TRANSMISSION AND TRANSFER CASE

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MANUAL TRANSMISSION - NV3500

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MANUAL TRANSMISSION - NV3500

DESCRIPTION

The transmission is a medium-duty 5-speed, constant mesh fully synchronized manual transmission with fifth gear overdrive range. The transmission is available in two and four-wheel drive configurations. The transmission gear case consists of two aluminum housings (Fig. 1). The clutch housing is an integral part of the transmission front housing.

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

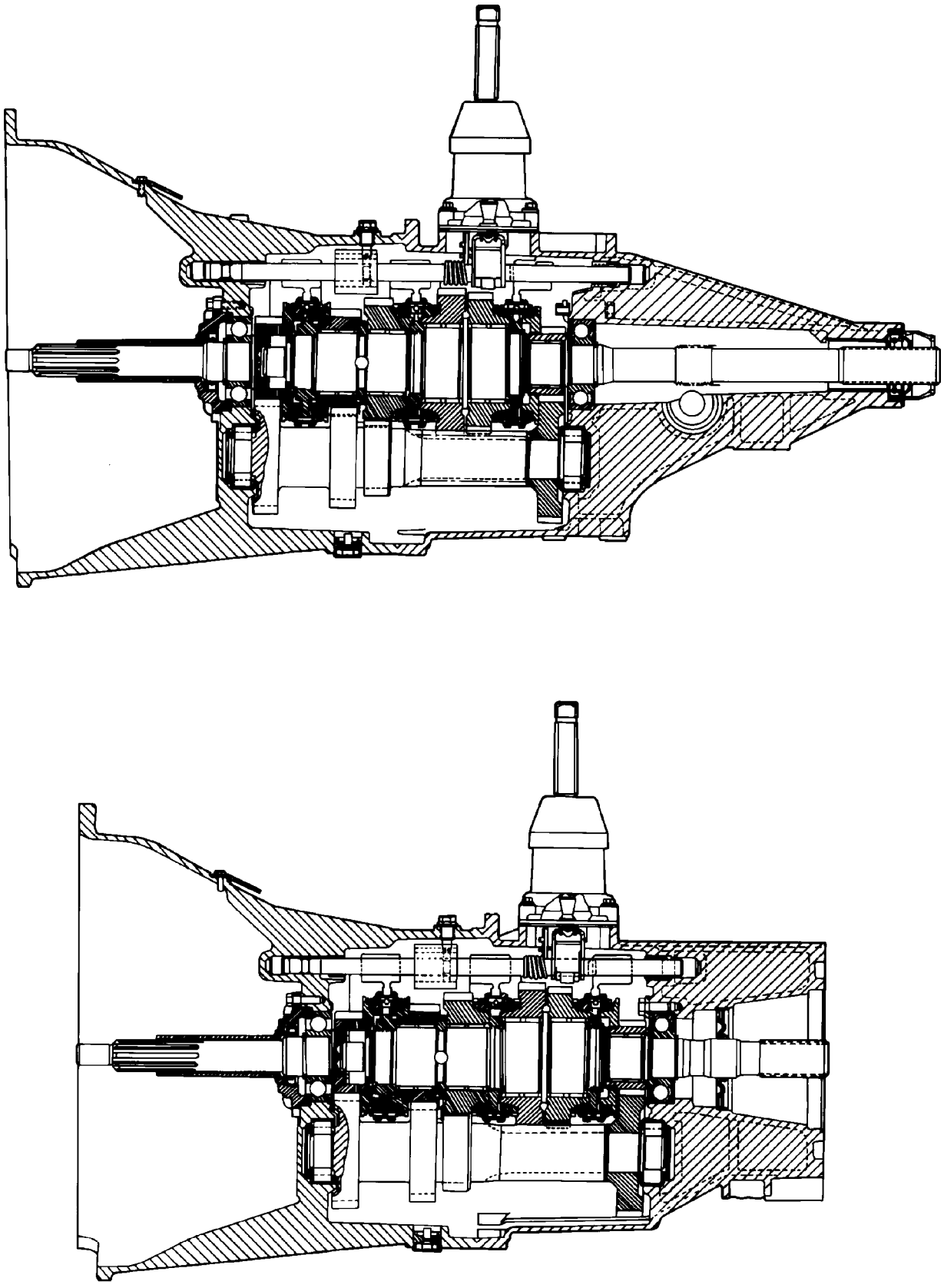
The transmission has a single shaft shift mechanism with three shift forks all mounted on the shaft. The shaft is supported in the front and rear housings by bushings and one linear ball bearing. Internal shift components consist of the forks, shaft, shift lever socket and detent components

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 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.

MANUAL TRANSMISSION - NV3500 (Continued)



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Fig. 1 NV3500 TRANSMISSION

MANUAL TRANSMISSION - NV3500 (Continued)

DIAGNOSIS AND TESTING

LOW LUBRICANT LEVEL

A low transmission lubricant level is generally the result of a leak, inadequate lubricant fill or an incorrect lubricant level check. Leaks can occur at the mating surfaces of the gear case, adaptor or extension housing, or from the front/rear seals. A suspected leak could also be the result of an overfill condition.

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

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

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

HARD SHIFTING

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

Shift component damage or damaged clutch pressure plate or disc are additional probable causes of increased shift effort. 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 and bearing damage.

REMOVAL

(1) Disconnect battery negative cable.
(2) Shift transmission into Neutral.
(3) Remove shift boot bezel screws and slide boot upward on shift lever extension.
(4) Remove shift lever extension from the shift tower and lever assembly.
(5) Raise vehicle on hoist.
(6) Remove skid plate, if equipped.
(7) Drain lubricant if transmission will be disassembled for service.
(8) Mark propeller shaft/shafts and companion flange yoke/yokes for installation reference and remove propeller shaft/shafts.
(9) Disconnect harness from clips on transmission housing.
(10) Remove transfer case linkage if equipped.
(11) Remove transfer case mounting nuts and remove transfer case if equipped.
(12) Remove slave cylinder mounting nut and remove cylinder (Fig. 2).

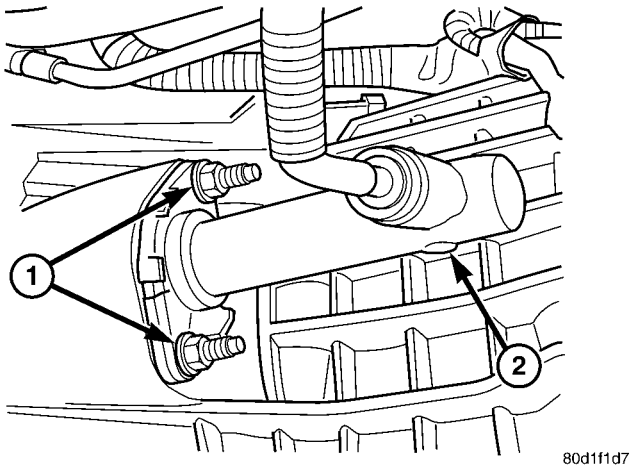


Fig. 2 SLAVE CYLINDER

1 - MOUNTING NUTS
2 - SLAVE CYLINDER

(13) Remove starter motor, structural dust cover, dust shield and suspension crossmember (Fig. 3).

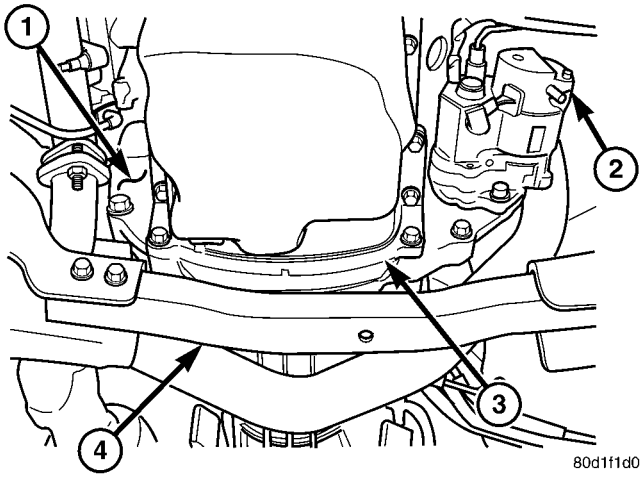


Fig. 3 DUST COVER

1 - DUST SHIELD
2 - STARTER MOTOR
3 - DUST COVER
4 - CROSSMEMBER

(14) Remove exhaust pipe from the exhaust manifolds.

(15) Support engine with adjustable jack stand and wood block.

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

(17) Remove bolts from the rear transmission mount.

(18) Remove the rear crossmember and transmission mount (Fig. 4).

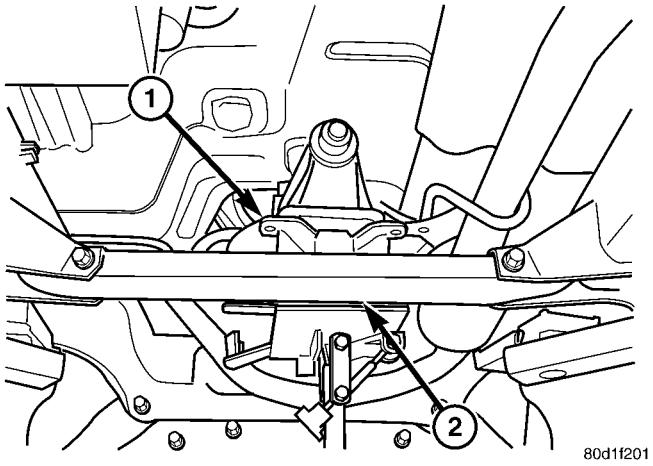


Fig. 4 CROSSMEMBER

1 - TRANSMISSION MOUNT
2 - CROSSMEMBER

(19) Remove bolts attaching transmission to the engine.

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

DISASSEMBLY

FRONT HOUSING

(1) Shift transmission into Neutral.

(2) If lubricant was not drained out of transmission during removal, remove drain plug and drain lubricant.

(3) Inspect drain plug magnet for debris.

(4) Remove backup light switch located on passenger side of rear housing (Fig. 5).

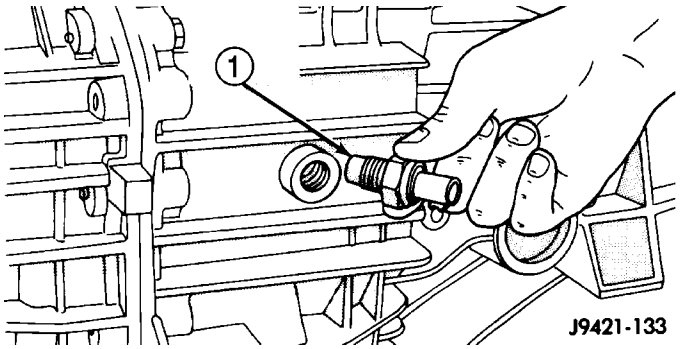


Fig. 5 BACKUP LIGHT SWITCH

1 - BACKUP LIGHT SWITCH

(5) Remove shift tower bolts and remove tower and lever assembly (Fig. 6).

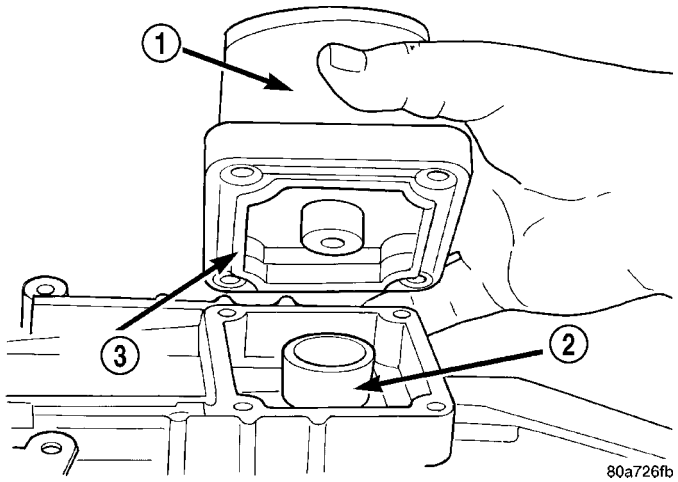


Fig. 6 SHIFT TOWER

1 - SHIFT TOWER
2 - SHIFT SOCKET
3 - SEAL

MANUAL TRANSMISSION - NV3500 (Continued)

(6) Remove shift shaft lock bolt (Fig. 7) from the top of front housing. The bolt secures the shift shaft bushing and lever.

NOTE: This is a special bolt and can not be substituted with any other bolt.

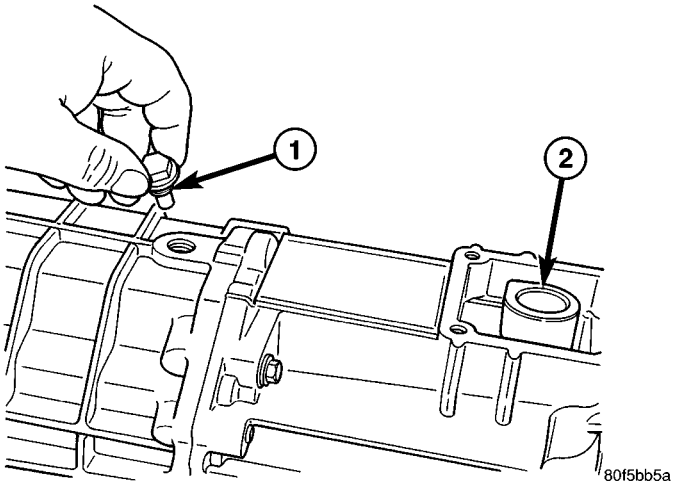


Fig. 7 SHAFT LOCK BOLT

1 - SHIFT SHAFT LOCK BOLT
2 - SHAFT SOCKET

(7) Remove input shaft bearing retainer bolts from the front housing, then carefully pry on the retainer to break sealer bead loose (Fig. 8).

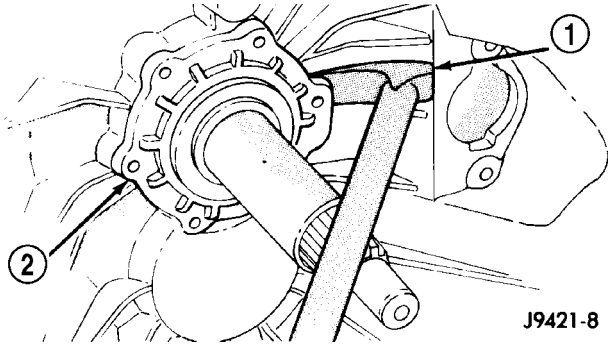


Fig. 8 BEARING RETAINER SEAL

1 - PRY TOOL
2 - INPUT SHAFT BEARING RETAINER

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

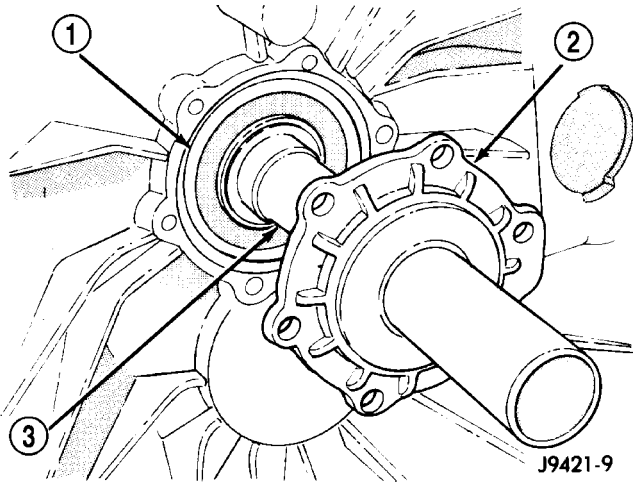


Fig. 9 INPUT SHAFT BEARING RETAINER

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

(9) Remove input shaft snap ring (Fig. 10).

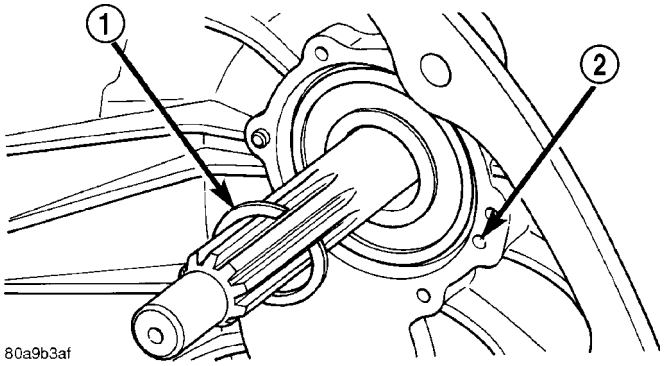


Fig. 10 INPUT SHAFT SNAP RING

1 - INPUT SHAFT SNAP RING
2 - OIL FEED

MANUAL TRANSMISSION - NV3500 (Continued)

(10) Remove shift shaft detent plug from the side of the transmission with Remover 8117A. Attach fingers of the remover to the detent plug and push the cup down till it contacts the trans. Then tighten the nut till it pulls the plug from the case.

(11) Remove shift shaft detent plunger and spring with a pencil magnet.

(12) Remove bolts that attach front housing to the rear housing (Fig. 11). Three bolts at extreme rear of housing are for the output shaft bearing retainer. Leave one bolt in place until geartrain is ready to be removed from case.

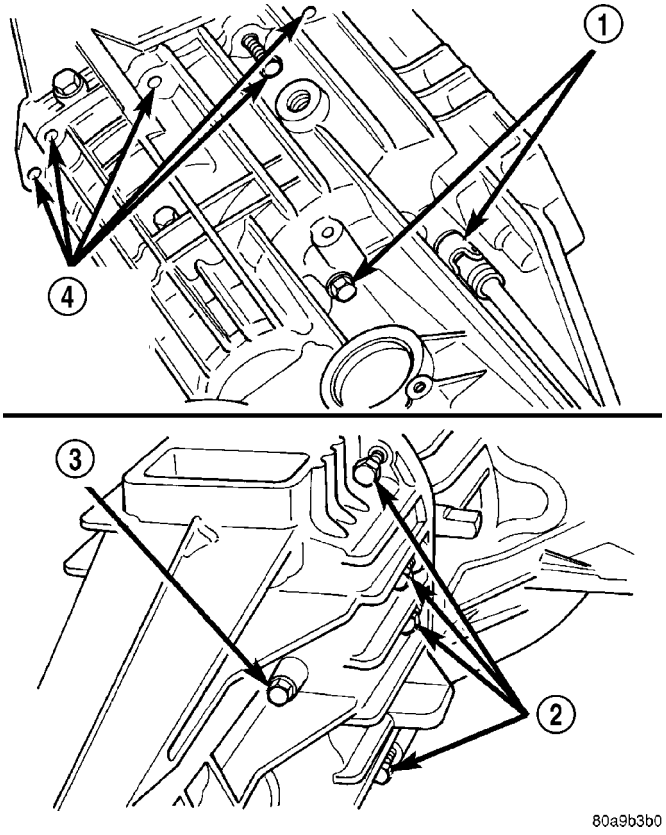


Fig. 11 HOUSING & BEARING RETAINER BOLT

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

(13) Separate the housings (Fig. 12) by tapping the front housing off alignment dowels with a plastic hammer.

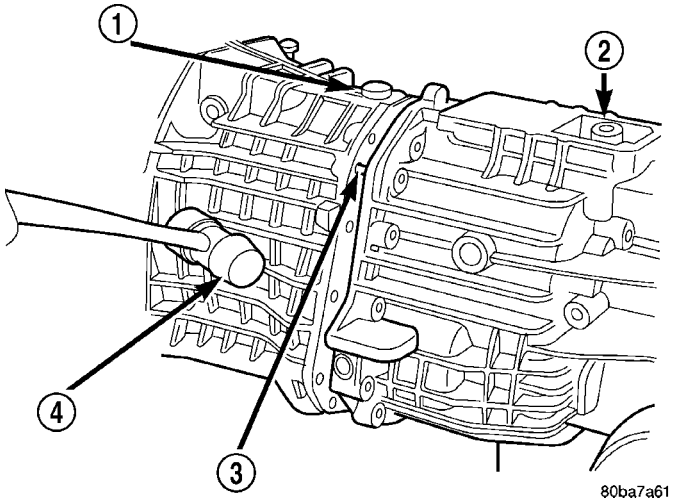


Fig. 12 FRONT HOUSING

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

(14) Remove input shaft bearing and countershaft front bearing race (Fig. 13).

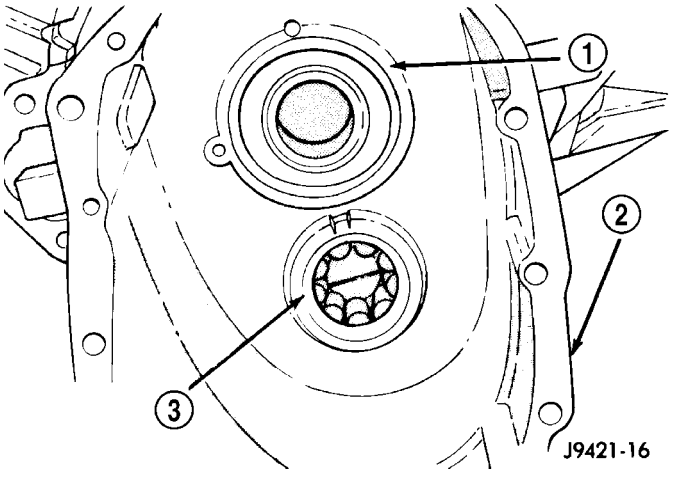
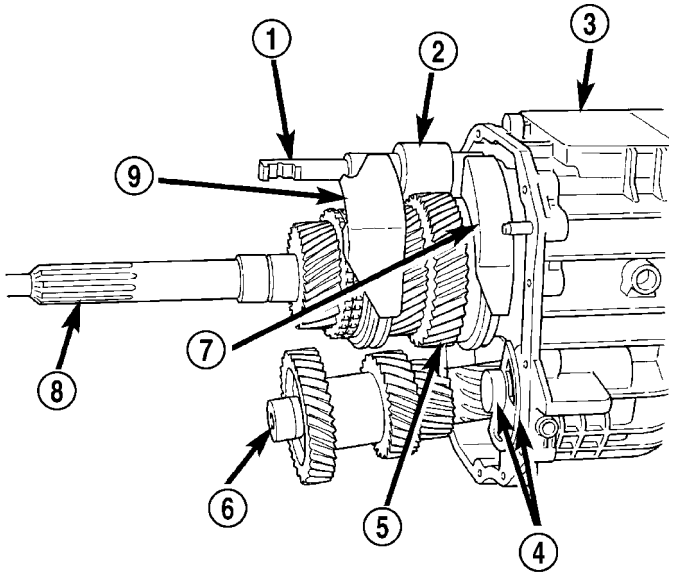


Fig. 13 Input Shaft Bearing and Countershaft Front Bearing Race

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

(15) Note position of input shaft, shift shaft, forks and geartrain components in housing (Fig. 14).



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Fig. 14 GEARTRAIN AND SHIFT COMPONENT

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

SHIFT/FORK SHAFTS AND REVERSE IDLER SEGMENT

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

(2) Rotate lever and bushing upward out of the shift forks and catch ball and spring (Fig. 15).

(3) Unseat shift socket roll pin with Remover 6858. Position remover on shift shaft and center tool over the roll pin. Verify tool legs are firmly seated on the shift socket (Fig. 16).

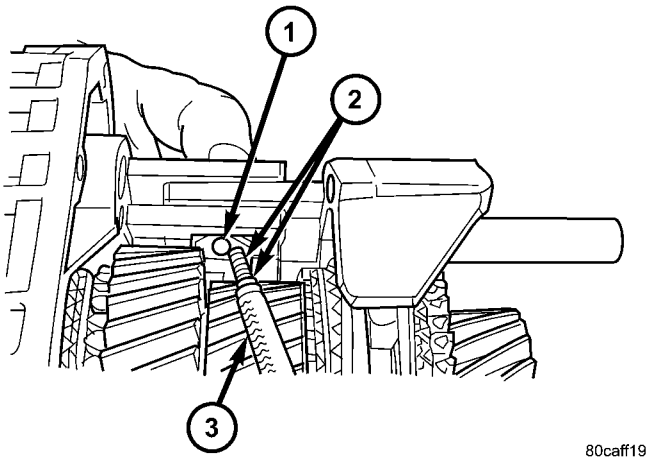
(4) Tilt socket toward the side of the case to avoid trapping the pin between the gear teeth.

(5) Tighten remover to press the roll pin downward and out of the shift socket (Fig. 16).

NOTE: Roll pin must only clear the shift shaft. Do not push the pin into the geartrain.

(6) Drive out shift bushing and lever roll pin with a hammer and punch (Fig. 17).

NOTE: Use proper size punch to avoid bending the shift shaft.



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Fig. 15 DETENT SPRING AND BALL

1 - SHAFT LEVER
2 - SPRING AND BALL
3 - MAGNET

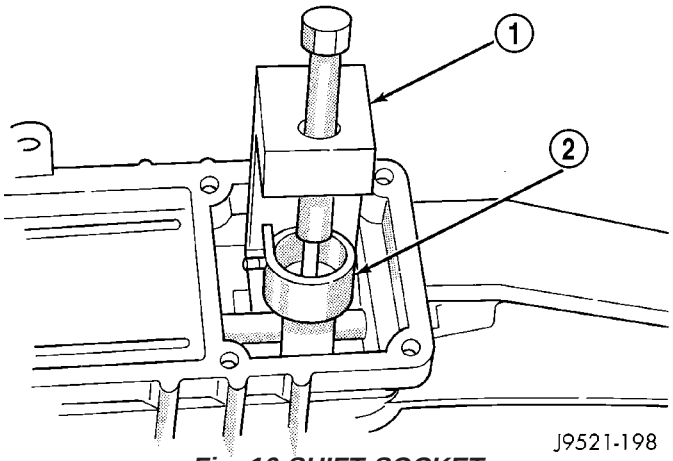


Fig. 16 SHIFT SOCKET

1 - REMOVER
2 - SHIFT SOCKET

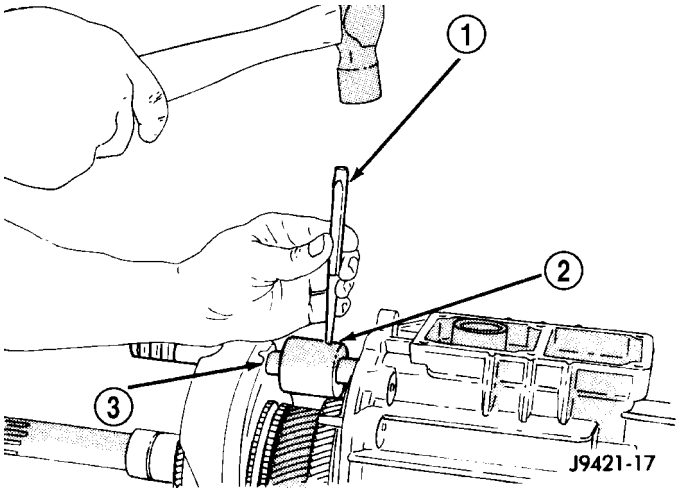


Fig. 17 SHIFT SHAFT LEVER & BUSHING ROLL PIN

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

MANUAL TRANSMISSION - NV3500 (Continued)

(7) Pull shift shaft straight out of rear housing, shift socket, fifth-reverse fork and 1-2 fork (Fig. 18).

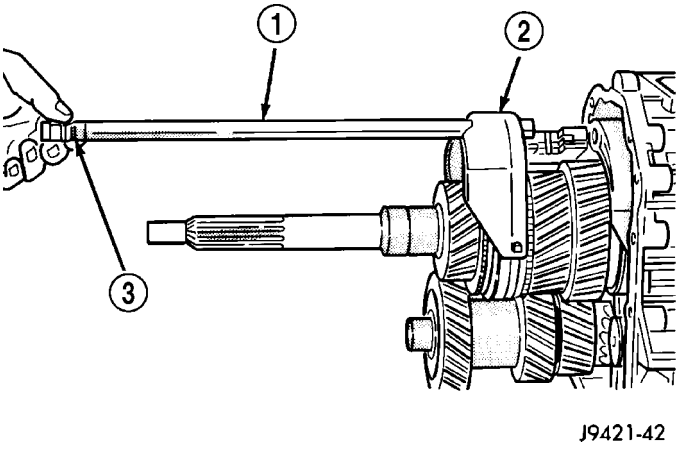


Fig. 18 SHIFT SHAFT

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

(8) Remove shift socket from rear housing (Fig. 19).

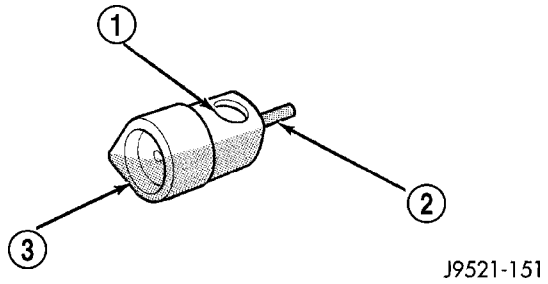


Fig. 19 SHIFT SOCKET & ROLL PIN

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

(9) Remove shaft lever and bushing (Fig. 20).

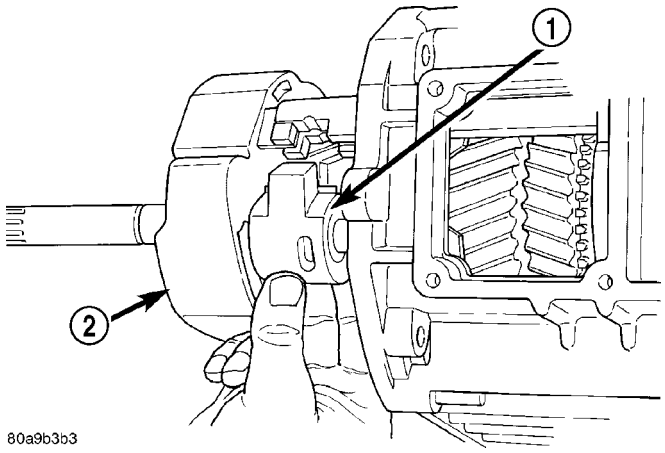


Fig. 20 SHIFT SHAFT LEVER & BUSHING

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

(10) Rotate 3-4 fork around synchro sleeve until fork clears shift arms on 1-2 and fifth-reverse forks, then remove 3-4 fork (Fig. 21).

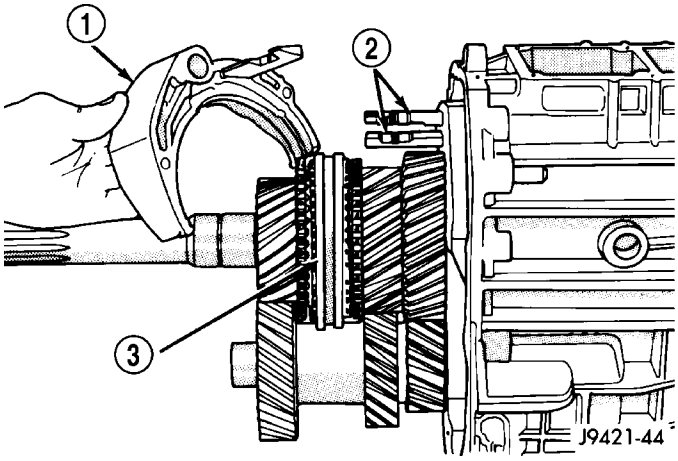


Fig. 21 3-4 SHIFT FORK

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

(11) Remove reverse idler shaft support bolt and loosen rear reverse idler shaft bolt (Fig. 22).

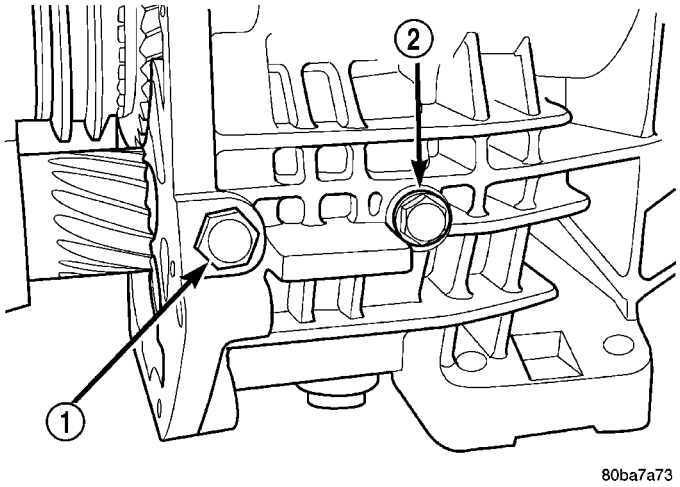


Fig. 22 REVERSE IDLER SHAFT & SUPPORT

1 - SUPPORT BOLT
2 - SHAFT BOLT

MANUAL TRANSMISSION - NV3500 (Continued)

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

(13) Support geartrain and rear housing on Fixture 6747 as follows:

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

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

(c) Slide fixture tool onto input shaft, countershaft and idler gear (Fig. 23).

(d) Stand geartrain and rear housing upright on fixture (Fig. 24). Have helper hold fixture tool in place while housing and geartrain is being rotated into upright position.

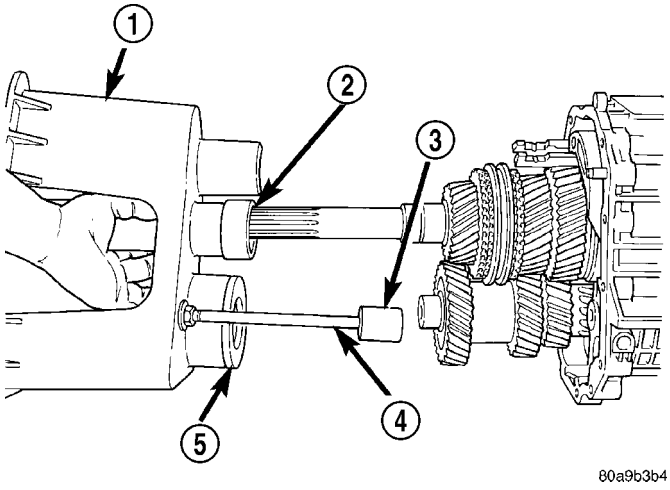


Fig. 23 FIXTURE ASSEMBLY

1 - FIXTURE 6747
2 - ADAPTER 6747-1A
3 - CUP ADAPTER 8115
4 - REVERSE IDLER PEDESTAL
5 - ADAPTER 6747-2A

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

REAR HOUSING - 2WD

(1) On 2-wheel drive transmission, remove three bolts that attach output shaft bearing retainer to rear case (Fig. 25). Bolts are rear of shift tower opening.

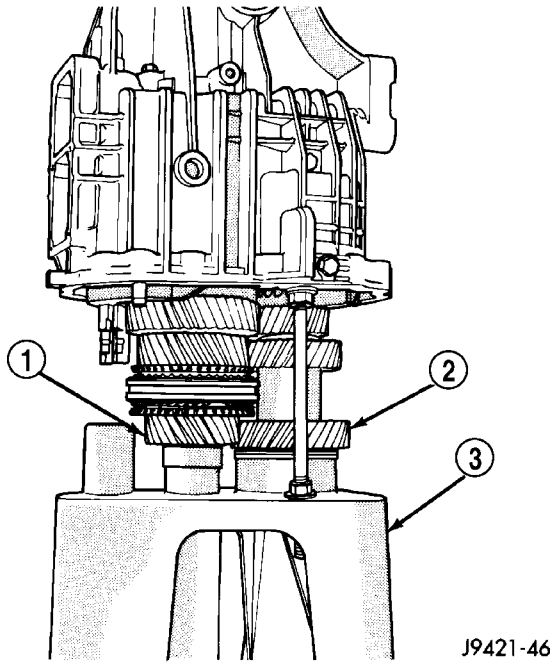


Fig. 24 GEARTRAIN & HOUSING ON FIXTURE

1 - INPUT SHAFT
2 - COUNTERSHAFT
3 - FIXTURE 6747

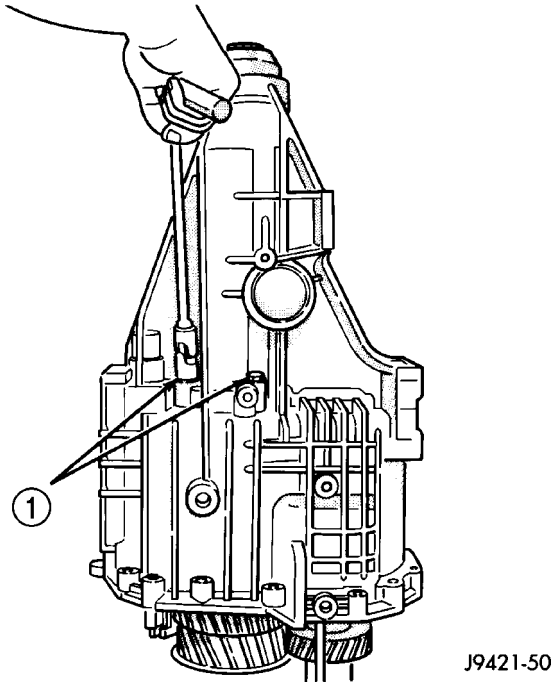


Fig. 25 OUTPUT SHAFT

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

MANUAL TRANSMISSION - NV3500 (Continued)

(2) Tap rear housing upward and off output shaft bearing with a plastic/rawhide hammer (Fig. 26).

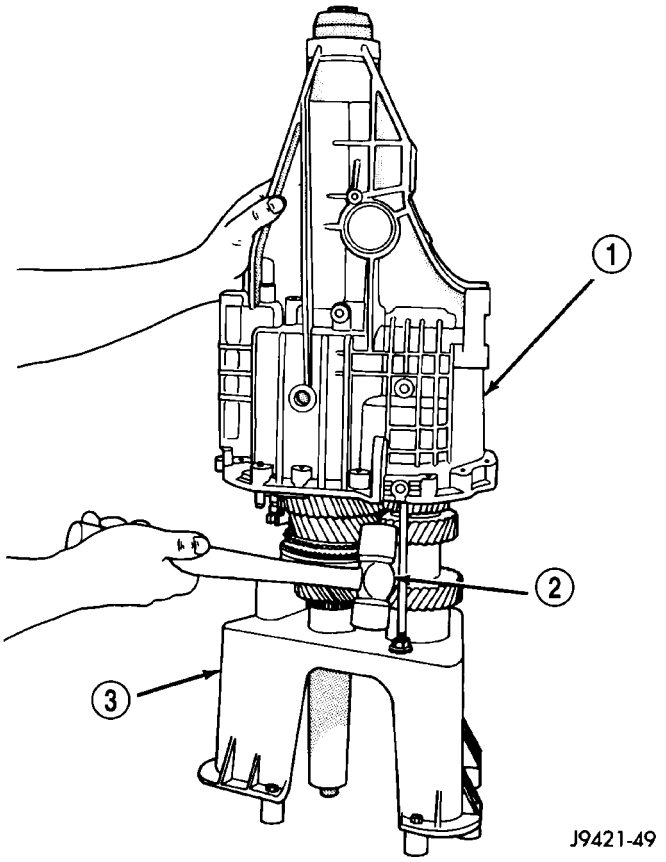


Fig. 26 SEPARATE REAR HOUSING & OUTPUT SHAFT BEARING

1 - REAR HOUSING
2 - MALLET
3 - FIXTURE

(3) Lift rear housing up and off geartrain (Fig. 27).

(4) Remove countershaft rear bearing from countershaft (Fig. 28).

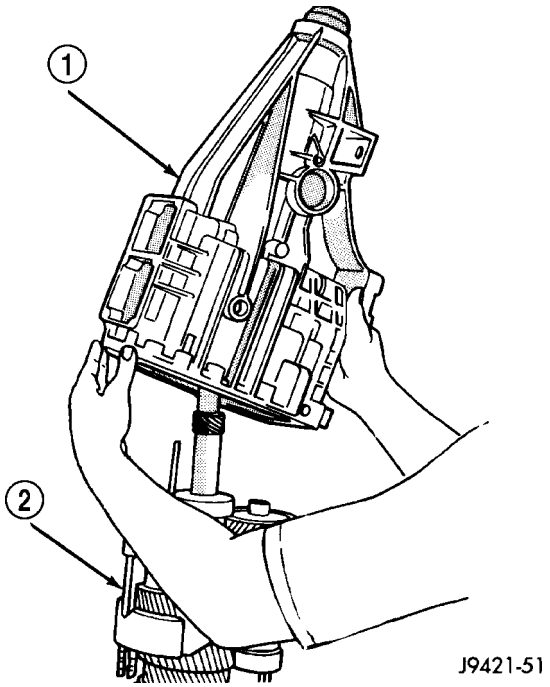


Fig. 27 REAR HOUSING - 2WD

1 - REAR HOUSING
2 - SHIFT FORKS AND GEARTRAIN

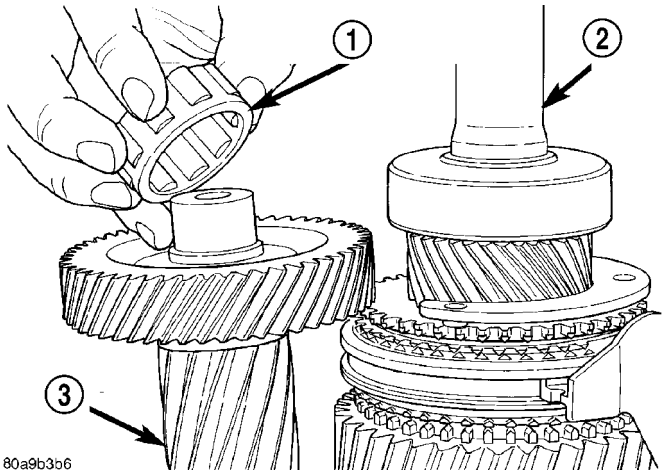


Fig. 28 COUNTERSHAFT REAR BEARING

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

MANUAL TRANSMISSION - NV3500 (Continued)

REAR ADAPTER HOUSING - 4WD

(1) Inserting screw from slide hammer (Fig. 29) into one of the dimples in face of rear seal (Fig. 30) and remove seal.

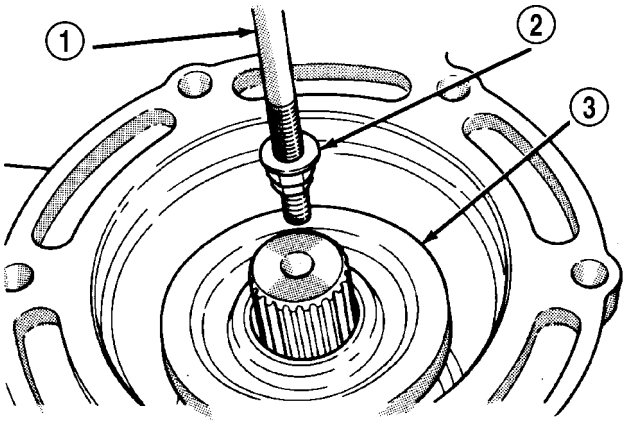


Fig. 29 REAR SEAL

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

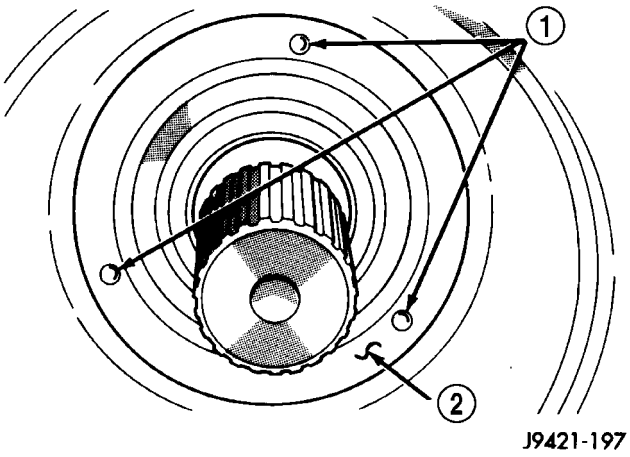


Fig. 30 REAR SEAL FACE

1 - DIMPLES
2 - SEAL FACE

(2) Remove rear bearing snap ring from output shaft (Fig. 31).

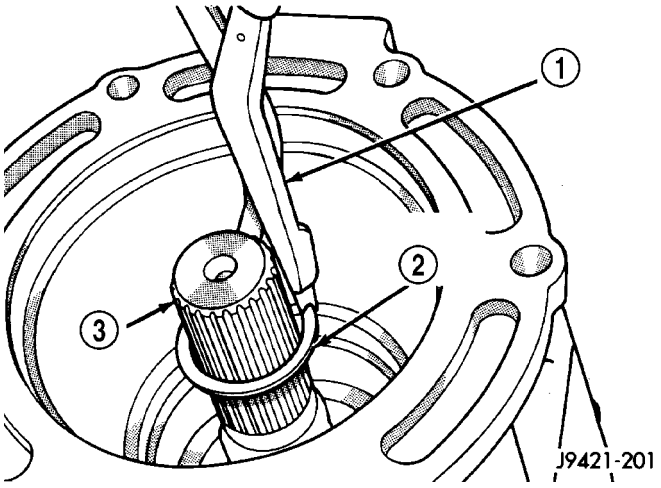


Fig. 31 REAR BEARING SNAP RING

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

(3) Lift rear adapter housing upward and off geartrain (Fig. 32).

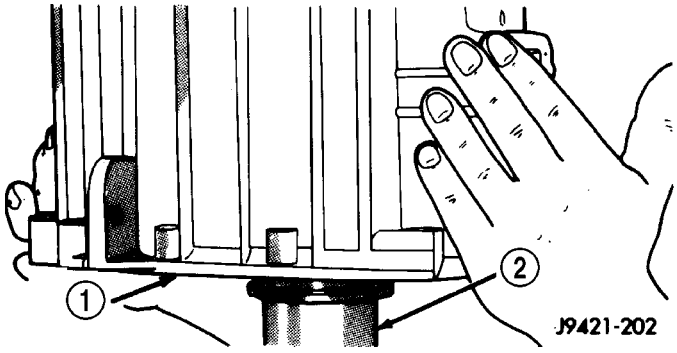


Fig. 32 REAR ADAPTER HOUSING

1 - REAR ADAPTER HOUSING
2 - OUTPUT SHAFT

(4) Remove bearing retainer bolts and remove rear bearing retainer and rear bearing (Fig. 33). Push or tap bearing out of housing with a hammer handle if needed.

NOTE: Housing must be replaced if race, bearing bore or idler shaft notch are worn or damaged.

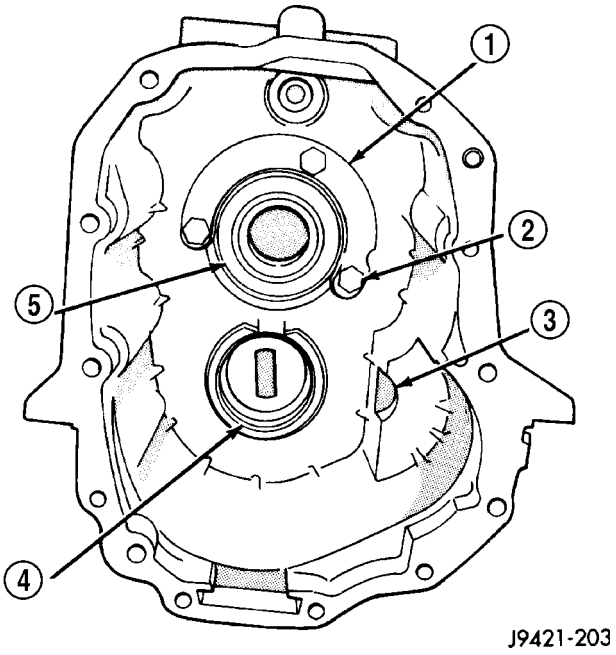


Fig. 33 REAR ADAPTER HOUSING COMPONENTS

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

GEARTRAIN FROM FIXTURE

(1) Remove reverse idler gear assembly from assembly fixture cup.

(2) Remove 1-2 and fifth-reverse forks from synchro sleeves.

(3) Slide countershaft out of fixture tool.

(4) Remove output shaft bearing retainer from rear surface of fifth gear (retainer will drop onto gear after bolts are removed).

(5) Lift and remove output shaft and gears off input shaft.

(6) Lift and remove input shaft, pilot bearing and fourth gear synchro ring from the fixture.

OUTPUT SHAFT

NOTE: Synchronizer hubs and sleeves are different and must not be mixed. Remove each synchronizer unit as an assembly to avoid mixing parts. Mark each synchro hub and sleeve with a scriber or paint for correct assembly reference.

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

(2) Position Bearing Splitter 1130 between second and third gears and press off 3-4 synchro assembly, third gear synchro ring and third gear with a shop press.

(3) Remove third gear needle bearing (Fig. 34).

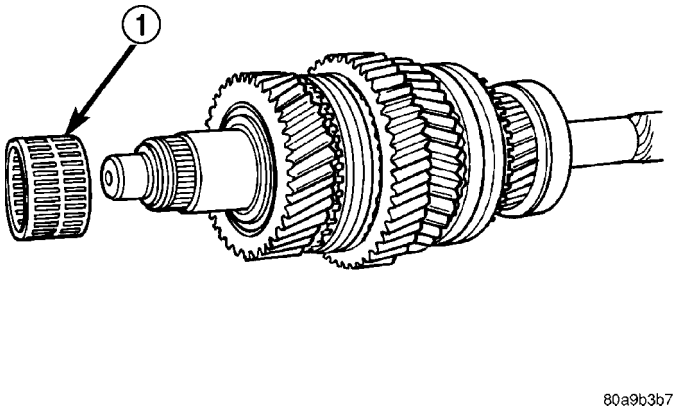


Fig. 34 THIRD GEAR NEEDLE BEARING

1 - THIRD GEAR NEEDLE BEARING

(4) Remove retaining ring that secures two-piece thrust washer on shaft with a small pry tool (Fig. 35).

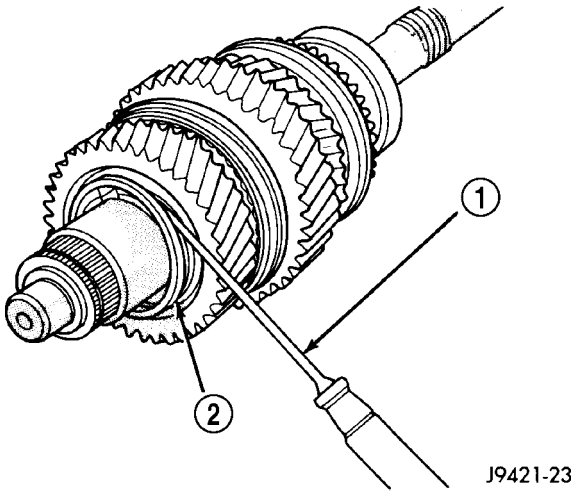


Fig. 35 THRUST WASHER

1 - PRY TOOL
2 - THRUST WASHER RETAINING RING

MANUAL TRANSMISSION - NV3500 (Continued)

(5) Remove two-piece thrust washer (Fig. 36) and note position of washer locating lugs in shaft notches for installation reference.

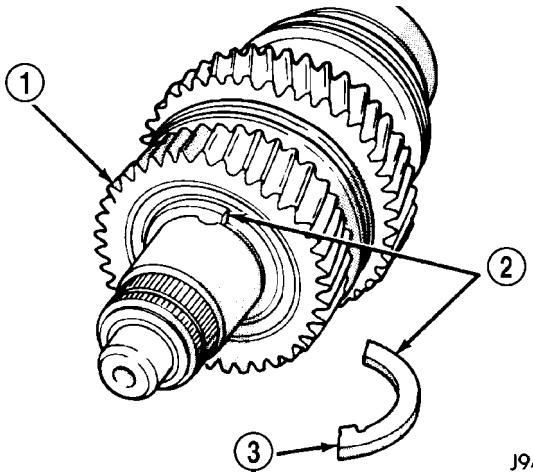


Fig. 36 TWO-PIECE THRUST WASHER

1 - SECOND GEAR
2 - THRUST WASHER (2-PIECE)
3 - WASHER LOCATING LUG

(6) Remove second gear and needle bearing (Fig. 37).

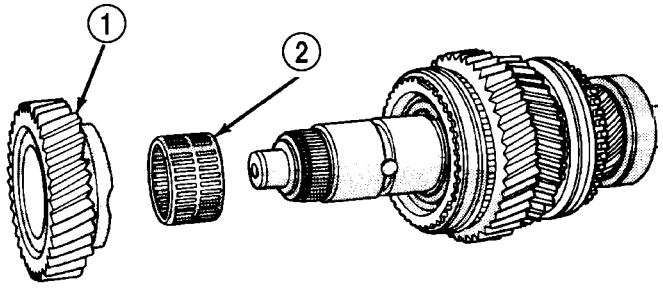


Fig. 37 SECOND GEAR

1 - SECOND GEAR
2 - SECOND GEAR NEEDLE BEARING

(7) Remove second gear synchro ring, synchro friction cone, synchro cone and interm ring (Fig. 38).

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

(9) Position Bearing Splitter 1130 between first and reverse gear. Press off 1-2 synchro hub, sleeve and first gear from output shaft with shop press (Fig. 39).

(10) Remove first gear needle bearing (Fig. 40).

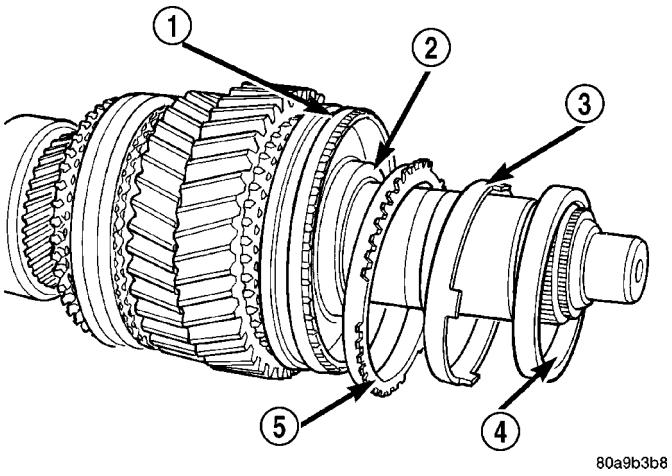


Fig. 38 SECOND GEAR SYNCHRO RING & CONES

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

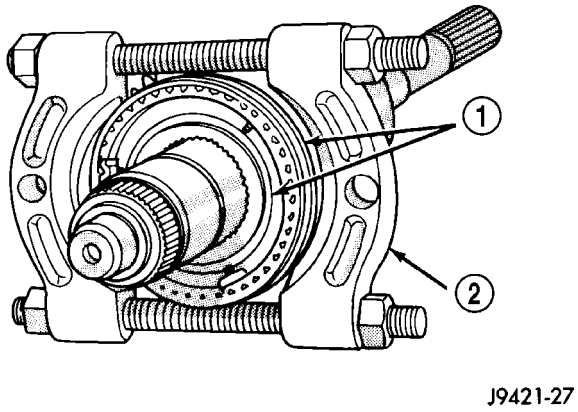


Fig. 39 HUB SLEEVE & 1-2 SYNCHRO

1 - 1-2 SYNCHRO HUB AND SLEEVE
2 - BEARING SPLITTER 1130

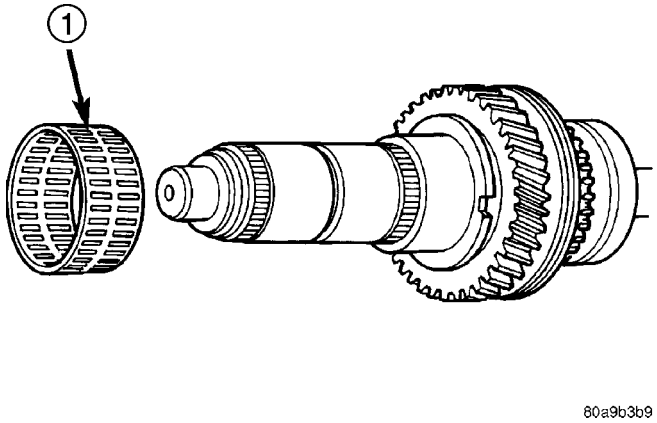


Fig. 40 FIRST GEAR NEEDLE BEARING

1 - FIRST GEAR NEEDLE BEARING

MANUAL TRANSMISSION - NV3500 (Continued)

(11) Remove output shaft bearing snap ring (Fig. 41).

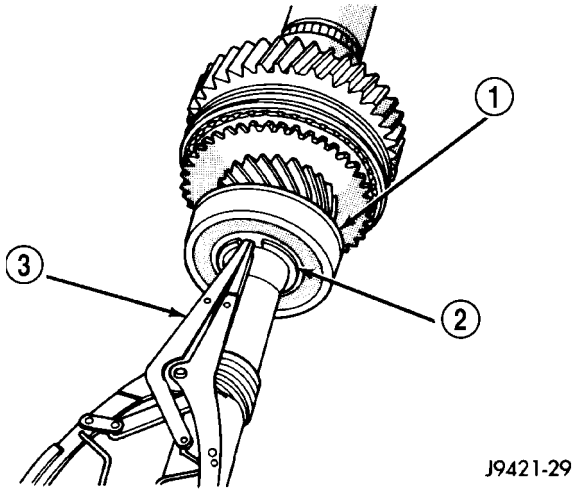


Fig. 41 OUTPUT SHAFT BEARING SNAP RING

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

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

(13) Remove fifth gear (Fig. 42).

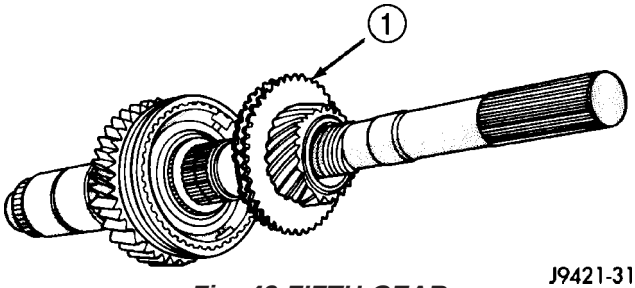


Fig. 42 FIFTH GEAR

1 - FIFTH GEAR AND SYNCHRO RING

(14) Remove fifth gear needle bearing. Spread bearing just enough to clear shoulder on output shaft (Fig. 43).

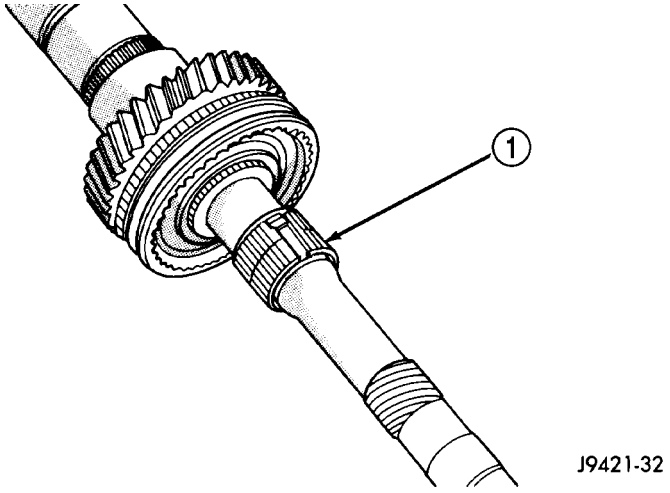


Fig. 43 FIFTH GEAR NEEDLE BEARING

1 - FIFTH GEAR NEEDLE BEARING

(15) Remove fifth-reverse synchro hub snap ring (Fig. 44).

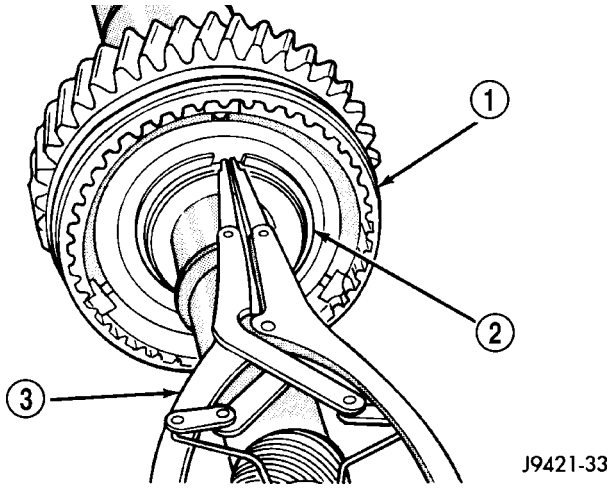


Fig. 44 FIFTH-REVERSE SYNCHRO HUB SNAP RING

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

(16) Remove fifth-reverse synchro hub and sleeve with shop press (Fig. 45).

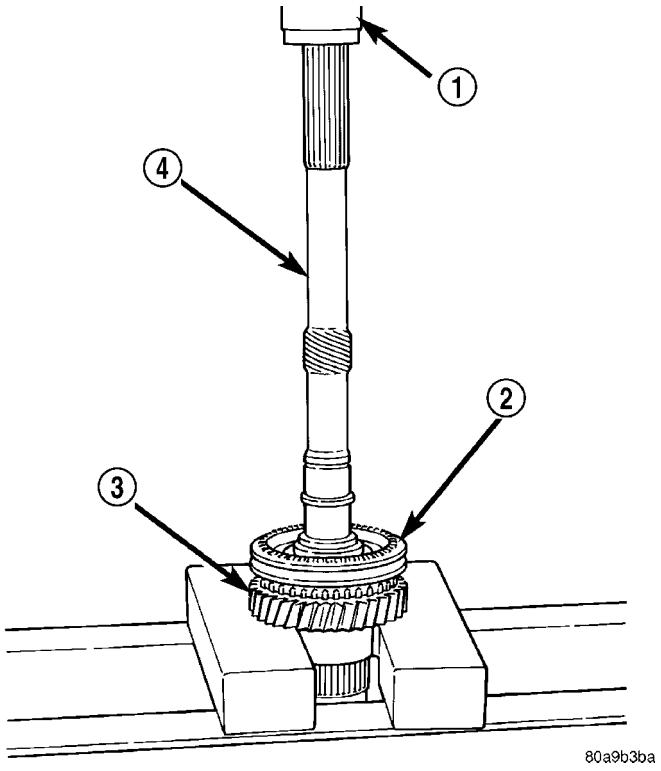


Fig. 45 FIFTH-REVERSE SYNCHRO

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

(17) Remove reverse gear and needle bearing (Fig. 46).

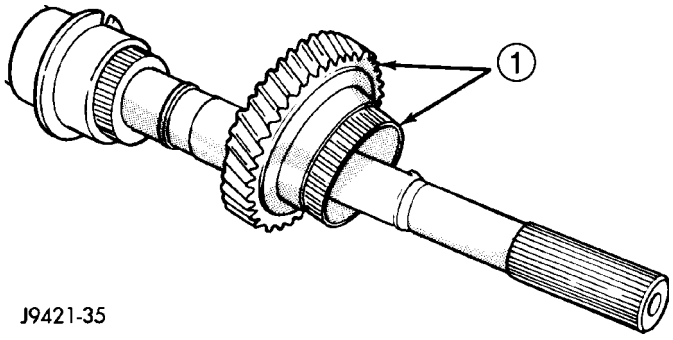


Fig. 46 REVERSE GEAR & NEEDLE BEARING

1 - REVERSE GEAR AND NEEDLE BEARING

REVERSE IDLER

(1) Remove idler gear snap rings (Fig. 47).

(2) Remove thrust washer, wave washer, thrust plate and idler gear from shaft.

(3) Remove idler gear needle bearing from shaft.

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

SHIFT LEVER ASSEMBLY

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

SHIFT SHAFT AND FORKS

Inspect the shift fork interlock arms and synchro sleeve contact surfaces (Fig. 48). Replace any fork exhibiting wear or damage in these areas. Do not attempt to salvage shift forks.

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

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

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

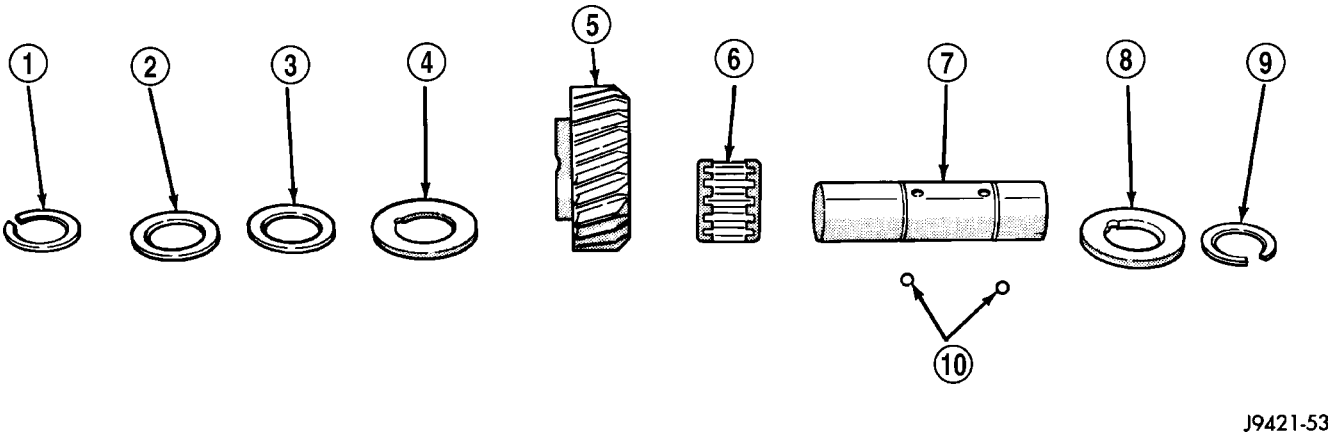


Fig. 47 Reverse Idler Components

1 - SNAP RING
2 - FLAT WASHER
3 - WAVE WASHER
4 - THRUST WASHER
5 - REVERSE IDLER GEAR
6 - IDLER GEAR BEARING
7 - IDLER SHAFT
8 - THRUST WASHER
9 - SNAP RING
10 - THRUST WASHER LOCKBALLS

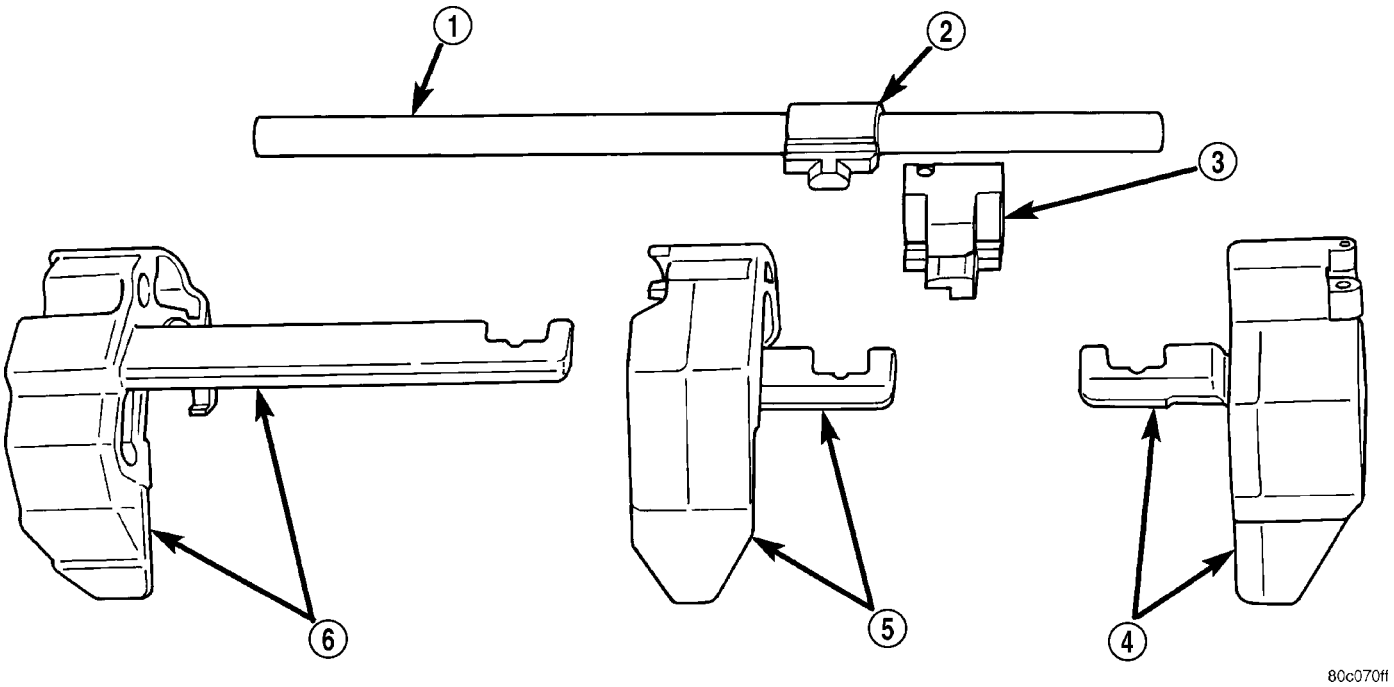


Fig. 48 Shift Forks And Shaft

1 - SHIFT SHAFT
2 - SHAFT LEVER
3 - SHAFT LEVER BUSHING
4 - 3-4 SHIFT FORK
5 - 1-2 SHIFT FORK
6 - FIFTH-REVERSE SHIFT FORK

FRONT/REAR HOUSINGS AND BEARING RETAINERS

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

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

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

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

COUNTERSHAFT BEARINGS AND RACES

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

NOTE: The bearing races are a permanent press fit in the housings and are NOT serviceable. If a bearing race becomes damaged, the front or rear housing must be replaced. A new countershaft bearing will be supplied with each new housing for service use.

REVERSE IDLER COMPONENTS

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

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

Shift Socket

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

Output Shaft And Geartrain

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

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

ASSEMBLY

NOTE: Sealers are used at all case joints. Use Mopar Gasket Maker or equivalent for all case joints and Mopar silicone sealer or equivalent for the input shaft bearing retainer.

SYNCHRONIZER

(1) Slide sleeve onto the hub, leaving enough room to install the spring in the hub and strut in the hub groove.

(2) Install first spring in the hub, then install a strut over the spring. Verify spring is seated in the spring bore in the strut.

(3) Slide sleeve onto the hub far enough to hold the first strut and spring in place.

(4) Place detent ball in the top of the strut, then press the ball into place with a small screwdriver. Work the sleeve over the ball to hold it in place.

(5) Repeat procedure for the remaining springs, struts and balls. Use tape or rubber bands to temporarily secure each strut and ball as they are installed.

(6) Verify the synchro three springs, struts and detent balls are all in place (Fig. 49).

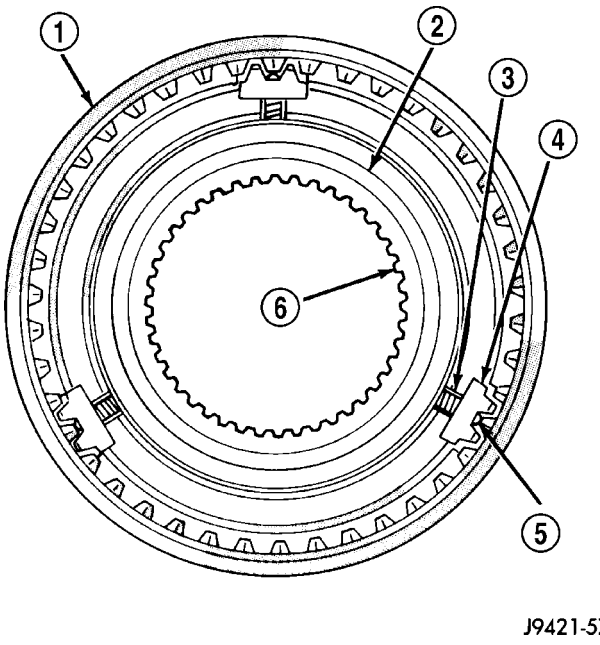


Fig. 49 SYNCHRONIZER COMPONENTS

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

OUTPUT SHAFT

NOTE: Lubricate shaft, gears, bearings and immerse each synchro ring with recommended lubricant during assembly. Petroleum jelly can be used to hold parts in place.

(1) Install reverse gear needle bearing up against shoulder on output shaft (Fig. 50).

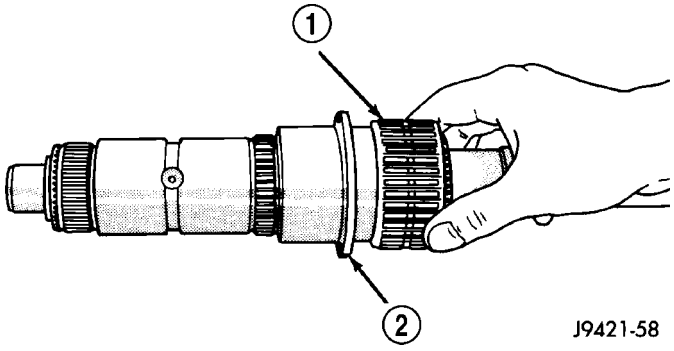


Fig. 50 REVERSE GEAR BEARING

1 - REVERSE GEAR BEARING
2 - SHOULDER

(2) Install reverse gear over needle bearing (Fig. 51).

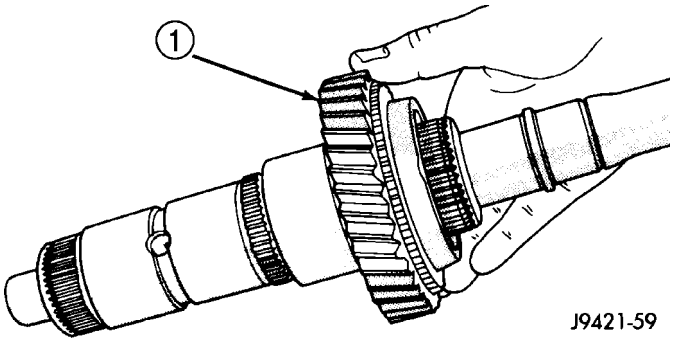


Fig. 51 REVERSE GEAR

1 - REVERSE GEAR

(3) Install brass synchro ring on reverse gear (Fig. 52).

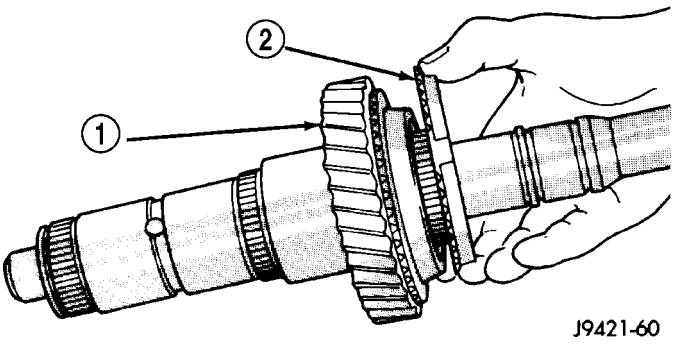


Fig. 52 REVERSE GEAR SYNCHRO

1 - REVERSE GEAR
2 - SYNCHRO RING

(4) Start fifth-reverse synchro assembly on output shaft splines by hand. Then seat synchro onto shaft with shop press and Remover 6310-1 (Fig. 53).

CAUTION: One side of the hub has shoulders around the hub bore, this side faces the front of the shaft. One side of the sleeve is tapered the tapered side faces the front of the shaft.

(5) Install **new** fifth-reverse hub snap ring (Fig. 54). Verify snap ring is seated in the groove.

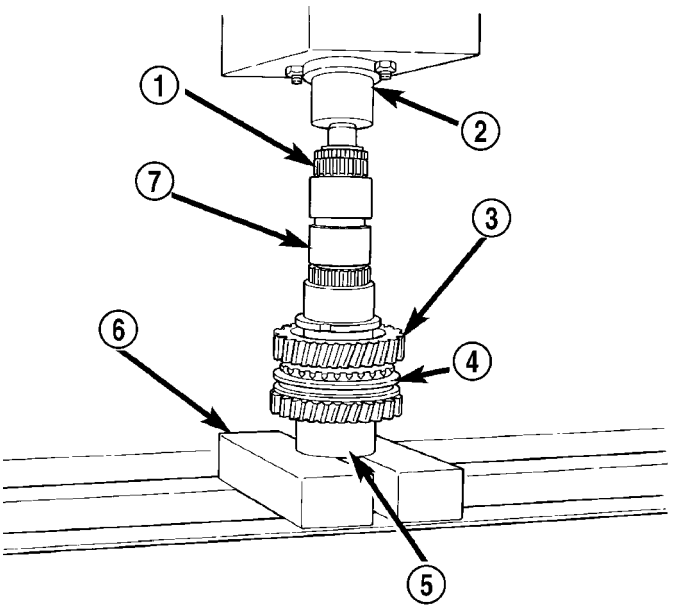


Fig. 53 FIFTH/REVERSE SYNCHRO ASSEMBLY

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

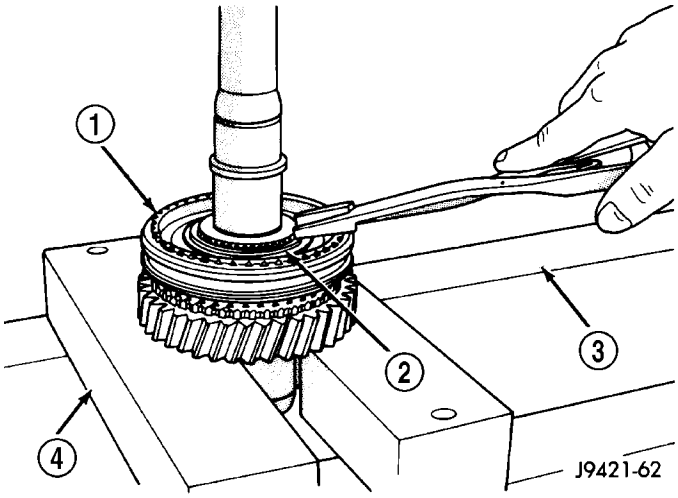


Fig. 54 FIFTH/REVERSE SYNCHRO HUB SNAP RING

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

MANUAL TRANSMISSION - NV3500 (Continued)

(6) Install fifth gear synchro ring in synchro hub and sleeve (Fig. 55).

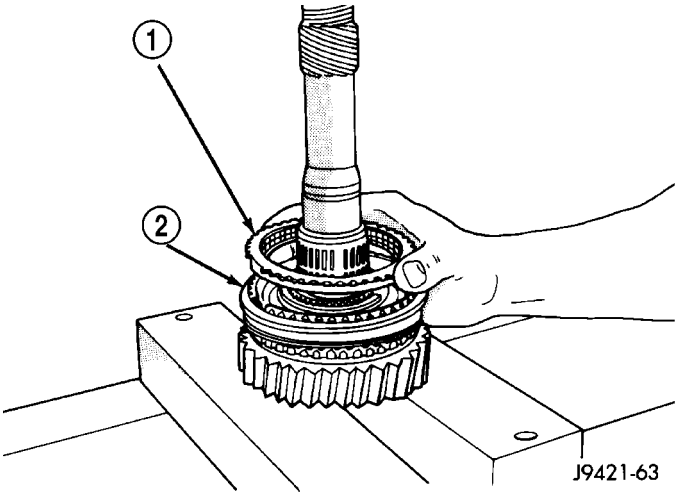


Fig. 55 FIFTH GEAR SYNCHRO RING

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

(7) Install fifth gear bearing. Spread bearing only enough to clear shoulder on output shaft (Fig. 56). Verify bearing is properly seated.

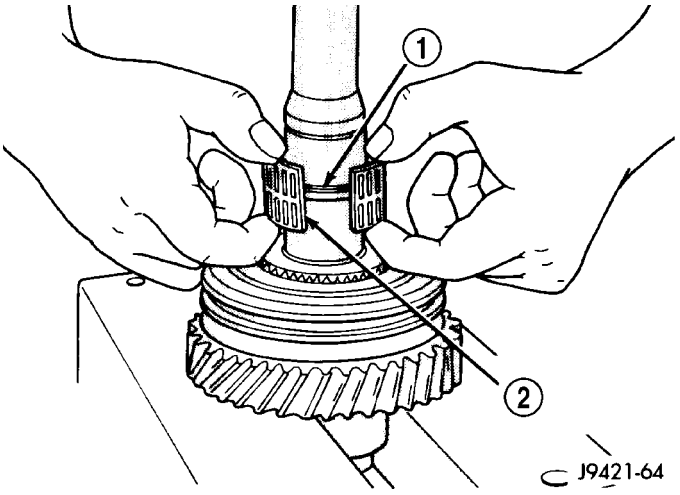


Fig. 56 FIFTH GEAR BEARING

1 - SHAFT SHOULDER
2 - FIFTH GEAR BEARING

(8) Install fifth gear on shaft and onto bearing (Fig. 57).

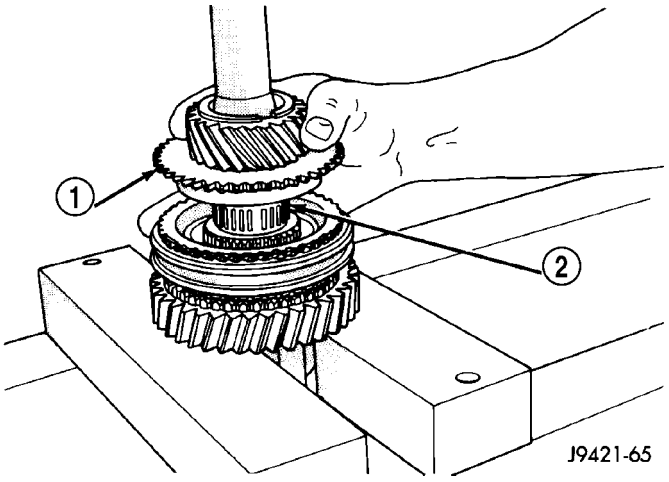


Fig. 57 FIFTH GEAR

1 - FIFTH GEAR
2 - BEARING

(9) Invert output shaft and set the shaft in Collar 6310-1 so fifth gear is seated on the tool (Fig. 58).

(10) Install first gear bearing on output shaft (Fig. 58). Verify bearing is seated on shaft shoulder and is properly joined.

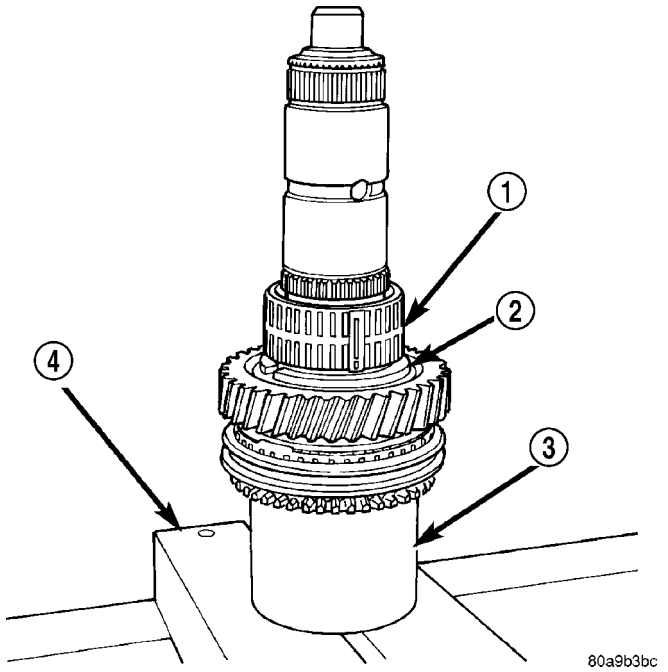


Fig. 58 FIRST GEAR

1 - FIRST GEAR BEARING
2 - SHAFT SHOULDER
3 - COLLAR
4 - PRESS BLOCKS

(11) Install first gear on shaft and over bearing (Fig. 59) with bearing synchro cone facing up.

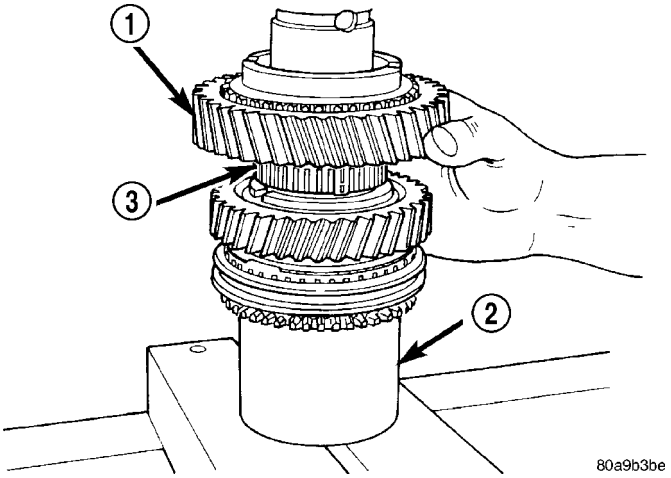


Fig. 59 FIRST GEAR

1 - FIRST GEAR
2 - COLLAR
3 - BEARING

(12) Install first gear synchro ring (Fig. 60).

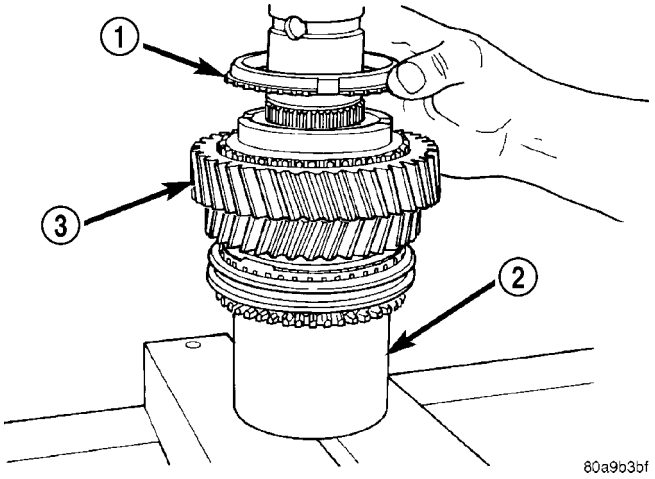


Fig. 60 FIRST GEAR SYNCHRO RING

1 - FIRST GEAR SYNCHRO RING
2 - COLLAR
3 - FIRST GEAR

(13) Start 1-2 synchro assembly on shaft by hand (Fig. 61).

CAUTION: One side of the synchro sleeve is marked First Gear Side, this side must face first gear.

(14) Press 1-2 synchro onto output shaft using suitable size pipe and shop press (Fig. 62).

CAUTION: Keep synchro ring and sleeve aligned as the hub is being pressed onto the shaft. The synchro ring can be cracked if it becomes misaligned.

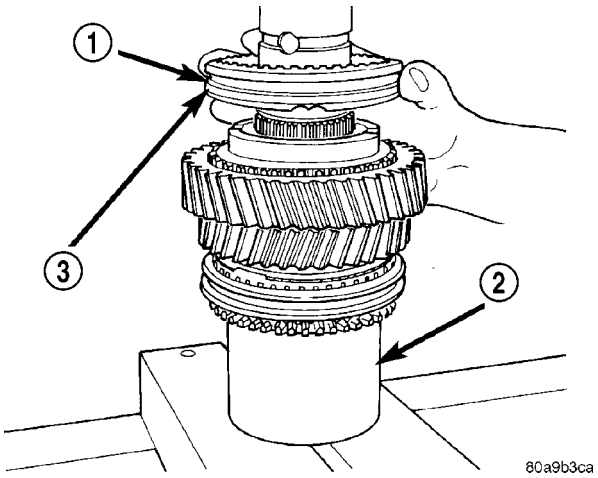


Fig. 61 STARTING 1-2 SYNCHRO

1 - 1-2 SYNCHRO ASSEMBLY
2 - COLLAR
3 - FIRST GEAR SIDE

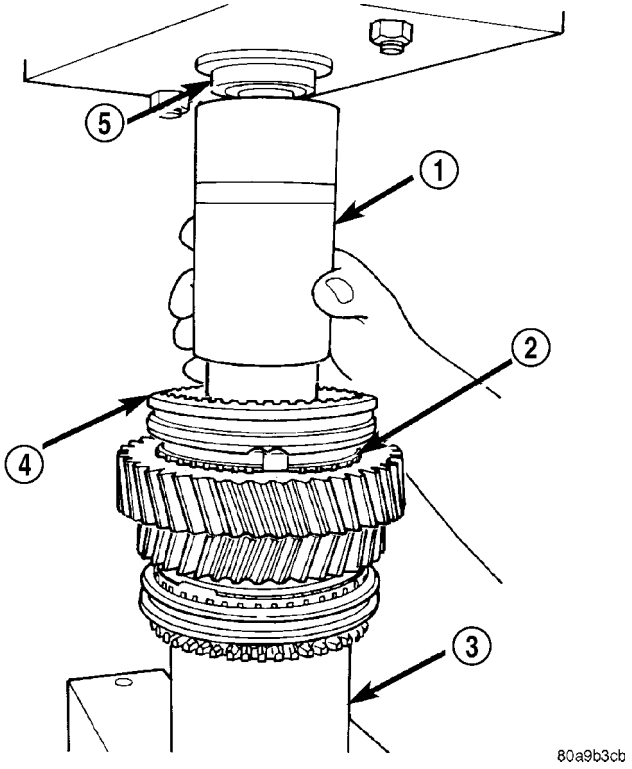


Fig. 62 1-2 SYNCHRO ON OUTPUT SHAFT

1 - PIPE TOOL
2 - SYNCHRO RING
3 - COLLAR
4 - 1-2 SYNCHRO ASSEMBLY
5 - PRESS RAM

(15) Install interm ring.

(16) Install **new** 1-2 synchro hub snap ring (Fig. 63). Verify snap ring is seated in shaft groove.

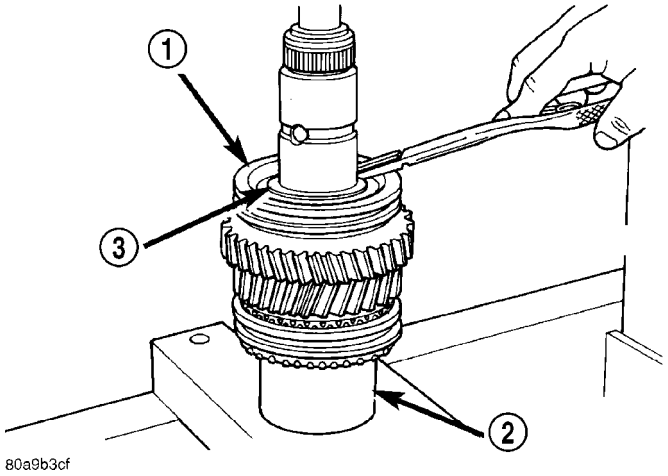


Fig. 63 1-2 SYNCHRO HUB SNAP RING

1 - 1-2 SYNCHRO
2 - COLLAR
3 - SYNCHRO SNAP RING

(17) Install second gear synchro ring in 1-2 synchro hub and sleeve (Fig. 64). Verify synchro ring is seated in sleeve.

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

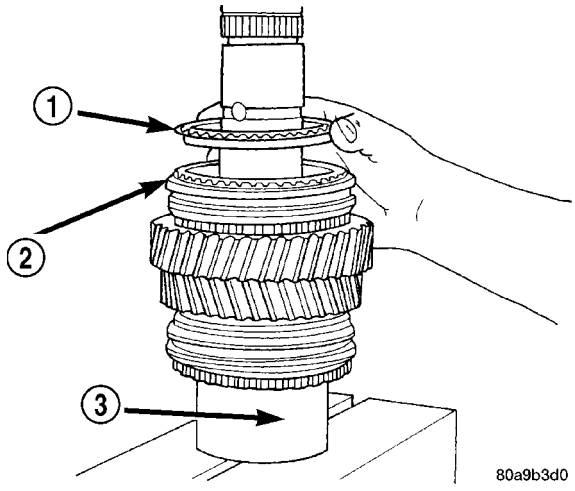


Fig. 64 SECOND GEAR SYNCHRO RING

1 - SECOND GEAR SYNCHRO RING
2 - 1-2 SYNCHRO
3 - COLLAR

(19) Install second gear needle bearing on shaft (Fig. 65).

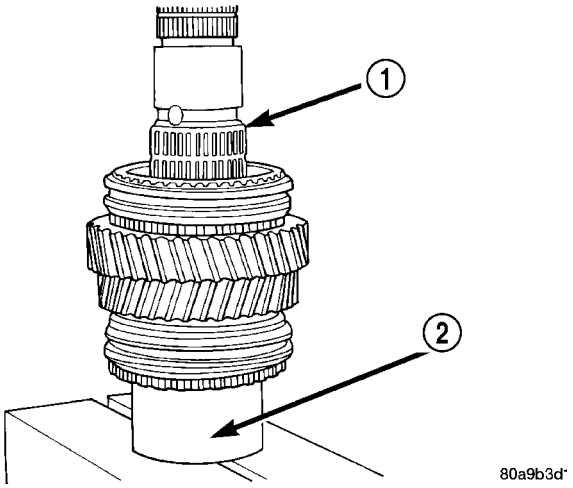


Fig. 65 SECOND GEAR BEARING

1 - SECOND GEAR BEARING
2 - COLLAR

(20) Install second gear onto shaft and bearing (Fig. 66). Verify second gear is seated on synchro components.

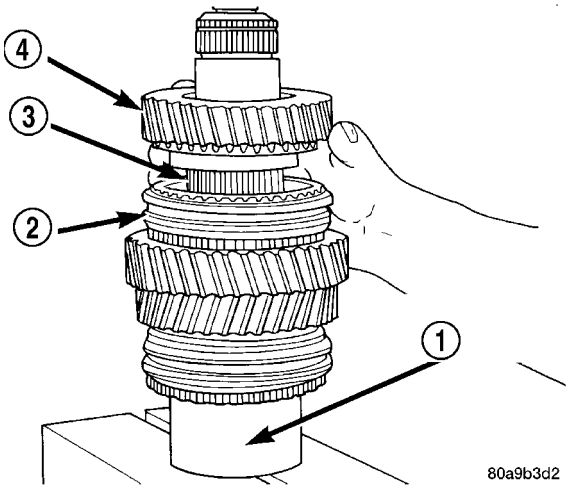


Fig. 66 SECOND GEAR

1 - COLLAR
2 - 1-2 SYNCHRO ASSEMBLY
3 - BEARING
4 - SECOND GEAR

MANUAL TRANSMISSION - NV3500 (Continued)

(21) Install two-piece thrust washer with halves seated in the shaft groove and washer lugs seated in shaft lug bores (Fig. 67). Verify i.d. grooves and markings noted during removal are facing the correct direction.

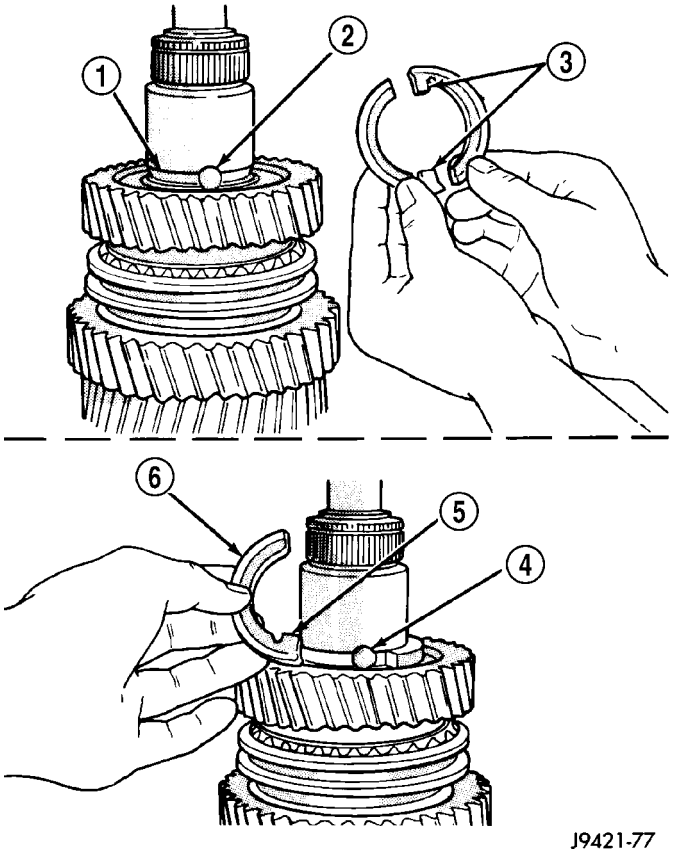


Fig. 67 TWO-PIECE THRUST WASHER

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

(22) Start retaining ring around two-piece thrust washer (Fig. 68). Verify locating dimple is between thrust washer halves.

(23) Seat thrust washer retaining ring with plastic mallet (Fig. 69).

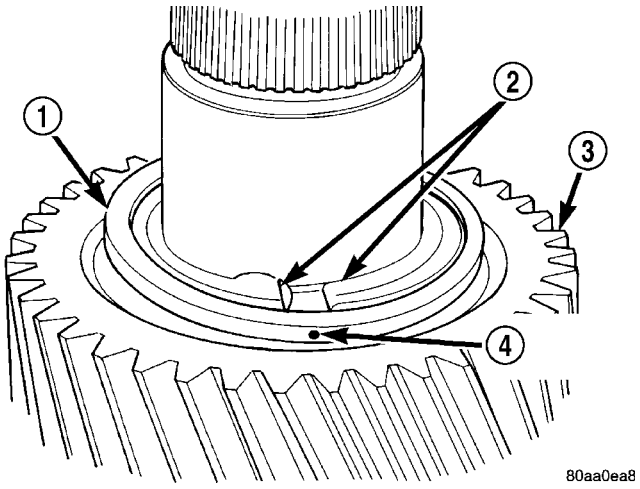


Fig. 68 RETAINING RING

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

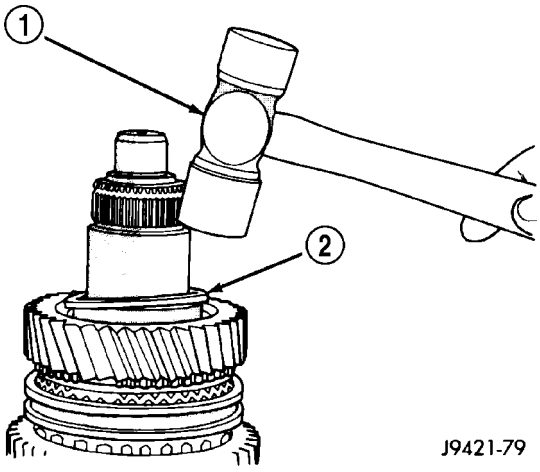


Fig. 69 THRUST RETAINER

1 - PLASTIC MALLET
2 - THRUST WASHER RETAINING RING

MANUAL TRANSMISSION - NV3500 (Continued)

(24) Install third gear needle bearing on shaft (Fig. 70).

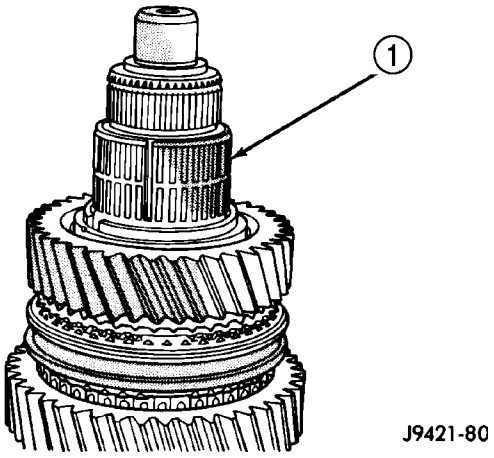


Fig. 70 THIRD GEAR BEARING

1 - THIRD GEAR BEARING

(25) Install third gear on shaft and bearing (Fig. 71).

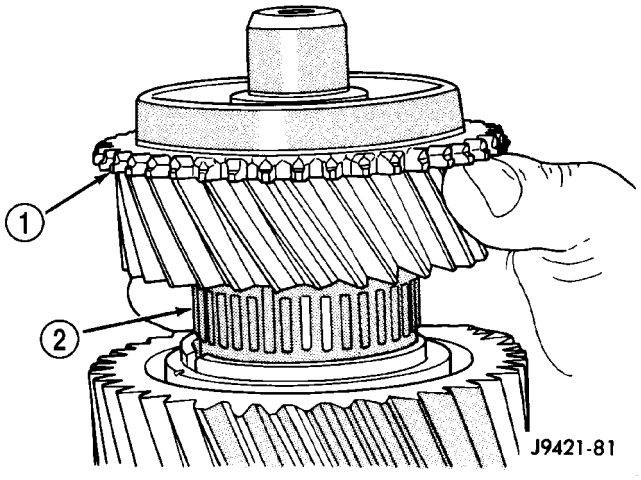


Fig. 71 THIRD GEAR

1 - THIRD GEAR
2 - BEARING

(26) Install third speed synchro ring on third gear (Fig. 72).

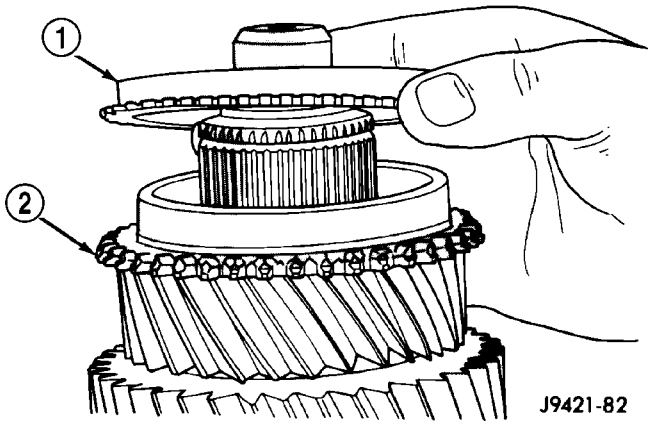


Fig. 72 THIRD GEAR SYNCHRO RING

1 - THIRD SPEED SYNCHRO RING
2 - THIRD GEAR

(27) Start 3-4 synchro hub on output shaft splines by hand (Fig. 73).

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

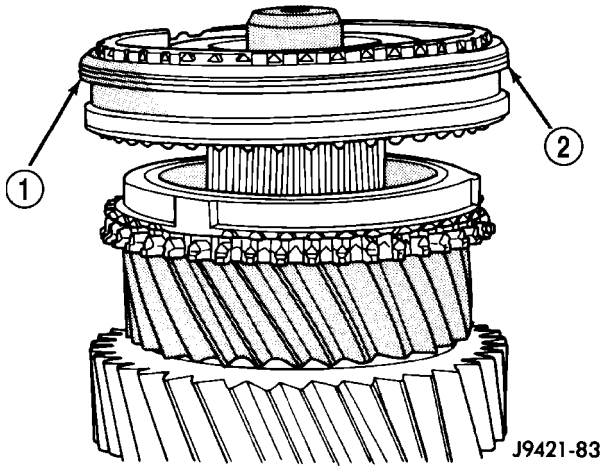


Fig. 73 3-4 SYNCHRO HUB ON OUTPUT SHAFT

1 - GROOVED SIDE OF SLEEVE
2 - 3-4 SYNCHRO ASSEMBLY

MANUAL TRANSMISSION - NV3500 (Continued)

(28) Press 3-4 synchro assembly onto output shaft with shop press and suitable size pipe (Fig. 74).

NOTE: Tool presses on hub must be as close to output shaft as possible but not contacting the shaft splines.

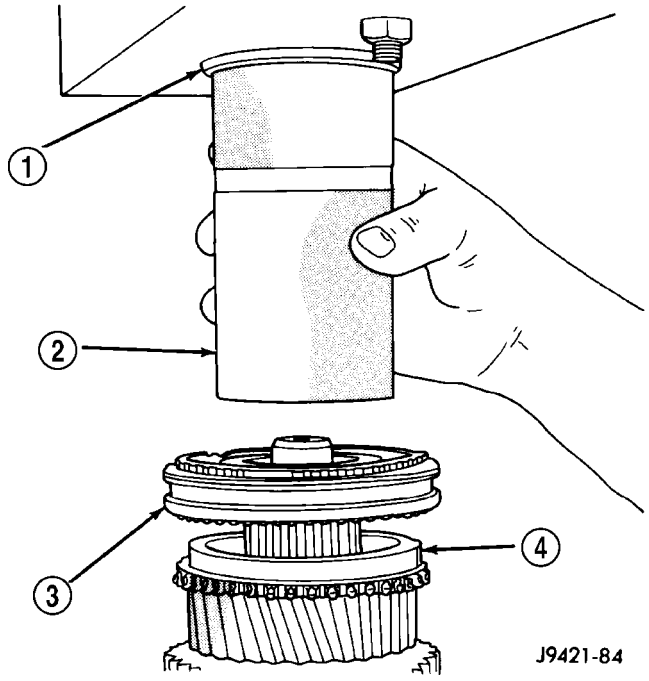


Fig. 74 3-4 SYNCHRO ON OUTPUT SHAFT

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

(29) Install **new** 3-4 synchro hub snap ring (Fig. 75). Verify snap ring is seated in groove.

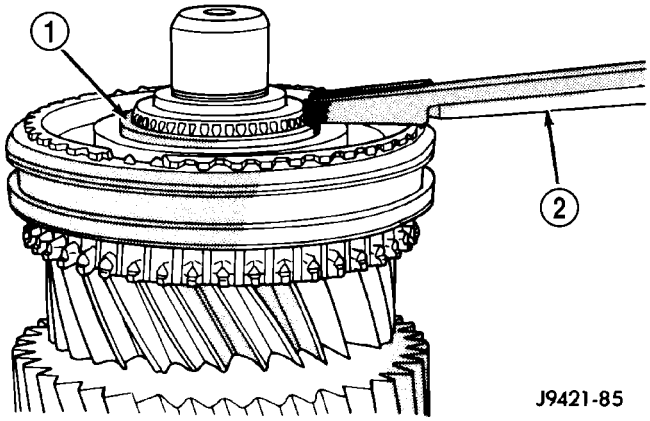


Fig. 75 3-4 SYNCHRO HUB SNAP RING

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

(30) Install output shaft bearing.

(31) Install output shaft bearing snap ring with heavy duty snap ring pliers (Fig. 76). Verify snap ring is seated in shaft groove.

NOTE: Spread snap ring only enough to install it.

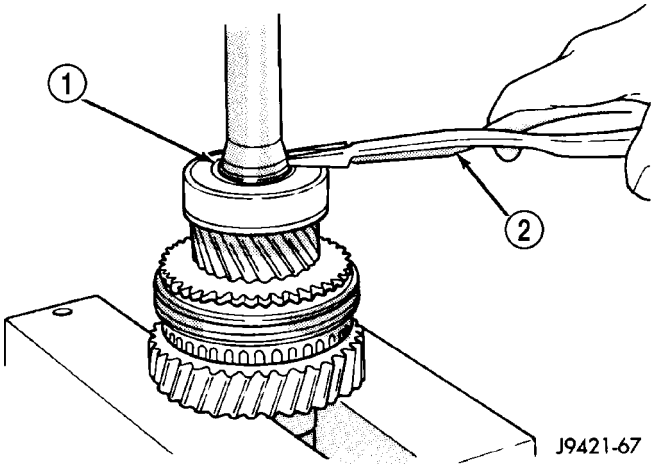


Fig. 76 OUTPUT SHAFT BEARING SNAP

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

(32) Verify position of synchro sleeves before proceeding (Fig. 77). Grooved side of 3-4 sleeve must face forward. First gear side of 1-2 sleeve must face first gear. Tapered side of fifth-reverse sleeve must face forward.

REVERSE IDLER ASSEMBLY

(1) Lubricate idler components with gear lube.

(2) Slide idler gear bearing on shaft (Fig. 78). Bearing fits either way on shaft.

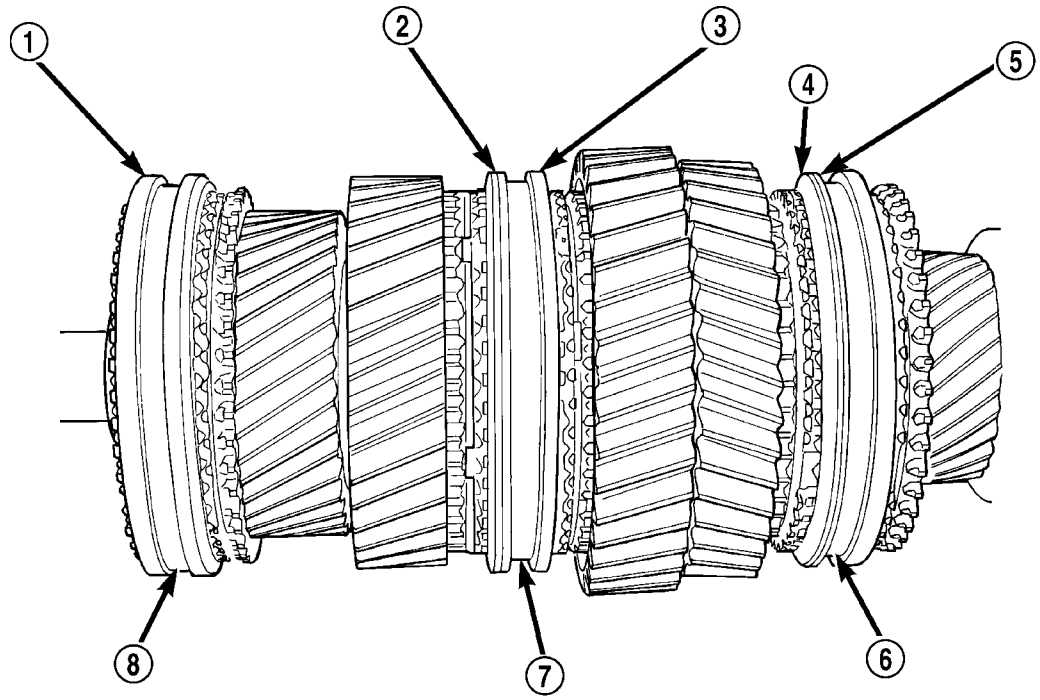
(3) Slide gear onto shaft. Side of gear with recess goes to rear (Fig. 78).

(4) Place first lock ball in dimple at rear end of idler shaft (Fig. 78). Petroleum jelly can be used to hold ball in place if desired.

(5) Slide thrust rear thrust washer onto shaft and over lock ball (Fig. 79).

(6) Install snap ring in groove at rear of shaft (Fig. 79).

MANUAL TRANSMISSION - NV3500 (Continued)



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Fig. 77 SYNCHRO SLEEVE LOCATIONS

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

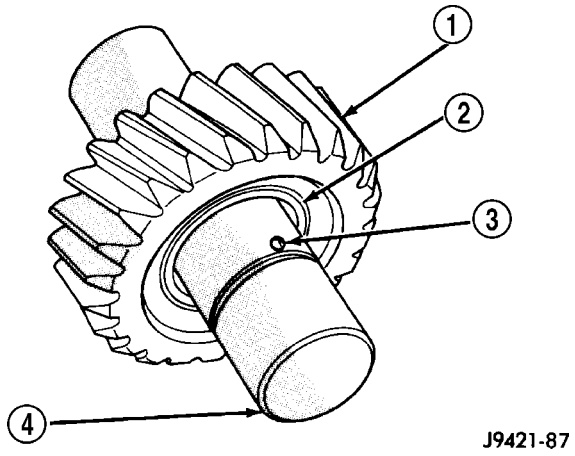


Fig. 78 IDLER GEAR & BEARING

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

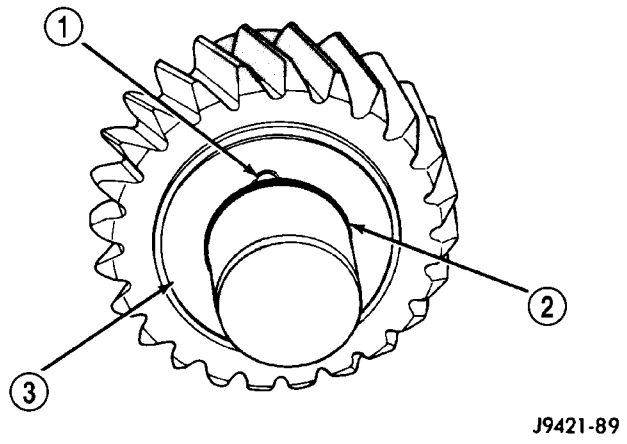


Fig. 79 IDLER GEAR REAR THRUST WASHER

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

(7) Install lock ball in dimple at front of shaft. Hold ball in place with petroleum jelly if desired.

(8) Install front thrust washer on shaft and slide washer up against gear and over lock ball (Fig. 80).

(9) Install wave washer, flat washer and remaining snap ring on idler shaft (Fig. 80). Verify snap ring is seated.

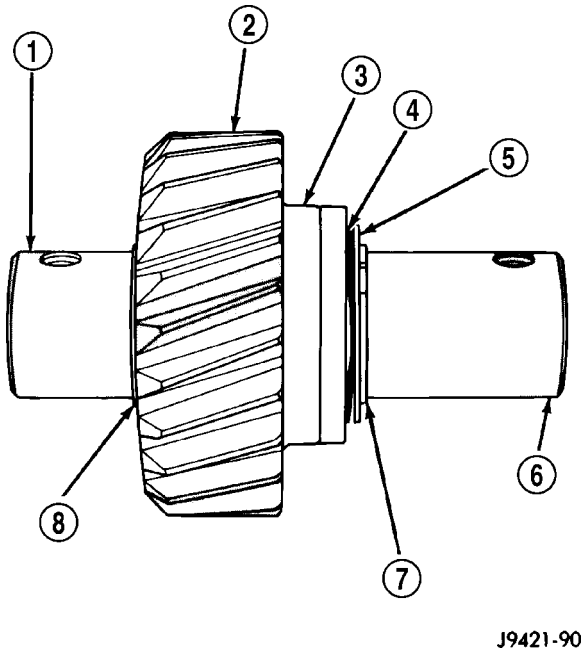


Fig. 80 IDLER GEAR & SHAFT ASSEMBLY

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

SHIFT SHAFT AND DETENT PLUNGER BUSHINGS/ BEARINGS

(1) Inspect shift shaft bushing and bearing for damage.

(2) If necessary, the shift shaft bushing can be replaced as follows:

(a) Locate a bolt that will thread into the bushing without great effort.

(b) Thread the bolt into the bushing, allowing the bolt to make its own threads in the bushing.

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

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

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

(3) If necessary, the shift shaft bearing can be replaced as follows:

(a) Locate a bolt that will thread into the bearing without great effort.

(b) Thread the bolt into the bearing as much as possible.

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

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

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

(4) Inspect detent plunger bushings for damage.

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

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

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

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

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

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

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

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

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

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

MANUAL TRANSMISSION - NV3500 (Continued)

GEARTRAIN ASSEMBLY

(1) Install Adapter 6747-1A on input shaft hub of Fixture 6747 (Fig. 81). Then install Adapter 6747-2A on front bearing hub of countershaft. Be sure the shoulder is seated against the countershaft.

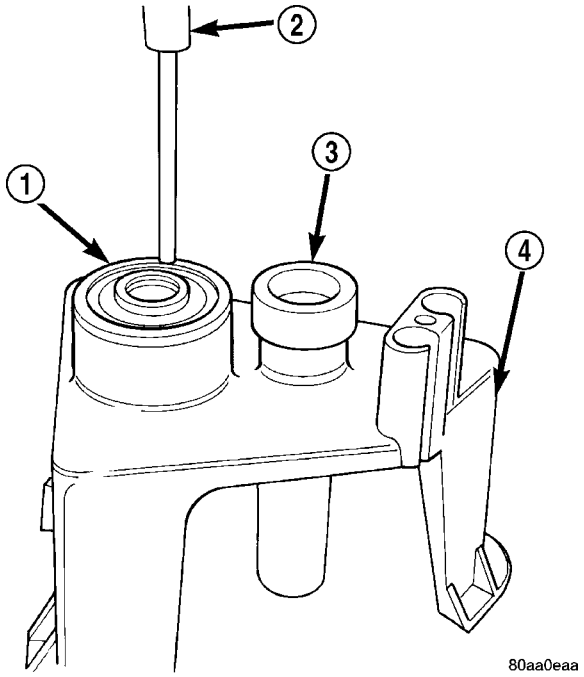


Fig. 81 FIXTURE FOR GEARTRAIN BUILD-UP

1 - ADAPTER 6747-2A
2 - CUP 8115
3 - ADAPTER 6747-1A
4 - FIXTURE 6747

(2) Install input shaft in fixture tool with Adapter Tool 6747-1A positioned under the shaft as shown (Fig. 82).

(3) Install pilot bearing in input shaft (Fig. 82).

NOTE: The side of the pilot bearing with the small diameter goes toward the input shaft.

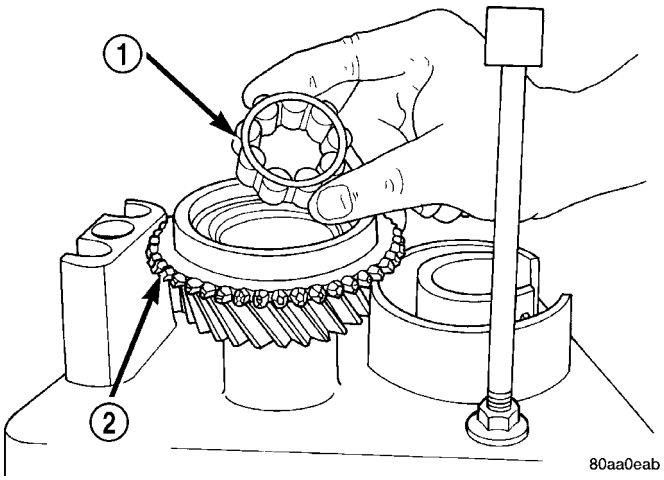


Fig. 82 PILOT BEARING & INPUT SHAFT

1 - PILOT BEARING
2 - INPUT SHAFT

(4) Install fourth gear synchro ring on input shaft (Fig. 83).

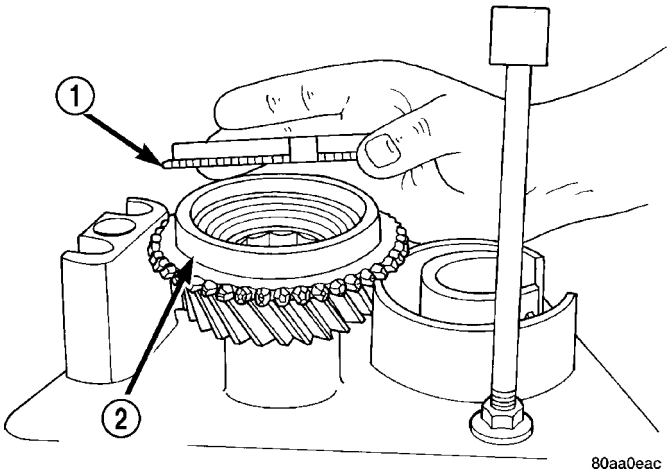


Fig. 83 FOURTH GEAR SYNCHRO

1 - FOURTH GEAR SYNCHRO RING
2 - INPUT SHAFT

(5) Adjust height of idler gear pedestal on fixture (Fig. 84). Start with a basic height of 18.4 cm (7-1/4 in.). Final adjustment can be made after gear is positioned on pedestal.

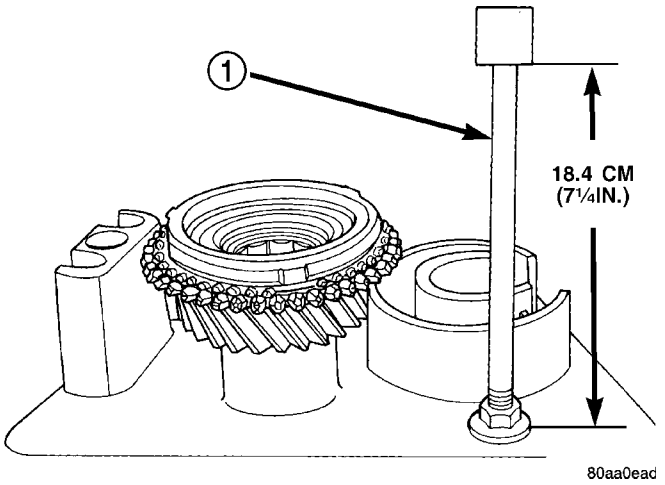


Fig. 84 IDLER PEDESTAL BASE HEIGHT

1 - REVERSE IDLER PEDESTAL

MANUAL TRANSMISSION - NV3500 (Continued)

(6) Install assembled output shaft and geartrain in input shaft (Fig. 85). Carefully rotate output shaft until the 3-4 synchro ring seats in synchro hub and sleeve.

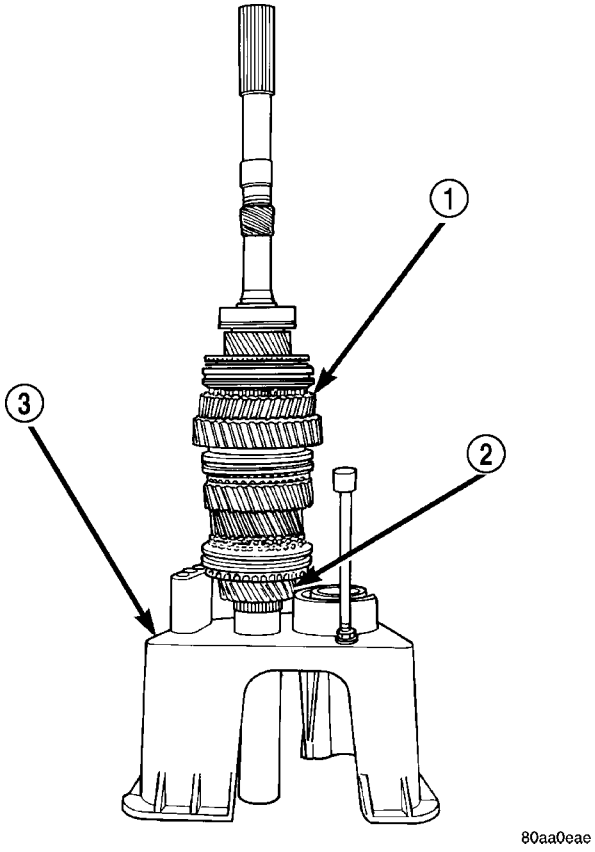


Fig. 85 OUTPUT SHAFT, GEARTRAIN & INPUT SHAFT

1 - OUTPUT SHAFT AND GEARTRAIN
2 - INPUT SHAFT
3 - FIXTURE 6747

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

(8) Slide countershaft (and adapter) into fixture slot. Verify countershaft and output shaft gears are fully meshed with the mainshaft gears before proceeding (Fig. 86).

(9) Check alignment of countershaft and output shaft gear teeth. Gears may not align perfectly a difference in height of 1.57 to 3.18 mm (1/16 to 1/8 in.) will probably exist. This will not interfere with assembly. If difference is greater than this, the countershaft adapter tool is probably upside down.

(10) Position reverse idler in support cup of fixture (Fig. 87). Verify idler gear is properly meshed and aligned with shaft gear teeth and that bolt holes are facing out from the geartrain. Adjust pedestal up or down if necessary and verify short end of idler shaft is facing up as shown.

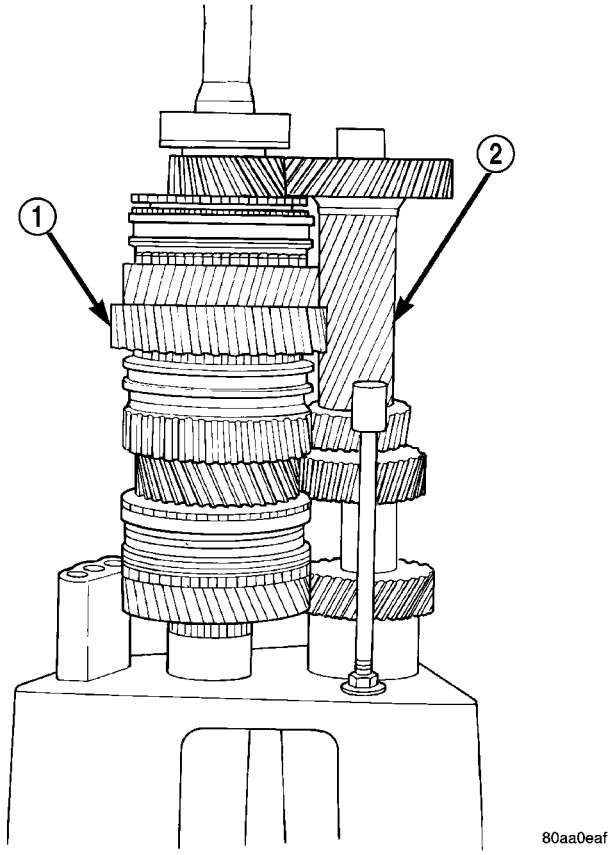


Fig. 86 COUNTERSHAFT ON FIXTURE

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

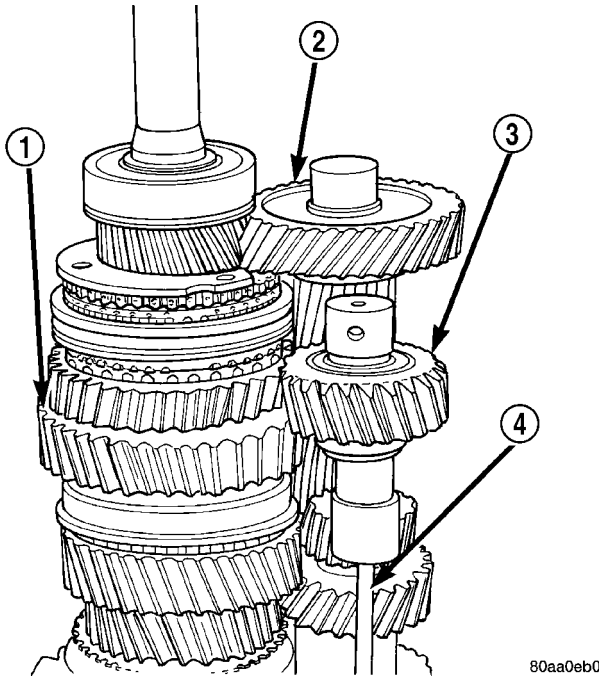


Fig. 87 REVERSE IDLER ASSEMBLY ON FIXTURE

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

MANUAL TRANSMISSION - NV3500 (Continued)

(11) On 2-wheel drive transmission, thread one Alignment Pin 8120 in center or passenger side hole of output shaft bearing retainer. Then position retainer on fifth gear as shown (Fig. 88).

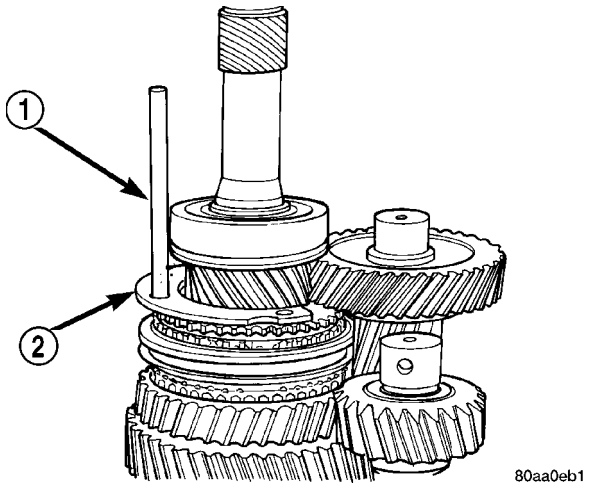


Fig. 88 ALIGN OUTPUT SHAFT BEARING RETAINER

1 - ALIGNMENT PIN
2 - OUTPUT SHAFT BEARING RETAINER

(12) Assemble 1-2 and fifth reverse-shift forks (Fig. 89). Arm of fifth-reverse fork goes through slot in 1-2 fork.

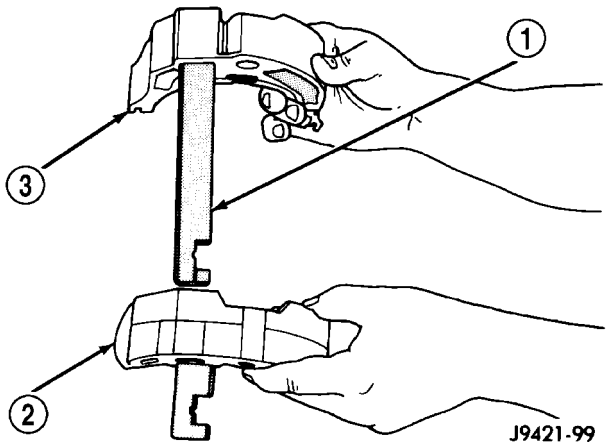


Fig. 89 1-2 & FIFTH-REVERSE SHIFT FORKS

1 - 1-2 FORK
2 - 1-2 FORK ARM
3 - FIFTH-REVERSE FORK

(13) Install assembled shift forks in synchro sleeves and verify forks are seated in sleeves (Fig. 90).

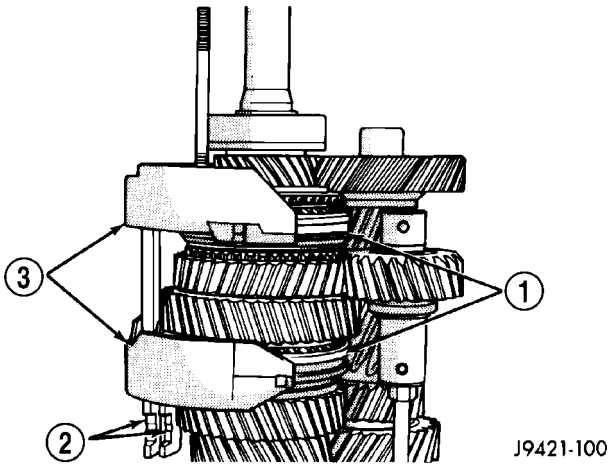


Fig. 90 SHIFT FORKS IN SYNCHRO

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

REAR HOUSING - 2WD

NOTE: Transmission shift components must be in Neutral position to prevent damaging the synchro and shift components when installing the housings.

(1) Drive adapter housing alignment dowels back into housing until dowels are flush with mounting surface (Fig. 91).

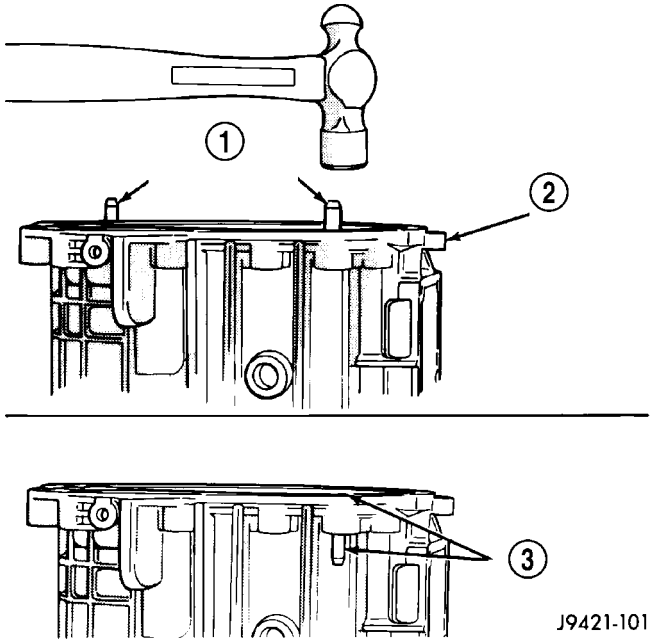


Fig. 91 REAR HOUSING DOWELS

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

MANUAL TRANSMISSION - NV3500 (Continued)

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

(3) Install countershaft rear bearing in bearing race (Fig. 92).

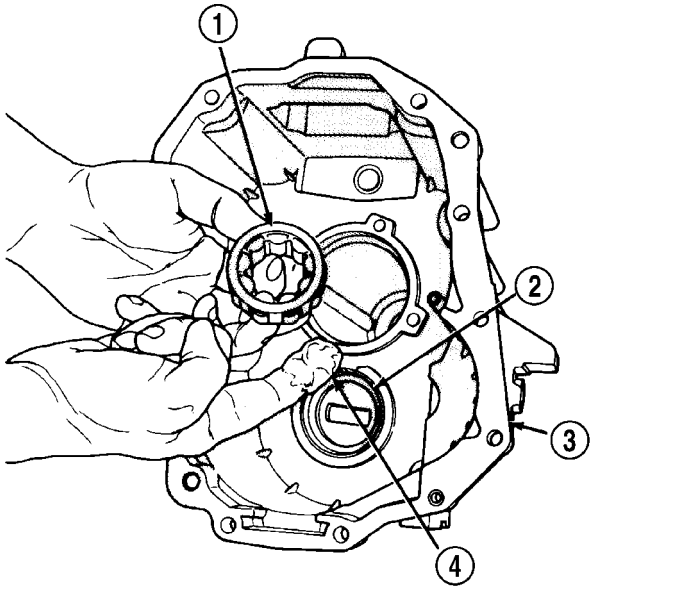


Fig. 92 COUNTERSHAFT REAR BEARING

1 - COUNTERSHAFT REAR BEARING
2 - REAR BEARING RACE
3 - REAR HOUSING
4 - PETROLEUM JELLY

NOTE: Large diameter side of the roller retainer faces the countershaft and the small diameter side faces the race and housing (Fig. 93).

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

(5) Apply light coat of petroleum jelly to shift shaft bushing/bearing in rear housing (Fig. 93).

(6) Reach into countershaft rear bearing with finger and push each bearing roller outward against the race. Then apply extra petroleum jelly to hold rollers in place during housing installation.

(7) Install rear housing onto geartrain (Fig. 94) and verify bearing retainer pilot stud is in correct bolt hole in housing. Verify countershaft and output shaft bearings are aligned in housing and on countershaft.

NOTE: It may be necessary to lift upward on countershaft slightly to ensure that the countershaft rear bearing engages to the countershaft before the rear output shaft bearing engages the housing.

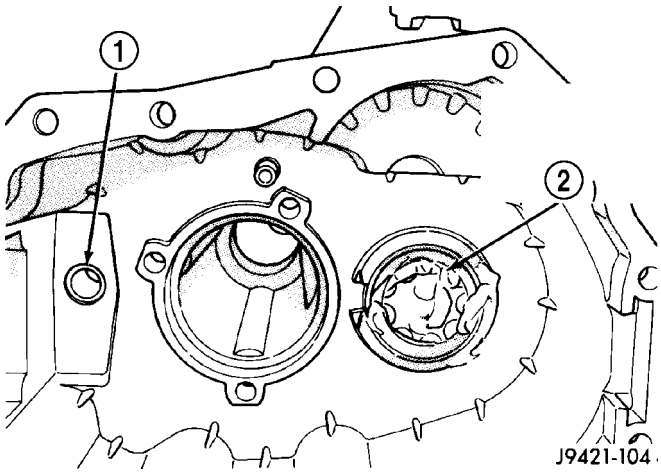


Fig. 93 COUNTERSHAFT BEARING

1 - SHIFT SHAFT BUSHING/BEARING
2 - COUNTERSHAFT REAR BEARING

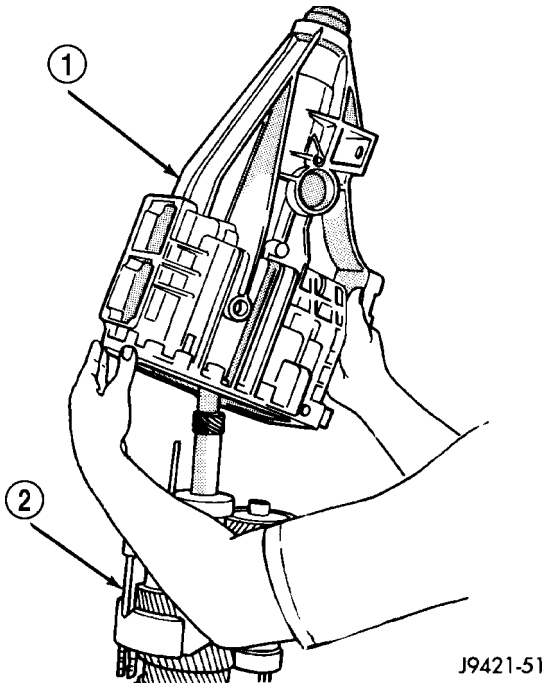


Fig. 94 REAR HOUSING

1 - REAR HOUSING
2 - SHIFT FORKS AND GEARTRAIN

(8) Seat rear housing on output shaft rear bearing and countershaft by tapping the housing with a plastic mallet.

MANUAL TRANSMISSION - NV3500 (Continued)

(9) Apply Mopar Gasket Maker or equivalent to housing bolt threads, bolt shanks and under bolt heads (Fig. 95).

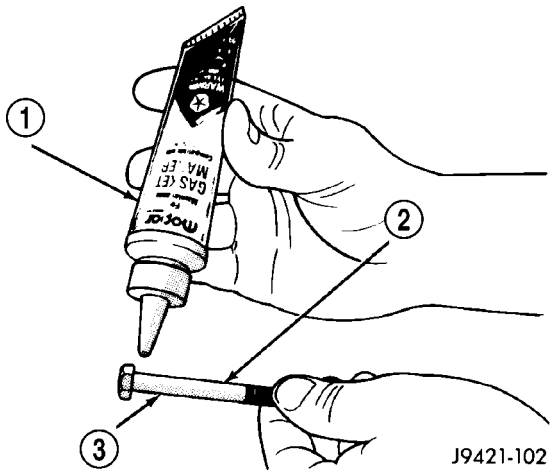


Fig. 95 HOUSING BOLTS

1 - GASKET MAKER
2 - RETAINER AND HOUSING BOLTS
3 - APPLY SEALER TO UNDERSIDE OF BOLT HEAD, SHANK AND THREADS

(10) Start first two bolts in retainer (Fig. 96). It may be necessary to move retainer rearward (with pilot stud) in order to start bolts in retainer.

(11) Remove Alignment Pin 8120 and install last retainer bolt (Fig. 96).

(12) Tighten retainer bolts to 30-35 N·m (22-26 ft. lbs.).

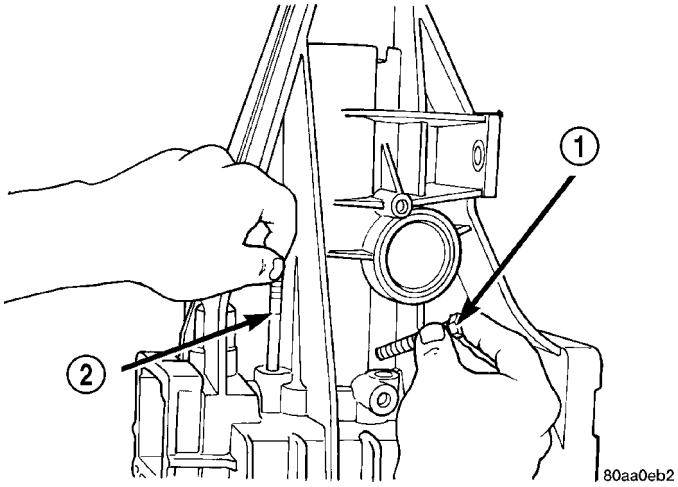


Fig. 96 Alitgnment Pin And Retainer Bolts

1 - BEARING RETAINER BOLT
2 - ALIGNMENT PIN

ADAPTER HOUSING - 4WD

NOTE: Transmission shift components must be in Neutral to prevents damaging to the synchro and shift components when installing the housings.

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

(2) Position rear bearing retainer in adapter housing (Fig. 97).

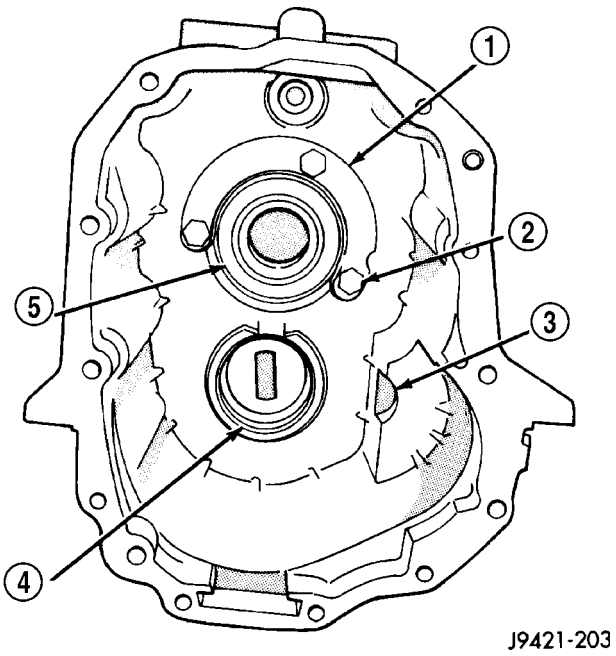


Fig. 97 ADAPTER HOUSING

1 - BEARING RETAINER
2 - RETAINER BOLT
3 - IDLER SHAFT NOTCH
4 - COUNTERSHAFT BEARING RACE
5 - REAR BEARING

(3) Apply Mopar Gasket Maker or equivalent to threads, bolt shanks and under hex heads of bearing retainer bolts (Fig. 95).

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

(5) Install countershaft rear bearing in bearing race (Fig. 93).

NOTE: Large diameter side of the roller retainer faces the countershaft and the small diameter side faces the race and housing (Fig. 93).

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

(7) Apply light coat of petroleum jelly to shift shaft bushing/bearing in adapter housing (Fig. 93).

(8) Install adapter housing on geartrain.

(9) Install rear bearing snap ring on output shaft (Fig. 98).

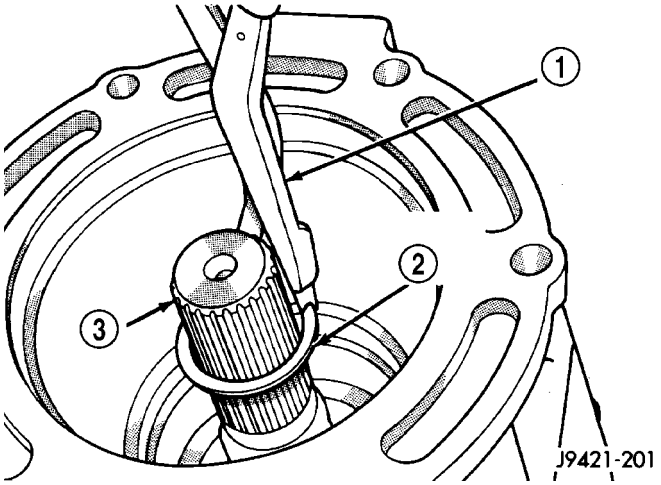


Fig. 98 REAR BEARING SNAP RING

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

(10) Lubricate lip of new rear seal (Fig. 99) with Mopar Door Ease, or transmission fluid.

(11) Install **new** rear seal in adapter housing bore with Installer C-3860-A. Verify seal is seated in housing bore (Fig. 99).

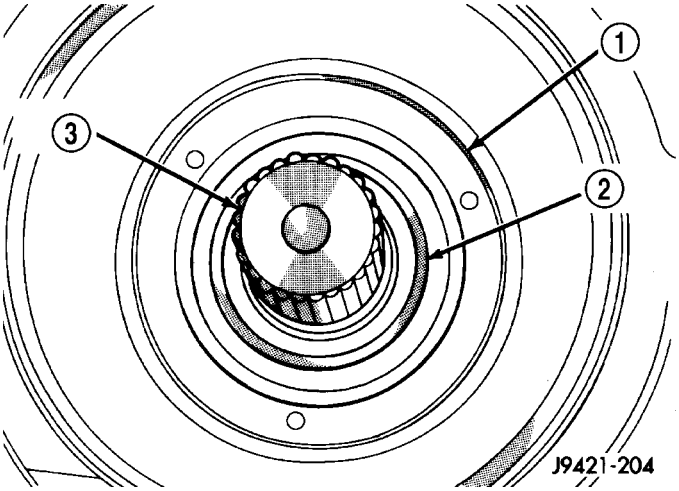


Fig. 99 ADAPTER HOUSING REAR SEAL

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

SHIFT SHAFT, SHAFT LEVER AND BUSHING AND SHIFT SOCKET

(1) Verify all synchro sleeves are in Neutral position (centered on hub).

CAUTION: Transmission synchros must all be in Neutral position to prevent damaging the housings, shift forks and gears while installing the housings.

(2) Install 3-4 shift fork in synchro sleeve (Fig. 100). Verify groove in fork arm is aligned with grooves in 1-2 and fifth-reverse fork arms as shown.

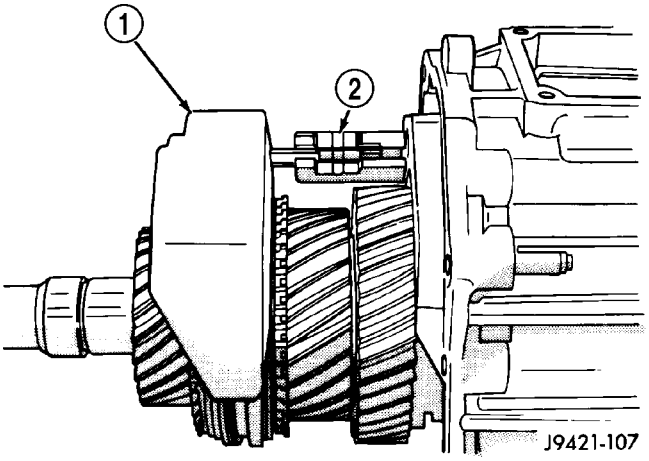


Fig. 100 3-4 SHIFT FORK

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

(3) Slide shift shaft through 3-4 shift fork (Fig. 101).

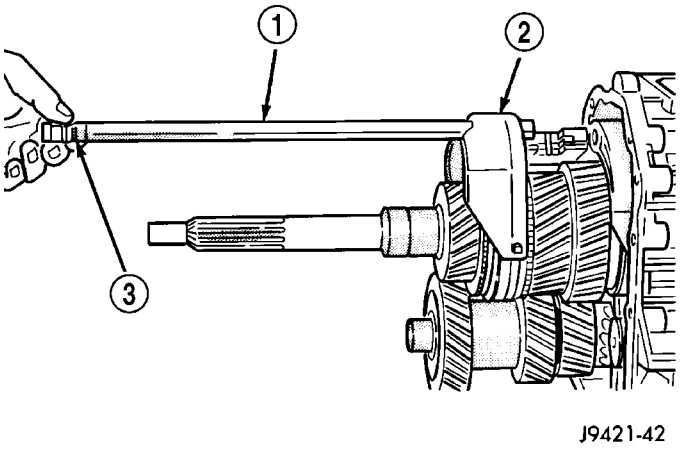


Fig. 101 SHIFT SHAFT

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

MANUAL TRANSMISSION - NV3500 (Continued)

(4) Assemble shift shaft shift lever and bushing (Fig. 102). Verify slot in bushing is facing up and roll pin hole for lever is aligned with hole in shaft.

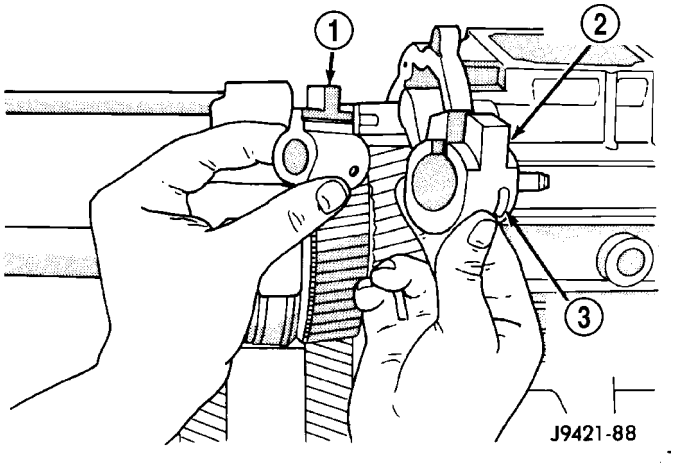


Fig. 102 SHIFT SHAFT LEVER AND BUSHING

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

(5) Install assembled lever and bushing on shift shaft (Fig. 103).

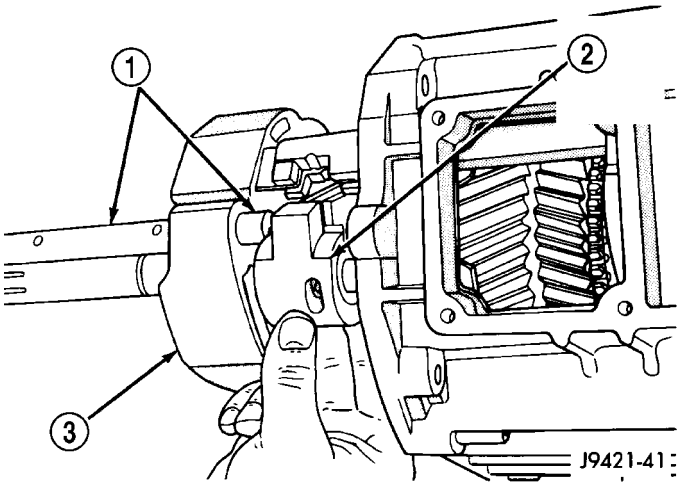


Fig. 103 SHIFT SHAFT LEVER AND BUSHING

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

(6) Slide shift shaft through 1-2 and fifth-reverse fork and into shift lever opening in rear housing (Fig. 104).

(7) Align shift socket with shaft and slide shaft through socket and into shift shaft bearing in rear housing (Fig. 105).

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

CAUTION: Both shaft roll pins can be installed when the shaft is 180° off. If this occurs, the transmission will have to be disassembled again to correct shaft alignment.

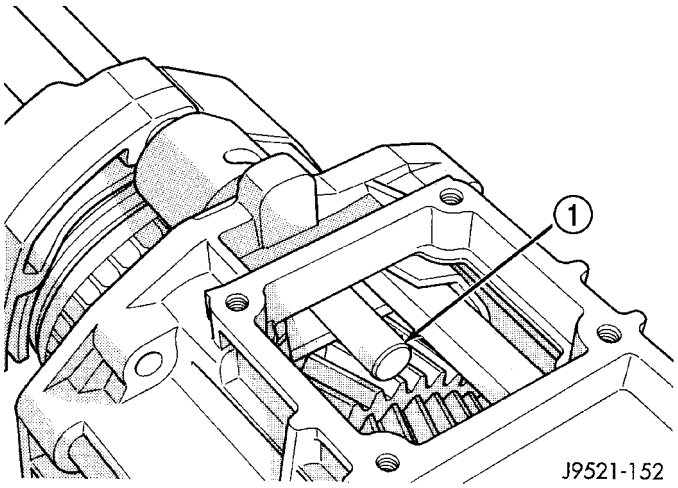


Fig. 104 SHAFT LEVER OPENING

1 - SHIFT SHAFT

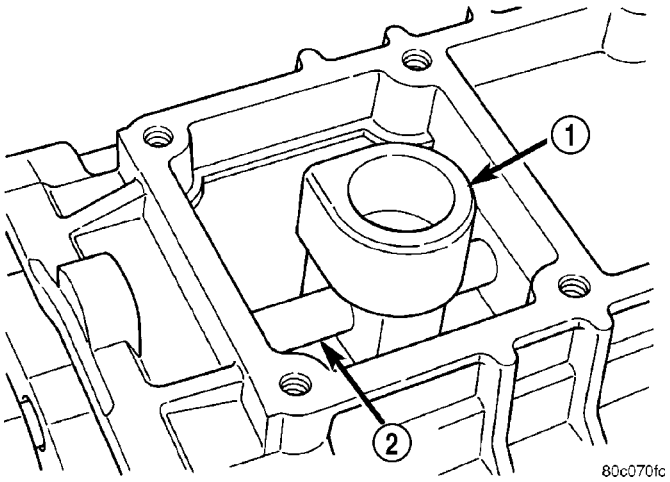


Fig. 105 SHIFT SOCKET

1 - SHIFT SOCKET
2 - SHIFT SHAFT

(9) Select correct **new** roll pin for shift shaft lever (Fig. 106). Shaft lever roll pin is approximately 22 mm (7/8 in.) long. Shift socket roll pin is approximately 33 mm (1-1/4 in.) long.

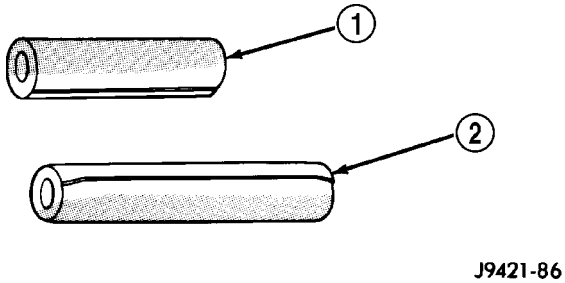


Fig. 106 ROLL PIN IDENTIFICATION

1 - SHAFT LEVER ROLL PIN
2 - SHIFT SOCKET ROLL PIN

MANUAL TRANSMISSION - NV3500 (Continued)

(10) Align roll pin holes in shift shaft, lever and bushing. Then start roll pin into shaft lever by hand (Fig. 107).

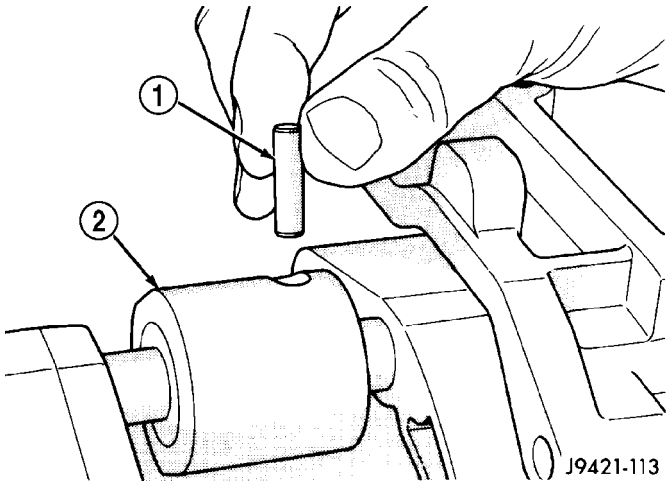


Fig. 107 SHIFT SHAFT ROLL PIN

1 - SHAFT LEVER ROLL PIN
2 - LEVER AND BUSHING

(11) Seat shaft lever roll pin with pin punch (Fig. 108).

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

(12) Verify that lock pin slot in lever bushing is positioned as shown (Fig. 108).

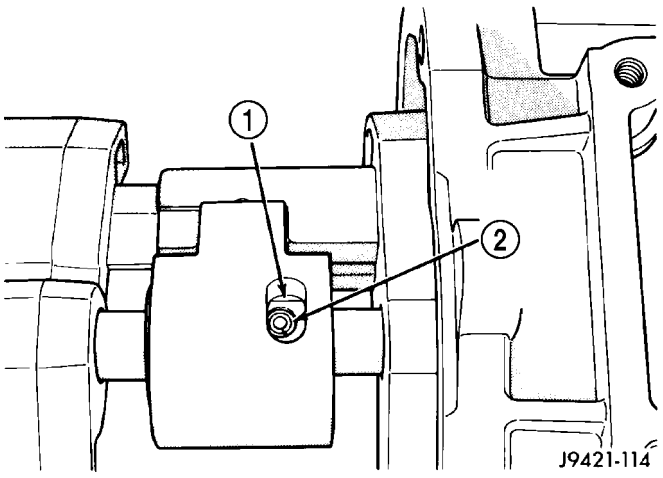


Fig. 108 SHIFT SHAFT/LEVER ROLL PIN

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

(13) Align roll pin holes in shift socket and shift shaft. Then start roll pin into shift shaft by hand (Fig. 109).

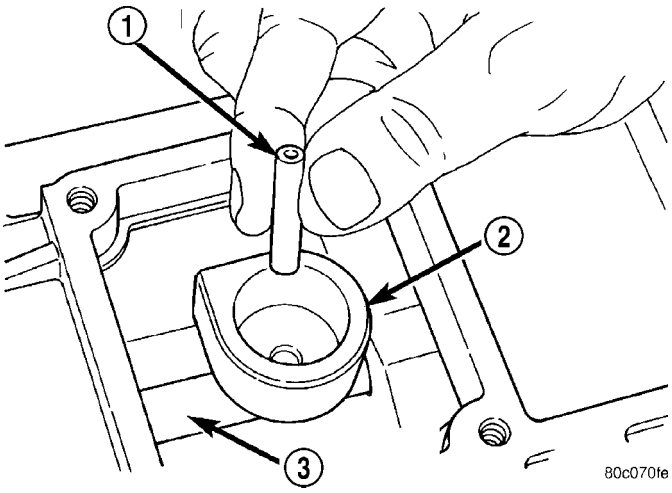


Fig. 109 SHIFT SOCKET ROLL PIN

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

(14) Seat roll pin in shift socket with pin punch. Roll pin must be flush with socket after installation (Fig. 110).

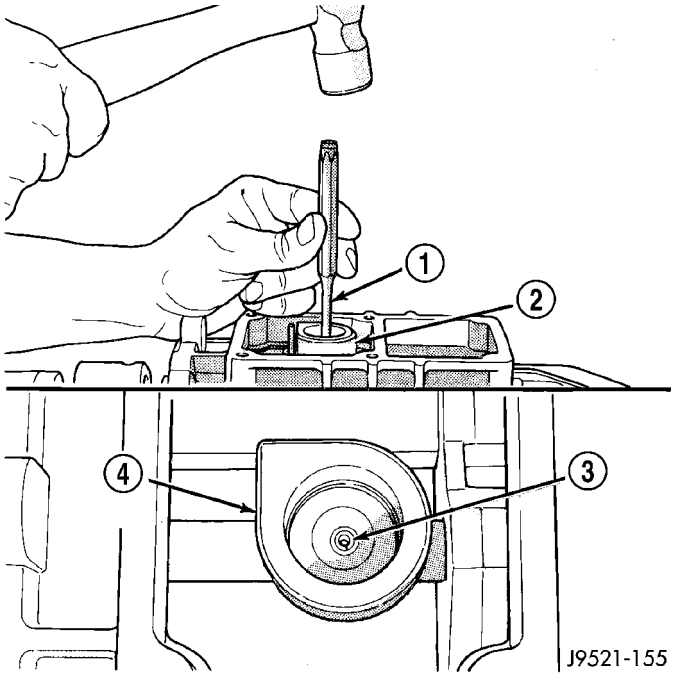


Fig. 110 SEAT SHIFT SOCKET

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

(15) Verify that notches in shift fork arms are aligned (Fig. 111). Realign arms if necessary.

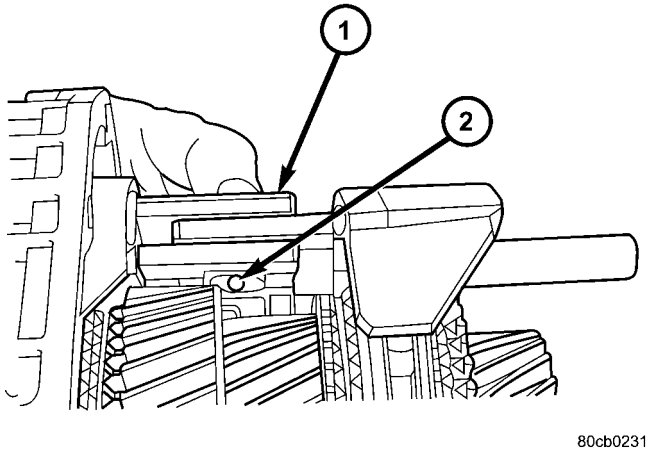


Fig. 111 SHIFT LEVER POSITION

1 - SHIFT FORK ARMS
2 - DETENT BORE

(16) Rotate shift lever and bushing downward to expose detent bore in the lever.

(17) Install detent spring then the ball into the detent bore (Fig. 112) and hold the ball in the lever. Then rotate the lever upward into the fork arm notches.

NOTE: Verify detent ball is seated in the fork arms before proceeding.

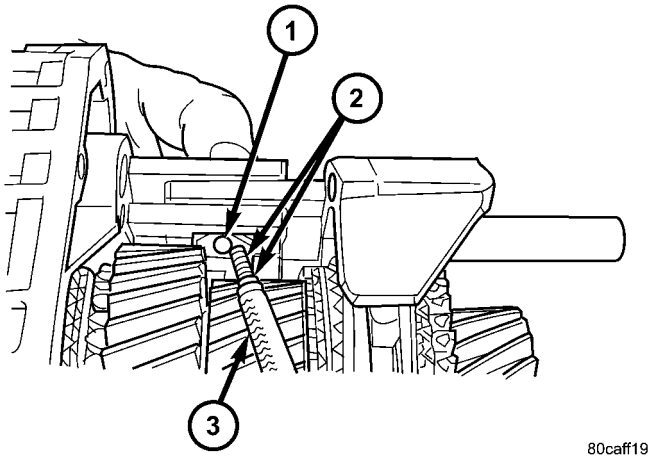


Fig. 112 DETENT SPRING AND BALL

1 - SHAFT LEVER
2 - SPRING AND BALL
3 - MAGNET

FRONT HOUSING AND INPUT SHAFT BEARING RETAINER

(1) If previously removed, install input shaft bearing in front housing bore (Fig. 113). Install snap ring and use plastic mallet to seat bearing. Bearing goes in from front side of housing only.

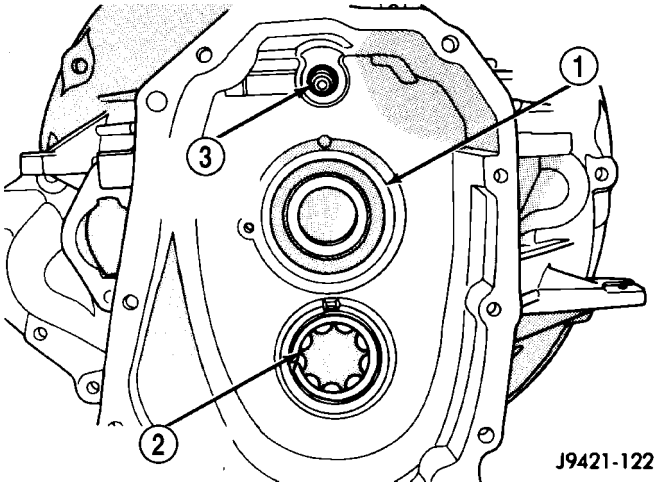


Fig. 113 INPUT SHAFT & COUNTERSHAFT BEARING

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

(2) Apply liberal quantity of petroleum jelly to countershaft front bearing. Then insert bearing in front housing race (Fig. 113). Large diameter side of bearing cage goes toward countershaft (Fig. 114). Small diameter side goes toward bearing race in housing.

(3) Reach into countershaft front bearing with finger and push each bearing roller outward against race. Then apply extra petroleum jelly to hold rollers in place during housing installation.

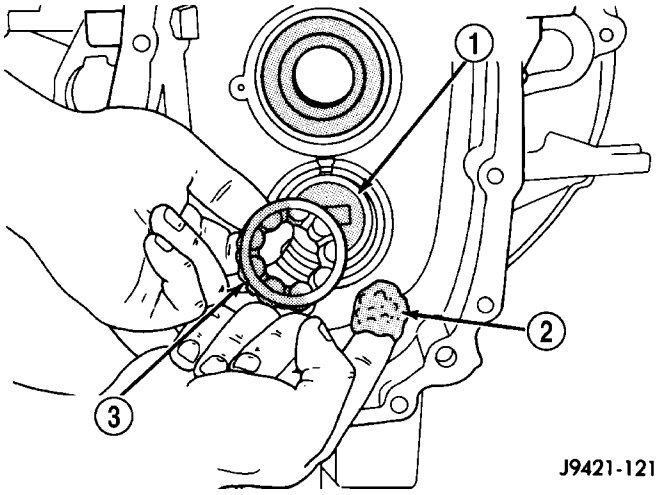


Fig. 114 COUNTERSHAFT FRONT BEARING

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

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

MANUAL TRANSMISSION - NV3500 (Continued)

(5) Apply 1/8 in. wide bead of Mopar Gasket Maker or equivalent to mating surfaces of front and rear housings (Fig. 115).

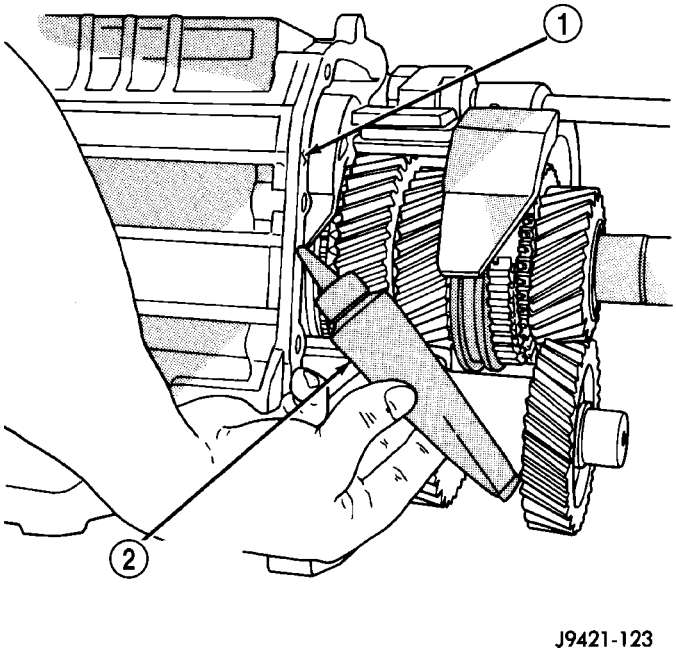


Fig. 115 SEAL HOUSINGS

1 - HOUSING FLANGE SURFACE
2 -GASKET MAKER

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

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

CAUTION: Front housings will not seat if shift components are not in Neutral or one or more components are misaligned. Do not force the front housing into place.

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

(9) Place transmission in horizontal position.

(10) Apply Mopar Gasket Maker or equivalent to housing attaching bolts. Apply sealer material sealer to underside of bolt heads and to bolt shanks and threads (Fig. 116).

(11) Install and start housing attaching bolts by hand (Fig. 116). Then tighten bolts to 34 N·m (25 ft. lbs.).

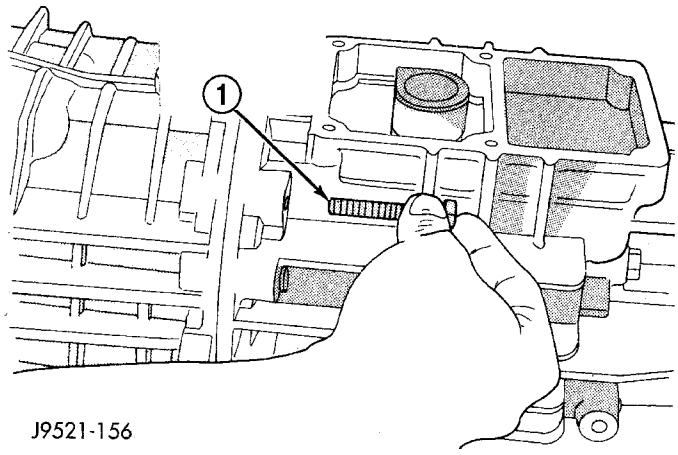


Fig. 116 HOUSING BOLTS

1 - HOUSING BOLTS

(12) Install shift shaft bushing lock bolt (Fig. 117). Apply Mopar Gasket Maker or equivalent to bolt threads, shank and underside of bolt head before installation.

CAUTION: If lock bolt cannot be fully installed the shift shaft is not in Neutral, or the shaft bushing (or lever) is misaligned.

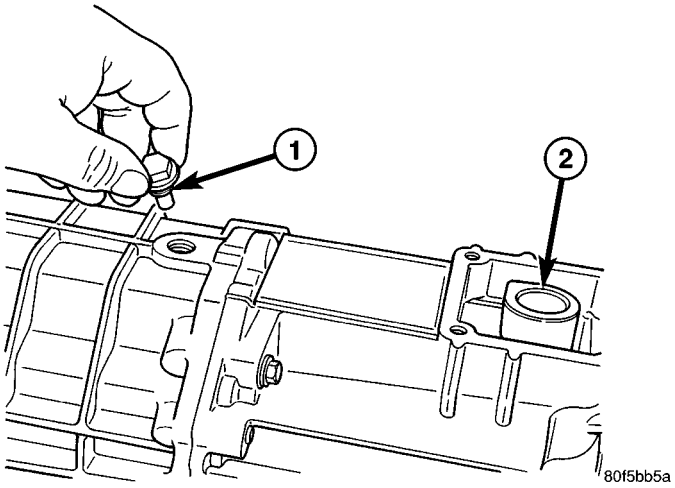


Fig. 117 SHAFT LOCK BOLT

1 - SHIFT SHAFT LOCK BOLT
2 - SHAFT SOCKET

(13) Lubricate then install shift shaft detent plunger in housing bore. Lubricate plunger with semi-synthetic/synthetic grease. Verify plunger is fully seated in detent notch in shift shaft.

(14) Install detent spring inside plunger.

