TRANSMISSION AND TRANSFER CASE

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MANUAL - NV4500

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MANUAL - NV4500

DESCRIPTION

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. The transmission has a cast iron gear case and aluminum shift cover.

Two versions are used, a standard duty for 5.9L applications and a heavy duty 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.

Tapered roller bearings support the drive gear, mainshaft and countershaft in the gear case. 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.

The transmission is a top loader style. 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.

SHIFT PATTERN

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

MANUAL - NV4500 (Continued)

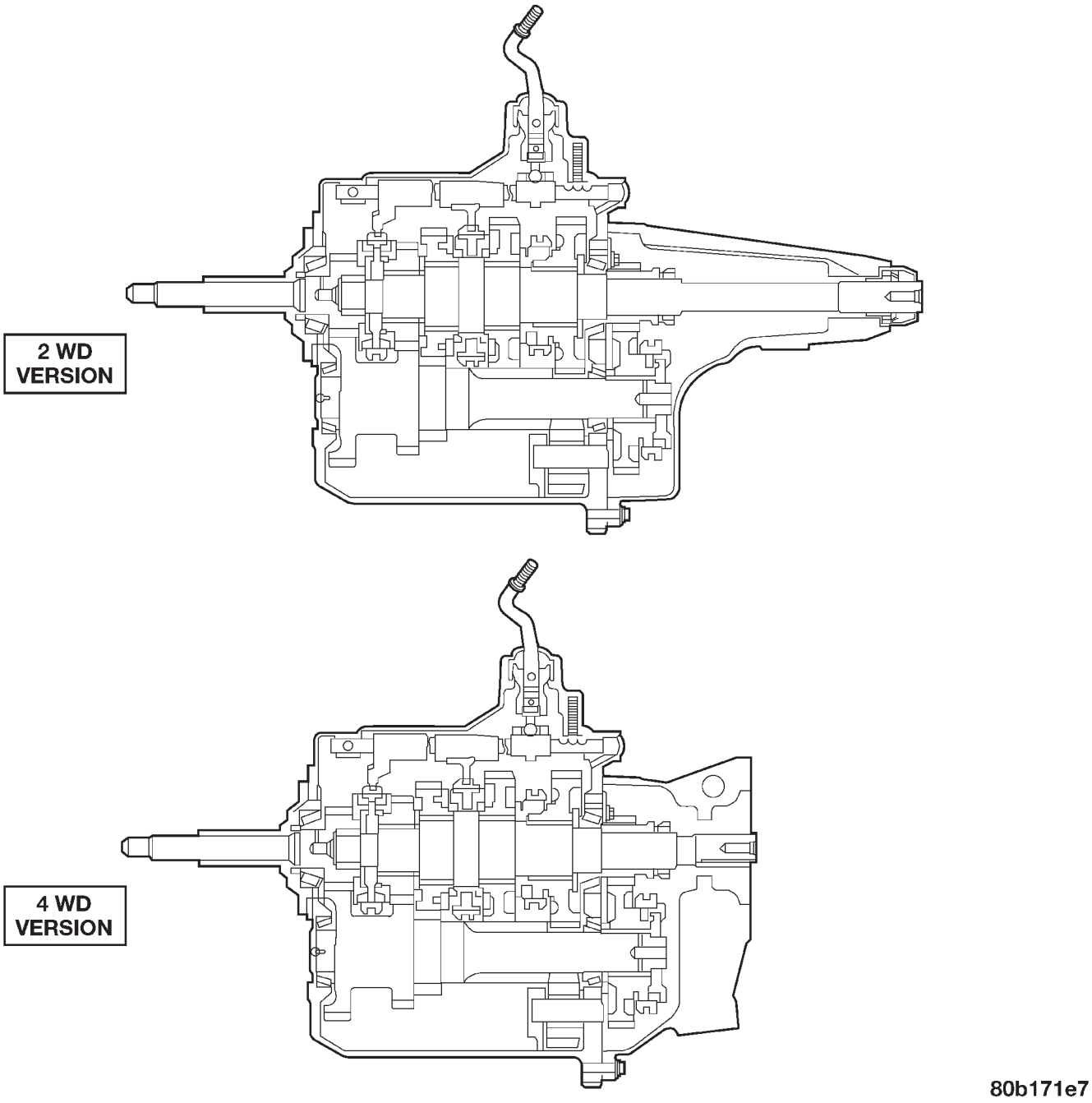


Fig. 1 NV4500 Manual Transmissions

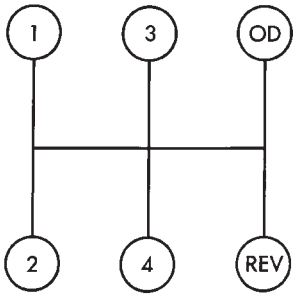


Fig. 2 NV4500

MANUAL - NV4500 (Continued)

GEAR RATIOS

GEAR	RATIO
FIRST	5.61:1
SECOND	3.04:1
THIRD	1.67:1
FOURTH	1.00:1
FIFTH	0.75:1
REVERSE	5.04:1

IDENTIFICATION

The transmission identification tag is attached to the driver side PTO cover (Fig. 3).

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.

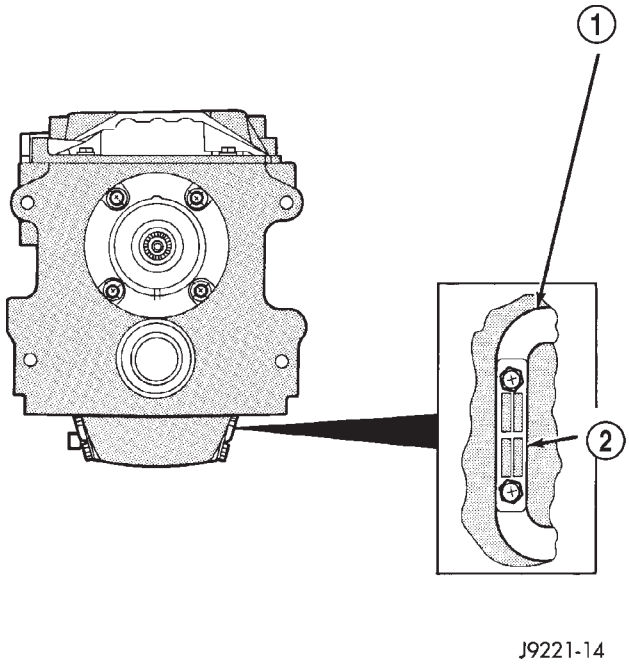


Fig. 3 Identification Tag Location

1 - PTO COVER
2 - I.D. TAG

OPERATION

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

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

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

Leaks can occur at the mating surfaces of the gear case, adaptor or extension housing, or from the front/rear seals. A suspected leak could also be the result of an overfill condition. Leaks at the rear of the extension or adapter housing will be from the housing oil seals. Leaks at component mating surfaces will probably be the result of inadequate sealer, gaps in the sealer, incorrect bolt tightening or use of a non-recommended sealer. A leak at the front of the transmission will be from either the front bearing retainer or retainer seal. Lubricant may be seen dripping from the clutch housing after extended operation. If the leak is severe, it may also contaminate the clutch disc causing the disc to slip, grab and or chatter.

MANUAL - NV4500 (Continued)

HARD SHIFTING

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

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

TRANSMISSION NOISE

Most manual transmissions make some noise during normal operation. Rotating gears generate a mild whine that is audible, but generally only at extreme speeds. Severe highly audible transmission noise is generally the initial indicator of a lubricant problem.

Insufficient, improper or contaminated lubricant will promote rapid wear of gears, synchros, shift rails, forks and bearings. The overheating caused by a lubricant problem, can also lead to gear breakage.

REMOVAL

(1) Disconnect battery negative cable.

(2) Shift transmission into Neutral.

(3) Remove shift boot screws from floorpan and slide boot upward on the shift lever.

(4) Remove shift lever extension from shift tower and lever assembly.

(5) Remove shift tower bolts holding tower to isolator plate and transmission shift cover.

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

(7) Raise and support vehicle.

(8) Remove skid plate, if equipped.

(9) Mark propeller shaft and axle yokes for installation reference and remove shaft/shafts.

(10) Remove exhaust system Y-pipe.

(11) Disconnect speed sensor and backup light switch connectors.

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

(13) If transmission is to be disassembled for, remove drain bolt at bottom of PTO cover and drain lubricant (Fig. 4).

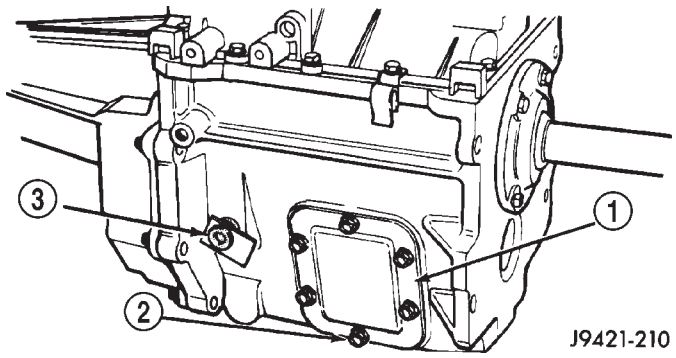


Fig. 4 Drain Bolt

1 - PTO COVER
2 - DRAIN BOLT
3 - FILL PLUG

TWO WHEEL DRIVE

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

(2) Support and secure transmission with safety chains to a transmission jack.

(3) Remove rear crossmember.

(4) Remove clutch slave cylinder bolts and move cylinder aside for clearance.

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

(6) Remove transmission to clutch housing bolts.

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

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

FOUR WHEEL DRIVE

(1) Disconnect transfer case shift linkage at transfer case range lever. Then remove transfer case shift mechanism from transmission (Fig. 5).

(2) Support and secure transfer case to transmission jack with safety chains.

(3) Remove transfer case mounting nuts.

(4) Move transfer case rearward until input gear clears transmission mainshaft.

(5) Lower transfer case assembly and move it from under vehicle.

(6) Support and secure transmission with safety chains to a transmission jack.

(7) Remove transmission harness from retaining clips on transmission shift cover.

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

(9) Remove rear crossmember.

(10) Remove clutch slave cylinder splash shield, if equipped.

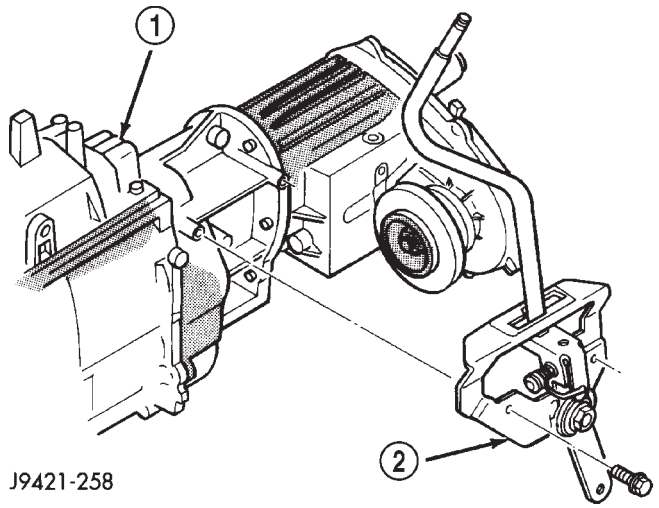


Fig. 5 Transfer Case Shift Mechanism-Typical

1 - TRANSMISSION
2 - TRANSFER CASE SHIFT MECHANISM

(11) 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.

(12) Remove transmission bolts from clutch housing.

(13) Move transmission rearward until input shaft clears clutch disc and release bearing.

(14) Lower transmission and remove it from under vehicle.

DISASSEMBLY

EXTENSION/ADAPTER HOUSING

(1) Raise and support vehicle.

(2) Remove rear propeller shaft.

(3) Support transmission with a transmission jack.

(4) Remove engine rear support.

(5) Remove transfer case, if equipped.

(6) Remove bolts attaching extension/adapter housing to gear case (Fig. 6).

(7) Remove extension/adapter housing (Fig. 7). 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. 8). The seal is used to prevent lubricant loss during shipping and does not have to be replaced if damaged.

FIFTH GEAR NUT

(1) Remove extension/adapter housing.

(2) Loosen fifth gear clamp nut clamping screw approximately 1 1/2 turns.

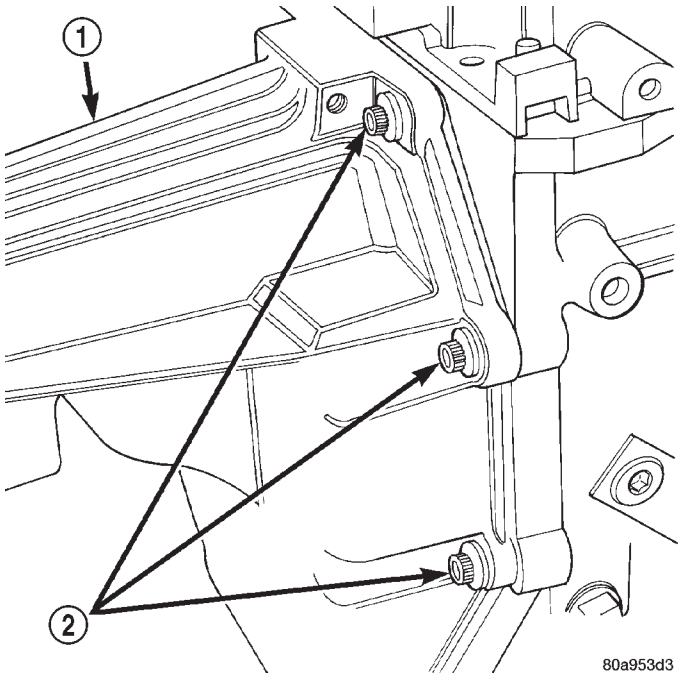


Fig. 6 Extension/Adapter Housing Bolts

1 - EXTENSION HOUSING
2 - BOLTS (8)

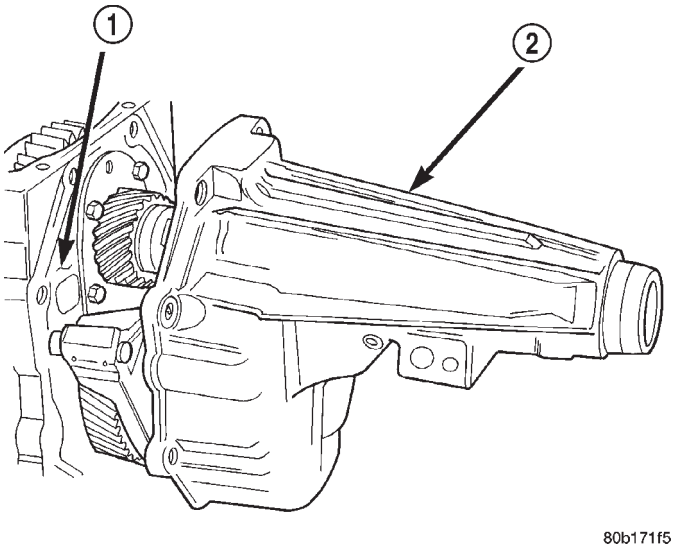


Fig. 7 Extension/Adapter Housing

1 - GEAR CASE
2 - EXTENSION HOUSING

(3) Install nut Wrench 6743 on fifth gear nut (Fig. 9).

NOTE: Wrench only fits one way on nut. Make sure wrench is fully engaged in nut slots and is not cocked.

MANUAL - NV4500 (Continued)

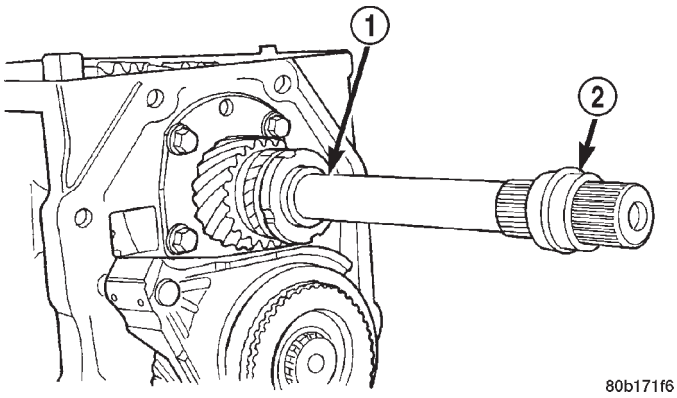


Fig. 8 Mainshaft Spline Seal

1 - MAINSHAFT
2 - RUBBER SPLINE SEAL

(4) Install splined Socket 6993 4X2 Socket 6984 4X4 to retain mainshaft while removing the fifth gear nut.

(5) Install breaker bar in socket wrench (Fig. 9)

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

(6) Remove fifth gear nut, then remove belleville washer from mainshaft.

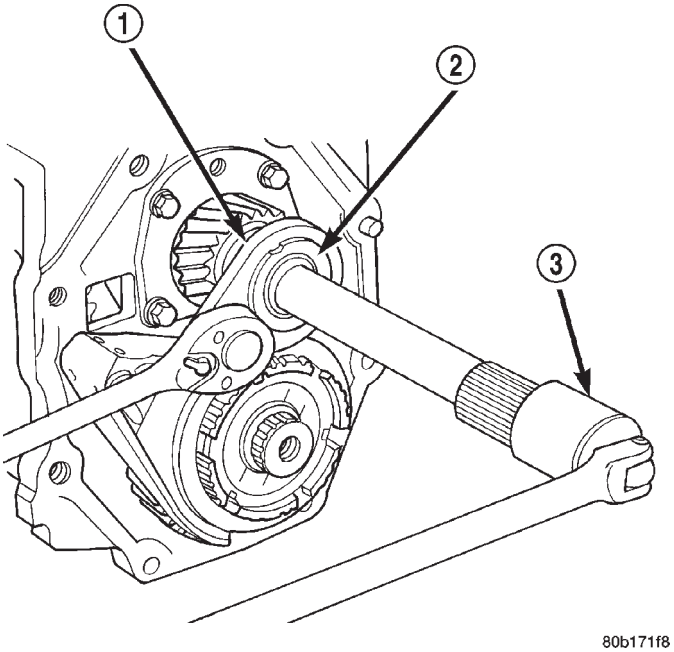


Fig. 9 Fifth Gear Nut

1 - WRENCH 6443 OR 6743
2 - FIFTH GEAR NUT
3 - SPLINE SOCKET 6993 OR 6984

FIFTH GEAR

(1) Remove roll pins that secure countershaft fifth gear shift fork to shift rail with pin punch (Fig. 10). Drive roll pins are out from the bottom of fork.

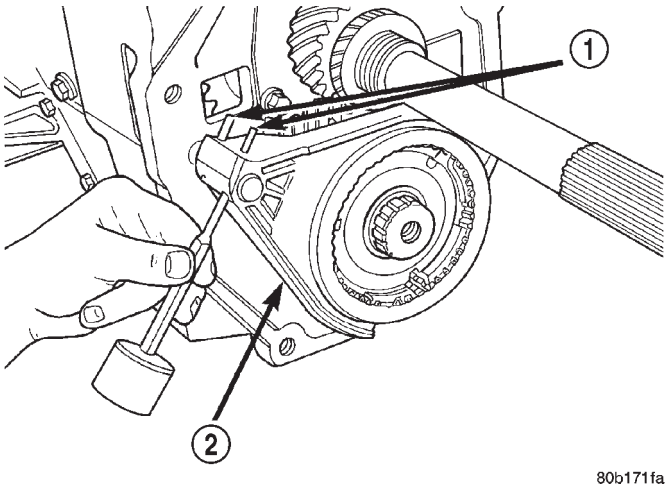


Fig. 10 Fifth Gear Shift Fork Roll Pins

1 - FORK ROLL PINS
2 - FIFTH GEAR SHIFT FORK

(2) Remove fifth gear clutch hub and gear snap ring on countershaft (Fig. 11).

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

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

(5) Remove fifth gear shift fork from sleeve.

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

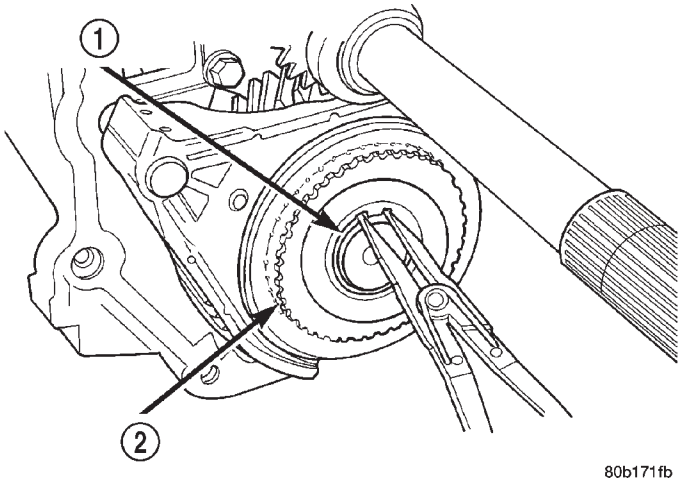


Fig. 11 Countershaft Fifth Gear Clutch Gear Snap Ring

1 - CLUTCH GEAR RING
2 - FIFTH SYNCHRO CLUTCH GEAR

MANUAL - NV4500 (Continued)

(7) Remove countershaft fifth gear needle bearing assembly (Fig. 12).

(8) Remove cone shaped rear bearing thrust washer from end of countershaft (Fig. 13). Note position of washer and washer bore notch for locating pin for assembly reference.

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

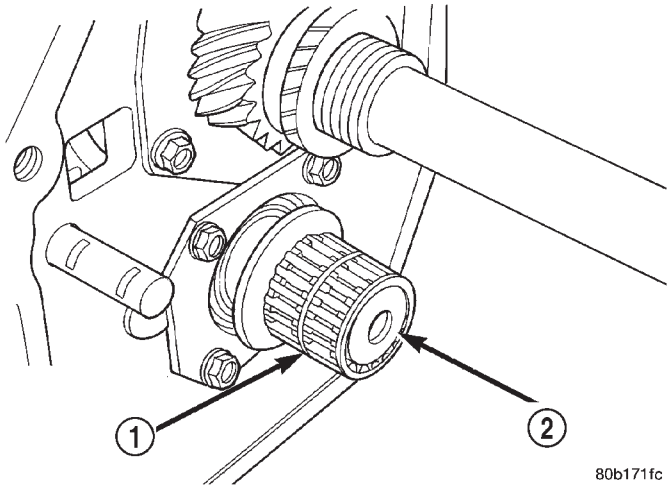


Fig. 12 Countershaft Fifth Gear Needle Bearing

1 - FIFTH GEAR NEEDLE BEARING
2 - COUNTERSHAFT

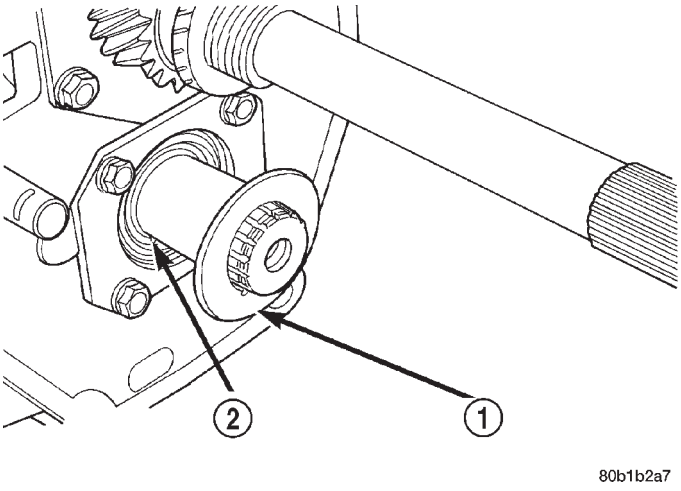


Fig. 13 Countershaft Rear Bearing Thrust Washer

1 - THRUST WASHER (CONE SHAPED)
2 - THRUST WASHER PIN

(10) Remove mainshaft overdrive fifth gear with Puller Tool Set 6444.

(11) Position first Puller Jaw 6459 or 6820 on gear (Fig. 14).

(12) Assemble Puller Flange 6444-1 and Puller Rods 6444-3 4X2 or 6444-4 4X4 vehicles (Fig. 15).

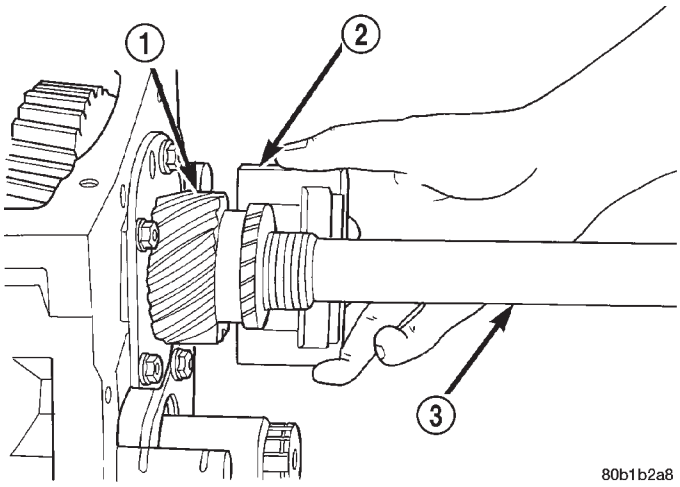


Fig. 14 First Puller Jaw On Mainshaft Fifth (Overdrive) Gear

1 - MAINSHAFT FIFTH GEAR
2 - JAWS 6459 OR 6820
3 - MAINSHAFT

(13) Slide assembled puller flange and rods onto output shaft. Then seat flange in notch of puller jaw (Fig. 15).

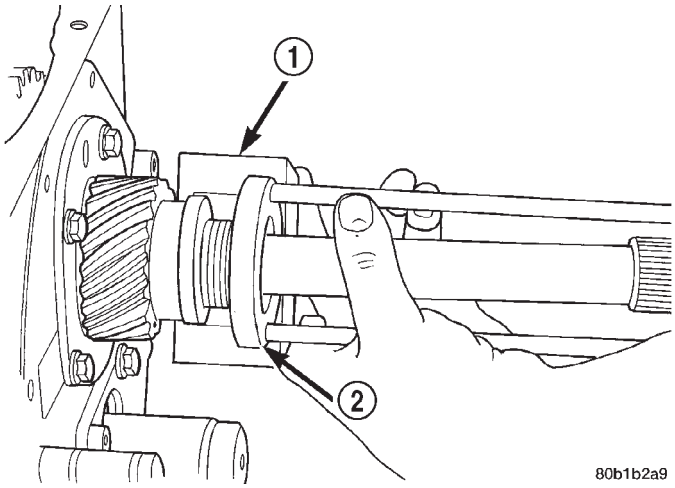


Fig. 15 Seating Puller Flange In First Puller

1 - JAWS 6459 or 6820
2 - PULLER FLANGE 6444-1

(14) Position second puller jaw on gear and in notch of puller flange (Fig. 16).

(15) Slide Retaining Collar 6444-8 over puller jaws to hold them in place (Fig. 16).

(16) Install Puller and Bolt 6444 on puller rods. Then secure puller to rods with retaining nuts (Fig. 17).

(17) Tighten puller bolt to remove gear from shaft splines (Fig. 17).

MANUAL - NV4500 (Continued)

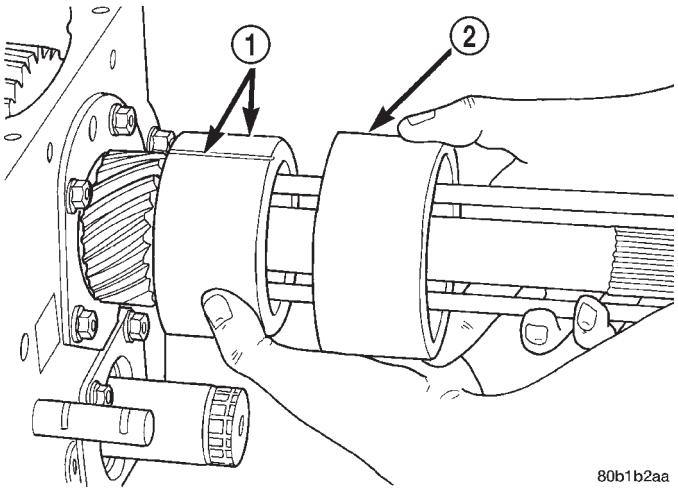


Fig. 16 Retaining Collar Over Puller Jaws

1 - JAWS 6459 or 6820
2 - COLLAR 6444-8

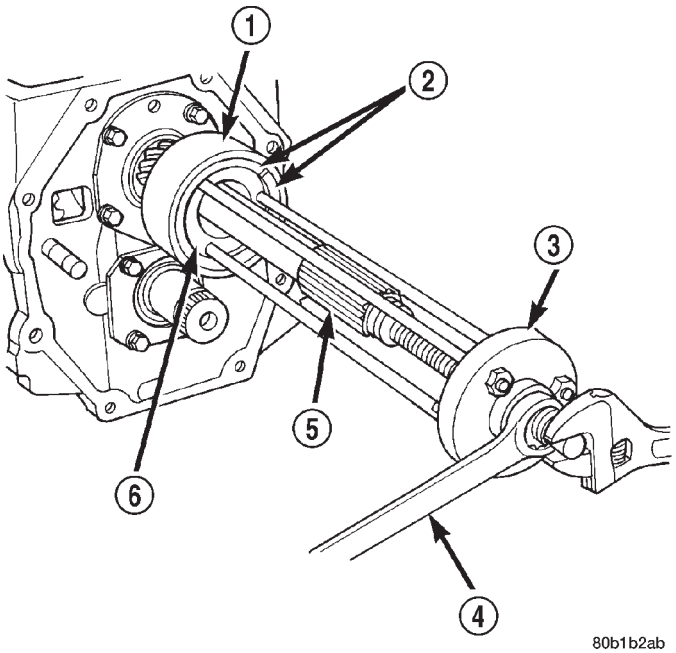


Fig. 17 Fifth Gear From Mainshaft Splines

1 - COLLAR 6444-8
2 - JAWS 6459 OR 6820
3 - BOLT 6444
4 - WRENCH
5 - MAINSHAFT
6 - PULLER FLANGE 6444-1

(18) Remove mainshaft rear bearing plate bolts and remove fifth gear plate end play shims and bearing cup (Fig. 18).

FRONT RETAINER

(1) Remove and discard front bearing retainer bolts (Fig. 19). Do not reused retainer bolts.

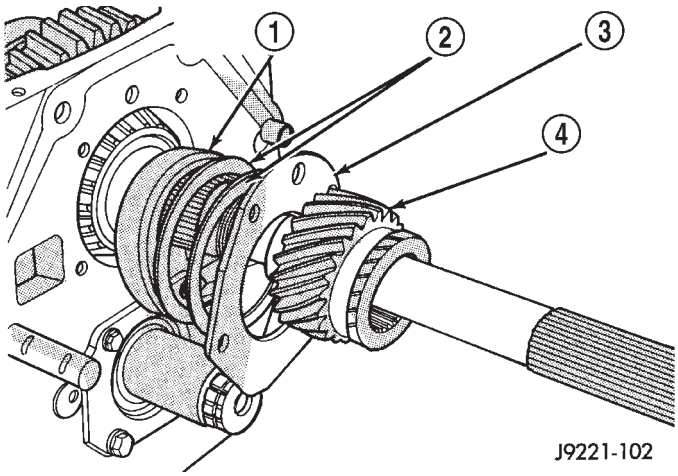


Fig. 18 Mainshaft Fifth Gear Bearing Plate, Bearing Shims And Rear Bearing Cup

1 - MAINSHAFT REAR BEARING CUP
2 - BEARING SHIMS
3 - BEARING PLATE
4 - FIFTH GEAR

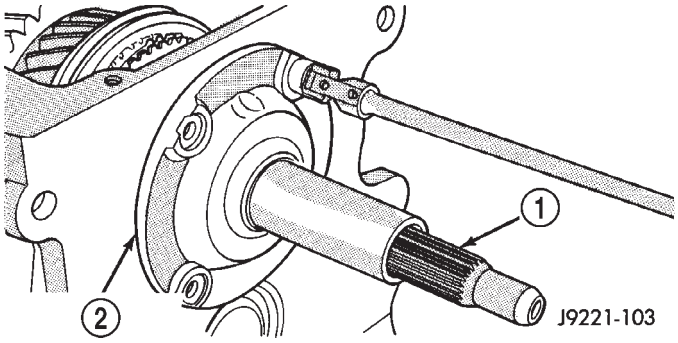


Fig. 19 Front Bearing Retainer

1 - DRIVE GEAR
2 - FRONT BEARING RETAINER

(2) Lightly tapping retainer back and forth with plastic mallet. Then rock retainer back and forth by hand to work it out of gear case.

NOTE: Retainer flange extends into transmission case and is a snug fit.

(3) Remove front retainer seal by (Fig. 20) collapsing one side of seal then prying it out.

(4) To remove front retainer bearing cup, assemble Puller Flange 6444-1 and Puller Rods 6444-4 (Fig. 21).

(5) Insert Puller Jaws 6453-1 in puller flange (Fig. 21). Narrow lip of puller jaws will go under bearing cup.

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

MANUAL - NV4500 (Continued)

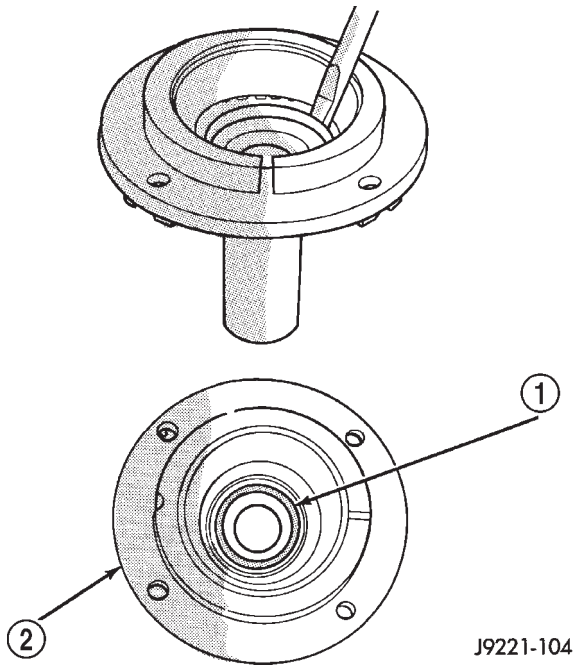


Fig. 20 Bearing Retainer Seal

1 - SEAL
2 - FRONT BEARING RETAINER

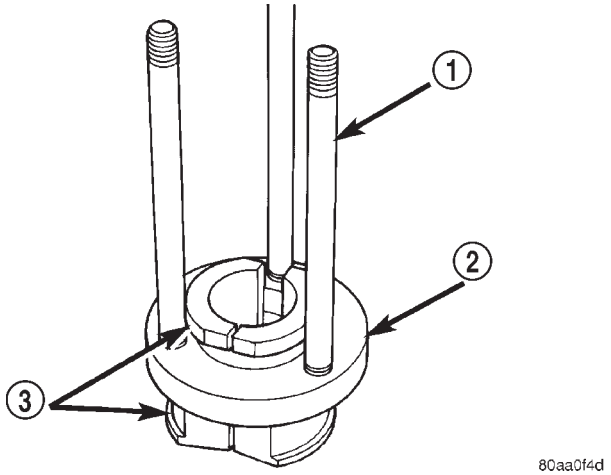


Fig. 21 Puller Rods, Flange And Jaws

1 - RODS 6444-4
2 - FLANGE 6444-1
3 - JAWS 6453-1

(7) Install assembled tools in front retainer (Fig. 22) with puller jaws seated under bearing cup.

(8) Place Insert Tool 6453-2 in center of puller jaws, to hold puller jaws in place (Fig. 22).

(9) Install Puller 6444 on puller rods (Fig. 23) and install retaining nuts on puller rods.

(10) Tighten puller bolt to draw bearing cup out of retainer (Fig. 23).

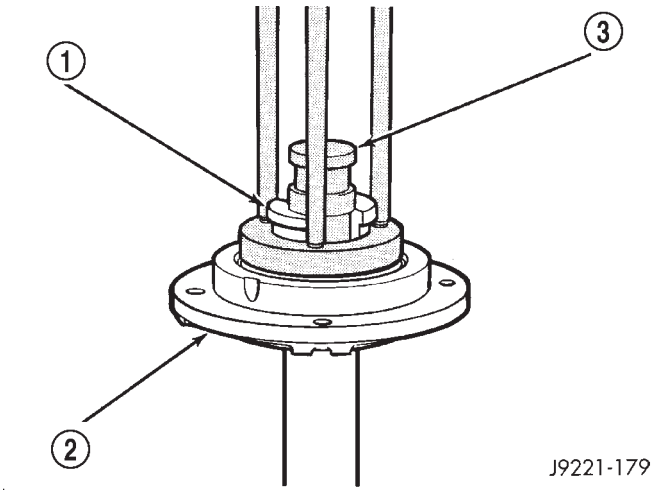


Fig. 22 Puller Tools In Front Retainer

1 - INSERT 6453-2
2 - FRONT RETAINER
3 - JAWS 6453-1

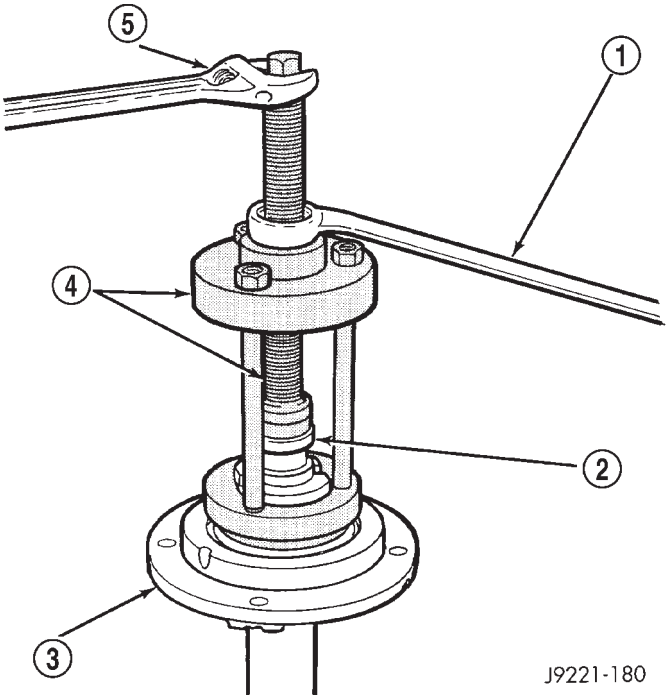


Fig. 23 Bearing Cup Puller

1 - WRENCH
2 - INSERT 6453-2
3 - FRONT RETAINER
4 - PULLER 6444
5 - WRENCH

MANUAL - NV4500 (Continued)

DRIVE GEAR

(1) Remove drive gear (Fig. 24).
(2) Remove pilot bearing from drive gear (Fig. 25).

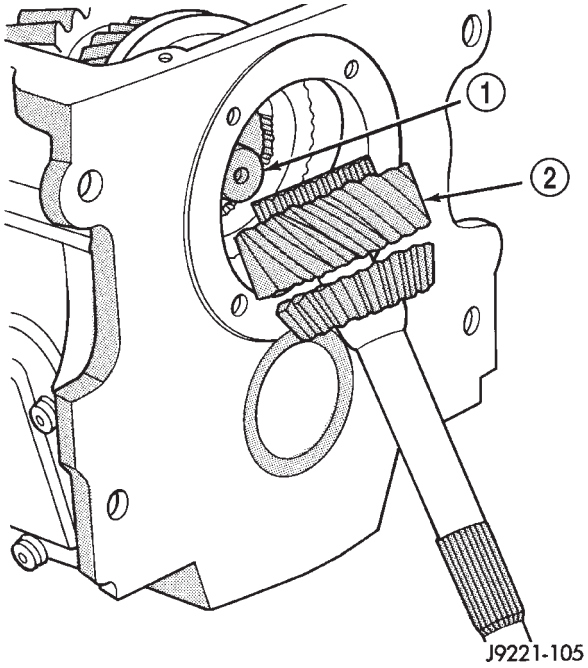


Fig. 24 Drive Gear

1 - MAINSHAFT
2 - DRIVE GEAR

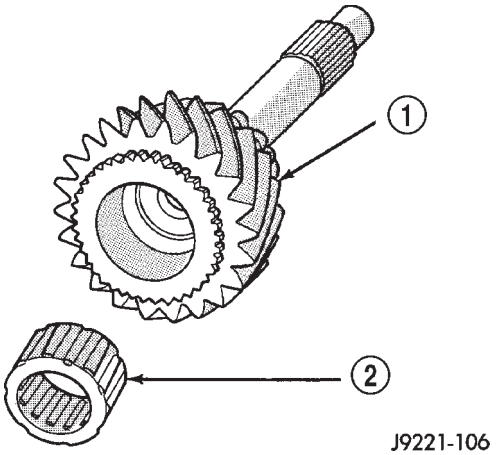


Fig. 25 Pilot Bearing

1 - DRIVE GEAR
2 - MAINSHAFT PILOT BEARING

(3) Remove tapered bearing from drive gear with Puller Flange 6444-1 and Puller Rods 6444-6 (Fig. 26). Then position first Puller Jaw 6447 on bearing
(4) Slide assembled puller flange and rod tools onto input shaft. Then seat flange in notch of puller jaw.
(5) Position second Puller Jaw 6447 on gear and in notch of puller flange.
(6) Slide Retaining Collar 6444-8 over puller jaws to hold them in place.
(7) Install Puller 6444 on puller rods then install retaining nuts.
(8) Tighten puller bolt to remove bearing cone from drive gear.

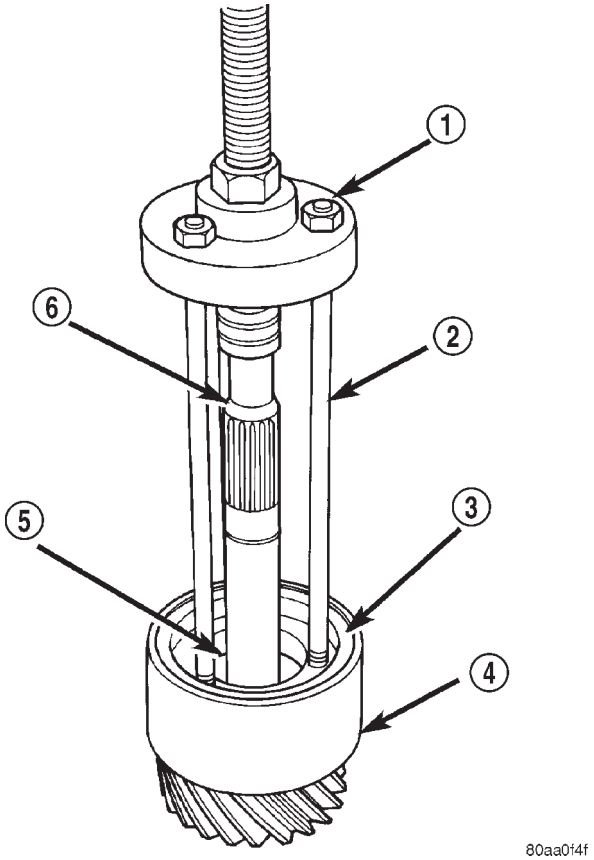


Fig. 26 Front Bearing Puller

1 - PULLER 6444
2 - RODS 6444-6
3 - JAWS 6447
4 - COLLAR 6444-8
5 - FLANGE 6444-1
6 - DRIVE GEAR

MANUAL - NV4500 (Continued)

MAINSHAFT AND GEARTRAIN

(1) Move 1-2 and 3-4 synchro sleeves into neutral.

(2) Remove drive gear thrust bearing from forward end of mainshaft (Fig. 27).

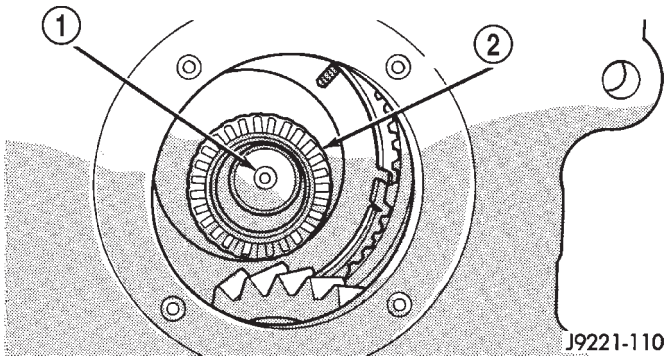


Fig. 27 Drive Gear Thrust Bearing

1 - MAINSHAFT
2 - DRIVE GEAR THRUST BEARING

(3) Remove fourth gear clutch gear and synchro stop ring from mainshaft (Fig. 28).

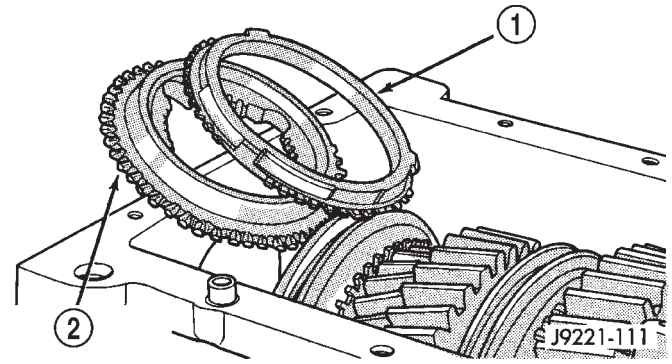


Fig. 28 Fourth Gear Clutch Gear Stop Ring

1 - FOURTH GEAR SYNCHRO STOP RING
2 - FOURTH SPEED CLUTCH GEAR

(4) Roll gear case onto left side (Fig. 29).

(5) To remove mainshaft assembly (Fig. 29) lift front end of mainshaft slightly.

NOTE: Handling mainshaft carfully because gears are lose on the mainshaft.

(6) Grasp mainshaft rear splines, then turn spline end of mainshaft counterclockwise to rotate shaft and geartrain out of case. Tilt mainshaft outward and removed from case.

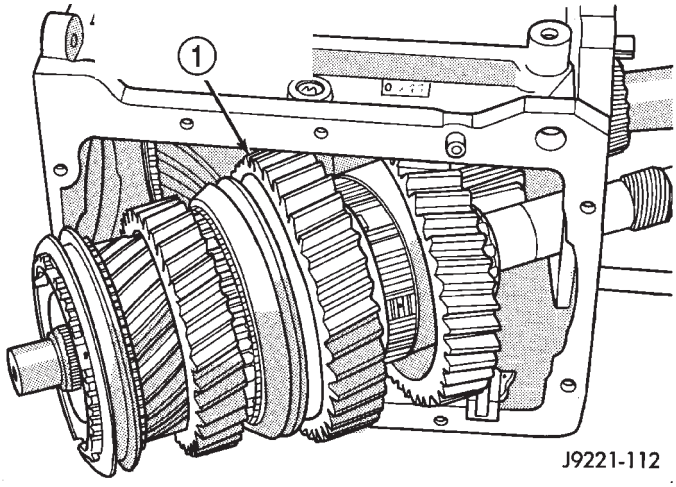


Fig. 29 Mainshaft And Geartrain

1 - MAINSHAFT AND CASE

REVERSE IDLER AND COUNTERSHAFT

(1) Remove countershaft rear bearing plate (Fig. 30).

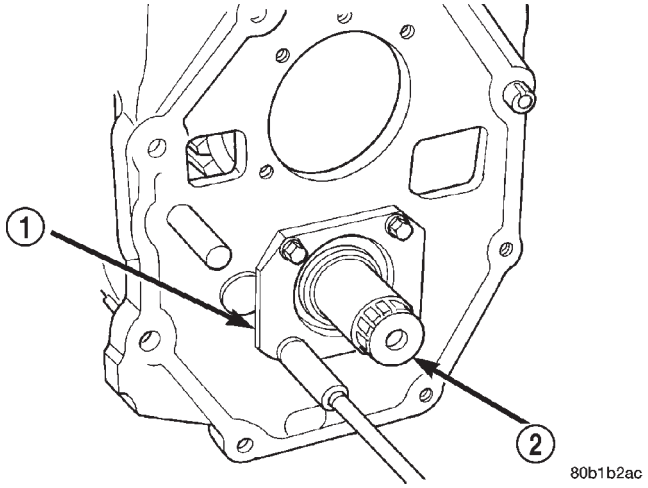


Fig. 30 Countershaft Rear Bearing Plate

1 - REAR BEARING PLATE
2 - COUNTERSHAFT

MANUAL - NV4500 (Continued)

(2) Remove countershaft end play shim and rear bearing cup (Fig. 31).

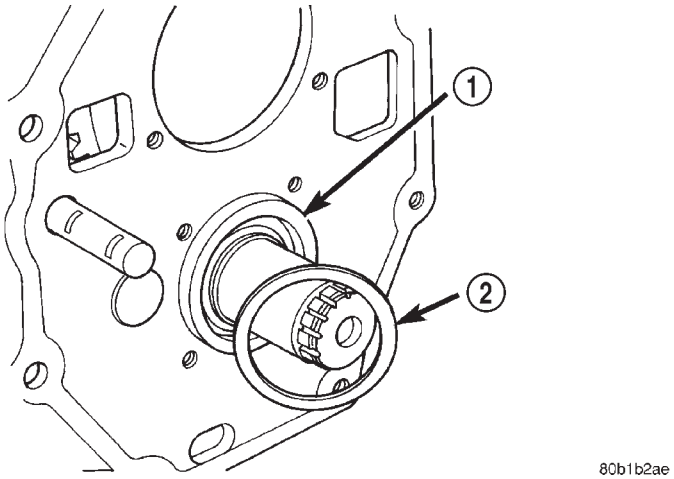


Fig. 31 Countershaft End Play Shim And Rear Bearing Cup

1 - COUNTERSHAFT REAR BEARING CUP
2 - END PLAY SHIM

(3) Remove reverse idler shaft (Fig. 32).

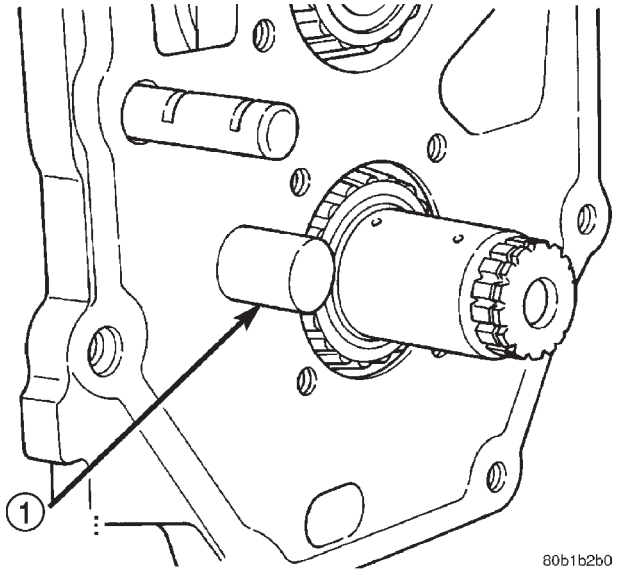


Fig. 32 Reverse Idler Shaft

1 - REVERSE IDLER SHAFT

(4) Rotate countershaft outward and push reverse idler gear away from countershaft and toward front of case (Fig. 33).

(5) Remove idler gear (Fig. 34).

(6) Keep reverse idler gear bearings and spacer together (Fig. 35). Insert idler shaft through gear and bearings to keep them in place.

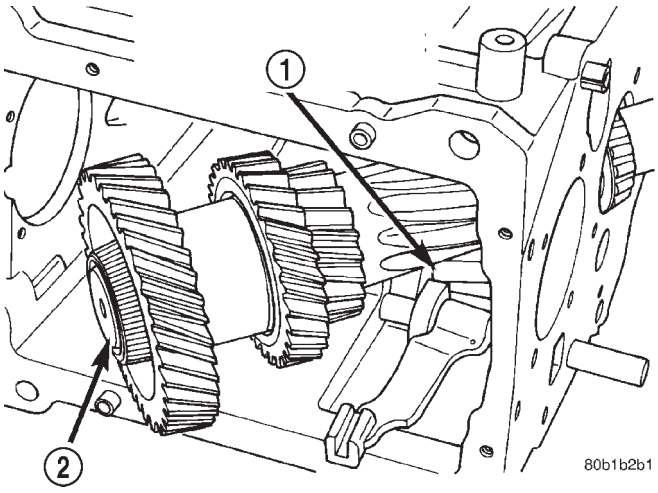


Fig. 33 Idler Gear Moved Away From Countershaft

1 - REVERSE IDLER GEAR
2 - COUNTERSHAFT

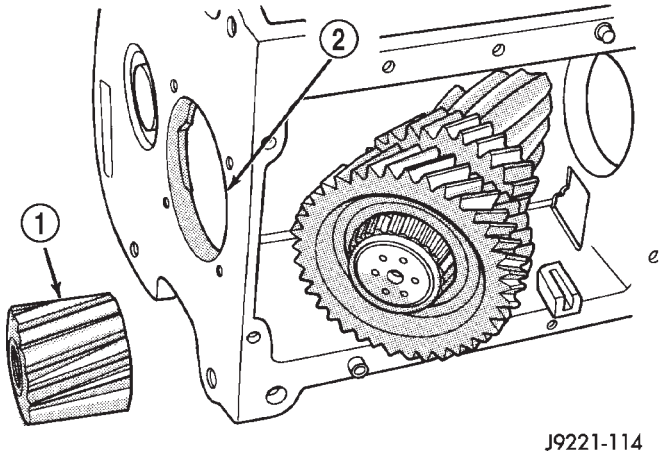


Fig. 34 Reverse Idler Gear

1 - REVERSE IDLER GEAR
2 - DRIVE GEAR BORE

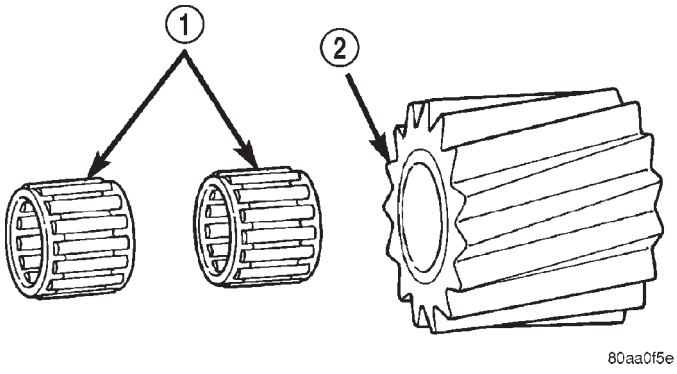


Fig. 35 Idler Gear Components

1 - BEARINGS
2 - REVERSE IDLER GEAR

MANUAL - NV4500 (Continued)

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

(8) To remove countershaft rear bearing ,assemble Puller Flange 6444-1 and Puller Rods 6444-4 (Fig. 36).

NOTE: Shaft cannot be removed from case until rear bearing has been removed.

(9) Position first Puller Jaw 6449 on bearing cone

(10) Seat puller flange in notch of puller jaw just installed on bearing cone

(11) Install second Puller Jaw 6449 on bearing and in notch of puller flange

(12) Slide Retaining Collar 6444-8 over puller jaws to hold them in place

NOTE: Retaining collar has small lip on one end and only fits one way over jaws.

(13) Install Puller 6444 on puller rods, then secure puller to rods with retaining nuts

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

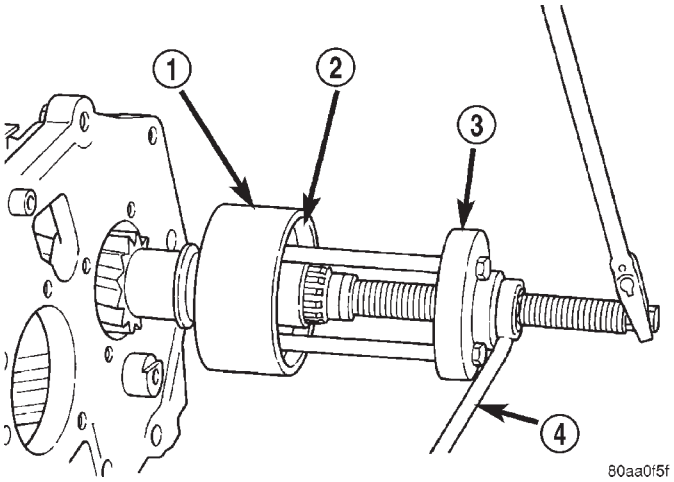


Fig. 36 Countershaft Rear Bearing

1 - COLLAR 6444-8
2 - JAWS 6449
3 - PULLER 6444
4 - WRENCH

(15) Remove bearing puller tools then rotate countershaft out of gear case (Fig. 37).

(16) ToRemove countershaft front bearing, assemble Puller Flange 6444-1 and Puller Bolts 6444-4 (Fig. 38).

(17) Position first Puller Jaw 6451 on bearing.

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

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

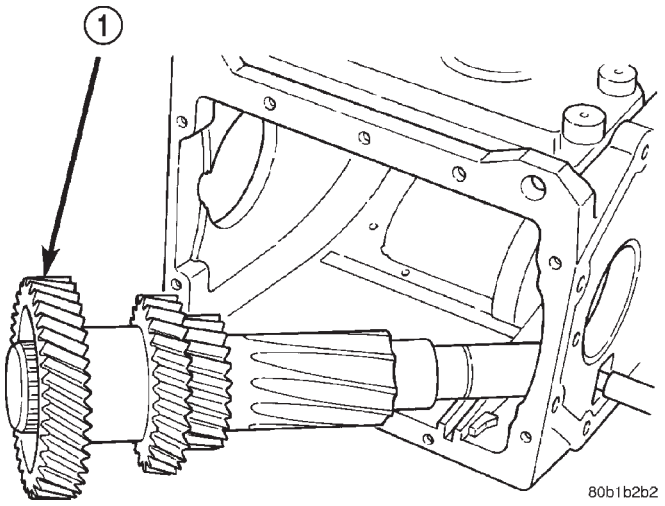


Fig. 37 Countershaft And Case

1 - COUNTERSHAFT

(20) Slide Retaining Collar 6444-8 over puller jaws to hold them in place

NOTE: Retaining collar has small lip on one end and only fits one way over jaws.

(21) Install puller bridge and bolt assembly 6444 on puller bolts and install retaining nuts

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

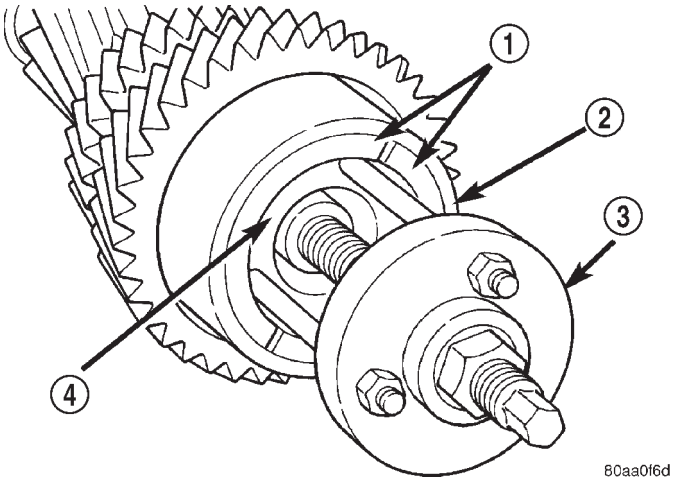


Fig. 38 Countershaft Front Bearing

1 - JAWS 6451
2 - COLLAR 6444-8
3 - PULLER 6444
4 - FLANGE 6444-1

(23) Remove bearing puller tools.

MANUAL - NV4500 (Continued)

GEAR CASE

(1) Remove countershaft front bearing cap with hammer (Fig. 39).

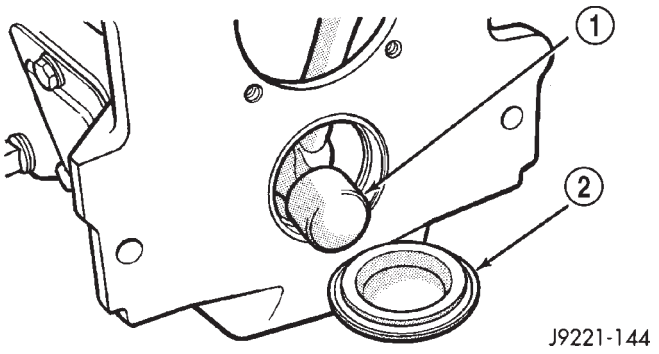


Fig. 39 Countershaft Front Bearing Cap

1 - HAMMER
2 - BEARING CAP

(2) Remove countershaft front bearing cup with Remover 6454 and Handle C-4171 (Fig. 40).

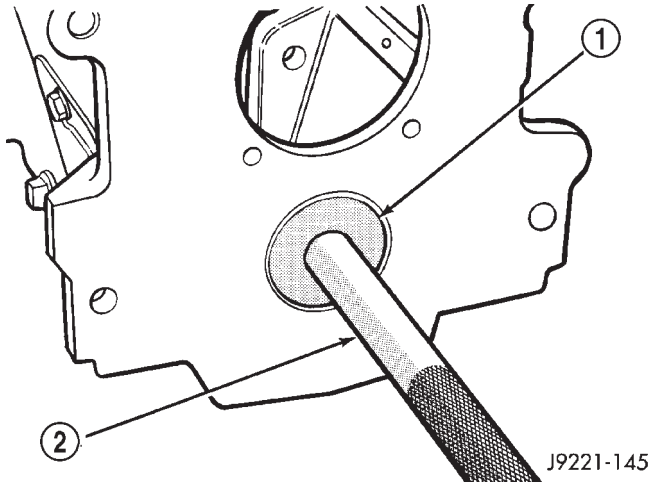


Fig. 40 Countershaft Front Bearing Cup

1 - REMOVER 6454
2 - HANDLE C-4171

(3) Remove roll pin that secures shift lug on shift rail in case (Fig. 41). A small pin punch can be modified by putting a slight bend in it to drive pin completely out of shift rail (Fig. 41).

(4) Remove shift lug rail.

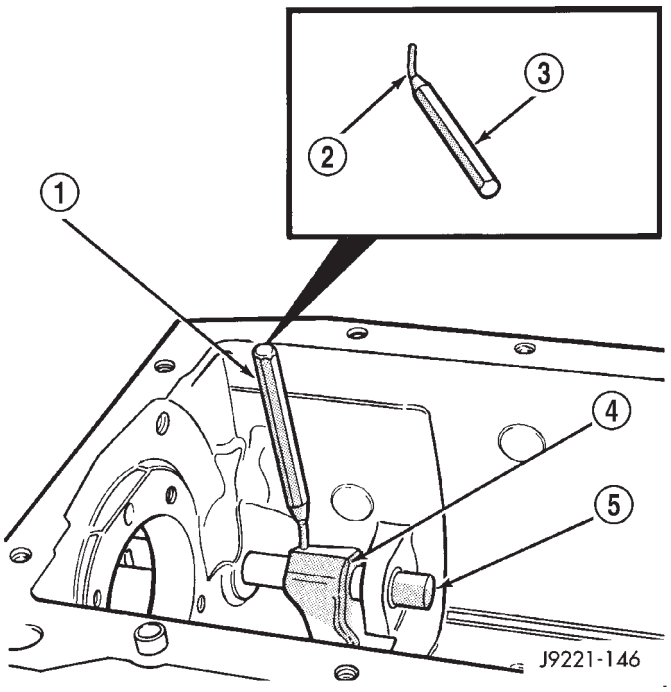


Fig. 41 Shift Lug Roll Pin

1 - PUNCH
2 - 30° BEND
3 - PIN PUNCH MODIFICATION
4 - SHIFT LUG
5 - SHIFT RAIL

MAINSHAFT

NOTE: Gear and synchro components can be installed backwards. Paint or scriber gear and synchro components for installation reference. Then stack geartrain parts in order of removal.

(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. 42).

(3) Remove third gear bearing from mainshaft (Fig. 43).

(4) Remove third gear bearing spacer (Fig. 44).

(5) Remove second gear thrust washer snap ring from mainshaft (Fig. 44).

MANUAL - NV4500 (Continued)

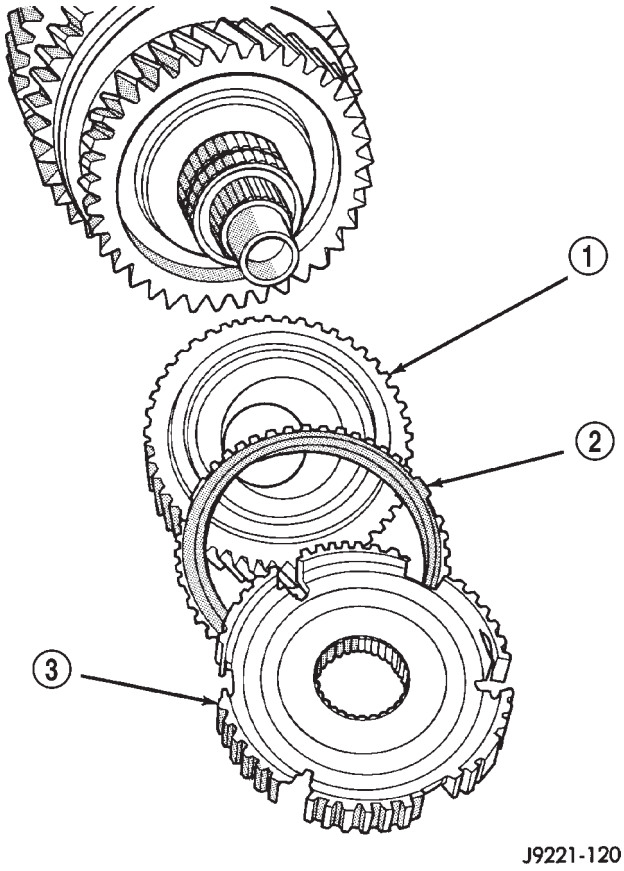


Fig. 42 Third Gear, Stop Ring, And 3-4 Hub

1 - THIRD GEAR
2 - THIRD GEAR STOP RING
3 - 3-4 SYNCHRO HUB

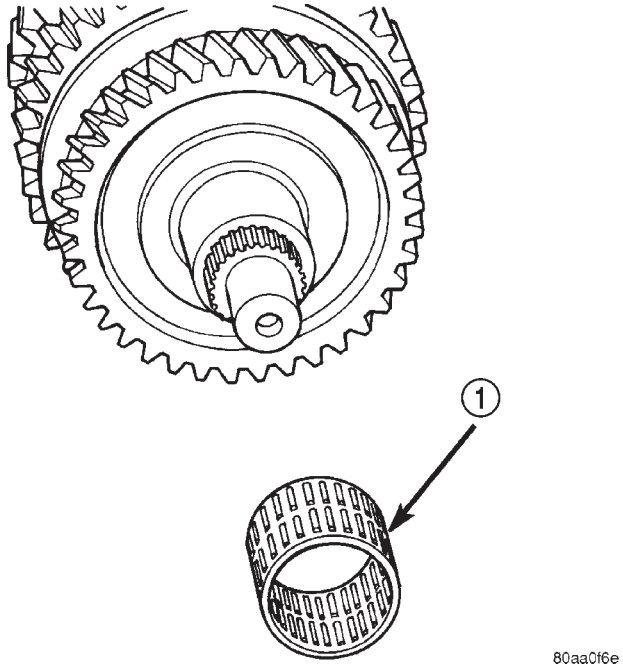


Fig. 43 Third Gear Bearing

1 - THIRD GEAR NEEDLE BEARING

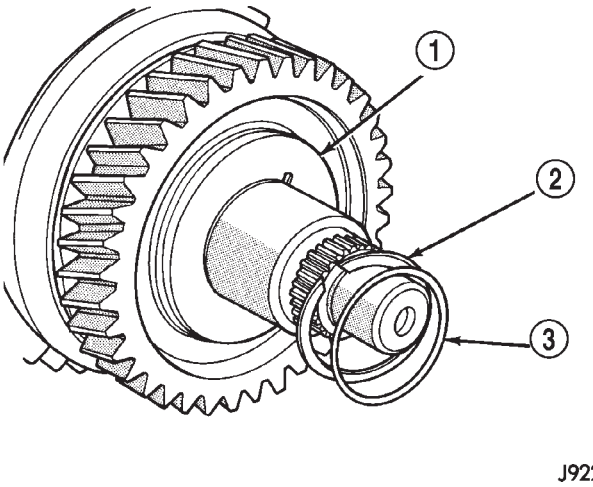


Fig. 44 Snap Ring And Third Gear Bearing Spacer

1 - SECOND GEAR THRUST WASHER
2 - THRUST WASHER SNAP RING
3 - THIRD GEAR BEARING SPACER

(6) Remove second gear thrust washer (Fig. 45). Note washer notch for locating pin.

(7) Remove thrust washer locating pin (Fig. 46) with needle nose pliers.

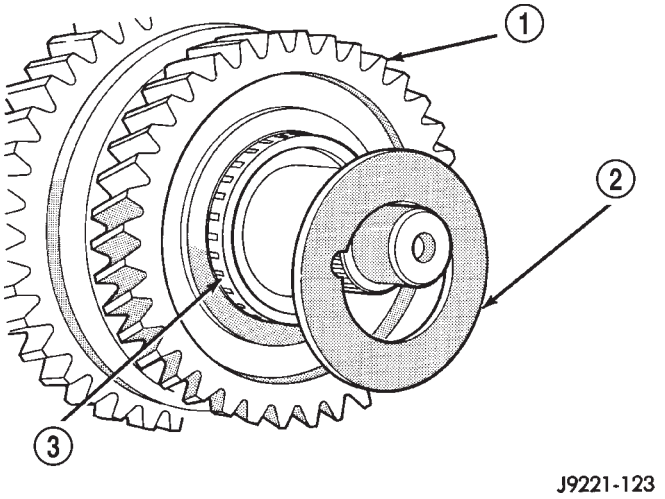


Fig. 45 Second Gear Thrust Washer

1 - SECOND GEAR
2 - THRUST WASHER
3 - SECOND GEAR BEARING

(8) Remove second gear (Fig. 47).

(9) Remove second gear bearing (Fig. 48).

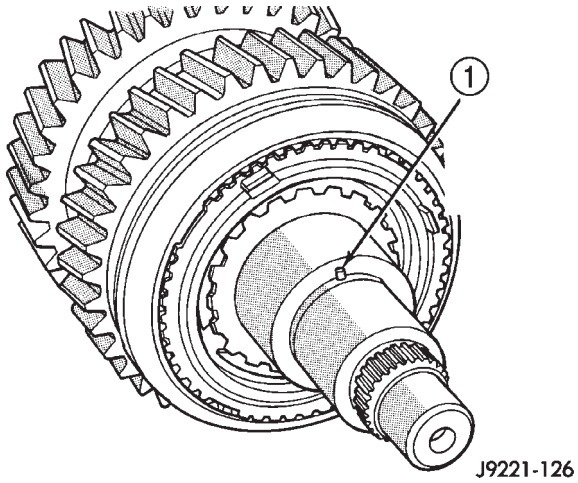


Fig. 46 Thrust Washer Locating Pin

1 - THRUST WASHER LOCATING PIN

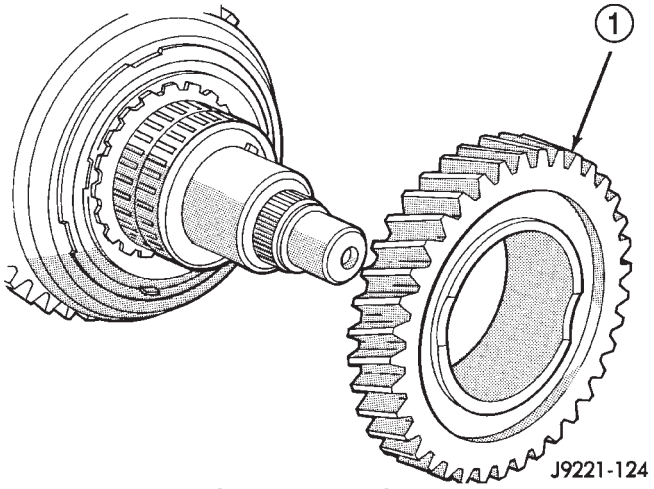


Fig. 47 Second Gear

1 - SECOND GEAR

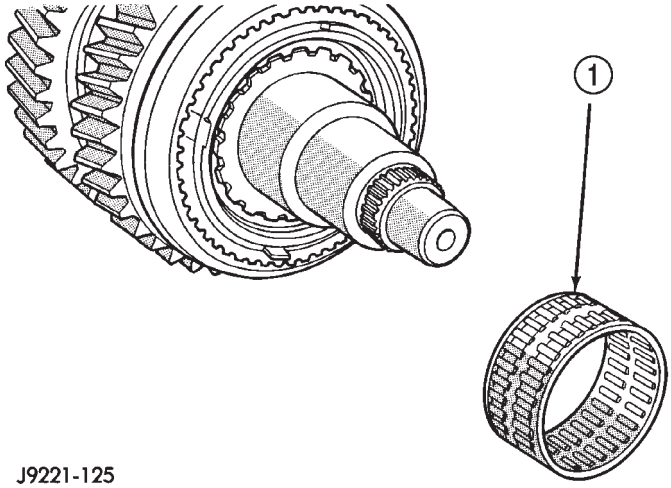


Fig. 48 Second Gear Bearing

1 - SECOND GEAR NEEDLE BEARING

(10) Remove second gear clutch cone snap ring from mainshaft synchro hub groove (Fig. 49).

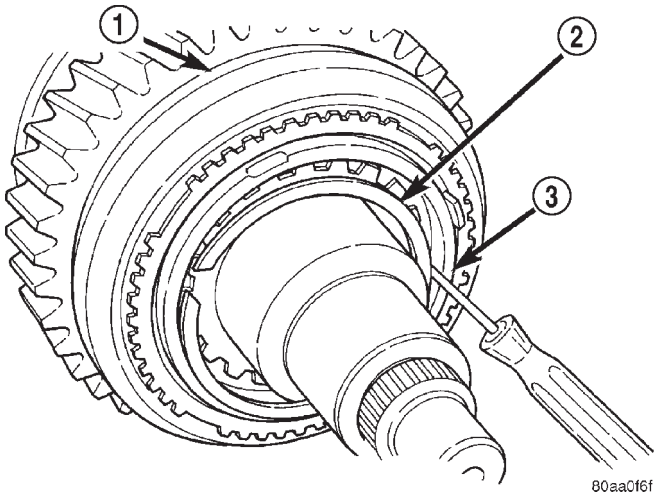


Fig. 49 Second Gear Clutch Cone Snap Ring

1 - 1-2 SLEEVE
2 - SNAP RING
3 - SECOND GEAR CLUTCH CONE

(11) Remove second gear clutch cone, synchro clutch ring and synchro stop ring (Fig. 50).

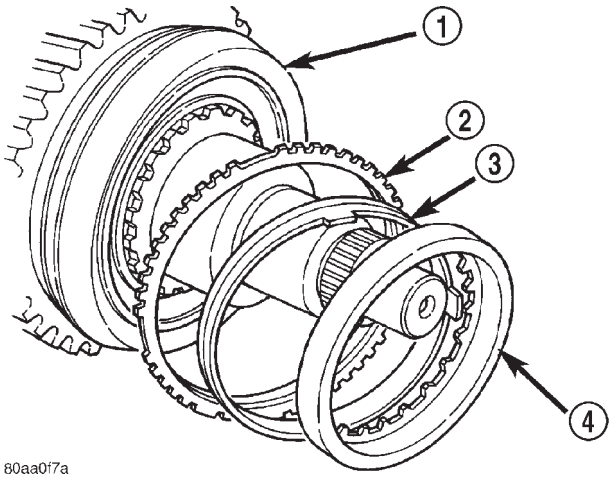


Fig. 50 Second Gear Clutch Cone And Ring

1 - 1-2 SLEEVE AND HUB
2 - SYNCHRO STOP RING
3 - CLUTCH RING
4 - SECOND GEAR CLUTCH CONE

(12) Remove 1-2 synchro hub snap ring (Fig. 51).

(13) Remove 1-2 synchro sleeve, hub, struts and springs as an assembly (Fig. 52). Note tapered side of sleeve also goes toward front. Do not disassemble synchro components unless worn or damaged.

(14) Remove first gear synchro stop ring and clutch ring (Fig. 53).

MANUAL - NV4500 (Continued)

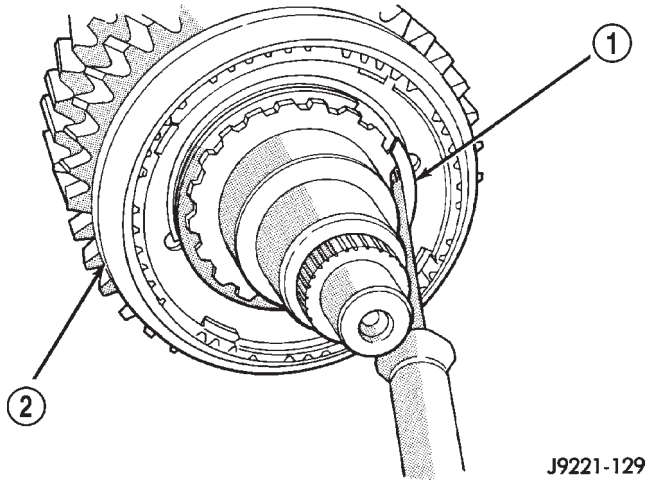


Fig. 51 1-2 Sleeve And Hub Snap Ring

1 - 1-2 HUB SNAP RING
2 - 1-2 SLEEVE AND HUB

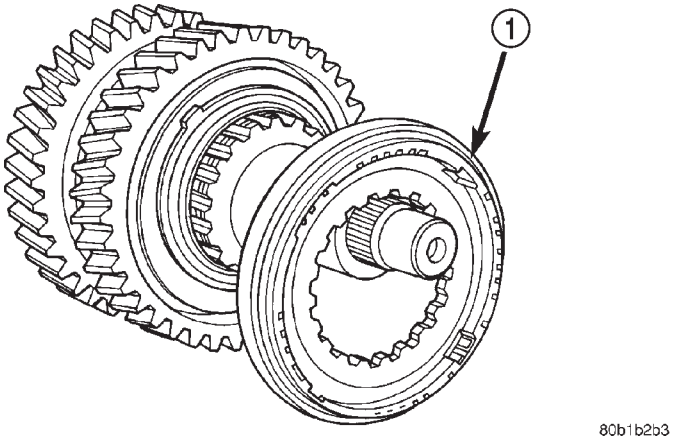


Fig. 52 1-2 Synchro Sleeve And Hub

1 - 1-2 SLEEVE AND HUB

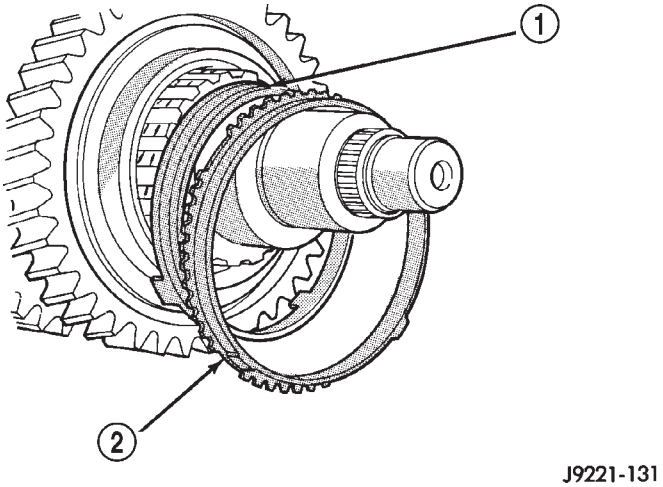


Fig. 53 First Gear Stop And Clutch Ring

1 - FIRST GEAR CLUTCH RING
2 - FIRST GEAR STOP RING

(15) Remove first gear clutch cone front snap ring from mainshaft hub (Fig. 54).

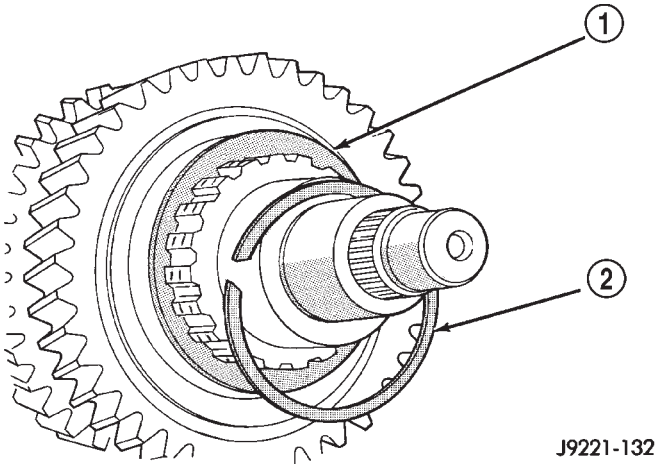


Fig. 54 First Gear Clutch Gear Front Snap Ring

1 - FIRST SPEED CLUTCH GEAR
2 - CLUTCH GEAR SNAP RING (FRONT)

(16) Remove first gear clutch cone (Fig. 55).

(17) Remove first gear clutch gear rear snap ring from mainshaft hub (Fig. 55). Do not remove this snap ring unless mainshaft is to be replaced.

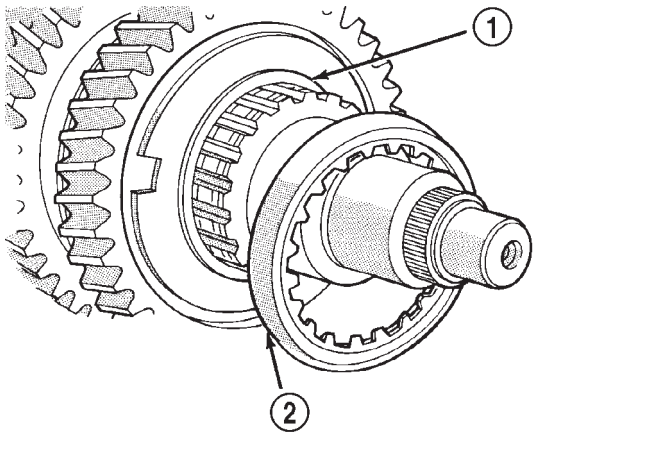


Fig. 55 First Gear Clutch Gear

1 - CLUTCH GEAR SNAP RING (REAR)
2 - FIRST SPEED CLUTCH GEAR

(18) To remove mainshaft rear bearing, assemble Puller Flange 6444-1 and Puller Rods 6444-3 for 4X2 or 6444-4 for 4X4 (Fig. 56).

(19) Position the first Puller Jaw 6445 on the bearing cone.

(20) Seat Puller Flange 6444-1 in notch of first puller jaw.

(21) Install the second Puller Jaw 6445 on the bearing cone and puller flange.

MANUAL - NV4500 (Continued)

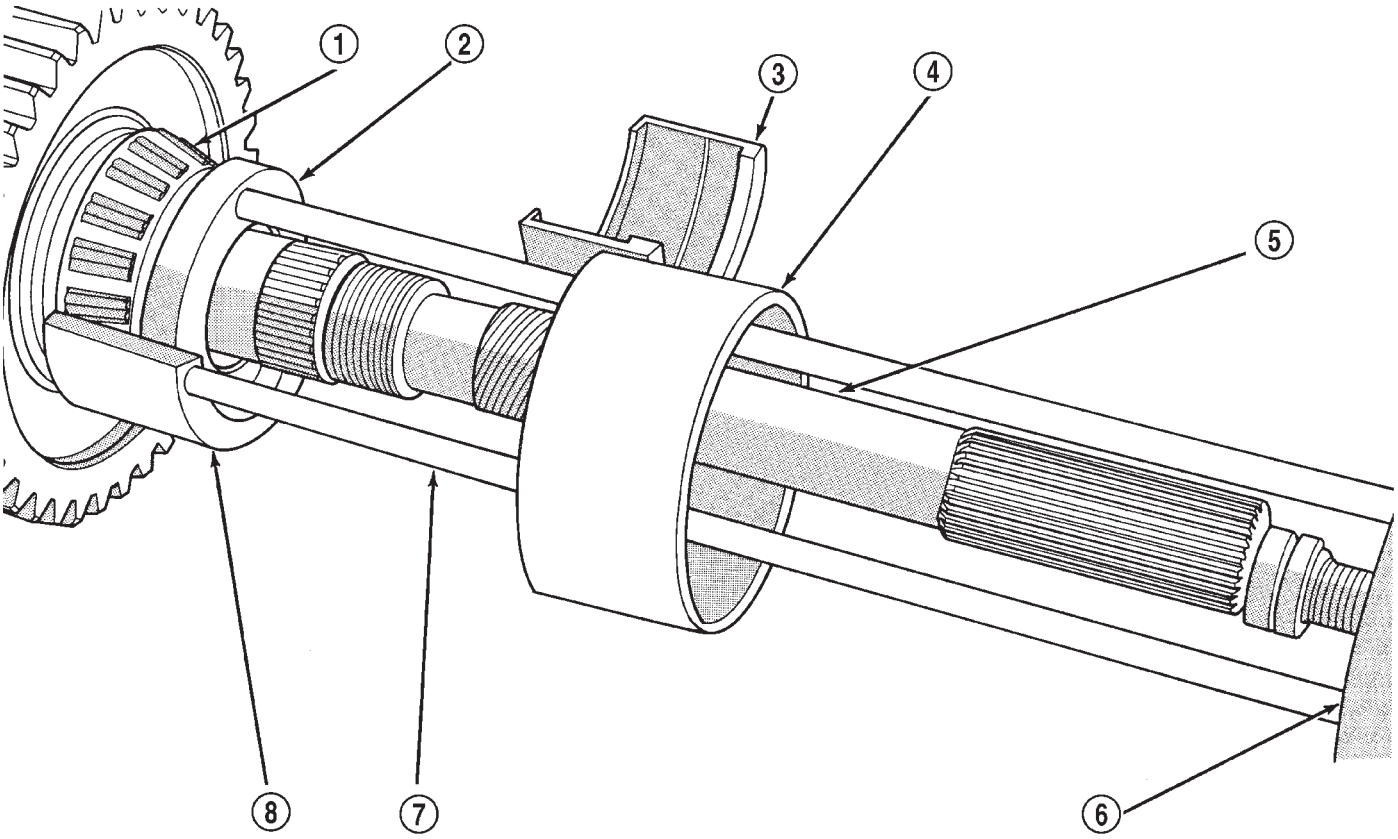


Fig. 56 Mainshaft Rear Bearing Puller

1 - REAR BEARING
2 - FLANGE 6444-1
3 - JAW 6445
4 - COLLAR 6444-8
5 - MAINSHAFT
6 - PULLER 6444
7 - RODS 6443-3 OR 6444-4
8 - JAW 6445

(22) Install Puller 6444 on the puller rods and secure with nuts.

(23) Hold hex portion of Puller 6444 a wrench (Fig. 57) and tighten screw.

(24) Remove bearing puller tools and rear mainshaft bearing from output shaft.

(25) Remove reverse gear thrust washer (Fig. 58).

(26) Remove reverse gear and synchro components as assembly (Fig. 59). Do not disassemble synchro components unless they are damaged. 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.

(27) Remove reverse gear bearing assembly from mainshaft (Fig. 59).

(28) Remove reverse gear bearing spacer from mainshaft (Fig. 60).

(29) Remove reverse clutch gear snap ring (Fig. 60). Tension of this snap ring is considerable. Heavy duty snap ring pliers will be required to spread the ring far enough to remove it.

MANUAL - NV4500 (Continued)

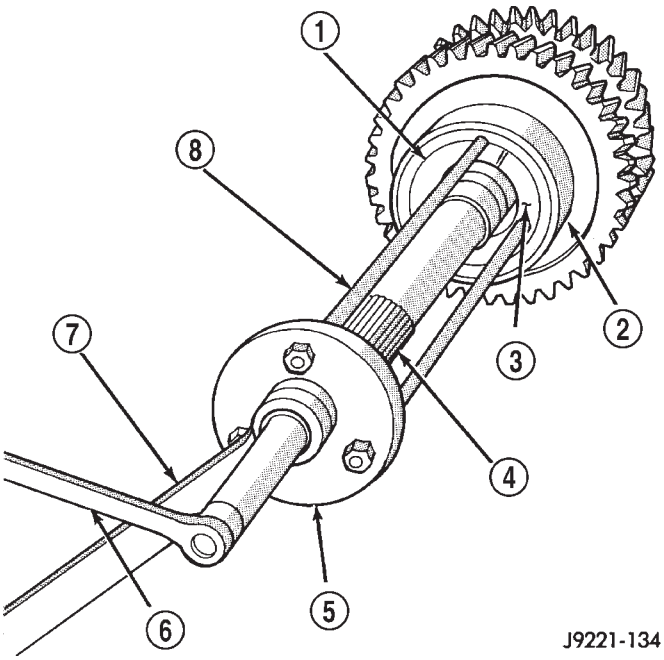


Fig. 57 Mainshaft Rear Bearing

1 - JAWS 6445
2 - COLLAR 6444-8
3 - FLANGE 6444-1
4 - MAINSHAFT
5 - PULLER 6444
6 - TIGHTENING WRENCH
7 - HOLDING WRENCH
8 - RODS 6444-3 OR 6444-4

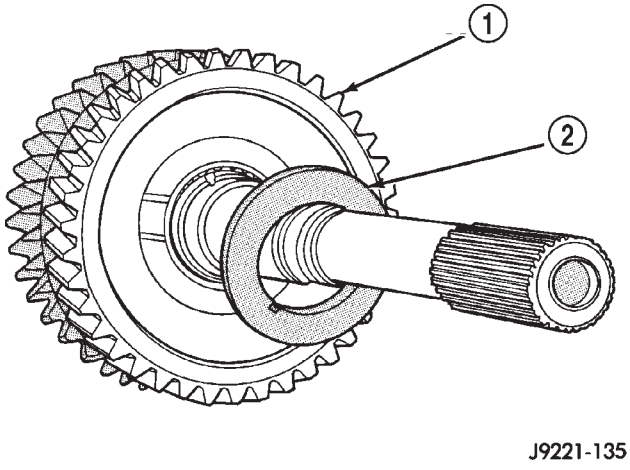


Fig. 58 Reverse Gear Thrust Washer

1 - REVERSE GEAR
2 - THRUST WASHER

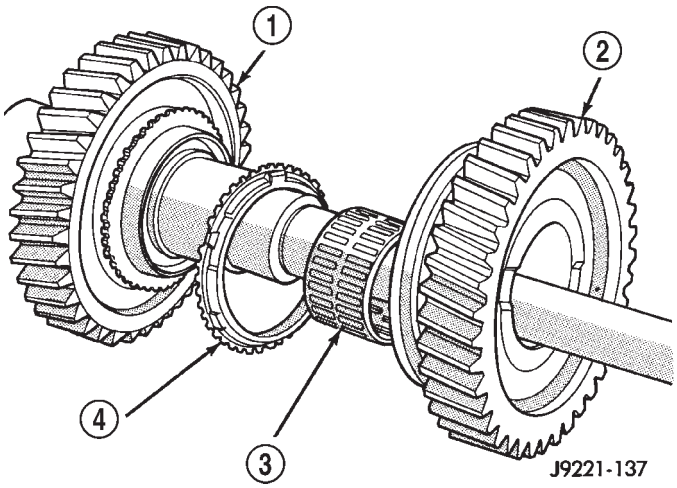


Fig. 59 Reverse Gear, Bearing, And Stop Ring

1 - FIRST GEAR
2 - REVERSE GEAR ASSEMBLY
3 - BEARING ASSEMBLY
4 - STOP RING

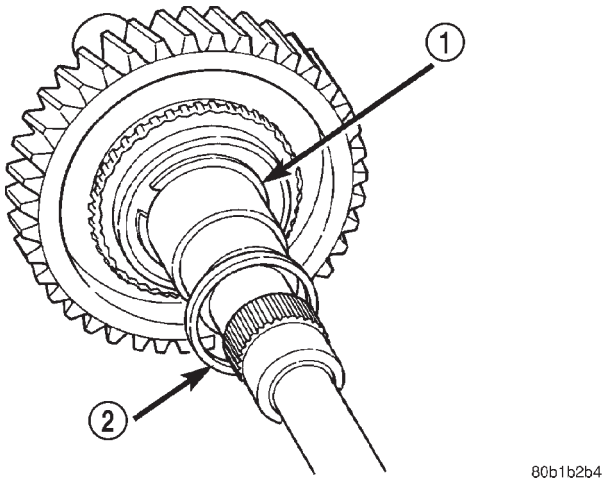


Fig. 60 Reverse Gear Bearing Spacer And First Gear Snap Ring

1 - CLUTCH GEAR SNAP RING
2 - REVERSE GEAR BEARING SPACER

(30) Remove reverse clutch gear (Fig. 61).

(31) Remove first gear from bearing and mainshaft (Fig. 62).

(32) Remove first gear bearing from mainshaft (Fig. 63).

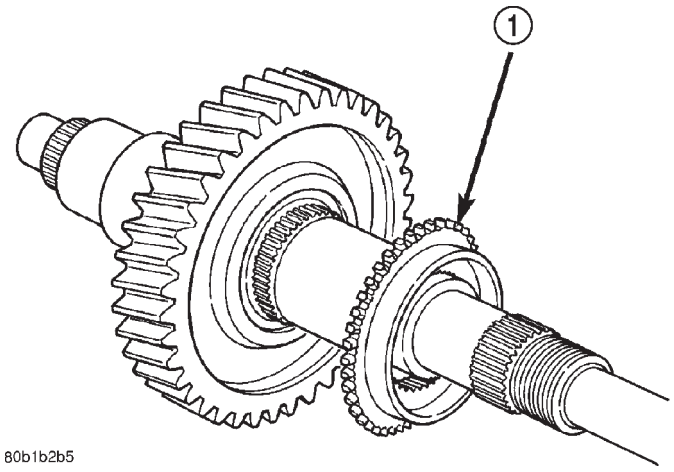


Fig. 61 Reverse Clutch Gear

1 - REVERSE CLUTCH GEAR

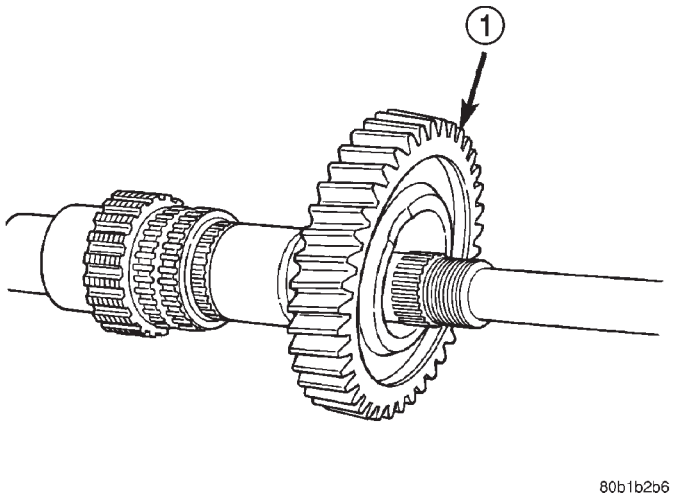


Fig. 62 First Gear

1 - FIRST GEAR

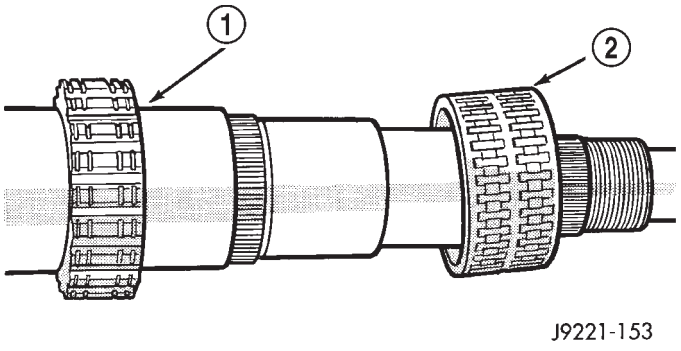


Fig. 63 First Gear Bearing

1 - MAINSHAFT
2 - FIRST GEAR BEARING

CLEANING

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

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

INSPECTION

NOTE: Minor corrosion, nicks, or pitting can be smoothed with 400 grit emery and polished out with crocus cloth.

Inspect the reverse idler gear, bearings, shaft and thrust washers. Replace the bearings if the rollers are worn, chipped, cracked, flat-spotted or brinnelled. Replace the gear if the teeth are chipped, cracked or worn thin.

Inspect the front bearing retainer and bearing cup. Replace the bearing cup if scored, cracked, brinnelled or rough. Check the release bearing slide surface of the retainer carefully. Replace the retainer if worn or damaged in any way.

Inspect mainshaft bearing surfaces, splines, snap ring grooves and threads. Replace the shaft if any surfaces exhibit considerable wear or damage.

Inspect the countershaft and bearings. Replace the shaft if any surfaces exhibit considerable wear or damage.

Inspect shift forks for 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 oversize or damaged. Do not attempt to salvage a worn fork. Replace shift fork roll pins if necessary or if doubt exists about their condition.

The all bearings for wear, roughness, flat spots, pitting or other damage. Replace the bearings if necessary.

Inspect the blocker rings and fiction cones. replace either part if worn or damaged in any way. Replace if the friction material is burned, flaking off or worn.

Inspect synchro components wear or damage. Replace parts if worn, cracked or distorted.

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.

Inspect the case and housing/adapter sealing and mating surfaces are free of burrs and nicks. Inspcet the alignment dowels in the case top surface and in the housing/adapter are tight and in good condition. Replace the gear case or housing/adapter if cracked or broken.

MANUAL - NV4500 (Continued)

ASSEMBLY

NOTE: Gaskets are not used in the transmission. Use Mopar Silicone Sealer or equivalent on all gear case and extension housing sealing surfaces.

COUNTERSHAFT AND REVERSE IDLER GEAR

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

(2) Install front bearing on countershaft with Installer C-4340 (Fig. 64).

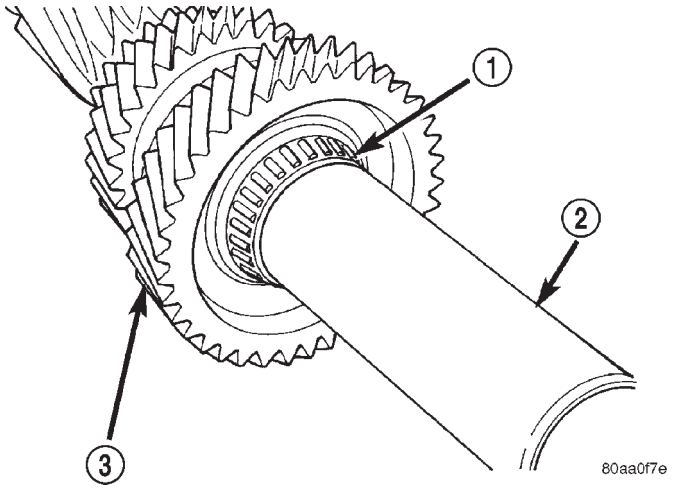


Fig. 64 Countershaft Front Bearing

1 - FRONT BEARING
2 - INSTALLER C-4340
3 - COUNTERSHAFT

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

(4) Position gear case on end with rear of case facing up (Fig. 65).

(5) Install countershaft in gear case (Fig. 65).

NOTE: Do not install rear countershaft bearing on countershaft at this time.

(6) Lubricate reverse idler gear bearings with petroleum jelly and install first bearing and second bearing (Fig. 66).

(7) Install idler gear front thrust washer on boss in gear case (Fig. 66). Coat thrust washer with liberal quantity of petroleum jelly to hold it in place.

(8) Install reverse idler gear in case (Fig. 67).

(9) Install idler gear rear thrust washer between idler gear and case boss (Fig. 67).

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

(11) Install reverse idler shaft with notched end of shaft facing countershaft (Fig. 68).

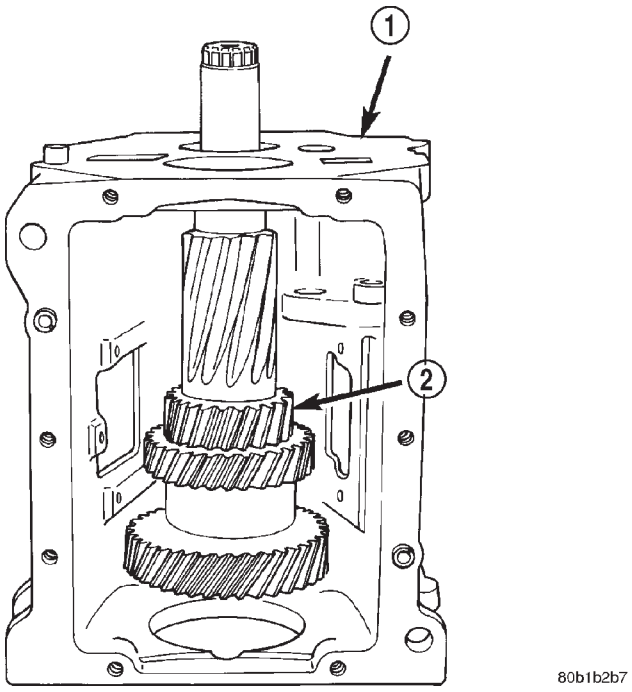


Fig. 65 Countershaft In Gear Case

1 - GEAR CASE
2 - COUNTERSHAFT

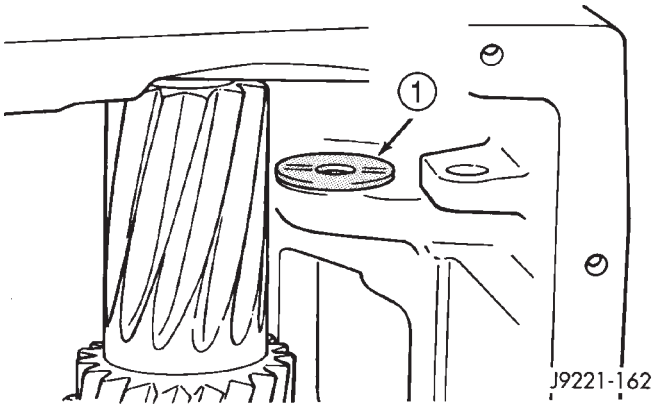


Fig. 66 Idler Gear Front Thrust Washer

1 - POSITION IDLER GEAR FRONT THRUST WASHER ON BOSS

MANUAL - NV4500 (Continued)

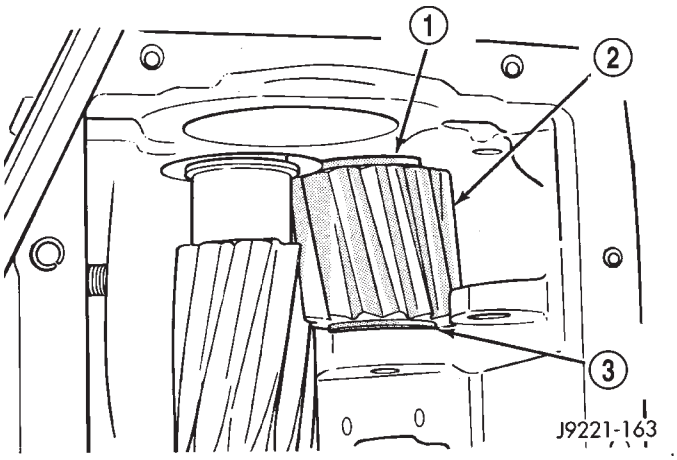


Fig. 67 Idler Gear

1 - REAR THRUST WASHER
2 - REVERSE IDLER GEAR
3 - FRONT THRUST WASHER

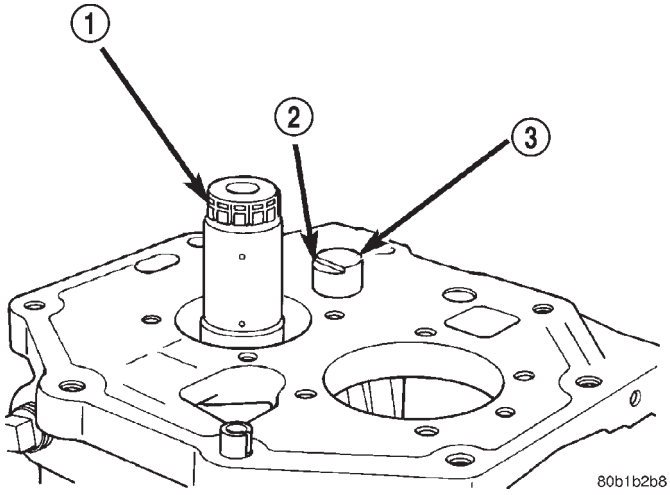


Fig. 68 Reverse Idler Shaft

1 - COUNTERSHAFT
2 - SHAFT NOTCH
3 - REVERSE IDLER SHAFT

(12) Lift countershaft upward and position wood block between front of shaft and case (Fig. 69).

(13) Install rear bearing cone on countershaft with Installer C-4040 (Fig. 70).

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

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

(16) Install countershaft rear bearing cup in gear case and over rear bearing (Fig. 71). Tap cup into place with plastic mallet if necessary.

(17) Install countershaft rear bearing plate (Fig. 72).

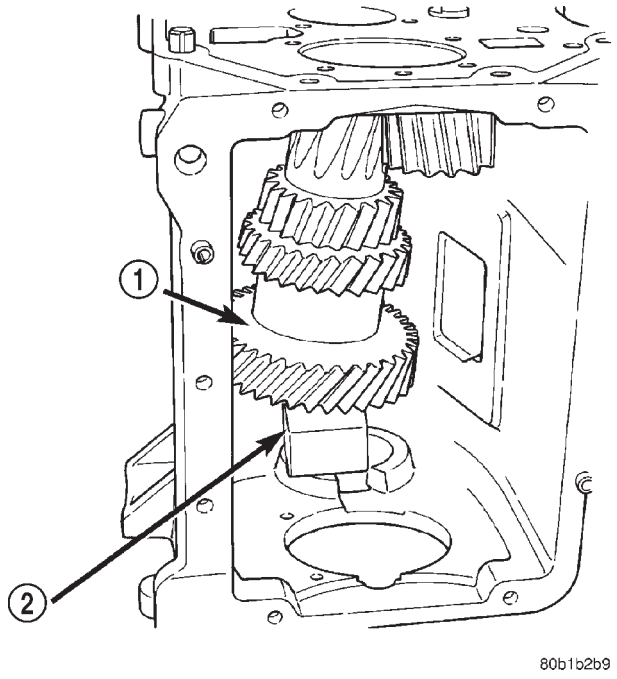


Fig. 69 Supporting Countershaft With Wood Block

1 - COUNTERSHAFT
2 - WOOD BLOCK

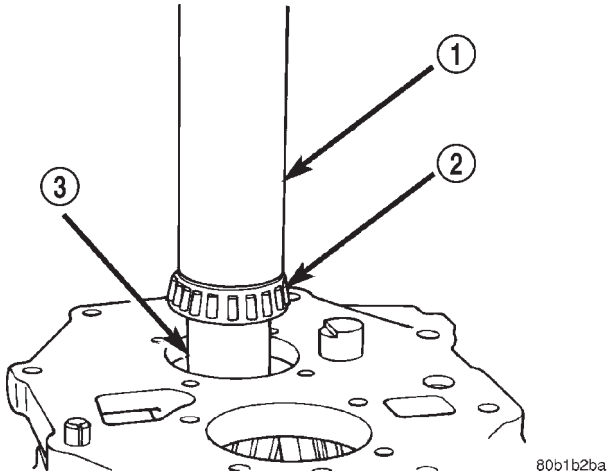


Fig. 70 Countershaft Rear Bearing

1 - INSTALLER C-4040
2 - REAR BEARING
3 - COUNTERSHAFT

NOTE: Verify plate is seated in notch in reverse idler shaft before tightening bearing plate bolts.

(18) Apply Mopar silicone adhesive/sealer or equivalent to flange and lip of new cap. Install **new** front bearing cap in gear case (Fig. 73) with Handle C-4171 and Installer C-3972-A.

MANUAL - NV4500 (Continued)

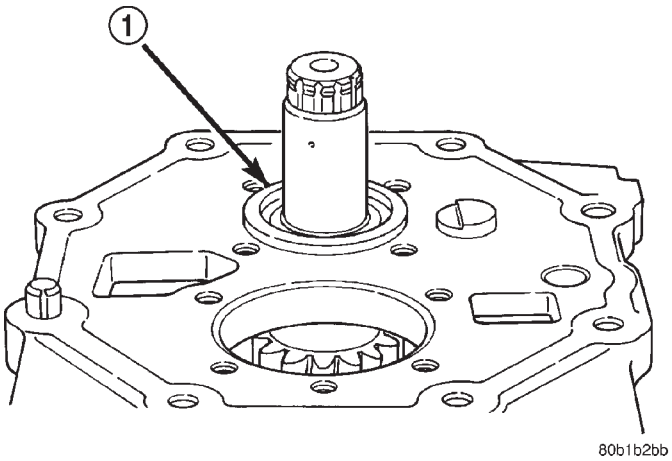


Fig. 71 Countershaft Rear Bearing Cup

1 - COUNTERSHAFT REAR BEARING CUP

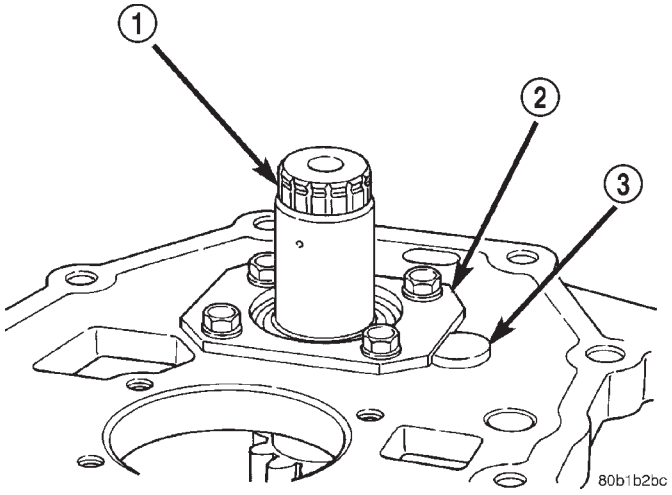


Fig. 72 Countershaft Rear Bearing Plate

1 - COUNTERSHAFT
2 - REAR BEARING PLATE
3 - IDLER SHAFT

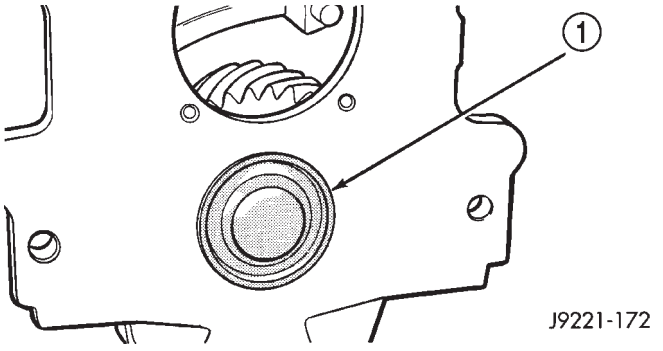


Fig. 73 Countershaft Front Bearing Cap

1 - FRONT BEARING CAP (SEAT WITH WOOD BLOCK)

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 dial indicator (Fig. 74).

(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.).

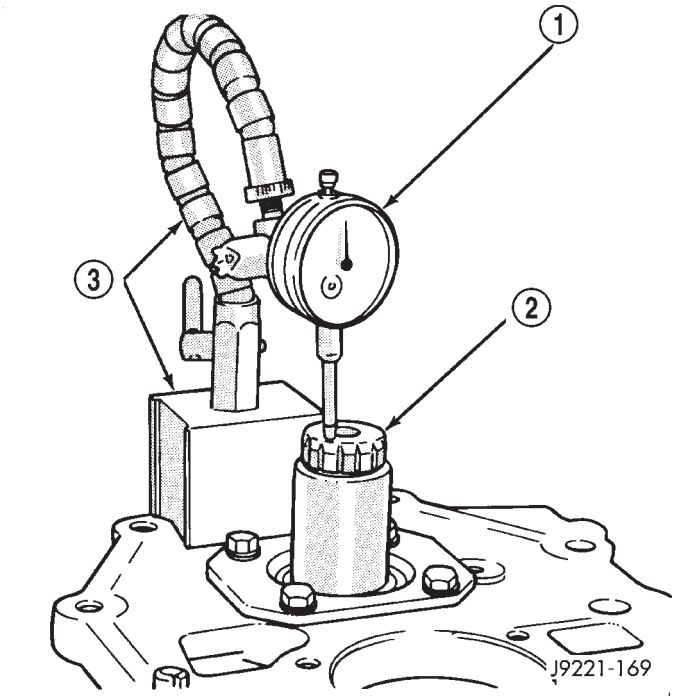


Fig. 74 Measuring Countershaft End Play

1 - DIAL INDICATOR
2 - COUNTER SHAFT
3 - INDICATOR MOUNTING ARM AND BASE

(4) Remove countershaft rear bearing plate.

(5) Install a end play shim that will provide minimum countershaft end play. Position shim on rear bearing cup (Fig. 75).

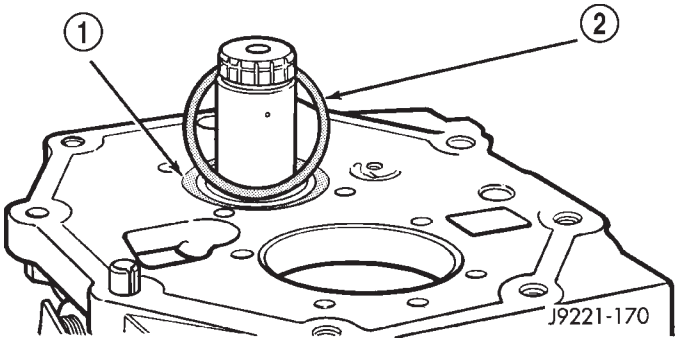


Fig. 75 Countershaft End Play Shim

1 - REAR BEARING CUP
2 - END PLAY SHIM (SELECTIVE)

(6) Install countershaft rear bearing plate (Fig. 72).

NOTE: Verify plate is seated in reverse idler shaft notch and end play shims are still in position before installing 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.).

SHIFT LUG AND RAIL

(1) Lubricate shift lug and rail with Castrol® Syntorq or equivalent.
(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. 76).
(5) Install roll pin that secures lug to rail (Fig. 76).

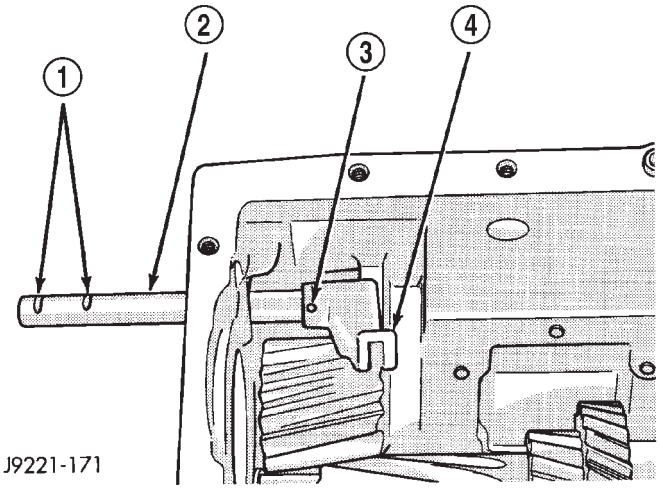


Fig. 76 Shift Lug And Rail

1 - NOTCHES (FOR 5TH GEAR SHIFT FORK ROLL PINS)
2 - LUG RAIL
3 - ROLL PIN HOLE
4 - SHIFT LUG

MAINSHAFT AND GEARTRAIN

CAUTION: The reverse, 1-2 and 3-4 synchro components can be assembled and installed incorrectly. Follow 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 rear most groove of mainshaft hub (Fig. 77). This snap ring locates first gear clutch gear on shaft.

NOTE: 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.

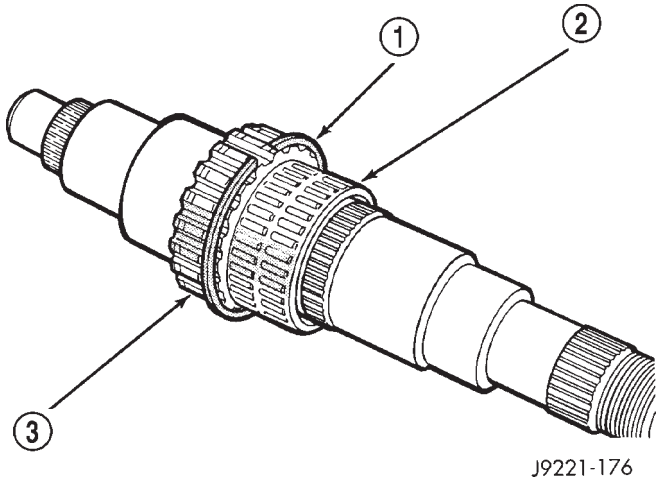


Fig. 77 First Gear Bearing and Snap Ring

1 - SNAP RING
2 - FIRST GEAR BEARING
3 - MAINSHAFT SYNCHRO HUB

(2) Install first gear clutch cone on mainshaft 1-2 synchro hub with recessed side of cone facing front (Fig. 78). Verify cone is seated against snap ring on hub.

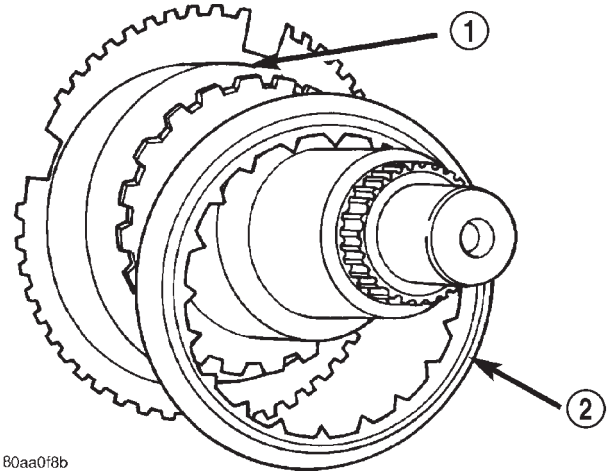


Fig. 78 First Gear Clutch Cone

1 - MAINSHAFT 1-2 SYNCHRO HUB
2 - FIRST GEAR CLUTCH CONE

(3) Install snap ring on mainshaft 1-2 synchro hub to secure clutch cone (Fig. 79). Verify snap ring is seated in hub groove and against clutch cone.

(4) Support mainshaft in upright position to install remaining gears, snap rings and synchro components. Shaft can be supported in gear case or hole can be cut in workbench to support shaft.

MANUAL - NV4500 (Continued)

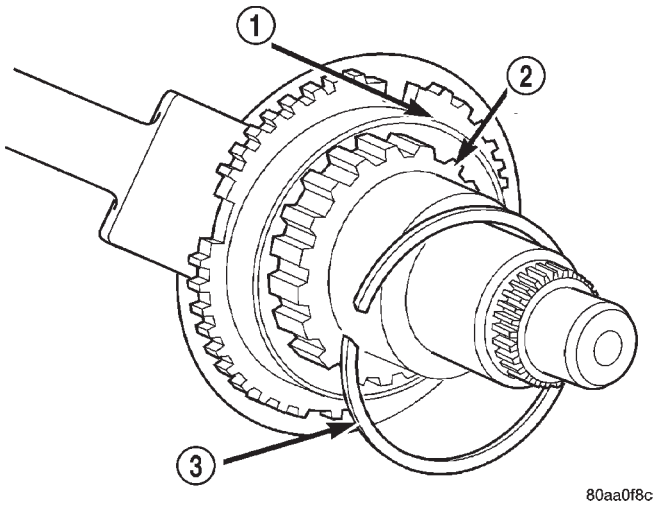


Fig. 79 First Gear Clutch Cone Snap Ring

1 - FIRST GEAR CLUTCH CONE
2 - MAINSHAFT 1-2 SYNCHRO HUB
3 - CLUTCH CONE SNAP RING

(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. 80).

(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. 81).

(c) Install springs and struts in hub (Fig. 81). 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.

(6) Install first gear stop ring in 1-2 synchro hub and sleeve (Fig. 82). Verify stop ring is seated and engaged in hub and sleeve.

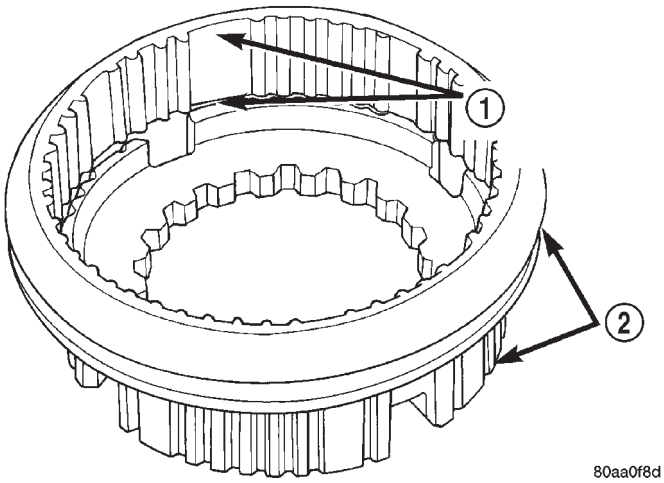


Fig. 80 1-2 Synchro Sleeve On Hub

1 - ALIGN WIDE SLOT IN SLEEVE WITH WIDE SPLINE OF HUB
2 - 1-2 SLEEVE AND HUB

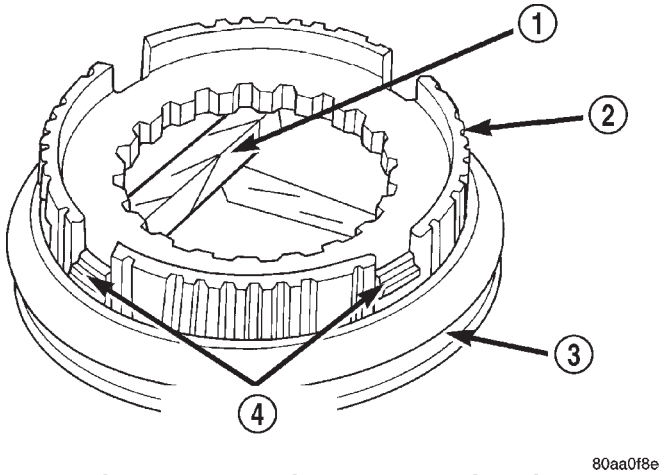


Fig. 81 1-2 Synchro Struts And Springs

1 - WOOD BLOCKS
2 - HUB
3 - SLEEVE
4 - STRUTS AND SPRINGS (4 EACH)

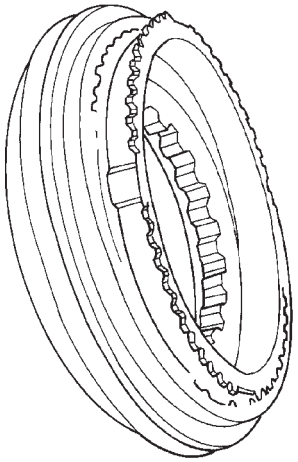


Fig. 82 First Gear Stop Ring In Synchro Hub

MANUAL - NV4500 (Continued)

(7) Install 1-2 synchro assembly and stop ring on mainshaft with the taper on the sleeve facing forward. (Fig. 83).

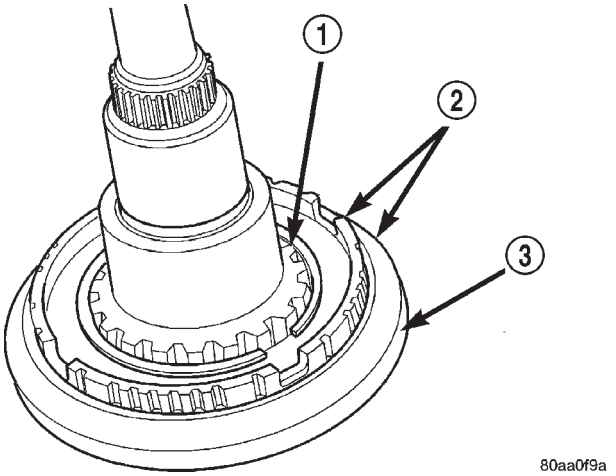


Fig. 83 1-2 Synchro

1 - MAINSHAFT HUB
2 - 1-2 SYNCHRO ASSEMBLY
3 - TAPERED SIDE OF SLEEVE

(8) Install snap ring that secures 1-2 synchro on mainshaft hub (Fig. 84). Verify snap ring is seated in groove in mainshaft hub.

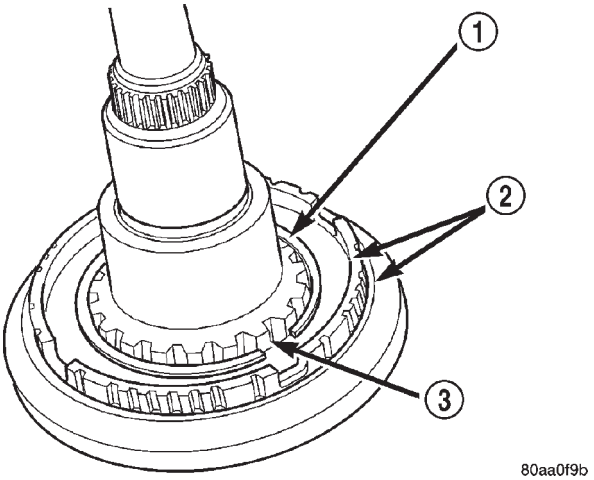


Fig. 84 1-2 Synchro Snap Ring

1 - SYNCHRO SNAP RING
2 - 1-2 SYNCHRO ASSEMBLY
3 - MAINSHAFT HUB

(9) Assemble second gear clutch cone, clutch ring and stop ring (Fig. 85).

(10) Install assembled second gear clutch cone and rings on mainshaft and in 1-2 synchro hub (Fig. 86).

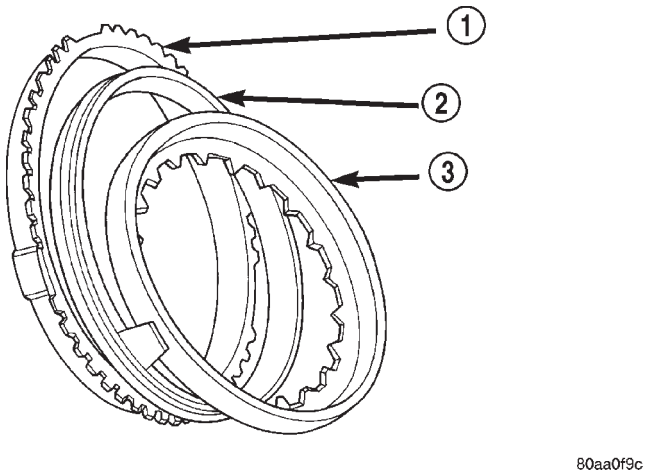


Fig. 85 Second Gear Clutch Cone, Clutch Ring And Stop Ring

1 - STOP RING
2 - CLUTCH RING
3 - CLUTCH CONE

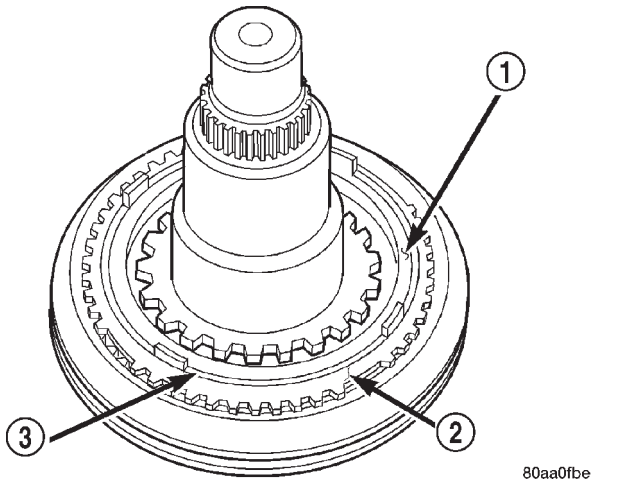


Fig. 86 Second Gear Clutch Cone, Clutch Ring And Stop Ring

1 - CLUTCH CONE
2 - STOP RING
3 - CLUTCH RING

MANUAL - NV4500 (Continued)

(11) Install snap ring that secures second gear clutch cone on mainshaft (Fig. 87). Use narrow blade screwdriver to work snap ring into hub groove as shown. Verify snap ring is seated in mainshaft groove.

NOTE: If snap ring will not fit in groove, clutch cone is slightly misaligned.

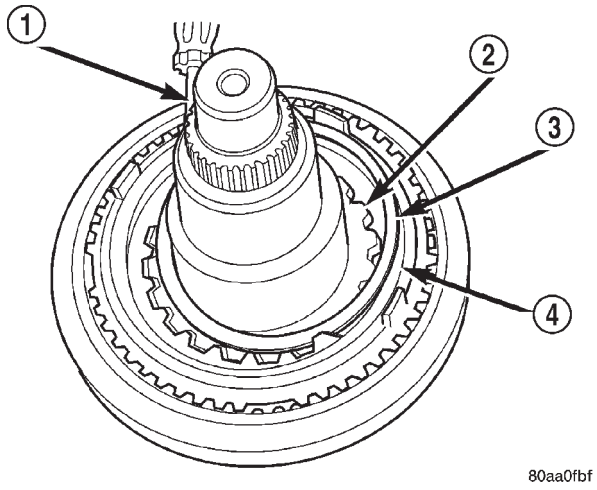


Fig. 87 Second Gear Clutch Cone Snap Ring

1 - SCREWDRIVER
2 - MAINSHAFT HUB
3 - SNAP RING
4 - SECOND GEAR CLUTCH CONE

(12) Install second gear bearing on mainshaft (Fig. 88).

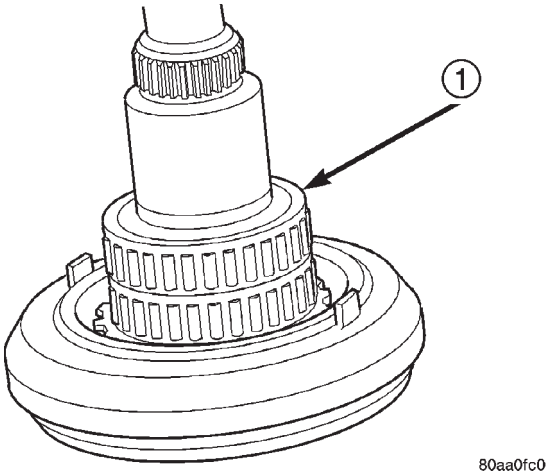


Fig. 88 Second Gear Bearing

1 - SECOND GEAR BEARING

(13) Install second gear on mainshaft and bearing. Rotate gear until tabs of second gear clutch ring are seated in tab slots in gear (Fig. 89).

(14) Install thrust washer pin in shaft (Fig. 90).

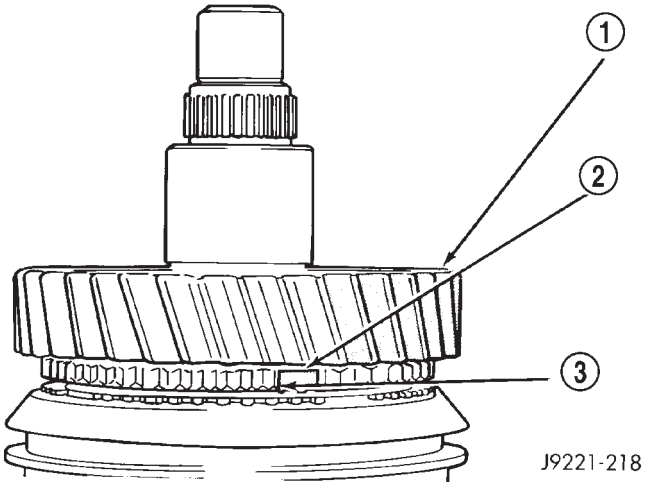


Fig. 89 Second Gear

1 - SECOND GEAR
2 - CLUTCH RING TABS
3 - TAB SLOTS (IN GEAR)

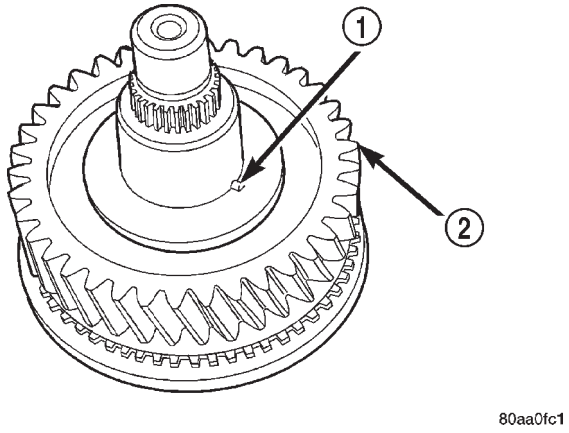
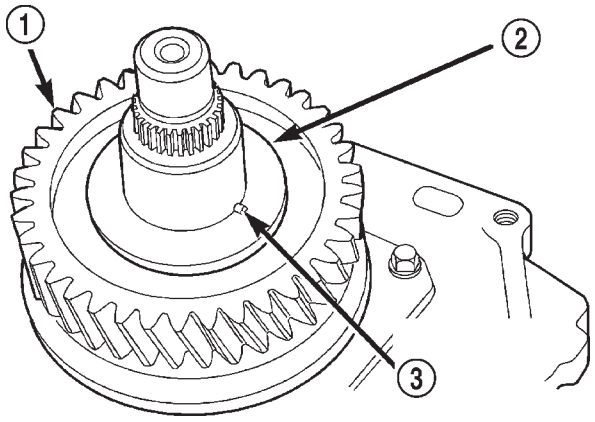


Fig. 90 Thrust Washer Pin

1 - THRUST WASHER PIN
2 - SECOND GEAR

MANUAL - NV4500 (Continued)

(15) Install second gear thrust washer. Verify washer is seated on gear and pin (Fig. 91).



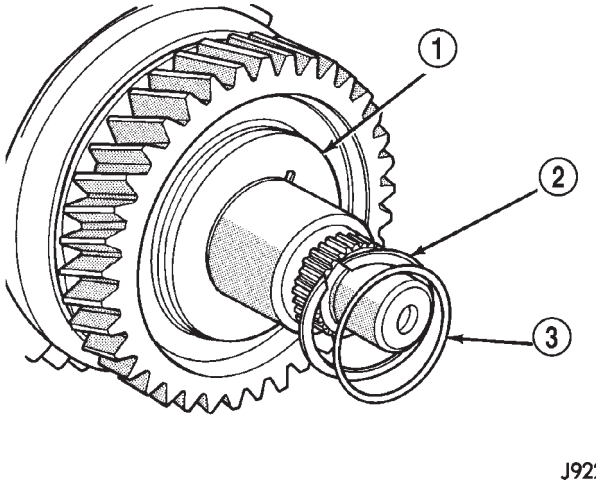
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Fig. 91 Second Gear Thrust Washer

1 - SECOND GEAR
2 - SECOND GEAR THRUST WASHER
3 - LOCATING PIN IN WASHER NOTCH

(16) Install second gear thrust washer snap ring (Fig. 92). Verify snap ring is seated in mainshaft groove.

(17) Install third gear bearing spacer on shaft and seat it against thrust washer snap ring (Fig. 92).



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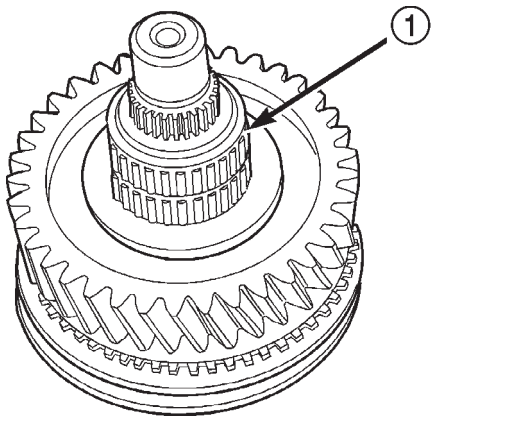
Fig. 92 Snap Ring And Third

1 - SECOND GEAR THRUST WASHER
2 - THRUST WASHER SNAP RING
3 - THIRD GEAR BEARING SPACER

(18) Install third gear bearing on mainshaft (Fig. 93). Bearing should be flush with mainshaft hub.

NOTE: If bearing is not flush with hub, the bearing spacer or snap ring was not installed.

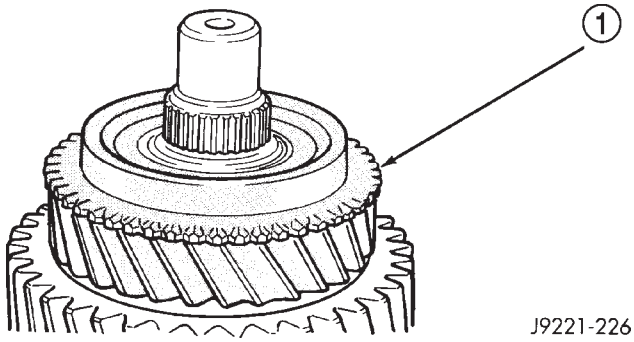
(19) Install third gear over bearing and onto mainshaft (Fig. 94).



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Fig. 93 Third Gear Bearing

1 - THIRD GEAR BEARING

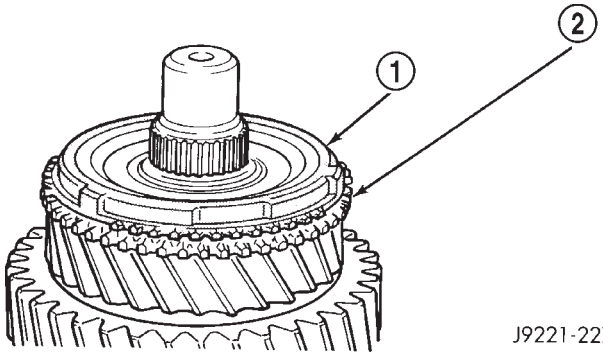


J9221-226

Fig. 94 Third Gear

1 - THIRD GEAR

(20) Install synchro stop ring on third gear (Fig. 95). Verify stop ring is seated on cone taper.



J9221-227

Fig. 95 Third Gear Stop Ring

1 - SYNCHRO STOP RING
2 - THIRD GEAR

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

MANUAL - NV4500 (Continued)

(a) Align and install synchro sleeve on hub (Fig. 96). **Front side of hub has a narrow groove machined in it.**

(b) Insert all three synchro struts in slots machined in sleeve and hub (Fig. 96).

(c) Install and seat synchro springs (Fig. 96). Use screwdriver to compress springs and seat them in struts and hub as shown.

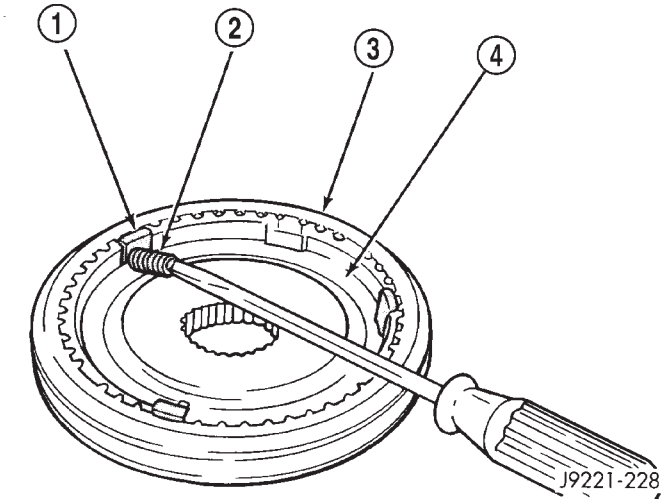


Fig. 96 Synchro Assembly (3-4)

1 - STRUT (3)
2 - SPRING (3)
3 - 3-4 SLEEVE
4 - 3-4 HUB

(22) Start 3-4 synchro assembly on mainshaft with the hub groove and sleeve groove both facing 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 Installer C-4040 (Fig. 97).

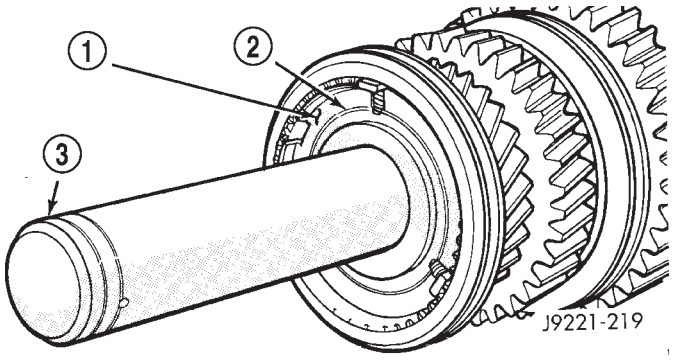


Fig. 97 Seating 3-4 Synchro Assembly On Mainshaft

1 - 3-4 SYNCHRO HUB
2 - HUB GROOVE
3 - INSTALLER C-4040

(23) Verify 3-4 synchro hub is seated on shaft with approximately 3 mm (0.125 in.) of shaft spline visible.

NOTE: If hub is not seated, stop ring lugs are misaligned. Rotate ring until lugs are 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.

(26) Install first gear bearing on mainshaft.

(27) Install first gear on shaft with clutch hub side of gear facing the front of shaft (Fig. 98). Verify tabs on clutch ring are aligned and seated in first gear hub.

NOTE: 1-2 synchro hub will not seat properly if clutch ring tabs are misaligned.

(28) Install reverse clutch gear on first gear (Fig. 98). Verify clutch gear is seated on shaft splines.

(29) Install reverse clutch gear snap ring with heavy duty snap ring pliers (Fig. 98). Verify snap ring is seated in groove.

NOTE: Reverse gear will not fit properly if snap ring is not seated.

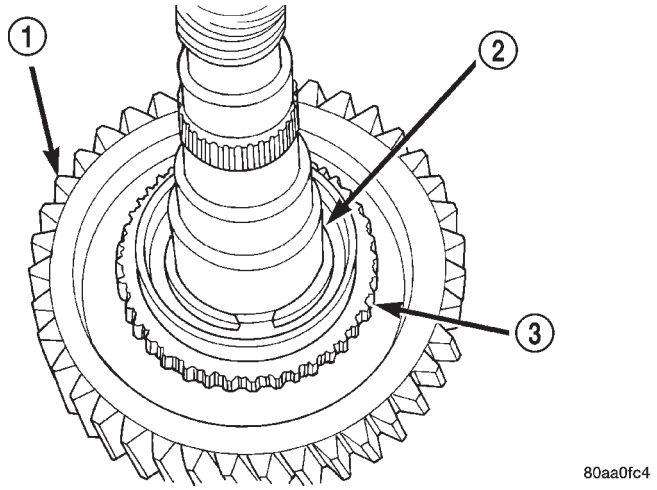


Fig. 98 First Gear And Clutch Gear

1 - FIRST GEAR
2 - REVERSE CLUTCH GEAR SNAP RING
3 - REVERSE CLUTCH GEAR

(30) Install stop ring on clutch cone (Fig. 99). Verify stop ring is seated on cone taper.

(31) Install reverse gear bearing spacer on mainshaft and seat against reverse clutch gear snap ring (Fig. 100).

(32) Install reverse gear bearing on mainshaft (Fig. 100).

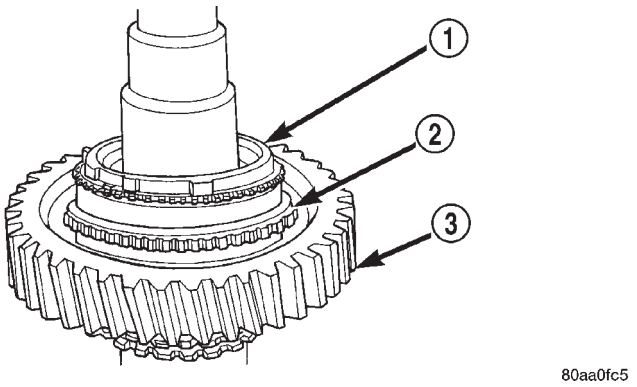


Fig. 99 Clutch Gear Stop Ring

1 - REVERSE GEAR STOP RING
2 - CLUTCH GEAR
3 - FIRST GEAR

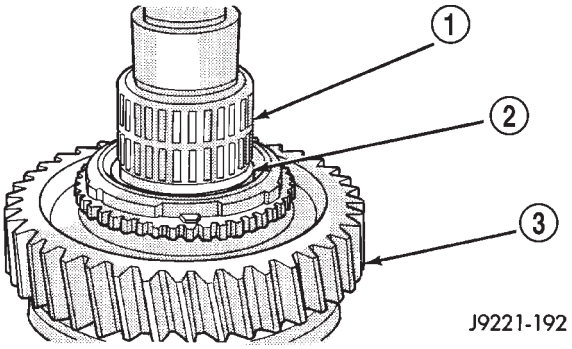


Fig. 100 Reverse Gear Bearing And Spacer

1 - REVERSE GEAR BEARING
2 - BEARING SPACER
3 - FIRST GEAR

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

CAUTION: The reverse sleeve will fit either way on the hub. Verify tapered side of the sleeve faces rearward.

(a) Position sleeve on hub so tapered side of sleeve faces rearward. (Fig. 101).

(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. 101). 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.

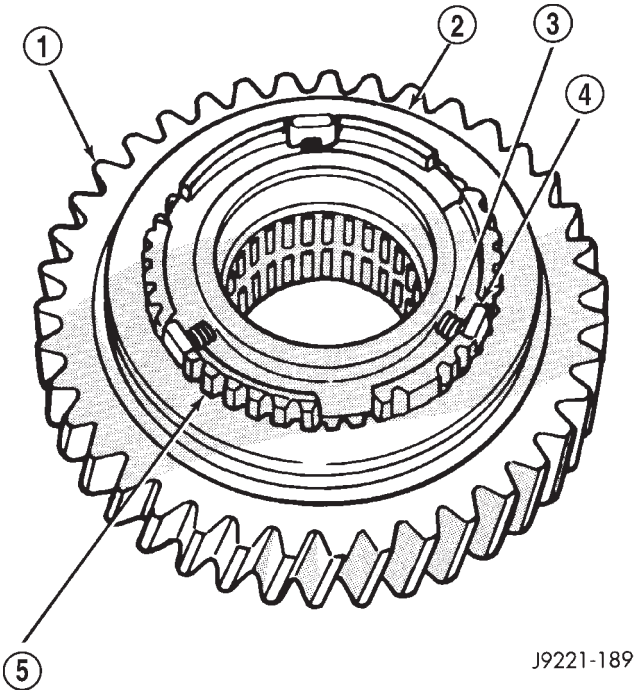


Fig. 101 Reverse Gear Synchro Assembly

1 - REVERSE GEAR
2 - SLEEVE
3 - SPRING (3)
4 - STRUT (3)
5 - HUB

(34) Install reverse gear and synchro assembly on mainshaft (Fig. 102). Rotate assembly until stop ring lugs engage in hub slots and gear drops into seated position.

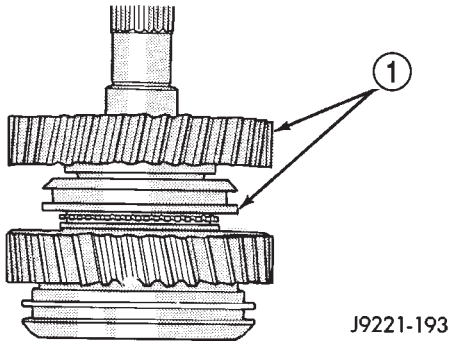


Fig. 102 Reverse Gear

1 - REVERSE GEAR AND SYNCHRO ASSEMBLY

(35) Install reverse gear thrust washer (Fig. 103).

(36) Install rear bearing on mainshaft with Installer 6446. Seat bearing on output shaft and against thrust washer (Fig. 104).

MANUAL - NV4500 (Continued)

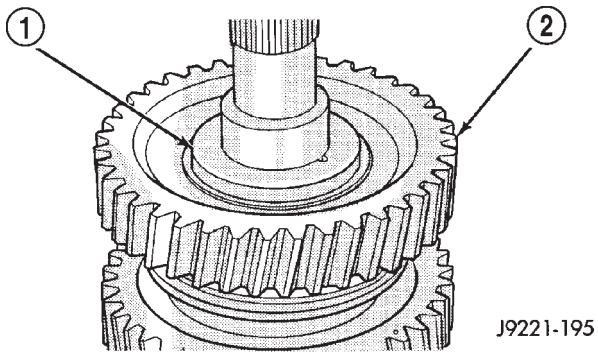


Fig. 103 Reverse Gear Thrust Washer

1 - THRUST WASHER
2 - REVERSE GEAR

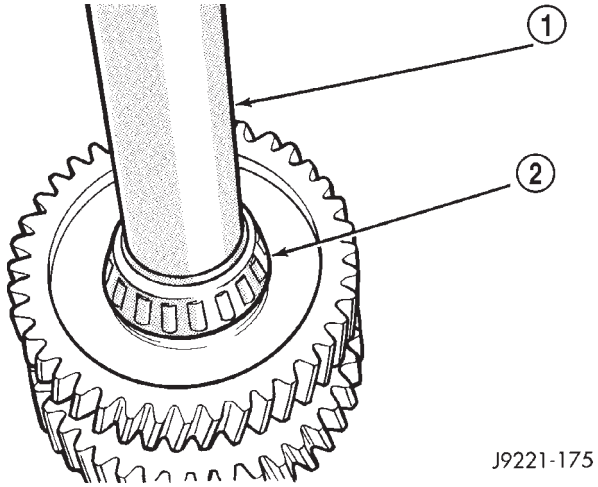


Fig. 104 Mainshaft Rear Bearing

1 - INSTALLER 6446
2 - MAINSHAFT REAR BEARING

(37) Install fourth gear stop ring in 3-4 synchro sleeve (Fig. 105).

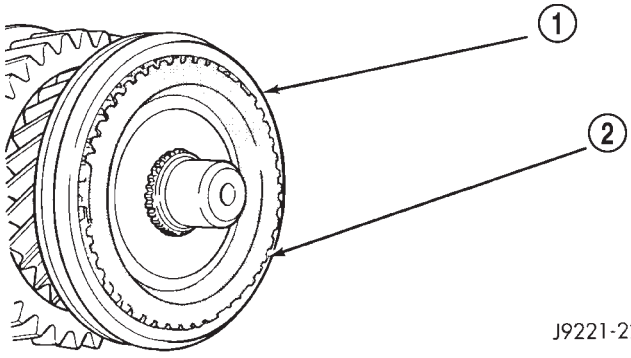


Fig. 105 Fourth gear Stop Ring

1 - 3-4 SYNCHRO SLEEVE
2 - FOURTH SPEED STOP RING

(38) Install fourth gear clutch gear in stop ring (Fig. 106).

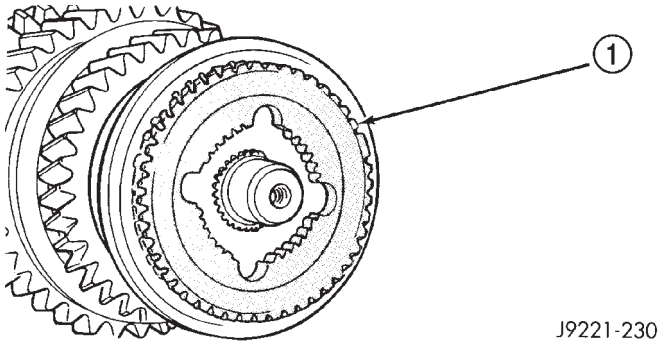


Fig. 106 Fourth gear Clutch Gear

1 - FOURTH SPEED CLUTCH GEAR

(39) Roll gear case onto its left side.

(40) 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.

(41) 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.

(42) Set transmission case upright (Fig. 107).

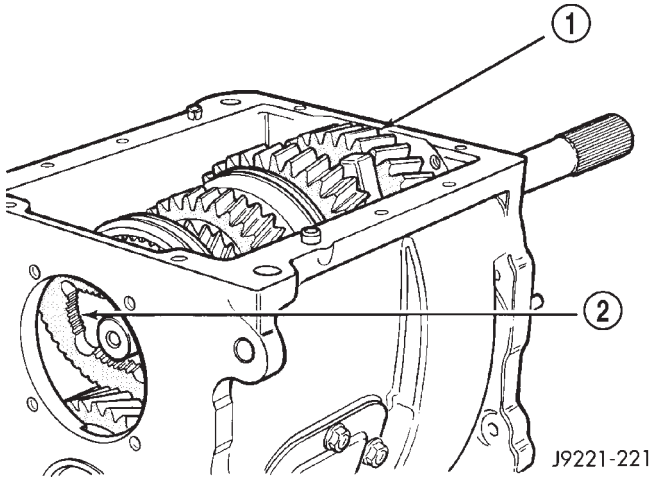


Fig. 107 Mainshaft And Geartrain In Case

1 - MAINSHAFT AND GEARTRAIN
2 - FOURTH SPEED CLUTCH GEAR

(43) Install drive gear thrust bearing on mainshaft (Fig. 108). Use plenty of petroleum jelly to hold bearing in place.

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

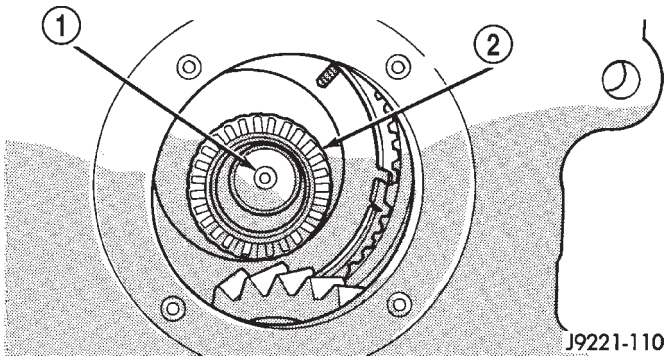


Fig. 108 Drive Gear Thrust Bearing

1 - MAINSHAFT
2 - DRIVE GEAR THRUST BEARING

DRIVE GEAR AND RETAINER

(1) Install bearing on drive gear with Installer 6448 (Fig. 109).

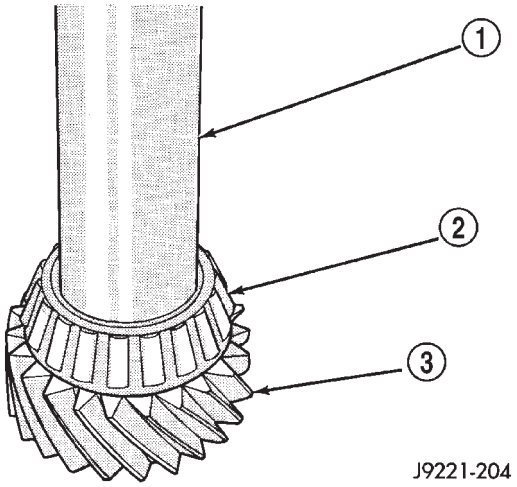


Fig. 109 Front Bearing On Drive Gear

1 - INSTALLER 6448
2 - BEARING
3 - DRIVE GEAR

(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 seated in pilot bearing.

(4) Install bearing cup in front retainer with Handle C-4171 and Installer C-4308 (Fig. 110).

(5) Install new oil seal in front bearing retainer with Installer 6052 (Fig. 111). 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 Silicone Sealer or equivalent to flange surface of front bearing retainer (Fig. 112).

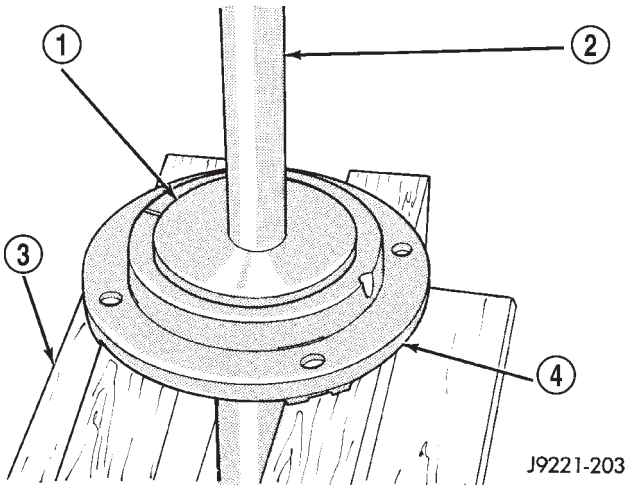


Fig. 110 Front Bearing Cup In Retainer

1 - INSTALLER C-4308
2 - HANDLE C-4171
3 - WOOD BLOCKS
4 - RETAINER

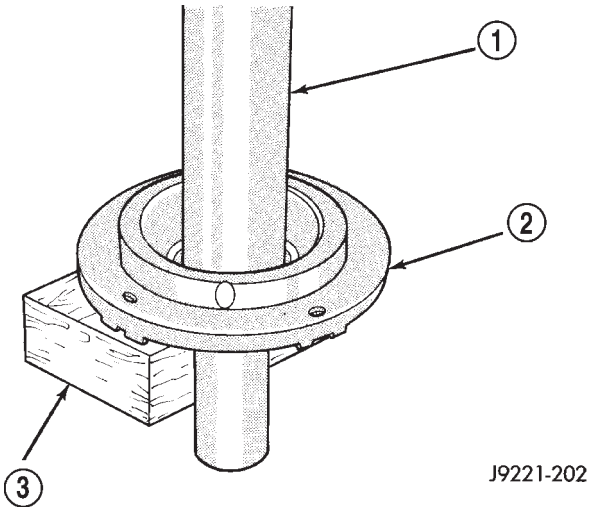


Fig. 111 Bearing Retainer Oil Seal

1 - INSTALLER 6052
2 - RETAINER
3 - WOOD BLOCK

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

(9) Start front bearing retainer in gear case. Verify retainer lube channel is at the top-center **(12 O'clock)** position (Fig. 112).

(10) Align front bearing retainer bolt holes and tap retainer into place with plastic mallet. Install **new** retainer bolts and tighten to 30 N·m (22 ft. lbs.) (Fig. 113).

NOTE: Never reuse the old bolts.

MANUAL - NV4500 (Continued)

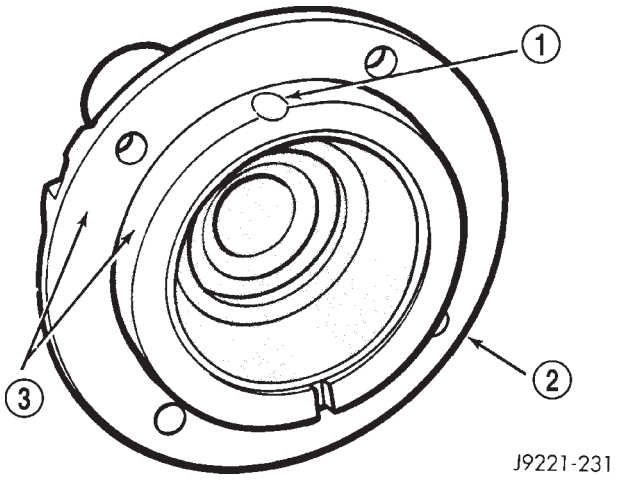


Fig. 112 Location Of Front Retainer Lube Channel

1 - LUBE CHANNEL
2 - FRONT RETAINER
3 - APPLY GASKET MAKER HERE

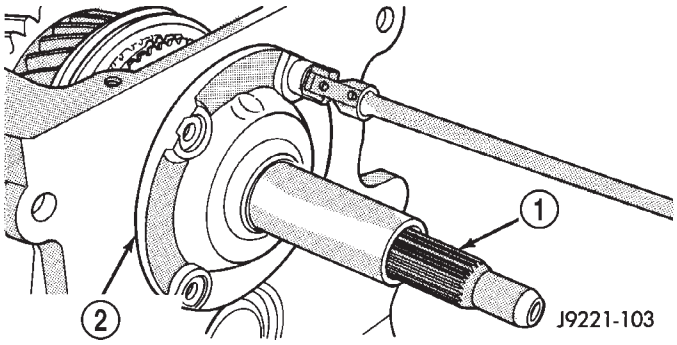


Fig. 113 Front Bearing Retainer

1 - DRIVE GEAR
2 - FRONT BEARING RETAINER

MAINSHAFT END PLAY

(1) Install mainshaft rear bearing cup in case and over bearing. Tap bearing cup into place with plastic mallet.

(2) Install rear bearing plate to hold mainshaft and rear bearing in position (Fig. 114).

NOTE: Do not install any end play shims at this time.

(3) Tighten rear bearing plate bolts securely.

(4) 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.

NOTE: Do not leave transmission unsupported.

(5) Install Extension Rod 8161 into a suitable threaded hole in rear of case.

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

(7) Move mainshaft forward to remove all play then zero dial indicator.

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

(9) End play should be 0.051-0.15 mm (0.002-0.006 in.). Select fit shims are available to adjust end play. If end play adjustment is required, remove bearing plate and install necessary shim.

(10) Reinstall rear bearing plate with oil hole in bearing plate at the top (Fig. 114).

(11) Apply Mopar Lock N' Seal or equivalent to bearing plate bolt threads. Install and tighten bolts to 23 N·m (200 in. lbs.).

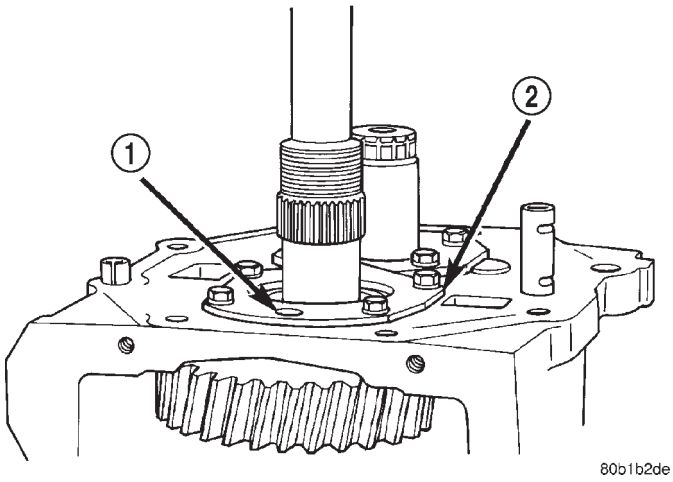


Fig. 114 Rear Bearing Plate

1 - BEARING PLATE OIL HOLE (AT TOP)
2 - MAINSHAFT REAR BEARING PLATE

(12) Install mainshaft fifth gear with Installer 6446 (Fig. 115). Gear is seated when it contacts rear bearing.

COUNTERSHAFT FIFTH GEAR SYNCHRO

(1) Install thrust washer pin in countershaft (Fig. 116).

(2) Install thrust washer on countershaft. Turn washer until pin engages in washer notch (Fig. 117).

NOTE: The flat side of washer faces the rear and cone side faces the front.

(3) Lubricate and install fifth gear bearing on countershaft (Fig. 118).

(4) Install synchro sleeve on hub of countershaft fifth gear with tapered side of sleeve facing front and the flat side facing rear (Fig. 119).

(5) Install shift fork in synchro sleeve (Fig. 120).

MANUAL - NV4500 (Continued)

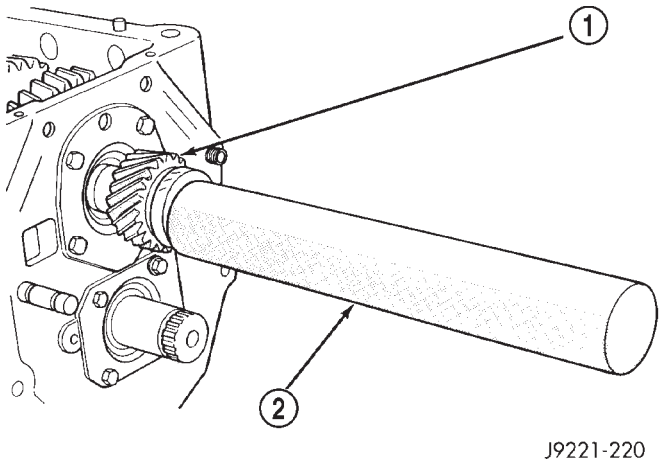


Fig. 115 Mainshaft Fifth Gear

1 - MAINSHAFT FIFTH GEAR
2 - INSTALLER 6446

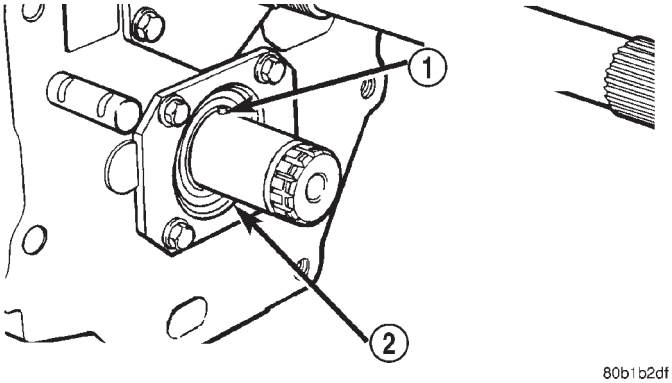


Fig. 116 Fifth Gear Thrust Washer Pin

1 - THRUST WASHER PIN
2 - COUNTERSHAFT

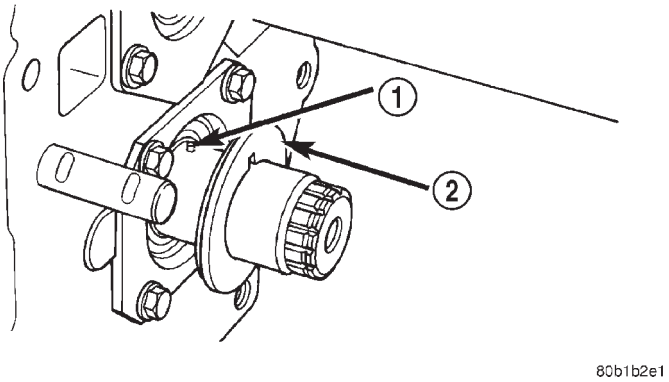


Fig. 117 Fifth Gear Thrust Washer

1 - PIN
2 - THRUST WASHER

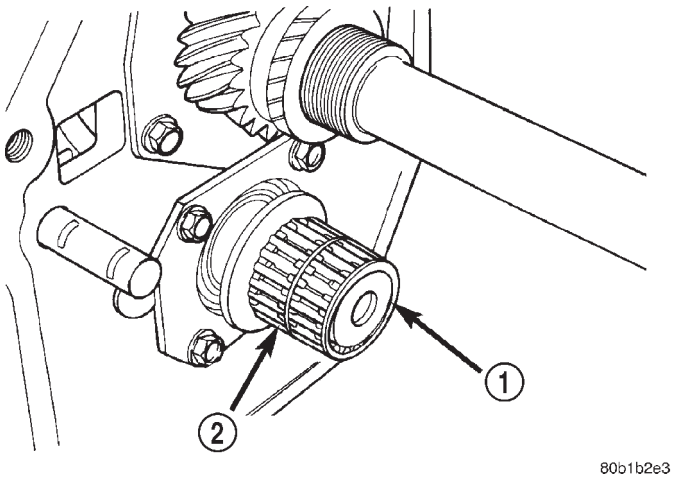


Fig. 118 Countershaft Fifth Gear Bearing

1 - COUNTERSHAFT
2 - FIFTH GEAR NEEDLE BEARING

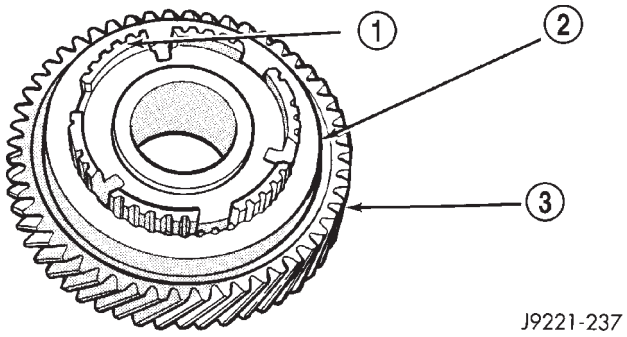


Fig. 119 Synchro Sleeve On Countershaft Fifth

1 - GEAR HUB
2 - SYNCHRO SLEEVE
3 - COUNTERSHAFT FIFTH GEAR

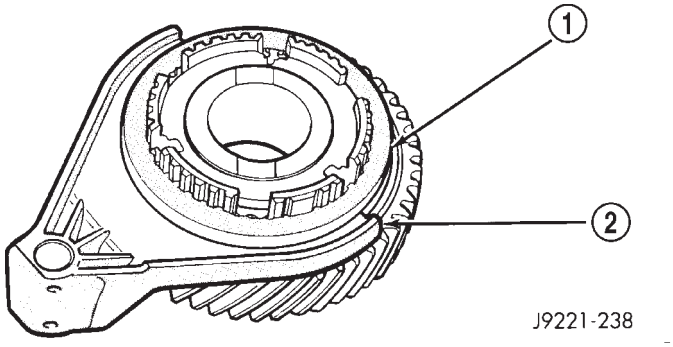


Fig. 120 Fifth Gear Shift Fork In Synchro Sleeve

1 - SYNCHRO SLEEVE
2 - SHIFT FORK

MANUAL - NV4500 (Continued)

(6) Install assembled fifth gear, synchro sleeve and shift fork (Fig. 121). 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.

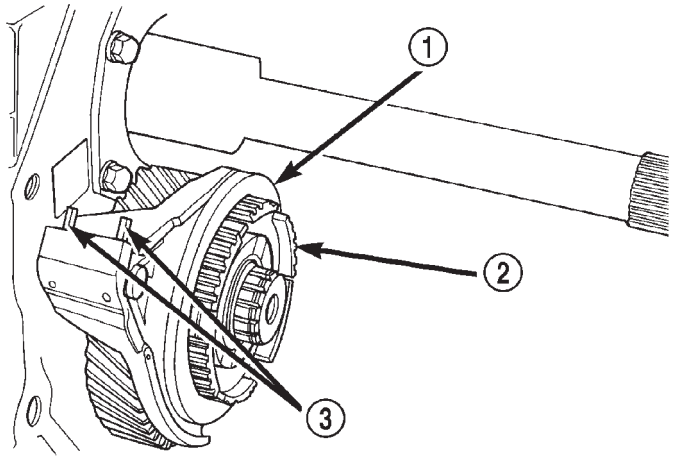


Fig. 121 Countershaft Fifth Gear, Shift Fork And Synchro Sleeve

1 - SHIFT FORK AND SLEEVE
2 - FIFTH GEAR HUB
3 - SHIFT FORK ROLL PINS

(7) Install fifth gear synchro struts and springs (Fig. 122).

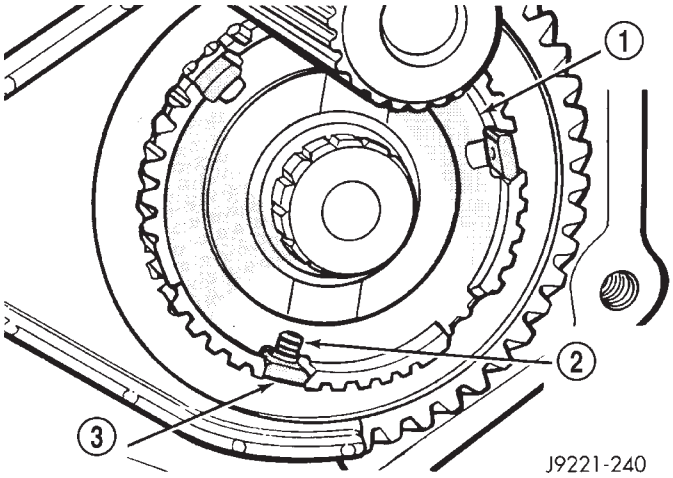


Fig. 122 Fifth Gear Synchro Struts And Springs

1 - FIFTH GEAR HUB
2 - SYNCHRO SPRING (3)
3 - SYNCHRO STRUT (3)

(8) Assemble and install fifth synchro clutch gear and stop ring in fifth gear hub (Fig. 123). Verify parts are seated in fifth gear hub.

(9) Install clutch gear snap ring (Fig. 124).

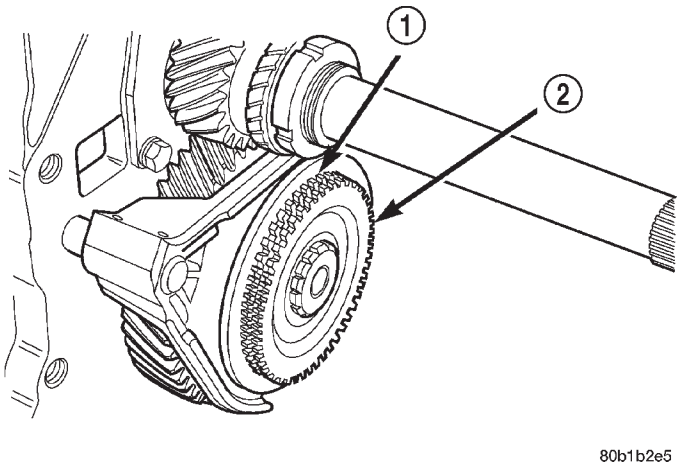


Fig. 123 Fifth Synchro Clutch Gear And Stop Ring

1 - STOP RING
2 - CLUTCH GEAR

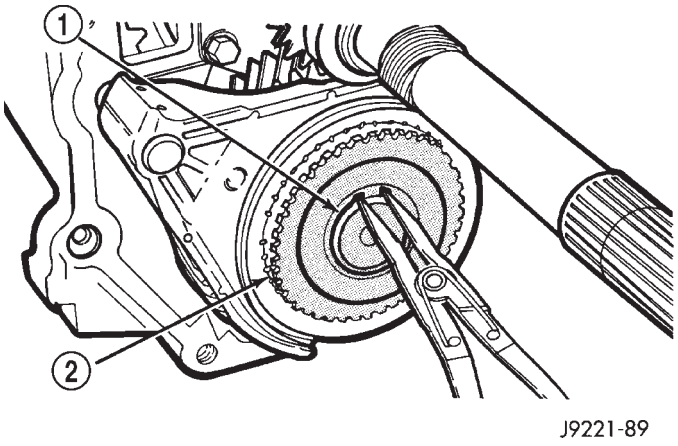


Fig. 124 Fifth Synchro Clutch Snap Ring

1 - CLUTCH GEAR RING
2 - FIFTH SYNCHRO CLUTCH GEAR

(10) Align roll pin holes in shift fork with notches in shift lug rail. Then install roll pins from top side of fork (Fig. 121).

NOTE: Roll pins only fit one way due to small shoulder at one end of each pin.

FIFTH GEAR NUT

(1) Install belleville washer onto the mainshaft.
(2) Install fifth gear nut over the mainshaft.
(3) Tighten the clamp bolt until the gap in the clamp nut assembly is closed.
(4) Back the clamp bolt off one full turn.
(5) Place 10-15 drops of Loctite 272 onto the mainshaft threads where the fifth gear nut will be engaged.
(6) Install fifth gear nut on mainshaft (Fig. 125).

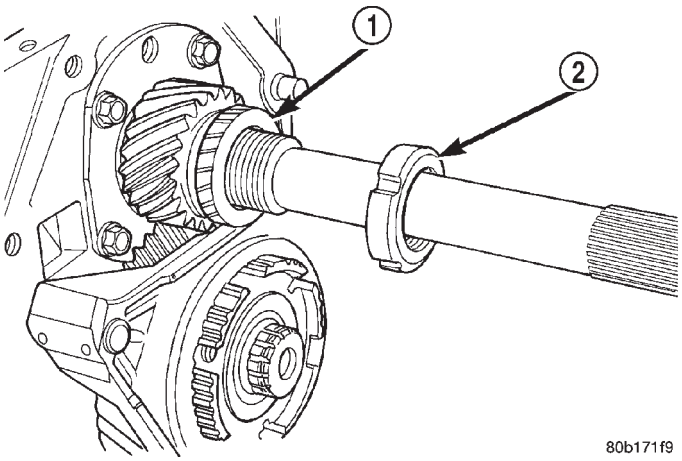


Fig. 125 Fifth Gear Nut

1 - FIFTH GEAR
2 - FIFTH GEAR NUT

(7) Hold mainshaft Socket 6993 4X2 or Socket 6984 4X4 while installing the fifth gear nut.

(8) Tighten fifth gear nut as much as possible with Nut Wrench 6743, long handle ratchet, breaker bar and applicable socket wrench (Fig. 126).

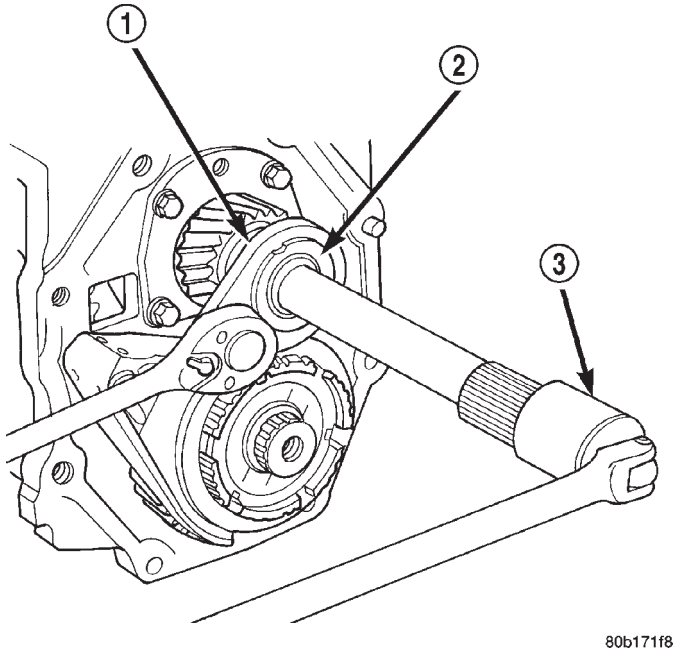


Fig. 126 Fifth Gear Nut

1 - WRENCH 6443 OR 6743
2 - FIFTH GEAR NUT
3 - SOCKET 6993 OR 6984

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

(10) Tighten fifth gear nut with Nut Wrench 6743 and high capacity torque wrench. Tighten nut to 366-380 N·m (270-280 ft. lbs.). Have helper hold transmission steady if necessary.

(11) Torque the fifth gear clamp nut clamping bolt to 13.5 N·m (10 ft. lbs.).

(12) Unlock the mainshaft gears by shifting all synchro sleeves out of the engaged position.

EXTENSION/ADAPTER HOUSING

(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.

(3) Apply Mopar Silicone Sealer or equivalent to gear case and housing mating surfaces.

(4) Align and install extension/adapter housing on gear case (Fig. 127).

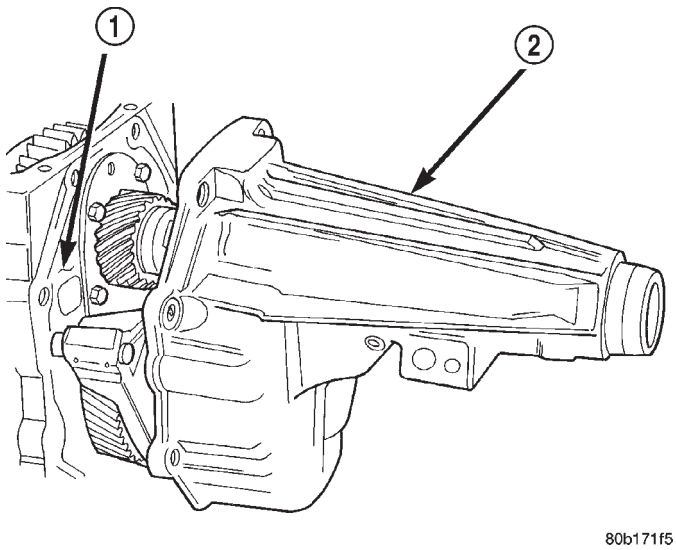


Fig. 127 Installing Extension/Adapter Housing

1 - GEAR CASE
2 - EXTENSION 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.).

(7) Install transfer case, if equipped.

(8) Install engine rear support.

(9) Install propeller shaft(s).

(10) Remove transmission support stand and lower vehicle.

MANUAL - NV4500 (Continued)

INSTALLATION

NOTE: If a new transmission is being installed, use all components supplied with the new transmission. For example, if a new shift tower is supplied with the new transmission, do not re-use the original shift tower.

(1) Apply light coat of Mopar high temperature bearing grease or equivalent to contact surfaces of the following components:
- input shaft splines.
- release bearing slide surface of front retainer.
- release bearing bore.
- release fork.
- 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.).

(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) Install clutch slave cylinder and install slave cylinder shield, if equipped.

(13) Connect speed sensor and backup light switch wires.

TWO WHEEL DRIVE

(1) Fill transmission with recommended lubricant. Correct fill level is bottom edge of fill plug hole.

(2) Align and install propeller shaft.

(3) Lower vehicle.

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

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

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

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

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

(9) 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.).

(10) Install the shift lever extension onto the shift tower and lever assembly.

(11) Install shift boot and bezel.

(12) Connect battery negative cable.

FOUR WHEEL DRIVE

(1) Install transfer case shift mechanism on transmission.

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

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

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

(5) 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.

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

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

(8) Align and connect propeller shafts.

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

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

(11) Install exhaust system components.

(12) Lower vehicle.

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

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

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

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

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

MANUAL - NV4500 (Continued)

(18) 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.).

(19) Install the shift lever extension onto the shift tower and lever assembly.

(20) Install shift lever boot and bezel.

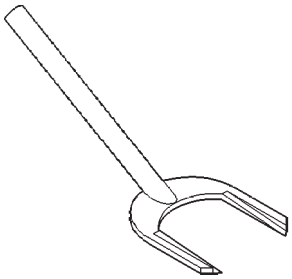
(21) Connect battery negative cable.

SPECIFICATIONS

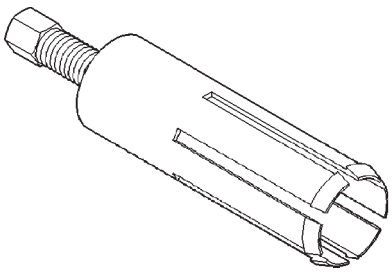
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Switch, Back-up Lamp	22-34	16-25	-
Countershaft Bearing Plate Bolts	19-26	14-19	170-230
Fifth Gear Nut	366-380	270-280	-
Fifth Gear Nut Clamp Bolt	13.5	10	-
Drain and Fill Plug	34-47	25-35	-
Front Bearing Retainer Bolts	27-34	20-25	235-305
Mainshaft Bearing Plate Bolts	19-26	14-19	170-230
PTO Cover Bolts	27-54	20-40	-
Extension/Adapter Housing Bolts	41-68	30-50	-
Shift Cover Bolt	27-31	20-23	-

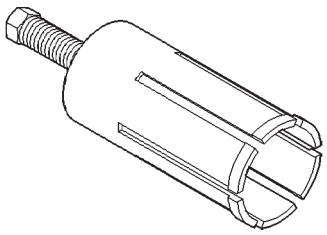
SPECIAL TOOLS



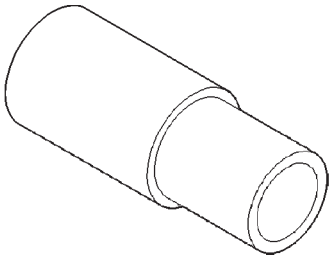
Remover Seal C-3985-B



Remover Bushing 6957

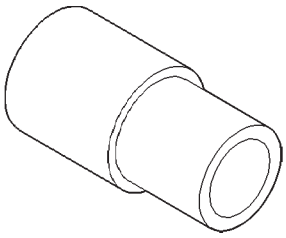


Remover, Bushing—8155

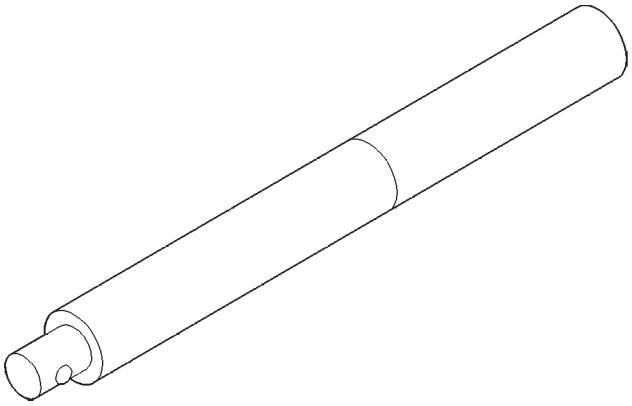


Installer Bushing 6951

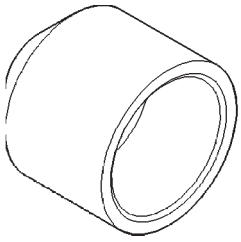
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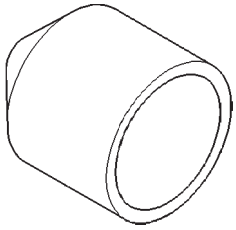
Installer Bushing 8156



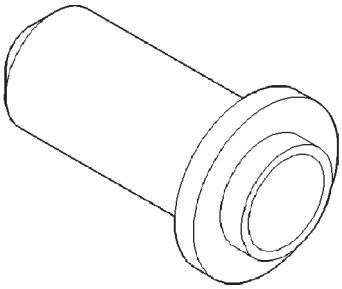
Handle C-4171



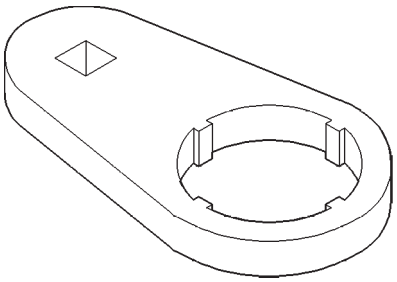
Installer Seal C-3972-A



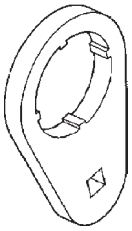
Installer Seal 8154



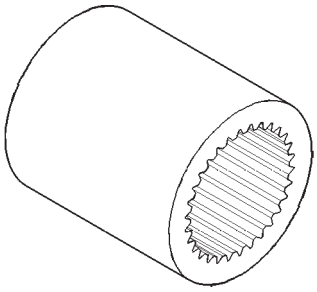
Installer Seal C-3860-A



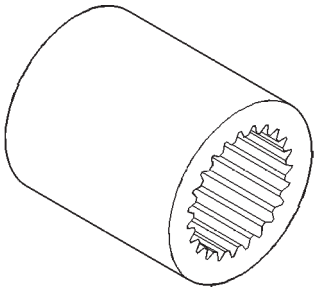
Wrench 6443



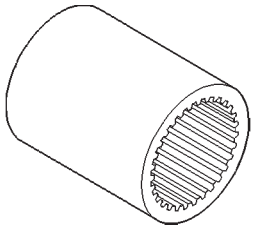
Wrench 6743



Socket 6441

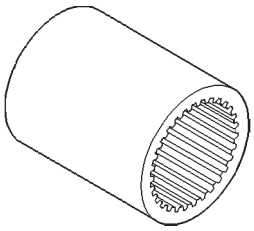


Socket 6442

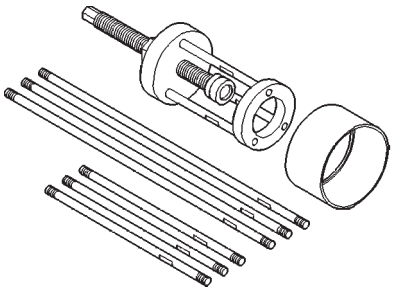


Socket 6993

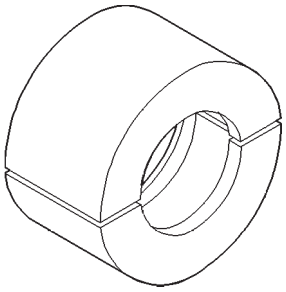
MANUAL - NV4500 (Continued)



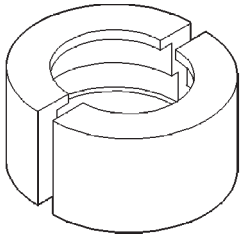
Socket 6984



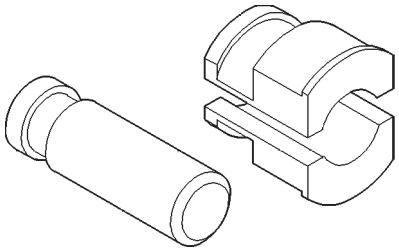
Puller 6444



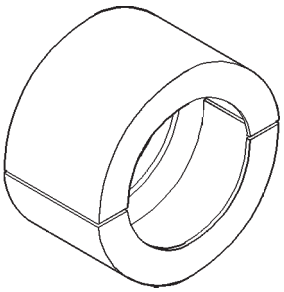
Jaws 6459



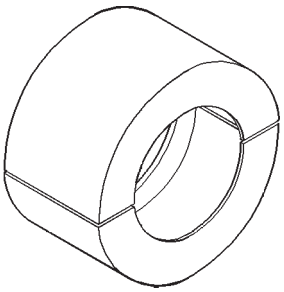
Jaws 6820



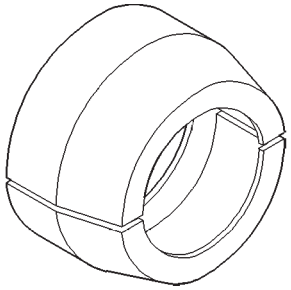
Jaws and Insert 6453



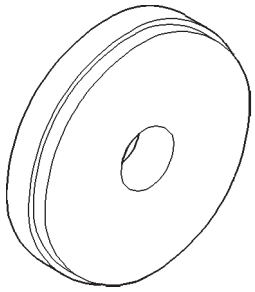
Jaws 6447



Jaws 6449

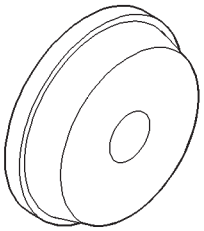


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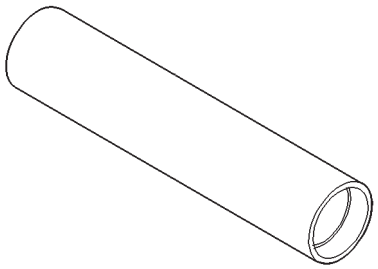


Remover 6454

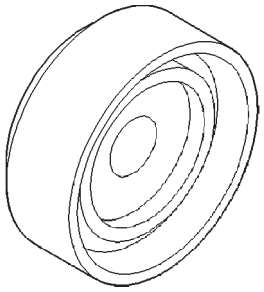
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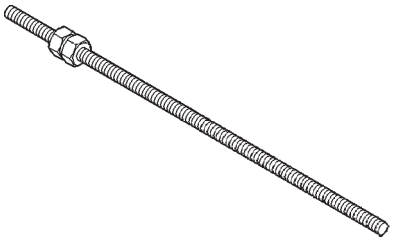
Installer 6061



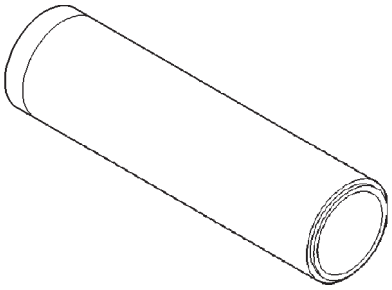
Installer 6052



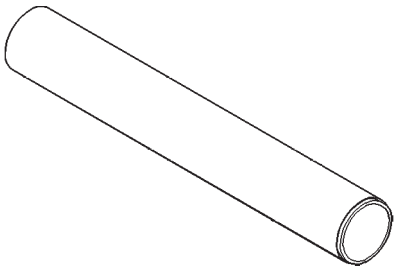
Installer C-4340



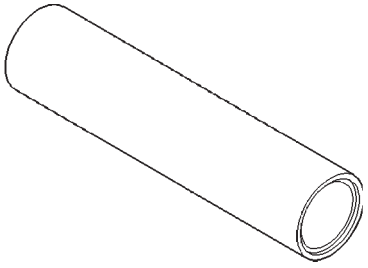
Rod Extension 8161



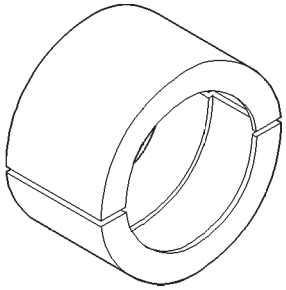
Installer C-4040



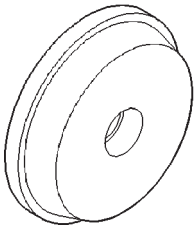
Installer 6446



Installer 6448



Jaws 6445



Installer C-4308

ADAPTER HOUSING SEAL - NV4500

REMOVAL

(1) Raise and support vehicle.
(2) Mark the propeller shafts and yokes for installation reference and remove the shafts.
(3) Support transmission with a transmission jack.
(4) Remove engine rear support.
(5) Remove transfer case.
(6) Remove adapter housing seal with a pry tool or slide hammer mounted screw (Fig. 128).

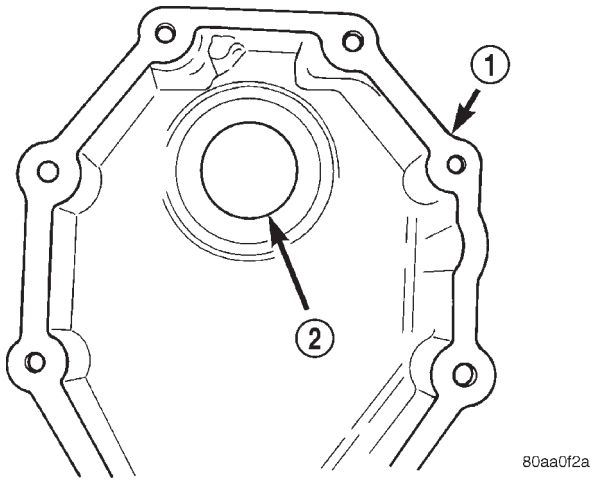


Fig. 128 Adapter Housing - 4WD

1 - ADAPTER HOUSING
2 - SEAL

INSTALLATION

(1) Install adapter housing seal with Installer C-3860-A and Handle C-4171.
(2) Install transfer case.
(3) Install propeller shafts with reference marks aligned.
(4) Fill transfer case and transmission to proper level.
(5) Remove support and lower vehicle.

EXTENSION HOUSING SEAL - NV4500

REMOVAL

(1) Raise and support the vehicle.
(2) Mark the propeller shaft and yoke for installation reference.
(3) Remove the propeller shaft.
(4) Remove extension housing seal (Fig. 129) using Remover C-3985-B.
(5) On heavy duty 4X2 vehicles, remove extension housing seal with a pry tool or a slide hammer mounted screw.

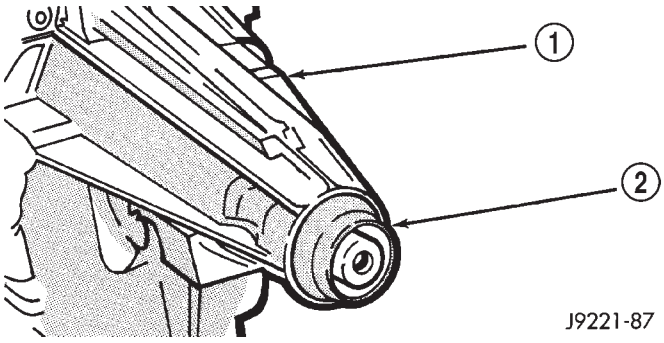


Fig. 129 Extension Housing - 2WD

1 - EXTENSION HOUSING
2 - SEAL

(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) Install housing bushing with Handle C-4171 (Fig. 130) and Installer.
- Light Duty - Installer 6951
- Heavy Duty - Installer 8161

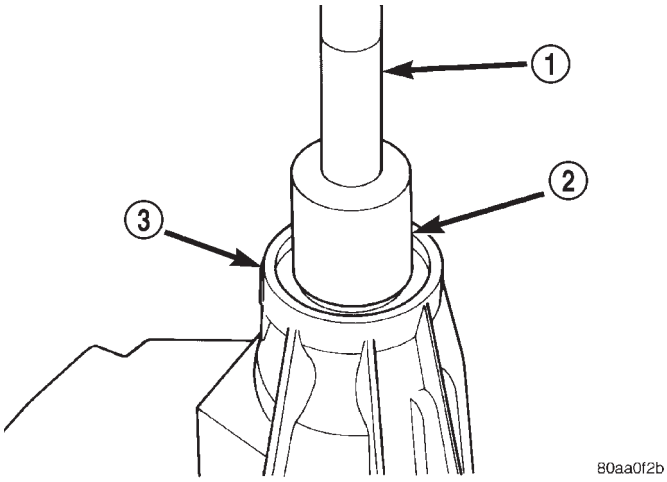


Fig. 130 Extension Housing Bushing

1 - HANDLE C-4171
2 - INSTALLER
3 - EXTENSION HOUSING

(2) Install housing seal with Handle C-4171 (Fig. 131) and Installer.
- Light Duty - Installer C-3972-A
- Heavy Duty - Installer 8154

(3) Install propeller shaft with reference marks aligned.

EXTENSION HOUSING SEAL - NV4500 (Continued)

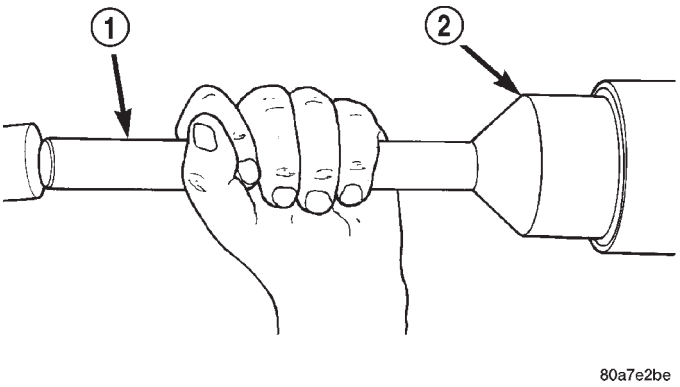


Fig. 131 Extension Housing Seal

1 - HANDLE C-4171
2 - INSTALLER

(4) Check and fill transmission.
(5) Remove support and lower vehicle.

SHIFT MECHANISM - NV4500

REMOVAL

(1) Remove transmission from vehicle.
(2) Remove shift cover bolts (Fig. 132).

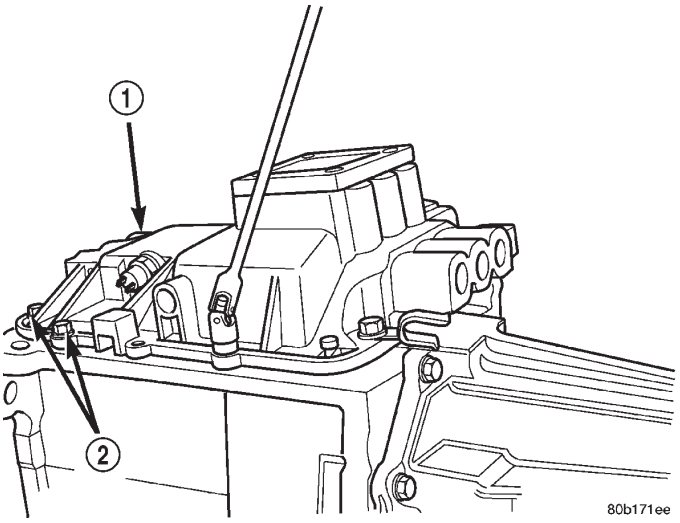


Fig. 132 Shift Cover Bolts

1 - SHIFT COVER
2 - BOLTS

(3) Pry up shift cover at slots provided in cover (Fig. 133).
(4) Raise cover enough to disengage it from alignment dowels in gear case (Fig. 134).
(5) Raise front of shift cover and lift cover up and off gear case (Fig. 134).

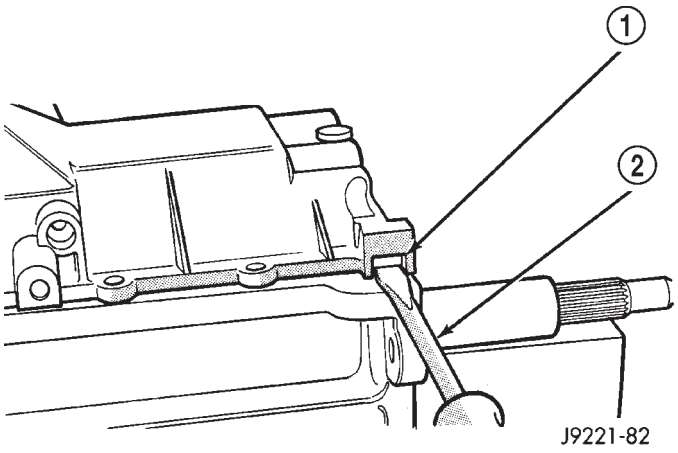


Fig. 133 Loosening Shift Cover

1 - SHIFT COVER SLOT
2 - PRY TOOL

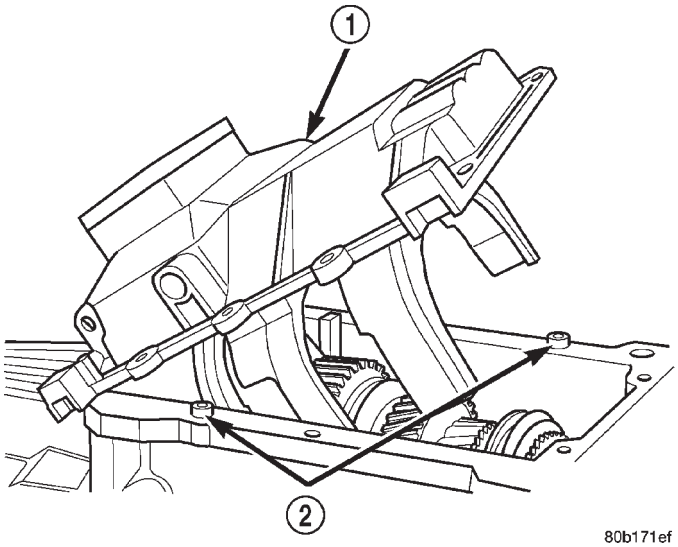


Fig. 134 Shift Cover

1 - SHIFT COVER
2 - ALIGNMENT DOWELS

FIFTH-REVERSE SHIFT FORK PADS

Three shift pads on the forks are held in place by tension and a small locating tang (Fig. 135).

To remove the pads, grasp a pad with hand and tilt it out and off the fork. If pad is difficult to remove by hand, insert a screwdriver blade between the pad and fork and pry the pad off.

EXPANSION PLUG

The expansion plugs at the rear of the shift rail bores (Fig. 136) can be replaced if loose/leaking.

(1) Drill 6 mm (1/4 in.) diameter hole in center of the plug to be removed.
(2) Pry plug out of cover with tapered punch.

SHIFT MECHANISM - NV4500 (Continued)

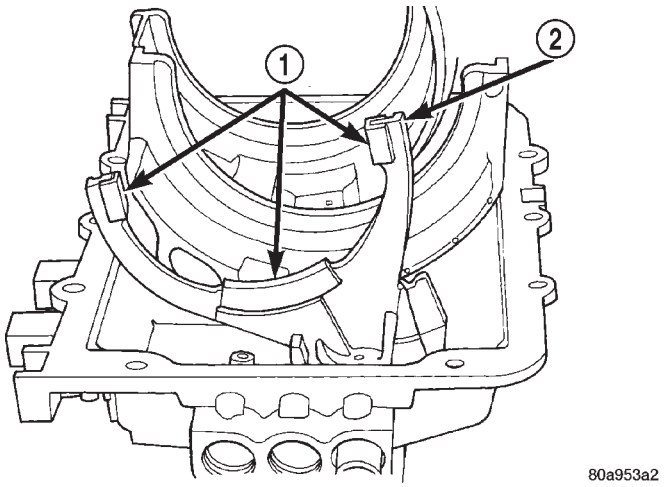


Fig. 135 Shift Fork Pad Locations

1 - SHIFT FORK PADS
2 - FIFTH-REVERSE FORK

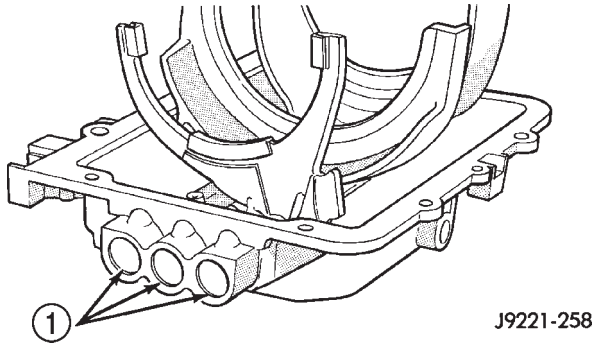


Fig. 136 Expansion Plug Location

1 - EXPANSION PLUGS

(3) Clean all chips from shift cover and plug bores. Then clean plug bores with solvent and dry with clean shop towel.

INSTALLATION

EXPANSION PLUG

(1) Apply small bead of Mopar silicone sealer or equivalent to outer edge of each new plug.

(2) Position each plug in bore and tap into place with hammer and punch or socket.

FIFTH-REVERSE SHIFT FORK PADS

(1) Align pad locating tab.

(2) Snap pads into place and verify locating tabs are locked-in.

SHIFT COVER

(1) Clean mating surfaces of shift cover and gear case with wax and grease remover.

(2) Apply a small amount of Mopar silicone sealer or equivalent to sealing surface of shift cover.

CAUTION: Do not over-apply an excesive amount sealer. Excess can squeezed into gear case and could block lubricant feed holes in time.

(3) Lubricate synchro sleeves with Castrol® Syntorq gear lubricant or equivalent. Then apply light coat of petroleum jelly to shift fork contact surfaces.

(4) Verify shift fork pads (Fig. 137) are secure.

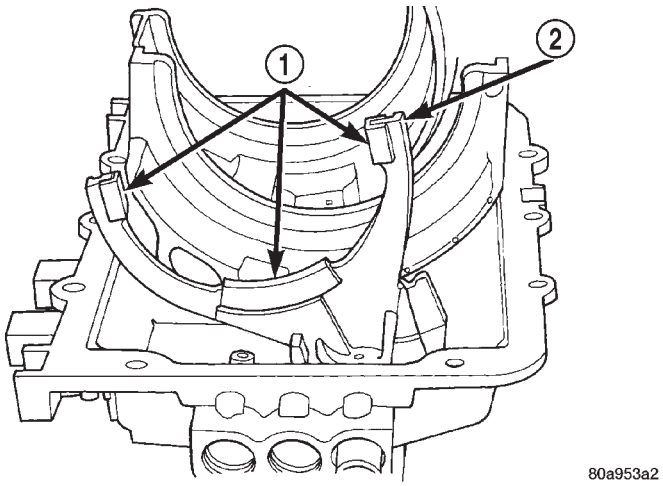


Fig. 137 Fifth-Reverse Shift Fork Pads

1 - SHIFT FORK PADS
2 - FIFTH-REVERSE FORK

(5) Verify 1-2 and 3-4 synchro sleeves and forks in shift cover are in neutral position.

(6) Align and seat shift cover on transmission.

NOTE: If cover will not seat, it may not be 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 shift cover bolts and tighten to 27-31 N·m (216-276 in. lbs.).

(9) Apply sealer to backup lamp switch. Install switch into cover and tighten 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.

(11) Install transmission.

SHIFT COVER - NV4500

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 shift tower, isolator plate and shift tower bushings are properly aligned.

(6) Install 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 shift lever extension, shift boot and bezel.

MANUAL - NV5600

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MANUAL - NV5600

DESCRIPTION

The NV5600 is a six speed constant mesh manual transmission (Fig. 1). All gear ranges including reverse are synchronized. First and second gears utilize dual cone synchronizers in order to aid shifting. Sixth gear is an overdrive range. The transmission uses cast iron for the gear case and extension/adapter housing and aluminum for the clutch housing.

To drain the trans remove the bottom PTO cover bolt. Fill the trans through the plug to the rear of the PTO cover (Fig. 1). Dry fill is approximately 4.5 liters (9.5 pints) or to the bottom edge of the fill plug hole.

The transmission is a end loader transmission. The shift lever is located in a shifter tower which is bolted to the gear case and operates the shift shaft.

The shift pattern is in a modified H pattern (Fig. 2). Overdrive fifth and sixth gears are in line and outboard of the first through fourth gear positions. Reverse gear is to the right of fifth and sixth and forward of the neutral gate.

The gear ratios are:

GEAR RATIOS

GEAR	RATIO
FIRST	5.63:1
SECOND	3.38:1
THIRD	2.04:1
FOURTH	1.39:1
FIFTH	1.00:1
SIXTH	0.73:1
REVERSE	5.63:1

IDENTIFICATION

The transmission has two identification tags attached to the driver side upper clutch housing (Fig. 3). One tag provides the transmission part number. The second tag provides sequencing and build date information. The information on the tags are essential to correct parts ordering.

MANUAL - NV5600 (Continued)

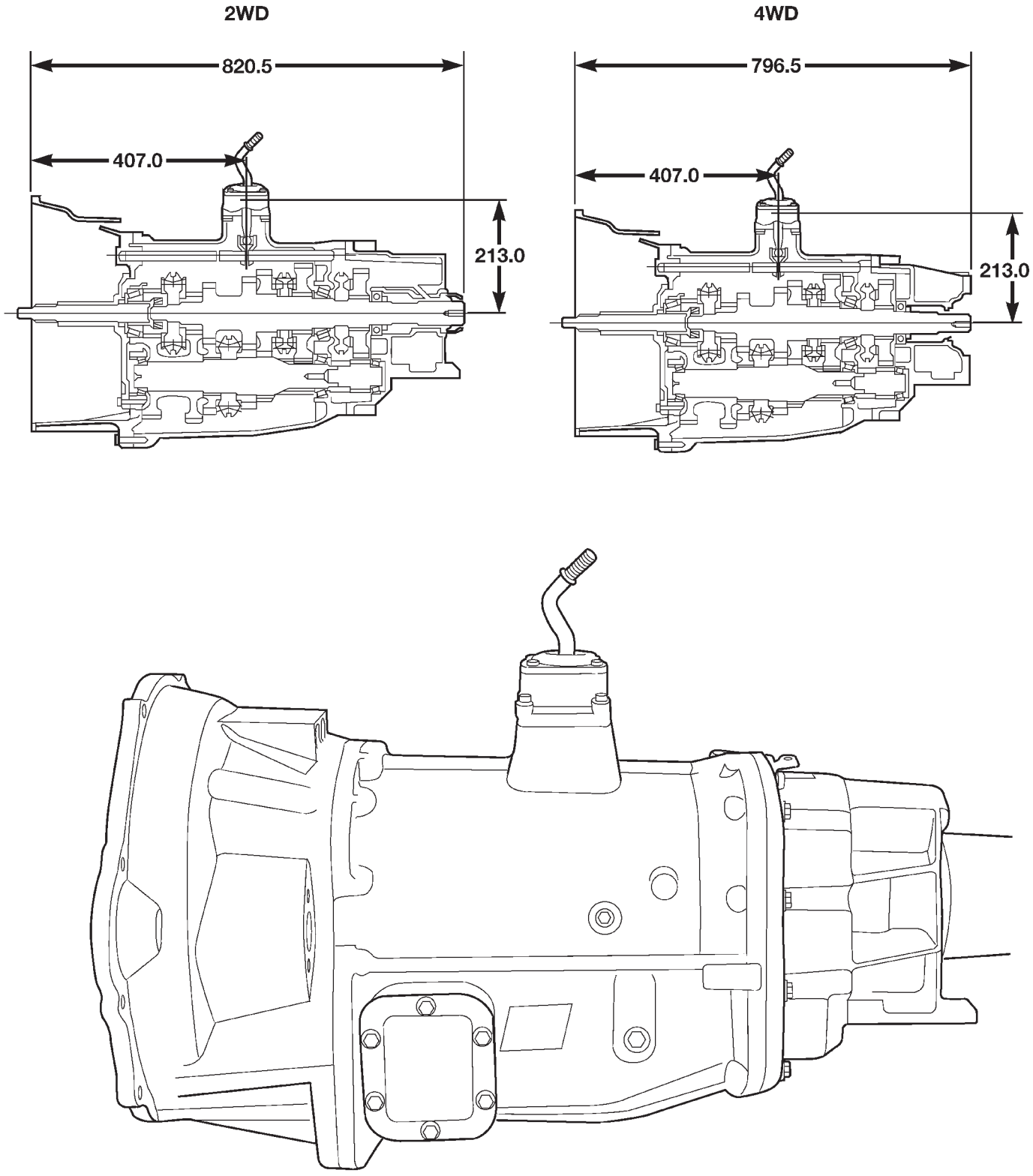


Fig. 1 NV5600 Manual Transmission

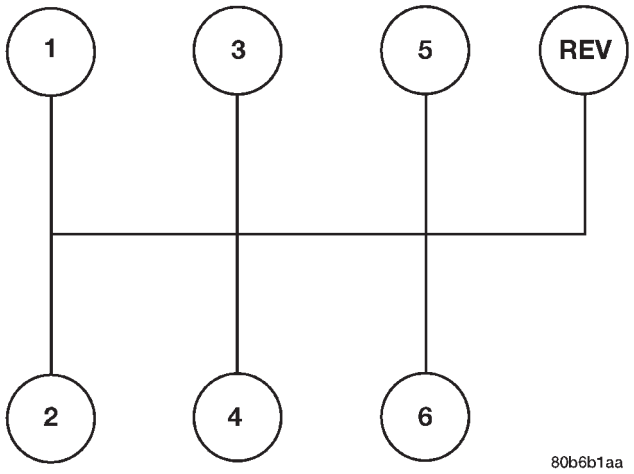


Fig. 2 Shift Pattern

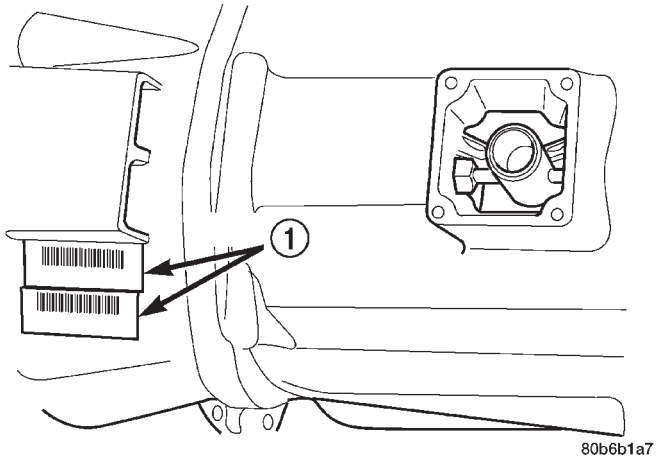


Fig. 3 Identification Tag Location

1 - IDENTIFICATION TAGS

OPERATION

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

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

Leaks can occur at the mating surfaces of the gear case, adaptor or extension housing, or from the front/rear seals. A suspected leak could also be the result of an overfill condition. Leaks at the rear of the extension or adapter housing will be from the housing oil seals. Leaks at component mating surfaces will probably be the result of inadequate sealer, gaps in the sealer, incorrect bolt tightening or use of a non-recommended sealer. A leak at the front of the transmission will be from either the front bearing retainer or retainer seal. Lubricant may be seen dripping from the clutch housing after extended operation. If the leak is severe, it may also contaminate the clutch disc causing the disc to slip, grab and or chatter.

HARD SHIFTING

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

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

MANUAL - NV5600 (Continued)

TRANSMISSION NOISE

Most manual transmissions make some noise during normal operation. Rotating gears generate a mild whine that is audible, but generally only at extreme speeds. Severe highly audible transmission noise is generally the initial indicator of a lubricant problem.

Insufficient, improper or contaminated lubricant will promote rapid wear of gears, synchros, shift rails, forks and bearings. The overheating caused by a lubricant problem, can also lead to gear breakage.

REMOVAL

NOTE: Use a heavy duty scissors style transmission jack for remove of the transmission.

(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 gear case.
(5) Remove the shift tower and isolator plate from the transmission gear case.
(6) Raise and support vehicle.
(7) Remove skid plate, if equipped.
(8) Mark propeller shaft/shafts and axle yokes for installation reference.
(9) Remove propeller shaft.
(10) Disconnect and remove exhaust system as necessary.
(11) Disconnect wires at 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. 4).

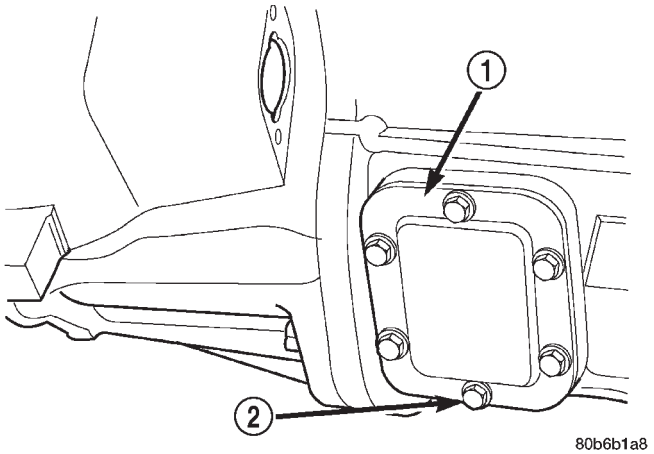


Fig. 4 NV5600 Drain Bolt

1 - PTO COVER
2 - DRAIN BOLT

(14) Remove clutch slave cylinder splash shield, if equipped.
(15) Remove clutch slave cylinder bolts and move cylinder aside for clearance.
(16) Remove wire harness from clips on transmission.

TWO WHEEL DRIVE

(1) Remove bolts/nuts mounting transmission to the rear mount.
(2) Support and secure transmission with safety chains to a transmission jack.
(3) Remove rear crossmember.
(4) Remove transmission clutch housing bolts at the engine block.
(5) Slide transmission and jack rearward until input shaft clears clutch disc and pressure plate.
(6) Lower transmission jack and remove transmission from under vehicle.

FOUR WHEEL DRIVE

(1) Disconnect transfer case shift linkage at transfer case range lever.
(2) Support and secure transfer case with safety chains to a transmission jack.
(3) Remove transfer case mounting nuts.
(4) Move transfer case rearward until input gear clears transmission mainshaft.
(5) Lower transfer case assembly and move it from under vehicle.
(6) Support and secure transmission with safety chains to a transmission jack.
(7) Remove bolts/nuts attaching transmission mount to rear crossmember.
(8) Remove rear crossmember.
(9) Remove transmission clutch housing bolts at the engine block.
(10) Move transmission rearward until input shaft clears clutch disc.
(11) Lower transmission and remove it from under vehicle.

DISASSEMBLY

NOTE: Use Fixture 8241 for moving and handling the transmission. The fixture supports the transmission at the center of gravity in order to ease mounting the transmission into the build fixture.

(1) Mount the transmission into Fixture 8230 (Fig. 5).
(2) Rotate the transmission to the horizontal position, if necessary.

MANUAL - NV5600 (Continued)

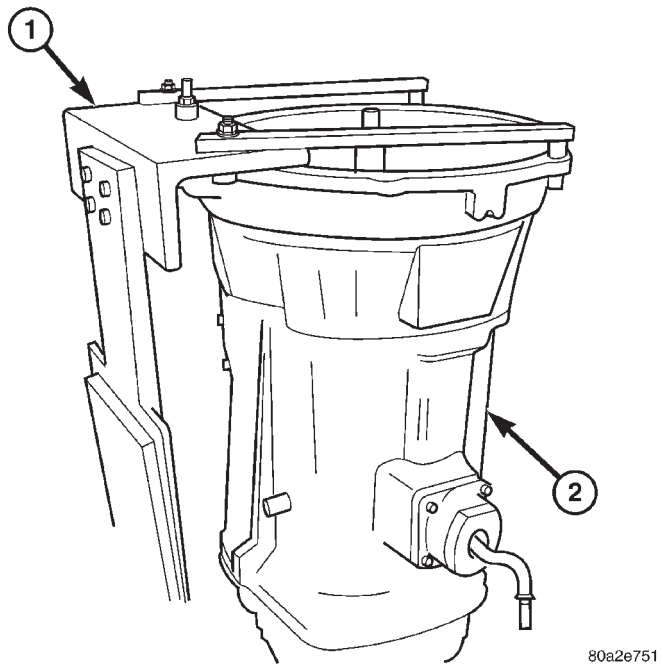


Fig. 5 TRANSMISSION BUILD FIXTURE

1 - FIXTURE
2 - TRANSMISSION

(3) Remove the shift tower (Fig. 6) and isolator plate (Fig. 7).

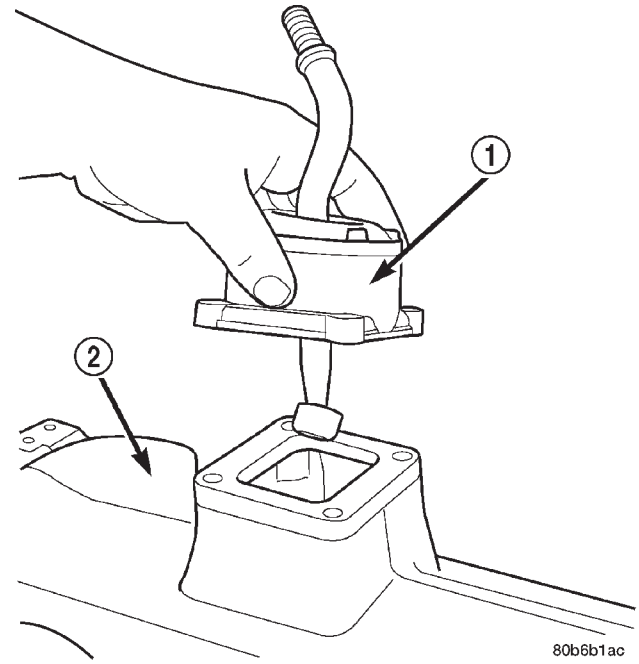


Fig. 6 Shift Tower

1 - SHIFT TOWER
2 - TRANSMISSION

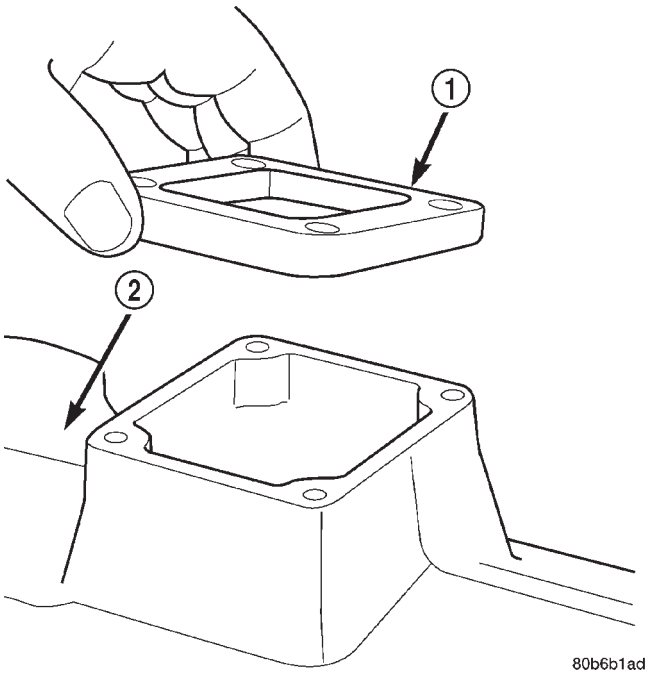


Fig. 7 Isolator Plate

1 - ISOLATOR PLATE
2 - TRANSMISSION

(4) Remove primary shift rail detent plug (Fig. 8).
(5) Remove primary shift rail detent spring (Fig. 9).
(6) Remove primary shift rail detent plunger (Fig. 10).

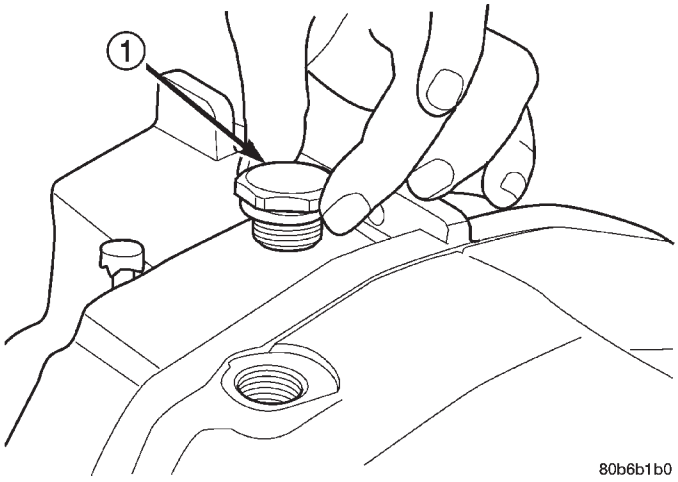


Fig. 8 PRIMARY SHIFT RAIL DETENT

1 - PRIMARY SHFT RAIL DETENT PLUG

MANUAL - NV5600 (Continued)

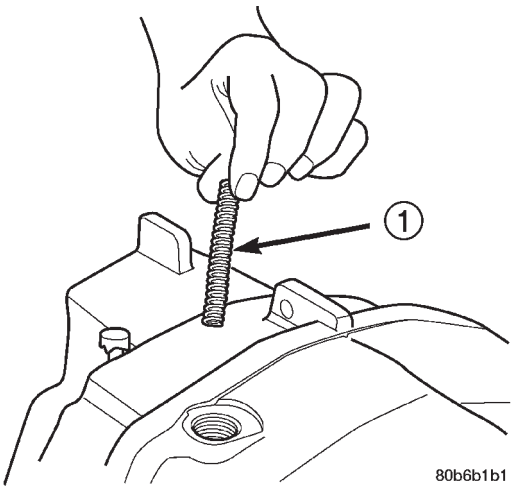


Fig. 9 PRIMARY SHIFT RAIL DETENT

1 - PRIMARY SHFT RAIL DETENT SPRING

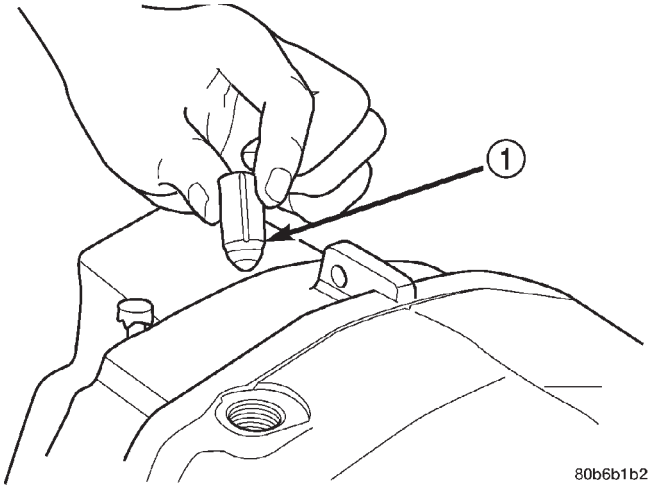


Fig. 10 PRIMARY SHIFT RAIL DETENT

1 - PRIMARY SHFT RAIL DETENT PLUNGER

(7) Remove clutch housing bolts (10) (Fig. 11) from inside the housing.

(8) Remove shift rail blocker bolt (Fig. 12) from the side of the transmission gear case.

EXTENSION/ADAPTER HOUSING

(1) Remove bolts holding the extension/adapter housing onto the transmission gear case.

(2) Remove extension/adapter housing from the transmission gear case with Puller 8244 (Fig. 13).

NOTE: It may be necessary to straighten the housing during removal due to the tendency for the reverse idler shaft to bind into one side of the housing.

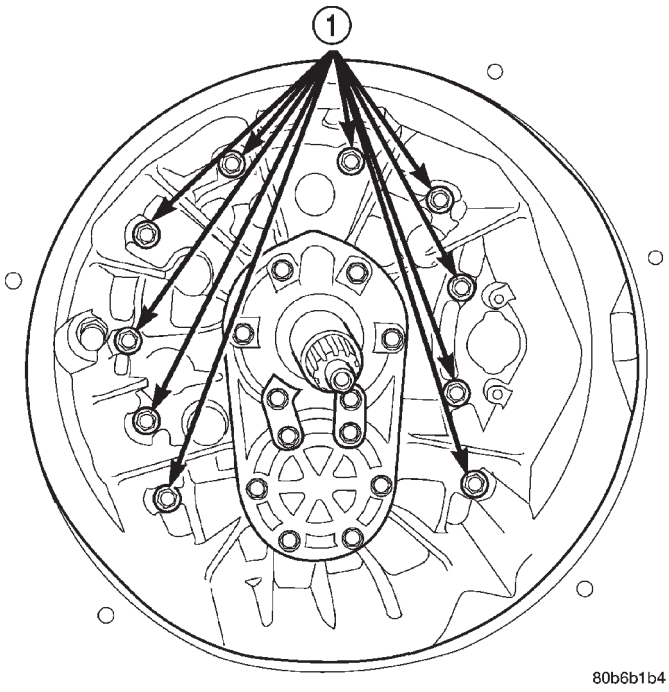


Fig. 11 CLUTCH HOUSING BOLTS

1 - BOLTS (10)

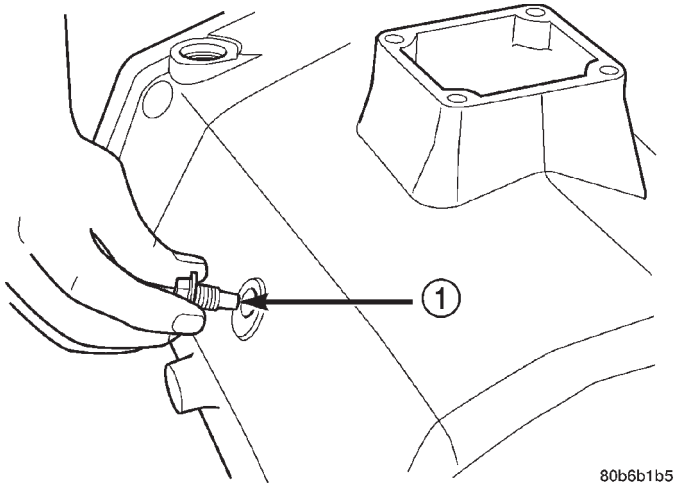


Fig. 12 SHIFT RAIL BLOCKER BOLT

1 - SHIFT RAIL BLOCKER BOLT

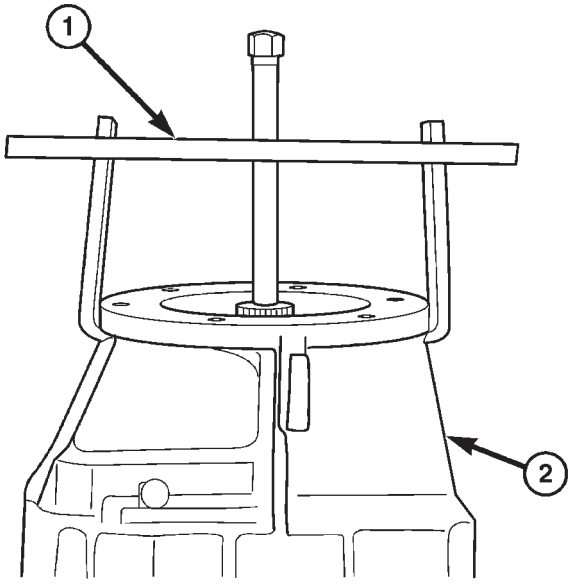


Fig. 13 Trans Case Puller

1 - PULLER
2 - EXTENSION/ADAPTER HOUSING

(3) Remove crossover detent plug, spring and plunger from the extension/adapter housing (Fig. 14).

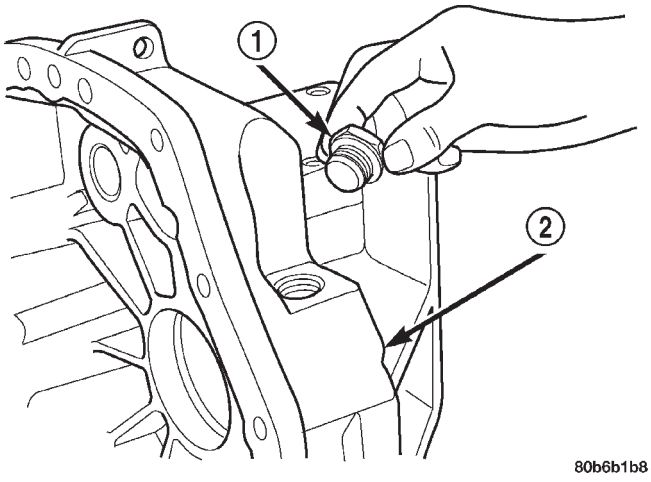


Fig. 14 Crossover Cam Detent Plug

1 - DETENT PLUG
2 - EXTENSION HOUSING

(4) Remove bolt and washer holding the crossover cam to the extension/adapter housing (Fig. 15).

(5) Remove crossover cam from the extension/adapter housing.

(6) Remove back-up lamp switch from the extension/adapter housing.

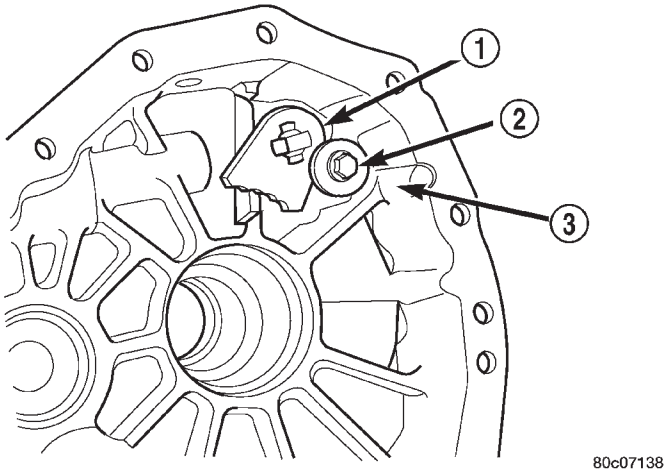


Fig. 15 Crossover Cam Bolt

1 - CROSSOVER CAM
2 - BOLT
3 - EXTENSION HOUSING

(7) Remove countershaft rear bearing race from the extension/adapter housing with Remover L-4518 (Fig. 16).

NOTE: Tag all countershaft pre-load shims from between the bearing race and the housing (Fig. 17).

(8) Remove crossover cam bushing from the extension/adapter housing with Remover 8240.

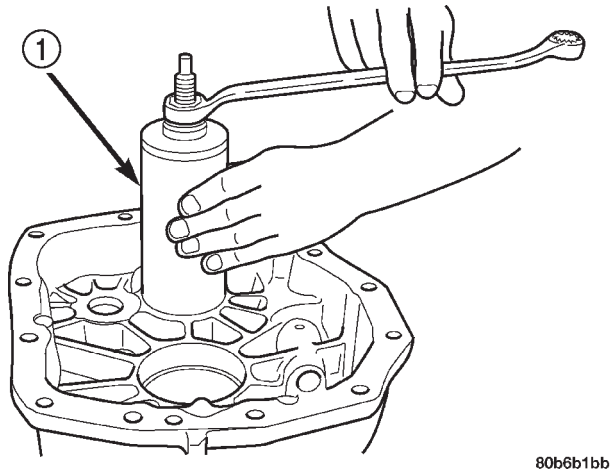


Fig. 16 Countershaft Rear Bearing Race

1 - REMOVER

(9) On 4X2 vehicles, remove extension housing seal with a pry tool or a slide hammer and screw.

(10) On 4X4 vehicles, remove adapter housing seal with a pry tool or a slide hammer and screw.

MANUAL - NV5600 (Continued)

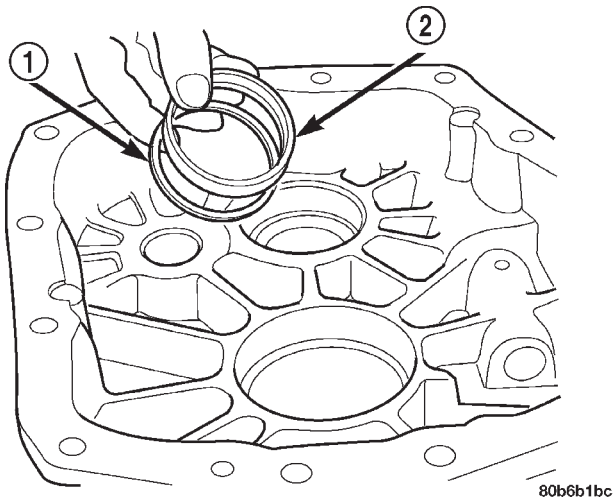


Fig. 17 Countershaft Rear Bearing Race and Shim

1 - PRE-LOAD SHIM
2 - BEARING RACE

REVERSE GEAR

(1) Remove crossover cam rollers and pin (Fig. 18).

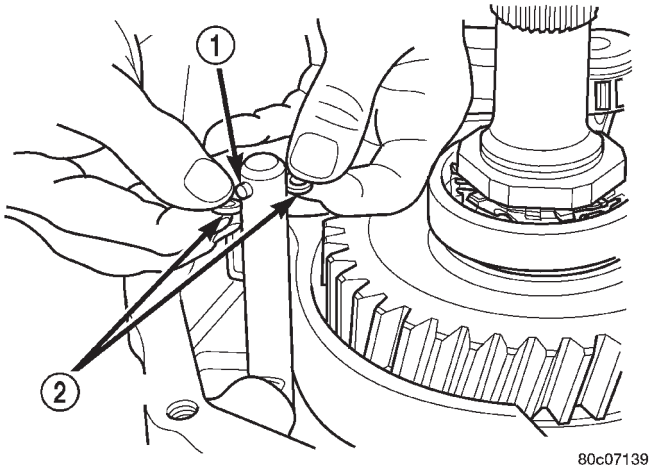


Fig. 18 CROSSOVER CAM ROLLERS

1 - CROSSOVER CAM PIN
2 - CROSSOVER CAM ROLLERS

(2) Remove reverse idler thrust washer from the reverse idler.

(3) Remove reverse idler and reverse countershaft gears together (Fig. 19).

(4) Remove reverse idler gear rear bearing, bearing spacer, front bearing and front thrust washer from the idler gear shaft.

(5) Remove reverse countershaft rear bearing from the countershaft reverse gear assembly with Puller C-293-PA and Adapters C-293-52 (Fig. 20).

(6) With a bearing splitter and shop press separate the countershaft reverse gear and sleeve (Fig. 21).

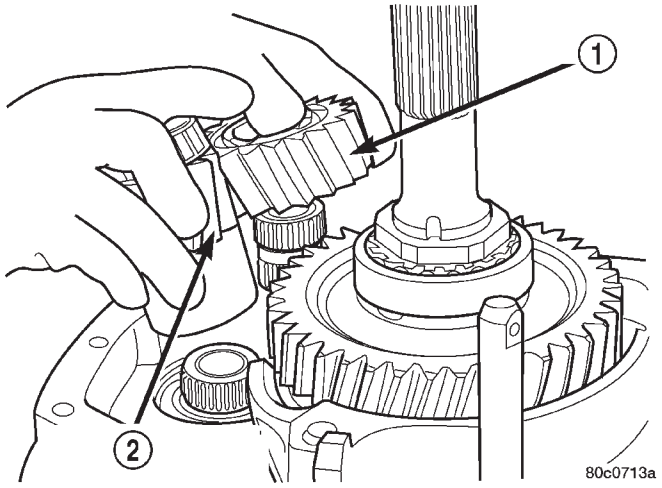


Fig. 19 REVERSE IDLER AND COUNTERSHAFT

1 - REVERSE IDLER GEAR
2 - COUNTERSHAFT REVERSE GEAR

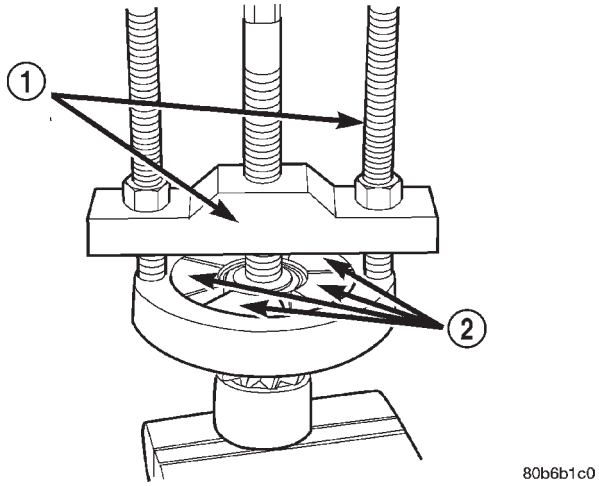


Fig. 20 COUNTERSHAFT REAR BEARING

1 - PULLER
2 - ADAPTERS

(7) Remove output shaft nut with Wrench 8226 on the shaft nut and Socket 6993 or 6984 to hold the shaft (Fig. 22). Discard output shaft nut from the output shaft.

NOTE: If necessary strike the flat side area of Wrench 8226 with a hammer to break the nut loose.

(8) Remove output shaft ball bearing assembly and reverse thrust washer from the output shaft (Fig. 23).

(9) Remove reverse gear, reverse gear synchronizer cone, reverse gear outer blocker ring and reverse gear bearing (Fig. 24).

(10) Remove reverse gear bearing sleeve from the output shaft (Fig. 25).

MANUAL - NV5600 (Continued)

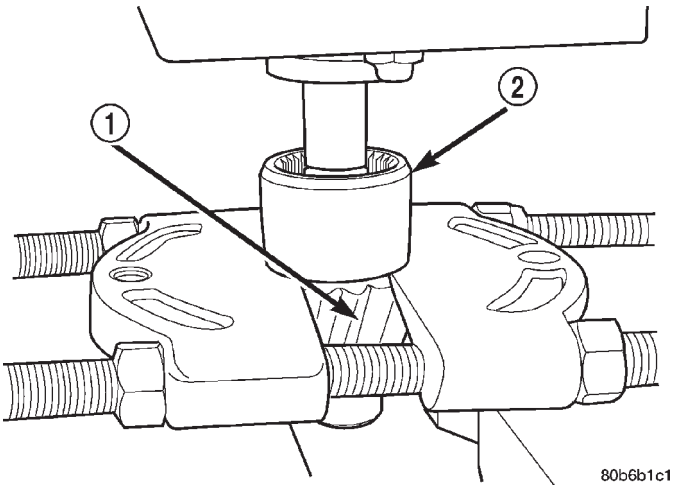


Fig. 21 Reverse Countershaft

1 - COUNTERSHAFT REVERSE GEAR
2 - SLEEVE

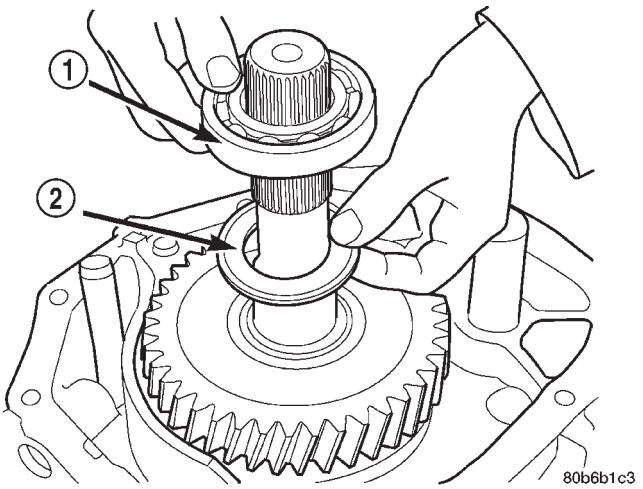


Fig. 23 OUTPUT SHAFT BEARING

1 - OUTPUT SHAFT BALL BEARING
2 - THRUST WASHER

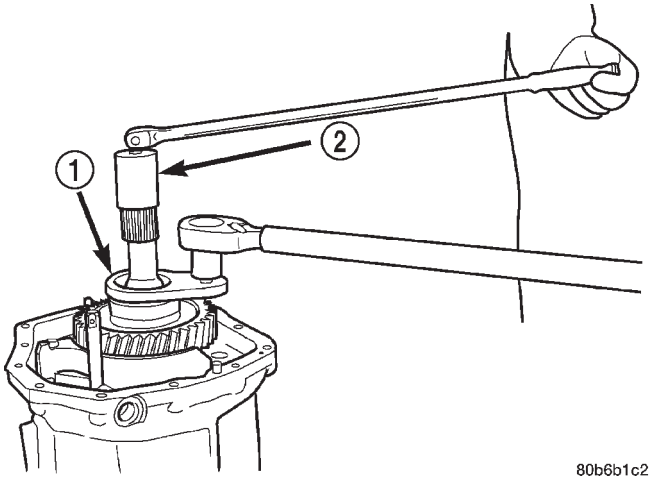


Fig. 22 Output Shaft Nut

1 - WRENCH
2 - SOCKET

NOTE: If necessary heat the sleeve slightly with a heat gun. Do not use a torch to heat the sleeve or damage to the output shaft may occur.

(11) Remove roll-pin securing the reverse shift fork to the reverse shift rail with a 6mm (7/32 inch) punch and hammer.

(12) Remove reverse shift fork and synchronizer as an assembly from the reverse shift rail and the output shaft (Fig. 26).

TRANSMISSION GEAR CASE

(1) Remove remaining bolts holding the transmission gear case to the clutch housing.

(2) Remove the shift socket roll pin with a 6mm (7/32 inch) punch and hammer.

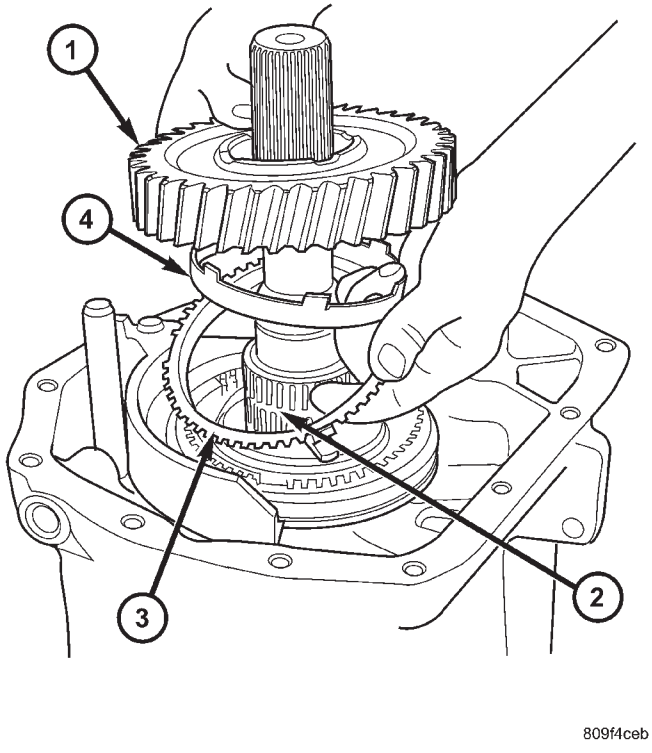


Fig. 24 REVERSE GEAR COMPONENTS

1 - REVERSE GEAR
2 - REVERSE BEARING
3 - BLOCKER RING
4 - FRICTION CONE

(3) Turn shift socket so it won't catch the case when lifting it up.

MANUAL - NV5600 (Continued)

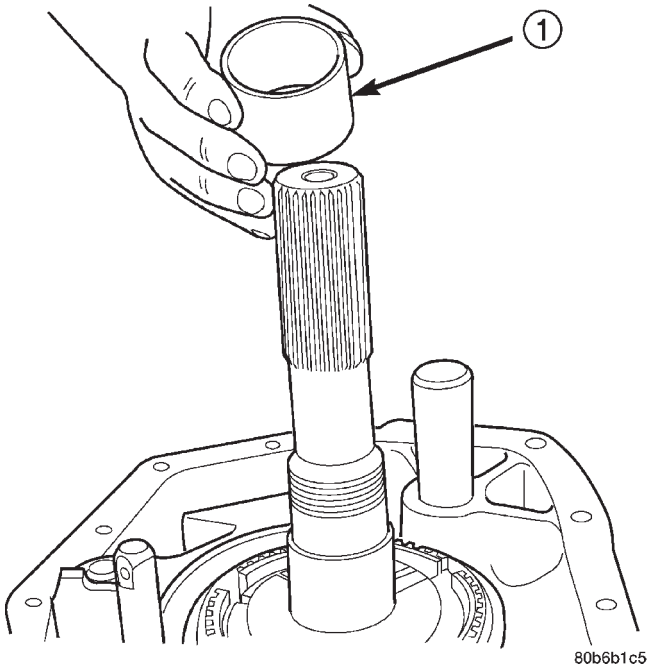


Fig. 25 REVERSE BEARING SLEEVE

1 - REVERSE GEAR BEARING SLEEVE

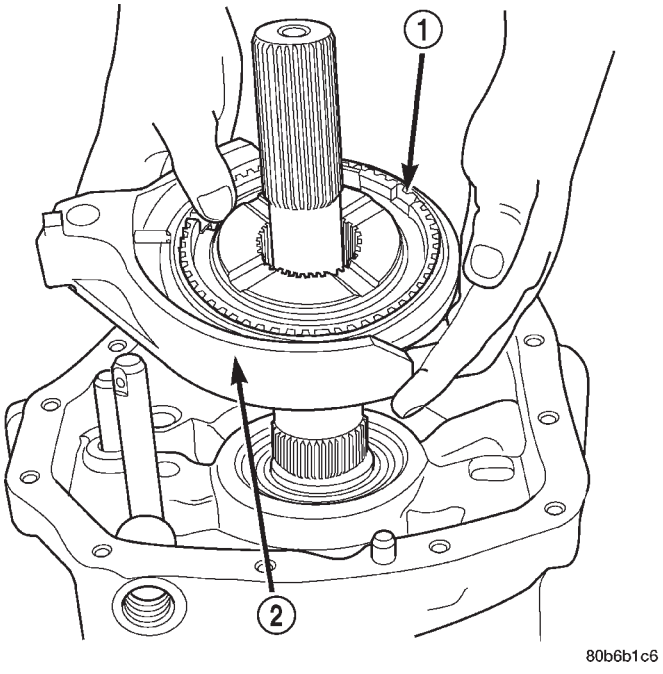


Fig. 26 REVERSE SHIFT FORK

1 - REVERSE SYNCHRO
2 - REVERSE SHIFT FORK

(4) Install Fixture 8232 to the transmission gear case.

(5) Attach an engine crane or equivalent to Fixture 8232 and remove the transmission gear case from the clutch housing (Fig. 27).

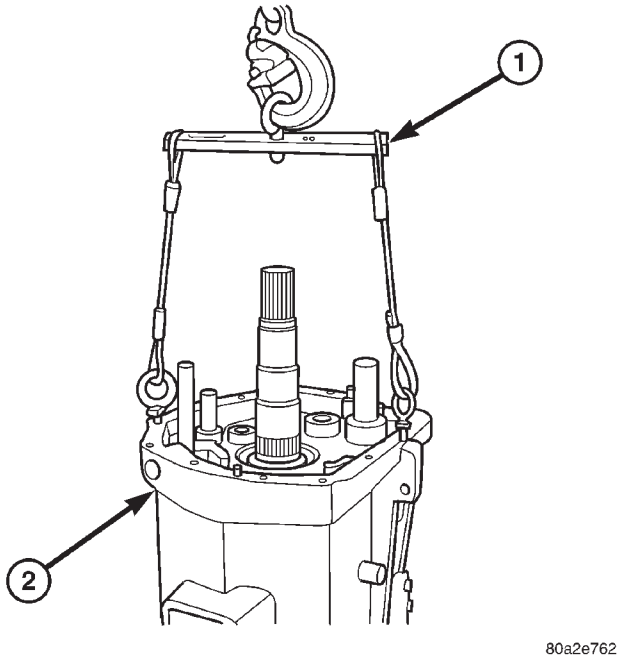


Fig. 27 TRANSMISSION LIFT

1 - FIXTURE
2 - TRANSMISSION CASE

(6) Remove rear output shaft and countershaft bearing races from the transmission gear case with a brass drift and hammer.

GEARTRAIN

(1) Remove bolts holding the 5-6 crossover bracket to the clutch housing (Fig. 28).

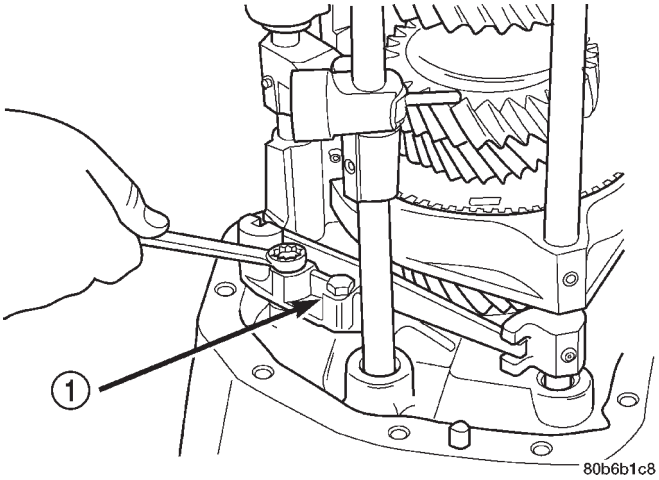


Fig. 28 5-6 CROSSOVER

1 - 5-6 CROSSOVER BRACKET

(2) Attach Fixture 8232 to the output shaft and countershaft (Fig. 29).

MANUAL - NV5600 (Continued)

(3) Attach an engine crane or equivalent to Fixture 8232 and raise the geartrain approximately 1/4 in. from the clutch housing.

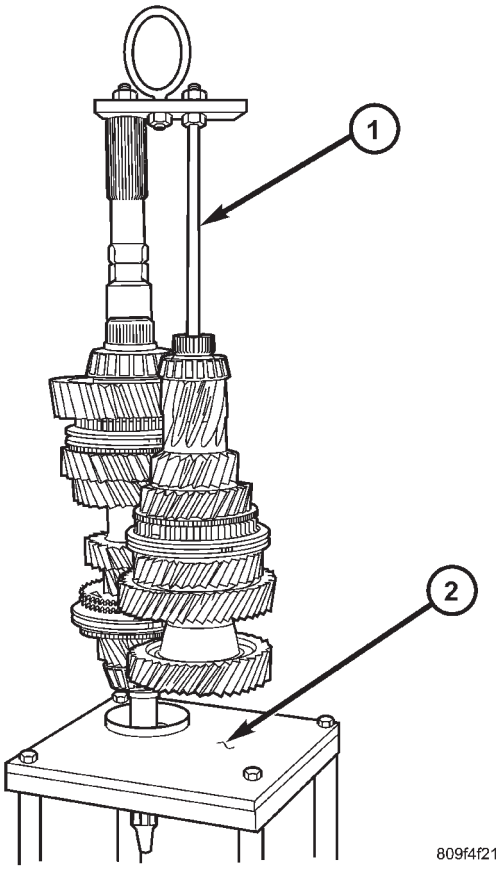


Fig. 29 ATTACH FIXTURE

1 - FIXTURE

(4) Remove 5-6 crossover bracket from the clutch housing.

(5) Lower the geartrain back into the clutch housing.

(6) Install Holding Tool 8242 (Fig. 30) onto the 5-6 synchro and tighten the screw to hold the 5-6 synchro together during the removal operation.

NOTE: Note the order of the shift fork arms at the primary shift rail, while in the Neutral position.

(7) Raise geartrain and shift rails until all the shift rails clear the clutch housing.

(8) Remove shift rails from the rest of the geartrain (Fig. 31).

(9) Raise the geartrain until the input shaft is clear of the clutch housing.

(10) Remove geartrain from the clutch housing and install the geartrain into Support Stand 8246 (Fig. 32).

(11) Remove Fixture 8232 from the output shaft and the countershaft.

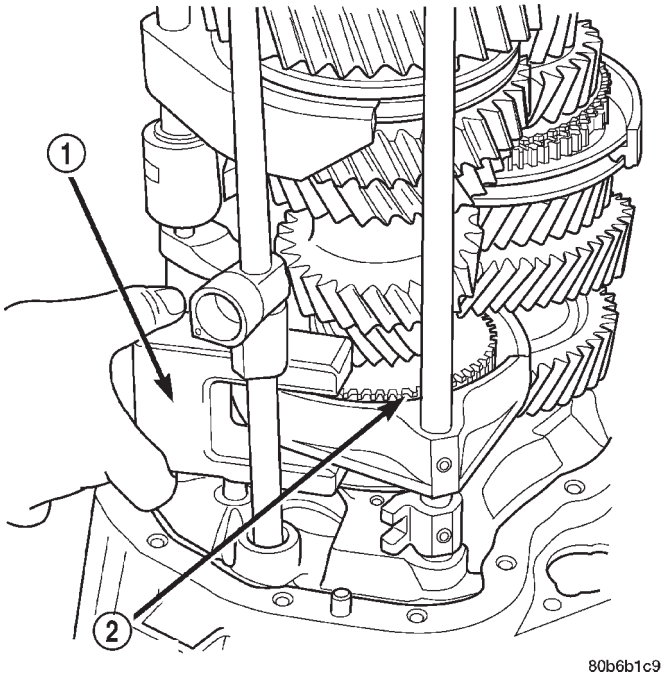


Fig. 30 HOLDING TOOL

1 - HOLDING TOOL
2 - 5-6 SYNCHRO

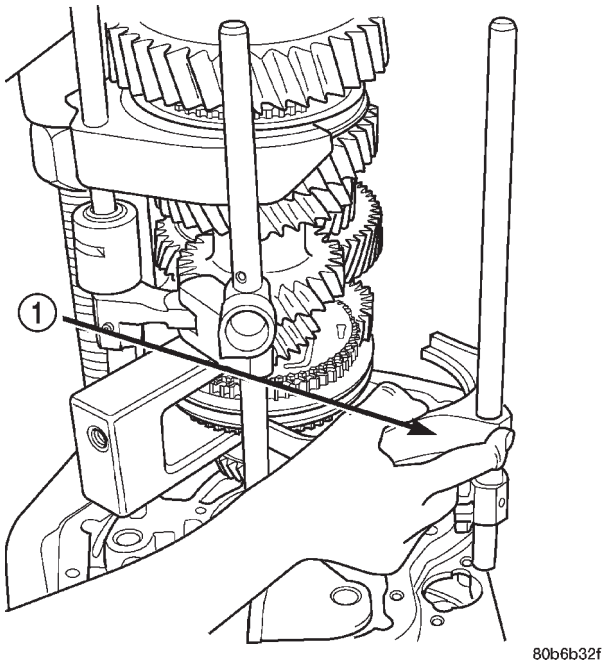


Fig. 31 SHIFT RAILS

1 - 5-6 SHIFT RAIL

(12) Separate the countershaft from the output shaft.

MANUAL - NV5600 (Continued)

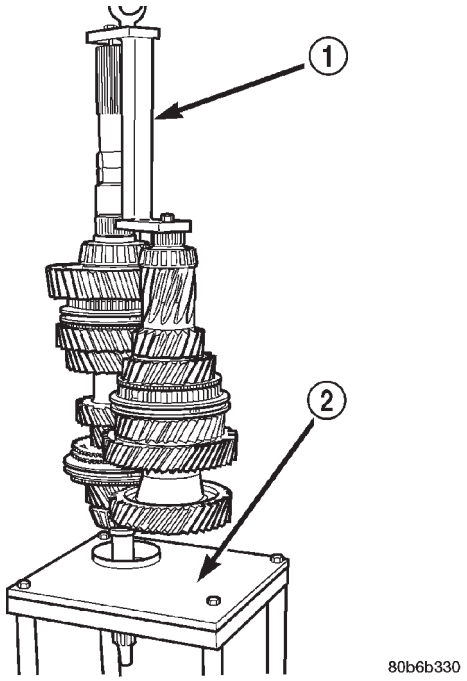


Fig. 32 LIFT GEARTRAIN WITH ENGINE CRANE

1 - FIXTURE
2 - SUPPORT STAND

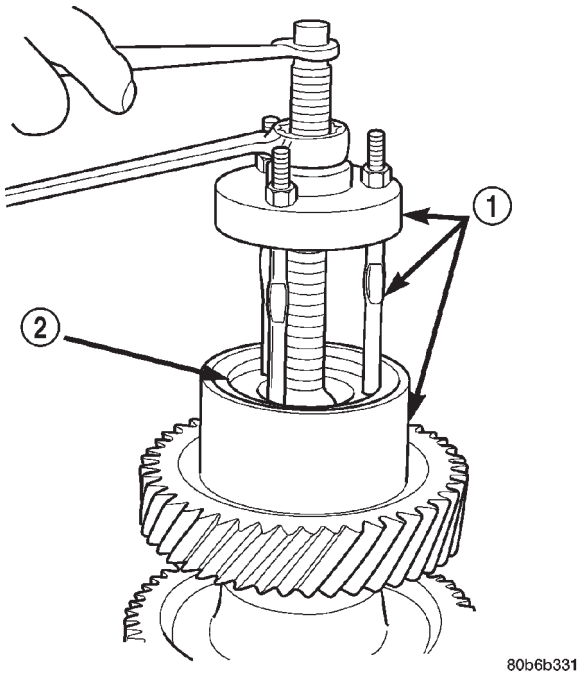


Fig. 33 FRONT COUNTERSHAFT BEARING

1 - PULLER
2 - ADAPTERS

(13) Separate the output shaft from the input shaft. Hold the 5-6 synchro together while removing the output shaft to prevent the synchro sleeve from being dislodged from the synchro hub.

