearing to the extension.

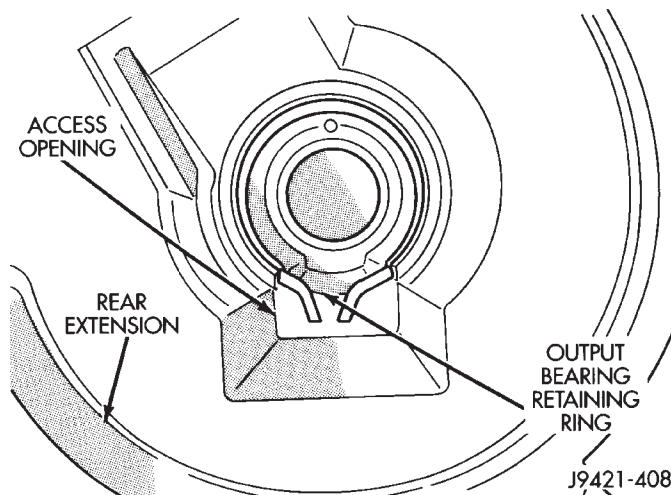
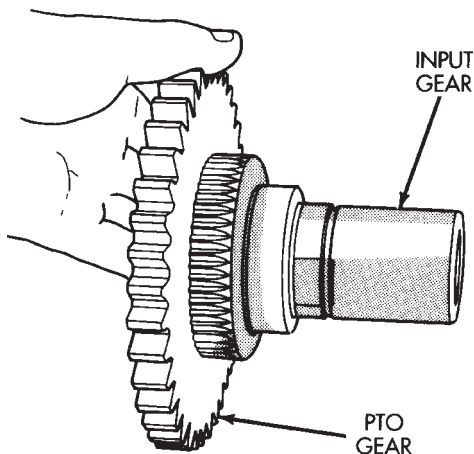


Fig. 79 Bearing Retaining Ring Location In Extension

CLEANING AND INSPECTION (Continued)

The extension has a bushing at the rear. If the bushing is worn, remove the seal. Then remove the bushing by cutting and collapsing it with a cape chisel. A new bushing can be installed with any suitable size installer tool similar to 5065 or 5062.

Slide the PTO gear onto the input gear and check fit (Fig. 80). Replace either gear if any gear teeth, or splines are damaged. Also check the bearing/seal surface of the input gear. Small scratches on this surface can be smoothed with 320/400 grit emery cloth if necessary.



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Fig. 80 Input And PTO Gears

The various snap rings used in the adapter should be replaced during overhaul. This is recommended as some of the snap rings can be distorted during removal. A distorted snap ring will not seat properly.

Inspect the bearings carefully. Rotate them by hand and check for noise or roughness. Replace any bearing exhibiting roughness, noise, or visible surface damage of the rollers or bearing balls.

Check the splines and gear teeth on the PTO gear, mainshaft, and shift sleeve. Replace any component exhibiting damage.

Install new O-rings on the poppet screw and in the sector shaft bore. Do not reuse the original O-rings.

Check condition of the plastic inserts on the shift fork. Be sure the inserts are not worn through, or otherwise damaged. Replace the fork if worn, or damaged in any way.

ADJUSTMENTS

SHIFT LINKAGE

- (1) Place adapter floor shift lever in D position.
- (2) Raise vehicle.
- (3) Loosen locknut on shift rod.
- (4) Verify that adapter shift lever is in D position.
- (5) Tighten shift rod locknut and lower vehicle.

SPECIFICATIONS

NV 021 ADAPTER

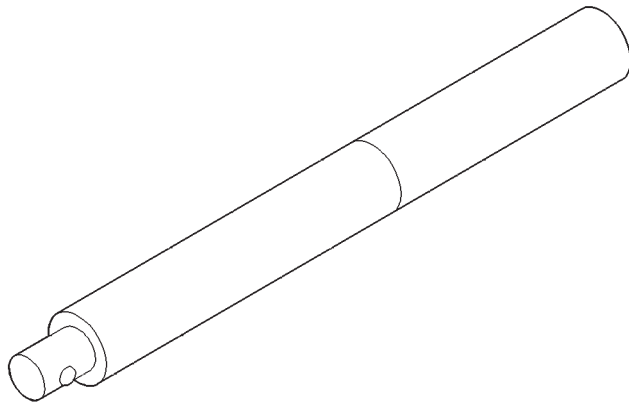
TORQUE

Description	Torque
Access Cover Screws	8–11 N•m (75–95 in. lbs.)
Adapter Mounting Nuts:	
With 5/16 stud	30–41 N•m (22–30 ft. lbs.)
With 3/8 stud	41–47 N•m (30–35 ft. lbs.)
Adapter Shift Lever Nut	27–34 N•m (20–25 ft. lbs.)
Fill/Drain Plugs	41–54 N•m (30–40 ft. lbs.)
Front Case-To-Rear	
Extension Bolts	27–34 N•m (20–25 ft. lbs.)
Indicator Switch	20–34 N•m (15–25 ft. lbs.)
Input Bearing Retainer Bolts	16–24 N•m (12–18 ft. lbs.)
Poppet Plunger Screw	16–24 N•m (12–18 ft. lbs.)
Propeller Shaft Clamp Bolts	19 N•m (170 in. lbs.)

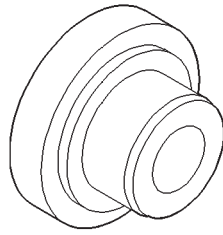
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SPECIAL TOOLS

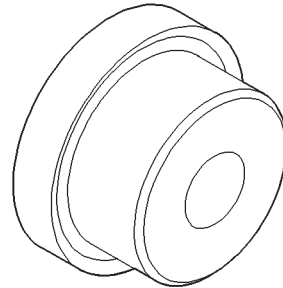
NV 021 ADAPTER



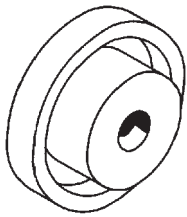
Handle C-4171



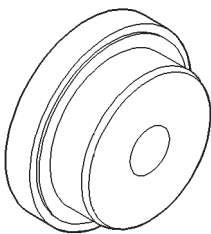
Driver 5065



Driver 7828



Driver C-4210



Driver 5062