(15) Install detent plug in end of Installer 8123. Position plug on detent spring and compress spring until detent plug pilots in detent plunger bore. Drive detent plug into transmission case until plug seats.

MANUAL TRANSMISSION - NV3500 (Continued)

(16) Install backup light switch (Fig. 118).

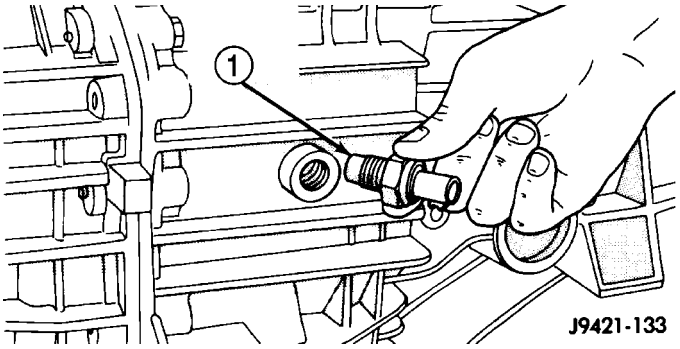


Fig. 118 BACKUP LIGHT SWITCH

1 - BACKUP LIGHT SWITCH

(17) Install input shaft snap ring (Fig. 119).

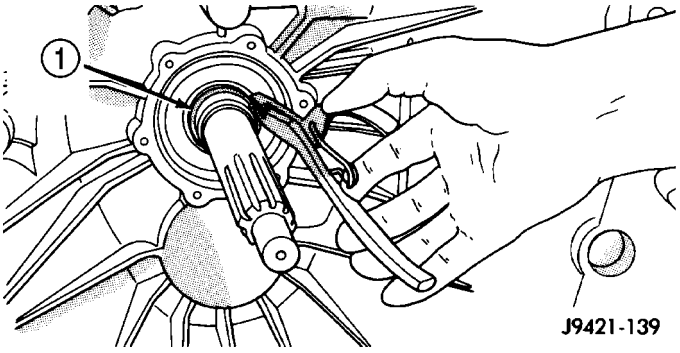


Fig. 119 SHAFT SNAP RING - TYPICAL

1 - INPUT SHAFT SNAP RING

(18) Install **new** oil seal in front bearing retainer with Installer 6448 (Fig. 120).

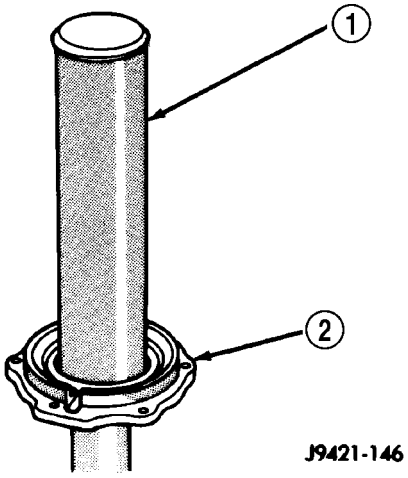


Fig. 120 BEARING RETAINER OIL SEAL

1 - INSTALLER
2 - FRONT BEARING RETAINER

(19) Apply bead of Mopar silicone sealer or equivalent to flange surface of front bearing retainer (Fig. 121).

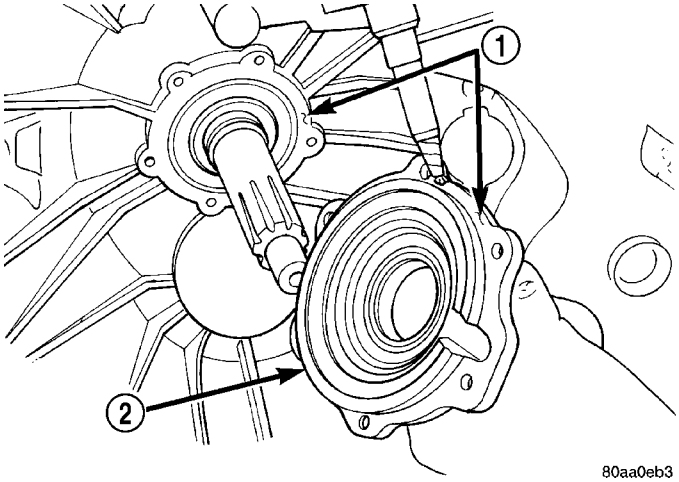


Fig. 121 SEAL BEARING RETAINER - TYPICAL

1 - APPLY SEALER BEAD
2 - INPUT SHAFT BEARING RETAINER

(20) Align and install front bearing retainer over input shaft and onto housing mounting surface (Fig. 122). Verify bolt holes are aligned before seating retainer.

CAUTION: Be sure sealer does not get into the oil feed hole in the transmission case or bearing retainer.

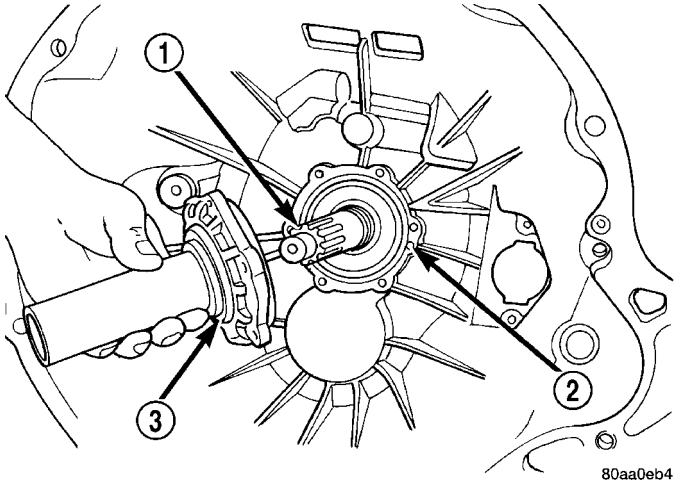


Fig. 122 INPUT SHAFT BEARING RETAINER

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

(21) Install and tighten bearing retainer bolts to 7-10 N·m (5-7 ft. lbs.) (Fig. 123).

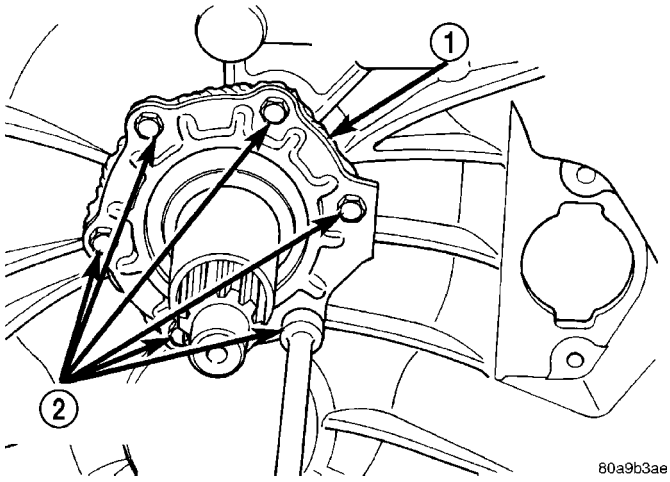


Fig. 123 BEARING RETAINER BOLTS - TYPICAL

1 - RETAINER BOLTS
2 - RETAINER

SHIFT TOWER AND LEVER

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

(2) Shift the transmission into third gear.

(3) Align and install shift tower and lever assembly (Fig. 124). Be sure shift ball is seated in socket and the offset in the tower is toward the passenger side of the vehicle before installing tower bolts.

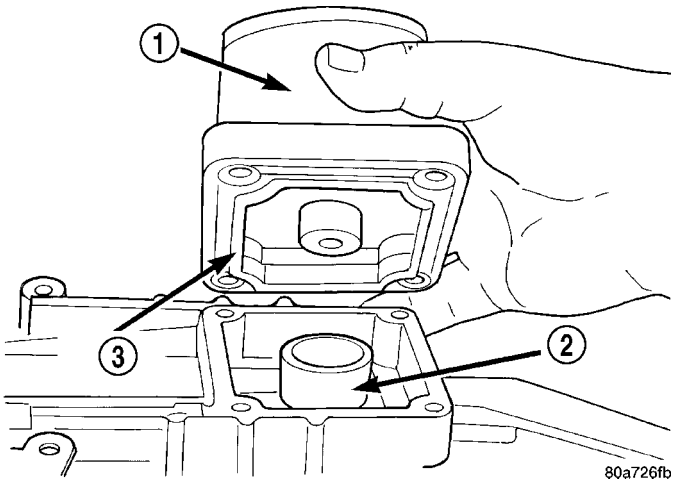


Fig. 124 SHIFT TOWER

1 - SHIFT TOWER
2 - SHAFT SOCKET
3 - SHIFT BALL

(4) Install shift tower bolts (Fig. 125) and tighten bolts to 8.5 N·m (75.2 in. lbs.).

(5) Fill transmission to bottom edge of fill plug hole with lubricant.

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

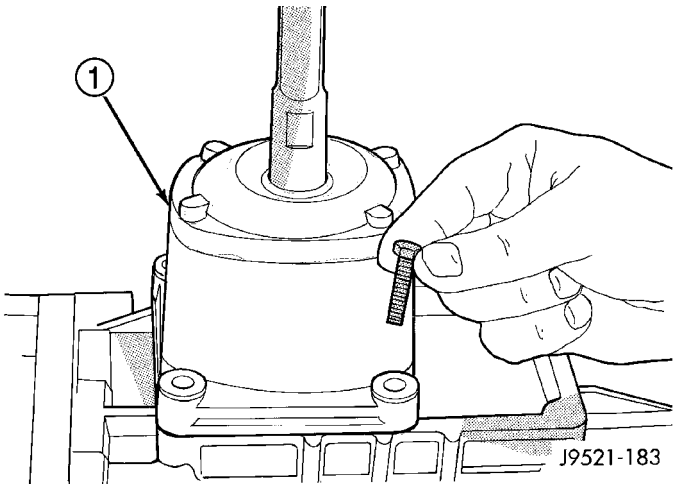


Fig. 125 SHIFT TOWER BOLTS

1 - SHIFT TOWER AND LEVER ASSEMBLY

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

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, do not re-use the original shift tower.

(1) Clean transmission front housing mounting surface.

(2) Apply light coat of Mopar high temperature bearing grease or equivalent to contact surfaces (Fig. 126) of following components:

- release fork ball stud.
- release bearing slide surface.
- input shaft splines.
- release bearing bore.
- propeller shaft slip yoke.

(3) Support and secure transmission to jack.

(4) Raise and align transmission input shaft with clutch disc, then slide transmission into place.

(5) Verify front housing is fully seated. Install transmission bolts without washers and tighten bolts into the engine to 41 N·m (30 ft. lbs.). Tighten the bolts with washers into the transmission to 68 N·m (50 ft. lbs.) (Fig. 127).

(6) Install rear crossmember and tighten nuts to 102 N·m (75 ft. lbs.).

(7) Install transmission rear mounting bolts and tighten to 68 N·m (50 ft. lbs.).

(8) Install front dust shield.

(9) Install structural dust cover and tighten the bolts to 73 N·m (54 ft. lbs.).

(10) Install starter motor.

(11) Install suspension crossmember and tighten nuts to 102 N·m (75 ft. lbs.).

MANUAL TRANSMISSION - NV3500 (Continued)

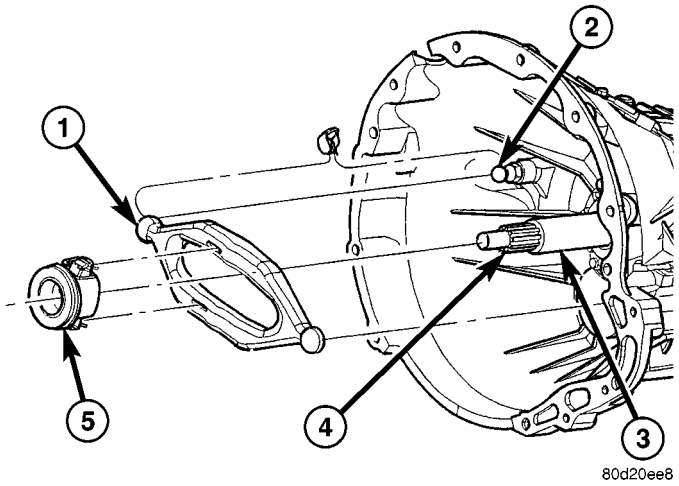


Fig. 126 LUBRICATION POINTS

1 - RELEASE FORK
2 - FORK BALL STUD
3 - BEARING SLIDE SURFACE
4 - SPLINE
5 - RELEASE BEAING

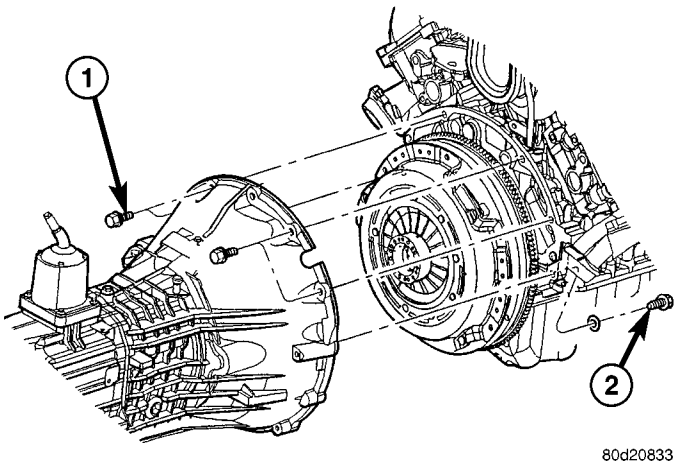


Fig. 127 TRANSMISSION

1 - BOLT WITHOUT WASHER
2 - BOLT WITH WASHER

(12) Connect transmission harnesses to clips on case and connect switches.

(13) Install slave cylinder and tighten cylinder nuts to 23 N·m (200 in. lbs.).

(14) Install transfer case and transfer case linkage if equipped.

(15) Remove transmission jack.

(16) Install propeller shaft/shafts with reference marks aligned.

(17) Install exhaust on the exhaust manifolds.

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

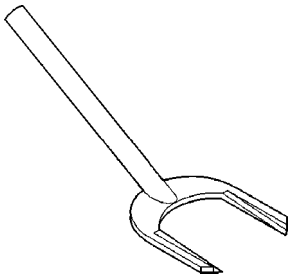
SPECIFICATIONS

TORQUE SPECIFICATIONS

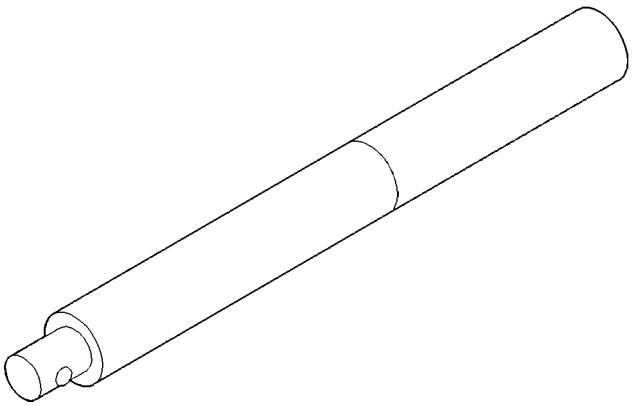
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Crossmember Nuts	102	75	-
Transmission Mount Bolts 4WD	68	50	-
Transmission Mount Bolts 2WD	68	50	-
Structural Dust Cover Bolts	73	54	-
Drain/Fill Plug	9-27	14-20	-
Front To Rear Housing Bolts	30-35	22-26	-
Front Bearing Retainer Bolts	7-10	5-7	62-88
Idler Shaft Bolts	19-25	14-18	-
Rear Bearing Retainer Bolts	30-35	22-26	-
Shift Tower Bolts	7-10	5-7	62-88
Slave Cylinder Nuts	23	17	-
Transfer Case Nuts	47	35	-

MANUAL TRANSMISSION - NV3500 (Continued)

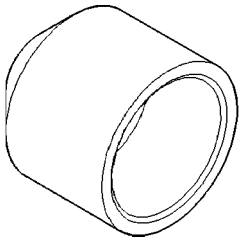
SPECIAL TOOLS



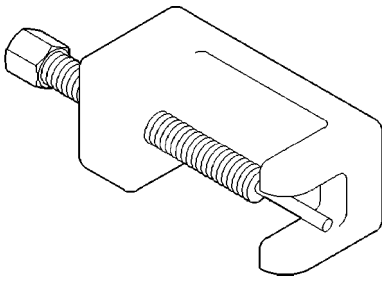
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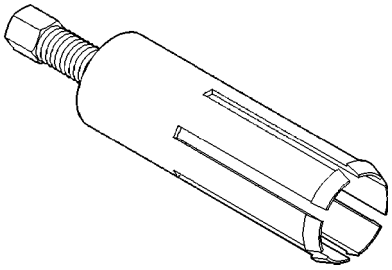
HANDLE C-4171



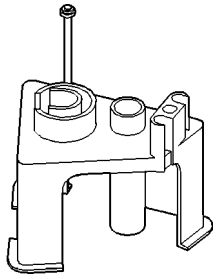
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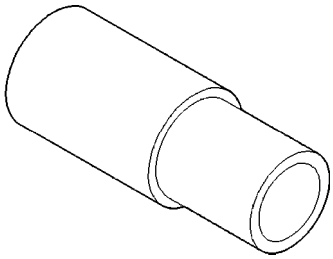
REMOVER/INSTALLER 6858



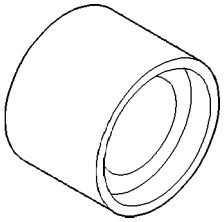
REMOVER 6957



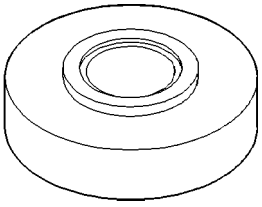
FIXTURE 6747



INSTALLER 6951

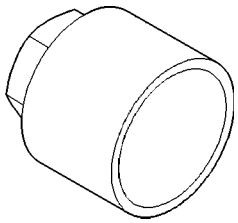


ADAPTER 6747-1A

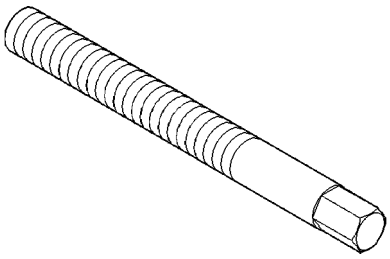


ADAPTER 6747-2A

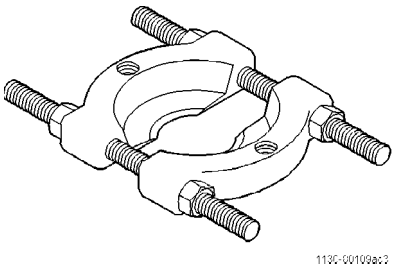
MANUAL TRANSMISSION - NV3500 (Continued)



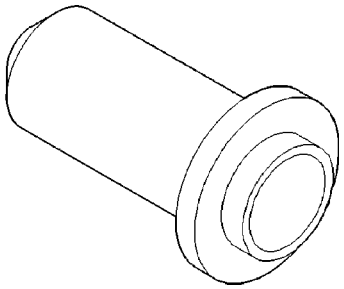
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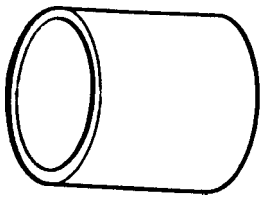
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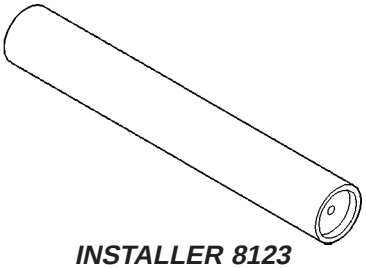
BEARING SPLITTER 1130



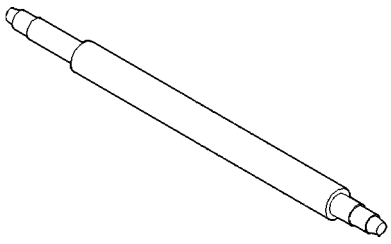
INSTALLER C-3860-A



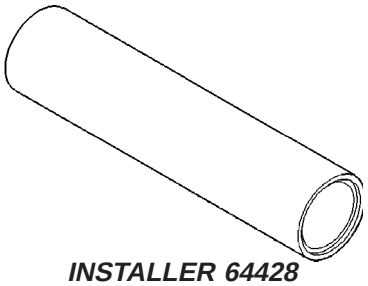
TUBE 6310-1



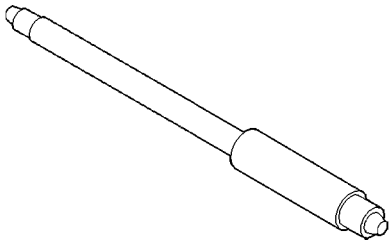
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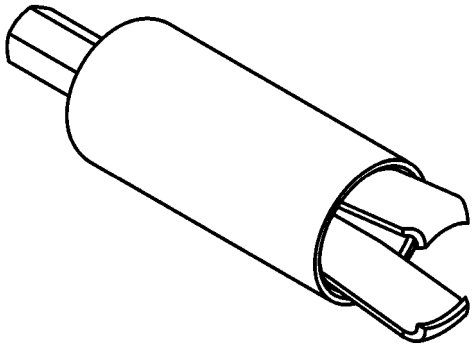
INSTALLER 8118



INSTALLER 64428



REMOVER/INSTALLER 8119



REMOVER 8117A

MANUAL TRANSMISSION - NV4500

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MANUAL TRANSMISSION - NV4500

DESCRIPTION

The NV4500 is a five speed constant mesh manual transmission. 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 5.7L applications and a heavy duty for V10 and Cummins diesel applications. Main difference is a larger diameter input shaft, for 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.

IDENTIFICATION

The transmission identification tag is attached to the driver side PTO cover (Fig. 1).

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.

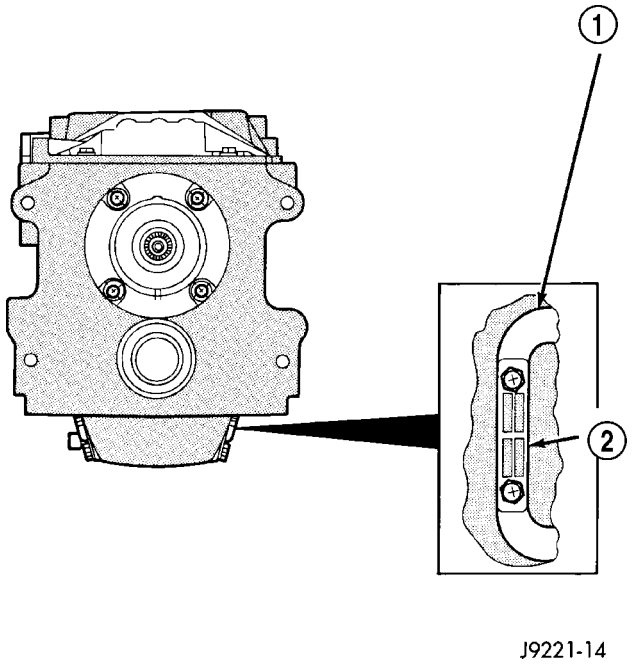


Fig. 1 IDENTIFICATION TAG LOCATION

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 the driver is 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.

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) Shift transmission into Neutral.

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

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

(4) Remove shift tower bolts (Fig. 2).

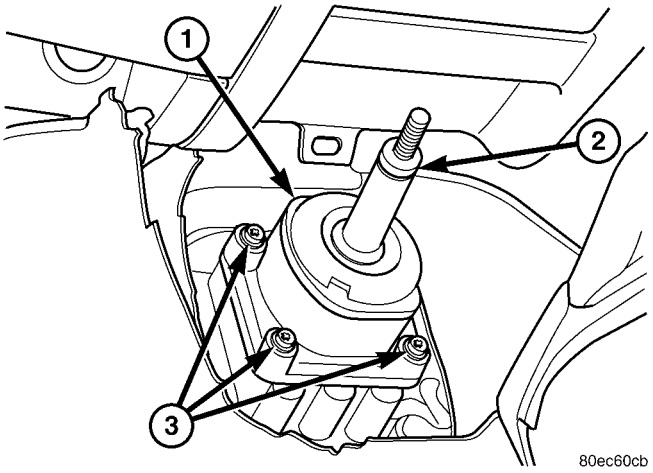


Fig. 2 SHIFT TOWER

1 - SHIFT TOWER
2 - SHIFTER
3 - BOLTS

MANUAL TRANSMISSION - NV4500 (Continued)

(5) Remove shift tower and isolator plate from transmission shift cover.
(6) Raise and support vehicle.
(7) Remove skid plate, if equipped.
(8) Mark propeller shaft and axle yokes for installation reference and remove shaft/shafts.
(9) Remove exhaust system Y-pipe.
(10) Disconnect speed sensor and backup light switch connectors.
(11) Support engine with safety stand and a wood block.
(12) If transmission is to be disassembled, remove drain bolt at bottom of PTO cover and drain lubricant (Fig. 3).

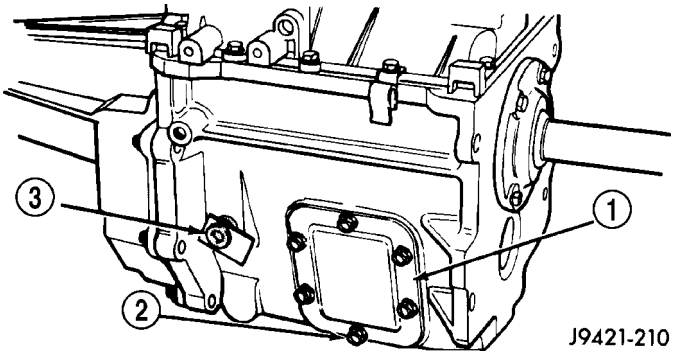


Fig. 3 FILL AND DRAIN PLUGS

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

TWO WHEEL DRIVE

(1) Remove bolts attaching transmission to rear crossmember mount.
(2) Support and secure transmission with safety chains to a transmission jack.
(3) Remove rear crossmember bolts and pry out crossmenber.
(4) Remove clutch slave cylinder bolts and move cylinder aside for clearance.

NOTE: The hydraulic linkage has a quick connect at the slave cylinder. This fitting should not be disconnected.

(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. 4).

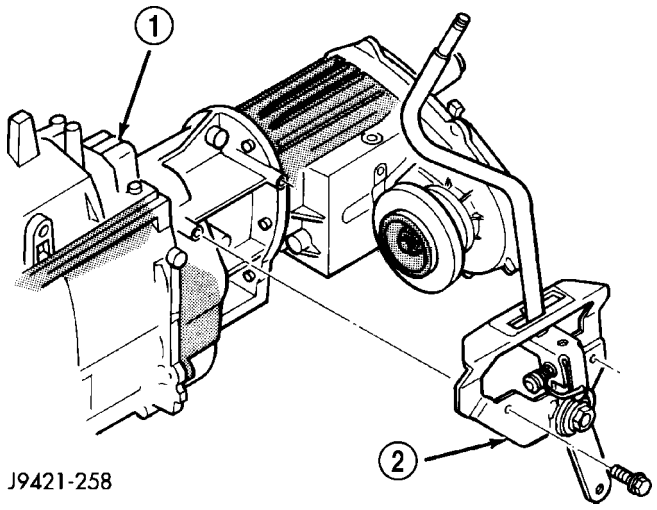


Fig. 4 TRANSFER CASE SHIFTER-TYPICAL

1 - TRANSMISSION
2 - TRANSFER CASE SHIFT MECHANISM

(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 bolts and pry out crossmenber.
(10) Remove clutch slave cylinder splash shield, if equipped.
(11) Remove clutch slave cylinder bolts and move cylinder aside for clearance.

NOTE: The hydraulic linkage has a quick connect at the slave cylinder. This fitting should not be disconnected.

(12) Remove transmission to clutch housing bolts.
(13) Slide transmission and jack rearward until input shaft clears clutch housing.
(14) Lower transmission jack and remove transmission from under vehicle.

DISASSEMBLY

SHIFT MECHANISM

(1) Remove bolts holding shift tower to shift mechanism cover and remove tower.

MANUAL TRANSMISSION - NV4500 (Continued)

(2) Remove bolts (Fig. 5) holding shift mechanism cover to transmission.

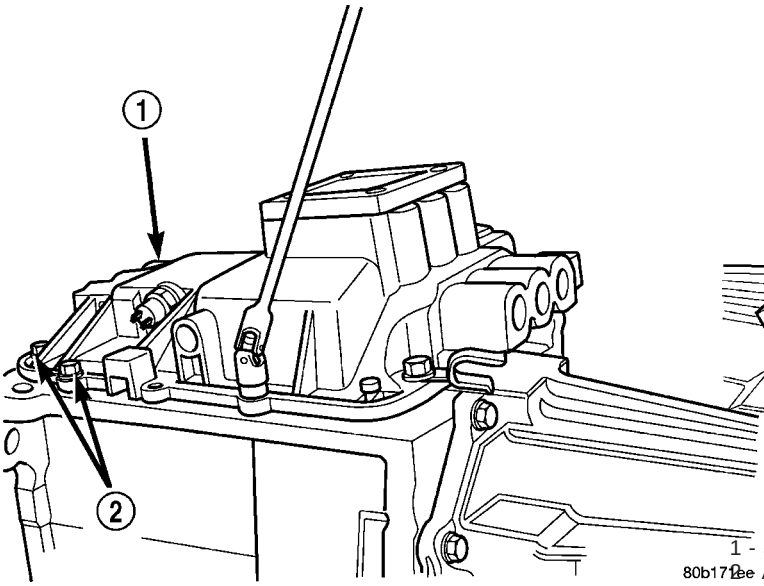


Fig. 5 SHIFT MECHANISM COVER BOLTS

1 - SHIFT MECHANISM COVER
2 - BOLTS

(3) Pry up shift mechanism cover at slot (Fig. 6) in cover.

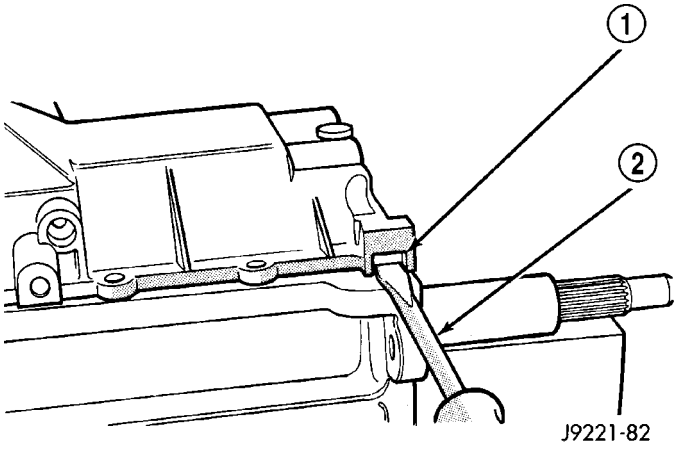


Fig. 6 LOOSEN SHIFT MECHANISM

1 - SHIFT MECHANISM COVER SLOT
2 - PRY TOOL

(4) Raise mechanism up enough to disengage it from the dowl pins (Fig. 7).

(5) Raise front of the mechanism and lift up and off the transmission.

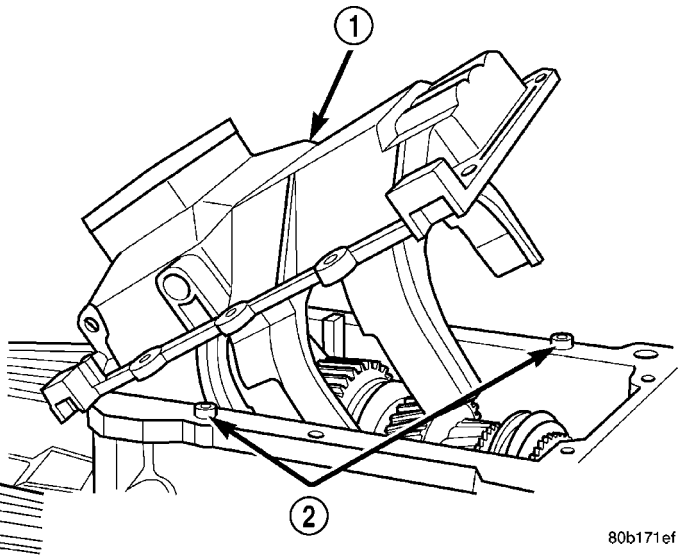


Fig. 7 SHIFT MECHANISM COVER

1 - SHIFT MECHANISM COVER
2 - ALIGNMENT DOWELS

EXTENSION/ADAPTER HOUSING

(1) Remove bolts attaching extension/adapter housing to gear case (Fig. 8).

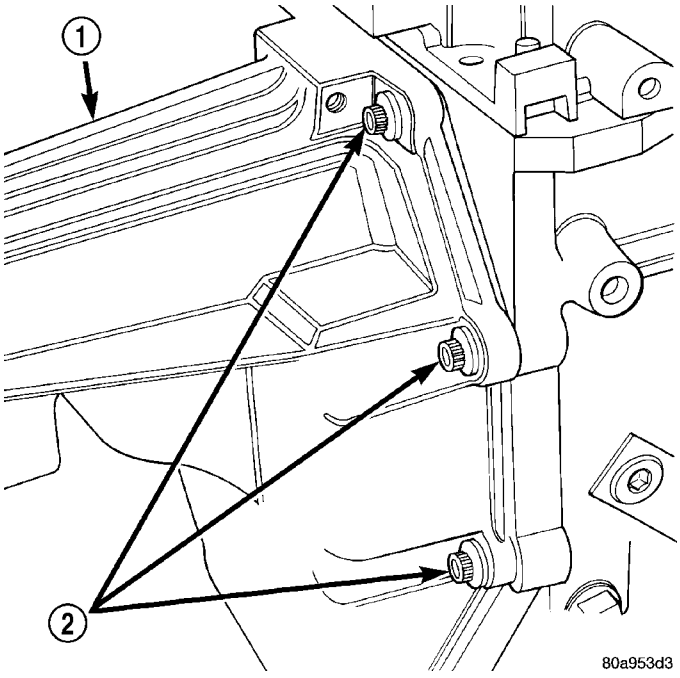


Fig. 8 EXTENSION/ADAPTER HOUSING BOLTS

1 - EXTENSION HOUSING
2 - BOLTS (8)

MANUAL TRANSMISSION - NV4500 (Continued)

(2) Remove extension/adapter housing (Fig. 9). There is one alignment dowel in the gear case and one in the extension/adapter housing.

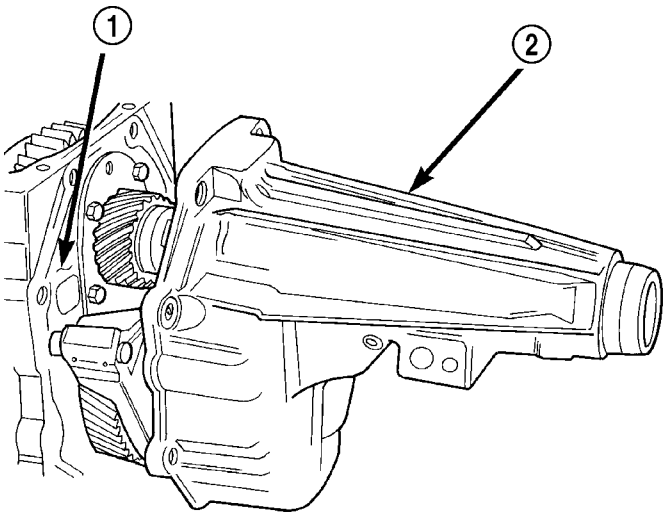


Fig. 9 EXTENSION/ADAPTER HOUSING

1 - GEAR CASE
2 - EXTENSION HOUSING

(3) Remove rubber spline seal from end of mainshaft (Fig. 10). The seal is used to prevent lubricant loss during shipping and does not have to be replaced if damaged.

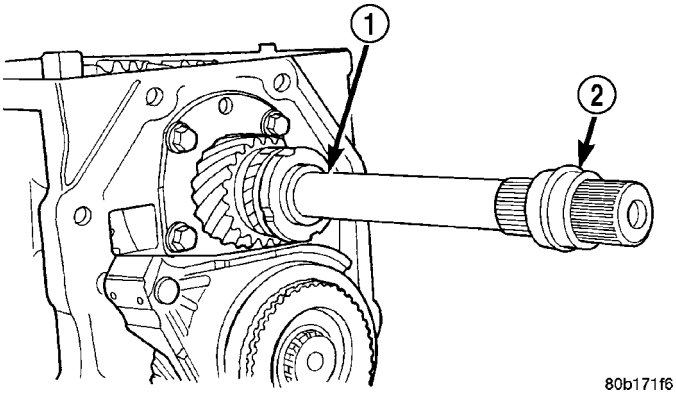


Fig. 10 MAINSHAFT SPLINE SEAL

1 - MAINSHAFT
2 - RUBBER SPLINE SEAL

FIFTH GEAR NUT

(1) Remove extension/adapter housing.

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

(3) Install Wrench 6743 on fifth gear nut (Fig. 11).

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

(4) Install Socket 6993 4X2 or Socket 6984 4X4 with breaker bar to hold mainshaft and remove fifth gear nut.

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

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

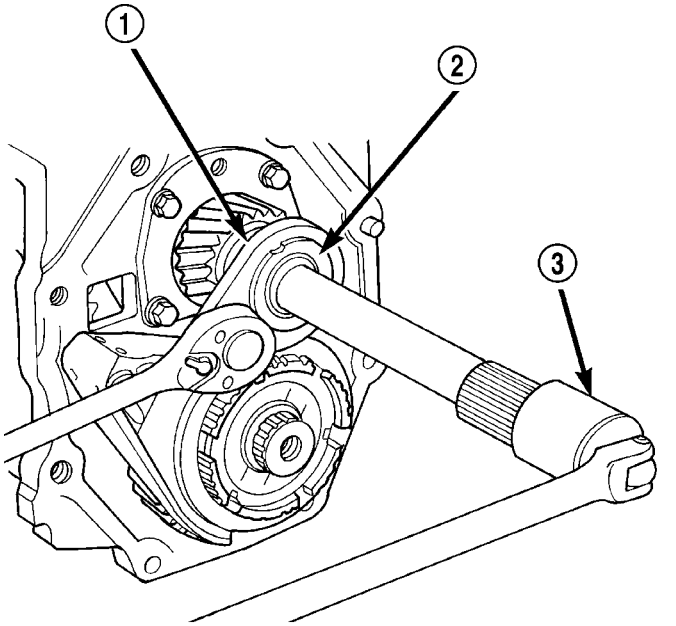


Fig. 11 FIFTH GEAR NUT

1 - WRENCH
2 - FIFTH GEAR NUT
3 - SPLINE SOCKET

FIFTH GEAR

(1) Remove fifth gear shift fork roll pins (Fig. 12). Drive roll pins out from the bottom of fork.

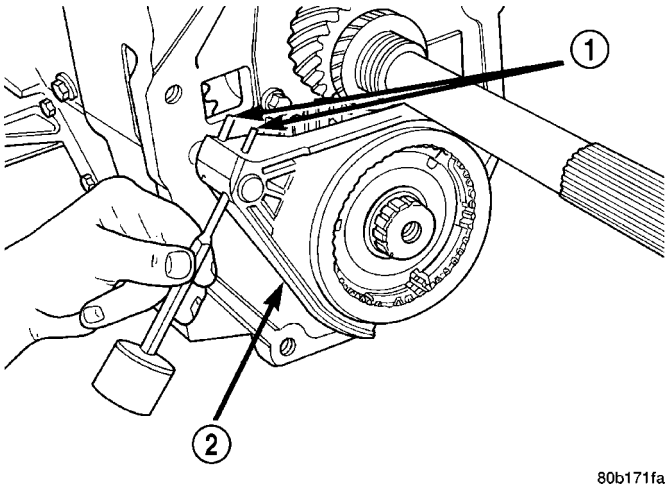


Fig. 12 FIFTH GEAR SHIFT FORK ROLL PINS

1 - ROLL PINS
2 - FIFTH GEAR SHIFT FORK

MANUAL TRANSMISSION - NV4500 (Continued)

(2) Remove fifth gear clutch hub and gear snap ring from countershaft (Fig. 13).

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

(4) Tap off fifth gear shift fork and gear assembly 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.

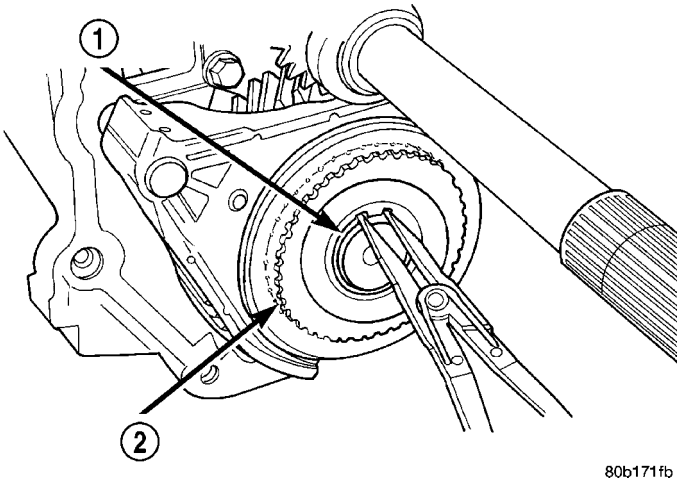


Fig. 13 FIFTH GEAR CLUTCH GEAR SNAP RING

1 - CLUTCH GEAR RING
2 - FIFTH SYNCHRO CLUTCH GEAR

(7) Remove countershaft fifth gear needle bearing assembly (Fig. 14).

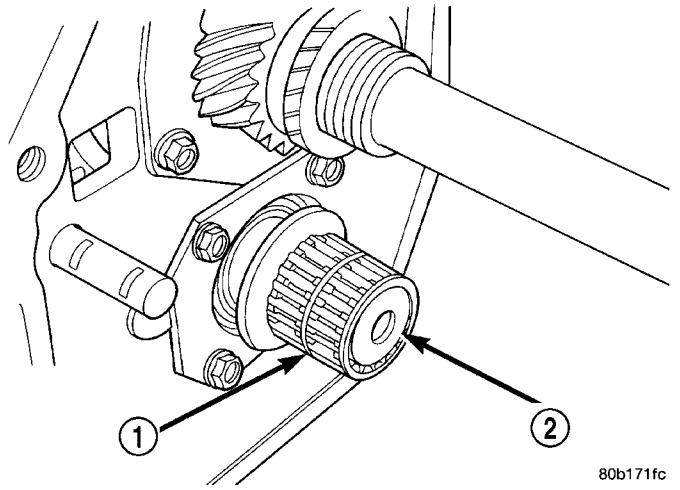


Fig. 14 COUNTERSHAFT FIFTH GEAR NEEDLE BEARING

1 - NEEDLE BEARING
2 - COUNTERSHAFT

(8) Remove coned shape rear bearing thrust washer from countershaft (Fig. 15).

NOTE: Note washer bore locating notch for assembly reference.

(9) Remove thrust washer locating pin from countershaft.

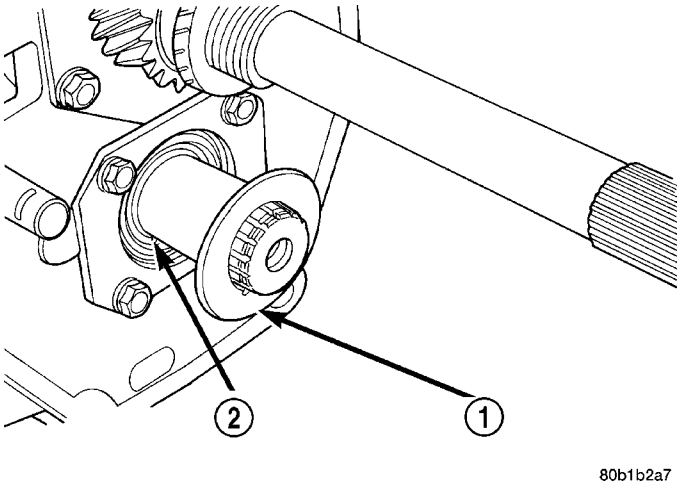


Fig. 15 COUNTERSHAFT REAR BEARING THRUST WASHER

1 - THRUST WASHER
2 - THRUST WASHER PIN

(10) Remove mainshaft fifth gear with Puller Set 6444 and Jaw 6459 or 6820. Position first Jaw on gear (Fig. 16).

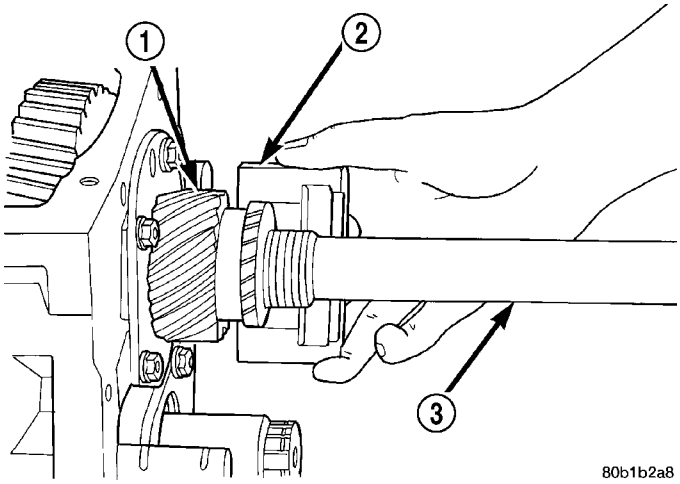


Fig. 16 JAW ON MAINSHAFT FIFTH GEAR

1 - MAINSHAFT FIFTH GEAR
2 - JAW
3 - MAINSHAFT

MANUAL TRANSMISSION - NV4500 (Continued)

(11) Assemble Puller Flange 6444-1and Puller Rods 6444-3 4X2 or 6444-4 4X4 (Fig. 17). Slide assembly onto output shaft and seat flange in notch of jaw.

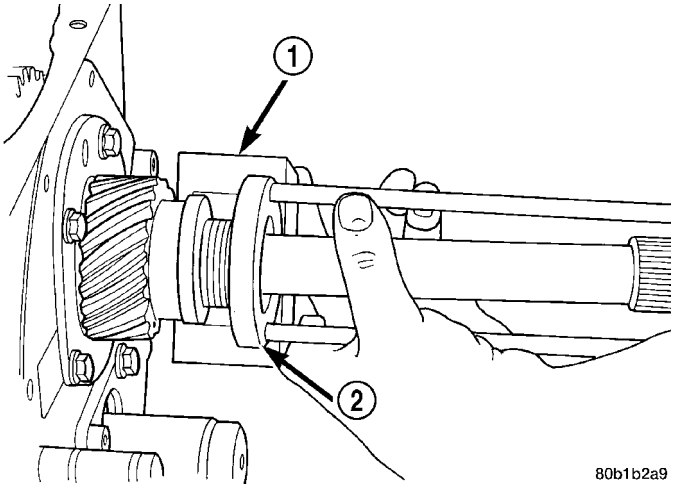


Fig. 17 PULLER FLANGE

1 - JAW
2 - PULLER FLANGE

(12) Position second puller jaw on gear and in notch of puller flange (Fig. 18). Slide Collar 6444-8 over puller jaws to hold them in place.

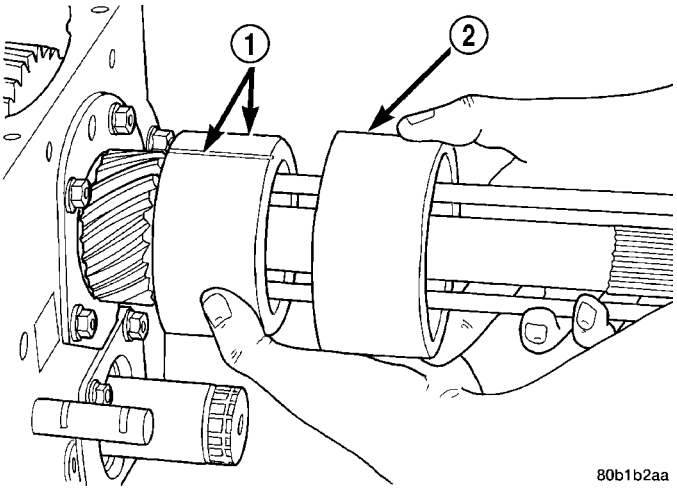


Fig. 18 PULLER COLLAR

1 - JAWS
2 - COLLAR

(13) Install Puller and Bolt 6444 on puller rods and secure puller to rods with retaining nuts (Fig. 19). Tighten puller bolt to remove gear from shaft splines.

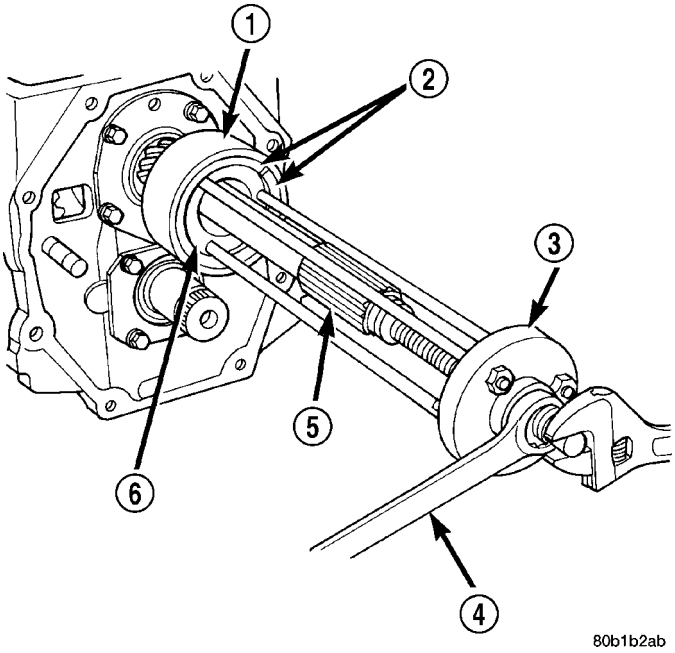


Fig. 19 PULLER ASSEMBLY

1 - COLLAR
2 - JAWS
3 - BOLT
4 - WRENCH
5 - MAINSHAFT
6 - PULLER FLANGE

(14) Remove mainshaft rear bearing plate bolts and remove fifth gear plate end play shims and bearing cup (Fig. 20).

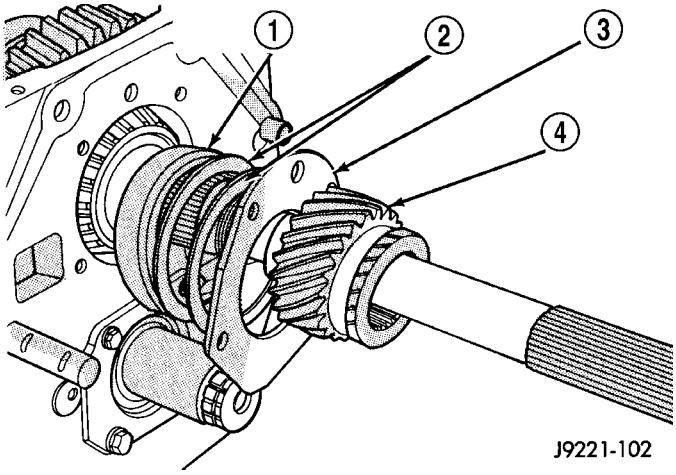


Fig. 20 FIFTH GEAR BEARING PLATE, SHIMS AND BEARING CUP

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

MANUAL TRANSMISSION - NV4500 (Continued)

FRONT RETAINER

(1) Remove and discard front bearing retainer bolts (Fig. 21).

CAUTION: Do not reuse retainer bolts.

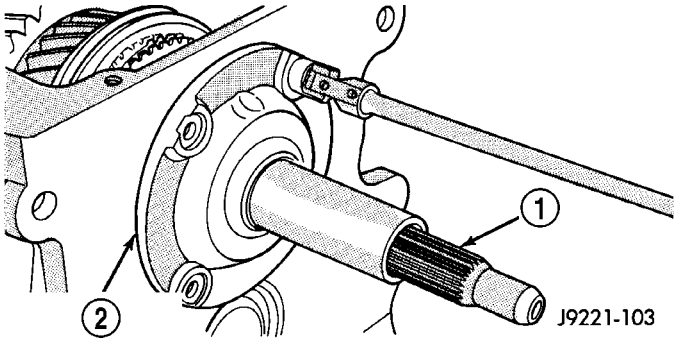


Fig. 21 FRONT BEARING RETAINER

1 - DRIVE GEAR
2 - FRONT BEARING RETAINER

(2) Lightly tap retainer back and forth with plastic mallet 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. 22) collapsing one side of seal then prying it out.

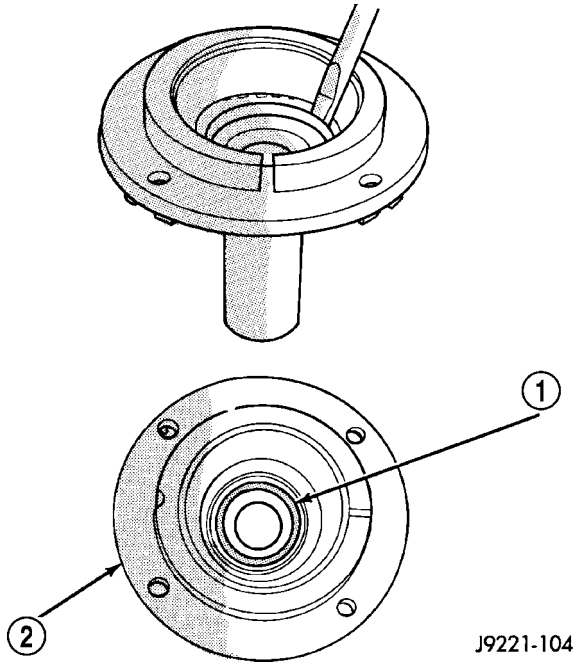


Fig. 22 BEARING RETAINER SEAL

1 - SEAL
2 - FRONT BEARING RETAINER

(4) Remove front retainer bearing cup with Puller 6444. Assemble Puller Flange 6444-1 and Puller Rods 6444-4 (Fig. 23). Insert Jaws 6453-1 in puller flange. Narrow lip of puller jaws will go under bearing cup.

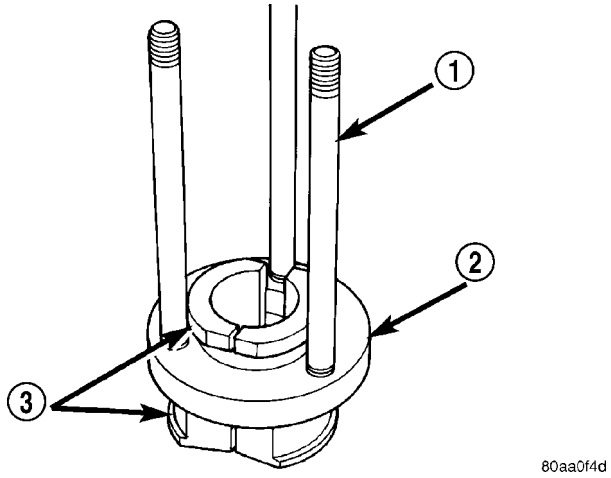


Fig. 23 PULLER RODS, FLANGE AND JAWS

1 - RODS
2 - FLANGE
3 - JAWS

(5) Install Disc C-4487-1 into bearing retainer for Insert 6453-2 to rest upon.

(6) Install assembled tools in front retainer (Fig. 24) with puller jaws seated under bearing cup. Place Insert 6453-2 in center of puller jaws, to hold puller jaws in place.

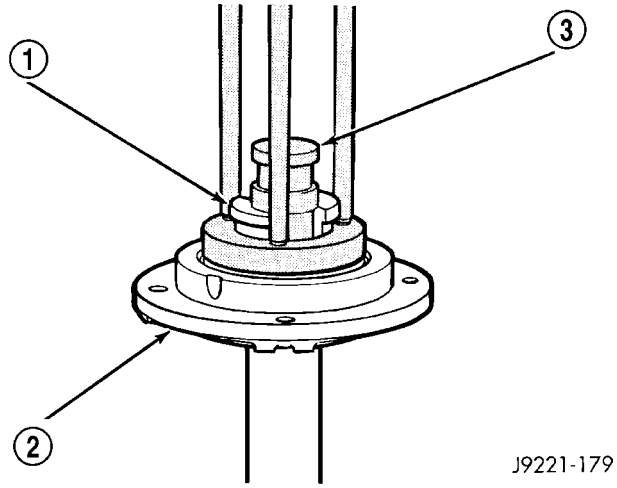


Fig. 24 INSERT AND RETAINER

1 - INSERT
2 - FRONT RETAINER
3 - JAWS

(7) Install Puller 6444 on puller rods (Fig. 25) and install retaining nuts on puller rods. Tighten puller bolt to draw bearing cup out of retainer.

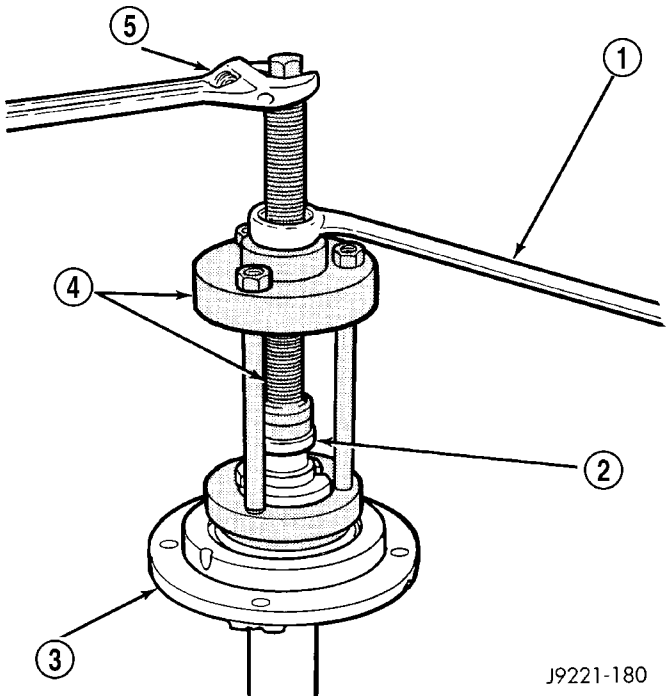


Fig. 25 BEARING CUP PULLER ASSEMBLY

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

DRIVE GEAR

(1) Remove drive gear (Fig. 26).

(2) Remove pilot bearing from drive gear (Fig. 27).

(3) Remove tapered bearing from drive gear with Puller Flange 6444-1 and Puller Rods 6444-6 (Fig. 28).

(4) Position first Jaw 6447 on bearing. Slide assembled puller flange and rod tools onto input shaft. Then seat flange in notch of puller jaw.

(5) Position second Jaw 6447 on gear and in notch of puller flange. Slide Collar 6444-8 over puller jaws to hold them in place.

(6) Install Puller 6444 on puller rods then install retaining nuts. Tighten puller bolt to remove bearing cone from drive gear.

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. 29).

(3) Remove fourth gear clutch gear and synchro stop ring from mainshaft (Fig. 30).

(4) Roll gear case onto left side.

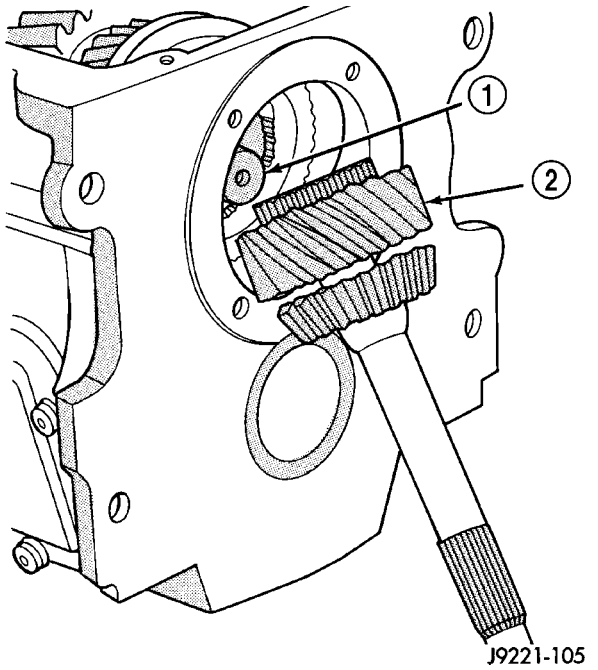


Fig. 26 DRIVE GEAR

1 - MAINSHAFT
2 - DRIVE GEAR

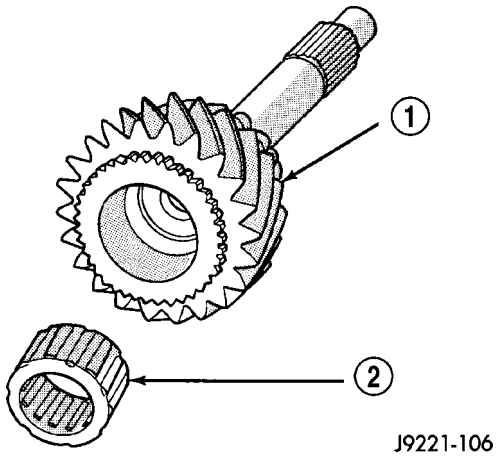


Fig. 27 PILOT BEARING

1 - DRIVE GEAR
2 - MAINSHAFT PILOT BEARING

(5) Remove mainshaft assembly (Fig. 31) by lifting front end of mainshaft slightly. Then grasp mainshaft rear splines and turn spline end of mainshaft counterclockwise to rotate shaft and geartrain out of case. Tilt mainshaft outward and removed from case.

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

REVERSE IDLER AND COUNTERSHAFT

(1) Remove countershaft rear bearing plate (Fig. 32).

MANUAL TRANSMISSION - NV4500 (Continued)

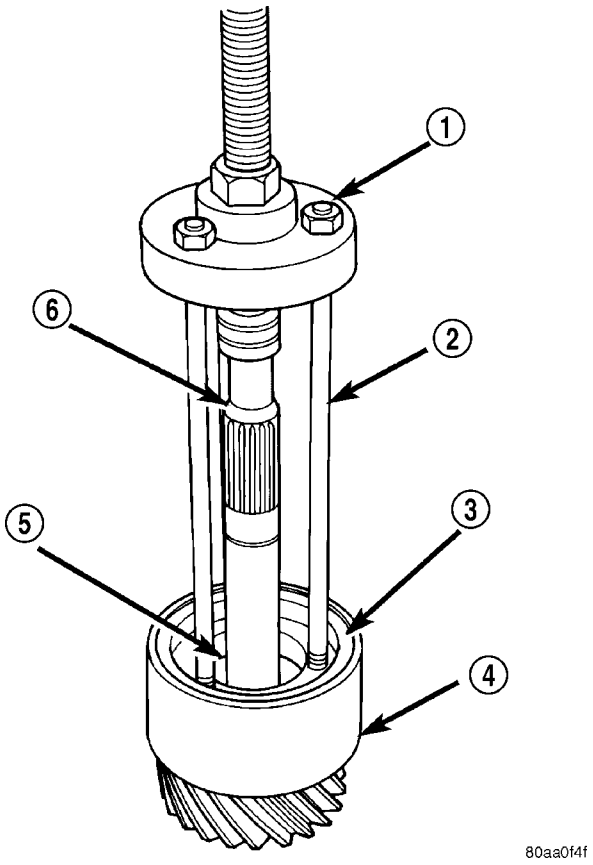


Fig. 28 FRONT BEARING PULLER

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

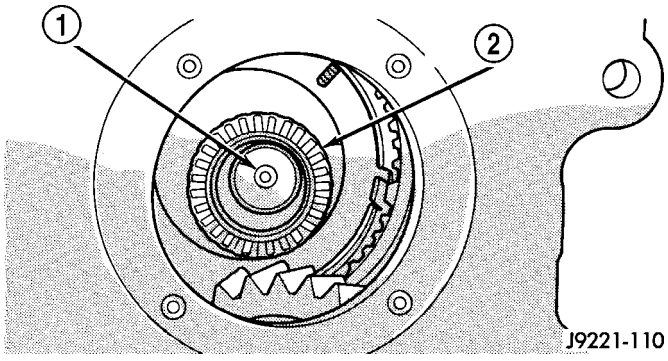


Fig. 29 DRIVE GEAR THRUST BEARING

1 - MAINSHAFT
2 - DRIVE GEAR THRUST BEARING

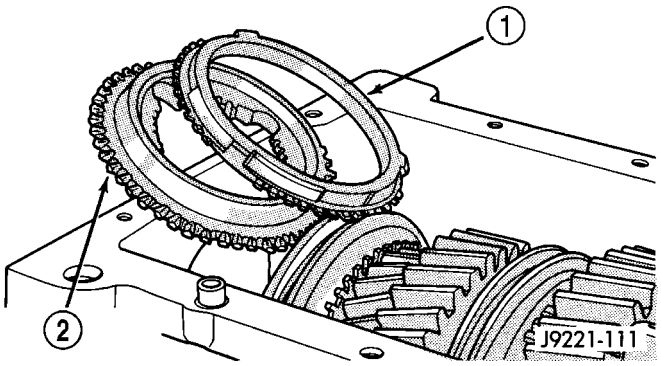


Fig. 30 FOURTH GEAR CLUTCH GEAR STOP RING

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

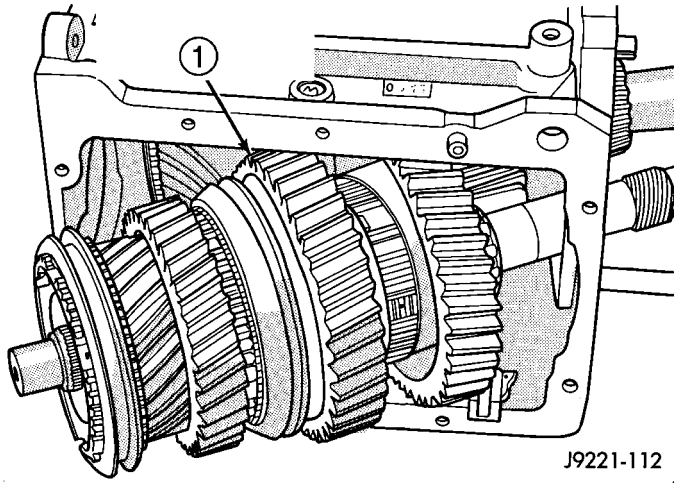


Fig. 31 MAINSHAFT AND GEARTRAIN

1 - MAINSHAFT AND CASE

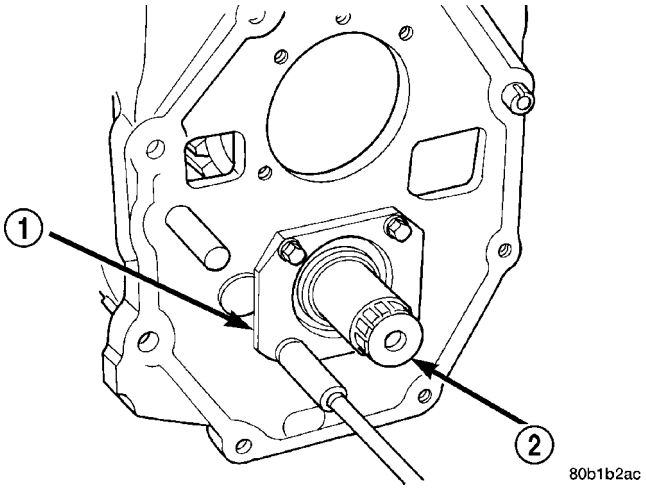


Fig. 32 COUNTERSHAFT REAR BEARING PLATE

1 - REAR BEARING PLATE
2 - COUNTERSHAFT

(2) Remove countershaft end play shim and rear bearing cup (Fig. 33).

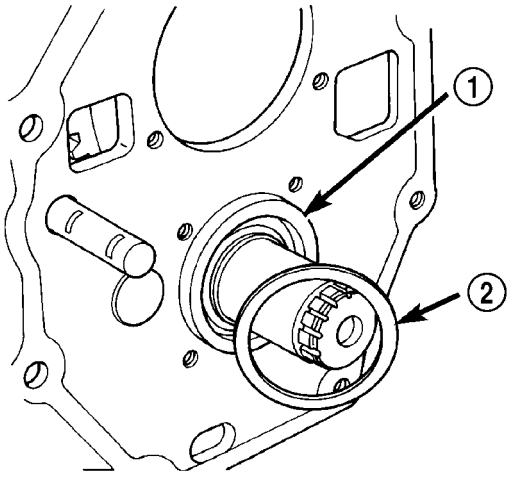


Fig. 33 END PLAY SHIM AND REAR BEARING CUP

1 - COUNTERSHAFT REAR BEARING CUP
2 - END PLAY SHIM

(3) Remove reverse idler shaft (Fig. 34).

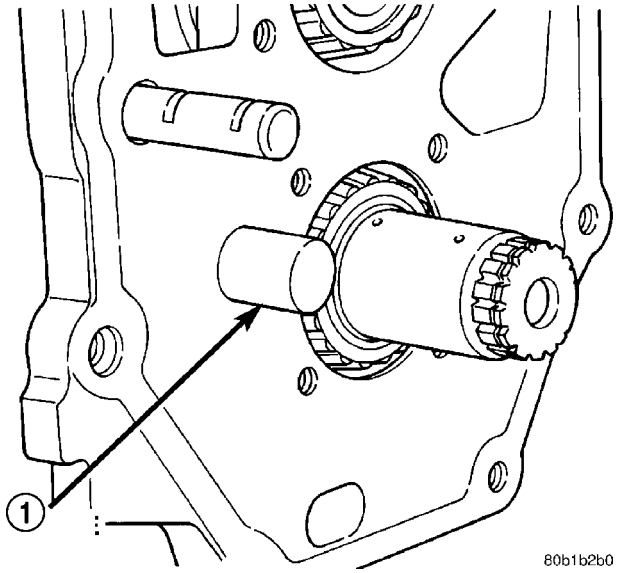


Fig. 34 REVERSE IDLER SHAFT

1 - REVERSE IDLER SHAFT

(4) Rotate countershaft outward and push reverse idler gear away from countershaft and toward front of case (Fig. 35).

(5) Remove idler gear (Fig. 36).

(6) Keep reverse idler gear bearings and spacer together (Fig. 37). Insert idler shaft through gear and bearings to keep them in place.

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

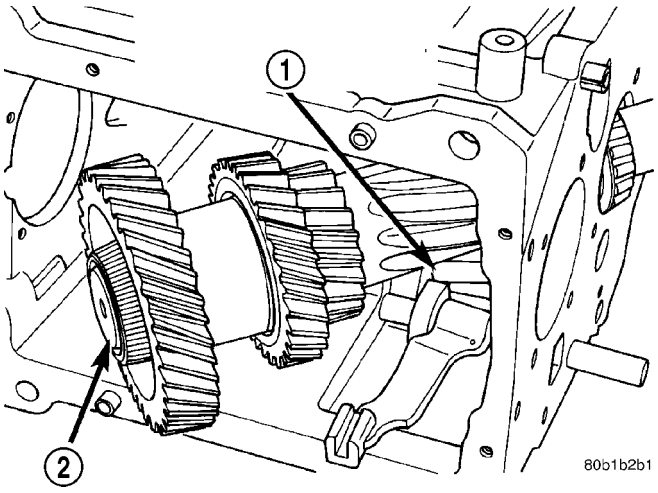


Fig. 35 IDLER GEAR AND COUNTERSHAFT

1 - REVERSE IDLER GEAR
2 - COUNTERSHAFT

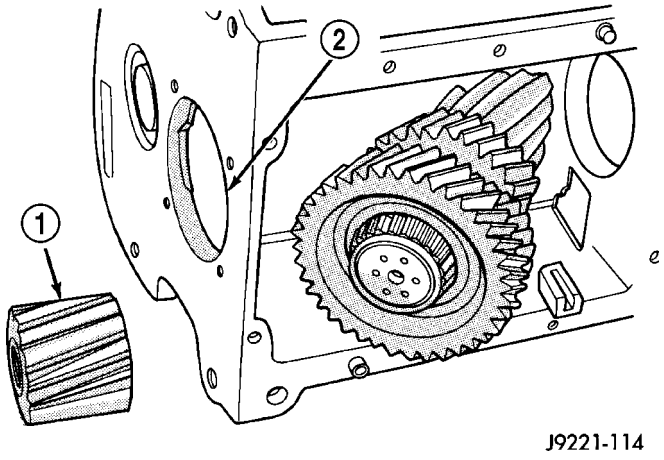


Fig. 36 REVERSE IDLER GEAR

1 - REVERSE IDLER GEAR
2 - DRIVE GEAR BORE

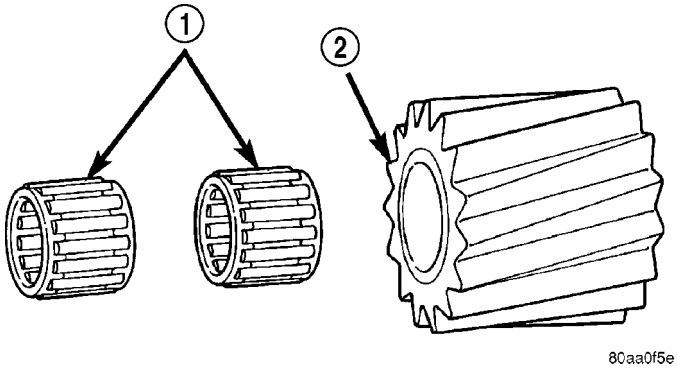


Fig. 37 IDLER GEAR COMPONENTS

1 - BEARINGS
2 - REVERSE IDLER GEAR

MANUAL TRANSMISSION - NV4500 (Continued)

(8) Remove countershaft rear bearing with Puller Flange 6444-1 and Puller Rods 6444-4 (Fig. 38).

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

(9) Position first Jaw 6449 on bearing cone and seat puller flange in notch of puller.

(10) Install second Jaw 6449 on bearing and in notch of puller flange. Slide 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.

(11) Install Puller 6444 on puller rods, then secure puller to rods with retaining nuts.Tighten puller bolt to remove bearing from shaft.

NOTE: If bearing is exceptionally tight, tap end of puller bolt with copper mallet to help loosen bearing.

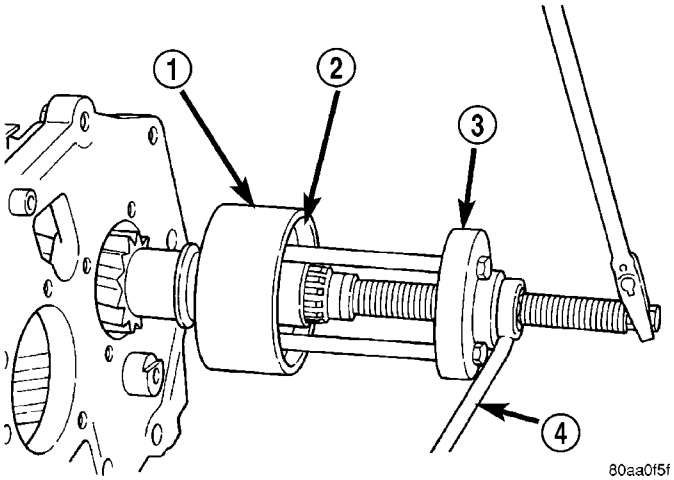


Fig. 38 COUNTERSHAFT REAR BEARING

1 - COLLAR
2 - JAWS
3 - PULLER
4 - WRENCH

(12) Remove bearing puller tools then rotate countershaft out of gear case (Fig. 39).

(13) Remove countershaft front bearing, with Puller Flange 6444-1 and Puller Bolts 6444-4 (Fig. 40).

(14) Position first Jaw 6451 on bearing and seat puller flange in notch of puller jaw.

(15) Install second Jaw 6451 on bearing and in notch of puller flange. Slide Collar 6444-8 over puller jaws to hold them in place.

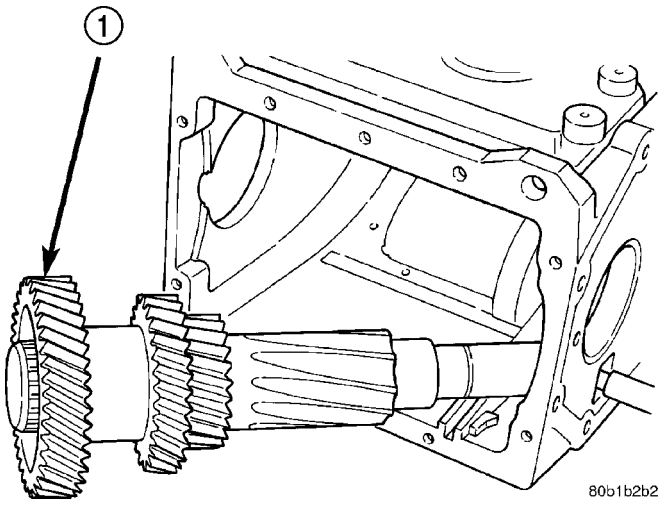


Fig. 39 COUNTERSHAFT AND CASE

1 - COUNTERSHAFT

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

(16) Install puller bridge and bolt assembly 6444 on puller bolts and install retaining nuts. Tighten puller bolt to remove bearing from shaft.

NOTE: If bearing is exceptionally tight, tap end of puller bolt with mallet to help loosen bearing.

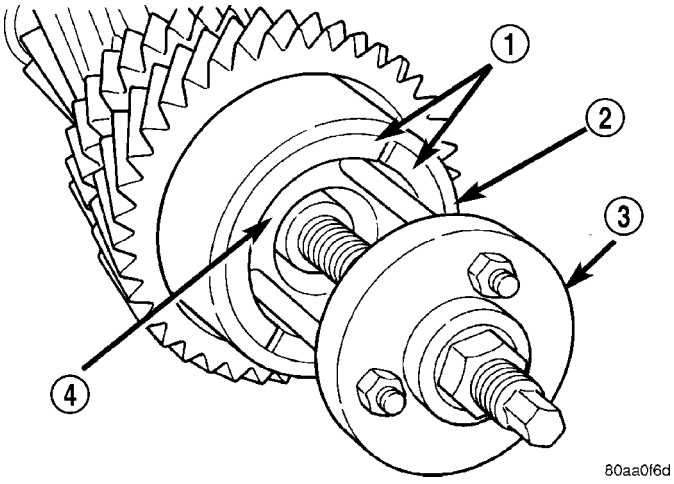


Fig. 40 Countershaft Front Bearing

1 - JAWS
2 - COLLAR
3 - PULLER
4 - FLANGE

(17) Remove bearing puller tools.

MANUAL TRANSMISSION - NV4500 (Continued)

GEAR CASE

(1) Remove countershaft front bearing cap with hammer (Fig. 41).

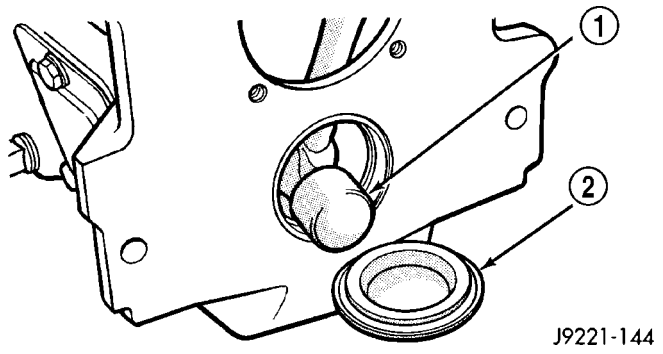


Fig. 41 COUNTERSHAFT FRONT BEARING CAP

1 - HAMMER
2 - BEARING CAP

(2) Remove countershaft front bearing cup with Remover 6454 and Handle C-4171 (Fig. 42).

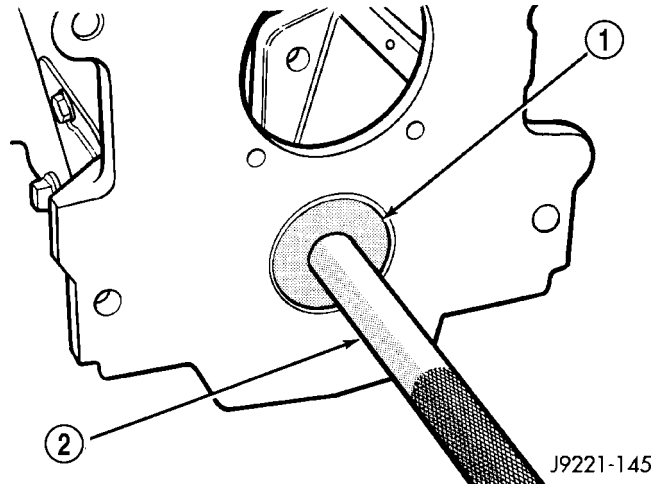


Fig. 42 COUNTERSHAFT FRONT BEARING CUP

1 - REMOVER
2 - HANDLE

(3) Remove roll pin that secures shift lug on shift rail in case (Fig. 43). A small pin punch can be modified by putting a slight bend in it to drive pin completely out of shift rail (Fig. 43).

(4) Remove shift lug rail.

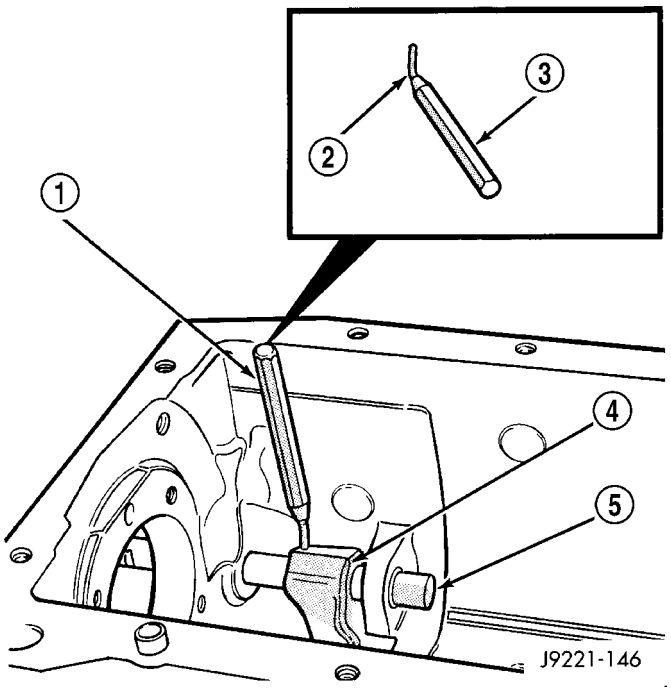


Fig. 43 SHIFT LUG ROLL PIN

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 scribe 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) Place 3-4 gear in a press with support under 3rd gear and Remove 3-4 synchro hub, third gear stop ring and third gear as an assembly (Fig. 44).

(3) Remove third gear bearing from mainshaft (Fig. 45).

(4) Remove third gear bearing spacer (Fig. 46).

(5) Remove second gear thrust washer snap ring from mainshaft (Fig. 46).

(6) Remove second gear thrust washer (Fig. 47). Note washer notch for locating pin.

MANUAL TRANSMISSION - NV4500 (Continued)

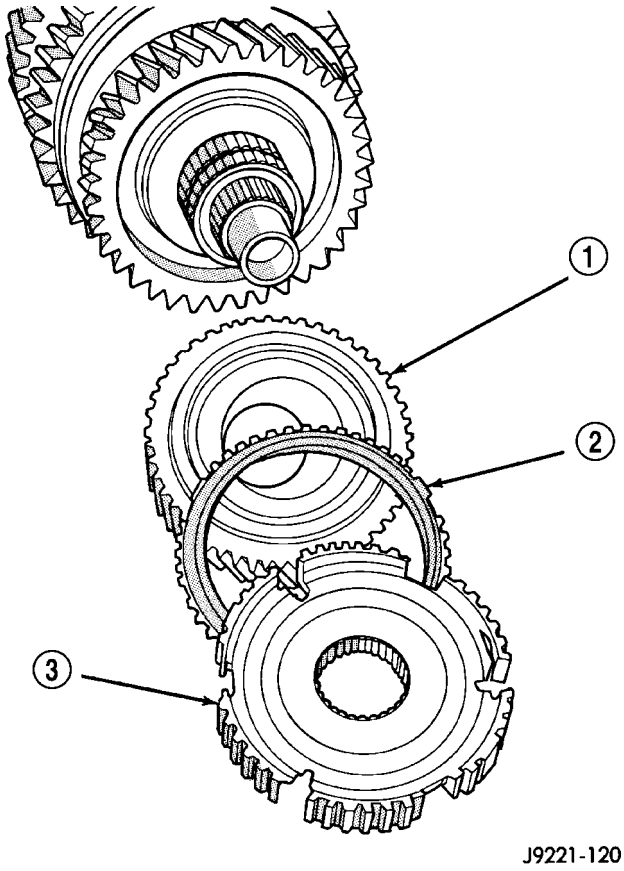


Fig. 44 THIRD GEAR, STOP RING, AND 3-4 HUB

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

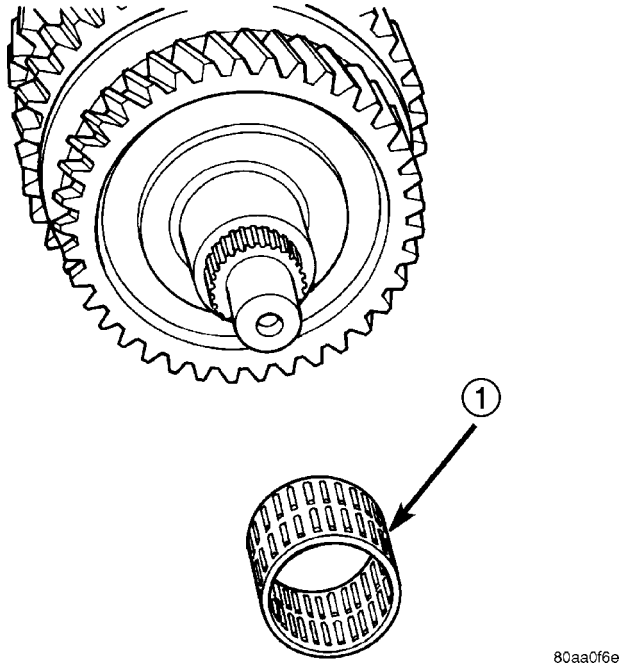


Fig. 45 THIRD GEAR BEARING

1 - THIRD GEAR NEEDLE BEARING

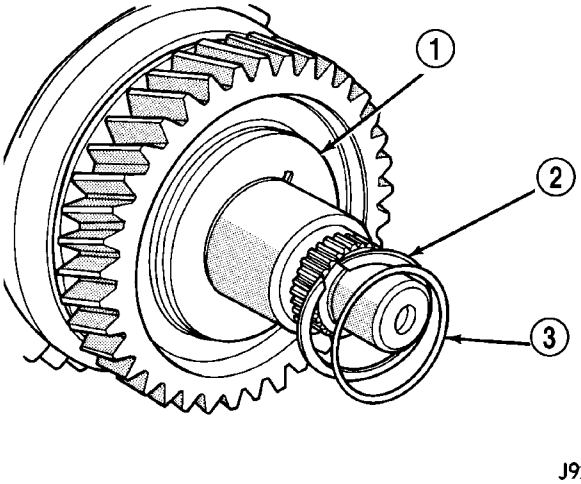


Fig. 46 SNAP RING AND THIRD GEAR BEARING SPACER

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

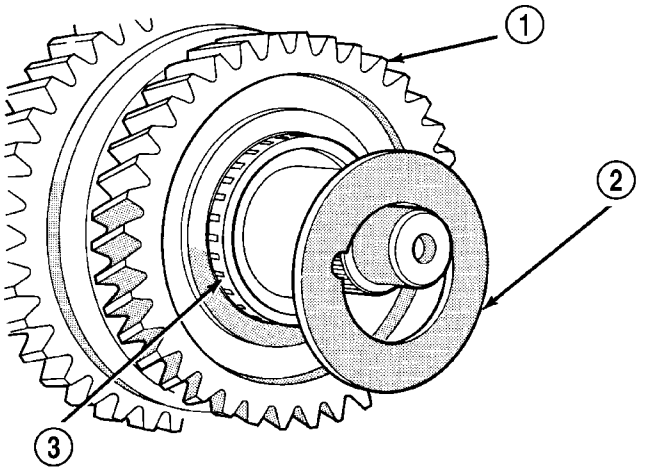


Fig. 47 SECOND GEAR THRUST WASHER

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

(7) Remove thrust washer locating pin (Fig. 48) with needle nose pliers.

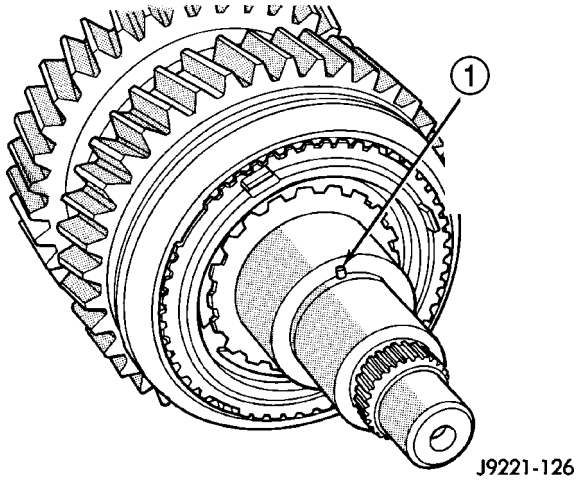


Fig. 48 THRUST WASHER LOCATING PIN

1 - THRUST WASHER LOCATING PIN

(8) Remove second gear (Fig. 49).

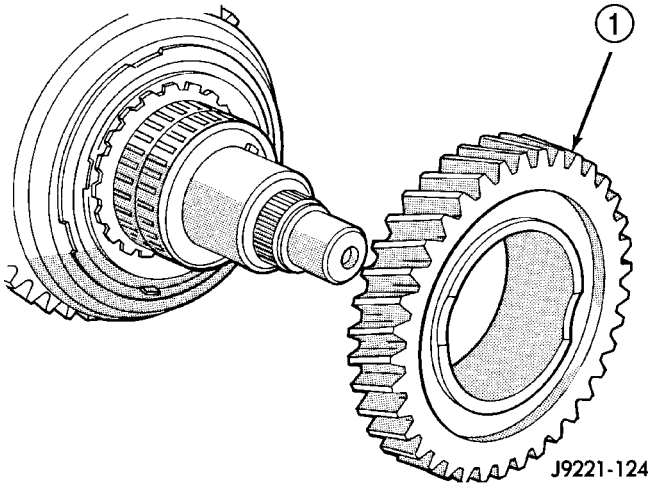


Fig. 49 SECOND GEAR

1 - SECOND GEAR

(9) Remove second gear bearing (Fig. 50).

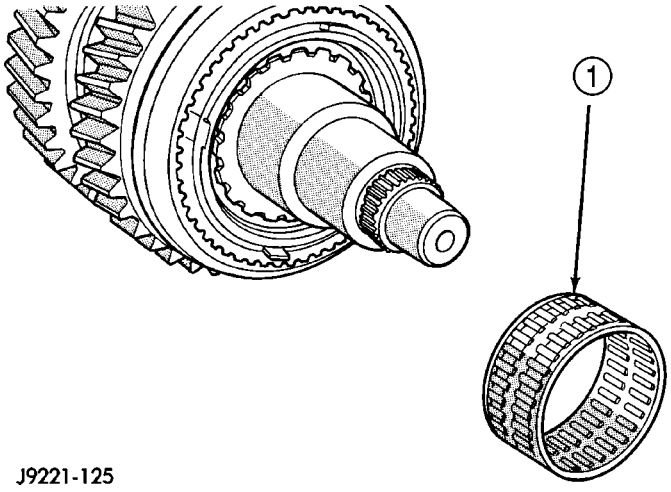


Fig. 50 SECOND GEAR BEARING

1 - SECOND GEAR NEEDLE BEARING

(10) Remove second gear clutch cone snap ring from mainshaft synchro hub groove (Fig. 51).

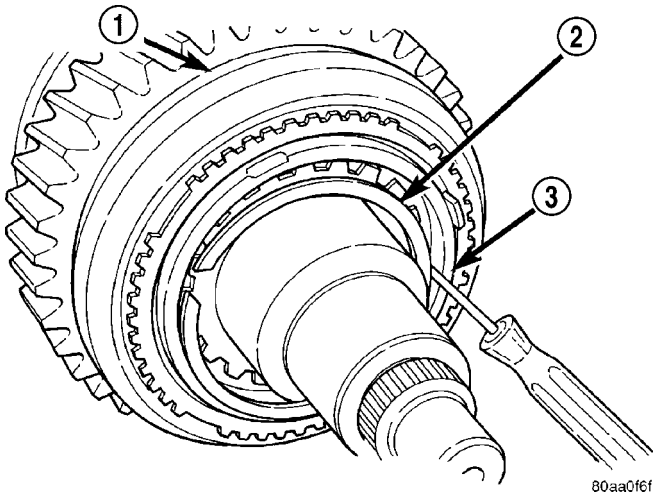


Fig. 51 SECOND GEAR CLUTCH CONE SNAP RING

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

MANUAL TRANSMISSION - NV4500 (Continued)

(11) Remove second gear clutch cone, synchro clutch ring and synchro stop ring (Fig. 52).

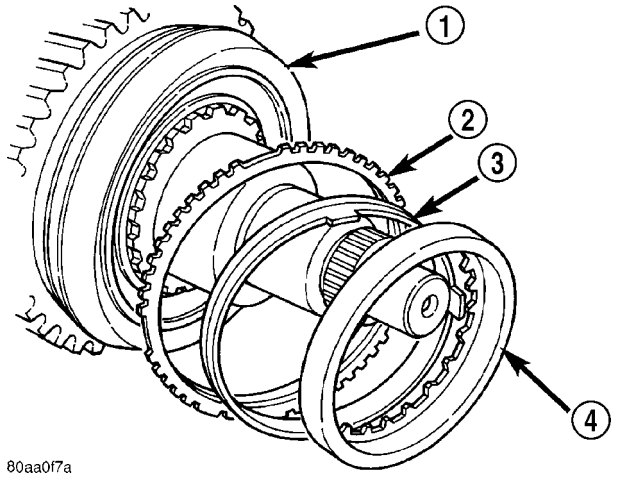


Fig. 52 SECOND GEAR CLUTCH CONE AND RING

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. 53).

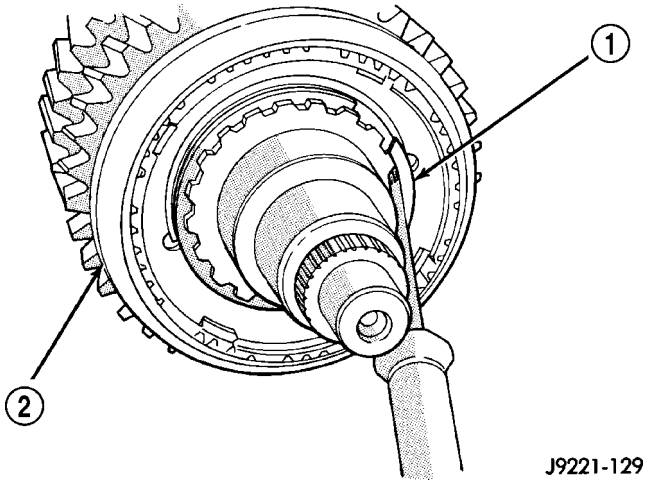


Fig. 53 1-2 SLEEVE AND HUB SNAP RING

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

(13) Remove 1-2 synchro sleeve, hub, struts and springs as an assembly (Fig. 54).

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. 55).

(15) Remove first gear clutch cone front snap ring from mainshaft hub (Fig. 56).

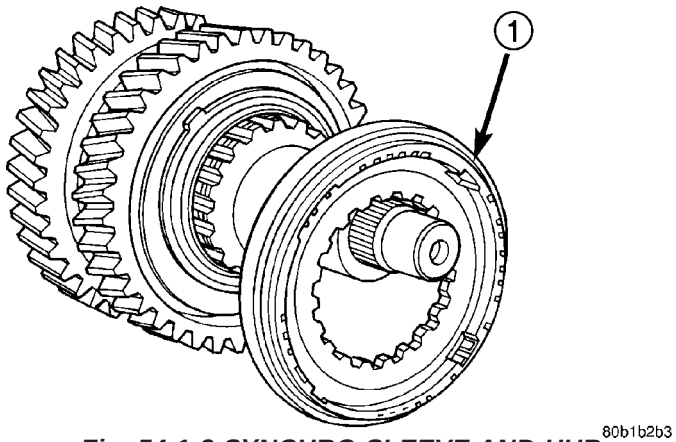


Fig. 54 1-2 SYNCHRO SLEEVE AND HUB

1 - 1-2 SLEEVE AND HUB

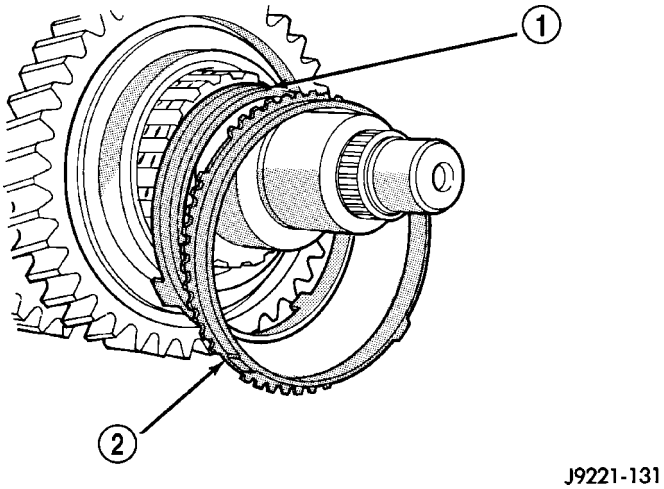


Fig. 55 FIRST GEAR STOP AND CLUTCH RING

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

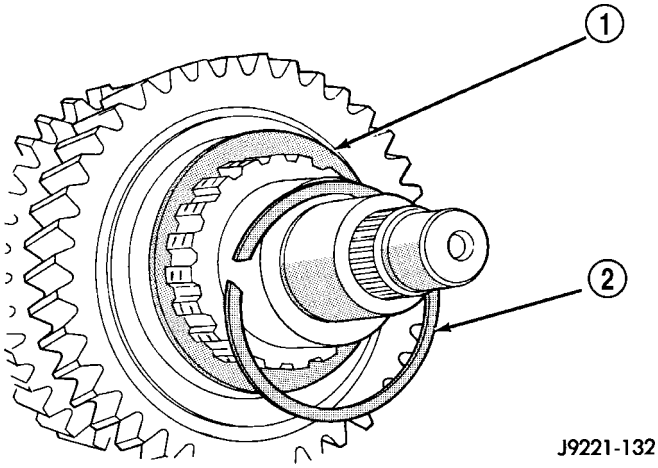


Fig. 56 FIRST GEAR CLUTCH GEAR FRONT SNAP RING

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

MANUAL TRANSMISSION - NV4500 (Continued)

(16) Remove first gear clutch cone (Fig. 57).

(17) Remove first gear clutch gear rear snap ring from mainshaft hub (Fig. 57).

NOTE: Do not remove this snap ring unless mainshaft is being replaced.

(18) Remove mainshaft rear bearing, with Puller Flange 6444-1 and Puller Rods 6444-3 for 4X2 or 6444-4 for 4X4.

(19) Position the first Jaw 6445 on the bearing cone and seat Puller Flange 6444-1 in notch of jaw (Fig. 58).

(20) Install second Jaw 6445 on the bearing cone and puller flange. Slide Collar 6444-8 over jaws to hold them in place.

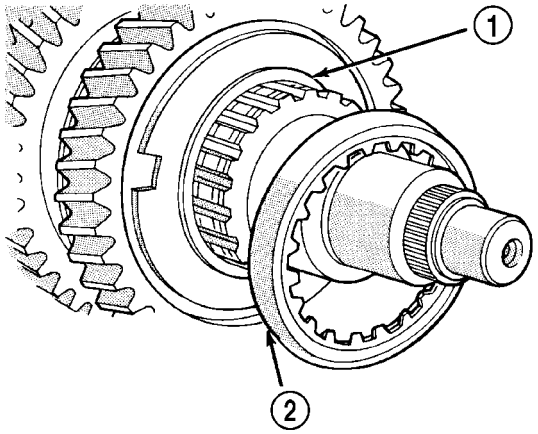


Fig. 57 FIRST GEAR CLUTCH GEAR

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

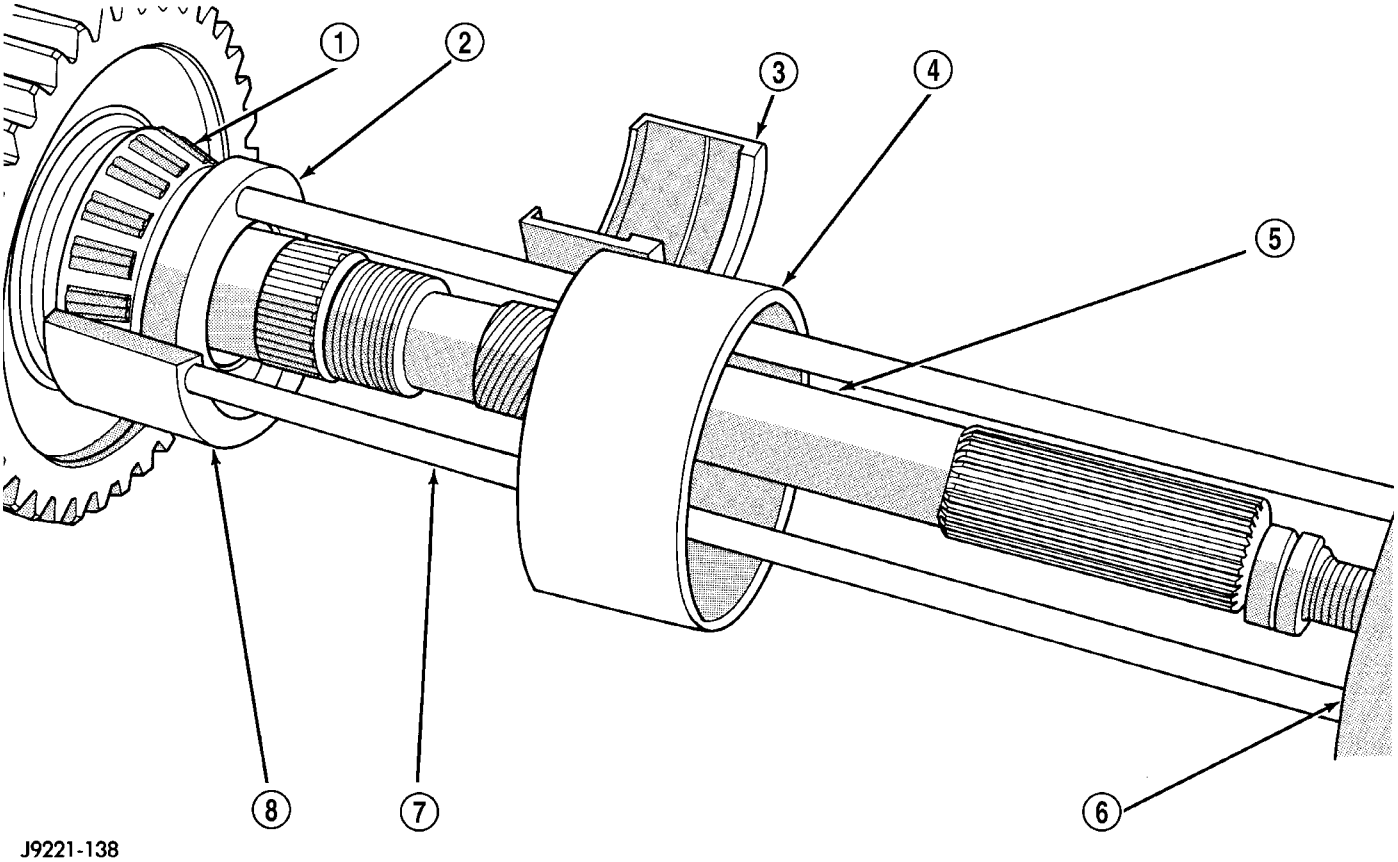


Fig. 58 MAINSHAFT REAR BEARING PULLER

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

(21) Install Puller 6444 on the puller rods and secure with nuts (Fig. 59). Tighten puller bolt to the remove bearing.

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

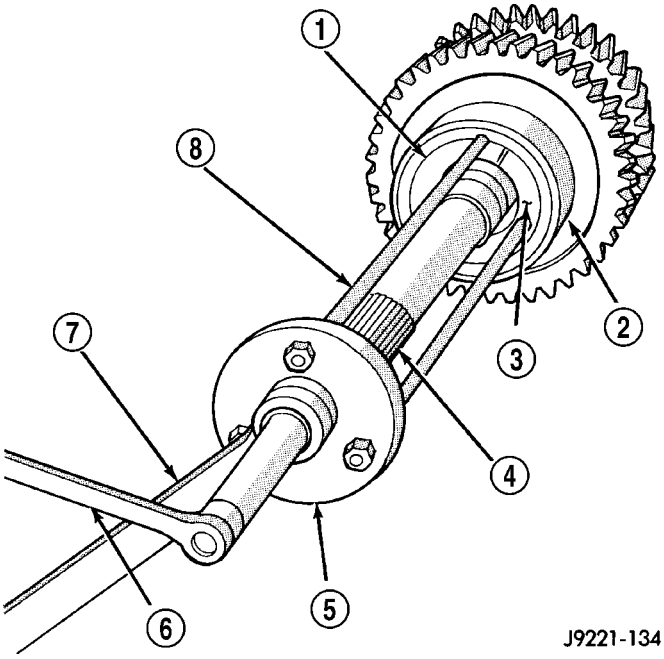


Fig. 59 MAINSHAFT REAR BEARING

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

(23) Remove reverse gear thrust washer (Fig. 60).

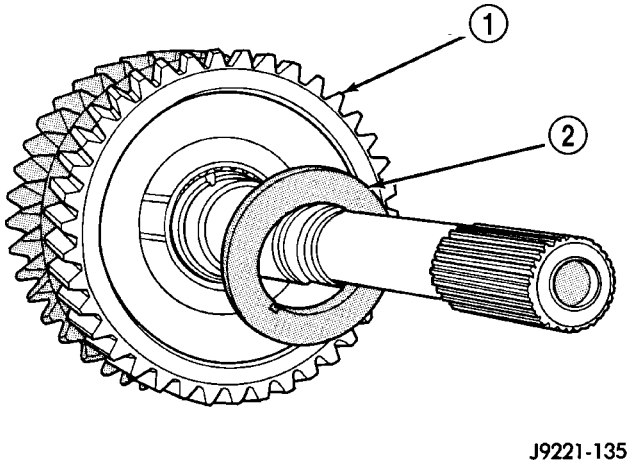


Fig. 60 REVERSE GEAR THRUST WASHER

1 - REVERSE GEAR
2 - THRUST WASHER

(24) Remove reverse gear and synchro components as assembly (Fig. 61).

CAUTION: 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.

(25) Remove reverse gear bearing assembly from mainshaft (Fig. 61).

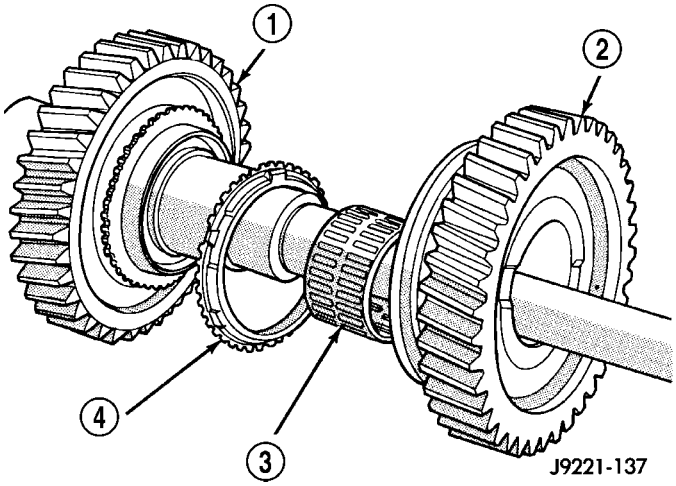


Fig. 61 REVERSE GEAR, BEARING, AND STOP RING

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

(26) Remove reverse gear bearing spacer from mainshaft (Fig. 62).

(27) Remove reverse clutch gear snap ring (Fig. 62). Heavy duty snap ring pliers will be required to spread the ring far enough to remove it.

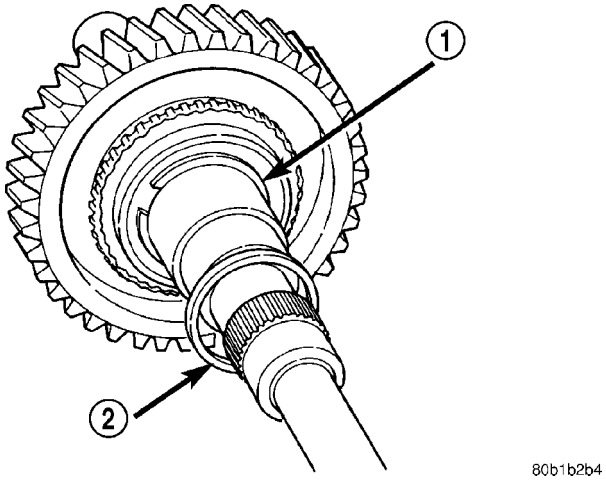


Fig. 62 REVERSE GEAR BEARING SPACER AND FIRST GEAR SNAP RING

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

(28) Remove reverse clutch gear (Fig. 63).

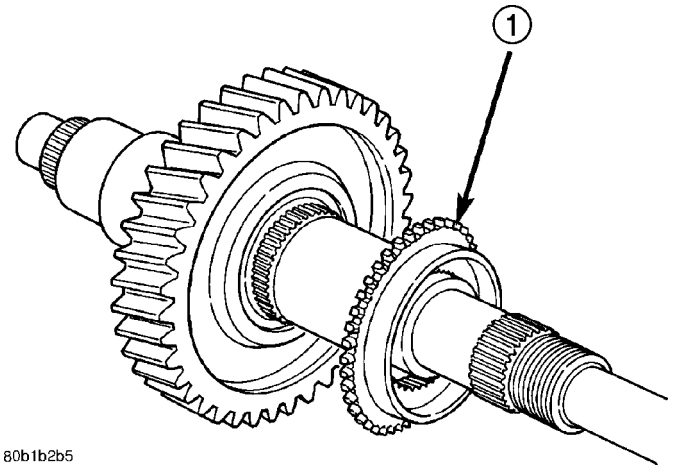


Fig. 63 Reverse Clutch Gear

1 - REVERSE CLUTCH GEAR

(29) Remove first gear from bearing and mainshaft (Fig. 64).

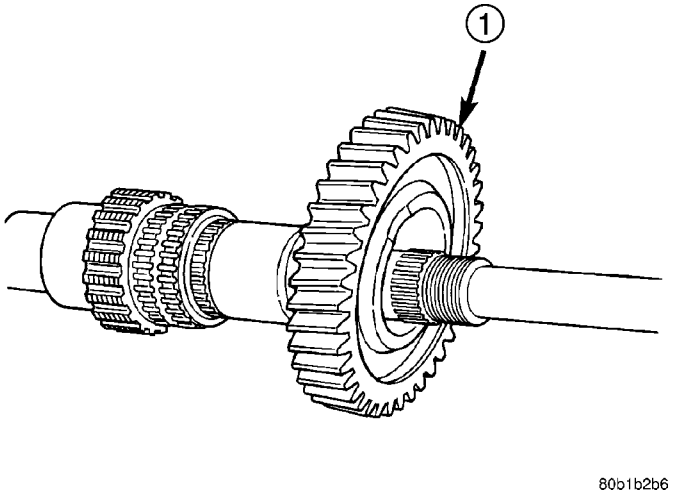


Fig. 64 FIRST GEAR

1 - FIRST GEAR

(30) Remove first gear bearing from mainshaft (Fig. 65).

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.

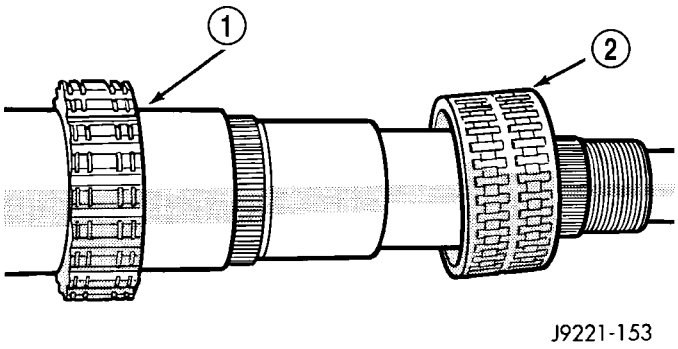


Fig. 65 FIRST GEAR BEARING

1 - MAINSHAFT
2 - FIRST GEAR BEARING

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.

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. 66).

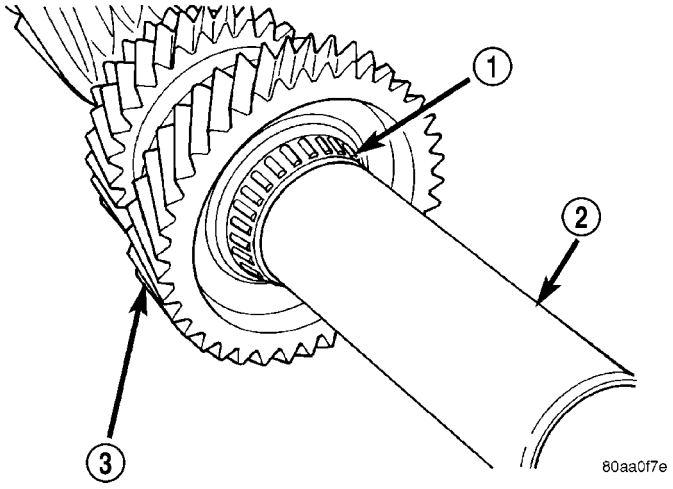


Fig. 66 COUNTERSHAFT FRONT BEARING

1 - FRONT BEARING
2 - INSTALLER
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. 67).

(5) Install countershaft in gear case (Fig. 67).

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

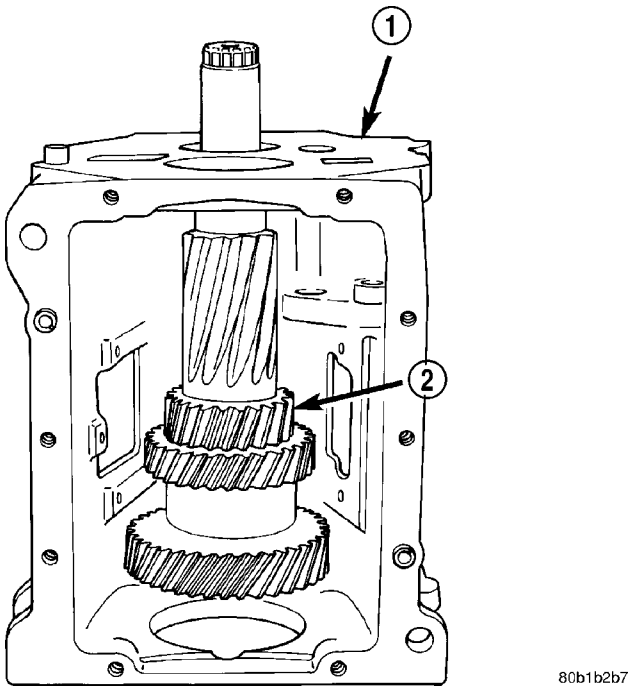


Fig. 67 COUNTERSHAFT IN GEAR CASE

1 - GEAR CASE
2 - COUNTERSHAFT

(6) Lubricate reverse idler gear bearings with petroleum jelly and install first bearing and second bearing (Fig. 68).

(7) Install idler gear front thrust washer on boss in gear case (Fig. 68). Coat thrust washer with liberal quantity of petroleum jelly to hold it in place.

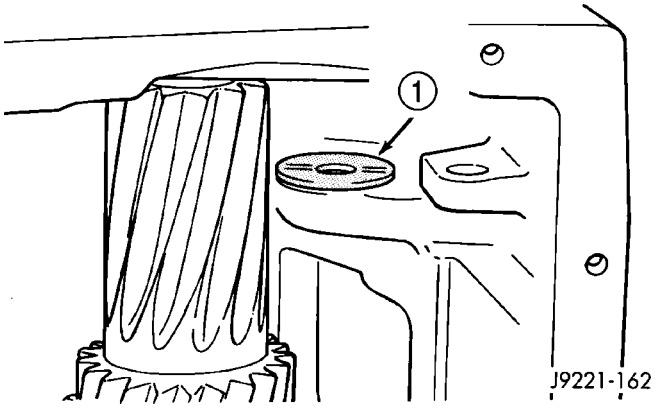


Fig. 68 IDLER GEAR FRONT THRUST WASHER

1 - IDLER GEAR FRONT THRUST WASHER ON BOSS

MANUAL TRANSMISSION - NV4500 (Continued)

(8) Install reverse idler gear in case (Fig. 69).

(9) Install idler gear rear thrust washer between idler gear and case boss (Fig. 69).

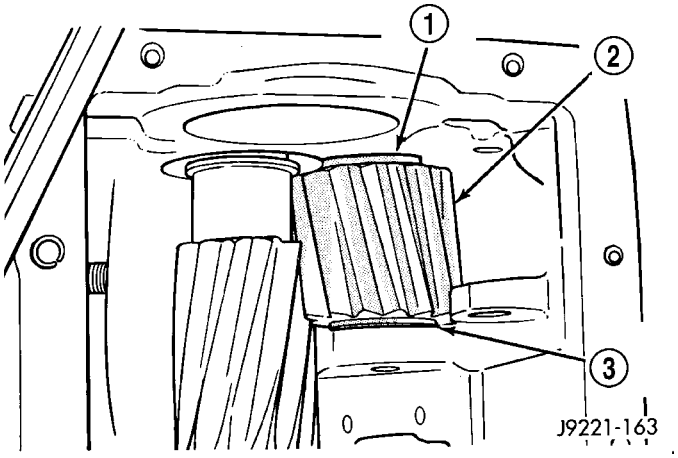


Fig. 69 IDLER GEAR

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

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

(11) Install reverse idler shaft with notched end of shaft facing countershaft (Fig. 70).

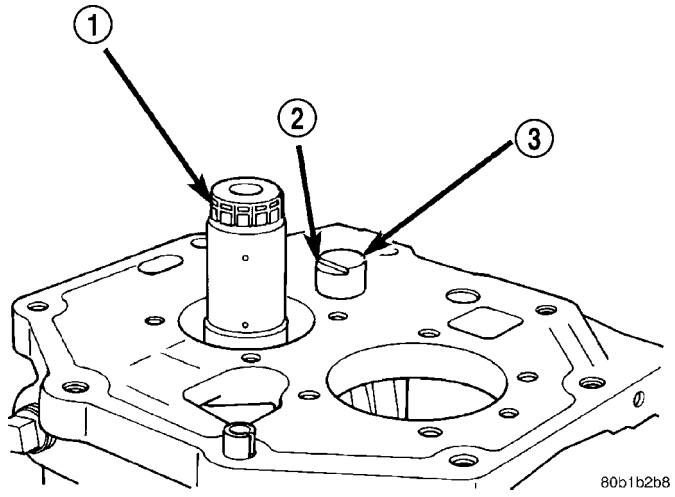


Fig. 70 REVERSE IDLER SHAFT

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

(12) Lift countershaft upward and position wood block between front of shaft and case (Fig. 71).

(13) Install rear bearing cone on countershaft with Installer C-4040 (Fig. 72).

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

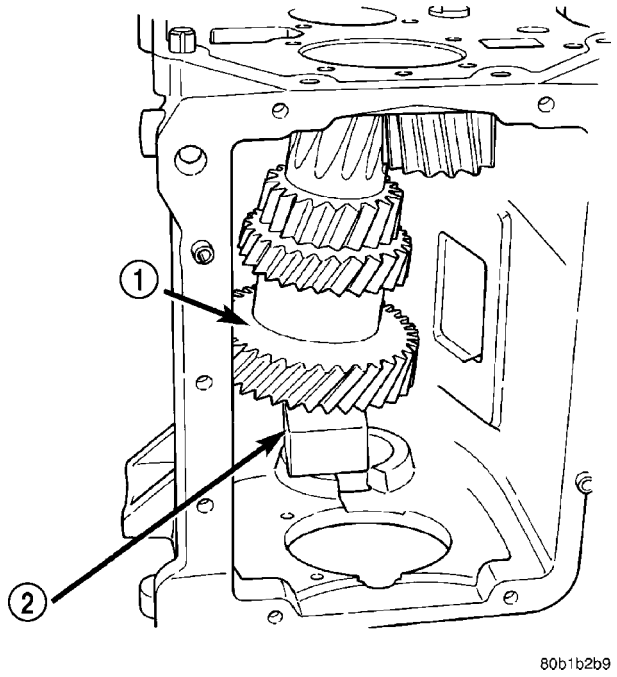


Fig. 71 SUPPORTING COUNTERSHAFT

1 - COUNTERSHAFT
2 - WOOD BLOCK

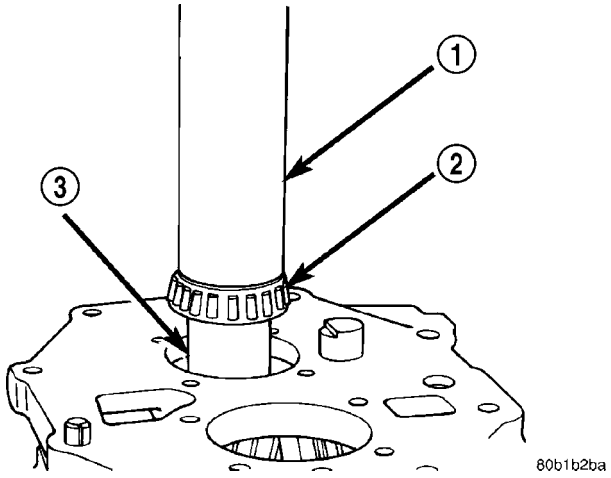


Fig. 72 COUNTERSHAFT REAR BEARING

1 - INSTALLER
2 - REAR BEARING
3 - COUNTERSHAFT

(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. 73). Tap cup into place with plastic mallet if necessary.

(17) Install countershaft rear bearing plate (Fig. 74).

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

MANUAL TRANSMISSION - NV4500 (Continued)

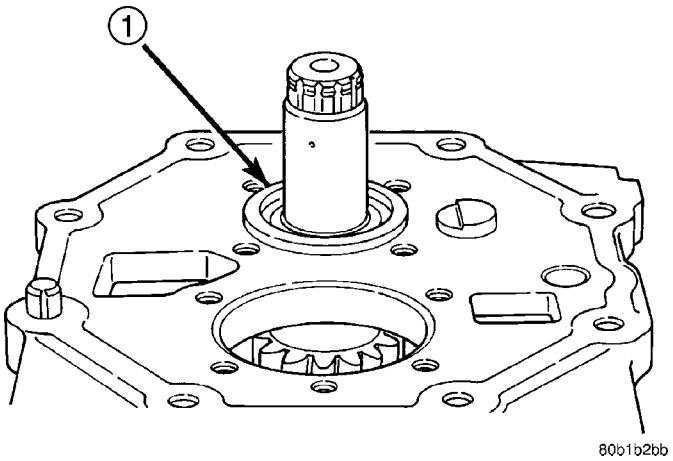


Fig. 73 COUNTERSHAFT REAR BEARING CUP

1 - COUNTERSHAFT REAR BEARING CUP

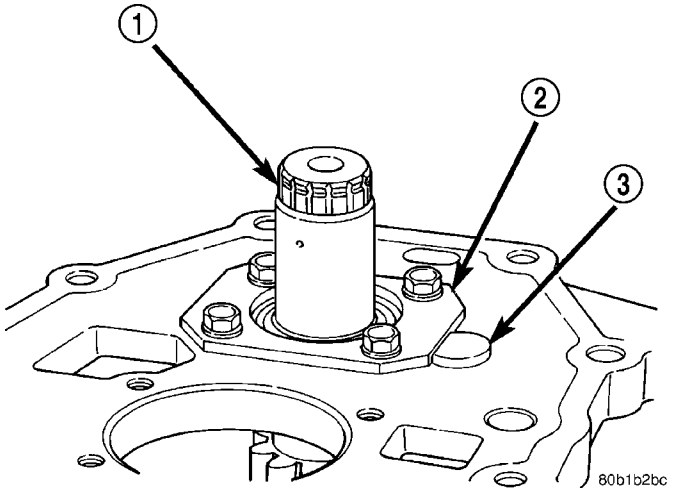


Fig. 74 COUNTERSHAFT REAR BEARING PLATE

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

(18) Apply Mopar silicone adhesive/sealer or equivalent to flange and lip of new cap. Install **new** front bearing cap in gear case (Fig. 75) with Handle C-4171 and Installer C-3972-A.

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. 76).

(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.).

(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. 77).

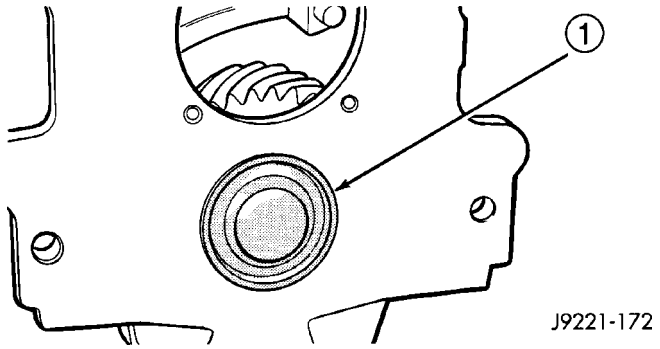


Fig. 75 COUNTERSHAFT FRONT BEARING CAP

1 - FRONT BEARING CAP

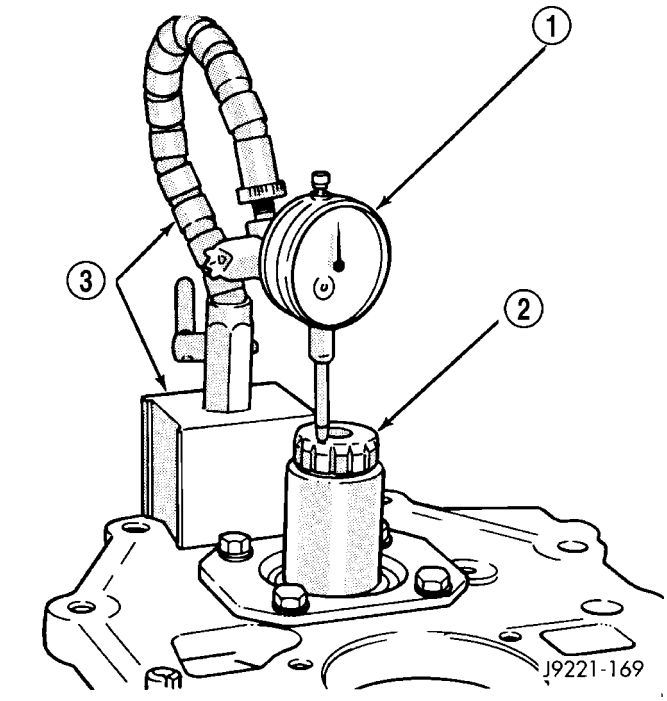


Fig. 76 MEASURING COUNTERSHAFT END PLAY

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

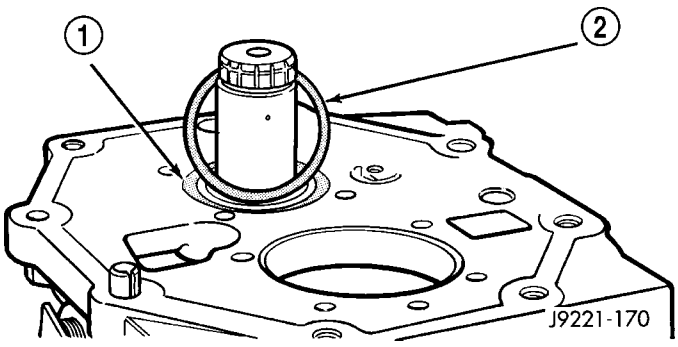


Fig. 77 COUNTERSHAFT END PLAY SHIM

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

MANUAL TRANSMISSION - NV4500 (Continued)

(6) Install countershaft rear bearing plate (Fig. 74).

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. 78).
(5) Install roll pin that secures lug to rail (Fig. 78).

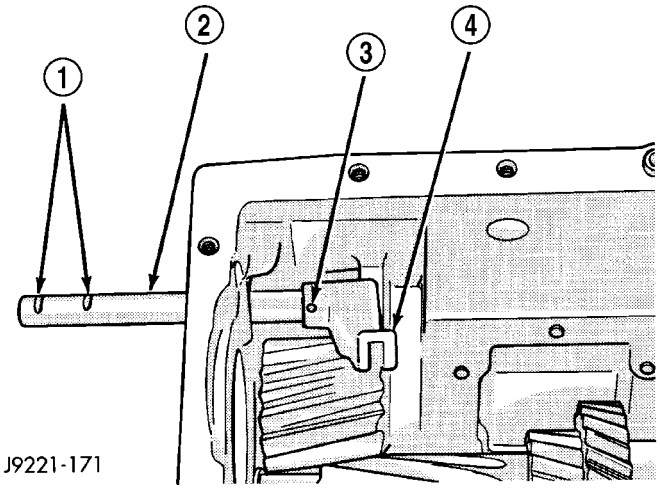


Fig. 78 SHIFT LUG AND RAIL

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. 79). 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.

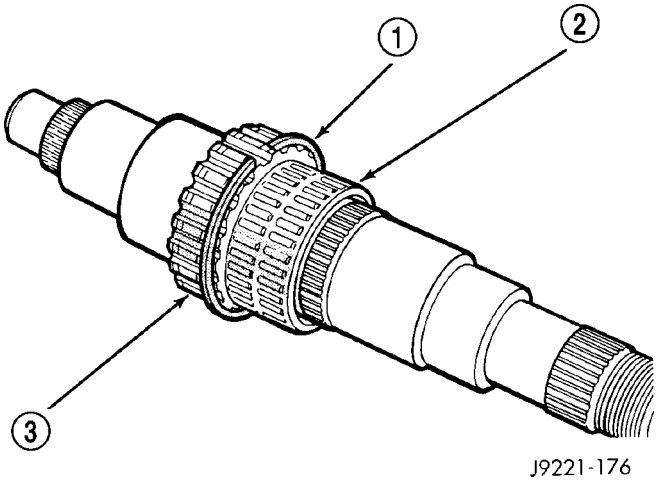


Fig. 79 FIRST GEAR BEARING AND SNAP RING

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. 80). Verify cone is seated against snap ring on hub.

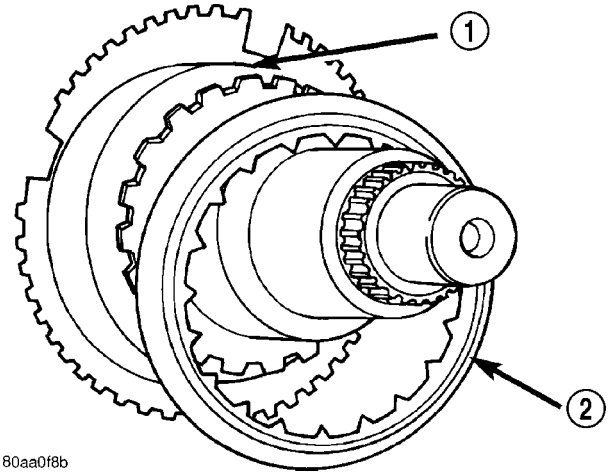


Fig. 80 FIRST GEAR CLUTCH CONE

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

MANUAL TRANSMISSION - NV4500 (Continued)

(3) Install snap ring on mainshaft 1-2 synchro hub to secure clutch cone (Fig. 81). Verify snap ring is seated in hub groove and against clutch cone.

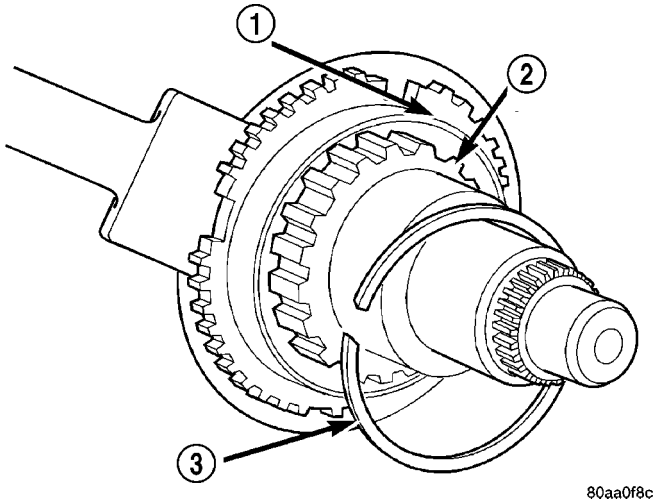


Fig. 81 FIRST GEAR CLUTCH CONE SNAP RING

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

(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.

(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. 82).

(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. 83).

(c) Install springs and struts in hub (Fig. 83). Use lots of petroleum jelly to hold them in place. Then compress struts with your fingers and move sleeve upward until struts are started in sleeve. Verify that struts are engaged in sleeve before proceeding.

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

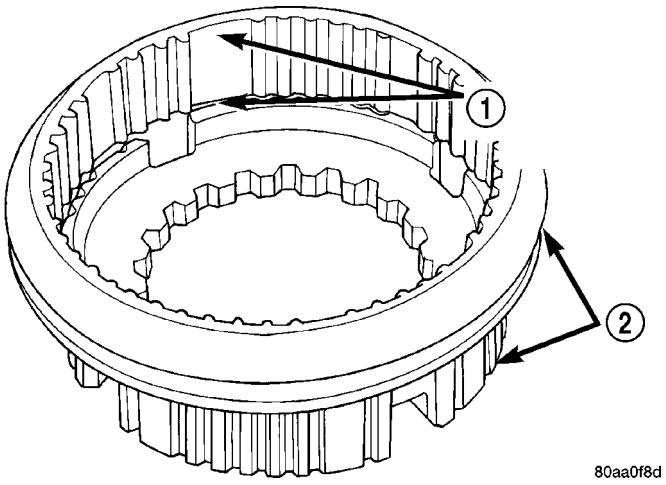


Fig. 82 1-2 SYNCHRO SLEEVE ON HUB

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

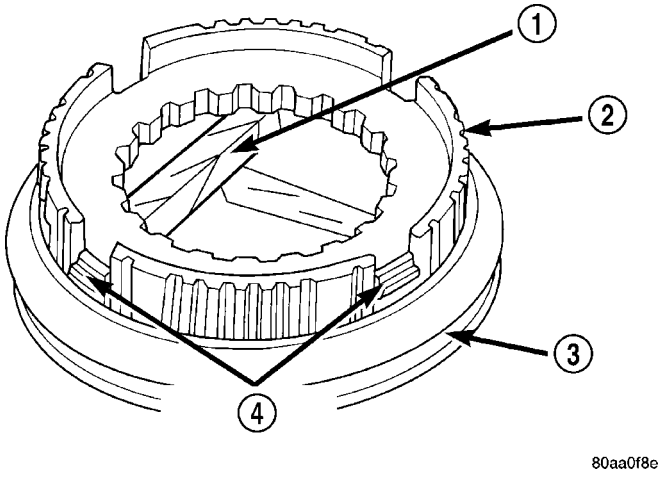


Fig. 83 1-2 SYNCHRO STRUTS AND SPRINGS

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

(6) Install first gear stop ring in 1-2 synchro hub and sleeve (Fig. 84). Verify stop ring is seated and engaged in hub and sleeve.

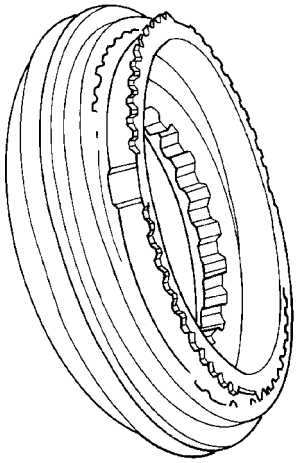


Fig. 84 FIRST GEAR STOP RING IN SYNCHRO HUB

(7) Install 1-2 synchro assembly and stop ring on mainshaft with the taper on the sleeve facing forward. (Fig. 85).

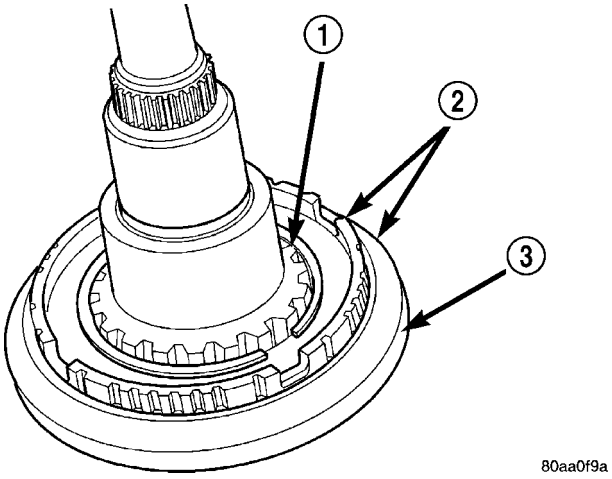


Fig. 85 1-2 SYNCHRO

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. 86). Verify snap ring is seated in groove in mainshaft hub.

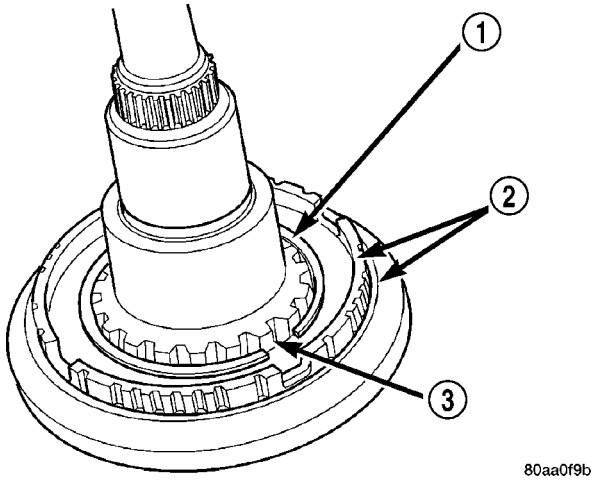


Fig. 86 1-2 SYNCHRO SNAP RING

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

(9) Assemble second gear clutch cone, clutch ring and stop ring (Fig. 87).

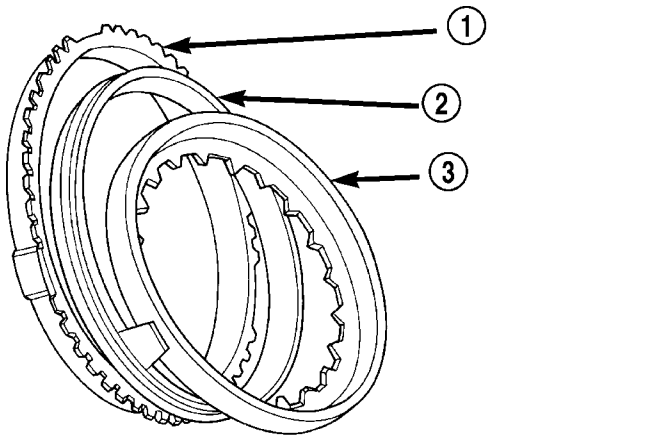


Fig. 87 SECOND GEAR CLUTCH CONE, CLUTCH RING AND STOP RING

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

MANUAL TRANSMISSION - NV4500 (Continued)

(10) Install assembled second gear clutch cone and rings on mainshaft and in 1-2 synchro hub (Fig. 88).

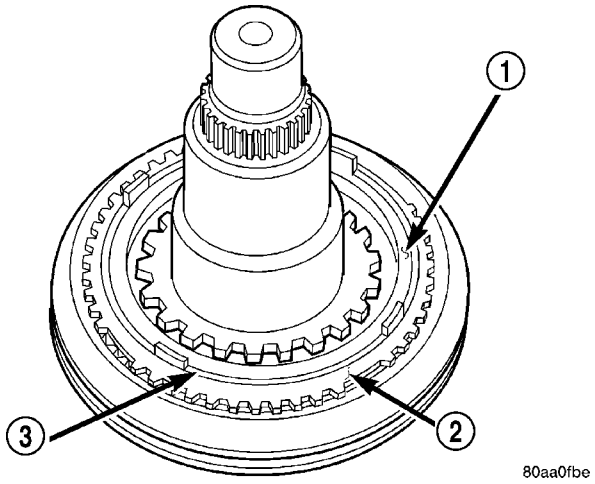


Fig. 88 SECOND GEAR CLUTCH CONE, CLUTCH RING AND STOP RING

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

(11) Install snap ring that secures second gear clutch cone on mainshaft (Fig. 89). 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.

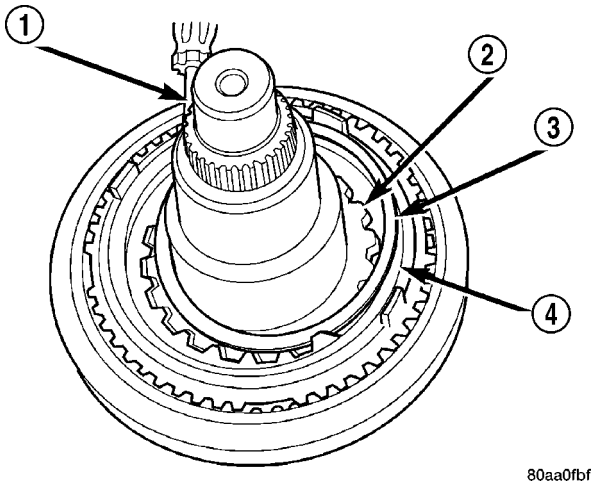


Fig. 89 SECOND GEAR CLUTCH CONE SNAP RING

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

(12) Install second gear bearing on mainshaft (Fig. 90).

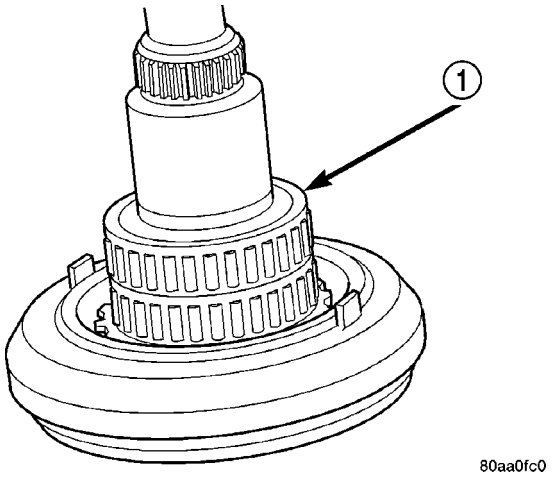


Fig. 90 SECOND GEAR BEARING

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. 91).

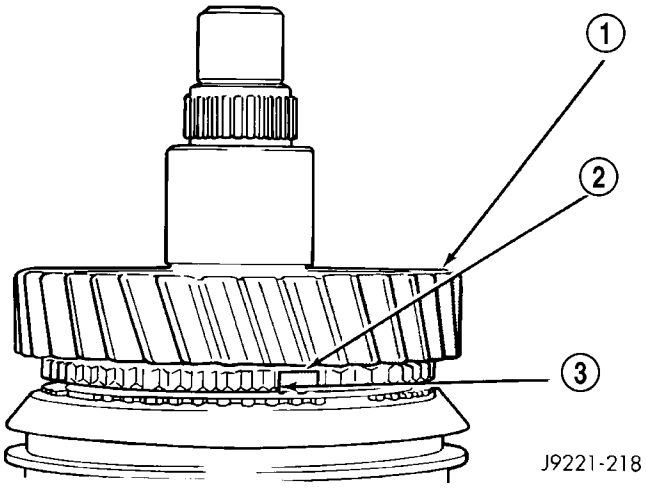


Fig. 91 SECOND GEAR

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

MANUAL TRANSMISSION - NV4500 (Continued)

(14) Install thrust washer pin in shaft (Fig. 92).

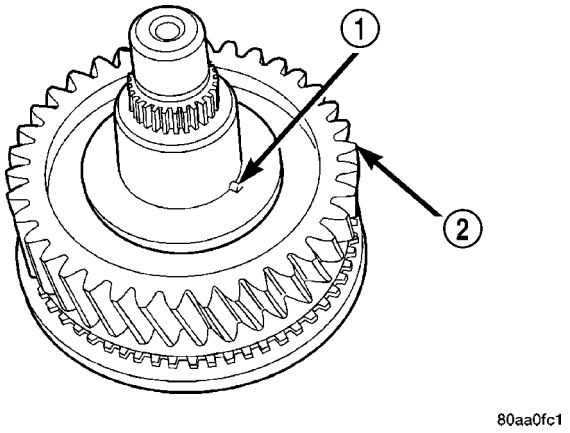


Fig. 92 THRUST WASHER PIN

1 - THRUST WASHER PIN
2 - SECOND GEAR

(15) Install second gear thrust washer. Verify washer is seated on gear and pin (Fig. 93).

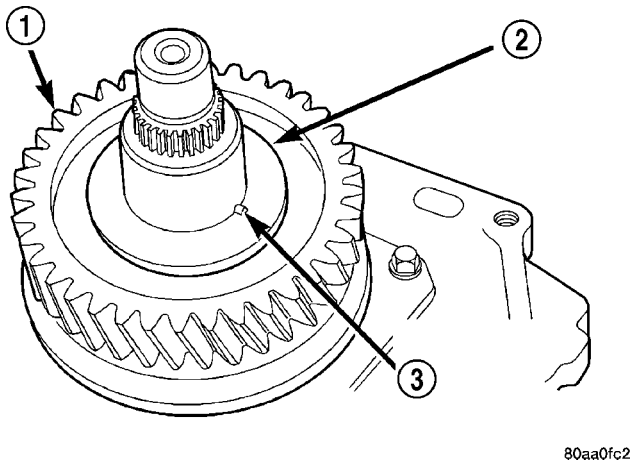


Fig. 93 SECOND GEAR THRUST WASHER

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

(16) Install second gear thrust washer snap ring (Fig. 94). 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. 94).

(18) Install third gear bearing on mainshaft (Fig. 95). 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. 96).

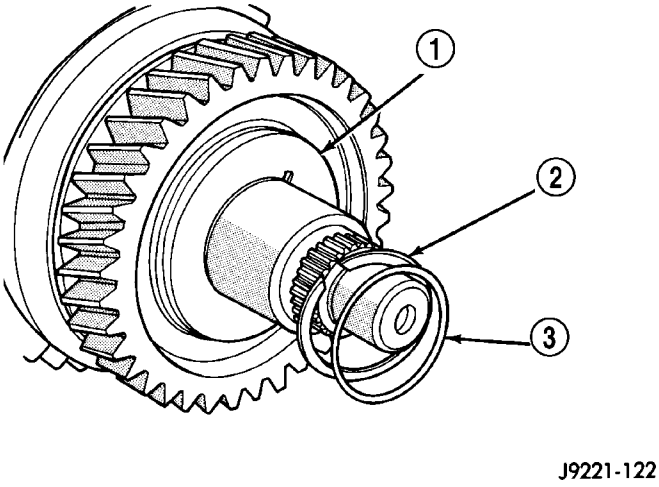


Fig. 94 SNAP RING AND THIRD

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

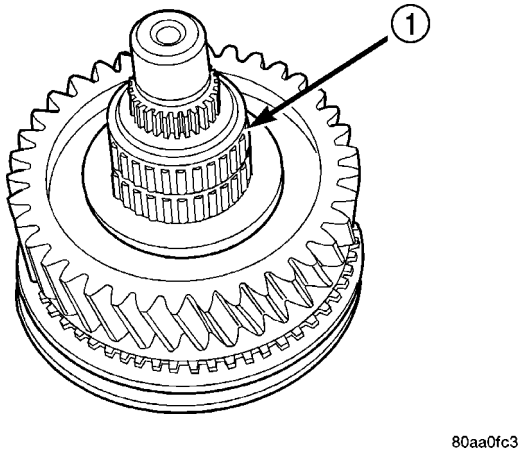


Fig. 95 THIRD GEAR BEARING

1 - THIRD GEAR BEARING

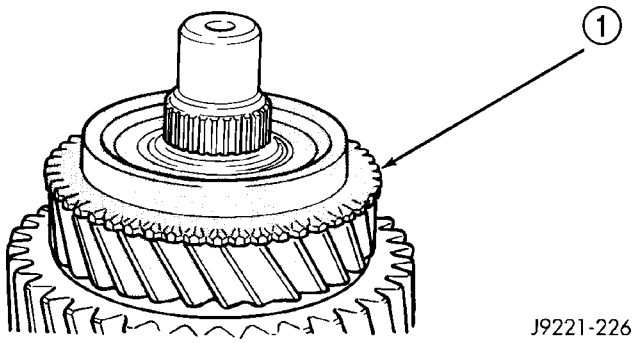


Fig. 96 THIRD GEAR

1 - THIRD GEAR

(20) Install synchro stop ring on third gear (Fig. 97). Verify stop ring is seated on cone taper.

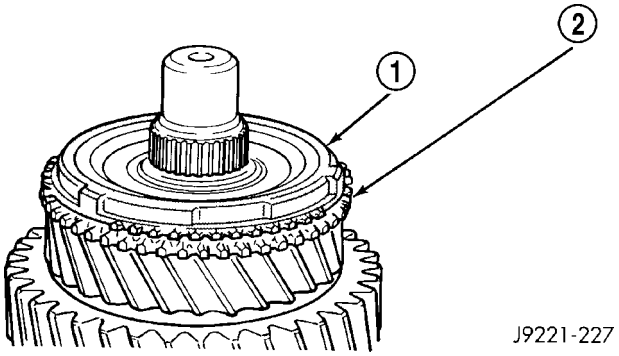


Fig. 97 THIRD GEAR STOP RING

1 - SYNCHRO STOP RING
2 - THIRD GEAR

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

(a) Align and install synchro sleeve on hub (Fig. 98). **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. 98).

(c) Install and seat synchro springs (Fig. 98). Use screwdriver to compress springs and seat them in struts and hub as shown.

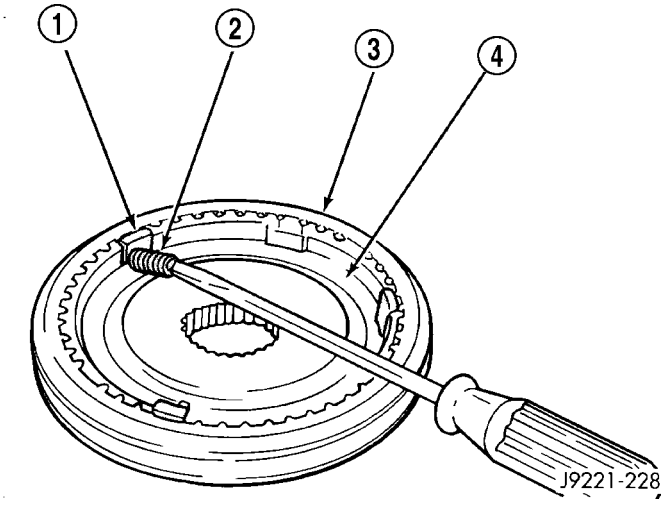


Fig. 98 SYNCHRO ASSEMBLY (3-4)

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. 99).

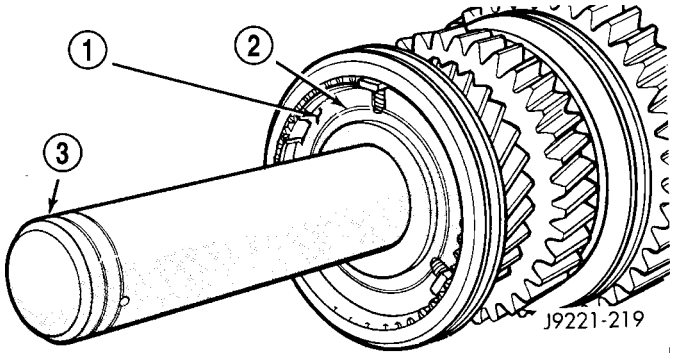


Fig. 99 SEATING 3-4 SYNCHRO ASSEMBLY ON MAINSHAFT

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. 100). 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.

MANUAL TRANSMISSION - NV4500 (Continued)

(28) Install reverse clutch gear on first gear (Fig. 100). Verify clutch gear is seated on shaft splines.

(29) Install reverse clutch gear snap ring with heavy duty snap ring pliers (Fig. 100). Verify snap ring is seated in groove.

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

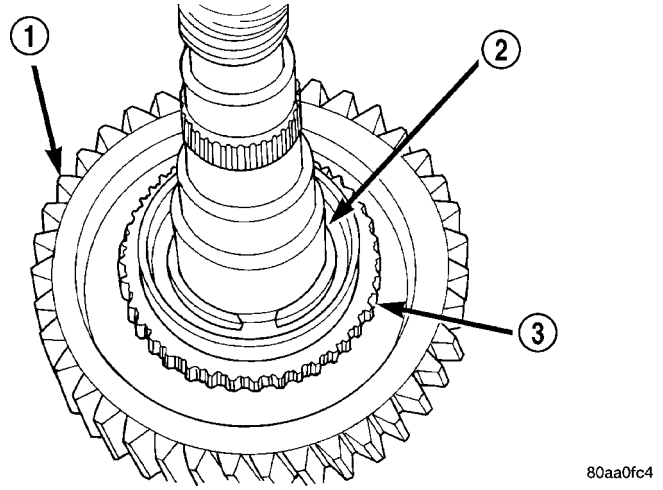


Fig. 100 FIRST GEAR AND CLUTCH GEAR

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

(30) Install stop ring on clutch cone (Fig. 101). Verify stop ring is seated on cone taper.

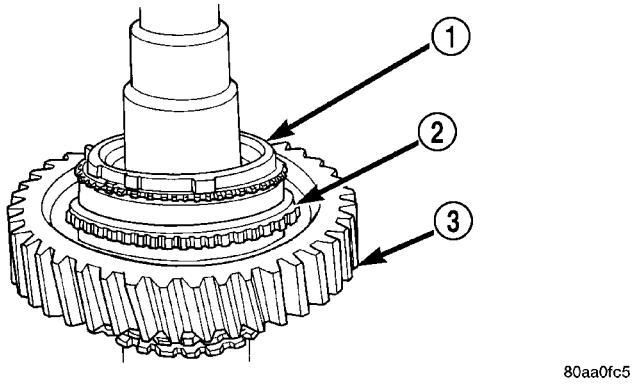


Fig. 101 CLUTCH GEAR STOP RING

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

(31) Install reverse gear bearing spacer on mainshaft and seat against reverse clutch gear snap ring (Fig. 102).

(32) Install reverse gear bearing on mainshaft (Fig. 102).

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

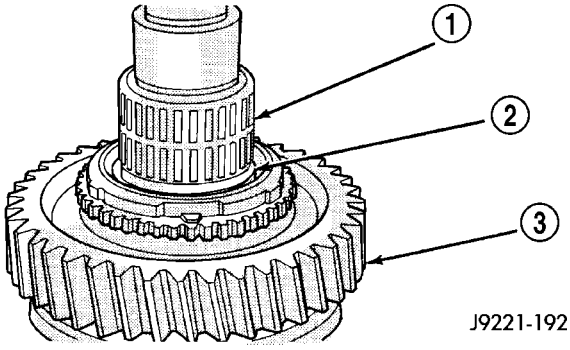


Fig. 102 REVERSE GEAR BEARING AND SPACER

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

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. 103).

(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. 103). 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.

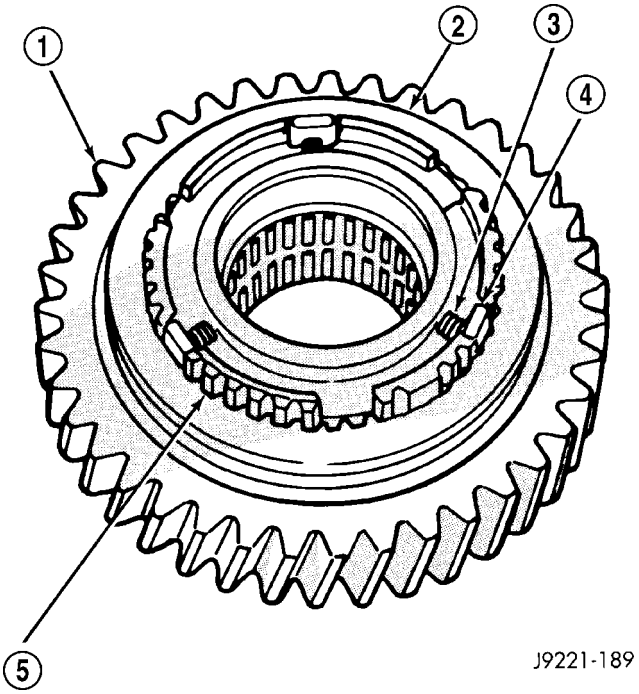


Fig. 103 REVERSE GEAR SYNCHRO ASSEMBLY

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

MANUAL TRANSMISSION - NV4500 (Continued)

(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.

(34) Install reverse gear and synchro assembly on mainshaft (Fig. 104). Rotate assembly until stop ring lugs engage in hub slots and gear drops into seated position.

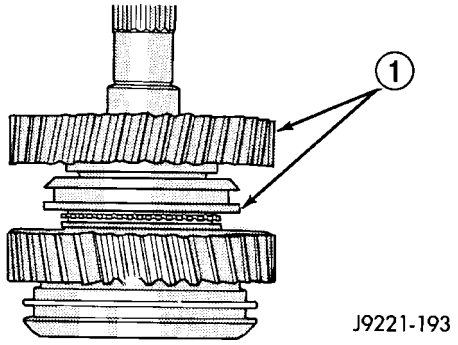


Fig. 104 REVERSE GEAR

1 - REVERSE GEAR AND SYNCHRO ASSEMBLY

(35) Install reverse gear thrust washer (Fig. 105).

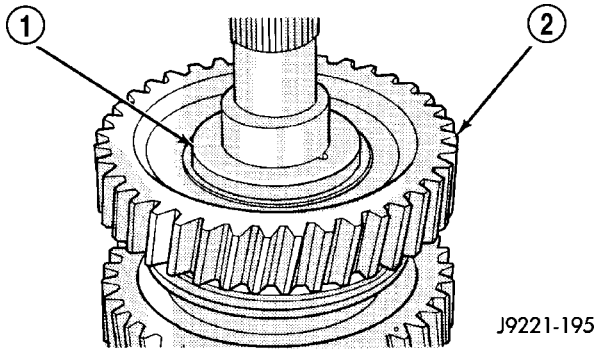


Fig. 105 REVERSE GEAR THRUST WASHER

1 - THRUST WASHER
2 - REVERSE GEAR

(36) Install rear bearing on mainshaft with Installer 6446. Seat bearing on output shaft and against thrust washer (Fig. 106).

(37) Install fourth gear stop ring in 3-4 synchro sleeve (Fig. 107).

(38) Install fourth gear clutch gear in stop ring (Fig. 108).

(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.

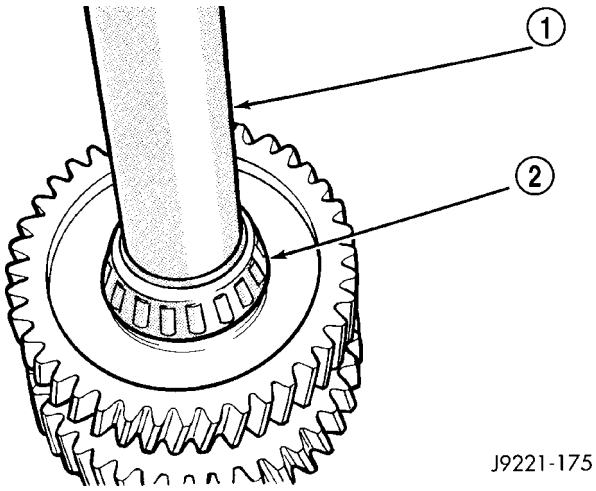


Fig. 106 MAINSHAFT REAR BEARING

1 - INSTALLER
2 - MAINSHAFT REAR BEARING

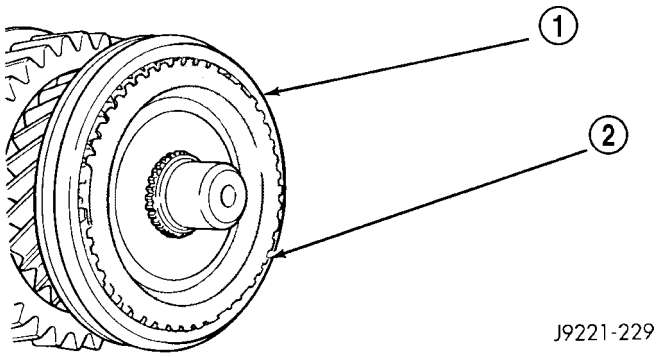


Fig. 107 FOURTH GEAR STOP RING

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

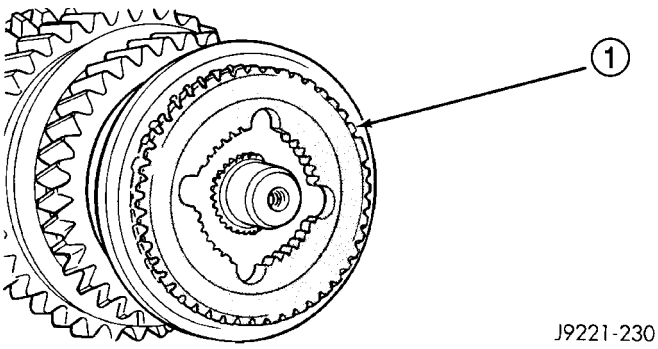


Fig. 108 FOURTH GEAR CLUTCH GEAR

1 - FOURTH SPEED CLUTCH GEAR

(42) Set transmission case upright (Fig. 109).

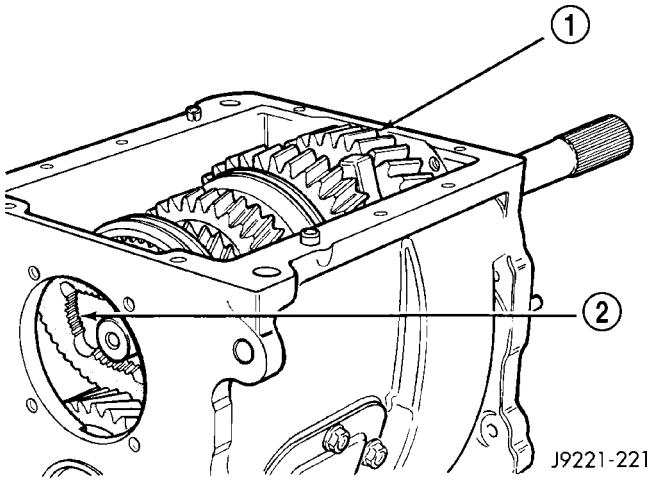


Fig. 109 MAINSHAFT AND GEARTRAIN IN CASE

1 - MAINSHAFT AND GEARTRAIN
2 - FOURTH SPEED CLUTCH GEAR

(43) Install drive gear thrust bearing on mainshaft (Fig. 110). 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.

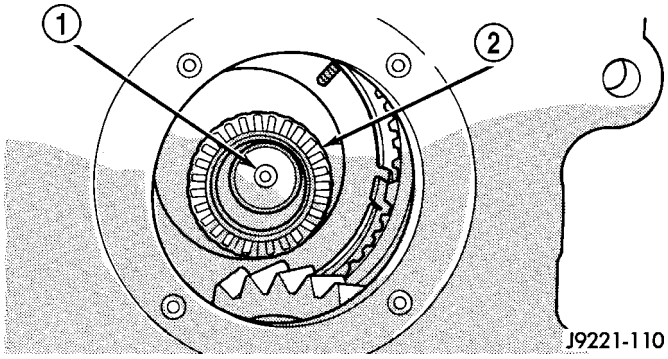


Fig. 110 DRIVE GEAR THRUST BEARING

1 - MAINSHAFT
2 - DRIVE GEAR THRUST BEARING

DRIVE GEAR AND RETAINER

(1) Install bearing on drive gear with Installer 6448 (Fig. 111).

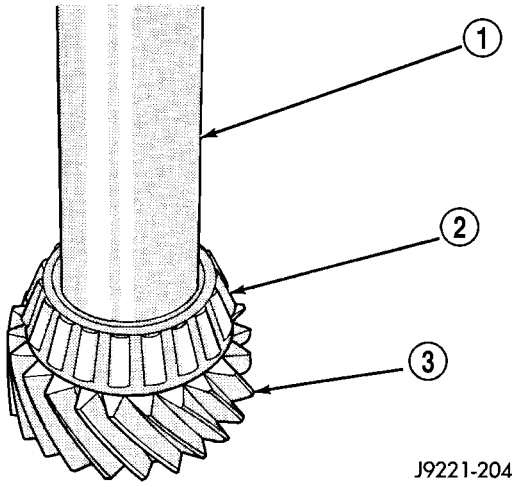


Fig. 111 FRONT BEARING ON DRIVE GEAR

1 - INSTALLER
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. 112).

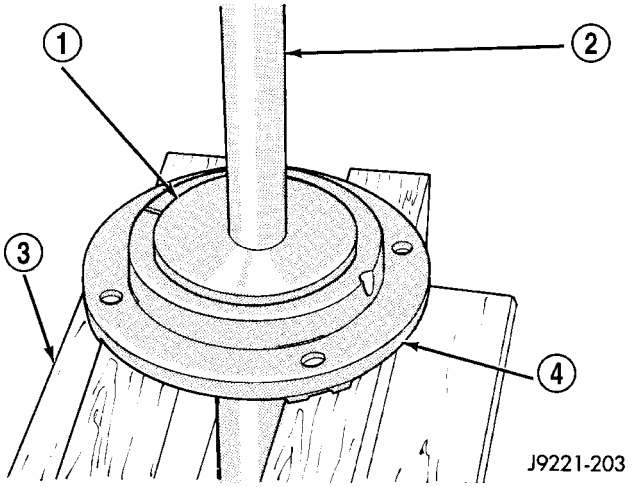


Fig. 112 FRONT BEARING CUP IN RETAINER

1 - INSTALLER
2 - HANDLE
3 - WOOD BLOCKS
4 - RETAINER

MANUAL TRANSMISSION - NV4500 (Continued)

(5) Install new oil seal in front bearing retainer with Installer 6052 (Fig. 113). Use one or two wood blocks to support retainer as shown. Lubricate seal lip with petroleum jelly after installation.

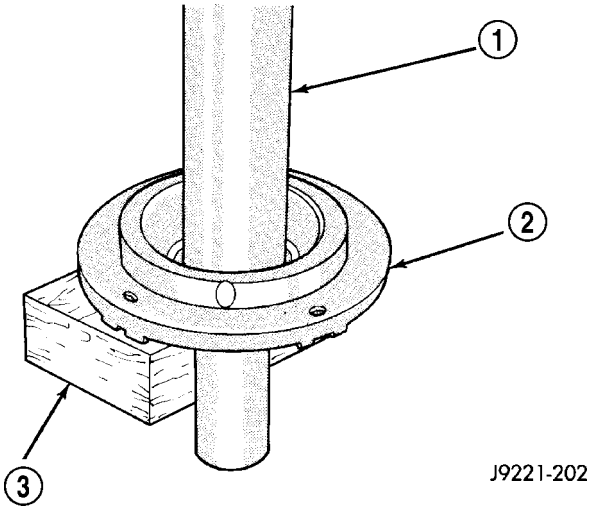


Fig. 113 BEARING RETAINER OIL SEAL

1 - INSTALLER
2 - RETAINER
3 - WOOD BLOCK

(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. 114).

(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. 114).

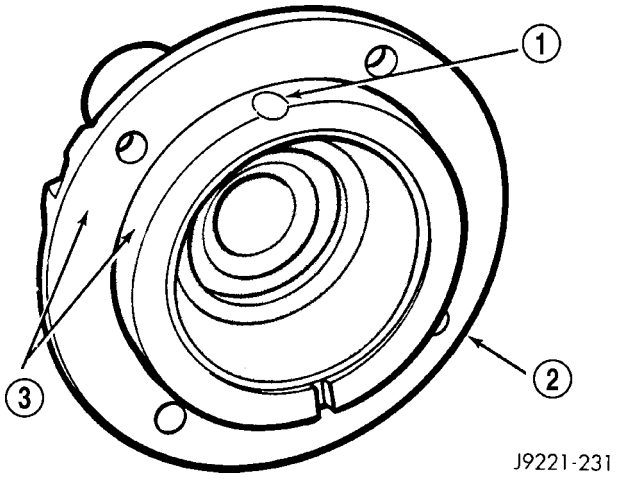


Fig. 114 LOCATION OF FRONT RETAINER LUBE CHANNEL

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

(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. 115).