COUNTERSHAFT BEARINGS

(1) Remove snap-ring holding the front countershaft bearing onto the countershaft.

(2) Remove front countershaft bearing with Sleeve 6444-8, Adapters 6451, Puller Rods 6444-4 and Puller 6444 (Fig. 33).

(3) Remove rear countershaft bearing with Sleeve 6444-8, Adapters 6447, Puller Rods 6444-4, Puller 6444 and suitable press button (Fig. 34).

OUTPUT SHAFT BEARINGS

(1) Remove snap-ring holding the pocket bearing onto the output shaft.

(2) Remove pocket bearing from the output shaft with Sleeve 6444-8, Adapters 8234, Puller Rods 6444-4 and the remainder of Puller 6444 (Fig. 35).

(3) Remove snap-ring holding the rear output shaft bearing onto the output shaft.

(4) Use Sleeve 6444-8, Adapters 8271 and Puller Rods 6444-3 for 4X2 vehicles or Puller Rods 6444-4 for 4X4 vehicles with the remainder of Puller 6444 to remove the rear output shaft bearing from the output shaft.

(5) Remove rear output shaft thrust washer from the output shaft.

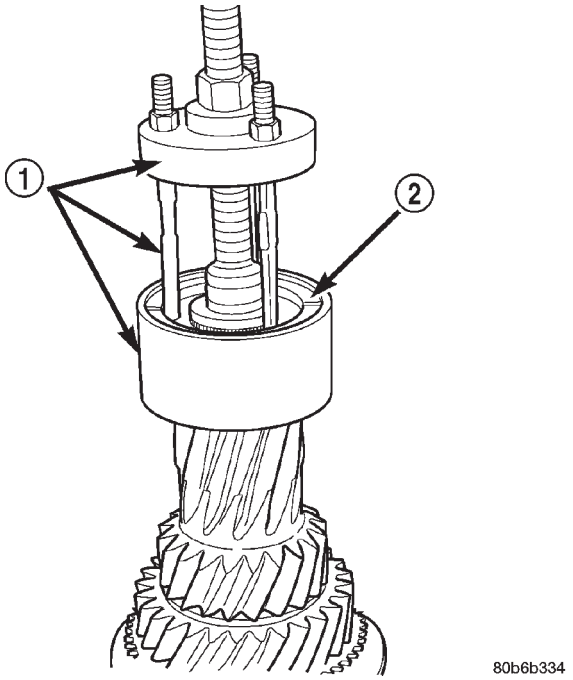


Fig. 34 REAR COUNTERSHAFT BEARING

1 - PULLER
2 - ADAPTERS

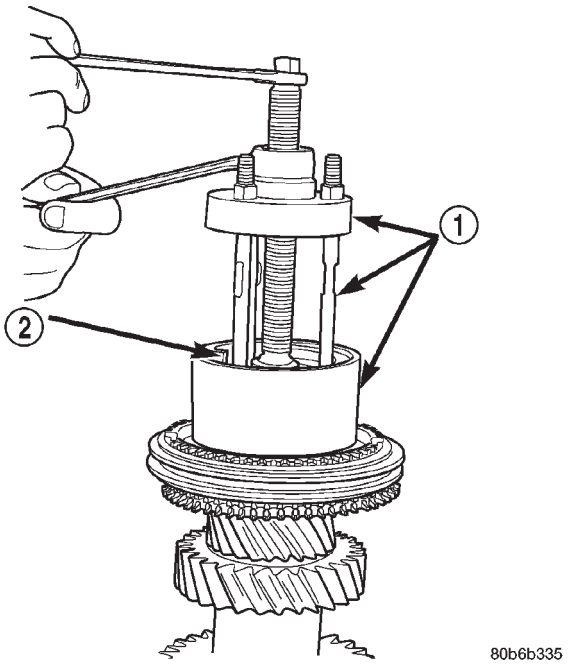


Fig. 35 OUTPUT SHAFT POCKET BEARING

1 - PULLER
2 - ADAPTERS

INPUT SHAFT

(1) Remove fifth gear blocker ring from the input shaft (Fig. 36).

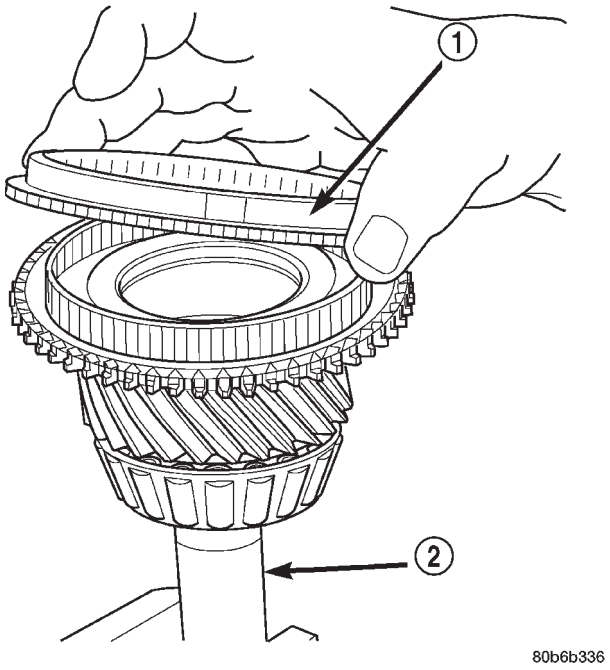


Fig. 36 FIFTH GEAR BLOCKER RING

1 - FIFTH GEAR BLOCKER RING
2 - INPUT SHAFT

(2) Remove fifth gear friction cone from the input shaft (Fig. 37).

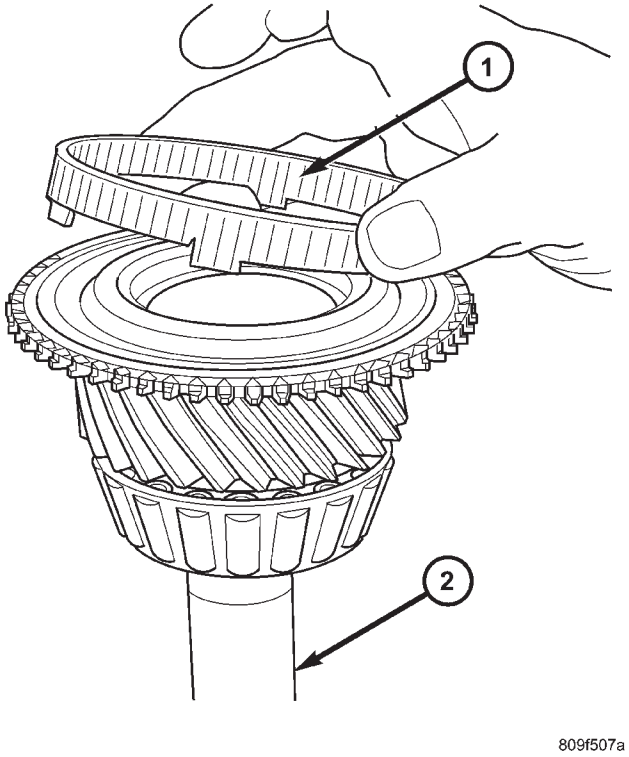


Fig. 37 FIFTH GEAR FRICTION CONE

1 - FIFTH GEAR FRICTION CONE
2 - INPUT SHAFT

(3) Remove output shaft pocket bearing race from the input shaft with Puller L-4518 (Fig. 38).

(4) Remove input shaft bearing and oil guide from the input shaft with Sleeve 6444-8, Adapters 8243, Puller Rods 6444-6 and the remainder of Puller 6444 (Fig. 39).

OUTPUT SHAFT

NOTE: Some gear and synchro components can be installed backwards. Mark the gears, clutch gears, synchro hubs, and sleeves for installation reference during teardown. Use paint or a scriber for marking purposes. Then stack the geartrain parts in order of removal.

MANUAL - NV5600 (Continued)

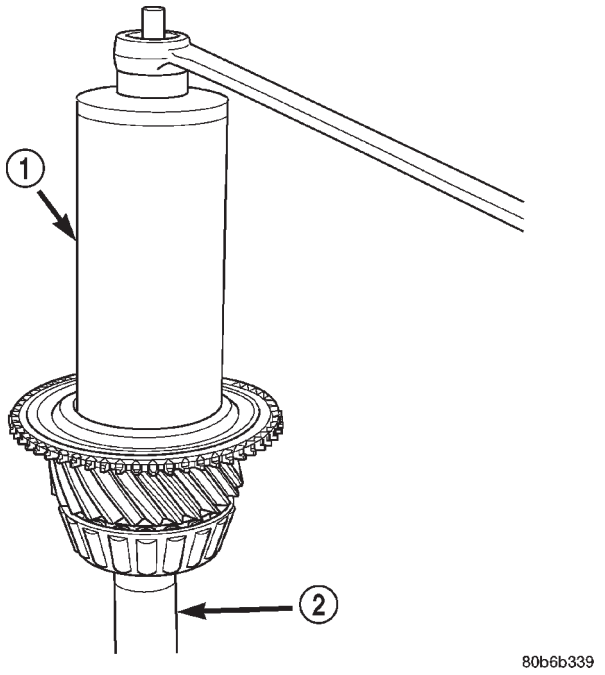


Fig. 38 OUTPUT SHAFT POCKET BEARING

1 - PULLER
2 - INPUT SHAFT

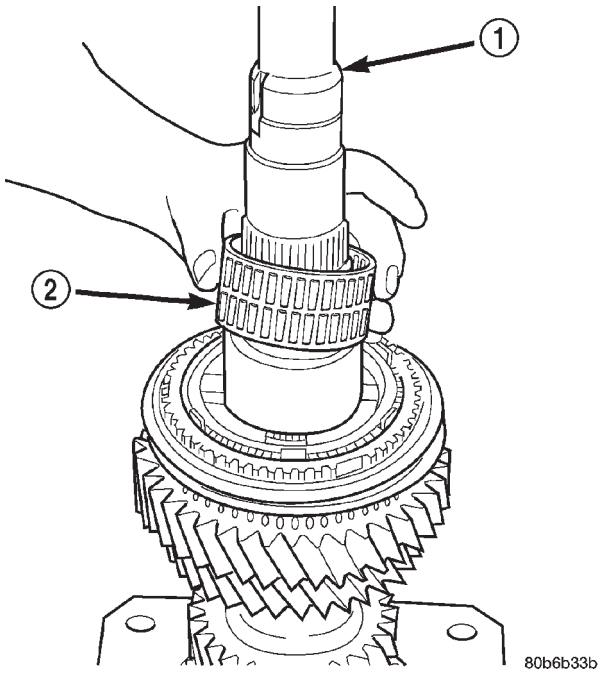


Fig. 40 FIRST GEAR BEARING

1 - OUTPUT SHAFT
2 - FIRST GEAR BEARING

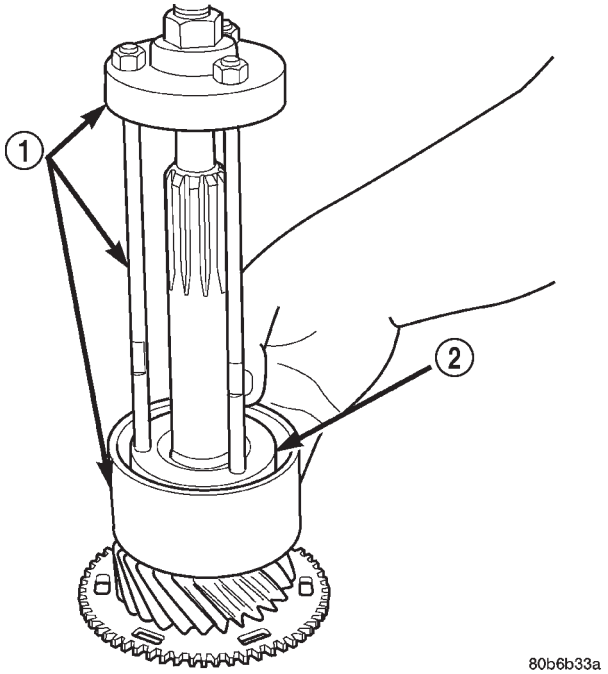


Fig. 39 INPUT SHAFT BEARING

1 - PULLER
2 - ADAPTERS

(1) Remove first gear from the output shaft.
(2) Remove first gear bearing from the output shaft (Fig. 40).

(3) Remove first gear blocker rings (2) and cones from the 1-2 synchro assembly (Fig. 41).

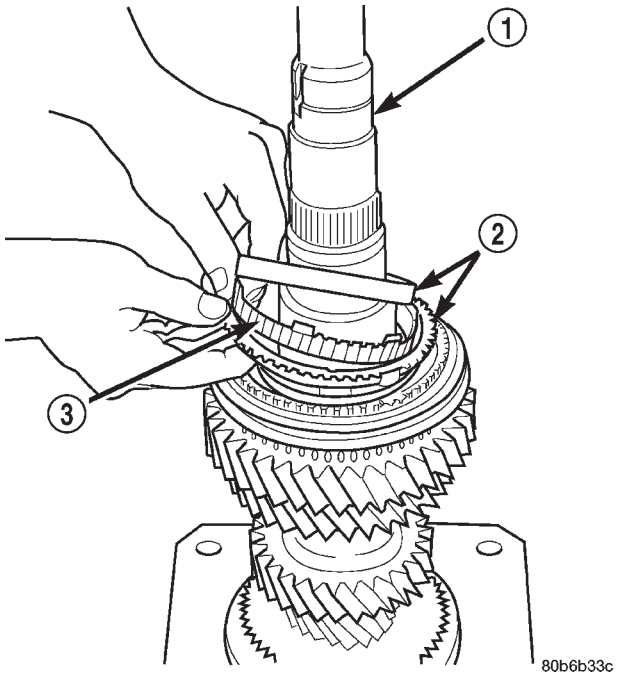


Fig. 41 FIRST GEAR BLOCKER RINGS

1 - OUTPUT SHAFT
2 - FIRST GEAR BLOCKER RINGS
3 - FIRST GEAR FRICTION CONE

MANUAL - NV5600 (Continued)

(4) Install the remainder of the output shaft into Fixture 8227 with press blocks under second gear.

(5) Install shaft and Fixture assembly into a shop press (Fig. 42).

(6) Press second gear, 1-2 synchro assembly and first gear bearing sleeve from the output shaft.

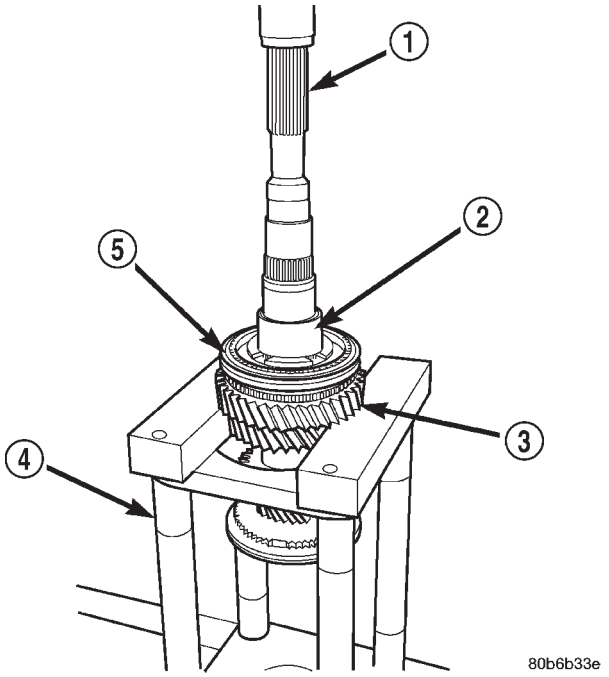


Fig. 42 SECOND GEAR 1-2 SYNCRO

1 - OUTPUT SHAFT
2 - FIRST GEAR BEARING SLEEVE
3 - SECOND GEAR
4 - FIXTURE
5 - 1-2 SYNCHRO

(7) Remove second gear bearing from the output shaft.

(8) Reverse output shaft in the Fixture 8227 with press blocks positioned under the 5-6 synchro assembly.

(9) Press the 5-6 synchro assembly from the output shaft.

(10) Remove sixth gear and the sixth gear bearing from the output shaft (Fig. 43).

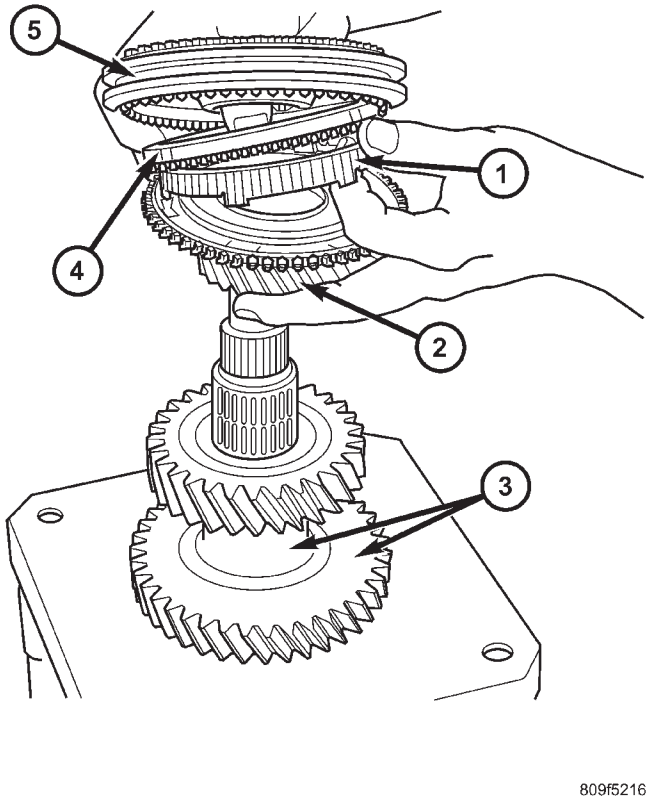


Fig. 43 SIXTH GEAR COMPONENTS

1 - SIXTH GEAR FRICTION CONE
2 - SIXTH GEAR
3 - OUTPUT SHAFT
4 - SIXTH GEAR BLOCKER RING
5 - 5-6 SYNCHRO

COUNTERSHAFT

(1) Install the countershaft into Fixture 8227 with press blocks located under the fifth countershaft gear.

(2) Place the assembly into a shop press.

(3) Use Guide 8235 on end of countershaft and press the countershaft fifth gear from the countershaft (Fig. 44).

(4) Place countershaft in Fixture 8227 with press blocks placed under the sixth countershaft gear.

(5) Use Guide 8235 on end of countershaft and press the countershaft sixth gear from the countershaft (Fig. 45).

MANUAL - NV5600 (Continued)

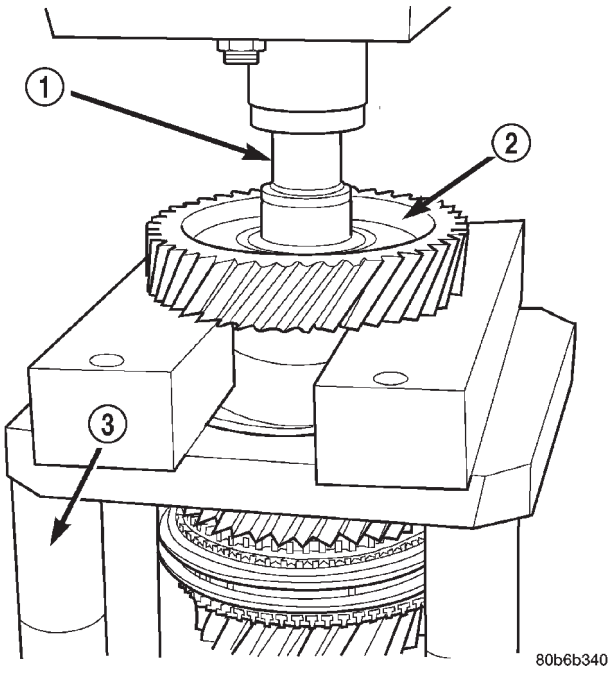


Fig. 44 FIFTH COUNTERSHAFT GEAR

1 - GUIDE
2 - FIFTH COUNTER SHAFT GEAR
3 - FIXTURE

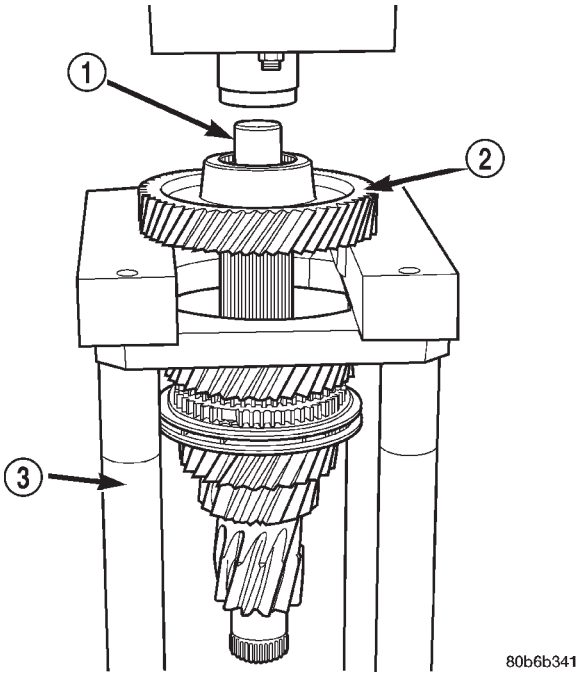


Fig. 45 SIXTH COUNTERSHAFT GEAR

1 - GUIDE
2 - SIXTH COUNTER SHAFT GEAR
3 - FIXTURE

(6) Remove countershaft from the press and Fixture 8227.

(7) Remove fourth countershaft gear, friction cone, blocker ring and bearing from the countershaft (Fig. 46).

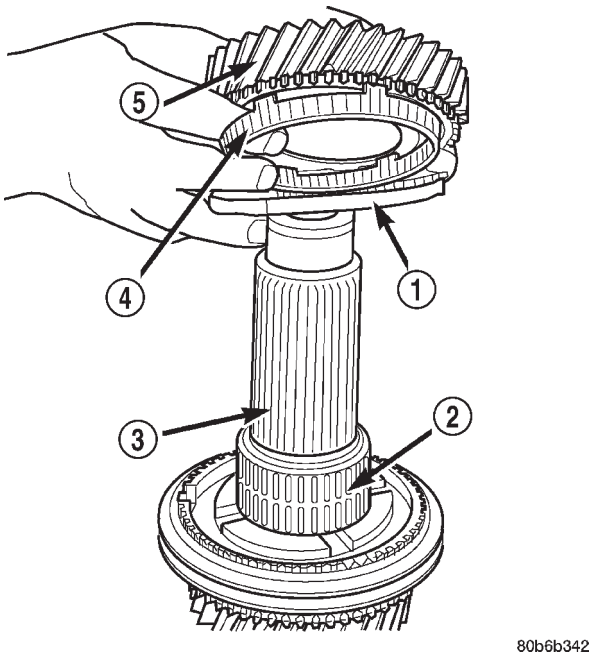


Fig. 46 FOURTH COUNTERSHAFT GEAR

1 - FOURTH GEAR BLOCKER RING
2 - FOURTH GEAR BEARING
3 - COUNTERSHAFT
4 - FOURTH GEAR FRICTION CONE
5 - FOURTH COUNTERSHAFT GEAR

(8) Install countershaft into Fixture 8227 with press blocks located under the third countershaft gear.

(9) Place assembly into a shop press and press third countershaft gear, 3-4 synchro and fourth countershaft gear bearing sleeve from the countershaft (Fig. 47).

(10) Remove countershaft from the press and Fixture 8227.

(11) Remove third countershaft gear bearing from the countershaft (Fig. 48).

(12) The 2-3 thrust washer should not normally need to be removed from the countershaft. If necessary slide 2-3 thrust washer off countershaft.

CLUTCH HOUSING

(1) Remove input shaft retainer bolts from the clutch housing and remove retainer (Fig. 49).

(2) Remove countershaft oil guide from the countershaft front bearing bore in the clutch housing (Fig. 50).

(3) Remove countershaft front bearing race, endplay shims and spacer from the clutch housing with Remover 6061-1 and Handle C-4171 (Fig. 51).

MANUAL - NV5600 (Continued)

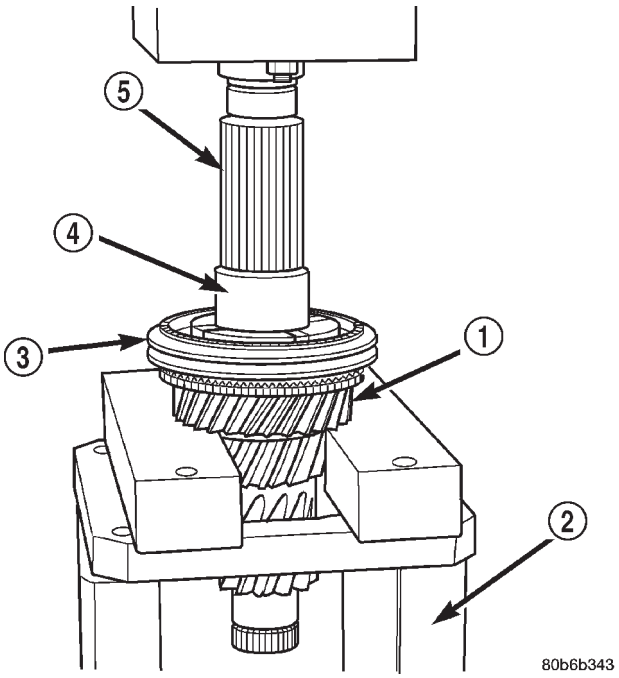


Fig. 47 THIRD COUNTERSHAFT GEAR

1 - THIRD COUNTERSHAFT GEAR
2 - FIXTURE
3 - 3-4 SYNCHRO
4 - BEARING SLEEVE
5 - COUNTERSHAFT

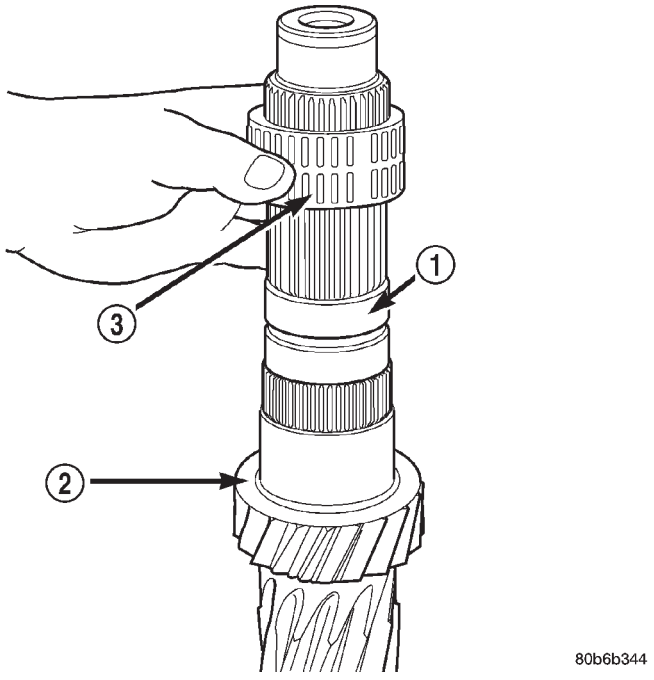


Fig. 48 THIRD GEAR BEARING

1 - COUNTERSHAFT
2 - 2-3 THRUST WASHER
3 - THIRD COUNTERSHAFT GEAR BEARING

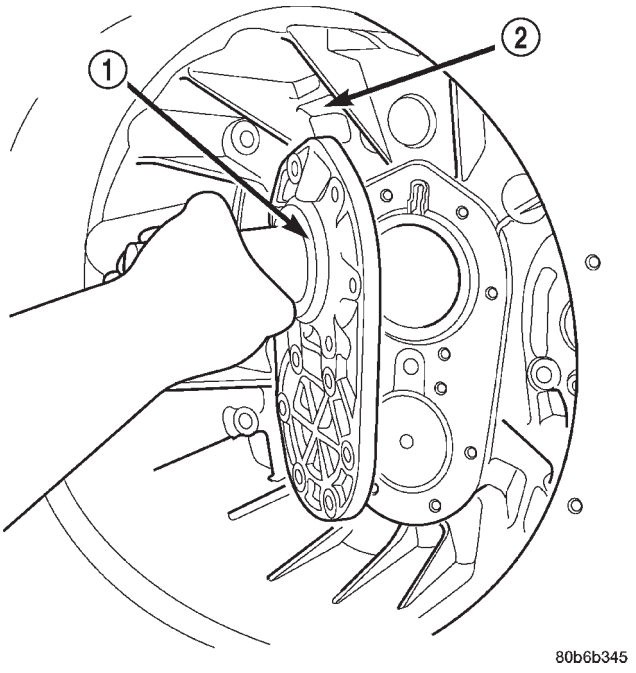


Fig. 49 INPUT SHAFT RETAINER

1 - INPUT SHAFT RETAINER
2 - CLUTCH HOUSING

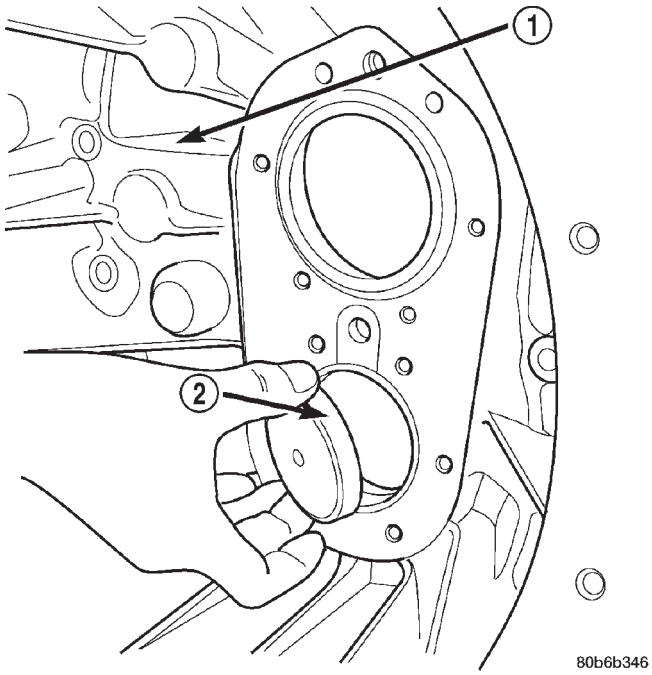


Fig. 50 COUNTERSHAFT OIL GUIDE

1 - CLUTCH HOUSING
2 - COUNTERSHAFT OIL GUIDE

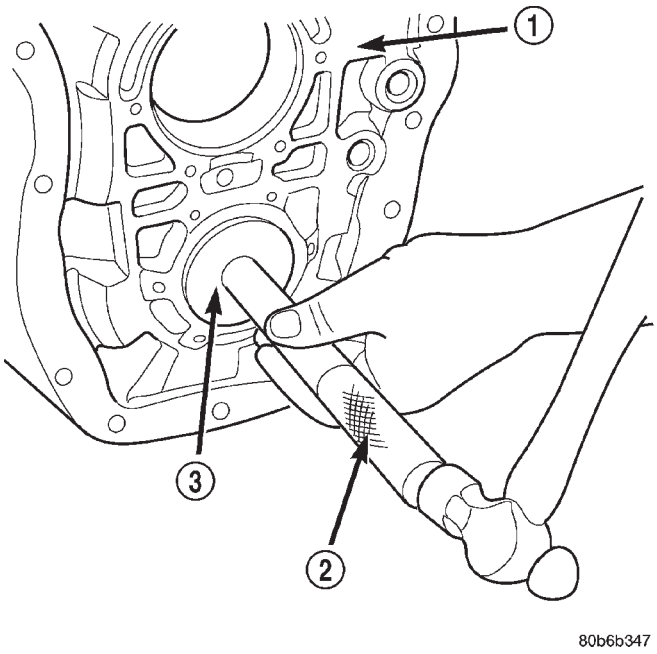


Fig. 51 FRONT COUNTERSHAFT BEARING

1 - CLUTCH HOUSING
2 - HANDLE
3 - REMOVER

(4) Remove input shaft bearing race with Remover/ Installer 8237 and Handle C-4171.

(5) Remove input shaft oil guide and retainer seal (Fig. 52).

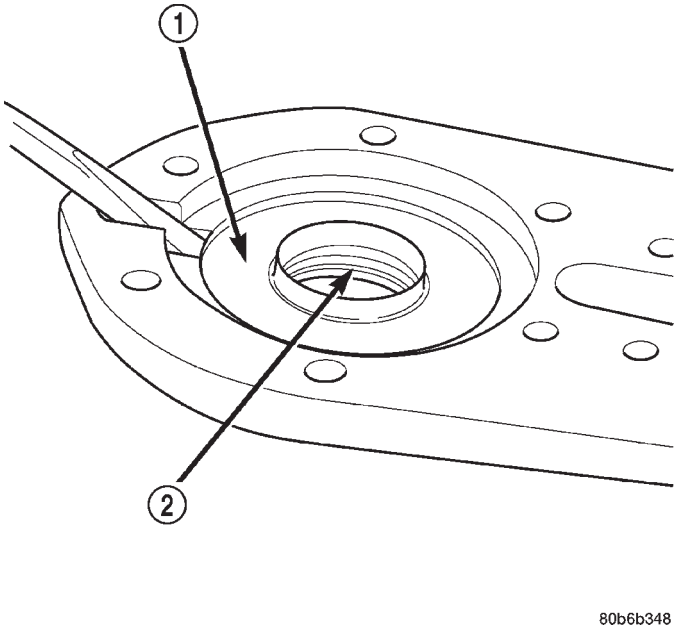


Fig. 52 OIL GUIDE AND SEAL

1 - INPUT SHAFT OIL GUIDE
2 - INPUT SHAFT OIL SEAL

CLEANING

Clean the gears, bearings shafts, extension/adapter 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.

INSPECTION

NOTE: Minor corrosion, nicks, or pitting can be smoothed with 400 grit emery and polished out with crocus cloth.

Inspect the reverse idler gear, bearings, shaft and thrust washers. Replace the bearings if the rollers are worn, chipped, cracked, flat-spotted or brinnelled. Replace the gear if the teeth are chipped, cracked or worn thin.

Inspect the front bearing retainer and bearing cup. Replace the bearing cup if scored, cracked, brinnelled or rough. Check the release bearing slide surface of the retainer carefully. Replace the retainer if worn or damaged in any way.

Inspect mainshaft bearing surfaces, splines, snap ring grooves and threads. Replace the shaft if any surfaces exhibit considerable wear or damage.

Inspect the countershaft and bearings. Replace the shaft if any surfaces exhibit considerable wear or damage.

Inspect shift forks for 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 oversize or damaged. Do not attempt to salvage a worn fork. Replace shift fork roll pins if necessary or if doubt exists about their condition.

The all bearings for wear, roughness, flat spots, pitting or other damage. Replace the bearings if necessary.

Inspect the blocker rings and fiction cones. replace either part if worn or damaged in any way. Replace if the friction material is burned, flaking off or worn.

Inspect synchro components wear or damage. Replace parts if worn, cracked or distorted.

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.

Inspect the case and housing/adapter sealing and mating surfaces are free of burrs and nicks. Inspcet the alignment dowels in the case top surface and in the housing/adapter are tight and in good condition. Replace the gear case or housing/adapter if cracked or broken.

MANUAL - NV5600 (Continued)

ASSEMBLY

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

OUTPUT SHAFT

(1) Place second gear on bench with the synchro clutch ring up.

(2) Install second gear synchro inner blocker ring onto second gear (Fig. 53).

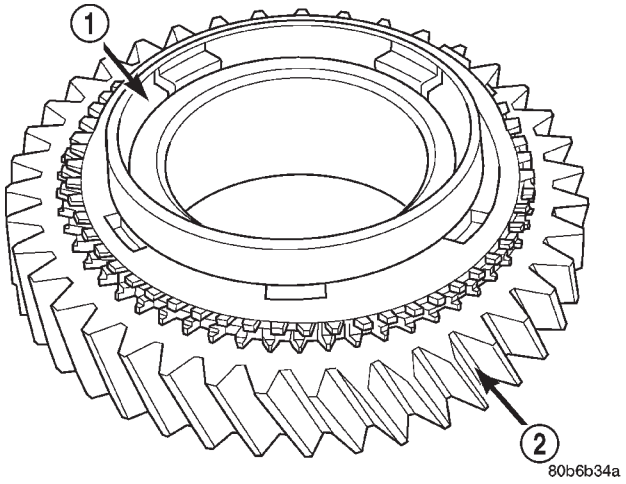


Fig. 53 INNER BLOCKER RING

1 - INNER BLOCKER RING
2 - GEAR

(3) Install second gear synchro friction cone over the blocker ring and onto second gear (Fig. 54).

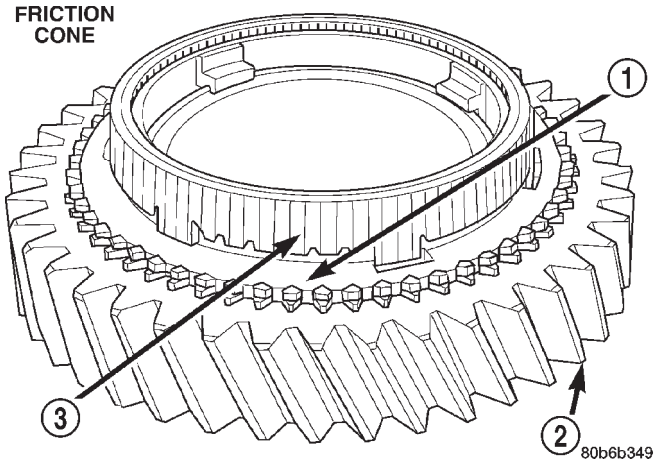


Fig. 54 FRICTION CONE

1 - LOW AREA
2 - GEAR
3 - HIGH AREA

(4) Install second gear synchro outer blocker ring over the second gear synchro friction cone. Align one of the lugs on the outer ring with a lug on the inner ring (Fig. 55).

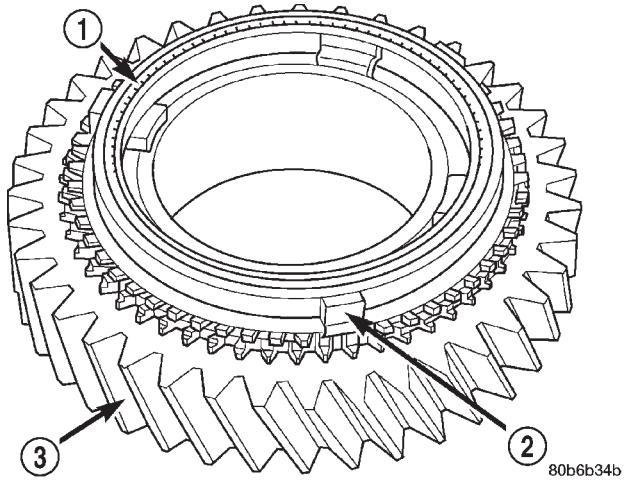


Fig. 55 OUTER BLOCKER RING

1 - OUTER BLOCKER RING
2 - LUG
3 - GEAR

(5) Install 1-2 synchro assembly onto the second gear assembly (Fig. 56).

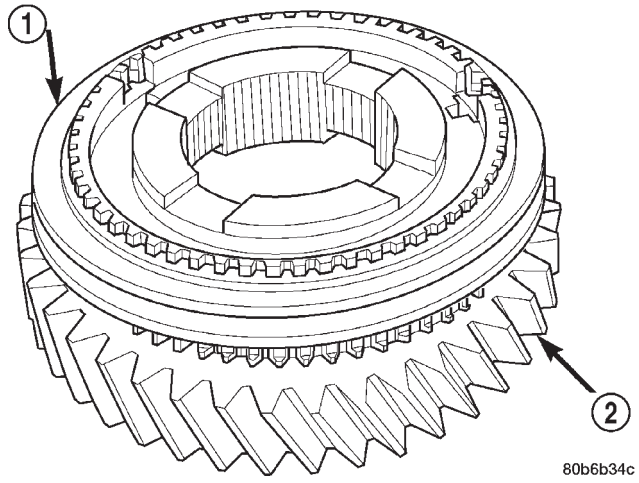


Fig. 56 3-4 SYNCHRO ASSEMBLY

1 - SYNCHRO
2 - GEAR

MANUAL - NV5600 (Continued)

(6) Reverse assembly on the bench.

(7) Lubricate and install second gear bearing into second gear (Fig. 57).

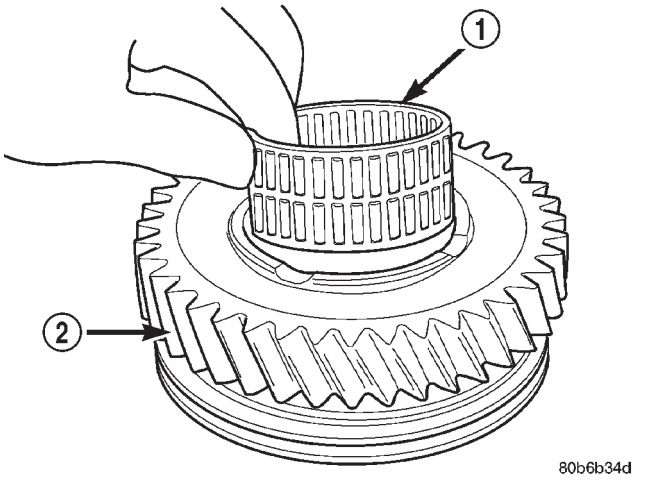


Fig. 57 SECOND GEAR BEARING

1 - BEARING
2 - GEAR

(8) Place 1-2 synchro, second gear and second gear bearing assembly on shop press with second gear facing upward.

(9) Install output shaft into the second gear 1-2 synchro assembly with the front of the output shaft facing upward (Fig. 58).

(10) Press the output shaft into position.

(11) Place first gear on bench with the synchro clutch ring up.

(12) Install first gear synchro inner blocker ring onto first gear (Fig. 53).

(13) Install first gear synchro friction cone over the blocker ring and onto first gear (Fig. 54).

(14) Install first gear synchro outer blocker ring over the first gear synchro friction cone. Align one of the lugs on the outer ring with a lug on the inner ring (Fig. 55).

(15) Reverse the output shaft in the press.

(16) Install first gear bearing sleeve onto the output shaft.

(17) Install first gear bearing sleeve the remainder of the way onto the output shaft using Installer 8228 and a shop press (Fig. 59).

(18) Install first gear and blocker assembly onto the output shaft (Fig. 60).

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

(20) Install output shaft thrust washer onto the output shaft (Fig. 61).

(21) Install rear output shaft bearing onto the output shaft with Installer 8228 and a shop press (Fig. 62).

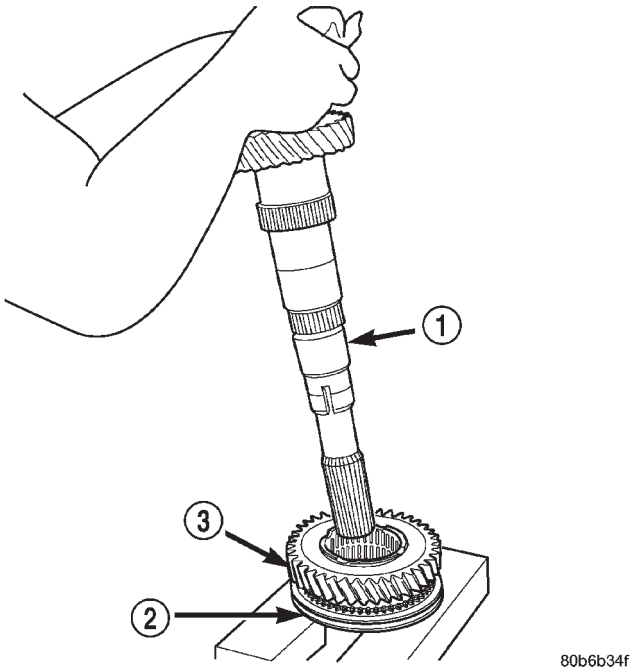


Fig. 58 OUTPUT SHAFT INTO 1-2 SYNCHRO

1 - OUTPUT SHAFT
2 - 1-2 SYNCHRO
3 - SECOND GEAR

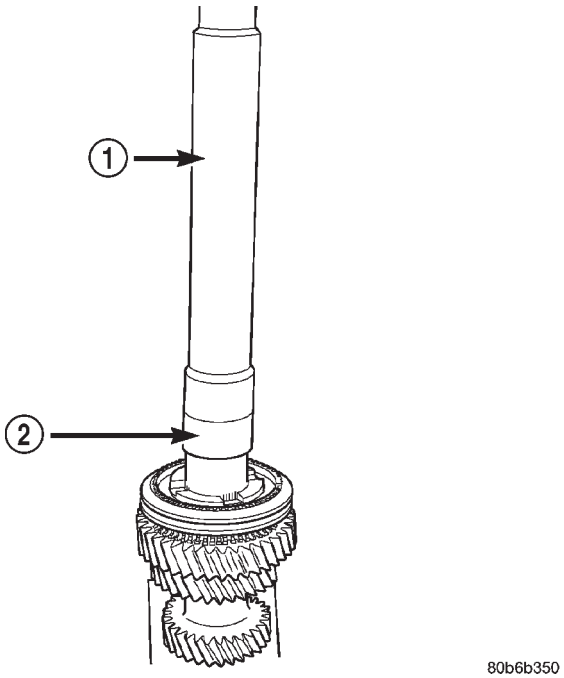


Fig. 59 FIRST GEAR BEARING SLEEVE

1 - INSTALLER
2 - FIRST GEAR BEARING SLEEVE

(22) Install a **new** snap-ring to hold the rear output bearing onto the output shaft. Install the thickest snap-ring which will fit into the groove.

MANUAL - NV5600 (Continued)

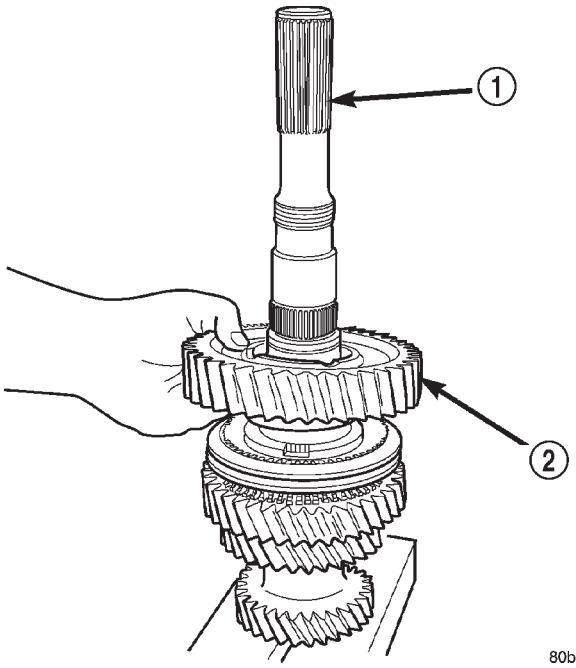


Fig. 60 FIRST GEAR AND BLOCKER ASSEMBLY

1 - OUTPUT SHAFT
2 - FIRST GEAR ASSEMBLY

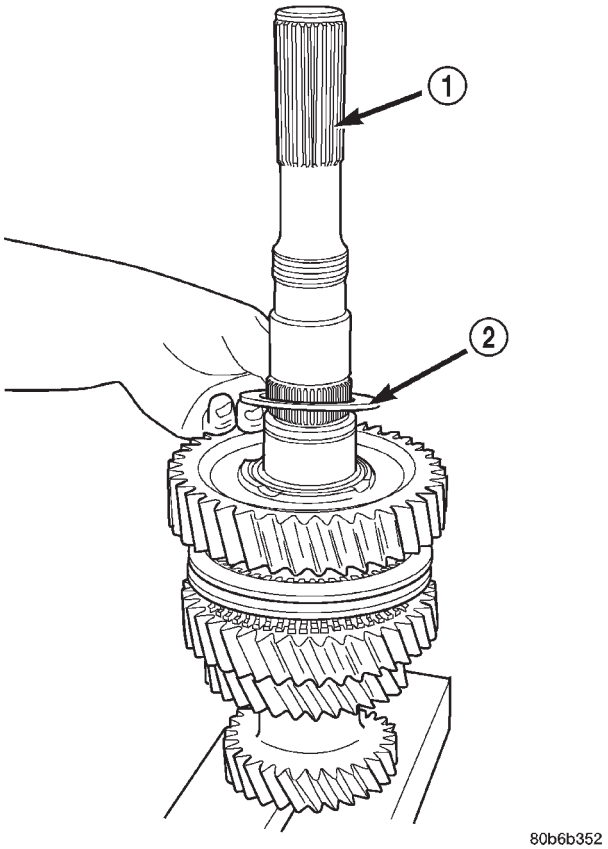


Fig. 61 OUTPUT SHAFT THRUST WASHER

1 - OUTPUT SHAFT
2 - OUTPUT SHAFT THRUST WASHER

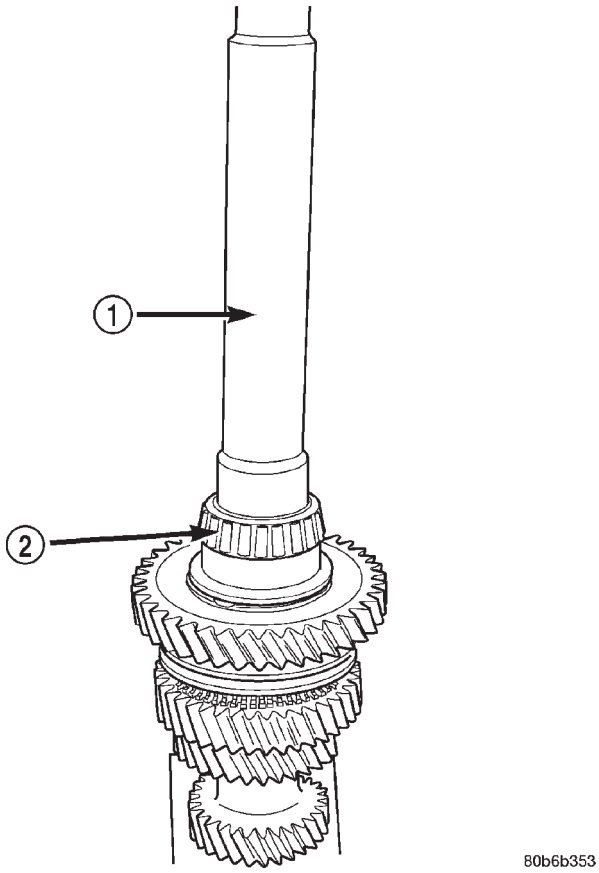


Fig. 62 REAR OUTPUT SHAFT BEARING

1 - INSTALLER
2 - REAR OUTPUT SHAFT BEARING

(23) Reverse output shaft in the Fixture 8227 and support the shaft with press blocks under first gear.

(24) Install sixth gear bearing onto the output shaft.

(25) Install sixth gear onto the output shaft and over the sixth gear bearing (Fig. 63).

(26) Install the sixth gear friction cone onto sixth gear.

(27) Install sixth gear blocker ring over the sixth gear friction cone (Fig. 64).

(28) Install Guide 8235 onto the end of the output shaft (Fig. 65).

(29) Install 5-6 synchro over Guide 8235 and onto the output shaft.

(30) Press 5-6 synchro (Fig. 66) onto the output shaft with Installer 8156 and a shop press.

MANUAL - NV5600 (Continued)

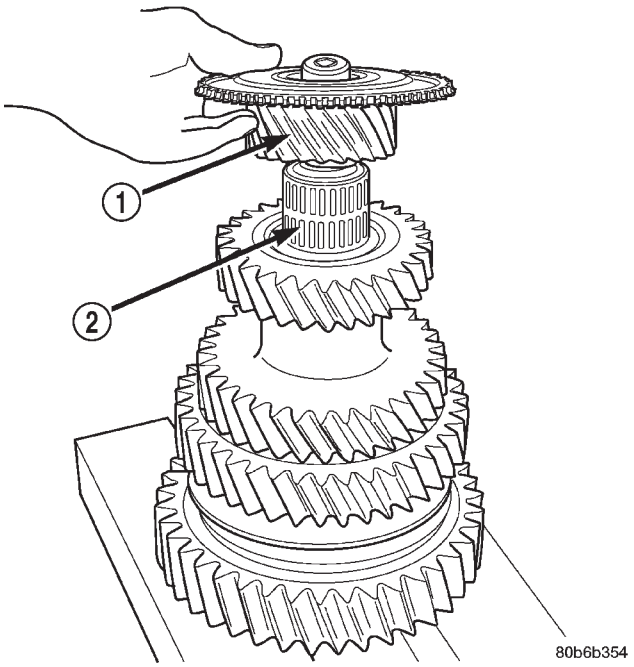


Fig. 63 SIXTH GEAR

1 - SIXTH GEAR
2 - SIXTH GEAR BEARING

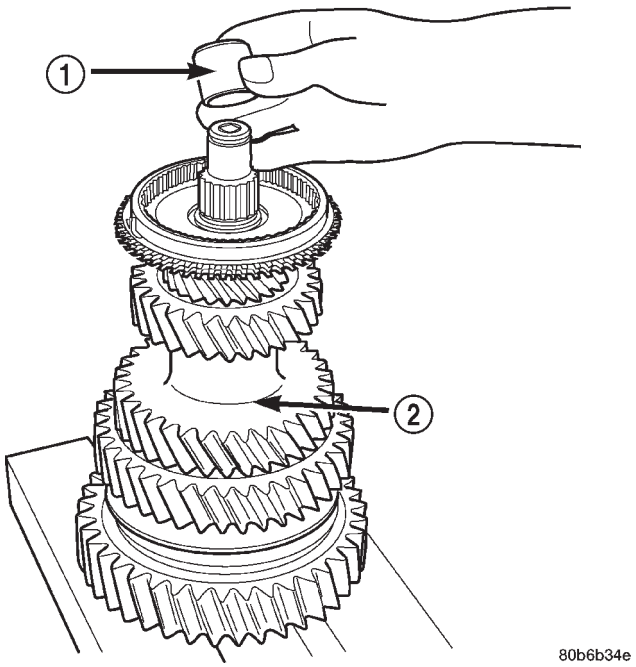


Fig. 65 OUTPUT SHAFT GUIDE

1 - GUIDE
2 - OUTPUT SHAFT

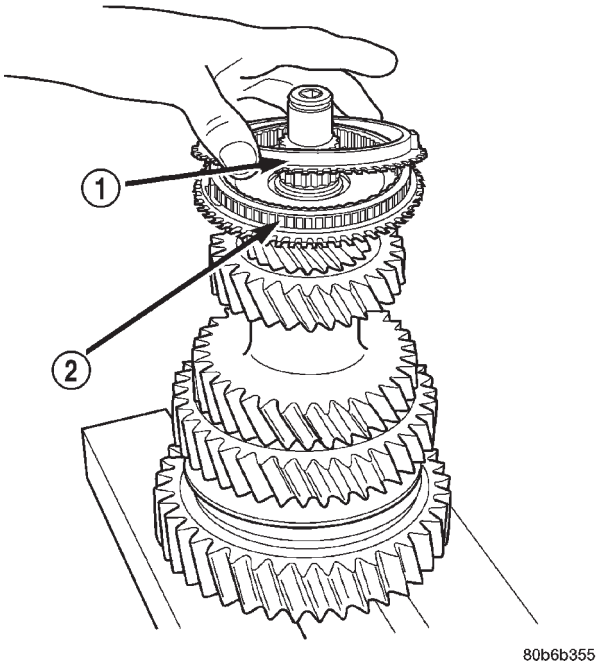


Fig. 64 SIXTH GEAR BLOCKER RING

1 - SIXTH GEAR BLOCKER RING
2 - SIXTH GEAR FRICTION CONE

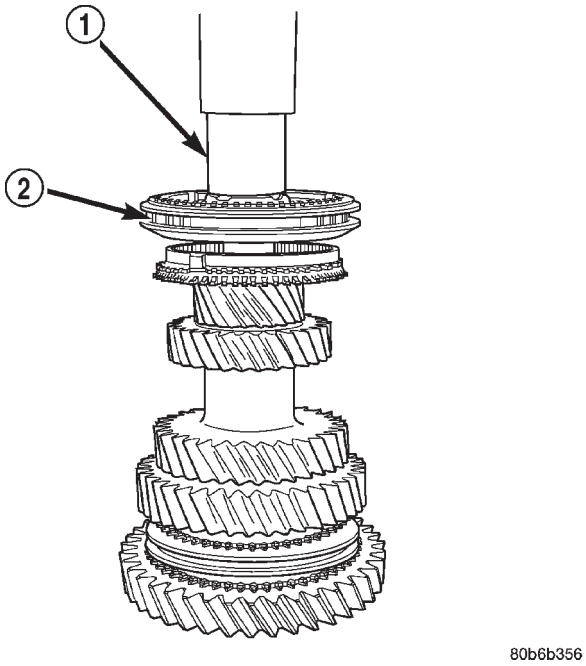


Fig. 66 5-6 SYNCHRO

1 - INSTALLER
2 - 5-6 SYNCHRO

(31) Install output shaft pocket bearing onto the output shaft.

(32) Press pocket bearing the remainder of the way onto the output shaft using Guide 8235 and a shop press (Fig. 67).

(33) Install a **new** snap-ring to hold the output shaft pocket bearing onto the output shaft.

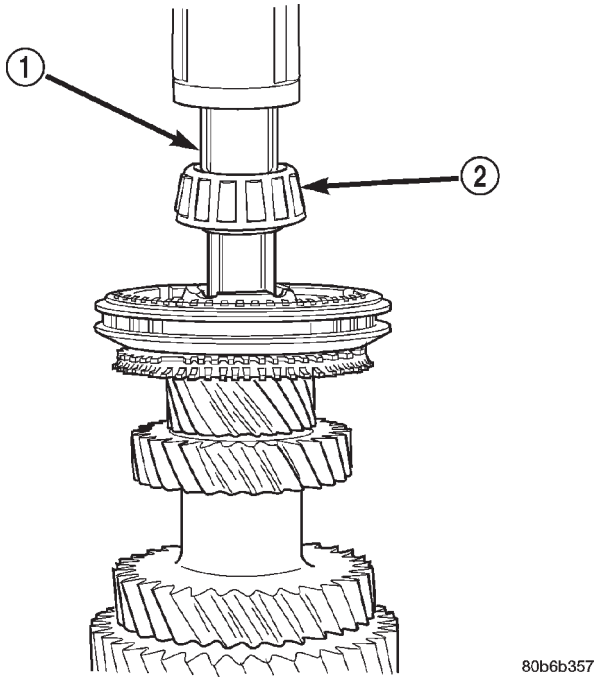


Fig. 67 OUTPUT SHAFT POCKET BEARING

1 - GUIDE
2 - POCKET BEARING

COUNTERSHAFT

(1) Place third countershaft gear on the bench with the synchro clutch ring up.

(2) Install third countershaft gear friction cone onto third gear (Fig. 68).

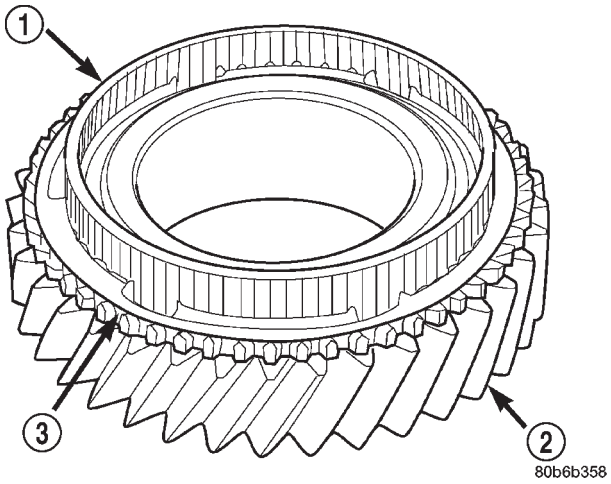


Fig. 68 FRICTION CONE ONTO GEAR

1 - FRICTION CONE
2 - GEAR
3 - CLUTCH RING

(3) Install third countershaft gear blocker ring onto the friction cone (Fig. 69).

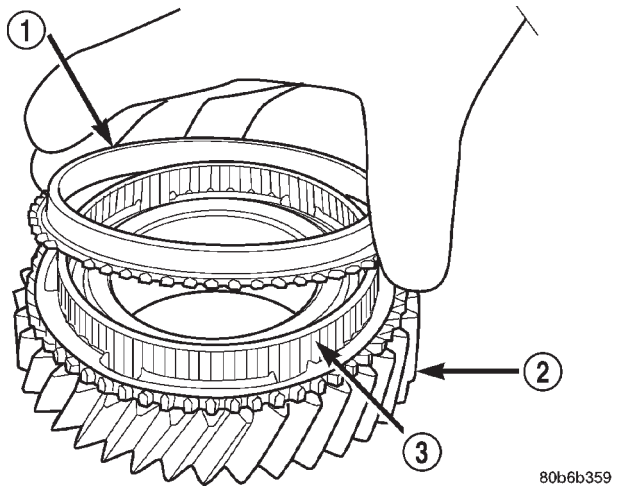


Fig. 69 BLOCKER RING ONTO FRICTION CONE

1 - BLOCKER RING
2 - GEAR
3 - FRICTION CONE

(4) Install 3-4 synchro assembly onto the blocker ring/gear assembly (Fig. 70).

(5) Reverse the assembly on the bench.

(6) Install third countershaft gear bearing into the third countershaft gear.

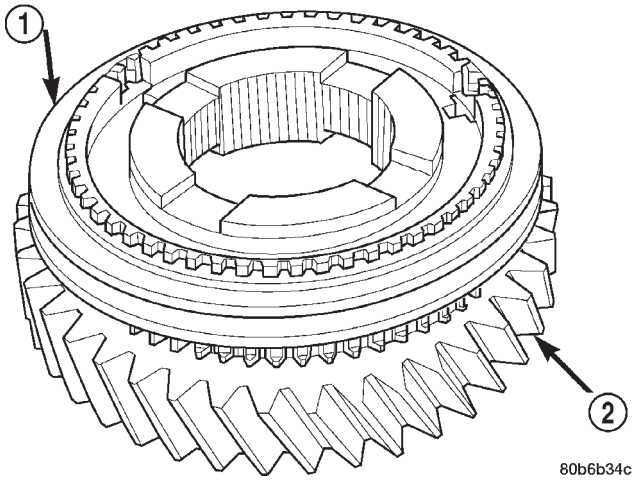


Fig. 70 3-4 SYNCHRO ASSEMBLY

1 - SYNCHRO
2 - GEAR

(7) Install 2-3 thrust washer onto the countershaft.

(8) Place third gear/3-4 synchro assembly in a shop press.

(9) Install countershaft through the third gear/3-4 synchro assembly.

(10) Press countershaft into the 3-4 synchro assembly (Fig. 71).

(11) Install fourth countershaft gear bearing sleeve onto the output shaft.

MANUAL - NV5600 (Continued)

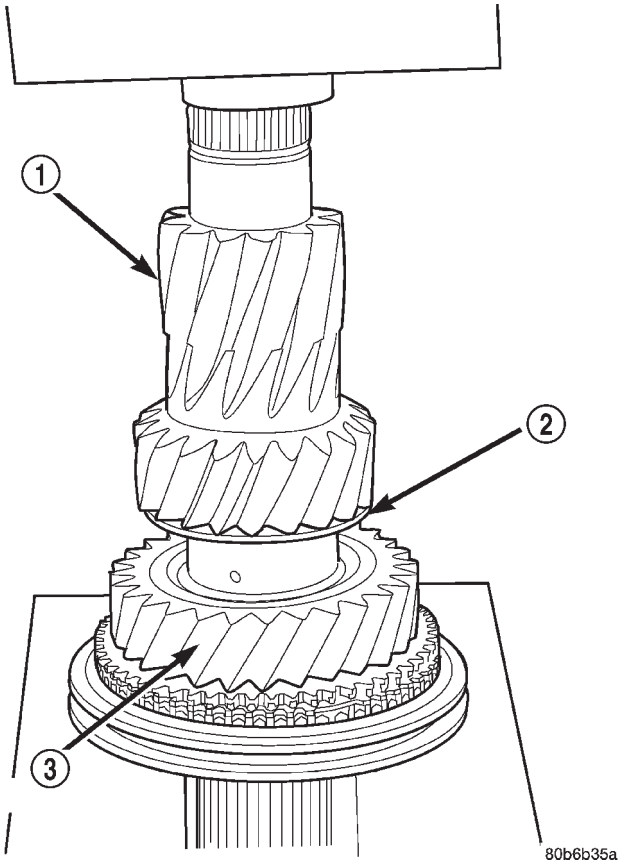


Fig. 71 COUNTERSHAFT INTO 3-4 SYNCHRO

1 - COUNTERSHAFT
2 - 2-3 THRUST WASHER
3 - THIRD COUNTERSHAFT GEAR

(12) Press fourth countershaft bearing sleeve onto the countershaft with Installer 8228 and a shop press.

(13) Place fourth countershaft gear on the bench with the synchro clutch ring up.

(14) Install fourth countershaft gear friction cone onto fourth countershaft gear (Fig. 68).

(15) Install fourth countershaft gear blocker ring onto the friction cone (Fig. 69).

(16) Install fourth countershaft gear bearing into the fourth countershaft gear.

(17) Place sixth countershaft gear in the shop press.

(18) Position fourth countershaft gear assembly onto the sixth countershaft gear (Fig. 72).

(19) Install countershaft into the fourth/sixth countershaft gear assembly in the shop press.

(20) Press countershaft into sixth gear (Fig. 73).

CAUTION: Gear and shaft must be aligned while pressing or the gear will bind on the shaft.

(21) Place fifth countershaft gear into the shop press.

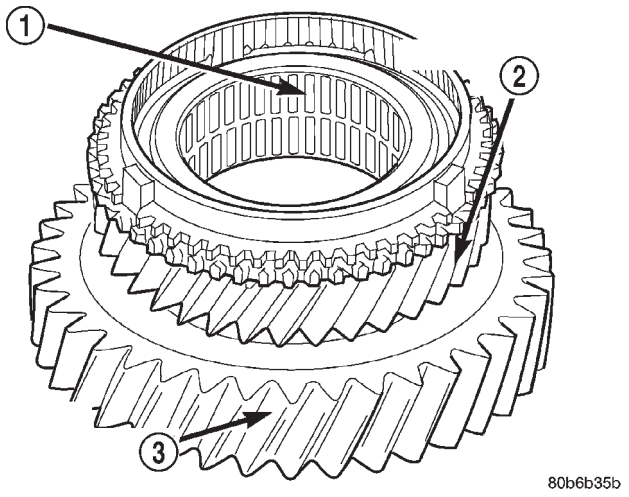


Fig. 72 FOURTH COUNTERSHAFT ONTO SIXTH COUNTERSHAFT GEAR

1 - FOURTH BEARING
2 - FOURTH COUNTERSHAFT GEAR
3 - SIXTH COUNTERSHAFT GEAR

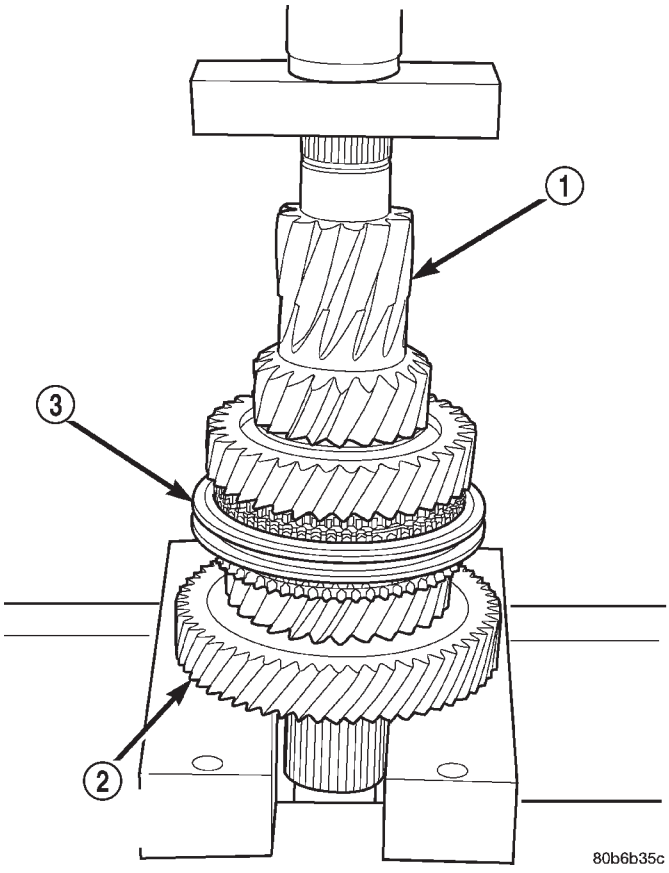


Fig. 73 COUNTERSHAFT TO SIXTH COUNTERSHAFT GEAR

1 - COUNTERSHAFT
2 - SIXTH COUNTERSHAFT GEAR
3 - 3-4 SYNCHRO

MANUAL - NV5600 (Continued)

(22) Install countershaft into the fifth countershaft gear and press countershaft into fifth gear (Fig. 74).

CAUTION: Gear and shaft must be aligned while pressing or the gear will bind on the shaft.

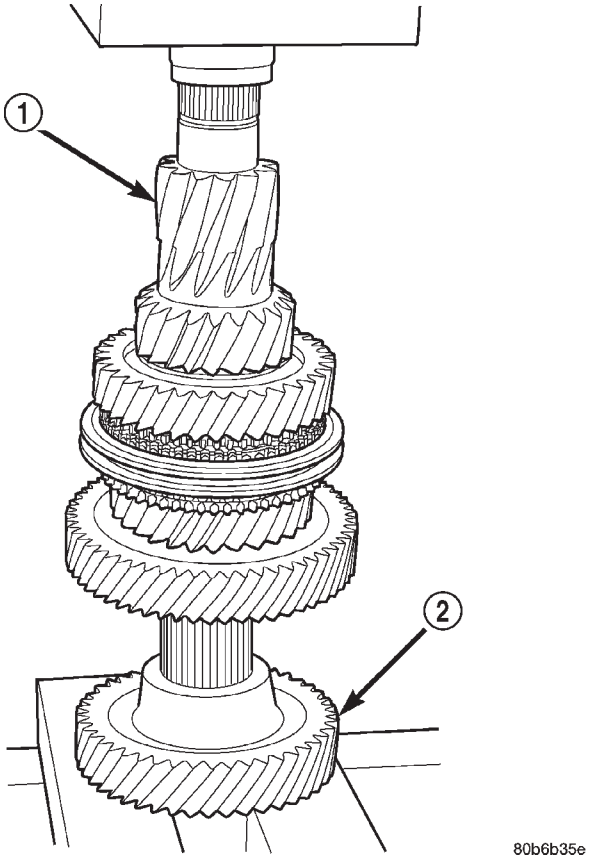


Fig. 74 COUNTERSHAFT TO FIFTH COUNTERSHAFT GEAR

1 - COUNTERSHAFT
2 - FIFTH COUNTERSHAFT GEAR

(23) Place front countershaft bearing onto the countershaft.

(24) Install front countershaft bearing onto the countershaft with Installer 8236 and Handle C-4171.

(25) Install a **new** snap-ring to hold the front countershaft bearing onto the countershaft.

(26) Place rear countershaft bearing onto the countershaft.

INPUT SHAFT

(1) Place the input shaft bearing onto the input shaft.

(2) Install input shaft bearing with Installer MD998805 (Fig. 75).

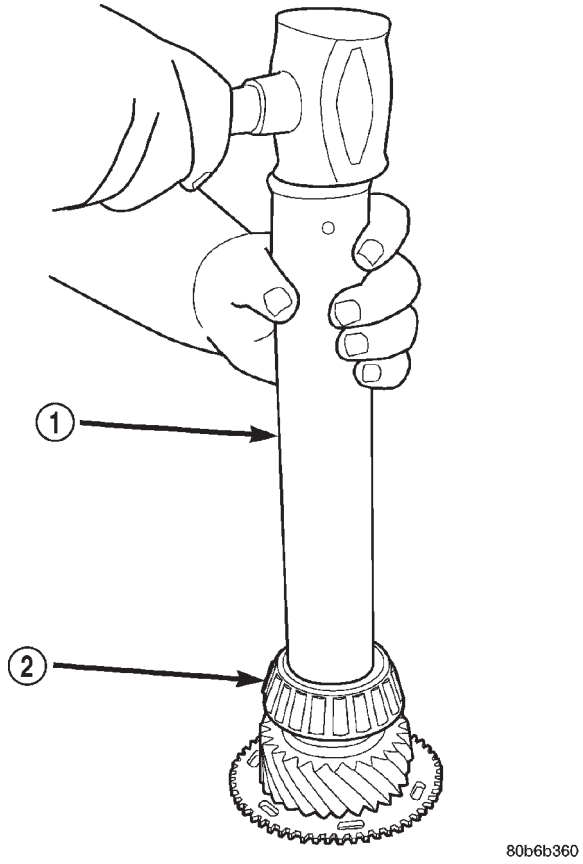


Fig. 75 INPUT SHAFT BEARING

1 - INSTALLER
2 - INPUT SHAFT BEARING

(3) Position the input shaft bearing oil guide on the input shaft (Fig. 76).

(4) Install input shaft bearing oil guide with Installer MD998805.

(5) Place the output shaft pocket bearing race in the input shaft.

(6) Install output shaft pocket bearing race into the input shaft with Installer C-4628 and Handle C-4171 (Fig. 77).

MANUAL - NV5600 (Continued)

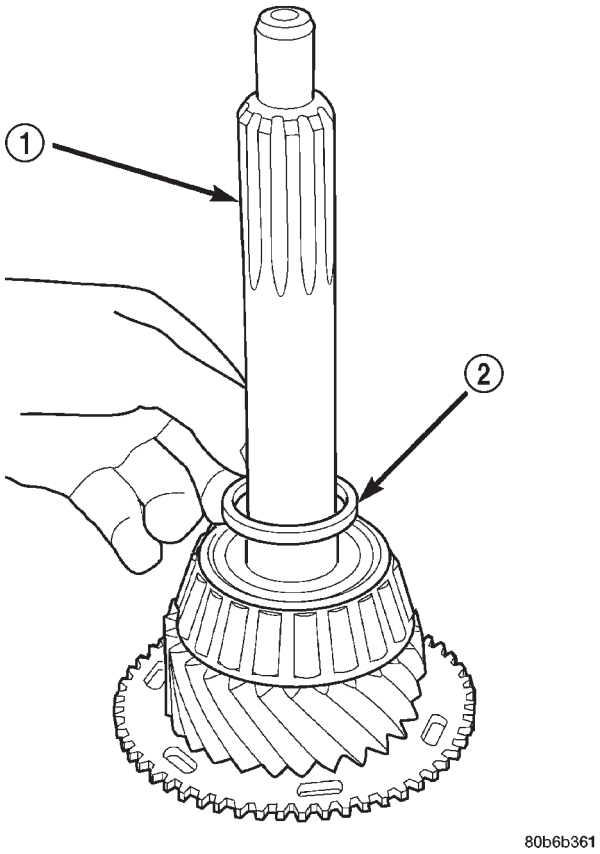


Fig. 76 INPUT SHAFT OIL GUIDE

1 - INPUT SHAFT
2 - INPUT SHAFT OIL GUIDE

CLUTCH HOUSING

(1) Install input shaft bearing race so that the bearing race protrudes 0.3 in. above the front surface of the clutch housing. Install bearing race with Remover/Installer 8237 and Handle C-4171.

(2) Install countershaft front bearing race into the clutch housing so that the bearing race protrudes 0.4 in. above the front surface of the clutch housing. Install bearing race with Remover 6061-1 and Handle C-4171.

(3) Install countershaft oil guide and spacer into the countershaft front bearing bore in the clutch housing (Fig. 78).

(4) Clean all old sealer from the input shaft retainer and the clutch housing but **DO NOT** apply new sealer at this time. New sealer will be applied after all the preload measurements are made and end-play shims are installed.

NOTE: Do not replace the input shaft seal at this time. A new seal will be installed after all the preload measurements are made and endplay shims are installed.

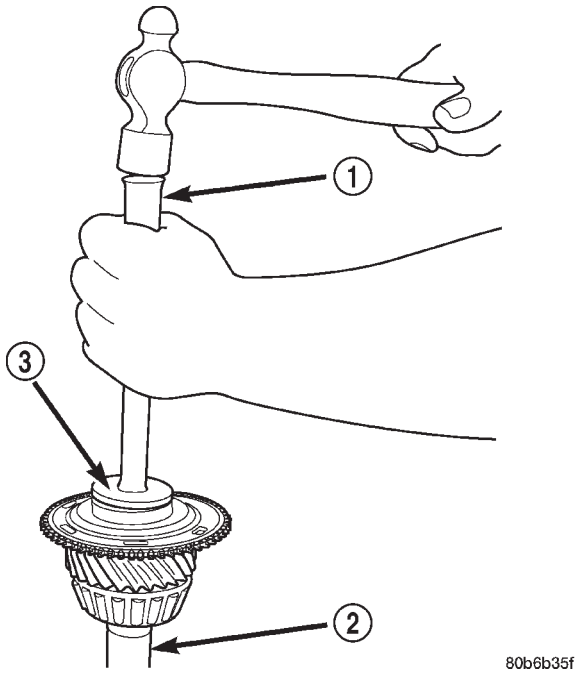


Fig. 77 OUTPUT SHAFT POCKET BEARING RACE

1 - HANDLE
2 - INPUT SHAFT
3 - INSTALLER

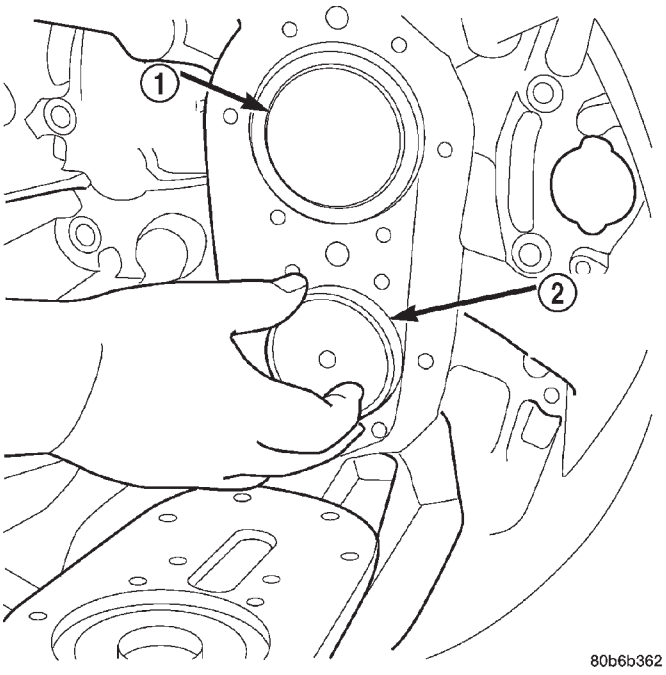


Fig. 78 OIL GUIDE AND SPACER

1 - 0.3 IN. BEYOND FLUSH
2 - 0.4 IN. BEYOND FLUSH

(5) Install input shaft retainer onto the clutch housing and install bolts to hold the input shaft retainer.

MANUAL - NV5600 (Continued)

GEARTRAIN

(1) Install input shaft into Support Stand 8246.

(2) Install fifth gear friction cone onto the input shaft.

(3) Install fifth gear blocker ring onto the fifth gear friction cone.

(4) Install output shaft into the input shaft (Fig. 79).

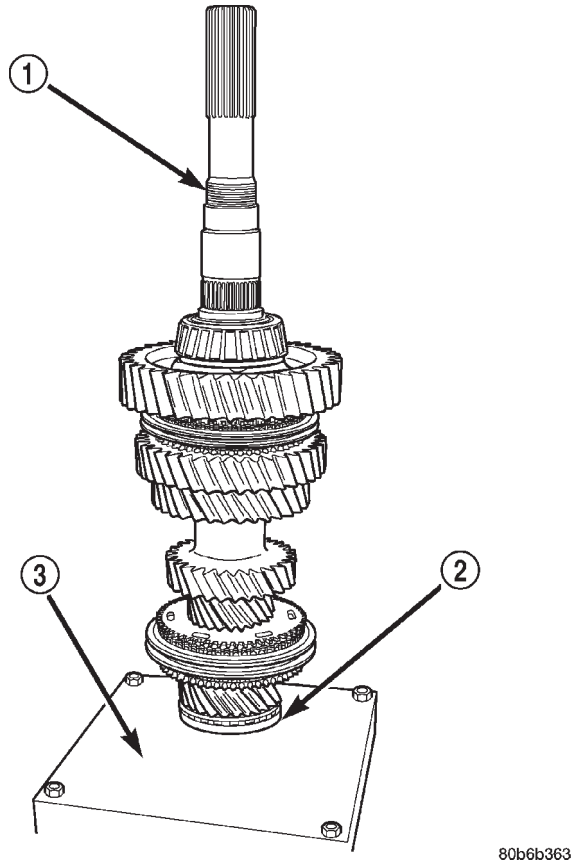


Fig. 79 OUTPUT SHAFT AND INPUT SHAFT

1 - OUTPUT SHAFT
2 - INPUT SHAFT
3 - SUPPORT STAND

(5) Install countershaft into the Support Stand 8246 and verify that all gears are meshed with their mates on the mainshaft (Fig. 80).

(6) Install Fixture 8232 to the output shaft and countershaft.

(7) Install Holding Tool 8242 onto the 5-6 synchro and tighten the screw to hold the 5-6 synchro together during the remainder of the installation procedure.

(8) Attach a engine crane or equivalent to Fixture 8232 and move the geartrain from the Support Stand 8246 to the clutch housing (Fig. 81).

(9) Install shift forks and rails onto the geartrain (Fig. 82).

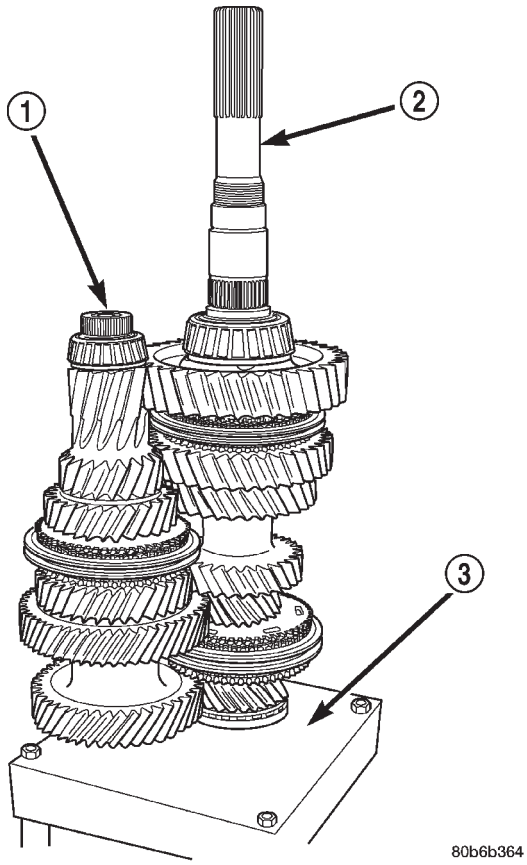


Fig. 80 COUNTERSHAFT TO MAINSHAFT

1 - COUNTERSHAFT
2 - OUTPUT SHAFT
3 - SUPPORT STAND

NOTE: The closest shift arm to the geartrain is for Reverse. The next is 5-6, then 3-4 and then 1-2 when moving out from the geartrain.

(10) Install geartrain and shift rails into the clutch housing. Lower the geartrain and rails into the housing slowly while guiding input shaft through input shaft seal. Avoid any binds on the shift rails, forks and synchros as the rails enter their bushings.

CAUTION: Do not damage input shaft seal with the input shaft splines.

(11) With the geartrain approximately 1/4 in. from the clutch housing, remove Holding Tool 8242 from the 5-6 synchro (Fig. 83).

(12) Install 5-6 crossover bracket and arm to the shift rails and the clutch housing.

(13) Lower geartrain the remainder of the way into the clutch housing.

(14) Install the 5-6 crossover bracket bolts and tighten to 28 N·m (20 ft. lbs.) (Fig. 84).

(15) Remove engine crane and Fixture 8232 from the output shaft and the countershaft.

MANUAL - NV5600 (Continued)

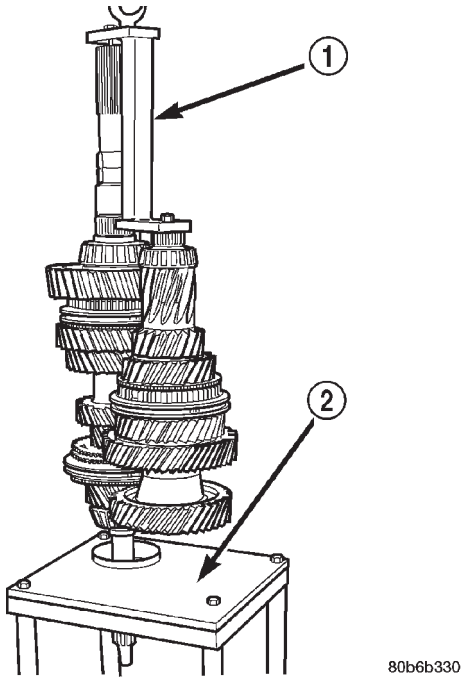


Fig. 81 LIFT GEARTRAIN

1 - FIXTURE
2 - SUPPORT STAND

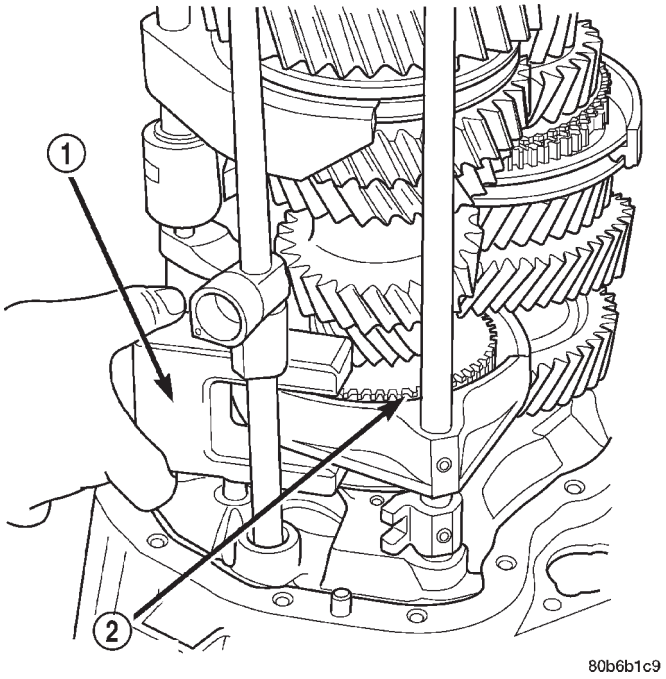


Fig. 83 HOLDING TOOL

1 - HOLDING TOOL
2 - 5-6 SYNCHRO

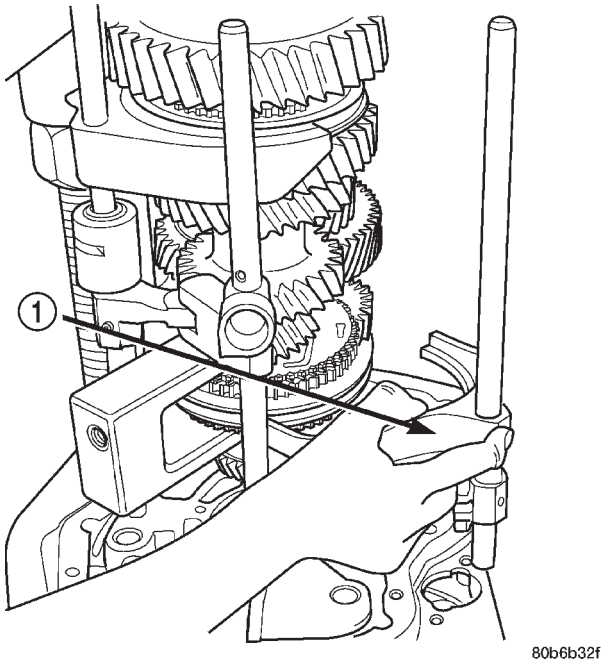


Fig. 82 INSTALL SHIFT RAILS

1 - SHIFT RAILS

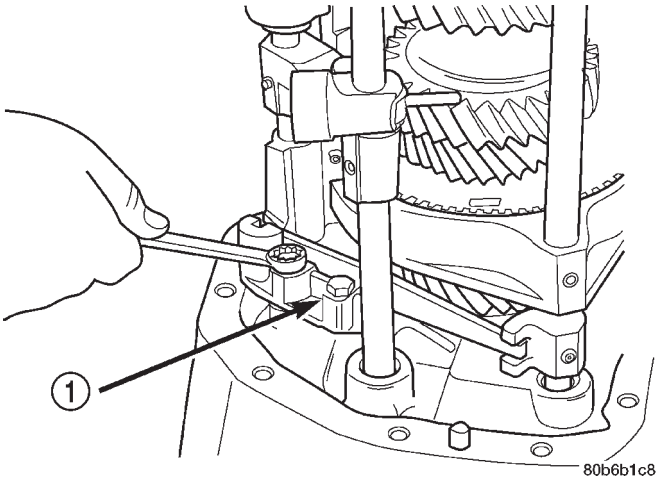


Fig. 84 5-6 CROSSOVER BRACKET BOLTS

1 - 5-6 CROSSOVER BRACKET

TRANSMISSION GEAR CASE

(1) Install rear output shaft bearing race into the transmission gear case with Installer C-4308 and Handle C-4171.

(2) Install rear countershaft bearing race into the transmission gear case with Installer 8153 and Handle C-4171.

(3) Install Fixture 8232 to the transmission gear case.

NOTE: Shift socket must be loose on the shift shaft and is rotated a minimum of 90° from its normal position. This will ensure enough clearance to install the transmission gear case.

MANUAL - NV5600 (Continued)

(4) Apply sealant to the clutch housing.

(5) Attach an engine crane or equivalent to Fixture 8232 and install the transmission gear case onto the clutch housing (Fig. 85).

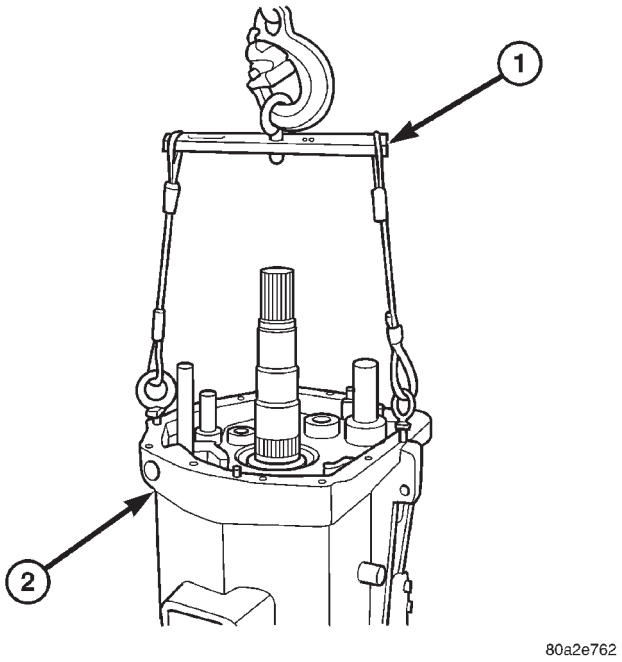


Fig. 85 TRANSMISSION GEAR CASE

1 - FIXTURE
2 - TRANSMISSION CASE

(6) Install clutch housing bolts and tighten to 48 N·m (35 ft.lbs.).

(7) Install shift socket roll pin with a suitable 6mm (7/32 inch) punch and hammer.

MAINSHAFT AND COUNTERSHAFT ENDPLAY

(1) With transmission in vertical position, use Socket 6993 to rotate the shafts and seat the bearings.

(2) Measure mainshaft endplay with Dial Indicator Set C-3339 and Extension Rod 8161 installed onto the rear of the transmission gear case (Fig. 86).

(3) Measure countershaft end-play with Dial Indicator Set C-3339 and Extension Rod 8161 installed onto the rear of the transmission gear case (Fig. 87).

(4) Rotate transmission into a horizontal position and remove the input shaft retainer.

(5) Install shims necessary to achieve an end-play of 0.051-0.15 mm (0.002-0.006 in.) for the mainshaft and countershaft.

NOTE: Countershaft shims go between the bearing race and spacer. Mainshaft shims go into the input shaft retainer.

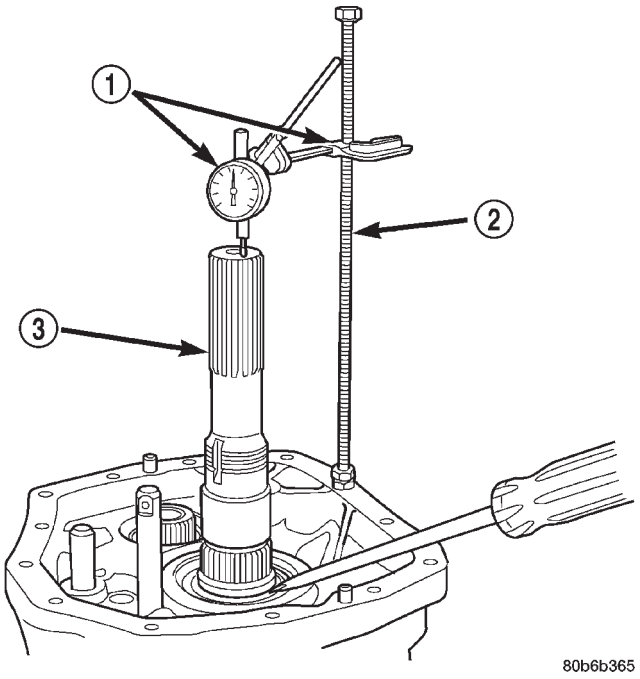


Fig. 86 MAINSHAFT END-PLAY

1 - DIAL INDICATOR
2 - EXTENSION ROD
3 - MAIN SHAFT

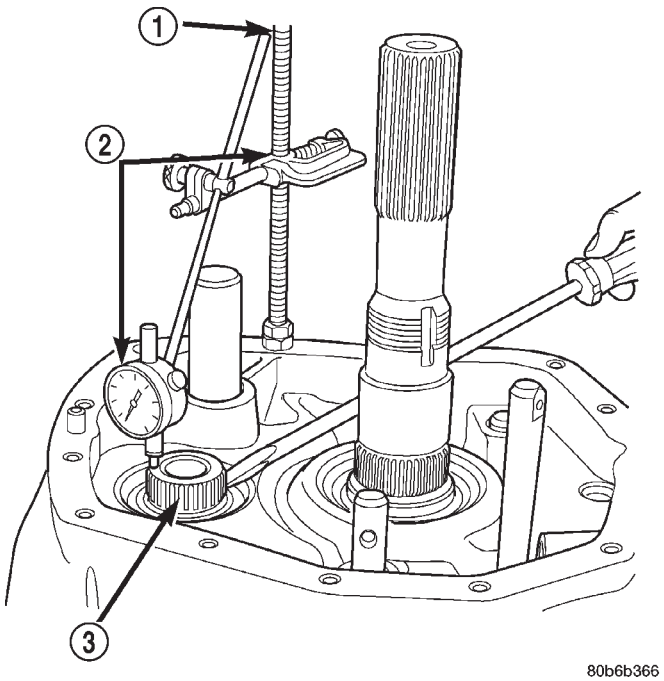


Fig. 87 COUNTERSHAFT END-PLAY

1 - EXTENSION ROD
2 - DIAL INDICATOR
3 - COUNTERSHAFT

(6) Install a **new** input shaft seal into the input shaft retainer with Installer C-4965.

MANUAL - NV5600 (Continued)

(7) Install input shaft oil guide with C-3972-A and Handle C-4171.

(8) Apply sealer to the input shaft retainer and install retainer onto the clutch housing. Install bolts and tighten to 28 N·m (20 ft.lbs.).

REVERSE GEAR

(1) Install reverse shift fork and synchronizer as an assembly onto the reverse shift rail and output shaft (Fig. 88).

NOTE: Raised square shoulder and snap-ring on the synchro face the case.

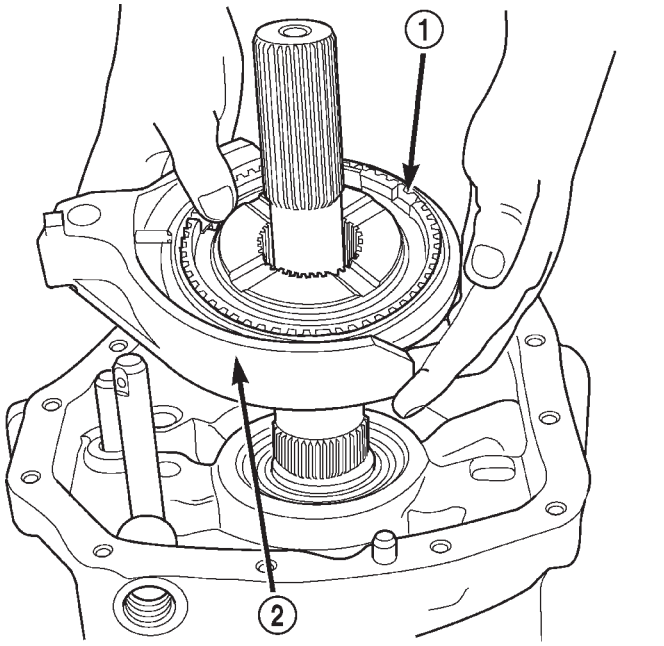


Fig. 88 REVERSE SHIFT FORK AND SYNCHRO

1 - REVERSE SYNCHRO
2 - REVERSE SHIFT FORK

(2) Install roll-pin securing the reverse shift fork to the reverse shift rail with 6mm (7/32 in) punch and a hammer.

(3) Install reverse gear bearing sleeve onto the output shaft with Installer 6446 if necessary (Fig. 89).

(4) Install reverse gear, reverse gear synchronizer cone, reverse gear outer blocker ring and reverse gear bearing (Fig. 90).

(5) Install output shaft ball bearing assembly and reverse thrust washer onto the output shaft (Fig. 91).

NOTE: Raised shoulder on thrust washer faces away from the reverse gear.

(6) Install a **new** output shaft nut onto the ouput shaft.

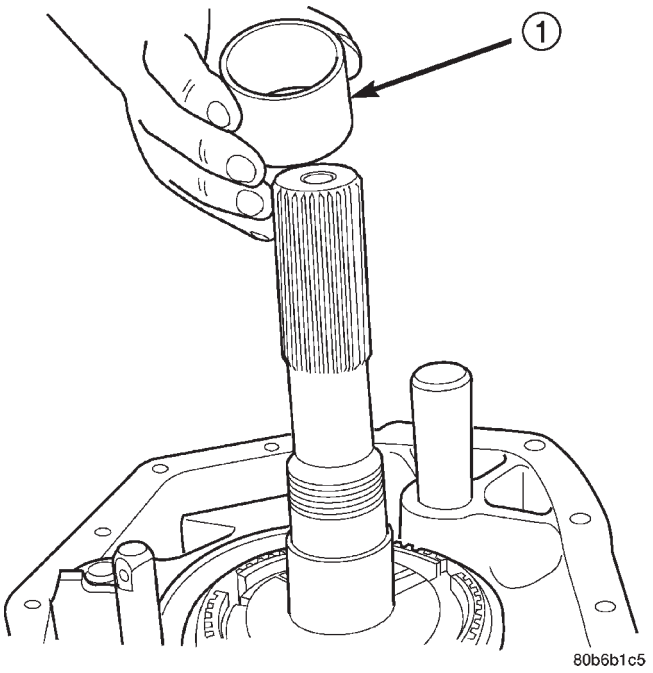


Fig. 89 REVERSE BEARING SLEEVE

1 - REVERSE GEAR BEARING SLEEVE

(7) With Wrench 8226 on the output shaft nut and Socket 6993 or 6984 holding the output shaft, tighten the nut to 339 N·m (250 ft.lbs.).

(8) Stake nut into the slot in the output shaft with a 9mm (5/16 in.) punch.

(9) Press countershaft reverse gear into the sleeve with a shop press.

(10) Install reverse countershaft rear bearing onto the countershaft reverse gear assembly with Installer C-4652 and Handle C-4171.

(11) Install reverse idler gear rear bearing, bearing spacer, front bearing, and front thrust washer onto the idler gear shaft.

(12) Install idler and reverse countershaft gears together (Fig. 92).

(13) Install reverse idler thrust washer from the reverse idler.

(14) Install crossover cam rollers and pin (Fig. 93).

EXTENSION/ADAPTER HOUSING

(1) Install extension housing bushing with Installer 8156 and Handle C-4171, if necessary. The oil feed hole must be at the 12 o'clock position when installed.

(2) On 4X2 vehicles, install extension housing seal with Installer 8154 and Handle C-4171, with the weep hole at the bottom.

NOTE: Drain hole located in the dust boot portion of the seal must face downward (toward the ground) when installed.

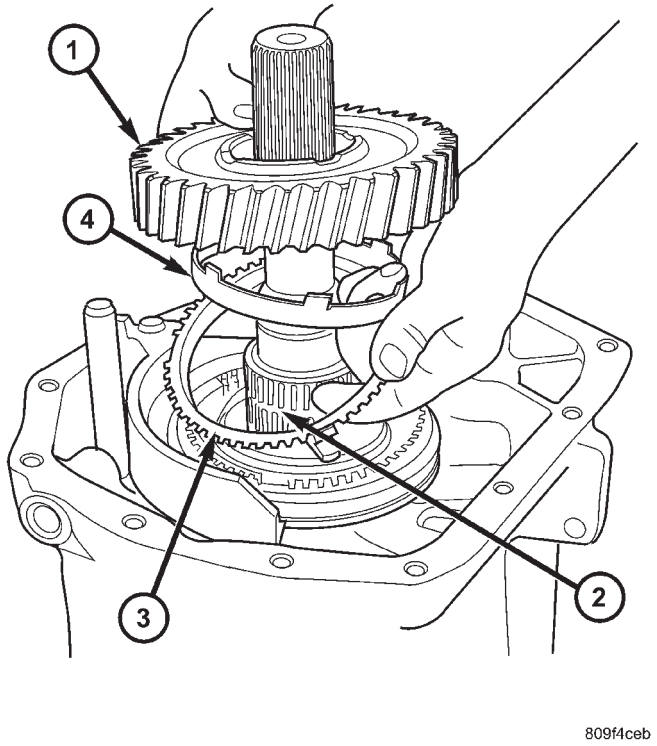


Fig. 90 REVERSE GEAR COMPONENTS

1 - REVERSE GEAR
2 - REVERSE BEARING
3 - BLOCKER RING
4 - FRICTION CONE

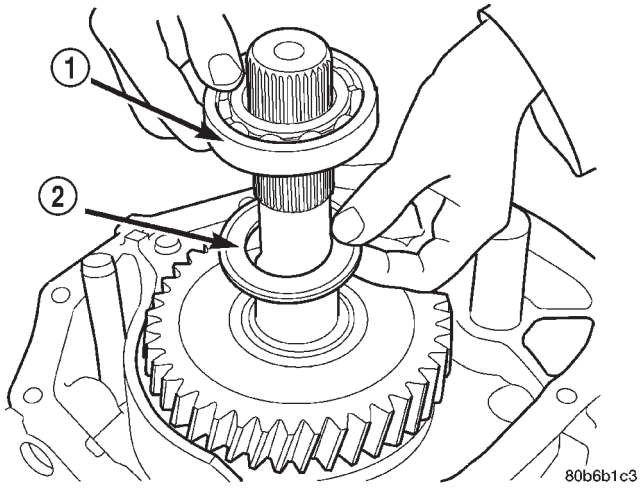


Fig. 91 OUTPUT SHAFT BEARING AND THRUST WASHER

1 - OUTPUT SHAFT BALL BEARING
2 - THRUST WASHER

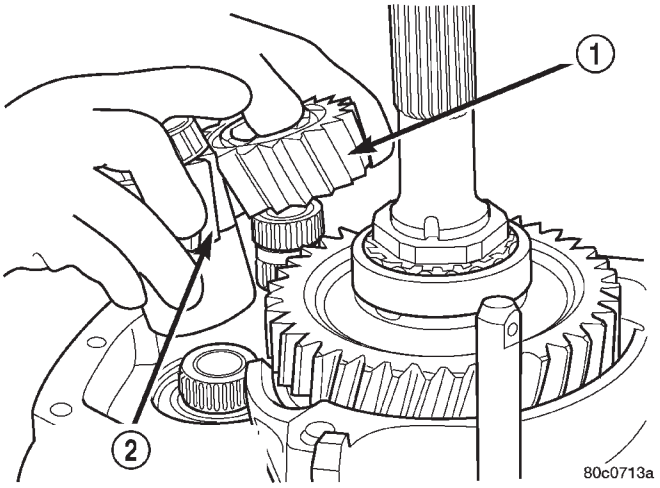


Fig. 92 REVERSE IDLER AND COUNTERSHAFT GEARS

1 - REVERSE IDLER GEAR
2 - COUNTERSHAFT REVERSE GEAR

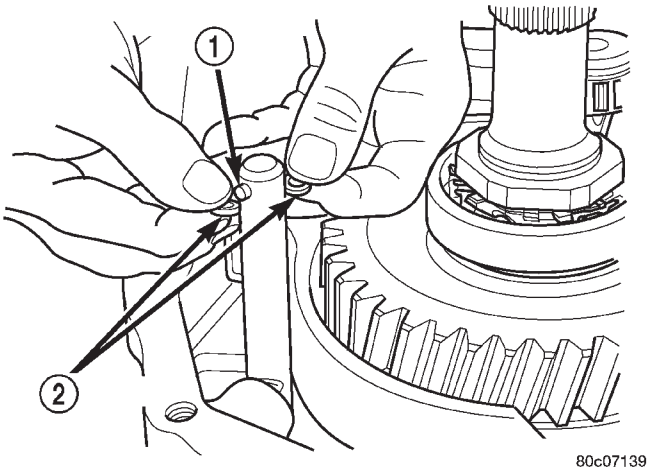


Fig. 93 CROSSOVER CAM ROLLERS AND PIN

1 - CROSSOVER CAM PIN
2 - CROSSOVER CAM ROLLERS

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

(4) Install the crossover cam bushing into the extension/adapter housing with Installer 8239 and Handle C-4171.

(5) Clean the rear of the transmission case of all sealer.

(6) Install reverse countershaft gear bearing race onto the reverse countershaft gear bearing.

(7) Measure the distance from the back of the bearing race to Gauge Bar 6311 (Fig. 94).

(8) Measure thickness of the gauge bar and record the total of the two measurements.

(9) Clean all the sealer from the extension/adapter housing.

MANUAL - NV5600 (Continued)

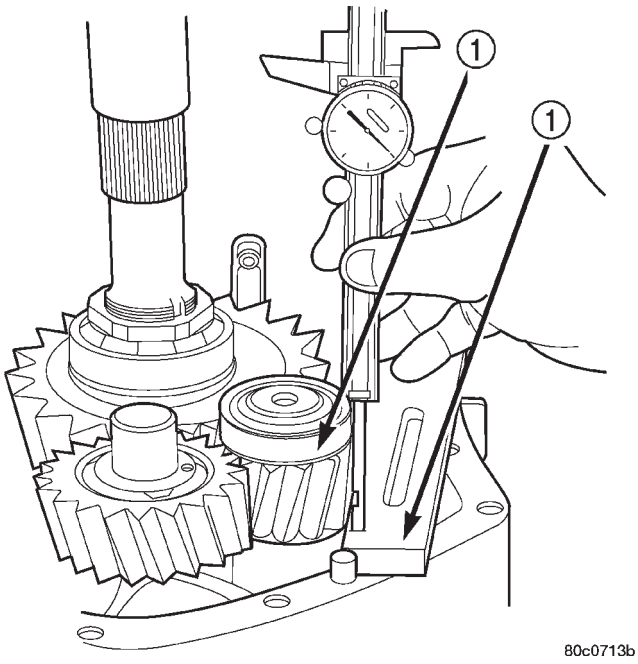


Fig. 94 MEASURE HEIGHT OF REVERSE COUNTERSHAFT

1 - MEASURE DISTANCE FROM RACE TO GAUGE BAR

(10) Place Gauge Bar 6311 across the housing face. Measure the distance from the top of the bar to the bottom of the reverse countershaft bearing race bore (Fig. 95).

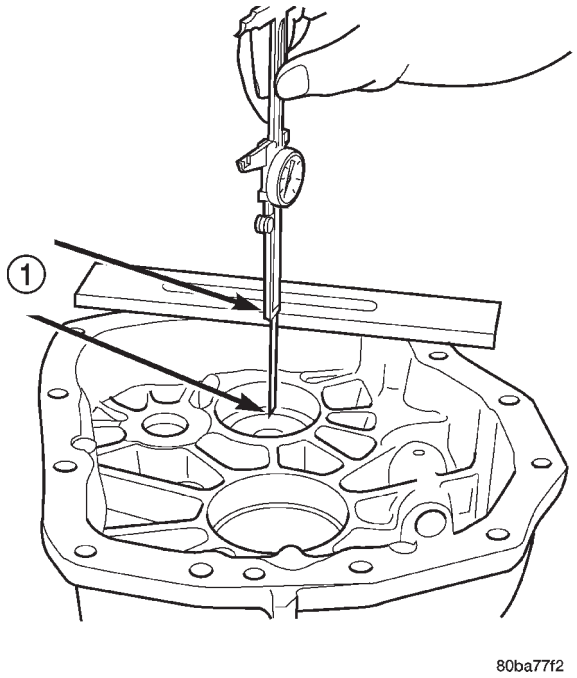


Fig. 95 REVERSE COUNTERSHAFT GEAR BEARING RACE BORE

1 - GAUGE BAR TO BEARING RACE BORE MEASUREMENT

(11) Subtract thickness of the gauge bar from the measurement and record the result.

(12) The difference between the two measurements is the end-play for the reverse countershaft gear assembly.

(13) Install shims to achieve 0.15-0.25 mm (0.006-0.010 in.) end-play for the reverse countershaft gear assembly into the reverse countershaft bearing race bore.

(14) Use Installer to install the reverse countershaft bearing race into the extension/adapter housing.

(15) Install back-up lamp switch into the extension/adapter housing and tighten to 28 N·m (20 ft.lbs.).

(16) Install crossover cam into the extension/adapter housing.

(17) Install bolt to hold the crossover cam to the extension/adapter housing (Fig. 96).

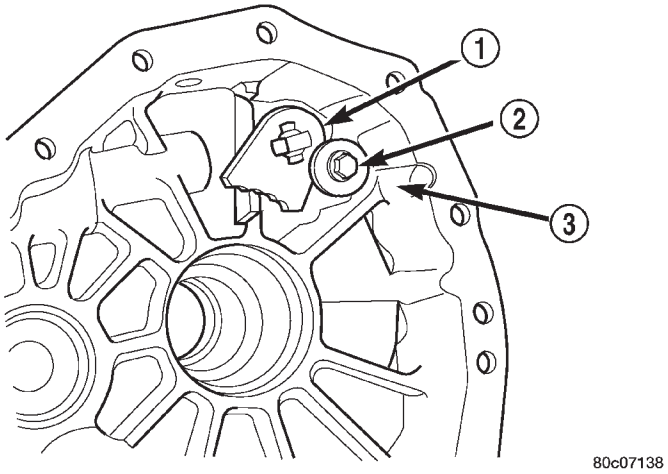


Fig. 96 CROSSOVER CAM

1 - CROSSOVER CAM
2 - BOLT
3 - EXTENSION HOUSING

(18) Install crossover detent plunger, spring and plug into the extension/adapter housing. Tighten the plug to 47.5 N·m (35 ft.lbs.) (Fig. 97).

(19) Apply sealer to the surface of the transmission case.

(20) Install extension/adapter housing onto the transmission case.

(21) Install bolts to hold the extension/adapter housing onto the transmission gear case. Tighten bolts to 48 N·m (35 ft.lbs.).

(22) Install shift rail blocker bolt and tighten bolt to 55 N·m (41 ft.lbs.).

(23) Install primary shift rail detent plunger, spring and plug into the transmission case. Tighten detent plug to 47.5 N·m (35 ft.lbs.).

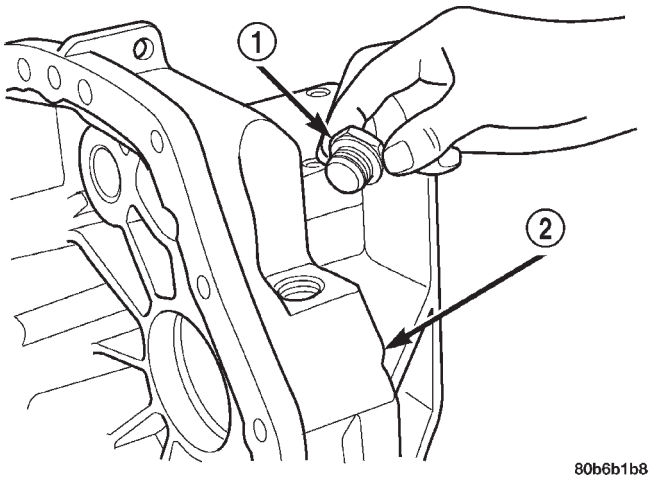


Fig. 97 CROSSOVER CAM DETENT PLUG

1 - DETENT PLUG
2 - EXTENSION HOUSING

(24) Install shift tower onto the transmission case and tighten bolts to 9 N·m (7 ft.lbs.).

INSTALLATION

NOTE: If installing a new transmission, use all components supplied with the transmission. If a new shift tower is supplied with the new transmission, do not re-use the original shift tower.

(1) Apply a light coat of Mopar high temperature bearing grease or equivalent to contact surfaces of following components:
- input shaft splines.
- release bearing slide surface of front retainer.
- release bearing bore.
- release fork.
- 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 clutch disc hub.

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

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

(7) Install and tighten transmission-to-engine block bolts.

(8) Install clutch slave cylinder.

(9) Connect backup light switch wires.

(10) Position transmission harness wires in clips on transmission.

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

(12) Install rear crossmember.

(13) Remove transmission jack and engine support fixture.

(14) Fill transmission with required lubricant (Fig. 98). Check lubricant level in transfer case if equipped.

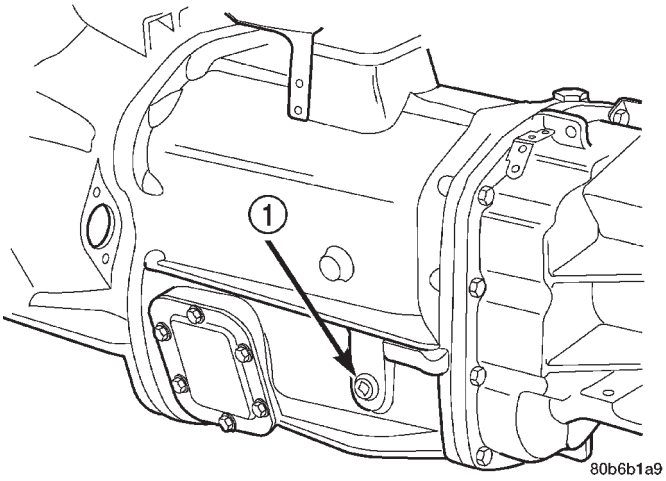


Fig. 98 FILL PLUG

1 - FILL PLUG

TWO WHEEL DRIVE

(1) Install propeller shaft with referece marks aligned.

(2) Install exhaust system components.

(3) Remove support and lower vehicle.

(4) Shift transmission into third gear.

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

(6) Apply Mopar Gasket Maker or equivalent to sealing surface of the transmission case. Do not over apply sealant.

(7) Install isolator plate onto the transmission case metal side down.

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

(9) Verify shift tower, isolator plate and the shift socket are properly aligned.

(10) Install bolts to hold the shift tower to the isolator plate and the transmission case. Tighten bolts to 10.2–11.25 N·m (7.5–8.3 ft. lbs.).

(11) Install shift boot and bezel.

(12) Connect battery negative cable.

FOUR WHEEL DRIVE

(1) Install and secure transfer case on the transmission jack.

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

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

(4) Install and tighten transfer case mounting nuts to 41-47 N·m (30-35 ft. lbs.) if case has 3/8 studs. If case has 5/16 studs tighten to 30-41 N·m (22-30 ft. lbs.).

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

(6) Install propeller shafts with reference marks aligned.

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

(8) Install exhaust system components.

(9) Remove support and lower vehicle.

(10) Shift transmission into third gear.

(11) Clean the mating surfaces of shift tower, isolator plate and transmission case with suitable wax and grease remover.

(12) Apply Mopar Gasket Maker or equivalent to the sealing surface of the transmission case. Do not over apply sealant.

(13) Install isolator plate onto the transmission case, metal side down.

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

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

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

(17) Install shift lever boot and bezel.

(18) Connect battery negative cable.

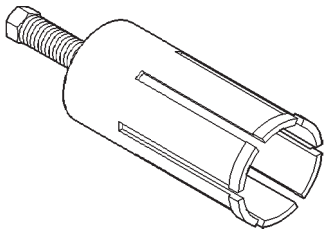
SPECIFICATIONS

TORQUE SPECIFICATIONS

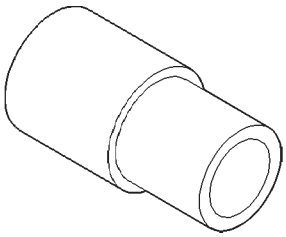
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Plug, Crossover Cam and Detent	48	35	-
Bolt, Input Retainer	28	20	-
Bolt, 5-6 Crossover Bracket	28	20	-
Bolt, Clutch Housing	48	35	-
Bolt, Extension/Adapter Housing	48	35	-
Bolt, Shift Tower	9	7	80
Switch, Back-up Lamp	28	20	-
Bolt, Shift Blocker	55	41	-
Bolt, PTO Cover	40	30	-
Pivot, Clutch Release Lever	22	16	-
Plug, Fill	30	22	-
Nut, Output Shaft	339	250	-

MANUAL - NV5600 (Continued)

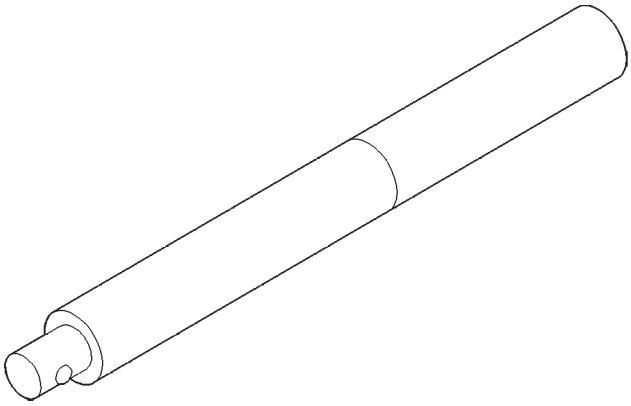
SPECIAL TOOLS



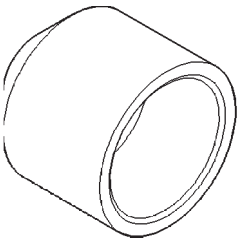
REMOVER 8155



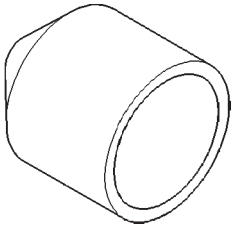
INSTALLER 8156



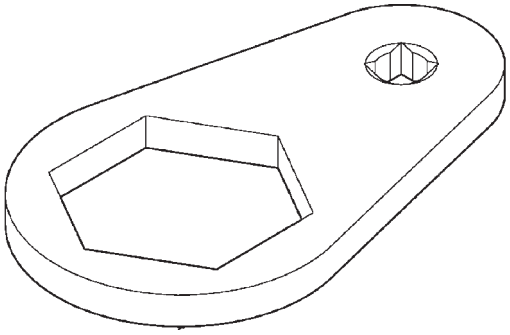
HANDLE C-4171



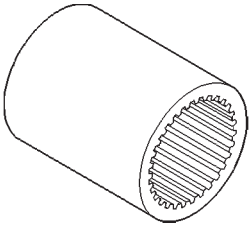
INSTALLER C-3972-A



INSTALLER 8154

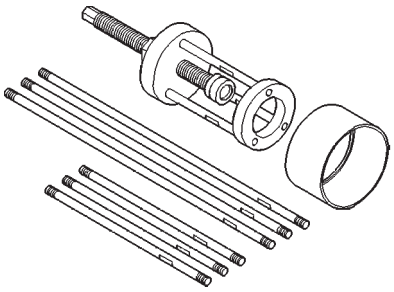


WRENCH 8226

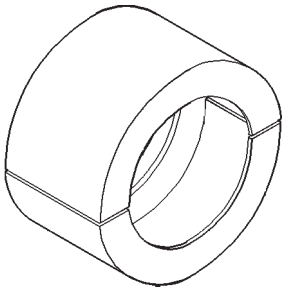


SOCKET 6984

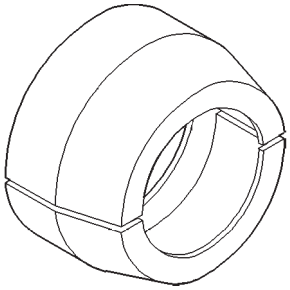
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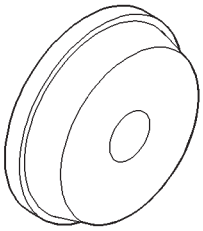
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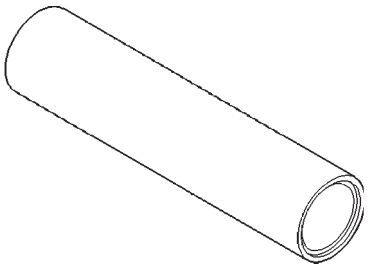
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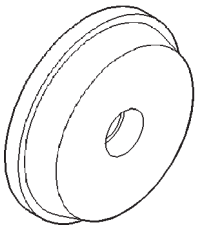
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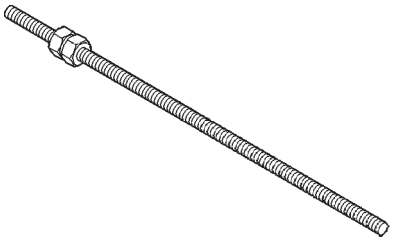
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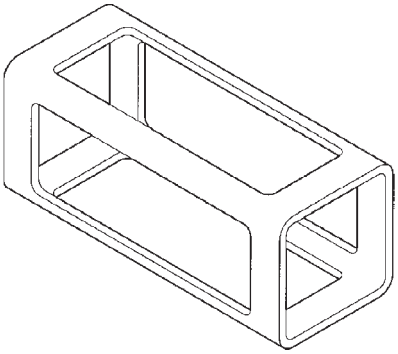
INSTALLER 6448



INSTALLER C-4308

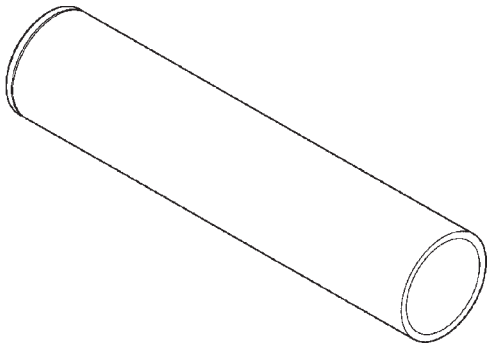


EXTENSION ROD 8161

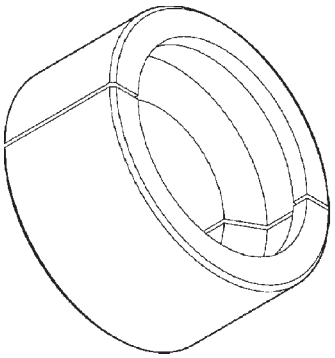


FIXTURE 8227

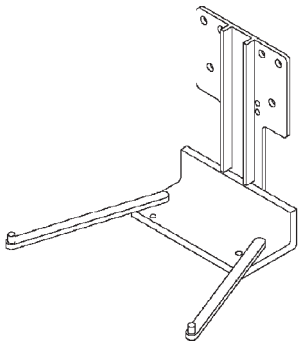
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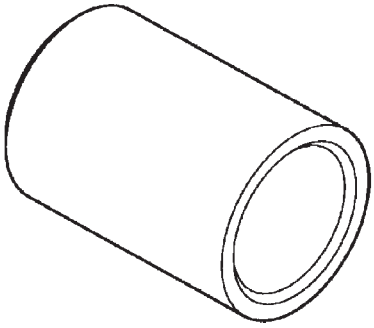
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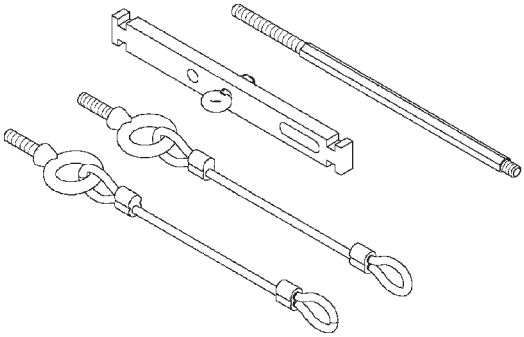
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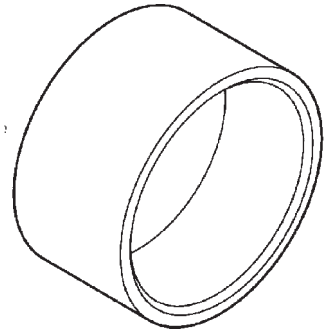
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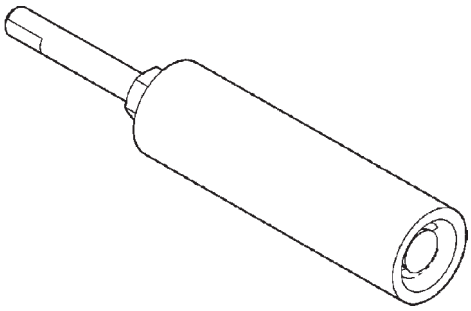
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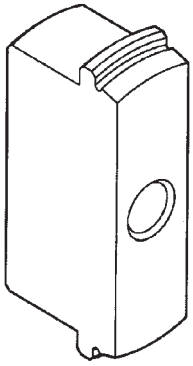
ADAPTER 8232



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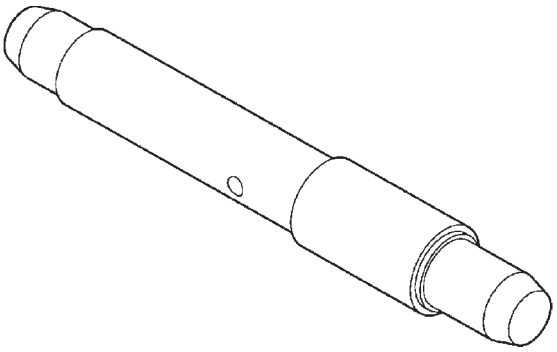


REMOVER 8233

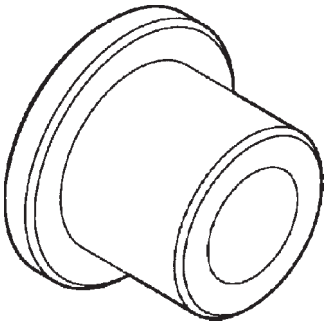


INSTALLER/REMOVER 8237

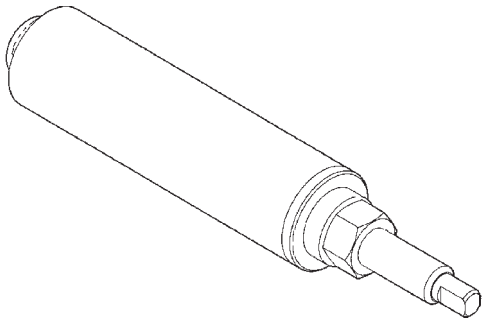
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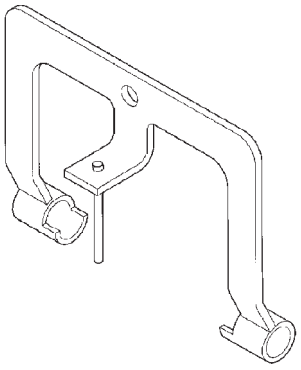
INSTALLER/REMOVER 8238



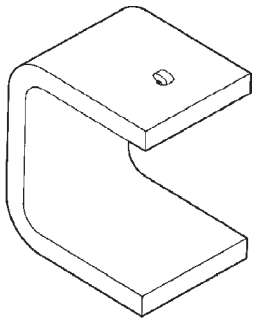
INSTALLER 8239



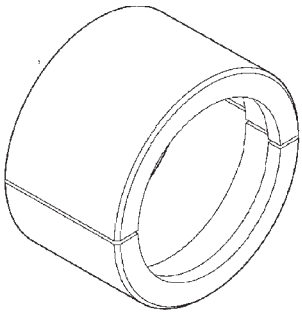
REMOVER 8240



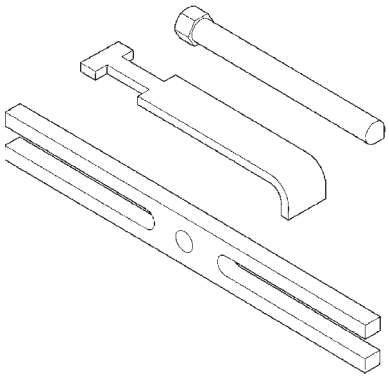
FIXTURE 8241



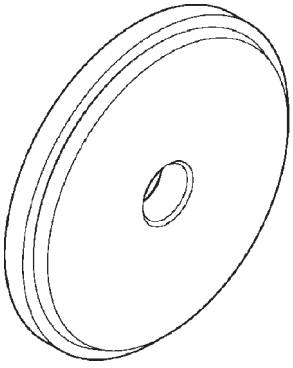
HOLDING TOOL 8242



REMOVER 8243

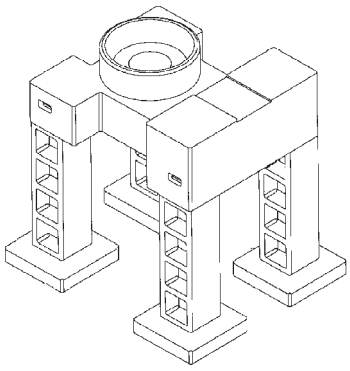


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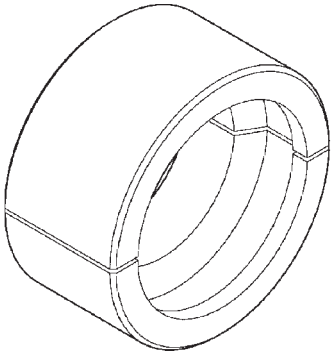


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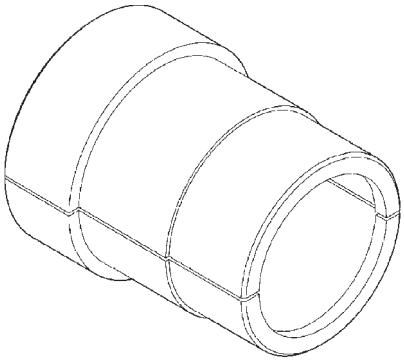
MANUAL - NV5600 (Continued)



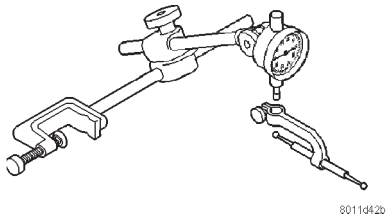
SUPPORT STAND 8246



REMOVER 8262



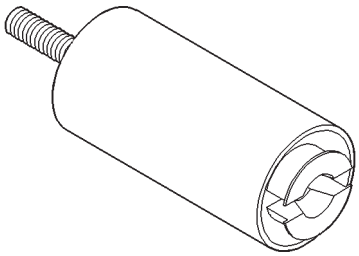
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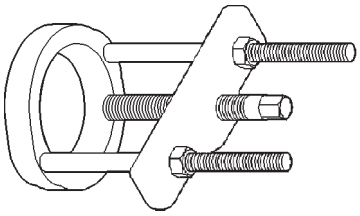
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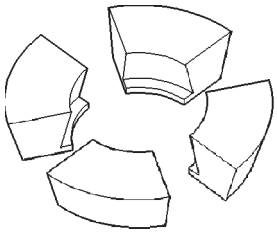
INSTALLER C-4965



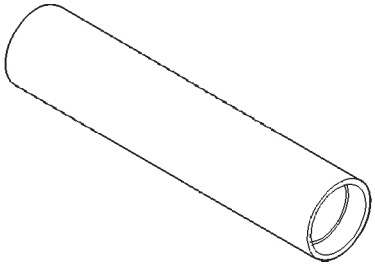
REMOVER L-4518



PULLER C-293-PA



ADAPTERS C-293-52



INSTALLER MD998805

ADAPTER HOUSING SEAL - NV5600

REMOVAL

(1) Raise and support vehicle.
(2) Mark propeller shaft and yokes for installation reference and remove shaft.
(3) Remove the transfer case.
(4) Remove the adapter housing seal with a pry tool or slide hammer with a screw.

INSTALLATION

(1) Install adapter housing seal with Installer and Handle C-4171.
(2) Install transfer case.
(3) Install propeller shaft with reference marks aligned.
(4) Check fluid level.
(5) Remove support and lower vehicle.

EXTENSION HOUSING SEAL - NV5600

REMOVAL

(1) Raise and support vehicle.
(2) Mark propeller shaft and pinion yoke for installation reference and remove the propeller shaft.
(3) Remove extension housing seal with a pry tool or a slide hammer and screw.
(4) Remove extension housing bushing with Remover 8155 (Fig. 99).

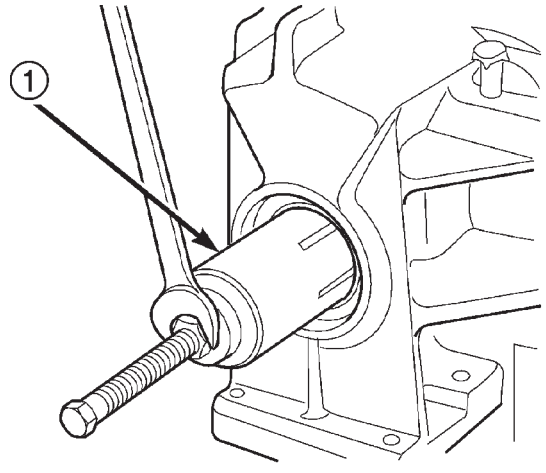


Fig. 99 EXTENSION HOUSING

1 - REMOVER

INSTALLATION

(1) Install extension housing bushing with Installer 8156 and Handle C-4171 (Fig. 100).

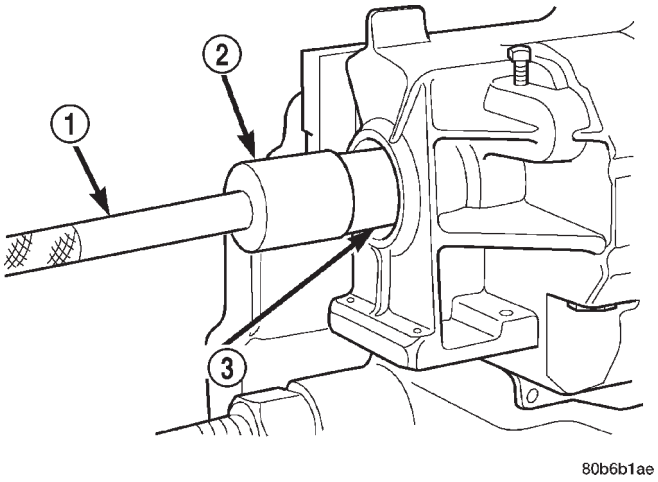


Fig. 100 EXTENSION HOUSING BUSHING

1 - HANDLE
2 - INSTALLER
3 - BUSHING

(2) Install extension housing seal with Installer 8154 and Handle C-4171 (Fig. 101).

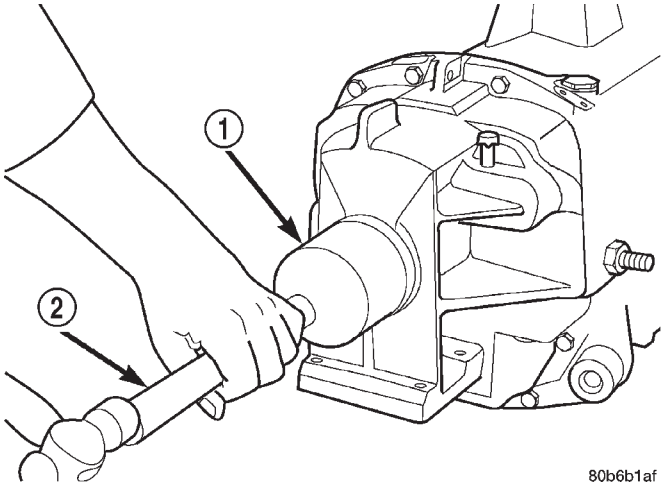


Fig. 101 EXTENSION HOUSING SEAL

1 - INSTALLER
2 - HANDLE

(3) Install propeller shaft with reference marks aligned.
(4) Check and fill transmission.
(5) Remove support and lower vehicle.

SHIFT COVER - NV5600

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 gear case.

(5) Remove the shift tower (Fig. 102) and isolator plate (Fig. 103) from the transmission.

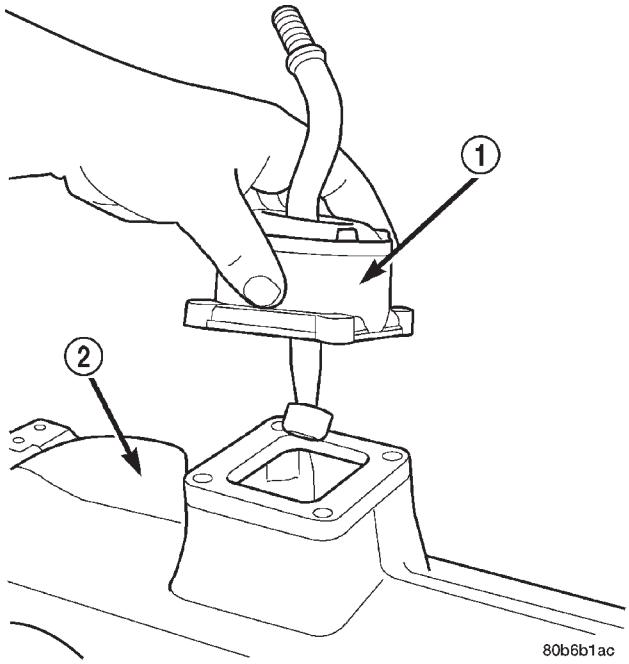


Fig. 102 SHIFT TOWER

1 - SHIFT TOWER
2 - TRANSMISSION

INSTALLATION

(1) Shift transmission into third gear.

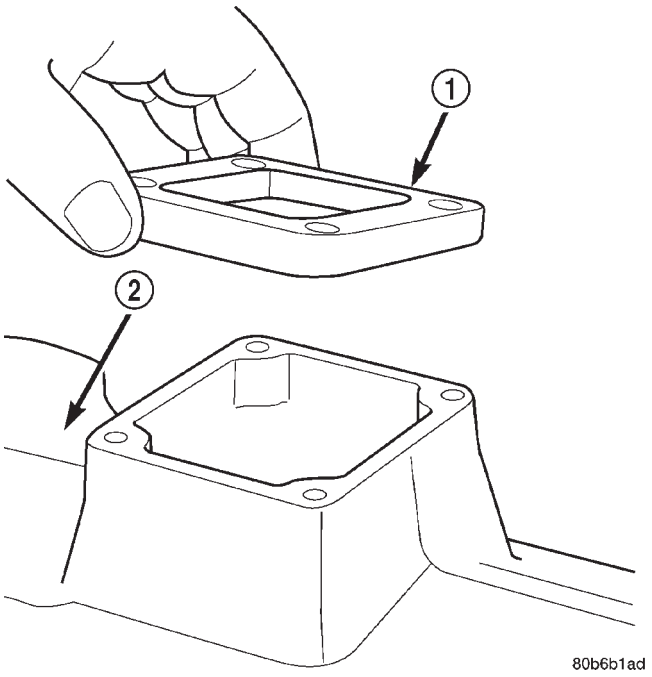


Fig. 103 SHIFT TOWER ISOLATOR PLATE

1 - ISOLATOR PLATE
2 - TRANSMISSION

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

(3) Apply Mopar Gasket Maker or equivalent to the sealing surface of the transmission. Do not over apply sealant.

(4) Install isolator plate onto the transmission, metal side down.

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

(6) Verify shift tower, isolator plate and shift tower bushings are properly aligned.

(7) Install shift tower bolts and tighten the shift tower bolts to 8-10 N·m (7-9 ft. lbs.).

(8) Install shift lever extension, shift boot and bezel.

AUTOMATIC TRANSMISSION - 46RE

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AUTOMATIC TRANSMISSION - 46RE

DESCRIPTION

The 46RE (Fig. 1) is a four speed fully automatic transmissions with an electronic governor. The 46RE is equipped with a lock-up clutch in the torque converter. 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 transmission contains a front, rear, and direct clutch which function as the input driving components. It also contains the kickdown (front) and the low/reverse (rear) bands which, along with the overrunning clutch and overdrive clutch, serve as the holding components. The driving and holding components combine to select the necessary planetary gear components, in the front, rear, or overdrive planetary gear set, transfer the engine power from the input shaft through to the output shaft.

The valve body is mounted to the lower side of the transmission and contains the valves to control pressure regulation, fluid flow control, and clutch/band application. The oil pump is mounted at the front of the transmission and is driven by the torque converter hub. The pump supplies the oil pressure necessary for clutch/band actuation and transmission lubrication.

AUTOMATIC TRANSMISSION - 46RE (Continued)

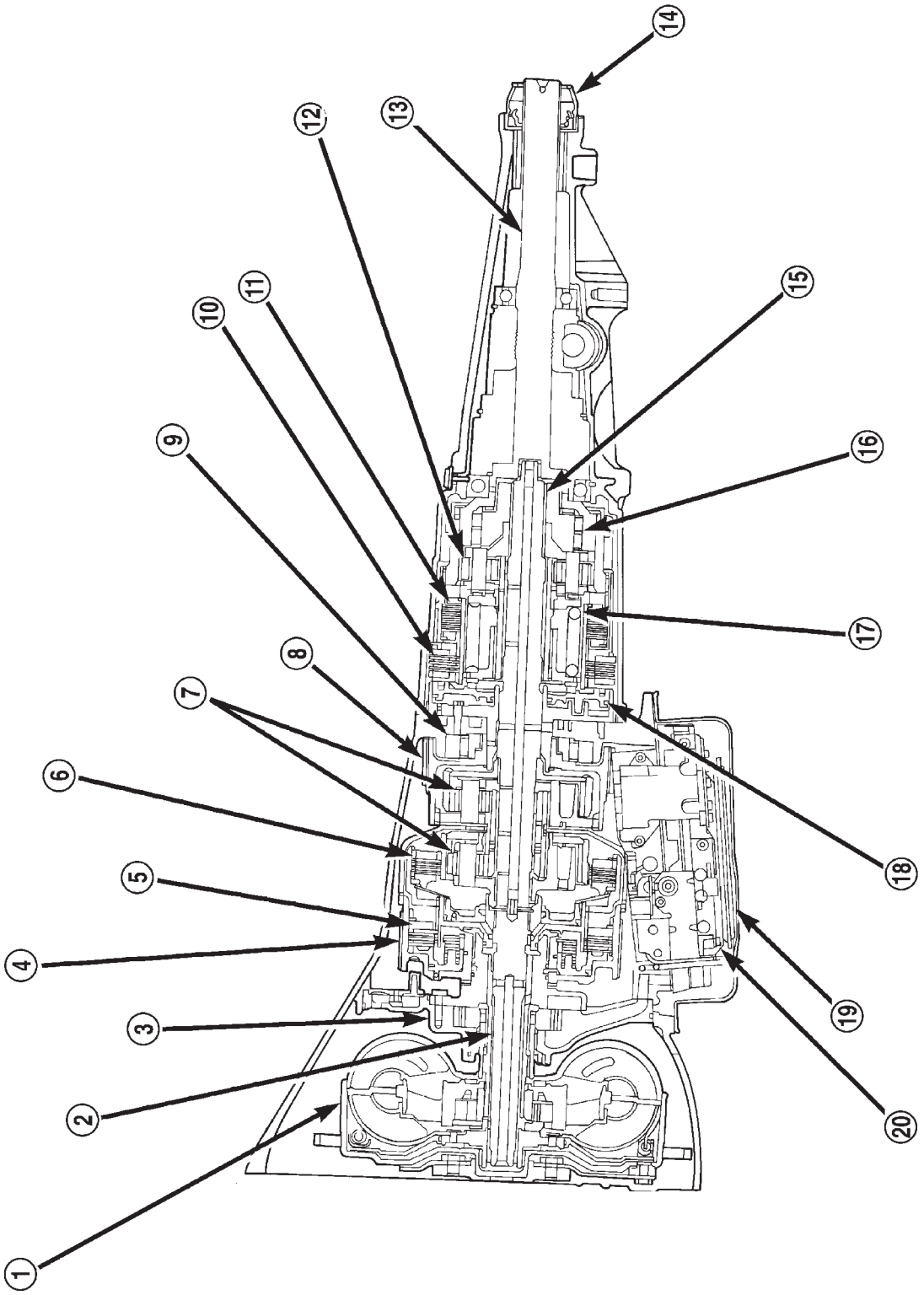


Fig. 1 46RE Transmission

AUTOMATIC TRANSMISSION - 46RE (Continued)

1 - TORQUE CONVERTER
2 - INPUT SHAFT
3 - OIL PUMP
4 - FRONT BAND
5 - FRONT CLUTCH
6 - REAR CLUTCH
7 - PLANETARIES
8 - REAR BAND
9 - OVERRUNNING CLUTCH
10 - OVERDRIVE CLUTCH
11 - DIRECT CLUTCH
12 - PLANETARY GEAR
13 - OUTPUT SHAFT
14 - SEAL
15 - INTERMEDIATE SHAFT
16 - OVERDRIVE OVERRUNNING CLUTCH
17 - DIRECT CLUTCH SPRING
18 - OVERDRIVE PISTON RETAINER
19 - FILTER
20 - VALVE BODY

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.

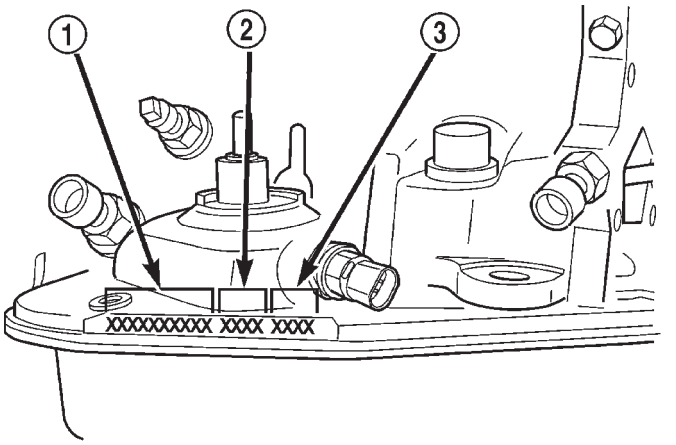


Fig. 2 Transmission Part And Serial Number Location

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

GEAR RATIOS

The 46RE gear ratios are:

1st 2.45:1
2nd 1.45:1
3rd 1.00:1
4th 0.69:1
Rev. 2.21

OPERATION

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

Since the overdrive clutch is applied in fourth gear only and the direct clutch is applied in all ranges except fourth gear, the transmission operation for park, neutral, and first through third gear will be described first. Once these powerflows are described, the third to fourth shift sequence will be described.

AUTOMATIC TRANSMISSION - 46RE (Continued)

PARK POWERFLOW

As the engine is running and the crankshaft is rotating, the flexplate and torque converter, which are also bolted to it, are all rotating in a clockwise direction as viewed from the front of the engine. The notched hub of the torque converter is connected to the oil pump's internal gear, supplying the transmission with oil pressure. As the converter turns, it turns the input shaft in a clockwise direction. As the input shaft is rotating, the front clutch hub-rear clutch retainer and all their associated parts are also rotating, all being directly connected to the input shaft. The power flow from the engine through the front clutch hub and rear clutch retainer stops at the rear clutch retainer. Therefore, no power flow to the output shaft occurs because no clutches are applied. The only mechanism in use at this time is the parking sprag (Fig. 3), which locks the parking gear on the output shaft to the transmission case.

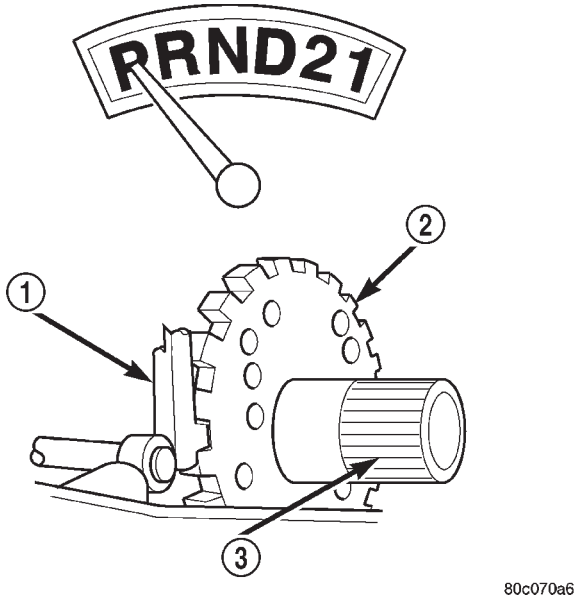


Fig. 3 Park Powerflow

1 - LEVER ENGAGED FOR PARK
2 - PARK SPRAG
3 - OUTPUT SHAFT

NEUTRAL POWERFLOW

With the gear selector in the NEUTRAL position (Fig. 4), the power flow of the transmission is essentially the same as in the park position. The only operational difference is that the parking sprag has been disengaged, unlocking the output shaft from the transmission case and allowing it to move freely.

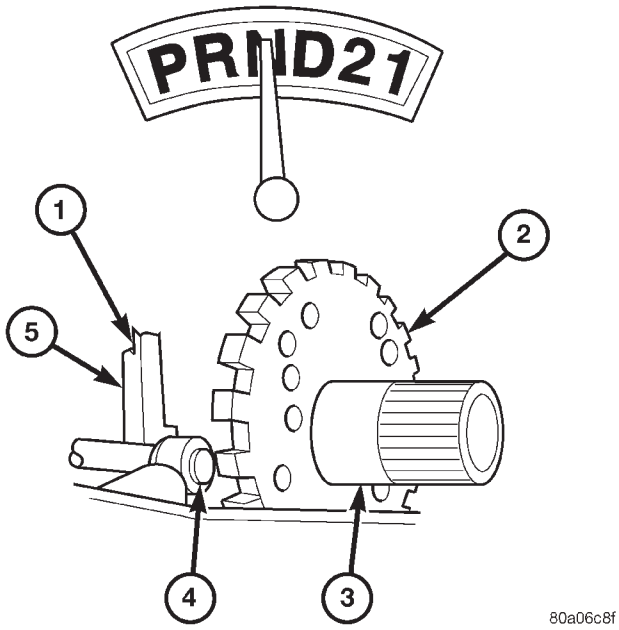


Fig. 4 Neutral Powerflow

1 - PAWL DISENGAGED FOR NEUTRAL
2 - PARK SPRAG
3 - OUTPUT SHAFT
4 - CAM
5 - PAWL

REVERSE POWERFLOW

When the gear selector is moved into the REVERSE position (Fig. 5), the front clutch and the rear band are applied. With the application of the front clutch, engine torque is applied to the sun gear, turning it in a clockwise direction. The clockwise rotation of the sun gear causes the rear planet pinions to rotate against engine rotation in a counterclockwise direction. The rear band is holding the low reverse drum, which is splined to the rear carrier. Since the rear carrier is being held, the torque from the planet pinions is transferred to the rear annulus gear, which is splined to the output shaft. The output shaft in turn rotates with the annulus gear in a counterclockwise direction giving a reverse gear output. The entire transmission of torque is applied to the rear planetary gearset only. Although there is torque input to the front gearset through the sun gear, no other member of the gearset is being held. During the entire reverse stage of operation, the front planetary gears are in an idling condition.

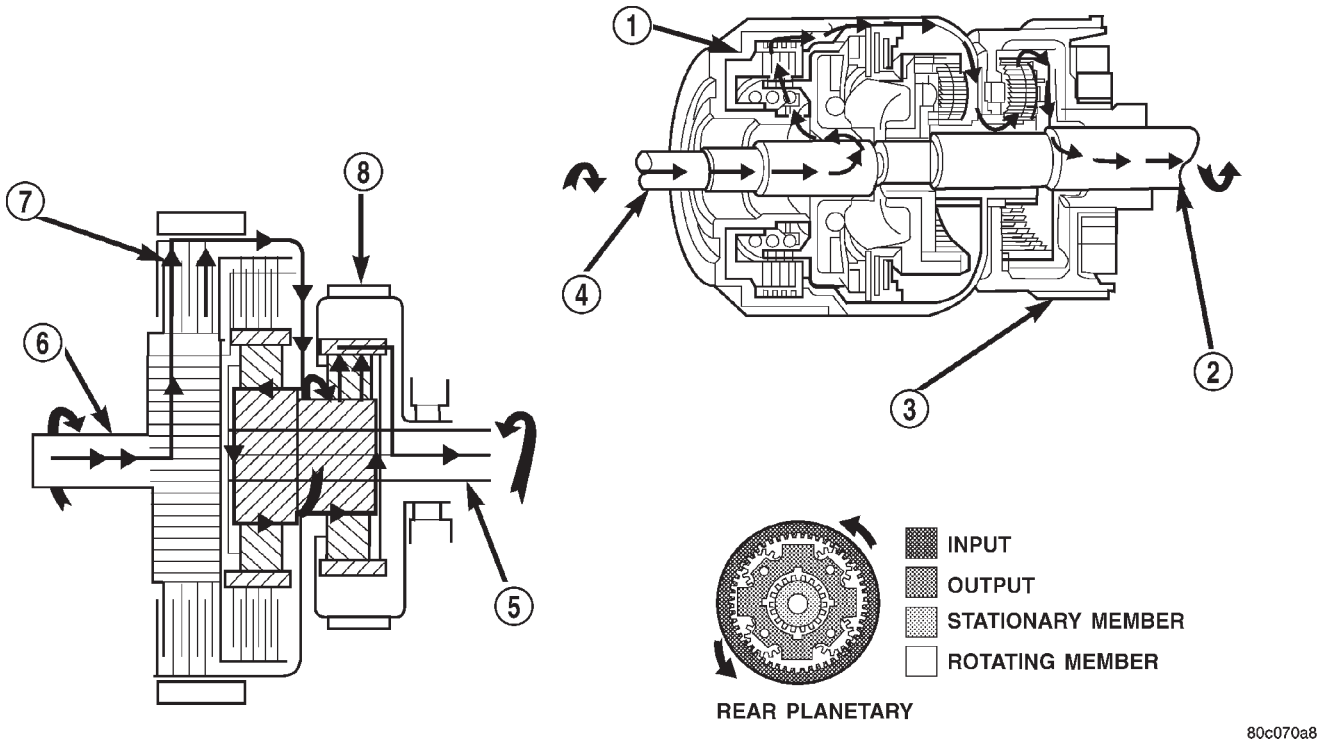


Fig. 5 Reverse Powerflow

1 - FRONT CLUTCH ENGAGED
2 - OUTPUT SHAFT
3 - LOW/REVERSE BAND APPLIED
4 - INPUT SHAFT
5 - OUTPUT SHAFT
6 - INPUT SHAFT
7 - FRONT CLUTCH ENGAGED
8 - LOW/REVERSE BAND APPLIED

FIRST GEAR POWERFLOW

When the gearshift lever is moved into the DRIVE position the transmission goes into first gear (Fig. 6). As soon as the transmission is shifted from PARK or NEUTRAL to DRIVE, the rear clutch applies, applying the rear clutch pack to the front annulus gear. Engine torque is now applied to the front annulus gear turning it in a clockwise direction. With the front annulus gear turning in a clockwise direction, it causes the front planets to turn in a clockwise direction. The rotation of the front planets cause the sun to revolve in a counterclockwise direction. The sun gear now transfers its counterclockwise rotation to the rear planets which rotate back in a clockwise direction. With the rear annulus gear stationary, the rear planet rotation on the annulus gear causes the rear planet carrier to revolve in a counterclockwise direction. The rear planet carrier is splined into the low-reverse drum, and the low reverse drum is splined to the inner race of the over-running clutch. With the over-running clutch locked, the planet carrier is held, and the resulting torque provided by the planet pinions is transferred to the rear annulus gear. The rear annulus gear is splined to the output shaft and rotated along with it (clockwise) in an underdrive gear reduction mode.

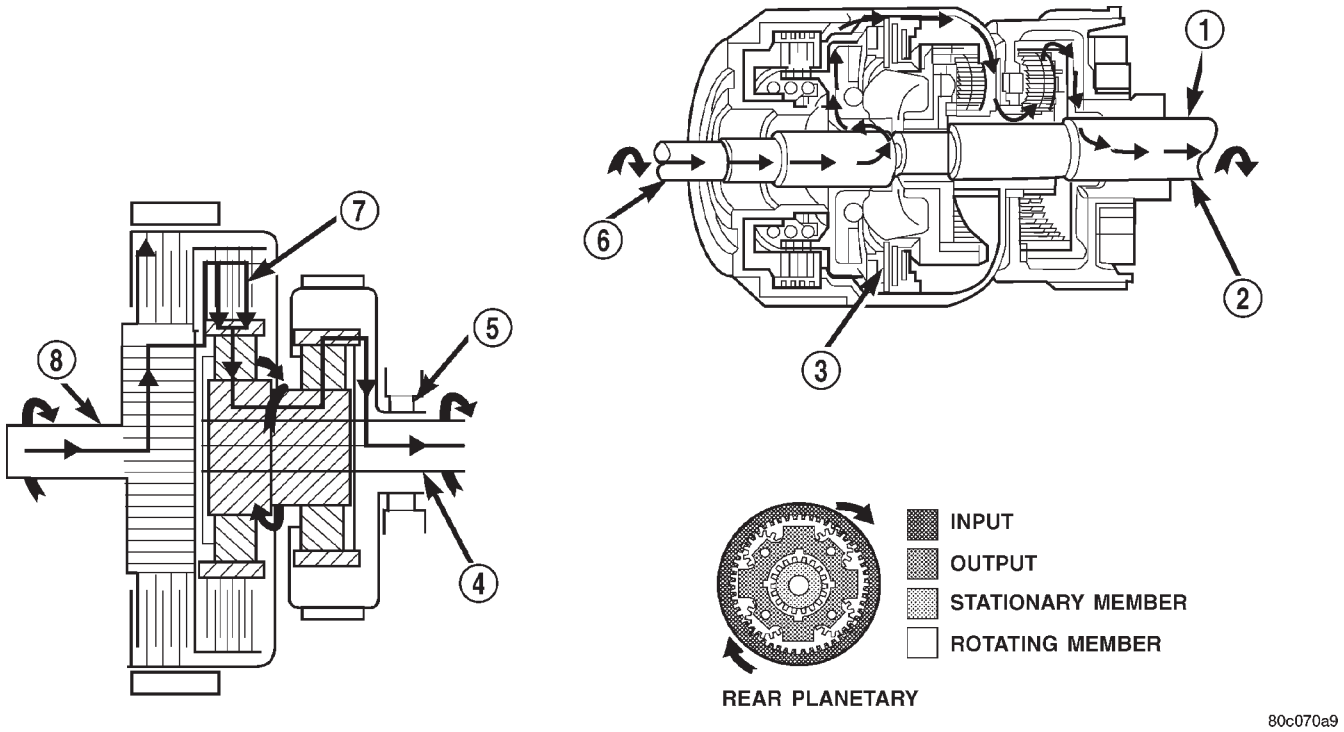


Fig. 6 First Gear Powerflow

1 - OUTPUT SHAFT
2 - OVER-RUNNING CLUTCH HOLDING
3 - REAR CLUTCH APPLIED
4 - OUTPUT SHAFT
5 - OVER-RUNNING CLUTCH HOLDING
6 - INPUT SHAFT
7 - REAR CLUTCH APPLIED
8 - INPUT SHAFT

SECOND GEAR POWERFLOW

In DRIVE-SECOND (Fig. 7), the same elements are applied as in MANUAL-SECOND. Therefore, the power flow will be the same, and both gears will be discussed as one in the same. In DRIVE-SECOND, the transmission has proceeded from first gear to its shift point, and is shifting from first gear to second. The second gear shift is obtained by keeping the rear clutch applied and applying the front (kickdown) band. The front band holds the front clutch retainer that is locked to the sun gear driving shell. With the rear clutch still applied, the input is still on the front annulus gear turning it clockwise at engine speed. Now that the front band is holding the sun gear stationary, the annulus rotation causes the front planets to rotate in a clockwise direction. The front carrier is then also made to rotate in a clockwise direction but at a reduced speed. This will transmit the torque to the output shaft, which is directly connected to the front planet carrier. The rear planetary annulus gear will also be turning because it is directly splined to the output shaft. All power flow has occurred in the front planetary gear set during the drive-second stage of operation, and now the over-running clutch, in the rear of the transmission, is disengaged and freewheeling on its hub.

AUTOMATIC TRANSMISSION - 46RE (Continued)

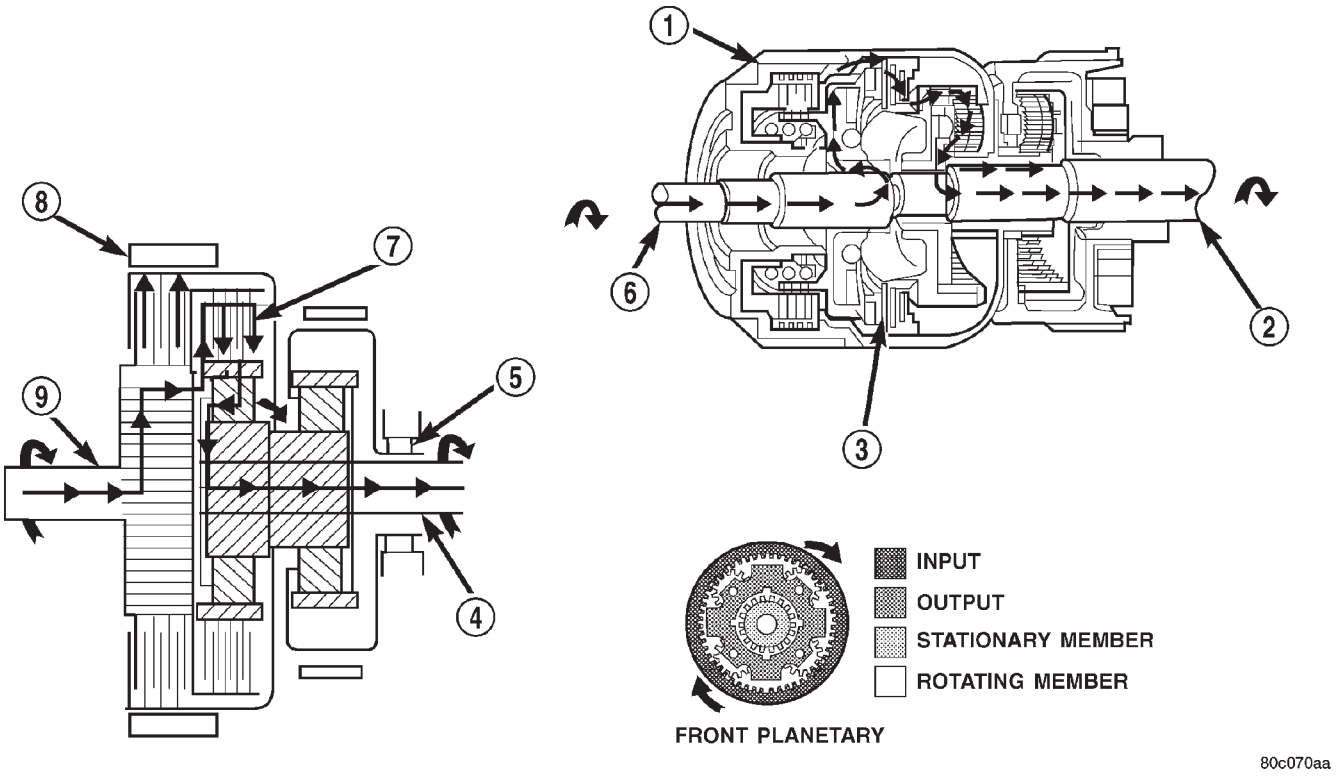


Fig. 7 Second Gear Powerflow

1 - KICKDOWN BAND APPLIED
2 - OUTPUT SHAFT
3 - REAR CLUTCH ENGAGED
4 - OUTPUT SHAFT
5 - OVER-RUNNING CLUTCH FREE-WHEELING
6 - INPUT SHAFT
7 - REAR CLUTCH APPLIED
8 - KICKDOWN BAND APPLIED
9 - INPUT SHAFT

DIRECT DRIVE POWERFLOW

The vehicle has accelerated and reached the shift point for the 2-3 upshift into direct drive (Fig. 8). When the shift takes place, the front band is released, and the front clutch is applied. The rear clutch stays applied as it has been in all the forward gears. With the front clutch now applied, engine torque is now on the front clutch retainer, which is locked to the sun gear driving shell. This means that the sun gear is now turning in engine rotation (clockwise) and at engine speed. The rear clutch is still applied so engine torque is also still on the front annulus gear. If two members of the same planetary set are driven, direct drive results. Therefore, when two members are rotating at the same speed and in the same direction, it is the same as being locked up. The rear planetary set is also locked up, given the sun gear is still the input, and the rear annulus gear must turn with the output shaft. Both gears are turning in the same direction and at the same speed. The front and rear planet pinions do not turn at all in direct drive. The only rotation is the input from the engine to the connected parts, which are acting as one common unit, to the output shaft.

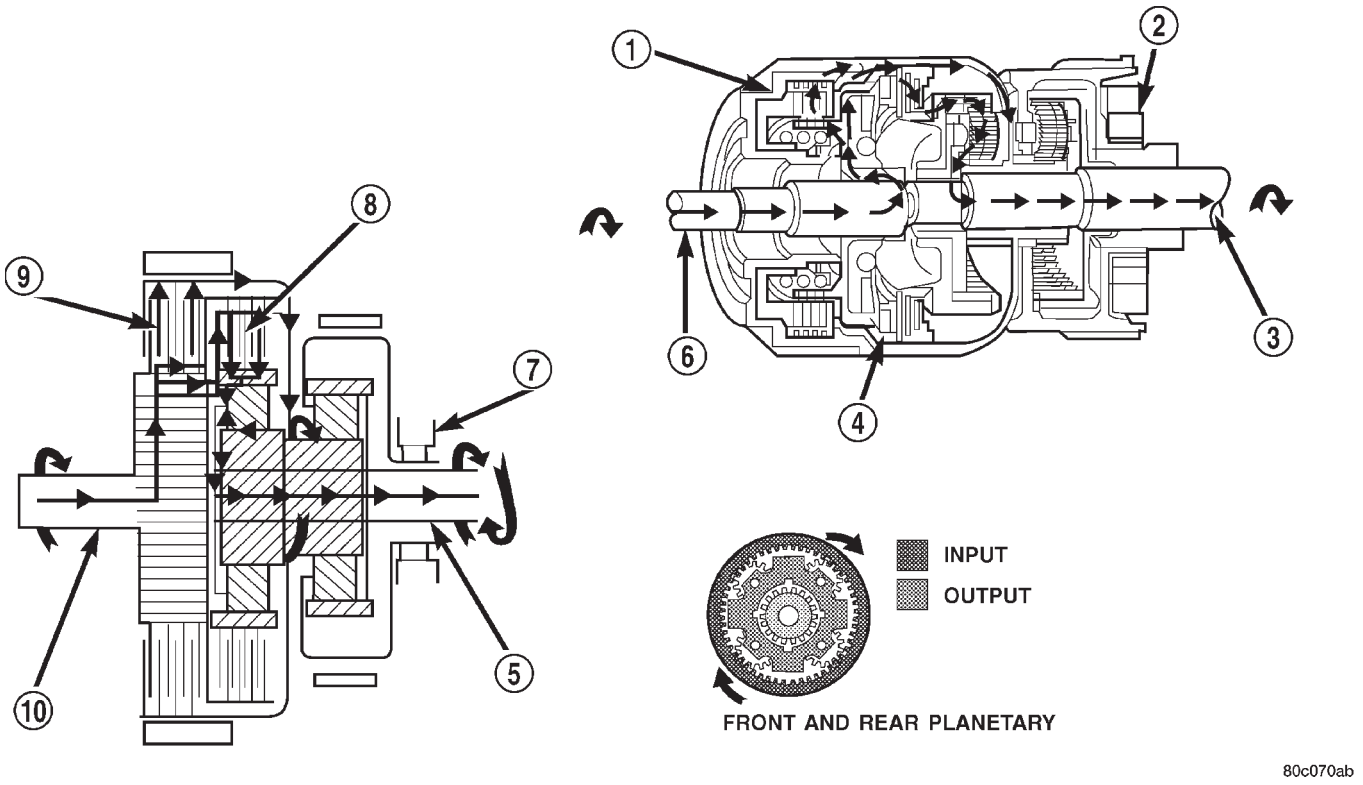


Fig. 8 Direct Drive Powerflow

1 - FRONT CLUTCH APPLIED
2 - OVER-RUNNING CLUTCH FREE-WHEELING
3 - OUTPUT SHAFT
4 - REAR CLUTCH APPLIED
5 - OUTPUT SHAFT
6 - INPUT SHAFT
7 - OVER-RUNNING CLUTCH FREE-WHEELING
8 - REAR CLUTCH APPLIED
9 - FRONT CLUTCH APPLIED
10 - INPUT SHAFT

FOURTH GEAR POWERFLOW

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 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.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - AUTOMATIC TRANSMISSION

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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

DIAGNOSIS AND TESTING - PRELIMINARY

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 hydraulic pressure test if shift problems were noted during road test.

(6) Perform air-pressure test to check clutch-band operation.

VEHICLE IS DISABLED

(1) Check fluid level and condition.

(2) Check for broken or disconnected gearshift or throttle linkage.

(3) Check for cracked, leaking cooler lines, or loose or missing pressure-port plugs.

(4) Raise and support vehicle on safety stands, start engine, shift transmission into gear, and note following:

(a) If propeller shaft turns but wheels do not, problem is with differential or axle shafts.

(b) If propeller shaft does not turn and transmission is noisy, stop engine. Remove oil pan, and check for debris. If pan is clear, remove transmission and check for damaged drive plate, converter, oil pump, or input shaft.

(c) If propeller shaft does not turn and transmission is not noisy, perform hydraulic-pressure test to determine if problem is hydraulic or mechanical.

DIAGNOSIS AND TESTING - 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.

CLUTCH AND BAND APPLICATION CHART

SHIFT LEVER POSITION	TRANSMISSION CLUTCHES AND BANDS					OVERDRIVE CLUTCHES		
	FRONT CLUTCH	FRONT BAND	REAR CLUTCH	REAR BAND	OVER-RUNNING CLUTCH	OVER-DRIVE CLUTCH	DIRECT CLUTCH	OVER-RUNNING CLUTCH
Reverse	X			X			X	
Drive - First			X		X		X	X
Drive - Second		X	X				X	X
Drive - Third	X		X				X	X
Drive - Fourth	X		X			X		
Manual Second		X	X		X		X	X
Manual First			X	X	X		X	X

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.

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.

DIAGNOSIS AND TESTING - 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. 9).

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.

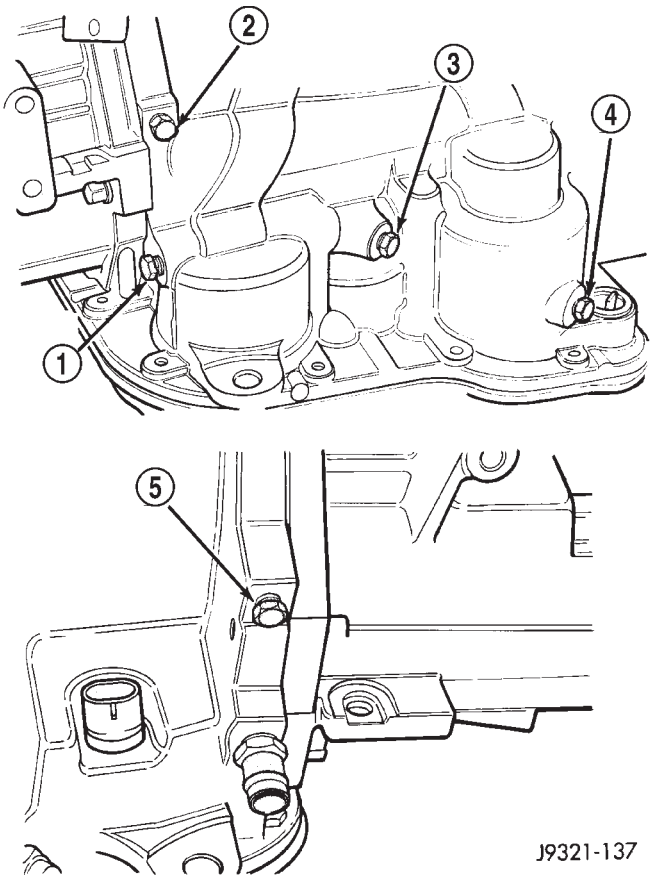


Fig. 9 Pressure Test Port Locations

1 - REAR SERVO TEST PORT
2 - GOVERNOR TEST PORT
3 - ACCUMULATOR TEST PORT
4 - FRONT SERVO TEST PORT
5 - OVERDRIVE CLUTCH TEST PORT

Test One - Transmission In Manual Low

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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

(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:

- 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

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

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

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 C-3292 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.

Test Five - Governor Pressure

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

This test checks line pressure at the overdrive clutch in fourth gear range. Use 300 psi Test Gauge C-3293-SP 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 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

DIAGNOSIS AND TESTING - 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. 10).

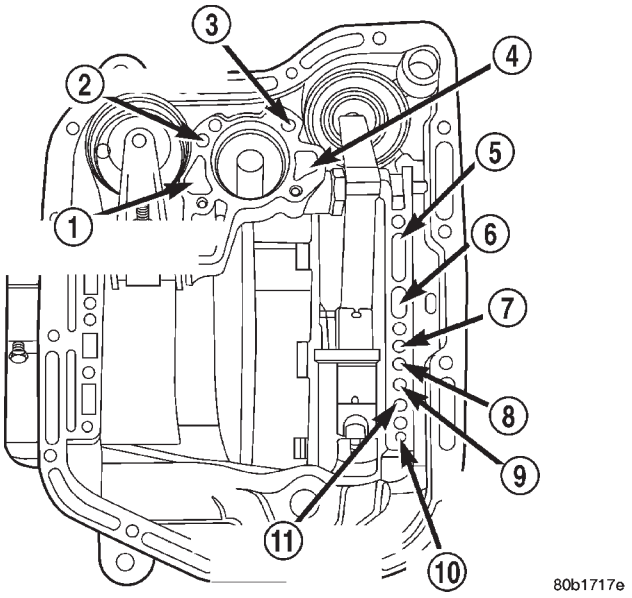


Fig. 10 Air Pressure Test Passages

1 - LINE PRESSURE TO ACCUMULATOR
2 - REAR SERVO APPLY
3 - FRONT SERVO APPLY
4 - FRONT SERVO RELEASE
5 - PUMP SUCTION
6 - PUMP PRESSURE
7 - FRONT CLUTCH APPLY
8 - REAR CLUTCH APPLY
9 - TO TORQUE CONVERTOR
10 - TO COOLER
11 - FROM TORQUE CONVERTER

AUTOMATIC TRANSMISSION - 46RE (Continued)

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 tighten around the drum. Spring pressure should release the servo when air pressure is removed.

DIAGNOSIS AND TESTING - CONVERTER HOUSING FLUID LEAK

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 body leaks follow the same path as a seal leak (Fig. 11). Pump vent or pump attaching bolt leaks are generally deposited on the inside of the converter housing and not on the converter itself (Fig. 11). Pump o-ring 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.

TORQUE CONVERTER LEAK POINTS

Possible sources of converter leaks are:

(1) Leaks at the weld joint around the outside diameter weld (Fig. 12).

(2) Leaks at the converter hub weld (Fig. 12).

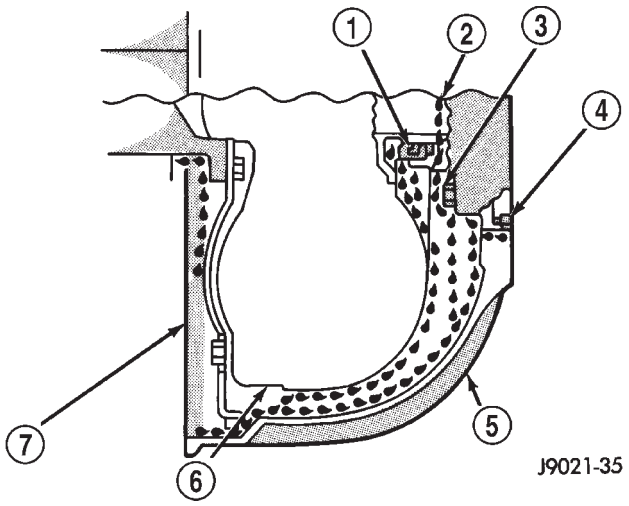


Fig. 11 Converter Housing Leak Paths

1 - PUMP SEAL
2 - PUMP VENT
3 - PUMP BOLT
4 - PUMP GASKET
5 - CONVERTER HOUSING
6 - CONVERTER
7 - REAR MAIN SEAL LEAK

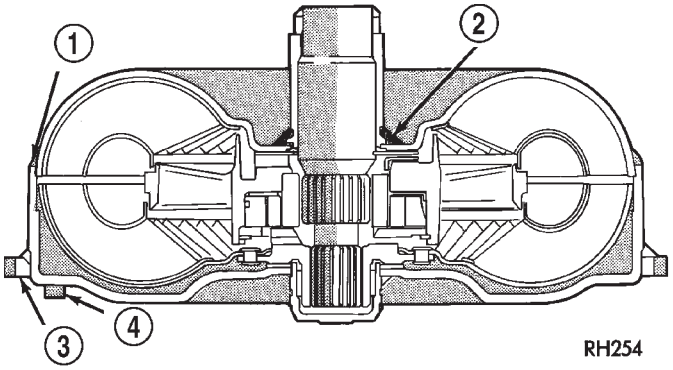


Fig. 12 Converter Leak Points - Typical

1 - OUTSIDE DIAMETER WELD
2 - TORQUE CONVERTER HUB WELD
3 - STARTER RING GEAR
4 - LUG

CONVERTER HOUSING AREA LEAK CORRECTION

(1) Remove converter.

(2) Tighten front band adjusting screw until band is tight around front clutch retainer. This prevents front/rear clutches from coming out when oil pump is removed.

(3) Remove oil pump and remove pump seal. Inspect pump housing drainback and vent holes for obstructions. Clear holes with solvent and wire.

(4) Inspect pump bushing and converter hub. If bushing is scored, replace it. If converter hub is

scored, either polish it with crocus cloth or replace converter.

(5) Install new pump seal, O-ring, and gasket. Replace oil pump if cracked, porous or damaged in any way. Be sure to loosen the front band before installing the oil pump, damage to the oil pump seal may occur if the band is still tightened to the front clutch retainer.

(6) Loosen kickdown lever pin access plug three turns. Apply Loctite™ 592, or Permatex® No. 2 to plug threads and tighten plug to 17 N·m (150 in. lbs.) torque.

(7) Adjust front band.

(8) Lubricate pump seal and converter hub with transmission fluid or petroleum jelly and install converter.

(9) Install transmission and converter housing dust shield.

(10) Lower vehicle.

DIAGNOSIS AND TESTING - DIAGNOSIS CHARTS

The diagnosis charts provide additional reference when diagnosing a transmission fault. The charts provide general information on a variety of transmission, overdrive unit and converter clutch fault conditions.

The hydraulic flow charts in the Schematics and Diagrams section of this group, outline fluid flow and hydraulic circuitry. Circuit operation is provided for PARK, NEUTRAL, FIRST, SECOND, THIRD, FOURTH, MANUAL FIRST, MANUAL SECOND, and REVERSE gear ranges. Normal working pressures are also supplied for each of the gear ranges.

DIAGNOSIS CHARTS

CONDITION	POSSIBLE CAUSES	CORRECTION
HARSH ENGAGEMENT (FROM NEUTRAL TO DRIVE OR REVERSE)	1. Fluid Level Low.	1. Add Fluid
	2. Throttle Linkage Mis-adjusted.	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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 46RE (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 Mis-adjusted.	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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 46RE (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.
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 Mis-adjusted.	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 Mis-adjusted.	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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO REVERSE (D RANGES OK)	1. Gearshift Linkage/Cable Mis-adjusted/Damaged.	1. Repair or replace linkage parts as needed.
	2. Park Sprag Sticking.	2. Replace overdrive annulus gear.
	3. Rear Band Mis-adjusted/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.
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.
NO LOW GEAR (MOVES IN 2ND OR 3RD GEAR ONLY)	1. Governor Circuit Electrical Fault.	1. Test with DRB® scan tool and repair as required.
	2. Valve Body Malfunction.	2. Remove, clean and inspect. Look for sticking 1-2 shift valve, 2-3 shift valve, governor plug or broken springs.
	3. Front Servo Piston Cocked in Bore.	3. Inspect servo and repair as required.
	4. Front Band Linkage Malfunction	4. Inspect linkage and look for bind in linkage.

AUTOMATIC TRANSMISSION - 46RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO KICKDOWN OR NORMAL DOWNSHIFT	1. Throttle Linkage Mis-adjusted.	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.
STUCK IN LOW GEAR (WILL NOT UPSHIFT)	1. Throttle Linkage Mis-adjusted/ Stuck.	1. Adjust linkage and repair linkage if worn or damaged. Check for binding cable or missing return spring.
	2. Gearshift Linkage Mis-adjusted.	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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
BUZZING NOISE	1. Fluid Level Low	1. Add fluid and check for leaks.
	2. Shift Cable Mis-assembled.	2. Route cable away from engine and bell housing.
	3. Valve Body Mis-assembled.	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 Mis-adjusted.	2. Adjust linkage.
	3. Rear Band Mis-adjusted.	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.
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 Mis-adjusted.	3. Adjust linkage.
	4. Gearshift Linkage Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
SLIPS IN LOW GEAR ″D″ ONLY, BUT NOT IN MANUAL 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 Mis-adjusted.	8. Adjust bands.
DRAGS OR LOCKS UP	1. Fluid Level Low.	1. Check and adjust level.
	2. Clutch Dragging/Failed	2. Air pressure check clutch operation and repair as required.
	3. Front or Rear Band Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO 3-4 UPSHIFT	1. 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 Sense to PCM Wire Shorted/Cut.	6. Test switch/sensor 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.

AUTOMATIC TRANSMISSION - 46RE (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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 46RE (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 Mis-adjusted.	1. Adjust linkage/cable.
	2. Neutral Sense Wire Open/Cut.	2. Check continuity with test lamp. Repair as required.
	3. Park/Neutral Switch, or Transmission Range Sensor Faulty.	3. Refer to service section for test and replacement procedure.
	4. Park/Neutral Switch, or Transmission Range Sensor Connection 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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 46RE (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. Park/Neutral Switch, or Transmission Range Sensor 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.

STANDARD PROCEDURE - ALUMINUM THREAD REPAIR

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

Heli-Coil™, or equivalent, tools and inserts are readily available from most automotive parts suppliers.

REMOVAL

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

(1) Disconnect battery negative cable.

(2) Disconnect and lower or remove necessary exhaust components.

(3) Remove engine-to-transmission struts, if equipped (Fig. 13).

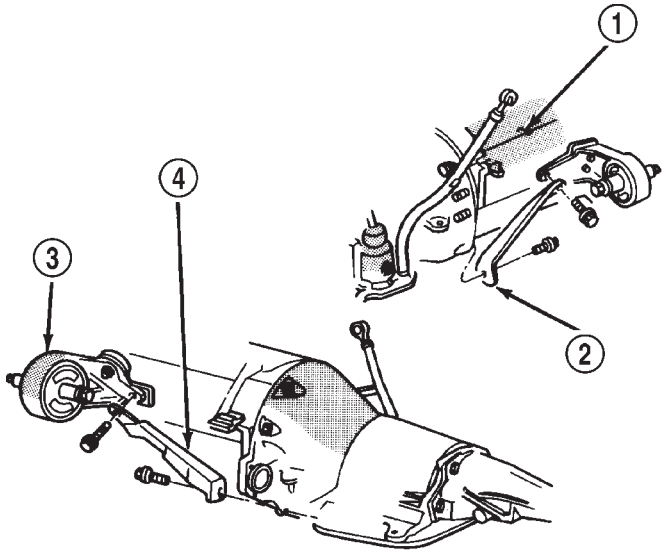


Fig. 13 Transmission-To-Engine Strut Attachment

1 - ENGINE BLOCK
2 - STRUT (PASSENGER SIDE)
3 - ENGINE MOUNT
4 - STRUT (DRIVER SIDE)

(4) Disconnect fluid cooler lines at transmission.

(5) Remove starter motor. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - REMOVAL)

(6) Disconnect and remove the crankshaft position sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/CRANKSHAFT POSITION SENSOR - REMOVAL) 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).

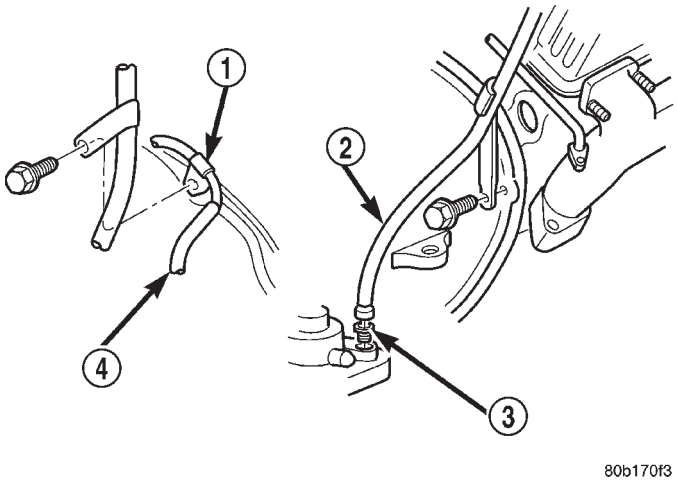


Fig. 14 Fill Tube Attachment

1 - TRANSFER CASE VENT TUBE
2 - FILL TUBE (V8)
3 - TUBE SEAL
4 - FILL TUBE (V6)

(10) 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.

(11) Mark propeller shaft and axle yokes for assembly alignment. Then disconnect and remove propeller shaft. On 4 x 4 models, remove both propeller shafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)

(12) Disconnect wires from park/neutral position switch and transmission solenoid.

AUTOMATIC TRANSMISSION - 46RE (Continued)

(13) Disconnect gearshift rod and torque shaft assembly from transmission.

(14) Disconnect throttle valve cable from transmission bracket and throttle valve lever.

(15) On 4 x 4 models, disconnect shift rod from transfer case shift lever.

(16) Support rear of engine with safety stand or jack.

(17) Raise transmission slightly with service jack to relieve load on crossmember and supports.

(18) 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.

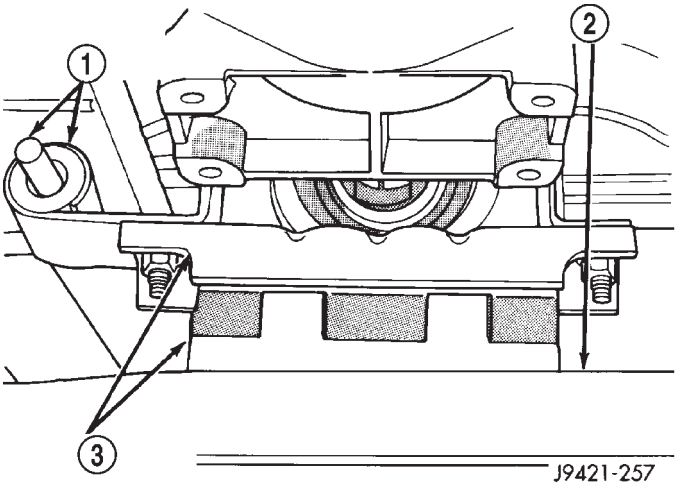


Fig. 15 Rear Support Cushion

1 - EXHAUST PIPE ARM AND BRACKET
2 - CROSSMEMBER
3 - REAR SUPPORT AND CUSHION

(19) Remove bolts attaching crossmember to frame and remove crossmember.

(20) On 4 x 4 models, remove transfer case with transmission jack or aid of helper.

(21) Remove all converter housing bolts.

(22) Carefully work transmission and torque converter assembly rearward off engine block dowels.

(23) Lower transmission and remove assembly from under the vehicle.

(24) To remove torque converter, remove C-clamp from edge of bell housing and carefully slide torque converter out of the transmission.

DISASSEMBLY

(1) Clean exterior of transmission with suitable solvent or pressure washer.

(2) Place transmission in vertical position.

(3) Measure the input shaft end play as follows (Fig. 16).

(a) Attach Adapter 8266-5 to Handle 8266-8.

(b) Attach dial indicator C-3339 to Handle 8266-8.

(c) Install the assembled tool onto the input shaft of the transmission and tighten the retaining screw on Adapter 8266-5 to secure it to the input shaft.

(d) Position the dial indicator plunger against a flat spot on the oil pump and zero the dial indicator.

(e) Move input shaft in and out and record reading. Record the maximum travel for assembly reference

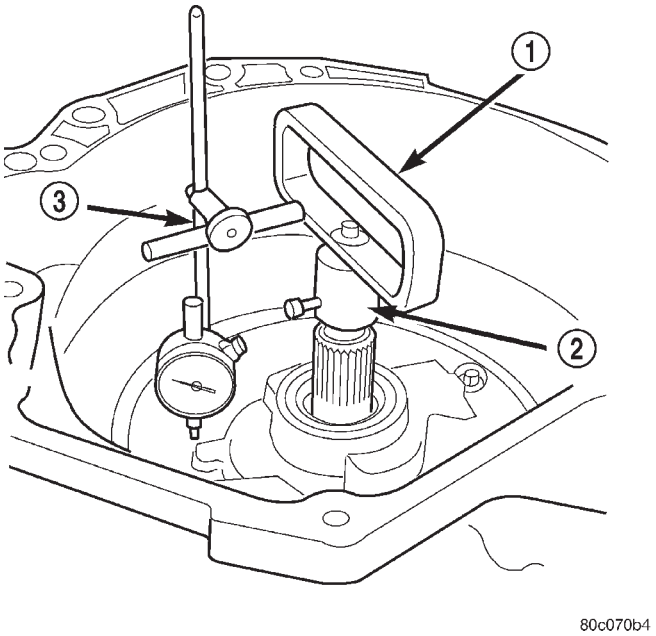


Fig. 16 Checking Input Shaft End Play

1 - TOOL 8266-8
2 - TOOL 8266-5
3 - TOOL C-3339

(4) Remove throttle and shift levers from valve body manual shaft and throttle lever shaft.

(5) Remove transmission oil pan and gasket.

(6) Remove filter from valve body (Fig. 17). Keep filter screws separate from other valve body screws. Filter screws are longer and should be kept with filter.

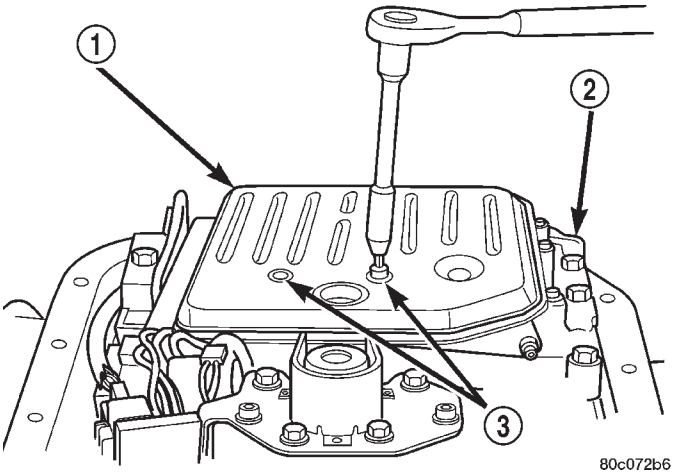


Fig. 17 Oil Filter Removal

1 - OIL FILTER
2 - VALVE BODY
3 - FILTER SCREWS (2)

(7) Remove park/neutral position switch and seal.

(8) Remove hex head bolts attaching valve body to transmission case (Fig. 18). A total of 10 bolts are used. Note different bolt lengths for assembly reference.

(9) Remove valve body assembly. Push valve body harness connector out of case. Then work park rod and valve body out of case (Fig. 19).

(10) Remove accumulator outer spring, piston and inner spring (Fig. 20). Note position of piston and springs for assembly reference. Remove and discard piston seals if worn or cut.

(11) Remove pump oil seal with suitable pry tool or slide-hammer mounted screw.

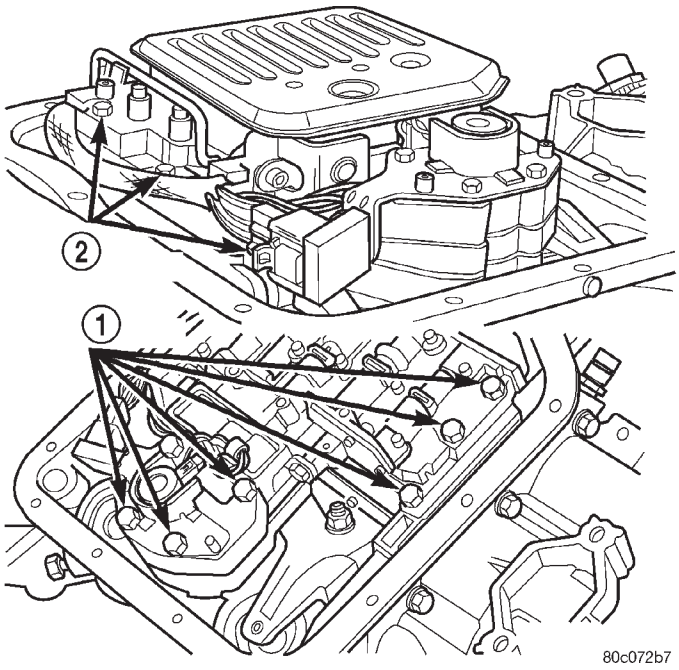


Fig. 18 Valve Body Bolt Locations

1 - VALVE BODY BOLTS
2 - VALVE BODY BOLTS

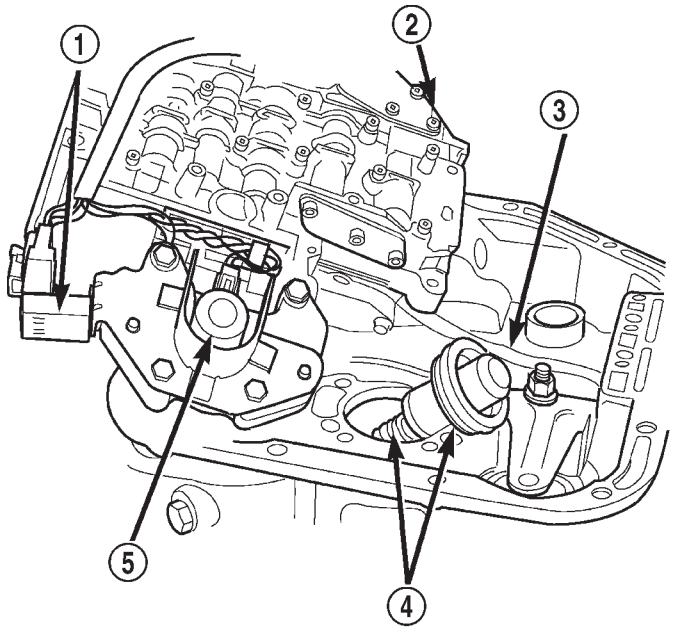


Fig. 19 Valve Body Removal

1 - GOVERNOR PRESSURE SENSOR
2 - VALVE BODY
3 - PARK ROD
4 - ACCUMULATOR PISTON
5 - GOVERNOR PRESSURE SOLENOID

AUTOMATIC TRANSMISSION - 46RE (Continued)

(12) Remove front band lever pin access plug (Fig. 21). Use square end of 1/4 in. drive extension to remove plug as shown.

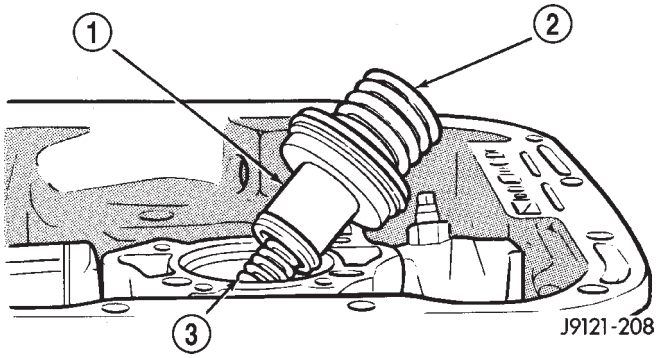


Fig. 20 Accumulator Component Removal

1 - ACCUMULATOR PISTON
2 - OUTER SPRING
3 - INNER SPRING

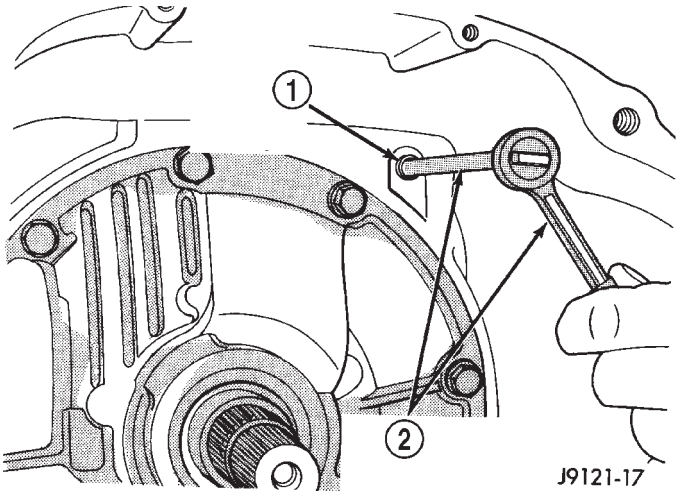


Fig. 21 Front Band Lever Pin Access Plug

1 - FRONT BAND REACTION PIN ACCESS PLUG
2 - 1/4 DRIVE EXTENSION AND RATCHET

(13) 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. 22). This will prevent retainer from coming out with pump and possibly damaging clutch or pump components.

(b) Remove oil pump bolts.

(c) Thread Slide Hammer Tools C-3752 into threaded holes in flange of oil pump housing (Fig. 23).

(d) Remove oil pump and reaction shaft support by bumping slide hammers outward alternately to pull pump from case (Fig. 24).

(14) Remove oil pump gasket (Fig. 25). Note gasket position in case for assembly reference.

(15) Loosen front band adjusting screw until band is completely loose.

(16) Remove front band strut and anchor (Fig. 26).

(17) Squeeze front band together slightly and slide band over front clutch retainer and out of case (Fig. 27).

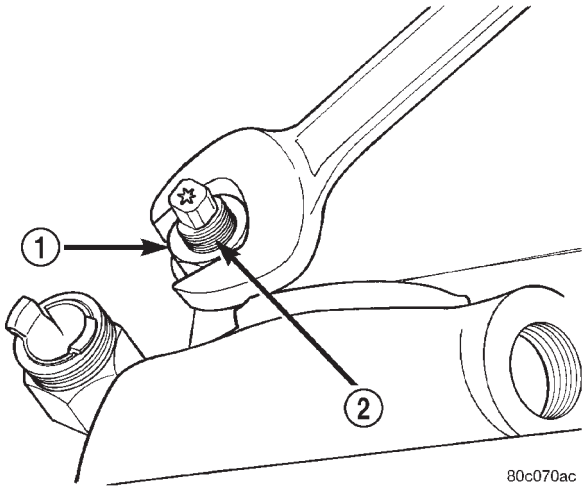


Fig. 22 Tightening Front Band To Hold Front Clutch In Place

1 - LOCK-NUT
2 - FRONT BAND ADJUSTER

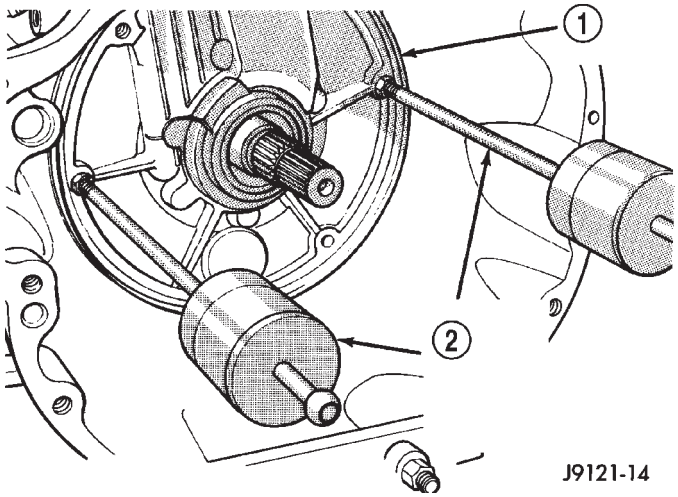


Fig. 23 Oil Pump Removal Tools

1 - PUMP HOUSING
2 - SLIDE HAMMER TOOLS (THREAD INTO PUMP HOUSING)

AUTOMATIC TRANSMISSION - 46RE (Continued)

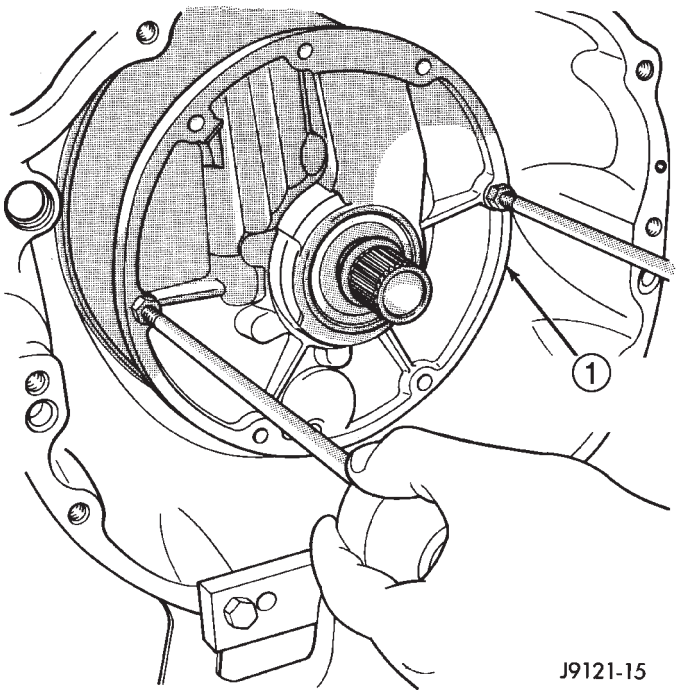


Fig. 24 Oil Pump Removal

1 - OIL PUMP AND REACTION SHAFT SUPPORT

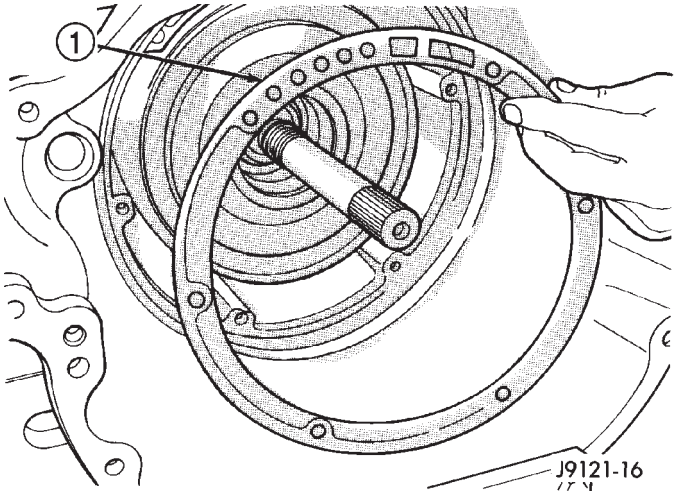


Fig. 25 Oil Pump Gasket

1 - OIL PUMP GASKET

(18) Remove front and rear clutch assemblies as a unit (Fig. 28).

(19) 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. 29).

(20) Remove intermediate shaft thrust washer. Triangular shaped washer will either be on shaft pilot hub or in rear clutch retainer (Fig. 30).

(21) Remove thrust plate from intermediate shaft hub (Fig. 31).

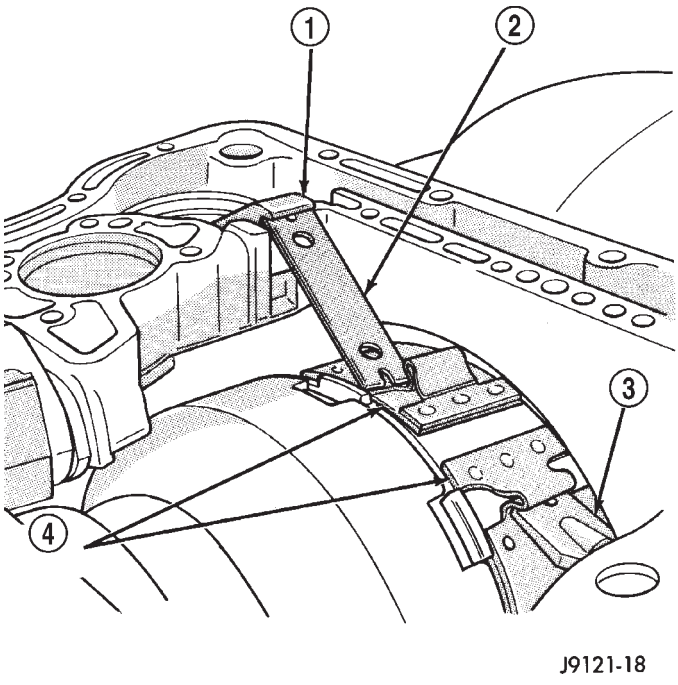


Fig. 26 Front Band Linkage

1 - LEVER
2 - STRUT
3 - ANCHOR
4 - FRONT BAND

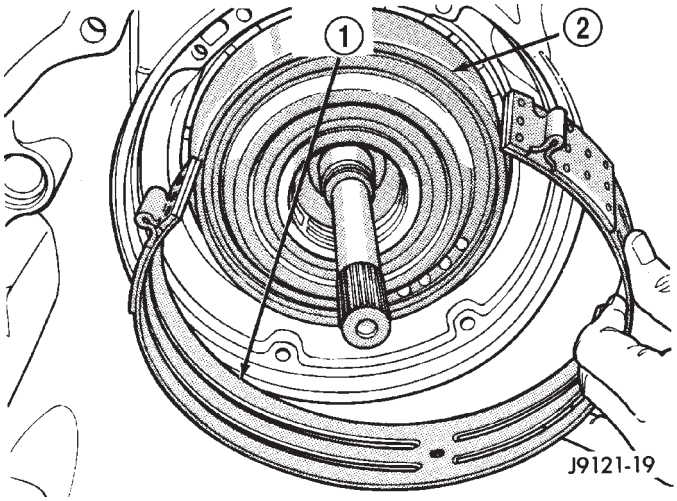


Fig. 27 Front Band Removal

1 - FRONT BAND
2 - FRONT CLUTCH RETAINER

(22) Remove intermediate shaft-planetary geartrain assembly (Fig. 32).

(23) 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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

(24) Loosen rear band locknut and loosen adjusting screw 3-4 turns.

(25) Remove snap-ring that retains low-reverse drum on overdrive piston retainer hub (Fig. 33).

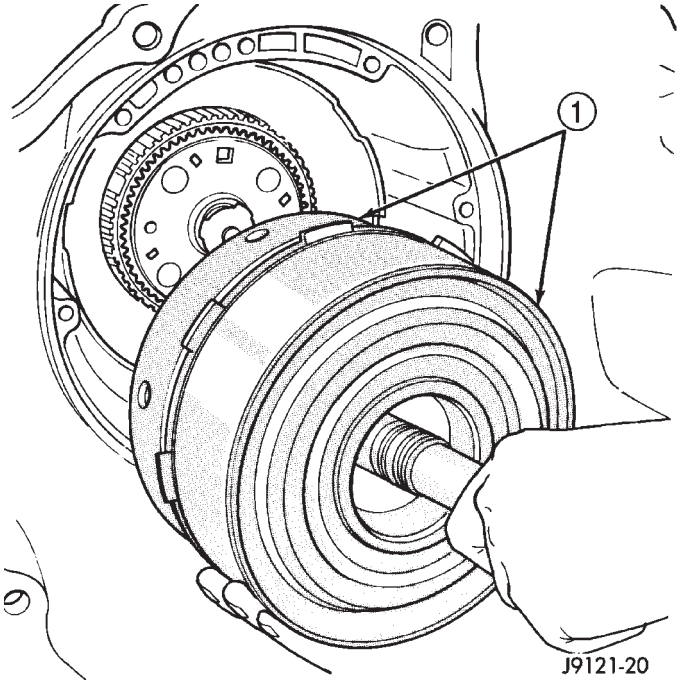


Fig. 28 Removing Front/Rear Clutch Assemblies

1 - FRONT AND REAR CLUTCH ASSEMBLIES

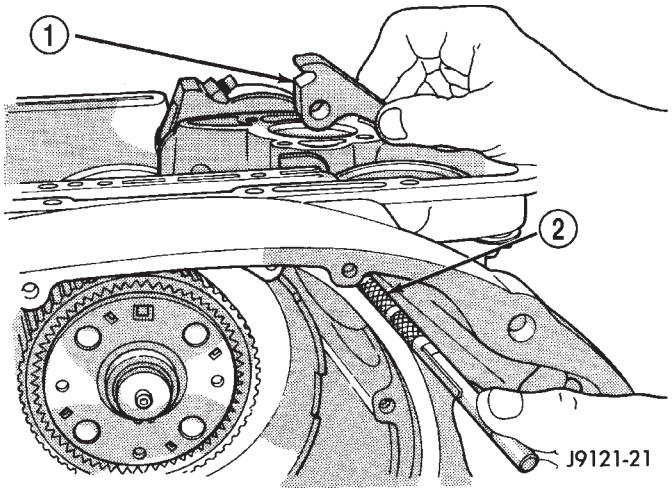


Fig. 29 Front Band Lever And Pin

1 - BAND LEVER
2 - USE PENCIL MAGNET TO REMOVE REACTION PIN

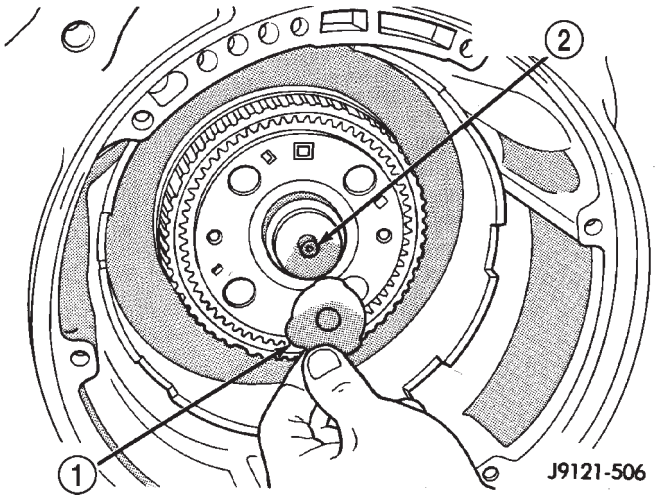


Fig. 30 Intermediate Shaft Thrust Washer

1 - THRUST WASHER
2 - INTERMEDIATE SHAFT PILOT HUB

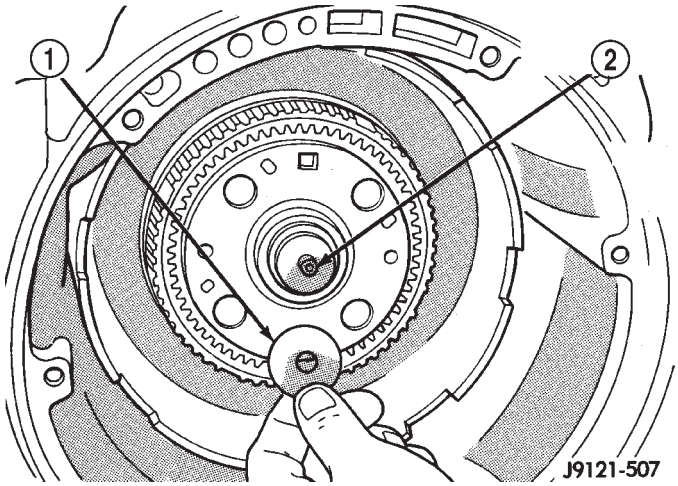


Fig. 31 Intermediate Shaft Thrust Plate

1 - SHAFT THRUST PLATE
2 - INTERMEDIATE SHAFT PILOT HUB

AUTOMATIC TRANSMISSION - 46RE (Continued)

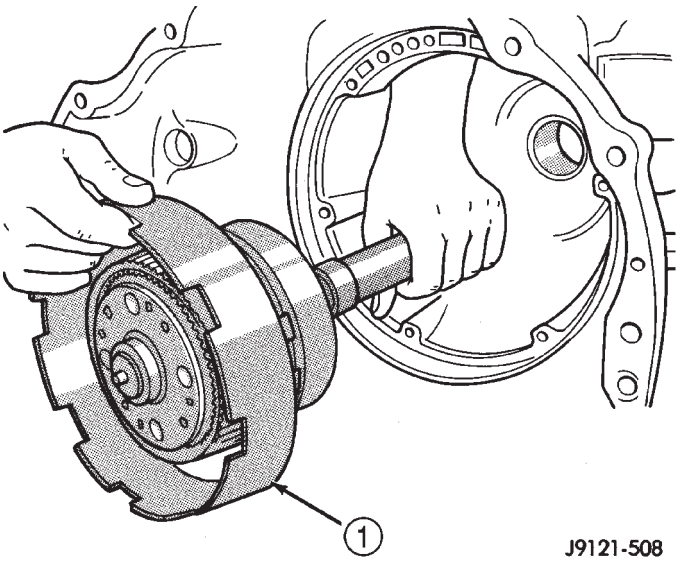


Fig. 32 Intermediate Shaft And Planetary Geartrain

1 - INTERMEDIATE SHAFT AND PLANETARY GEAR TRAIN ASSEMBLY

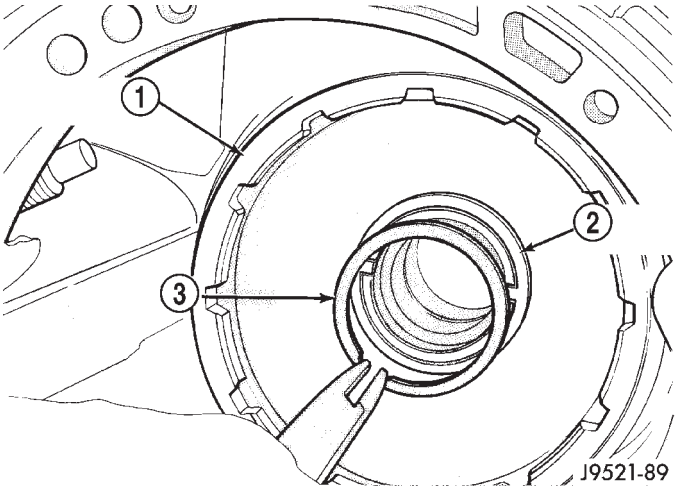


Fig. 33 Low-Reverse Drum Snap-Ring

1 - LOW-REVERSE DRUM
2 - TABBED WASHER
3 - SNAP-RING

(26) Slide low-reverse drum and thrust washer off piston retainer hub and out of rear band (Fig. 34).

(27) Note that overrunning clutch race will remain on splines of low-reverse drum after removal (Fig. 35). **The race is a permanent press fit on the hub splines. Do not attempt to remove the race.**

(28) Remove overrunning clutch assembly (Fig. 36). Assembly can be removed without displacing rollers and springs if care is exercised. Note position of rollers and springs for assembly reference.

(29) Remove rear band adjusting lever, reaction lever and pin (Fig. 37).

(30) Remove strut from rear band. Keep strut with levers and pin for cleaning, inspection and assembly reference.

(31) Remove rear band and link (Fig. 38).

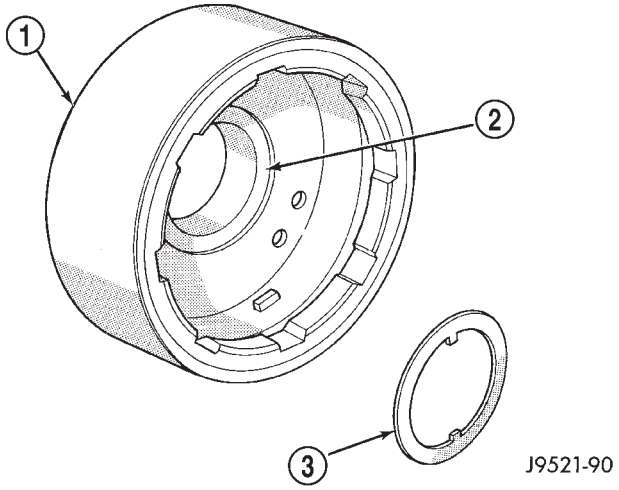


Fig. 34 Low-Reverse Drum And Thrust Washer

1 - LOW-REVERSE DRUM
2 - SPOTFACE FOR WASHER
3 - THRUST WASHER

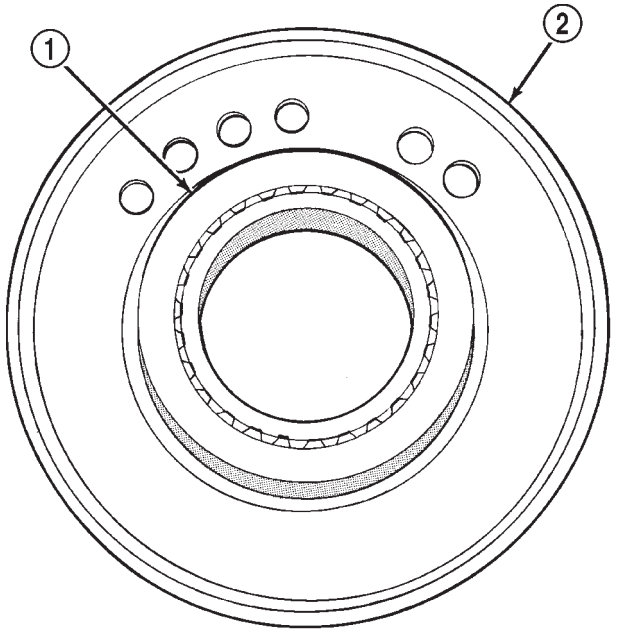


Fig. 35 Overrunning Clutch Race Position On Low-Reverse Drum

1 - OVERRUNNING CLUTCH RACE
2 - LOW-REVERSE DRUM

(32) Compress front servo rod guide with large C-clamp and Tool C-4470, or Compressor Tool C-3422-B (Fig. 39). Compress guide only enough to permit snap-ring removal (about 1/8 in.).

AUTOMATIC TRANSMISSION - 46RE (Continued)

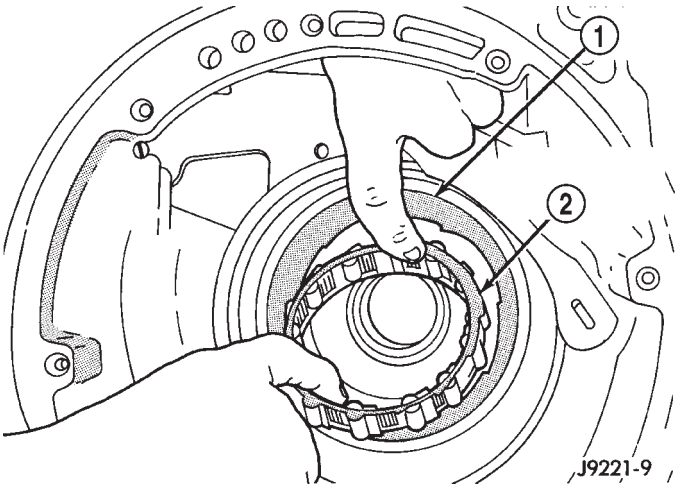


Fig. 36 Overrunning Clutch Removal

1 - CLUTCH CAM
2 - OVERRUNNING CLUTCH ASSEMBLY

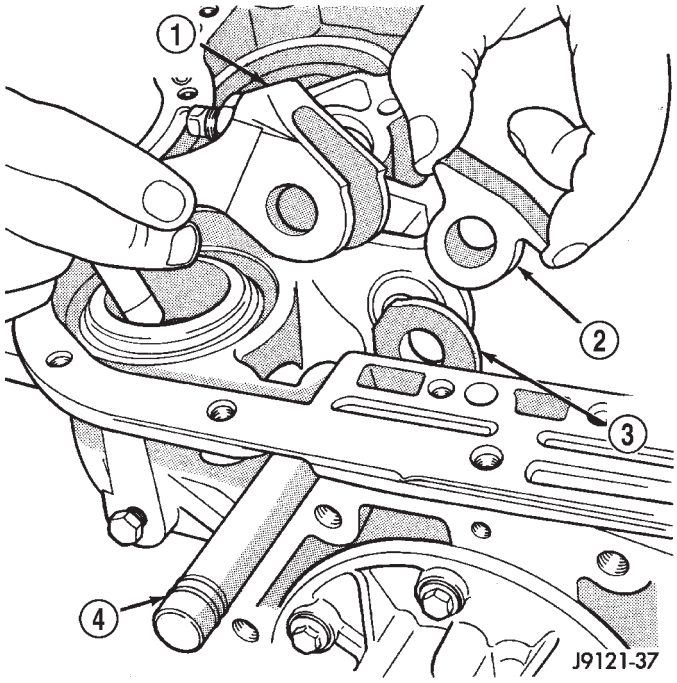


Fig. 37 Rear Band Levers And Pins

1 - REAR BAND ADJUSTING LEVER
2 - REACTION LEVER
3 - BAND LINK
4 - REAR BAND REACTION PIN

(33) Remove servo piston snap-ring (Fig. 39). 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.**

(34) Remove tools and remove servo piston and spring.

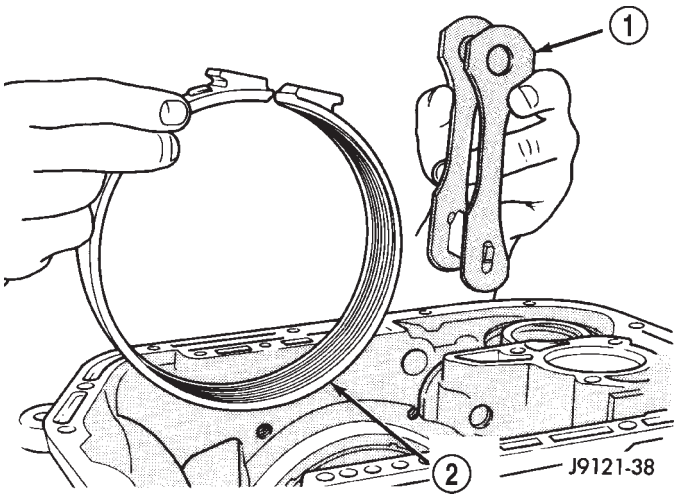


Fig. 38 Rear Band And Link

1 - BAND LINK
2 - REAR BAND

(35) Compress rear servo piston with C-clamp and Tool C-4470, or Valve Spring Compressor C-3422-B (Fig. 40). Compress servo spring retainer only enough to permit snap-ring removal.

(36) Remove servo piston snap-ring (Fig. 40). 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.**

(37) Remove tools and remove rear servo retainer, spring and piston assembly.

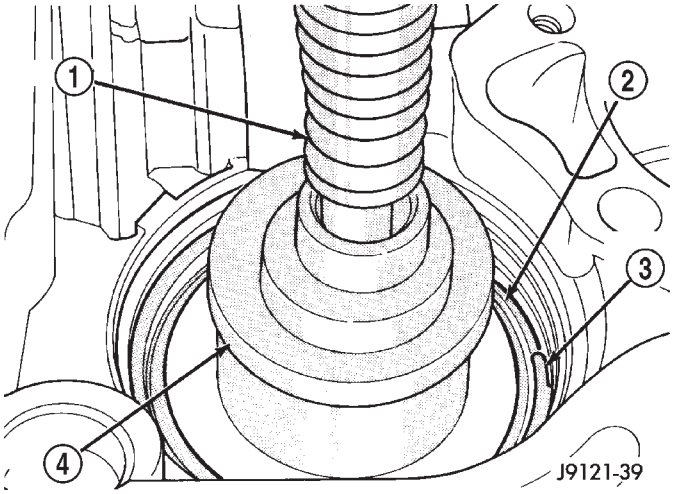


Fig. 39 Front Servo Retaining Snap-Ring

1 - C-CLAMP
2 - FRONT SERVO ROD GUIDE
3 - SNAP-RING
4 - TOOL C-4470

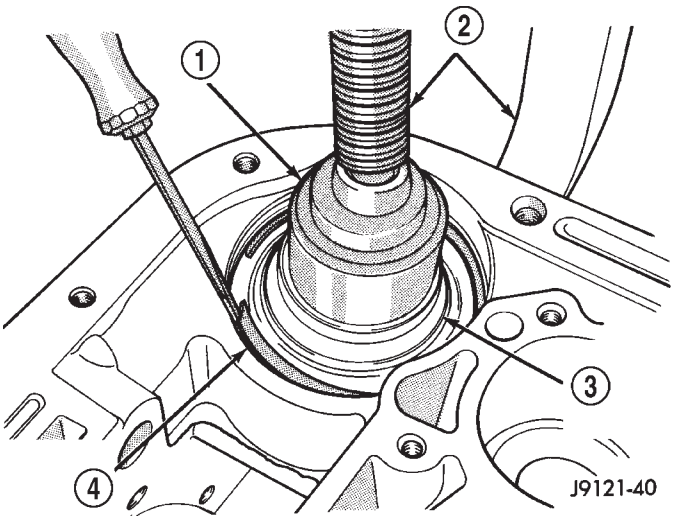


Fig. 40 Rear Servo Retaining Snap-Ring

1 - TOOL C-4470
2 - C-CLAMP
3 - REAR SERVO SPRING RETAINER
4 - RETAINER SNAP-RING

CLEANING

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.

Lubricate transmission parts with Mopar® ATF +4, type 9602, 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.

INSPECTION

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.

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.

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.

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 +4, type 9602, during 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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

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 +4. Lubricate servo bore in case with ATF +4.

(2) Install rear servo piston in case. Position piston at slight angle to bore and insert piston with twisting motion (Fig. 41).

(3) Install rear servo spring and retainer in case bore (Fig. 42). 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. 43).

(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. 44). Rotate piston into bore at same time. Rock piston slightly to ease piston ring past snap-ring groove and into bore.

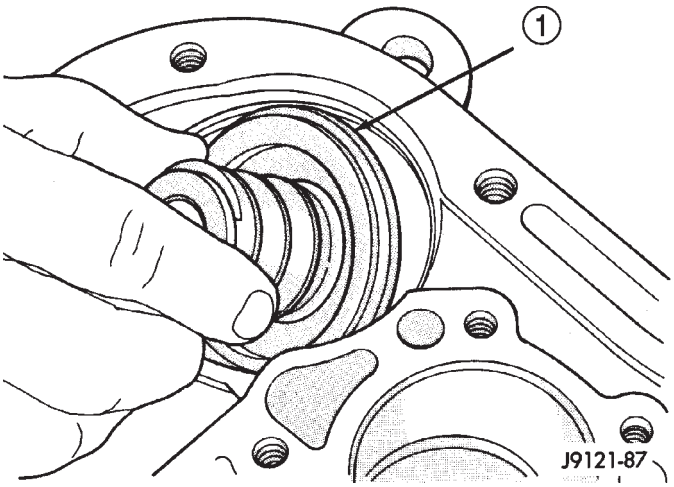


Fig. 41 Rear Servo Piston

1 - REAR SERVO PISTON

(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. 45).

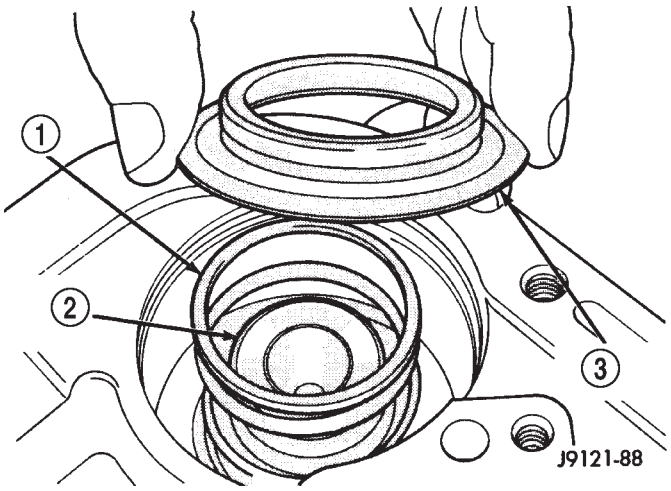


Fig. 42 Rear Servo Piston Spring And Retainer

1 - PISTON SPRING
2 - REAR SERVO PISTON
3 - SPRING RETAINER

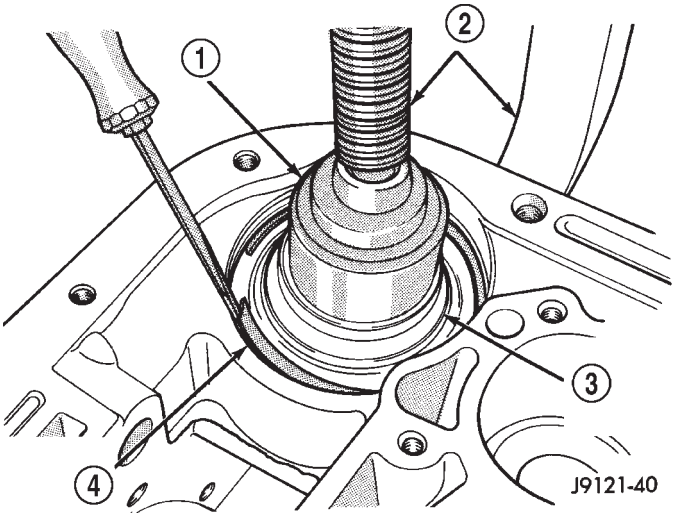


Fig. 43 Rear Servo Snap-Ring

1 - TOOL C-4470
2 - C-CLAMP
3 - REAR SERVO SPRING RETAINER
4 - RETAINER SNAP-RING

(b) Slowly compress rod guide while simultaneously easing seal ring into bore with suitable tool.

(9) Install rod guide snap-ring (Fig. 45).

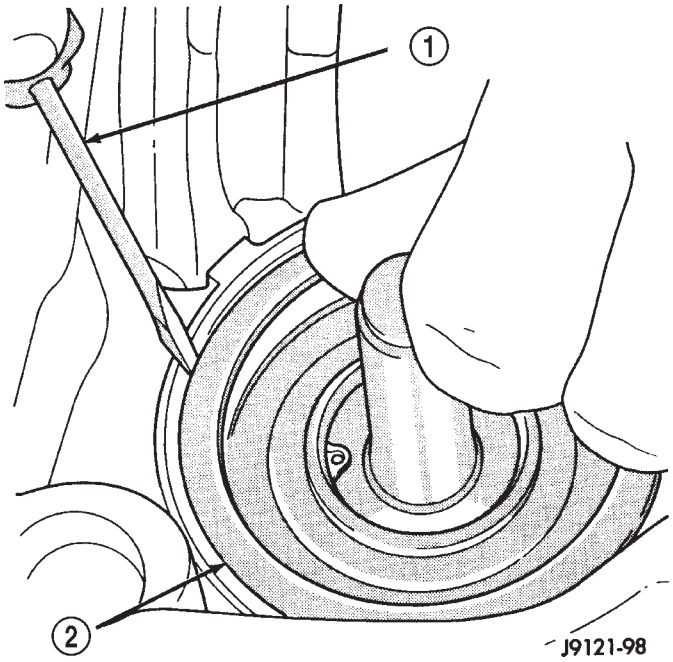


Fig. 44 Front Servo Piston

1 - USE SUITABLE TOOL TO HELP SEAT PISTON RING
2 - FRONT SERVO PISTON

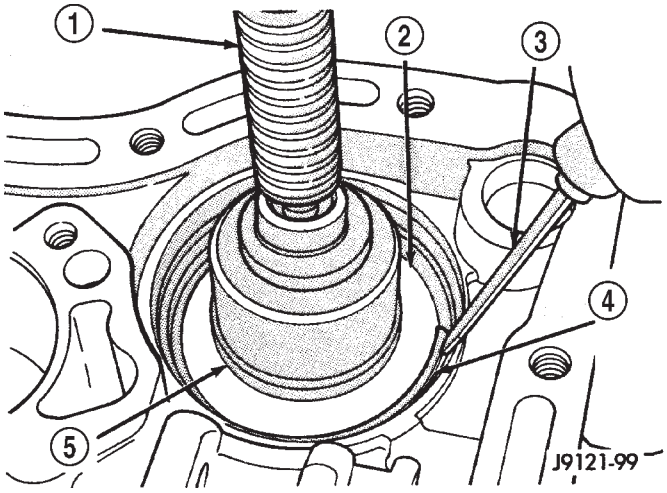


Fig. 45 Front Servo Rod Guide And Snap-Ring

1 - C-CLAMP
2 - ROD GUIDE
3 - SMALL SCREWDRIVER
4 - ROD GUIDE SNAP-RING
5 - TOOL SP-5560

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. 46).

(3) Install low-reverse drum (Fig. 47). Slide drum through rear band, onto piston retainer hub and into engagement with overrunning clutch and race.

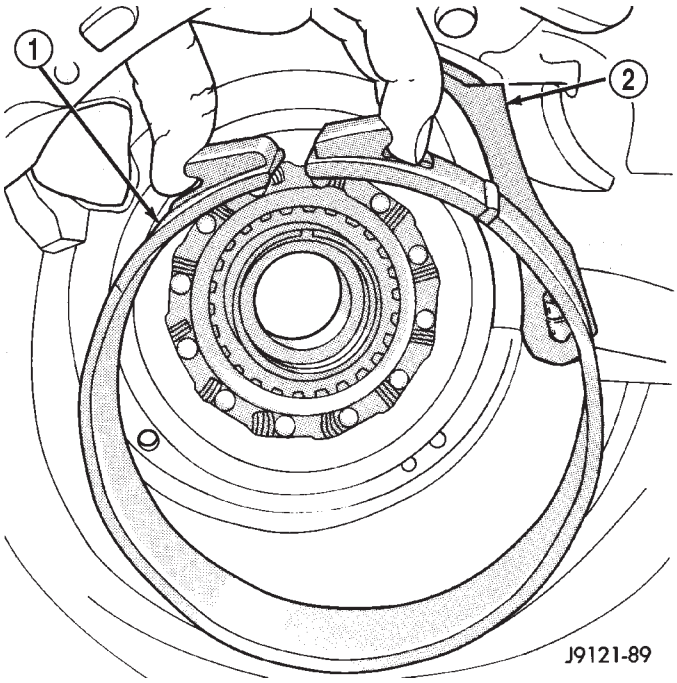


Fig. 46 Rear Band And Link

1 - REAR BAND
2 - BAND LINK

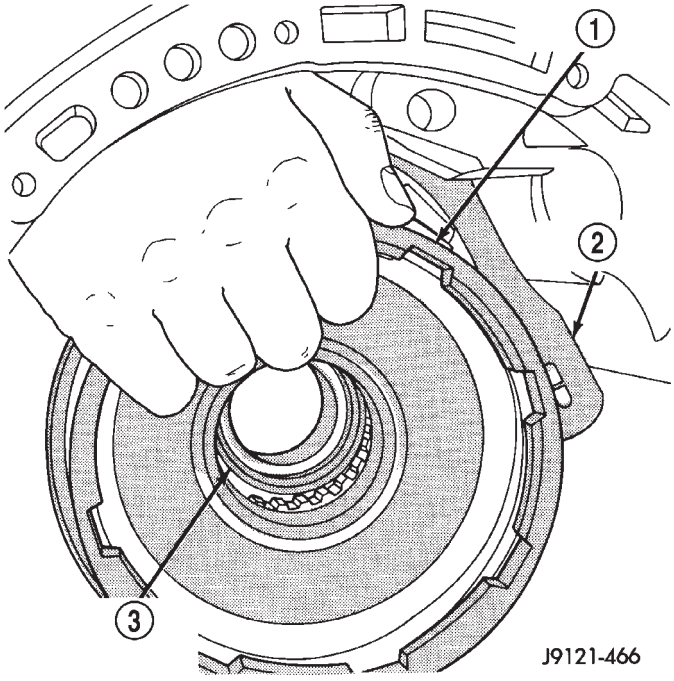


Fig. 47 Low-Reverse Drum

1 - LOW-REVERSE DRUM
2 - REAR BAND LINK
3 - HUB OF OVERDRIVE PISTON RETAINER

AUTOMATIC TRANSMISSION - 46RE (Continued)

(4) Install thrust washer in low-reverse drum spotface (Fig. 48). Use petroleum jelly to hold washer in place.

(5) Install snap-ring that secures low-reverse drum to piston retainer hub (Fig. 48).

(6) Insert band reaction pin part way into case and band link (Fig. 49).

(7) Install rear band adjusting lever, reaction lever, and strut (Fig. 50). Be sure levers and strut are aligned and engaged before seating band reaction pin in case.

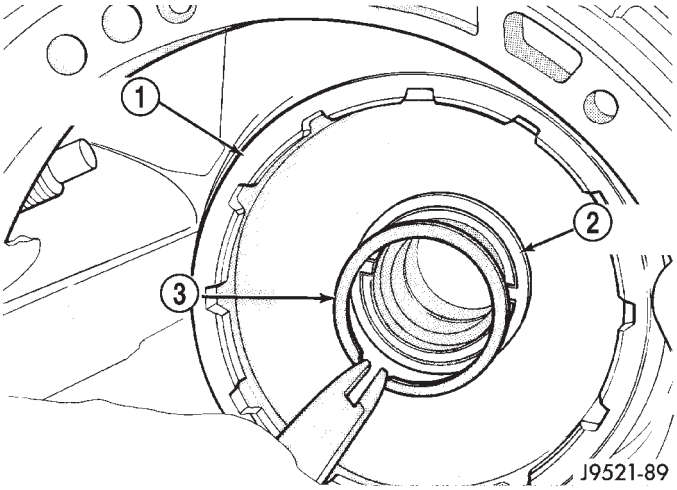


Fig. 48 Low-Reverse Drum Snap-Ring

1 - LOW-REVERSE DRUM
2 - TABBED WASHER
3 - SNAP-RING

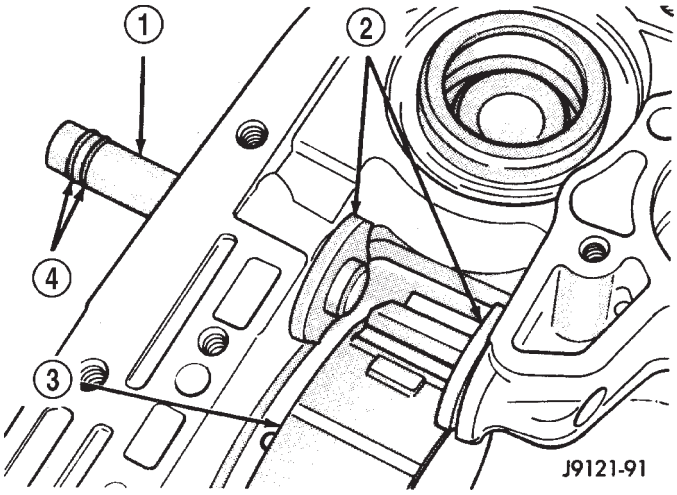


Fig. 49 Rear Band Reaction Pin

1 - REACTION PIN
2 - BAND LINK
3 - REAR BAND
4 - O-RINGS

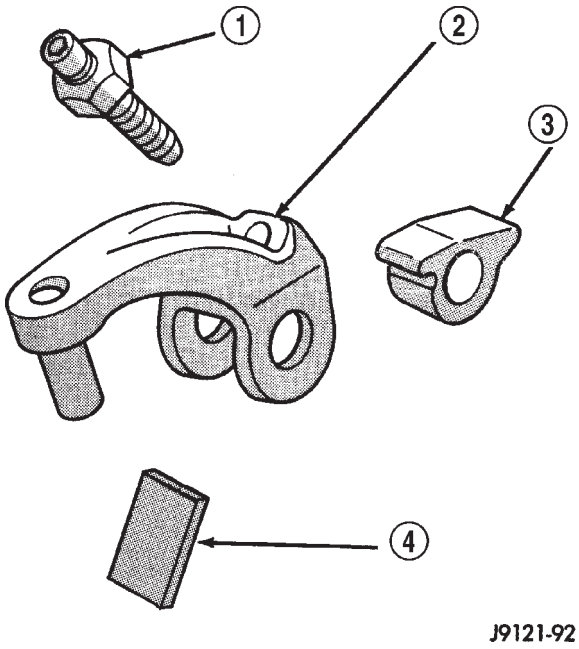


Fig. 50 Rear Band Levers And Strut

1 - ADJUSTING SCREW AND NUT
2 - ADJUSTING LEVER
3 - REACTION LEVER
4 - 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. 51). **Support shaft carefully during installation. Do not allow shaft bearing/bushing surfaces to become nicked or scratched.**

(3) Lubricate intermediate shaft thrust plate with petroleum jelly and install plate on shaft pilot hub (Fig. 52).

(4) Check input shaft front seal rings, fiber thrust washer and rear seal ring (Fig. 53). 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.

(5) Assemble front and rear clutches (Fig. 54). 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.

(6) Install intermediate shaft thrust washer in hub of rear clutch retainer (Fig. 55). Use petroleum jelly to hold washer in place. Position washer so grooves are facing outward. **Washer only fits one way in clutch retainer hub.**

AUTOMATIC TRANSMISSION - 46RE (Continued)

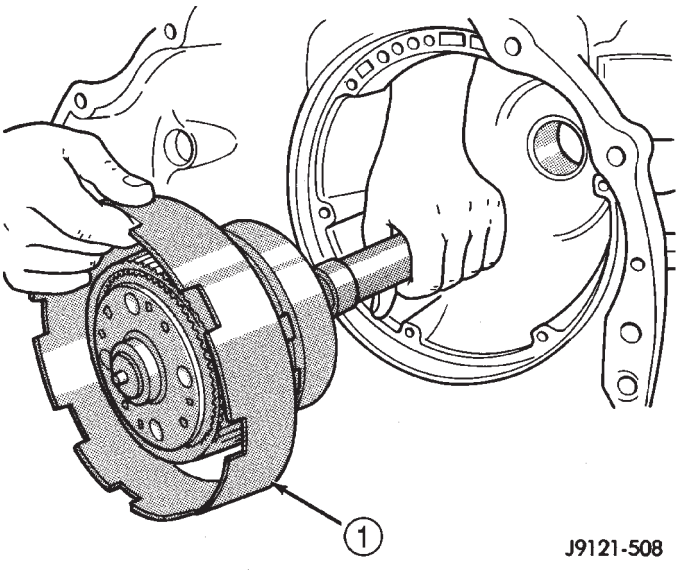


Fig. 51 Intermediate Shaft And Planetary Geartrain

1 - INTERMEDIATE SHAFT AND PLANETARY GEAR TRAIN ASSEMBLY

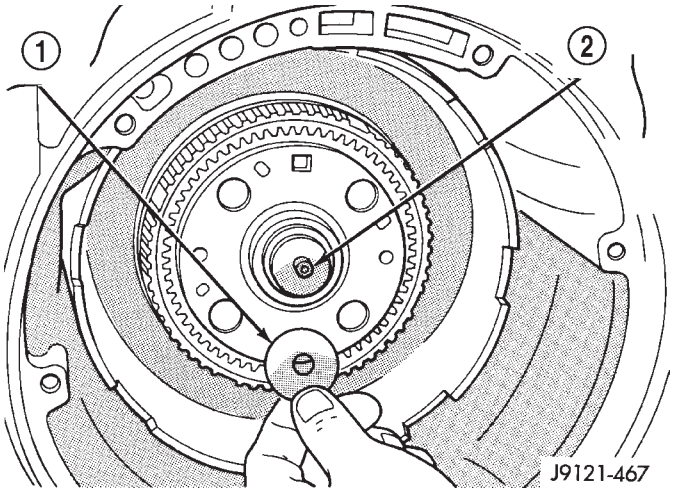


Fig. 52 Intermediate Shaft Thrust Plate

1 - SHAFT THRUST PLATE
2 - INTERMEDIATE SHAFT PILOT 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. 56). 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.

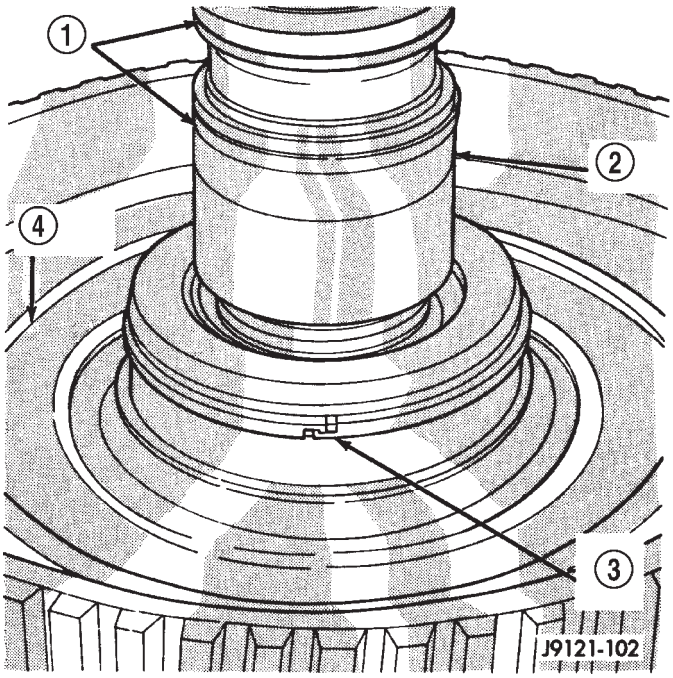


Fig. 53 Input Shaft Seal Rings And Thrust Washer

1 - TORLON® FRONT SEAL RINGS
2 - INPUT SHAFT
3 - REAR SEAL RING
4 - THRUST WASHER

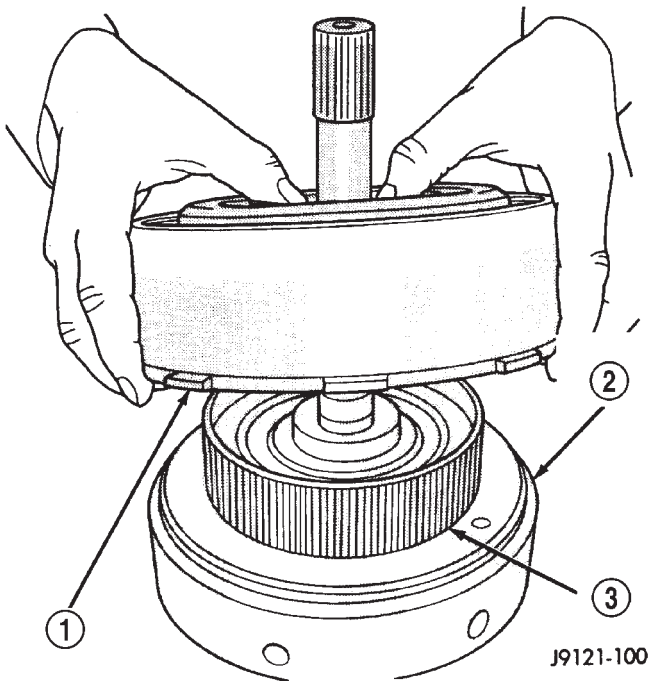


Fig. 54 Assembling Front And Rear Clutches

1 - FRONT CLUTCH ASSEMBLY
2 - REAR CLUTCH ASSEMBLY
3 - REAR CLUTCH SPLINED HUB

AUTOMATIC TRANSMISSION - 46RE (Continued)

(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. 57).

(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.**

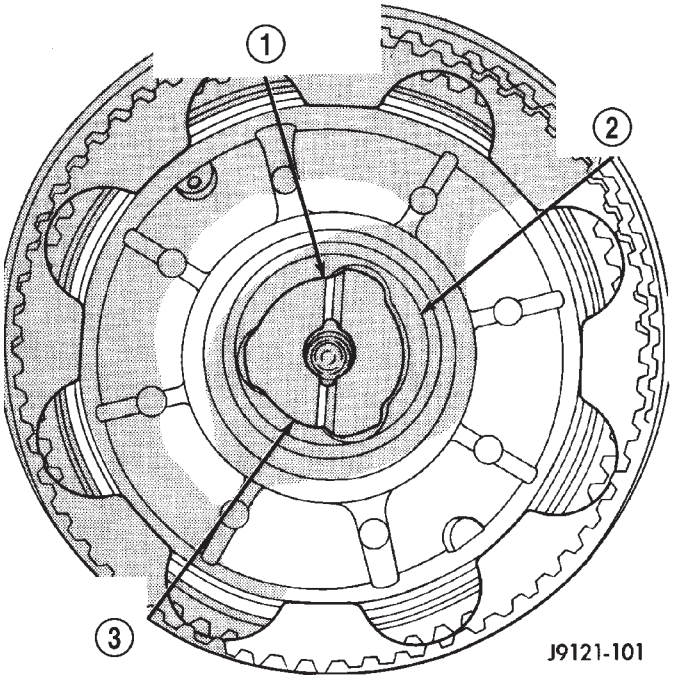


Fig. 55 Intermediate Shaft Thrust Washer

1 - BE SURE WASHER GROOVES FACE OUT AS SHOWN
2 - REAR CLUTCH RETAINER HUB
3 - SHAFT THRUST WASHER

OIL PUMP

(1) Install oil pump Pilot Studs C-3288-B in case (Fig. 58).

(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. 58).

(3) Coat the reaction shaft thrust washer with petroleum jelly to hold it in place. Then install washer over reaction shaft hub and seat it on pump (Fig. 59).

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 fiber thrust washer is in position (Fig. 60). Use extra petroleum jelly to hold washer in place if necessary.

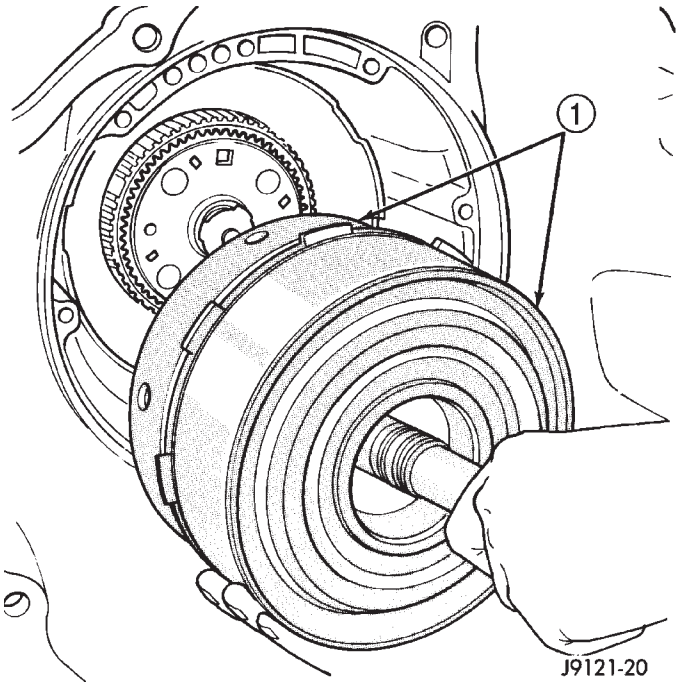


Fig. 56 Front/Rear Clutch Assemblies

1 - FRONT AND REAR CLUTCH ASSEMBLIES

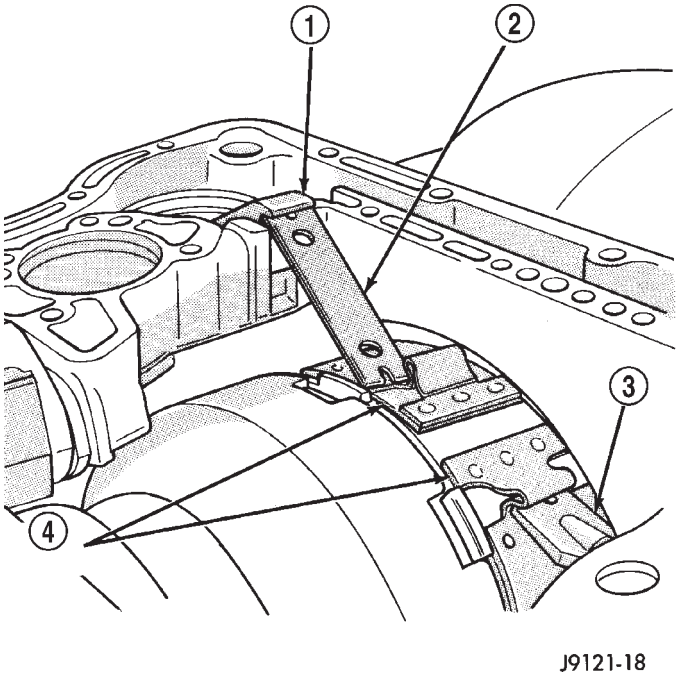


Fig. 57 Front Band And Linkage

1 - LEVER
2 - STRUT
3 - ANCHOR
4 - FRONT BAND

(5) Lubricate oil pump seals with petroleum Mopar® ATF +4, type 9602.

AUTOMATIC TRANSMISSION - 46RE (Continued)

(6) Mount oil pump on pilot studs and slide pump into case opening (Fig. 61). **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.

(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.

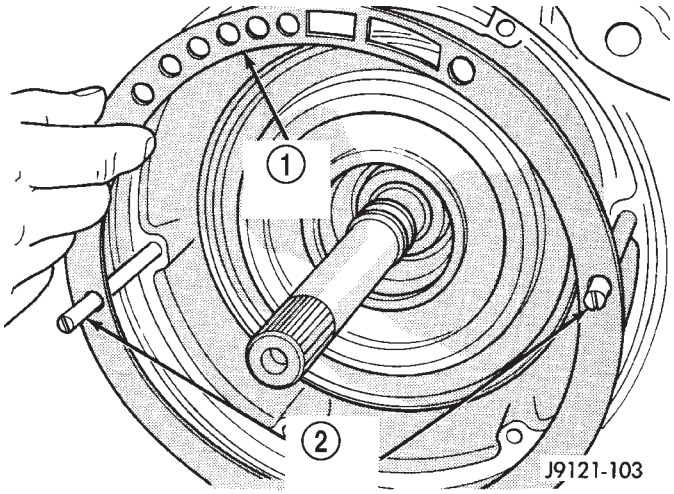


Fig. 58 Oil Pump Gasket And Pilot Studs

1 - OIL PUMP GASKET
2 - PILOT STUDS C-3288-B

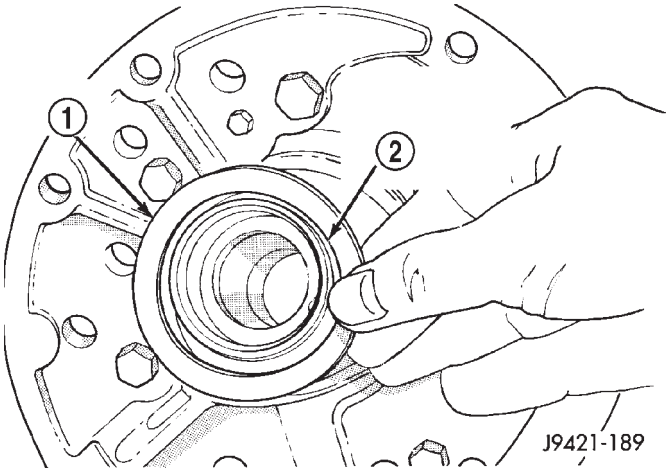


Fig. 59 Reaction Shaft Thrust Washer

1 - THRUST WASHER
2 - CHAMFERED SIDE OF WASHER BORE GOES TOWARD PUMP

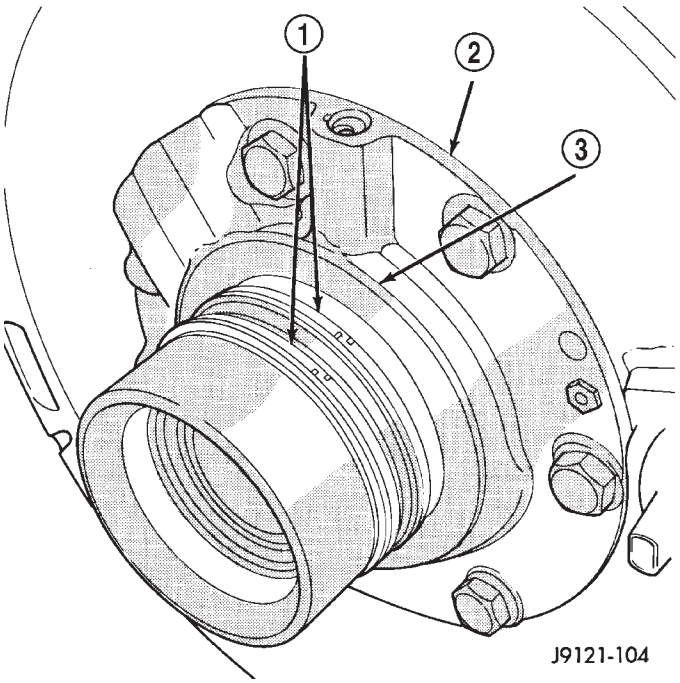


Fig. 60 Reaction Shaft Seal Ring And Thrust Washer

1 - SEAL RINGS
2 - REACTION SHAFT SUPPORT
3 - THRUST WASHER (FIBER)

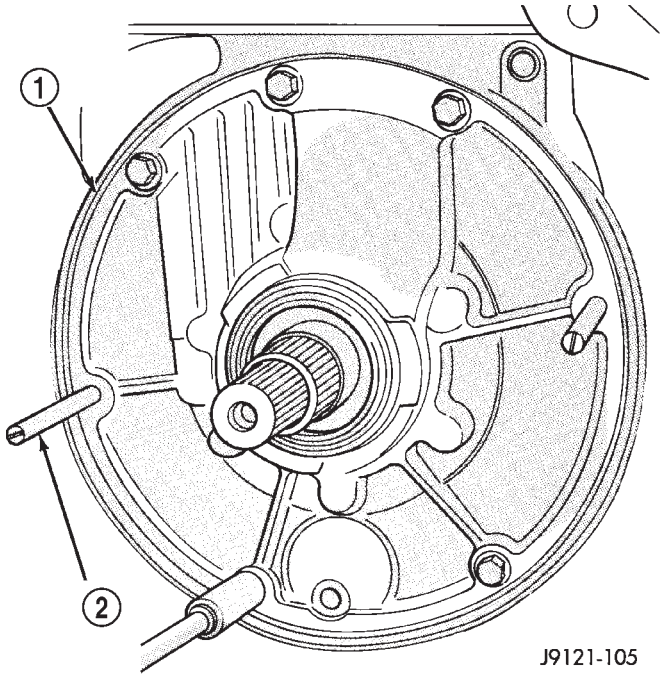


Fig. 61 Oil Pump

1 - SEAT OIL PUMP IN CASE BY HAND
2 - REMOVE PILOT STUDS WHEN PUMP IS SEATED

AUTOMATIC TRANSMISSION - 46RE (Continued)

INPUT SHAFT END PLAY CHECK

NOTE: Overdrive unit must be installed in order to correctly measure the input shaft end-play.