NOTE: Never reuse the old bolts.

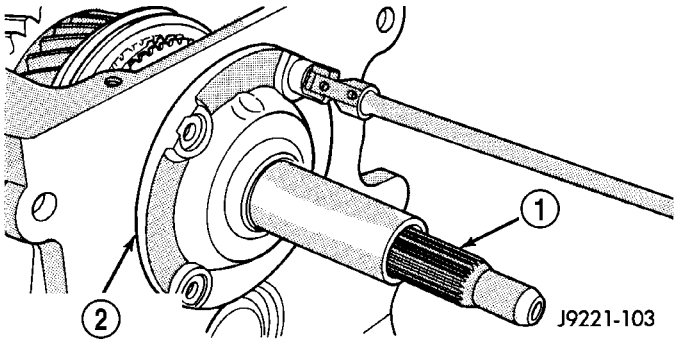


Fig. 115 FRONT BEARING RETAINER

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. 116).

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. 116).

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

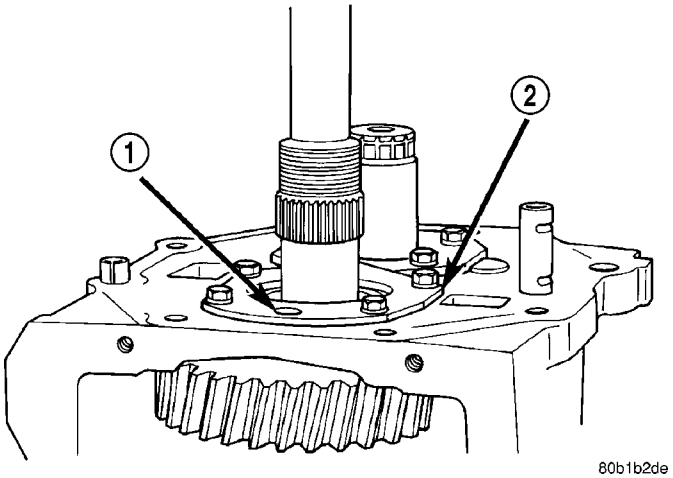


Fig. 116 REAR BEARING PLATE

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

(12) Install mainshaft fifth gear with Installer 6446 (Fig. 117). Gear is seated when it contacts rear bearing.

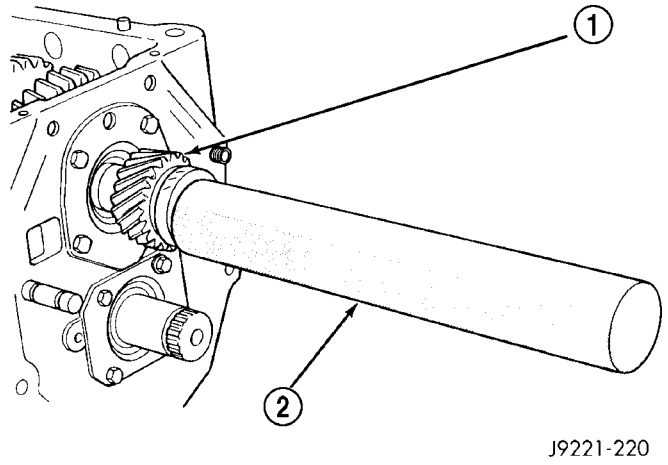


Fig. 117 MAINSHAFT FIFTH GEAR

1 - MAINSHAFT FIFTH GEAR
2 - INSTALLER

COUNTERSHAFT FIFTH GEAR SYNCHRO

(1) Install thrust washer pin in countershaft (Fig. 118).

(2) Install thrust washer on countershaft. Turn washer until pin engages in washer notch (Fig. 119).

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. 120).

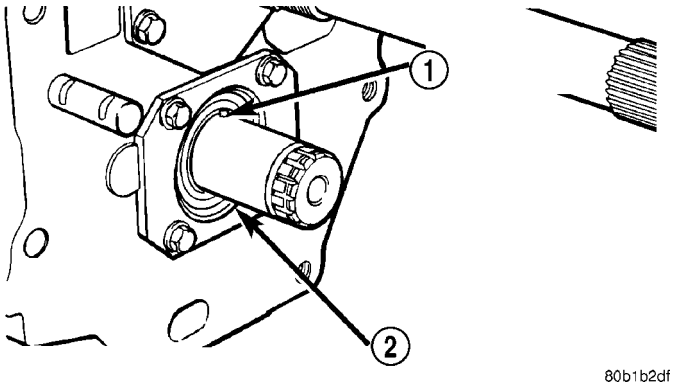


Fig. 118 FIFTH GEAR THRUST WASHER PIN

1 - THRUST WASHER PIN
2 - COUNTERSHAFT

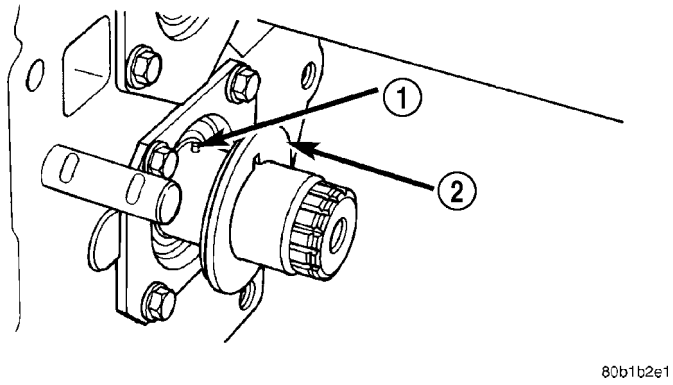


Fig. 119 FIFTH GEAR THRUST WASHER

1 - PIN
2 - THRUST WASHER

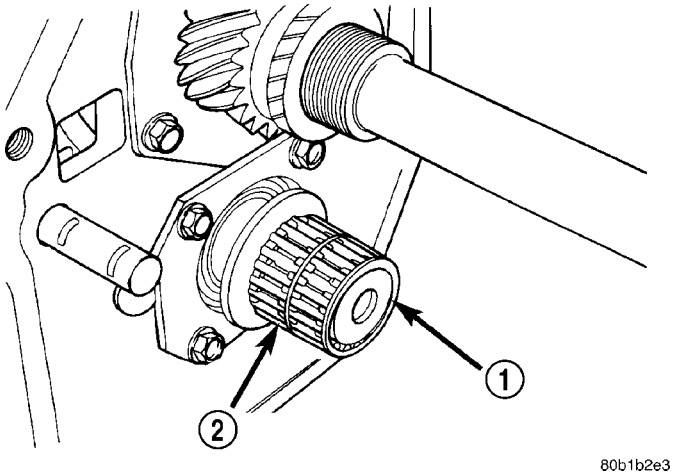


Fig. 120 COUNTERSHAFT FIFTH GEAR BEARING

1 - COUNTERSHAFT
2 - FIFTH GEAR NEEDLE BEARING

(4) Install synchro sleeve on hub of countershaft fifth gear with tapered side of sleeve facing front and the flat side facing rear (Fig. 121).

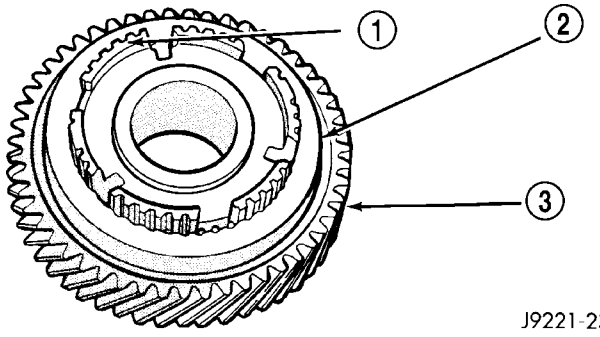


Fig. 121 SYNCHRO SLEEVE ON COUNTERSHAFT FIFTH

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

(5) Install shift fork in synchro sleeve (Fig. 122).

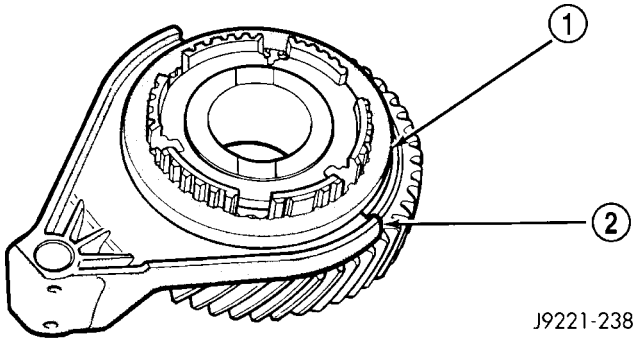


Fig. 122 FIFTH GEAR SHIFT FORK IN SYNCHRO SLEEVE

1 - SYNCHRO SLEEVE
2 - SHIFT FORK

(6) Install assembled fifth gear, synchro sleeve and shift fork (Fig. 123). 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.

(7) Install fifth gear synchro struts and springs (Fig. 124).

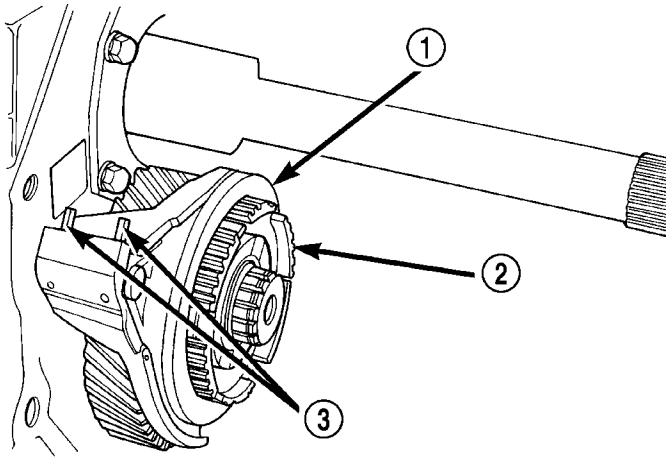


Fig. 123 COUNTERSHAFT FIFTH GEAR, SHIFT FORK AND SYNCHRO SLEEVE

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

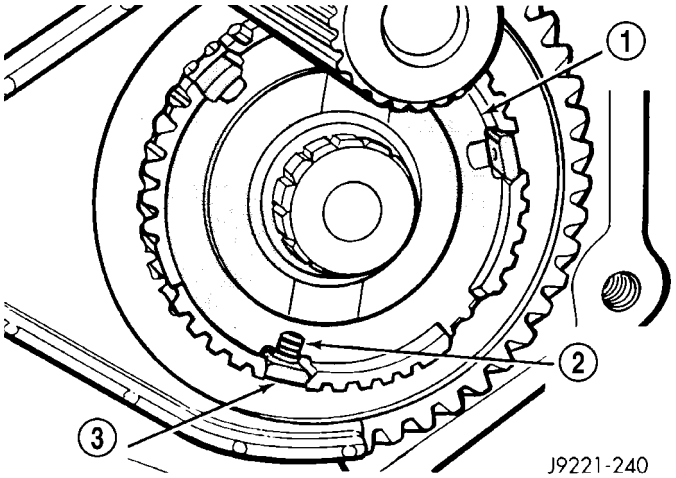


Fig. 124 FIFTH GEAR SYNCHRO STRUTS AND SPRINGS

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. 125). Verify parts are seated in fifth gear hub.

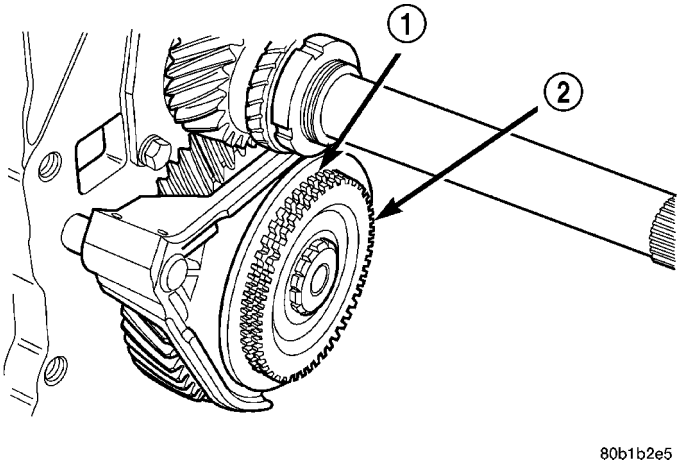


Fig. 125 FIFTH SYNCHRO CLUTCH GEAR AND STOP RING

1 - STOP RING
2 - CLUTCH GEAR

(9) Install clutch gear snap ring (Fig. 126).

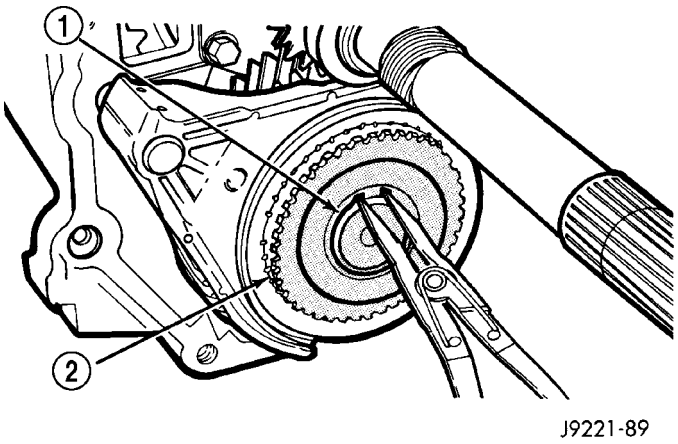


Fig. 126 FIFTH SYNCHRO CLUTCH SNAP RING

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. 123).

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. 127).

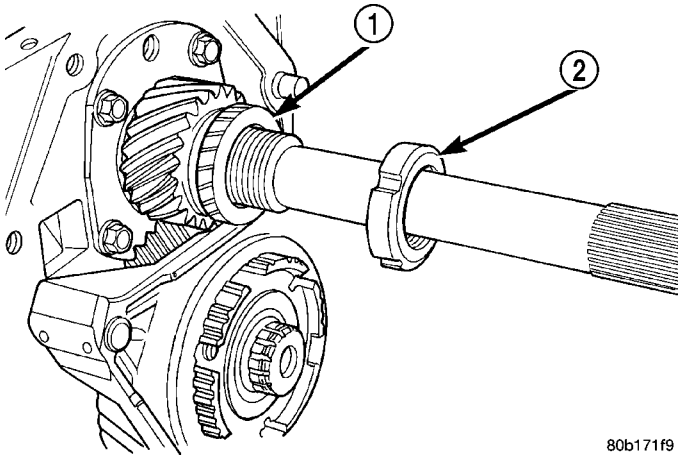


Fig. 127 FIFTH GEAR NUT

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 Wrench 6743, long handle ratchet, breaker bar and applicable socket wrench (Fig. 128).

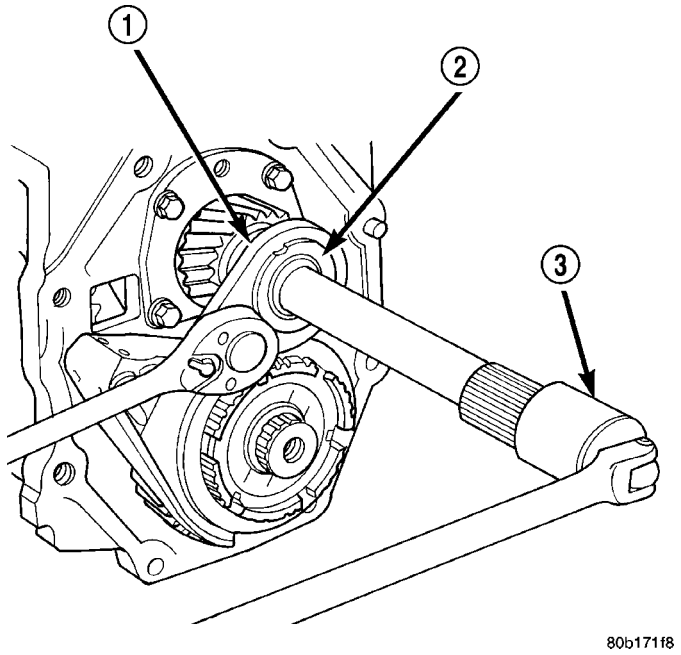


Fig. 128 FIFTH GEAR NUT

1 - WRENCH
2 - FIFTH GEAR NUT
3 - SOCKET

(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. 129).

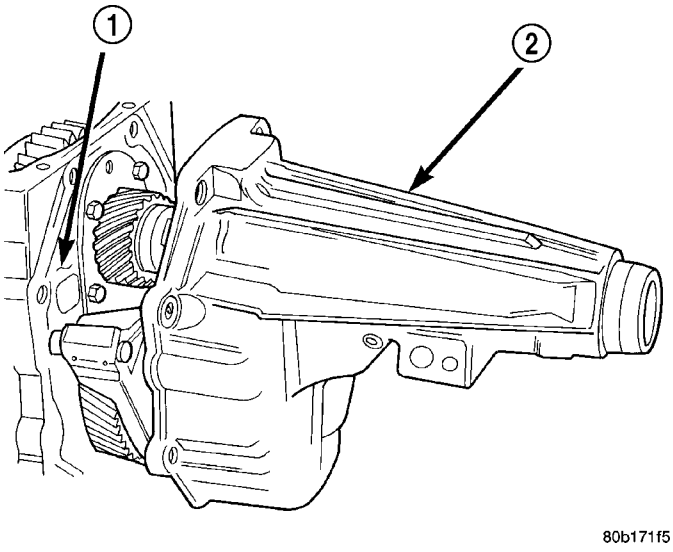


Fig. 129 INSTALLING EXTENSION/ADAPTER HOUSING

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.).

SHIFT MECHANISM

(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. 130) are secure.

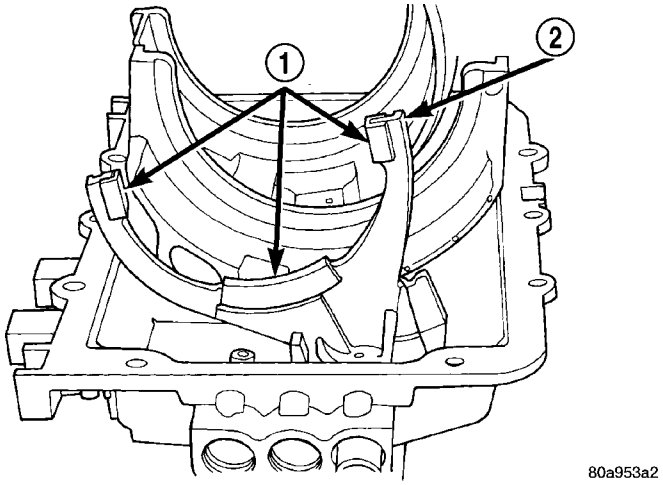


Fig. 130 SHIFT FORK PAD

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.

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 transmission bolts and tighten 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 transfer case nuts and tighten to:

- If 3/8 studs 41-47 N·m (30-35 ft. lbs.).
- If 5/16 studs 30-41 N·m (22-30 ft. lbs.).

(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.

(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.

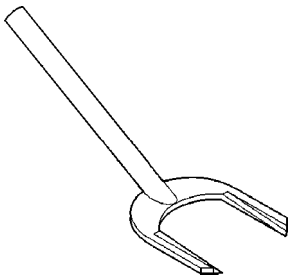
MANUAL TRANSMISSION - NV4500 (Continued)

SPECIFICATIONS

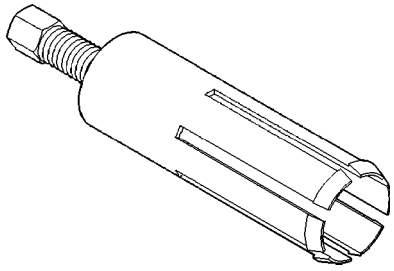
TORQUE SPECIFICATIONS

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 Mechanism Cover Bolts	27-31	20-23	-
Transmission Bolts	108	80	-

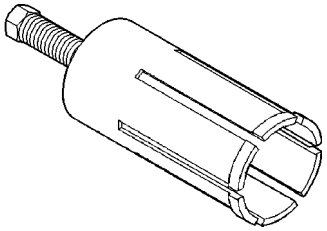
SPECIAL TOOLS



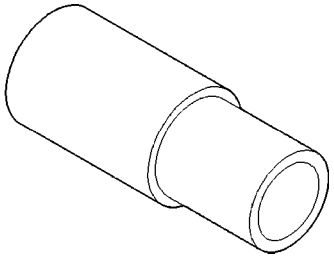
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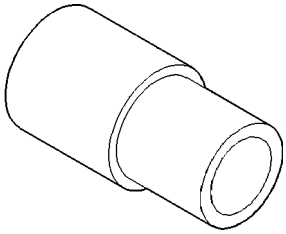
BUSHING REMOVER 6957



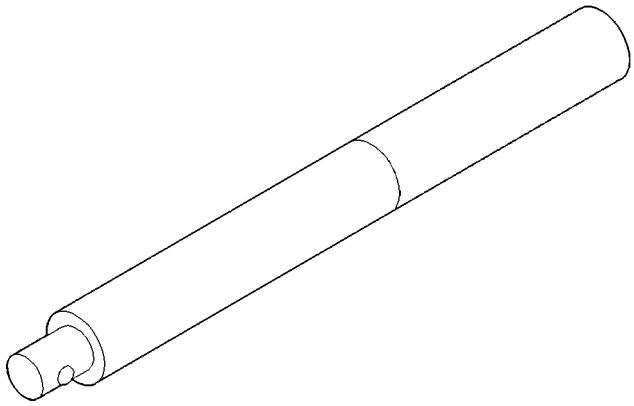
REMOVER BUSHING 8155



INSTALLER BUSHING 6951

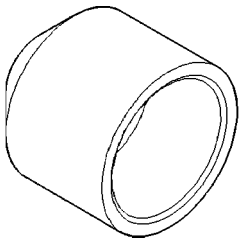


INSTALLER BUSHING 8156

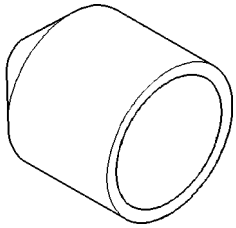


HANDLE C-4171

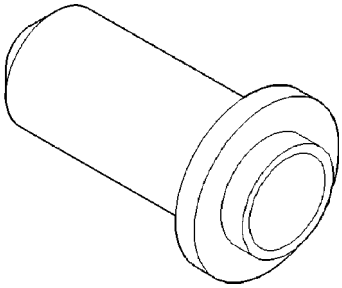
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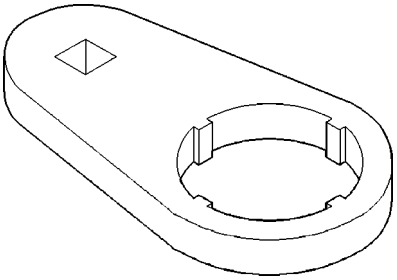
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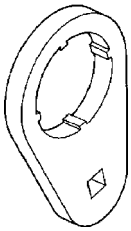
INSTALLER SEAL 8154



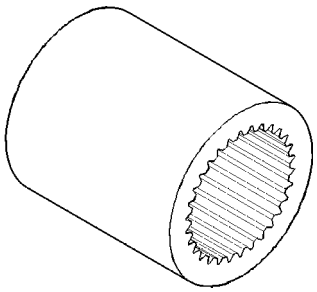
INSTALLER SEAL C-3860-A



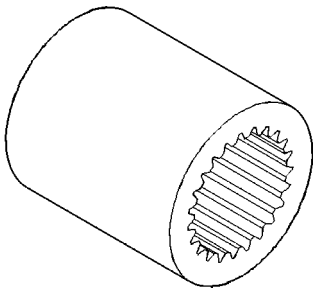
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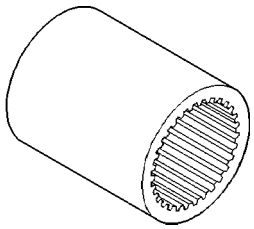
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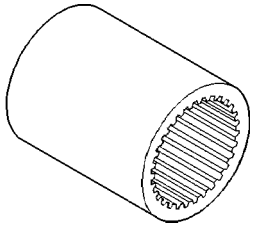
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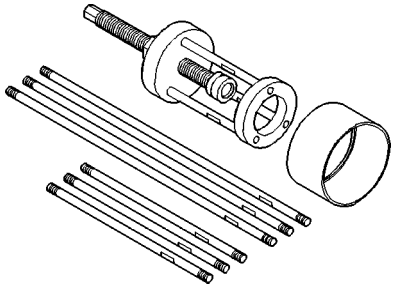
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SOCKET 6993

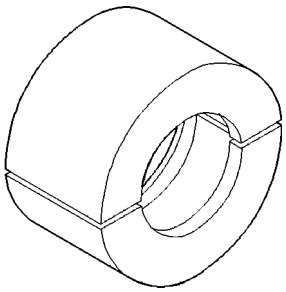


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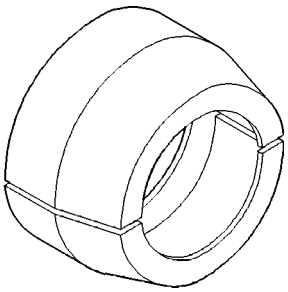


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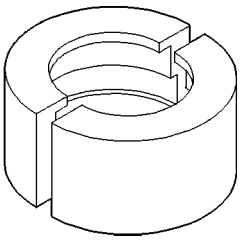
MANUAL TRANSMISSION - NV4500 (Continued)



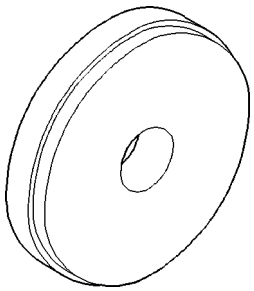
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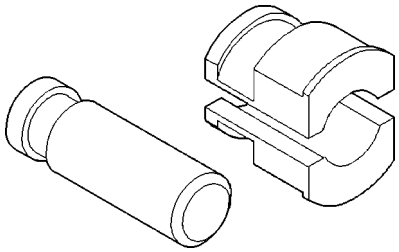
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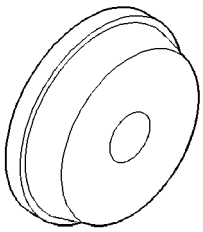
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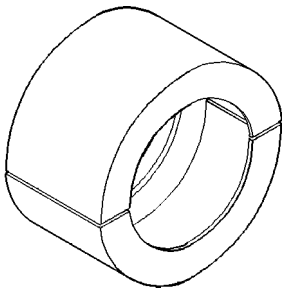
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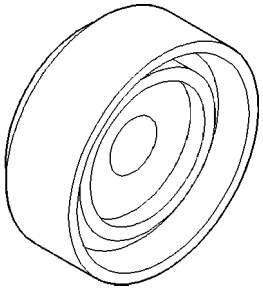
JAWS & INSERT 6453



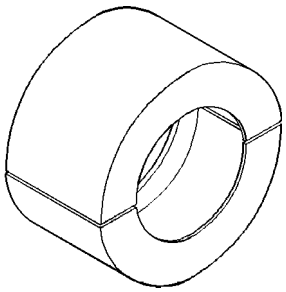
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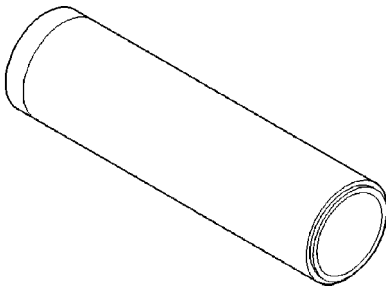
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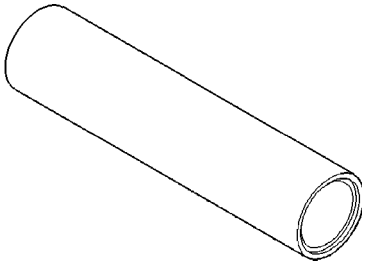
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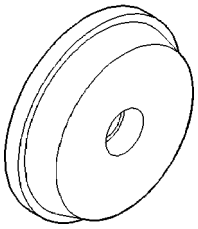
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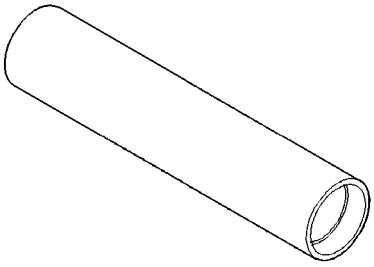
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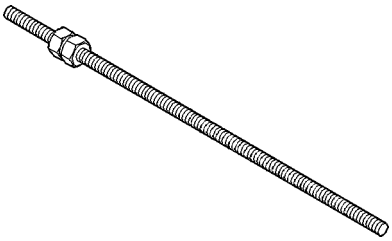
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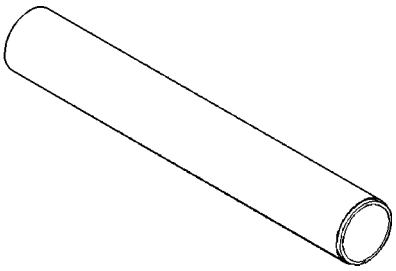
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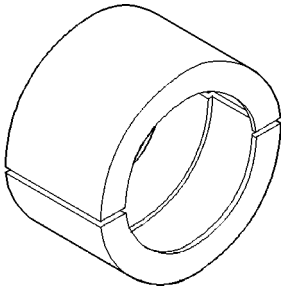
INSTALLER 6052



ROD EXTENSION 8161



INSTALLER 6446



JAWS 6445

ADAPTER HOUSING SEAL

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. 131).

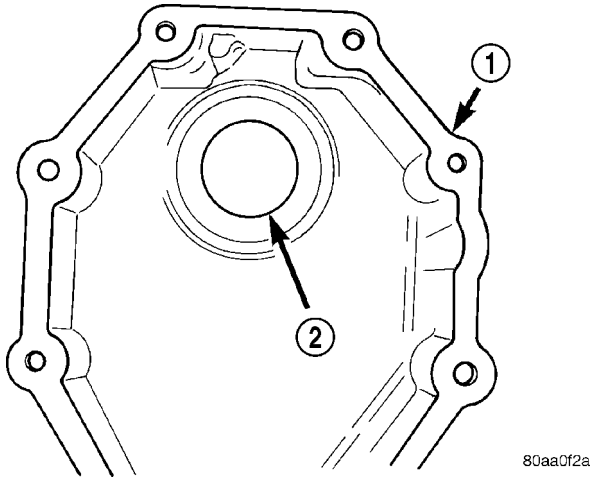


Fig. 131 Adapter Housing (4–Wheel Drive Models)

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

REMOVAL

(1) Mark the propeller shaft and yoke for installation reference.
(2) Remove the propeller shaft.
(3) Remove extension housing seal (Fig. 132) using Remover C-3985-B.
(4) On heavy duty 4X2 vehicles, remove extension housing seal with a pry tool or a slide hammer mounted screw.

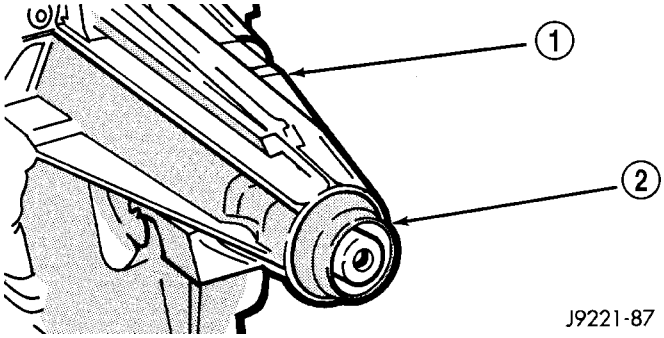


Fig. 132 EXTENSION HOUSING AND SEAL (4X2)

1 - EXTENSION HOUSING
2 - SEAL

(5) On light duty transmissions, remove the extension housing bushing with Remover 6957.
(6) On heavy duty transmissions, remove the extension housing bushing with Remover 8155.

INSTALLATION

(1) Install housing bushing with Handle C-4171 (Fig. 133) and Installer.

- Light Duty - Installer 6951
- Heavy Duty - Installer 8161

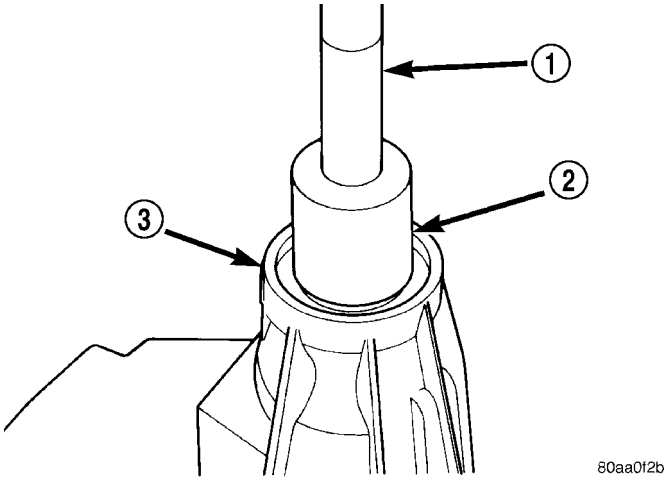


Fig. 133 Extension Housing Bushing

1 - HANDLE
2 - INSTALLER
3 - EXTENSION HOUSING

EXTENSION HOUSING SEAL (Continued)

(2) Install housing seal with Handle C-4171 (Fig. 134) and Installer.

- Light Duty - Installer C-3972-A
- Heavy Duty - Installer 8154

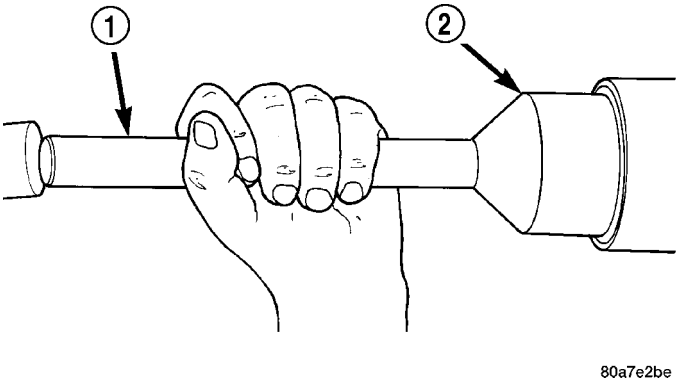


Fig. 134 Pinion Seal

1 - HANDLE
2 - INSTALLER

(3) Install propeller shaft with reference marks aligned.

(4) Check and fill transmission.

SHIFT MECHANISM

REMOVAL

(1) Remove transmission from vehicle.

(2) Remove shift mechanism cover bolts (Fig. 135).

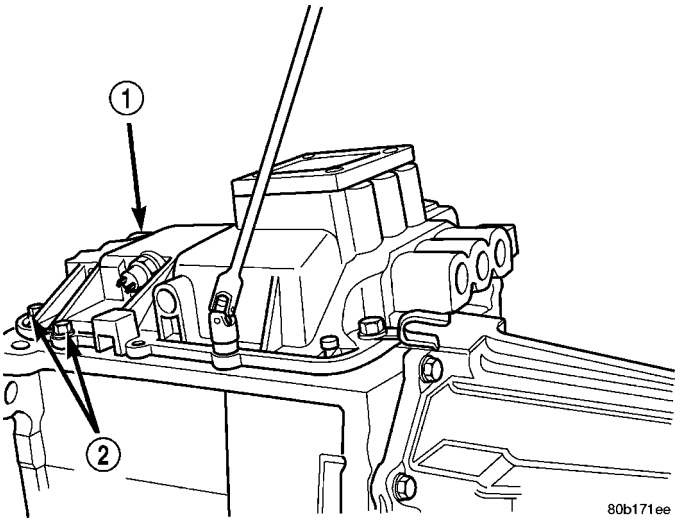


Fig. 135 SHIFT MECHANISM BOLTS

1 - SHIFT MECHANISM COVER
2 - BOLTS

(3) Pry up shift mechanism cover at slots provided in cover (Fig. 136).

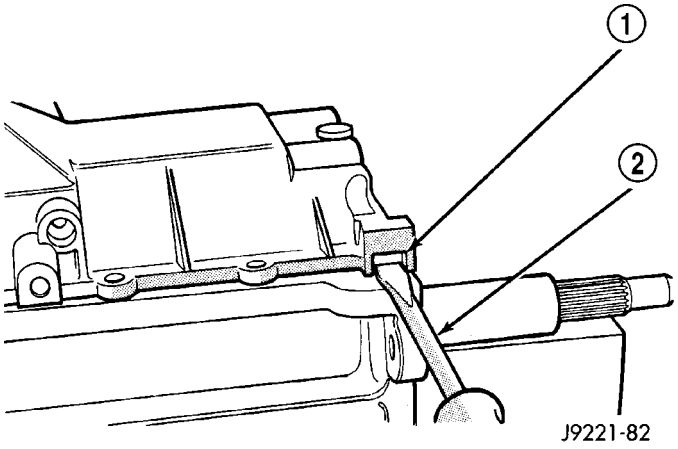


Fig. 136 LOOSEN SHIFT MECHANISM

1 - SHIFT MECHANISM COVER SLOT
2 - PRY TOOL

(4) Raise cover enough to disengage it from alignment dowels in gear case (Fig. 137).

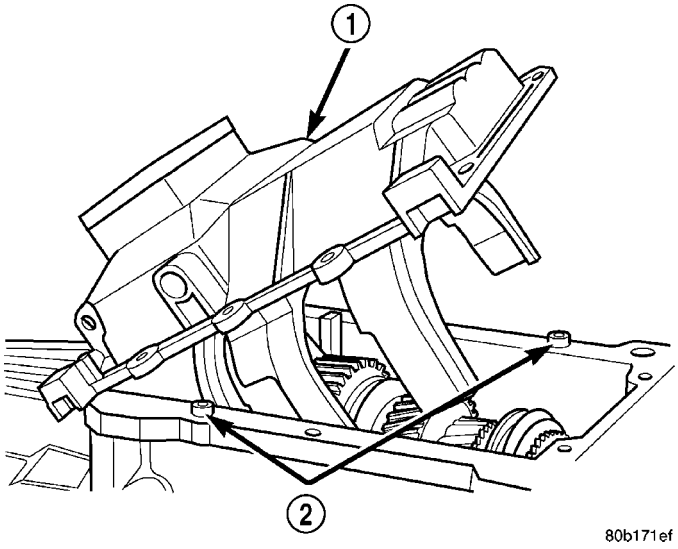


Fig. 137 SHIFT MECHANISM COVER

1 - SHIFT MECHANISM COVER
2 - ALIGNMENT DOWELS

(5) Raise front of shift mechanism cover and lift cover up and off gear case (Fig. 137).

SHIFT MECHANISM (Continued)

FIFTH-REVERSE SHIFT FORK PADS

Three shift pads on the forks are held in place by tension and a small locating tang (Fig. 138).

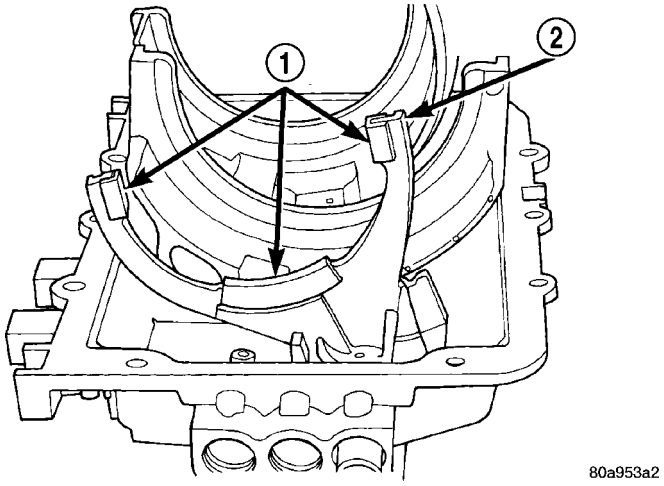


Fig. 138 SHIFT FORK PAD LOCATIONS

1 - SHIFT FORK PADS
2 - FIFTH-REVERSE FORK

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. 139) can be replaced if loose/leaking.

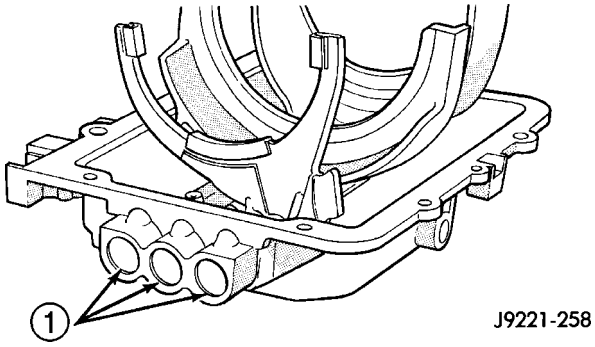


Fig. 139 EXPANSION PLUG LOCATION

1 - EXPANSION PLUGS

(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.
(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 mechanism 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 mechanism cover.

CAUTION: Do not use an excessive 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. 140) are secure.

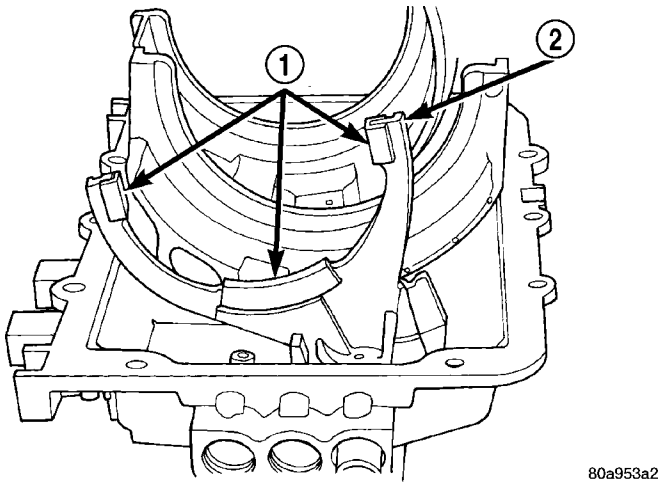


Fig. 140 SHIFT FORK PAD

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 mechanism 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.

SHIFT MECHANISM (Continued)

(7) Apply Mopar Lock N' Seal or equivalent to threads of shift cover bolts.

(8) Install shift cover mechanism 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

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 TRANSMISSION - NV5600

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MANUAL TRANSMISSION - 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.

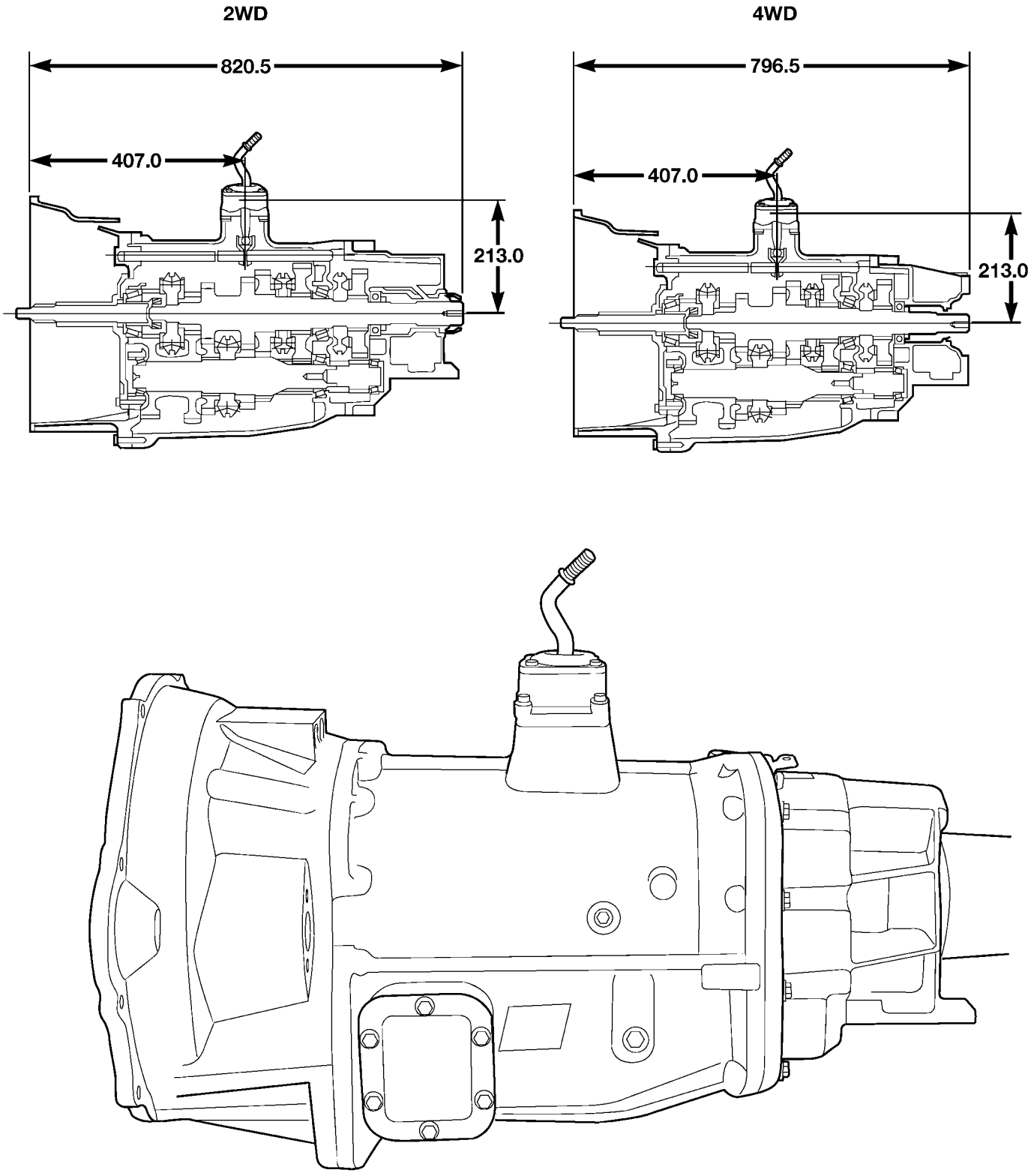
To drain the trans remove the bottom PTO cover bolt. Fill the trans through the plug to the rear of the PTO cover (Fig. 1). Dry fill is approximately 4.5 liters (9.5 pints) or to the bottom edge of the fill plug hole.

The 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

MANUAL TRANSMISSION - NV5600 (Continued)



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Fig. 1 NV5600 MANUAL TRANSMISSION

MANUAL TRANSMISSION - NV5600 (Continued)

IDENTIFICATION

The transmission has two identification tags attached to the driver side upper clutch housing (Fig. 2). 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.

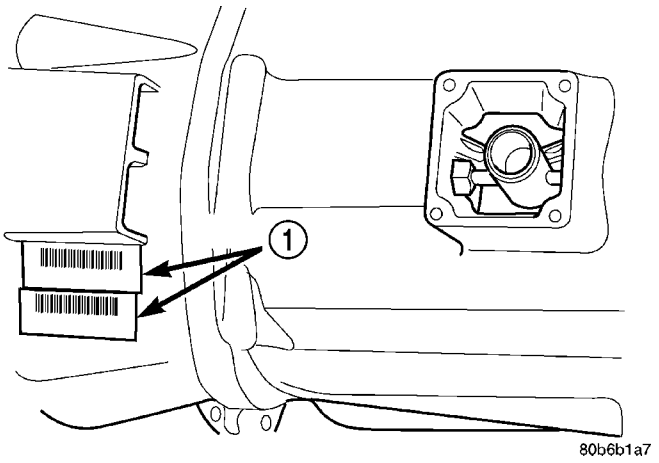


Fig. 2 IDENTIFICATION TAG LOCATION

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.

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) Shift transmission into Neutral.

(2) Remove screws attaching shift boot to floorpan. Then slide boot upward on the shift lever.
(3) Remove the bolts holding the shift tower to the isolator plate and transmission gear case.
(4) Remove the shift tower and isolator plate from the transmission gear case.
(5) Raise and support vehicle.
(6) Remove skid plate, if equipped.
(7) Mark propeller shaft/shafts and axle yokes for installation reference.
(8) Remove propeller shaft.
(9) Disconnect and remove exhaust system as necessary.
(10) Disconnect wires at backup light switch.
(11) Support engine with adjustable safety stand and wood block.
(12) If transmission is to be disassembled for repair, remove drain bolt at bottom of PTO cover and drain lubricant from transmission (Fig. 3).

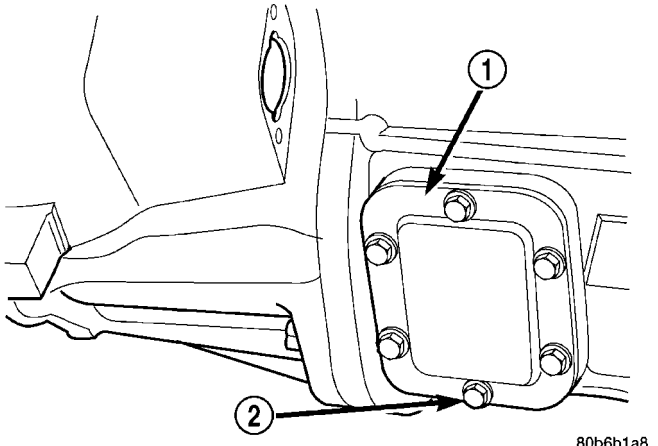


Fig. 3 NV5600 DRAIN BOLT

1 - PTO COVER
2 - DRAIN BOLT

(13) Remove clutch slave cylinder splash shield, if equipped.
(14) Remove clutch slave cylinder bolts and move cylinder aside for clearance.
(15) 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 bolts and pry out 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 bolts and pry out 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. 4).

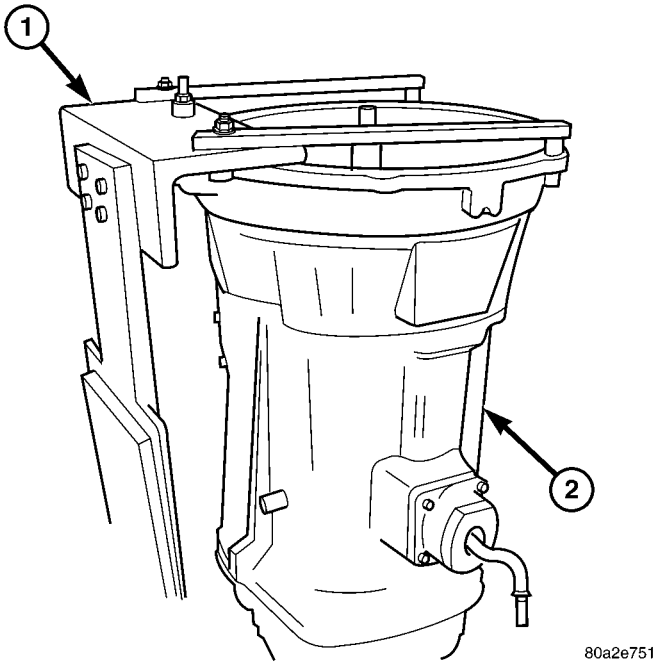


Fig. 4 TRANSMISSION FIXTURE

1 - FIXTURE
2 - TRANSMISSION

MANUAL TRANSMISSION - NV5600 (Continued)

(2) Rotate the transmission to the horizontal position, if necessary.

(3) Remove the shift tower (Fig. 5) and isolator plate (Fig. 6).

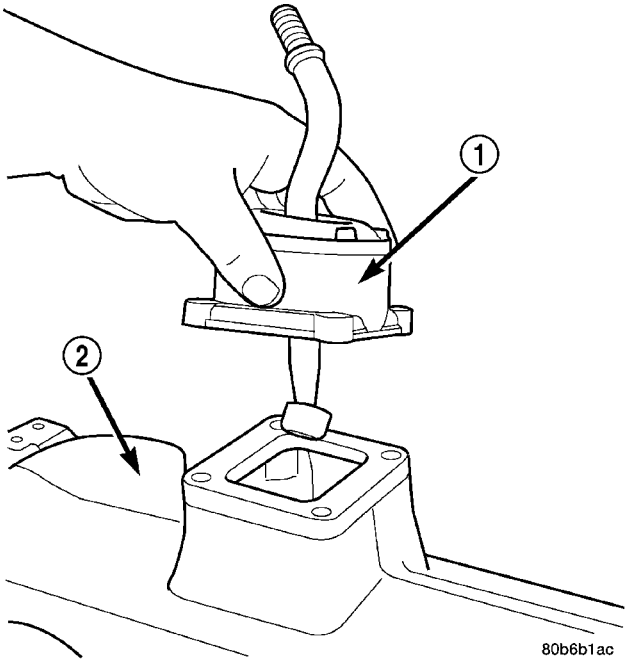


Fig. 5 REMOVE SHIFT TOWER

1 - SHIFT TOWER
2 - TRANSMISSION

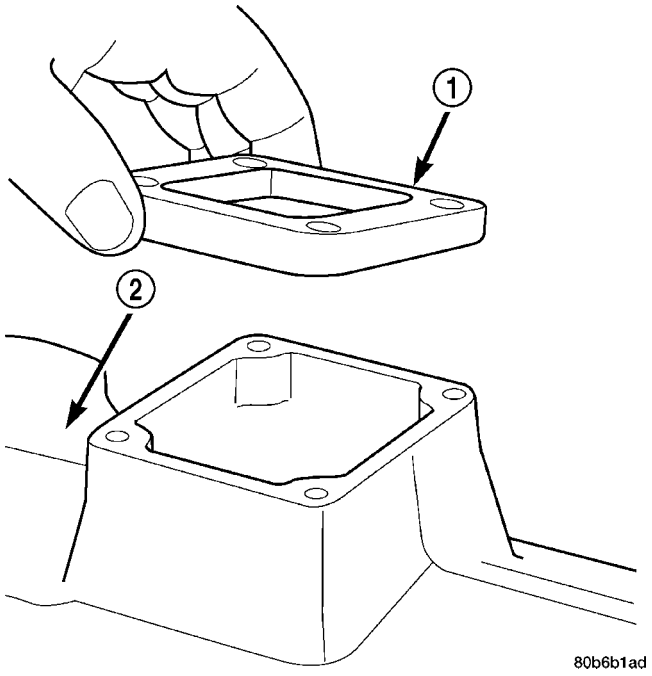


Fig. 6 SHIFT TOWER ISOLATOR PLATE

1 - ISOLATOR PLATE
2 - TRANSMISSION

(4) Remove primary shift rail detent plug (Fig. 7).

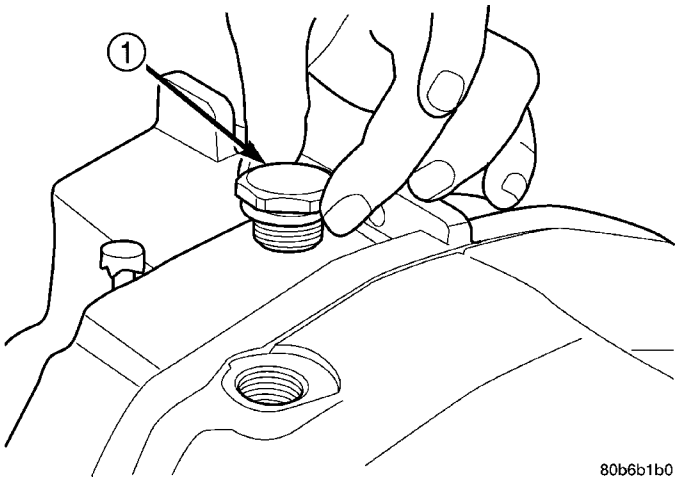


Fig. 7 PRIMARY SHIFT RAIL DETENT PLUG

1 - DETENT PLUG

(5) Remove primary shift rail detent spring (Fig. 8).

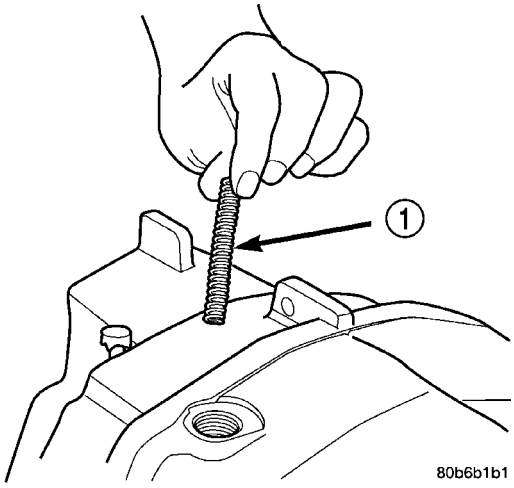


Fig. 8 PRIMARY SHIFT RAIL DETENT SPRING

1 - DETENT SPRING

(6) Remove primary shift rail detent plunger (Fig. 9).

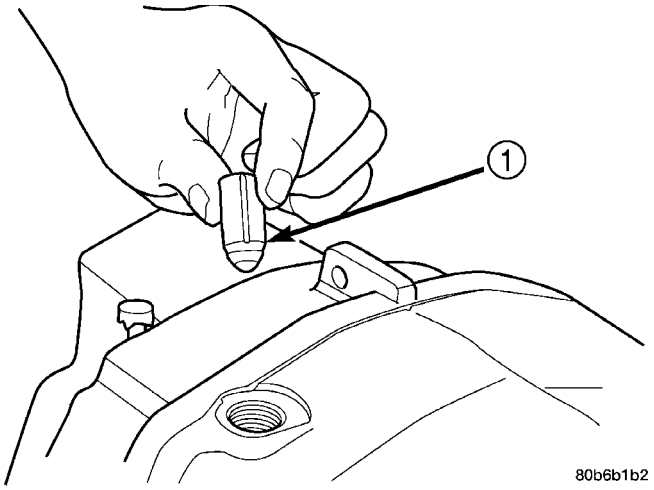


Fig. 9 PRIMARY SHIFT RAIL DETENT PLUNGER

1 - DETENT PLUNGER

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

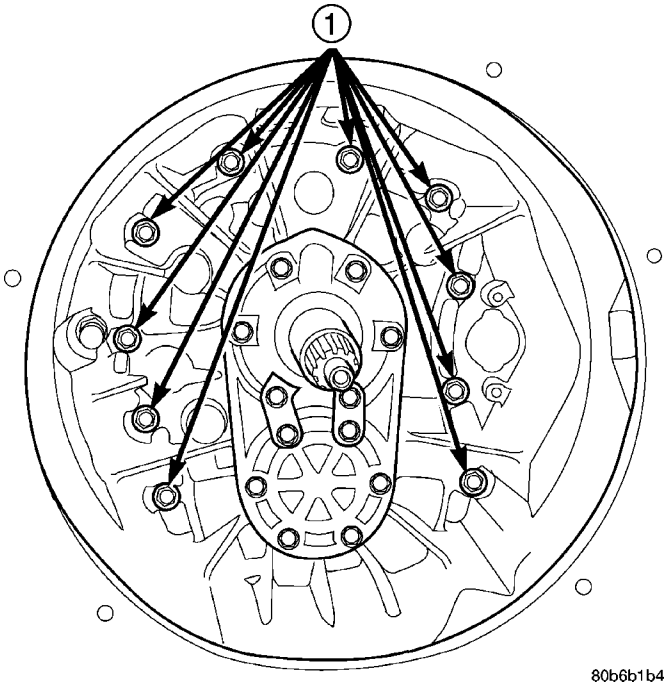


Fig. 10 CLUTCH HOUSING BOLTS

1 - BOLTS (10)

(8) Remove shift rail blocker bolt (Fig. 11) from the side of the transmission gear case.

EXTENSION/ADAPTER HOUSING

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

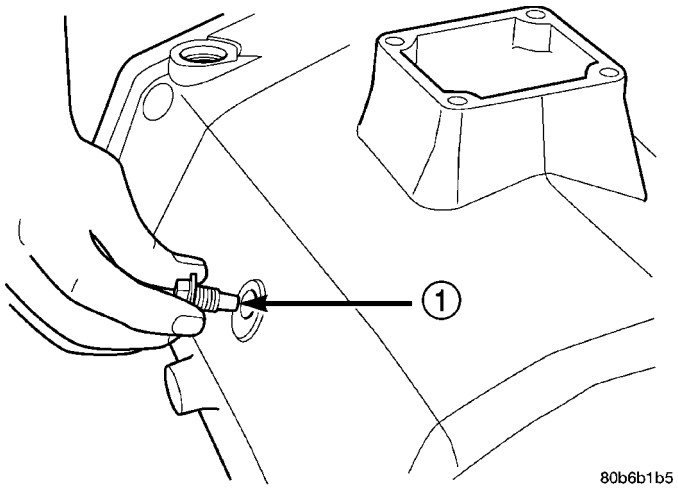


Fig. 11 SHIFT RAIL BLOCKER BOLT

1 - BLOCKER BOLT

(2) Remove extension/adapter housing from the transmission gear case with Puller 8244 (Fig. 12).

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.

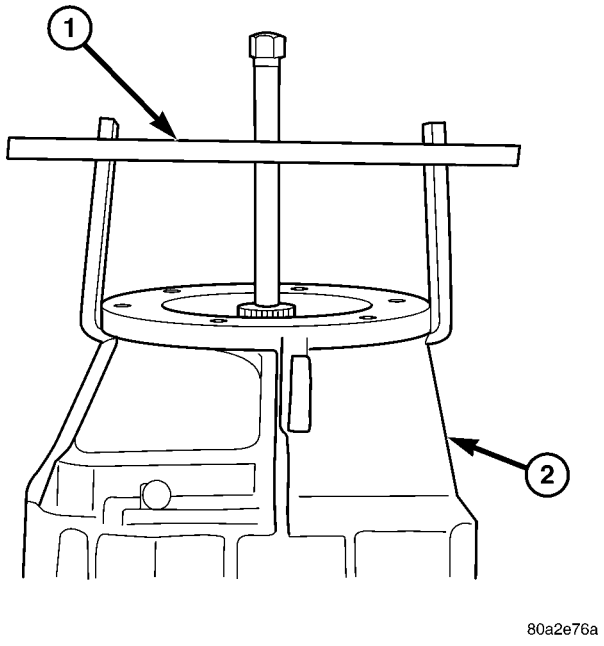


Fig. 12 TRANSMISSION CASE PULLER

1 - PULLER
2 - EXTENSION/ADAPTER HOUSING

(3) Remove crossover detent plug, spring and plunger from the extension/adapter housing (Fig. 13).

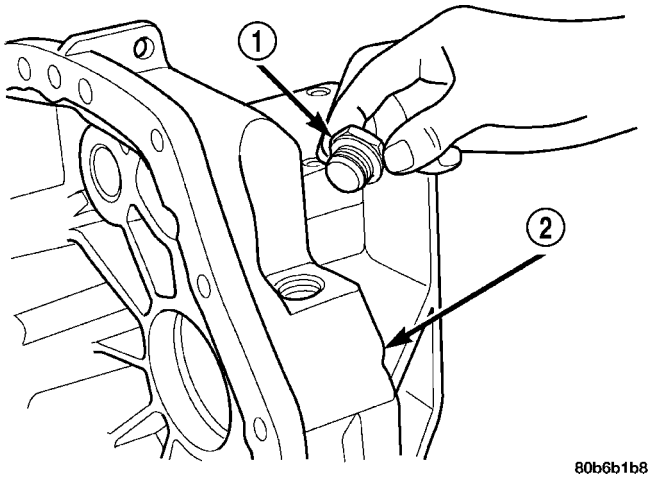


Fig. 13 CROSSOVER CAM DETENT PLUG

1 - DETENT PLUG
2 - EXTENSION HOUSING

(4) Remove bolt and washer holding the crossover cam to the extension/adapter housing (Fig. 14).

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

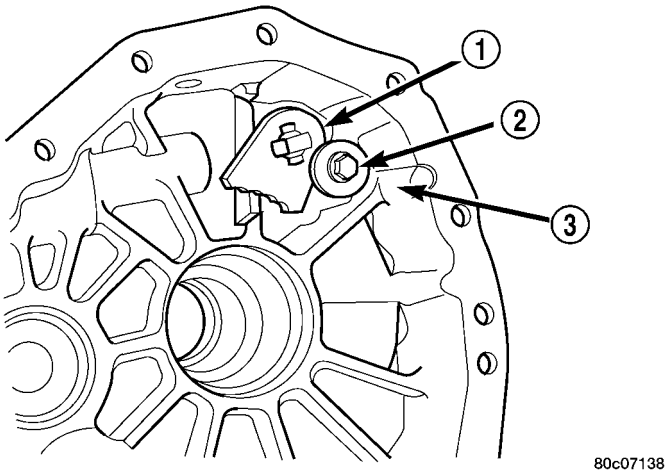


Fig. 14 CROSSOVER CAM BOLT

1 - CROSSOVER CAM
2 - BOLT
3 - EXTENSION HOUSING

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

(7) Remove countershaft rear bearing race from the extension/adapter housing with Remover L-4518 (Fig. 15).

NOTE: Tag all countershaft pre-load shims from between the bearing race and the housing (Fig. 16).

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

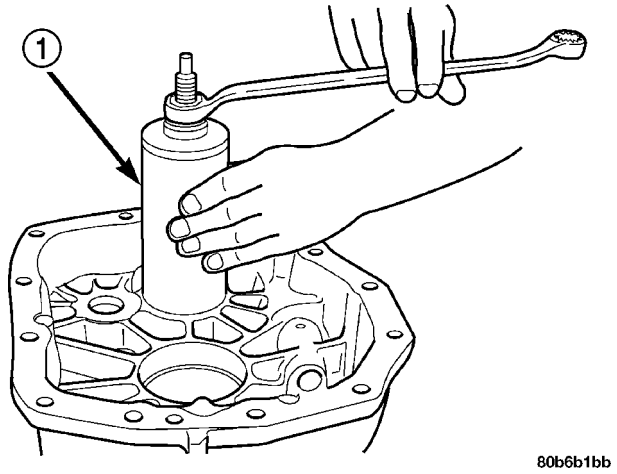


Fig. 15 COUNTERSHAFT REAR BEARING RACE

1 - REMOVER

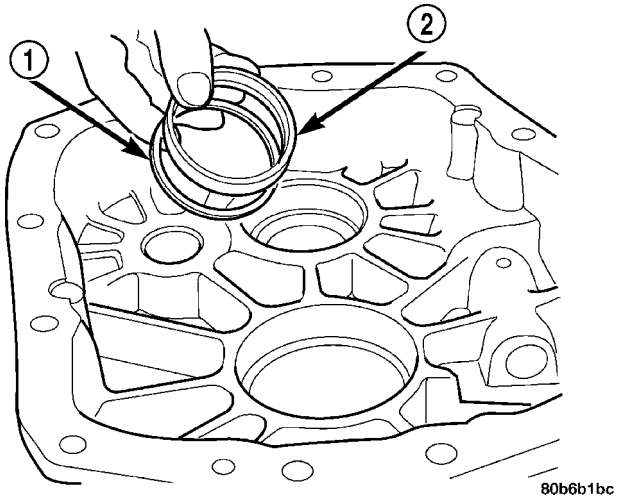


Fig. 16 COUNTERSHAFT REAR BEARING RACE AND SHIM

1 - PRE-LOAD SHIM
2 - BEARING RACE

(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.

REVERSE GEAR

(1) Remove crossover cam rollers and pin (Fig. 17).

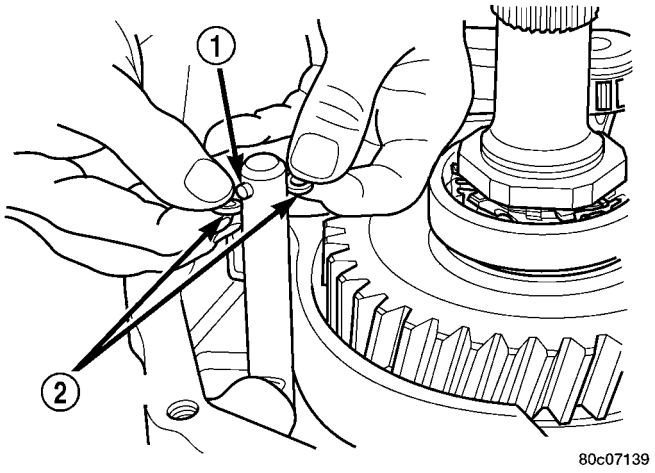


Fig. 17 CROSSOVER CAM ROLLERS AND PIN

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. 18).

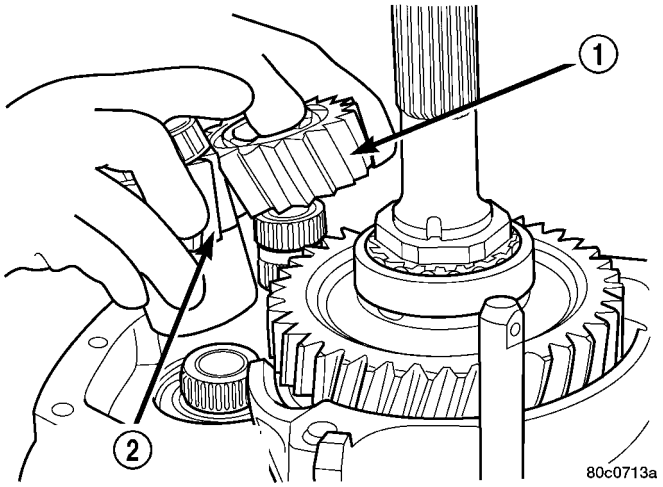


Fig. 18 REVERSE IDLER AND COUNTERSHAFT GEARS

1 - REVERSE IDLER GEAR
2 - COUNTERSHAFT REVERSE GEAR

(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. 19).

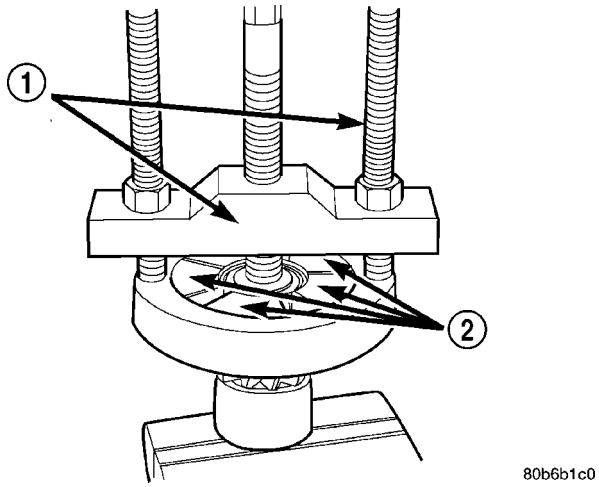


Fig. 19 COUNTERSHAFT REAR BEARING PULLER

1 - PULLER
2 - ADAPTERS

(6) Seperate countershaft reverse gear and sleeve.

(7) Remove output shaft nut with Wrench 8226 on the shaft nut and Socket 6993 or 6984 to hold the shaft (Fig. 20). 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.

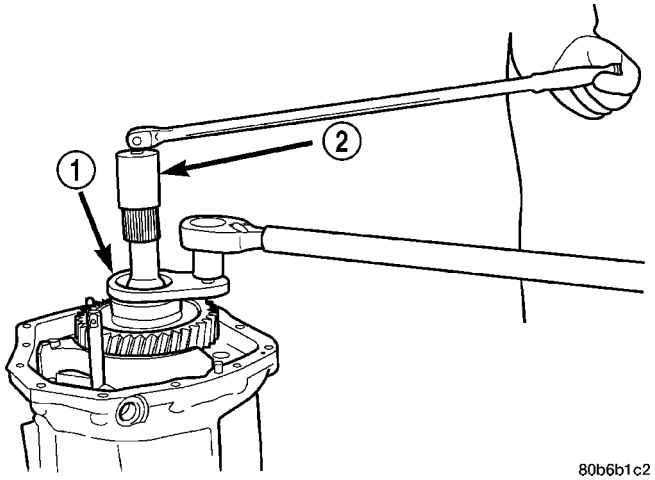


Fig. 20 LOOSEN OUTPUT SHAFT NUT

1 - WRENCH
2 - SOCKET

(8) Remove output shaft ball bearing assembly and reverse thrust washer from the output shaft (Fig. 21).

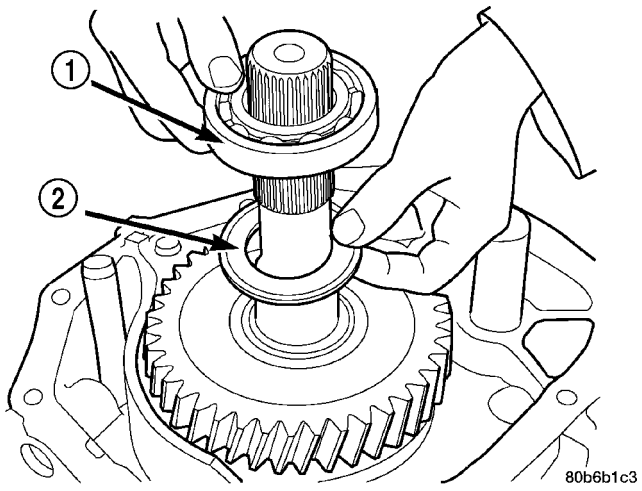


Fig. 21 OUTPUT SHAFT BEARING AND THRUST WASHER

1 - OUTPUT SHAFT BALL BEARING
2 - THRUST WASHER

(9) Remove reverse gear, reverse gear synchronizer cone, reverse gear outer blocker ring and reverse gear bearing (Fig. 22).

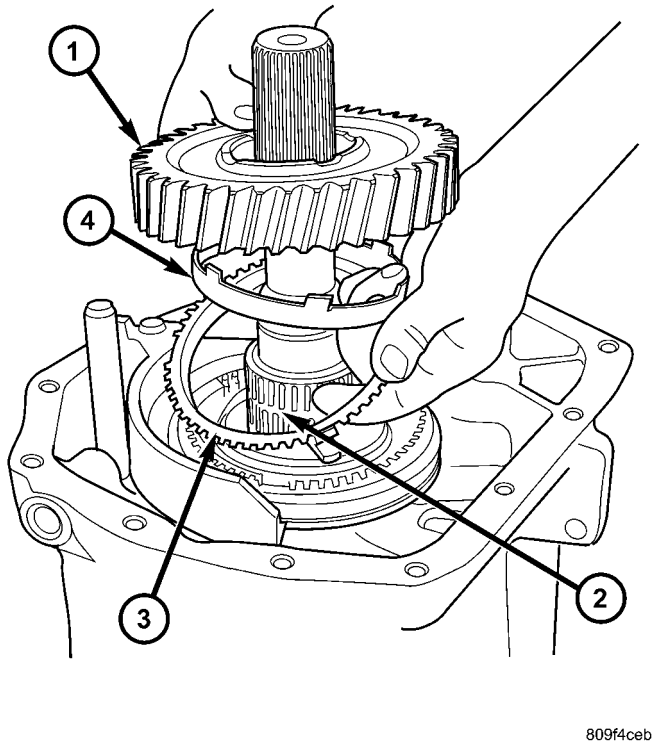


Fig. 22 REVERSE GEAR COMPONENTS

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

(10) Remove reverse gear bearing sleeve from the output shaft (Fig. 23).

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.

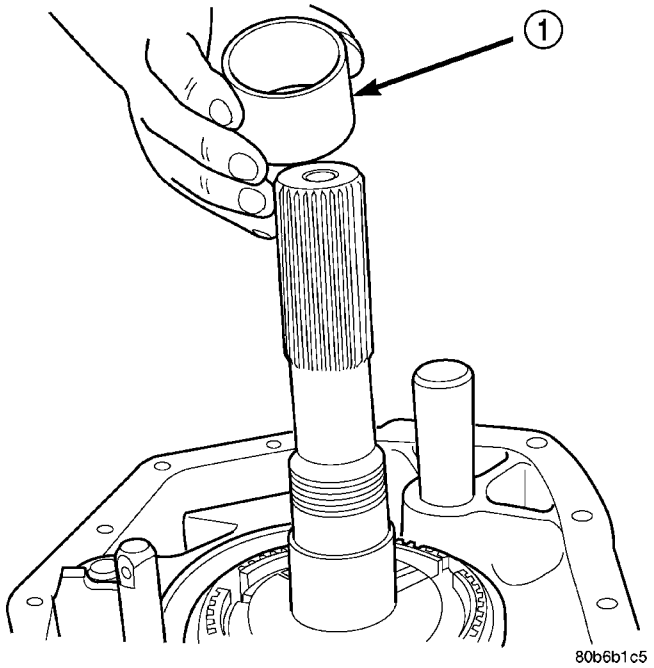


Fig. 23 REVERSE BEARING SLEEVE

1 - REVERSE GEAR BEARING SLEEVE

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

(12) Remove reverse shift fork and synchronizer as an assembly from the reverse shift rail and the output shaft (Fig. 24).

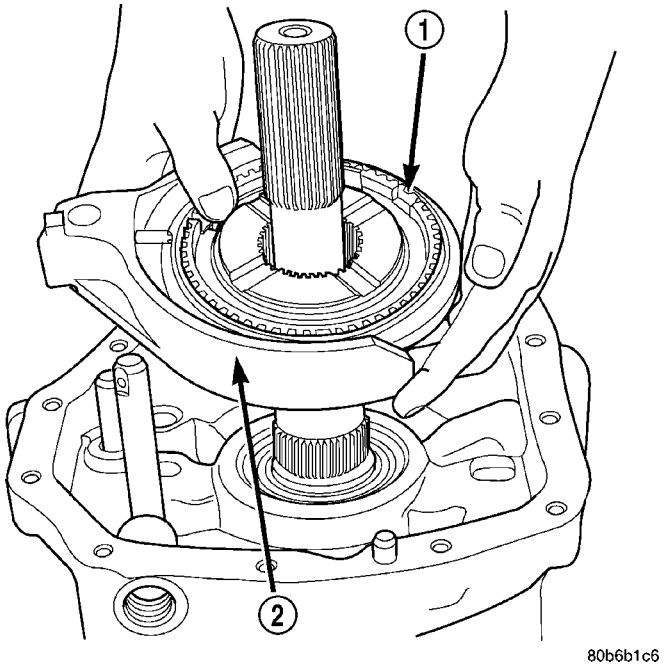


Fig. 24 REVERSE SHIFT FORK AND SYNCHRO

1 - REVERSE SYNCHRO
2 - REVERSE SHIFT FORK

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 6 mm (7/32 in.) punch and hammer.

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

(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. 25).

(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. 26).

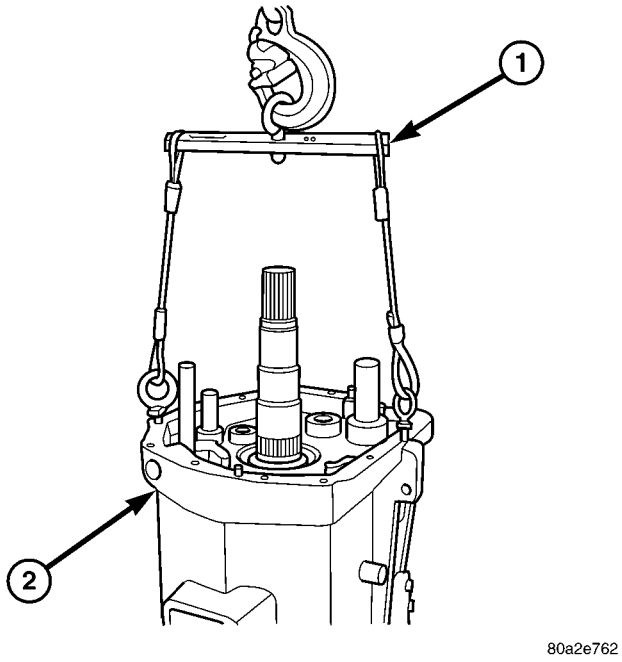


Fig. 25 TRANSMISSION CASE LIFT FIXTURE

1 - FIXTURE
2 - TRANSMISSION CASE

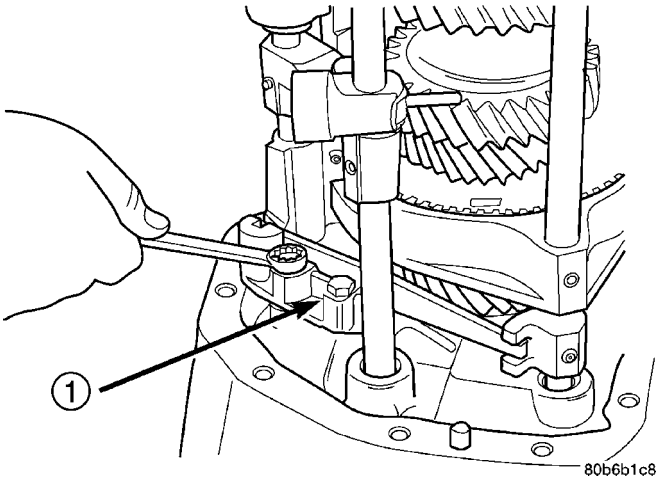


Fig. 26 5-6 CROSSOVER BRACKET BOLTS

1 - 5-6 CROSSOVER BRACKET

MANUAL TRANSMISSION - NV5600 (Continued)

(2) Attach Fixture 8232 to the output shaft and countershaft (Fig. 27).

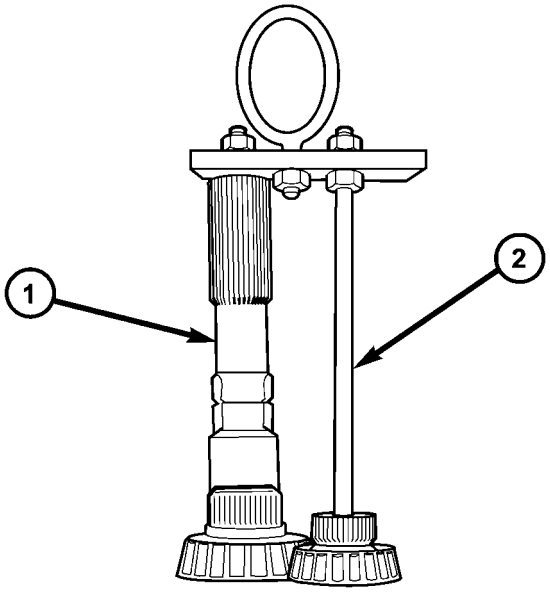


Fig. 27 FIXTURE/OUTPUT SHAFT

1 - OUTPUT SHAFT
2 - FIXTURE

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

(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. 28) 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. 29).

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

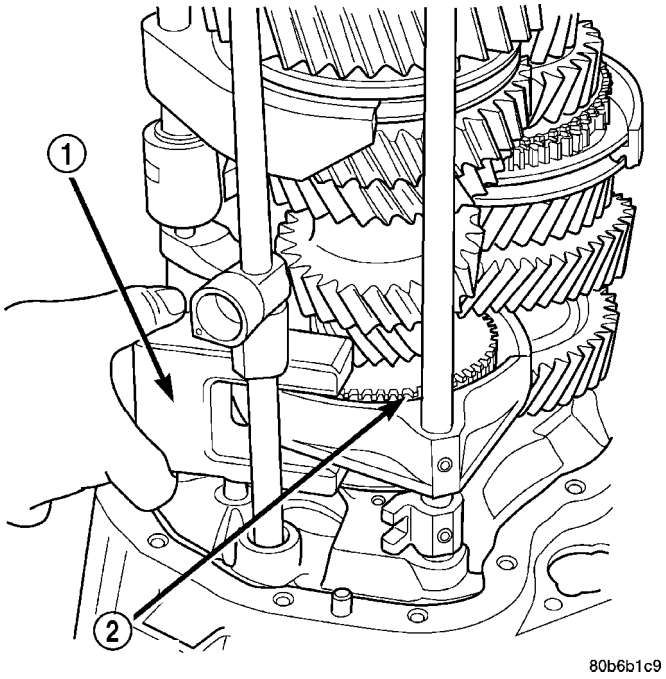


Fig. 28 Remove Holding Tool

1 - HOLDING TOOL
2 - 5-6 SYNCHRO

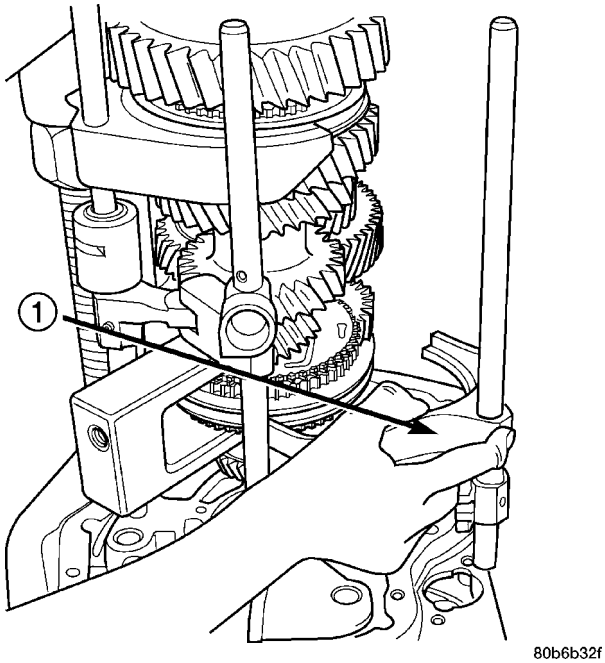


Fig. 29 SHIFT RAILS

1 - 5-6 SHIFT RAIL

MANUAL TRANSMISSION - NV5600 (Continued)

(10) Remove geartrain from the clutch housing and install the geartrain into Support Stand 8246 (Fig. 30).

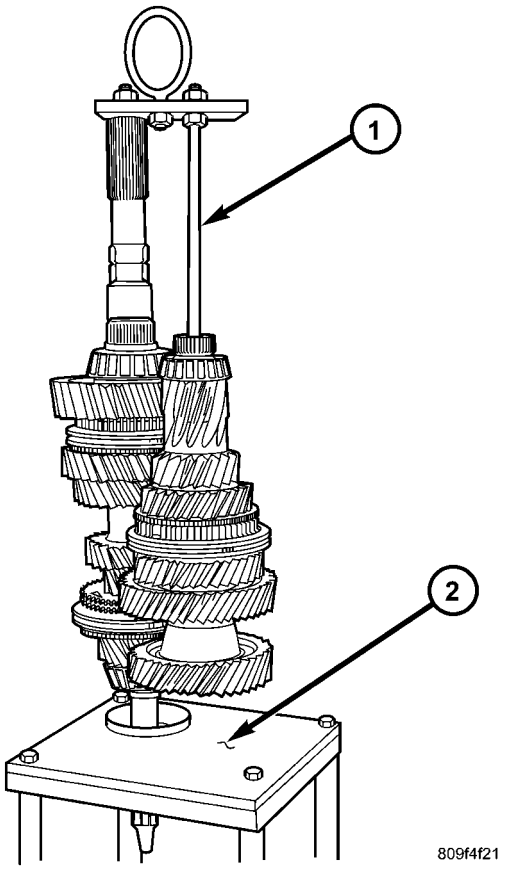


Fig. 30 GEARTRAIN FIXTURE

1 - FIXTURE
2 - SUPPORT STAND

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

(12) Separate the countershaft from the output shaft.

(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 Collar 6444-8, Jaws 6451, Puller Rods 6444-4 and Puller 6444 (Fig. 31).

(3) Remove rear countershaft bearing with Collar 6444-8, Jaws 6447, Puller Rods 6444-4, Puller 6444 and suitable press button (Fig. 32).

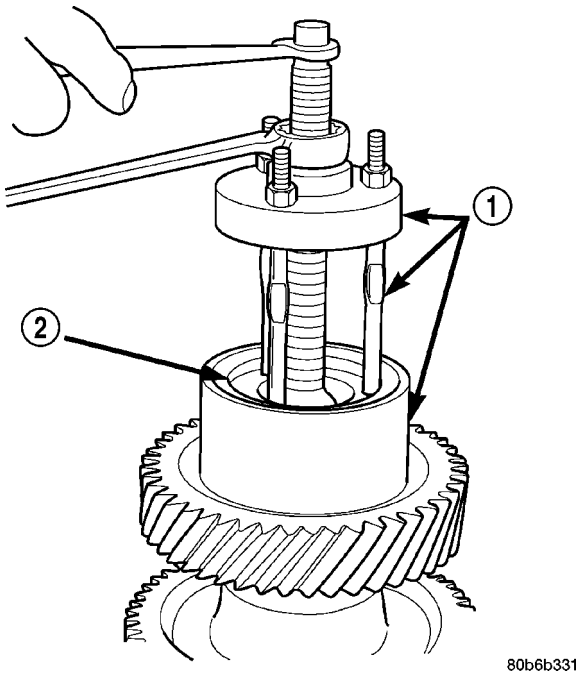


Fig. 31 FRONT COUNTERSHAFT BEARING

1 - PULLER
2 - JAWS

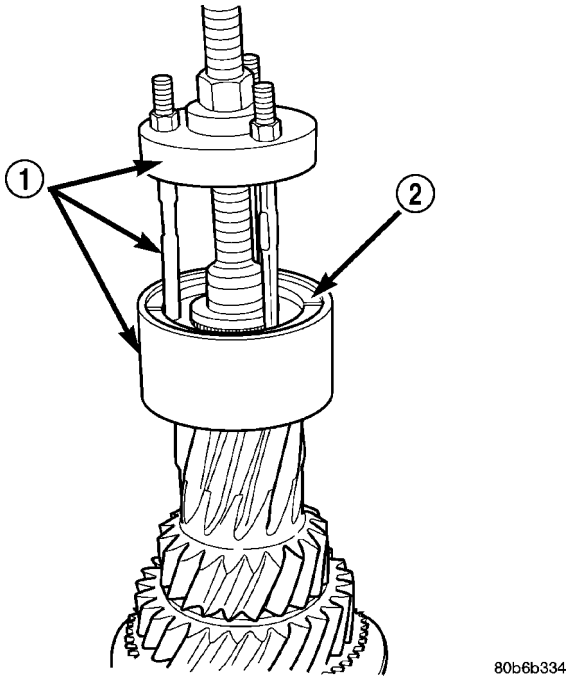


Fig. 32 REAR COUNTERSHAFT BEARING

1 - PULLER
2 - JAWS

MANUAL TRANSMISSION - NV5600 (Continued)

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, Jaws 8234, Puller Rods 6444-4 and the remainder of Puller 6444 (Fig. 33).

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

(4) Use Collar 6444-8, Jaws 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.

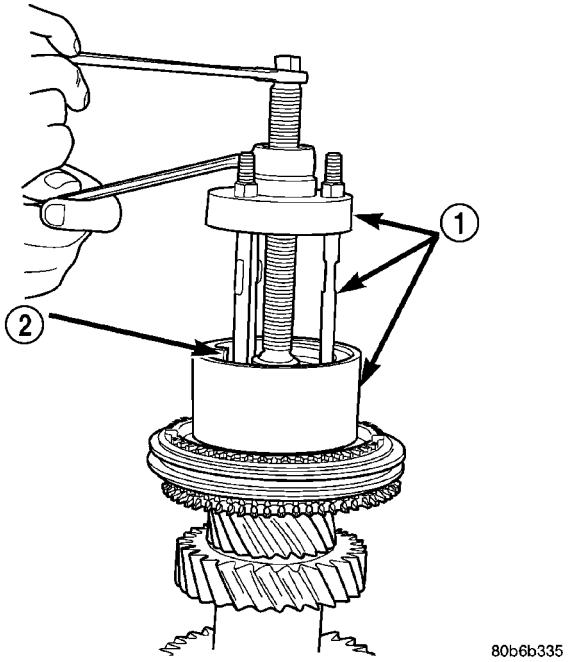


Fig. 33 OUTPUT SHAFT POCKET BEARING

1 - PULLER
2 - JAWS

INPUT SHAFT

(1) Remove fifth gear blocker ring from the input shaft (Fig. 34).

(2) Remove fifth gear friction cone from the input shaft (Fig. 35).

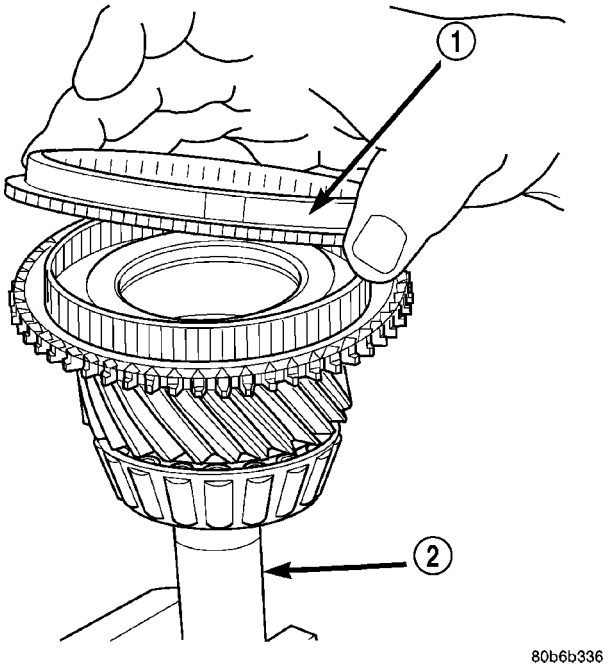


Fig. 34 FIFTH GEAR BLOCKER RING

1 - FIFTH GEAR BLOCKER RING
2 - INPUT SHAFT

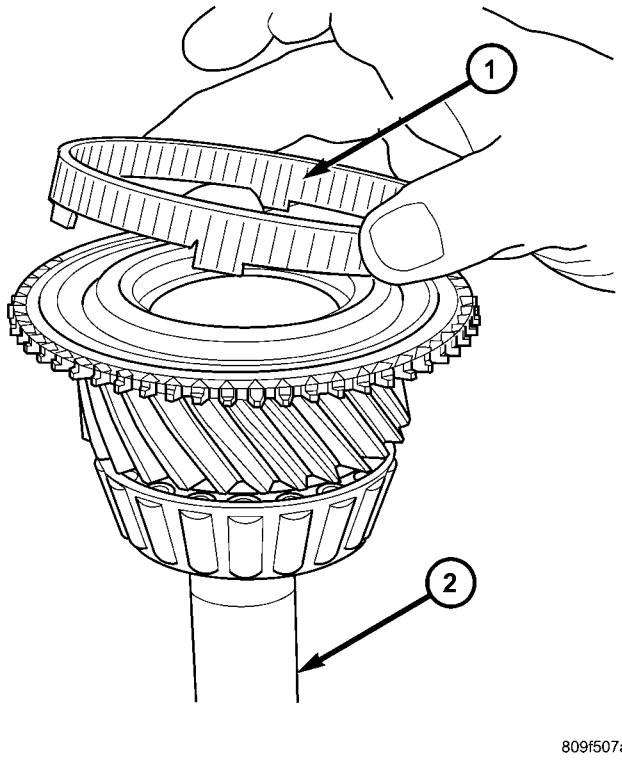


Fig. 35 FIFTH GEAR FRICTION CONE

1 - FRICTION CONE
2 - INPUT SHAFT

(3) Remove output shaft pocket bearing race from the input shaft with Puller L-4518 (Fig. 36).

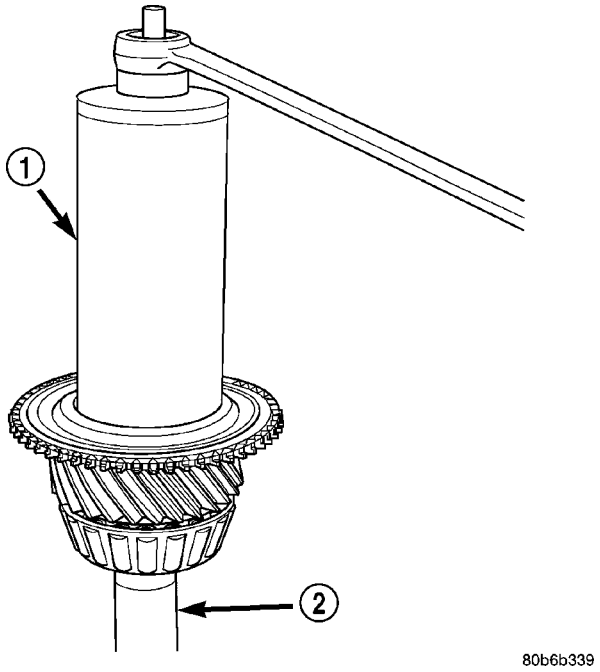


Fig. 36 OUTPUT SHAFT POCKET BEARING RACE

1 - PULLER
2 - INPUT SHAFT

(4) Remove input shaft bearing and oil guide from the input shaft with Collar 6444-8, Jaws 8243, Puller Rods 6444-6 and the remainder of Puller 6444 (Fig. 37).

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 disassembly. Use paint or a scribe for marking purposes. Then stack the geartrain parts in order of removal.

(1) Remove first gear from the output shaft.
(2) Remove first gear bearing from the output shaft (Fig. 38).
(3) Remove first gear blocker rings (2) and cones from the 1-2 synchro assembly (Fig. 39).
(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. 40).
(6) Press second gear, 1-2 synchro assembly and first gear bearing sleeve from the output shaft.
(7) Remove second gear bearing from the output shaft.

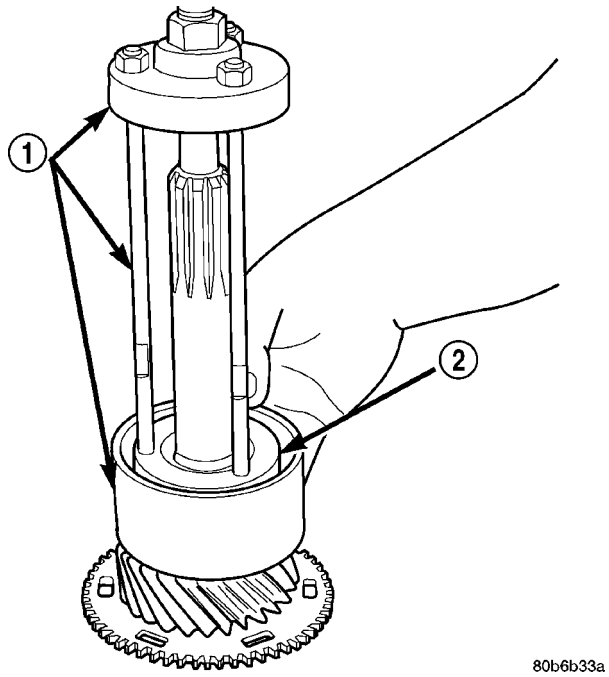


Fig. 37 INPUT SHAFT BEARING

1 - PULLER
2 - JAWS

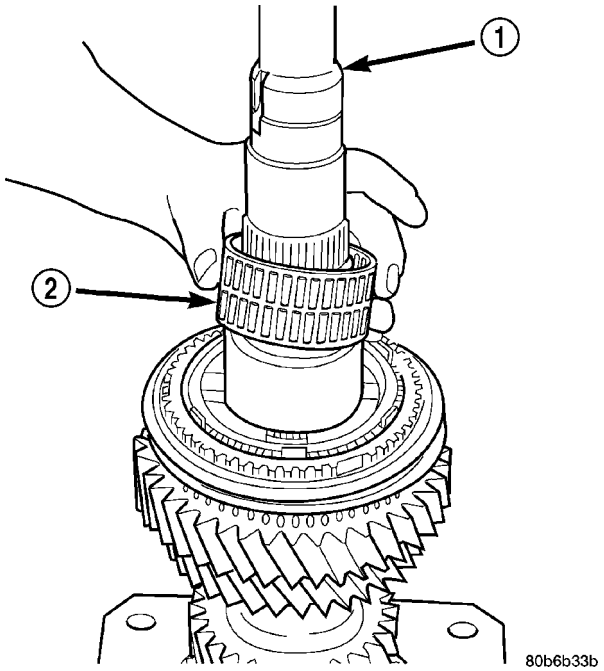


Fig. 38 FIRST GEAR BEARING

1 - OUTPUT SHAFT
2 - FIRST GEAR BEARING

(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.

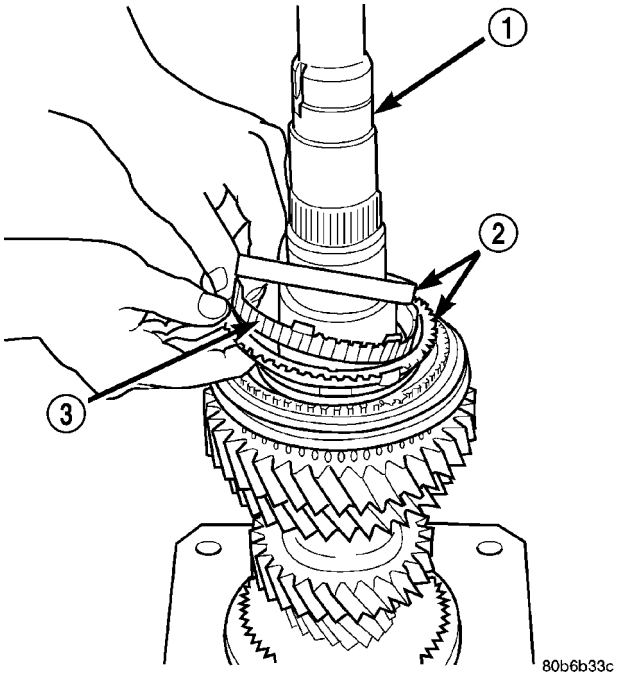


Fig. 39 FIRST GEAR BLOCKER RINGS AND FRICTION CONE

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

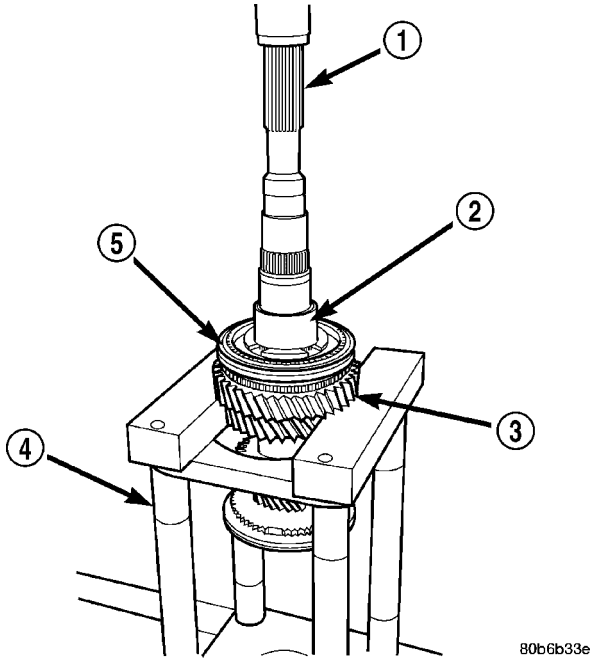


Fig. 40 SECOND GEAR, 1-2 SYNCHRO & FIRST GEAR BEARING SLEEVE

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

(10) Remove sixth gear and the sixth gear bearing from the output shaft (Fig. 41).

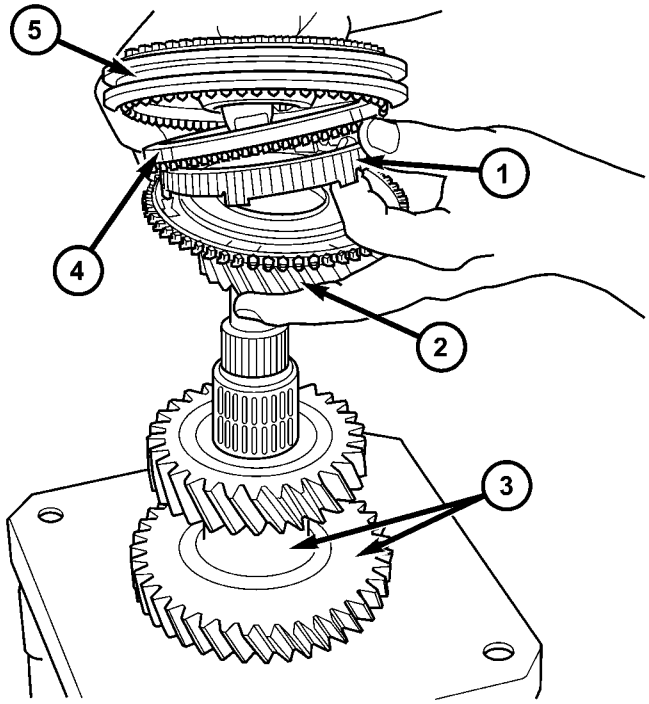


Fig. 41 SIXTH GEAR COMPONENTS

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

MANUAL TRANSMISSION - NV5600 (Continued)

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. 42).

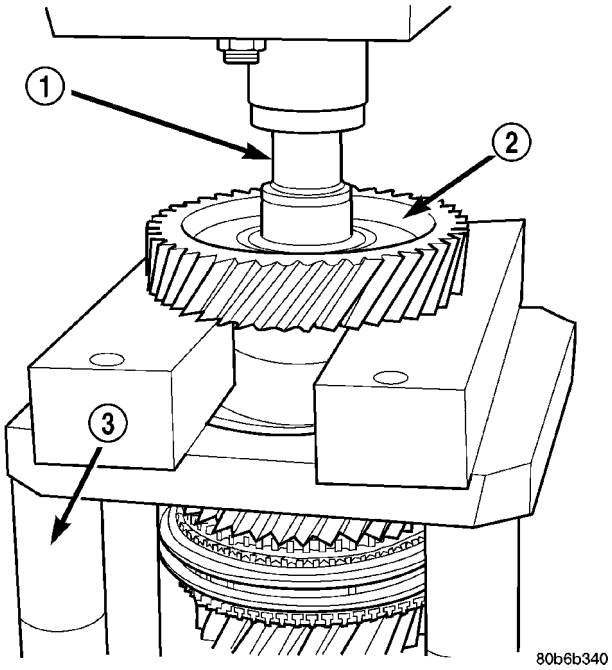


Fig. 42 FIFTH COUNTERSHAFT GEAR

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

(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. 43).

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

(7) Remove fourth countershaft gear, friction cone, blocker ring and bearing from the countershaft (Fig. 44).

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

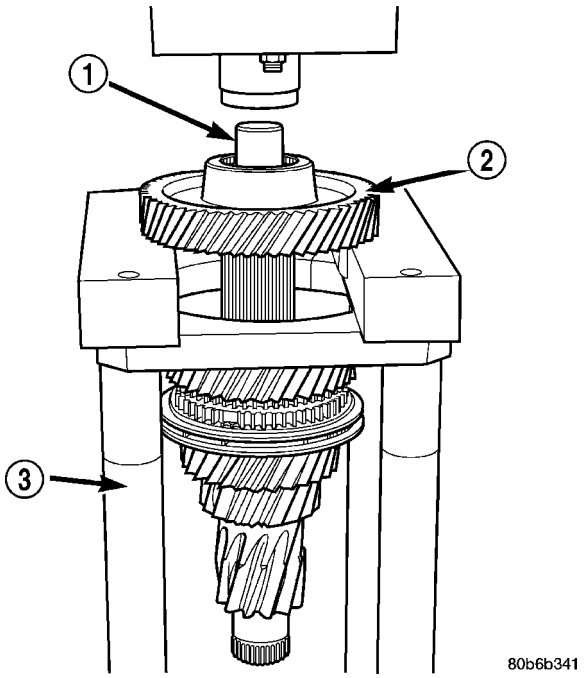


Fig. 43 SIXTH COUNTERSHAFT GEAR

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

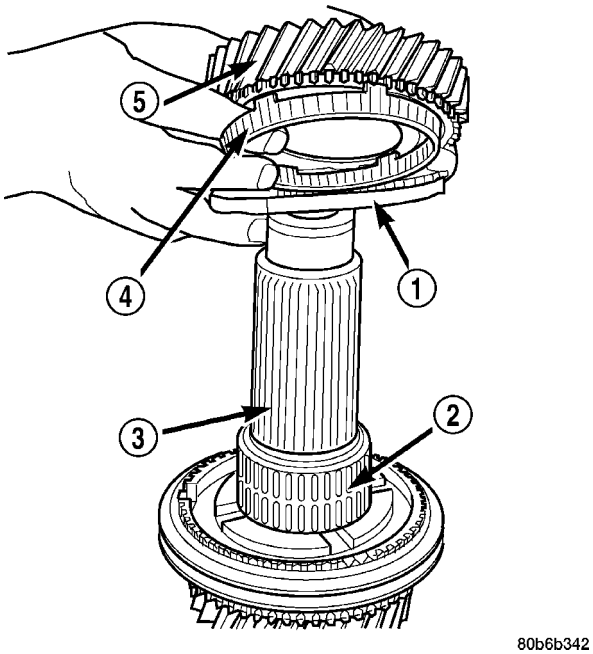


Fig. 44 FOURTH COUNTERSHAFT GEAR COMPONENTS

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

MANUAL TRANSMISSION - NV5600 (Continued)

(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. 45).

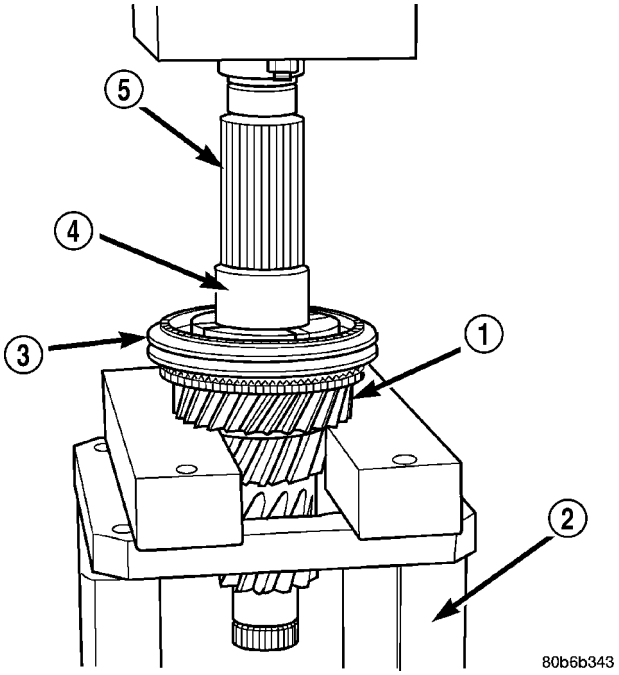


Fig. 45 THIRD COUNTERSHAFT GEAR COMPONENTS

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

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

(11) Remove third countershaft gear bearing from the countershaft (Fig. 46).

(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. 47).

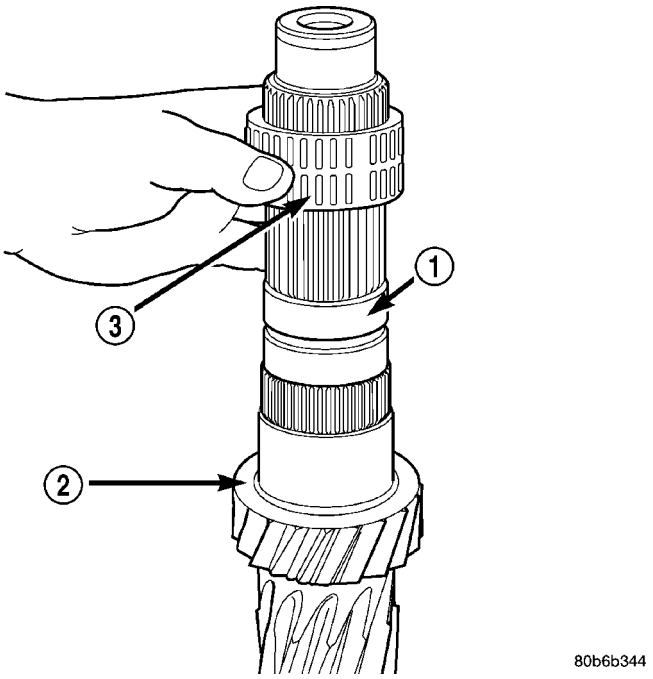


Fig. 46 THIRD GEAR BEARING

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

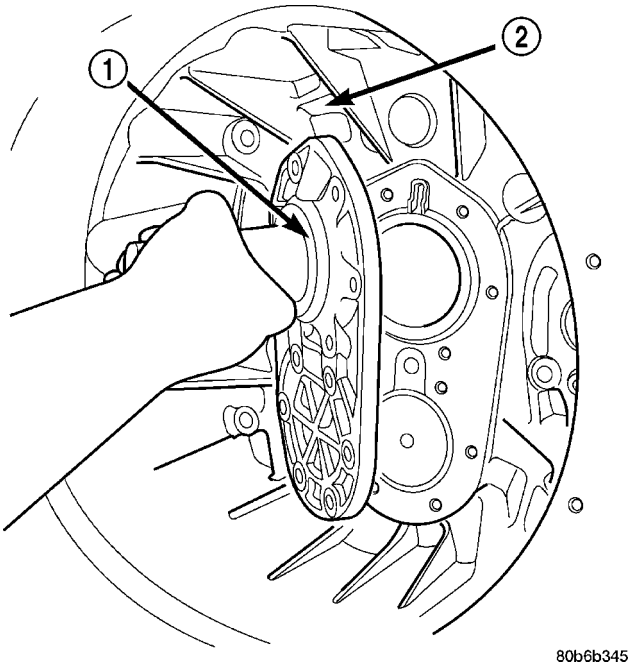


Fig. 47 INPUT SHAFT RETAINER

1 - INPUT SHAFT RETAINER
2 - CLUTCH HOUSING

(2) Remove countershaft oil guide from the countershaft front bearing bore in the clutch housing (Fig. 48).

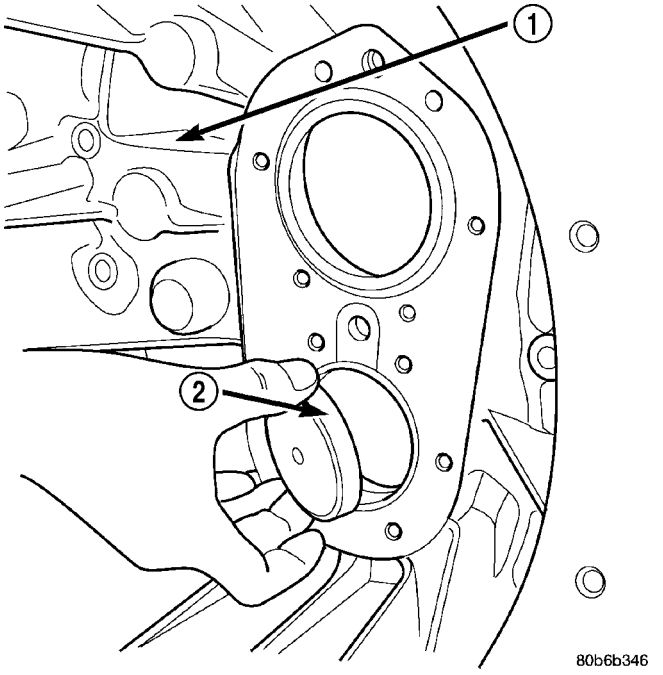


Fig. 48 COUNTERSHAFT OIL GUIDE

1 - CLUTCH HOUSING
2 - COUNTERSHAFT OIL GUIDE

(3) Remove countershaft front bearing race, endplay shims and spacer from the clutch housing with Remover 6061-1 and Handle C-4171 (Fig. 49).

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

(5) Remove input shaft oil guide and retainer seal (Fig. 50).

CLEANING - TRANSMISSION

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.

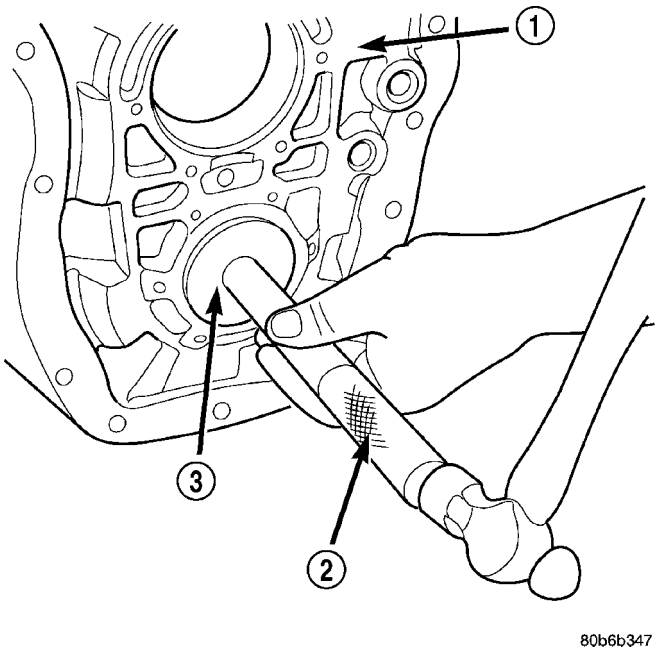


Fig. 49 FRONT COUNTERSHAFT BEARING RACE

1 - CLUTCH HOUSING
2 - HANDLE
3 - REMOVER

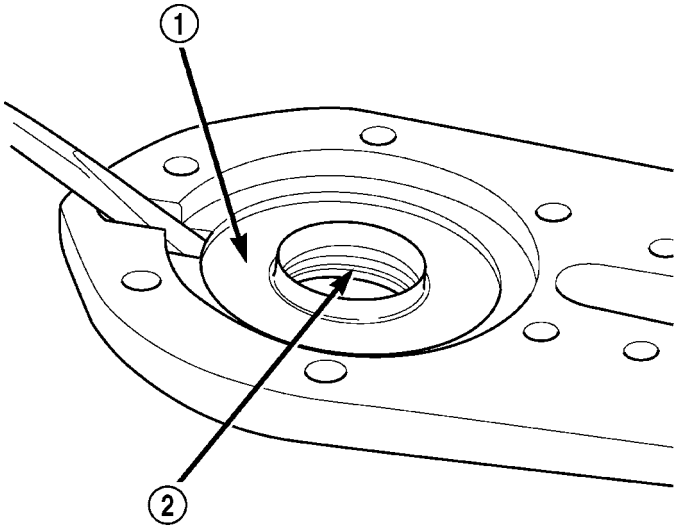


Fig. 50 OIL GUIDE AND SEAL

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

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.

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. 51).

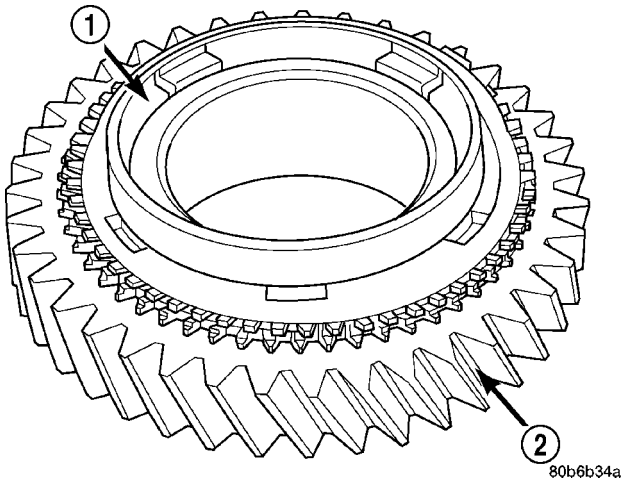


Fig. 51 INNER BLOCKER RING

1 - INNER BLOCKER RING
2 - GEAR

(3) Install second gear synchro friction cone over the blocker ring and onto second gear (Fig. 52).

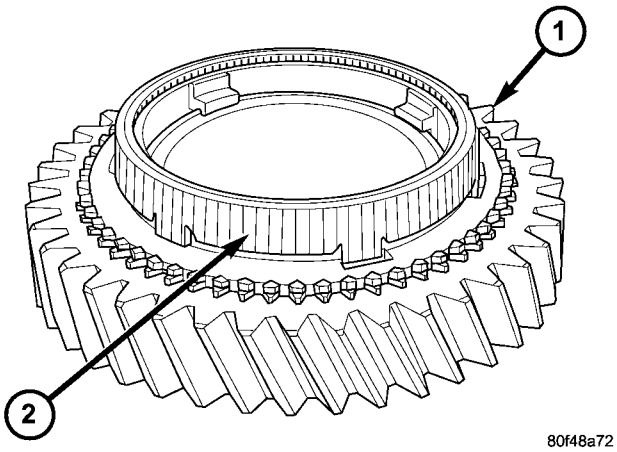


Fig. 52 FRICTION CONE

1 - GEAR
2 - FRICTION CONE

(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. 53).

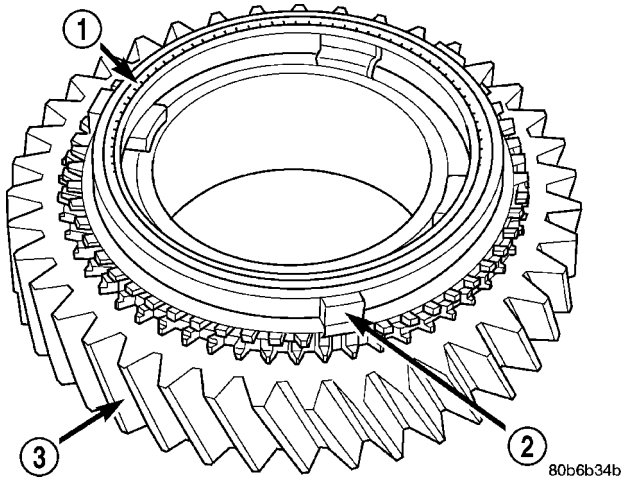


Fig. 53 OUTER BLOCKER RING

1 - OUTER BLOCKER RING
2 - LUG
3 - GEAR

(5) Install 1-2 synchro assembly onto the second gear assembly (Fig. 54).

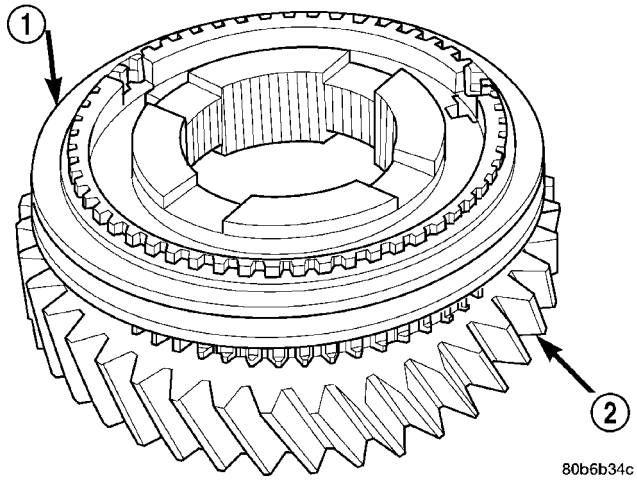


Fig. 54 3-4 SYNCHRO ASSEMBLY

1 - SYNCHRO
2 - GEAR

(6) Reverse assembly on the bench.

(7) Lubricate and install second gear bearing into second gear (Fig. 55).

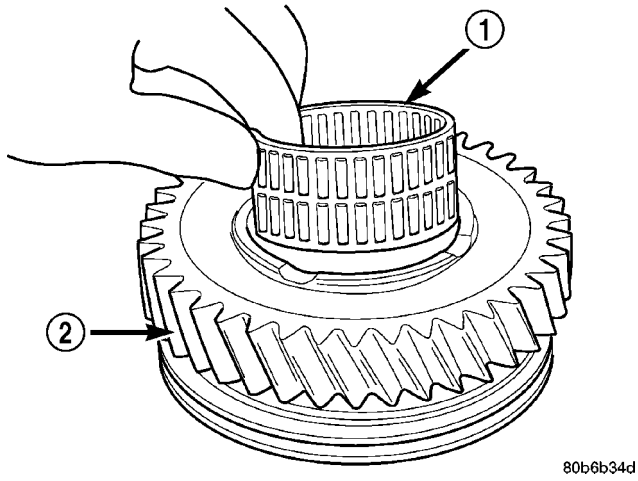


Fig. 55 SECOND GEAR AND BEARING

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. 56).

(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. 51).

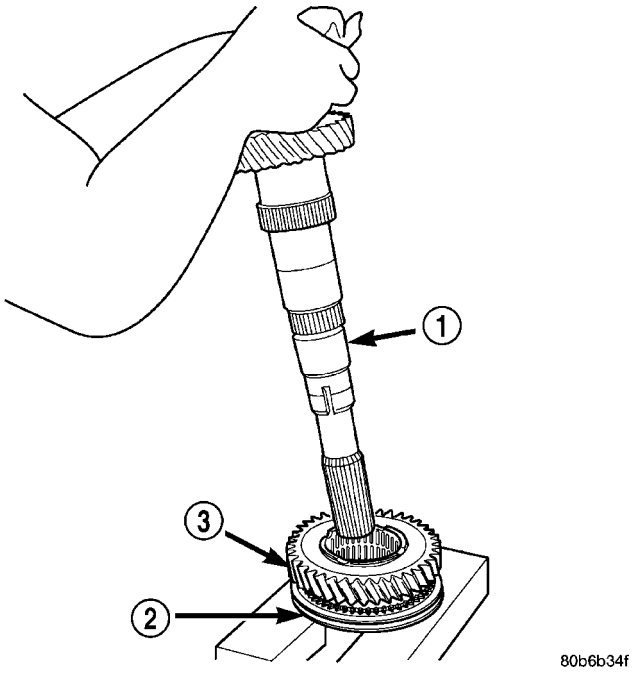


Fig. 56 OUTPUT SHAFT INTO 1-2 SYNCHRO

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

(13) Install first gear synchro friction cone over the blocker ring and onto first gear (Fig. 52).

(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. 53).

(15) Reverse the output shaft in the press.

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

MANUAL TRANSMISSION - NV5600 (Continued)

(17) Install first gear bearing sleeve the remainder of the way onto the output shaft using Installer 8228 and a shop press (Fig. 57).

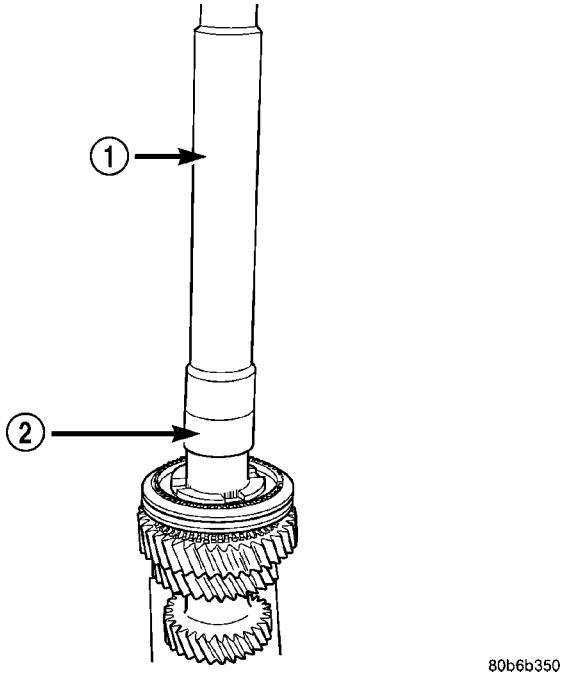


Fig. 57 FIRST GEAR BEARING SLEEVE

1 - INSTALLER
2 - FIRST GEAR BEARING SLEEVE

(18) Install first gear and blocker assembly onto the output shaft (Fig. 58).

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

(20) Install output shaft thrust washer onto the output shaft (Fig. 59).

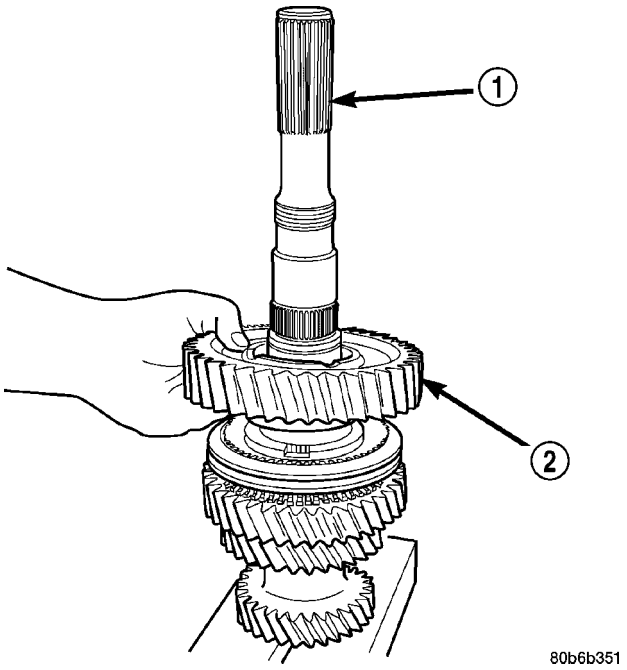


Fig. 58 FIRST GEAR AND BLOCKER ASSEMBLY

1 - OUTPUT SHAFT
2 - FIRST GEAR ASSEMBLY

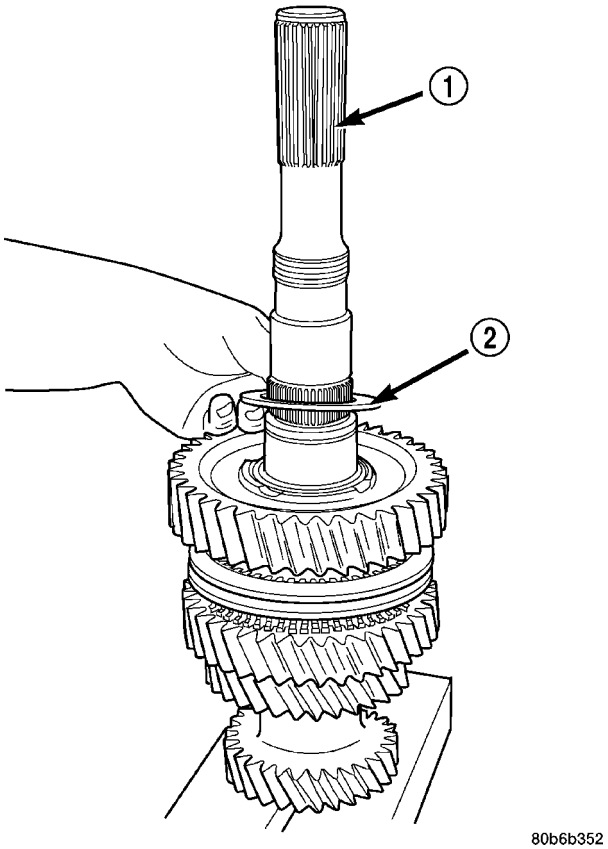


Fig. 59 OUTPUT SHAFT THRUST WASHER

1 - OUTPUT SHAFT
2 - OUTPUT SHAFT THRUST WASHER

MANUAL TRANSMISSION - NV5600 (Continued)

(21) Install rear output shaft bearing onto the output shaft with Installer 8228 and a shop press (Fig. 60).

(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.

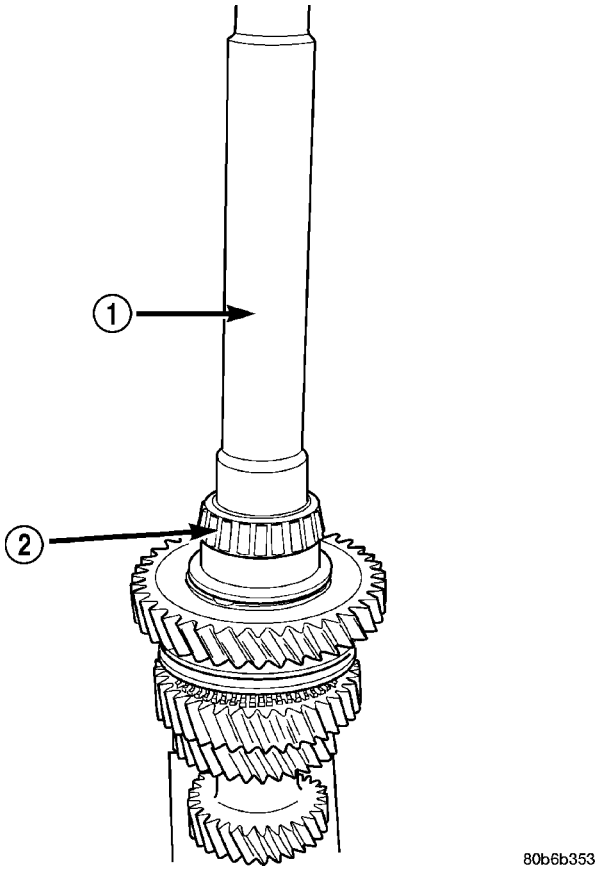


Fig. 60 REAR OUTPUT SHAFT BEARING

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. 61).

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

(27) Install sixth gear blocker ring over the sixth gear friction cone (Fig. 62).

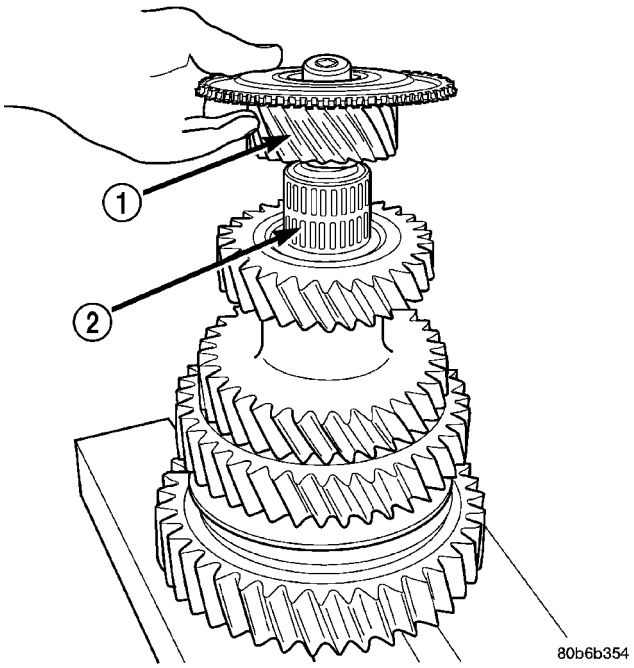


Fig. 61 SIXTH GEAR

1 - SIXTH GEAR
2 - SIXTH GEAR BEARING

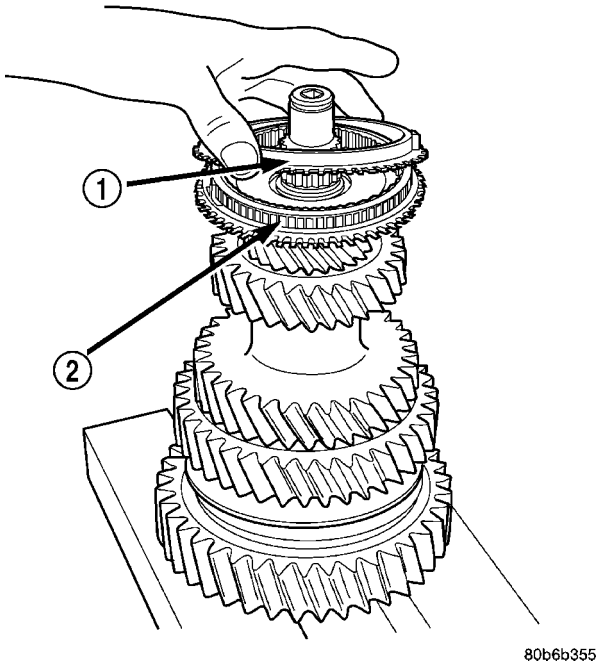


Fig. 62 SIXTH GEAR BLOCKER RING

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

MANUAL TRANSMISSION - NV5600 (Continued)

(28) Install Guide 8235 onto the end of the output shaft (Fig. 63).

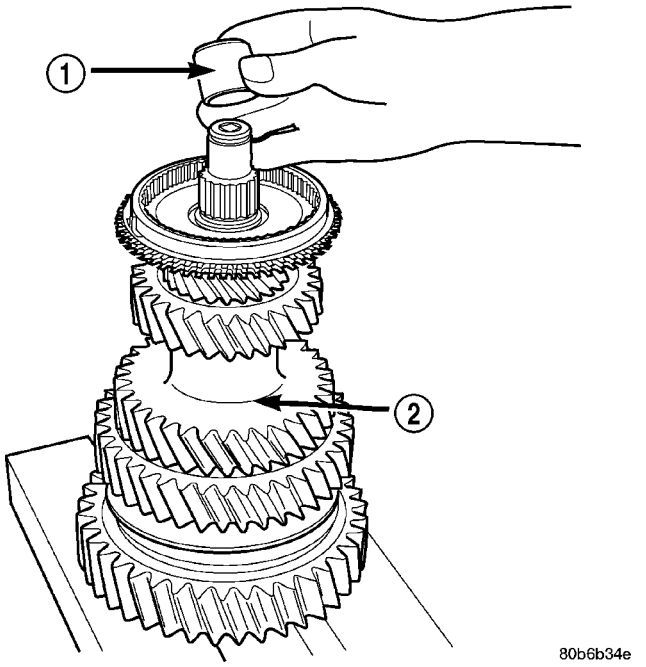


Fig. 63 OUTPUT SHAFT GUIDE

1 - GUIDE
2 - OUTPUT SHAFT

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

(30) Press 5-6 synchro (Fig. 64) onto the output shaft with Installer 8156 and a shop press.

(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. 65).

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

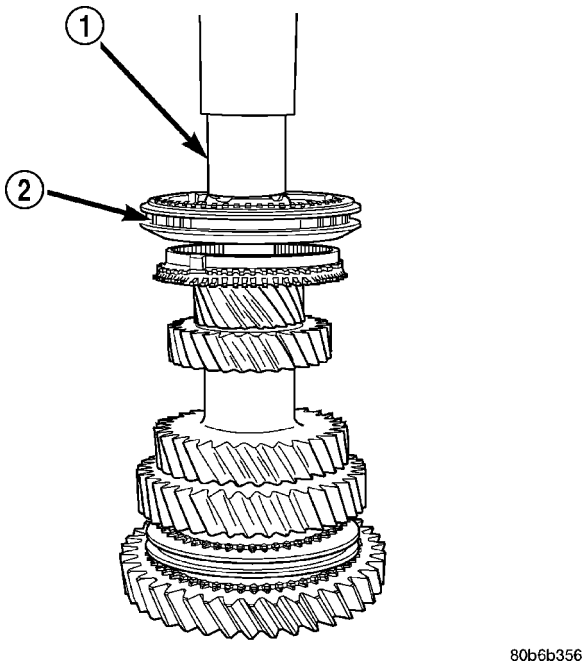


Fig. 64 5-6 SYNCHRO

1 - INSTALLER
2 - 5-6 SYNCHRO

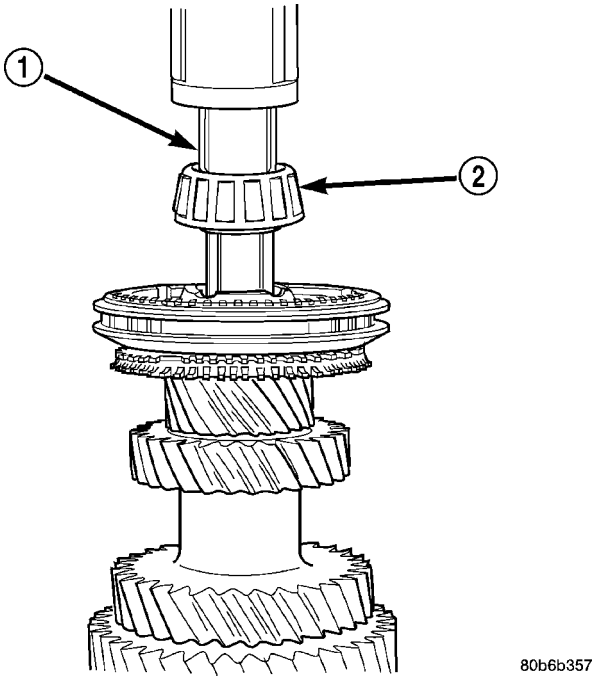


Fig. 65 OUTPUT SHAFT POCKET BEARING

1 - GUIDE
2 - POCKET BEARING

MANUAL TRANSMISSION - NV5600 (Continued)

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. 66).

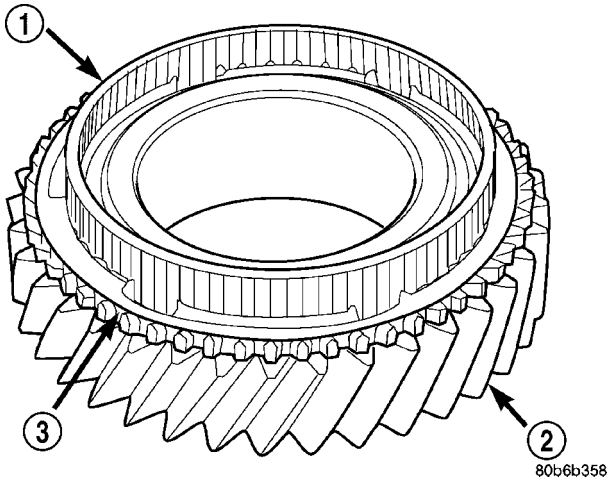


Fig. 66 FRICTION CONE AND THIRD GEAR

1 - FRICTION CONE
2 - GEAR
3 - CLUTCH RING

(3) Install third countershaft gear blocker ring onto the friction cone (Fig. 67).

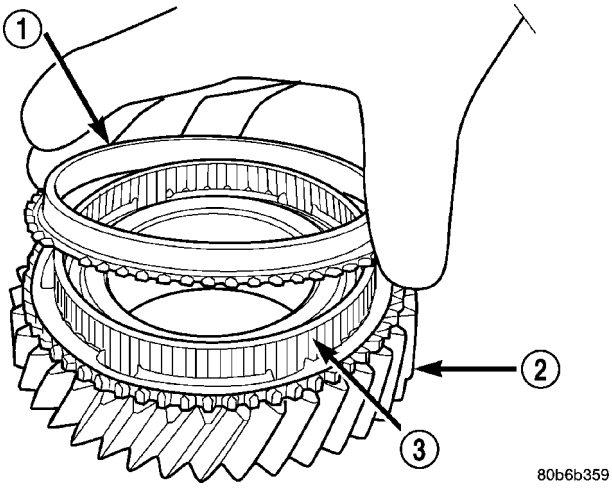


Fig. 67 BLOCKER RING ONTO FRICTION CONE

1 - BLOCKER RING
2 - GEAR
3 - FRICTION CONE

(4) Install 3-4 synchro assembly onto the blocker ring/gear assembly (Fig. 68).

(5) Reverse the assembly on the bench.

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

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

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

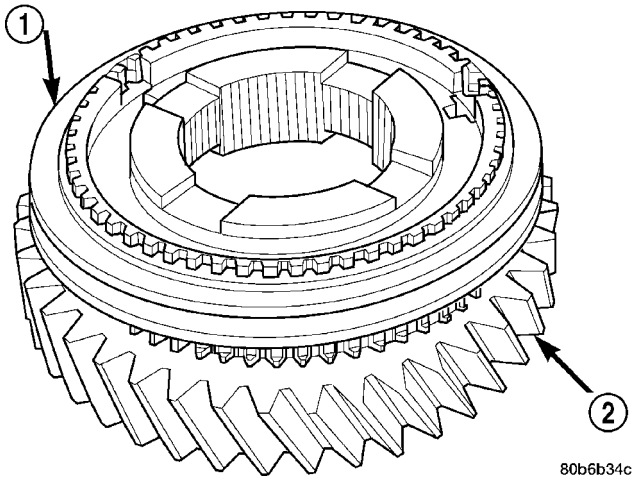


Fig. 68 3-4 SYNCHRO ASSEMBLY

1 - SYNCHRO
2 - GEAR

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

(10) Press countershaft into the 3-4 synchro assembly (Fig. 69).

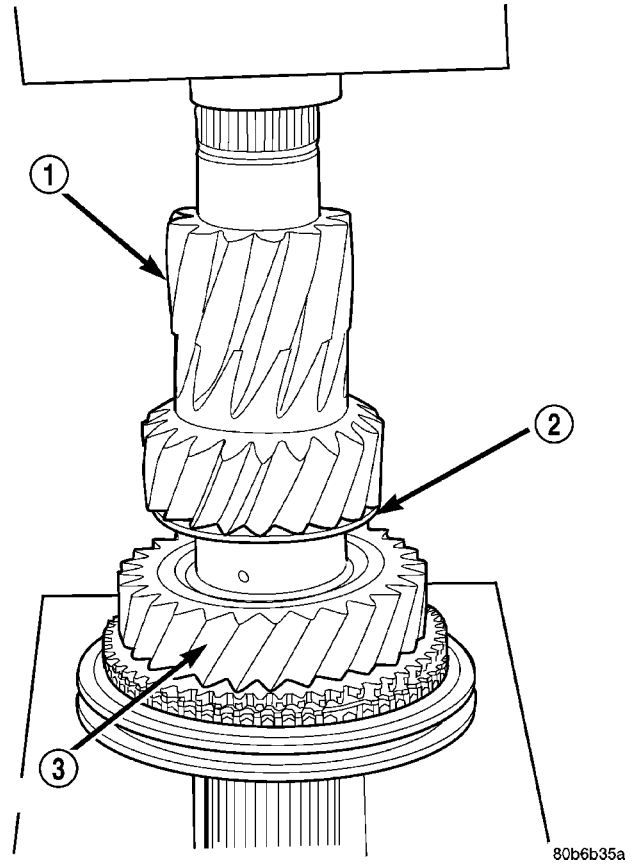


Fig. 69 COUNTERSHAFT INTO 3-4 SYNCHRO

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

MANUAL TRANSMISSION - NV5600 (Continued)

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

(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. 66).

(15) Install fourth countershaft gear blocker ring onto the friction cone (Fig. 67).

(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. 70).

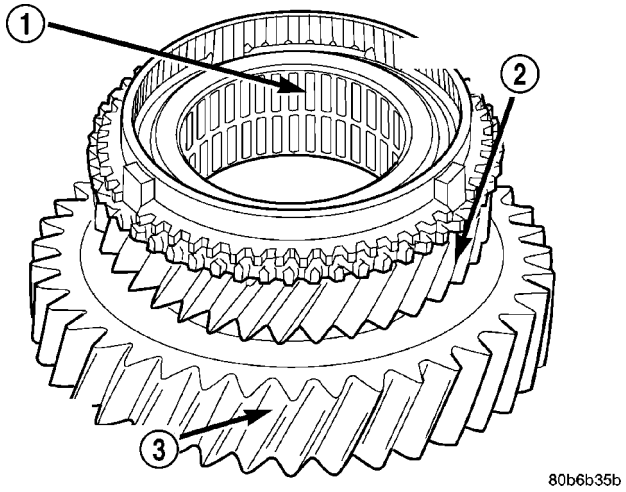


Fig. 70 FOURTH COUNTERSHAFT ONTO SIXTH COUNTERSHAFT GEAR

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

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

(20) Press countershaft into sixth gear (Fig. 71).

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

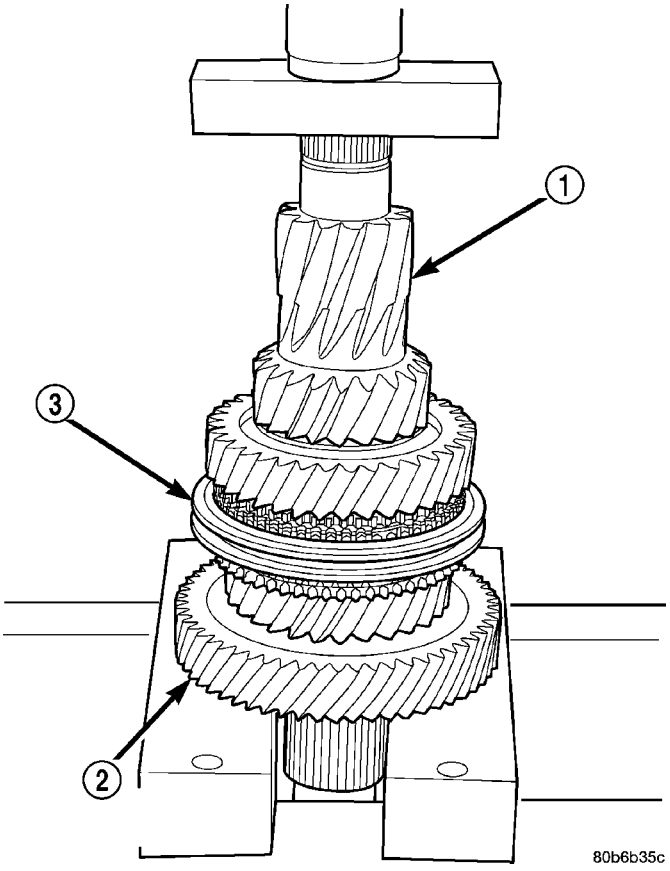


Fig. 71 COUNTERSHAFT INTO SIXTH GEAR

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

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

(22) Install countershaft into the fifth countershaft gear and press countershaft into fifth gear (Fig. 72).

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

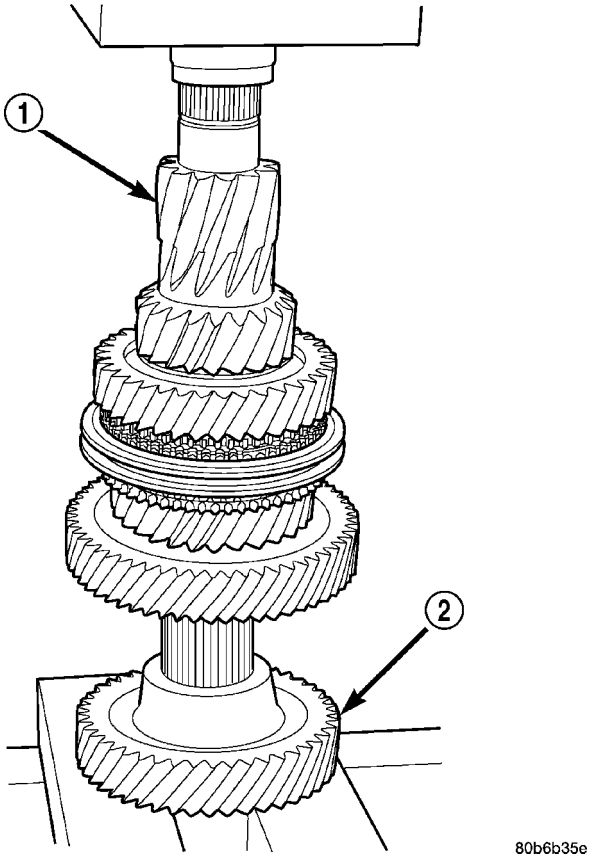


Fig. 72 COUNTERSHAFT TO FIFTH COUNTERSHAFT GEAR

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. 73).

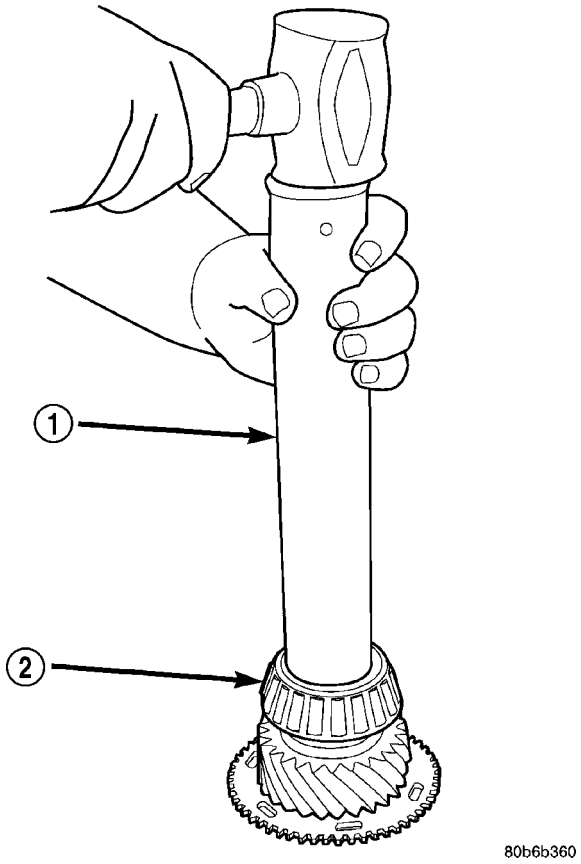


Fig. 73 INPUT SHAFT BEARING

1 - INSTALLER
2 - INPUT SHAFT BEARING

(3) Position the input shaft bearing oil guide on the input shaft (Fig. 74).

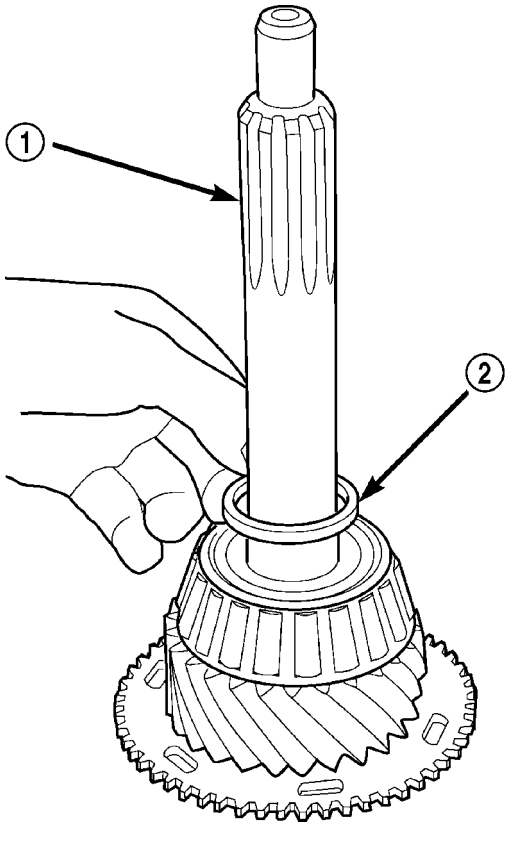


Fig. 74 INPUT SHAFT OIL GUIDE

1 - INPUT SHAFT
2 - INPUT SHAFT OIL GUIDE

(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. 75).

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. 76).

(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.

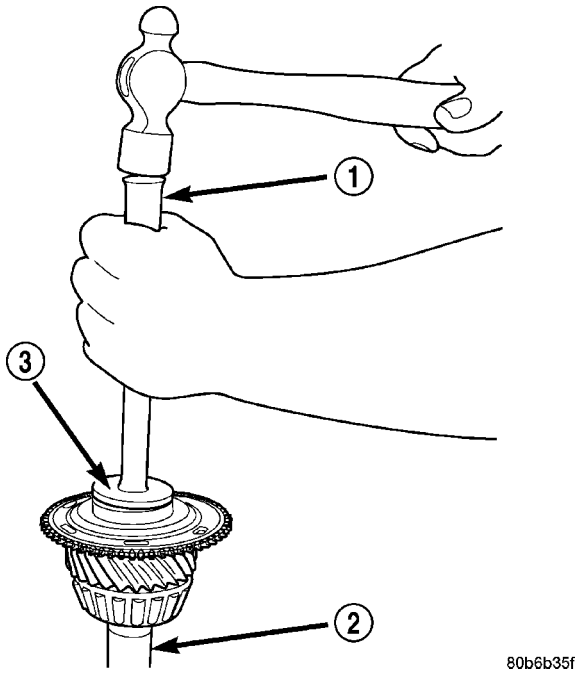


Fig. 75 OUTPUT SHAFT POCKET BEARING RACE

1 - HANDLE
2 - INPUT SHAFT
3 - INSTALLER

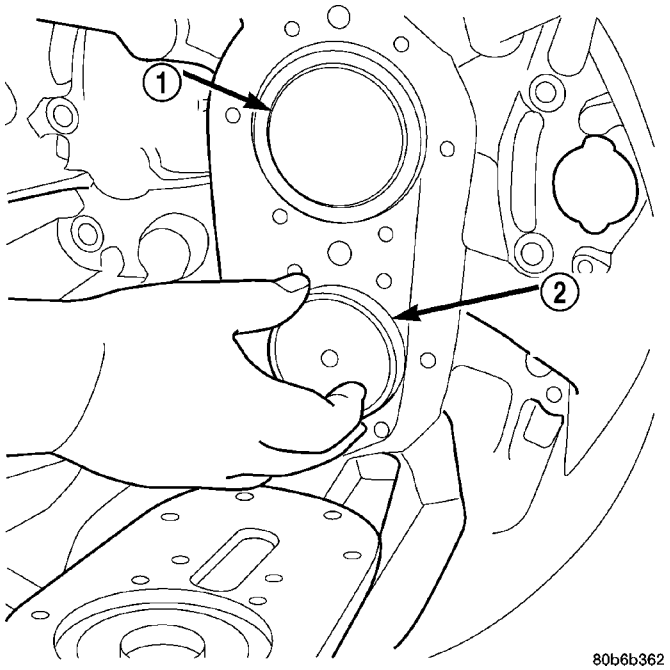


Fig. 76 OIL GUIDE AND SPACER

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

MANUAL TRANSMISSION - NV5600 (Continued)

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.

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

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. 77).

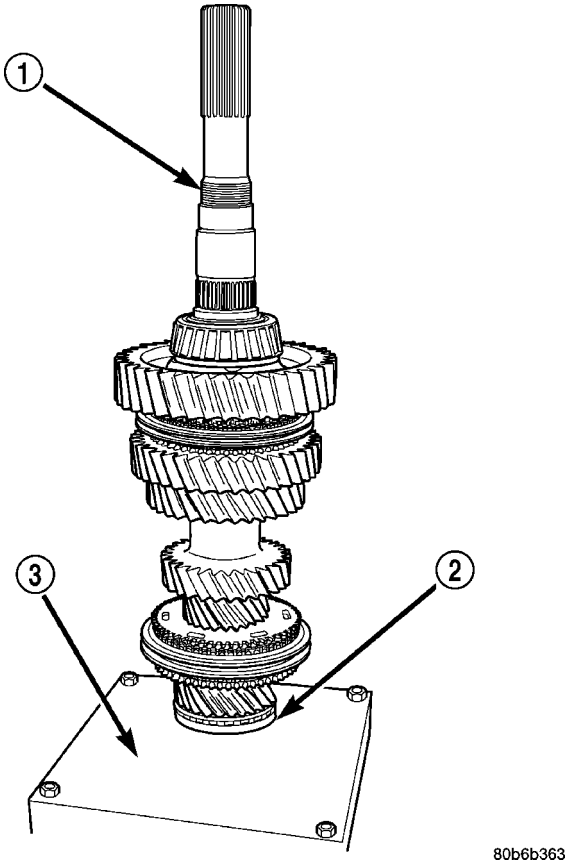


Fig. 77 OUTPUT SHAFT AND INPUT SHAFT

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 output shaft (Fig. 78).

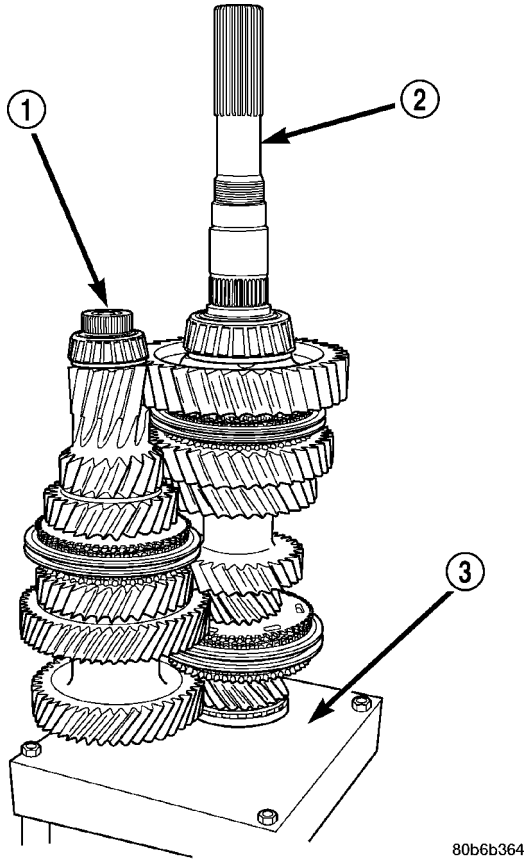


Fig. 78 COUNTERSHAFT WITH OUTPUT SHAFT

1 - COUNTERSHAFT
2 - OUTPUT SHAFT
3 - SUPPORT STAND

MANUAL TRANSMISSION - NV5600 (Continued)

(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. 79).

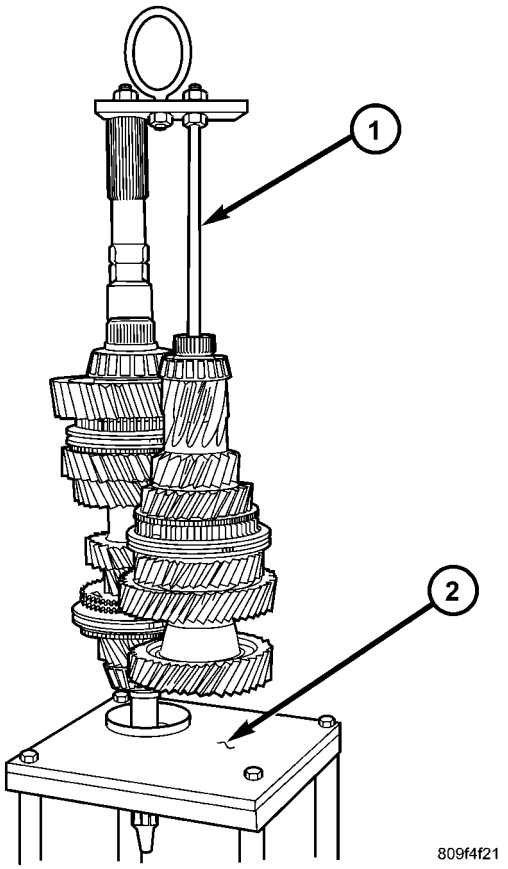


Fig. 79 GEARTRAIN FIXTURE

1 - FIXTURE
2 - SUPPORT STAND

(9) Install shift forks and rails onto the geartrain (Fig. 80).

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.

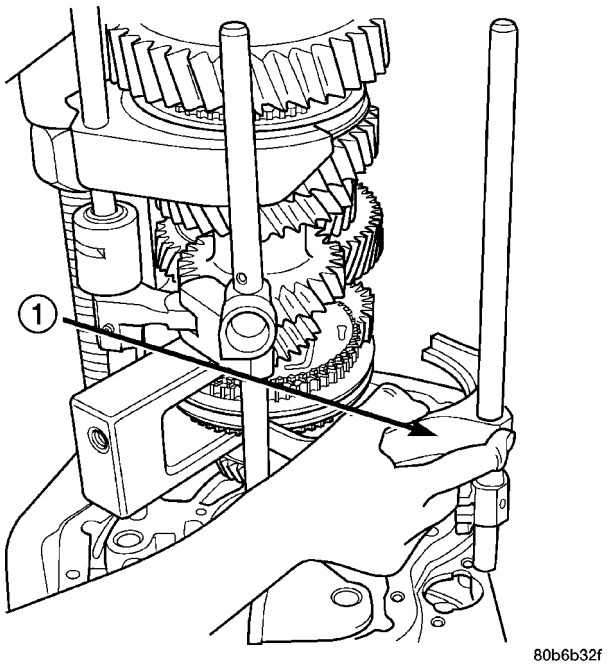


Fig. 80 SHIFT RAILS INSTALLED

1 - SHIFT RAILS

(11) With the geartrain approximately 1/4 in. from the clutch housing, remove Holding Tool 8242 from the 5-6 synchro (Fig. 81).

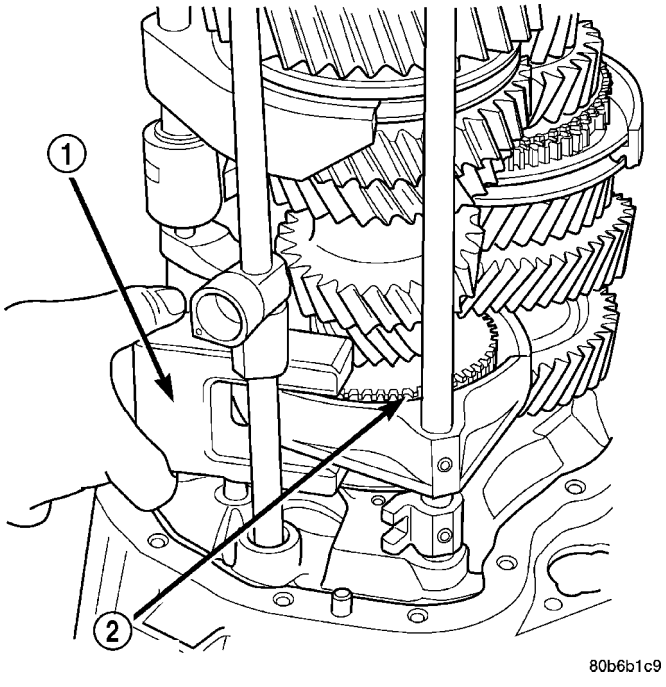


Fig. 81 HOLDING TOOL

1 - HOLDING TOOL
2 - 5-6 SYNCHRO

(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. 82).

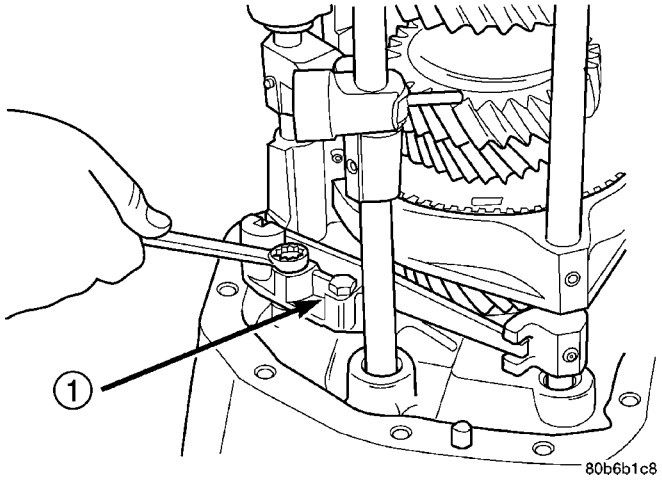


Fig. 82 5-6 CROSSOVER BRACKET BOLTS

1 - 5-6 CROSSOVER BRACKET

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

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.

(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. 83).

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

(7) Install shift socket roll pin with a suitable 6 mm (7/32 in.) 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. 84).

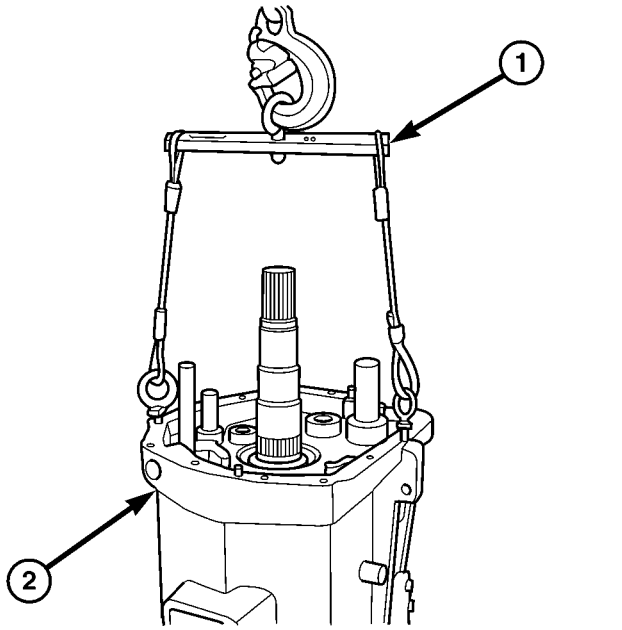


Fig. 83 LIFT FIXTURE

1 - FIXTURE
2 - TRANSMISSION CASE

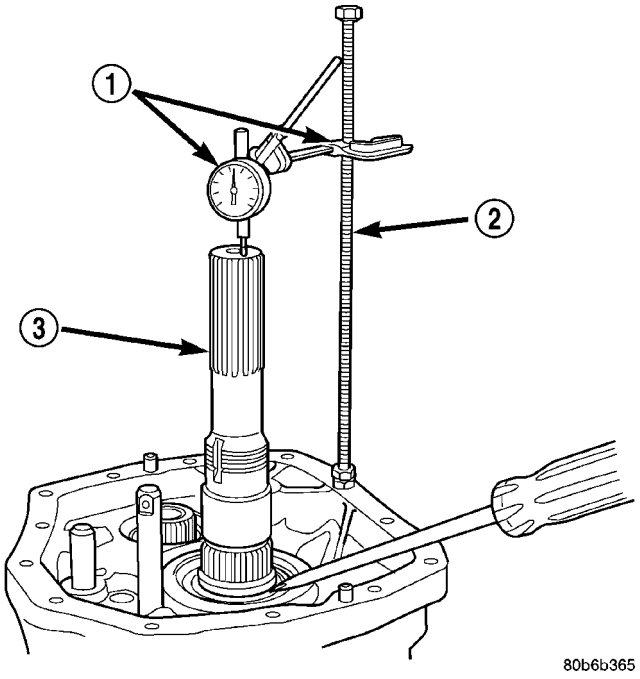


Fig. 84 MEASURE MAINSHAFT ENDPLAY

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

MANUAL TRANSMISSION - NV5600 (Continued)

(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. 85).