(1) Measure input shaft end play (Fig. 62).

NOTE: If end play is incorrect, transmission is incorrectly assembled, or reaction shaft thrust washer is incorrect. The reaction shaft thrust washer is selective.

(a) Attach Adapter 8266-5 to Handle 8266-8.
(b) Attach dial indicator C-3339 to Handle 8266-8.
(c) Install the assembled tool onto the input shaft of the transmission and tighten the retaining screw on Adapter 8266-5 to secure it to the input shaft.
(d) Position the dial indicator plunger against a flat spot on the oil pump and zero the dial indicator.
(e) Move input shaft in and out and record reading. End play should be 0.86-2.13 mm (0.034-0.084 in.). Adjust as necessary.

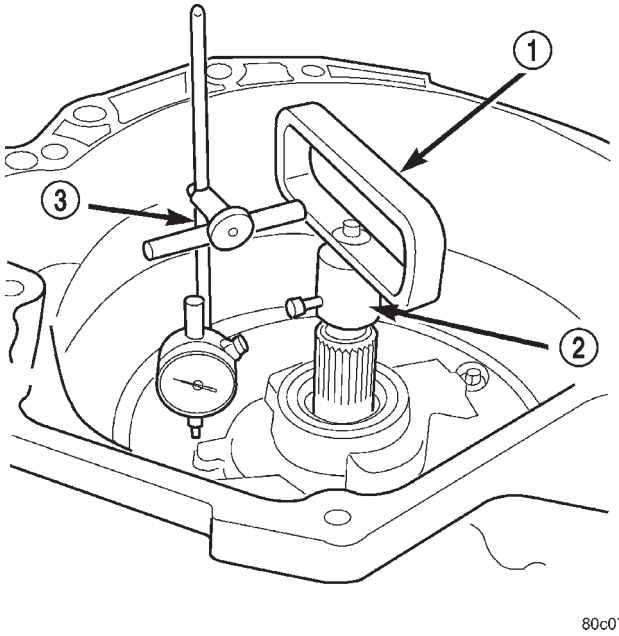


Fig. 62 Checking Input Shaft End Play

1 - TOOL 8266-8
2 - TOOL 8266-5
3 - TOOL C-3339

ACCUMULATOR, VALVE BODY, OIL PAN, AND TORQUE CONVERTER

(1) Install accumulator inner spring, piston and outer spring (Fig. 63).

(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. 64). 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.
(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.).

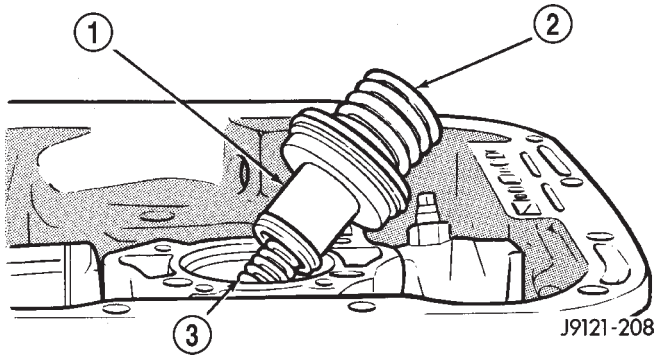


Fig. 63 Accumulator Piston And Springs

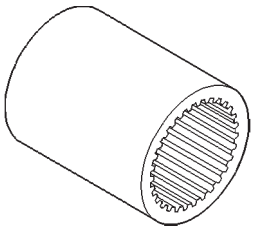
1 - ACCUMULATOR PISTON
2 - OUTER SPRING
3 - INNER SPRING

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:



SOCKET 6984

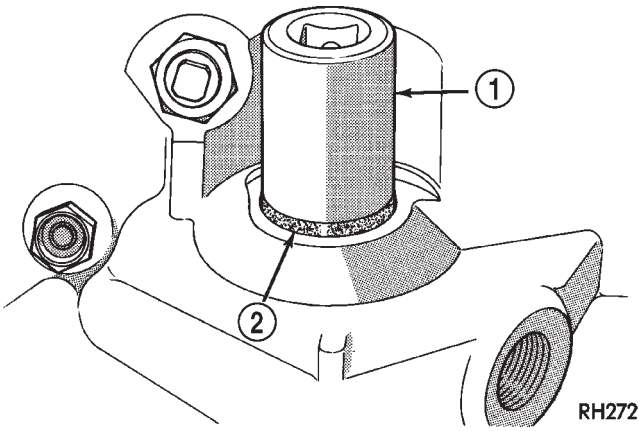


Fig. 64 Manual Lever Shaft Seal

1 - 15/16" SOCKET
2 - SEAL

(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 13.6 N·m (125 in. 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.

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 pocket in the rear oil pump seal lip with transmission fluid.

(3) Lubricate converter pilot hub of the crankshaft with a light coating of Mopar® High Temp Grease.

(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. 65). 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.

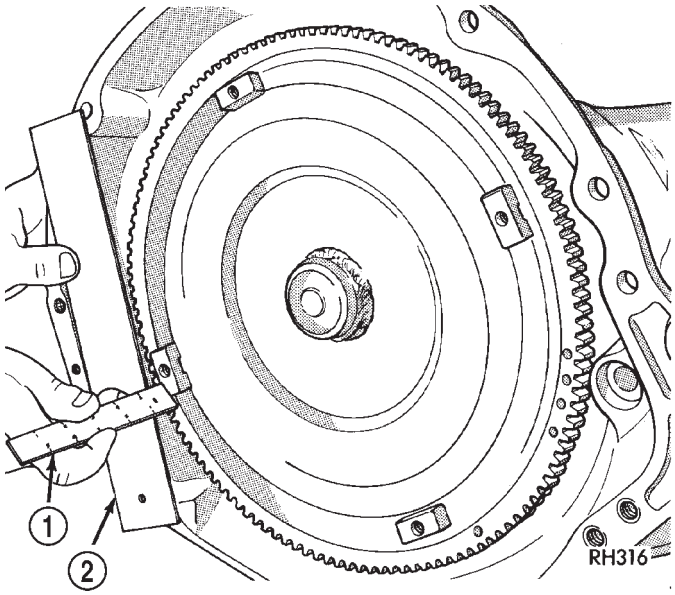


Fig. 65 Checking Converter Seating - Typical

1 - SCALE
2 - STRAIGHTEDGE

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

(13) Install bolts attaching converter housing to engine.

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

(15) Remove engine support fixture.

(16) Install crankshaft position sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/CRANKSHAFT POSITION SENSOR - INSTALLATION)

(17) 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.

(18) Connect gearshift and throttle cable to transmission.

(19) 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.

(20) 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.).

(21) Install converter housing access cover.

(22) Install starter motor and cooler line bracket. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - INSTALLATION)

(23) Connect cooler lines to transmission.

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

(25) Install exhaust components.

(26) Align and connect propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

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

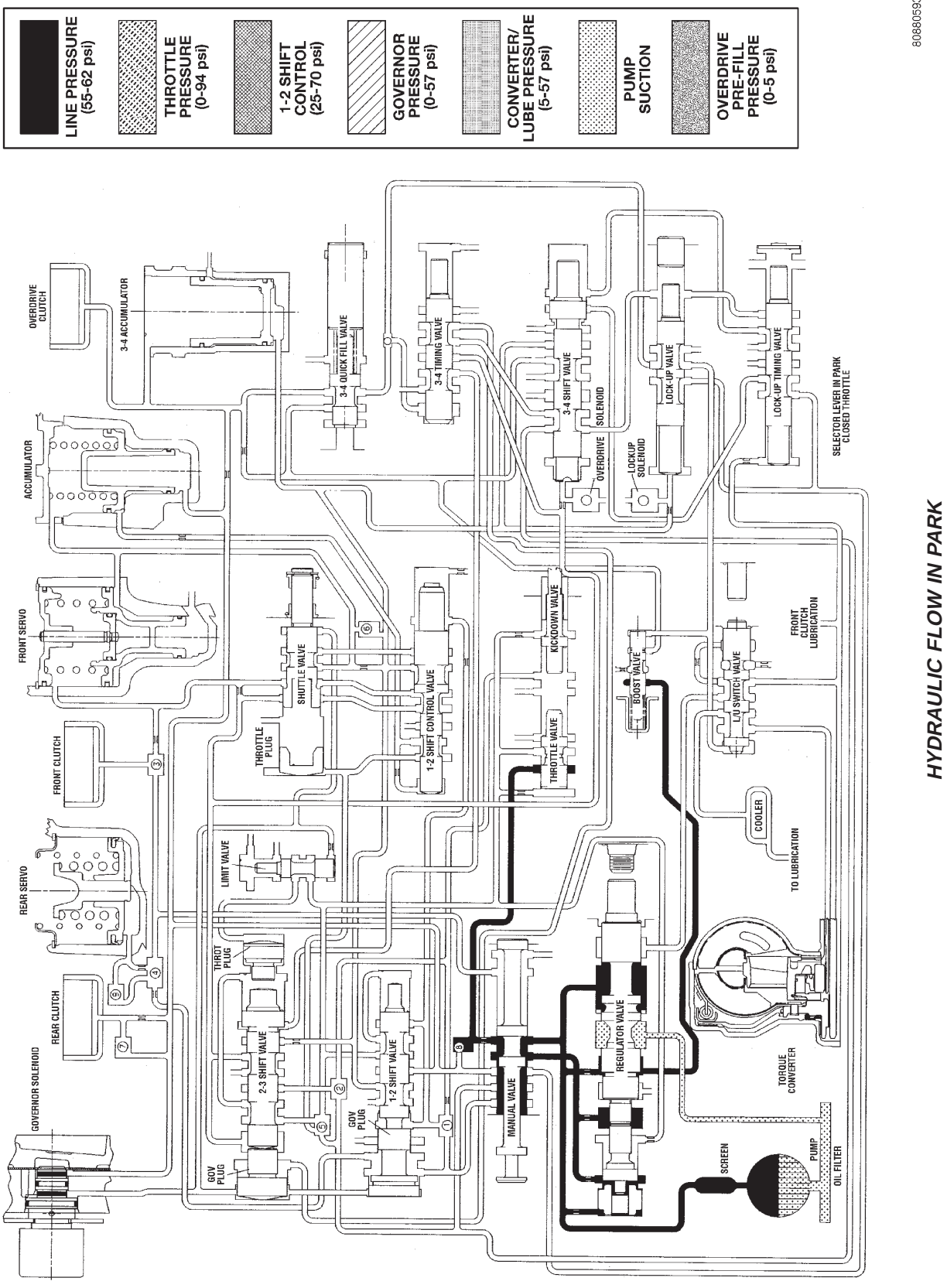
(28) Lower vehicle.

(29) Fill transmission with Mopar® ATF +4, type 9602, Automatic Transmission fluid.

AUTOMATIC TRANSMISSION - 46RE (Continued)

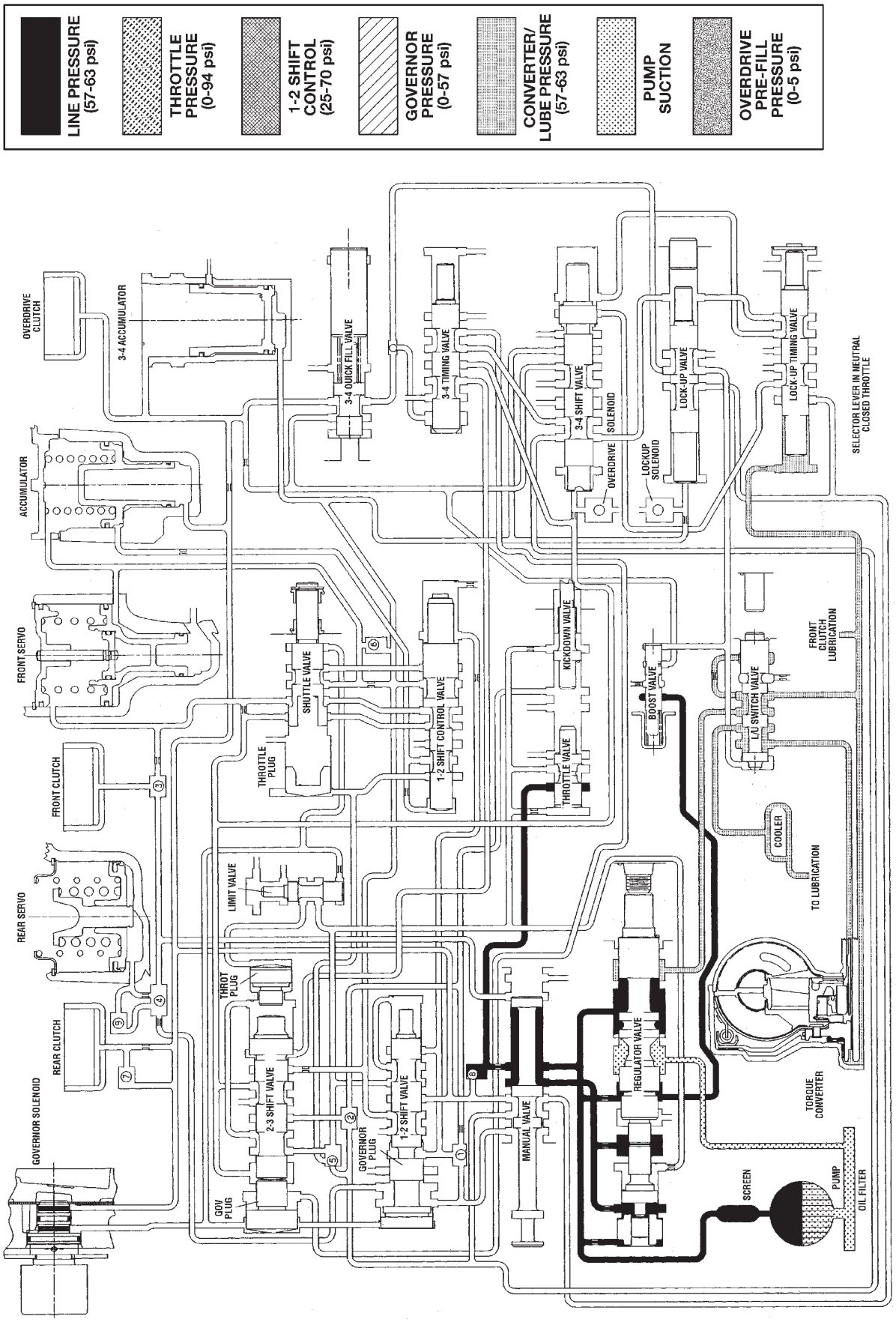
SCHEMATICS AND DIAGRAMS

HYDRAULIC SCHEMATICS



HYDRAULIC FLOW IN PARK

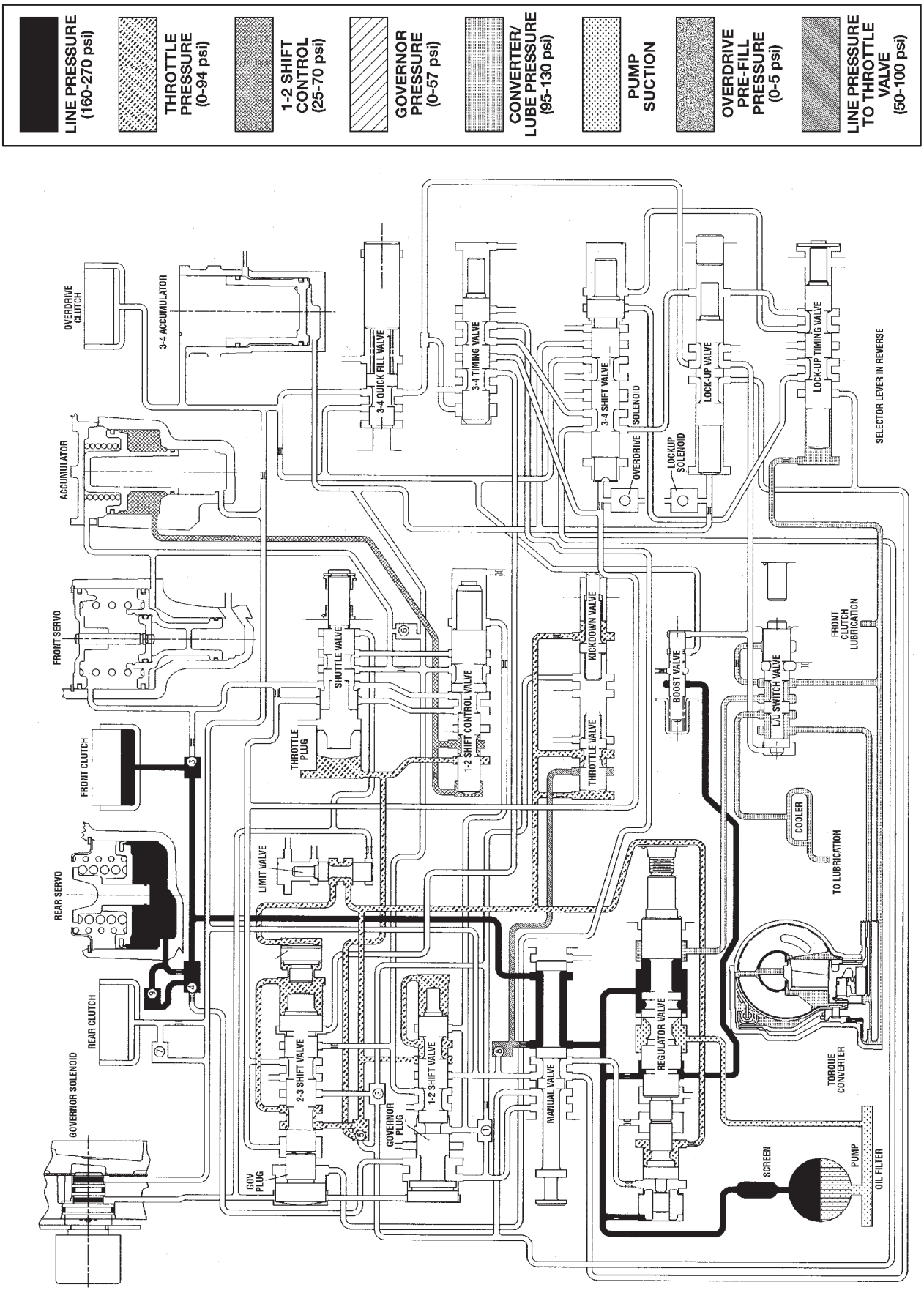
AUTOMATIC TRANSMISSION - 46RE (Continued)



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HYDRAULIC FLOW IN NEUTRAL

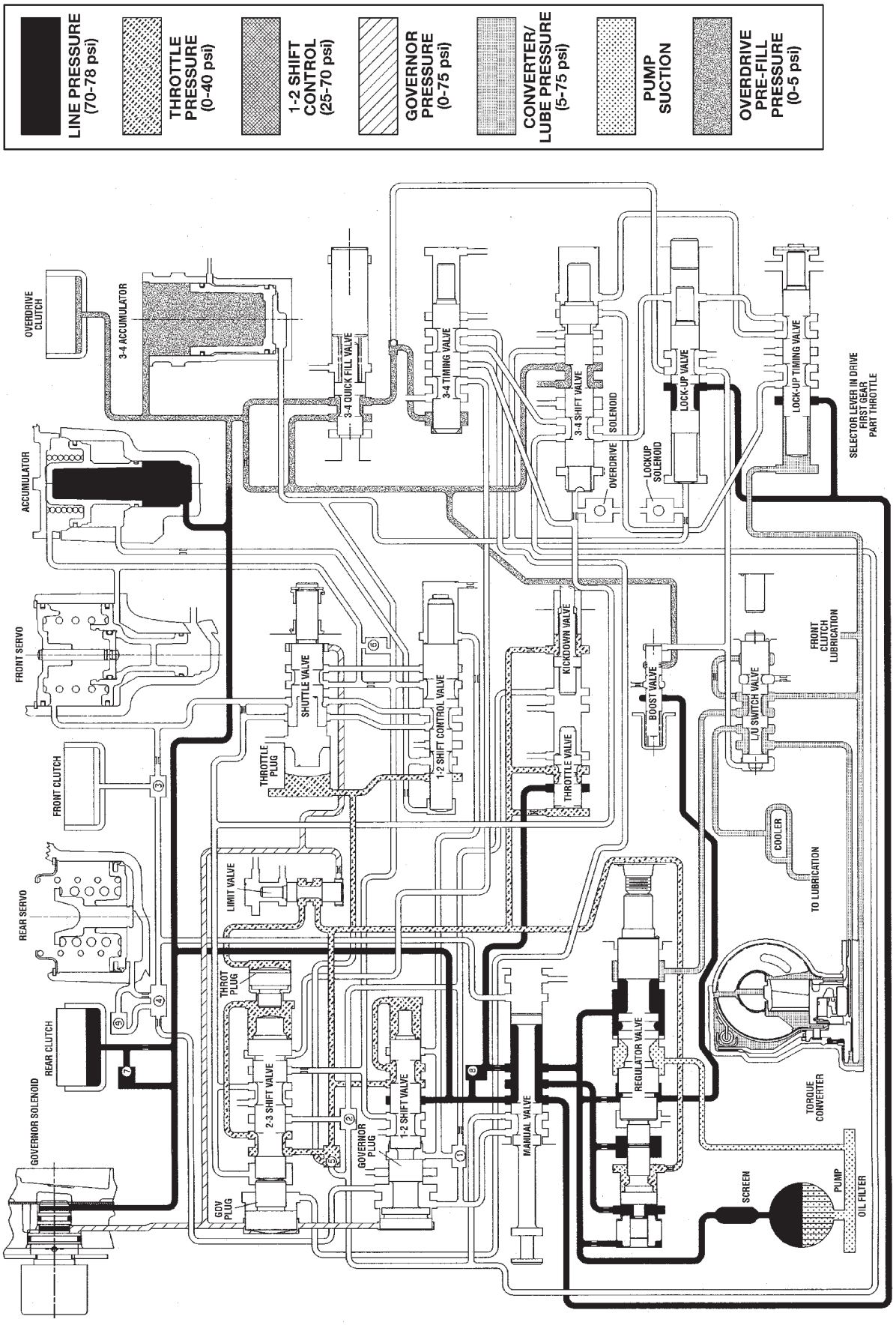
AUTOMATIC TRANSMISSION - 46RE (Continued)



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HYDRAULIC FLOW IN REVERSE

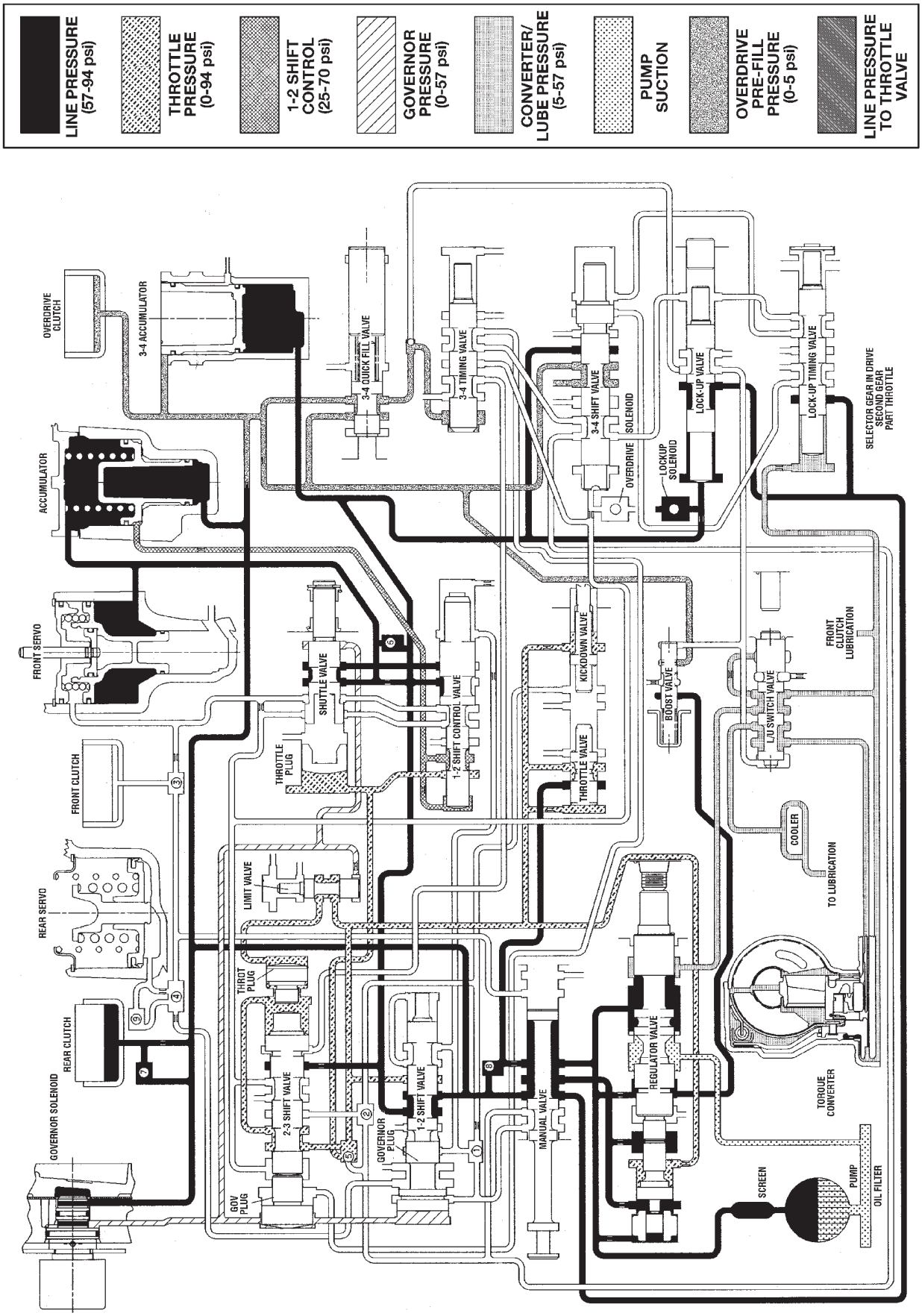
AUTOMATIC TRANSMISSION - 46RE (Continued)



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HYDRAULIC FLOW IN DRIVE FIRST GEAR

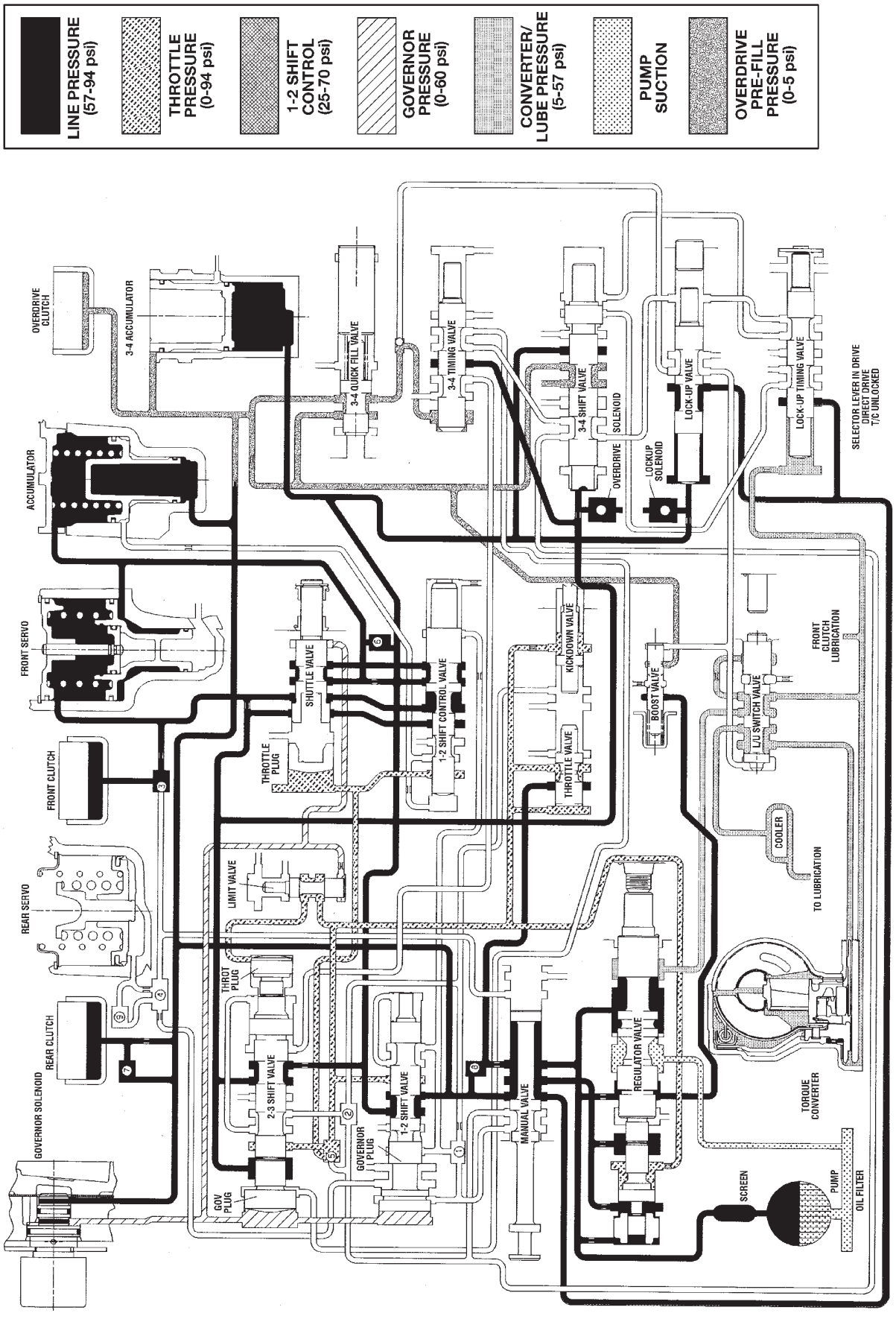
AUTOMATIC TRANSMISSION - 46RE (Continued)



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HYDRAULIC FLOW IN DRIVE SECOND GEAR

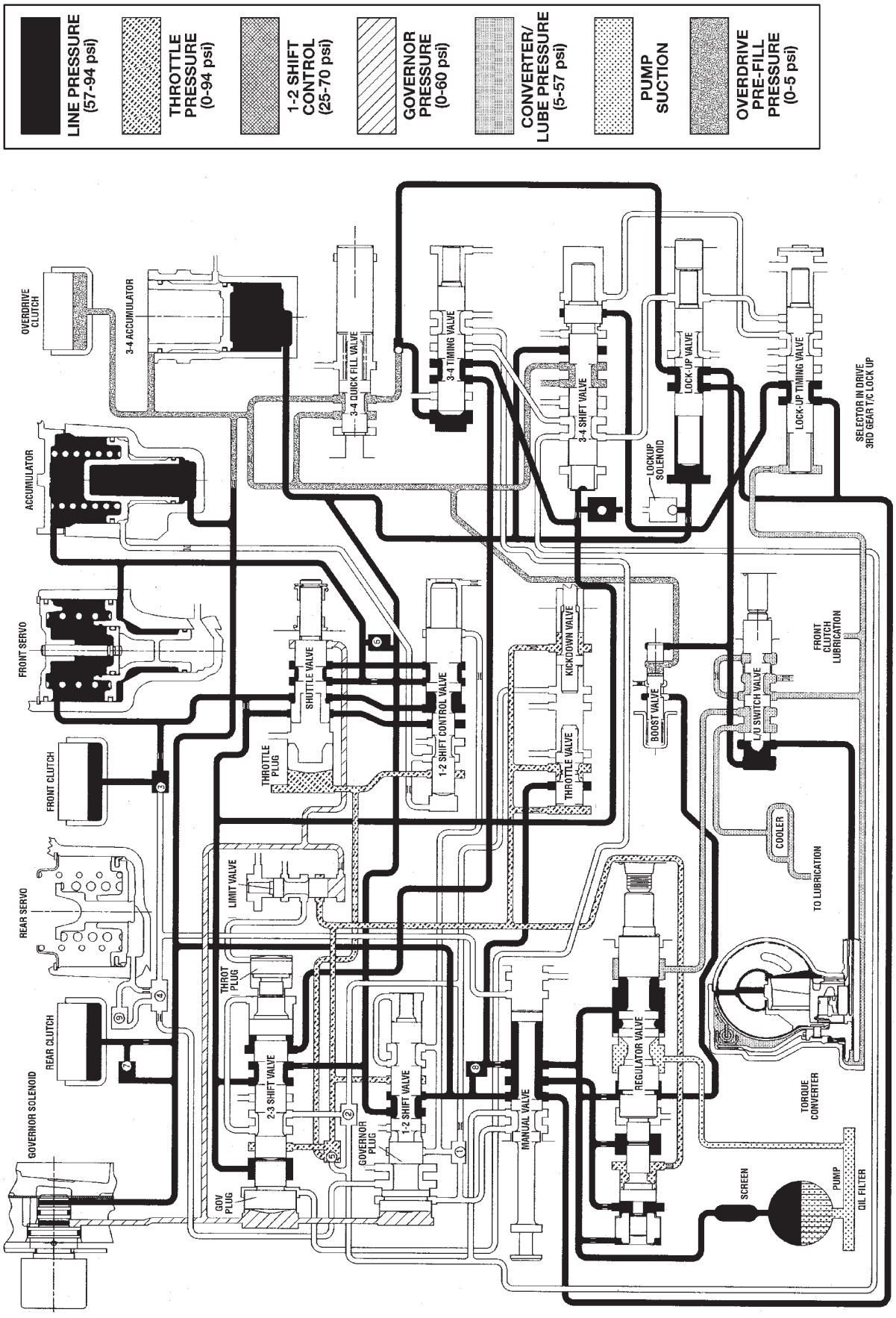
AUTOMATIC TRANSMISSION - 46RE (Continued)



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HYDRAULIC FLOW IN DRIVE THIRD GEAR (CONVERTER CLUTCH NOT APPLIED)

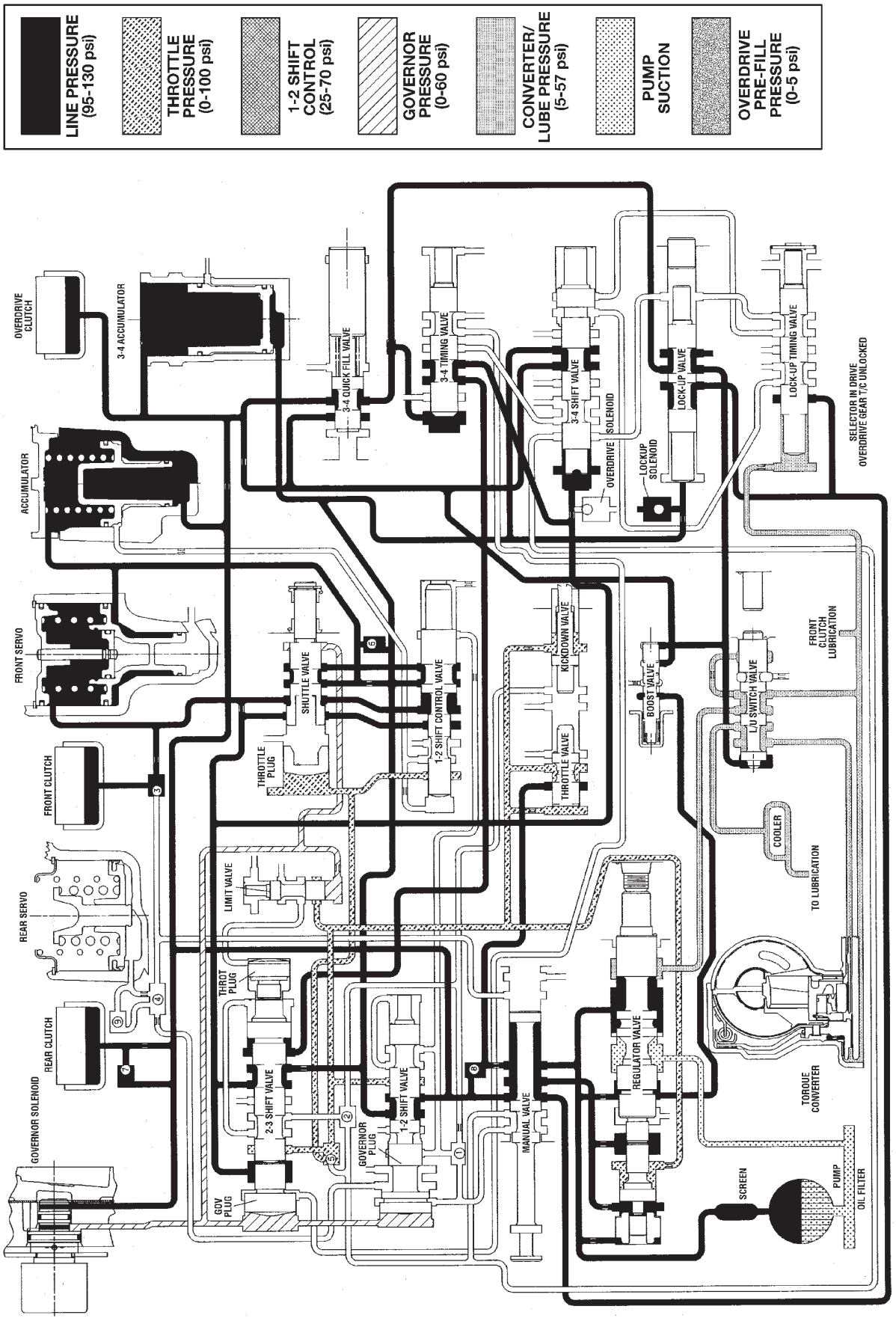
AUTOMATIC TRANSMISSION - 46RE (Continued)



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HYDRAULIC FLOW IN DRIVE THIRD GEAR (CONVERTER CLUTCH APPLIED)

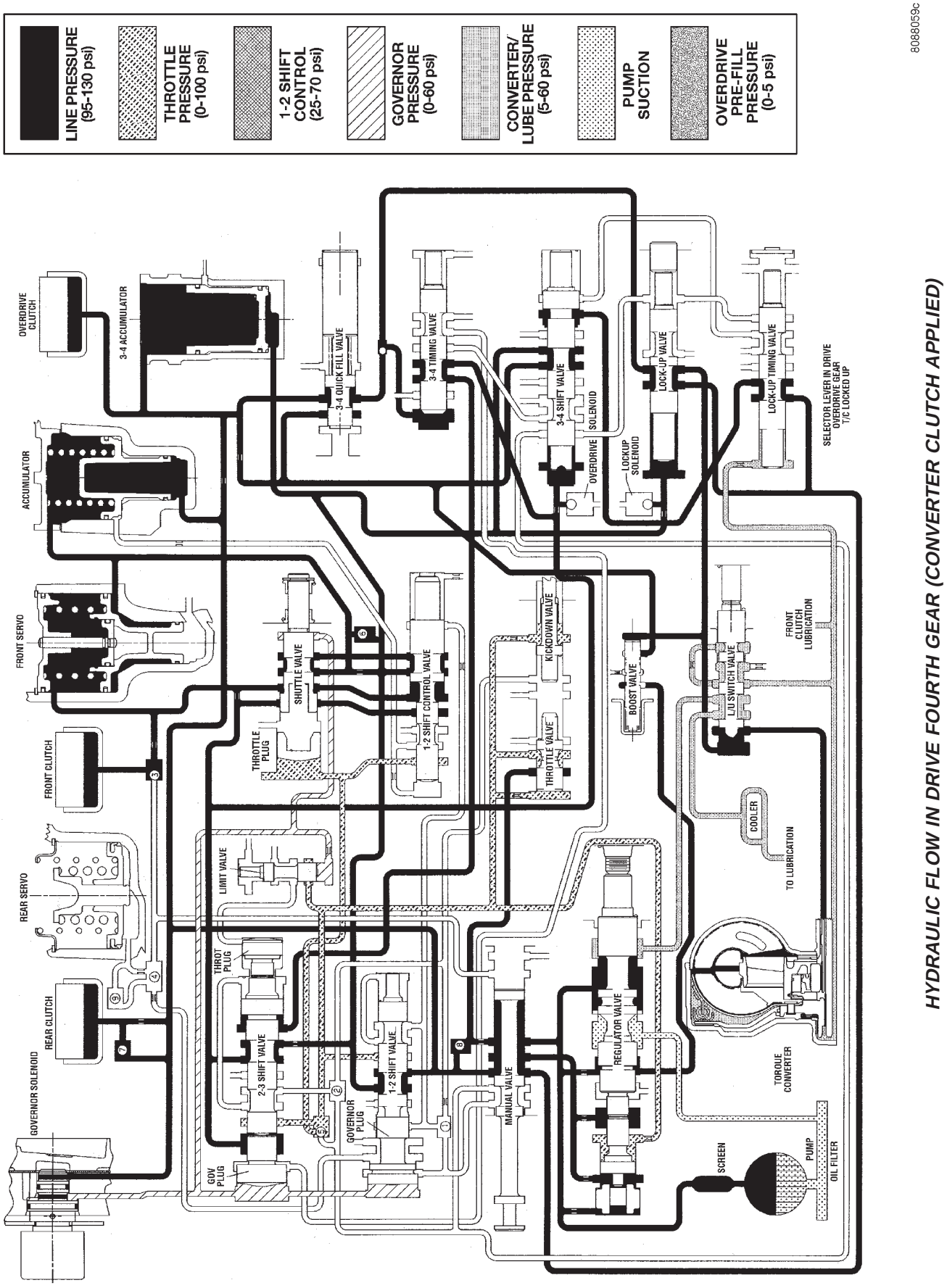
AUTOMATIC TRANSMISSION - 46RE (Continued)



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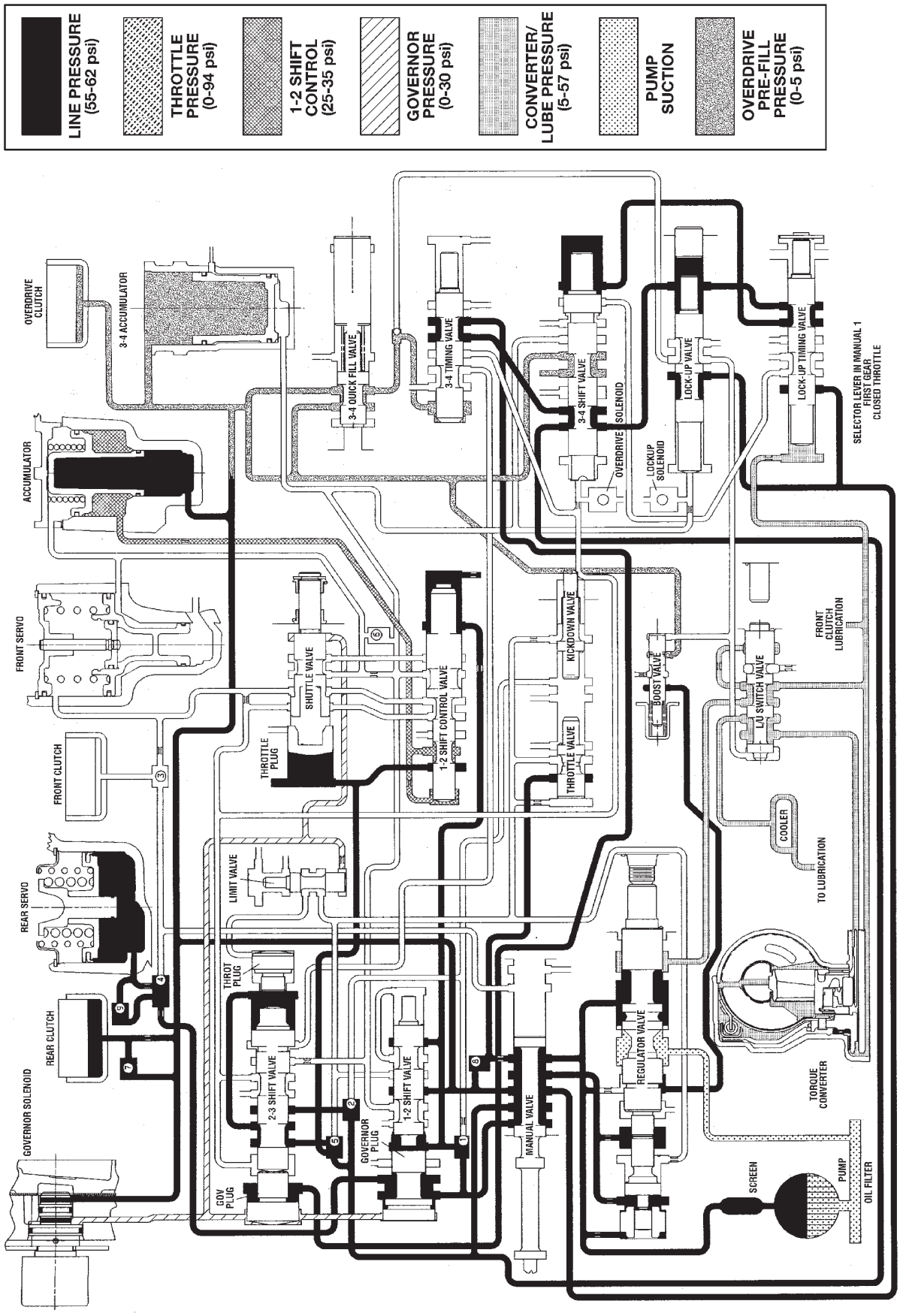
HYDRAULIC FLOW IN DRIVE FOURTH GEAR (CONVERTER CLUTCH NOT APPLIED)

AUTOMATIC TRANSMISSION - 46RE (Continued)



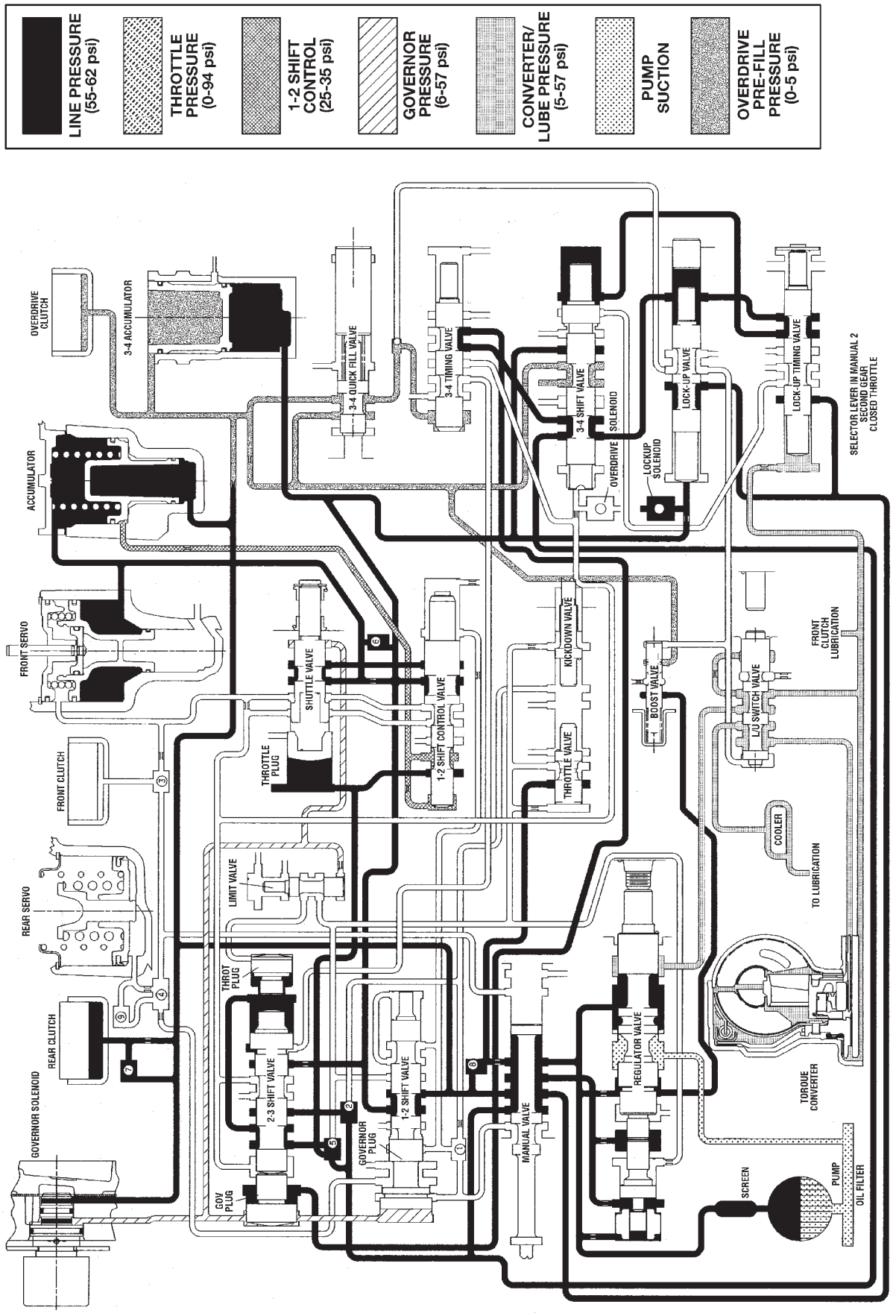
HYDRAULIC FLOW IN DRIVE FOURTH GEAR (CONVERTER CLUTCH APPLIED)

AUTOMATIC TRANSMISSION - 46RE (Continued)



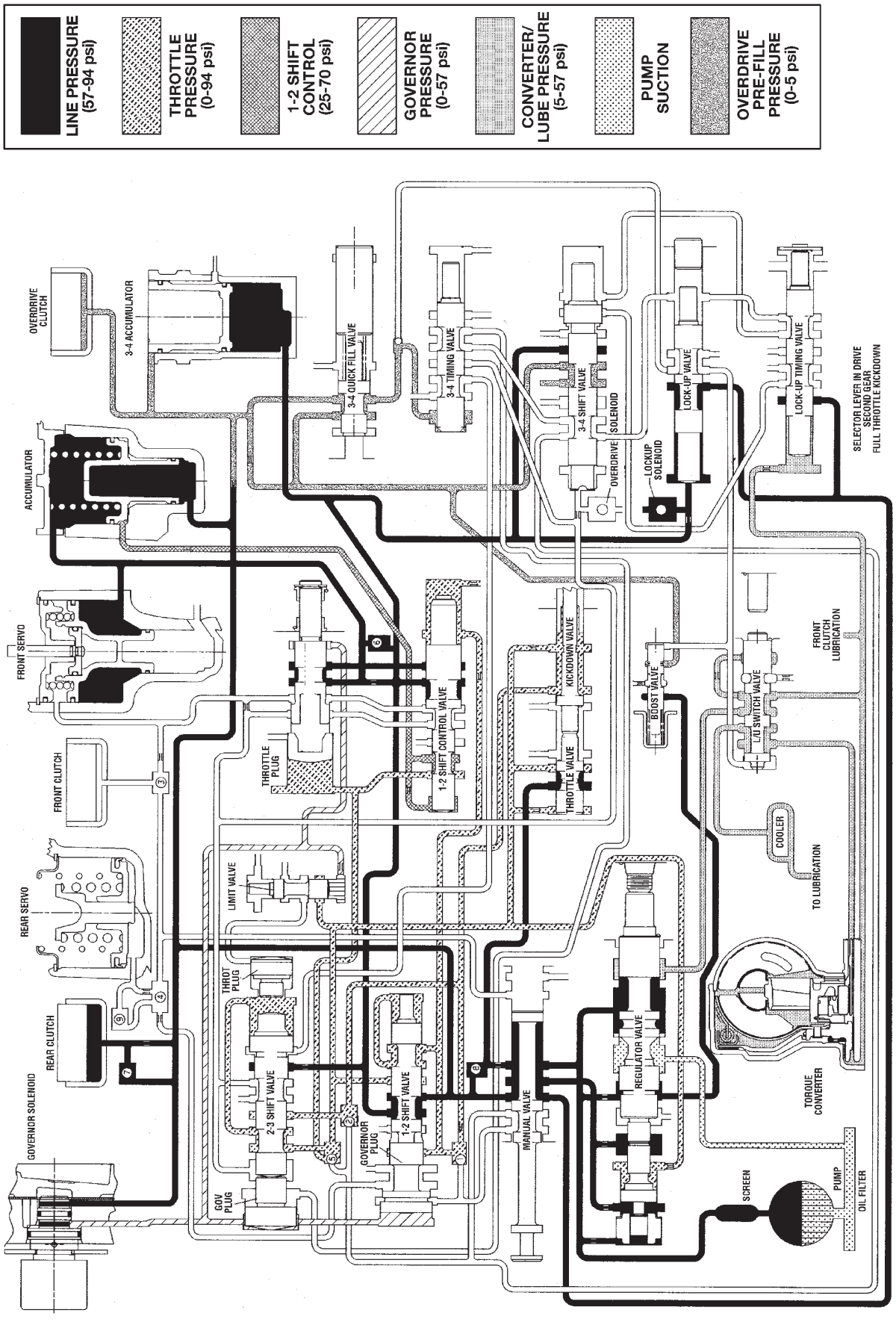
HYDRAULIC FLOW IN MANUAL LOW (1)

AUTOMATIC TRANSMISSION - 46RE (Continued)



HYDRAULIC FLOW IN MANUAL SECOND (2)

AUTOMATIC TRANSMISSION - 46RE (Continued)



808805a2

HYDRAULIC FLOW DURING FULL THROTTLE 3-2 DOWNSHIFT (PASSING)

AUTOMATIC TRANSMISSION - 46RE (Continued)

SPECIFICATIONS

TRANSMISSION

GENERAL

Component	Metric	Inch
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.	1.78-3.28 mm	0.070-0.129 in.
Clutch pack clearance/ Rear.	0.635-0.914 mm	0.025-0.036 in.
Front clutch	3 discs	
Rear clutch	4 discs	
Overdrive clutch	4 discs	

Component	Metric	Inch
Direct clutch	8 discs	
Band adjustment from 72 in. lbs.		
Front band	Back off 2 7/8 turns	
Rear band	Back off 2 turns	
Recommended fluid	Mopar® ATF Plus 4, type 9602	

GEAR RATIOS

1ST GEAR	2.45:1
2ND GEAR	1.45:1
3RD GEAR	1.0:1
4TH GEAR	0.69:1
REVERSE	2.21:1

THRUST WASHER/SPACER/SNAP-RING DIMENSIONS

Component	Metric	Inch
Front clutch thrust washer (reaction shaft support hub)	1.55 mm	0.061 in.
	2.15 mm	0.084 in.
	2.59 mm	0.102 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)	1.3-1.4 mm	0.052-0.054 in.
	1.75-1.8 mm	0.068-0.070 in.
	2.1-2.2 mm	0.083-0.085 in.
Rear clutch pack snap-ring	1.5-1.6 mm	0.060-0.062 in.
	1.9-1.95 mm	0.074-0.076 in.
Planetary geartrain snap-ring (at front of output shaft)	1.4-1.5 mm	0.055-0.059 in.
	1.6-1.7 mm	0.062-0.066 in.
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		

AUTOMATIC TRANSMISSION - 46RE (Continued)

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	No more than 21 kPa (3 psi) lower than line pressure.
	R range	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.

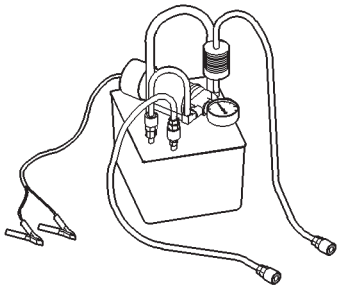
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Fitting, cooler line at trans	18	13	-
Bolt, torque convertor	31	23	-
Bolt, clevis bracket to crossmember	47	35	-
Bolt, clevis bracket to rear support	68	50	-
Bolt, driveplate to crankshaft	75	55	-
Plug, front band reaction	17	13	-
Locknut, front band adj.	34	25	-
Switch, park/neutral	34	25	-
Bolt, fluid pan	13.6	-	125
Screws, fluid filter	4	-	35
Bolt, oil pump	20	15	-
Bolt, overrunning clutch cam	17	13	-
Bolt, O/D to trans.	34	25	-
Bolt, O/D piston retainer	17	13	-
Plug, pressure test port	14	10	-
Bolt, reaction shaft support	20	15	-
Locknut, rear band	41	30	-
Bolt, valve body to case	12	-	100
Sensor, trans speed	27	20	-
Screw, solenoid wiring connector	4	-	35
Screw, solenoid to transfer plate	4	-	35

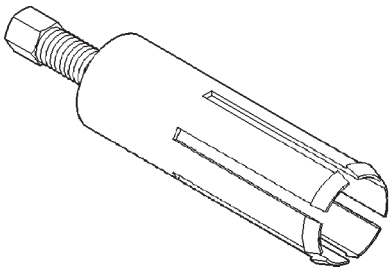
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SPECIAL TOOLS

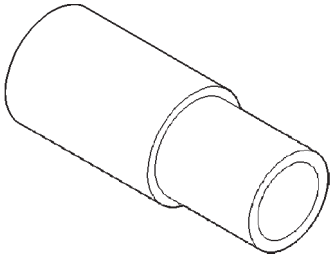
RE TRANSMISSION



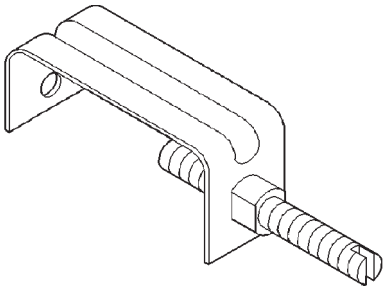
Flusher, Oil Cooler - 6906



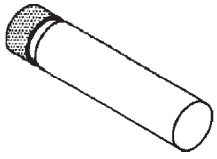
Remover, Bushing - 6957



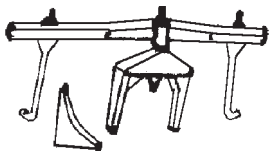
Installer, Bushing - 6951



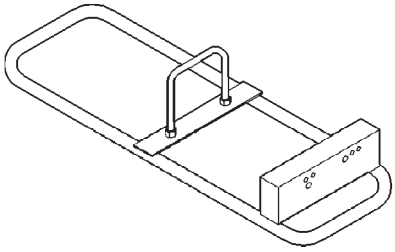
Retainer, Detent Ball and Spring - 6583



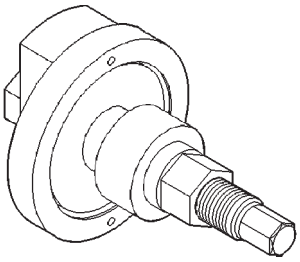
Gauge, Block - 6312



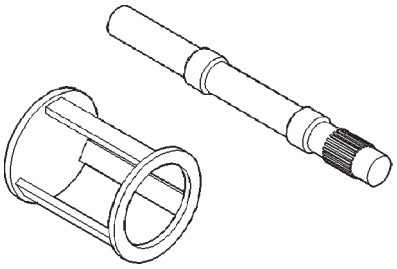
Fixture, Engine Support - C-3487-A



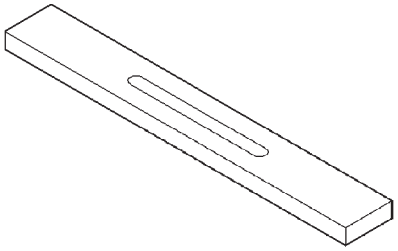
Stand, Transmission Repair - C-3750-B



Compressor, Spring - C-3863-A

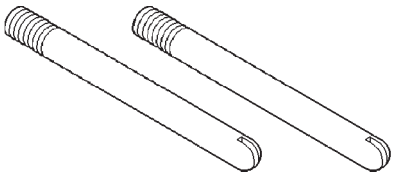


Spring Compressor and Alignment Shaft - 6227

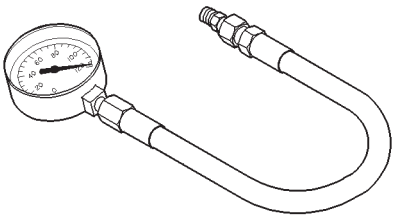


Bar, Gauge - 6311

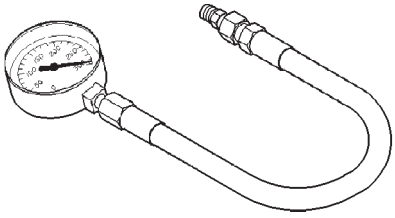
AUTOMATIC TRANSMISSION - 46RE (Continued)



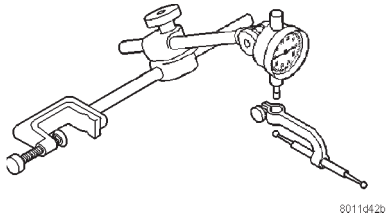
Studs, Oil Pump Pilot - C-3288-B



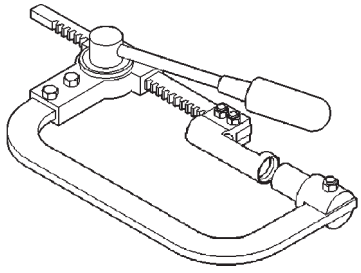
Gauge, Pressure - C-3292



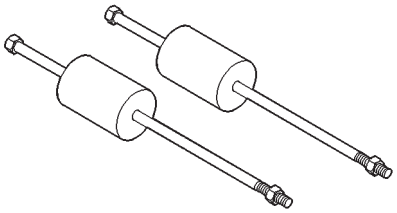
Gauge, Pressure - C-3293SP



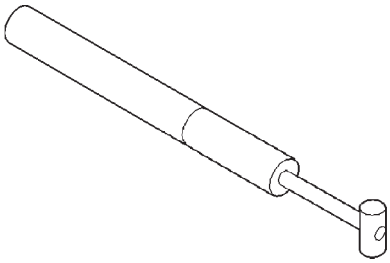
Set, Dial Indicator - C-3339



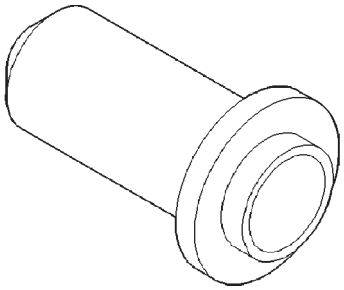
Compressor, Spring - C-3422-B



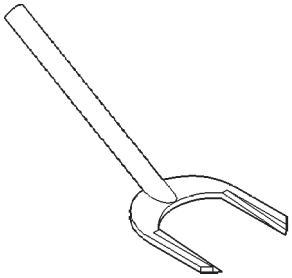
Puller, Slide Hammer - C-3752



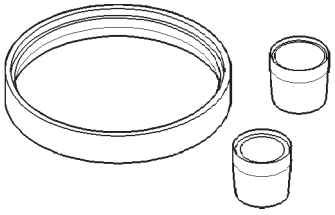
Gauge, Throttle Setting - C-3763



Installer, Seal - C-3860-A

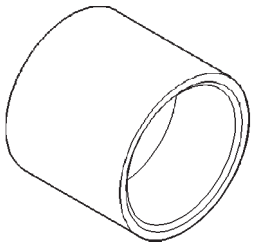


Remover, Seal - C-3985-B

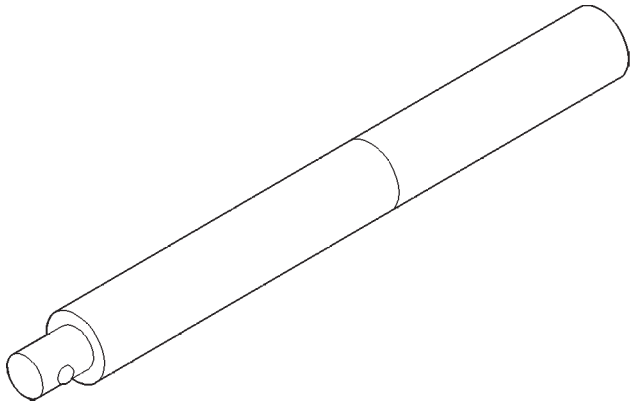


Installer, Overdrive Piston Seal - 8114

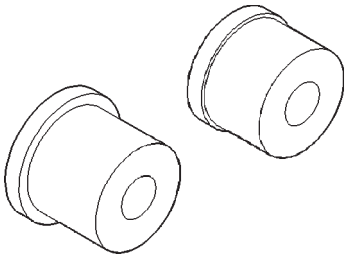
AUTOMATIC TRANSMISSION - 46RE (Continued)



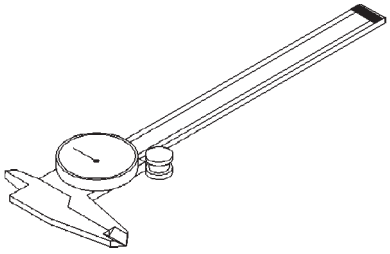
Installer, Seal - C-3995-A



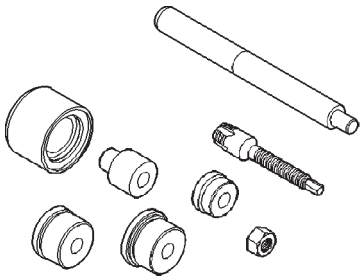
Handle, Universal - C-4171



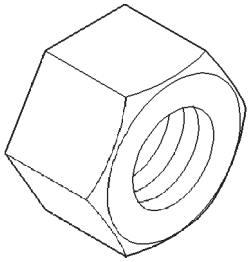
Remover/Installer, Bushing - C-4470



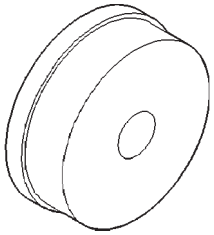
Dial Caliper - C-4962



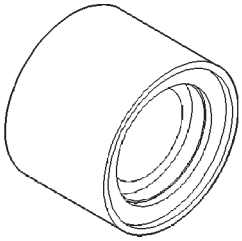
Set, Bushing Remover/Installer - C-3887-J



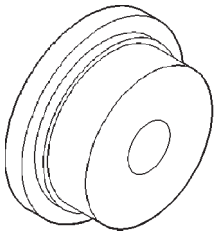
Nut, Bushing Remover - SP-1191, From kit C-3887-J



Remover, Front Clutch Bushing - SP-3629, From kit C-3887-J

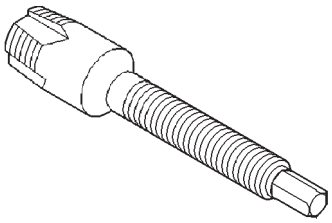


Cup, Bushing Remover - SP-3633, From kit C-3887-J

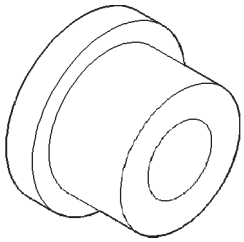


Installer, Oil Pump Bushing - SP-5118, From kit C-3887-J

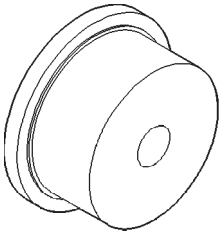
AUTOMATIC TRANSMISSION - 46RE (Continued)



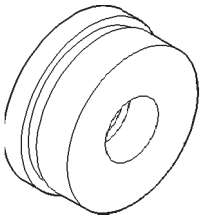
Remover, Reaction Shaft Bushing - SP-5301, From Kit C-3887-J



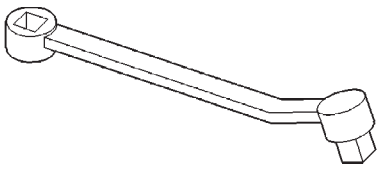
Installer, Reaction Shaft Bushing - SP-5302, From kit C-3887-J



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

ACCUMULATOR

DESCRIPTION

The accumulator (Fig. 66) is a hydraulic device that has the sole purpose of cushioning the application of a band or clutch. The accumulator consists of a dual-land piston and a spring located in a bore in the transmission case. The 3-4 accumulator is located in a housing attached to the side of the valve body (Fig. 67).

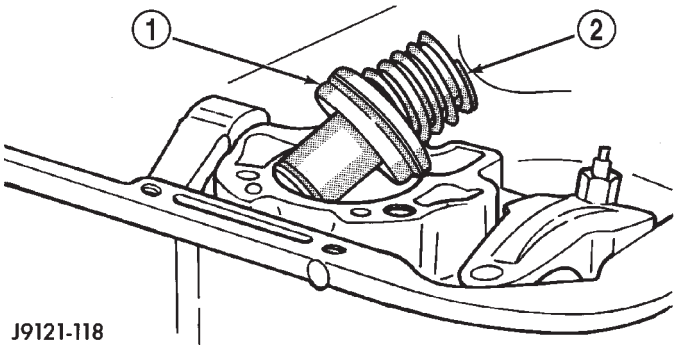


Fig. 66 Accumulator

1 - ACCUMULATOR PISTON
2 - PISTON SPRING

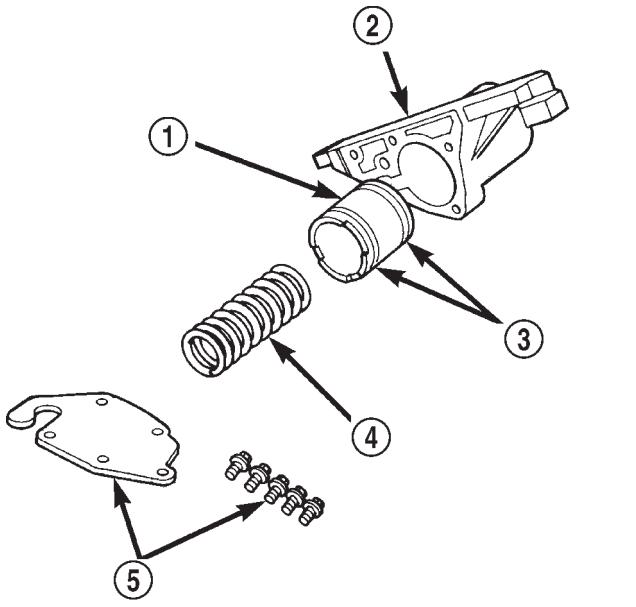


Fig. 67 3-4 Accumulator and Housing

1 - ACCUMULATOR PISTON
2 - 3-4 ACCUMULATOR HOUSING
3 - TEFLON SEALS
4 - PISTON SPRING
5 - COVER PLATE AND SCREWS

ACCUMULATOR (Continued)

OPERATION

Both the accumulator and the 3-4 accumulator function the same. Line pressure is directed to the small end of the piston when the transmission is placed into a DRIVE position (Fig. 68), bottoming it against the accumulator plate. When the 1-2 upshift occurs (Fig. 69), line pressure is directed to the large end of the piston and then to the kickdown servo. As the line pressure reaches the accumulator, the combination of spring pressure and line pressure forces the piston away from the accumulator plate. This causes a balanced pressure situation, which results in a cushioned band application. After the kickdown servo has become immovable, line pressure will finish pushing the accumulator up into its bore. When the large end of the accumulator piston is seated in its bore, the band or clutch is fully applied.

NOTE: The accumulator is shown in the inverted position for illustrative purposes.

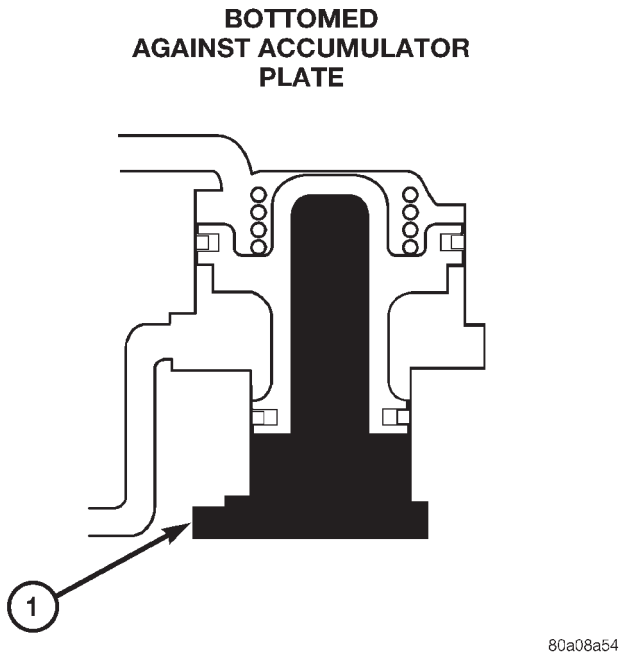


Fig. 68 Accumulator in DRIVE - FIRST Gear Position

1 - LINE PRESSURE

INSPECTION

Inspect the accumulator piston and seal rings (Fig. 70). 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. 70). Replace the springs if the coils are cracked, distorted or collapsed.

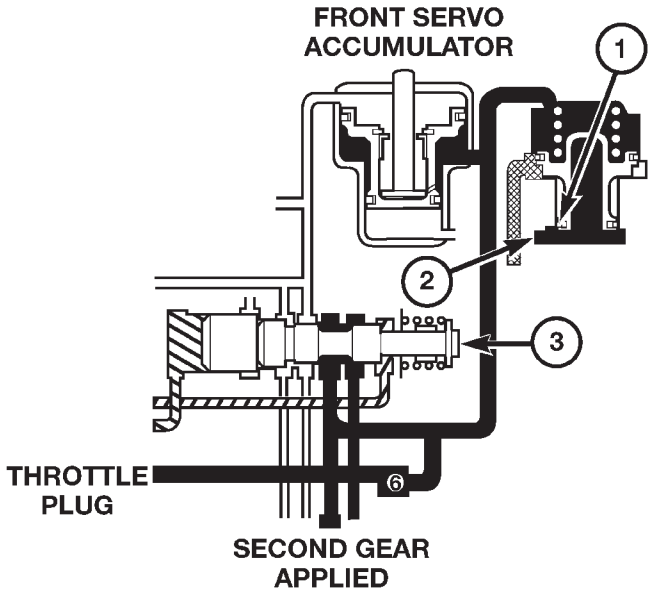


Fig. 69 Accumulator in SECOND Gear Position

1 - BOTTOM OF BORE
2 - LINE PRESSURE
3 - SHUTTLE VALVE

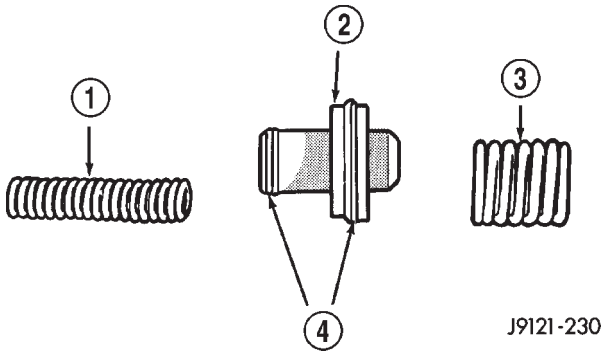


Fig. 70 Accumulator Components

1 - INNER SPRING
2 - ACCUMULATOR PISTON
3 - OUTER SPRING
4 - SEAL RINGS

BANDS

DESCRIPTION

KICKDOWN (FRONT) BAND

The kickdown, or “front”, band (Fig. 71) holds the common sun gear of the planetary gear sets. The front (kickdown) band is made of steel, and faced on its inner circumference with a friction-type lining. One end of the band is anchored to the transmission

BANDS (Continued)

case, and the other is acted on with a pushing force by a servo piston. The front band is a single-wrap design (the band does not completely encompass/ wrap the drum that it holds).

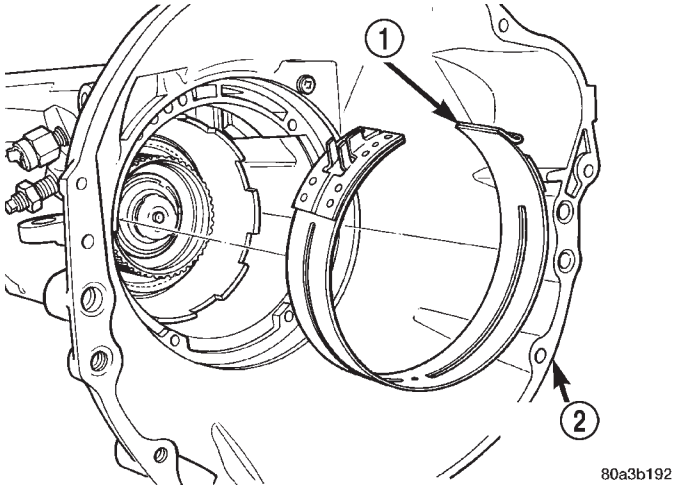


Fig. 71 Front Band

1 - FRONT BAND
2 - TRANSMISSION HOUSING

LOW/REVERSE (REAR) BAND

The low/reverse band, or “rear”, band (Fig. 72) is similar in appearance and operation to the front band. The rear band is also a single-wrap design (the band does not completely encompass/wrap the drum that it holds).

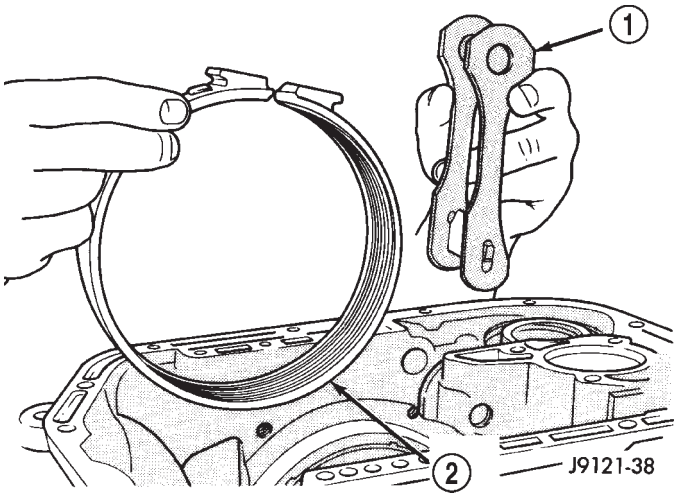


Fig. 72 Rear Band And Link

1 - BAND LINK
2 - REAR BAND

OPERATION

KICKDOWN (FRONT) BAND

The kickdown band holds the common sun gear of the planetary gear sets by applying and holding the front clutch retainer, which is splined to the sun gear driving shell, and in turn splined directly to the sun gear. The application of the band by the servo is typically done by an apply lever and link bar.

LOW/REVERSE (REAR) BAND

The rear band holds the rear planet carrier stationary by being mounted around and applied to the low/reverse drum.

ADJUSTMENTS

ADJUSTMENT - BANDS

FRONT BAND

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. 73). 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 an appropriate Torx™ socket.

CAUTION: If Adapter C-3705 is needed to reach the adjusting screw, tighten the screw to only 5 N·m (47-50 in. lbs.) torque.

(4) Back off front band adjusting screw 2-7/8 turns.

(5) Hold adjuster screw in position and tighten locknut to 41 N·m (30 ft. lbs.) torque.

(6) Lower vehicle.

REAR BAND

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. 74).

(5) Back off adjusting screw 2 turns.

(6) Hold adjusting screw in place and tighten locknut to 34 N·m (25 ft. lbs.) torque.

BANDS (Continued)

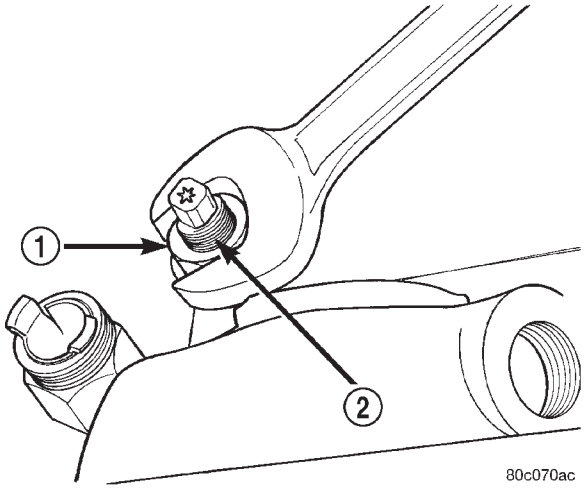


Fig. 73 Front Band Adjustment Screw Location

1 - LOCK-NUT
2 - FRONT BAND ADJUSTER

(7) Position new gasket on oil pan and install pan on transmission. Tighten pan bolts to 13.6 N·m (125 in. lbs.) lbs.) torque.

(8) Lower vehicle and refill transmission with Mopar® ATF +4, Type 9602 fluid.

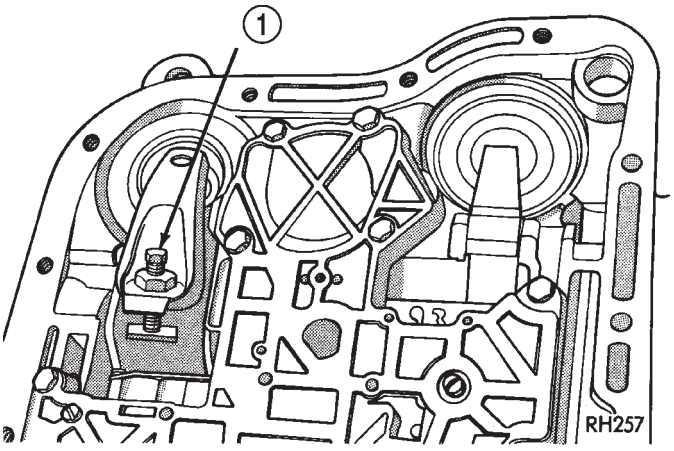


Fig. 74 Rear Band Adjustment Screw Location

1 - LOW-REVERSE BAND ADJUSTMENT

ELECTRONIC GOVERNOR

DESCRIPTION

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. 75).

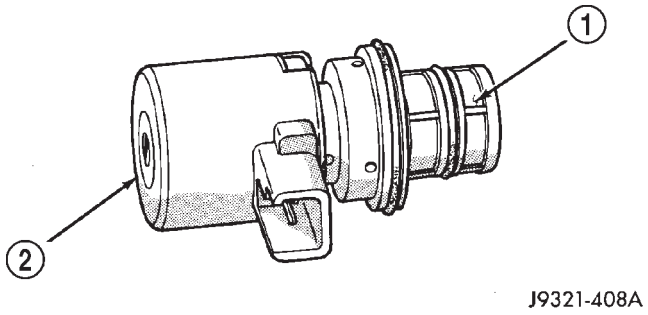


Fig. 75 Governor Pressure Solenoid Valve

1 - SOLENOID FILTER
2 - GOVERNOR PRESSURE SOLENOID

GOVERNOR PRESSURE SENSOR

The governor pressure sensor measures output pressure of the governor pressure solenoid valve (Fig. 76).

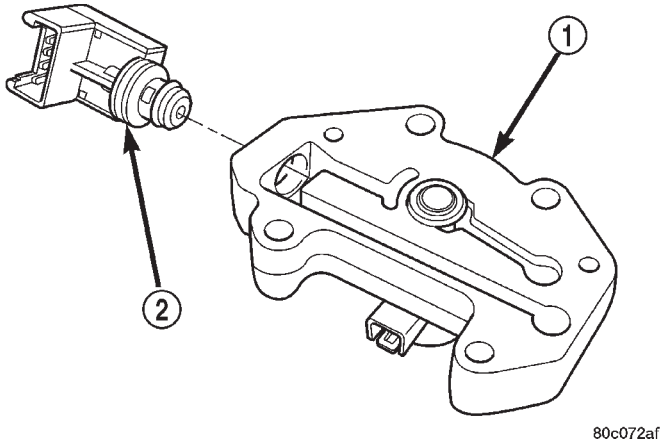


Fig. 76 Governor Pressure Sensor

1 - GOVERNOR BODY
2 - GOVERNOR PRESSURE SENSOR/TRANSMISSION FLUID TEMPERATURE THERMISTOR

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. 76).

ELECTRONIC GOVERNOR (Continued)

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.

OPERATION

Compensation is required for performance variations of two of the input devices. Though the slope of the transfer functions is tightly controlled, offset may vary due to various environmental factors or manufacturing tolerances.

The pressure transducer is affected by barometric pressure as well as temperature. Calibration of the zero pressure offset is required to compensate for shifting output due to these factors.

Normal calibration will be performed when sump temperature is above 50 degrees F, or in the absence of sump temperature data, after the first 10 minutes of vehicle operation. Calibration of the pressure transducer offset occurs each time the output shaft speed falls below 200 RPM. Calibration shall be repeated each 3 seconds the output shaft speed is below 200 RPM. A 0.5 second pulse of 95% duty cycle is applied to the governor pressure solenoid valve and the transducer output is read during this pulse. Averaging of the transducer signal is necessary to reject electrical noise.

Under cold conditions (below 50 degrees F sump), the governor pressure solenoid valve response may be too slow to guarantee 0 psi during the 0.5 second calibration pulse. Calibration pulses are continued during this period, however the transducer output valves are discarded. Transducer offset must be read at key-on, under conditions which promote a stable reading. This value is retained and becomes the offset during the ″cold″ period of operation.

GOVERNOR PRESSURE SOLENOID VALVE

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.

GOVERNOR PRESSURE SENSOR

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

GOVERNOR BODY AND TRANSFER PLATE

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.

GOVERNOR PRESSURE CURVES

LOW TRANSMISSION FLUID TEMPERATURE

When the transmission fluid is cold the conventional governor can delay shifts, resulting in higher than normal shift speeds and harsh shifts. The electronically controlled low temperature governor pressure curve is higher than normal to make the transmission shift at normal speeds and sooner. The PCM uses a temperature sensor in the transmission oil sump to determine when low temperature governor pressure is needed.

NORMAL OPERATION

Normal operation is refined through the increased computing power of the PCM and through access to data on engine operating conditions provided by the PCM that were not available with the previous stand-alone electronic module. This facilitated the development of a load adaptive shift strategy - the ability to alter the shift schedule in response to vehicle load condition. One manifestation of this capability is grade ″hunting″ prevention - the ability of the transmission logic to delay an upshift on a grade if the engine does not have sufficient power to maintain speed in the higher gear. The 3-2 downshift and the potential for hunting between gears occurs with a heavily loaded vehicle or on steep grades. When hunting occurs, it is very objectionable because shifts are frequent and accompanied by large changes in noise and acceleration.

WIDE OPEN THROTTLE OPERATION

In wide-open throttle (WOT) mode, adaptive memory in the PCM assures that up-shifts occur at the preprogrammed optimum speed. WOT operation is determined from the throttle position sensor, which is also a part of the emission control system. The ini-

ELECTRONIC GOVERNOR (Continued)

tial setting for the WOT upshift is below the optimum engine speed. As WOT shifts are repeated, the PCM learns the time required to complete the shifts by comparing the engine speed when the shifts occur to the optimum speed. After each shift, the PCM adjusts the shift point until the optimum speed is reached. The PCM also considers vehicle loading, grade and engine performance changes due to high altitude in determining when to make WOT shifts. It does this by measuring vehicle and engine acceleration and then factoring in the shift time.

TRANSFER CASE LOW RANGE OPERATION

On four-wheel drive vehicles operating in low range, the engine can accelerate to its peak more rapidly than in Normal range, resulting in delayed shifts and undesirable engine ″flare.″ The low range governor pressure curve is also higher than normal to initiate upshifts sooner. The PCM compares electronic vehicle speed signal used by the speedometer to the transmission output shaft speed signal to determine when the transfer case is in low range.

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. 77).

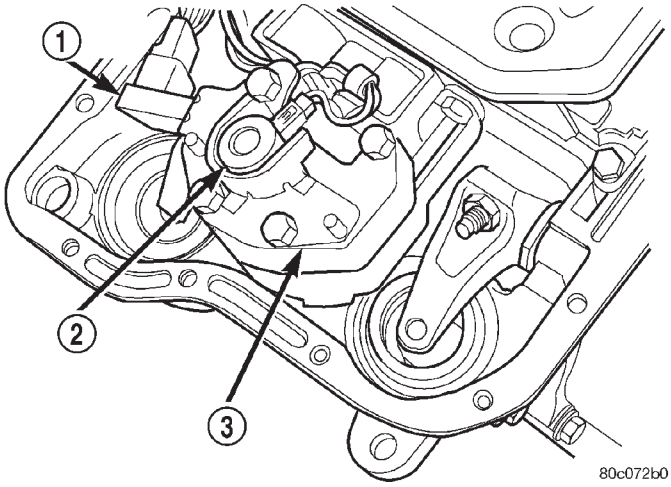


Fig. 77 Governor Solenoid And Pressure Sensor

1 - PRESSURE SENSOR
2 - PRESSURE SOLENOID
3 - GOVERNOR

(4) Remove screws holding pressure solenoid retainer to governor body.

(5) Separate solenoid retainer from governor (Fig. 78).

(6) Pull solenoid from governor body (Fig. 79).

(7) Pull pressure sensor from governor body.

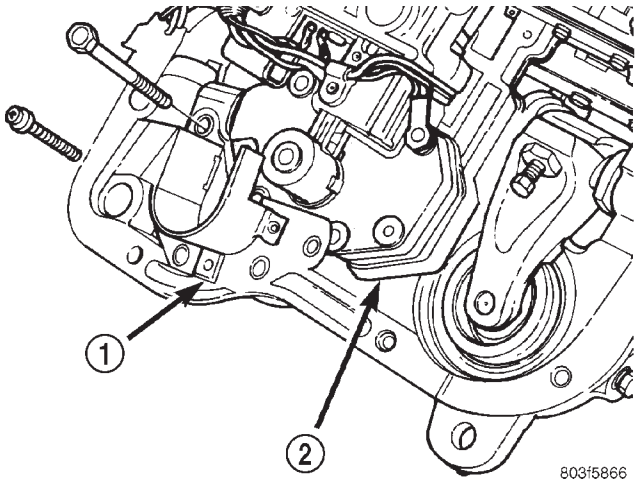


Fig. 78 Pressure Solenoid Retainer

1 - PRESSURE SOLENOID RETAINER
2 - GOVERNOR

(8) Remove bolts holding governor body to valve body.

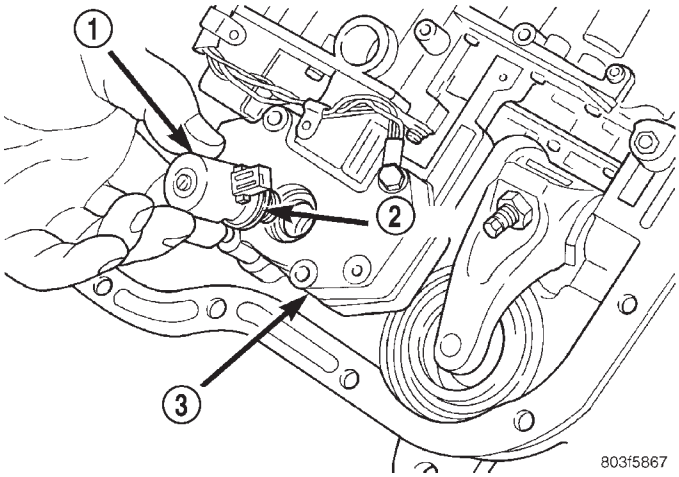


Fig. 79 Pressure Solenoid and O-ring

1 - PRESSURE SOLENOID
2 - O-RING
3 - GOVERNOR

(9) Separate governor body from valve body (Fig. 80).

(10) Remove governor body gasket.

INSTALLATION

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

(1) Place gasket in position on back of governor body (Fig. 81).

(2) Place governor body in position on valve body.

(3) Install bolts to hold governor body to valve body.

ELECTRONIC GOVERNOR (Continued)

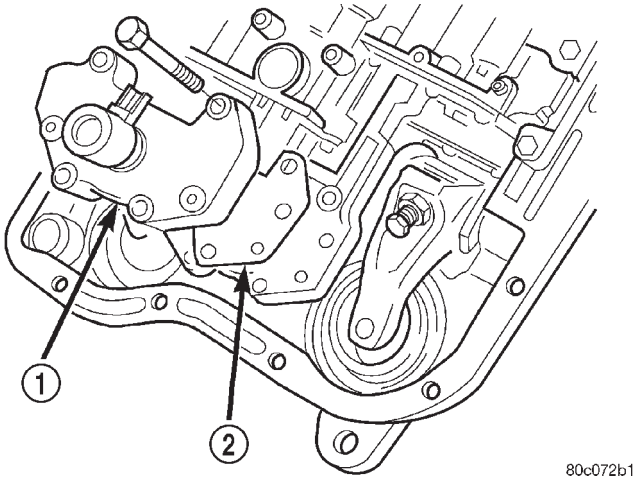


Fig. 80 Governor Body and Gasket

1 - GOVERNOR BODY
2 - GASKET

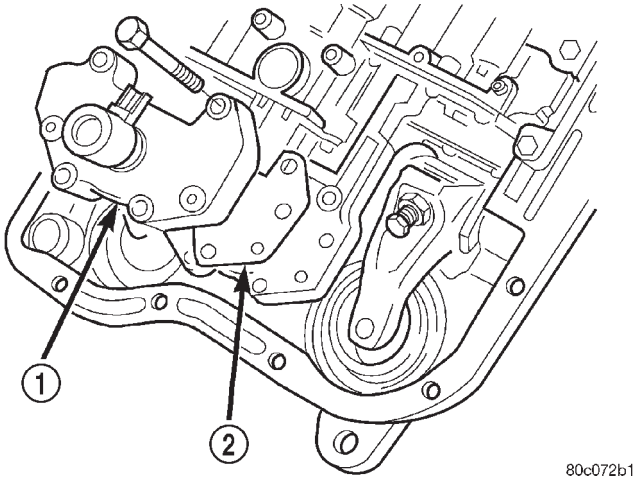


Fig. 81 Governor Body and Gasket

1 - GOVERNOR BODY
2 - GASKET

(4) Lubricate o-ring on pressure sensor with transmission fluid.

(5) Align pressure sensor to bore in governor body.

(6) Push pressure sensor into governor body.

(7) Lubricate o-ring, on pressure solenoid, with transmission fluid.

(8) Align pressure solenoid to bore in governor body (Fig. 82).

(9) Push solenoid into governor body.

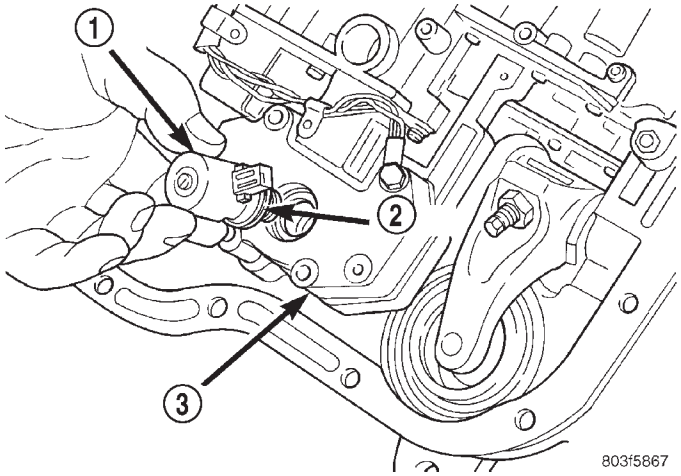


Fig. 82 Pressure Solenoid and O-ring

1 - PRESSURE SOLENOID
2 - O-RING
3 - GOVERNOR

(10) Place solenoid retainer in position on governor (Fig. 83).

(11) Install screws to hold pressure solenoid retainer to governor body.

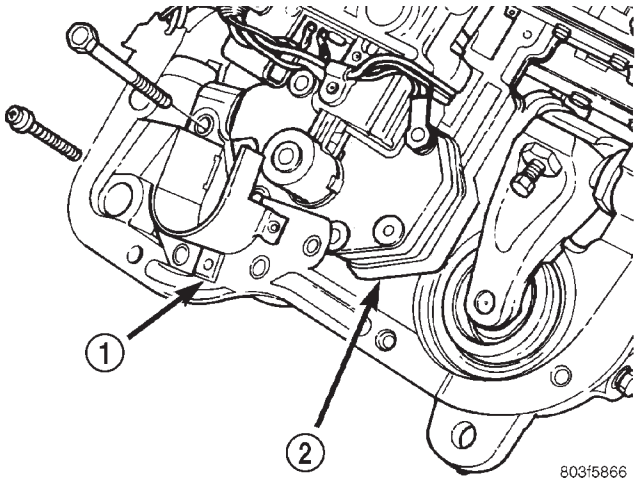


Fig. 83 Pressure Solenoid Retainer

1 - PRESSURE SOLENOID RETAINER
2 - GOVERNOR

(12) Engage wire connectors into pressure sensor and solenoid (Fig. 84).

(13) Install transmission fluid pan and (new) filter.

(14) Lower vehicle and road test to verify repair.

ELECTRONIC GOVERNOR (Continued)

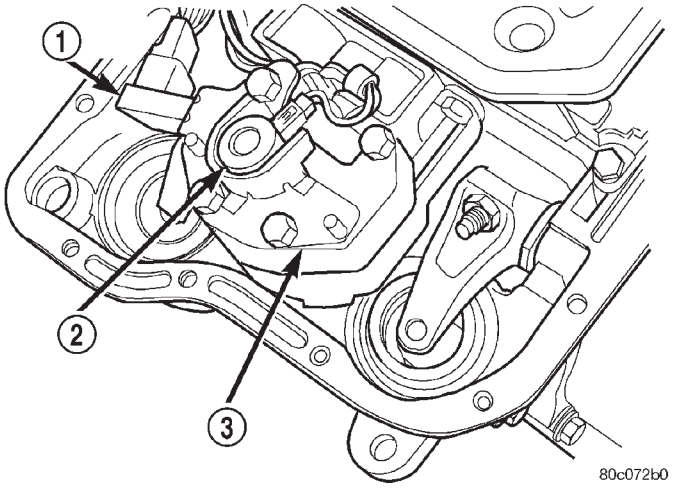


Fig. 84 Governor Solenoid And Pressure Sensor

1 - PRESSURE SENSOR
2 - PRESSURE SOLENOID
3 - GOVERNOR

EXTENSION HOUSING BUSHING

REMOVAL

(1) Remove extension housing yoke seal.

(2) Insert Remover 6957 into the extension housing. Tighten tool to bushing and remove bushing (Fig. 85).

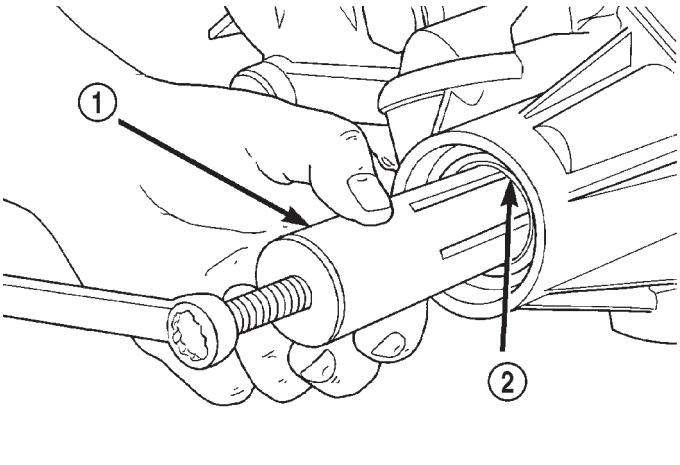


Fig. 85 Bushing Removal - Typical

1 - REMOVER
2 - EXTENSION HOUSING BUSHING

INSTALLATION

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

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

(3) Install new oil seal in housing using Seal Installer C-3995-A (Fig. 86).

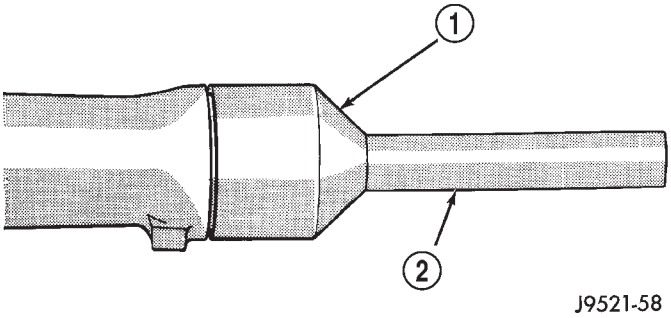


Fig. 86 Extension Housing Seal Installation

1 - SPECIAL TOOL C-3995-A OR C-3972-A
2 - SPECIAL TOOL C-4471

EXTENSION HOUSING SEAL

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. 87) from overdrive housing.

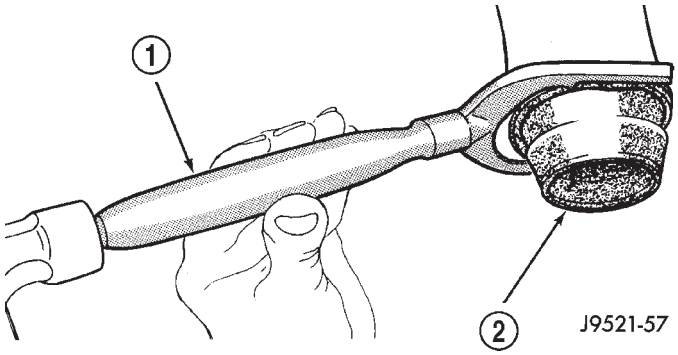


Fig. 87 Removing Overdrive Housing Yoke Seal

1 - SPECIAL TOOL C-3985-B
2 - SEAL

INSTALLATION

(1) Place seal in position on overdrive housing.

(2) Drive seal into overdrive housing with Seal Installer C-3995-A (Fig. 88).

(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.

EXTENSION HOUSING SEAL (Continued)

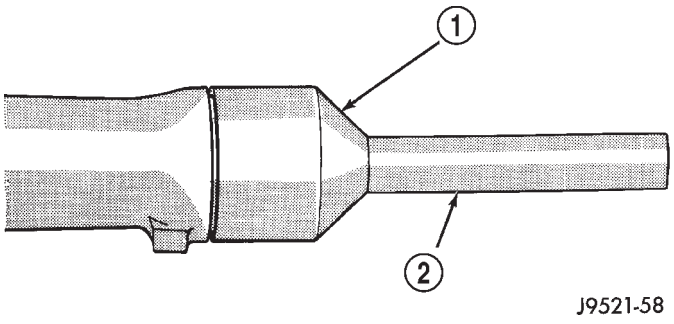


Fig. 88 Installing Overdrive Housing Seal

1 - SPECIAL TOOL C-3995-A OR C-3972-A
2 - SPECIAL TOOL C-4471

FLUID AND FILTER

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - 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 and clutch 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.

DIAGNOSIS AND TESTING - CAUSES OF BURNT FLUID

Burnt, discolored fluid is a result of overheating which has two primary causes.

(1) A result of restricted fluid flow through the main and/or auxiliary cooler. This condition is usually the result of a faulty or improperly installed drainback valve, a damaged main cooler, or severe restrictions in the coolers and lines caused by debris or kinked lines.

(2) Heavy duty operation with a vehicle not properly equipped for this type of operation. Trailer towing or similar high load operation will overheat the transmission fluid if the vehicle is improperly equipped. Such vehicles should have an auxiliary transmission fluid cooler, a heavy duty cooling system, and the engine/axle ratio combination needed to handle heavy loads.

DIAGNOSIS AND TESTING - 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, an overhaul is necessary.

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.

STANDARD PROCEDURE

STANDARD PROCEDURE - FLUID LEVEL CHECK

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

Improper filling can also raise the fluid level too high. When the transmssion has too much fluid, the geartrain churns up foam and cause the same conditions which occur with a low fluid level.

FLUID AND FILTER (Continued)

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

Along with fluid level, it is important to check the condition of the fluid. When the fluid smells burned, and is contaminated with metal or friction material particles, a complete transmission recondition is needed. Be sure to examine the fluid on the dipstick closely. If there is any doubt about its condition, drain out a sample for a double check.

After the fluid has been checked, seat the dipstick fully to seal out water and dirt.

The transmission has a dipstick to check oil level. It is located on the right side of the engine. Be sure to wipe all dirt from dipstick handle before removing.

Fluid level is checked with the engine running at curb idle speed, the transmission in NEUTRAL and the transmission fluid at normal operating temperature. **The engine should be running at idle speed for at least one minute, with the vehicle on level ground.**

The transmission fluid level can be checked two ways.

PROCEDURE ONE

(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. 89) 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 +4, type 9602, to restore correct level. Do not overfill.

PROCEDURE TWO

(1) Start engine and apply parking brake.

(2) Shift the transmission into DRIVE for approximately 2 seconds.

(3) Shift the transmission into REVERSE for approximately 2 seconds.

(4) Shift the transmission into PARK.

(5) Hook up DRB® scan tool and select engine.

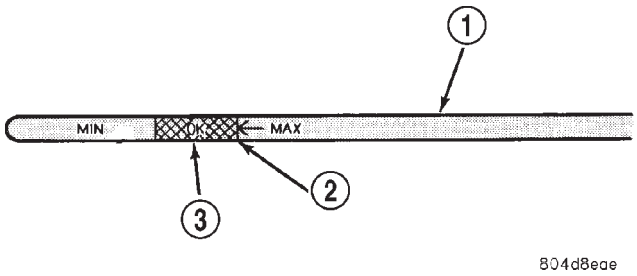


Fig. 89 Dipstick Fluid Level Marks - Typical

1 - DIPSTICK
2 - MAXIMUM CORRECT FLUID LEVEL
3 - ACCEPTABLE FLUID LEVEL

(6) Select sensors.

(7) Read the transmission temperature value.

(8) Compare the fluid temperature value with the figure. (Fig. 90)

(9) Adjust transmission fluid level shown on the dipstick according to the figure.

NOTE: After adding any fluid to the transmission, wait a minimum of 2 minutes for the oil to fully drain from the fill tube into the transmission before rechecking the fluid level.

(10) Check transmission for leaks.

STANDARD PROCEDURE - FLUID AND FILTER REPLACEMENT

For proper service intervals (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION). 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. 91).

(4) Loosen bolts holding rear of pan to transmission.

(5) Slowly separate front of pan and gasket 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 and gasket away from transmission.

(8) Pour remaining fluid in pan into drain pan.

(9) Remove screws holding filter to valve body (Fig. 92).

(10) Separate filter from valve body and pour fluid in filter into drain pan.

(11) Dispose of used trans fluid and filter properly.

FLUID AND FILTER (Continued)

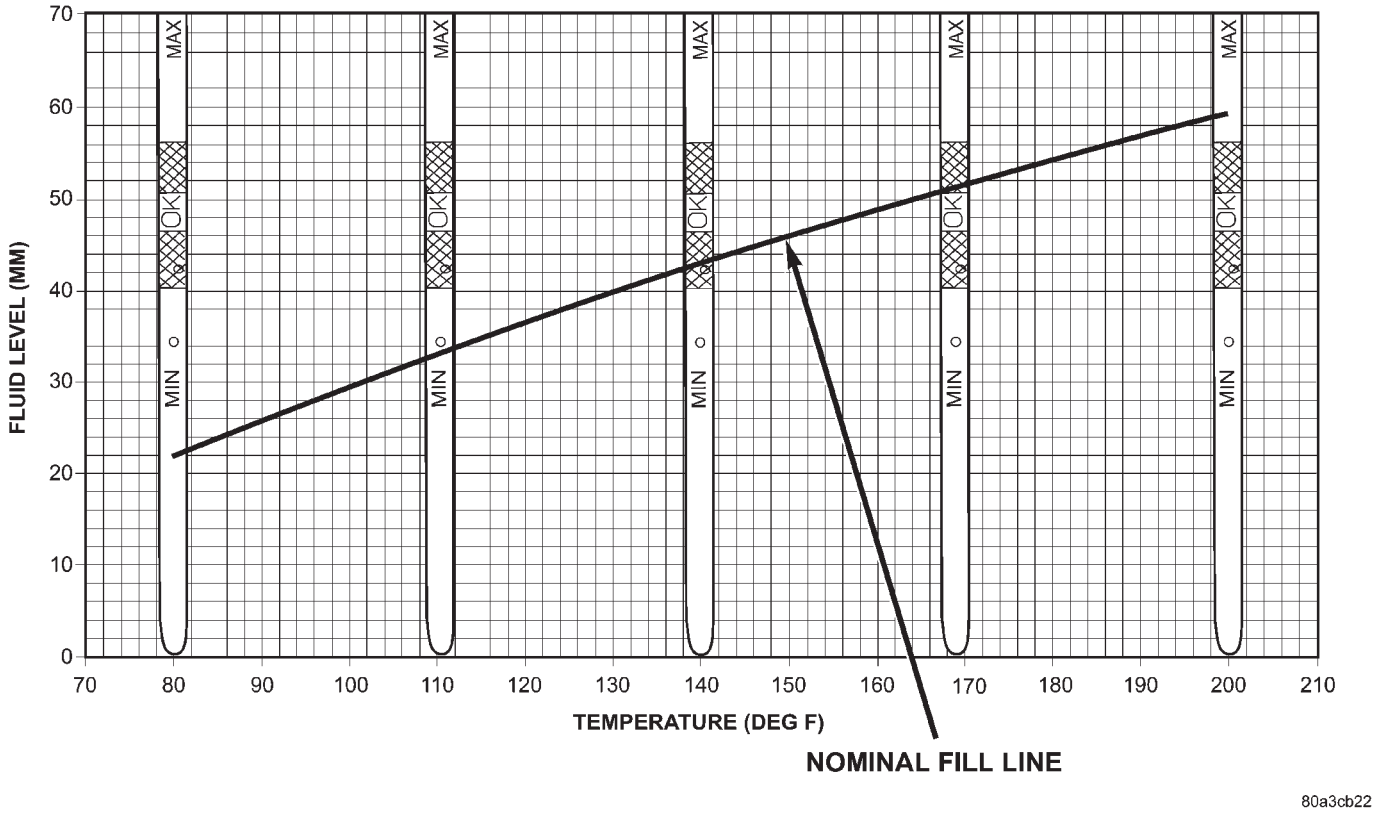


Fig. 90 46RE Fluid Fill Graph

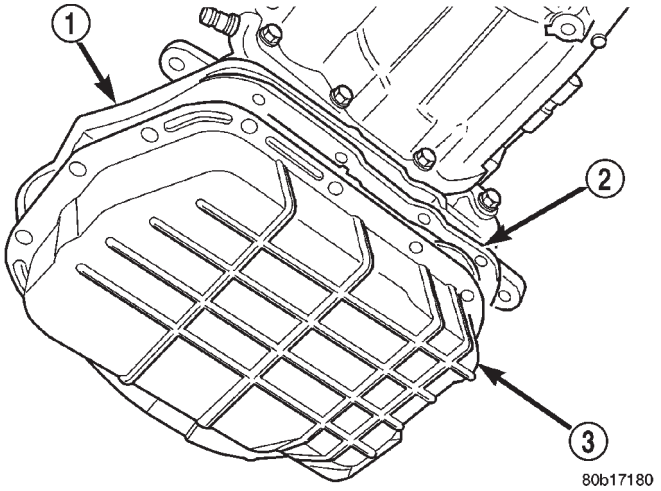


Fig. 91 Transmission Pan

1 - TRANSMISSION
2 - GASKET
3 - PAN

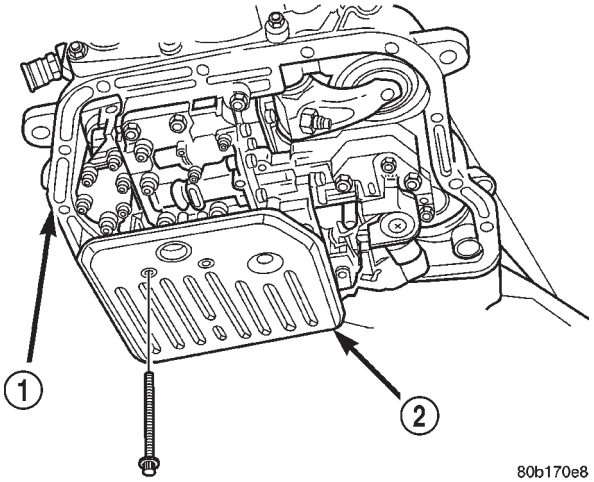


Fig. 92 Transmission Filter

1 - TRANSMISSION
2 - FILTER

FLUID AND FILTER (Continued)

INSTALLATION

(1) Position a new transmission oil filter onto the valve body.

(2) Install the screws to hold the filter to the valve body. Tighten the screws to 4 N·m (35 in.lbs.).

(3) Clean the gasket surfaces of the transmission oil pan and transmission pan rail.

NOTE: The transmission pan oil gasket is reusable. Inspect the sealing surfaces of the gasket. If the sealing ribs on both surfaces appear to be in good condition, clean the gasket of any foreign material and reinstall.

(4) Position the oil pan gasket onto the oil pan.

(5) Position the oil pan and gasket onto the transmission and install several bolts to hold the pan and gasket to the transmission.

(6) Install the remainder of the oil pan bolts. Tighten the bolts to 13.6 N·m (125 in.lbs.).

(7) Lower vehicle and fill transmission. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC/ FLUID - STANDARD PROCEDURE)

STANDARD PROCEDURE - TRANSMISSION FILL

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 +4, type 9602, to transmission:

(a) If only fluid and filter were changed, add **3 pints (1-1/2 quarts)** of ATF +4 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 +4 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 noticably 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.

FRONT CLUTCH

DESCRIPTION

The front clutch assembly (Fig. 93) is composed of the front clutch retainer, pressure plate, clutch plates, driving discs, piston, piston return spring, return spring retainer, and snap-rings. The front clutch is the forward-most component in the transmission geartrain and is directly behind the oil pump and is considered a driving component.

NOTE: The number of discs and plates may vary with each engine and vehicle combination.

OPERATION

To apply the clutch, pressure is applied between the clutch retainer and piston. The fluid pressure is provided by the oil pump, transferred through the control valves and passageways, and enters the clutch through the hub of the reaction shaft support. With pressure applied between the clutch retainer and piston, the piston moves away from the clutch retainer and compresses the clutch pack. This action applies the clutch pack, allowing torque to flow through the input shaft into the driving discs, and into the clutch plates and pressure plate that are lugged to the clutch retainer. The waved snap-ring is used to cushion the application of the clutch pack.

When pressure is released from the piston, the spring returns the piston to its fully released position and disengages the clutch. The release spring also helps to cushion the application of the clutch assembly. When the clutch is in the process of being released by the release spring, fluid flows through a vent and one-way ball-check-valve located in the clutch retainer. The check-valve is needed to eliminate the possibility of plate drag caused by centrifugal force acting on the residual fluid trapped in the clutch piston retainer.

FRONT CLUTCH (Continued)

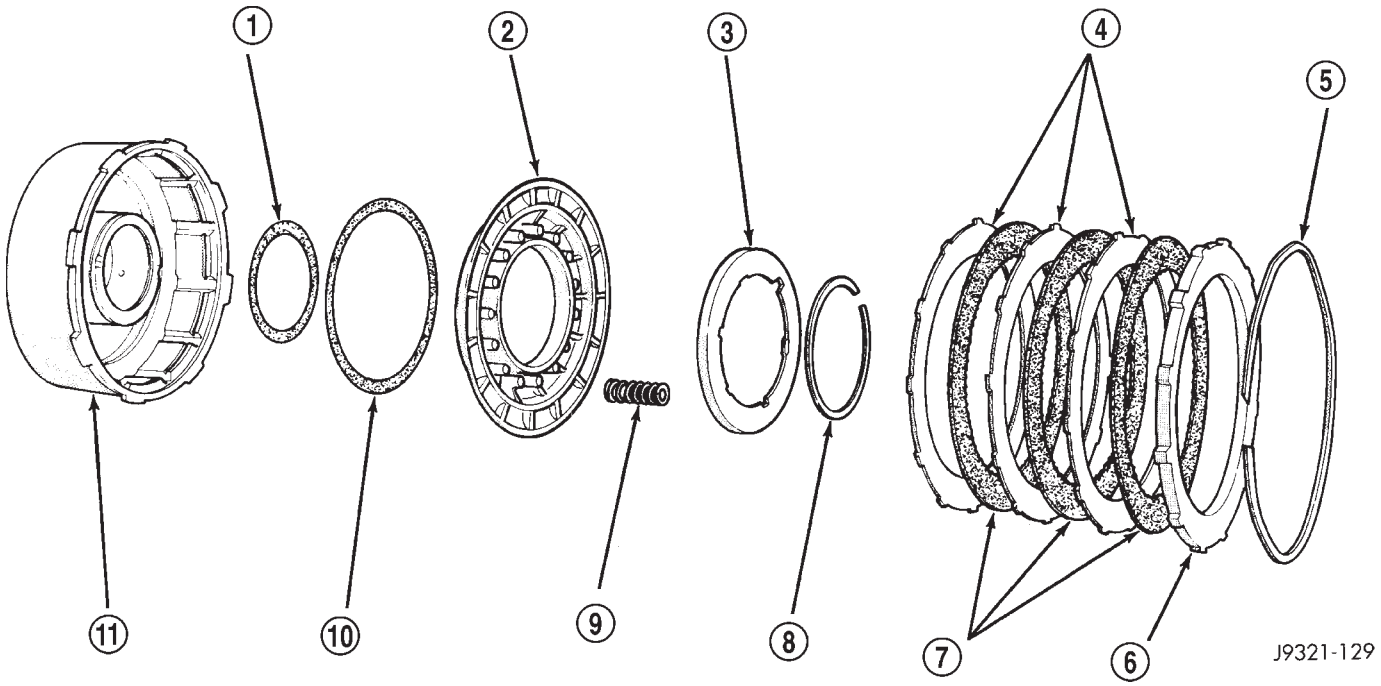


Fig. 93 Front Clutch Components

1 - INNER PISTON SEAL
2 - CLUTCH PISTON
3 - CLUTCH PISTON SPRING RETAINER
4 - CLUTCH PLATES
5 - CLUTCH PACK SNAP-RING (WAVED)
6 - REACTION PLATE
7 - CLUTCH DISCS
8 - RETAINER SNAP-RING
9 - CLUTCH PISTON SPRINGS (9)
10 - OUTER PISTON SEAL
11 - FRONT CLUTCH RETAINER

DISASSEMBLY

(1) Remove the waved snap-ring, reaction plate, clutch plates, and clutch discs.

(2) Compress clutch piston retainer and piston springs with Compressor Tool C-3863-A (Fig. 94).

(3) Remove retainer snap-ring and remove compressor tool.

(4) Remove clutch piston springs (Fig. 95). 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. 96).

(8) Insert remover tool in bushing and drive bushing straight out of clutch retainer.

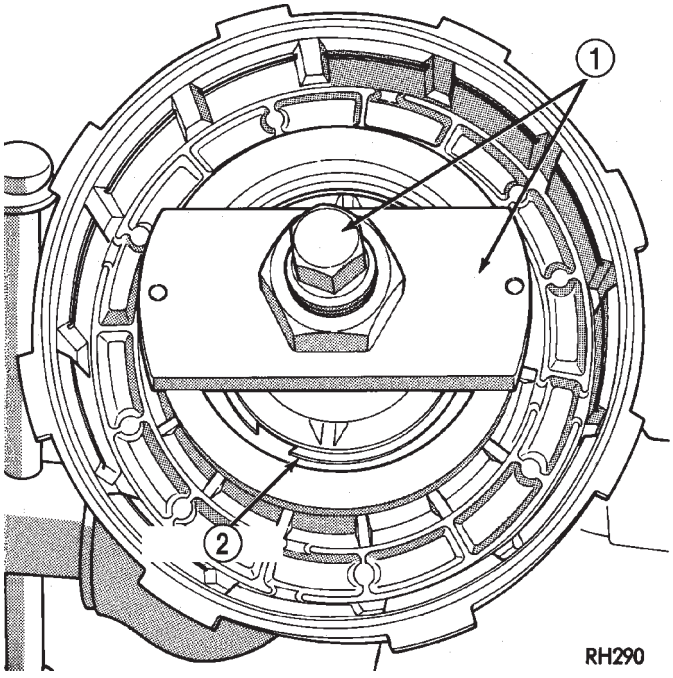


Fig. 94 Removing Front Clutch Spring Retainer Snap-Ring

1 - SPECIAL TOOL C-3863-A
2 - SNAP-RING

FRONT CLUTCH (Continued)

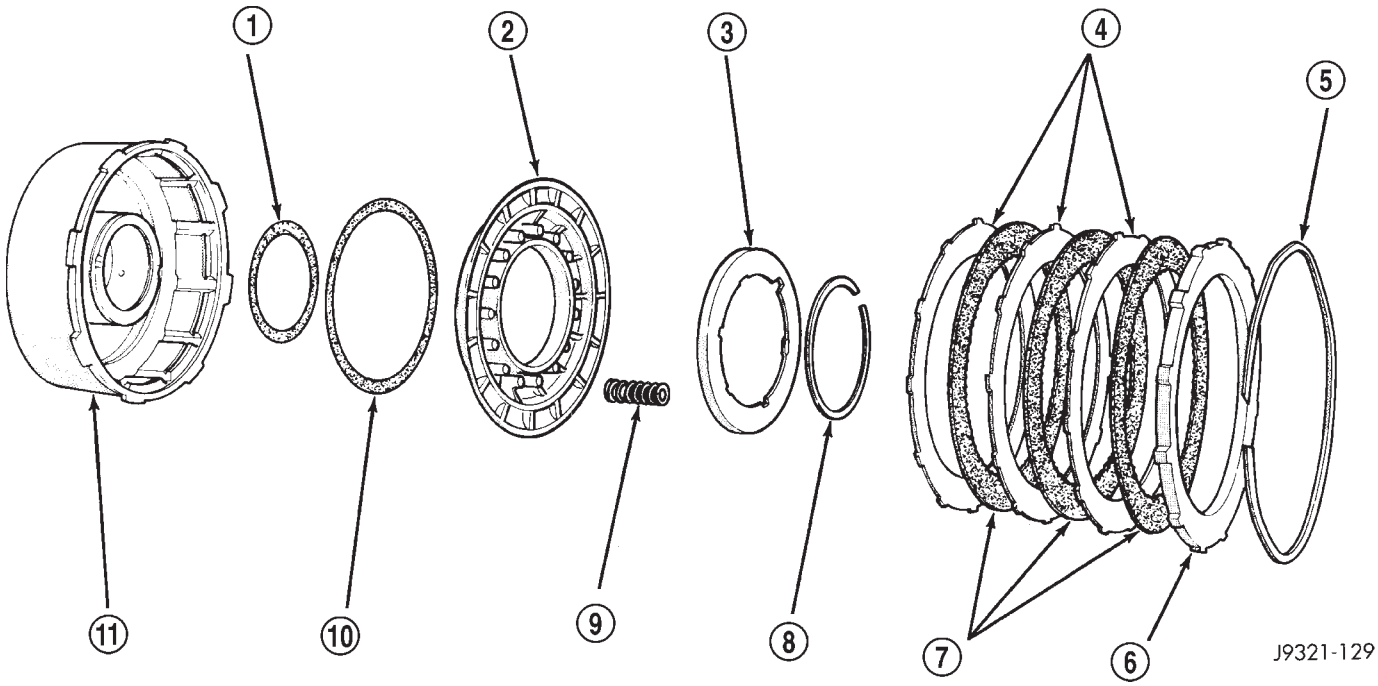


Fig. 95 Front Clutch Components

1 - INNER PISTON SEAL
2 - CLUTCH PISTON
3 - CLUTCH PISTON SPRING RETAINER
4 - CLUTCH PLATES
5 - CLUTCH PACK SNAP-RING (WAVED)
6 - REACTION PLATE
7 - CLUTCH DISCS
8 - RETAINER SNAP-RING
9 - CLUTCH PISTON SPRINGS (9)
10 - OUTER PISTON SEAL
11 - FRONT CLUTCH RETAINER

INSPECTION

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 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.

ASSEMBLY

NOTE: The 46RE transmission uses three plates and discs for the front clutch.

(1) Mount Bushing Installer SP-5511 on tool handle (Fig. 97).

(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 piston seal onto the outer diameter of the clutch retainer inner hub.

(7) Install new outer seal onto the clutch piston. Be sure seal lips of both seals face the interior of the retainer.

(8) Lubricate new inner and outer piston seals with Ru-Glyde™, or Mopar® Door Ease.

(9) 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.

FRONT CLUTCH (Continued)

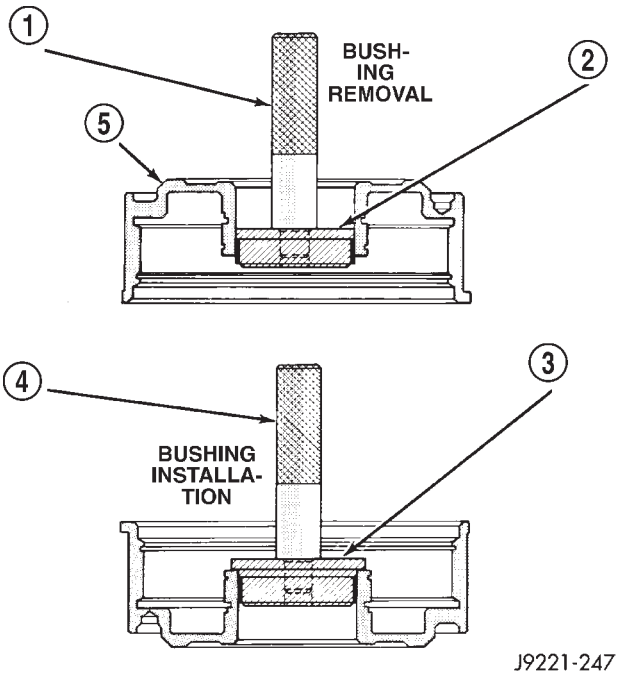


Fig. 96 Front Clutch Retainer Bushing Replacement Tools

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL SP-3629
3 - SPECIAL TOOL SP-5511
4 - SPECIAL TOOL C-4171
5 - FRONT CLUTCH RETAINER

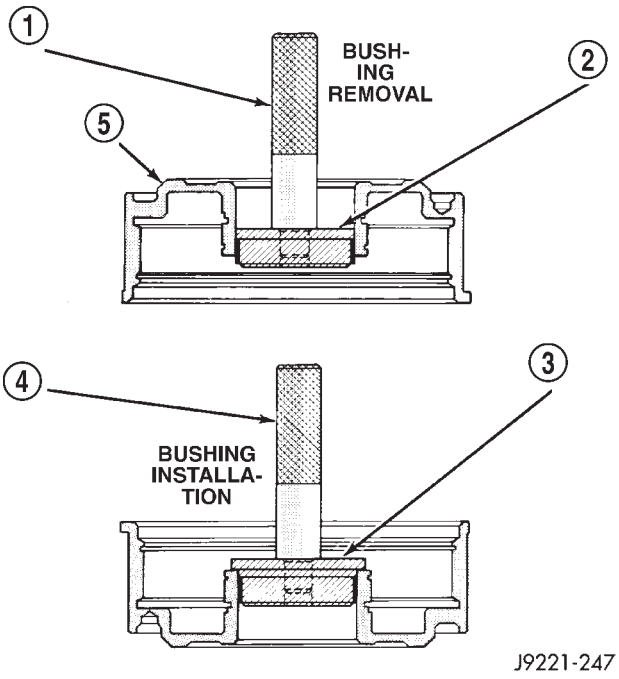


Fig. 97 Front Clutch Retainer Bushing Replacement Tools

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL SP-3629
3 - SPECIAL TOOL SP-5511
4 - SPECIAL TOOL C-4171
5 - FRONT CLUTCH RETAINER

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.

(10) Install and position nine clutch piston springs (Fig. 98).

(11) Install spring retainer on top of piston springs.

(12) Compress spring retainer and piston springs with Tool C-3863-A.

(13) Install spring retainer snap-ring and remove compressor tool.

(14) Install clutch plates and discs (Fig. 95). Three clutch discs, three steel plates and one reaction plate are required.

(15) Install reaction plate followed by waved snap-ring.

(16) Check clutch pack clearance with feeler gauge (Fig. 99). 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.

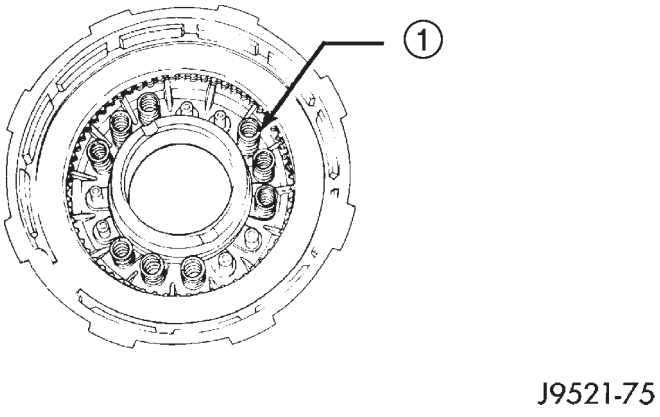


Fig. 98 Front Clutch Spring Position

1 - 9 SPRING CLUTCH

FRONT CLUTCH (Continued)

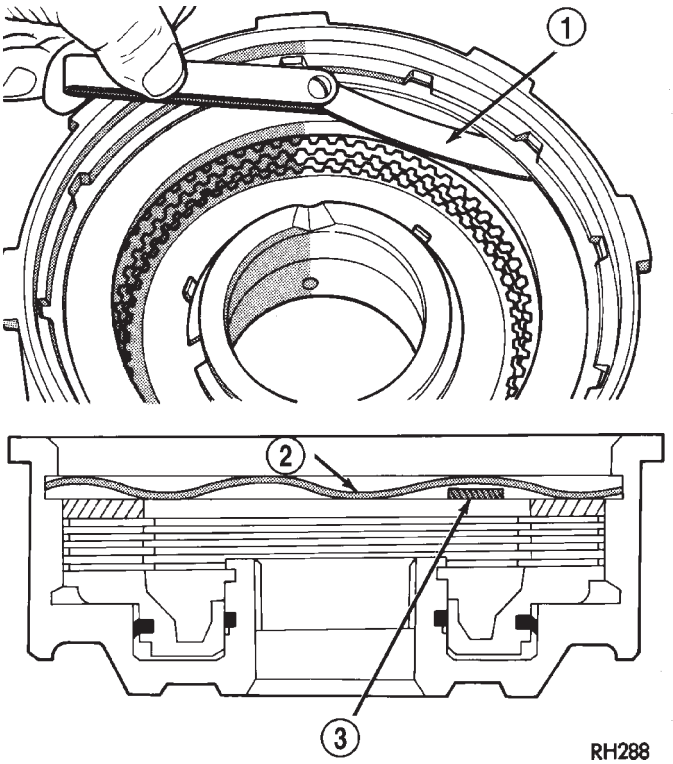


Fig. 99 Typical Method Of Measuring Front Clutch Pack Clearance

1 - FEELER GAUGE
2 - WAVED SNAP-RING
3 - FEELER GAUGE

FRONT SERVO

DESCRIPTION

The kickdown servo (Fig. 100) consists of a two-land piston with an inner piston, a piston rod and guide, and a return spring. The dual-land piston uses seal rings on its outer diameters and an O-ring for the inner piston.

OPERATION

The application of the piston is accomplished by applying pressure between the two lands of the piston. The pressure acts against the larger lower land to push the piston downward, allowing the piston rod to extend though its guide against the apply lever. Release of the servo at the 2-3 upshift is accomplished by a combination of spring and line pressure, acting on the bottom of the larger land of the piston. The small piston is used to cushion the application of the band by bleeding oil through a small orifice in the larger piston. The release timing of the kickdown servo is very important to obtain a smooth but firm shift. The release has to be very quick, just as the front clutch application is taking place. Otherwise, engine runaway or a shift hesitation will occur. To accomplish this, the band retains its holding capacity

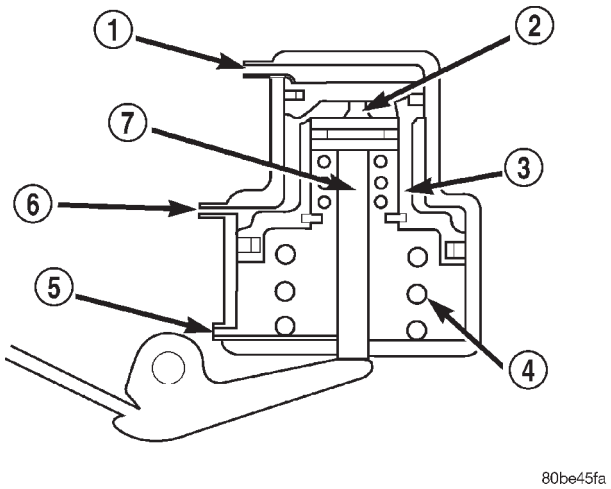


Fig. 100 Front Servo

1 - VENT
2 - INNER PISTON
3 - PISTON
4 - SPRING
5 - RELEASE PRESSURE
6 - APPLY PRESSURE
7 - PISTON ROD

until the front clutch is applied, giving a small amount of overlap between them.

DISASSEMBLY

(1) Remove seal ring from rod guide (Fig. 101).

(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.

CLEANING

Clean the servo piston components (Fig. 102) with solvent and dry them with compressed air.

INSPECTION

Inspect the servo components (Fig. 103). 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.

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. 104).

FRONT SERVO (Continued)

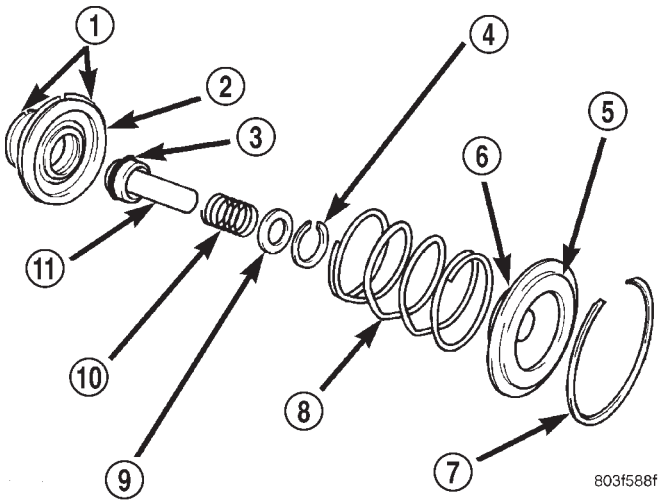


Fig. 101 Front Servo

1 - PISTON RINGS
2 - SERVO PISTON
3 - O-RING
4 - SNAP-RING
5 - PISTON ROD GUIDE
6 - SEAL RING
7 - SNAP-RING
8 - SERVO SPRING
9 - WASHER
10 - SPRING
11 - PISTON ROD

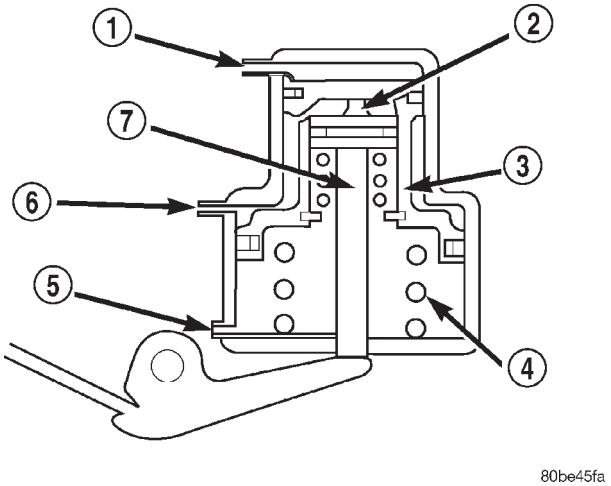


Fig. 102 Front Servo

1 - VENT
2 - INNER PISTON
3 - PISTON
4 - SPRING
5 - RELEASE PRESSURE
6 - APPLY PRESSURE
7 - PISTON ROD

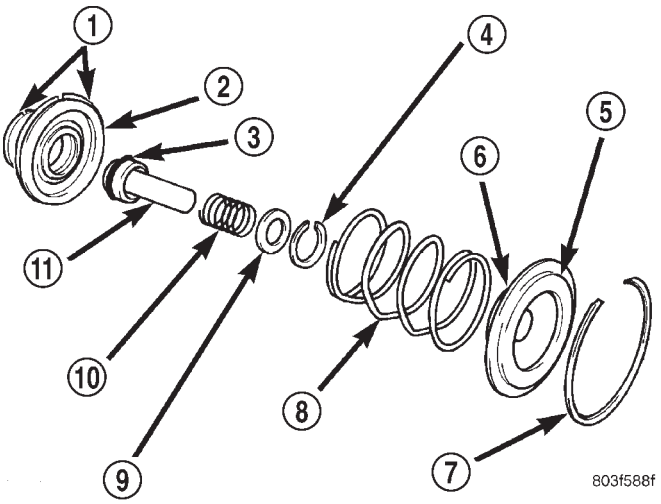


Fig. 103 Front Servo

1 - PISTON RINGS
2 - SERVO PISTON
3 - O-RING
4 - SNAP-RING
5 - PISTON ROD GUIDE
6 - SEAL RING
7 - SNAP-RING
8 - SERVO SPRING
9 - WASHER
10 - SPRING
11 - PISTON ROD

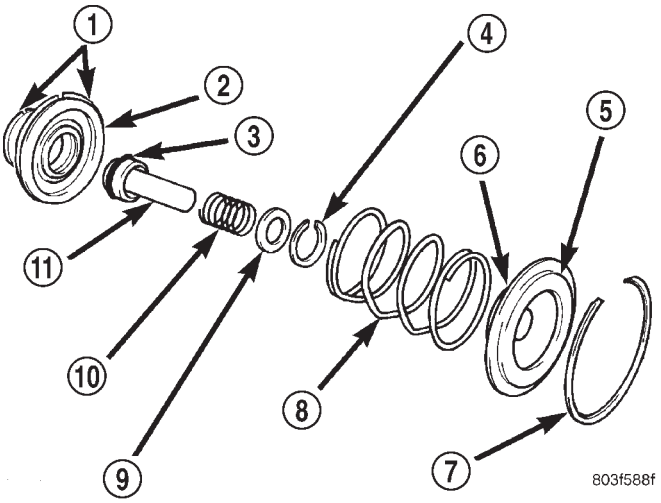


Fig. 104 Front Servo

1 - PISTON RINGS
2 - SERVO PISTON
3 - O-RING
4 - SNAP-RING
5 - PISTON ROD GUIDE
6 - SEAL RING
7 - SNAP-RING
8 - SERVO SPRING
9 - WASHER
10 - SPRING
11 - PISTON ROD

OIL PUMP

DESCRIPTION

The oil pump (Fig. 105) is located in the pump housing inside the bell housing of the transmission case. The oil pump consists of an inner and outer gear, a housing, and a reaction shaft support.

OPERATION

As the torque converter rotates, the converter hub rotates the inner and outer gears. As the gears rotate, the clearance between the gear teeth increases in the crescent area, and creates a suction at the inlet side of the pump. This suction draws fluid through the pump inlet from the oil pan. As the clearance between the gear teeth in the crescent area decreases, it forces pressurized fluid into the pump outlet and to the valve body.

STANDARD PROCEDURE - OIL PUMP VOLUME CHECK

Measuring the oil pump output volume will determine if sufficient oil flow to the transmission oil cooler exists, and whether or not an internal transmission failure is present.

Verify that the transmission fluid is at the proper level. Refer to the Fluid Level Check procedure in this section. If necessary, fill the transmission to the proper level with Mopar® ATF +4, type 9602, Automatic Transmission Fluid.

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

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

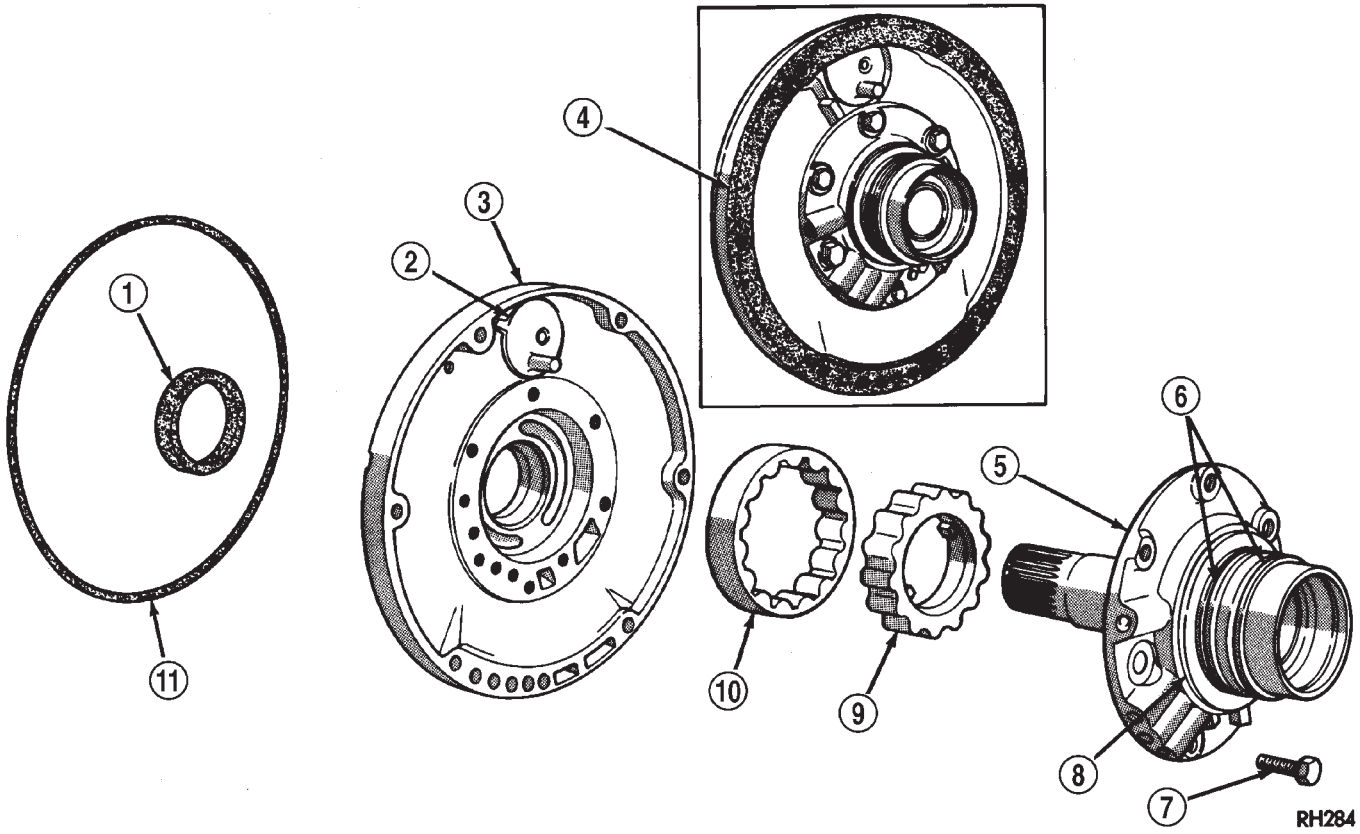


Fig. 105 Oil Pump Assembly

1 - OIL SEAL
2 - VENT BAFFLE
3 - OIL PUMP BODY
4 - GASKET
5 - REACTION SHAFT SUPPORT
6 - SEAL RINGS
7 - BOLTS (6)
8 - #1 THRUST WASHER (SELECTIVE)
9 - INNER GEAR
10 - OUTER GEAR
11 - "O" RING

OIL PUMP (Continued)

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

(3) If one quart of transmission fluid is collected in the container in 20 seconds or less, oil pump flow volume is within acceptable limits. If fluid flow is intermittent, or it takes more than 20 seconds to collect one quart of fluid, refer to the Hydraulic Pressure tests in this section for further diagnosis.

(4) Re-connect the **To cooler** line to the transmission cooler inlet.

(5) Refill the transmission to proper level.

DISASSEMBLY

(1) Mark position of support in oil pump body for assembly alignment reference. Use scriber 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. 106).

(4) Remove pump inner and outer gears (Fig. 107).

(5) Remove o-ring seal from pump body (Fig. 108). Discard seal after removal.

(6) Remove oil pump seal with Remover Tool C-3981. Discard seal after removal.

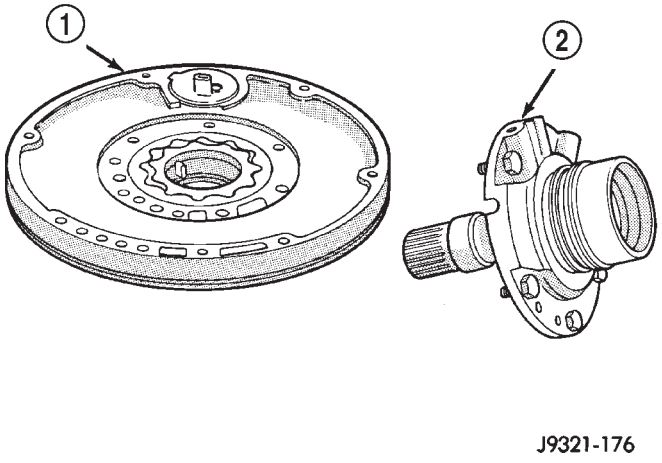


Fig. 106 Reaction Shaft Support

1 - OIL PUMP
2 - REACTION SHAFT SUPPORT

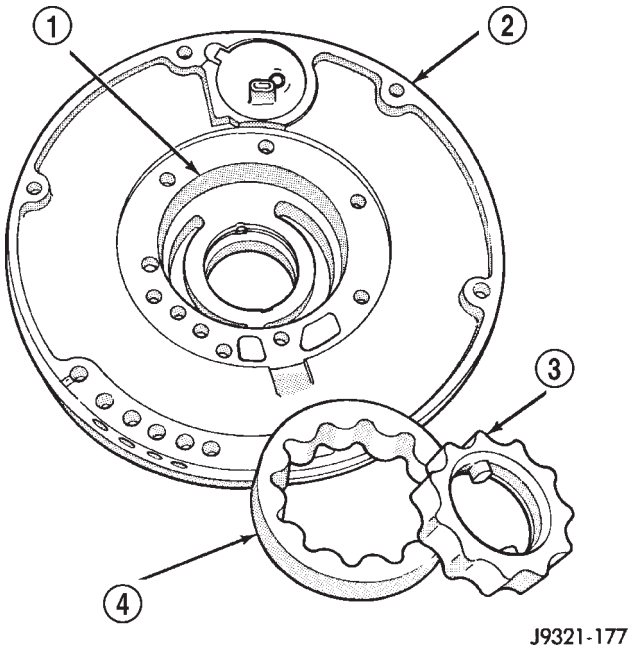


Fig. 107 Pump Gears

1 - GEAR BORE
2 - PUMP BODY
3 - INNER GEAR
4 - OUTER GEAR

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. 109).

REACTION SHAFT SUPPORT BUSHING REMOVAL

(1) Assemble Cup Tool SP-3633, Nut SP-1191 and Bushing Remover SP-5301 (Fig. 110).

(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.

OIL PUMP (Continued)

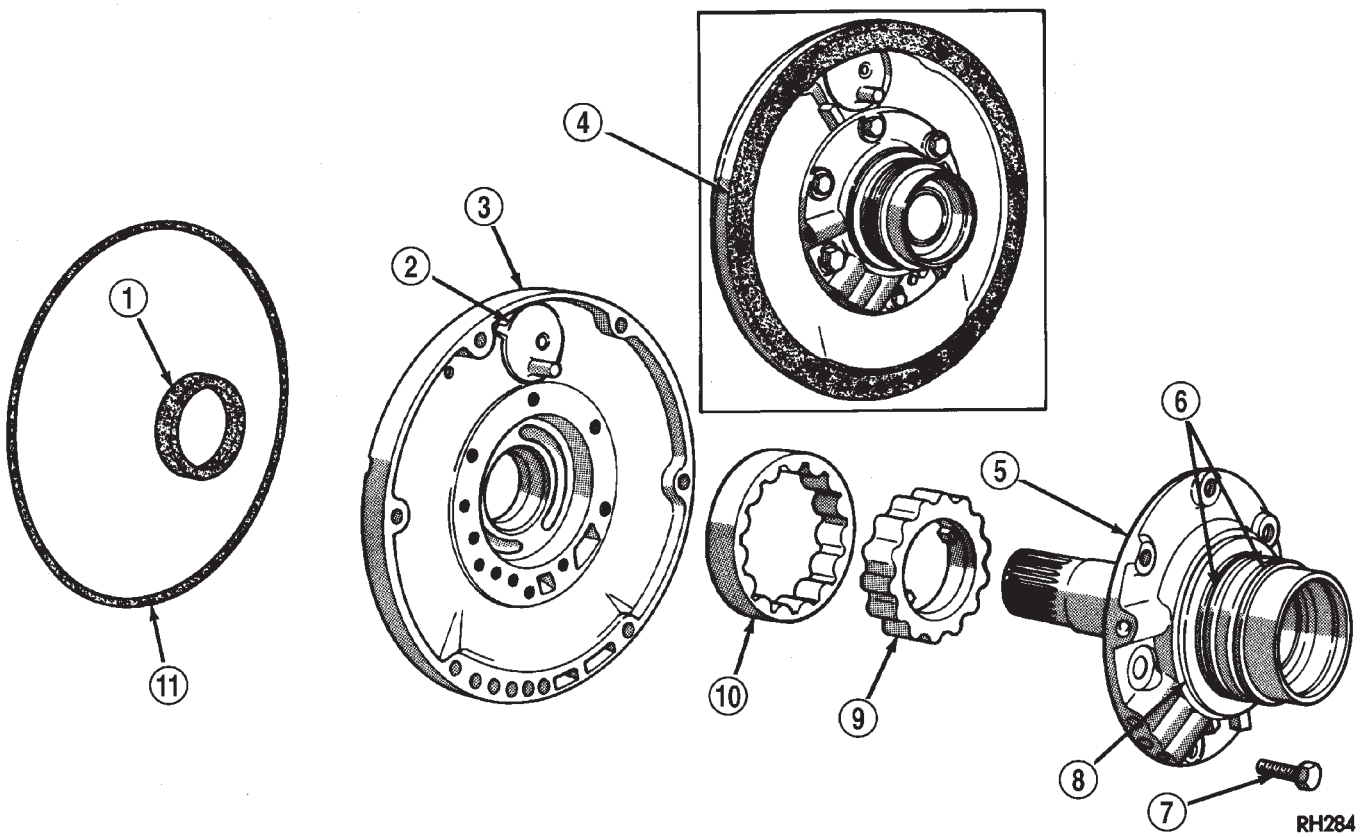


Fig. 108 Oil Pump Assembly

1 - OIL SEAL
2 - VENT BAFFLE
3 - OIL PUMP BODY
4 - GASKET
5 - REACTION SHAFT SUPPORT
6 - SEAL RINGS
7 - BOLTS (6)
8 - #1 THRUST WASHER (SELECTIVE)
9 - INNER GEAR
10 - OUTER GEAR
11 - "O" RING

CLEANING

Clean pump and support components with solvent and dry them with compressed air.

INSPECTION

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.

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.

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 installing the gears in the pump body and measure pump component clearances as follows:

(1) Position an appropriate piece of Plastigage™ across both gears.

(2) Align the plastigage to a flat area on the reaction shaft housing.

(3) Install the reaction shaft to the pump housing.

(4) Separate the reaction shaft housing from the pump housing and measure the Plastigage™ following the instructions supplied with it.

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. 111).

OIL PUMP (Continued)

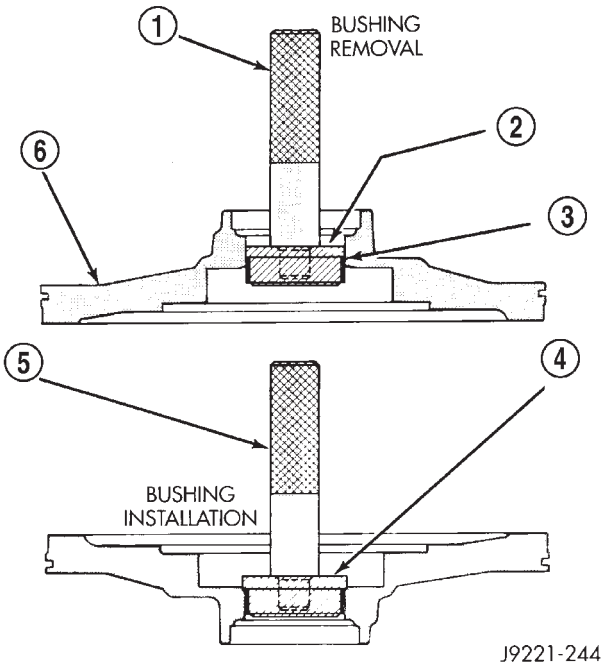


Fig. 109 Oil Pump Bushing

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL SP-3550
3 - BUSHING
4 - SPECIAL TOOL SP-5118
5 - SPECIAL TOOL C-4171
6 - PUMP HOUSING

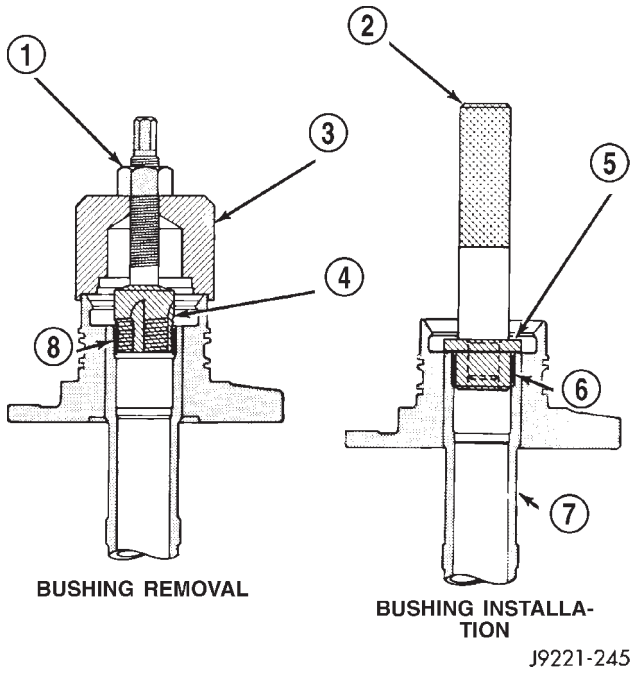


Fig. 110 Reaction Shaft Bushing

1 - SPECIAL TOOL SP-1191
2 - SPECIAL TOOL C-4171
3 - SPECIAL TOOL SP-3633
4 - SPECIAL TOOL SP-5301
5 - SPECIAL TOOL SP-5302
6 - BUSHING
7 - REACTION SHAFT
8 - BUSHING

Clearance between outer gear and pump housing should be 0.10 to 0.19 mm (0.004 to 0.0075 in.). Measure clearance with an appropriate feeler gauge.

ASSEMBLY

OIL PUMP BUSHING

(1) Assemble Tool Handle C-4171 and Bushing Installer SP-5118 (Fig. 112).

(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 bushing 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. 113).

REACTION SHAFT SUPPORT BUSHING

(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. 114).

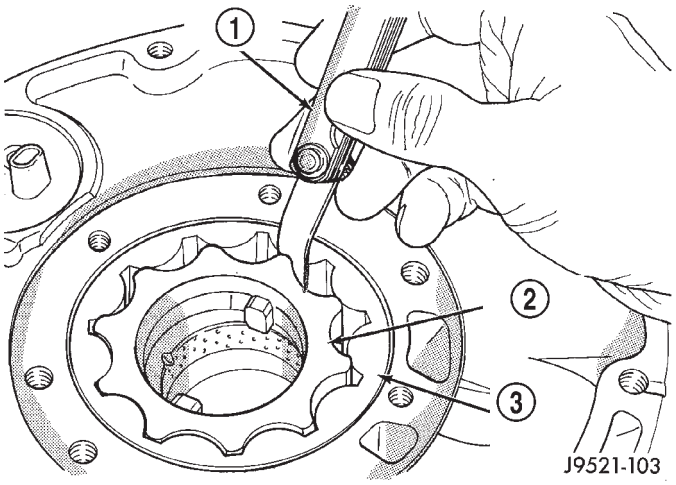


Fig. 111 Checking Pump Gear Tip Clearance

1 - FEELER GAUGE
2 - INNER GEAR
3 - OUTER GEAR

(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).

OIL PUMP (Continued)

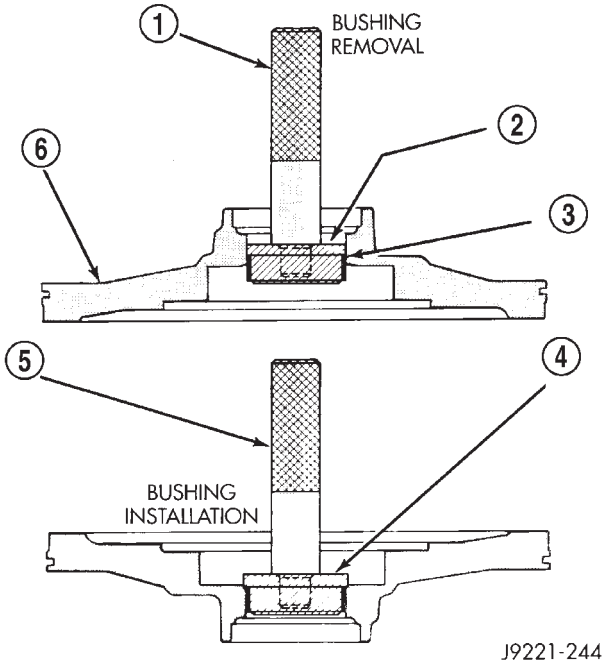


Fig. 112 Oil Pump Bushing

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL SP-3550
3 - BUSHING
4 - SPECIAL TOOL SP-5118
5 - SPECIAL TOOL C-4171
6 - PUMP HOUSING

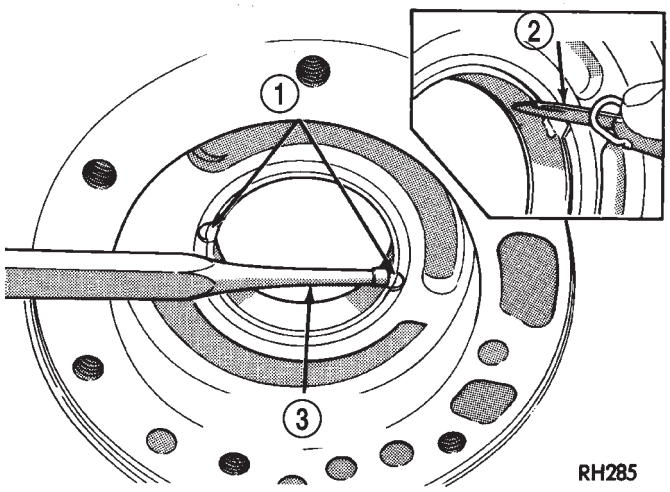


Fig. 113 Staking-Deburring Oil Pump Bushing

1 - TWO STAKES
2 - NARROW BLADE
3 - BLUNT PUNCH

OIL PUMP BODY

(1) Lubricate pump gears with transmission fluid and install them in pump body.

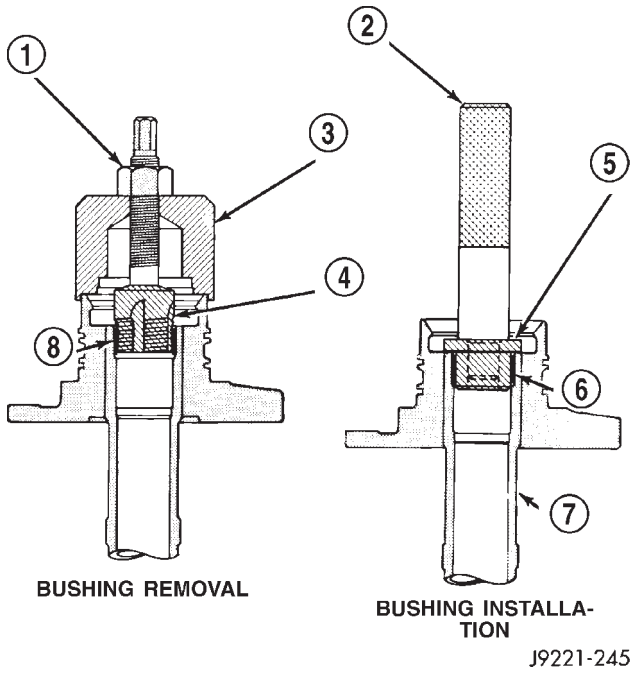


Fig. 114 Reaction Shaft Bushing

1 - SPECIAL TOOL SP-1191
2 - SPECIAL TOOL C-4171
3 - SPECIAL TOOL SP-3633
4 - SPECIAL TOOL SP-5301
5 - SPECIAL TOOL SP-5302
6 - BUSHING
7 - REACTION SHAFT
8 - BUSHING

(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.

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. 115). Use hammer or mallet to tap seal into place.

OIL PUMP (Continued)

(7) Install new o-ring on pump body. Lubricate oil seal and o-ring with petroleum jelly.

(8) Cover pump assembly to prevent dust entry and set aside for assembly installation.

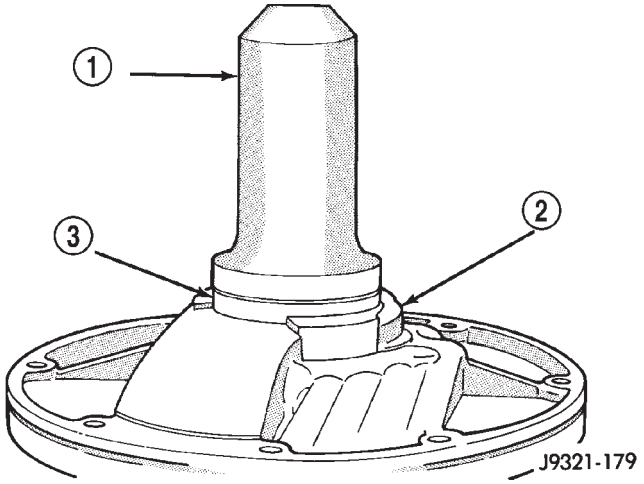


Fig. 115 Oil Pump Seal

1 - SPECIAL TOOL C-3860-A
2 - PUMP BODY
3 - PUMP SEAL

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. 116).

(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.

(4) Install overdrive geartrain into housing.

(5) Install overdrive unit in vehicle.

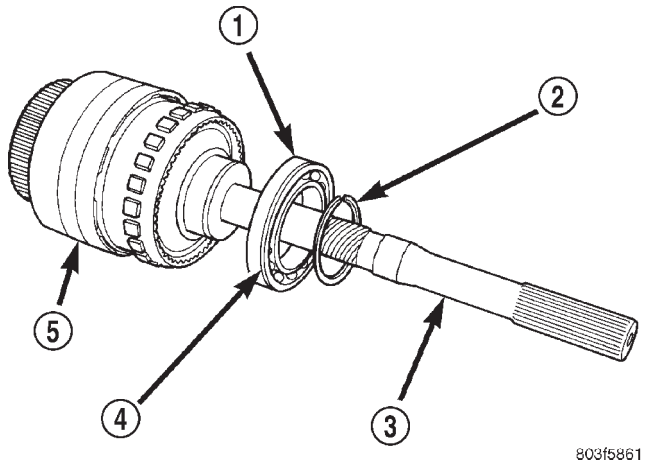


Fig. 116 Output Shaft Front Bearing

1 - OUTPUT SHAFT FRONT BEARING
2 - SNAP-RING
3 - OUTPUT SHAFT
4 - GROOVE TO REAR
5 - OVERDRIVE GEARTRAIN

OUTPUT SHAFT REAR BEARING

REMOVAL

(1) Remove overdrive unit from the vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC/OVERDRIVE - REMOVAL)

(2) Remove overdrive geartrain from housing.

(3) Remove snap-ring holding output shaft rear bearing into overdrive housing (Fig. 117).

(4) Using a suitable driver inserted through the rear end of housing, drive bearing from housing.

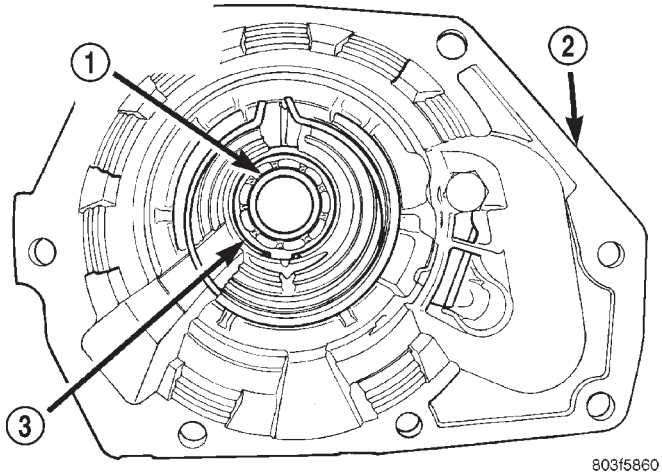


Fig. 117 Output Shaft Rear Bearing

1 - OUTPUT SHAFT REAR BEARING
2 - OVERDRIVE HOUSING
3 - SNAP-RING

OUTPUT SHAFT REAR BEARING (Continued)

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. 117).
(4) Install overdrive geartrain into housing.
(5) Install overdrive unit in vehicle.

OVERDRIVE CLUTCH

DESCRIPTION

The overdrive clutch (Fig. 118) is composed of the pressure plate, clutch plates, holding discs, overdrive piston retainer, piston, piston spacer, and snap-rings. The overdrive clutch is the forwardmost component in the transmission overdrive unit and is considered a holding component. The overdrive piston retainer, piston, and piston spacer are located on the rear of the main transmission case.

NOTE: The number of discs and plates may vary with each engine and vehicle combination.

OPERATION

To apply the clutch, pressure is applied between the piston retainer and piston. The fluid pressure is provided by the oil pump, transferred through the control valves and passageways, and enters the clutch through passages at the lower rear portion of the valve body area. With pressure applied between the piston retainer and piston, the piston moves away from the piston retainer and compresses the clutch pack. This action applies the clutch pack, allowing torque to flow through the intermediate shaft into the overdrive planetary gear set. The overdrive clutch discs are attached to the overdrive clutch hub while the overdrive clutch plates, reaction plate, and pressure plate are lugged to the overdrive housing. This allows the intermediate shaft to transfer the engine torque to the planetary gear and overrunning clutch. This drives the planetary gear inside the annulus, which is attached to the overdrive clutch drum and output shaft, creating the desired gear ratio. The waved snap-ring is used to cushion the application of the clutch pack.

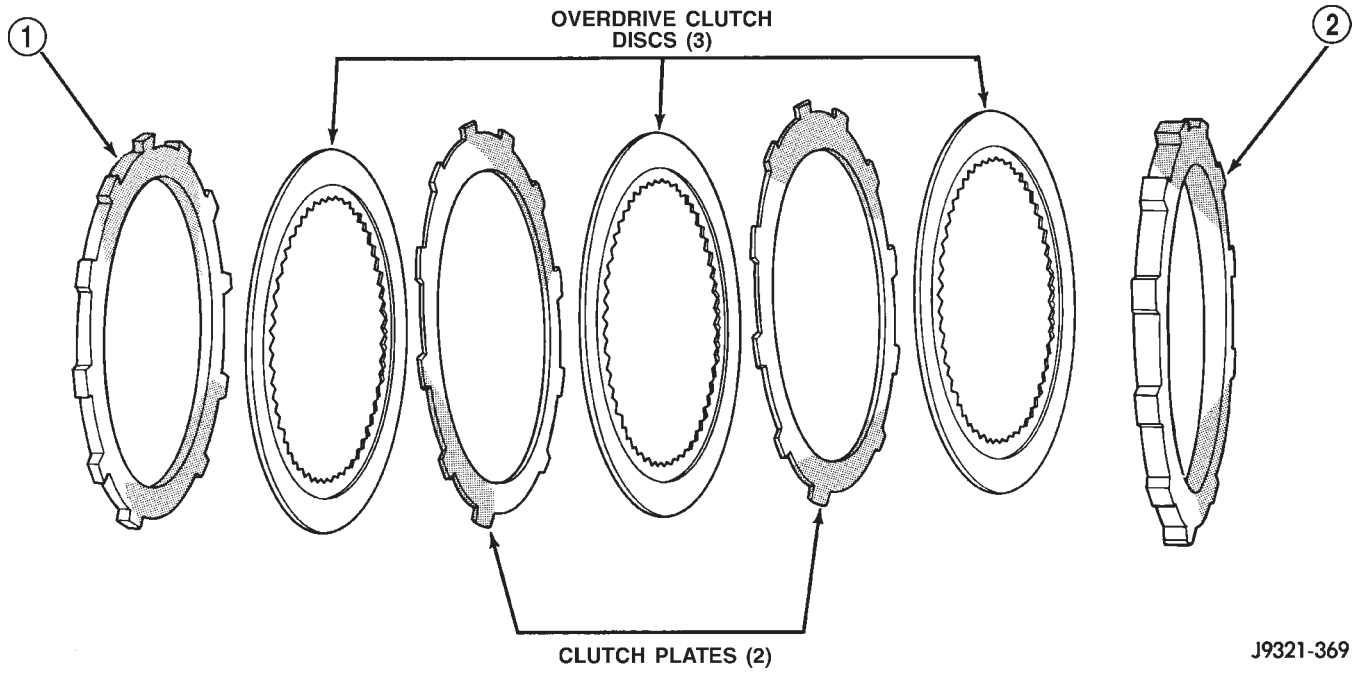


Fig. 118 Overdrive Clutch

1 - REACTION PLATE
2 - PRESSURE PLATE

OVERDRIVE UNIT

REMOVAL

(1) Shift transmission into PARK.
(2) Raise vehicle.
(3) Remove transfer case, if equipped.
(4) Mark propeller shaft universal joint(s) and axle pinion yoke, or the companion flange and flange yoke, for alignment reference at installation, if neccesary.
(5) Disconnect and remove the rear propeller shaft, if necessary. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)
(6) Remove transmission oil pan, remove gasket, drain oil and reinstall pan.
(7) If overdrive unit had malfunctioned, or if fluid is contaminated, remove entire transmission. If diagnosis indicated overdrive problems only, remove just the overdrive unit.
(8) Support transmission with transmission jack.
(9) Remove bolts attaching overdrive unit to transmission (Fig. 119).

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.

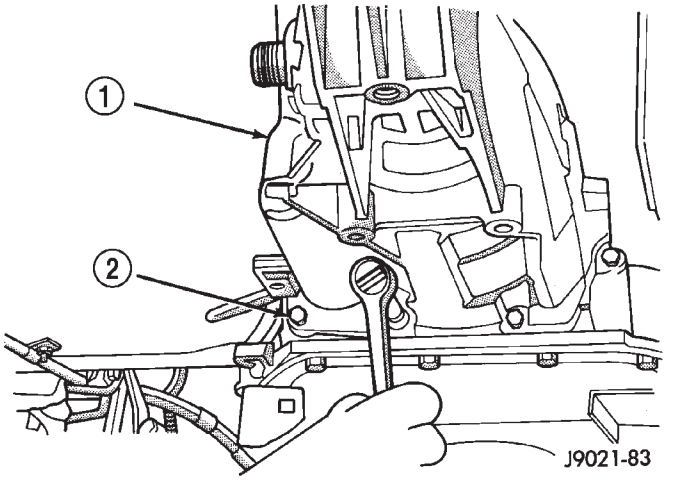


Fig. 119 Overdrive Unit Bolts

1 - OVERDRIVE UNIT
2 - ATTACHING BOLTS (7)

(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.

DISASSEMBLY

(1) Remove transmission speed sensor and o-ring seal from overdrive case (Fig. 120).
(2) Remove overdrive piston thrust bearing (Fig. 121).

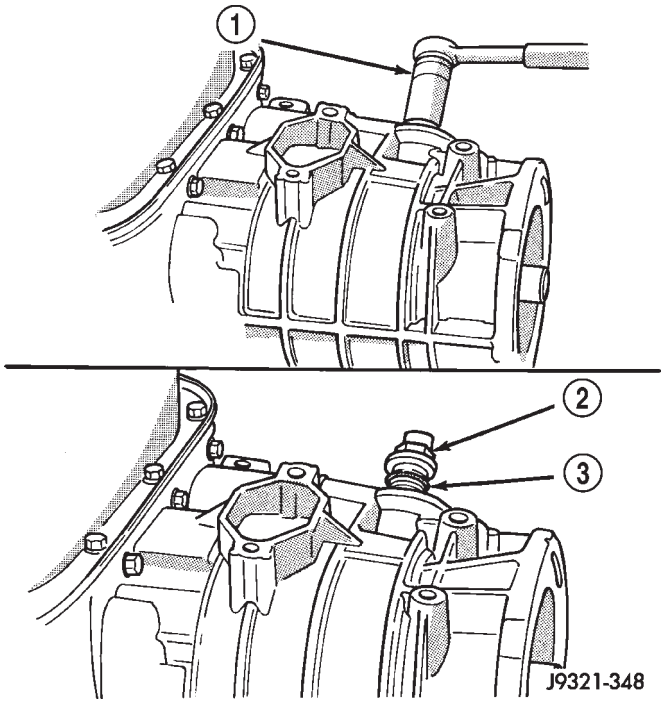


Fig. 120 Transmission Speed Sensor

1 - SOCKET AND WRENCH
2 - SPEED SENSOR
3 - O-RING

OVERDRIVE UNIT (Continued)

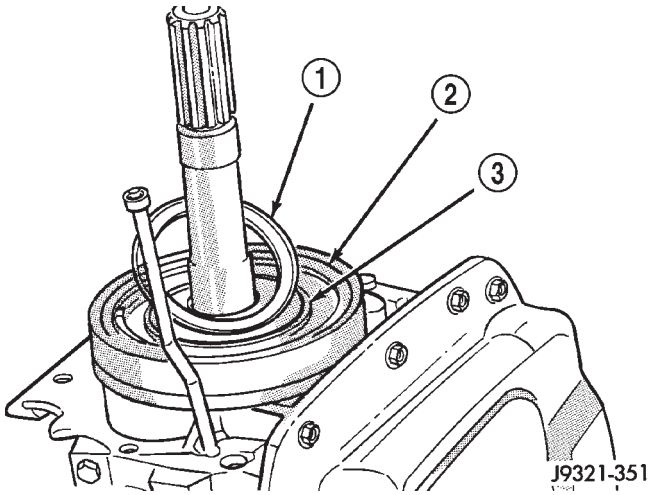


Fig. 121 Overdrive Piston Thrust Bearing Removal/ Installation

1 - THRUST BEARING
2 - OVERDRIVE PISTON
3 - THRUST PLATE

OVERDRIVE PISTON

(1) Remove overdrive piston thrust plate (Fig. 122). Retain thrust plate. It is a select fit part and may possibly be reused.

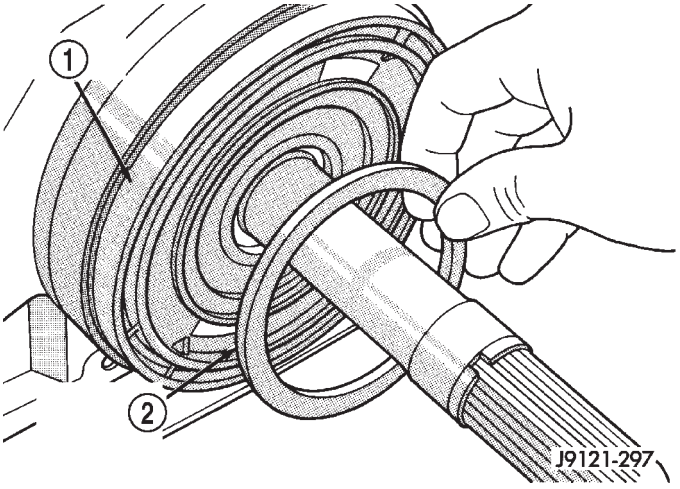


Fig. 122 Overdrive Piston Thrust Plate Removal/ Installation

1 - OVERDRIVE PISTON
2 - OVERDRIVE PISTON SPACER (SELECT FIT)

(2) Remove intermediate shaft spacer (Fig. 123). Retain spacer. It is a select fit part and may possibly be reused.

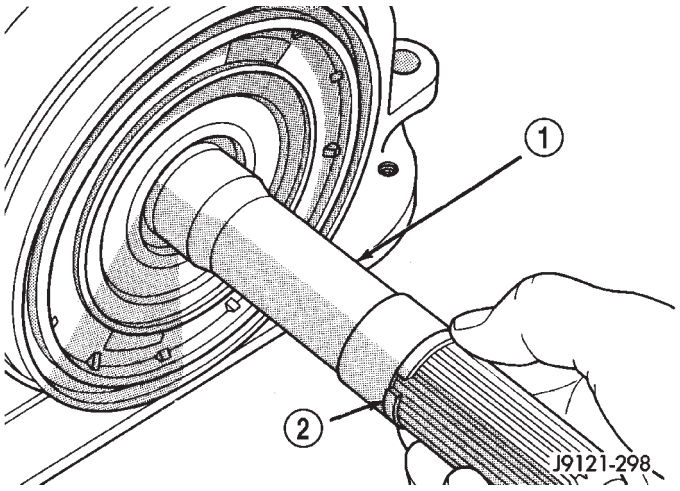


Fig. 123 Intermediate Shaft Spacer Location

1 - INTERMEDIATE SHAFT
2 - INTERMEDIATE SHAFT SPACER (SELECT FIT)

(3) Remove overdrive piston from retainer (Fig. 124).

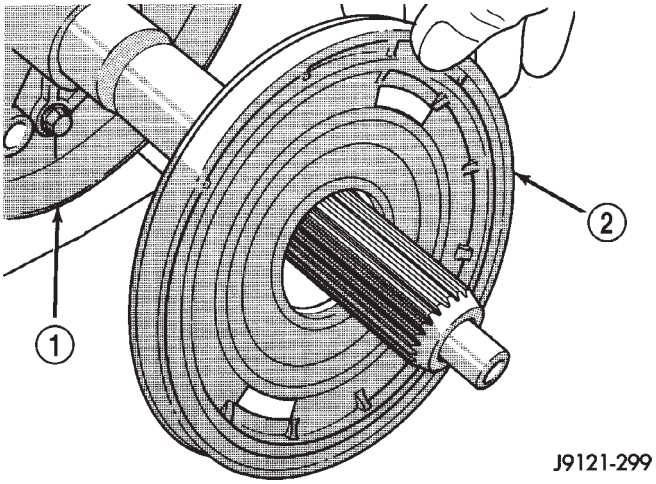


Fig. 124 Overdrive Piston Removal

1 - PISTON RETAINER
2 - OVERDRIVE PISTON

OVERDRIVE UNIT (Continued)

OVERDRIVE CLUTCH PACK

(1) Remove overdrive clutch pack wire retaining ring (Fig. 125).

(2) Remove overdrive clutch pack (Fig. 126).

(3) Note position of clutch pack components for assembly reference (Fig. 127).

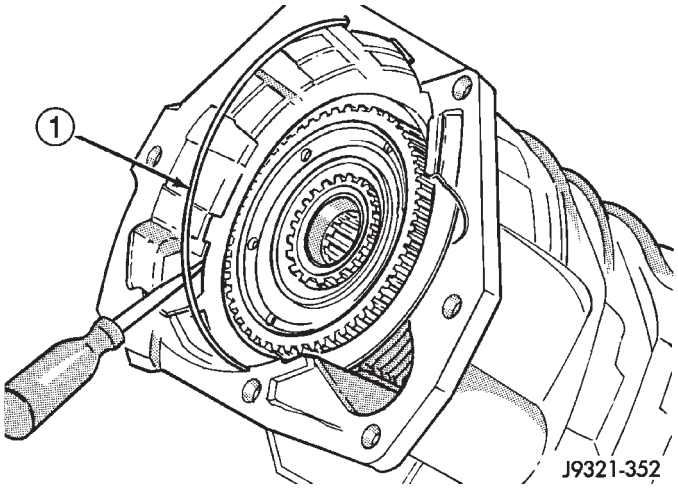


Fig. 125 Removing Overdrive Clutch Pack Retaining Ring

1 - OVERDRIVE CLUTCH PACK RETAINING RING

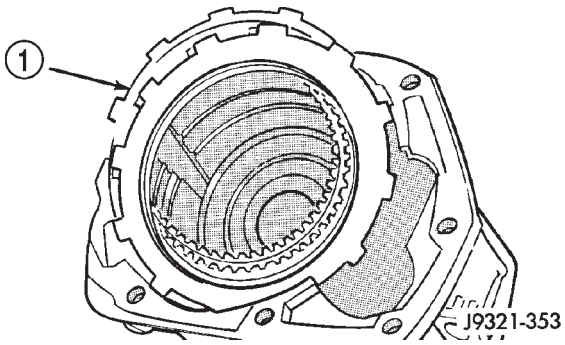


Fig. 126 Overdrive Clutch Pack Removal

1 - OVERDRIVE CLUTCH PACK

OVERDRIVE GEARTRAIN

(1) Remove overdrive clutch wave spring (Fig. 128).

(2) Remove overdrive clutch reaction snap-ring (Fig. 129). Note that snap-ring is located in same groove as wave spring.

(3) Remove Torx™ head screws that attach access cover and gasket to overdrive case (Fig. 130).

(4) Remove access cover and gasket (Fig. 131).

(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. 132).

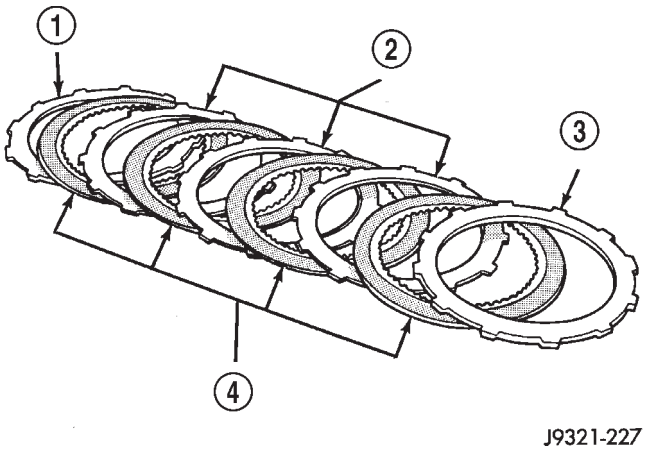


Fig. 127 Overdrive Clutch Component Position - Typical

1 - REACTION PLATE
2 - CLUTCH PLATES (3)
3 - PRESSURE PLATE
4 - CLUTCH DISCS (4)

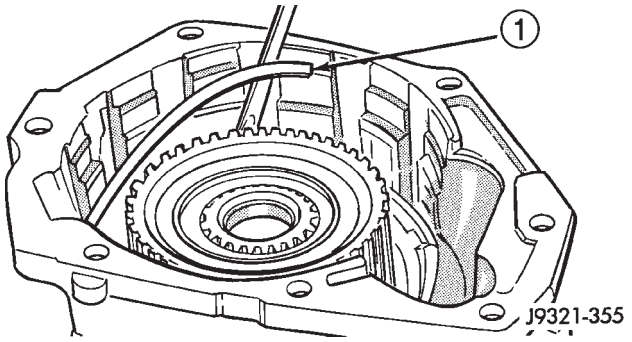


Fig. 128 Overdrive Clutch Wave Spring Removal

1 - WAVE SPRING

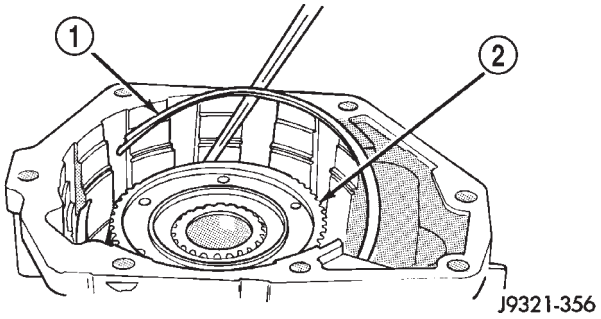


Fig. 129 Overdrive Clutch Reaction Snap-Ring Removal

1 - REACTION RING
2 - CLUTCH HUB

(6) Lift gear case up and off geartrain assembly (Fig. 133).

(7) Remove snap-ring that retains rear bearing on output shaft.

OVERDRIVE UNIT (Continued)

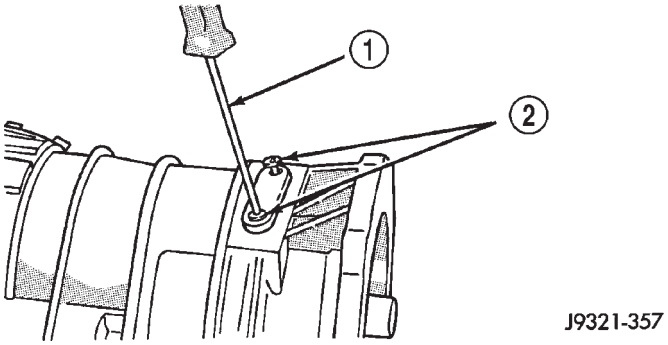


Fig. 130 Access Cover Screw Removal

1 - TORX SCREWDRIVER (T25)
2 - ACCESS COVER SCREWS

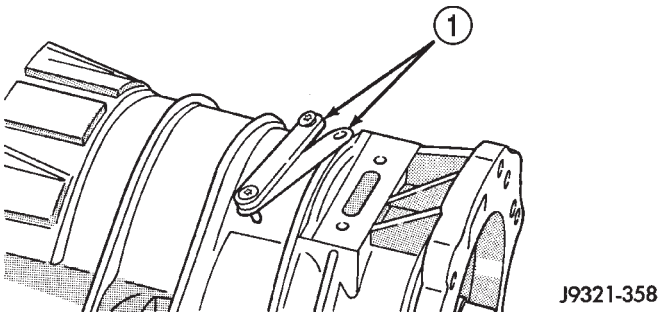


Fig. 131 Access Cover And Gasket Removal

1 - ACCESS COVER AND GASKET

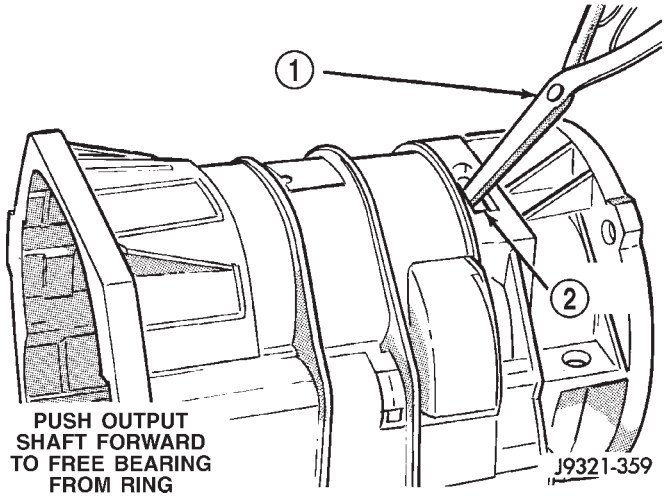


Fig. 132 Releasing Bearing From Locating Ring

1 - EXPAND BEARING LOCATING RING WITH SNAP-RING PLIERS
2 - ACCESS HOLE

(8) Remove rear bearing from output shaft (Fig. 134).

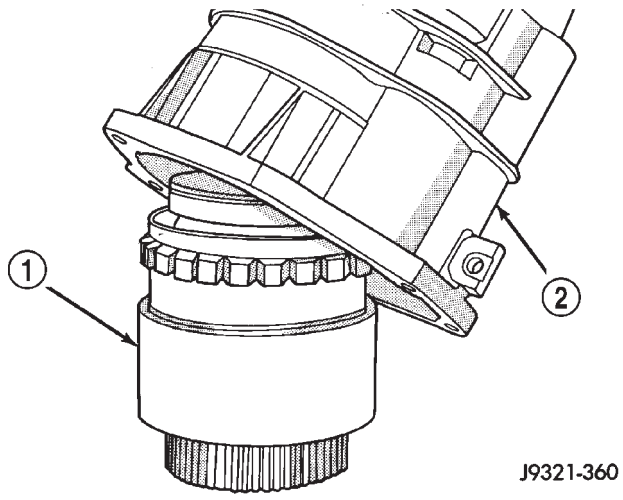


Fig. 133 Removing Geartrain

1 - GEARTRAIN ASSEMBLY
2 - GEAR CASE

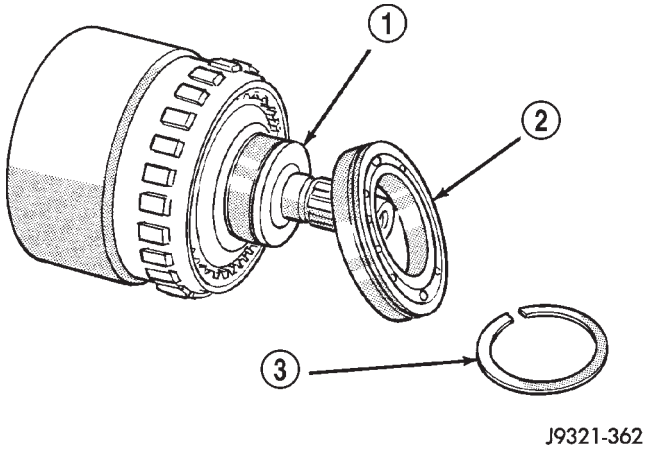


Fig. 134 Rear Bearing Removal

1 - OUTPUT SHAFT
2 - REAR BEARING
3 - SNAP-RING

DIRECT CLUTCH, HUB AND SPRING

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.

OVERDRIVE UNIT (Continued)

(1) Mount geartrain assembly in shop press (Fig. 135).

(2) Position Compressor Tool 6227-1 on clutch hub (Fig. 135). 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. 135).

(4) Remove direct clutch pack snap-ring (Fig. 136).

(5) Remove direct clutch hub retaining ring (Fig. 137).

(6) Release press load slowly and completely (Fig. 138).

(7) Remove Special Tool 6227-1. Then remove clutch pack from hub (Fig. 138).

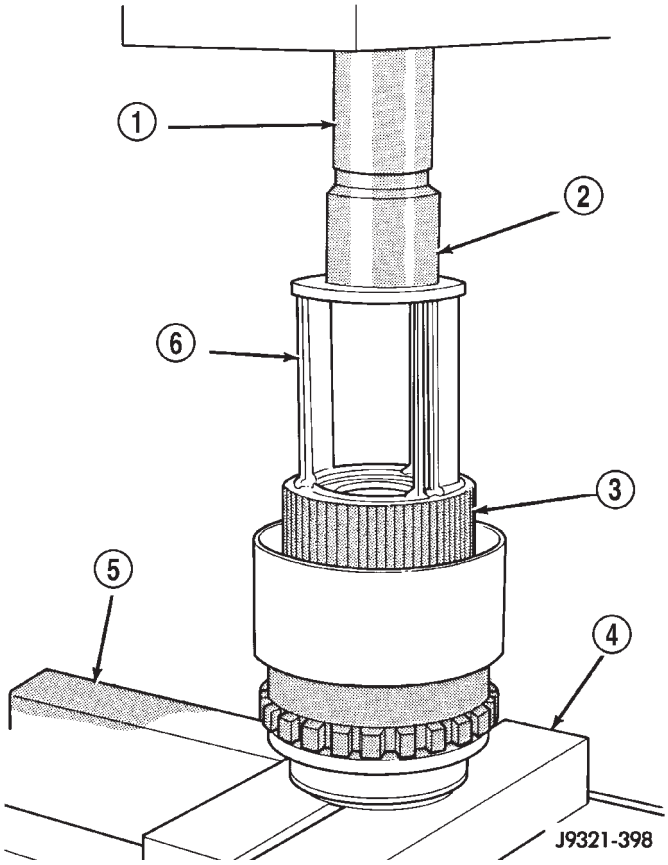


Fig. 135 Geartrain Mounted In Shop Press

1 - PRESS RAM
2 - SPECIAL TOOL C-3995-A (OR SIMILAR TOOL)
3 - CLUTCH HUB
4 - PLATES
5 - PRESS BED
6 - SPECIAL TOOL 6227-1

GEARTRAIN

(1) Remove direct clutch hub and spring (Fig. 139).

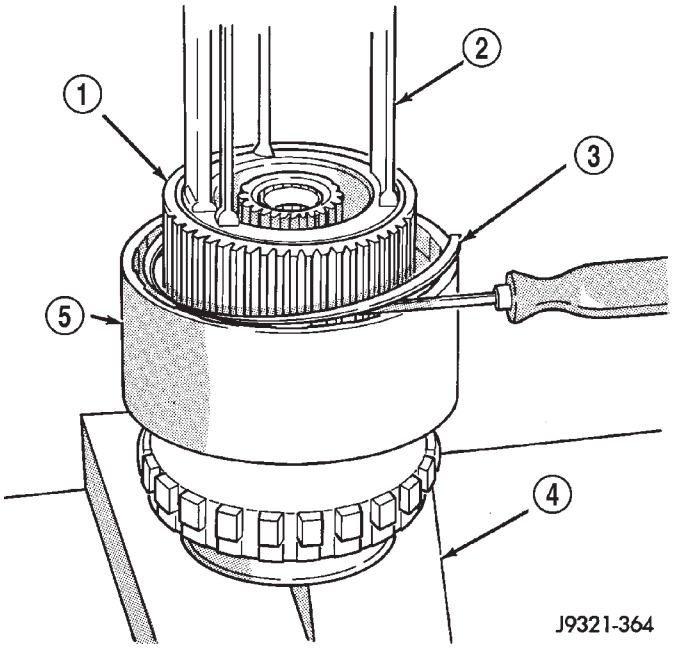


Fig. 136 Direct Clutch Pack Snap-Ring Removal

1 - CLUTCH HUB
2 - SPECIAL TOOL 6227-1
3 - DIRECT CLUTCH PACK SNAP-RING
4 - PRESS PLATES
5 - CLUTCH DRUM

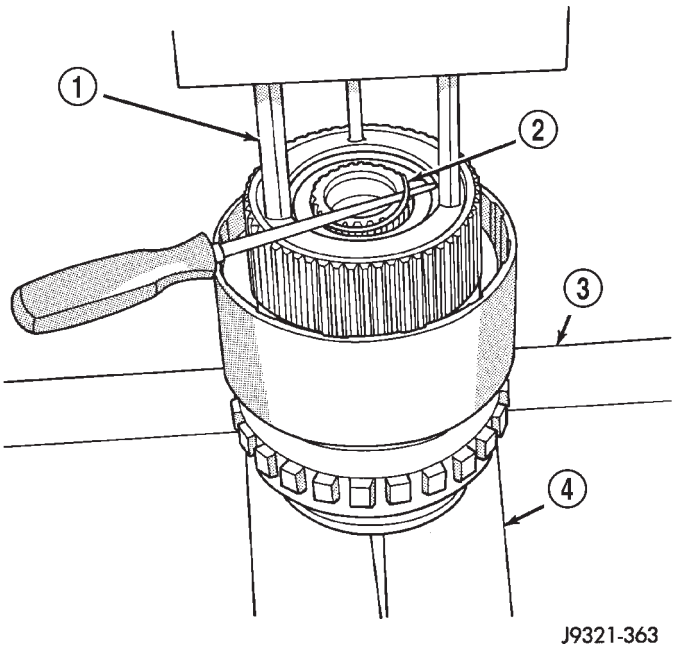


Fig. 137 Direct Clutch Hub Retaining Ring Removal

1 - SPECIAL TOOL 6227-1
2 - CLUTCH HUB RETAINING RING
3 - PRESS BED
4 - PRESS PLATES

OVERDRIVE UNIT (Continued)

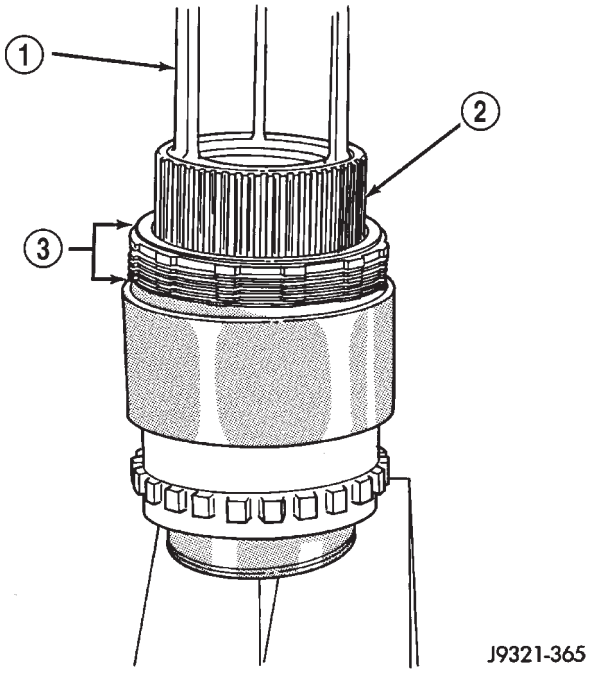


Fig. 138 Direct Clutch Pack Removal

1 - SPECIAL TOOL 6227-1
2 - DIRECT CLUTCH HUB
3 - DIRECT CLUTCH PACK

(2) Remove sun gear and spring plate. Then remove planetary thrust bearing and planetary gear (Fig. 140).

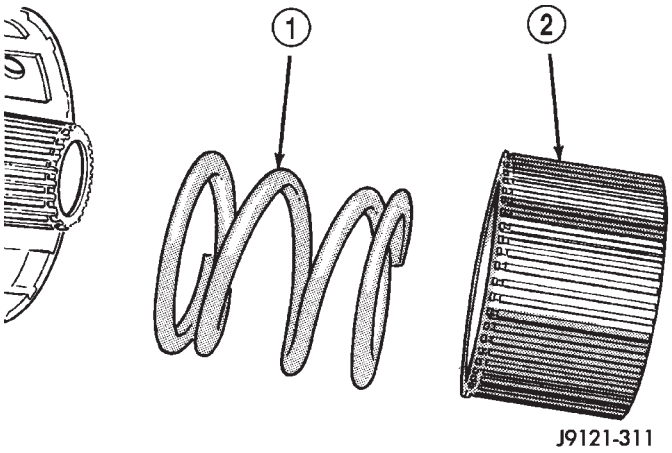


Fig. 139 Direct Clutch Hub And Spring Removal

1 - DIRECT CLUTCH SPRING
2 - DIRECT CLUTCH HUB

(3) Remove overrunning clutch assembly with expanding type snap-ring pliers (Fig. 141). 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.

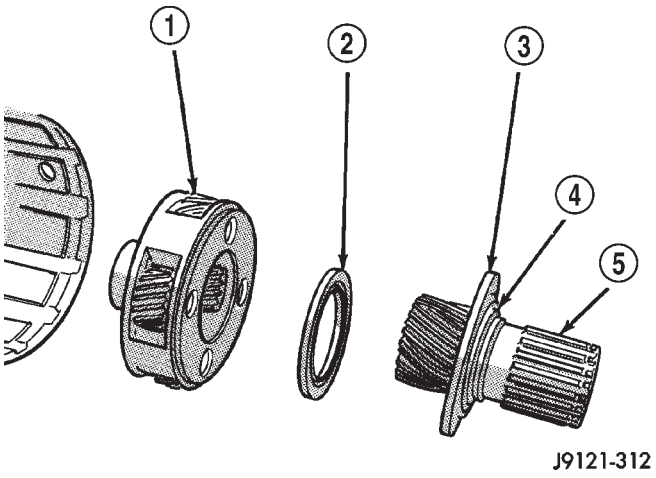


Fig. 140 Removing Sun Gear, Thrust Bearing And Planetary Gear

1 - PLANETARY GEAR
2 - PLANETARY THRUST BEARING
3 - CLUTCH SPRING PLATE
4 - SPRING PLATE SNAP-RING
5 - SUN GEAR

(5) Remove overrunning clutch from hub.

(6) Mark position of annulus gear and direct clutch drum for assembly alignment reference (Fig. 142). Use small center punch or scriber to make alignment marks.

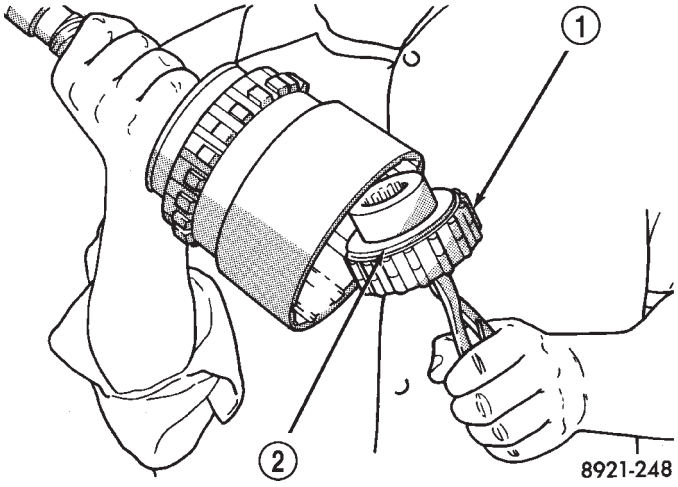


Fig. 141 Overrunning Clutch Assembly Removal/ Installation

1 - OVERRUNNING CLUTCH
2 - NEEDLE BEARING

(7) Remove direct clutch drum rear retaining ring (Fig. 143).

(8) Remove direct clutch drum outer retaining ring (Fig. 144).

OVERDRIVE UNIT (Continued)

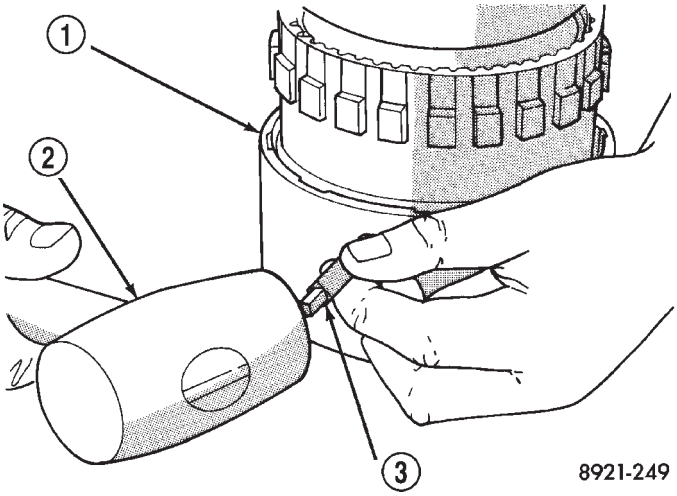


Fig. 142 Marking Direct Clutch Drum And Annulus Gear For Assembly Alignment

1 - DIRECT CLUTCH DRUM
2 - HAMMER
3 - PUNCH

(9) Mark annulus gear and output shaft for assembly alignment reference (Fig. 145). Use punch or scriber to mark gear and shaft.

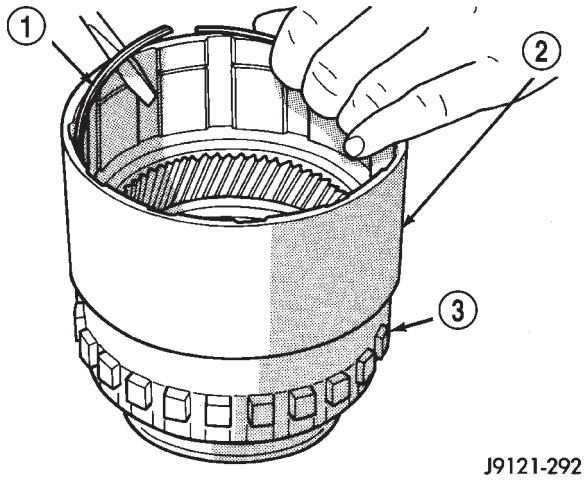


Fig. 143 Clutch Drum Inner Retaining Ring Removal

1 - INNER RETAINING RING
2 - DIRECT CLUTCH DRUM
3 - ANNULUS GEAR

(10) Remove snap-ring that secures annulus gear on output shaft (Fig. 146). Use two screwdrivers to unseat and work snap-ring out of groove as shown.

(11) Remove annulus gear from output shaft (Fig. 147). Use rawhide or plastic mallet to tap gear off shaft.

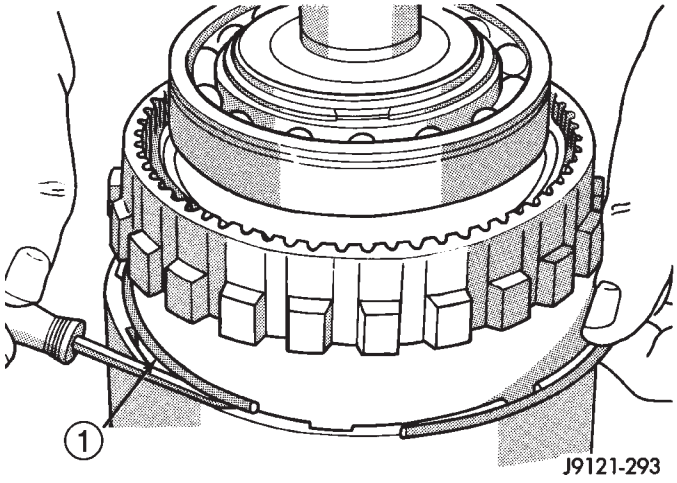


Fig. 144 Clutch Drum Outer Retaining Ring Removal

1 - OUTER RETAINING RING

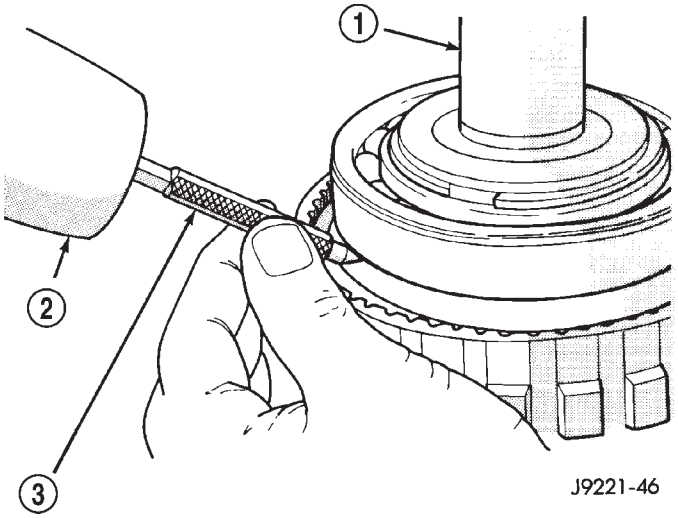


Fig. 145 Marking Annulus Gear And Output Shaft For Assembly Alignment

1 - OUTPUT SHAFT
2 - HAMMER
3 - PUNCH

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.

CLEANING

Clean the geartrain and case components with solvent. Dry all parts except the bearings with compressed air. Allow bearings to air dry.

OVERDRIVE UNIT (Continued)

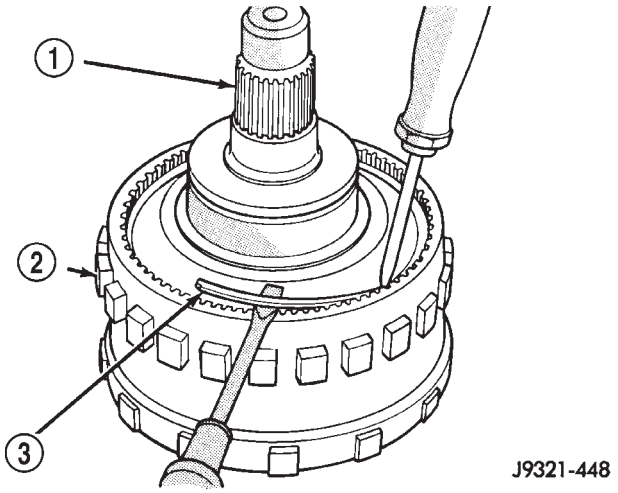


Fig. 146 Annulus Gear Snap-Ring Removal

1 - OUTPUT SHAFT
2 - ANNULUS GEAR
3 - SNAP-RING

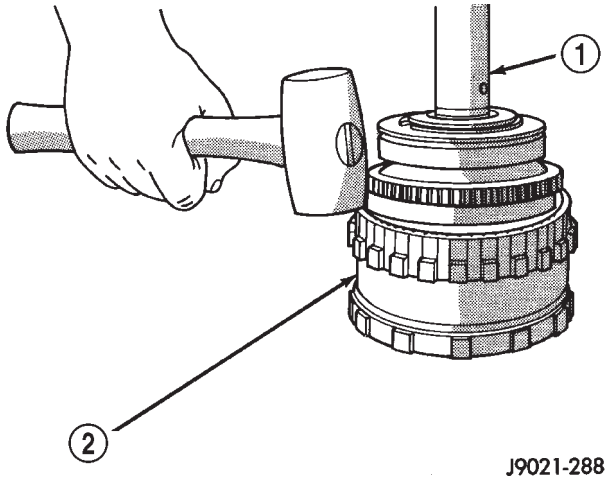


Fig. 147 Annulus Gear Removal

1 - OUTPUT SHAFT
2 - ANNULUS GEAR

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.

INSPECTION

Check condition of the park lock components and the overdrive case.

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, 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.

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 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.

ASSEMBLY

GEARTRAIN AND DIRECT CLUTCH

(1) Soak direct clutch and overdrive clutch discs in Mopar® ATF +4, type 9602, transmission fluid. Allow discs to soak for 10-20 minutes.

OVERDRIVE UNIT (Continued)

(2) Install new pilot bushing and clutch hub bushing in output shaft if necessary (Fig. 148). Lubricate bushings with petroleum jelly, or transmission fluid.

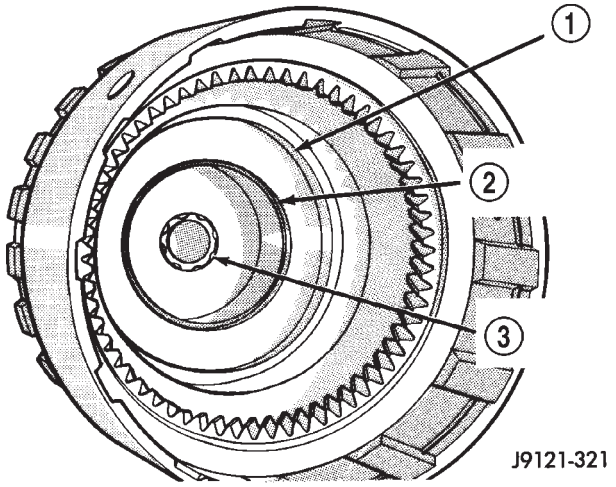


Fig. 148 Output Shaft Pilot Bushing

1 - OUTPUT SHAFT HUB
2 - OVERRUNNING CLUTCH HUB BUSHING
3 - INTERMEDIATE SHAFT PILOT BUSHING

(3) Install annulus gear on output shaft, if removed. Then install annulus gear retaining snap-ring (Fig. 149).

(4) Align and install clutch drum on annulus gear (Fig. 150). Be sure drum is engaged in annulus gear lugs.

(5) Install clutch drum outer retaining ring (Fig. 150).

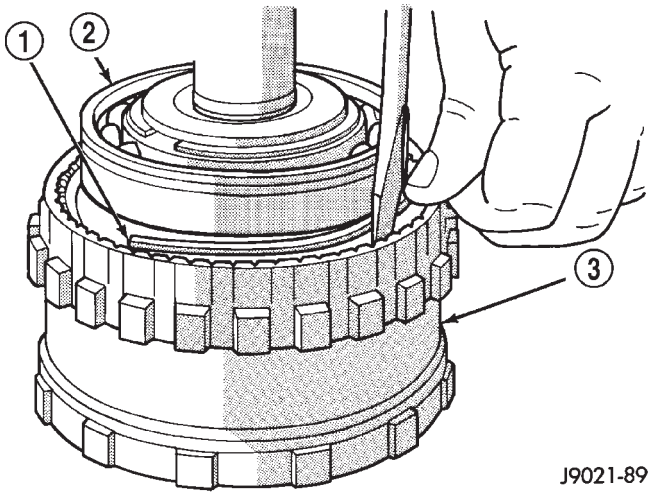


Fig. 149 Annulus Gear Installation

1 - SNAP-RING
2 - OUTPUT SHAFT FRONT BEARING
3 - ANNULUS GEAR

(6) Slide clutch drum forward and install inner retaining ring (Fig. 151).

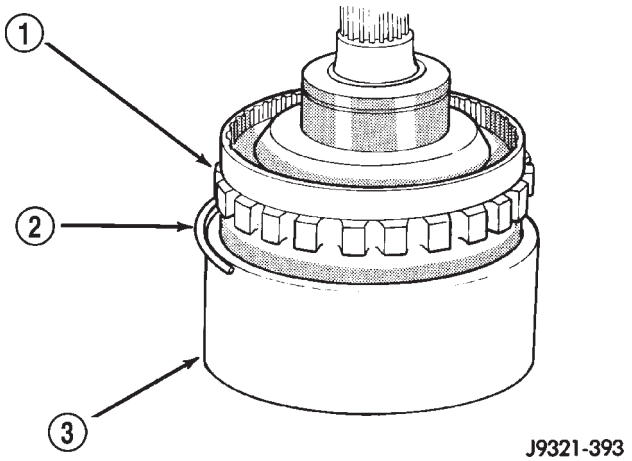


Fig. 150 Clutch Drum And Outer Retaining Ring Installation

1 - ANNULUS GEAR
2 - OUTER SNAP-RING
3 - CLUTCH DRUM

(7) Install rear bearing and snap ring on output shaft (Fig. 152). Be sure locating ring groove in bearing is toward rear.

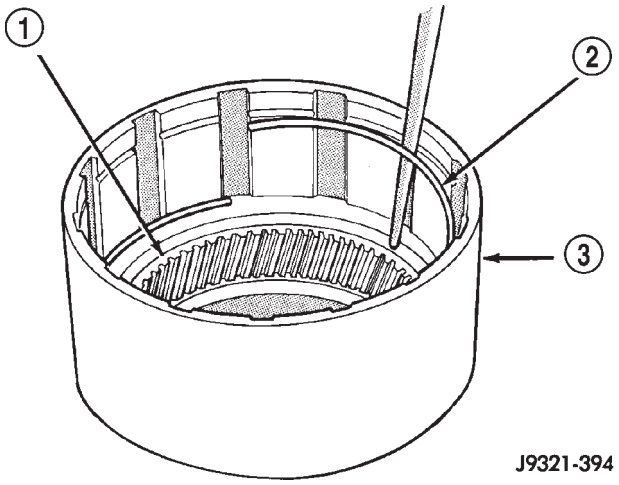


Fig. 151 Clutch Drum Inner Retaining Ring Installation

1 - ANNULUS GEAR
2 - INNER SNAP-RING
3 - CLUTCH DRUM

(8) Install overrunning clutch on hub (Fig. 153). 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.

OVERDRIVE UNIT (Continued)

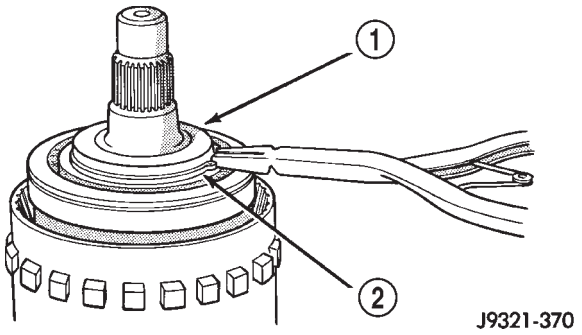


Fig. 152 Rear Bearing And Snap-Ring Installation

1 - REAR BEARING
2 - SNAP-RING

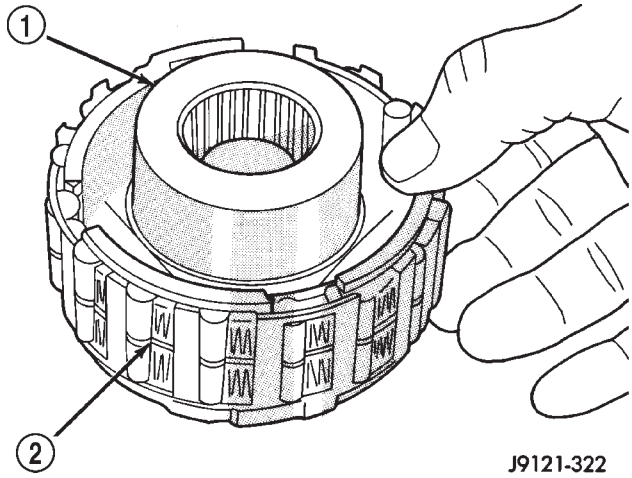


Fig. 153 Assembling Overrunning Clutch And Hub

1 - CLUTCH HUB
2 - OVERRUNNING CLUTCH

(10) Install overrunning clutch in output shaft (Fig. 154). 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. 155). 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.

(13) Install planetary thrust bearing on sun gear (Fig. 156). 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. 157). Be sure sun gear and thrust bearing are fully seated before proceeding.

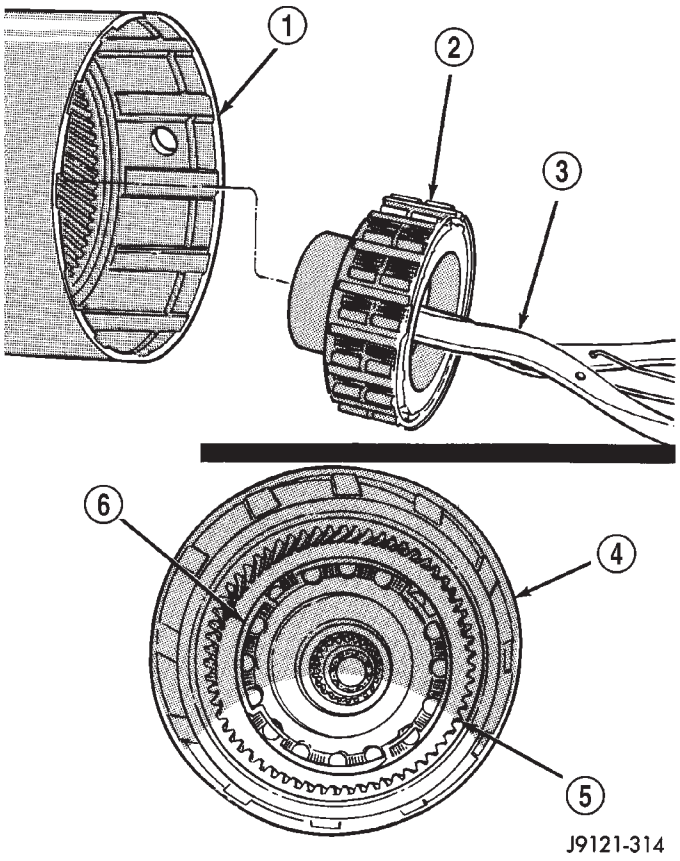


Fig. 154 Overrunning Clutch Installation

1 - CLUTCH DRUM
2 - OVERRUNNING CLUTCH ASSEMBLY
3 - EXPANDING-TYPE SNAP-RING PLIERS
4 - CLUTCH DRUM
5 - ANNULUS GEAR
6 - OVERRUNNING CLUTCH ASSEMBLY SEATED IN OUTPUT SHAFT

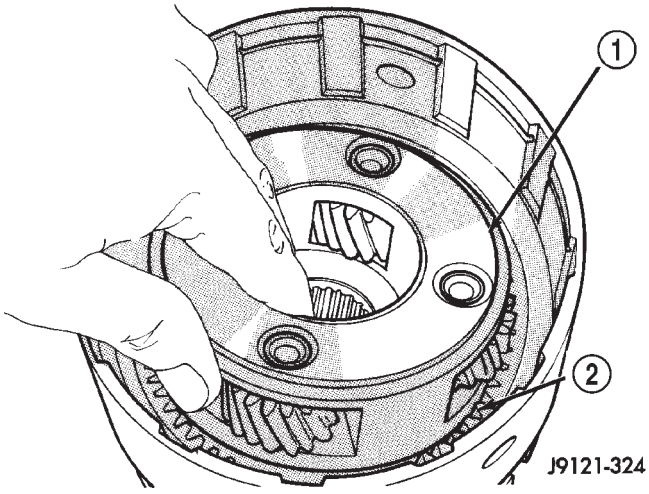


Fig. 155 Planetary Gear Installation

1 - PLANETARY GEAR
2 - ANNULUS GEAR

OVERDRIVE UNIT (Continued)

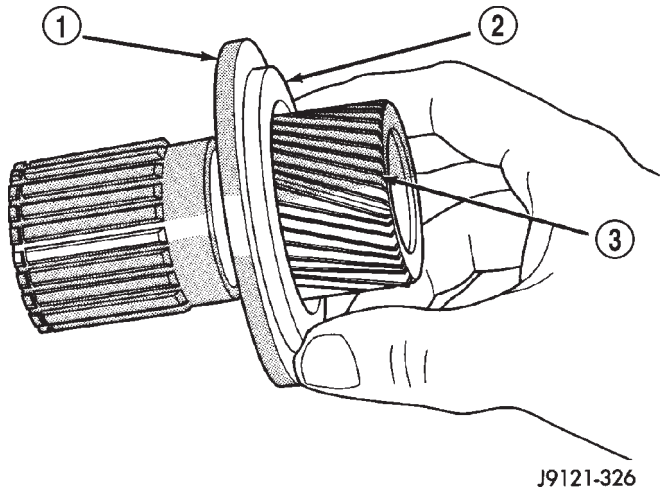


Fig. 156 Planetary Thrust Bearing Installation

1 - SPRING PLATE
2 - PLANETARY THRUST BEARING
3 - SUN GEAR

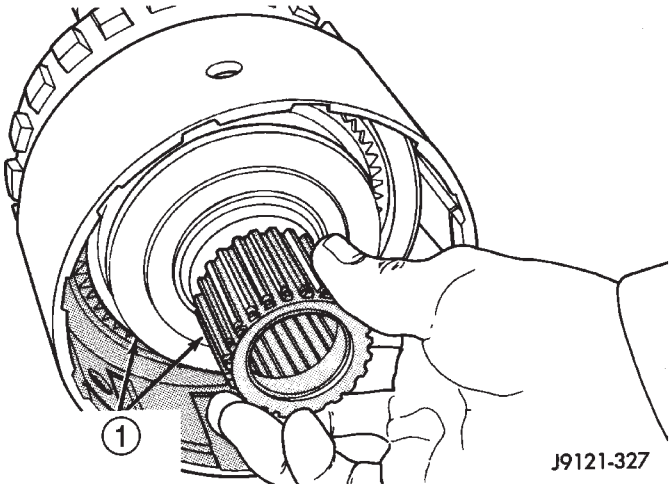


Fig. 157 Sun Gear Installation

1 - SUN GEAR AND SPRING PLATE ASSEMBLY

(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. 158). 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. 159). Be sure spring is properly seated on spring plate.

NOTE: The direct clutch in a 46RE transmission uses 8 clutch discs.

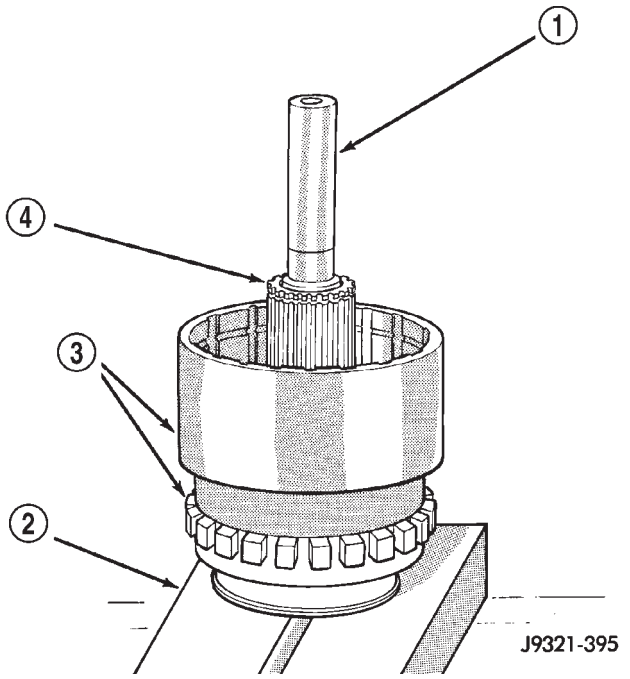


Fig. 158 Alignment Tool Installation

1 - SPECIAL TOOL 6227-2
2 - PRESS PLATES
3 - ASSEMBLED DRUM AND ANNULUS GEAR
4 - SUN GEAR

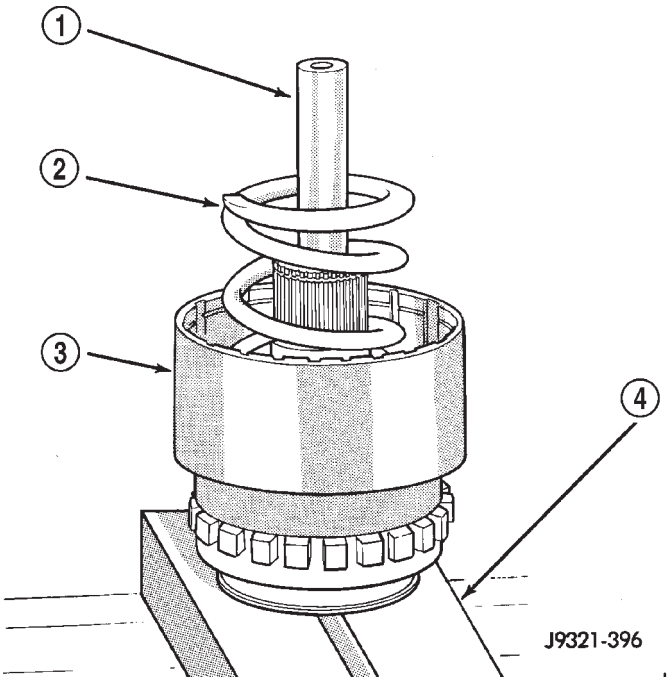


Fig. 159 Direct Clutch Spring Installation

1 - SPECIAL TOOL 6227-2
2 - DIRECT CLUTCH SPRING
3 - CLUTCH HUB
4 - PRESS PLATES

OVERDRIVE UNIT (Continued)

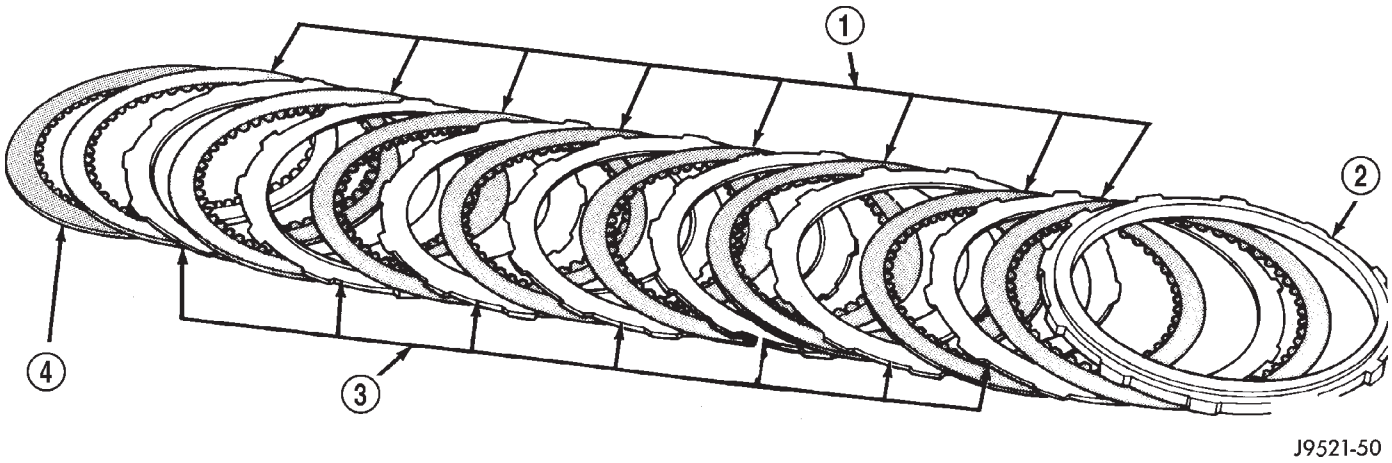


Fig. 160 46RE Direct Clutch Pack Components

1 - CLUTCH DISCS (8)
2 - PRESSURE PLATE
3 - CLUTCH PLATES (7)
4 - REACTION PLATE

(18) Assemble and install direct clutch pack on hub as follows:

(a) Assemble clutch pack components (Fig. 160).

(b) Install direct clutch reaction plate on clutch hub first. Note that one side of reaction plate 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. 161).

(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. 162).

(19) Install clutch hub and clutch pack on direct clutch spring (Fig. 163). Be sure hub is started on sun gear splines before proceeding.

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.

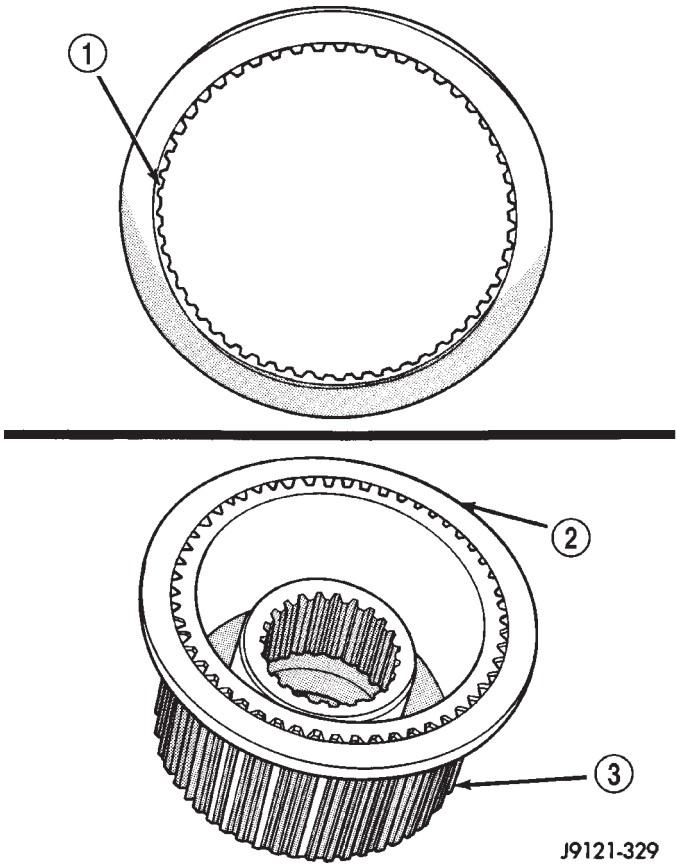


Fig. 161 Correct Position Of Direct Clutch Reaction Plate

1 - REACTION PLATE COUNTERBORE
2 - DIRECT CLUTCH REACTION PLATE (FLUSH WITH END OF HUB)
3 - CLUTCH HUB

OVERDRIVE UNIT (Continued)

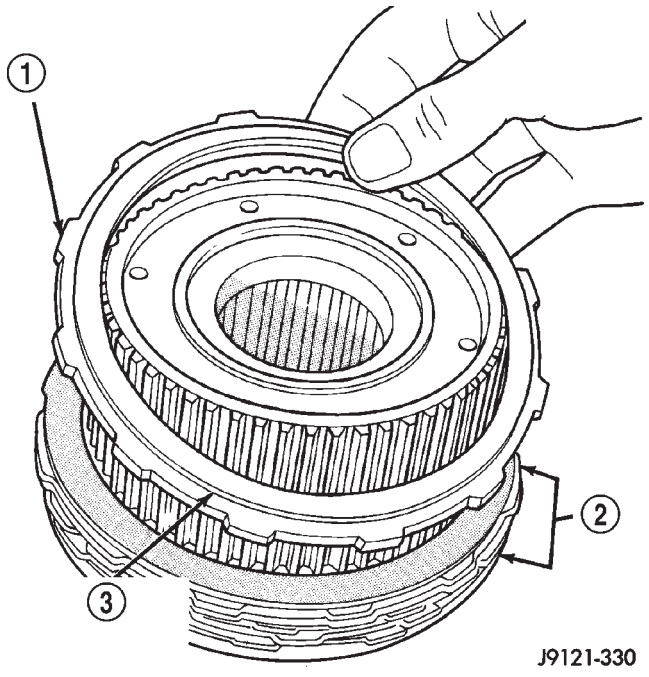


Fig. 162 Correct Position Of Direct Clutch

1 - DIRECT CLUTCH PRESSURE PLATE
2 - CLUTCH PACK
3 - BE SURE SHOULDER SIDE OF PLATE FACES UPWARD

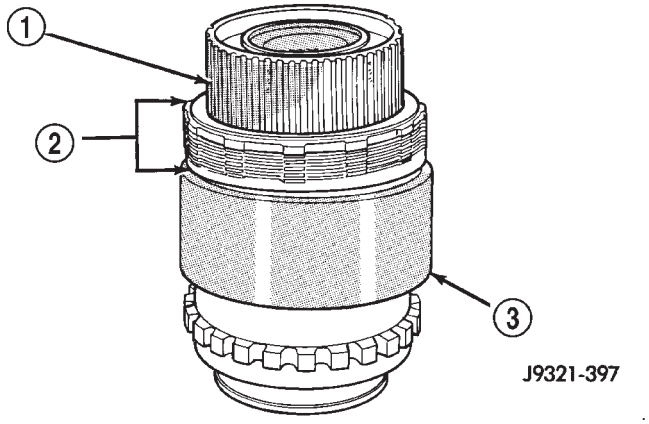


Fig. 163 Direct Clutch Pack And Clutch Hub Installation

1 - CLUTCH HUB
2 - DIRECT CLUTCH PACK
3 - CLUTCH DRUM

(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. 164). Be very sure snap ring is fully seated in clutch drum ring groove.

(25) Install clutch hub retaining ring (Fig. 165). 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.

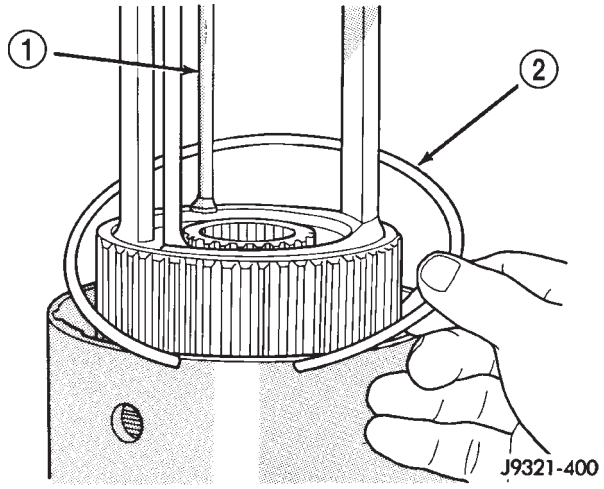


Fig. 164 Direct Clutch Pack Snap-Ring Installation

1 - SPECIAL TOOL 6227-1
2 - DIRECT CLUTCH PACK SNAP-RING

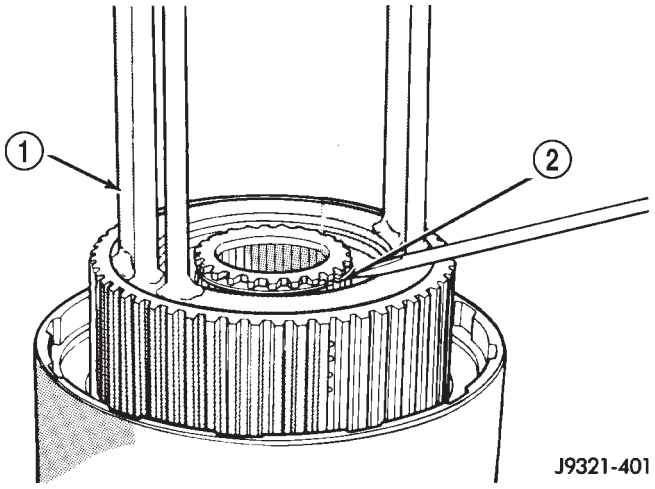


Fig. 165 Clutch Hub Retaining Ring Installation

1 - SPECIAL TOOL 6227-1
2 - CLUTCH HUB RETAINING RING

OVERDRIVE UNIT (Continued)

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.

(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. 166). Be sure pin is seated in hole in case before installing snap ring.

(4) Install reaction plug snap-ring (Fig. 167). Compress snap ring only enough for installation; do not distort it.

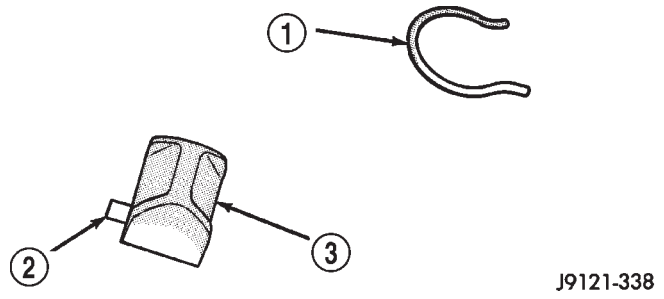


Fig. 166 Reaction Plug Locating Pin And Snap-Ring

1 - REACTION PLUG SNAP-RING (DO NOT OVERCOMPRESS TO INSTALL)
2 - LOCATING PIN
3 - PARK LOCK REACTION PLUG

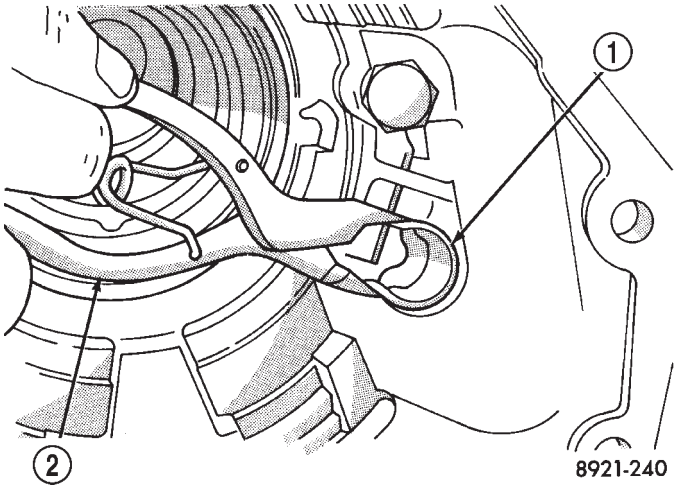


Fig. 167 Reaction Plug And Snap-Ring Installation

1 - REACTION PLUG SNAP-RING
2 - SNAP-RING PLIERS

(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. 168).

(7) Support geartrain on Tool 6227-1 (Fig. 169). Be sure tool is securely seated in clutch hub.

(8) Install overdrive gear case on geartrain (Fig. 169).

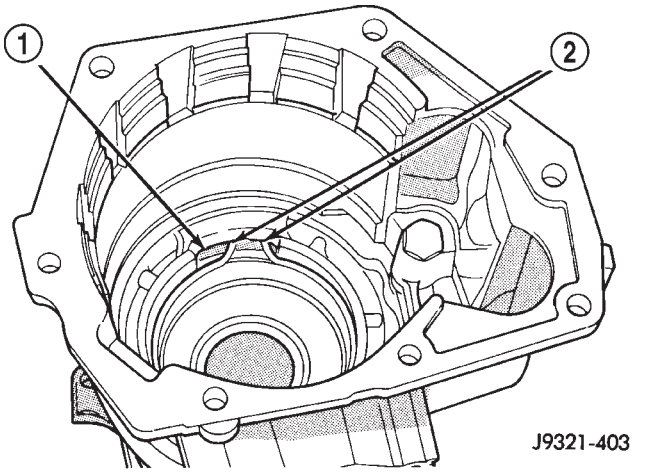


Fig. 168 Correct Rear Bearing Locating Ring Position

1 - CASE ACCESS HOLE
2 - TAB ENDS OF LOCATING RING

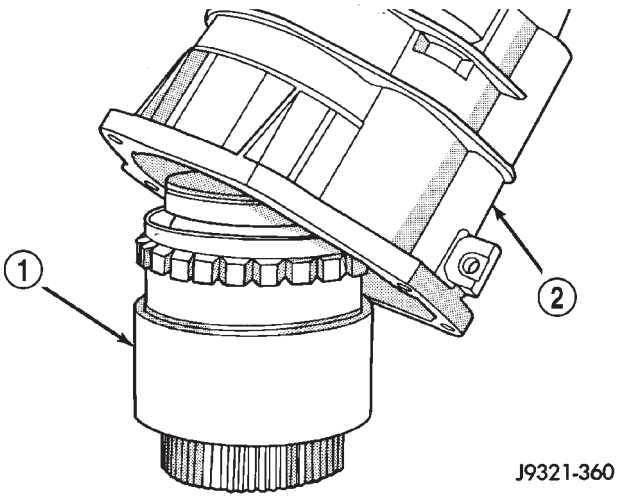


Fig. 169 Overdrive Gear Case Installation

1 - GEARTRAIN ASSEMBLY
2 - GEAR CASE

OVERDRIVE UNIT (Continued)

(9) Expand front bearing locating ring with snap ring pliers (Fig. 170). 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. 171).

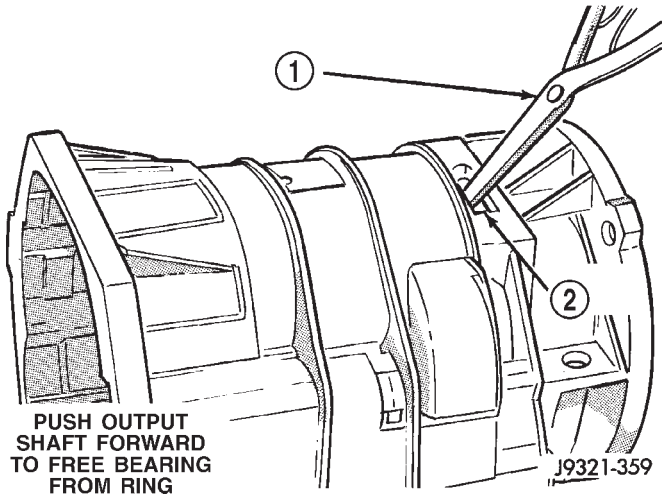


Fig. 170 Seating Locating Ring In Rear Bearing

1 - EXPAND BEARING LOCATING RING WITH SNAP-RING PLIERS
2 - ACCESS HOLE

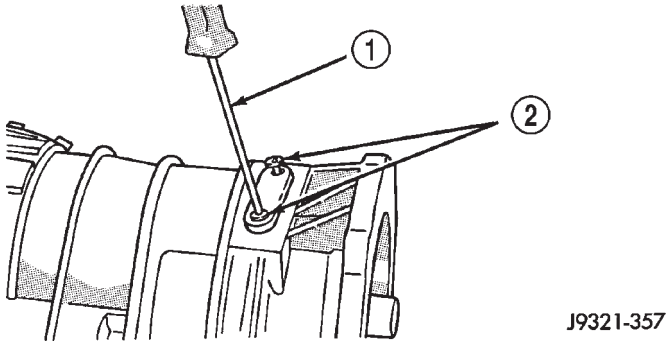


Fig. 171 Locating Ring Access Cover And Gasket Installation

1 - TORX SCREWDRIVER (T25)
2 - ACCESS COVER SCREWS

OVERDRIVE CLUTCH

NOTE: The overdrive clutch in a 46RE transmission uses 4 clutch discs.

(1) Install overdrive clutch reaction ring first. Reaction ring is flat with notched ends (Fig. 172).

(2) Install wave spring on top of reaction ring (Fig. 173). 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. 174).

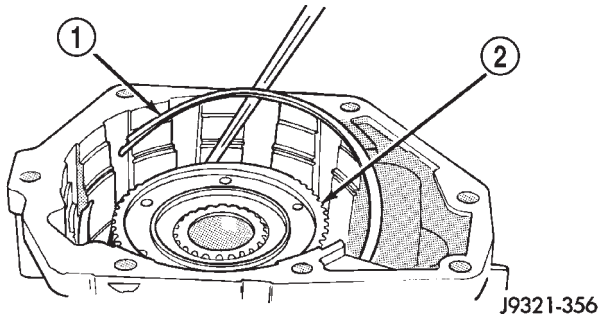


Fig. 172 Overdrive Clutch Reaction Ring Installation

1 - REACTION RING
2 - CLUTCH HUB

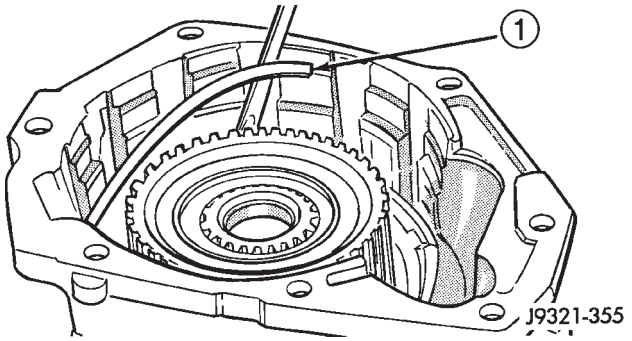


Fig. 173 Overdrive Clutch Wave Spring Installation

1 - WAVE SPRING

(4) Install overdrive clutch reaction plate first.

NOTE: The reaction plate is the same thickness as the pressure plate in a 46RE transmission.

(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. 175).

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.

OVERDRIVE UNIT (Continued)

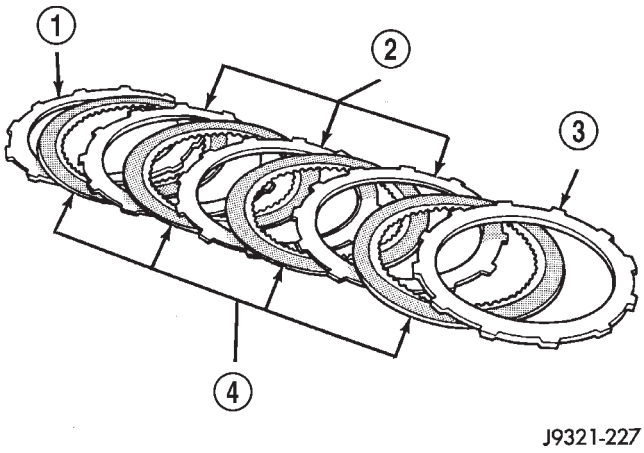


Fig. 174 46RE Overdrive Clutch Components

1 - REACTION PLATE
2 - CLUTCH PLATES (3)
3 - PRESSURE PLATE
4 - CLUTCH DISCS (4)

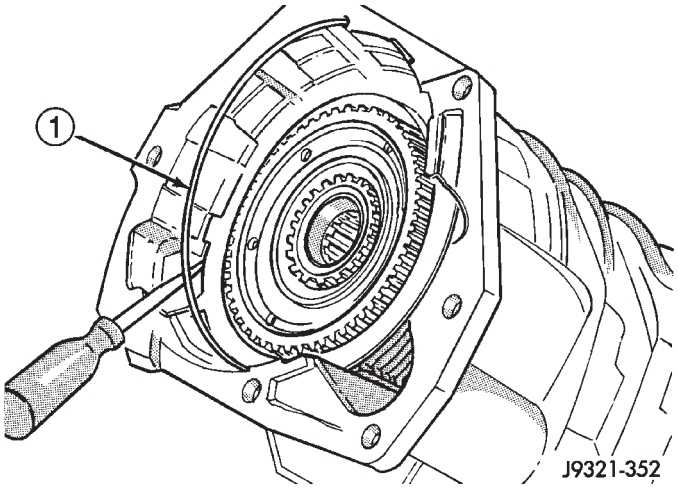


Fig. 175 Overdrive Clutch Pack Retaining Ring Installation

1 - OVERDRIVE CLUTCH PACK RETAINING RING

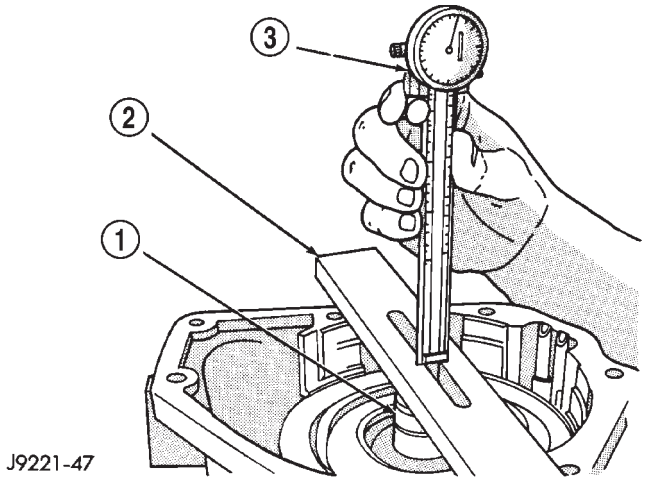


Fig. 176 Shaft End Play Measurement

1 - SPECIAL TOOL 6312
2 - SPECIAL TOOL 6311
3 - SPECIAL TOOL C-4962

(b) Position Gauge Tool 6311 across face of overdrive case (Fig. 176). 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. 176).

(d) Select proper thickness end play spacer from spacer chart based on distance measured (Fig. 177).

(e) Remove Gauge Alignment Tool 6312.

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. 177 Intermediate Shaft End Play Spacer Selection

OVERDRIVE UNIT (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. 178).

(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. 179).

(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.

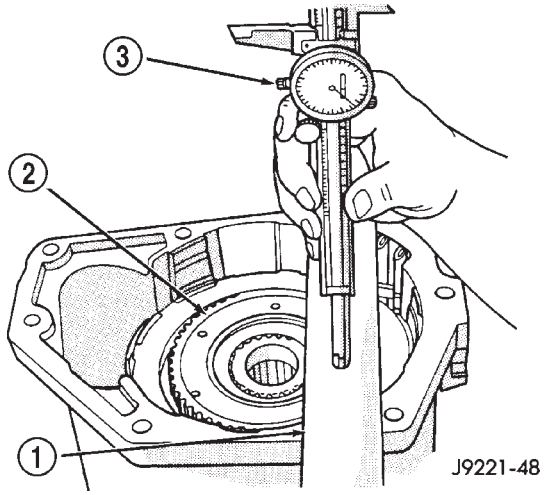


Fig. 178 Overdrive Piston Thrust Plate Measurement

1 - SPECIAL TOOL 6311
2 - DIRECT CLUTCH HUB THRUST BEARING SEAT
3 - SPECIAL TOOL C-4962

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.

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. 179 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.

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. 180).

(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.

OVERDRIVE UNIT (Continued)

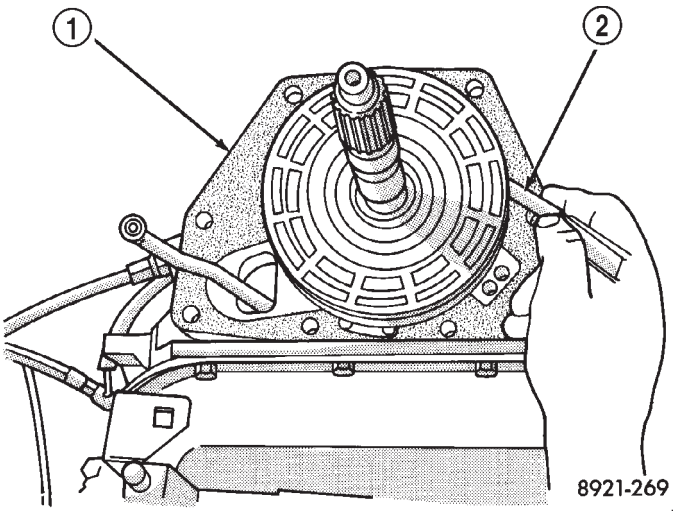


Fig. 180 Trimming Overdrive Case Gasket

1 - GASKET
2 - SHARP KNIFE

(6) Install selective spacer on intermediate shaft, if removed. Spacer goes in groove just rearward of shaft rear splines (Fig. 181).

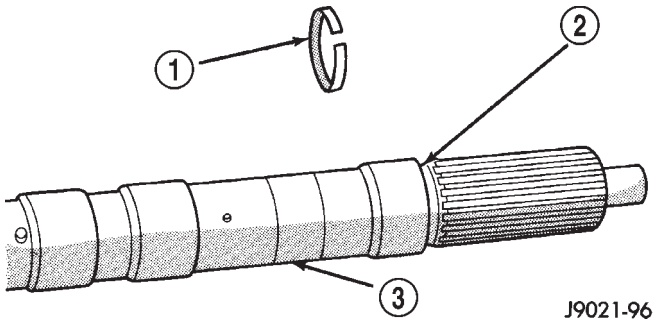


Fig. 181 Intermediate Shaft Selective Spacer Location

1 - SELECTIVE SPACER
2 - SPACER GROOVE
3 - INTERMEDIATE SHAFT

(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) Connect the transmission speed sensor and overdrive wiring connectors.

(14) Install the transfer case, if equipped.

(15) Align and install rear propeller shaft, if necessary. (Refer to 3 - DIFFERENTIAL & DRIVELINE/ PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

OVERDRIVE SWITCH

DESCRIPTION

The overdrive OFF (control) switch is located in the shift lever arm (Fig. 182). The switch is a momentary contact device that signals the PCM to toggle current status of the overdrive function.

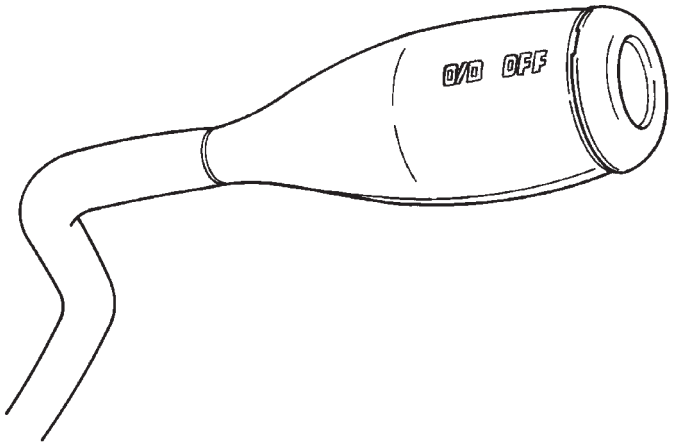


Fig. 182 Overdrive Off Switch

OPERATION

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 con-

OVERDRIVE SWITCH (Continued)

trol 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.

DIAGNOSIS AND TESTING - 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.

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

REMOVAL

(1) Using a plastic trim tool, remove the overdrive off switch retainer from the shift lever (Fig. 183).

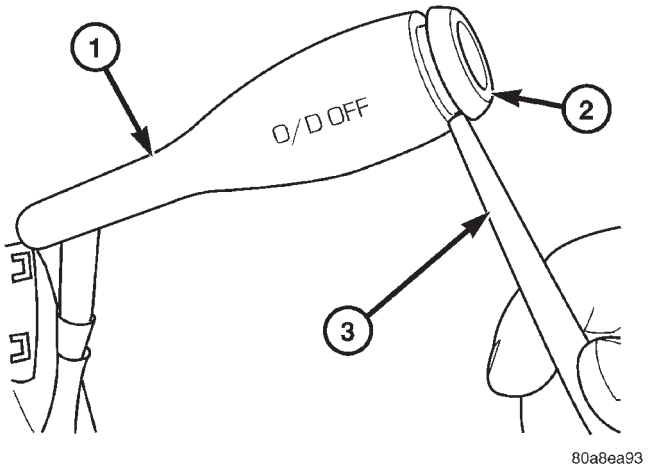


Fig. 183 Overdrive Off Switch Retainer

1 - GEAR SHIFT LEVER
2 - OVERDRIVE OFF SWITCH RETAINER
3 - PLASTIC TRIM TOOL

(2) Pull the switch outwards to release it from the connector in the lever (Fig. 184)

INSTALLATION

NOTE: There is enough slack in the wire to pull out the connector from the lever.

(1) Pull the connector out of the lever just enough to grasp it.

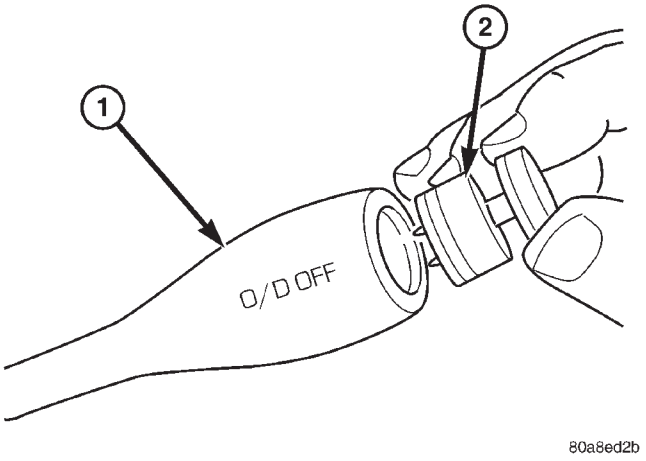


Fig. 184 Remove the Overdrive Off Switch

1 - GEAR SHIFT LEVER
2 - OVERDRIVE OFF SWITCH

CAUTION: Be careful not to bend the pins on the overdrive off switch. Use care when installing the switch, as it is not indexed, and can be accidentally installed incorrectly.

(2) Install the overdrive off switch into the connector (Fig. 185)

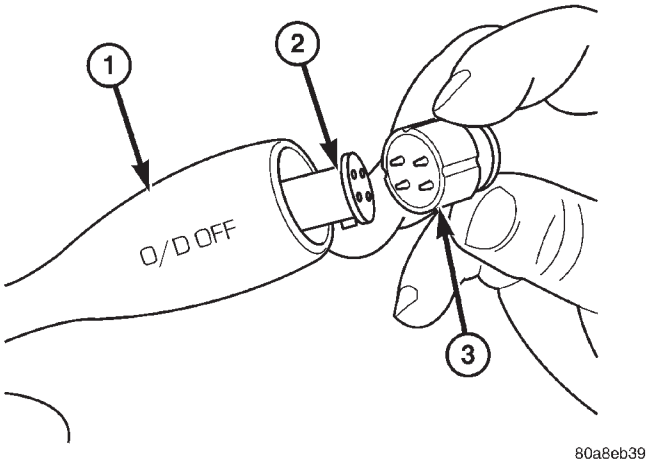


Fig. 185 Install the Overdrive Off Switch

1 - GEAR SHIFT LEVER
2 - OVERDRIVE OFF SWITCH WIRING CONNECTOR
3 - OVERDRIVE OFF SWITCH

(3) Push the overdrive off switch and wiring into the shift lever.

(4) Install the overdrive off switch retainer onto the shift lever.

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER

DESCRIPTION

The overrunning clutch (Fig. 186) consists of an inner race, an outer race (or cam), rollers and springs, and the spring retainer. The number of rollers and springs depends on what transmission and which overrunning clutch is being dealt with.