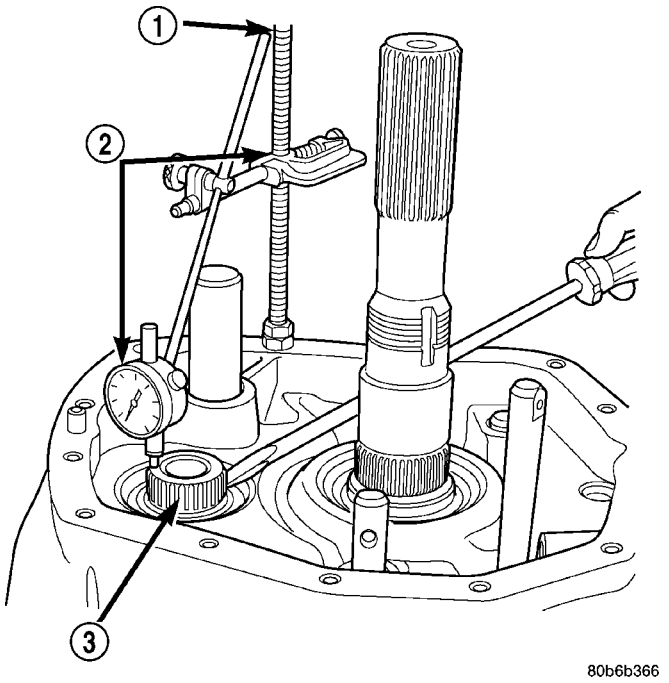


Fig. 85 MEASURE COUNTERSHAFT END-PLAY

1 - EXTENSION ROD
2 - DIAL INDICATOR
3 - COUNTERSHAFT

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

(5) Install shims necessary to achieve an end-play of 0-0.10 mm (0-0.004 in.) for the mainshaft and countershaft.

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

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

(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. 86).

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

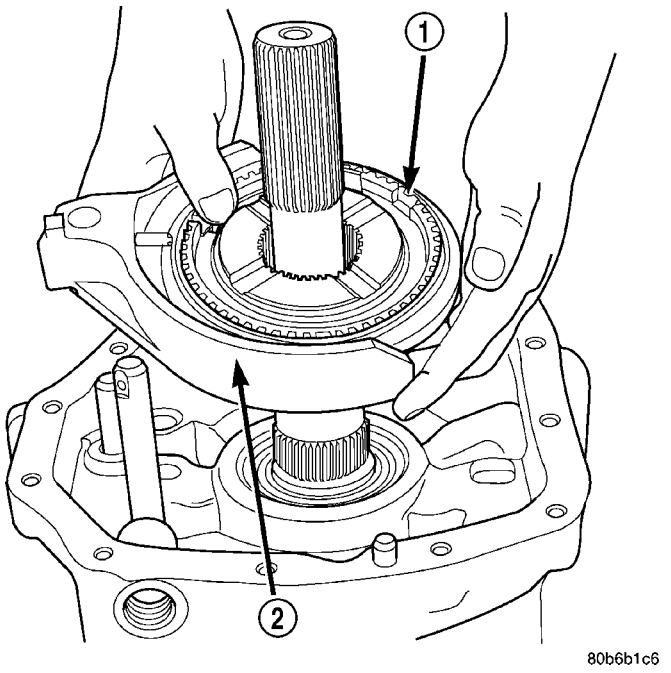


Fig. 86 REVERSE SHIFT FORK AND SYNCHRO

1 - REVERSE SYNCHRO
2 - REVERSE SHIFT FORK

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

(3) Install reverse gear bearing sleeve onto the output shaft with Installer 6446 if necessary (Fig. 87).

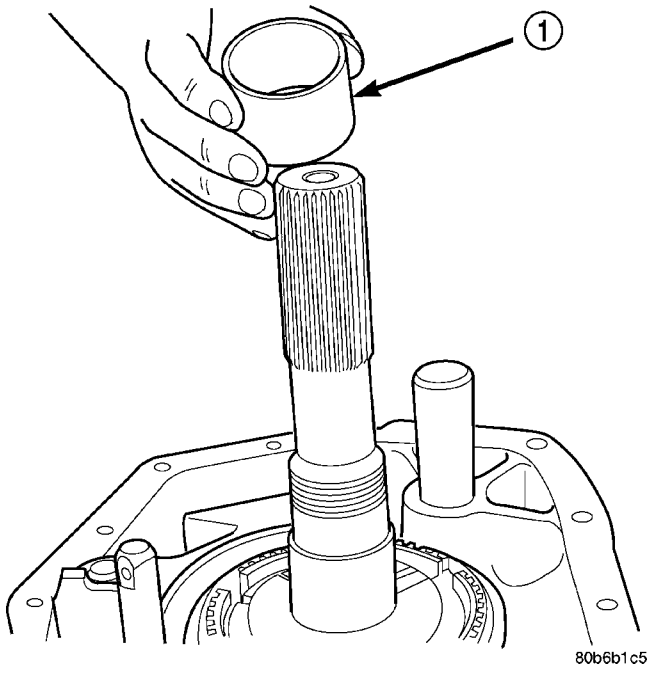


Fig. 87 REVERSE BEARING SLEEVE

1 - REVERSE GEAR BEARING SLEEVE

(4) Install reverse gear, reverse gear synchronizer cone, reverse gear outer blocker ring and reverse gear bearing (Fig. 88).

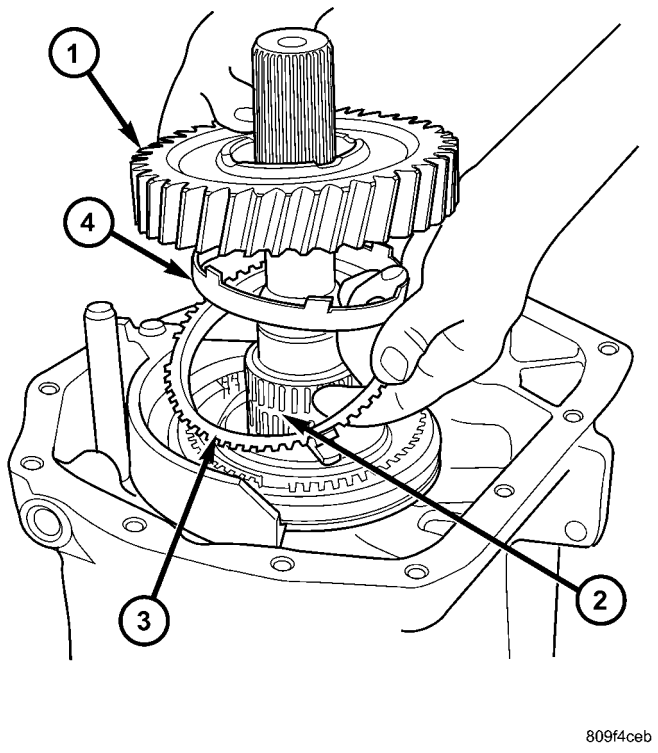


Fig. 88 REVERSE GEAR COMPONENTS

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

(5) Install output shaft ball bearing assembly and reverse thrust washer onto the output shaft (Fig. 89).

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

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

(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 9 mm (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.

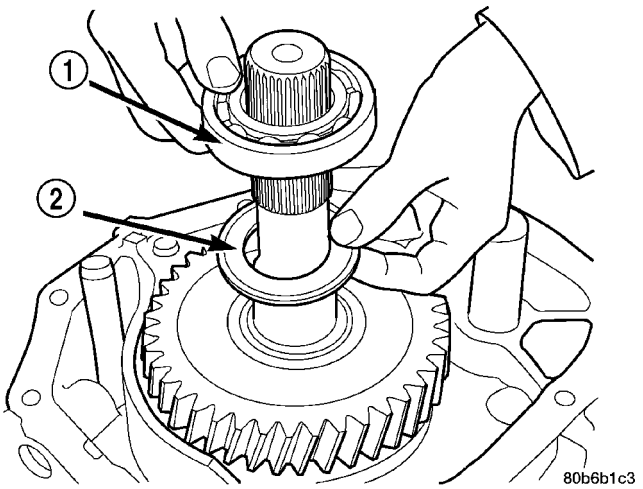


Fig. 89 OUTPUT SHAFT BEARING AND THRUST WASHER

1 - OUTPUT SHAFT BALL BEARING
2 - THRUST WASHER

(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. 90).

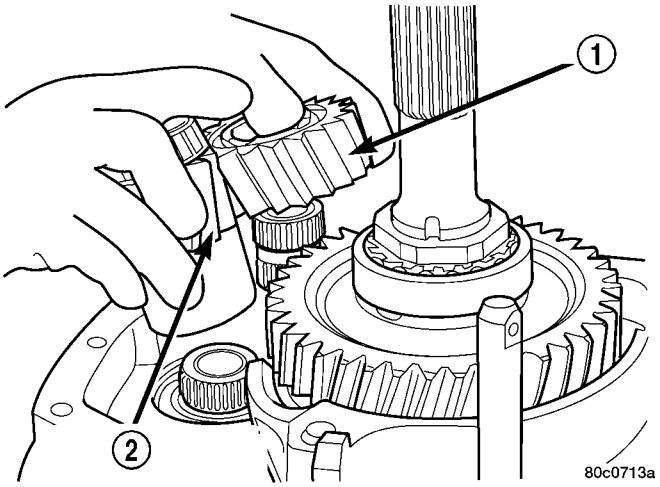


Fig. 90 REVERSE IDLER AND COUNTERSHAFT GEARS

1 - REVERSE IDLER GEAR
2 - COUNTERSHAFT REVERSE GEAR

MANUAL TRANSMISSION - NV5600 (Continued)

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

(14) Install crossover cam rollers and pin (Fig. 91).

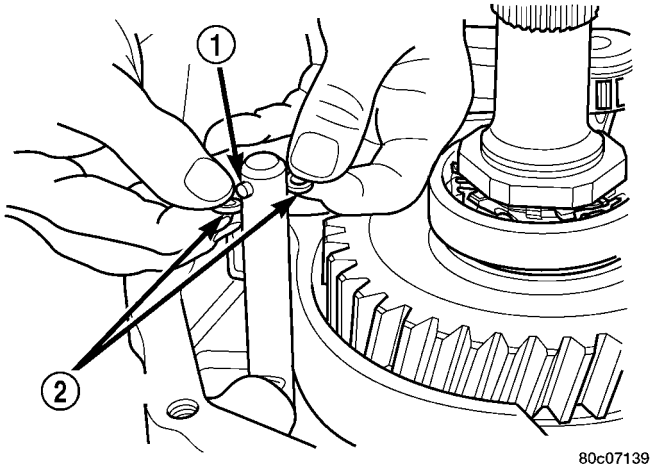


Fig. 91 CROSSOVER CAM ROLLERS AND PIN

1 - CROSSOVER CAM PIN
2 - CROSSOVER CAM ROLLERS

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.

(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. 92).

(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.

(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. 93).

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

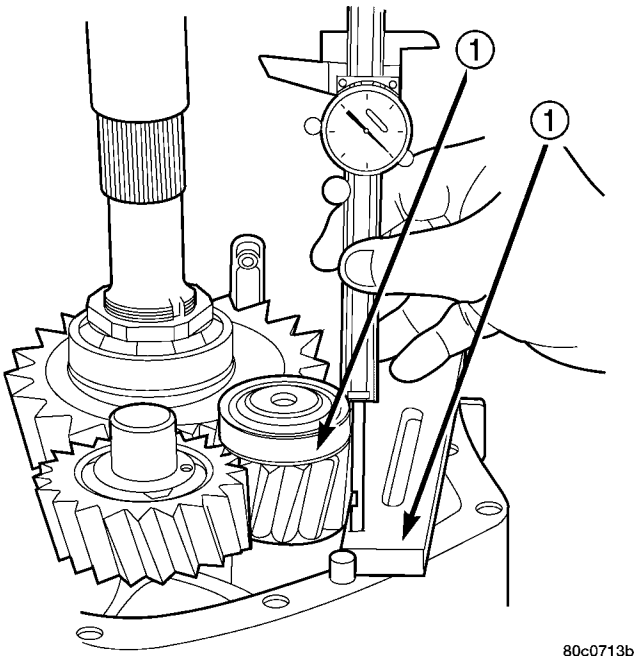


Fig. 92 Measure Height of Reverse Countershaft

1 - MEASURE DISTANCE FROM RACE TO GAUGE BAR

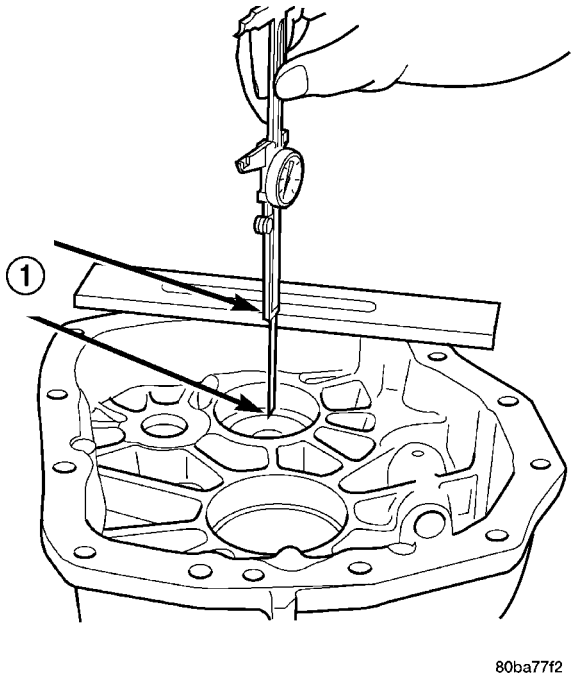


Fig. 93 MEASURE DEPTH OF REVERSE COUNTERSHAFT GEAR BEARING RACE BORE

1 - GAUGE BAR TO BEARING RACE BORE MEASUREMENT

(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. 94).

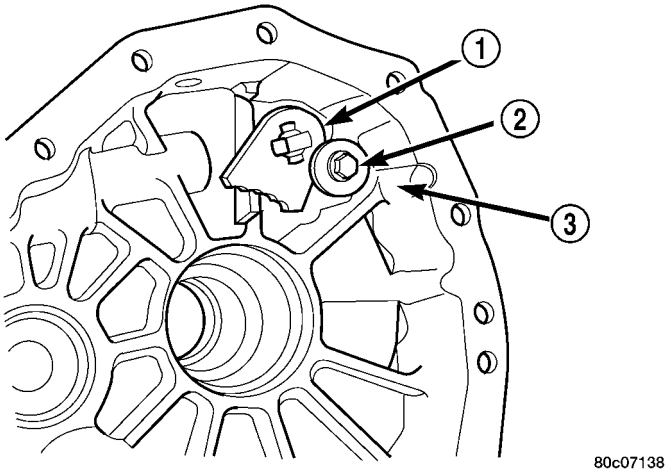


Fig. 94 CROSSOVER CAM BOLT

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. 95).

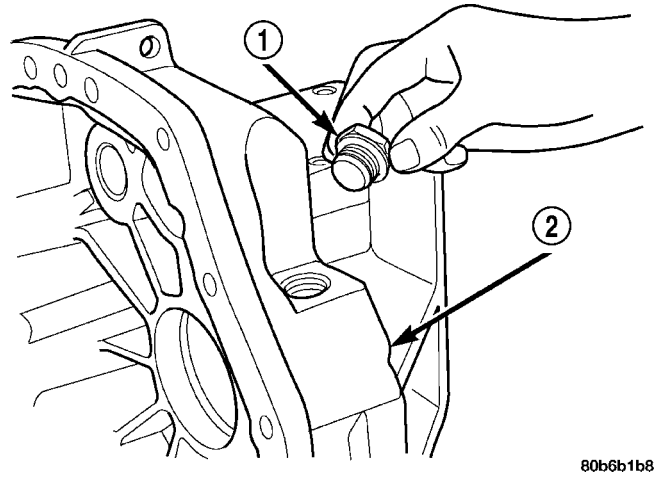


Fig. 95 CROSSOVER CAM DETENT PLUG

1 - DETENT PLUG
2 - EXTENSION HOUSING

(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.).

(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. 96). Check lubricant level in transfer case if equipped.

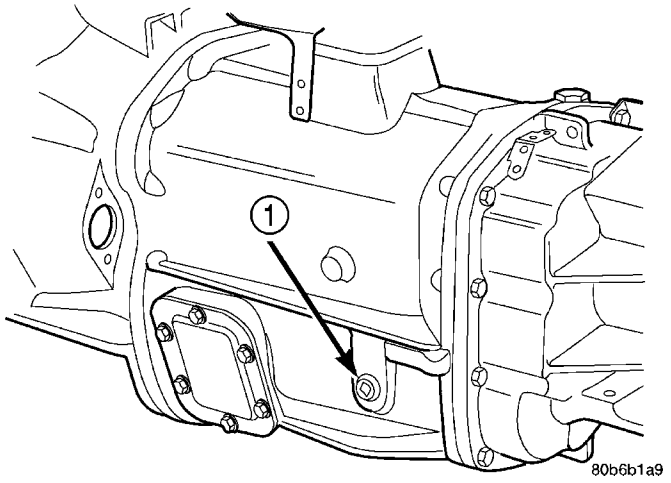


Fig. 96 FILL PLUG

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.

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.

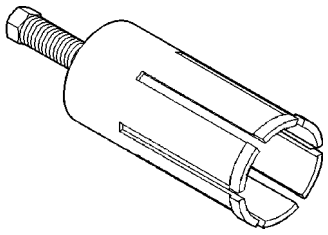
MANUAL TRANSMISSION - NV5600 (Continued)

SPECIFICATIONS - NV5600

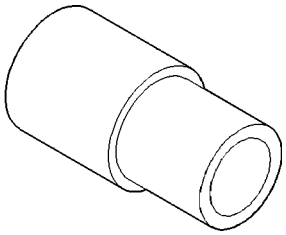
TORQUE SPECIFICATIONS

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	-

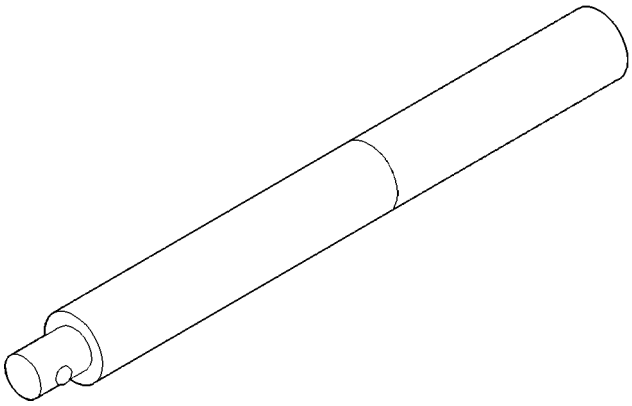
SPECIAL TOOLS



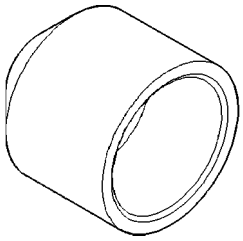
REMOVER 8155



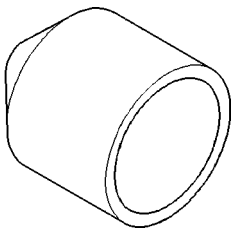
INSTALLER 8156



HANDLE C-4171

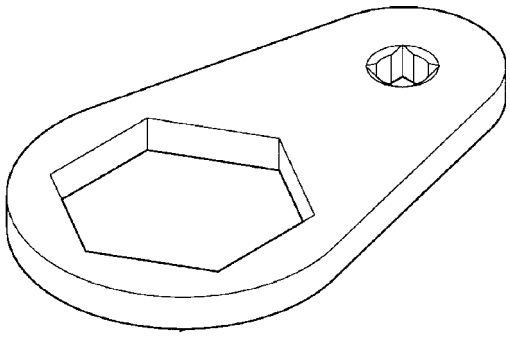


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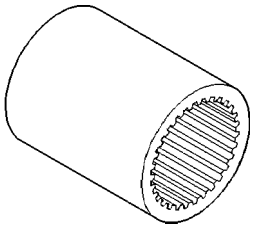


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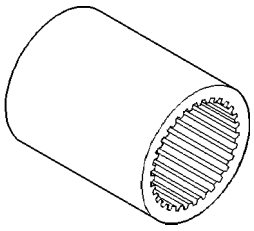
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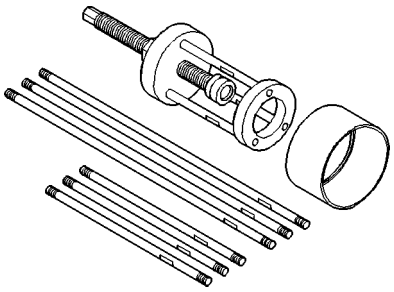
WRENCH 8226



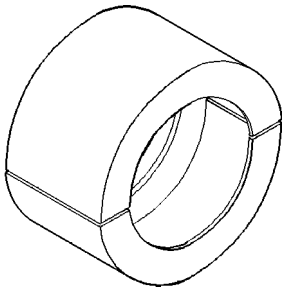
SOCKET 6984



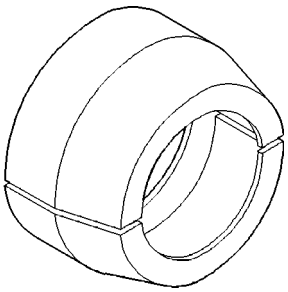
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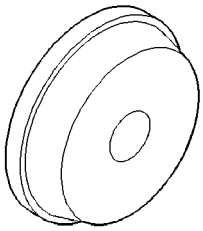
PULLER 6444



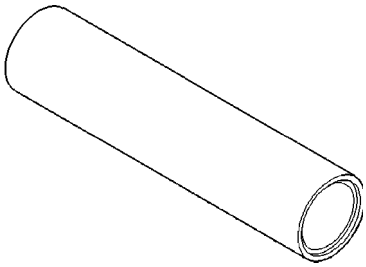
JAWS 6447



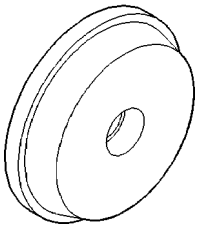
JAWS 6451



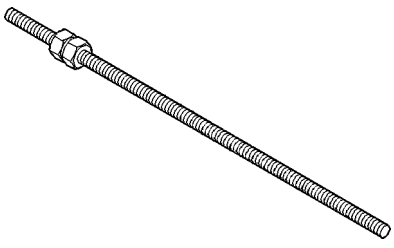
INSTALLER 6061



INSTALLER 6448

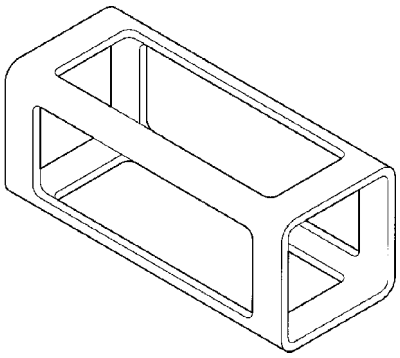


INSTALLER C-4308

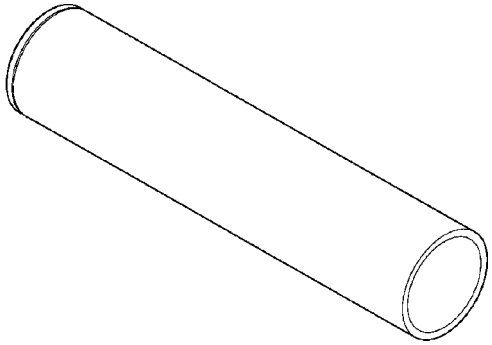


ROD EXTENSION 8161

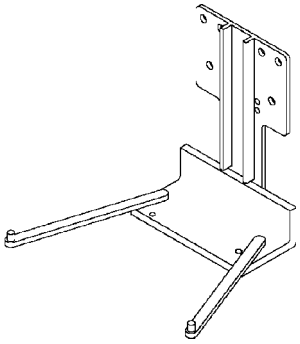
MANUAL TRANSMISSION - NV5600 (Continued)



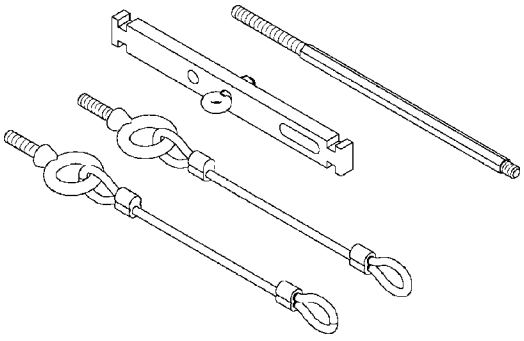
FIXTURE 8227



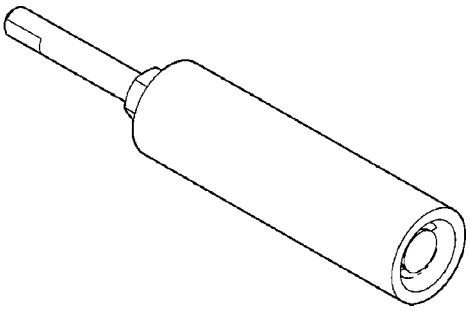
INSTALLER 8228



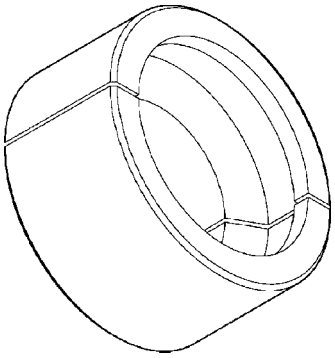
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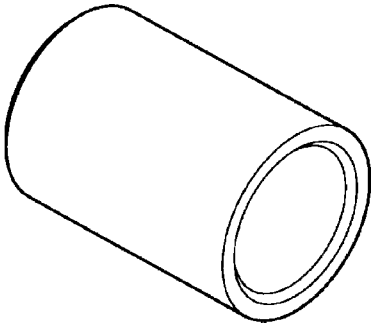
FIXTURE 8232



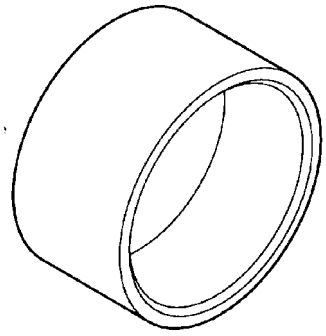
REMOVER 8233



REMOVER 8234

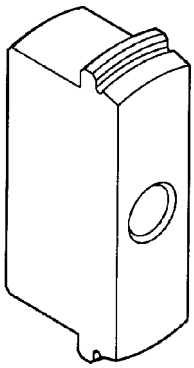


GUIDE 8235

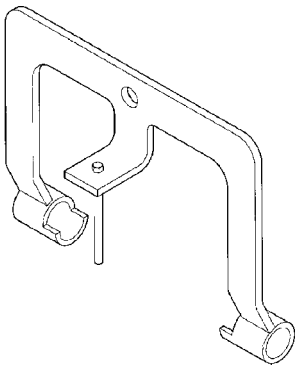


INSTALLER 8236

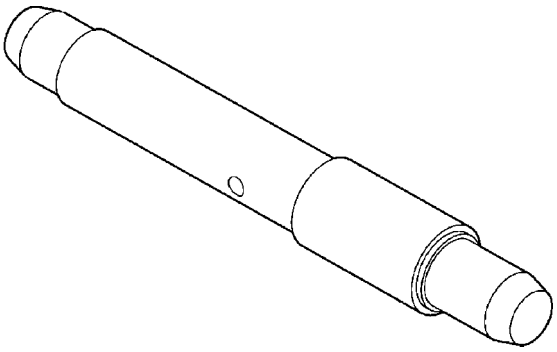
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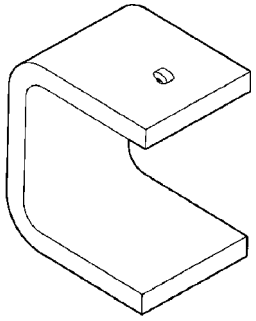
INSTALLER/REMOVER 8237



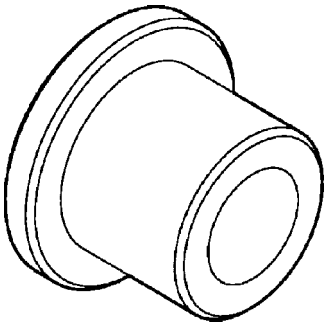
FIXTURE 8241



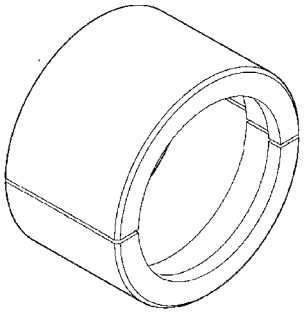
INSTALLER/REMOVE 8238



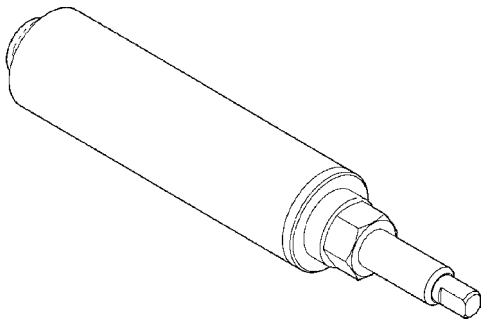
HOLDING 8242



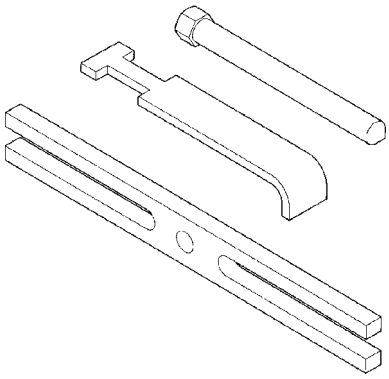
INSTALLER 8239



REMOVER 8243

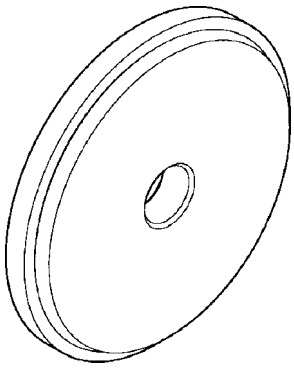


REMOVER 8240

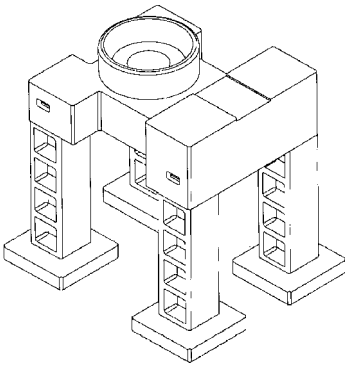


PULLER 8244

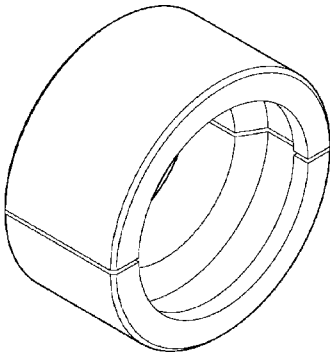
MANUAL TRANSMISSION - NV5600 (Continued)



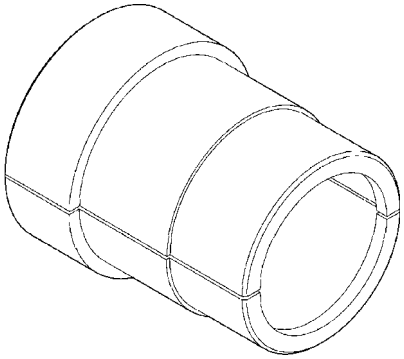
REMOVER 8245



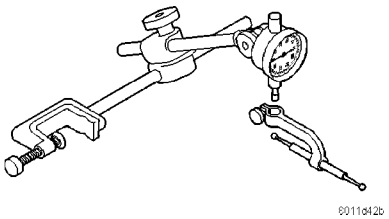
SUPPORT STAND 8246



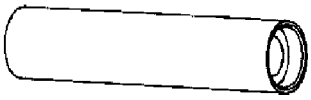
REMOVER 8262



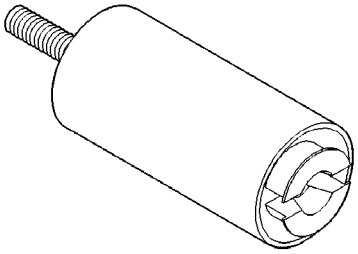
REMOVER 8271



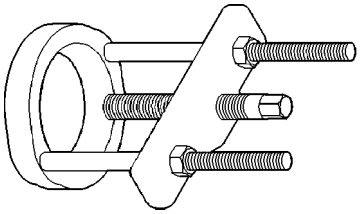
DIAL INDICATOR C-3339



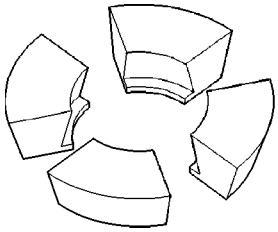
INSTALLER C-4965



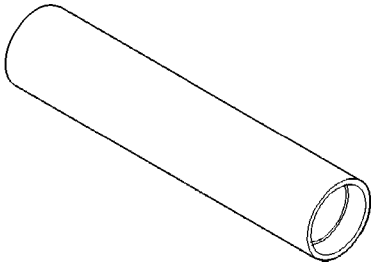
REMOVER L-4418



PULLER C-293-PA



ADAPTERS C-293-52



INSTALLER MD998805

ADAPTER HOUSING SEAL

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

REMOVAL

(1) Mark propeller shaft and pinion yoke for installation reference and remove the propeller shaft.
(2) Remove extension housing seal with a pry tool or a slide hammer and screw.
(3) Remove extension housing bushing with Remover 8155 (Fig. 97).

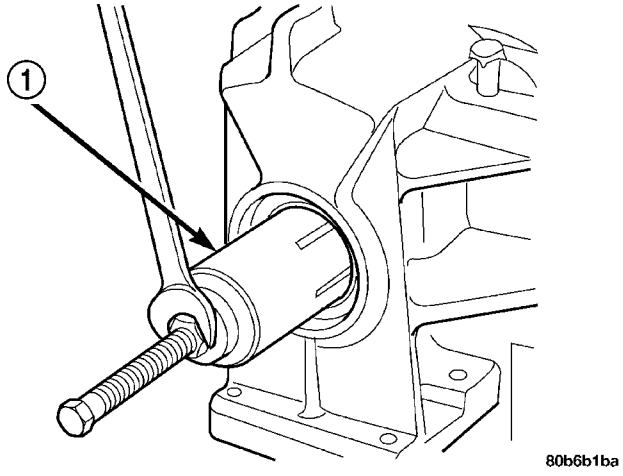


Fig. 97 EXTENSION HOUSING BUSHING REMOVAL

1 - REMOVER

INSTALLATION

(1) Install extension housing bushing with Installer 8156 and Handle C-4171 (Fig. 98).

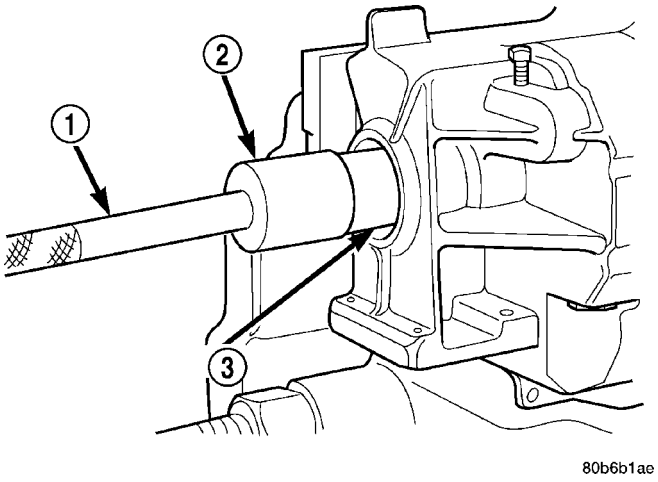


Fig. 98 Install Extension Housing Bushing

1 - HANDLE
2 - INSTALLER
3 - BUSHING

(2) Install extension housing seal with Installer 8154 and Handle C-4171 (Fig. 99).

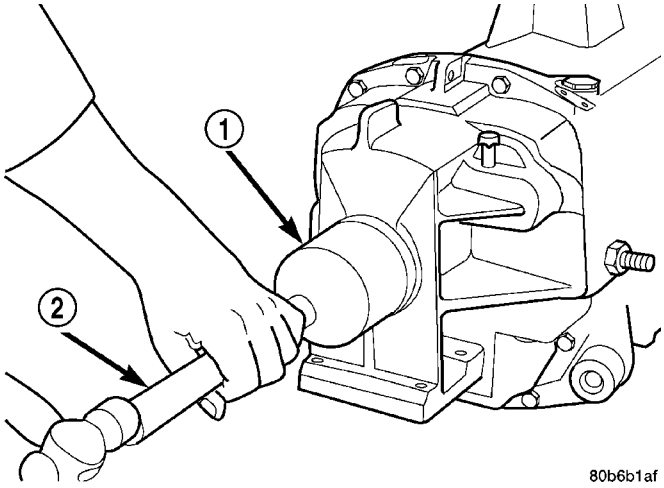


Fig. 99 EXTENSION HOUSING SEAL INSTALLER

1 - INSTALLER
2 - HANDLE

(3) Install propeller shaft with reference marks aligned.
(4) Check and fill transmission.

SHIFT COVER

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. 100) and isolator plate (Fig. 101) from the transmission.

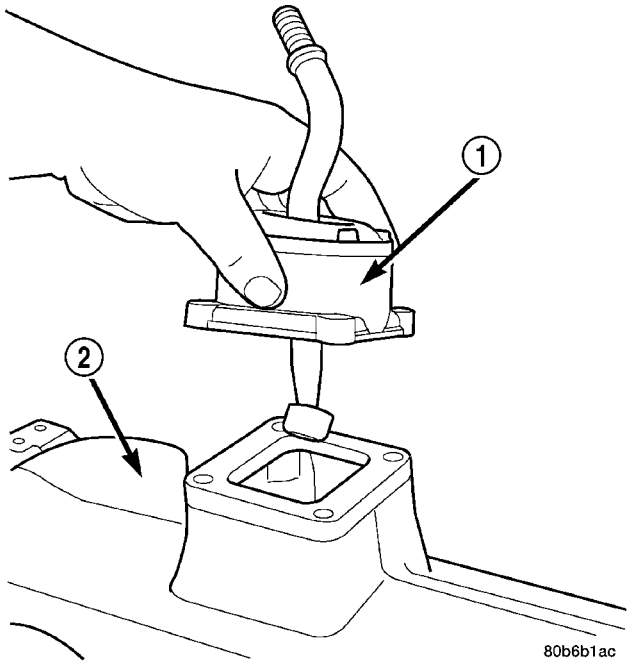


Fig. 100 SHIFT TOWER

1 - SHIFT TOWER
2 - TRANSMISSION

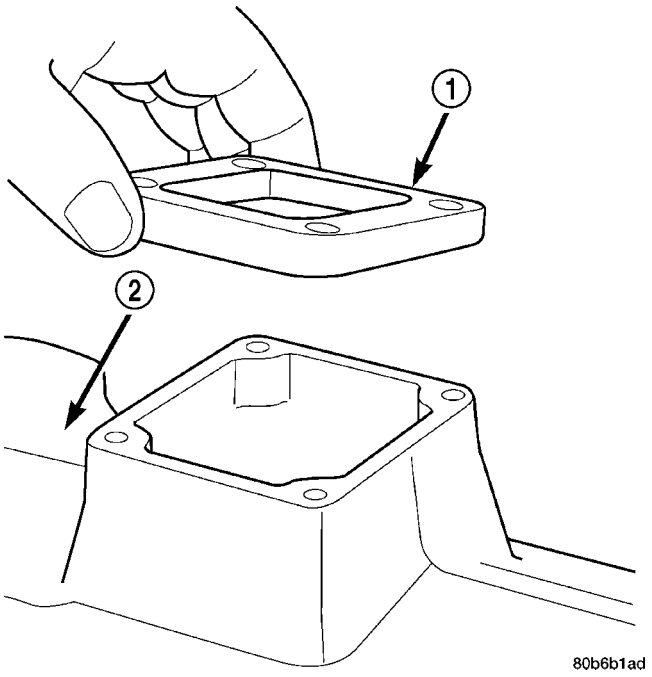


Fig. 101 SHIFT TOWER ISOLATOR PLATE

1 - ISOLATOR PLATE
2 - TRANSMISSION

INSTALLATION

(1) Shift transmission into third gear.
(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)

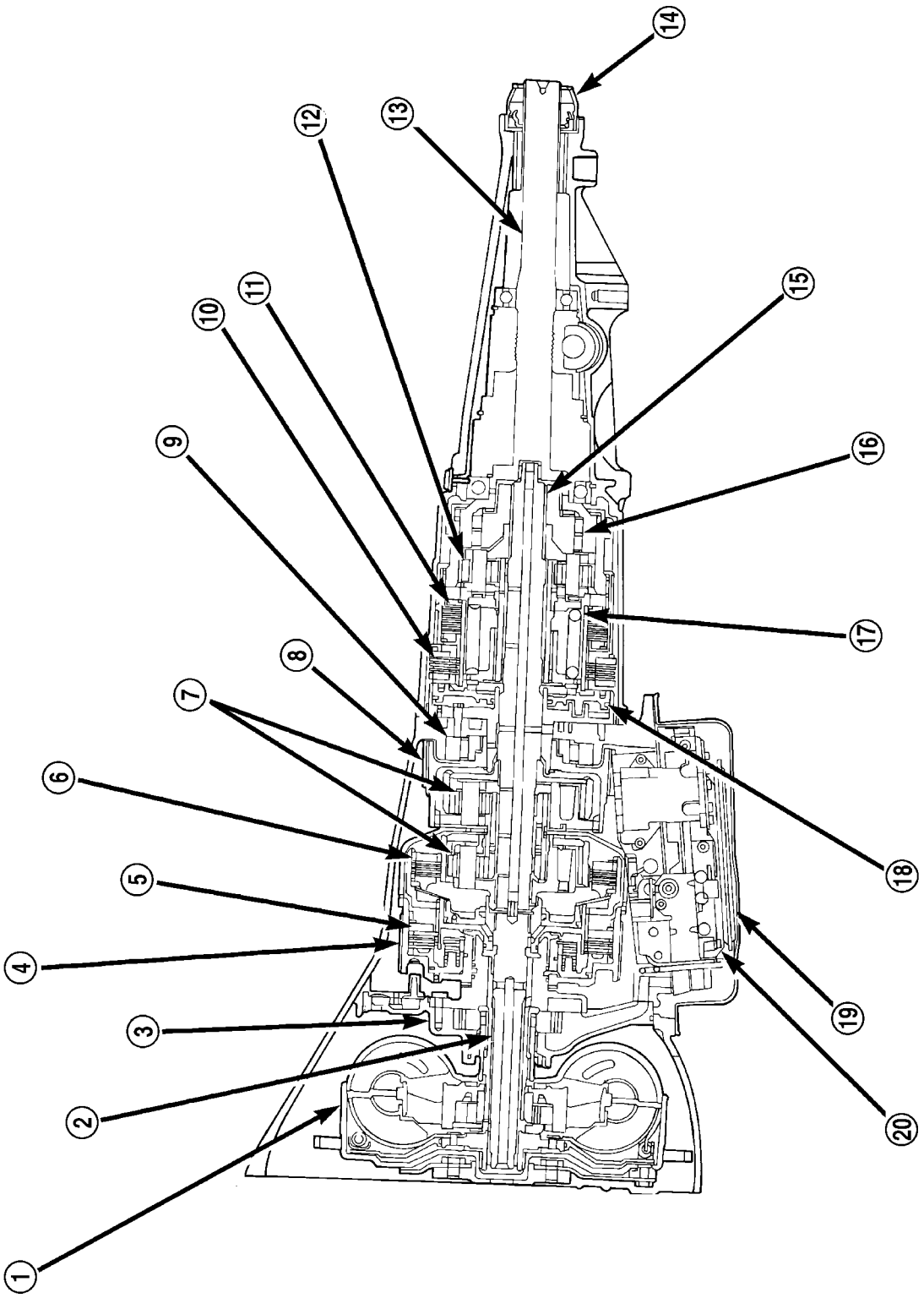


Fig. 1 46RE Transmission

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.

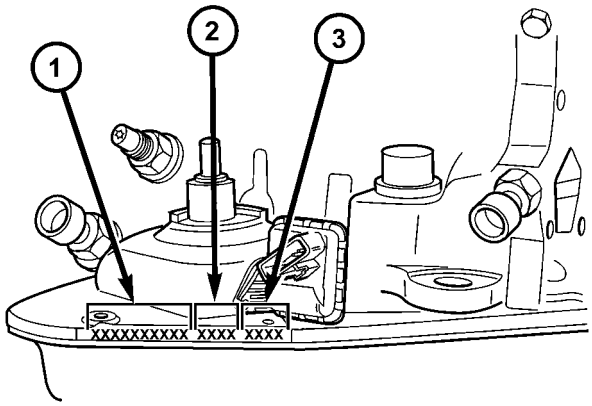


Fig. 2 Transmission Part And Serial Number Location

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 can also be engaged in the manual second gear position if high transmission temperatures are sensed by the PCM. 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.

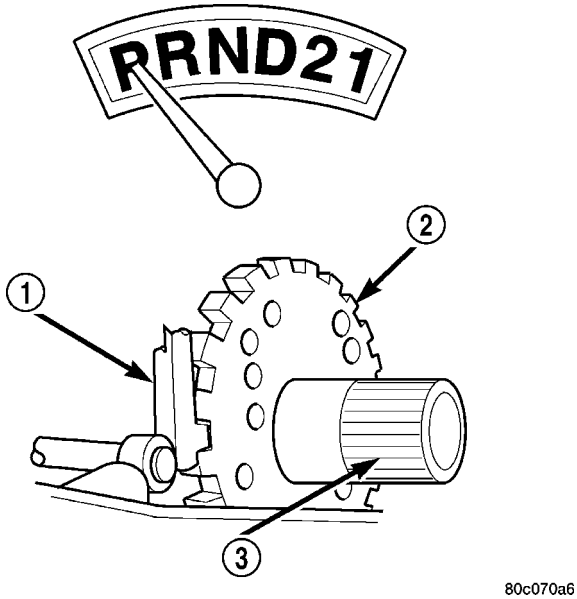


Fig. 3 Park Powerflow

1 - PAWL 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.

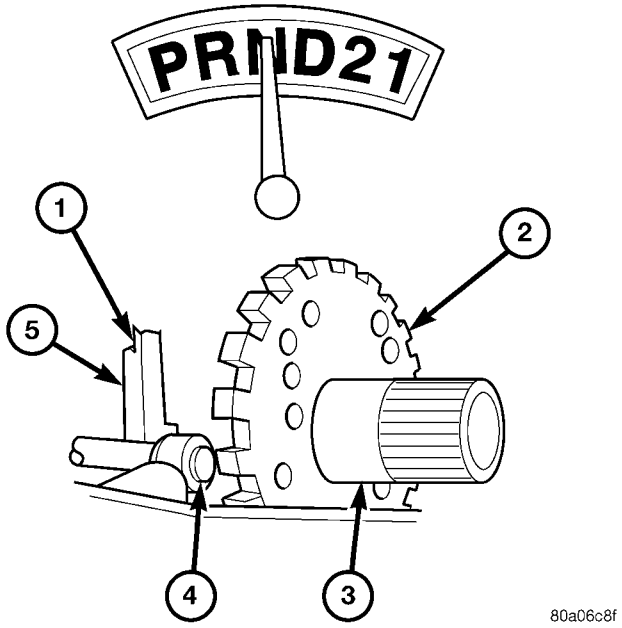


Fig. 4 Neutral Powerflow

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

AUTOMATIC TRANSMISSION - 46RE (Continued)

REVERSE POWERFLOW

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

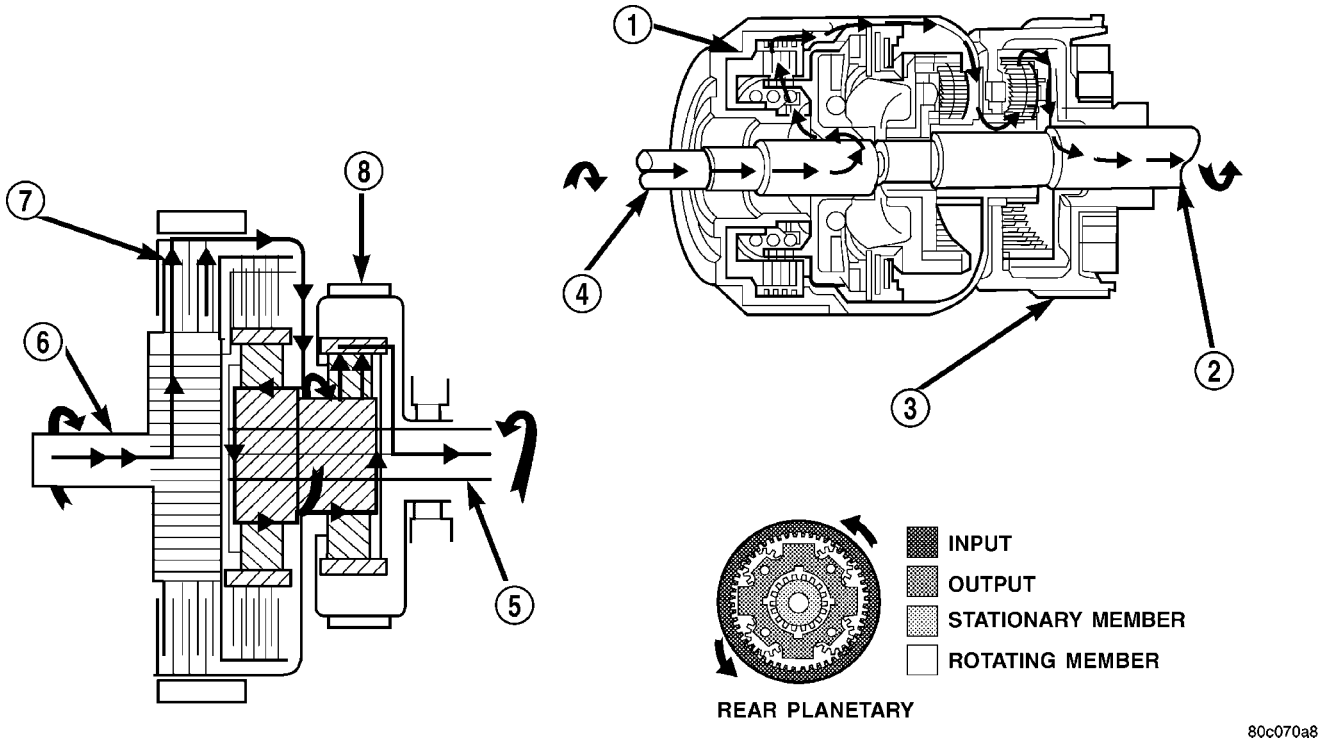


Fig. 5 Reverse Powerflow

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.

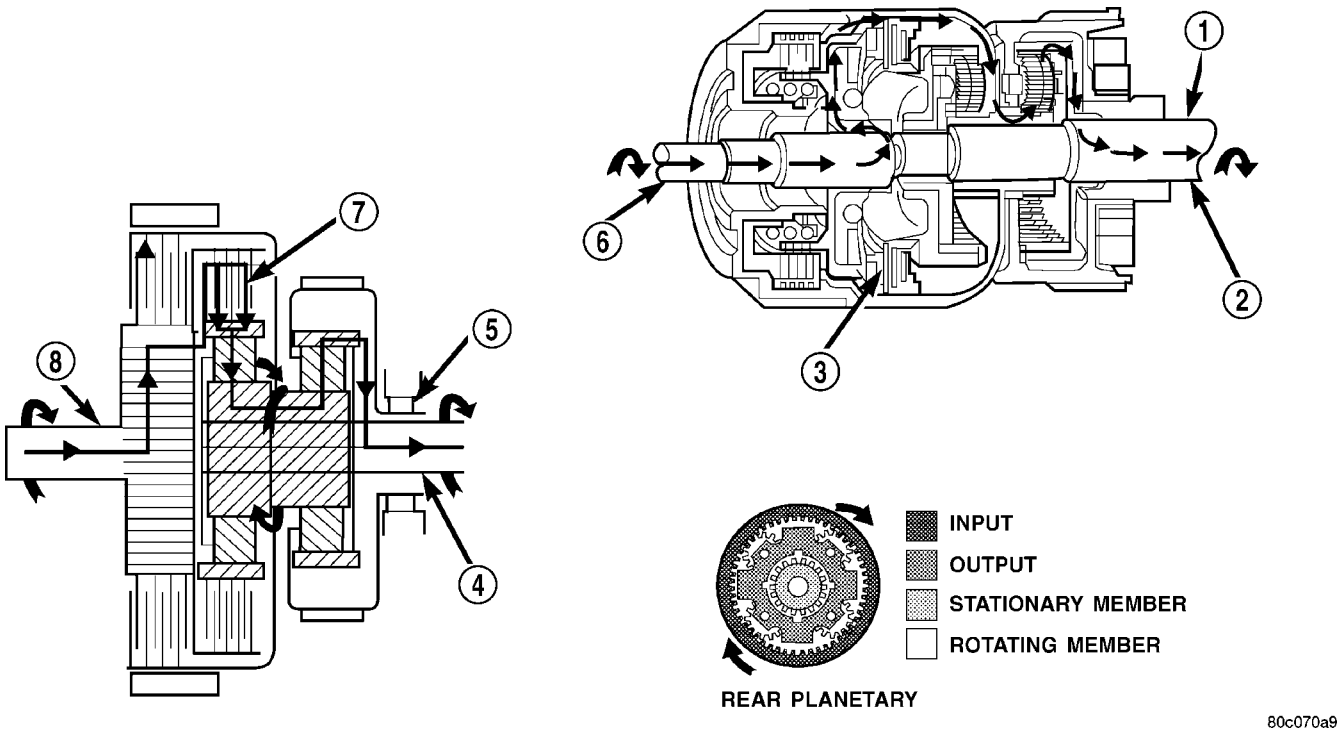


Fig. 6 First Gear Powerflow

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

AUTOMATIC TRANSMISSION - 46RE (Continued)

SECOND GEAR POWERFLOW

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

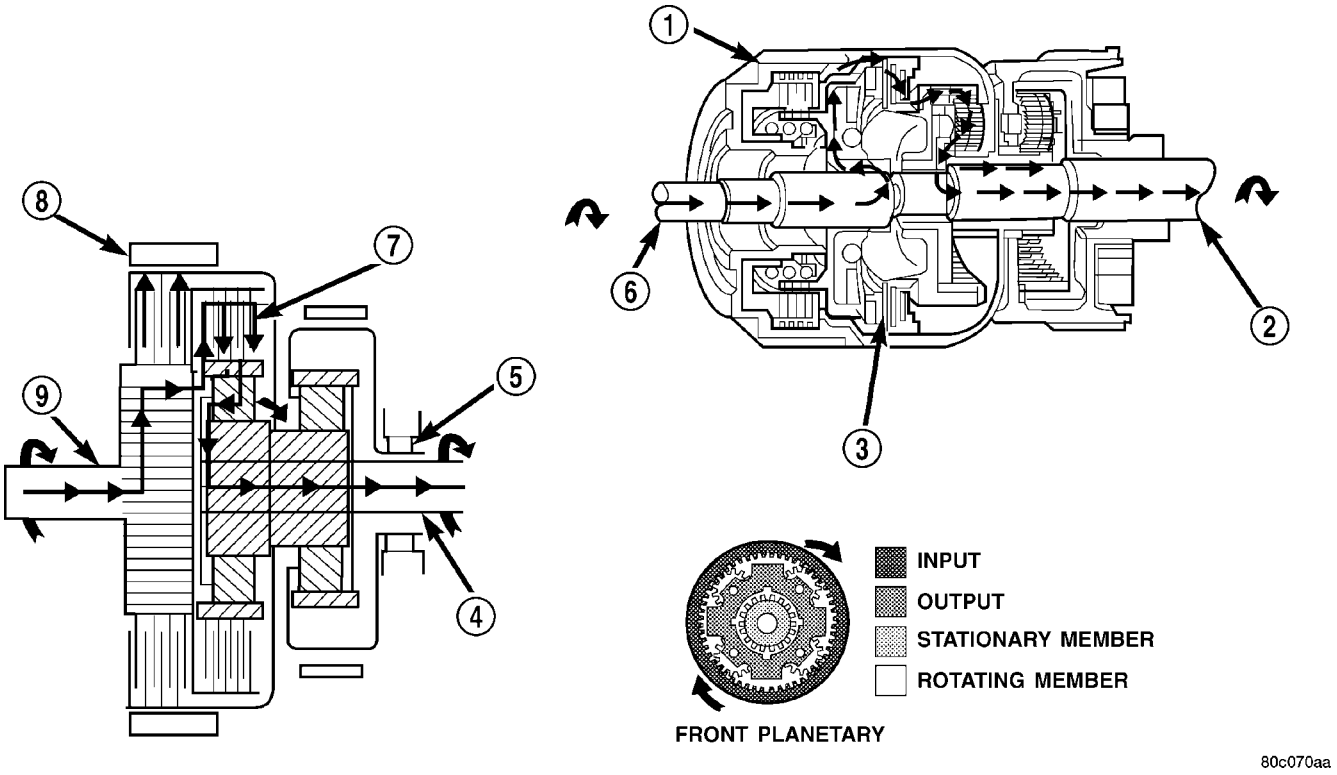


Fig. 7 Second Gear Powerflow

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.

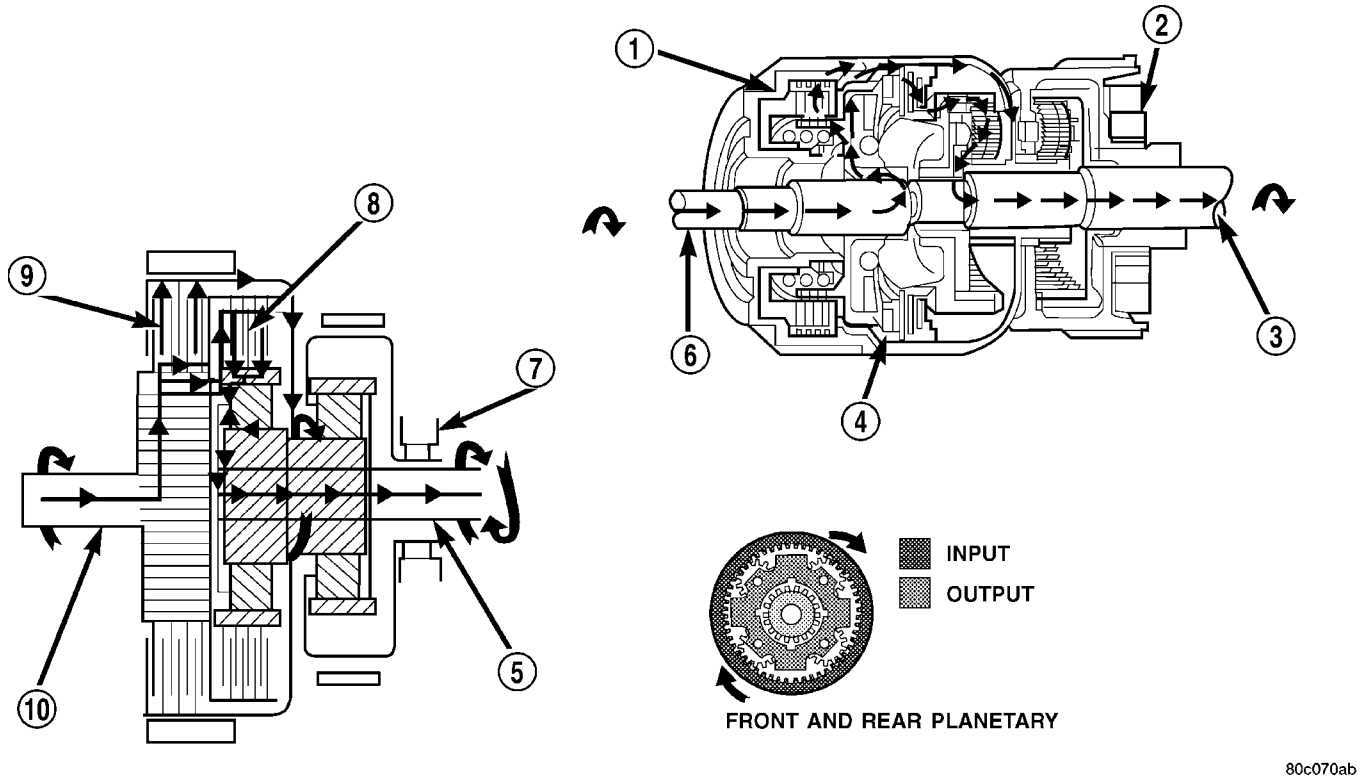


Fig. 8 Direct Drive Powerflow

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.

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
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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

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.

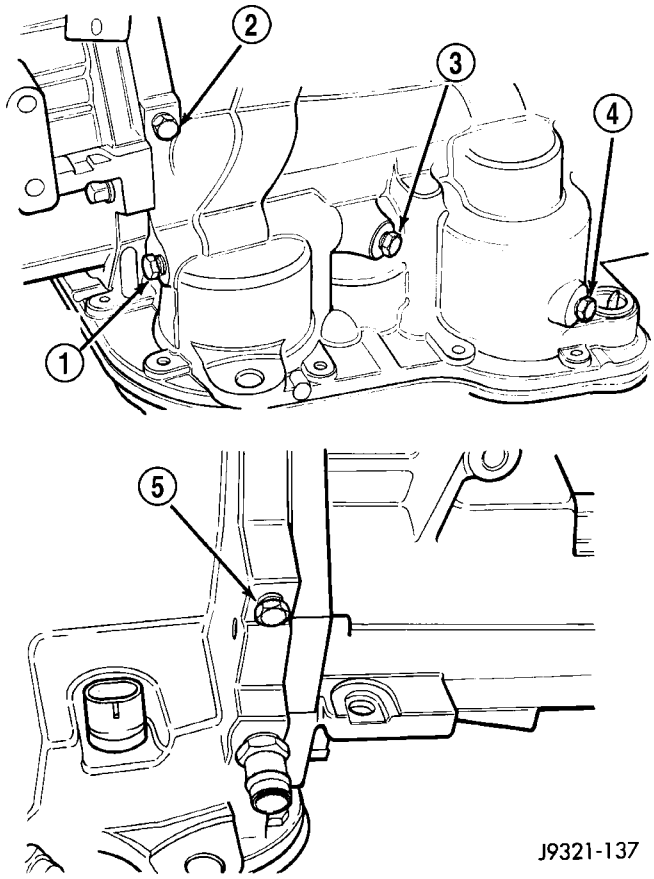


Fig. 9 Pressure Test Port Locations

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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

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

AUTOMATIC TRANSMISSION - 46RE (Continued)

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).

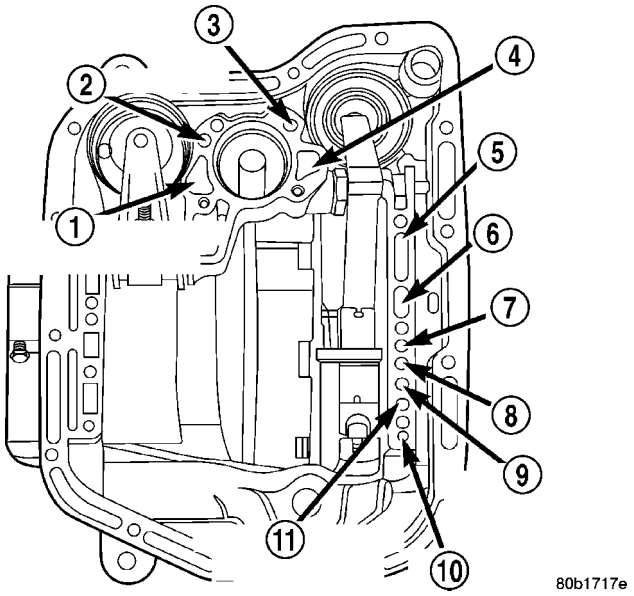


Fig. 10 Air Pressure Test Passages

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

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.

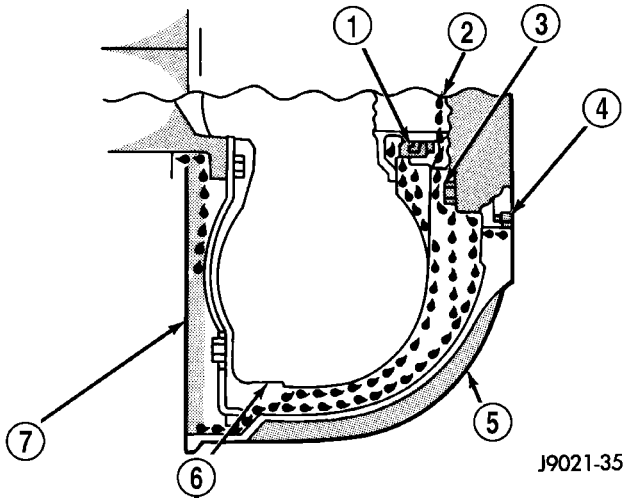


Fig. 11 Converter Housing Leak Paths

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

TORQUE CONVERTER LEAK POINTS

Possible sources of converter leaks are:

- Leaks at the weld joint around the outside diameter weld.
- Leaks at the converter hub weld.

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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

DIAGNOSIS CHARTS

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

AUTOMATIC TRANSMISSION - 46RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO DRIVE RANGE (REVERSE OK)	1. Fluid Level Low.	1. Add fluid and check for leaks if drive is restored.
	2. Gearshift Linkage/Cable Loose/Misadjusted.	2. Repair or replace linkage components.
	3. Rear Clutch Burnt.	3. Remove and disassemble transmission and rear clutch and seals. Repair/replace worn or damaged parts as needed.
	4. Valve Body Malfunction.	4. Remove and disassemble valve body. Replace assembly if any valves or bores are damaged.
	5. Transmission Overrunning Clutch Broken.	5. Remove and disassemble transmission. Replace overrunning clutch.
	6. Input Shaft Seal Rings Worn/ Damaged.	6. Remove and disassemble transmission. Replace seal rings and any other worn or damaged parts.
	7. Front Planetary Failed Broken.	7. Remove and repair.
NO DRIVE OR REVERSE (VEHICLE WILL NOT MOVE)	1. Fluid Level Low.	1. Add fluid and check for leaks if drive is restored.
	2. Gearshift Linkage/Cable Loose/Misadjusted.	2. Inspect, adjust and reassemble linkage as needed. Replace worn/damaged parts.
	3. 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. 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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
SHIFTS DELAYED OR ERRATIC (SHIFTS ALSO HARSH AT TIMES)	1. Fluid Level Low/High.	1. Correct fluid level and check for leaks if low.
	2. Fluid Filter Clogged.	2. Replace filter. If filter and fluid contained clutch material or metal particles, an overhaul may be necessary.
	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.
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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
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.
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. Replace cooler.
	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 - 46RE (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. 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.
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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
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

NOTE: 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) Raise vehicle.
(3) Remove the transfer case skid plate (Fig. 12), if equipped.

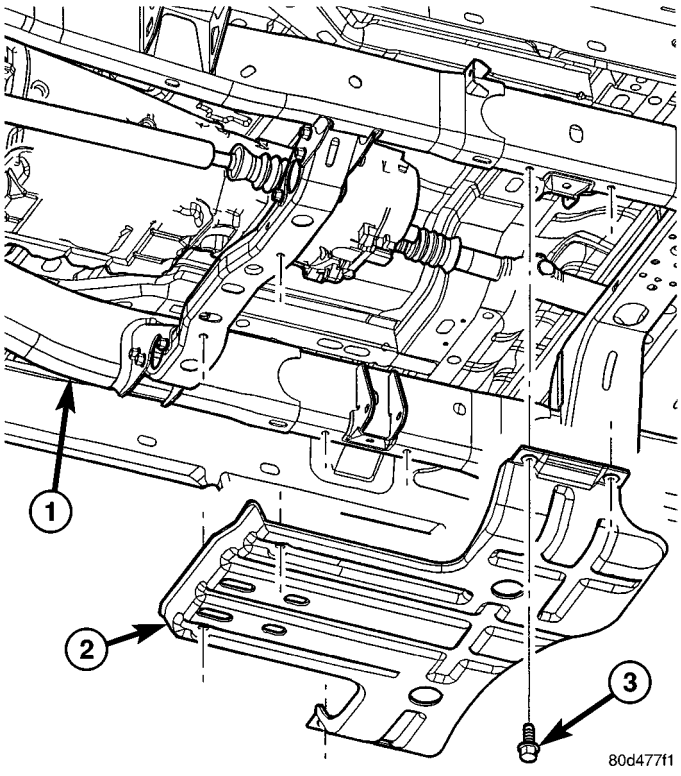


Fig. 12 Transfer Case Skid Plate

1 - FRAME RAIL
2 - SKID PLATE
3 - BOLTS (6)

(4) Disconnect and lower or remove necessary exhaust components.
(5) Remove engine-to-transmission struts (Fig. 13) and (Fig. 14).

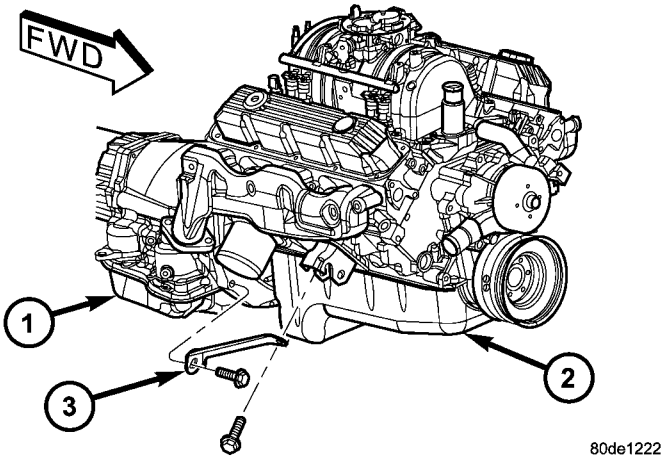


Fig. 13 Right Side Engine-to-Transmission Strut

1 - TRANSMISSION
2 - ENGINE
3 - STRUT

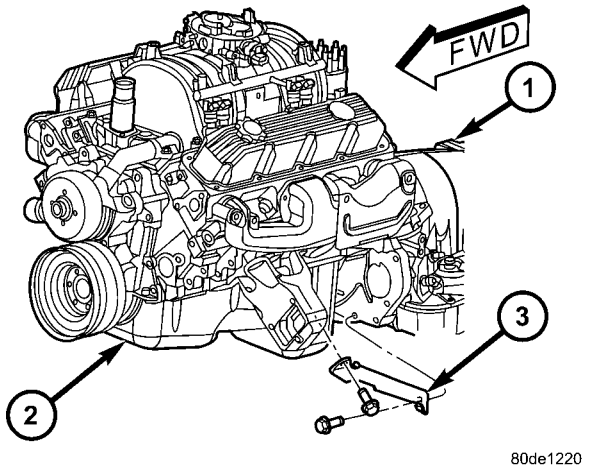


Fig. 14 Left Side Engine-to-Transmission Strut

1 - TRANSMISSION
2 - ENGINE
3 - STRUT

(6) Remove starter motor. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - REMOVAL)
(7) Disconnect and remove the crankshaft position sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/CRANKSHAFT POSITION SENSOR - REMOVAL) Retain the sensor attaching bolts.
(8) If transmission is being removed for overhaul, remove transmission oil pan, drain fluid and reinstall pan.
(9) Remove torque converter access cover.

AUTOMATIC TRANSMISSION - 46RE (Continued)

(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 the transmission range sensor and transmission solenoid connector.

(13) Disconnect gearshift cable (Fig. 15) from the transmission.

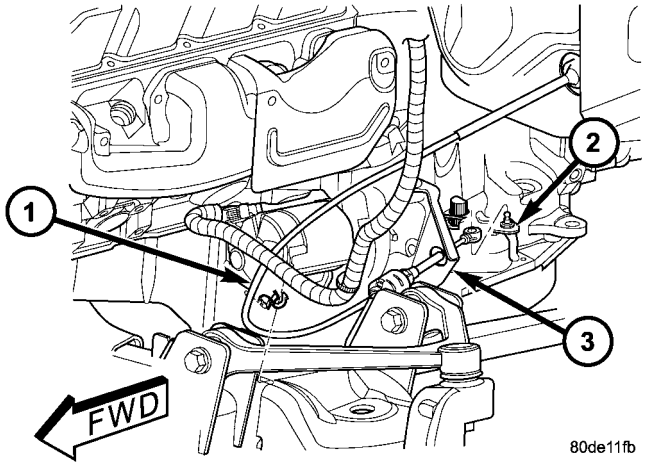


Fig. 15 Gearshift Cable At Transmission

1 - GEARSHIFT CABLE
2 - TRANSMISSION MANUAL LEVER
3 - CABLE SUPPORT BRACKET

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

(15) On 4X4 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 (Fig. 16) and (Fig. 17) to transmission and crossmember and remove rear support.

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

(20) On 4X4 models, remove transfer case with transmission jack or aid of helper.

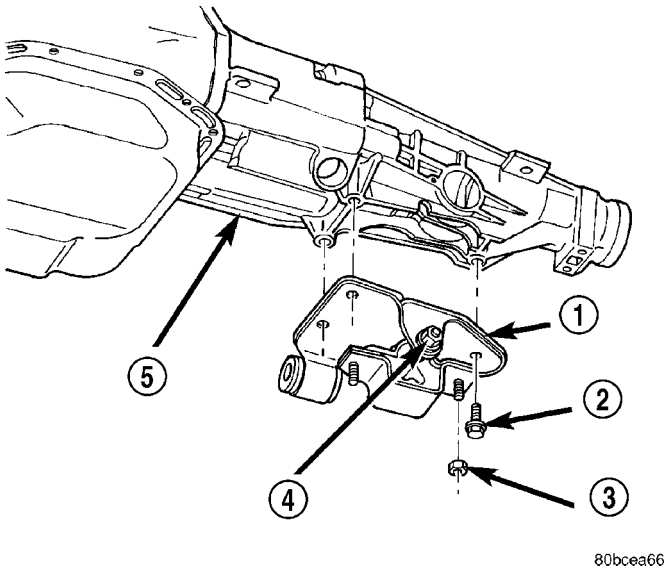


Fig. 16 Engine Rear Mount - 4X2 Automatic Transmission

1 - ENGINE REAR MOUNT
2 - BOLT
3 - NUT
4 - THROUGH BOLT NUT
5 - TRANSMISSION

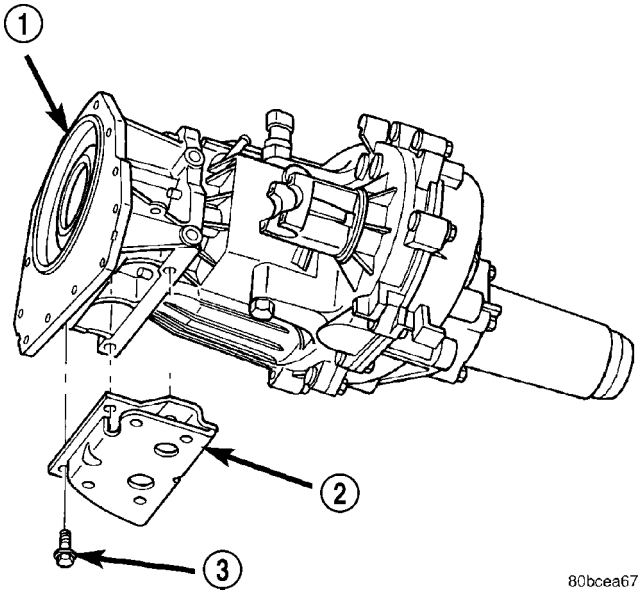


Fig. 17 Engine Rear Mount - 4X4 Automatic Transmission

1 - TRANSMISSION
2 - ENGINE REAR MOUNT
3 - BOLT

(21) Disconnect fluid cooler lines at transmission (Fig. 18).

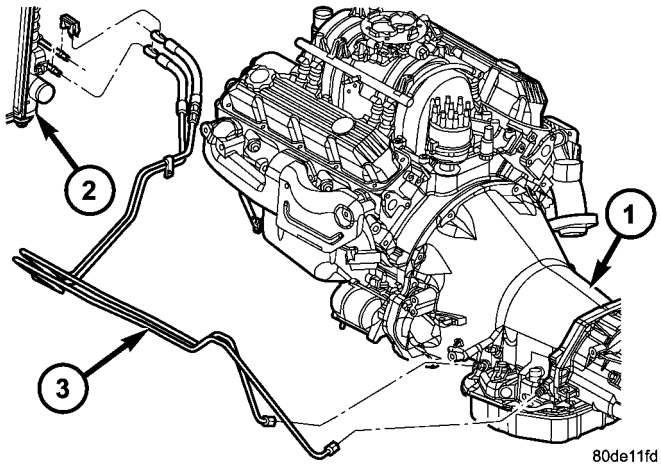


Fig. 18 Transmission Cooler Lines

1 - TRANSMISSION
2 - RADIATOR
3 - COOLER LINES

(22) Remove fill tube bracket bolts and pull tube out of transmission. Retain fill tube seal. On 4X4 models, it will also be necessary to remove bolt attaching transfer case vent tube to converter housing (Fig. 19).

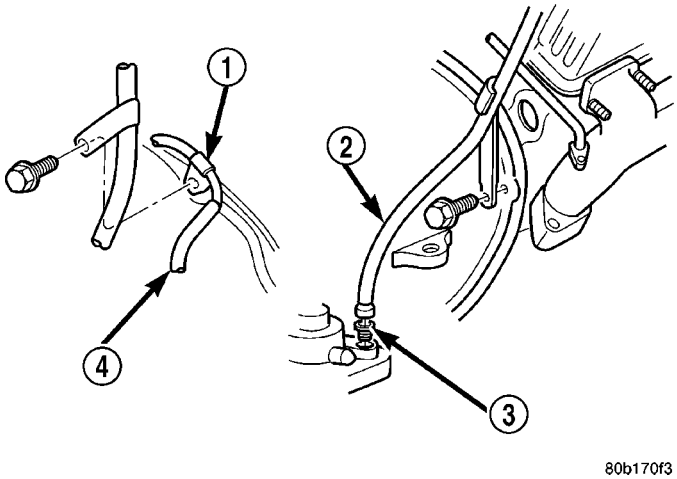


Fig. 19 Fill Tube Attachment

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

(23) Remove all converter housing bolts.

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

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

(26) 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. 20).

(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

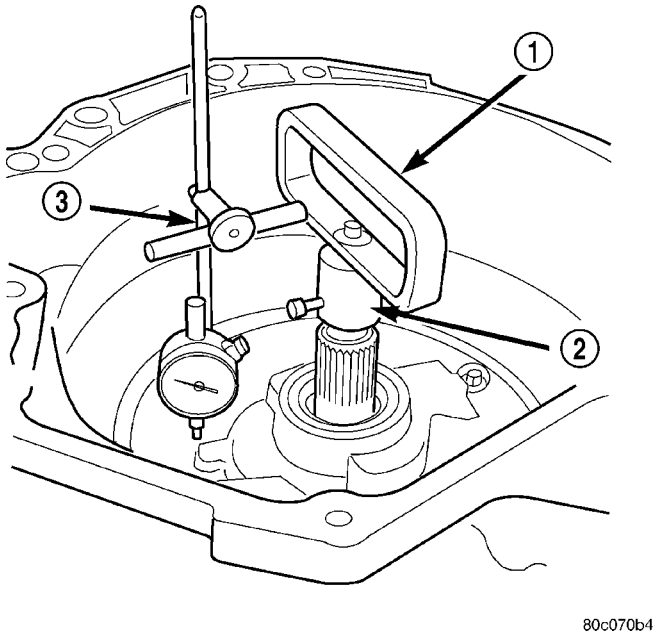


Fig. 20 Checking Input Shaft End Play

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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

(6) Remove filter from valve body (Fig. 21). Keep filter screws separate from other valve body screws. Filter screws are longer and should be kept with filter.

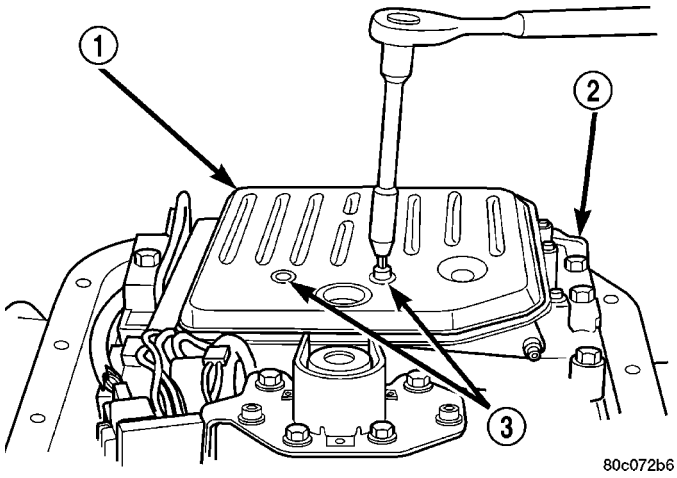


Fig. 21 Oil Filter Removal

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

(7) Remove the transmission range sensor.

(8) Remove hex head bolts attaching valve body to transmission case (Fig. 22). 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. 23).

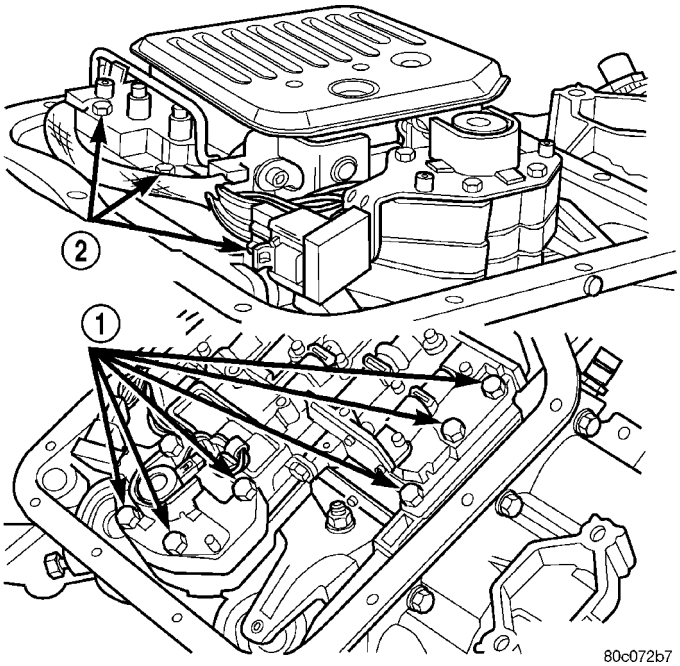


Fig. 22 Valve Body Bolt Locations

1 - VALVE BODY BOLTS
2 - VALVE BODY BOLTS

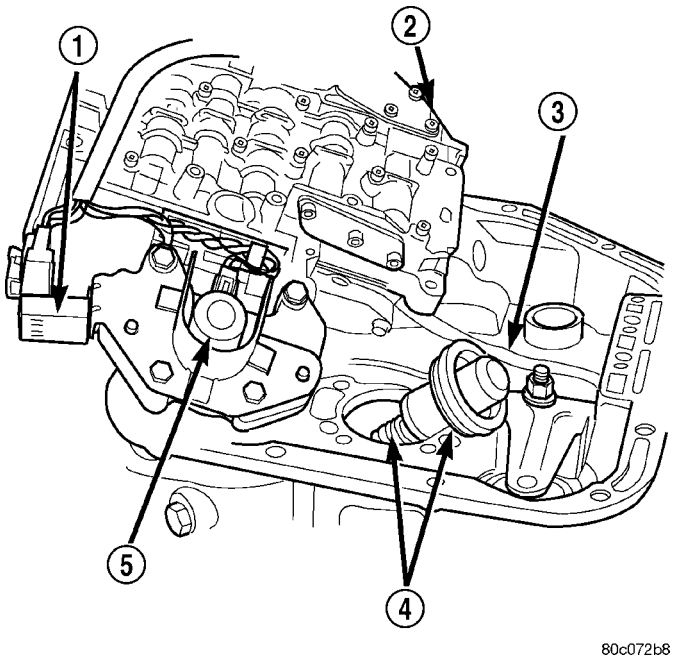


Fig. 23 Valve Body Removal

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

(10) Remove accumulator outer spring, piston and inner spring (Fig. 24). Note position of piston and springs for assembly reference. Remove and discard piston seals if worn or cut.

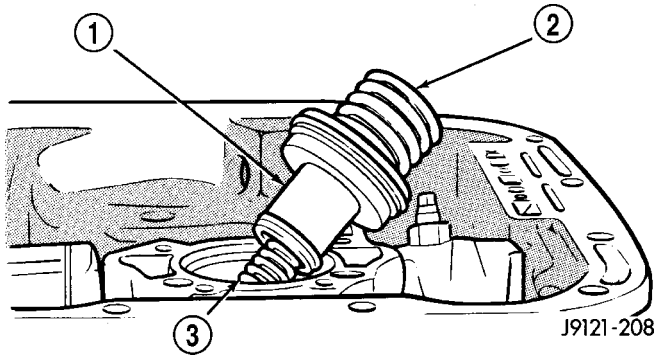


Fig. 24 Accumulator Component Removal

1 - ACCUMULATOR PISTON
2 - OUTER SPRING
3 - INNER SPRING

AUTOMATIC TRANSMISSION - 46RE (Continued)

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

(12) Remove front band lever pin access plug (Fig. 25). Use square end of 1/4 in. drive extension to remove plug as shown.

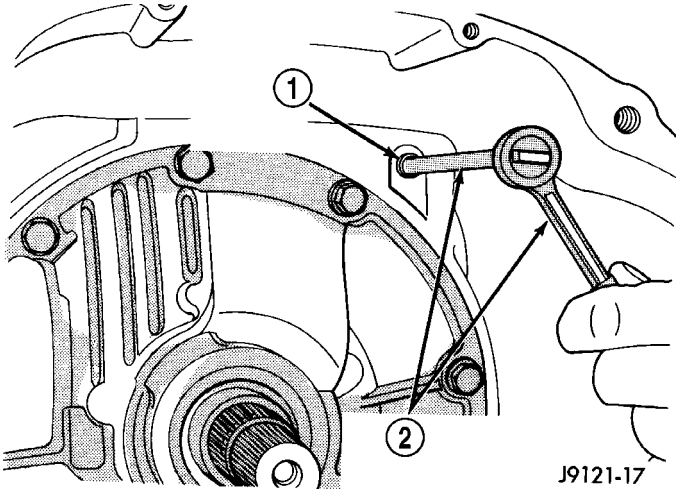


Fig. 25 Front Band Lever Pin Access Plug

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. 26). This will prevent retainer from coming out with pump and possibly damaging clutch or pump components.

(b) Remove oil pump bolts.

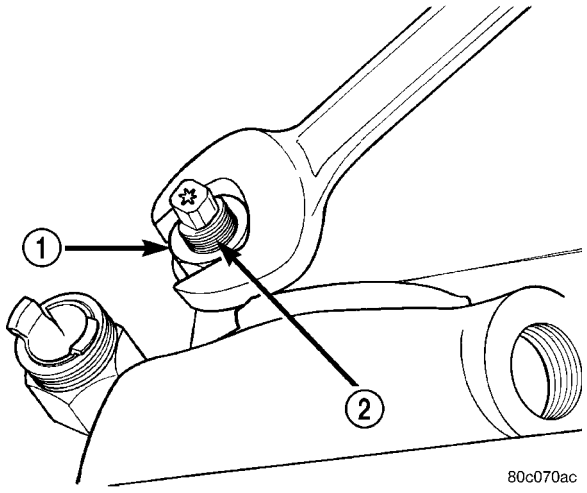


Fig. 26 Tightening Front Band To Hold Front Clutch In Place

1 - LOCK-NUT
2 - FRONT BAND ADJUSTER

(c) Thread Slide Hammer Tools C-3752 into threaded holes in flange of oil pump housing (Fig. 27).

(d) Remove oil pump and reaction shaft support by bumping slide hammers outward alternately to pull pump from case (Fig. 28).

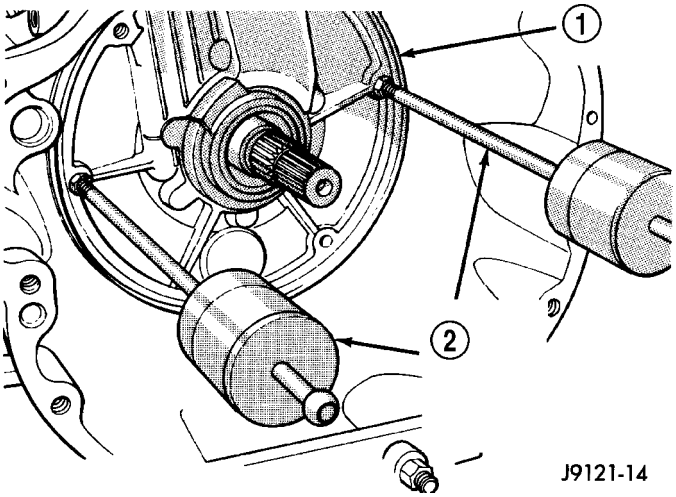


Fig. 27 Oil Pump Removal Tools

1 - PUMP HOUSING
2 - SLIDE HAMMER TOOLS (THREAD INTO PUMP HOUSING)

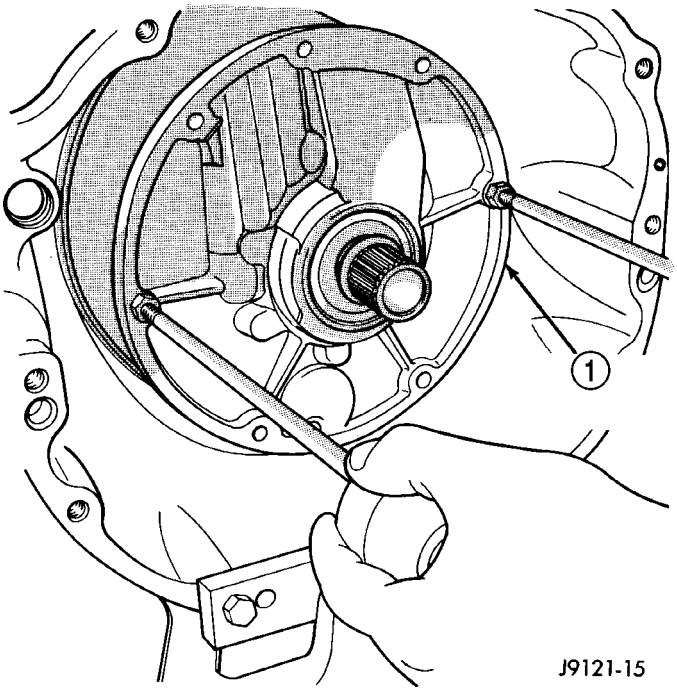


Fig. 28 Oil Pump Removal

1 - OIL PUMP AND REACTION SHAFT SUPPORT

AUTOMATIC TRANSMISSION - 46RE (Continued)

(14) Remove oil pump gasket (Fig. 29). 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. 30).

(17) Squeeze front band together slightly and slide band over front clutch retainer and out of case (Fig. 31).

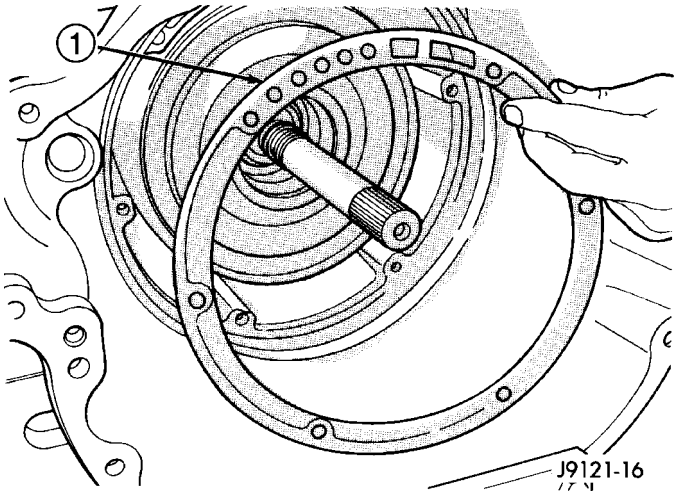


Fig. 29 Oil Pump Gasket

1 - OIL PUMP GASKET

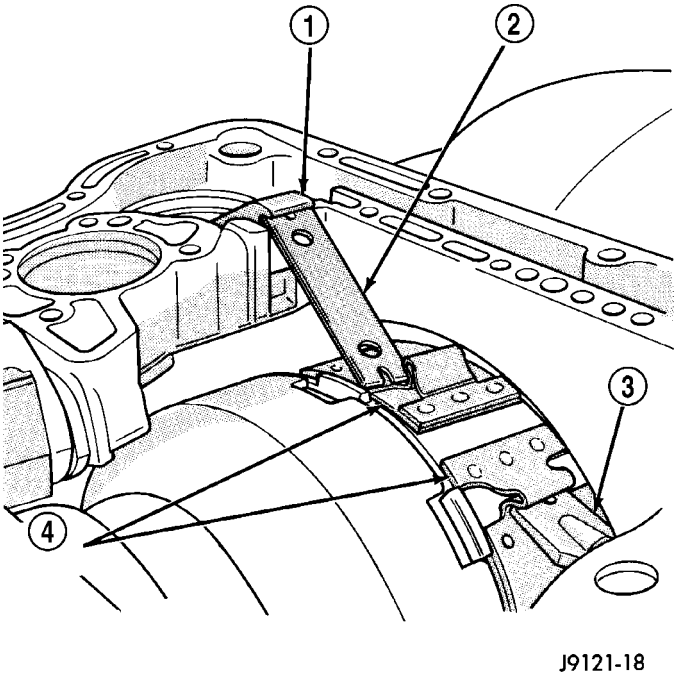


Fig. 30 Front Band Linkage

1 - LEVER
2 - STRUT
3 - ANCHOR
4 - FRONT BAND

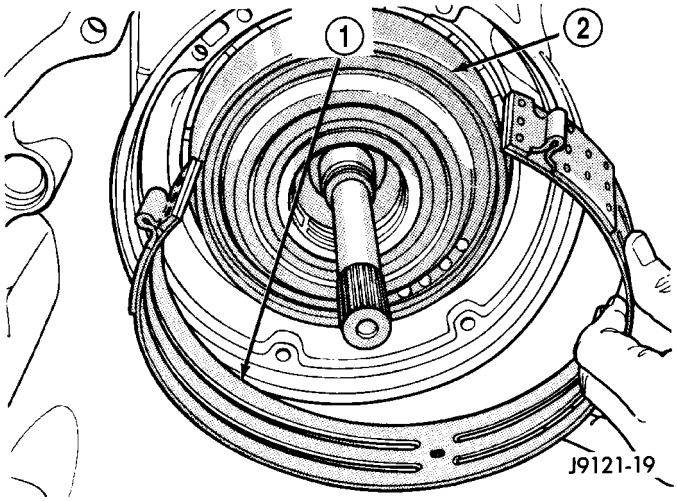


Fig. 31 Front Band Removal

1 - FRONT BAND
2 - FRONT CLUTCH RETAINER

(18) Remove front and rear clutch assemblies as a unit (Fig. 32).

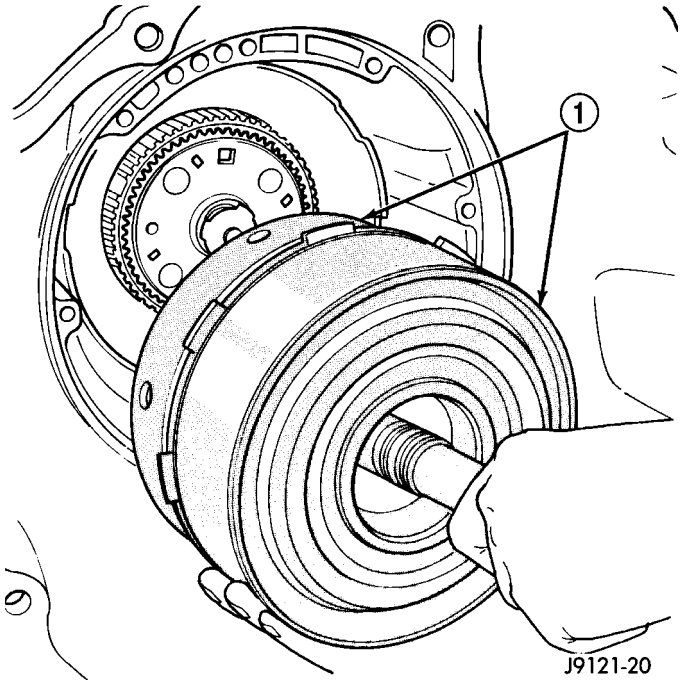


Fig. 32 Removing Front/Rear Clutch Assemblies

1 - FRONT AND REAR CLUTCH ASSEMBLIES

AUTOMATIC TRANSMISSION - 46RE (Continued)

(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. 33).

(20) Remove intermediate shaft thrust washer. Triangular shaped washer will either be on shaft pilot hub or in rear clutch retainer (Fig. 34).

(21) Remove thrust plate from intermediate shaft hub (Fig. 35).

(22) Remove intermediate shaft-planetary geartrain assembly (Fig. 36).

(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.

(24) Loosen rear band locknut and loosen adjusting screw 3-4 turns.

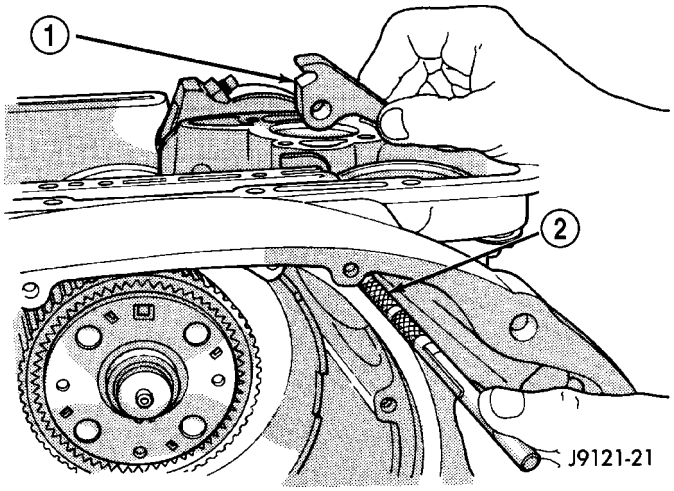


Fig. 33 Front Band Lever And Pin

1 - BAND LEVER
2 - USE PENCIL MAGNET TO REMOVE REACTION PIN

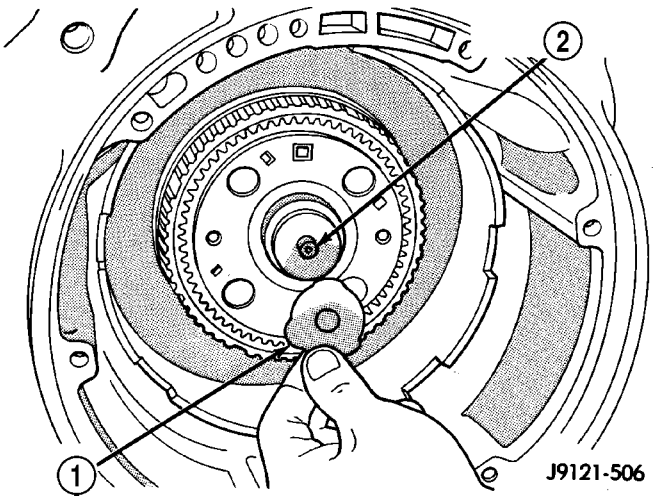


Fig. 34 Intermediate Shaft Thrust Washer

1 - THRUST WASHER
2 - INTERMEDIATE SHAFT PILOT HUB

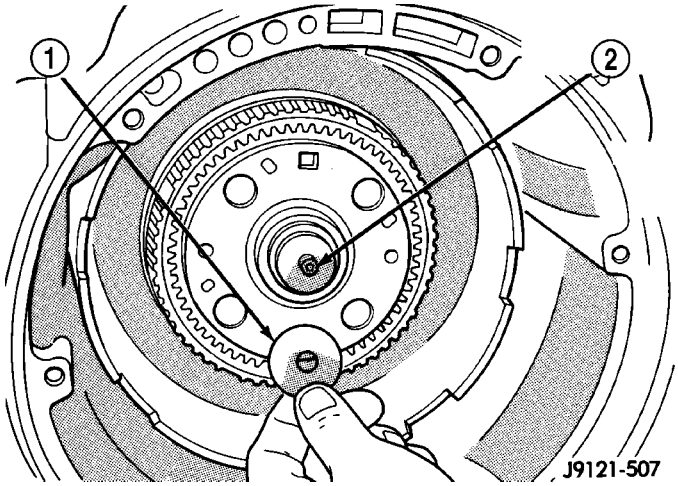


Fig. 35 Intermediate Shaft Thrust Plate

1 - SHAFT THRUST PLATE
2 - INTERMEDIATE SHAFT PILOT HUB

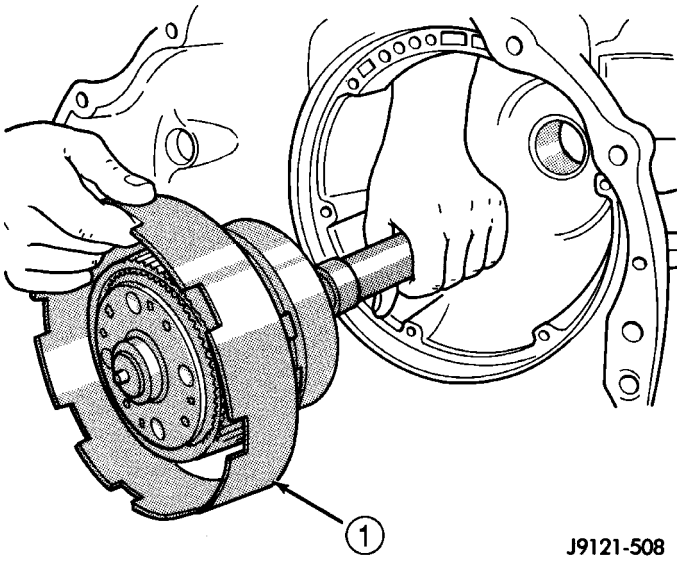


Fig. 36 Intermediate Shaft And Planetary Geartrain

1 - INTERMEDIATE SHAFT AND PLANETARY GEARTRAIN ASSEMBLY

AUTOMATIC TRANSMISSION - 46RE (Continued)

(25) Remove snap-ring that retains low-reverse drum on overdrive piston retainer hub (Fig. 37).

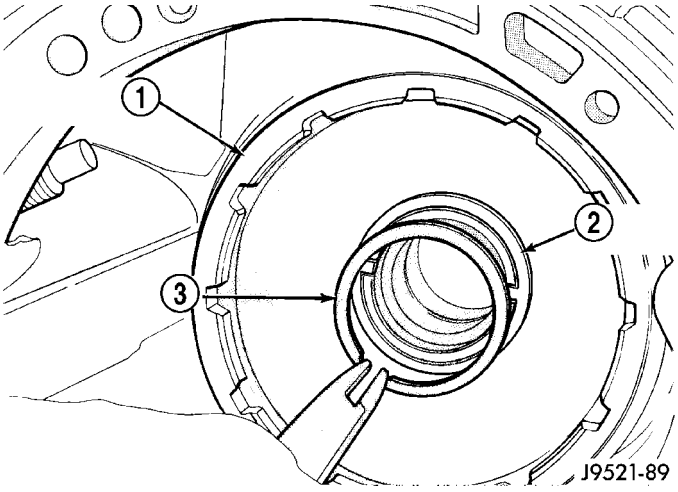


Fig. 37 Low-Reverse Drum Snap-Ring

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. 38).

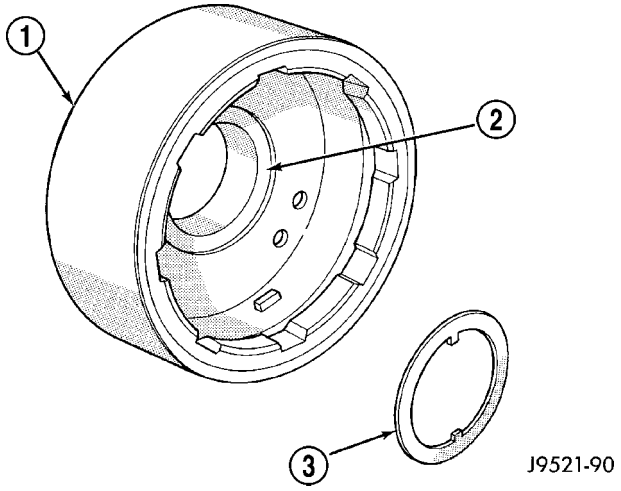


Fig. 38 Low-Reverse Drum And Thrust Washer

1 - LOW-REVERSE DRUM
2 - SPOTFACE FOR WASHER
3 - THRUST WASHER

(27) Note that overrunning clutch race will remain on splines of low-reverse drum after removal (Fig. 39). **The race is a permanent press fit on the hub splines. Do not attempt to remove the race.**

(28) Remove overrunning clutch assembly (Fig. 40). Assembly can be removed without displacing rollers and springs if care is exercised. Note position of rollers and springs for assembly reference.

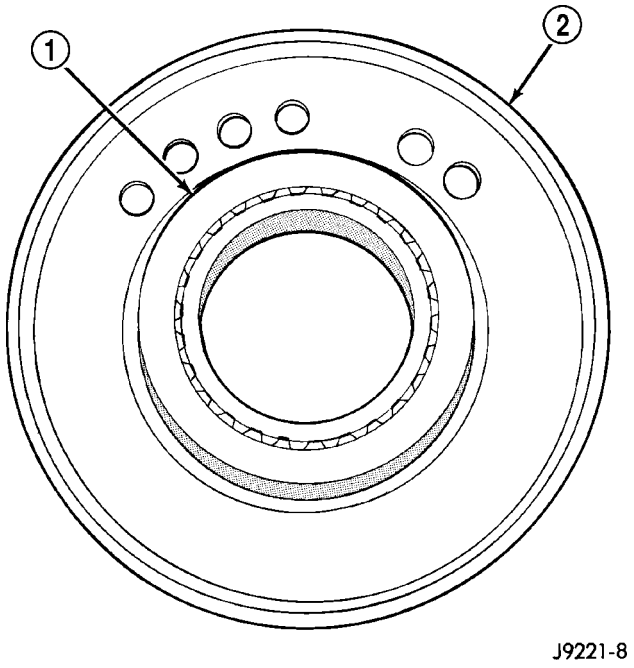


Fig. 39 Overrunning Clutch Race Position On Low-Reverse Drum

1 - OVERRUNNING CLUTCH RACE
2 - LOW-REVERSE DRUM

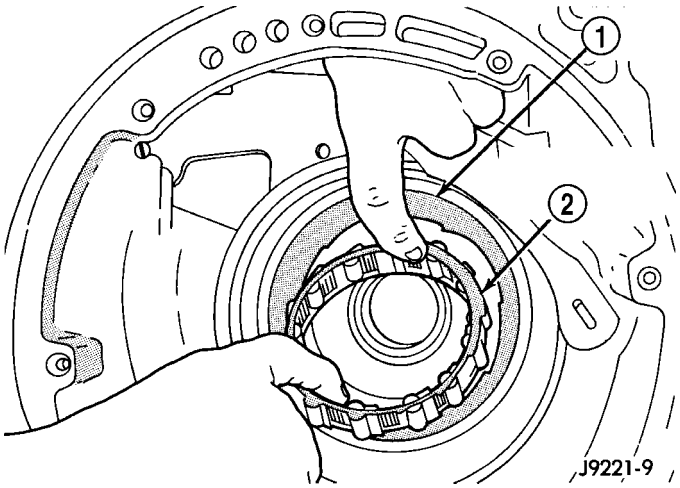


Fig. 40 Overrunning Clutch Removal

1 - CLUTCH CAM
2 - OVERRUNNING CLUTCH ASSEMBLY

(29) Remove rear band adjusting lever, reaction lever and pin (Fig. 41).

(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. 42).

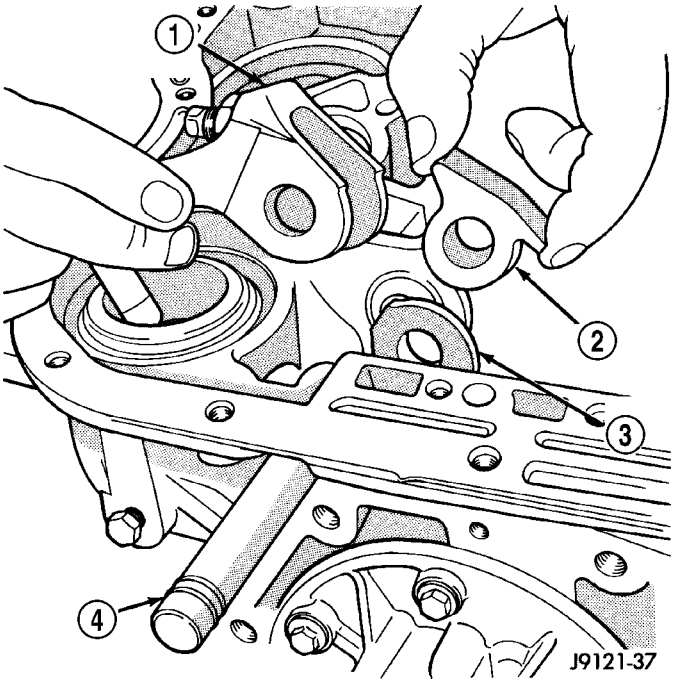


Fig. 41 Rear Band Levers And Pins

1 - REAR BAND ADJUSTING LEVER
2 - REACTION LEVER
3 - BAND LINK
4 - REAR BAND REACTION PIN

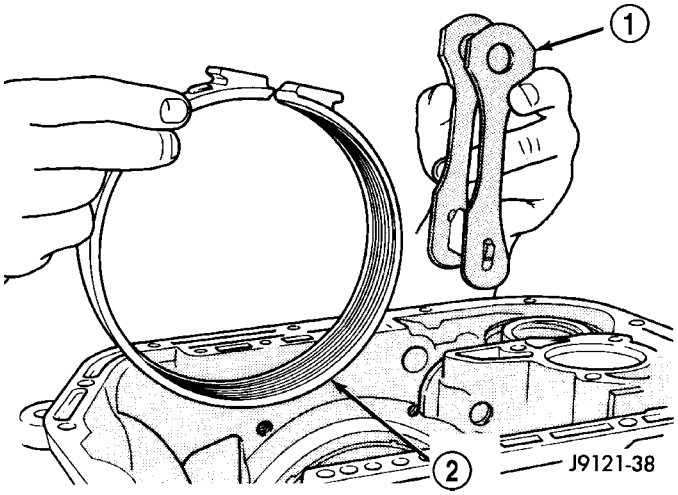


Fig. 42 Rear Band And Link

1 - BAND LINK
2 - REAR BAND

(32) Compress front servo rod guide with large C-clamp and Tool C-4470, or Compressor Tool C-3422-B (Fig. 43). Compress guide only enough to permit snap-ring removal (about 1/8 in.).

(33) Remove servo piston snap-ring (Fig. 43). 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.

(35) Compress rear servo piston with C-clamp and Tool C-4470, or Valve Spring Compressor C-3422-B (Fig. 44). Compress servo spring retainer only enough to permit snap-ring removal.

(36) Remove servo piston snap-ring (Fig. 44). 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.

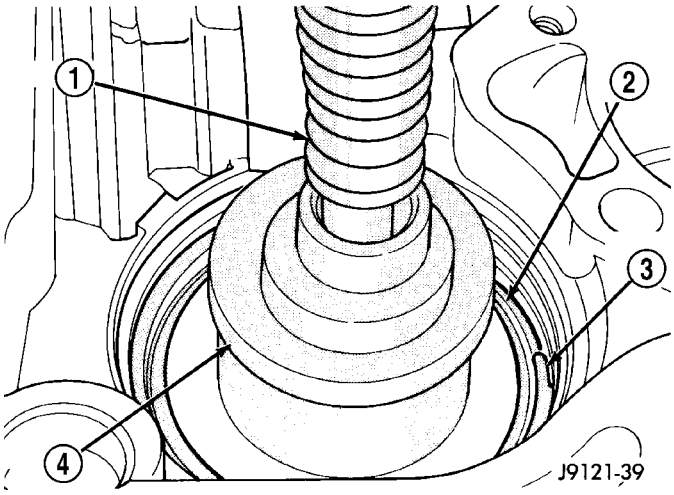


Fig. 43 Front Servo Retaining Snap-Ring

1 - C-CLAMP
2 - FRONT SERVO ROD GUIDE
3 - SNAP-RING
4 - TOOL C-4470

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.

AUTOMATIC TRANSMISSION - 46RE (Continued)

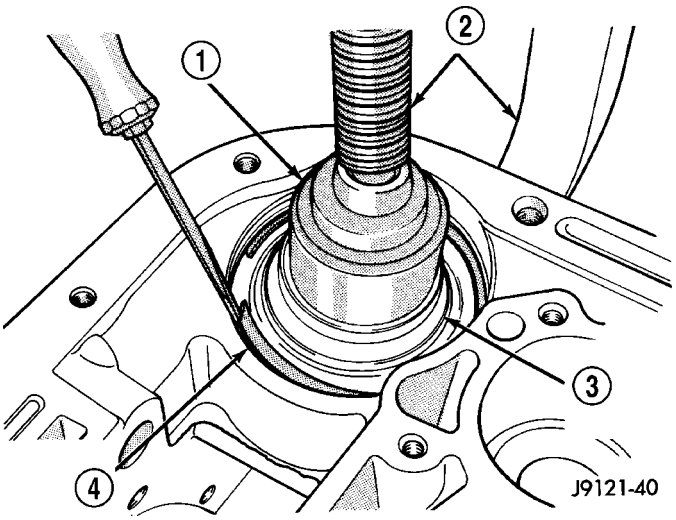


Fig. 44 Rear Servo Retaining Snap-Ring

1 - TOOL C-4470
2 - C-CLAMP
3 - REAR SERVO SPRING RETAINER
4 - RETAINER SNAP-RING

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, Automatic Transmission fluid during overhaul and assembly. Use petroleum jelly 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, Automatic Transmission fluid, 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. 45).

(3) Install rear servo spring and retainer in case bore (Fig. 46). 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. 47).

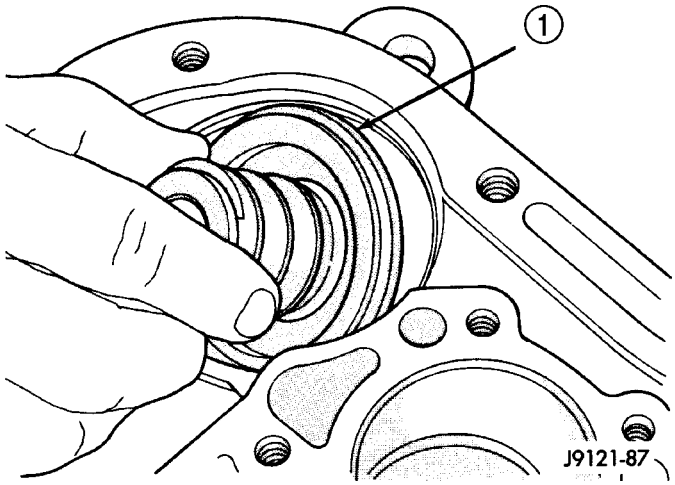


Fig. 45 Rear Servo Piston

1 - REAR SERVO PISTON

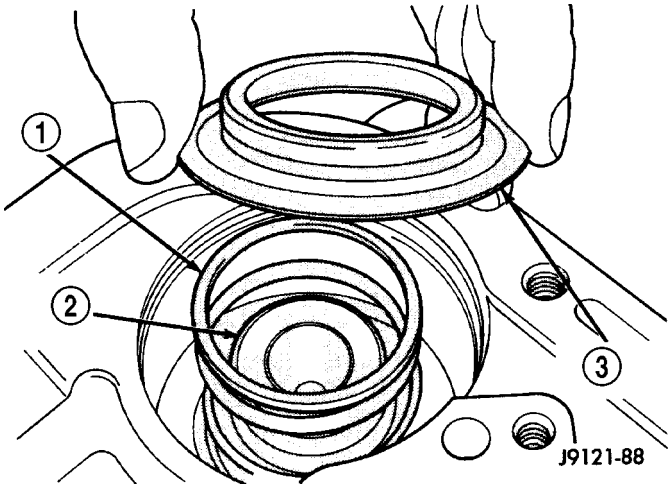


Fig. 46 Rear Servo Piston Spring And Retainer

1 - PISTON SPRING
2 - REAR SERVO PISTON
3 - SPRING RETAINER

(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. 48). Rotate piston into bore at same time. Rock piston slightly to ease piston ring past snap-ring groove and into bore.

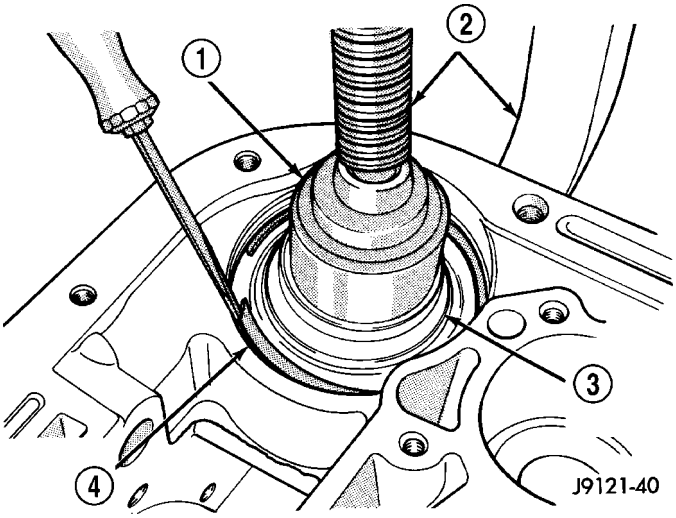


Fig. 47 Rear Servo Snap-Ring

1 - TOOL C-4470
2 - C-CLAMP
3 - REAR SERVO SPRING RETAINER
4 - RETAINER SNAP-RING

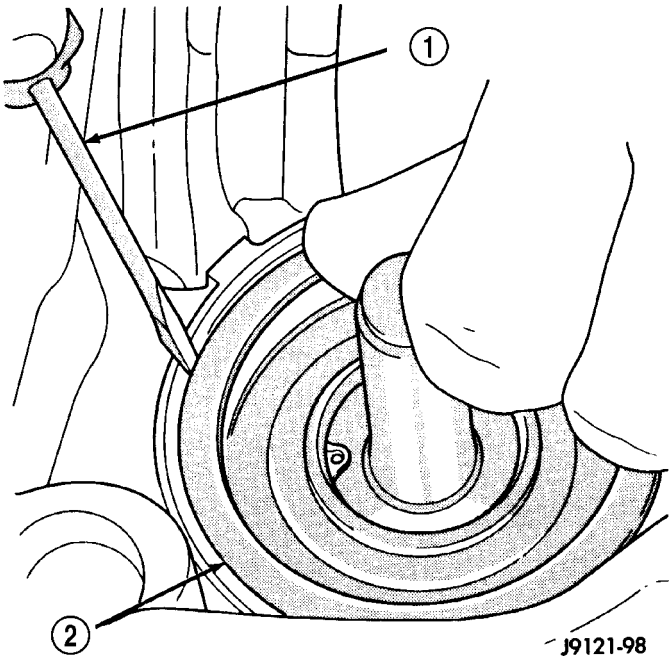


Fig. 48 Front Servo Piston

1 - USE SUITABLE TOOL TO HELP SEAT PISTON RING
2 - FRONT SERVO PISTON

AUTOMATIC TRANSMISSION - 46RE (Continued)

(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. 49).

(b) Slowly compress rod guide while simultaneously easing seal ring into bore with suitable tool.

(9) Install rod guide snap-ring (Fig. 49).

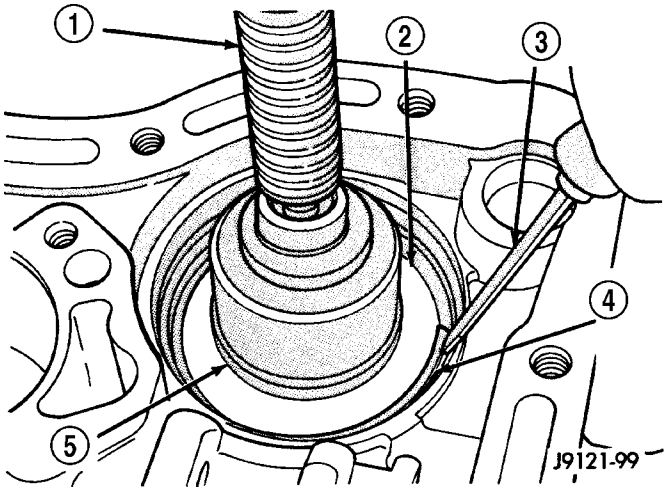


Fig. 49 Front Servo Rod Guide And Snap-Ring

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.

(2) Position rear band and link in case (Fig. 50).

(3) Install low-reverse drum (Fig. 51). Slide drum through rear band, onto piston retainer hub and into engagement with overrunning clutch and race.

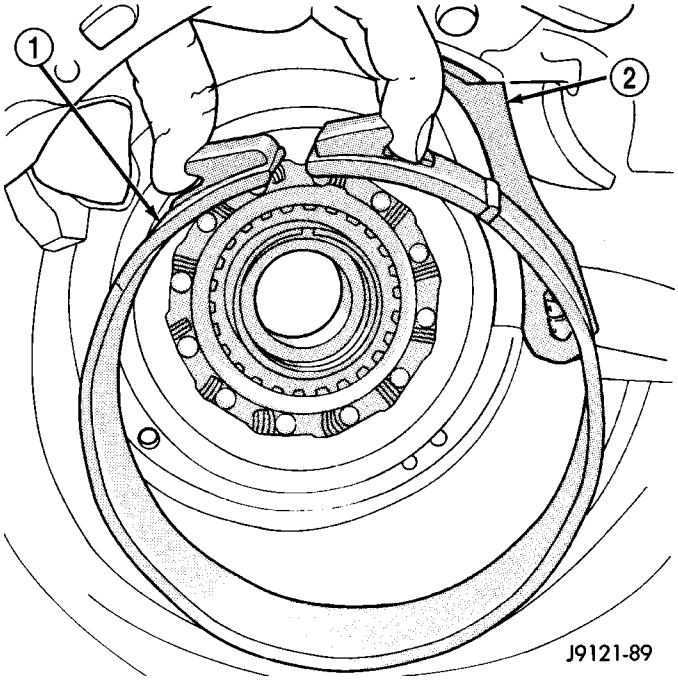


Fig. 50 Rear Band And Link

1 - REAR BAND
2 - BAND LINK

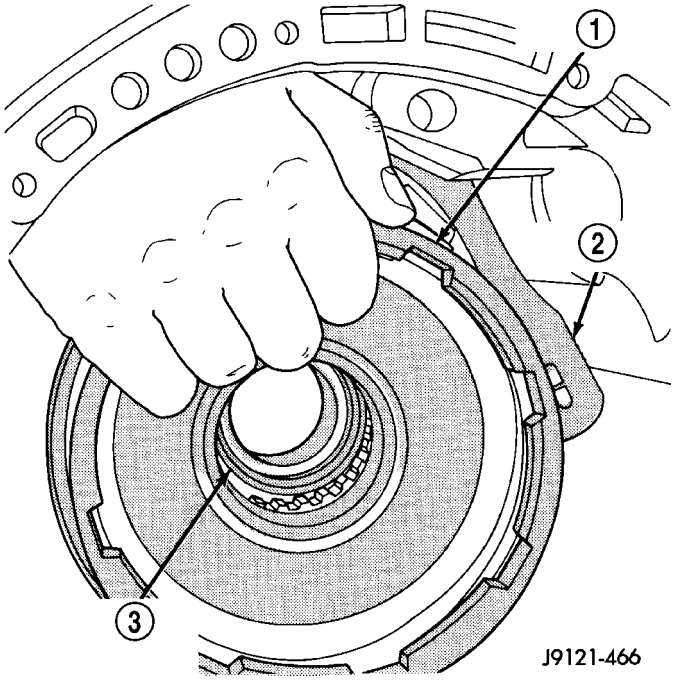


Fig. 51 Low-Reverse Drum

1 - LOW-REVERSE DRUM
2 - REAR BAND LINK
3 - HUB OF OVERDRIVE PISTON RETAINER

(4) Install thrust washer in low-reverse drum spotface (Fig. 52). Use petroleum jelly to hold washer in place.

(5) Install snap-ring that secures low-reverse drum to piston retainer hub (Fig. 52).

(6) Insert band reaction pin part way into case and band link (Fig. 53).

(7) Install rear band adjusting lever, reaction lever, and strut (Fig. 54). Be sure levers and strut are aligned and engaged before seating band reaction pin in case.

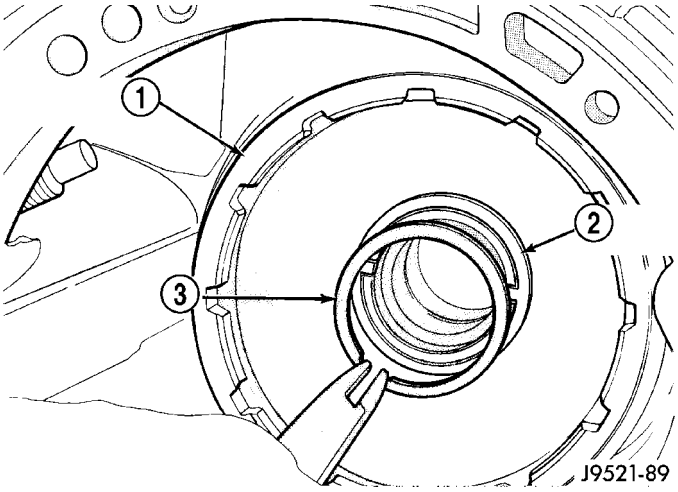


Fig. 52 Low-Reverse Drum Snap-Ring

1 - LOW-REVERSE DRUM
2 - TABBED WASHER
3 - SNAP-RING

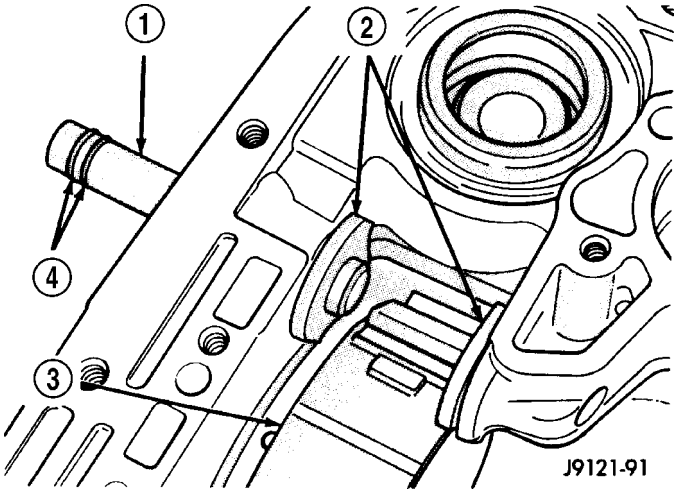


Fig. 53 Rear Band Reaction Pin

1 - REACTION PIN
2 - BAND LINK
3 - REAR BAND
4 - O-RINGS

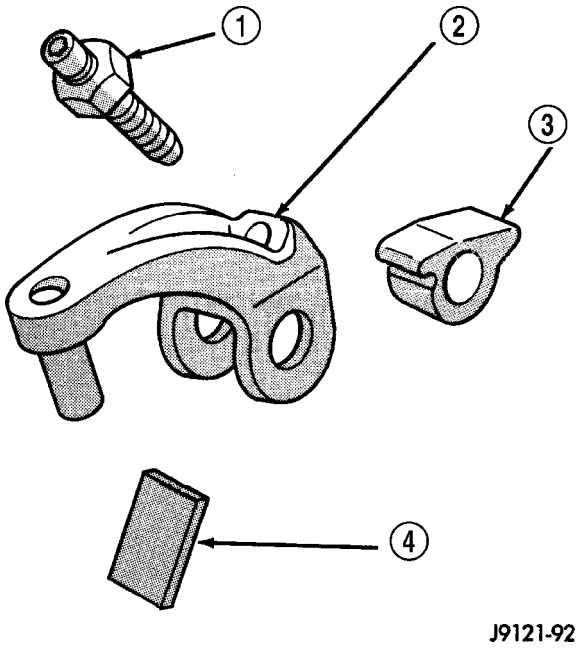


Fig. 54 Rear Band Levers And Strut

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. 55). Support shaft carefully during installation. Do not allow shaft bearing/bushing surfaces to become nicked or scratched.

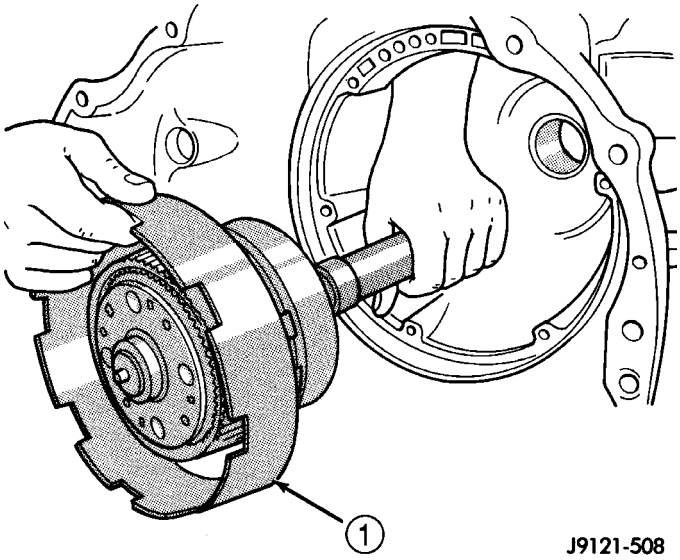


Fig. 55 Intermediate Shaft And Planetary Geartrain

1 - INTERMEDIATE SHAFT AND PLANETARY GEARTRAIN ASSEMBLY

AUTOMATIC TRANSMISSION - 46RE (Continued)

(3) Lubricate intermediate shaft thrust plate with petroleum jelly and install plate on shaft pilot hub (Fig. 56).

(4) Check input shaft front seal rings, fiber thrust washer and rear seal ring (Fig. 57). Be ends of rear seal ring are hooked together and the square cut ends of front seal rings are firmly seated against each other. Lubricate seal rings with petroleum jelly after checking them.

(5) Assemble front and rear clutches (Fig. 58). Align lugs on front clutch discs. Mount front clutch on rear clutch. Turn front clutch retainer back and forth until front clutch discs are fully seated on rear clutch splined hub.

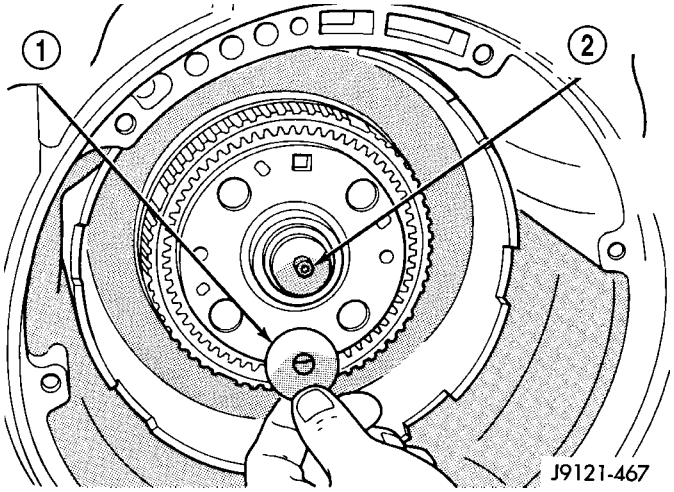


Fig. 56 Intermediate Shaft Thrust Plate

1 - SHAFT THRUST PLATE
2 - INTERMEDIATE SHAFT PILOT HUB

(6) Install intermediate shaft thrust washer in hub of rear clutch retainer (Fig. 59). Use petroleum jelly to hold washer in place. Position washer so grooves are facing outward. Washer only fits one way in clutch retainer hub.

(7) Place transmission case in upright position, or place blocks under front end of transmission repair stand to tilt case rearward. This makes it easier to install front/rear clutch assembly.

(8) Align discs in rear clutch. Then install and engage assembly in front planetary and driving shell (Fig. 60). 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.

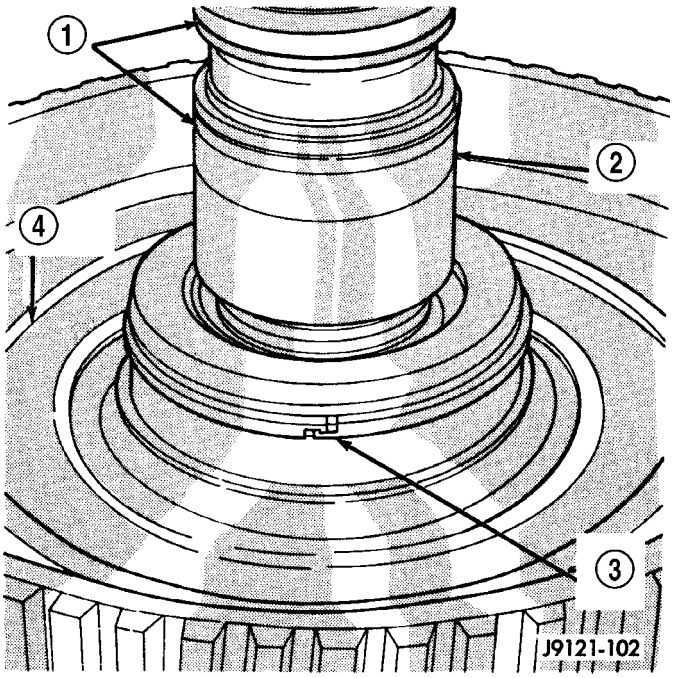


Fig. 57 Input Shaft Seal Rings And Thrust Washer

1 - TORLON® FRONT SEAL RINGS
2 - INPUT SHAFT
3 - REAR SEAL RING
4 - THRUST WASHER

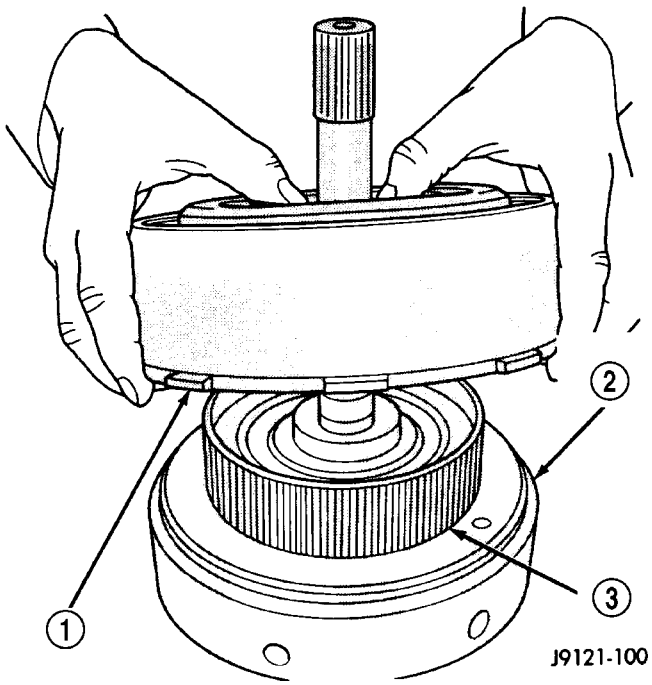


Fig. 58 Assembling Front And Rear Clutches

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. 61).

(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.

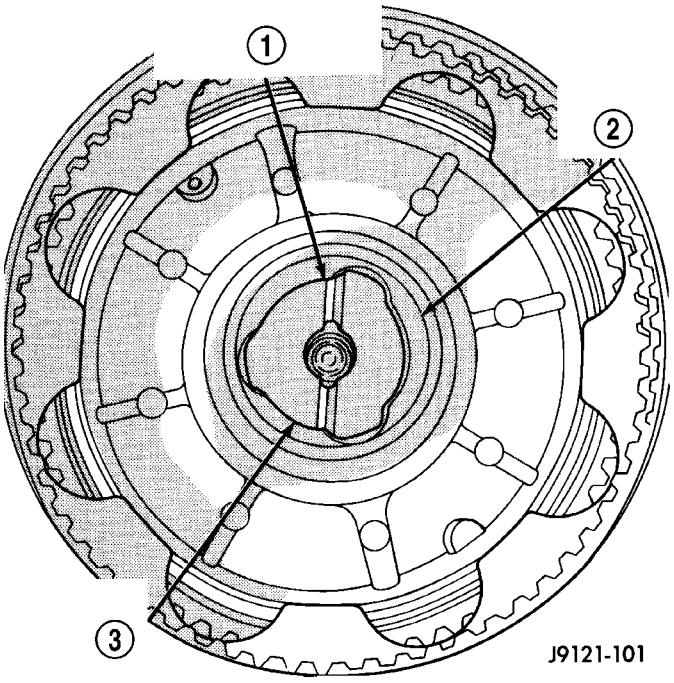


Fig. 59 Intermediate Shaft Thrust Washer

1 - BE SURE WASHER GROOVES FACE OUT AS SHOWN
2 - REAR CLUTCH RETAINER HUB
3 - THRUST WASHER

OIL PUMP

(1) Install oil pump Pilot Studs C-3288-B in case (Fig. 62).

(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. 62).

(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. 63).

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. 64). Use extra petroleum jelly to hold washer in place if necessary.

(5) Lubricate oil pump seals with petroleum Mopar® ATF +4.

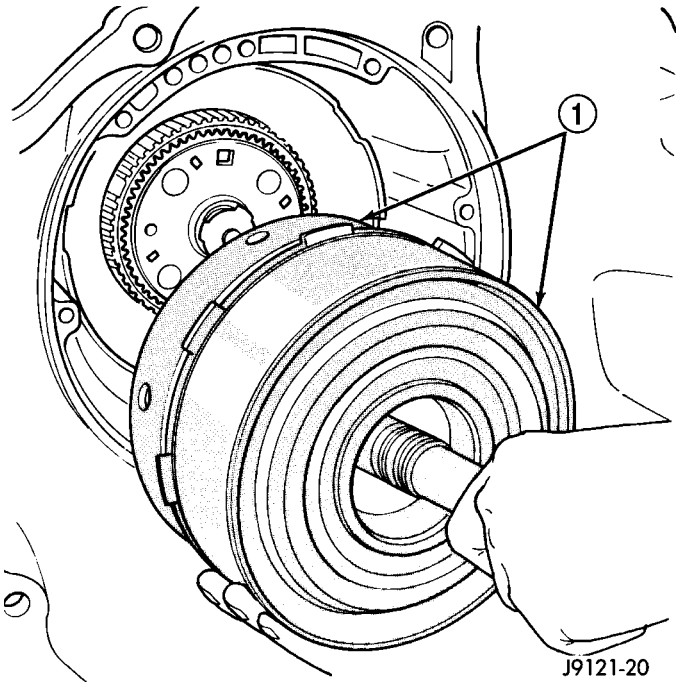


Fig. 60 Front/Rear Clutch Assemblies

1 - FRONT AND REAR CLUTCH ASSEMBLIES

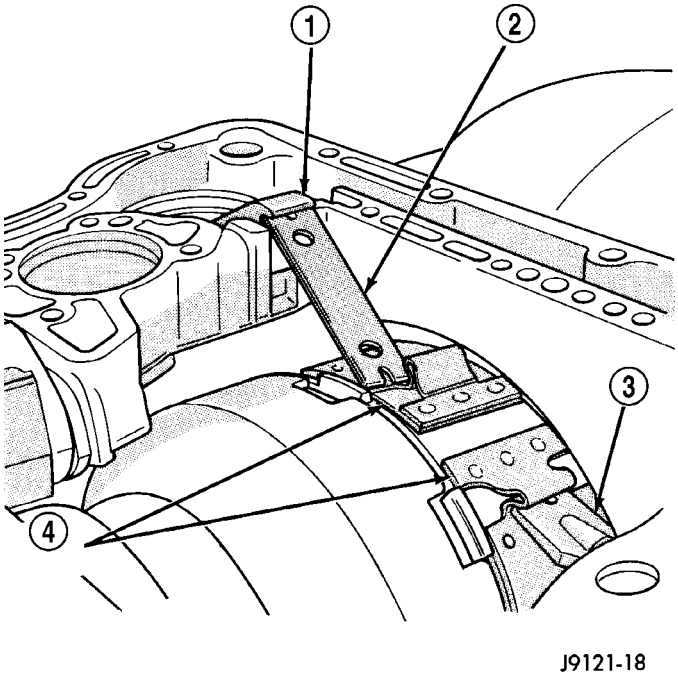


Fig. 61 Front Band And Linkage

1 - LEVER
2 - STRUT
3 - ANCHOR
4 - FRONT BAND

AUTOMATIC TRANSMISSION - 46RE (Continued)

(6) Mount oil pump on pilot studs and slide pump into case opening (Fig. 65). 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.

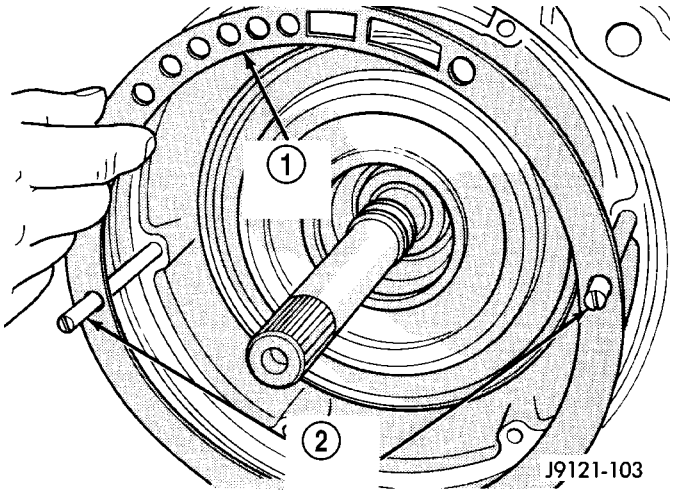


Fig. 62 Oil Pump Gasket And Pilot Studs

1 - OIL PUMP GASKET
2 - PILOT STUDS C-3288-B

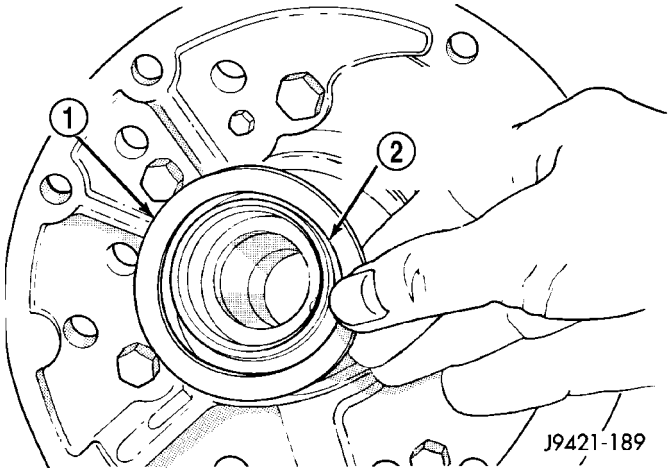


Fig. 63 Reaction Shaft Thrust Washer

1 - THRUST WASHER
2 - CHAMFERED SIDE OF WASHER BORE GOES TOWARD PUMP

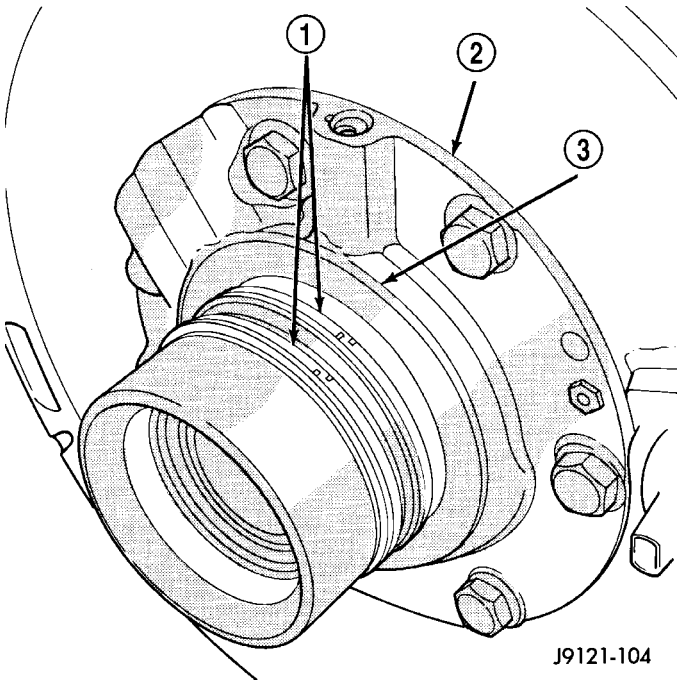


Fig. 64 Reaction Shaft Seal Ring And Thrust Washer

1 - SEAL RINGS
2 - REACTION SHAFT SUPPORT
3 - THRUST WASHER (FIBER)

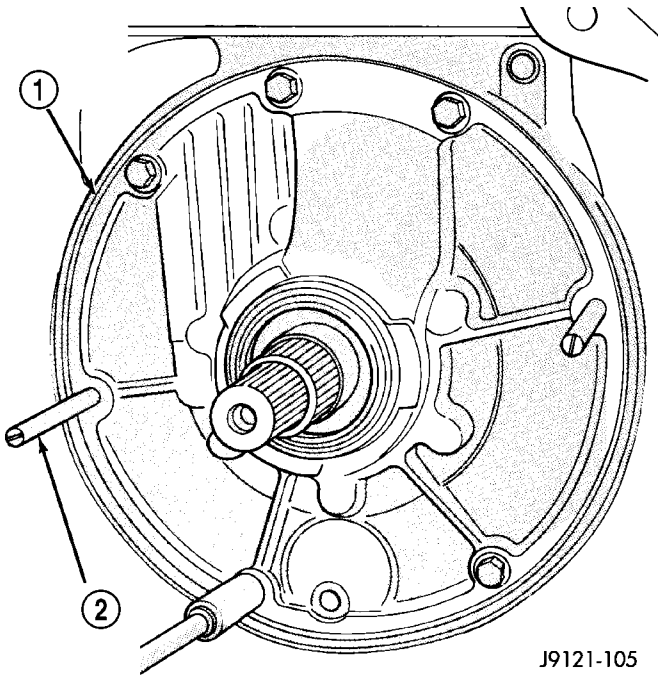


Fig. 65 Oil Pump

1 - SEAT OIL PUMP IN CASE BY HAND
2 - REMOVE PILOT STUDS WHEN PUMP IS SEATED

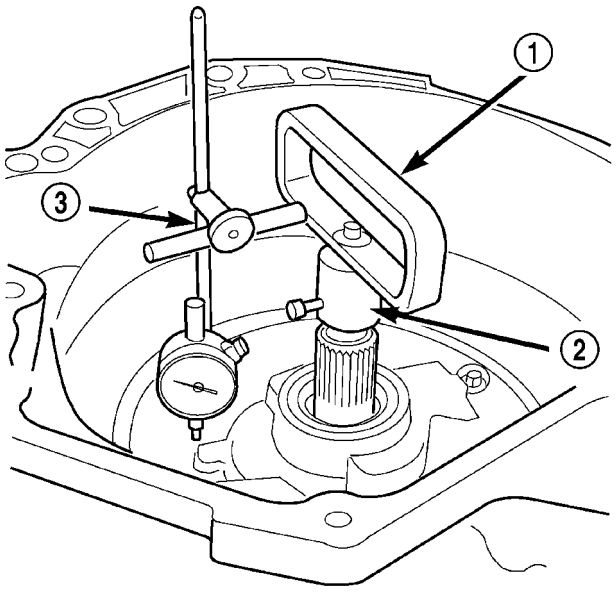
INPUT SHAFT END PLAY CHECK

NOTE: Overdrive unit must be installed in order to correctly measure the input shaft end-play.

(1) Measure input shaft end play (Fig. 66).

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.



80c070b4

Fig. 66 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. 67).

(2) Install new valve body manual shaft seal in case (Fig. 68). 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.

(3) 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.**.

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.

(4) Install new filter on valve body. Tighten filter screws to 4 N·m (35 in. lbs.).

(5) Install the transmission range sensor.

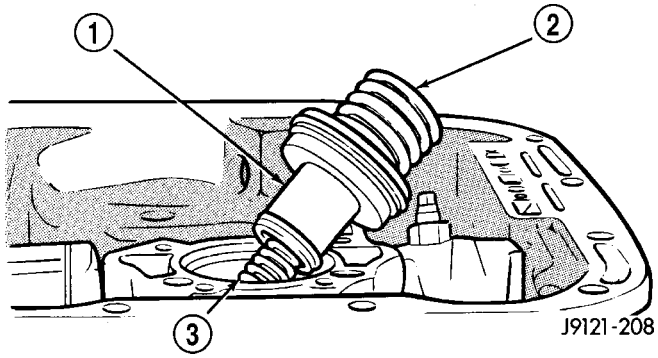


Fig. 67 Accumulator Piston And Springs

1 - ACCUMULATOR PISTON
2 - OUTER SPRING
3 - INNER SPRING

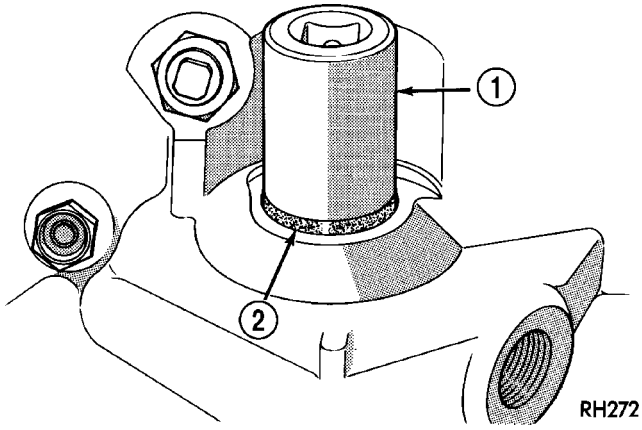


Fig. 68 Manual Lever Shaft Seal

1 - 15/16'' SOCKET
2 - SEAL

AUTOMATIC TRANSMISSION - 46RE (Continued)

CAUTION: If the condition of the transmission before the overhaul procedure caused excessive metallic or fiber contamination in the fluid, replace the torque converter. Fluid contamination and transmission failure can result if not done.

(6) Install torque converter. Use C-clamp or metal strap to hold converter in place for installation.

BAND ADJUSTMENT AND FINAL

(1) Adjust front and rear bands as follows:

(a) Loosen locknut on each band adjusting screw 4-5 turns.

(b) Tighten both adjusting screws to 8 N·m (72 in. lbs.).

(c) Back off front band adjusting screw 2-7/8 turns.

(d) Back off rear band adjusting screw 2 turns.

(e) Hold each adjusting screw in position and tighten locknut to 34 N·m (25 ft. lbs.) torque.

(2) Install magnet in oil pan. Magnet seats on small protrusion at corner of pan.

(3) Position new oil pan gasket on case and install oil pan. Tighten pan bolts to 17 N·m (13 ft. lbs.).

(4) Install throttle valve and shift selector levers on valve body manual lever shaft.

(5) Apply small quantity of dielectric grease to terminal pins of solenoid case connector and transmission range sensor.

(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. 69). 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.

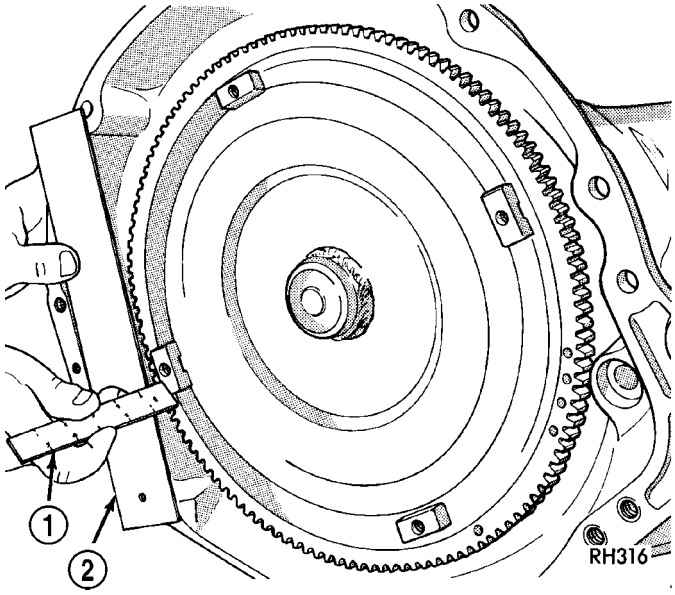


Fig. 69 Checking Converter Seating - Typical

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.

(15) Install the rear transmission crossmember.

(16) Lower transmission onto crossmember and install bolts attaching transmission mount to crossmember.

(17) Remove engine support fixture.

(18) Install the transfer case, if equipped.

(19) Install crankshaft position sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/CRANKSHAFT POSITION SENSOR - INSTALLATION)

(20) Connect gearshift cable (Fig. 70) and throttle cable to transmission.

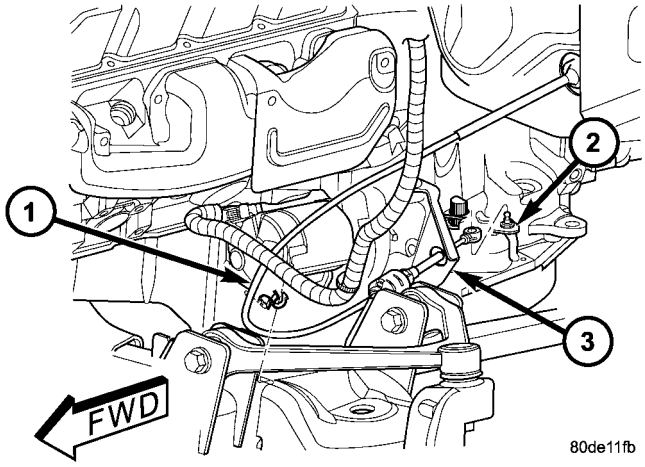


Fig. 70 Gearshift Cable At Transmission

1 - GEARSHIFT CABLE
2 - TRANSMISSION MANUAL LEVER
3 - CABLE SUPPORT BRACKET

(21) Connect wires to the transmission range sensor and transmission solenoid connector. Be sure the 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.

(22) Install torque converter-to-driveplate bolts.
(23) Install converter housing access cover.
(24) Install starter motor and cooler line bracket. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - INSTALLATION)

(25) Connect cooler lines (Fig. 71) to transmission.

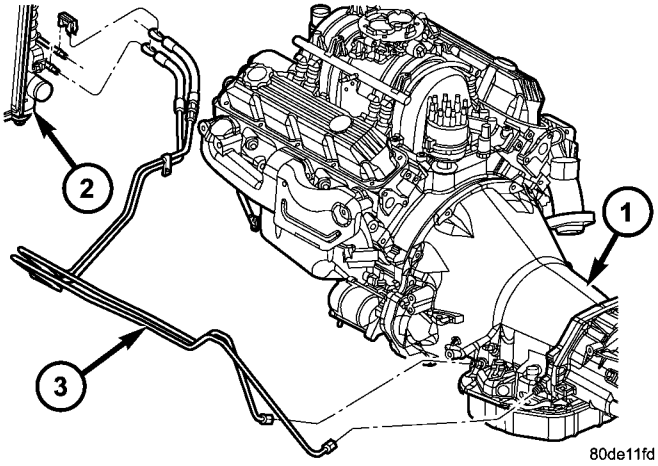


Fig. 71 Transmission Cooler Lines

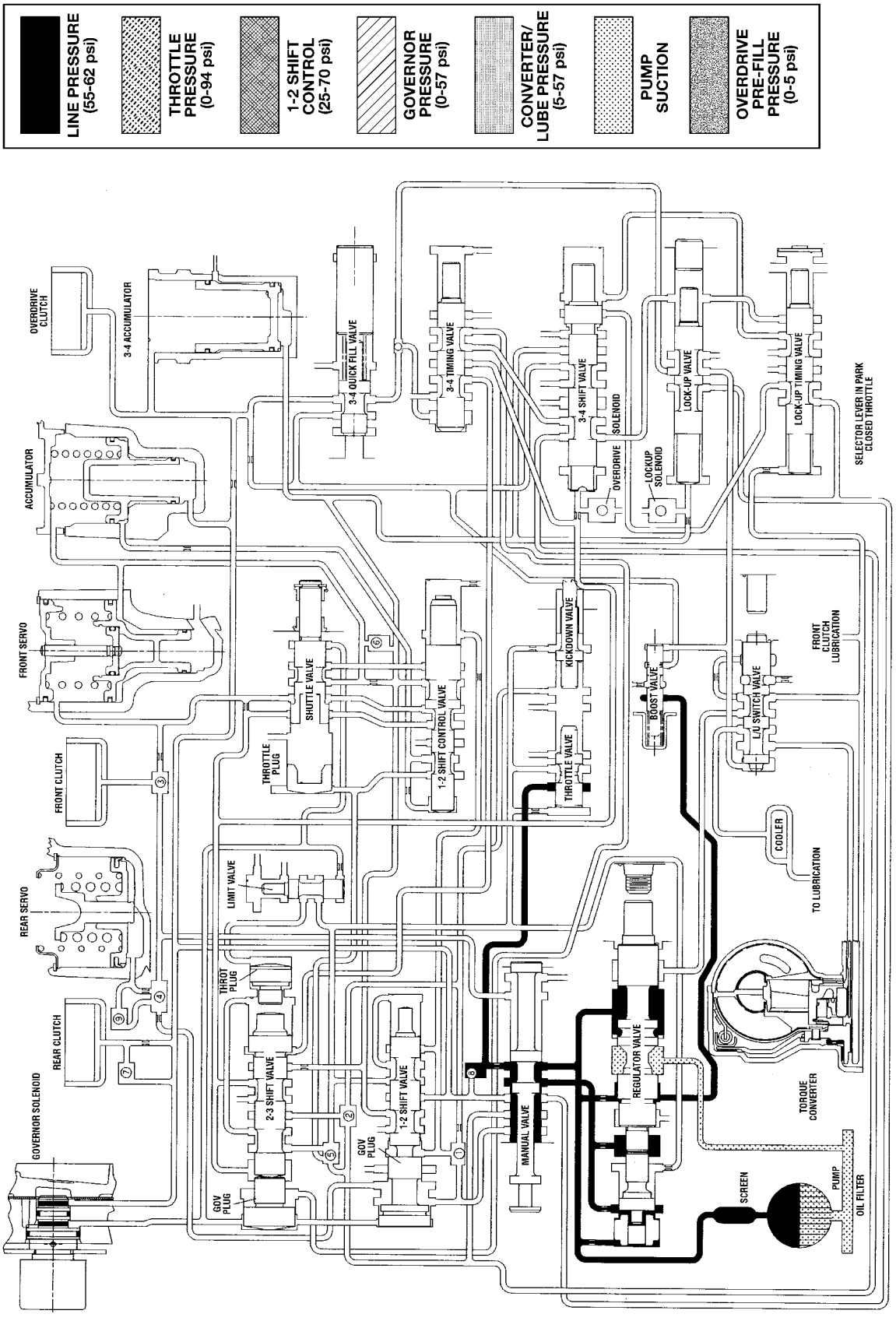
1 - TRANSMISSION
2 - RADIATOR
3 - COOLER LINES

(26) Install transmission fill tube. Install new seal on tube before installation.
(27) Install any exhaust components previously removed.
(28) Align and connect propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)
(29) Adjust gearshift cable and throttle valve cable, if necessary.
(30) Install the transfer case skid plate, if equipped.
(31) Lower vehicle.
(32) Fill transmission with Mopar® ATF +4, Automatic Transmission fluid.

AUTOMATIC TRANSMISSION - 46RE (Continued)

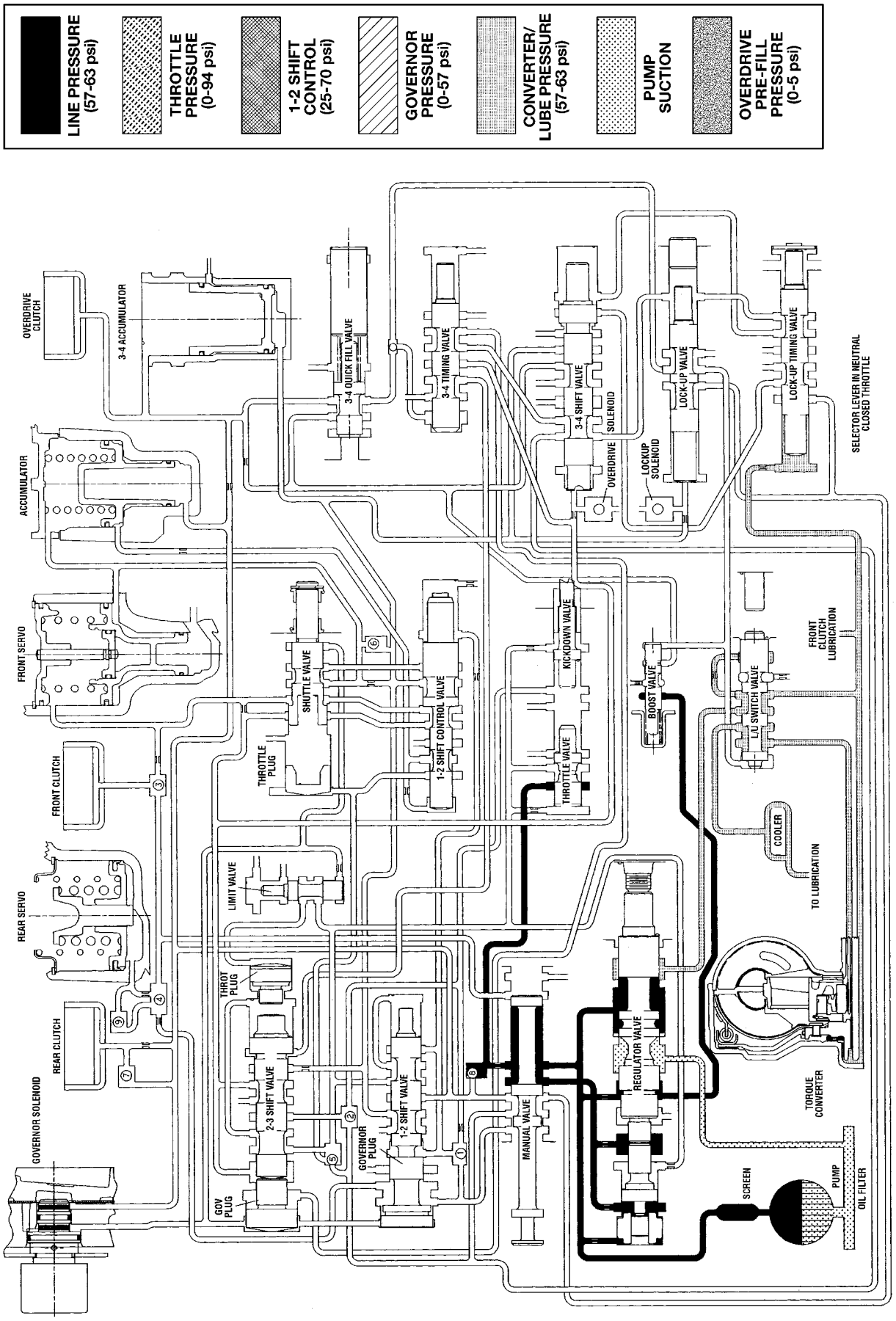
SCHEMATICS AND DIAGRAMS

HYDRAULIC SCHEMATICS



HYDRAULIC FLOW IN PARK

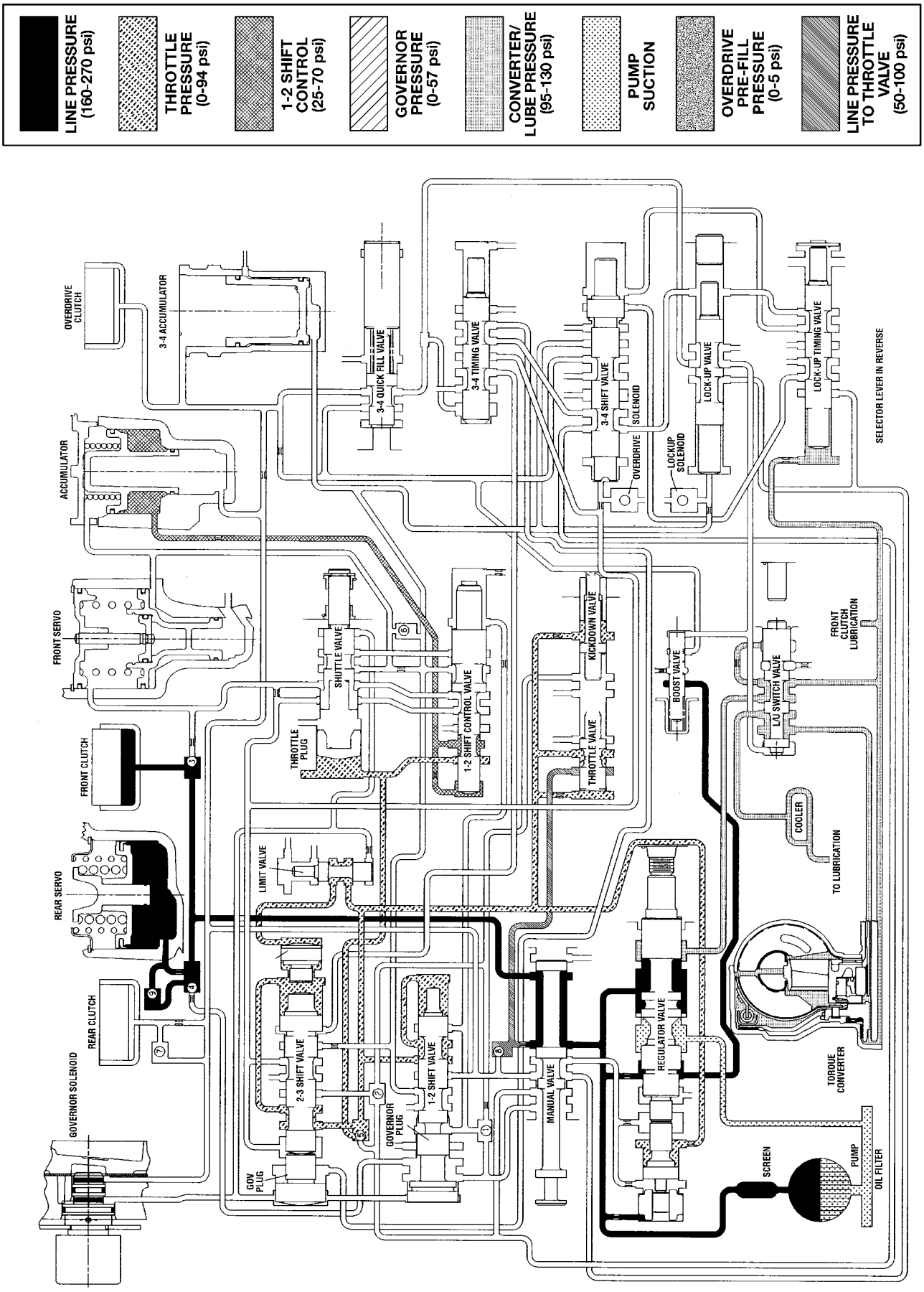
AUTOMATIC TRANSMISSION - 46RE (Continued)



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HYDRAULIC FLOW IN NEUTRAL

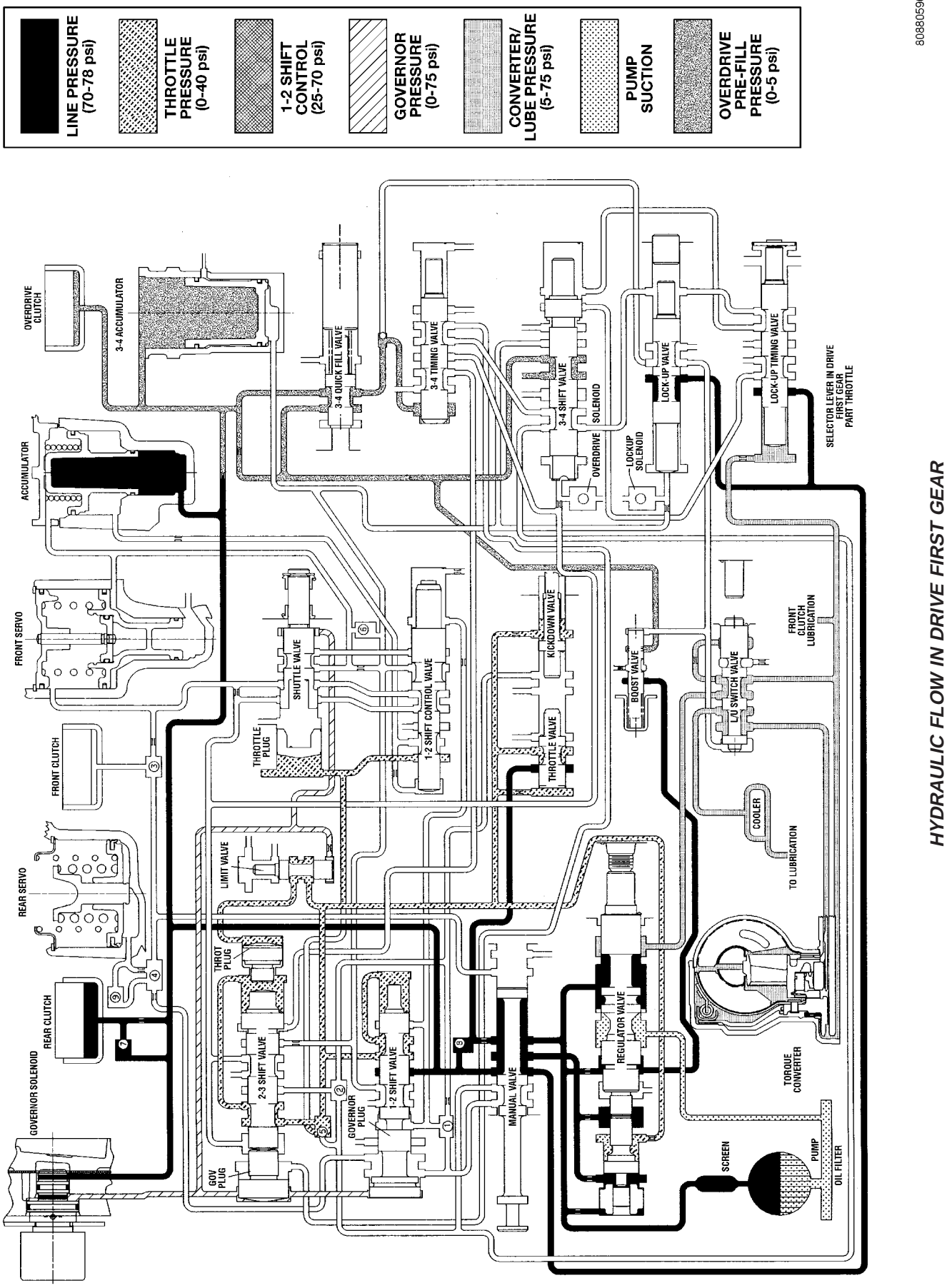
AUTOMATIC TRANSMISSION - 46RE (Continued)



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HYDRAULIC FLOW IN REVERSE

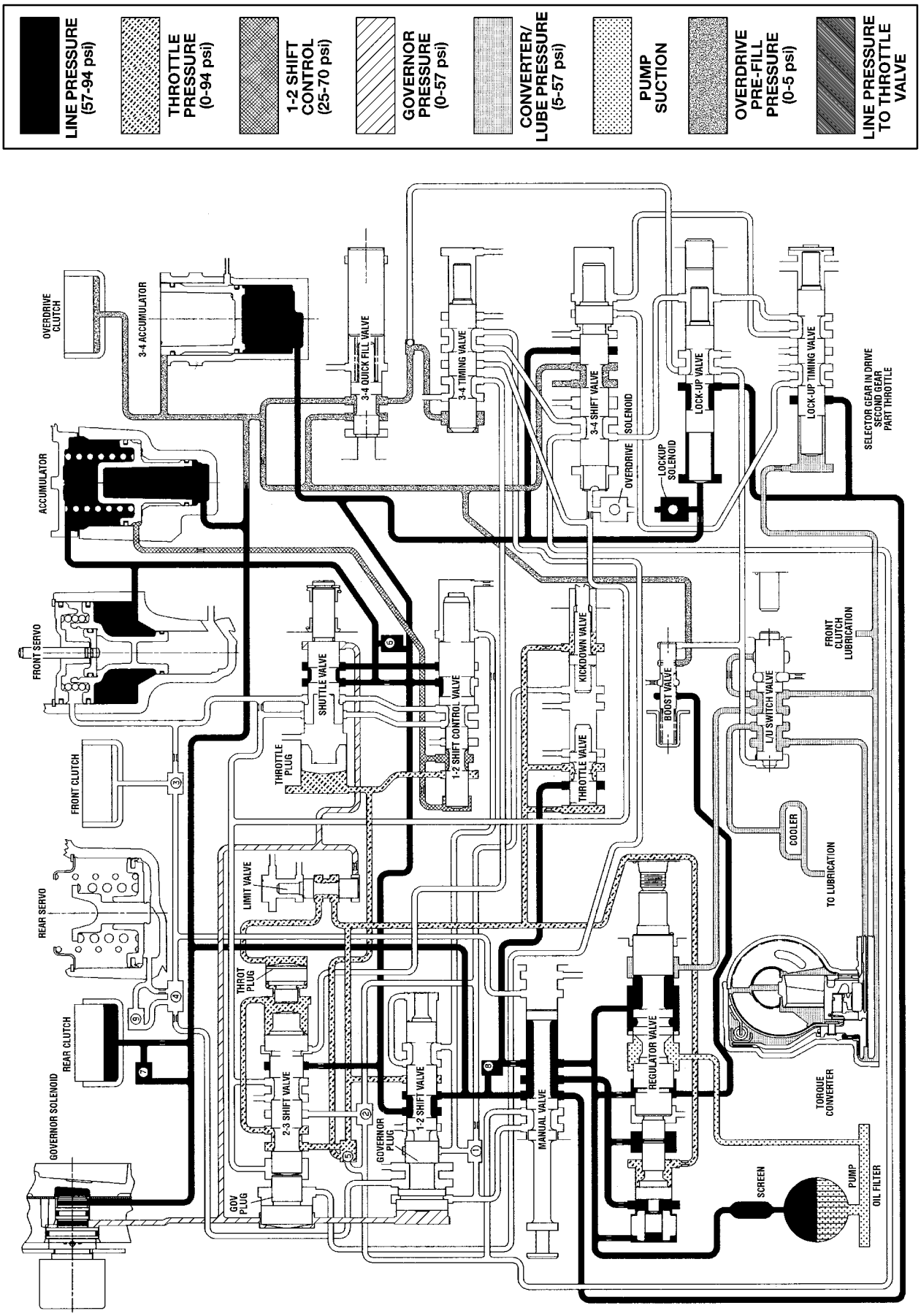
AUTOMATIC TRANSMISSION - 46RE (Continued)



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HYDRAULIC FLOW IN DRIVE FIRST GEAR

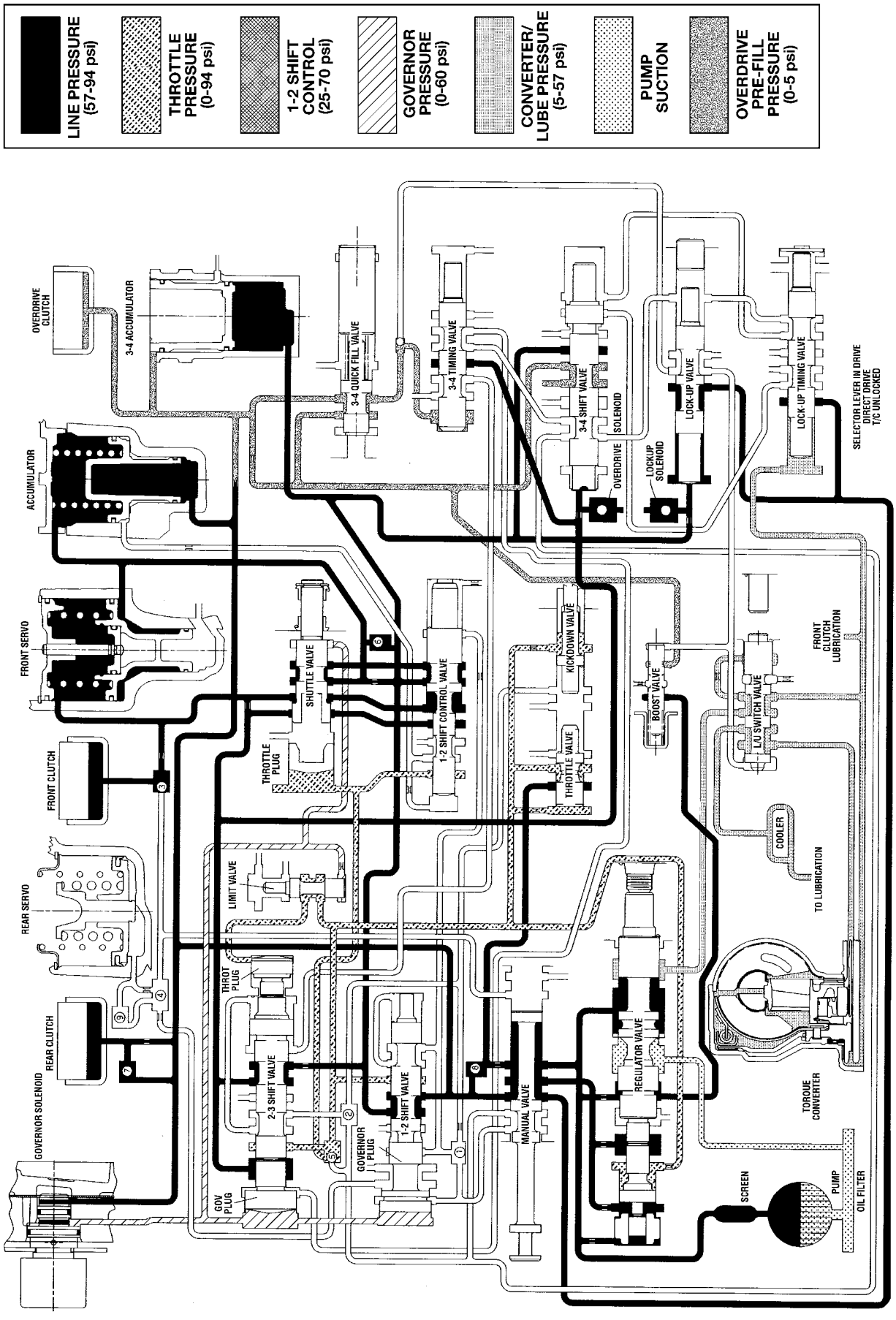
AUTOMATIC TRANSMISSION - 46RE (Continued)



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HYDRAULIC FLOW IN DRIVE SECOND GEAR

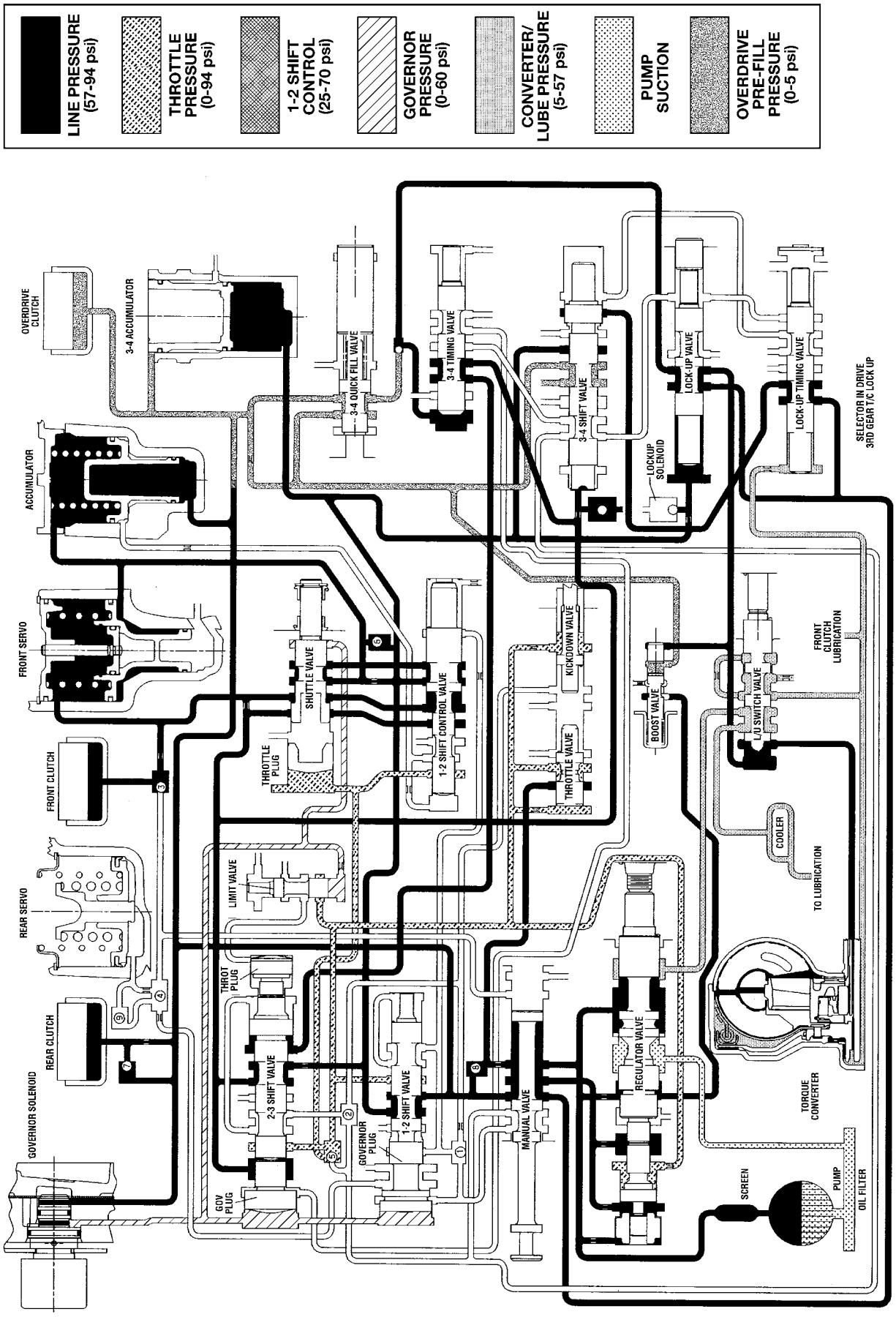
AUTOMATIC TRANSMISSION - 46RE (Continued)



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HYDRAULIC FLOW IN DRIVE THIRD GEAR (CONVERTER CLUTCH NOT APPLIED)

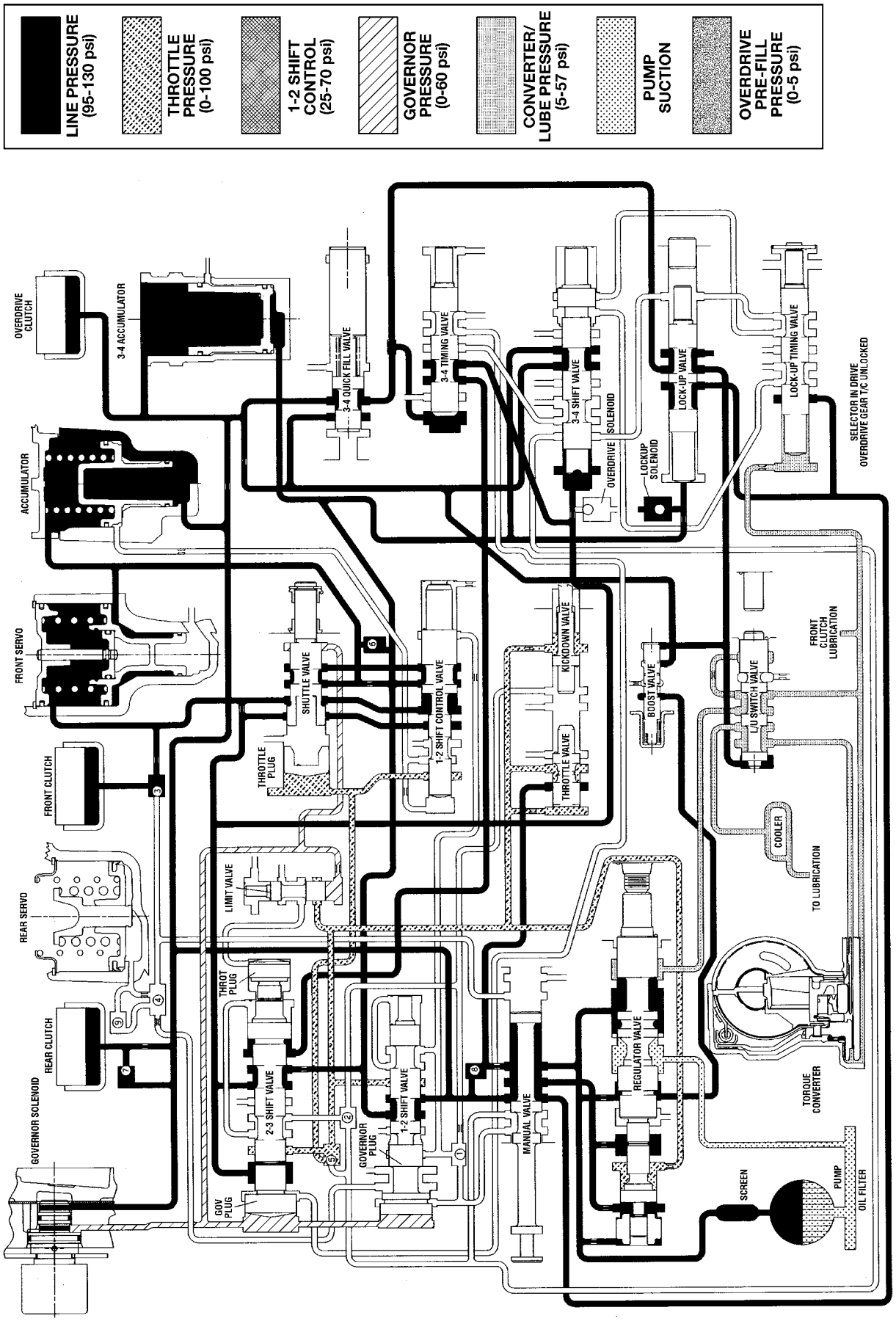
AUTOMATIC TRANSMISSION - 46RE (Continued)



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HYDRAULIC FLOW IN DRIVE THIRD GEAR (CONVERTER CLUTCH APPLIED)

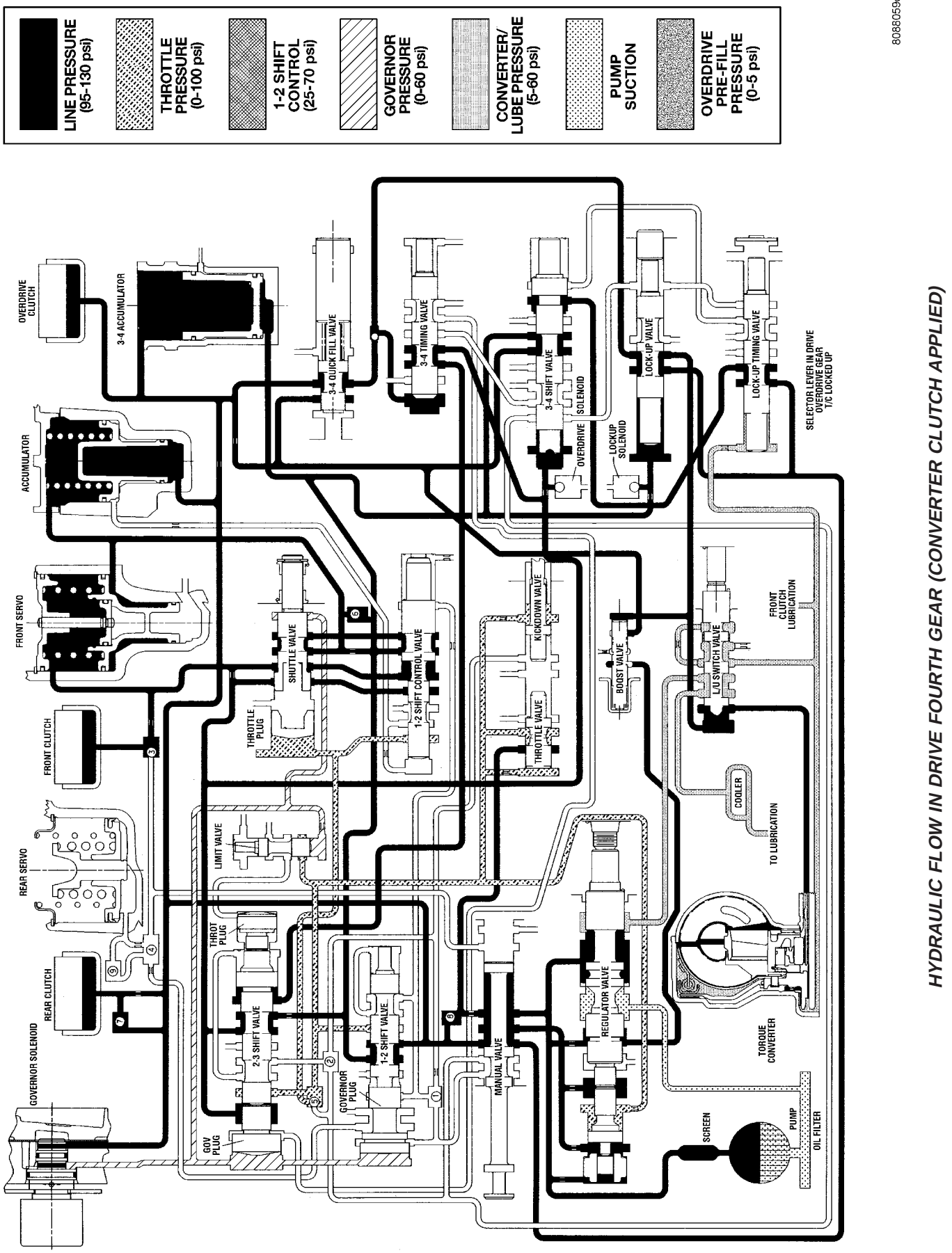
AUTOMATIC TRANSMISSION - 46RE (Continued)



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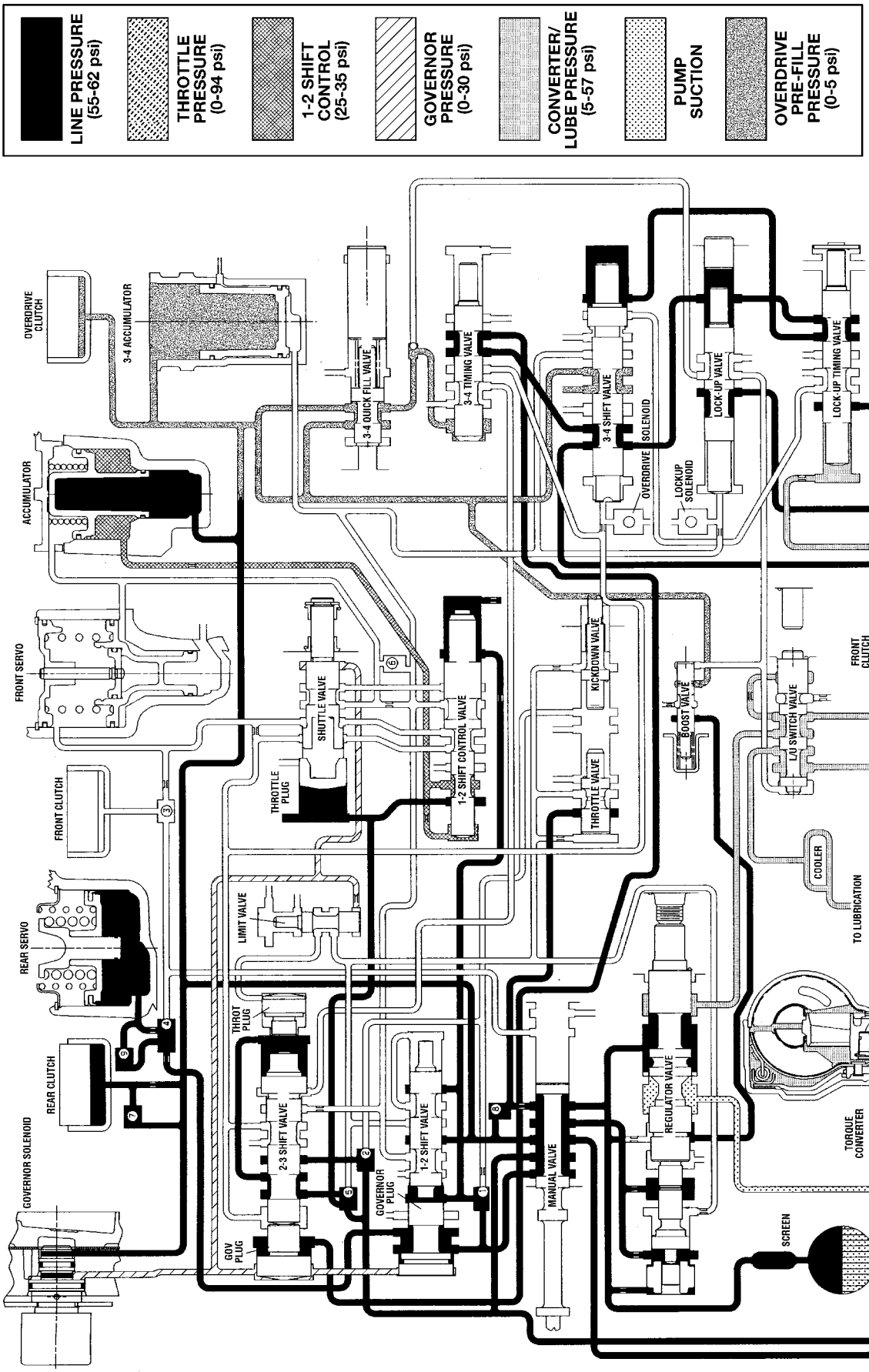
HYDRAULIC FLOW IN DRIVE FOURTH GEAR (CONVERTER CLUTCH NOT APPLIED)

AUTOMATIC TRANSMISSION - 46RE (Continued)



HYDRAULIC FLOW IN DRIVE FOURTH GEAR (CONVERTER CLUTCH APPLIED)

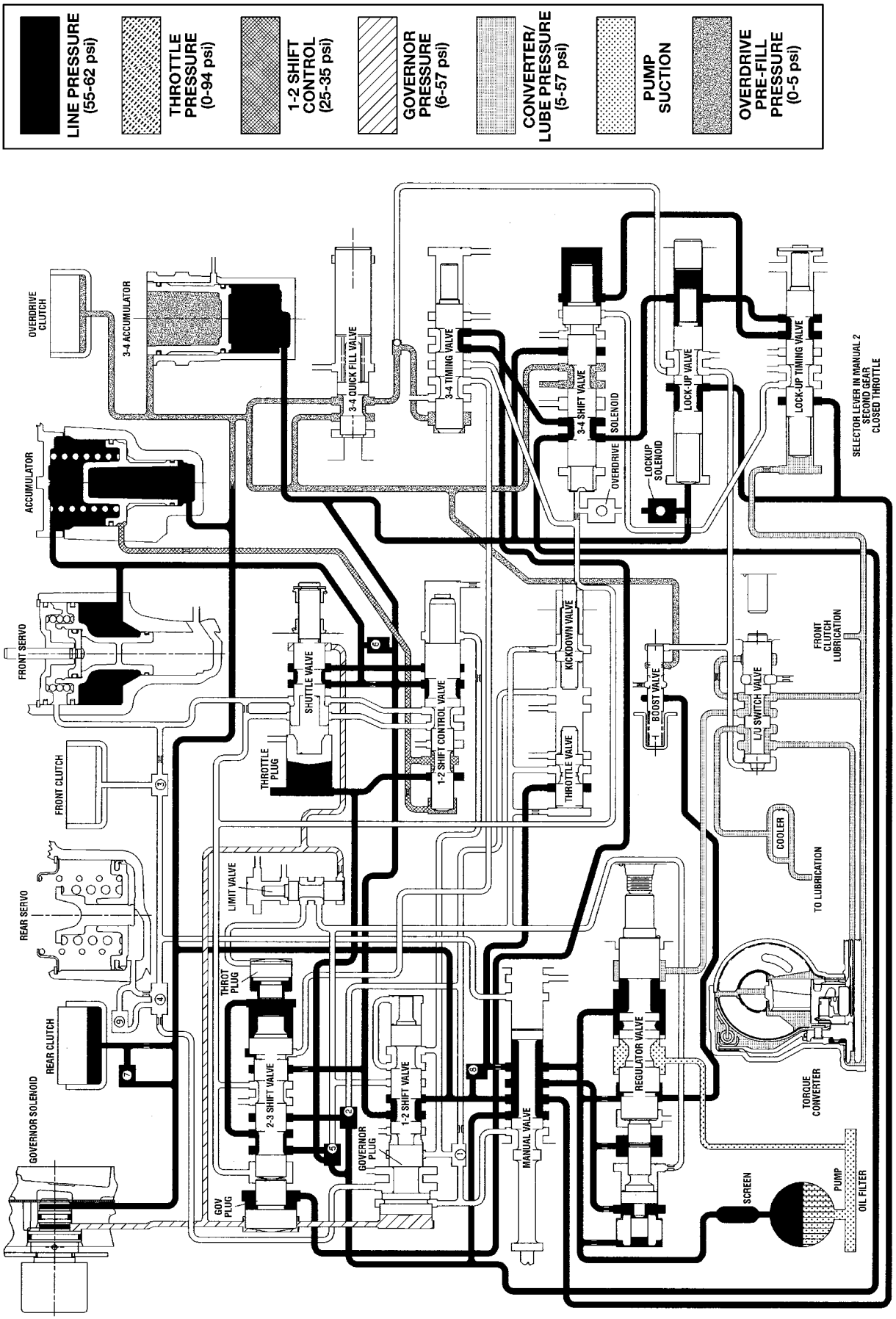
AUTOMATIC TRANSMISSION - 46RE (Continued)



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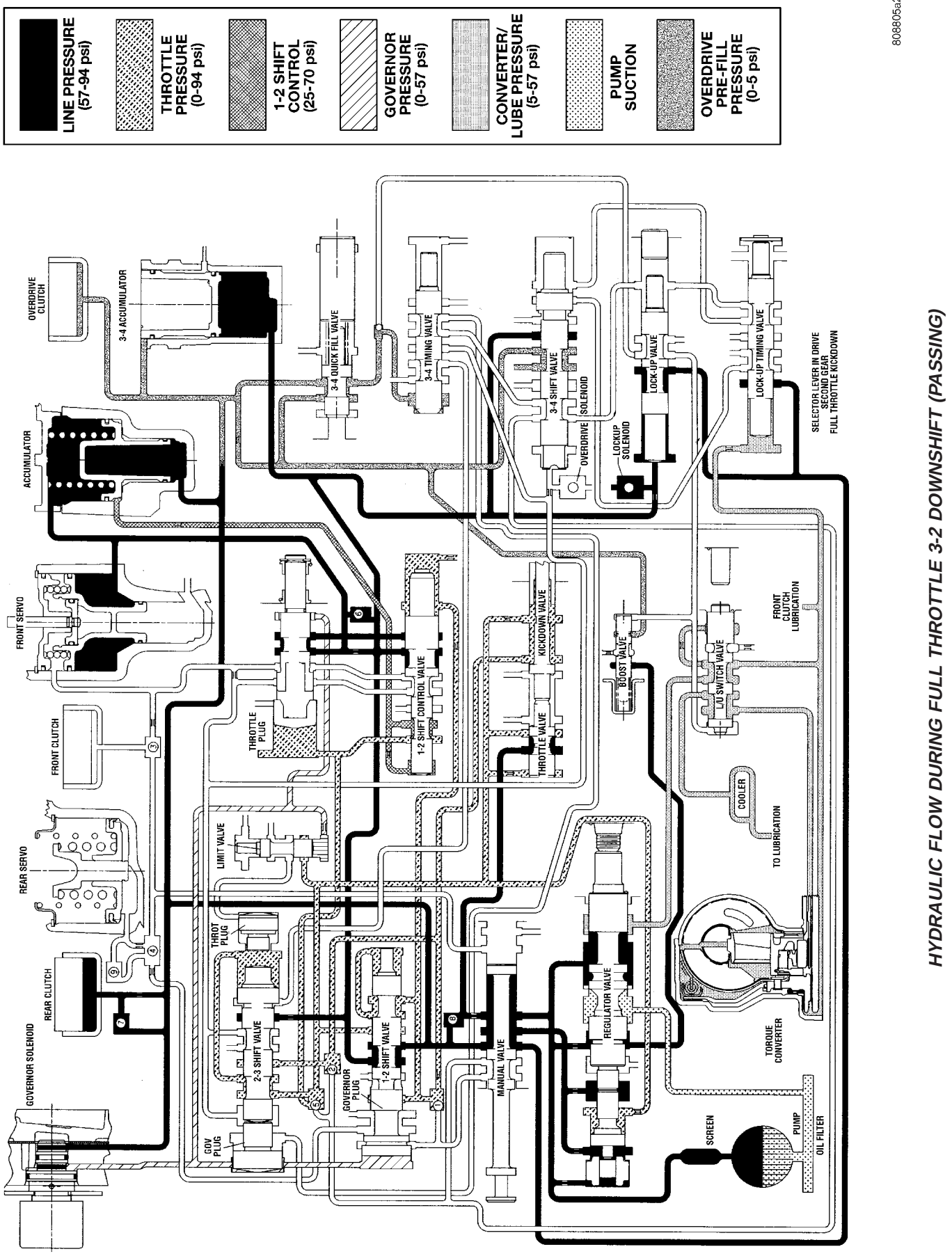
HYDRAULIC FLOW IN MANUAL LOW (1)

AUTOMATIC TRANSMISSION - 46RE (Continued)



HYDRAULIC FLOW IN MANUAL SECOND (2)

AUTOMATIC TRANSMISSION - 46RE (Continued)



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	
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 +4, Automatic Transmission Fluid	

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		

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.

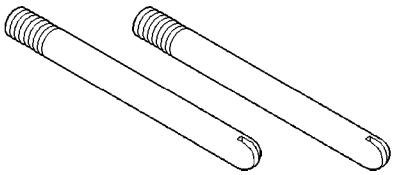
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Fitting, cooler line at trans	18	13	-
Bolt, torque convertor	31	-	270
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	17	13	-
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
Bracket, transmission range sensor mounting	34	-	300
Screw, transmission range sensor to mounting bracket	3.4	-	30

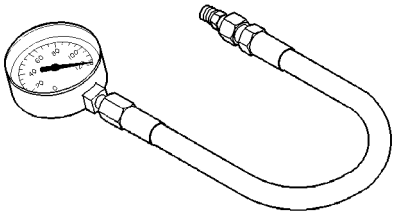
AUTOMATIC TRANSMISSION - 46RE (Continued)

SPECIAL TOOLS

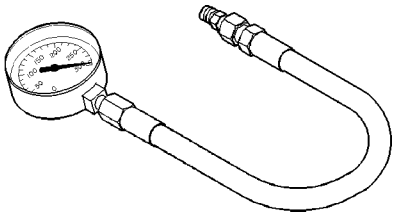
RE TRANSMISSION



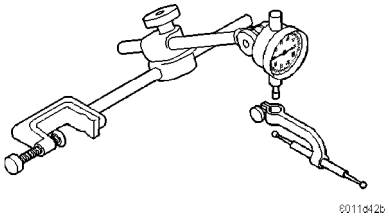
Studs, Oil Pump Pilot - C-3288-B



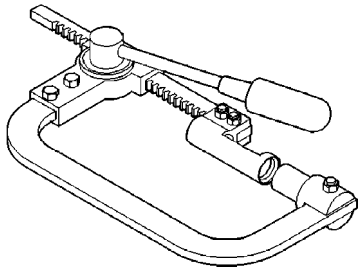
Gauge, Pressure - C-3292



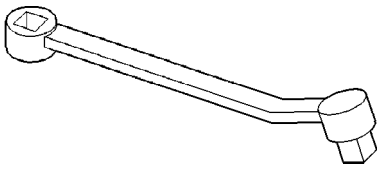
Gauge, Pressure - C-3293SP



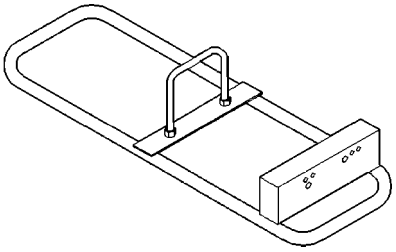
Set, Dial Indicator - C-3339



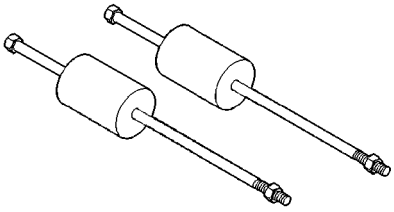
Compressor, Spring - C-3422-B



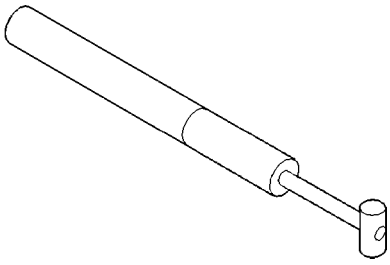
Adapter, Band Adjuster - C-3705



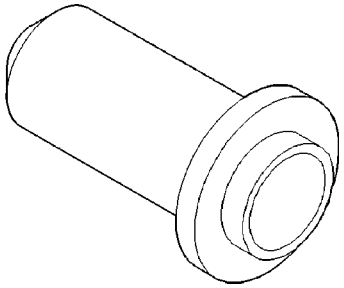
Stand, Transmission Repair - C-3750-B



Puller, Slide Hammer - C-3752

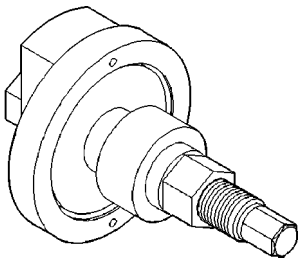


Gauge, Throttle Setting - C-3763

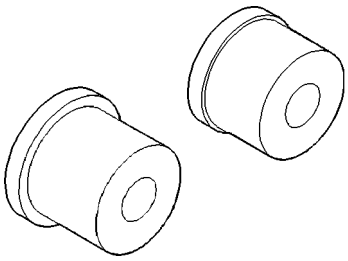


Installer, Seal - C-3860-A

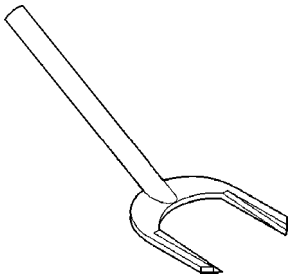
AUTOMATIC TRANSMISSION - 46RE (Continued)



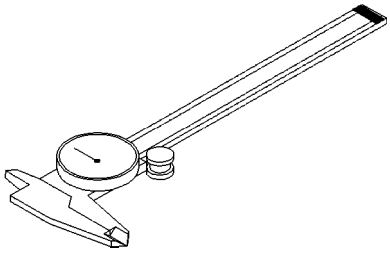
Compressor, Spring - C-3863-A



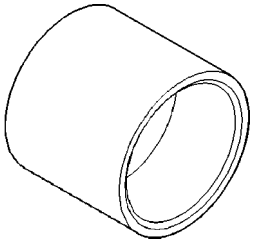
Remover/Installer, Bushing - C-4470



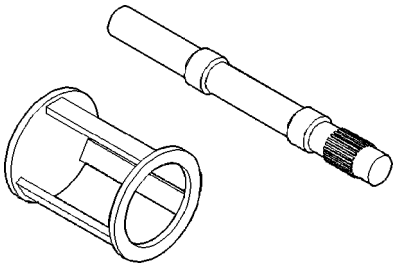
Remover, Seal - C-3985-B



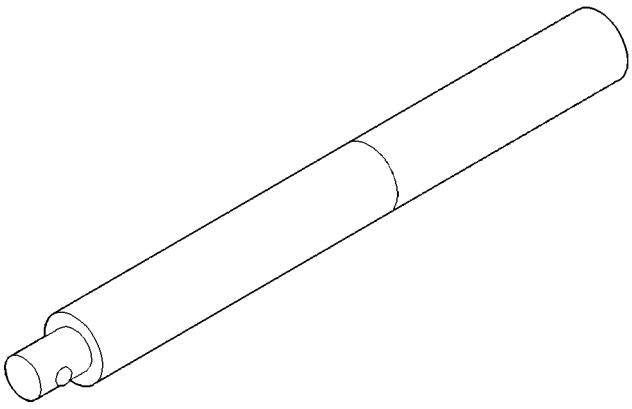
Dial Caliper - C-4962



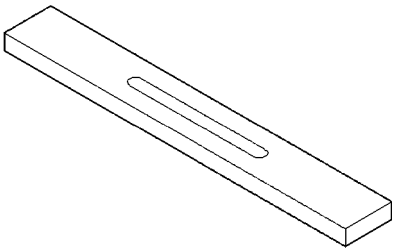
Installer, Seal - C-3995-A



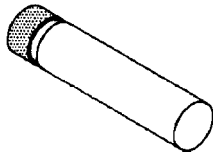
Spring Compressor and Alignment Shaft - 6227



Handle, Universal - C-4171

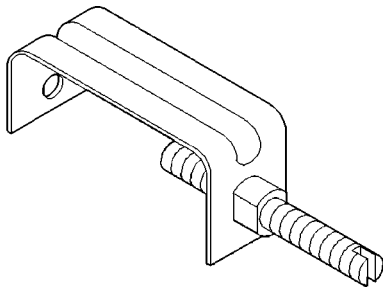


Bar, Gauge - 6311

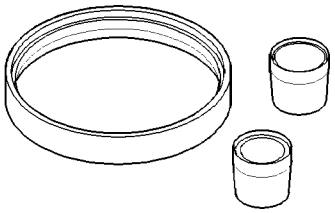


Gauge, Block - 6312

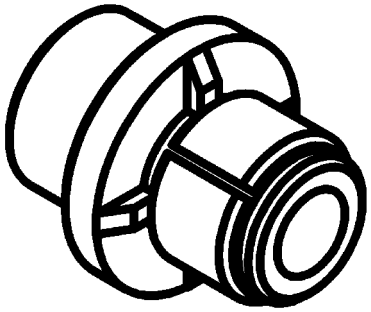
AUTOMATIC TRANSMISSION - 46RE (Continued)



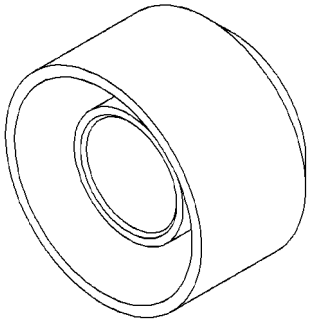
Retainer, Detent Ball and Spring - 6583



Installer, Overdrive Piston Seal - 8114



Socket, TRS Mounting Bracket - 8581



Installer, Seal - 9037

ACCUMULATOR

DESCRIPTION

The accumulator (Fig. 72) 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. 73).

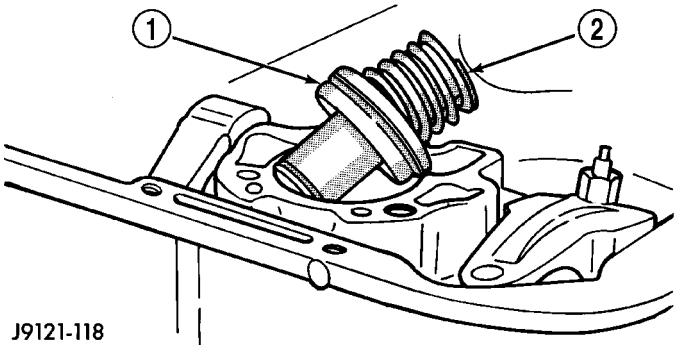


Fig. 72 Accumulator

1 - ACCUMULATOR PISTON
2 - PISTON SPRING

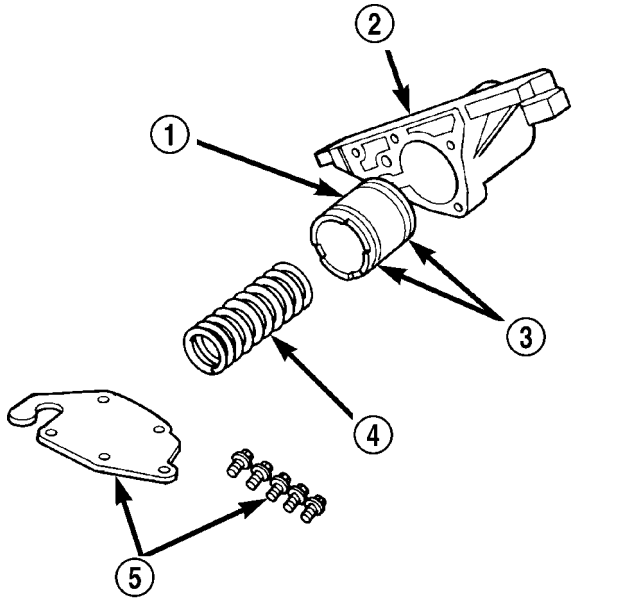


Fig. 73 3-4 Accumulator and Housing

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. 74), bottoming it against the accumulator plate. When the 1-2 upshift occurs (Fig. 75), 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.

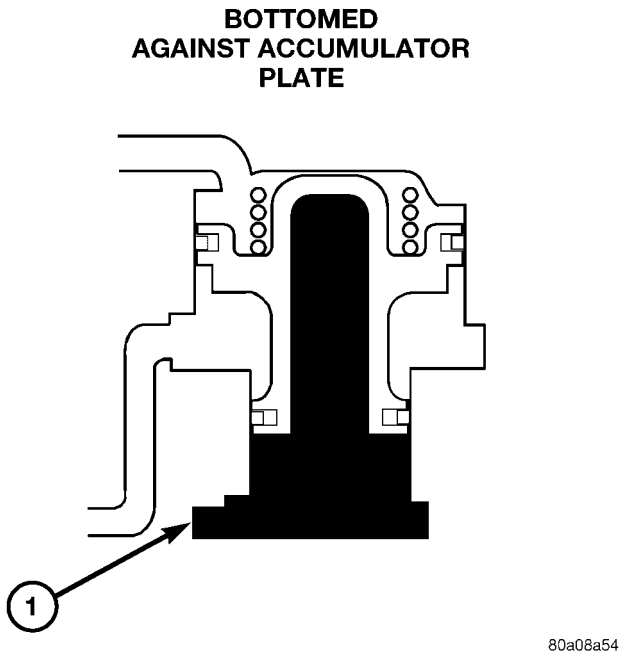


Fig. 74 Accumulator in DRIVE - FIRST Gear Position

1 - LINE PRESSURE

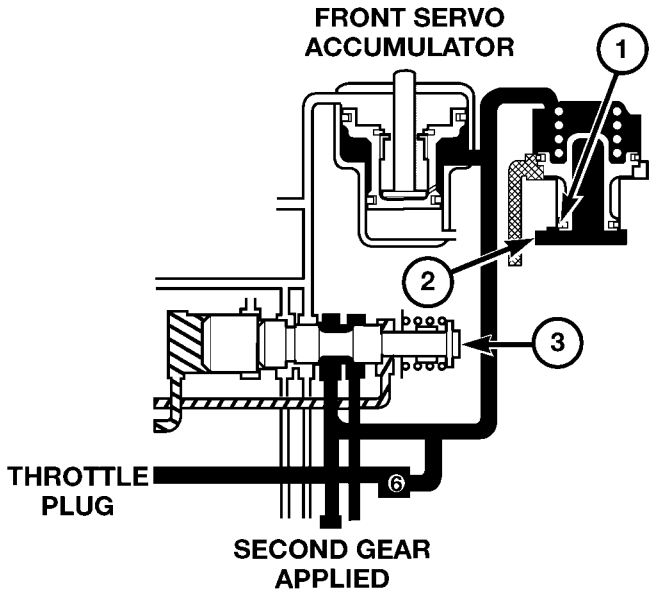


Fig. 75 Accumulator in SECOND Gear Position

1 - BOTTOM OF BORE
2 - LINE PRESSURE
3 - SHUTTLE VALVE

INSPECTION

Inspect the accumulator piston and seal rings. Replace the seal rings if worn or cut. Replace the piston if chipped or cracked.

Check condition of the accumulator spring. Replace the spring if the coils are cracked, distorted or collapsed.

BANDS

DESCRIPTION

KICKDOWN (FRONT) BAND

The kickdown, or "front", band (Fig. 76) holds the common sun gear of the planetary gear sets. The front (kickdown) band is made of steel, and faced on its inner circumference with a friction-type lining. One end of the band is anchored to the transmission case, and the other is acted on with a pushing force by a servo piston. The front band is a single-wrap design (the band does not completely encompass/ wrap the drum that it holds).

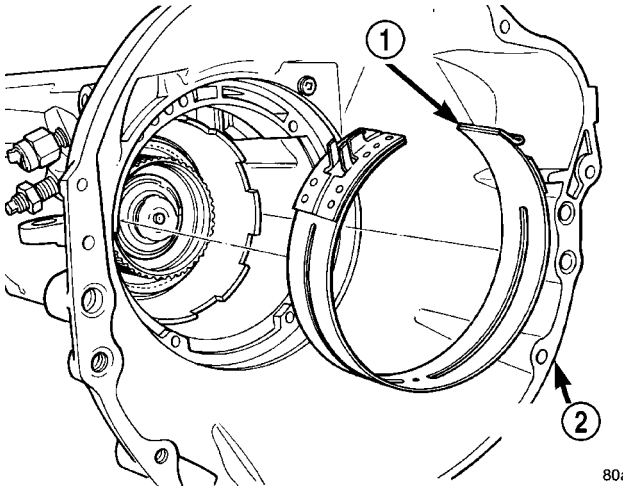


Fig. 76 Front Band

1 - FRONT BAND
2 - TRANSMISSION HOUSING

LOW/REVERSE (REAR) BAND

The low/reverse band, or "rear", band (Fig. 77) 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).

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.

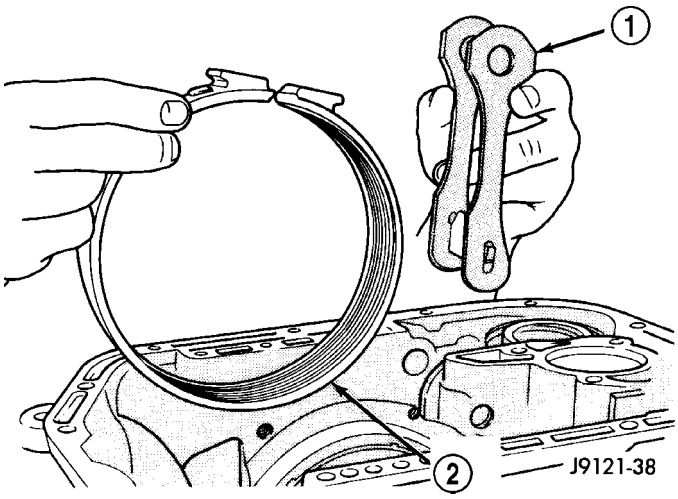


Fig. 77 Rear Band And Link

1 - BAND LINK
2 - REAR BAND

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. 78). 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.

BANDS (Continued)

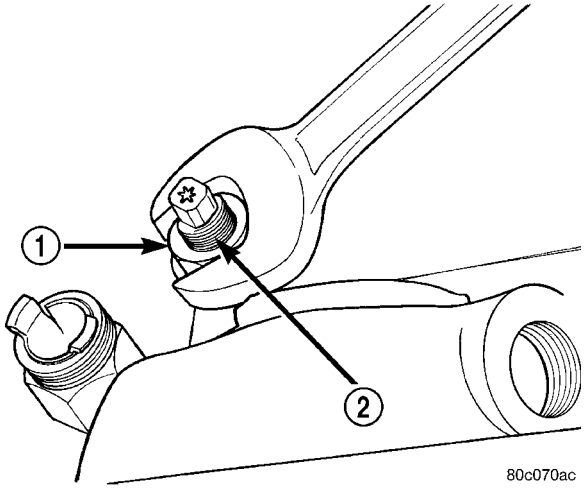


Fig. 78 Front Band Adjustment Screw Location

1 - LOCK-NUT
2 - FRONT BAND ADJUSTER

(4) Tighten adjusting screw to 8 N·m (72 in. lbs.) torque (Fig. 79).

(5) Back off adjusting screw 2 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, Automatic Transmission fluid.

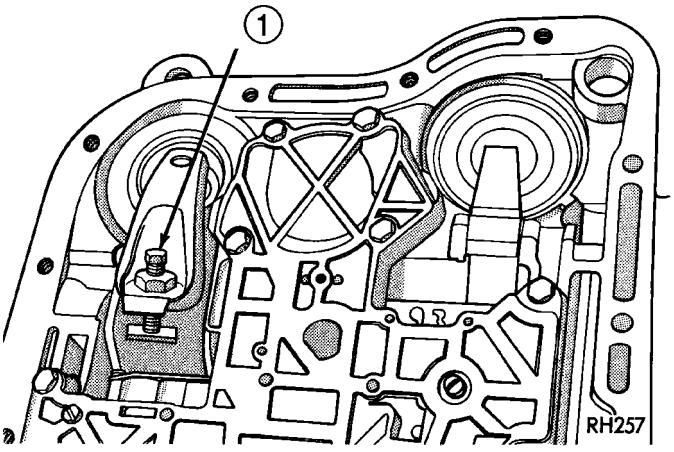


Fig. 79 Rear Band Adjustment Screw Location

1 - LOW-REVERSE BAND ADJUSTMENT

BRAKE TRANSMISSION SHIFT INTERLOCK SYSTEM

DESCRIPTION

The Brake Transmission Shifter Interlock (BTSI) (Fig. 80), is a solenoid operated system. It consists of a solenoid permanently mounted on the gearshift cable.

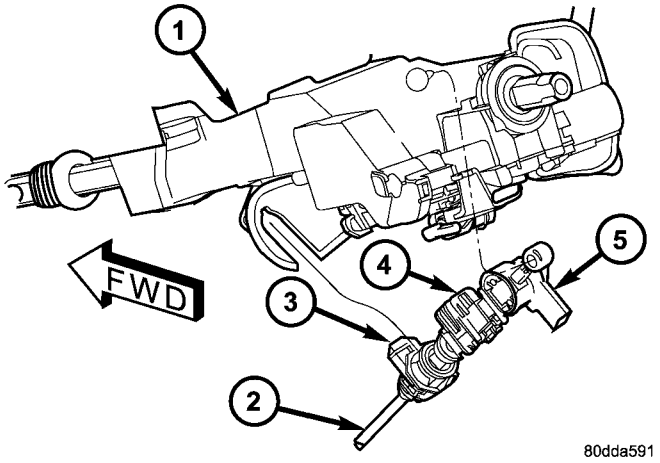


Fig. 80 Brake Transmission Interlock Mechanism

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

OPERATION

The system locks the shifter into the PARK position. The interlock system is engaged whenever the ignition switch is in the LOCK or ACCESSORY position. An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed approximately one-half an inch. A magnetic holding device in line with the park lock cable is energized when the ignition is in the RUN position. When the key is in the RUN position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK or ACCESSORY position, unless the shifter is fully locked into the PARK position.

BRAKE TRANSMISSION SHIFT INTERLOCK SYSTEM (Continued)

DIAGNOSIS AND TESTING - BRAKE TRANSMISSION SHIFT INTERLOCK

(1) Verify that the key can only be removed in the PARK position

(2) When the shift lever is in PARK And the shift handle pushbutton is in the "OUT" position, the ignition key cylinder should rotate freely from OFF to LOCK. When the shifter is in any other gear or neutral position, the ignition key cylinder should not rotate to the LOCK position.

(3) Shifting out of PARK should not be possible when the ignition key cylinder is in the OFF position.

(4) Shifting out of PARK should not be possible while applying normal pushbutton force and ignition key cylinder is in the RUN or START positions unless the foot brake pedal is depressed approximately 1/2 inch (12mm).

(5) Shifting out of PARK should not be possible when the ignition key cylinder is in the ACCESSORY or LOCK positions.

(6) Shifting between any gears, NEUTRAL or into PARK may be done without depressing foot brake pedal with ignition switch in RUN or START positions.

ADJUSTMENTS - BRAKE TRANSMISSION SHIFT INTERLOCK

Correct cable adjustment is important to proper interlock operation. The gearshift cable must be correctly adjusted in order to shift out of PARK.

ADJUSTMENT PROCEDURE

(1) Remove the steering column trim as necessary for access to the brake transmission shift interlock.

(2) Shift the transmission into the PARK position.

(3) Pull upward on both the BTSI lock tab and the gearshift cable lock tab (Fig. 81).

(4) Verify that the shift lever is in the PARK position.

(5) Verify positive engagement of the transmission park lock by attempting to rotate the propeller shaft. The shaft will not rotate when the park lock is engaged.

(6) Turn ignition switch to LOCK position. **Be sure ignition key cylinder is in the LOCK position. Cable will not adjust correctly in any other position.**

(7) Ensure that the cable is free to self-adjust by pushing cable rearward and releasing.

(8) Push the gearshift cable lock tab down until it snaps in place.

(9) Locate the BTSI alignment hole in the bottom of the BTSI mechanism between the BTSI lock tab and the BTSI connector.

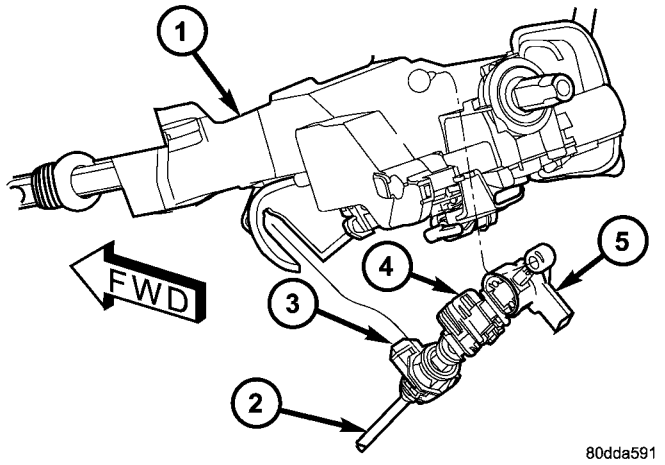


Fig. 81 Brake Transmission Interlock Mechanism

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

(10) Move the BTSI assembly up or down on the gearshift cable until an appropriate size drill bit can be inserted into the alignment hole and through the assembly.

(11) Push the BTSI lock tab down until it snaps into place and remove the drill bit.

(12) Install any steering column trim previously removed.

BTSI FUNCTION CHECK

(1) Verify removal of ignition key allowed in PARK position only.

(2) When the shift lever is in PARK, the ignition key cylinder should rotate freely from off to lock. When the shifter is in any other position, the ignition key should not rotate from off to lock.

(3) Shifting out of PARK should be possible when the ignition key cylinder is in the off position.

(4) Shifting out of PARK should not be possible while applying normal force, and ignition key cylinder is in the run or start positions, unless the foot brake pedal is depressed approximately 1/2 inch (12mm).

(5) Shifting out of PARK should not be possible when the ignition key cylinder is in the accessory or lock position.

(6) Shifting between any gear and NEUTRAL, or PARK, may be done without depressing foot brake with ignition switch in run or start positions.

(7) Engine starts must be possible with shifter lever in PARK or NEUTRAL positions only. Engine starts must not be possible in any position other than PARK or NEUTRAL.

(8) With shifter lever in the:

- PARK position - Apply upward force on the shift arm and remove pressure. Engine starts must be possible.
- PARK position - Apply downward force on the shift arm and remove pressure. Engine starts must be possible.
- NEUTRAL position - Normal position. Engine starts must be possible.
- NEUTRAL position - Engine running and brakes applied, apply upward force on the shift arm. Transmission shall not be able to shift from neutral to reverse.

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. 82).

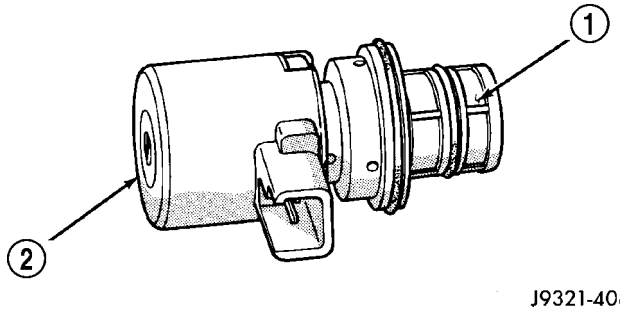


Fig. 82 Governor Pressure Solenoid Valve

1 - SOLENOID FILTER
2 - GOVERNOR PRESSURE SOLENOID

GOVERNOR PRESSURE SENSOR

The governor pressure sensor measures output pressure of the governor pressure solenoid valve (Fig. 83).

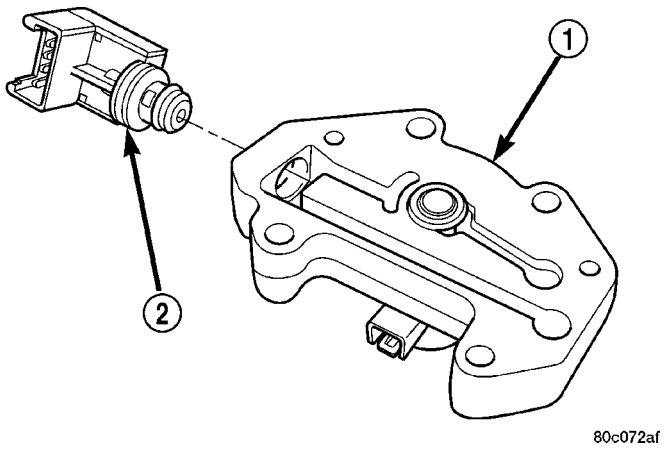


Fig. 83 Governor Pressure Sensor

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. 83).

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.

ELECTRONIC GOVERNOR (Continued)

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 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.

ELECTRONIC GOVERNOR (Continued)

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. 84).

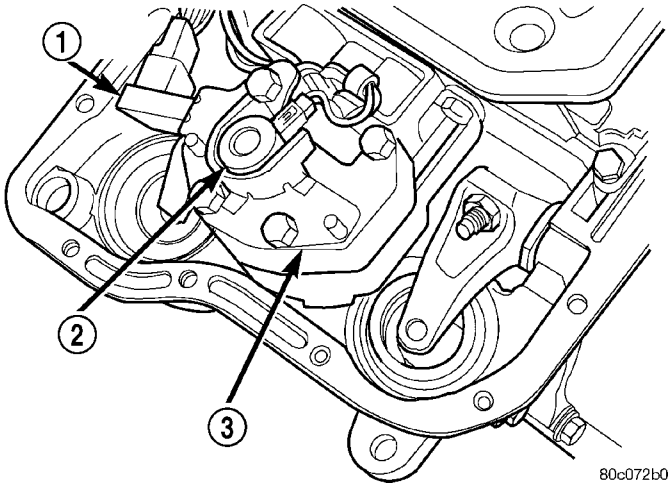


Fig. 84 Governor Solenoid And Pressure Sensor

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. 85).

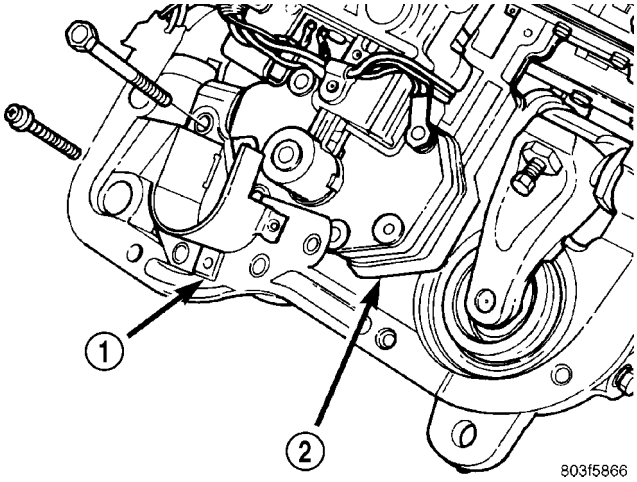


Fig. 85 Pressure Solenoid Retainer

1 - PRESSURE SOLENOID RETAINER
2 - GOVERNOR

(6) Pull solenoid from governor body (Fig. 86).
(7) Pull pressure sensor from governor body.
(8) Remove bolts holding governor body to valve body.

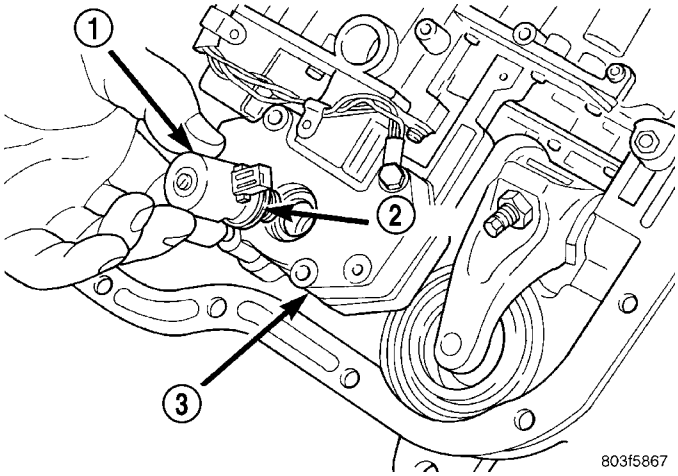


Fig. 86 Pressure Solenoid and O-ring

1 - PRESSURE SOLENOID
2 - O-RING
3 - GOVERNOR

(9) Separate governor body from valve body (Fig. 87).
(10) Remove governor body gasket.

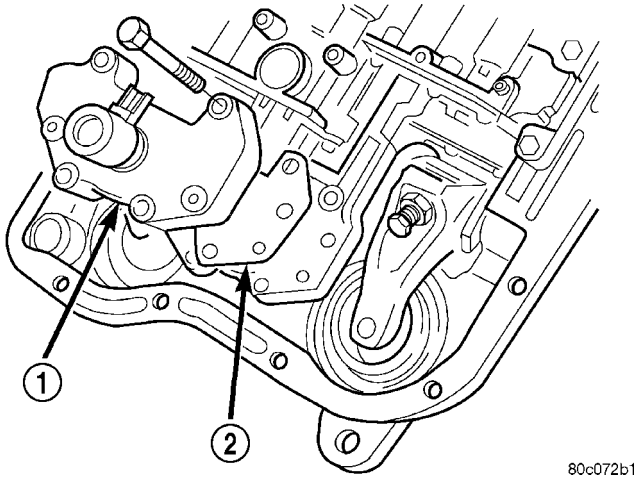


Fig. 87 Governor Body and Gasket

1 - GOVERNOR BODY
2 - GASKET

ELECTRONIC GOVERNOR (Continued)

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. 88).

(2) Place governor body in position on valve body.

(3) Install bolts to hold governor body to valve body.

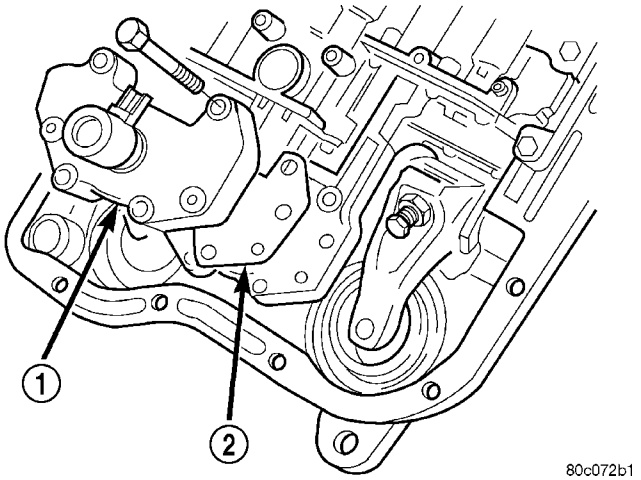


Fig. 88 Governor Body and Gasket

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. 89).

(9) Push solenoid into governor body.

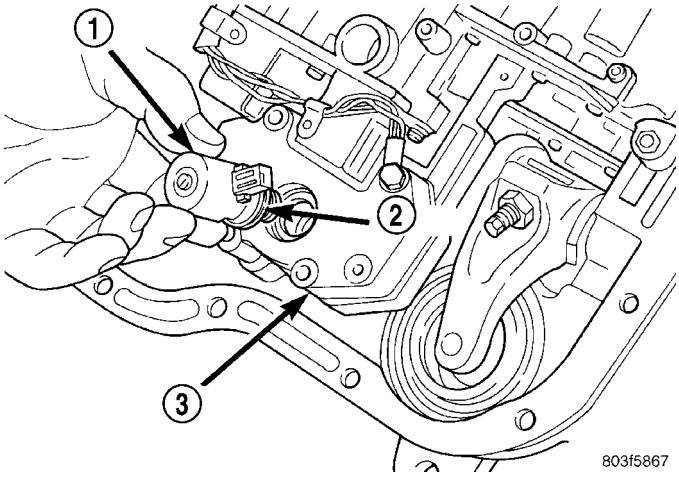


Fig. 89 Pressure Solenoid and O-ring

1 - PRESSURE SOLENOID
2 - O-RING
3 - GOVERNOR

(10) Place solenoid retainer in position on governor (Fig. 90).

(11) Install screws to hold pressure solenoid retainer to governor body.

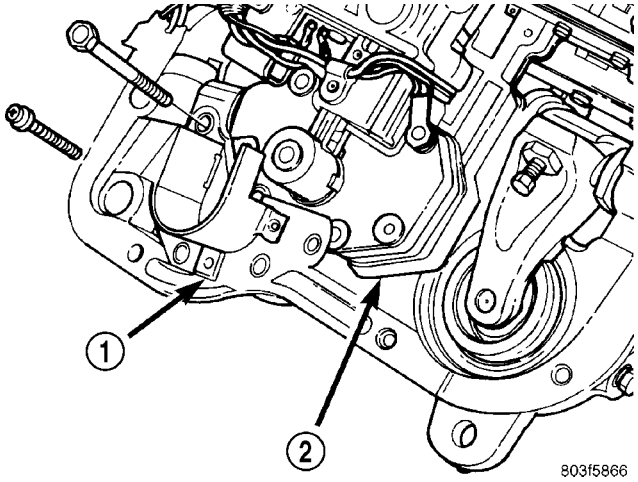


Fig. 90 Pressure Solenoid Retainer

1 - PRESSURE SOLENOID RETAINER
2 - GOVERNOR

(12) Engage wire connectors into pressure sensor and solenoid (Fig. 91).

(13) Install transmission fluid pan and (new) filter.

(14) Lower vehicle and road test to verify repair.

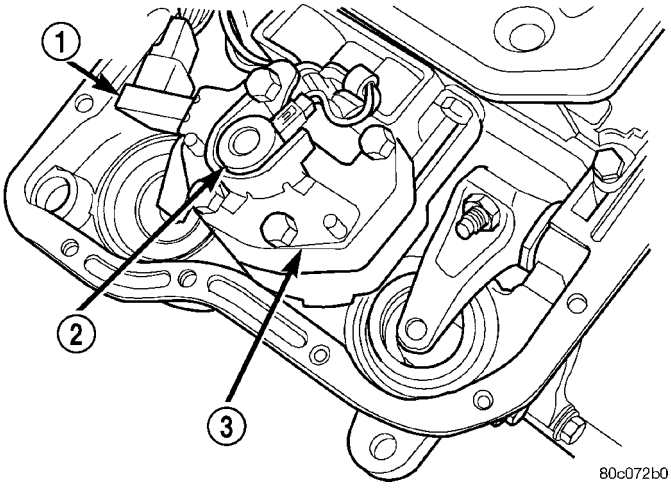


Fig. 91 Governor Solenoid And Pressure Sensor

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. 92).

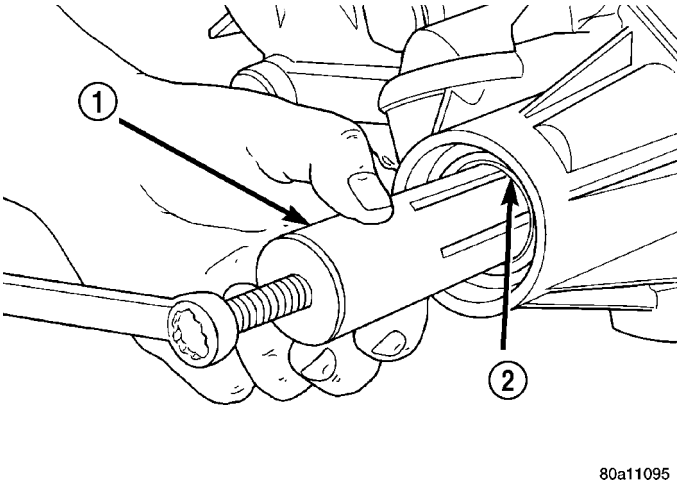


Fig. 92 Bushing Removal - Typical

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. 93).

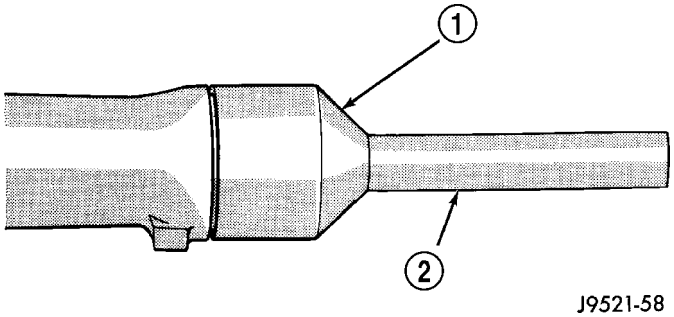


Fig. 93 Transmission Extension Housing Seal Installation

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. 94) from overdrive housing.

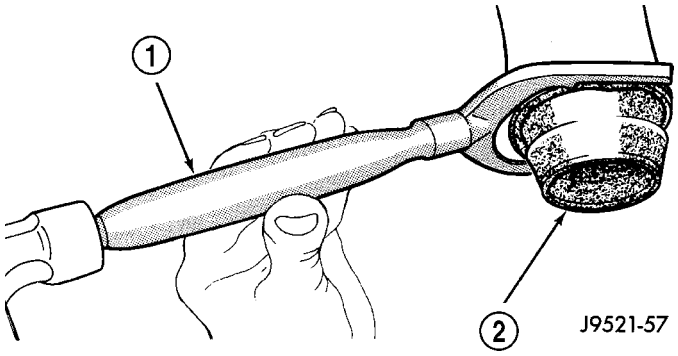


Fig. 94 Removing Transmission Housing Yoke Seal

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. 95).

(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.

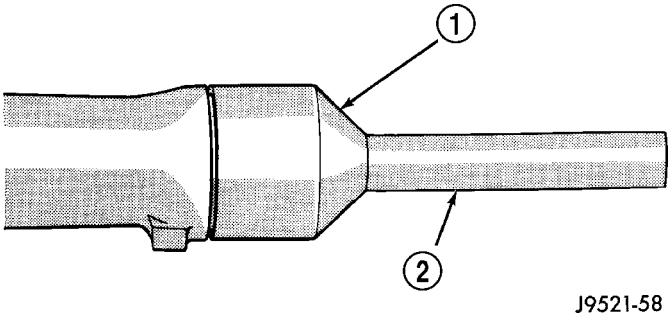


Fig. 95 Installing Transmission Housing Seal

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 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 torque converter should 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.

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

FLUID AND FILTER (Continued)

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. 96) 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, Automatic Transmission fluid, to restore correct level. Do not overfill.

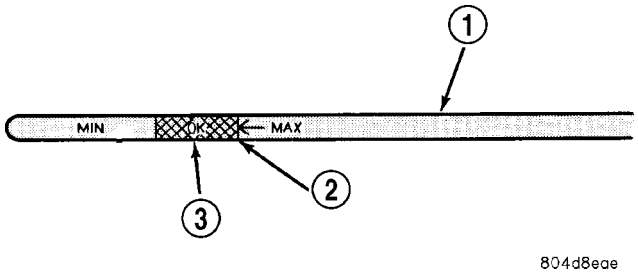


Fig. 96 Dipstick Fluid Level Marks - Typical

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 figure. (Fig. 97)

(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.

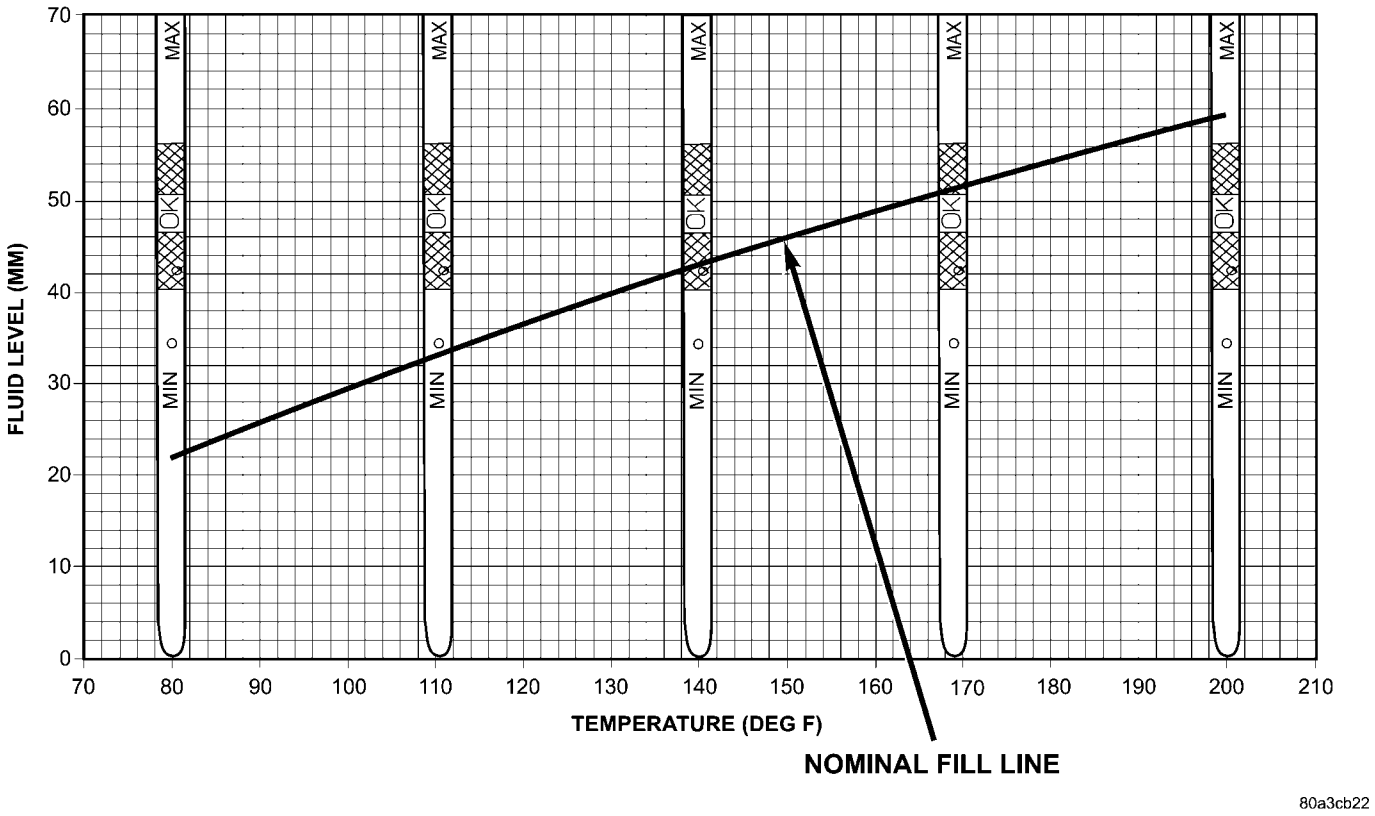


Fig. 97 46RE Fluid Fill Graph

FLUID AND FILTER (Continued)

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. 98).
(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. 99).
(10) Separate filter from valve body and pour fluid in filter into drain pan.
(11) Dispose of used trans fluid and filter properly.

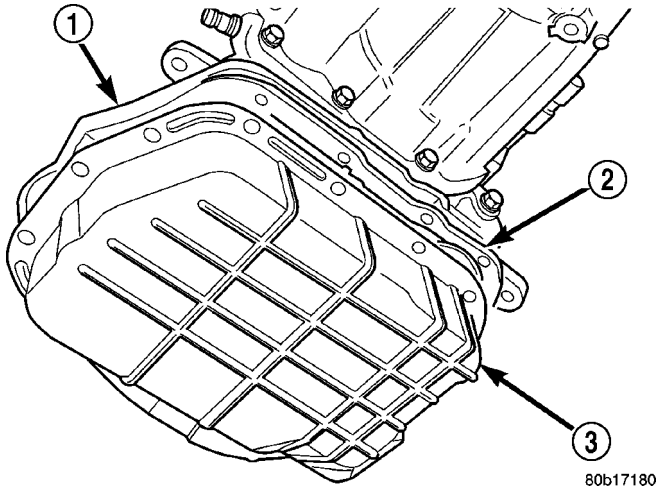


Fig. 98 Transmission Pan

1 - TRANSMISSION
2 - GASKET
3 - PAN

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.

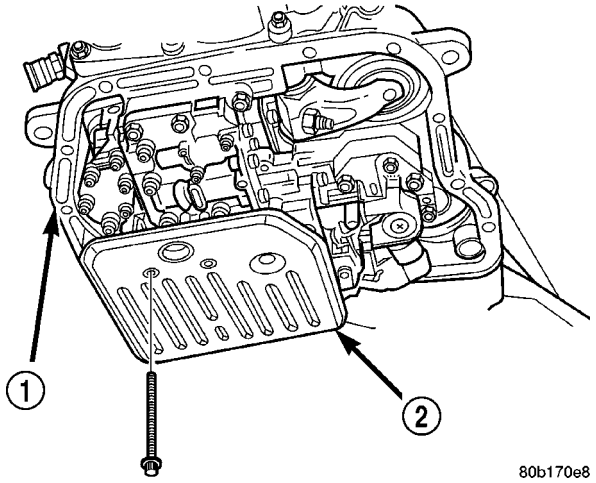


Fig. 99 Transmission Filter

1 - TRANSMISSION
2 - FILTER

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/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, Automatic Transmission Fluid, 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, or torque converter was replaced or drained, 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.

FLUID AND FILTER (Continued)

(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. 100) 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

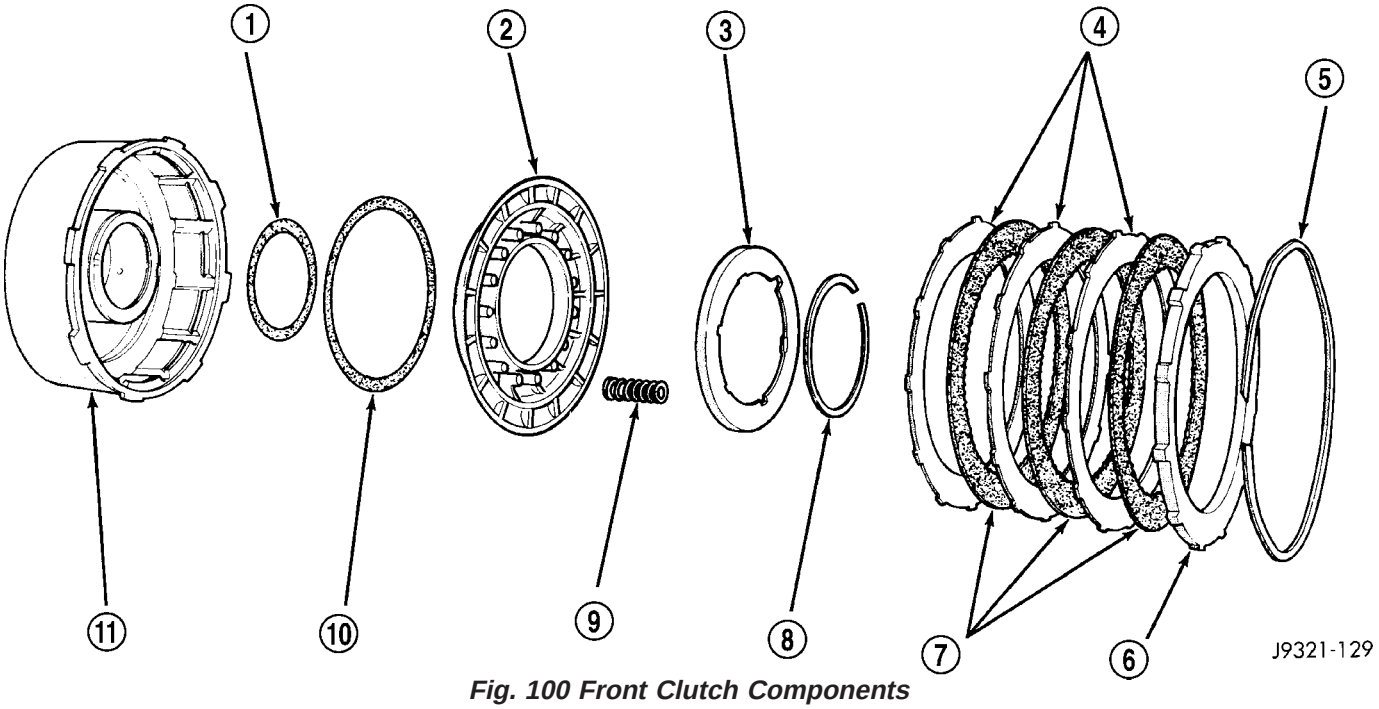


Fig. 100 Front Clutch Components

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

FRONT CLUTCH (Continued)

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. 101).

(3) Remove retainer snap-ring and remove compressor tool.

(4) Remove clutch piston springs (Fig. 102). 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.

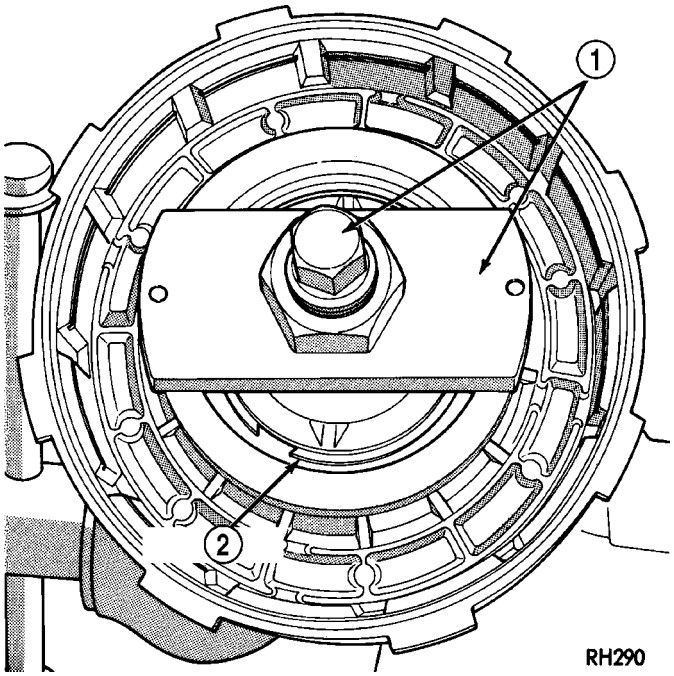


Fig. 101 Removing Front Clutch Spring Retainer Snap-Ring

1 - SPECIAL TOOL C-3863-A
2 - SNAP-RING

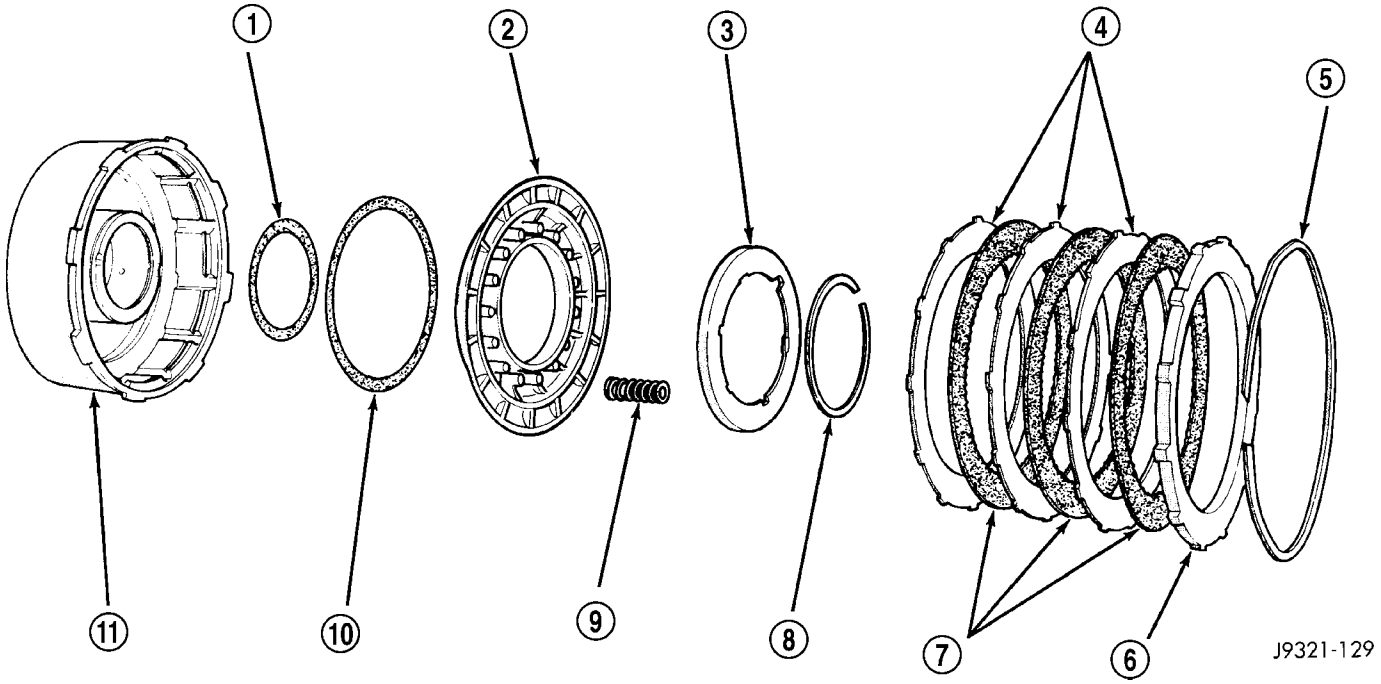


Fig. 102 Front Clutch Components

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

FRONT CLUTCH (Continued)

(7) Assemble Tool Handle C-4171 and Bushing Remover SP-3629 (Fig. 103).

(8) Insert remover tool in bushing and drive bushing straight out of clutch retainer.

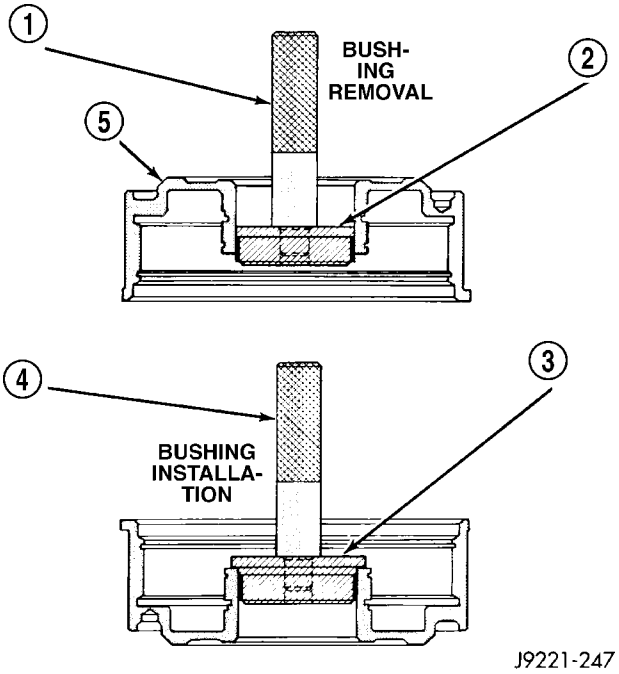


Fig. 103 Front Clutch Retainer Bushing Replacement Tools

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL SP-3629
3 - SPECIAL TOOL SP-5511
4 - SPECIAL TOOL C-4171
5 - FRONT CLUTCH RETAINER

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. 104).

(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.

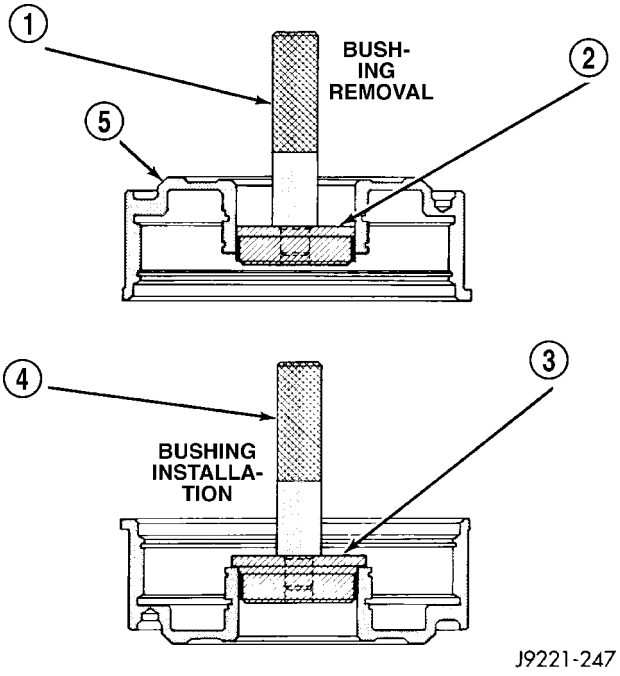


Fig. 104 Front Clutch Retainer Bushing Replacement Tools

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL SP-3629
3 - SPECIAL TOOL SP-5511
4 - SPECIAL TOOL C-4171
5 - FRONT CLUTCH RETAINER

(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)

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. 105).

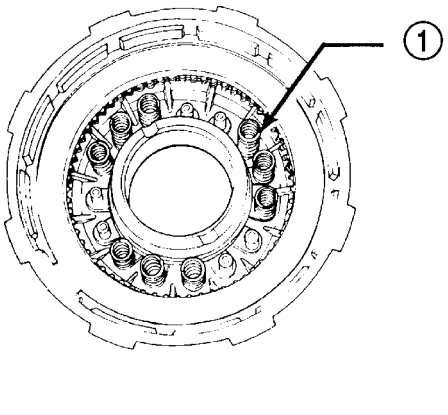


Fig. 105 Front Clutch Spring Position

1 - 9 SPRING CLUTCH

(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. 102). 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. 106). 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.

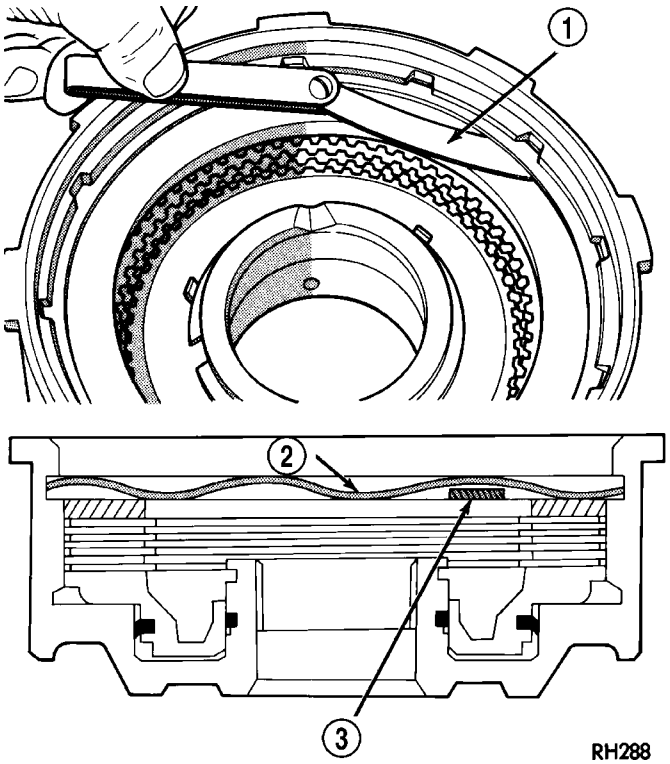


Fig. 106 Typical Method Of Measuring Front Clutch Pack Clearance

1 - FEELER GAUGE
2 - WAVED SNAP-RING
3 - FEELER GAUGE

FRONT SERVO

DESCRIPTION

The kickdown servo (Fig. 107) 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.

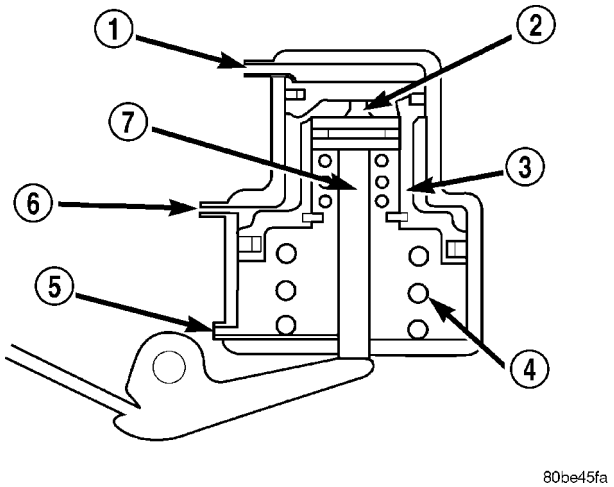


Fig. 107 Front Servo

1 - VENT
2 - INNER PISTON
3 - PISTON
4 - SPRING
5 - RELEASE PRESSURE
6 - APPLY PRESSURE
7 - PISTON ROD

FRONT SERVO (Continued)

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. 108).

(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.

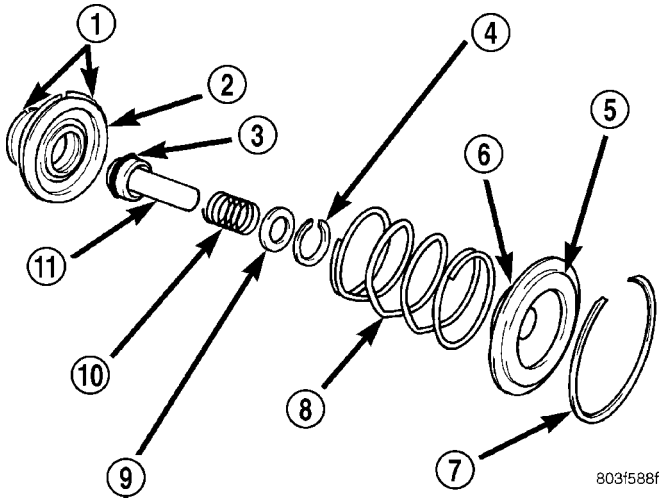


Fig. 108 Front Servo

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

CLEANING

Clean the servo piston components (Fig. 109) with solvent and dry them with compressed air.

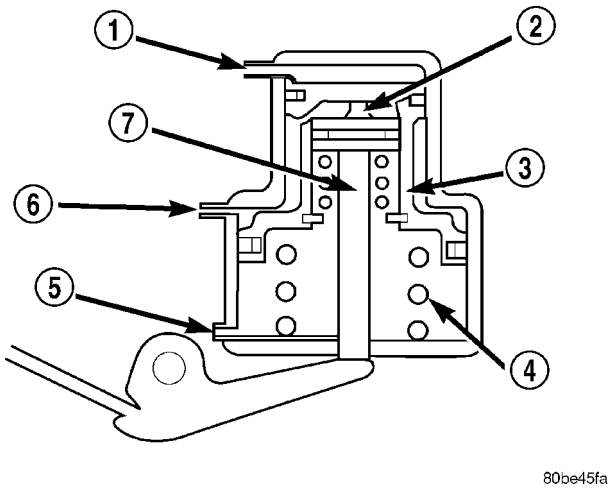


Fig. 109 Front Servo

1 - VENT
2 - INNER PISTON
3 - PISTON
4 - SPRING
5 - RELEASE PRESSURE
6 - APPLY PRESSURE
7 - PISTON ROD

INSPECTION

Inspect the servo components (Fig. 110). 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.

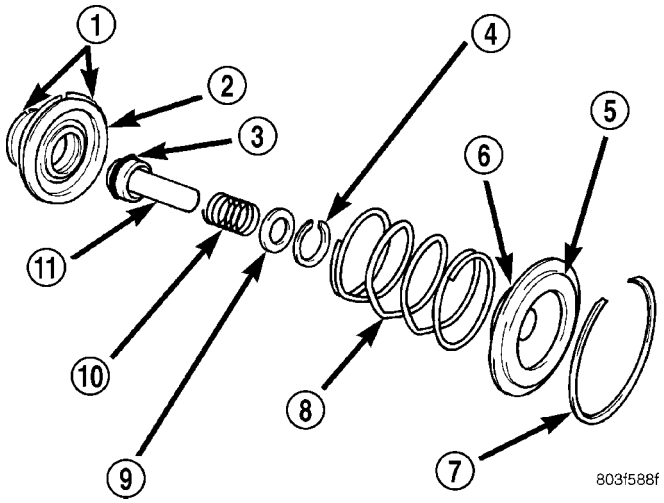


Fig. 110 Front Servo

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

FRONT SERVO (Continued)

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. 111).

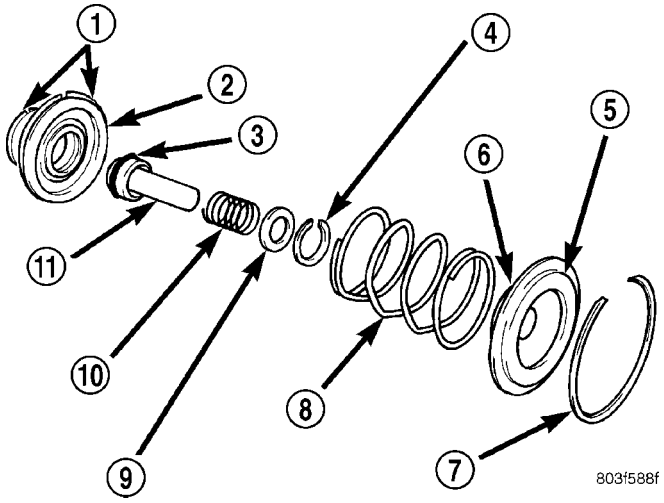


Fig. 111 Front Servo

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

GEARSHIFT CABLE

DIAGNOSIS AND TESTING - GEARSHIFT CABLE

(1) Engine starts must be possible with shift lever in PARK or NEUTRAL positions only. Engine starts must not be possible in any other gear position.

(2) With the shift lever in the:

(a) PARK position - Apply upward force on the shift arm and remove pressure. Engine starts must be possible.

(b) PARK position - Apply downward force on the shift arm and remove pressure. Engine starts must be possible.

(c) NEUTRAL position - Normal position. Engine starts must be possible.

(d) NEUTRAL position - Engine running and brakes applied, apply upward force on the shift arm. Transmission shall not be able to shift from neutral to reverse.

REMOVAL

(1) Shift transmission into PARK.

(2) Raise vehicle.

(3) Disengage cable eyelet at transmission shift lever and pull cable adjuster out of mounting bracket (Fig. 112) or (Fig. 113).

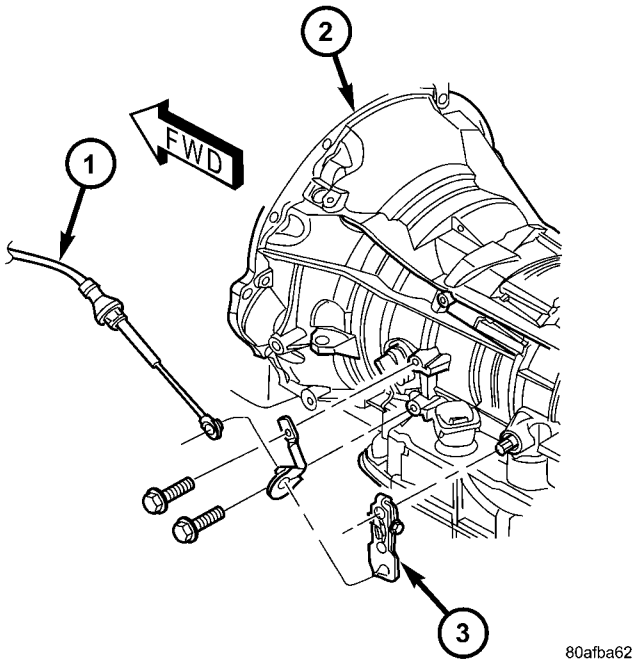


Fig. 112 Gearshift Cable at Transmission - RFE

1 - GEARSHIFT CABLE
2 - RFE TRANSMISSION
3 - MANUAL LEVER

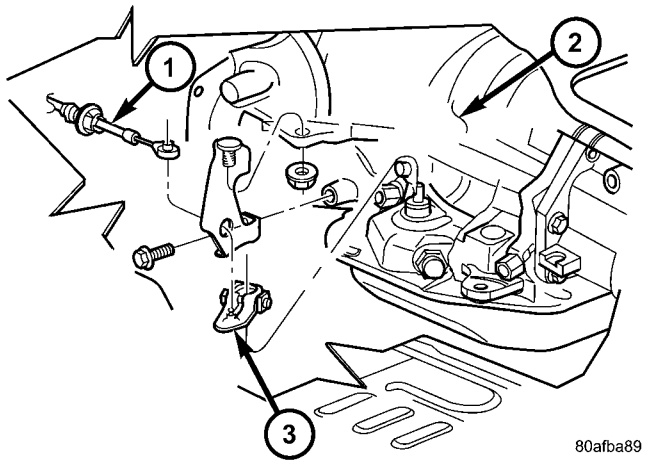


Fig. 113 Gearshift Cable at Transmission - RE

1 - GEARSHIFT CABLE
2 - RE TRANSMISSION
3 - MANUAL LEVER

GEARSHIFT CABLE (Continued)

(4) Lower the vehicle.

(5) Remove the dash panel insulation pad as necessary to access the gearshift cable grommet (Fig. 114).

(6) Remove grommet from the dash panel.

(7) Remove any steering column trim necessary to access the gearshift cable and BTSI mechanism.

(8) Disconnect the BTSI wiring connector.

(9) Disconnect cable at lower column bracket and shift lever pin and pull the cable through the dash panel opening into the vehicle (Fig. 115).

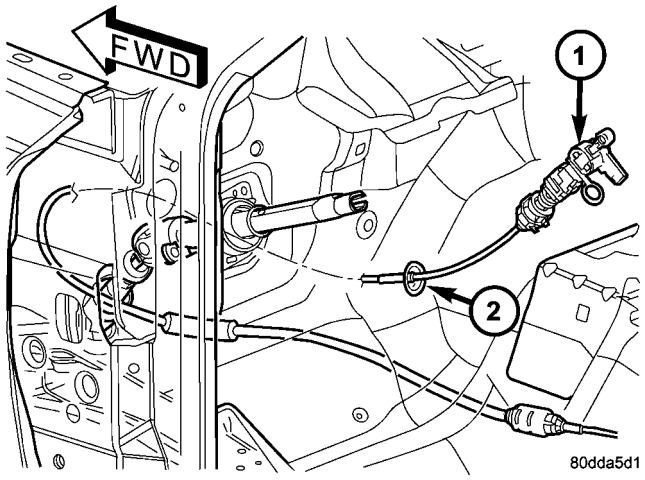


Fig. 114 Gearshift Cable at the Dash Panel

1 - GEARSHIFT CABLE
2 - GROMMET

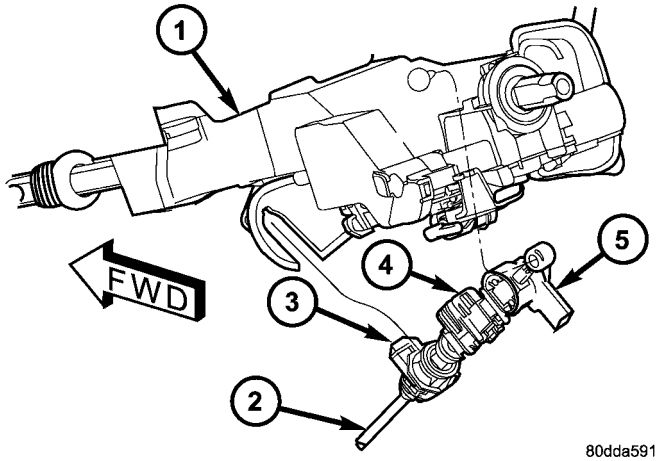


Fig. 115 Gearshift Cable at Steering Column

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

(10) Remove gearshift cable from vehicle.

INSTALLATION

(1) Route the transmission end of the gearshift cable through the opening in the dash panel (Fig. 116).

(2) Seat the cable grommet into the dash panel opening.

(3) Snap the cable into the steering column bracket so the retaining ears (Fig. 117) are engaged and snap the cable eyelet onto the shift lever ball stud.

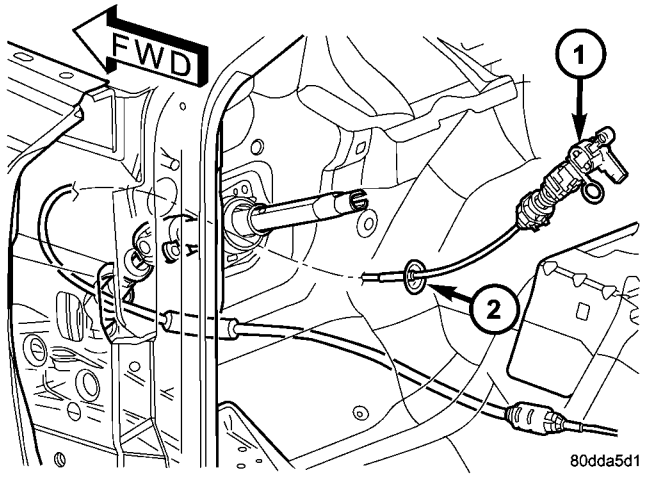


Fig. 116 Gearshift Cable at the Dash Panel

1 - GEARSHIFT CABLE
2 - GROMMET

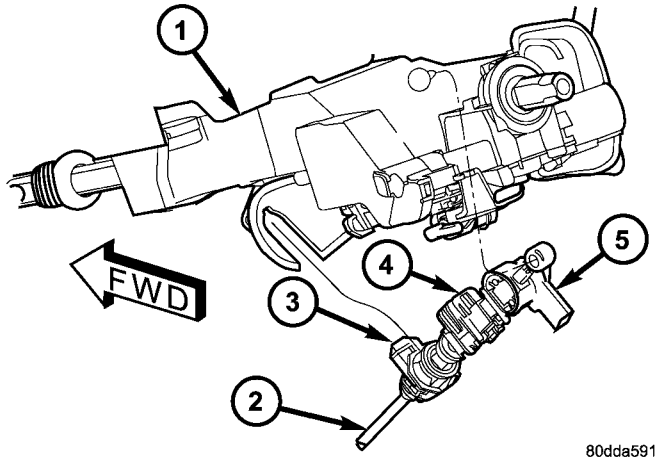


Fig. 117 Gearshift Cable at Steering Column

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

GEARSHIFT CABLE (Continued)

(4) Raise the vehicle.
(5) Place the transmission manual shift lever in the “PARK” detent (rearmost) position and rotate prop shaft to ensure transmission is in PARK.
(6) Route the gearshift cable through the transmission mounting bracket and secure the cable by snapping the cable retaining ears into the transmission bracket and snapping the cable eyelet on the manual shift lever ball stud.
(7) Lower vehicle.
(8) Lock the shift cable adjustment by pressing the cable adjuster lock tab downward until it snaps into place.
(9) Check for proper operation of the transmission range sensor.
(10) Adjust the gearshift cable and BTSI mechanism as necessary.

ADJUSTMENTS

GEARSHIFT CABLE

Check adjustment by starting the engine in PARK and NEUTRAL. Adjustment is CORRECT if the engine starts only in these positions. Adjustment is INCORRECT if the engine starts in one but not both positions. If the engine starts in any position other than PARK or NEUTRAL, or if the engine will not start at all, the transmission range sensor may be faulty.

Gearshift Adjustment Procedure

(1) Shift transmission into PARK.
(2) Release cable adjuster lock tab (underneath the steering column) (Fig. 118) to unlock cable.
(3) Raise vehicle.
(4) Disengage the cable eyelet from the transmission manual shift lever.
(5) Verify transmission shift lever is in PARK detent by moving lever fully rearward. Last rearward detent is PARK position.
(6) Verify positive engagement of transmission park lock by attempting to rotate propeller shaft. Shaft will not rotate when park lock is engaged.
(7) Snap the cable eyelet onto the transmission manual shift lever.
(8) Lower vehicle.
(9) Lock shift cable by pressing cable adjuster lock tab downward until it snaps into place.
(10) Check engine starting. Engine should start only in PARK and NEUTRAL

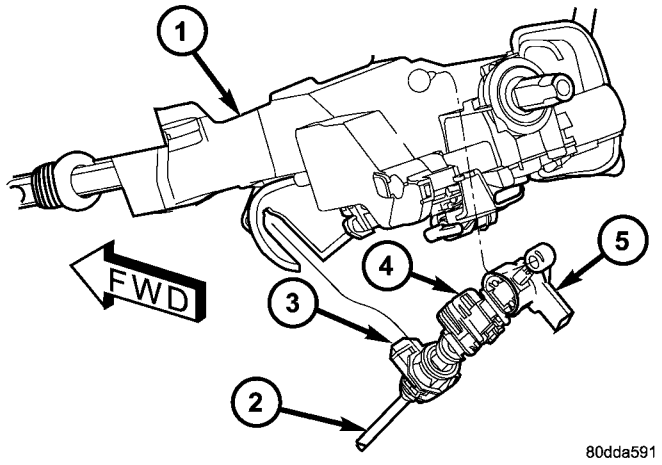


Fig. 118 Gearshift Cable at Steering Column

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

OIL PUMP

DESCRIPTION

The oil pump (Fig. 119) 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.

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. 120).

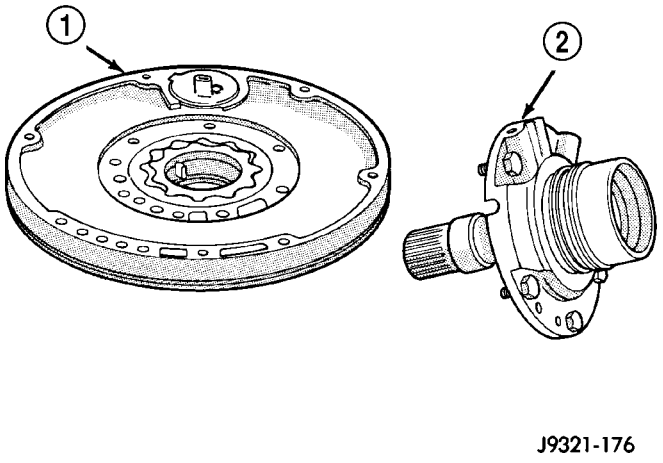


Fig. 120 Reaction Shaft Support

1 - OIL PUMP
2 - REACTION SHAFT SUPPORT

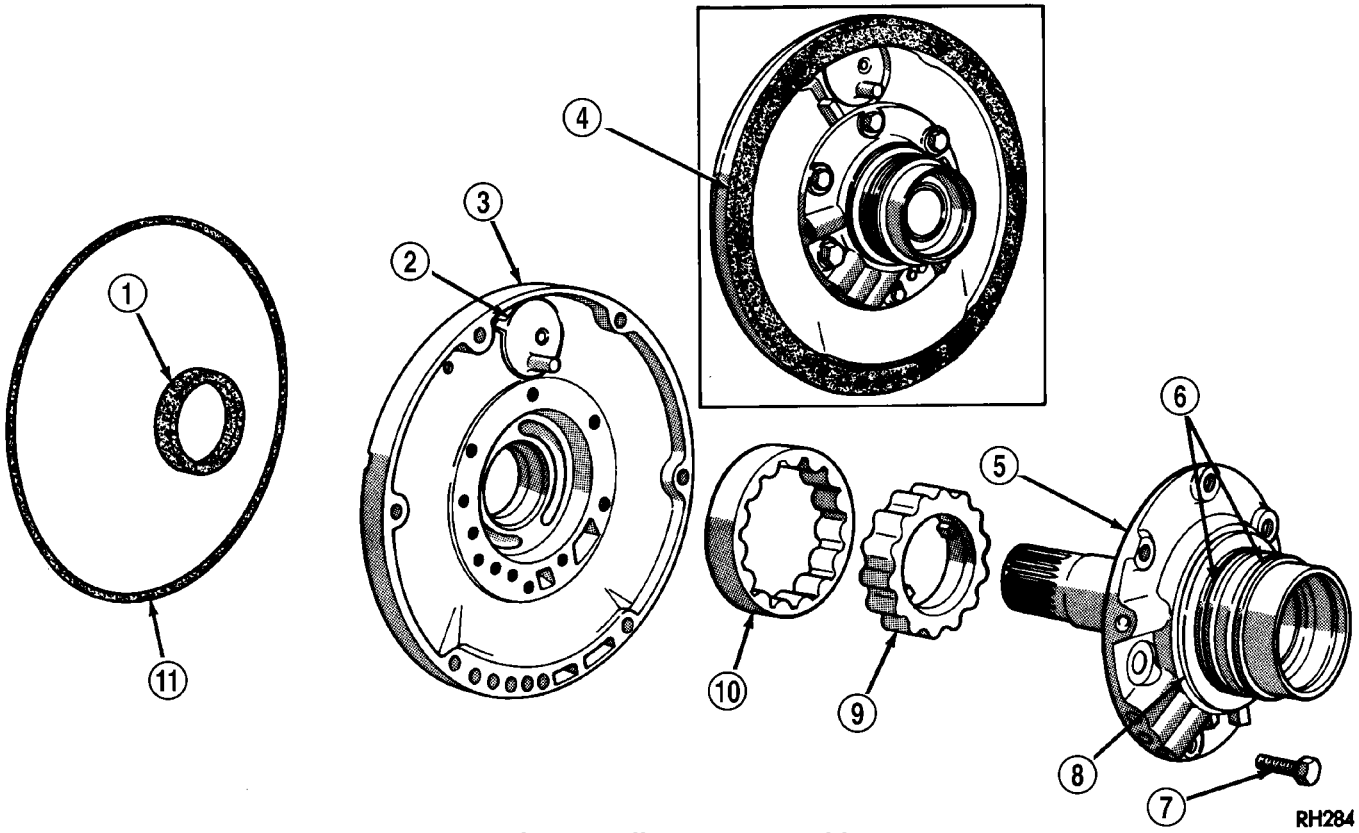


Fig. 119 Oil Pump Assembly

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)

(4) Remove pump inner and outer gears (Fig. 121).
(5) Remove o-ring seal from pump body (Fig. 122). Discard seal after removal.
(6) Remove oil pump seal with Remover Tool C-3981. Discard seal after removal.

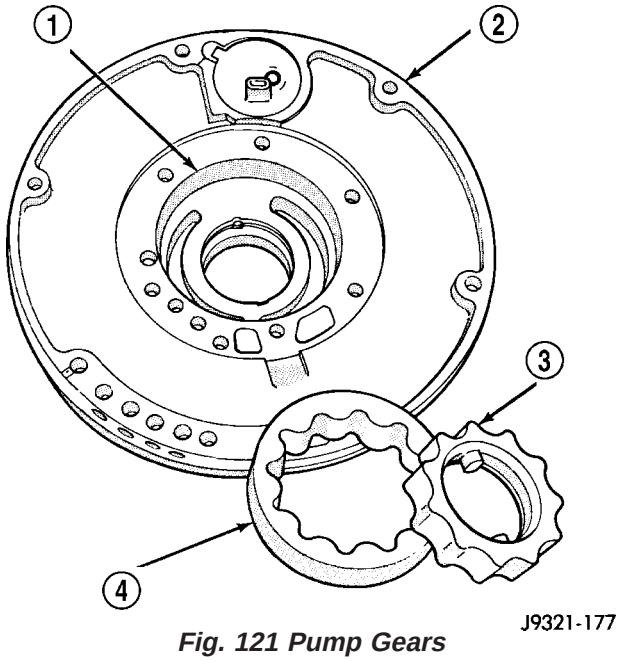


Fig. 121 Pump Gears

1 - GEAR BORE
2 - PUMP BODY
3 - INNER GEAR
4 - OUTER GEAR

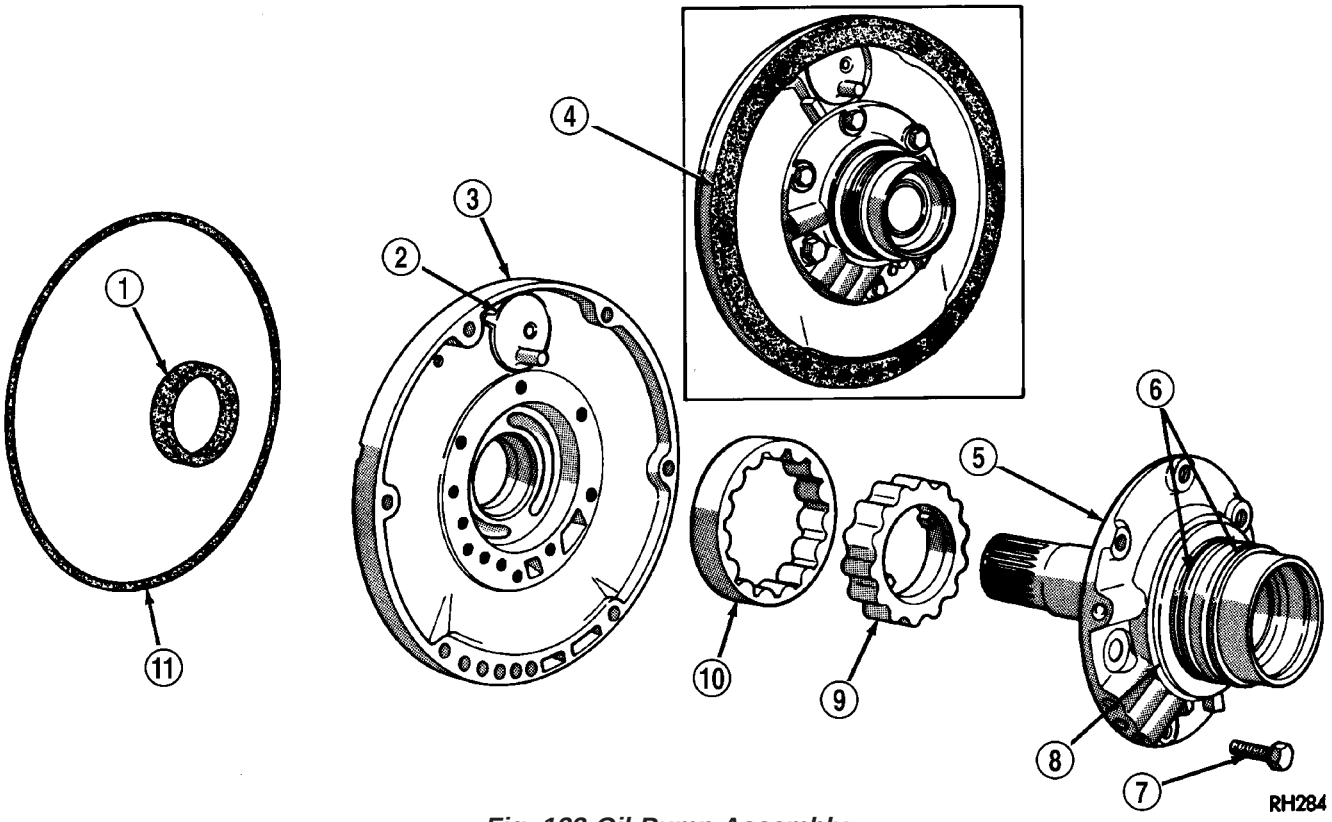


Fig. 122 Oil Pump Assembly

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)

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. 123).

REACTION SHAFT SUPPORT BUSHING REMOVAL

(1) Assemble Cup Tool SP-3633, Nut SP-1191 and Bushing Remover SP-5301 (Fig. 124).

(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.

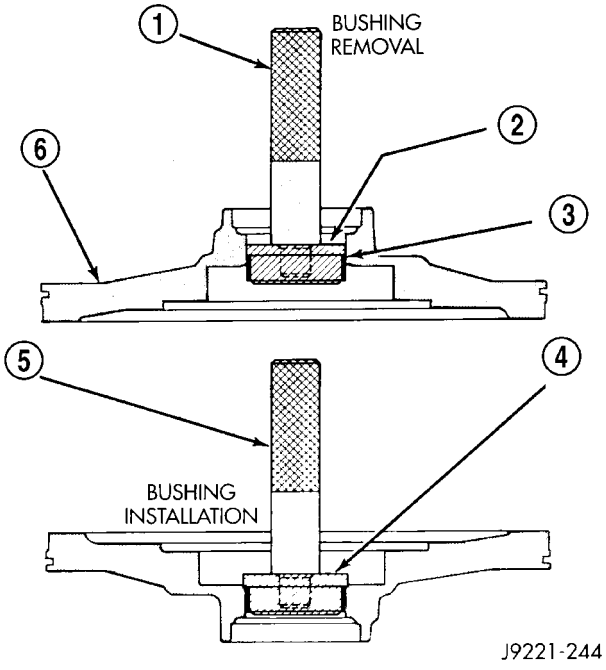


Fig. 123 Oil Pump Bushing

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

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.

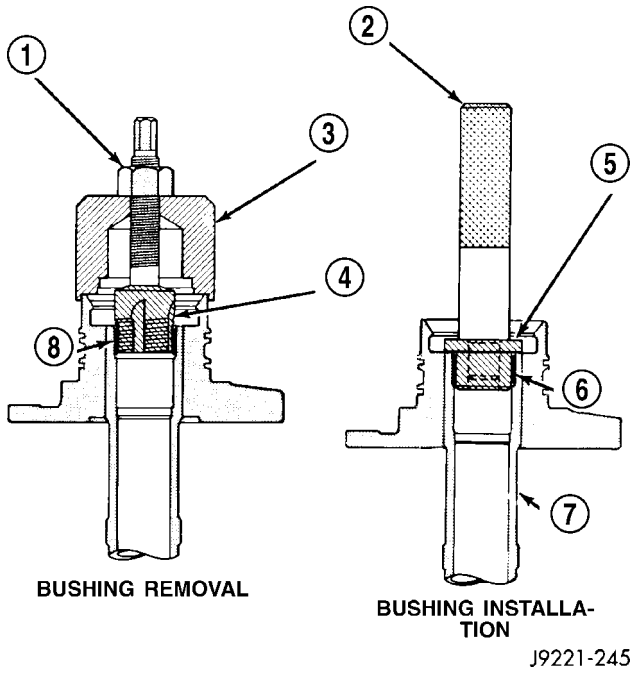


Fig. 124 Reaction Shaft Bushing

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

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.

OIL PUMP (Continued)

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. 125).

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.

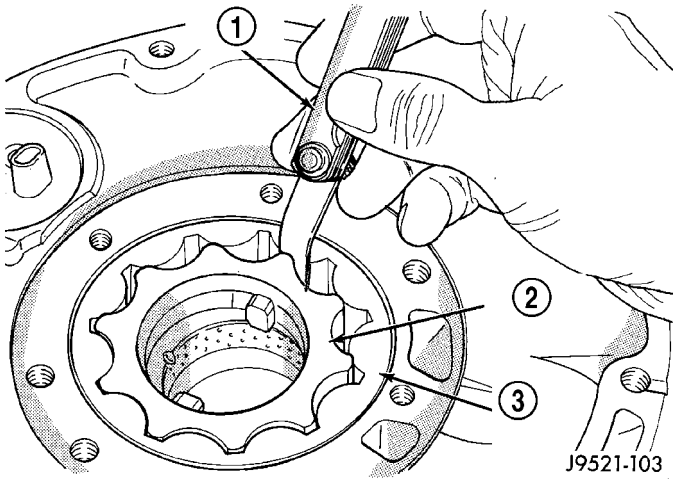


Fig. 125 Checking Pump Gear Tip Clearance

1 - FEELER GAUGE
2 - INNER GEAR
3 - OUTER GEAR

ASSEMBLY

OIL PUMP BUSHING

(1) Assemble Tool Handle C-4171 and Bushing Installer SP-5118 (Fig. 126).

(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. 127).

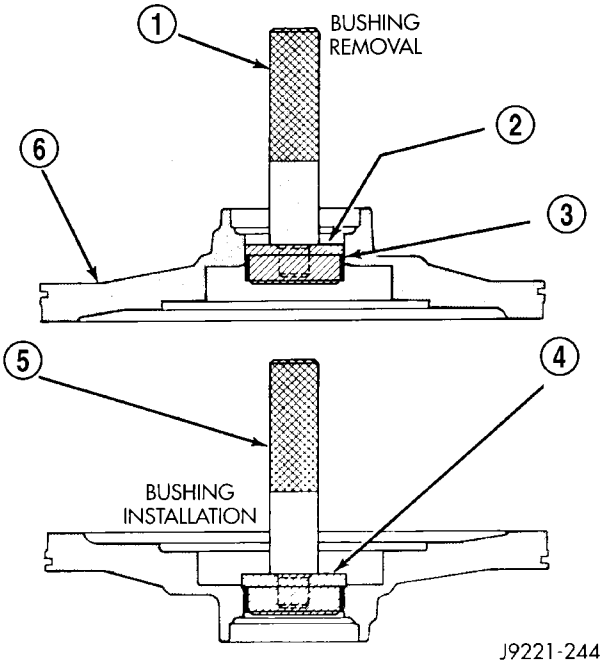


Fig. 126 Oil Pump Bushing

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

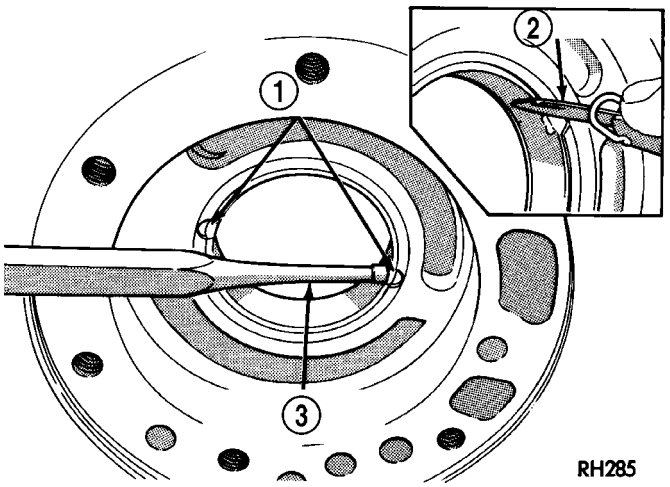


Fig. 127 Staking-Deburring Oil Pump Bushing

1 - TWO STAKES
2 - NARROW BLADE
3 - BLUNT PUNCH

OIL PUMP (Continued)

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. 128).

(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).

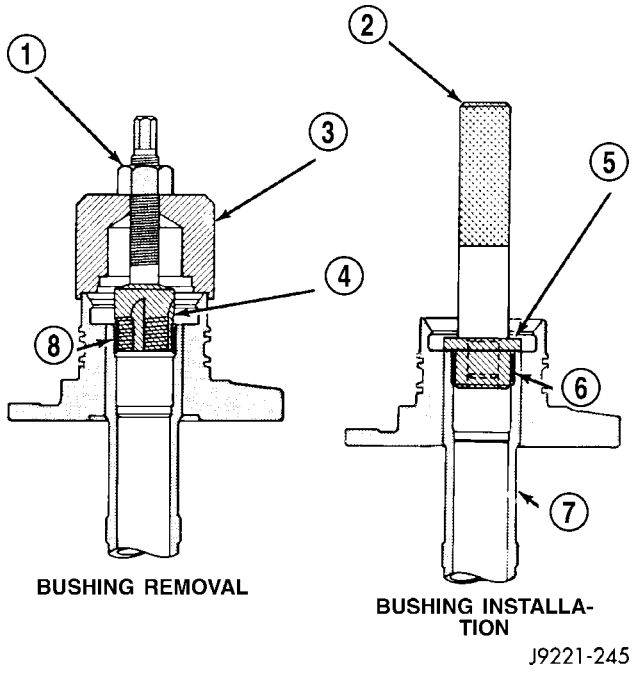


Fig. 128 Reaction Shaft Bushing

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.

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. 129). 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.

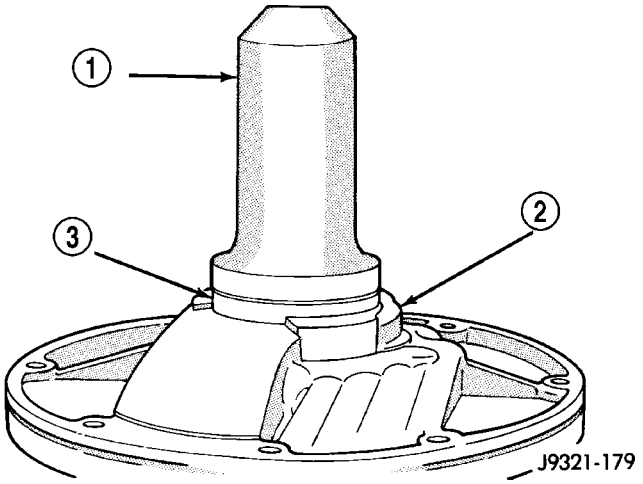


Fig. 129 Oil Pump Seal

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. 130).
(4) Pull bearing from output shaft.

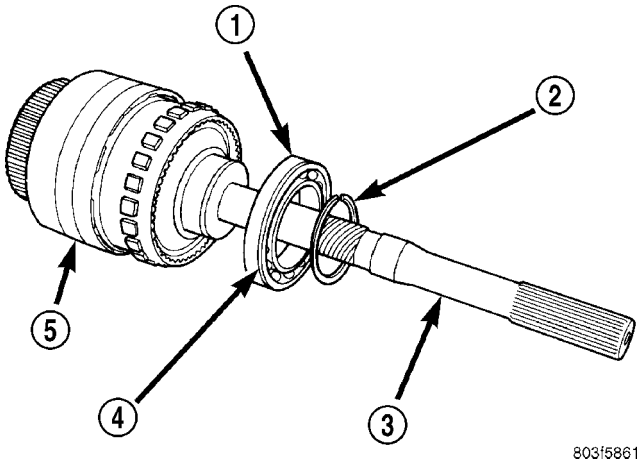


Fig. 130 Output Shaft Front Bearing

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/AUTOMATIC/OVERDRIVE - REMOVAL)
(2) Remove overdrive geartrain from housing.
(3) Remove snap-ring holding output shaft rear bearing into overdrive housing (Fig. 131).
(4) Using a suitable driver inserted through the rear end of housing, drive bearing from housing.

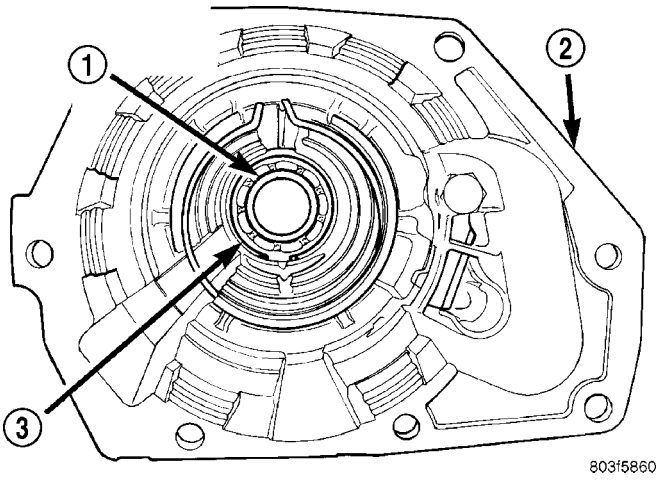


Fig. 131 Output Shaft Rear Bearing

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. 131).
(4) Install overdrive geartrain into housing.
(5) Install overdrive unit in vehicle.

OVERDRIVE CLUTCH

DESCRIPTION

The overdrive clutch (Fig. 132) 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 SWITCH

DESCRIPTION

The overdrive OFF (control) switch is located in the shift lever arm (Fig. 133). The switch is a momentary contact device that signals the PCM to toggle current status of the overdrive function.

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.

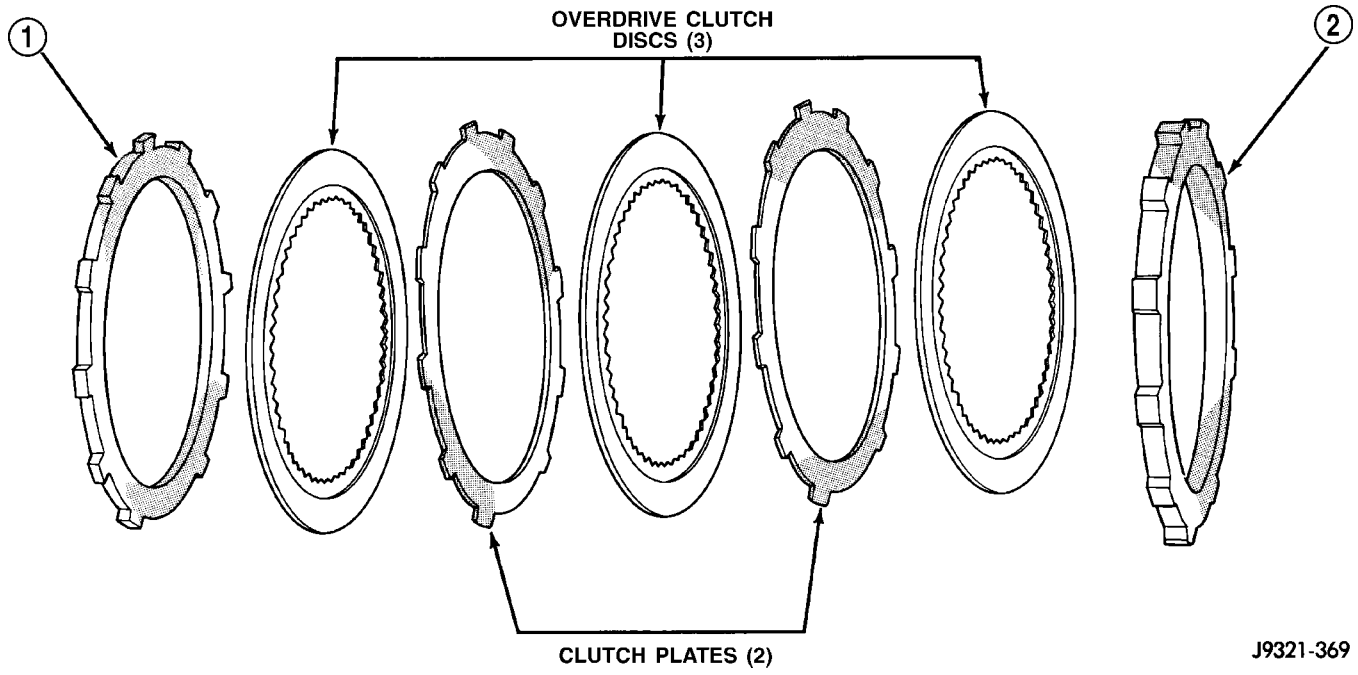


Fig. 132 Overdrive Clutch

1 - REACTION PLATE
2 - PRESSURE PLATE

OVERDRIVE SWITCH (Continued)

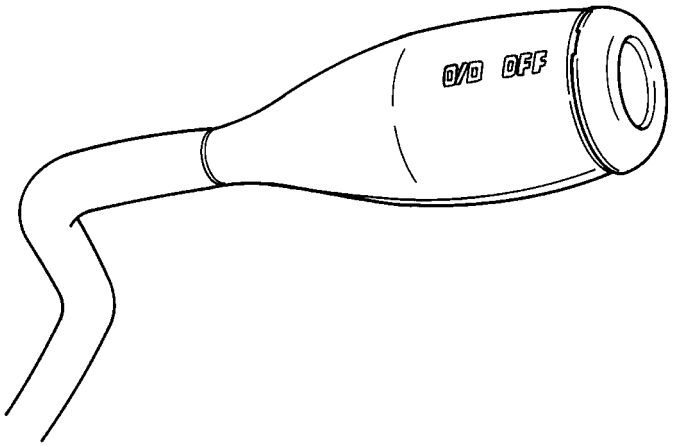


Fig. 133 Overdrive Off Switch

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. 134).

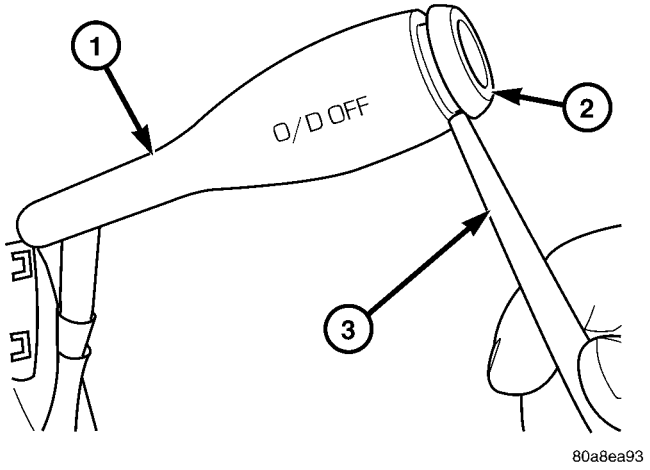


Fig. 134 Overdrive Off Switch Retainer

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. 135)

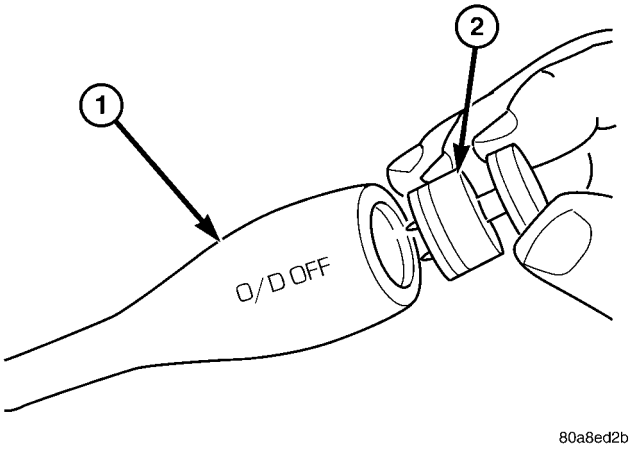


Fig. 135 Remove the Overdrive Off Switch

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. 136)

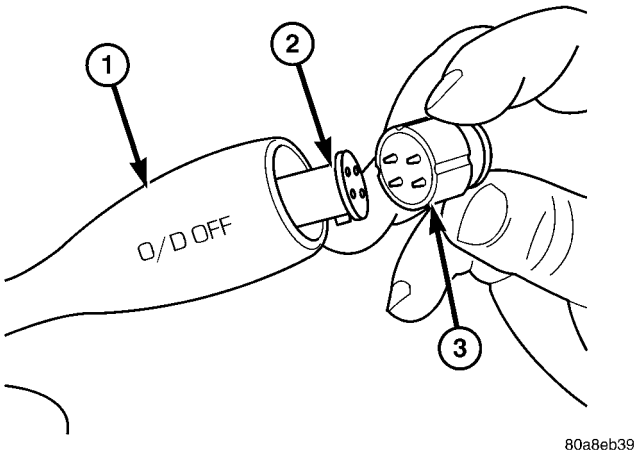


Fig. 136 Install the Overdrive Off Switch

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 necessary.
(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. 137).

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.

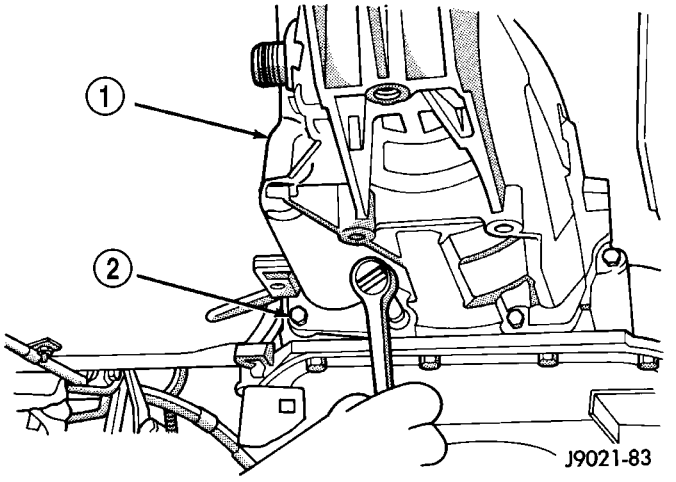


Fig. 137 Overdrive Unit Bolts

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. 138).
(2) Remove overdrive piston thrust bearing (Fig. 139).

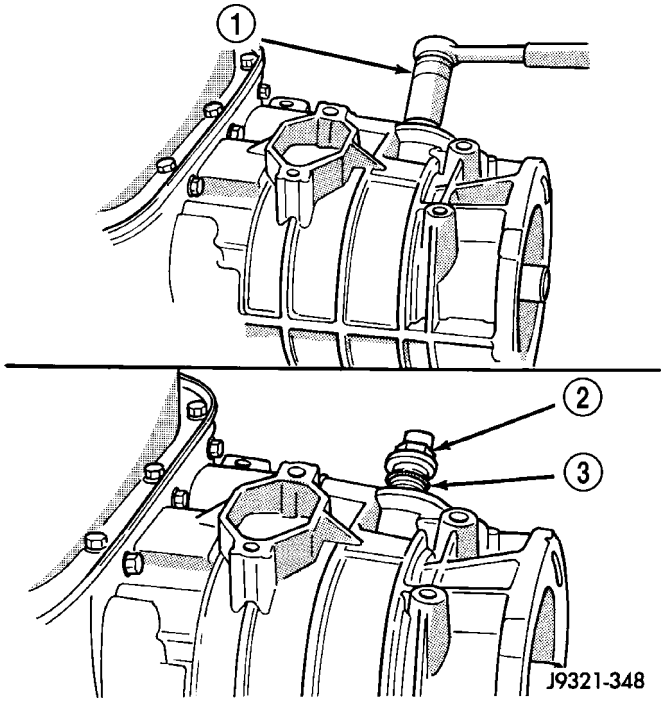


Fig. 138 Transmission Speed Sensor

1 - SOCKET AND WRENCH
2 - SPEED SENSOR
3 - O-RING

OVERDRIVE UNIT (Continued)

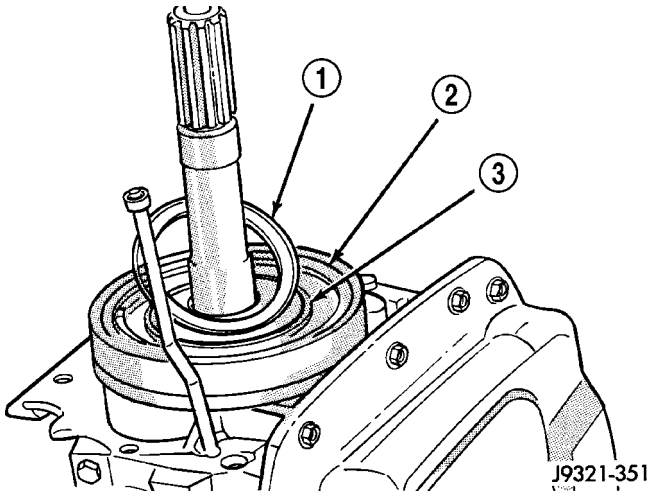


Fig. 139 Overdrive Piston Thrust Bearing Removal/ Installation

1 - THRUST BEARING
2 - OVERDRIVE PISTON
3 - THRUST PLATE

OVERDRIVE PISTON

(1) Remove overdrive piston thrust plate (Fig. 140). Retain thrust plate. It is a select fit part and may possibly be reused.

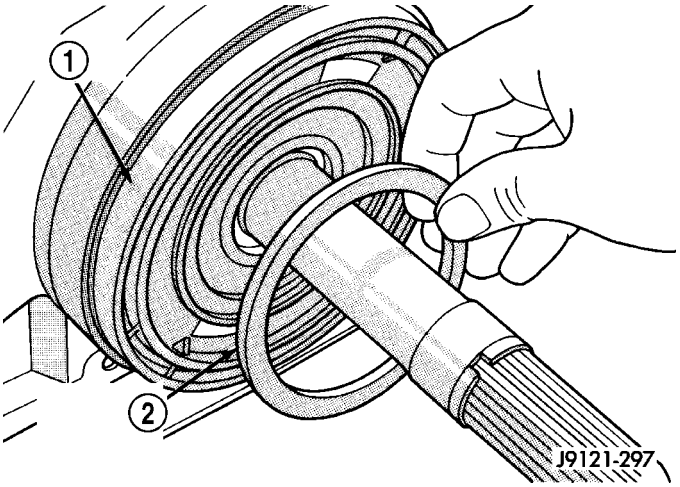


Fig. 140 Overdrive Piston Thrust Plate Removal/ Installation

1 - OVERDRIVE PISTON
2 - OVERDRIVE PISTON SPACER (SELECT FIT)

(2) Remove intermediate shaft spacer (Fig. 141). Retain spacer. It is a select fit part and may possibly be reused.

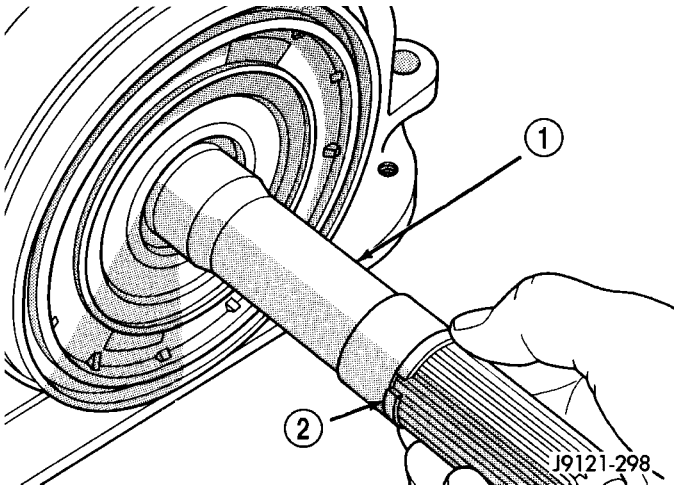


Fig. 141 Intermediate Shaft Spacer Location

1 - INTERMEDIATE SHAFT
2 - INTERMEDIATE SHAFT SPACER (SELECT FIT)

(3) Remove overdrive piston from retainer (Fig. 142).

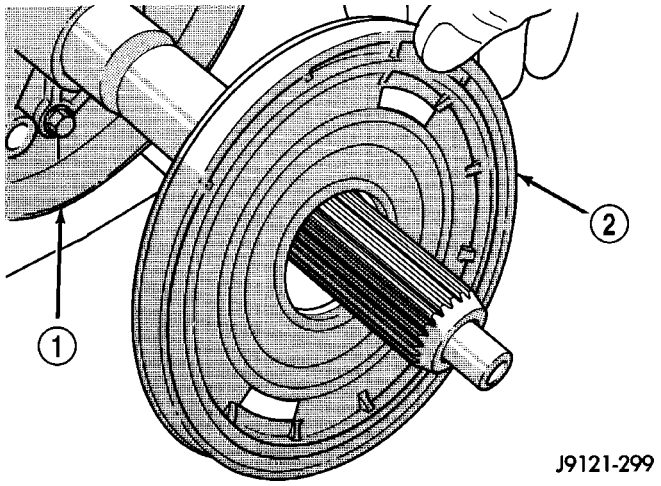


Fig. 142 Overdrive Piston Removal

1 - PISTON RETAINER
2 - OVERDRIVE PISTON

OVERDRIVE UNIT (Continued)

OVERDRIVE CLUTCH PACK

(1) Remove overdrive clutch pack wire retaining ring (Fig. 143).

(2) Remove overdrive clutch pack (Fig. 144).

(3) Note position of clutch pack components for assembly reference (Fig. 145).

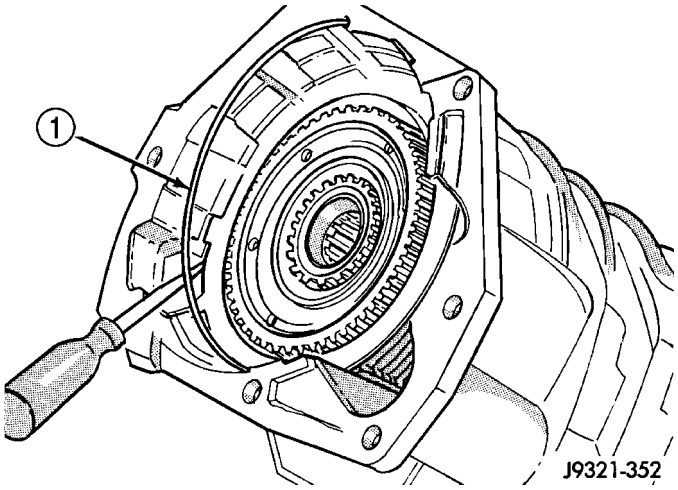


Fig. 143 Removing Overdrive Clutch Pack Retaining Ring

1 - OVERDRIVE CLUTCH PACK RETAINING RING

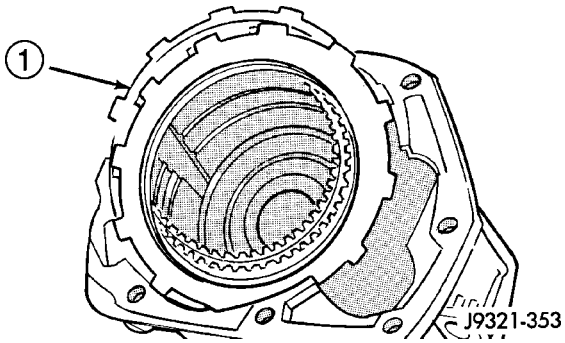


Fig. 144 Overdrive Clutch Pack Removal

1 - OVERDRIVE CLUTCH PACK

OVERDRIVE GEARTRAIN

(1) Remove overdrive clutch wave spring (Fig. 146).

(2) Remove overdrive clutch reaction snap-ring (Fig. 147). Note that snap-ring is located in same groove as wave spring.

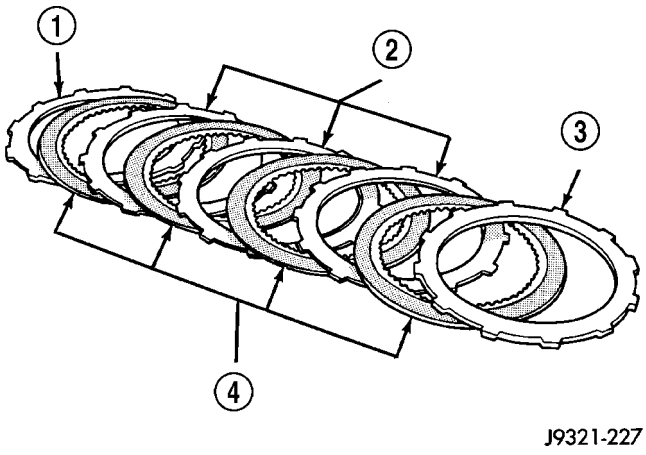


Fig. 145 Overdrive Clutch Component Position - Typical

1 - REACTION PLATE
2 - CLUTCH PLATES (3)
3 - PRESSURE PLATE
4 - CLUTCH DISCS (4)

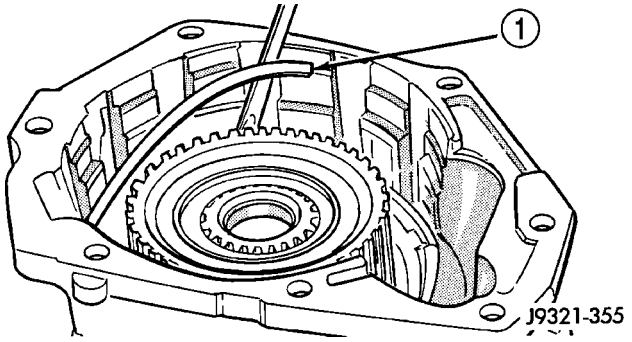


Fig. 146 Overdrive Clutch Wave Spring Removal

1 - WAVE SPRING

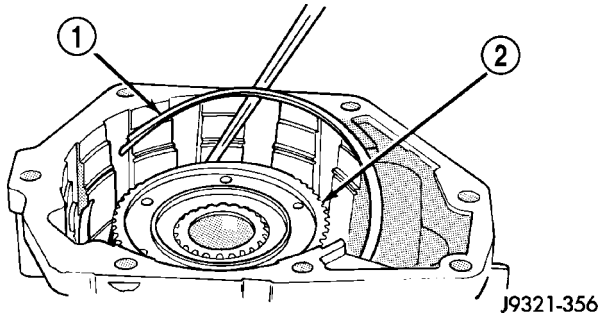


Fig. 147 Overdrive Clutch Reaction Snap-Ring Removal

1 - REACTION RING
2 - CLUTCH HUB

OVERDRIVE UNIT (Continued)

(3) Remove Torx™ head screws that attach access cover and gasket to overdrive case (Fig. 148).

(4) Remove access cover and gasket (Fig. 149).

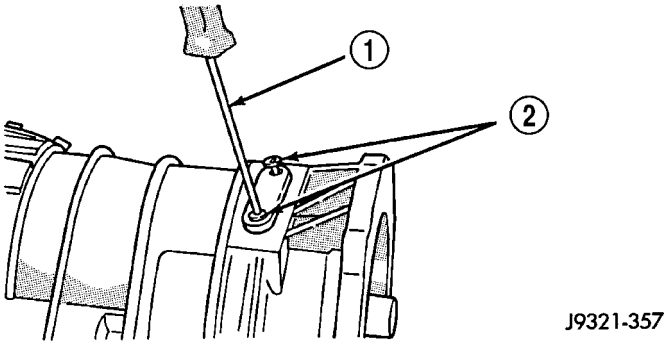


Fig. 148 Access Cover Screw Removal

1 - TORX SCREWDRIVER (T25)
2 - ACCESS COVER SCREWS

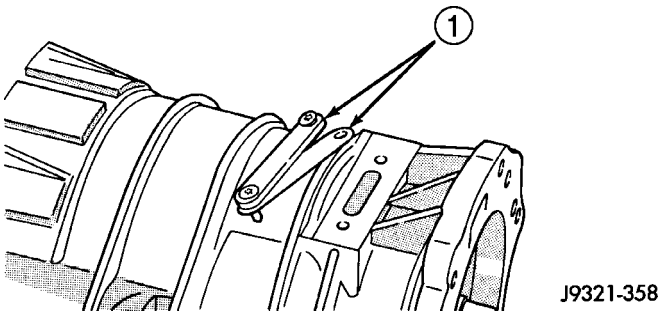


Fig. 149 Access Cover And Gasket Removal

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. 150).

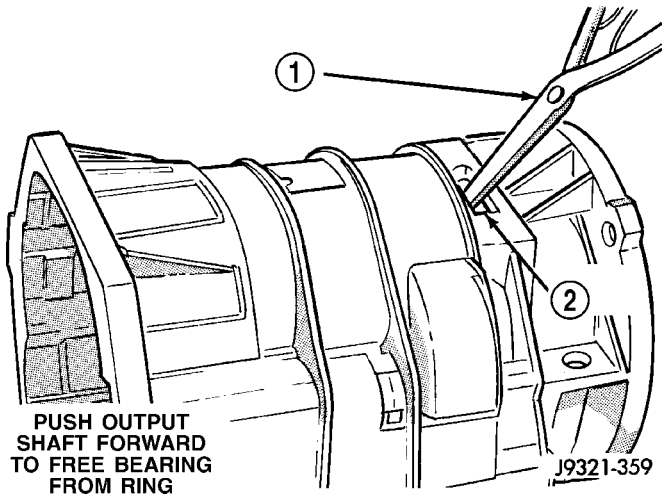


Fig. 150 Releasing Bearing From Locating Ring

1 - EXPAND BEARING LOCATING RING WITH SNAP-RING PLIERS
2 - ACCESS HOLE

(6) Lift gear case up and off geartrain assembly (Fig. 151).

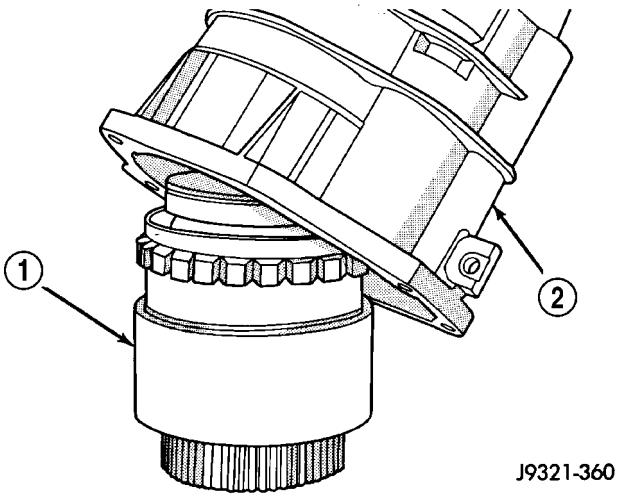


Fig. 151 Removing Geartrain

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. 152).

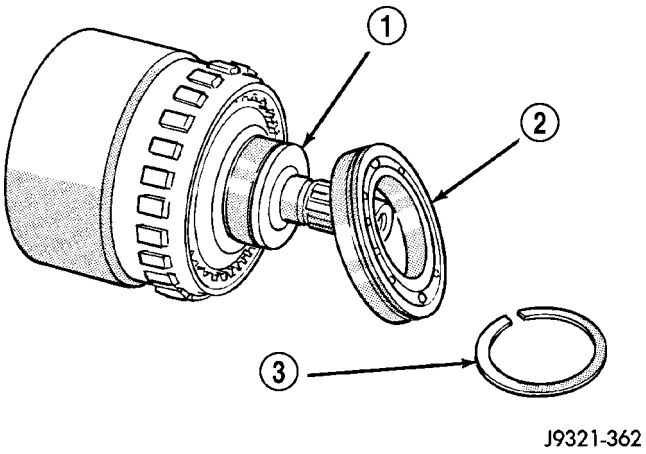


Fig. 152 Rear Bearing Removal

1 - OUTPUT SHAFT
2 - REAR BEARING
3 - SNAP-RING

OVERDRIVE UNIT (Continued)

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. 153).
(2) Position Compressor Tool 6227-1 on clutch hub (Fig. 153). 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. 153).

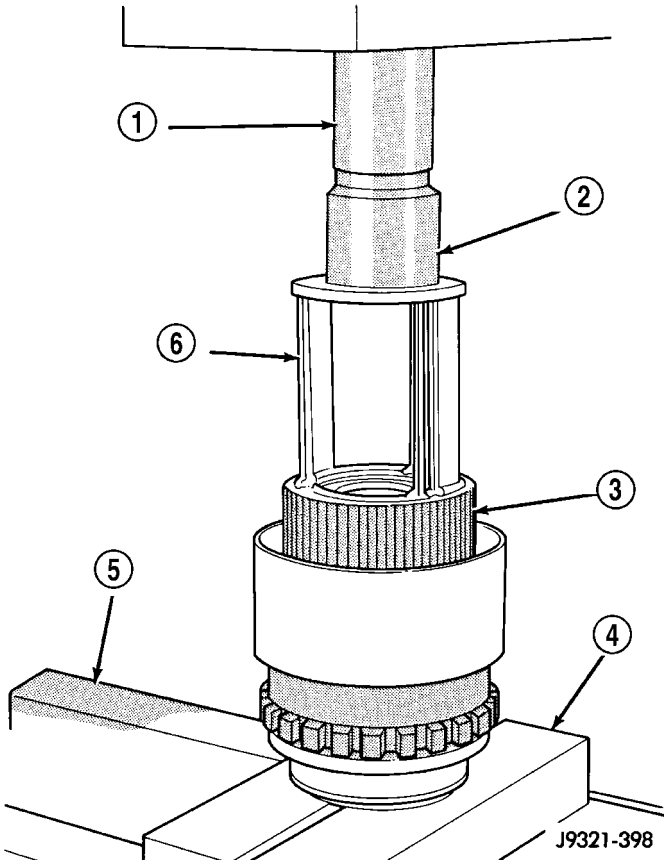


Fig. 153 Geartrain Mounted In Shop Press

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

(4) Remove direct clutch pack snap-ring (Fig. 154).
(5) Remove direct clutch hub retaining ring (Fig. 155).

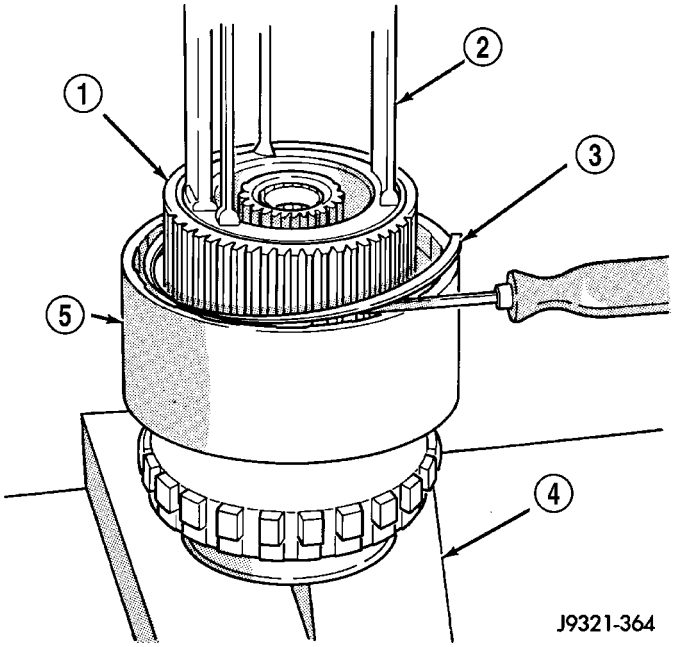


Fig. 154 Direct Clutch Pack Snap-Ring Removal

1 - CLUTCH HUB
2 - SPECIAL TOOL 6227-1
3 - DIRECT CLUTCH PACK SNAP-RING
4 - PRESS PLATES
5 - CLUTCH DRUM

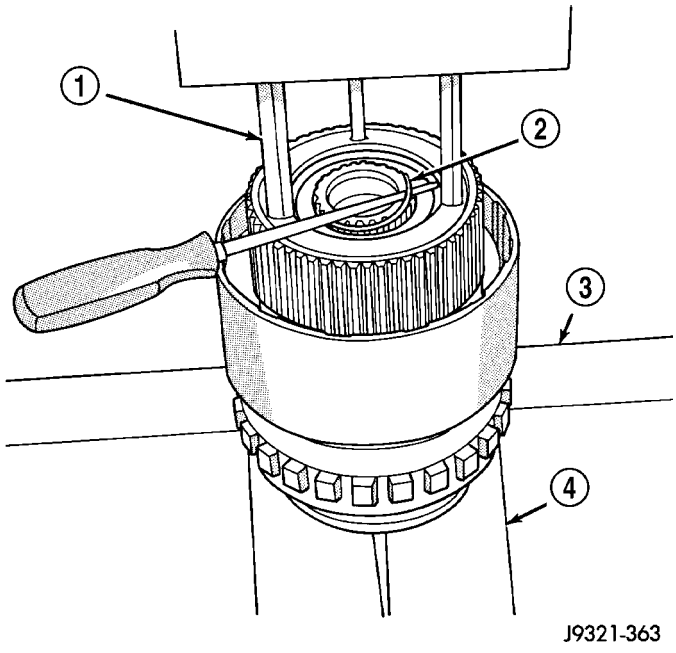


Fig. 155 Direct Clutch Hub Retaining Ring Removal

1 - SPECIAL TOOL 6227-1
2 - CLUTCH HUB RETAINING RING
3 - PRESS BED
4 - PRESS PLATES

OVERDRIVE UNIT (Continued)

(6) Release press load slowly and completely (Fig. 156).

(7) Remove Special Tool 6227-1. Then remove clutch pack from hub (Fig. 156).