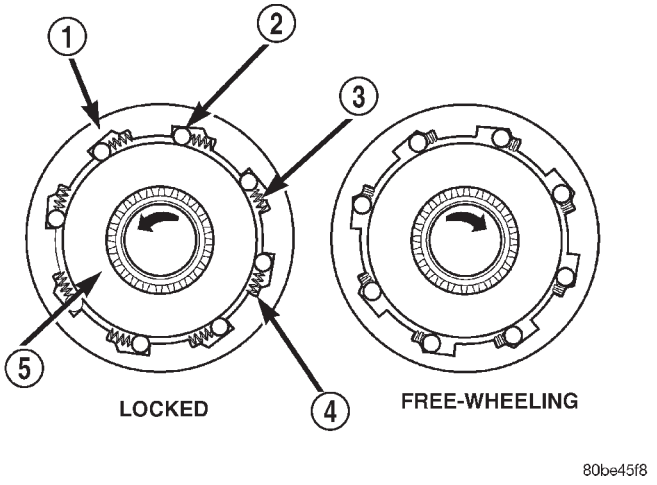


Fig. 186 Overrunning Clutch

1 - OUTER RACE (CAM)
2 - ROLLER
3 - SPRING
4 - SPRING RETAINER
5 - INNER RACE (HUB)

OPERATION

As the inner race is rotated in a clockwise direction (as viewed from the front of the transmission), the race causes the rollers to roll toward the springs, causing them to compress against their retainer. The compression of the springs increases the clearance between the rollers and cam. This increased clearance between the rollers and cam results in a freewheeling condition. When the inner race attempts to rotate counterclockwise, the action causes the rollers to roll in the same direction as the race, aided by the pushing of the springs. As the rollers try to move in the same direction as the inner race, they are wedged between the inner and outer races due to the design of the cam. In this condition, the clutch is locked and acts as one unit.

DISASSEMBLY

(1) Remove the overdrive piston (Fig. 187).
(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. 188). 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.

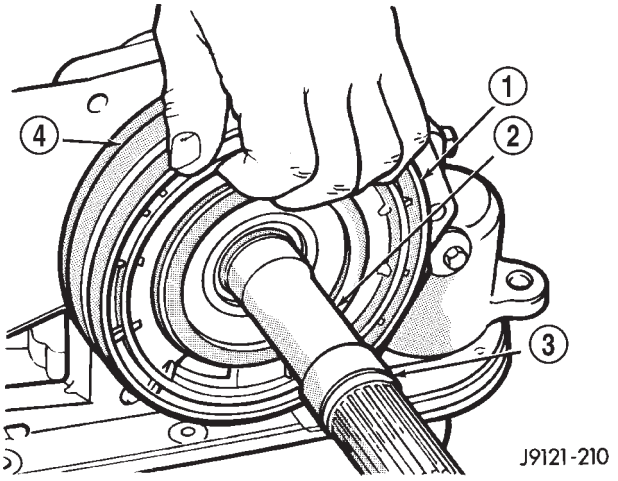


Fig. 187 Overdrive Piston Removal

1 - OVERDRIVE CLUTCH PISTON
2 - INTERMEDIATE SHAFT
3 - SELECTIVE SPACER
4 - PISTON RETAINER

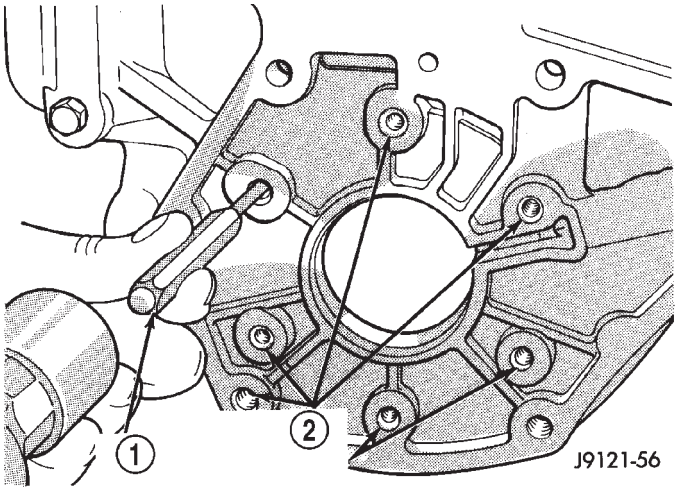


Fig. 188 Overrunning Clutch Cam

1 - PIN PUNCH
2 - REAR SUPPORT BOLT HOLES

CLEANING

Clean the overrunning clutch assembly, clutch cam, low-reverse drum, and overdrive piston retainer in solvent. Dry them with compressed air after cleaning.

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER (Continued)

INSPECTION

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.

ASSEMBLY

(1) Temporarily install overdrive piston retainer in case. Use 3-4 bolts to secure retainer.

(2) Align and start new clutch cam in the transmission case. Be sure serrations on cam and in case are aligned (Fig. 189). 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. 189).

(4) Insert Adapter Tool SP-5124 into piston retainer (Fig. 190).

(5) Assemble Puller Bolt SP-3701 and Press Plate SP-3583-A (Fig. 191).

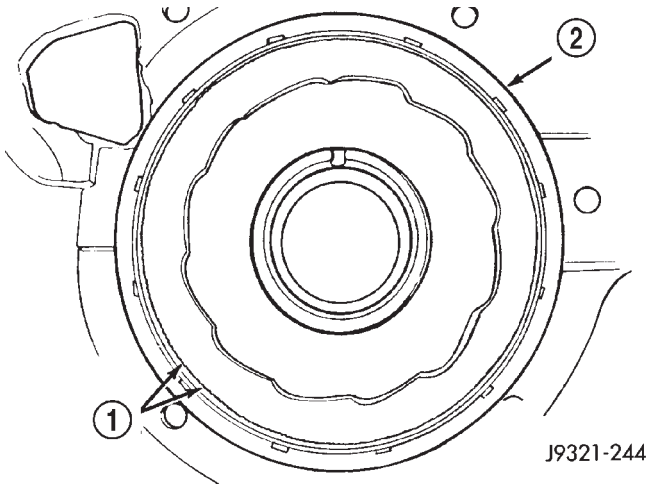


Fig. 189 Positioning Replacement Clutch Cam In Case

1 - ALIGN SERRATIONS ON CAM AND IN CASE
2 - CLUTCH CAM

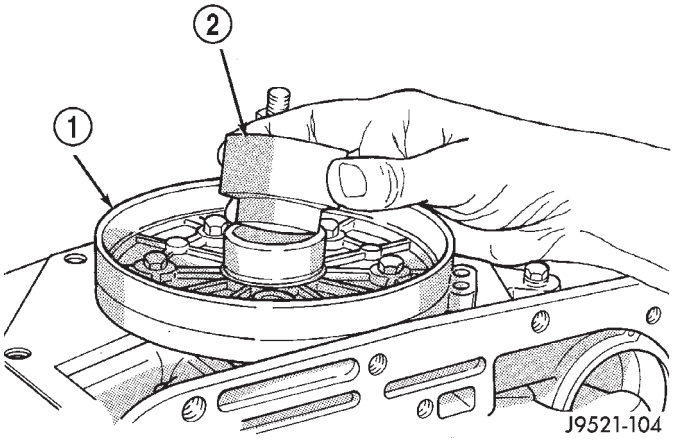


Fig. 190 Positioning Adapter Tool In Overdrive Piston Retainer

1 - PISTON RETAINER
2 - SPECIAL TOOL SP-5124

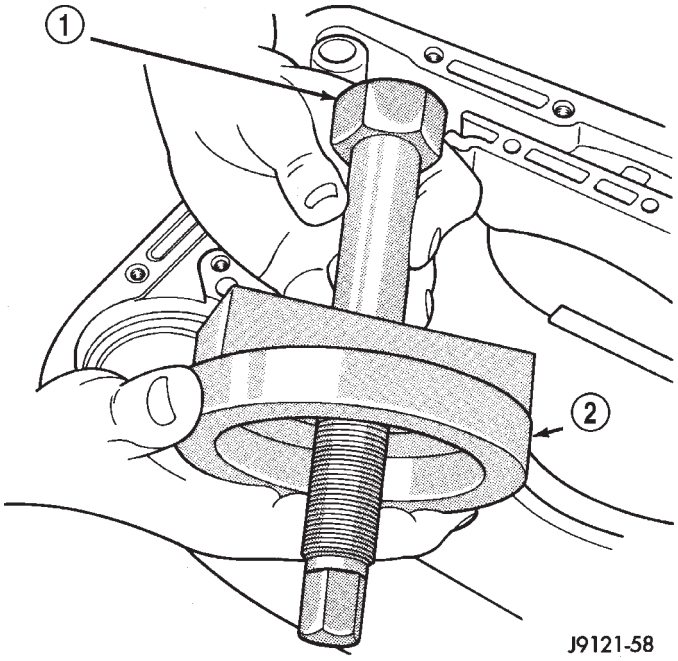


Fig. 191 Assembling Clutch Cam Puller Bolt And Press Plate

1 - PULLER BOLT SP-3701
2 - PRESS PLATE SP-3583-A

(6) Install assembled puller plate and bolt (Fig. 192). 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. 193).

(8) Tighten puller nut to press clutch cam into case (Fig. 193). Be sure cam is pressed into case evenly and does not become cocked.

(9) Remove clutch cam installer tools.

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER (Continued)

(10) Stake case in 14 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.

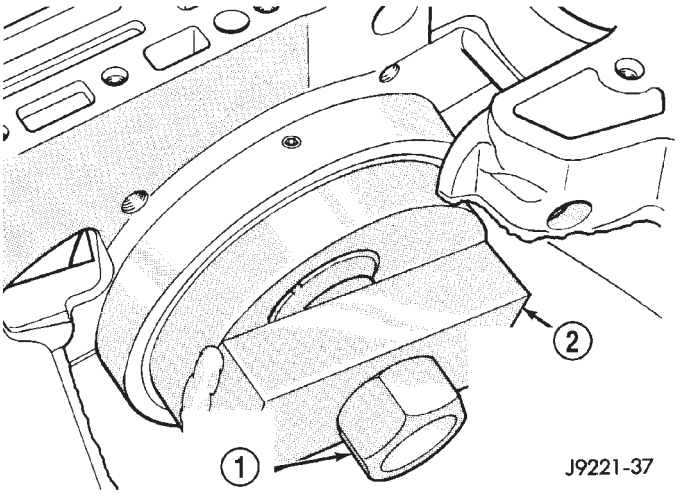


Fig. 192 Positioning Puller Plate On Clutch Cam

1 - SPECIAL TOOL SP-3701
2 - BE SURE PLATE SP-3583-A IS SEATED SQUARELY ON 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. 194). Also install gasket before overdrive piston retainer. Center hole in gasket is 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. 195). Then install and tighten retainer bolts to 17 N·m (13 ft. lbs.) torque.

(15) Install new seals on overdrive piston.

(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.

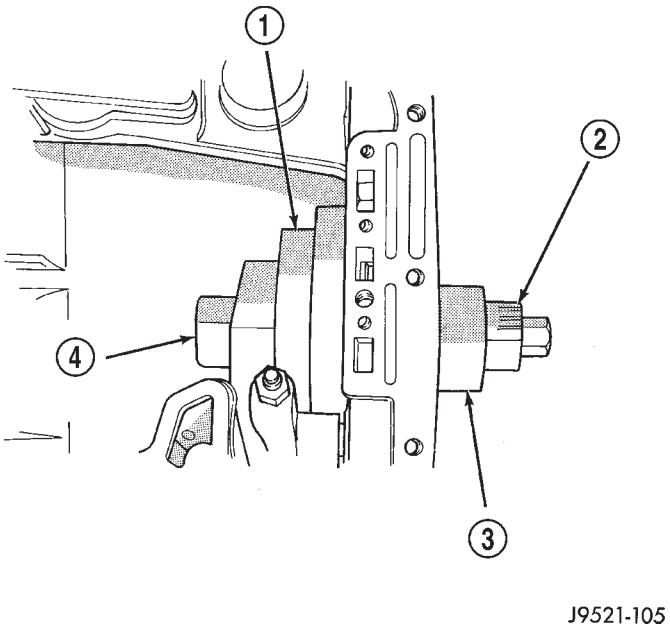


Fig. 193 Pressing Overrunning Clutch Cam Into Case

1 - SPECIAL TOOL SP-3583-A
2 - TIGHTEN NUT TO DRAW CAM INTO CASE (NUT IS PART OF BOLT SP-3701)
3 - SPECIAL TOOL SP-5124
4 - SPECIAL TOOL SP-3701

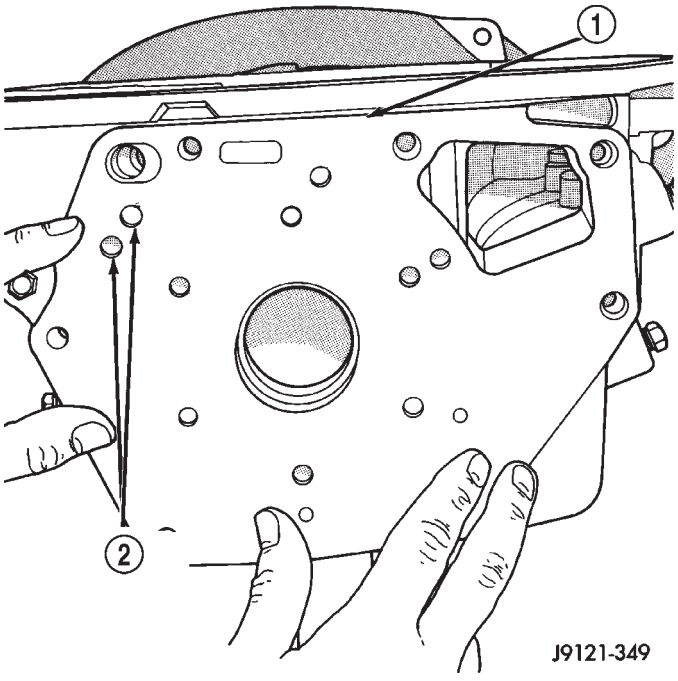


Fig. 194 Installing/Aligning Case Gasket

1 - CASE GASKET
2 - BE SURE GOVERNOR TUBE FEED HOLES IN CASE AND GASKET ARE ALIGNED

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER (Continued)

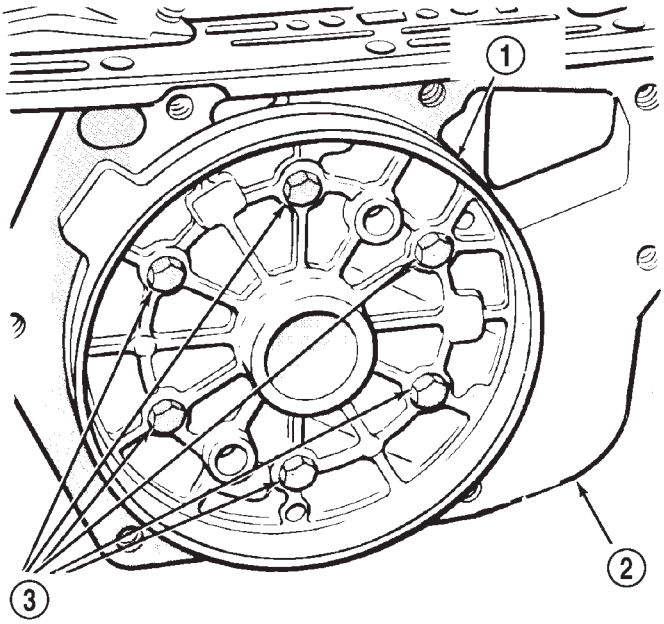


Fig. 195 Aligning Overdrive Piston Retainer

1 - PISTON RETAINER
2 - GASKET
3 - RETAINER BOLTS

(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.

PARK/NEUTRAL POSITION SWITCH

DIAGNOSIS AND TESTING - 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.

REMOVAL

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

(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. 196).

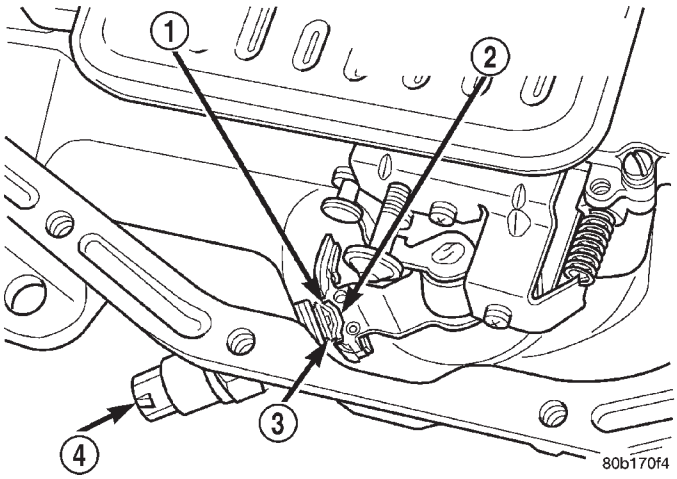


Fig. 196 Park/Neutral Position Switch

1 - NEUTRAL CONTACT
2 - MANUAL LEVER AND SWITCH PLUNGER IN REVERSE POSITION
3 - PARK CONTACT
4 - SWITCH

(2) Install new seal on switch and install switch in case. Tighten switch to 34 N·m (25 ft. lbs.) torque.

(3) Test continuity of new switch with 12V test lamp.

(4) Connect switch wires and lower vehicle.

(5) Top off transmission fluid level.

PISTONS

DESCRIPTION

There are several sizes and types of pistons used in an automatic transmission. Some pistons are used to apply clutches, while others are used to apply bands. They all have in common the fact that they are round or circular in shape, located within a smooth walled cylinder, which is closed at one end and converts fluid pressure into mechanical movement. The fluid pressure exerted on the piston is contained within the system through the use of piston rings or seals.

PISTONS (Continued)

OPERATION

The principal which makes this operation possible is known as Pascal's Law. Pascal's Law can be stated as: "Pressure on a confined fluid is transmitted equally in all directions and acts with equal force on equal areas."

PRESSURE

Pressure (Fig. 197) is nothing more than force (lbs.) divided by area (in or ft.), or force per unit area. Given a 100 lb. block and an area of 100 sq. in. on the floor, the pressure exerted by the block is: 100 lbs. 100 in or 1 pound per square inch, or PSI as it is commonly referred to.

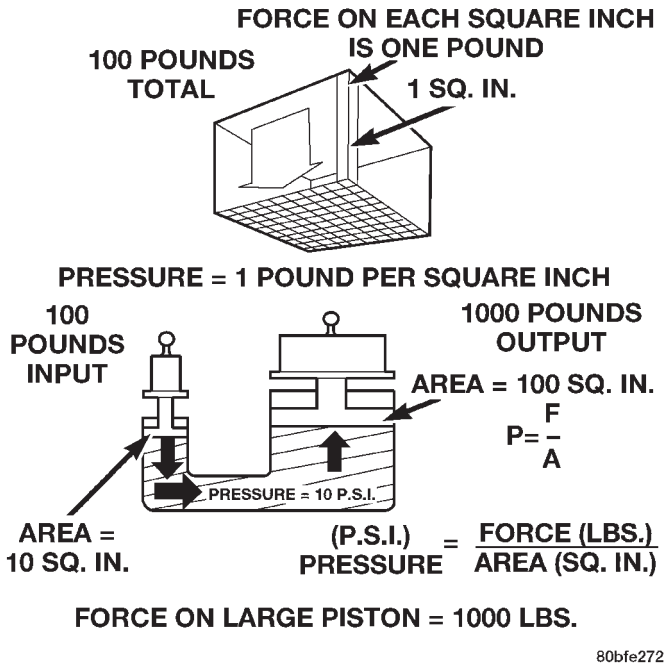


Fig. 197 Force and Pressure Relationship

PRESSURE ON A CONFINED FLUID

Pressure is exerted on a confined fluid (Fig. 198) by applying a force to some given area in contact with the fluid. A good example of this is a cylinder filled with fluid and equipped with a piston that is closely fitted to the cylinder wall. If a force is applied to the piston, pressure will be developed in the fluid. Of course, no pressure will be created if the fluid is not confined. It will simply "leak" past the piston. There must be a resistance to flow in order to create pressure. Piston sealing is extremely important in hydraulic operation. Several kinds of seals are used to accomplish this within a transmission. These include but are not limited to O-rings, D-rings, lip seals, sealing rings, or extremely close tolerances between the piston and the cylinder wall. The force exerted is downward (gravity), however, the principle remains the same no matter which direction is taken. The pressure created in the fluid is equal to the force applied, divided by the piston area. If the force is 100 lbs., and the piston area is 10 sq. in., then the pressure created equals 10 PSI. Another interpretation of Pascal's Law is that regardless of container shape or size, the pressure will be maintained throughout, as long as the fluid is confined. In other words, the pressure in the fluid is the same everywhere within the container.

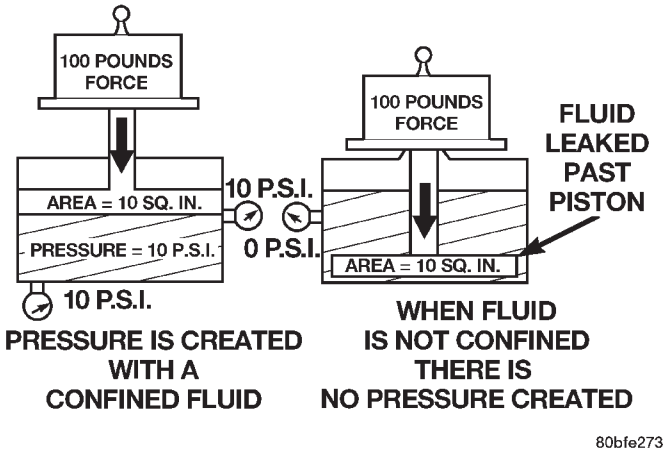


Fig. 198 Pressure on a Confined Fluid

FORCE MULTIPLICATION

Using the 10 PSI example used in the illustration (Fig. 199), a force of 1000 lbs. can be moved with a force of only 100 lbs. The secret of force multiplication in hydraulic systems is the total fluid contact area employed. The illustration, (Fig. 199), shows an area that is ten times larger than the original area. The pressure created with the smaller 100 lb. input is 10 PSI. The concept "pressure is the same everywhere" means that the pressure underneath the larger piston is also 10 PSI. Pressure is equal to the force applied divided by the contact area. Therefore, by means of simple algebra, the output force may be found. This concept is extremely important, as it is also used in the design and operation of all shift valves and limiting valves in the valve body, as well as the pistons, of the transmission, which activate the clutches and bands. It is nothing more than using a difference of area to create a difference in pressure to move an object.

PISTONS (Continued)

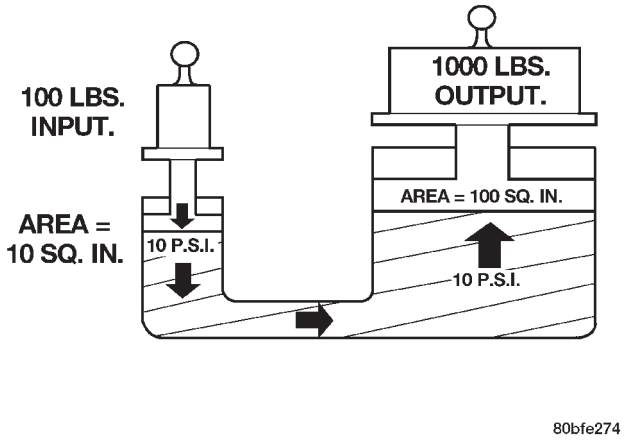


Fig. 199 Force Multiplication

PISTON TRAVEL

The relationship between hydraulic lever and a mechanical lever is the same. With a mechanical lever it's a weight-to-distance output rather than a pressure-to-area output. Using the same forces and areas as in the previous example, the smaller piston (Fig. 200) has to move ten times the distance required to move the larger piston one inch. Therefore, for every inch the larger piston moves, the smaller piston moves ten inches. This principle is true in other instances also. A common garage floor jack is a good example. To raise a car weighing 2000 lbs., an effort of only 100 lbs. may be required. For every inch the car moves upward, the input piston at the jack handle must move 20 inches downward.

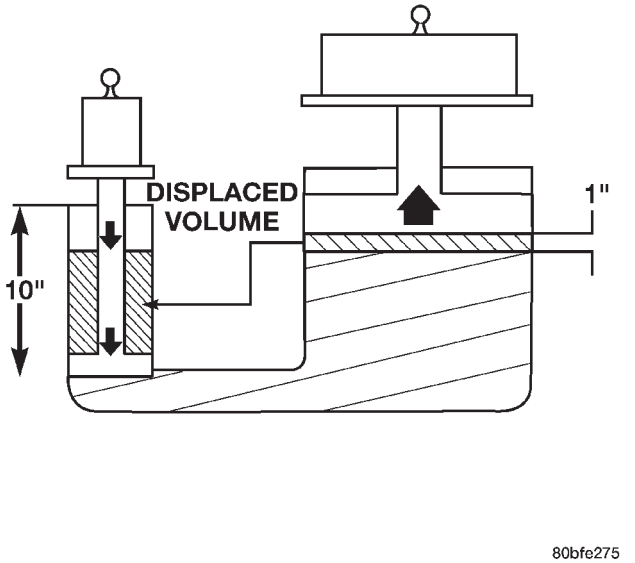


Fig. 200 Piston Travel

PLANETARY GEARTRAIN/ OUTPUT SHAFT

DESCRIPTION

The planetary gearsets (Fig. 201) are designated as the front, rear, and overdrive planetary gear assemblies and located in such order. A simple planetary gearset consists of three main members:

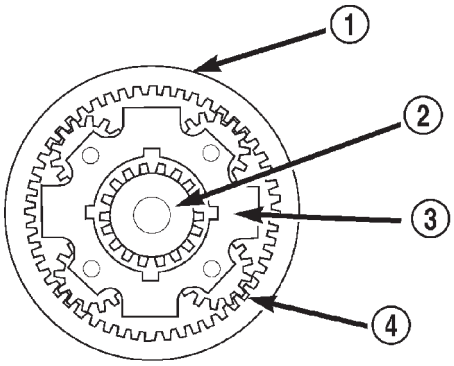


Fig. 201 Planetary Gearset

1 - ANNULUS GEAR
2 - SUN GEAR
3 - PLANET CARRIER
4 - PLANET PINIONS (4)

- The sun gear which is at the center of the system.
- The planet carrier with planet pinion gears which are free to rotate on their own shafts and are in mesh with the sun gear.
- The annulus gear, which rotates around and is in mesh with the planet pinion gears.

NOTE: The number of pinion gears does not affect the gear ratio, only the duty rating.

OPERATION

With any given planetary gearset, several conditions must be met for power to be able to flow:

- One member must be held.
- Another member must be driven or used as an input.
- The third member may be used as an output for power flow.
- For direct drive to occur, two gear members in the front planetary gearset must be driven.

NOTE: Gear ratios are dependent on the number of teeth on the annulus and sun gears.

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

DISASSEMBLY

(1) Remove planetary snap-ring from intermediate shaft (Fig. 202). Discard snap-ring as it is not reusable.

(2) Remove front planetary gear and front annulus gear as assembly (Fig. 203).

(3) Remove front planetary gear and thrust washer from front annulus gear (Fig. 204). Note thrust washer position for assembly reference.

(4) Remove tabbed thrust washer from driving shell (Fig. 205). Note washer position for assembly reference.

(5) Remove sun gear and driving shell as assembly (Fig. 206).

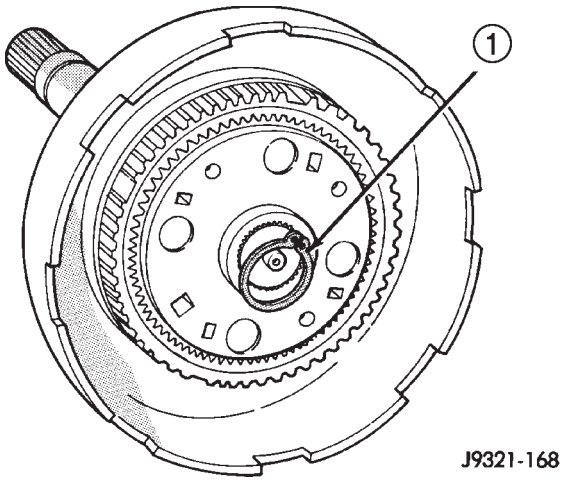


Fig. 202 Removing Planetary Snap-Ring

1 - PLANETARY SNAP-RING

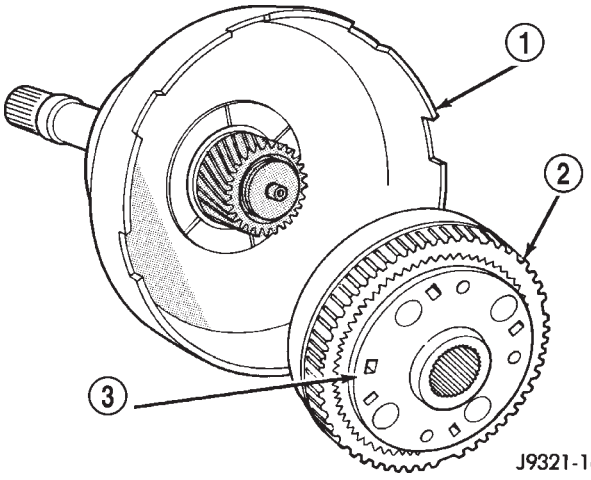


Fig. 203 Removing Front Planetary And Annulus Gears

1 - DRIVING SHELL
2 - FRONT ANNULUS GEAR
3 - FRONT PLANETARY GEAR

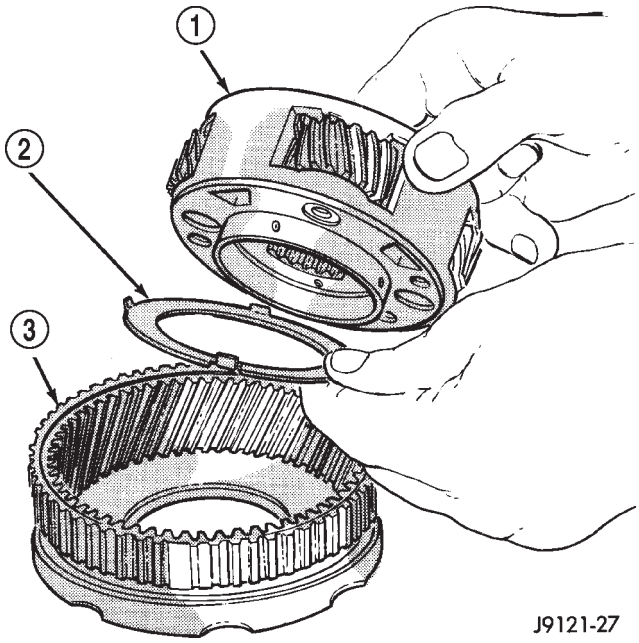


Fig. 204 Disassembling Front Planetary And Annulus Gears

1 - FRONT PLANETARY GEAR
2 - TABBED THRUST WASHER
3 - FRONT ANNULUS GEAR

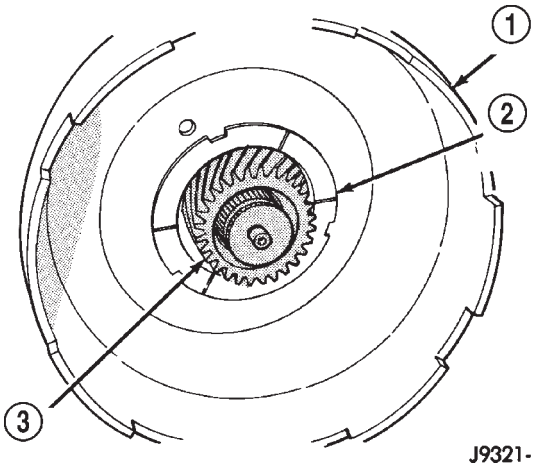


Fig. 205 Driving Shell Thrust Washer Removal

1 - DRIVING SHELL
2 - TABBED THRUST WASHER
3 - SUN GEAR

(6) Remove tabbed thrust washer from rear planetary gear (Fig. 207). Note washer position on gear for assembly reference.

(7) Remove rear planetary gear and rear annulus gear from intermediate shaft (Fig. 208).

(8) Remove thrust plate from rear annulus gear (Fig. 209).

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

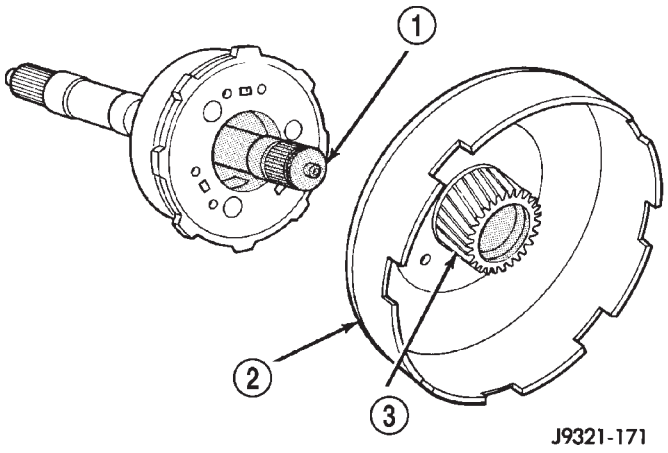


Fig. 206 Sun Gear And Driving Shell Removal

1 - INTERMEDIATE SHAFT
2 - DRIVING SHELL
3 - SUN GEAR

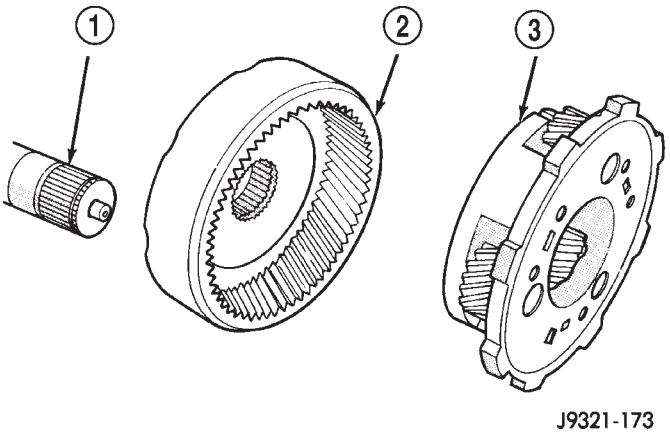


Fig. 208 Rear Planetary And Annulus Gear Removal

1 - INTERMEDIATE SHAFT
2 - REAR ANNULUS GEAR
3 - REAR PLANETARY GEAR

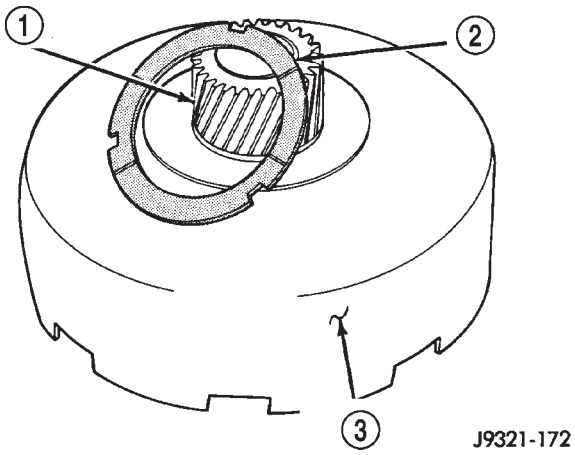


Fig. 207 Rear Planetary Thrust Washer Removal

1 - SUN GEAR
2 - REAR PLANETARY THRUST WASHER
3 - DRIVING SHELL

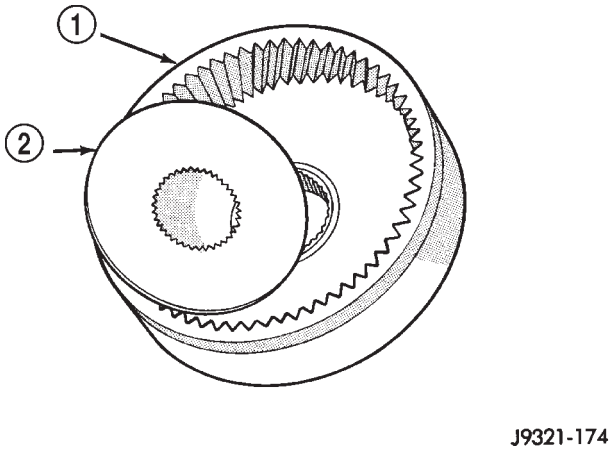


Fig. 209 Rear Annulus Thrust Plate Removal

1 - REAR ANNULUS GEAR
2 - THRUST PLATE

INSPECTION

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.

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.

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

(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. 210). Install rear snap-ring to secure sun gear and thrust plate in driving shell.

(3) Install rear annulus gear on intermediate shaft (Fig. 211).

(4) Install thrust plate in annulus gear (Fig. 212). Be sure plate is seated on shaft splines and against gear.

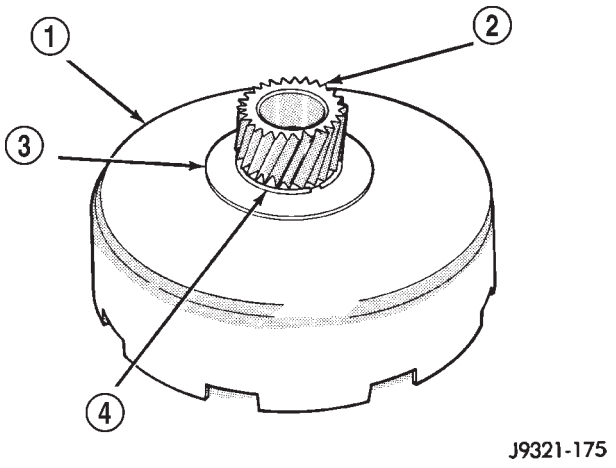


Fig. 210 Sun Gear Installation

1 - DRIVING SHELL
2 - SUN GEAR
3 - THRUST PLATE
4 - SUN GEAR REAR RETAINING RING

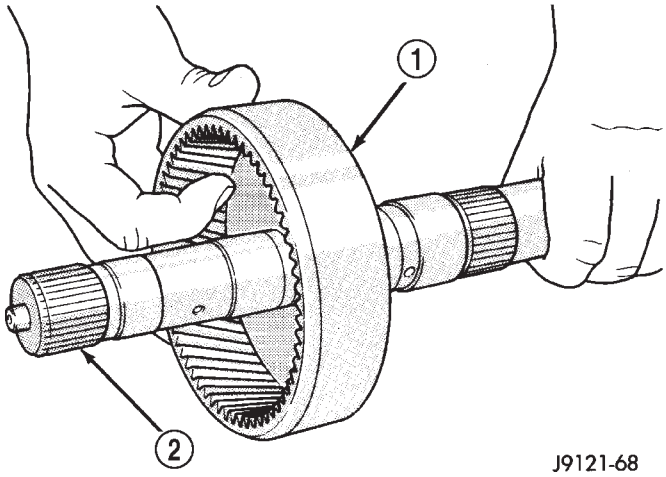


Fig. 211 Installing Rear Annulus Gear On Intermediate Shaft

1 - REAR ANNULUS GEAR
2 - OUTPUT SHAFT

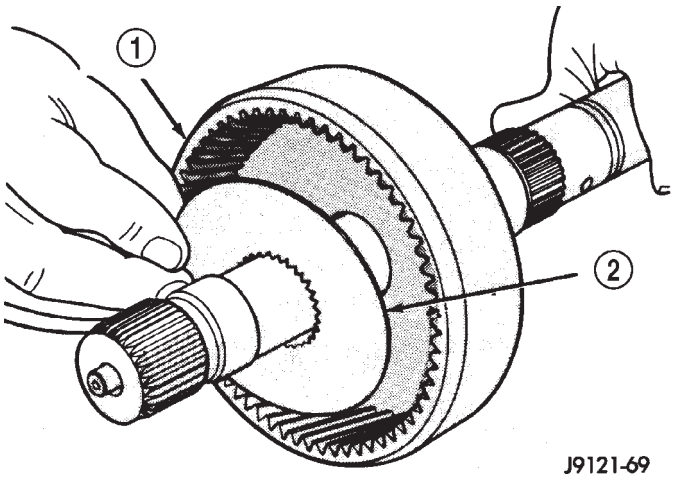


Fig. 212 Installing Rear Annulus Thrust Plate

1 - REAR ANNULUS GEAR
2 - THRUST PLATE

(5) Install rear planetary gear in rear annulus gear (Fig. 213). Be sure planetary carrier is seated against annulus gear.

(6) Install tabbed thrust washer on front face of rear planetary gear (Fig. 214). Seat washer tabs in matching slots in face of gear carrier. Use extra petroleum jelly to hold washer in place if desired.

(7) Lubricate sun gear bushings with petroleum jelly or transmission fluid.

(8) Install sun gear and driving shell on intermediate shaft (Fig. 215). Seat shell against rear planetary gear. Verify that thrust washer on planetary gear was not displaced during installation.

(9) Install tabbed thrust washer in driving shell (Fig. 216), be sure washer tabs are seated in tab slots of driving shell. Use extra petroleum jelly to hold washer in place if desired.

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

(10) Install tabbed thrust washer on front planetary gear (Fig. 217). Seat washer tabs in matching slots in face of gear carrier. Use extra petroleum jelly to hold washer in place if desired.

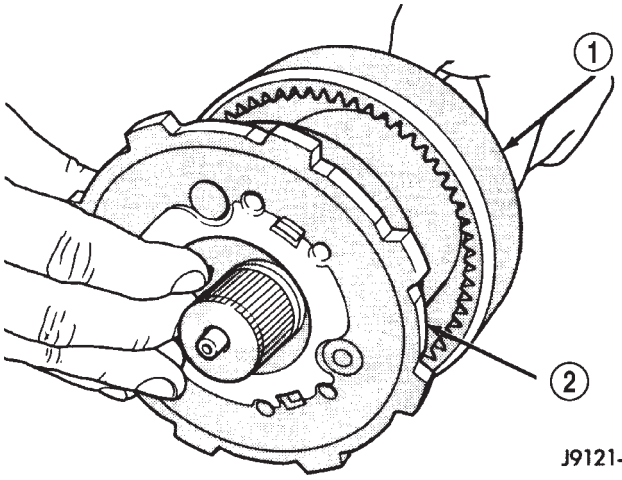


Fig. 213 Installing Rear Planetary Gear

1 - REAR ANNULUS GEAR
2 - REAR PLANETARY GEAR

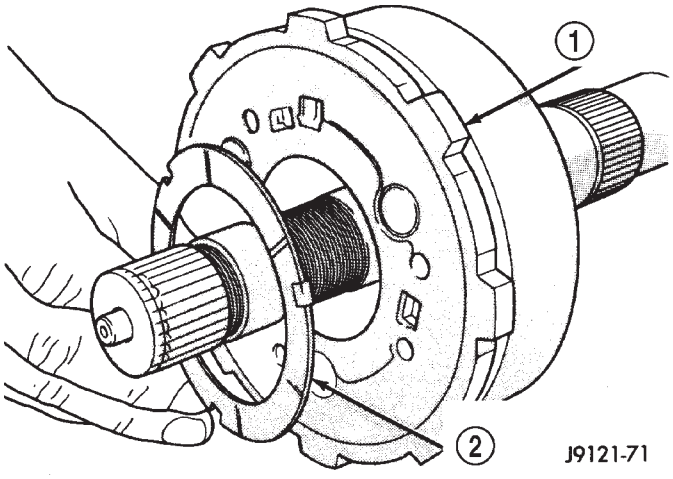


Fig. 214 Installing Rear Planetary Thrust Washer

1 - REAR PLANETARY GEAR
2 - TABBED THRUST WASHER

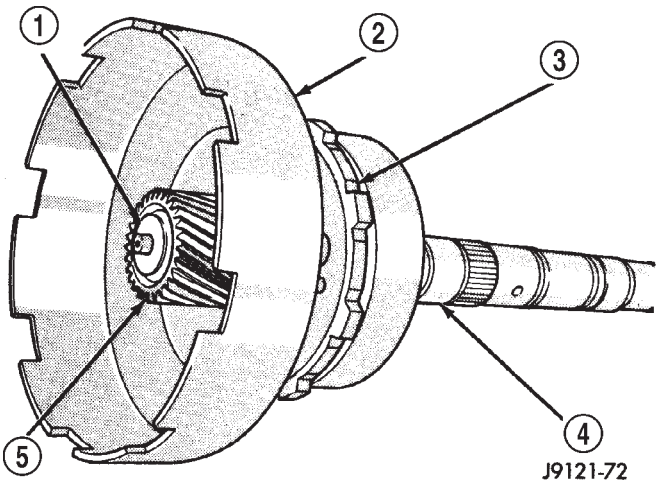


Fig. 215 Installing Sun Gear And Driving Shell

1 - OUTPUT SHAFT
2 - DRIVING SHELL
3 - REAR PLANETARY GEAR
4 - OUTPUT SHAFT
5 - SUN GEAR

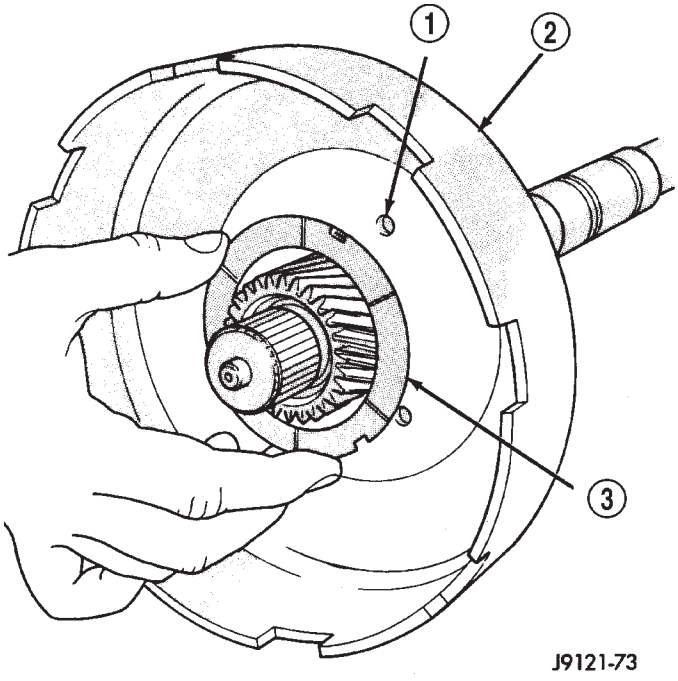


Fig. 216 Installing Driving Shell Thrust Washer

1 - TAB SLOTS (3)
2 - DRIVING SHELL
3 - TABBED THRUST WASHER

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

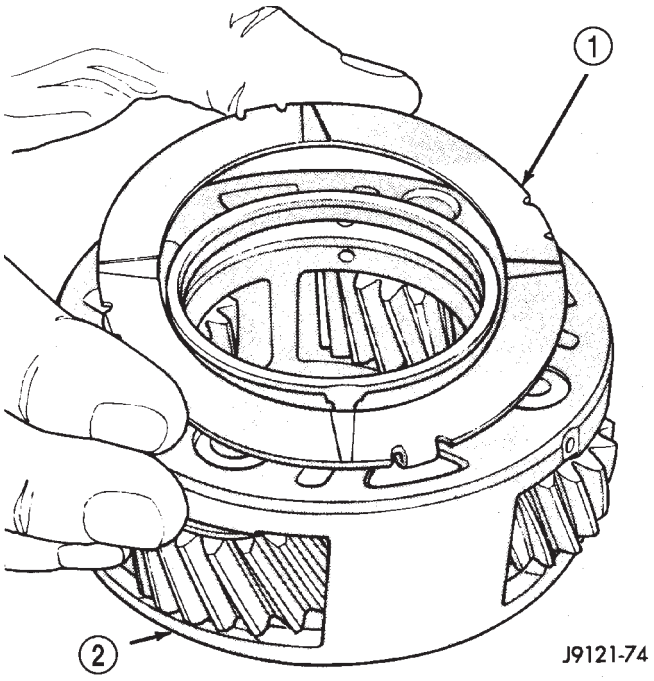


Fig. 217 Installing Thrust Washer On Front Planetary Gear

1 - TABBED THRUST WASHER
2 - FRONT PLANETARY GEAR

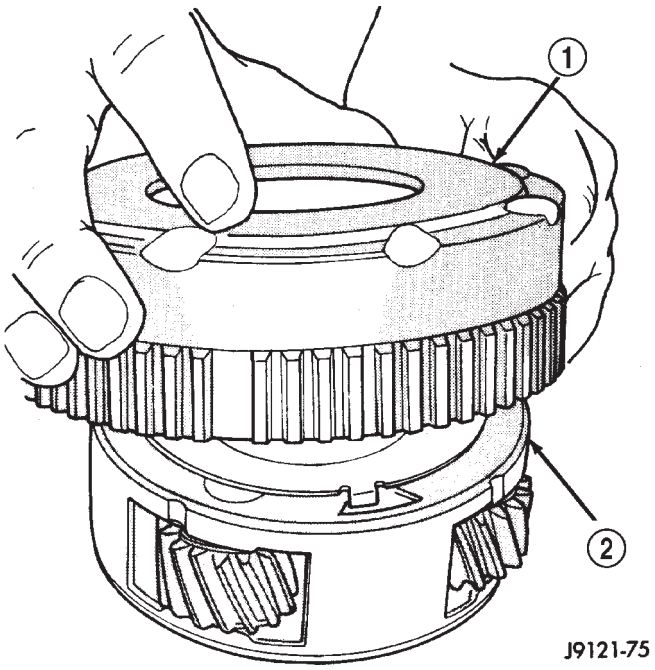


Fig. 218 Assembling Front Planetary And Annulus Gears

1 - FRONT ANNULUS GEAR
2 - FRONT PLANETARY GEAR

(11) Install front annulus gear over and onto front planetary gear (Fig. 218). Be sure gears are fully meshed and seated.

(12) Install front planetary and annulus gear assembly (Fig. 219). 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. 220).

(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. 221). 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.

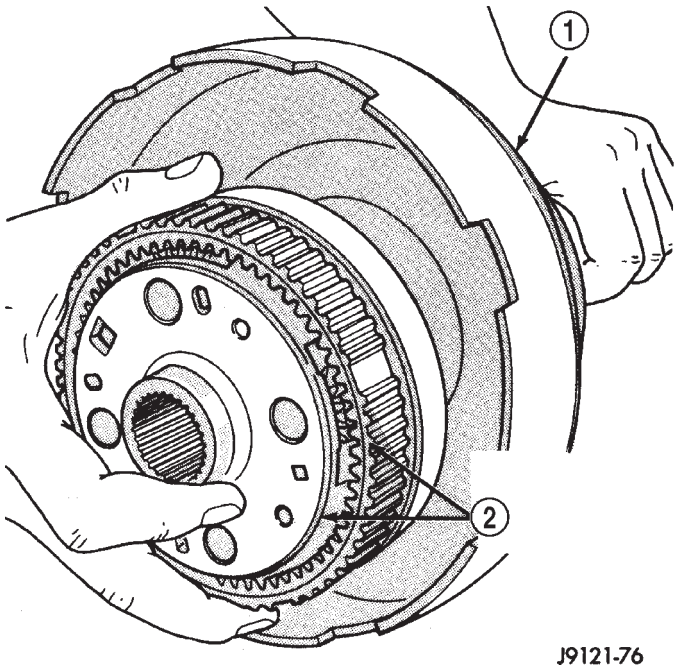


Fig. 219 Installing Front Planetary And Annulus Gear Assembly

1 - DRIVING SHELL
2 - ASSEMBLED FRONT PLANETARY AND ANNULUS GEARS

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

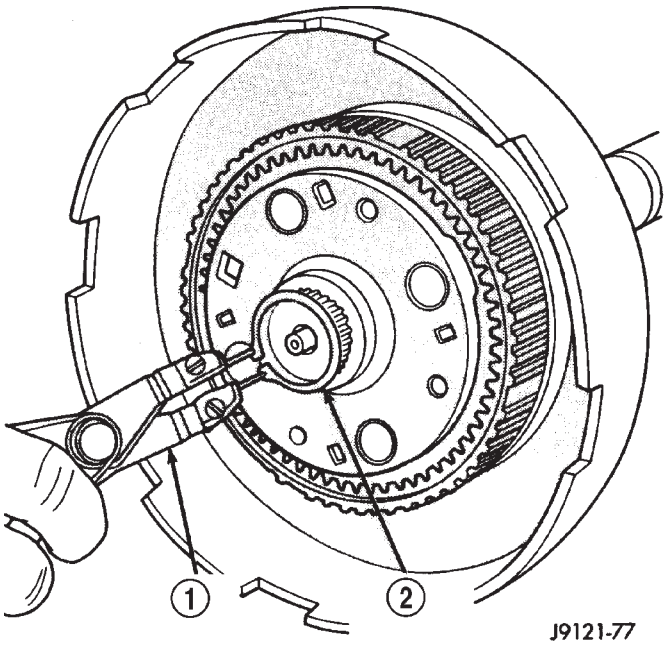


Fig. 220 Installing Planetary Snap-Ring

1 - SNAP-RING PLIERS
2 - PLANETARY SNAP-RING

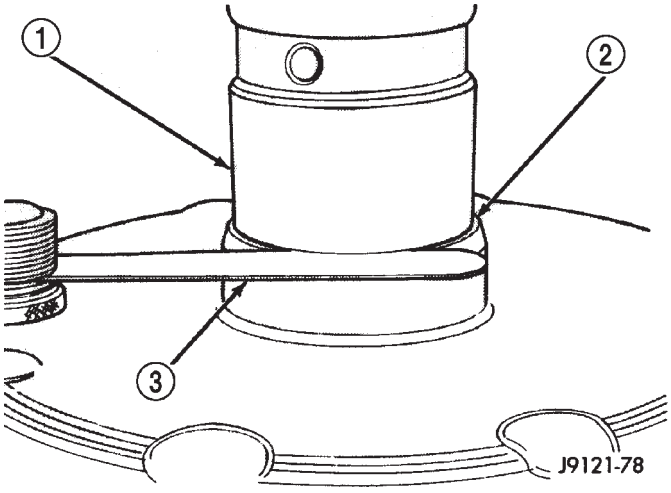


Fig. 221 Checking Planetary Geartrain End Play

1 - OUTPUT SHAFT
2 - REAR ANNULUS GEAR
3 - FEELER GAUGE

REAR CLUTCH

DESCRIPTION

The rear clutch assembly (Fig. 222) is composed of the rear clutch retainer, pressure plate, clutch plates, driving discs, piston, Belleville spring, and snap-rings. The Belleville spring acts as a lever to multiply the force applied on to it by the apply piston. The increased apply force on the rear clutch pack, in comparison to the front clutch pack, is needed to hold against the greater torque load imposed onto the rear pack. The rear clutch is directly behind the front clutch and is considered a driving component.

NOTE: The number of discs and plates may vary with each engine and vehicle combination.

OPERATION

To apply the clutch, pressure is applied between the clutch retainer and piston. The fluid pressure is provided by the oil pump, transferred through the control valves and passageways, and enters the clutch through the hub of the reaction shaft support. With pressure applied between the clutch retainer and piston, the piston moves away from the clutch retainer and compresses the clutch pack. This action applies the clutch pack, allowing torque to flow through the input shaft into the driving discs, and into the clutch plates and pressure plate that are lugged to the clutch retainer. The waved spring is used to cushion the application of the clutch pack. The snap-ring is selective and used to adjust clutch pack clearance.

When pressure is released from the piston, the spring returns the piston to its fully released position and disengages the clutch. The release spring also helps to cushion the application of the clutch assembly. When the clutch is in the process of being released by the release spring, fluid flows through a vent and one-way ball-check-valve located in the piston. The check-valve is needed to eliminate the possibility of plate drag caused by centrifugal force acting on the residual fluid trapped in the clutch piston retainer.

REAR CLUTCH (Continued)

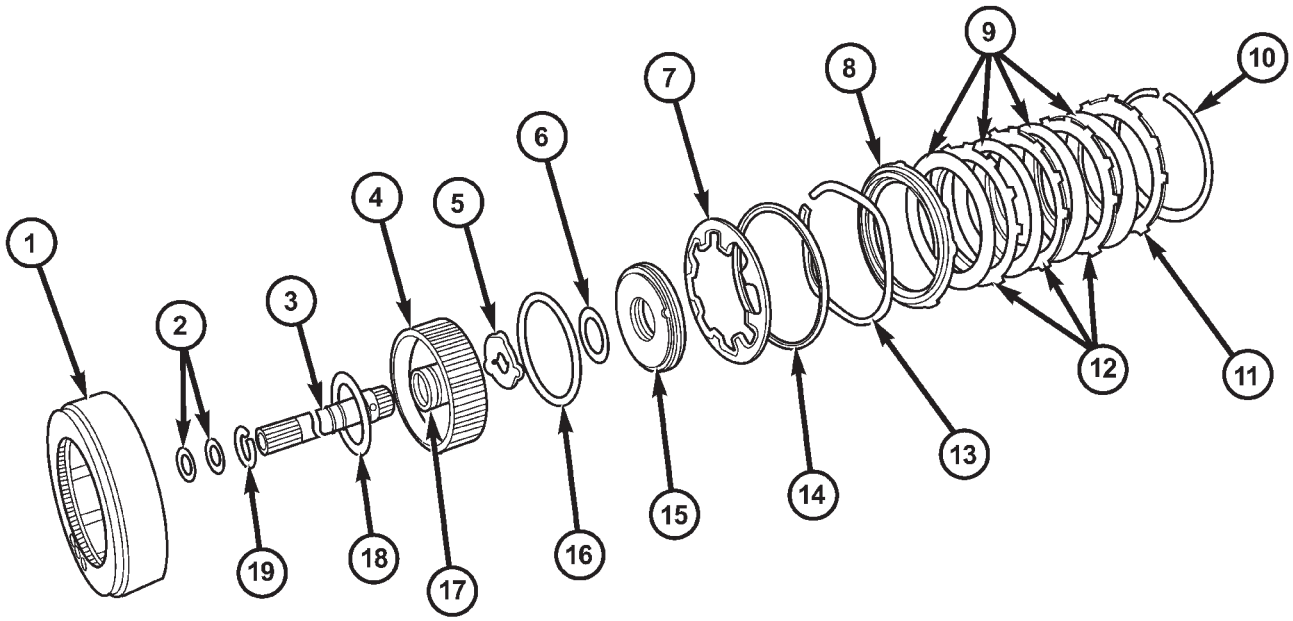


Fig. 222 Rear Clutch Components

1 - REAR CLUTCH RETAINER
2 - TORLON™ SEAL RINGS
3 - INPUT SHAFT
4 - PISTON RETAINER
5 - OUTPUT SHAFT THRUST WASHER
6 - INNER PISTON SEAL
7 - PISTON SPRING
8 - PRESSURE PLATE
9 - CLUTCH DISCS
10 - SNAP-RING (SELECTIVE)
11 - REACTION PLATE
12 - CLUTCH PLATES
13 - WAVE SPRING
14 - SPACER RING
15 - PISTON
16 - OUTER PISTON SEAL
17 - REAR SEAL RING
18 - FIBER THRUST WASHER
19 - RETAINING RING

DISASSEMBLY

(1) Remove fiber thrust washer from forward side of clutch retainer.

(2) Remove input shaft front and rear seal rings.

(3) Remove selective clutch pack snap-ring (Fig. 223).

(4) Remove the reaction plate, clutch discs, steel plates, pressure plate, wave spring, spacer ring, and piston spring (Fig. 223).

(5) Remove clutch piston with rotating motion.

(6) Remove and discard piston seals.

(7) Remove input shaft retaining ring. It may be necessary to press the input shaft in slightly to relieve tension on the retaining 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.

CLEANING

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.

INSPECTION

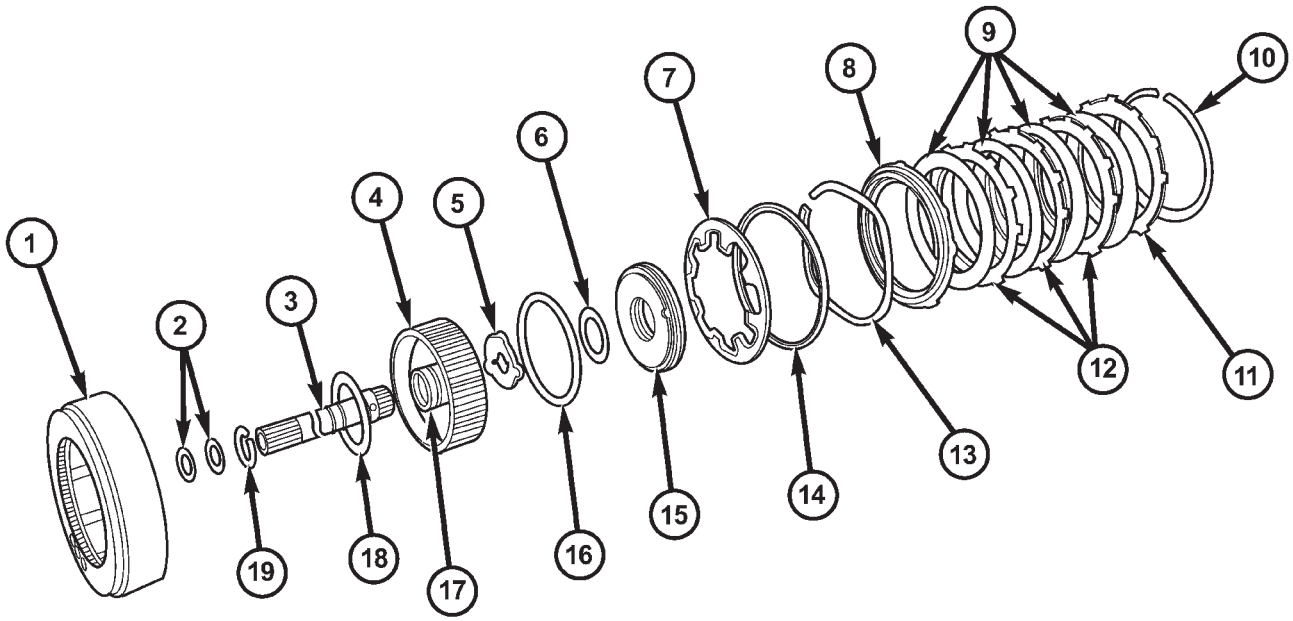
Replace the clutch discs if warped, worn, scored, burned/charred, the lugs are damaged, or if the facing is flaking off. Replace the top and bottom pressure plates if scored, warped, or cracked. Be sure the driving lugs on the pressure and clutch plates are also in good condition. The lugs must not be bent, cracked or damaged in any way.

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.

REAR CLUTCH (Continued)



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Fig. 223 Rear Clutch Components

1 - REAR CLUTCH RETAINER
2 - TORLON™ SEAL RINGS
3 - INPUT SHAFT
4 - PISTON RETAINER
5 - OUTPUT SHAFT THRUST WASHER
6 - INNER PISTON SEAL
7 - PISTON SPRING
8 - PRESSURE PLATE
9 - CLUTCH DISCS
10 - SNAP-RING (SELECTIVE)
11 - REACTION PLATE
12 - CLUTCH PLATES
13 - WAVE SPRING
14 - SPACER RING
15 - PISTON
16 - OUTER PISTON SEAL
17 - REAR SEAL RING
18 - FIBER THRUST WASHER
19 - RETAINING RING

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.

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.

(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 partially press input shaft into retainer (Fig. 224). Use a suitably sized press tool to support retainer as close to input shaft as possible.

(4) Install input shaft retaining ring.

(5) Press the input shaft the remainder of the way into the clutch retainer.

(6) Install new seals on clutch piston. Be sure lip of each seal faces interior of clutch retainer.

(7) Lubricate lip of piston seals with generous quantity of Mopar® Door Ease. Then lubricate retainer hub and bore with light coat of transmission fluid.

(8) Install clutch piston in retainer. Use twisting motion to seat piston in bottom of retainer. A thin strip of plastic (about 0.020″ thick), can be used to guide seals into place if necessary.

CAUTION: Never push the clutch piston straight in. This will fold the seals over causing leakage and clutch slip. In addition, never use any type of metal tool to help ease the piston seals into place. Metal tools will cut, shave, or score the seals.

REAR CLUTCH (Continued)

(9) Install piston spring in retainer and on top of piston. Concave side of spring faces downward (toward piston).

(10) Install the spacer ring and wave spring into the retainer. Be sure spring is completely seated in retainer groove.

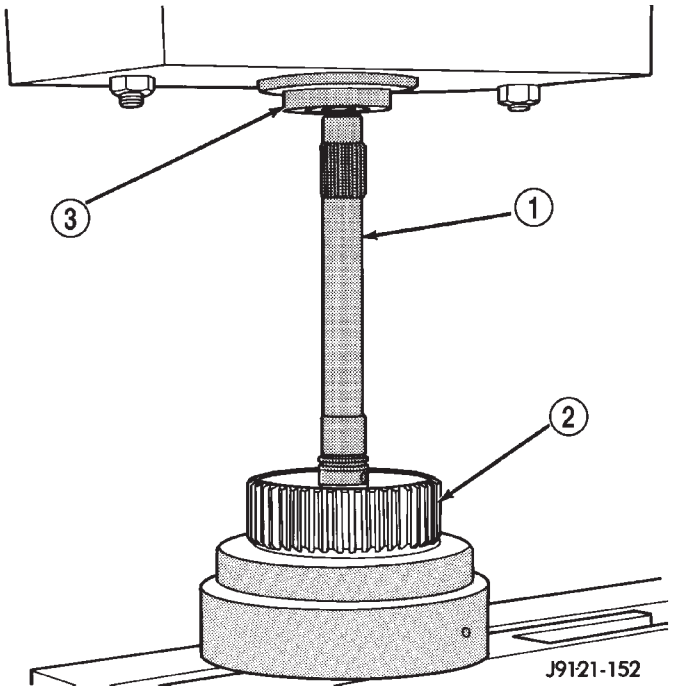


Fig. 224 Pressing Input Shaft Into Rear Clutch Retainer

1 - INPUT SHAFT
2 - REAR CLUTCH RETAINER
3 - PRESS RAM

(11) Install pressure plate (Fig. 223). Ridged side of plate faces downward (toward piston) and flat side toward clutch pack.

(12) Install first clutch disc in retainer on top of 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. 223).

(13) Install the reaction 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. 225).

(a) Position gauge bar across the clutch drum with the dial indicator pointer on the pressure plate (Fig. 225).

(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 0.635 - 0.914 mm (0.025 - 0.036 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:

- 0.107 - 0.109 in.
- 0.098 - 0.100 in.
- 0.095 - 0.097 in.
- 0.083 - 0.085 in.
- 0.076 - 0.078 in.
- 0.071 - 0.073 in.
- 0.060 - 0.062 in.

(16) Coat rear clutch thrust washer with petroleum jelly and install washer over input shaft and into clutch retainer (Fig. 226). Use enough petroleum jelly to hold washer in place.

(17) Set rear clutch aside for installation during final assembly.

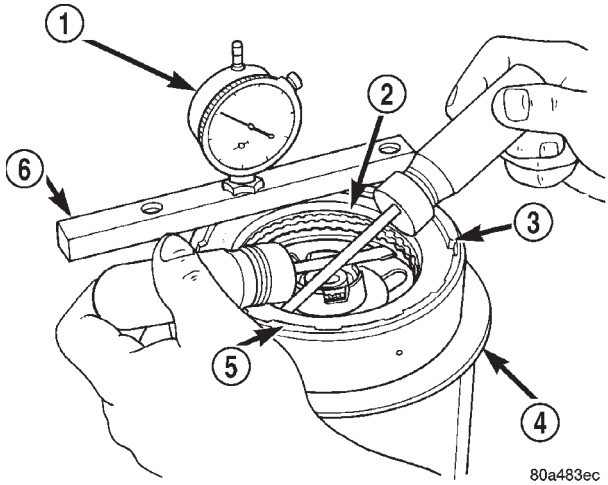


Fig. 225 Checking Rear Clutch Pack Clearance

1 - DIAL INDICATOR
2 - PRESSURE PLATE
3 - SNAP-RING
4 - STAND
5 - REAR CLUTCH
6 - GAUGE BAR

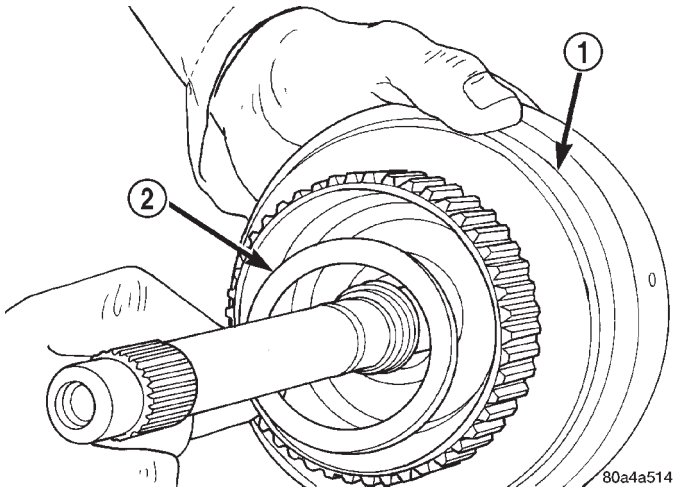


Fig. 226 Installing Rear Clutch Thrust Washer

1 - REAR CLUTCH RETAINER
2 - REAR CLUTCH THRUST WASHER

REAR SERVO

DESCRIPTION

The rear (low/reverse) servo consists of a single stage or diameter piston and a spring loaded plug. The spring is used to cushion the application of the rear (low/reverse) band.

OPERATION

While in the de-energized state (no pressure applied), the piston is held up in its bore by the piston spring. The plug is held down in its bore, in the piston, by the plug spring. When pressure is applied to the top of the piston, the plug is forced down in its bore, taking up any clearance. As the piston moves, it causes the plug spring to compress, and the piston moves down over the plug. The piston continues to move down until it hits the shoulder of the plug and fully applies the band. The period of time from the initial application, until the piston is against the shoulder of the plug, represents a reduced shocking of the band that cushions the shift.

DISASSEMBLY

(1) Remove small snap-ring and remove plug and spring from servo piston (Fig. 227).

(2) Remove and discard servo piston seal ring.

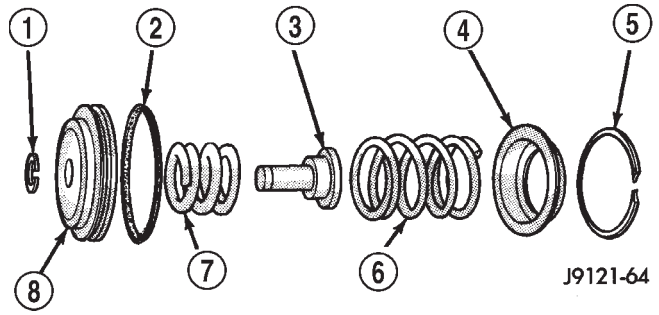


Fig. 227 Rear Servo Components

1 - SNAP-RING
2 - PISTON SEAL
3 - PISTON PLUG
4 - SPRING RETAINER
5 - SNAP-RING
6 - PISTON SPRING
7 - CUSHION SPRING
8 - PISTON

CLEANING

Remove and discard the servo piston seal ring (Fig. 228). 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 new ones at assembly.

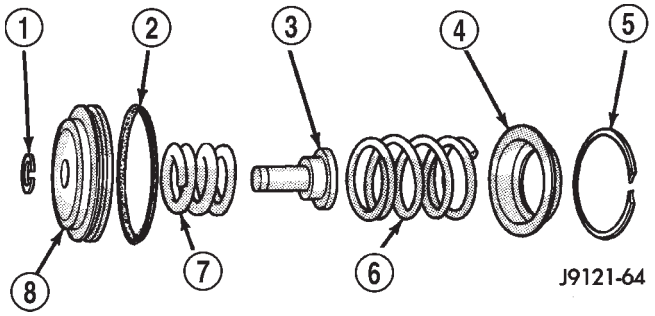


Fig. 228 Rear Servo Components

1 - SNAP-RING
2 - PISTON SEAL
3 - PISTON PLUG
4 - SPRING RETAINER
5 - SNAP-RING
6 - PISTON SPRING
7 - CUSHION SPRING
8 - PISTON

ASSEMBLY

(1) Lubricate piston and guide seals (Fig. 229) with petroleum jelly. Lubricate other servo parts with Mopar® ATF +4, type 9602, 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.

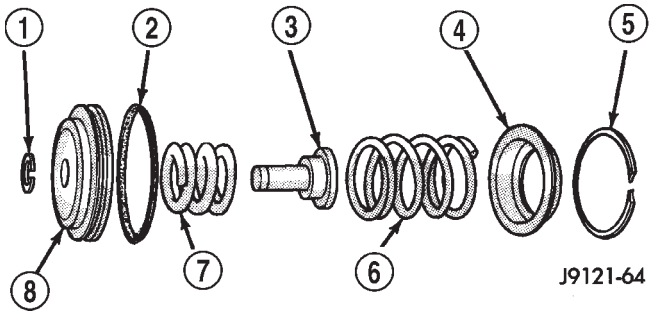


Fig. 229 Rear Servo Components

1 - SNAP-RING
2 - PISTON SEAL
3 - PISTON PLUG
4 - SPRING RETAINER
5 - SNAP-RING
6 - PISTON SPRING
7 - CUSHION SPRING
8 - PISTON

SHIFT MECHANISM

DESCRIPTION

The gear shift mechanism provides six shift positions which are:

- PARK (P)
- REVERSE (R)
- NEUTRAL (N)
- DRIVE (D)
- Manual SECOND (2)
- Manual LOW (1)

OPERATION

Manual LOW (1) range provides first gear only. Overrun braking is also provided in this range. Manual SECOND (2) range provides first and second gear only.

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. No upshift to fourth gear will occur if any of the following are true:

- The transmission fluid temperature is below 10° C (50° F) or above 121° C (250° F).
- The shift to third is not yet complete.
- Vehicle speed is too low for the 3-4 shift to occur.
- Battery temperature is below -5° C (23° F).

ADJUSTMENTS

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. 230). 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. 230).

(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.

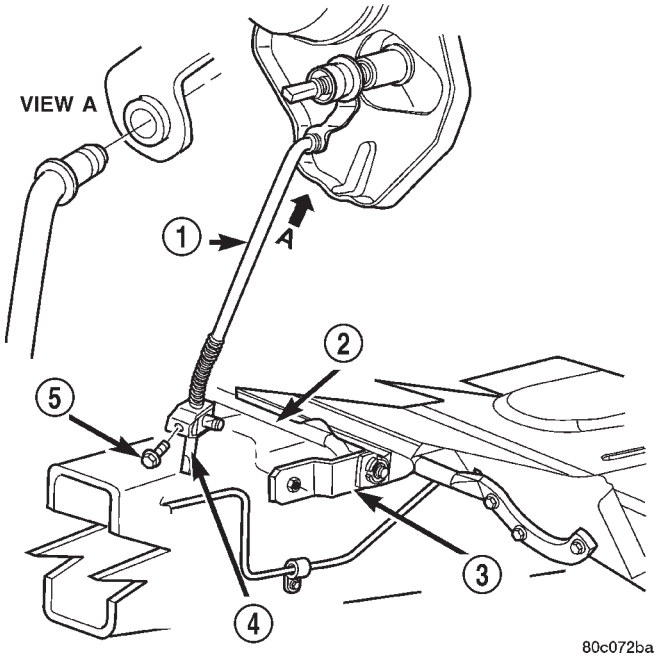


Fig. 230 Linkage Adjustment Components

1 - FRONT SHIFT ROD
2 - TORQUE SHAFT ASSEMBLY
3 - TORQUE SHAFT ARM
4 - ADJUSTING SWIVEL
5 - LOCK BOLT

SOLENOID

DESCRIPTION

The typical electrical solenoid used in automotive applications is a linear actuator. It is a device that produces motion in a straight line. This straight line motion can be either forward or backward in direction, and short or long distance.

A solenoid is an electromechanical device that uses a magnetic force to perform work. It consists of a coil of wire, wrapped around a magnetic core made from steel or iron, and a spring loaded, movable plunger, which performs the work, or straight line motion.

The solenoids used in transmission applications are attached to valves which can be classified as **normally open** or **normally closed**. The **normally open** solenoid valve is defined as a valve which allows hydraulic flow when no current or voltage is applied to the solenoid. The **normally closed** sole-

SOLENOID (Continued)

noid valve is defined as a valve which does not allow hydraulic flow when no current or voltage is applied to the solenoid. These valves perform hydraulic control functions for the transmission and must therefore be durable and tolerant of dirt particles. For these reasons, the valves have hardened steel poppets and ball valves. The solenoids operate the valves directly, which means that the solenoids must have very high outputs to close the valves against the sizable flow areas and line pressures found in current transmissions. Fast response time is also necessary to ensure accurate control of the transmission.

The strength of the magnetic field is the primary force that determines the speed of operation in a particular solenoid design. A stronger magnetic field will cause the plunger to move at a greater speed than a weaker one. There are basically two ways to increase the force of the magnetic field:

- Increase the amount of current applied to the coil or
- Increase the number of turns of wire in the coil.

The most common practice is to increase the number of turns by using thin wire that can completely fill the available space within the solenoid housing. The strength of the spring and the length of the plunger also contribute to the response speed possible by a particular solenoid design.

A solenoid can also be described by the method by which it is controlled. Some of the possibilities include variable force, pulse-width modulated, constant ON, or duty cycle. The variable force and pulse-width modulated versions utilize similar methods to control the current flow through the solenoid to position the solenoid plunger at a desired position somewhere between full ON and full OFF. The constant ON and duty cycled versions control the voltage across the solenoid to allow either full flow or no flow through the solenoid's valve.

OPERATION

When an electrical current is applied to the solenoid coil, a magnetic field is created which produces an attraction to the plunger, causing the plunger to move and work against the spring pressure and the load applied by the fluid the valve is controlling. The plunger is normally directly attached to the valve which it is to operate. When the current is removed from the coil, the attraction is removed and the plunger will return to its original position due to spring pressure.

The plunger is made of a conductive material and accomplishes this movement by providing a path for the magnetic field to flow. By keeping the air gap between the plunger and the coil to the minimum necessary to allow free movement of the plunger, the magnetic field is maximized.

SPEED SENSOR

DESCRIPTION

The speed sensor (Fig. 231) is located in the overdrive gear case. The sensor is positioned over the park gear and monitors transmission output shaft rotating speed.

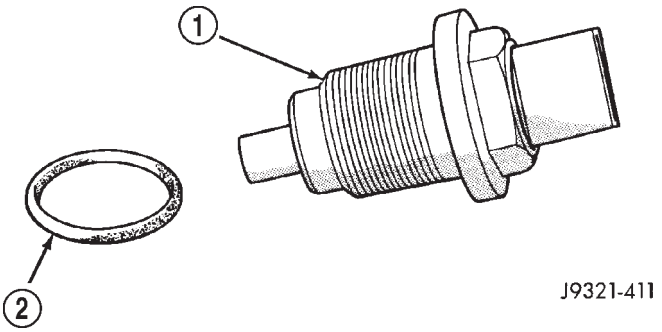


Fig. 231 Transmission Output Speed Sensor

1 - TRANSMISSION OUTPUT SHAFT SPEED SENSOR
2 - SEAL

OPERATION

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. Signals from this sensor are shared with the powertrain control module.

THROTTLE VALVE CABLE

DESCRIPTION

Transmission throttle valve cable (Fig. 232) adjustment is extremely important to proper operation. This adjustment positions the throttle valve, which controls shift speed, quality, and part-throttle downshift sensitivity.

If cable setting is too loose, early shifts and slippage between shifts may occur. If the setting is too tight, shifts may be delayed and part throttle downshifts may be very sensitive.

The transmission throttle valve is operated by a cam on the throttle lever. The throttle lever is operated by an adjustable cable (Fig. 233). The cable is attached to an arm mounted on the throttle lever shaft. A retaining clip at the engine-end of the cable is removed to provide for cable adjustment. The retaining clip is then installed back onto the throttle valve cable to lock in the adjustment.

THROTTLE VALVE CABLE (Continued)

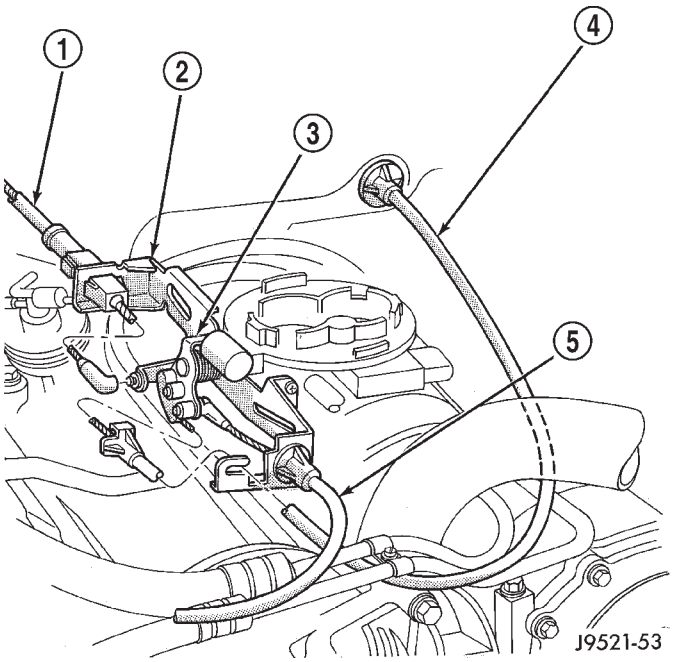


Fig. 232 Throttle Valve Cable Attachment - At Engine

1 - THROTTLE VALVE CABLE
2 - CABLE BRACKET
3 - THROTTLE BODY LEVER
4 - ACCELERATOR CABLE
5 - SPEED CONTROL CABLE

ADJUSTMENTS - TRANSMISSION THROTTLE VALVE CABLE

A correctly adjusted throttle valve cable will cause the throttle lever on the transmission to move simultaneously with the throttle body lever from the idle position. Proper adjustment will allow simultaneous movement without causing the transmission throttle lever to either move ahead of, or lag behind the lever on the throttle body.

ADJUSTMENT VERIFICATION

(1) Turn ignition key to OFF position.
(2) Remove air cleaner.
(3) Verify that lever on throttle body is at curb idle position (Fig. 234). Then verify that the transmission throttle lever (Fig. 235) is also at idle (fully forward) position.
(4) Slide cable off attachment stud on throttle body lever.
(5) Compare position of cable end to attachment stud on throttle body lever:

- Cable end and attachment stud should be aligned (or centered on one another) to within 1 mm (0.039 in.) in either direction (Fig. 236).

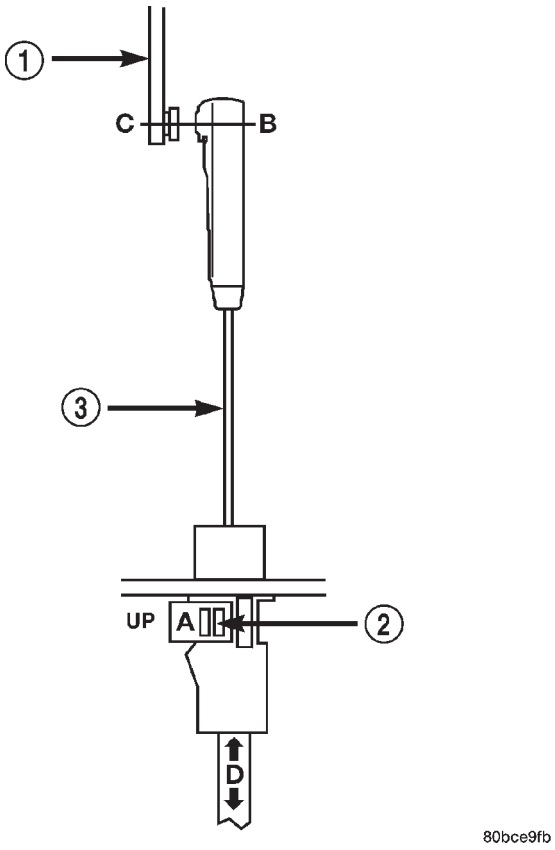


Fig. 233 Throttle Valve Cable at Throttle Linkage

1 - THROTTLE LINKAGE
2 - THROTTLE VALVE CABLE LOCKING CLIP
3 - THROTTLE VALVE CABLE

- If cable end and attachment stud are misaligned (off center), cable will have to be adjusted as described in Throttle Valve Cable Adjustment procedure.

(6) Reconnect cable end to attachment stud. Then with aid of a helper, observe movement of transmission throttle lever and lever on throttle body.

- If both levers move simultaneously from idle to half-throttle and back to idle position, adjustment is correct.
- If transmission throttle lever moves ahead of, or lags behind throttle body lever, cable adjustment will be necessary. Or, if throttle body lever prevents transmission lever from returning to closed position, cable adjustment will be necessary.

THROTTLE VALVE CABLE (Continued)

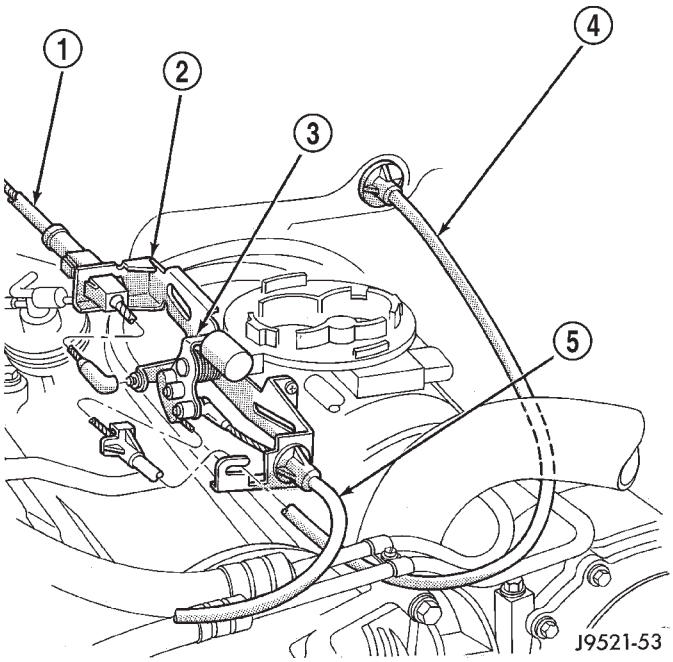


Fig. 234 Throttle Valve Cable Attachment - At Engine

1 - THROTTLE VALVE CABLE
2 - CABLE BRACKET
3 - THROTTLE BODY LEVER
4 - ACCELERATOR CABLE
5 - SPEED CONTROL CABLE

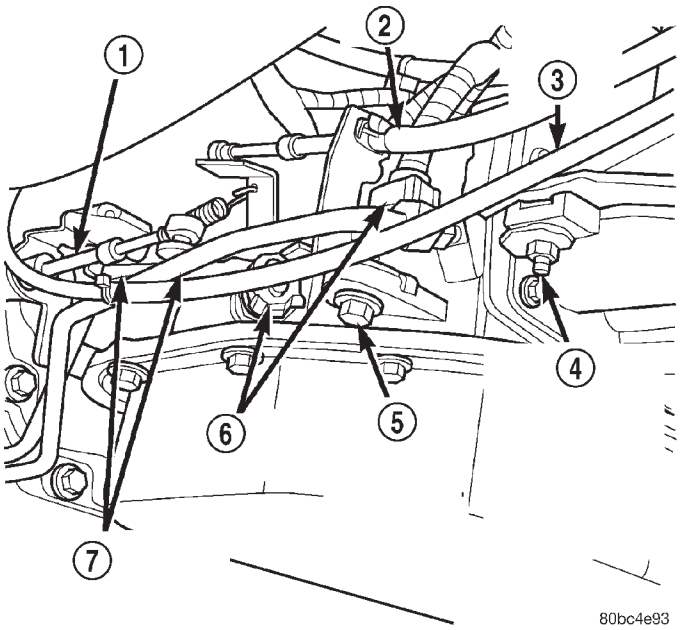


Fig. 235 Throttle Valve Cable at Transmission

1 - TRANSMISSION SHIFTER CABLE
2 - THROTTLE VALVE CABLE
3 - TRANSFER CASE SHIFTER CABLE
4 - TRANSFER CASE SHIFTER CABLE BRACKET RETAINING BOLT (1 OR 2)
5 - THROTTLE VALVE CABLE BRACKET RETAINING BOLT
6 - ELECTRICAL CONNECTORS
7 - TRANSMISSION FLUID LINES

ADJUSTMENT PROCEDURE

(1) Turn ignition switch to OFF position.

(2) Remove air cleaner if necessary.

(3) Disconnect cable end from attachment stud. **Carefully slide cable off stud. Do not pry or pull cable off.**

(4) Verify that transmission throttle lever is in fully closed position. Then be sure lever on throttle body is at curb idle position.

(5) Pry the T.V. cable lock (A) into the UP position (Fig. 236). This will unlock the cable and allow for readjustment.

(6) Apply just enough tension on the T.V. cable (B) to remove any slack in the cable.**Pulling too tight will cause the T.V. lever on the transmission to move out of its idle position, which will result in an incorrect T.V. cable adjustment.** Slide the sheath of the T.V. cable (D) back and forth until the centerlines of the T.V. cable end (B) and the throttle bell crank lever (C) are aligned within one millimeter (1mm) (Fig. 236).

(7) While holding the T.V. cable in the set position push the T.V. cable lock (A) into the down position (Fig. 236). This will lock the present T.V. cable adjustment.

NOTE: Be sure that as the cable is pulled forward and centered on the throttle lever stud, the cable housing moves smoothly with the cable. Due to the angle at which the cable housing enters the spring housing, the cable housing may bind slightly and create an incorrect adjustment.

(8) Reconnect the T.V. cable (B) to the throttle bellcrank lever (C).

(9) Check cable adjustment. Verify transmission throttle lever and lever on throttle body move simultaneously.

THROTTLE VALVE CABLE (Continued)

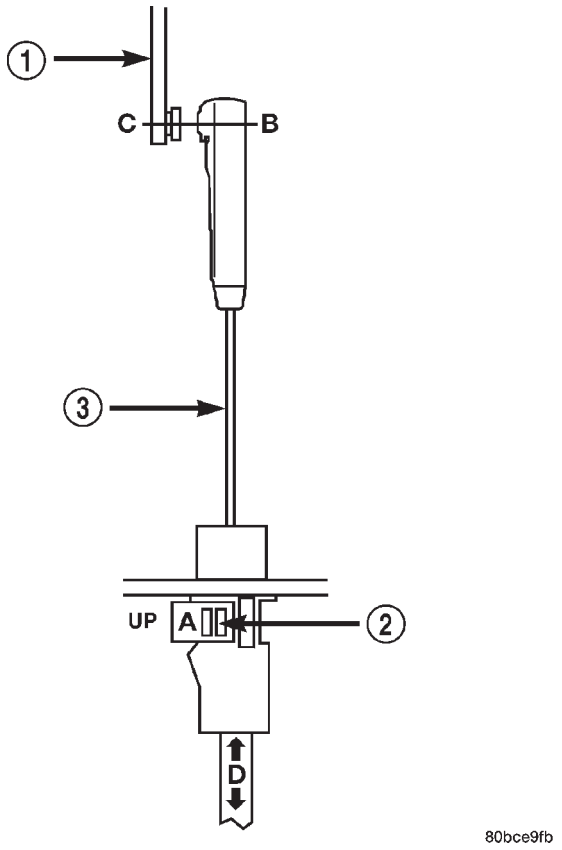


Fig. 236 Throttle Valve Cable at Throttle Linkage

1 - THROTTLE LINKAGE
2 - THROTTLE VALVE CABLE LOCKING CLIP
3 - THROTTLE VALVE CABLE

TORQUE CONVERTER

DESCRIPTION

The torque converter (Fig. 237) is a hydraulic device that couples the engine crankshaft to the transmission. The torque converter consists of an outer shell with an internal turbine, a stator, an overrunning clutch, an impeller and an electronically applied converter clutch. The converter clutch provides reduced engine speed and greater fuel economy when engaged. Clutch engagement also provides reduced transmission fluid temperatures. The torque converter hub drives the transmission oil (fluid) pump.

The torque converter is a sealed, welded unit that is not repairable and is serviced as an assembly.

CAUTION: The torque converter must be replaced if a transmission failure resulted in large amounts of metal or fiber contamination in the fluid. If the fluid is contaminated, flush the all transmission fluid cooler(s) and lines.

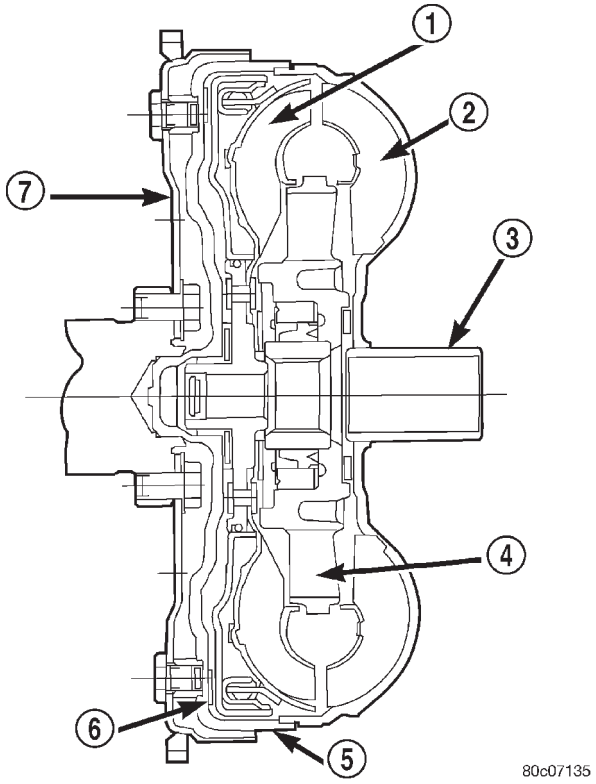


Fig. 237 Torque Converter Assembly

1 - TURBINE
2 - IMPELLER
3 - HUB
4 - STATOR
5 - FRONT COVER
6 - CONVERTER CLUTCH DISC
7 - DRIVE PLATE

IMPELLER

The impeller (Fig. 238) is an integral part of the converter housing. The impeller consists of curved blades placed radially along the inside of the housing on the transmission side of the converter. As the converter housing is rotated by the engine, so is the impeller, because they are one and the same and are the driving members of the system.

TORQUE CONVERTER (Continued)

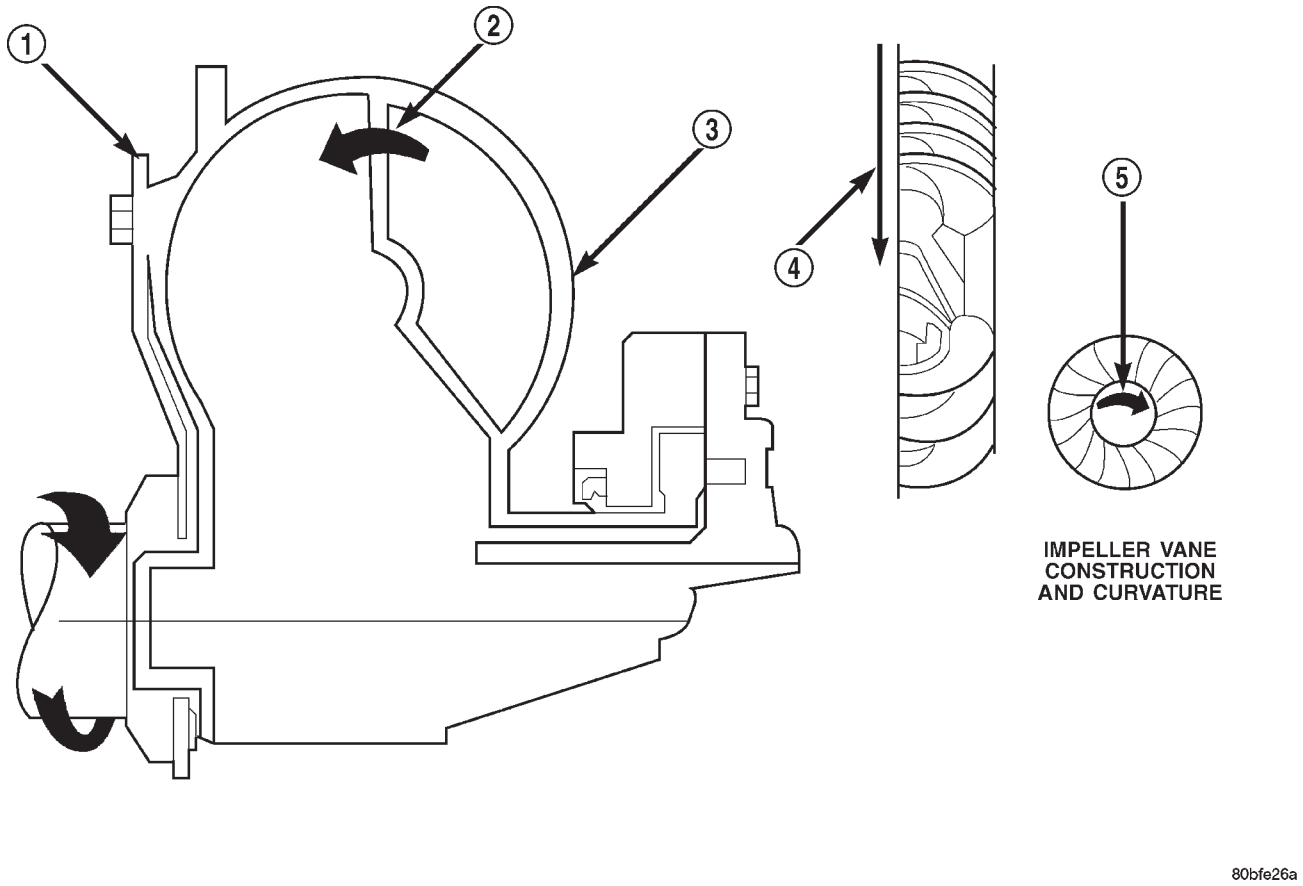


Fig. 238 Impeller

1 - ENGINE FLEXPLATE
2 - OIL FLOW FROM IMPELLER SECTION INTO TURBINE SECTION
3 - IMPELLER VANES AND COVER ARE INTEGRAL
4 - ENGINE ROTATION
5 - ENGINE ROTATION

TURBINE

The turbine (Fig. 239) is the output, or driven, member of the converter. The turbine is mounted within the housing opposite the impeller, but is not attached to the housing. The input shaft is inserted through the center of the impeller and splined into the turbine. The design of the turbine is similar to the impeller, except the blades of the turbine are curved in the opposite direction.

TORQUE CONVERTER (Continued)

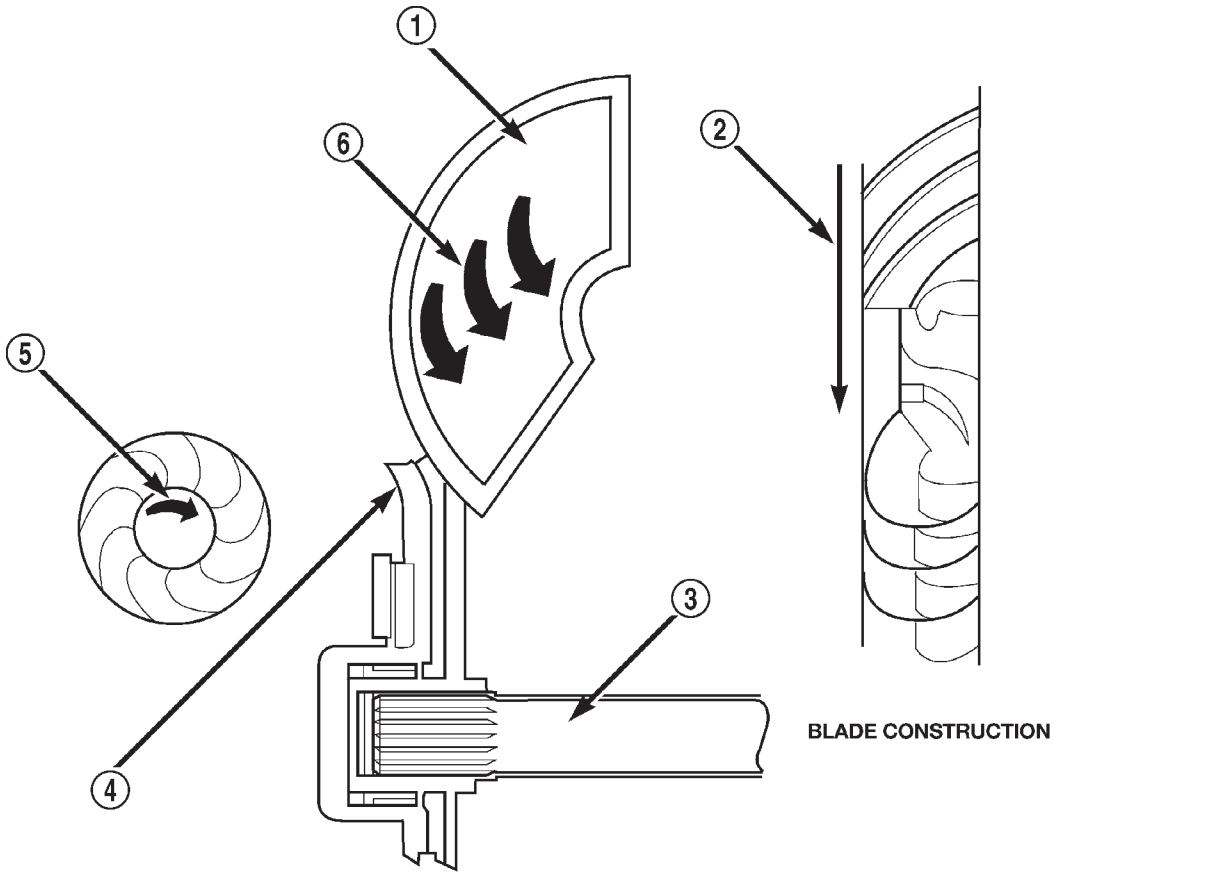


Fig. 239 Turbine

1 - TURBINE VANE
2 - ENGINE ROTATION
3 - INPUT SHAFT
4 - PORTION OF TORQUE CONVERTER COVER
5 - ENGINE ROTATION
6 - OIL FLOW WITHIN TURBINE SECTION

STATOR

The stator assembly (Fig. 240) is mounted on a stationary shaft which is an integral part of the oil pump. The stator is located between the impeller and turbine within the torque converter case (Fig. 241). The stator contains an over-running clutch, which allows the stator to rotate only in a clockwise direction. When the stator is locked against the over-running clutch, the torque multiplication feature of the torque converter is operational.

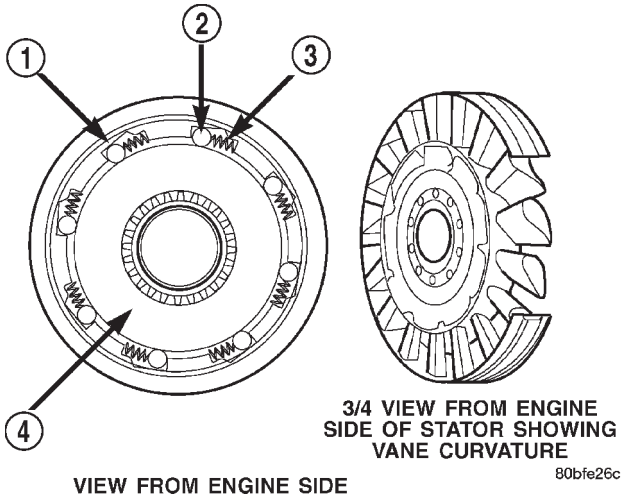


Fig. 240 Stator Components

1 - CAM (OUTER RACE)
2 - ROLLER
3 - SPRING
4 - INNER RACE

TORQUE CONVERTER (Continued)

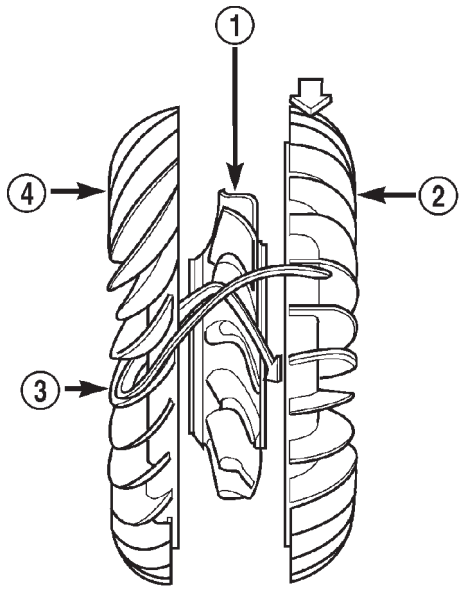


Fig. 241 Stator Location

1 - STATOR
2 - IMPELLER
3 - FLUID FLOW
4 - TURBINE

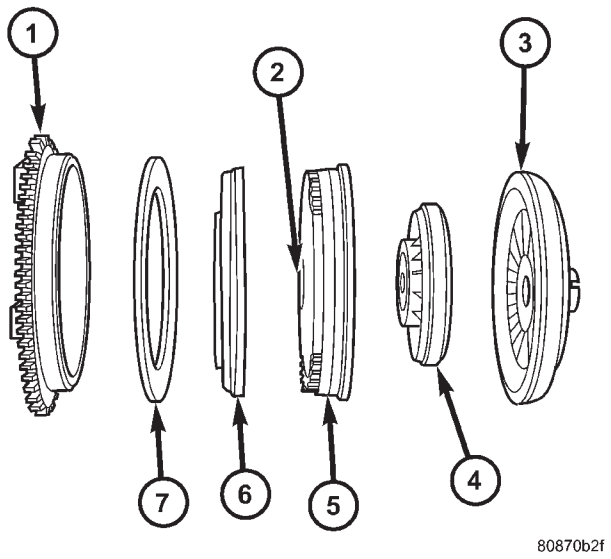


Fig. 242 Torque Converter Clutch (TCC)

1 - IMPELLER FRONT COVER
2 - THRUST WASHER ASSEMBLY
3 - IMPELLER
4 - STATOR
5 - TURBINE
6 - PISTON
7 - FRICTION DISC

TORQUE CONVERTER CLUTCH (TCC)

The TCC (Fig. 242) was installed to improve the efficiency of the torque converter that is lost to the slippage of the fluid coupling. Although the fluid coupling provides smooth, shock-free power transfer, it is natural for all fluid couplings to slip. If the impeller and turbine were mechanically locked together, a zero slippage condition could be obtained. A hydraulic piston was added to the turbine, and a friction material was added to the inside of the front cover to provide this mechanical lock-up.

OPERATION

The converter impeller (Fig. 243) (driving member), which is integral to the converter housing and bolted to the engine drive plate, rotates at engine speed. The converter turbine (driven member), which reacts from fluid pressure generated by the impeller, rotates and turns the transmission input shaft.

TURBINE

As the fluid that was put into motion by the impeller blades strikes the blades of the turbine, some of the energy and rotational force is transferred into the turbine and the input shaft. This causes both of them (turbine and input shaft) to rotate in a clockwise direction following the impeller. As the fluid is leaving the trailing edges of the turbine's blades it continues in a "hindering" direction back toward the impeller. If the fluid is not redirected before it strikes the impeller, it will strike the impeller in such a direction that it would tend to slow it down.

STATOR

Torque multiplication is achieved by locking the stator's over-running clutch to its shaft (Fig. 244). Under stall conditions (the turbine is stationary), the oil leaving the turbine blades strikes the face of the stator blades and tries to rotate them in a counterclockwise direction. When this happens the overrunning clutch of the stator locks and holds the stator from rotating. With the stator locked, the oil strikes the stator blades and is redirected into a "helping" direction before it enters the impeller. This circulation of oil from impeller to turbine, turbine to stator, and stator to impeller, can produce a maximum torque multiplication of about 2.4:1. As the turbine begins to match the speed of the impeller, the fluid that was hitting the stator in such as way as to cause it to lock-up is no longer doing so. In this condition of operation, the stator begins to free wheel and the converter acts as a fluid coupling.

TORQUE CONVERTER (Continued)

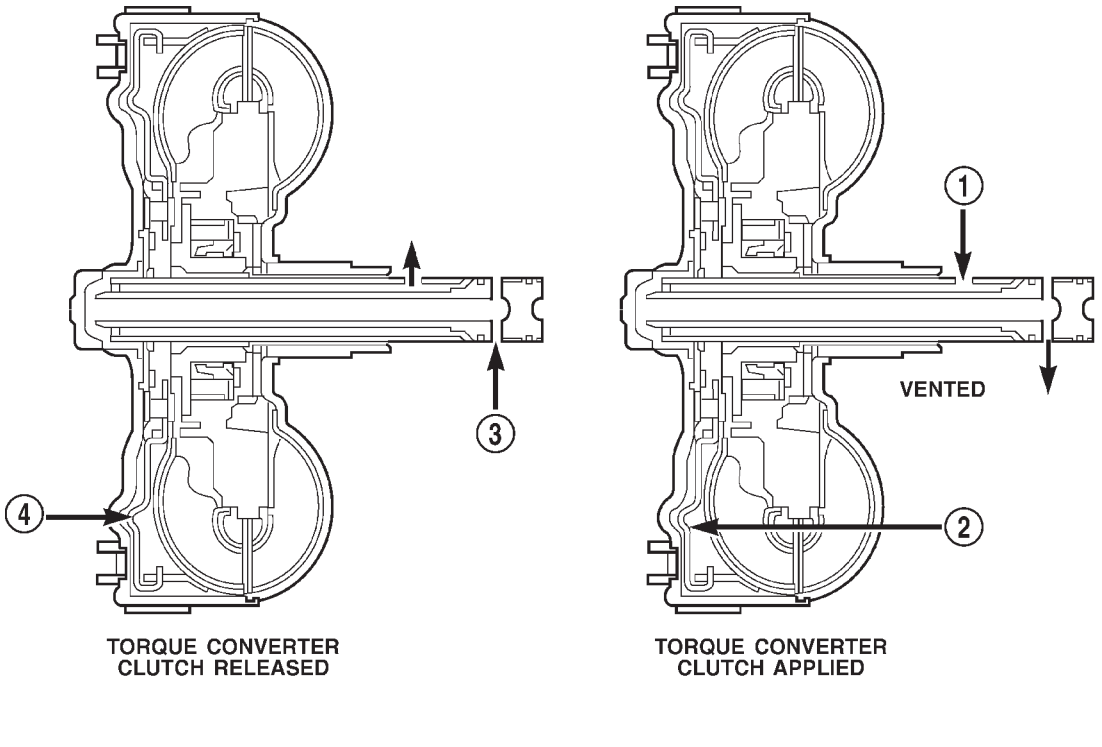


Fig. 243 Torque Converter Fluid Operation

1 - APPLY PRESSURE
2 - THE PISTON MOVES SLIGHTLY FORWARD
3 - RELEASE PRESSURE
4 - THE PISTON MOVES SLIGHTLY REARWARD

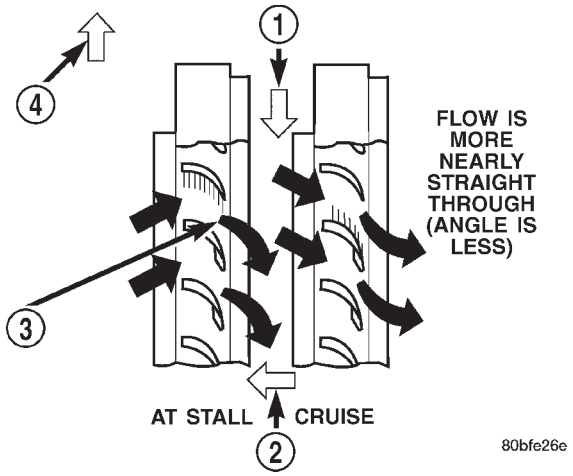


Fig. 244 Stator Operation

1 - DIRECTION STATOR WILL FREE WHEEL DUE TO OIL PUSHING ON BACKSIDE OF VANES
2 - FRONT OF ENGINE
3 - INCREASED ANGLE AS OIL STRIKES VANES
4 - DIRECTION STATOR IS LOCKED UP DUE TO OIL PUSHING AGAINST STATOR VANES

TORQUE CONVERTER CLUTCH (TCC)

The torque converter clutch is hydraulically applied and is released when fluid is vented from the hydraulic circuit by the torque converter control (TCC) solenoid on the valve body. The torque converter clutch is controlled by the Powertrain Control Module (PCM). The torque converter clutch engages in fourth gear, and in third gear under various conditions, such as when the O/D switch is OFF, when the vehicle is cruising on a level surface after the vehicle has warmed up. The torque converter clutch will disengage momentarily when an increase in engine load is sensed by the PCM, such as when the vehicle begins to go uphill or the throttle pressure is increased.

REMOVAL

(1) Remove transmission and torque converter from vehicle.

(2) Place a suitable drain pan under the converter housing end of the transmission.

TORQUE CONVERTER (Continued)

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 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. 245). 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.

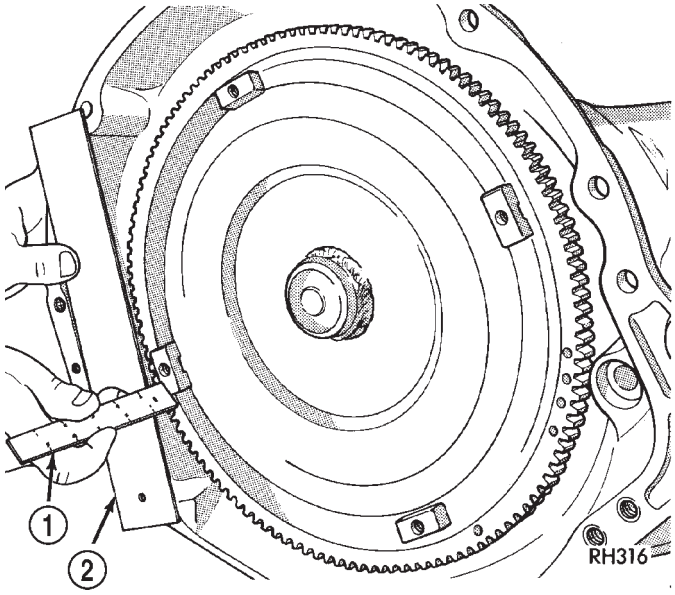


Fig. 245 Checking Torque Converter Seating - Typical

1 - SCALE
2 - STRAIGHTEDGE

TORQUE CONVERTER DRAINBACK VALVE

DESCRIPTION

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

OPERATION

The valve prevents fluid from draining from the converter into the cooler and lines when the vehicle is shut down for lengthy periods. Production valves have a hose nipple at one end, while the opposite end is threaded for a flare fitting. All valves have an arrow (or similar mark) to indicate direction of flow through the valve.

STANDARD PROCEDURE - TORQUE CONVERTER DRAINBACK VALVE

The converter drainback check valve is located in the cooler outlet (pressure) line near the radiator tank. The valve prevents fluid drainback when the vehicle is parked for lengthy periods. The valve check ball is spring loaded and has an opening pressure of approximately 2 psi.

TORQUE CONVERTER DRAINBACK VALVE (Continued)

The valve is serviced as an assembly; it is not repairable. Do not clean the valve if restricted, or contaminated by sludge, or debris. If the valve fails, or if a transmission malfunction occurs that generates significant amounts of sludge and/or clutch particles and metal shavings, the valve must be replaced.

The valve must be removed whenever the cooler and lines are reverse flushed. The valve can be flow tested when necessary. The procedure is exactly the same as for flow testing a cooler.

If the valve is restricted, installed backwards, or in the wrong line, it will cause an overheating condition and possible transmission failure.

CAUTION: The drainback valve is a one-way flow device. It must be properly oriented in terms of flow direction for the cooler to function properly. The valve must be installed in the pressure line. Otherwise flow will be blocked and would cause an overheating condition and eventual transmission failure.

TRANSMISSION TEMPERATURE SENSOR

DESCRIPTION

Transmission fluid temperature readings are supplied to the transmission control module by the thermistor (Fig. 246). 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 2000 ohms.

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

OPERATION

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).

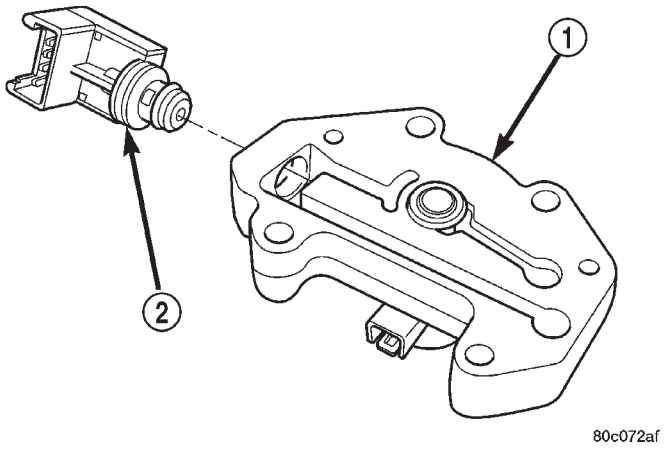


Fig. 246 Governor Pressure Sensor

1 - GOVERNOR BODY
2 - GOVERNOR PRESSURE SENSOR/TRANSMISSION FLUID TEMPERATURE THERMISTOR

VALVE BODY

DESCRIPTION

The valve body consists of a cast aluminum valve body, a separator plate, and transfer plate. The valve body contains valves and check balls that control fluid delivery to the torque converter clutch, bands, and frictional clutches. The valve body contains the following components (Fig. 247), (Fig. 248), (Fig. 249), and (Fig. 250):

- Regulator valve
- Regulator valve throttle pressure plug
- Line pressure plug and sleeve
- Kickdown valve
- Kickdown limit valve
- 1-2 shift valve
- 1-2 control valve
- 2-3 shift valve
- 2-3 governor plug
- 3-4 shift valve
- 3-4 timing valve
- 3-4 quick fill valve
- 3-4 accumulator
- Throttle valve
- Throttle pressure plug
- Switch valve
- Manual valve
- Converter clutch lock-up valve
- Converter clutch lock-up timing Valve
- Shuttle valve
- Shuttle valve throttle plug
- Boost Valve
- 10 check balls

By adjusting the spring pressure acting on the regulator valve, transmission line pressure can be adjusted.

VALVE BODY (Continued)

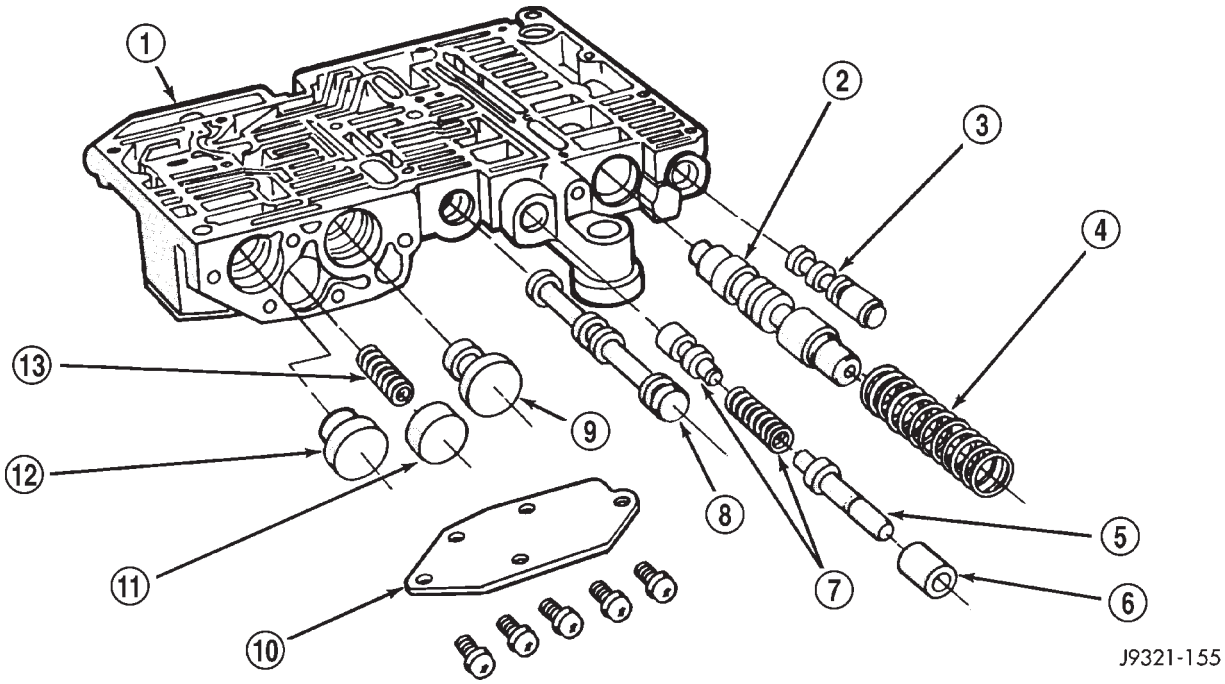


Fig. 247 Upper Housing Control Valve Locations

1 - UPPER HOUSING
2 - REGULATOR VALVE
3 - SWITCH VALVE
4 - REGULATOR VALVE SPRING
5 - KICKDOWN VALVE
6 - KICKDOWN DETENT
7 - THROTTLE VALVE AND SPRING
8 - MANUAL VALVE
9 - 1-2 GOVERNOR PLUG
10 - GOVERNOR PLUG COVER
11 - THROTTLE PLUG
12 - 2-3 GOVERNOR PLUG
13 - SHUTTLE VALVE PRIMARY SPRING

VALVE BODY (Continued)

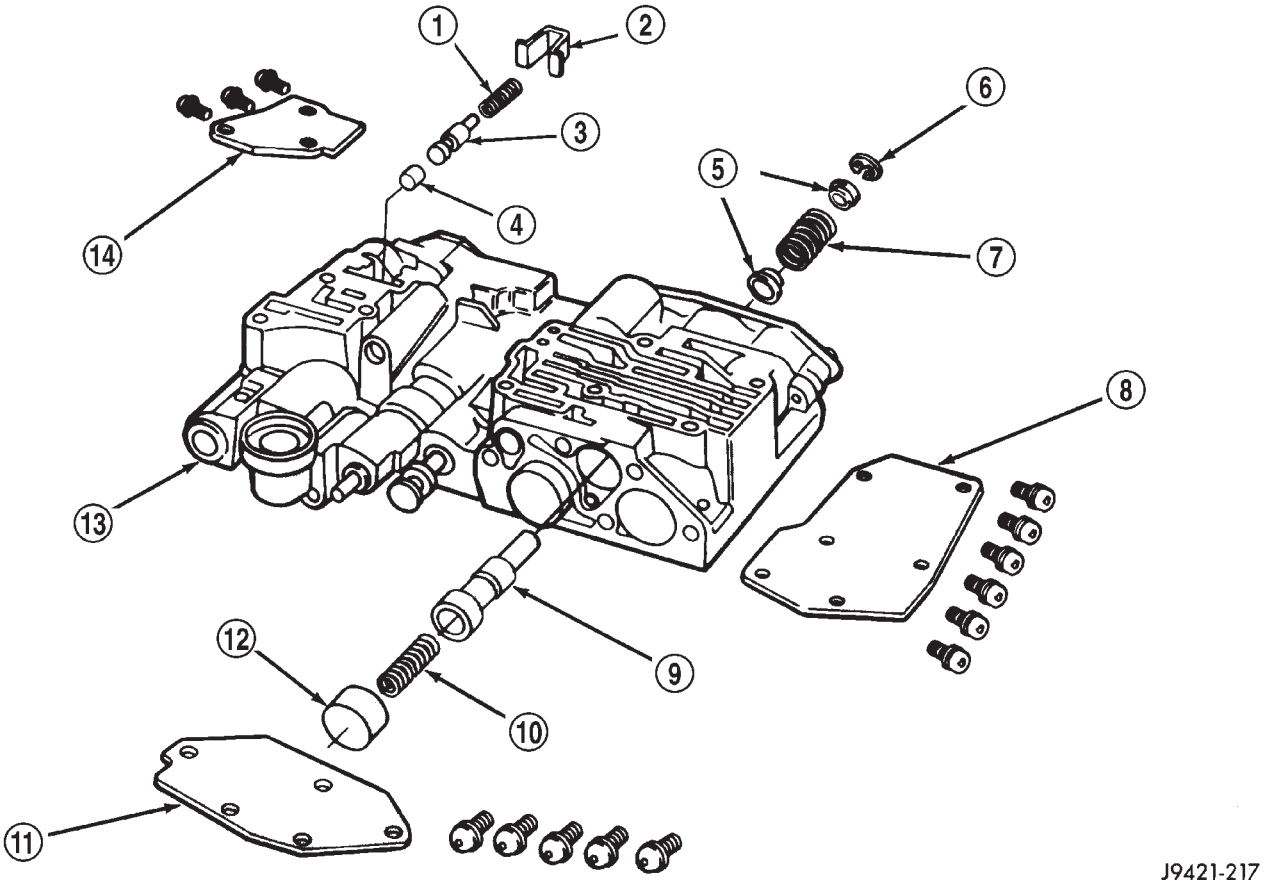


Fig. 248 Shuttle and Boost Valve Locations

1 - SPRING
2 - RETAINER
3 - BOOST VALVE
4 - BOOST VALVE PLUG
5 - SPRING GUIDES
6 - E-CLIP
7 - SHUTTLE VALVE SECONDARY SPRING
8 - SHUTTLE VALVE COVER
9 - SHUTTLE VALVE
10 - SHUTTLE VALVE PRIMARY SPRING
11 - GOVERNOR PLUG COVER
12 - THROTTLE PLUG
13 - UPPER HOUSING
14 - BOOST VALVE COVER

VALVE BODY (Continued)

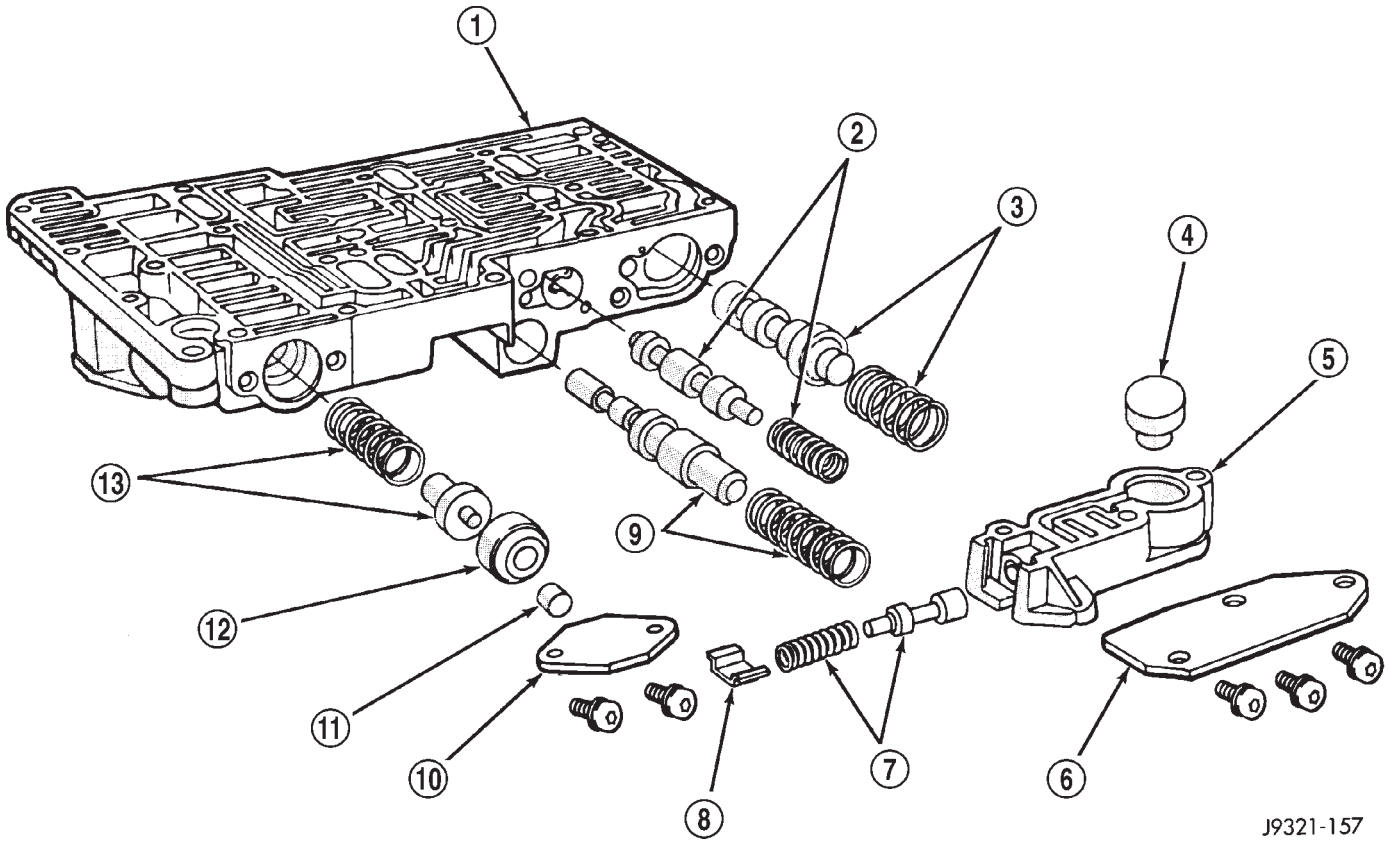


Fig. 249 Upper Housing Shift Valve and Pressure Plug Locations

1 - UPPER HOUSING
2 - 1-2 SHIFT VALVE AND SPRING
3 - 2-3 SHIFT VALVE AND SPRING
4 - 2-3 THROTTLE PLUG
5 - LIMIT VALVE HOUSING
6 - LIMIT VALVE COVER
7 - LIMIT VALVE AND SPRING
8 - RETAINER
9 - 1-2 SHIFT CONTROL VALVE AND SPRING
10 - PRESSURE PLUG COVER
11 - LINE PRESSURE PLUG
12 - PLUG SLEEVE
13 - THROTTLE PRESSURE SPRING AND PLUG

VALVE BODY (Continued)

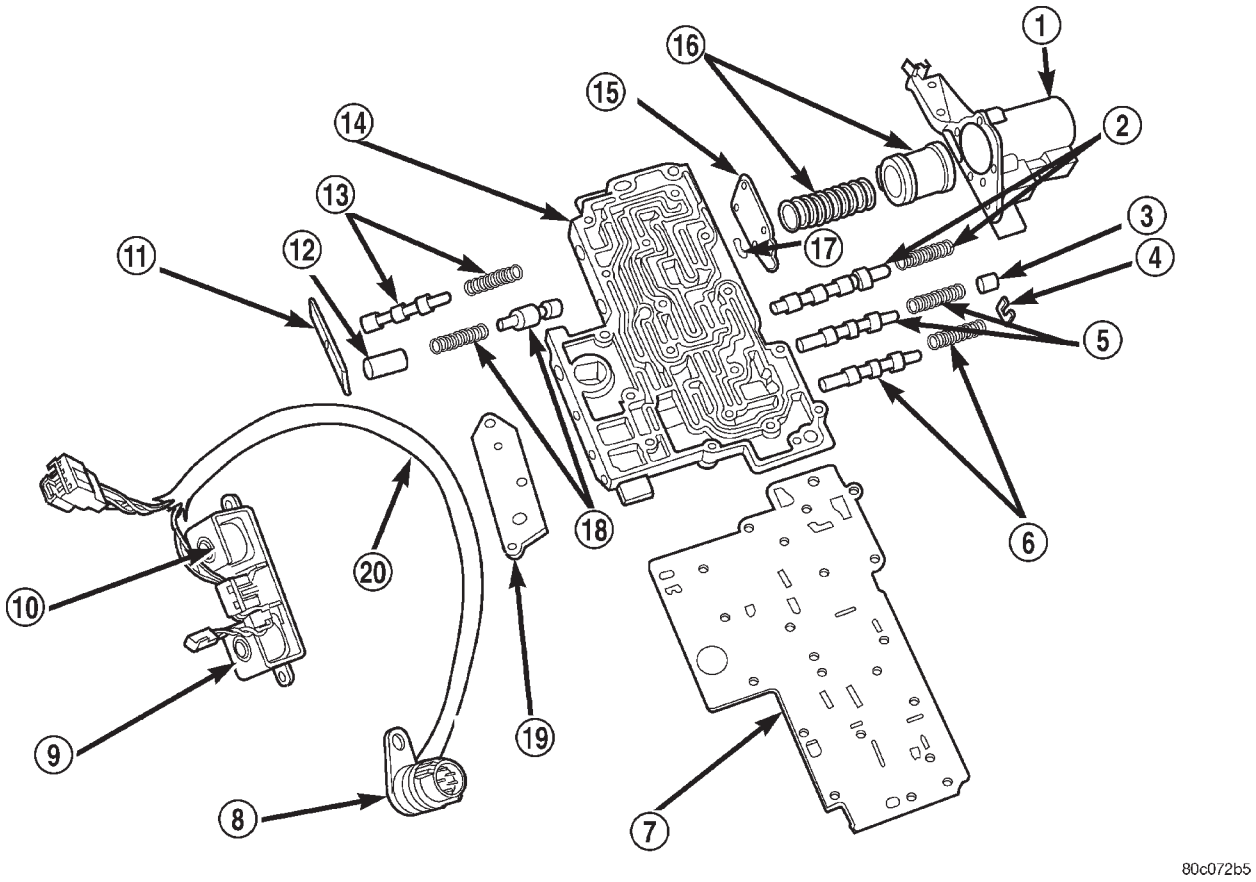


Fig. 250 Lower Housing Shift Valves and Springs

1 - 3-4 ACCUMULATOR HOUSING
2 - 3-4 SHIFT VALVE AND SPRING
3 - PLUG
4 - SPRING RETAINER
5 - CONVERTER CLUTCH VALVE AND SPRING
6 - CONVERTER CLUTCH TIMING VALVE AND SPRING
7 - OVERDRIVE SEPARATOR PLATE
8 - CASE CONNECTOR
9 - CONVERTER CLUTCH SOLENOID
10 - OVERDRIVE SOLENOID
11 - TIMING VALVE COVER
12 - PLUG
13 - 3-4 TIMING VALVE AND SPRING
14 - LOWER HOUSING
15 - ACCUMULATOR END PLATE
16 - 3-4 ACCUMULATOR PISTON AND SPRING
17 - E-CLIP
18 - 3-4 QUICK FILL SPRING AND VALVE
19 - SOLENOID GASKET
20 - HARNESS

VALVE BODY (Continued)

OPERATION

NOTE: Refer to the Hydraulic Schematics for a visual aid in determining valve location, operation and design.

CHECK BALLS

CHECK BALL NUMBER	DESCRIPTION
1	Allows either the manual valve to put line pressure on the 1-2 governor plug or the KD Valve to put WOT line pressure on the 1-2 governor plug.
2	Allows either the manual valve to put line pressure on the 2-3 governor plug or the KD Valve to put WOT line pressure on the 2-3 governor plug.
3	Allows either the Reverse circuit or the 3rd gear circuit to pressurize the front clutch.
4	Allows either the Manual Low circuit from the Manual Valve or the Reverse from the Manual Valve circuit to pressurize the rear servo.
5	Directs line pressure to the spring end of the 2-3 shift valve in either Manual Low or Manual 2nd, forcing the downshift to 2nd gear regardless of governor pressure.
6	Provides a by-pass around the front servo orifice so that the servo can release quickly.
7	Provides a by-pass around the rear clutch orifice so that the clutch can release quickly.
8	Directs reverse line pressure through an orifice to the throttle valve eliminating the extra leakage and insuring that Reverse line pressure pressure will be sufficient.
9	Provides a by-pass around the rear servo orifice so that the servo can release quickly.
ECE (10)	Allows the lockup clutch to used at WOT in 3rd gear by putting line pressure from the 3-4 Timing Valve on the interlock area of the 2-3 shift valve, thereby preventing a 3rd gear Lock-up to 2nd gear kickdown.

VALVE BODY (Continued)

REGULATOR VALVE

The pressure regulator valve is needed to control the hydraulic pressure within the system and reduce the amount of heat produced in the fluid. The pressure regulator valve is located in the valve body near the manual valve. The pressure regulator valve train controls the maximum pressure in the lines by metering the dumping of fluid back into the sump. Regulated pressure is referred to as “line pressure.”

The regulator valve (Fig. 251) has a spring on one end that pushes the valve to the left. This closes a dump (vent) that is used to lower pressure. The closing of the dump will cause the oil pressure to increase. Oil pressure on the opposite end of the valve pushes the valve to the right, opening the dump and lowering oil pressure. The result is spring pressure working against oil pressure to maintain the oil at specific pressures. With the engine running, fluid flows from the pump to the pressure regulator valve, manual valve, and the interconnected circuits. As fluid is sent through passages to the regulator valve, the pressure pushes the valve to the right against the large spring. It is also sent to the reaction areas on the left side of the throttle pressure plug and the line pressure plug. With the gear selector in the PARK position, fluid recirculates through the regulator and manual valves back to the sump.

Meanwhile, the torque converter is filled slowly. In all other gear positions (Fig. 252), fluid flows between two right side lands to the switch valve and torque converter. At low pump speeds, the flow is controlled by the pressure valve groove to reduce pressure to the torque converter. After the torque converter and switch valve fill with fluid, the switch valve becomes the controlling metering device for torque converter pressure. The regulator valve then begins to control the line pressure for the other transmission circuits. The balance of the fluid pressure pushing the valve to the right and the spring pressure pushing to the left determines the size of the metering passage at land #2 (land #1 being at the far right of the valve in the diagram). As fluid leaks past the land, it moves into a groove connected to the filter or sump. As the land meters the fluid to the sump, it causes the pressure to reduce and the spring decreases the size of the metering passage. When the size of the metering passage is reduced, the pressure rises again and the size of the land is increased again. Pressure is regulated by this constant balance of hydraulic and spring pressure.

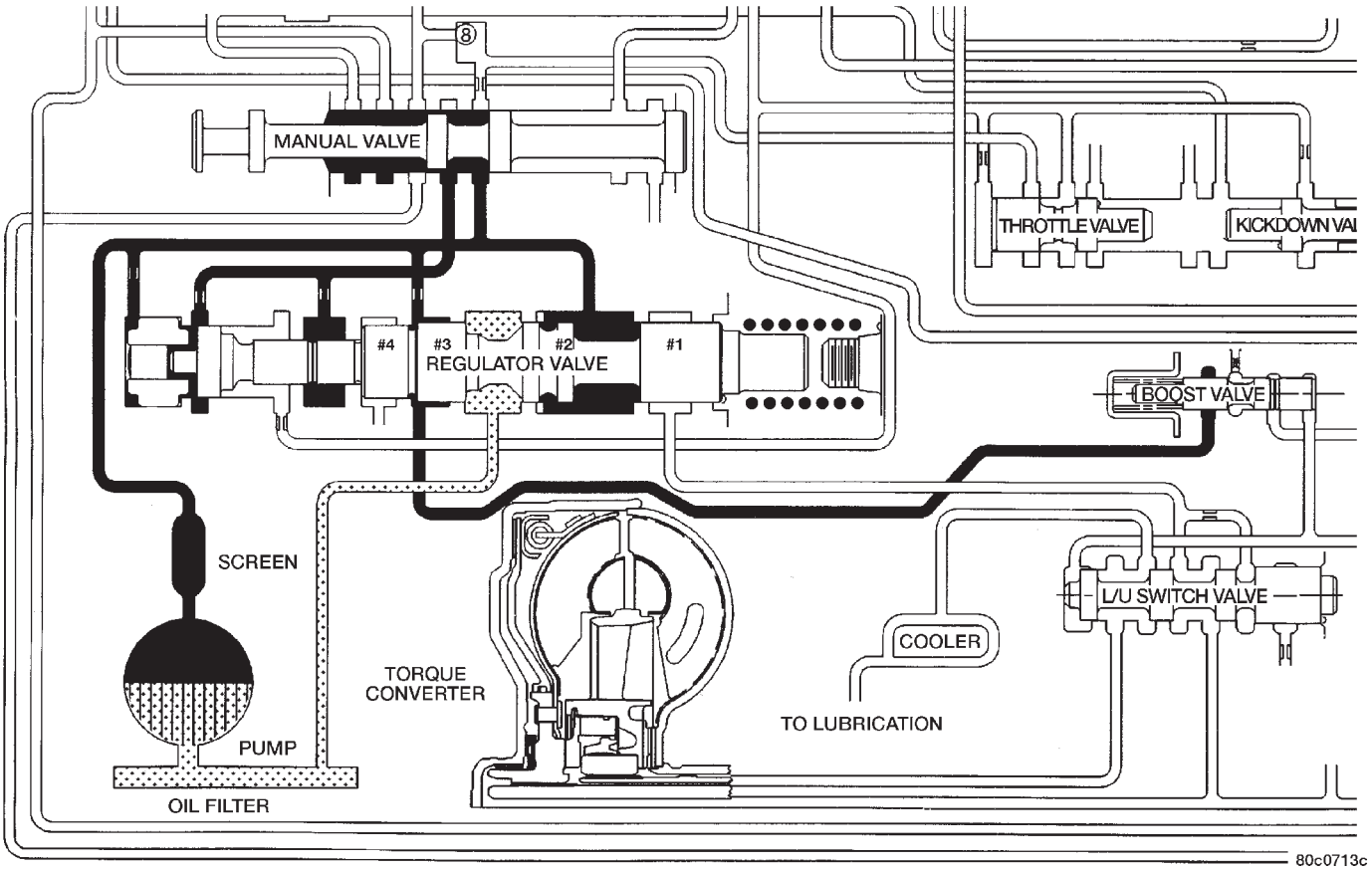


Fig. 251 Regulator Valve in PARK Position

VALVE BODY (Continued)

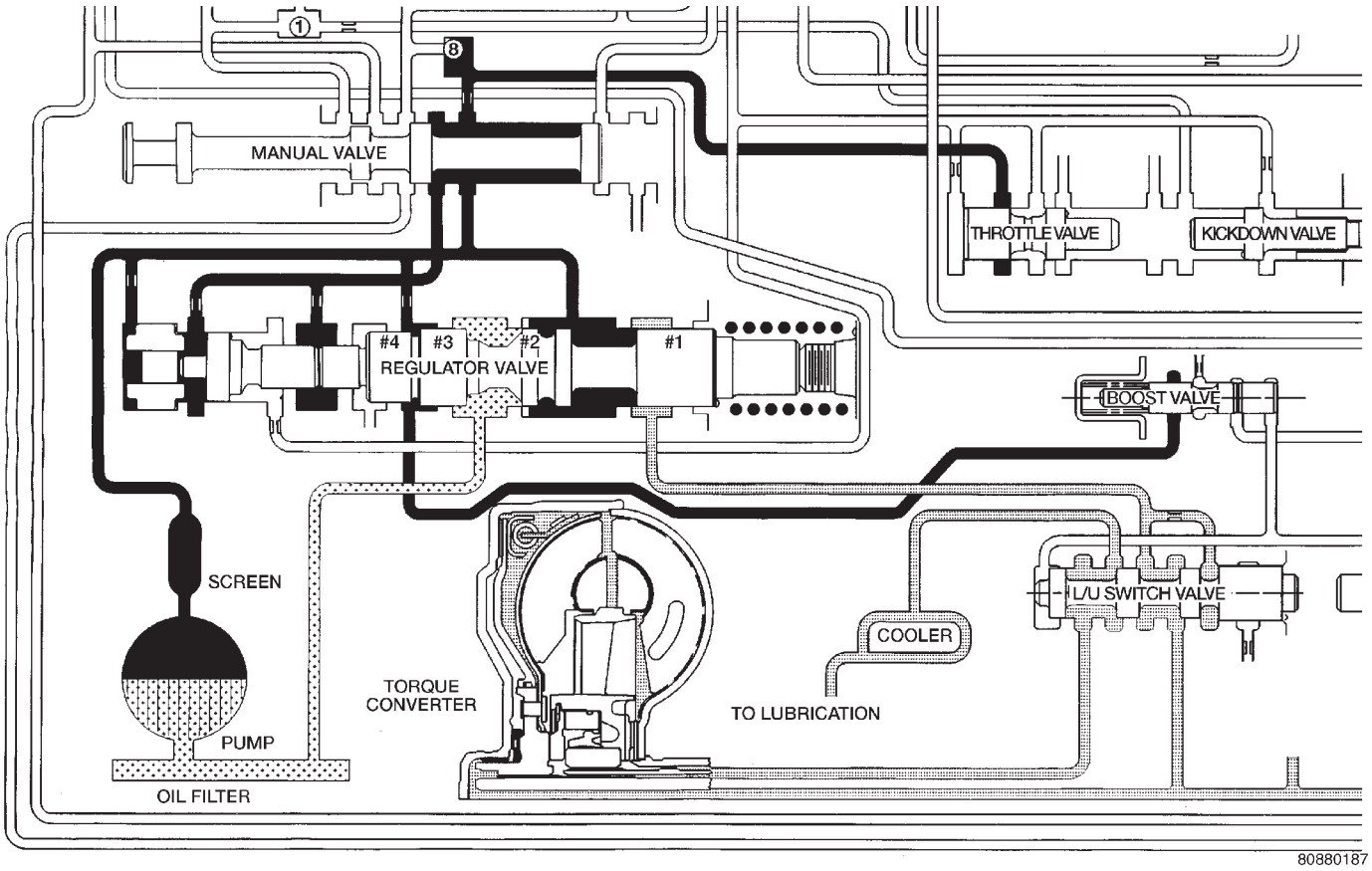


Fig. 252 Regulator Valve in NEUTRAL Position

The metering at land #2 establishes the line pressure throughout the transmission. It is varied according to changes in throttle position and the transmission's internal condition within a range of 57-94 psi (except in REVERSE) (Fig. 253). The regulated line pressure in REVERSE (Fig. 254) is held at much higher pressures than in the other gear positions: 145-280 psi. The higher pressure for REVERSE is achieved by the manual valve blocking the supply of line pressure to the reaction area left of land #4. With this pressure blocked, there is less area for pressure to act on to balance the force of the spring on the right. This allows line pressure to push the valve train to the right, reducing the amount of fluid returned to the pump's inlet, increasing line pressure.

KICKDOWN VALVE

When the throttle valve is as far over to the left as it can go, the maximum line pressure possible will enter the throttle pressure circuit. In this case, throttle pressure will equal line pressure. With the kickdown valve (Fig. 255) pushed into the bore as far as it will go, fluid initially flows through the annular groove of the 2-3 shift valve (which will be in the direct drive position to the right).

After passing the annular groove, the fluid is routed to the spring end of the 2-3 shift valve. Fluid pressure reacting on the area of land #1 overcomes governor pressure, downshifting the 2-3 shift valve into the kickdown, or second gear stage of operation. The valve is held in the kickdown position by throttle pressure routed from a seated check ball (#2). Again, if vehicle speed is low enough, throttle pressure will also push the 1-2 shift valve left to seat its governor plug, and downshift to drive breakaway.

VALVE BODY (Continued)

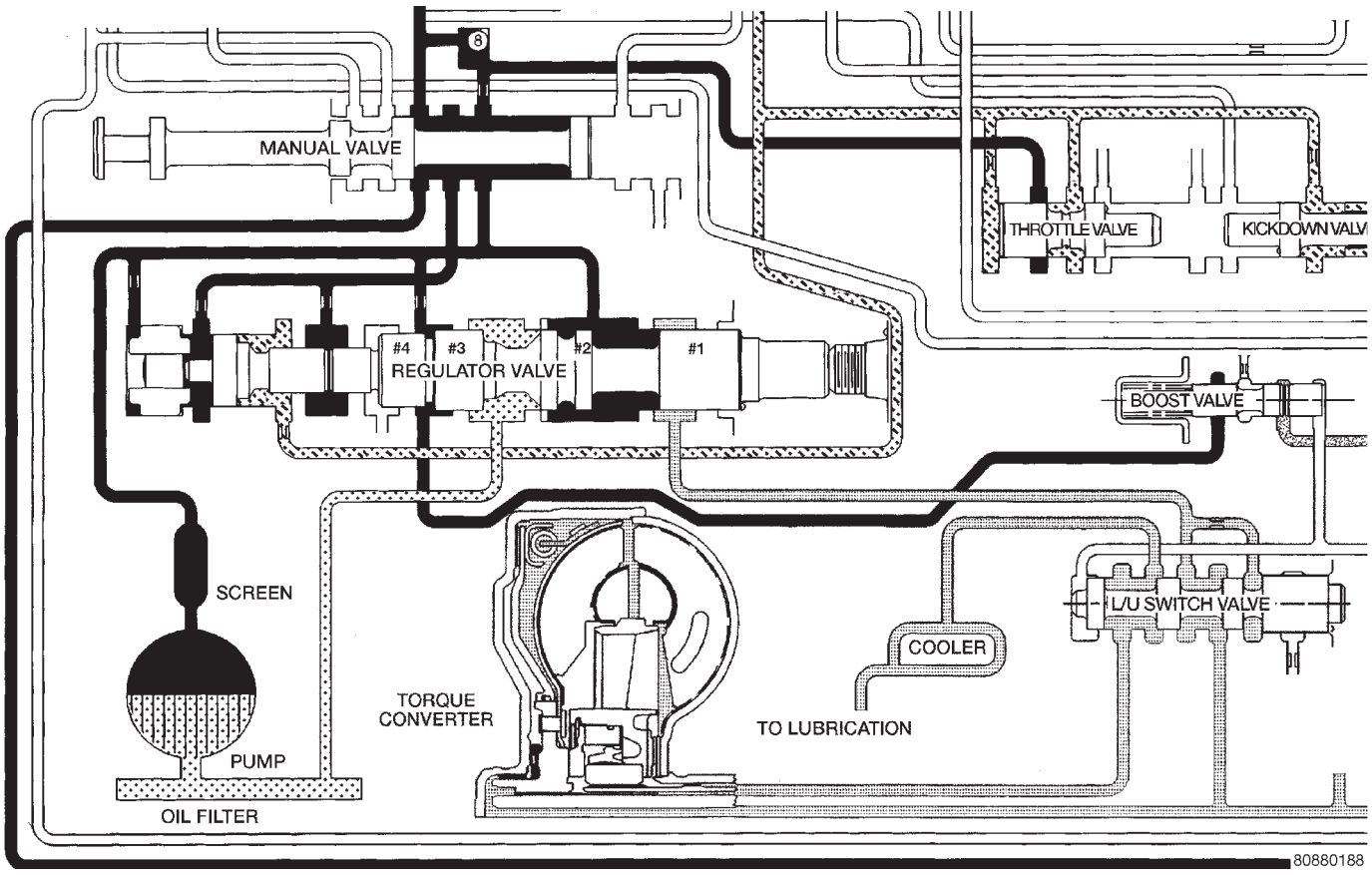


Fig. 253 Regulator Valve in DRIVE Position

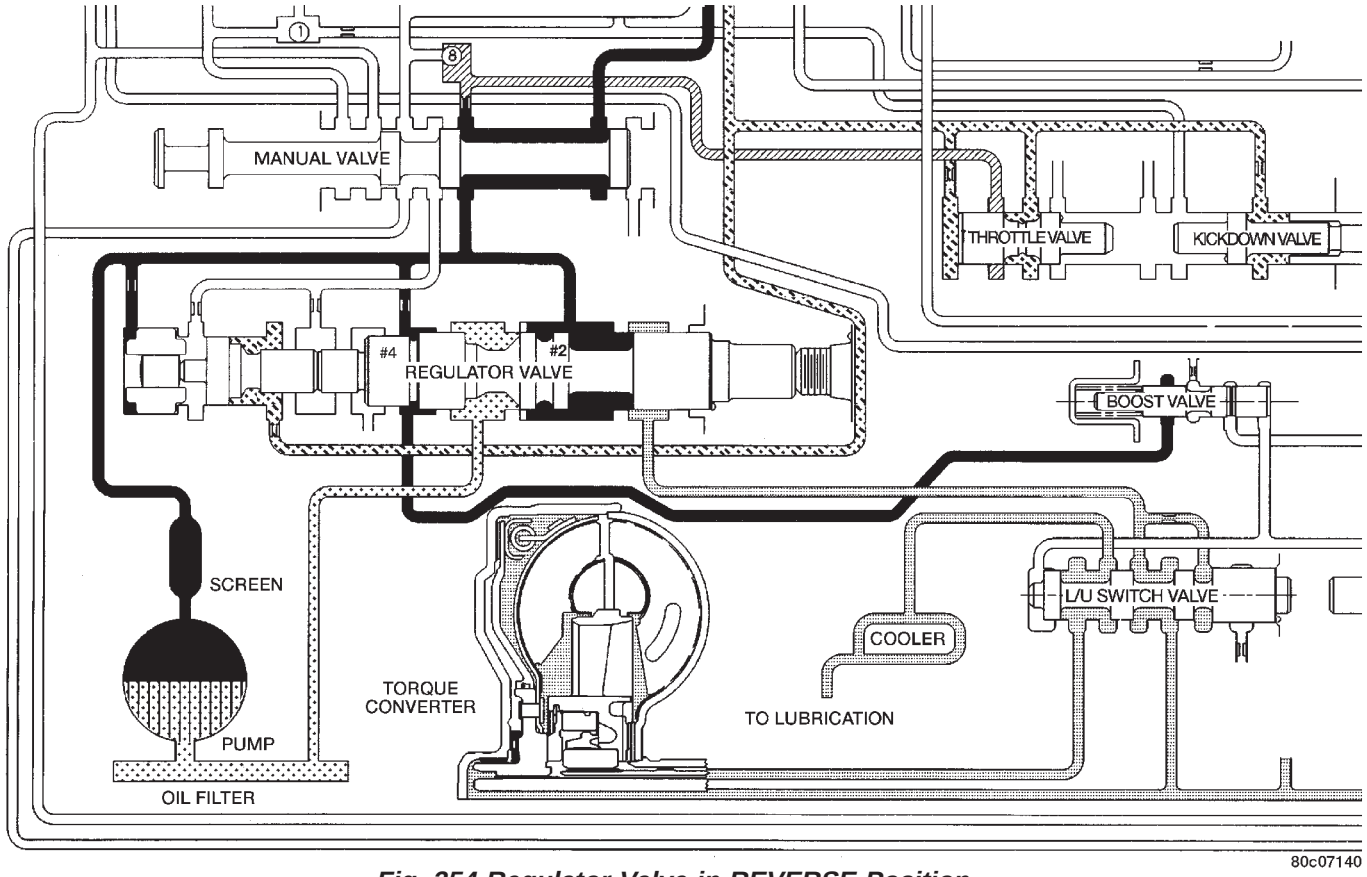


Fig. 254 Regulator Valve in REVERSE Position

VALVE BODY (Continued)

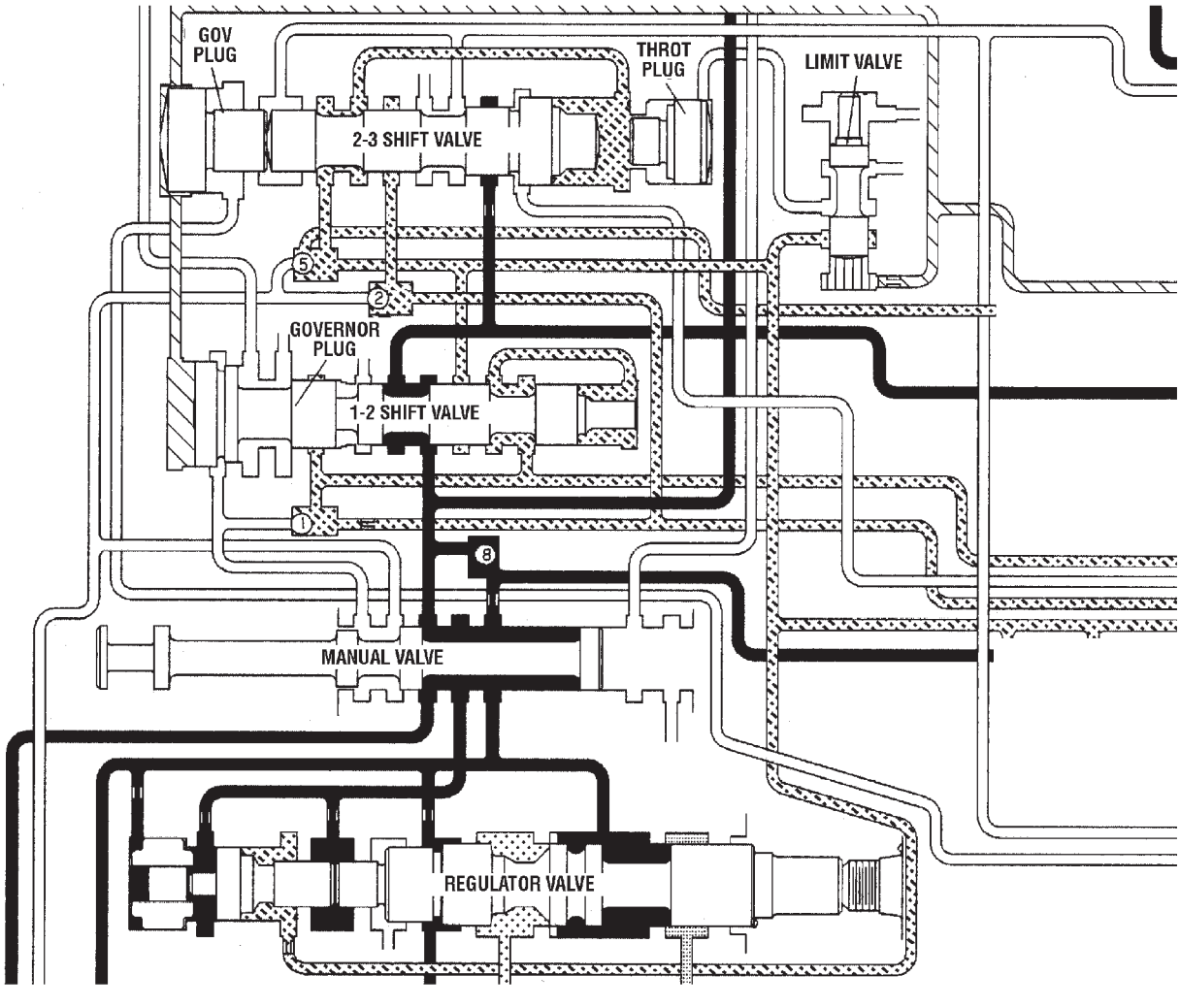


Fig. 255 Kickdown Valve-Wide Open Throttle

KICKDOWN LIMIT VALVE

The purpose of the limit valve is to prevent a 3-2 downshift at higher speeds when a part-throttle downshift is not desirable. At these higher speeds only a full throttle 3-2 downshift will occur. At low road speeds (Fig. 256) the limit valve does not come into play and does not affect the downshifts. As the vehicle's speed increases (Fig. 257), the governor pressure also increases. The increased governor pressure acts on the reaction area of the bottom land of the limit valve overcoming the spring force trying to push the valve toward the bottom of its bore. This pushes the valve upward against the spring and bottoms the valve against the top of the housing. With the valve bottomed against the housing, the throttle pressure supplied to the valve will be closed off by the bottom land of the limit valve. When the supply of throttle pressure has been shut off, the 3-2 part throttle downshift plug becomes inoperative, because no pressure is acting on its reaction area.

1-2 SHIFT VALVE

The 1-2 shift valve assembly (Fig. 258), or mechanism, consists of: the 1-2 shift valve, governor plug, and a spring on the end of the valve. After the manual valve has been placed into a forward gear range, line pressure is directed to the 1-2 shift valve. As the throttle is depressed, throttle pressure is applied to the right side of the 1-2 shift valve assembly. With throttle pressure applied to the right side of the valve, there is now both spring pressure and throttle pressure acting on the valve, holding it against the governor plug. As the vehicle begins to move and build speed, governor pressure is created and is applied to the left of the valve at the governor plug.

When governor pressure builds to a point where it can overcome the combined force of the spring and throttle pressure on the other side of the valve, the valve will begin to move over to the right. As the valve moves to the right, the middle land of the valve will close off the circuit supplying the throttle pressure to the right side of the valve. When the throttle

VALVE BODY (Continued)

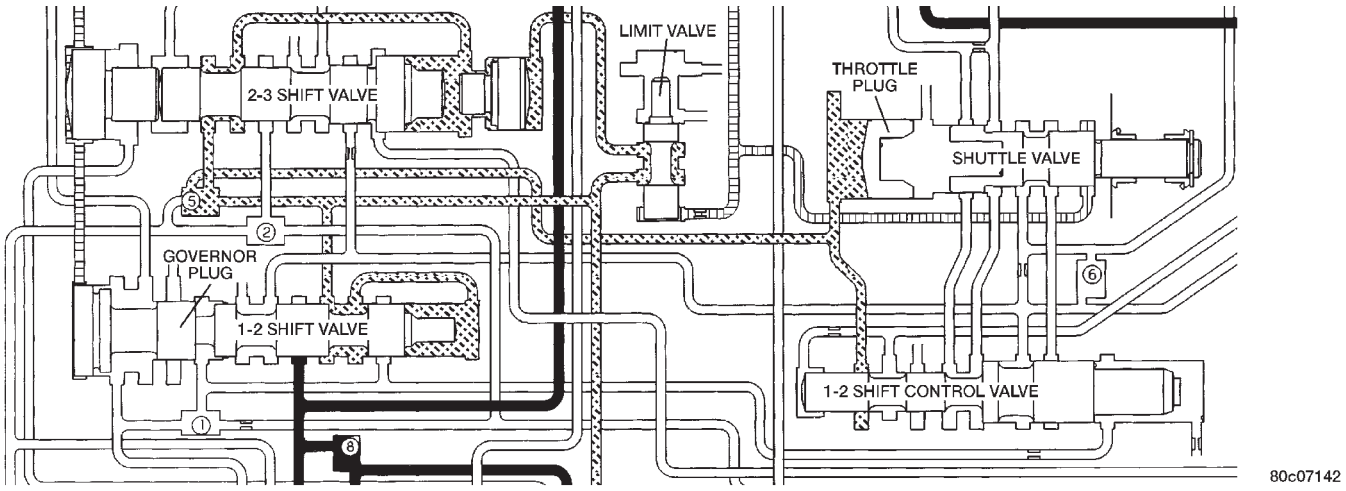


Fig. 256 Kickdown Limit Valve-Low Speeds

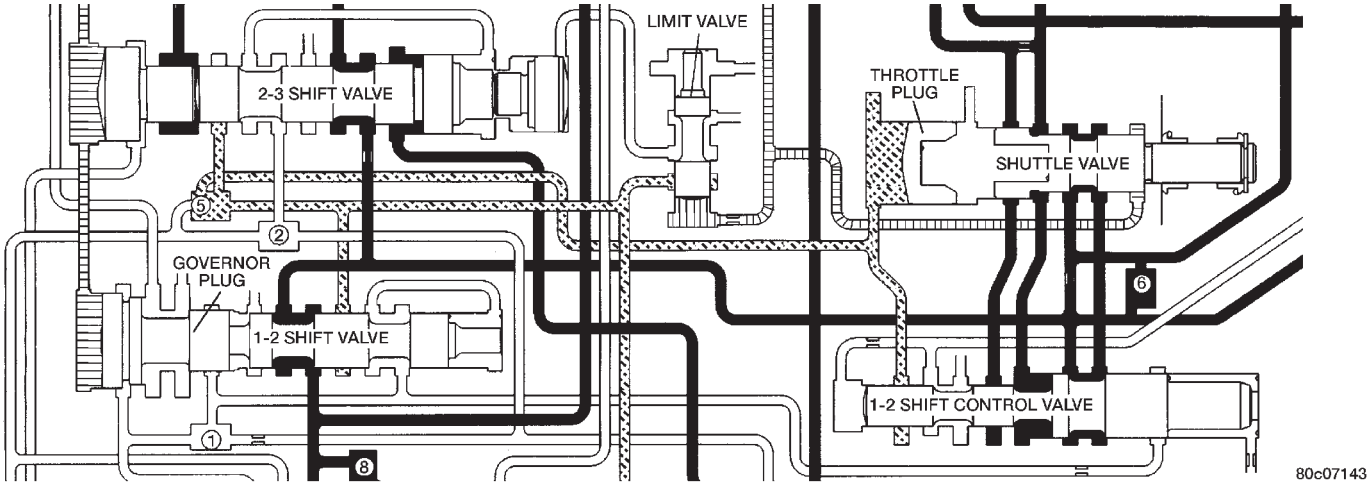


Fig. 257 Kickdown Limit Valve-High Speeds

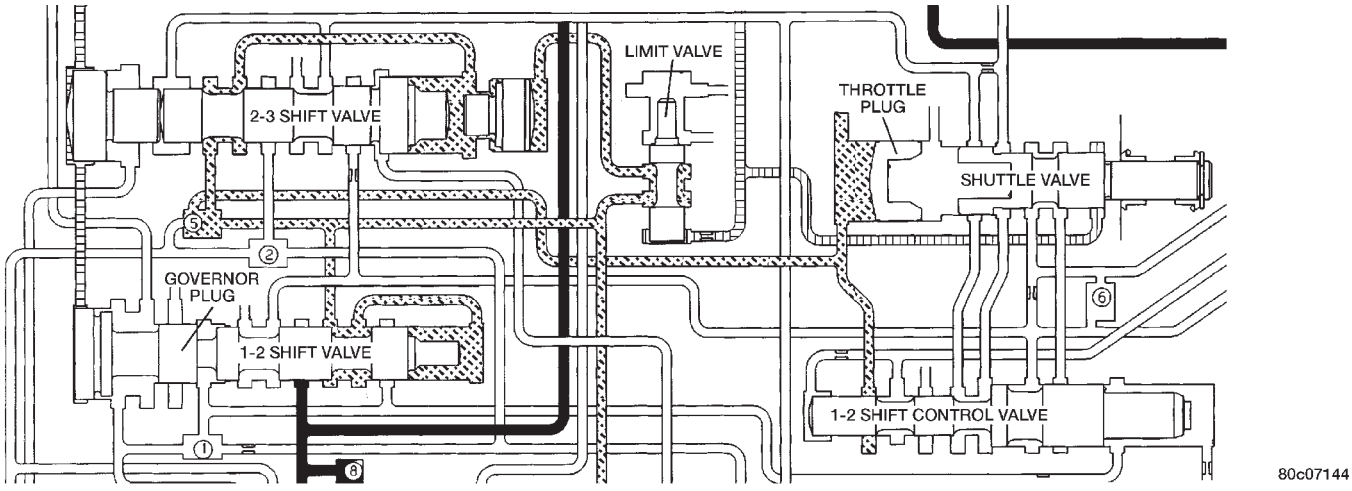


Fig. 258 1-2 Shift Valve-Before Shift

pressure is closed off, the valve will move even farther to the right, allowing line pressure to enter another circuit and energize the front servo, applying the front band (Fig. 259).

The governor plug serves a dual purpose:

- It allows the shift valves to move either left or right, allowing both upshifts and downshifts.

VALVE BODY (Continued)

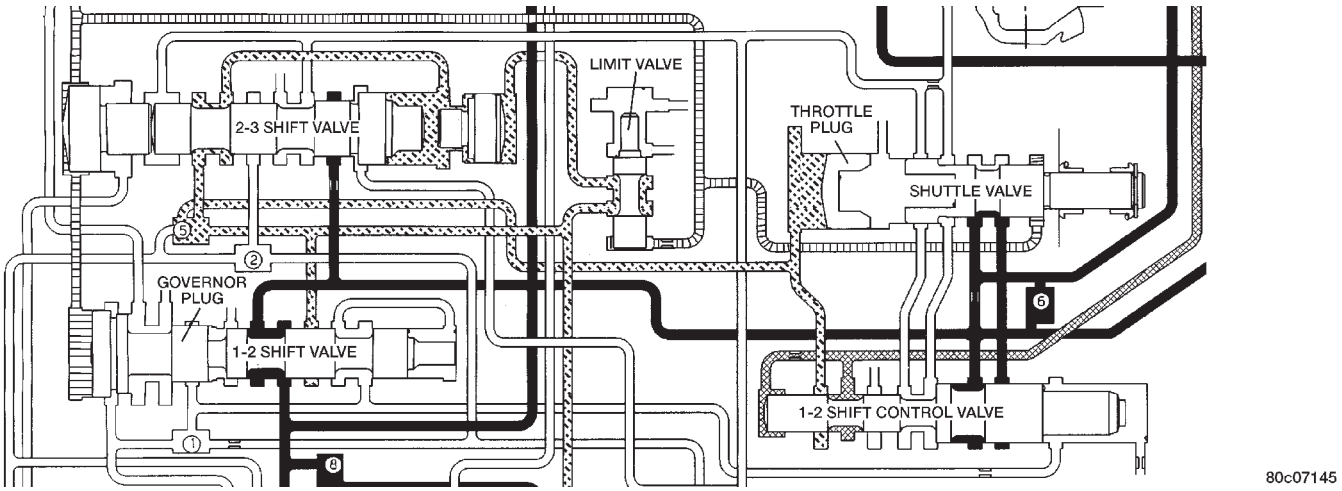


Fig. 259 1-2 Shift Valve-After Shift

• When in a manual selection position, it will be hydraulically "blocked" into position so no upshift can occur.

The physical blocking of the upshift while in the manual "1" position is accomplished by the directing of line pressure between both lands of the governor plug. The line pressure reacts against the larger land of the plug, pushing the plug back against the end plate overcoming governor pressure. With the combination of the line pressure and spring pressure, the valve cannot move, preventing any upshift.

1-2 SHIFT CONTROL VALVE

It contains a valve with four lands and a spring. It is used as both a "relay" and "balanced" valve.

The valve has two specific operations (Fig. 260):

• Aid in quality of the 1-2 upshift.

• Aid in the quality and timing of the 3-2 kickdown ranges.

When the manual valve is set to the DRIVE position and the transmission is in the first or second gear range, 1-2 shift control or "modulated throttle pressure" is supplied to the middle of the accumulator piston by the 1-2 shift control valve. During the 1-2 upshift, this pressure is used to control the kickdown servo apply pressure that is needed to apply the kickdown and accumulator pistons. Thus, the 1-2 shift point is "cushioned" and the quality is improved. During a WOT kickdown, kickdown pressure is applied between the kickdown valve and the 1-2 shift control valve. This additional pressure is directed to the 1-2 shift control's spring cavity, adding to the spring load on the valve. The result of this increased "modulated" throttle pressure is a firmer WOT upshift.

2-3 SHIFT VALVE

The 2-3 shift valve mechanism (Fig. 261) consists of the 2-3 shift valve, governor plug and spring, and a throttle plug. After the 1-2 shift valve has completed its operation and applied the front band, line pressure is directed to the 2-3 shift valve through the connecting passages from the 1-2 shift valve. The line pressure will then dead–end at land #2 until the 2-3 valve is ready to make its shift. Now that the vehicle is in motion and under acceleration, there is throttle pressure being applied to the spring side of the valve and between lands #3 and #4.

As vehicle speed increases, governor pressure increases proportionately, until it becomes great enough to overcome the combined throttle and spring pressure on the right side of the valve. Since the throttle pressure end of the 2-3 shift valve is larger in diameter than the 1-2 shift valve, the 2-3 shift will always happen at a greater speed than the 1-2 shift. When this happens, the governor plug is forced against the shift valve moving it to the right. The shift valve causes land #4 to close the passage supplying throttle pressure to the 2-3 shift valve. Without throttle pressure present in the circuit now, the governor plug will push the valve over far enough to bottom the valve in its bore. This allows land #2 to direct line pressure to the front clutch.

After the shift (Fig. 262), line pressure is directed to the land between the shift valve and the governor plug, and to the release side of the kickdown servo. This releases the front band and applies the front clutch, shifting into third gear or direct drive. The rear clutch remains applied, as it has been in the other gears. During a manual "1" or manual "2" gear selection, line pressure is sent between the two lands of the 2-3 governor plug. This line pressure at the governor plug locks the shift valve into the second gear position, preventing an upshift into direct drive. The theory for the blocking of the valve is the same as that of the 1-2 shift valve.

VALVE BODY (Continued)

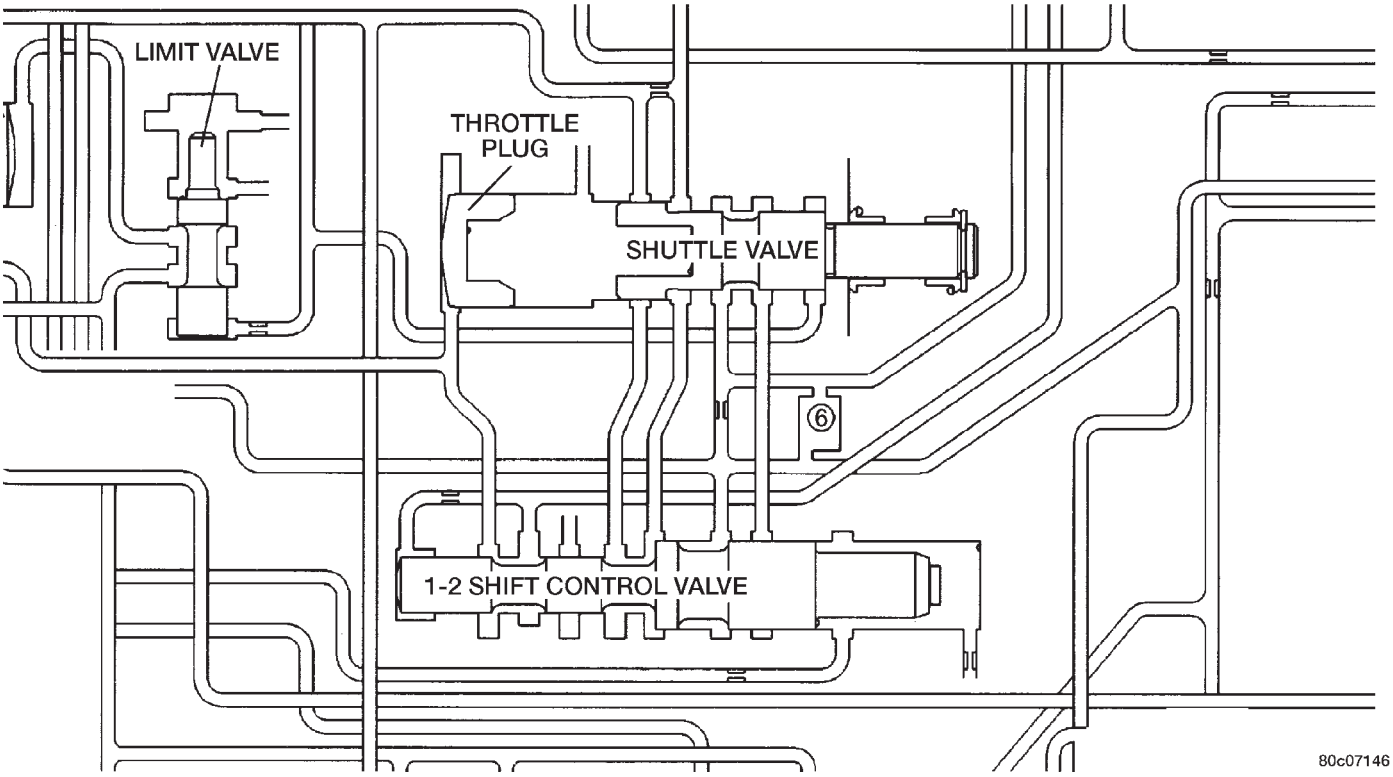


Fig. 260 1-2 Shift Control Valve

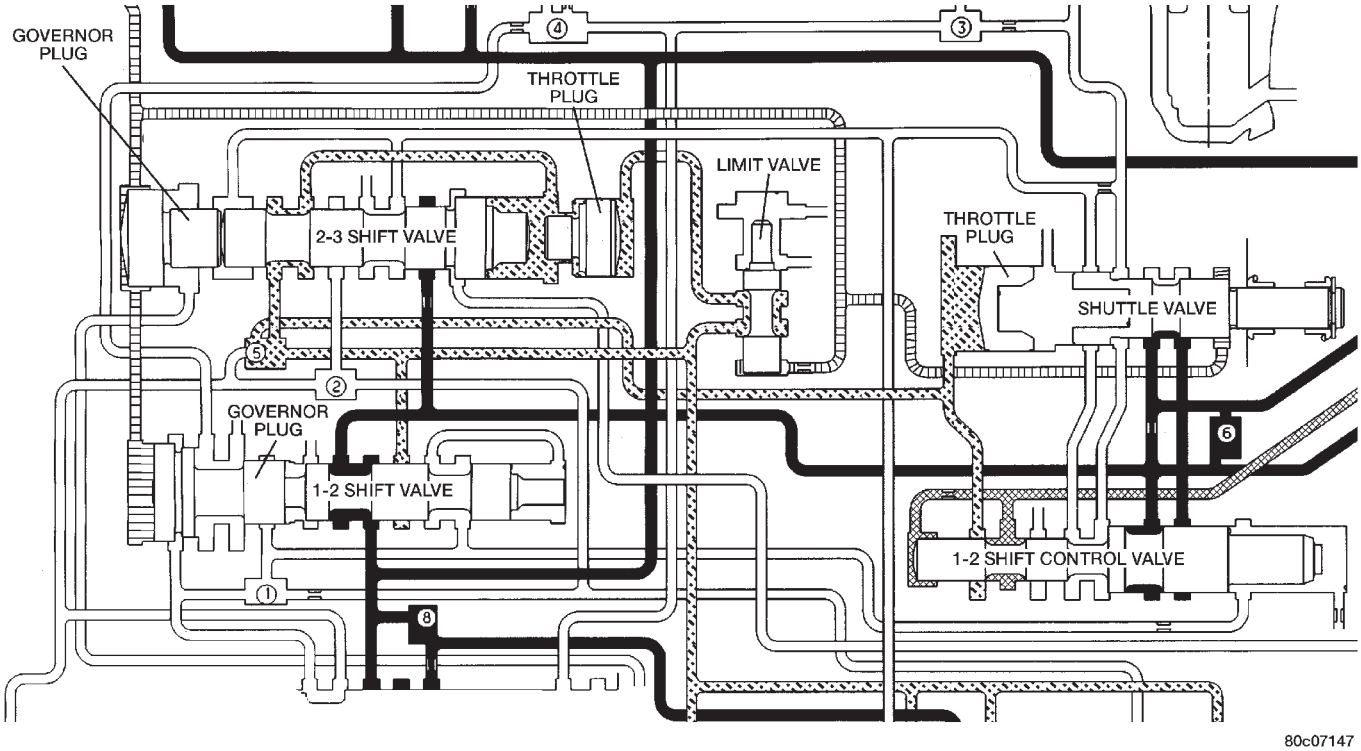


Fig. 261 2-3 Shift Valve-Before Shift

3-4 SHIFT VALVE

The PCM energizes the overdrive solenoid during the 3-4 upshift (Fig. 263). 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 (Fig. 264). 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.

VALVE BODY (Continued)

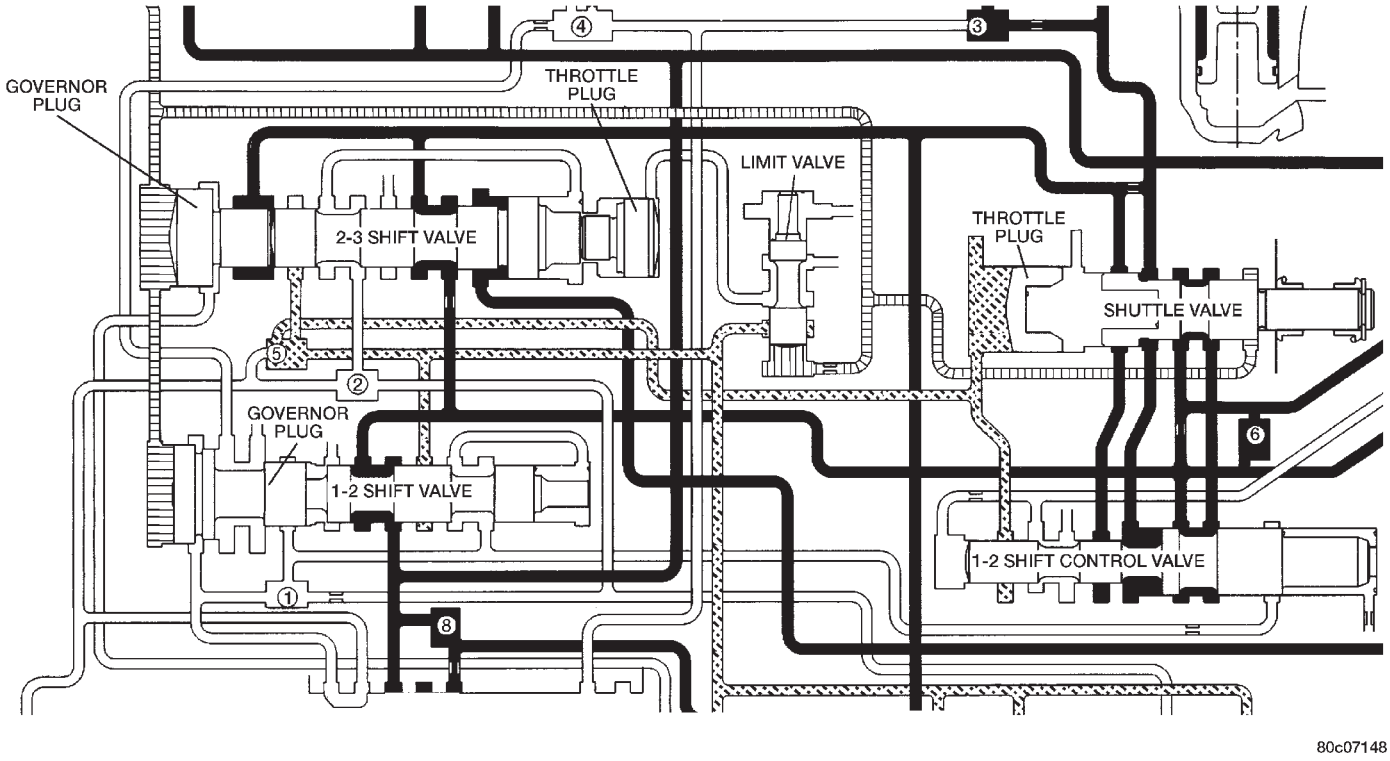


Fig. 262 2-3 Shift Valve-After Shift

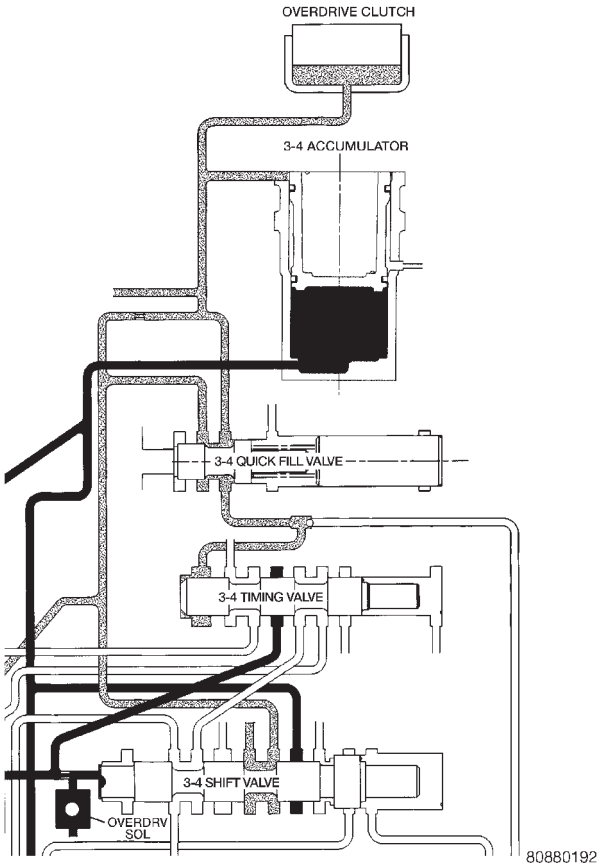


Fig. 263 3-4 Shift Valve Before Shift

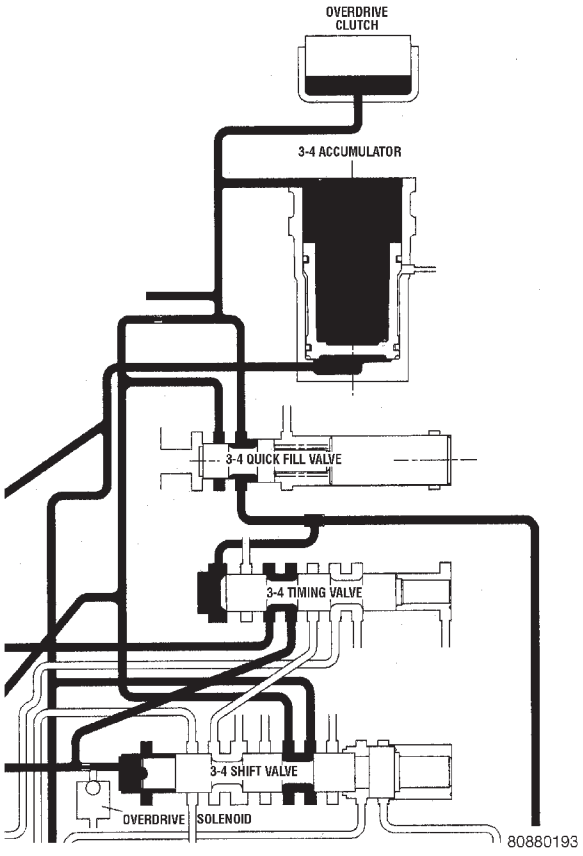


Fig. 264 3-4 Shift Valve After Shift

VALVE BODY (Continued)

3-4 TIMING VALVE

The 3-4 timing valve is moved by line pressure coming through the 3-4 shift valve (Fig. 264). After the shift, the timing valve holds the 2-3 shift valve in an upshift position. The purpose is to prevent the 2-3 valve from downshifting before the 3-4 valve (Fig. 263).

3-4 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 (Fig. 263). 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 (Fig. 264). Clutch fill is then completed through the regular feed orifice.

THROTTLE VALVE

In all gear positions the throttle valve (Fig. 265) is being supplied with line pressure. The throttle valve meters and reduces the line pressure that now becomes throttle pressure. The throttle valve is moved by a spring and the kickdown valve, which is mechanically connected to the throttle. The larger the throttle opening, the higher the throttle pressure (to a maximum of line pressure). The smaller the throttle opening, the lower the throttle pressure (to a minimum of zero at idle). As engine speed increases, the increase in pump speed increases pump output. The increase in pressure and volume must be regulated to maintain the balance within the transmission. To do this, throttle pressure is routed to the reaction area on the right side of the throttle pressure plug (in the regulator valve).

The higher engine speed and line pressure would open the vent too far and reduce line pressure too much. Throttle pressure, which increases with engine speed (throttle opening), is used to oppose the movement of the pressure valve to help control the metering passage at the vent. The throttle pressure is combined with spring pressure to reduce the force of the throttle pressure plug on the pressure valve. The larger spring at the right closes the regulator valve passage and maintains or increases line pressure. The increased line pressure works against the reaction area of the line pressure plug and the reaction area left of land #3 simultaneously moves the regulator valve train to the right and controls the metering passage.

The kickdown valve, along with the throttle valve, serve to delay upshifts until the correct vehicle speed has been reached. It also controls downshifts upon driver demand, or increased engine load. If these valves were not in place, the shift points would be at the same speed for all throttle positions. The kickdown valve is actuated by a cam connected to the

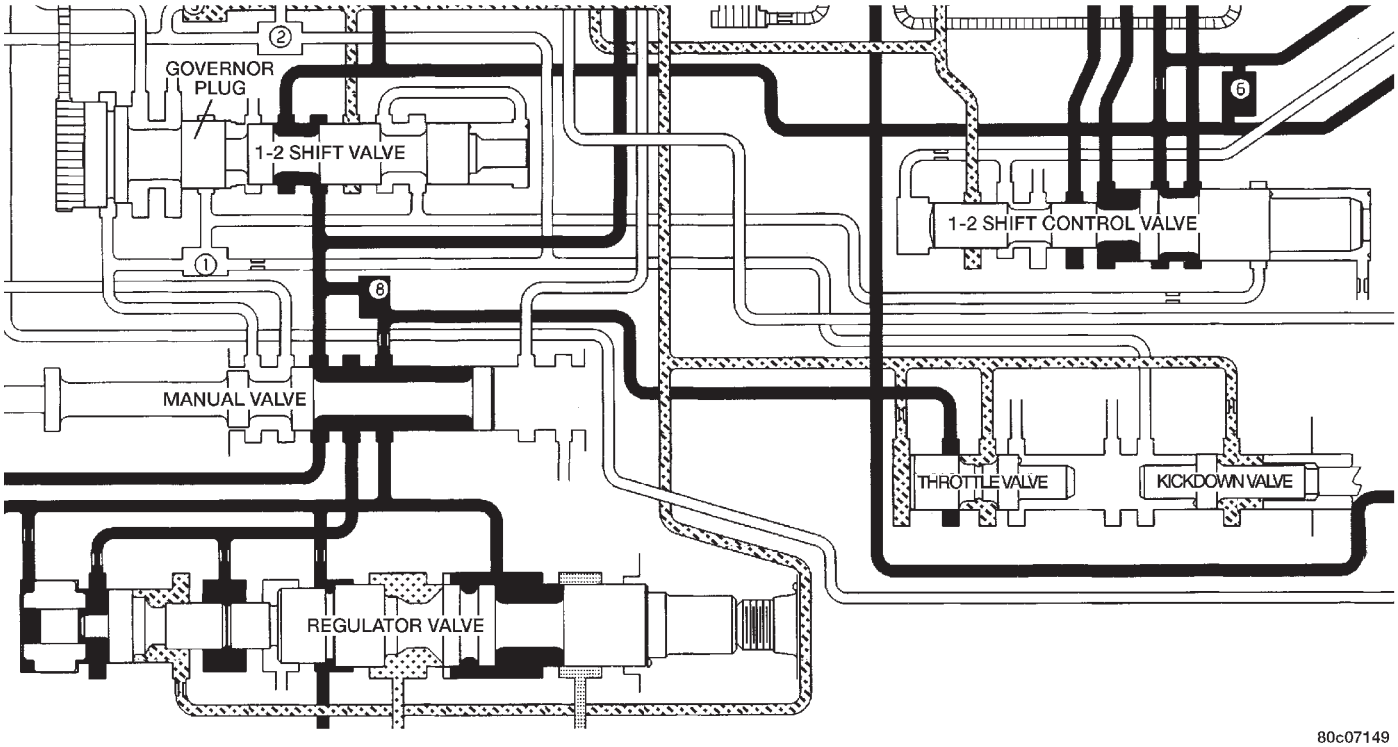


Fig. 265 Throttle Valve

VALVE BODY (Continued)

throttle. This is accomplished through either a linkage or a cable. The cam forces the kickdown valve toward the throttle valve compressing the spring between them and moving the throttle valve. As the throttle valve land starts to uncover its port, line pressure is "metered" out into the circuits and viewed as throttle pressure. This increased throttle pressure is metered out into the circuits it is applied to: the 1-2 and 2-3 shift valves. When the throttle pressure is high enough, a 3-2 downshift will occur. If the vehicle speed is low enough, a 2-1 downshift will occur.

SWITCH VALVE

When the transmission is in Drive Second before the TCC application occurs (Fig. 266), the pressure regulator valve is supplying torque converter pressure to the switch valve. The switch valve directs this pressure through the transmission input shaft, into the converter, through the converter, back out between the input shaft and the reaction shaft, and back up to the switch valve. From the switch valve, the fluid pressure is directed to the transmission cooler, and lubrication pressure returns from the cooler to lubricate different portions of the transmission.

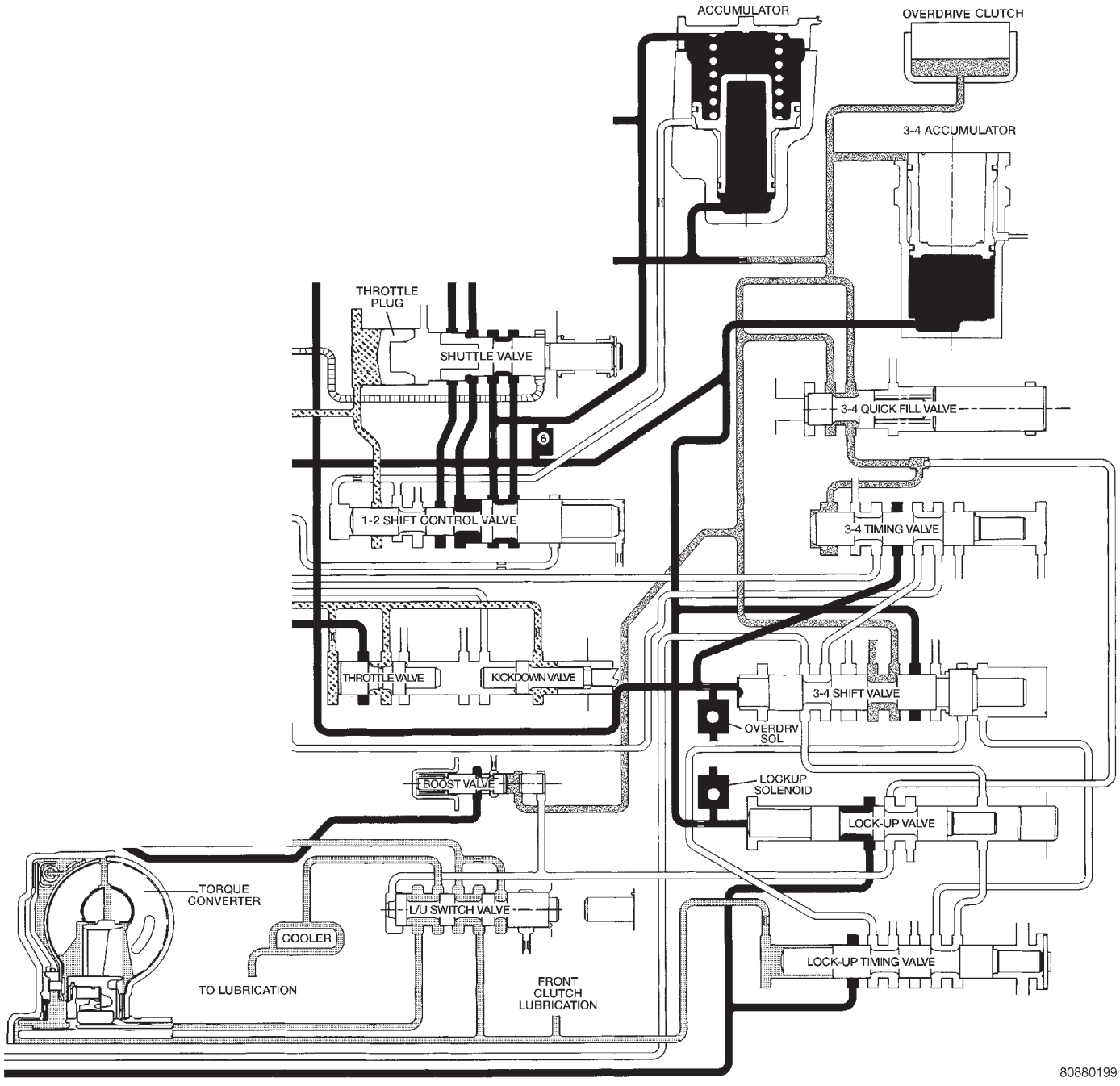


Fig. 266 Switch Valve-Torque Converter Unlocked

VALVE BODY (Continued)

Once the TCC control valve has moved to the right (Fig. 267), line pressure is directed to the tip of the switch valve, forcing the valve to the right. The switch valve now vents oil from the front of the piston in the torque converter, and supplies line pressure to the (rear) apply side of the torque converter piston. This pressure differential causes the piston to apply against the friction material, cutting off any further flow of line pressure oil. After the switch valve is shuttled right allowing line pressure to engage the TCC, torque converter pressure is directed past the switch valve into the transmission cooler and lubrication circuits.

MANUAL VALVE

The manual valve (Fig. 268) is a relay valve. The purpose of the manual valve is to direct fluid to the correct circuit needed for a specific gear or driving range. The manual valve, as the name implies, is manually operated by the driver with a lever located on the side of the valve body. The valve is connected mechanically by either a cable or linkage to the gearshift mechanism. The valve is held in each of its positions by a spring-loaded roller or ball that engages the "roostercomb" of the manual valve lever.

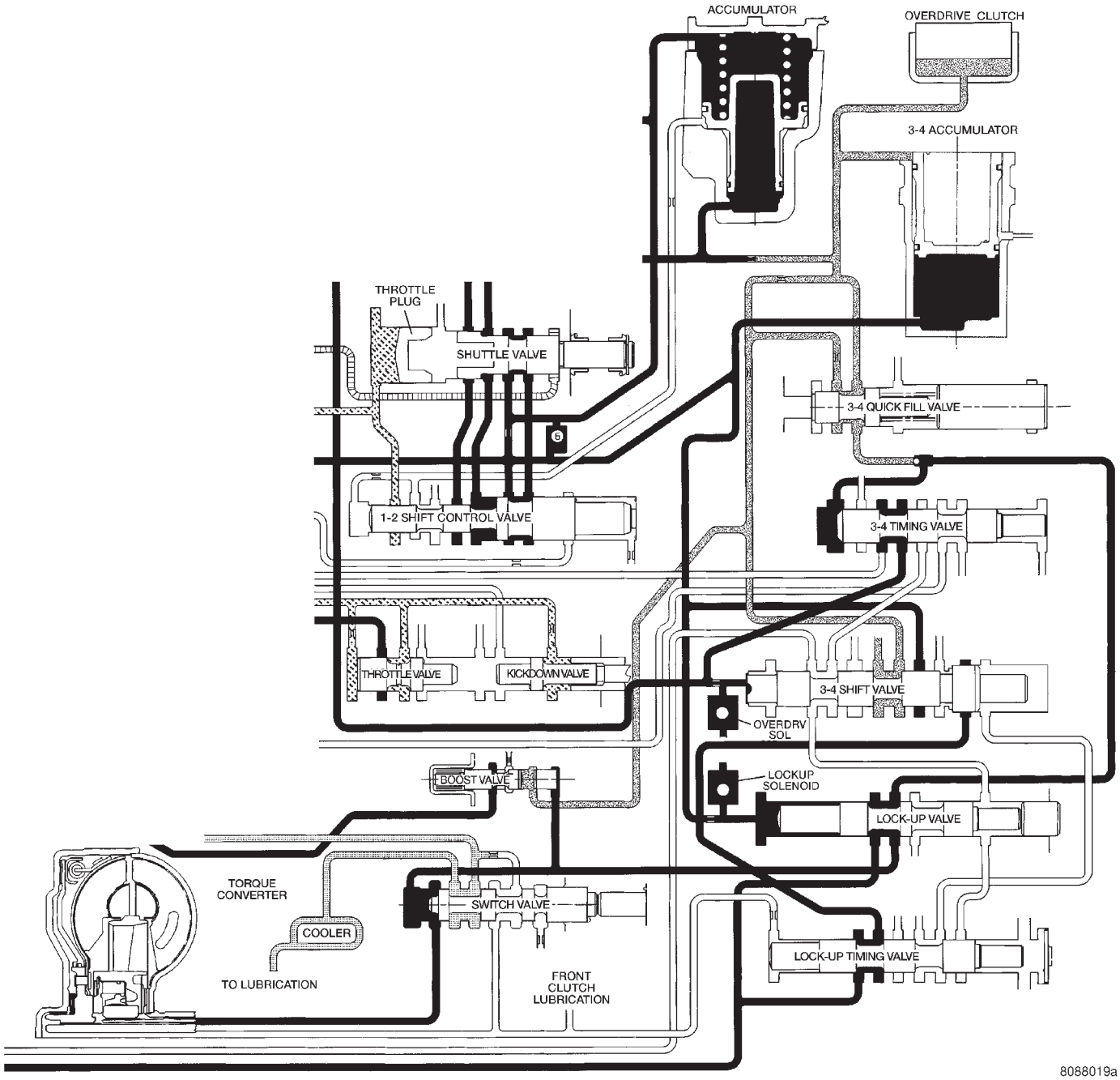


Fig. 267 Switch Valve-Torque Converter Locked

VALVE BODY (Continued)

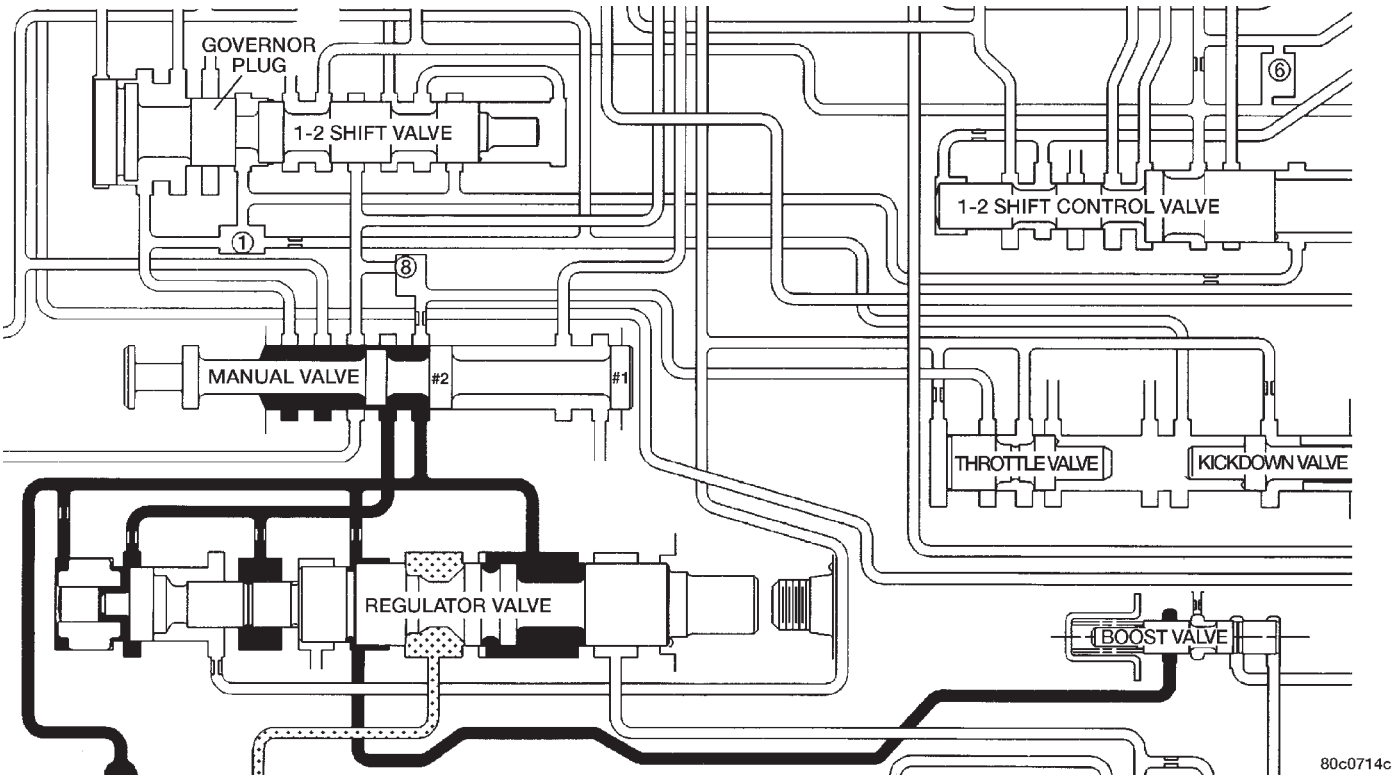


Fig. 268 Manual Valve

CONVERTER CLUTCH LOCK-UP VALVE

The torque converter clutch (TCC) lock-up valve controls the back (ON) side of the torque converter clutch. When the PCM energizes the TCC solenoid to engage the converter clutch piston, pressure is applied to the TCC lock-up valve which moves to the right and applies pressure to the torque converter clutch.

CONVERTER CLUTCH LOCK-UP TIMING VALVE

The torque converter clutch (TCC) lock-up timing valve is there to block any 4-3 downshift until the TCC is completely unlocked and the clutch is disengaged.

SHUTTLE VALVE

The assembly is contained in a bore in the valve body above the shift valves. When the manual valve is positioned in the Drive range, throttle pressure acts on the throttle plug of the shuttle valve (Fig. 260) to move it against a spring, increasing the spring force on the shuttle valve. During a part or full throttle 1-2 upshift, the throttle plug is bottomed by throttle pressure, holding the shuttle valve to the right against governor pressure, and opening a by–pass circuit. The shuttle valve controls the quality of the kickdown shift by restricting the rate of fluid discharge from the front clutch and servo release circuits. During a 3-2 kickdown, fluid discharges through the shuttle by-pass circuit. When the shuttle valve closes the by-pass circuit, fluid discharge is restricted and controlled for the application of the front band. During a 2-3 “lift foot” upshift, the shuttle valve by-passes the restriction to allow full fluid flow through the by-pass groove for a faster release of the band.

VALVE BODY (Continued)

BOOST VALVE

The boost valve (Fig. 269) provides increased fluid apply pressure to the overdrive clutch during 3-4 upshifts (Fig. 270), and when accelerating in fourth gear. The boost valve also serves to increase line pressure during torque converter lock-up.

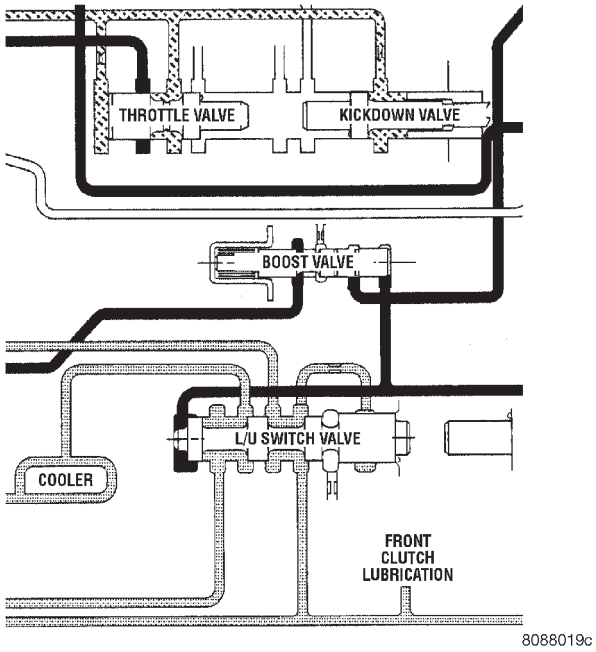


Fig. 269 Boost Valve Before Lock-up

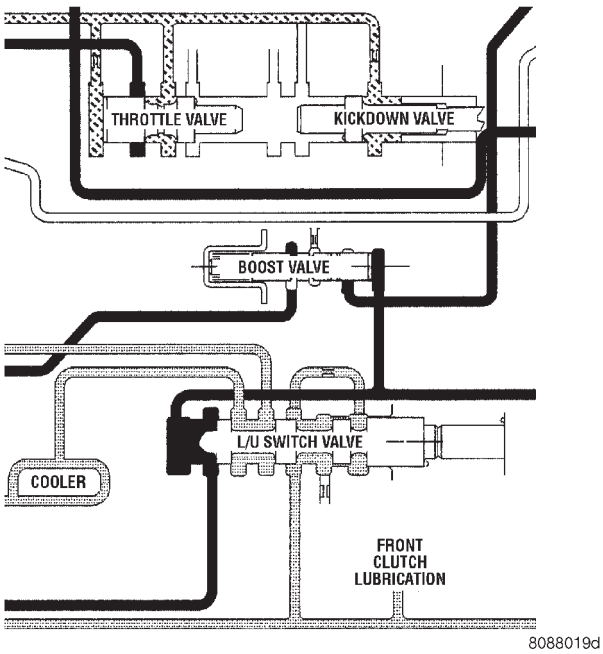


Fig. 270 Boost Valve After Lock-up

REMOVAL

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

The valve body can be disassembled for cleaning and inspection of the individual components.

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 (includes transmission temperature thermistor).
- Converter clutch/overdrive solenoid assembly and harness.
- Governor housing gasket.
- Solenoid case connector O-rings.

(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. 271).

(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.

(11) Lower valve body, rotate valve body away from case, pull park rod out of sprag, and remove valve body (Fig. 272).

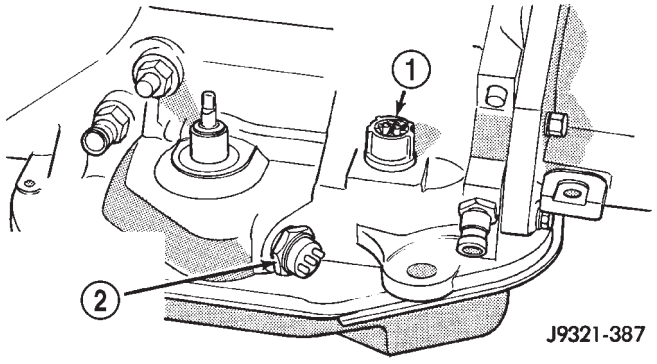


Fig. 271 Transmission Case Connector

1 - SOLENOID CASE CONNECTOR
2 - PARK/NEUTRAL POSITION SWITCH

VALVE BODY (Continued)

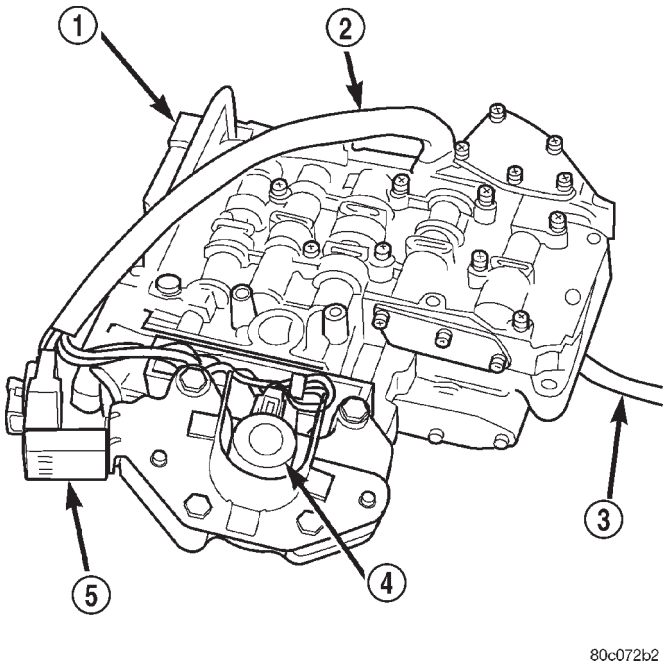


Fig. 272 Valve Body

1 - VALVE BODY
2 - WIRE HARNESS
3 - PARK ROD
4 - GOVERNOR PRESSURE SOLENOID
5 - GOVERNOR PRESSURE SENSOR

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) Disconnect wires from governor pressure sensor and solenoid.

(2) Remove screws attaching governor body and retainer plate to transfer plate.

(3) Remove retainer plate, governor body and gasket from transfer plate.

(4) Remove governor pressure sensor from governor body.

(5) 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.

(6) Remove small shoulder bolt that secures solenoid harness case connector to 3-4 accumulator housing (Fig. 273). Retain shoulder bolt. Either tape it to harness or thread it back into accumulator housing after connector removal.

(7) Unhook overdrive/converter solenoid harness from 3-4 accumulator cover plate (Fig. 274).

(8) Turn valve body over and remove screws that attach overdrive/converter solenoid assembly to valve body (Fig. 275).

(9) Remove solenoid and harness assembly from valve body (Fig. 276).

(10) Remove boost valve cover (Fig. 277).

(11) Remove boost valve retainer, valve spring and boost valve (Fig. 278).

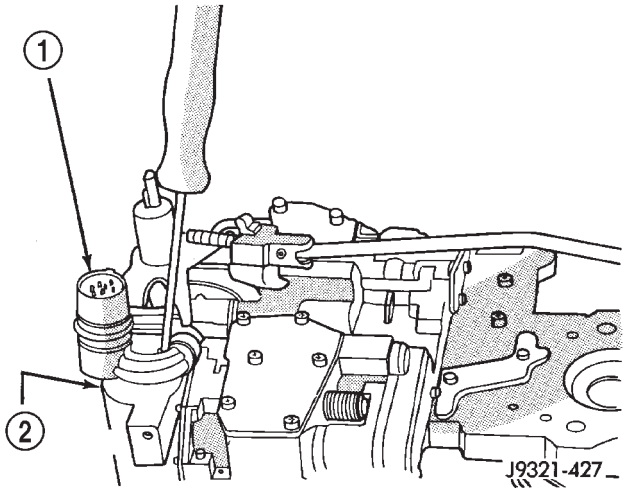


Fig. 273 Solenoid Harness Case Connector Shoulder Bolt

1 - SOLENOID HARNESS CASE CONNECTOR
2 - 3-4 ACCUMULATOR HOUSING

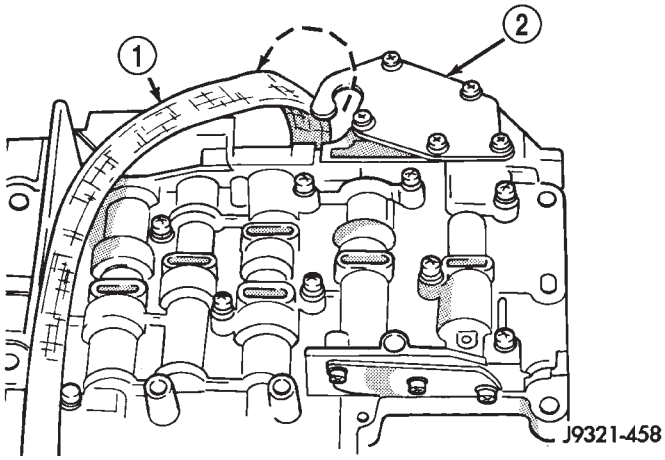


Fig. 274 Solenoid Harness Routing

1 - OVERDRIVE/CONVERTER SOLENOID WIRE HARNESS
2 - 3-4 ACCUMULATOR COVER PLATE

VALVE BODY (Continued)

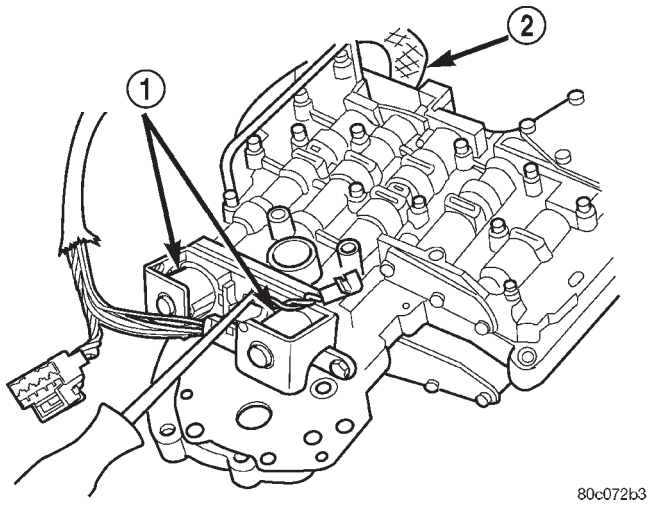


Fig. 275 Solenoid Assembly Screws

1 - OVERDRIVE/CONVERTER CLUTCH SOLENOID ASSEMBLY
2 - HARNESS

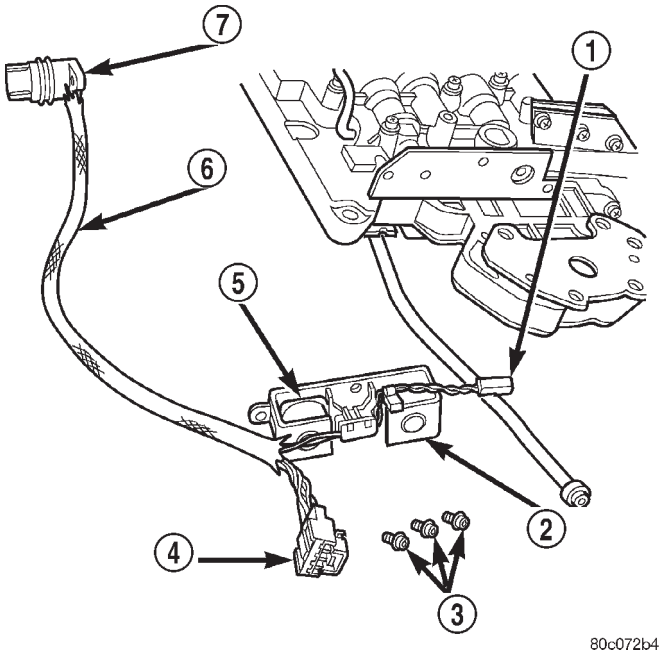


Fig. 276 Solenoid Assembly

1 - GOVERNOR SOLENOID WIRES
2 - CONVERTER CLUTCH SOLENOID
3 - SOLENOID SCREWS
4 - GOVERNOR SENSOR WIRES
5 - OVERDRIVE SOLENOID
6 - HARNESS
7 - CASE CONNECTOR

(12) Secure detent ball and spring with Retainer Tool 6583 (Fig. 279).

(13) Remove park rod E-clip and separate rod from manual lever (Fig. 280).

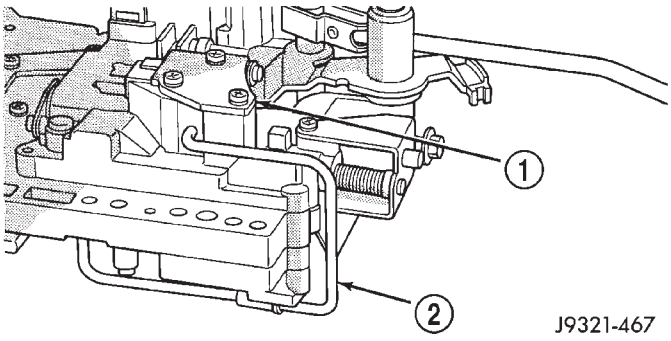


Fig. 277 Boost Valve Cover Location

1 - BOOST VALVE HOUSING AND COVER
2 - BOOST VALVE TUBE

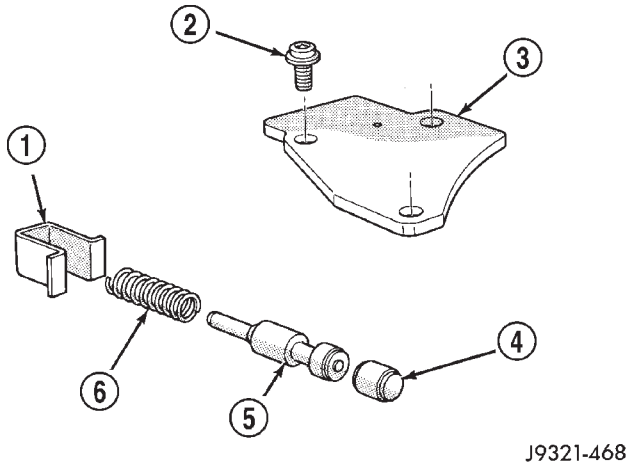


Fig. 278 Boost Valve Components

1 - SPRING AND VALVE RETAINER
2 - COVER SCREWS
3 - BOOST VALVE COVER
4 - BOOST VALVE PLUG
5 - BOOST VALVE
6 - BOOST VALVE SPRING

(14) Remove E-clip and washer that retains throttle lever shaft in manual lever (Fig. 281).

(15) Remove manual lever and throttle lever (Fig. 282). Rotate and lift manual lever off valve body and throttle lever shaft. Then slide throttle lever out of valve body.

(16) 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. 283).

VALVE BODY (Continued)

(17) Remove screws attaching pressure adjusting screw bracket to valve body and transfer plate (Fig. 284). Hold bracket firmly against spring tension while removing last screw.

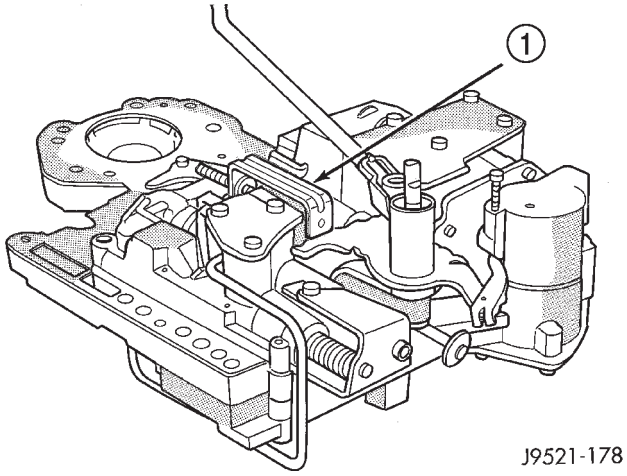


Fig. 279 Detent Ball Spring

1 - SPECIAL TOOL 6583 POSITIONED ON DETENT HOUSING

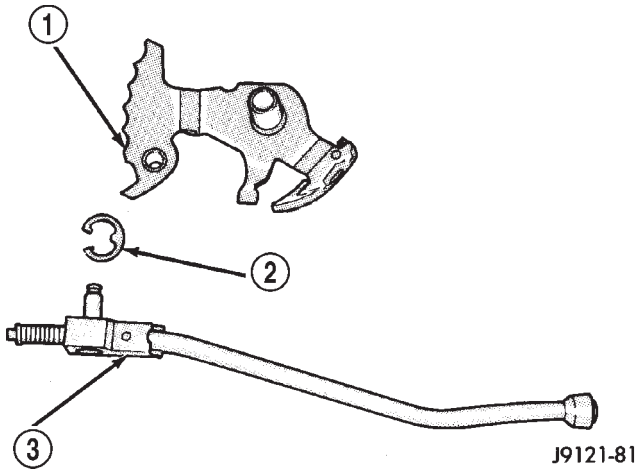


Fig. 280 Park Rod

1 - MANUAL LEVER
2 - E-CLIP
3 - PARK ROD

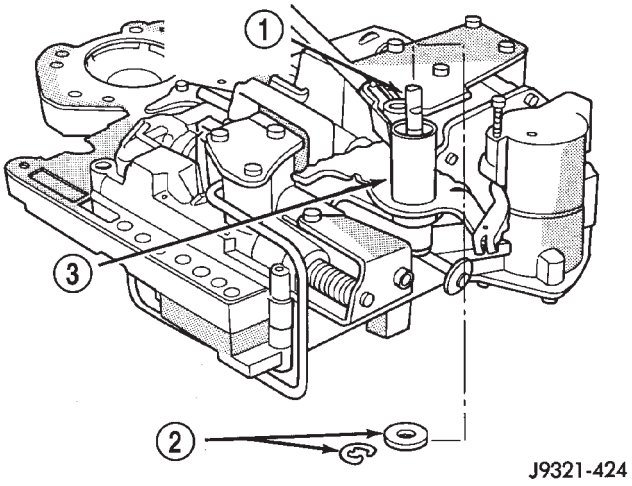


Fig. 281 Throttle Lever E-Clip And Washer

1 - THROTTLE LEVER SHAFT
2 - E-CLIP AND WASHER
3 - MANUAL SHAFT

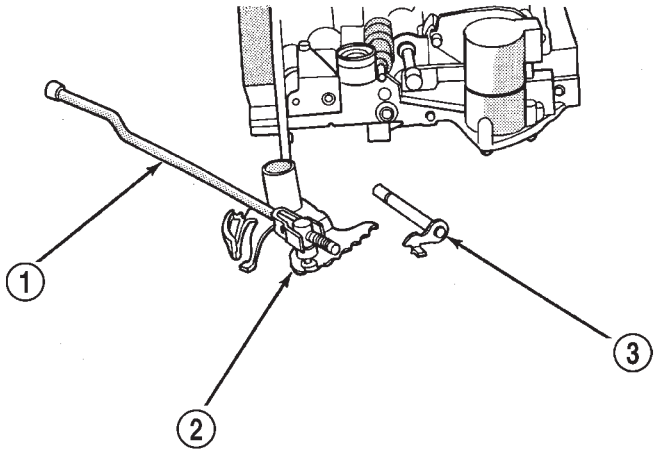


Fig. 282 Manual And Throttle Lever

1 - PARK ROD
2 - MANUAL LEVER ASSEMBLY
3 - THROTTLE LEVER

VALVE BODY (Continued)

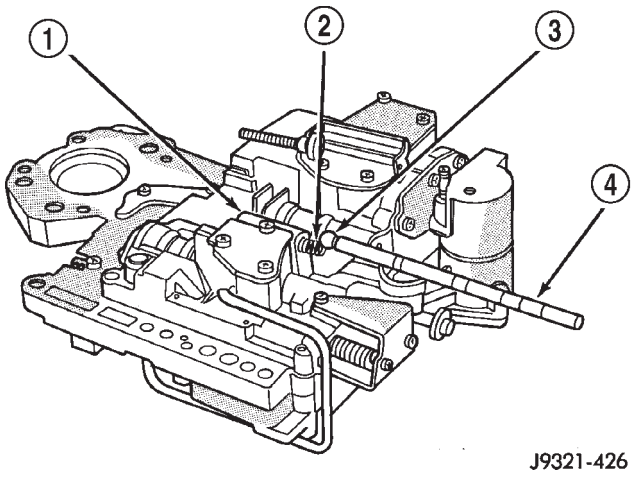


Fig. 283 Detent Ball And Spring

1 - DETENT HOUSING
2 - DETENT SPRING
3 - DETENT BALL
4 - PENCIL MAGNET

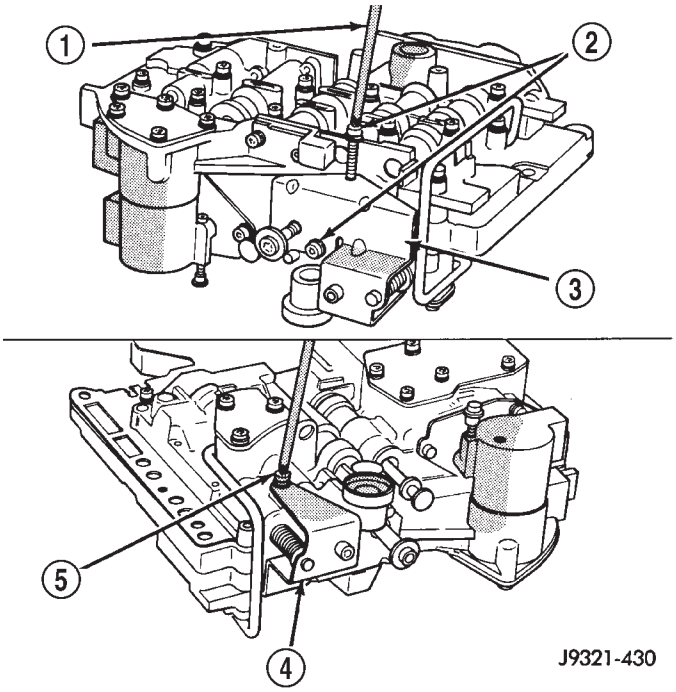


Fig. 284 Adjusting Screw Bracket Fastener

1 - T25 TORX™ BIT
2 - REMOVE THESE SCREWS FIRST
3 - BRACKET
4 - BRACKET
5 - REMOVE THIS SCREW LAST

(18) Remove adjusting screw bracket, line pressure adjusting screw, pressure regulator valve spring and switch valve spring (Fig. 285). Do not remove throttle pressure adjusting screw from bracket and do not disturb setting of either adjusting screw during removal.

(19) Turn upper housing over and remove switch valve, regulator valve and spring, and manual valve (Fig. 286).

(20) Remove kickdown detent, kickdown valve, and throttle valve and spring (Fig. 286).

(21) Loosen left-side 3-4 accumulator housing attaching screw about 2-3 threads. Then remove center and right-side housing attaching screws (Fig. 287).

(22) Carefully rotate 3-4 accumulator housing upward and remove 3-4 shift valve spring and converter clutch valve plug and spring (Fig. 288).

(23) Remove left-side screw and remove 3-4 accumulator housing from valve body (Fig. 289).

(24) Bend back tabs on boost valve tube brace (Fig. 290).

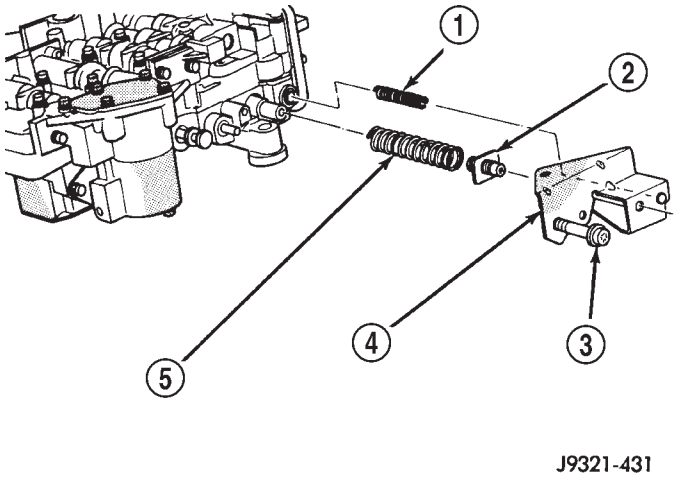


Fig. 285 Adjusting Screw Bracket

1 - SWITCH VALVE SPRING
2 - LINE PRESSURE SCREW
3 - THROTTLE PRESSURE ADJUSTING SCREW
4 - ADJUSTING SCREW BRACKET
5 - PRESSURE REGULATOR VALVE SPRING

(25) Remove boost valve connecting tube (Fig. 291). 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.

VALVE BODY (Continued)

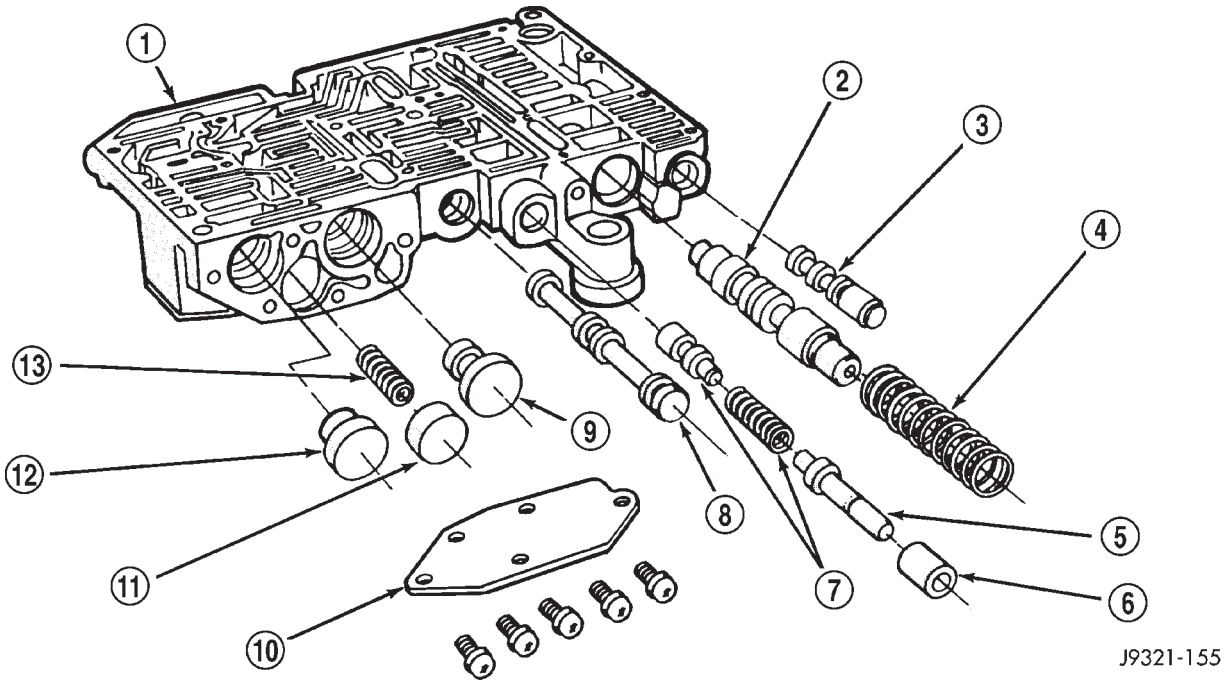


Fig. 286 Upper Housing Control Valve Locations

1 - UPPER HOUSING
2 - REGULATOR VALVE
3 - SWITCH VALVE
4 - REGULATOR VALVE SPRING
5 - KICKDOWN VALVE
6 - KICKDOWN DETENT
7 - THROTTLE VALVE AND SPRING
8 - MANUAL VALVE
9 - 1-2 GOVERNOR PLUG
10 - GOVERNOR PLUG COVER
11 - THROTTLE PLUG
12 - 2-3 GOVERNOR PLUG
13 - SHUTTLE VALVE PRIMARY SPRING

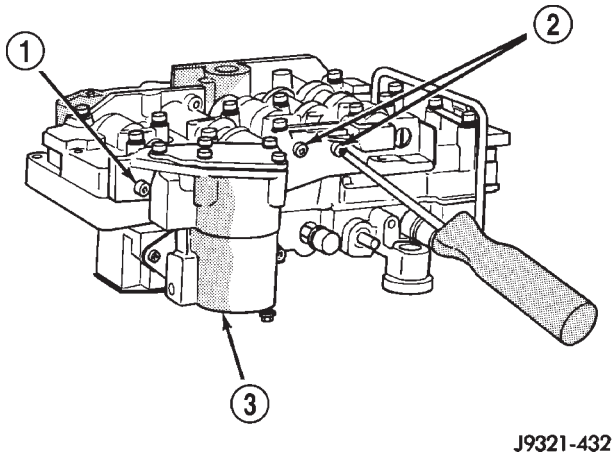


Fig. 287 Accumulator Housing Screw Locations

1 - LOOSEN THIS SCREW
2 - REMOVE THESE SCREWS
3 - 3-4 ACCUMULATOR HOUSING

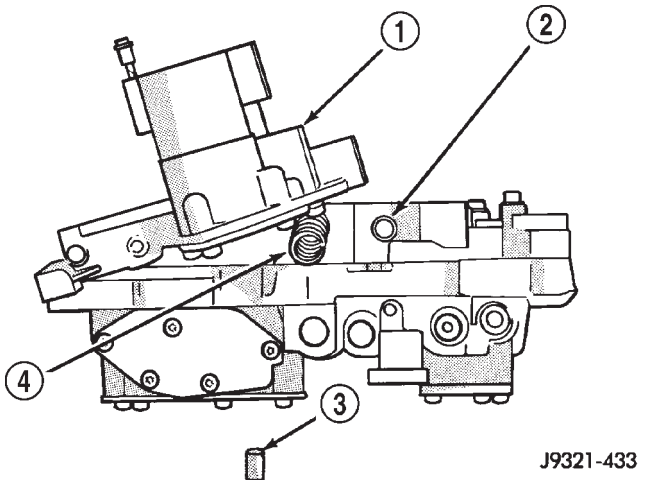


Fig. 288 3-4 Shift And Converter Clutch Valve Springs and Plug

1 - ACCUMULATOR HOUSING
2 - CONVERTER CLUTCH VALVE SPRING
3 - CLUTCH VALVE PLUG
4 - 3-4 SHIFT VALVE SPRING

VALVE BODY (Continued)

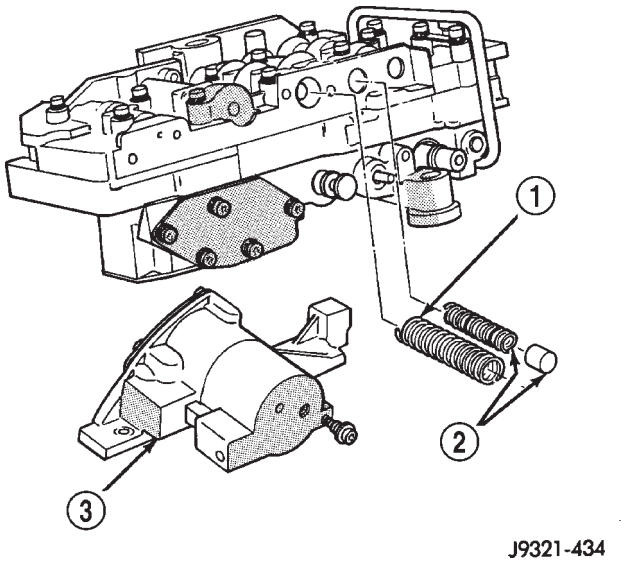


Fig. 289 Accumulator Housing, Valve Springs, and Plug

1 - 3-4 SHIFT VALVE SPRING
2 - CONVERTER CLUTCH VALVE SPRING AND PLUG
3 - 3-4 ACCUMULATOR HOUSING

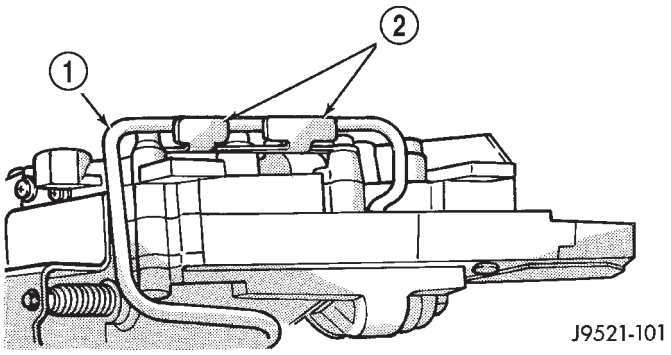


Fig. 290 Boost Valve Tube Brace

1 - BOOST VALVE TUBE
2 - TUBE BRACE (DOUBLE TAB)

(26) Turn valve body over so lower housing is facing upward (Fig. 292). 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.

(27) Remove screws attaching valve body lower housing to upper housing and transfer plate (Fig. 292). Note position of boost valve tube brace for assembly reference.

(28) Remove lower housing and overdrive separator plate from transfer plate (Fig. 292).

(29) Remove the Number 10 check ball from the transfer plate (Fig. 293). The check ball is approximately 4.8 mm (3/16 in.) in diameter.

(30) Remove transfer plate from upper housing (Fig. 294).

(31) Turn transfer plate over so upper housing separator plate is facing upward.

(32) Remove upper housing separator plate from transfer plate (Fig. 295). Note position of filter in separator plate for assembly reference.

(33) Remove rear clutch and rear servo check balls from transfer plate. Note check ball location for assembly reference (Fig. 296).

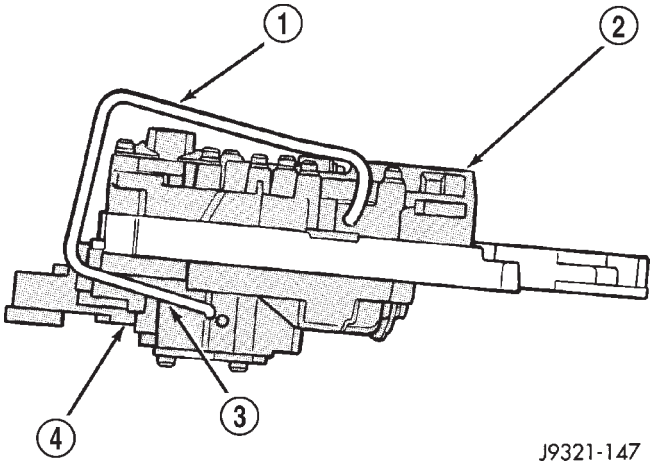


Fig. 291 Boost Valve Tube

1 - BOOST VALVE TUBE
2 - LOWER HOUSING
3 - DISENGAGE THIS END OF TUBE FIRST
4 - UPPER HOUSING

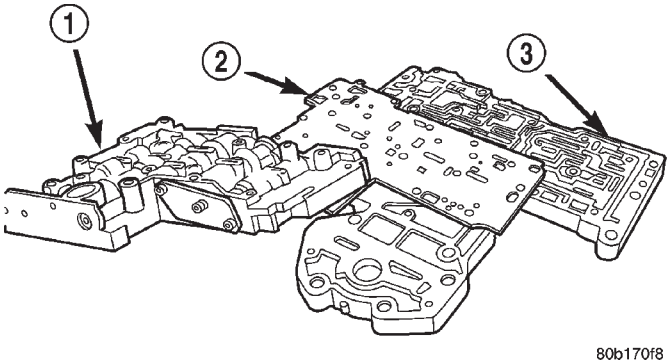


Fig. 292 Lower Housing

1 - LOWER HOUSING
2 - OVERDRIVE SEPARATOR PLATE
3 - TRANSFER PLATE AND UPPER HOUSING

VALVE BODY (Continued)

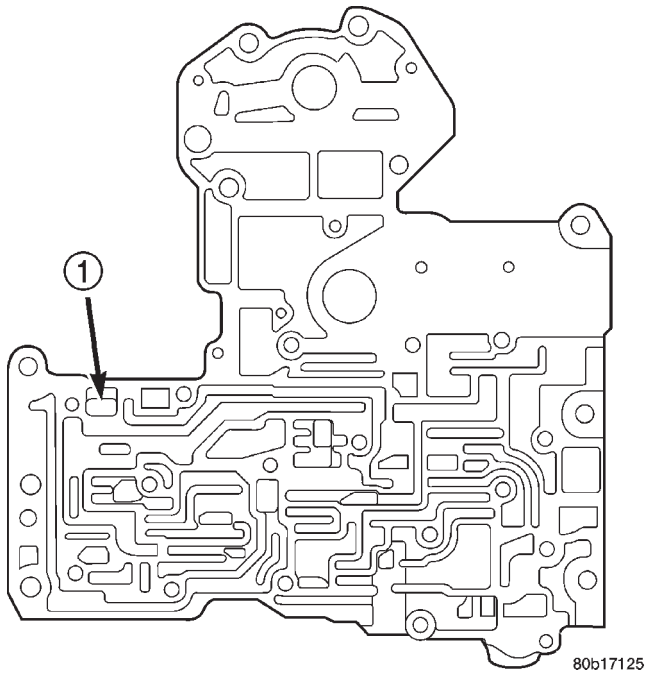


Fig. 293 Number 10 Check Ball

1 - NUMBER 10 CHECK BALL (3/16″)

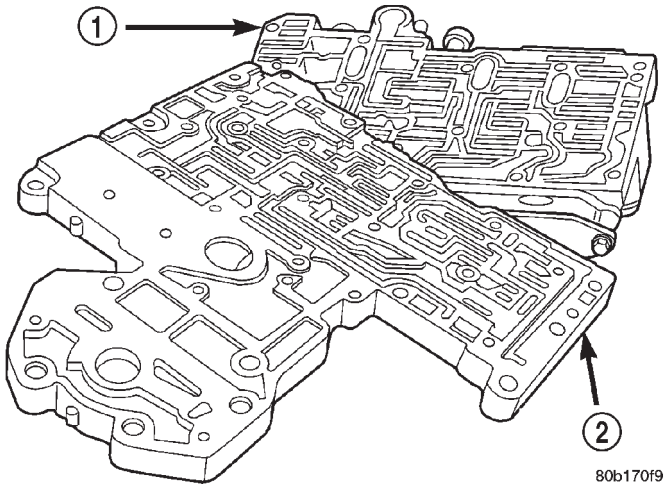


Fig. 294 Transfer Plate

1 - UPPER HOUSING
2 - TRANSFER PLATE

VALVE BODY UPPER HOUSING

(1) Note location of check balls in valve body upper housing (Fig. 297). Then remove the one large diameter and the six smaller diameter check balls.

(2) Remove governor plug and shuttle valve covers (Fig. 299).

(3) Remove E-clip that secures shuttle valve secondary spring on valve stem (Fig. 298).

(4) Remove throttle plug, primary spring, shuttle valve, secondary spring, and spring guides (Fig. 299).

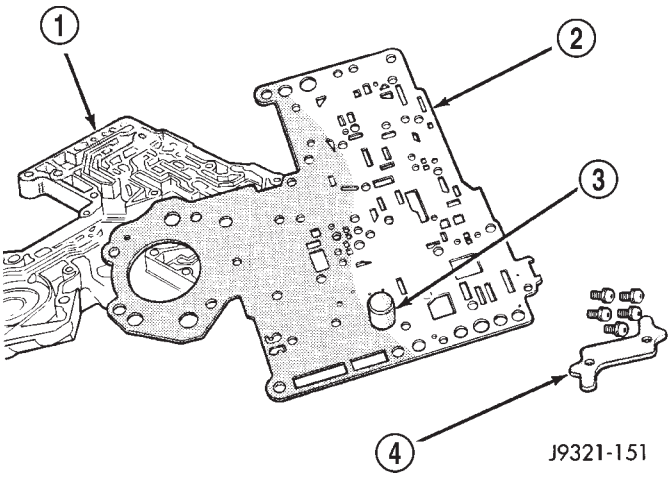


Fig. 295 Upper Housing Separator Plate

1 - TRANSFER PLATE
2 - UPPER HOUSING SEPARATOR PLATE
3 - FILTER SCREEN
4 - BRACE

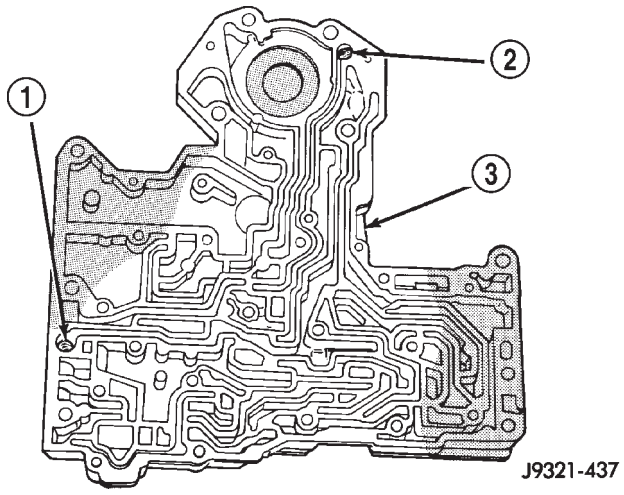


Fig. 296 Rear Clutch and Rear Servo Check Ball Locations

1 - REAR CLUTCH CHECK BALL
2 - REAR SERVO CHECK BALL
3 - TRANSFER PLATE

(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. 286).

(7) Turn upper housing around and remove limit valve and shift valve covers (Fig. 300).

(8) Remove limit valve housing. Then remove retainer, spring, limit valve, and 2-3 throttle plug from limit valve housing (Fig. 300).

(9) Remove 1-2 shift control valve and spring (Fig. 300).

(10) Remove 1-2 shift valve and spring (Fig. 300).

VALVE BODY (Continued)

(11) Remove 2-3 shift valve and spring from valve body (Fig. 300).

(12) Remove pressure plug cover (Fig. 300).

(13) Remove line pressure plug, sleeve, throttle pressure plug and spring (Fig. 300).

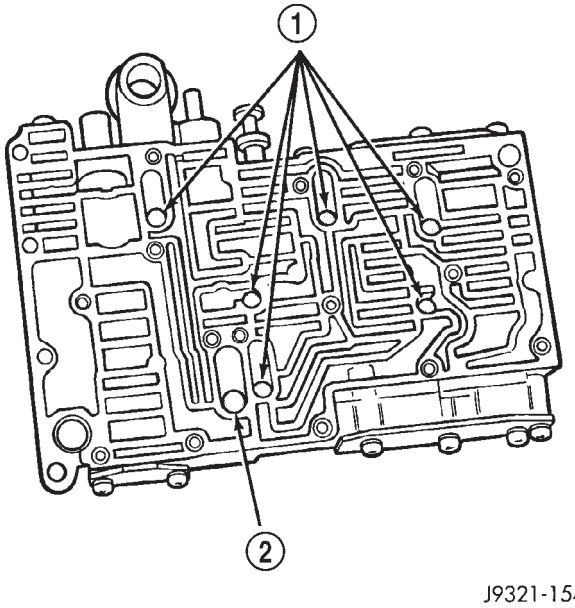


Fig. 297 Check Ball Locations In Upper Housing

1 - SMALL DIAMETER CHECK BALLS (6)
2 - LARGE DIAMETER CHECK BALL (1)

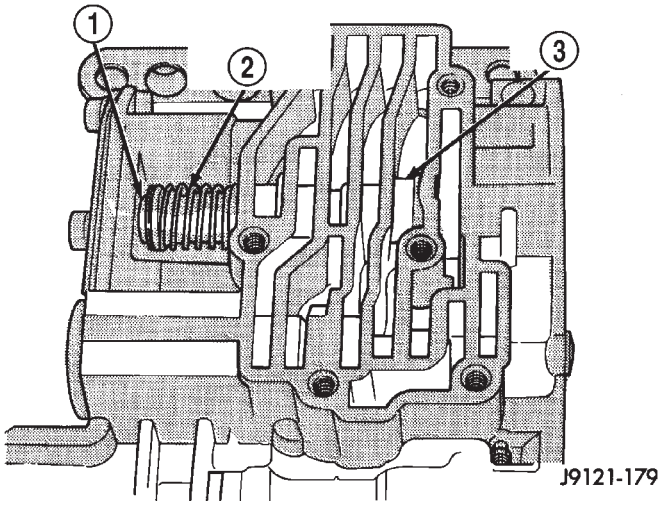


Fig. 298 Shuttle Valve E-Clip And Secondary Spring

1 - E-CLIP
2 - SECONDARY SPRING AND GUIDES
3 - SHUTTLE VALVE

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. 301).

(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. 302).

CLEANING

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.

INSPECTION

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 straightedge to check surface flatness. Minor scratches may be removed with crocus cloth using only very light pressure.

VALVE BODY (Continued)

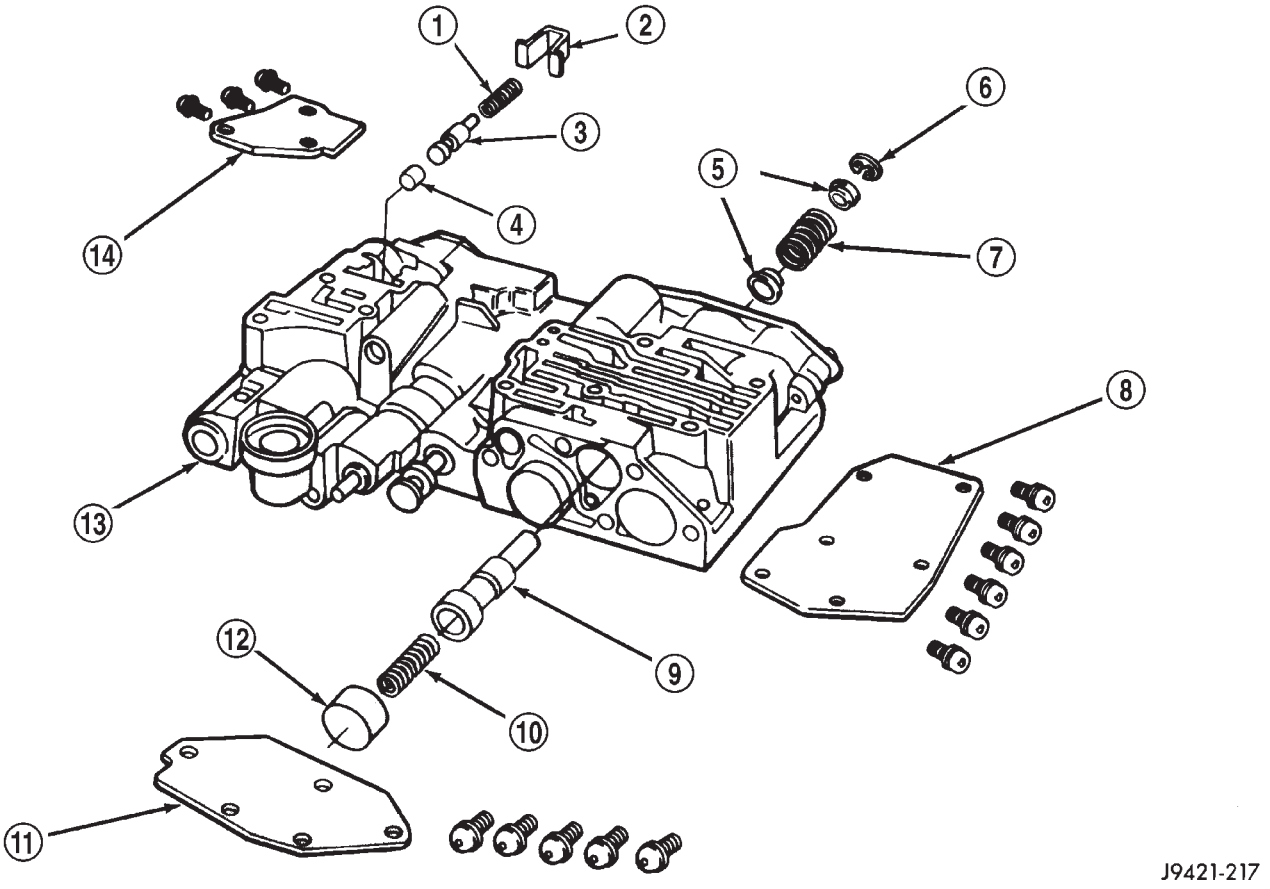


Fig. 299 Shuttle and Boost Valve Location

1 - SPRING	8 - SHUTTLE VALVE COVER
2 - RETAINER	9 - SHUTTLE VALVE
3 - BOOST VALVE	10 - SHUTTLE VALVE PRIMARY SPRING
4 - BOOST VALVE PLUG	11 - GOVERNOR PLUG COVER
5 - SPRING GUIDES	12 - THROTTLE PLUG
6 - E-CLIP	13 - UPPER HOUSING
7 - SHUTTLE VALVE SECONDARY SPRING	14 - BOOST VALVE COVER

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.

VALVE BODY (Continued)

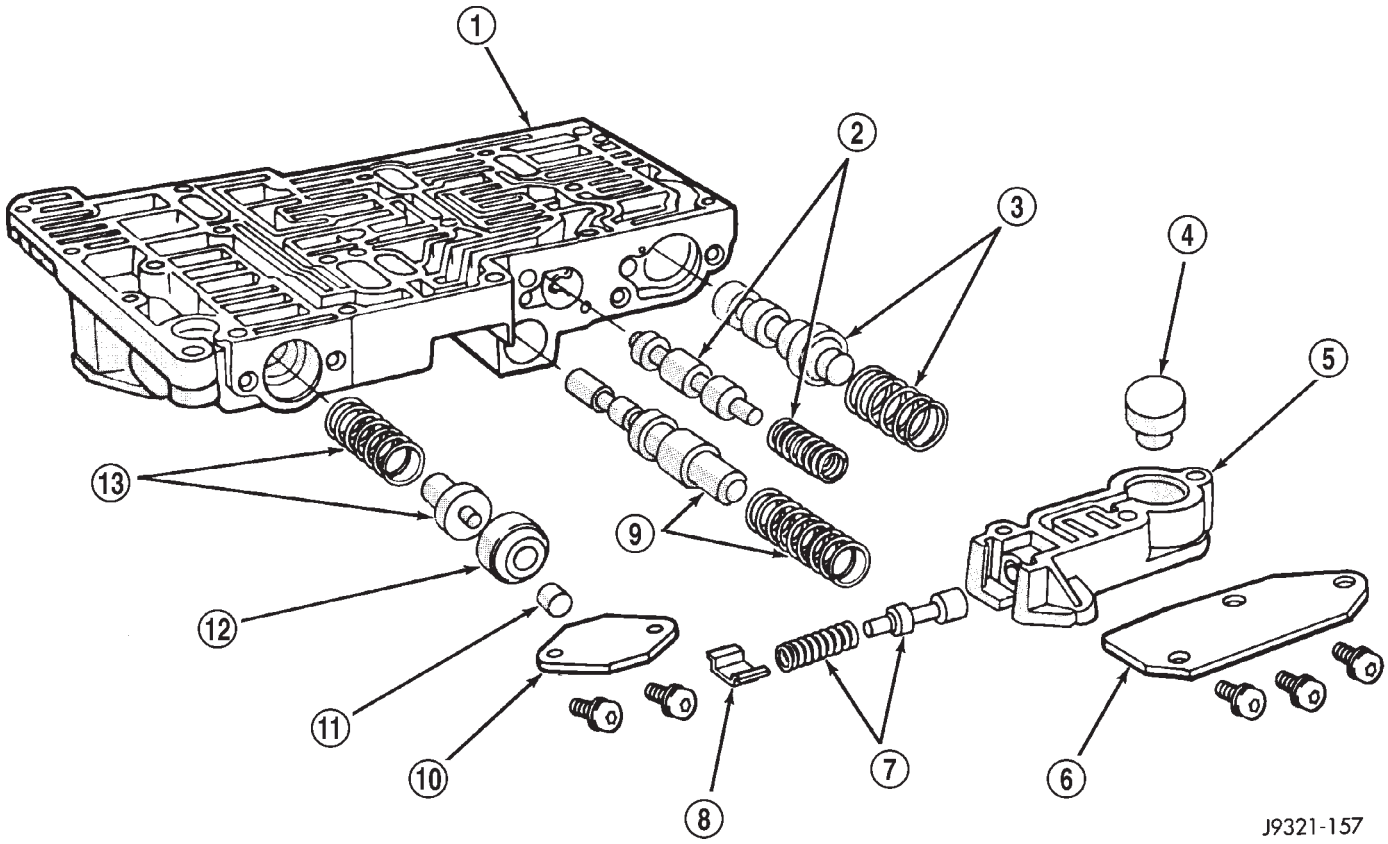


Fig. 300 Upper Housing Shift Valve and Pressure Plug Locations

1 - UPPER HOUSING
2 - 1-2 SHIFT VALVE AND SPRING
3 - 2-3 SHIFT VALVE AND SPRING
4 - 2-3 THROTTLE PLUG
5 - LIMIT VALVE HOUSING
6 - LIMIT VALVE COVER
7 - LIMIT VALVE AND SPRING
8 - RETAINER
9 - 1-2 SHIFT CONTROL VALVE AND SPRING
10 - PRESSURE PLUG COVER
11 - LINE PRESSURE PLUG
12 - PLUG SLEEVE
13 - THROTTLE PRESSURE SPRING AND PLUG

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

VALVE BODY (Continued)

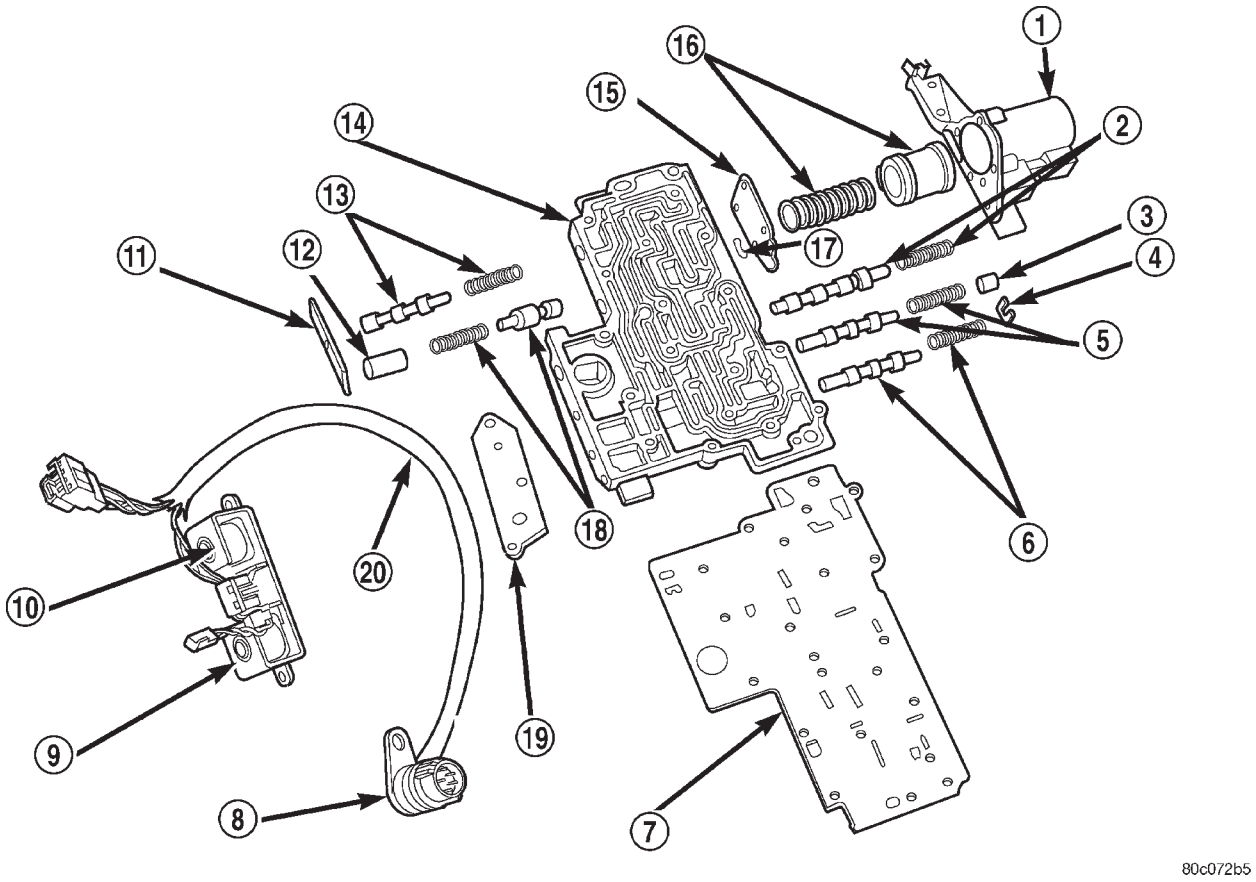


Fig. 301 Lower Housing Shift Valves and Springs

1 - 3-4 ACCUMULATOR HOUSING
2 - 3-4 SHIFT VALVE AND SPRING
3 - PLUG
4 - SPRING RETAINER
5 - CONVERTER CLUTCH VALVE AND SPRING
6 - CONVERTER CLUTCH TIMING VALVE AND SPRING
7 - OVERDRIVE SEPARATOR PLATE
8 - CASE CONNECTOR
9 - CONVERTER CLUTCH SOLENOID
10 - OVERDRIVE SOLENOID
11 - TIMING VALVE COVER
12 - PLUG
13 - 3-4 TIMING VALVE AND SPRING
14 - LOWER HOUSING
15 - ACCUMULATOR END PLATE
16 - 3-4 ACCUMULATOR PISTON AND SPRING
17 - E-CLIP
18 - 3-4 QUICK FILL SPRING AND VALVE
19 - SOLENOID GASKET
20 - HARNESS

VALVE BODY (Continued)

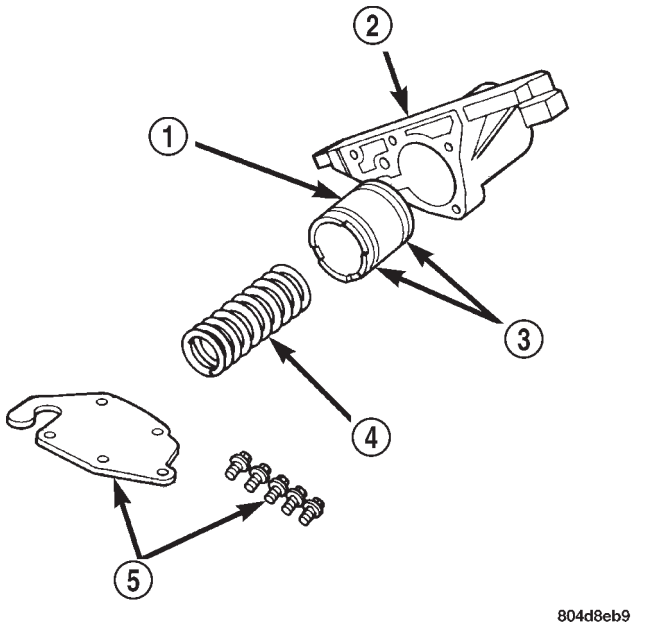


Fig. 302 3-4 Accumulator and Housing

1 - ACCUMULATOR PISTON
2 - 3-4 ACCUMULATOR HOUSING
3 - TEFLON SEALS
4 - PISTON SPRING
5 - COVER PLATE AND SCREWS

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. 301).