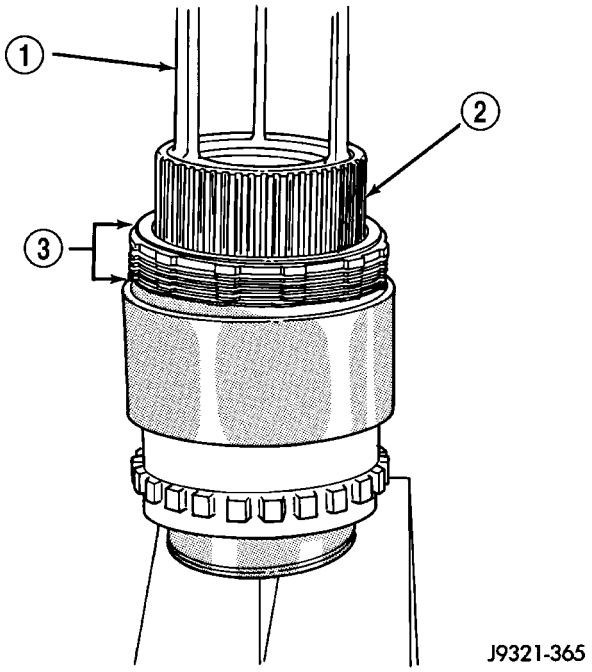


Fig. 156 Direct Clutch Pack Removal

1 - SPECIAL TOOL 6227-1
2 - DIRECT CLUTCH HUB
3 - DIRECT CLUTCH PACK

GEARTRAIN

(1) Remove direct clutch hub and spring (Fig. 157).

(2) Remove sun gear and spring plate. Then remove planetary thrust bearing and planetary gear (Fig. 158).

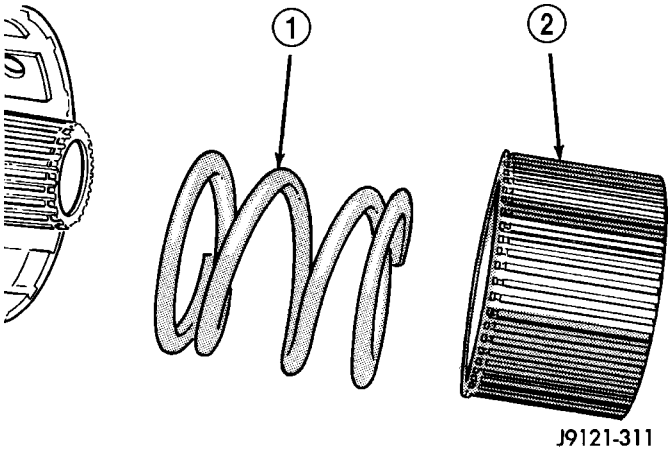


Fig. 157 Direct Clutch Hub And Spring Removal

1 - DIRECT CLUTCH SPRING
2 - DIRECT CLUTCH HUB

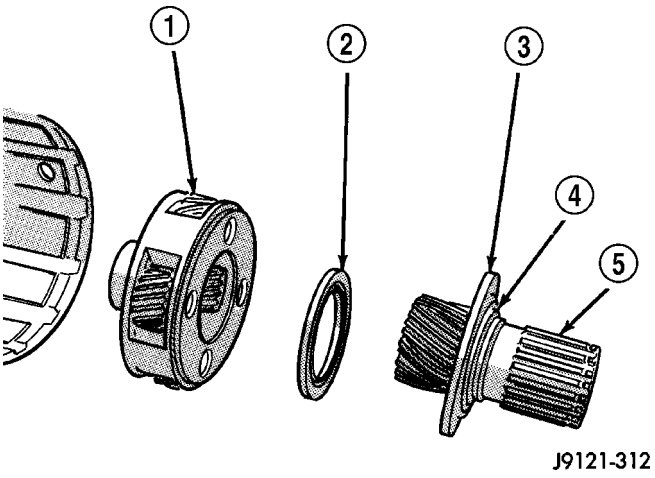


Fig. 158 Removing Sun Gear, Thrust Bearing And Planetary Gear

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. 159). Insert pliers into clutch hub. Expand pliers to grip hub splines and remove clutch with counterclockwise, twisting motion.

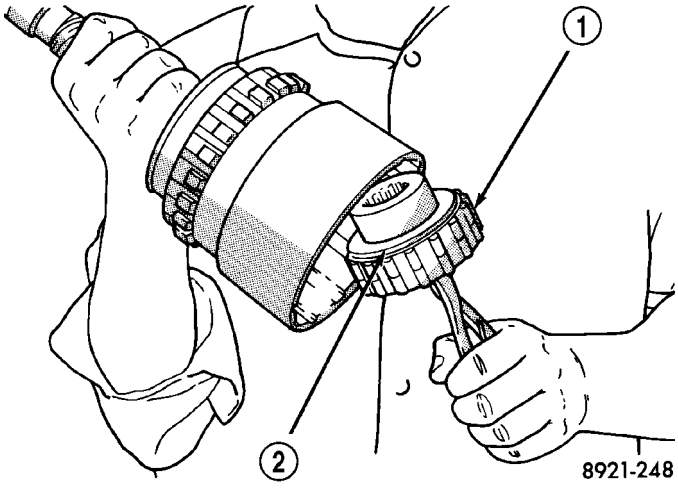


Fig. 159 Overrunning Clutch Assembly Removal/ Installation

1 - OVERRUNNING CLUTCH
2 - NEEDLE BEARING

OVERDRIVE UNIT (Continued)

(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. 160). Use small center punch or scriber to make alignment marks.

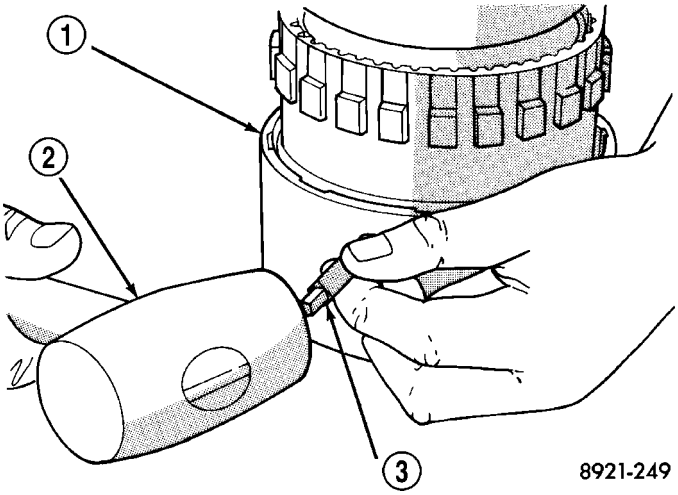


Fig. 160 Marking Direct Clutch Drum And Annulus Gear For Assembly Alignment

1 - DIRECT CLUTCH DRUM
2 - HAMMER
3 - PUNCH

(7) Remove direct clutch drum rear retaining ring (Fig. 161).

(8) Remove direct clutch drum outer retaining ring (Fig. 162).

(9) Mark annulus gear and output shaft for assembly alignment reference (Fig. 163). Use punch or scriber to mark gear and shaft.

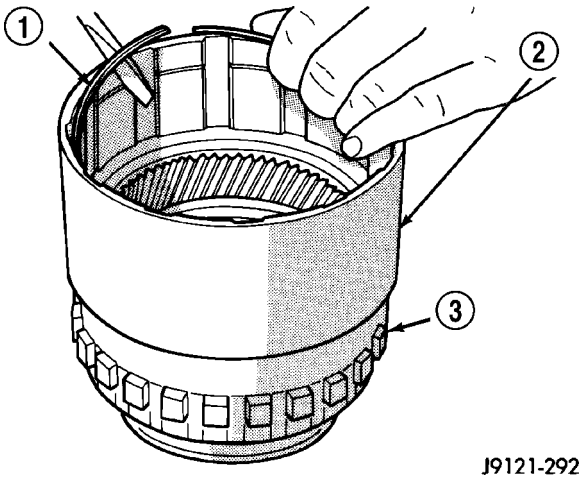


Fig. 161 Clutch Drum Inner Retaining Ring Removal

1 - INNER RETAINING RING
2 - DIRECT CLUTCH DRUM
3 - ANNULUS GEAR

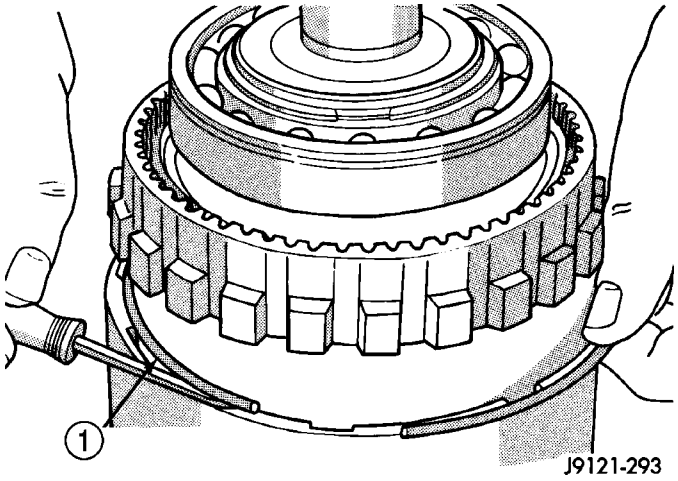


Fig. 162 Clutch Drum Outer Retaining Ring Removal

1 - OUTER RETAINING RING

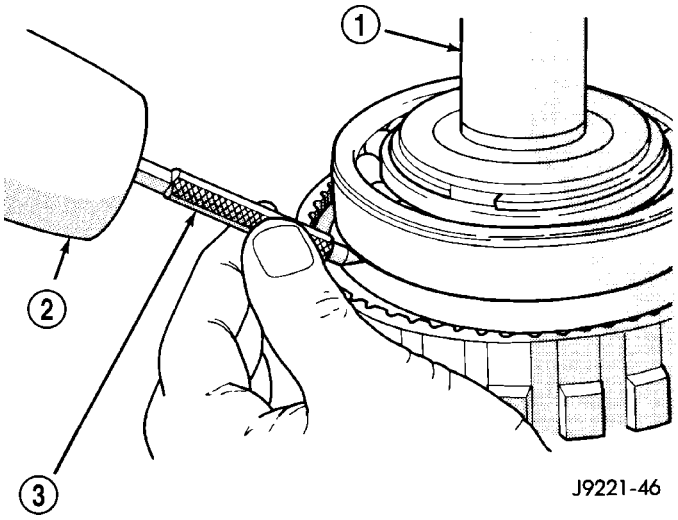


Fig. 163 Marking Annulus Gear And Output Shaft For Assembly Alignment

1 - OUTPUT SHAFT
2 - HAMMER
3 - PUNCH

OVERDRIVE UNIT (Continued)

(10) Remove snap-ring that secures annulus gear on output shaft (Fig. 164). Use two screwdrivers to unseat and work snap-ring out of groove as shown.

(11) Remove annulus gear from output shaft (Fig. 165). Use rawhide or plastic mallet to tap gear off shaft.

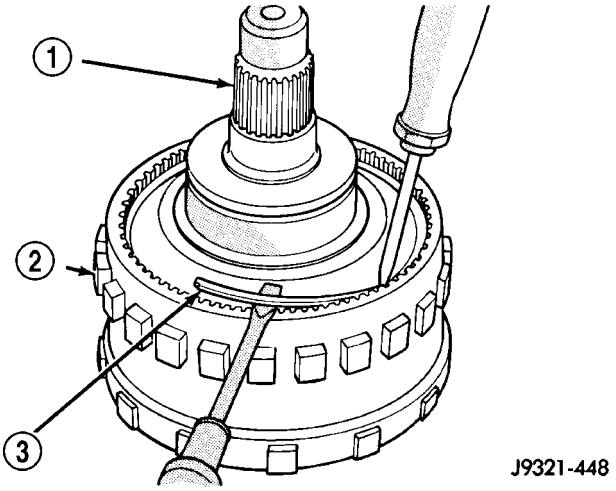


Fig. 164 Annulus Gear Snap-Ring Removal

1 - OUTPUT SHAFT
2 - ANNULUS GEAR
3 - SNAP-RING

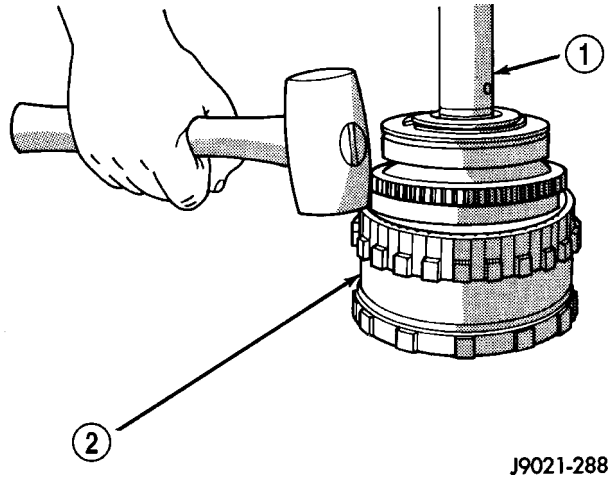


Fig. 165 Annulus Gear Removal

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, Automatic 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. 166). Lubricate bushings with petroleum jelly, or transmission fluid.

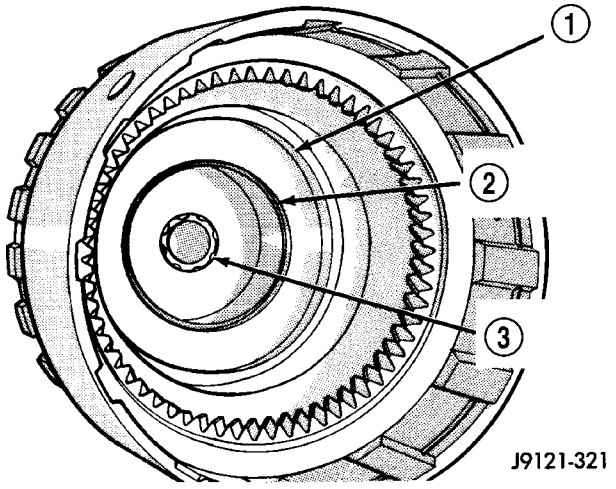


Fig. 166 Output Shaft Pilot Bushing

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. 167).

(4) Align and install clutch drum on annulus gear (Fig. 168). Be sure drum is engaged in annulus gear lugs.

(5) Install clutch drum outer retaining ring (Fig. 168).

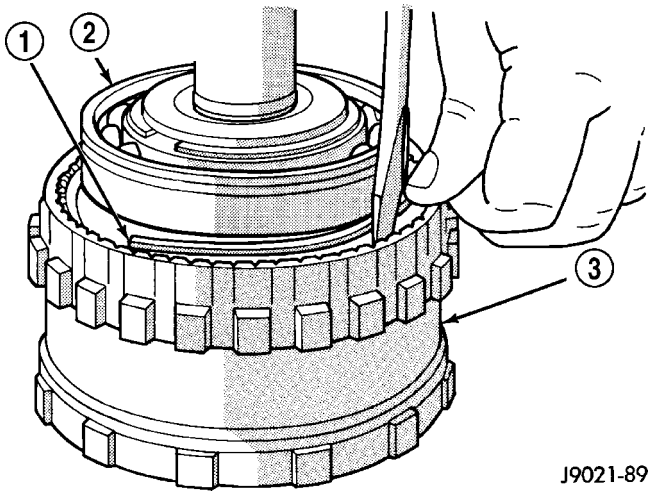


Fig. 167 Annulus Gear Installation

1 - SNAP-RING
2 - OUTPUT SHAFT FRONT BEARING
3 - ANNULUS GEAR

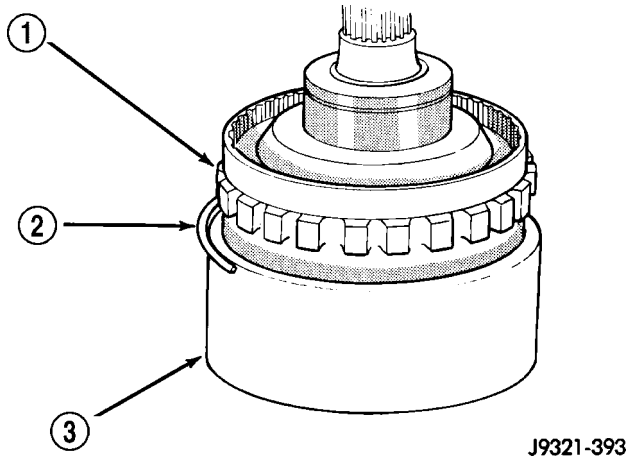


Fig. 168 Clutch Drum And Outer Retaining Ring Installation

1 - ANNULUS GEAR
2 - OUTER SNAP-RING
3 - CLUTCH DRUM

OVERDRIVE UNIT (Continued)

(6) Slide clutch drum forward and install inner retaining ring (Fig. 169).

(7) Install rear bearing and snap ring on output shaft (Fig. 170). Be sure locating ring groove in bearing is toward rear.

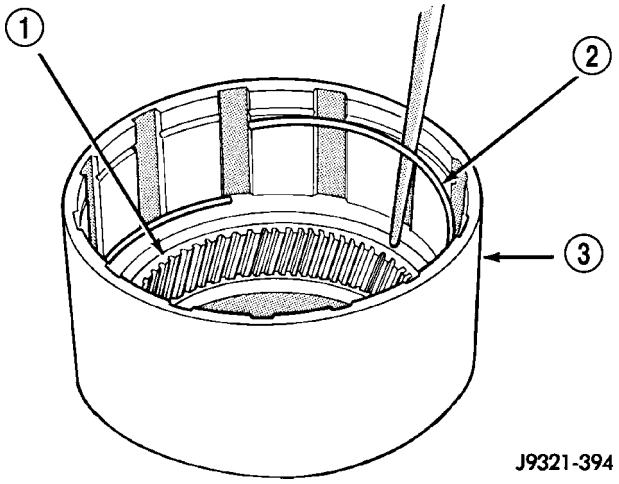


Fig. 169 Clutch Drum Inner Retaining Ring Installation

1 - ANNULUS GEAR
2 - INNER SNAP-RING
3 - CLUTCH DRUM

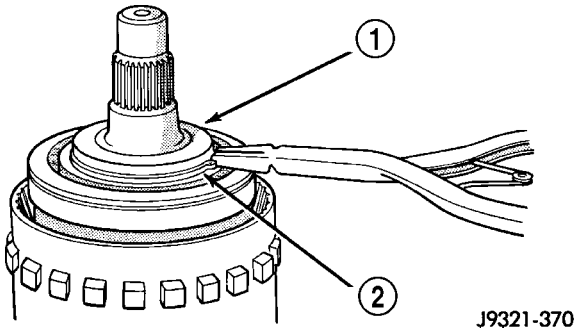


Fig. 170 Rear Bearing And Snap-Ring Installation

1 - REAR BEARING
2 - SNAP-RING

(8) Install overrunning clutch on hub (Fig. 171). 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.

(10) Install overrunning clutch in output shaft (Fig. 172). Insert snap ring pliers in hub splines. Expand pliers to grip hub. Then install assembly with counterclockwise, twisting motion.

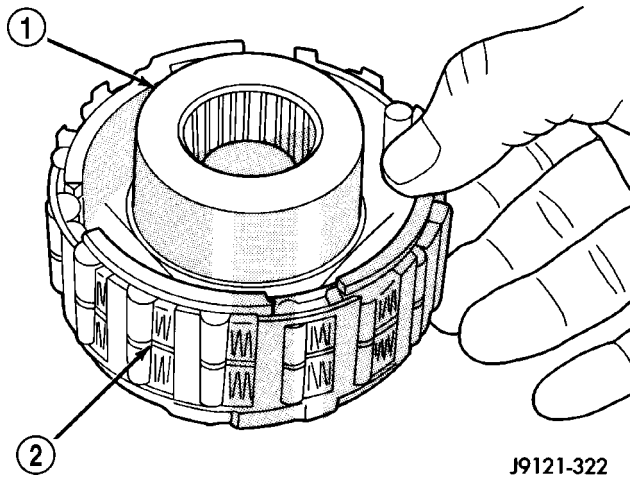


Fig. 171 Assembling Overrunning Clutch And Hub

1 - CLUTCH HUB
2 - OVERRUNNING CLUTCH

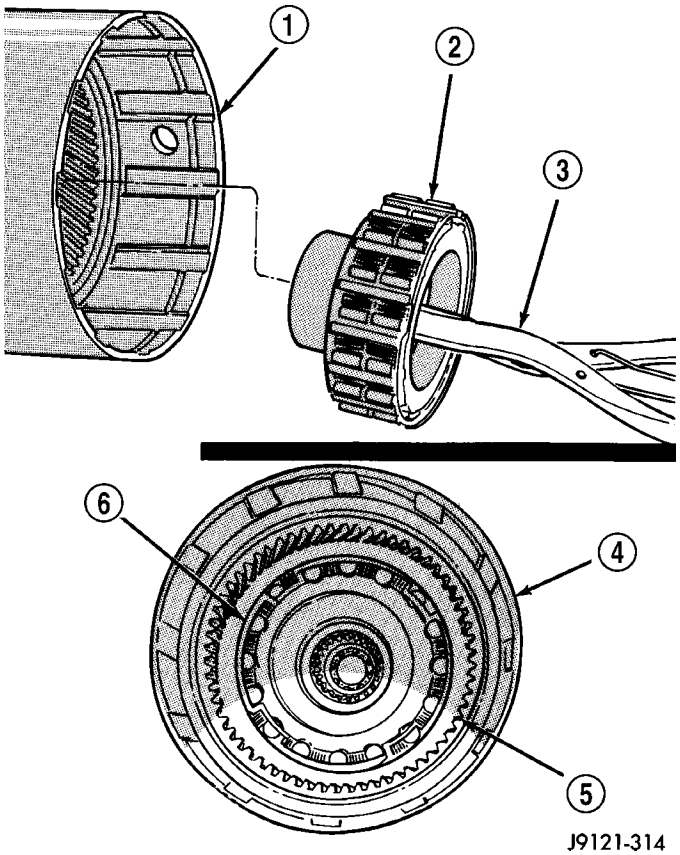


Fig. 172 Overrunning Clutch Installation

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

OVERDRIVE UNIT (Continued)

(11) Install planetary gear in annulus gear (Fig. 173). Be sure planetary pinions are fully seated in annulus gear before proceeding.

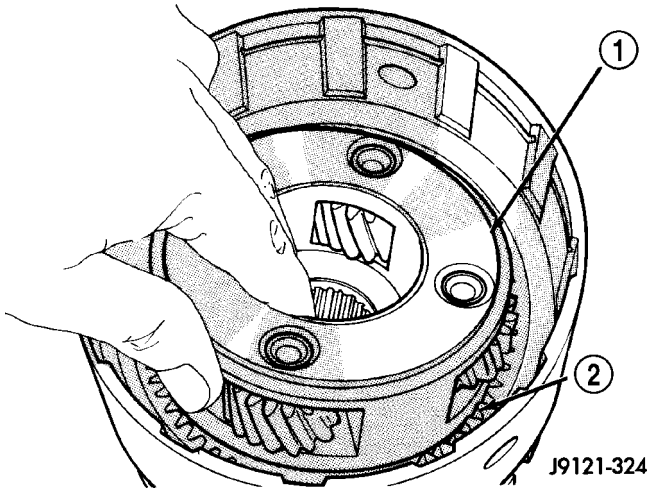


Fig. 173 Planetary Gear Installation

1 - PLANETARY GEAR
2 - ANNULUS GEAR

(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. 174). 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. 175). Be sure sun gear and thrust bearing are fully seated before proceeding.

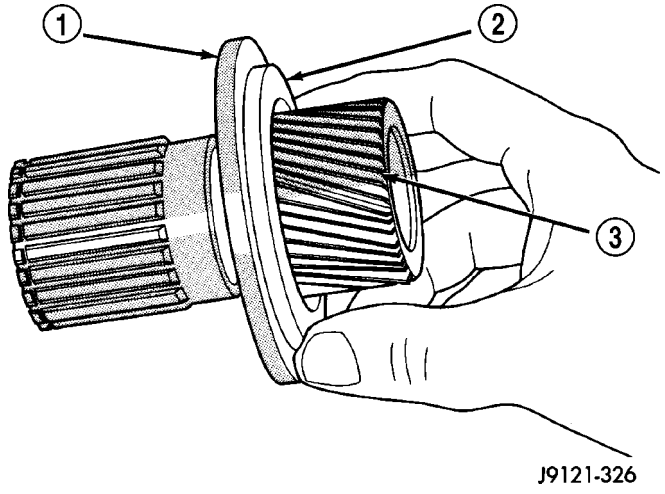


Fig. 174 Planetary Thrust Bearing Installation

1 - SPRING PLATE
2 - PLANETARY THRUST BEARING
3 - SUN GEAR

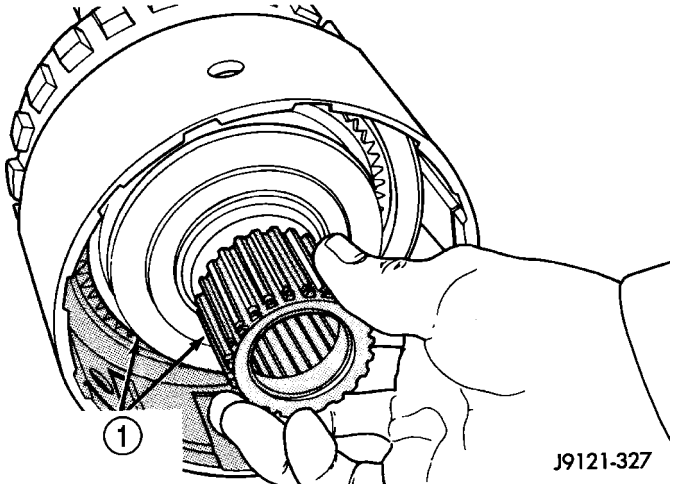


Fig. 175 Sun Gear Installation

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. 176). Insert tool through sun gear and into splines of both hubs. Be sure alignment tool is fully seated before proceeding.

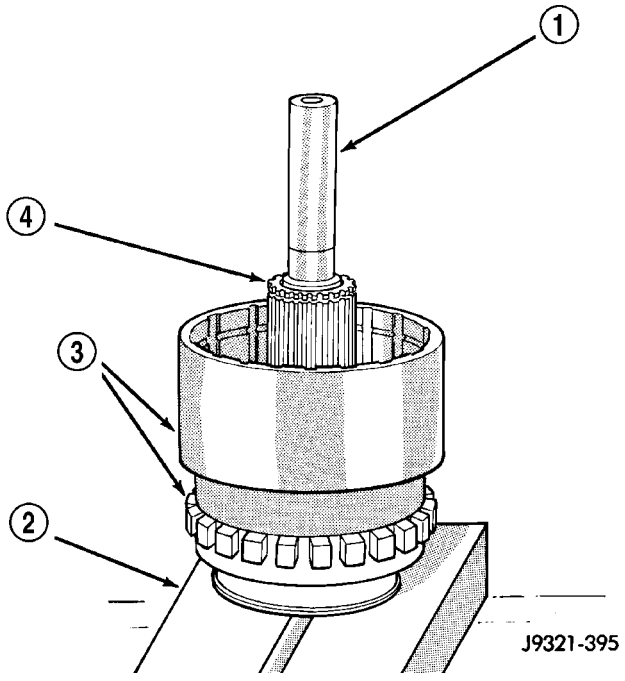


Fig. 176 Alignment Tool Installation

1 - SPECIAL TOOL 6227-2
2 - PRESS PLATES
3 - ASSEMBLED DRUM AND ANNULUS GEAR
4 - SUN GEAR

OVERDRIVE UNIT (Continued)

(17) Install direct clutch spring (Fig. 177). Be sure spring is properly seated on spring plate.

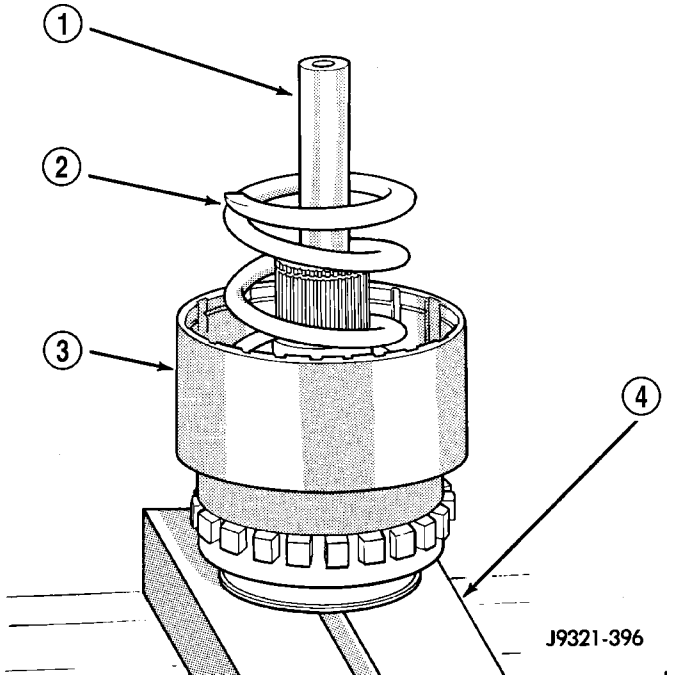


Fig. 177 Direct Clutch Spring Installation

1 - SPECIAL TOOL 6227-2
2 - DIRECT CLUTCH SPRING
3 - CLUTCH HUB
4 - PRESS PLATES

NOTE: The direct clutch in a 46RE transmission uses 8 clutch discs.

(18) Assemble and install direct clutch pack on hub as follows:

(a) Assemble clutch pack components (Fig. 178).

(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. 179).

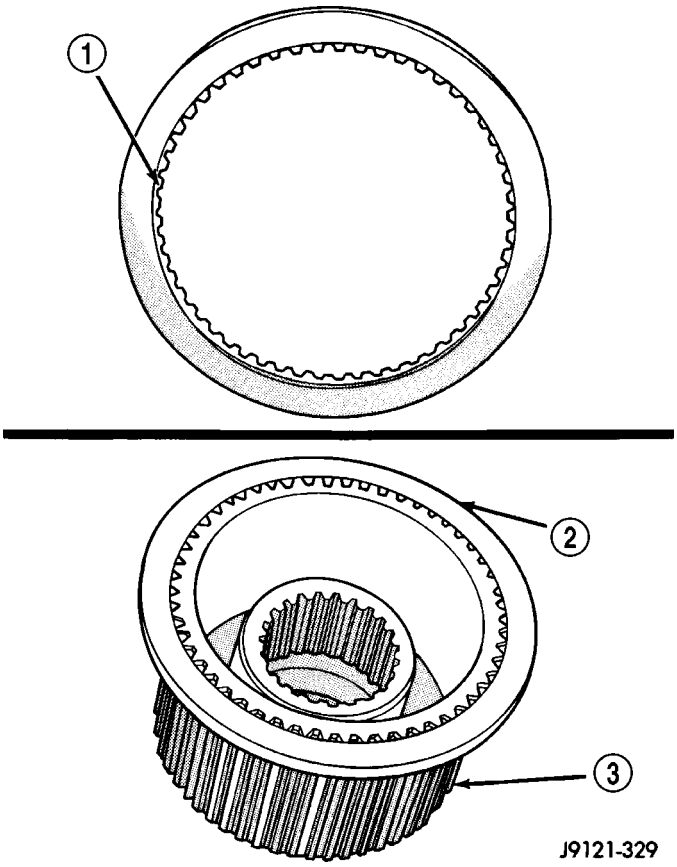


Fig. 179 Correct Position Of Direct Clutch Reaction Plate

1 - REACTION PLATE COUNTERBORE
2 - DIRECT CLUTCH REACTION PLATE (FLUSH WITH END OF HUB)
3 - CLUTCH HUB

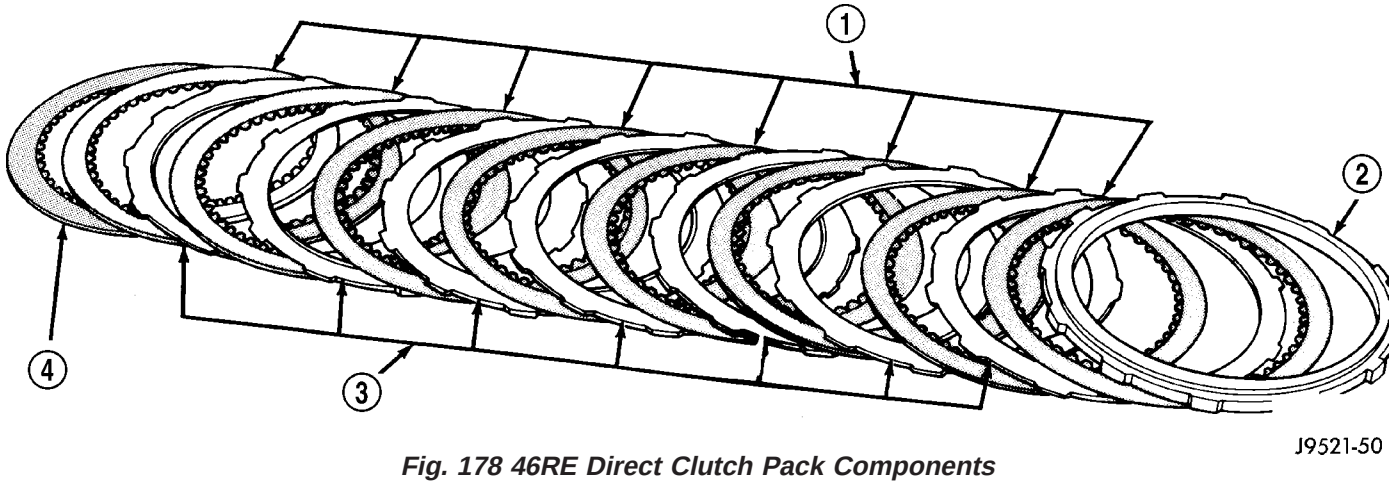


Fig. 178 46RE Direct Clutch Pack Components

1 - CLUTCH DISCS (8)
2 - PRESSURE PLATE
3 - CLUTCH PLATES (7)
4 - REACTION PLATE

OVERDRIVE UNIT (Continued)

(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. 180).

(19) Install clutch hub and clutch pack on direct clutch spring (Fig. 181). Be sure hub is started on sun gear splines before proceeding.

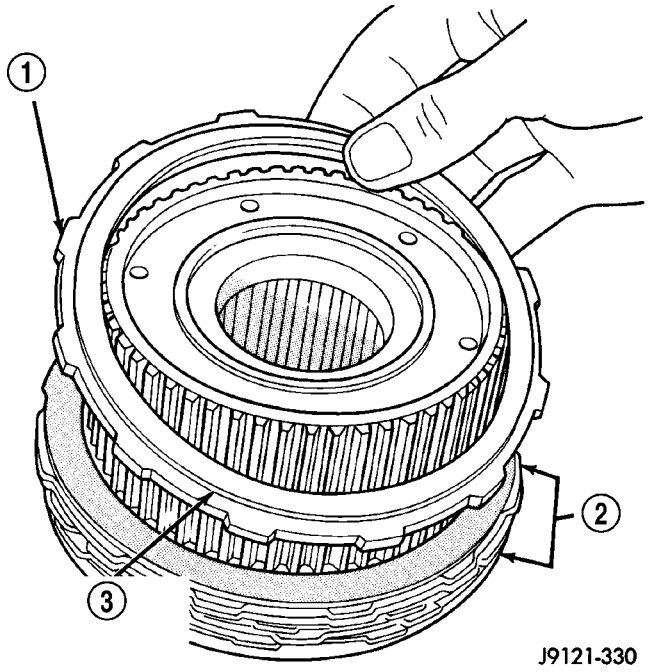


Fig. 180 Correct Position Of Direct Clutch

1 - DIRECT CLUTCH PRESSURE PLATE
2 - CLUTCH PACK
3 - BE SURE SHOULDER SIDE OF PLATE FACES UPWARD

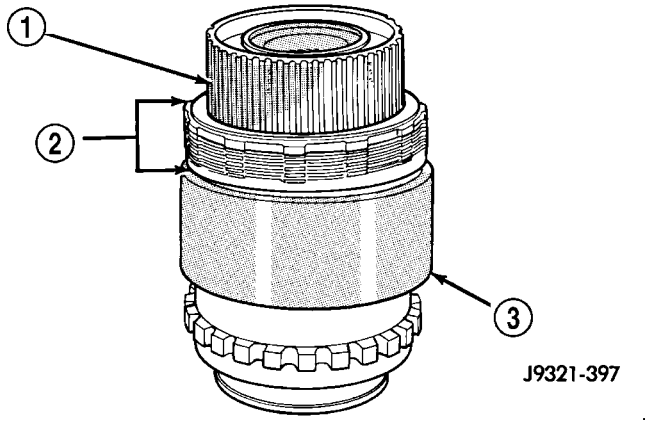


Fig. 181 Direct Clutch Pack And Clutch Hub Installation

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. 182). Be very sure snap ring is fully seated in clutch drum ring groove.

(25) Install clutch hub retaining ring (Fig. 183). 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.

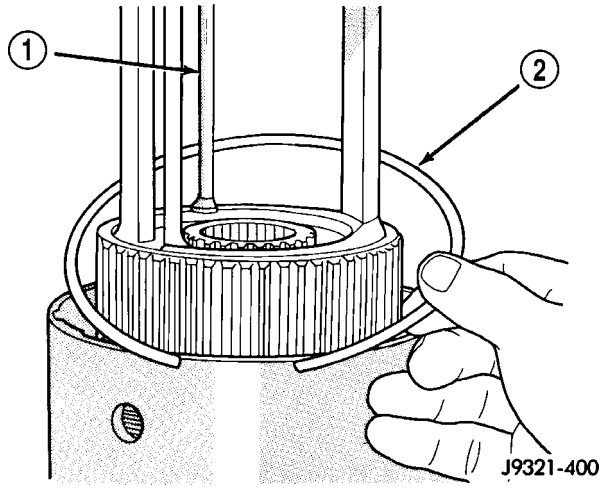


Fig. 182 Direct Clutch Pack Snap-Ring Installation

1 - SPECIAL TOOL 6227-1
2 - DIRECT CLUTCH PACK SNAP-RING

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.

OVERDRIVE UNIT (Continued)

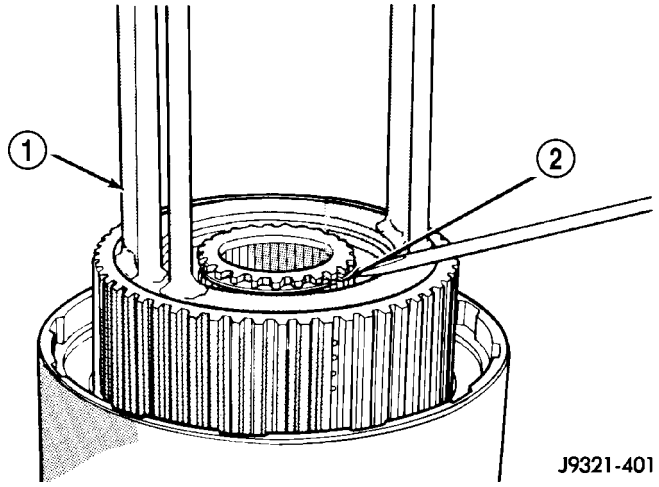


Fig. 183 Clutch Hub Retaining Ring Installation

1 - SPECIAL TOOL 6227-1
2 - CLUTCH HUB RETAINING RING

(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. 184). Be sure pin is seated in hole in case before installing snap ring.

(4) Install reaction plug snap-ring (Fig. 185). Compress snap ring only enough for installation; do not distort it.

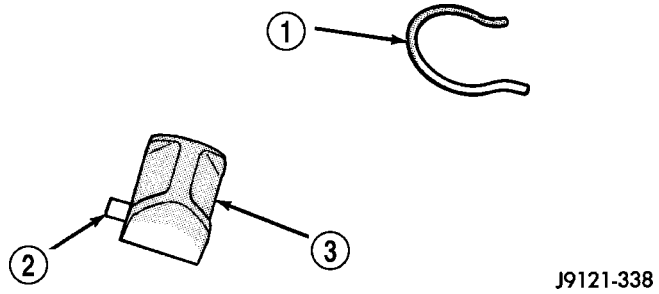


Fig. 184 Reaction Plug Locating Pin And Snap-Ring

1 - REACTION PLUG SNAP-RING (DO NOT OVERCOMPRESS TO INSTALL)
2 - LOCATING PIN
3 - PARK LOCK REACTION PLUG

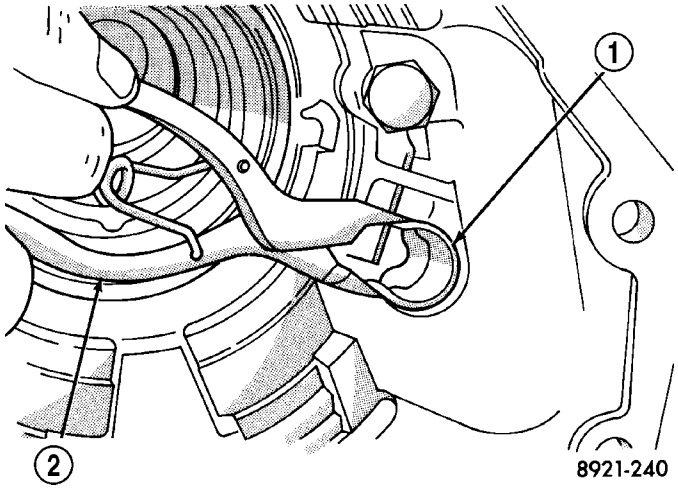


Fig. 185 Reaction Plug And Snap-Ring Installation

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. 186).

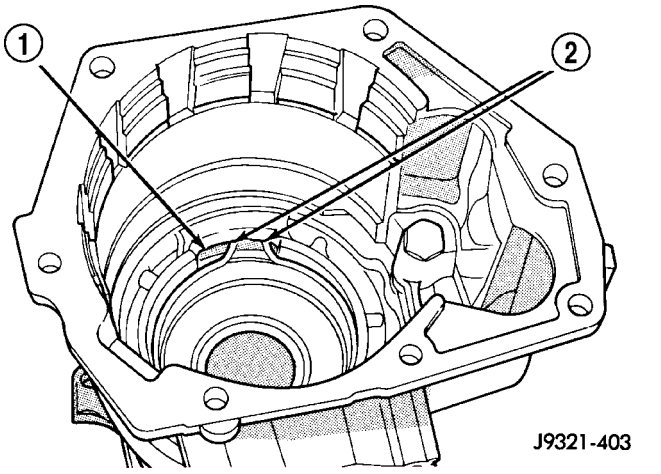


Fig. 186 Correct Rear Bearing Locating Ring Position

1 - CASE ACCESS HOLE
2 - TAB ENDS OF LOCATING RING

OVERDRIVE UNIT (Continued)

(7) Support geartrain on Tool 6227-1 (Fig. 187). Be sure tool is securely seated in clutch hub.

(8) Install overdrive gear case on geartrain (Fig. 187).

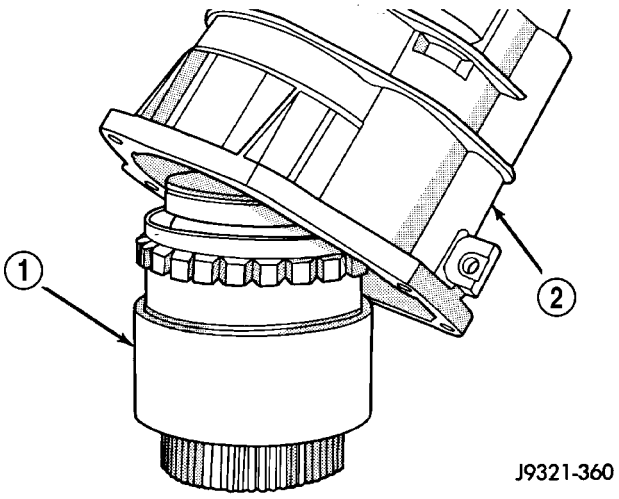


Fig. 187 Overdrive Gear Case Installation

1 - GEARTRAIN ASSEMBLY
2 - GEAR CASE

(9) Expand front bearing locating ring with snap ring pliers (Fig. 188). 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. 189).

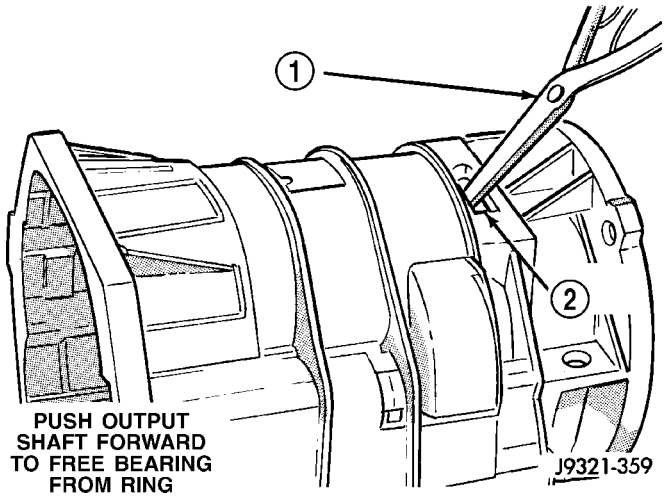


Fig. 188 Seating Locating Ring In Rear Bearing

1 - EXPAND BEARING LOCATING RING WITH SNAP-RING PLIERS
2 - ACCESS HOLE

OVERDRIVE CLUTCH

NOTE: The overdrive clutch in a 46RE transmission uses 4 clutch discs.

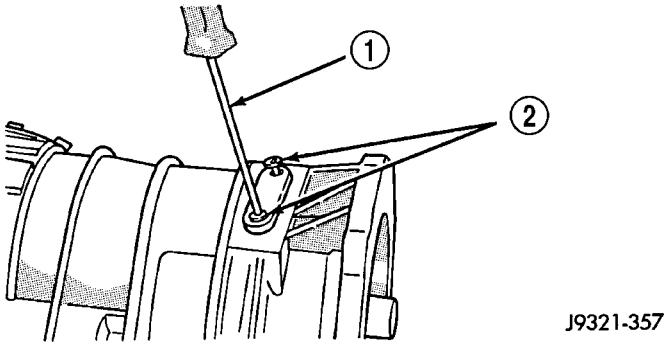


Fig. 189 Locating Ring Access Cover And Gasket Installation

1 - TORX SCREWDRIVER (T25)
2 - ACCESS COVER SCREWS

(1) Install overdrive clutch reaction ring first. Reaction ring is flat with notched ends (Fig. 190).

(2) Install wave spring on top of reaction ring (Fig. 191). 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.

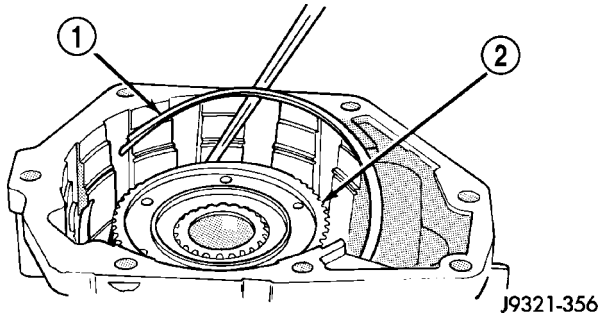


Fig. 190 Overdrive Clutch Reaction Ring Installation

1 - REACTION RING
2 - CLUTCH HUB

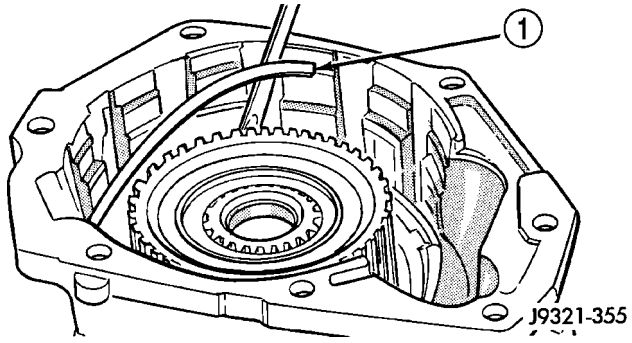


Fig. 191 Overdrive Clutch Wave Spring Installation

1 - WAVE SPRING

OVERDRIVE UNIT (Continued)

(3) Assemble overdrive clutch pack (Fig. 192).

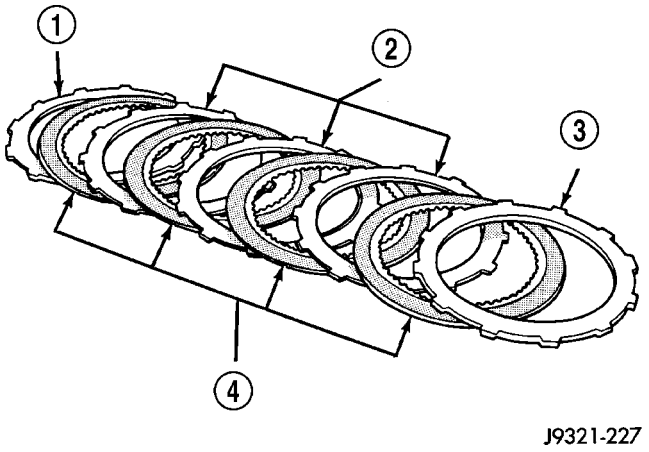


Fig. 192 46RE Overdrive Clutch Components

1 - REACTION PLATE
2 - CLUTCH PLATES (3)
3 - PRESSURE PLATE
4 - CLUTCH DISCS (4)

(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. 193).

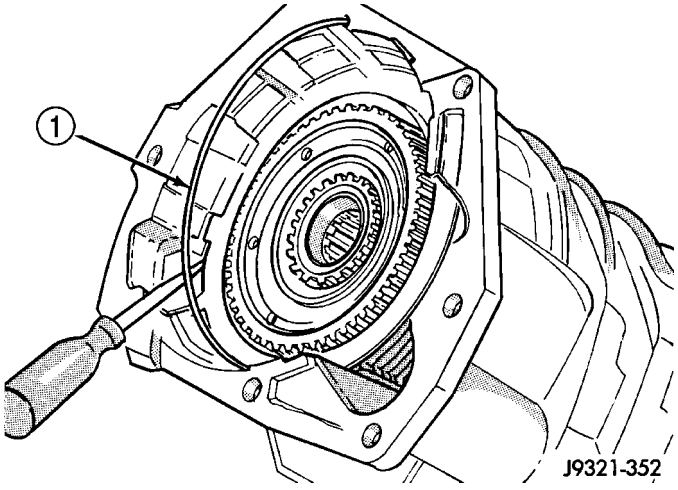


Fig. 193 Overdrive Clutch Pack Retaining Ring Installation

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. 194). 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. 194).

(d) Select proper thickness end play spacer from spacer chart based on distance measured (Fig. 195).

(e) Remove Gauge Alignment Tool 6312.

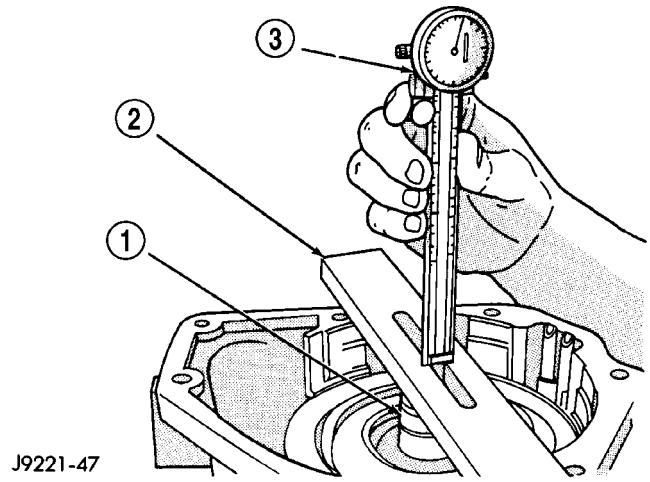


Fig. 194 Shaft End Play Measurement

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. 195 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. 196).

(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. 197).

(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.

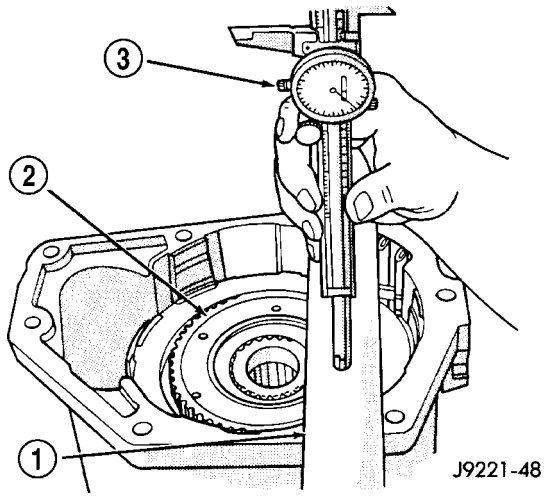


Fig. 196 Overdrive Piston Thrust Plate Measurement

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.

(5) Install overdrive piston in overdrive piston retainer by:

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. 197 Overdrive Piston Thrust Plate Selection

(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. 198).

(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.

(6) Install selective spacer on intermediate shaft, if removed. Spacer goes in groove just rearward of shaft rear splines (Fig. 199).

OVERDRIVE UNIT (Continued)

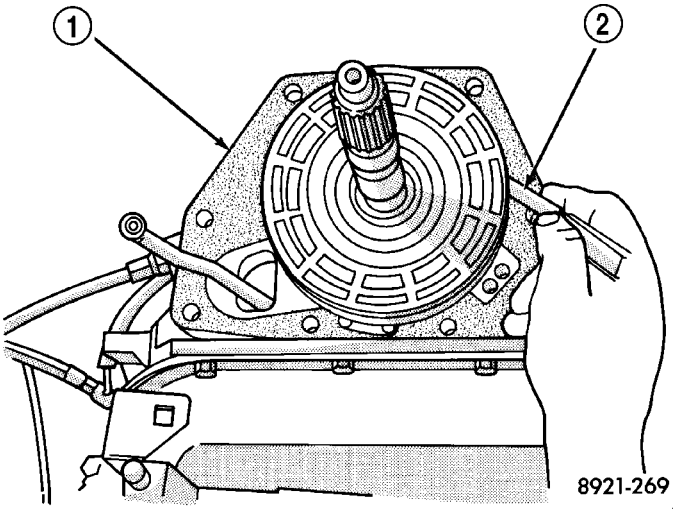


Fig. 198 Trimming Overdrive Case Gasket

1 - GASKET
2 - SHARP KNIFE

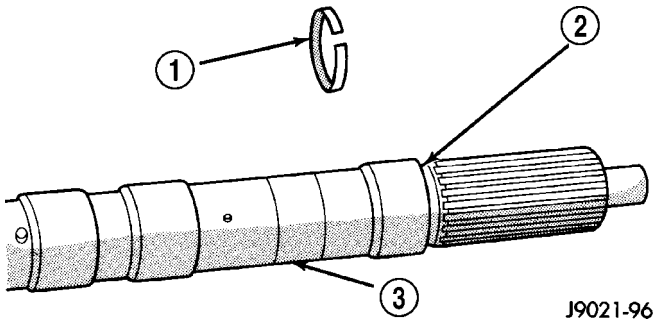


Fig. 199 Intermediate Shaft Selective Spacer Location

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. 200) 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.

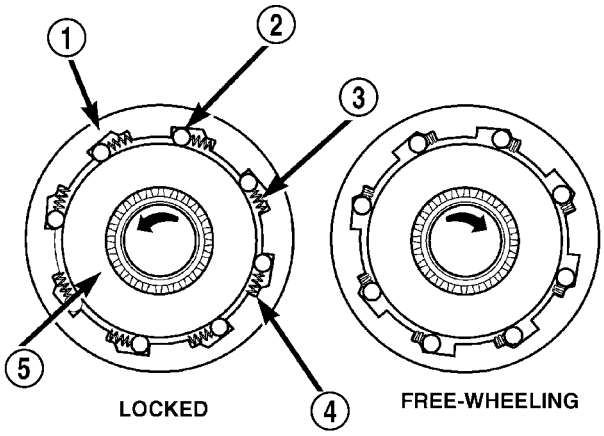


Fig. 200 Overrunning Clutch

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

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER (Continued)

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. 201).
(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. 202). 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.

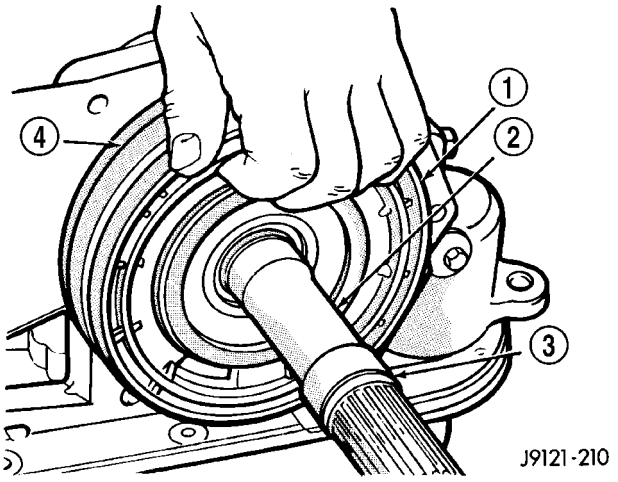


Fig. 201 Overdrive Piston Removal

1 - OVERDRIVE CLUTCH PISTON
2 - INTERMEDIATE SHAFT
3 - SELECTIVE SPACER
4 - PISTON RETAINER

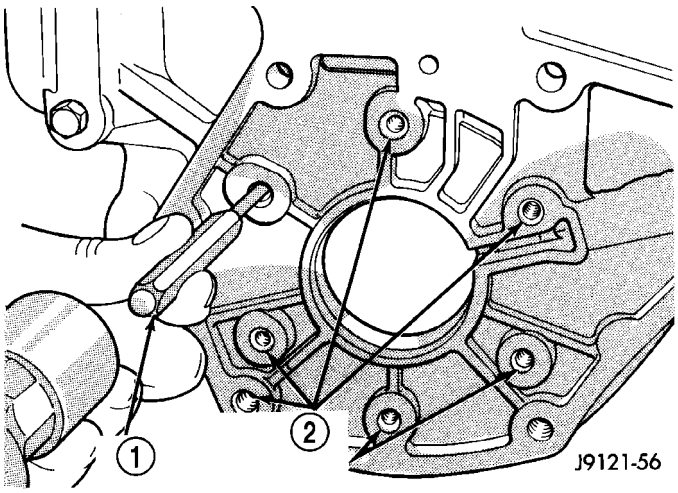


Fig. 202 Overrunning Clutch Cam

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.

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER (Continued)

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. 203). 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. 203).

(4) Insert Adapter Tool SP-5124 into piston retainer (Fig. 204).

(5) Assemble Puller Bolt SP-3701 and Press Plate SP-3583-A (Fig. 205).

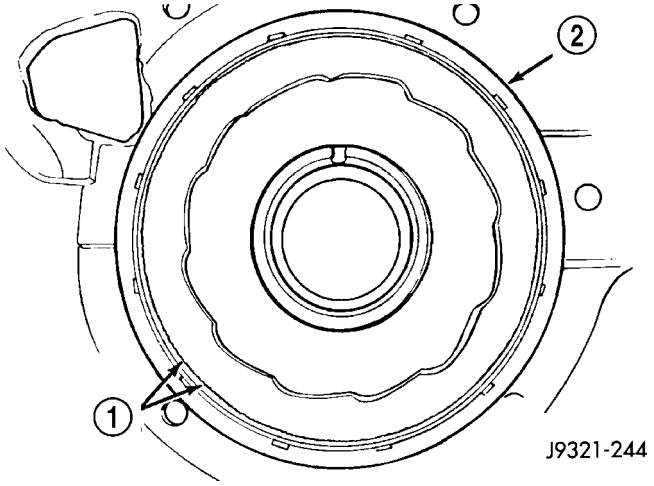


Fig. 203 Positioning Replacement Clutch Cam In Case

1 - ALIGN SERRATIONS ON CAM AND IN CASE
2 - CLUTCH CAM

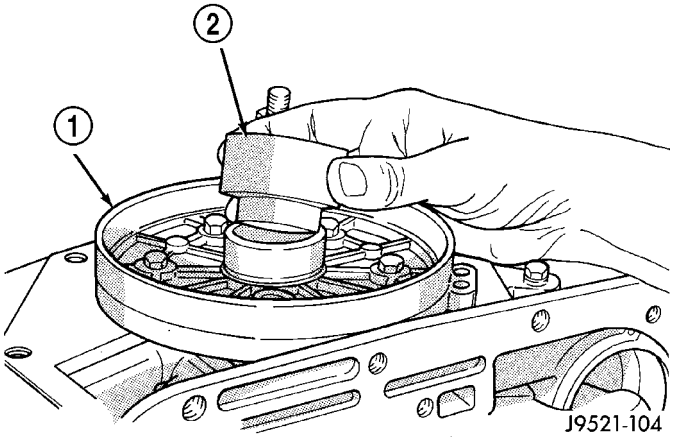


Fig. 204 Positioning Adapter Tool In Overdrive Piston Retainer

1 - PISTON RETAINER
2 - SPECIAL TOOL SP-5124

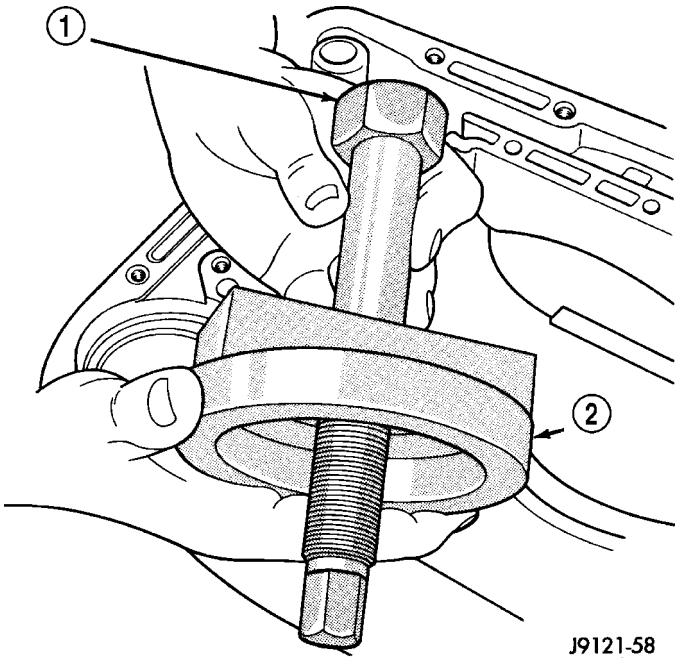


Fig. 205 Assembling Clutch Cam Puller Bolt And Press Plate

1 - PULLER BOLT SP-3701
2 - PRESS PLATE SP-3583-A

(6) Install assembled puller plate and bolt (Fig. 206). Insert bolt through cam, case and adapter tool. Be sure plate is seated squarely on cam.

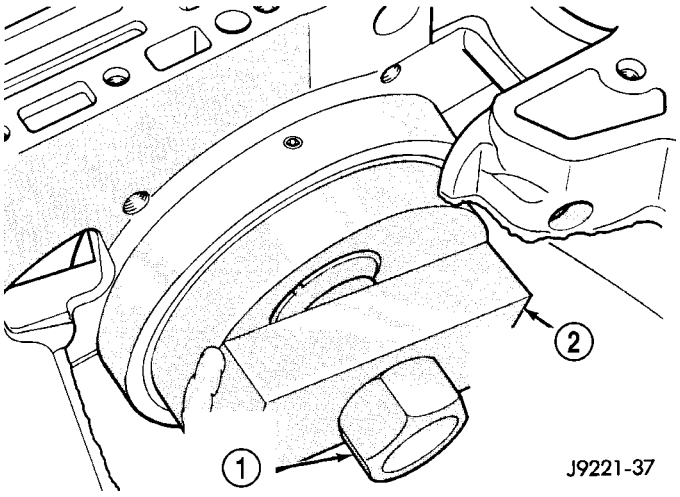


Fig. 206 Positioning Puller Plate On Clutch Cam

1 - SPECIAL TOOL SP-3701
2 - BE SURE PLATE SP-3583-A IS SEATED SQUARELY ON CAM

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER (Continued)

(7) Hold puller plate and bolt in place and install puller nut SP-3701 on puller bolt (Fig. 207).

(8) Tighten puller nut to press clutch cam into case (Fig. 207). 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.

(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.

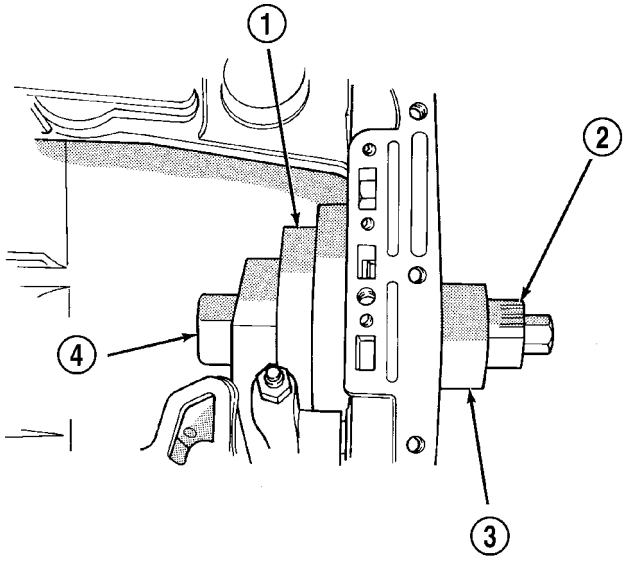


Fig. 207 Pressing Overrunning Clutch Cam Into Case

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

(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. 208). 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. 209). 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.

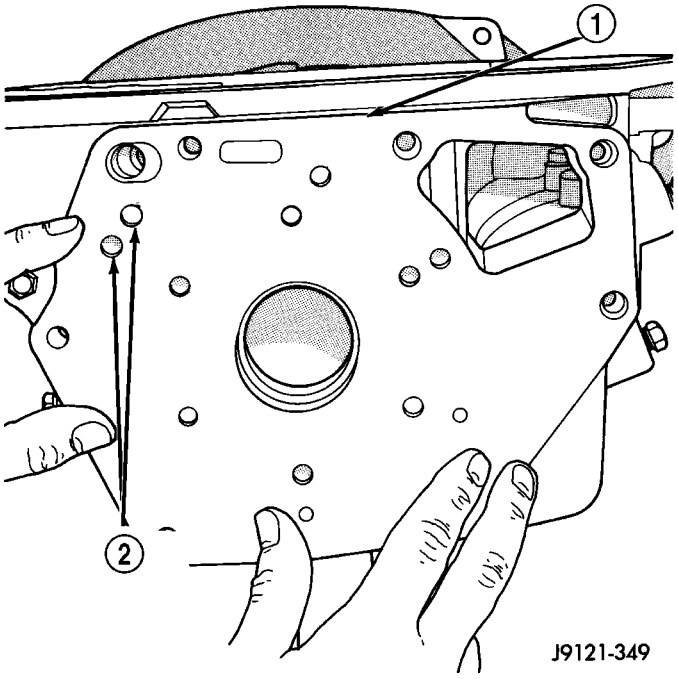


Fig. 208 Installing/Aligning Case Gasket

1 - CASE GASKET
2 - BE SURE GOVERNOR TUBE FEED HOLES IN CASE AND GASKET ARE ALIGNED

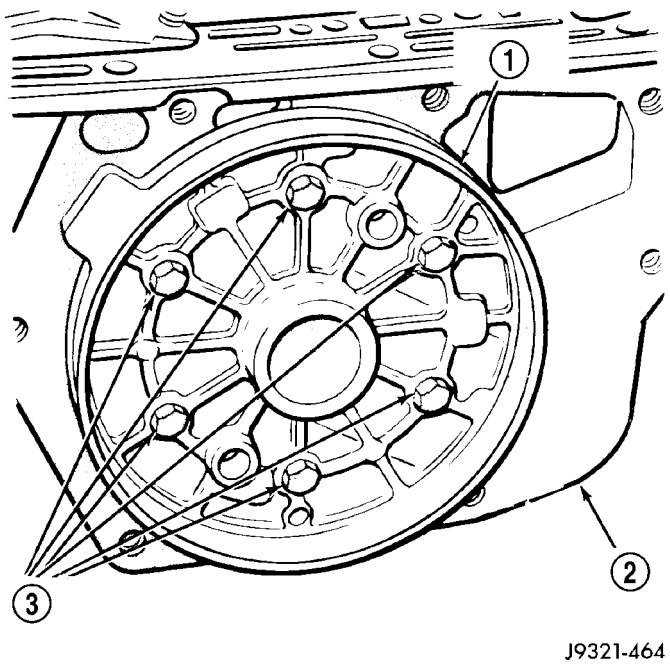


Fig. 209 Aligning Overdrive Piston Retainer

1 - PISTON RETAINER
2 - GASKET
3 - RETAINER BOLTS

(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.

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER (Continued)

(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.

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. 210) 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. 211) 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

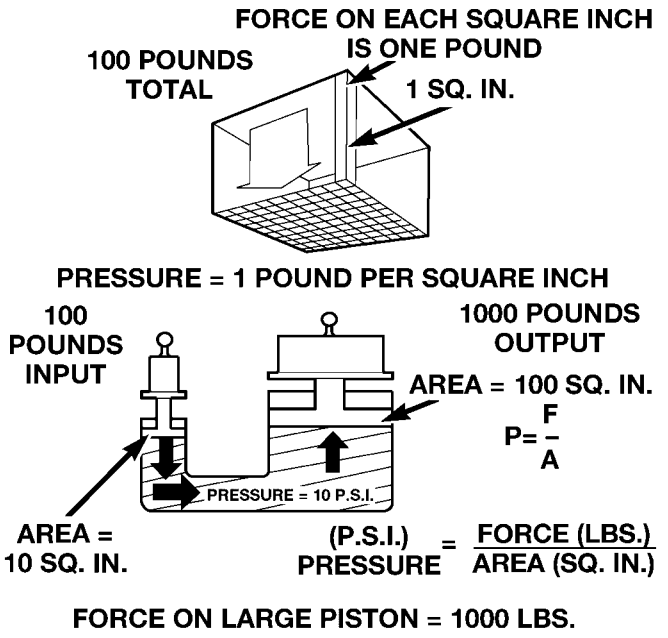


Fig. 210 Force and Pressure Relationship

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.

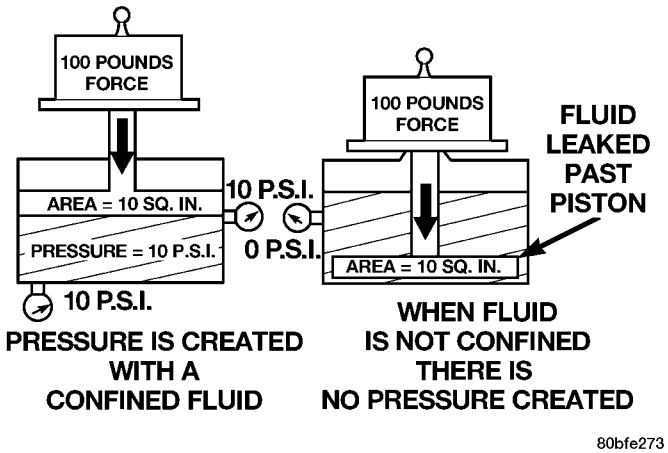


Fig. 211 Pressure on a Confined Fluid

PISTONS (Continued)

FORCE MULTIPLICATION

Using the 10 PSI example used in the illustration (Fig. 212), 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. 212), 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.

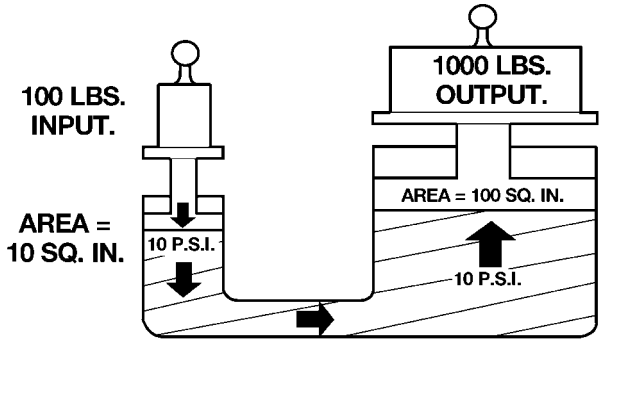


Fig. 212 Force Multiplication

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. 213) 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.

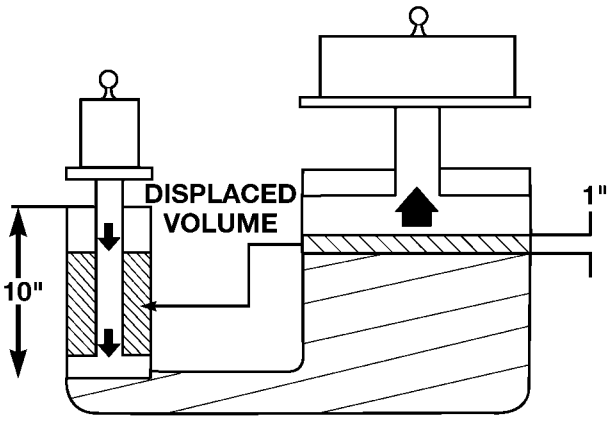


Fig. 213 Piston Travel

PLANETARY GEARTRAIN/ OUTPUT SHAFT

DESCRIPTION

The planetary gearsets (Fig. 214) 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:

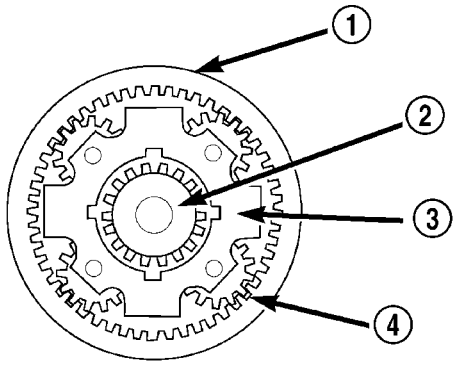


Fig. 214 Planetary Gearset

1 - ANNULUS GEAR
2 - SUN GEAR
3 - PLANET CARRIER
4 - PLANET PINIONS (4)

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

- 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. 215). Discard snap-ring as it is not reusable.

(2) Remove front planetary gear and front annulus gear as assembly (Fig. 216).

(3) Remove front planetary gear and thrust washer from front annulus gear (Fig. 217). Note thrust washer position for assembly reference.

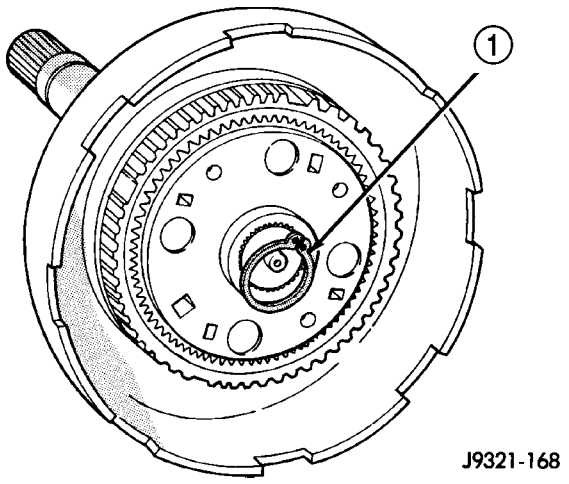


Fig. 215 Removing Planetary Snap-Ring

1 - PLANETARY SNAP-RING

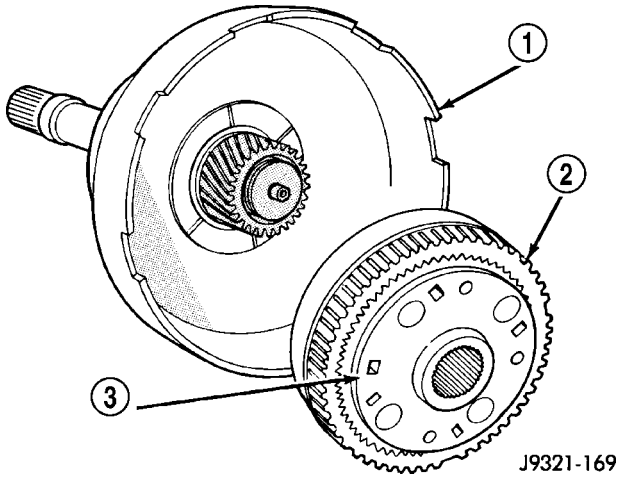


Fig. 216 Removing Front Planetary And Annulus Gears

1 - DRIVING SHELL
2 - FRONT ANNULUS GEAR
3 - FRONT PLANETARY GEAR

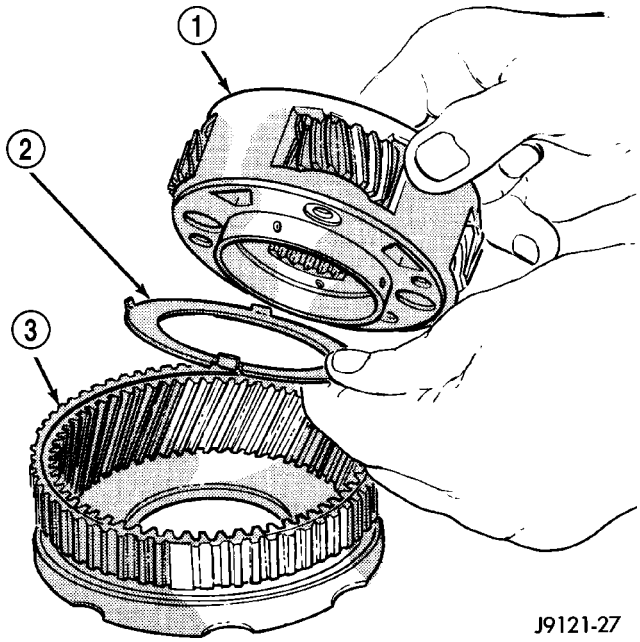


Fig. 217 Disassembling Front Planetary And Annulus Gears

1 - FRONT PLANETARY GEAR
2 - TABBED THRUST WASHER
3 - FRONT ANNULUS GEAR

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

(4) Remove tabbed thrust washer from driving shell (Fig. 218). Note washer position for assembly reference.

(5) Remove sun gear and driving shell as assembly (Fig. 219).

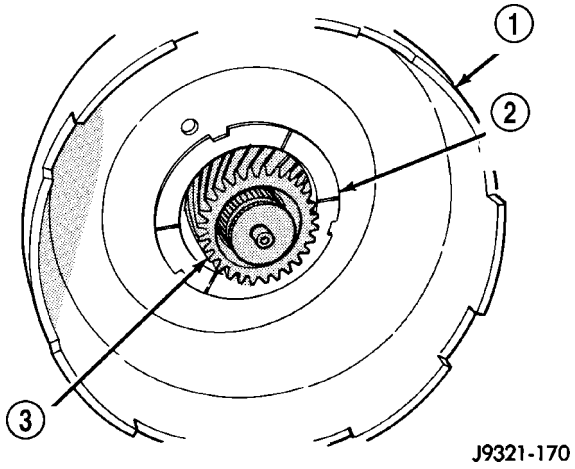


Fig. 218 Driving Shell Thrust Washer Removal

1 - DRIVING SHELL
2 - TABBED THRUST WASHER
3 - SUN GEAR

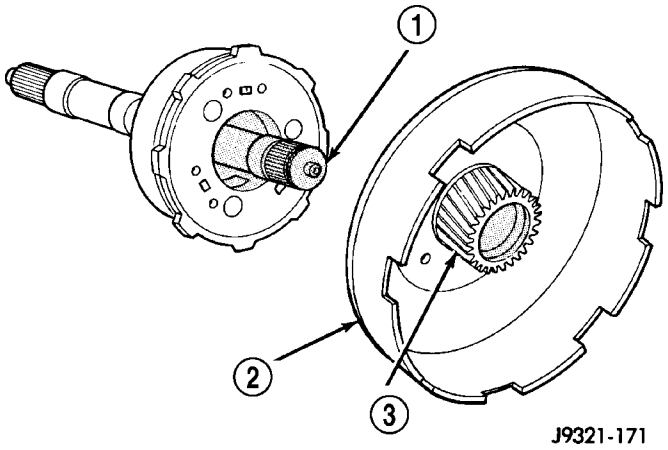


Fig. 219 Sun Gear And Driving Shell Removal

1 - INTERMEDIATE SHAFT
2 - DRIVING SHELL
3 - SUN GEAR

(6) Remove tabbed thrust washer from rear planetary gear (Fig. 220). Note washer position on gear for assembly reference.

(7) Remove rear planetary gear and rear annulus gear from intermediate shaft (Fig. 221).

(8) Remove thrust plate from rear annulus gear (Fig. 222).

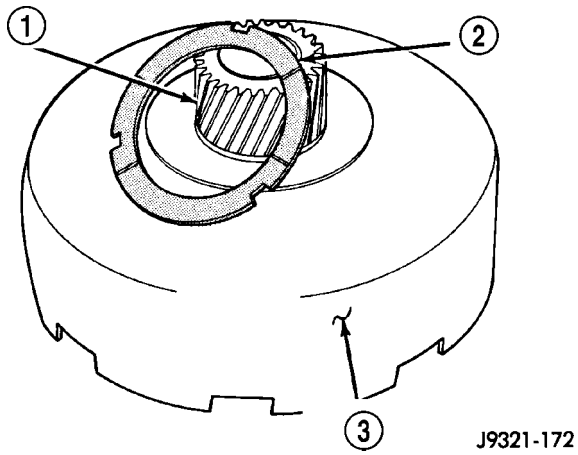


Fig. 220 Rear Planetary Thrust Washer Removal

1 - SUN GEAR
2 - REAR PLANETARY THRUST WASHER
3 - DRIVING SHELL

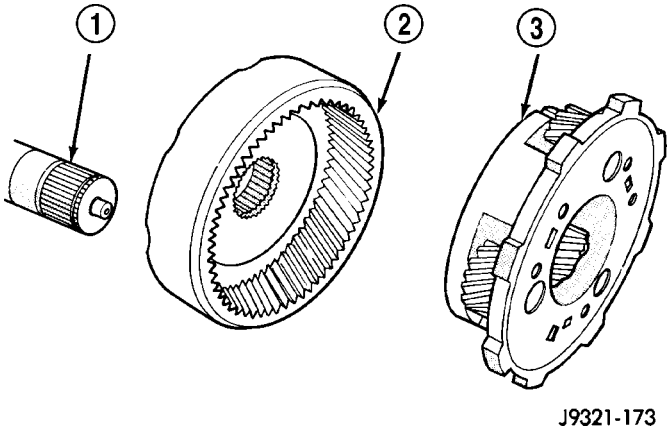


Fig. 221 Rear Planetary And Annulus Gear Removal

1 - INTERMEDIATE SHAFT
2 - REAR ANNULUS GEAR
3 - REAR PLANETARY GEAR

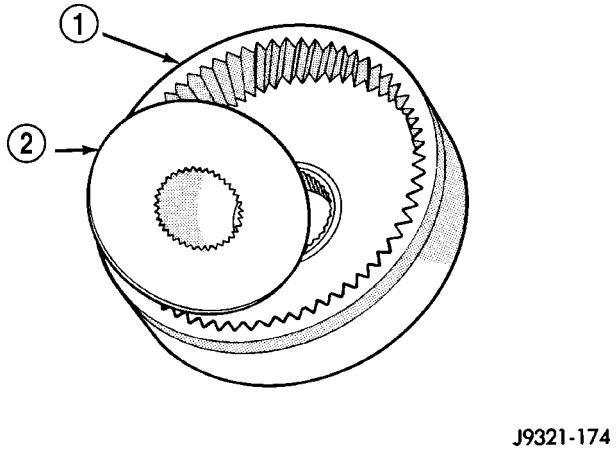


Fig. 222 Rear Annulus Thrust Plate Removal

1 - REAR ANNULUS GEAR
2 - THRUST PLATE

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

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.

(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. 223). Install rear snap-ring to secure sun gear and thrust plate in driving shell.

(3) Install rear annulus gear on intermediate shaft (Fig. 224).

(4) Install thrust plate in annulus gear (Fig. 225). Be sure plate is seated on shaft splines and against gear.

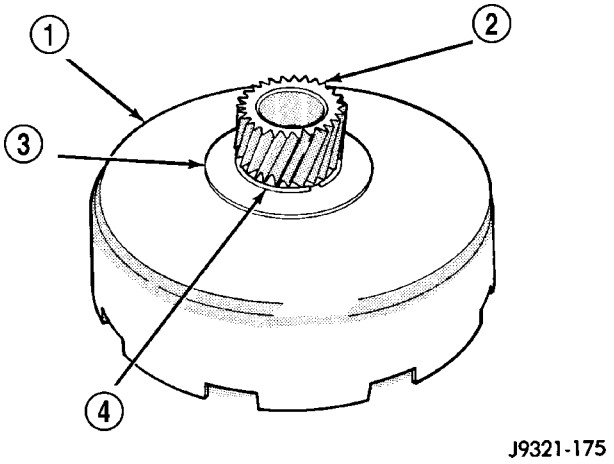


Fig. 223 Sun Gear Installation

1 - DRIVING SHELL
2 - SUN GEAR
3 - THRUST PLATE
4 - SUN GEAR REAR RETAINING RING

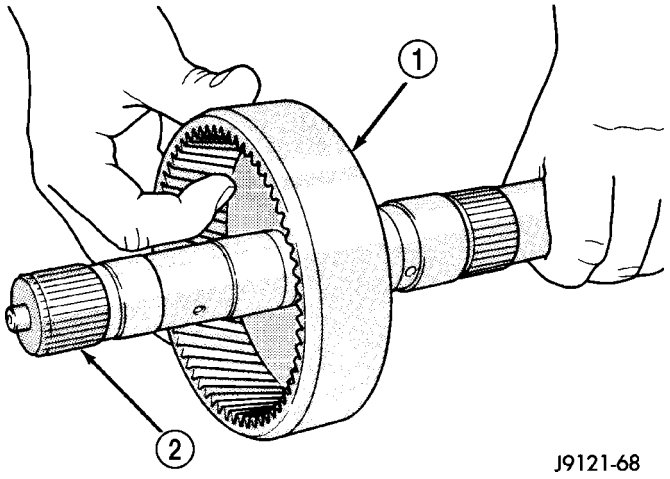


Fig. 224 Installing Rear Annulus Gear On Intermediate Shaft

1 - REAR ANNULUS GEAR
2 - OUTPUT SHAFT

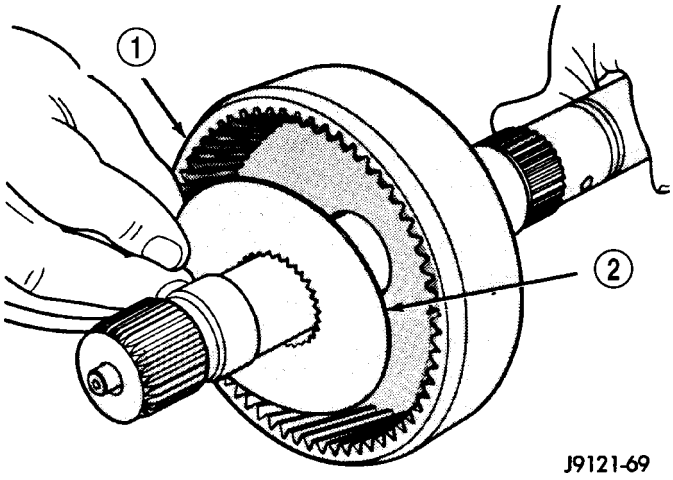


Fig. 225 Installing Rear Annulus Thrust Plate

1 - REAR ANNULUS GEAR
2 - THRUST PLATE

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

(5) Install rear planetary gear in rear annulus gear (Fig. 226). Be sure planetary carrier is seated against annulus gear.

(6) Install tabbed thrust washer on front face of rear planetary gear (Fig. 227). 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. 228). 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. 229), be sure washer tabs are seated in tab slots of driving shell. Use extra petroleum jelly to hold washer in place if desired.

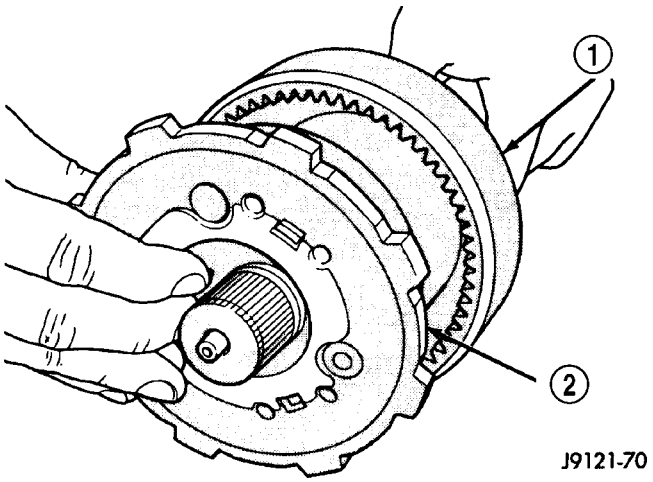


Fig. 226 Installing Rear Planetary Gear

1 - REAR ANNULUS GEAR
2 - REAR PLANETARY GEAR

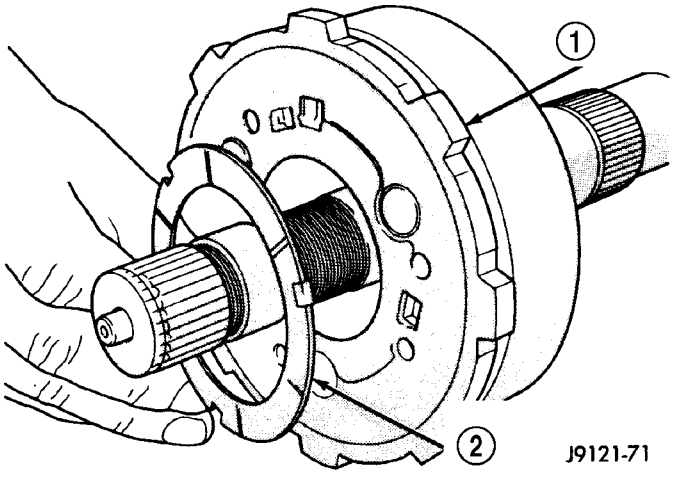


Fig. 227 Installing Rear Planetary Thrust Washer

1 - REAR PLANETARY GEAR
2 - TABBED THRUST WASHER

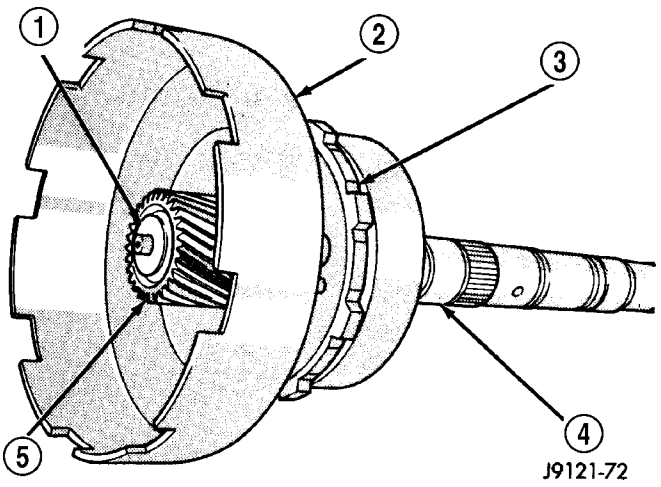


Fig. 228 Installing Sun Gear And Driving Shell

1 - OUTPUT SHAFT
2 - DRIVING SHELL
3 - REAR PLANETARY GEAR
4 - OUTPUT SHAFT
5 - SUN GEAR

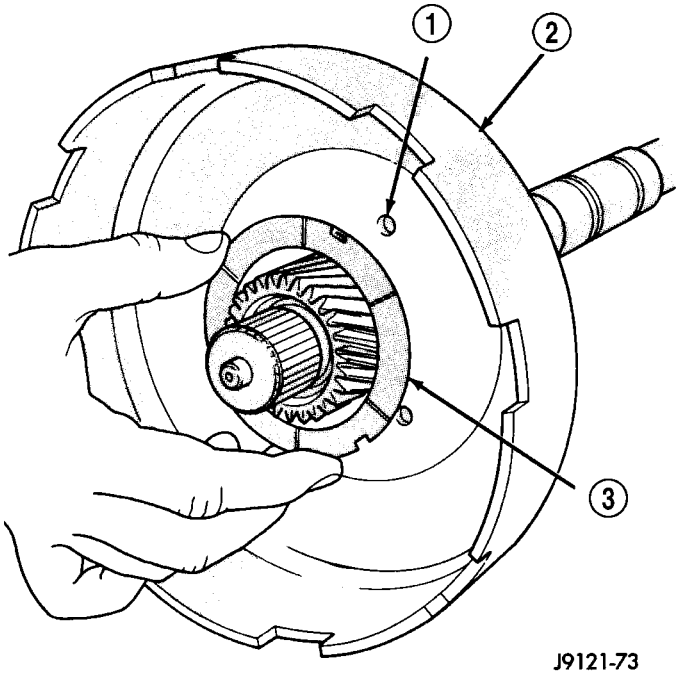


Fig. 229 Installing Driving Shell Thrust Washer

1 - TAB SLOTS (3)
2 - DRIVING SHELL
3 - TABBED THRUST WASHER

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

(10) Install tabbed thrust washer on front planetary gear (Fig. 230). Seat washer tabs in matching slots in face of gear carrier. Use extra petroleum jelly to hold washer in place if desired.

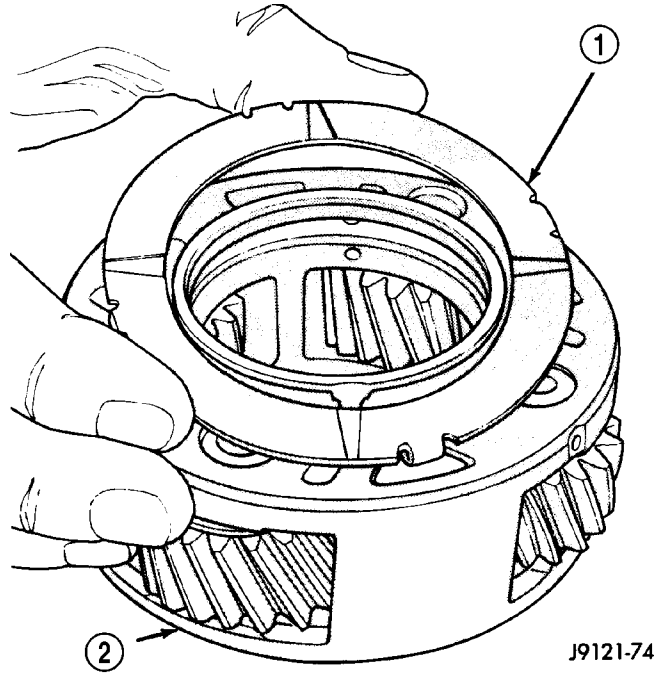


Fig. 230 Installing Thrust Washer On Front Planetary Gear

1 - TABBED THRUST WASHER
2 - FRONT PLANETARY GEAR

(11) Install front annulus gear over and onto front planetary gear (Fig. 231). Be sure gears are fully meshed and seated.

(12) Install front planetary and annulus gear assembly (Fig. 232). 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.

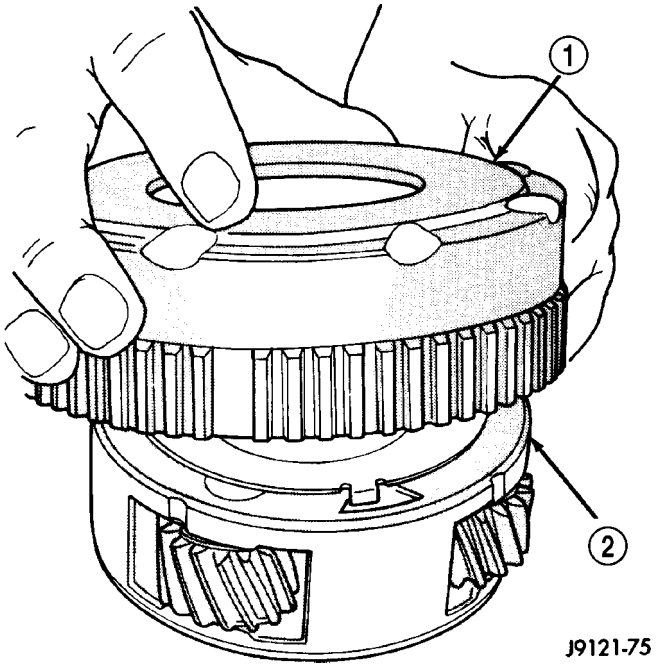


Fig. 231 Assembling Front Planetary And Annulus Gears

1 - FRONT ANNULUS GEAR
2 - FRONT PLANETARY GEAR

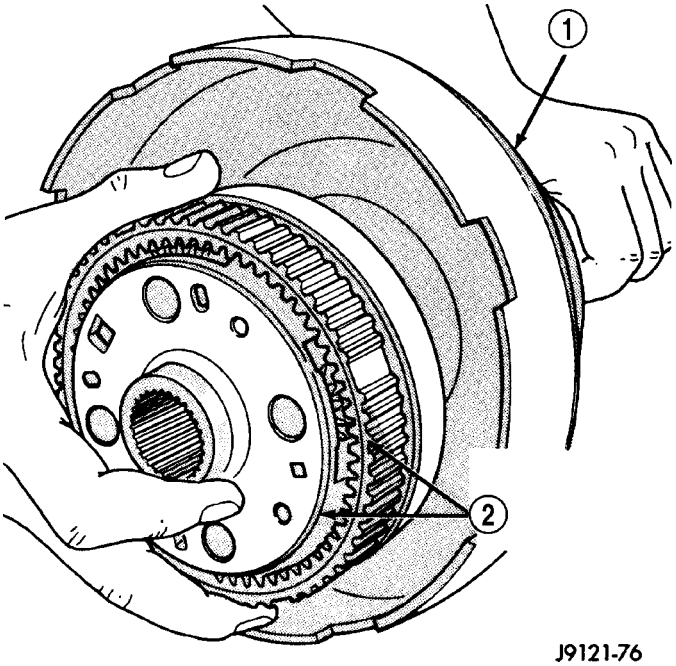


Fig. 232 Installing Front Planetary And Annulus Gear Assembly

1 - DRIVING SHELL
2 - ASSEMBLED FRONT PLANETARY AND ANNULUS GEARS

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

(14) Install new planetary snap-ring in groove at end of intermediate shaft (Fig. 233).

(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. 234). 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.

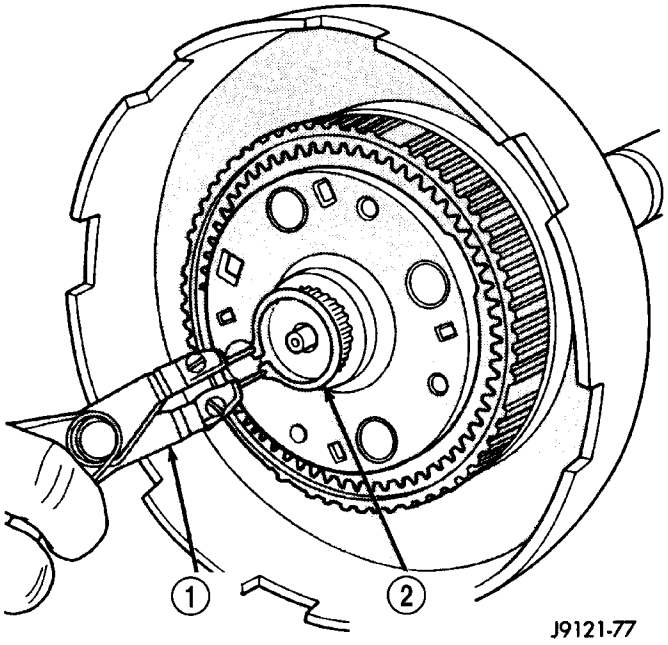


Fig. 233 Installing Planetary Snap-Ring

1 - SNAP-RING PLIERS
2 - PLANETARY SNAP-RING

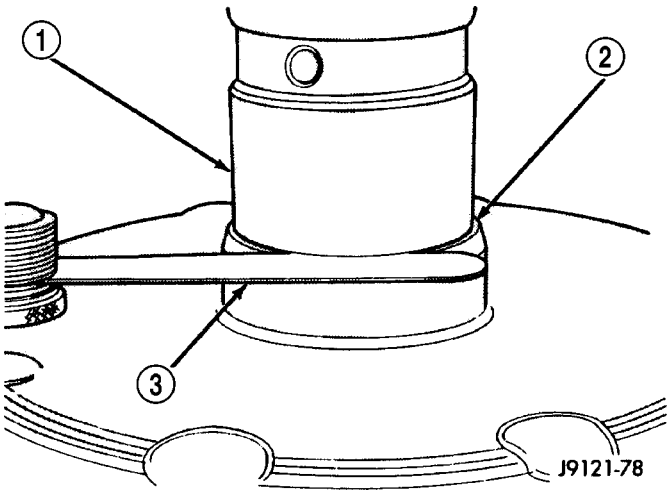


Fig. 234 Checking Planetary Geartrain End Play

1 - OUTPUT SHAFT
2 - REAR ANNULUS GEAR
3 - FEELER GAUGE

REAR CLUTCH

DESCRIPTION

The rear clutch assembly (Fig. 235) 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.

REAR CLUTCH (Continued)

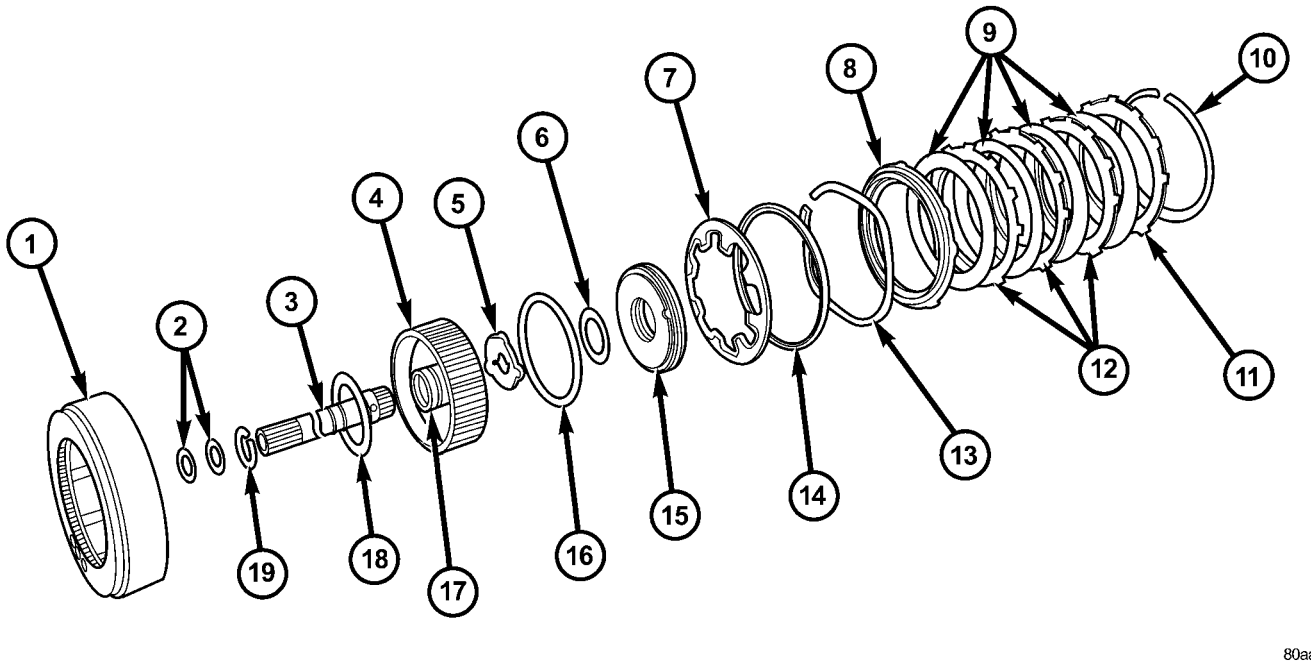


Fig. 235 Rear Clutch Components

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

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.

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. 236).

(4) Remove the reaction plate, clutch discs, steel plates, pressure plate, wave spring, spacer ring, and piston spring (Fig. 236).

(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.

REAR CLUTCH (Continued)

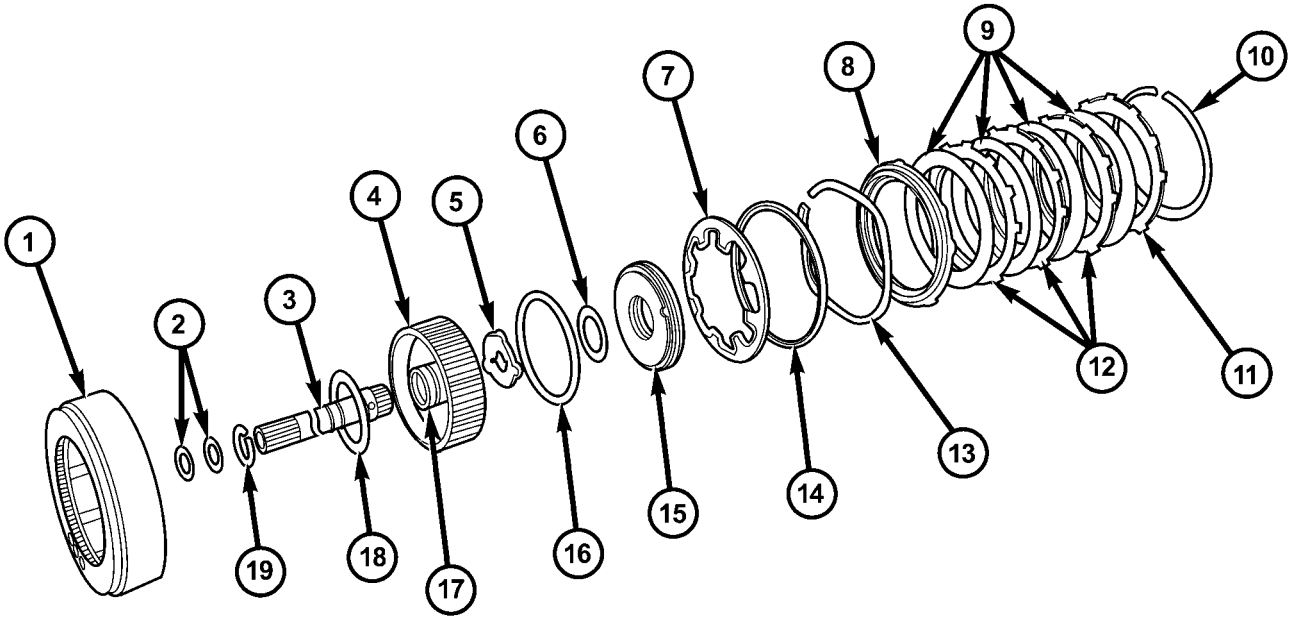


Fig. 236 Rear Clutch Components

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

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.

REAR CLUTCH (Continued)

(3) Lubricate splined end of input shaft and clutch retainer with transmission fluid. Then partially press input shaft into retainer (Fig. 237). 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.

(11) Install pressure plate (Fig. 236). 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. 236).

(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. 238).

(a) Position gauge bar across the clutch drum with the dial indicator pointer on the pressure plate (Fig. 238).

(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.

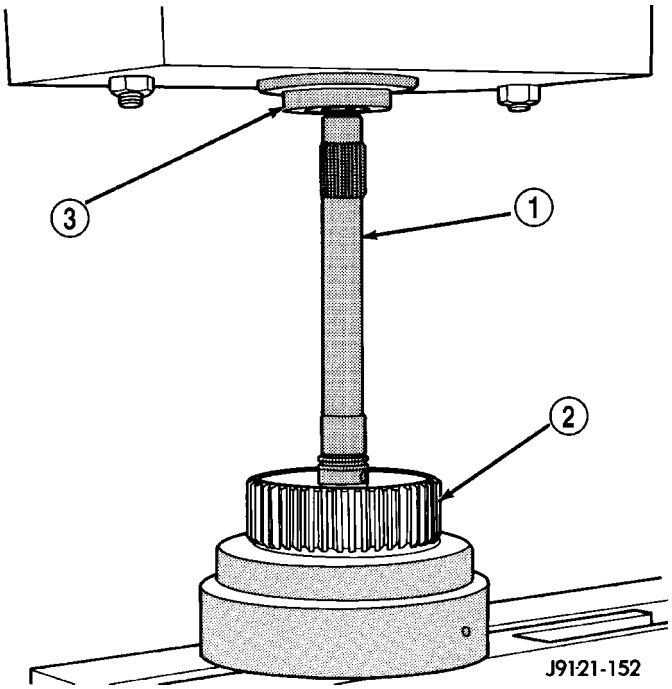


Fig. 237 Pressing Input Shaft Into Rear Clutch Retainer

1 - INPUT SHAFT
2 - REAR CLUTCH RETAINER
3 - PRESS RAM

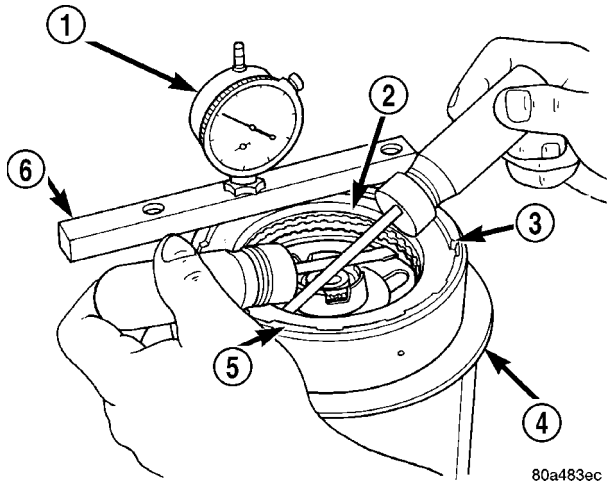


Fig. 238 Checking Rear Clutch Pack Clearance

1 - DIAL INDICATOR
2 - PRESSURE PLATE
3 - SNAP-RING
4 - STAND
5 - REAR CLUTCH
6 - GAUGE BAR

REAR CLUTCH (Continued)

(16) Coat rear clutch thrust washer with petroleum jelly and install washer over input shaft and into clutch retainer (Fig. 239). Use enough petroleum jelly to hold washer in place.

(17) Set rear clutch aside for installation during final assembly.

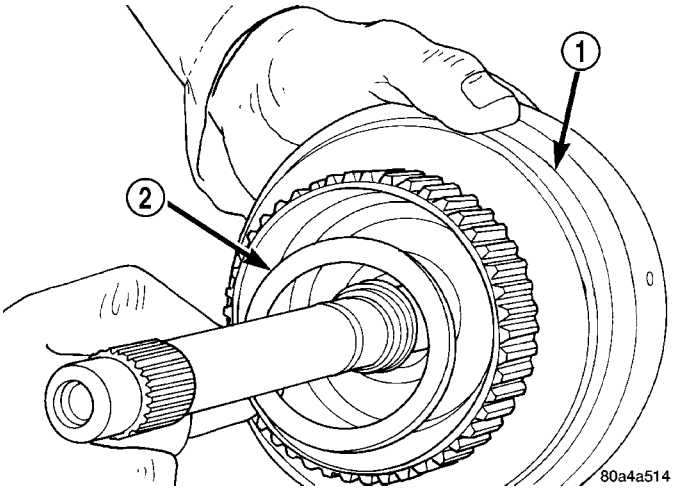


Fig. 239 Installing Rear Clutch Thrust Washer

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. 240).

(2) Remove and discard servo piston seal ring.

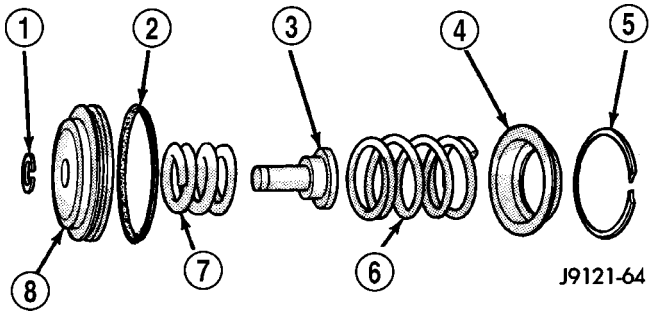


Fig. 240 Rear Servo Components

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. 241). 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.

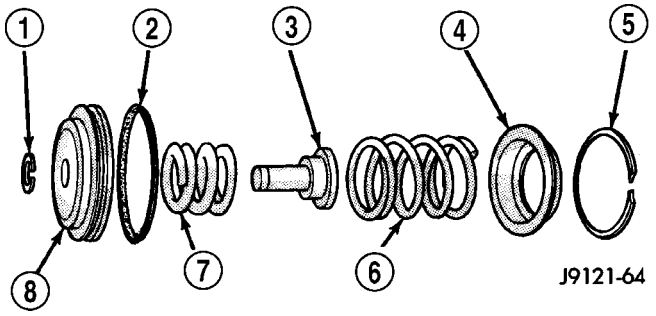


Fig. 241 Rear Servo Components

1 - SNAP-RING
2 - PISTON SEAL
3 - PISTON PLUG
4 - SPRING RETAINER
5 - SNAP-RING
6 - PISTON SPRING
7 - CUSHION SPRING
8 - PISTON

REAR SERVO (Continued)

ASSEMBLY

(1) Lubricate piston and guide seals (Fig. 242) with petroleum jelly. Lubricate other servo parts with Mopar® ATF +4, Automatic 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.

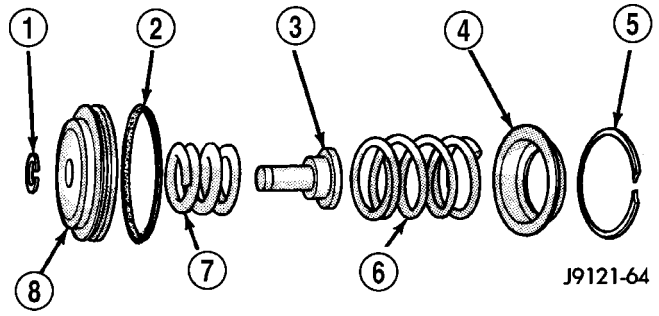


Fig. 242 Rear Servo Components

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).

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:

1. Increase the amount of current applied to the coil or
2. 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, con-

SOLENOID (Continued)

stant 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. 243) is located in the overdrive gear case. The sensor is positioned over the park gear and monitors transmission output shaft rotating speed.

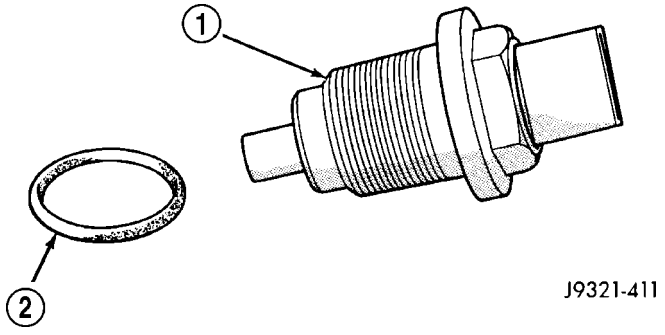


Fig. 243 Transmission Output Speed Sensor

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. 244) 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.

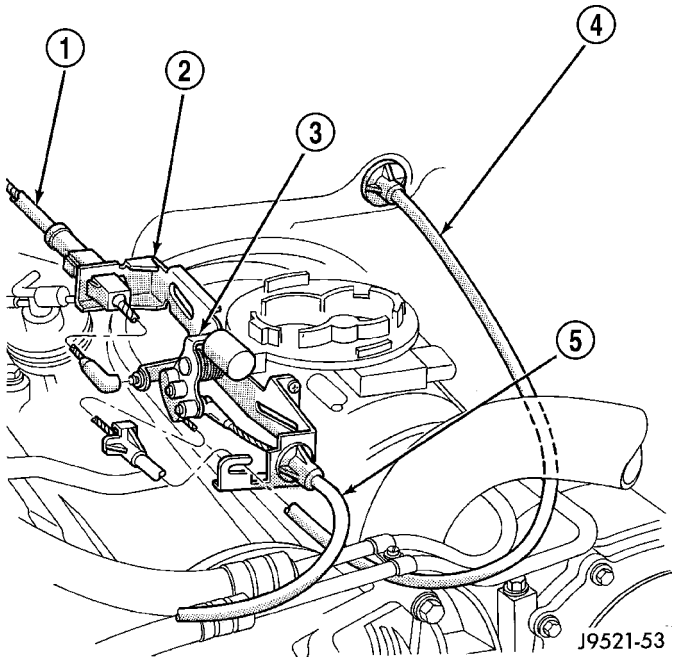


Fig. 244 Throttle Valve Cable Attachment - At Engine

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. 245). 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)

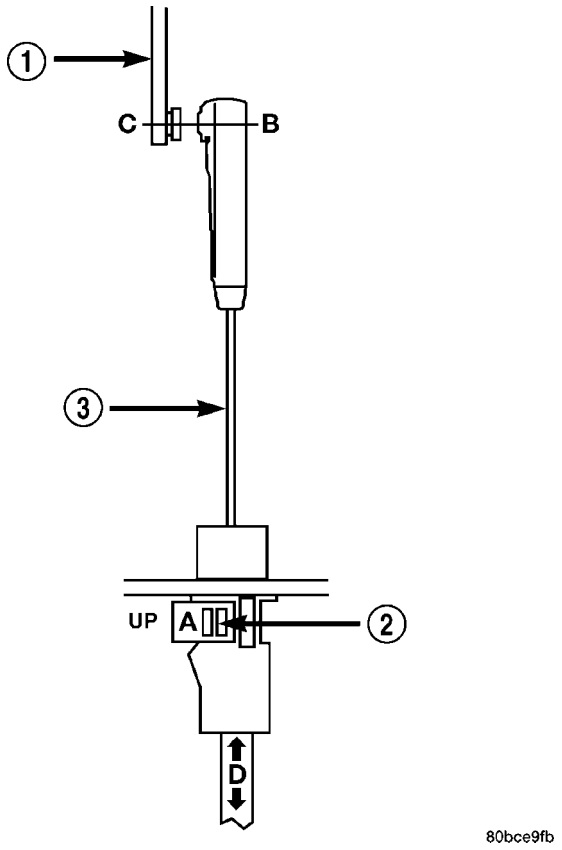


Fig. 245 Throttle Valve Cable at Throttle Linkage

1 - THROTTLE LINKAGE
2 - THROTTLE VALVE CABLE LOCKING CLIP
3 - THROTTLE VALVE CABLE

ADJUSTMENTS - 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. 246). Then verify that the transmission throttle lever (Fig. 247) 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. 248).

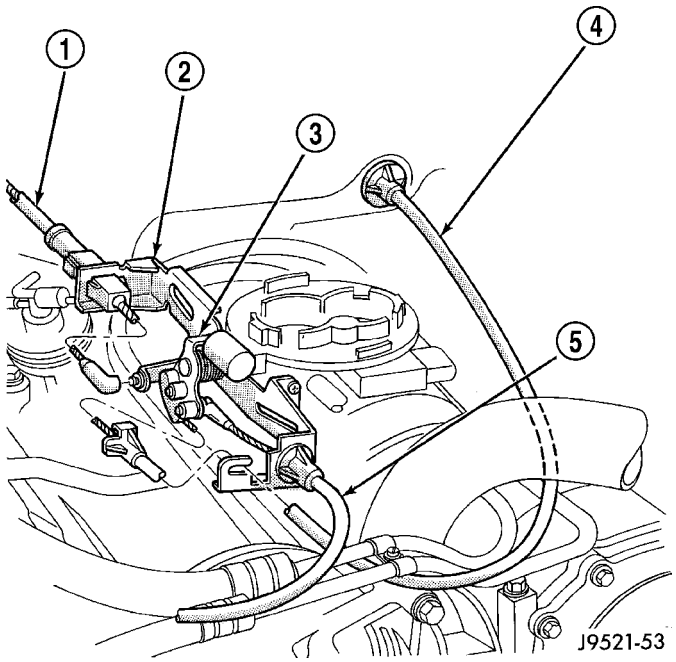


Fig. 246 Throttle Valve Cable Attachment - At Engine

1 - THROTTLE VALVE CABLE
2 - CABLE BRACKET
3 - THROTTLE BODY LEVER
4 - ACCELERATOR CABLE
5 - SPEED CONTROL CABLE

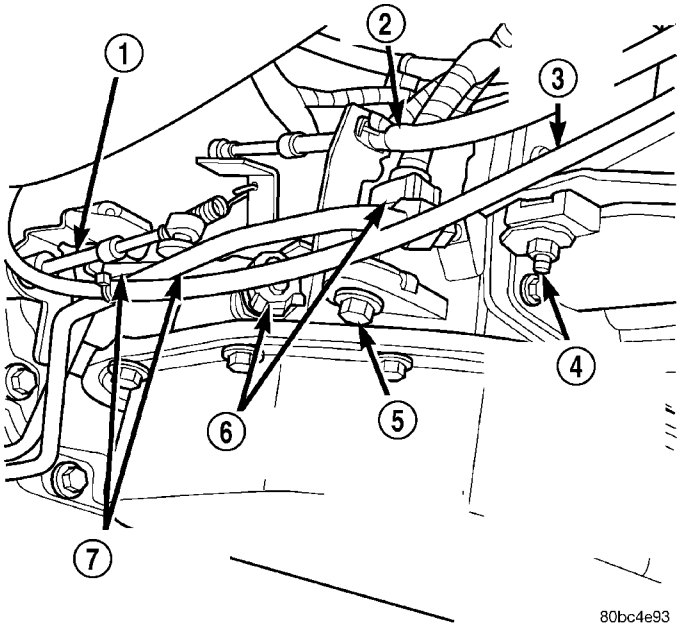


Fig. 247 Throttle Valve Cable at Transmission

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

THROTTLE VALVE CABLE (Continued)

• If cable end and attachment stud are misaligned (off center), cable will have to be adjusted as described in Throttle Valve Cable Adjustment procedure.

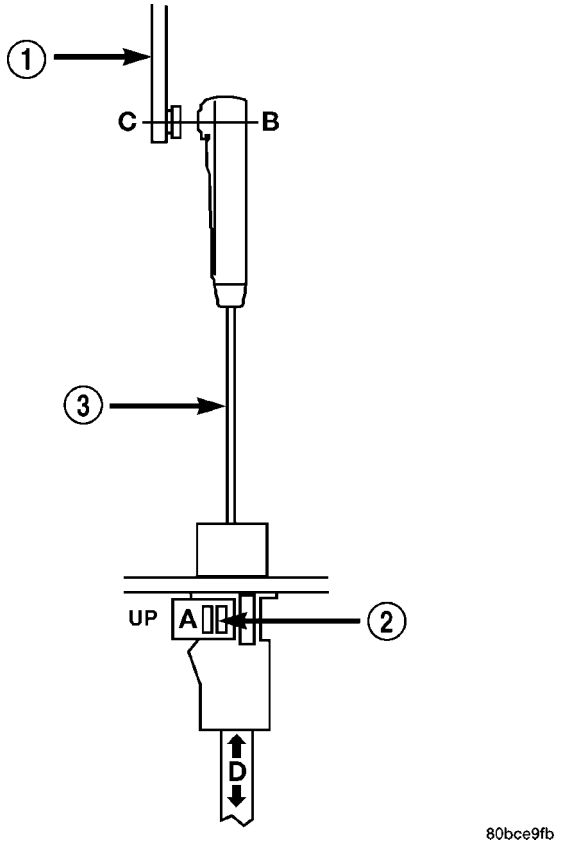


Fig. 248 Throttle Valve Cable at Throttle Linkage

1 - THROTTLE LINKAGE
2 - THROTTLE VALVE CABLE LOCKING CLIP
3 - THROTTLE VALVE CABLE

(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.**
(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. 248). 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. 248).
(7) While holding the T.V. cable in the set position push the T.V. cable lock (A) into the down position (Fig. 248). 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.

TORQUE CONVERTER

DESCRIPTION

The torque converter (Fig. 249) 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.

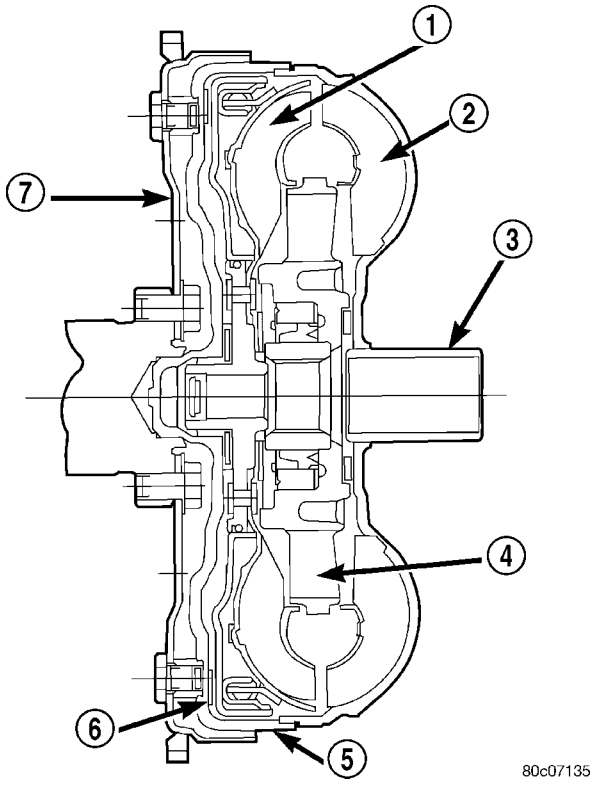


Fig. 249 Torque Converter Assembly

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. 250) 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.

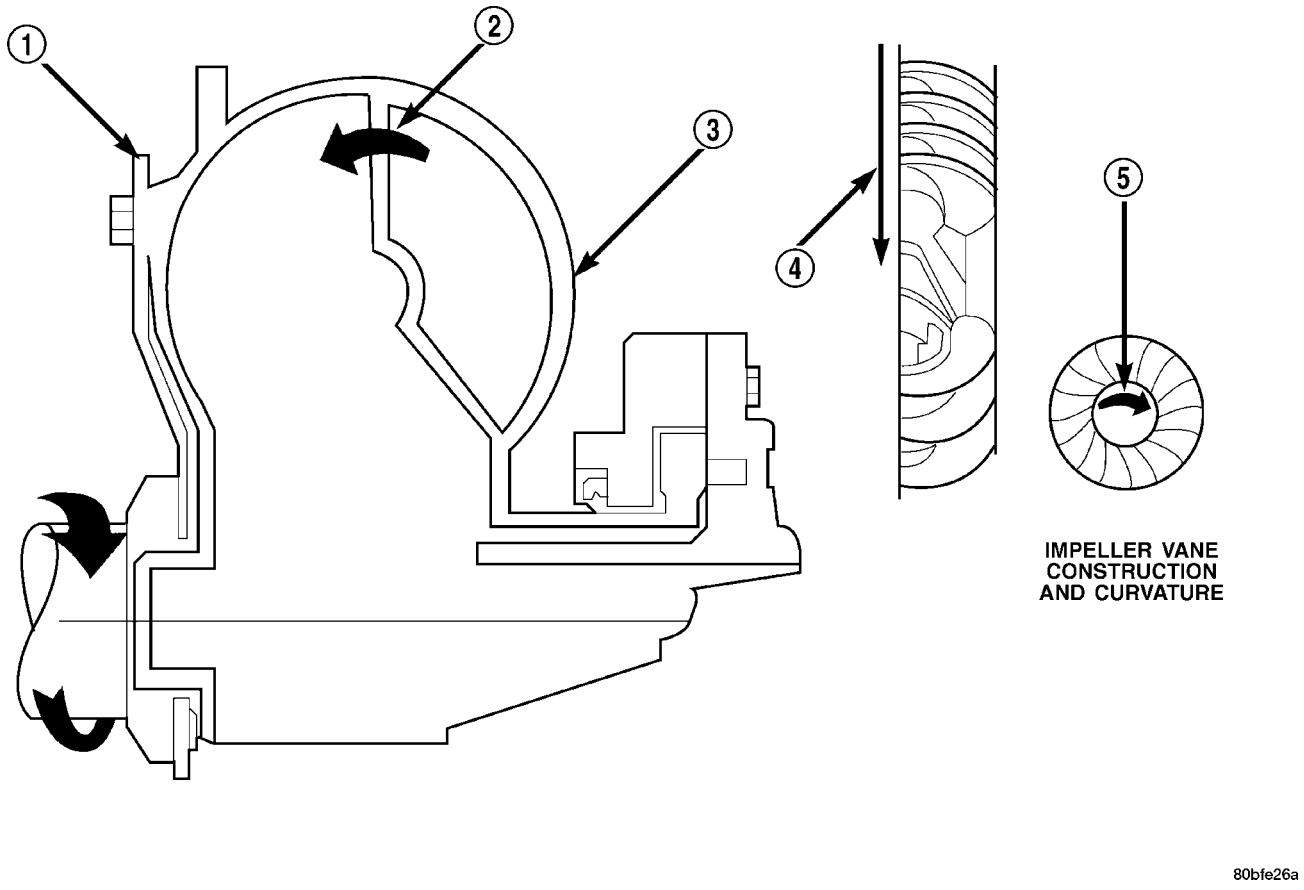


Fig. 250 Impeller

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. 251) 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.

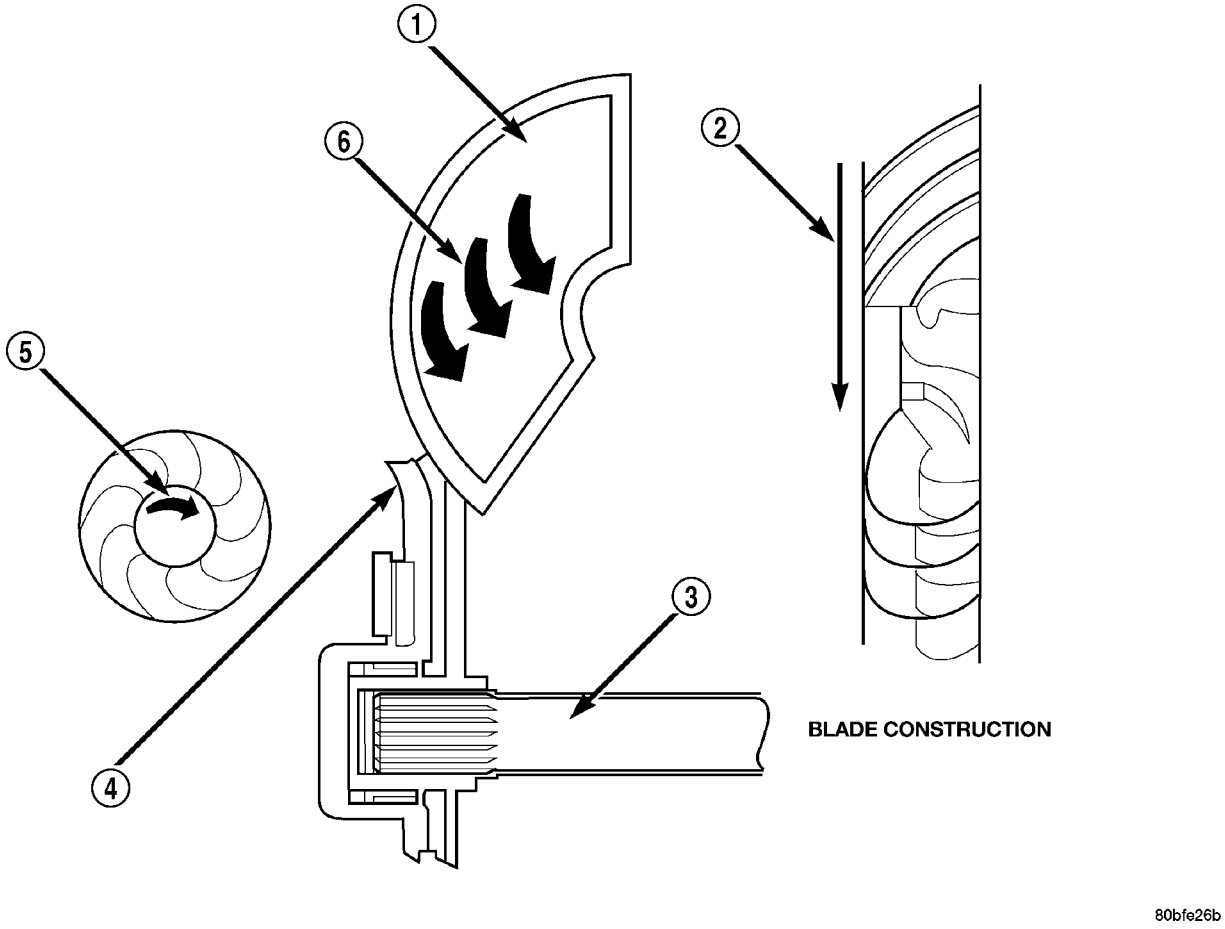


Fig. 251 Turbine

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. 252) 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. 253). 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.

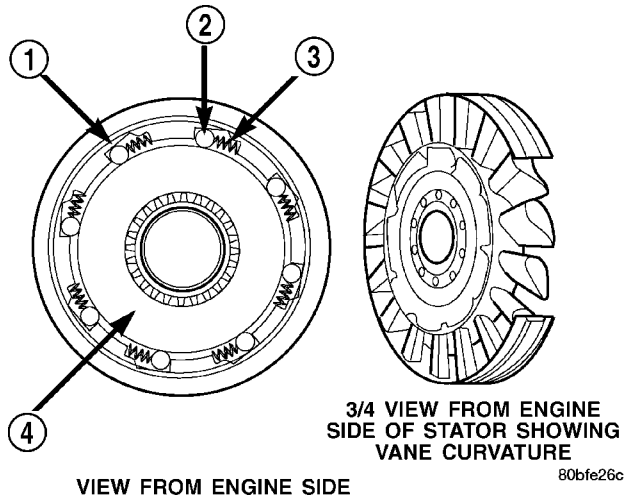


Fig. 252 Stator Components

1 - CAM (OUTER RACE)
2 - ROLLER
3 - SPRING
4 - INNER RACE

TORQUE CONVERTER CLUTCH (TCC)

The TCC (Fig. 254) 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.

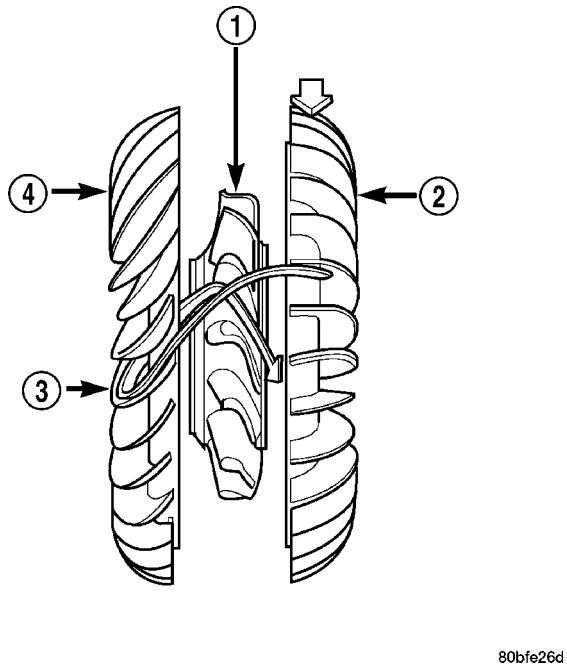


Fig. 253 Stator Location

1 - STATOR
2 - IMPELLER
3 - FLUID FLOW
4 - TURBINE

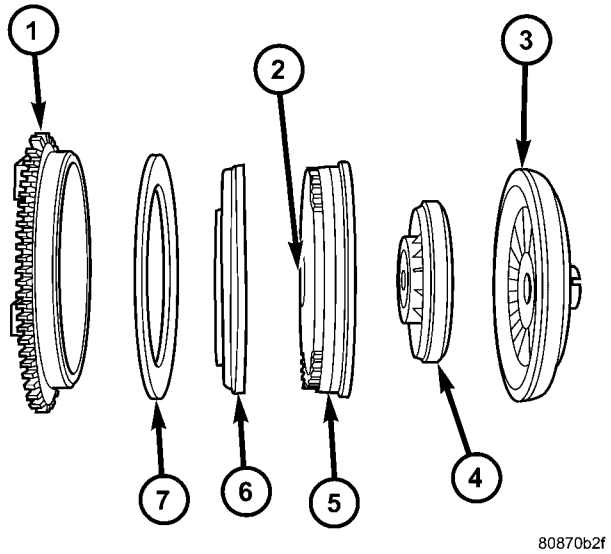


Fig. 254 Torque Converter Clutch (TCC)

1 - IMPELLER FRONT COVER
2 - THRUST WASHER ASSEMBLY
3 - IMPELLER
4 - STATOR
5 - TURBINE
6 - PISTON
7 - FRICTION DISC

TORQUE CONVERTER (Continued)

OPERATION

The converter impeller (Fig. 255) (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. 256). 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 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.

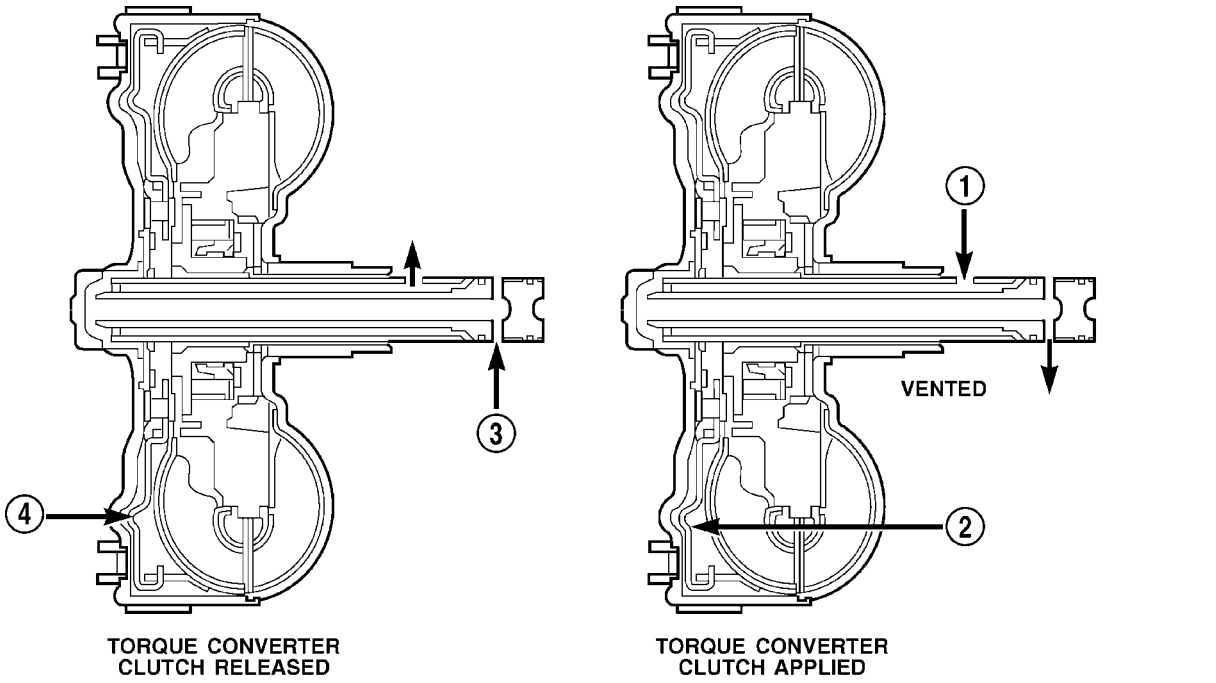


Fig. 255 Torque Converter Fluid Operation

1 - APPLY PRESSURE
2 - THE PISTON MOVES SLIGHTLY FORWARD
3 - RELEASE PRESSURE
4 - THE PISTON MOVES SLIGHTLY REARWARD

TORQUE CONVERTER (Continued)

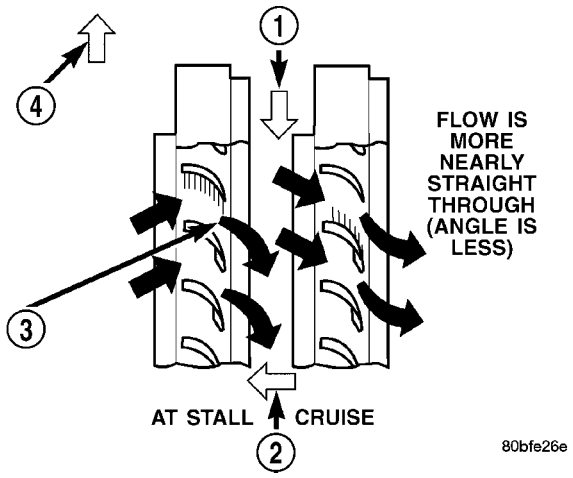


Fig. 256 Stator Operation

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

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. 257). 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.

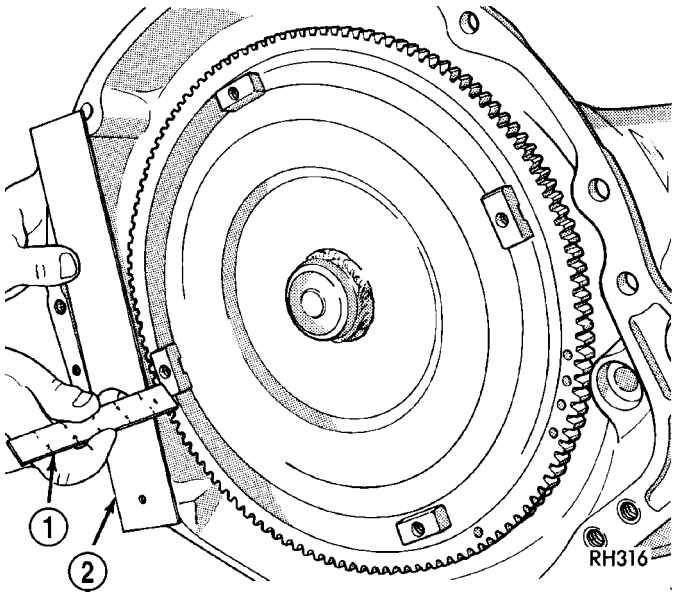


Fig. 257 Checking Torque Converter Seating - Typical

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

TORQUE CONVERTER DRAINBACK VALVE (Continued)

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.

If the valve is restricted, installed backwards, or in the wrong line, it will cause an overheating condition and possible transmission failure.

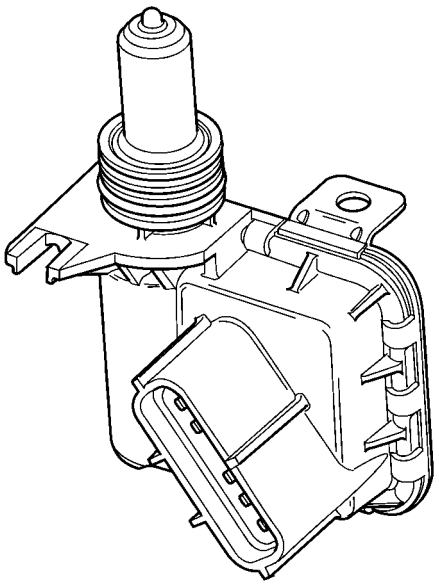
CAUTION: The drainback valve is a one-way flow device. It must be properly oriented in terms of flow direction for the cooler to function properly. The valve must be installed in the pressure line. Otherwise flow will be blocked and would cause an overheating condition and eventual transmission failure.

TRANSMISSION RANGE SENSOR

DESCRIPTION

The Transmission Range Sensor (TRS) (Fig. 258) has 3 primary functions:

- Provide a PARK/NEUTRAL start signal to the engine controller and the starter relay.
- Turn the Back-up lamps on when the transmission is in REVERSE and the engine (ignition) is on.
- Provide a transmission range signal to the instrument cluster.



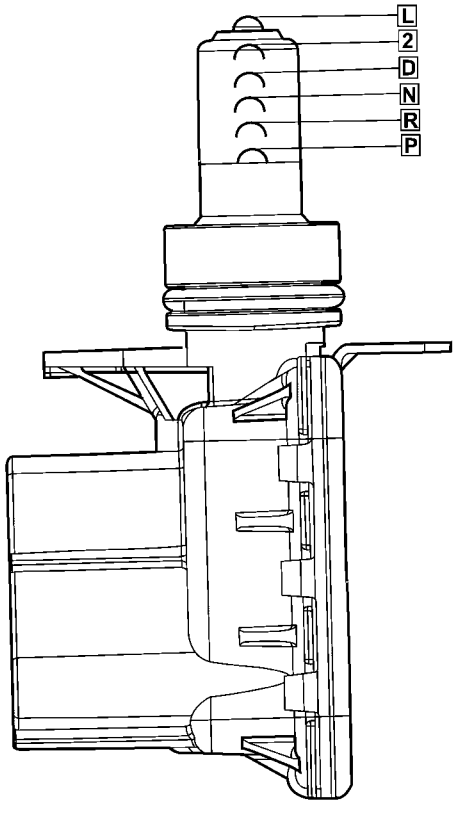
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Fig. 258 Transmission Range Sensor

The sensor is mounted in the transmission housing near the valve body, just above the pan rail. It's in the same position as the Park/Neutral switch on other transmissions. The TRS contacts a cammed surface on the manual valve lever. The cammed surface translates the rotational motion of the manual lever into the linear motion of the sensor. The cammed surface on the manual lever is comprised of two parts controlling the TRS signal: The insulator portion contacts the switch poppet when the manual lever is not in PARK or NEUTRAL. The manual lever itself contacts the poppet when the lever is in PARK or NEUTRAL; providing a ground for the signal from the starter relay and the JTEC engine controller.

OPERATION

As the switch moves through its linear motion (Fig. 259) contacts slide across a circuit board which changes the resistance between the range sensing pins of the switch. A power supply on the instrument cluster provides a regulated voltage signal to the switch. The return signal is decoded by the cluster, which then controls the PRNDL display to correspond with the correct transmission range. A bus message of transmission range is also sent by the cluster. In REVERSE range a second contact set closes the circuit providing power to the reverse lamps.



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Fig. 259 Transmission Range Sensor Linear Movement

TRANSMISSION RANGE SENSOR (Continued)

Mechanical State	Electronic Display (Ignition Unlocked)	Electronic Display (Ignition On)		
Indicated Gear Position			Transmission Status	Column Shifter Position
P	P	P	Vehicle is in PARK with the pawl engaged.	In the PARK gate.
	R		The PARK pawl is disengaged and the vehicle is free to roll, but REVERSE is not engaged.	Between the PARK and REVERSE gates.
R	R	R	The transmission is hydraulically in REVERSE.	In the REVERSE gate.
	N		The transmission is transitioning between REVERSE and NEUTRAL.	Between the REVERSE and NEUTRAL gates.
N	N	N	The vehicle is in NEUTRAL.	In the NEUTRAL gate.
	N		The transmission is transitioning between NEUTRAL and DRIVE, but is not in DRIVE.	Between the NEUTRAL and DRIVE gates.
D	D	D	The transmission is hydraulically in DRIVE.	In the DRIVE gate,
2	2	2	The transmission is hydraulically in Manual SECOND.	In the SECOND gate.
1	1	1	The transmission is hydraulically in Manual FIRST.	In the FIRST gate.

DIAGNOSIS AND TESTING - TRANSMISSION RANGE SENSOR (TRS)

NOTE: For all circuit identification in the following steps, Refer to the appropriate Wiring Information.

(1) Raise vehicle on suitable hoist.

(2) Disconnect the vehicle's shift cable from the manual lever.

(3) With the manual lever in the PARK position (the PARK position is with the manual lever moved to the full rearward position), measure the resistance between the Park/Neutral Position Sense pin of the TRS and the transmission case. The resistance should be less than 5 ohms.

(4) With the manual lever in the NEUTRAL position (the NEUTRAL position is with the manual lever moved two detents forward of the full rearward position), measure the resistance between the Park/Neutral Position Sense pin of the TRS and the transmission case. The resistance should be less than 5 ohms.

(5) If the resistance is greater than 5 ohms in either of the previous steps, check for a dirty contact between the tip of the TRS rod and the valve body manual lever. If the contact is OK, replace the TRS.

(6) With the manual lever in the REVERSE position (the REVERSE position is with the manual lever moved one detent forward of the full rearward position), measure the resistance between the Fused Ignition Switch Output and the Back-up Lamp feed pins of the TRS. The resistance should be less than 5

TRANSMISSION RANGE SENSOR (Continued)

ohms. If the resistance is greater than 5 ohms, replace the TRS.

(7) With the manual lever in the PARK position (the PARK position is with the manual lever moved to the full rearward position), measure the resistance between the Transmission Range Sensor MUX and the Transmission Range Sensor 5V Supply pins of the TRS. The resistance should be 522.2 ohms. If the resistance is not correct, replace the TRS.

(8) With the manual lever in the REVERSE position (the REVERSE position is with the manual lever moved one detent forward of the full rearward position), measure the resistance between the Transmission Range Sensor MUX and the Transmission Range Sensor 5V Supply pins of the TRS. The resistance should be 206.2 ohms. If the resistance is not correct, replace the TRS.

(9) With the manual lever in the NEUTRAL position (the NEUTRAL position is with the manual lever moved two detents forward of the full rearward position), measure the resistance between the Transmission Range Sensor MUX and the Transmission Range Sensor 5V Supply pins of the TRS. The resistance should be 108.6 ohms. If the resistance is not correct, replace the TRS.

(10) With the manual lever in the DRIVE position (the DRIVE position is with the manual lever moved three detents forward of the full rearward position), measure the resistance between the Transmission Range Sensor MUX and the Transmission Range Sensor 5V Supply pins of the TRS. The resistance should be 59.9 ohms. If the resistance is not correct, replace the TRS.

(11) With the manual lever in the SECOND position (the SECOND position is with the manual lever moved one detent rearward of the full forward position), measure the resistance between the Transmission Range Sensor MUX and the Back-up Lamp feed pins of the TRS. The resistance should be 31.9 ohms. If the resistance is not correct, replace the TRS.

(12) With the manual lever in the LOW position (the LOW position is with the manual lever moved to the full forward position), measure the resistance between the Transmission Range Sensor MUX and the Back-up Lamp feed pins of the TRS. The resistance should be 13.7 ohms. If the resistance is not correct, replace the TRS.

REMOVAL

(1) Raise vehicle and position drain pan under the transmission range sensor (TRS).

(2) Move the transmission manual lever to the manual LOW position. The manual LOW position is with the manual lever in the forward-most detent.

(3) Disengage the wiring connector from the TRS.

(4) Remove the two screws holding the TRS to the TRS mounting bracket.

(5) Remove the TRS (Fig. 260) from the TRS mounting bracket by pulling it straight out of the bracket.

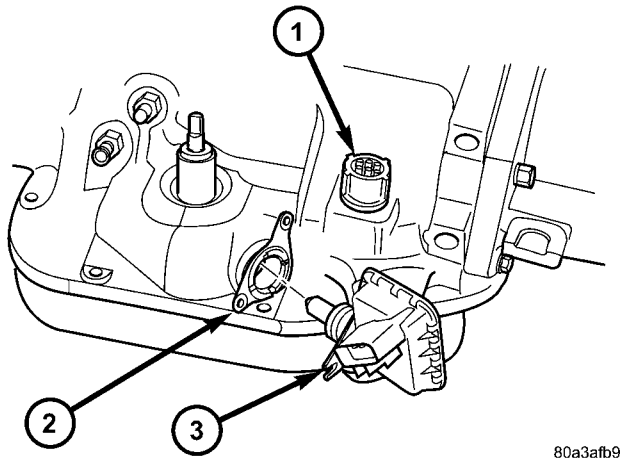


Fig. 260 Remove Transmission Range Sensor

1 - SOLENOID CASE CONNECTOR
2 - TRS MOUNTING BRACKET
3 - TRANSMISSION RANGE SENSOR

(6) Loosen the TRS mounting bracket in the transmission case using Adapter 8581 (Fig. 261).

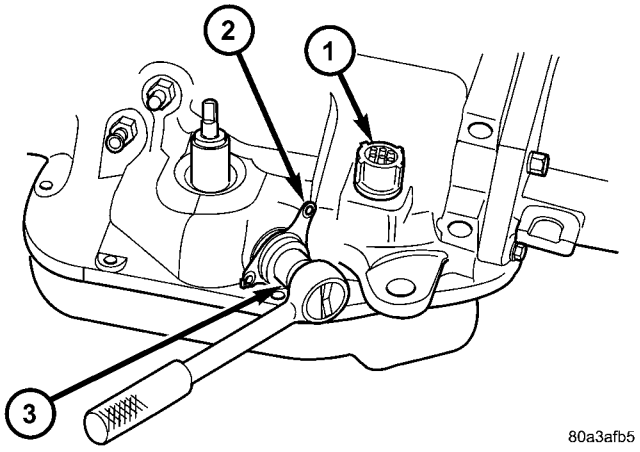


Fig. 261 Loosen the TRS Mounting Bracket

1 - SOLENOID CASE CONNECTOR
2 - TRS MOUNTING BRACKET
3 - ADAPTER 8581

TRANSMISSION RANGE SENSOR (Continued)

(7) Remove the TRS mounting bracket (Fig. 262) from the transmission case.

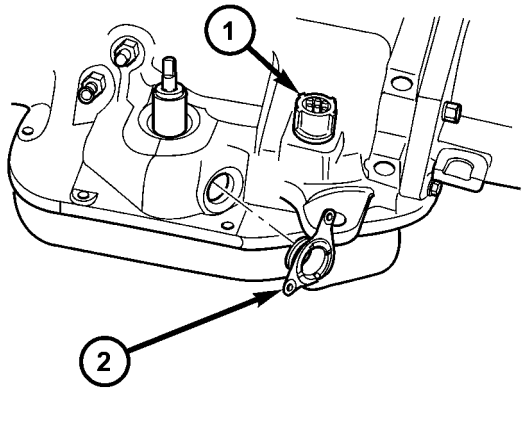


Fig. 262 Remove TRS Mounting Bracket

1 - SOLENOID CASE CONNECTOR
2 - TRS MOUNTING BRACKET

INSTALLATION

(1) Move the transmission manual shaft lever to the manual LOW position.

(2) Install the TRS mounting bracket into the transmission case. Using Adapter 8581 (Fig. 263), tighten the mounting bracket to 34 N·m (300 in.lbs.).

(3) Install the TRS (Fig. 264) into the mounting bracket with the wiring connector facing the front of the transmission.

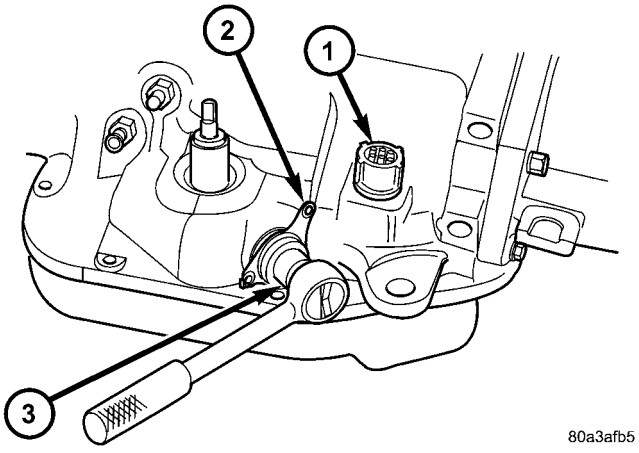


Fig. 263 Tighten the TRS Mounting Bracket

1 - SOLENOID CASE CONNECTOR
2 - TRS MOUNTING BRACKET
3 - ADAPTER 8581

(4) Install the two screws to hold the TRS to the mounting bracket. Tighten the screws to 3.4 N·m (30 in.lbs.).

(5) Verify proper sensor operation (Fig. 265).

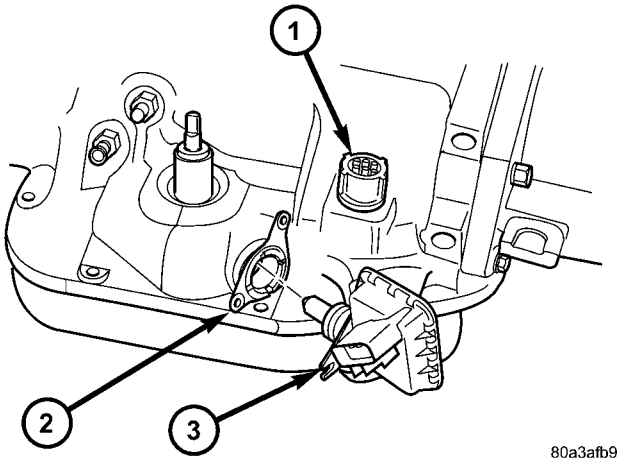


Fig. 264 Remove Transmission Range Sensor

1 - SOLENOID CASE CONNECTOR
2 - TRS MOUNTING BRACKET
3 - TRANSMISSION RANGE SENSOR

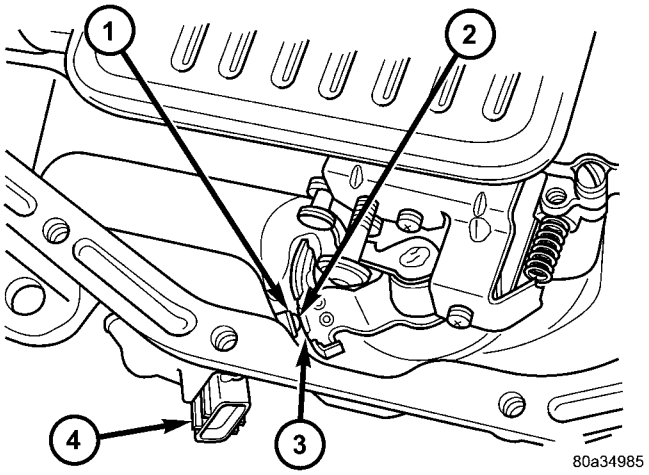


Fig. 265 Transmission Range Sensor Operation

1 - NEUTRAL CONTACT
2 - MANUAL LEVER AND SENSOR PLUNGER IN REVERSE POSITION
3 - PARK CONTACT
4 - TRANSMISSION RANGE SENSOR

(6) Move the transmission manual shaft lever to the PARK position.

(7) Connect TRS wiring connector to the TRS and lower vehicle.

(8) Refill the transmission fluid to the correct level.

TRANSMISSION TEMPERATURE SENSOR

DESCRIPTION

Transmission fluid temperature readings are supplied to the transmission control module by the thermistor (Fig. 266). 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.

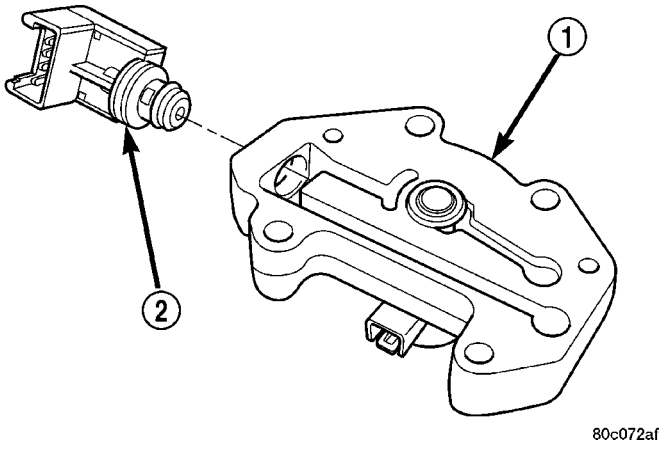


Fig. 266 Governor Pressure Sensor

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).

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. 267), (Fig. 268), (Fig. 269), and (Fig. 270):

- 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)

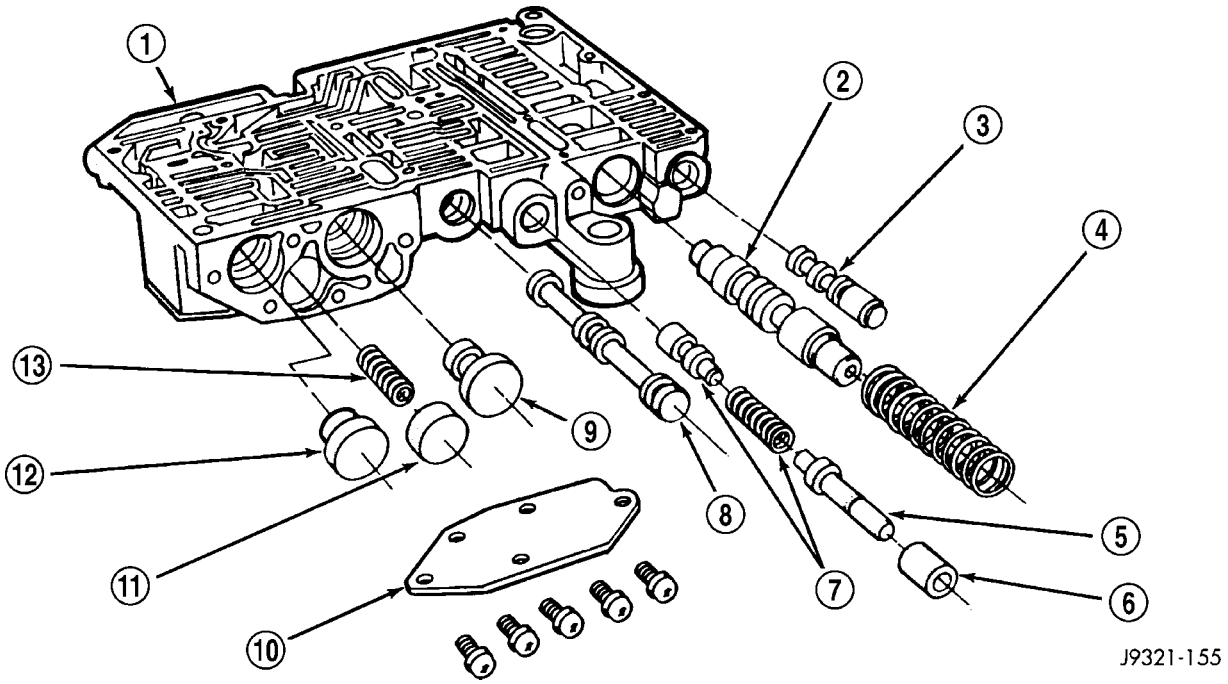


Fig. 267 Upper Housing Control Valve Locations

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)

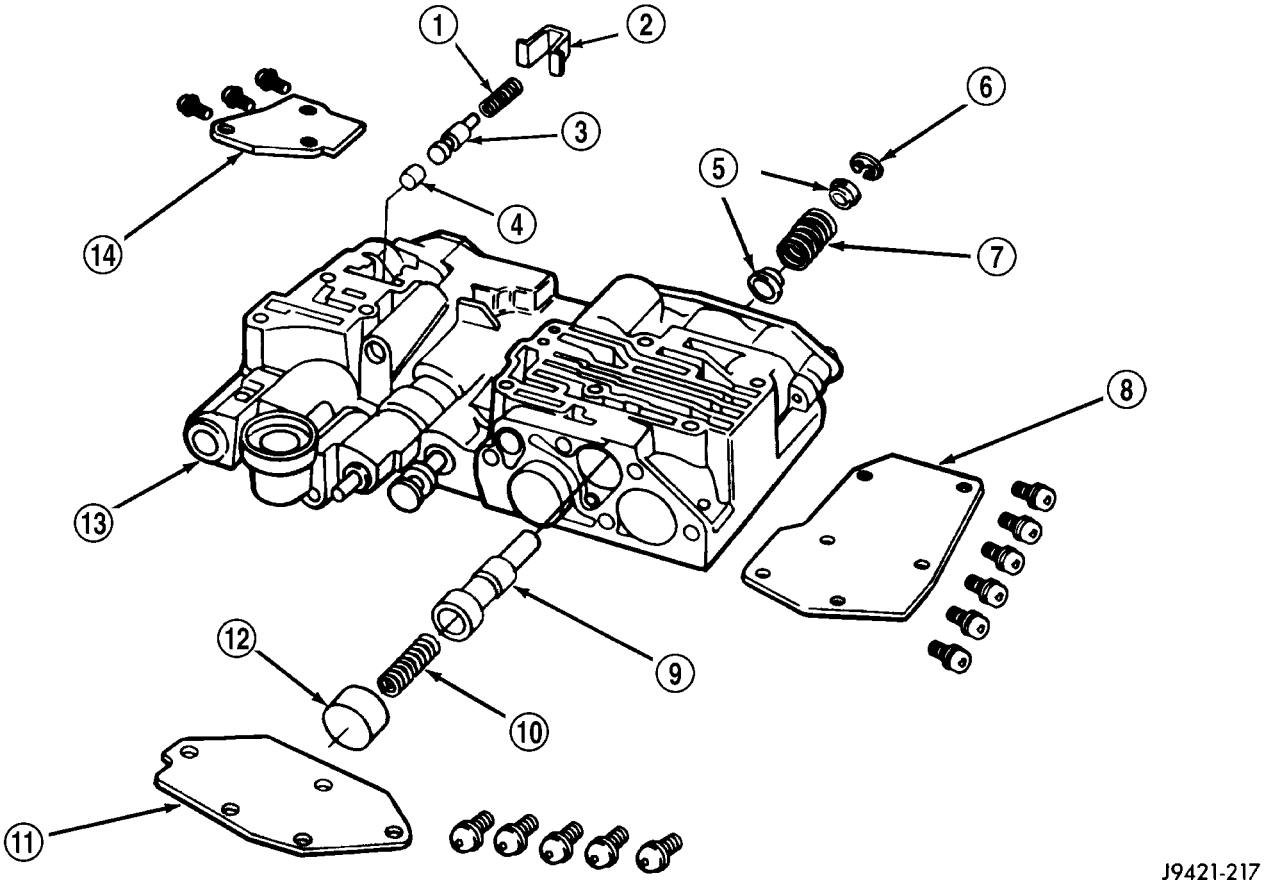


Fig. 268 Shuttle and Boost Valve Locations

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)

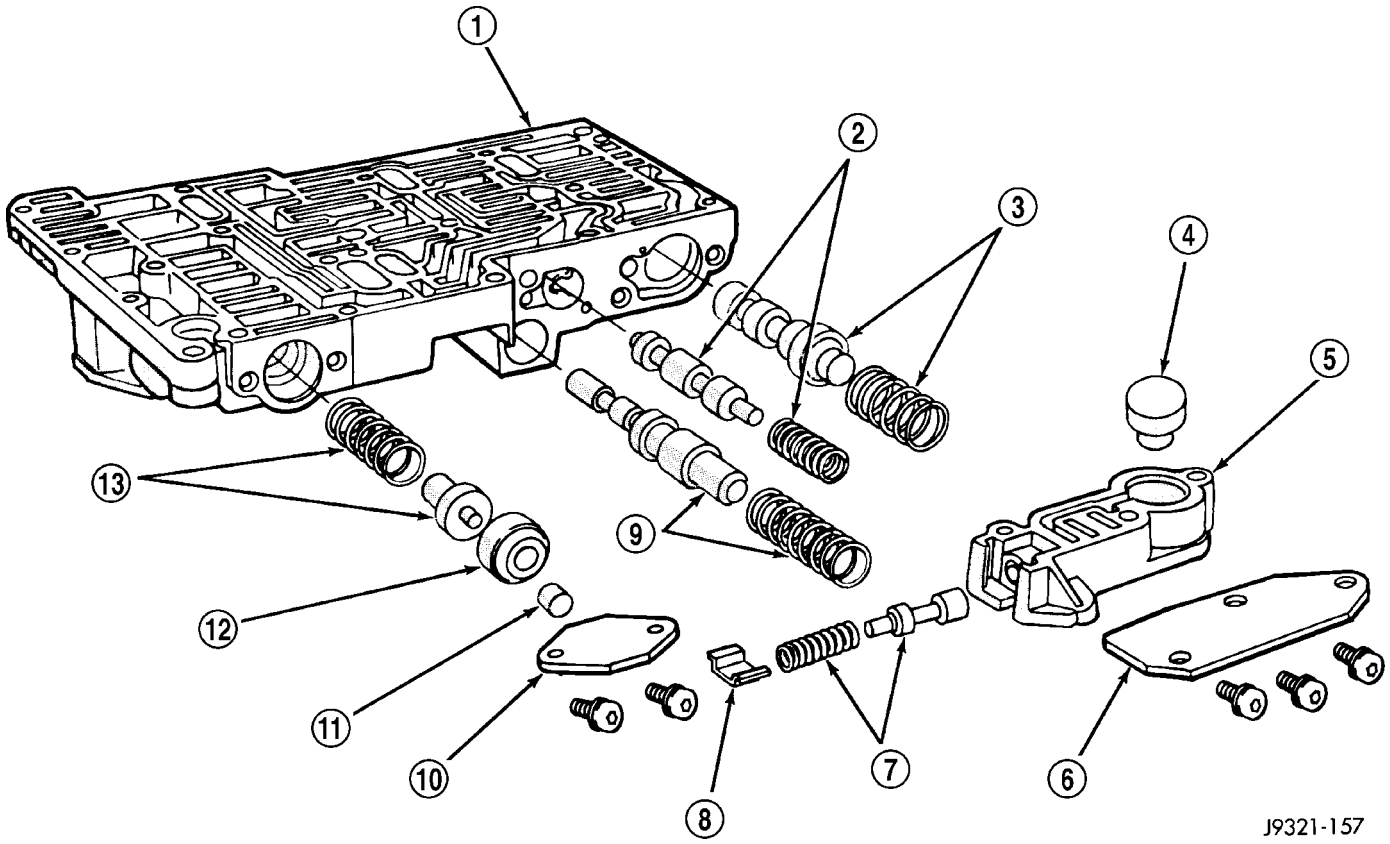


Fig. 269 Upper Housing Shift Valve and Pressure Plug Locations

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)

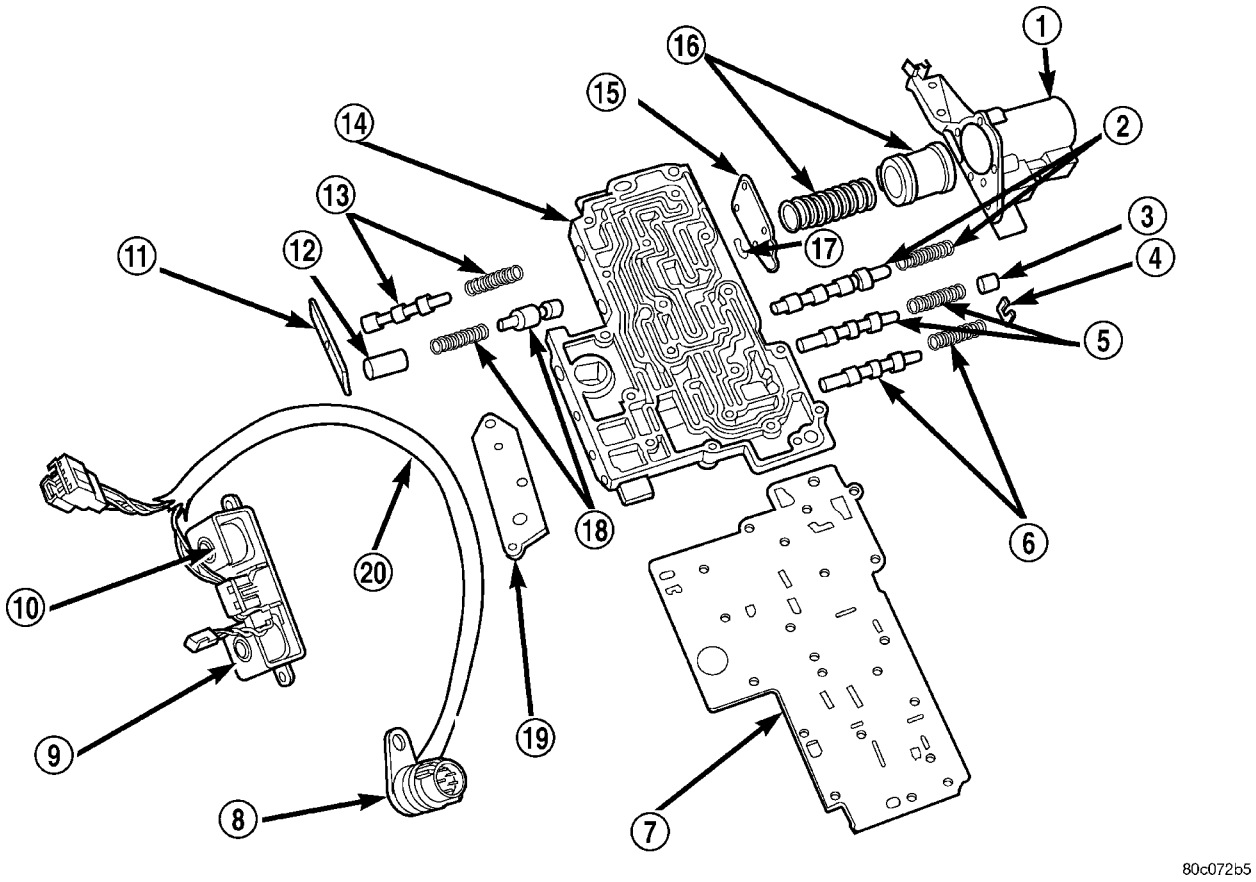


Fig. 270 Lower Housing Shift Valves and Springs

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.
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.”

The regulator valve (Fig. 271) 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. 272), 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.

VALVE BODY (Continued)

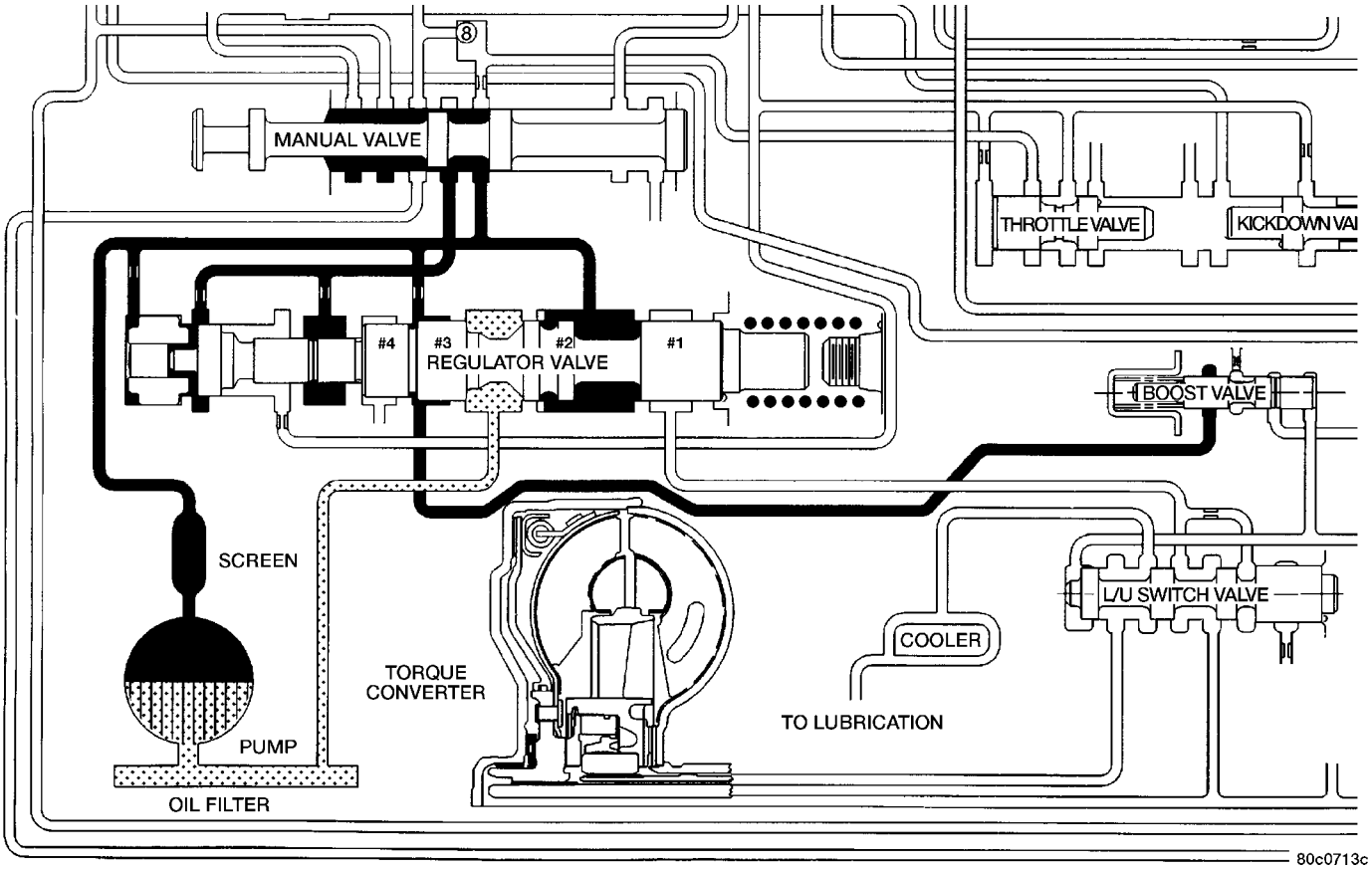


Fig. 271 Regulator Valve in PARK Position

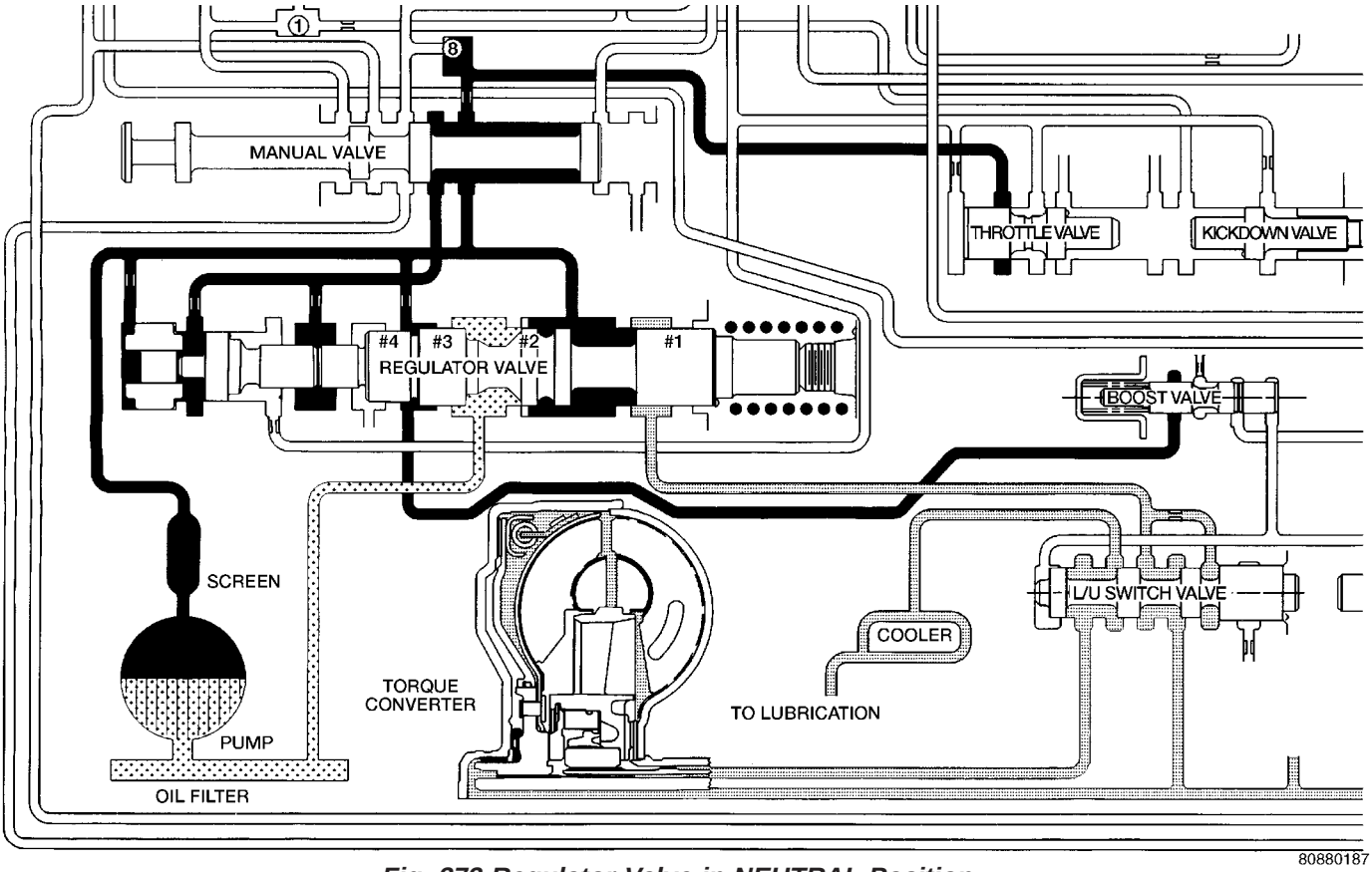


Fig. 272 Regulator Valve in NEUTRAL Position

VALVE BODY (Continued)

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. 273). The regulated line pressure in REVERSE (Fig. 274) 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.

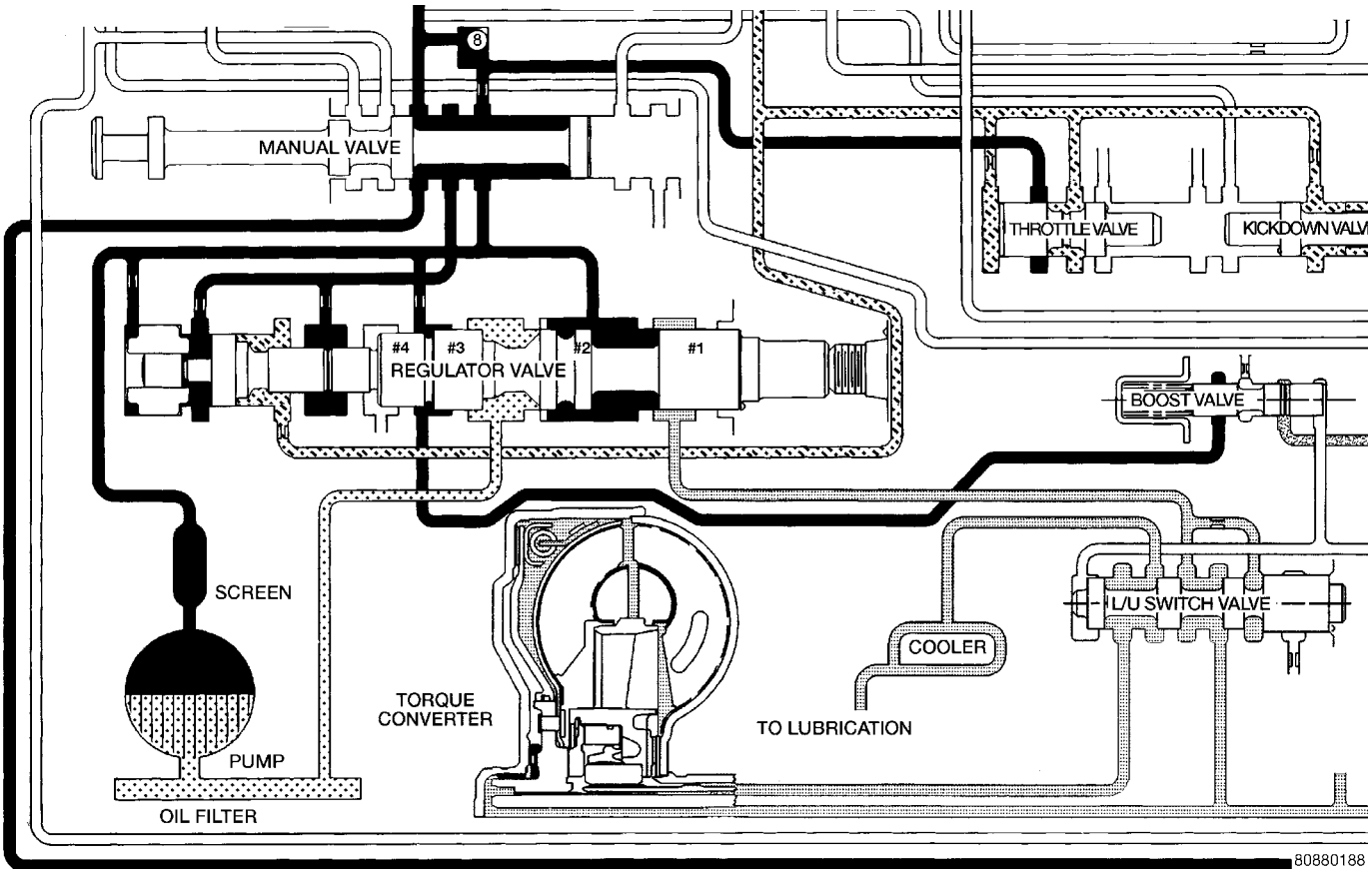


Fig. 273 Regulator Valve in DRIVE Position

VALVE BODY (Continued)

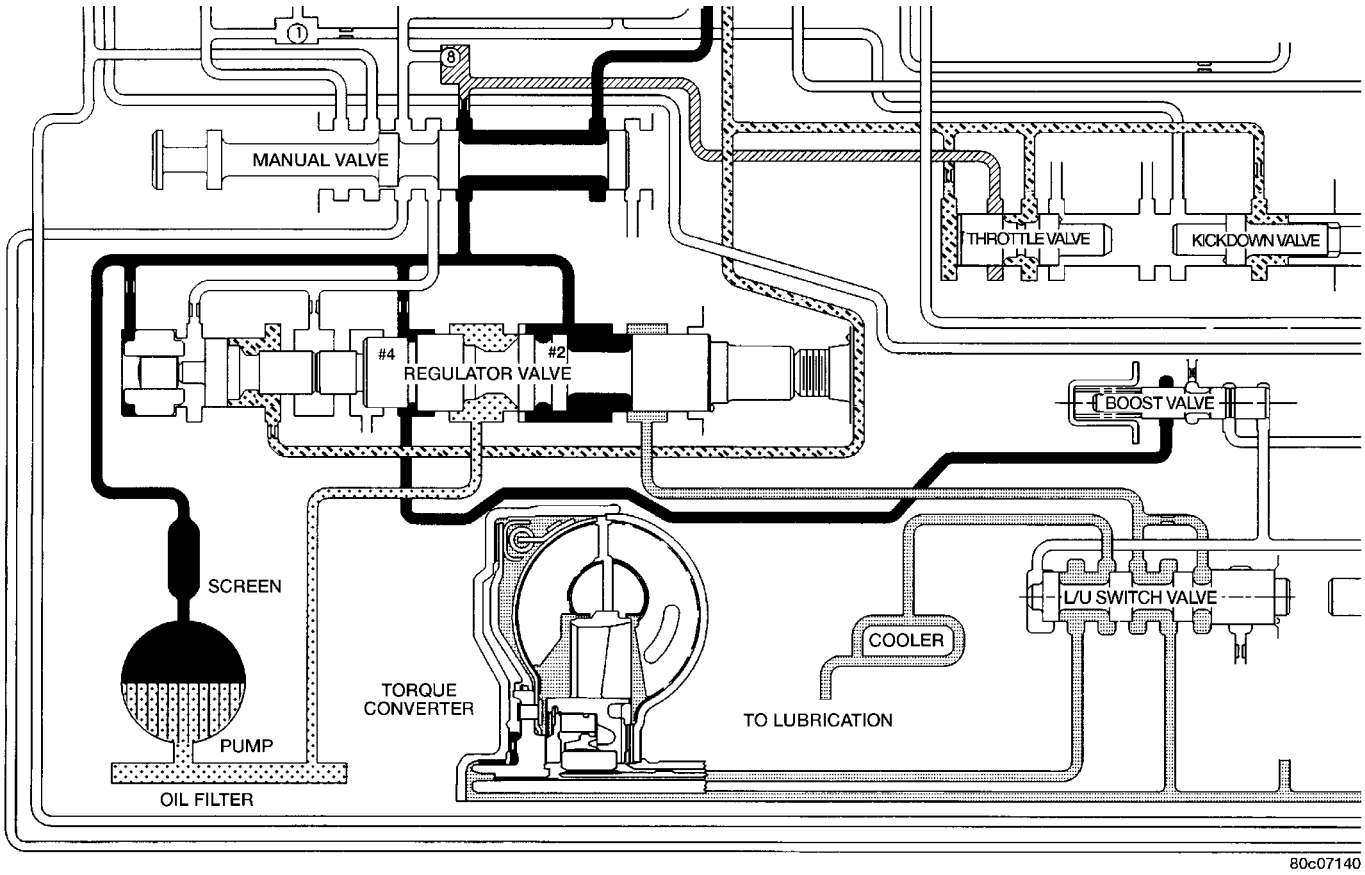


Fig. 274 Regulator Valve in REVERSE Position

VALVE BODY (Continued)

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. 275) 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.

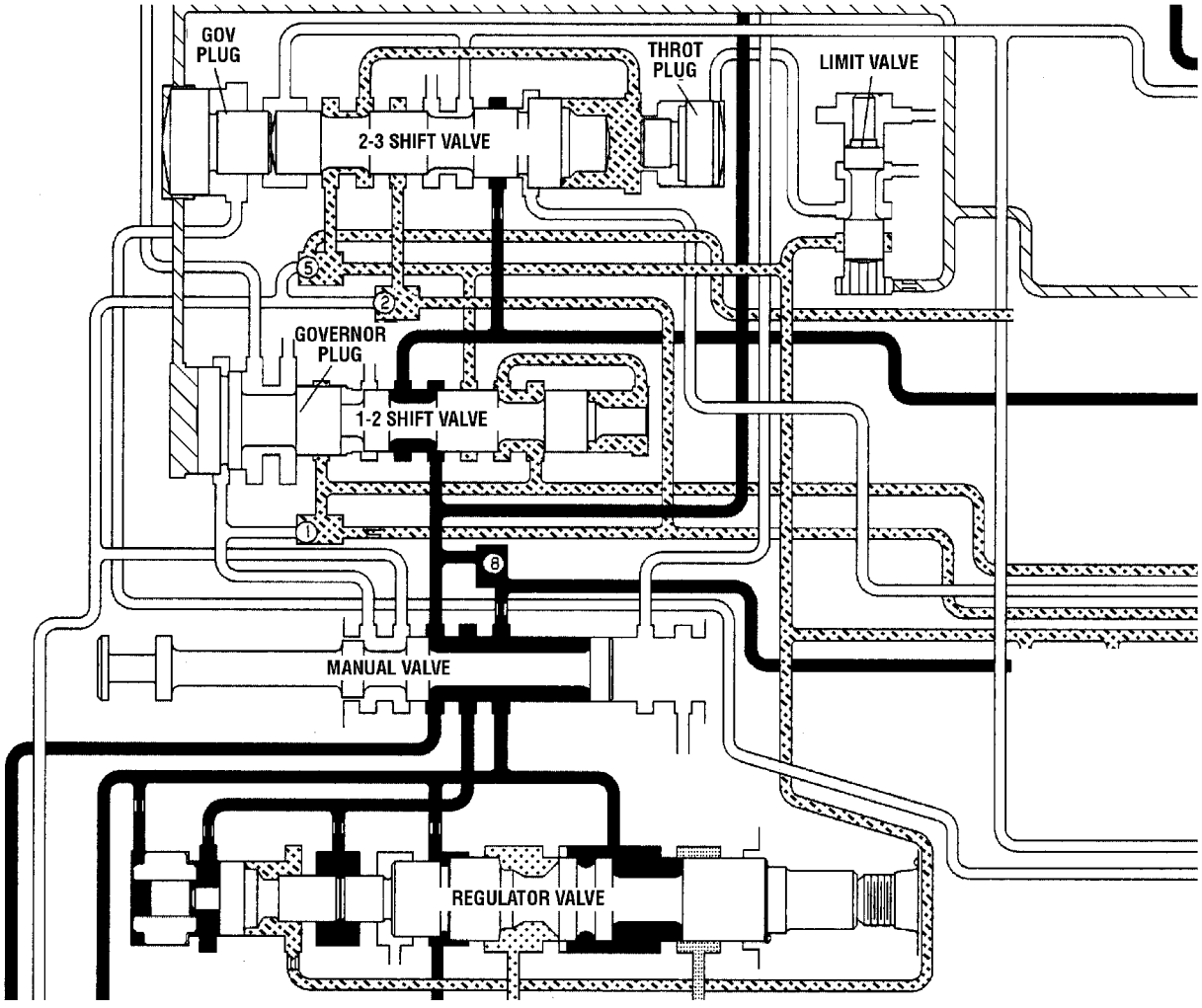


Fig. 275 Kickdown Valve-Wide Open Throttle

VALVE BODY (Continued)

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. 276) the limit valve does not come into play and does not affect the downshifts. As the vehicle's speed increases (Fig. 277), 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.

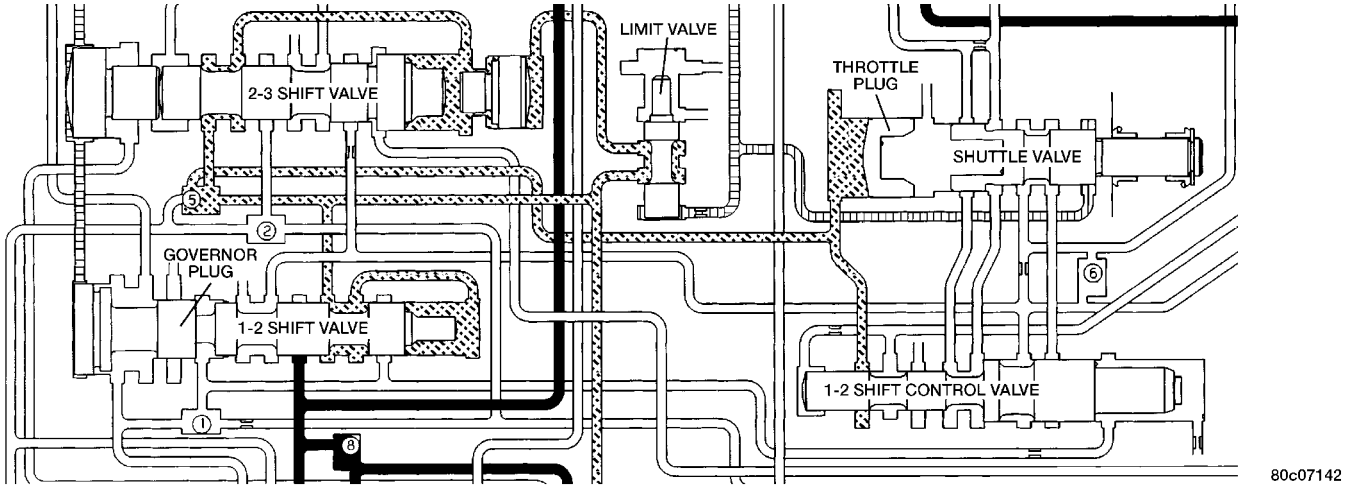


Fig. 276 Kickdown Limit Valve-Low Speeds

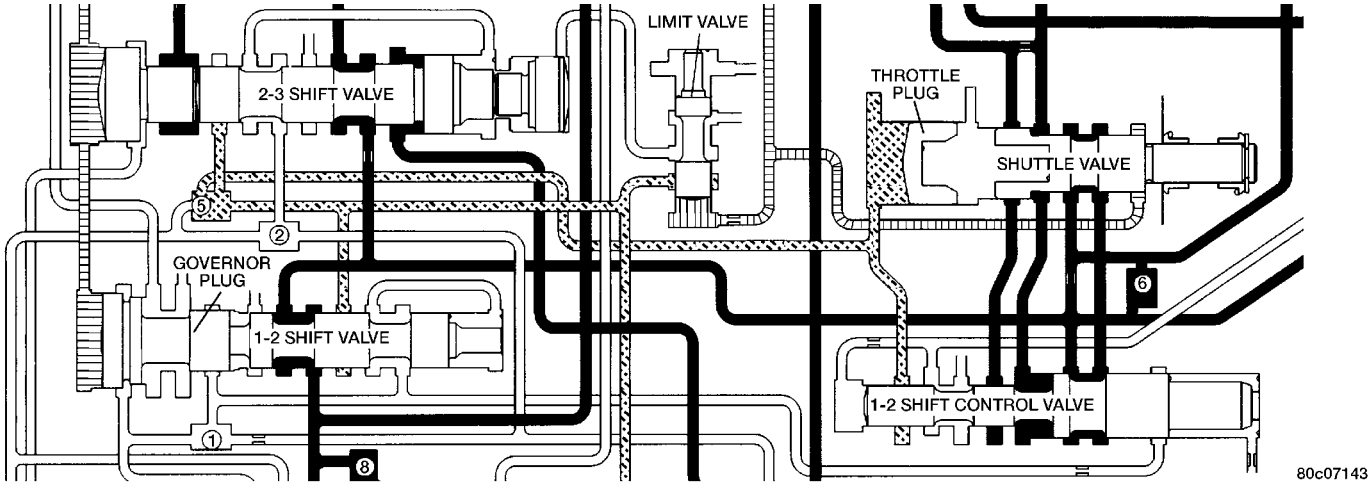


Fig. 277 Kickdown Limit Valve-High Speeds

VALVE BODY (Continued)

1-2 SHIFT VALVE

The 1-2 shift valve assembly (Fig. 278), 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. 279).

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.

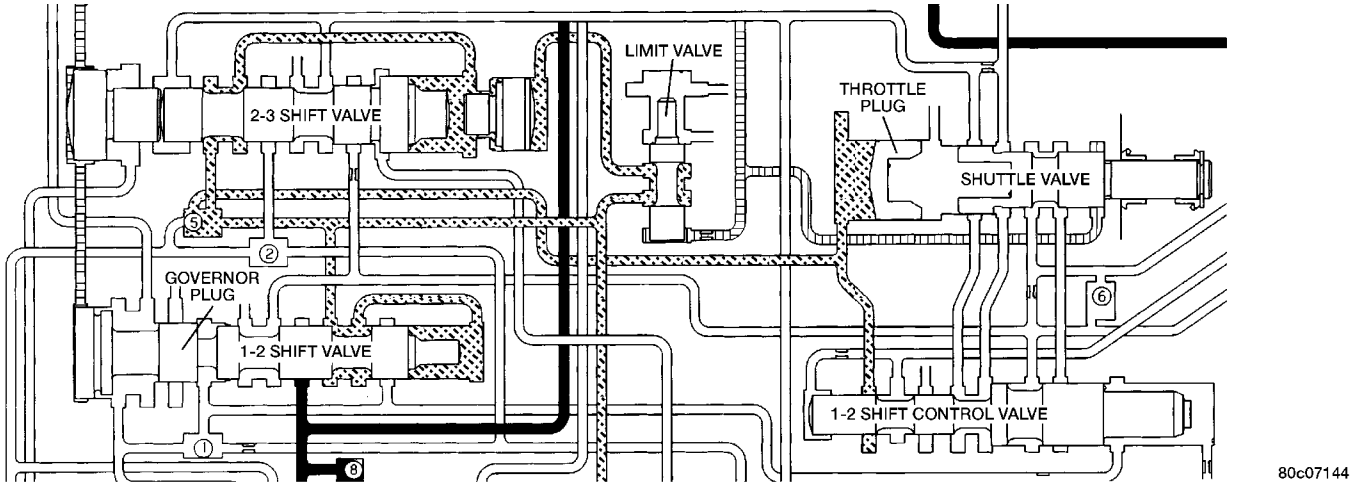


Fig. 278 1-2 Shift Valve-Before Shift

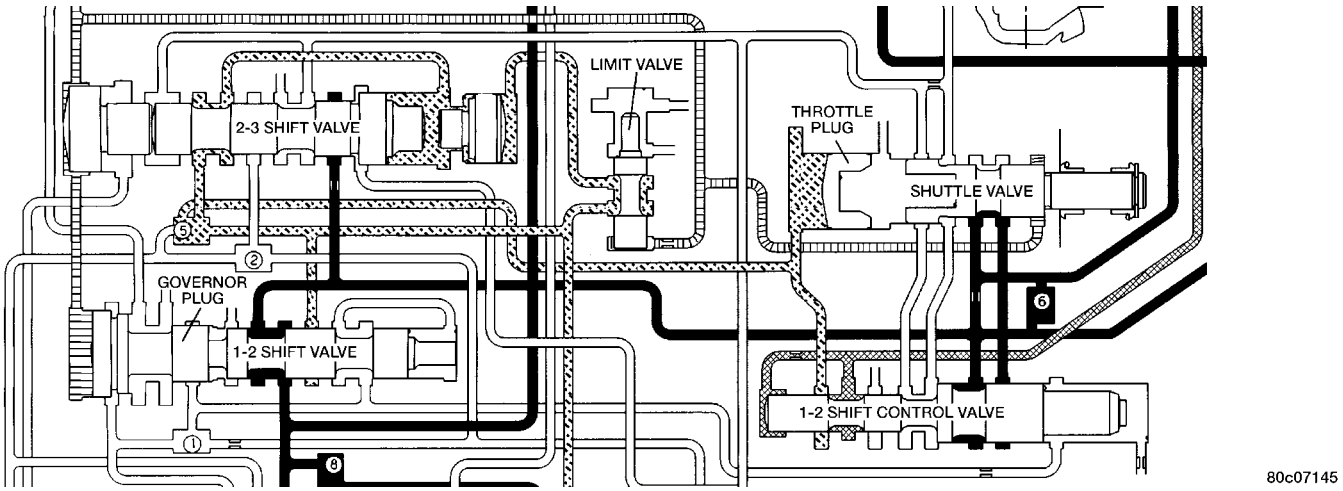


Fig. 279 1-2 Shift Valve-After Shift

VALVE BODY (Continued)

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. 280):

- 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. 281) 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. 282), 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.

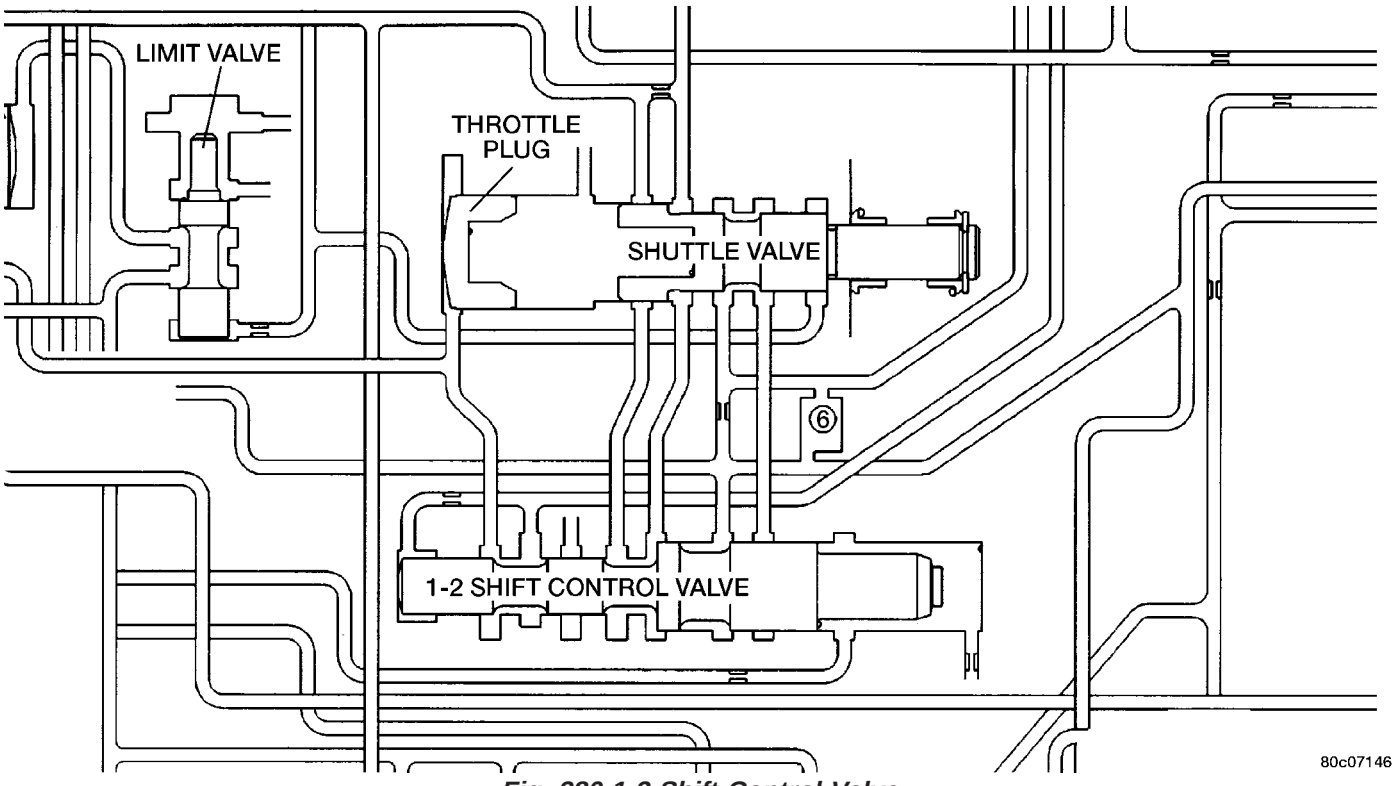


Fig. 280 1-2 Shift Control Valve

VALVE BODY (Continued)

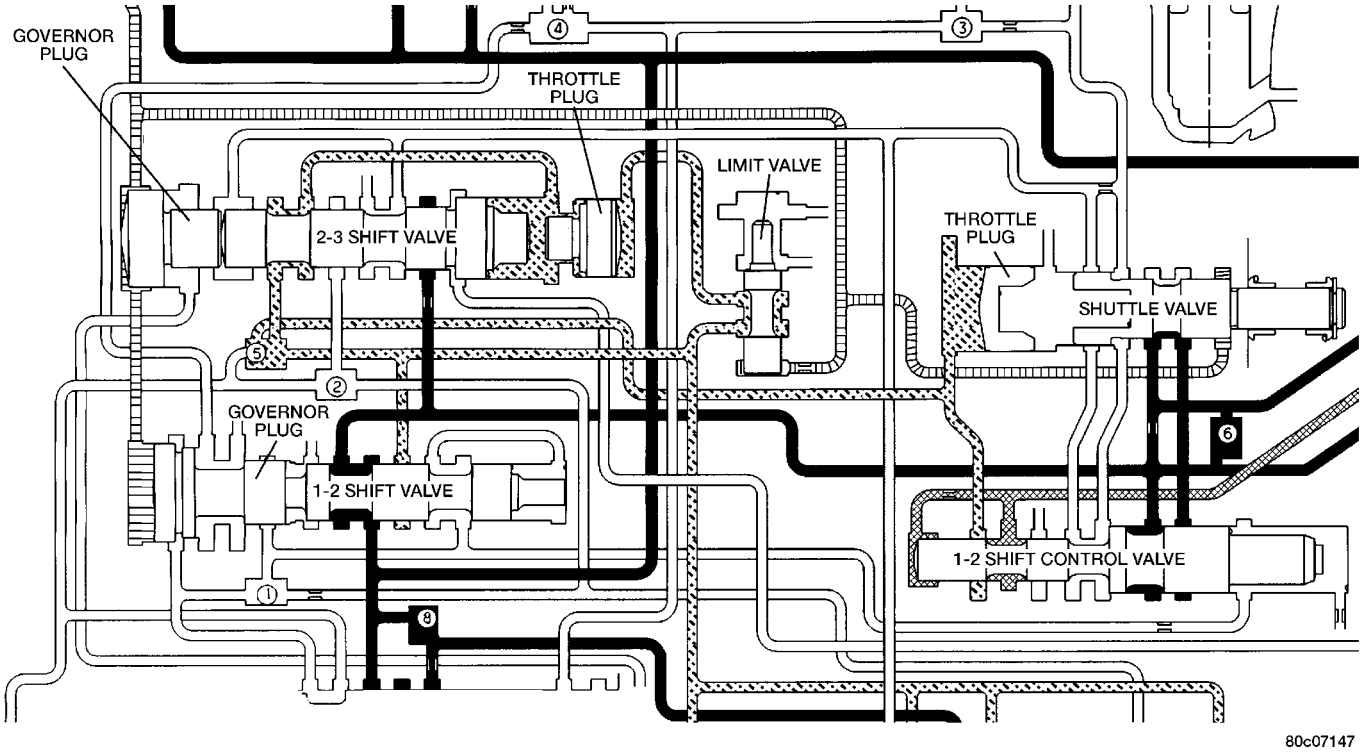


Fig. 281 2-3 Shift Valve-Before Shift

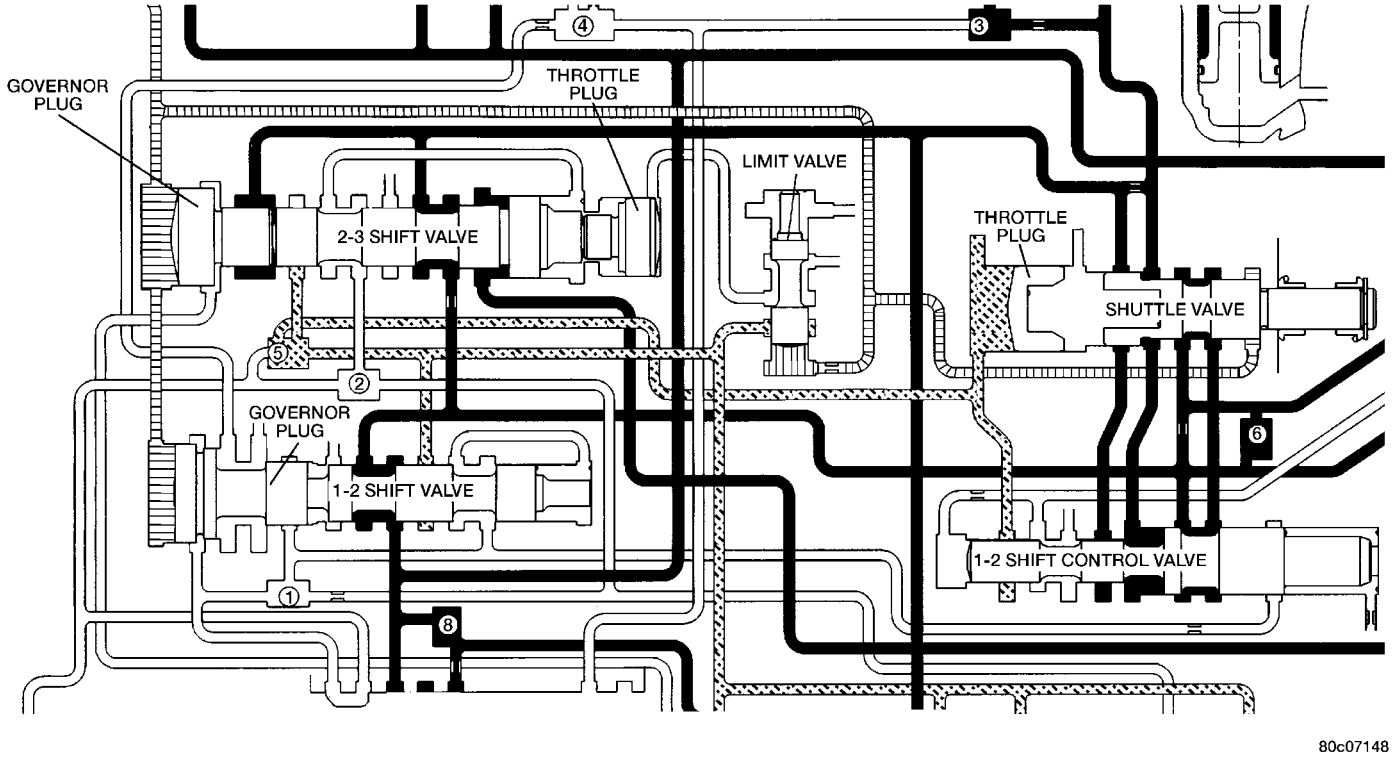


Fig. 282 2-3 Shift Valve-After Shift

VALVE BODY (Continued)

3-4 SHIFT VALVE

The PCM energizes the overdrive solenoid during the 3-4 upshift (Fig. 283). 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. 284). 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.

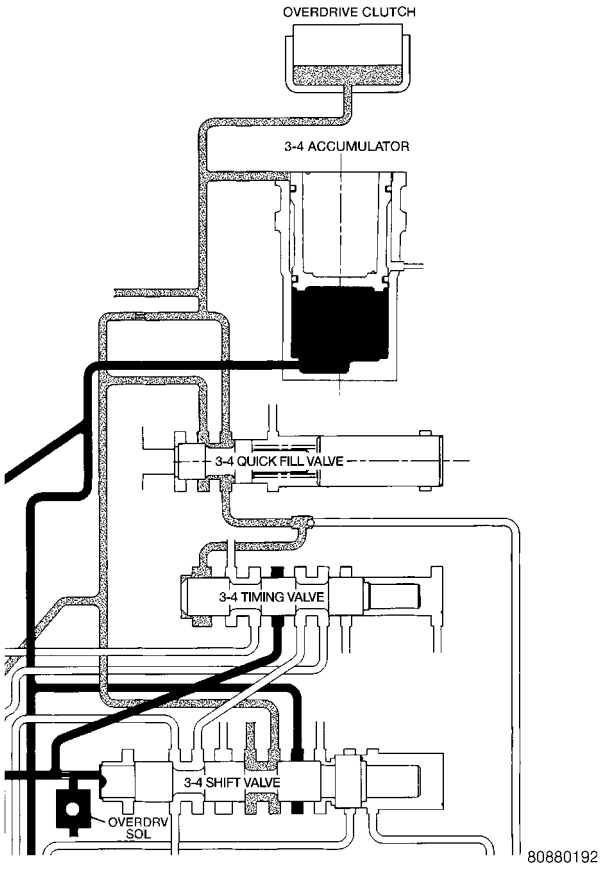


Fig. 283 3-4 Shift Valve Before Shift

3-4 TIMING VALVE

The 3-4 timing valve is moved by line pressure coming through the 3-4 shift valve (Fig. 284). 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. 283).

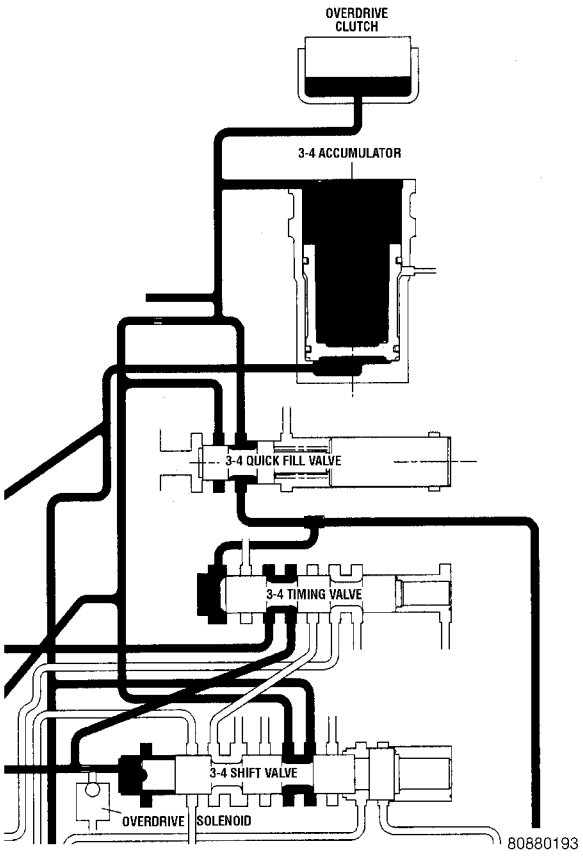


Fig. 284 3-4 Shift Valve After Shift

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. 283). 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. 284). Clutch fill is then completed through the regular feed orifice.

VALVE BODY (Continued)

THROTTLE VALVE

In all gear positions the throttle valve (Fig. 285) 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 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.

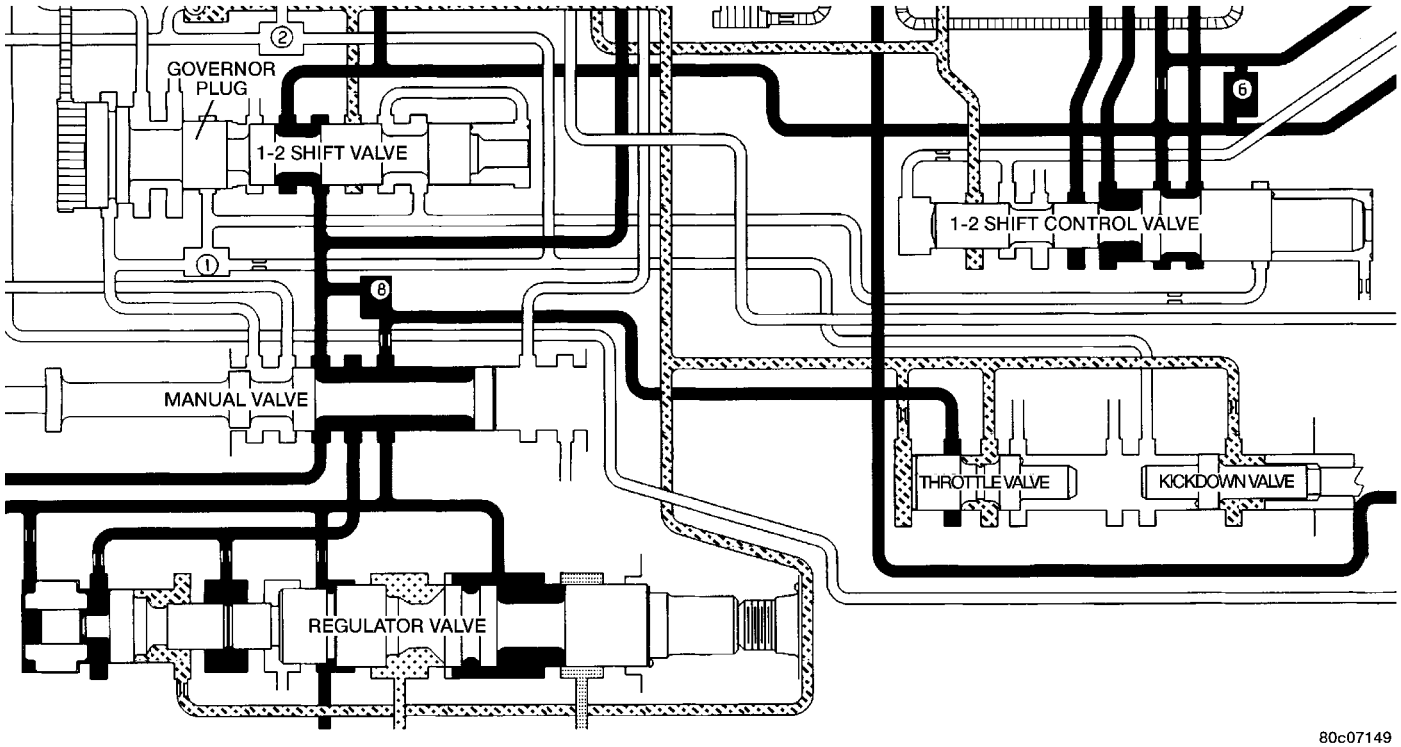


Fig. 285 Throttle Valve

VALVE BODY (Continued)

SWITCH VALVE

When the transmission is in Drive Second before the TCC application occurs (Fig. 286), 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.

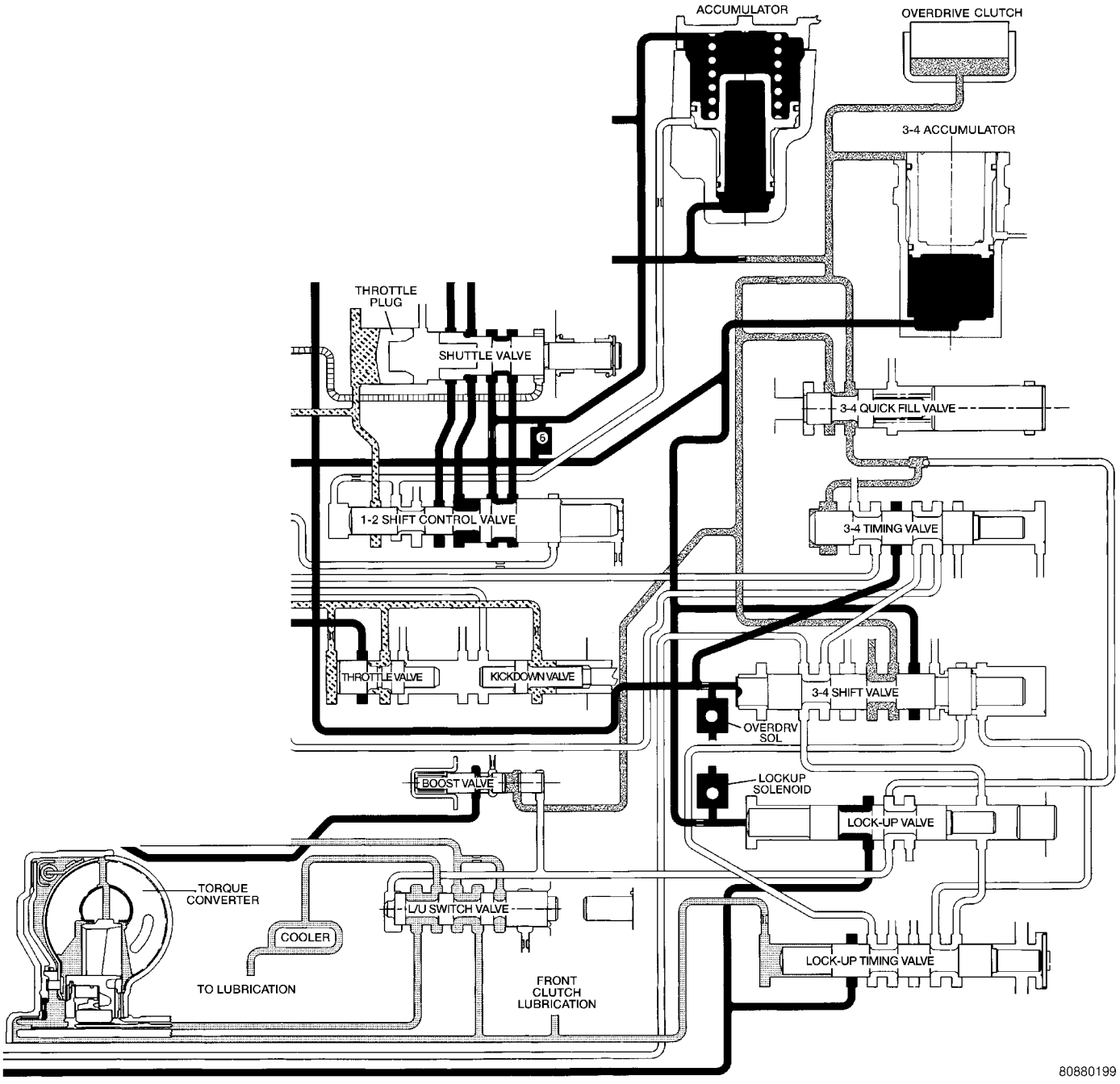


Fig. 286 Switch Valve-Torque Converter Unlocked

VALVE BODY (Continued)

Once the TCC control valve has moved to the right (Fig. 287), 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.

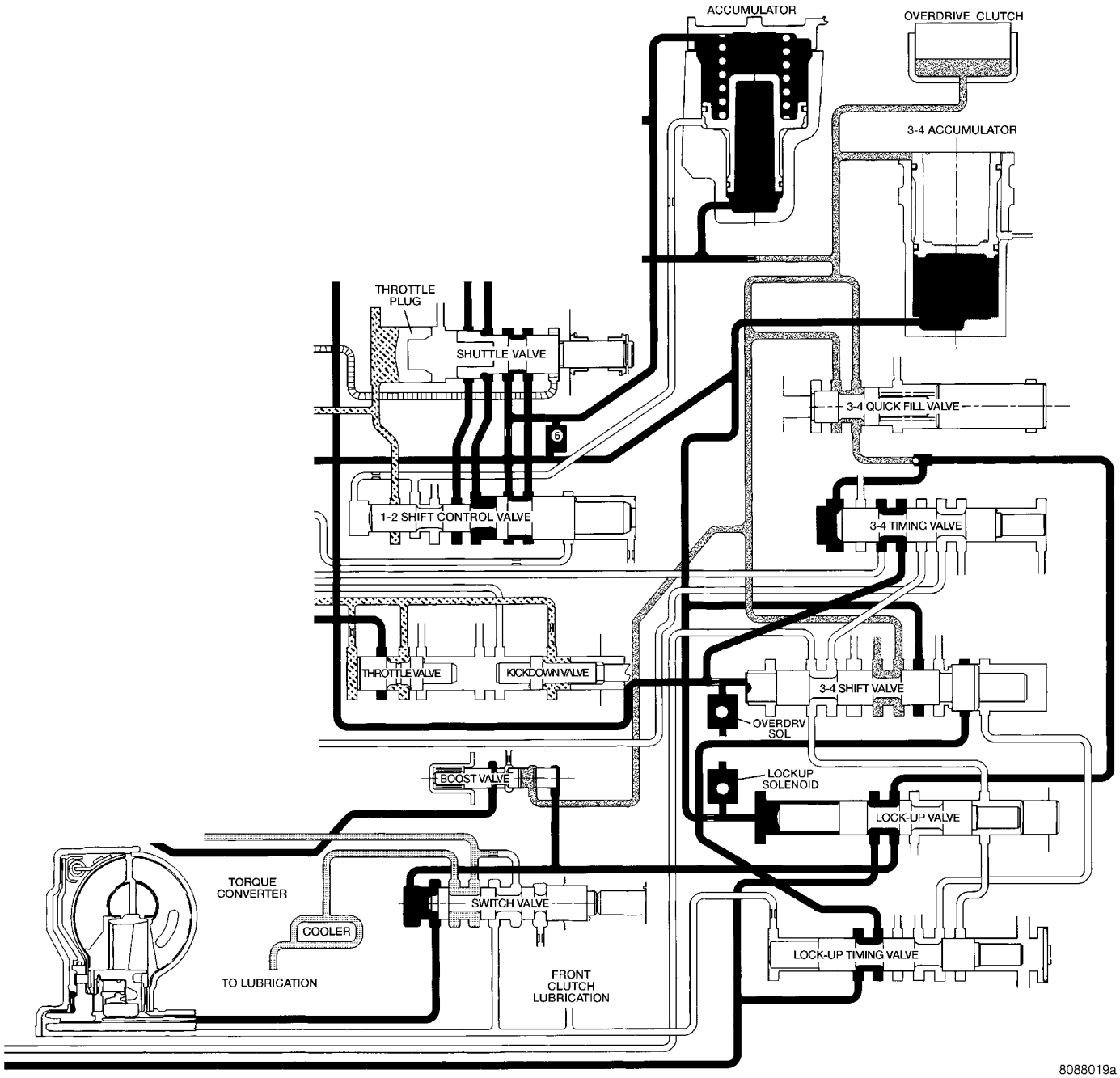


Fig. 287 Switch Valve-Torque Converter Locked

VALVE BODY (Continued)

MANUAL VALVE

The manual valve (Fig. 288) is a relay valve. The purpose of the manual valve is to direct fluid to the correct circuit needed for a specific gear or driving range. The manual valve, as the name implies, is manually operated by the driver with a lever located on the side of the valve body. The valve is connected mechanically by either a cable or linkage to the gear-shift mechanism. The valve is held in each of its positions by a spring-loaded roller or ball that engages the “roostercomb” of the manual valve 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.

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. 280) 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.

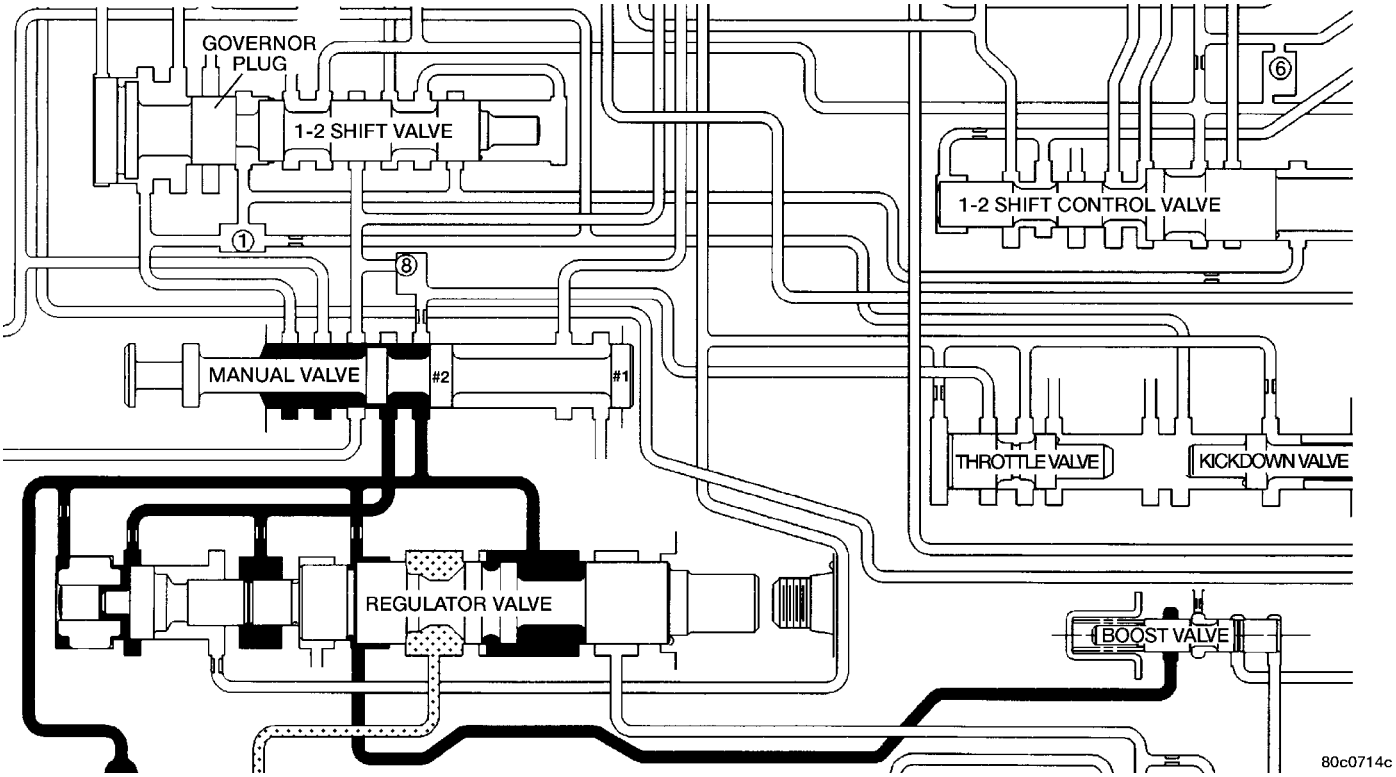


Fig. 288 Manual Valve

VALVE BODY (Continued)

BOOST VALVE

The boost valve (Fig. 289) provides increased fluid apply pressure to the overdrive clutch during 3-4 upshifts (Fig. 290), and when accelerating in fourth gear. The boost valve also serves to increase line pressure during torque converter lock-up.

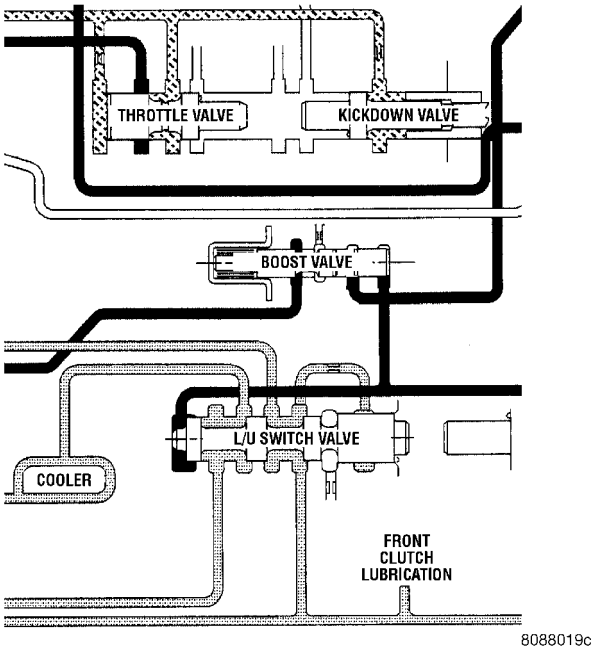


Fig. 289 Boost Valve Before Lock-up

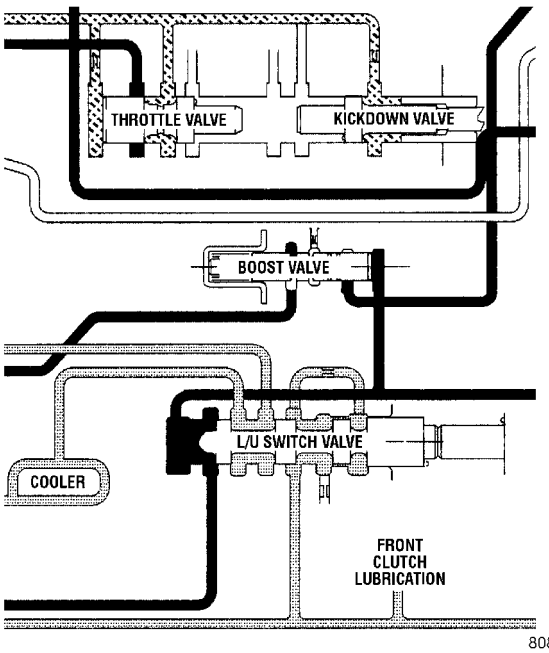


Fig. 290 Boost Valve After Lock-up

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. 291).

(5) Remove the transmission range sensor.

(6) Position drain pan under transmission oil pan.

(7) Remove transmission oil pan and gasket.

(8) Remove fluid filter from valve body.

(9) Remove bolts attaching valve body to transmission case.

(10) Lower valve body enough to remove accumulator piston and springs.

(11) Work manual lever shaft and electrical connector out of transmission case.

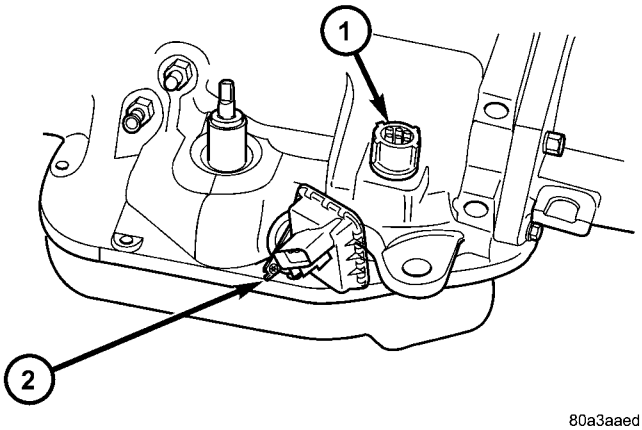


Fig. 291 Transmission Case Connector

1 - SOLENOID CASE CONNECTOR
2 - TRANSMISSION RANGE SENSOR

VALVE BODY (Continued)

(12) Lower valve body, rotate valve body away from case, pull park rod out of sprag, and remove valve body (Fig. 292).

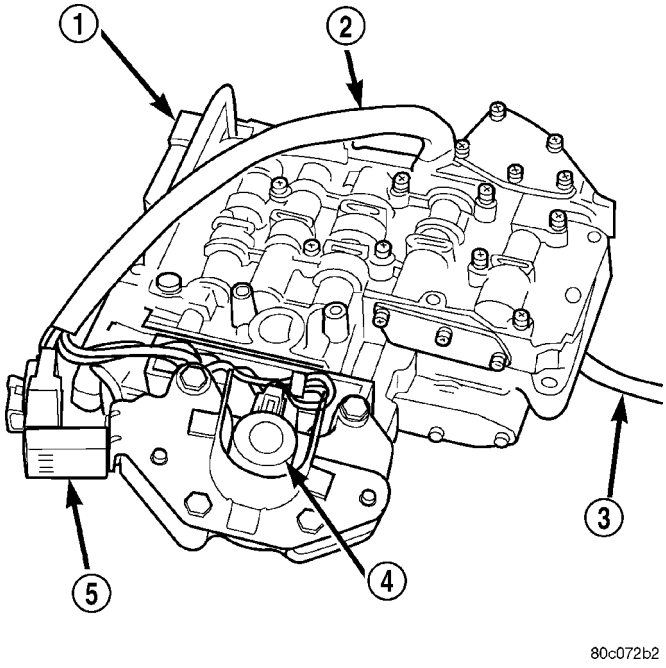


Fig. 292 Valve Body

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. 293). 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. 294).

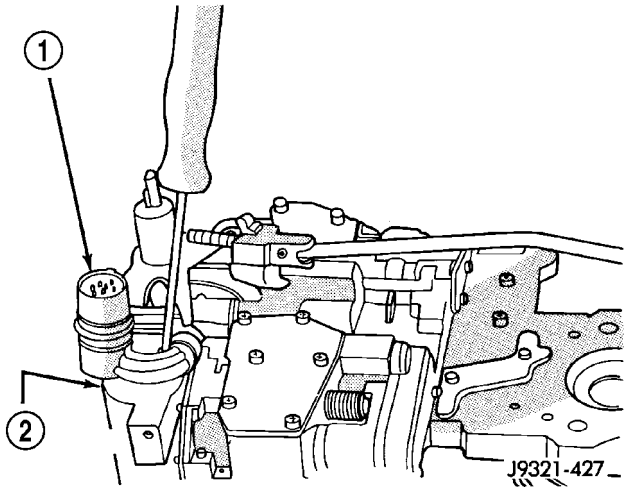


Fig. 293 Solenoid Harness Case Connector Shoulder Bolt

1 - SOLENOID HARNESS CASE CONNECTOR
2 - 3-4 ACCUMULATOR HOUSING

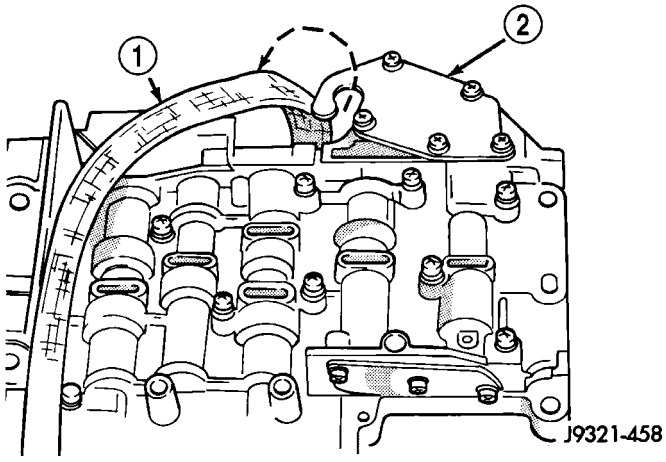


Fig. 294 Solenoid Harness Routing

1 - OVERDRIVE/CONVERTER SOLENOID WIRE HARNESS
2 - 3-4 ACCUMULATOR COVER PLATE

VALVE BODY (Continued)

(8) Turn valve body over and remove screws that attach overdrive/converter solenoid assembly to valve body (Fig. 295).

(9) Remove solenoid and harness assembly from valve body (Fig. 296).

(10) Remove boost valve cover (Fig. 297).

(11) Remove boost valve retainer, valve spring and boost valve (Fig. 298).

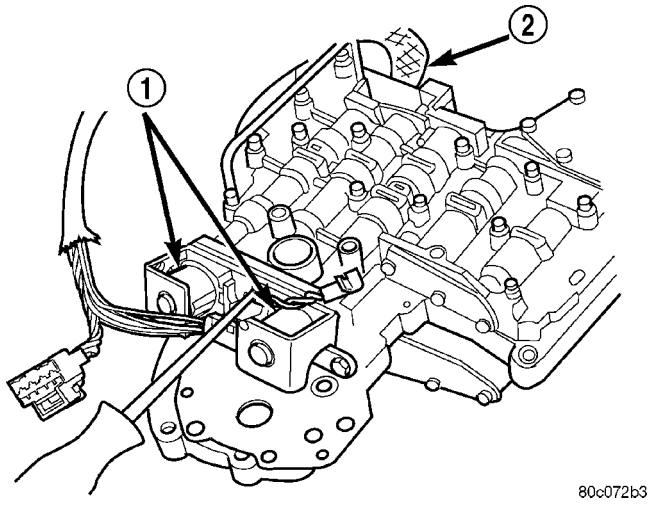


Fig. 295 Solenoid Assembly Screws

1 - OVERDRIVE/CONVERTER CLUTCH SOLENOID ASSEMBLY
2 - HARNESS

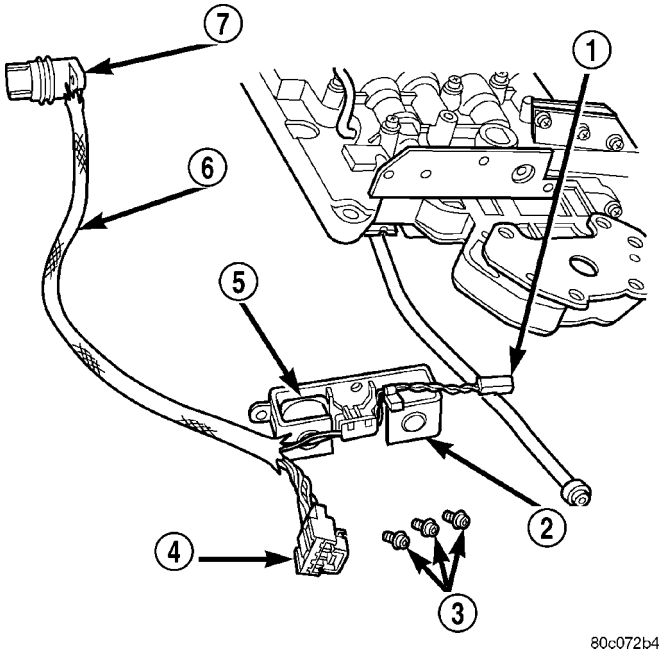


Fig. 296 Solenoid Assembly

1 - GOVERNOR SOLENOID WIRES
2 - CONVERTER CLUTCH SOLENOID
3 - SOLENOID SCREWS
4 - GOVERNOR SENSOR WIRES
5 - OVERDRIVE SOLENOID
6 - HARNESS
7 - CASE CONNECTOR

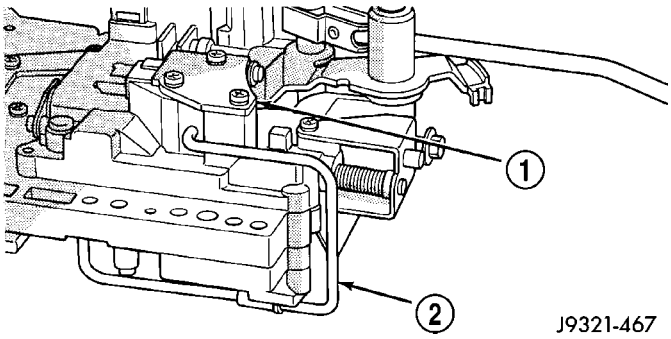


Fig. 297 Boost Valve Cover Location

1 - BOOST VALVE HOUSING AND COVER
2 - BOOST VALVE TUBE

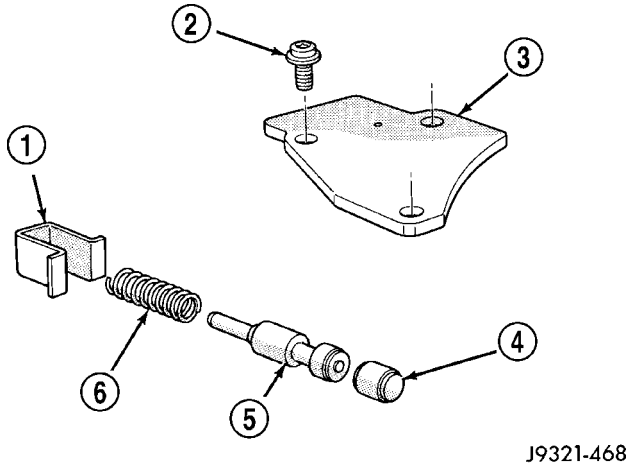


Fig. 298 Boost Valve Components

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. 299).

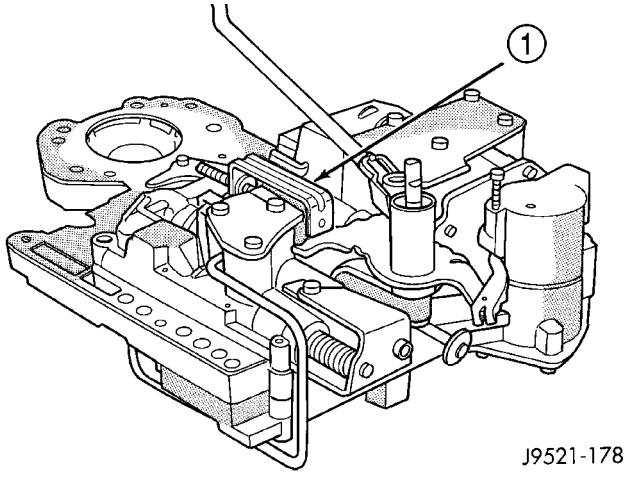


Fig. 299 Detent Ball Spring

1 - SPECIAL TOOL 6583 POSITIONED ON DETENT HOUSING

VALVE BODY (Continued)

(13) Remove park rod E-clip and separate rod from manual lever (Fig. 300).

(14) Remove E-clip and washer that retains throttle lever shaft in manual lever (Fig. 301).

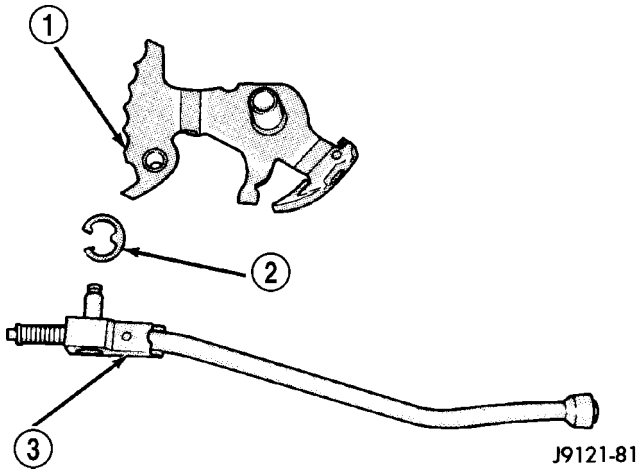


Fig. 300 Park Rod

1 - MANUAL LEVER
2 - E-CLIP
3 - PARK ROD

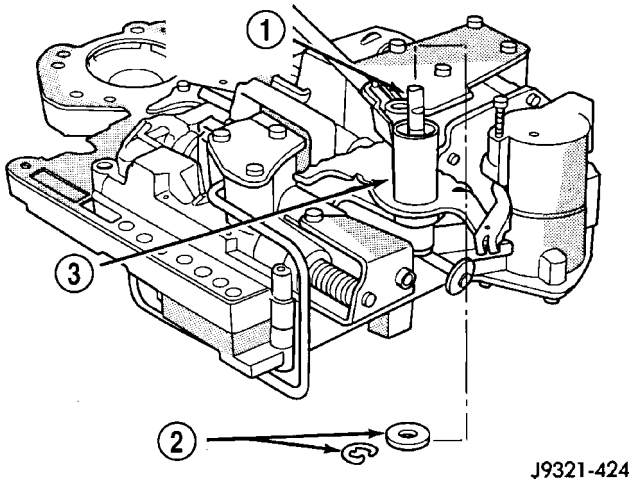


Fig. 301 Throttle Lever E-Clip And Washer

1 - THROTTLE LEVER SHAFT
2 - E-CLIP AND WASHER
3 - MANUAL SHAFT

(15) Remove manual lever and throttle lever (Fig. 302). 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. 303).

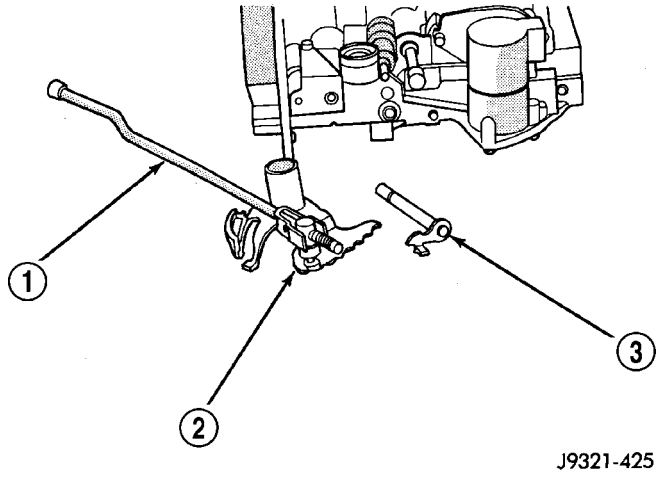


Fig. 302 Manual And Throttle Lever

1 - PARK ROD
2 - MANUAL LEVER ASSEMBLY
3 - THROTTLE LEVER

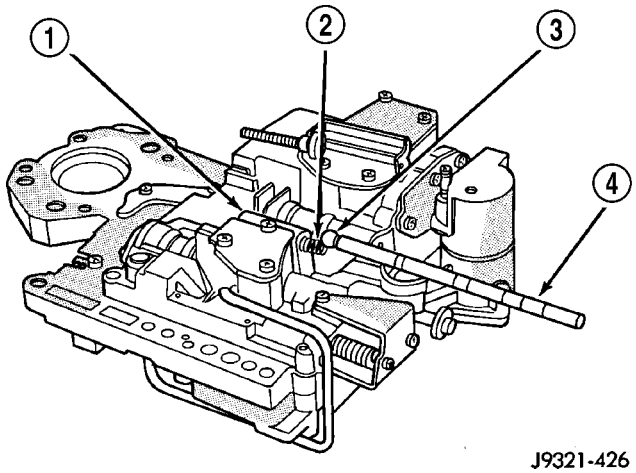


Fig. 303 Detent Ball And Spring

1 - DETENT HOUSING
2 - DETENT SPRING
3 - DETENT BALL
4 - PENCIL MAGNET

VALVE BODY (Continued)

(17) Remove screws attaching pressure adjusting screw bracket to valve body and transfer plate (Fig. 304). Hold bracket firmly against spring tension while removing last screw.

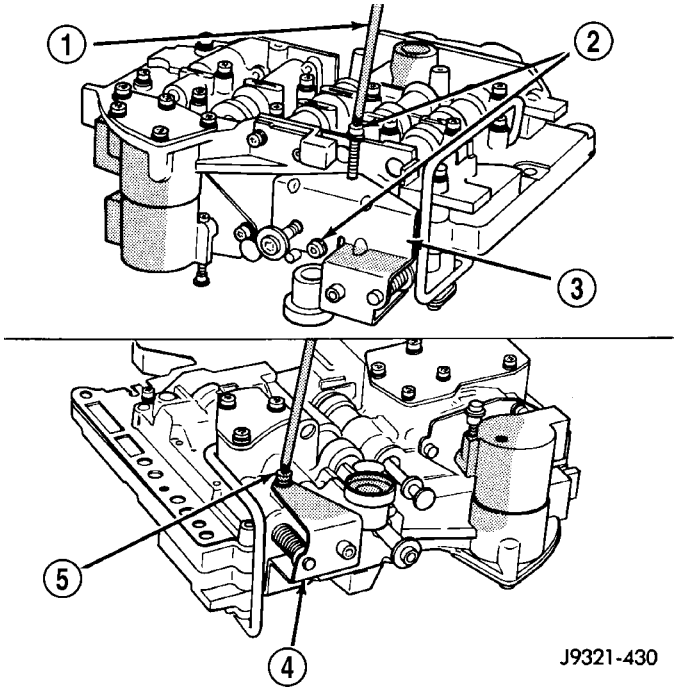


Fig. 304 Adjusting Screw Bracket Fastener

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. 305). 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. 306).

(20) Remove kickdown detent, kickdown valve, and throttle valve and spring (Fig. 306).

(21) Loosen left-side 3-4 accumulator housing attaching screw about 2-3 threads. Then remove center and right-side housing attaching screws (Fig. 307).

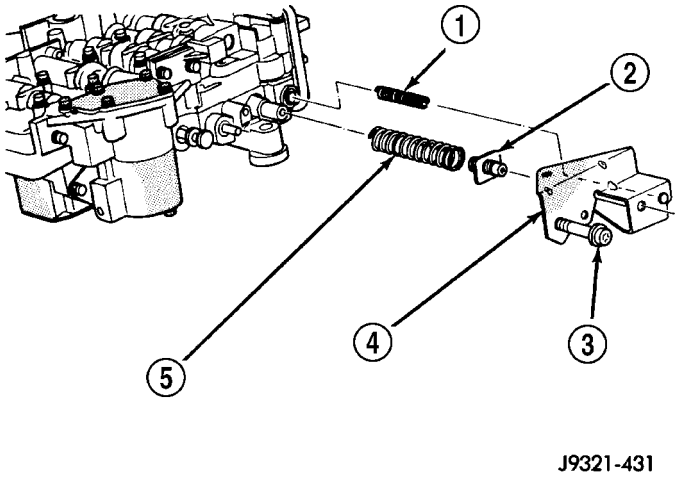


Fig. 305 Adjusting Screw Bracket

1 - SWITCH VALVE SPRING
2 - LINE PRESSURE SCREW
3 - THROTTLE PRESSURE ADJUSTING SCREW
4 - ADJUSTING SCREW BRACKET
5 - PRESSURE REGULATOR VALVE SPRING

VALVE BODY (Continued)

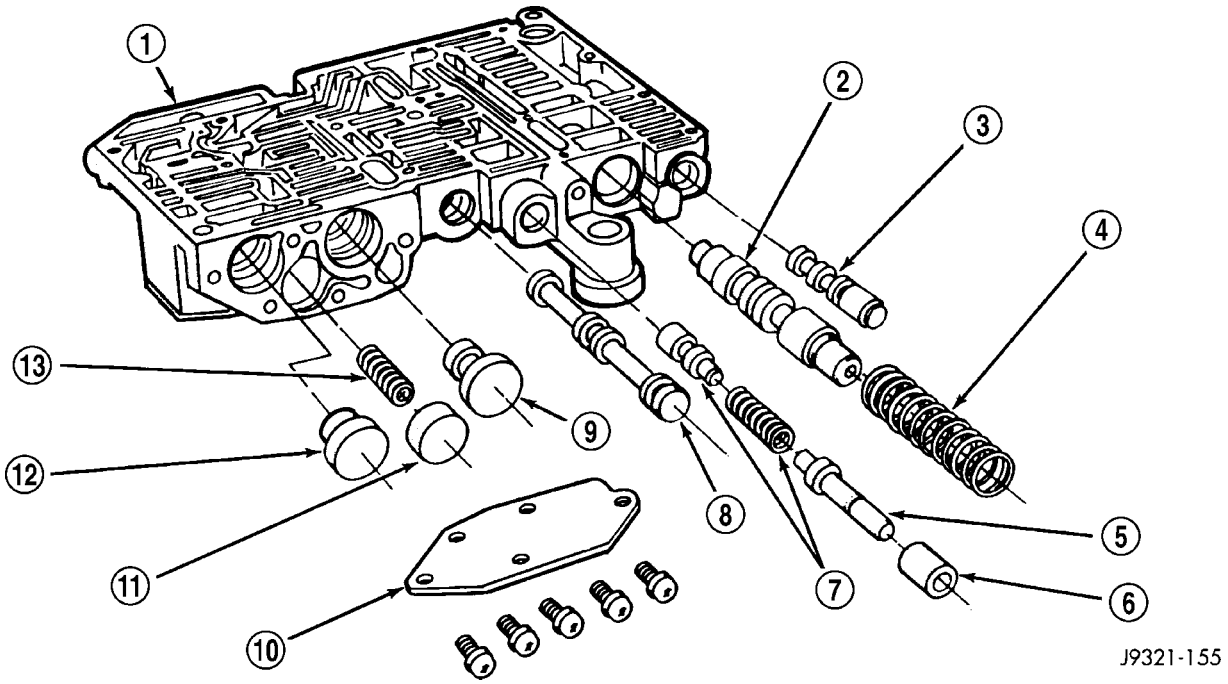


Fig. 306 Upper Housing Control Valve Locations

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

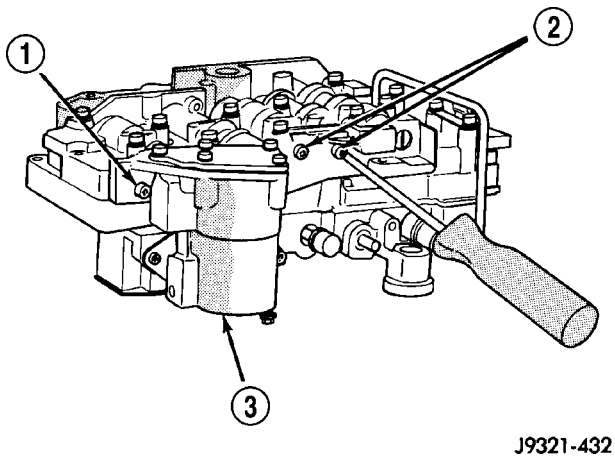


Fig. 307 Accumulator Housing Screw Locations

1 - LOOSEN THIS SCREW
2 - REMOVE THESE SCREWS
3 - 3-4 ACCUMULATOR HOUSING

(22) Carefully rotate 3-4 accumulator housing upward and remove 3-4 shift valve spring and converter clutch valve plug and spring (Fig. 308).

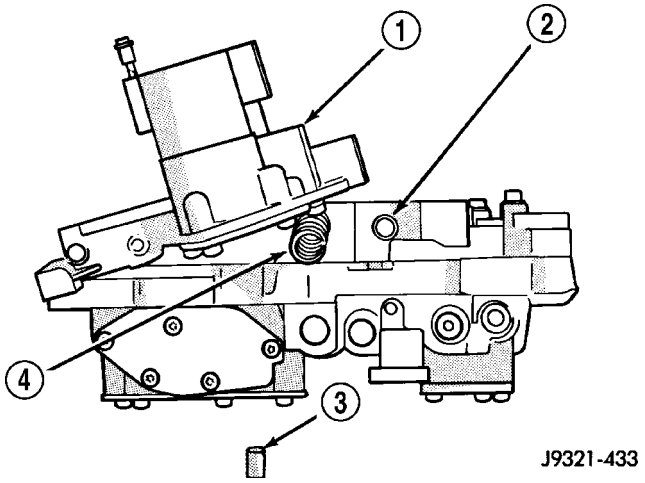


Fig. 308 3-4 Shift And Converter Clutch Valve Springs and Plug

1 - ACCUMULATOR HOUSING
2 - CONVERTER CLUTCH VALVE SPRING
3 - CLUTCH VALVE PLUG
4 - 3-4 SHIFT VALVE SPRING

VALVE BODY (Continued)

(23) Remove left-side screw and remove 3-4 accumulator housing from valve body (Fig. 309).

(24) Bend back tabs on boost valve tube brace (Fig. 310).

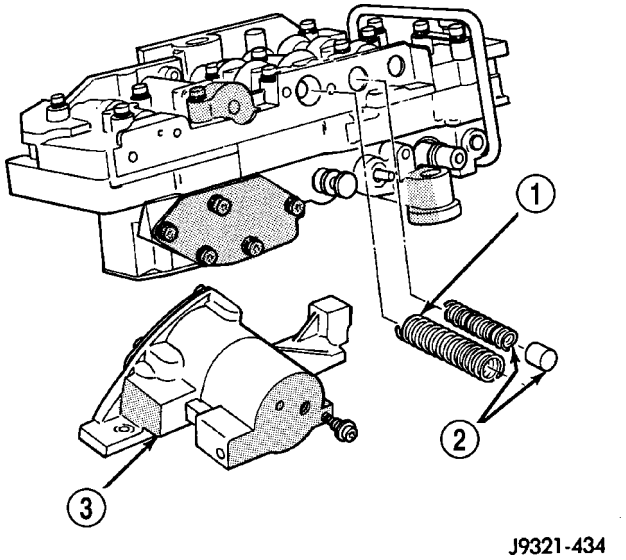


Fig. 309 Accumulator Housing, Valve Springs, and Plug

1 - 3-4 SHIFT VALVE SPRING
2 - CONVERTER CLUTCH VALVE SPRING AND PLUG
3 - 3-4 ACCUMULATOR HOUSING

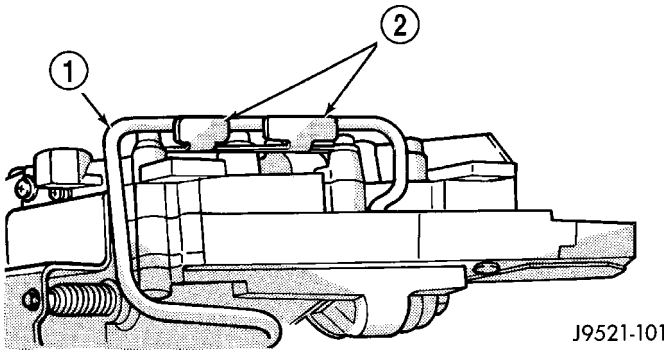


Fig. 310 Boost Valve Tube Brace

1 - BOOST VALVE TUBE
2 - TUBE BRACE (DOUBLE TAB)

(25) Remove boost valve connecting tube (Fig. 311). 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.

(26) Turn valve body over so lower housing is facing upward (Fig. 312). 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. 312). Note position of boost valve tube brace for assembly reference.

(28) Remove lower housing and overdrive separator plate from transfer plate (Fig. 312).

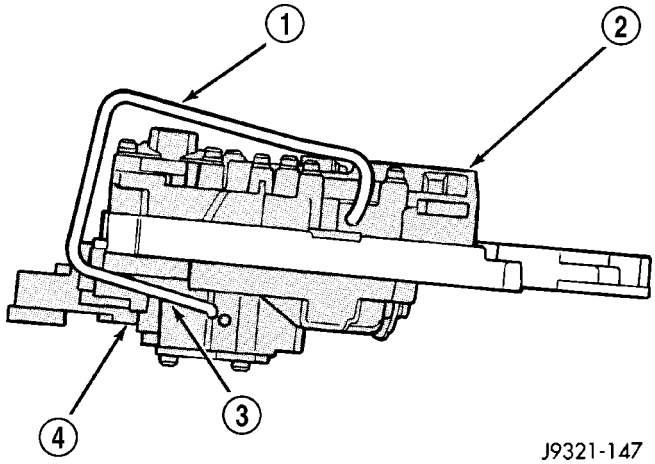


Fig. 311 Boost Valve Tube

1 - BOOST VALVE TUBE
2 - LOWER HOUSING
3 - DISENGAGE THIS END OF TUBE FIRST
4 - UPPER HOUSING

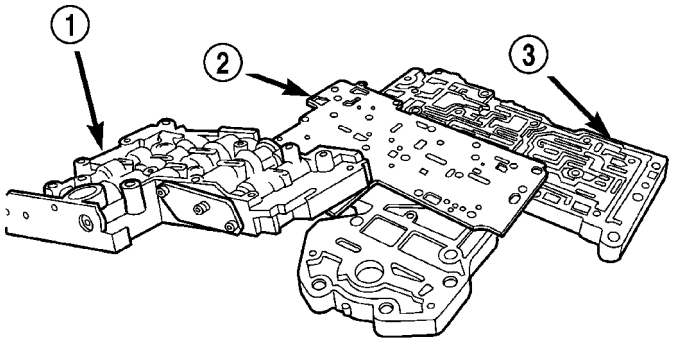


Fig. 312 Lower Housing

1 - LOWER HOUSING
2 - OVERDRIVE SEPARATOR PLATE
3 - TRANSFER PLATE AND UPPER HOUSING

VALVE BODY (Continued)

(29) Remove the Number 10 check ball from the transfer plate (Fig. 313). The check ball is approximately 4.8 mm (3/16 in.) in diameter.

(30) Remove transfer plate from upper housing (Fig. 314).

(31) Turn transfer plate over so upper housing separator plate is facing upward.

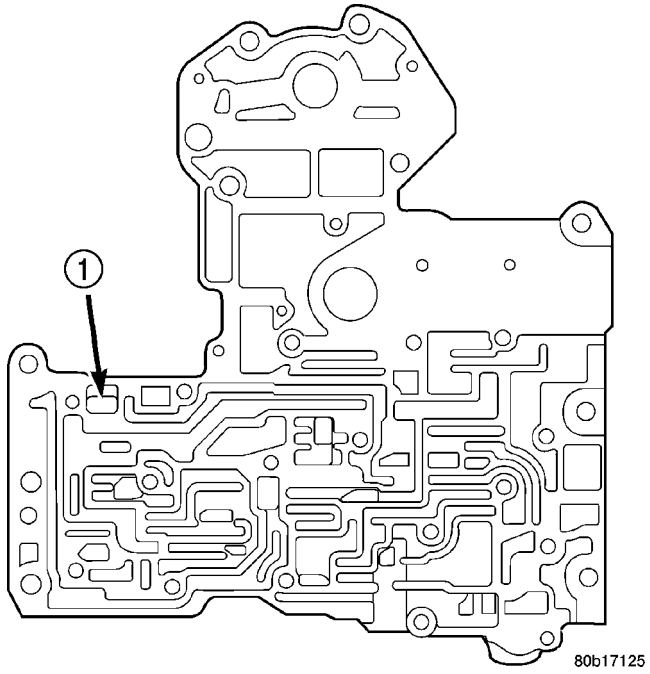


Fig. 313 Number 10 Check Ball

1 - NUMBER 10 CHECK BALL (3/16")

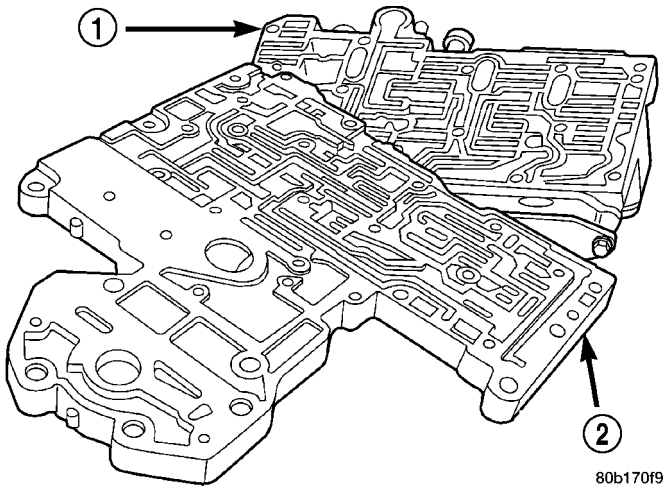


Fig. 314 Transfer Plate

1 - UPPER HOUSING
2 - TRANSFER PLATE

(32) Remove upper housing separator plate from transfer plate (Fig. 315). 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. 316).

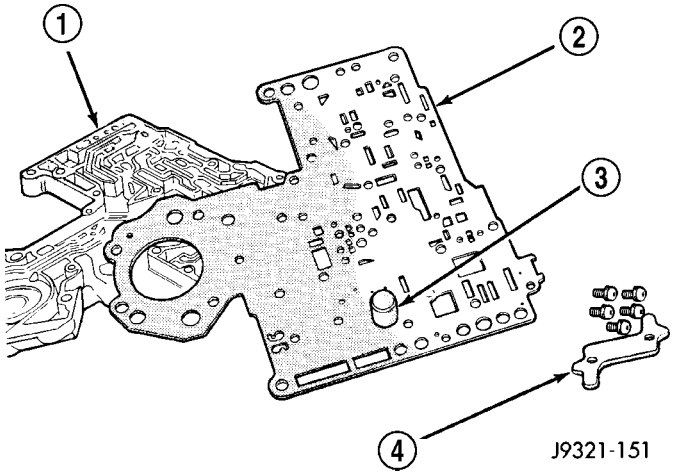


Fig. 315 Upper Housing Separator Plate

1 - TRANSFER PLATE
2 - UPPER HOUSING SEPARATOR PLATE
3 - FILTER SCREEN
4 - BRACE

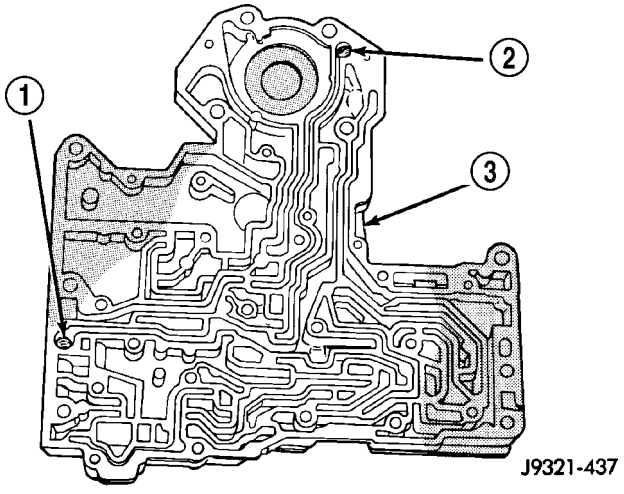


Fig. 316 Rear Clutch and Rear Servo Check Ball Locations

1 - REAR CLUTCH CHECK BALL
2 - REAR SERVO CHECK BALL
3 - TRANSFER PLATE

VALVE BODY (Continued)

VALVE BODY UPPER HOUSING

(1) Note location of check balls in valve body upper housing (Fig. 317). Then remove the one large diameter and the six smaller diameter check balls.

(2) Remove governor plug and shuttle valve covers (Fig. 319).

(3) Remove E-clip that secures shuttle valve secondary spring on valve stem (Fig. 318).

(4) Remove throttle plug, primary spring, shuttle valve, secondary spring, and spring guides (Fig. 319).

(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. 306).

(7) Turn upper housing around and remove limit valve and shift valve covers (Fig. 320).

(8) Remove limit valve housing. Then remove retainer, spring, limit valve, and 2-3 throttle plug from limit valve housing (Fig. 320).

(9) Remove 1-2 shift control valve and spring (Fig. 320).

(10) Remove 1-2 shift valve and spring (Fig. 320).

(11) Remove 2-3 shift valve and spring from valve body (Fig. 320).

(12) Remove pressure plug cover (Fig. 320).

(13) Remove line pressure plug, sleeve, throttle pressure plug and spring (Fig. 320).

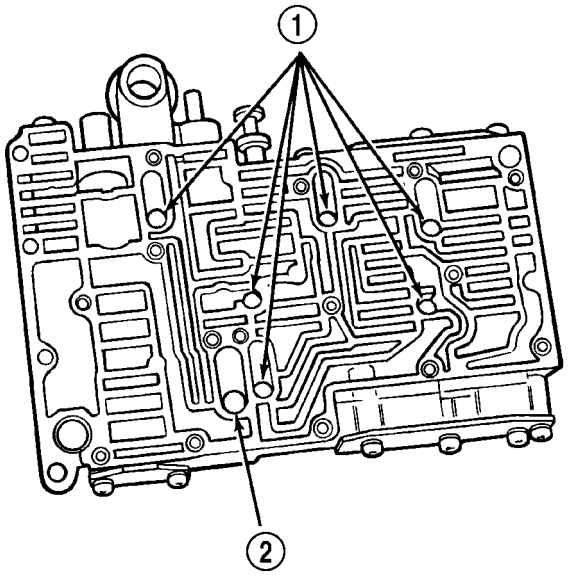


Fig. 317 Check Ball Locations In Upper Housing

1 - SMALL DIAMETER CHECK BALLS (6)
2 - LARGE DIAMETER CHECK BALL (1)

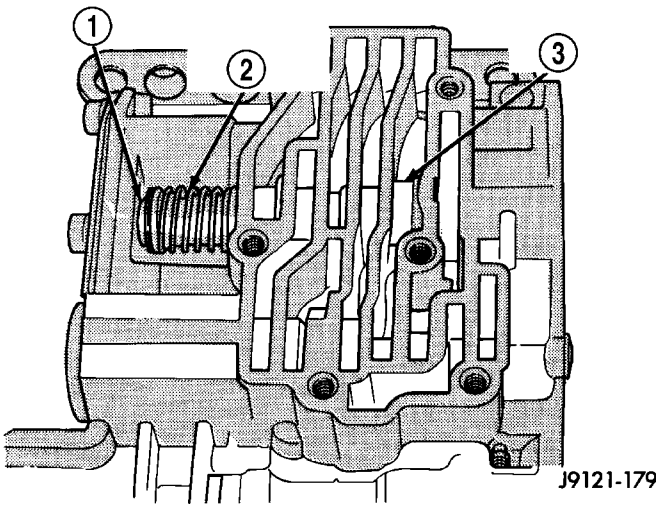


Fig. 318 Shuttle Valve E-Clip And Secondary Spring

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. 321).

(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. 322).

VALVE BODY (Continued)

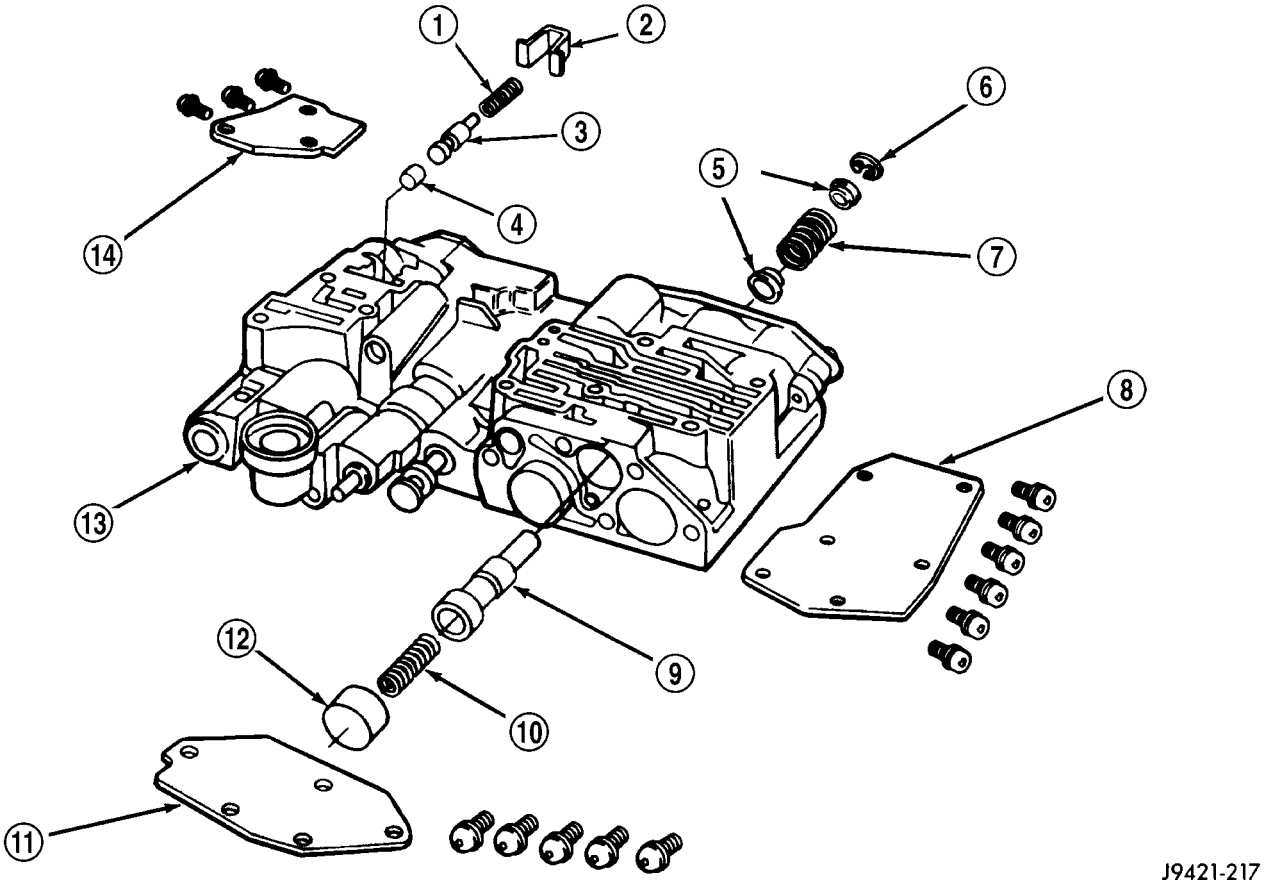


Fig. 319 Shuttle and Boost Valve Location

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)

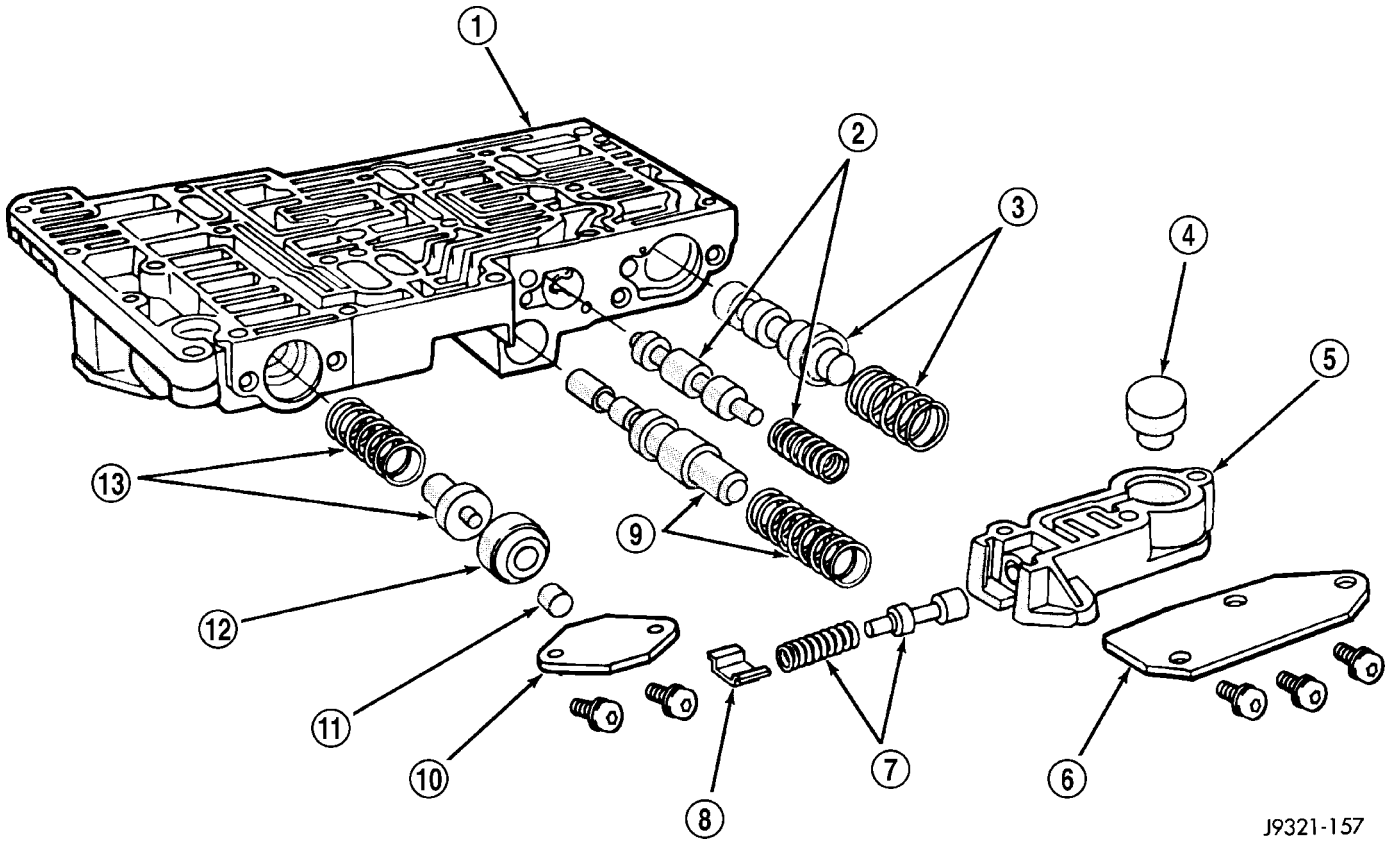


Fig. 320 Upper Housing Shift Valve and Pressure Plug Locations

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)

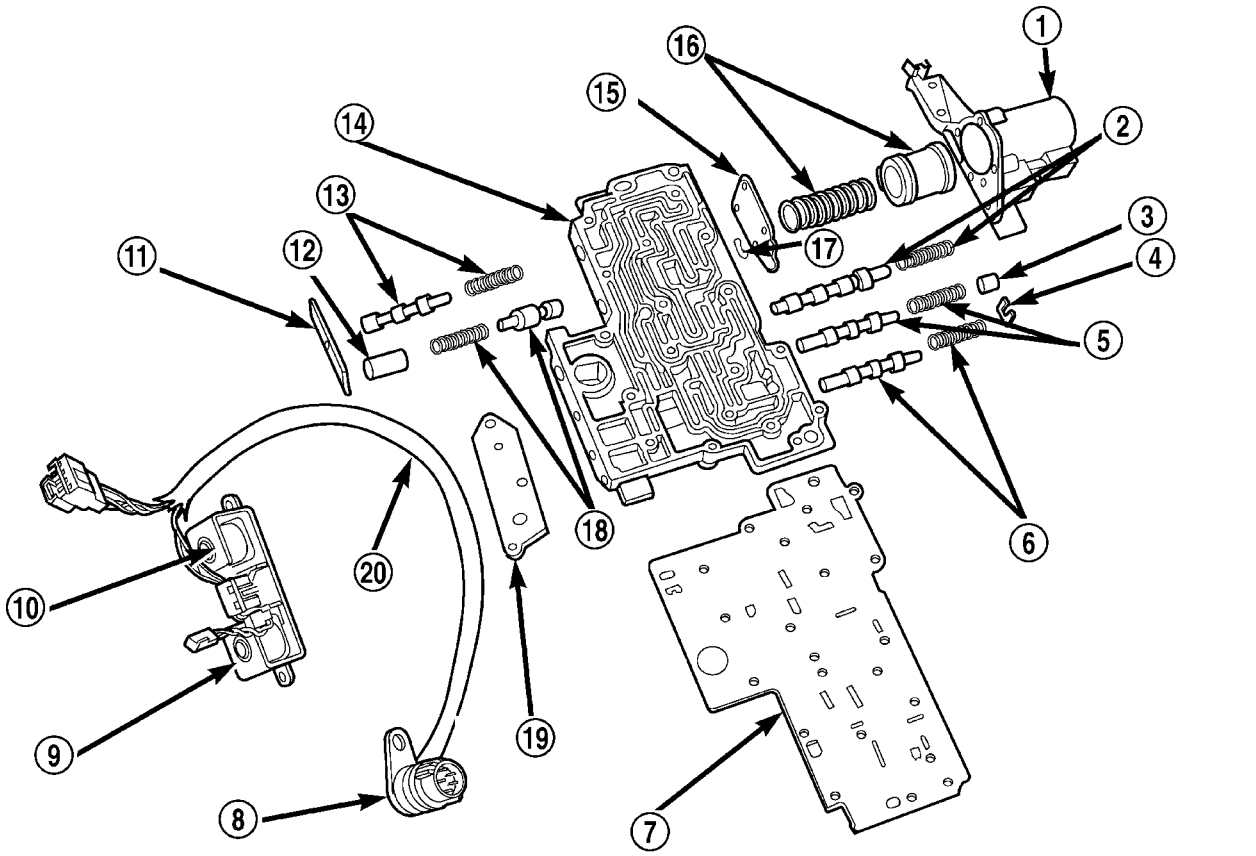


Fig. 321 Lower Housing Shift Valves and Springs

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)

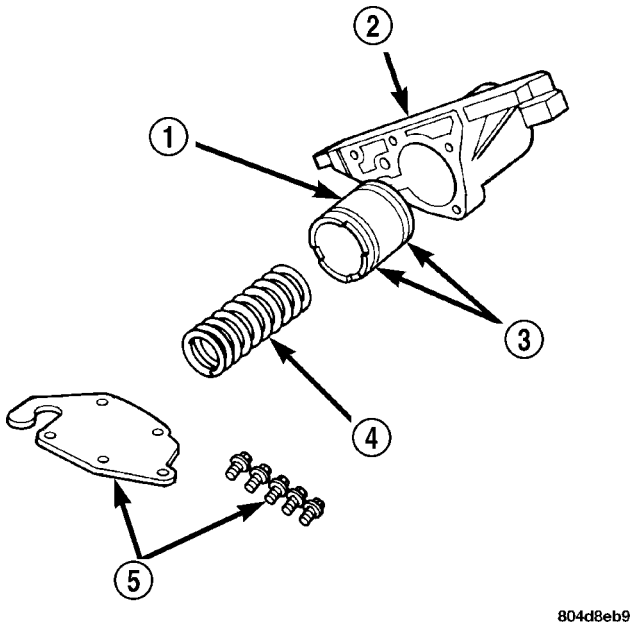


Fig. 322 3-4 Accumulator and Housing

1 - ACCUMULATOR PISTON
2 - 3-4 ACCUMULATOR HOUSING
3 - TEFLON SEALS
4 - PISTON SPRING
5 - COVER PLATE AND SCREWS

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.

Minor distortion of a valve body mating surface may be corrected by smoothing the surface with a sheet of crocus cloth. Position the crocus cloth on a surface plate, sheet of plate glass or equally flat surface. If distortion is severe or any surfaces are heavily scored, the valve body will have to be replaced.

CAUTION: Many of the valves and plugs, such as the throttle valve, shuttle valve plug, 1-2 shift valve and 1-2 governor plug, are made of coated aluminum. Aluminum components are identified by the dark color of the special coating applied to the surface (or by testing with a magnet). Do not sand aluminum valves or plugs under any circumstances. This practice could damage the special coating causing the valves/plugs to stick and bind.

Inspect the valves and plugs for scratches, burrs, nicks, or scores. Minor surface scratches on steel valves and plugs can be removed with crocus cloth but **do not round off the edges of the valve or plug lands.**Maintaining sharpness of these edges is vitally important. The edges prevent foreign matter from lodging between the valves and plugs and the bore.

Inspect all the valve and plug bores in the valve body. Use a penlight to view the bore interiors. Replace the valve body if any bores are distorted or scored. Inspect all of the valve body springs. The springs must be free of distortion, warpage or broken coils.

Check the two separator plates for distortion or damage of any kind. Inspect the upper housing, lower housing, 3-4 accumulator housing, and transfer plate carefully. Be sure all fluid passages are clean and clear. Check condition of the upper housing and transfer plate check balls as well. The check balls and ball seats must not be worn or damaged.

Trial fit each valve and plug in its bore to check freedom of operation. When clean and dry, the valves and plugs should drop freely into the bores.

VALVE BODY (Continued)

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. 321).

(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. 322).

(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. 323).

(2) Install filter screen in upper housing separator plate (Fig. 324).

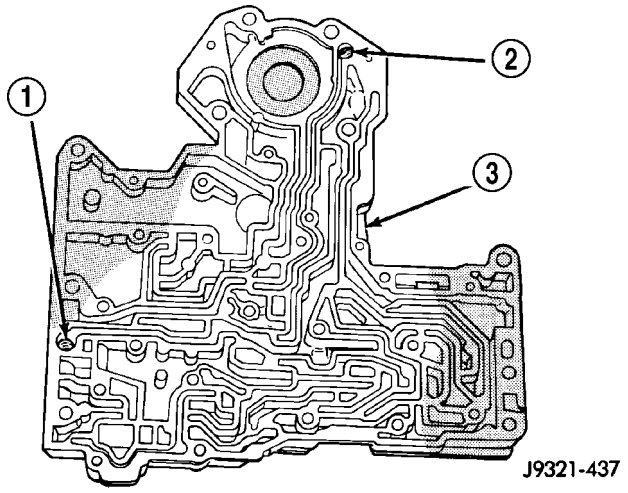


Fig. 323 Rear Clutch And Rear Servo Check Ball Locations

1 - REAR CLUTCH CHECK BALL
2 - REAR SERVO CHECK BALL
3 - TRANSFER PLATE

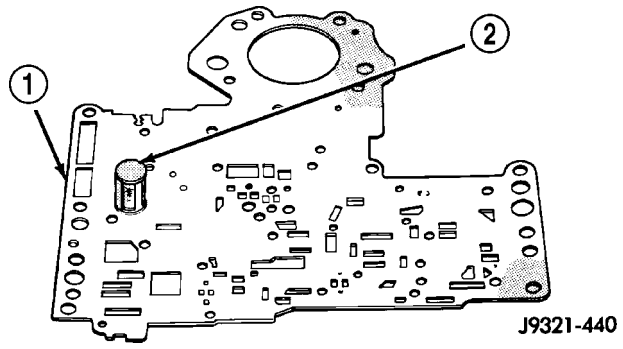


Fig. 324 Separator Plate Filter Screen Installation

1 - UPPER HOUSING SEPARATOR PLATE
2 - FILTER SCREEN

VALVE BODY (Continued)

(3) Align and position upper housing separator plate on transfer plate (Fig. 325).

(4) Install brace plate (Fig. 325). 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.

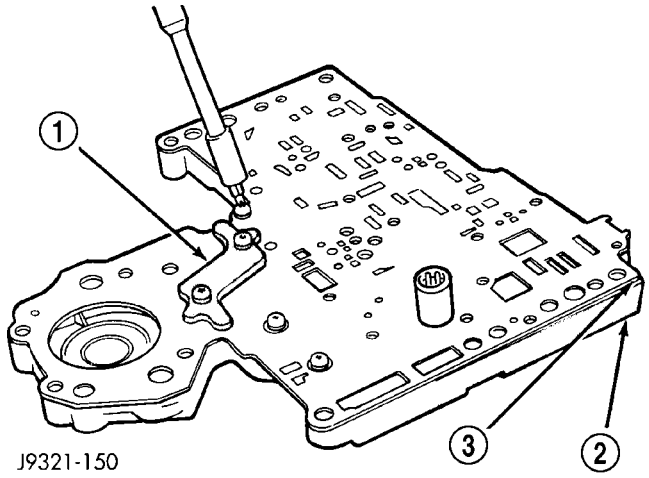


Fig. 325 Brace Plate

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. 326). 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.

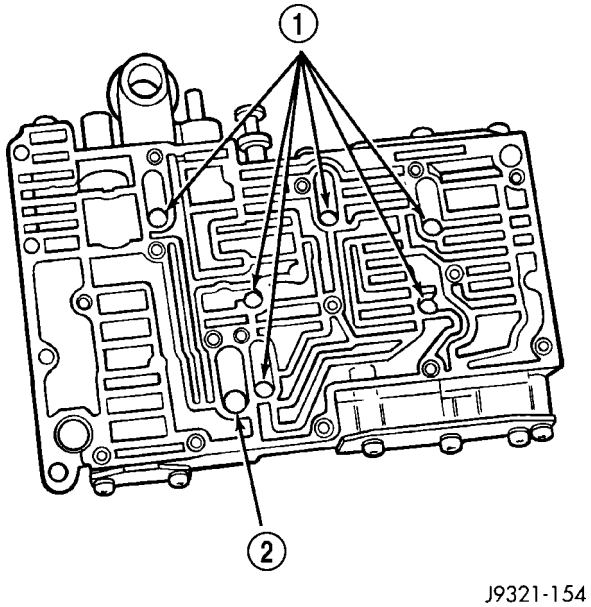


Fig. 326 Check Ball Locations In Upper Housing

1 - SMALL DIAMETER CHECK BALLS (6)
2 - LARGE DIAMETER CHECK BALL (1)

(2) Position assembled transfer plate and upper housing separator plate on upper housing (Fig. 327). Be sure filter screen is seated in proper housing recess.

(3) Install the Number 10 check ball into the transfer plate (Fig. 328). The check ball is approximately 4.8 mm (3/16 in.) in diameter.

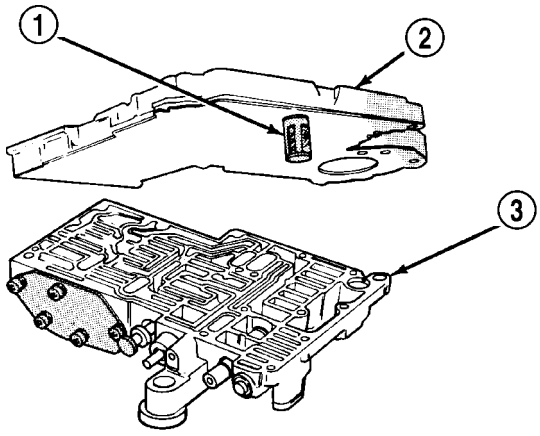


Fig. 327 Installing Transfer Plate On Upper Housing

1 - FILTER SCREEN
2 - TRANSFER PLATE/SEPARATOR PLATE ASSEMBLY
3 - UPPER HOUSING

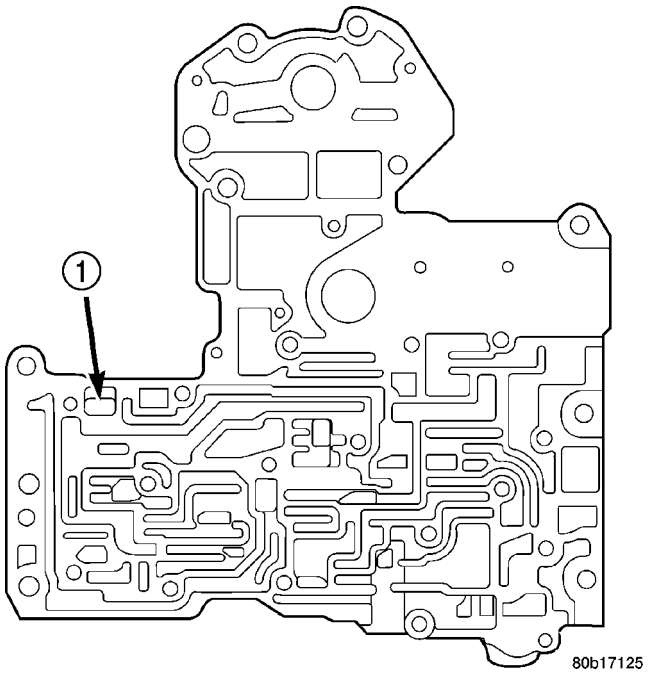


Fig. 328 Number 10 Check Ball

1 - NUMBER 10 CHECK BALL (3/16″)

VALVE BODY (Continued)

(4) Position lower housing separator plate on transfer plate (Fig. 329).

(5) Install lower housing on assembled transfer plate and upper housing (Fig. 330).

(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. 330).

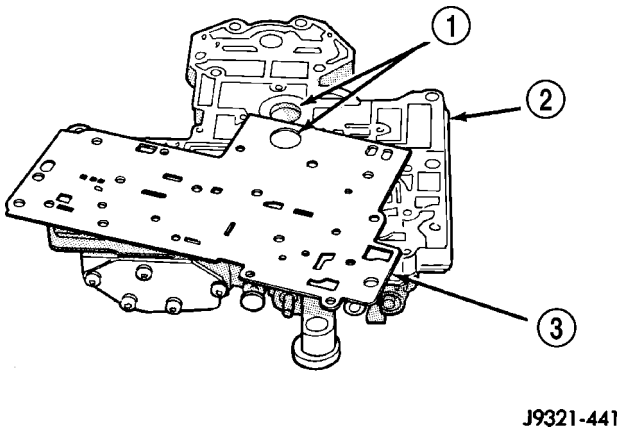


Fig. 329 Lower Housing Separator Plate

1 - BE SURE TO ALIGN BORES
2 - TRANSFER PLATE
3 - LOWER HOUSING (OVERDRIVE) SEPARATOR PLATE

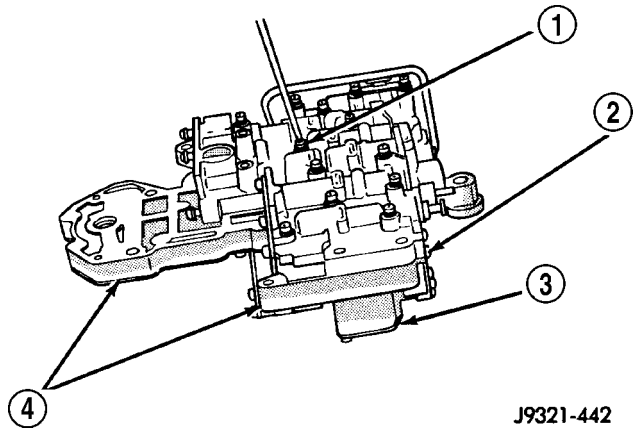


Fig. 330 Installing Lower Housing On Transfer Plate And Upper Housing

1 - VALVE BODY SCREWS (13)
2 - LOWER HOUSING
3 - UPPER HOUSING
4 - TRANSFER PLATE

UPPER HOUSING VALVE AND PLUG

Refer to (Fig. 331), (Fig. 332) and (Fig. 333) to perform the following steps.

(1) Lubricate valves, plugs, springs with clean transmission fluid.

(2) Assemble regulator valve line pressure plug, sleeve, throttle plug and spring. Insert assembly in upper housing and install cover plate. Tighten cover plate screws to 4 N·m (35 in. lbs.) torque.

(3) Install 1-2 and 2-3 shift valves and springs.

(4) Install 1-2 shift control valve and spring.

(5) Install retainer, spring, limit valve, and 2-3 throttle plug from limit valve housing.

(6) Install limit valve housing and cover plate. Tighten screws to 4 N·m (35 in. lbs.).

(7) Install shuttle valve as follows:

(a) Insert plastic guides in shuttle valve secondary spring and install spring on end of valve.

(b) Install shuttle valve into housing.

(c) Hold shuttle valve in place.

(d) Compress secondary spring and install E-clip in groove at end of shuttle valve.

(e) Verify that spring and E-clip are properly seated before proceeding.

(8) Install shuttle valve cover plate. Tighten cover plate screws to 4 N·m (35 in. lbs.) torque.

(9) Install 1-2 and 2-3 valve governor plugs in valve body.

(10) Install shuttle valve primary spring and throttle plug.

(11) Align and install governor plug cover. Tighten cover screws to 4 N·m (35 in. lbs.) torque.

VALVE BODY (Continued)

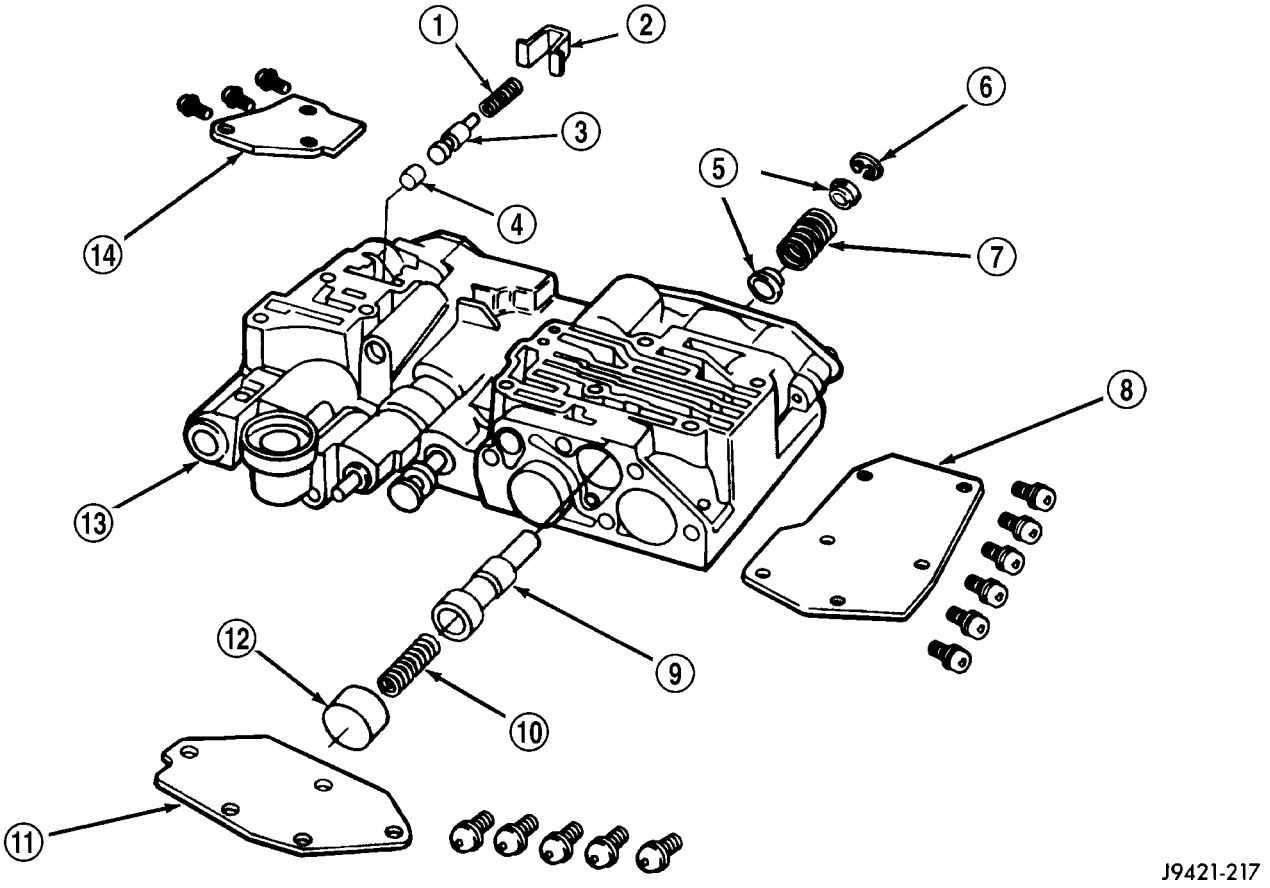


Fig. 331 Shuttle and Boost Valve Locations

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)

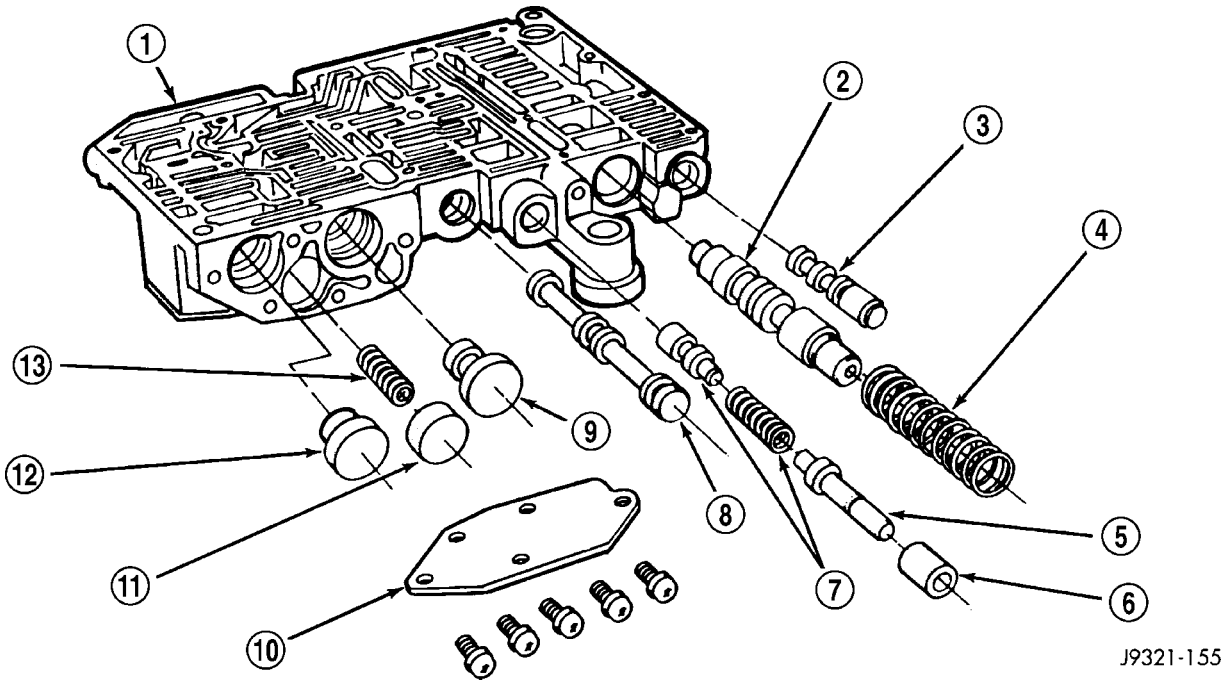


Fig. 332 Upper Housing Control Valve Locations

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)

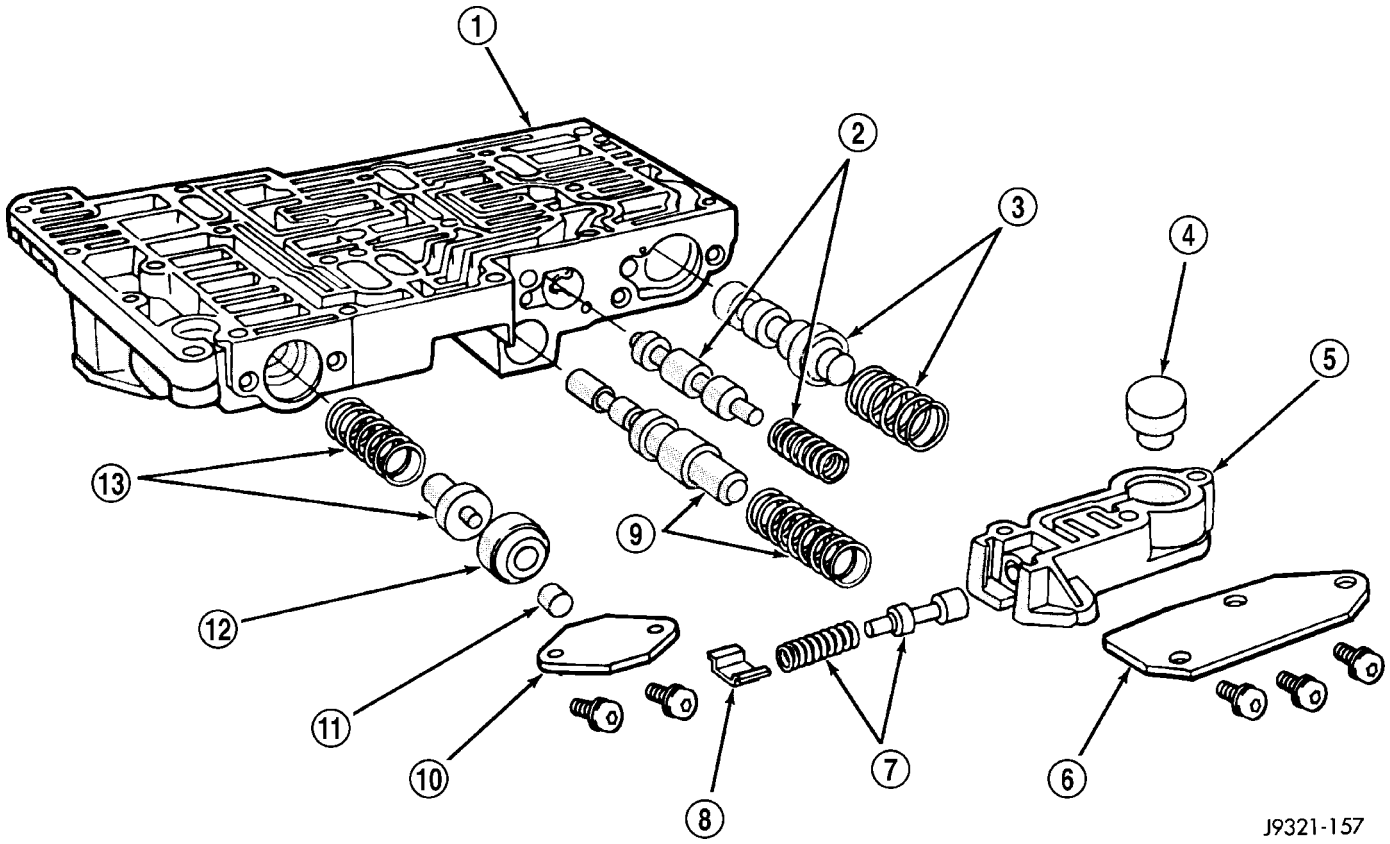


Fig. 333 Upper Housing Shift Valve and Pressure Plug Locations

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. 334).

(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. 334).

(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. 335).

(6) Install and finger tighten three screws that secure tube brace to valve body housings (Fig. 335).

(7) Bend tube brace tabs up and against tube to hold it in position (Fig. 336).

(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.

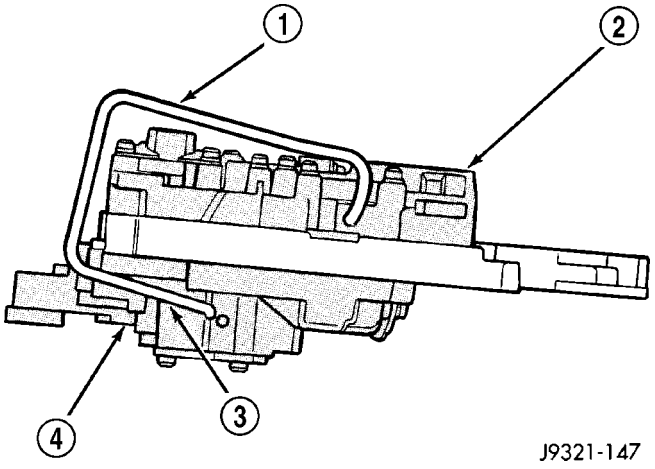


Fig. 334 Boost Valve Tube

1 - BOOST VALVE TUBE
2 - LOWER HOUSING
3 - DISENGAGE THIS END OF TUBE FIRST
4 - UPPER HOUSING

VALVE BODY (Continued)

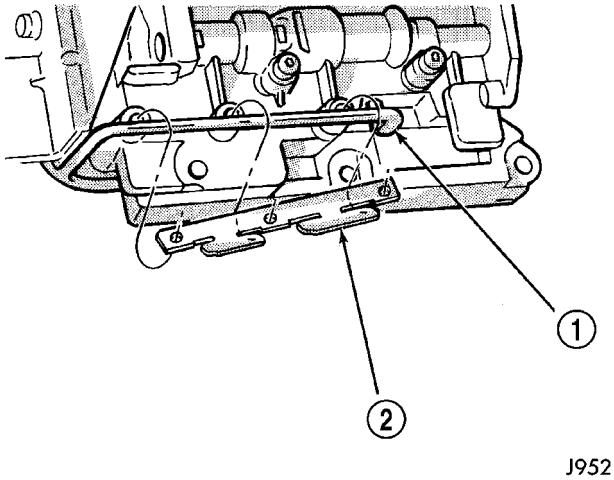


Fig. 335 Boost Valve Tube And Brace

1 - BOOST VALVE TUBE
2 - TUBE BRACE

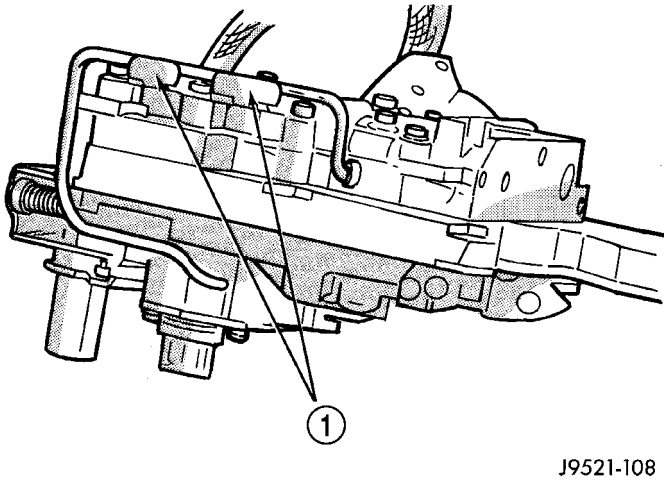


Fig. 336 Securing Boost Valve Tube With Brace Tabs

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. 337).

(2) Loosely attach accumulator housing with right-side screw (Fig. 337). 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. 338). Tighten screws to 4 N·m (35 in. lbs.).

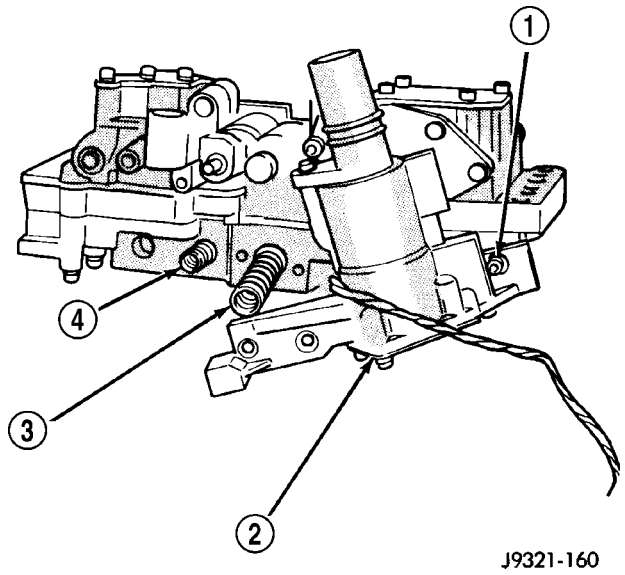


Fig. 337 Converter Clutch And 3-4 Shift Valve Springs

1 - RIGHT-SIDE SCREW
2 - 3-4 ACCUMULATOR
3 - 3-4 SHIFT VALVE SPRING
4 - CONVERTER CLUTCH VALVE SPRING

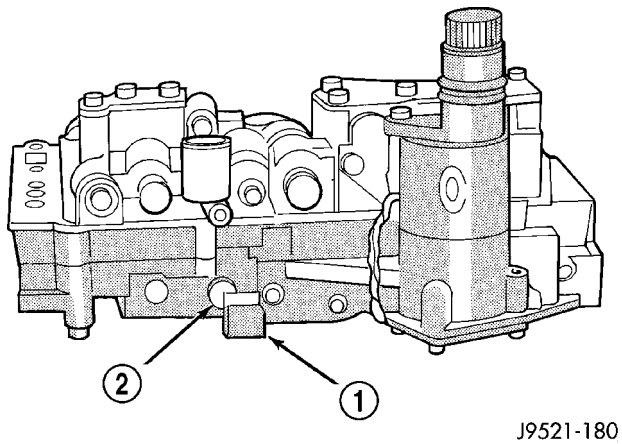


Fig. 338 Seating 3-4 Accumulator On Lower Housing

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. 339).

(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. 340).

(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.

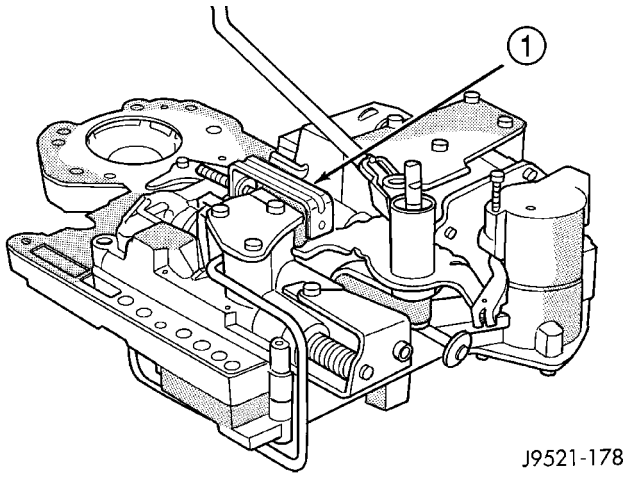


Fig. 339 Detent Ball Spring

1 - SPECIAL TOOL 6583 POSITIONED ON DETENT HOUSING

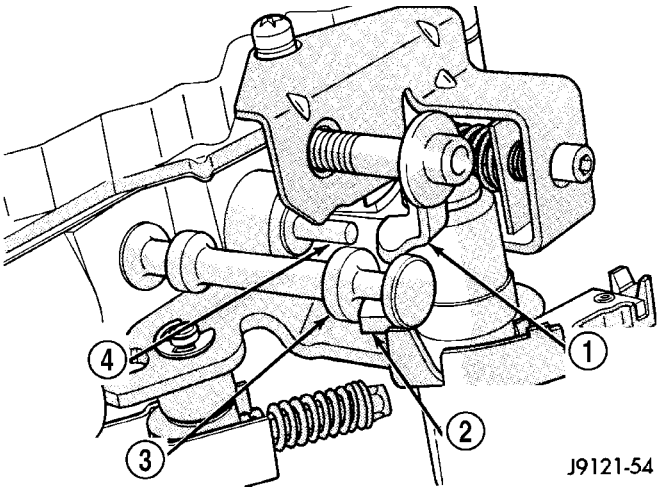


Fig. 340 Manual And Throttle Lever Alignment

1 - THROTTLE LEVER
2 - MANUAL LEVER VALVE ARM
3 - MANUAL VALVE
4 - KICKDOWN VALVE

(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. 341). Seat tang in dimple before tightening connector screw.

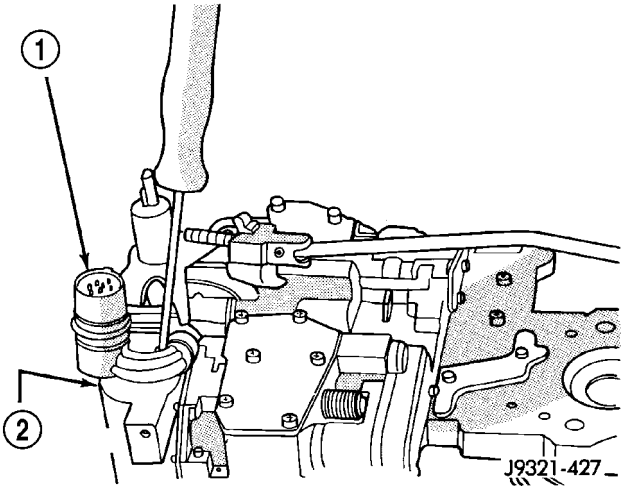


Fig. 341 Solenoid Harness Case Connector Shoulder Bolt

1 - SOLENOID HARNESS CASE CONNECTOR
2 - 3-4 ACCUMULATOR HOUSING

VALVE BODY (Continued)

(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. 342). Solenoid harness must be clear of manual lever and park rod and not be pinched between accumulator housing and cover.

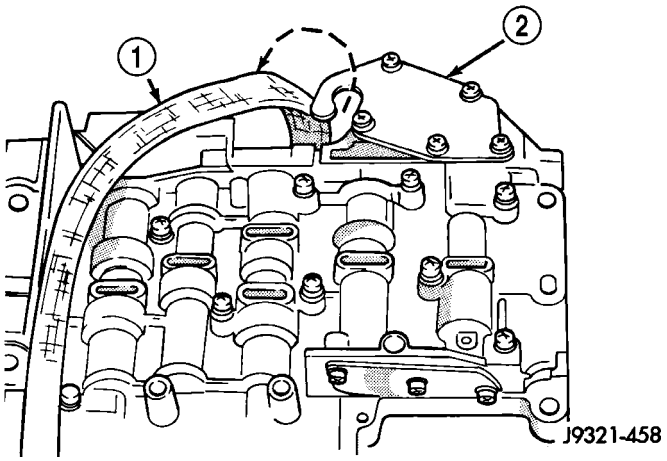


Fig. 342 Solenoid Harness Routing

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. 343). 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. 344).

(3) Check condition of seals on accumulator piston. Install new piston seals, if necessary.

(4) Verify that transmission range sensor is **NOT** installed. Valve body cannot be installed with sensor in place.

(5) Place valve body manual lever in low (1 position) so ball on park lock rod will be easier to install in sprag.

(6) Lubricate shaft of manual lever with petroleum jelly. This will ease inserting shaft through seal in case.

(7) Lubricate seal rings on valve body harness connector with petroleum jelly.

(8) 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.

(9) Install accumulator spring and piston into case. Then swing valve body over piston and outer spring to hold it in place.

(10) Align accumulator piston and outer spring, manual lever shaft and electrical connector in case.

(11) Then seat valve body in case and install one or two bolts to hold valve body in place.

(12) Tighten valve body bolts alternately and evenly to 11 N·m (100 in. lbs.) torque.

(13) Install new fluid filter on valve body. Tighten filter screws to 4 N·m (35 in. lbs.) torque.

(14) Install throttle and gearshift levers on valve body manual lever shaft.

VALVE BODY (Continued)

(15) Check and adjust front and rear bands if necessary.

(16) Connect solenoid case connector wires.

(17) Install the transmission range sensor.

(18) Install oil pan and new gasket. Tighten pan bolts to 17 N·m (13 ft. lbs.) torque.

(19) Lower vehicle and fill transmission with Mopar® ATF +4, Automatic Transmission fluid.

(20) Check and adjust gearshift and throttle valve cables, if necessary.

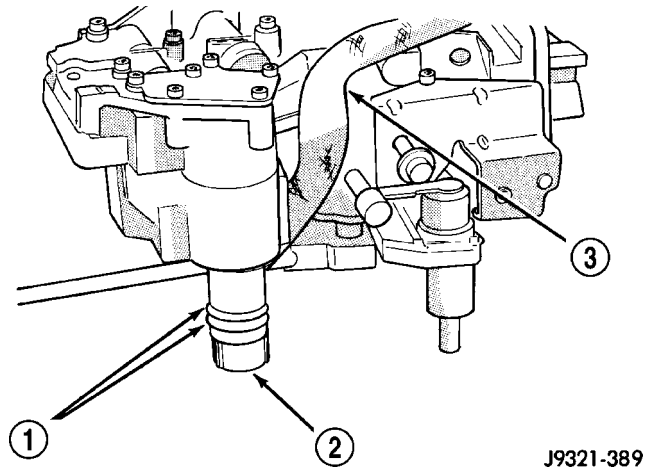


Fig. 343 Valve Body Harness Connector O-Ring Seal

1 - CONNECTOR O-RINGS
2 - VALVE BODY HARNESS CONNECTOR
3 - HARNESS

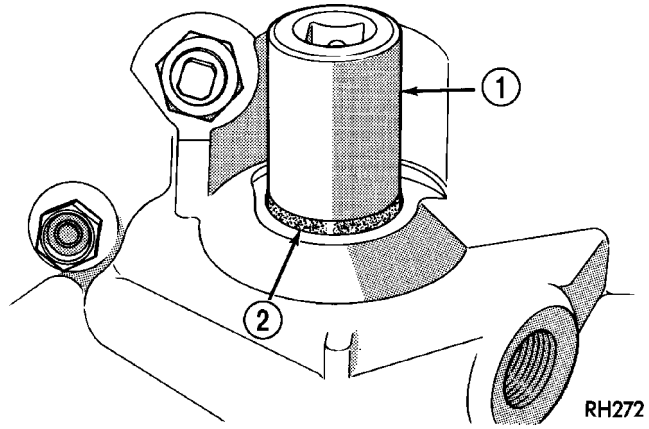


Fig. 344 Manual Lever Shaft Seal

1 - 15/16'' SOCKET
2 - SEAL

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. 345).

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.

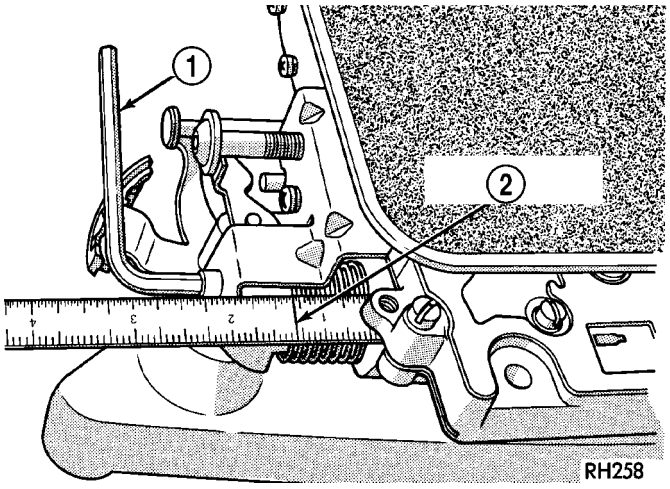


Fig. 345 Line Pressure Adjustment

1 - WRENCH
2 - 1–5/16 INCH

VALVE BODY (Continued)

THROTTLE PRESSURE ADJUSTMENT

Insert Gauge Tool C-3763 between the throttle lever cam and the kickdown valve stem (Fig. 346).

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.

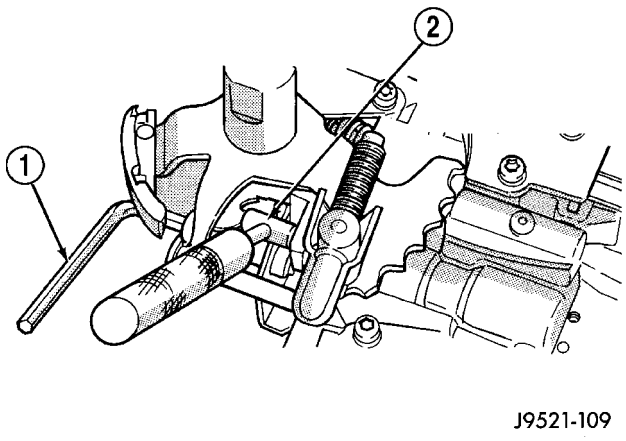


Fig. 346 Throttle Pressure Adjustment

1 - HEX WRENCH (IN THROTTLE LEVER ADJUSTING SCREW)
2 - SPECIAL TOOL C-3763 (POSITIONED BETWEEN THROTTLE LEVER AND KICKDOWN VALVE)

AUTOMATIC TRANSMISSION - 48RE

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AUTOMATIC TRANSMISSION - 48RE

DESCRIPTION

The 48RE (Fig. 1) is a four speed fully automatic transmission with an electronic governor. The 48RE 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 - 48RE (Continued)

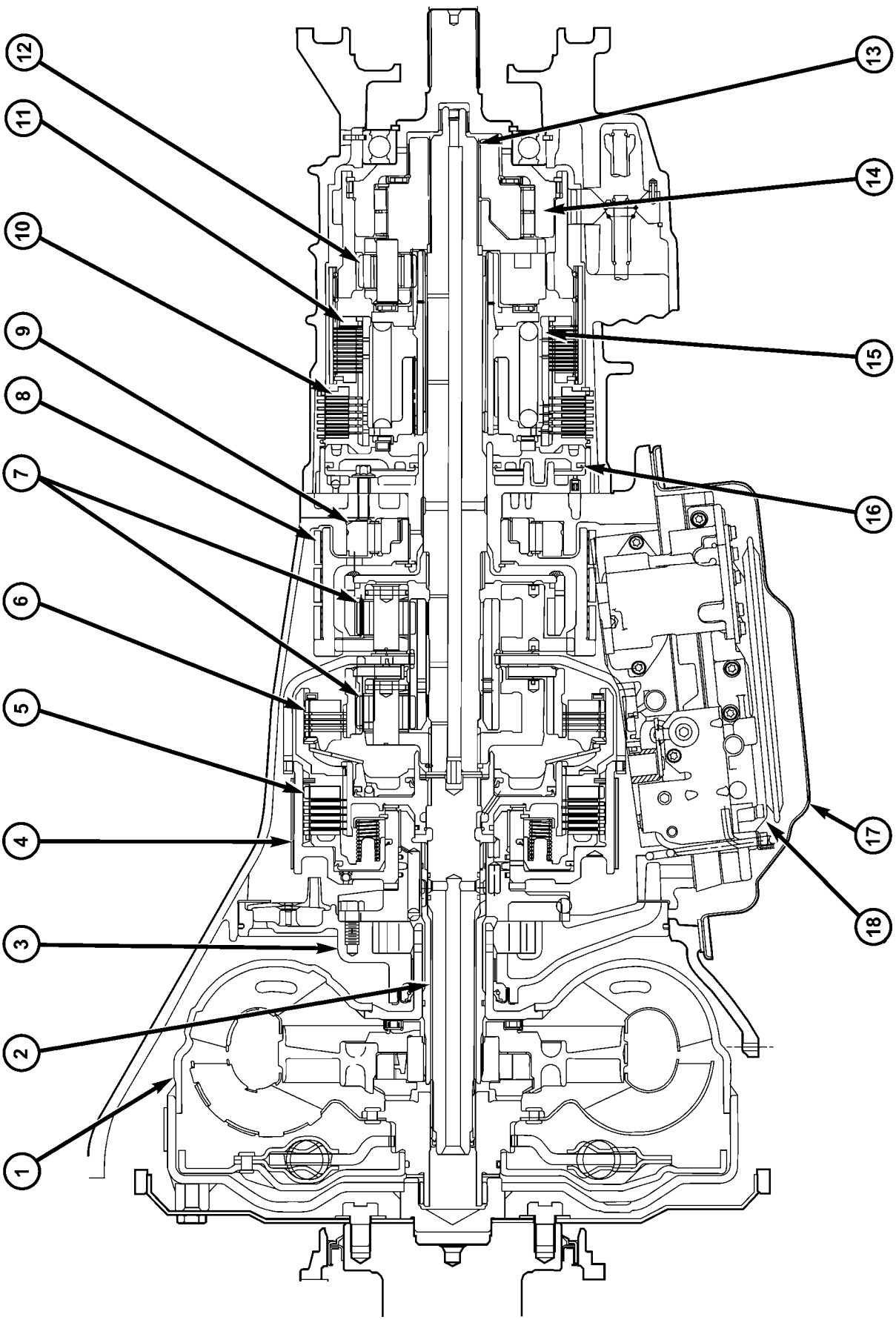


Fig. 1 48RE Transmission

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 - INTERMEDIATE SHAFT
14 - OVERDRIVE OVERRUNNING CLUTCH
15 - DIRECT CLUTCH SPRING
16 - OVERDRIVE PISTON RETAINER
17 - OIL PAN
18 - 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.

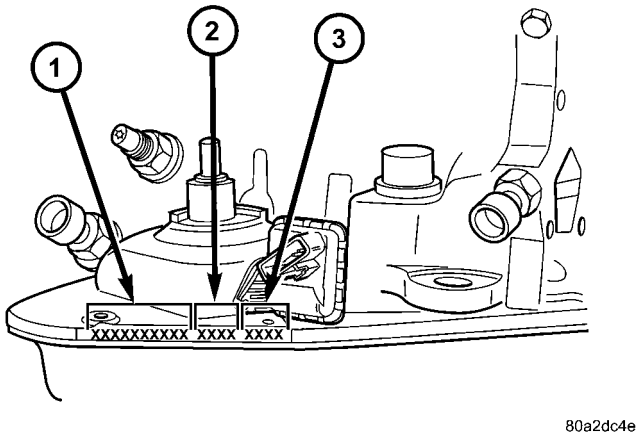


Fig. 2 Transmission Part And Serial Number Location

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

GEAR RATIOS

The 48RE gear ratios are:

1st	2.45:1
2nd	1.45:1
3rd	1.00:1
4th	0.69:1
Rev.	2.20:1

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 can also be engaged in the manual second gear position if high transmission temperatures are sensed by the PCM. 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 - 48RE (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.

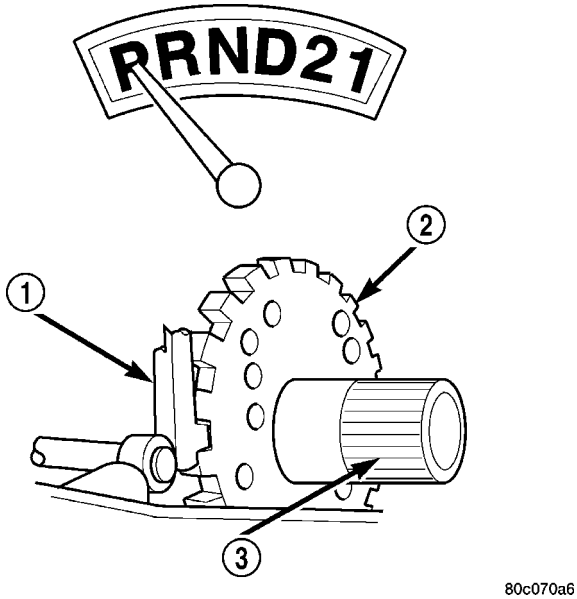


Fig. 3 Park Powerflow

1 - PAWL 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.

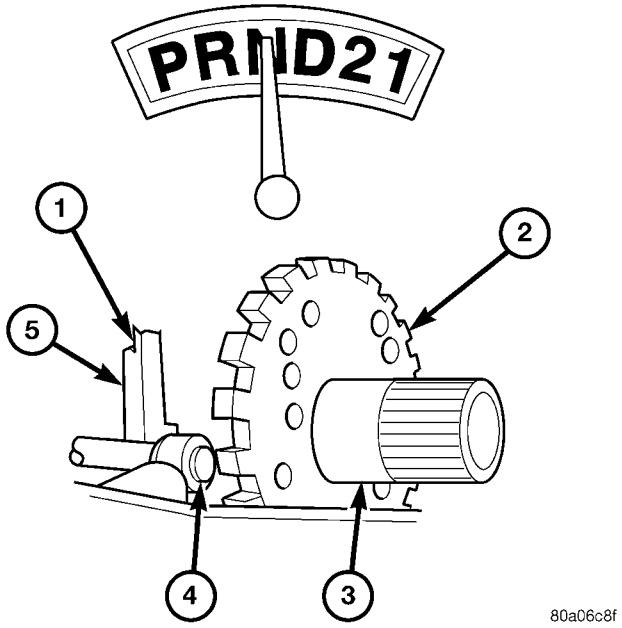


Fig. 4 Neutral Powerflow

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.

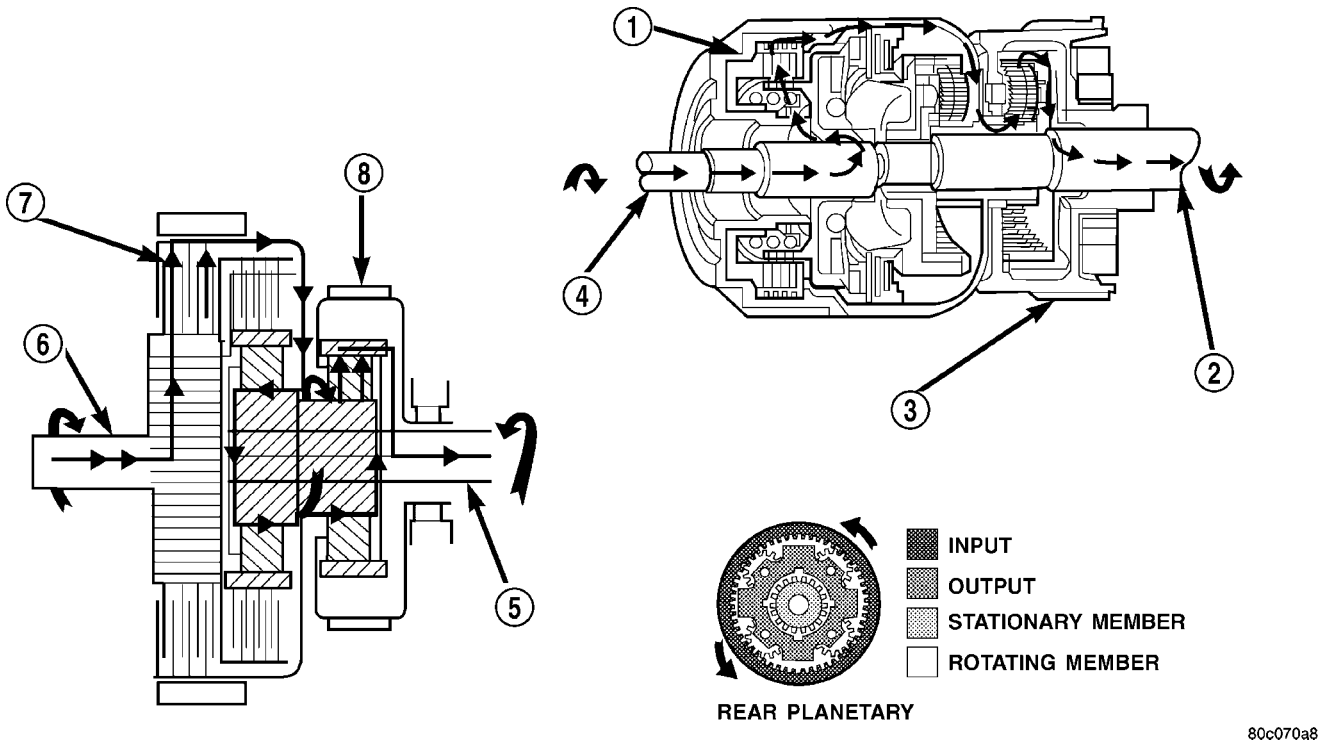


Fig. 5 Reverse Powerflow

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

AUTOMATIC TRANSMISSION - 48RE (Continued)

FIRST GEAR POWERFLOW

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

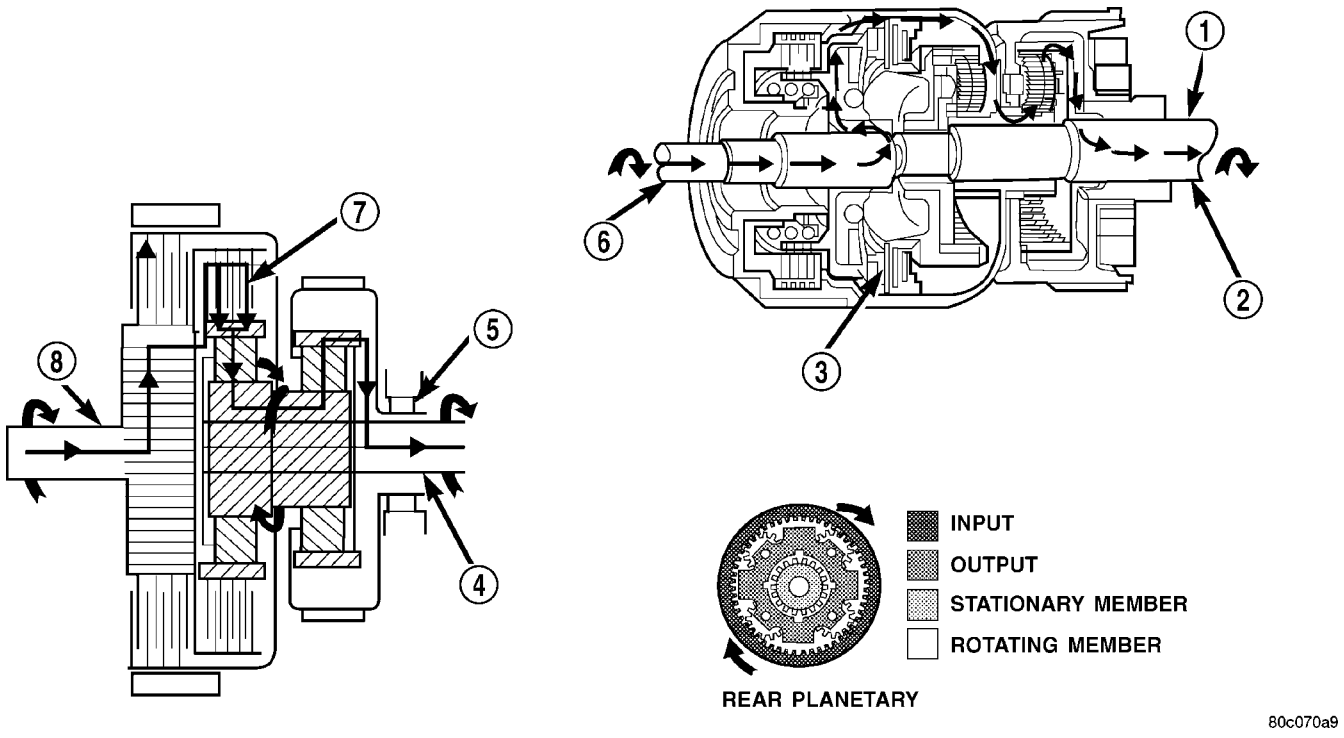


Fig. 6 First Gear Powerflow

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.