(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. 302).

(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. 303).

(2) Install filter screen in upper housing separator plate (Fig. 304).

(3) Align and position upper housing separator plate on transfer plate (Fig. 305).

(4) Install brace plate (Fig. 305). 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.

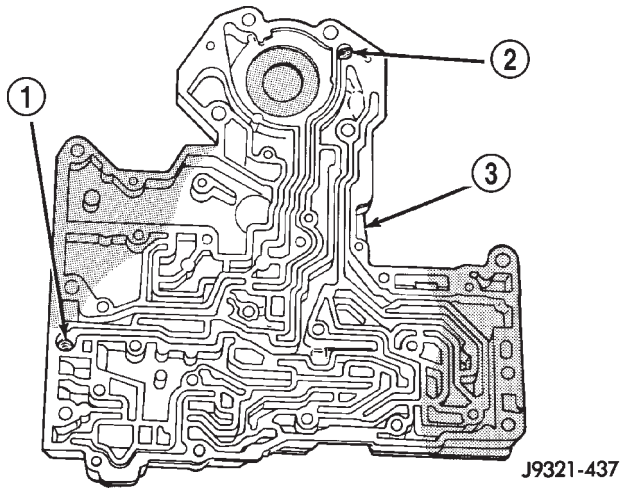


Fig. 303 Rear Clutch And Rear Servo Check Ball Locations

1 - REAR CLUTCH CHECK BALL
2 - REAR SERVO CHECK BALL
3 - TRANSFER PLATE

VALVE BODY (Continued)

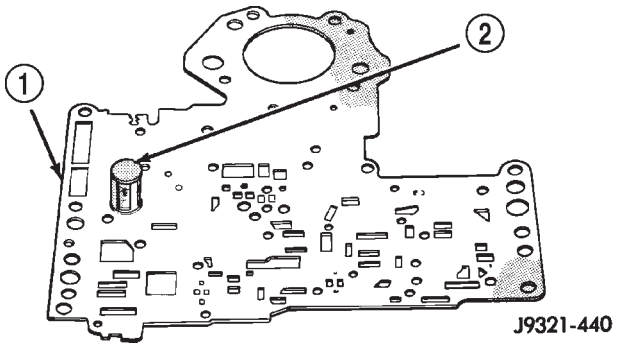


Fig. 304 Separator Plate Filter Screen Installation

1 - UPPER HOUSING SEPARATOR PLATE
2 - FILTER SCREEN

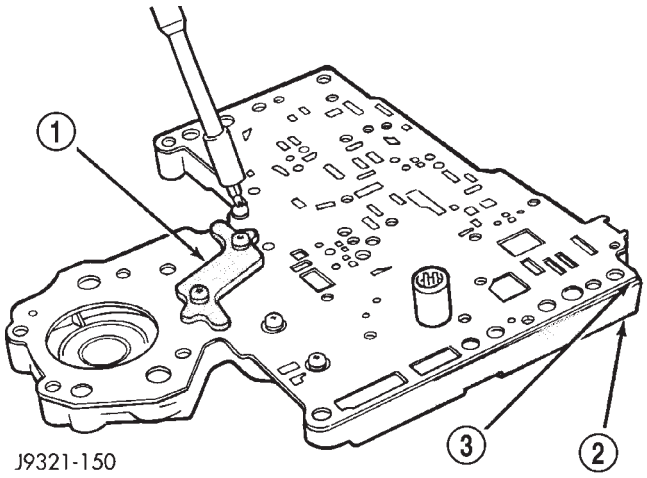


Fig. 305 Brace Plate

1 - BRACE
2 - TRANSFER PLATE
3 - SEPARATOR 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. 306). 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.

(2) Position assembled transfer plate and upper housing separator plate on upper housing (Fig. 307). Be sure filter screen is seated in proper housing recess.

(3) Install the Number 10 check ball into the transfer plate (Fig. 308). The check ball is approximately 4.8 mm (3/16 in.) in diameter.

(4) Position lower housing separator plate on transfer plate (Fig. 309).

(5) Install lower housing on assembled transfer plate and upper housing (Fig. 310).

(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. 310).

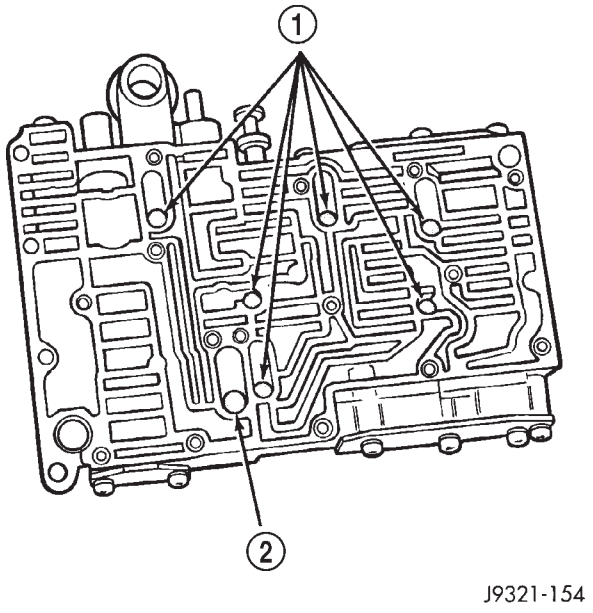


Fig. 306 Check Ball Locations In Upper Housing

1 - SMALL DIAMETER CHECK BALLS (6)
2 - LARGE DIAMETER CHECK BALL (1)

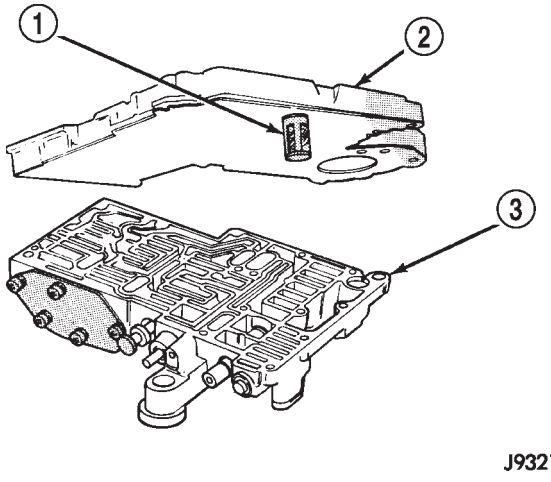


Fig. 307 Installing Transfer Plate On Upper Housing

1 - FILTER SCREEN
2 - TRANSFER PLATE/SEPARATOR PLATE ASSEMBLY
3 - UPPER HOUSING

VALVE BODY (Continued)

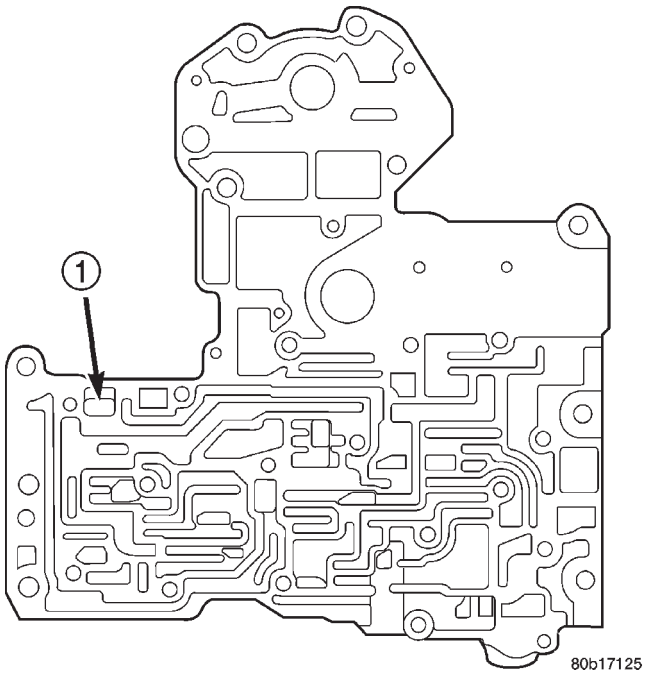


Fig. 308 Number 10 Check Ball

1 - NUMBER 10 CHECK BALL (3/16″)

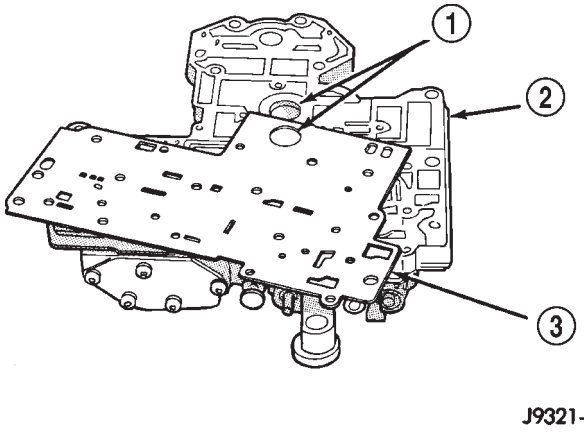


Fig. 309 Lower Housing Separator Plate

1 - BE SURE TO ALIGN BORES
2 - TRANSFER PLATE
3 - LOWER HOUSING (OVERDRIVE) SEPARATOR PLATE

UPPER HOUSING VALVE AND PLUG

Refer to (Fig. 311), (Fig. 312) and (Fig. 313) to perform the following steps.

(1) Lubricate valves, plugs, springs with clean transmission fluid.

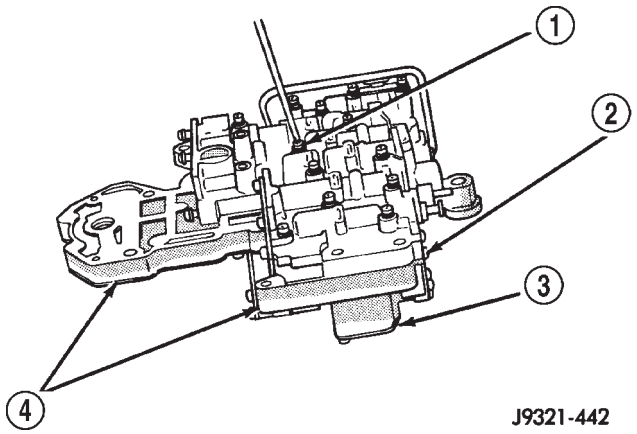


Fig. 310 Installing Lower Housing On Transfer Plate And Upper Housing

1 - VALVE BODY SCREWS (13)
2 - LOWER HOUSING
3 - UPPER HOUSING
4 - TRANSFER PLATE

(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.

VALVE BODY (Continued)

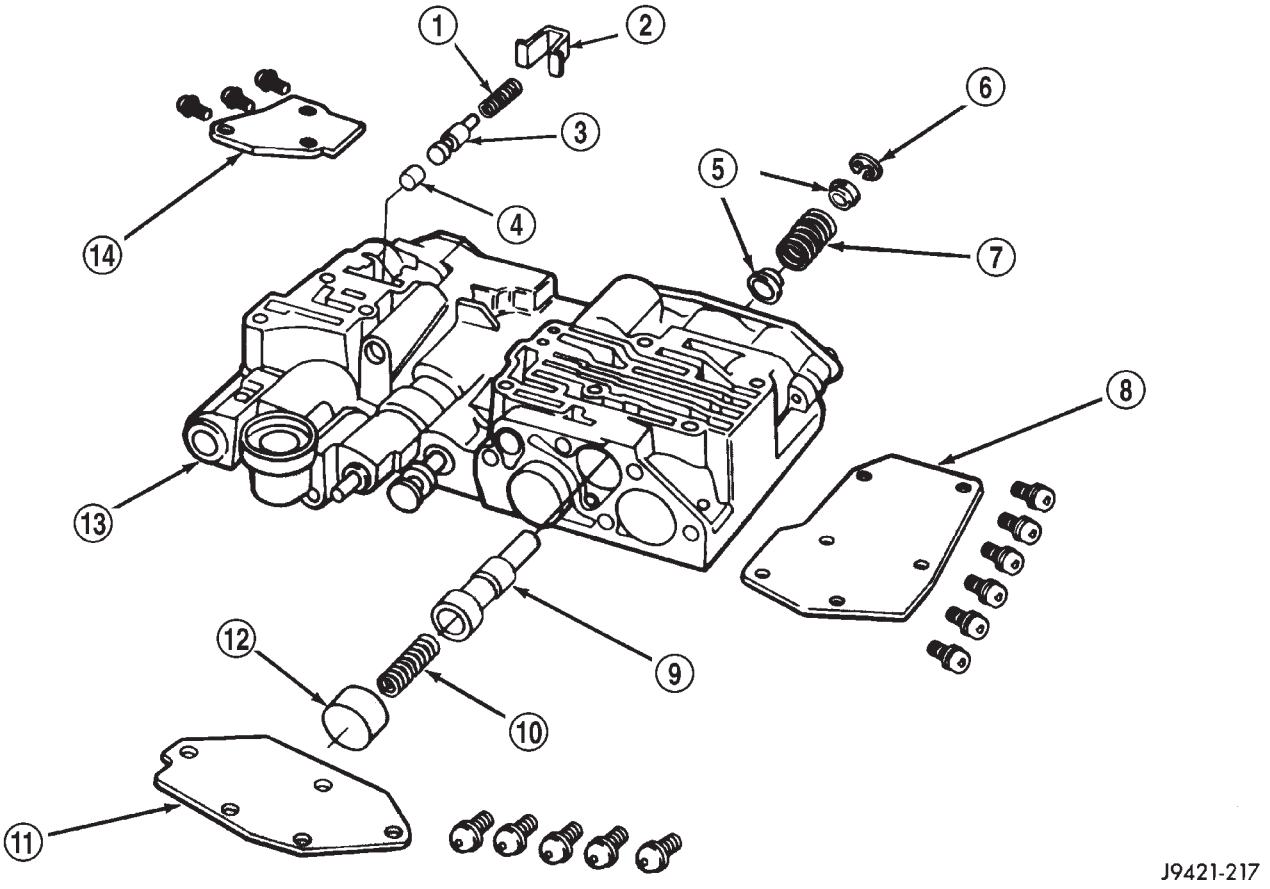


Fig. 311 Shuttle and Boost Valve Locations

1 - SPRING
2 - RETAINER
3 - BOOST VALVE
4 - BOOST VALVE PLUG
5 - SPRING GUIDES
6 - E-CLIP
7 - SHUTTLE VALVE SECONDARY SPRING
8 - SHUTTLE VALVE COVER
9 - SHUTTLE VALVE
10 - SHUTTLE VALVE PRIMARY SPRING
11 - GOVERNOR PLUG COVER
12 - THROTTLE PLUG
13 - UPPER HOUSING
14 - BOOST VALVE COVER

VALVE BODY (Continued)

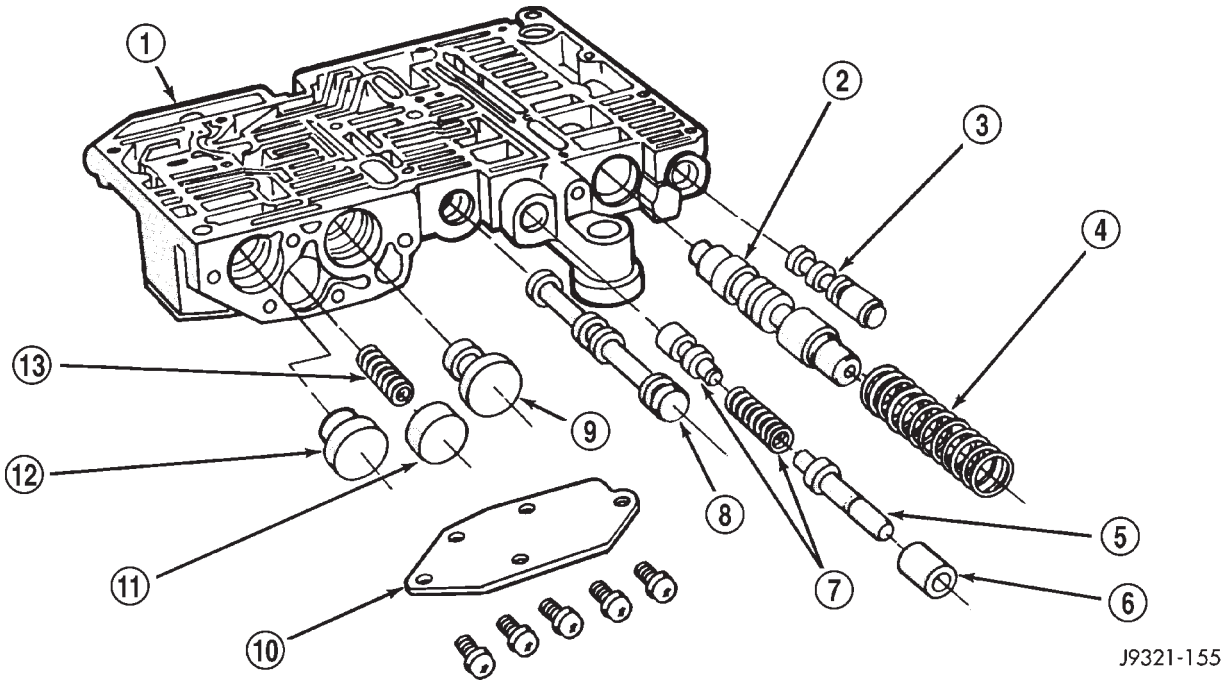


Fig. 312 Upper Housing Control Valve Locations

1 - UPPER HOUSING
2 - REGULATOR VALVE
3 - SWITCH VALVE
4 - REGULATOR VALVE SPRING
5 - KICKDOWN VALVE
6 - KICKDOWN DETENT
7 - THROTTLE VALVE AND SPRING
8 - MANUAL VALVE
9 - 1-2 GOVERNOR PLUG
10 - GOVERNOR PLUG COVER
11 - THROTTLE PLUG
12 - 2-3 GOVERNOR PLUG
13 - SHUTTLE VALVE PRIMARY SPRING

VALVE BODY (Continued)

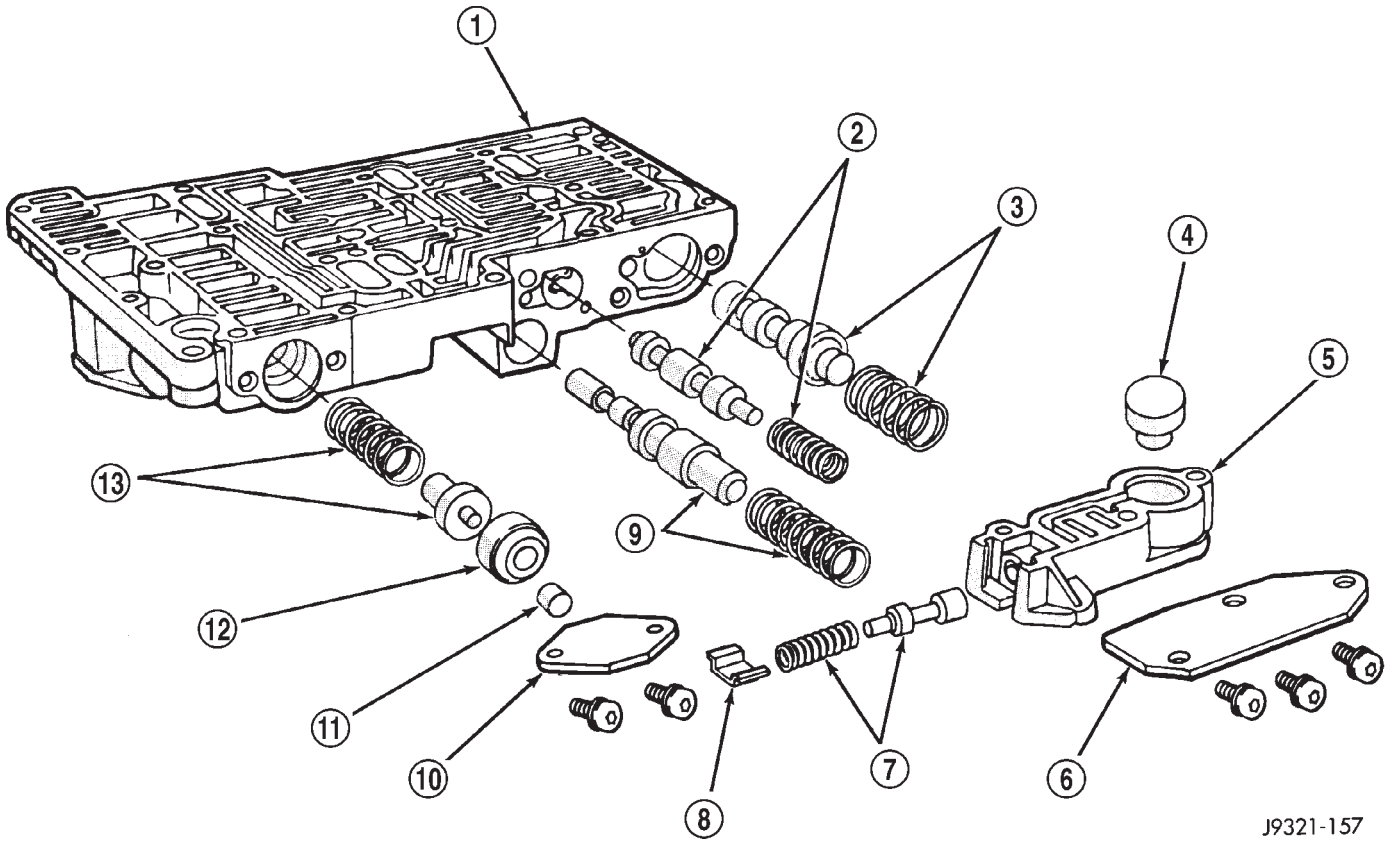


Fig. 313 Upper Housing Shift Valve and Pressure Plug Locations

1 - UPPER HOUSING
2 - 1-2 SHIFT VALVE AND SPRING
3 - 2-3 SHIFT VALVE AND SPRING
4 - 2-3 THROTTLE PLUG
5 - LIMIT VALVE HOUSING
6 - LIMIT VALVE COVER
7 - LIMIT VALVE AND SPRING
8 - RETAINER
9 - 1-2 SHIFT CONTROL VALVE AND SPRING
10 - PRESSURE PLUG COVER
11 - LINE PRESSURE PLUG
12 - PLUG SLEEVE
13 - THROTTLE PRESSURE SPRING AND PLUG

BOOST VALVE TUBE AND BRACE

(1) Position valve body assembly so lower housing is facing upward (Fig. 314).

(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. 314).

(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. 315).

(6) Install and finger tighten three screws that secure tube brace to valve body housings (Fig. 315).

(7) Bend tube brace tabs up and against tube to hold it in position (Fig. 316).

(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.

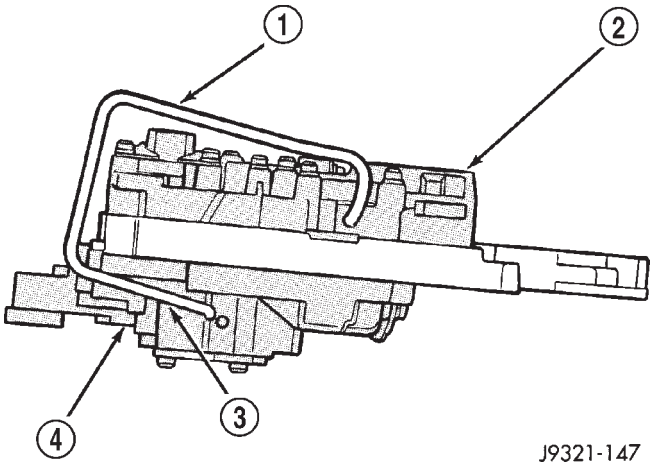


Fig. 314 Boost Valve Tube

1 - BOOST VALVE TUBE
2 - LOWER HOUSING
3 - DISENGAGE THIS END OF TUBE FIRST
4 - UPPER HOUSING

VALVE BODY (Continued)

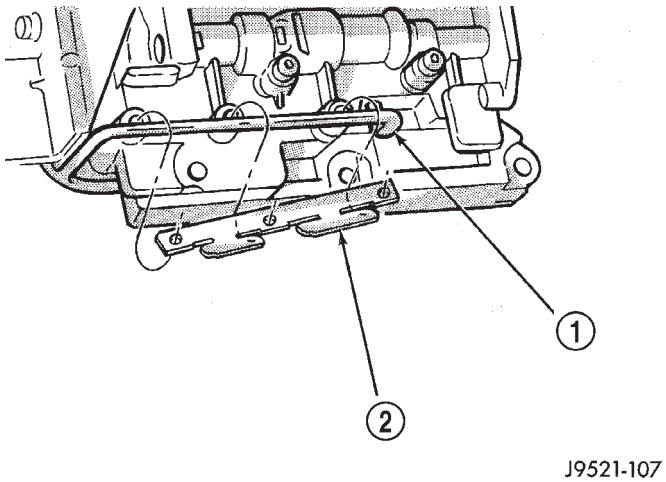


Fig. 315 Boost Valve Tube And Brace

1 - BOOST VALVE TUBE
2 - TUBE BRACE

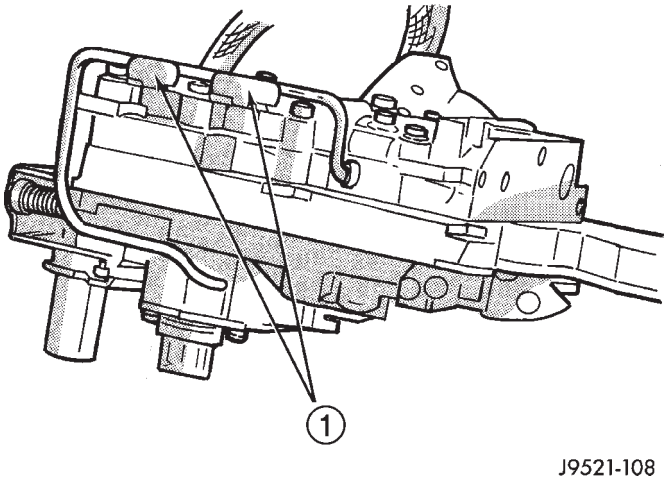


Fig. 316 Securing Boost Valve Tube With Brace Tabs

1 - BEND TABS UP AGAINST TUBE AS SHOWN

3-4 ACCUMULATOR

(1) Position converter clutch valve and 3-4 shift valve springs in housing (Fig. 317).

(2) Loosely attach accumulator housing with right-side screw (Fig. 317). 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. 318). Tighten screws to 4 N·m (35 in. lbs.).

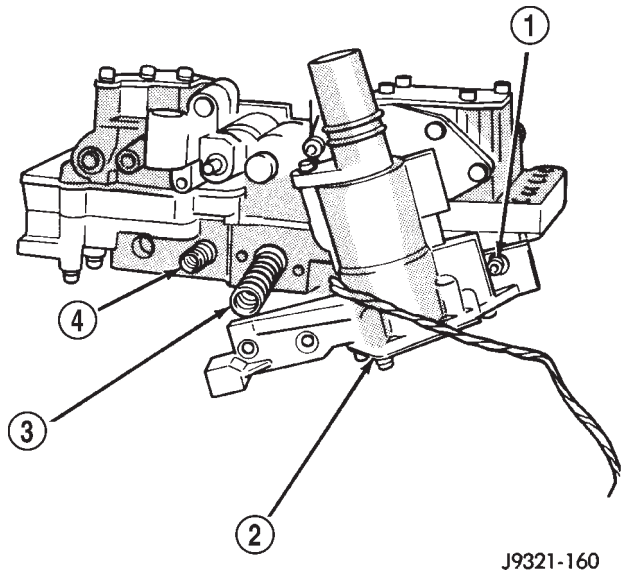


Fig. 317 Converter Clutch And 3-4 Shift Valve Springs

1 - RIGHT-SIDE SCREW
2 - 3-4 ACCUMULATOR
3 - 3-4 SHIFT VALVE SPRING
4 - CONVERTER CLUTCH VALVE SPRING

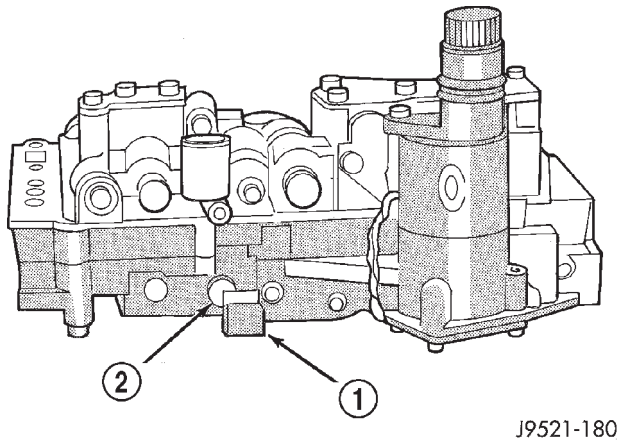


Fig. 318 Seating 3-4 Accumulator On Lower Housing

1 - ACCUMULATOR BOX
2 - CONVERTER CLUTCH VALVE PLUG

VALVE BODY (Continued)

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. 319).

(4) Install throttle lever in upper housing. Then install manual lever over throttle lever and start manual lever into 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. 320).

(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) Perform Line Pressure and Throttle Pressure adjustments. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC/VALVE BODY - ADJUSTMENTS)

(18) Lubricate solenoid case connector O-rings and shaft of manual lever with light coat of petroleum jelly.

(19) 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. 321). Seat tang in dimple before tightening connector screw.

(20) Install solenoid assembly and gasket. Tighten solenoid attaching screws to 8 N·m (72 in. lbs.) torque.

(21) Verify that solenoid wire harness is properly routed (Fig. 322). Solenoid harness must be clear of manual lever and park rod and not be pinched between accumulator housing and cover.

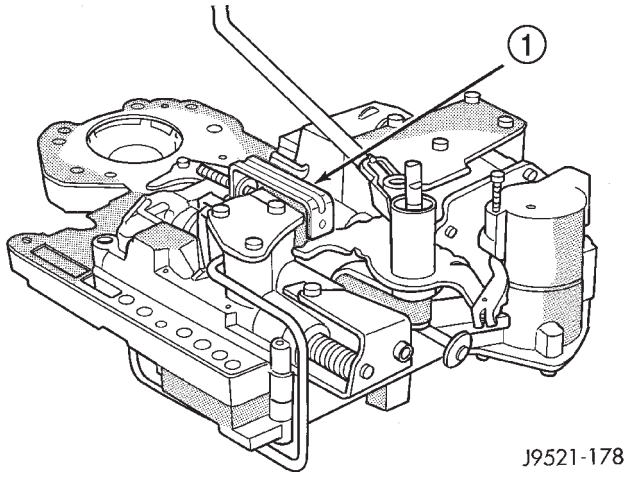


Fig. 319 Detent Ball Spring

1 - SPECIAL TOOL 6583 POSITIONED ON DETENT HOUSING

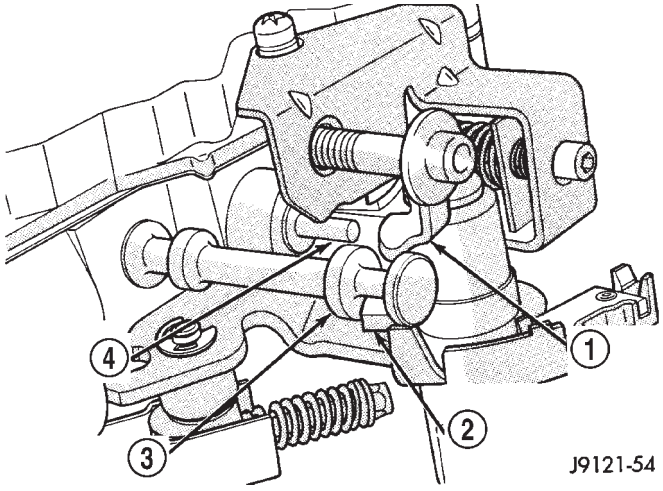


Fig. 320 Manual And Throttle Lever Alignment

1 - THROTTLE LEVER
2 - MANUAL LEVER VALVE ARM
3 - MANUAL VALVE
4 - KICKDOWN VALVE

VALVE BODY (Continued)

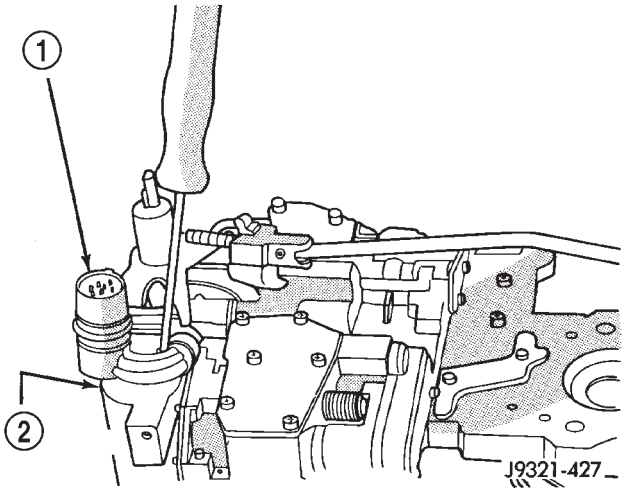


Fig. 321 Solenoid Harness Case Connector Shoulder Bolt

1 - SOLENOID HARNESS CASE CONNECTOR
2 - 3-4 ACCUMULATOR HOUSING

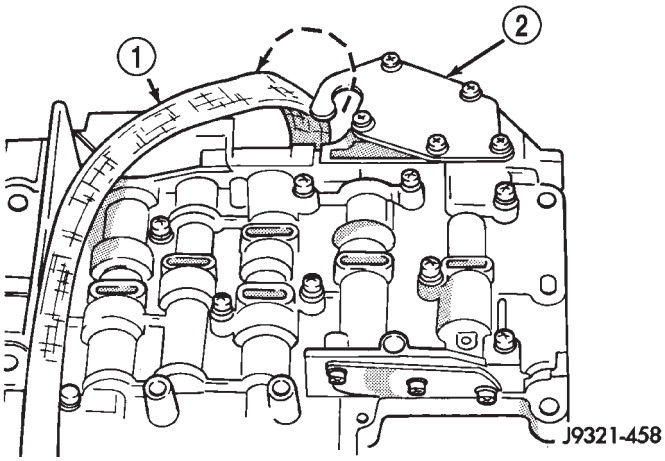


Fig. 322 Solenoid Harness Routing

1 - OVERDRIVE/CONVERTER SOLENOID WIRE HARNESS
2 - 3-4 ACCUMULATOR COVER PLATE

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.

(4) Install governor pressure sensor in governor body.

(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) Install fluid filter and pan.

(11) Lower vehicle.

(12) Fill transmission with recommended fluid and road test vehicle to verify repair.

INSTALLATION

(1) Check condition of O-ring seals on valve body harness connector (Fig. 323). 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. 324).

(3) Check condition of seals on accumulator piston (Fig. 325). 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.

VALVE BODY (Continued)

(15) Connect solenoid case connector wires.

(16) Install oil pan and new gasket. Tighten pan bolts to 13.6 N·m (125 in. lbs.) torque.

(17) Lower vehicle and fill transmission with Mopar® ATF +4, type 9602, fluid.

(18) Check and adjust gearshift and throttle valve cables, if necessary.

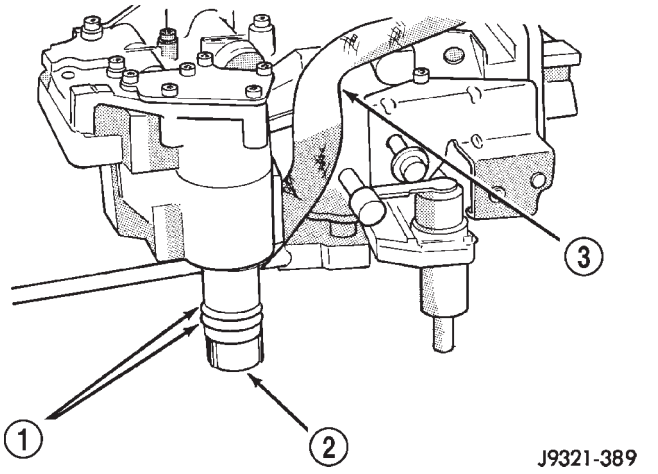


Fig. 323 Valve Body Harness Connector O-Ring Seal

1 - CONNECTOR O-RINGS
2 - VALVE BODY HARNESS CONNECTOR
3 - HARNESS

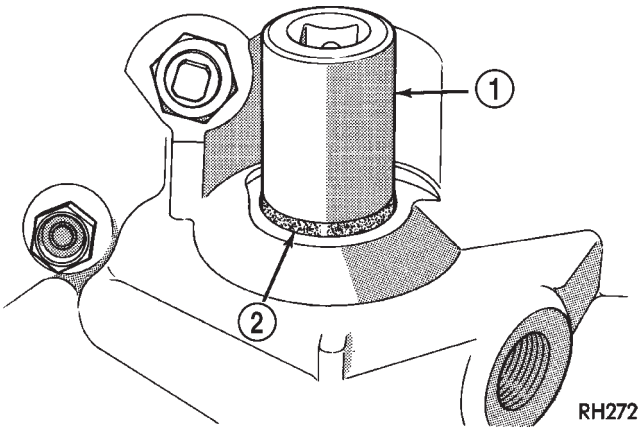


Fig. 324 Manual Lever Shaft Seal

1 - 15/16" SOCKET
2 - SEAL

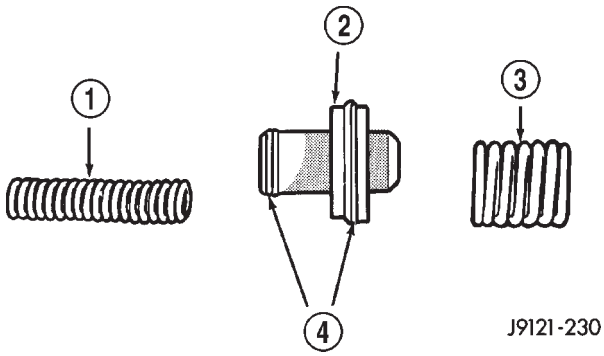


Fig. 325 Accumulator Piston Components

1 - INNER SPRING
2 - ACCUMULATOR PISTON
3 - OUTER SPRING
4 - SEAL RINGS

ADJUSTMENTS - 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. 326).

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.

VALVE BODY (Continued)

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.

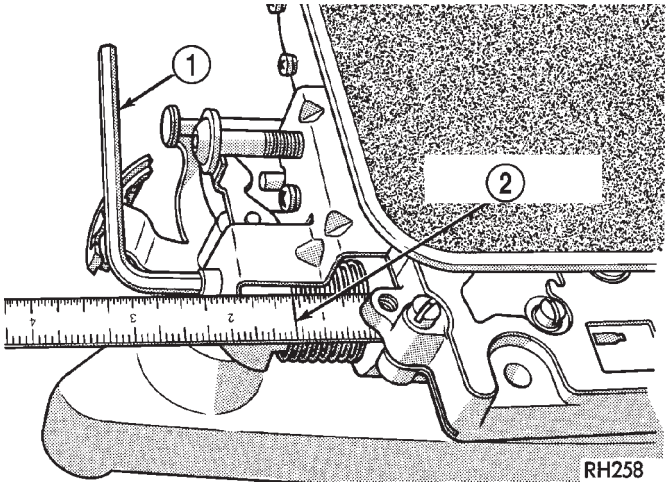


Fig. 326 Line Pressure Adjustment

1 - WRENCH
2 - 1–5/16 INCH

THROTTLE PRESSURE ADJUSTMENT

Insert Gauge Tool C-3763 between the throttle lever cam and the kickdown valve stem (Fig. 327).

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.

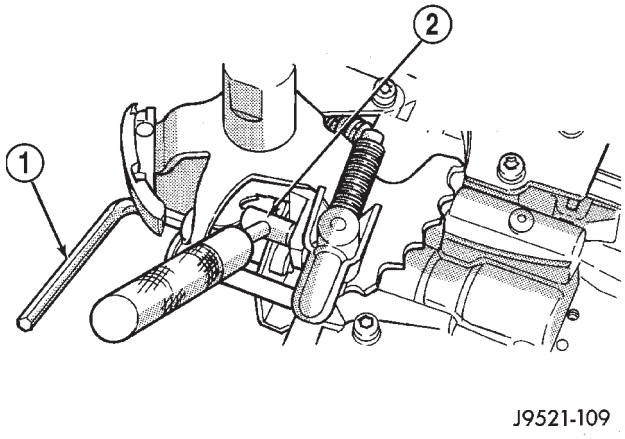


Fig. 327 Throttle Pressure Adjustment

1 - HEX WRENCH (IN THROTTLE LEVER ADJUSTING SCREW)
2 - SPECIAL TOOL C-3763 (POSITIONED BETWEEN THROTTLE LEVER AND KICKDOWN VALVE)

AUTOMATIC TRANSMISSION - 47RE

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AUTOMATIC TRANSMISSION - 47RE

DESCRIPTION

The 47RE (Fig. 1) is a four speed fully automatic transmissions with an electronic governor. The 47RE is equipped with a lock-up clutch in the torque converter. 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 transmission contains a front, rear, and direct clutch which function as the input driving components. It also contains the kickdown (front) and the low/reverse (rear) bands which, along with the overrunning clutch and overdrive clutch, serve as the holding components. The driving and holding components combine to select the necessary planetary gear components, in the front, rear, or overdrive planetary gear set, transfer the engine power from the input shaft through to the output shaft.

The valve body is mounted to the lower side of the transmission and contains the valves to control pressure regulation, fluid flow control, and clutch/band application. The oil pump is mounted at the front of the transmission and is driven by the torque converter hub. The pump supplies the oil pressure necessary for clutch/band actuation and transmission lubrication.

AUTOMATIC TRANSMISSION - 47RE (Continued)

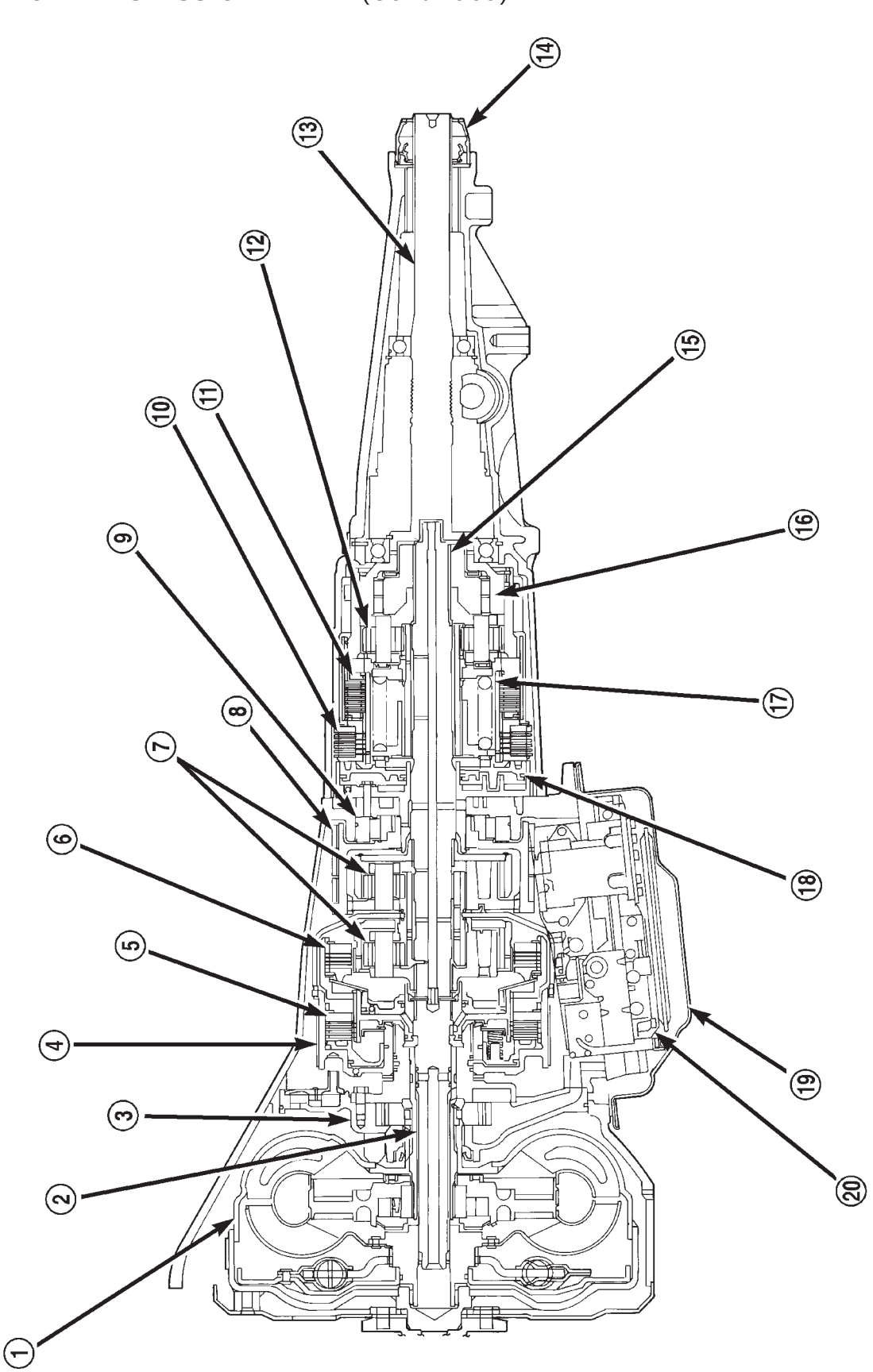


Fig. 1 47RE Transmission

AUTOMATIC TRANSMISSION - 47RE (Continued)

1 - TORQUE CONVERTER
2 - INPUT SHAFT
3 - OIL PUMP
4 - FRONT BAND
5 - FRONT CLUTCH
6 - REAR CLUTCH
7 - PLANETARIES
8 - REAR BAND
9 - OVERRUNNING CLUTCH
10 - OVERDRIVE CLUTCH
11 - DIRECT CLUTCH
12 - PLANETARY GEAR
13 - OUTPUT SHAFT
14 - SEAL
15 - INTERMEDIATE SHAFT
16 - OVERDRIVE OVERRUNNING CLUTCH
17 - DIRECT CLUTCH SPRING
18 - OVERDRIVE PISTON RETAINER
19 - FILTER
20 - VALVE BODY

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.

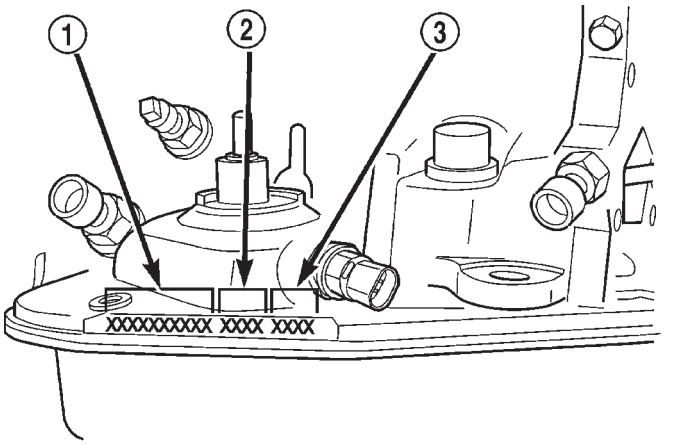


Fig. 2 Transmission Part and Serial Number Location

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

GEAR RATIOS

The 47RE gear ratios are:

1st 2.45:1
2nd 1.45:1
3rd 1.00:1
4th 0.69:1
Rev. 2.21

OPERATION

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

Since the overdrive clutch is applied in fourth gear only and the direct clutch is applied in all ranges except fourth gear, the transmission operation for park, neutral, and first through third gear will be described first. Once these powerflows are described, the third to fourth shift sequence will be described.

PARK POWERFLOW

As the engine is running and the crankshaft is rotating, the flexplate and torque converter, which are also bolted to it, are all rotating in a clockwise direction as viewed from the front of the engine. The notched hub of the torque converter is connected to the oil pump's internal gear, supplying the transmission with oil pressure. As the converter turns, it turns the input shaft in a clockwise direction. As the input shaft is rotating, the front clutch hub-rear clutch retainer and all their associated parts are also rotating, all being directly connected to the input shaft. The power flow from the engine through the front clutch hub and rear clutch retainer stops at the rear clutch retainer. Therefore, no power flow to the output shaft occurs because no clutches are applied. The only mechanism in use at this time is the parking sprag (Fig. 3), which locks the parking gear on the output shaft to the transmission case.

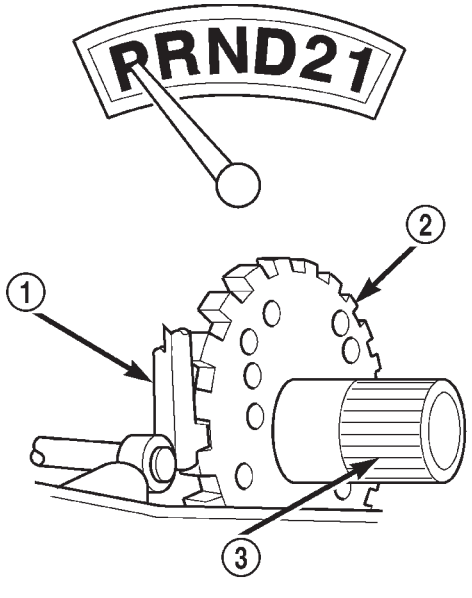


Fig. 3 Park Powerflow

1 - LEVER ENGAGED FOR PARK
2 - PARK SPRAG
3 - OUTPUT SHAFT

NEUTRAL POWERFLOW

With the gear selector in the NEUTRAL position (Fig. 4), the power flow of the transmission is essentially the same as in the park position. The only operational difference is that the parking sprag has been disengaged, unlocking the output shaft from the transmission case and allowing it to move freely.

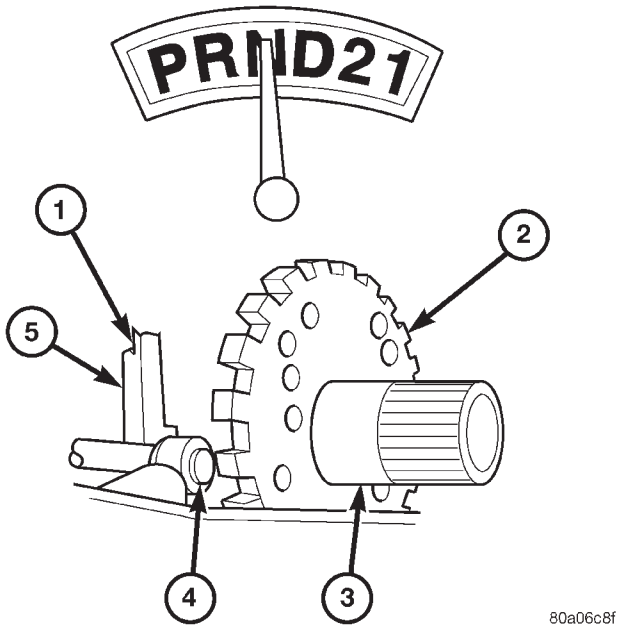


Fig. 4 Neutral Powerflow

1 - PAWL DISENGAGED FOR NEUTRAL
2 - PARK SPRAG
3 - OUTPUT SHAFT
4 - CAM
5 - PAWL

REVERSE POWERFLOW

When the gear selector is moved into the REVERSE position (Fig. 5), the front clutch and the rear band are applied. With the application of the front clutch, engine torque is applied to the sun gear, turning it in a clockwise direction. The clockwise rotation of the sun gear causes the rear planet pinions to rotate against engine rotation in a counterclockwise direction. The rear band is holding the low reverse drum, which is splined to the rear carrier. Since the rear carrier is being held, the torque from the planet pinions is transferred to the rear annulus gear, which is splined to the output shaft. The output shaft in turn rotates with the annulus gear in a counterclockwise direction giving a reverse gear output. The entire transmission of torque is applied to the rear planetary gearset only. Although there is torque input to the front gearset through the sun gear, no other member of the gearset is being held. During the entire reverse stage of operation, the front planetary gears are in an idling condition.

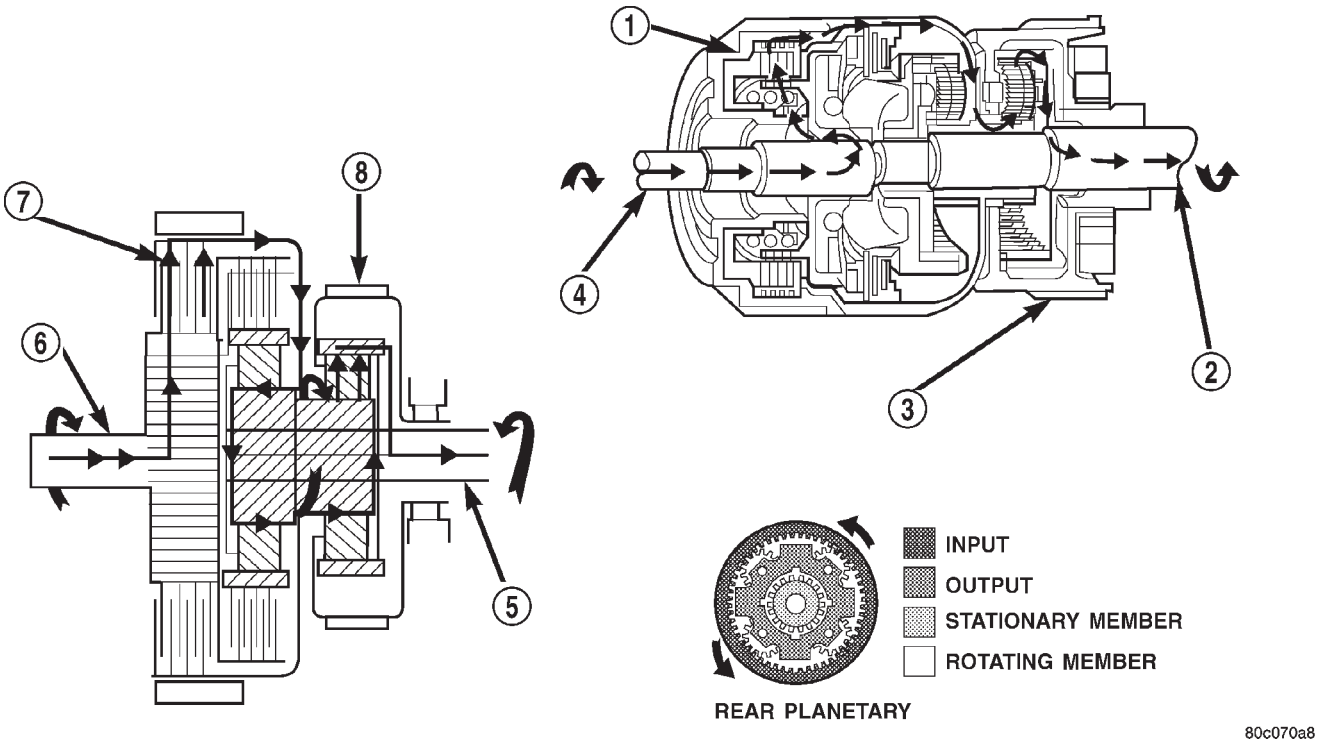


Fig. 5 Reverse Powerflow

1 - FRONT CLUTCH ENGAGED
2 - OUTPUT SHAFT
3 - LOW/REVERSE BAND APPLIED
4 - INPUT SHAFT
5 - OUTPUT SHAFT
6 - INPUT SHAFT
7 - FRONT CLUTCH ENGAGED
8 - LOW/REVERSE BAND APPLIED

FIRST GEAR POWERFLOW

When the gearshift lever is moved into the DRIVE position the transmission goes into first gear (Fig. 6). As soon as the transmission is shifted from PARK or NEUTRAL to DRIVE, the rear clutch applies, applying the rear clutch pack to the front annulus gear. Engine torque is now applied to the front annulus gear turning it in a clockwise direction. With the front annulus gear turning in a clockwise direction, it causes the front planets to turn in a clockwise direction. The rotation of the front planets cause the sun to revolve in a counterclockwise direction. The sun gear now transfers its counterclockwise rotation to the rear planets which rotate back in a clockwise direction. With the rear annulus gear stationary, the rear planet rotation on the annulus gear causes the rear planet carrier to revolve in a counterclockwise direction. The rear planet carrier is splined into the low-reverse drum, and the low reverse drum is splined to the inner race of the over-running clutch. With the over-running clutch locked, the planet carrier is held, and the resulting torque provided by the planet pinions is transferred to the rear annulus gear. The rear annulus gear is splined to the output shaft and rotated along with it (clockwise) in an underdrive gear reduction mode.

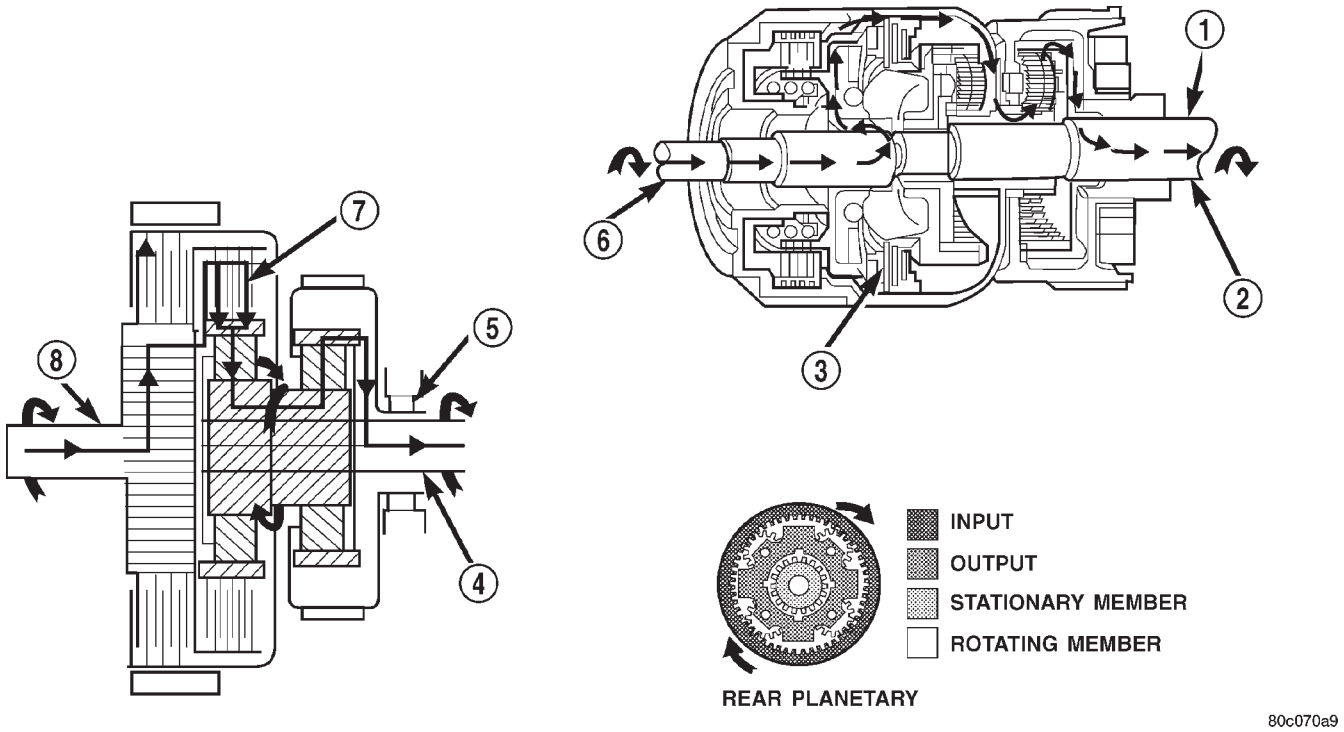


Fig. 6 First Gear Powerflow

1 - OUTPUT SHAFT
2 - OVER-RUNNING CLUTCH HOLDING
3 - REAR CLUTCH APPLIED
4 - OUTPUT SHAFT
5 - OVER-RUNNING CLUTCH HOLDING
6 - INPUT SHAFT
7 - REAR CLUTCH APPLIED
8 - INPUT SHAFT

SECOND GEAR POWERFLOW

In DRIVE-SECOND (Fig. 7), the same elements are applied as in MANUAL-SECOND. Therefore, the power flow will be the same, and both gears will be discussed as one in the same. In DRIVE-SECOND, the transmission has proceeded from first gear to its shift point, and is shifting from first gear to second. The second gear shift is obtained by keeping the rear clutch applied and applying the front (kickdown) band. The front band holds the front clutch retainer that is locked to the sun gear driving shell. With the rear clutch still applied, the input is still on the front annulus gear turning it clockwise at engine speed. Now that the front band is holding the sun gear stationary, the annulus rotation causes the front planets to rotate in a clockwise direction. The front carrier is then also made to rotate in a clockwise direction but at a reduced speed. This will transmit the torque to the output shaft, which is directly connected to the front planet carrier. The rear planetary annulus gear will also be turning because it is directly splined to the output shaft. All power flow has occurred in the front planetary gear set during the drive-second stage of operation, and now the over-running clutch, in the rear of the transmission, is disengaged and freewheeling on its hub.

AUTOMATIC TRANSMISSION - 47RE (Continued)

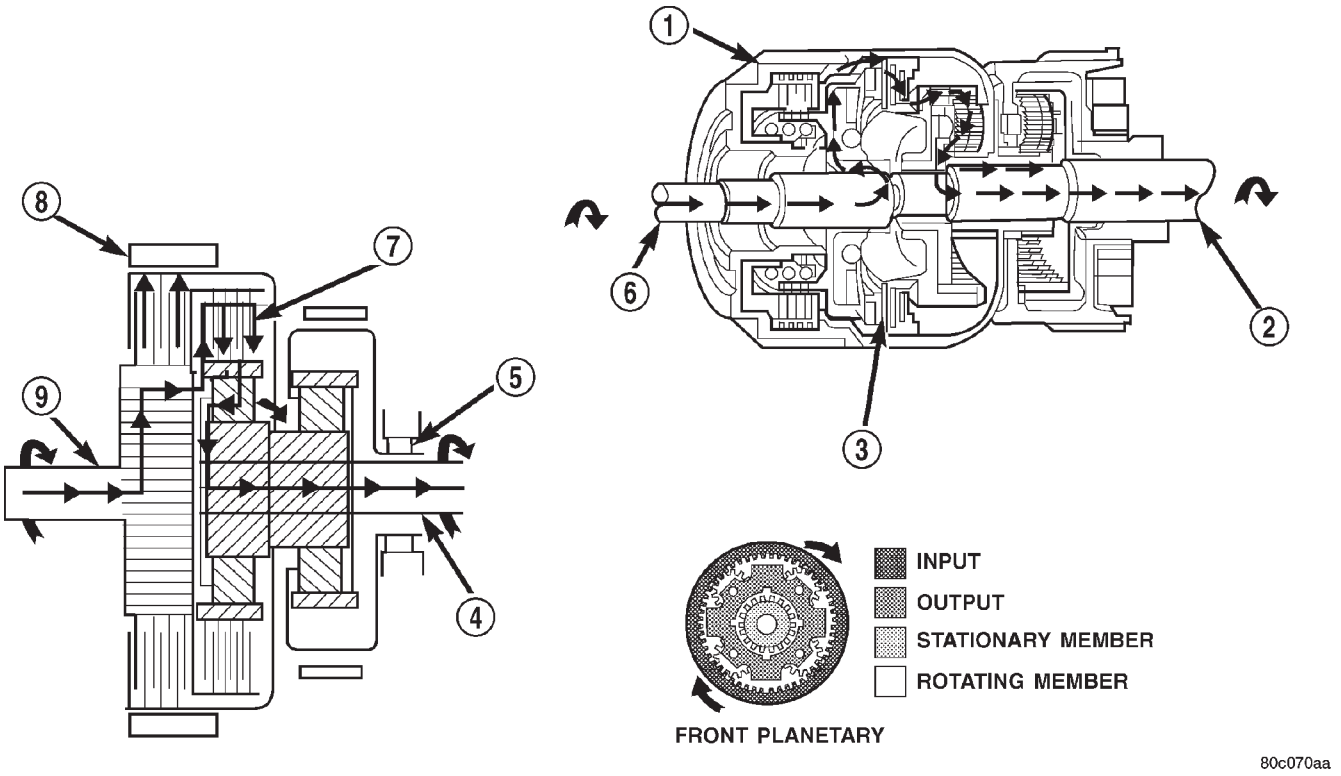


Fig. 7 Second Gear Powerflow

1 - KICKDOWN BAND APPLIED
2 - OUTPUT SHAFT
3 - REAR CLUTCH ENGAGED
4 - OUTPUT SHAFT
5 - OVER-RUNNING CLUTCH FREE-WHEELING
6 - INPUT SHAFT
7 - REAR CLUTCH APPLIED
8 - KICKDOWN BAND APPLIED
9 - INPUT SHAFT

DIRECT DRIVE POWERFLOW

The vehicle has accelerated and reached the shift point for the 2-3 upshift into direct drive (Fig. 8). When the shift takes place, the front band is released, and the front clutch is applied. The rear clutch stays applied as it has been in all the forward gears. With the front clutch now applied, engine torque is now on the front clutch retainer, which is locked to the sun gear driving shell. This means that the sun gear is now turning in engine rotation (clockwise) and at engine speed. The rear clutch is still applied so engine torque is also still on the front annulus gear. If two members of the same planetary set are driven, direct drive results. Therefore, when two members are rotating at the same speed and in the same direction, it is the same as being locked up. The rear planetary set is also locked up, given the sun gear is still the input, and the rear annulus gear must turn with the output shaft. Both gears are turning in the same direction and at the same speed. The front and rear planet pinions do not turn at all in direct drive. The only rotation is the input from the engine to the connected parts, which are acting as one common unit, to the output shaft.

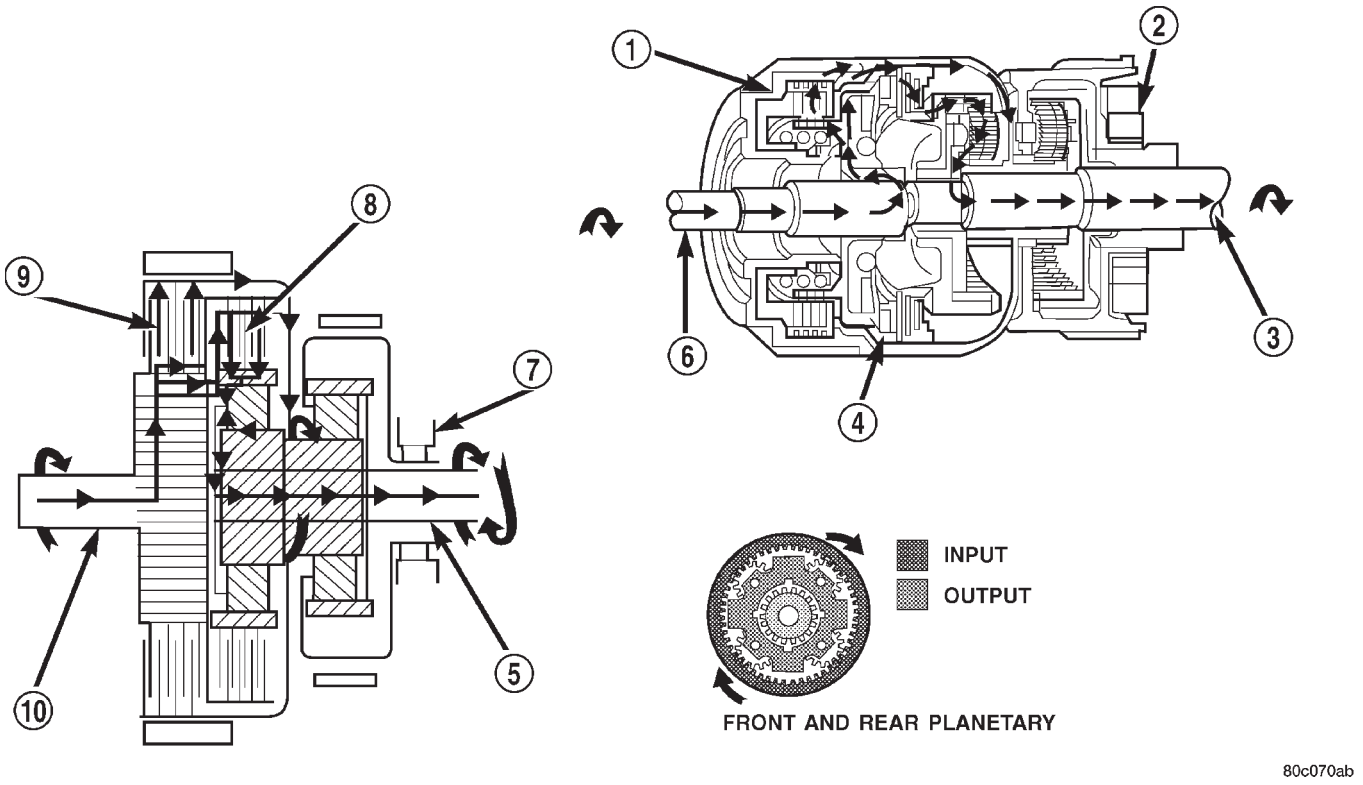


Fig. 8 Direct Drive Powerflow

1 - FRONT CLUTCH APPLIED
2 - OVER-RUNNING CLUTCH FREE-WHEELING
3 - OUTPUT SHAFT
4 - REAR CLUTCH APPLIED
5 - OUTPUT SHAFT
6 - INPUT SHAFT
7 - OVER-RUNNING CLUTCH FREE-WHEELING
8 - REAR CLUTCH APPLIED
9 - FRONT CLUTCH APPLIED
10 - INPUT SHAFT

FOURTH GEAR POWERFLOW

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 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.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - AUTOMATIC TRANSMISSION

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.

AUTOMATIC TRANSMISSION - 47RE (Continued)

DIAGNOSIS AND TESTING - PRELIMINARY

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 hydraulic pressure test if shift problems were noted during road test.

(6) Perform air-pressure test to check clutch-band operation.

VEHICLE IS DISABLED

(1) Check fluid level and condition.

(2) Check for broken or disconnected gearshift or throttle linkage.

(3) Check for cracked, leaking cooler lines, or loose or missing pressure-port plugs.

(4) Raise and support vehicle on safety stands, start engine, shift transmission into gear, and note following:

(a) If propeller shaft turns but wheels do not, problem is with differential or axle shafts.

(b) If propeller shaft does not turn and transmission is noisy, stop engine. Remove oil pan, and check for debris. If pan is clear, remove transmission and check for damaged drive plate, converter, oil pump, or input shaft.

(c) If propeller shaft does not turn and transmission is not noisy, perform hydraulic-pressure test to determine if problem is hydraulic or mechanical.

DIAGNOSIS AND TESTING - 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.

CLUTCH AND BAND APPLICATION CHART

SHIFT LEVER POSITION	TRANSMISSION CLUTCHES AND BANDS					OVERDRIVE CLUTCHES		
	FRONT CLUTCH	FRONT BAND	REAR CLUTCH	REAR BAND	OVER-RUNNING CLUTCH	OVER-DRIVE CLUTCH	DIRECT CLUTCH	OVER-RUNNING CLUTCH
Reverse	X			X			X	
Drive - First			X		X		X	X
Drive - Second		X	X				X	X
Drive - Third	X		X				X	X
Drive - Fourth	X		X			X		
Manual Second		X	X		X		X	X
Manual First			X	X	X		X	X

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.

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.

DIAGNOSIS AND TESTING - 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. 9).

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.

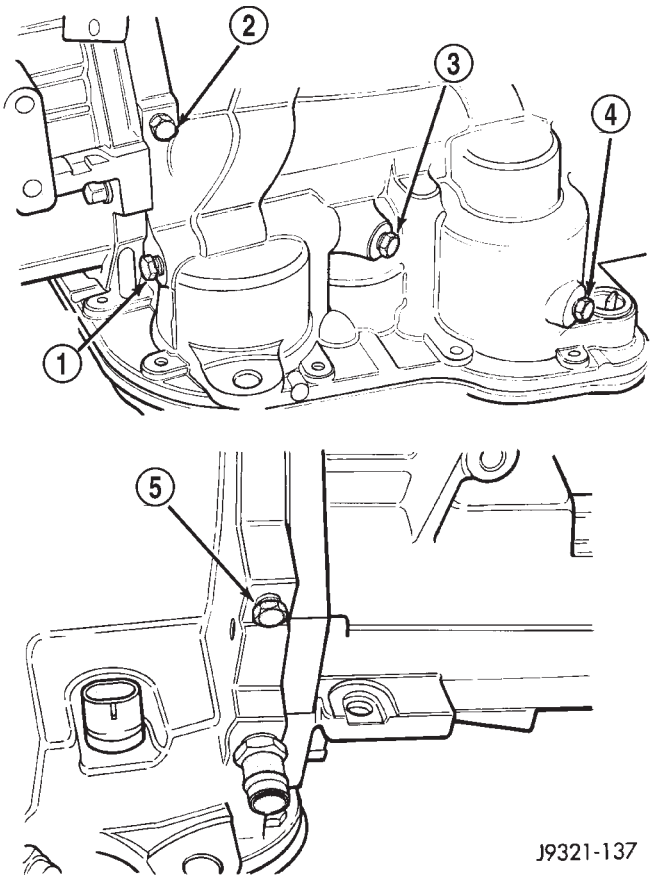


Fig. 9 Pressure Test Port Locations

1 - REAR SERVO TEST PORT
2 - GOVERNOR TEST PORT
3 - ACCUMULATOR TEST PORT
4 - FRONT SERVO TEST PORT
5 - OVERDRIVE CLUTCH TEST PORT

Test One - Transmission In Manual Low

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:

- 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

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

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

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 C-3292 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.

Test Five - Governor Pressure

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

This test checks line pressure at the overdrive clutch in fourth gear range. Use 300 psi Test Gauge C-3293-SP 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 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

DIAGNOSIS AND TESTING - 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. 10).

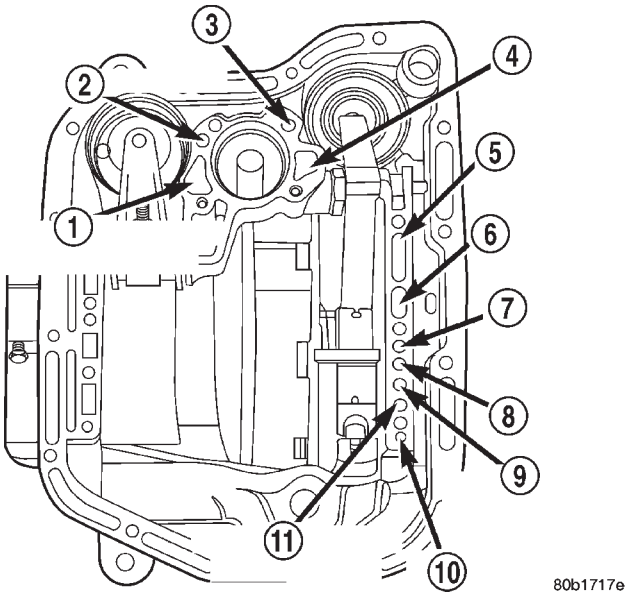


Fig. 10 Air Pressure Test Passages

1 - LINE PRESSURE TO ACCUMULATOR
2 - REAR SERVO APPLY
3 - FRONT SERVO APPLY
4 - FRONT SERVO RELEASE
5 - PUMP SUCTION
6 - PUMP PRESSURE
7 - FRONT CLUTCH APPLY
8 - REAR CLUTCH APPLY
9 - TO TORQUE CONVERTOR
10 - TO COOLER
11 - FROM TORQUE CONVERTER

AUTOMATIC TRANSMISSION - 47RE (Continued)

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 tighten around the drum. Spring pressure should release the servo when air pressure is removed.

DIAGNOSIS AND TESTING - CONVERTER HOUSING FLUID LEAK

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 body leaks follow the same path as a seal leak (Fig. 11). Pump vent or pump attaching bolt leaks are generally deposited on the inside of the converter housing and not on the converter itself (Fig. 11). Pump o-ring 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.

TORQUE CONVERTER LEAK POINTS

Possible sources of converter leaks are:

(1) Leaks at the weld joint around the outside diameter weld (Fig. 12).

(2) Leaks at the converter hub weld (Fig. 12).

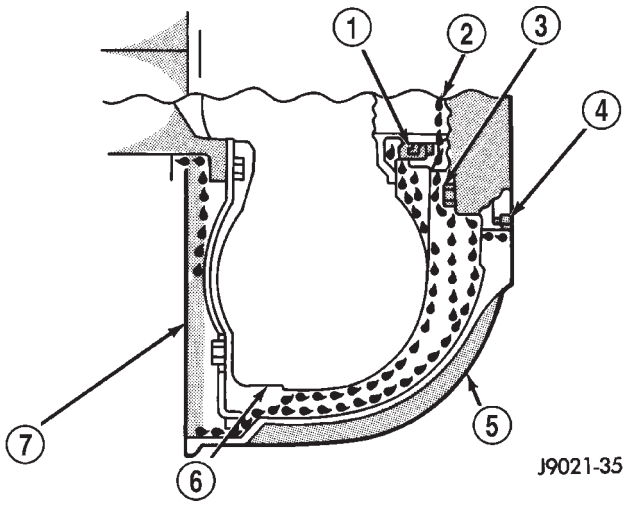


Fig. 11 Converter Housing Leak Paths

1 - PUMP SEAL
2 - PUMP VENT
3 - PUMP BOLT
4 - PUMP GASKET
5 - CONVERTER HOUSING
6 - CONVERTER
7 - REAR MAIN SEAL LEAK

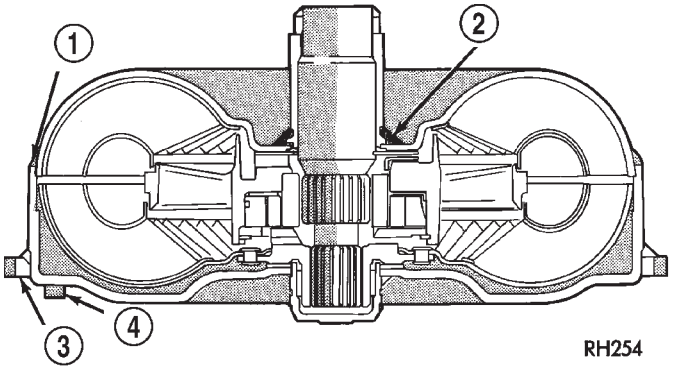


Fig. 12 Converter Leak Points - Typical

1 - OUTSIDE DIAMETER WELD
2 - TORQUE CONVERTER HUB WELD
3 - STARTER RING GEAR
4 - LUG

CONVERTER HOUSING AREA LEAK CORRECTION

(1) Remove converter.

(2) Tighten front band adjusting screw until band is tight around front clutch retainer. This prevents front/rear clutches from coming out when oil pump is removed.

(3) Remove oil pump and remove pump seal. Inspect pump housing drainback and vent holes for obstructions. Clear holes with solvent and wire.

(4) Inspect pump bushing and converter hub. If bushing is scored, replace it. If converter hub is

scored, either polish it with crocus cloth or replace converter.

(5) Install new pump seal, O-ring, and gasket. Replace oil pump if cracked, porous or damaged in any way. Be sure to loosen the front band before installing the oil pump, damage to the oil pump seal may occur if the band is still tightened to the front clutch retainer.

(6) Loosen kickdown lever pin access plug three turns. Apply Loctite™ 592, or Permatex® No. 2 to plug threads and tighten plug to 17 N·m (150 in. lbs.) torque.

(7) Adjust front band.

(8) Lubricate pump seal and converter hub with transmission fluid or petroleum jelly and install converter.

(9) Install transmission and converter housing dust shield.

(10) Lower vehicle.

DIAGNOSIS AND TESTING - DIAGNOSIS CHARTS

The diagnosis charts provide additional reference when diagnosing a transmission fault. The charts provide general information on a variety of transmission, overdrive unit and converter clutch fault conditions.

The hydraulic flow charts in the Schematics and Diagrams section of this group, outline fluid flow and hydraulic circuitry. Circuit operation is provided for PARK, NEUTRAL, FIRST, SECOND, THIRD, FOURTH, MANUAL FIRST, MANUAL SECOND, and REVERSE gear ranges. Normal working pressures are also supplied for each of the gear ranges.

DIAGNOSIS CHARTS

CONDITION	POSSIBLE CAUSES	CORRECTION
HARSH ENGAGEMENT (FROM NEUTRAL TO DRIVE OR REVERSE)	1. Fluid Level Low.	1. Add Fluid
	2. Throttle Linkage Mis-adjusted.	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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 47RE (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 Mis-adjusted.	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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 47RE (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.
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 Mis-adjusted.	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 Mis-adjusted.	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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 47RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO REVERSE (D RANGES OK)	1. Gearshift Linkage/Cable Mis-adjusted/Damaged.	1. Repair or replace linkage parts as needed.
	2. Park Sprag Sticking.	2. Replace overdrive annulus gear.
	3. Rear Band Mis-adjusted/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.
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.
NO LOW GEAR (MOVES IN 2ND OR 3RD GEAR ONLY)	1. Governor Circuit Electrical Fault.	1. Test with DRB® scan tool and repair as required.
	2. Valve Body Malfunction.	2. Remove, clean and inspect. Look for sticking 1-2 shift valve, 2-3 shift valve, governor plug or broken springs.
	3. Front Servo Piston Cocked in Bore.	3. Inspect servo and repair as required.
	4. Front Band Linkage Malfunction	4. Inspect linkage and look for bind in linkage.

AUTOMATIC TRANSMISSION - 47RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO KICKDOWN OR NORMAL DOWNSHIFT	1. Throttle Linkage Mis-adjusted.	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.
STUCK IN LOW GEAR (WILL NOT UPSHIFT)	1. Throttle Linkage Mis-adjusted/ Stuck.	1. Adjust linkage and repair linkage if worn or damaged. Check for binding cable or missing return spring.
	2. Gearshift Linkage Mis-adjusted.	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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 47RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
BUZZING NOISE	1. Fluid Level Low	1. Add fluid and check for leaks.
	2. Shift Cable Mis-assembled.	2. Route cable away from engine and bell housing.
	3. Valve Body Mis-assembled.	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 Mis-adjusted.	2. Adjust linkage.
	3. Rear Band Mis-adjusted.	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.
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 Mis-adjusted.	3. Adjust linkage.
	4. Gearshift Linkage Mis-adjusted.	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 NOT IN MANUAL 1 POSITION	Overrunning Clutch Faulty.	Replace overrunning clutch.

AUTOMATIC TRANSMISSION - 47RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
GROWLING, GRATING OR SCRAPING NOISES	1. Drive Plate Broken.	1. Replace.
	2. Torque Converter Bolts Hitting Dust Shield.	2. Dust shield bent. Replace or repair.
	3. Planetary Gear Set Broken/ Seized.	3. Check for debris in oil pan and repair as required.
	4. Overrunning Clutch Worn/Broken.	4. Inspect and check for debris in oil pan. Repair as required.
	5. Oil Pump Components Scored/ Binding.	5. Remove, inspect and repair as required.
	6. Output Shaft Bearing or Bushing Damaged.	6. Remove, inspect and repair as required.
	7. Clutch Operation Faulty.	7. Perform air pressure check and repair as required.
	8. Front and Rear Bands Mis-adjusted.	8. Adjust bands.
DRAGS OR LOCKS UP	1. Fluid Level Low.	1. Check and adjust level.
	2. Clutch Dragging/Failed	2. Air pressure check clutch operation and repair as required.
	3. Front or Rear Band Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 47RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 47RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO 3-4 UPSHIFT	1. 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 Sense to PCM Wire Shorted/Cut.	6. Test switch/sensor 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.

AUTOMATIC TRANSMISSION - 47RE (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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 47RE (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 Mis-adjusted.	1. Adjust linkage/cable.
	2. Neutral Sense Wire Open/Cut.	2. Check continuity with test lamp. Repair as required.
	3. Park/Neutral Switch, or Transmission Range Sensor Faulty.	3. Refer to service section for test and replacement procedure.
	4. Park/Neutral Switch, or Transmission Range Sensor Connection 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 Mis-adjusted.	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.

AUTOMATIC TRANSMISSION - 47RE (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. Park/Neutral Switch, or Transmission Range Sensor 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.

STANDARD PROCEDURE - ALUMINUM THREAD REPAIR

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

Heli-Coil™, or equivalent, tools and inserts are readily available from most automotive parts suppliers.

REMOVAL

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

(1) Disconnect battery negative cable.

(2) Disconnect and lower or remove necessary exhaust components.

(3) Remove engine-to-transmission struts, if equipped (Fig. 13).

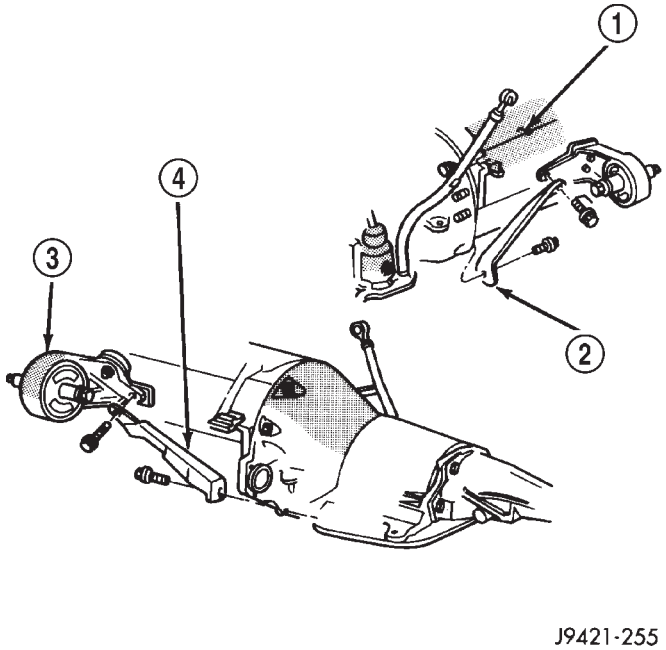


Fig. 13 Transmission-To-Engine Strut Attachment

1 - ENGINE BLOCK
2 - STRUT (PASSENGER SIDE)
3 - ENGINE MOUNT
4 - STRUT (DRIVER SIDE)

(4) Disconnect fluid cooler lines at transmission.

(5) Remove starter motor. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - REMOVAL)

(6) Disconnect and remove the crankshaft position sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/CRANKSHAFT POSITION SENSOR - REMOVAL) 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).

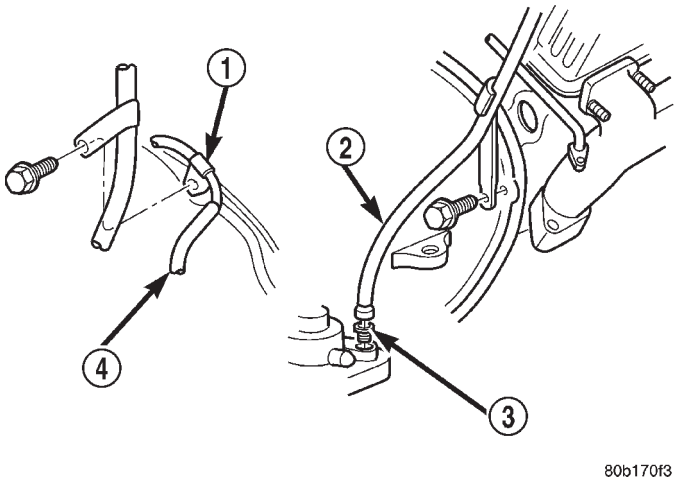


Fig. 14 Fill Tube Attachment

1 - TRANSFER CASE VENT TUBE
2 - FILL TUBE (V8)
3 - TUBE SEAL
4 - FILL TUBE (V6)

(10) 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.

(11) Mark propeller shaft and axle yokes for assembly alignment. Then disconnect and remove propeller shaft. On 4 x 4 models, remove both propeller shafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)

(12) Disconnect wires from park/neutral position switch and transmission solenoid.

AUTOMATIC TRANSMISSION - 47RE (Continued)

(13) Disconnect gearshift rod and torque shaft assembly from transmission.

(14) Disconnect throttle valve cable from transmission bracket and throttle valve lever.

(15) On 4 x 4 models, disconnect shift rod from transfer case shift lever.

(16) Support rear of engine with safety stand or jack.

(17) Raise transmission slightly with service jack to relieve load on crossmember and supports.

(18) 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.

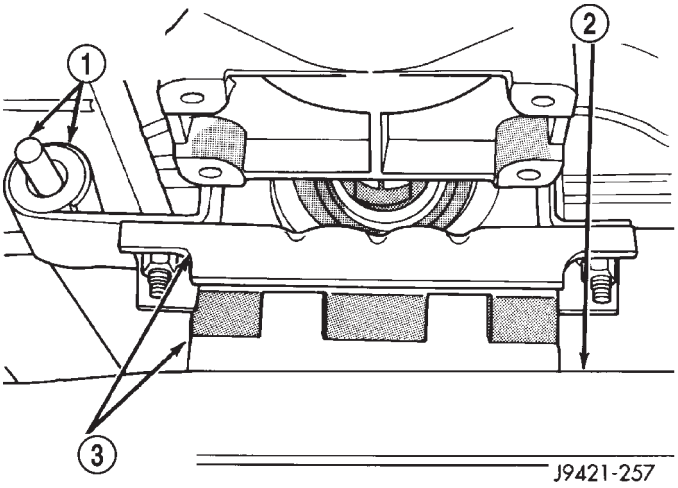


Fig. 15 Rear Support Cushion

1 - EXHAUST PIPE ARM AND BRACKET
2 - CROSSMEMBER
3 - REAR SUPPORT AND CUSHION

(19) Remove bolts attaching crossmember to frame and remove crossmember.

(20) On 4 x 4 models, remove transfer case with transmission jack or aid of helper.

(21) Remove all converter housing bolts.

(22) Carefully work transmission and torque converter assembly rearward off engine block dowels.

(23) Lower transmission and remove assembly from under the vehicle.

(24) To remove torque converter, remove C-clamp from edge of bell housing and carefully slide torque converter out of the transmission.

DISASSEMBLY

(1) Clean exterior of transmission with suitable solvent or pressure washer.

(2) Place transmission in vertical position.

(3) Measure the input shaft end play as follows (Fig. 16).

(a) Attach Adapter 8266-5 to Handle 8266-8.

(b) Attach dial indicator C-3339 to Handle 8266-8.

(c) Install the assembled tool onto the input shaft of the transmission and tighten the retaining screw on Adapter 8266-5 to secure it to the input shaft.

(d) Position the dial indicator plunger against a flat spot on the oil pump and zero the dial indicator.

(e) Move input shaft in and out and record reading. Record the maximum travel for assembly reference

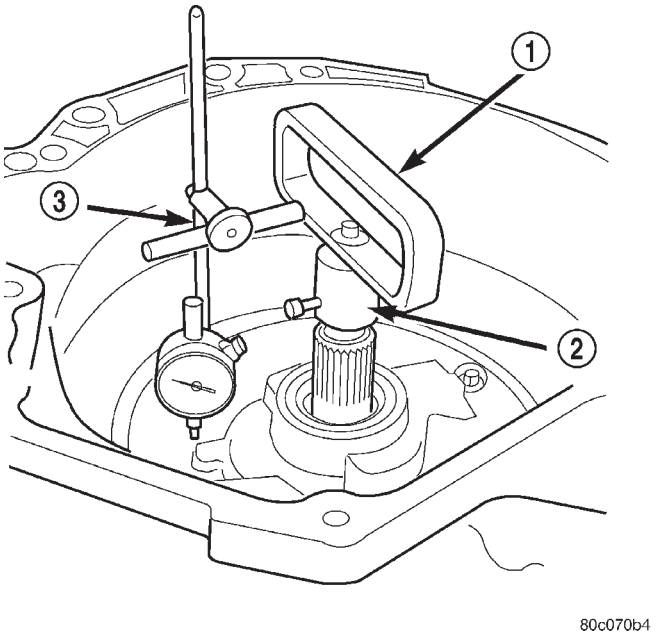


Fig. 16 Checking Input Shaft End Play

1 - TOOL 8266-8
2 - TOOL 8266-5
3 - TOOL C-3339

(4) Remove throttle and shift levers from valve body manual shaft and throttle lever shaft.

(5) Remove transmission oil pan and gasket.

(6) Remove filter from valve body (Fig. 17). Keep filter screws separate from other valve body screws. Filter screws are longer and should be kept with filter.

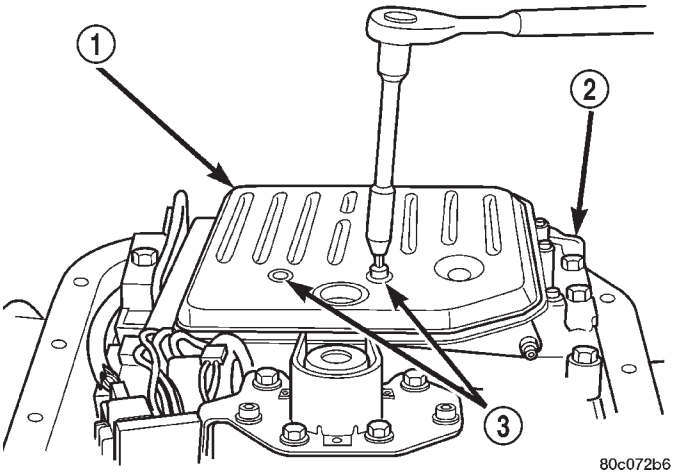


Fig. 17 Oil Filter Removal

1 - OIL FILTER
2 - VALVE BODY
3 - FILTER SCREWS (2)

(7) Remove park/neutral position switch and seal.

(8) Remove hex head bolts attaching valve body to transmission case (Fig. 18). A total of 10 bolts are used. Note different bolt lengths for assembly reference.

(9) Remove valve body assembly. Push valve body harness connector out of case. Then work park rod and valve body out of case (Fig. 19).

(10) Remove accumulator outer spring, piston and inner spring (Fig. 20). Note position of piston and springs for assembly reference. Remove and discard piston seals if worn or cut.

(11) Remove pump oil seal with suitable pry tool or slide-hammer mounted screw.

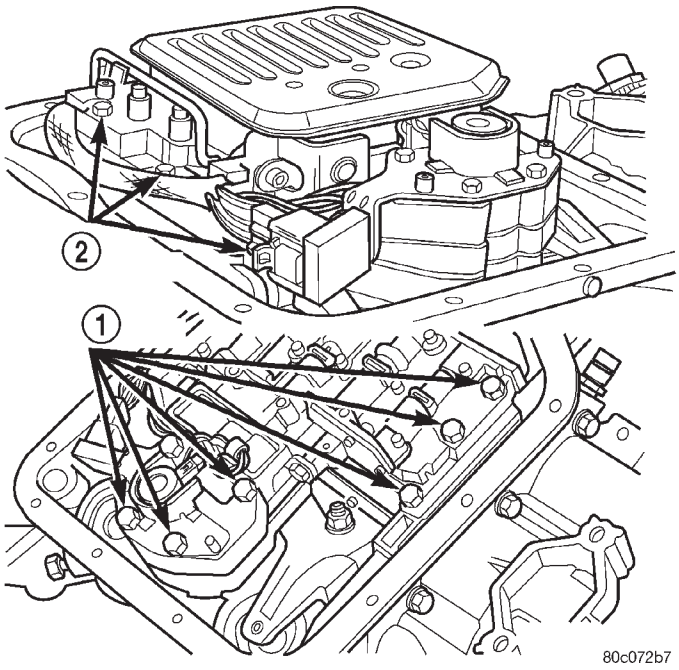


Fig. 18 Valve Body Bolt Locations

1 - VALVE BODY BOLTS
2 - VALVE BODY BOLTS

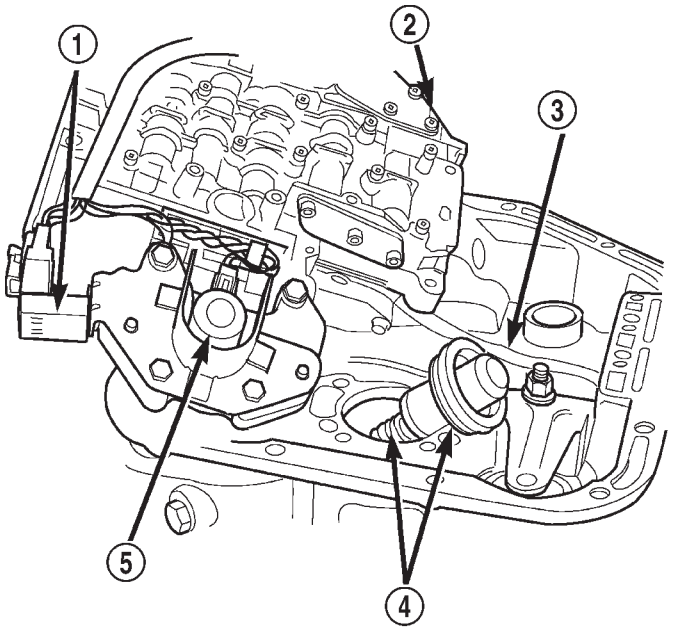


Fig. 19 Valve Body Removal

1 - GOVERNOR PRESSURE SENSOR
2 - VALVE BODY
3 - PARK ROD
4 - ACCUMULATOR PISTON
5 - GOVERNOR PRESSURE SOLENOID

AUTOMATIC TRANSMISSION - 47RE (Continued)

(12) Remove front band lever pin access plug (Fig. 21). Use square end of 1/4 in. drive extension to remove plug as shown.

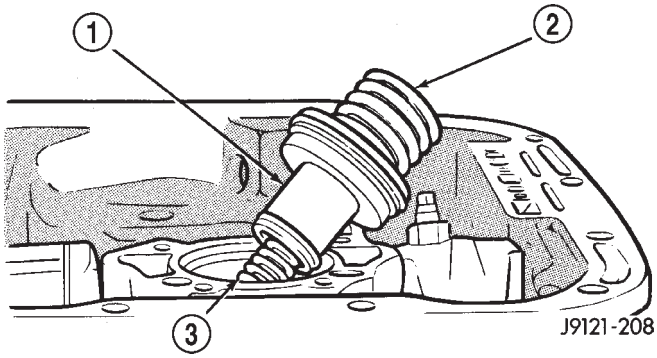


Fig. 20 Accumulator Component Removal

1 - ACCUMULATOR PISTON
2 - OUTER SPRING
3 - INNER SPRING

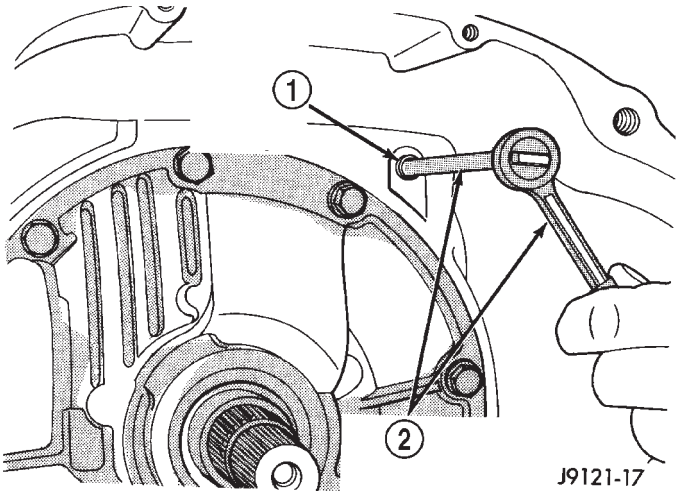


Fig. 21 Front Band Lever Pin Access Plug

1 - FRONT BAND REACTION PIN ACCESS PLUG
2 - 1/4 DRIVE EXTENSION AND RATCHET

(13) 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. 22). This will prevent retainer from coming out with pump and possibly damaging clutch or pump components.

(b) Remove oil pump bolts.

(c) Thread Slide Hammer Tools C-3752 into threaded holes in flange of oil pump housing (Fig. 23).

(d) Remove oil pump and reaction shaft support by bumping slide hammers outward alternately to pull pump from case (Fig. 24).

(14) Remove oil pump gasket (Fig. 25). Note gasket position in case for assembly reference.

(15) Loosen front band adjusting screw until band is completely loose.

(16) Remove front band strut and anchor (Fig. 26).

(17) Squeeze front band together slightly and slide band over front clutch retainer and out of case (Fig. 27).

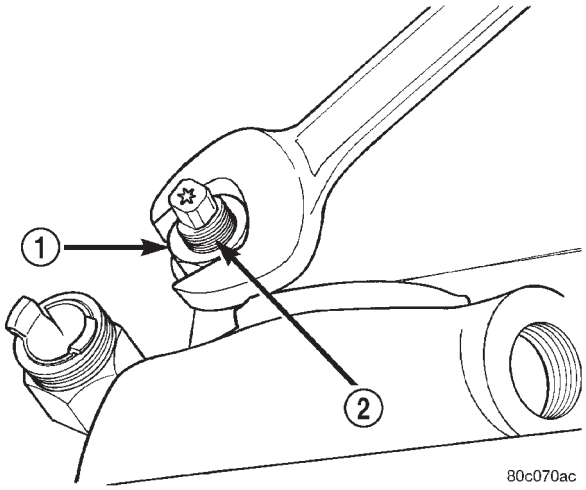


Fig. 22 Tightening Front Band To Hold Front Clutch In Place

1 - LOCK-NUT
2 - FRONT BAND ADJUSTER

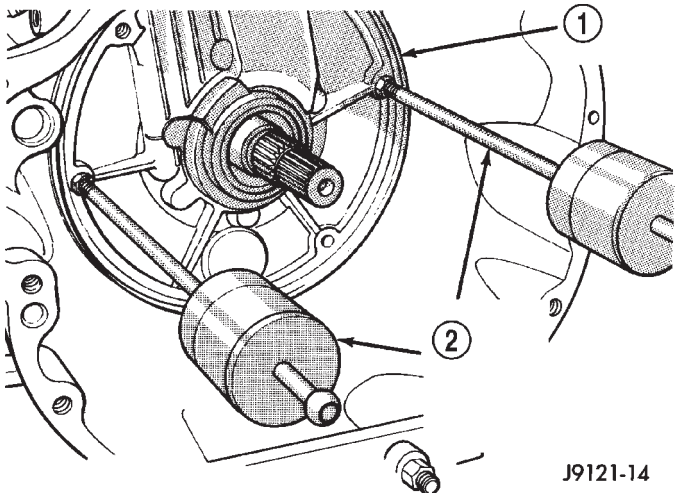


Fig. 23 Oil Pump Removal Tools

1 - PUMP HOUSING
2 - SLIDE HAMMER TOOLS (THREAD INTO PUMP HOUSING)

AUTOMATIC TRANSMISSION - 47RE (Continued)

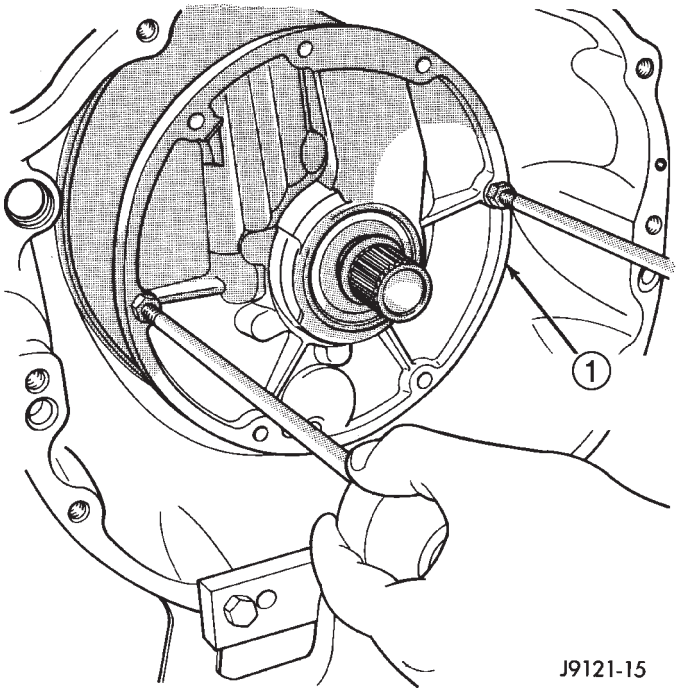


Fig. 24 Oil Pump Removal

1 - OIL PUMP AND REACTION SHAFT SUPPORT

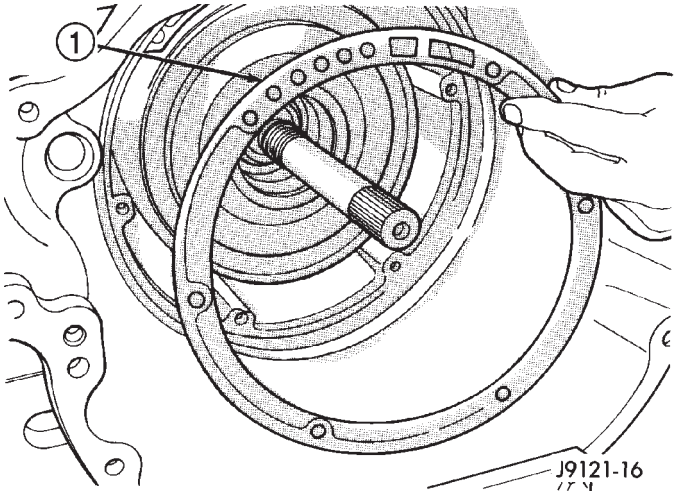


Fig. 25 Oil Pump Gasket

1 - OIL PUMP GASKET

(18) Remove front and rear clutch assemblies as a unit (Fig. 28).

(19) 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. 29).

(20) Remove intermediate shaft thrust washer. Triangular shaped washer will either be on shaft pilot hub or in rear clutch retainer (Fig. 30).

(21) Remove thrust plate from intermediate shaft hub (Fig. 31).

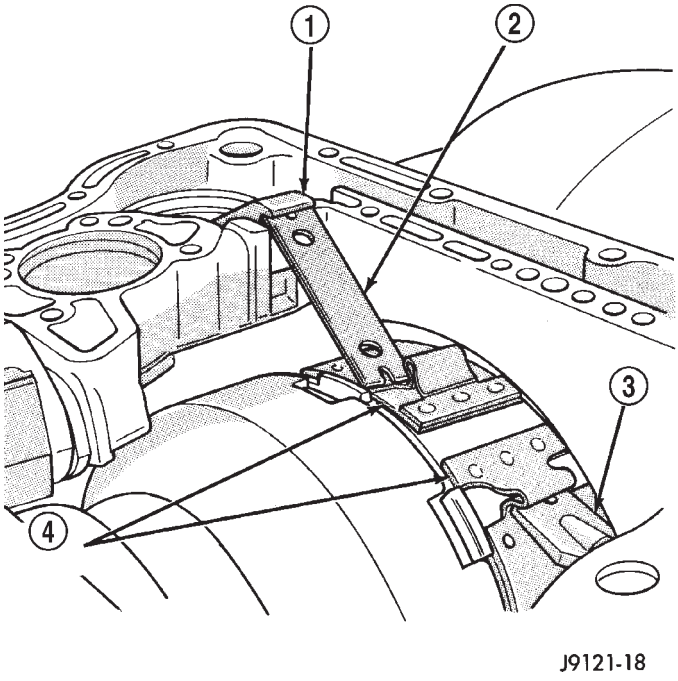


Fig. 26 Front Band Linkage

1 - LEVER
2 - STRUT
3 - ANCHOR
4 - FRONT BAND

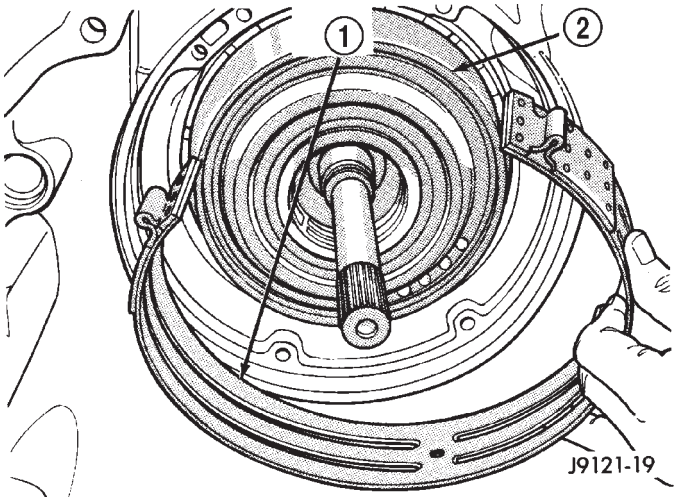


Fig. 27 Front Band Removal

1 - FRONT BAND
2 - FRONT CLUTCH RETAINER

(22) Remove intermediate shaft-planetary geartrain assembly (Fig. 32).

(23) 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.

AUTOMATIC TRANSMISSION - 47RE (Continued)

(24) Loosen rear band locknut and loosen adjusting screw 3-4 turns.

(25) Remove snap-ring that retains low-reverse drum on overdrive piston retainer hub (Fig. 33).

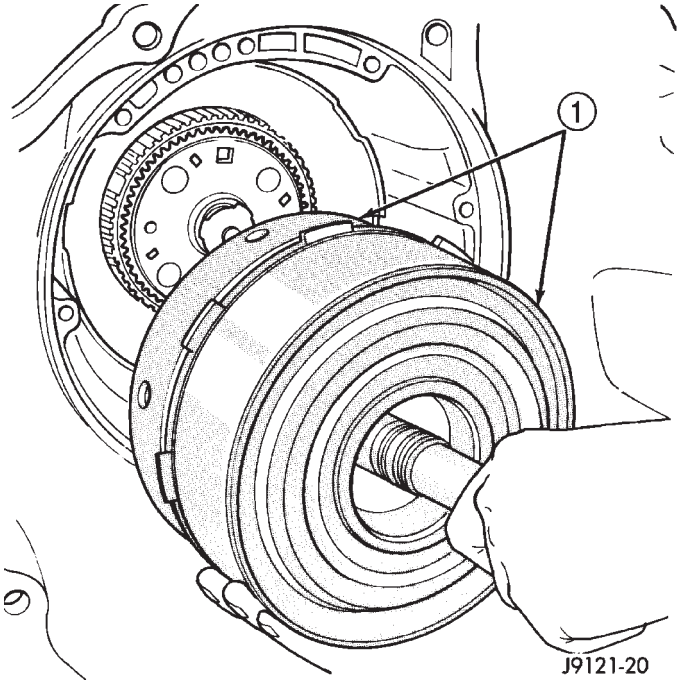


Fig. 28 Removing Front/Rear Clutch Assemblies

1 - FRONT AND REAR CLUTCH ASSEMBLIES

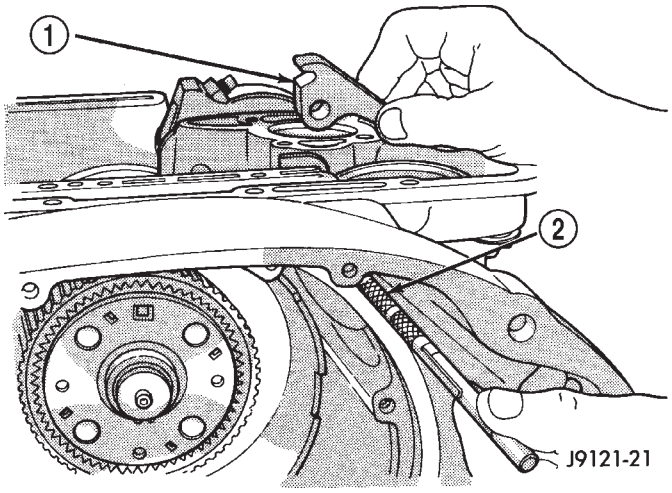


Fig. 29 Front Band Lever And Pin

1 - BAND LEVER
2 - USE PENCIL MAGNET TO REMOVE REACTION PIN

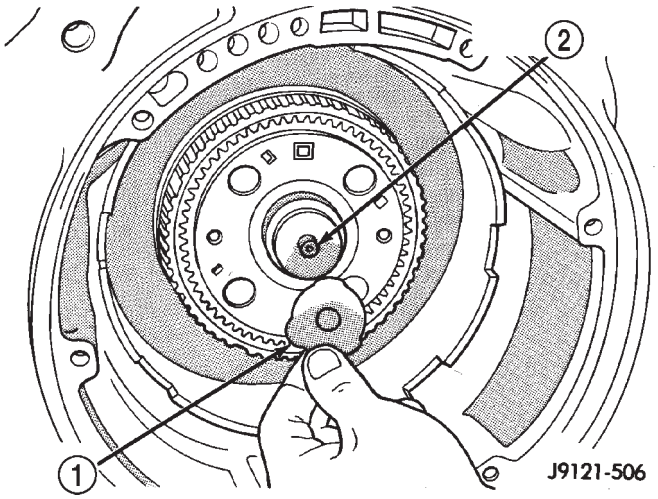


Fig. 30 Intermediate Shaft Thrust Washer

1 - THRUST WASHER
2 - INTERMEDIATE SHAFT PILOT HUB

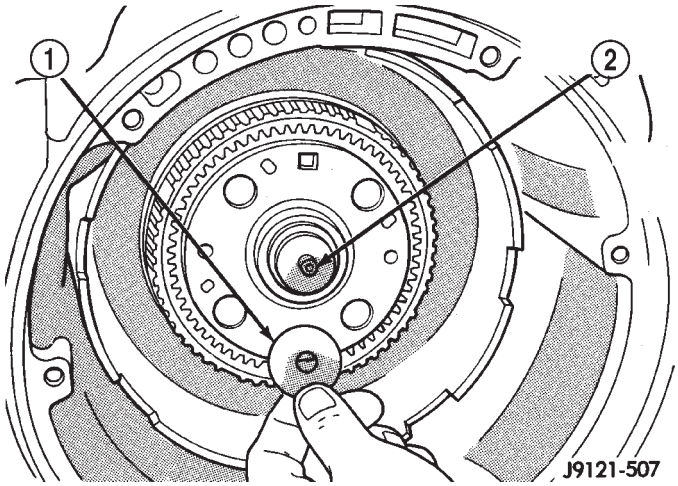


Fig. 31 Intermediate Shaft Thrust Plate

1 - SHAFT THRUST PLATE
2 - INTERMEDIATE SHAFT PILOT HUB

(26) Slide low-reverse drum and thrust washer off piston retainer hub and out of rear band (Fig. 34).

(27) Note that overrunning clutch race will remain on splines of low-reverse drum after removal (Fig. 35). **The race is a permanent press fit on the hub splines. Do not attempt to remove the race.**

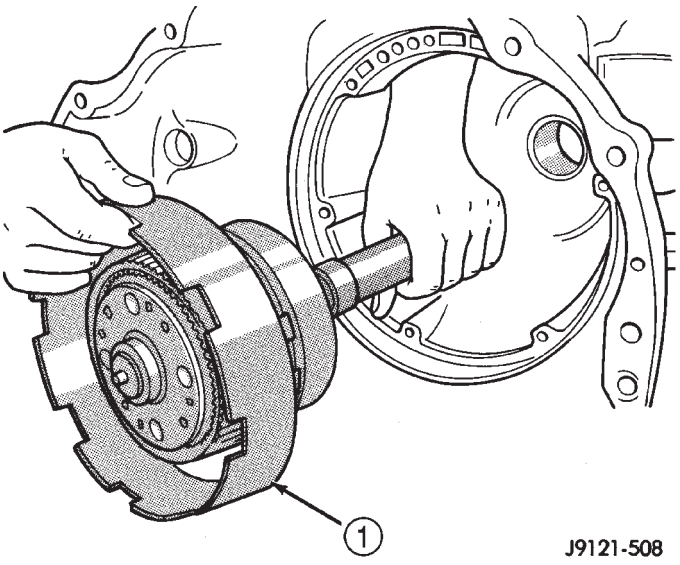


Fig. 32 Intermediate Shaft And Planetary Geartrain

1 - INTERMEDIATE SHAFT AND PLANETARY GEAR TRAIN ASSEMBLY

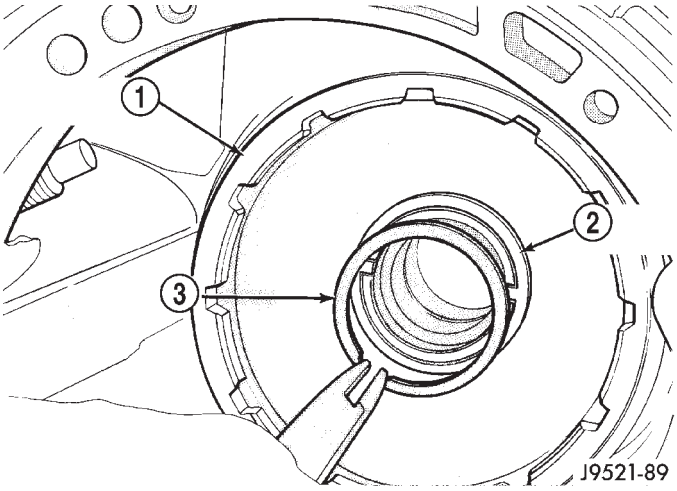


Fig. 33 Low-Reverse Drum Snap-Ring

1 - LOW-REVERSE DRUM
2 - TABBED WASHER
3 - SNAP-RING

(28) Remove overrunning clutch assembly (Fig. 36). Assembly can be removed without displacing rollers and springs if care is exercised. Note position of rollers and springs for assembly reference.

(29) Remove rear band adjusting lever and reaction pin.

(30) Remove rear band.

(31) Compress front servo rod guide with large C-clamp and Tool C-4470, or Compressor Tool C-3422-B (Fig. 37). Compress guide only enough to permit snap-ring removal (about 1/8 in.).

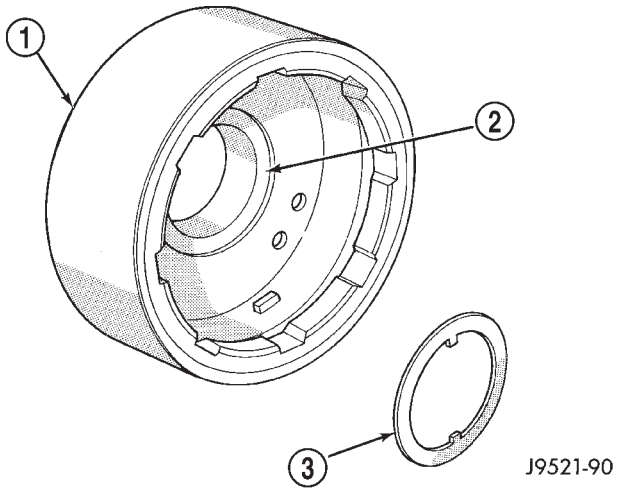


Fig. 34 Low-Reverse Drum And Thrust Washer

1 - LOW-REVERSE DRUM
2 - SPOTFACE FOR WASHER
3 - THRUST WASHER

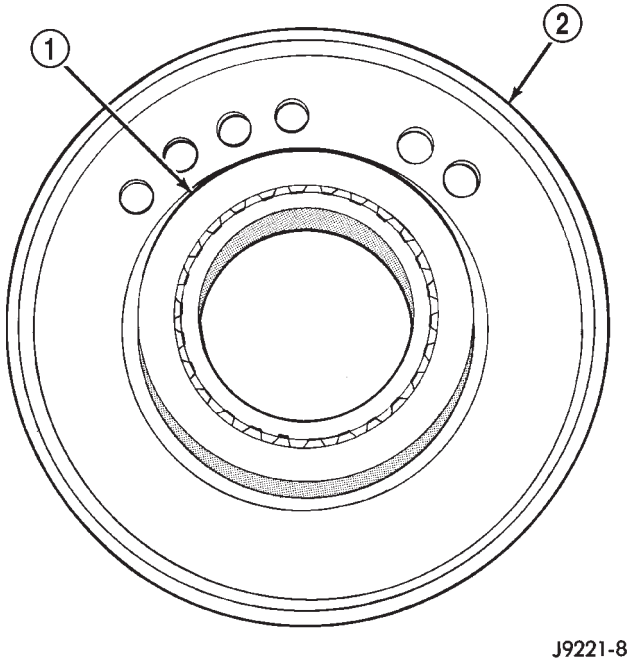


Fig. 35 Overrunning Clutch Race Position On Low-Reverse Drum

1 - OVERRUNNING CLUTCH RACE
2 - LOW-REVERSE DRUM

(32) Remove servo piston snap-ring (Fig. 37). 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.**

(33) Remove tools and remove servo piston and spring.

AUTOMATIC TRANSMISSION - 47RE (Continued)

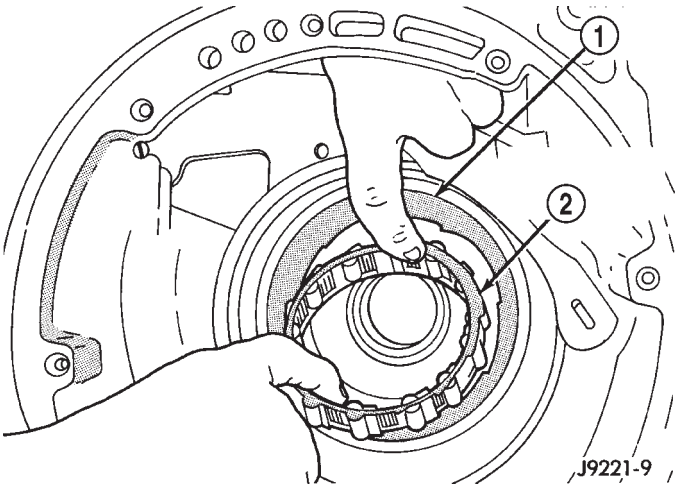


Fig. 36 Overrunning Clutch

1 - CLUTCH CAM
2 - OVERRUNNING CLUTCH ASSEMBLY

(34) Compress rear servo piston with C-clamp and Tool C-4470, or Valve Spring Compressor C-3422-B (Fig. 38). Compress servo spring retainer only enough to permit snap-ring removal.

(35) Remove servo piston snap-ring (Fig. 38). 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.**

(36) Remove tools and remove rear servo retainer, spring and piston assembly.

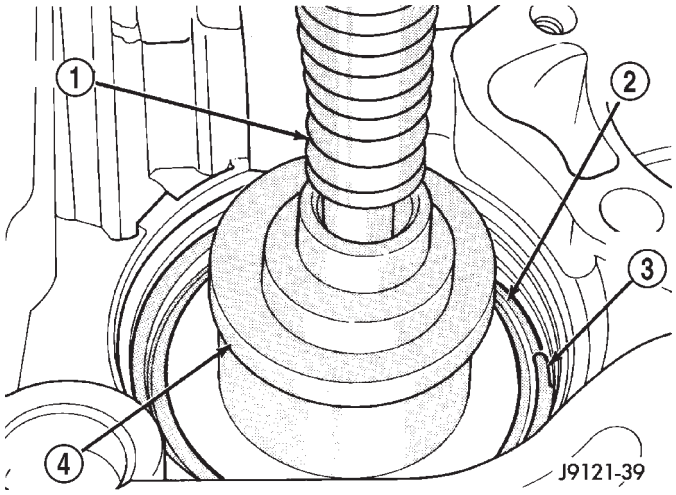


Fig. 37 Front Servo Retaining Snap-Ring

1 - C-CLAMP
2 - FRONT SERVO ROD GUIDE
3 - SNAP-RING
4 - TOOL C-4470

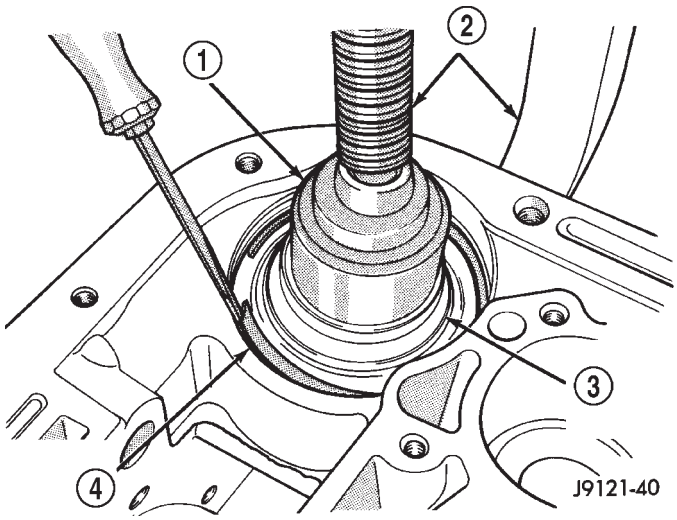


Fig. 38 Rear Servo Retaining Snap-Ring

1 - TOOL C-4470
2 - C-CLAMP
3 - REAR SERVO SPRING RETAINER
4 - RETAINER SNAP-RING

CLEANING

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.

Lubricate transmission parts with Mopar® ATF +4, type 9602, 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.

INSPECTION

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.

Inspect the transmission bushings during overhaul. Bushing condition is important as worn, scored bush-

ings 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.

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.

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 +4, type 9602, during 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 +4. Lubricate servo bore in case with ATF +4.

(2) Install rear servo piston in case. Position piston at slight angle to bore and insert piston with twisting motion (Fig. 39).

(3) Install rear servo spring and retainer in case bore (Fig. 40). 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. 41).

(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. 42). Rotate piston into bore at same time. Rock piston slightly to ease piston ring past snap-ring groove and into bore.

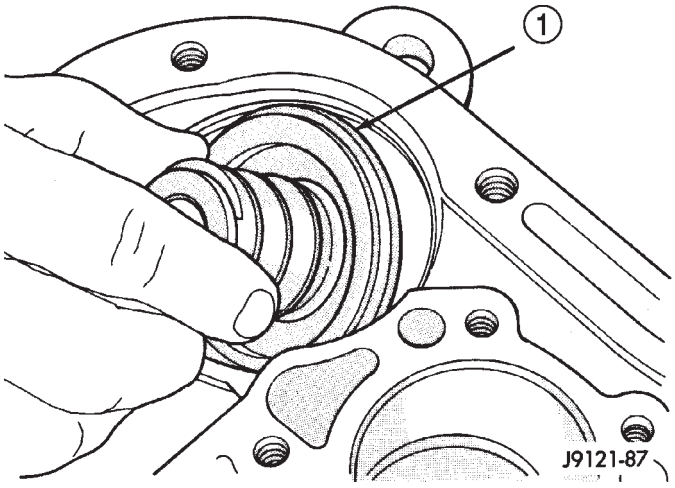


Fig. 39 Rear Servo Piston

1 - REAR SERVO PISTON

(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. 43).

(b) Slowly compress rod guide while simultaneously easing seal ring into bore with suitable tool.

(9) Install rod guide snap-ring (Fig. 43).

AUTOMATIC TRANSMISSION - 47RE (Continued)

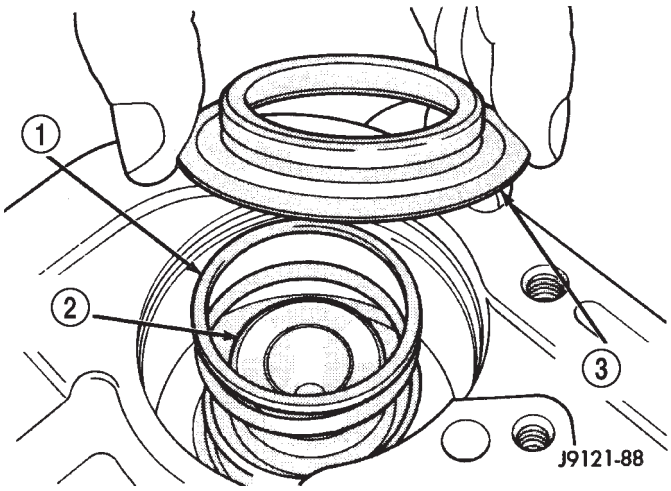


Fig. 40 Rear Servo Piston Spring And Retainer

1 - PISTON SPRING
2 - REAR SERVO PISTON
3 - SPRING RETAINER

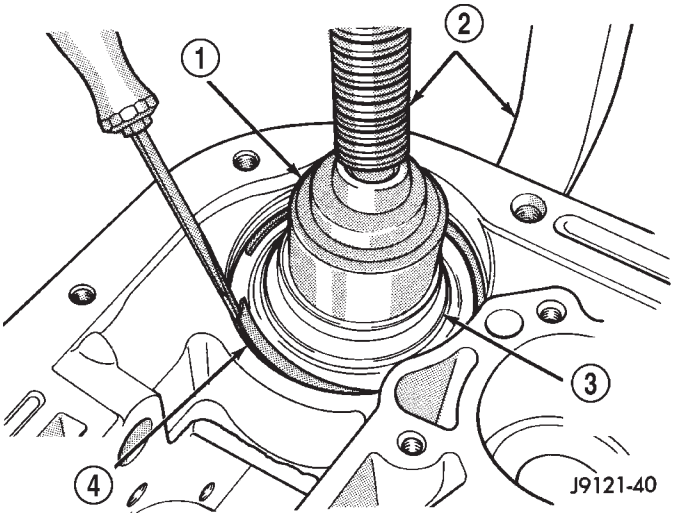


Fig. 41 Rear Servo Snap-Ring

1 - TOOL C-4470
2 - C-CLAMP
3 - REAR SERVO SPRING RETAINER
4 - RETAINER SNAP-RING

OVERRUNNING CLUTCH, REAR BAND, AND LOW-REVERSE DRUM

(1) Install overrunning clutch components if not yet installed.

(2) Position rear band reaction pin and band in case. Be sure that the twin lugs on the band are seated against the reaction pin.

(3) Install low-reverse drum. Slide drum through rear band, onto piston retainer hub and into engagement with overrunning clutch and race.

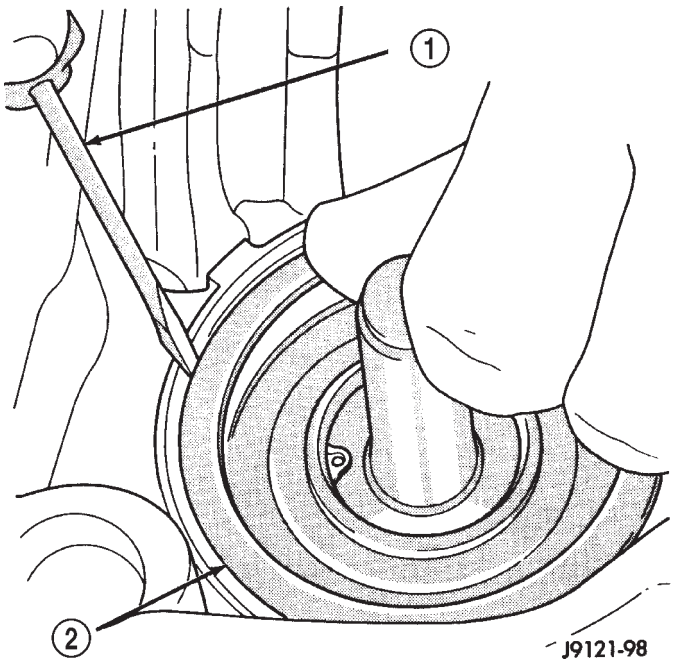


Fig. 42 Front Servo Piston

1 - USE SUITABLE TOOL TO HELP SEAT PISTON RING
2 - FRONT SERVO PISTON

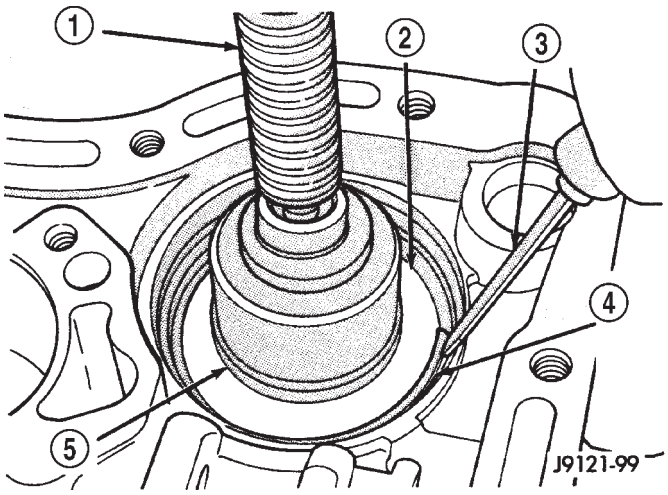


Fig. 43 Front Servo Rod Guide And Snap-Ring

1 - C-CLAMP
2 - ROD GUIDE
3 - SMALL SCREWDRIVER
4 - ROD GUIDE SNAP-RING
5 - TOOL SP-5560

(4) Install thrust washer in low-reverse drum spotface (Fig. 44). Use petroleum jelly to hold washer in place.

(5) Install snap-ring that secures low-reverse drum to piston retainer hub (Fig. 44).

(6) Insert the rear band pivot pin part way into the case.

(7) Install rear band adjusting lever and pivot pin. Be sure lever and the single lug on the band are aligned and engaged before seating band pivot pin in case.

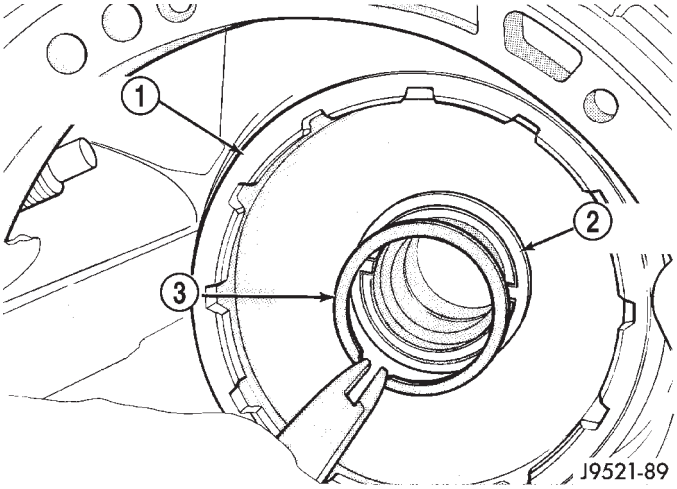


Fig. 44 Low-Reverse Drum Snap-Ring

1 - LOW-REVERSE DRUM
2 - TABBED WASHER
3 - SNAP-RING

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. 45). **Support shaft carefully during installation. Do not allow shaft bearing/ bushing surfaces to become nicked or scratched.**

(3) Lubricate intermediate shaft thrust plate with petroleum jelly and install plate on shaft pilot hub (Fig. 46).

(4) Check input shaft front seal rings, fiber thrust washer and rear seal ring (Fig. 47). 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.

(5) Assemble front and rear clutches (Fig. 48). 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.

(6) Install intermediate shaft thrust washer in hub of rear clutch retainer (Fig. 49). 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.

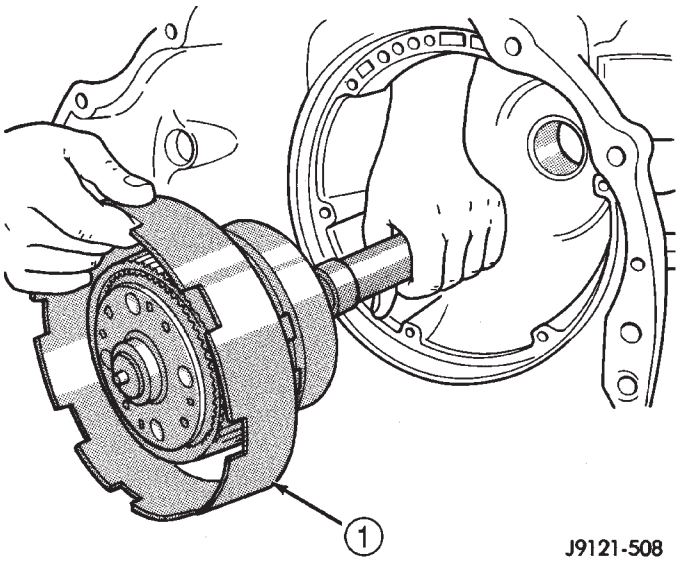


Fig. 45 Intermediate Shaft And Planetary Geartrain

1 - INTERMEDIATE SHAFT AND PLANETARY GEAR TRAIN ASSEMBLY

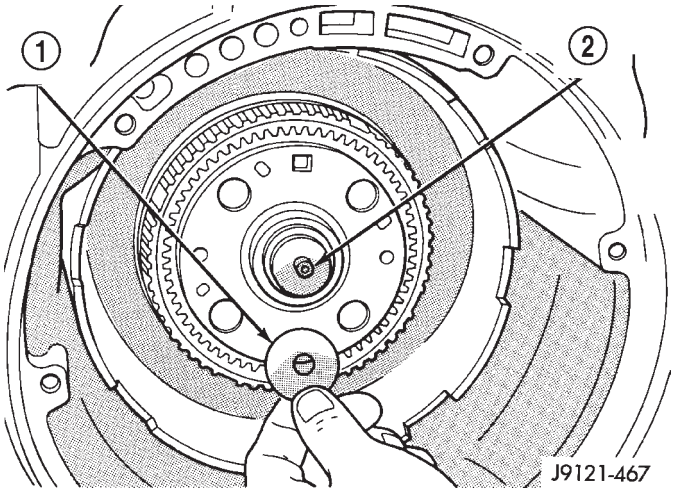


Fig. 46 Intermediate Shaft Thrust Plate

1 - SHAFT THRUST PLATE
2 - INTERMEDIATE SHAFT PILOT HUB

(8) Align discs in rear clutch. Then install and engage assembly in front planetary and driving shell (Fig. 50). 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.

AUTOMATIC TRANSMISSION - 47RE (Continued)

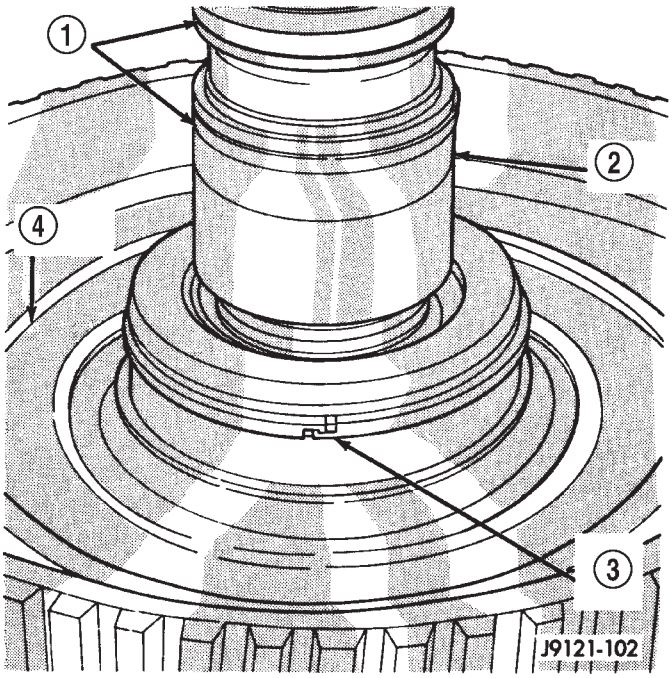


Fig. 47 Input Shaft Seal Rings And Thrust Washer

1 - TORLON® FRONT SEAL RINGS
2 - INPUT SHAFT
3 - REAR SEAL RING
4 - THRUST WASHER

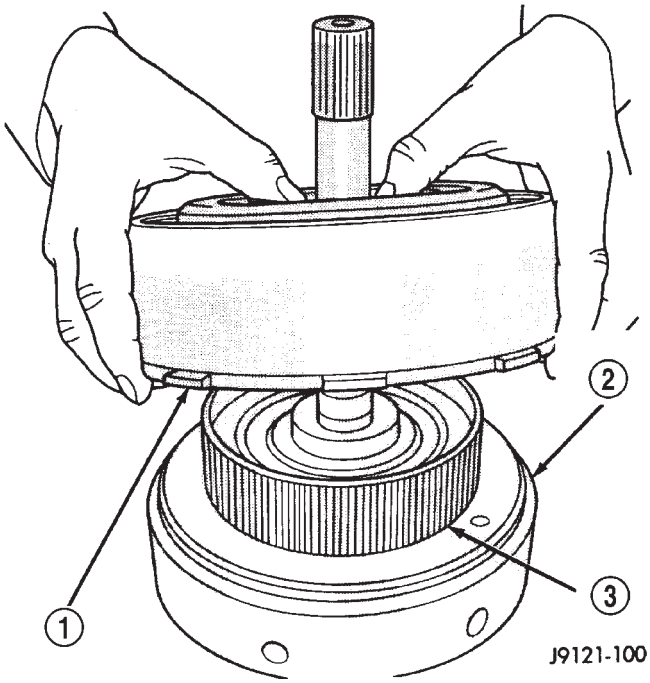


Fig. 48 Assembling Front And Rear Clutches

1 - FRONT CLUTCH ASSEMBLY
2 - REAR CLUTCH ASSEMBLY
3 - REAR CLUTCH SPLINED HUB

(11) Slide front band over front clutch retainer and install front band strut and anchor (Fig. 51).

(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.**

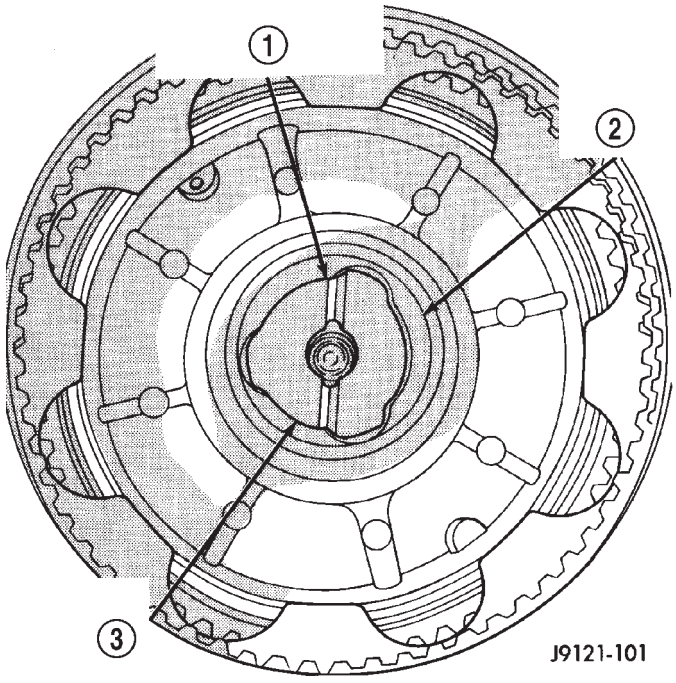


Fig. 49 Intermediate Shaft Thrust Washer

1 - BE SURE WASHER GROOVES FACE OUT AS SHOWN
2 - REAR CLUTCH RETAINER HUB
3 - SHAFT THRUST WASHER

OIL PUMP

(1) Install oil pump Pilot Studs C-3288-B in case (Fig. 52).

(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. 52).

(3) Coat the reaction shaft thrust washer with petroleum jelly to hold it in place. Then install washer over reaction shaft hub and seat it on pump (Fig. 53).

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 fiber thrust washer is in position (Fig. 54). Use extra petroleum jelly to hold washer in place if necessary.

(5) Lubricate oil pump seals with petroleum Mopar® ATF +4, type 9602.

AUTOMATIC TRANSMISSION - 47RE (Continued)

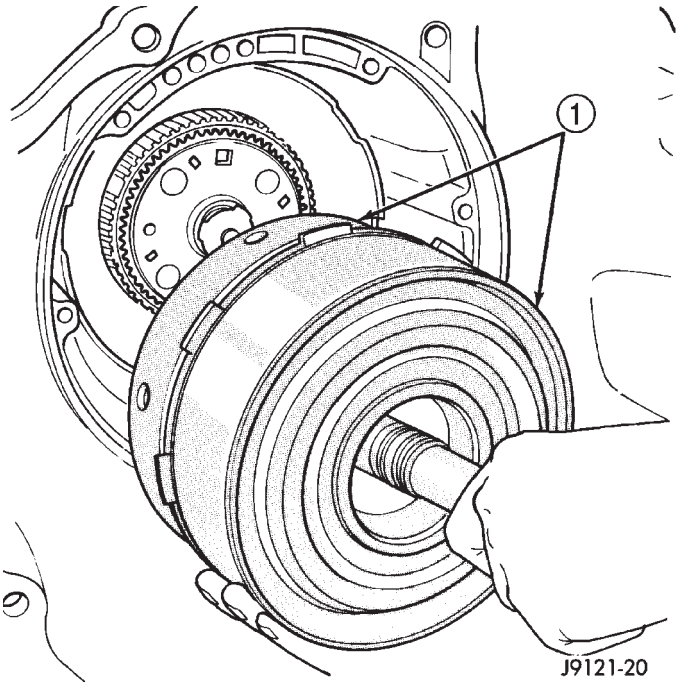


Fig. 50 Front/Rear Clutch Assemblies

1 - FRONT AND REAR CLUTCH ASSEMBLIES

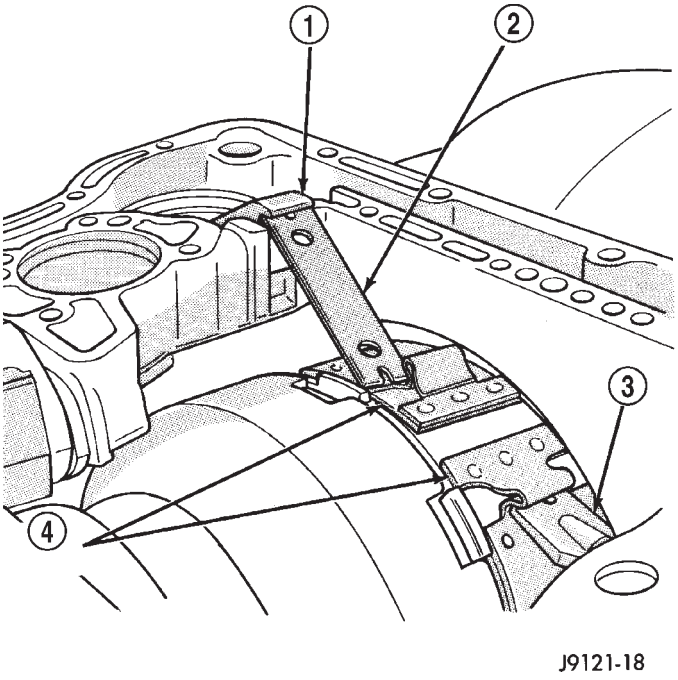


Fig. 51 Front Band And Linkage

1 - LEVER
2 - STRUT
3 - ANCHOR
4 - FRONT BAND

(6) Mount oil pump on pilot studs and slide pump into case opening (Fig. 55). **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.

(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.

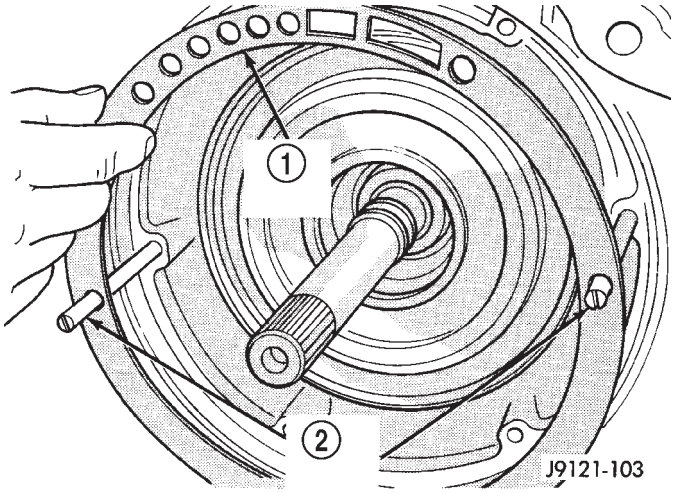


Fig. 52 Oil Pump Gasket And Pilot Studs

1 - OIL PUMP GASKET
2 - PILOT STUDS C-3288-B

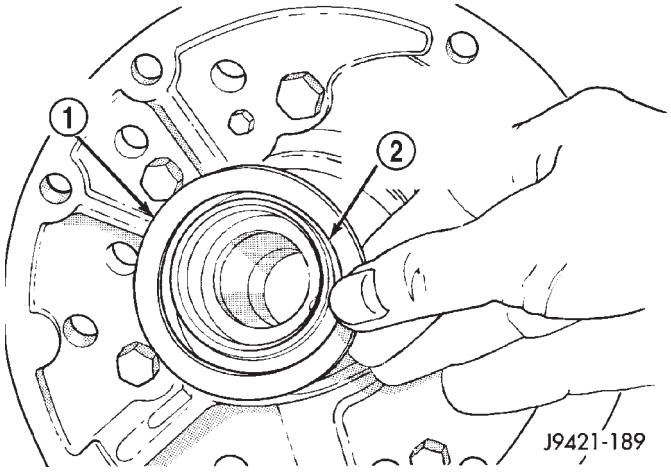


Fig. 53 Reaction Shaft Thrust Washer

1 - THRUST WASHER
2 - CHAMFERED SIDE OF WASHER BORE GOES TOWARD PUMP

INPUT SHAFT END PLAY CHECK

NOTE: Overdrive unit must be installed in order to correctly measure the input shaft end-play.

AUTOMATIC TRANSMISSION - 47RE (Continued)

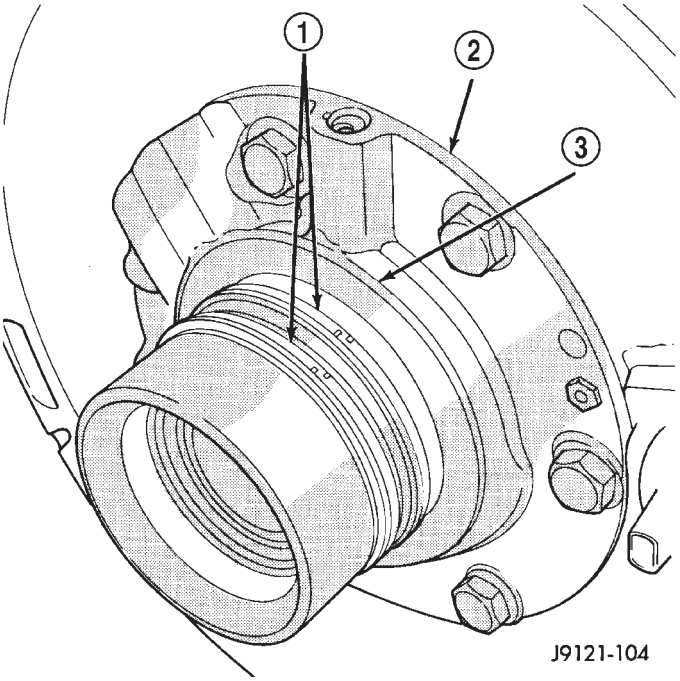


Fig. 54 Reaction Shaft Seal Ring And Thrust Washer

1 - SEAL RINGS
2 - REACTION SHAFT SUPPORT
3 - THRUST WASHER (FIBER)

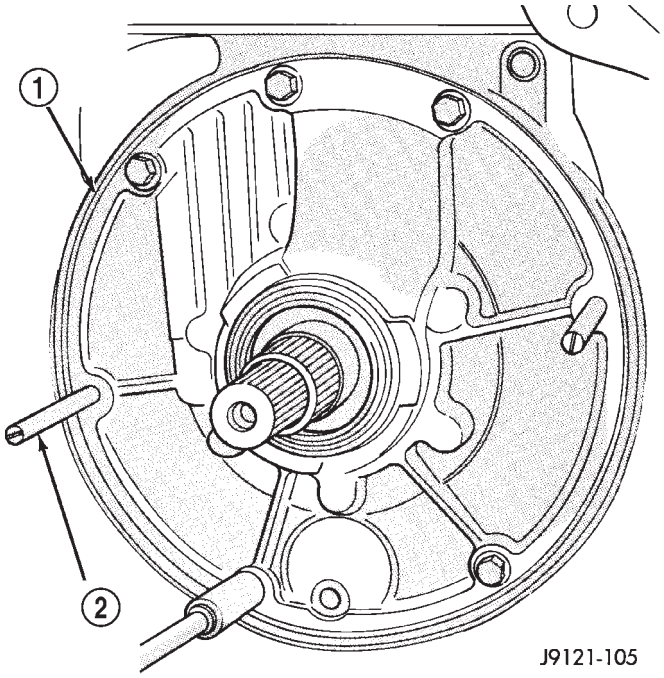


Fig. 55 Oil Pump

1 - SEAT OIL PUMP IN CASE BY HAND
2 - REMOVE PILOT STUDS WHEN PUMP IS SEATED

(1) Measure input shaft end play (Fig. 56).

NOTE: If end play is incorrect, transmission is incorrectly assembled, or reaction shaft thrust washer is incorrect. The reaction shaft thrust washer is selective.

(a) Attach Adapter 8266-5 to Handle 8266-8.
(b) Attach dial indicator C-3339 to Handle 8266-8.
(c) Install the assembled tool onto the input shaft of the transmission and tighten the retaining screw on Adapter 8266-5 to secure it to the input shaft.
(d) Position the dial indicator plunger against a flat spot on the oil pump and zero the dial indicator.
(e) Move input shaft in and out and record reading. End play should be 0.86 - 2.13 mm (0.034 - 0.084 in.). Adjust as necessary.

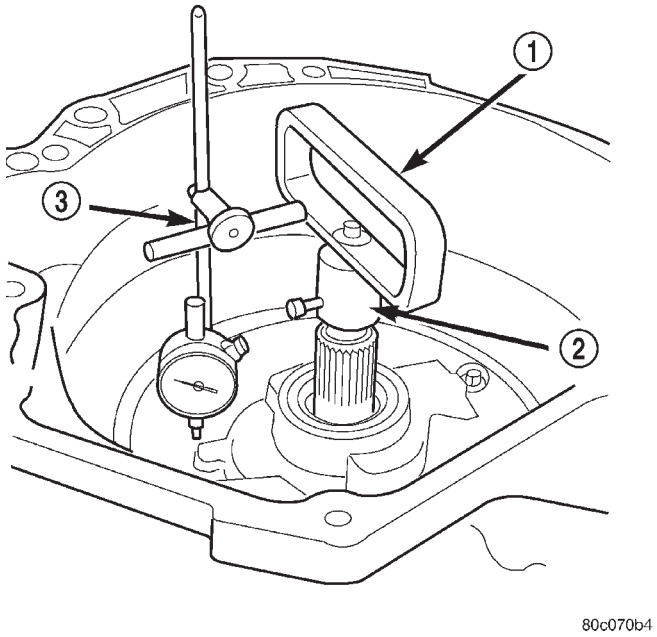


Fig. 56 Checking Input Shaft End Play

1 - TOOL 8266-8
2 - TOOL 8266-5
3 - TOOL C-3339

ACCUMULATOR, VALVE BODY, OIL PAN, AND TORQUE CONVERTER

(1) Install accumulator inner spring, piston and outer spring (Fig. 57).
(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. 58). 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.
(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.).

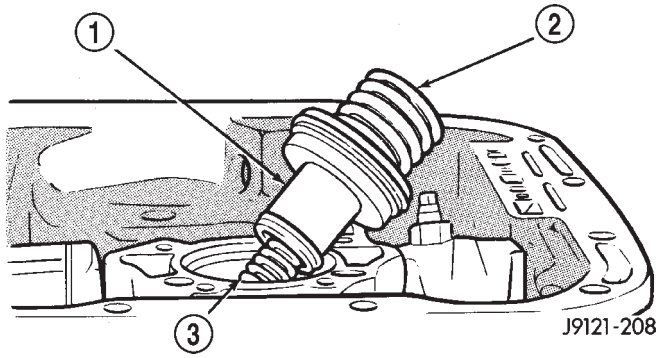


Fig. 57 Accumulator Piston And Springs

1 - ACCUMULATOR PISTON
2 - OUTER SPRING
3 - INNER SPRING

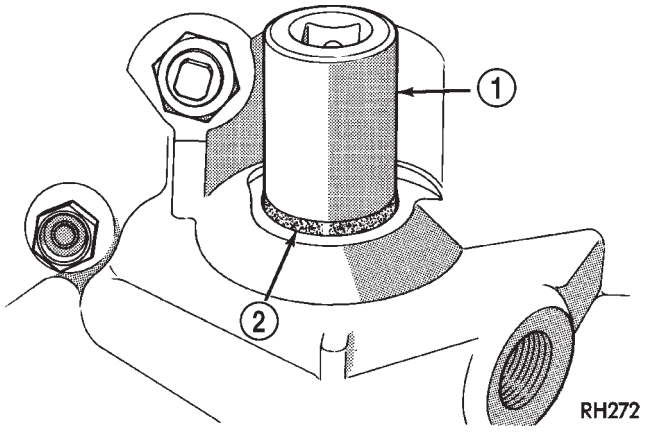


Fig. 58 Manual Lever Shaft Seal

1 - 15/16" SOCKET
2 - 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 1-7/8 turns.

(d) Back off rear band adjusting screw 3 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 13.6 N·m (125 in. 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.

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 pocket in the rear oil pump seal lip with transmission fluid.

(3) Lubricate converter pilot hub of the crankshaft with a light coating of Mopar® High Temp Grease.

(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.

AUTOMATIC TRANSMISSION - 47RE (Continued)

(6) Check converter seating with steel scale and straightedge (Fig. 59). Surface of converter lugs should be 19mm (0.75 in.) to the rear of straightedge when the converter is fully seated.

(7) Temporarily secure converter with C-clamp.

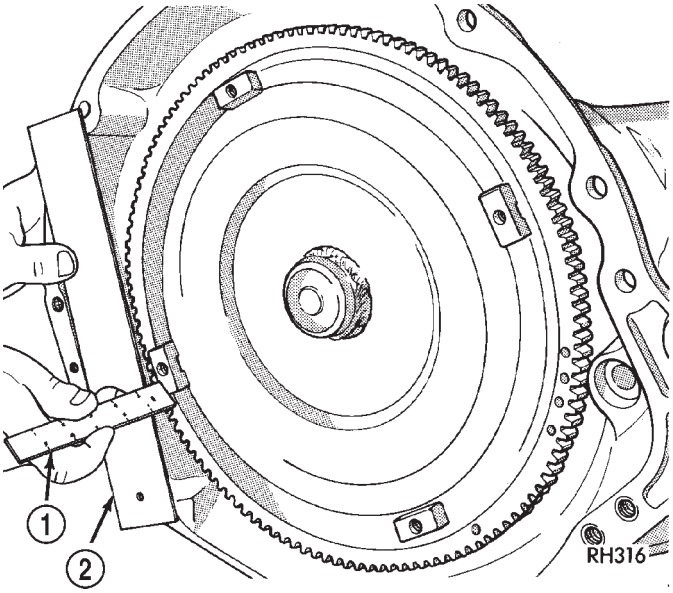


Fig. 59 Checking Converter Seating - Typical

1 - SCALE
2 - STRAIGHTEDGE

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

(13) Install bolts attaching converter housing to engine.

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

(15) Remove engine support fixture.

(16) Install crankshaft position sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/CRANKSHAFT POSITION SENSOR - INSTALLATION)

(17) 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.

(18) Connect gearshift and throttle cable to transmission.

(19) 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.

(20) Install torque converter-to-driveplate bolts. Tighten bolts to 47 N·m (35 ft. lbs.).

(21) Install converter housing access cover.

(22) Install starter motor and cooler line bracket. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - INSTALLATION)

(23) Connect cooler lines to transmission.

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

(25) Install exhaust components.

(26) Align and connect propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

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

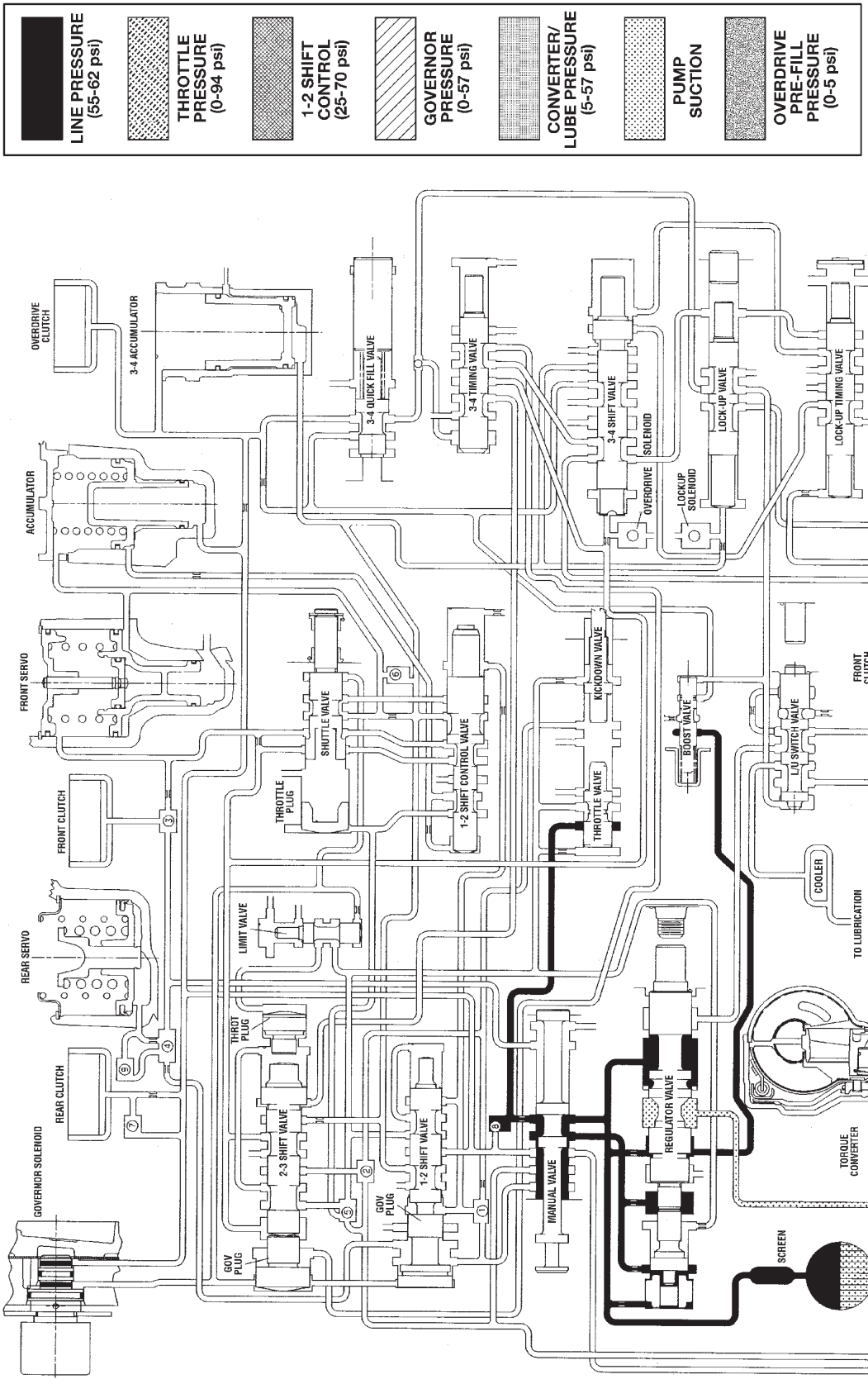
(28) Lower vehicle.

(29) Fill transmission with Mopar® ATF +4, type 9602, Automatic Transmission fluid.

AUTOMATIC TRANSMISSION - 47RE (Continued)

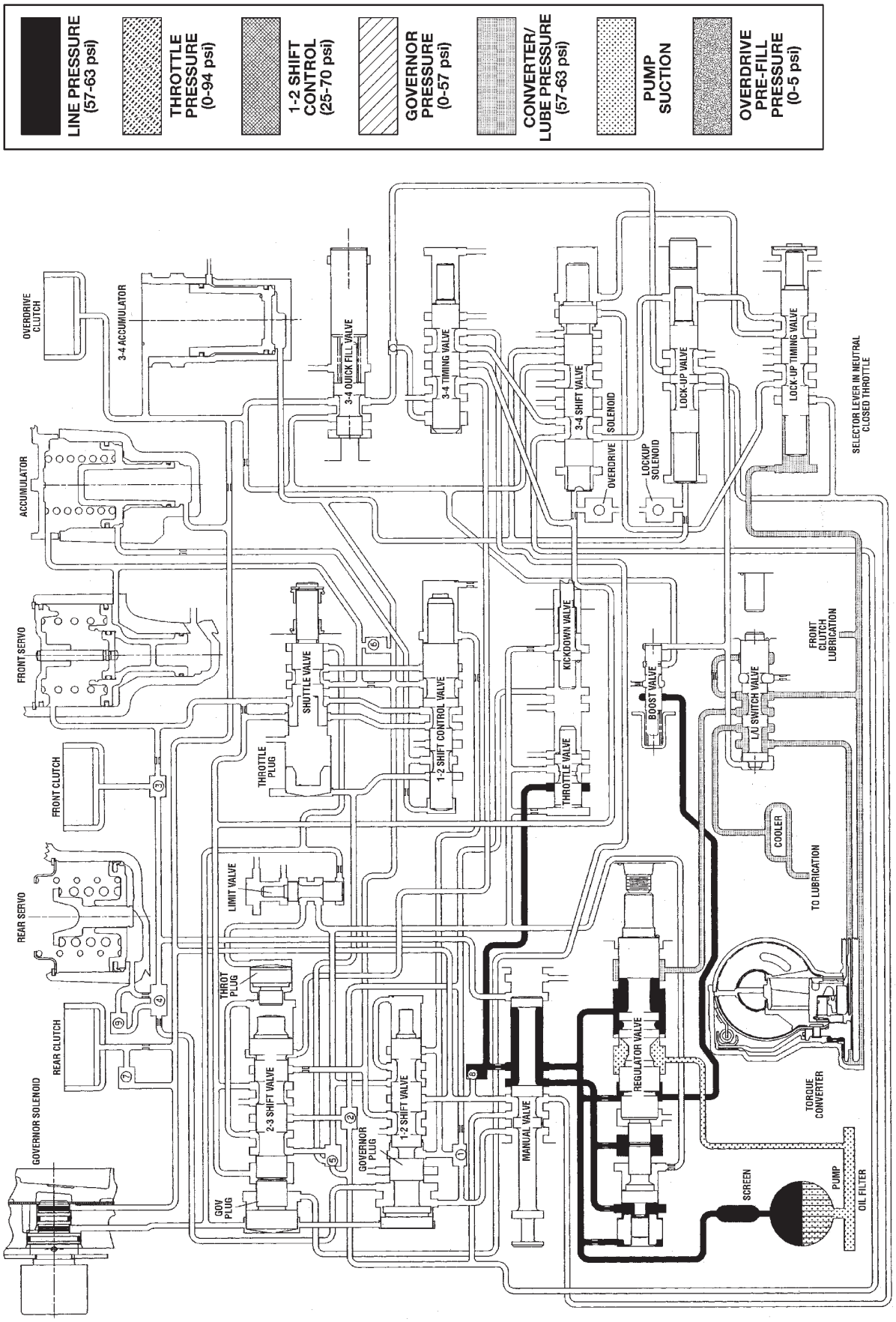
SCHEMATICS AND DIAGRAMS

HYDRAULIC SCHEMATICS



HYDRAULIC FLOW IN PARK

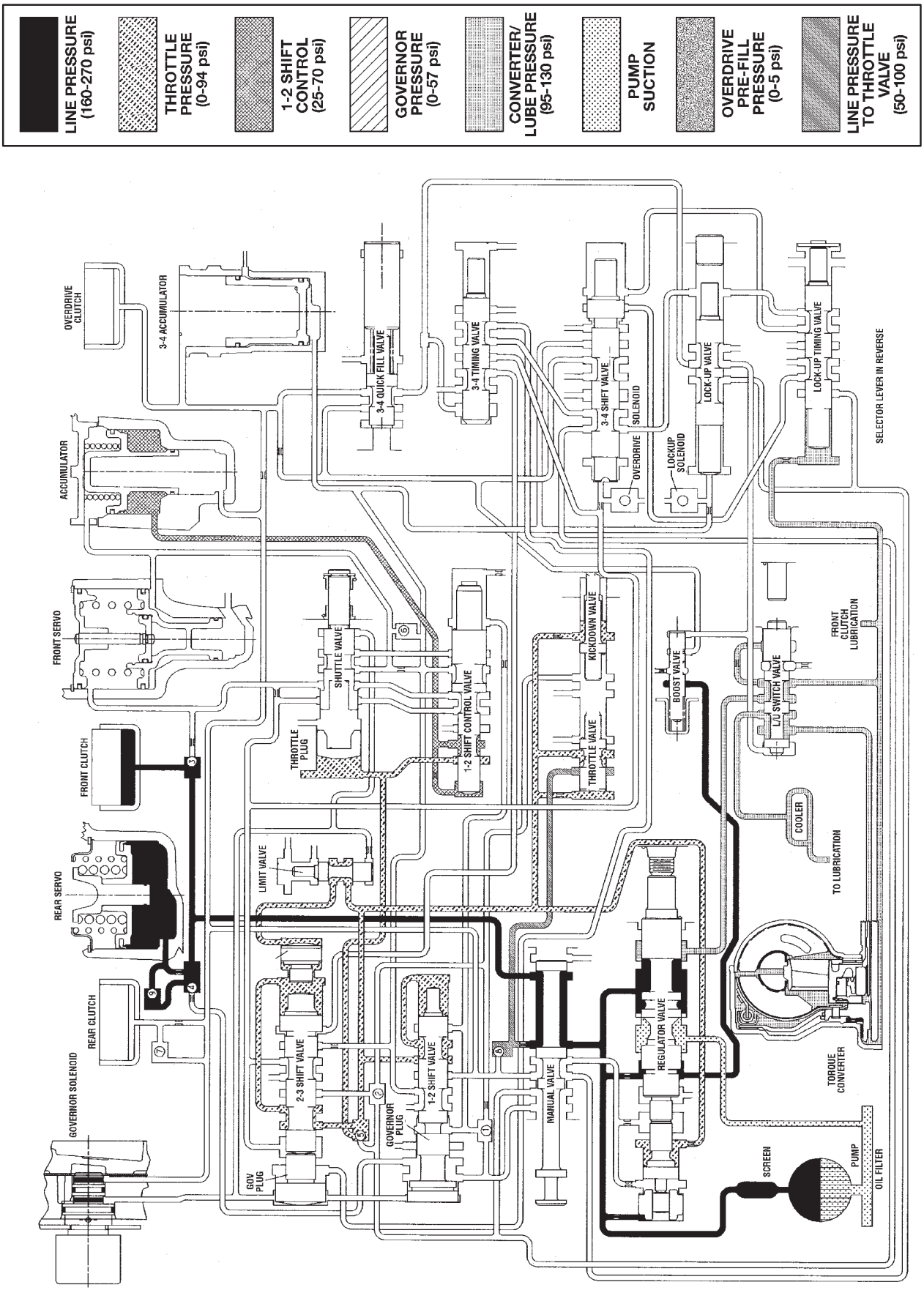
AUTOMATIC TRANSMISSION - 47RE (Continued)



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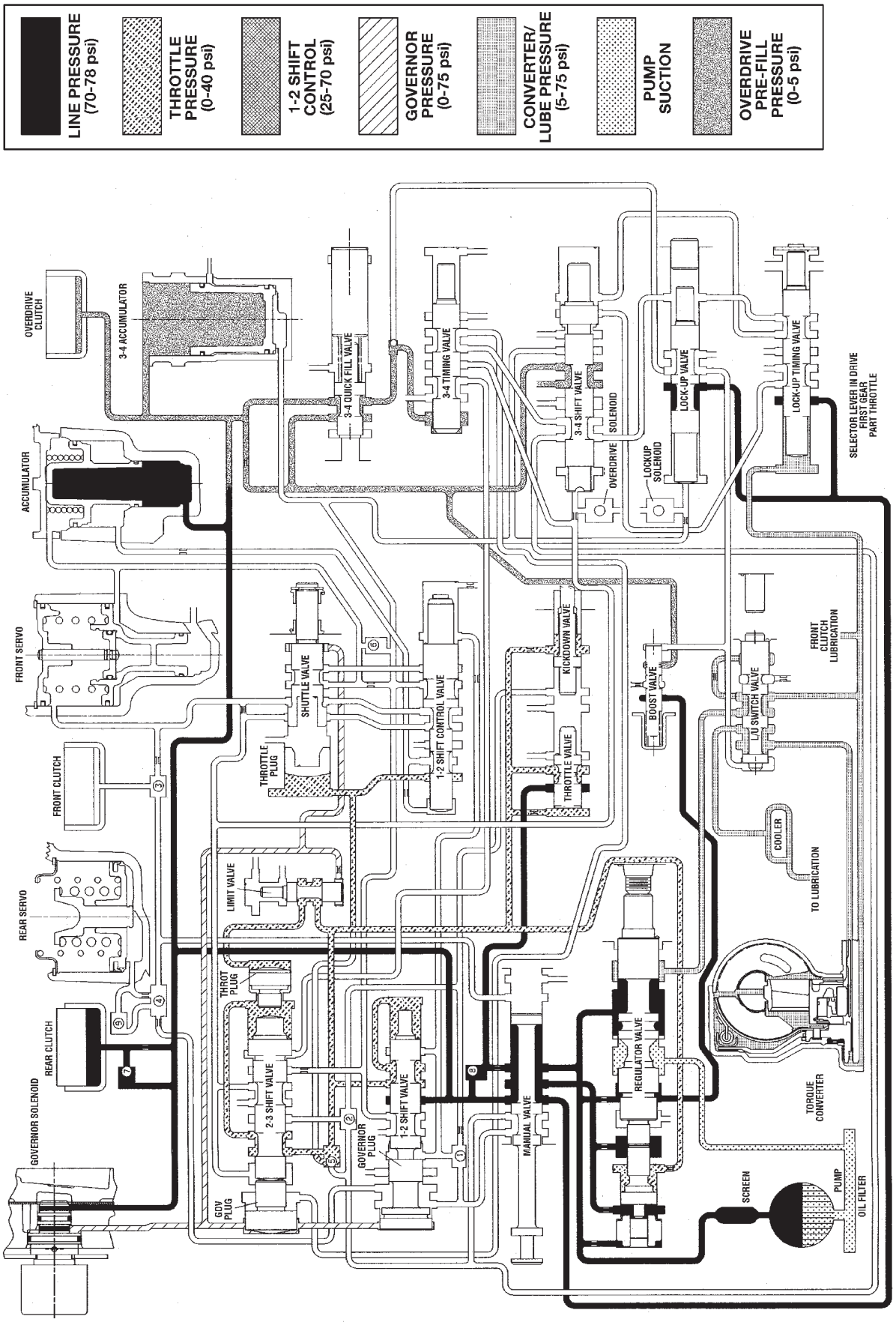
HYDRAULIC FLOW IN NEUTRAL

AUTOMATIC TRANSMISSION - 47RE (Continued)



HYDRAULIC FLOW IN REVERSE

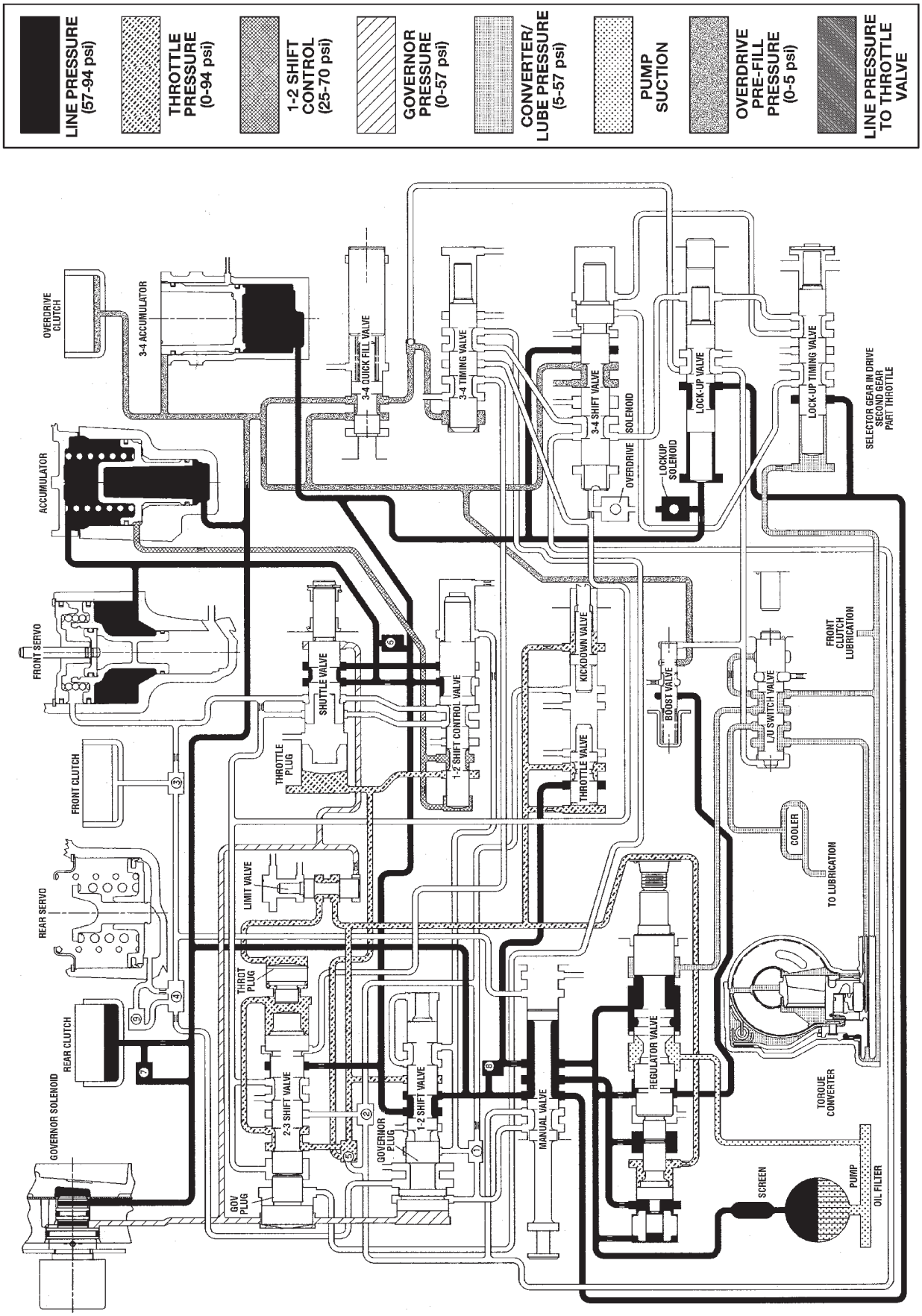
AUTOMATIC TRANSMISSION - 47RE (Continued)



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HYDRAULIC FLOW IN DRIVE FIRST GEAR

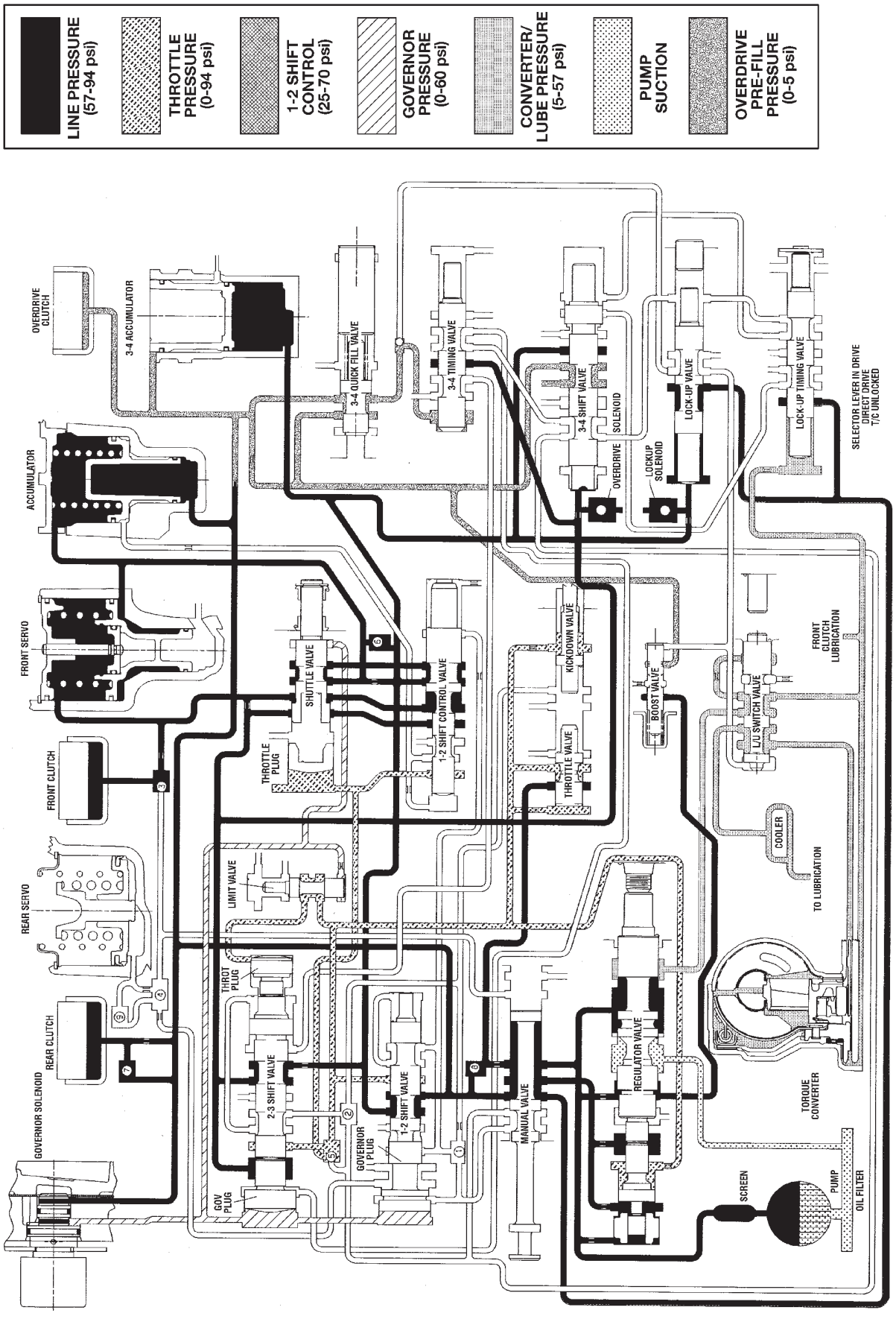
AUTOMATIC TRANSMISSION - 47RE (Continued)



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HYDRAULIC FLOW IN DRIVE SECOND GEAR

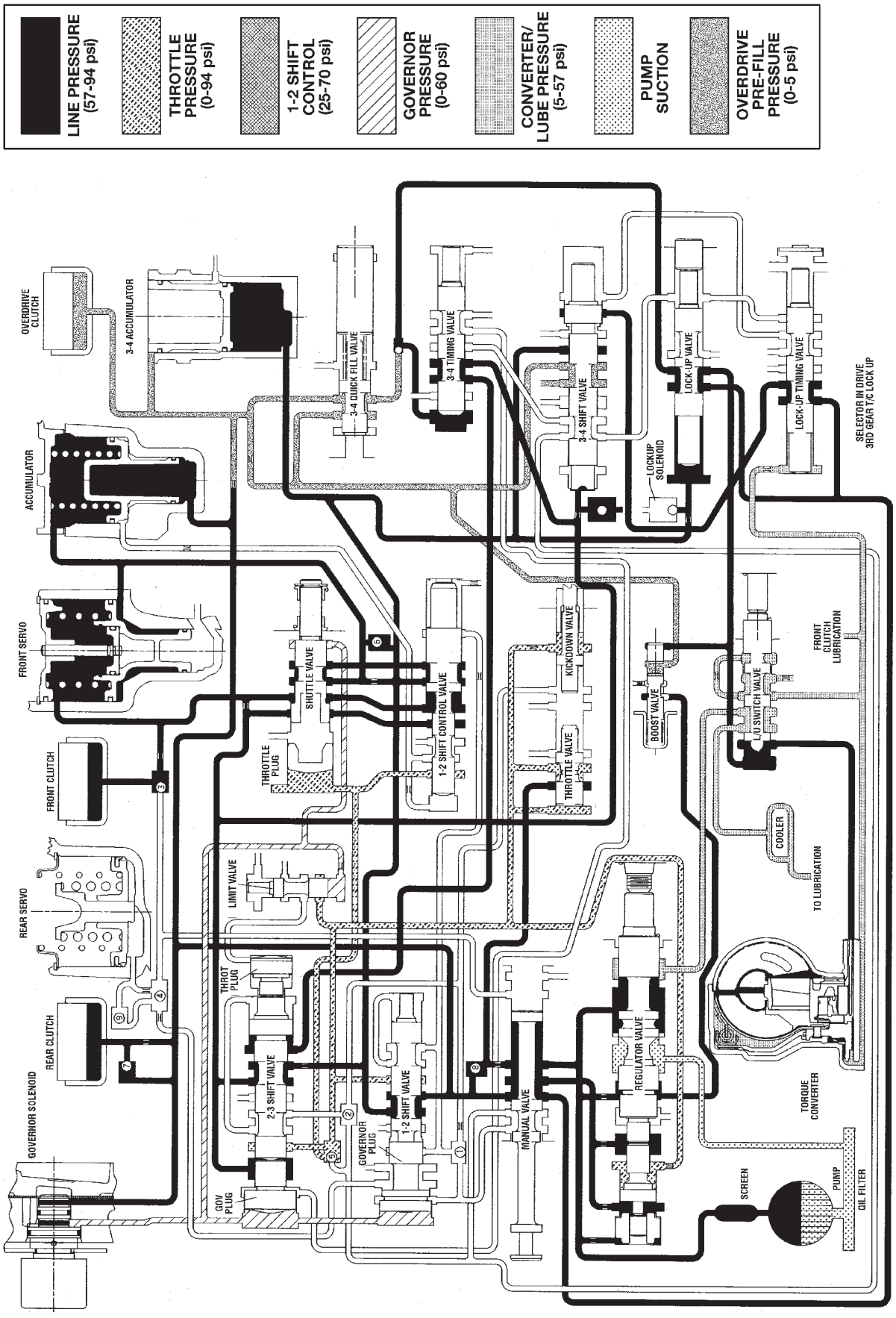
AUTOMATIC TRANSMISSION - 47RE (Continued)



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HYDRAULIC FLOW IN DRIVE THIRD GEAR (CONVERTER CLUTCH NOT APPLIED)

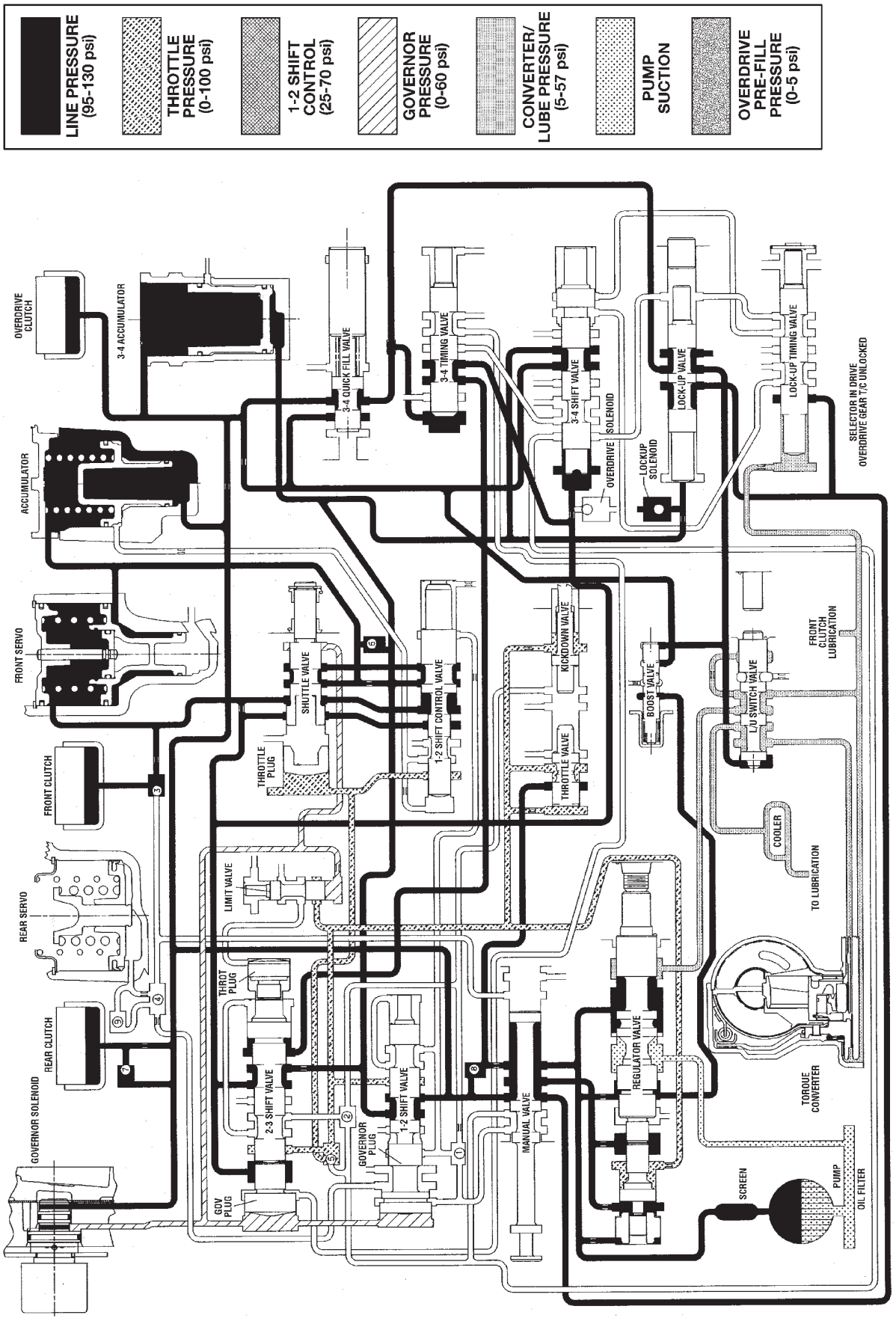
AUTOMATIC TRANSMISSION - 47RE (Continued)



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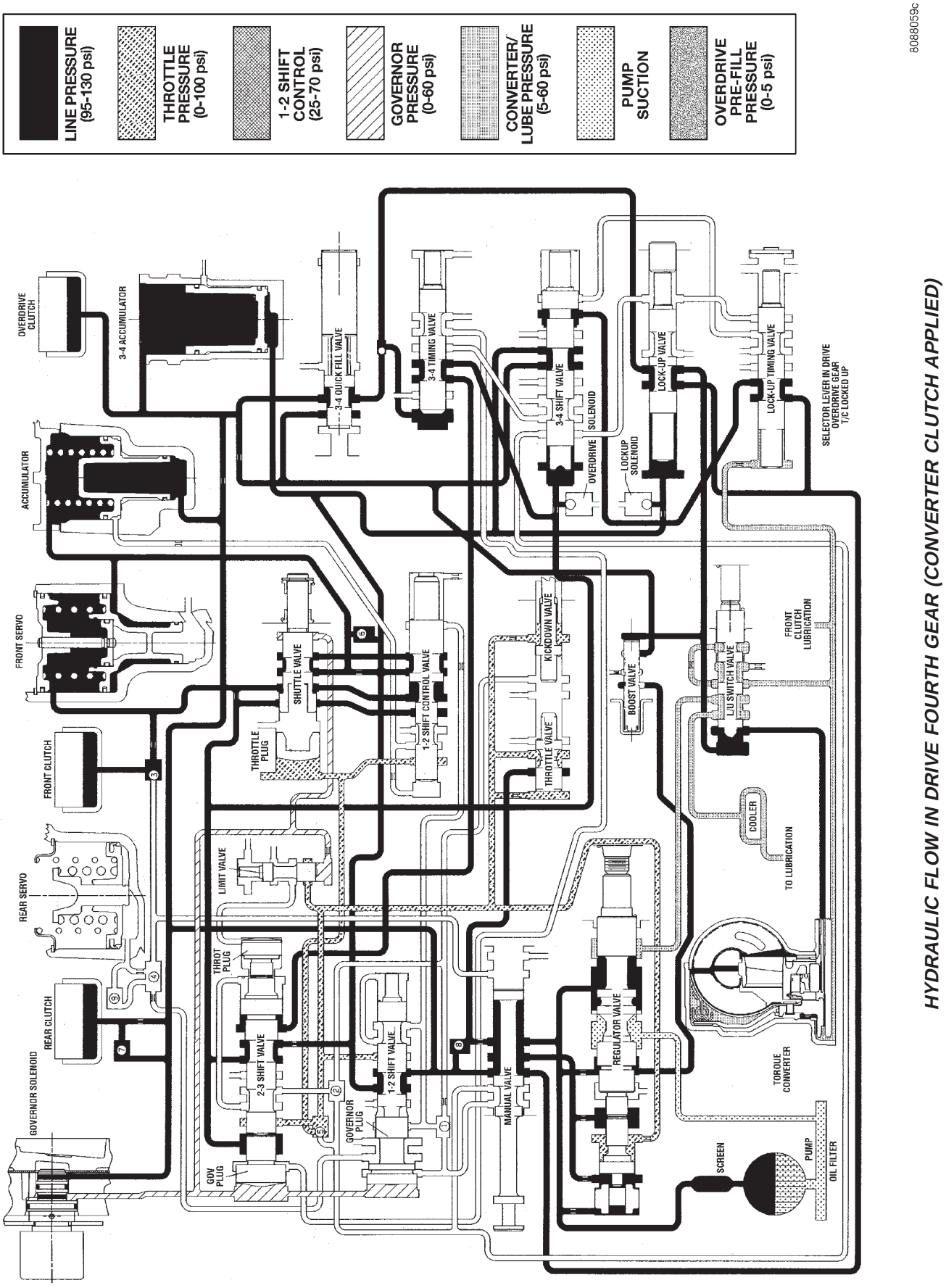
HYDRAULIC FLOW IN DRIVE THIRD GEAR (CONVERTER CLUTCH APPLIED)

AUTOMATIC TRANSMISSION - 47RE (Continued)



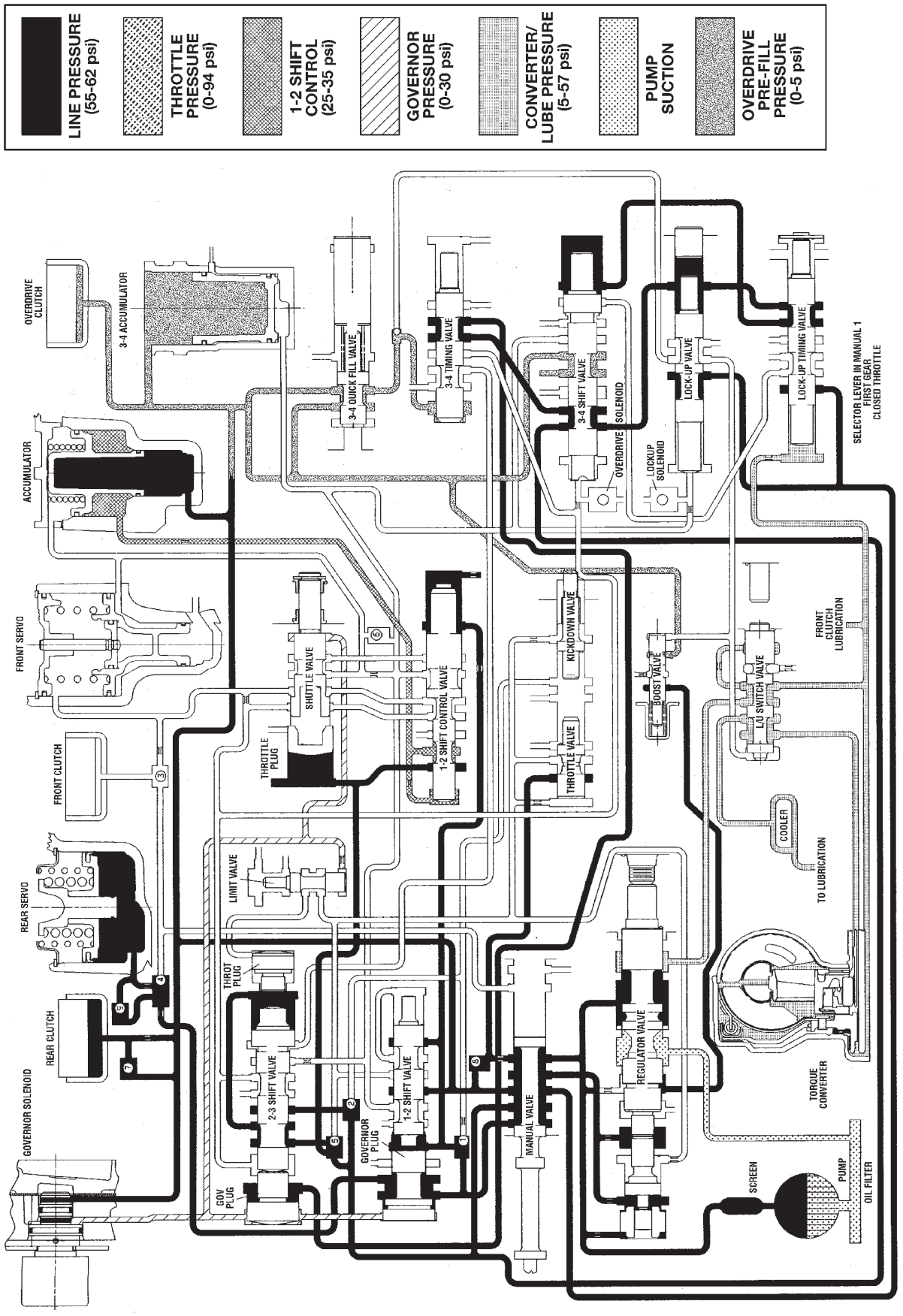
HYDRAULIC FLOW IN DRIVE FOURTH GEAR (CONVERTER CLUTCH NOT APPLIED)

AUTOMATIC TRANSMISSION - 47RE (Continued)



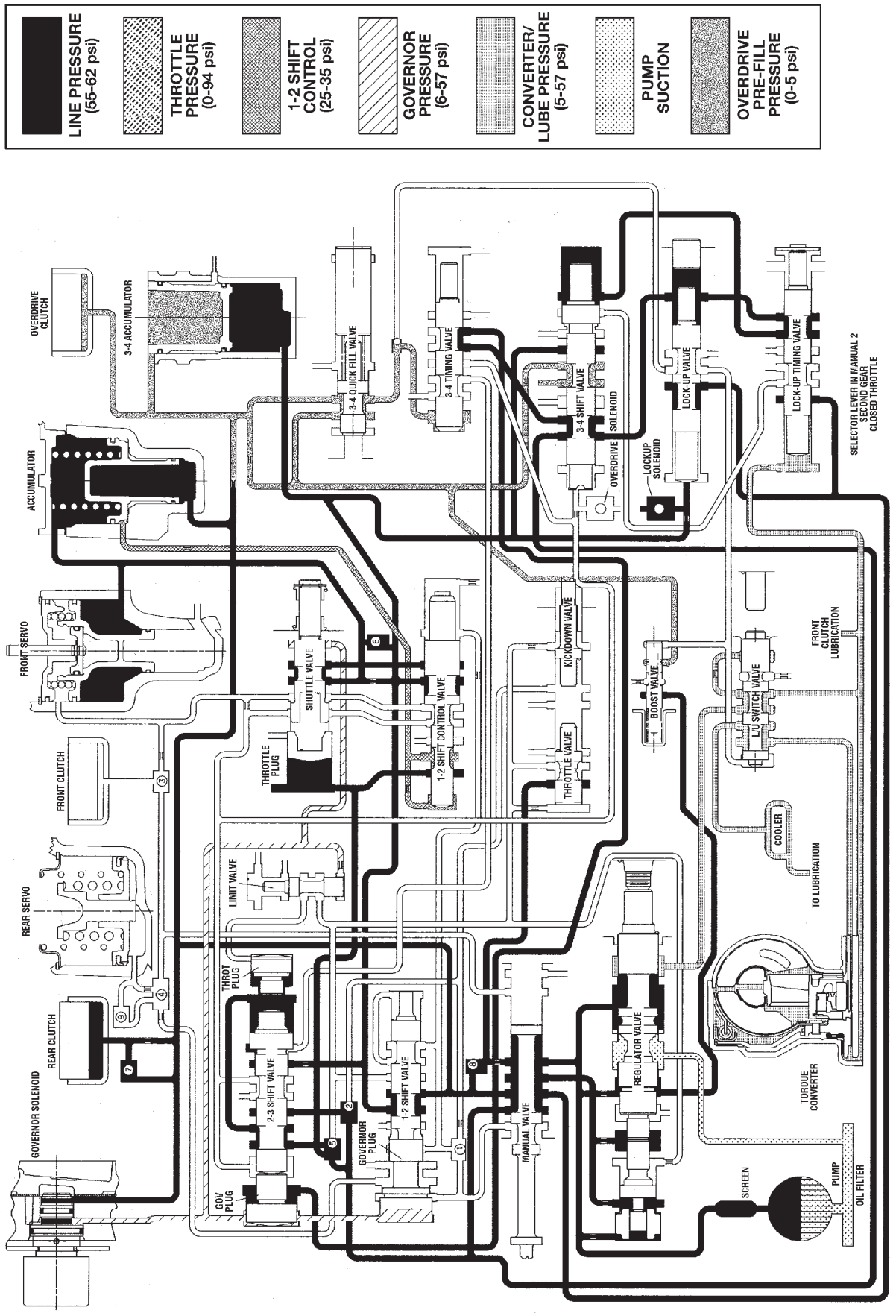
HYDRAULIC FLOW IN DRIVE FOURTH GEAR (CONVERTER CLUTCH APPLIED)

AUTOMATIC TRANSMISSION - 47RE (Continued)



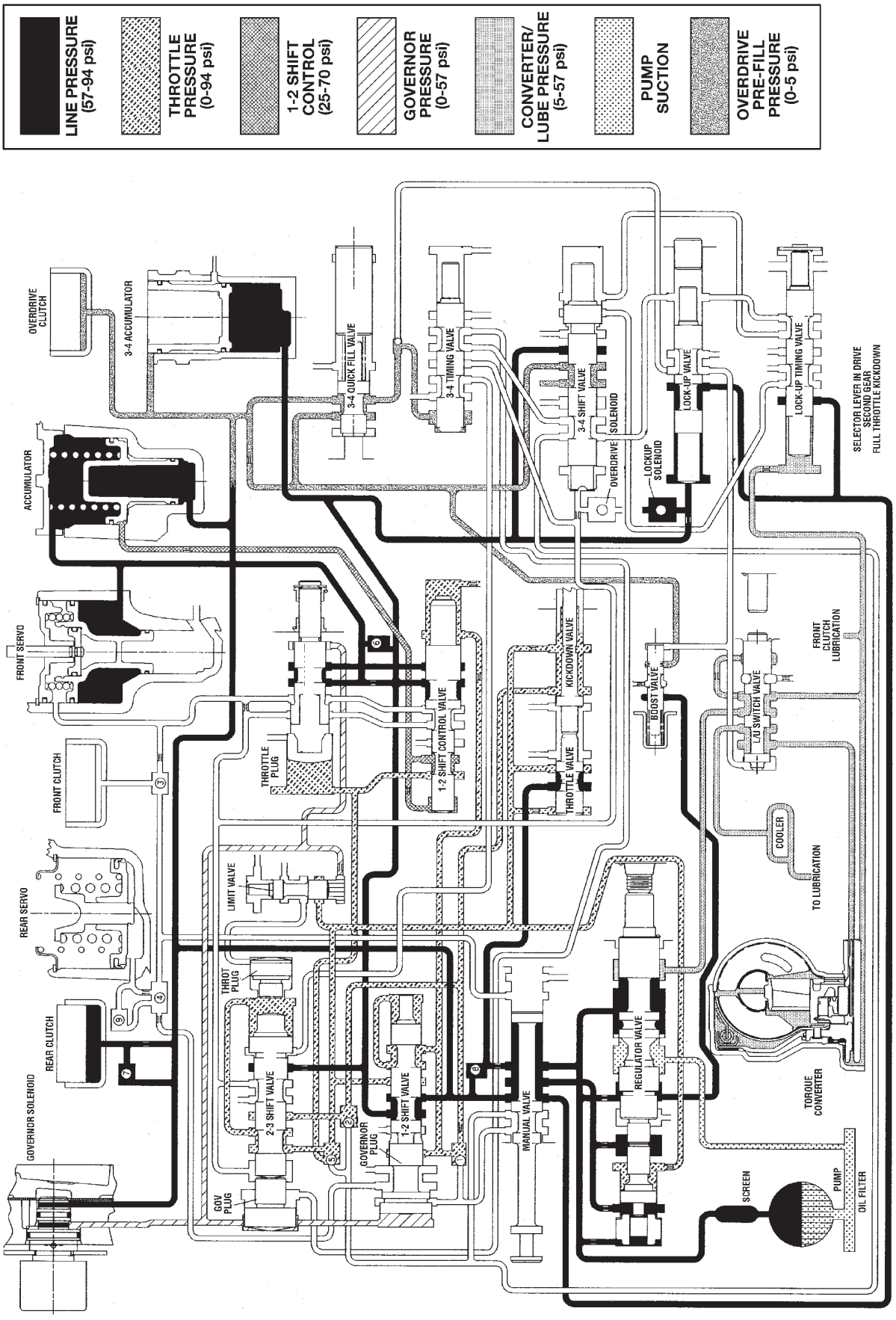
HYDRAULIC FLOW IN MANUAL LOW (1)

AUTOMATIC TRANSMISSION - 47RE (Continued)



HYDRAULIC FLOW IN MANUAL SECOND (2)

AUTOMATIC TRANSMISSION - 47RE (Continued)



808805a2

HYDRAULIC FLOW DURING FULL THROTTLE 3-2 DOWNSHIFT (PASSING)

AUTOMATIC TRANSMISSION - 47RE (Continued)

SPECIFICATIONS

TRANSMISSION

GENERAL

Component	Metric	Inch
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.	1.78-3.28 mm	0.070-0.129 in.
Clutch pack clearance/ Rear.	0.635-0.914 mm	0.025-0.036 in.
Front clutch	4 discs	
Rear clutch	4 discs	
Overdrive clutch	5 discs	

Component	Metric	Inch
Direct clutch	10 discs	
Band adjustment from 72 in. lbs.		
Front band	Back off 1 7/8 turns	
Rear band	Back off 3 turns	
Recommended fluid	Mopar® ATF +4, type 9602	

GEAR RATIOS

1ST GEAR	2.45:1
2ND GEAR	1.45:1
3RD GEAR	1.0:1
4TH GEAR	0.69:1
REVERSE	2.21:1

THRUST WASHER/SPACER/SNAP-RING DIMENSIONS

Component	Metric	Inch
Front clutch thrust washer (reaction shaft support hub)	1.55 mm	0.061 in.
	2.15 mm	0.084 in.
	2.59 mm	0.102 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)	1.3-1.4 mm	0.052-0.054 in.
	1.75-1.8 mm	0.068-0.070 in.
	2.1-2.2 mm	0.083-0.085 in.
Rear clutch pack snap-ring	1.5-1.6 mm	0.060-0.062 in.
	1.9-1.95 mm	0.074-0.076 in.
Planetary geartrain snap-ring (at front of output shaft)	1.4-1.5 mm	0.055-0.059 in.
	1.6-1.7 mm	0.062-0.066 in.
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		

AUTOMATIC TRANSMISSION - 47RE (Continued)

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 or Fourth gear only	No more than 21 kPa (3 psi) lower than line pressure.
Rear servo	1 range	No more than 21 kPa (3 psi) lower than line pressure.
	R range	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.

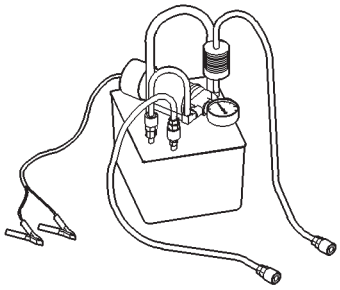
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Fitting, cooler line at trans	18	13	-
Bolt, torque convertor	47	35	-
Bolt, clevis bracket to crossmember	47	35	-
Bolt, clevis bracket to rear support	68	50	-
Bolt, driveplate to crankshaft	75	55	-
Plug, front band reaction	17	13	-
Locknut, front band adj.	34	25	-
Bolt, fluid pan	13.6	-	125
Screws, fluid filter	4	-	35
Bolt, oil pump	20	15	-
Bolt, overrunning clutch cam	17	13	-
Bolt, O/D to trans.	34	25	-
Bolt, O/D piston retainer	17	13	-
Plug, pressure test port	14	10	-
Bolt, reaction shaft support	20	15	-
Locknut, rear band	41	30	-
Bolt, valve body to case	12	-	100
Sensor, trans speed	27	20	-
Screw, solenoid wiring connector	4	-	35
Screw, solenoid to transfer plate	4	-	35
Switch, Park/Neutral	34	25	-

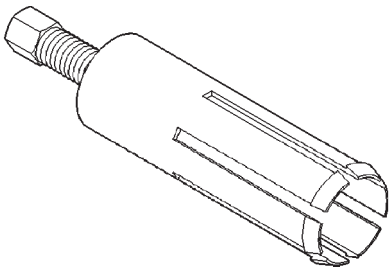
AUTOMATIC TRANSMISSION - 47RE (Continued)

SPECIAL TOOLS

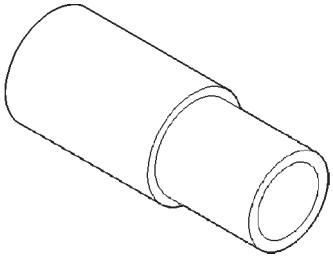
RE TRANSMISSION



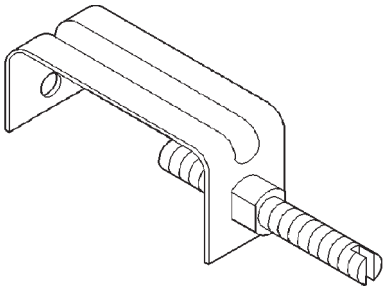
Flusher, Oil Cooler - 6906



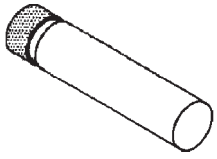
Remover, Bushing - 6957



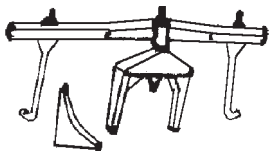
Installer, Bushing - 6951



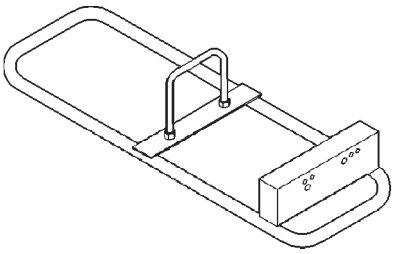
Retainer, Detent Ball and Spring - 6583



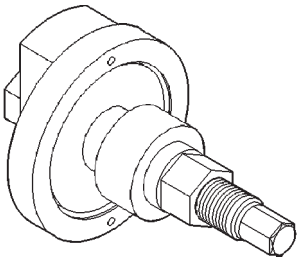
Gauge, Block - 6312



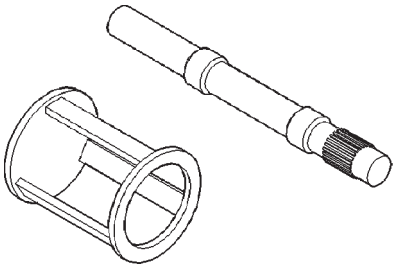
Fixture, Engine Support - C-3487-A



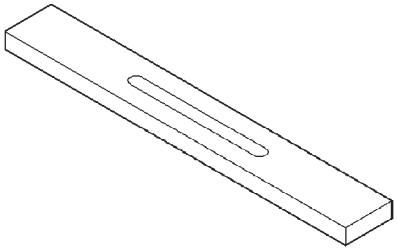
Stand, Transmission Repair - C-3750-B



Compressor, Spring - C-3863-A

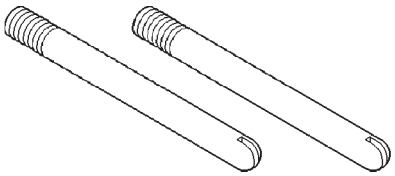


Spring Compressor and Alignment Shaft - 6227

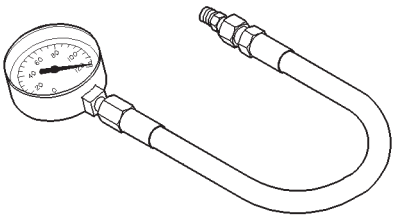


Bar, Gauge - 6311

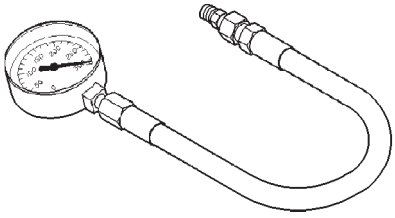
AUTOMATIC TRANSMISSION - 47RE (Continued)



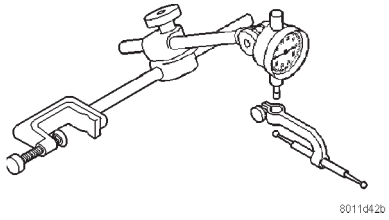
Studs, Oil Pump Pilot - C-3288-B



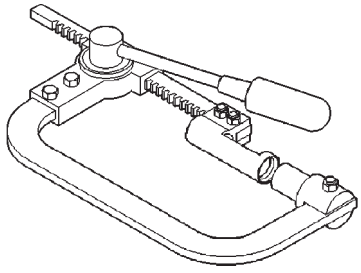
Gauge, Pressure - C-3292



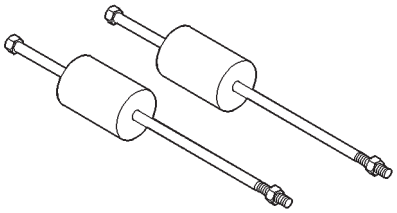
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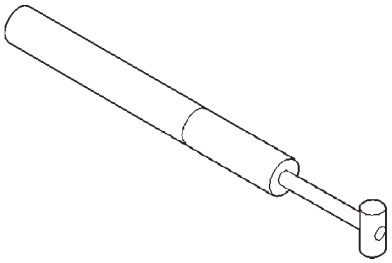
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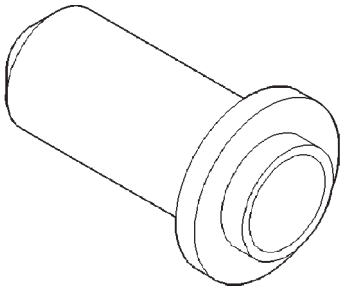
Compressor, Spring - C-3422-B



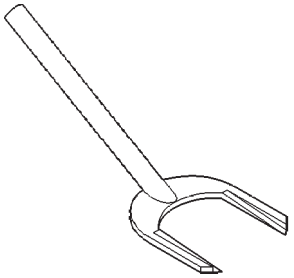
Puller, Slide Hammer - C-3752



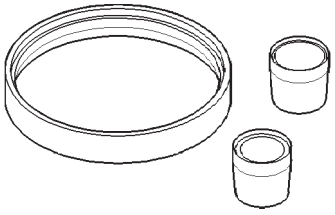
Gauge, Throttle Setting - C-3763



Installer, Seal - C-3860-A

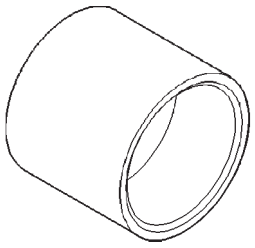


Remover, Seal - C-3985-B

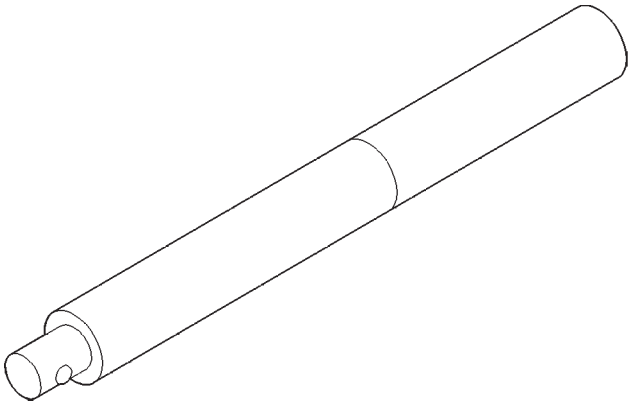


Installer, Overdrive Piston Seal - 8114

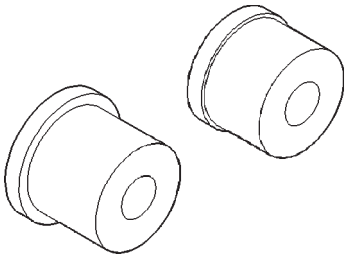
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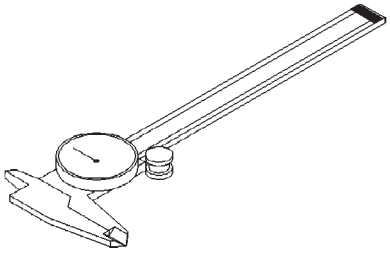
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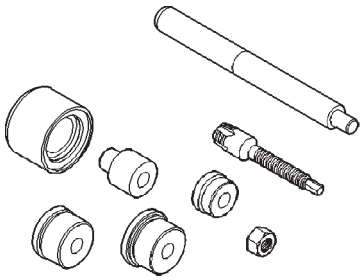
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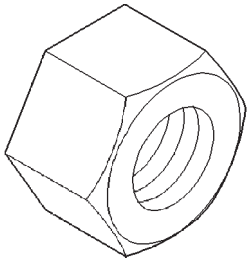
Remover/Installer, Bushing - C-4470



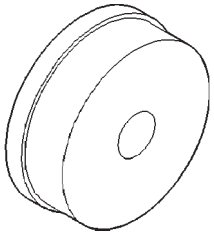
Dial Caliper - C-4962



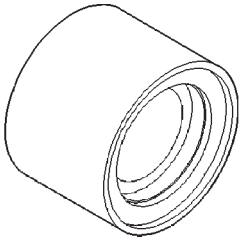
Set, Bushing Remover/Installer - C-3887-J



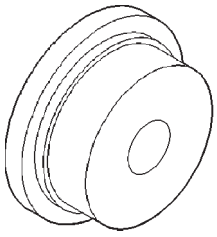
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Remover, Front Clutch Bushing - SP-3629, From kit C-3887-J

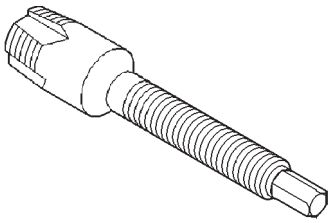


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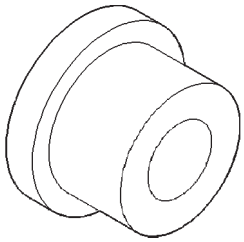


Installer, Oil Pump Bushing - SP-5118, From kit C-3887-J

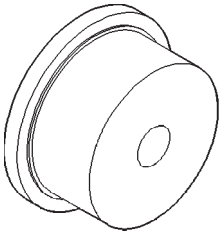
AUTOMATIC TRANSMISSION - 47RE (Continued)



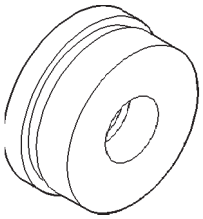
Remover, Reaction Shaft Bushing - SP-5301, From Kit C-3887-J



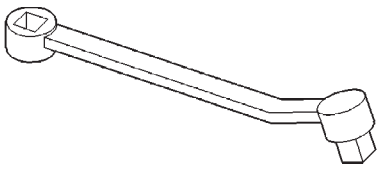
Installer, Reaction Shaft Bushing - SP-5302, From kit C-3887-J



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

ACCUMULATOR

DESCRIPTION

The accumulator (Fig. 60) is a hydraulic device that has the sole purpose of cushioning the application of a band or clutch. The accumulator consists of a dual-land piston and a spring located in a bore in the transmission case. The 3-4 accumulator is located in a housing attached to the side of the valve body (Fig. 61).

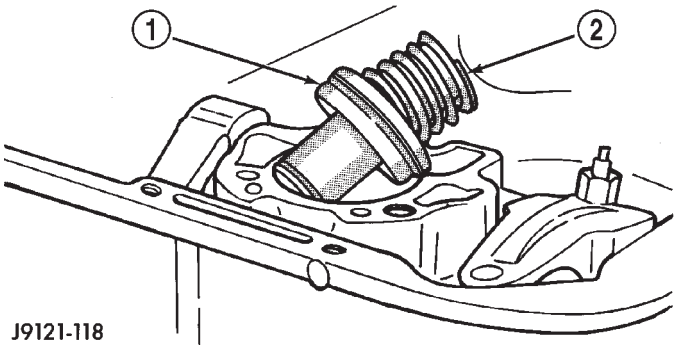


Fig. 60 Accumulator

1 - ACCUMULATOR PISTON
2 - PISTON SPRING

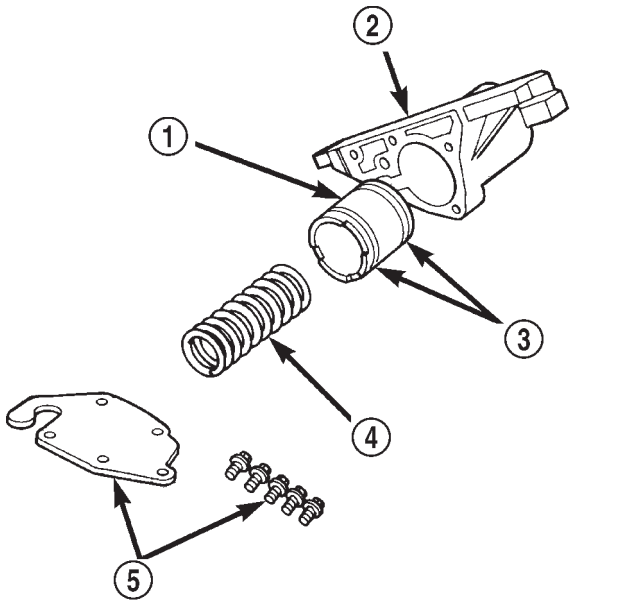


Fig. 61 3-4 Accumulator and Housing

1 - ACCUMULATOR PISTON
2 - 3-4 ACCUMULATOR HOUSING
3 - TEFLON SEALS
4 - PISTON SPRING
5 - COVER PLATE AND SCREWS

ACCUMULATOR (Continued)

OPERATION

Both the accumulator and the 3-4 accumulator function the same. Line pressure is directed to the small end of the piston when the transmission is placed into a DRIVE position (Fig. 62), bottoming it against the accumulator plate. When the 1-2 upshift occurs (Fig. 63), line pressure is directed to the large end of the piston and then to the kickdown servo. As the line pressure reaches the accumulator, the combination of spring pressure and line pressure forces the piston away from the accumulator plate. This causes a balanced pressure situation, which results in a cushioned band application. After the kickdown servo has become immovable, line pressure will finish pushing the accumulator up into its bore. When the large end of the accumulator piston is seated in its bore, the band or clutch is fully applied.

NOTE: The accumulator is shown in the inverted position for illustrative purposes.

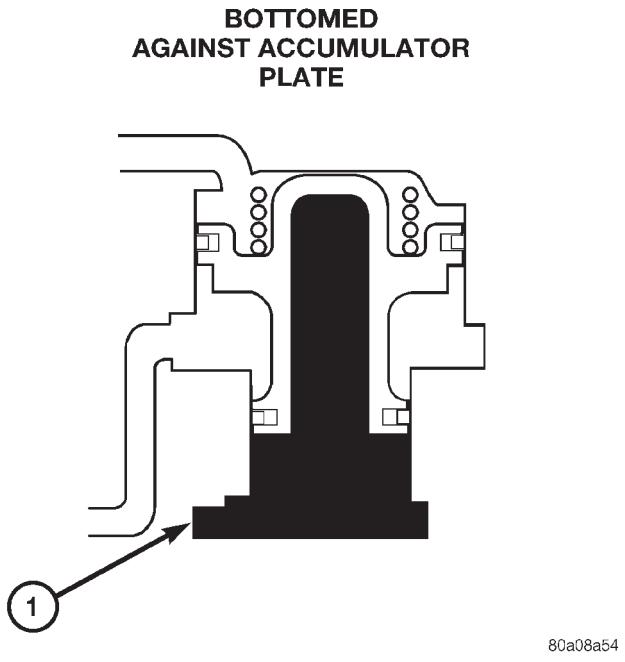


Fig. 62 Accumulator in DRIVE - FIRST Gear Position

1 - LINE PRESSURE

INSPECTION

Inspect the accumulator piston and seal rings (Fig. 64). 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. 64). Replace the springs if the coils are cracked, distorted or collapsed.

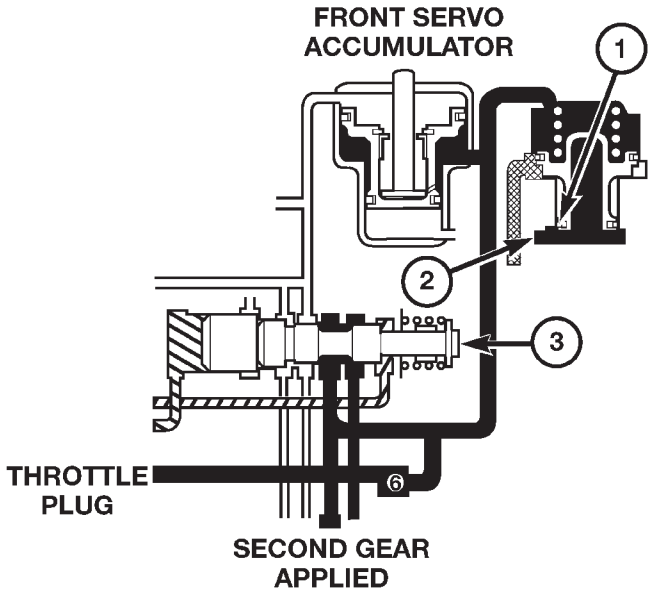


Fig. 63 Accumulator in SECOND Gear Position

1 - BOTTOM OF BORE
2 - LINE PRESSURE
3 - SHUTTLE VALVE

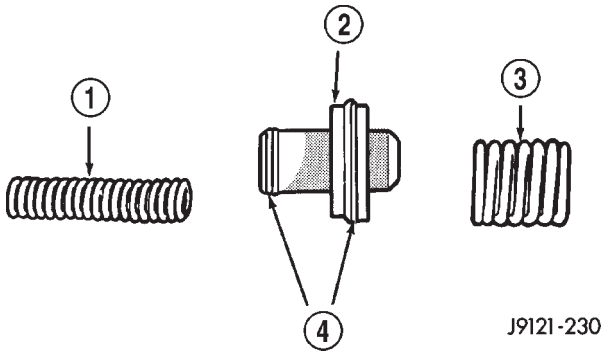


Fig. 64 Accumulator Components

1 - INNER SPRING
2 - ACCUMULATOR PISTON
3 - OUTER SPRING
4 - SEAL RINGS

BANDS

DESCRIPTION

KICKDOWN (FRONT) BAND

The kickdown, or “front”, band (Fig. 65) holds the common sun gear of the planetary gear sets. The front (kickdown) band is made of steel, and faced on its inner circumference with a friction-type lining. One end of the band is anchored to the transmission

BANDS (Continued)

case, and the other is acted on with a pushing force by a servo piston. The front band is a single-wrap design (the band does not completely encompass/ wrap the drum that it holds).

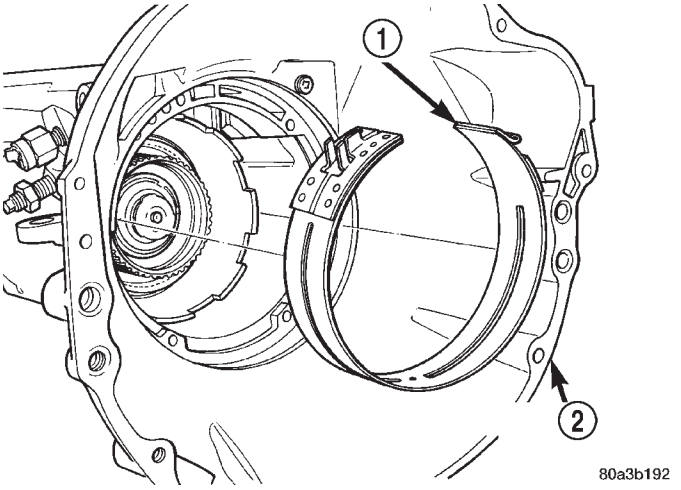


Fig. 65 Front Band

1 - FRONT BAND
2 - TRANSMISSION HOUSING

LOW/REVERSE (REAR) BAND

The low/reverse band, or “rear”, band (Fig. 66) is similar in appearance and operation to the front band. The rear band is slightly different in that it does not use a link bar, but is acted directly on by the apply lever. This is referred to as a double-wrap band design (the drum is completely encompassed/ wrapped by the band). The double-wrap band provides a greater holding power in comparison to the single-wrap design.

OPERATION

KICKDOWN (FRONT) BAND

The kickdown band holds the common sun gear of the planetary gear sets by applying and holding the front clutch retainer, which is splined to the sun gear driving shell, and in turn splined directly to the sun gear. The application of the band by the servo is typically done by an apply lever and link bar.

LOW/REVERSE (REAR) BAND

The rear band holds the rear planet carrier stationary by being mounted around and applied to the low/reverse drum.

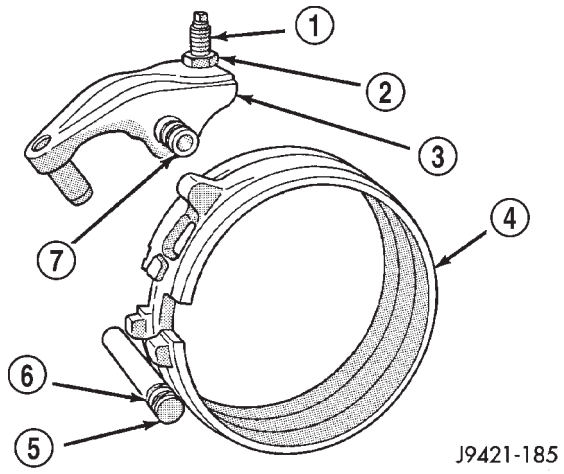


Fig. 66 Rear Band

1 - ADJUSTING SCREW
2 - LOCKNUT
3 - LEVER
4 - REAR BAND
5 - REACTION PIN
6 - O-RINGS
7 - PIVOT PIN

ADJUSTMENTS

ADJUSTMENT - BANDS

FRONT BAND

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. 67). 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 an appropriate Torx™ socket.

CAUTION: If Adapter C-3705 is needed to reach the adjusting screw, tighten the screw to only 5 N·m (47-50 in. lbs.) torque.

(4) Back off front band adjusting screw 1-7/8 turns.

(5) Hold adjuster screw in position and tighten locknut to 41 N·m (30 ft. lbs.) torque.

(6) Lower vehicle.

BANDS (Continued)

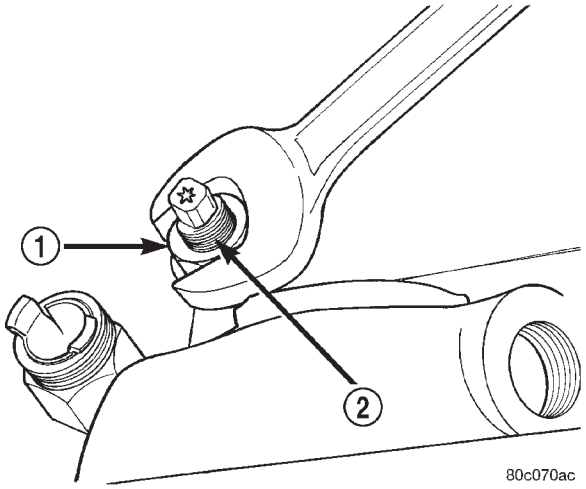


Fig. 67 Front Band Adjustment Screw Location

1 - LOCK-NUT
2 - FRONT BAND ADJUSTER

REAR BAND

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. 68).

(5) Back off adjusting screw 3 turns.

(6) Hold adjusting screw in place and tighten locknut to 34 N·m (25 ft. lbs.) torque.

(7) Position new gasket on oil pan and install pan on transmission. Tighten pan bolts to 13.6 N·m (125 in. lbs.) torque.

(8) Lower vehicle and refill transmission with Mopar® ATF +4, Type 9602 fluid.

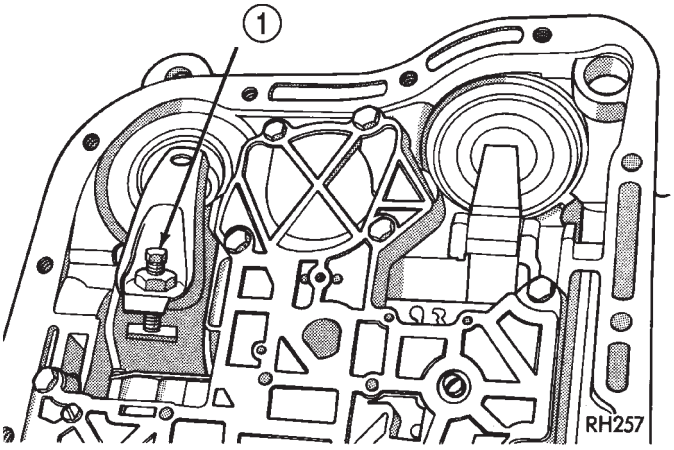


Fig. 68 Rear Band Adjustment Screw Location

1 - LOW-REVERSE BAND ADJUSTMENT

ELECTRONIC GOVERNOR

DESCRIPTION

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. 69).

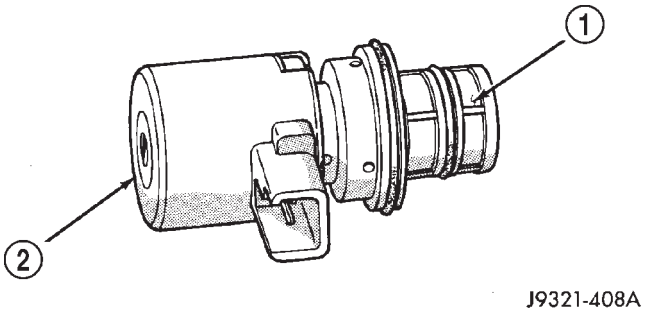


Fig. 69 Governor Pressure Solenoid Valve

1 - SOLENOID FILTER
2 - GOVERNOR PRESSURE SOLENOID

GOVERNOR PRESSURE SENSOR

The governor pressure sensor measures output pressure of the governor pressure solenoid valve (Fig. 70).

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. 70).

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

ELECTRONIC GOVERNOR (Continued)

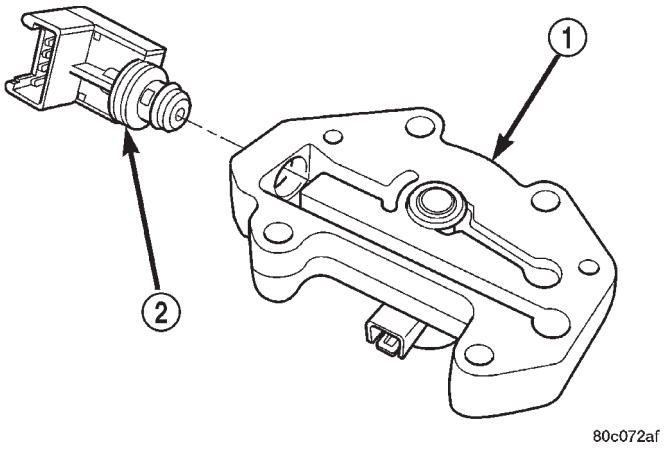


Fig. 70 Governor Pressure Sensor

1 - GOVERNOR BODY
2 - GOVERNOR PRESSURE SENSOR/TRANSMISSION FLUID TEMPERATURE THERMISTOR

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.

OPERATION

Compensation is required for performance variations of two of the input devices. Though the slope of the transfer functions is tightly controlled, offset may vary due to various environmental factors or manufacturing tolerances.

The pressure transducer is affected by barometric pressure as well as temperature. Calibration of the zero pressure offset is required to compensate for shifting output due to these factors.

Normal calibration will be performed when sump temperature is above 50 degrees F, or in the absence of sump temperature data, after the first 10 minutes of vehicle operation. Calibration of the pressure transducer offset occurs each time the output shaft speed falls below 200 RPM. Calibration shall be repeated each 3 seconds the output shaft speed is below 200 RPM. A 0.5 second pulse of 95% duty cycle is applied to the governor pressure solenoid valve and the transducer output is read during this pulse. Averaging of the transducer signal is necessary to reject electrical noise.

Under cold conditions (below 50 degrees F sump), the governor pressure solenoid valve response may be too slow to guarantee 0 psi during the 0.5 second calibration pulse. Calibration pulses are continued during this period, however the transducer output valves are discarded. Transducer offset must be read at key-on, under conditions which promote a stable reading. This value is retained and becomes the offset during the ″cold″ period of operation.

GOVERNOR PRESSURE SOLENOID VALVE

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.

GOVERNOR PRESSURE SENSOR

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

GOVERNOR BODY AND TRANSFER PLATE

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.

GOVERNOR PRESSURE CURVES

LOW TRANSMISSION FLUID TEMPERATURE

When the transmission fluid is cold the conventional governor can delay shifts, resulting in higher than normal shift speeds and harsh shifts. The electronically controlled low temperature governor pressure curve is higher than normal to make the transmission shift at normal speeds and sooner. The PCM uses a temperature sensor in the transmission oil sump to determine when low temperature governor pressure is needed.

NORMAL OPERATION

Normal operation is refined through the increased computing power of the PCM and through access to data on engine operating conditions provided by the PCM that were not available with the previous stand-alone electronic module. This facilitated the development of a load adaptive shift strategy - the ability to alter the shift schedule in response to vehicle load condition. One manifestation of this capability is grade ″hunting″ prevention - the ability of the transmission logic to delay an upshift on a grade if the engine does not have sufficient power to maintain speed in the higher gear. The 3-2 downshift and the potential for hunting between gears occurs with a

ELECTRONIC GOVERNOR (Continued)

heavily loaded vehicle or on steep grades. When hunting occurs, it is very objectionable because shifts are frequent and accompanied by large changes in noise and acceleration.

WIDE OPEN THROTTLE OPERATION

In wide-open throttle (WOT) mode, adaptive memory in the PCM assures that up-shifts occur at the preprogrammed optimum speed. WOT operation is determined from the throttle position sensor, which is also a part of the emission control system. The initial setting for the WOT upshift is below the optimum engine speed. As WOT shifts are repeated, the PCM learns the time required to complete the shifts by comparing the engine speed when the shifts occur to the optimum speed. After each shift, the PCM adjusts the shift point until the optimum speed is reached. The PCM also considers vehicle loading, grade and engine performance changes due to high altitude in determining when to make WOT shifts. It does this by measuring vehicle and engine acceleration and then factoring in the shift time.

TRANSFER CASE LOW RANGE OPERATION

On four-wheel drive vehicles operating in low range, the engine can accelerate to its peak more rapidly than in Normal range, resulting in delayed shifts and undesirable engine ″flare.″ The low range governor pressure curve is also higher than normal to initiate upshifts sooner. The PCM compares electronic vehicle speed signal used by the speedometer to the transmission output shaft speed signal to determine when the transfer case is in low range.

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. 71).
(4) Remove screws holding pressure solenoid retainer to governor body.
(5) Separate solenoid retainer from governor (Fig. 72).
(6) Pull solenoid from governor body (Fig. 73).
(7) Pull pressure sensor from governor body.
(8) Remove bolts holding governor body to valve body.
(9) Separate governor body from valve body (Fig. 74).
(10) Remove governor body gasket.

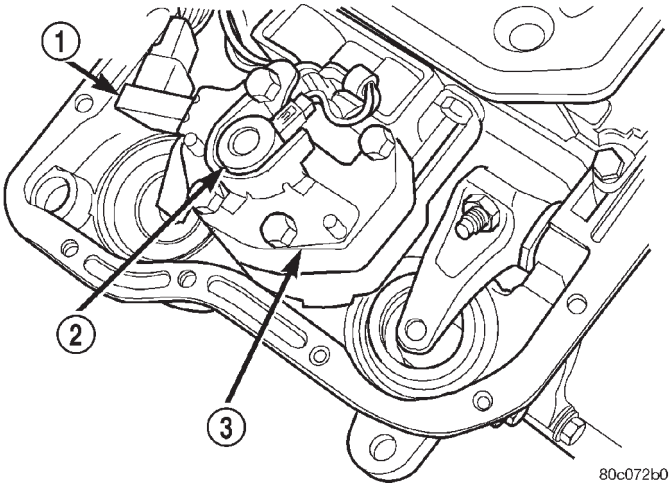


Fig. 71 Governor Solenoid And Pressure Sensor

1 - PRESSURE SENSOR
2 - PRESSURE SOLENOID
3 - GOVERNOR

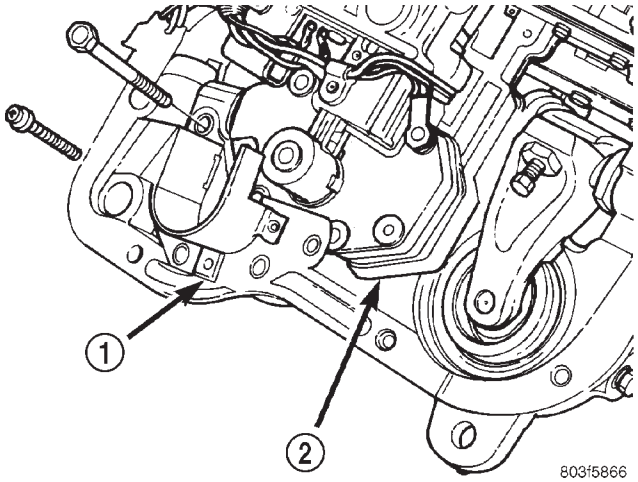


Fig. 72 Pressure Solenoid Retainer

1 - PRESSURE SOLENOID RETAINER
2 - GOVERNOR

INSTALLATION

Before installing the pressure sensor and solenoid in the governor body, replace o-ring seals, clean the gasket surfaces and replace gasket.
(1) Place gasket in position on back of governor body (Fig. 75).
(2) Place governor body in position on valve body.
(3) Install bolts to hold governor body to valve body.
(4) Lubricate o-ring on pressure sensor with transmission fluid.
(5) Align pressure sensor to bore in governor body.
(6) Push pressure sensor into governor body.
(7) Lubricate o-ring, on pressure solenoid, with transmission fluid.

ELECTRONIC GOVERNOR (Continued)

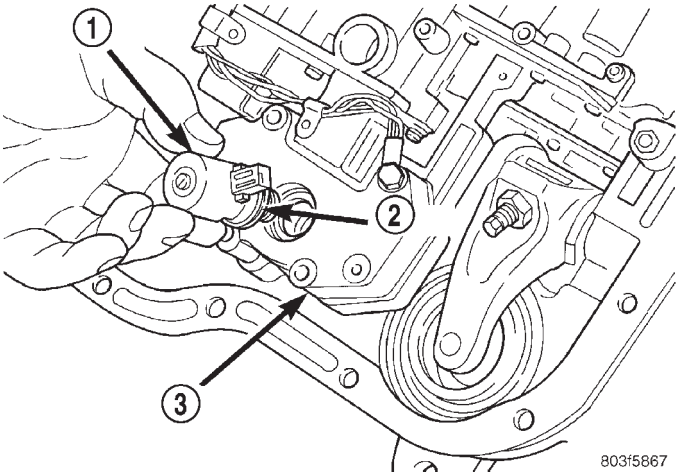


Fig. 73 Pressure Solenoid and O-ring

1 - PRESSURE SOLENOID
2 - O-RING
3 - GOVERNOR

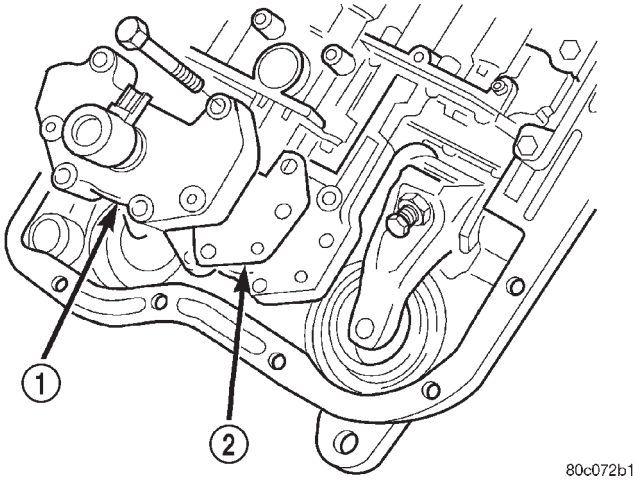


Fig. 75 Governor Body and Gasket

1 - GOVERNOR BODY
2 - GASKET

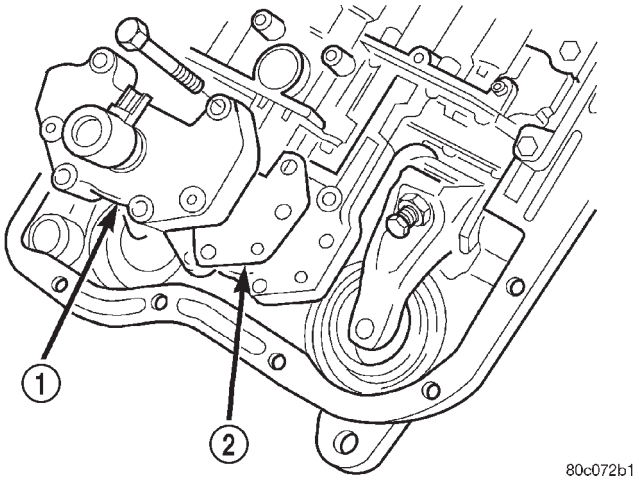


Fig. 74 Governor Body and Gasket

1 - GOVERNOR BODY
2 - GASKET

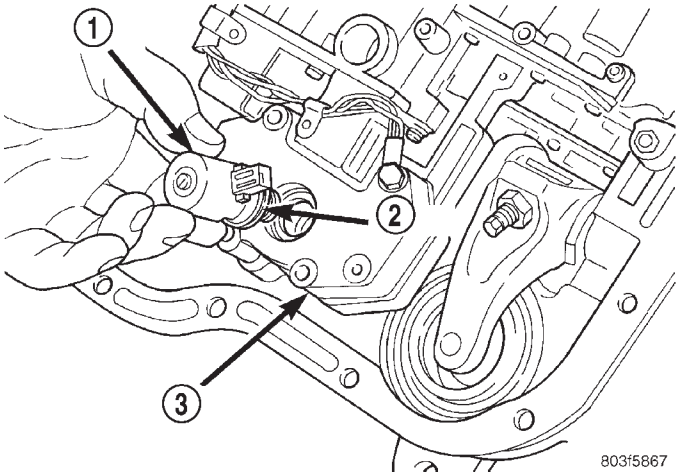


Fig. 76 Pressure Solenoid and O-ring

1 - PRESSURE SOLENOID
2 - O-RING
3 - GOVERNOR

(8) Align pressure solenoid to bore in governor body (Fig. 76).

(9) Push solenoid into governor body.

(10) Place solenoid retainer in position on governor (Fig. 77).

(11) Install screws to hold pressure solenoid retainer to governor body.

(12) Engage wire connectors into pressure sensor and solenoid (Fig. 78).

(13) Install transmission fluid pan and (new) filter.

(14) Lower vehicle and road test to verify repair.

ELECTRONIC GOVERNOR (Continued)

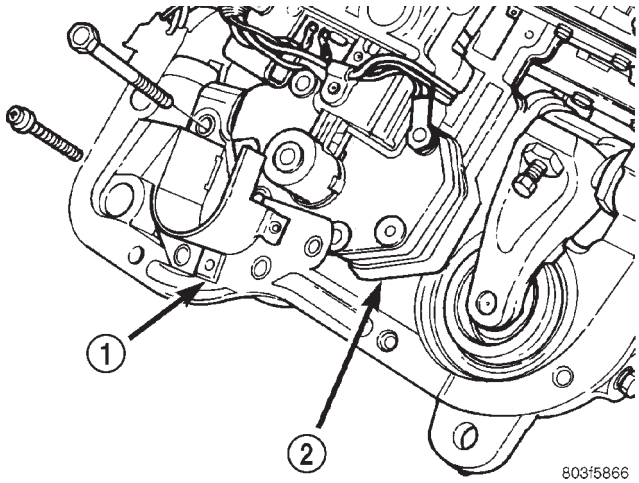


Fig. 77 Pressure Solenoid Retainer

1 - PRESSURE SOLENOID RETAINER
2 - GOVERNOR

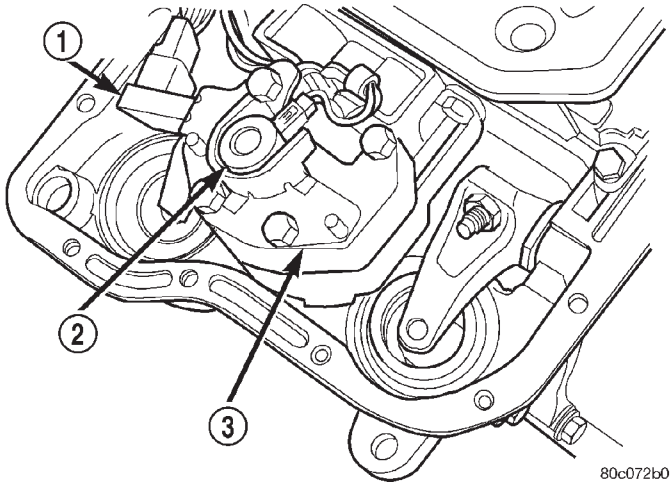


Fig. 78 Governor Solenoid And Pressure Sensor

1 - PRESSURE SENSOR
2 - PRESSURE SOLENOID
3 - GOVERNOR

EXTENSION HOUSING BUSHING

REMOVAL

(1) Remove extension housing yoke seal.

(2) Insert Remover 6957 into the extension housing. Tighten tool to bushing and remove bushing (Fig. 79).

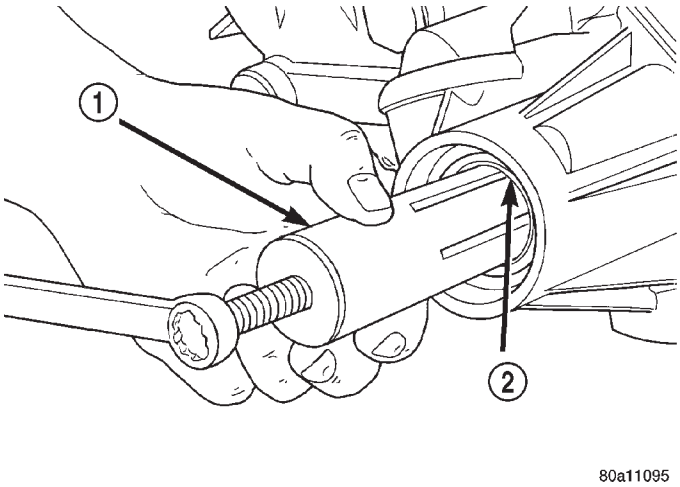


Fig. 79 Bushing Removal - Typical

1 - REMOVER
2 - EXTENSION HOUSING BUSHING

INSTALLATION

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

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

(3) Install new oil seal in housing using Seal Installer C-3995-A (Fig. 80).

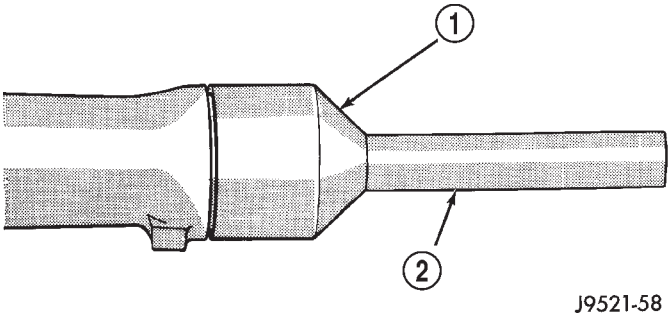


Fig. 80 Extension Housing Seal Installation

1 - SPECIAL TOOL C-3995-A OR C-3972-A
2 - SPECIAL TOOL C-4471

EXTENSION HOUSING SEAL

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. 81) from overdrive housing.

EXTENSION HOUSING SEAL (Continued)

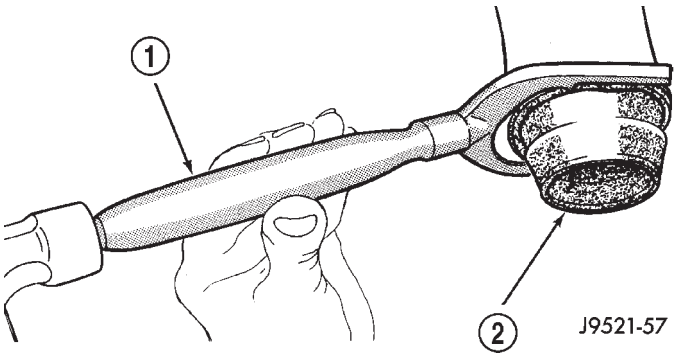


Fig. 81 Removing Overdrive Housing Yoke Seal

1 - SPECIAL TOOL C-3985-B
2 - SEAL

INSTALLATION

(1) Place seal in position on overdrive housing.

(2) Drive seal into overdrive housing with Seal Installer C-3995-A (Fig. 82).

(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.

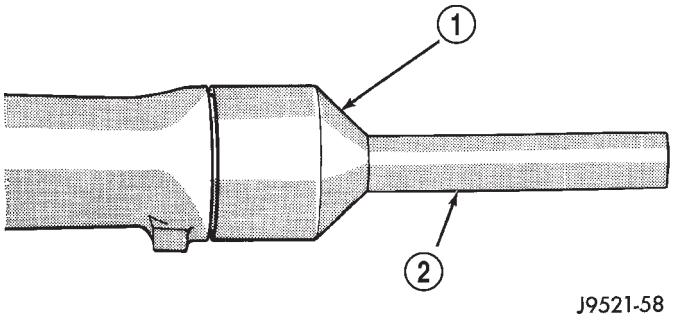


Fig. 82 Installing Overdrive Housing Seal

1 - SPECIAL TOOL C-3995-A OR C-3972-A
2 - SPECIAL TOOL C-4471

FLUID AND FILTER

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - 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 and clutch 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.

DIAGNOSIS AND TESTING - CAUSES OF BURNT FLUID

Burnt, discolored fluid is a result of overheating which has two primary causes.

(1) A result of restricted fluid flow through the main and/or auxiliary cooler. This condition is usually the result of a faulty or improperly installed drainback valve, a damaged main cooler, or severe restrictions in the coolers and lines caused by debris or kinked lines.

(2) Heavy duty operation with a vehicle not properly equipped for this type of operation. Trailer towing or similar high load operation will overheat the transmission fluid if the vehicle is improperly equipped. Such vehicles should have an auxiliary transmission fluid cooler, a heavy duty cooling system, and the engine/axle ratio combination needed to handle heavy loads.

DIAGNOSIS AND TESTING - 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, an overhaul is necessary.

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.

STANDARD PROCEDURE

STANDARD PROCEDURE - FLUID LEVEL CHECK

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

Improper filling can also raise the fluid level too high. When the transmssion has too much fluid, the geartrain churns up foam and cause the same conditions which occur with a low fluid level.

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

Along with fluid level, it is important to check the condition of the fluid. When the fluid smells burned, and is contaminated with metal or friction material particles, a complete transmission recondition is needed. Be sure to examine the fluid on the dipstick closely. If there is any doubt about its condition, drain out a sample for a double check.

After the fluid has been checked, seat the dipstick fully to seal out water and dirt.

The transmission has a dipstick to check oil level. It is located on the right side of the engine. Be sure to wipe all dirt from dipstick handle before removing.

Fluid level is checked with the engine running at curb idle speed, the transmission in NEUTRAL and the transmission fluid at normal operating temperature. **The engine should be running at idle speed for at least one minute, with the vehicle on level ground.**

The transmission fluid level can be checked two ways.

PROCEDURE ONE

(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. 83) 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 +4, type 9602, to restore correct level. Do not overfill.

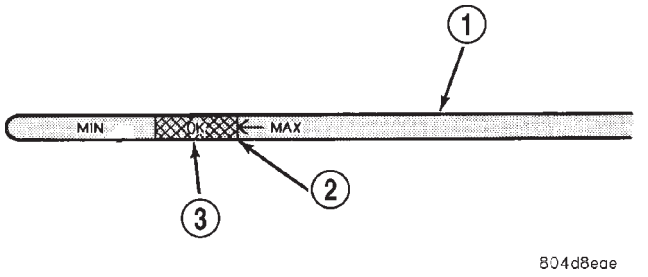


Fig. 83 Dipstick Fluid Level Marks—Typical

1 - DIPSTICK
2 - MAXIMUM CORRECT FLUID LEVEL
3 - ACCEPTABLE FLUID LEVEL

PROCEDURE TWO

(1) Start engine and apply parking brake.

(2) Shift the transmission into DRIVE for approximately 2 seconds.

(3) Shift the transmission into REVERSE for approximately 2 seconds.

(4) Shift the transmission into PARK.

(5) Hook up DRB® scan tool and select engine.

(6) Select sensors.

(7) Read the transmission temperature value.

(8) Compare the fluid temperature value with the chart.

(9) Adjust transmission fluid level shown on the dipstick according to the chart (Fig. 84).

NOTE: After adding any fluid to the transmission, wait a minimum of 2 minutes for the oil to fully drain from the fill tube into the transmission before rechecking the fluid level.

(10) Check transmission for leaks.

FLUID AND FILTER (Continued)

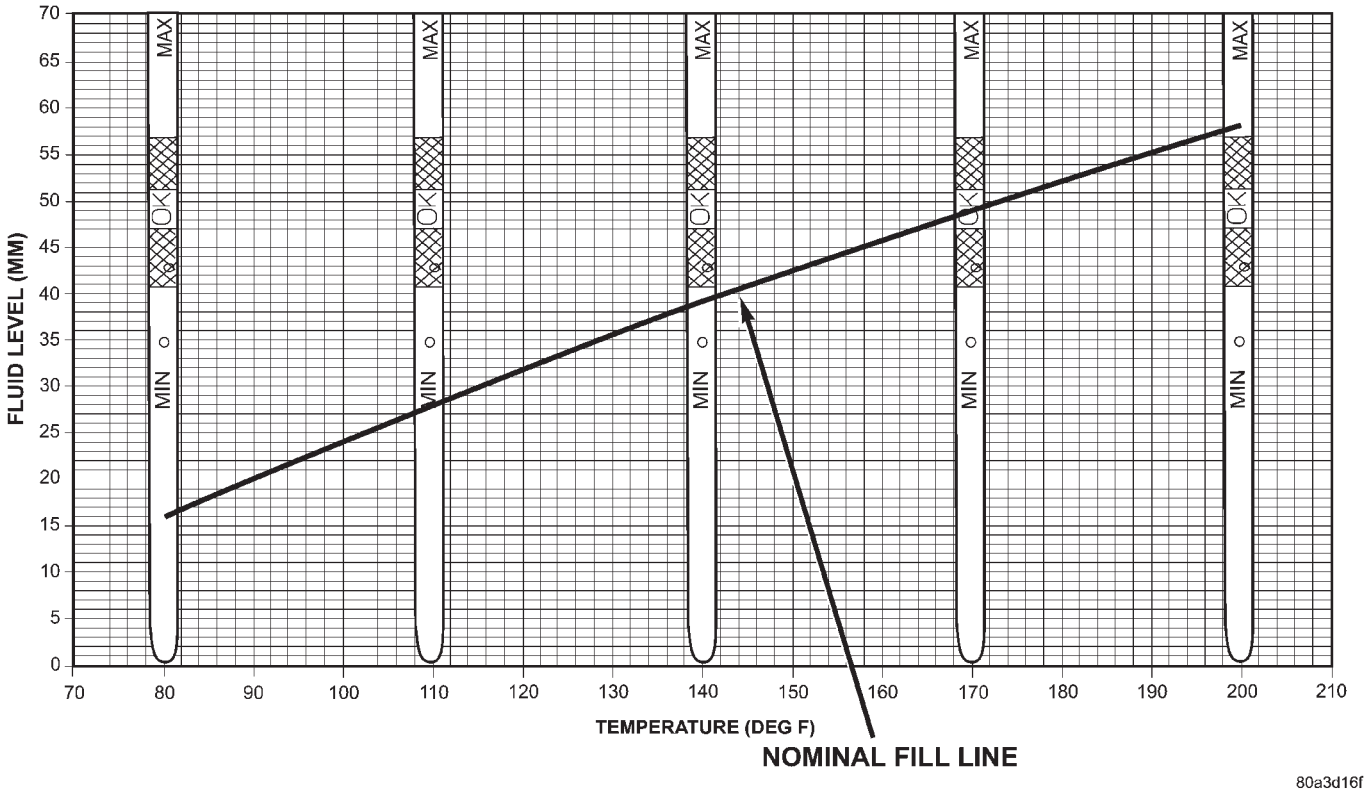


Fig. 84 47RE Fluid Fill Graph

STANDARD PROCEDURE - FLUID AND FILTER REPLACEMENT

For proper service intervals (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION). 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. 85).

(4) Loosen bolts holding rear of pan to transmission.

(5) Slowly separate front of pan and gasket 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 and gasket away from transmission.

(8) Pour remaining fluid in pan into drain pan.

(9) Remove screws holding filter to valve body (Fig. 86).

(10) Separate filter from valve body and pour fluid in filter into drain pan.

(11) Dispose of used trans fluid and filter properly.

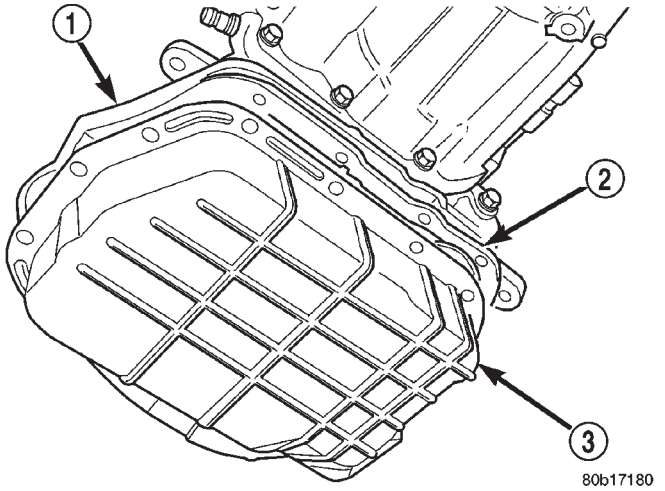


Fig. 85 Transmission Pan

1 - TRANSMISSION
2 - GASKET
3 - PAN

FLUID AND FILTER (Continued)

INSTALLATION

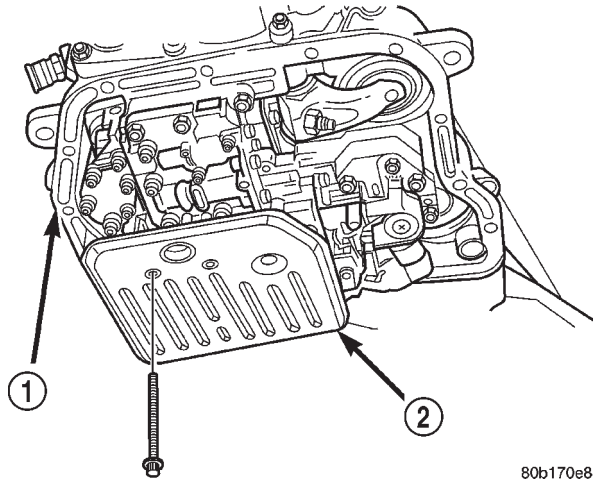


Fig. 86 Transmission Filter

1 - TRANSMISSION
2 - FILTER

(1) Position a new transmission oil filter onto the valve body.

(2) Install the screws to hold the filter to the valve body. Tighten the screws to 4 N·m (35 in.lbs.).

(3) Clean the gasket surfaces of the transmission oil pan and transmission pan rail.

NOTE: The transmission pan oil gasket is reusable. Inspect the sealing surfaces of the gasket. If the sealing ribs on both surfaces appear to be in good condition, clean the gasket of any foreign material and reinstall.

(4) Position the oil pan gasket onto the oil pan.

(5) Position the oil pan and gasket onto the transmission and install several bolts to hold the pan and gasket to the transmission.

(6) Install the remainder of the oil pan bolts. Tighten the bolts to 13.6 N·m (125 in.lbs.).

(7) Lower vehicle and fill transmission. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC/ FLUID - STANDARD PROCEDURE)

STANDARD PROCEDURE - TRANSMISSION FILL

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 +4, type 9602, to transmission:

(a) If only fluid and filter were changed, add **3 pints (1-1/2 quarts)** of ATF +4 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 +4 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 noticably 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.

FRONT CLUTCH

DESCRIPTION

The front clutch assembly (Fig. 87) is composed of the front clutch retainer, pressure plate, clutch plates, driving discs, piston, piston return spring, return spring retainer, and snap-rings. The front clutch is the forward-most component in the transmission geartrain and is directly behind the oil pump and is considered a driving component.

NOTE: The number of discs and plates may vary with each engine and vehicle combination.

OPERATION

To apply the clutch, pressure is applied between the clutch retainer and piston. The fluid pressure is provided by the oil pump, transferred through the control valves and passageways, and enters the clutch through the hub of the reaction shaft support. With pressure applied between the clutch retainer and piston, the piston moves away from the clutch retainer and compresses the clutch pack. This action applies the clutch pack, allowing torque to flow through the input shaft into the driving discs, and into the clutch plates and pressure plate that are lugged to the clutch retainer. The waved snap-ring is used to cushion the application of the clutch pack.

FRONT CLUTCH (Continued)

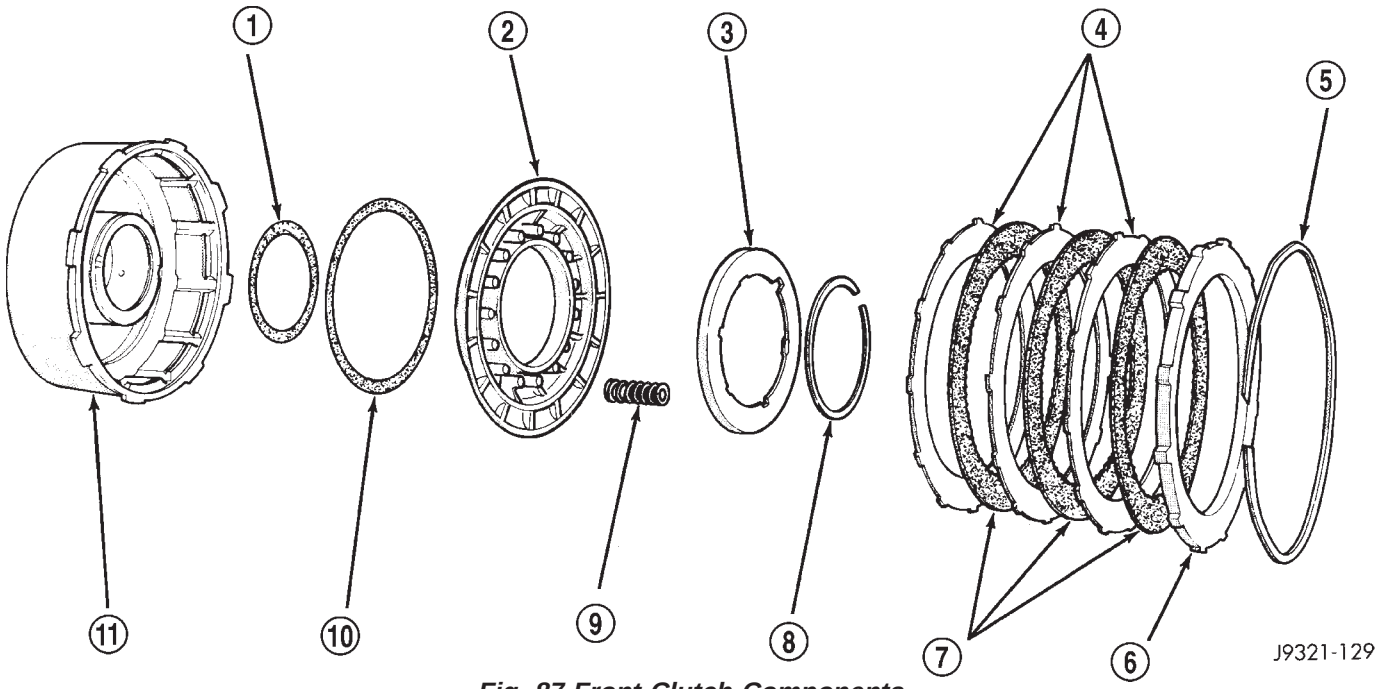


Fig. 87 Front Clutch Components

1 - INNER PISTON SEAL
2 - CLUTCH PISTON
3 - CLUTCH PISTON SPRING RETAINER
4 - CLUTCH PLATES
5 - CLUTCH PACK SNAP-RING (WAVED)
6 - REACTION PLATE
7 - CLUTCH DISCS
8 - RETAINER SNAP-RING
9 - CLUTCH PISTON SPRINGS (9)
10 - OUTER PISTON SEAL
11 - FRONT CLUTCH RETAINER

When pressure is released from the piston, the spring returns the piston to its fully released position and disengages the clutch. The release spring also helps to cushion the application of the clutch assembly. When the clutch is in the process of being released by the release spring, fluid flows through a vent and one-way ball-check-valve located in the clutch retainer. The check-valve is needed to eliminate the possibility of plate drag caused by centrifugal force acting on the residual fluid trapped in the clutch piston retainer.

DISASSEMBLY

(1) Remove the waved snap-ring, reaction plate, clutch plates, and clutch discs.

(2) Compress clutch piston retainer and piston springs with Compressor Tool C-3863-A (Fig. 88).

(3) Remove retainer snap-ring and remove compressor tool.

(4) Remove clutch piston springs (Fig. 89). 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.

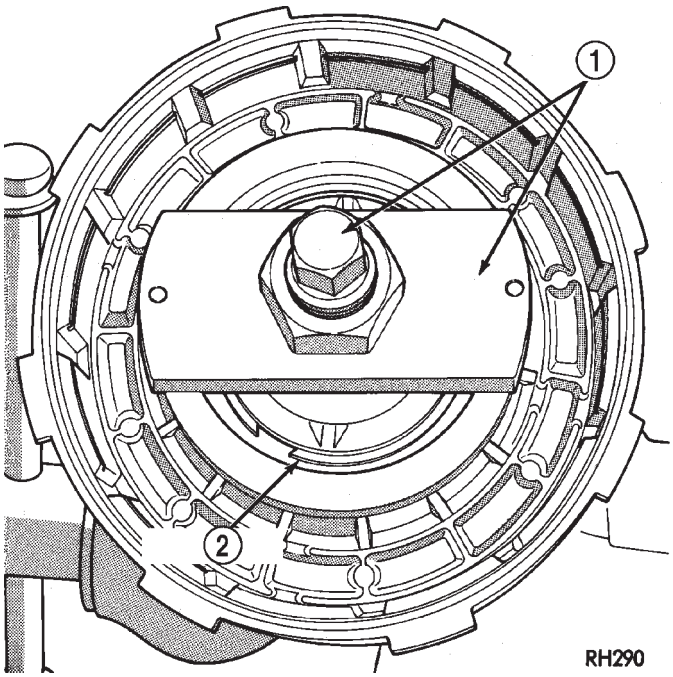


Fig. 88 Removing Front Clutch Spring Retainer Snap-Ring

1 - SPECIAL TOOL C-3863-A
2 - SNAP-RING

FRONT CLUTCH (Continued)

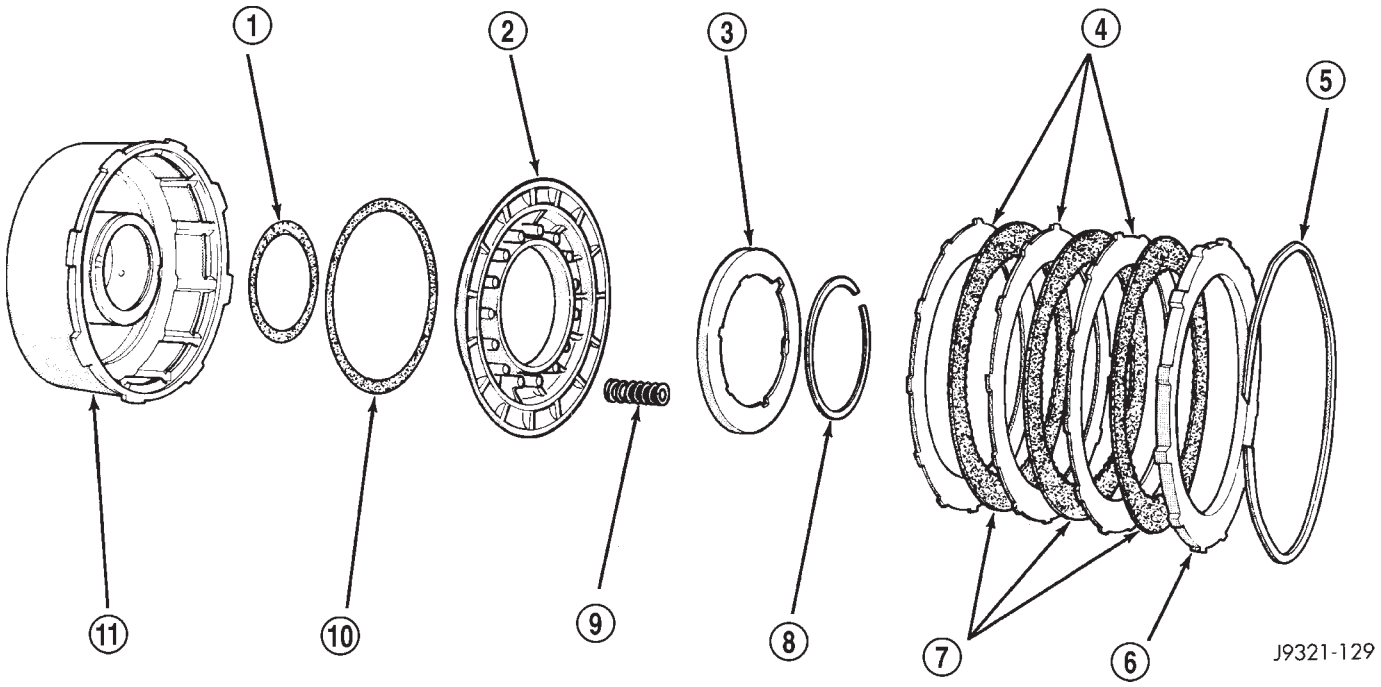


Fig. 89 Front Clutch Components

1 - INNER PISTON SEAL
2 - CLUTCH PISTON
3 - CLUTCH PISTON SPRING RETAINER
4 - CLUTCH PLATES
5 - CLUTCH PACK SNAP-RING (WAVED)
6 - REACTION PLATE
7 - CLUTCH DISCS
8 - RETAINER SNAP-RING
9 - CLUTCH PISTON SPRINGS (9)
10 - OUTER PISTON SEAL
11 - FRONT CLUTCH RETAINER

(7) Assemble Tool Handle C-4171 and Bushing Remover SP-3629 (Fig. 90).

(8) Insert remover tool in bushing and drive bushing straight out of clutch retainer.

INSPECTION

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 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.

FRONT CLUTCH (Continued)

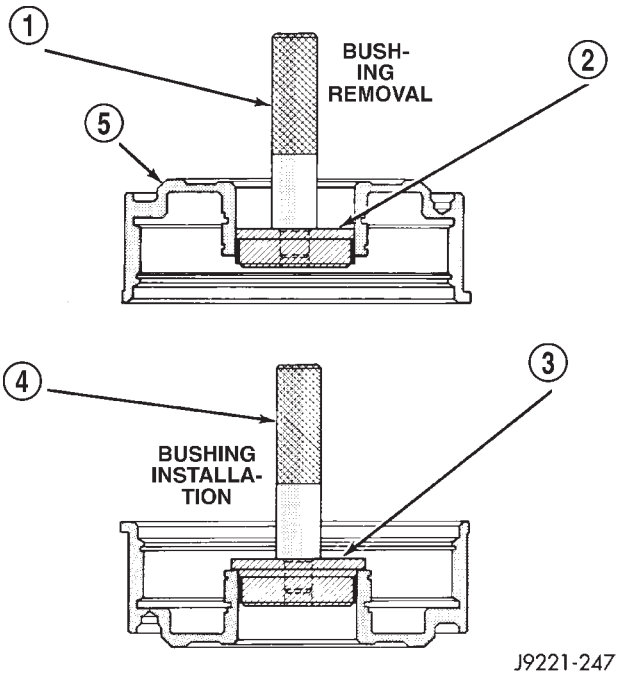


Fig. 90 Front Clutch Retainer Bushing Replacement Tools

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL SP-3629
3 - SPECIAL TOOL SP-5511
4 - SPECIAL TOOL C-4171
5 - FRONT CLUTCH RETAINER

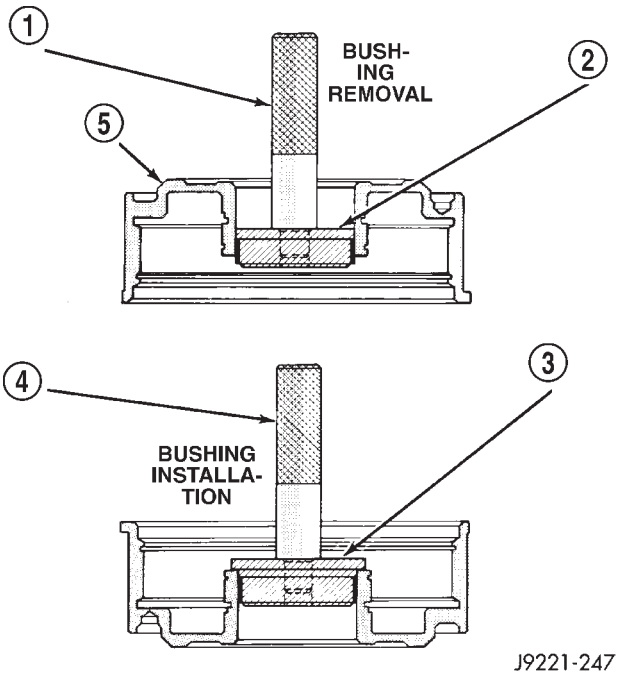


Fig. 91 Front Clutch Retainer Bushing Replacement Tools

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL SP-3629
3 - SPECIAL TOOL SP-5511
4 - SPECIAL TOOL C-4171
5 - FRONT CLUTCH RETAINER

ASSEMBLY

NOTE: The 47RE transmission uses four plates and discs for the front clutch.

(1) Mount Bushing Installer SP-5511 on tool handle (Fig. 91).

(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 piston seal onto the outer diameter of the clutch retainer inner hub.

(7) Install new outer seal onto the clutch piston. Be sure seal lips of both seals face the interior of the retainer.

(8) Lubricate new inner and outer piston seals with Ru-Glyde™, or Mopar® Door Ease.

(9) 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.

(10) Install and position nine clutch piston springs (Fig. 92).

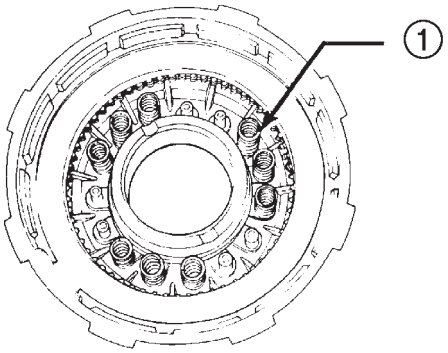


Fig. 92 Front Clutch Spring Position

1 - 9 SPRING CLUTCH

FRONT CLUTCH (Continued)

(11) Install spring retainer on top of piston springs.

(12) Compress spring retainer and piston springs with Tool C-3863-A.

(13) Install spring retainer snap-ring and remove compressor tool.

(14) Install clutch plates and discs (Fig. 95). Four clutch discs, four steel plates and one reaction plate are required.

(15) Install reaction plate followed by waved snap-ring.

(16) Check clutch pack clearance with feeler gauge (Fig. 93). 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.

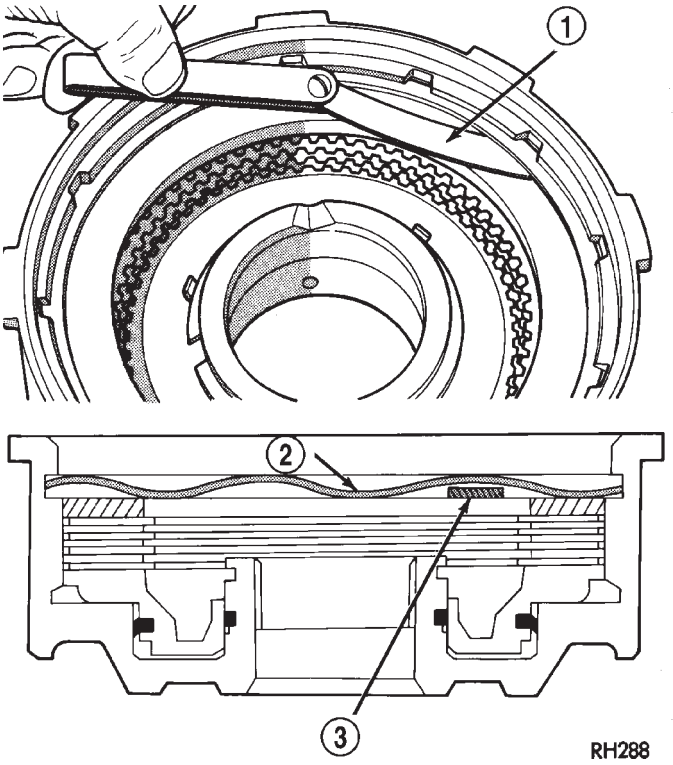


Fig. 93 Typical Method Of Measuring Front Clutch Pack Clearance

1 - FEELER GAUGE
2 - WAVED SNAP-RING
3 - FEELER GAUGE

FRONT SERVO

DESCRIPTION

The kickdown servo (Fig. 94) consists of a two-land piston with an inner piston, a piston rod and guide, and a return spring. The dual-land piston uses seal rings on its outer diameters and an O-ring for the inner piston.

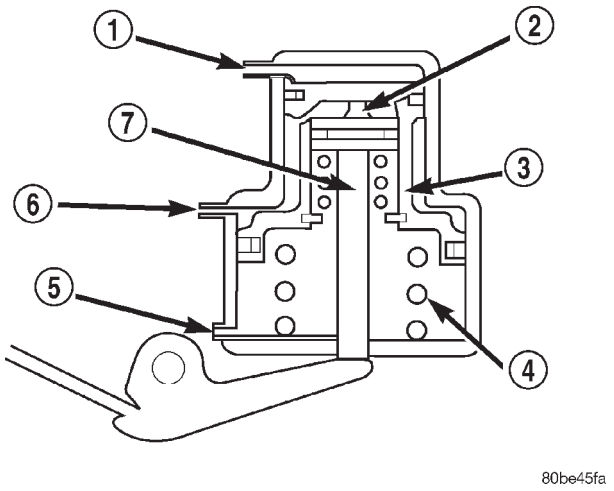


Fig. 94 Front Servo

1 - VENT
2 - INNER PISTON
3 - PISTON
4 - SPRING
5 - RELEASE PRESSURE
6 - APPLY PRESSURE
7 - PISTON ROD

OPERATION

The application of the piston is accomplished by applying pressure between the two lands of the piston. The pressure acts against the larger lower land to push the piston downward, allowing the piston rod to extend though its guide against the apply lever. Release of the servo at the 2-3 upshift is accomplished by a combination of spring and line pressure, acting on the bottom of the larger land of the piston. The small piston is used to cushion the application of the band by bleeding oil through a small orifice in the larger piston. The release timing of the kickdown servo is very important to obtain a smooth but firm shift. The release has to be very quick, just as the front clutch application is taking place. Otherwise, engine runaway or a shift hesitation will occur. To accomplish this, the band retains its holding capacity until the front clutch is applied, giving a small amount of overlap between them.

DISASSEMBLY

(1) Remove seal ring from rod guide (Fig. 95).

(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.

CLEANING

Clean the servo piston components (Fig. 96) with solvent and dry them with compressed air.

FRONT SERVO (Continued)

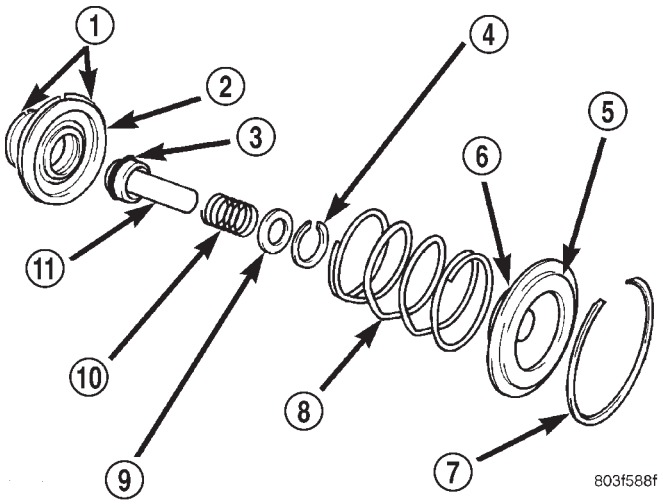


Fig. 95 Front Servo

1 - PISTON RINGS
2 - SERVO PISTON
3 - O-RING
4 - SNAP-RING
5 - PISTON ROD GUIDE
6 - SEAL RING
7 - SNAP-RING
8 - SERVO SPRING
9 - WASHER
10 - SPRING
11 - PISTON ROD

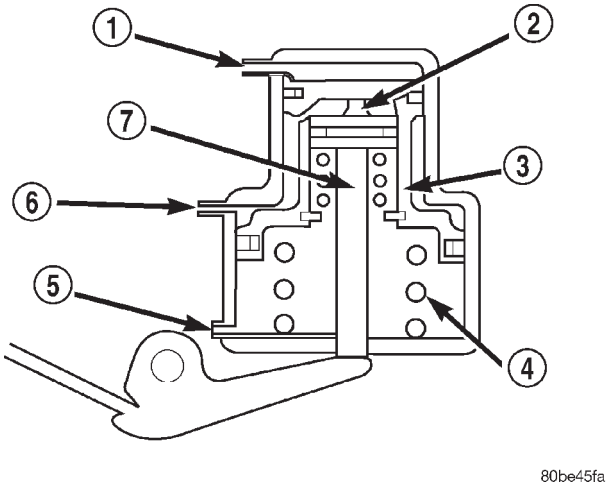


Fig. 96 Front Servo

1 - VENT
2 - INNER PISTON
3 - PISTON
4 - SPRING
5 - RELEASE PRESSURE
6 - APPLY PRESSURE
7 - PISTON ROD

INSPECTION

Inspect the servo components (Fig. 97). 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.

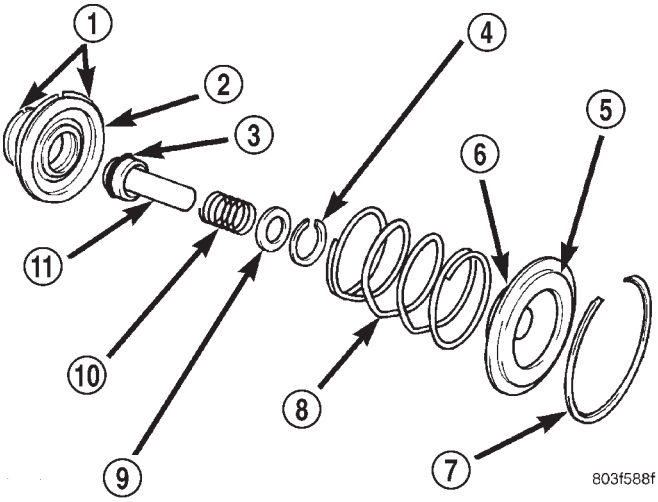


Fig. 97 Front Servo

1 - PISTON RINGS
2 - SERVO PISTON
3 - O-RING
4 - SNAP-RING
5 - PISTON ROD GUIDE
6 - SEAL RING
7 - SNAP-RING
8 - SERVO SPRING
9 - WASHER
10 - SPRING
11 - PISTON ROD

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.

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. 98).

FRONT SERVO (Continued)

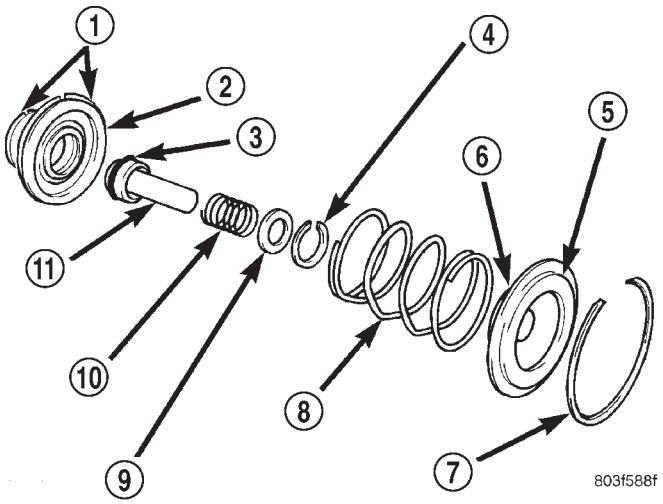


Fig. 98 Front Servo

1 - PISTON RINGS
2 - SERVO PISTON
3 - O-RING
4 - SNAP-RING
5 - PISTON ROD GUIDE
6 - SEAL RING
7 - SNAP-RING
8 - SERVO SPRING
9 - WASHER
10 - SPRING
11 - PISTON ROD

OIL PUMP

DESCRIPTION

The oil pump (Fig. 99) is located in the pump housing inside the bell housing of the transmission case. The oil pump consists of an inner and outer gear, a housing, and a reaction shaft support.

OPERATION

As the torque converter rotates, the converter hub rotates the inner and outer gears. As the gears rotate, the clearance between the gear teeth increases in the crescent area, and creates a suction at the inlet side of the pump. This suction draws fluid through the pump inlet from the oil pan. As the clearance between the gear teeth in the crescent area decreases, it forces pressurized fluid into the pump outlet and to the valve body.

STANDARD PROCEDURE - OIL PUMP VOLUME CHECK

Measuring the oil pump output volume will determine if sufficient oil flow to the transmission oil cooler exists, and whether or not an internal transmission failure is present.

Verify that the transmission fluid is at the proper level. Refer to the Fluid Level Check procedure in this section. If necessary, fill the transmission to the proper level with Mopar® ATF +4, type 9602, Automatic Transmission Fluid.

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

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

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

(3) If one quart of transmission fluid is collected in the container in 20 seconds or less, oil pump flow volume is within acceptable limits. If fluid flow is intermittent, or it takes more than 20 seconds to collect one quart of fluid, refer to the Hydraulic Pressure tests in this section for further diagnosis.

(4) Re-connect the **To cooler** line to the transmission cooler inlet.

(5) Refill the transmission to proper level.

OIL PUMP (Continued)

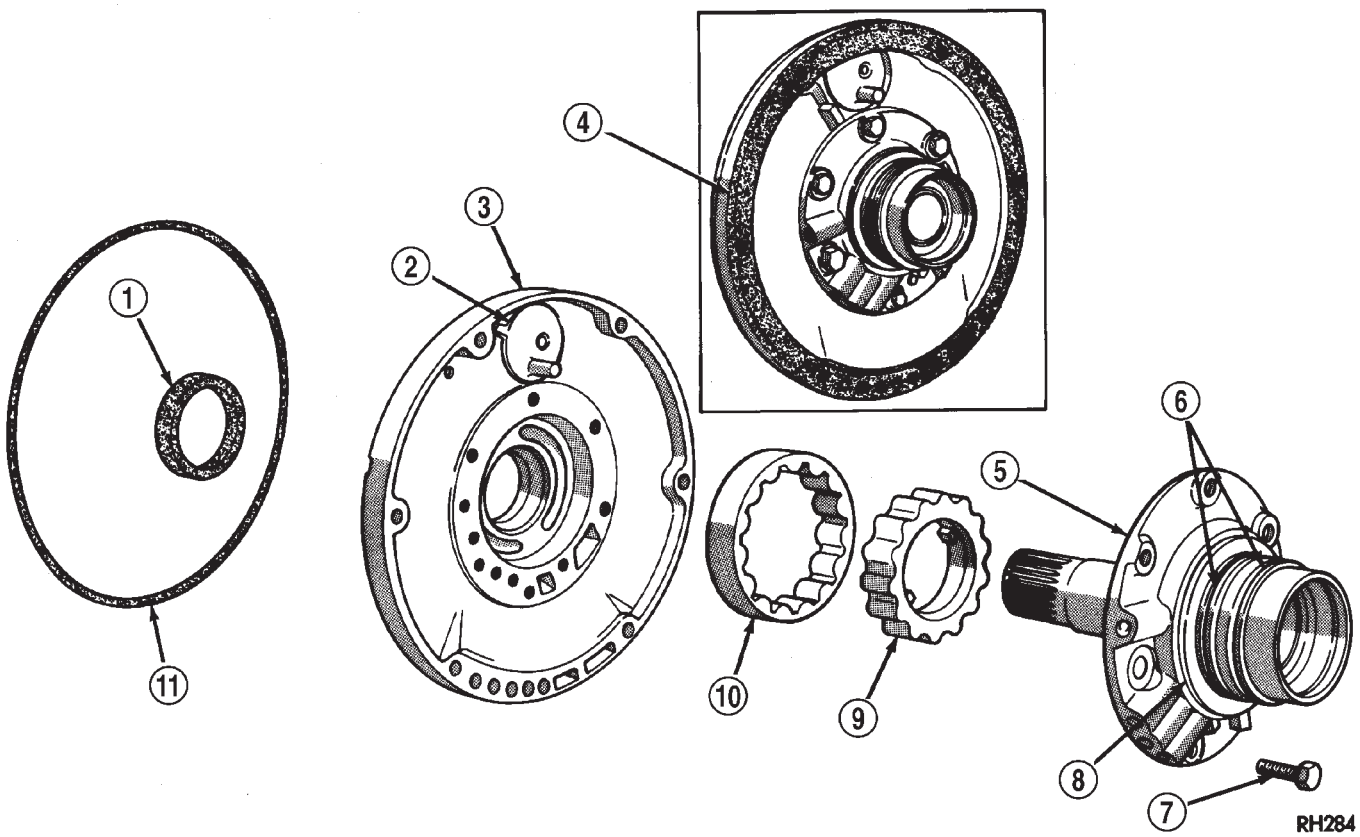


Fig. 99 Oil Pump Assembly

1 - OIL SEAL
2 - VENT BAFFLE
3 - OIL PUMP BODY
4 - GASKET
5 - REACTION SHAFT SUPPORT
6 - SEAL RINGS
7 - BOLTS (6)
8 - #1 THRUST WASHER (SELECTIVE)
9 - INNER GEAR
10 - OUTER GEAR
11 - “O” RING

DISASSEMBLY

(1) Mark position of support in oil pump body for assembly alignment reference. Use scriber 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. 100).

(4) Remove pump inner and outer gears (Fig. 101).

(5) Remove o-ring seal from pump body (Fig. 102). Discard seal after removal.

(6) Remove oil pump seal with Remover Tool C-3981. Discard seal after removal.

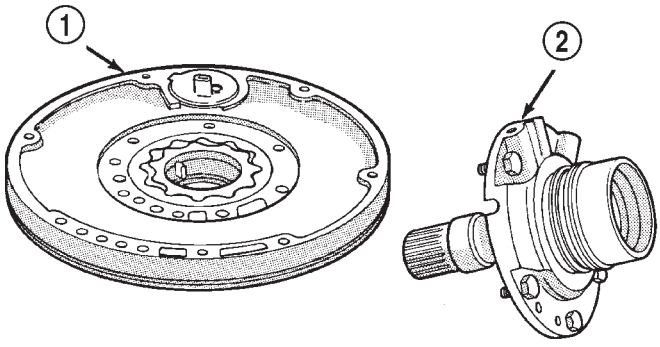


Fig. 100 Reaction Shaft Support

1 - OIL PUMP
2 - REACTION SHAFT SUPPORT

OIL PUMP (Continued)

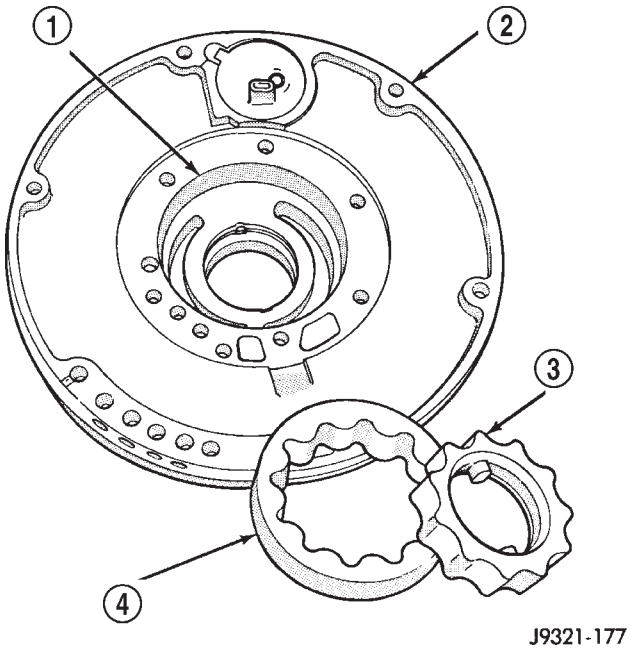


Fig. 101 Pump Gears

1 - GEAR BORE
2 - PUMP BODY
3 - INNER GEAR
4 - OUTER GEAR

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. 103).

REACTION SHAFT SUPPORT BUSHING REMOVAL

(1) Assemble Cup Tool SP-3633, Nut SP-1191 and Bushing Remover SP-5301 (Fig. 104).

(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.

CLEANING

Clean pump and support components with solvent and dry them with compressed air.

OIL PUMP (Continued)

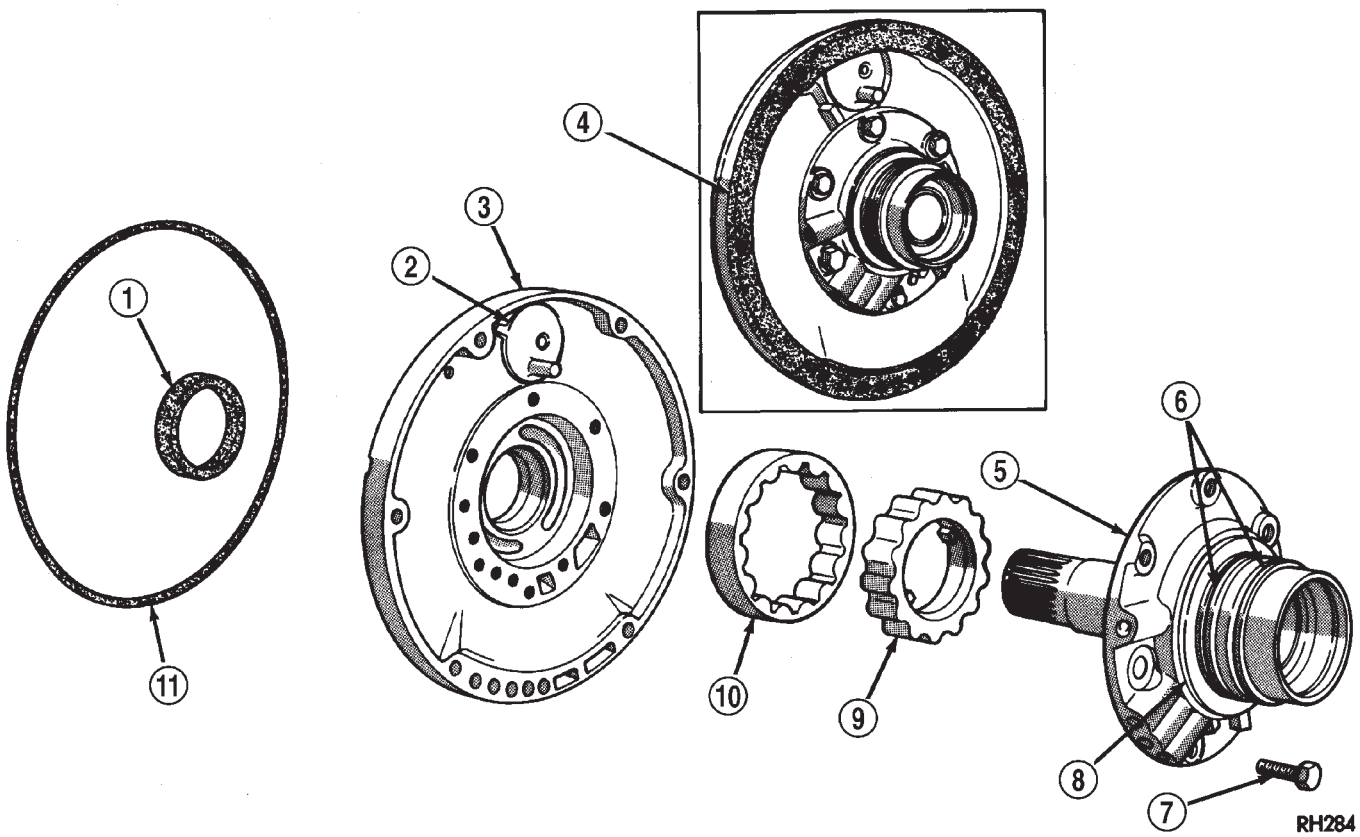


Fig. 102 Oil Pump Assembly

1 - OIL SEAL
2 - VENT BAFFLE
3 - OIL PUMP BODY
4 - GASKET
5 - REACTION SHAFT SUPPORT
6 - SEAL RINGS
7 - BOLTS (6)
8 - #1 THRUST WASHER (SELECTIVE)
9 - INNER GEAR
10 - OUTER GEAR
11 - "O" RING

INSPECTION

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.

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.

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 installing the gears in the pump body and measure pump component clearances as follows:

(1) Position an appropriate piece of Plastigage™ across both gears.

(2) Align the plastigage to a flat area on the reaction shaft housing.

(3) Install the reaction shaft to the pump housing.

(4) Separate the reaction shaft housing from the pump housing and measure the Plastigage™ following the instructions supplied with it.

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. 105).

Clearance between outer gear and pump housing should be 0.10 to 0.19 mm (0.004 to 0.0075 in.). Measure clearance with an appropriate feeler gauge.

OIL PUMP (Continued)

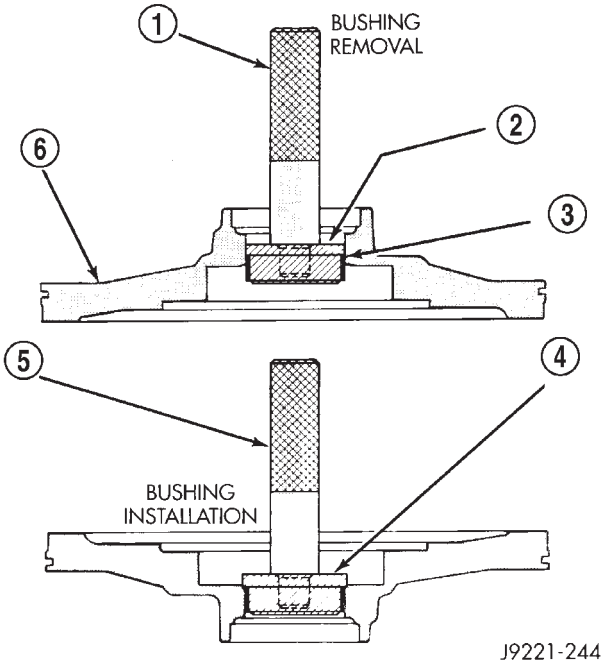


Fig. 103 Oil Pump Bushing

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL SP-3550
3 - BUSHING
4 - SPECIAL TOOL SP-5118
5 - SPECIAL TOOL C-4171
6 - PUMP HOUSING

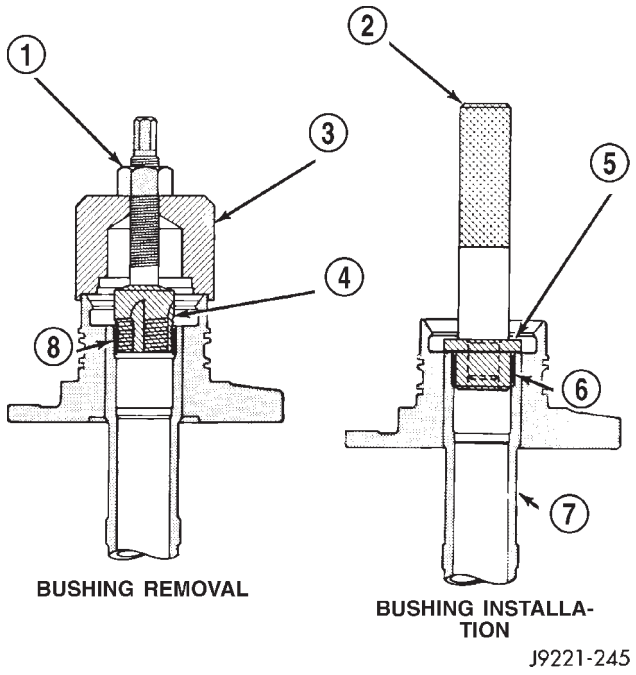


Fig. 104 Reaction Shaft Bushing

1 - SPECIAL TOOL SP-1191
2 - SPECIAL TOOL C-4171
3 - SPECIAL TOOL SP-3633
4 - SPECIAL TOOL SP-5301
5 - SPECIAL TOOL SP-5302
6 - BUSHING
7 - REACTION SHAFT
8 - BUSHING

ASSEMBLY

OIL PUMP BUSHING

(1) Assemble Tool Handle C-4171 and Bushing Installer SP-5118 (Fig. 106).

(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 bushing 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. 107).

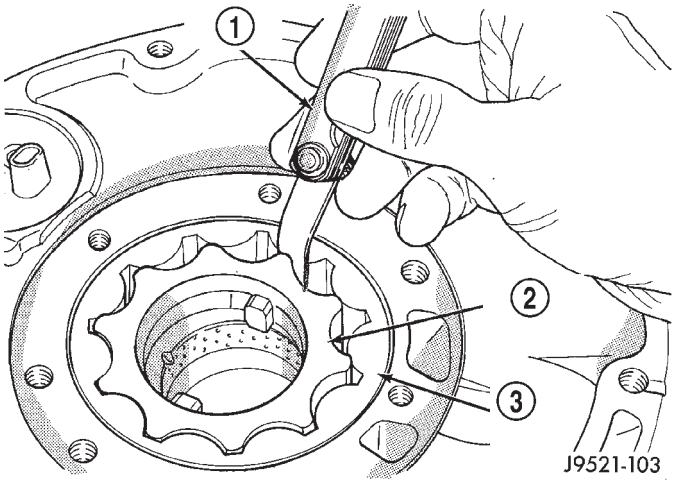


Fig. 105 Checking Pump Gear Tip Clearance

1 - FEELER GAUGE
2 - INNER GEAR
3 - OUTER GEAR

OIL PUMP (Continued)

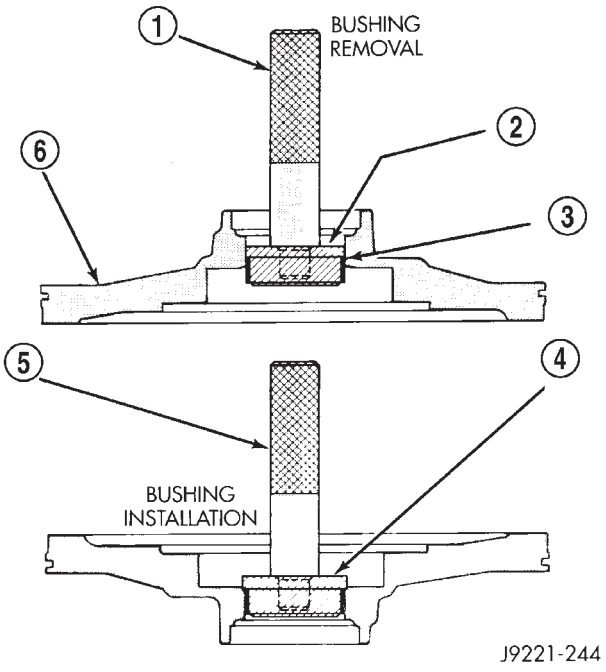


Fig. 106 Oil Pump Bushing

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL SP-3550
3 - BUSHING
4 - SPECIAL TOOL SP-5118
5 - SPECIAL TOOL C-4171
6 - PUMP HOUSING

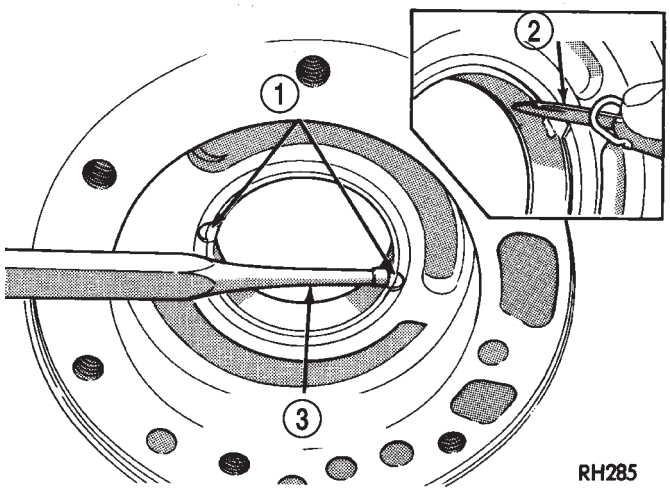


Fig. 107 Staking-Deburring Oil Pump Bushing

1 - TWO STAKES
2 - NARROW BLADE
3 - BLUNT PUNCH

REACTION SHAFT SUPPORT BUSHING

(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. 108).

(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).

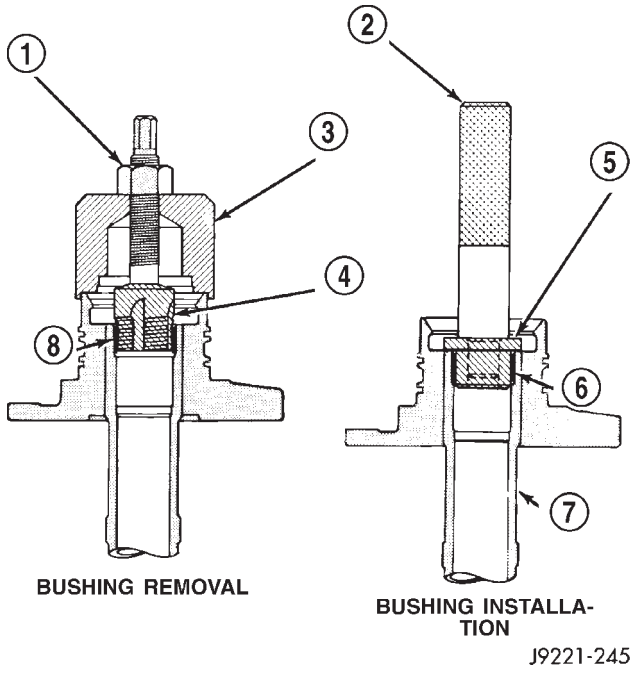


Fig. 108 Reaction Shaft Bushing

1 - SPECIAL TOOL SP-1191
2 - SPECIAL TOOL C-4171
3 - SPECIAL TOOL SP-3633
4 - SPECIAL TOOL SP-5301
5 - SPECIAL TOOL SP-5302
6 - BUSHING
7 - REACTION SHAFT
8 - BUSHING

OIL PUMP BODY

(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.

OIL PUMP (Continued)

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. 109). Use hammer or mallet to tap seal into place.

(7) Install new o-ring on pump body. Lubricate oil seal and o-ring with petroleum jelly.

(8) Cover pump assembly to prevent dust entry and set aside for assembly installation.

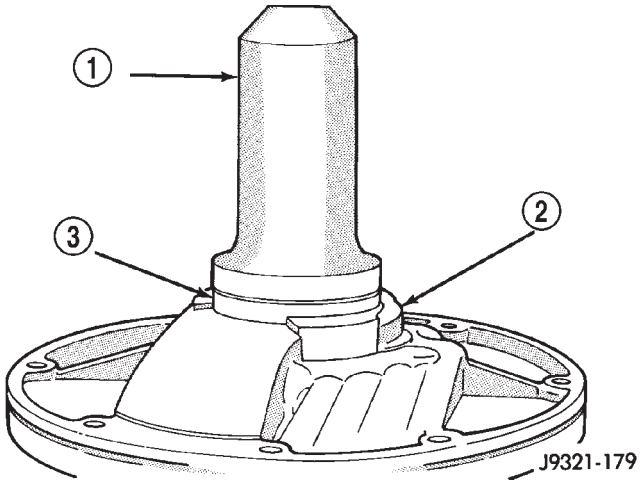


Fig. 109 Oil Pump Seal

1 - SPECIAL TOOL C-3860-A
2 - PUMP BODY
3 - PUMP SEAL

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. 110).

(4) Pull bearing from output shaft.

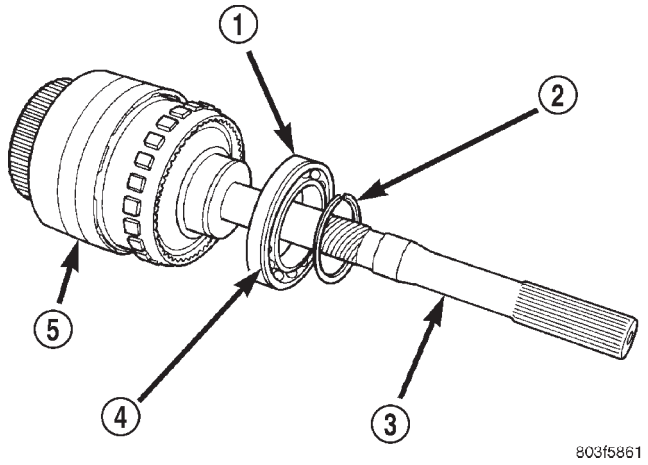


Fig. 110 Output Shaft Front Bearing

1 - OUTPUT SHAFT FRONT BEARING
2 - SNAP-RING
3 - OUTPUT SHAFT
4 - GROOVE TO REAR
5 - OVERDRIVE GEARTRAIN

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.

(4) Install overdrive geartrain into housing.

(5) Install overdrive unit in vehicle.

OUTPUT SHAFT REAR BEARING

REMOVAL

(1) Remove overdrive unit from the vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC/OVERDRIVE - REMOVAL)

(2) Remove overdrive geartrain from housing.

(3) Remove snap-ring holding output shaft rear bearing into overdrive housing (Fig. 111).

(4) Using a suitable driver inserted through the rear end of housing, drive bearing from housing.

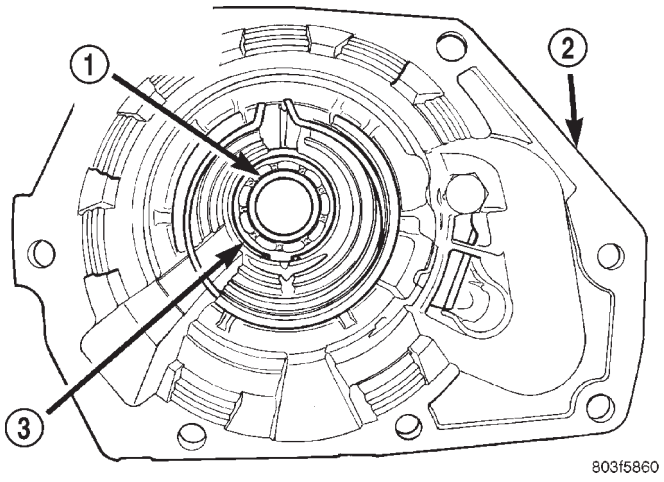


Fig. 111 Output Shaft Rear Bearing

1 - OUTPUT SHAFT REAR BEARING
2 - OVERDRIVE HOUSING
3 - SNAP-RING

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. 117).

(4) Install overdrive geartrain into housing.

(5) Install overdrive unit in vehicle.

OVERDRIVE CLUTCH

DESCRIPTION

The overdrive clutch (Fig. 112) is composed of the pressure plate, clutch plates, holding discs, overdrive piston retainer, piston, piston spacer, and snap-rings. The overdrive clutch is the forwardmost component in the transmission overdrive unit and is considered a holding component. The overdrive piston retainer, piston, and piston spacer are located on the rear of the main transmission case.

NOTE: The number of discs and plates may vary with each engine and vehicle combination.

OPERATION

To apply the clutch, pressure is applied between the piston retainer and piston. The fluid pressure is provided by the oil pump, transferred through the control valves and passageways, and enters the clutch through passages at the lower rear portion of the valve body area. With pressure applied between the piston retainer and piston, the piston moves away from the piston retainer and compresses the clutch pack. This action applies the clutch pack, allowing torque to flow through the intermediate shaft into the overdrive planetary gear set. The overdrive clutch discs are attached to the overdrive clutch hub while the overdrive clutch plates, reaction plate, and pressure plate are lugged to the overdrive housing. This allows the intermediate shaft to transfer the engine torque to the planetary gear and overrunning clutch. This drives the planetary gear inside the annulus, which is attached to the overdrive clutch drum and output shaft, creating the desired gear ratio. The waved snap-ring is used to cushion the application of the clutch pack.

OVERDRIVE CLUTCH (Continued)

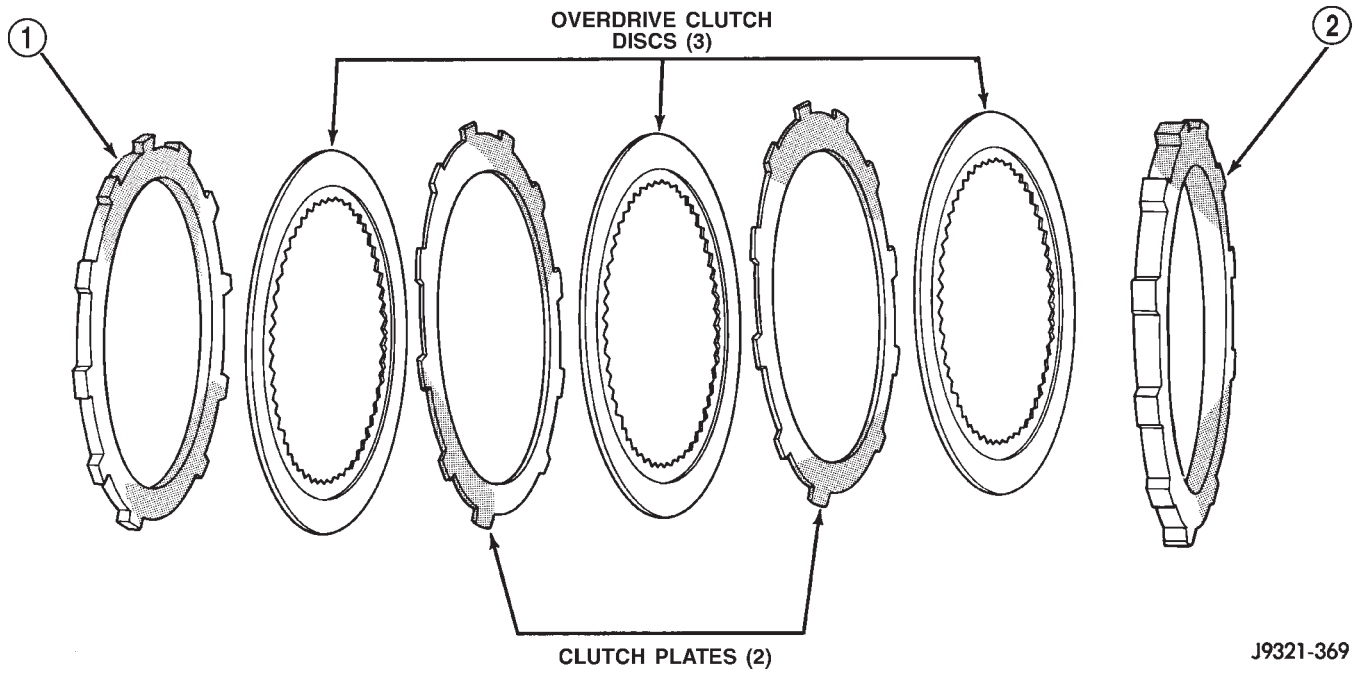


Fig. 112 Overdrive Clutch

1 - REACTION PLATE
2 - PRESSURE PLATE

OVERDRIVE SWITCH

DESCRIPTION

The overdrive OFF (control) switch is located in the shift lever arm (Fig. 113). The switch is a momentary contact device that signals the PCM to toggle current status of the overdrive function.

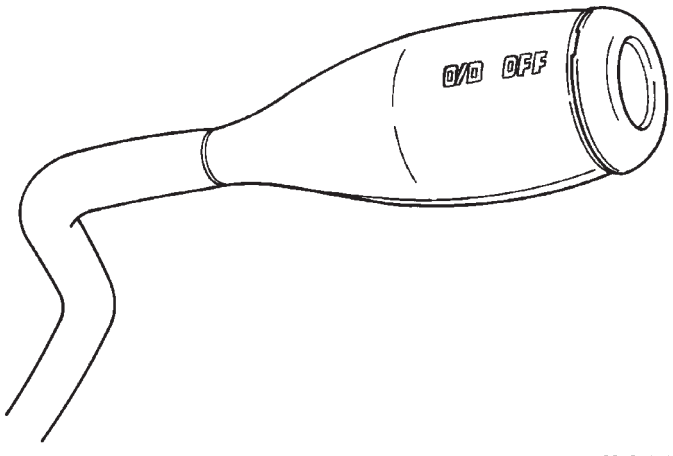


Fig. 113 Overdrive Off Switch

OPERATION

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.

DIAGNOSIS AND TESTING - 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.

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

REMOVAL

(1) Using a plastic trim tool, remove the overdrive off switch retainer from the shift lever (Fig. 114).

(2) Pull the switch outwards to release it from the connector in the lever (Fig. 115)

OVERDRIVE SWITCH (Continued)

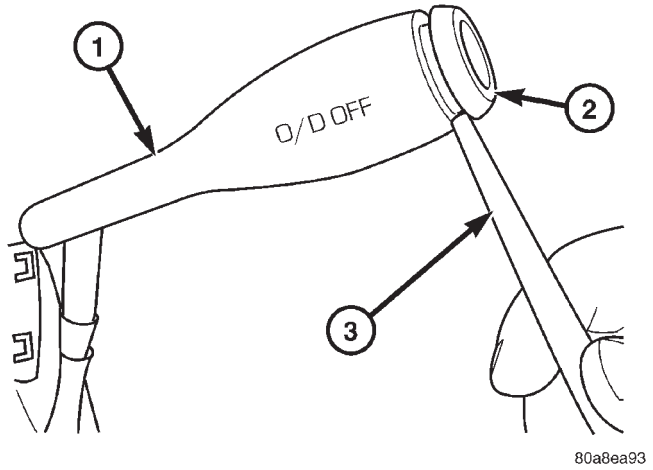


Fig. 114 Overdrive Off Switch Retainer

1 - GEAR SHIFT LEVER
2 - OVERDRIVE OFF SWITCH RETAINER
3 - PLASTIC TRIM TOOL

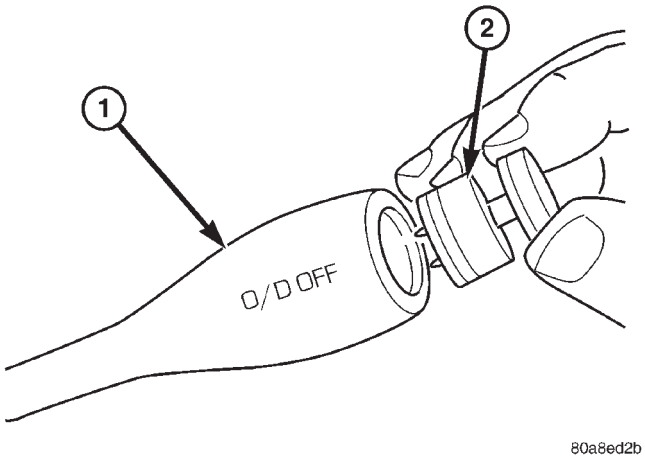


Fig. 115 Remove the Overdrive Off Switch

1 - GEAR SHIFT LEVER
2 - OVERDRIVE OFF SWITCH

INSTALLATION

NOTE: There is enough slack in the wire to pull out the connector from the lever.

(1) Pull the connector out of the lever just enough to grasp it.

CAUTION: Be careful not to bend the pins on the overdrive off switch. Use care when installing the switch, as it is not indexed, and can be accidentally installed incorrectly.

(2) Install the overdrive off switch into the connector (Fig. 116)

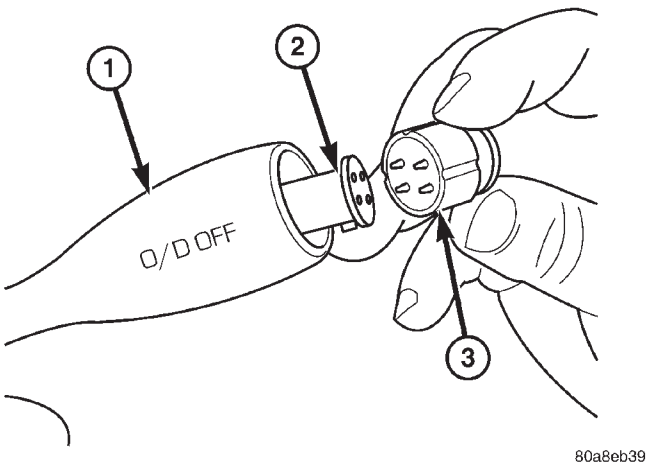


Fig. 116 Install the Overdrive Off Switch

1 - GEAR SHIFT LEVER
2 - OVERDRIVE OFF SWITCH WIRING CONNECTOR
3 - OVERDRIVE OFF SWITCH

(3) Push the overdrive off switch and wiring into the shift lever.

(4) Install the overdrive off switch retainer onto the shift lever.

OVERDRIVE UNIT

REMOVAL

(1) Shift transmission into PARK.

(2) Raise vehicle.

(3) Remove transfer case, if equipped.

(4) Mark propeller shaft universal joint(s) and axle pinion yoke, or the companion flange and flange yoke, for alignment reference at installation, if neccesary.

(5) Disconnect and remove the rear propeller shaft, if necessary. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)

(6) Remove transmission oil pan, remove gasket, drain oil and reinstall pan.

(7) If overdrive unit had malfunctioned, or if fluid is contaminated, remove entire transmission. If diagnosis indicated overdrive problems only, remove just the overdrive unit.

(8) Support transmission with transmission jack.

(9) Remove bolts attaching overdrive unit to transmission (Fig. 117).

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.

OVERDRIVE UNIT (Continued)

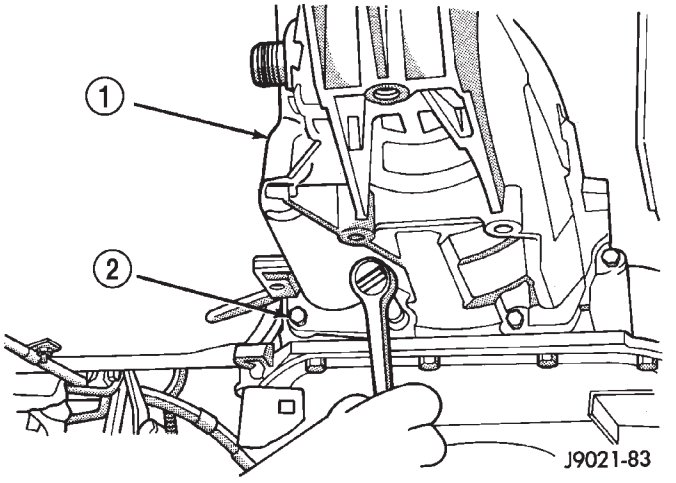


Fig. 117 Overdrive Unit Bolts

1 - OVERDRIVE UNIT
2 - ATTACHING BOLTS (7)

(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.

DISASSEMBLY

(1) Remove transmission speed sensor and o-ring seal from overdrive case (Fig. 118).

(2) Remove overdrive piston thrust bearing (Fig. 119).

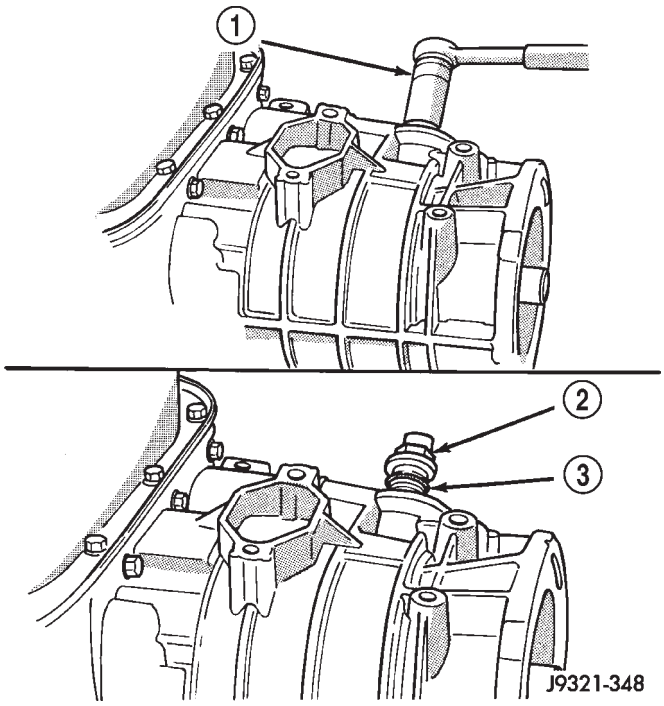


Fig. 118 Transmission Speed Sensor

1 - SOCKET AND WRENCH
2 - SPEED SENSOR
3 - O-RING

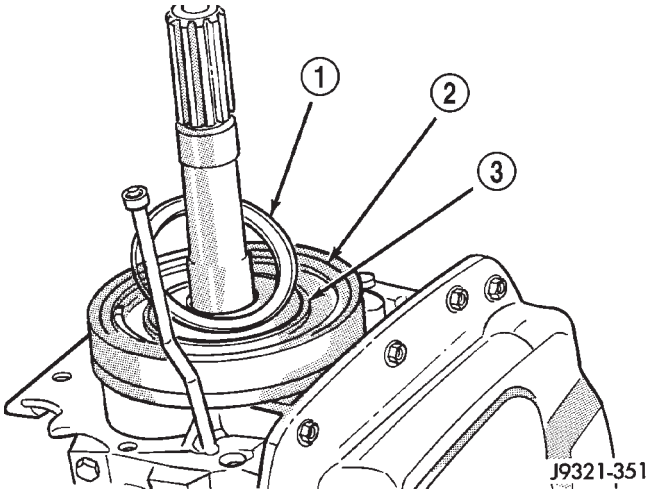


Fig. 119 Overdrive Piston Thrust Bearing Removal/ Installation

1 - THRUST BEARING
2 - OVERDRIVE PISTON
3 - THRUST PLATE

OVERDRIVE UNIT (Continued)

OVERDRIVE PISTON

(1) Remove overdrive piston thrust plate (Fig. 120). Retain thrust plate. It is a select fit part and may possibly be reused.

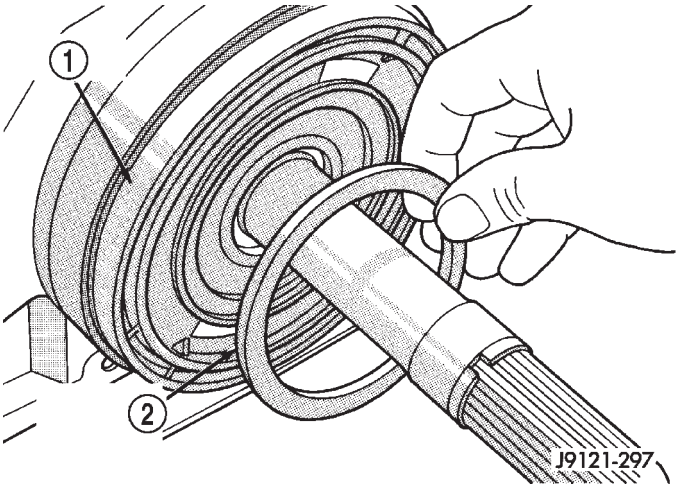


Fig. 120 Overdrive Piston Thrust Plate Removal/ Installation

1 - OVERDRIVE PISTON
2 - OVERDRIVE PISTON SPACER (SELECT FIT)

(2) Remove intermediate shaft spacer (Fig. 121). Retain spacer. It is a select fit part and may possibly be reused.

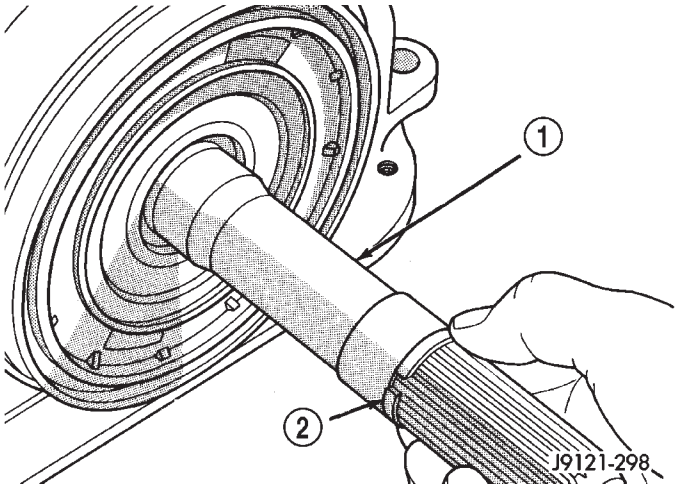


Fig. 121 Intermediate Shaft Spacer Location

1 - INTERMEDIATE SHAFT
2 - INTERMEDIATE SHAFT SPACER (SELECT FIT)

(3) Remove overdrive piston from retainer (Fig. 122).

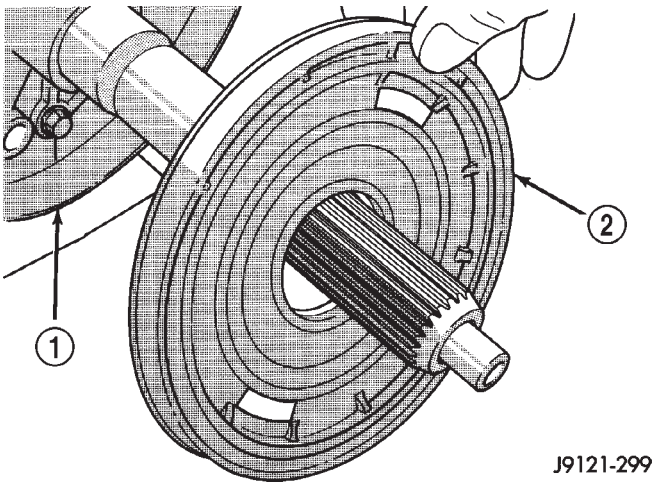


Fig. 122 Overdrive Piston Removal

1 - PISTON RETAINER
2 - OVERDRIVE PISTON

OVERDRIVE CLUTCH PACK

(1) Remove overdrive clutch pack wire retaining ring (Fig. 123).

(2) Remove overdrive clutch pack (Fig. 124).

(3) Note position of clutch pack components for assembly reference (Fig. 125).

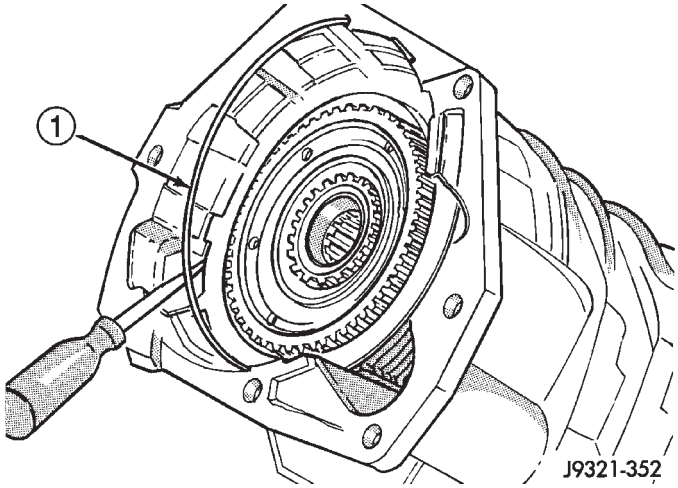


Fig. 123 Removing Overdrive Clutch Pack Retaining Ring

1 - OVERDRIVE CLUTCH PACK RETAINING RING

OVERDRIVE UNIT (Continued)

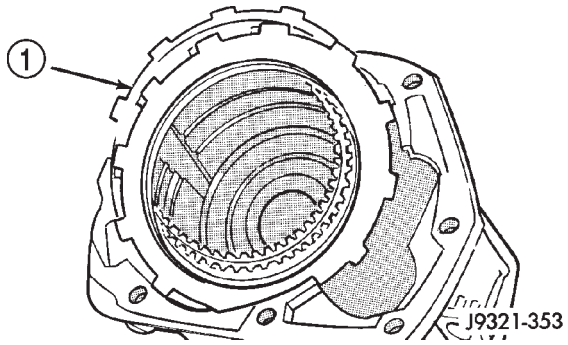


Fig. 124 Overdrive Clutch Pack Removal

1 - OVERDRIVE CLUTCH PACK

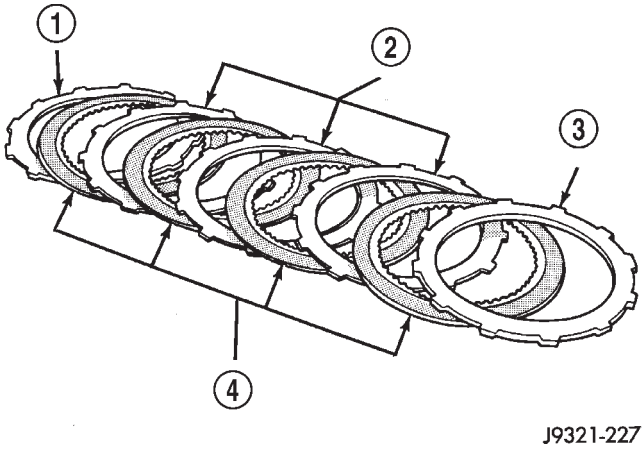


Fig. 125 Overdrive Clutch Component Position - Typical

1 - REACTION PLATE
2 - CLUTCH PLATES (3)
3 - PRESSURE PLATE
4 - CLUTCH DISCS (4)

OVERDRIVE GEARTRAIN

(1) Remove overdrive clutch wave spring (Fig. 126).

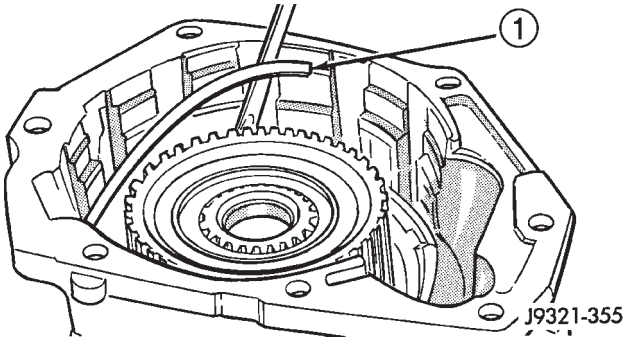


Fig. 126 Overdrive Clutch Wave Spring Removal

1 - WAVE SPRING

(2) Remove overdrive clutch reaction snap-ring (Fig. 127). Note that snap-ring is located in same groove as wave spring.

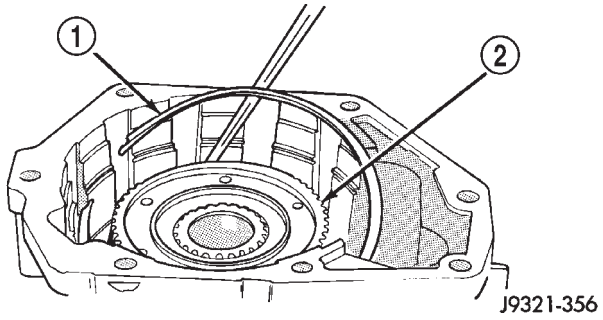


Fig. 127 Overdrive Clutch Reaction Snap-Ring Removal

1 - REACTION RING
2 - CLUTCH HUB

(3) Remove Torx™ head screws that attach access cover and gasket to overdrive case (Fig. 128).

(4) Remove access cover and gasket (Fig. 129).

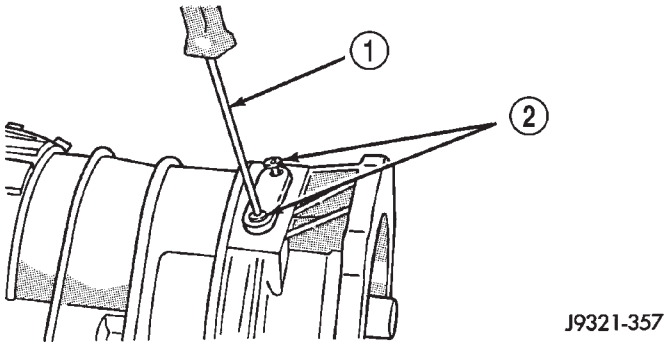


Fig. 128 Access Cover Screw Removal

1 - TORX SCREWDRIVER (T25)
2 - ACCESS COVER SCREWS

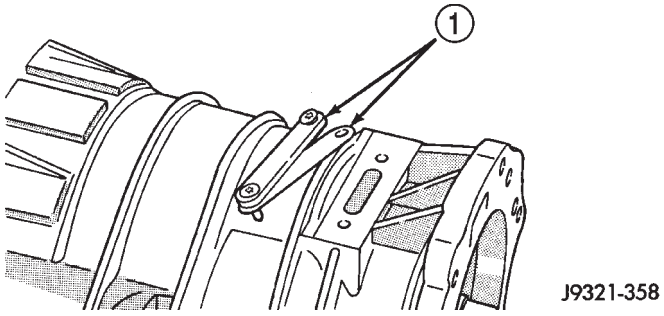


Fig. 129 Access Cover And Gasket Removal

1 - ACCESS COVER AND GASKET

(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. 130).

OVERDRIVE UNIT (Continued)

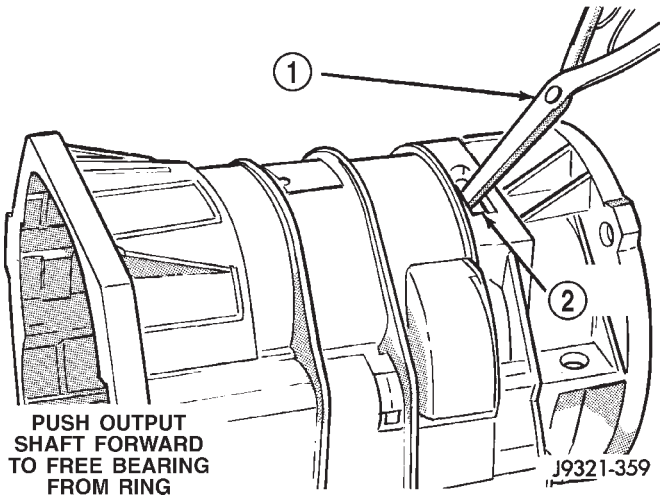


Fig. 130 Releasing Bearing From Locating Ring

1 - EXPAND BEARING LOCATING RING WITH SNAP-RING PLIERS
2 - ACCESS HOLE

(6) Lift gear case up and off geartrain assembly (Fig. 131).

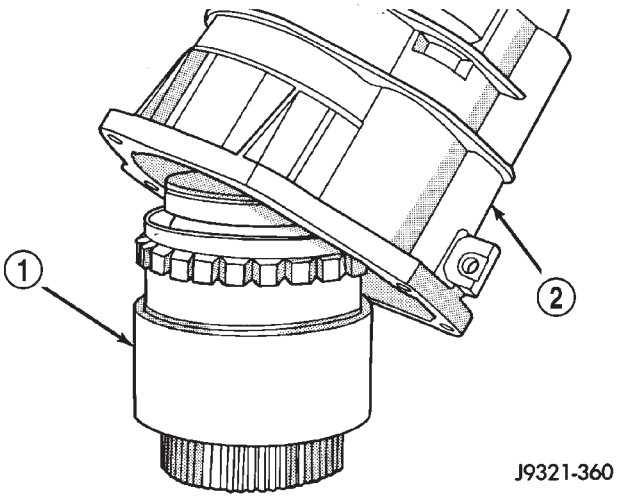


Fig. 131 Removing Geartrain

1 - GEARTRAIN ASSEMBLY
2 - GEAR CASE

(7) Remove snap-ring that retains rear bearing on output shaft.

(8) Remove rear bearing from output shaft (Fig. 132).

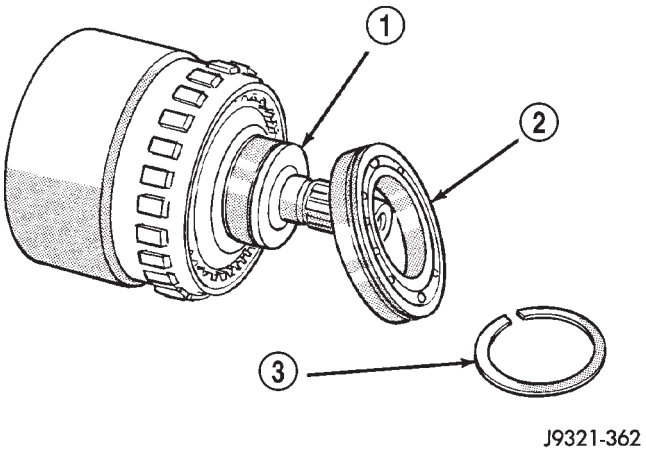


Fig. 132 Rear Bearing Removal

1 - OUTPUT SHAFT
2 - REAR BEARING
3 - SNAP-RING

DIRECT CLUTCH, HUB AND SPRING

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. 133).

(2) Position Compressor Tool 6227-1 on clutch hub (Fig. 133). 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. 133).

OVERDRIVE UNIT (Continued)

(4) Remove direct clutch pack snap-ring (Fig. 134).
(5) Remove direct clutch hub retaining ring (Fig. 135).
(6) Release press load slowly and completely (Fig. 136).
(7) Remove Special Tool 6227-1. Then remove clutch pack from hub (Fig. 136).

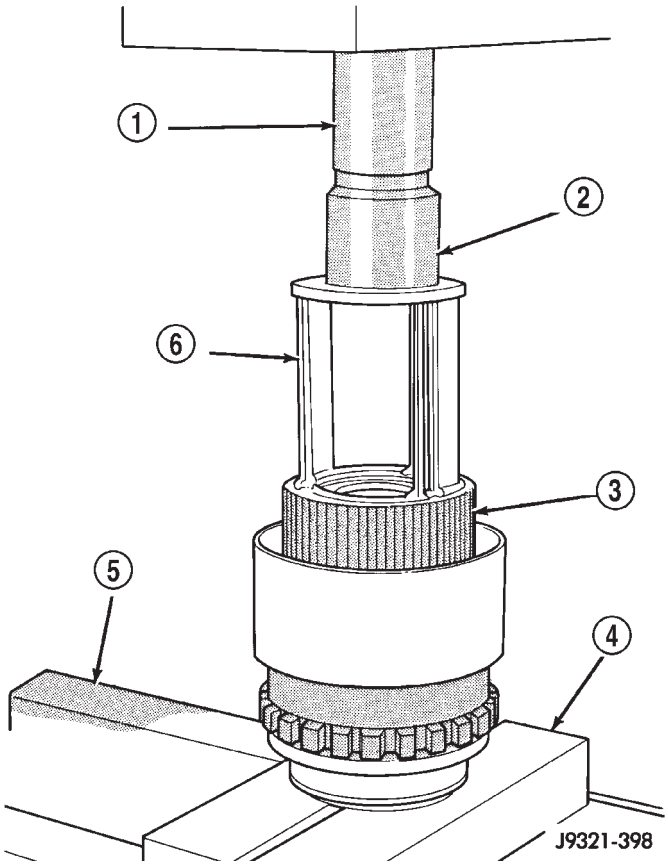


Fig. 133 Geartrain Mounted In Shop Press

1 - PRESS RAM
2 - SPECIAL TOOL C-3995-A (OR SIMILAR TOOL)
3 - CLUTCH HUB
4 - PLATES
5 - PRESS BED
6 - SPECIAL TOOL 6227-1

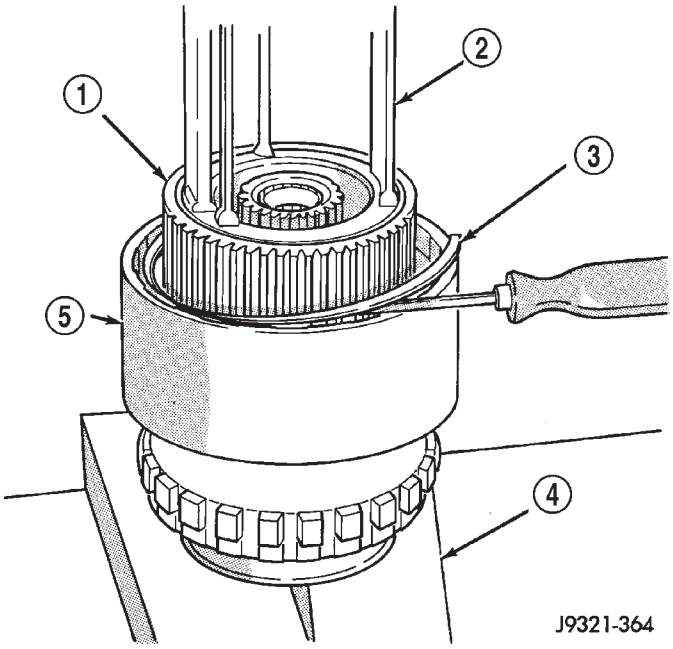


Fig. 134 Direct Clutch Pack Snap-Ring Removal

1 - CLUTCH HUB
2 - SPECIAL TOOL 6227-1
3 - DIRECT CLUTCH PACK SNAP-RING
4 - PRESS PLATES
5 - CLUTCH DRUM

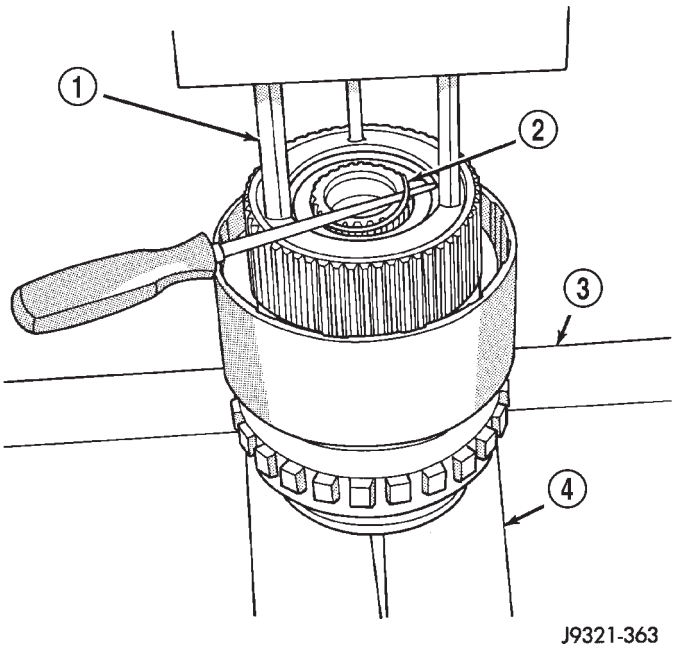


Fig. 135 Direct Clutch Hub Retaining Ring Removal

1 - SPECIAL TOOL 6227-1
2 - CLUTCH HUB RETAINING RING
3 - PRESS BED
4 - PRESS PLATES

OVERDRIVE UNIT (Continued)

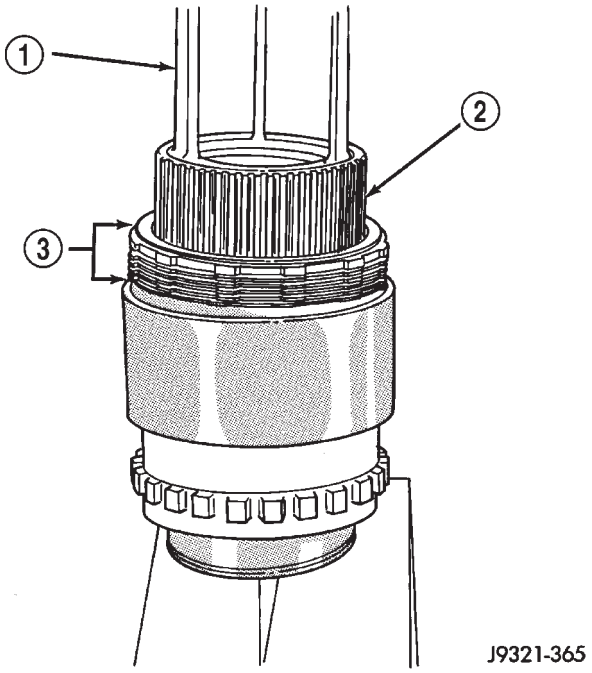


Fig. 136 Direct Clutch Pack Removal

1 - SPECIAL TOOL 6227-1
2 - DIRECT CLUTCH HUB
3 - DIRECT CLUTCH PACK

GEARTRAIN

(1) Remove direct clutch hub and spring (Fig. 137).

(2) Remove sun gear and spring plate. Then remove planetary thrust bearing and planetary gear (Fig. 138).

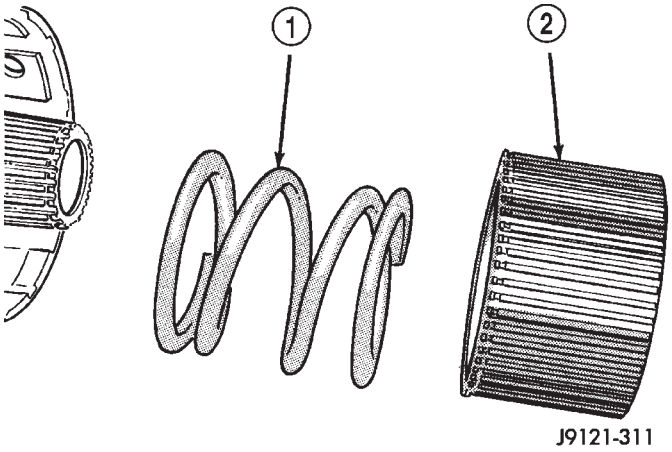


Fig. 137 Direct Clutch Hub And Spring Removal

1 - DIRECT CLUTCH SPRING
2 - DIRECT CLUTCH HUB

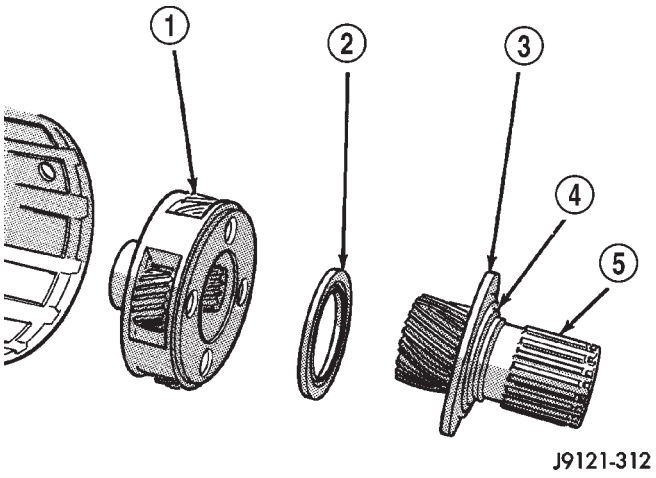


Fig. 138 Removing Sun Gear, Thrust Bearing And Planetary Gear

1 - PLANETARY GEAR
2 - PLANETARY THRUST BEARING
3 - CLUTCH SPRING PLATE
4 - SPRING PLATE SNAP-RING
5 - SUN GEAR

(3) Remove overrunning clutch assembly with expanding type snap-ring pliers (Fig. 139). 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. 140). Use small center punch or scriber to make alignment marks.

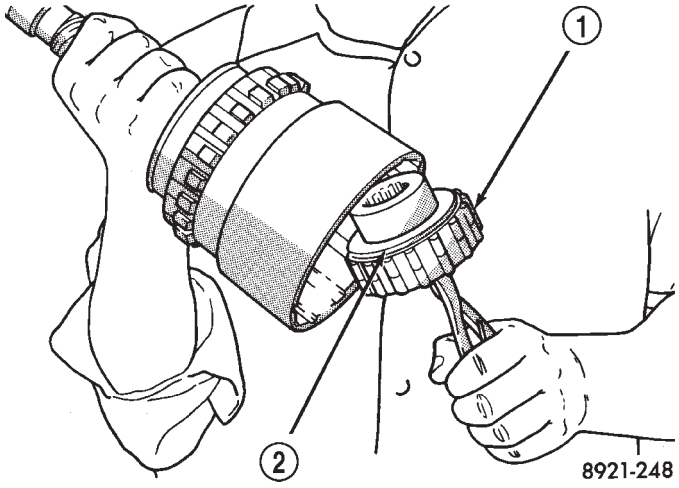


Fig. 139 Overrunning Clutch Assembly Removal/ Installation

1 - OVERRUNNING CLUTCH
2 - NEEDLE BEARING

OVERDRIVE UNIT (Continued)

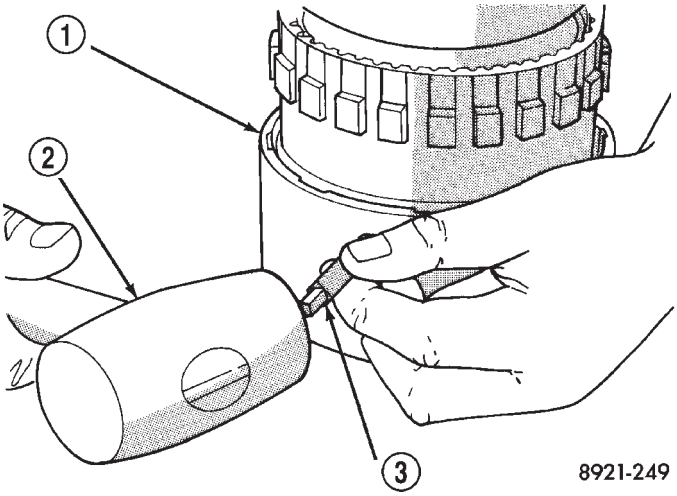


Fig. 140 Marking Direct Clutch Drum And Annulus Gear For Assembly Alignment

1 - DIRECT CLUTCH DRUM
2 - HAMMER
3 - PUNCH

(7) Remove direct clutch drum rear retaining ring (Fig. 141).

(8) Remove direct clutch drum outer retaining ring (Fig. 142).

(9) Mark annulus gear and output shaft for assembly alignment reference (Fig. 143). Use punch or scriber to mark gear and shaft.

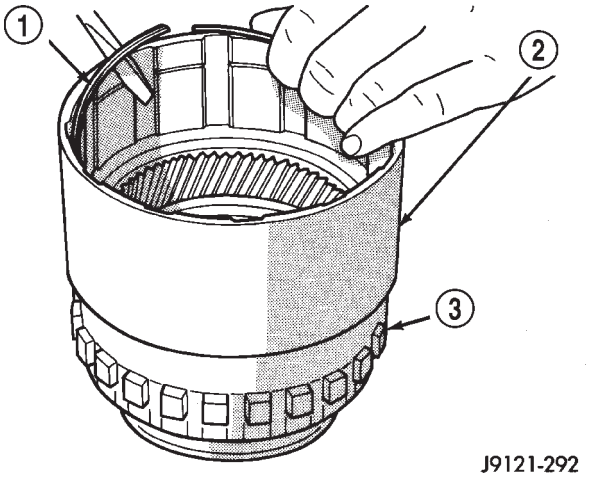


Fig. 141 Clutch Drum Inner Retaining Ring Removal

1 - INNER RETAINING RING
2 - DIRECT CLUTCH DRUM
3 - ANNULUS GEAR

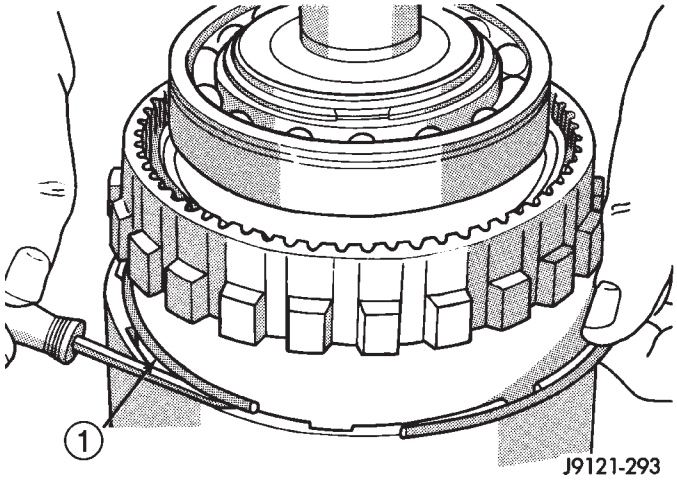


Fig. 142 Clutch Drum Outer Retaining Ring Removal

1 - OUTER RETAINING RING

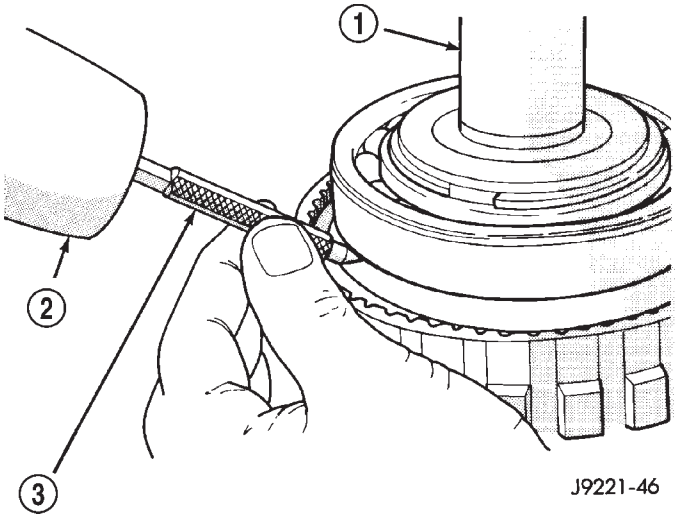


Fig. 143 Marking Annulus Gear And Output Shaft For Assembly Alignment

1 - OUTPUT SHAFT
2 - HAMMER
3 - PUNCH

OVERDRIVE UNIT (Continued)

(10) Remove snap-ring that secures annulus gear on output shaft (Fig. 144). Use two screwdrivers to unseat and work snap-ring out of groove as shown.

(11) Remove annulus gear from output shaft (Fig. 145). Use rawhide or plastic mallet to tap gear off shaft.

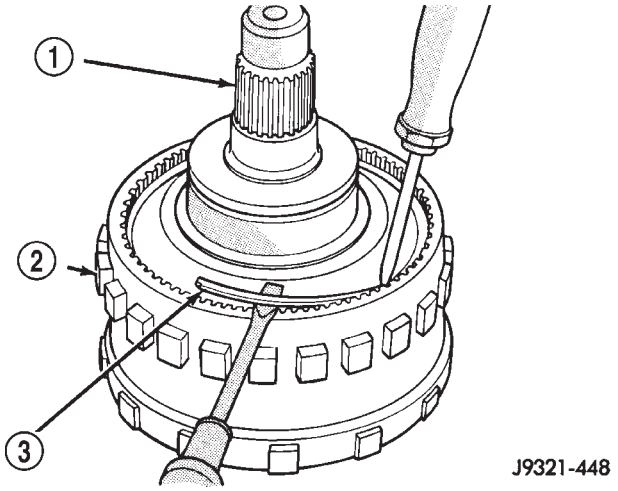


Fig. 144 Annulus Gear Snap-Ring Removal

1 - OUTPUT SHAFT
2 - ANNULUS GEAR
3 - SNAP-RING

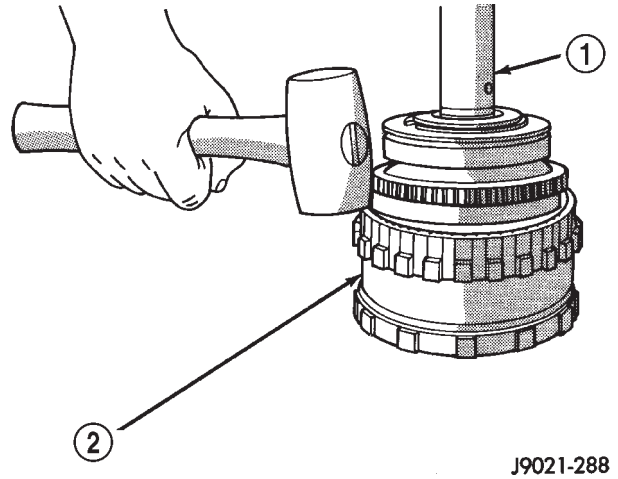


Fig. 145 Annulus Gear Removal

1 - OUTPUT SHAFT
2 - ANNULUS GEAR

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.

CLEANING

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.

INSPECTION

Check condition of the park lock components and the overdrive case.

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, 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.

OVERDRIVE UNIT (Continued)

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 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.

ASSEMBLY

GEARTRAIN AND DIRECT CLUTCH

(1) Soak direct clutch and overdrive clutch discs in Mopar® ATF +4, type 9602, 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. 146). Lubricate bushings with petroleum jelly, or transmission fluid.

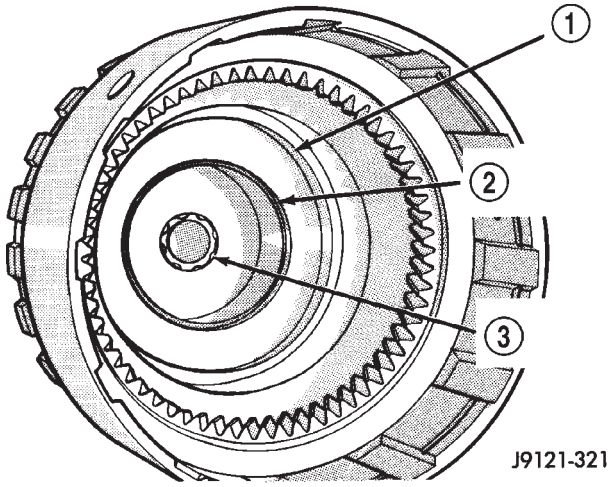


Fig. 146 Output Shaft Pilot Bushing

1 - OUTPUT SHAFT HUB
2 - OVERRUNNING CLUTCH HUB BUSHING
3 - INTERMEDIATE SHAFT PILOT BUSHING

(3) Install annulus gear on output shaft, if removed. Then install annulus gear retaining snap-ring (Fig. 147).

(4) Align and install clutch drum on annulus gear (Fig. 148). Be sure drum is engaged in annulus gear lugs.

(5) Install clutch drum outer retaining ring (Fig. 148).

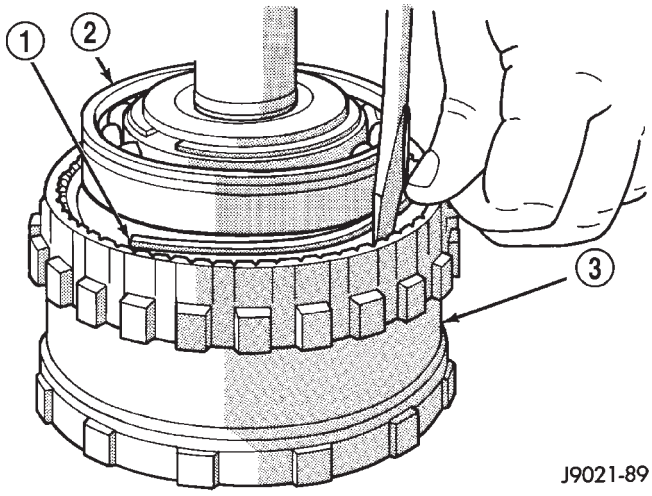


Fig. 147 Annulus Gear Installation

1 - SNAP-RING
2 - OUTPUT SHAFT FRONT BEARING
3 - ANNULUS GEAR

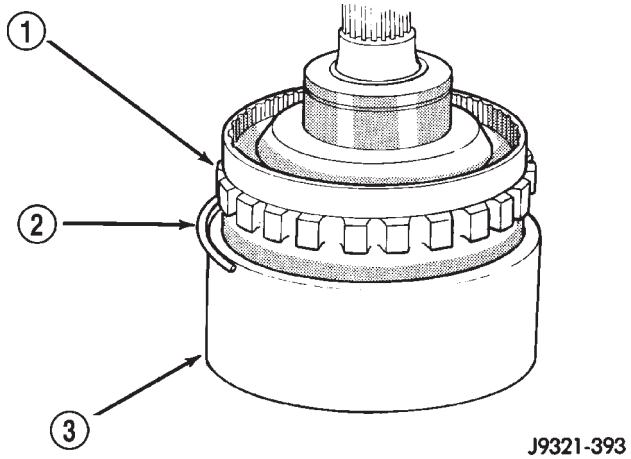


Fig. 148 Clutch Drum And Outer Retaining Ring Installation

1 - ANNULUS GEAR
2 - OUTER SNAP-RING
3 - CLUTCH DRUM

OVERDRIVE UNIT (Continued)

(6) Slide clutch drum forward and install inner retaining ring (Fig. 149).

(7) Install rear bearing and snap-ring on output shaft (Fig. 150). Be sure locating ring groove in bearing is toward rear.

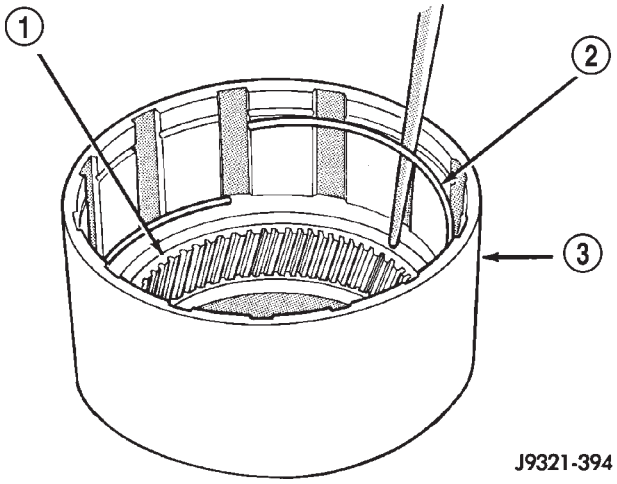


Fig. 149 Clutch Drum Inner Retaining Ring Installation

1 - ANNULUS GEAR
2 - INNER SNAP-RING
3 - CLUTCH DRUM

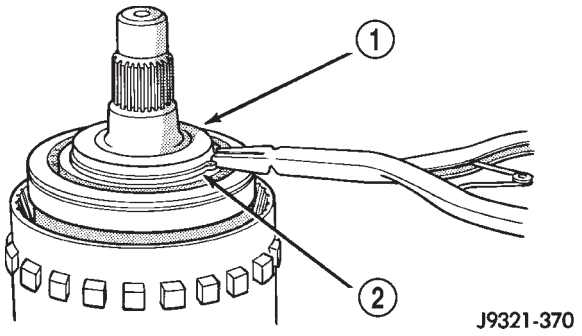


Fig. 150 Rear Bearing And Snap-Ring Installation

1 - REAR BEARING
2 - SNAP-RING

(8) Install overrunning clutch on hub (Fig. 151). 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.

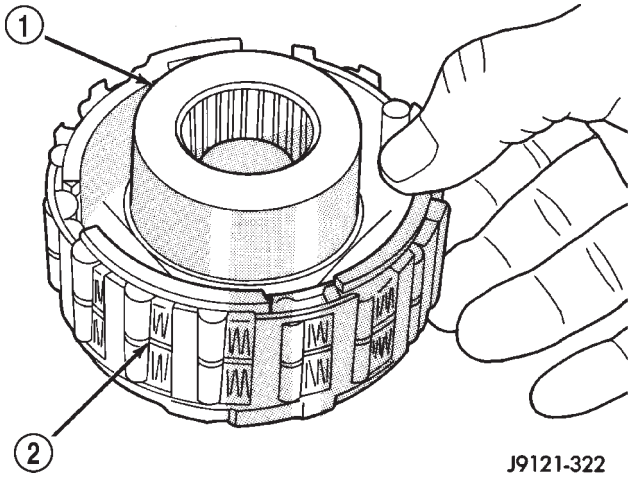


Fig. 151 Assembling Overrunning Clutch And Hub

1 - CLUTCH HUB
2 - OVERRUNNING CLUTCH

(10) Install overrunning clutch in output shaft (Fig. 152). 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. 153). 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.

(13) Install planetary thrust bearing on sun gear (Fig. 154). 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. 155). Be sure sun gear and thrust bearing are fully seated before proceeding.

OVERDRIVE UNIT (Continued)

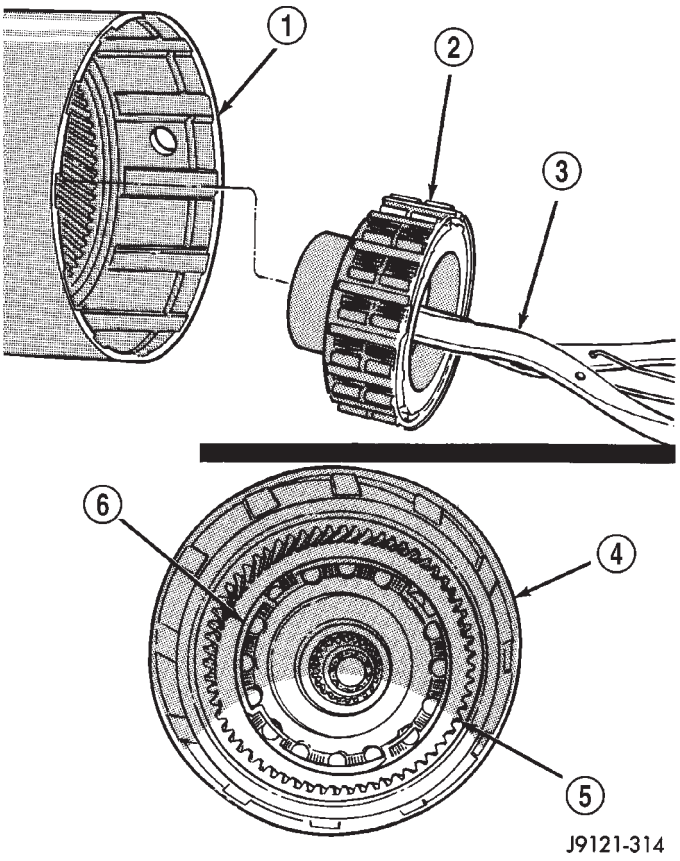


Fig. 152 Overrunning Clutch Installation

1 - CLUTCH DRUM
2 - OVERRUNNING CLUTCH ASSEMBLY
3 - EXPANDING-TYPE SNAP-RING PLIERS
4 - CLUTCH DRUM
5 - ANNULUS GEAR
6 - OVERRUNNING CLUTCH ASSEMBLY SEATED IN OUTPUT SHAFT

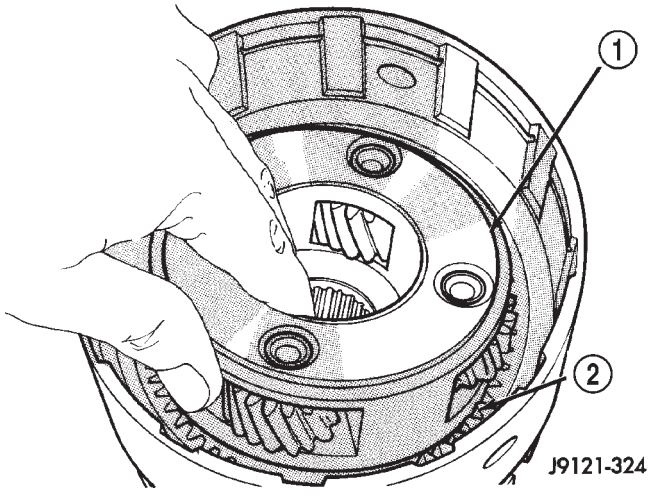


Fig. 153 Planetary Gear Installation

1 - PLANETARY GEAR
2 - ANNULUS GEAR

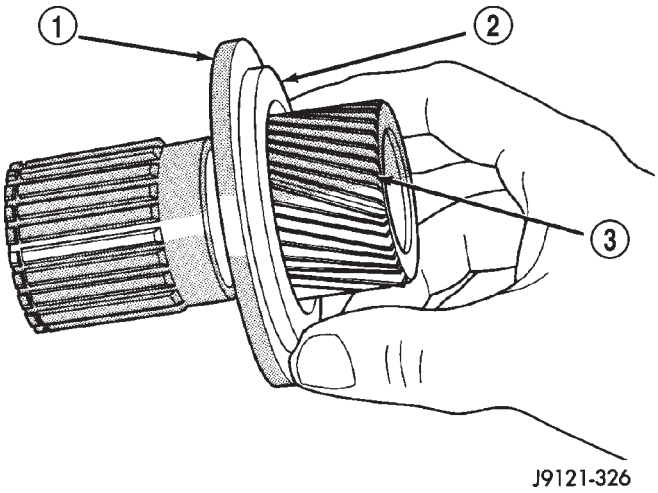


Fig. 154 Planetary Thrust Bearing Installation

1 - SPRING PLATE
2 - PLANETARY THRUST BEARING
3 - SUN GEAR

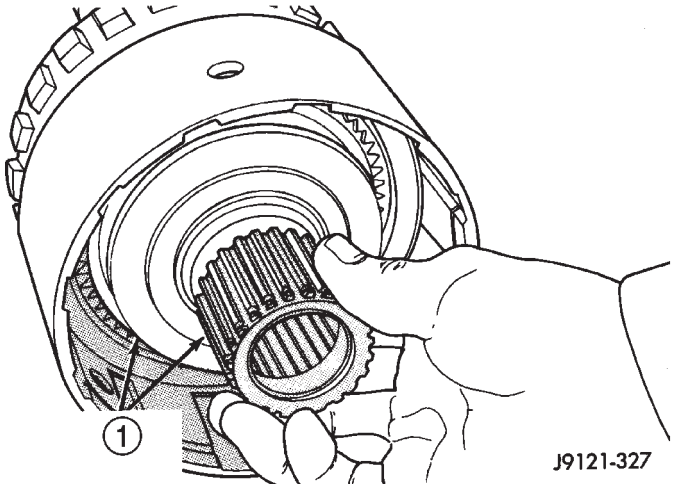


Fig. 155 Sun Gear Installation

1 - SUN GEAR AND SPRING PLATE ASSEMBLY

(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. 156). 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. 157). Be sure spring is properly seated on spring plate.

NOTE: The direct clutch in a 47RE transmission uses 10 clutch discs.

OVERDRIVE UNIT (Continued)

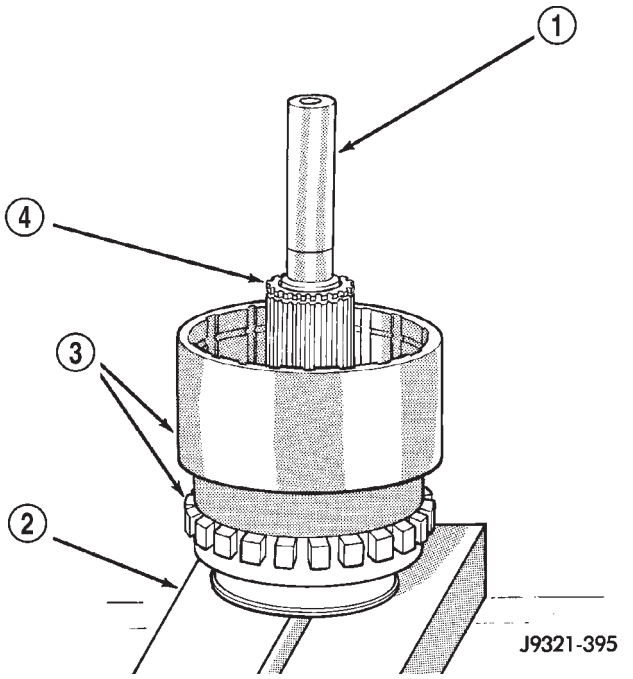


Fig. 156 Alignment Tool Installation

1 - SPECIAL TOOL 6227-2
2 - PRESS PLATES
3 - ASSEMBLED DRUM AND ANNULUS GEAR
4 - SUN GEAR

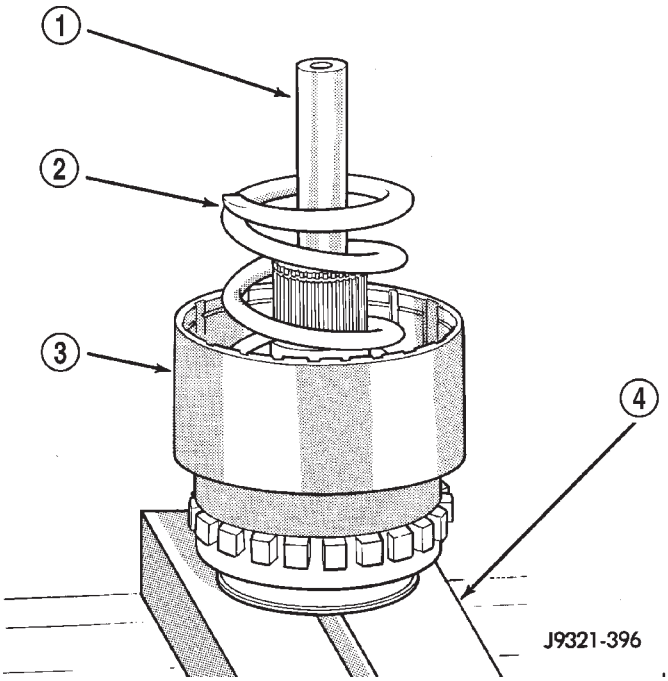


Fig. 157 Direct Clutch Spring Installation

1 - SPECIAL TOOL 6227-2
2 - DIRECT CLUTCH SPRING
3 - CLUTCH HUB
4 - PRESS PLATES

(18) Assemble and install direct clutch pack on hub as follows:

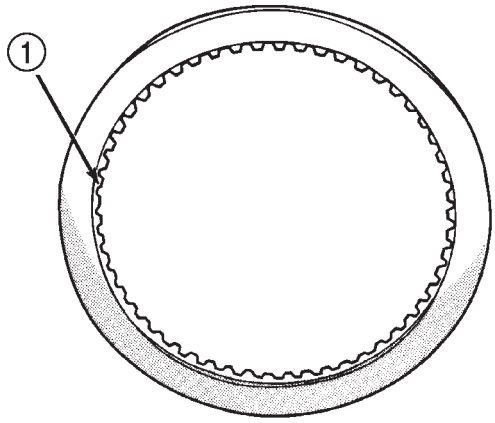
(a) Assemble clutch pack components.

(b) Install direct clutch reaction plate on clutch hub first. Note that one side of reaction plate 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. 158).

(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. 159).

(19) Install clutch hub and clutch pack on direct clutch spring (Fig. 160). Be sure hub is started on sun gear splines before proceeding.



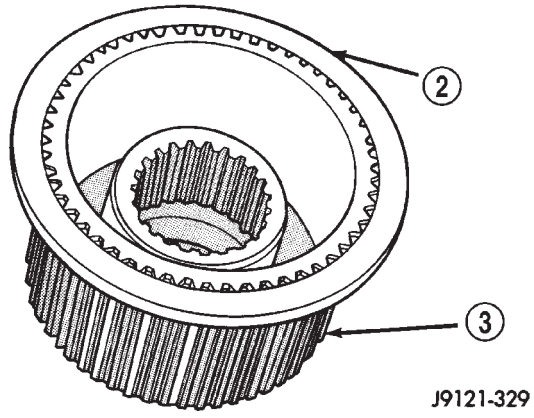


Fig. 158 Correct Position Of Direct Clutch Reaction Plate

1 - REACTION PLATE COUNTERBORE
2 - DIRECT CLUTCH REACTION PLATE (FLUSH WITH END OF HUB)
3 - CLUTCH HUB

OVERDRIVE UNIT (Continued)

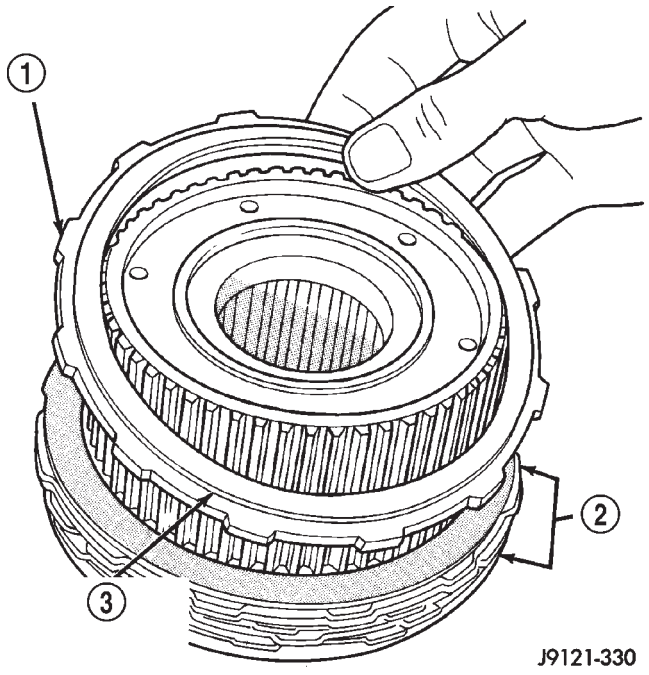


Fig. 159 Correct Position Of Direct Clutch

1 - DIRECT CLUTCH PRESSURE PLATE
2 - CLUTCH PACK
3 - BE SURE SHOULDER SIDE OF PLATE FACES UPWARD

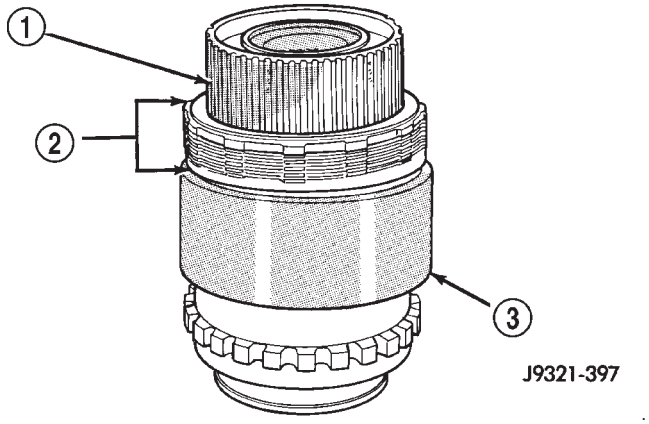


Fig. 160 Direct Clutch Pack And Clutch Hub Installation

1 - CLUTCH HUB
2 - DIRECT CLUTCH PACK
3 - CLUTCH DRUM

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. 161). Be very sure snap-ring is fully seated in clutch drum ring groove.

(25) Install clutch hub retaining ring (Fig. 162). 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.

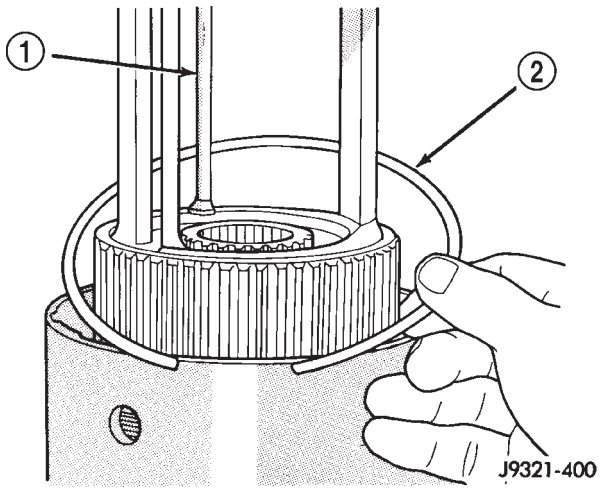


Fig. 161 Direct Clutch Pack Snap-Ring Installation

1 - SPECIAL TOOL 6227-1
2 - DIRECT CLUTCH PACK SNAP-RING

OVERDRIVE UNIT (Continued)

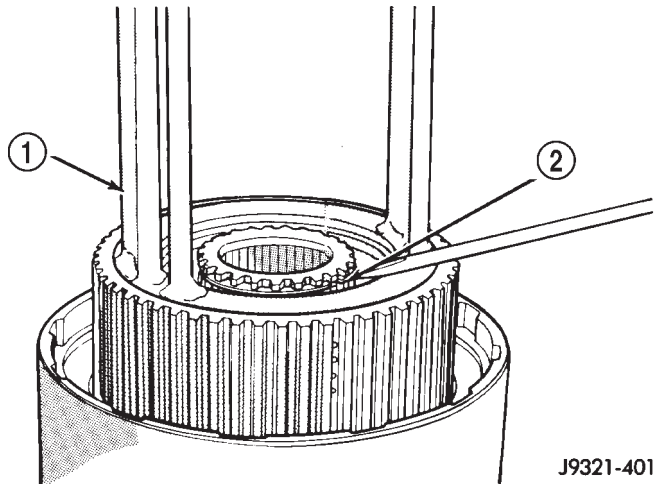


Fig. 162 Clutch Hub Retaining Ring Installation

1 - SPECIAL TOOL 6227-1
2 - CLUTCH HUB RETAINING RING

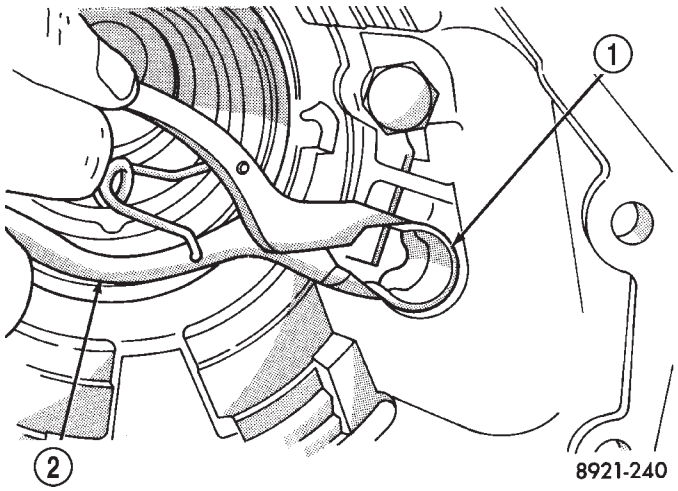


Fig. 164 Reaction Plug And Snap-Ring Installation

1 - REACTION PLUG SNAP-RING
2 - SNAP-RING PLIERS

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.

(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. 163). Be sure pin is seated in hole in case before installing snap-ring.

(4) Install reaction plug snap-ring (Fig. 164). Compress snap-ring only enough for installation; do not distort it.

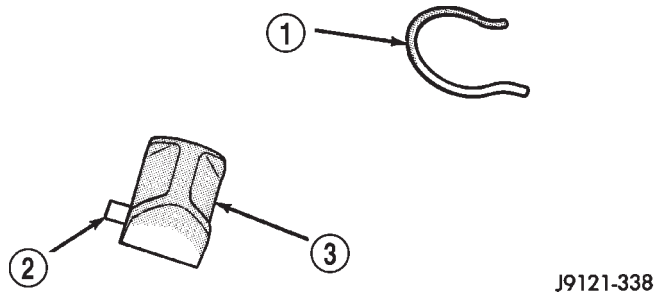


Fig. 163 Reaction Plug Locating Pin And Snap-Ring

1 - REACTION PLUG SNAP-RING (DO NOT OVERCOMPRESS TO INSTALL)
2 - LOCATING PIN
3 - PARK LOCK REACTION PLUG

(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. 165).

(7) Support geartrain on Tool 6227-1 (Fig. 166). Be sure tool is securely seated in clutch hub.

(8) Install overdrive gear case on geartrain (Fig. 166).

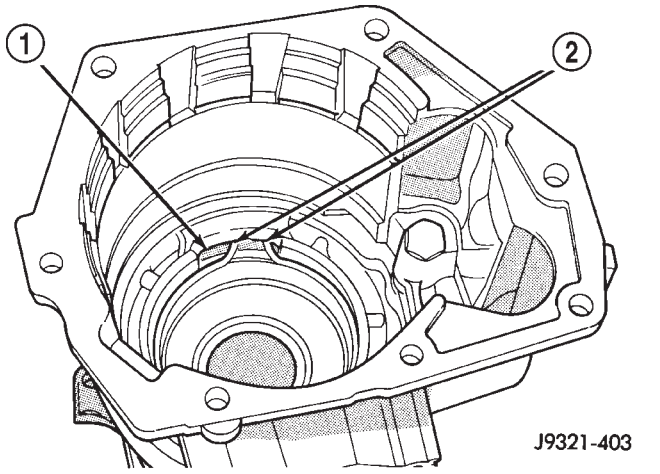


Fig. 165 Correct Rear Bearing Locating Ring Position

1 - CASE ACCESS HOLE
2 - TAB ENDS OF LOCATING RING

OVERDRIVE UNIT (Continued)

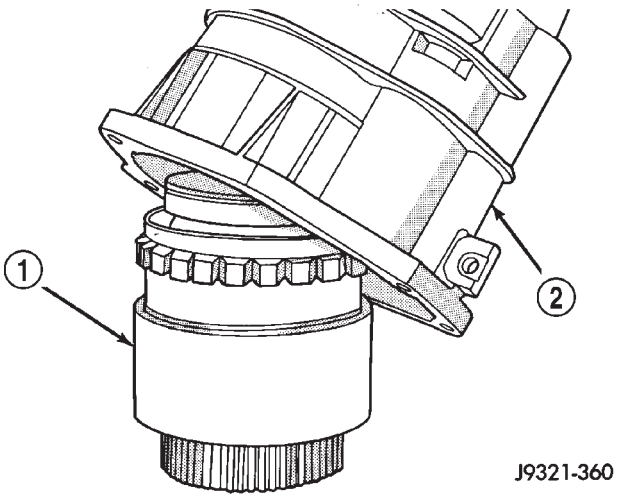


Fig. 166 Overdrive Gear Case Installation

1 - GEARTRAIN ASSEMBLY
2 - GEAR CASE

(9) Expand front bearing locating ring with snap-ring pliers (Fig. 167). 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. 168).

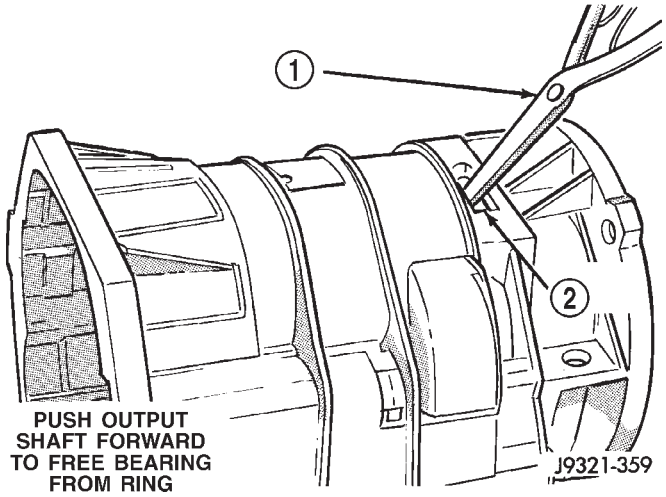


Fig. 167 Seating Locating Ring In Rear Bearing

1 - EXPAND BEARING LOCATING RING WITH SNAP-RING PLIERS
2 - ACCESS HOLE

OVERDRIVE CLUTCH

NOTE: The overdrive clutch in a 47RE transmission uses 5 clutch discs.

(1) Install overdrive clutch reaction ring first. Reaction ring is flat with notched ends (Fig. 169).

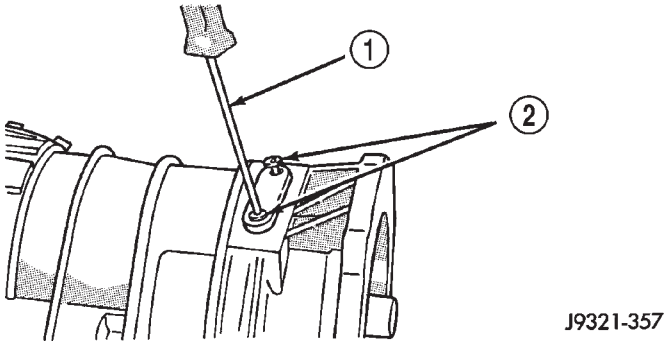


Fig. 168 Locating Ring Access Cover And Gasket Installation

1 - TORX SCREWDRIVER (T25)
2 - ACCESS COVER SCREWS

(2) Install wave spring on top of reaction ring (Fig. 170). 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.

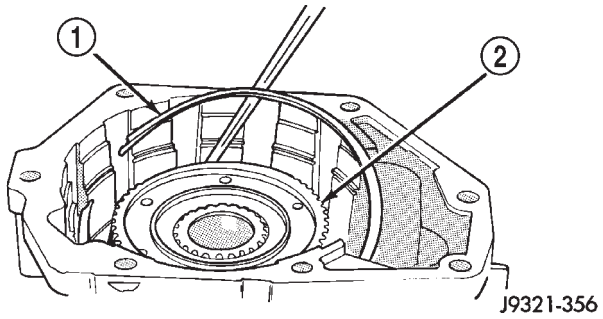


Fig. 169 Overdrive Clutch Reaction Ring Installation

1 - REACTION RING
2 - CLUTCH HUB

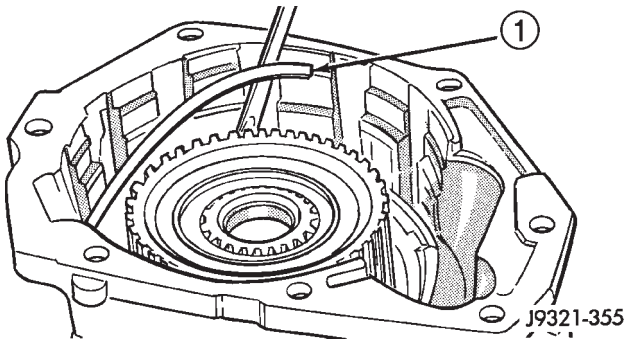


Fig. 170 Overdrive Clutch Wave Spring Installation

1 - WAVE SPRING

(4) Install overdrive clutch reaction plate first.

OVERDRIVE UNIT (Continued)

NOTE: The reaction plate is thicker than the pressure plate in a 47RE transmission.

(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. 171).

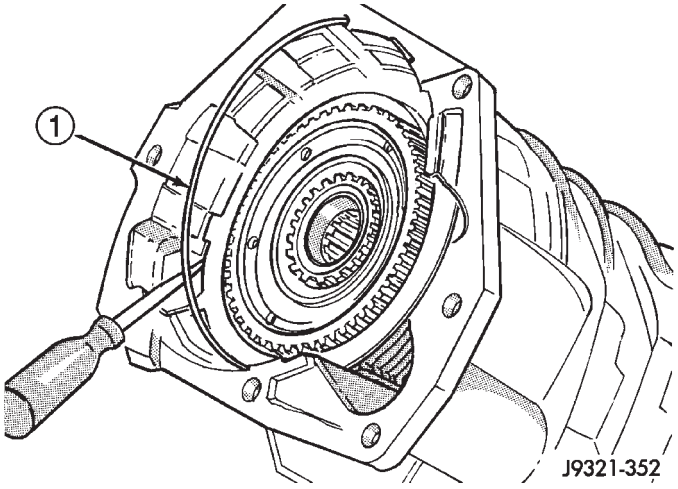


Fig. 171 Overdrive Clutch Pack Retaining Ring Installation

1 - OVERDRIVE CLUTCH PACK RETAINING RING

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. 172). 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. 172).

(d) Select proper thickness end play spacer from spacer chart based on distance measured (Fig. 173).

(e) Remove Gauge Alignment Tool 6312.

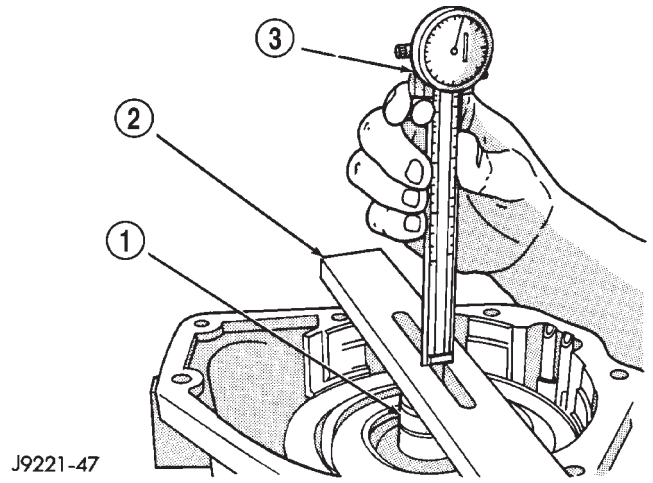


Fig. 172 Shaft End Play Measurement

1 - SPECIAL TOOL 6312
2 - SPECIAL TOOL 6311
3 - SPECIAL TOOL C-4962

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. 173 Intermediate Shaft End Play Spacer Selection

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. 174).

(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. 175).

(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.

OVERDRIVE UNIT (Continued)

(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.

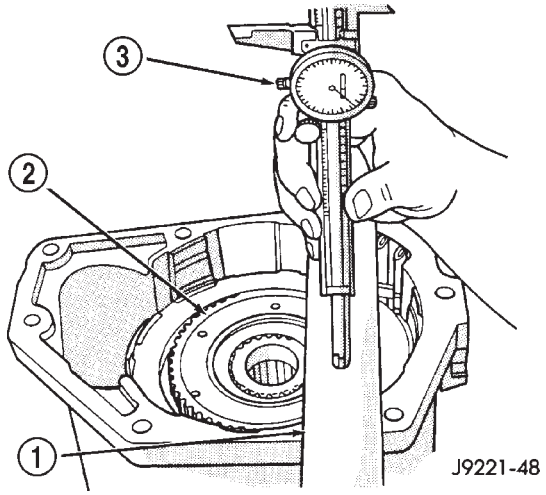


Fig. 174 Overdrive Piston Thrust Plate Measurement

1 - SPECIAL TOOL 6311
2 - DIRECT CLUTCH HUB THRUST BEARING SEAT
3 - SPECIAL TOOL C-4962

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. 175 Overdrive Piston Thrust Plate Selection

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.
(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.

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. 176).
(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.

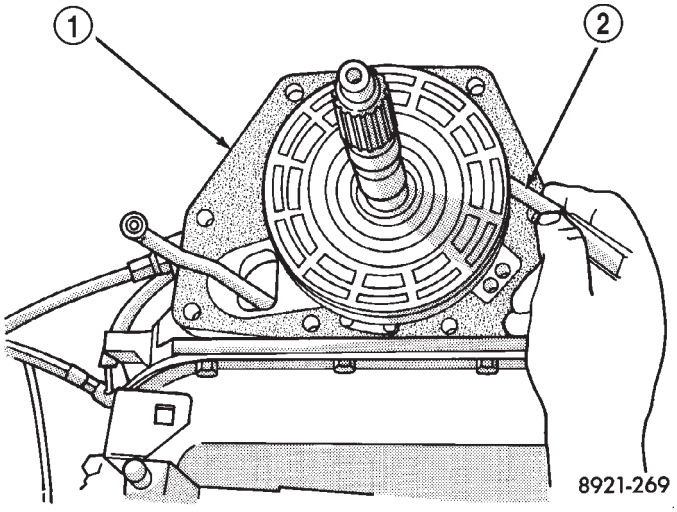


Fig. 176 Trimming Overdrive Case Gasket

1 - GASKET
2 - SHARP KNIFE

OVERDRIVE UNIT (Continued)

(6) Install selective spacer on intermediate shaft, if removed. Spacer goes in groove just rearward of shaft rear splines (Fig. 177).

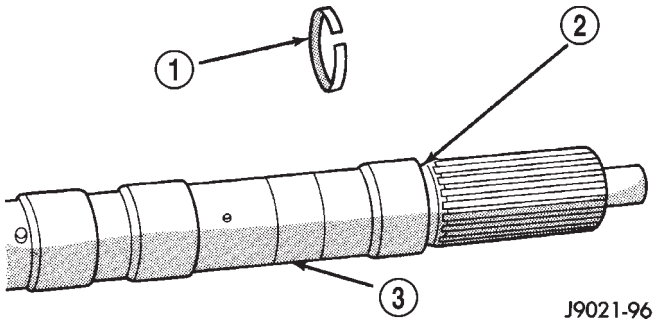


Fig. 177 Intermediate Shaft Selective Spacer Location

1 - SELECTIVE SPACER
2 - SPACER GROOVE
3 - INTERMEDIATE SHAFT

(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) Connect the transmission speed sensor and overdrive wiring connectors.

(14) Install the transfer case, if equipped.

(15) Align and install rear propeller shaft, if necessary. (Refer to 3 - DIFFERENTIAL & DRIVELINE/ PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER

DESCRIPTION

The overrunning clutch (Fig. 178) consists of an inner race, an outer race (or cam), rollers and springs, and the spring retainer. The number of rollers and springs depends on what transmission and which overrunning clutch is being dealt with.

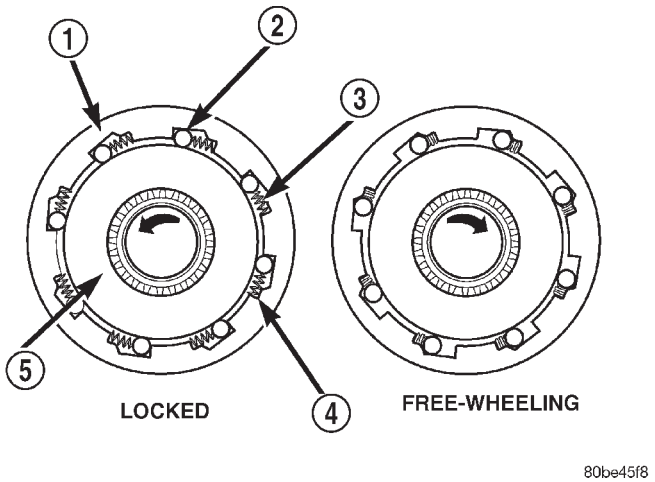


Fig. 178 Overrunning Clutch

1 - OUTER RACE (CAM)
2 - ROLLER
3 - SPRING
4 - SPRING RETAINER
5 - INNER RACE (HUB)

OPERATION

As the inner race is rotated in a clockwise direction (as viewed from the front of the transmission), the race causes the rollers to roll toward the springs, causing them to compress against their retainer. The compression of the springs increases the clearance between the rollers and cam. This increased clearance between the rollers and cam results in a freewheeling condition. When the inner race attempts to rotate counterclockwise, the action causes the rollers to roll in the same direction as the race, aided by the pushing of the springs. As the rollers try to move in the same direction as the inner race, they are wedged between the inner and outer races due to the design of the cam. In this condition, the clutch is locked and acts as one unit.

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER (Continued)

DISASSEMBLY

(1) Remove the overdrive piston (Fig. 179).
(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. 180). 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.

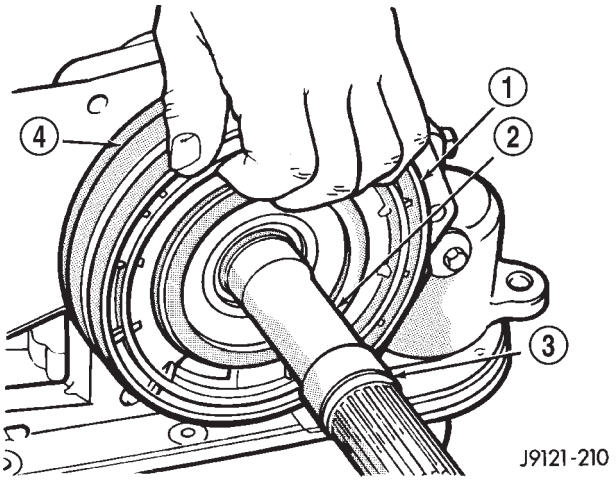


Fig. 179 Overdrive Piston Removal

1 - OVERDRIVE CLUTCH PISTON
2 - INTERMEDIATE SHAFT
3 - SELECTIVE SPACER
4 - PISTON RETAINER

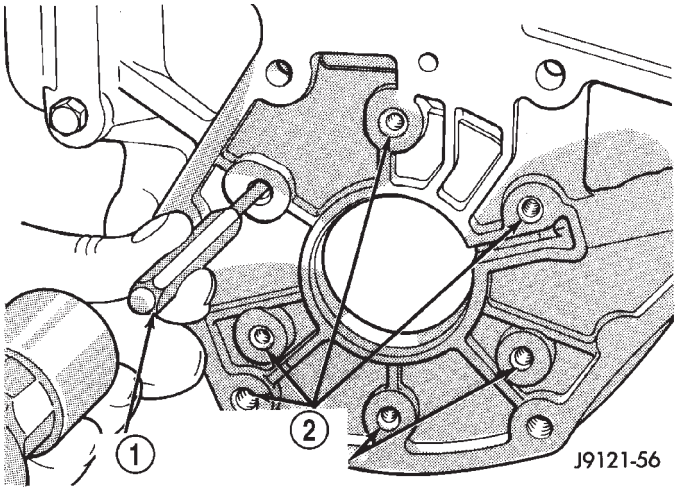


Fig. 180 Overrunning Clutch Cam

1 - PIN PUNCH
2 - REAR SUPPORT BOLT HOLES

CLEANING

Clean the overrunning clutch assembly, clutch cam, low-reverse drum, and overdrive piston retainer in solvent. Dry them with compressed air after cleaning.

INSPECTION

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.

ASSEMBLY

(1) Temporarily install overdrive piston retainer in case. Use 3-4 bolts to secure retainer.
(2) Align and start new clutch cam in the transmission case. Be sure serrations on cam and in case are aligned (Fig. 181). 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. 181).
(4) Insert Adapter Tool SP-5124 into piston retainer (Fig. 182).
(5) Assemble Puller Bolt SP-3701 and Press Plate SP-3583-A (Fig. 183).
(6) Install assembled puller plate and bolt (Fig. 184). 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. 185).
(8) Tighten puller nut to press clutch cam into case (Fig. 185). Be sure cam is pressed into case evenly and does not become cocked.
(9) Remove clutch cam installer tools.
(10) Stake case in 14 places around clutch cam to help secure cam in case. Use blunt punch or chisel to stake case.

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER (Continued)

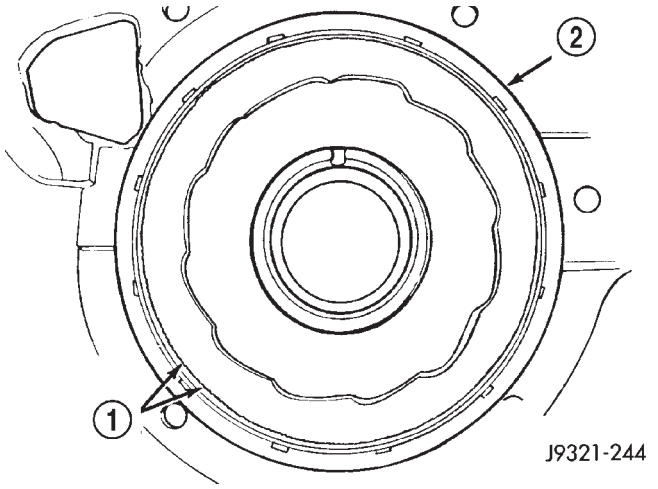


Fig. 181 Positioning Replacement Clutch Cam In Case

1 - ALIGN SERRATIONS ON CAM AND IN CASE
2 - CLUTCH CAM

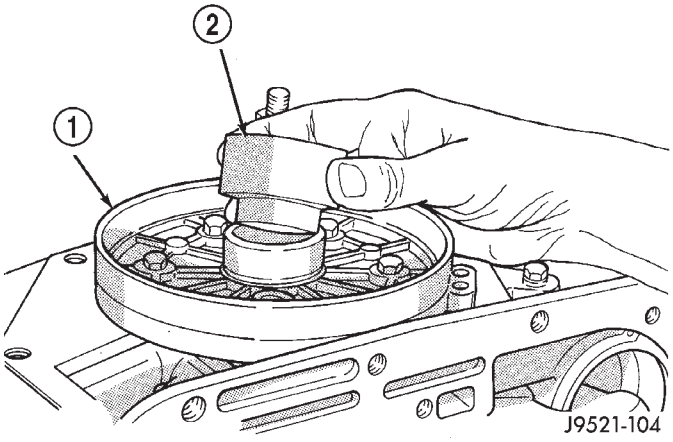


Fig. 182 Positioning Adapter Tool In Overdrive Piston Retainer

1 - PISTON RETAINER
2 - SPECIAL TOOL SP-5124

(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.

(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. 186). Also install gasket before overdrive piston retainer. Center hole in gasket is smaller than retainer and cannot be installed over retainer.

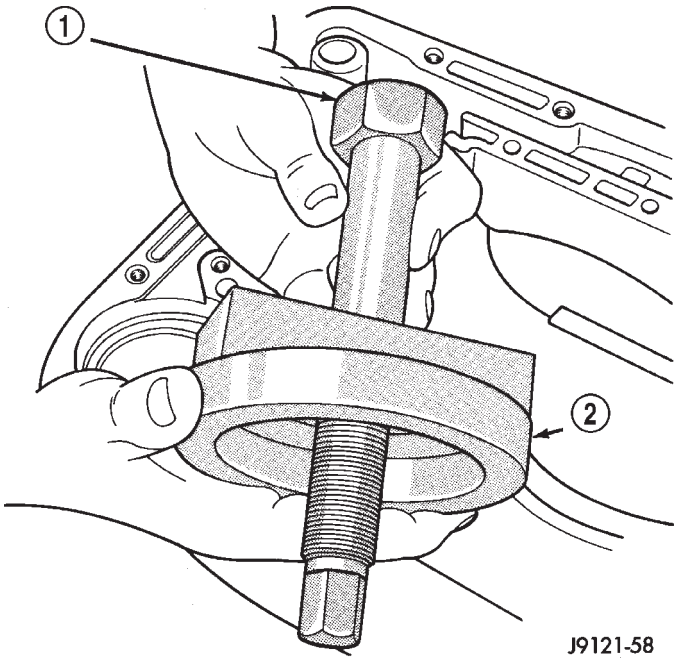


Fig. 183 Assembling Clutch Cam Puller Bolt And Press Plate

1 - PULLER BOLT SP-3701
2 - PRESS PLATE SP-3583-A

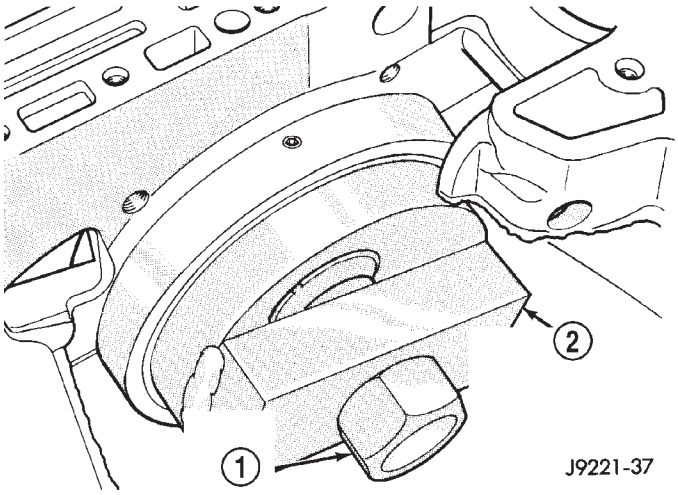


Fig. 184 Positioning Puller Plate On Clutch Cam

1 - SPECIAL TOOL SP-3701
2 - BE SURE PLATE SP-3583-A IS SEATED SQUARELY ON CAM

(14) Position overdrive piston retainer on transmission case and align bolt holes in retainer, gasket and case (Fig. 187). Then install and tighten retainer bolts to 17 N·m (13 ft. lbs.) torque.

(15) Install new seals on overdrive piston.

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER (Continued)

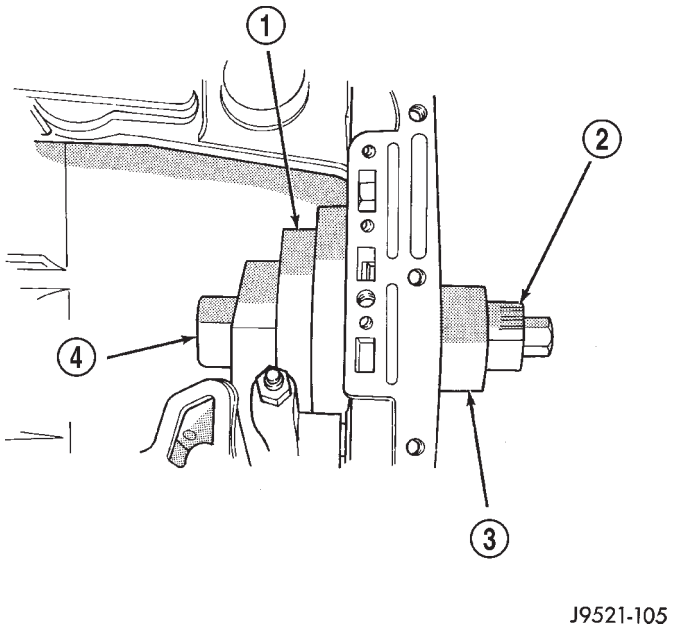


Fig. 185 Pressing Overrunning Clutch Cam Into Case

1 - SPECIAL TOOL SP-3583-A
2 - TIGHTEN NUT TO DRAW CAM INTO CASE (NUT IS PART OF BOLT SP-3701)
3 - SPECIAL TOOL SP-5124
4 - SPECIAL TOOL SP-3701

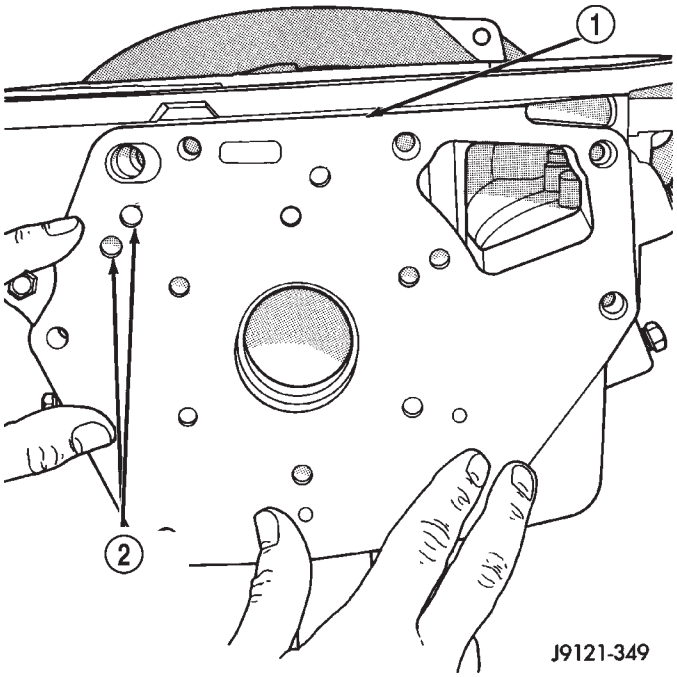


Fig. 186 Installing/Aligning Case Gasket

1 - CASE GASKET
2 - BE SURE GOVERNOR TUBE FEED HOLES IN CASE AND GASKET ARE ALIGNED

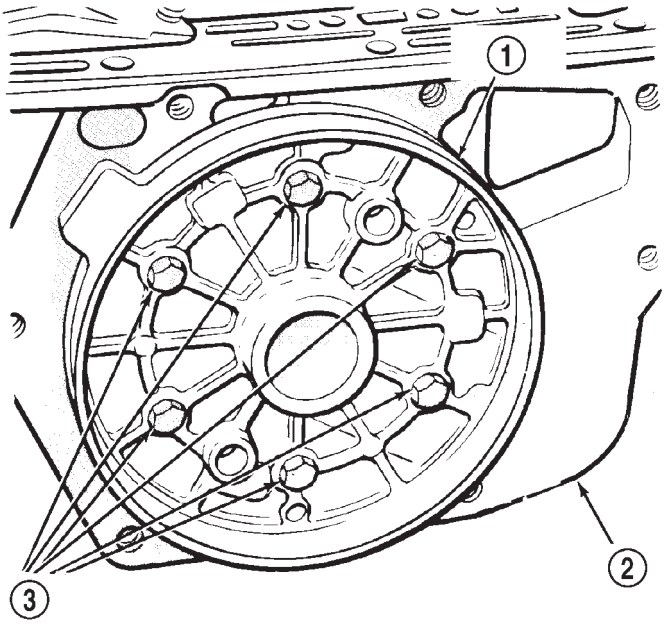


Fig. 187 Aligning Overdrive Piston Retainer

1 - PISTON RETAINER
2 - GASKET
3 - RETAINER BOLTS

(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.

PARK/NEUTRAL POSITION SWITCH

DIAGNOSIS AND TESTING - 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.

REMOVAL

(1) Raise vehicle and position drain pan under switch.
(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. 188).
(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.

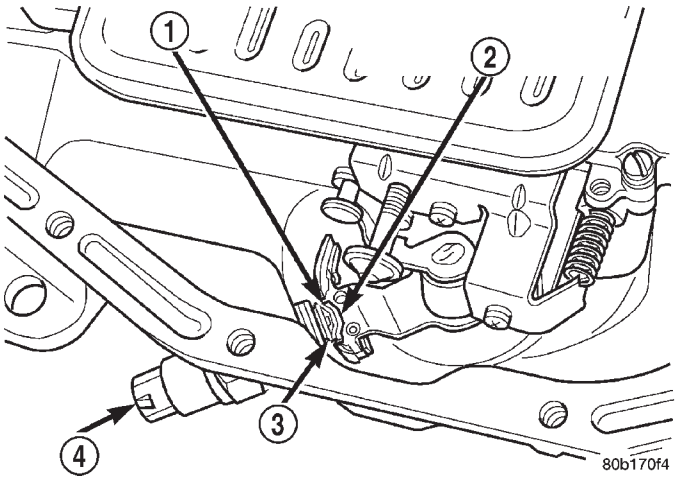


Fig. 188 Park/Neutral Position Switch

1 - NEUTRAL CONTACT
2 - MANUAL LEVER AND SWITCH PLUNGER IN REVERSE POSITION
3 - PARK CONTACT
4 - SWITCH

PISTONS

DESCRIPTION

There are several sizes and types of pistons used in an automatic transmission. Some pistons are used to apply clutches, while others are used to apply bands. They all have in common the fact that they are round or circular in shape, located within a smooth walled cylinder, which is closed at one end and converts fluid pressure into mechanical movement. The fluid pressure exerted on the piston is contained within the system through the use of piston rings or seals.

OPERATION

The principal which makes this operation possible is known as Pascal's Law. Pascal's Law can be stated as: "Pressure on a confined fluid is transmitted equally in all directions and acts with equal force on equal areas."

PRESSURE

Pressure (Fig. 189) is nothing more than force (lbs.) divided by area (in or ft.), or force per unit area. Given a 100 lb. block and an area of 100 sq. in. on the floor, the pressure exerted by the block is: 100 lbs. 100 in or 1 pound per square inch, or PSI as it is commonly referred to.

PRESSURE ON A CONFINED FLUID

Pressure is exerted on a confined fluid (Fig. 190) by applying a force to some given area in contact with the fluid. A good example of this is a cylinder filled with fluid and equipped with a piston that is closely fitted to the cylinder wall. If a force is applied to the piston, pressure will be developed in the fluid. Of course, no pressure will be created if the fluid is not confined. It will simply "leak" past the piston. There must be a resistance to flow in order to create pressure. Piston sealing is extremely important in hydraulic operation. Several kinds of seals are used to accomplish this within a transmission. These include but are not limited to O-rings, D-rings, lip seals, sealing rings, or extremely close tolerances between the piston and the cylinder wall. The force

PISTONS (Continued)

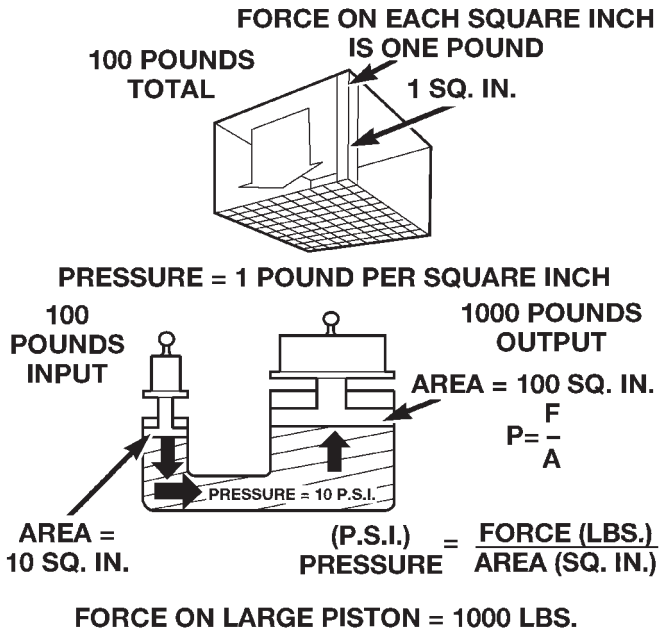


Fig. 189 Force and Pressure Relationship

exerted is downward (gravity), however, the principle remains the same no matter which direction is taken. The pressure created in the fluid is equal to the force applied, divided by the piston area. If the force is 100 lbs., and the piston area is 10 sq. in., then the pressure created equals 10 PSI. Another interpretation of Pascal's Law is that regardless of container shape or size, the pressure will be maintained throughout, as long as the fluid is confined. In other words, the pressure in the fluid is the same everywhere within the container.

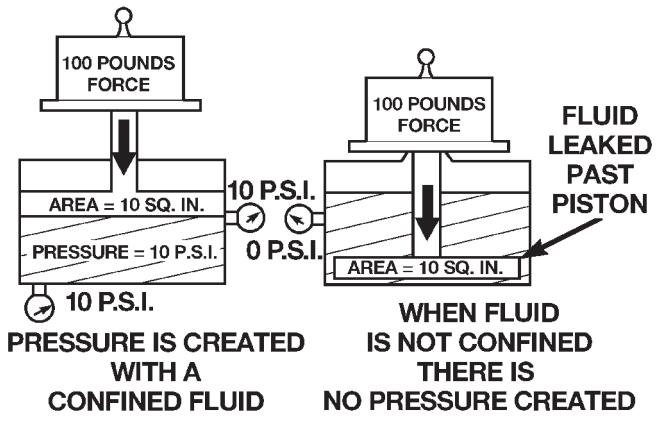


Fig. 190 Pressure on a Confined Fluid

FORCE MULTIPLICATION

Using the 10 PSI example used in the illustration (Fig. 191), a force of 1000 lbs. can be moved with a force of only 100 lbs. The secret of force multiplication in hydraulic systems is the total fluid contact area employed. The illustration, (Fig. 191), shows an area that is ten times larger than the original area. The pressure created with the smaller 100 lb. input is 10 PSI. The concept "pressure is the same everywhere" means that the pressure underneath the larger piston is also 10 PSI. Pressure is equal to the force applied divided by the contact area. Therefore, by means of simple algebra, the output force may be found. This concept is extremely important, as it is also used in the design and operation of all shift valves and limiting valves in the valve body, as well as the pistons, of the transmission, which activate the clutches and bands. It is nothing more than using a difference of area to create a difference in pressure to move an object.

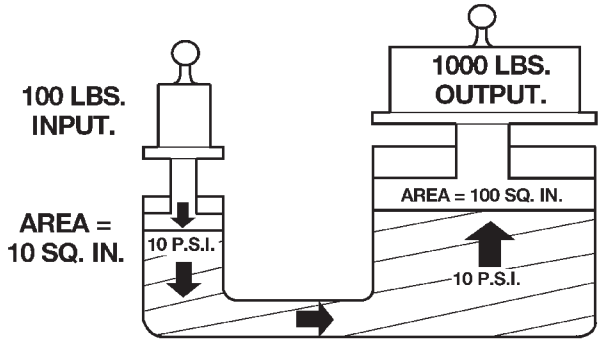


Fig. 191 Force Multiplication

PISTON TRAVEL

The relationship between hydraulic lever and a mechanical lever is the same. With a mechanical lever it's a weight-to-distance output rather than a pressure-to-area output. Using the same forces and areas as in the previous example, the smaller piston (Fig. 192) has to move ten times the distance required to move the larger piston one inch. Therefore, for every inch the larger piston moves, the smaller piston moves ten inches. This principle is true in other instances also. A common garage floor jack is a good example. To raise a car weighing 2000 lbs., an effort of only 100 lbs. may be required. For every inch the car moves upward, the input piston at the jack handle must move 20 inches downward.

PISTONS (Continued)

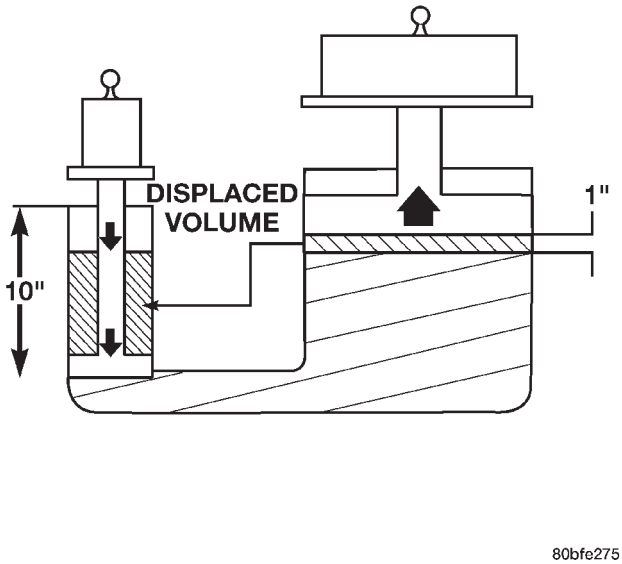


Fig. 192 Piston Travel

PLANETARY GEARTRAIN/ OUTPUT SHAFT

DESCRIPTION

The planetary gearsets (Fig. 193) are designated as the front, rear, and overdrive planetary gear assemblies and located in such order. A simple planetary gearset consists of three main members:

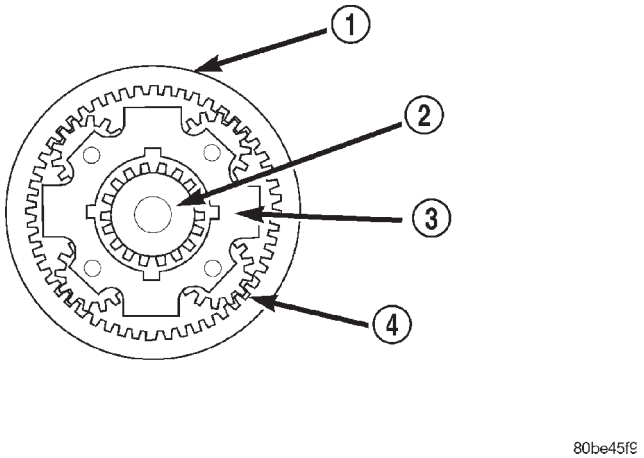


Fig. 193 Planetary Gearset

1 - ANNULUS GEAR
2 - SUN GEAR
3 - PLANET CARRIER
4 - PLANET PINIONS (4)

- The sun gear which is at the center of the system.
- The planet carrier with planet pinion gears which are free to rotate on their own shafts and are in mesh with the sun gear.
- The annulus gear, which rotates around and is in mesh with the planet pinion gears.

NOTE: The number of pinion gears does not affect the gear ratio, only the duty rating.

OPERATION

With any given planetary gearset, several conditions must be met for power to be able to flow:

- One member must be held.
- Another member must be driven or used as an input.
- The third member may be used as an output for power flow.
- For direct drive to occur, two gear members in the front planetary gearset must be driven.

NOTE: Gear ratios are dependent on the number of teeth on the annulus and sun gears.

DISASSEMBLY

(1) Remove planetary snap-ring from intermediate shaft (Fig. 194). Discard snap-ring as it is not reusable.

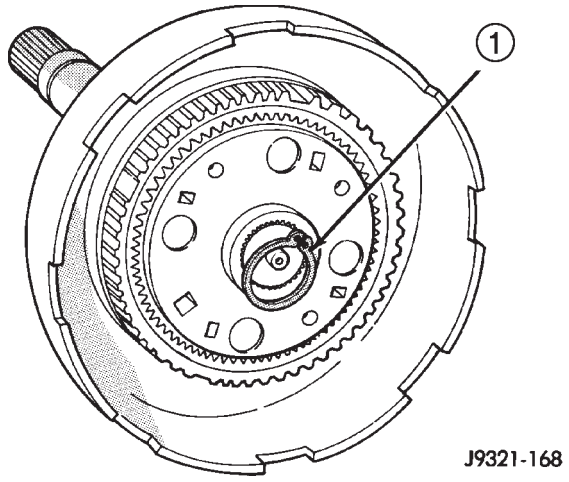


Fig. 194 Removing Planetary Snap-Ring

1 - PLANETARY SNAP-RING

(2) Remove front planetary gear and front annulus gear as assembly (Fig. 195).

(3) Remove front planetary gear and thrust washer from front annulus gear (Fig. 196). Note thrust washer position for assembly reference.

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

(4) Remove tabbed thrust washer from driving shell (Fig. 197). Note washer position for assembly reference.

(5) Remove sun gear and driving shell as assembly (Fig. 198).

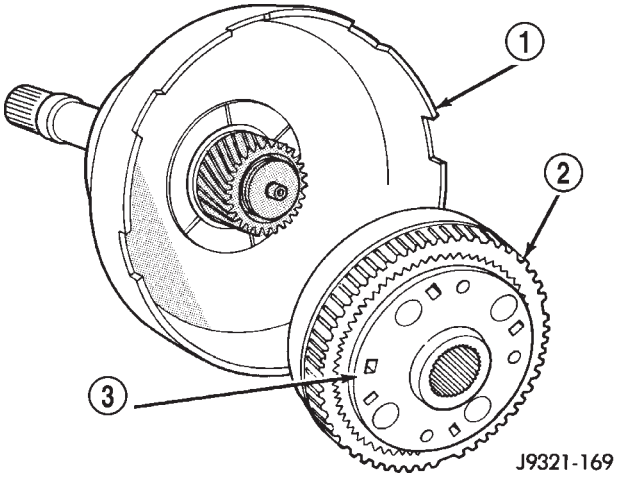


Fig. 195 Removing Front Planetary And Annulus Gears

1 - DRIVING SHELL
2 - FRONT ANNULUS GEAR
3 - FRONT PLANETARY GEAR

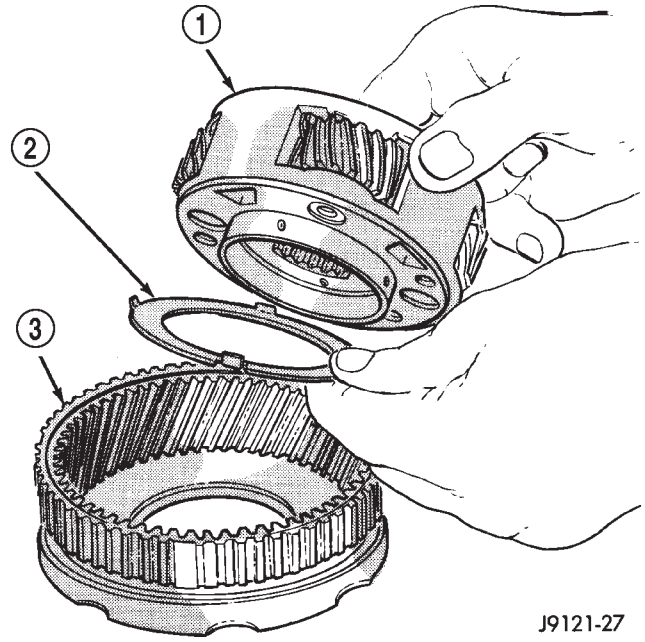


Fig. 196 Disassembling Front Planetary And Annulus Gears

1 - FRONT PLANETARY GEAR
2 - TABBED THRUST WASHER
3 - FRONT ANNULUS GEAR

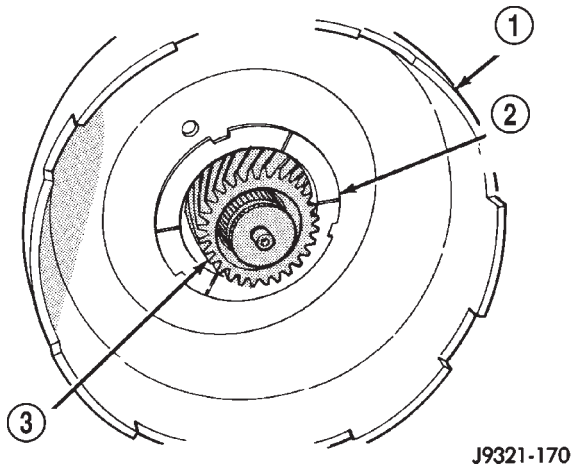


Fig. 197 Driving Shell Thrust Washer Removal

1 - DRIVING SHELL
2 - TABBED THRUST WASHER
3 - SUN GEAR

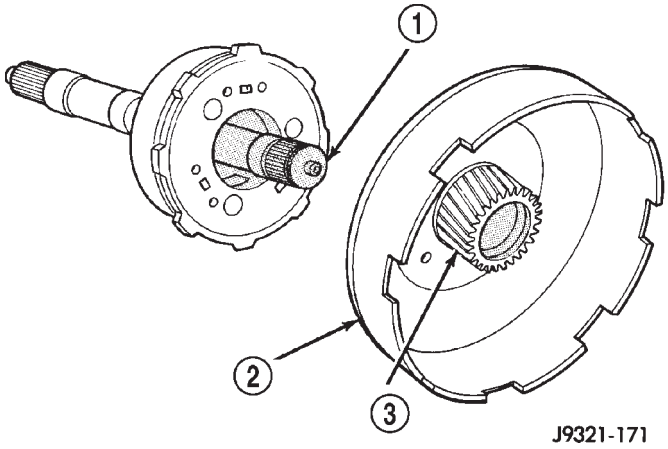


Fig. 198 Sun Gear And Driving Shell Removal

1 - INTERMEDIATE SHAFT
2 - DRIVING SHELL
3 - SUN GEAR

(6) Remove tabbed thrust washer from rear planetary gear (Fig. 199). Note washer position on gear for assembly reference.

(7) Remove rear planetary gear and rear annulus gear from intermediate shaft (Fig. 200).

(8) Remove thrust plate from rear annulus gear (Fig. 201).

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

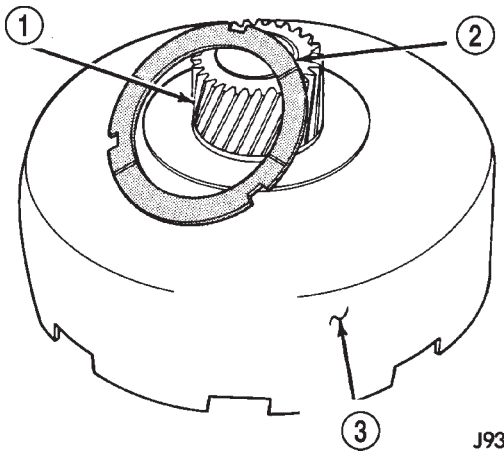


Fig. 199 Rear Planetary Thrust Washer Removal

1 - SUN GEAR
2 - REAR PLANETARY THRUST WASHER
3 - DRIVING SHELL

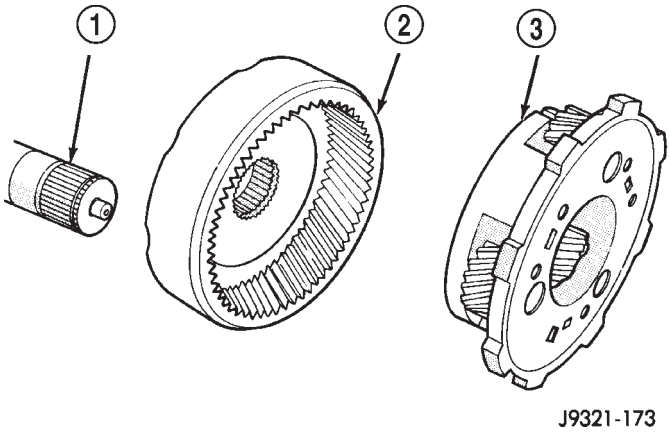


Fig. 200 Rear Planetary And Annulus Gear Removal

1 - INTERMEDIATE SHAFT
2 - REAR ANNULUS GEAR
3 - REAR PLANETARY GEAR

INSPECTION

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.

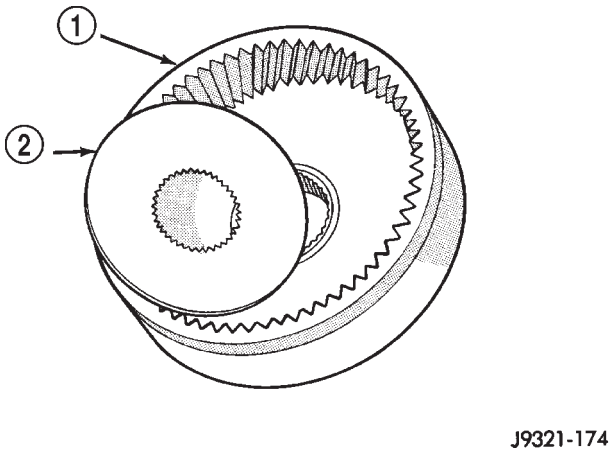


Fig. 201 Rear Annulus Thrust Plate Removal

1 - REAR ANNULUS GEAR
2 - THRUST PLATE

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.

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. 202). Install rear snap-ring to secure sun gear and thrust plate in driving shell.

(3) Install rear annulus gear on intermediate shaft (Fig. 203).

(4) Install thrust plate in annulus gear (Fig. 204). Be sure plate is seated on shaft splines and against gear.

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

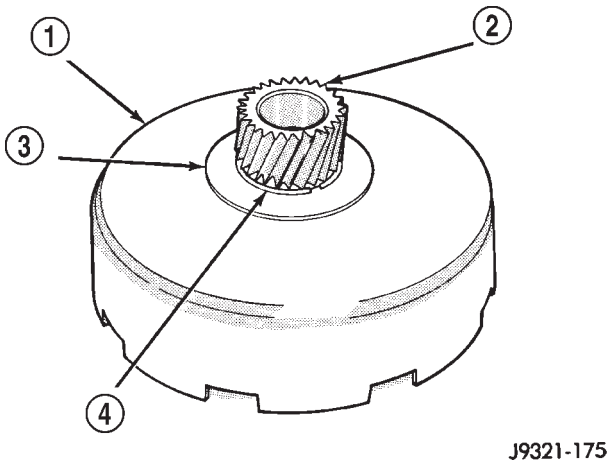


Fig. 202 Sun Gear Installation

1 - DRIVING SHELL
2 - SUN GEAR
3 - THRUST PLATE
4 - SUN GEAR REAR RETAINING RING

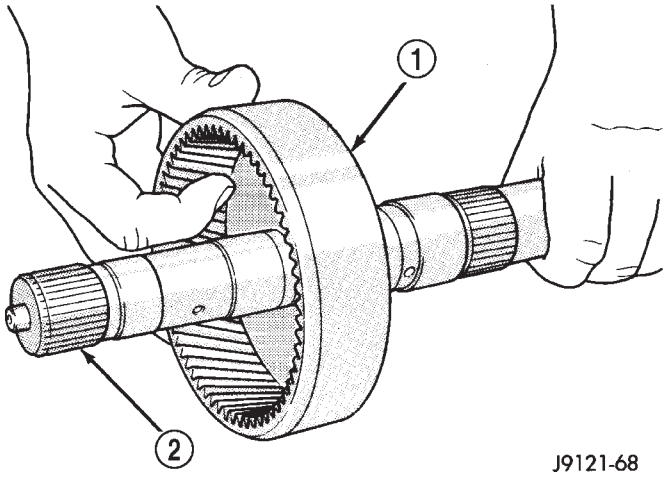


Fig. 203 Installing Rear Annulus Gear On Intermediate Shaft

1 - REAR ANNULUS GEAR
2 - OUTPUT SHAFT

(5) Install rear planetary gear in rear annulus gear (Fig. 205). Be sure planetary carrier is seated against annulus gear.

(6) Install tabbed thrust washer on front face of rear planetary gear (Fig. 206). Seat washer tabs in matching slots in face of gear carrier. Use extra petroleum jelly to hold washer in place if desired.

(7) Lubricate sun gear bushings with petroleum jelly or transmission fluid.

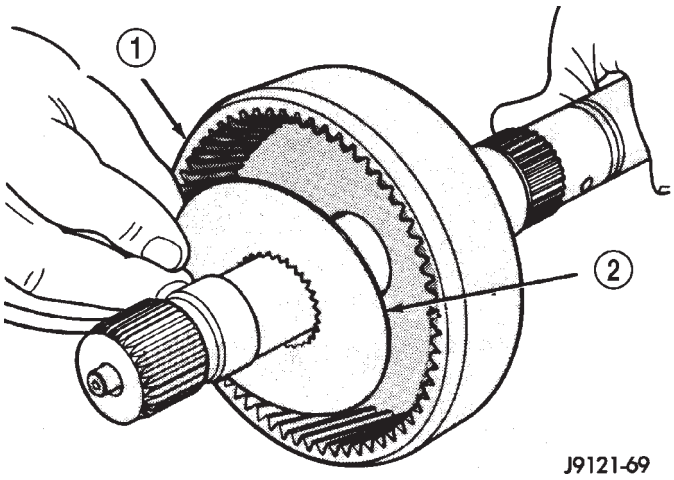


Fig. 204 Installing Rear Annulus Thrust Plate

1 - REAR ANNULUS GEAR
2 - THRUST PLATE

(8) Install sun gear and driving shell on intermediate shaft (Fig. 207). Seat shell against rear planetary gear. Verify that thrust washer on planetary gear was not displaced during installation.

(9) Install tabbed thrust washer in driving shell (Fig. 208), 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. 209). Seat washer tabs in matching slots in face of gear carrier. Use extra petroleum jelly to hold washer in place if desired.

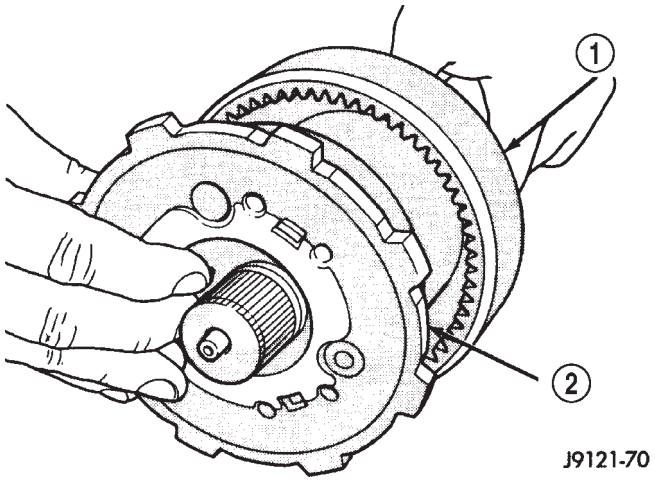


Fig. 205 Installing Rear Planetary Gear

1 - REAR ANNULUS GEAR
2 - REAR PLANETARY GEAR

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

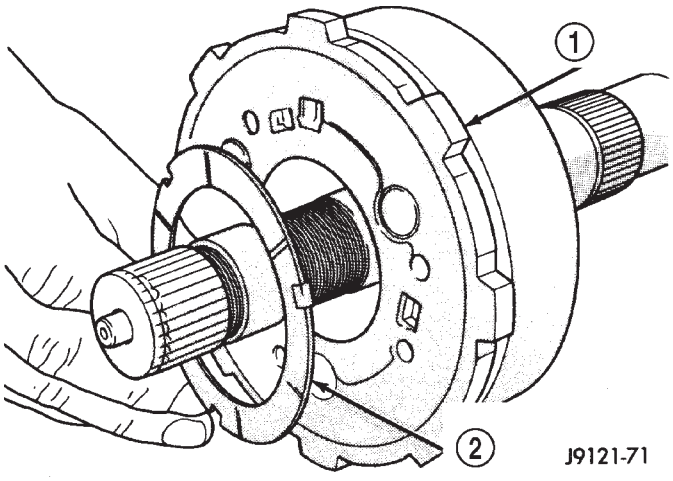


Fig. 206 Installing Rear Planetary Thrust Washer

1 - REAR PLANETARY GEAR
2 - TABBED THRUST WASHER

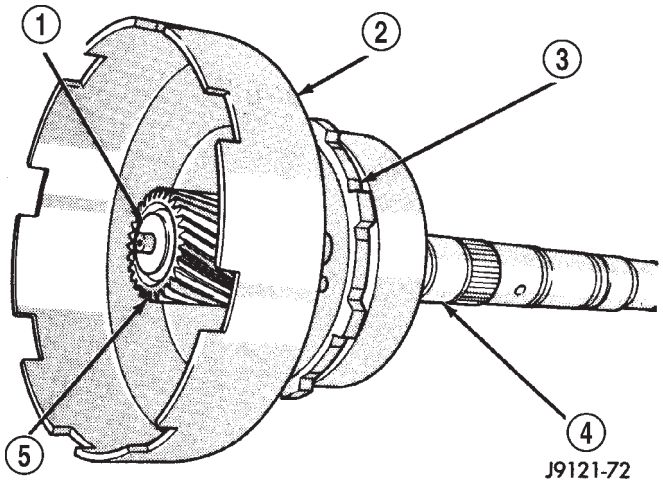


Fig. 207 Installing Sun Gear And Driving Shell

1 - OUTPUT SHAFT
2 - DRIVING SHELL
3 - REAR PLANETARY GEAR
4 - OUTPUT SHAFT
5 - SUN GEAR

(11) Install front annulus gear over and onto front planetary gear (Fig. 210). Be sure gears are fully meshed and seated.

(12) Install front planetary and annulus gear assembly (Fig. 211). 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.

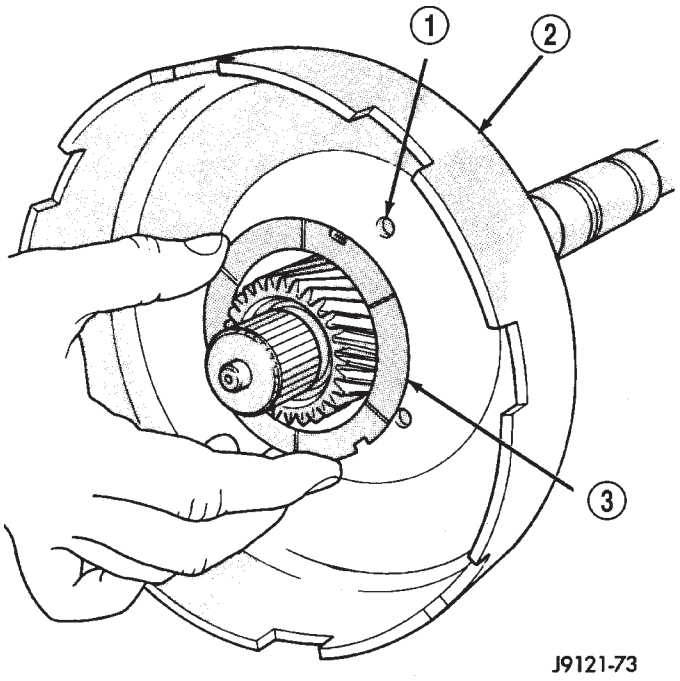


Fig. 208 Installing Driving Shell Thrust Washer

1 - TAB SLOTS (3)
2 - DRIVING SHELL
3 - TABBED THRUST WASHER

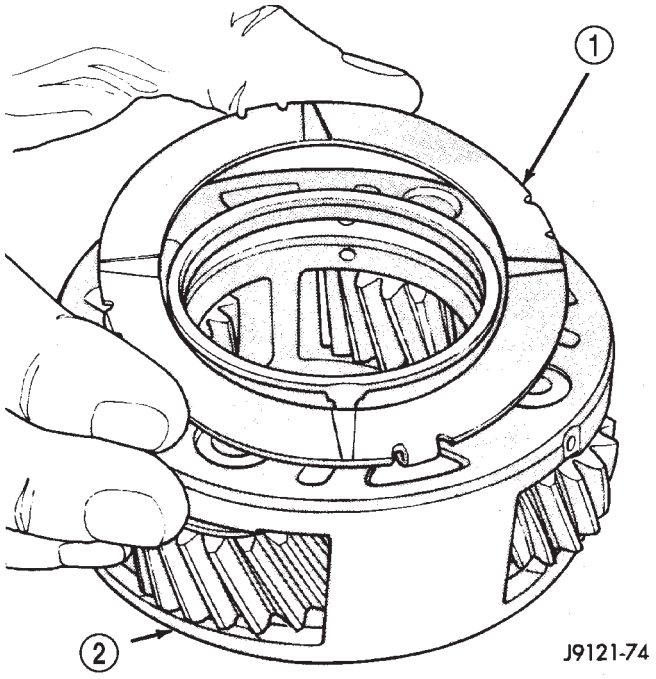


Fig. 209 Installing Thrust Washer On Front Planetary Gear

1 - TABBED THRUST WASHER
2 - FRONT PLANETARY GEAR

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

(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. 212).

(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. 213). 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.

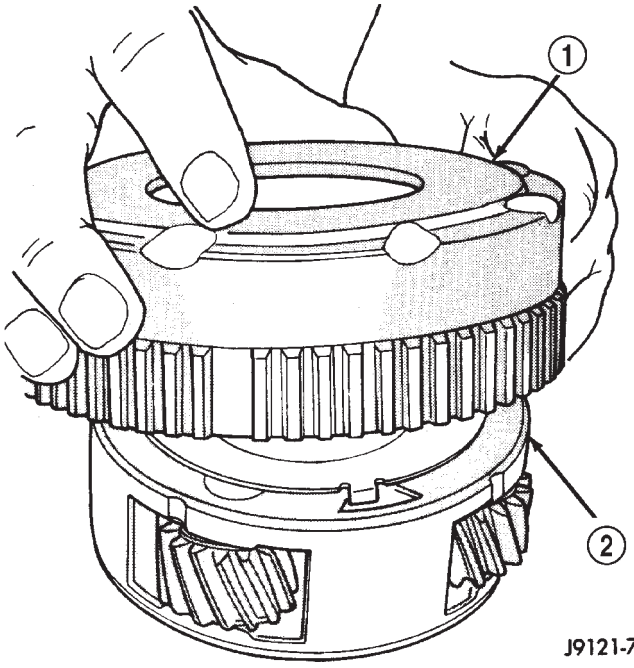


Fig. 210 Assembling Front Planetary And Annulus Gears

1 - FRONT ANNULUS GEAR
2 - FRONT PLANETARY GEAR

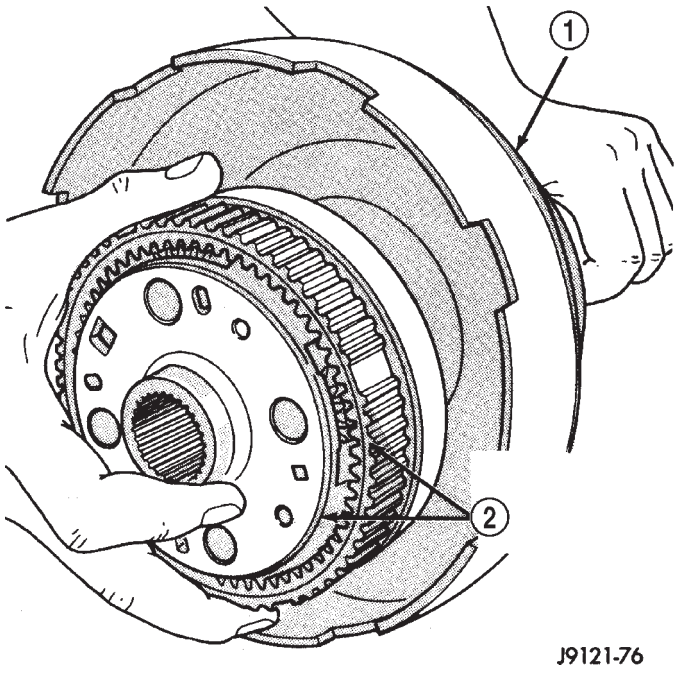


Fig. 211 Installing Front Planetary And Annulus Gear Assembly

1 - DRIVING SHELL
2 - ASSEMBLED FRONT PLANETARY AND ANNULUS GEARS

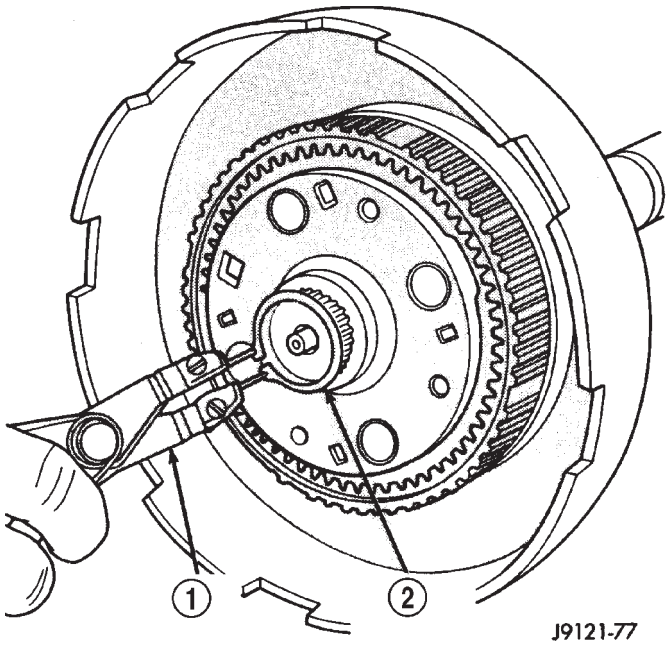


Fig. 212 Installing Planetary Snap-Ring

1 - SNAP-RING PLIERS
2 - PLANETARY SNAP-RING

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

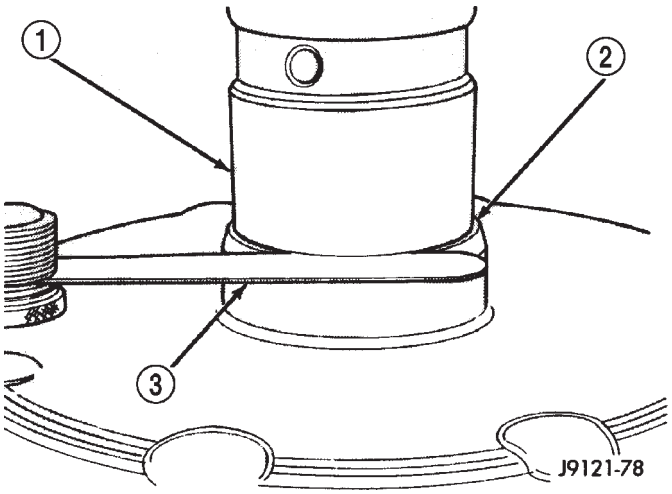


Fig. 213 Checking Planetary Geartrain End Play

1 - OUTPUT SHAFT
2 - REAR ANNULUS GEAR
3 - FEELER GAUGE

REAR CLUTCH

DESCRIPTION

The rear clutch assembly (Fig. 214) is composed of the rear clutch retainer, pressure plate, clutch plates, driving discs, piston, Belleville spring, and snap-rings. The Belleville spring acts as a lever to multiply the force applied on to it by the apply piston. The increased apply force on the rear clutch pack, in comparison to the front clutch pack, is needed to hold against the greater torque load imposed onto the rear pack. The rear clutch is directly behind the front clutch and is considered a driving component.

NOTE: The number of discs and plates may vary with each engine and vehicle combination.

OPERATION

To apply the clutch, pressure is applied between the clutch retainer and piston. The fluid pressure is provided by the oil pump, transferred through the

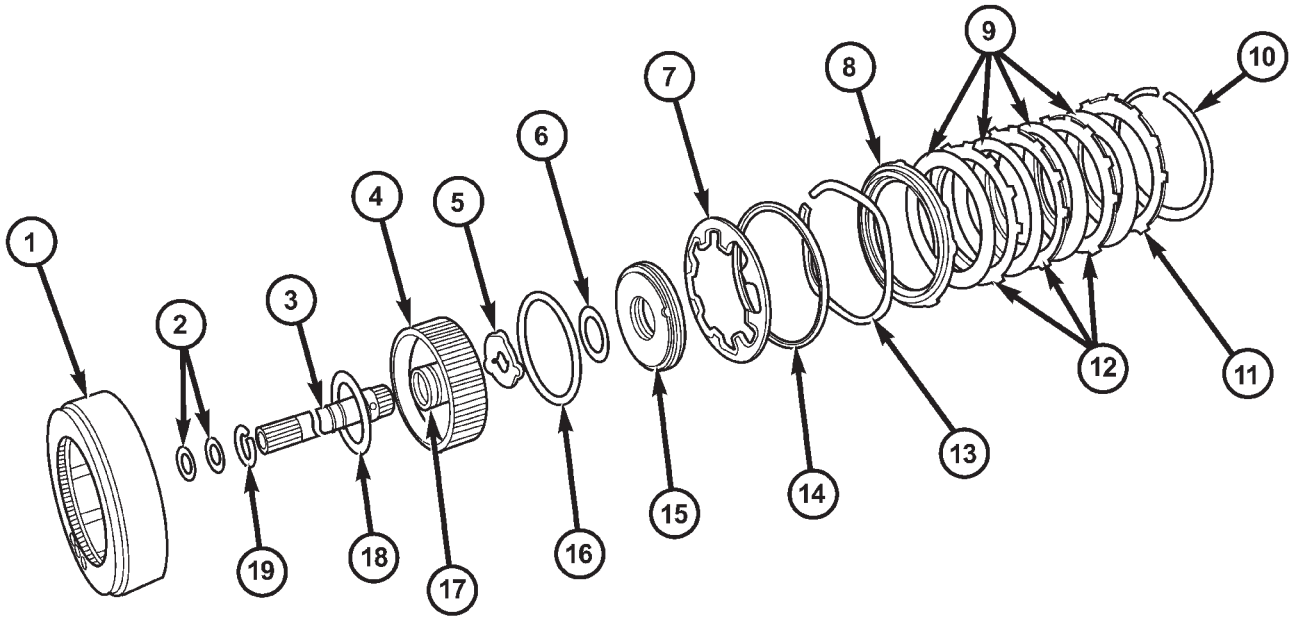


Fig. 214 Rear Clutch Components

1 - REAR CLUTCH RETAINER
2 - TORLON™ SEAL RINGS
3 - INPUT SHAFT
4 - PISTON RETAINER
5 - OUTPUT SHAFT THRUST WASHER
6 - INNER PISTON SEAL
7 - PISTON SPRING
8 - PRESSURE PLATE
9 - CLUTCH DISCS
10 - SNAP-RING (SELECTIVE)
11 - REACTION PLATE
12 - CLUTCH PLATES
13 - WAVE SPRING
14 - SPACER RING
15 - PISTON
16 - OUTER PISTON SEAL
17 - REAR SEAL RING
18 - FIBER THRUST WASHER
19 - RETAINING RING

REAR CLUTCH (Continued)

control valves and passageways, and enters the clutch through the hub of the reaction shaft support. With pressure applied between the clutch retainer and piston, the piston moves away from the clutch retainer and compresses the clutch pack. This action applies the clutch pack, allowing torque to flow through the input shaft into the driving discs, and into the clutch plates and pressure plate that are lugged to the clutch retainer. The waved spring is used to cushion the application of the clutch pack. The snap-ring is selective and used to adjust clutch pack clearance.

When pressure is released from the piston, the spring returns the piston to its fully released position and disengages the clutch. The release spring also helps to cushion the application of the clutch assembly. When the clutch is in the process of being released by the release spring, fluid flows through a vent and one-way ball-check-valve located in the piston. The check-valve is needed to eliminate the possibility of plate drag caused by centrifugal force acting on the residual fluid trapped in the clutch piston retainer.

DISASSEMBLY

(1) Remove fiber thrust washer from forward side of clutch retainer.

(2) Remove input shaft front and rear seal rings.

(3) Remove selective clutch pack snap-ring (Fig. 215).

(4) Remove the reaction plate, clutch discs, steel plates, pressure plate, wave spring, spacer ring, and piston spring (Fig. 215).

(5) Remove clutch piston with rotating motion.

(6) Remove and discard piston seals.

(7) Remove input shaft retaining ring. It may be necessary to press the input shaft in slightly to relieve tension on the retaining 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.

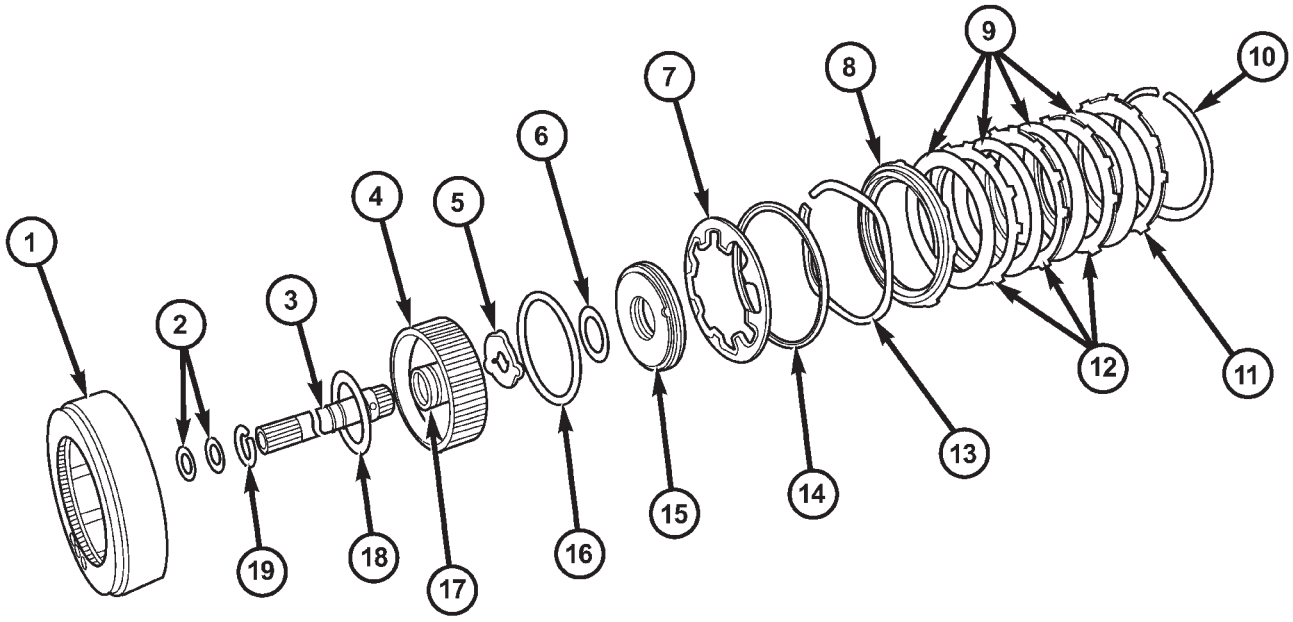


Fig. 215 Rear Clutch Components

1 - REAR CLUTCH RETAINER
2 - TORLON™ SEAL RINGS
3 - INPUT SHAFT
4 - PISTON RETAINER
5 - OUTPUT SHAFT THRUST WASHER
6 - INNER PISTON SEAL
7 - PISTON SPRING
8 - PRESSURE PLATE
9 - CLUTCH DISCS
10 - SNAP-RING (SELECTIVE)
11 - REACTION PLATE
12 - CLUTCH PLATES
13 - WAVE SPRING
14 - SPACER RING
15 - PISTON
16 - OUTER PISTON SEAL
17 - REAR SEAL RING
18 - FIBER THRUST WASHER
19 - RETAINING RING

REAR CLUTCH (Continued)

CLEANING

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.

INSPECTION

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.

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.

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.

(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 partially press input shaft into retainer (Fig. 216). Use a suitably sized press tool to support retainer as close to input shaft as possible.

(4) Install input shaft retaining ring.

(5) Press the input shaft the remainder of the way into the clutch retainer.

(6) Install new seals on clutch piston. Be sure lip of each seal faces interior of clutch retainer.

(7) Lubricate lip of piston seals with generous quantity of Mopar® Door Ease. Then lubricate retainer hub and bore with light coat of transmission fluid.

(8) Install clutch piston in retainer. Use twisting motion to seat piston in bottom of retainer. A thin strip of plastic (about 0.020″ thick), can be used to guide seals into place if necessary.

CAUTION: Never push the clutch piston straight in. This will fold the seals over causing leakage and clutch slip. In addition, never use any type of metal tool to help ease the piston seals into place. Metal tools will cut, shave, or score the seals.

(9) Install piston spring in retainer and on top of piston. Concave side of spring faces downward (toward piston).

(10) Install the spacer ring and wave spring into the retainer. Be sure spring is completely seated in retainer groove.

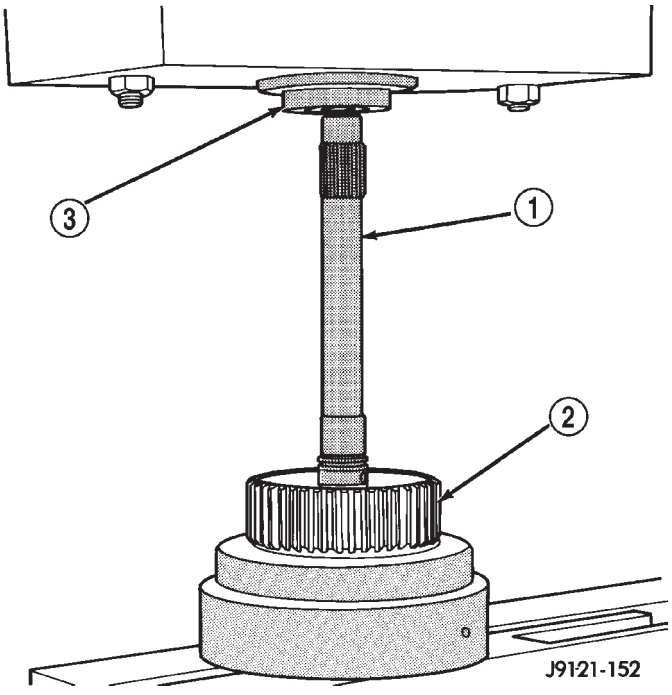


Fig. 216 Pressing Input Shaft Into Rear Clutch Retainer

1 - INPUT SHAFT
2 - REAR CLUTCH RETAINER
3 - PRESS RAM

REAR CLUTCH (Continued)

(11) Install pressure plate (Fig. 223). Ridged side of plate faces downward (toward piston) and flat side toward clutch pack.

(12) Install first clutch disc in retainer on top of 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. 223).

(13) Install the reaction 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. 217).

(a) Position gauge bar across the clutch drum with the dial indicator pointer on the pressure plate (Fig. 217).

(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 0.635 - 0.914 mm (0.025 - 0.036 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:

- 0.107 - 0.109 in.
- 0.098 - 0.100 in.
- 0.095 - 0.097 in.
- 0.083 - 0.085 in.
- 0.076 - 0.078 in.
- 0.071 - 0.073 in.
- 0.060 - 0.062 in.

(16) Coat rear clutch thrust washer with petroleum jelly and install washer over input shaft and into clutch retainer (Fig. 218). Use enough petroleum jelly to hold washer in place.

(17) Set rear clutch aside for installation during final assembly.

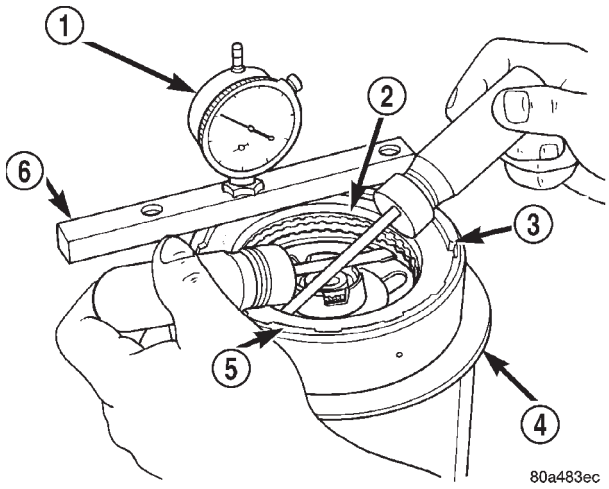


Fig. 217 Checking Rear Clutch Pack Clearance

1 - DIAL INDICATOR
2 - PRESSURE PLATE
3 - SNAP-RING
4 - STAND
5 - REAR CLUTCH
6 - GAUGE BAR

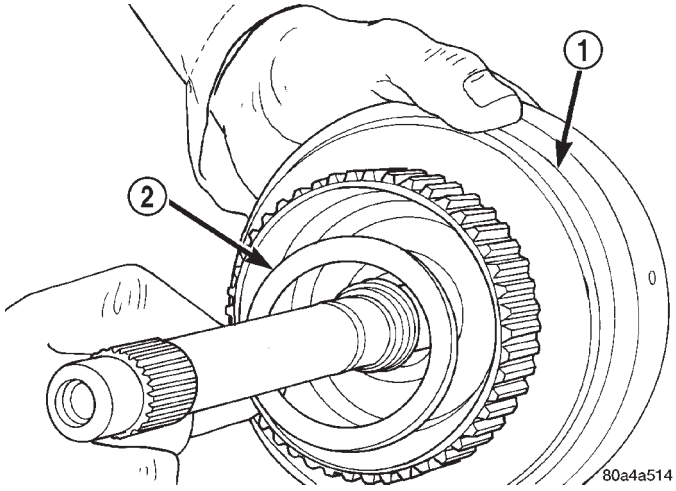


Fig. 218 Installing Rear Clutch Thrust Washer

1 - REAR CLUTCH RETAINER
2 - REAR CLUTCH THRUST WASHER

REAR SERVO

DESCRIPTION

The rear (low/reverse) servo consists of a single stage or diameter piston and a spring loaded plug. The spring is used to cushion the application of the rear (low/reverse) band.

OPERATION

While in the de-energized state (no pressure applied), the piston is held up in its bore by the piston spring. The plug is held down in its bore, in the piston, by the plug spring. When pressure is applied to the top of the piston, the plug is forced down in its bore, taking up any clearance. As the piston moves, it causes the plug spring to compress, and the piston moves down over the plug. The piston continues to move down until it hits the shoulder of the plug and fully applies the band. The period of time from the initial application, until the piston is against the shoulder of the plug, represents a reduced shocking of the band that cushions the shift.

DISASSEMBLY

(1) Remove small snap-ring and remove plug and spring from servo piston (Fig. 219).

(2) Remove and discard servo piston seal ring.

REAR SERVO (Continued)

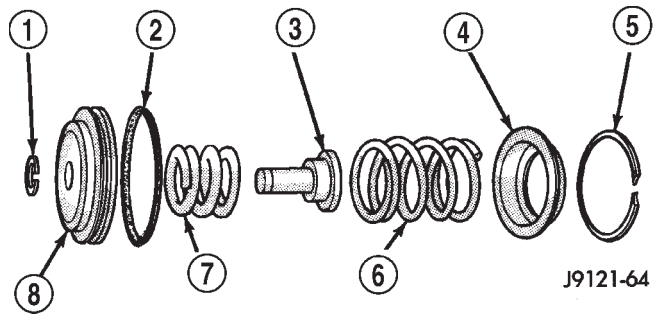


Fig. 219 Rear Servo Components

1 - SNAP-RING
2 - PISTON SEAL
3 - PISTON PLUG
4 - SPRING RETAINER
5 - SNAP-RING
6 - PISTON SPRING
7 - CUSHION SPRING
8 - PISTON

CLEANING

Remove and discard the servo piston seal ring (Fig. 220). 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 new ones at assembly.

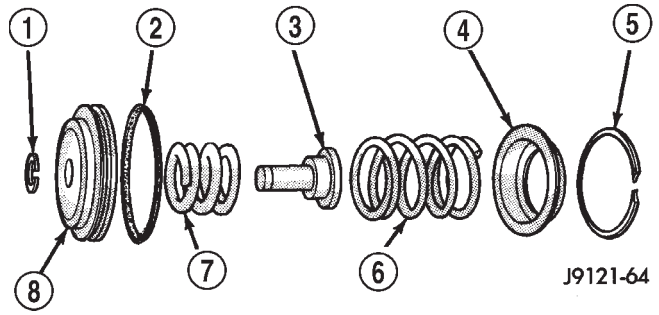


Fig. 220 Rear Servo Components

1 - SNAP-RING
2 - PISTON SEAL
3 - PISTON PLUG
4 - SPRING RETAINER
5 - SNAP-RING
6 - PISTON SPRING
7 - CUSHION SPRING
8 - PISTON

ASSEMBLY

(1) Lubricate piston and guide seals (Fig. 221) with petroleum jelly. Lubricate other servo parts with Mopar® ATF +4, type 9602, 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.

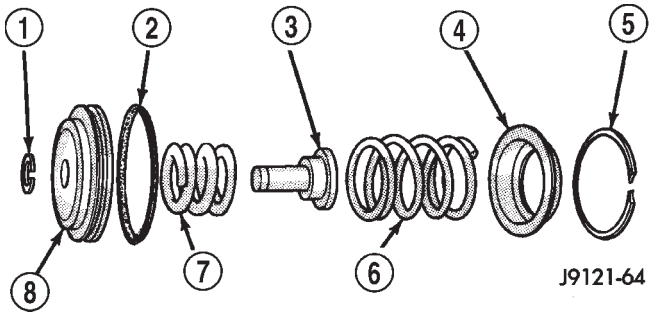


Fig. 221 Rear Servo Components

1 - SNAP-RING
2 - PISTON SEAL
3 - PISTON PLUG
4 - SPRING RETAINER
5 - SNAP-RING
6 - PISTON SPRING
7 - CUSHION SPRING
8 - PISTON

SHIFT MECHANISM

DESCRIPTION

The gear shift mechanism provides six shift positions which are:

- PARK (P)
- REVERSE (R)
- NEUTRAL (N)
- DRIVE (D)
- Manual SECOND (2)
- Manual LOW (1)

OPERATION

Manual LOW (1) range provides first gear only. Overrun braking is also provided in this range. Manual SECOND (2) range provides first and second gear only.

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. No upshift to fourth gear will occur if any of the following are true:

- The transmission fluid temperature is below 10° C (50° F) or above 121° C (250° F).
- The shift to third is not yet complete.
- Vehicle speed is too low for the 3-4 shift to occur.
- Battery temperature is below -5° C (23° F).

SHIFT MECHANISM (Continued)

ADJUSTMENTS

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. 222). 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. 222).

(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.

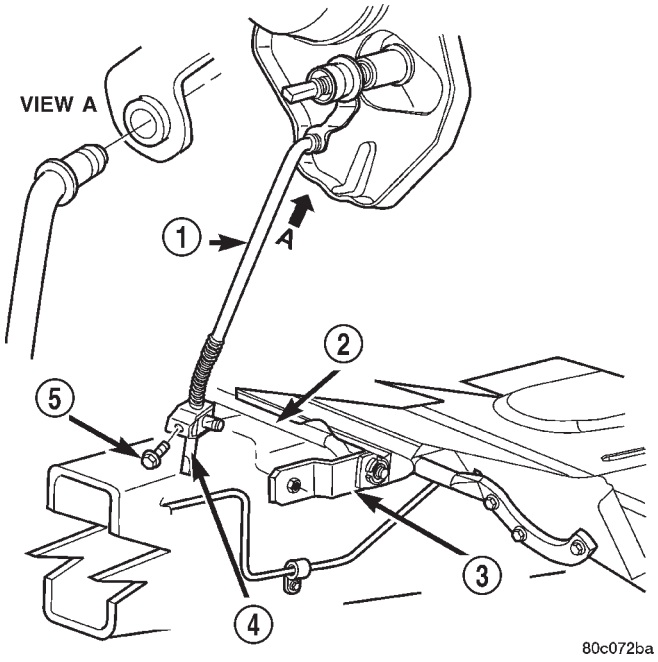


Fig. 222 Linkage Adjustment Components

1 - FRONT SHIFT ROD
2 - TORQUE SHAFT ASSEMBLY
3 - TORQUE SHAFT ARM
4 - ADJUSTING SWIVEL
5 - LOCK BOLT

SOLENOID

DESCRIPTION

The typical electrical solenoid used in automotive applications is a linear actuator. It is a device that produces motion in a straight line. This straight line motion can be either forward or backward in direction, and short or long distance.

A solenoid is an electromechanical device that uses a magnetic force to perform work. It consists of a coil of wire, wrapped around a magnetic core made from steel or iron, and a spring loaded, movable plunger, which performs the work, or straight line motion.

The solenoids used in transmission applications are attached to valves which can be classified as **normally open** or **normally closed**. The **normally open** solenoid valve is defined as a valve which allows hydraulic flow when no current or voltage is applied to the solenoid. The **normally closed** solenoid valve is defined as a valve which does not allow hydraulic flow when no current or voltage is applied to the solenoid. These valves perform hydraulic control functions for the transmission and must therefore be durable and tolerant of dirt particles. For these reasons, the valves have hardened steel poppets and ball valves. The solenoids operate the valves directly, which means that the solenoids must have very high outputs to close the valves against the sizable flow areas and line pressures found in current transmissions. Fast response time is also necessary to ensure accurate control of the transmission.

The strength of the magnetic field is the primary force that determines the speed of operation in a particular solenoid design. A stronger magnetic field will cause the plunger to move at a greater speed than a weaker one. There are basically two ways to increase the force of the magnetic field:

- Increase the amount of current applied to the coil or
- Increase the number of turns of wire in the coil.

The most common practice is to increase the number of turns by using thin wire that can completely fill the available space within the solenoid housing. The strength of the spring and the length of the plunger also contribute to the response speed possible by a particular solenoid design.

A solenoid can also be described by the method by which it is controlled. Some of the possibilities include variable force, pulse-width modulated, constant ON, or duty cycle. The variable force and pulse-width modulated versions utilize similar methods to

SOLENOID (Continued)

control the current flow through the solenoid to position the solenoid plunger at a desired position somewhere between full ON and full OFF. The constant ON and duty cycled versions control the voltage across the solenoid to allow either full flow or no flow through the solenoid's valve.

OPERATION

When an electrical current is applied to the solenoid coil, a magnetic field is created which produces an attraction to the plunger, causing the plunger to move and work against the spring pressure and the load applied by the fluid the valve is controlling. The plunger is normally directly attached to the valve which it is to operate. When the current is removed from the coil, the attraction is removed and the plunger will return to its original position due to spring pressure.

The plunger is made of a conductive material and accomplishes this movement by providing a path for the magnetic field to flow. By keeping the air gap between the plunger and the coil to the minimum necessary to allow free movement of the plunger, the magnetic field is maximized.

SPEED SENSOR

DESCRIPTION

The speed sensor (Fig. 223) is located in the overdrive gear case. The sensor is positioned over the park gear and monitors transmission output shaft rotating speed.

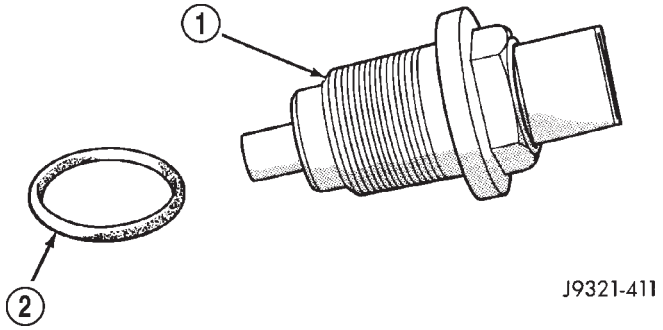


Fig. 223 Transmission Output Speed Sensor

1 - TRANSMISSION OUTPUT SHAFT SPEED SENSOR
2 - SEAL

OPERATION

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. Signals from this sensor are shared with the powertrain control module.

THROTTLE VALVE CABLE

DESCRIPTION

Transmission throttle valve cable (Fig. 224) adjustment is extremely important to proper operation. This adjustment positions the throttle valve, which controls shift speed, quality, and part-throttle downshift sensitivity.

If cable setting is too loose, early shifts and slippage between shifts may occur. If the setting is too tight, shifts may be delayed and part throttle downshifts may be very sensitive.

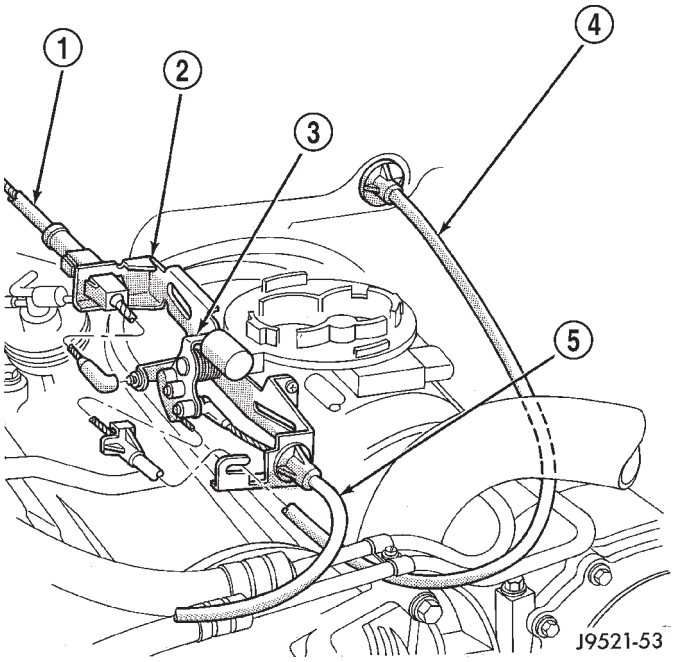


Fig. 224 Throttle Valve Cable Attachment - At Engine

1 - THROTTLE VALVE CABLE
2 - CABLE BRACKET
3 - THROTTLE BODY LEVER
4 - ACCELERATOR CABLE
5 - SPEED CONTROL CABLE

The transmission throttle valve is operated by a cam on the throttle lever. The throttle lever is operated by an adjustable cable (Fig. 225). The cable is attached to an arm mounted on the throttle lever shaft. A retaining clip at the engine-end of the cable is removed to provide for cable adjustment. The retaining clip is then installed back onto the throttle valve cable to lock in the adjustment.

THROTTLE VALVE CABLE (Continued)

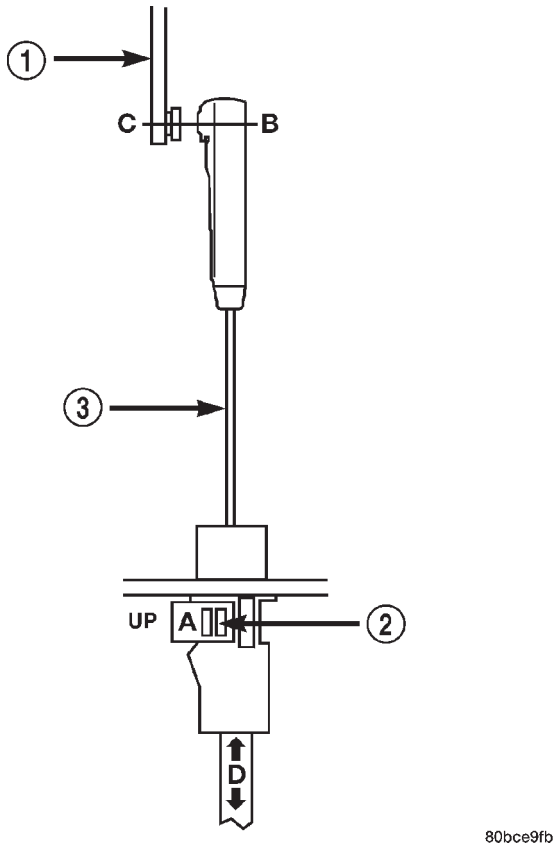


Fig. 225 Throttle Valve Cable at Throttle Linkage

1 - THROTTLE LINKAGE
2 - THROTTLE VALVE CABLE LOCKING CLIP
3 - THROTTLE VALVE CABLE

ADJUSTMENTS - TRANSMISSION THROTTLE VALVE CABLE

A correctly adjusted throttle valve cable will cause the throttle lever on the transmission to move simultaneously with the throttle body lever from the idle position. Proper adjustment will allow simultaneous movement without causing the transmission throttle lever to either move ahead of, or lag behind the lever on the throttle body.

ADJUSTMENT VERIFICATION

(1) Turn ignition key to OFF position.
(2) Remove air cleaner.
(3) Verify that lever on throttle body is at curb idle position (Fig. 226). Then verify that the transmission throttle lever (Fig. 227) is also at idle (fully forward) position.
(4) Slide cable off attachment stud on throttle body lever.
(5) Compare position of cable end to attachment stud on throttle body lever:

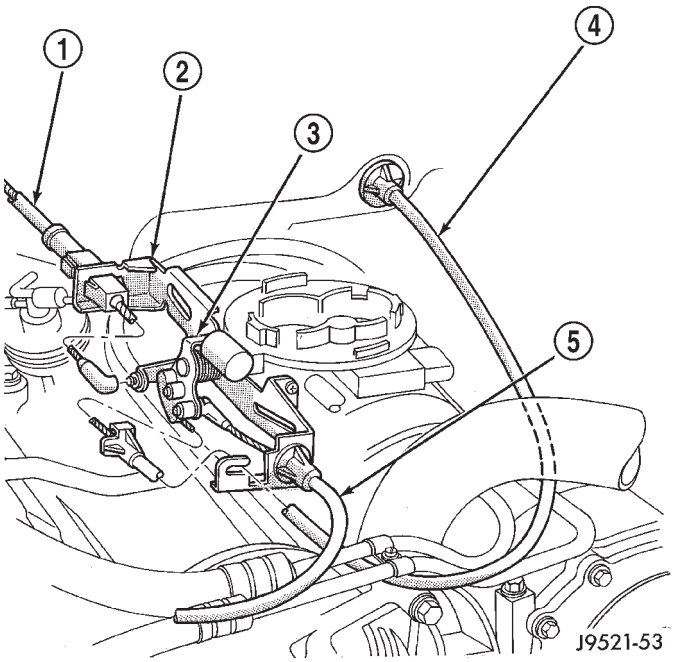


Fig. 226 Throttle Valve Cable Attachment - At Engine

1 - THROTTLE VALVE CABLE
2 - CABLE BRACKET
3 - THROTTLE BODY LEVER
4 - ACCELERATOR CABLE
5 - SPEED CONTROL CABLE

- Cable end and attachment stud should be aligned (or centered on one another) to within 1 mm (0.039 in.) in either direction (Fig. 228).
- If cable end and attachment stud are misaligned (off center), cable will have to be adjusted as described in Throttle Valve Cable Adjustment procedure.

(6) Reconnect cable end to attachment stud. Then with aid of a helper, observe movement of transmission throttle lever and lever on throttle body.

- If both levers move simultaneously from idle to half-throttle and back to idle position, adjustment is correct.
- If transmission throttle lever moves ahead of, or lags behind throttle body lever, cable adjustment will be necessary. Or, if throttle body lever prevents transmission lever from returning to closed position, cable adjustment will be necessary.

ADJUSTMENT PROCEDURE

(1) Turn ignition switch to OFF position.
(2) Remove air cleaner if necessary.
(3) Disconnect cable end from attachment stud. **Carefully slide cable off stud. Do not pry or pull cable off.**

THROTTLE VALVE CABLE (Continued)

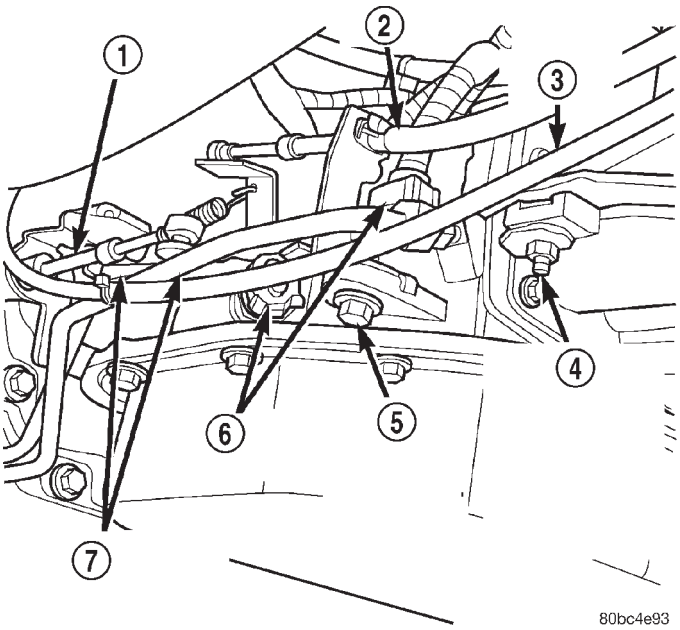


Fig. 227 Throttle Valve Cable at Transmission

1 - TRANSMISSION SHIFTER CABLE
2 - THROTTLE VALVE CABLE
3 - TRANSFER CASE SHIFTER CABLE
4 - TRANSFER CASE SHIFTER CABLE BRACKET RETAINING BOLT (1 OR 2)
5 - THROTTLE VALVE CABLE BRACKET RETAINING BOLT
6 - ELECTRICAL CONNECTORS
7 - TRANSMISSION FLUID LINES

(4) Verify that transmission throttle lever is in fully closed position. Then be sure lever on throttle body is at curb idle position.

(5) Pry the T.V. cable lock (A) into the UP position (Fig. 228). This will unlock the cable and allow for readjustment.

(6) Apply just enough tension on the T.V. cable (B) to remove any slack in the cable.**Pulling too tight will cause the T.V. lever on the transmission to move out of its idle position, which will result in an incorrect T.V. cable adjustment.** Slide the sheath of the T.V. cable (D) back and forth until the centerlines of the T.V. cable end (B) and the throttle bell crank lever (C) are aligned within one millimeter (1mm) (Fig. 228).

(7) While holding the T.V. cable in the set position push the T.V. cable lock (A) into the down position (Fig. 228). This will lock the present T.V. cable adjustment.

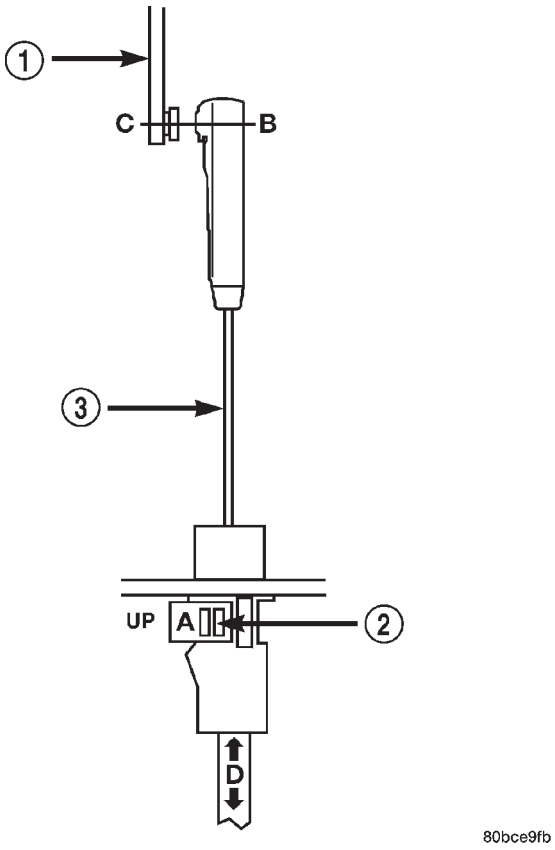


Fig. 228 Throttle Valve Cable at Throttle Linkage

1 - THROTTLE LINKAGE
2 - THROTTLE VALVE CABLE LOCKING CLIP
3 - THROTTLE VALVE CABLE

NOTE: Be sure that as the cable is pulled forward and centered on the throttle lever stud, the cable housing moves smoothly with the cable. Due to the angle at which the cable housing enters the spring housing, the cable housing may bind slightly and create an incorrect adjustment.

(8) Reconnect the T.V. cable (B) to the throttle bellcrank lever (C).

(9) Check cable adjustment. Verify transmission throttle lever and lever on throttle body move simultaneously.

TORQUE CONVERTER

DESCRIPTION

The torque converter (Fig. 229) is a hydraulic device that couples the engine crankshaft to the transmission. The torque converter consists of an outer shell with an internal turbine, a stator, an overrunning clutch, an impeller and an electronically applied converter clutch. The converter clutch provides reduced engine speed and greater fuel economy when engaged. Clutch engagement also provides reduced transmission fluid temperatures. The torque converter hub drives the transmission oil (fluid) pump.

The torque converter is a sealed, welded unit that is not repairable and is serviced as an assembly.

CAUTION: The torque converter must be replaced if a transmission failure resulted in large amounts of metal or fiber contamination in the fluid. If the fluid is contaminated, flush the all transmission fluid cooler(s) and lines.

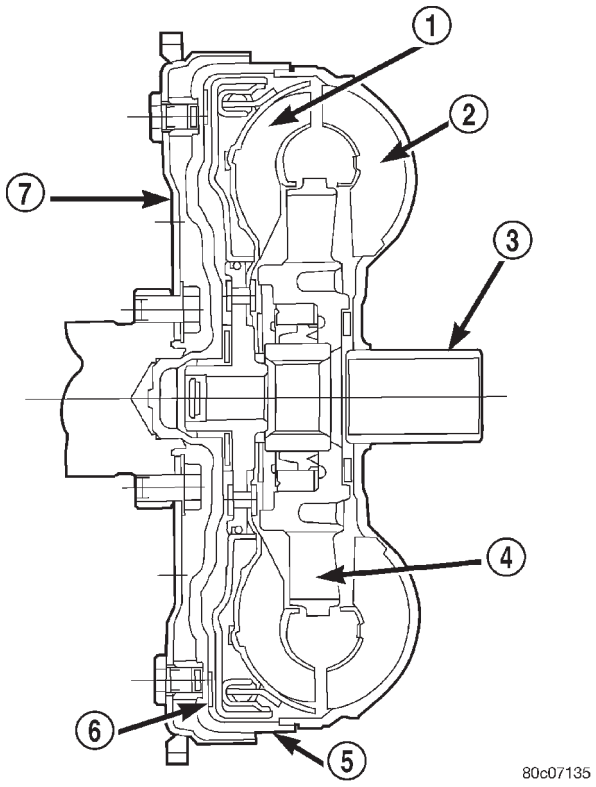


Fig. 229 Torque Converter Assembly

1 - TURBINE
2 - IMPELLER
3 - HUB
4 - STATOR
5 - FRONT COVER
6 - CONVERTER CLUTCH DISC
7 - DRIVE PLATE

TORQUE CONVERTER (Continued)

IMPELLER

The impeller (Fig. 230) is an integral part of the converter housing. The impeller consists of curved blades placed radially along the inside of the housing on the transmission side of the converter. As the converter housing is rotated by the engine, so is the impeller, because they are one and the same and are the driving members of the system.

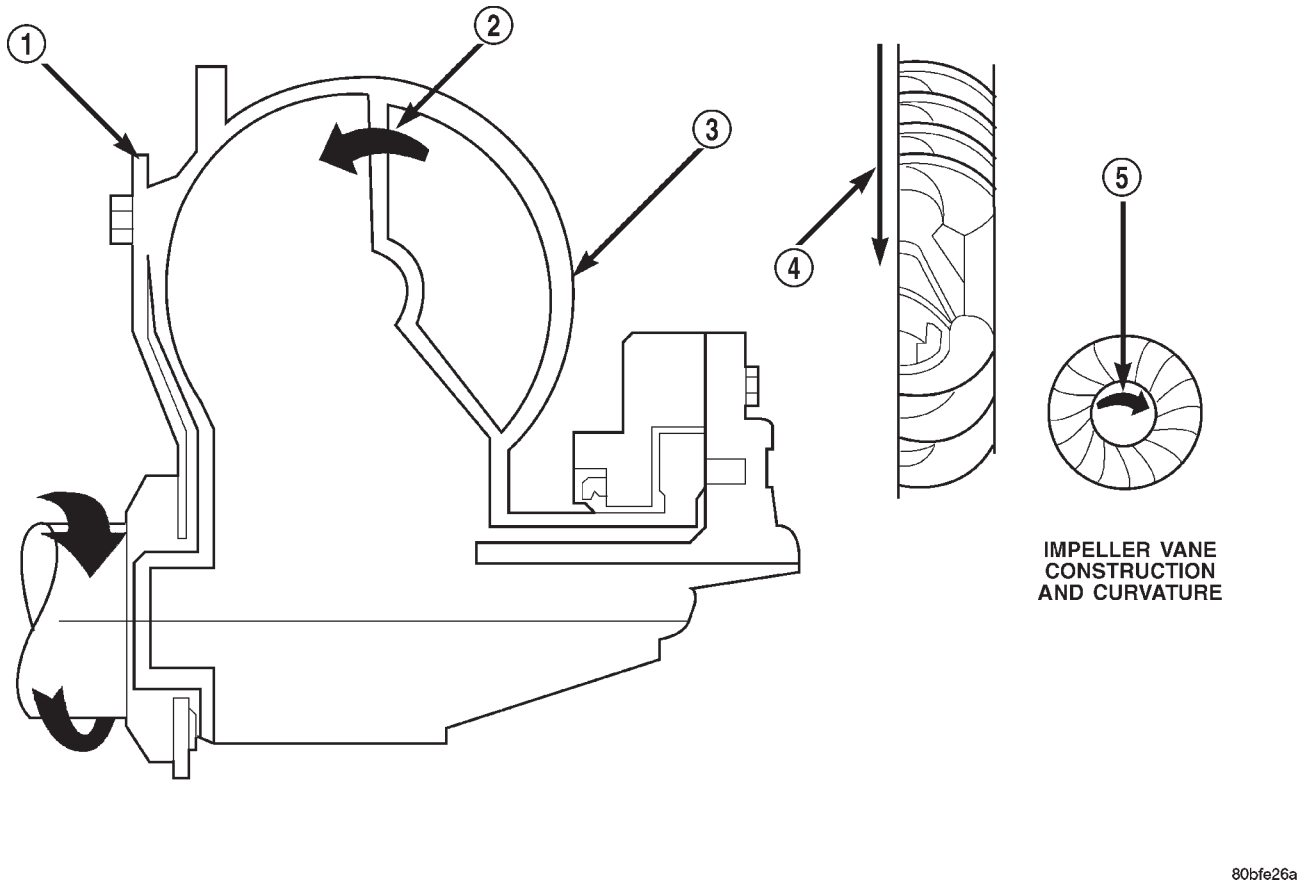


Fig. 230 Impeller

1 - ENGINE FLEXPLATE
2 - OIL FLOW FROM IMPELLER SECTION INTO TURBINE SECTION
3 - IMPELLER VANES AND COVER ARE INTEGRAL
4 - ENGINE ROTATION
5 - ENGINE ROTATION

TORQUE CONVERTER (Continued)

TURBINE

The turbine (Fig. 231) is the output, or driven, member of the converter. The turbine is mounted within the housing opposite the impeller, but is not attached to the housing. The input shaft is inserted through the center of the impeller and splined into the turbine. The design of the turbine is similar to the impeller, except the blades of the turbine are curved in the opposite direction.

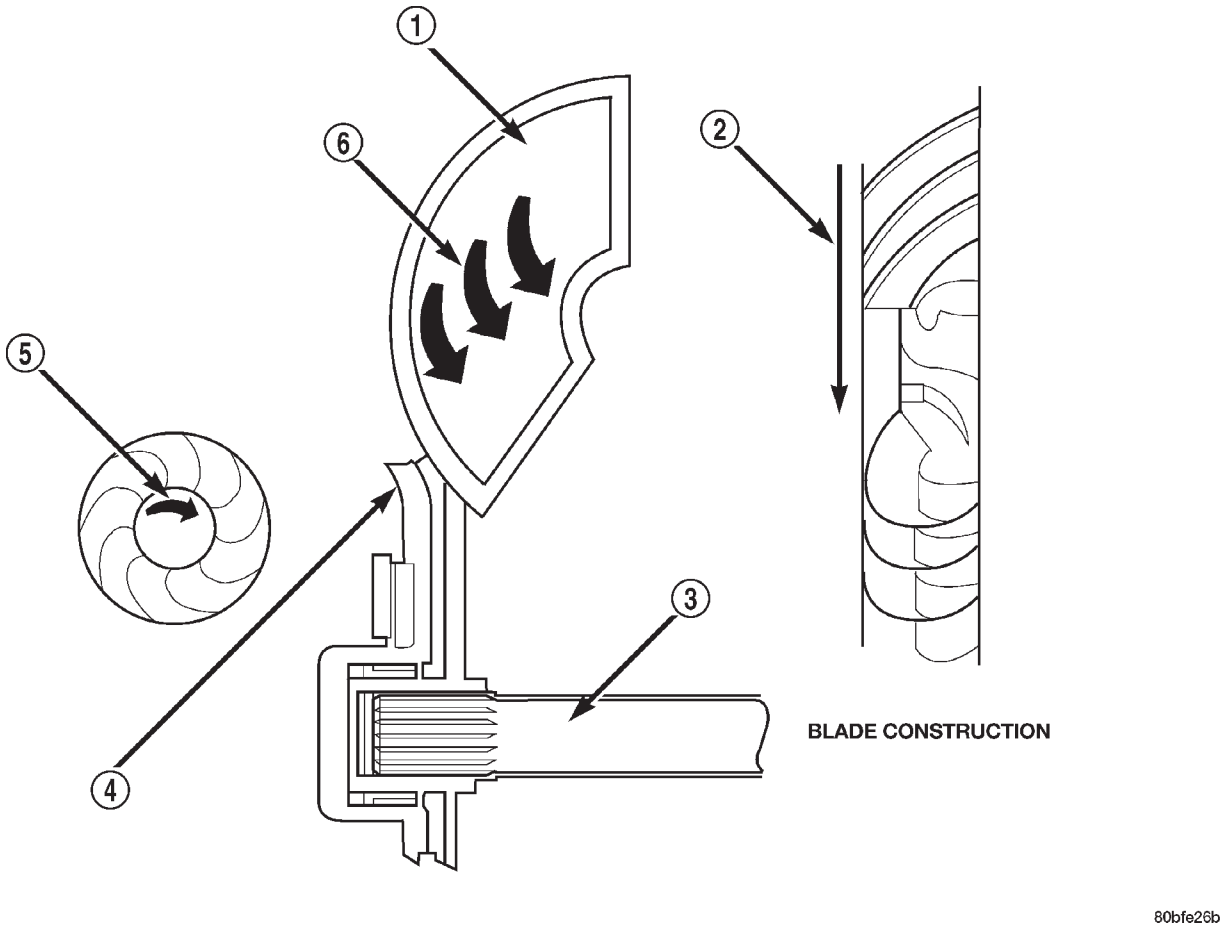


Fig. 231 Turbine

1 - TURBINE VANE
2 - ENGINE ROTATION
3 - INPUT SHAFT
4 - PORTION OF TORQUE CONVERTER COVER
5 - ENGINE ROTATION
6 - OIL FLOW WITHIN TURBINE SECTION

TORQUE CONVERTER (Continued)

STATOR

The stator assembly (Fig. 232) is mounted on a stationary shaft which is an integral part of the oil pump. The stator is located between the impeller and turbine within the torque converter case (Fig. 233). The stator contains an over-running clutch, which allows the stator to rotate only in a clockwise direction. When the stator is locked against the over-running clutch, the torque multiplication feature of the torque converter is operational.

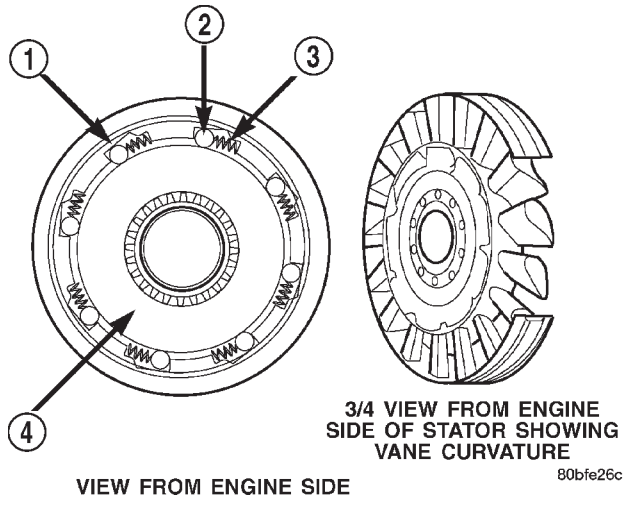


Fig. 232 Stator Components

1 - CAM (OUTER RACE)
2 - ROLLER
3 - SPRING
4 - INNER RACE

TORQUE CONVERTER CLUTCH (TCC)

The TCC (Fig. 234) was installed to improve the efficiency of the torque converter that is lost to the slippage of the fluid coupling. Although the fluid coupling provides smooth, shock-free power transfer, it is natural for all fluid couplings to slip. If the impeller and turbine were mechanically locked together, a zero slippage condition could be obtained. A hydraulic piston was added to the turbine, and a friction material was added to the inside of the front cover to provide this mechanical lock-up.

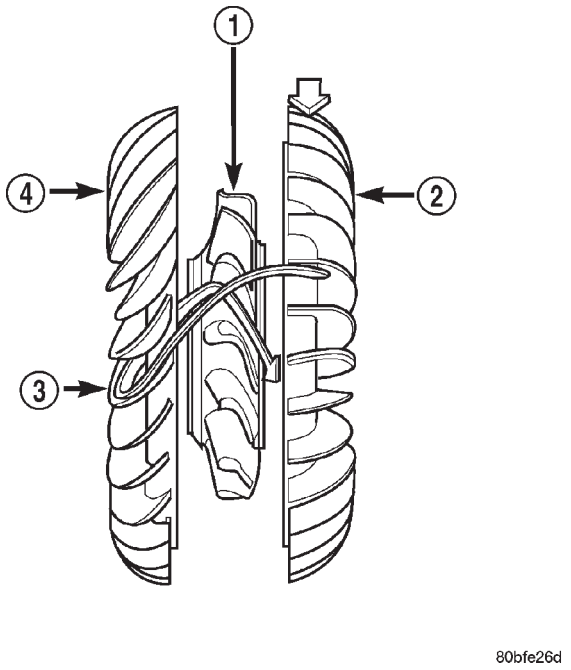


Fig. 233 Stator Location

1 - STATOR
2 - IMPELLER
3 - FLUID FLOW
4 - TURBINE

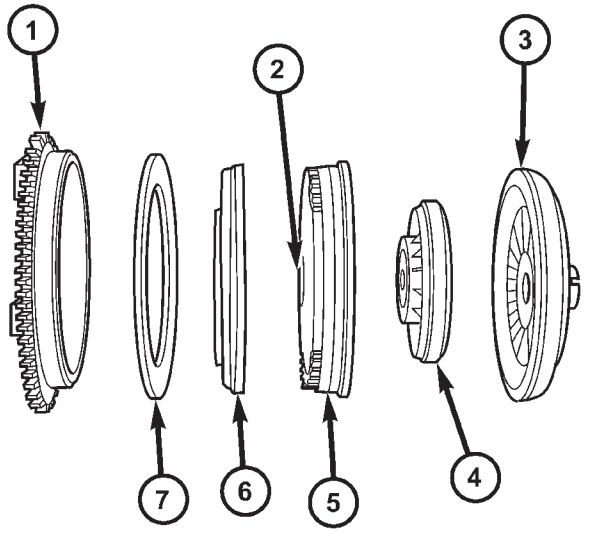


Fig. 234 Torque Converter Clutch (TCC)

1 - IMPELLER FRONT COVER
2 - THRUST WASHER ASSEMBLY
3 - IMPELLER
4 - STATOR
5 - TURBINE
6 - PISTON
7 - FRICTION DISC

TORQUE CONVERTER (Continued)

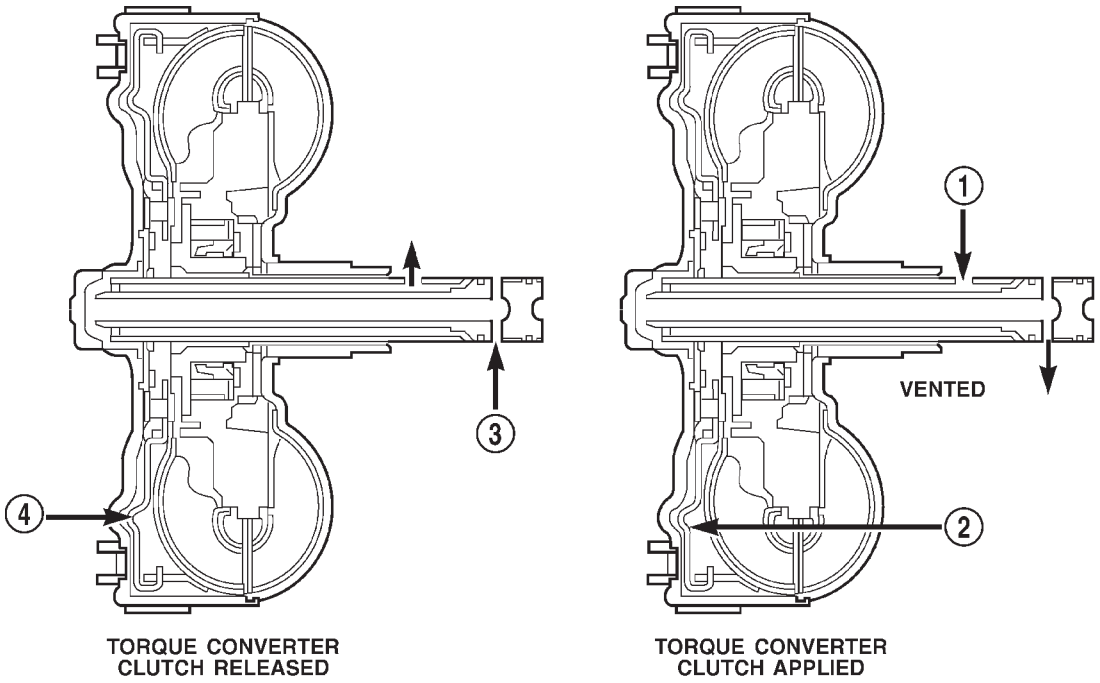


Fig. 235 Torque Converter Fluid Operation

1 - APPLY PRESSURE
2 - THE PISTON MOVES SLIGHTLY FORWARD
3 - RELEASE PRESSURE
4 - THE PISTON MOVES SLIGHTLY REARWARD

OPERATION

The converter impeller (Fig. 235) (driving member), which is integral to the converter housing and bolted to the engine drive plate, rotates at engine speed. The converter turbine (driven member), which reacts from fluid pressure generated by the impeller, rotates and turns the transmission input shaft.

TURBINE

As the fluid that was put into motion by the impeller blades strikes the blades of the turbine, some of the energy and rotational force is transferred into the turbine and the input shaft. This causes both of them (turbine and input shaft) to rotate in a clockwise direction following the impeller. As the fluid is leaving the trailing edges of the turbine's blades it continues in a "hindering" direction back toward the impeller. If the fluid is not redirected before it strikes the impeller, it will strike the impeller in such a direction that it would tend to slow it down.

TORQUE CONVERTER (Continued)

STATOR

Torque multiplication is achieved by locking the stator's over-running clutch to its shaft (Fig. 236). Under stall conditions (the turbine is stationary), the oil leaving the turbine blades strikes the face of the stator blades and tries to rotate them in a counter-clockwise direction. When this happens the overrunning clutch of the stator locks and holds the stator from rotating. With the stator locked, the oil strikes the stator blades and is redirected into a "helping" direction before it enters the impeller. This circulation of oil from impeller to turbine, turbine to stator, and stator to impeller, can produce a maximum torque multiplication of about 2.4:1. As the turbine begins to match the speed of the impeller, the fluid that was hitting the stator in such as way as to cause it to lock-up is no longer doing so. In this condition of operation, the stator begins to free wheel and the converter acts as a fluid coupling.

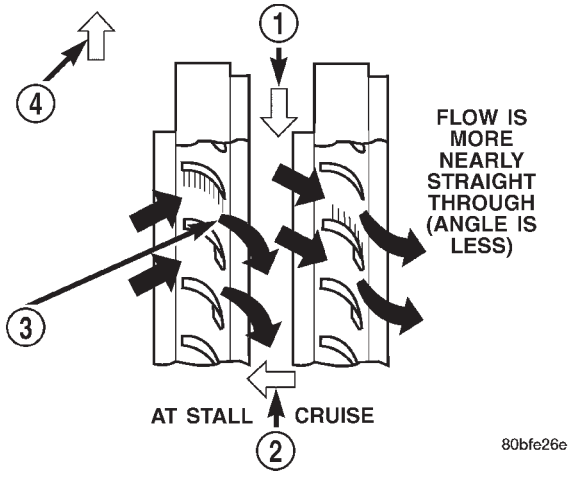


Fig. 236 Stator Operation

1 - DIRECTION STATOR WILL FREE WHEEL DUE TO OIL PUSHING ON BACKSIDE OF VANES
2 - FRONT OF ENGINE
3 - INCREASED ANGLE AS OIL STRIKES VANES
4 - DIRECTION STATOR IS LOCKED UP DUE TO OIL PUSHING AGAINST STATOR VANES

TORQUE CONVERTER CLUTCH (TCC)

The torque converter clutch is hydraulically applied and is released when fluid is vented from the hydraulic circuit by the torque converter control (TCC) solenoid on the valve body. The torque converter clutch is controlled by the Powertrain Control Module (PCM). The torque converter clutch engages in fourth gear, and in third gear under various conditions, such as when the O/D switch is OFF, when the vehicle is cruising on a level surface after the vehicle has warmed up. The torque converter clutch will disengage momentarily when an increase in engine load is sensed by the PCM, such as when the vehicle begins to go uphill or the throttle pressure is increased.

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 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. 237). Surface of converter lugs should be 19mm (0.75 in.) to the rear of the 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.

TORQUE CONVERTER (Continued)

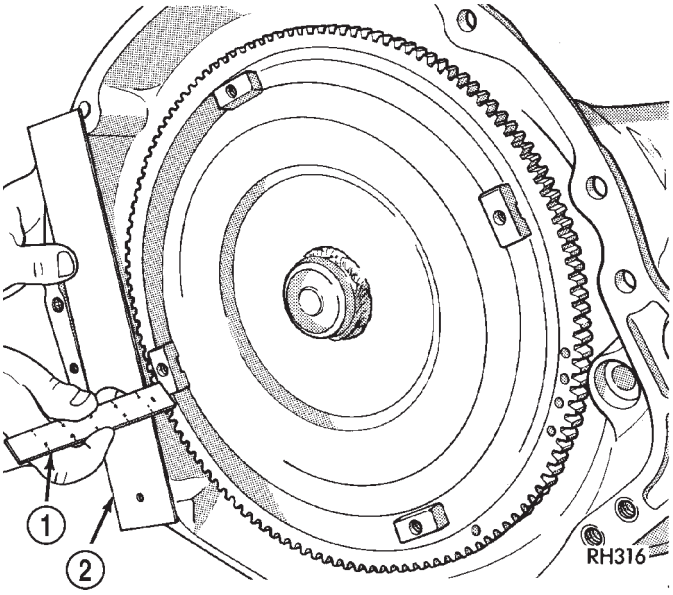


Fig. 237 Typical Method Of Checking Converter Seating

1 - SCALE
2 - STRAIGHTEDGE

TORQUE CONVERTER DRAINBACK VALVE

DESCRIPTION

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

OPERATION

The valve prevents fluid from draining from the converter into the cooler and lines when the vehicle is shut down for lengthy periods. Production valves have a hose nipple at one end, while the opposite end is threaded for a flare fitting. All valves have an arrow (or similar mark) to indicate direction of flow through the valve.

STANDARD PROCEDURE - TORQUE CONVERTER DRAINBACK VALVE

The converter drainback check valve is located in the cooler outlet (pressure) line near the radiator tank. The valve prevents fluid drainback when the vehicle is parked for lengthy periods. The valve check ball is spring loaded and has an opening pressure of approximately 2 psi.

The valve is serviced as an assembly; it is not repairable. Do not clean the valve if restricted, or contaminated by sludge, or debris. If the valve fails, or if a transmission malfunction occurs that generates significant amounts of sludge and/or clutch particles and metal shavings, the valve must be replaced.

The valve must be removed whenever the cooler and lines are reverse flushed. The valve can be flow tested when necessary. The procedure is exactly the same as for flow testing a cooler.

If the valve is restricted, installed backwards, or in the wrong line, it will cause an overheating condition and possible transmission failure.

CAUTION: The drainback valve is a one-way flow device. It must be properly oriented in terms of flow direction for the cooler to function properly. The valve must be installed in the pressure line. Otherwise flow will be blocked and would cause an overheating condition and eventual transmission failure.

TRANSMISSION TEMPERATURE SENSOR

DESCRIPTION

Transmission fluid temperature readings are supplied to the transmission control module by the thermistor (Fig. 238). 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 2000 ohms.

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

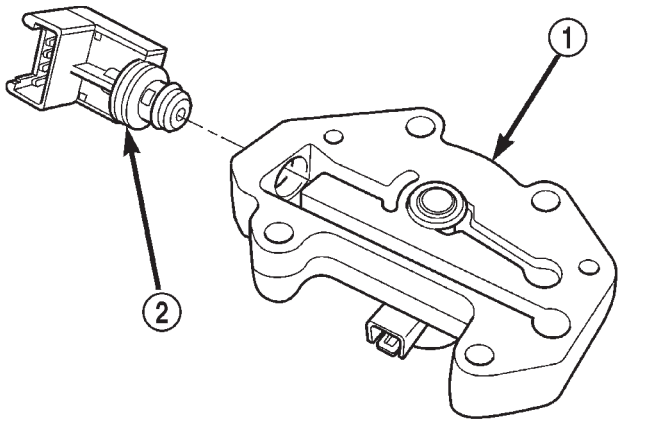


Fig. 238 Governor Pressure Sensor

1 - GOVERNOR BODY
2 - GOVERNOR PRESSURE SENSOR/TRANSMISSION FLUID TEMPERATURE THERMISTOR

OPERATION

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

TRANSMISSION TEMPERATURE SENSOR (Continued)

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).

VALVE BODY

DESCRIPTION

The valve body consists of a cast aluminum valve body, a separator plate, and transfer plate. The valve body contains valves and check balls that control fluid delivery to the torque converter clutch, bands, and frictional clutches. The valve body contains the following components (Fig. 239), (Fig. 240), (Fig. 241), and (Fig. 242):

- Regulator valve
- Regulator valve throttle pressure plug
- Line pressure plug and sleeve
- Kickdown valve
- Kickdown limit valve
- 1-2 shift valve
- 1-2 control valve
- 2-3 shift valve
- 2-3 governor plug
- 3-4 shift valve
- 3-4 timing valve
- 3-4 quick fill valve
- 3-4 accumulator
- Throttle valve
- Throttle pressure plug
- Switch valve
- Manual valve
- Converter clutch lock-up valve
- Converter clutch lock-up timing Valve
- Shuttle valve
- Shuttle valve throttle plug
- Boost Valve
- 10 check balls

By adjusting the spring pressure acting on the regulator valve, transmission line pressure can be adjusted.

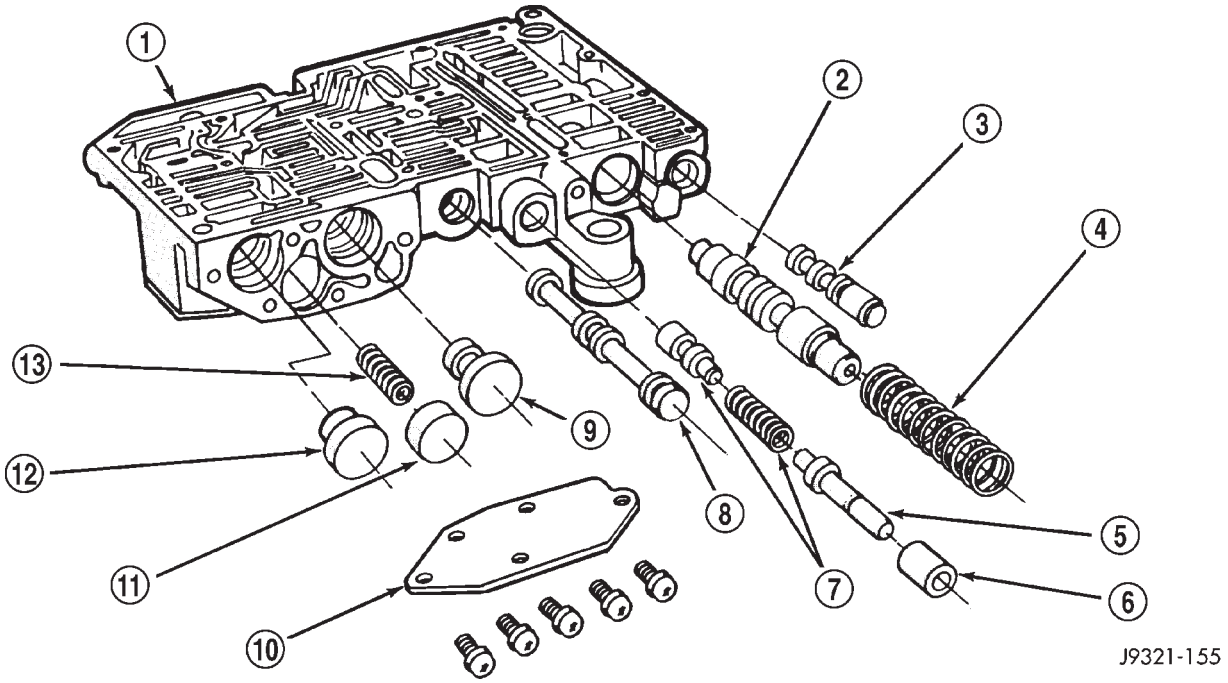


Fig. 239 Upper Housing Control Valve Locations

1 - UPPER HOUSING
2 - REGULATOR VALVE
3 - SWITCH VALVE
4 - REGULATOR VALVE SPRING
5 - KICKDOWN VALVE
6 - KICKDOWN DETENT
7 - THROTTLE VALVE AND SPRING
8 - MANUAL VALVE
9 - 1-2 GOVERNOR PLUG
10 - GOVERNOR PLUG COVER
11 - THROTTLE PLUG
12 - 2-3 GOVERNOR PLUG
13 - SHUTTLE VALVE PRIMARY SPRING

VALVE BODY (Continued)

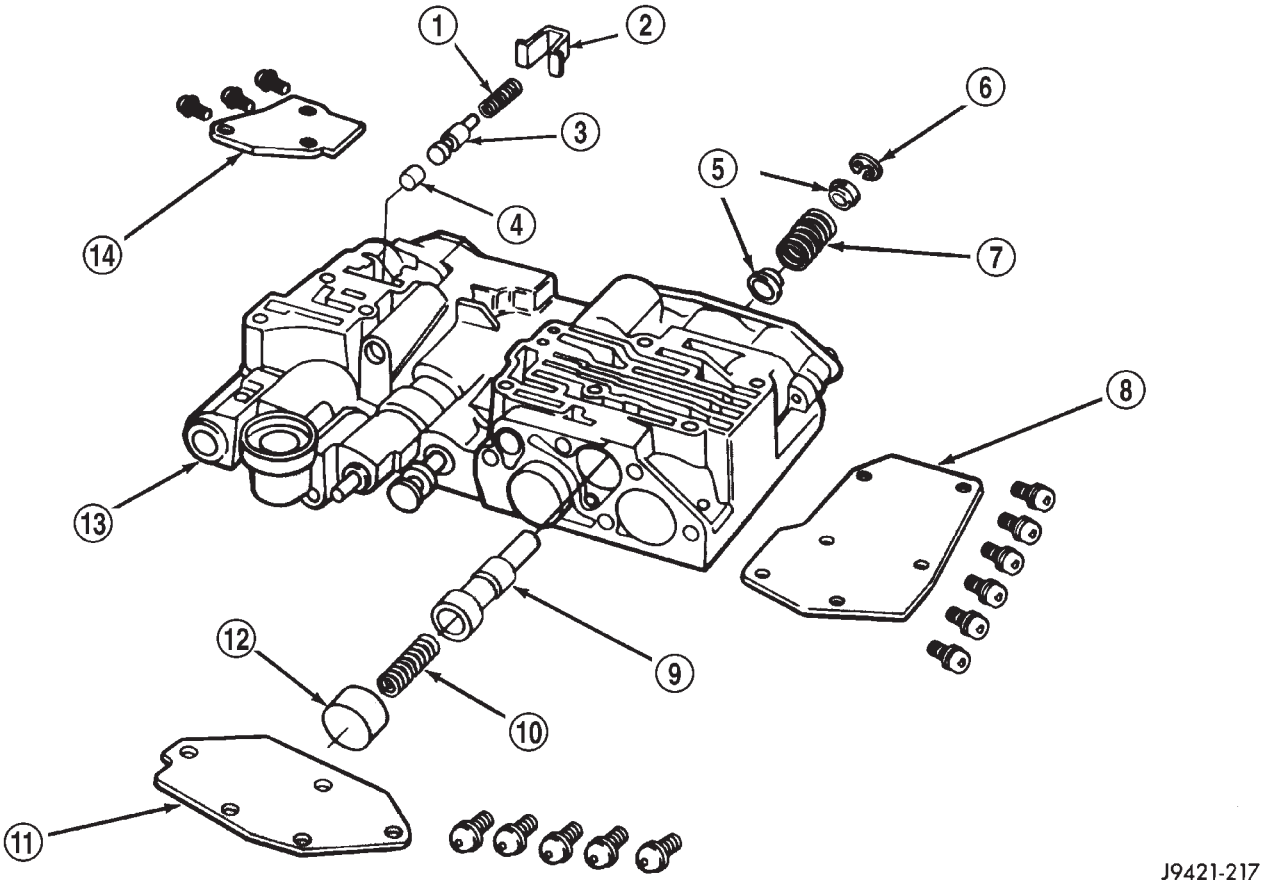


Fig. 240 Shuttle and Boost Valve Locations

1 - SPRING
2 - RETAINER
3 - BOOST VALVE
4 - BOOST VALVE PLUG
5 - SPRING GUIDES
6 - E-CLIP
7 - SHUTTLE VALVE SECONDARY SPRING
8 - SHUTTLE VALVE COVER
9 - SHUTTLE VALVE
10 - SHUTTLE VALVE PRIMARY SPRING
11 - GOVERNOR PLUG COVER
12 - THROTTLE PLUG
13 - UPPER HOUSING
14 - BOOST VALVE COVER

VALVE BODY (Continued)

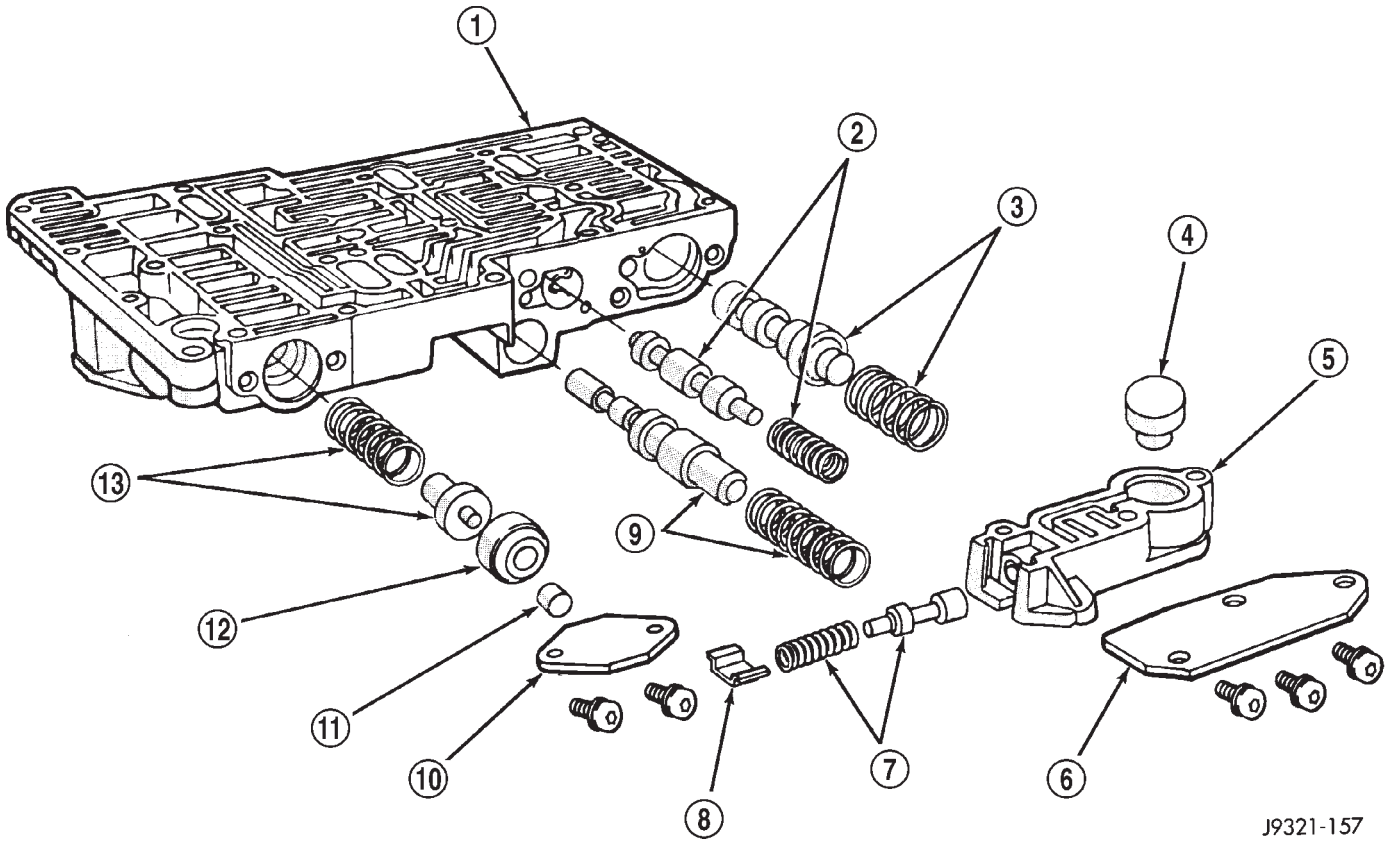


Fig. 241 Upper Housing Shift Valve and Pressure Plug Locations

1 - UPPER HOUSING
2 - 1-2 SHIFT VALVE AND SPRING
3 - 2-3 SHIFT VALVE AND SPRING
4 - 2-3 THROTTLE PLUG
5 - LIMIT VALVE HOUSING
6 - LIMIT VALVE COVER
7 - LIMIT VALVE AND SPRING
8 - RETAINER
9 - 1-2 SHIFT CONTROL VALVE AND SPRING
10 - PRESSURE PLUG COVER
11 - LINE PRESSURE PLUG
12 - PLUG SLEEVE
13 - THROTTLE PRESSURE SPRING AND PLUG

VALVE BODY (Continued)

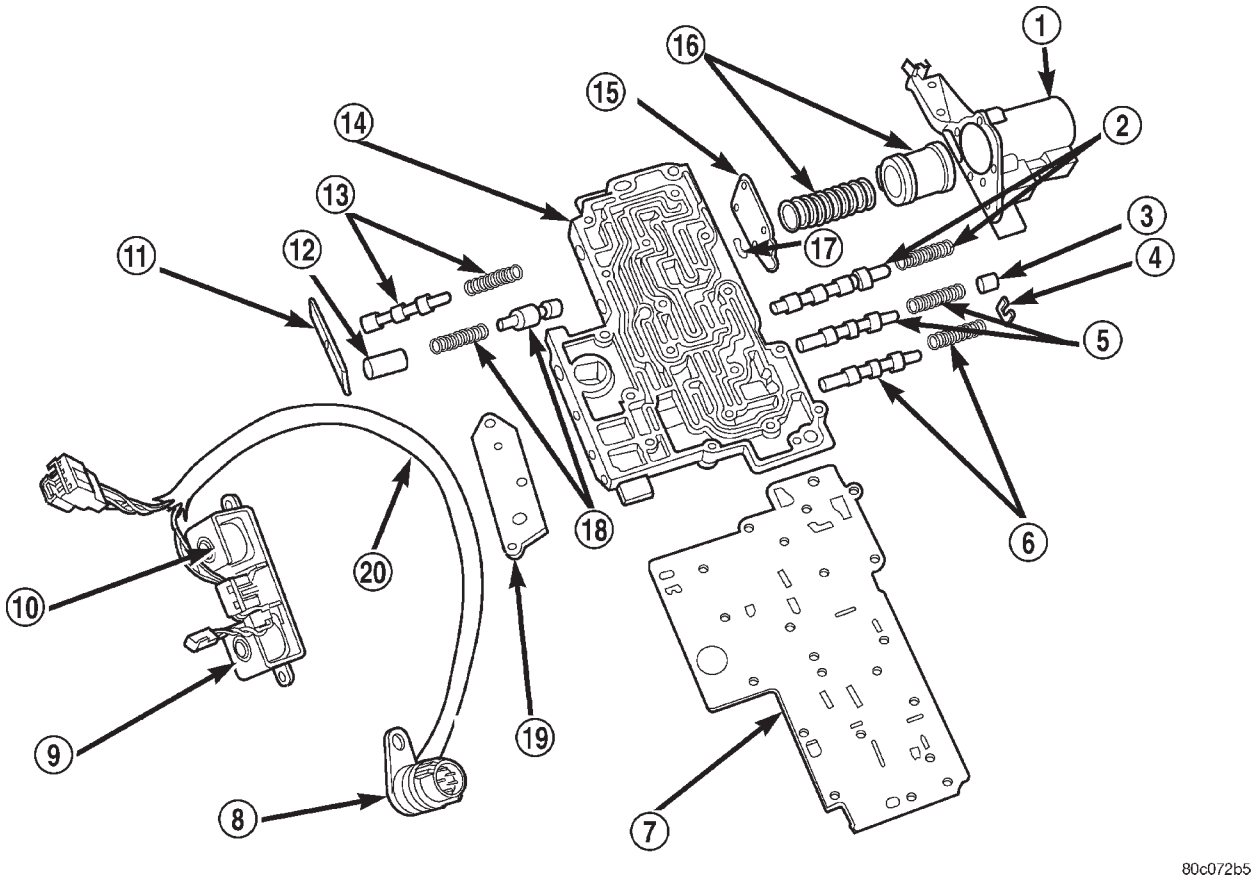


Fig. 242 Lower Housing Shift Valves and Springs

1 - 3-4 ACCUMULATOR HOUSING
2 - 3-4 SHIFT VALVE AND SPRING
3 - PLUG
4 - SPRING RETAINER
5 - CONVERTER CLUTCH VALVE AND SPRING
6 - CONVERTER CLUTCH TIMING VALVE AND SPRING
7 - OVERDRIVE SEPARATOR PLATE
8 - CASE CONNECTOR
9 - CONVERTER CLUTCH SOLENOID
10 - OVERDRIVE SOLENOID
11 - TIMING VALVE COVER
12 - PLUG
13 - 3-4 TIMING VALVE AND SPRING
14 - LOWER HOUSING
15 - ACCUMULATOR END PLATE
16 - 3-4 ACCUMULATOR PISTON AND SPRING
17 - E-CLIP
18 - 3-4 QUICK FILL SPRING AND VALVE
19 - SOLENOID GASKET
20 - HARNESS

OPERATION

NOTE: Refer to the Hydraulic Schematics for a visual aid in determining valve location, operation and design.

VALVE BODY (Continued)

CHECK BALLS

CHECK BALL NUMBER	DESCRIPTION
1	Allows either the manual valve to put line pressure on the 1-2 governor plug or the KD Valve to put WOT line pressure on the 1-2 governor plug.
2	Allows either the manual valve to put line pressure on the 2-3 governor plug or the KD Valve to put WOT line pressure on the 2-3 governor plug.
3	Allows either the Reverse circuit or the 3rd gear circuit to pressurize the front clutch.
4	Allows either the Manual Low circuit from the Manual Valve or the Reverse from the Manual Valve circuit to pressurize the rear servo.
5	Directs line pressure to the spring end of the 2-3 shift valve in either Manual Low or Manual 2nd, forcing the downshift to 2nd gear regardless of governor pressure.
6	Provides a by-pass around the front servo orifice so that the servo can release quickly.
7	Provides a by-pass around the rear clutch orifice so that the clutch can release quickly.
8	Directs reverse line pressure through an orifice to the throttle valve eliminating the extra leakage and insuring that Reverse line pressure pressure will be sufficient.
9	Provides a by-pass around the rear servo orifice so that the servo can release quickly.
ECE (10)	Allows the lockup clutch to used at WOT in 3rd gear by putting line pressure from the 3-4 Timing Valve on the interlock area of the 2-3 shift valve, thereby preventing a 3rd gear Lock-up to 2nd gear kickdown.

REGULATOR VALVE

The pressure regulator valve is needed to control the hydraulic pressure within the system and reduce the amount of heat produced in the fluid. The pressure regulator valve is located in the valve body near the manual valve. The pressure regulator valve train controls the maximum pressure in the lines by metering the dumping of fluid back into the sump. Regulated pressure is referred to as “line pressure.”

VALVE BODY (Continued)

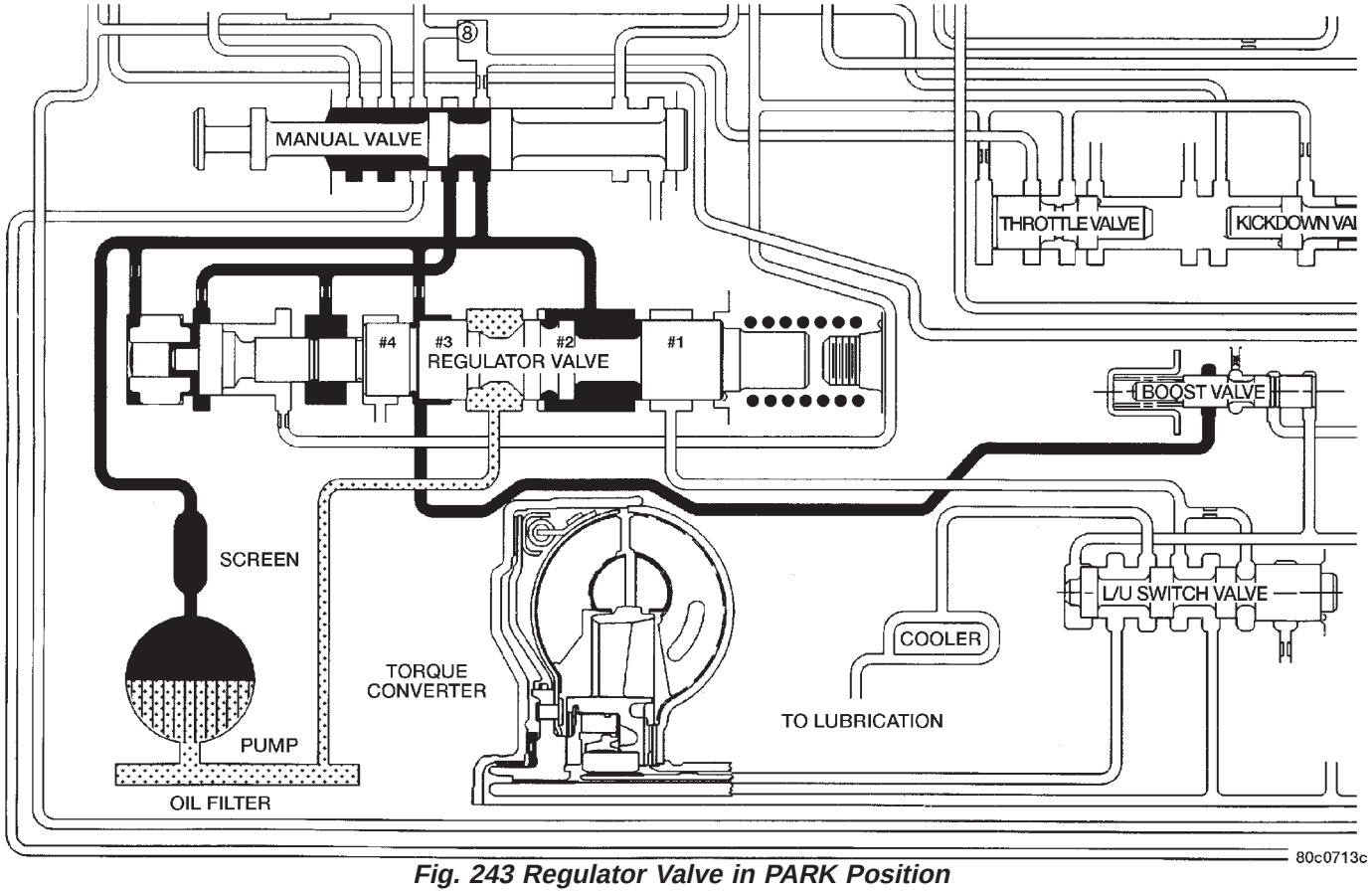


Fig. 243 Regulator Valve in PARK Position

The regulator valve (Fig. 243) has a spring on one end that pushes the valve to the left. This closes a dump (vent) that is used to lower pressure. The closing of the dump will cause the oil pressure to increase. Oil pressure on the opposite end of the valve pushes the valve to the right, opening the dump and lowering oil pressure. The result is spring pressure working against oil pressure to maintain the oil at specific pressures. With the engine running, fluid flows from the pump to the pressure regulator valve, manual valve, and the interconnected circuits. As fluid is sent through passages to the regulator valve, the pressure pushes the valve to the right against the large spring. It is also sent to the reaction areas on the left side of the throttle pressure plug and the line pressure plug. With the gear selector in the PARK position, fluid recirculates through the regulator and manual valves back to the sump.

Meanwhile, the torque converter is filled slowly. In all other gear positions (Fig. 244), fluid flows between two right side lands to the switch valve and torque converter. At low pump speeds, the flow is controlled by the pressure valve groove to reduce pressure to the torque converter. After the torque converter and switch valve fill with fluid, the switch valve becomes the controlling metering device for torque converter pressure. The regulator valve then begins to control the line pressure for the other transmission circuits. The balance of the fluid pressure pushing the valve to the right and the spring pressure pushing to the left determines the size of the metering passage at land #2 (land #1 being at the far right of the valve in the diagram). As fluid leaks past the land, it moves into a groove connected to the filter or sump. As the land meters the fluid to the sump, it causes the pressure to reduce and the spring decreases the size of the metering passage. When the size of the metering passage is reduced, the pressure rises again and the size of the land is increased again. Pressure is regulated by this constant balance of hydraulic and spring pressure.

The metering at land #2 establishes the line pressure throughout the transmission. It is varied according to changes in throttle position and the transmission's internal condition within a range of 57-94 psi (except in REVERSE) (Fig. 245). The regulated line pressure in REVERSE (Fig. 246) is held at much higher pressures than in the other gear positions: 145-280 psi. The higher pressure for REVERSE is achieved by the manual valve blocking the supply of line pressure to the reaction area left of land #4. With this pressure blocked, there is less area for pressure to act on to balance the force of the spring on the right. This allows line pressure to push the valve train to the right, reducing the amount of fluid returned to the pump's inlet, increasing line pressure.

VALVE BODY (Continued)

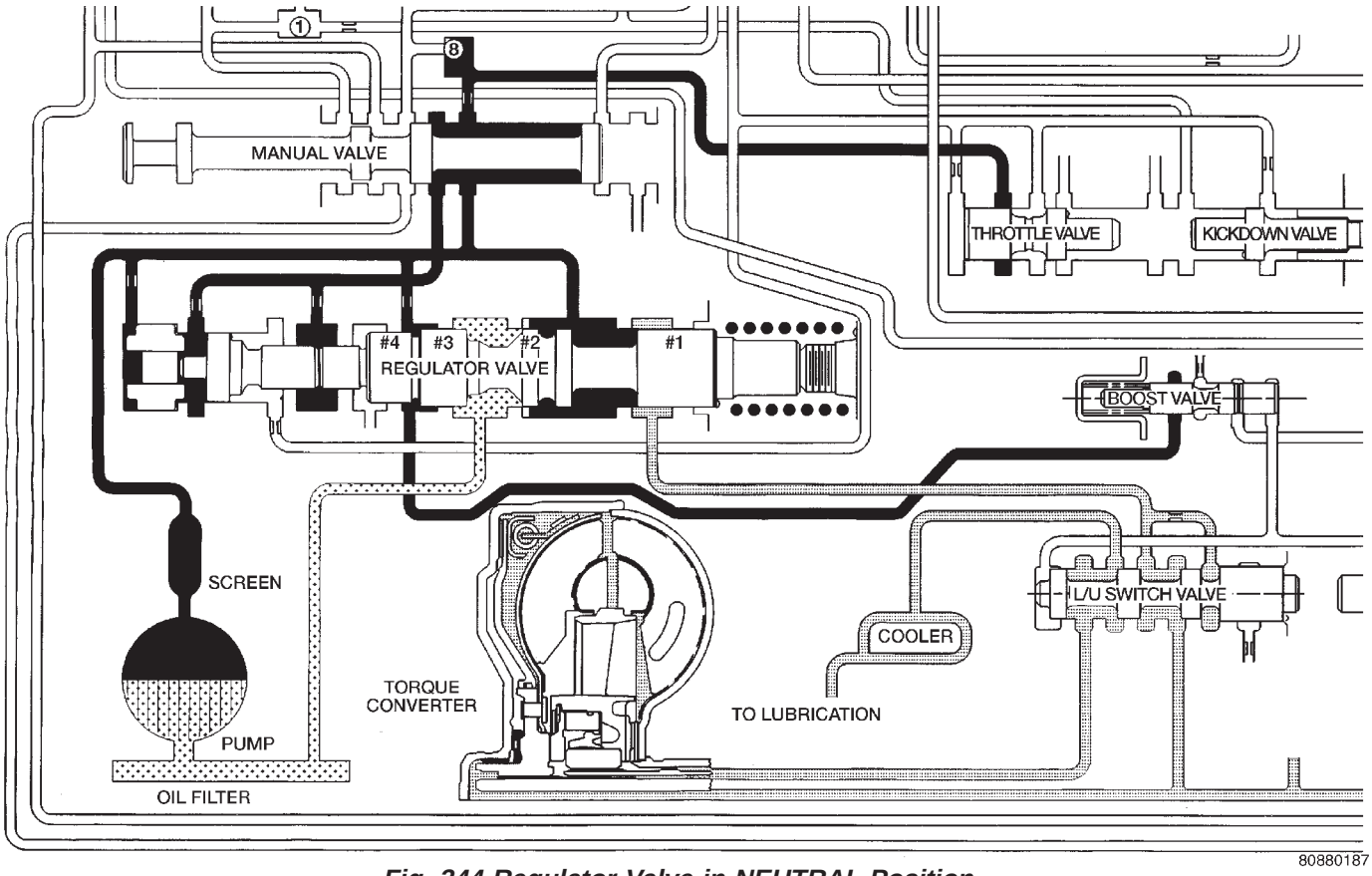


Fig. 244 Regulator Valve in NEUTRAL Position

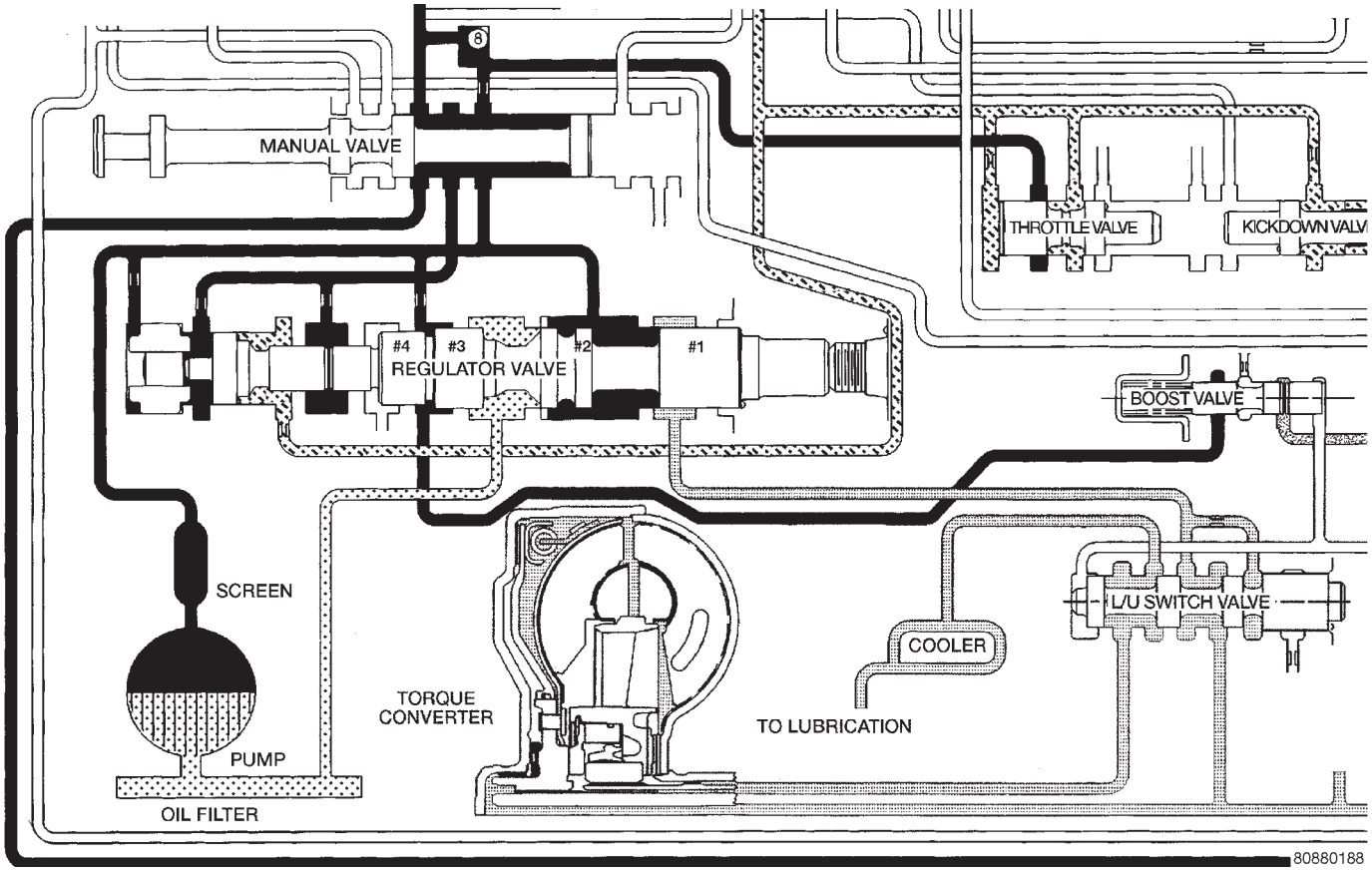


Fig. 245 Regulator Valve in DRIVE Position

VALVE BODY (Continued)

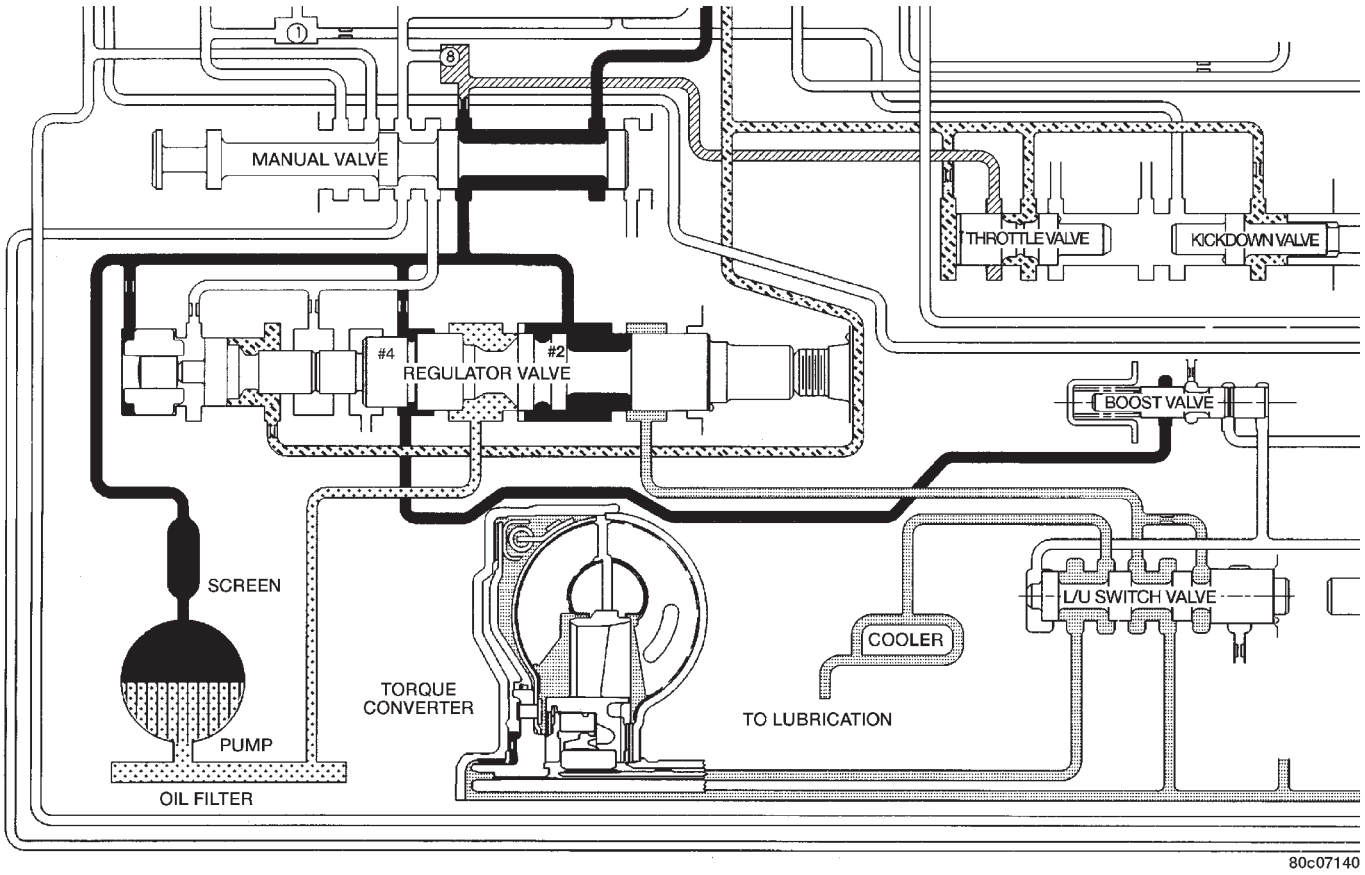


Fig. 246 Regulator Valve in REVERSE Position

KICKDOWN VALVE

When the throttle valve is as far over to the left as it can go, the maximum line pressure possible will enter the throttle pressure circuit. In this case, throttle pressure will equal line pressure. With the kickdown valve (Fig. 247) pushed into the bore as far as it will go, fluid initially flows through the annular groove of the 2-3 shift valve (which will be in the direct drive position to the right).

After passing the annular groove, the fluid is routed to the spring end of the 2-3 shift valve. Fluid pressure reacting on the area of land #1 overcomes governor pressure, downshifting the 2-3 shift valve into the kickdown, or second gear stage of operation. The valve is held in the kickdown position by throttle pressure routed from a seated check ball (#2). Again, if vehicle speed is low enough, throttle pressure will also push the 1-2 shift valve left to seat its governor plug, and downshift to drive breakaway.

KICKDOWN LIMIT VALVE

The purpose of the limit valve is to prevent a 3-2 downshift at higher speeds when a part-throttle downshift is not desirable. At these higher speeds only a full throttle 3-2 downshift will occur. At low road speeds (Fig. 248) the limit valve does not come into play and does not affect the downshifts. As the vehicle's speed increases (Fig. 249), the governor pressure also increases. The increased governor pressure acts on the reaction area of the bottom land of the limit valve overcoming the spring force trying to push the valve toward the bottom of its bore. This pushes the valve upward against the spring and bottoms the valve against the top of the housing. With the valve bottomed against the housing, the throttle pressure supplied to the valve will be closed off by the bottom land of the limit valve. When the supply of throttle pressure has been shut off, the 3-2 part throttle downshift plug becomes inoperative, because no pressure is acting on its reaction area.

VALVE BODY (Continued)

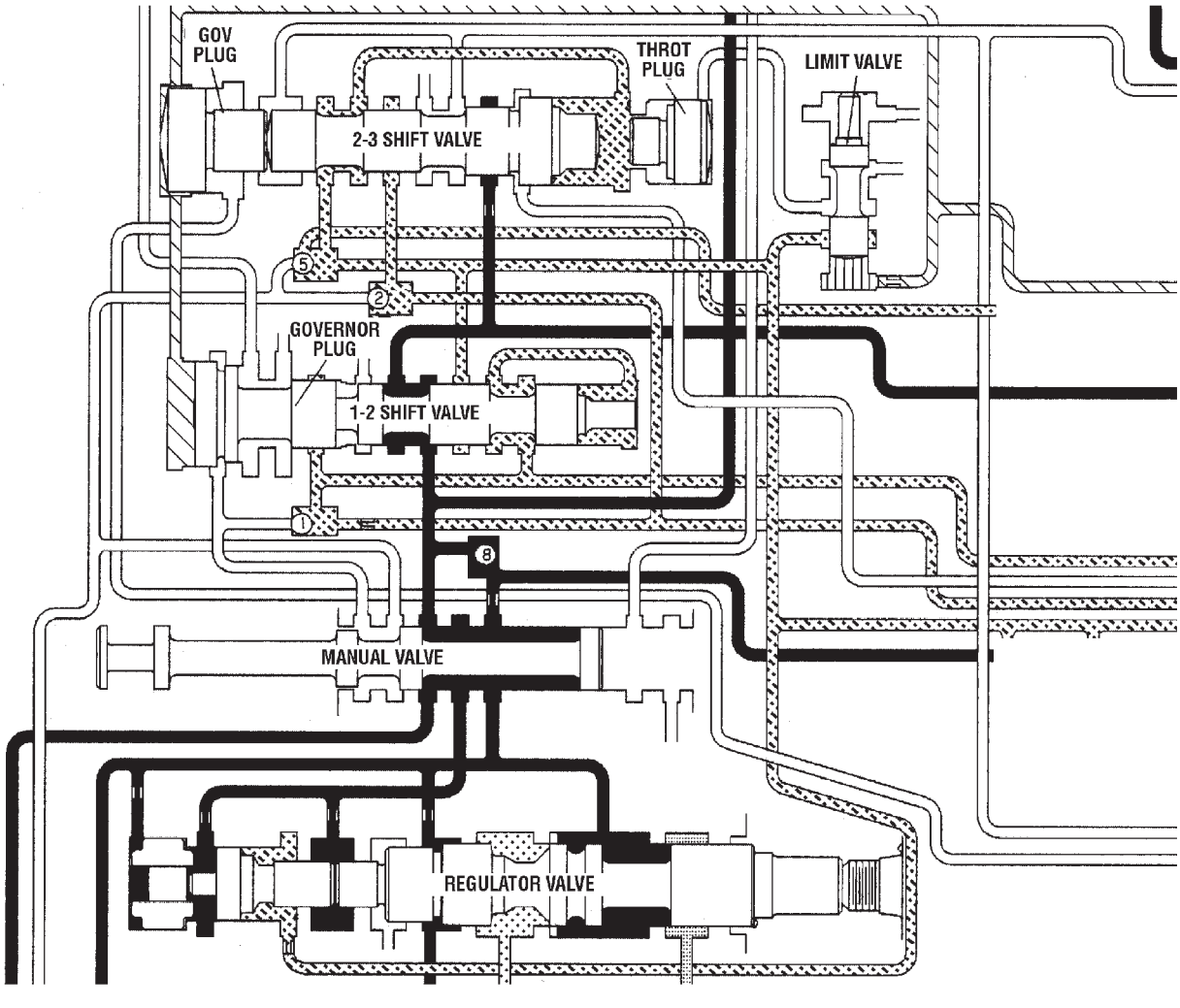


Fig. 247 Kickdown Valve-Wide Open Throttle

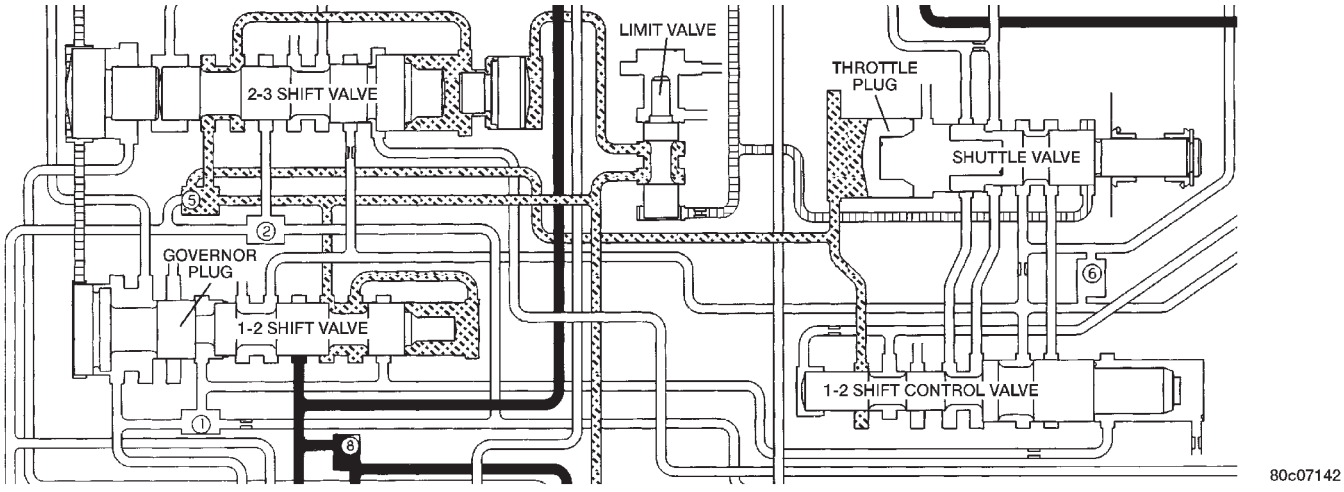


Fig. 248 Kickdown Limit Valve-Low Speeds

VALVE BODY (Continued)

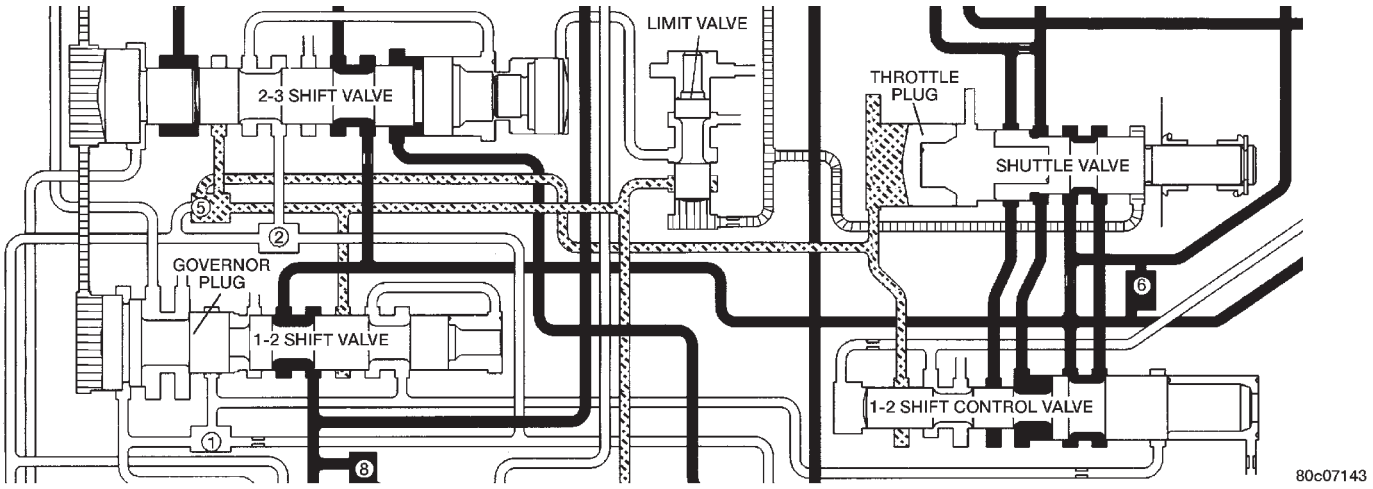


Fig. 249 Kickdown Limit Valve-High Speeds

1-2 SHIFT VALVE

The 1-2 shift valve assembly (Fig. 250), or mechanism, consists of: the 1-2 shift valve, governor plug, and a spring on the end of the valve. After the manual valve has been placed into a forward gear range, line pressure is directed to the 1-2 shift valve. As the throttle is depressed, throttle pressure is applied to the right side of the 1-2 shift valve assembly. With throttle pressure applied to the right side of the valve, there is now both spring pressure and throttle pressure acting on the valve, holding it against the governor plug. As the vehicle begins to move and build speed, governor pressure is created and is applied to the left of the valve at the governor plug.

When governor pressure builds to a point where it can overcome the combined force of the spring and throttle pressure on the other side of the valve, the valve will begin to move over to the right. As the valve moves to the right, the middle land of the valve will close off the circuit supplying the throttle pressure to the right side of the valve. When the throttle pressure is closed off, the valve will move even farther to the right, allowing line pressure to enter another circuit and energize the front servo, applying the front band (Fig. 251).

The governor plug serves a dual purpose:

- It allows the shift valves to move either left or right, allowing both upshifts and downshifts.
- When in a manual selection position, it will be hydraulically “blocked” into position so no upshift can occur.

The physical blocking of the upshift while in the manual “1” position is accomplished by the directing of line pressure between both lands of the governor plug. The line pressure reacts against the larger land of the plug, pushing the plug back against the end plate overcoming governor pressure. With the combination of the line pressure and spring pressure, the valve cannot move, preventing any upshift.

1-2 SHIFT CONTROL VALVE

It contains a valve with four lands and a spring. It is used as both a “relay” and “balanced” valve.

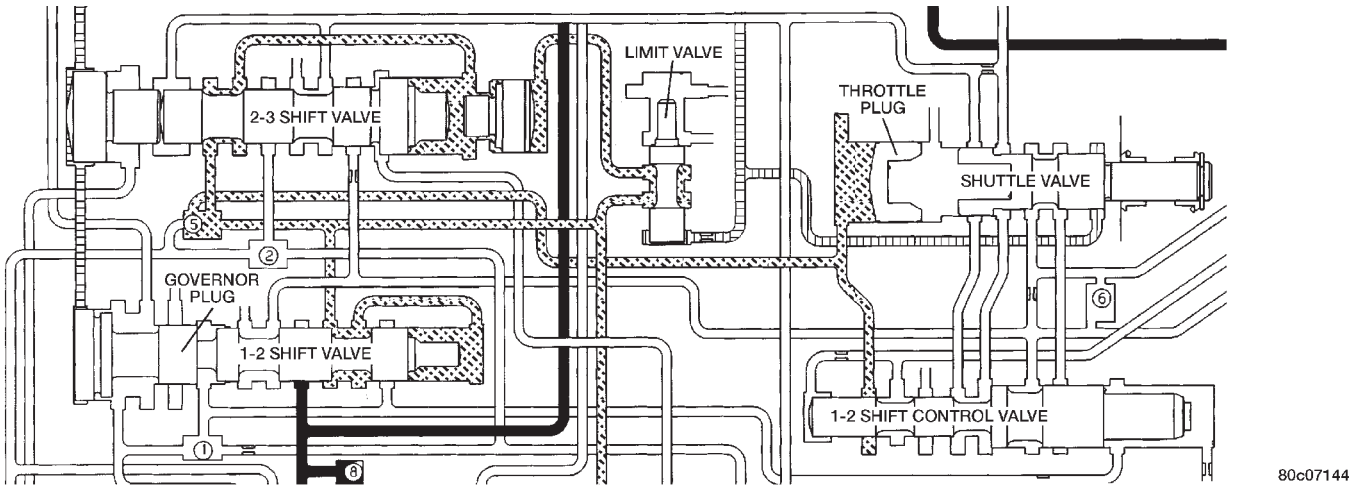


Fig. 250 1-2 Shift Valve-Before Shift

VALVE BODY (Continued)

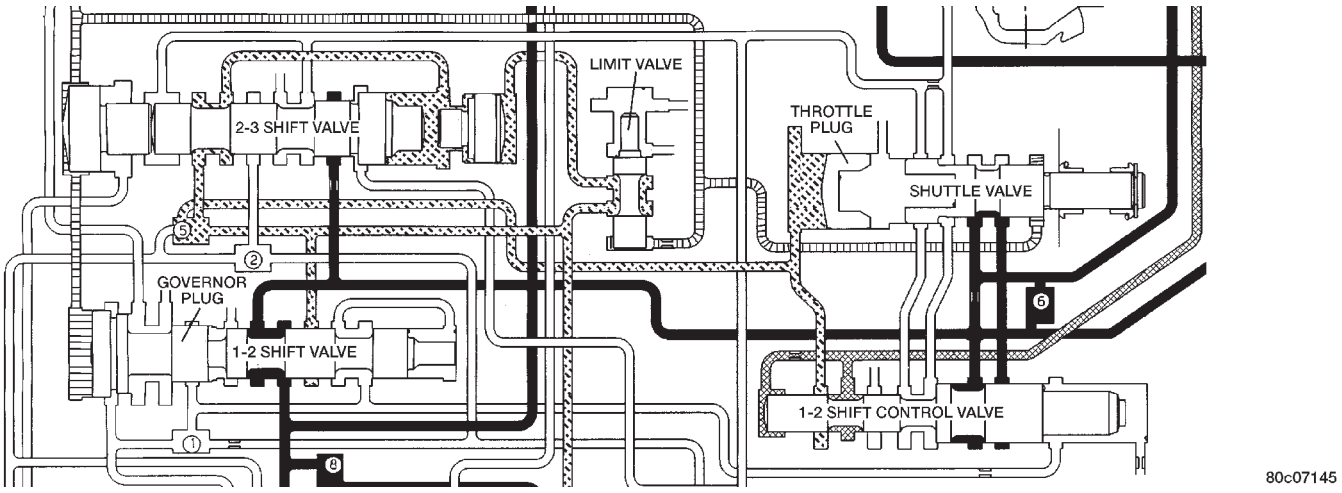


Fig. 251 1-2 Shift Valve-After Shift

The valve has two specific operations (Fig. 252):

- Aid in quality of the 1-2 upshift.
- Aid in the quality and timing of the 3-2 kickdown ranges.

When the manual valve is set to the DRIVE position and the transmission is in the first or second gear range, 1-2 shift control or "modulated throttle pressure" is supplied to the middle of the accumulator piston by the 1-2 shift control valve. During the 1-2 upshift, this pressure is used to control the kickdown servo apply pressure that is needed to apply the kickdown and accumulator pistons. Thus, the 1-2 shift point is "cushioned" and the quality is improved. During a WOT kickdown, kickdown pressure is applied between the kickdown valve and the 1-2 shift control valve. This additional pressure is directed to the 1-2 shift control's spring cavity, adding to the spring load on the valve. The result of this increased "modulated" throttle pressure is a firmer WOT upshift.

2-3 SHIFT VALVE

The 2-3 shift valve mechanism (Fig. 253) consists of the 2-3 shift valve, governor plug and spring, and a throttle plug. After the 1-2 shift valve has completed its operation and applied the front band, line pressure is directed to the 2-3 shift valve through the connecting passages from the 1-2 shift valve. The line pressure will then dead–end at land #2 until the 2-3 valve is ready to make its shift. Now that the vehicle is in motion and under acceleration, there is throttle pressure being applied to the spring side of the valve and between lands #3 and #4.

As vehicle speed increases, governor pressure increases proportionately, until it becomes great enough to overcome the combined throttle and spring pressure on the right side of the valve. Since the throttle pressure end of the 2-3 shift valve is larger in diameter than the 1-2 shift valve, the 2-3 shift will always happen at a greater speed than the 1-2 shift. When this happens, the governor plug is forced against the shift valve moving it to the right. The shift valve causes land #4 to close the passage supplying throttle pressure to the 2-3 shift valve. Without throttle pressure present in the circuit now, the governor plug will push the valve over far enough to bottom the valve in its bore. This allows land #2 to direct line pressure to the front clutch.

VALVE BODY (Continued)

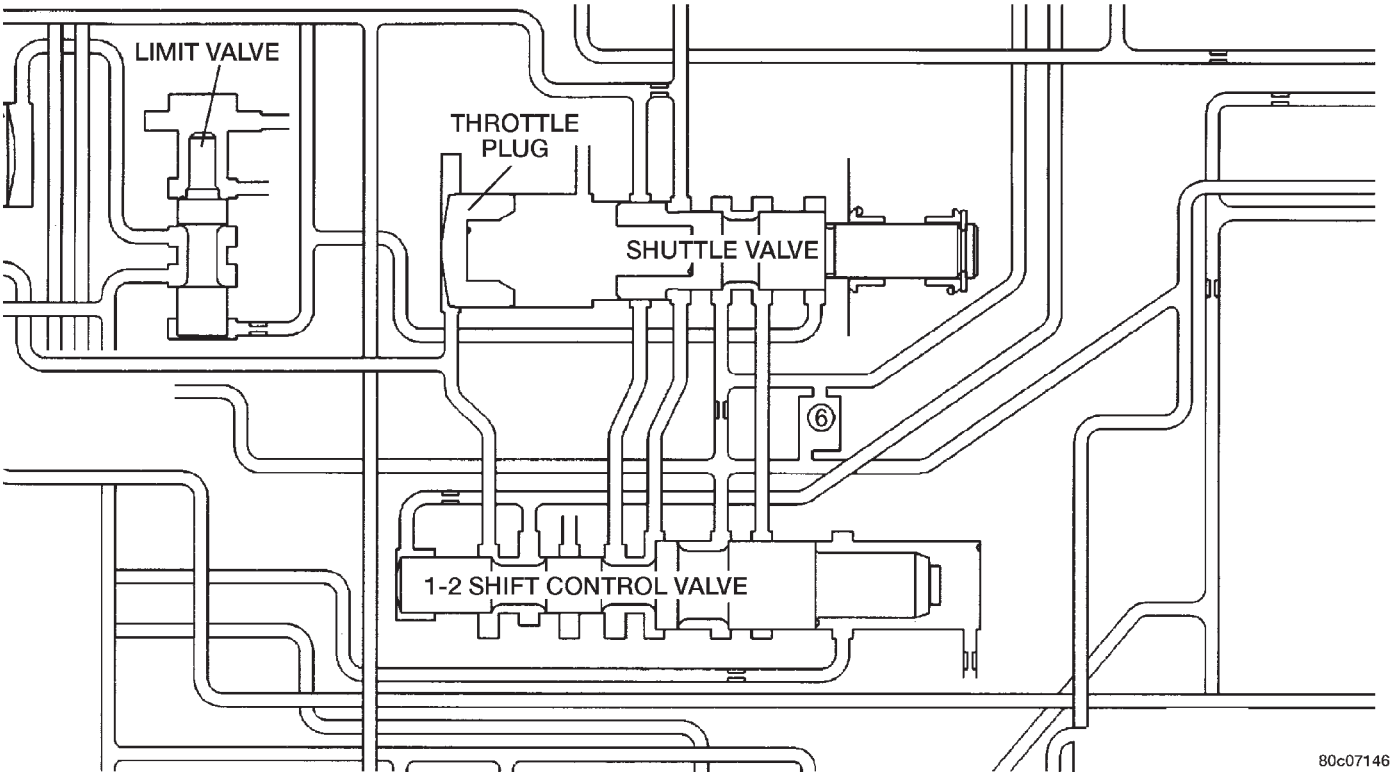


Fig. 252 1-2 Shift Control Valve

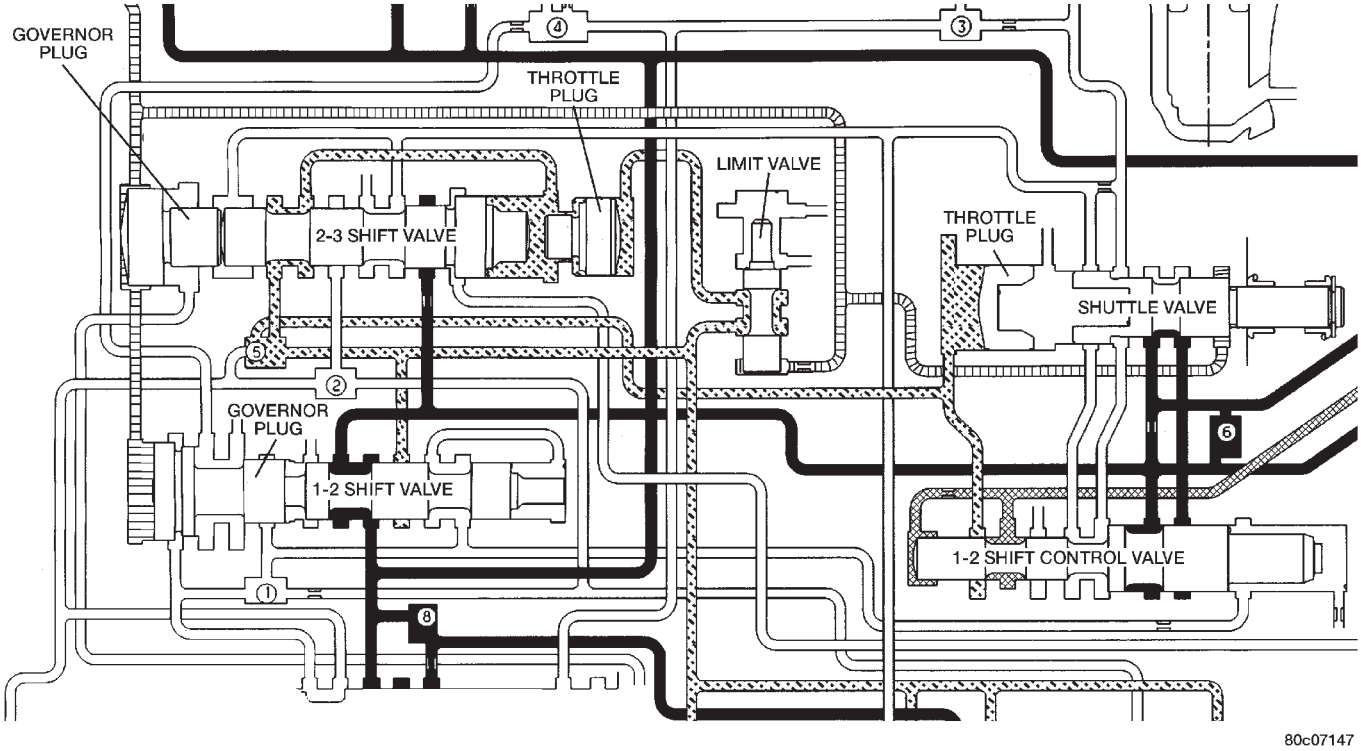


Fig. 253 2-3 Shift Valve-Before Shift

VALVE BODY (Continued)

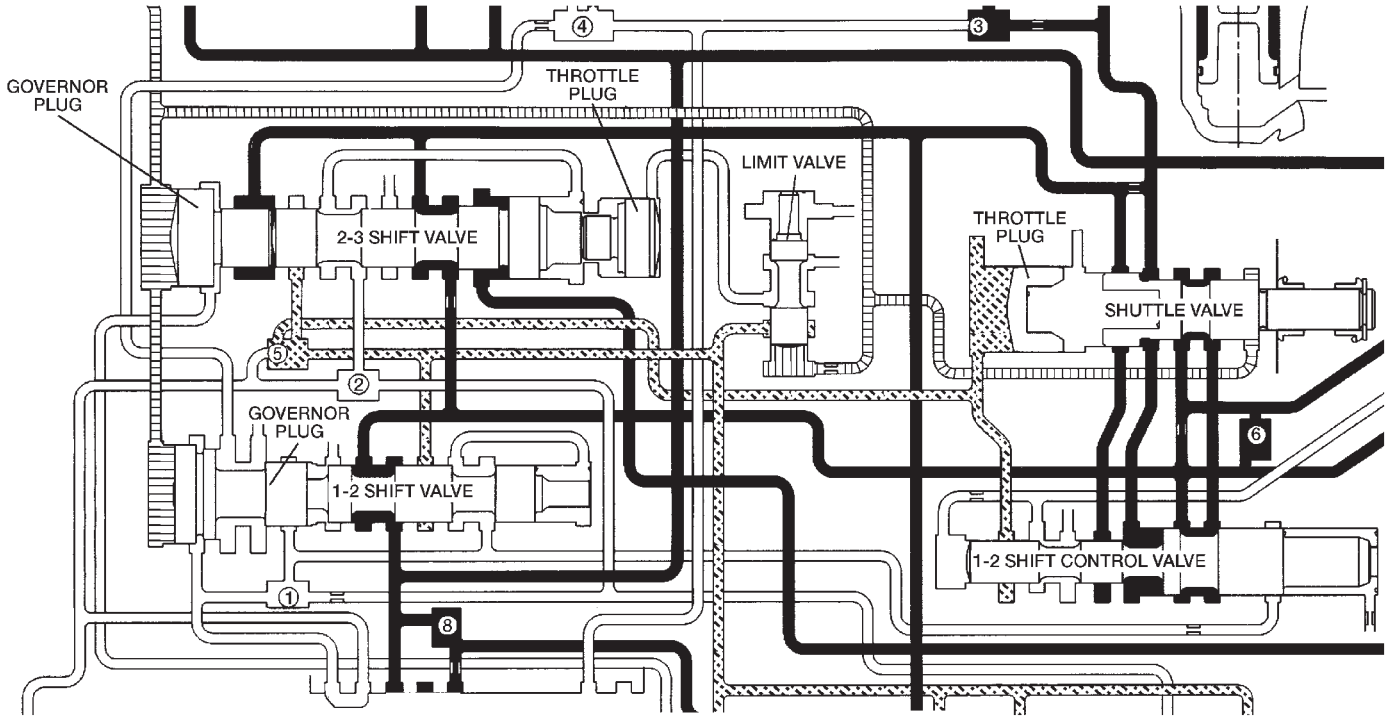


Fig. 254 2-3 Shift Valve-After Shift

After the shift (Fig. 254), line pressure is directed to the land between the shift valve and the governor plug, and to the release side of the kickdown servo. This releases the front band and applies the front clutch, shifting into third gear or direct drive. The rear clutch remains applied, as it has been in the other gears. During a manual “1” or manual “2” gear selection, line pressure is sent between the two lands of the 2-3 governor plug. This line pressure at the governor plug locks the shift valve into the second gear position, preventing an upshift into direct drive. The theory for the blocking of the valve is the same as that of the 1-2 shift valve.

3-4 SHIFT VALVE

The PCM energizes the overdrive solenoid during the 3-4 upshift (Fig. 255). 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 (Fig. 256). 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.

3-4 TIMING VALVE

The 3-4 timing valve is moved by line pressure coming through the 3-4 shift valve (Fig. 256). After the shift, the timing valve holds the 2-3 shift valve in an upshift position. The purpose is to prevent the 2-3 valve from downshifting before the 3-4 valve (Fig. 255).

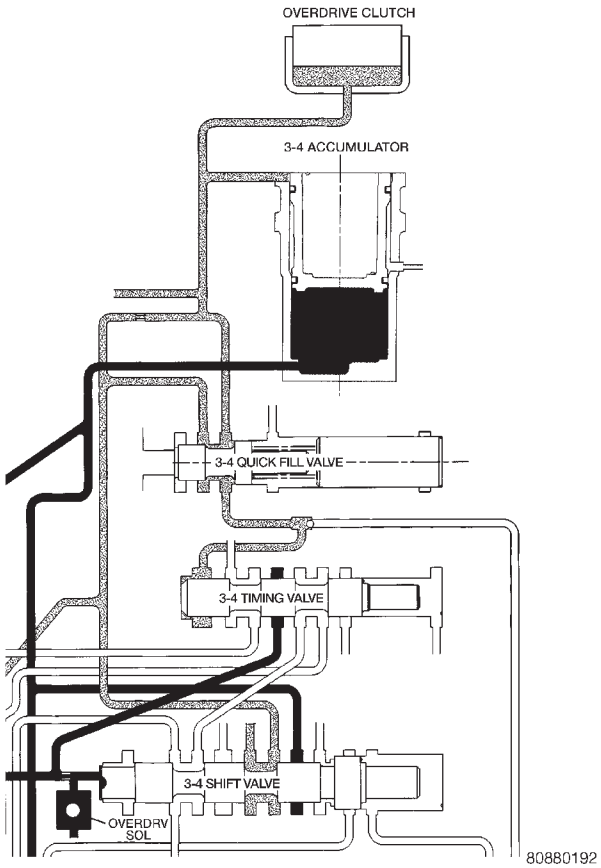


Fig. 255 3-4 Shift Valve Before Shift

VALVE BODY (Continued)

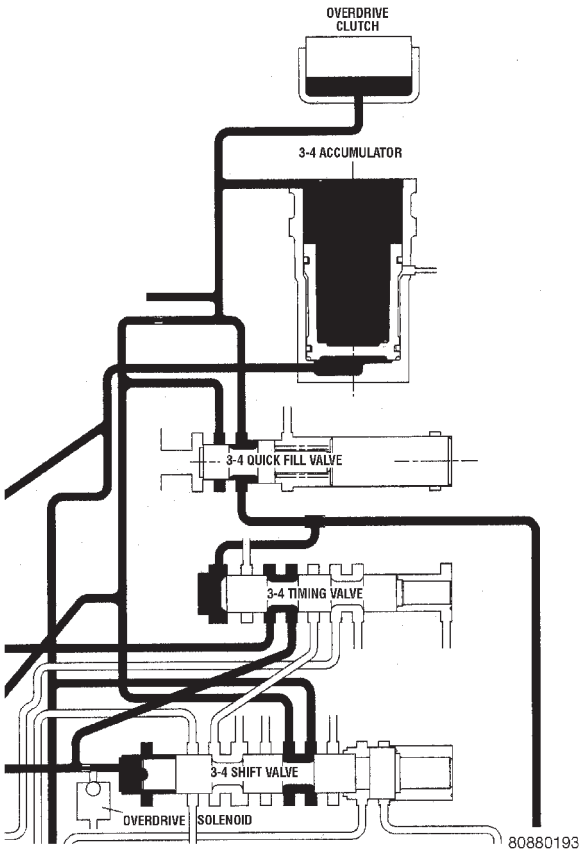


Fig. 256 3-4 Shift Valve After Shift

3-4 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 (Fig. 255). 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 (Fig. 256). Clutch fill is then completed through the regular feed orifice.

THROTTLE VALVE

In all gear positions the throttle valve (Fig. 257) is being supplied with line pressure. The throttle valve meters and reduces the line pressure that now becomes throttle pressure. The throttle valve is moved by a spring and the kickdown valve, which is mechanically connected to the throttle. The larger the throttle opening, the higher the throttle pressure (to a maximum of line pressure). The smaller the throttle opening, the lower the throttle pressure (to a minimum of zero at idle). As engine speed increases, the increase in pump speed increases pump output. The increase in pressure and volume must be regulated to maintain the balance within the transmission. To do this, throttle pressure is routed to the reaction area on the right side of the throttle pressure plug (in the regulator valve).

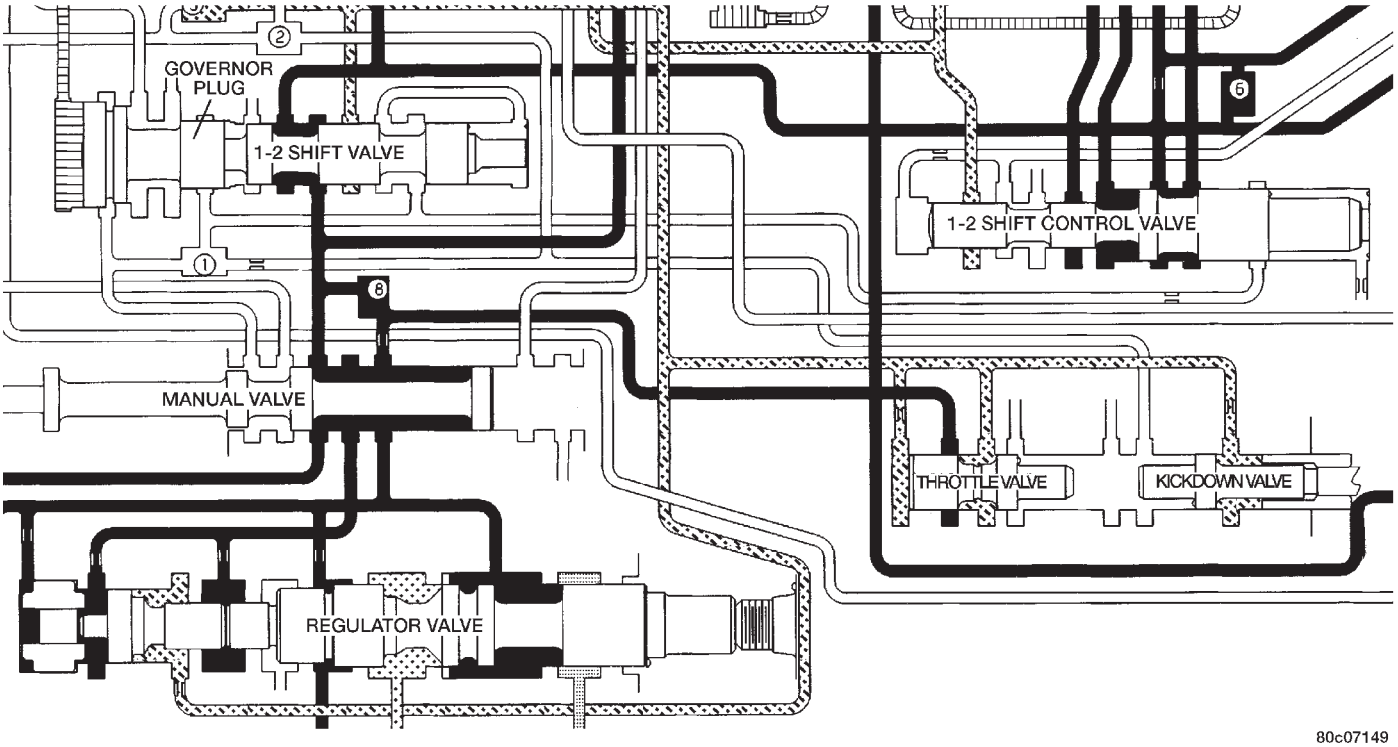


Fig. 257 Throttle Valve

VALVE BODY (Continued)

The higher engine speed and line pressure would open the vent too far and reduce line pressure too much. Throttle pressure, which increases with engine speed (throttle opening), is used to oppose the movement of the pressure valve to help control the metering passage at the vent. The throttle pressure is combined with spring pressure to reduce the force of the throttle pressure plug on the pressure valve. The larger spring at the right closes the regulator valve passage and maintains or increases line pressure. The increased line pressure works against the reaction area of the line pressure plug and the reaction area left of land #3 simultaneously moves the regulator valve train to the right and controls the metering passage.

The kickdown valve, along with the throttle valve, serve to delay upshifts until the correct vehicle speed has been reached. It also controls downshifts upon driver demand, or increased engine load. If these valves were not in place, the shift points would be at the same speed for all throttle positions. The kickdown valve is actuated by a cam connected to the throttle. This is accomplished through either a linkage or a cable. The cam forces the kickdown valve toward the throttle valve compressing the spring between them and moving the throttle valve. As the throttle valve land starts to uncover its port, line pressure is “metered” out into the circuits and viewed as throttle pressure. This increased throttle pressure is metered out into the circuits it is applied to: the 1-2 and 2-3 shift valves. When the throttle pressure is high enough, a 3-2 downshift will occur. If the vehicle speed is low enough, a 2-1 downshift will occur.

SWITCH VALVE

When the transmission is in Drive Second before the TCC application occurs (Fig. 258), the pressure regulator valve is supplying torque converter pressure to the switch valve. The switch valve directs this pressure through the transmission input shaft, into the converter, through the converter, back out between the input shaft and the reaction shaft, and back up to the switch valve. From the switch valve, the fluid pressure is directed to the transmission cooler, and lubrication pressure returns from the cooler to lubricate different portions of the transmission.

Once the TCC control valve has moved to the right (Fig. 259), line pressure is directed to the tip of the switch valve, forcing the valve to the right. The switch valve now vents oil from the front of the piston in the torque converter, and supplies line pressure to the (rear) apply side of the torque converter piston. This pressure differential causes the piston to apply against the friction material, cutting off any further flow of line pressure oil. After the switch valve is shuttled right allowing line pressure to engage the TCC, torque converter pressure is directed past the switch valve into the transmission cooler and lubrication circuits.

MANUAL VALVE

The manual valve (Fig. 260) is a relay valve. The purpose of the manual valve is to direct fluid to the correct circuit needed for a specific gear or driving range. The manual valve, as the name implies, is manually operated by the driver with a lever located on the side of the valve body. The valve is connected mechanically by either a cable or linkage to the gearshift mechanism. The valve is held in each of its positions by a spring-loaded roller or ball that engages the “roostercomb” of the manual valve lever.

CONVERTER CLUTCH LOCK-UP VALVE

The torque converter clutch (TCC) lock-up valve controls the back (ON) side of the torque converter clutch. When the PCM energizes the TCC solenoid to engage the converter clutch piston, pressure is applied to the TCC lock-up valve which moves to the right and applies pressure to the torque converter clutch.

CONVERTER CLUTCH LOCK-UP TIMING VALVE

The torque converter clutch (TCC) lock-up timing valve is there to block any 4-3 downshift until the TCC is completely unlocked and the clutch is disengaged.

VALVE BODY (Continued)

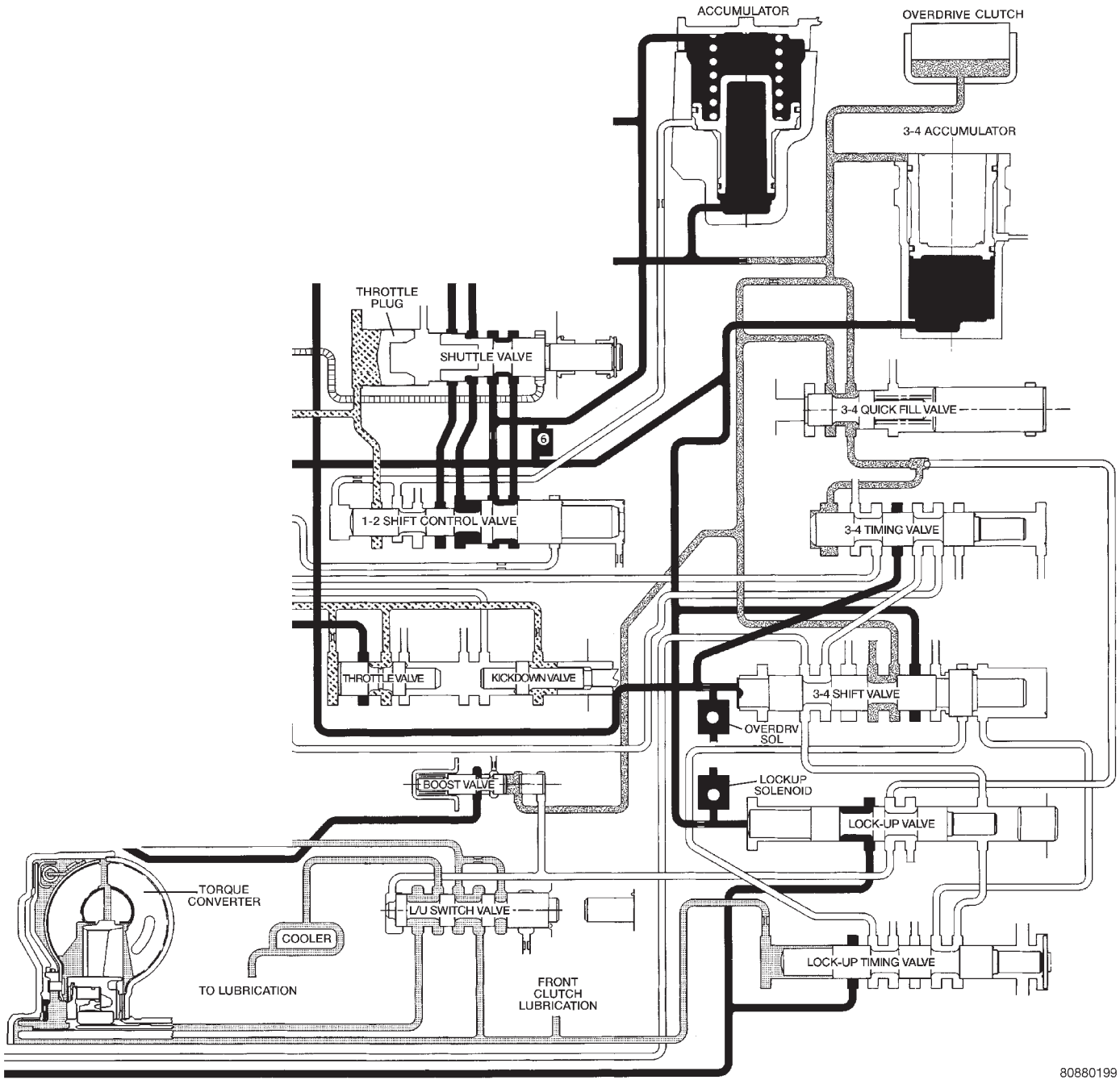


Fig. 258 Switch Valve-Torque Converter Unlocked

SHUTTLE VALVE

The assembly is contained in a bore in the valve body above the shift valves. When the manual valve is positioned in the Drive range, throttle pressure acts on the throttle plug of the shuttle valve (Fig. 252) to move it against a spring, increasing the spring force on the shuttle valve. During a part or full throttle 1-2 upshift, the throttle plug is bottomed by throttle pressure, holding the shuttle valve to the right against governor pressure, and opening a by–pass circuit. The shuttle valve controls the quality of the kickdown shift by restricting the rate of fluid discharge from the front clutch and servo release circuits. During a 3-2 kickdown, fluid discharges through the shuttle by-pass circuit. When the shuttle valve closes the by-pass circuit, fluid discharge is restricted and controlled for the application of the front band. During a 2-3 “lift foot” upshift, the shuttle valve by-passes the restriction to allow full fluid flow through the by-pass groove for a faster release of the band.

VALVE BODY (Continued)

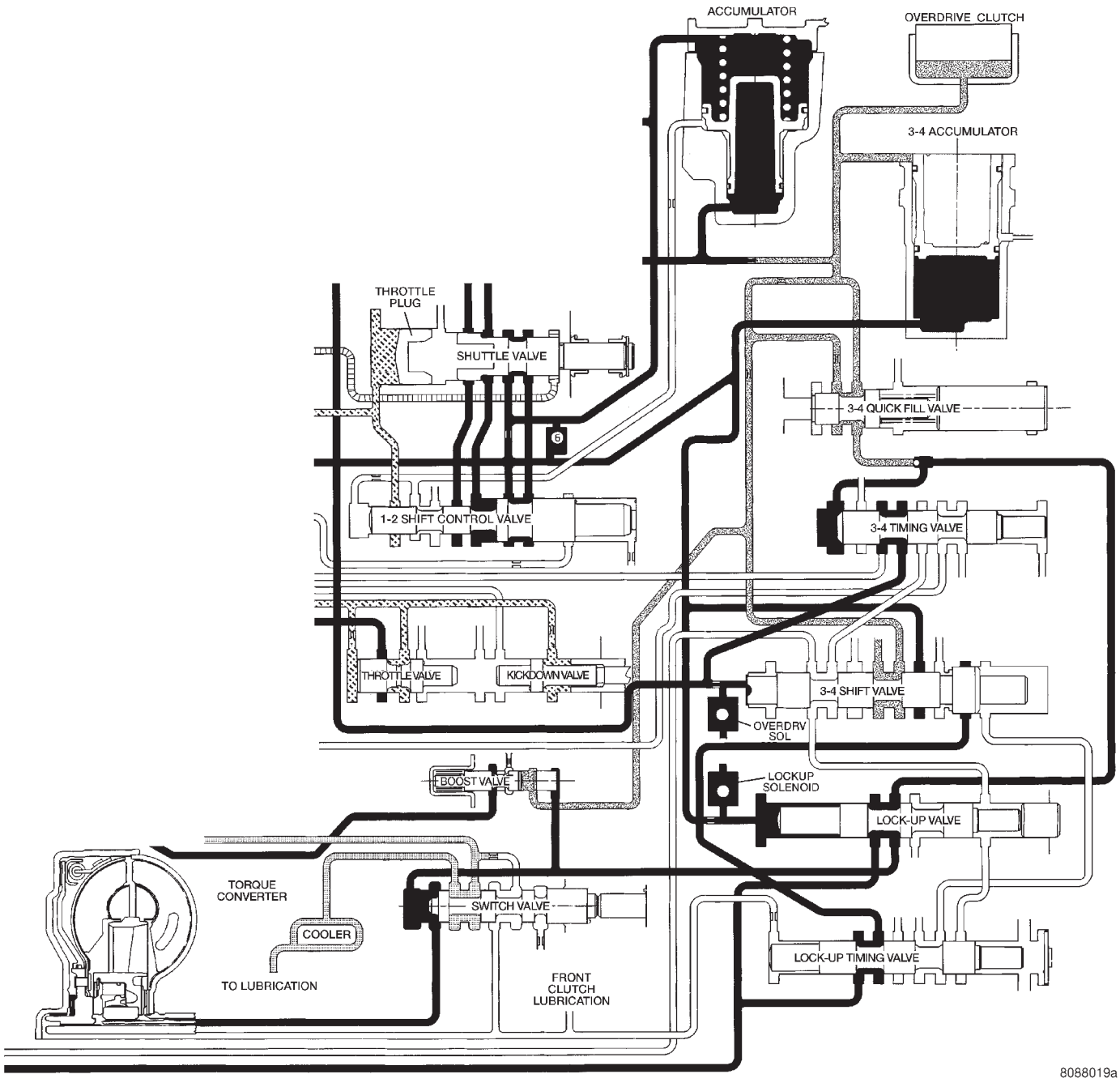


Fig. 259 Switch Valve-Torque Converter Locked

BOOST VALVE

The boost valve (Fig. 261) provides increased fluid apply pressure to the overdrive clutch during 3-4 upshifts (Fig. 262), and when accelerating in fourth gear. The boost valve also serves to increase line pressure during torque converter lock-up.

REMOVAL

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

The valve body can be disassembled for cleaning and inspection of the individual components.

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 (includes transmission temperature thermistor).

VALVE BODY (Continued)

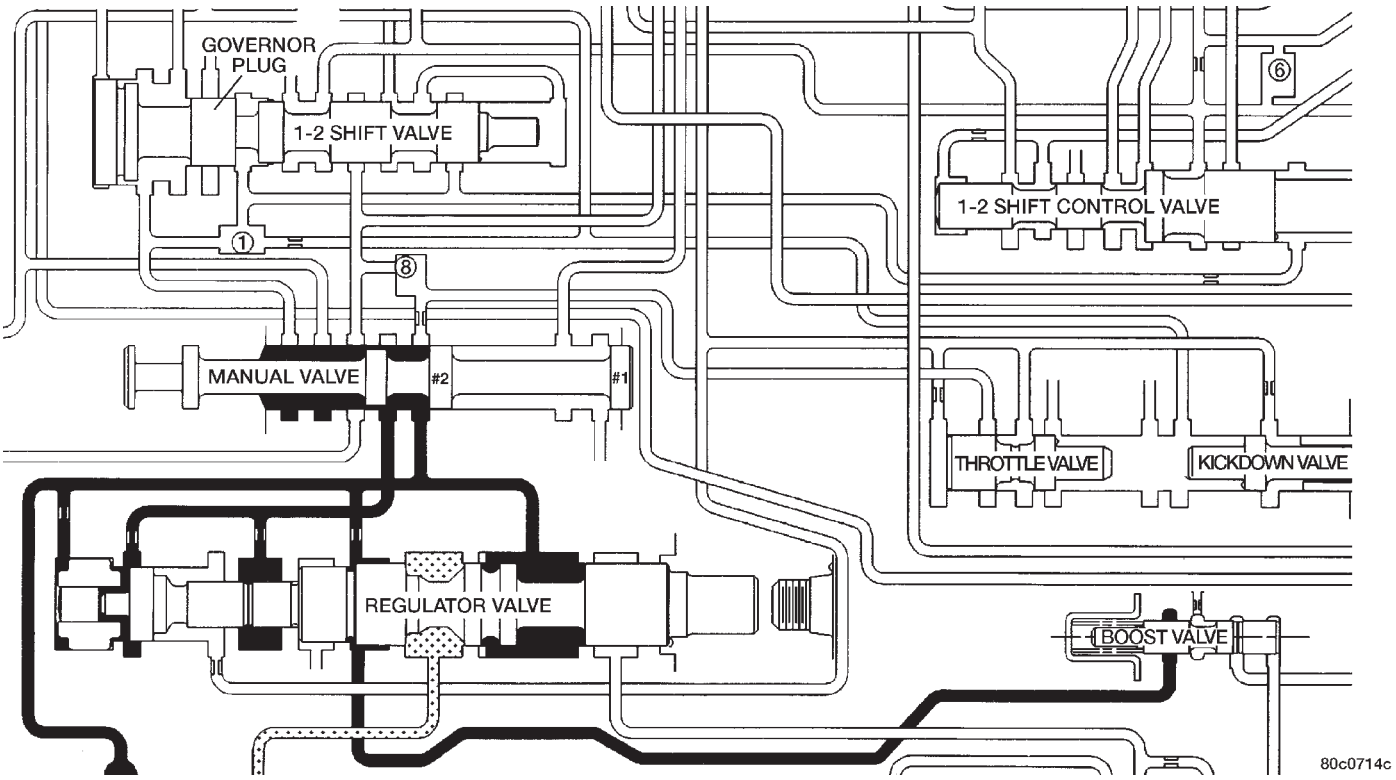


Fig. 260 Manual Valve

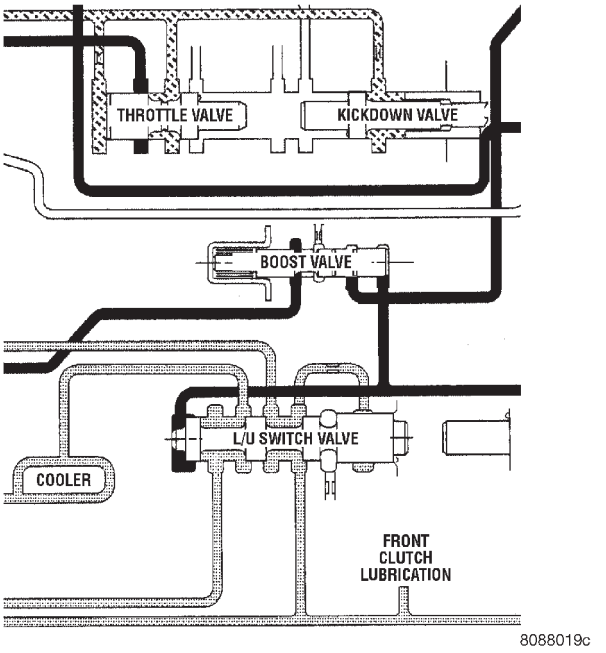


Fig. 261 Boost Valve Before Lock-up

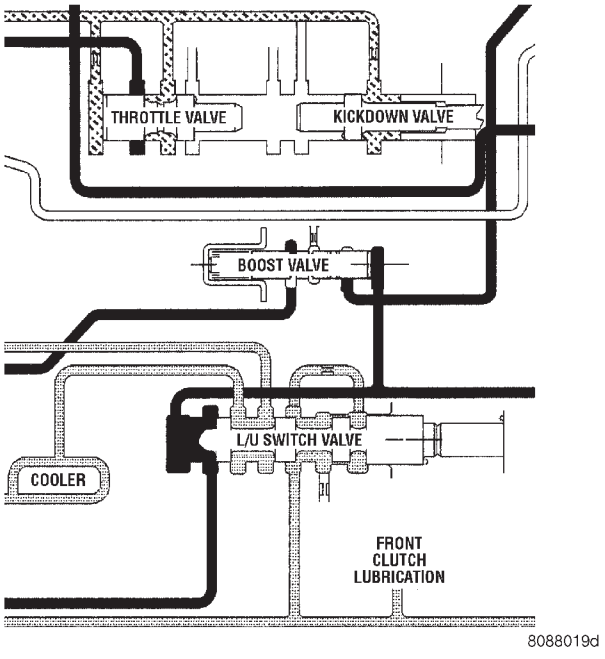


Fig. 262 Boost Valve After Lock-up

- Converter clutch/overdrive solenoid assembly and harness.
- Governor housing gasket.
- Solenoid case connector O-rings.

(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. 263).
(5) Position drain pan under transmission oil pan.
(6) Remove transmission oil pan and gasket.
(7) Remove fluid filter from valve body.

VALVE BODY (Continued)

(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.

(11) Lower valve body, rotate valve body away from case, pull park rod out of sprag, and remove valve body (Fig. 264).

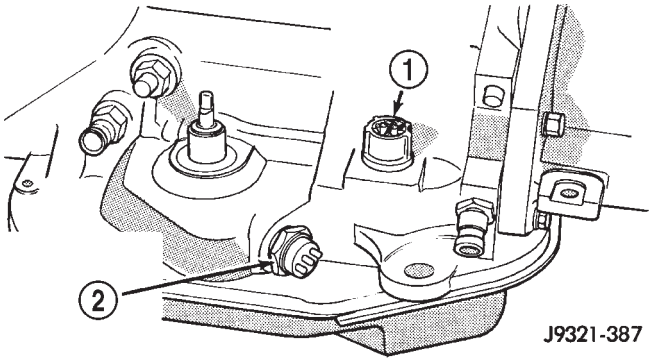


Fig. 263 Transmission Case Connector

1 - SOLENOID CASE CONNECTOR
2 - PARK/NEUTRAL POSITION SWITCH

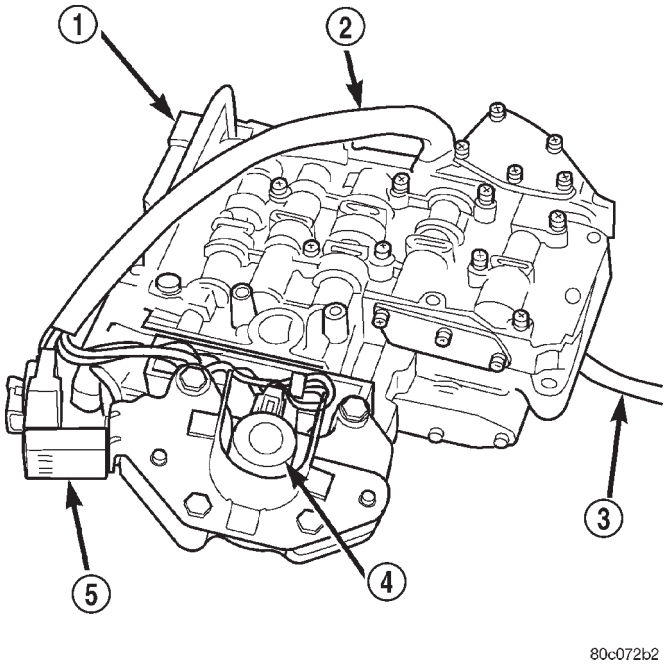


Fig. 264 Valve Body

1 - VALVE BODY
2 - WIRE HARNESS
3 - PARK ROD
4 - GOVERNOR PRESSURE SOLENOID
5 - GOVERNOR PRESSURE SENSOR

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) Disconnect wires from governor pressure sensor and solenoid.

(2) Remove screws attaching governor body and retainer plate to transfer plate.

(3) Remove retainer plate, governor body and gasket from transfer plate.

(4) Remove governor pressure sensor from governor body.

(5) 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.

(6) Remove small shoulder bolt that secures solenoid harness case connector to 3-4 accumulator housing (Fig. 265). Retain shoulder bolt. Either tape it to harness or thread it back into accumulator housing after connector removal.

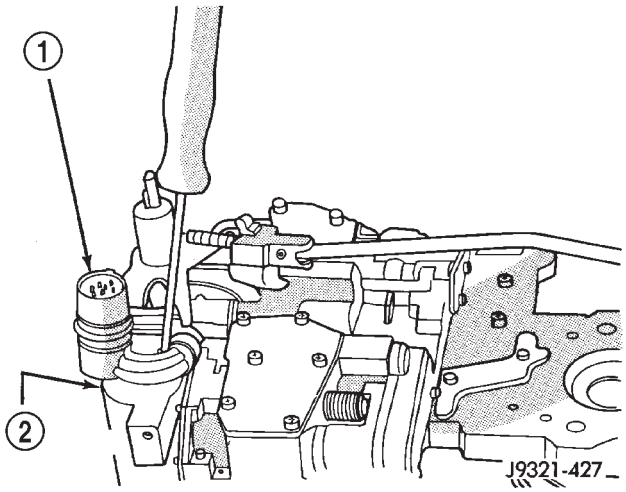


Fig. 265 Solenoid Harness Case Connector Shoulder Bolt

1 - SOLENOID HARNESS CASE CONNECTOR
2 - 3-4 ACCUMULATOR HOUSING

VALVE BODY (Continued)

(7) Unhook overdrive/converter solenoid harness from 3-4 accumulator cover plate (Fig. 266).

(8) Turn valve body over and remove screws that attach overdrive/converter solenoid assembly to valve body (Fig. 267).

(9) Remove solenoid and harness assembly from valve body (Fig. 268).

(10) Remove boost valve cover (Fig. 269).

(11) Remove boost valve retainer, valve spring and boost valve (Fig. 270).

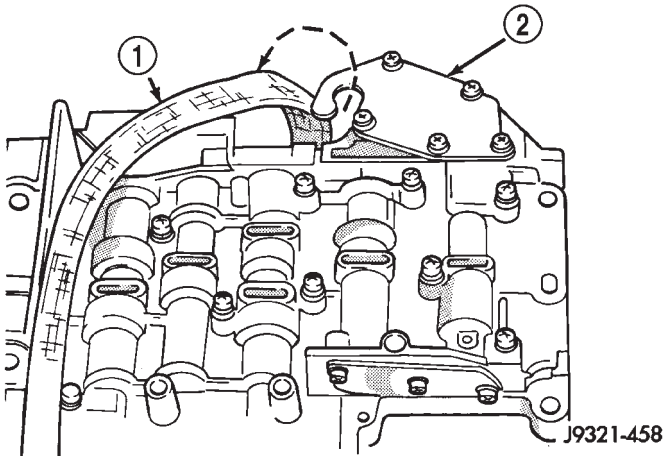


Fig. 266 Solenoid Harness Routing

1 - OVERDRIVE/CONVERTER SOLENOID WIRE HARNESS
2 - 3-4 ACCUMULATOR COVER PLATE

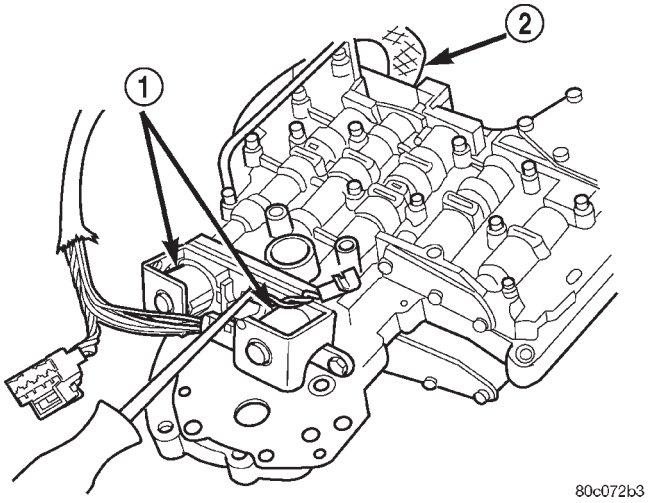


Fig. 267 Solenoid Assembly Screws

1 - OVERDRIVE/CONVERTER CLUTCH SOLENOID ASSEMBLY
2 - HARNESS

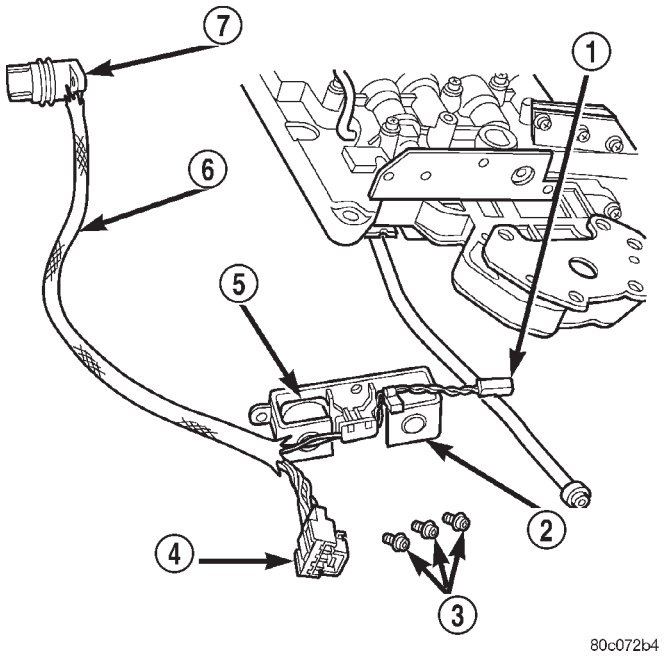


Fig. 268 Solenoid Assembly

1 - GOVERNOR SOLENOID WIRES
2 - CONVERTER CLUTCH SOLENOID
3 - SOLENOID SCREWS
4 - GOVERNOR SENSOR WIRES
5 - OVERDRIVE SOLENOID
6 - HARNESS
7 - CASE CONNECTOR

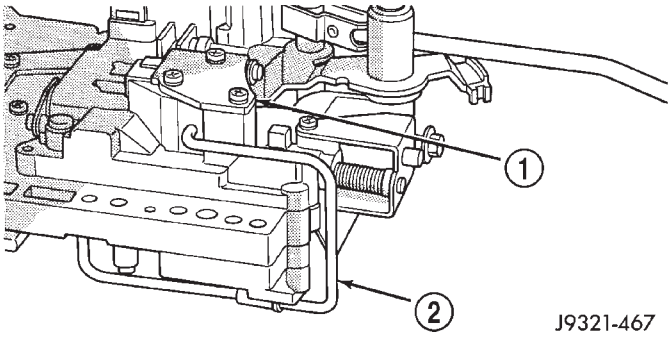


Fig. 269 Boost Valve Cover Location

1 - BOOST VALVE HOUSING AND COVER
2 - BOOST VALVE TUBE

VALVE BODY (Continued)

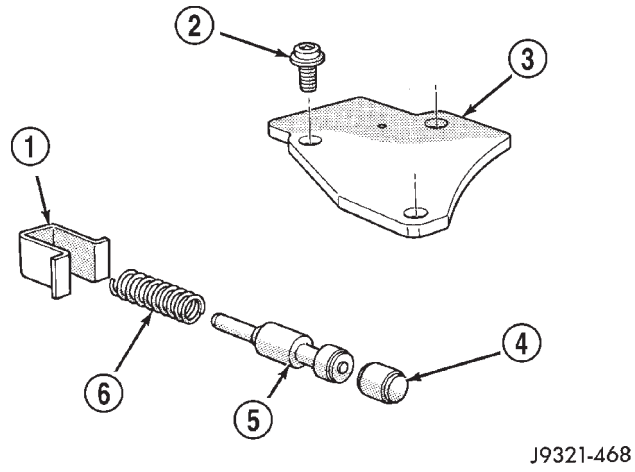


Fig. 270 Boost Valve Components

1 - SPRING AND VALVE RETAINER
2 - COVER SCREWS
3 - BOOST VALVE COVER
4 - BOOST VALVE PLUG
5 - BOOST VALVE
6 - BOOST VALVE SPRING

(12) Secure detent ball and spring with Retainer Tool 6583 (Fig. 271).

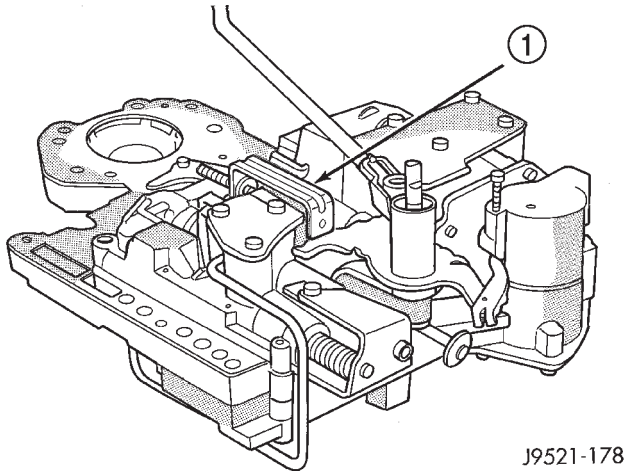


Fig. 271 Detent Ball Spring

1 - SPECIAL TOOL 6583 POSITIONED ON DETENT HOUSING

(13) Remove park rod E-clip and separate rod from manual lever (Fig. 272).

(14) Remove E-clip and washer that retains throttle lever shaft in manual lever (Fig. 273).

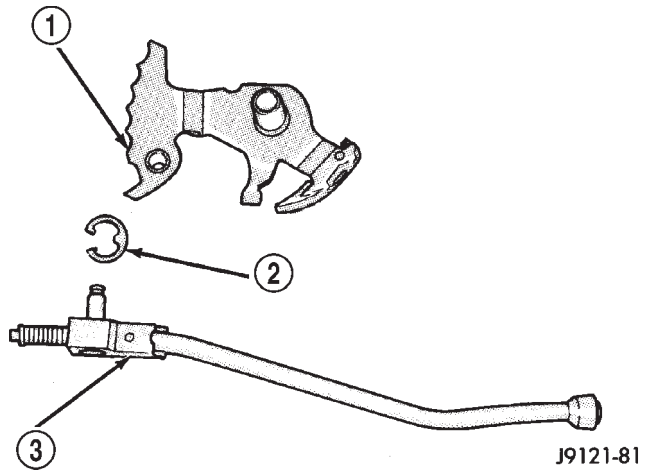


Fig. 272 Park Rod

1 - MANUAL LEVER
2 - E-CLIP
3 - PARK ROD

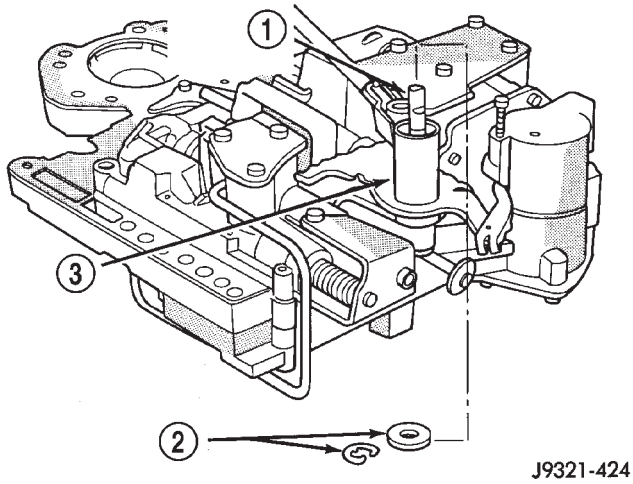


Fig. 273 Throttle Lever E-Clip And Washer

1 - THROTTLE LEVER SHAFT
2 - E-CLIP AND WASHER
3 - MANUAL SHAFT

VALVE BODY (Continued)

(15) Remove manual lever and throttle lever (Fig. 274). Rotate and lift manual lever off valve body and throttle lever shaft. Then slide throttle lever out of valve body.

(16) 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. 275).

(17) Remove screws attaching pressure adjusting screw bracket to valve body and transfer plate (Fig. 276). Hold bracket firmly against spring tension while removing last screw.

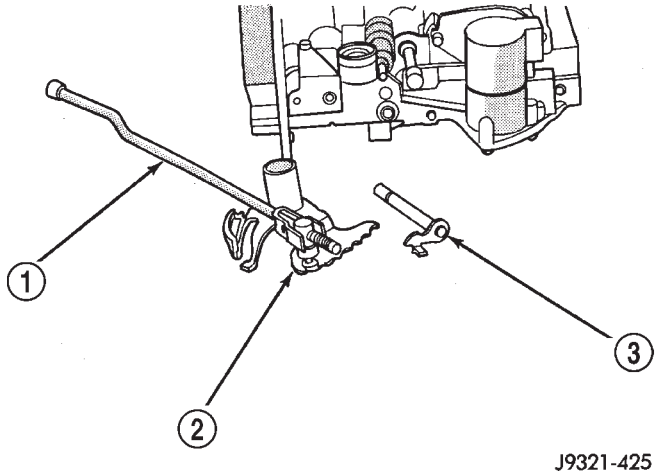


Fig. 274 Manual And Throttle Lever

1 - PARK ROD
2 - MANUAL LEVER ASSEMBLY
3 - THROTTLE LEVER

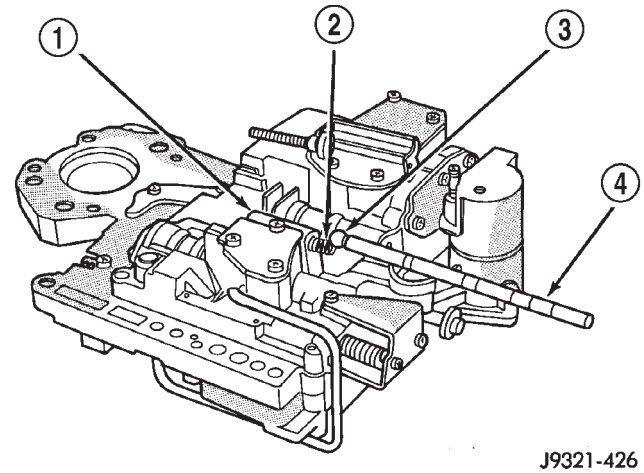


Fig. 275 Detent Ball And Spring

1 - DETENT HOUSING
2 - DETENT SPRING
3 - DETENT BALL
4 - PENCIL MAGNET

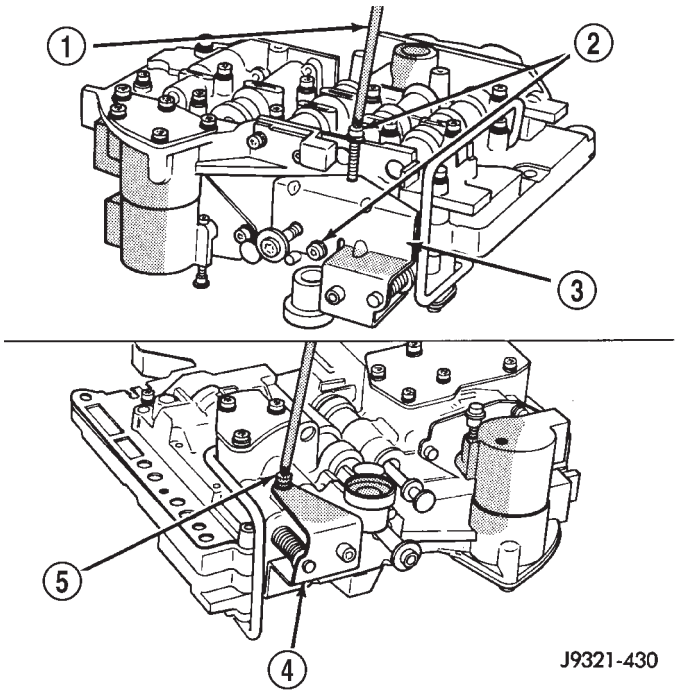


Fig. 276 Adjusting Screw Bracket Fastener

1 - T25 TORX™ BIT
2 - REMOVE THESE SCREWS FIRST
3 - BRACKET
4 - BRACKET
5 - REMOVE THIS SCREW LAST

(18) Remove adjusting screw bracket, line pressure adjusting screw, pressure regulator valve spring and switch valve spring (Fig. 277). Do not remove throttle pressure adjusting screw from bracket and do not disturb setting of either adjusting screw during removal.

(19) Turn upper housing over and remove switch valve, regulator valve and spring, and manual valve (Fig. 278).

(20) Remove kickdown detent, kickdown valve, and throttle valve and spring (Fig. 278).

(21) Loosen left-side 3-4 accumulator housing attaching screw about 2-3 threads. Then remove center and right-side housing attaching screws (Fig. 279).

VALVE BODY (Continued)

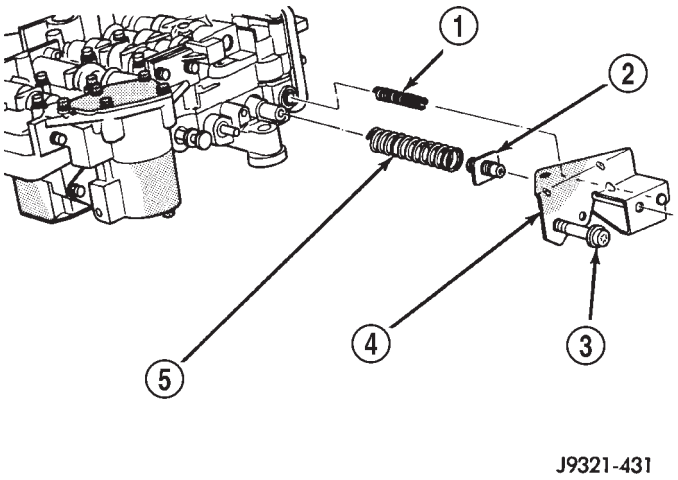


Fig. 277 Adjusting Screw Bracket

1 - SWITCH VALVE SPRING
2 - LINE PRESSURE SCREW
3 - THROTTLE PRESSURE ADJUSTING SCREW
4 - ADJUSTING SCREW BRACKET
5 - PRESSURE REGULATOR VALVE SPRING

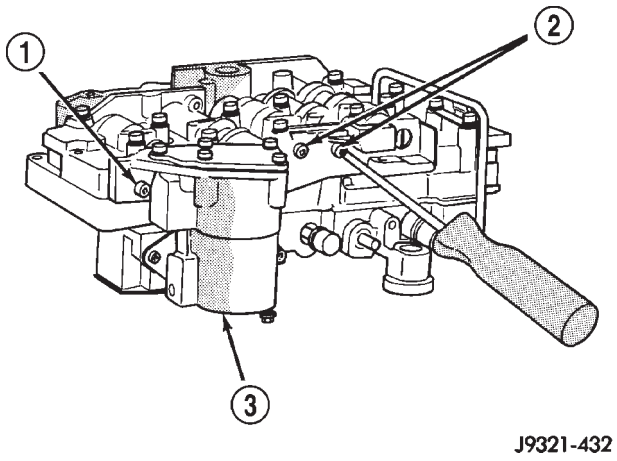


Fig. 279 Accumulator Housing Screw Locations

1 - LOOSEN THIS SCREW
2 - REMOVE THESE SCREWS
3 - 3-4 ACCUMULATOR HOUSING

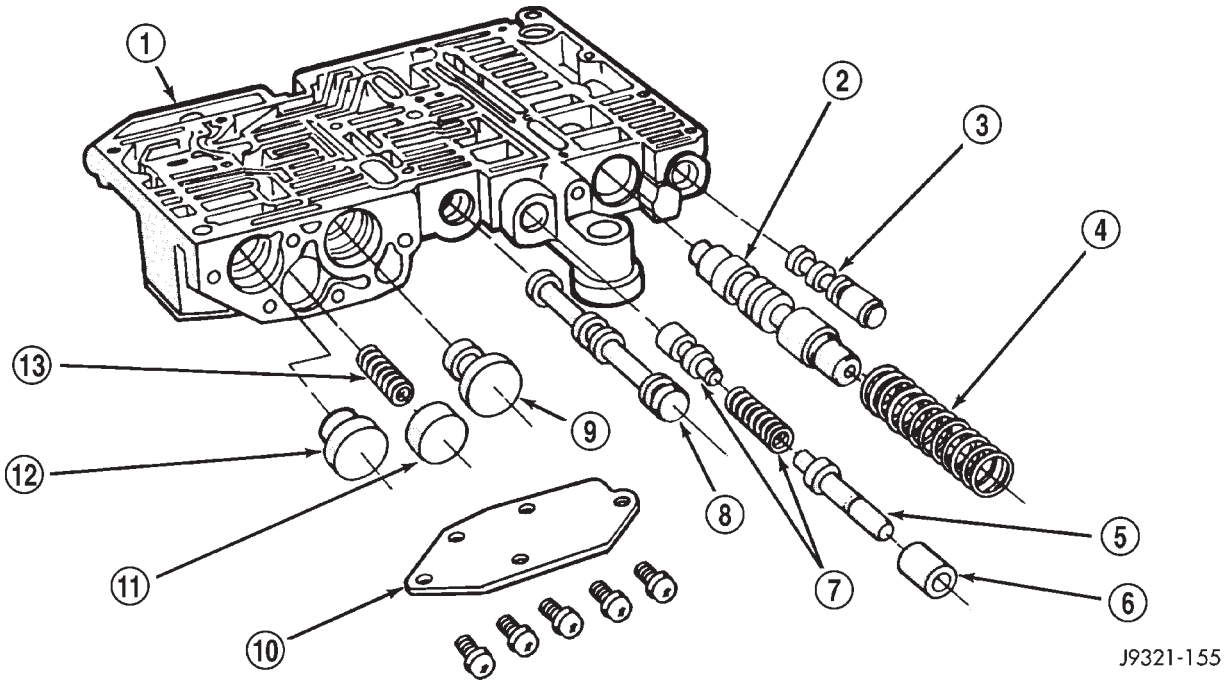


Fig. 278 Upper Housing Control Valve Locations

1 - UPPER HOUSING
2 - REGULATOR VALVE
3 - SWITCH VALVE
4 - REGULATOR VALVE SPRING
5 - KICKDOWN VALVE
6 - KICKDOWN DETENT
7 - THROTTLE VALVE AND SPRING
8 - MANUAL VALVE
9 - 1-2 GOVERNOR PLUG
10 - GOVERNOR PLUG COVER
11 - THROTTLE PLUG
12 - 2-3 GOVERNOR PLUG
13 - SHUTTLE VALVE PRIMARY SPRING

VALVE BODY (Continued)

(22) Carefully rotate 3-4 accumulator housing upward and remove 3-4 shift valve spring and converter clutch valve plug and spring (Fig. 280).

(23) Remove left-side screw and remove 3-4 accumulator housing from valve body (Fig. 281).

(24) Bend back tabs on boost valve tube brace (Fig. 282).

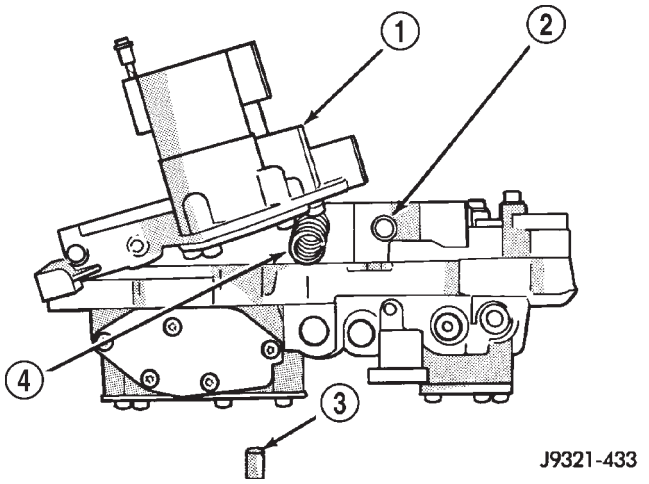


Fig. 280 3-4 Shift And Converter Clutch Valve Springs and Plug

1 - ACCUMULATOR HOUSING
2 - CONVERTER CLUTCH VALVE SPRING
3 - CLUTCH VALVE PLUG
4 - 3-4 SHIFT VALVE SPRING

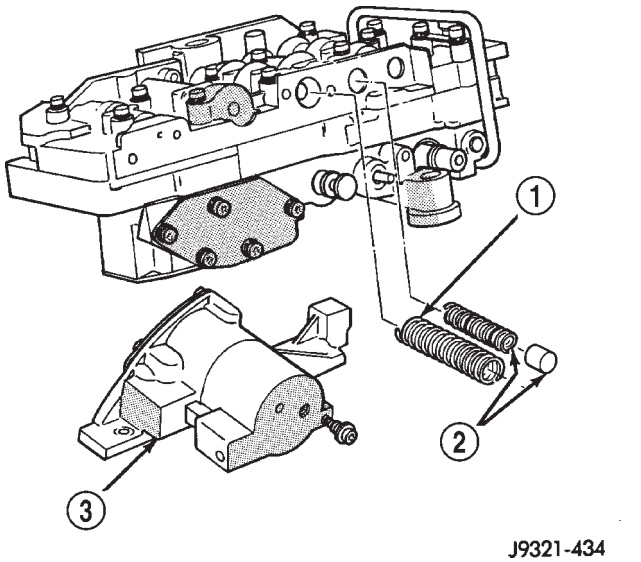


Fig. 281 Accumulator Housing, Valve Springs, and Plug

1 - 3-4 SHIFT VALVE SPRING
2 - CONVERTER CLUTCH VALVE SPRING AND PLUG
3 - 3-4 ACCUMULATOR HOUSING

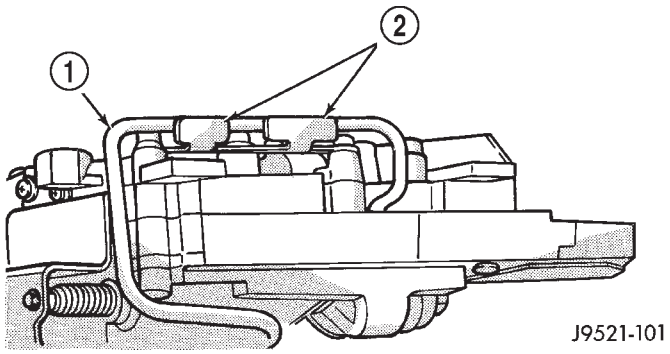


Fig. 282 Boost Valve Tube Brace

1 - BOOST VALVE TUBE
2 - TUBE BRACE (DOUBLE TAB)

(25) Remove boost valve connecting tube (Fig. 283). Disengage tube from upper housing port first. Then rock opposite end of tube back and forth to work it out of lower housing.

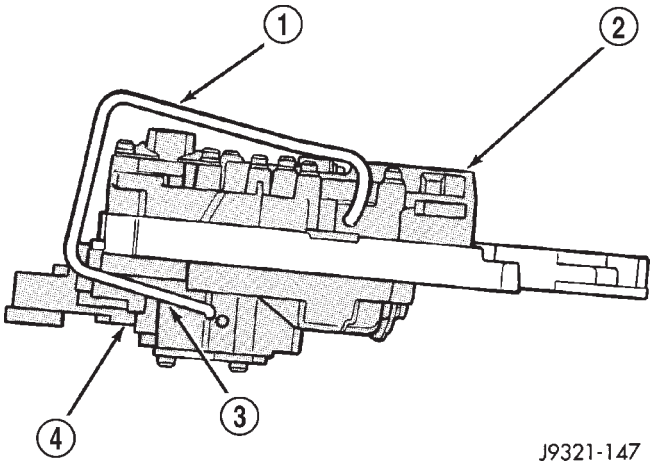


Fig. 283 Boost Valve Tube

1 - BOOST VALVE TUBE
2 - LOWER HOUSING
3 - DISENGAGE THIS END OF TUBE FIRST
4 - UPPER 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.

(26) Turn valve body over so lower housing is facing upward (Fig. 284). 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.

(27) Remove screws attaching valve body lower housing to upper housing and transfer plate (Fig. 284). Note position of boost valve tube brace for assembly reference.

(28) Remove lower housing and overdrive separator plate from transfer plate (Fig. 284).

VALVE BODY (Continued)

(29) Remove the Number 10 check ball from the transfer plate (Fig. 285). The check ball is approximately 4.8 mm (3/16 in.) in diameter.

(30) Remove transfer plate from upper housing (Fig. 286).

(31) Turn transfer plate over so upper housing separator plate is facing upward.

(32) Remove upper housing separator plate from transfer plate (Fig. 287). Note position of filter in separator plate for assembly reference.

(33) Remove rear clutch and rear servo check balls from transfer plate. Note check ball location for assembly reference (Fig. 288).

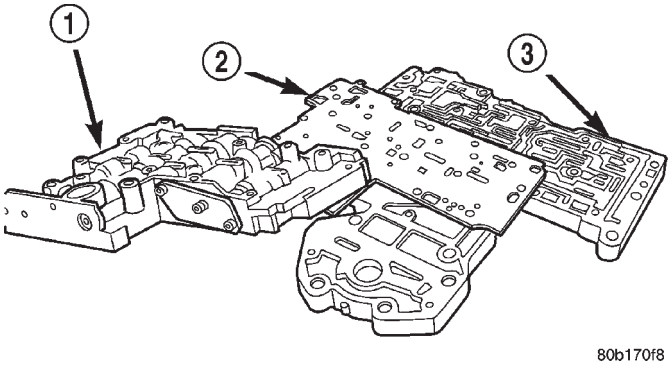


Fig. 284 Lower Housing

1 - LOWER HOUSING
2 - OVERDRIVE SEPARATOR PLATE
3 - TRANSFER PLATE AND UPPER HOUSING

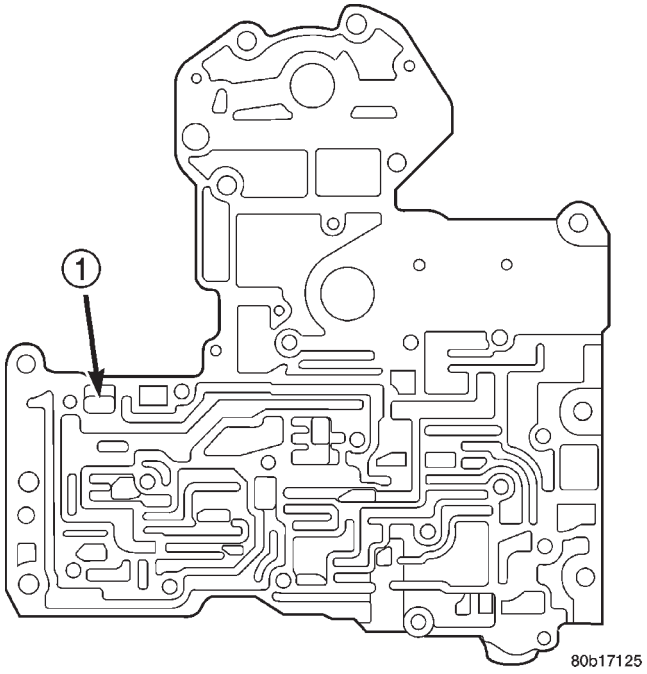


Fig. 285 Number 10 Check Ball

1 - NUMBER 10 CHECK BALL (3/16″)

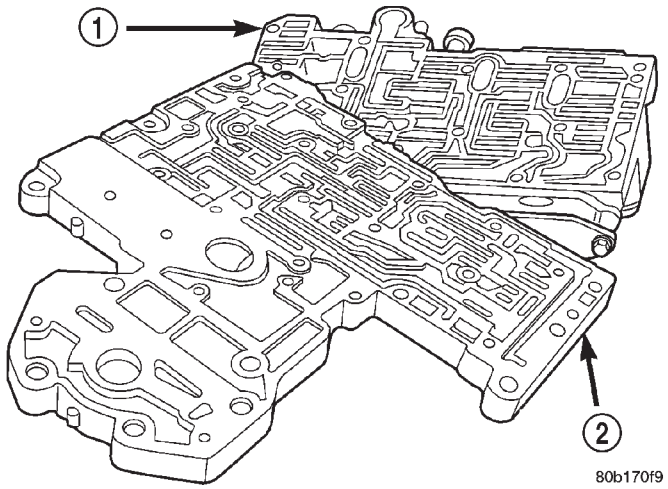


Fig. 286 Transfer Plate

1 - UPPER HOUSING
2 - TRANSFER PLATE

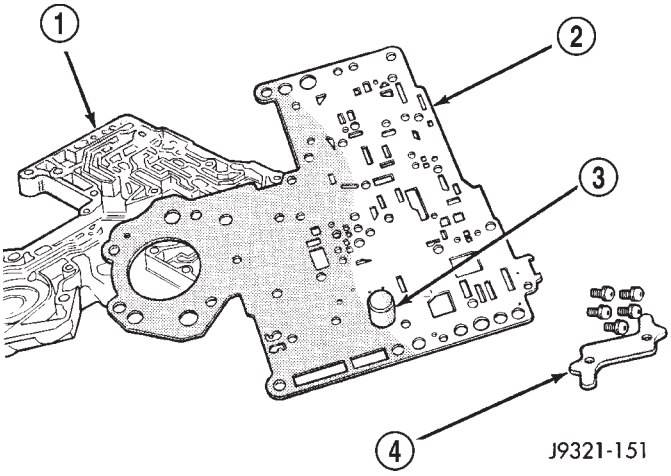


Fig. 287 Upper Housing Separator Plate

1 - TRANSFER PLATE
2 - UPPER HOUSING SEPARATOR PLATE
3 - FILTER SCREEN
4 - BRACE

VALVE BODY (Continued)

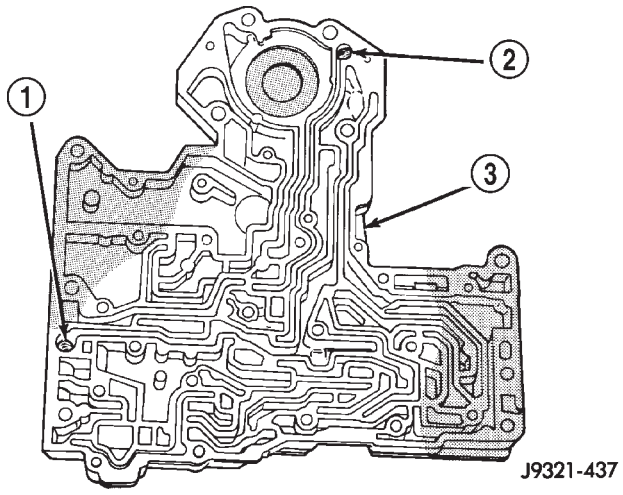


Fig. 288 Rear Clutch and Rear Servo Check Ball Locations

1 - REAR CLUTCH CHECK BALL
2 - REAR SERVO CHECK BALL
3 - TRANSFER PLATE

VALVE BODY UPPER HOUSING

(1) Note location of check balls in valve body upper housing (Fig. 289). Then remove the one large diameter and the six smaller diameter check balls.

(2) Remove governor plug and shuttle valve covers (Fig. 291).

(3) Remove E-clip that secures shuttle valve secondary spring on valve stem (Fig. 290).

(4) Remove throttle plug, primary spring, shuttle valve, secondary spring, and spring guides (Fig. 291).

(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. 278).

(7) Turn upper housing around and remove limit valve and shift valve covers (Fig. 292).

(8) Remove limit valve housing. Then remove retainer, spring, limit valve, and 2-3 throttle plug from limit valve housing (Fig. 292).

(9) Remove 1-2 shift control valve and spring (Fig. 292).

(10) Remove 1-2 shift valve and spring (Fig. 292).

(11) Remove 2-3 shift valve and spring from valve body (Fig. 292).

(12) Remove pressure plug cover (Fig. 292).

(13) Remove line pressure plug, sleeve, throttle pressure plug and spring (Fig. 292).

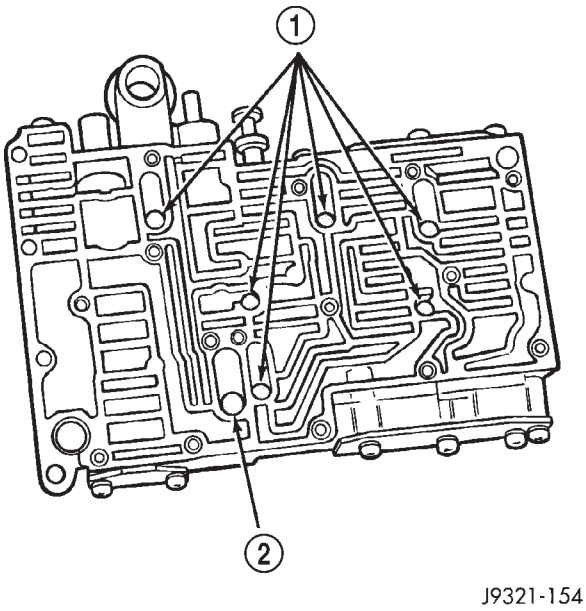


Fig. 289 Check Ball Locations In Upper Housing

1 - SMALL DIAMETER CHECK BALLS (6)
2 - LARGE DIAMETER CHECK BALL (1)

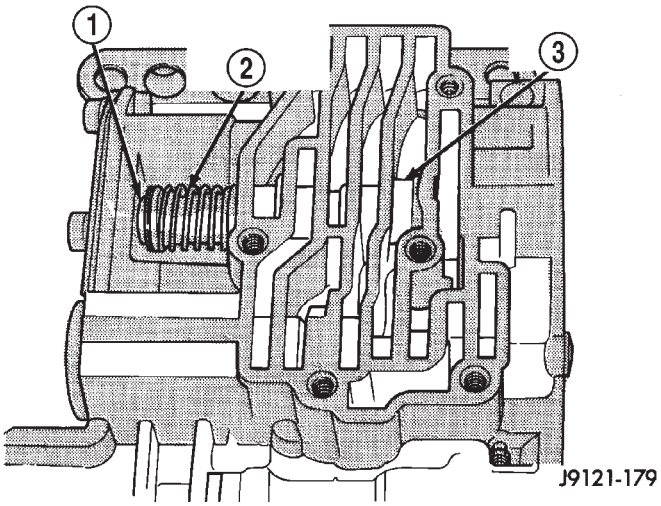


Fig. 290 Shuttle Valve E-Clip And Secondary Spring

1 - E-CLIP
2 - SECONDARY SPRING AND GUIDES
3 - SHUTTLE VALVE

VALVE BODY (Continued)

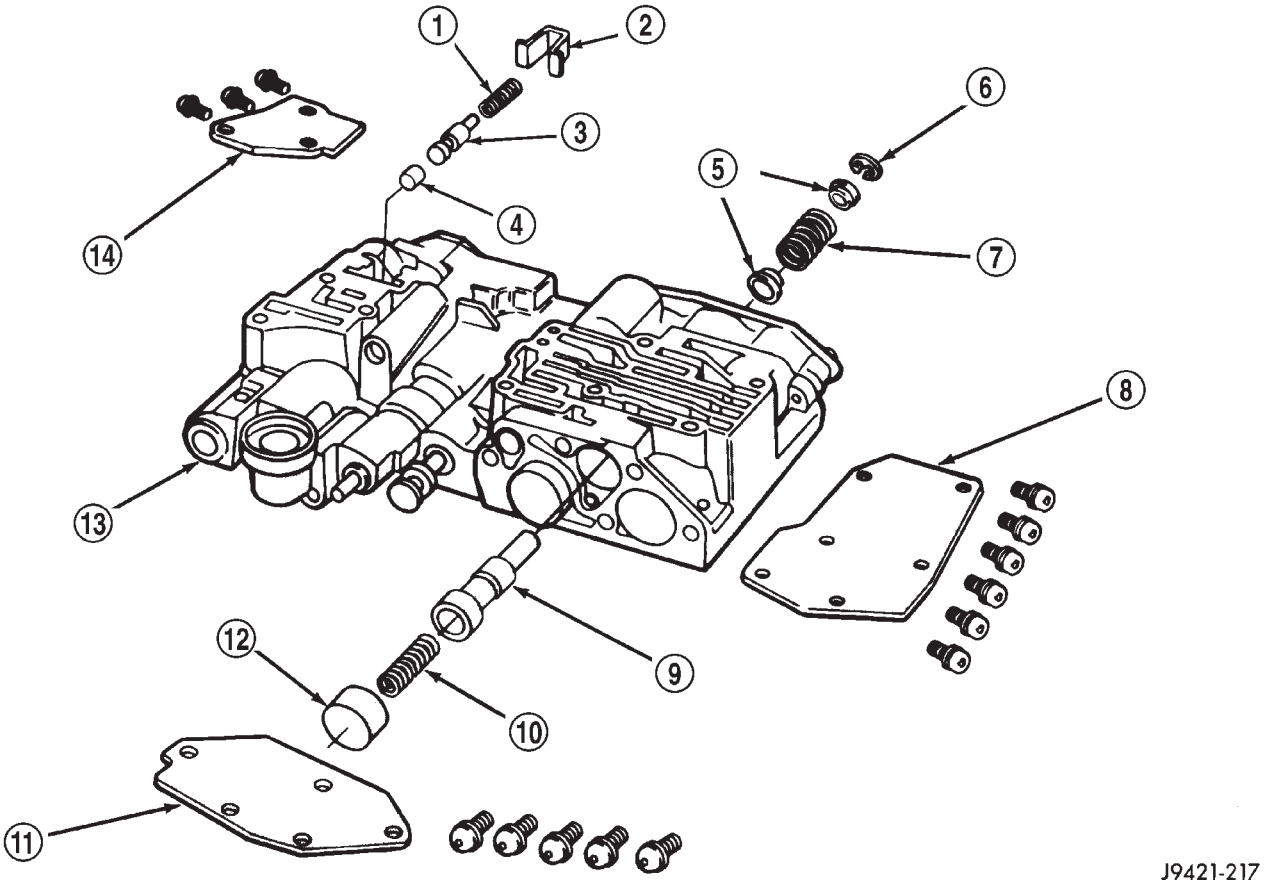


Fig. 291 Shuttle and Boost Valve Location

1 - SPRING
2 - RETAINER
3 - BOOST VALVE
4 - BOOST VALVE PLUG
5 - SPRING GUIDES
6 - E-CLIP
7 - SHUTTLE VALVE SECONDARY SPRING
8 - SHUTTLE VALVE COVER
9 - SHUTTLE VALVE
10 - SHUTTLE VALVE PRIMARY SPRING
11 - GOVERNOR PLUG COVER
12 - THROTTLE PLUG
13 - UPPER HOUSING
14 - BOOST VALVE COVER

VALVE BODY (Continued)

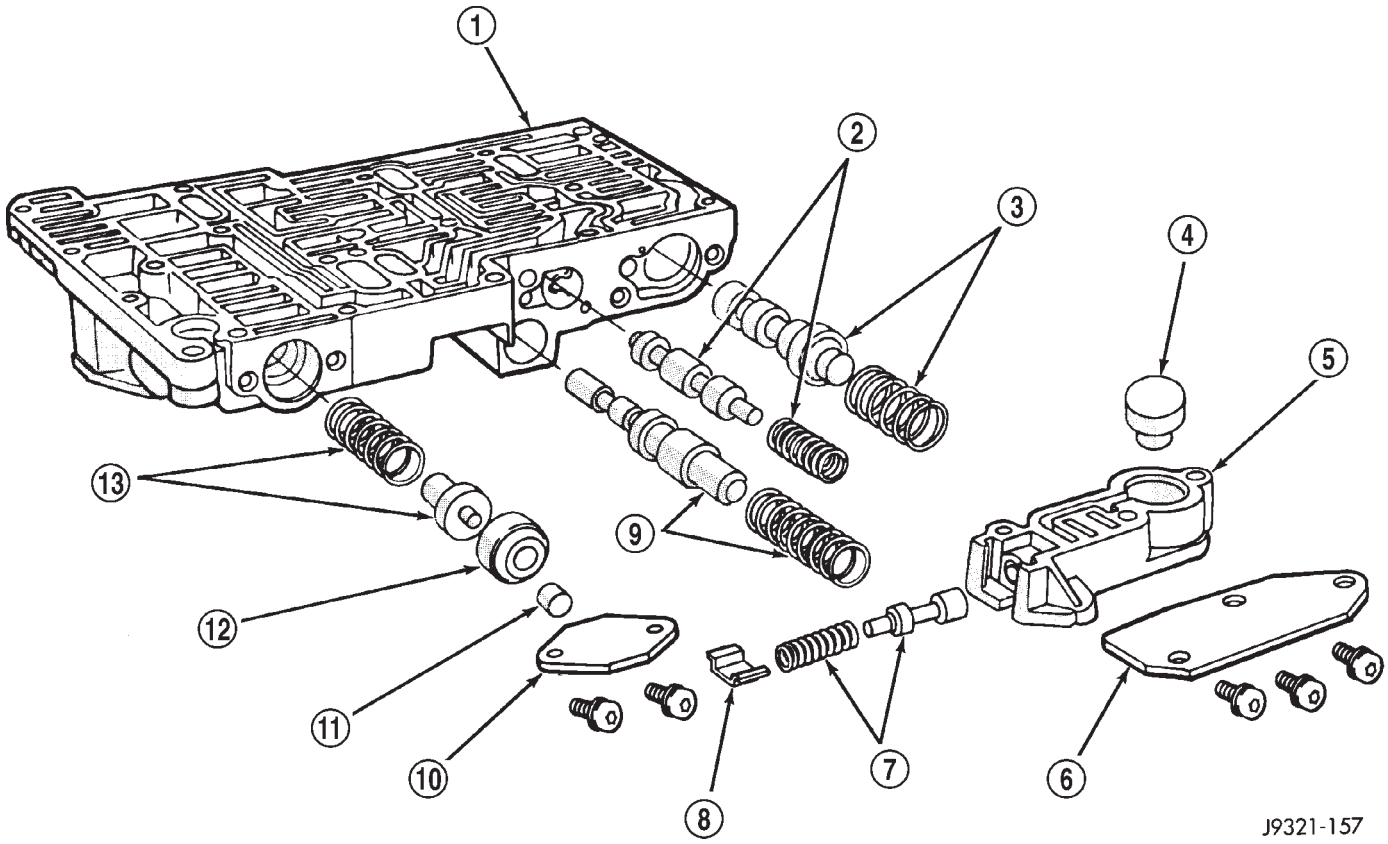


Fig. 292 Upper Housing Shift Valve and Pressure Plug Locations

1 - UPPER HOUSING
2 - 1-2 SHIFT VALVE AND SPRING
3 - 2-3 SHIFT VALVE AND SPRING
4 - 2-3 THROTTLE PLUG
5 - LIMIT VALVE HOUSING
6 - LIMIT VALVE COVER
7 - LIMIT VALVE AND SPRING
8 - RETAINER
9 - 1-2 SHIFT CONTROL VALVE AND SPRING
10 - PRESSURE PLUG COVER
11 - LINE PRESSURE PLUG
12 - PLUG SLEEVE
13 - THROTTLE PRESSURE SPRING AND PLUG

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. 293).
(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. 294).

CLEANING

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

VALVE BODY (Continued)

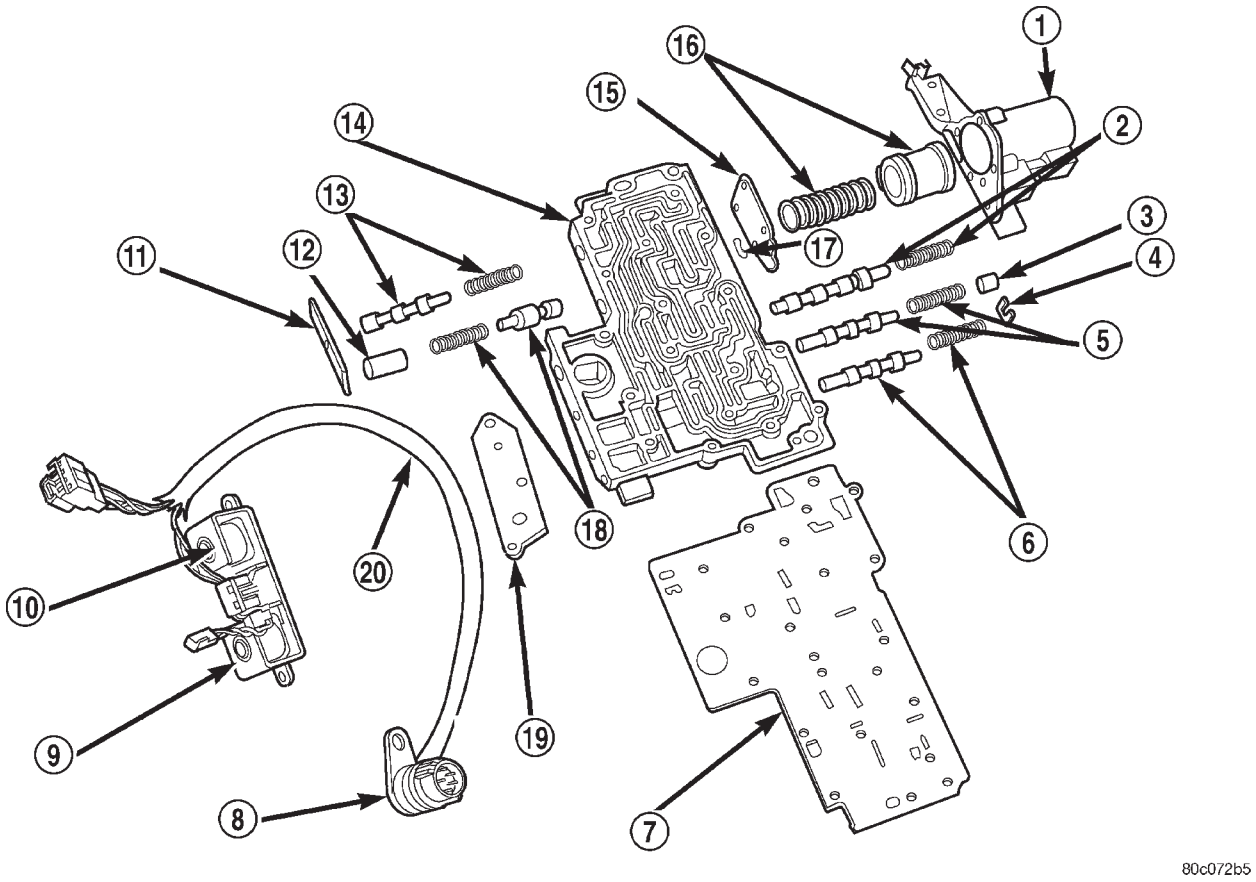


Fig. 293 Lower Housing Shift Valves and Springs

1 - 3-4 ACCUMULATOR HOUSING	11 - TIMING VALVE COVER
2 - 3-4 SHIFT VALVE AND SPRING	12 - PLUG
3 - PLUG	13 - 3-4 TIMING VALVE AND SPRING
4 - SPRING RETAINER	14 - LOWER HOUSING
5 - CONVERTER CLUTCH VALVE AND SPRING	15 - ACCUMULATOR END PLATE
6 - CONVERTER CLUTCH TIMING VALVE AND SPRING	16 - 3-4 ACCUMULATOR PISTON AND SPRING
7 - OVERDRIVE SEPARATOR PLATE	17 - E-CLIP
8 - CASE CONNECTOR	18 - 3-4 QUICK FILL SPRING AND VALVE
9 - CONVERTER CLUTCH SOLENOID	19 - SOLENOID GASKET
10 - OVERDRIVE SOLENOID	20 - HARNESS

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.

INSPECTION

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 straightedge 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.

VALVE BODY (Continued)

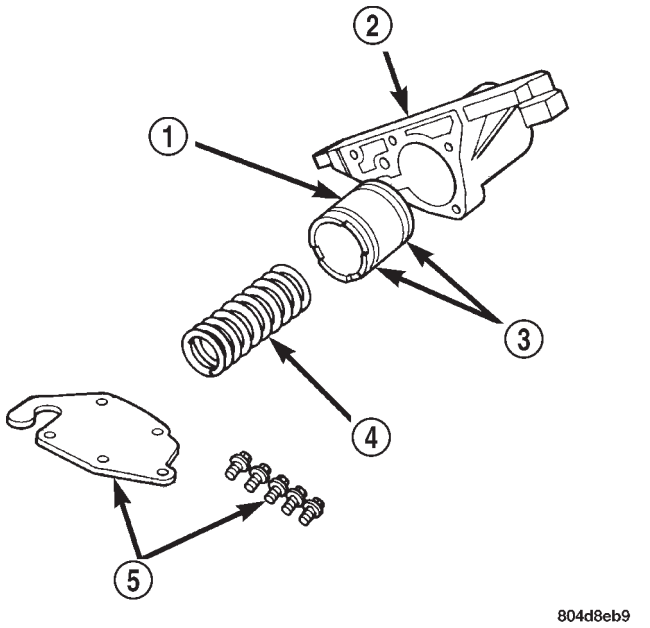


Fig. 294 3-4 Accumulator and Housing

1 - ACCUMULATOR PISTON
2 - 3-4 ACCUMULATOR HOUSING
3 - TEFLON SEALS
4 - PISTON SPRING
5 - COVER PLATE AND SCREWS

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

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. 301).

(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.

VALVE BODY (Continued)

3-4 ACCUMULATOR

(1) Lubricate accumulator piston, seals and housing piston bore with clean transmission fluid (Fig. 302).
(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. 295).
(2) Install filter screen in upper housing separator plate (Fig. 296).
(3) Align and position upper housing separator plate on transfer plate (Fig. 297).
(4) Install brace plate (Fig. 297). 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.

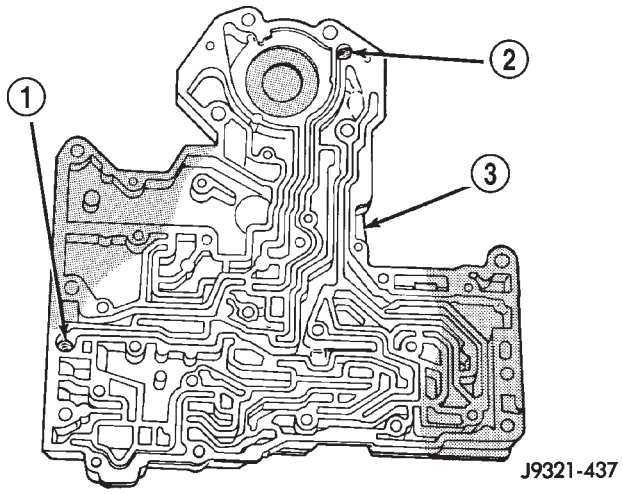


Fig. 295 Rear Clutch And Rear Servo Check Ball Locations

1 - REAR CLUTCH CHECK BALL
2 - REAR SERVO CHECK BALL
3 - TRANSFER 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. 298). 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.

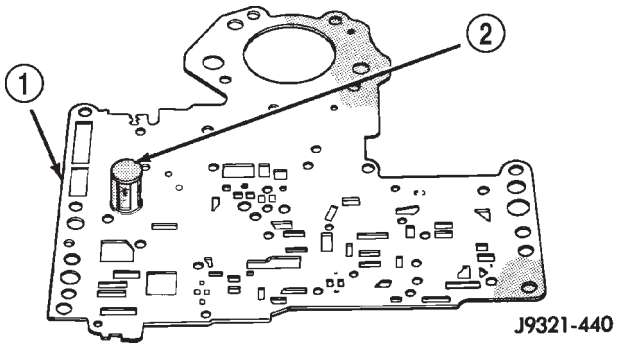


Fig. 296 Separator Plate Filter Screen Installation

1 - UPPER HOUSING SEPARATOR PLATE
2 - FILTER SCREEN

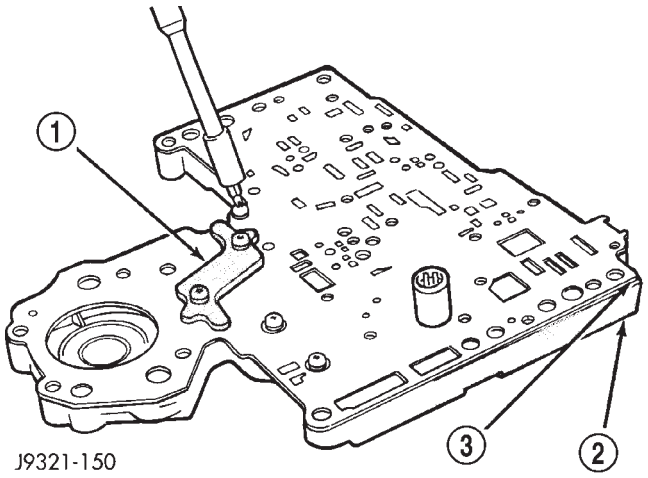


Fig. 297 Brace Plate

1 - BRACE
2 - TRANSFER PLATE
3 - SEPARATOR PLATE

(2) Position assembled transfer plate and upper housing separator plate on upper housing (Fig. 299). Be sure filter screen is seated in proper housing recess.
(3) Install the Number 10 check ball into the transfer plate (Fig. 300). The check ball is approximately 4.8 mm (3/16 in.) in diameter.
(4) Position lower housing separator plate on transfer plate (Fig. 301).
(5) Install lower housing on assembled transfer plate and upper housing (Fig. 302).
(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. 302).

VALVE BODY (Continued)

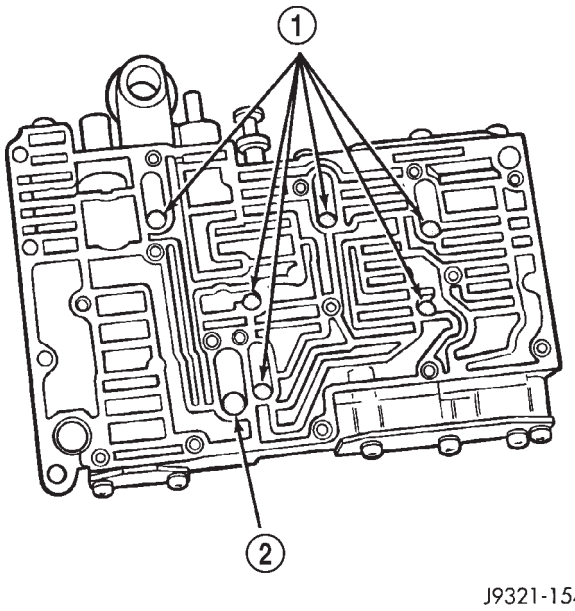


Fig. 298 Check Ball Locations In Upper Housing

1 - SMALL DIAMETER CHECK BALLS (6)
2 - LARGE DIAMETER CHECK BALL (1)

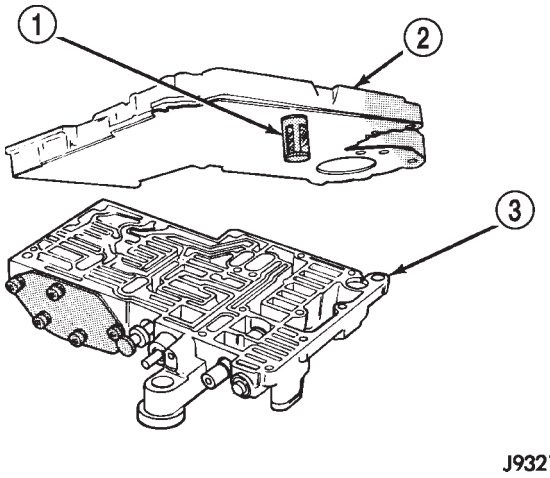


Fig. 299 Installing Transfer Plate On Upper Housing

1 - FILTER SCREEN
2 - TRANSFER PLATE/SEPARATOR PLATE ASSEMBLY
3 - UPPER HOUSING

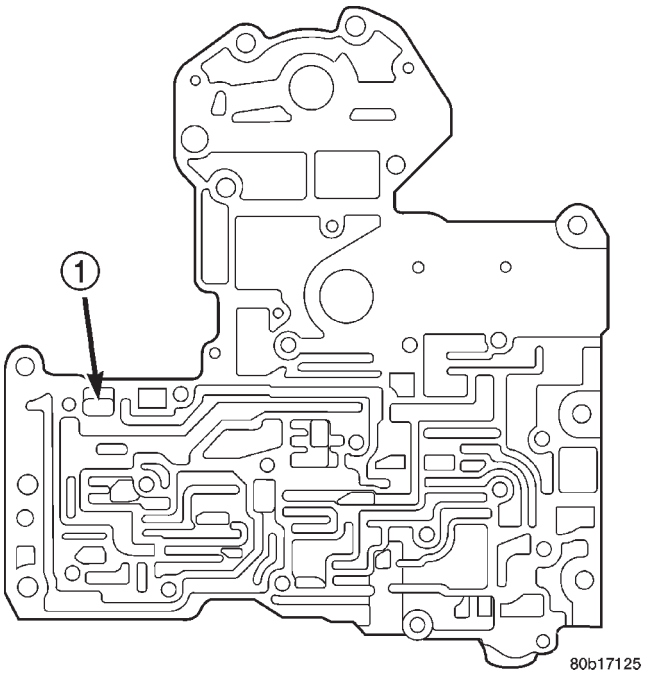


Fig. 300 Number 10 Check Ball

1 - NUMBER 10 CHECK BALL (3/16″)

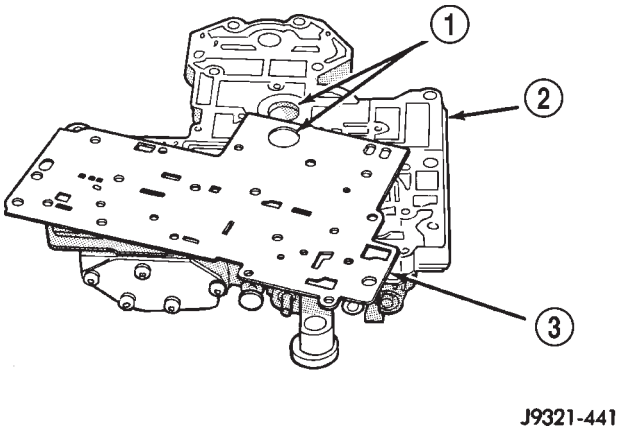


Fig. 301 Lower Housing Separator Plate

1 - BE SURE TO ALIGN BORES
2 - TRANSFER PLATE
3 - LOWER HOUSING (OVERDRIVE) SEPARATOR PLATE

VALVE BODY (Continued)

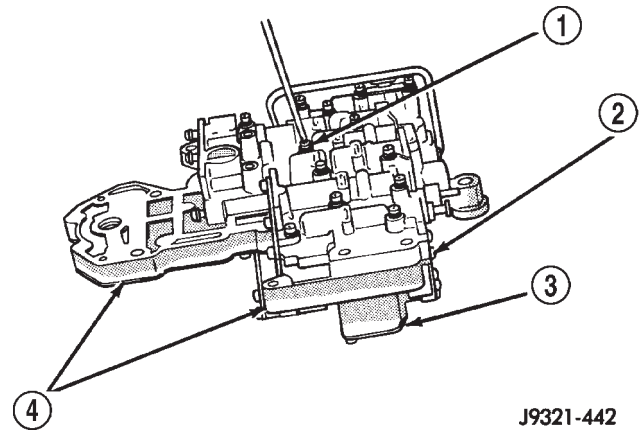


Fig. 302 Installing Lower Housing On Transfer Plate And Upper Housing

1 - VALVE BODY SCREWS (13)
2 - LOWER HOUSING
3 - UPPER HOUSING
4 - TRANSFER PLATE

UPPER HOUSING VALVE AND PLUG

Refer to (Fig. 303), (Fig. 304) and (Fig. 305) 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.

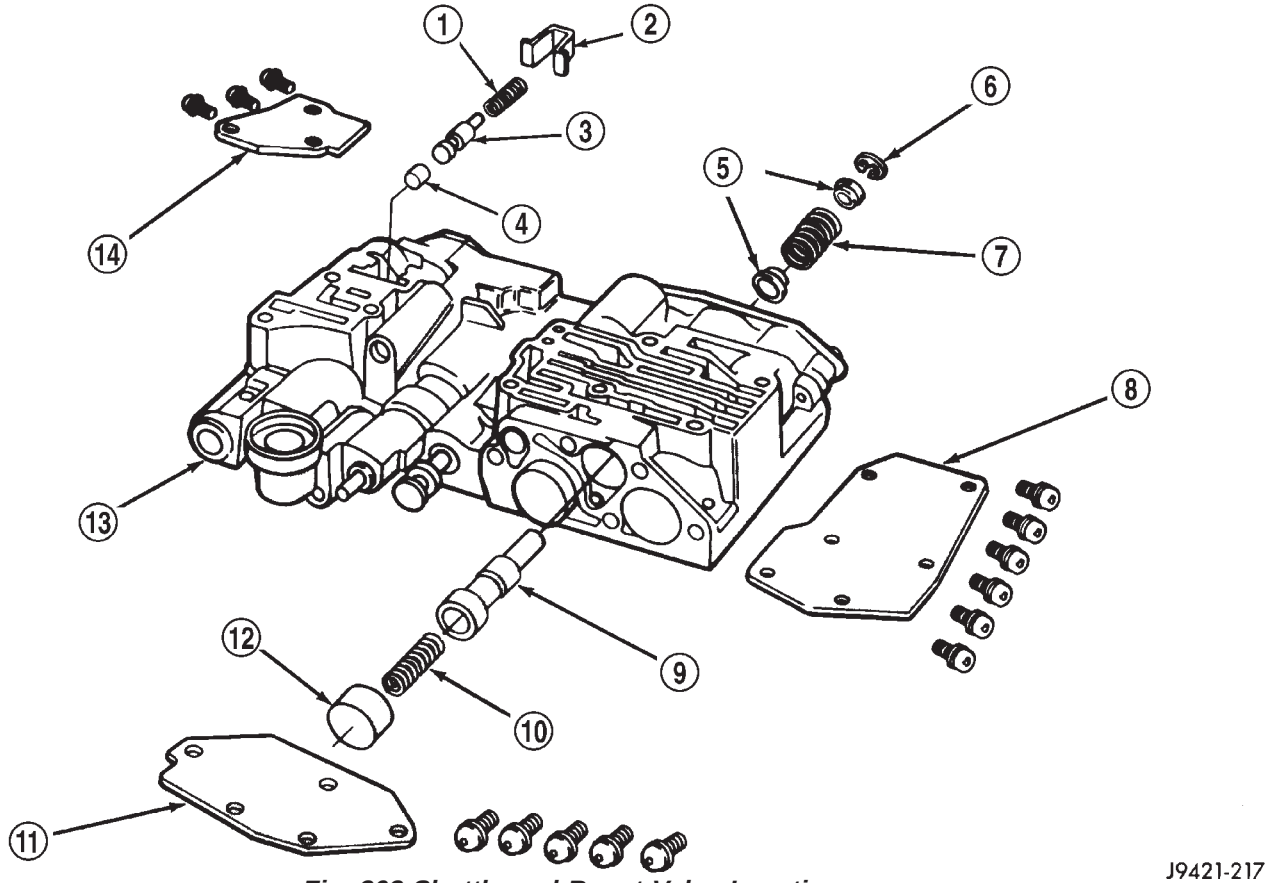


Fig. 303 Shuttle and Boost Valve Locations

1 - SPRING
2 - RETAINER
3 - BOOST VALVE
4 - BOOST VALVE PLUG
5 - SPRING GUIDES
6 - E-CLIP
7 - SHUTTLE VALVE SECONDARY SPRING
8 - SHUTTLE VALVE COVER
9 - SHUTTLE VALVE
10 - SHUTTLE VALVE PRIMARY SPRING
11 - GOVERNOR PLUG COVER
12 - THROTTLE PLUG
13 - UPPER HOUSING
14 - BOOST VALVE COVER

VALVE BODY (Continued)

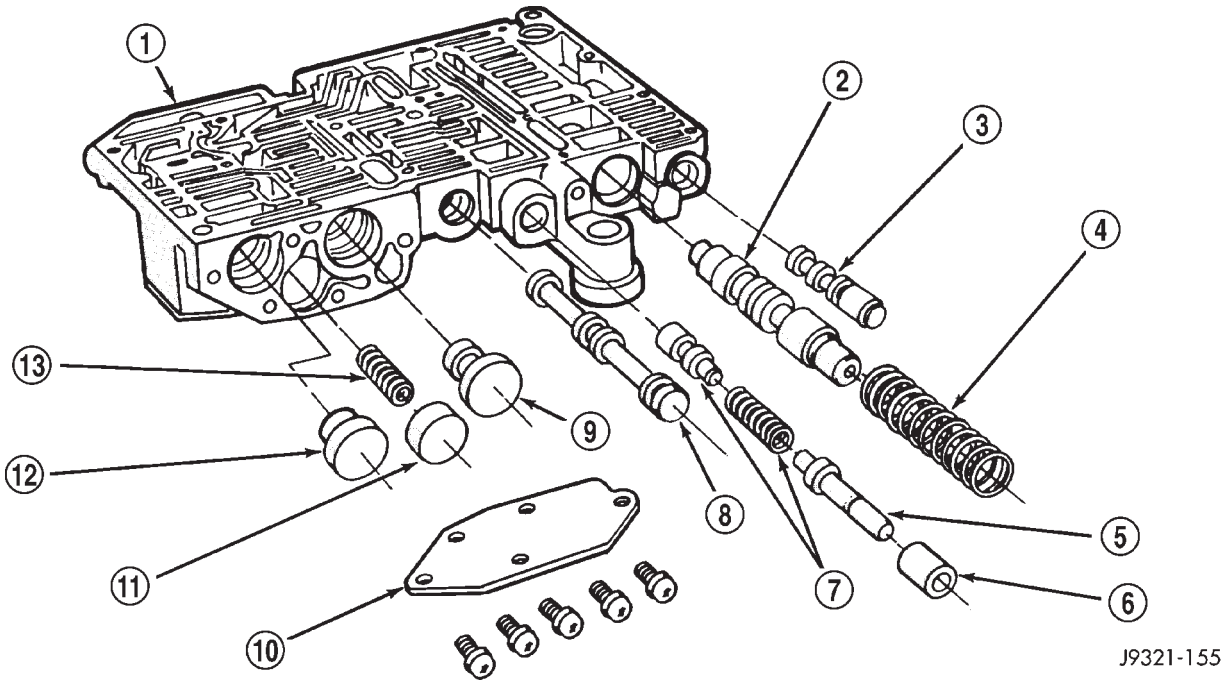


Fig. 304 Upper Housing Control Valve Locations

1 - UPPER HOUSING
2 - REGULATOR VALVE
3 - SWITCH VALVE
4 - REGULATOR VALVE SPRING
5 - KICKDOWN VALVE
6 - KICKDOWN DETENT
7 - THROTTLE VALVE AND SPRING
8 - MANUAL VALVE
9 - 1-2 GOVERNOR PLUG
10 - GOVERNOR PLUG COVER
11 - THROTTLE PLUG
12 - 2-3 GOVERNOR PLUG
13 - SHUTTLE VALVE PRIMARY SPRING

(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.

BOOST VALVE TUBE AND BRACE

(1) Position valve body assembly so lower housing is facing upward (Fig. 306).

(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. 306).

(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. 307).

(6) Install and finger tighten three screws that secure tube brace to valve body housings (Fig. 307).

(7) Bend tube brace tabs up and against tube to hold it in position (Fig. 308).

(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.

VALVE BODY (Continued)

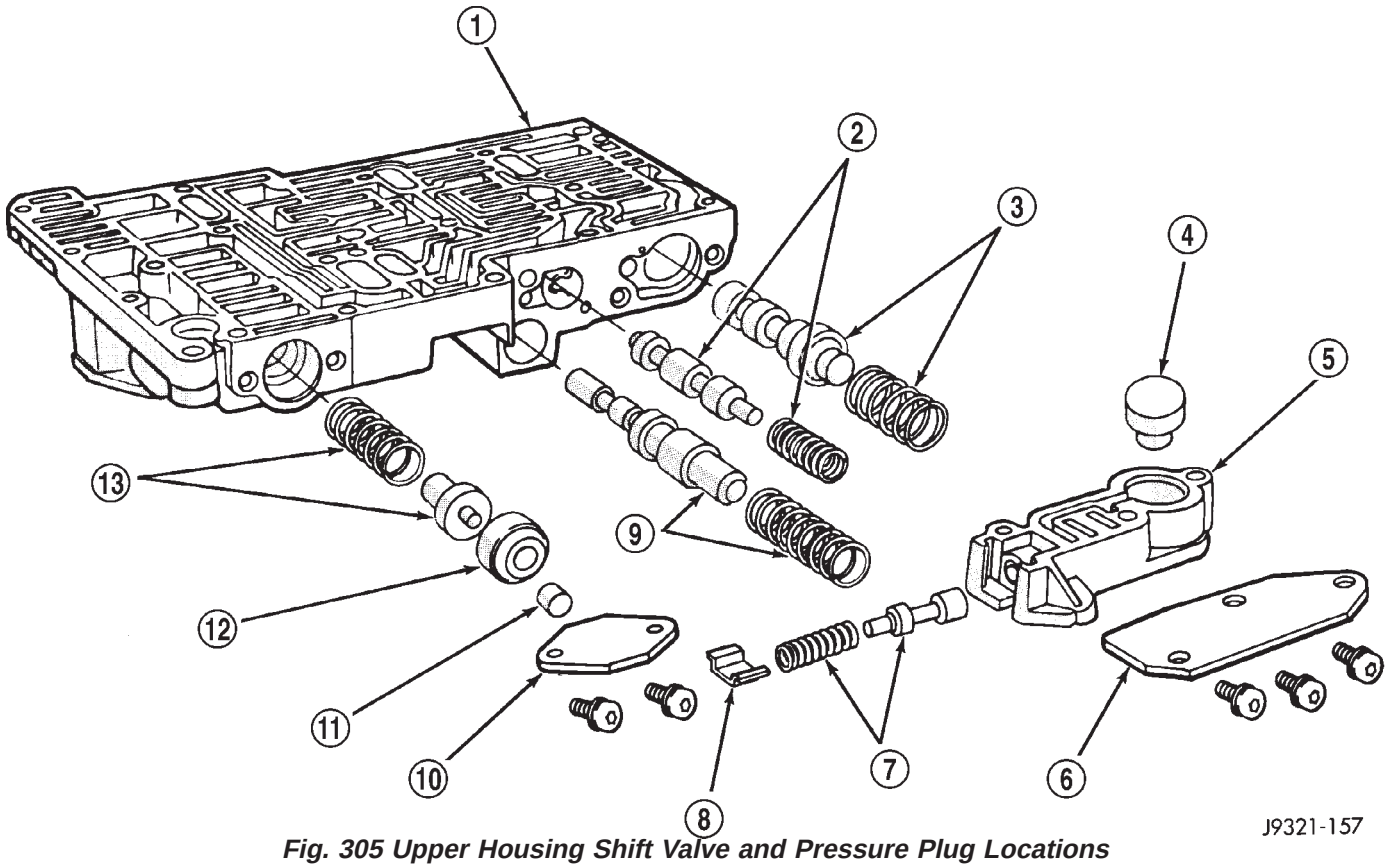


Fig. 305 Upper Housing Shift Valve and Pressure Plug Locations

1 - UPPER HOUSING
2 - 1-2 SHIFT VALVE AND SPRING
3 - 2-3 SHIFT VALVE AND SPRING
4 - 2-3 THROTTLE PLUG
5 - LIMIT VALVE HOUSING
6 - LIMIT VALVE COVER
7 - LIMIT VALVE AND SPRING
8 - RETAINER
9 - 1-2 SHIFT CONTROL VALVE AND SPRING
10 - PRESSURE PLUG COVER
11 - LINE PRESSURE PLUG
12 - PLUG SLEEVE
13 - THROTTLE PRESSURE SPRING AND PLUG

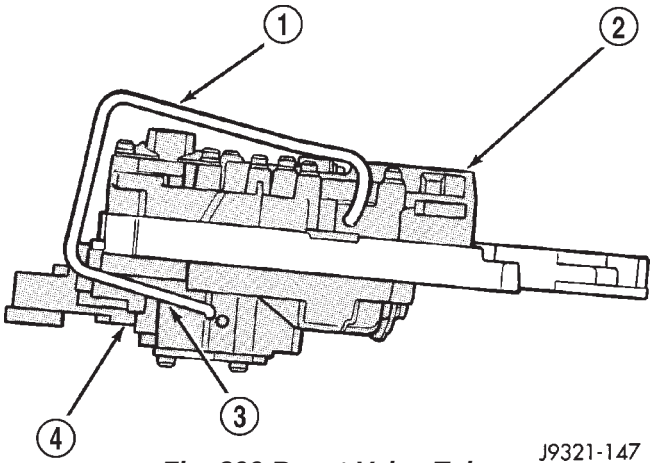


Fig. 306 Boost Valve Tube

1 - BOOST VALVE TUBE
2 - LOWER HOUSING
3 - DISENGAGE THIS END OF TUBE FIRST
4 - UPPER HOUSING

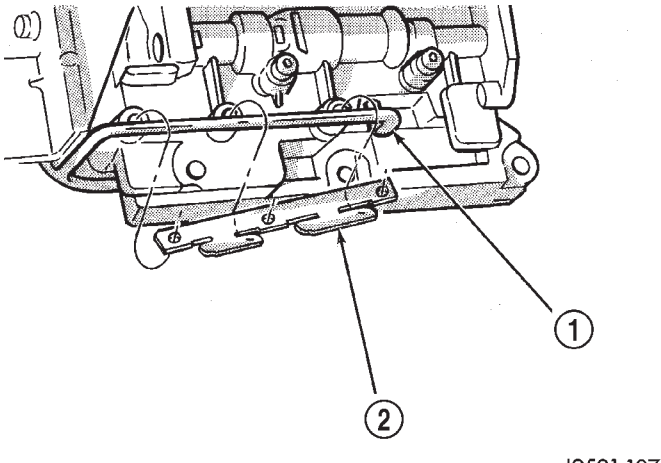


Fig. 307 Boost Valve Tube And Brace

1 - BOOST VALVE TUBE
2 - TUBE BRACE

VALVE BODY (Continued)

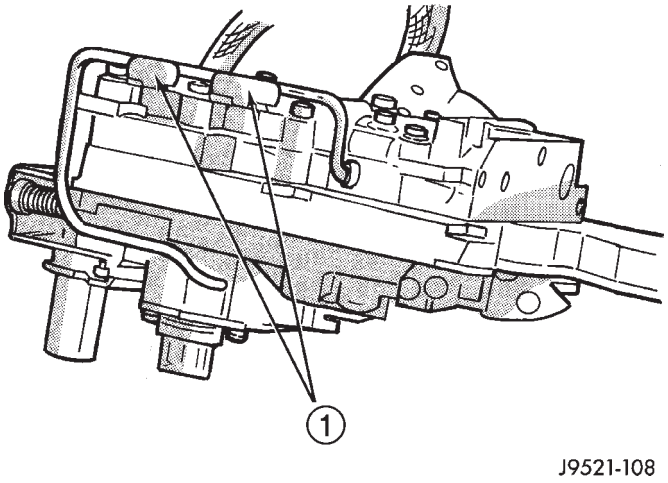


Fig. 308 Securing Boost Valve Tube With Brace Tabs

1 - BEND TABS UP AGAINST TUBE AS SHOWN

3-4 ACCUMULATOR

(1) Position converter clutch valve and 3-4 shift valve springs in housing (Fig. 309).

(2) Loosely attach accumulator housing with right-side screw (Fig. 309). 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. 310). 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. 311).

(4) Install throttle lever in upper housing. Then install manual lever over throttle lever and start manual lever into 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.

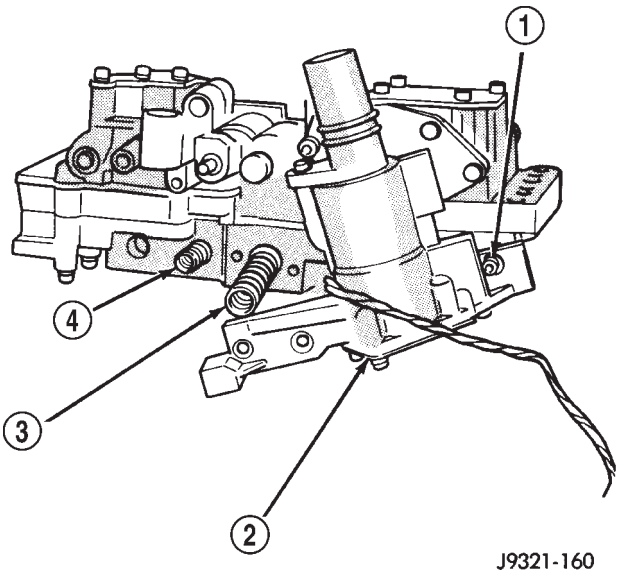


Fig. 309 Converter Clutch And 3-4 Shift Valve Springs

1 - RIGHT-SIDE SCREW
2 - 3-4 ACCUMULATOR
3 - 3-4 SHIFT VALVE SPRING
4 - CONVERTER CLUTCH VALVE SPRING

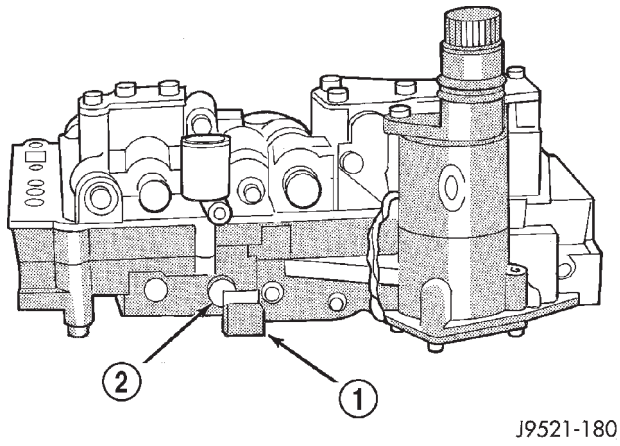


Fig. 310 Seating 3-4 Accumulator On Lower Housing

1 - ACCUMULATOR BOX
2 - CONVERTER CLUTCH VALVE PLUG

(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. 312).

(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.

VALVE BODY (Continued)

(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) Perform Line Pressure and Throttle Pressure adjustments. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC/VALVE BODY - ADJUSTMENTS)
(18) Lubricate solenoid case connector O-rings and shaft of manual lever with light coat of petroleum jelly.
(19) 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. 313). Seat tang in dimple before tightening connector screw.
(20) Install solenoid assembly and gasket. Tighten solenoid attaching screws to 8 N·m (72 in. lbs.) torque.
(21) Verify that solenoid wire harness is properly routed (Fig. 314). Solenoid harness must be clear of manual lever and park rod and not be pinched between accumulator housing and cover.

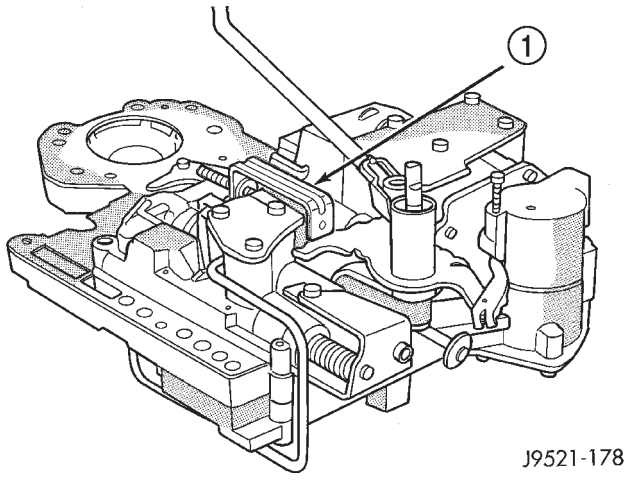


Fig. 311 Detent Ball Spring

1 - SPECIAL TOOL 6583 POSITIONED ON DETENT HOUSING

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.

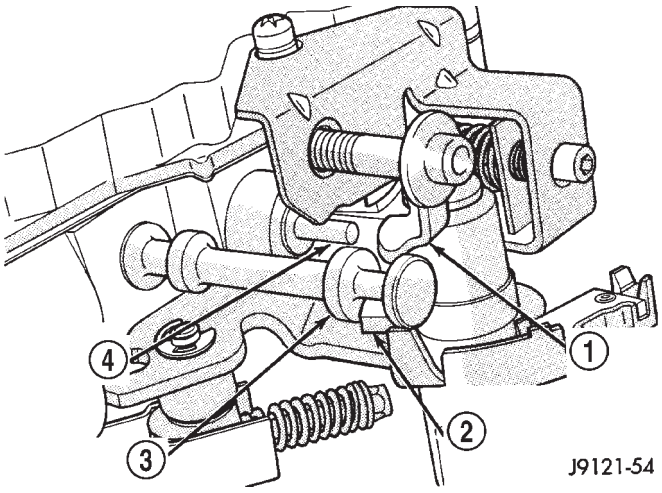


Fig. 312 Manual And Throttle Lever Alignment

1 - THROTTLE LEVER
2 - MANUAL LEVER VALVE ARM
3 - MANUAL VALVE
4 - KICKDOWN VALVE

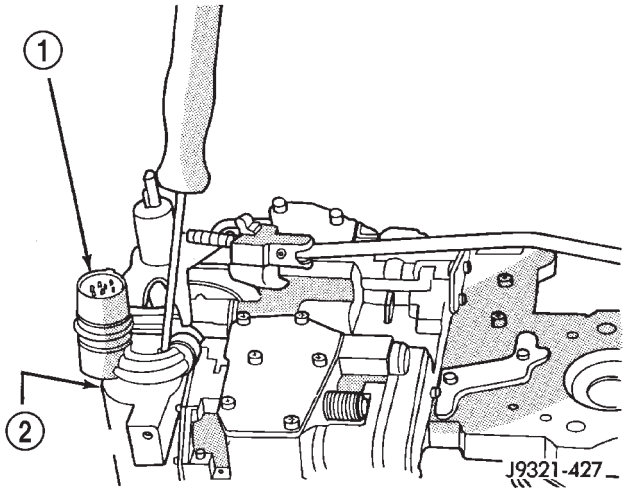


Fig. 313 Solenoid Harness Case Connector Shoulder Bolt

1 - SOLENOID HARNESS CASE CONNECTOR
2 - 3-4 ACCUMULATOR HOUSING

(4) Install governor pressure sensor in governor body.
(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.

VALVE BODY (Continued)

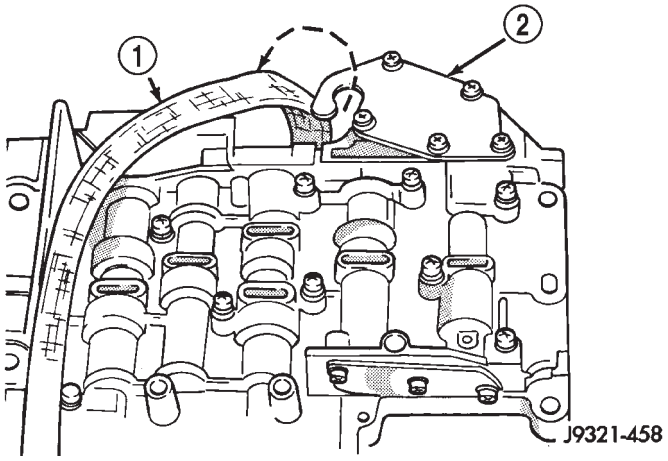


Fig. 314 Solenoid Harness Routing

1 - OVERDRIVE/CONVERTER SOLENOID WIRE HARNESS
2 - 3-4 ACCUMULATOR COVER PLATE

(9) Connect harness wires to governor pressure solenoid and governor pressure sensor.
(10) Install fluid filter and pan.
(11) Lower vehicle.
(12) Fill transmission with recommended fluid and road test vehicle to verify repair.

INSTALLATION

(1) Check condition of O-ring seals on valve body harness connector (Fig. 315). 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. 316).
(3) Check condition of seals on accumulator piston (Fig. 317). 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 13.6 N·m (125 in. lbs.) torque.
(17) Lower vehicle and fill transmission with Mopar® ATF +4, type 9602, fluid.
(18) Check and adjust gearshift and throttle valve cables, if necessary.

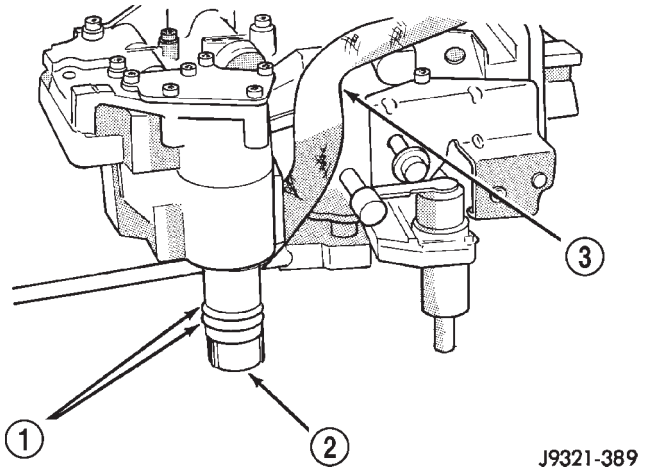


Fig. 315 Valve Body Harness Connector O-Ring Seal

1 - CONNECTOR O-RINGS
2 - VALVE BODY HARNESS CONNECTOR
3 - HARNESS

ADJUSTMENTS - 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.

VALVE BODY (Continued)

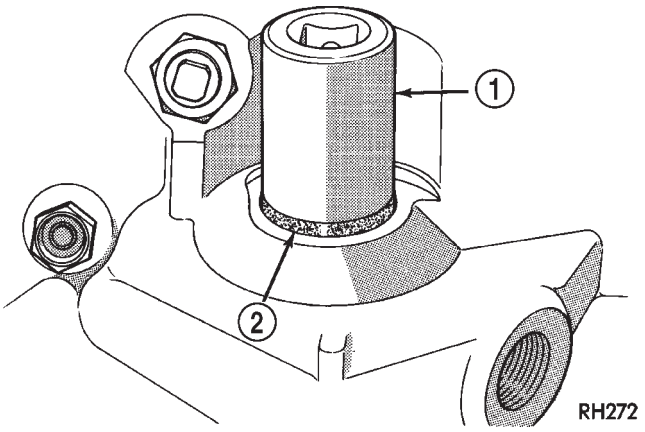


Fig. 316 Manual Lever Shaft Seal

1 - 15/16" SOCKET
2 - SEAL

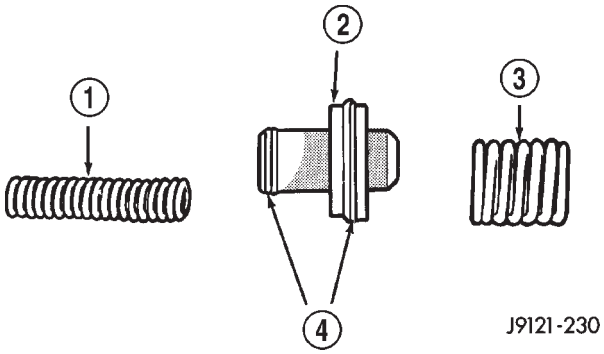


Fig. 317 Accumulator Piston Components

1 - INNER SPRING
2 - ACCUMULATOR PISTON
3 - OUTER SPRING
4 - SEAL RINGS

LINE PRESSURE ADJUSTMENT

Measure distance from the valve body to the inner edge of the adjusting screw with an accurate steel scale (Fig. 318).

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.

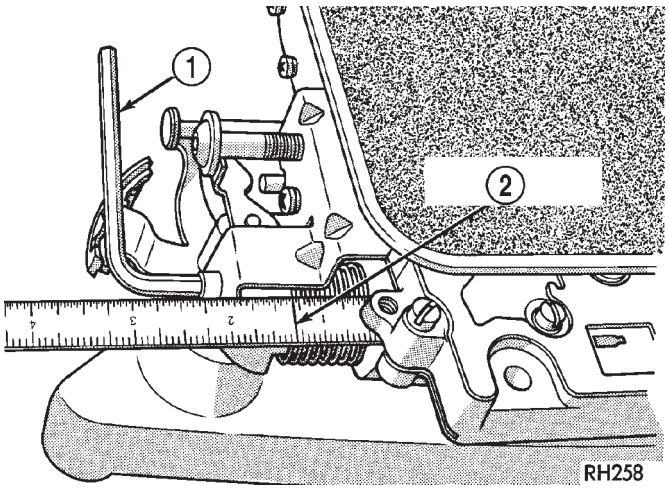


Fig. 318 Line Pressure Adjustment

1 - WRENCH
2 - 1–5/16 INCH

THROTTLE PRESSURE ADJUSTMENT

Insert Gauge Tool C-3763 between the throttle lever cam and the kickdown valve stem (Fig. 319).

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.

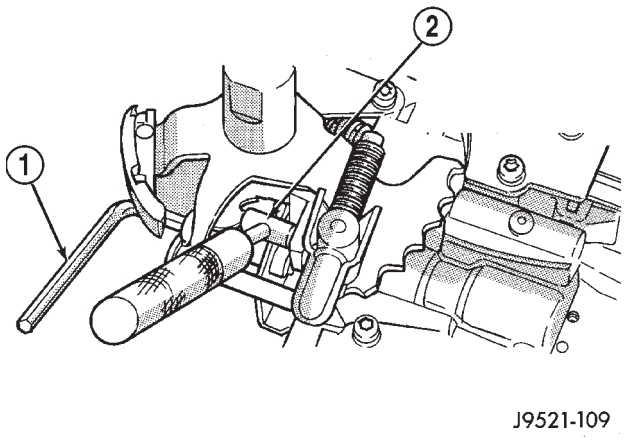


Fig. 319 Throttle Pressure Adjustment

1 - HEX WRENCH (IN THROTTLE LEVER ADJUSTING SCREW)
2 - SPECIAL TOOL C-3763 (POSITIONED BETWEEN THROTTLE LEVER AND KICKDOWN VALVE)

TRANSFER CASE - NV241LD

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TRANSFER CASE - NV241LD

DESCRIPTION

The NV241LD transfer case is a part-time transfer case with a low-range gear system. It 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.

The synchronizer mechanism consists of a brass stop ring, synchro hub, and the sliding clutch. The synchronizer components allow the transfer case to be shifted between the 2H and 4H operating ranges while the vehicle is in motion.

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.

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.

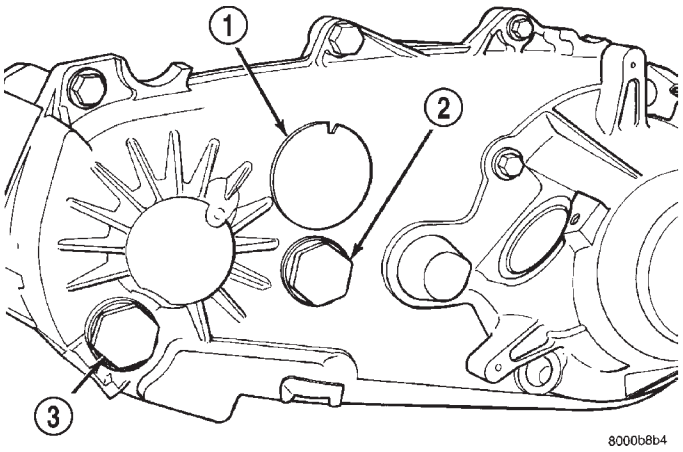


Fig. 1 Transfer Case Identification Tag - Typical

1 - I.D. TAG
2 - FILL PLUG
3 - DRAIN PLUG

OPERATION

OPERATING RANGES

Transfer case operating ranges are:

- 2H (2-wheel drive)
- 4H (4-wheel drive)
- 4LO (4-wheel drive low range

The 2H range is for use on any road surface at any time.

The 4H and 4LO 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 4LO 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.

SHIFTING

The synchronizer components allow the transfer case to be shifted between the 2H and 4H operating ranges while the vehicle is in motion. The vehicle must have the transmission placed in NEUTRAL, or the clutch depressed in the case of a manual transmission, and be moving less than 2-3 MPH when shifting into the 4L operating range.

DIAGNOSIS AND TESTING - TRANSFER CASE

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 Diagnosis Chart for further information.

DIAGNOSIS CHART

Condition	Possible Cause	Correction
Transfer Case difficult to shift or will not shift into desired range.	1) Vehicle speed too great to permit shifting.	1) Stop vehicle and shift into desired range. Or, reduce speed to below 3-4 km/h (2-3 mph) before attempting the shift.
	2) If vehicle was operated for an extended period in 4H on a dry paved surface, the driveline torque load may be causing a bind.	2) Stop vehicle and shift the transmission into neutral. Shift the transfer case to 2H and operate vehicle in 2H on dry paved surfaces.
	3) Transfer case external shift linkage binding.	3) Lubricate, repair, or replace linkage bushings, or tighten loose components as necessary.
	4) Insufficient or incorrect lubricant.	4) Drain and refill to edge of fill hole with Mopar® ATF +4, type 9602, Automatic Transmission fluid.
	5) Internal components binding, worn, or damaged.	5) Disassemble the transfer case and replace worn or damaged components as necessary.
Transfer Case noisy in all operating ranges.	1) Insufficient or incorrect lubricant.	1) Drain and refill to edge of fill hole with Mopar® ATF +4, type 9602, Automatic Transmission fluid.

TRANSFER CASE - NV241LD (Continued)

Condition	Possible Cause	Correction
Noisy in, or jumps out of, four wheel drive low range.	1) Transfer case not completely engaged in 4L position.	1) With the transmission in NEUTRAL, or the clutch depressed in the case of a manual transmission and the vehicle moving under 3-4 km/h (2-3 mph), shift the transfer case to NEUTRAL and then shift into the 4L position.
	2) Shift linkage out of adjustment.	2) Adjust linkage.
	3) Shift linkage loose or binding.	3) Tighten, lubricate, or repair linkage as necessary.
	4) Range fork damaged, inserts worn, or fork is binding on the shift rail.	4) Disassemble unit and repair as necessary.
	5) Low range gear worn or damaged.	5) Disassemble unit and repair as necessary.
Lubricant leaking from output shaft seal or vent.	1) Transfer case overfilled.	1) Drain lubricant to the correct level.
	2) Vent closed or restricted.	2) Clear or replace vent as necessary.
	3) Output shaft seals damaged or installed incorrectly.	3) Replace seal as necessary. Check to ensure that another component, the propeller shaft slip yoke for example, is not causing damage to seal.
Abnormal tire wear.	1) Extended operation on hard, dry surfaces in the 4H position.	1) Operate vehicle in the 2H position on hard, dry surfaces.

REMOVAL

(1) Raise and support vehicle.

(2) Remove skid plate, if equipped. (Refer to 13 - FRAMES & BUMPERS/FRAME/TRANSFER CASE SKID PLATE - REMOVAL)

(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. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)

(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.

DISASSEMBLY

Position transfer case in a shallow drain pan. Remove drain plug and drain any remaining lubricant remaining in case.

TRANSFER CASE - NV241LD (Continued)

REAR EXTENSION, RETAINER, AND REAR CASE

(1) Remove rear extension bolts (Fig. 2).

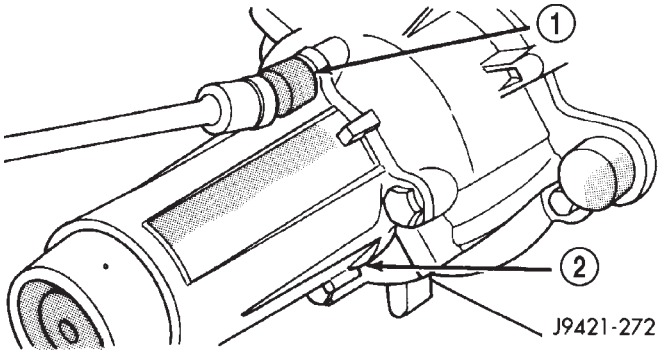


Fig. 2 Rear Extension Bolt Removal

1 - SOCKET
2 - REAR EXTENSION

(2) Remove rear extension housing (Fig. 3). Tap extension once or twice with a plastic mallet to break sealer bead and loosen it.

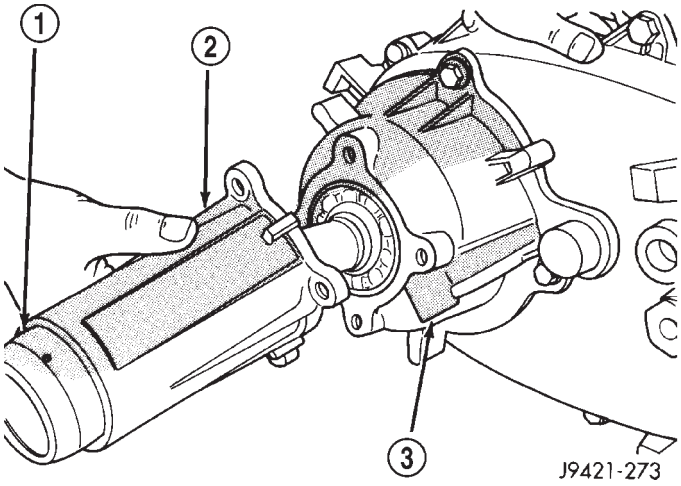


Fig. 3 Rear Extension Housing Removal

1 - SEAL
2 - REAR EXTENSION HOUSING
3 - REAR RETAINER

(3) Remove output bearing retaining ring with heavy duty snap-ring pliers (Fig. 4).

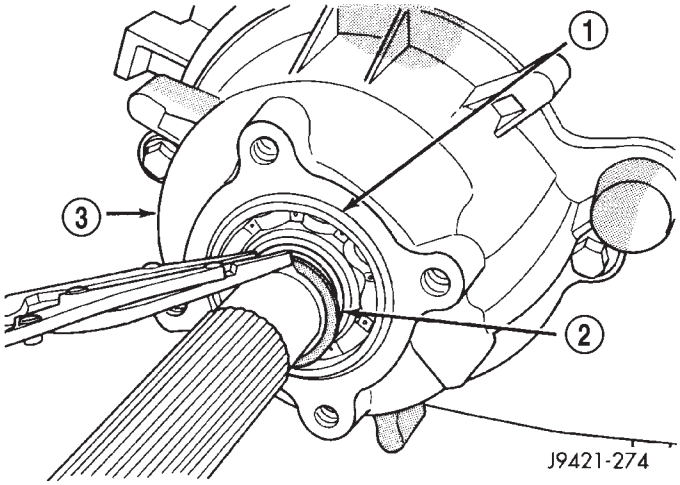


Fig. 4 Removing Output Bearing Retaining Ring

1 - OUTPUT BEARING
2 - RETAINING RING
3 - REAR RETAINER

(4) Remove rear retainer bolts (Fig. 5).

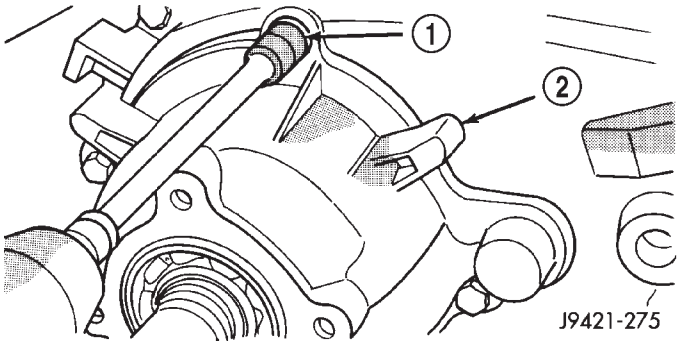


Fig. 5 Removing Rear Extension Bolts

1 - SOCKET
2 - REAR RETAINER

TRANSFER CASE - NV241LD (Continued)

(5) Loosen rear retainer with pry bar placed under flange (Fig. 6).

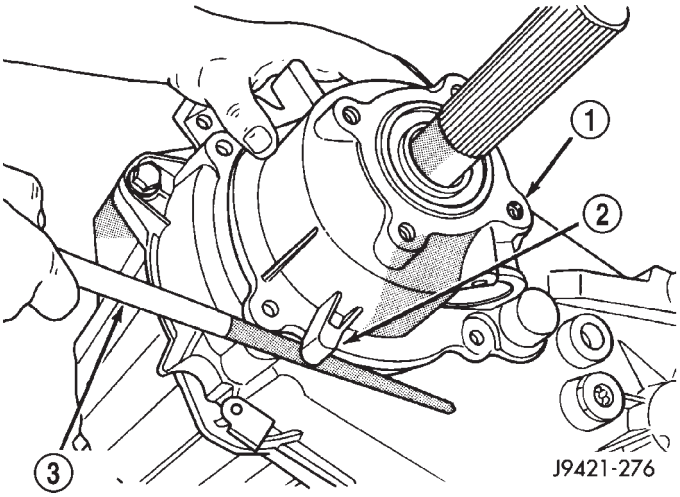


Fig. 6 Loosening Rear Retainer

1 - REAR RETAINER
2 - FLANGE
3 - PRY TOOL

(6) Remove rear retainer and output bearing as assembly (Fig. 7).

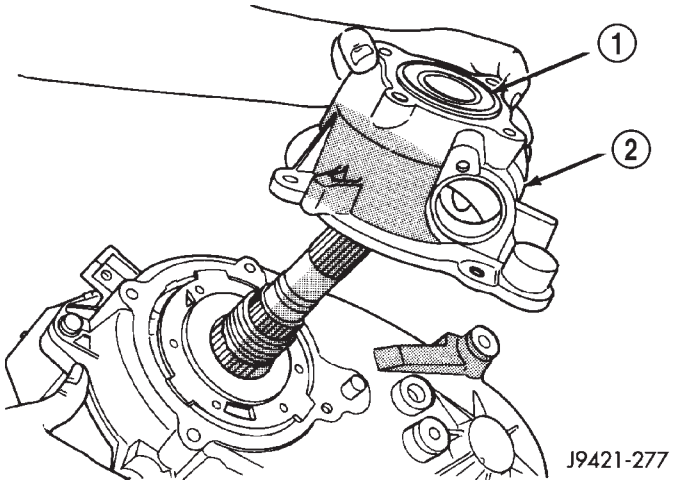


Fig. 7 Rear Retainer Removal

1 - OUTPUT BEARING
2 - REAR RETAINER

COMPANION FLANGE AND SHIFT LEVER

(1) Shift transfer case into NEUTRAL.

(2) Remove companion flange nut (Fig. 8). Discard nut after removal. It is not reusable.

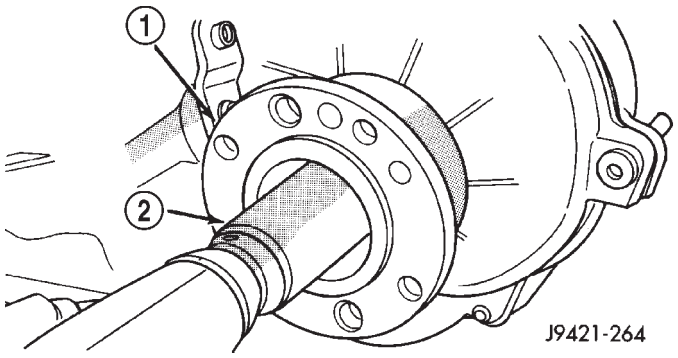


Fig. 8 Removing Companion Flange Nut

1 - COMPANION FLANGE
2 - 1-1/8" SOCKET

(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. 9).

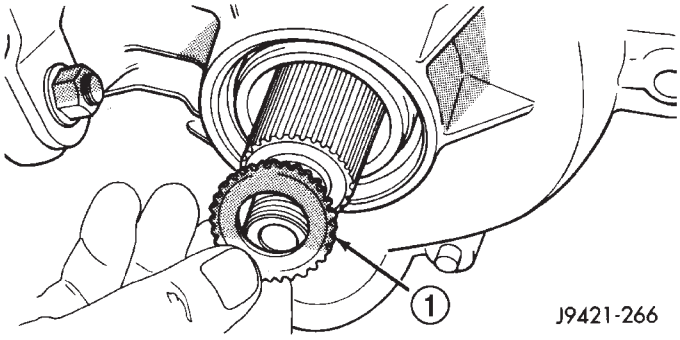


Fig. 9 Companion Flange Seal Removal

1 - FLANGE SEAL

(5) Remove nut and washer that retain shift lever to sector shaft. Then remove shift lever from shaft (Fig. 10).

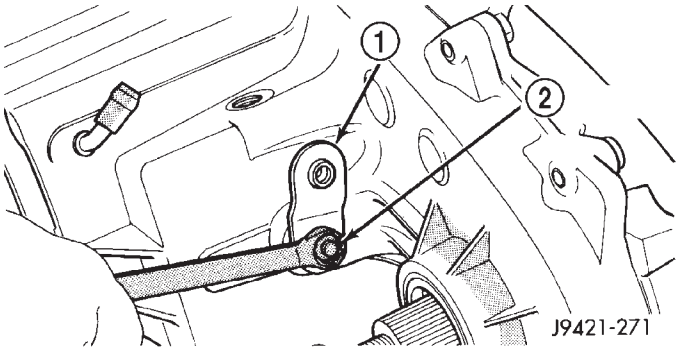


Fig. 10 Shift Lever Removal

1 - SHIFT LEVER
2 - NUT/WASHER

TRANSFER CASE - NV241LD (Continued)

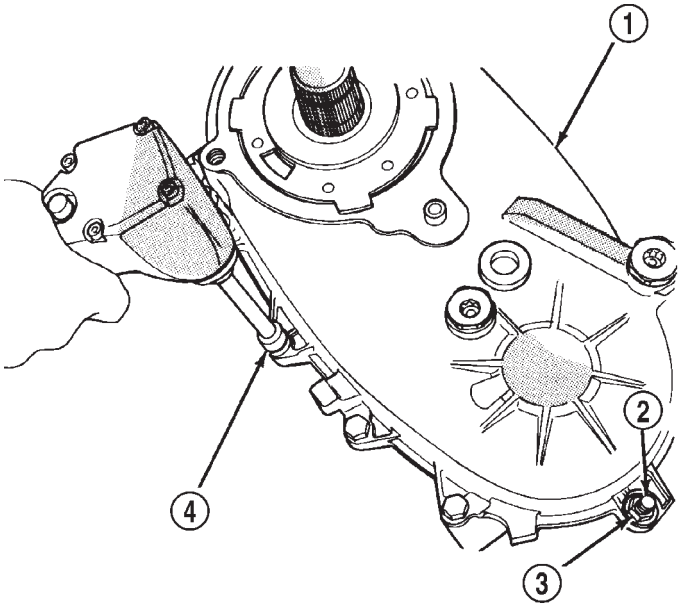
FRONT OUTPUT SHAFT AND DRIVE CHAIN

(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. 11). Some bolts/studs at ends of case require flat washers. Mark position of these bolts with paint or scriber.

(4) Remove rear case-to-front case bolts.



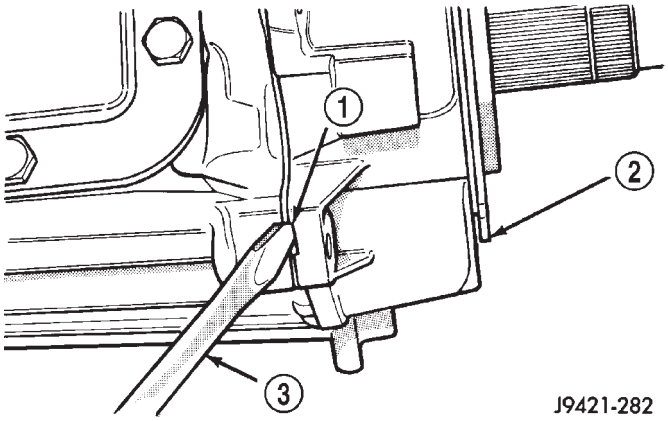
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Fig. 11 Removing Case Attaching Bolts

1 - REAR CASE
2 - STUD
3 - NUT AND WASHER
4 - SOCKET

(5) Loosen rear case with pry tool to break sealer bead. Insert tool in slot at each end of case (Fig. 12).

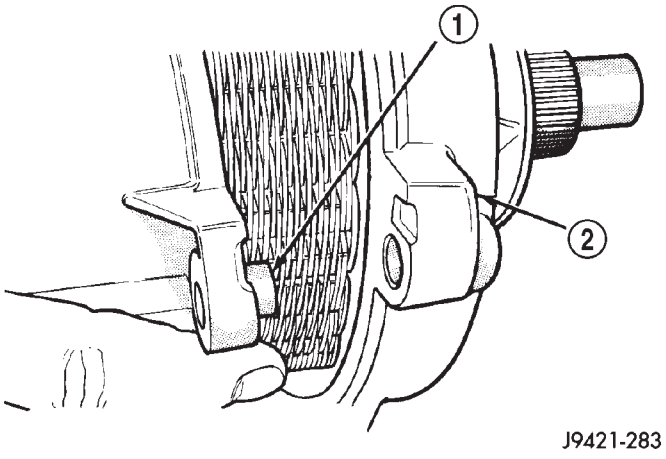
(6) Unseat rear case from alignment dowels (Fig. 13).



J9421-282

Fig. 12 Loosening Rear Case (Breaking Sealer Bead)

1 - SLOT
2 - REAR CASE
3 - PRY TOOL



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Fig. 13 Removing Rear Case From Alignment Dowels

1 - CASE DOWELS (2)
2 - REAR CASE

TRANSFER CASE - NV241LD (Continued)

(7) Remove rear case and oil pump assembly from front case.

(8) Remove shift rail cup and spring (Fig. 14).

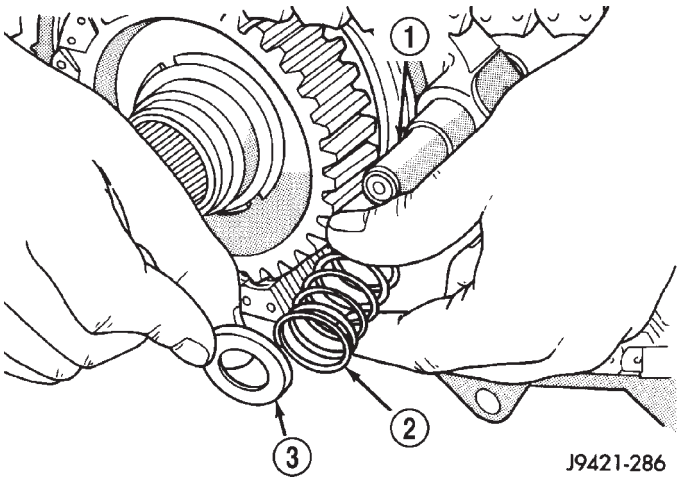


Fig. 14 Shift Rail Cup And Spring Removal

1 - SHIFT RAIL
2 - SPRING
3 - CUP

(9) Remove front sprocket retaining ring (Fig. 15).

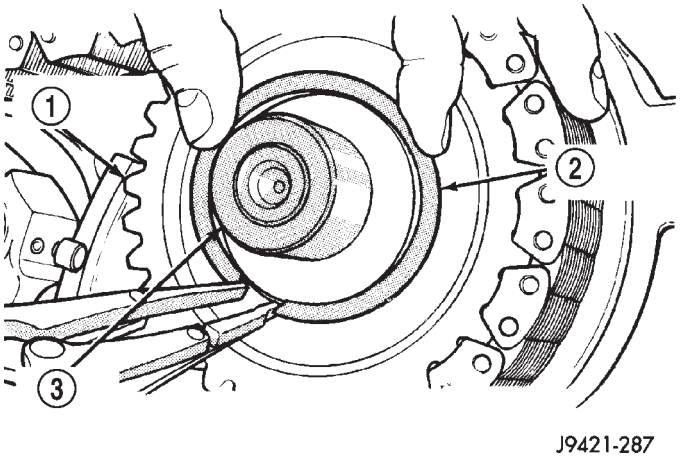


Fig. 15 Removing Front Sprocket Retaining Ring

1 - FRONT SPROCKET
2 - RETAINING RING
3 - FRONT OUTPUT SHAFT

(10) Pull mainshaft, front sprocket and chain outward about 25.4 mm (1-inch) simultaneously (Fig. 16).

(11) Remove chain from mainshaft drive sprocket and remove front sprocket and chain as assembly.

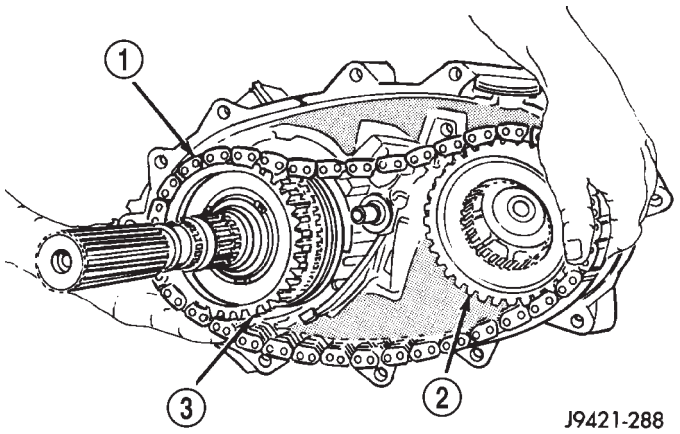


Fig. 16 Removing Drive Chain And Front Sprocket

1 - CHAIN
2 - DRIVE SPROCKET
3 - FRONT SPROCKET

SHIFT FORKS AND MAINSHAFT

(1) Remove vacuum/indicator switch (Fig. 17).

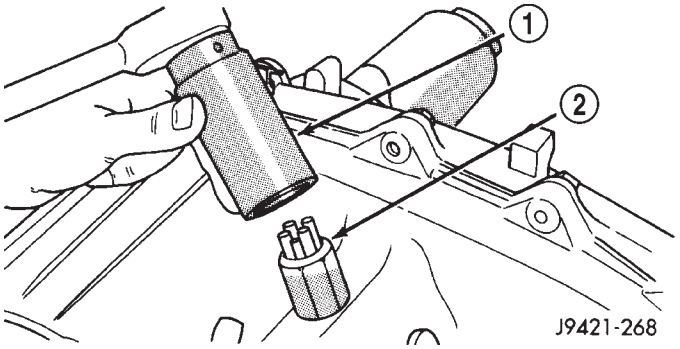


Fig. 17 Vacuum/Indicator Switch Removal

1 - 1-1/16" SOCKET
2 - INDICATOR SWITCH

(2) Loosen poppet plunger screw (Fig. 18).

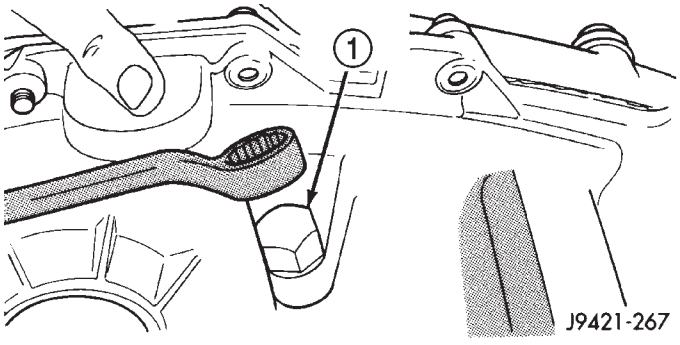


Fig. 18 Loosening Poppet Plunger Screw

1 - POPPET PLUNGER SCREW

TRANSFER CASE - NV241LD (Continued)

(3) Remove poppet plunger screw and spring (Fig. 19). Note that screw has O-ring seal. Remove and discard seal this seal.

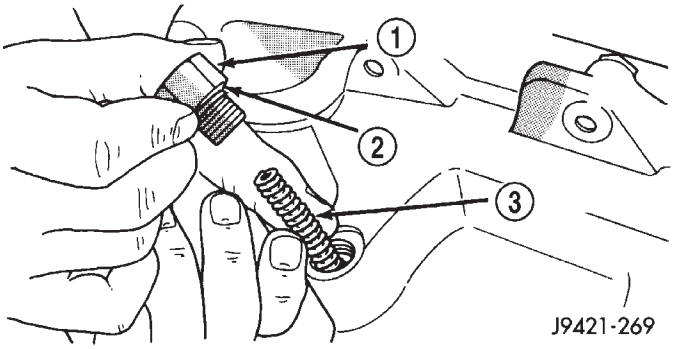


Fig. 19 Poppet Plunger Screw And Spring Removal

1 - POPPET PLUNGER SCREW
2 - O-RING
3 - PLUNGER SPRING

(4) Remove poppet plunger with magnet (Fig. 20).

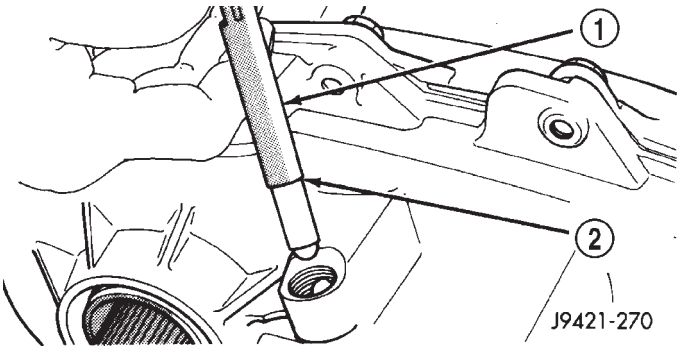


Fig. 20 Poppet Plunger Removal

1 - MAGNET
2 - POPPET PLUNGER

(5) Remove front output shaft from bearing in case (Fig. 21).

(6) Pull mainshaft assembly out of input gear, sliding clutch and case (Fig. 22).

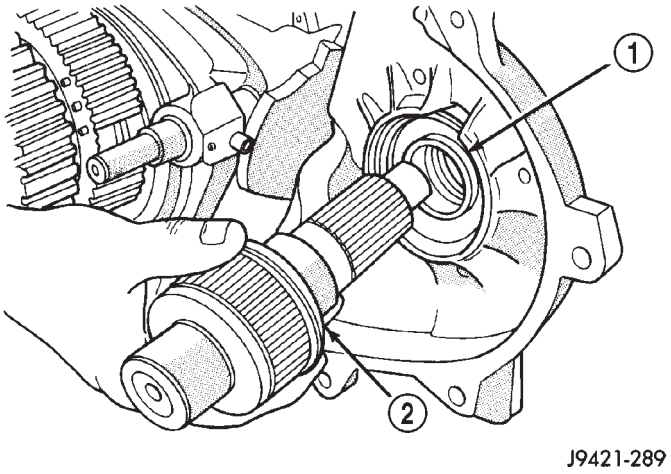


Fig. 21 Front Output Shaft Removal

1 - BALL BEARING
2 - FRONT OUTPUT SHAFT

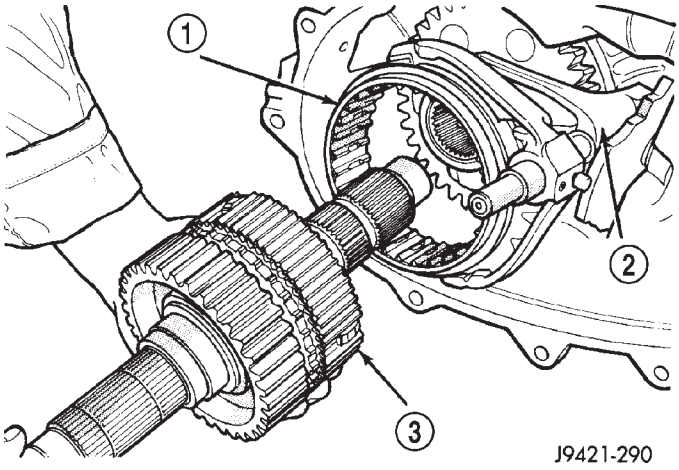


Fig. 22 Mainshaft Assembly Removal

1 - SLIDING CLUTCH
2 - MODE FORK
3 - MAINSHAFT ASSEMBLY

TRANSFER CASE - NV241LD (Continued)

(7) Remove mode fork, sliding clutch and shift rail as assembly (Fig. 23). Note which way clutch fits in fork (long side of clutch goes to front).

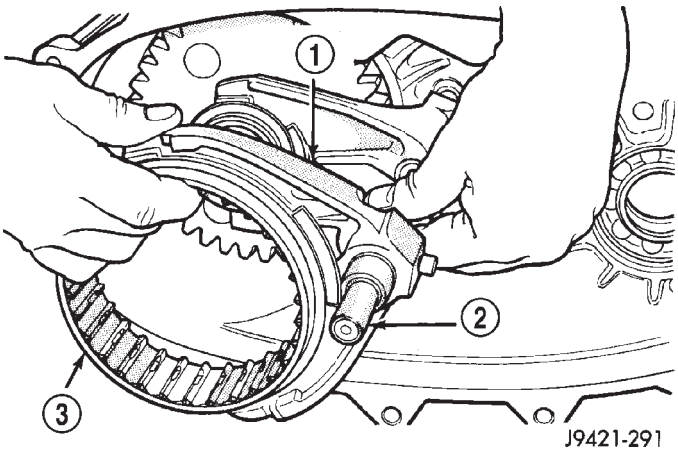


Fig. 23 Mode Fork, Shift Rail And Sliding Clutch Removal

1 - MODE FORK
2 - SHIFT RAIL
3 - SLIDING CLUTCH

(8) Remove range fork retaining ring.

(9) Remove range fork and hub as an assembly (Fig. 24). Note fork position for installation reference.

(10) Remove shift sector (Fig. 25).

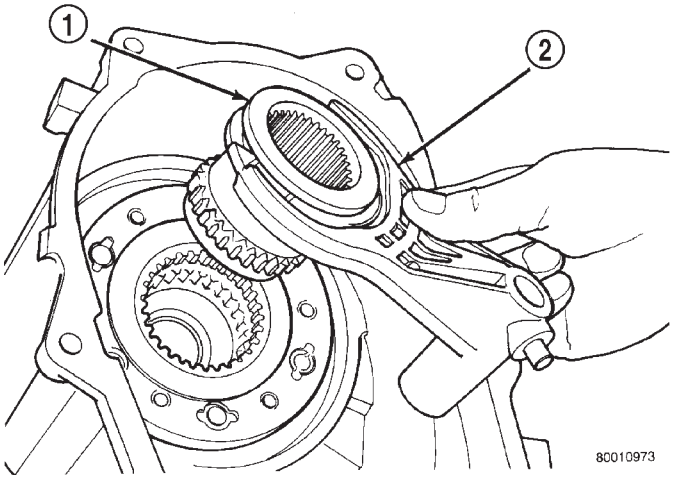


Fig. 24 Range Fork And Hub Removal

1 - RANGE HUB
2 - RANGE FORK

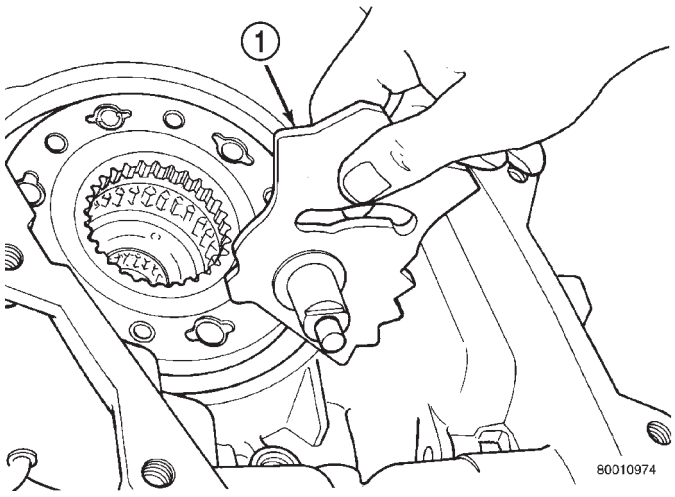


Fig. 25 Shift Sector Removal

1 - SHIFT SECTOR

(11) Remove shift sector shaft nylon retainer and O-ring from shaft bore in front case (Fig. 26).

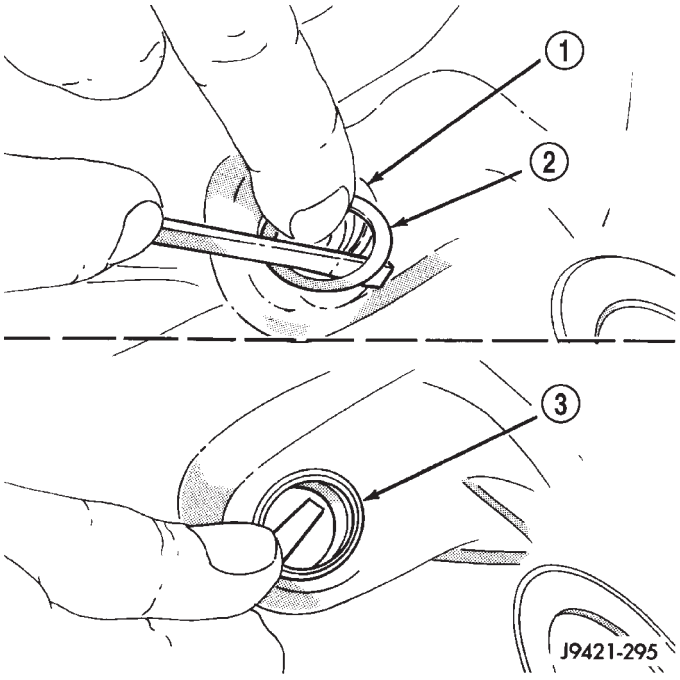


Fig. 26 Removing Sector Shaft O-Ring And Retainer

1 - SHAFT BORE
2 - NYLON RETAINING RING
3 - SECTOR SHAFT O-RING

TRANSFER CASE - NV241LD (Continued)

MAINSHAFT

(1) Remove retaining ring that secures synchronizer hub onto mainshaft (Fig. 27). Use standard (instead of parallel jaw) snap-ring pliers to remove this retaining ring.

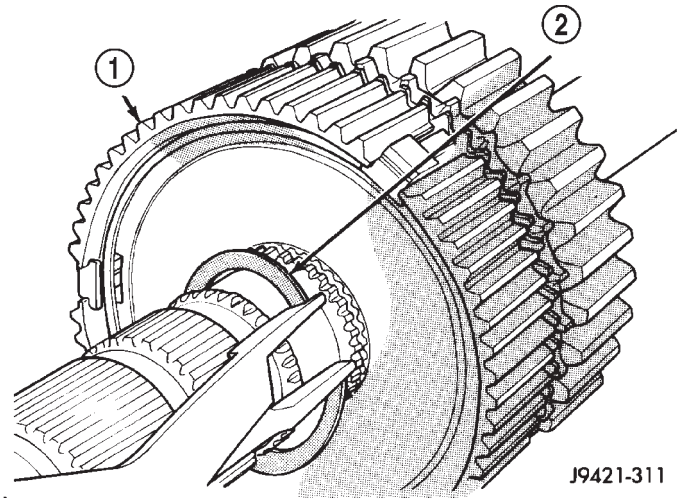


Fig. 27 Synchronizer Hub Retaining Ring Removal

1 - SYNCHRO HUB
2 - RETAINING RING

(2) Remove synchronizer hub (Fig. 28).

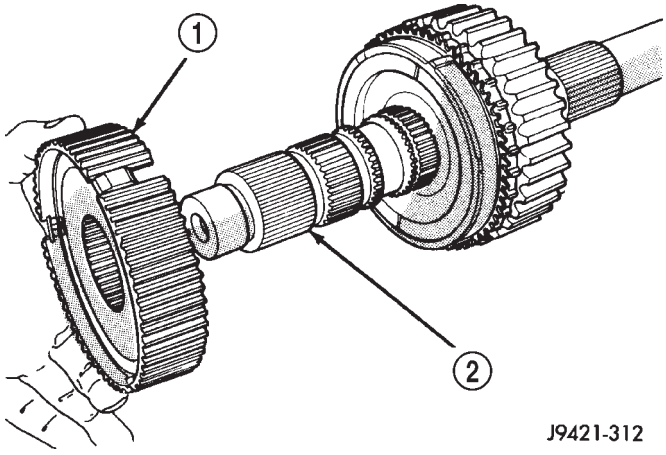


Fig. 28 Synchronizer Hub Removal

1 - SYNCHRO HUB
2 - MAINSHAFT

(3) Inspect synchronizer hub struts and springs. If struts appear worn, remove struts and springs from hub. Note position of springs for installation reference (Fig. 29).

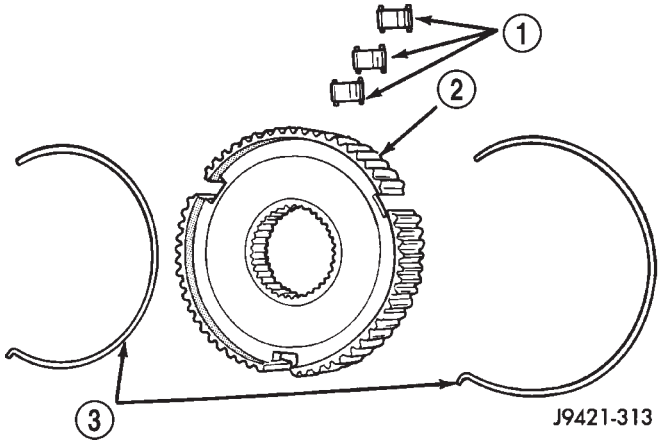


Fig. 29 Synchronizer Strut And Spring Removal

1 - SYNCHRO STRUTS
2 - SYNCHRO HUB
3 - SYNCHRO SPRINGS

(4) Remove brass stop ring (Fig. 30). Discard stop ring if worn, cracked, or any teeth are missing.

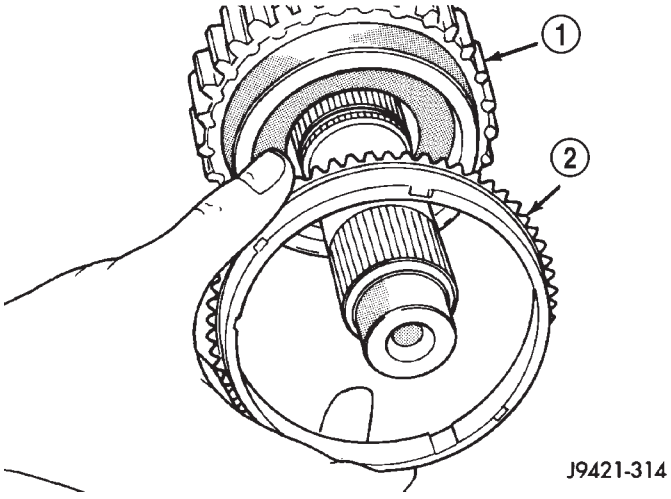


Fig. 30 Synchronizer Stop Ring Removal

1 - DRIVE SPROCKET
2 - STOP RING

TRANSFER CASE - NV241LD (Continued)

(5) Remove drive sprocket (Fig. 31).

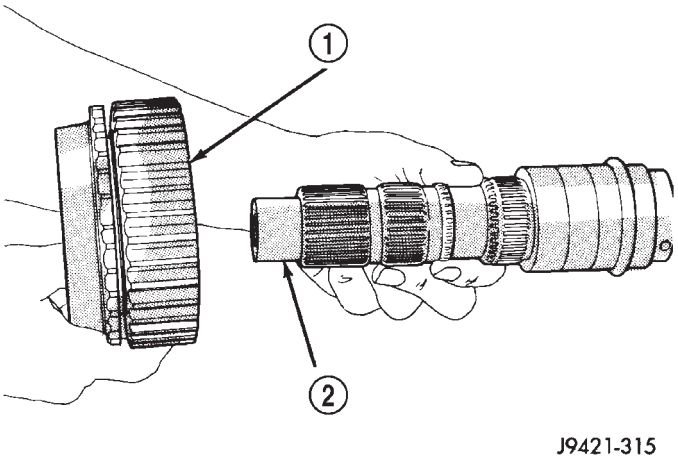


Fig. 31 Drive Sprocket Removal

1 - DRIVE SPROCKET
2 - MAINSHAFT

INPUT AND PLANETARY GEAR

(1) Remove front bearing retainer attaching bolts (Fig. 32).

(2) Remove front bearing retainer. Pry retainer loose with pry tool positioned in slots at each end of retainer (Fig. 33).

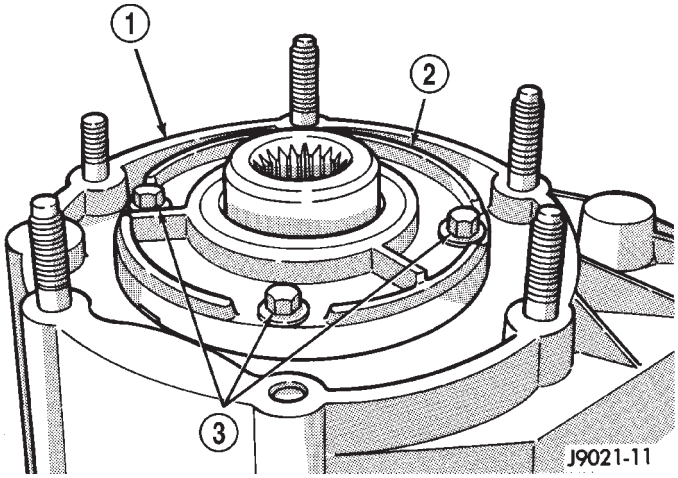


Fig. 32 Front Bearing Retainer Bolts

1 - FRONT CASE
2 - FRONT BEARING RETAINER
3 - RETAINER BOLTS

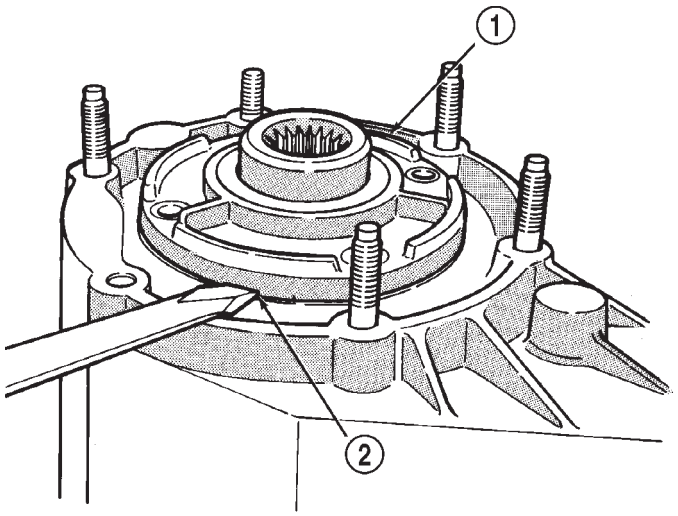


Fig. 33 Front Bearing Retainer Removal

1 - FRONT BEARING RETAINER
2 - RETAINER SLOT

(3) Remove front bearing retainer seal. Tap seal out with drift and hammer.

(4) Remove input gear retaining ring with heavy duty snap-ring pliers (Fig. 34).

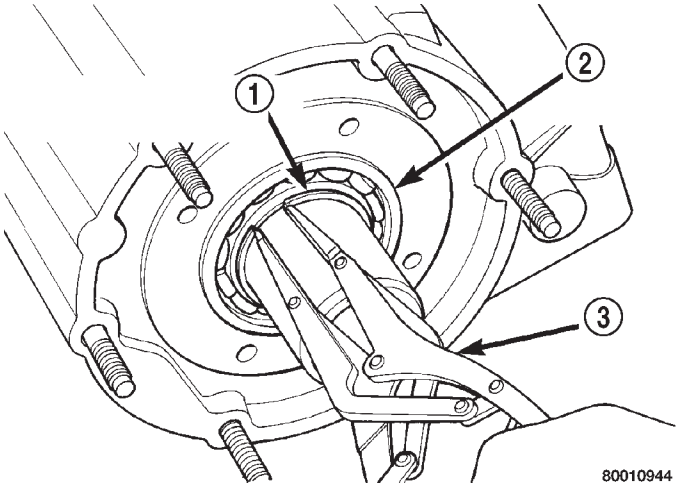


Fig. 34 Removing Input Gear Retaining Ring

1 - INPUT GEAR BEARING RETAINING RING
2 - INPUT GEAR BEARING
3 - SNAP-RING PLIERS

TRANSFER CASE - NV241LD (Continued)

(5) Place front case in horizontal position. Then remove input gear and low range gear as an assembly (Fig. 35). Tap gear out of bearing with plastic mallet, if necessary.

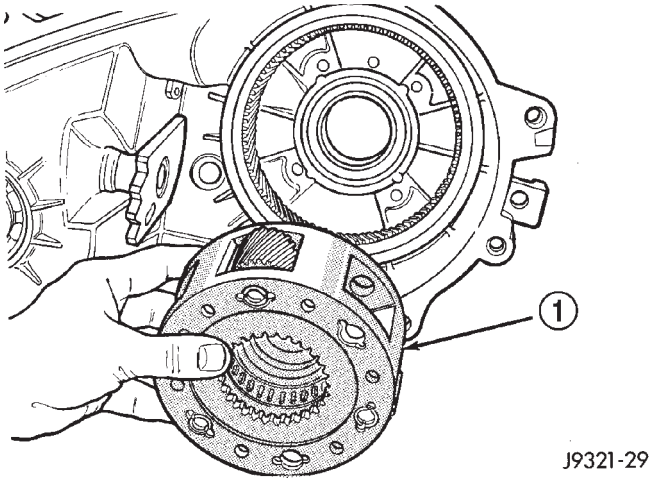


Fig. 35 Input Gear And Planetary Carrier Removal

1 - INPUT AND LOW RANGE GEAR ASSEMBLY

INPUT AND PLANETARY GEAR

(1) Remove snap-ring that retains input gear in low range gear (Fig. 36).
(2) Remove retainer (Fig. 37).
(3) Remove front tabbed thrust washer (Fig. 38).
(4) Remove input gear (Fig. 39).
(5) Remove rear tabbed thrust washer from low range gear (Fig. 40).

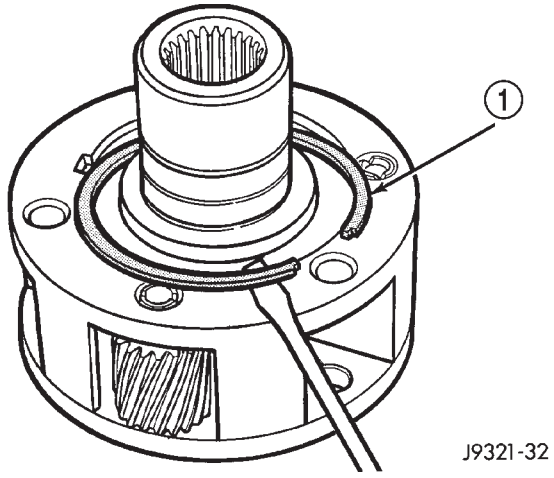


Fig. 36 Input Gear Snap-Ring Removal

1 - INPUT GEAR SNAP-RING

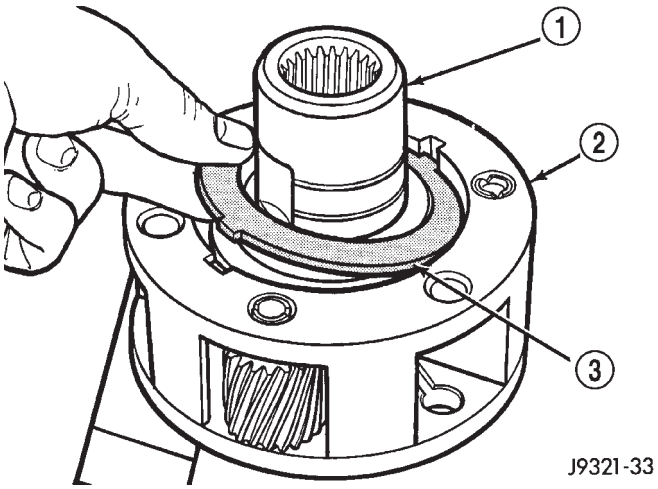


Fig. 37 Input Gear Retainer Removal

1 - INPUT GEAR
2 - LOW RANGE GEAR
3 - RETAINER

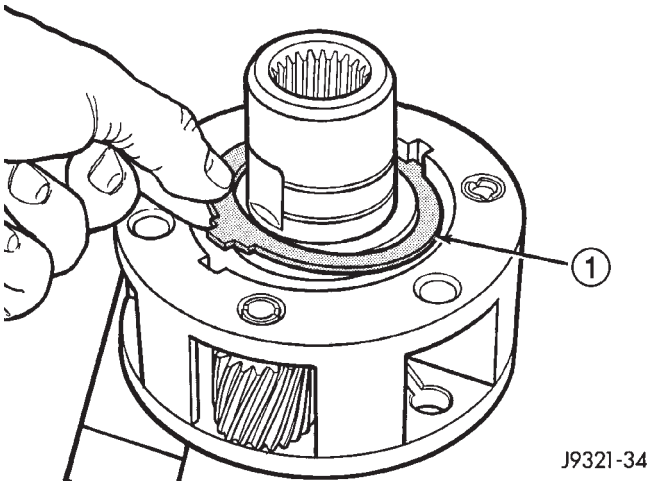


Fig. 38 Front Tabbed Thrust Washer Removal

1 - FRONT TABBED THRUST WASHER

CLEANING

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.

TRANSFER CASE - NV241LD (Continued)

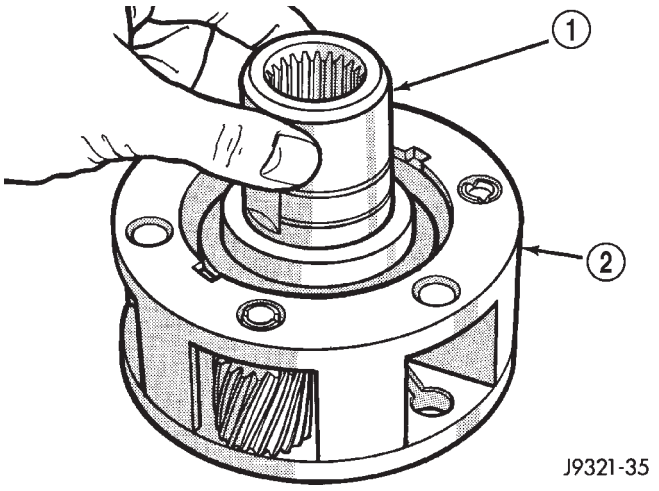


Fig. 39 Input Gear Removal

1 - INPUT GEAR
2 - LOW RANGE GEAR

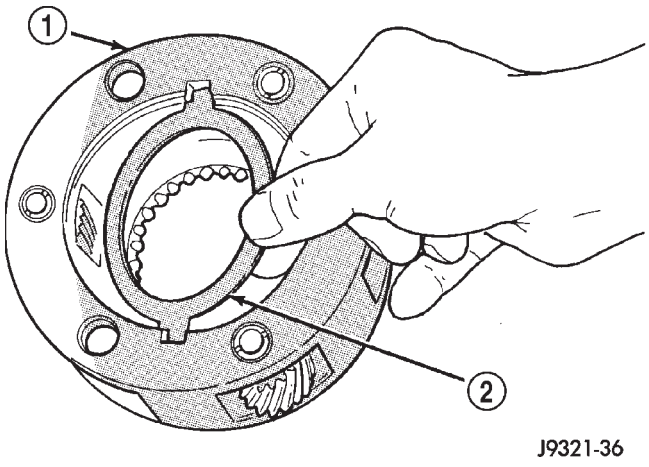


Fig. 40 Rear Tabbed Thrust Washer Removal

1 - LOW RANGE GEAR
2 - REAR TABBED THRUST WASHER

INSPECTION

MAINSHAFT/SPROCKET/HUB

Inspect the splines on the hub and shaft and the teeth on the sprocket (Fig. 41). Minor nicks and scratches can be smoothed with an oilstone, however, replace any part that is damaged.

Check the contact surfaces in the sprocket bore and on the mainshaft. Minor nicks and scratches can be smoothed with 320-400 grit emery cloth but do not try to salvage the shaft if nicks or wear is severe.

Inspect the spline teeth on the synchronizer hub. If evidence of chipping or excessive wear is apparent, replace the hub. The hooked end of each synchronizer 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 synchronizer ring for proper fit on the cone with a minimum of wobble. Also check the synchronizer struts for wear or damage.

INPUT GEAR AND PLANETARY CARRIER

Check the teeth on the gear (Fig. 42). Minor nicks can be dressed off with an oilstone but replace the gear if any teeth are broken, cracked, or chipped. The bearing surface on the gear can be smoothed with 300-400 grit emery cloth if necessary.

Examine the carrier body and pinion gears for wear or damage. The carrier will have to be replaced as an assembly if the body, pinion pins, or pinion gears are damaged.

Check the lock ring and both thrust washers for wear or cracks. Replace them if necessary. Also replace the lock retaining ring if bent, distorted, or broken.

TRANSFER CASE - NV241LD (Continued)

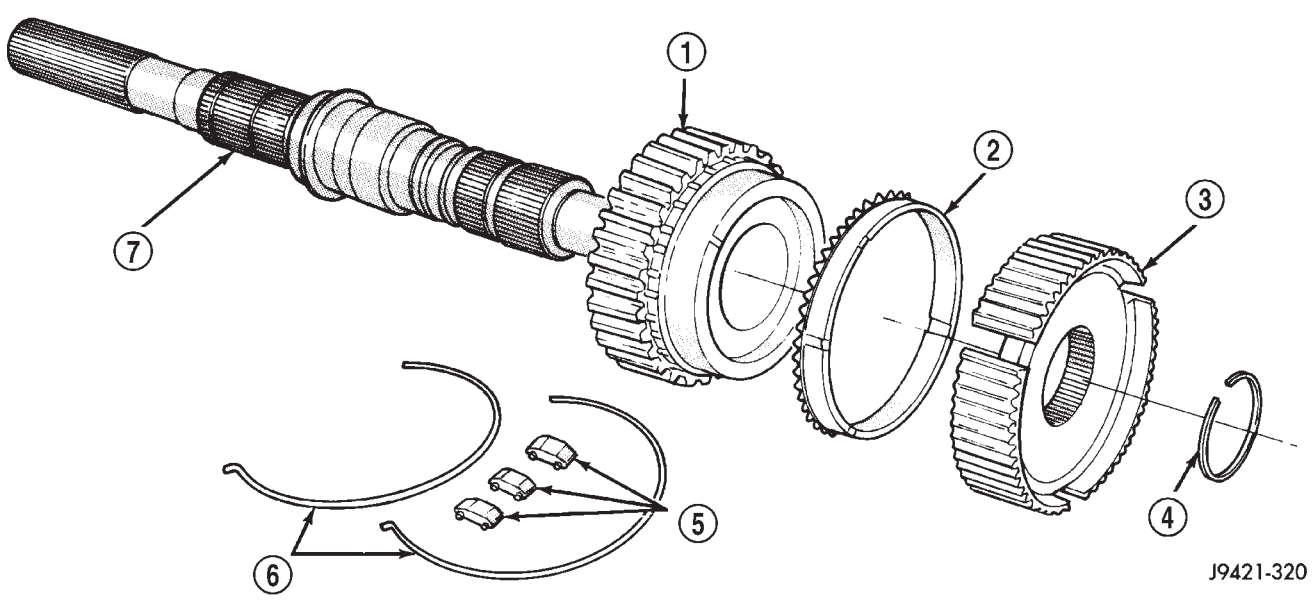


Fig. 41 Mainshaft Components

1 - DRIVE SPROCKET
2 - STOP RING
3 - SYNCHRO HUB
4 - RETAINING RING
5 - STRUTS
6 - SYNCHRO SPRINGS
7 - MAINSHAFT

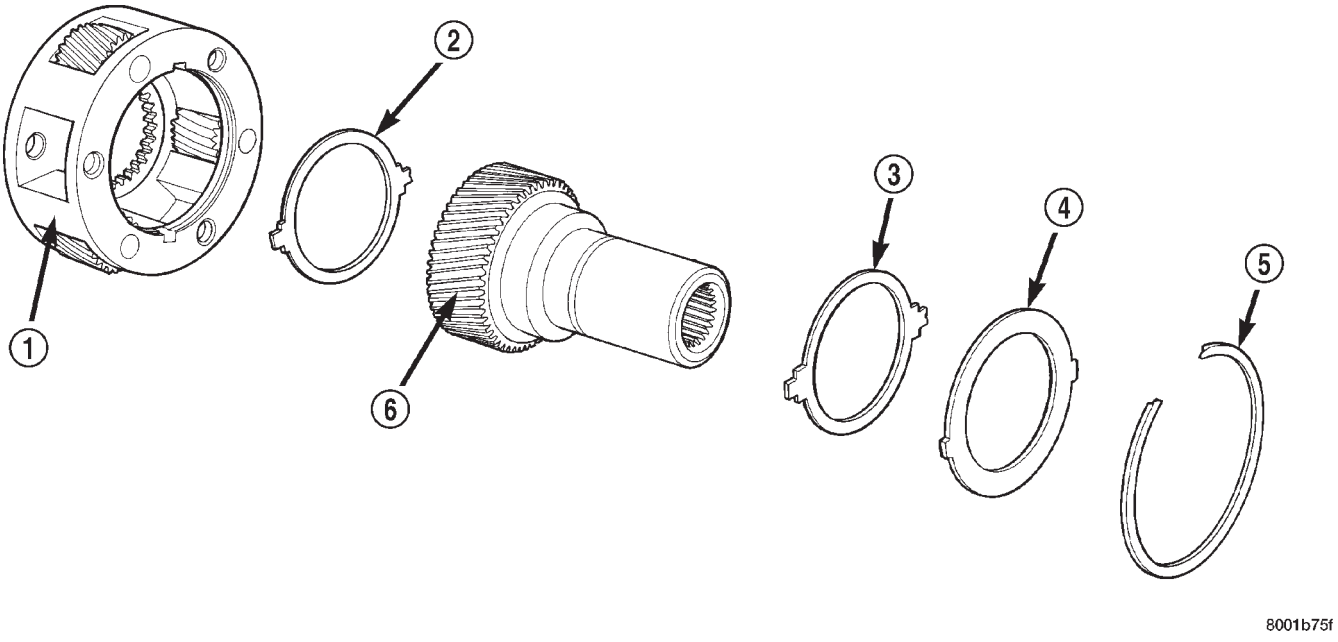


Fig. 42 Input Gear And Carrier Components

1 - PLANETARY CARRIER
2 - REAR THRUST WASHER
3 - FRONT THRUST WASHER
4 - CARRIER LOCK RING
5 - CARRIER LOCK RETAINING RING
6 - INPUT GEAR

TRANSFER CASE - NV241LD (Continued)

SHIFT FORKS/HUBS/SLEEVES

Check condition of the shift forks and mode fork shift rail (Fig. 43). Minor nicks on the shift rail can be smoothed with 320-400 grit emery cloth.

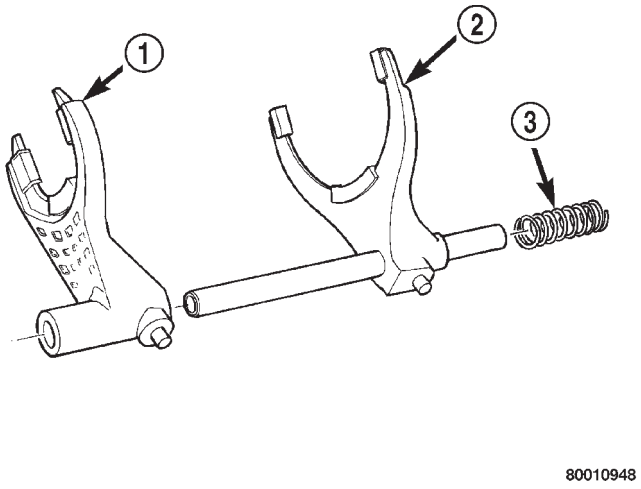


Fig. 43 Shift Forks

1 - RANGE FORK
2 - MODE FORK AND RAIL
3 - MODE SPRING

Inspect the shift fork wear pads (Fig. 44). 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.

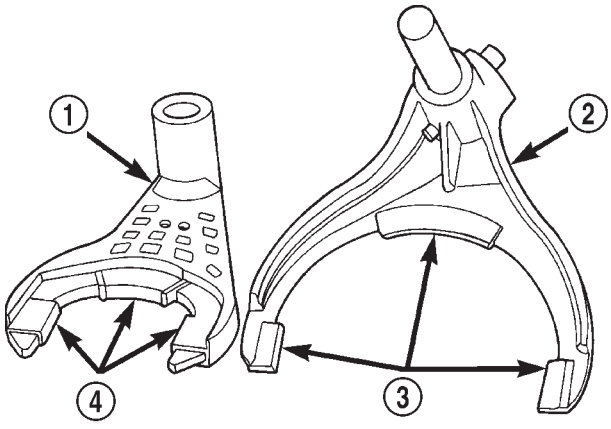


Fig. 44 Shift Fork And Wear Pad Locations

1 - RANGE FORK
2 - MODE FORK
3 - WEAR PADS (SERVICEABLE)
4 - WEAR PADS (NON-SERVICEABLE)

Check both of the sleeves for wear or damage, especially on the interior teeth. Replace the sleeves if wear or damage is evident.

REAR RETAINER COMPONENTS

Inspect the retainer components. Replace the bearing if rough or noisy. Check the retainer for cracks or wear in the bearing bore.

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. 45)

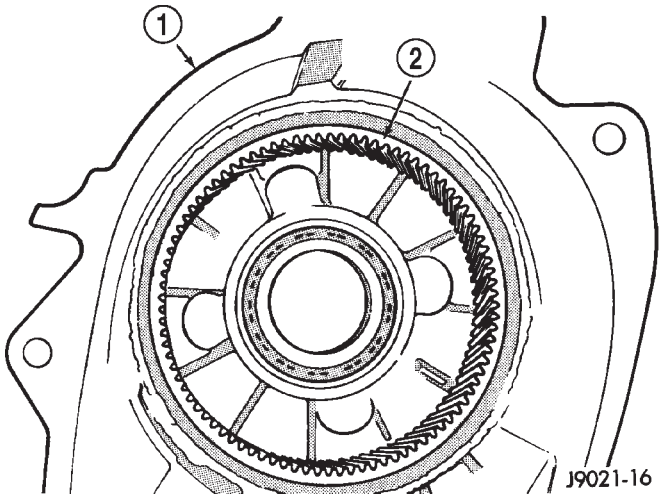


Fig. 45 Low Range Annulus Gear

1 - FRONT CASE
2 - LOW RANGE ANNULUS GEAR

FRONT-REAR CASES AND FRONT RETAINER

Inspect the cases and retainer for wear and damage. 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.

TRANSFER CASE - NV241LD (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.

ASSEMBLY

BEARINGS AND SEALS

(1) Using Remover C-4210 and Handle C-4171, drive input shaft bearing from case from inside annulus gear opening (Fig. 46).

(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. 47).

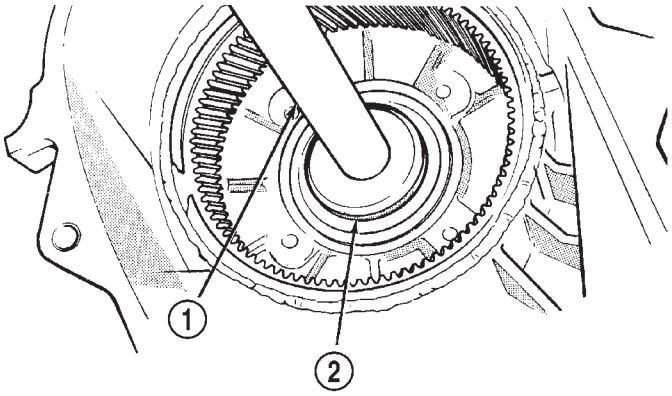


Fig. 46 Input Shaft Bearing Removal

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL C-4210

(5) Using Installer 6953, remove front output shaft bearing.

(6) Start front output shaft bearing in case (Fig. 48). Then seat bearing with Handle C-4171 and Installer 6953.

(7) Install front output shaft 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.**

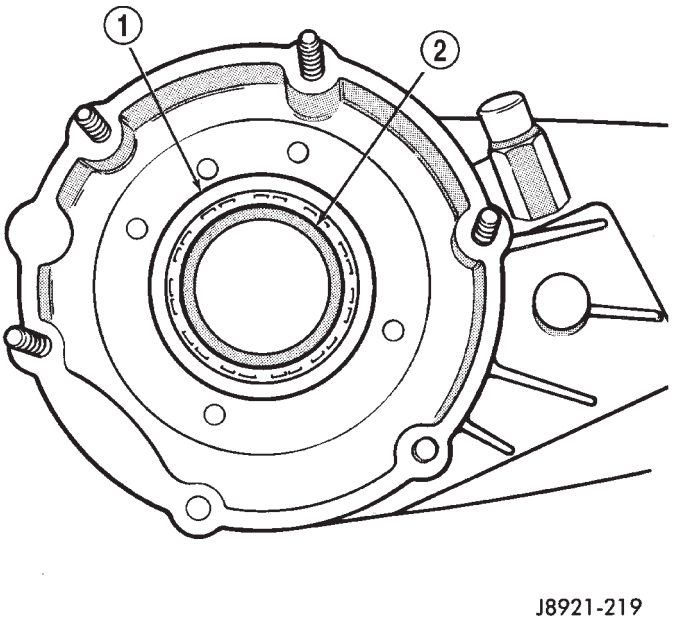


Fig. 47 Seating Input Shaft Bearing

1 - SNAP-RING
2 - INPUT SHAFT BEARING

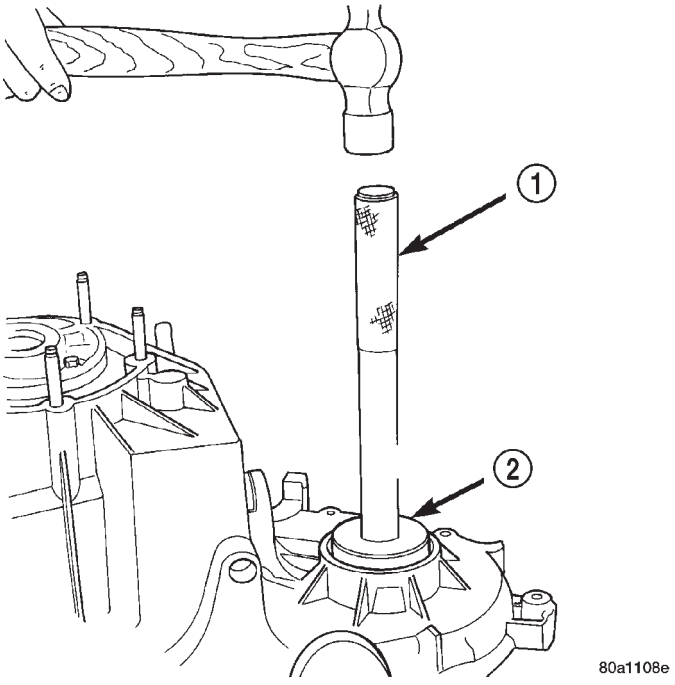


Fig. 48 Front Output Shaft Bearing Installation

1 - HANDLE C-4171
2 - REMOVER/INSTALLER 6953

(b) Start seal in bore with light taps from hammer (Fig. 49). Once seal is started, continue tapping seal into bore until installer tool bottoms against case.

TRANSFER CASE - NV241LD (Continued)

(c) Remove installer and verify that seal is recessed the proper amount (Fig. 50). 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.

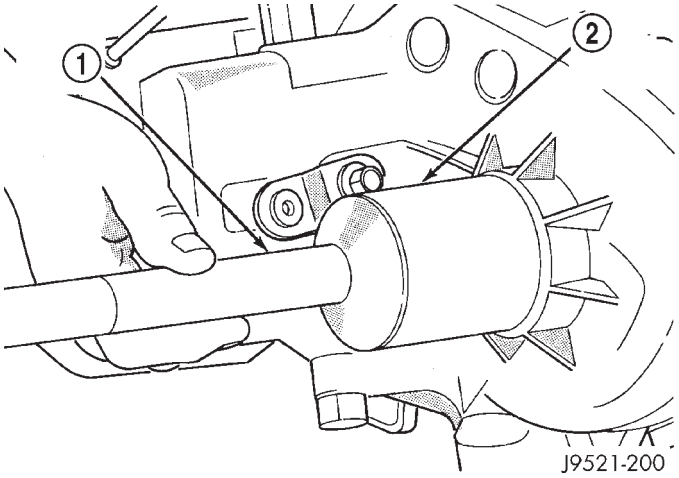


Fig. 49 Front Output Seal Installation

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL 6888

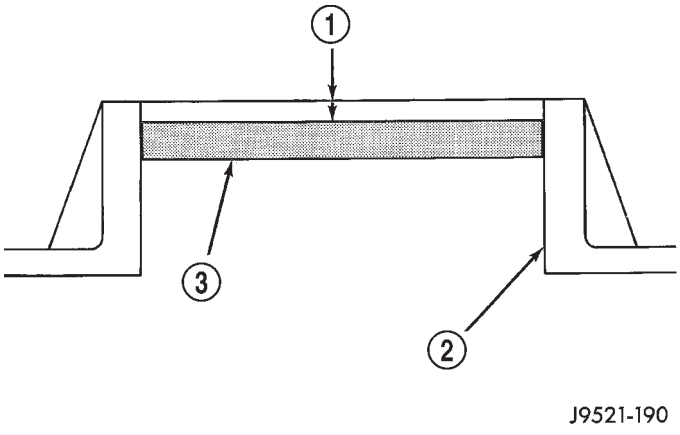


Fig. 50 Checking Front Output Seal Installation Depth

1 - CORRECT SEAL DEPTH IS 2.03-2.5 mm (0.080-0.100 in.) BELOW TOP EDGE OF BORE
2 - FRONT CASE SHAFT BORE
3 - FRONT OUTPUT SEAL

(9) Remove seal from front bearing retainer with suitable pry tool.

(10) Install new oil seal in front bearing retainer with Installer 7884 (Fig. 51).

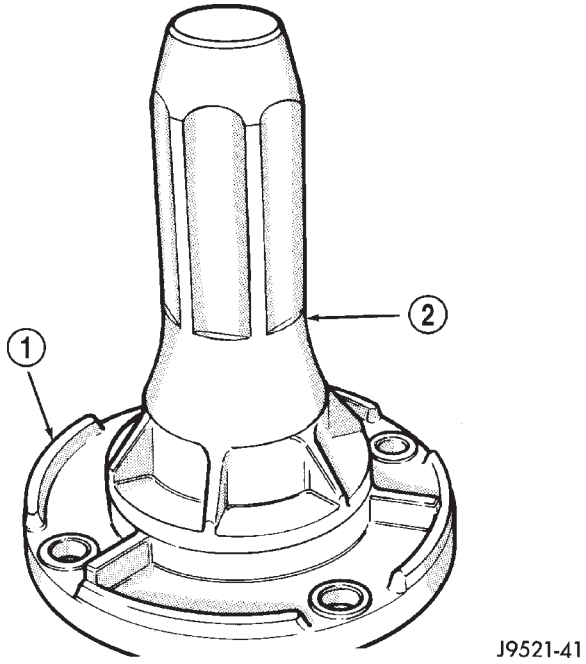


Fig. 51 Install Front Bearing Retainer Seal

1 - FRONT BEARING RETAINER
2 - SPECIAL TOOL 7884

(11) Remove seal from oil pump with suitable pry tool.

(12) Install new seal in oil pump with Installer 7888 (Fig. 52).

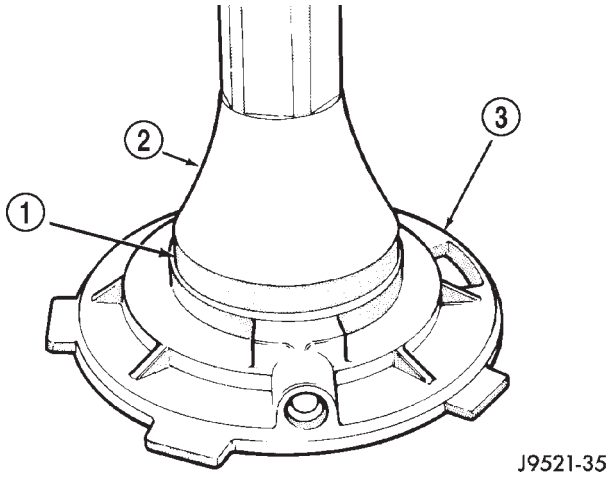


Fig. 52 Oil Pump Seal Installation

1 - HOUSING SEAL
2 - SPECIAL TOOL 7888
3 - OIL PUMP FEED HOUSING

TRANSFER CASE - NV241LD (Continued)

(13) Remove input gear pilot bearing by inserting a suitably sized drift into the splined end of the input gear and driving the bearing out with the drift and a hammer (Fig. 53).

(14) Install new pilot bearing with Plug C-293-3.

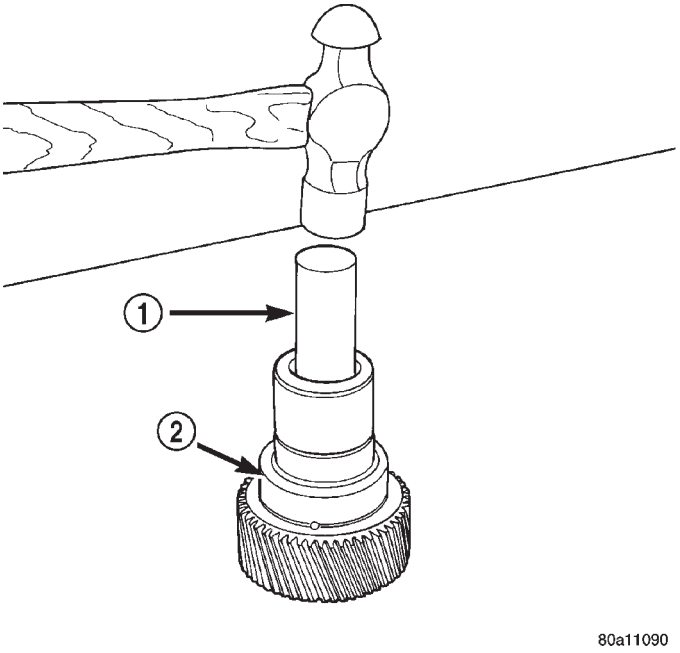


Fig. 53 Remove Input Gear Pilot Bearing

1 - DRIFT
2 - INPUT GEAR

(15) Remove the front output shaft rear bearing with the screw and jaws from Remover L-4454 and Cup 8148 (Fig. 54).

(16) Install new bearing with Tool Handle C-4171 and Installer 5066 (Fig. 55). The bearing bore is chamfered at the top. Install the bearing so it is flush with the lower edge of this chamfer (Fig. 56).

INPUT AND PLANETARY GEAR

(1) Lubricate gears and thrust washers (Fig. 57) with recommended transmission fluid.

(2) Install first thrust washer in low range gear (Fig. 57). Be sure washer tabs are properly aligned in gear notches.

(3) Install input gear in low range gear. Be sure input gear is fully seated.

(4) Install remaining thrust washer in low range gear and on top of input gear. Be sure washer tabs are properly aligned in gear notches.

(5) Install retainer on input gear and install snap-ring.

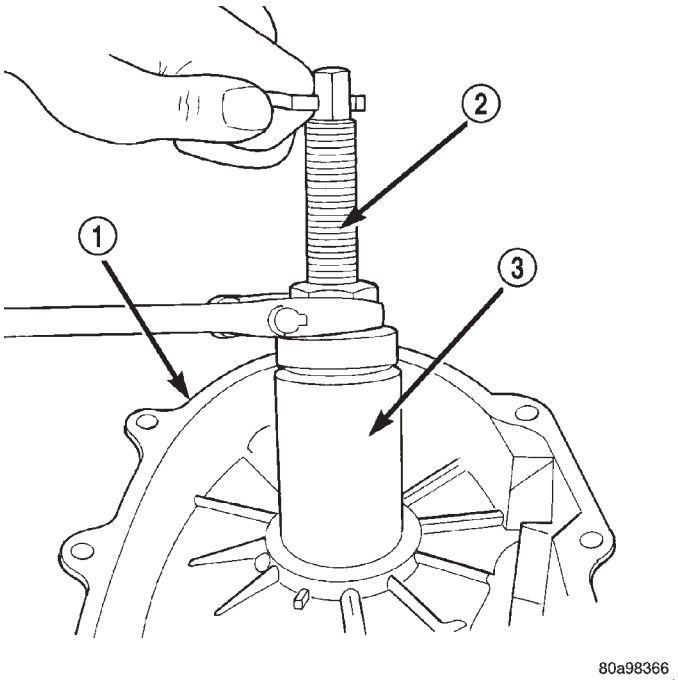


Fig. 54 Front Output Shaft Rear Bearing Removal

1 - REAR CASE
2 - SPECIAL TOOL L-4454-1 AND L-4454-3
3 - SPECIAL TOOL 8148

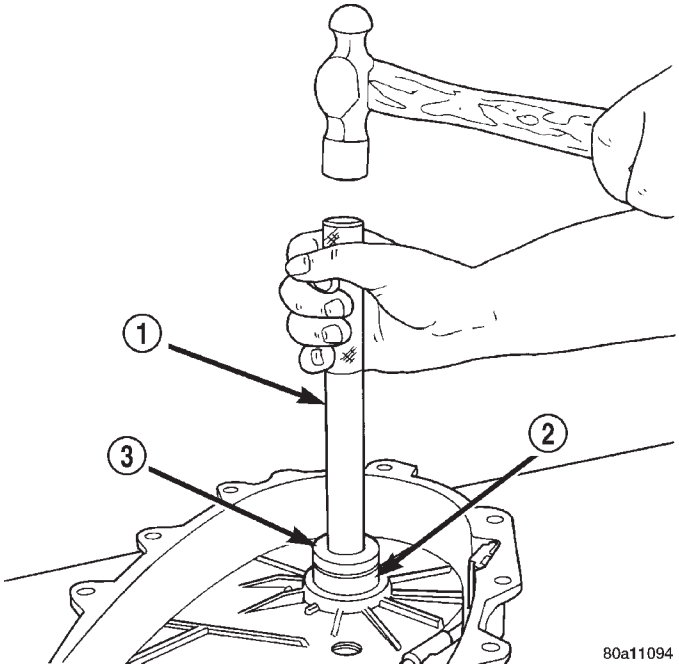


Fig. 55 Output Shaft Rear Bearing Installation

1 - HANDLE C-4171
2 - OUTPUT SHAFT INNER BEARING
3 - INSTALLER 5066

TRANSFER CASE - NV241LD (Continued)

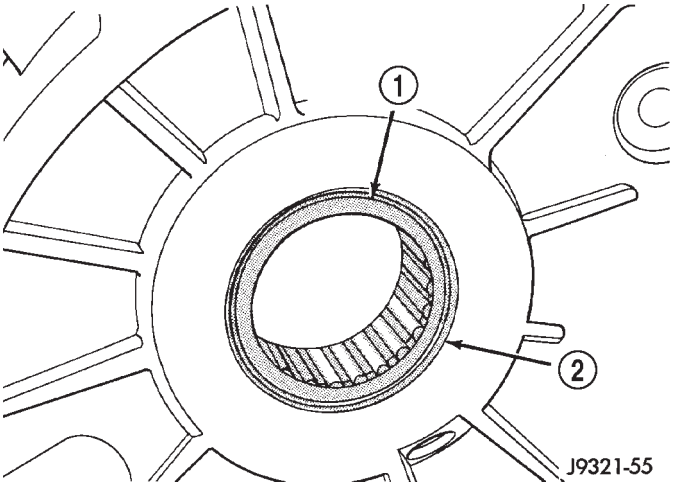


Fig. 56 Output Shaft Rear Bearing Installation Depth

1 - BEARING (SEATED) AT LOWER EDGE OF CHAMFER
2 - CHAMFER

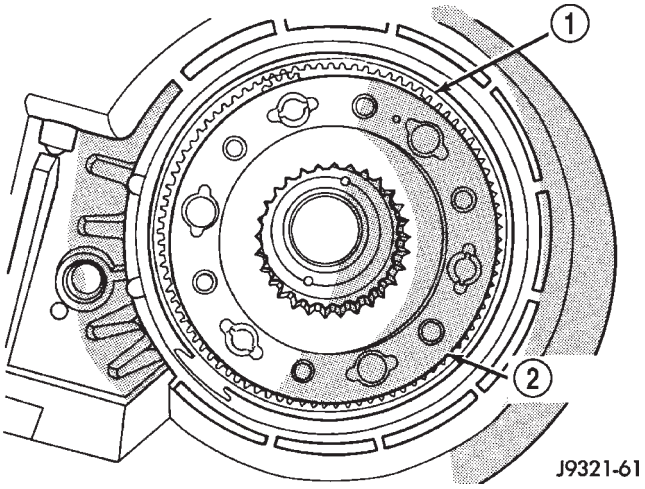


Fig. 58 Input/Low Range Gear Installation

1 - ANNULUS GEAR
2 - INPUT/LOW RANGE GEAR

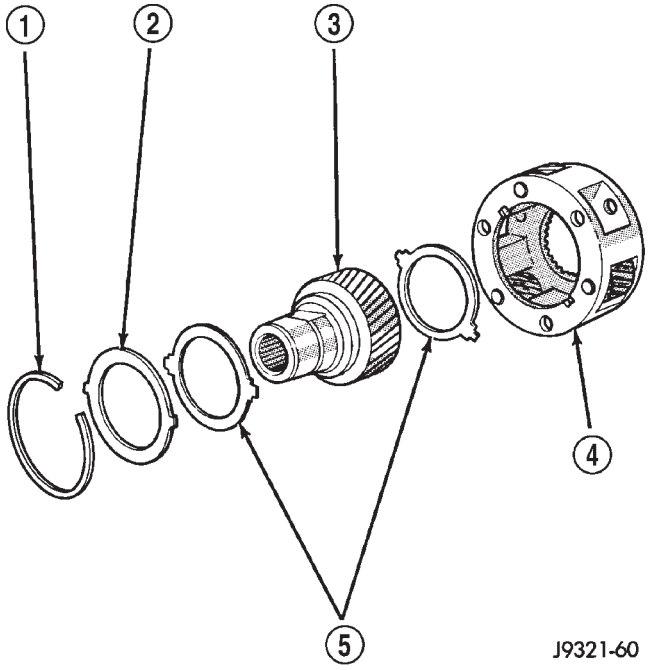


Fig. 57 Input/Low Range Gear Components

1 - SNAP-RING
2 - RETAINER PLATE
3 - INPUT GEAR
4 - LOW RANGE GEAR
5 - THRUST WASHERS

(6) Align and install low range/input gear assembly in front case (Fig. 58). Be sure low range gear pinions are engaged in annulus gear and that input gear shaft is fully seated in front bearing.

(7) Install snap-ring to hold input/low range gear into front bearing (Fig. 59).

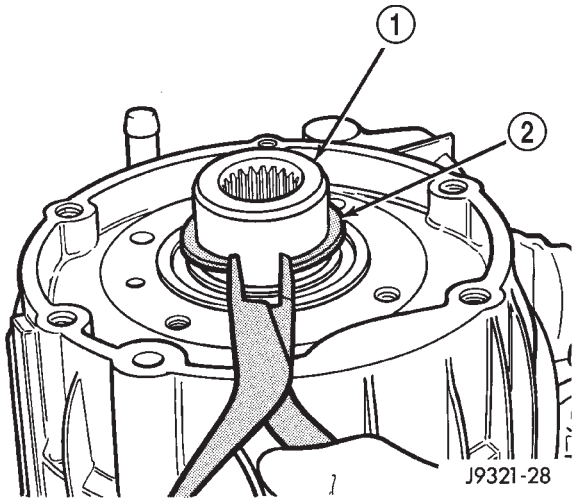


Fig. 59 Install Input Gear Snap-Ring

1 - INPUT GEAR
2 - SNAP-RING

(8) Clean gasket sealer residue from retainer and inspect retainer for cracks or other damage.

(9) Apply a 3 mm (1/8 in.) bead of Mopar® Gasket Maker, or equivalent silicone adhesive, to sealing surface of retainer.

(10) 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 equivalent silicone adhesive sealer. Seal failure and fluid leak can result.

(11) Install bolts to hold retainer to transfer case (Fig. 60). Tighten to 21 N·m (16 ft. lbs.) of torque.

TRANSFER CASE - NV241LD (Continued)

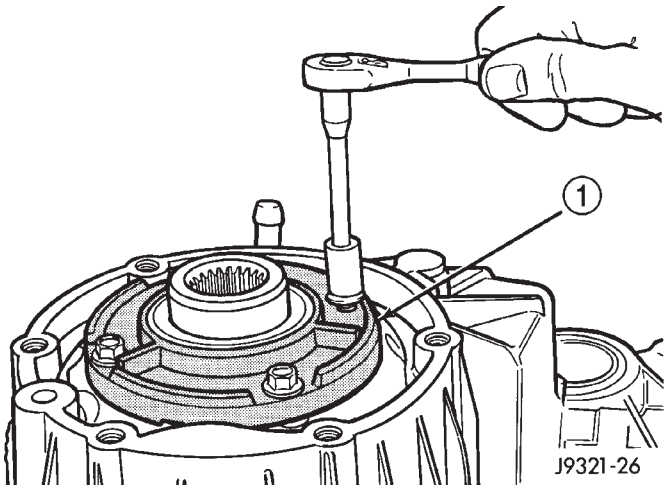


Fig. 60 Install Front Bearing Retainer

1 - FRONT BEARING RETAINER

SHIFT FORKS AND MAINSHAFT

(1) Lubricate mainshaft splines with recommended transmission fluid.

(2) Install drive sprocket on mainshaft (Fig. 61).

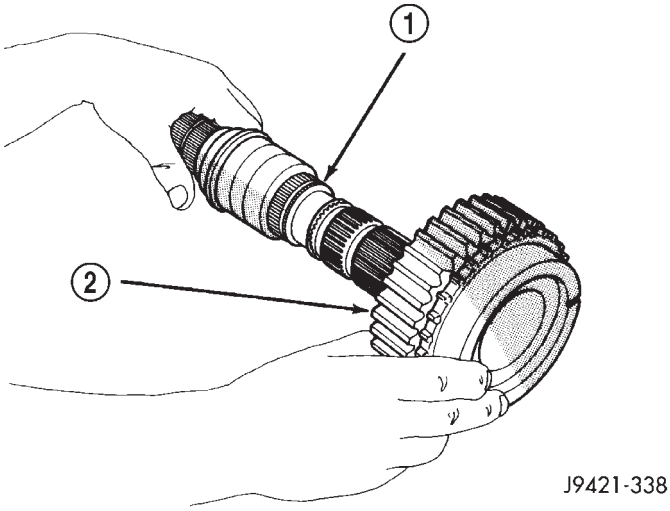


Fig. 61 Drive Sprocket Installation

1 - MAINSHAFT
2 - DRIVE SPROCKET

(3) Install brass stop ring on drive sprocket (Fig. 62).

(4) Install 3 synchronizer struts and 2 springs in hub as follows:

(a) Insert first strut in hub (Fig. 63). Strut shoulders rest (and slide) on sides hub slot as shown.

(b) Insert hooked end of first spring in center of strut to secure it. Then work spring into hub (Fig. 64).

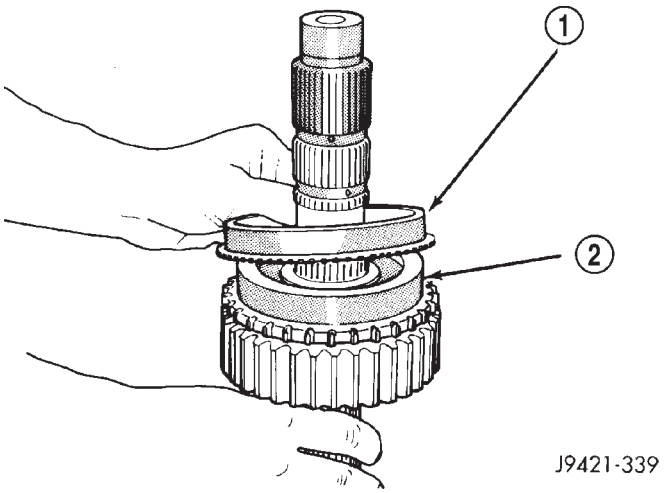


Fig. 62 Synchronizer Stop Ring Installation

1 - BRASS STOP RING
2 - DRIVE SPROCKET

(c) Press spring inward and insert last two struts in hub slots. Be sure spring is positioned under struts to properly secure them (Fig. 65).

(d) Turn hub over and install remaining spring in hub. Position hooked end of second spring opposite the first spring's hooked end.

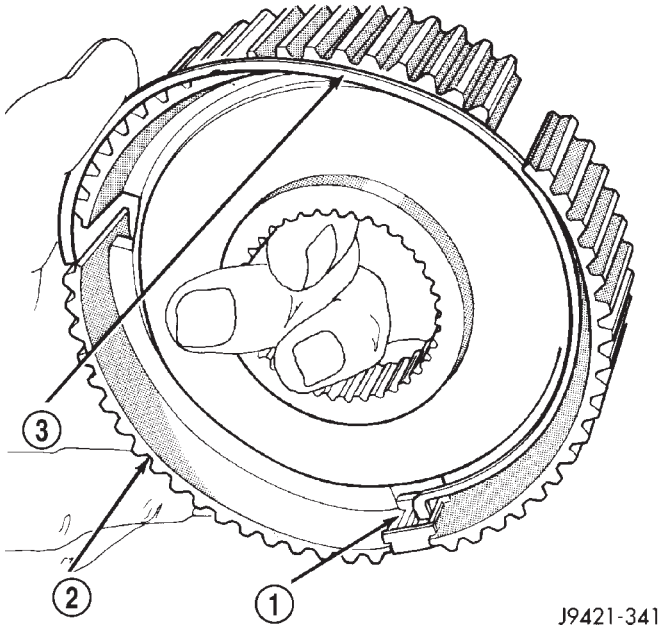


Fig. 63 Installing First Synchronizer Strut And Spring

1 - FIRST STRUT
2 - SYNCHRO HUB
3 - SPRING

TRANSFER CASE - NV241LD (Continued)

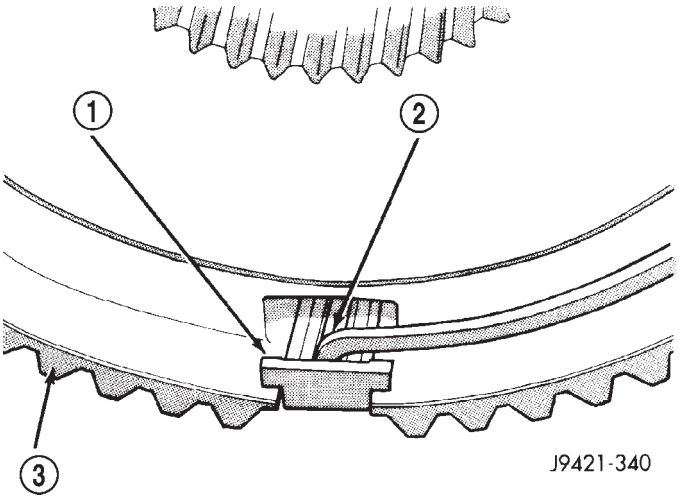


Fig. 64 Synchronizer Spring Installation

1 - STRUT SHOULDER
2 - SPRING (SEATED IN STRUT)
3 - HUB

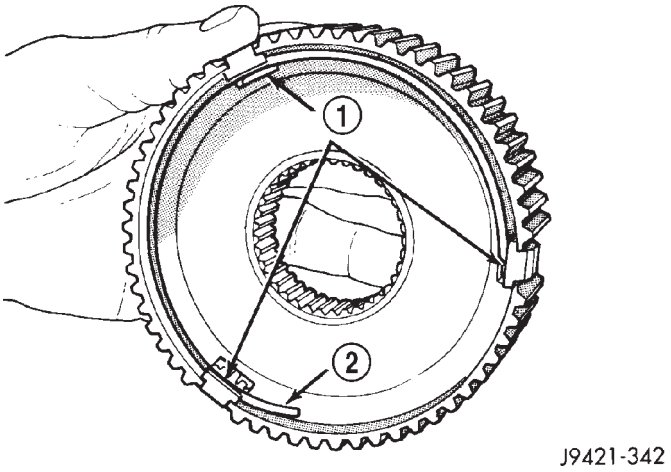


Fig. 65 Correct Position Of Struts And Springs

1 - STRUTS
2 - SPRING

(5) Install assembled synchronizer hub on mainshaft (Fig. 66). Hub has shoulder on one side which goes toward sprocket (rear of shaft). Flat side of hub faces front of shaft.

(6) Install synchronizer hub retaining ring (Fig. 67). Be sure ring is fully seated before proceeding.

(7) Install sliding clutch (sleeve) on synchronizer hub (Fig. 68).

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. 69). If the clutch is installed so a gap between splines is aligned with one or more struts, gear clash will result.

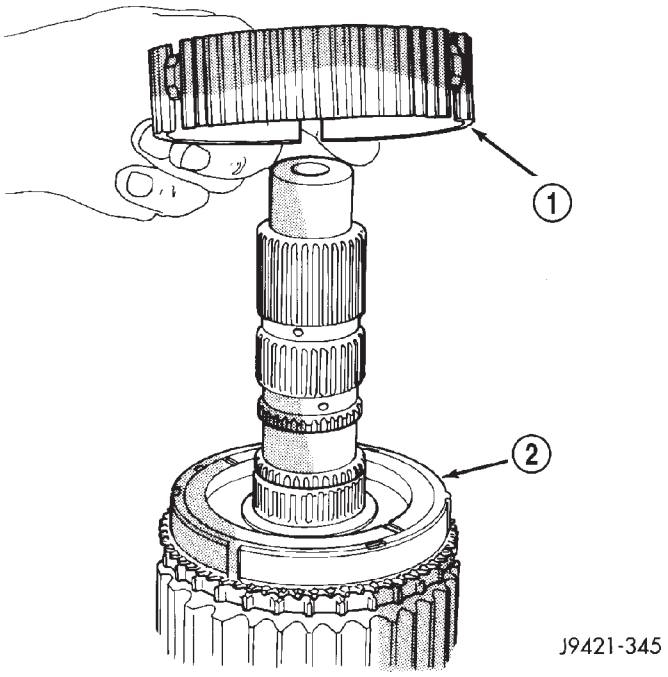


Fig. 66 Synchronizer Hub Installation

1 - SYNCHRO HUB (SHOULDER SIDE DOWN)
2 - STOP RING AND SPROCKET

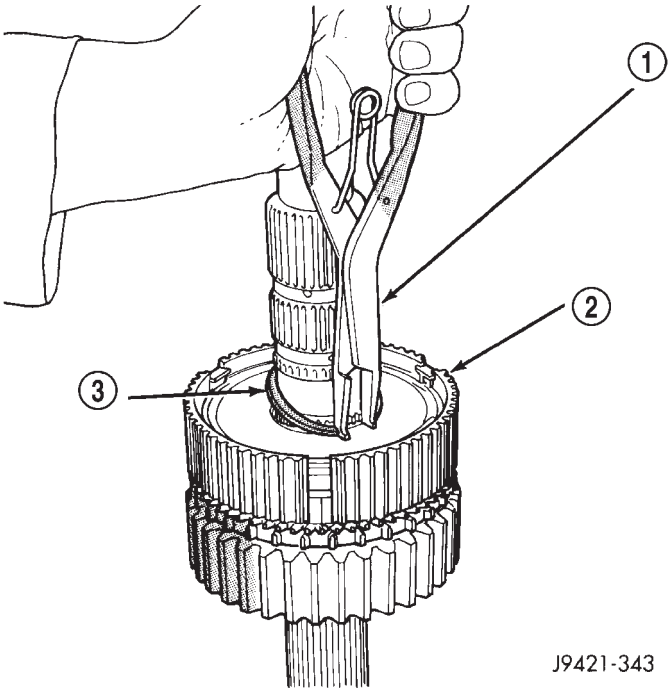


Fig. 67 Synchronizer Hub Retaining Ring Installation

1 - SNAP-RING PLIERS
2 - SYNCHRO HUB
3 - HUB RETAINING RING

TRANSFER CASE - NV241LD (Continued)

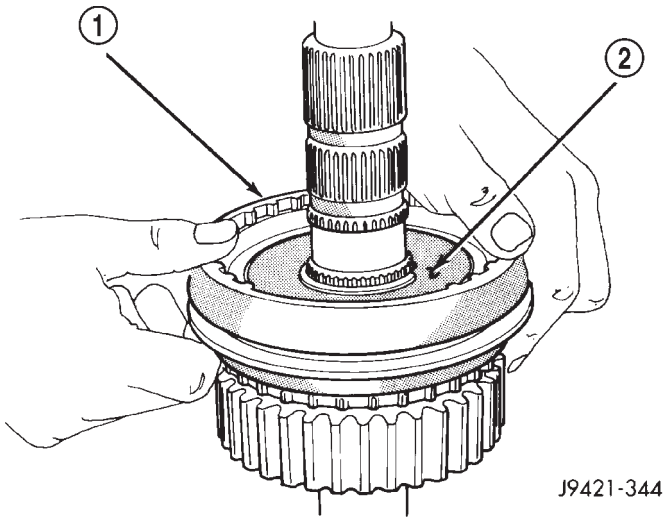


Fig. 68 Sliding Clutch Installation

1 - SLIDING CLUTCH
2 - SYNCHRO HUB

(8) 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.

(9) Lubricate mainshaft components with transmission fluid.

(10) Lubricate sector shaft with transmission fluid and install shift sector in case (Fig. 70). Position slot in sector so it will be aligned with shift fork pin when shift forks are installed.

(11) Assemble and install range fork and hub (Fig. 71). Be sure hub is properly seated in low range gear and engaged to the input gear.

(12) Align and insert range fork pin in shift sector slot.

(13) Install mode fork and shift rail in sliding clutch (Fig. 72).

(14) Install mainshaft/mode fork assembly (Fig. 73). Guide mainshaft through hub and into input gear and shift rail through range fork and into case bore.

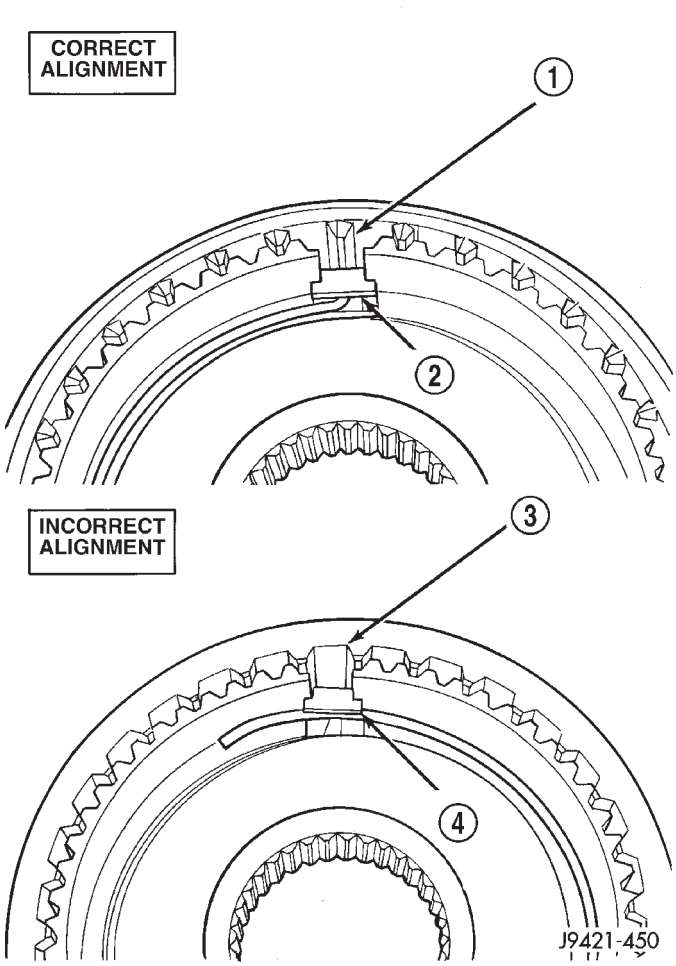


Fig. 69 Correct Alignment Of Struts And Sliding Clutch

1 - SLEEVE TOOTH ALIGNED WITH STRUT
2 - STRUT
3 - SLEEVE TOOTH NOT ALIGNED WITH STRUT
4 - STRUT

TRANSFER CASE - NV241LD (Continued)

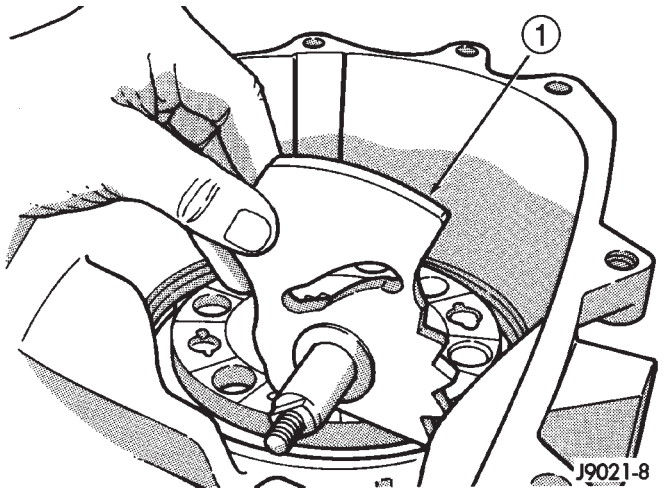


Fig. 70 Shift Sector Installation

1 - SHIFT SECTOR

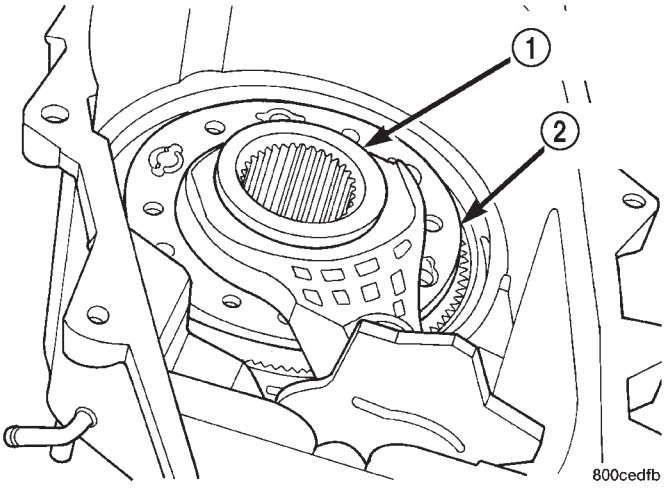


Fig. 71 Install Range Fork And Hub Assembly

1 - RANGE HUB
2 - RANGE FORK

(15) Install new o-ring on vacuum/indicator switch, if necessary.Install vacuum/indicator switch (Fig. 74). Tighten switch to 20-34 N·m (15-25 ft. lbs.) torque.

(16) Install new sector shaft o-ring and o-ring retainer in sector shaft bore (Fig. 75). Lubricate o-ring with transmission fluid or petroleum jelly after installation.

(17) Install shift lever on sector shaft (Fig. 76).

(18) 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.

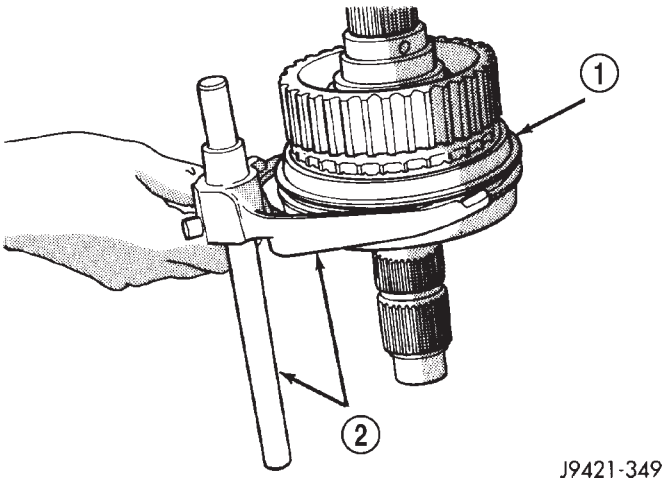


Fig. 72 Assembling Mode Fork And Mainshaft

1 - SLIDING CLUTCH
2 - MODE FORK AND SHIFT RAIL

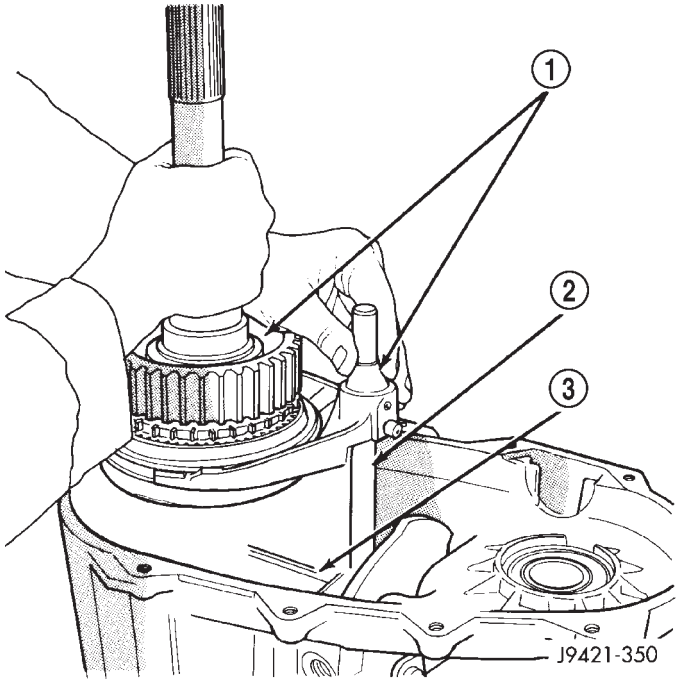


Fig. 73 Installing Mainshaft And Mode Fork Assembly

1 - MAINSHAFT AND MODE FORK ASSEMBLY
2 - SHIFT RAIL
3 - RANGE FORK

(19) Install poppet plunger and spring (Fig. 77).

(20) Install new o-ring on poppet screw and install screw in front case (Fig. 78). Tighten screw to 16-24 N·m (12-18 ft. lbs.).

TRANSFER CASE - NV241LD (Continued)

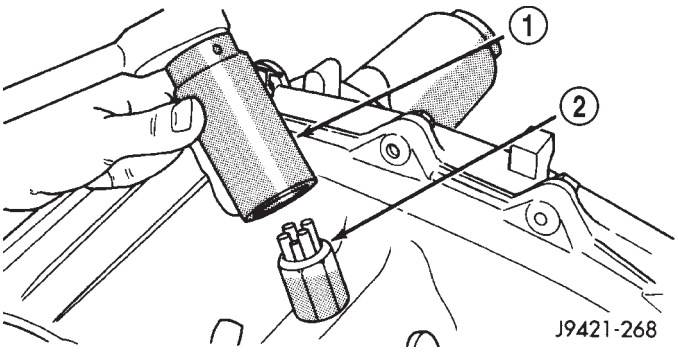


Fig. 74 Vacuum/Indicator Switch Installation

1 - 1-1/16" SOCKET
2 - INDICATOR SWITCH

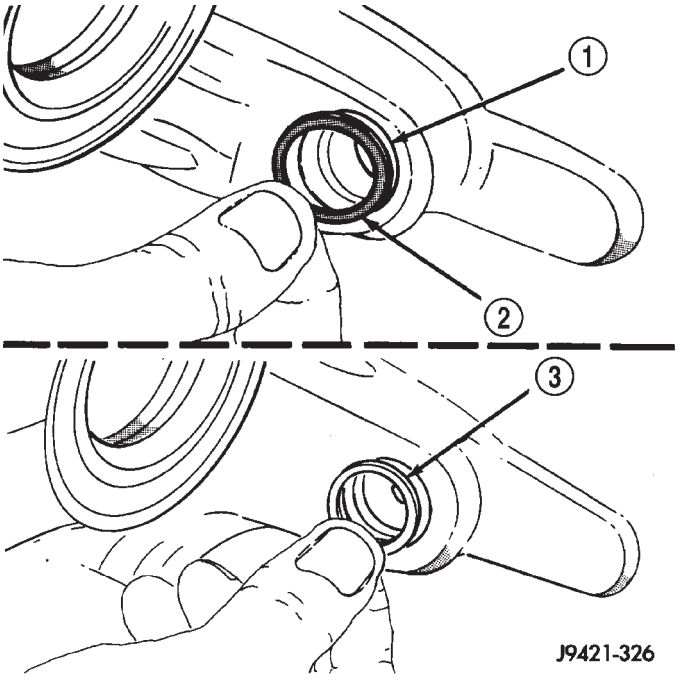


Fig. 75 Sector Shaft O-Ring And Retainer Installation

1 - SECTOR SHAFT BORE
2 - O-RING
3 - O-RING RETAINER

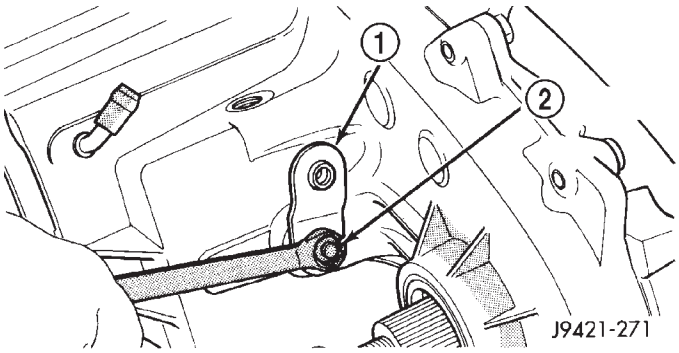


Fig. 76 Shift Lever Installation

1 - SHIFT LEVER
2 - NUT/WASHER

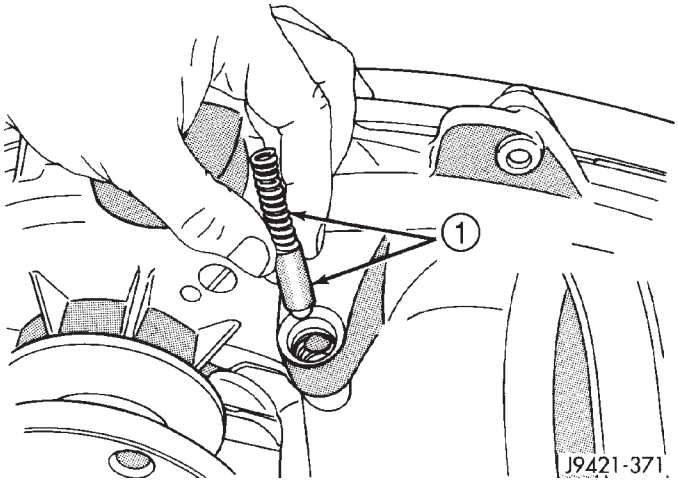


Fig. 77 Poppet Plunger And Spring Installation

1 - POPPET PLUNGER AND SPRING

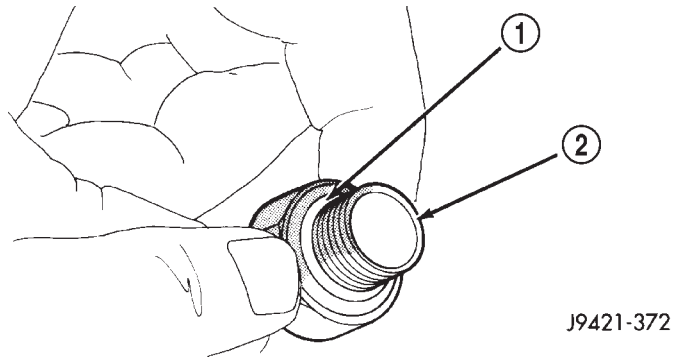


Fig. 78 O-Ring Installation On Poppet Plunger Screw

1 - O-RING
2 - PLUNGER SCREW

TRANSFER CASE - NV241LD (Continued)

FRONT OUTPUT SHAFT AND DRIVE CHAIN

(1) Install front output shaft in bearing (Fig. 79).

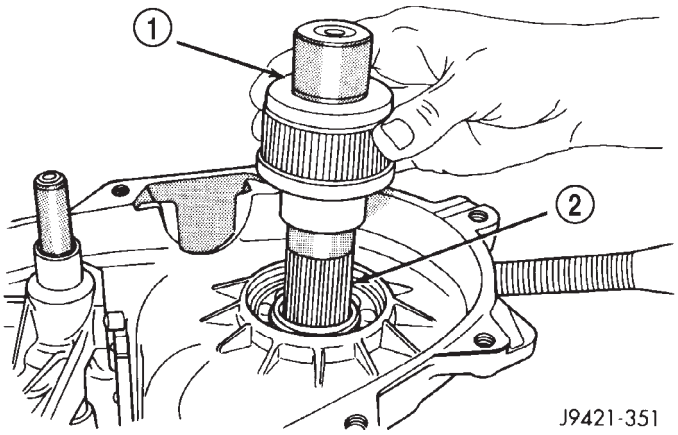


Fig. 79 Front Output Shaft Installation

1 - FRONT OUTPUT SHAFT
2 - BEARING

(2) Insert front sprocket in drive chain (Fig. 80).

(3) Install drive chain around mainshaft sprocket (Fig. 80). Then position front sprocket over front shaft.

(4) Raise mainshaft about 2.54 cm (one inch) and seat front sprocket on front output shaft.

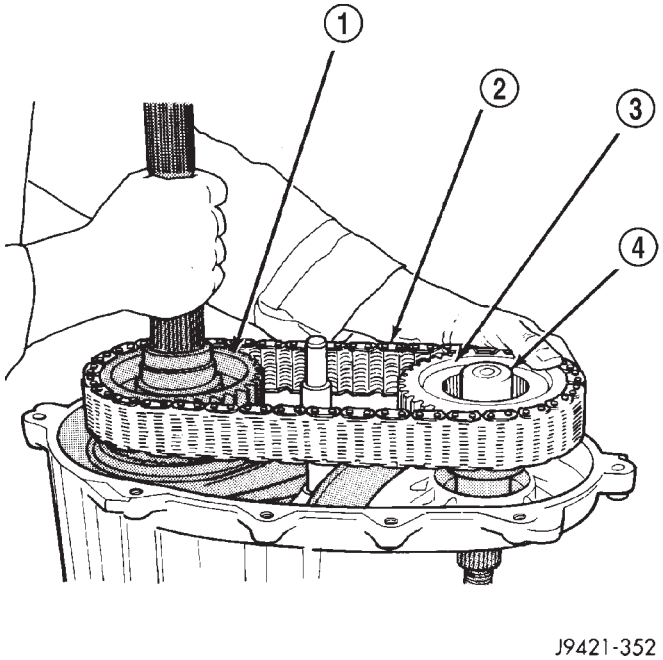


Fig. 80 Drive Chain And Front Sprocket Installation

1 - DRIVE SPROCKET
2 - DRIVE CHAIN
3 - FRONT SPROCKET
4 - FRONT SHAFT

(5) If mainshaft and mode sleeve were unseated during chain installation, align and reseat mainshaft in input gear and hub.

(6) Install front sprocket retaining ring (Fig. 81).

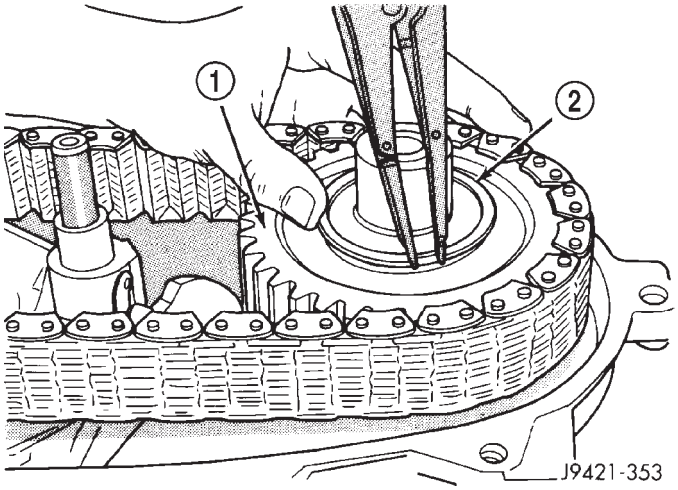


Fig. 81 Front Sprocket Retaining Ring Installation

1 - FRONT SPROCKET
2 - RETAINING RING

(7) Install spring and cup on shift rail (Fig. 82).

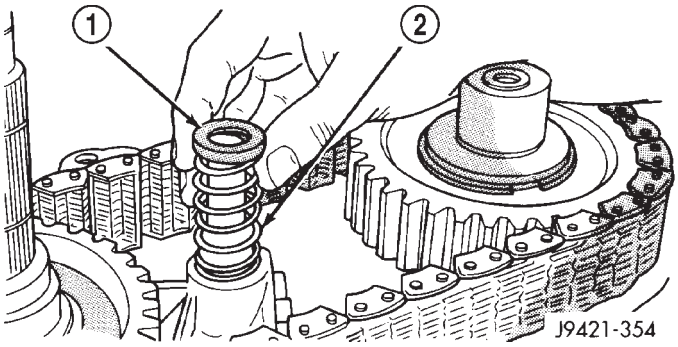


Fig. 82 Shift Rail Spring And Cup Installation

1 - CUP
2 - SPRING

(8) Insert magnet in front case pocket (Fig. 83).

OIL PUMP AND REAR CASE

Lubricate the oil pump components with 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. 84).

(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. 85). Be sure hose that connects tube to filter is securely positioned.

TRANSFER CASE - NV241LD (Continued)

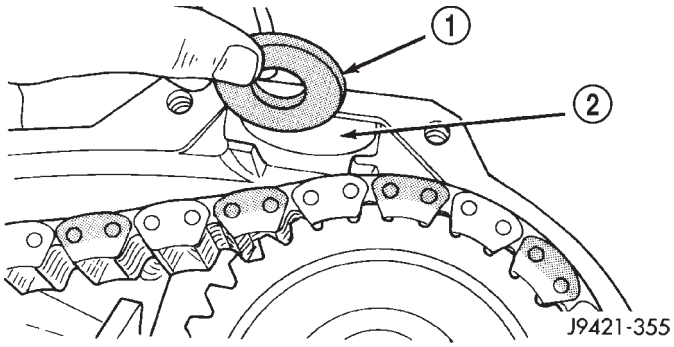


Fig. 83 Case Magnet Installation

1 - MAGNET
2 - CASE POCKET

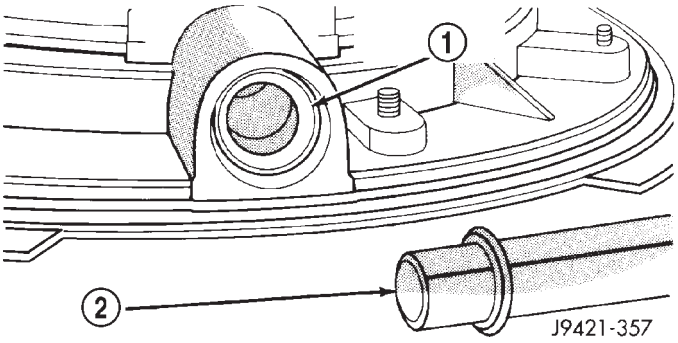


Fig. 84 Pickup Tube O-Ring Installation

1 - O-RING (PUMP PICKUP)
2 - PICKUP TUBE

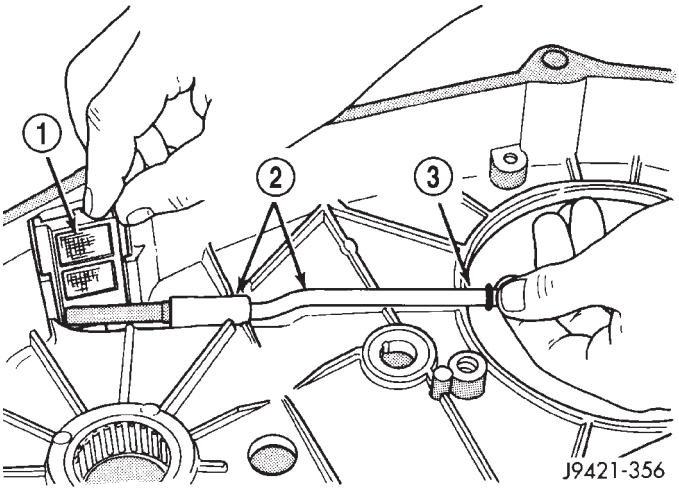


Fig. 85 Oil Pickup Tube And Filter Position In Rear Case

1 - FILTER
2 - TUBE AND HOSE
3 - TUBE IN NOTCH

(3) Insert oil pickup tube in oil pump and position pump in rear case (Fig. 86).

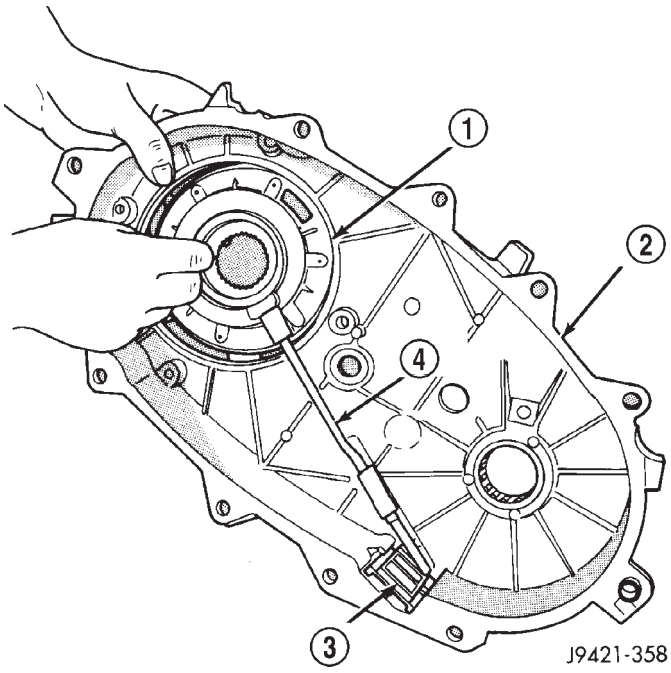


Fig. 86 Positioning Oil Pump In Rear Case

1 - OIL PUMP
2 - REAR CASE
3 - FILTER
4 - PICKUP TUBE

(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. 87). 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. 88), 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. 89). If stud was loosened or came out during disassembly, apply Loctite™ 242 to stud threads and reseat 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:

TRANSFER CASE - NV241LD (Continued)

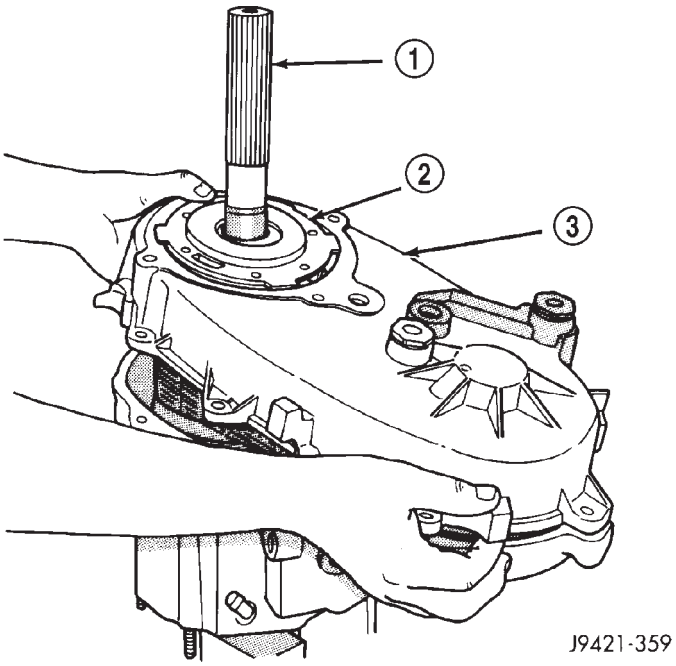


Fig. 87 Rear Case And Oil Pump Installation

1 - MAINSHAFT
2 - OIL PUMP
3 - REAR CASE

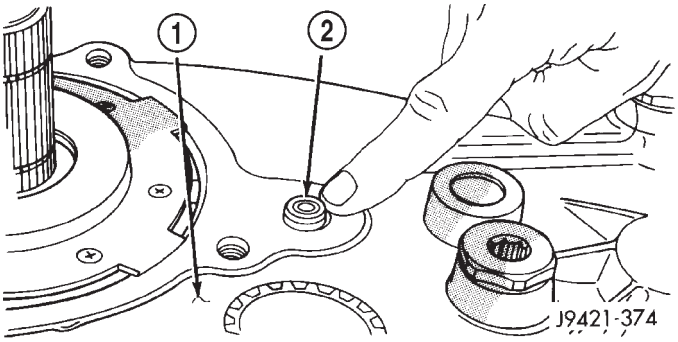


Fig. 88 Shift Rail Seated In Rear Case Bore

1 - REAR CASE
2 - SHIFT RAIL

- 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.)

(10) Install rear output bearing and snap-ring to output shaft.

COMPANION FLANGE

(1) Install companion flange seal on front shaft (Fig. 90).

(2) Install companion flange on front shaft (Fig. 91). Then install and tighten flange nut to 176-271 N·m (130-200 ft. lbs.) torque.

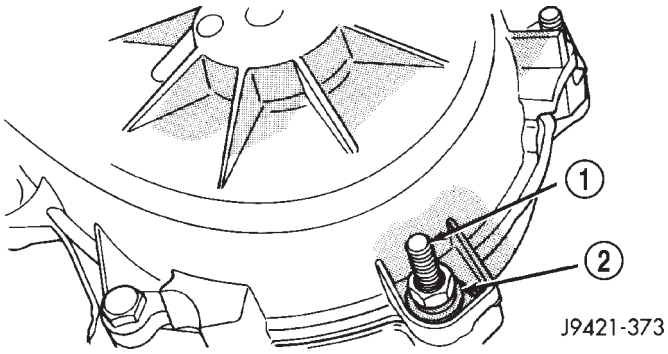


Fig. 89 Washer Installation On Case Stud And Dowel Bolts

1 - CASE STUD/BOLT
2 - WASHER

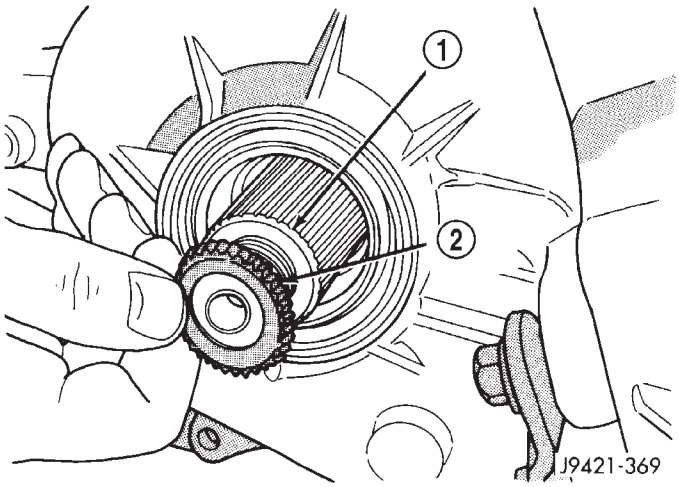


Fig. 90 Installing Flange Seal On Front Shaft

1 - FRONT OUTPUT SHAFT
2 - FLANGE SEAL

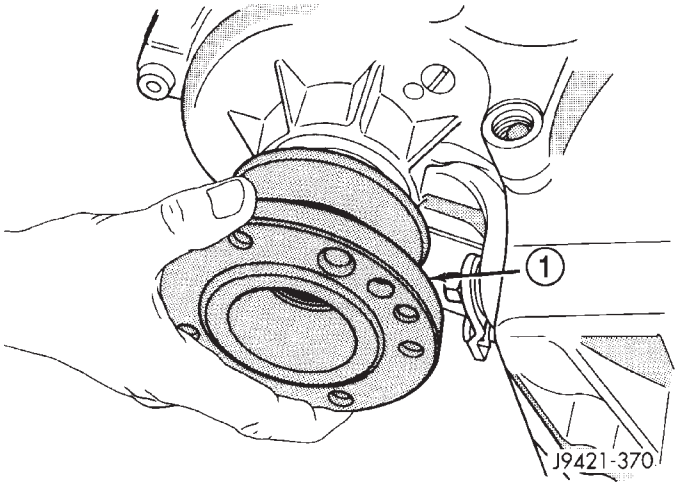


Fig. 91 Installing Companion Flange On Front Shaft

1 - COMPANION FLANGE

TRANSFER CASE - NV241LD (Continued)

REAR RETAINER AND EXTENSION

(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. 92).

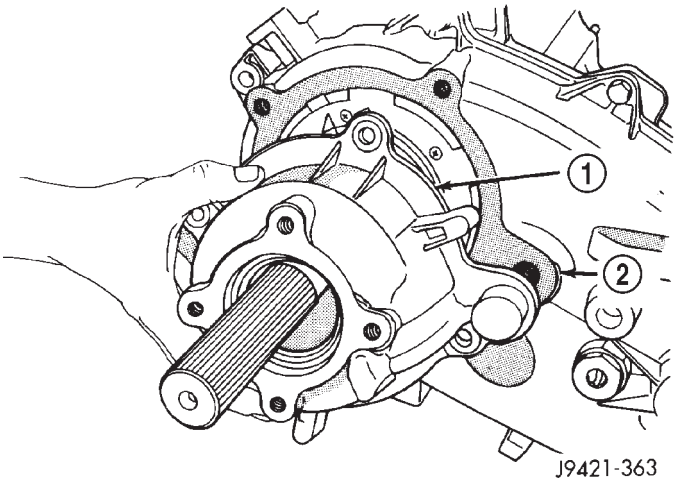


Fig. 92 Rear Retainer Installation

1 - REAR RETAINER
2 - SHIFT RAIL

(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. 93).

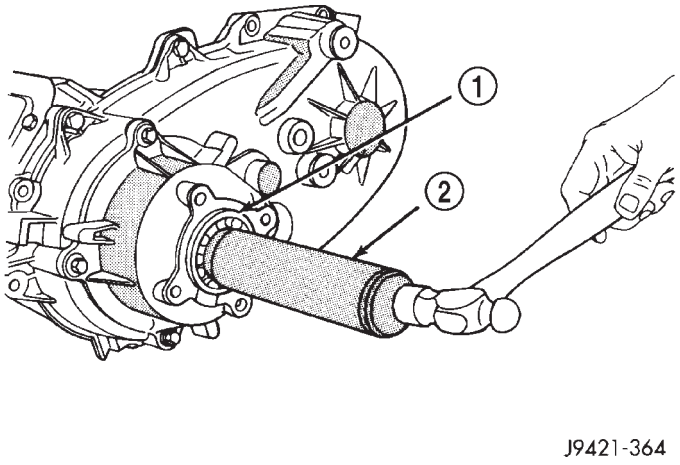


Fig. 93 Output Bearing Installation

1 - OUTPUT BEARING
2 - PIPE TOOL

(6) Install output bearing retaining ring (Fig. 94).

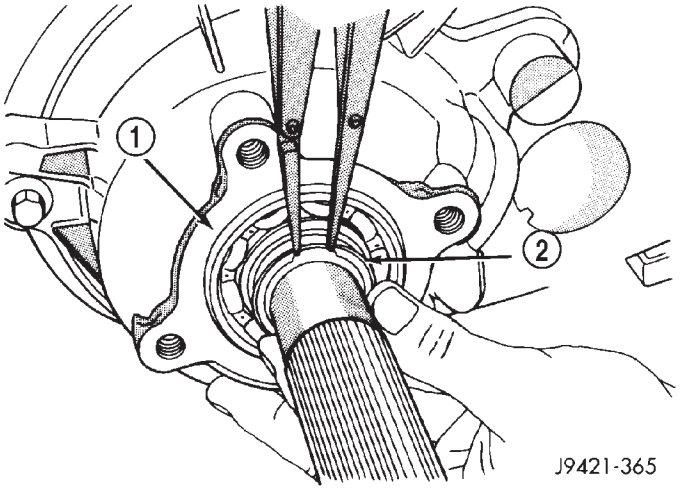


Fig. 94 Output Bearing Retaining Ring Installation

1 - OUTPUT BEARING
2 - RETAINING RING

(7) Tighten rear retainer bolts to 27-34 N·m (20-25 ft. lbs.) torque.

(8) Install new seal in rear extension housing seal with suitable size installer tool.

(9) Apply bead of Mopar® Gasket Maker, or equivalent, to mating surface of rear 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 output bearing.

(10) Align and install rear extension on retainer (Fig. 95).

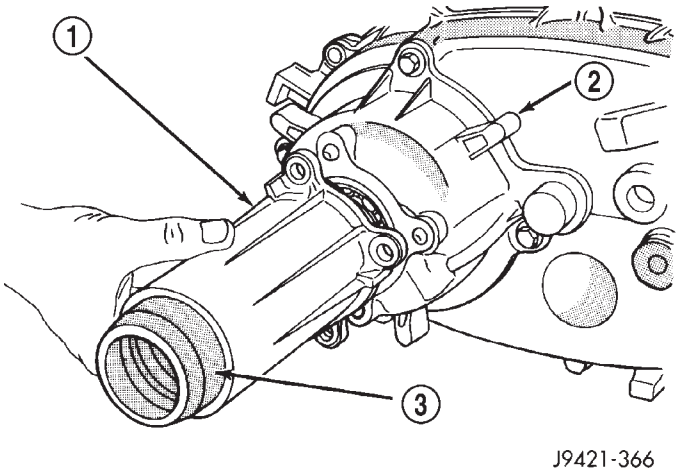


Fig. 95 Rear Extension Installation

1 - REAR EXTENSION
2 - RETAINER
3 - EXTENSION SEAL

TRANSFER CASE - NV241LD (Continued)

(11) Apply Mopar® Silicone Sealer to threads of rear extension housing bolts. Then install and tighten bolts to 27-34 N·m (20-25 ft. lbs.) torque.

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. Tighten nuts to 30-41 N·m (20-30 ft.lbs.).

(3) Install rear crossmember.

(4) Remove jack stand from under transmission.

(5) Align and connect propeller shafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

(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. (Refer to 13 - FRAMES & BUMPERS/FRAME/TRANSFER CASE SKID PLATE - INSTALLATION)

(11) Lower vehicle

SPECIFICATIONS

TRANSFER CASE

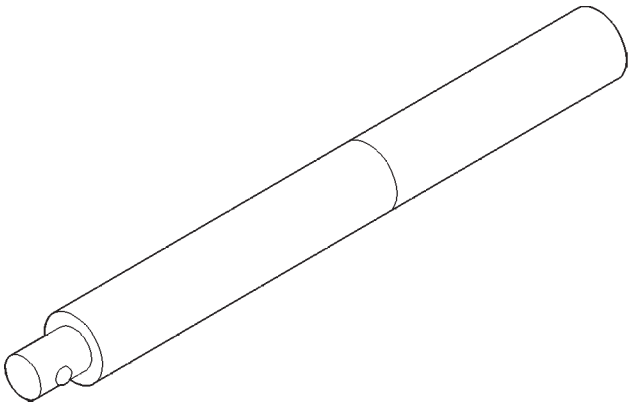
TORQUE SPECIFICATIONS

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Plug, Detent	16-24	12-18	-
Bolt, Diff. Case	17-27	15-24	-
Plug, Drain/Fill	40-45	30-40	-
Bolt, Extension Housing	35-46	26-34	-
Bolt, Front Brg. Retainer	16-27	12-24	-
Bolt, Case Half	35-46	26-34	-
Nut, Front Yoke	122-176	90-130	-
Screw, Oil Pump	1.2-1.8	-	12-15
Nut, Range Lever	27-34	20-25	-
Bolt, Rear Retainer	35-46	26-34	-
Nuts, Mounting	30-41	20-30	-
Bolts, U-Joint	19	17	-
Vacuum Switch	20-34	15-25	-

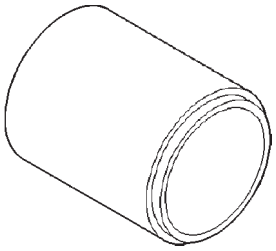
TRANSFER CASE - NV241LD (Continued)

SPECIAL TOOLS

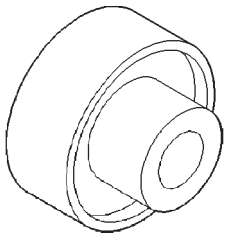
TRANSFER CASE - NV241LD



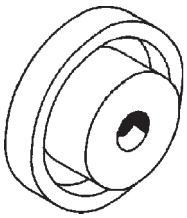
Handle, Universal - C-4171



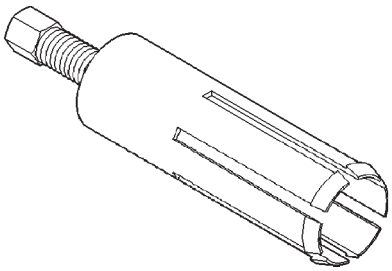
Installer, Seal - 6888



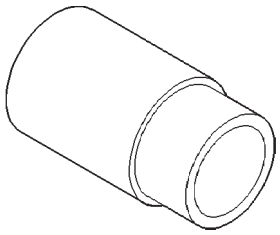
Installer, Bearing - 6953



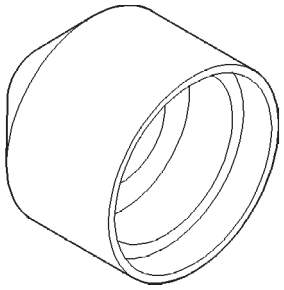
Installer, Seal - C-4210



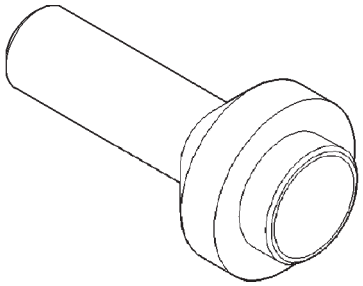
Remover, Bushing - 6957



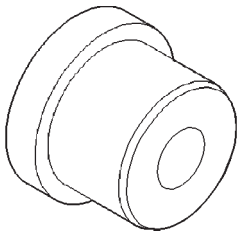
Installer, Bushing - 8157



Installer, Seal - D-163

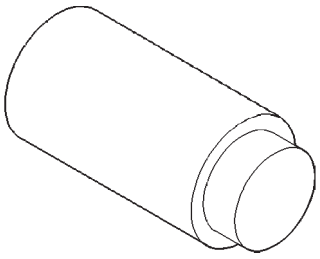


Installer, Seal - 7884

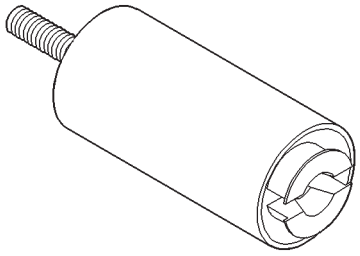


Installer, Bushing - 5066

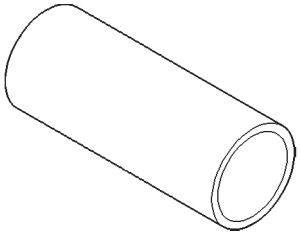
TRANSFER CASE - NV241LD (Continued)



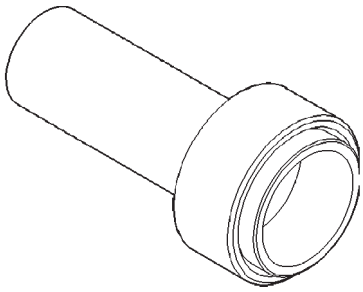
Plug, Extension - C-293-3



Tool Set - L-4518



Cup - 8148



Installer, Pump Housing Seal - 7888

EXTENSION HOUSING BUSHING AND SEAL

REMOVAL

(1) Raise and support vehicle.

(2) Remove rear propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)

(3) Using a suitable pry tool or slide-hammer mounted screw, remove the extension housing seal.

(4) Using Remover 8158, remove bushing from extension housing.

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 8157, drive bushing into housing until installer seats against case.

(4) Using Installer D-163, install seal in extension housing (Fig. 96).

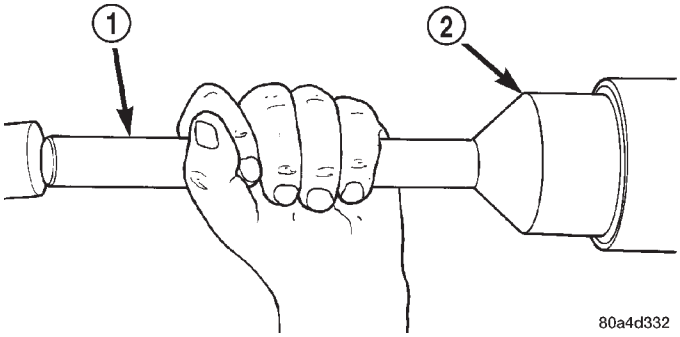


Fig. 96 Install Rear Seal in Extension Housing

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL D-163

(5) Install propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

(6) Verify proper transfer case fluid level.

(7) Lower vehicle.

FLUID

STANDARD PROCEDURE - FLUID DRAIN AND REFILL

The fill and drain plugs are both in the rear case (Fig. 97).

(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® ATF +4, type 9602, Automatic Transmission fluid.

(7) Install and tighten fill plug to 41-54 N·m (30-40 ft. lbs.).

(8) Lower vehicle.

FLUID (Continued)

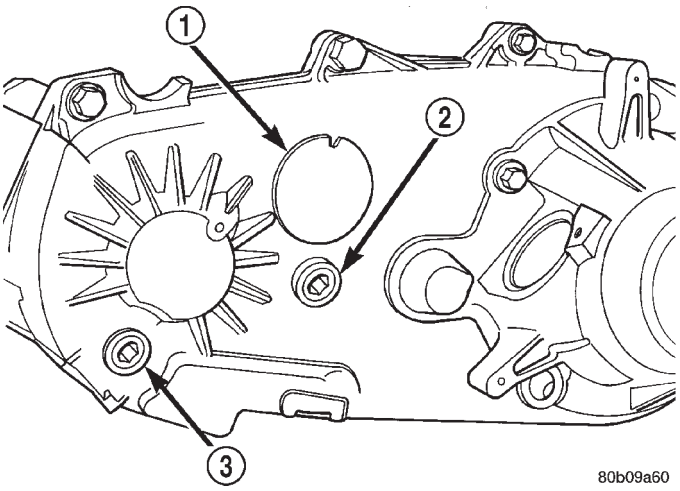


Fig. 97 Fill/Drain Plug and I.D. Tag Location - Typical

1 - I.D. TAG
2 - FILL PLUG
3 - DRAIN PLUG

FRONT OUTPUT SHAFT SEAL

REMOVAL

(1) Shift transfer case into NEUTRAL.
(2) Raise vehicle.
(3) Remove front propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)
(4) Remove companion flange nut (Fig. 98). Discard nut after removal. It is not reusable.

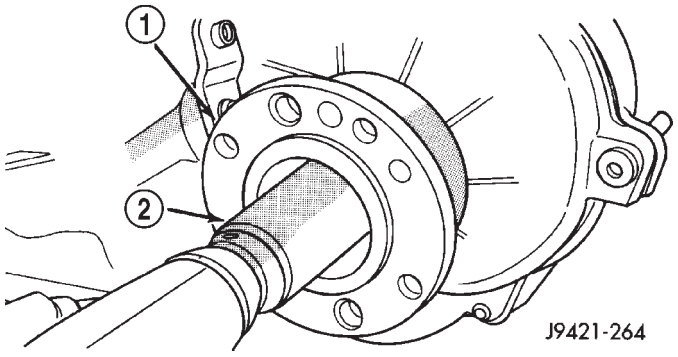


Fig. 98 Removing Companion Flange Nut

1 - COMPANION FLANGE
2 - 1-1/8" SOCKET

(5) Remove companion flange from output shaft. Use a suitable puller if flange can not be removed by hand.
(6) Remove companion flange rubber seal from front output shaft (Fig. 99).

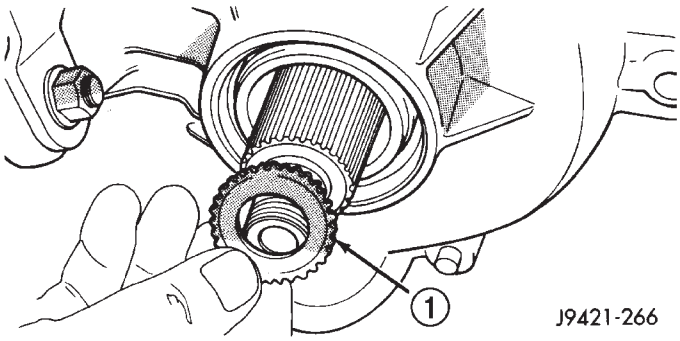


Fig. 99 Companion Flange Seal Removal

1 - FLANGE SEAL

(7) 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. 100) 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. 101). 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.

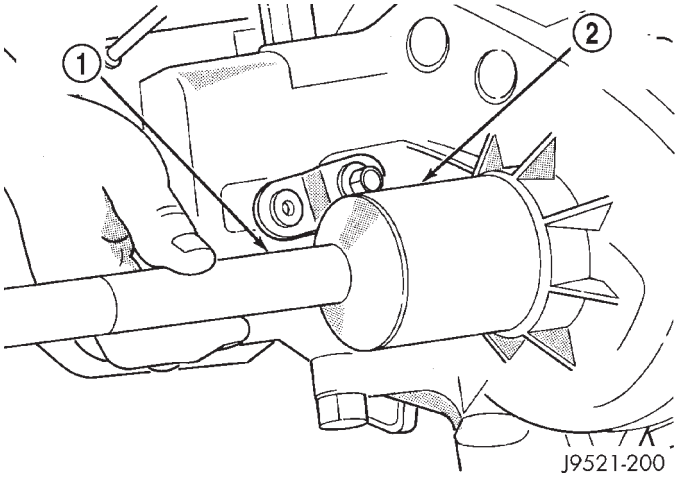


Fig. 100 Front Output Seal Installation

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL 6888

FRONT OUTPUT SHAFT SEAL (Continued)

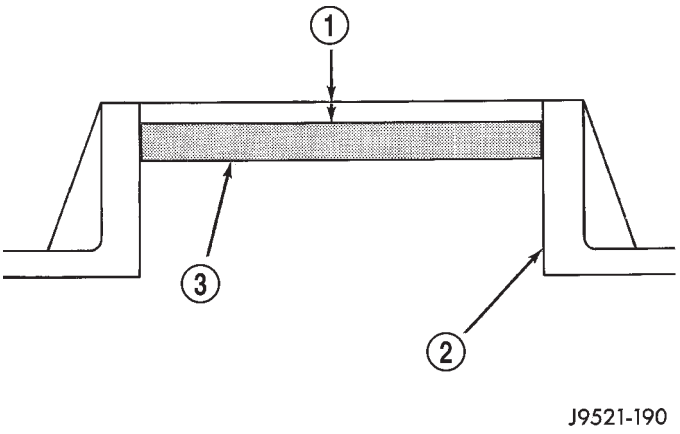


Fig. 101 Checking Front Output Seal Installation Depth

1 - CORRECT SEAL DEPTH IS 2.03-2.5 mm (0.080-0.100 in.) BELOW TOP EDGE OF BORE
2 - FRONT CASE SHAFT BORE
3 - FRONT OUTPUT SEAL

(2) Install companion flange seal on front shaft (Fig. 102).

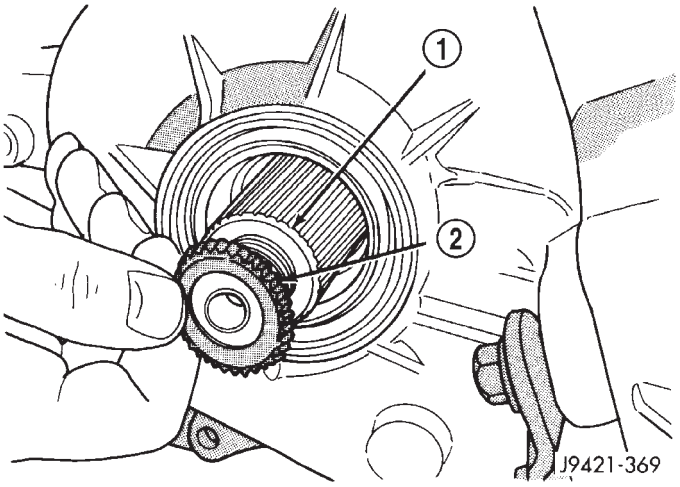


Fig. 102 Installing Flange Seal On Front Shaft

1 - FRONT OUTPUT SHAFT
2 - FLANGE SEAL

(3) Install companion flange on front shaft (Fig. 103). Then install and tighten flange nut to 176-271 N·m (130-200 ft. lbs.) torque.

(4) Install propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

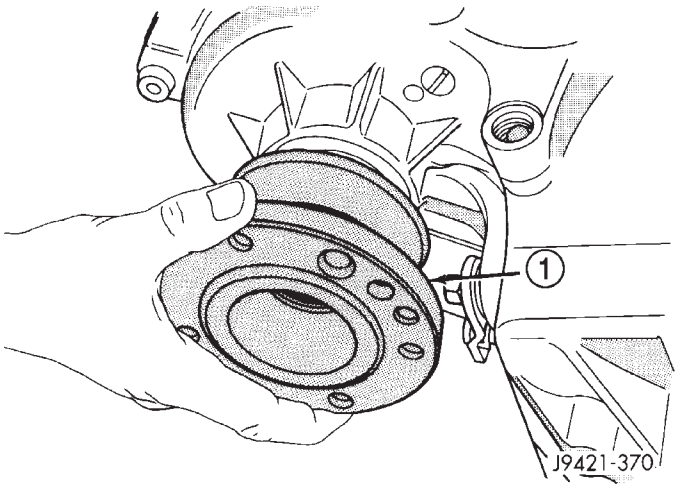


Fig. 103 Installing Companion Flange On Front Shaft

1 - COMPANION FLANGE

SHIFT LEVER

REMOVAL

(1) Shift transfer case into 2H.
(2) Remove transfer case shifter knob cap.
(3) Remove nut holding shifter knob to shift lever.
(4) Remove shifter knob.
(5) Remove the shift boot from the shifter bezel.
(6) Remove the bolts securing the shifter mechanism to the floor pan along the driver's side of the transmission tunnel (Fig. 104).
(7) Raise and support the vehicle.
(8) 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.
(9) Remove the nuts holding the shifter mechanism to the underside of the floor pan.
(10) Separate shift lever mechanism from the vehicle.

INSTALLATION

(1) If the shifter mechanism does not have a adjustment locating pin installed, align the adjustment channel on the shifter assembly to the locating hole in the lower shift lever and install an appropriately sized pin to retain the position (Fig. 105).
(2) Position shift lever on vehicle.
(3) Install nuts to hold shift lever to the underside of the body.
(4) Install trunnion to shift lever, if necessary.
(5) Install shift rod to trunnion, if necessary.
(6) Tighten the shift rod lock bolt to 10 N·m (90 in.lbs.).

SHIFT LEVER (Continued)

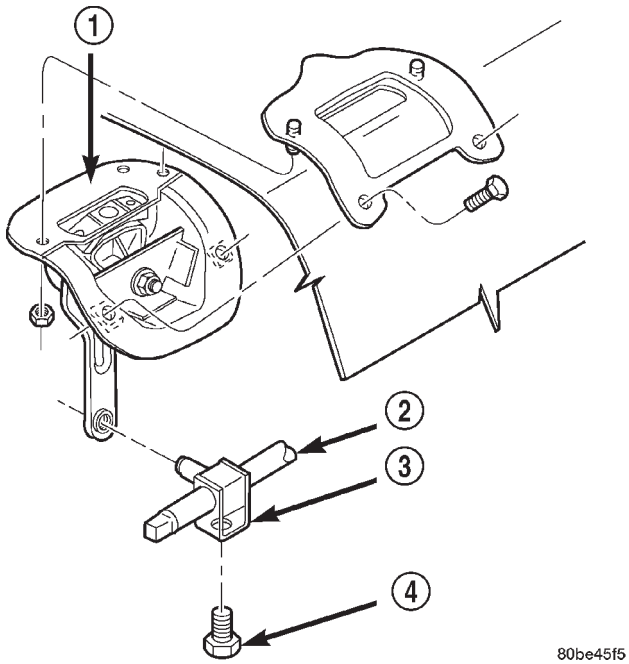


Fig. 104 Transfer Case Shifter

1 - TRANSFER CASE SHIFTER ASSEMBLY
2 - SHIFT ROD
3 - TRUNNION
4 - LOCK BOLT

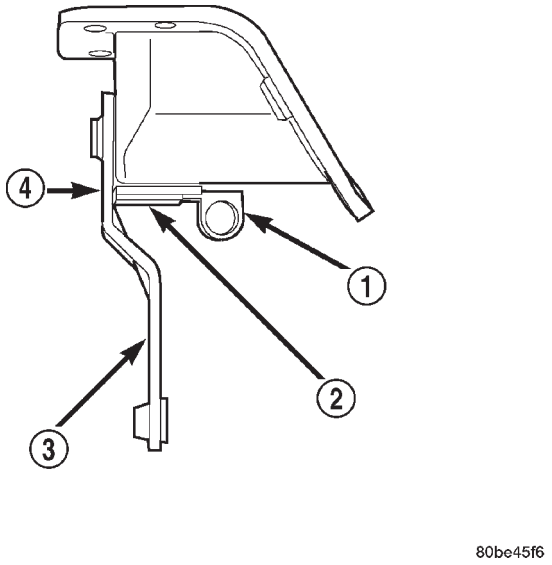


Fig. 105 Shifter Adjustment

1 - LOCATING PIN
2 - ADJUSTMENT CHANNEL
3 - LOWER SHIFTER LEVER
4 - LOCATING HOLE

(7) Remove the shifter adjustment locating pin from the adjustment channel and the locating hole.
(8) Lower vehicle.
(9) Install the bolts to hold the shifter mechanism to the floor pan.
(10) Install the transfer case shifter bezel.
(11) Install the shifter boot and the shifter knob onto the shifter lever.
(12) Install nut to hold shifter knob to shift lever.
(13) Install shifter knob cap.
(14) Verify transfer case operation.

ADJUSTMENTS

ADJUSTMENT - SHIFT LEVER

(1) Move shift lever into 2H position.
(2) Raise vehicle.
(3) Loosen shift rod lock bolt at trunnion (Fig. 106).

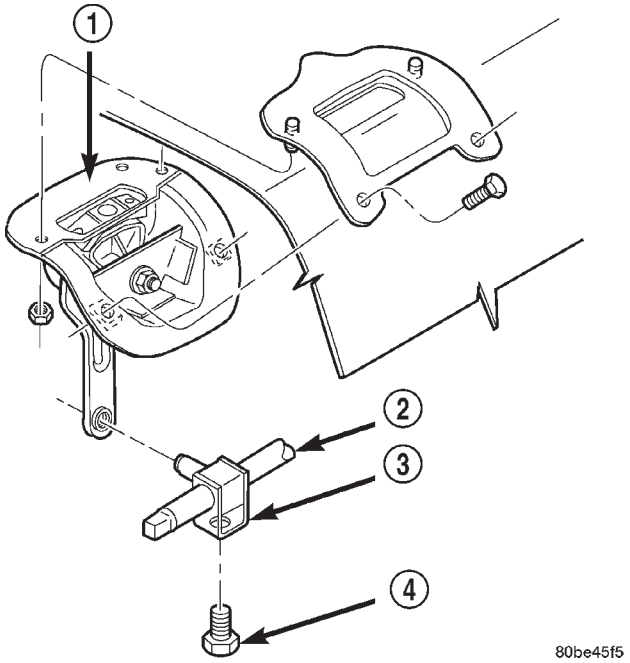


Fig. 106 Shift Rod Lock Bolt Location

1 - TRANSFER CASE SHIFTER ASSEMBLY
2 - SHIFT ROD
3 - TRUNNION
4 - LOCK BOLT

(4) Check shift rod fit in trunnion. Be sure rod does not bind in trunnion. Lubricate the shift rod and trunnion if necessary.

SHIFT LEVER (Continued)

(5) Verify that transfer case shift lever is in 2H detent position. The 2H detent position on the transfer case shift arm is the second position from full forward.

(6) Align the adjustment locating hole on the lower shifter lever with the adjustment channel on the shifter bracket assembly (Fig. 107).

(7) Insert an appropriately sized pin through into the adjustment channel and through the locating hole to hold the shifter in the correct position.

(8) Tighten shift rod lock bolt to 10 N·m (90 in. lbs.) torque.

(9) Remove the locating pin from the adjustment channel and locating hole.

(10) Check shift linkage operation. Be sure transfer case shifts into and operates properly in all ranges.

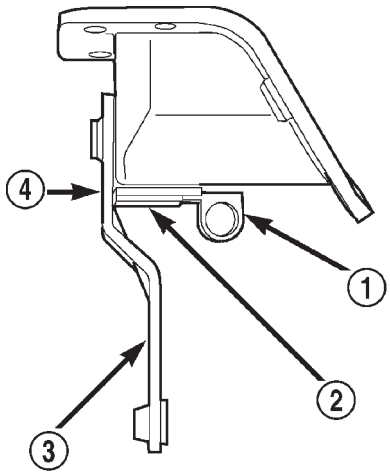


Fig. 107 Shifter Adjustment Location

1 - LOCATING PIN
2 - ADJUSTMENT CHANNEL
3 - LOWER SHIFTER LEVER
4 - LOCATING HOLE

TRANSFER CASE - NV241HD

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TRANSFER CASE - NV241HD

DESCRIPTION

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: 2H, 4H, and 4LO.

The synchronizer mechanism consists of a brass stop ring, synchronizer hub, and the sliding clutch (Fig. 1). The synchronizer components allow the transfer case to be shifted between the 2H and 4H operating ranges while the vehicle is in motion.

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.

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 - NV241HD (Continued)

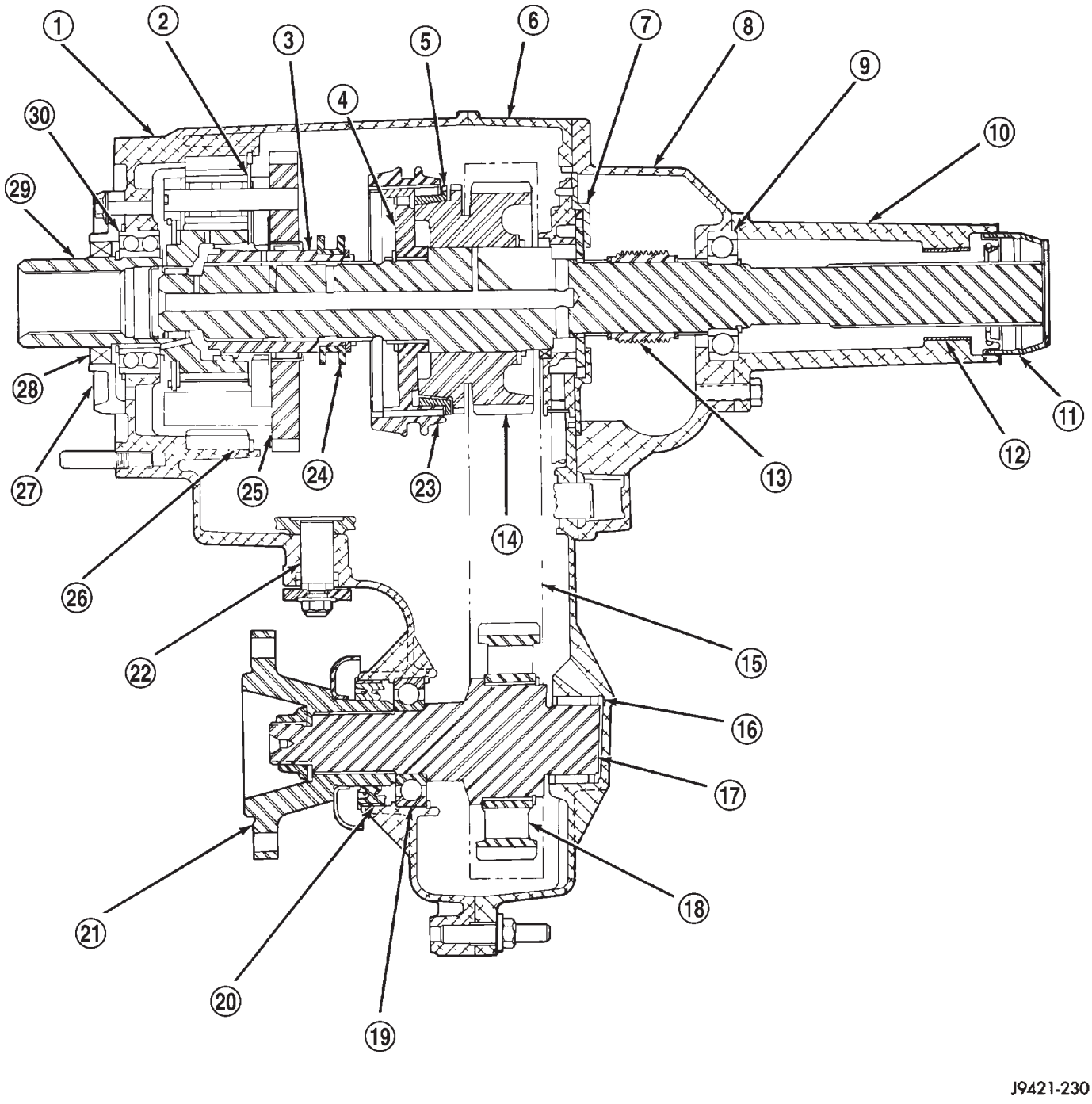


Fig. 1 NV241HD Transfer Case

TRANSFER CASE - NV241HD (Continued)

1 - FRONT CASE
2 - PLANETARY ASSEMBLY
3 - SUPPORT SLEEVE
4 - SYNCHRO HUB
5 - STOP RING
6 - REAR CASE
7 - OIL PUMP
8 - REAR RETAINER
9 - OUTPUT BEARING
10 - REAR EXTENSION
11 - SEAL
12 - BUSHING
13 - SPEEDOMETER GEAR
14 - DRIVE SPROCKET
15 - CHAIN
16 - NEEDLE BEARING
17 - FRONT OUTPUT SHAFT
18 - SPROCKET
19 - ROLLER BEARING
20 - SEAL
21 - COMPANION FLANGE
22 - SECTOR SHAFT
23 - SLIDING CLUTCH
24 - SLIDING HUB
25 - PTO GEAR
26 - ANNULUS GEAR
27 - INPUT BEARING RETAINER
28 - SEAL
29 - INPUT GEAR
30 - INPUT BEARING

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.

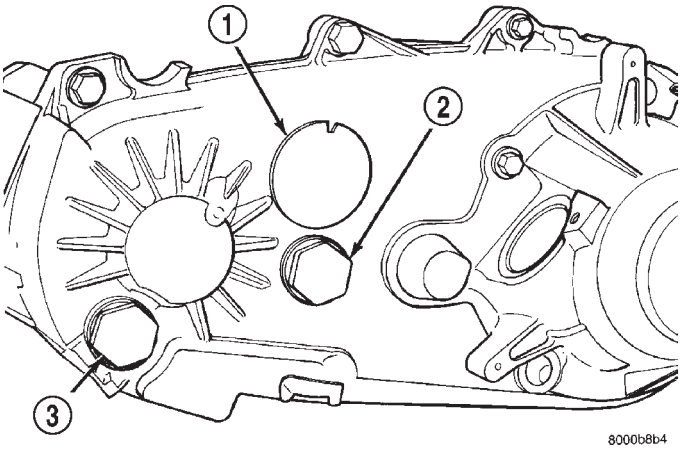


Fig. 2 Transfer Case Identification Tag - Typical

1 - I.D. TAG
2 - FILL PLUG
3 - DRAIN PLUG

OPERATION

OPERATING RANGES

Transfer case operating ranges are:

- 2H (2-wheel drive)
- 4H (4-wheel drive)
- 4LO (4-wheel drive low range)

The 2H range is for use on any road surface at any time.

The 4H and 4LO 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 or other loose, slippery material.

The low range reduction gear system is operative in 4LO 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.

SHIFTING

The synchronizer components allow the transfer case to be shifted between the 2H and 4H operating ranges while the vehicle is in motion. The vehicle must have the transmission placed in NEUTRAL, or the clutch depressed in the case of a manual transmission, and be moving less than 2-3 MPH when shifting into the 4L operating range.

DIAGNOSIS AND TESTING - TRANSFER CASE

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 Diagnosis Chart for further information.

DIAGNOSIS CHART

Condition	Possible Cause	Correction
Transfer Case difficult to shift or will not shift into desired range.	1) Vehicle speed too great to permit shifting.	1) Stop vehicle and shift into desired range. Or, reduce speed to below 3-4 km/h (2-3 mph) before attempting the shift.
	2) If vehicle was operated for an extended period in 4H on a dry paved surface, the driveline torque load may be causing a bind.	2) Stop vehicle and shift the transmission into neutral. Shift the transfer case to 2H and operate vehicle in 2H on dry paved surfaces.
	3) Transfer case external shift linkage binding.	3) Lubricate, repair, or replace linkage bushings, or tighten loose components as necessary.
	4) Insufficient or incorrect lubricant.	4) Drain and refill to edge of fill hole with Mopar® ATF +4, type 9602, Automatic Transmission fluid.
	5) Internal components binding, worn, or damaged.	5) Disassemble the transfer case and replace worn or damaged components as necessary.
Transfer Case noisy in all operating ranges.	1) Insufficient or incorrect lubricant.	1) Drain and refill to edge of fill hole with Mopar® ATF +4, type 9602, Automatic Transmission fluid.
Noisy in, or jumps out of, four wheel drive low range.	1) Transfer case not completely engaged in 4L position.	1) With the transmission in NEUTRAL, or the clutch depressed in the case of a manual transmission and the vehicle moving under 3-4 km/h (2-3 mph), shift the transfer case to NEUTRAL and then shift into the 4L position.
	2) Shift linkage out of adjustment.	2) Adjust linkage.
	3) Shift linkage loose or binding.	3) Tighten, lubricate, or repair linkage as necessary.
	4) Range fork damaged, inserts worn, or fork is binding on the shift rail.	4) Disassemble unit and repair as necessary.
	5) Low range gear worn or damaged.	5) Disassemble unit and repair as necessary.
Lubricant leaking from output shaft seal or vent.	1) Transfer case overfilled.	1) Drain lubricant to the correct level.
	2) Vent closed or restricted.	2) Clear or replace vent as necessary.
	3) Output shaft seals damaged or installed incorrectly.	3) Replace seal as necessary. Check to ensure that another component, the propeller shaft slip yoke for example, is not causing damage to seal.
Abnormal tire wear.	1) Extended operation on hard, dry surfaces in the 4H position.	1) Operate vehicle in the 2H position on hard, dry surfaces.

TRANSFER CASE - NV241HD (Continued)

REMOVAL

(1) Raise and support vehicle.
(2) Remove skid plate, if equipped. (Refer to 13 - FRAMES & BUMPERS/FRAME/TRANSFER CASE SKID PLATE - REMOVAL)
(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. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)
(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.

DISASSEMBLY

Position transfer case in a shallow drain pan. Remove drain plug and drain any remaining lubricant remaining in case.

EXTENSION HOUSING

(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.
(5) Separate extension housing from transfer case.

COMPANION FLANGE AND SHIFT LEVER

(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 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. 4).

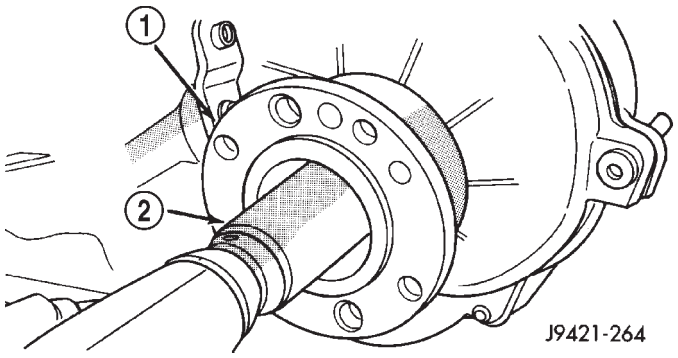


Fig. 3 Removing Companion Flange Nut

1 - COMPANION FLANGE
2 - 1-1/8” SOCKET

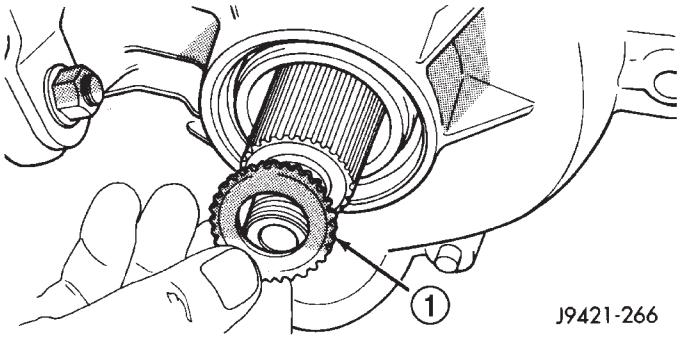


Fig. 4 Companion Flange Seal Removal

1 - FLANGE SEAL

(5) Remove nut and washer that retain shift lever to sector shaft. Then remove shift lever from shaft (Fig. 5).

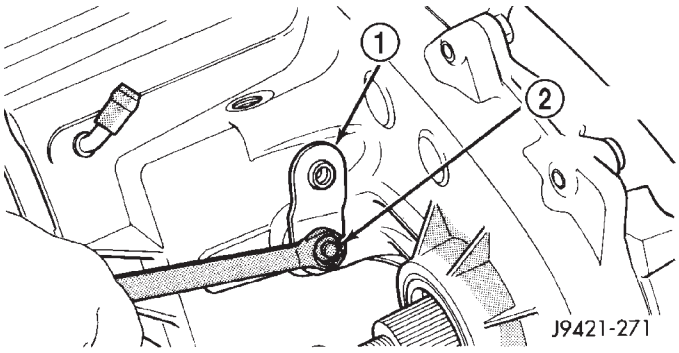


Fig. 5 Shift Lever Removal

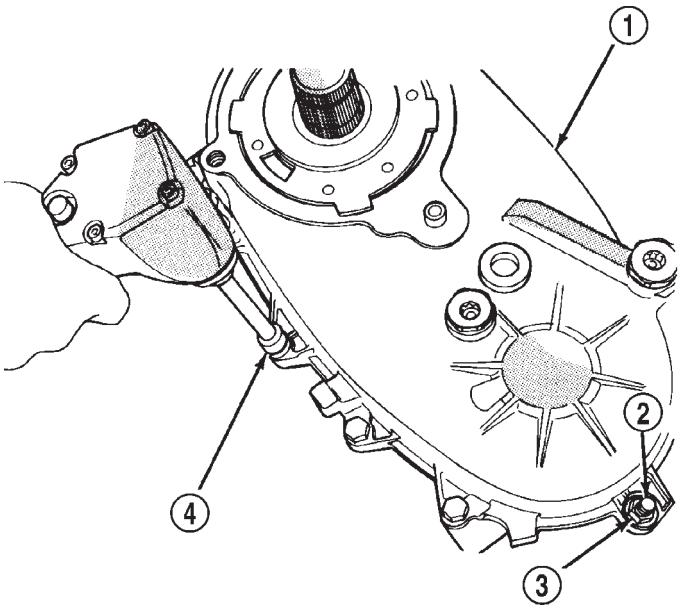
1 - SHIFT LEVER
2 - NUT/WASHER

FRONT OUTPUT SHAFT AND DRIVE CHAIN

(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. 6). Some bolts/studs at ends of case

require flat washers. Mark position of these bolts with paint or scriber.

(4) Remove rear case-to-front case bolts.

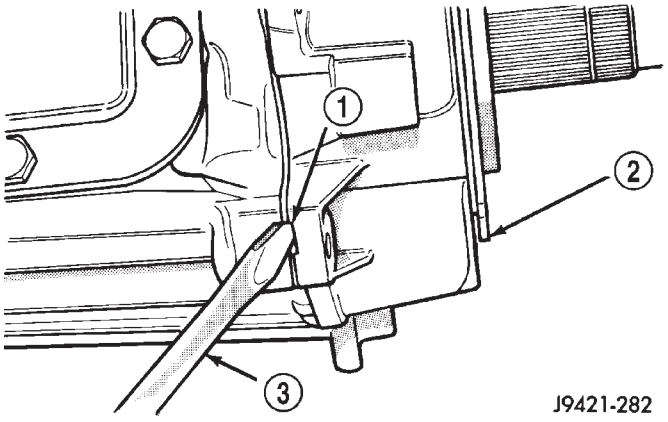


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Fig. 6 Removing Case Attaching Bolts

1 - REAR CASE
2 - STUD
3 - NUT AND WASHER
4 - SOCKET

(5) Loosen rear case with pry tool to break sealer bead. Insert tool in slot at each end of case (Fig. 7).

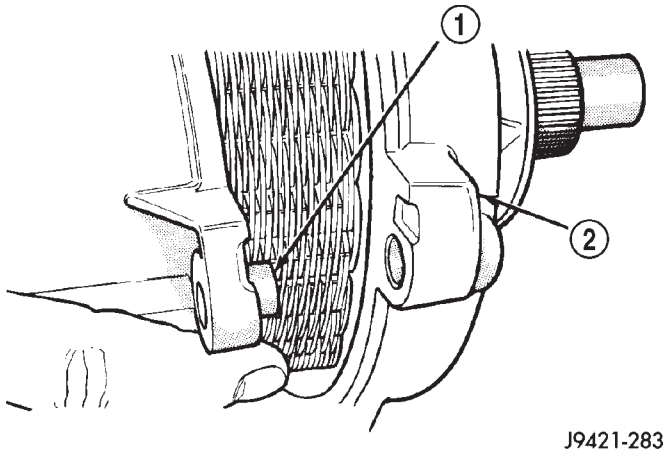


J9421-282

Fig. 7 Loosening Rear Case (Breaking Sealer Bead)

1 - SLOT
2 - REAR CASE
3 - PRY TOOL

(6) Unseat rear case from alignment dowels (Fig. 8).



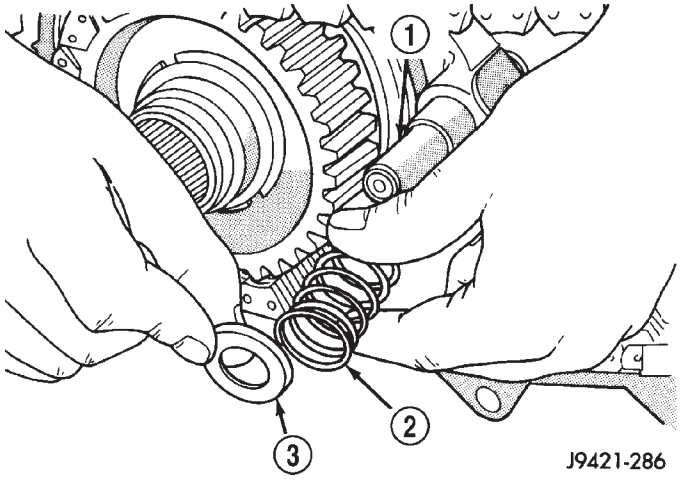
J9421-283

Fig. 8 Removing Rear Case From Alignment Dowels

1 - CASE DOWELS (2)
2 - REAR CASE

(7) Remove rear case and oil pump assembly from front case.

(8) Remove shift rail cup and spring (Fig. 9).



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Fig. 9 Shift Rail Cup And Spring Removal

1 - SHIFT RAIL
2 - SPRING
3 - CUP

TRANSFER CASE - NV241HD (Continued)

(9) Remove front sprocket retaining ring (Fig. 10).

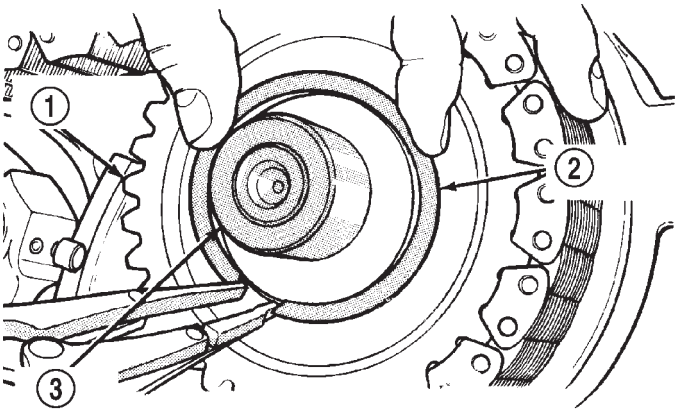


Fig. 10 Removing Front Drive Sprocket Retaining Ring

1 - FRONT SPROCKET
2 - RETAINING RING
3 - FRONT OUTPUT SHAFT

(10) Pull mainshaft, front sprocket, and chain outward about 25.4 mm (1-inch) simultaneously (Fig. 11).

(11) Remove chain from mainshaft drive sprocket and remove front sprocket and chain as an assembly.

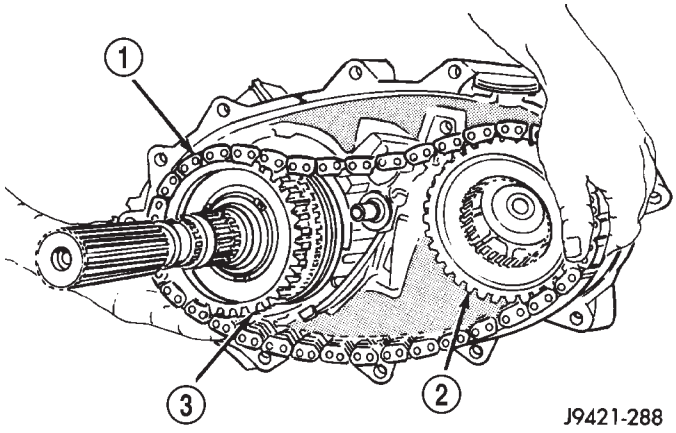


Fig. 11 Removing Drive Chain And Front Sprocket

1 - CHAIN
2 - DRIVE SPROCKET
3 - FRONT SPROCKET

SHIFT FORK AND MAINSHAFT

(1) Remove vacuum/indicator switch (Fig. 12).

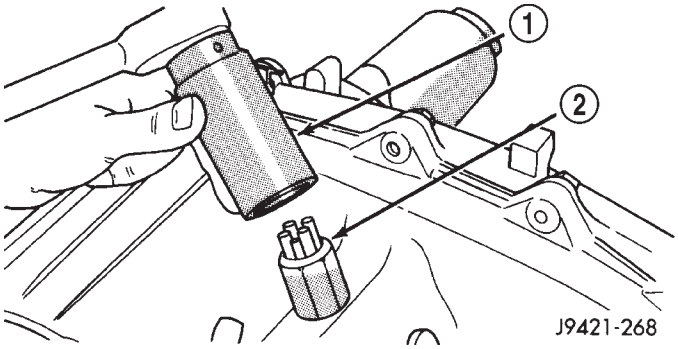


Fig. 12 Vacuum/Indicator Switch Removal

1 - 1-1/16" SOCKET
2 - INDICATOR SWITCH

(2) Loosen poppet plunger screw (Fig. 13).

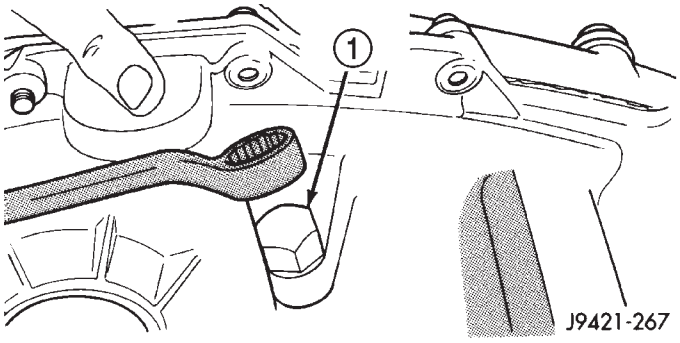


Fig. 13 Loosening Poppet Plunger Screw

1 - POPPET PLUNGER SCREW

(3) Remove poppet plunger screw and spring (Fig. 14). Note that screw has o-ring seal. Remove and discard seal this seal.

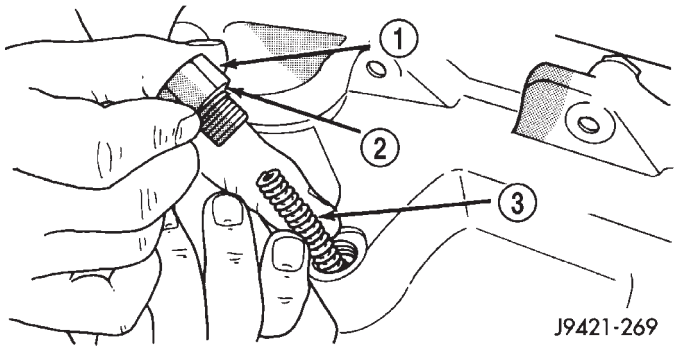


Fig. 14 Poppet Plunger Screw And Spring Removal

1 - POPPET PLUNGER SCREW
2 - O-RING
3 - PLUNGER SPRING

TRANSFER CASE - NV241HD (Continued)

(4) Remove poppet plunger with magnet (Fig. 15).

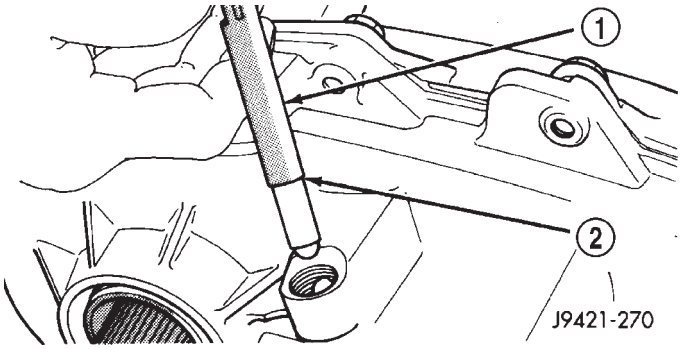


Fig. 15 Poppet Plunger Removal

1 - MAGNET
2 - POPPET PLUNGER

(5) Remove front output shaft from bearing in case (Fig. 16).

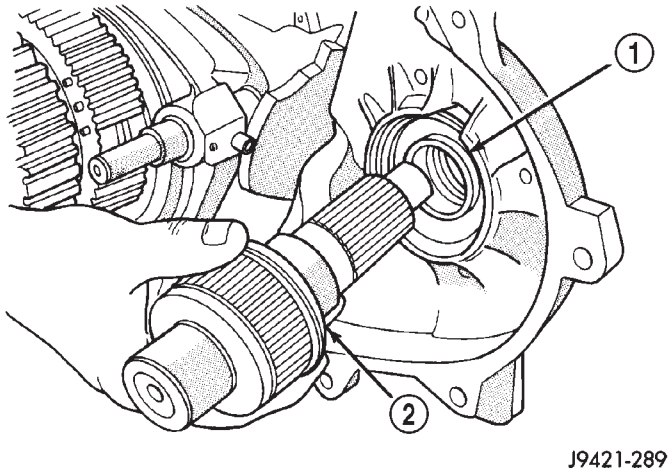


Fig. 16 Front Output Shaft Removal

1 - BALL BEARING
2 - FRONT OUTPUT SHAFT

(6) Pull mainshaft assembly out of input gear, sliding clutch and case (Fig. 17).

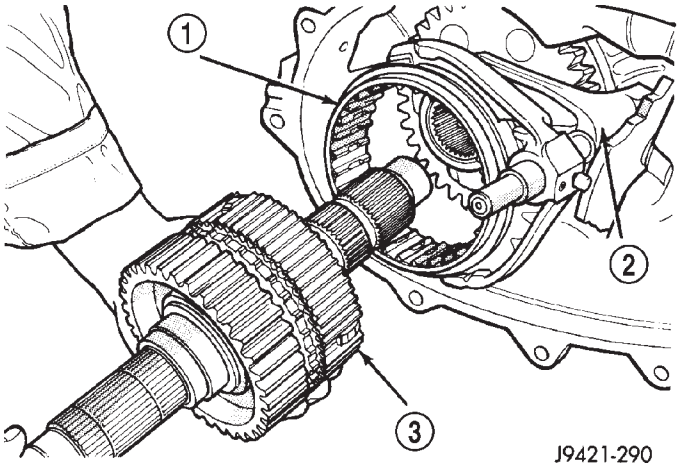


Fig. 17 Mainshaft Assembly Removal

1 - SLIDING CLUTCH
2 - MODE FORK
3 - MAINSHAFT ASSEMBLY

(7) Remove mode fork, sliding clutch and shift rail as assembly (Fig. 18). Note which way clutch fits in fork (long side of clutch goes to front).

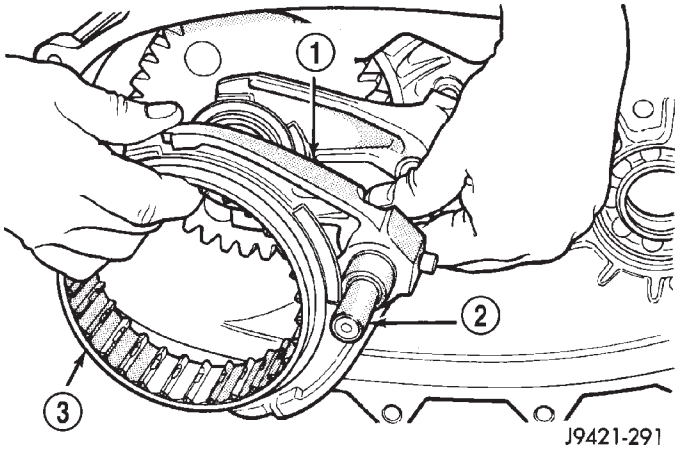


Fig. 18 Mode Fork, Shift Rail And Sliding Clutch Removal

1 - MODE FORK
2 - SHIFT RAIL
3 - SLIDING CLUTCH

TRANSFER CASE - NV241HD (Continued)

(8) Remove sliding hub retaining ring (Fig. 19).

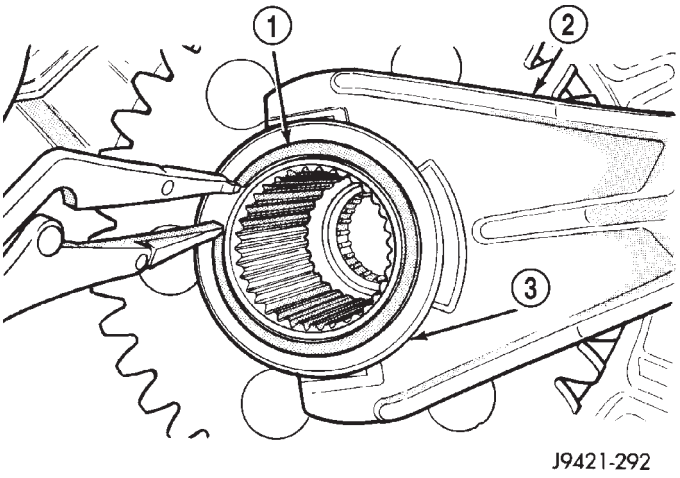


Fig. 19 Sliding Hub Retaining Ring Removal

1 - RETAINING RING
2 - RANGE FORK
3 - SLIDING HUB

(9) Remove range fork and sliding hub as an assembly (Fig. 20).

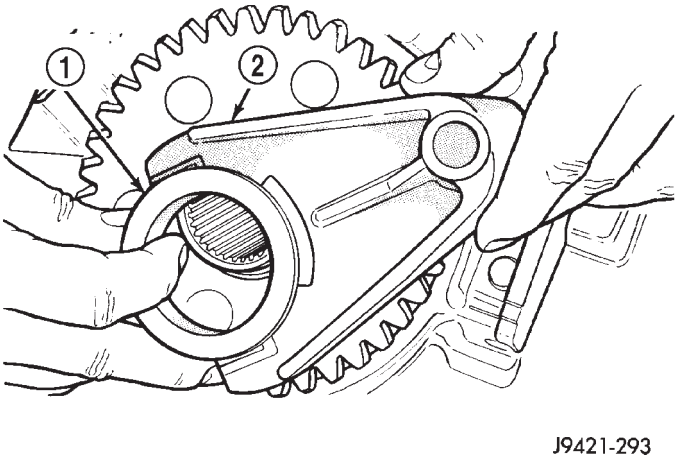


Fig. 20 Range Fork And Sliding Hub Removal

1 - SUPPORT SLEEVE
2 - RANGE FORK

(10) Remove shift sector (Fig. 21).

(11) Remove shift sector shaft nylon retainer and o-ring from shaft bore in front case (Fig. 22).

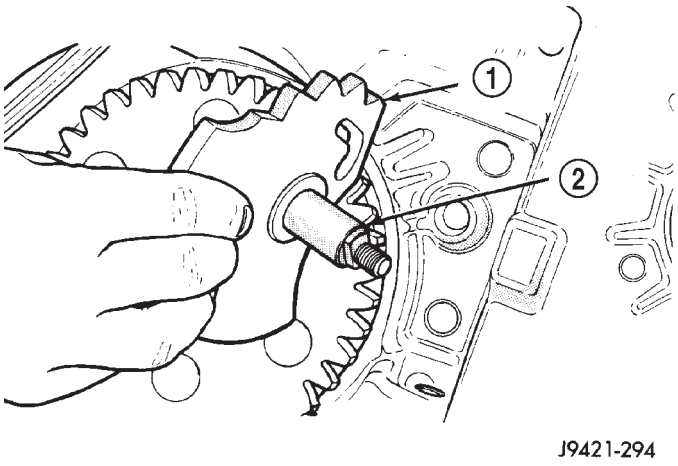


Fig. 21 Shift Sector Removal

1 - SHIFT SECTOR
2 - SECTOR SHAFT

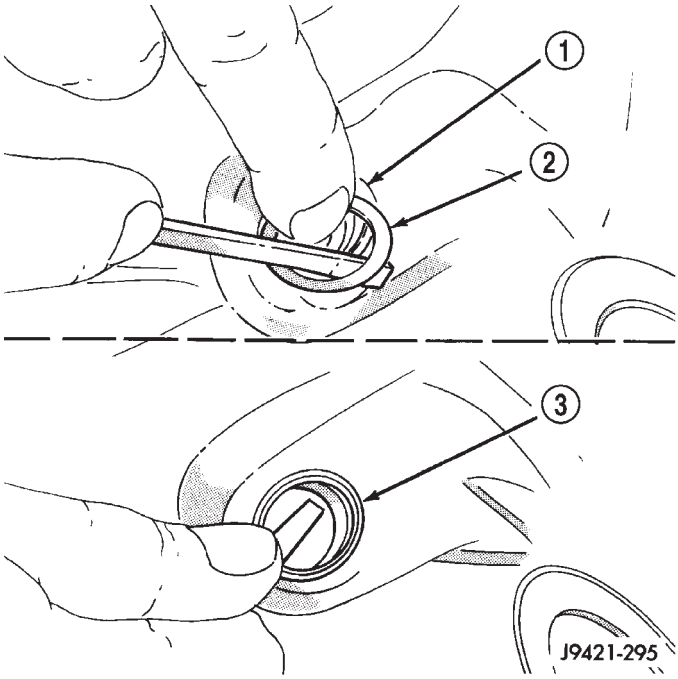


Fig. 22 Removing Sector Shaft O-Ring And Retainer

1 - SHAFT BORE
2 - NYLON RETAINING RING
3 - SECTOR SHAFT O-RING

TRANSFER CASE - NV241HD (Continued)

MAINSHAFT

(1) Remove retaining ring that secures synchronizer hub on mainshaft (Fig. 23). Use standard (instead of parallel jaw) snap-ring pliers to remove this retaining ring.

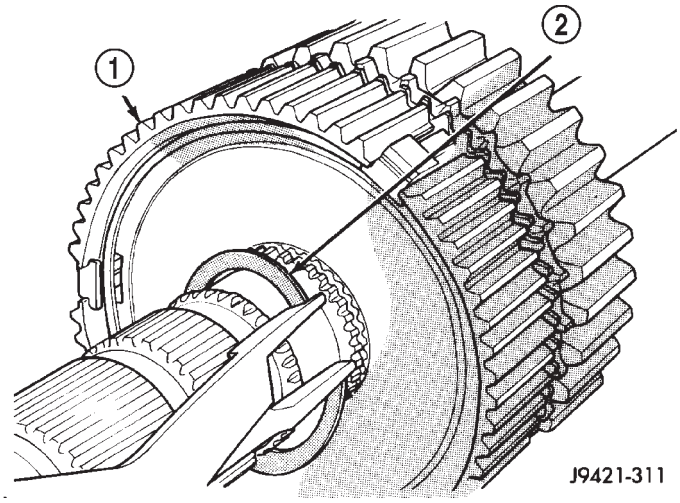


Fig. 23 Synchronizer Hub Retaining Ring Removal

1 - SYNCHRO HUB
2 - RETAINING RING

(2) Remove synchronizer hub (Fig. 24).

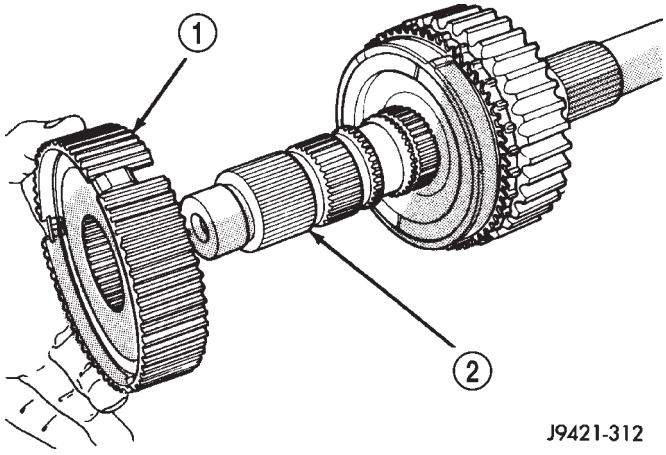


Fig. 24 Synchronizer Hub Removal

1 - SYNCHRO HUB
2 - MAINSHAFT

(3) Inspect synchronizer hub struts and springs. If struts appear worn, remove struts and springs from hub. Note position of springs for installation reference (Fig. 25).

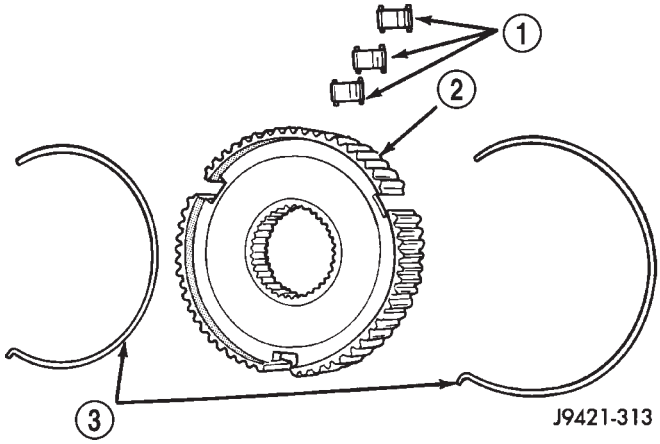


Fig. 25 Synchronizer Strut And Spring Removal

1 - SYNCHRO STRUTS
2 - SYNCHRO HUB
3 - SYNCHRO SPRINGS

(4) Remove brass stop ring (Fig. 26). Discard stop ring if worn, cracked, or any teeth are missing.

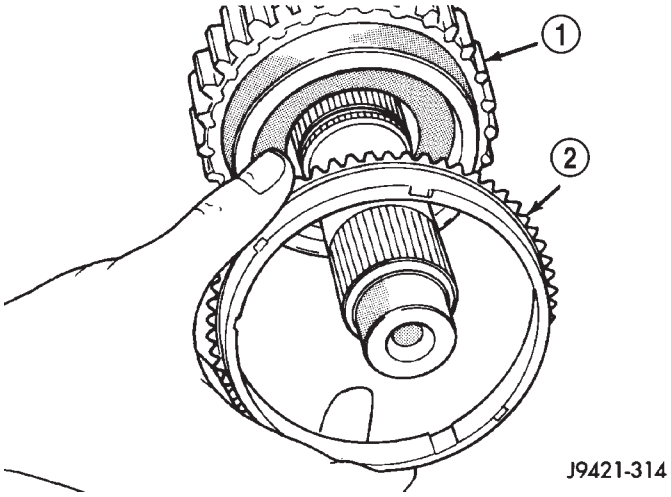


Fig. 26 Synchronizer Stop Ring Removal

1 - DRIVE SPROCKET
2 - STOP RING

TRANSFER CASE - NV241HD (Continued)

(5) Remove drive sprocket (Fig. 27).

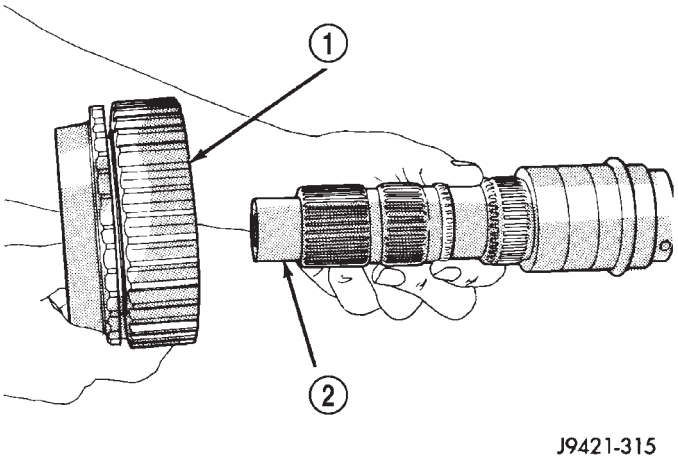


Fig. 27 Drive Sprocket Removal

1 - DRIVE SPROCKET
2 - MAINSHAFT

INPUT AND PLANETARY GEAR

(1) Remove input bearing retainer bolts (Fig. 28).

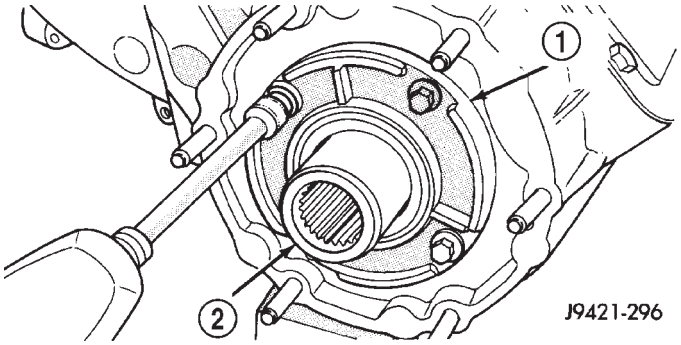


Fig. 28 Removing Input Bearing Retainer Bolts

1 - BEARING RETAINER
2 - INPUT GEAR

(2) Loosen bearing retainer with pry tool. Insert tool in retainer slot as shown (Fig. 29). Then remove retainer.

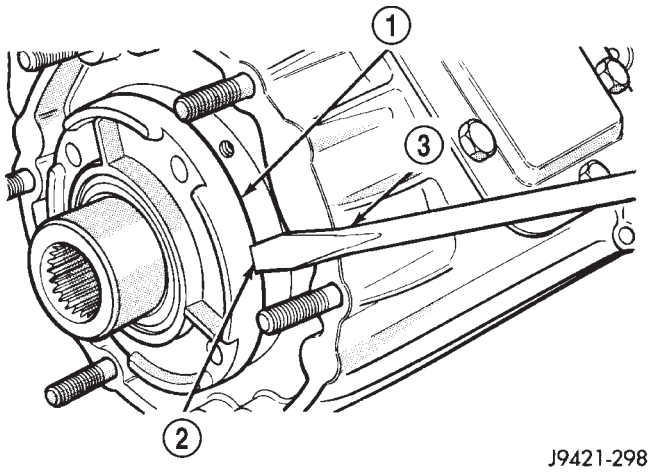


Fig. 29 Loosening/Removing Input Bearing Retainer

1 - BEARING RETAINER
2 - SLOT
3 - PRY TOOL

(3) Remove input gear retaining ring with heavy duty parallel jaw snap-ring pliers (Fig. 30).

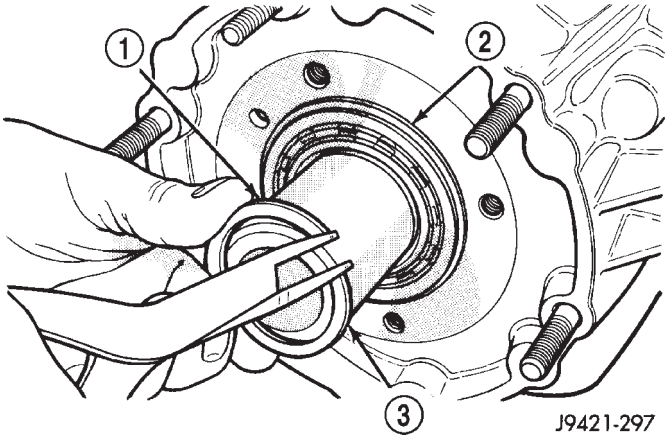


Fig. 30 Removing Input Gear Retaining Ring

1 - RETAINING RING
2 - INPUT BEARING
3 - INPUT GEAR

TRANSFER CASE - NV241HD (Continued)

(4) Tap input gear out of bearing with plastic mallet (Fig. 31).

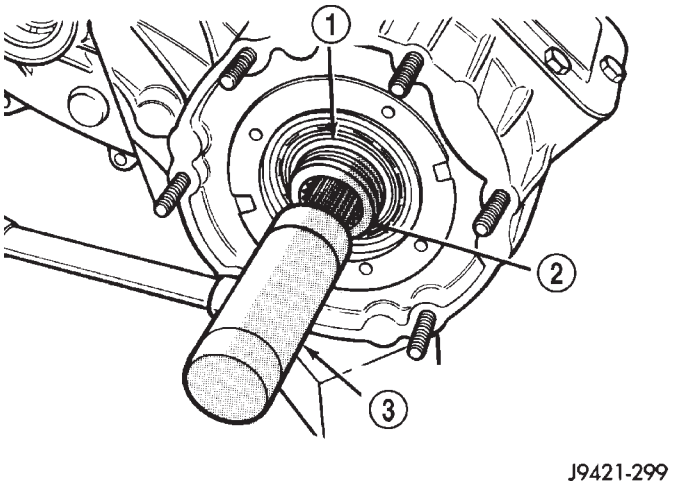


Fig. 31 Removing Input Gear

1 - BEARING
2 - INPUT GEAR
3 - PLASTIC MALLET

(5) Remove input gear and planetary/PTO gear as assembly (Fig. 32).

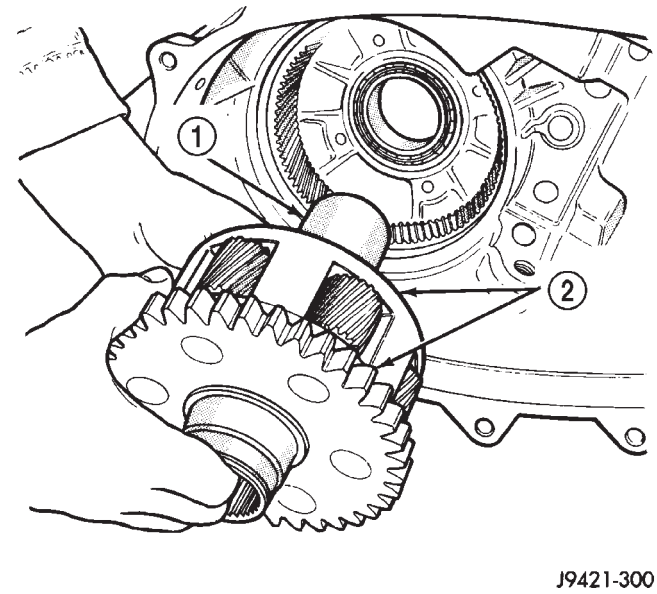


Fig. 32 Input Gear And Planetary Assembly Removal

1 - INPUT GEAR
2 - PLANETARY AND PTO GEAR ASSEMBLY

INPUT AND PLANETARY GEAR

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. 33).

(2) Remove retaining ring that secures input gear and lock ring in planetary assembly.

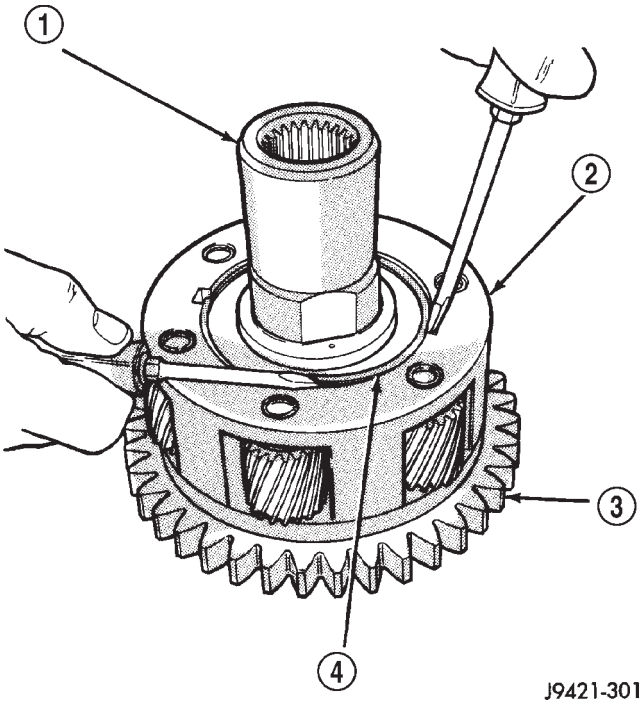


Fig. 33 Removing Lock Ring/Input Gear Retaining Ring

1 - INPUT GEAR
2 - PLANETARY ASSEMBLY
3 - PTO GEAR
4 - RETAINING RING

(3) Remove lock ring and front thrust washer from carrier (Fig. 34). Note that lock ring and thrust washer are both tabbed.

(4) Remove input gear from planetary carrier (Fig. 35). Lift gear straight up and out of carrier.

(5) Remove support sleeve from carrier (Fig. 36).

(6) Remove rear thrust washer (Fig. 37).

CLEANING

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.

INSPECTION

If any pump component is worn, or damaged, the pump must be replaced as an assembly.

TRANSFER CASE - NV241HD (Continued)

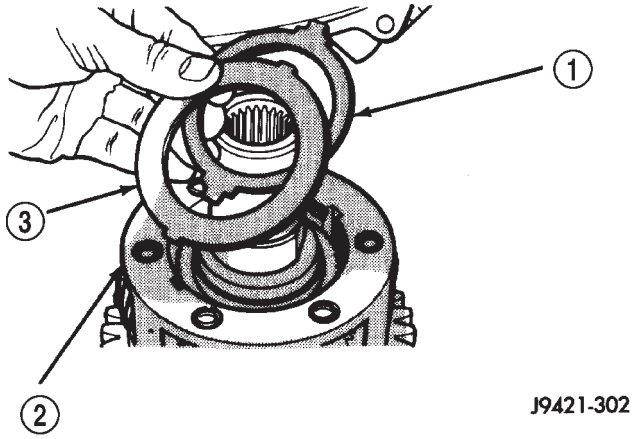


Fig. 34 Planetary Lock Ring And Front Thrust Washer Removal

1 - THRUST WASHER
2 - PLANETARY
3 - LOCK RING

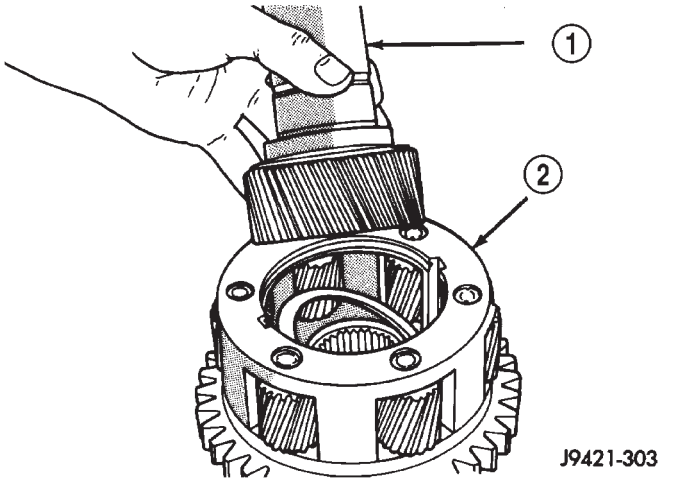


Fig. 35 Removing Input Gear From Planetary Carrier

1 - INPUT GEAR
2 - PLANETARY CARRIER

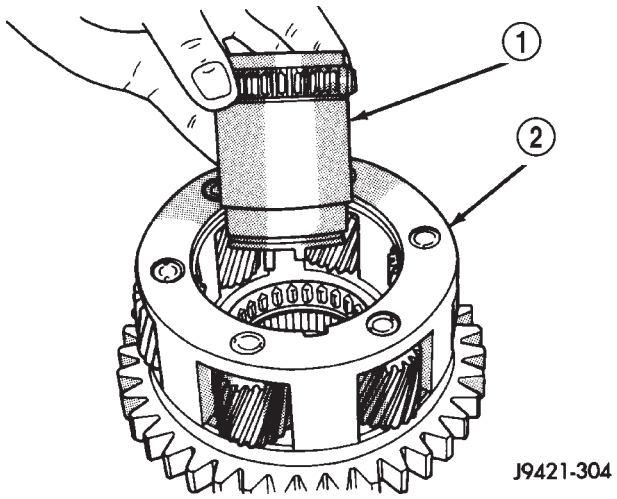


Fig. 36 Support Sleeve Removal

1 - SUPPORT SLEEVE
2 - PLANETARY CARRIER

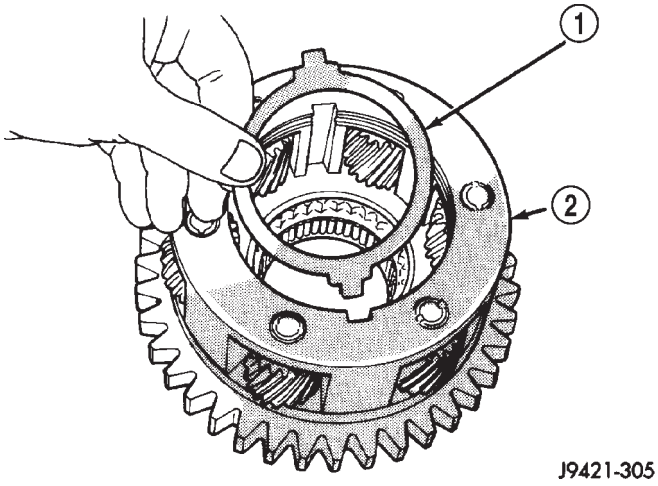


Fig. 37 Rear Thrust Washer Removal

1 - REAR THRUST WASHER
2 - PLANETARY CARRIER

Inspect the spline teeth on the synchronizer hub (Fig. 38). If evidence of chipping or excessive wear is apparent, replace the hub. The hooked end of each synchronizer 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 synchronizer 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 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. However, 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.

TRANSFER CASE - NV241HD (Continued)

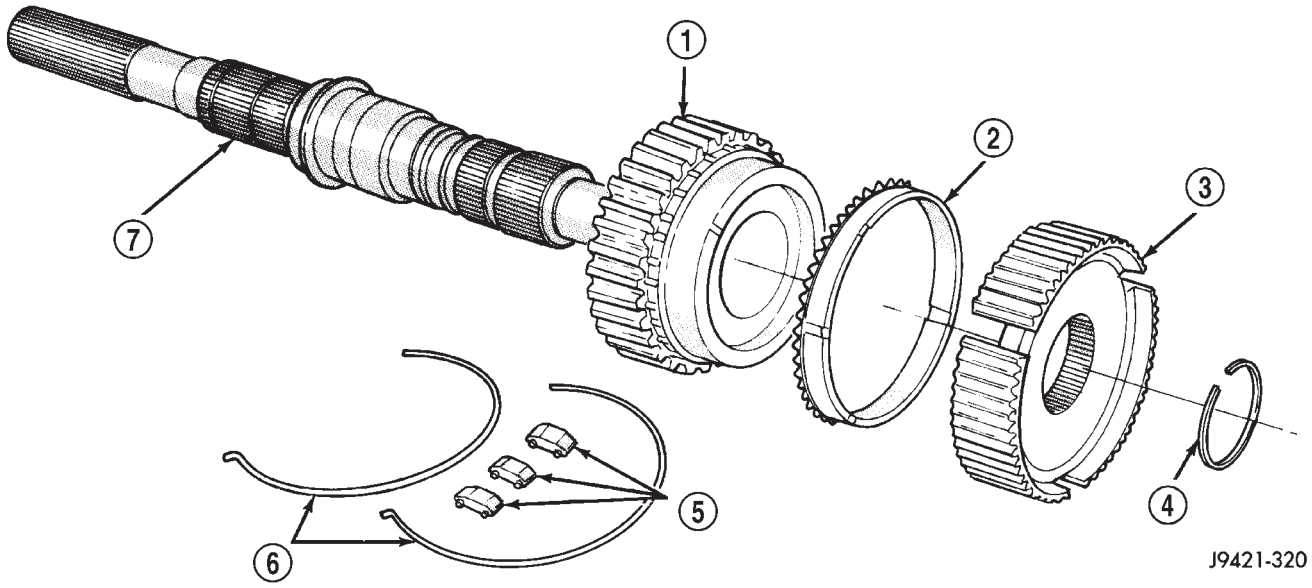


Fig. 38 Mainshaft Components

1 - DRIVE SPROCKET
2 - STOP RING
3 - SYNCHRO HUB
4 - RETAINING RING
5 - STRUTS
6 - SYNCHRO SPRINGS
7 - MAINSHAFT

Check condition of the shift fork pads (Fig. 39). The pads should be replaced if cracked, worn, or loose (won't stay on fork).

The shift forks, clutch and sleeve should all be checked for wear, cracks, or any type of damage (Fig. 40). 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. 41) 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.

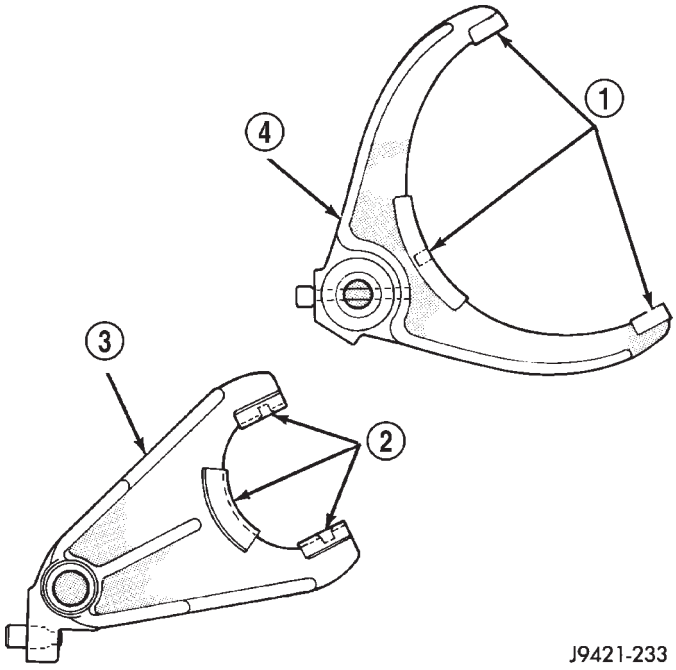


Fig. 39 Shift Fork Pads

1 - PADS
2 - PADS
3 - RANGE FORK
4 - MODE FORK

TRANSFER CASE - NV241HD (Continued)

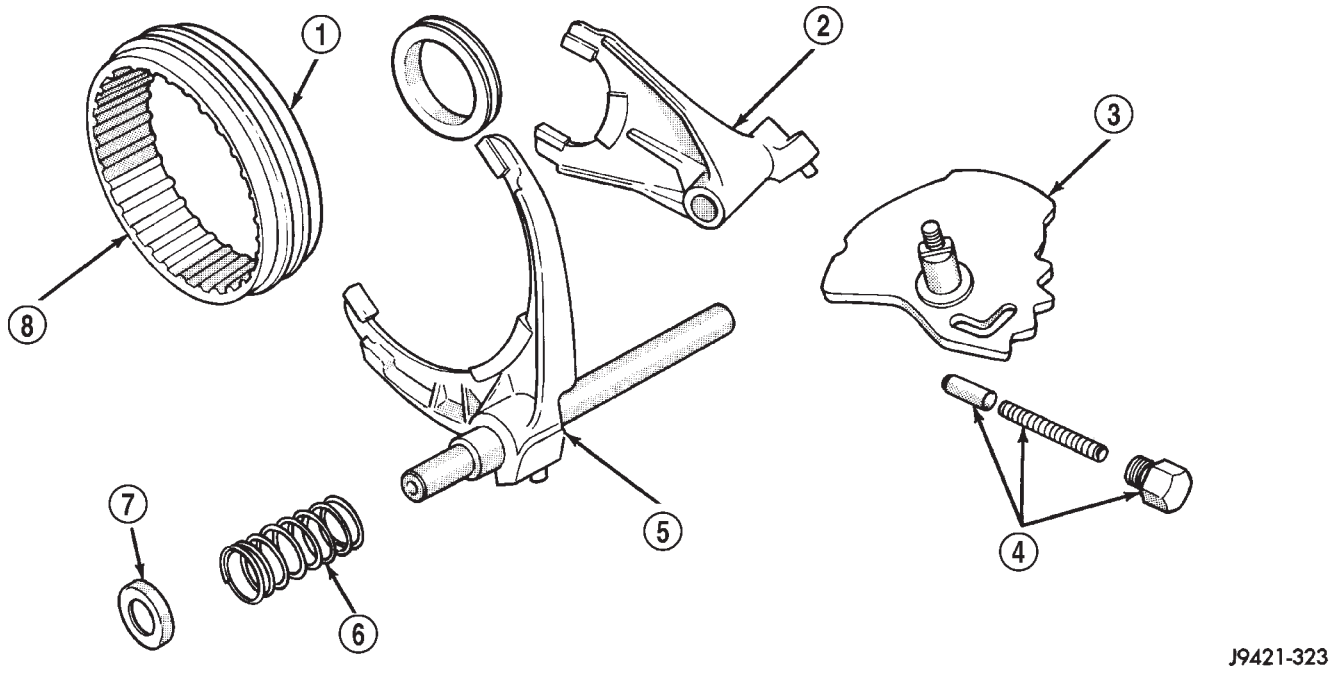


Fig. 40 Shift Fork Components

1 - SUPPORT SLEEVE
2 - RANGE FORK
3 - SHIFT SECTOR
4 - POPPET PLUNGER, SPRING, SCREW
5 - MODE FORK AND SHIFT RAIL
6 - SPRING
7 - CUP
8 - SLIDING CLUTCH

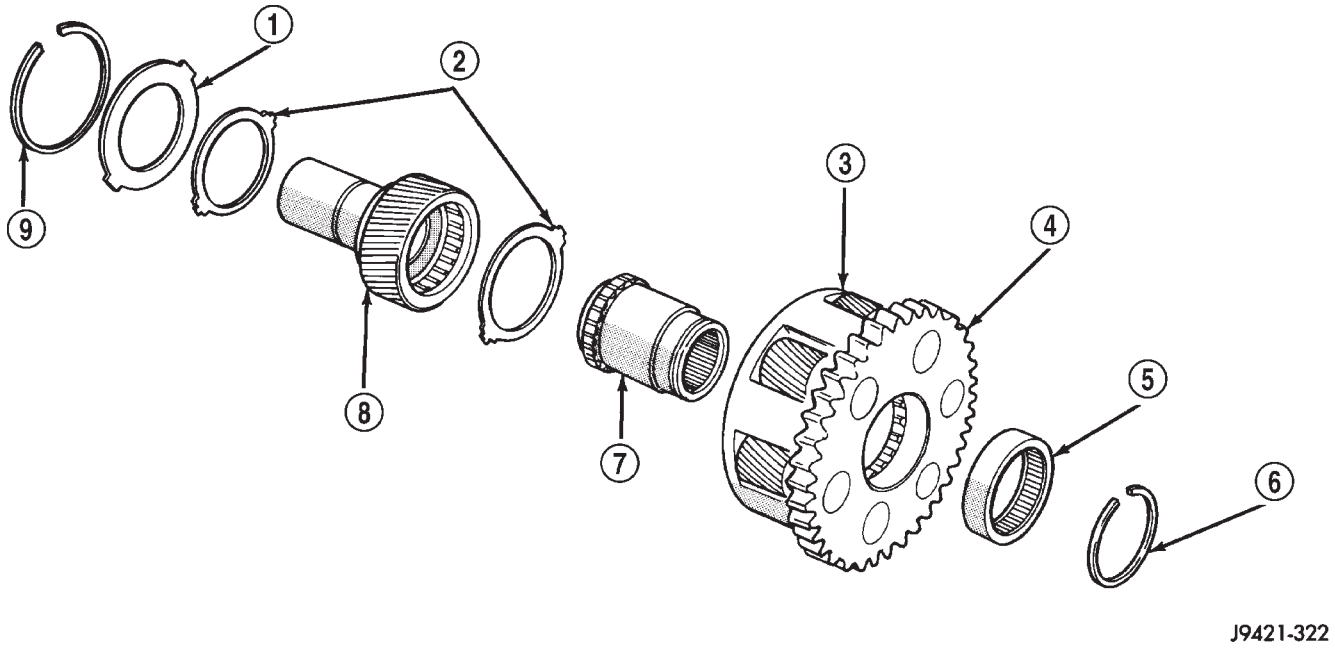


Fig. 41 Planetary And Input Gear Components

1 - LOCK RING
2 - THRUST WASHERS
3 - PLANETARY CARRIER
4 - PTO GEAR
5 - BEARING
6 - RETAINING RING
7 - SUPPORT SLEEVE
8 - INPUT GEAR
9 - RETAINING RING

TRANSFER CASE - NV241HD (Continued)

ASSEMBLY

BEARINGS AND SEALS

(1) Using Remover C-4210 and Handle C-4171, drive input shaft bearing from case from inside annulus gear opening (Fig. 42).

(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. 43).

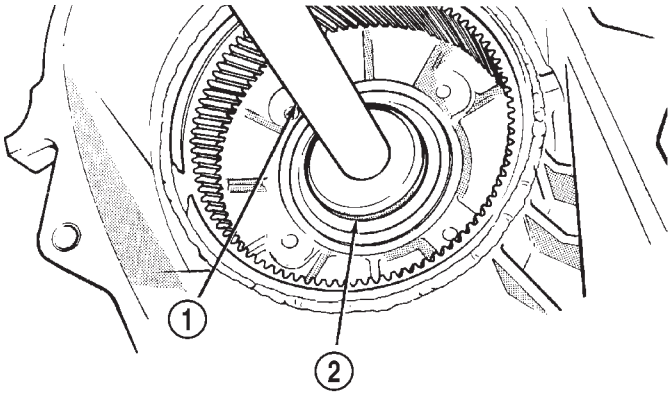


Fig. 42 Input Shaft Bearing Removal

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL C-4210

(5) Using Installer 6953, remove front output shaft bearing.

(6) Start front shaft output bearing in case (Fig. 44). Then seat bearing with Handle C-4171 and Installer 6953.

(7) Install front output bearing retaining ring.

(8) Install new front output seal in front case with Installer Tool 6888 (Fig. 45) 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. 46). 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. 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.

(9) Remove seal from front bearing retainer with suitable pry tool.

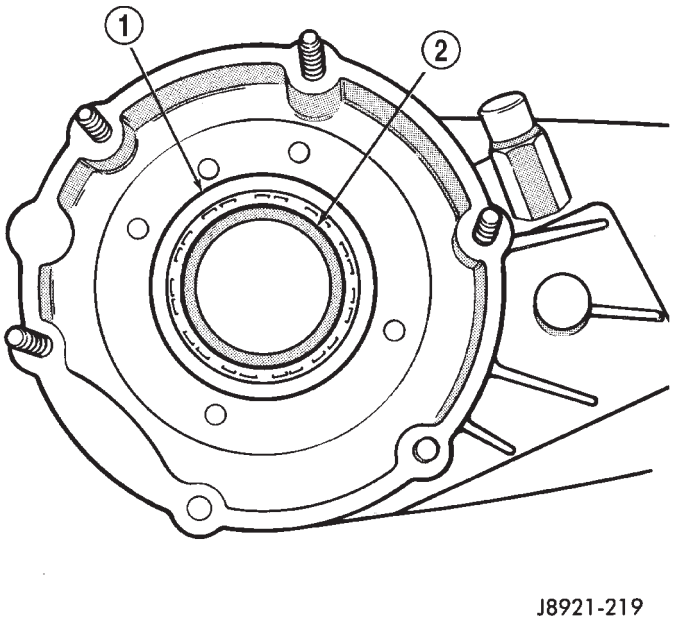


Fig. 43 Seating Input Shaft Bearing

1 - SNAP-RING
2 - INPUT SHAFT BEARING

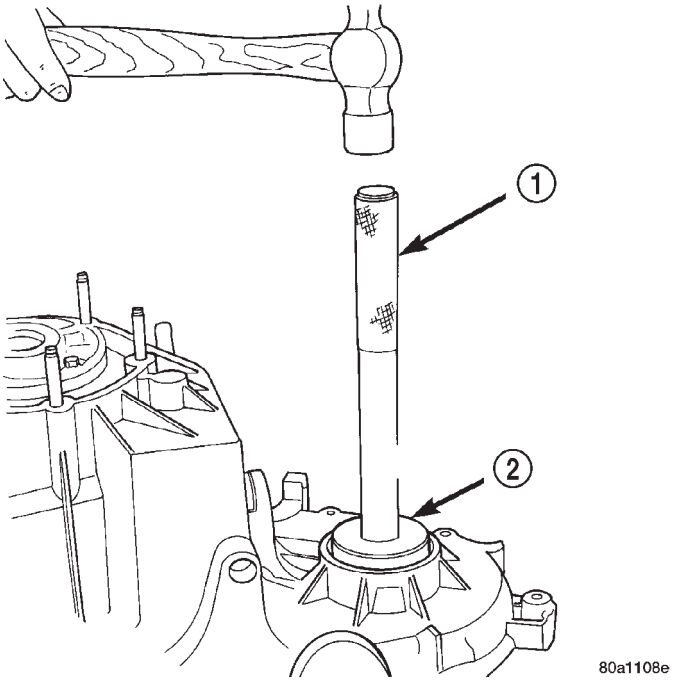


Fig. 44 Front Output Bearing Installation

1 - HANDLE C-4171
2 - REMOVER/INSTALLER 6953

TRANSFER CASE - NV241HD (Continued)

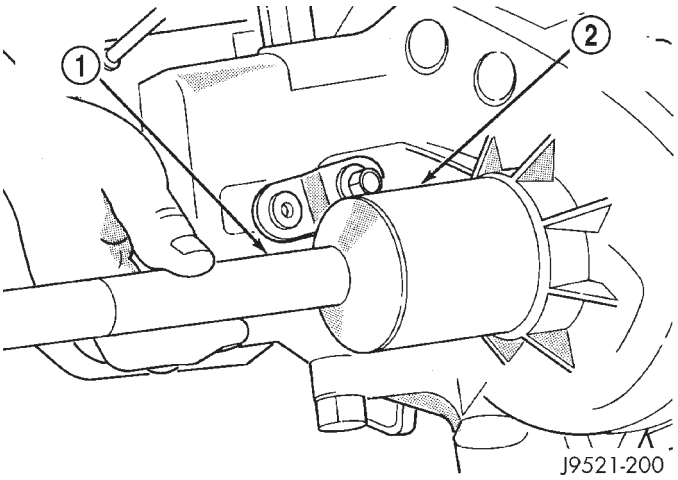


Fig. 45 Front Output Seal Installation

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL 6888

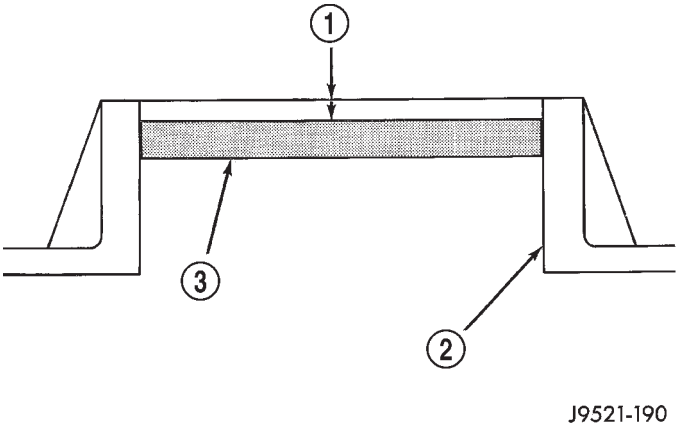


Fig. 46 Checking Front Output Seal Installation Depth

1 - CORRECT SEAL DEPTH IS 2.03-2.5 mm (0.080-0.100 in.) BELOW TOP EDGE OF BORE
2 - FRONT CASE SHAFT BORE
3 - FRONT OUTPUT SEAL

(10) Install new oil seal in front bearing retainer with Installer 7884 (Fig. 47).

(11) Remove seal from oil pump with suitable pry tool.

(12) Install new seal in oil pump with Installer 7888 (Fig. 48).

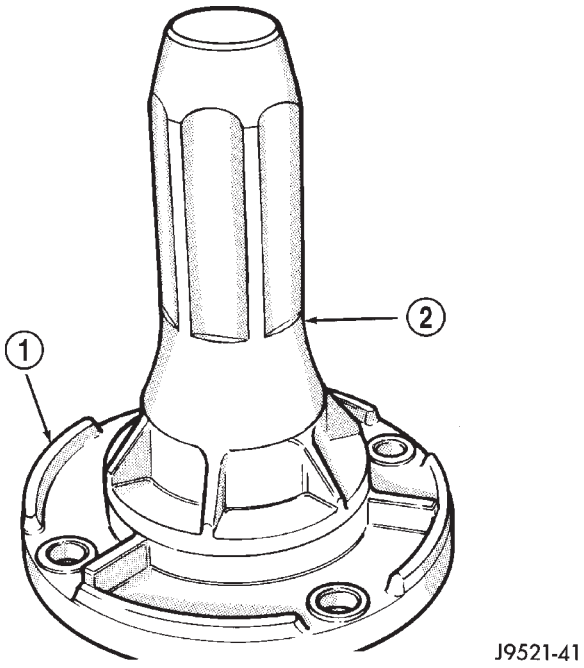


Fig. 47 Install Front Bearing Retainer Seal

1 - FRONT BEARING RETAINER
2 - SPECIAL TOOL 7884

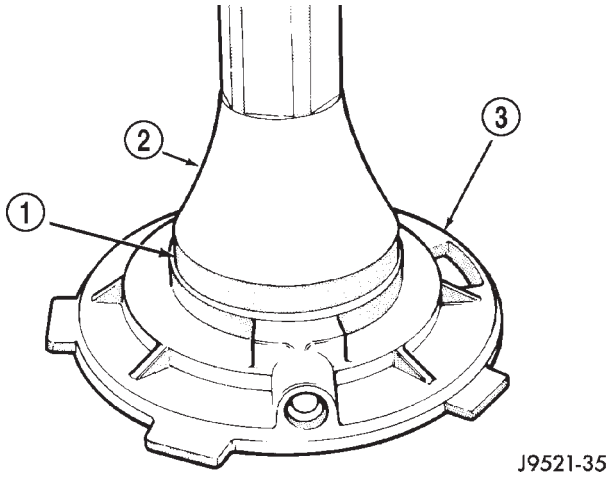


Fig. 48 Install Oil Pump Seal

1 - HOUSING SEAL
2 - SPECIAL TOOL 7888
3 - OIL PUMP FEED HOUSING

TRANSFER CASE - NV241HD (Continued)

(13) Inspect carrier needle bearing. If bearing is worn, rough, or damaged in any way, remove it with a brass punch and hammer (Fig. 49).

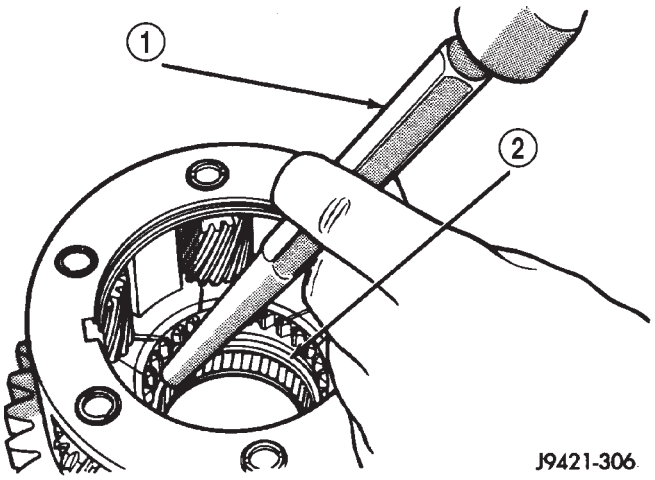


Fig. 49 Carrier Needle Bearing Removal

1 - BRASS PUNCH
2 - CARRIER NEEDLE BEARING

(14) Install new needle bearing in planetary carrier (Fig. 50). Use Handle C–4171 and Installer 5062 to install bearing.

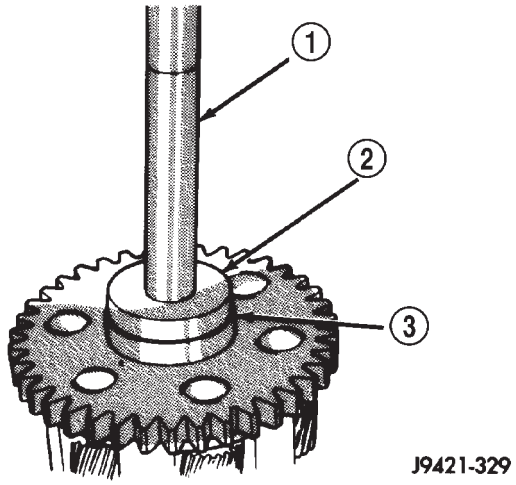


Fig. 50 Planetary Carrier Needle Bearing Installation

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL 5062
3 - CARRIER BEARING

(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. 51).

(16) Install new pilot bearing with Plug C-293-3.

(17) Remove the output shaft rear bearing with the screw and jaws from Remover L-4454 and Cup 8148 (Fig. 52).

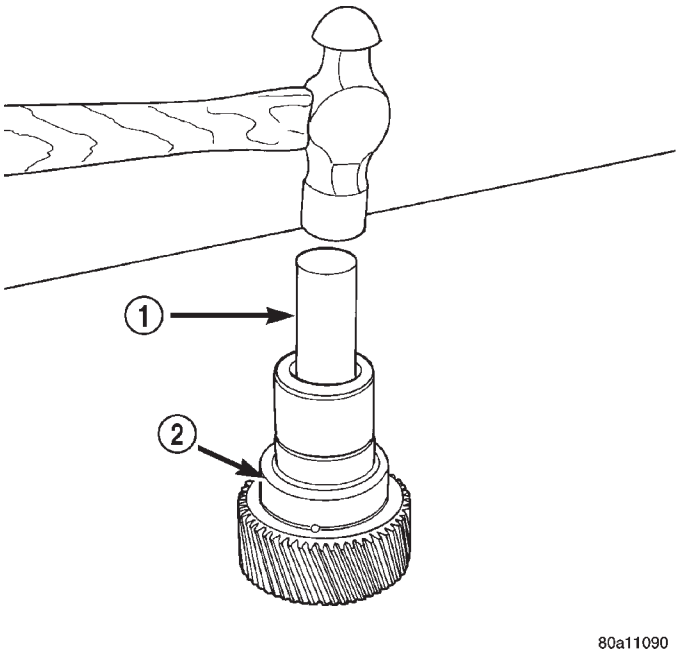


Fig. 51 Remove Input Gear Pilot Bearing

1 - DRIFT
2 - INPUT GEAR

(18) Install new bearing with Tool Handle C-4171 and Installer 5066 (Fig. 53). The bearing bore is chamfered at the top. Install the bearing so it is flush with the lower edge of this chamfer (Fig. 54).

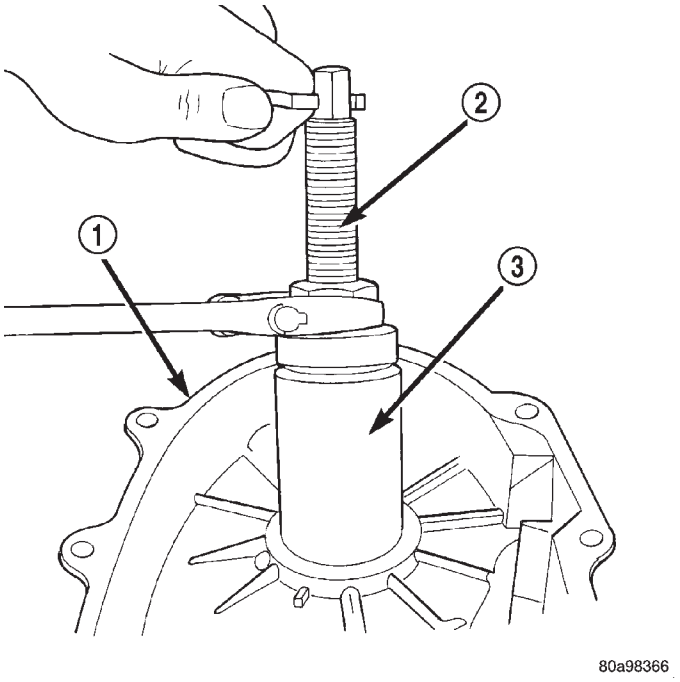


Fig. 52 Output Shaft Rear Bearing Removal

1 - REAR CASE
2 - SPECIAL TOOL L-4454-1 AND L-4454-3
3 - SPECIAL TOOL 8148

TRANSFER CASE - NV241HD (Continued)

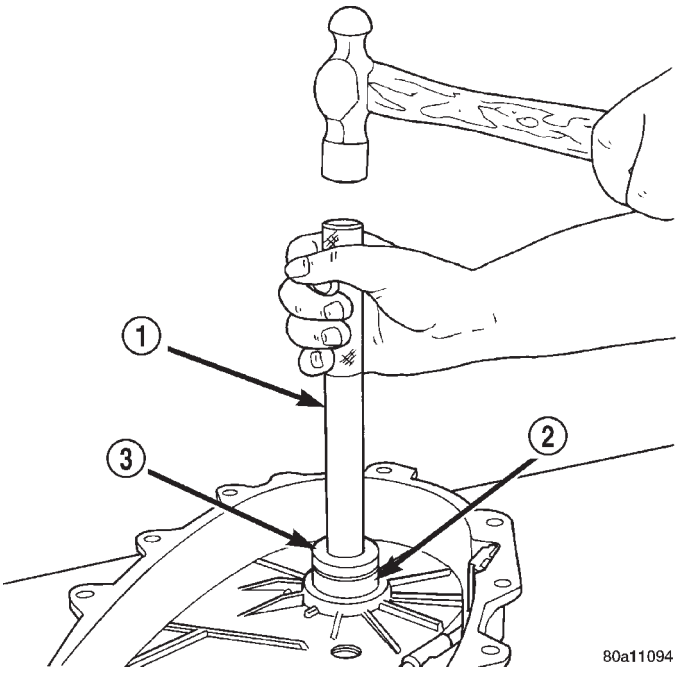


Fig. 53 Output Shaft Rear Bearing Installation

1 - HANDLE C-4171
2 - OUTPUT SHAFT INNER BEARING
3 - INSTALLER 5066

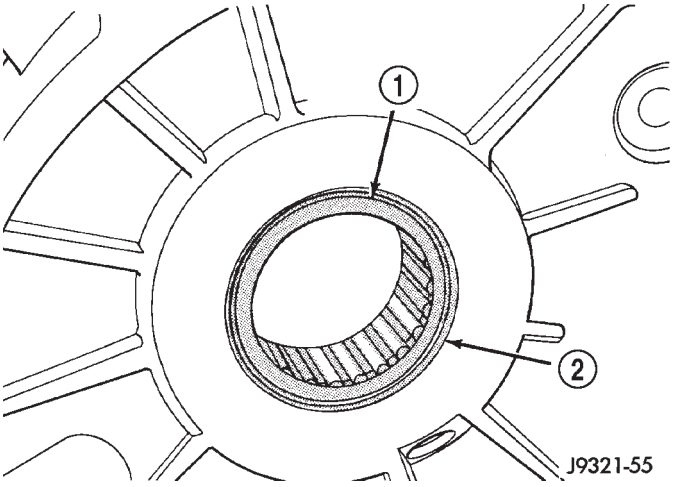


Fig. 54 Output Shaft Rear Bearing Installation Depth

1 - BEARING (SEATED) AT LOWER EDGE OF CHAMFER
2 - CHAMFER

INPUT AND PLANETARY GEAR

(1) Lubricate planetary components with transmission fluid.

(2) Install first thrust washer in carrier (Fig. 55). Lube washer with petroleum jelly before installation.

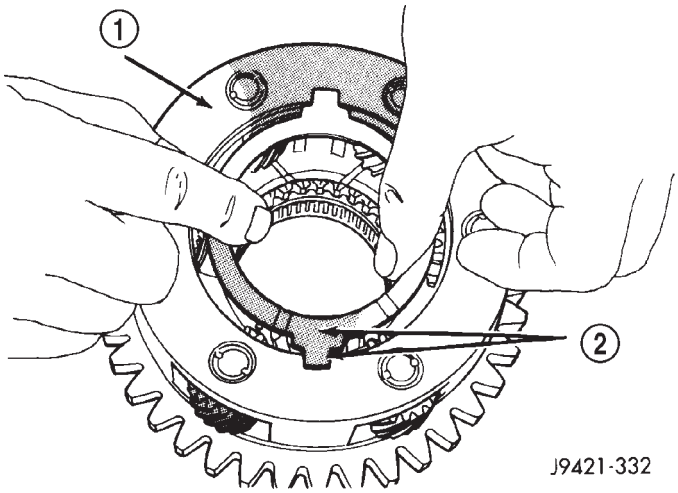


Fig. 55 Thrust Washer Installation

1 - THRUST WASHER
2 - TABS IN SLOTS

(3) Support carrier with wood blocks under PTO gear (Fig. 56).

(4) Install support sleeve in planetary carrier. Be sure sleeve is seated.

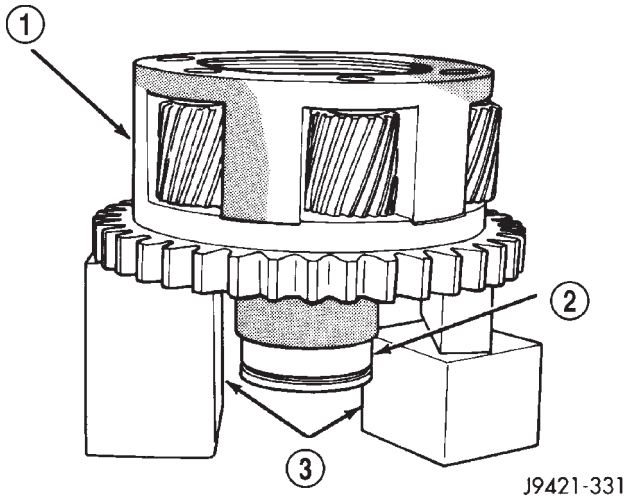


Fig. 56 Support Sleeve Installation

1 - PLANETARY
2 - SUPPORT SLEEVE
3 - WOOD BLOCKS

TRANSFER CASE - NV241HD (Continued)

(5) Install input gear in planetary carrier (Fig. 57).

(6) Install second thrust washer in planetary carrier. Be sure washer tabs are seated in carrier slots.

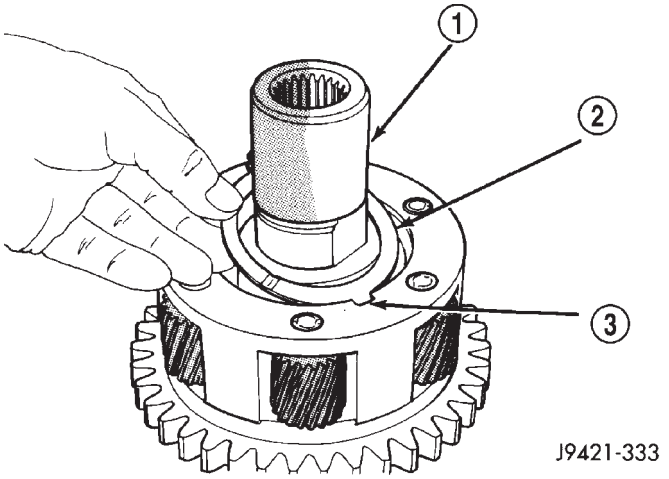


Fig. 57 Input Gear And Thrust Washer Installation

1 - INPUT GEAR
2 - THRUST WASHER
3 - TABS IN SLOTS

(7) Install lock ring (Fig. 58).

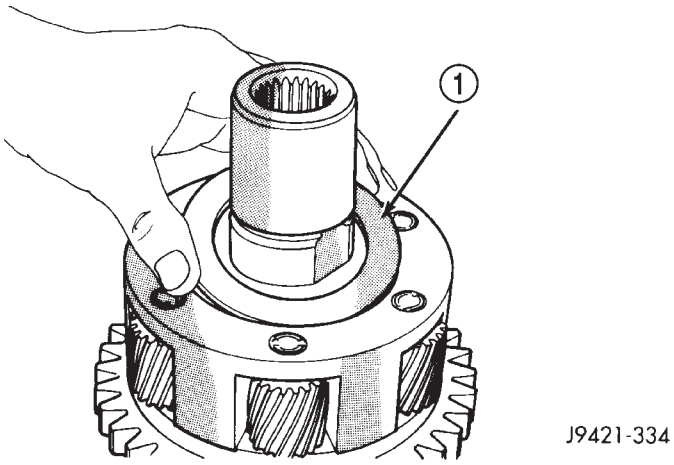


Fig. 58 Lock Ring Installation

1 - LOCK RING (BE SURE TABS ARE SEATED IN SLOTS)

(8) Install retaining ring (Fig. 59).

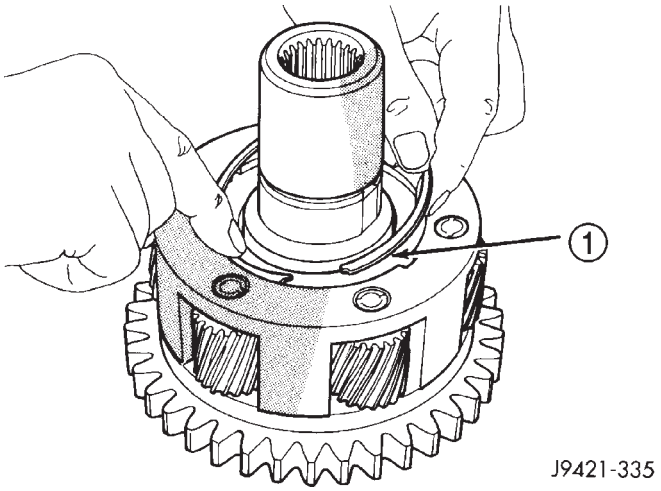


Fig. 59 Retaining Ring Installation

1 - RETAINING RING

INPUT AND PLANETARY GEAR

(1) Lubricate planetary pinions and annulus gear with transmission fluid.

(2) Install planetary/input gear assembly in case (Fig. 60).

(3) Start planetary pinions in low range annulus gear. Then tap PTO gear, with hammer handle to seat planetary pinions in annulus gear.

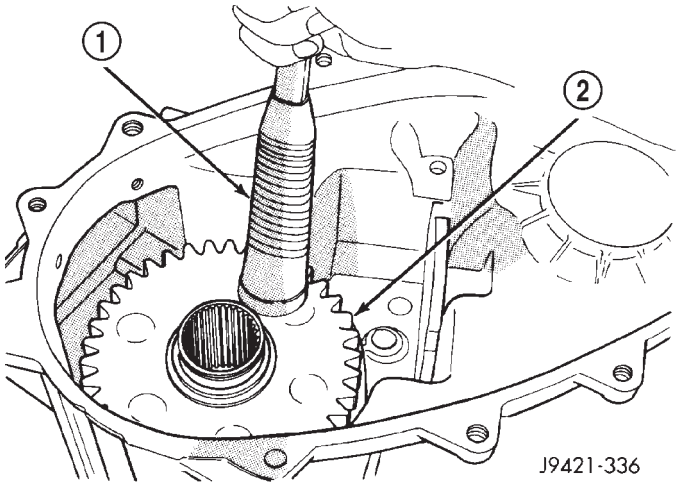


Fig. 60 Planetary/Input Gear Assembly Installation

1 - WOOD/RUBBER HAMMER HANDLE
2 - PLANETARY ASSEMBLY

TRANSFER CASE - NV241HD (Continued)

(4) Install retaining ring on input gear (Fig. 61).

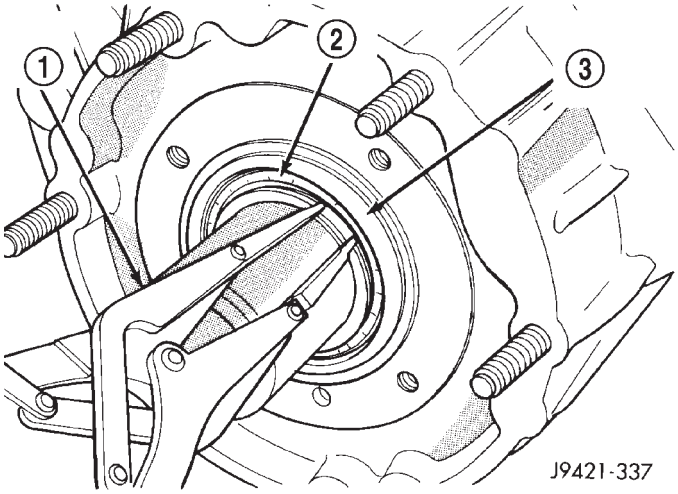


Fig. 61 Installing Input Gear Retaining Ring

1 - INPUT BEARING RETAINING RING
2 - SNAP-RING PLIERS
3 - INPUT GEAR

(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. 62).

(7) Install retainer on input gear shaft and front case (Fig. 63).

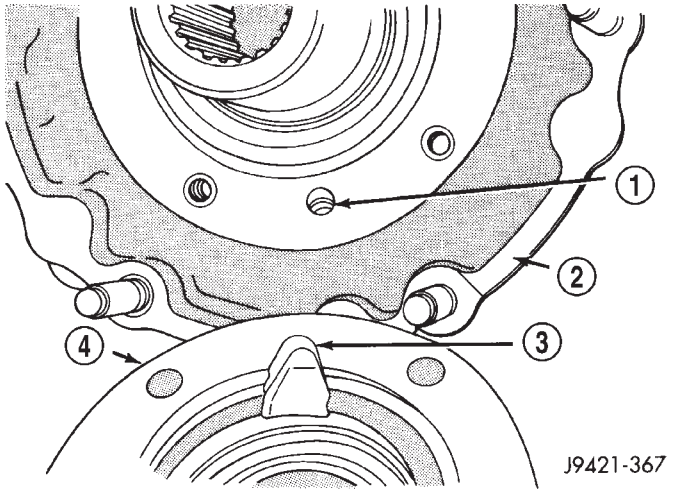


Fig. 62 Aligning Retainer Oil Channel and Case Feed Holes

1 - FEED HOLE
2 - FRONT CASE
3 - FEED CHANNEL
4 - BEARING RETAINER

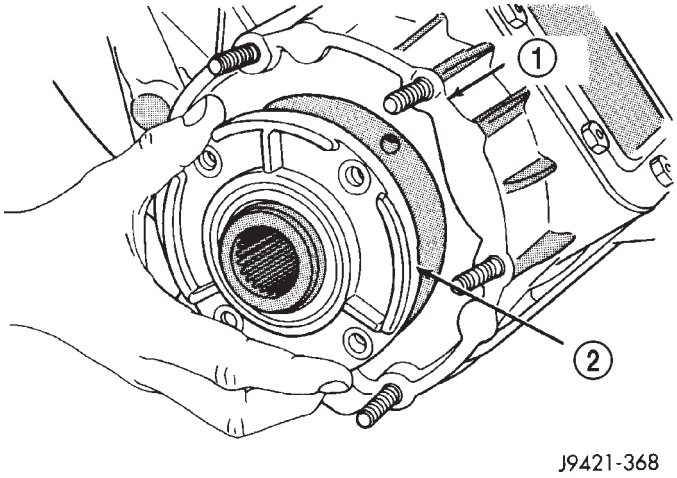


Fig. 63 Input Bearing Retainer Installation

1 - FRONT CASE
2 - INPUT BEARING RETAINER

(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.

MAINSHAFT

(1) Install drive sprocket on mainshaft (Fig. 64).

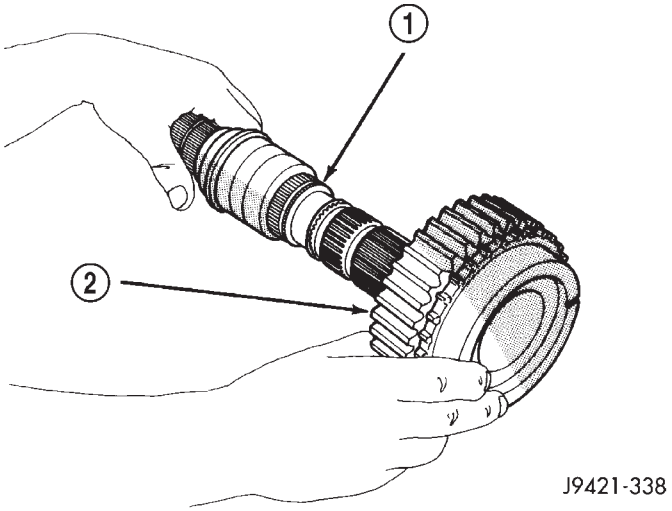


Fig. 64 Drive Sprocket Installation

1 - MAINSHAFT
2 - DRIVE SPROCKET

TRANSFER CASE - NV241HD (Continued)

(2) Install brass stop ring on drive sprocket (Fig. 65).

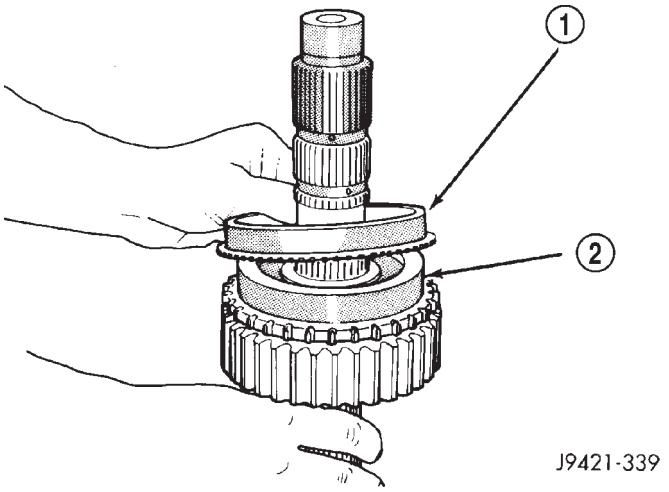


Fig. 65 Synchronizer Stop Ring Installation

1 - BRASS STOP RING
2 - DRIVE SPROCKET

(3) Install 3 synchronizer struts and 2 springs in hub as follows:

(a) Insert first strut in hub (Fig. 66). Strut shoulders rest (and slide) on sides hub slot as shown.

(b) Insert hooked end of first spring in center of strut to secure it. Then work spring into hub (Fig. 67).

(c) Press spring inward and insert last two struts in hub slots. Be sure spring is positioned under struts to properly secure them (Fig. 68).

(d) Turn hub over and install remaining spring in hub. Position hooked end of second spring opposite the first spring's hooked end.

(4) Install assembled synchronizer hub on mainshaft (Fig. 69). Hub has shoulder on one side which goes toward sprocket (rear of shaft). Flat side of hub faces front of shaft.

(5) Install synchronizer hub retaining ring (Fig. 70). Be sure ring is fully seated before proceeding.

(6) Install sliding clutch (sleeve) on synchronizer hub (Fig. 71).

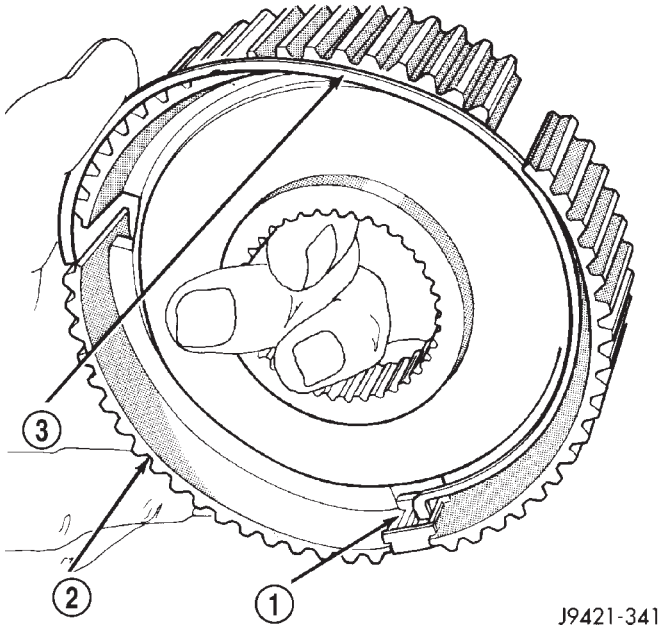


Fig. 66 Installing First Synchronizer Strut And Spring

1 - FIRST STRUT
2 - SYNCHRO HUB
3 - SPRING

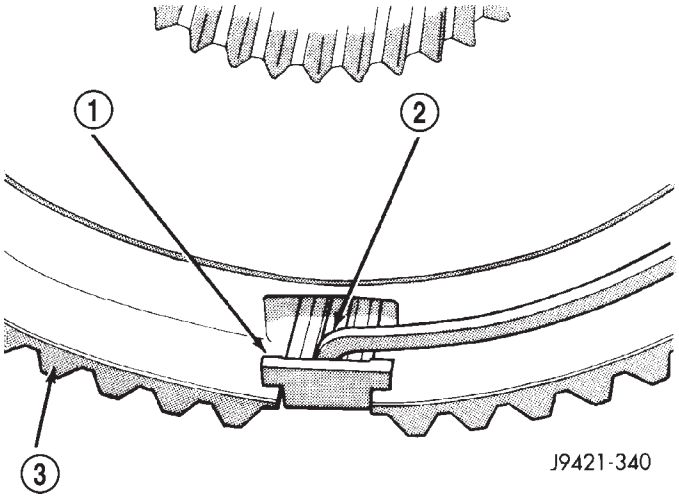


Fig. 67 Synchronizer Spring Installation

1 - STRUT SHOULDER
2 - SPRING (SEATED IN STRUT)
3 - HUB

TRANSFER CASE - NV241HD (Continued)

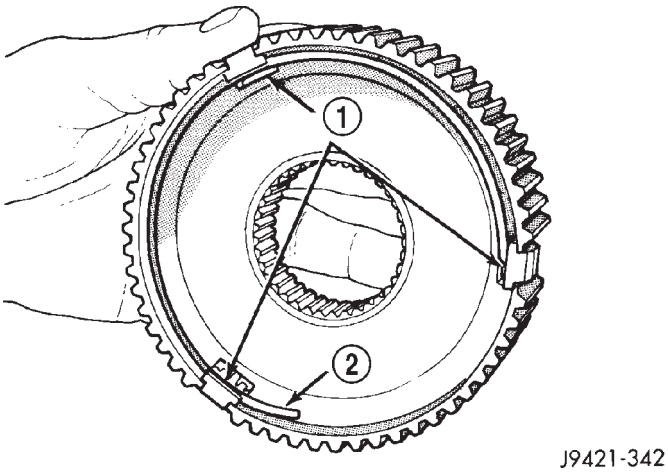


Fig. 68 Correct Position Of Struts And Springs

1 - STRUTS
2 - SPRING

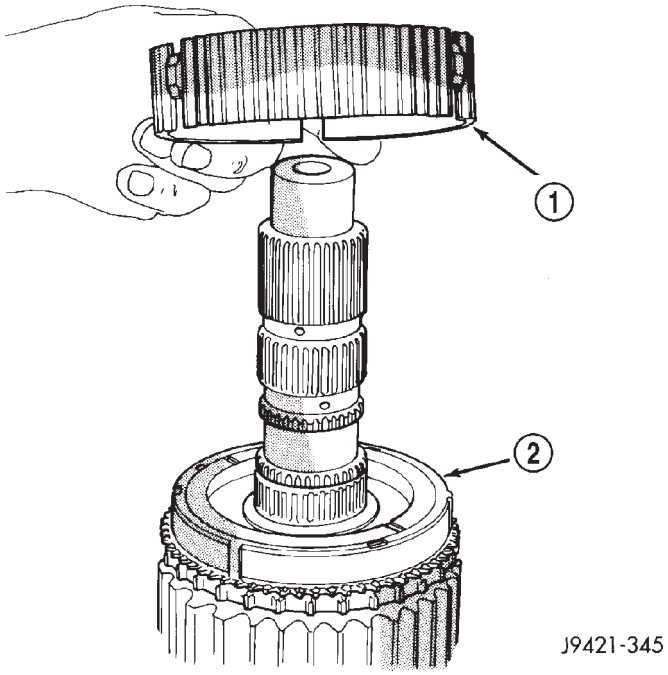


Fig. 69 Synchronizer Hub Installation

1 - SYNCHRO HUB (SHOULDER SIDE DOWN)
2 - STOP RING AND SPROCKET

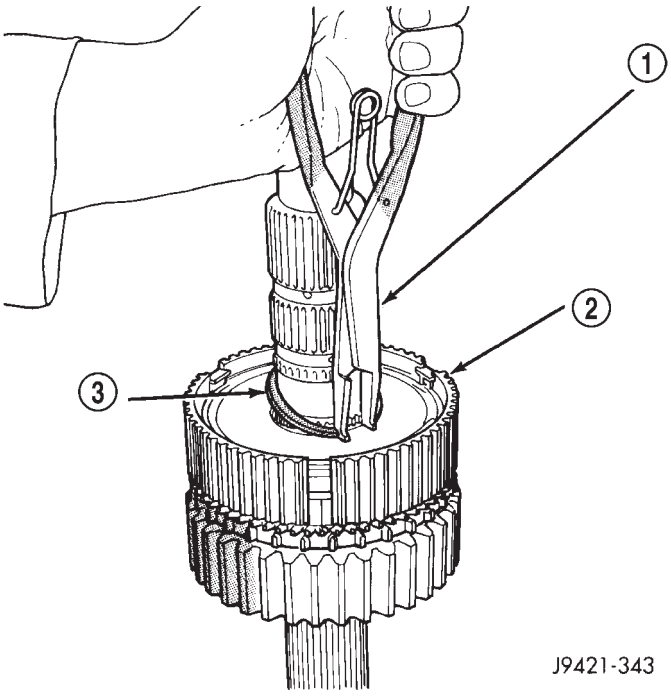


Fig. 70 Synchronizer Hub Retaining Ring Installation

1 - SNAP-RING PLIERS
2 - SYNCHRO HUB
3 - HUB RETAINING RING

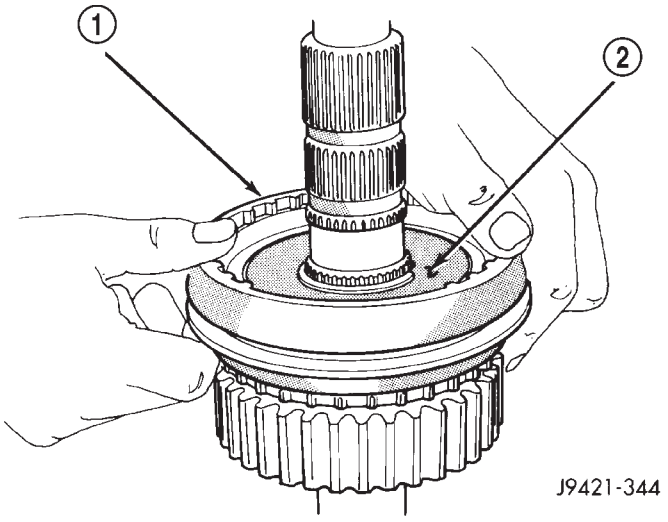


Fig. 71 Sliding Clutch Installation

1 - SLIDING CLUTCH
2 - SYNCHRO HUB

TRANSFER CASE - NV241HD (Continued)

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. 72). If the clutch is installed so a gap between splines is aligned with one or more struts, gear clash will result.

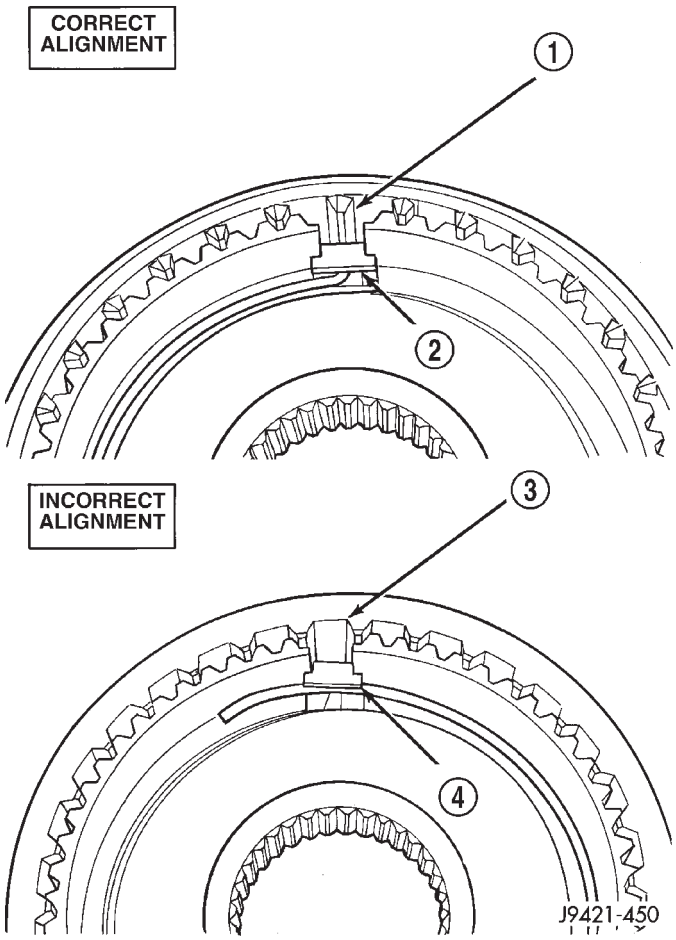


Fig. 72 Correct Alignment Of Struts And Sliding Clutch

1 - SLEEVE TOOTH ALIGNED WITH STRUT
2 - STRUT
3 - SLEEVE TOOTH NOT ALIGNED WITH STRUT
4 - STRUT

SHIFT FORKS AND MAINSHAFT

(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 transmission fluid.

(3) Lubricate sector shaft with transmission fluid and install shift sector in case (Fig. 73). Position slot in sector so it will be aligned with shift fork pin when shift forks are installed.

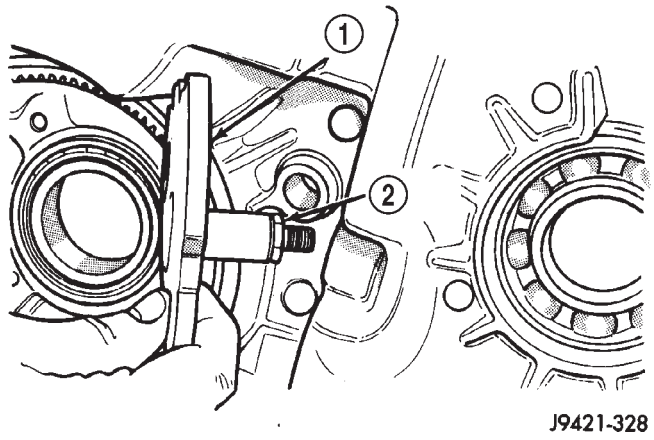


Fig. 73 Shift Sector Installation

1 - SHIFT SECTOR
2 - SECTOR SHAFT

(4) Assemble range fork and sliding hub (Fig. 74). Then install fork and hub in case. Seat hub on support sleeve and seat range fork pin in shift sector slot (Fig. 75).

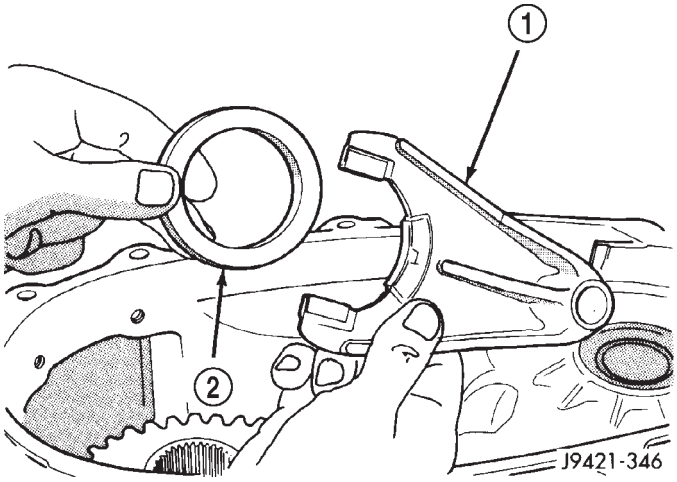


Fig. 74 Assembling Range Fork And Sliding Hub

1 - RANGE FORK
2 - SLIDING HUB

TRANSFER CASE - NV241HD (Continued)

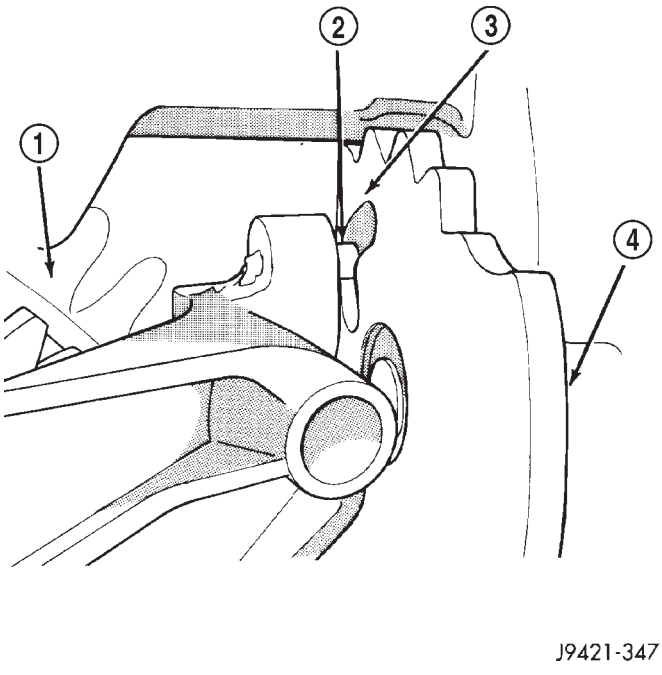


Fig. 75 Seating Range Fork And Hub

1 - RANGE FORK
2 - RANGE FORK PIN
3 - SECTOR SLOT
4 - SHIFT SECTOR

(5) Install sliding hub retaining ring (Fig. 76). Be sure ring is fully seated before proceeding.

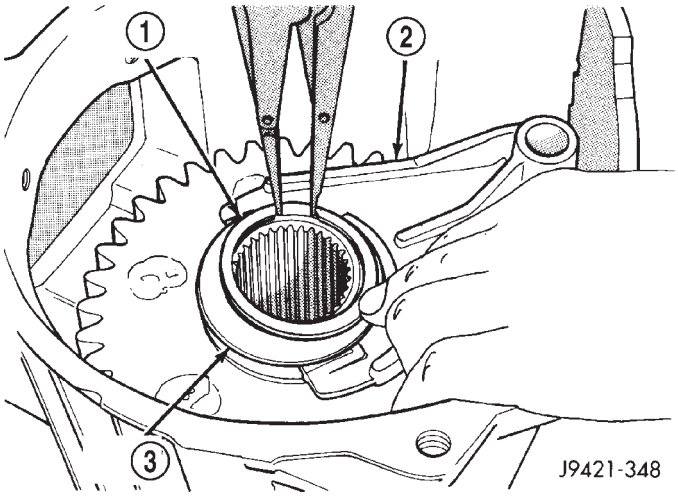


Fig. 76 Sliding Hub Retaining Ring Installation

1 - RETAINING RING
2 - RANGE FORK
3 - SLIDING HUB

(6) Install mode fork and shift rail in sliding clutch (Fig. 77).

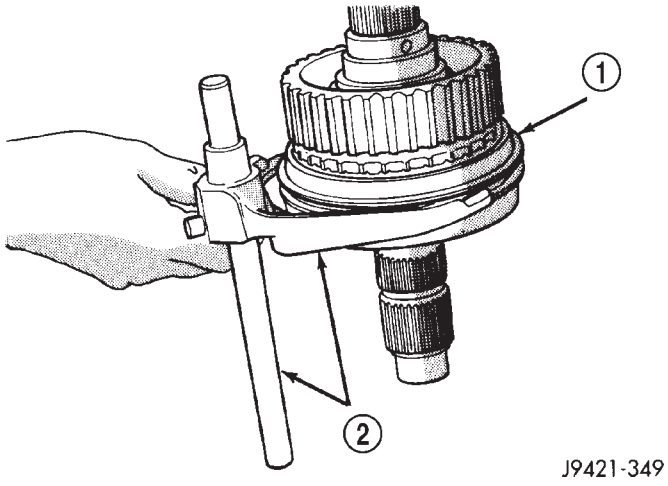


Fig. 77 Assembling Mode Fork And Mainshaft

1 - SLIDING CLUTCH
2 - MODE FORK AND SHIFT RAIL

(7) Install mainshaft/mode fork assembly (Fig. 78). Guide mainshaft through hub and into input gear and shift rail through range fork and into case bore.

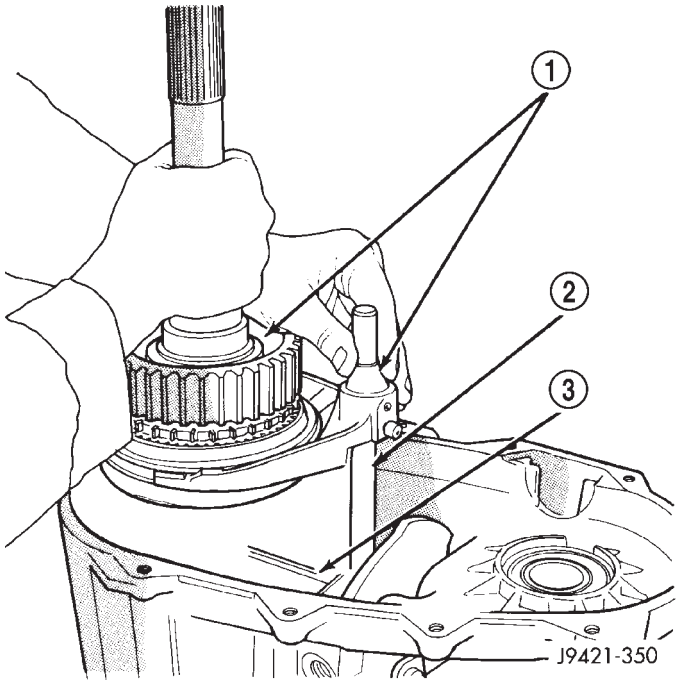


Fig. 78 Installing Mainshaft And Mode Fork Assembly

1 - MAINSHAFT AND MODE FORK ASSEMBLY
2 - SHIFT RAIL
3 - RANGE FORK

TRANSFER CASE - NV241HD (Continued)

(8) Install new o-ring on vacuum/indicator switch, if necessary. Install vacuum/indicator switch (Fig. 79). Tighten switch to 20-34 N·m (15-25 ft. lbs.) torque.

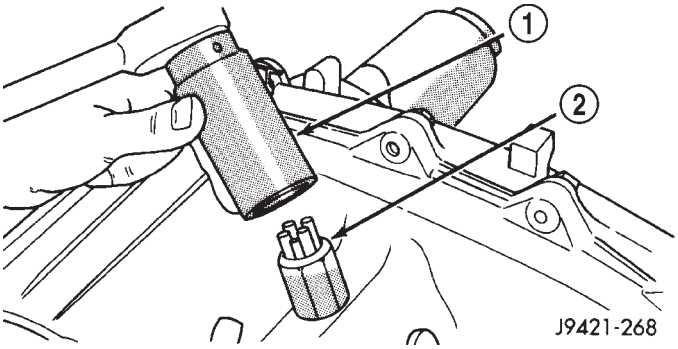


Fig. 79 Vacuum/Indicator Switch Installation

1 - 1-1/16" SOCKET
2 - INDICATOR SWITCH

(9) Install new sector shaft o-ring and o-ring retainer in sector shaft bore (Fig. 80). Lubricate o-ring with transmission fluid or petroleum jelly after installation.

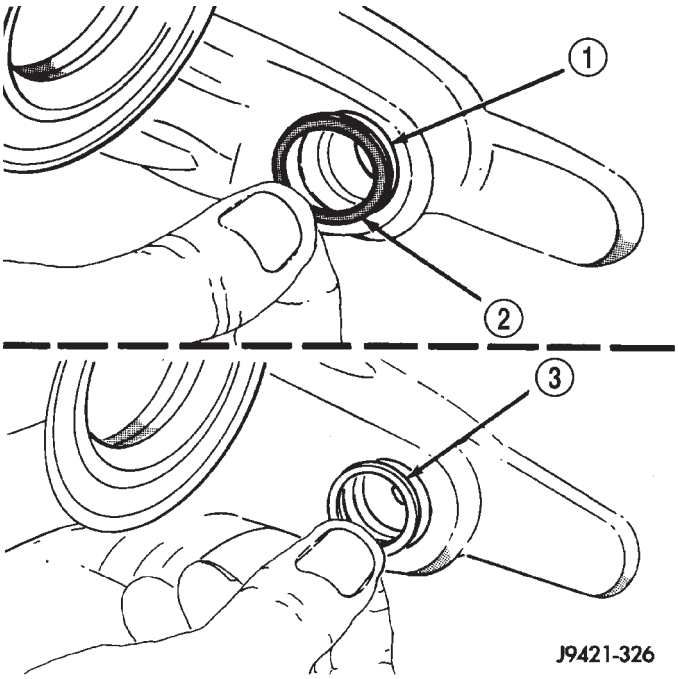


Fig. 80 Sector Shaft O-Ring And Retainer Installation

1 - SECTOR SHAFT BORE
2 - O-RING
3 - O-RING RETAINER

(10) Install shift lever on sector shaft (Fig. 81).

(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.

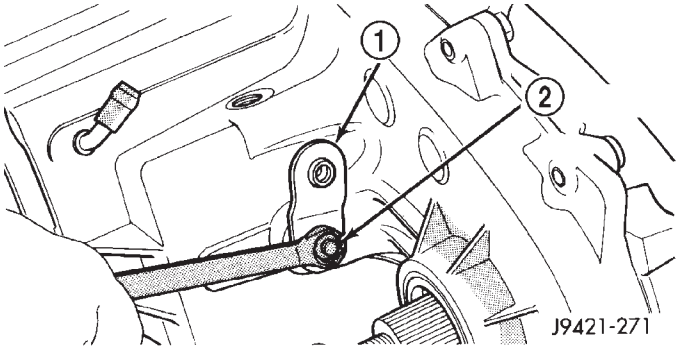


Fig. 81 Shift Lever Installation

1 - SHIFT LEVER
2 - NUT/WASHER

(12) Install poppet plunger and spring (Fig. 82).

(13) Install new o-ring on poppet screw and install screw in front case (Fig. 83). Tighten screw to 16-24 N·m (12-18 ft. lbs.).

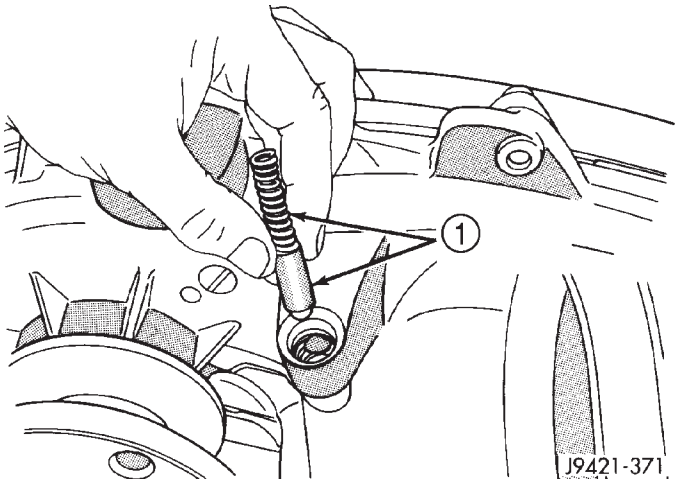


Fig. 82 Poppet Plunger And Spring Installation

1 - POPPET PLUNGER AND SPRING

TRANSFER CASE - NV241HD (Continued)

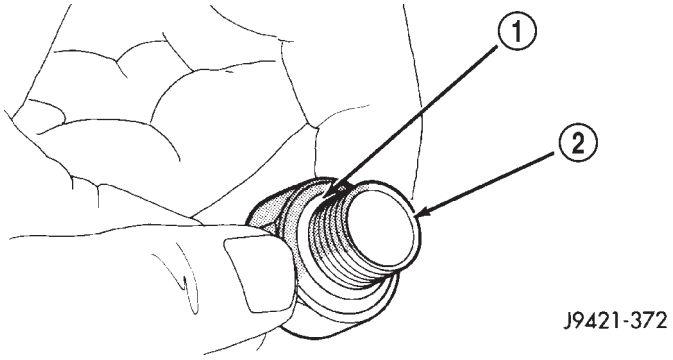


Fig. 83 O-Ring Installation On Poppet Plunger Screw

1 - O-RING
2 - PLUNGER SCREW

FRONT OUTPUT SHAFT AND DRIVE CHAIN

(1) Install front output shaft in bearing (Fig. 84).

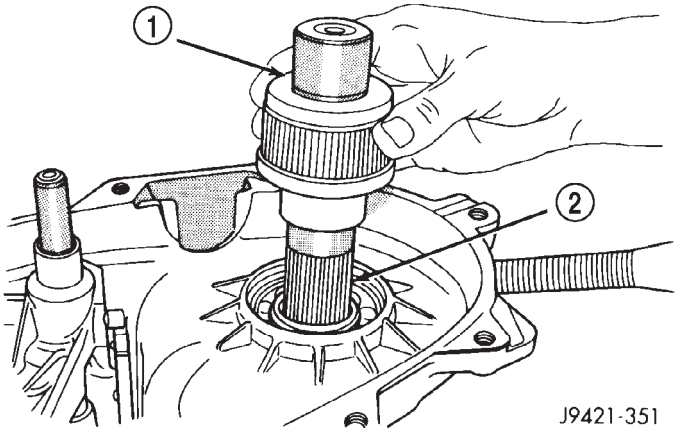


Fig. 84 Front Output Shaft Installation

1 - FRONT OUTPUT SHAFT
2 - BEARING

(2) Insert front sprocket in drive chain (Fig. 85).

(3) Install drive chain around mainshaft sprocket (Fig. 85). Then position front sprocket over front shaft.

(4) Raise mainshaft about 2.54 cm (one inch) and seat front sprocket on front output shaft.

(5) If mainshaft and sliding clutch were unseated during chain installation, align and reseat mainshaft in input gear and hub. Then reseat synchronizer hub in sliding clutch. Press synchronizer struts inward to ease clutch back onto hub.

(6) Install front sprocket retaining ring (Fig. 86).

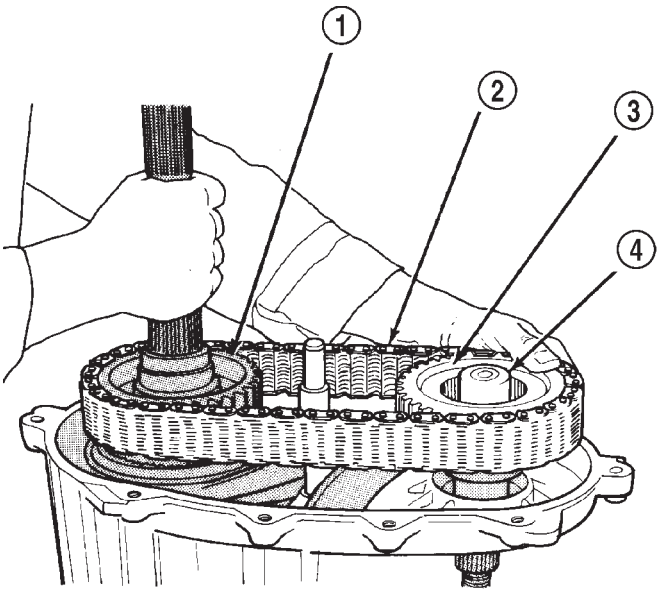


Fig. 85 Drive Chain And Front Sprocket Installation

1 - DRIVE SPROCKET
2 - DRIVE CHAIN
3 - FRONT SPROCKET
4 - FRONT SHAFT

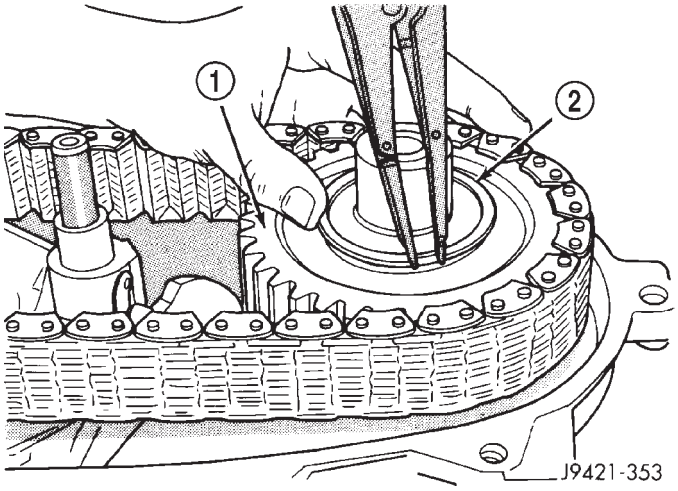


Fig. 86 Front Sprocket Retaining Ring Installation

1 - FRONT SPROCKET
2 - RETAINING RING

TRANSFER CASE - NV241HD (Continued)

(7) Realign sliding clutch on synchronizer hub if necessary. Press synchronizer struts inward to ease realignment. Be sure mainshaft is fully seated before proceeding.

(8) Install spring and cup on shift rail (Fig. 87).

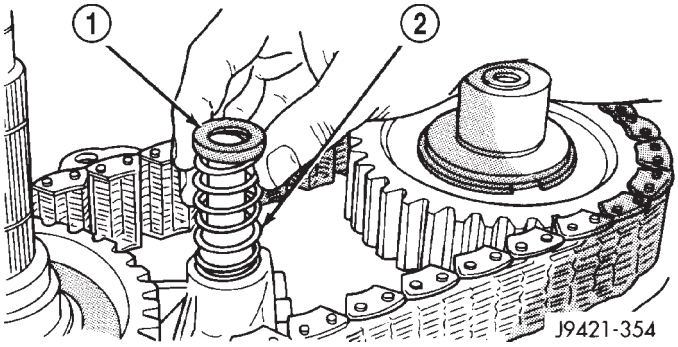


Fig. 87 Shift Rail Spring And Cup Installation

1 - CUP
2 - SPRING

(9) Insert magnet in front case pocket (Fig. 88).

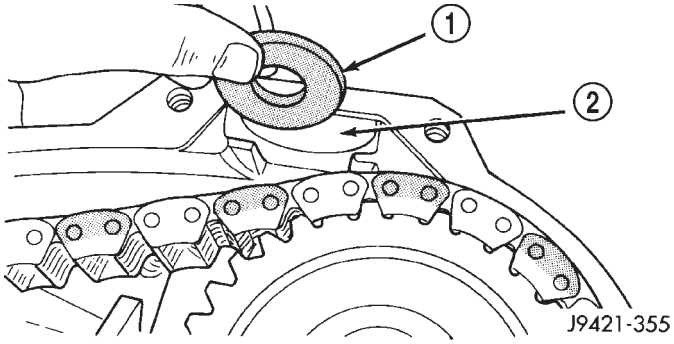


Fig. 88 Case Magnet Installation

1 - MAGNET
2 - CASE POCKET

OIL PUMP AND REAR CASE

Lubricate the oil pump components 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. 89).

(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. 90). Be sure hose that connects tube to filter is securely positioned.

(3) Insert oil pickup tube in oil pump and position pump in rear case (Fig. 91).

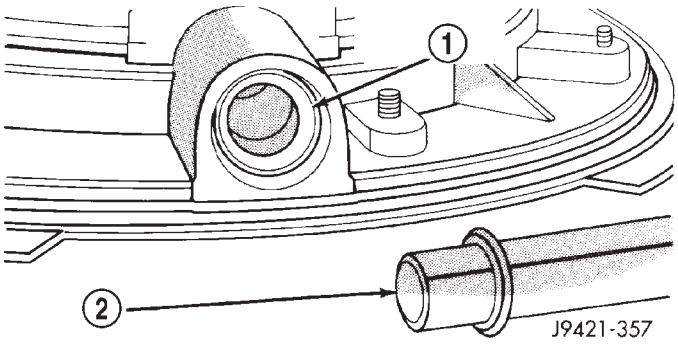


Fig. 89 Pickup Tube O-Ring Installation

1 - O-RING (PUMP PICKUP)
2 - PICKUP TUBE

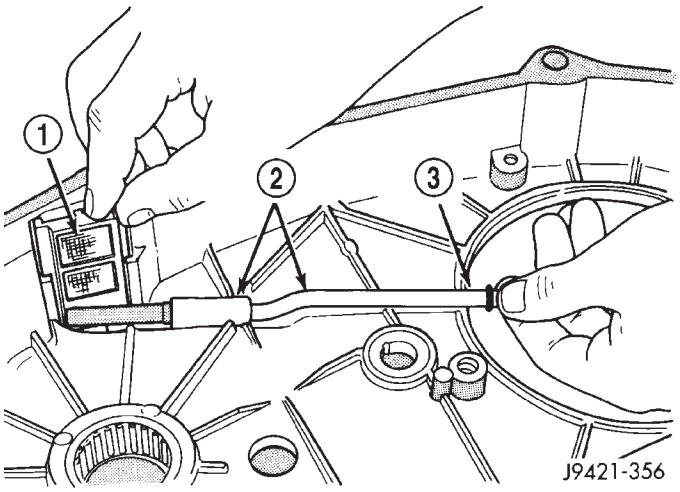


Fig. 90 Oil Pickup Tube And Filter Position In Rear Case

1 - FILTER
2 - TUBE AND HOSE
3 - TUBE IN NOTCH

(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. 92). 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. 93), and case alignment dowels are seated before installing any bolts. Case could be cracked if shaft rail or dowels are misaligned.

TRANSFER CASE - NV241HD (Continued)

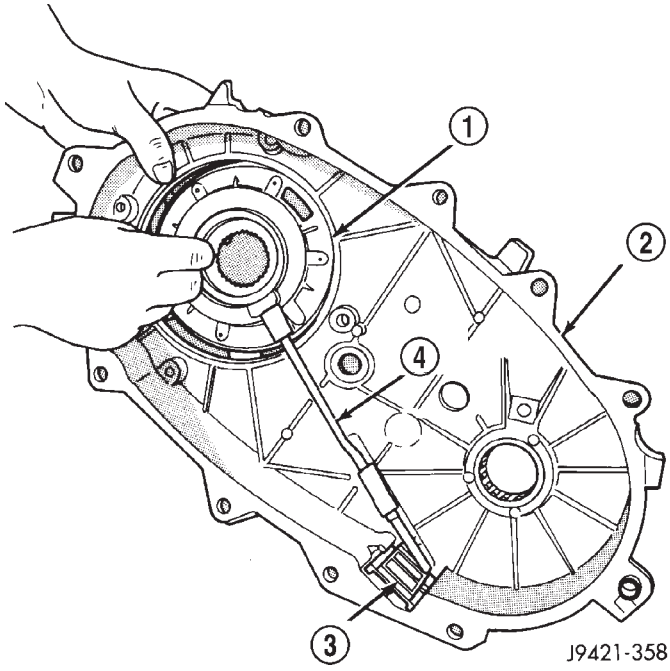


Fig. 91 Positioning Oil Pump In Rear Case

1 - OIL PUMP
2 - REAR CASE
3 - FILTER
4 - PICKUP TUBE

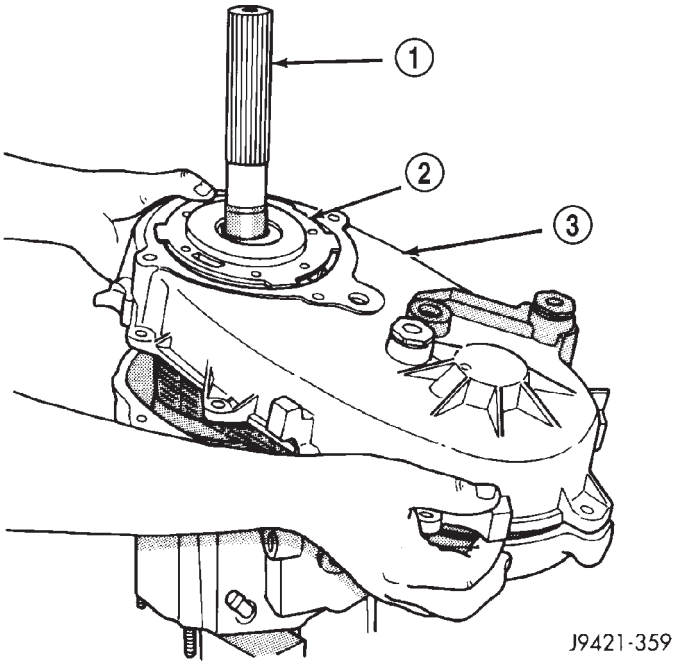


Fig. 92 Rear Case And Oil Pump Installation

1 - MAINSHAFT
2 - OIL PUMP
3 - REAR CASE

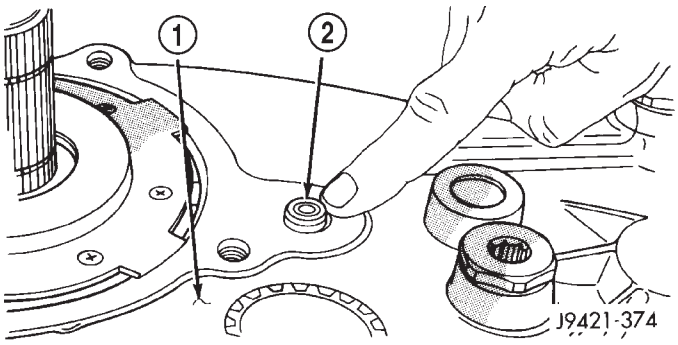


Fig. 93 Shift Rail Seated In Rear Case Bore

1 - REAR CASE
2 - SHIFT RAIL

(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. 94). If stud was loosened or came out during disassembly, apply Loctite™ 242 to stud threads and reseat 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.)

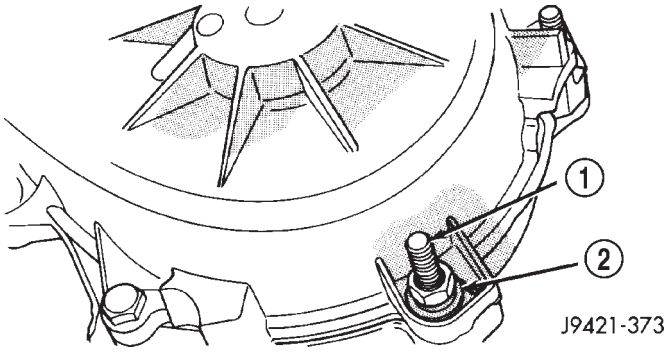


Fig. 94 Washer Installation On Case Stud And Dowel Bolts

1 - CASE STUD/BOLT
2 - WASHER

(10) Install rear output bearing and snap-ring to output shaft.

TRANSFER CASE - NV241HD (Continued)

COMPANION FLANGE

(1) Install companion flange seal on front shaft (Fig. 95).

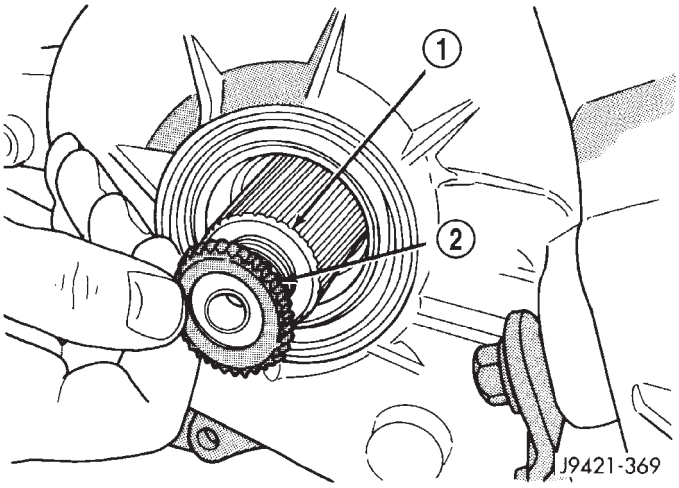


Fig. 95 Installing Flange Seal On Front Shaft

1 - FRONT OUTPUT SHAFT
2 - FLANGE SEAL

(2) Install companion flange on front shaft (Fig. 96). Then install and tighten flange nut to 176-271 N·m (130-200 ft. lbs.) torque.

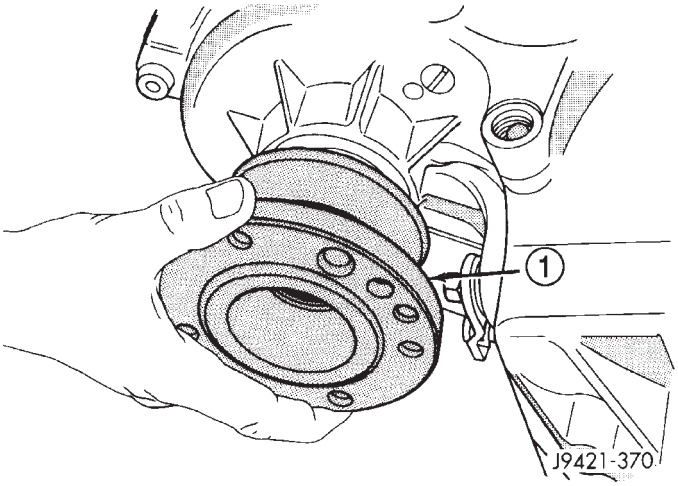


Fig. 96 Installing Companion Flange On Front Shaft

1 - COMPANION FLANGE

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 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.

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. Tighten nuts to 30-41 N·m (20-30 ft.lbs.).

(3) Install rear crossmember.

(4) Remove jack stand from under transmission.

(5) Align and connect propeller shafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

(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. (Refer to 13 - FRAMES & BUMPERS/FRAME/TRANSFER CASE SKID PLATE - INSTALLATION)

(11) Lower vehicle

TRANSFER CASE - NV241HD (Continued)

SPECIFICATIONS

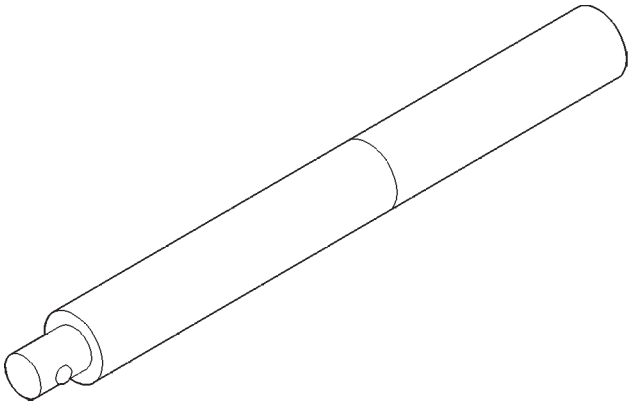
TRANSFER CASE

TORQUE SPECIFICATIONS

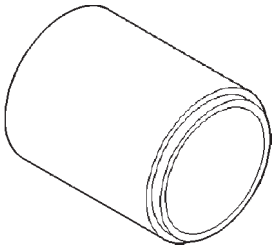
DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Plug, Detent	16-24	12-18	-
Bolt, Diff. Case	17-27	15-24	-
Plug, Drain/Fill	40-45	30-40	-
Bolt, Extension Housing	35-46	26-34	-
Bolt, Front Brg. Retainer	16-27	12-24	-
Bolt, Case Half	35-46	26-34	-
Nut, Front Yoke	122-176	90-130	-
Screw, Oil Pump	1.2-1.8	-	12-15
Nut, Range Lever	27-34	20-25	-
Bolt, Rear Retainer	35-46	26-34	-
Nuts, Mounting	30-41	20-30	-
Bolts, U-Joint	19	17	-
Vacuum Switch	20-34	15-25	-

SPECIAL TOOLS

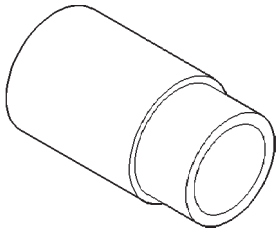
TRANSFER CASE - NV241HD



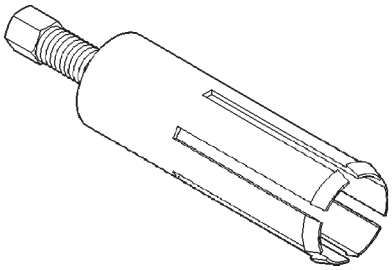
Handle, Universal - C-4171



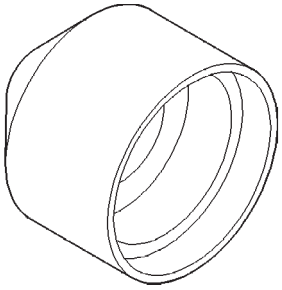
Installer, Seal - 6888



Installer, Bushing - 8156

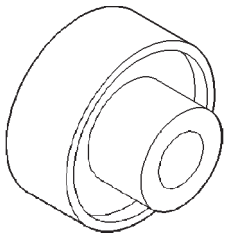


Remover, Bushing - 8155

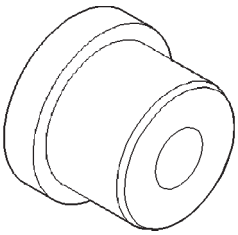


Installer, Seal - 8154

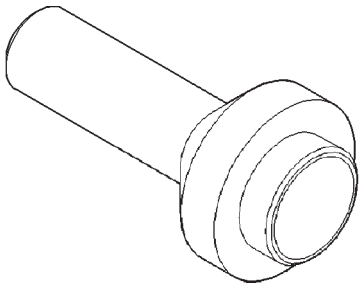
TRANSFER CASE - NV241HD (Continued)



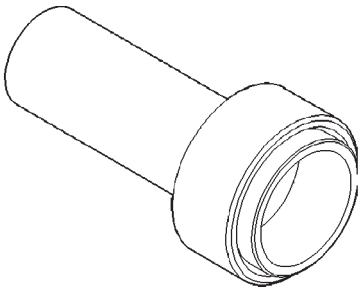
Installer, Bearing - 6953



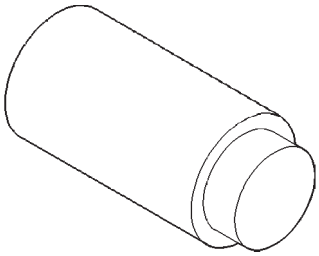
Installer, Bushing - 5066



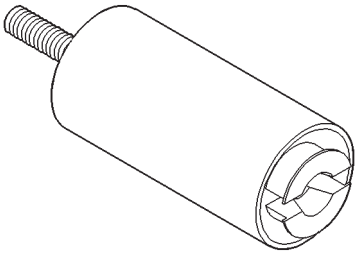
Installer, Seal - 7884



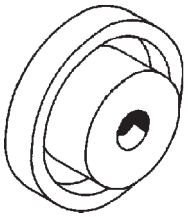
Installer, Pump Housing Seal - 7888



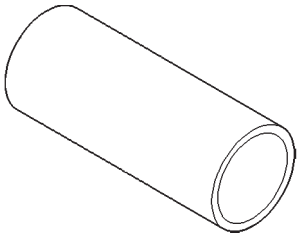
Plug, Extension - C-293-3



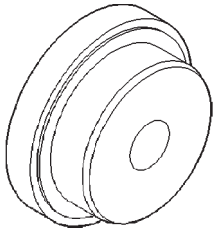
Remover, Bearing - L-4454



Installer, Seal - C-4210



Cup - 8148



Installer, Bearing - 5062

EXTENSION HOUSING BUSHING AND SEAL

REMOVAL

(1) Raise and support vehicle.

(2) Remove rear propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)

(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. 97).

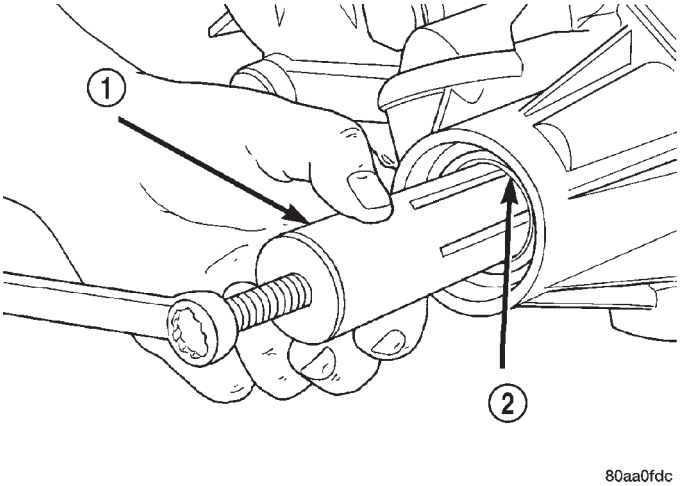


Fig. 97 Extension Housing Bushing Removal

1 - REMOVER 8155
2 - EXTENSION HOUSING BUSHING

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. 98).

(4) Using Installer 8154, install seal in extension housing (Fig. 99).

(5) Install propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

(6) Verify proper transfer case fluid level.

(7) Lower vehicle.

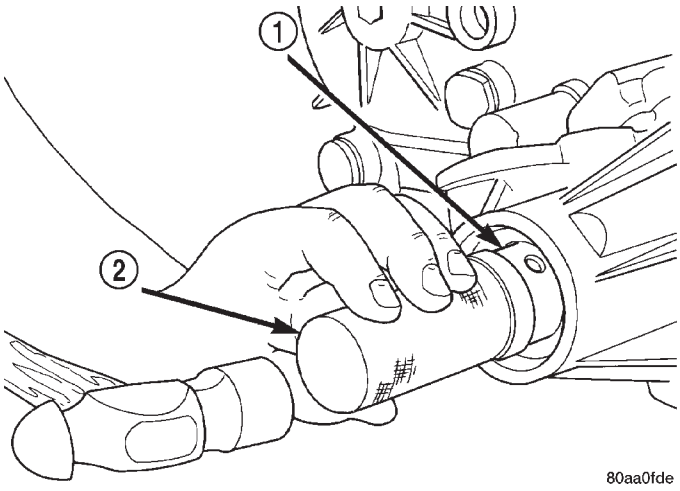


Fig. 98 Extension Housing Bushing Installation

1 - EXTENSION HOUSING BUSHING
2 - INSTALLER 8156

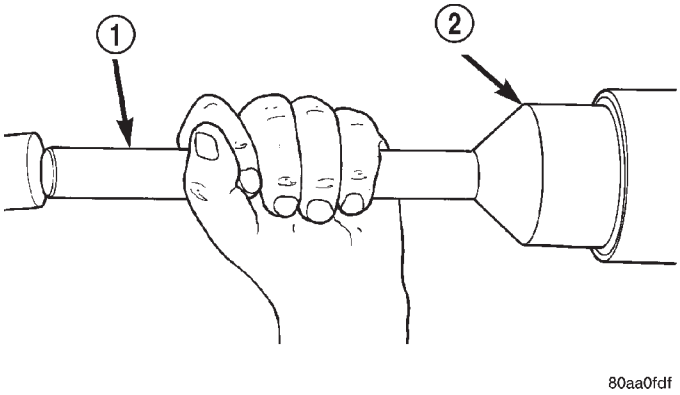


Fig. 99 Install Extension Housing Seal

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL 8154

FLUID

STANDARD PROCEDURE - 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® ATF +4, type 9602, Automatic Transmission fluid.

(7) Install and tighten fill plug to 41-54 N·m (30-40 ft. lbs.).

(8) Lower vehicle.

FRONT OUTPUT SHAFT SEAL

REMOVAL

(1) Shift transfer case into NEUTRAL.
(2) Raise vehicle.
(3) Remove front propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/ PROPELLER SHAFT - REMOVAL)
(4) Remove companion flange nut (Fig. 100). Discard nut after removal. It is not reusable.

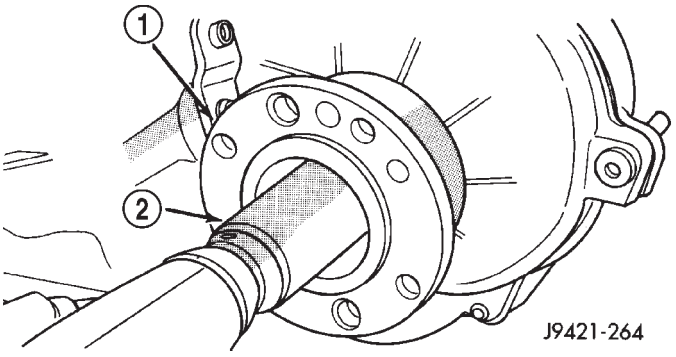


Fig. 100 Removing Companion Flange Nut

1 - COMPANION FLANGE
2 - 1-1/8" SOCKET

(5) Remove companion flange from output shaft. Use a suitable puller if flange can not be removed by hand.
(6) Remove companion flange rubber seal from front output shaft (Fig. 101).

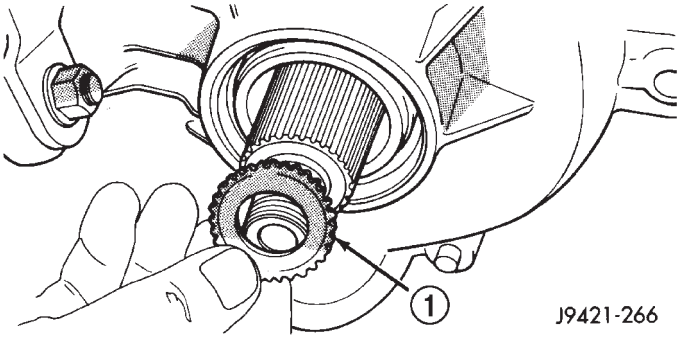


Fig. 101 Companion Flange Seal Removal

1 - FLANGE SEAL

(7) 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. 102) 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. 103). 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.

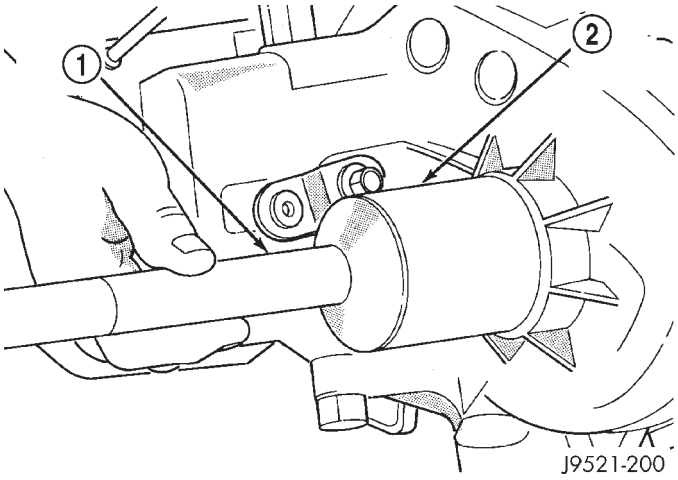


Fig. 102 Front Output Seal Installation

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL 6888

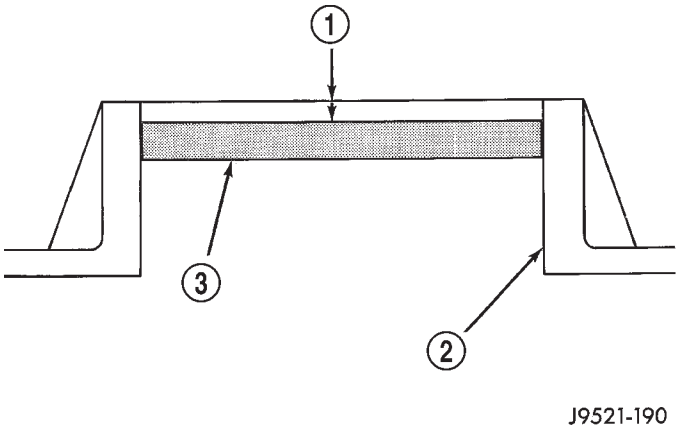


Fig. 103 Checking Front Output Seal Installation Depth

1 - CORRECT SEAL DEPTH IS 2.03-2.5 mm (0.080-0.100 in.) BELOW TOP EDGE OF BORE
2 - FRONT CASE SHAFT BORE
3 - FRONT OUTPUT SEAL

FRONT OUTPUT SHAFT SEAL (Continued)

(2) Install companion flange seal on front shaft (Fig. 104).

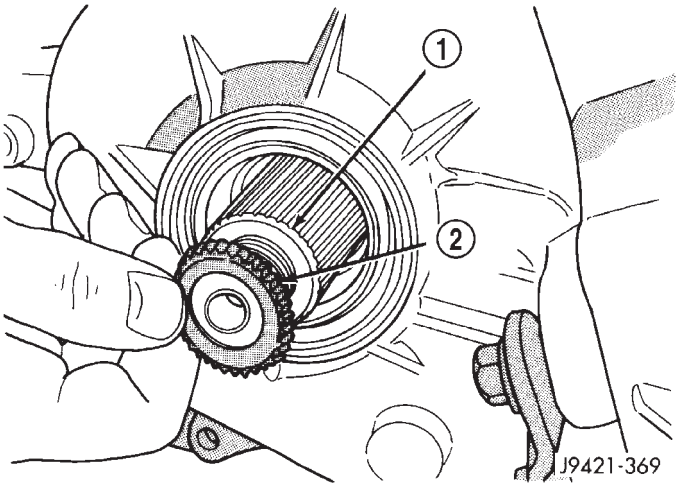


Fig. 104 Installing Flange Seal On Front Shaft

1 - FRONT OUTPUT SHAFT
2 - FLANGE SEAL

(3) Install companion flange on front shaft (Fig. 105). Then install and tighten flange nut to 176-271 N·m (130-200 ft. lbs.) torque.

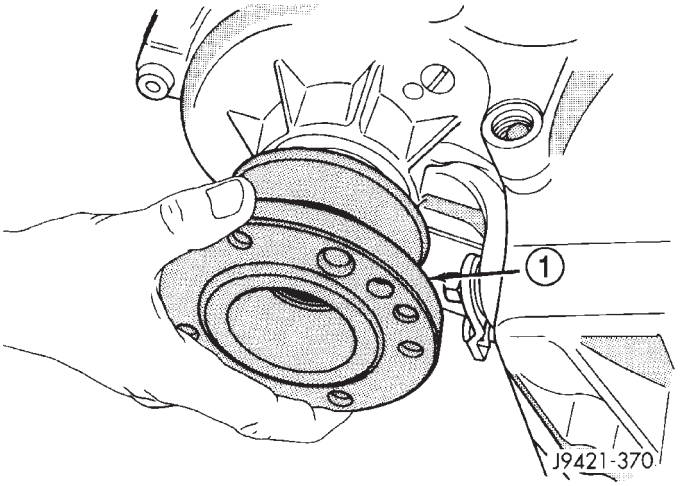


Fig. 105 Installing Companion Flange On Front Shaft

1 - COMPANION FLANGE

(4) Install propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

SHIFT LEVER

REMOVAL

(1) Shift transfer case into 2H.
(2) Remove transfer case shifter knob cap.
(3) Remove nut holding shifter knob to shift lever.
(4) Remove shifter knob.
(5) Remove the shift boot from the shifter bezel.
(6) Remove the bolts securing the shifter mechanism to the floor pan along the driver's side of the transmission tunnel (Fig. 106).

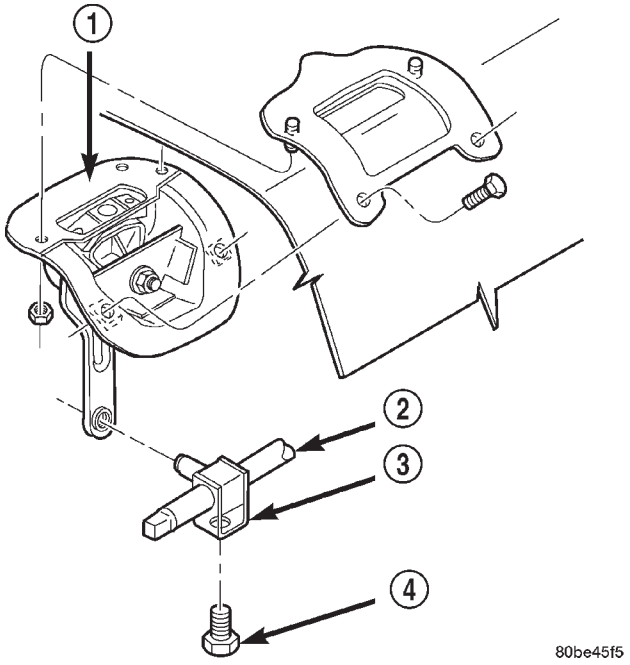


Fig. 106 Transfer Case Shifter

1 - TRANSFER CASE SHIFTER ASSEMBLY
2 - SHIFT ROD
3 - TRUNNION
4 - LOCK BOLT

(7) Raise and support the vehicle.
(8) 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.
(9) Remove the nuts holding the shifter mechanism to the underside of the floor pan.
(10) Separate shift lever mechanism from the vehicle.

SHIFT LEVER (Continued)

INSTALLATION

(1) If the shifter mechanism does not have a adjustment locating pin installed, align the adjustment channel on the shifter assembly to the locating hole in the lower shift lever and install an appropriately sized pin to retain the position (Fig. 107).

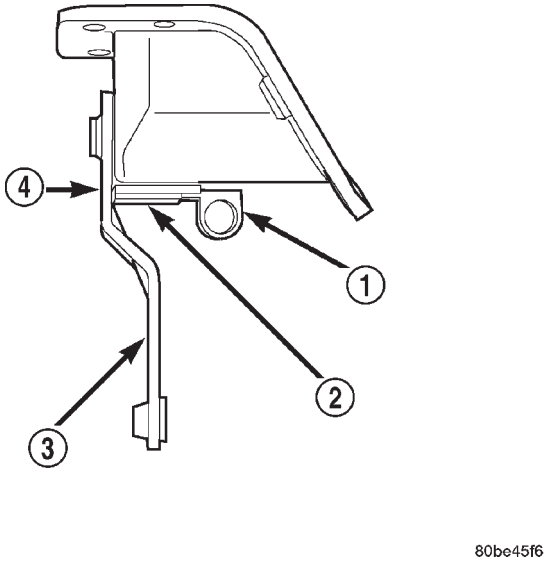


Fig. 107 Shifter Adjustment

1 - LOCATING PIN
2 - ADJUSTMENT CHANNEL
3 - LOWER SHIFTER LEVER
4 - LOCATING HOLE

(2) Position shift lever on vehicle.
(3) Install nuts to hold shift lever to the underside of the body.
(4) Install trunnion to shift lever, if necessary.
(5) Install shift rod to trunnion, if necessary.
(6) Tighten the shift rod lock bolt to 10 N·m (90 in.lbs.).
(7) Remove the shifter adjustment locating pin from the adjustment channel and the locating hole.
(8) Lower vehicle.
(9) Install the bolts to hold the shifter mechanism to the floor pan.
(10) Install the transfer case shifter bezel.
(11) Install the shifter boot and the shifter knob onto the shifter lever.
(12) Install nut to hold shifter knob to shift lever.
(13) Install shifter knob cap.
(14) Verify transfer case operation.

ADJUSTMENTS

ADJUSTMENT - SHIFT LEVER

(1) Move shift lever into 2H position.
(2) Raise vehicle.
(3) Loosen shift rod lock bolt at trunnion (Fig. 108).

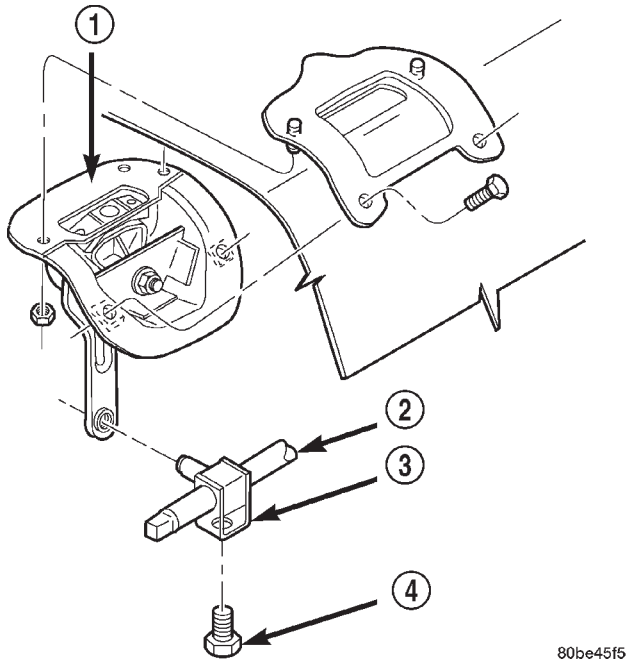


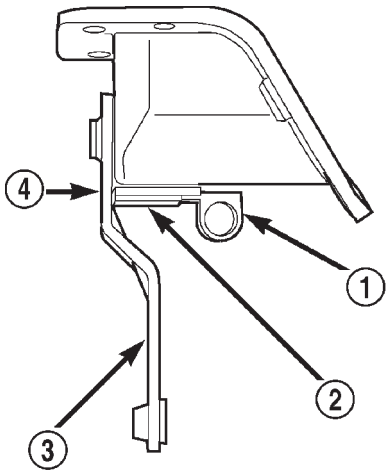
Fig. 108 Shift Rod Lock Bolt Location

1 - TRANSFER CASE SHIFTER ASSEMBLY
2 - SHIFT ROD
3 - TRUNNION
4 - LOCK BOLT

(4) Check shift rod fit in trunnion. Be sure rod does not bind in trunnion. Lubricate the shift rod and trunnion if necessary.
(5) Verify that transfer case shift lever is in 2H detent position. The 2H detent position on the transfer case shift arm is the second position from full forward.

SHIFT LEVER (Continued)

(6) Align the adjustment locating hole on the lower shifter lever with the adjustment channel on the shifter bracket assembly (Fig. 109).



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Fig. 109 Shifter Adjustment Location

1 - LOCATING PIN
2 - ADJUSTMENT CHANNEL
3 - LOWER SHIFTER LEVER
4 - LOCATING HOLE

(7) Insert an appropriately sized pin through into the adjustment channel and through the locating hole to hold the shifter in the correct position.

(8) Tighten shift rod lock bolt to 10 N·m (90 in. lbs.) torque.

(9) Remove the locating pin from the adjustment channel and locating hole.

(10) Check shift linkage operation. Be sure transfer case shifts into and operates properly in all ranges.