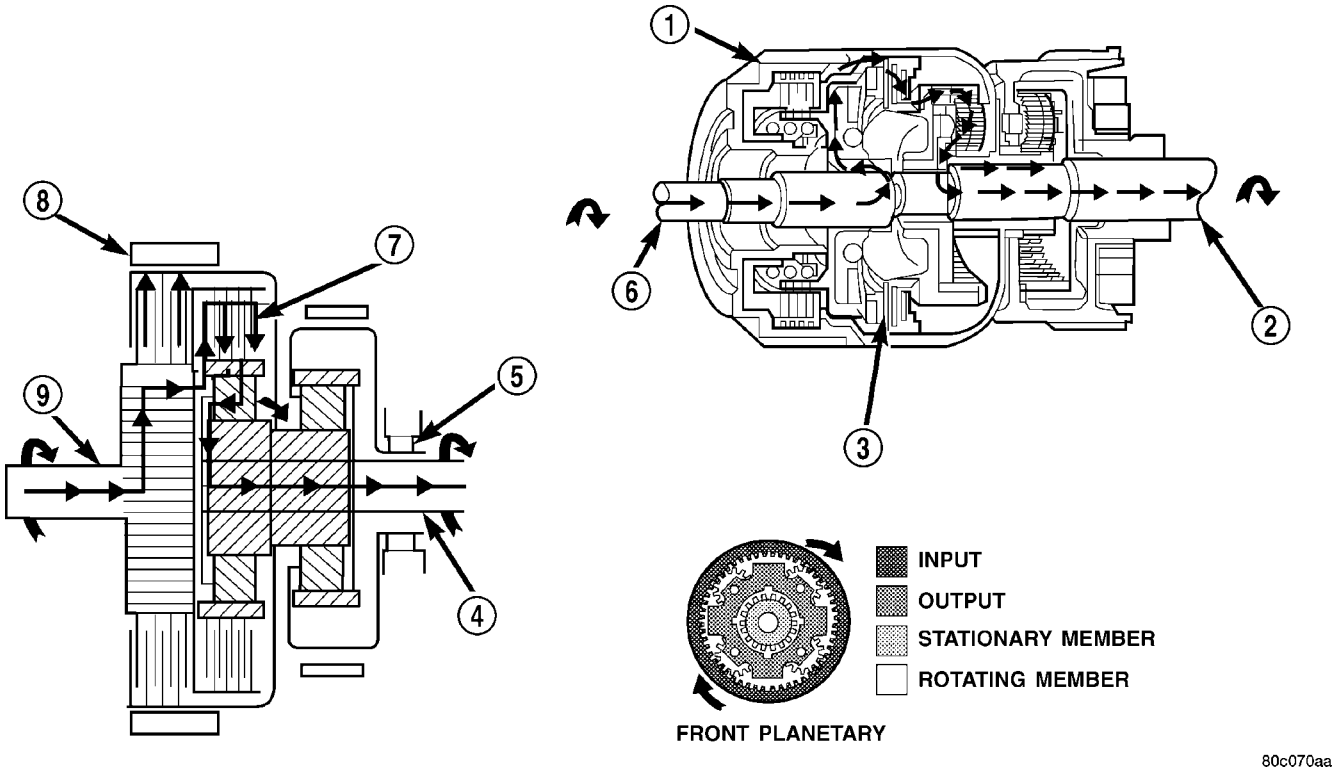


Fig. 7 Second Gear Powerflow

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

AUTOMATIC TRANSMISSION - 48RE (Continued)

DIRECT DRIVE POWERFLOW

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

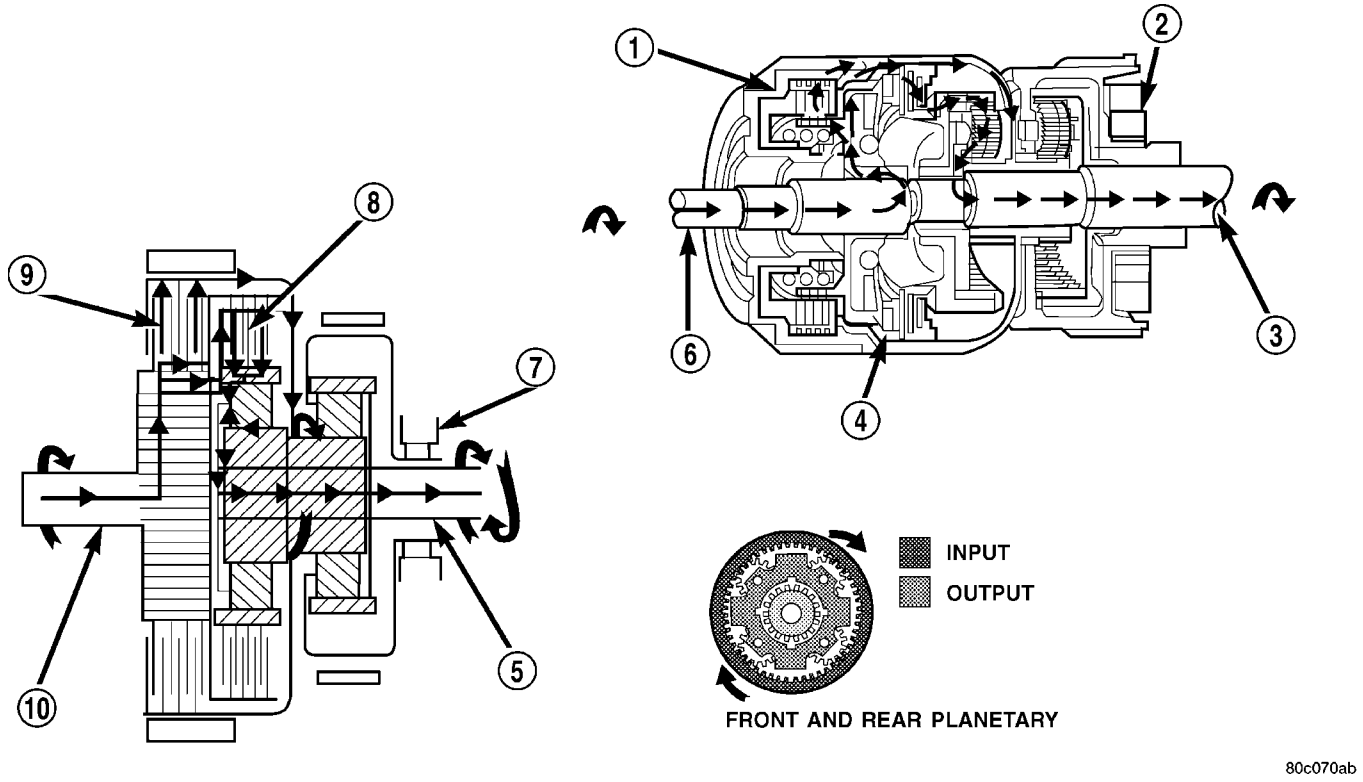


Fig. 8 Direct Drive Powerflow

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.

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
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.

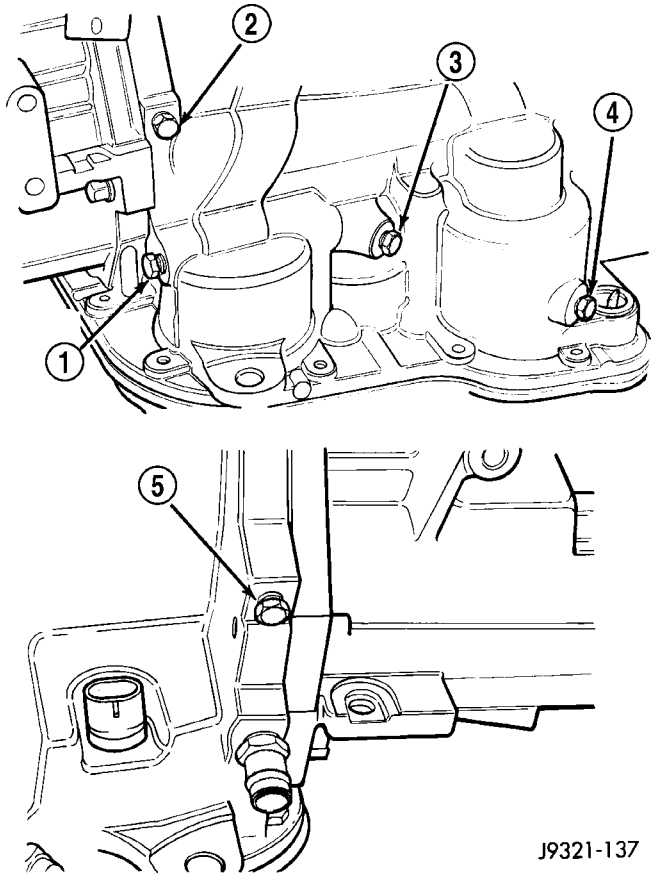


Fig. 9 Pressure Test Port Locations

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 524-565 kPa (76-82 psi) with closed throttle and increase to 690-896 kPa (100-130 psi) at 1/2 to 3/4 throttle. Note that pressure can increase to around 965 kPa (140 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).

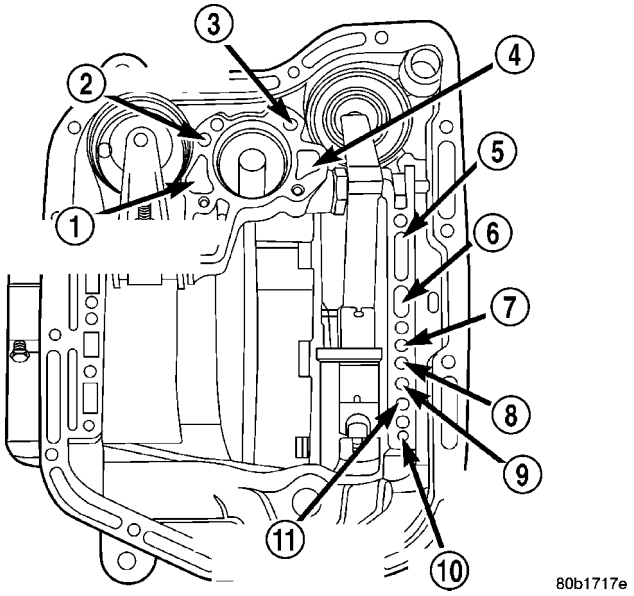


Fig. 10 Air Pressure Test Passages

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

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.

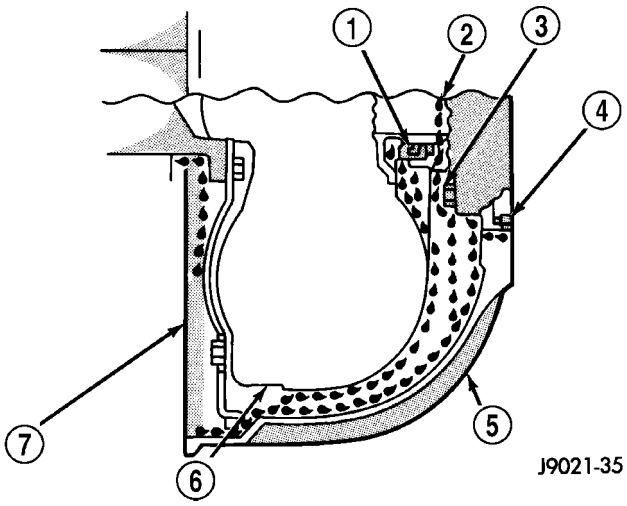


Fig. 11 Converter Housing Leak Paths

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

TORQUE CONVERTER LEAK POINTS

Possible sources of converter leaks are:

- Leaks at the weld joint around the outside diameter weld.
- Leaks at the converter hub weld.

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.
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. Replace cooler.

AUTOMATIC TRANSMISSION - 48RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO DRIVE RANGE (REVERSE OK)	1. Fluid Level Low.	1. Add fluid and check for leaks if drive is restored.
	2. Gearshift Linkage/Cable Loose/Misadjusted.	2. Repair or replace linkage components.
	3. Rear Clutch Burnt.	3. Remove and disassemble transmission and rear clutch and seals. Repair/replace worn or damaged parts as needed.
	4. Valve Body Malfunction.	4. Remove and disassemble valve body. Replace assembly if any valves or bores are damaged.
	5. Transmission Overrunning Clutch Broken.	5. Remove and disassemble transmission. Replace overrunning clutch.
	6. Input Shaft Seal Rings Worn/ Damaged.	6. Remove and disassemble transmission. Replace seal rings and any other worn or damaged parts.
	7. Front Planetary Failed Broken.	7. Remove and repair.
NO DRIVE OR REVERSE (VEHICLE WILL NOT MOVE)	1. Fluid Level Low.	1. Add fluid and check for leaks if drive is restored.
	2. Gearshift Linkage/Cable Loose/Misadjusted.	2. Inspect, adjust and reassemble linkage as needed. Replace worn/damaged parts.
	3. 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. 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.

AUTOMATIC TRANSMISSION - 48RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
SHIFTS DELAYED OR ERRATIC (SHIFTS ALSO HARSH AT TIMES)	1. Fluid Level Low/High.	1. Correct fluid level and check for leaks if low.
	2. Fluid Filter Clogged.	2. Replace filter. If filter and fluid contained clutch material or metal particles, an overhaul may be necessary.
	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.
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.

AUTOMATIC TRANSMISSION - 48RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
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.
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 - 48RE (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. Replace cooler.
	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 - 48RE (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. 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 - 48RE (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 - 48RE (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 - 48RE (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.
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.

AUTOMATIC TRANSMISSION - 48RE (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
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 - 48RE (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.

AUTOMATIC TRANSMISSION - 48RE (Continued)

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

NOTE: 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) Raise vehicle.
(3) Remove the transfer case skid plate (Fig. 12), if equipped.

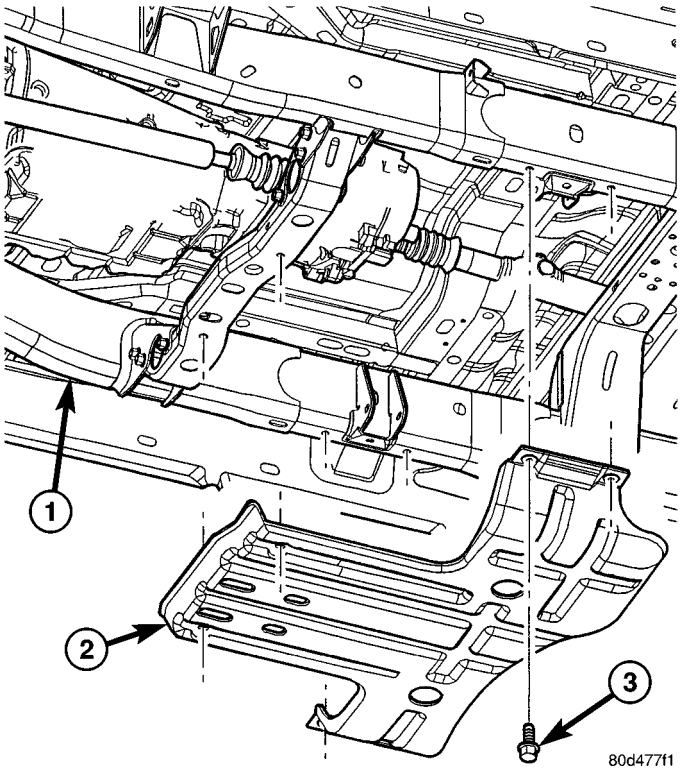


Fig. 12 Transfer Case Skid Plate

1 - FRAME RAIL
2 - SKID PLATE
3 - BOLTS (6)

(4) Disconnect and lower or remove necessary exhaust components.
(5) Remove engine-to-transmission struts (Fig. 13) and (Fig. 14).

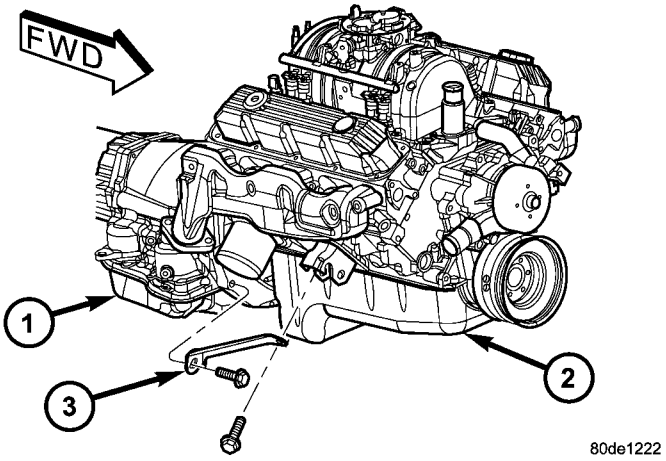


Fig. 13 Right Side Engine-to-Transmission Strut

1 - TRANSMISSION
2 - ENGINE
3 - STRUT

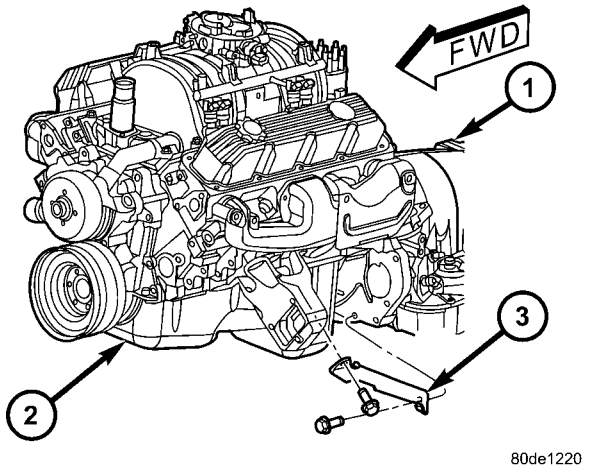


Fig. 14 Left Side Engine-to-Transmission Strut

1 - TRANSMISSION
2 - ENGINE
3 - STRUT

(6) Remove starter motor. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - REMOVAL)
(7) Disconnect and remove the crankshaft position sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/CRANKSHAFT POSITION SENSOR - REMOVAL) Retain the sensor attaching bolts.
(8) If transmission is being removed for overhaul, remove transmission oil pan, drain fluid and reinstall pan.
(9) Remove torque converter access cover.

AUTOMATIC TRANSMISSION - 48RE (Continued)

(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 the transmission range sensor and transmission solenoid connector.

(13) Disconnect gearshift cable (Fig. 15) from the transmission.

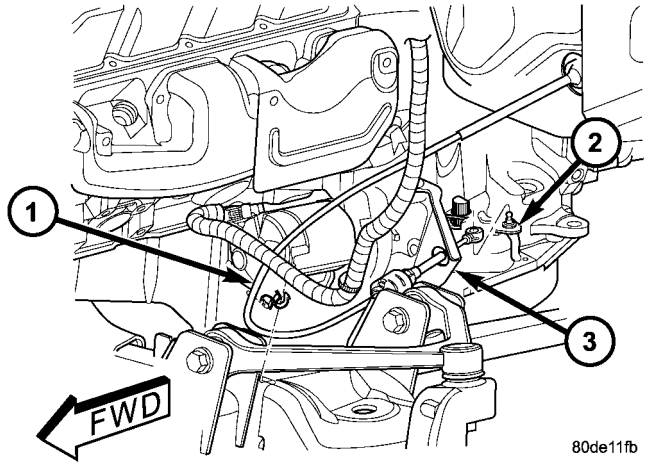


Fig. 15 Gearshift Cable At Transmission

1 - GEARSHIFT CABLE
2 - TRANSMISSION MANUAL LEVER
3 - CABLE SUPPORT BRACKET

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

(15) On 4X4 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 (Fig. 16) and (Fig. 17) to transmission and crossmember and remove rear support.

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

(20) On 4X4 models, remove transfer case with transmission jack or aid of helper.

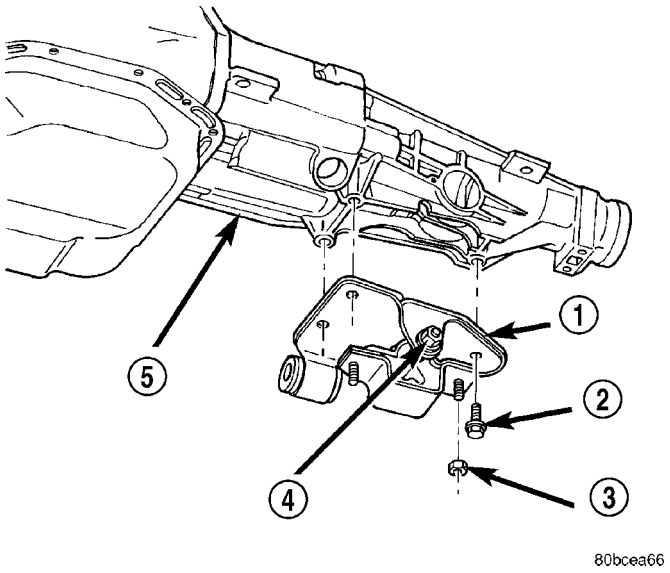


Fig. 16 Engine Rear Mount - 4X2 Automatic Transmission

1 - ENGINE REAR MOUNT
2 - BOLT
3 - NUT
4 - THROUGH BOLT NUT
5 - TRANSMISSION

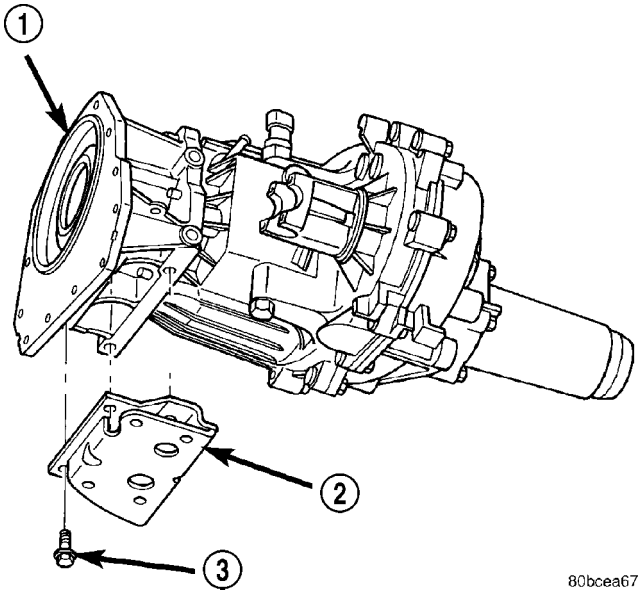


Fig. 17 Engine Rear Mount - 4X4 Automatic Transmission

1 - TRANSMISSION
2 - ENGINE REAR MOUNT
3 - BOLT

AUTOMATIC TRANSMISSION - 48RE (Continued)

(21) Disconnect fluid cooler lines at transmission (Fig. 18).

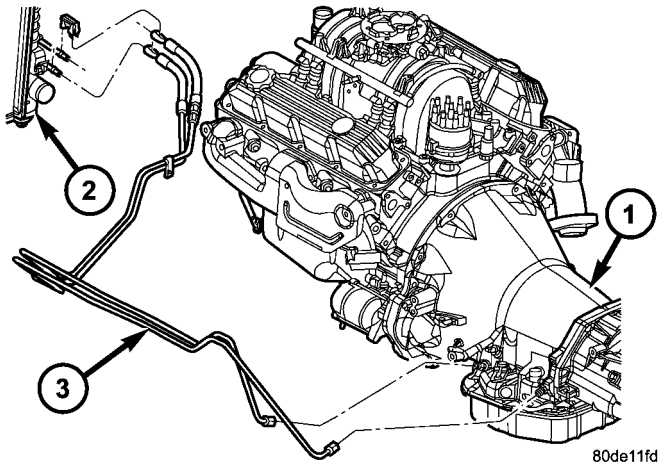


Fig. 18 Transmission Cooler Lines

1 - TRANSMISSION
2 - RADIATOR
3 - COOLER LINES

(22) Remove fill tube bracket bolts and pull tube out of transmission. Retain fill tube seal. On 4X4 models, it will also be necessary to remove bolt attaching transfer case vent tube to converter housing (Fig. 19).

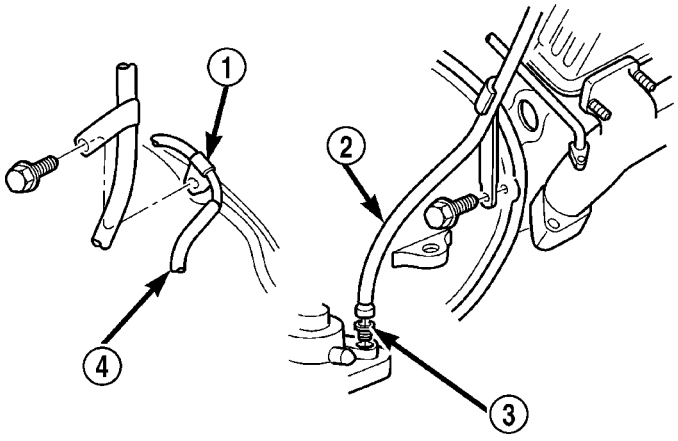


Fig. 19 Fill Tube Attachment

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

(23) Remove all converter housing bolts.

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

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

(26) 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. 20).

(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

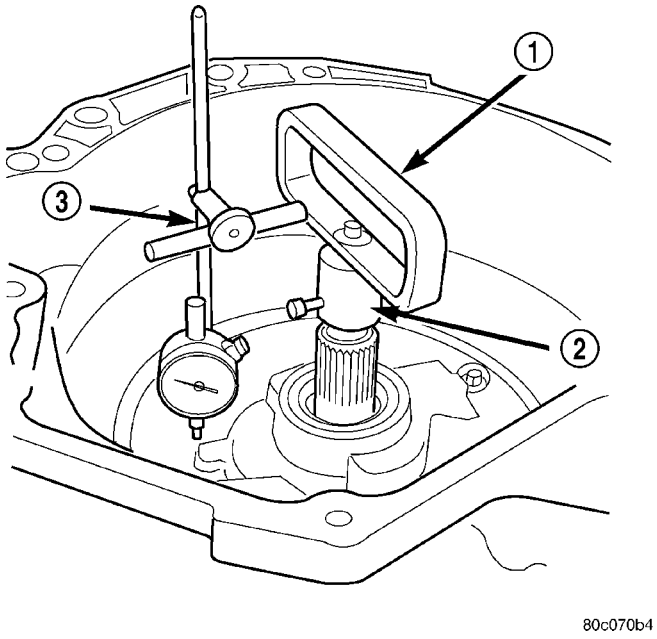


Fig. 20 Checking Input Shaft End Play

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. 21). Keep filter screws separate from other valve body screws. Filter screws are longer and should be kept with filter.

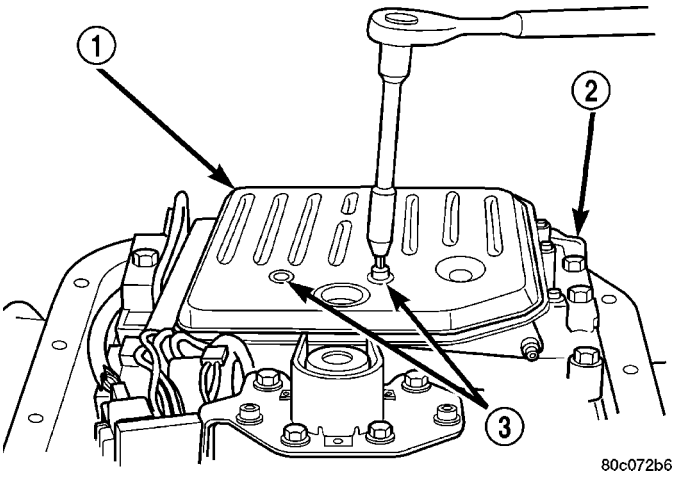


Fig. 21 Oil Filter Removal

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

(7) Remove the transmission range sensor..

(8) Remove hex head bolts attaching valve body to transmission case (Fig. 22). 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. 23).

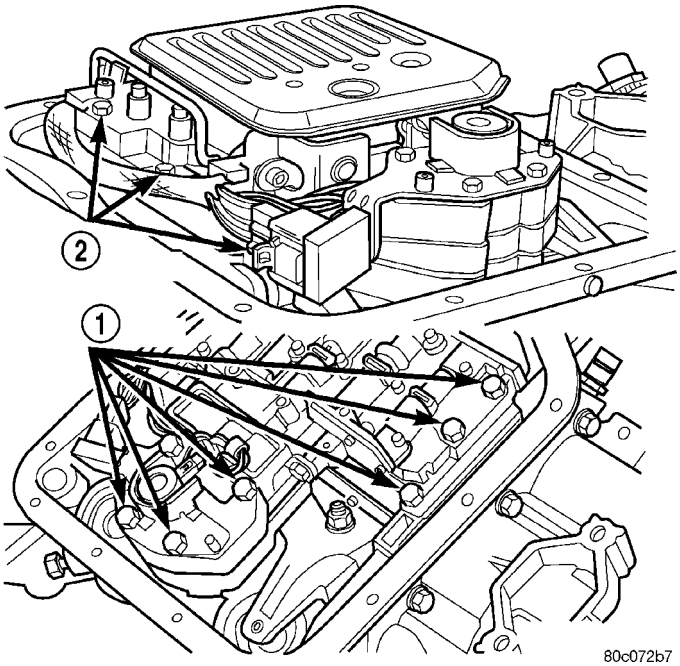


Fig. 22 Valve Body Bolt Locations

1 - VALVE BODY BOLTS
2 - VALVE BODY BOLTS

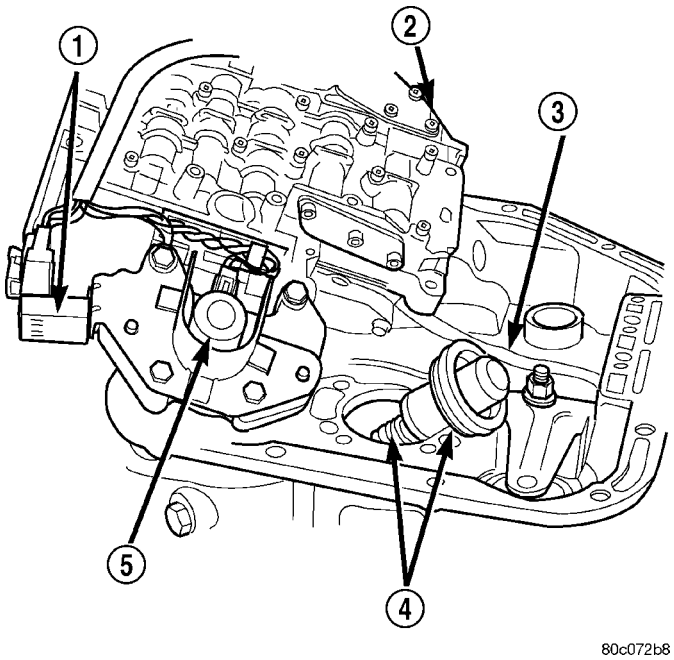


Fig. 23 Valve Body Removal

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

(10) Remove accumulator outer spring, piston and inner spring (Fig. 24). Note position of piston and springs for assembly reference. Remove and discard piston seals if worn or cut.

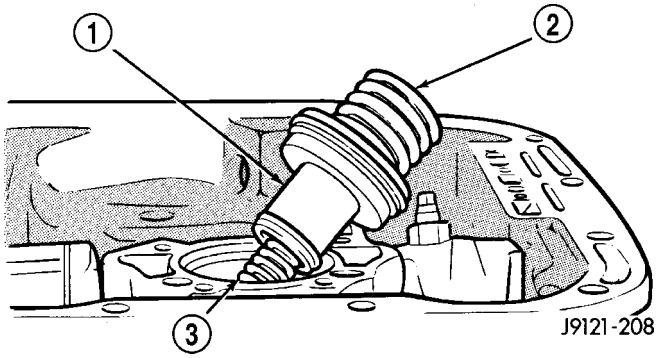


Fig. 24 Accumulator Component Removal

1 - ACCUMULATOR PISTON
2 - OUTER SPRING
3 - INNER SPRING

AUTOMATIC TRANSMISSION - 48RE (Continued)

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

(12) Remove front band lever pin access plug (Fig. 25). Use square end of 1/4 in. drive extension to remove plug as shown.

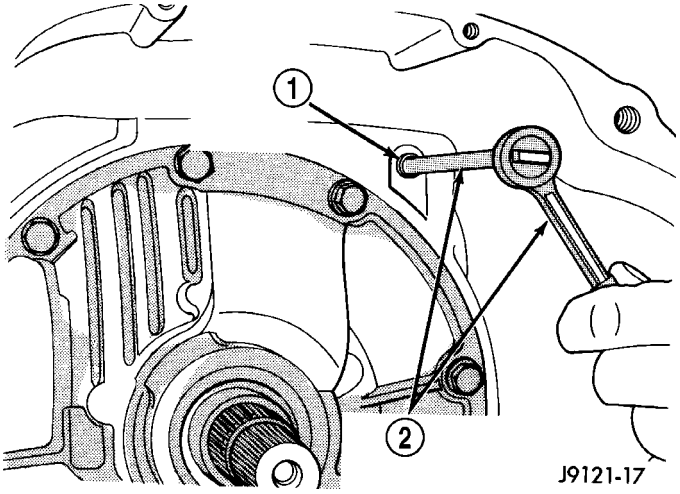


Fig. 25 Front Band Lever Pin Access Plug

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. 26). This will prevent retainer from coming out with pump and possibly damaging clutch or pump components.

(b) Remove oil pump bolts.

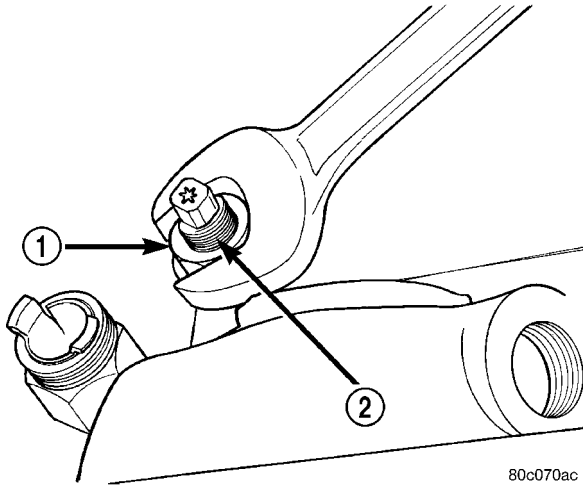


Fig. 26 Tightening Front Band To Hold Front Clutch In Place

1 - LOCK-NUT
2 - FRONT BAND ADJUSTER

(c) Thread Slide Hammer Tools C-3752 into threaded holes in flange of oil pump housing (Fig. 27).

(d) Remove oil pump and reaction shaft support by bumping slide hammers outward alternately to pull pump from case (Fig. 28).

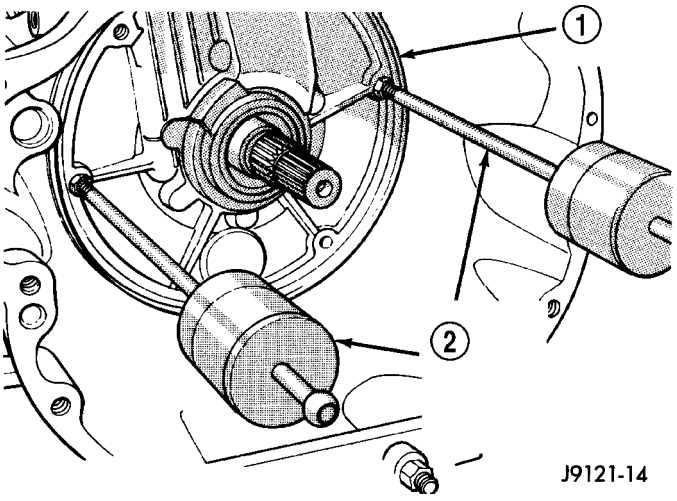


Fig. 27 Oil Pump Removal Tools

1 - PUMP HOUSING
2 - SLIDE HAMMER TOOLS (THREAD INTO PUMP HOUSING)

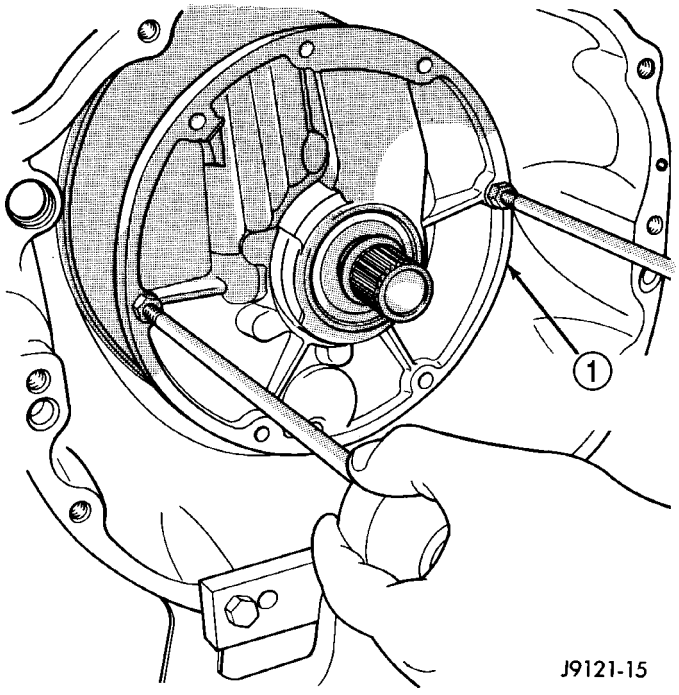


Fig. 28 Oil Pump Removal

1 - OIL PUMP AND REACTION SHAFT SUPPORT

AUTOMATIC TRANSMISSION - 48RE (Continued)

(14) Remove oil pump gasket (Fig. 29). 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. 30).

(17) Squeeze front band together slightly and slide band over front clutch retainer and out of case (Fig. 31).

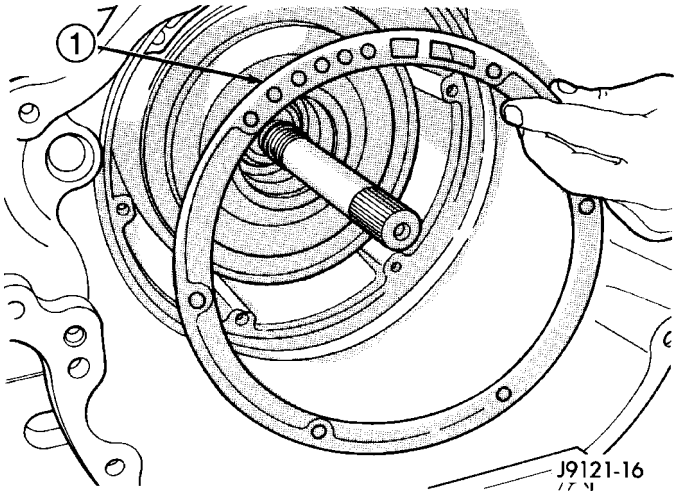


Fig. 29 Oil Pump Gasket

1 - OIL PUMP GASKET

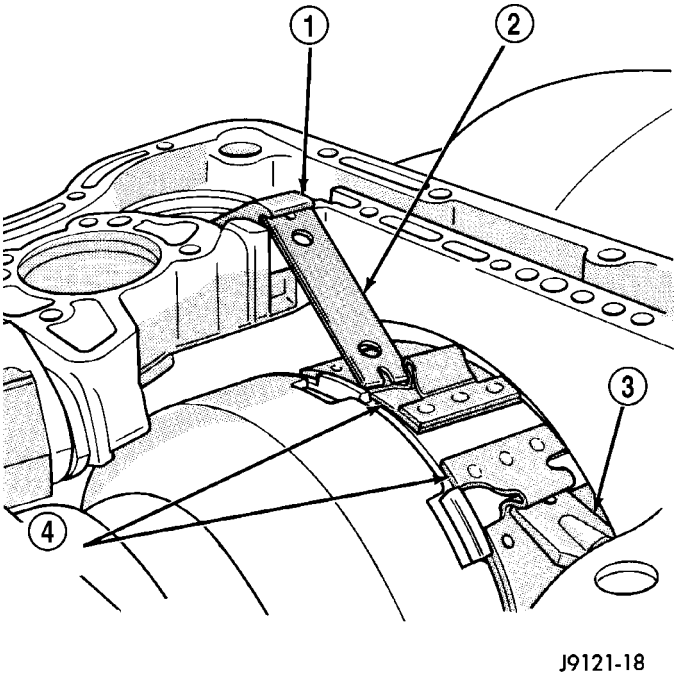


Fig. 30 Front Band Linkage

1 - LEVER
2 - STRUT
3 - ANCHOR
4 - FRONT BAND

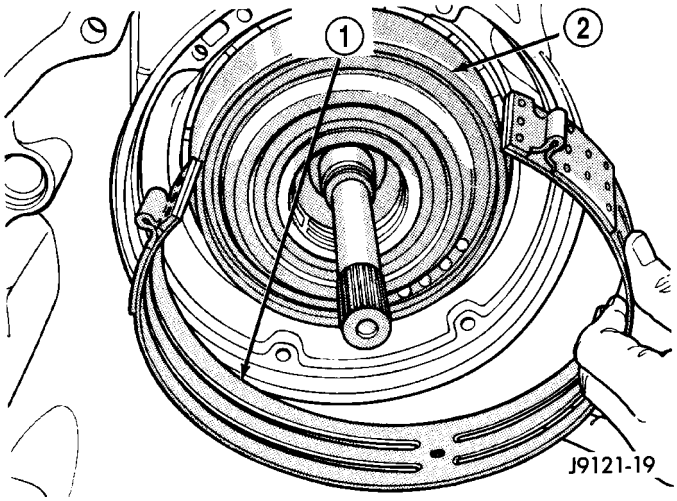


Fig. 31 Front Band Removal

1 - FRONT BAND
2 - FRONT CLUTCH RETAINER

(18) Remove front and rear clutch assemblies as a unit (Fig. 32).

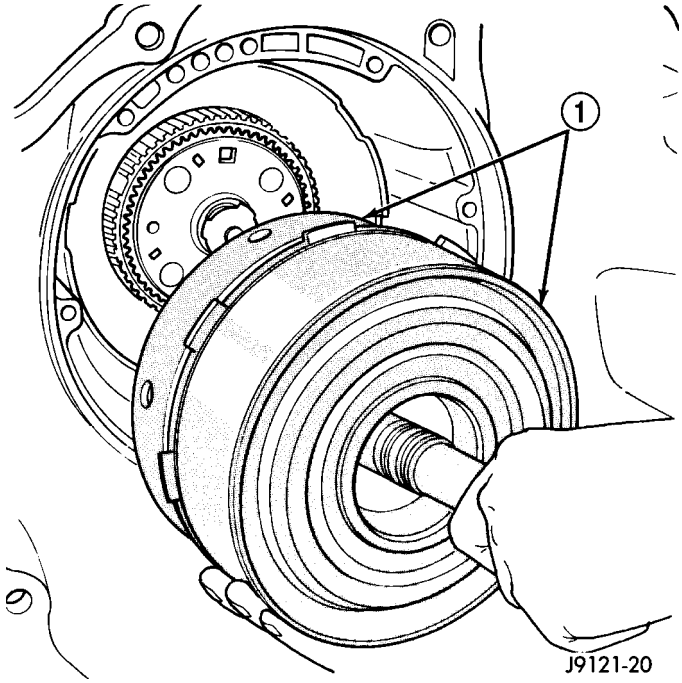


Fig. 32 Removing Front/Rear Clutch Assemblies

1 - FRONT AND REAR CLUTCH ASSEMBLIES

AUTOMATIC TRANSMISSION - 48RE (Continued)

(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. 33).

(20) Remove intermediate shaft thrust washer. Triangular shaped washer will either be on shaft pilot hub or in rear clutch retainer (Fig. 34).

(21) Remove thrust plate from intermediate shaft hub (Fig. 35).

(22) Remove intermediate shaft-planetary geartrain assembly (Fig. 36).

(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.

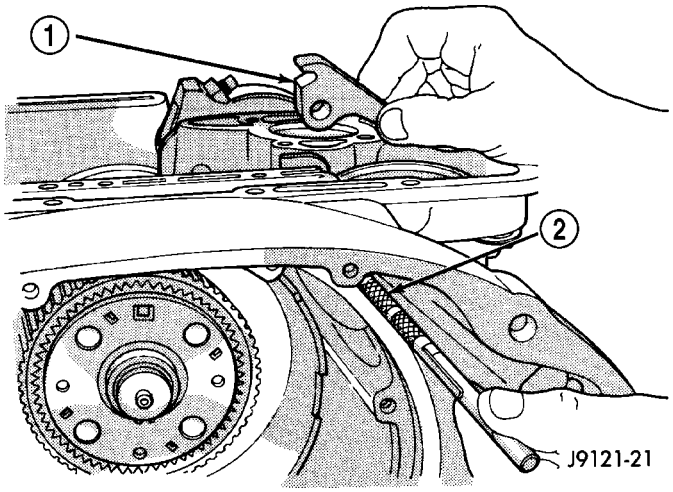


Fig. 33 Front Band Lever And Pin

1 - BAND LEVER
2 - USE PENCIL MAGNET TO REMOVE REACTION PIN

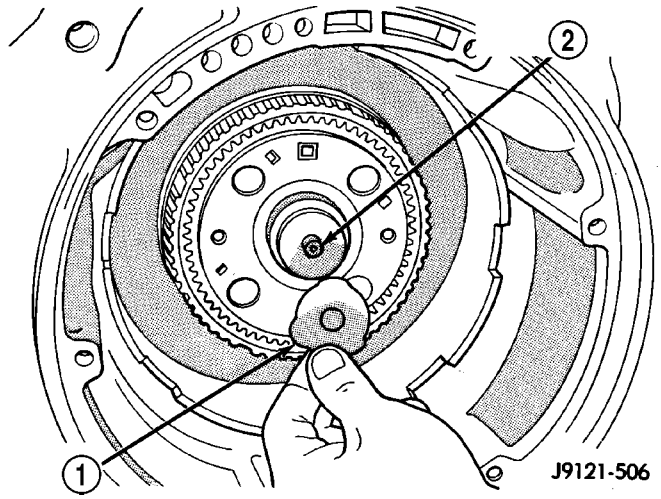


Fig. 34 Intermediate Shaft Thrust Washer

1 - THRUST WASHER
2 - INTERMEDIATE SHAFT PILOT HUB

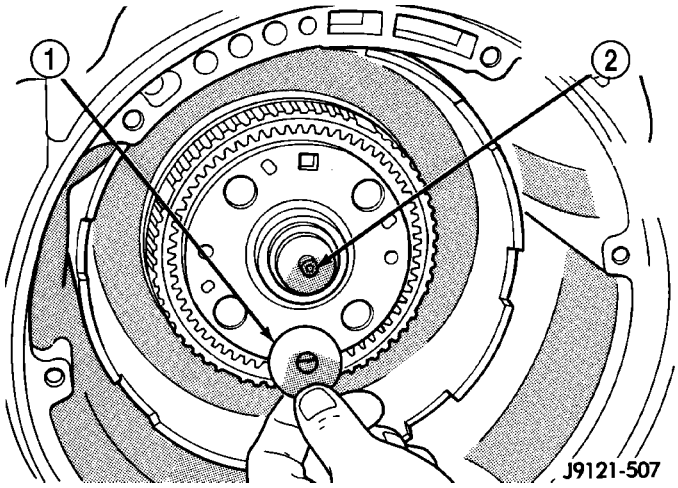


Fig. 35 Intermediate Shaft Thrust Plate

1 - SHAFT THRUST PLATE
2 - INTERMEDIATE SHAFT PILOT HUB

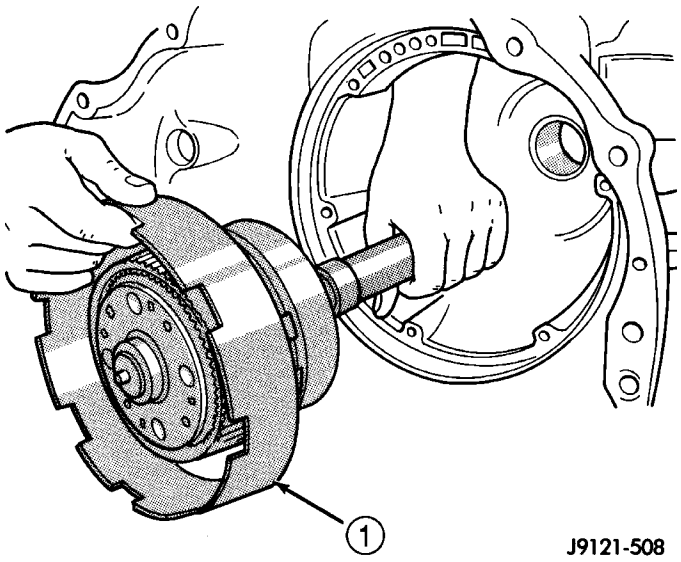


Fig. 36 Intermediate Shaft And Planetary Geartrain

1 - INTERMEDIATE SHAFT AND PLANETARY GEAR TRAIN ASSEMBLY

AUTOMATIC TRANSMISSION - 48RE (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. 37).

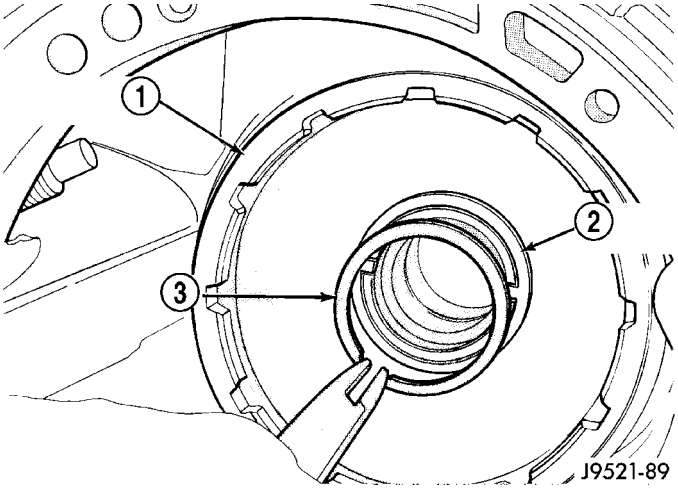


Fig. 37 Low-Reverse Drum Snap-Ring

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. 38).

(27) Note that overrunning clutch race will remain on splines of low-reverse drum after removal (Fig. 39). **The race is a permanent press fit on the hub splines. Do not attempt to remove the race.**

(28) Remove overrunning clutch assembly (Fig. 40). Assembly can be removed without displacing rollers and springs if care is exercised. Note position of rollers and springs for assembly reference.

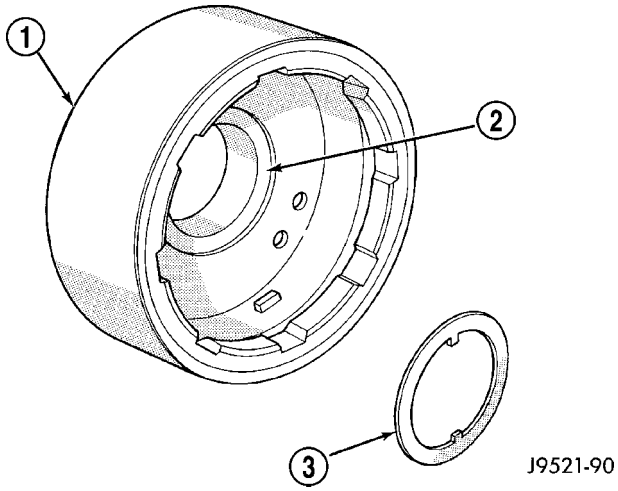


Fig. 38 Low-Reverse Drum And Thrust Washer

1 - LOW-REVERSE DRUM
2 - SPOTFACE FOR WASHER
3 - THRUST WASHER

(29) Remove rear band adjusting lever and reaction pin.

(30) Remove rear band.

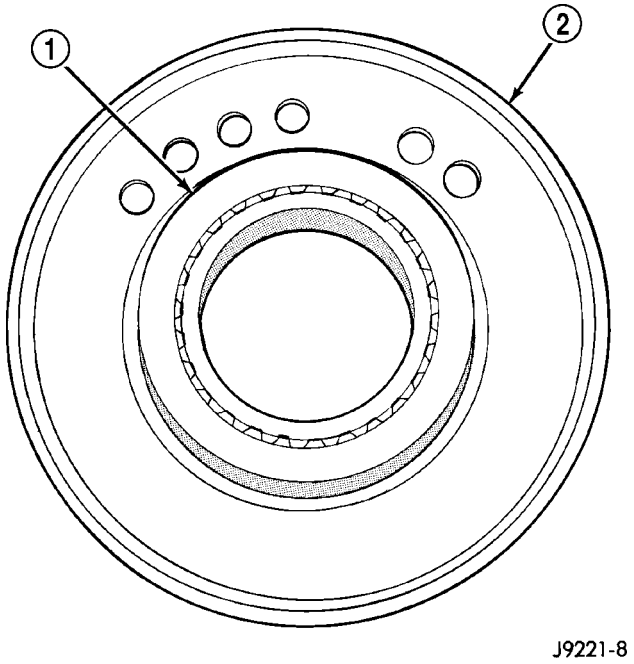


Fig. 39 Overrunning Clutch Race Position On Low-Reverse Drum

1 - OVERRUNNING CLUTCH RACE
2 - LOW-REVERSE DRUM

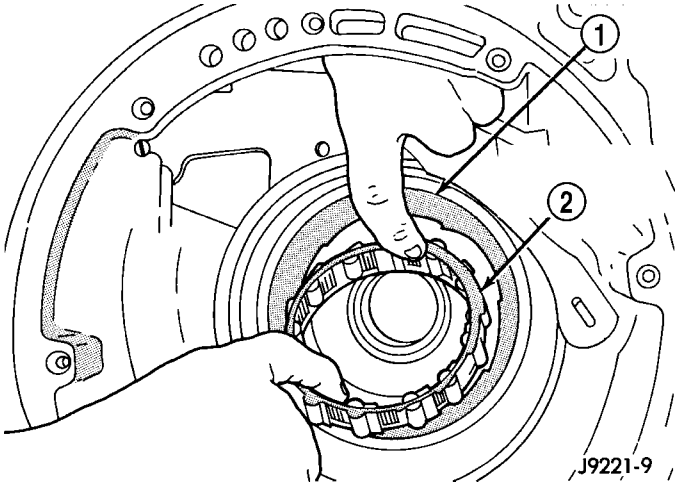


Fig. 40 Overrunning Clutch

1 - CLUTCH CAM
2 - OVERRUNNING CLUTCH ASSEMBLY

AUTOMATIC TRANSMISSION - 48RE (Continued)

(31) Compress front servo rod guide with large C-clamp and Tool C-4470, or Compressor Tool C-3422-B (Fig. 41). Compress guide only enough to permit snap-ring removal (about 1/8 in.).

(32) Remove servo piston snap-ring (Fig. 41). 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.

(34) Compress rear servo piston with C-clamp and Tool C-4470, or Valve Spring Compressor C-3422-B (Fig. 42). Compress servo spring retainer only enough to permit snap-ring removal.

(35) Remove servo piston snap-ring (Fig. 42). 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.

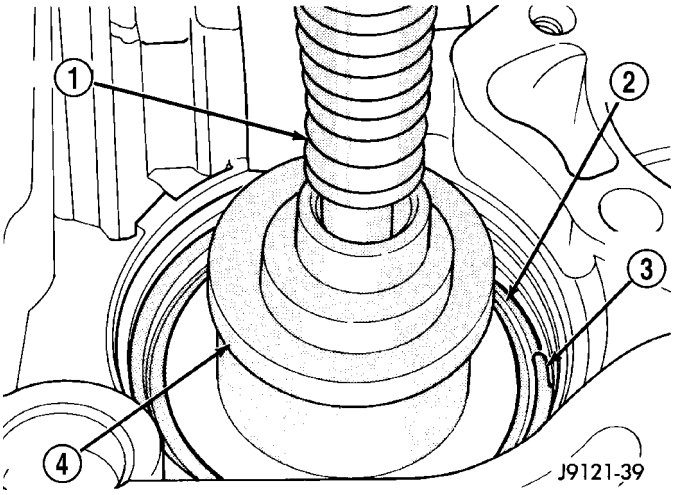


Fig. 41 Front Servo Retaining Snap-Ring

1 - C-CLAMP
2 - FRONT SERVO ROD GUIDE
3 - SNAP-RING
4 - TOOL C-4470

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.

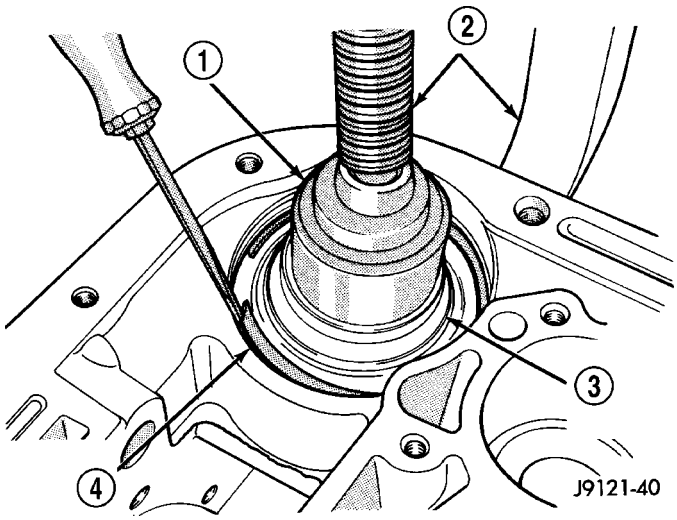


Fig. 42 Rear Servo Retaining Snap-Ring

1 - TOOL C-4470
2 - C-CLAMP
3 - REAR SERVO SPRING RETAINER
4 - RETAINER SNAP-RING

Lubricate transmission parts with Mopar® ATF +4, Automatic Transmission fluid during overhaul and assembly. Use petroleum jelly 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

CAUTION: If the condition of the transmission before the overhaul procedure caused excessive metallic or fiber contamination in the fluid, replace the torque converter. Fluid contamination and transmission failure can result if not done.

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 during reassembly. Soak clutch discs in transmission fluid before installation. Petroleum jelly can 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 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. 43).

(3) Install rear servo spring and retainer in case bore (Fig. 44). Be sure spring is seated on piston.

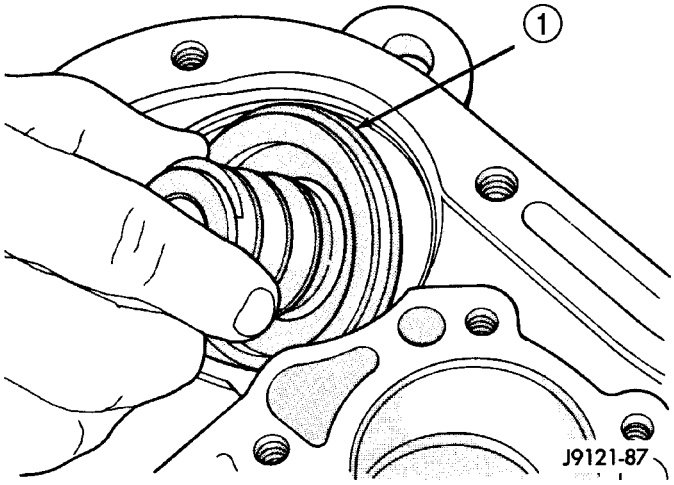


Fig. 43 Rear Servo Piston

1 - REAR SERVO PISTON

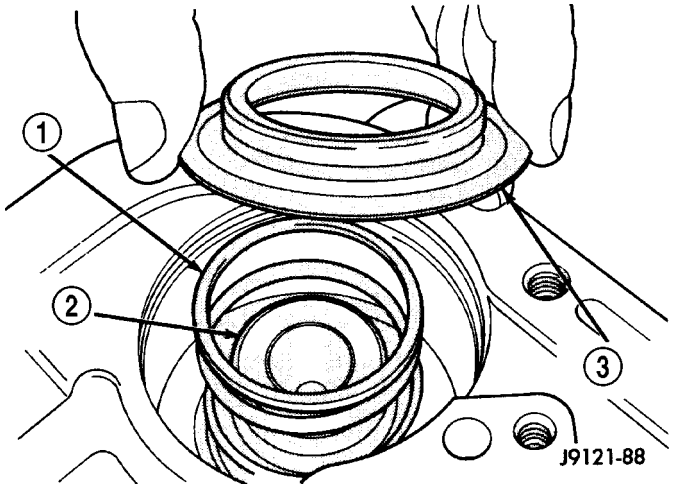


Fig. 44 Rear Servo Piston Spring And Retainer

1 - PISTON SPRING
2 - REAR SERVO PISTON
3 - SPRING RETAINER

AUTOMATIC TRANSMISSION - 48RE (Continued)

(4) Compress rear servo piston with C-clamp or Valve Spring Compressor C-3422-B and install servo piston snap-ring (Fig. 45).

(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. 46). Rotate piston into bore at same time. Rock piston slightly to ease piston ring past snap-ring groove and into bore.

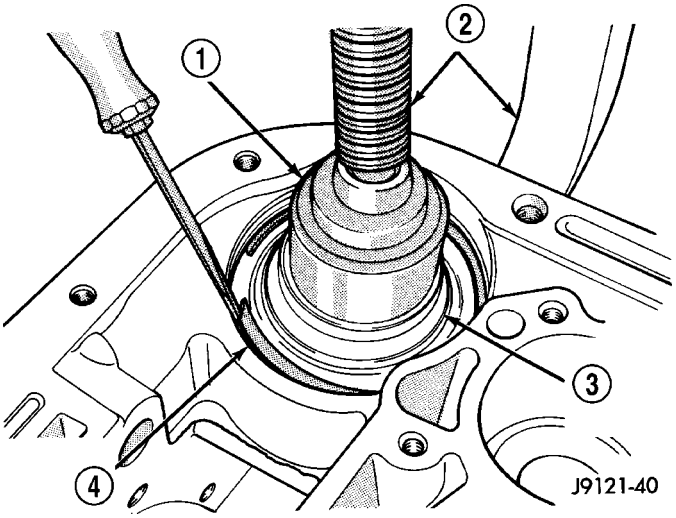


Fig. 45 Rear Servo Snap-Ring

1 - TOOL C-4470
2 - C-CLAMP
3 - REAR SERVO SPRING RETAINER
4 - RETAINER SNAP-RING

(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. 47).

(b) Slowly compress rod guide while simultaneously easing seal ring into bore with suitable tool.

(9) Install rod guide snap-ring (Fig. 47).

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.

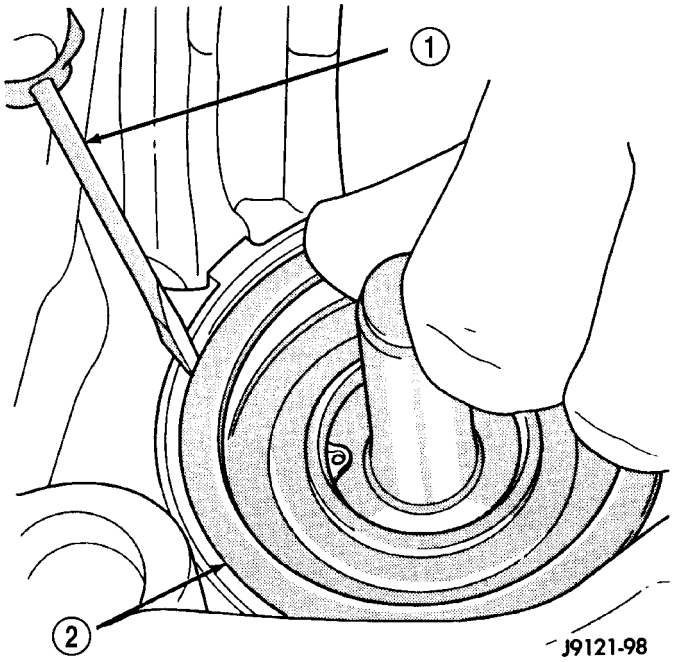


Fig. 46 Front Servo Piston

1 - USE SUITABLE TOOL TO HELP SEAT PISTON RING
2 - FRONT SERVO PISTON

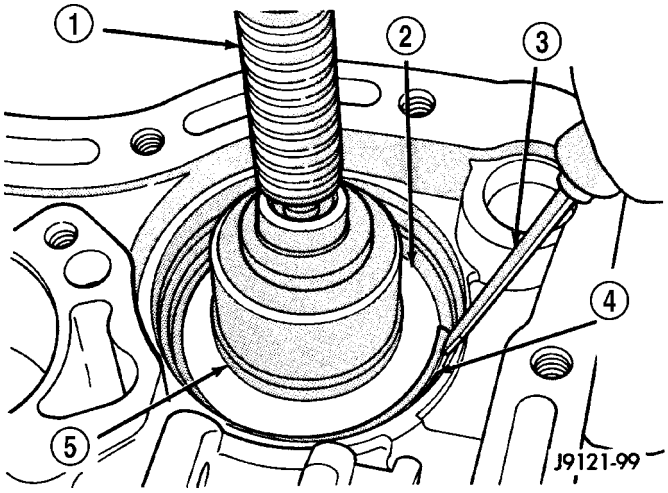


Fig. 47 Front Servo Rod Guide And Snap-Ring

1 - C-CLAMP
2 - ROD GUIDE
3 - SMALL SCREWDRIVER
4 - ROD GUIDE SNAP-RING
5 - TOOL SP-5560

(3) Install low-reverse drum. Slide drum through rear band, onto piston retainer hub and into engagement with overrunning clutch and race.

(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 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.

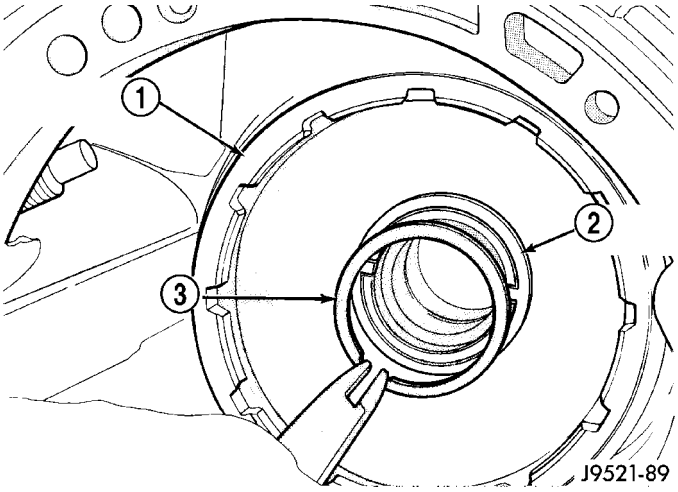


Fig. 48 Low-Reverse Drum Snap-Ring

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. 49). **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. 50).

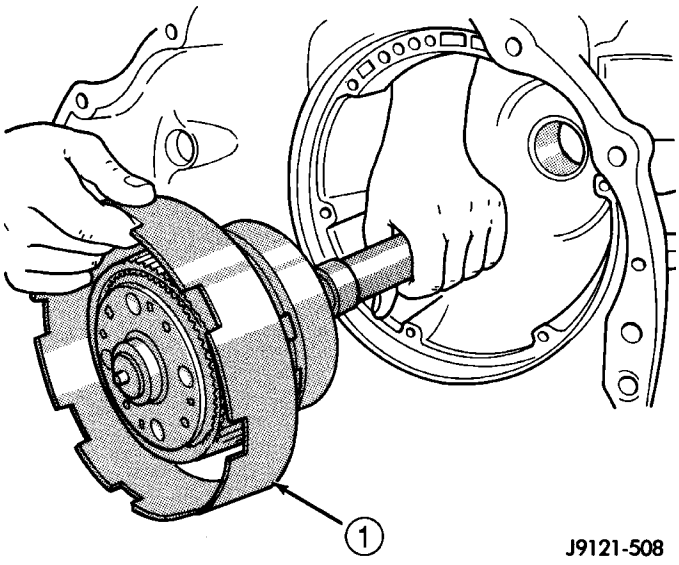


Fig. 49 Intermediate Shaft And Planetary Geartrain

1 - INTERMEDIATE SHAFT AND PLANETARY GEAR TRAIN ASSEMBLY

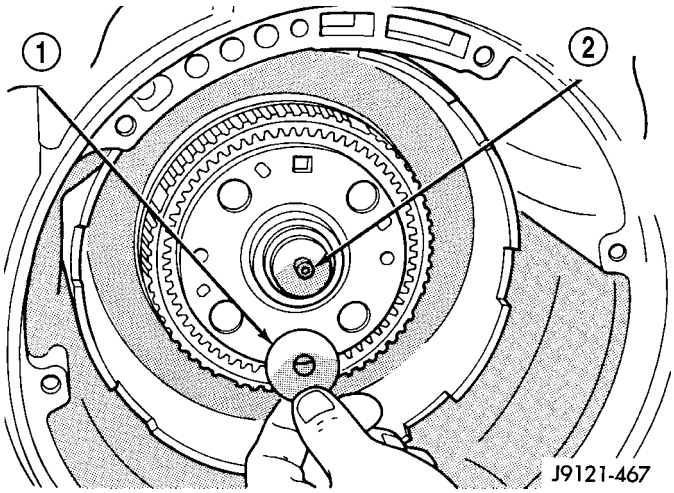


Fig. 50 Intermediate Shaft Thrust Plate

1 - SHAFT THRUST PLATE
2 - INTERMEDIATE SHAFT PILOT HUB

AUTOMATIC TRANSMISSION - 48RE (Continued)

(4) Check input shaft front seal rings, fiber thrust washer and rear seal ring (Fig. 51). Be sure the ends of the 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. 52). Align lugs on front clutch discs. Mount front clutch on rear clutch. Turn front clutch retainer back and forth until front clutch discs are fully seated on rear clutch splined hub.

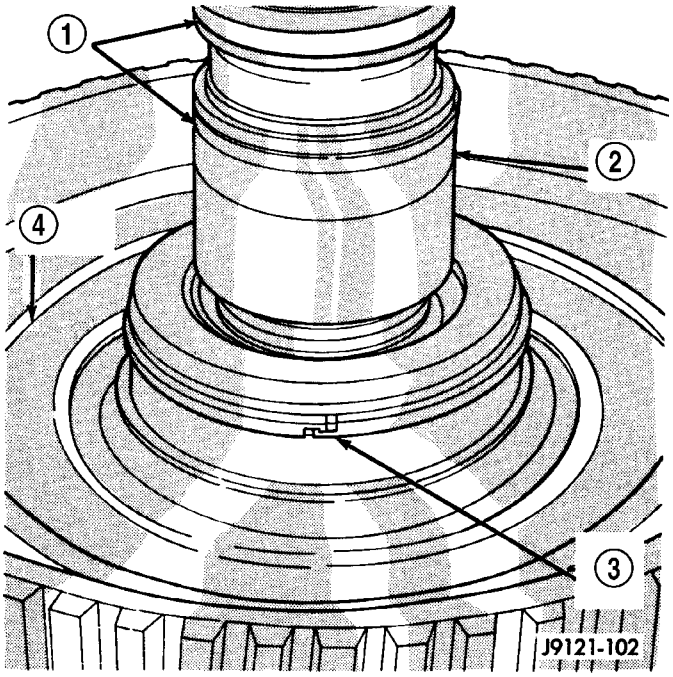


Fig. 51 Input Shaft Seal Rings And Thrust Washer

1 - TORLON® FRONT SEAL RINGS
2 - INPUT SHAFT
3 - REAR SEAL RING
4 - THRUST WASHER

(6) Install intermediate shaft thrust washer in hub of rear clutch retainer (Fig. 53). 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.

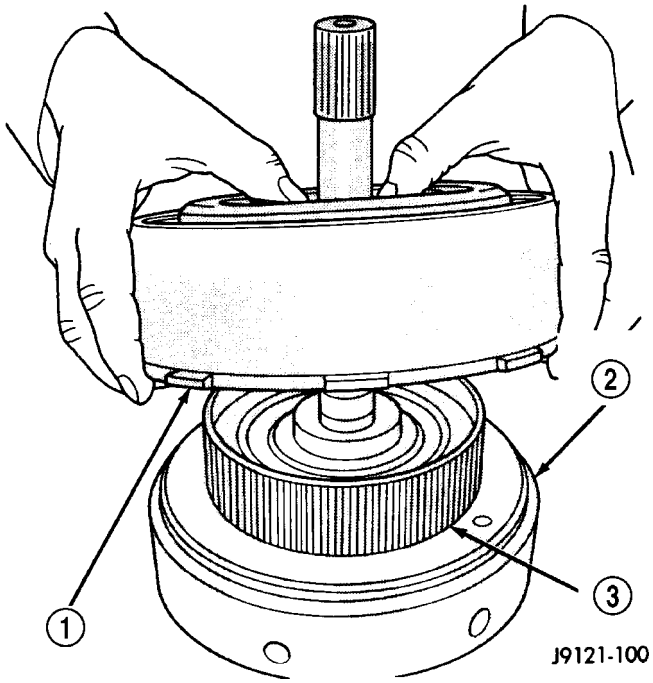


Fig. 52 Assembling Front And Rear Clutches

1 - FRONT CLUTCH ASSEMBLY
2 - REAR CLUTCH ASSEMBLY
3 - REAR CLUTCH SPLINED HUB

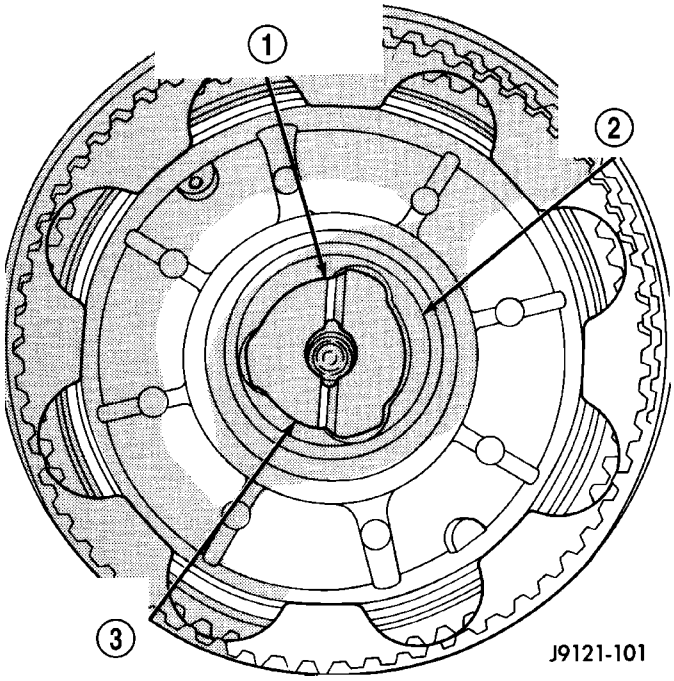


Fig. 53 Intermediate Shaft Thrust Washer

1 - BE SURE WASHER GROOVES FACE OUT AS SHOWN
2 - REAR CLUTCH RETAINER HUB
3 - SHAFT THRUST WASHER

(8) Align discs in rear clutch. Then install and engage assembly in front planetary and driving shell (Fig. 54). Turn clutch retainers back and forth until both clutches are seated.

(9) Position front band lever in case and over servo rod guide. Then install front band lever pin in case and slide it through lever.

(10) Coat threads of front band pin access plug with sealer and install it in case. Tighten plug to 17 N·m (13 ft. lbs.) torque.

(11) Slide front band over front clutch retainer and install front band strut and anchor (Fig. 55).

(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.**

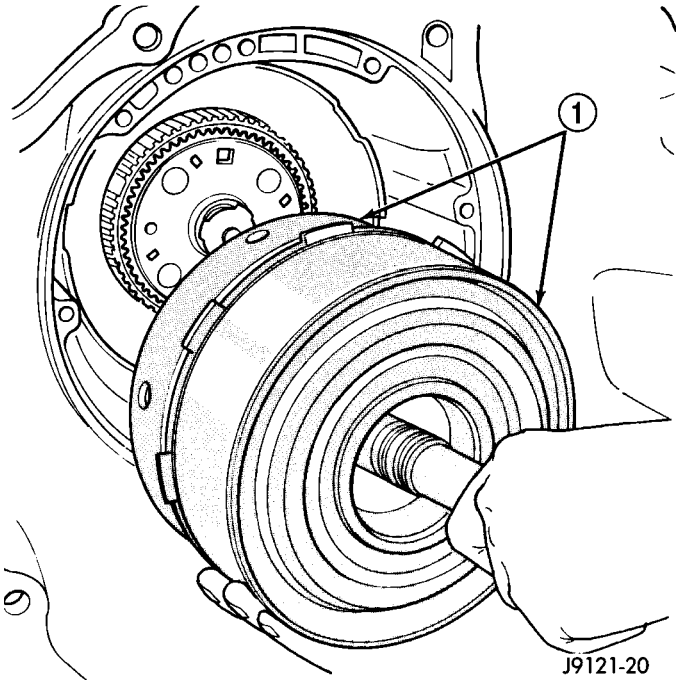


Fig. 54 Front/Rear Clutch Assemblies

1 - FRONT AND REAR CLUTCH ASSEMBLIES

OIL PUMP

(1) Install oil pump Pilot Studs C-3288-B in case (Fig. 56).

(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. 56).

(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. 57).

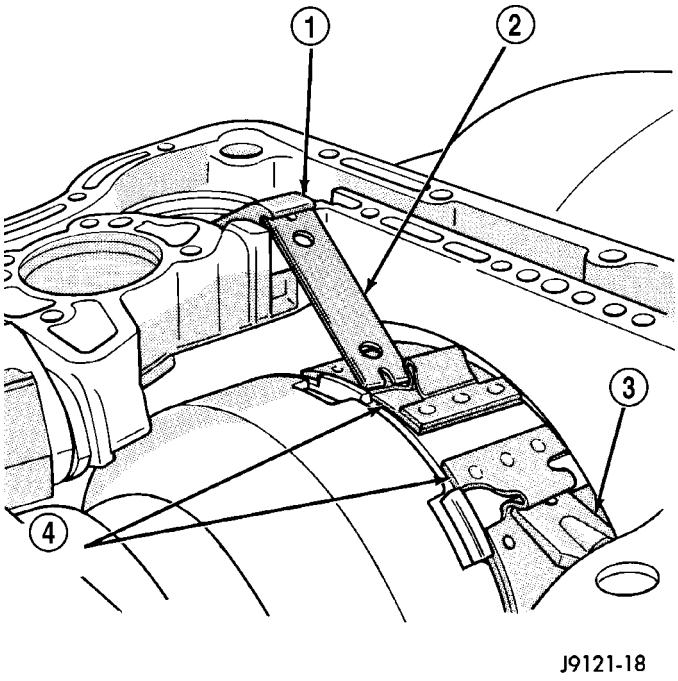


Fig. 55 Front Band And Linkage

1 - LEVER
2 - STRUT
3 - ANCHOR
4 - FRONT BAND

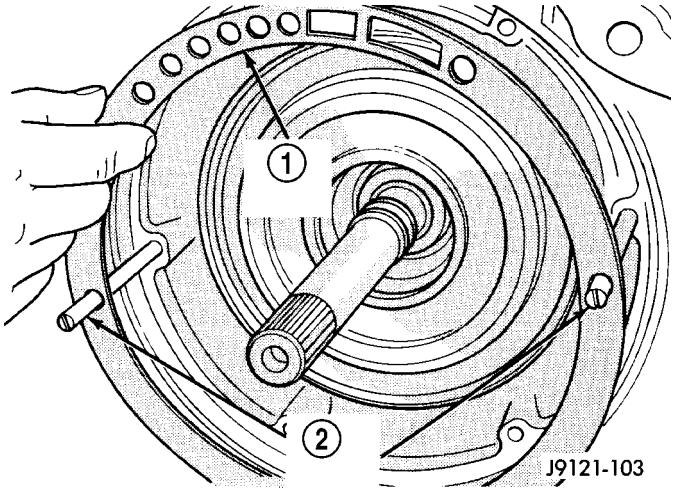


Fig. 56 Oil Pump Gasket And Pilot Studs

1 - OIL PUMP GASKET
2 - PILOT STUDS C-3288-B

CAUTION: The thrust washer bore (I.D.), is chamfered on one side. Make sure the chamfered side is installed so it faces the pump.

AUTOMATIC TRANSMISSION - 48RE (Continued)

(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. 58). Use extra petroleum jelly to hold washer in place if necessary.

(5) Check the torque converter hub seal ring on the reaction shaft for damage. Also check that the seal ring rotates freely in the reaction shaft groove. Replace if necessary.

(6) Lubricate oil pump seals with petroleum Mopar® ATF +4.

(7) Mount oil pump on pilot studs and slide pump into case opening (Fig. 59). **Work pump into case by hand. Do not use a mallet or similar tools to seat pump.**

(8) 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.

(9) 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.

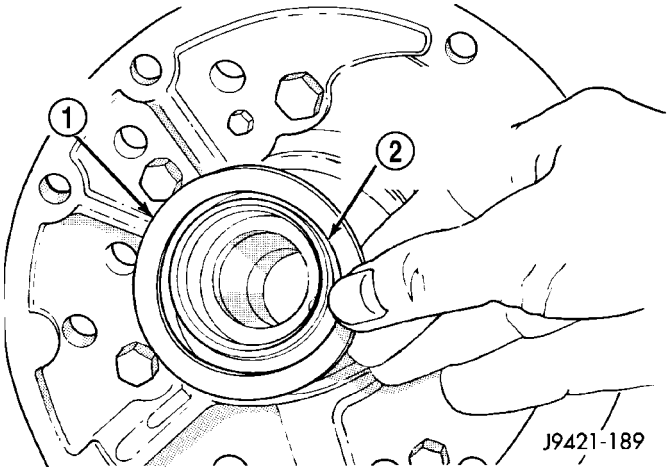


Fig. 57 Reaction Shaft Thrust Washer

1 - THRUST WASHER
2 - CHAMFERED SIDE OF WASHER BORE GOES TOWARD PUMP

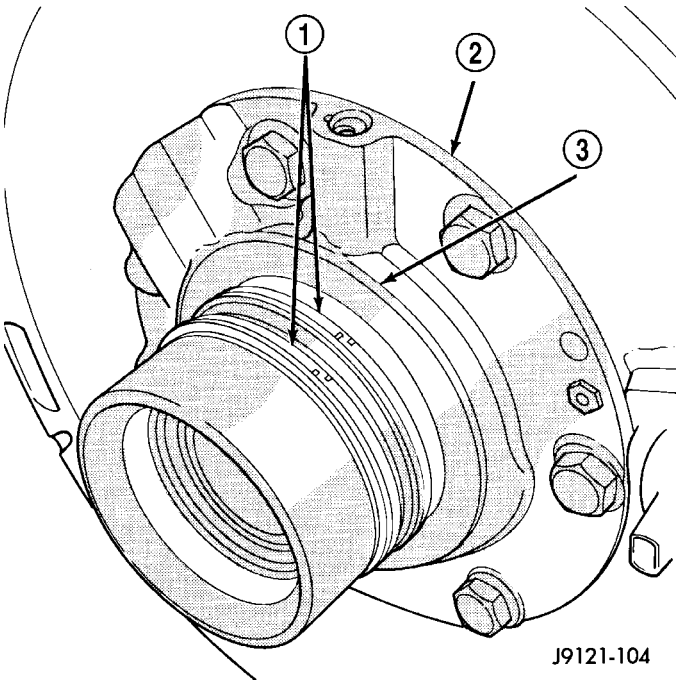


Fig. 58 Reaction Shaft Seal Ring And Thrust Washer

1 - SEAL RINGS
2 - REACTION SHAFT SUPPORT
3 - THRUST WASHER (FIBER)

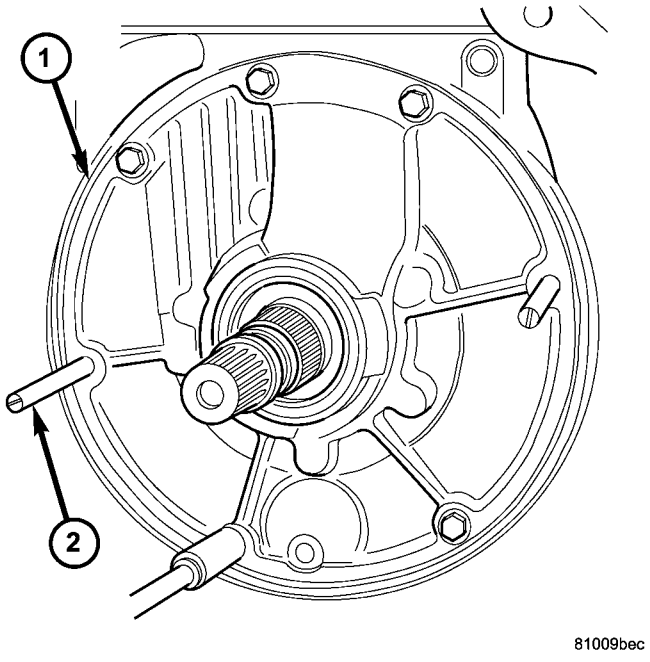


Fig. 59 Oil Pump

1 - SEAT OIL PUMP IN CASE BY HAND
2 - REMOVE PILOT STUDS WHEN PUMP IS SEATED

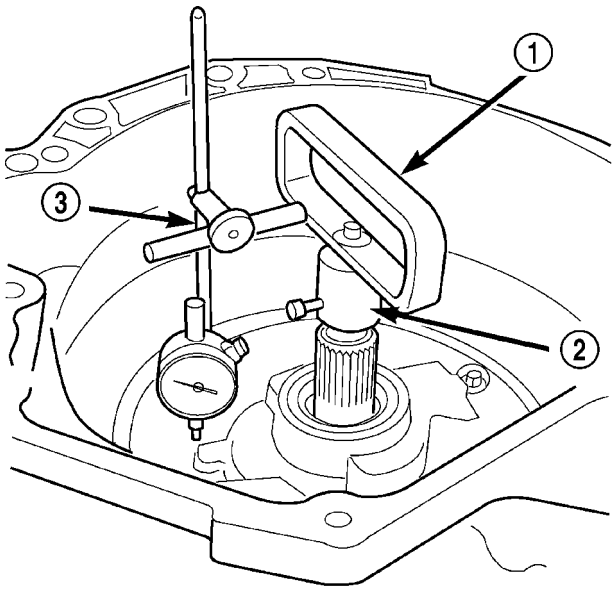
INPUT SHAFT END PLAY CHECK

NOTE: Overdrive unit must be installed in order to correctly measure the input shaft end-play.

(1) Measure input shaft end play (Fig. 60).

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.



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Fig. 60 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 the transmission range sensor has **not** been installed in case. Valve body can not be installed if sensor is installed.

(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.

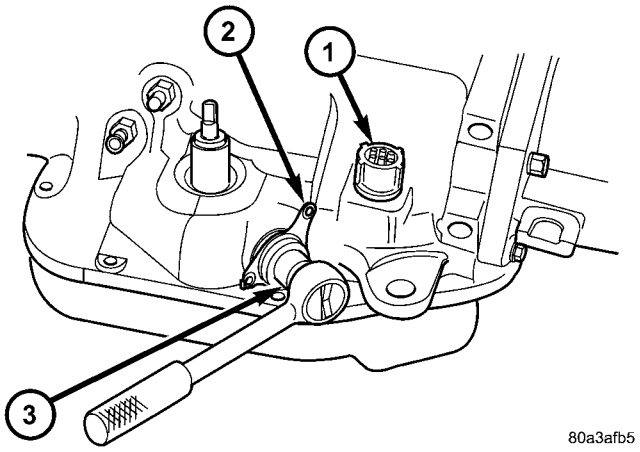
(b) Align and seat valve body on case. Be sure manual lever shaft and overdrive connector are fully seated in case.

(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) Move the transmission manual shaft lever to the manual LOW position.

(7) Install the TRS mounting bracket into the transmission case. Using Adapter 8581 (Fig. 61), tighten the mounting bracket to 34 N·m (300 in.lbs.).



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Fig. 61 Tighten the TRS Mounting Bracket

1 - SOLENOID CASE CONNECTOR
2 - TRS MOUNTING BRACKET
3 - ADAPTER 8581

(8) Install the TRS (Fig. 62) into the mounting bracket with the wiring connector facing the front of the transmission.

(9) Install the two screws to hold the TRS to the mounting bracket. Tighten the screws to 3.4 N·m (30 in.lbs.).

CAUTION: If the condition of the transmission before the overhaul procedure caused excessive metallic or fiber contamination in the fluid, replace the torque converter. Fluid contamination and transmission failure can result if not done.

AUTOMATIC TRANSMISSION - 48RE (Continued)

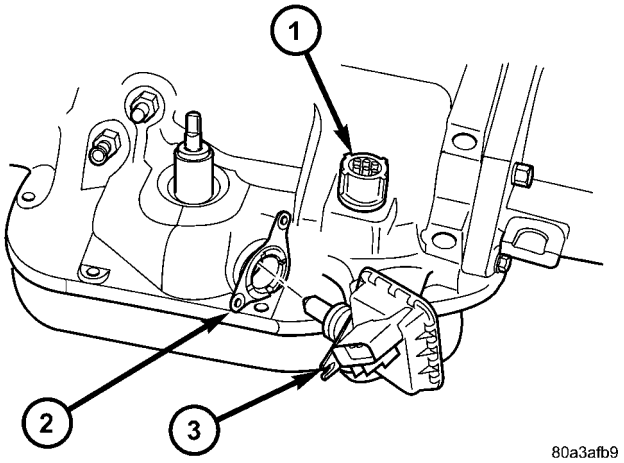


Fig. 62 Install the Transmission Range Sensor

1 - SOLENOID CASE CONNECTOR
2 - TRS MOUNTING BRACKET
3 - TRANSMISSION RANGE SENSOR

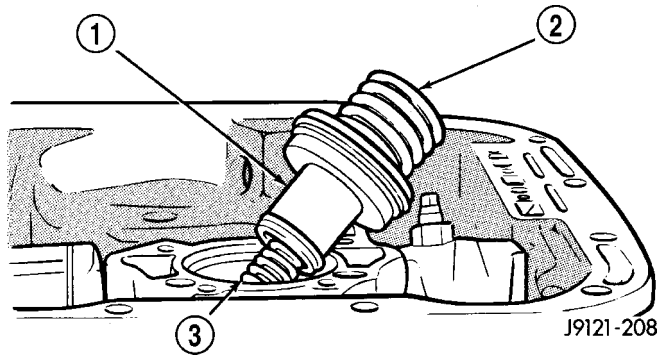


Fig. 63 Accumulator Piston And Springs

1 - ACCUMULATOR PISTON
2 - OUTER SPRING
3 - INNER SPRING

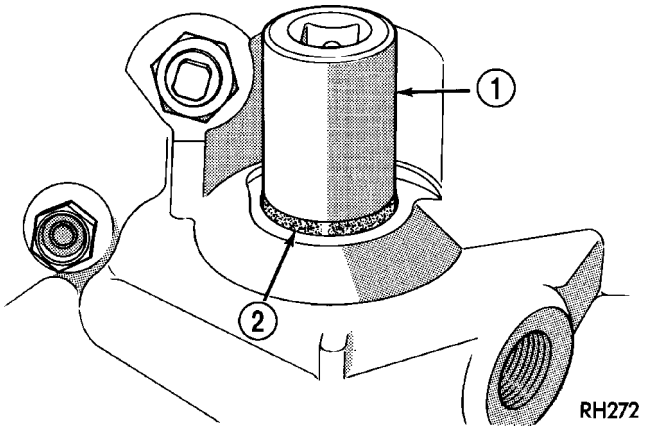


Fig. 64 Manual Lever Shaft Seal

1 - 15/16'' SOCKET
2 - SEAL

(10) 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 1-3/4 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 inner and outer diameters 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 19mm (0.75 in.) to rear of straightedge when converter is fully seated.

(7) Temporarily secure converter with C-clamp.

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

(9) Check condition of converter driveplate. Replace the plate if cracked, distorted or damaged. **Also be sure transmission dowel pins are seated in engine block and protrude far enough to hold transmission in alignment.**

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

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

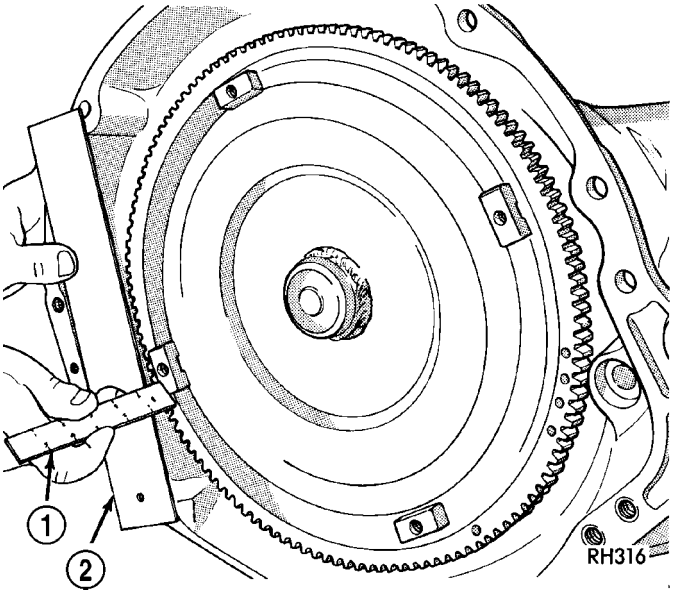


Fig. 65 Checking Converter Seating - Typical

1 - SCALE
2 - STRAIGHTEDGE

(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.

(15) Install the rear transmission crossmember.

(16) Lower transmission onto crossmember and install bolts attaching transmission mount to crossmember.

(17) Remove engine support fixture.

(18) Install the transfer case, if equipped.

(19) Install crankshaft position sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/CRANKSHAFT POSITION SENSOR - INSTALLATION)

(20) Connect gearshift cable (Fig. 66) and throttle cable to transmission.

(21) Connect wires to the transmission range sensor and transmission solenoid connector. Be sure the 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.

(22) Install torque converter-to-driveplate bolts.

(23) Install converter housing access cover.

(24) Install starter motor and cooler line bracket. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - INSTALLATION)

(25) Connect cooler lines (Fig. 67) to transmission.

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

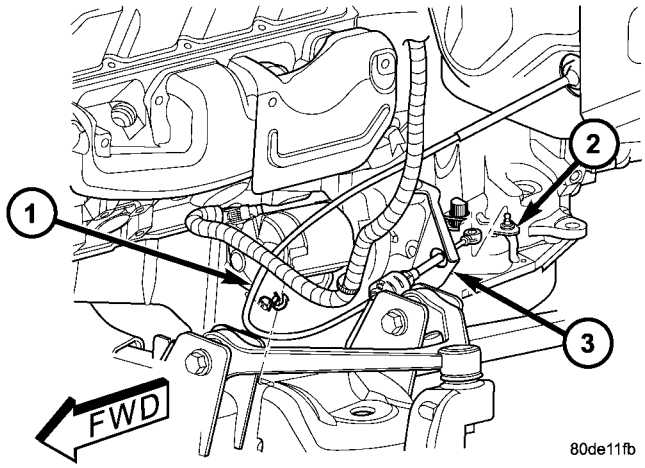


Fig. 66 Gearshift Cable At Transmission

1 - GEARSHIFT CABLE
2 - TRANSMISSION MANUAL LEVER
3 - CABLE SUPPORT BRACKET

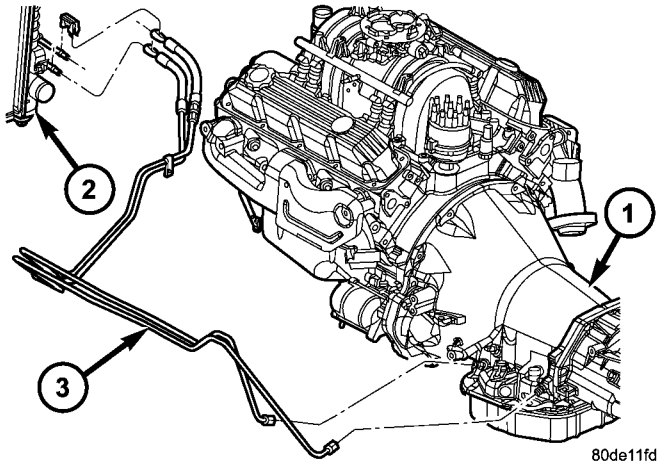


Fig. 67 Transmission Cooler Lines

1 - TRANSMISSION
2 - RADIATOR
3 - COOLER LINES

(27) Install any exhaust components previously removed.

(28) Align and connect propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

(29) Adjust gearshift cable and throttle valve cable, if necessary.

(30) Install the transfer case skid plate, if equipped.

(31) Lower vehicle.

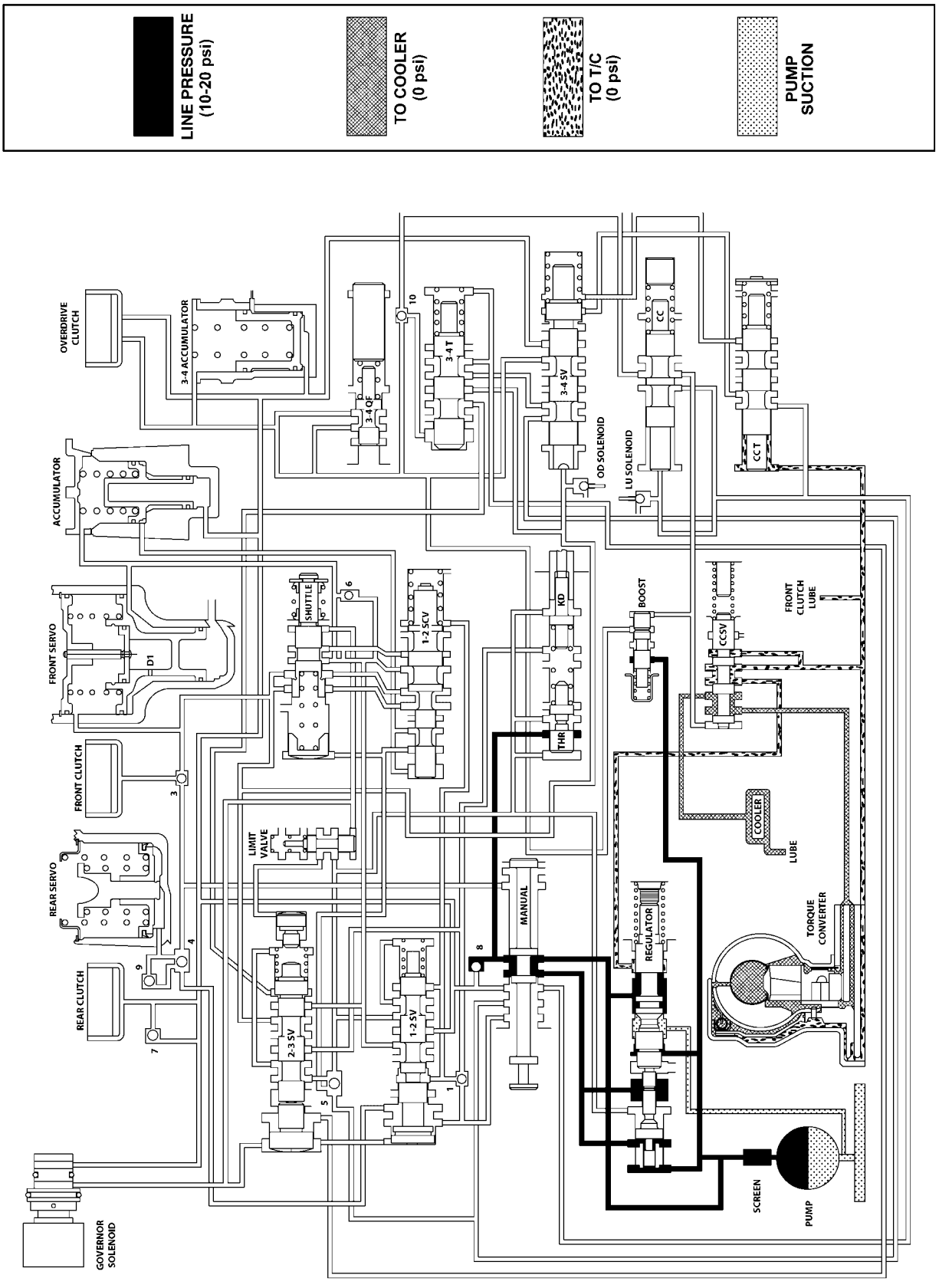
(32) Fill transmission with Mopar® ATF +4, Automatic Transmission fluid.

AUTOMATIC TRANSMISSION - 48RE (Continued)

SCHEMATICS AND DIAGRAMS

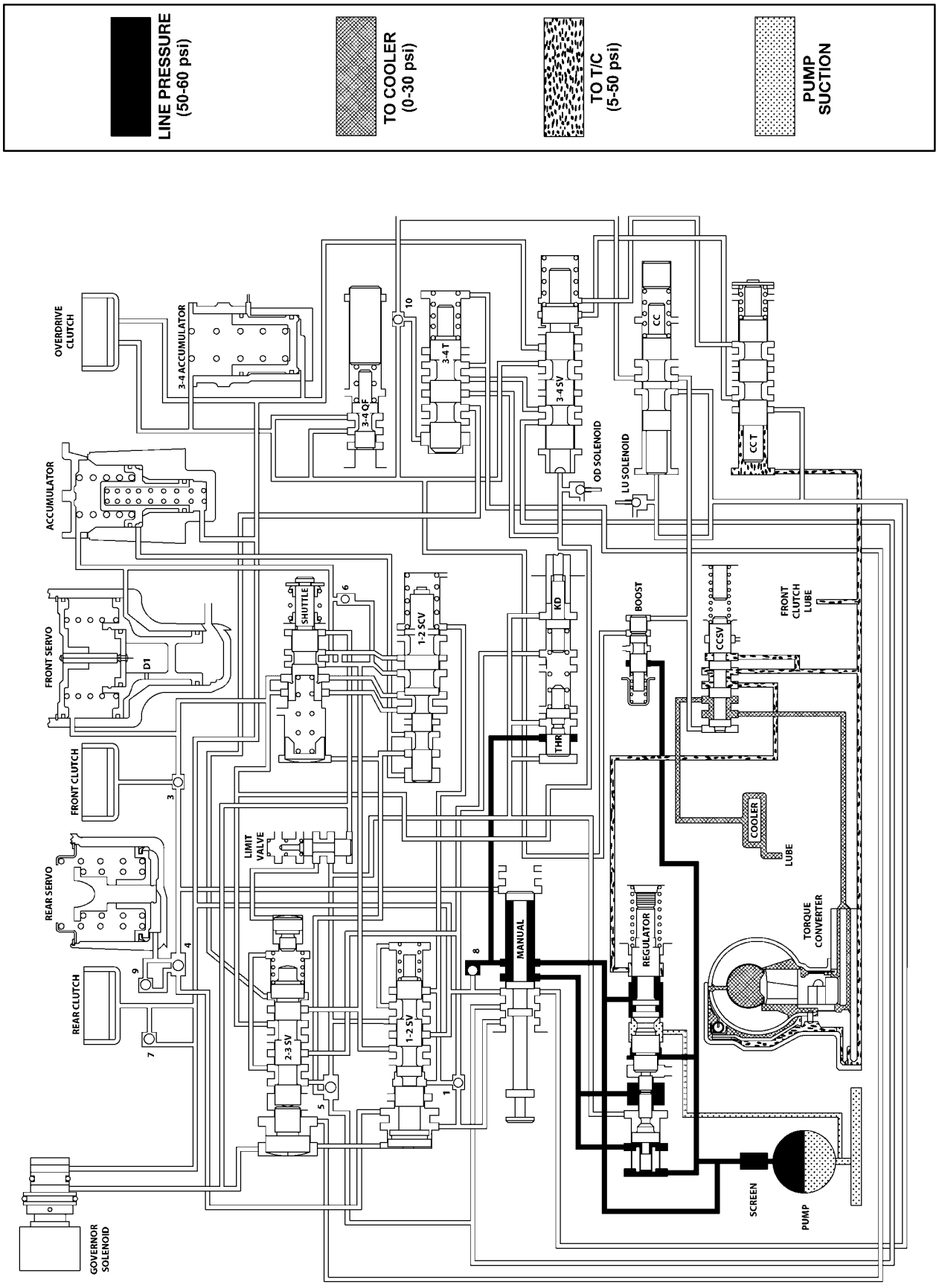
HYDRAULIC SCHEMATICS

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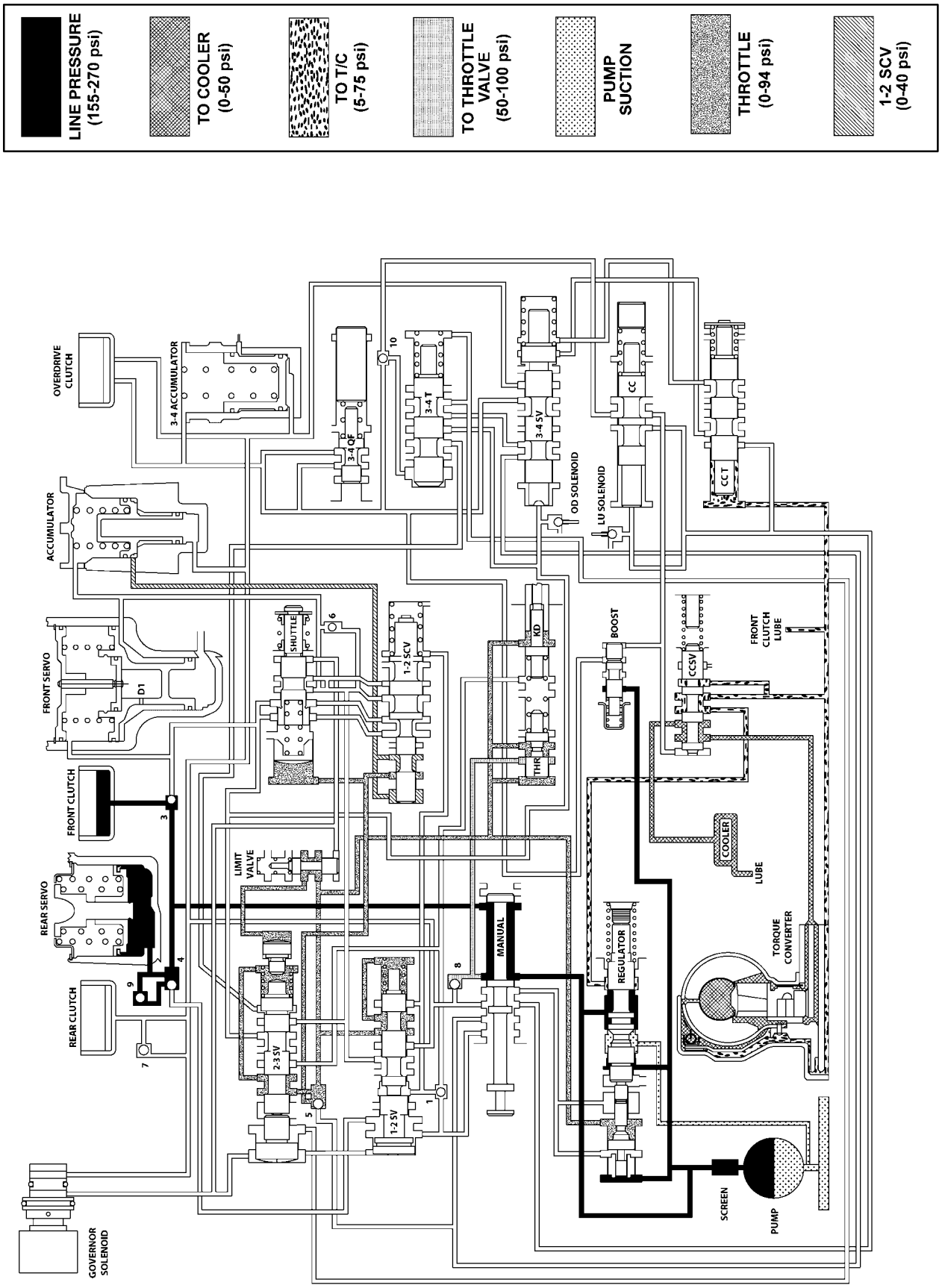
HYDRAULIC FLOW IN PARK

AUTOMATIC TRANSMISSION - 48RE (Continued)



AUTOMATIC TRANSMISSION - 48RE (Continued)

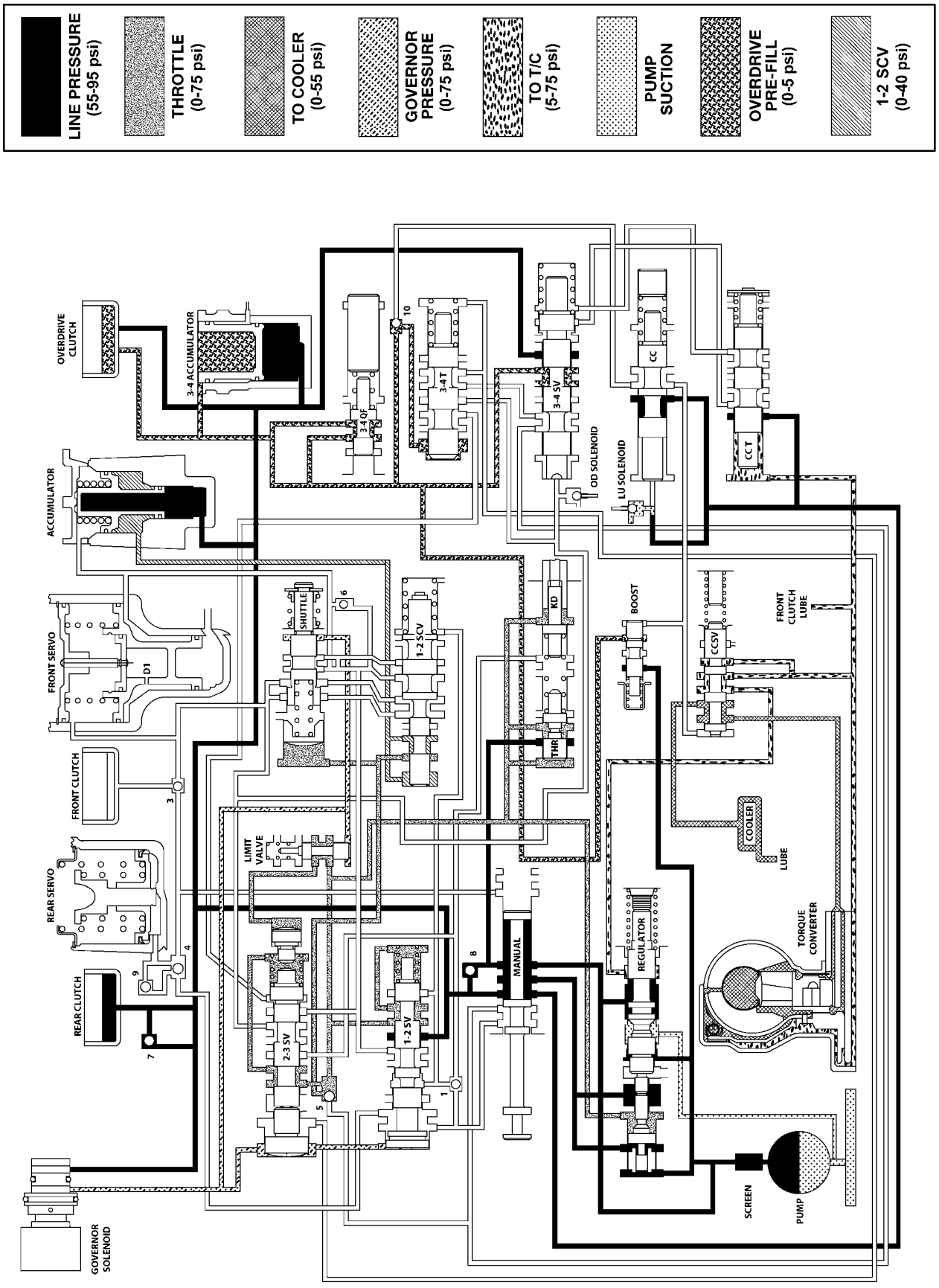
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HYDRAULIC FLOW IN REVERSE

AUTOMATIC TRANSMISSION - 48RE (Continued)

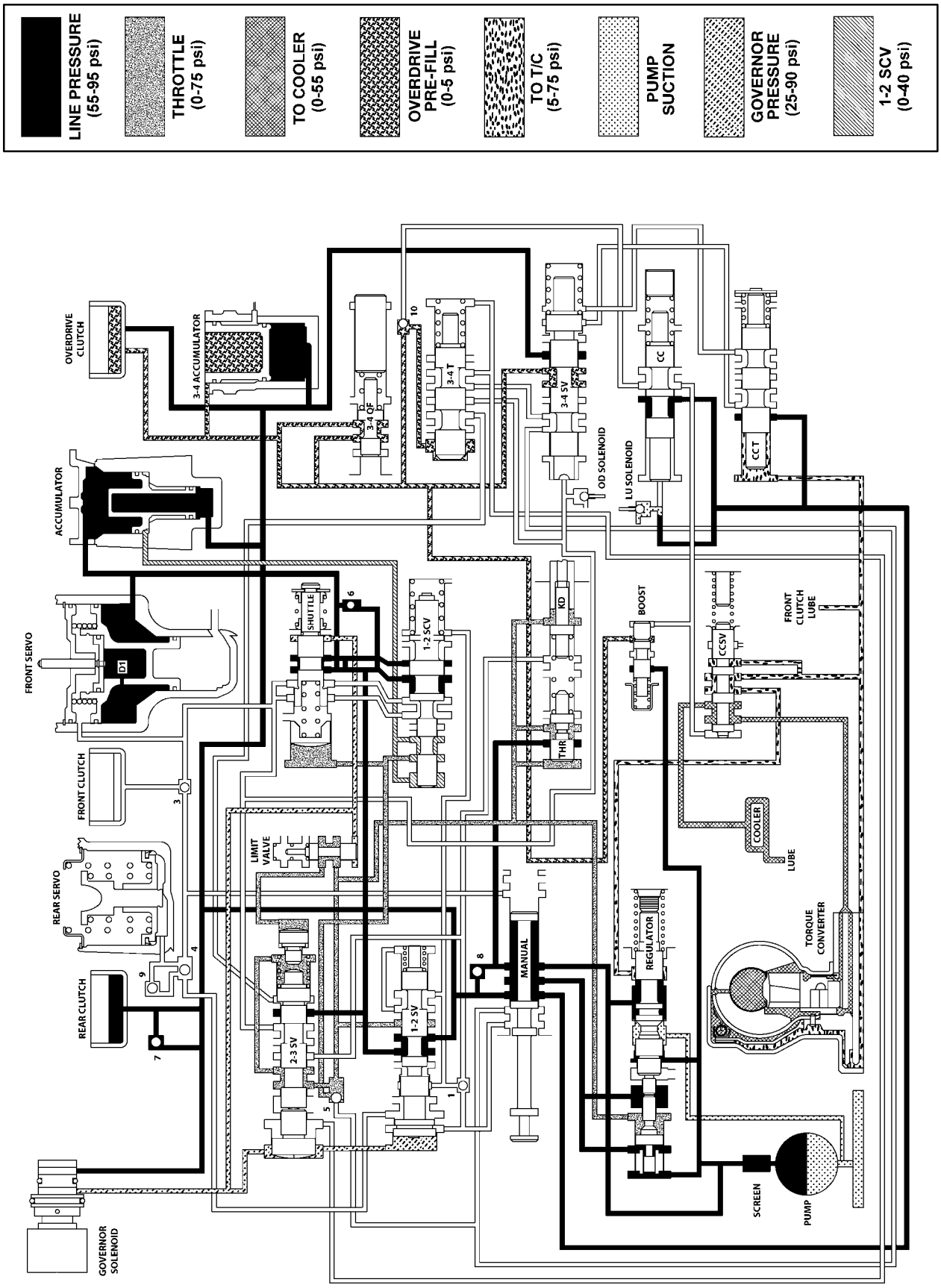
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HYDRAULIC FLOW IN DRIVE FIRST GEAR

AUTOMATIC TRANSMISSION - 48RE (Continued)

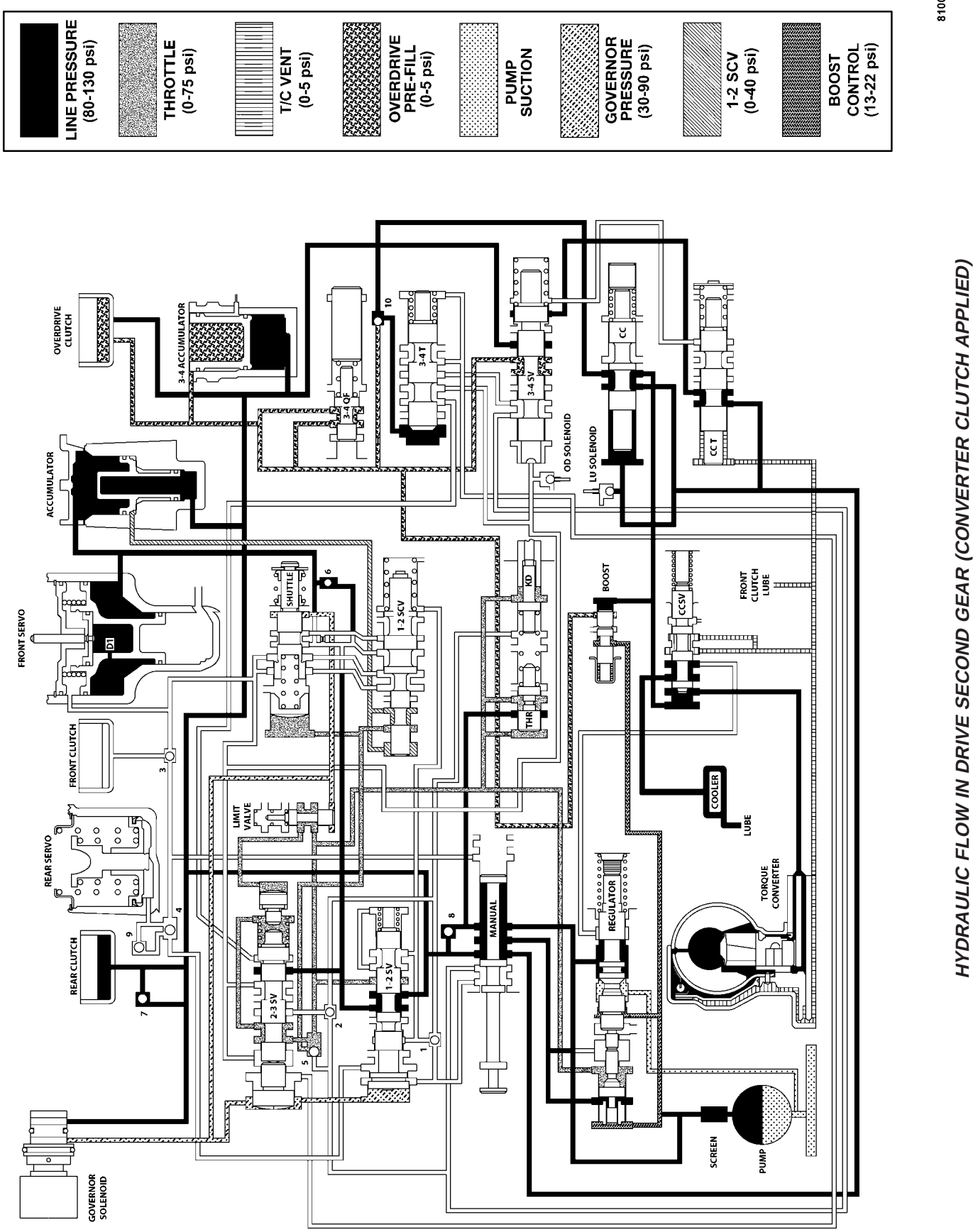
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HYDRAULIC FLOW IN DRIVE SECOND GEAR (CONVERTER CLUTCH NOT APPLIED)

AUTOMATIC TRANSMISSION - 48RE (Continued)

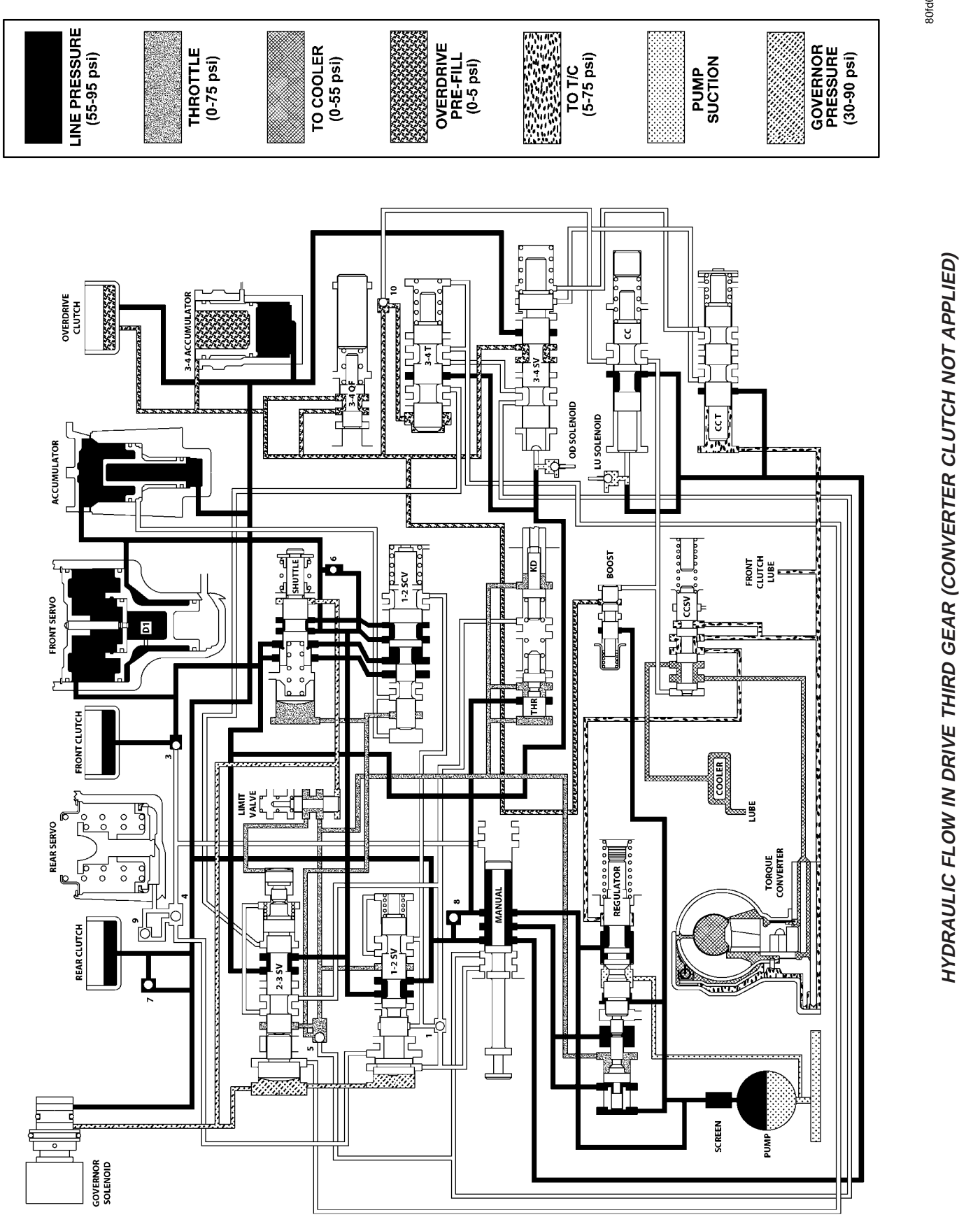
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HYDRAULIC FLOW IN DRIVE SECOND GEAR (CONVERTER CLUTCH APPLIED)

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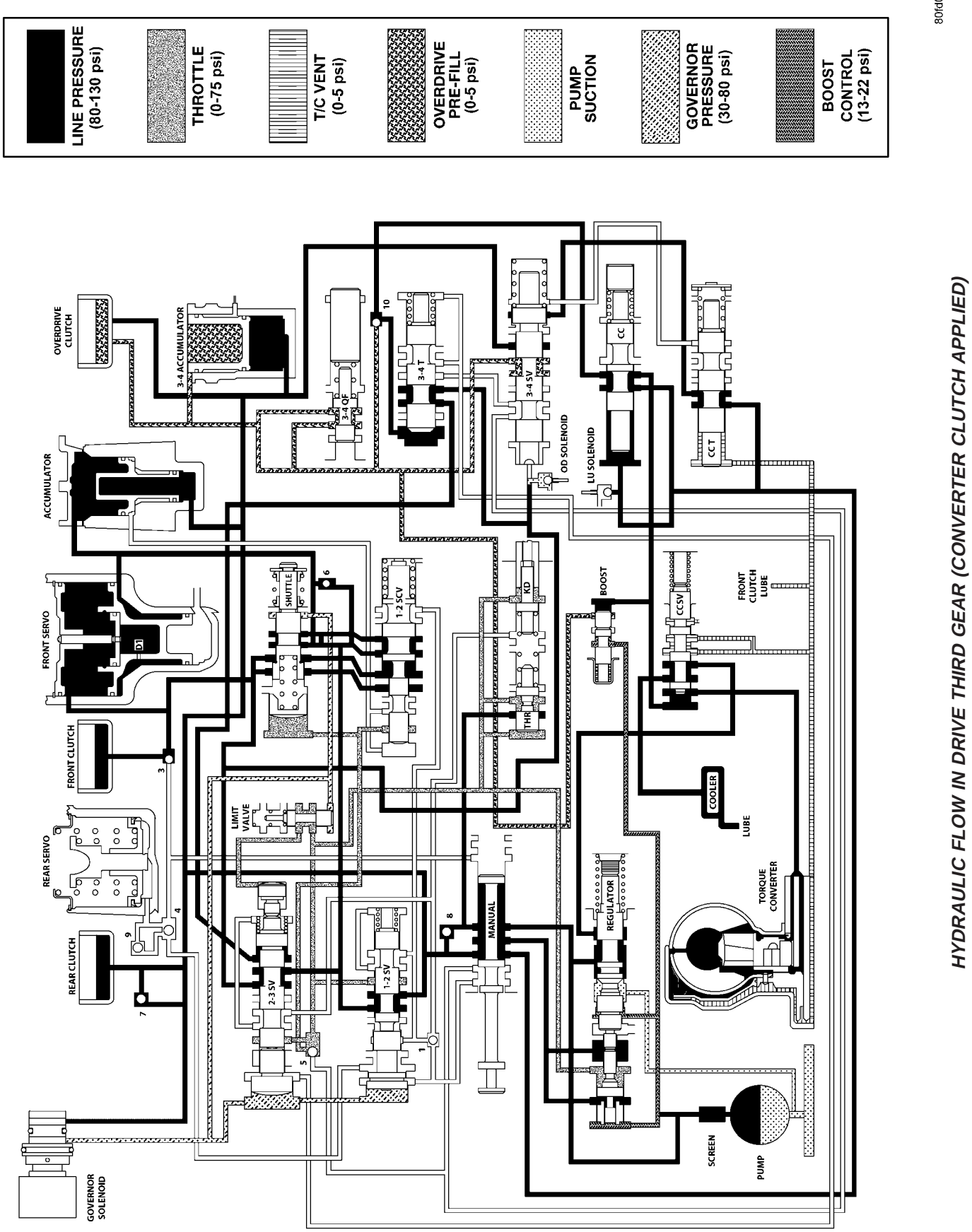
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HYDRAULIC FLOW IN DRIVE THIRD GEAR (CONVERTER CLUTCH NOT APPLIED)

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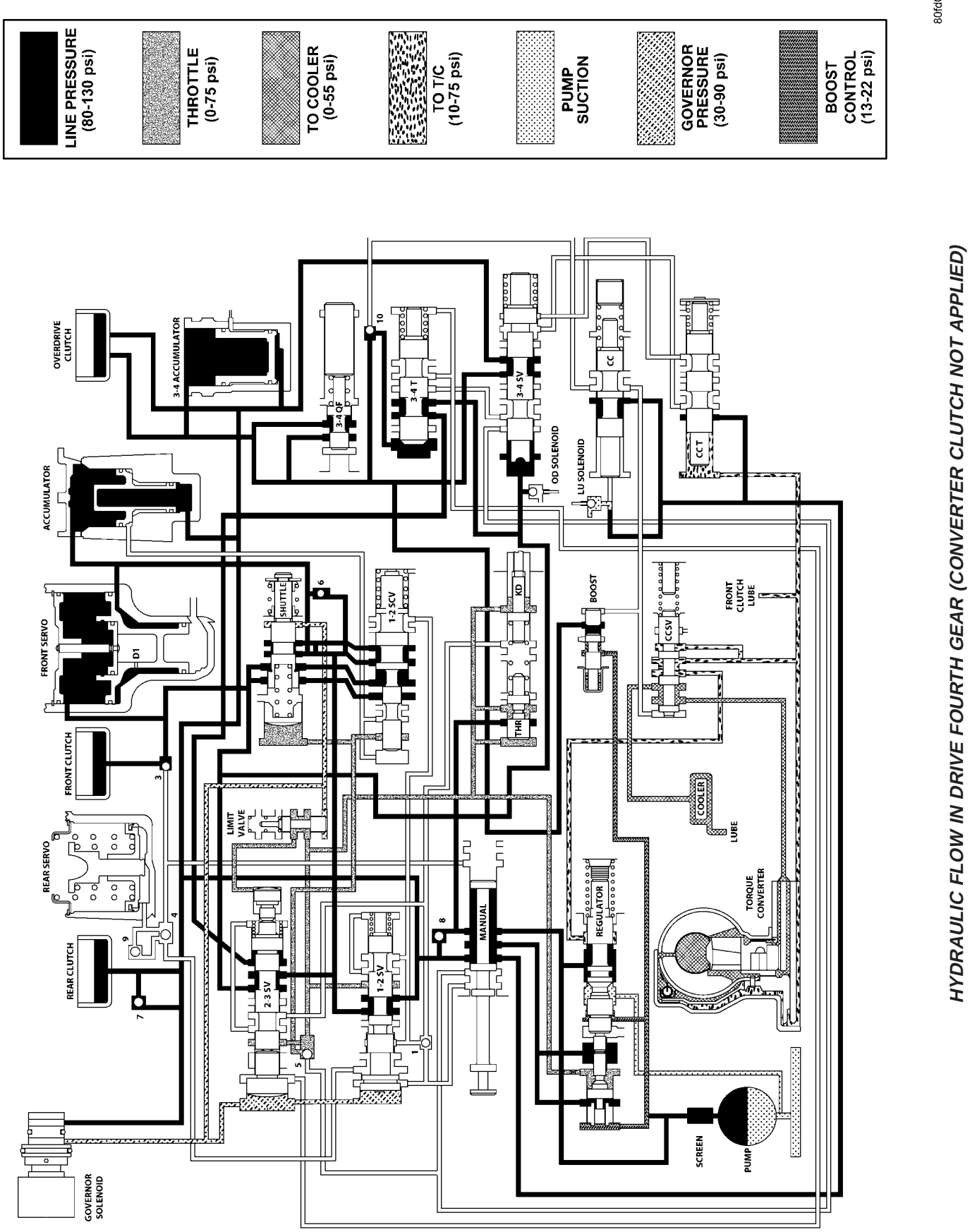
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HYDRAULIC FLOW IN DRIVE THIRD GEAR (CONVERTER CLUTCH APPLIED)

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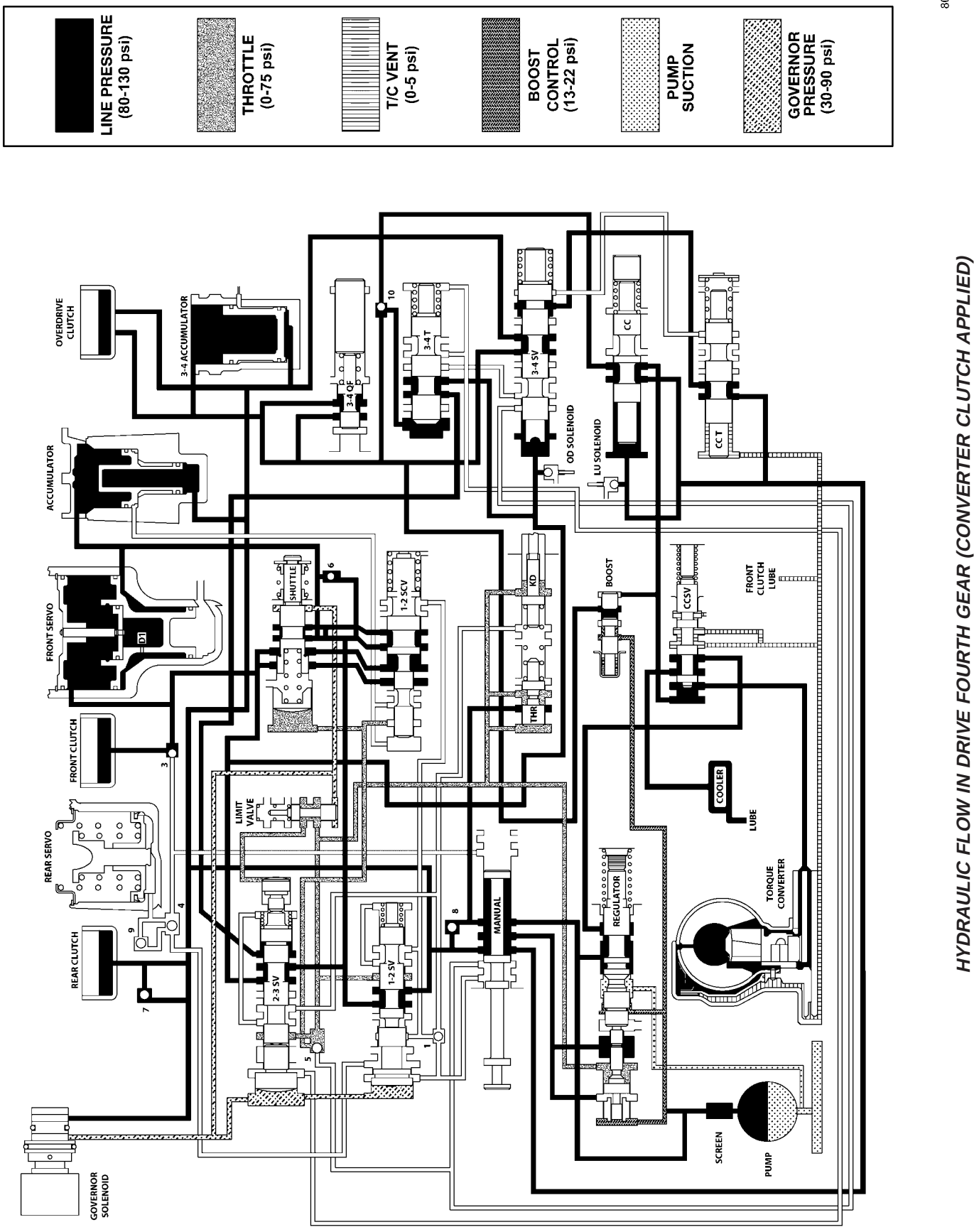
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HYDRAULIC FLOW IN DRIVE FOURTH GEAR (CONVERTER CLUTCH NOT APPLIED)

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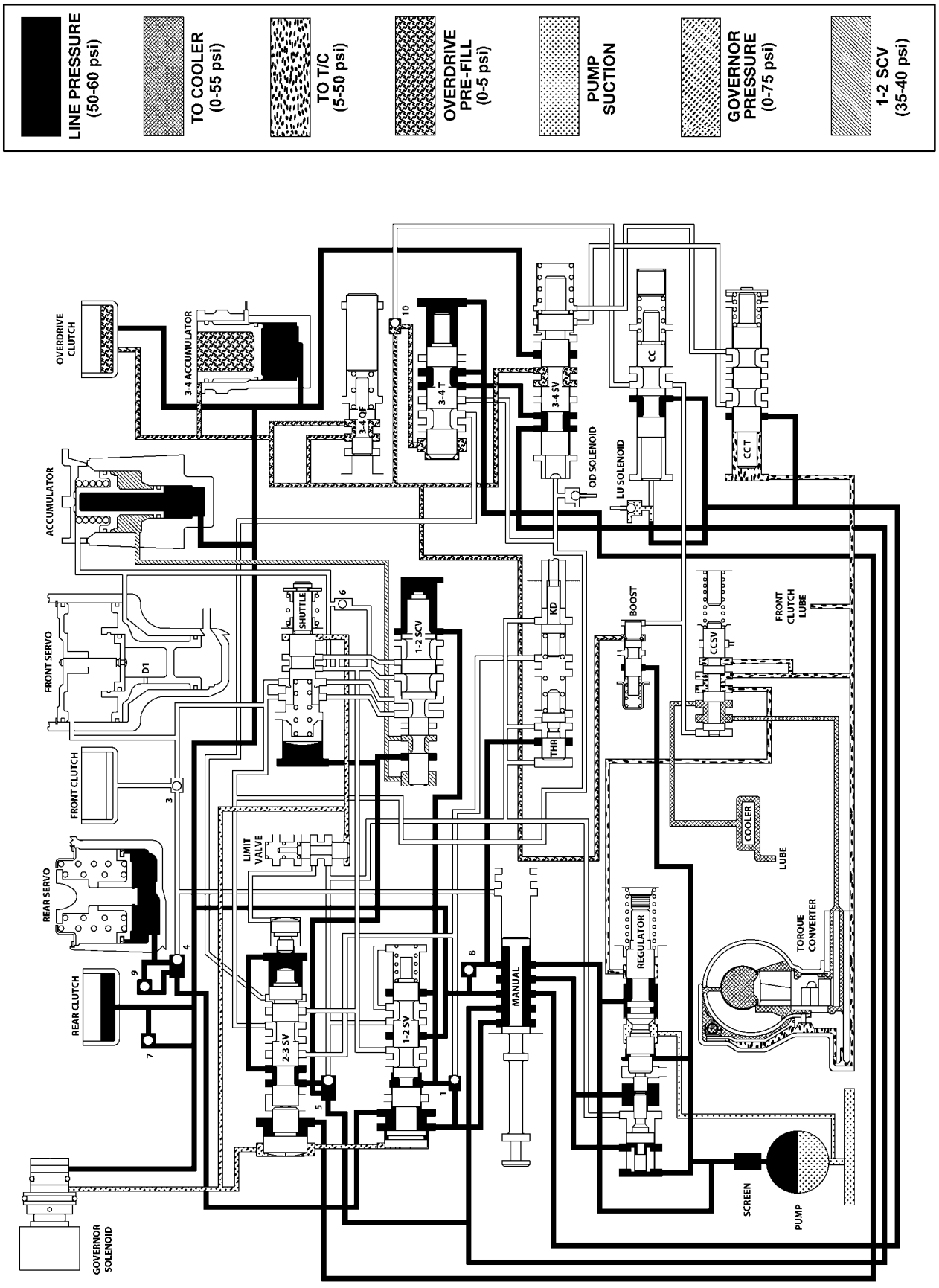
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HYDRAULIC FLOW IN DRIVE FOURTH GEAR (CONVERTER CLUTCH APPLIED)

AUTOMATIC TRANSMISSION - 48RE (Continued)

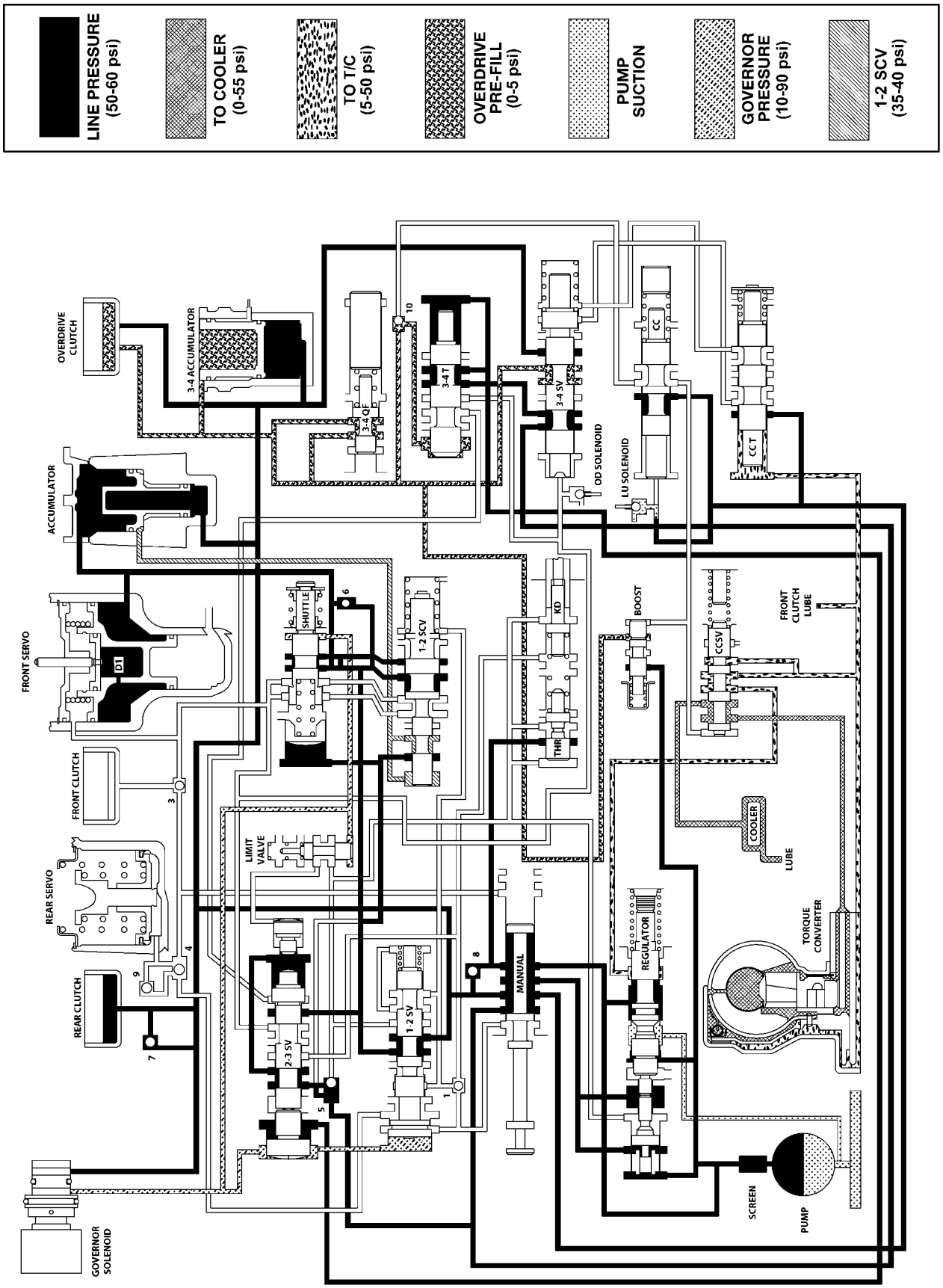
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HYDRAULIC FLOW IN MANUAL LOW (1)

AUTOMATIC TRANSMISSION - 48RE (Continued)

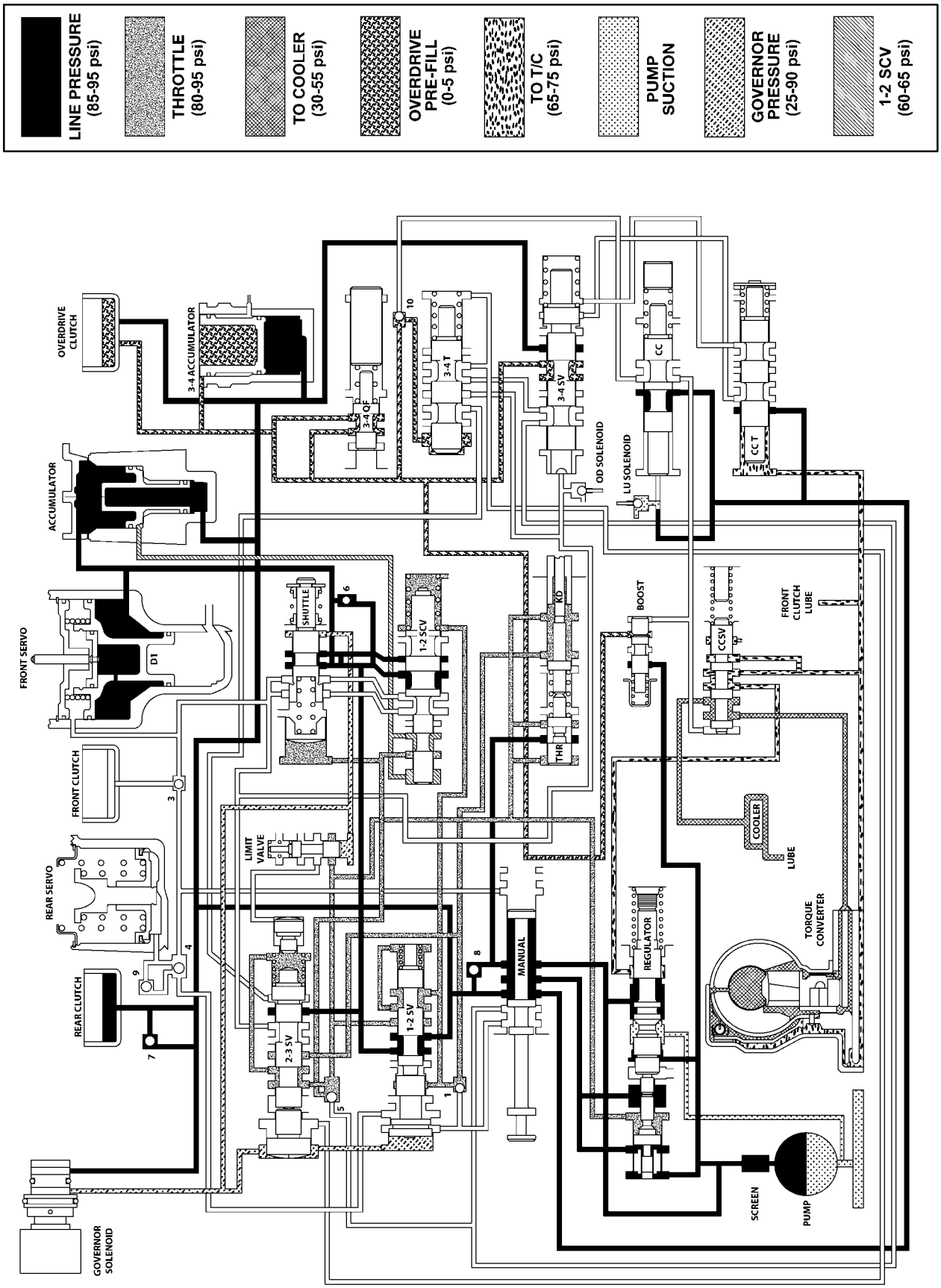
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HYDRAULIC FLOW IN MANUAL SECOND (2)

AUTOMATIC TRANSMISSION - 48RE (Continued)

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HYDRAULIC FLOW DURING FULL THROTTLE 3-2 DOWNSHIFT (PASSING GEAR)

AUTOMATIC TRANSMISSION - 48RE (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.	2.5-4.09 mm	0.098-0.161 in.
Clutch pack clearance/ Rear.	0.635-0.914 mm	0.025-0.036 in.
Front clutch	5 discs	
Rear clutch	4 discs	
Overdrive clutch	5(STD) or 6 (HO) discs	
Direct clutch	23 single sided discs	
Band adjustment from 72 in. lbs.		
Front band	Back off 1 3/4 turns	
Rear band	Back off 3 turns	
Recommended fluid	Mopar® ATF +4, Automatic Transmission Fluid	

GEAR RATIOS

1ST GEAR	2.45:1
2ND GEAR	1.45:1
3RD GEAR	1.00:1
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 - 48RE (Continued)

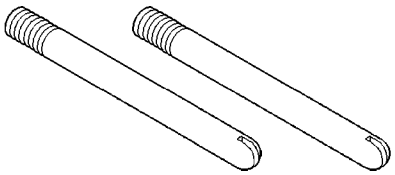
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Fitting, cooler line at trans	18	13	-
Bolt, torque convertor	31	-	270
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	17	13	-
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
Bracket, transmission range sensor mounting	34	-	300
Screw, transmission range sensor to mounting bracket	3.4	-	30

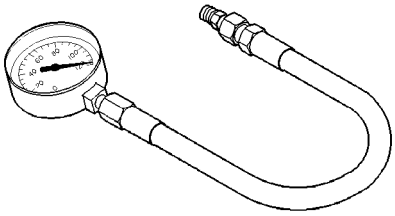
AUTOMATIC TRANSMISSION - 48RE (Continued)

SPECIAL TOOLS

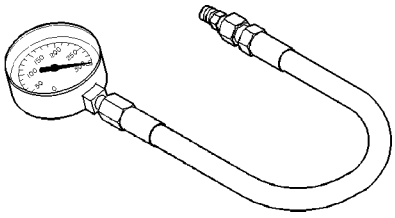
RE TRANSMISSION



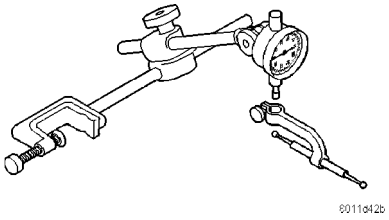
Studs, Oil Pump Pilot - C-3288-B



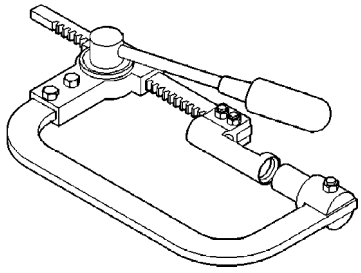
Gauge, Pressure - C-3292



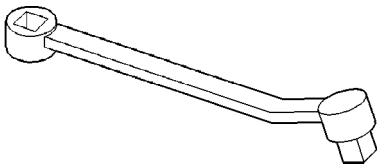
Gauge, Pressure - C-3293SP



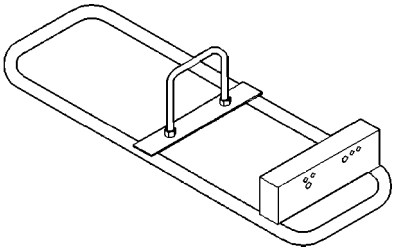
Set, Dial Indicator - C-3339



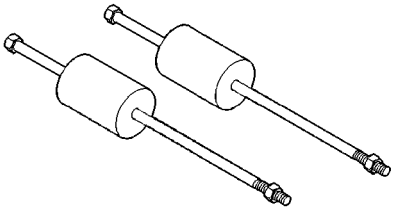
Compressor, Spring - C-3422-B



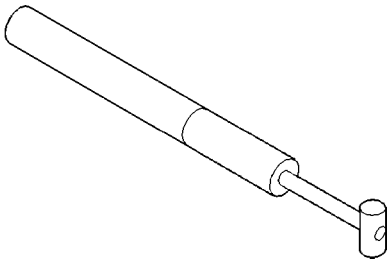
Adapter, Band Adjuster - C-3705



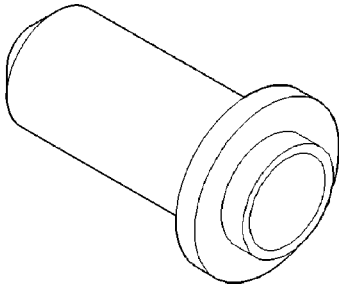
Stand, Transmission Repair - C-3750-B



Puller, Slide Hammer - C-3752

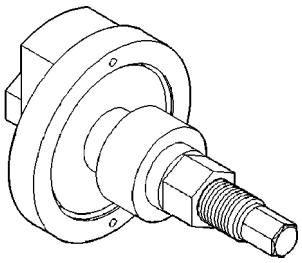


Gauge, Throttle Setting - C-3763

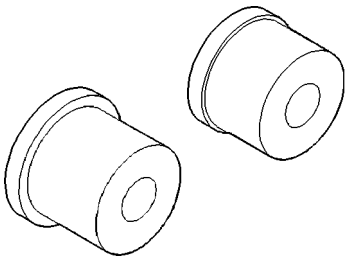


Installer, Seal - C-3860-A

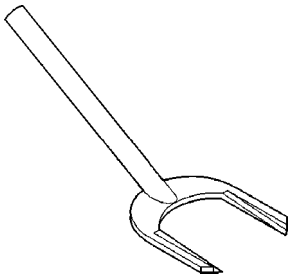
AUTOMATIC TRANSMISSION - 48RE (Continued)



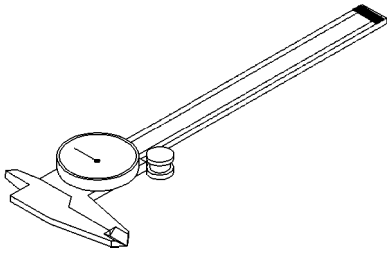
Compressor, Spring - C-3863-A



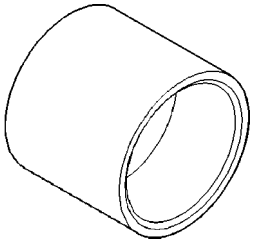
Remover/Installer, Bushing - C-4470



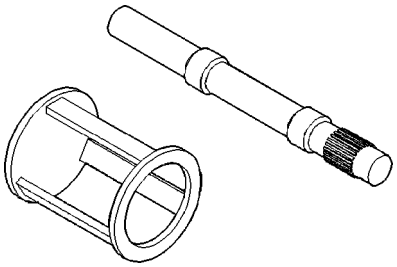
Remover, Seal - C-3985-B



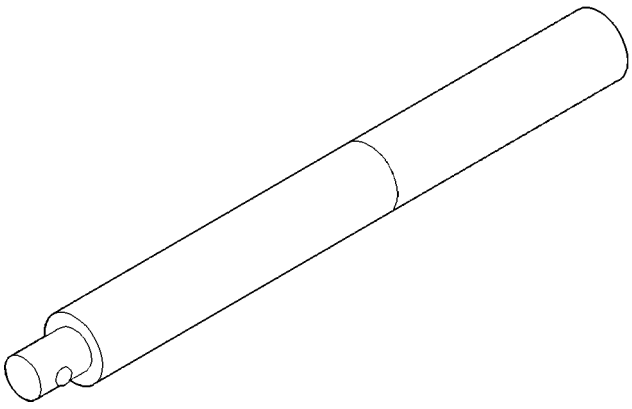
Dial Caliper - C-4962



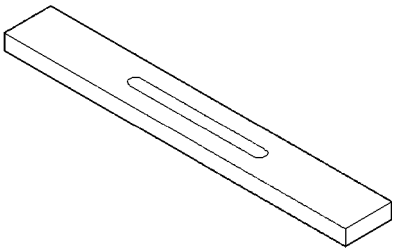
Installer, Seal - C-3995-A



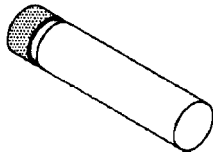
Spring Compressor and Alignment Shaft - 6227



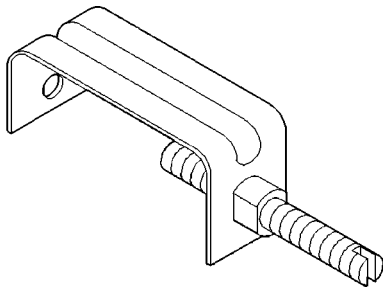
Handle, Universal - C-4171



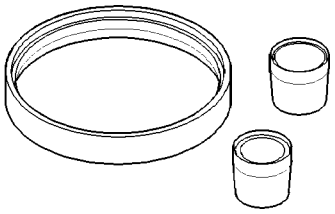
Bar, Gauge - 6311



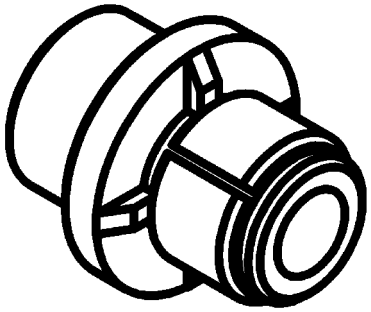
Gauge, Block - 6312



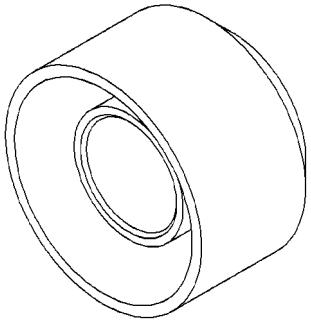
Retainer, Detent Ball and Spring - 6583



Installer, Overdrive Piston Seal - 8114



Socket, TRS Mounting Bracket - 8581



Installer, Seal - 9037

ACCUMULATOR

DESCRIPTION

The accumulator (Fig. 68) 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. 69).

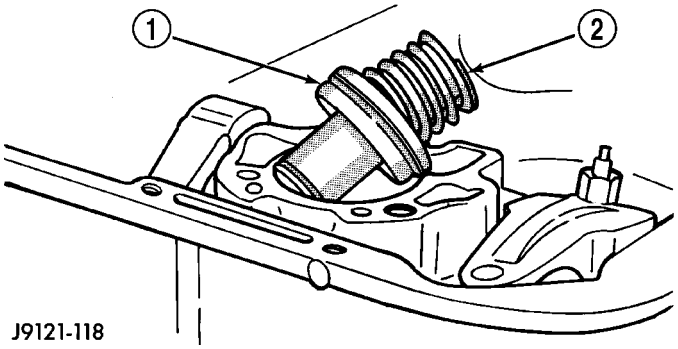


Fig. 68 Accumulator

1 - ACCUMULATOR PISTON
2 - PISTON SPRING

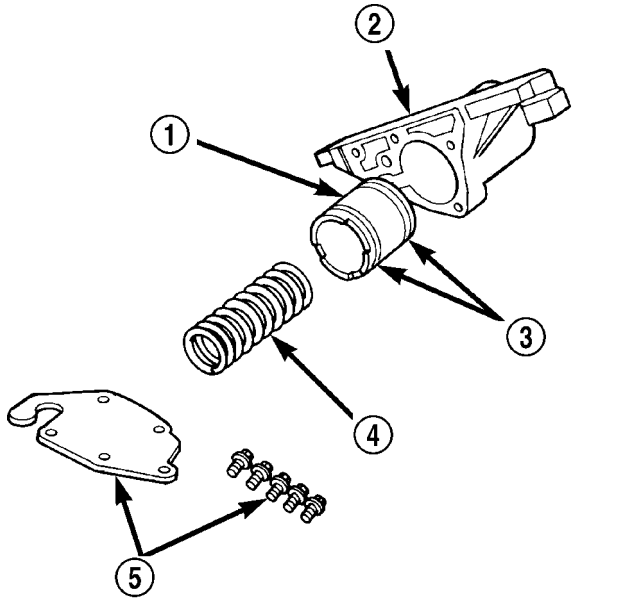


Fig. 69 3-4 Accumulator and Housing

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. 70), bottoming it against the accumulator plate. When the 1-2 upshift occurs (Fig. 71), 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.

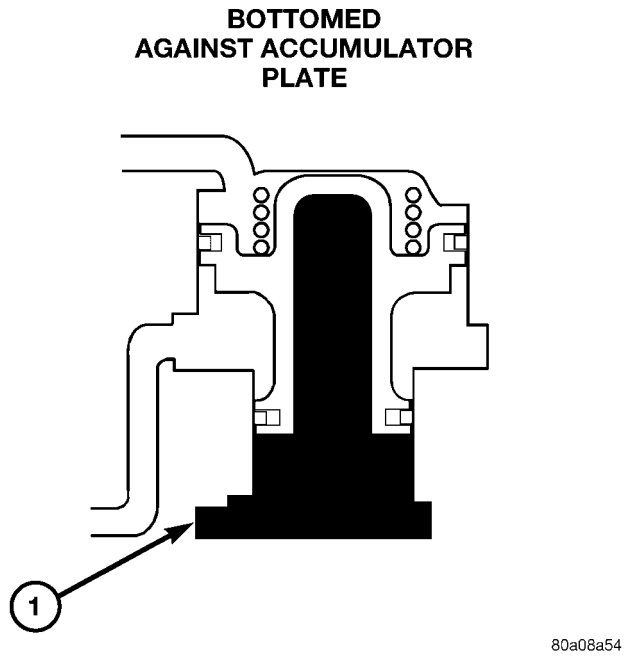


Fig. 70 Accumulator in DRIVE - FIRST Gear Position

1 - LINE PRESSURE

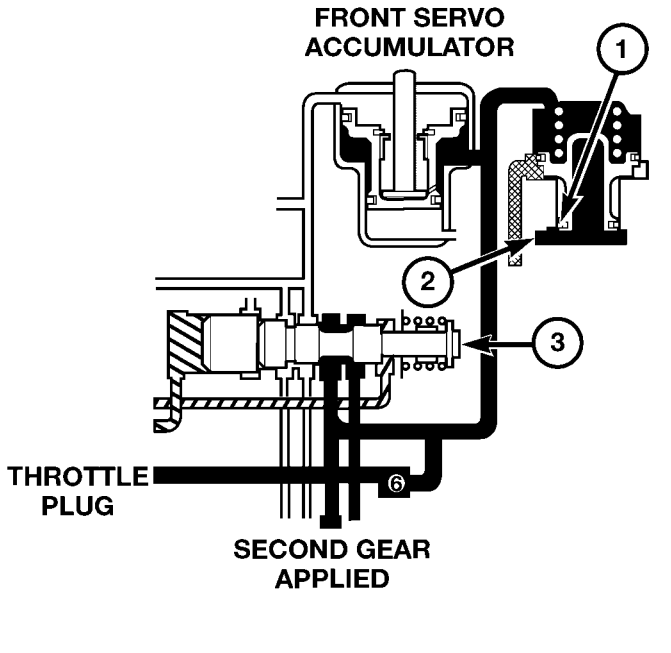


Fig. 71 Accumulator in SECOND Gear Position

1 - BOTTOM OF BORE
2 - LINE PRESSURE
3 - SHUTTLE VALVE

INSPECTION

Inspect the accumulator piston and seal rings. Replace the seal rings if worn or cut. Replace the piston if chipped or cracked.

Check condition of the accumulator spring. Replace the spring if the coils are cracked, distorted or collapsed.

BANDS

DESCRIPTION

KICKDOWN (FRONT) BAND

The kickdown, or “front”, band (Fig. 72) holds the common sun gear of the planetary gear sets. The front (kickdown) band is made of steel, and faced on its inner circumference with a friction-type lining. One end of the band is anchored to the transmission case, and the other is acted on with a pushing force by a servo piston. The front band is a single-wrap design (the band does not completely encompass/ wrap the drum that it holds).

BANDS (Continued)

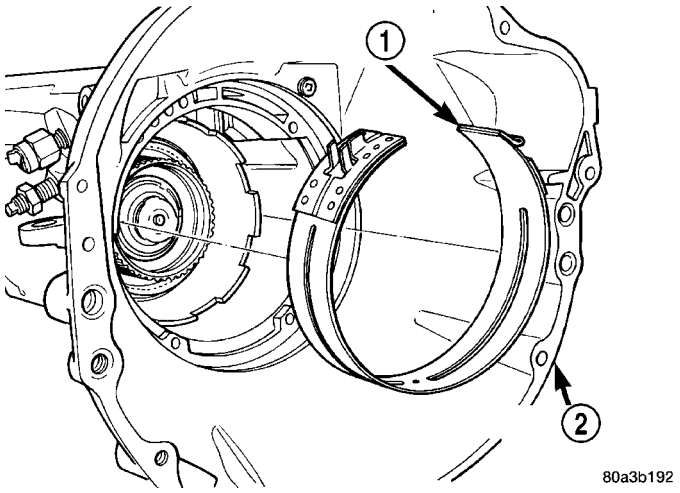


Fig. 72 Front Band

1 - FRONT BAND
2 - TRANSMISSION HOUSING

LOW/REVERSE (REAR) BAND

The low/reverse band, or "rear", band (Fig. 73) 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.

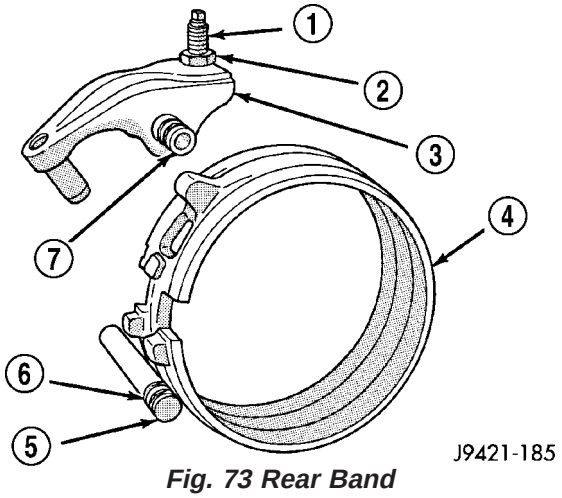


Fig. 73 Rear Band

1 - ADJUSTING SCREW
2 - LOCKNUT
3 - LEVER
4 - REAR BAND
5 - REACTION PIN
6 - O-RINGS
7 - PIVOT PIN

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. 74). 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 1-3/4 turns.

(5) Hold adjuster screw in position and tighten locknut to 41 N·m (30 ft. lbs.) torque.

(6) Lower vehicle.

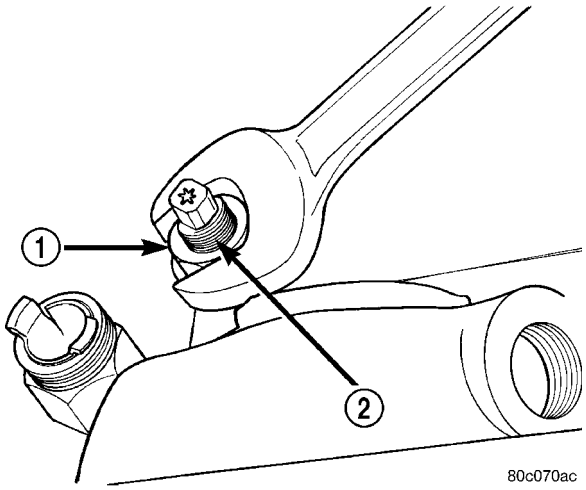


Fig. 74 Front Band Adjustment Screw Location

1 - LOCK-NUT
2 - FRONT BAND ADJUSTER

BANDS (Continued)

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. 75).

(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 17 N·m (13 ft. lbs.) torque.

(8) Lower vehicle and refill transmission with Mopar® ATF +4, Automatic Transmission fluid.

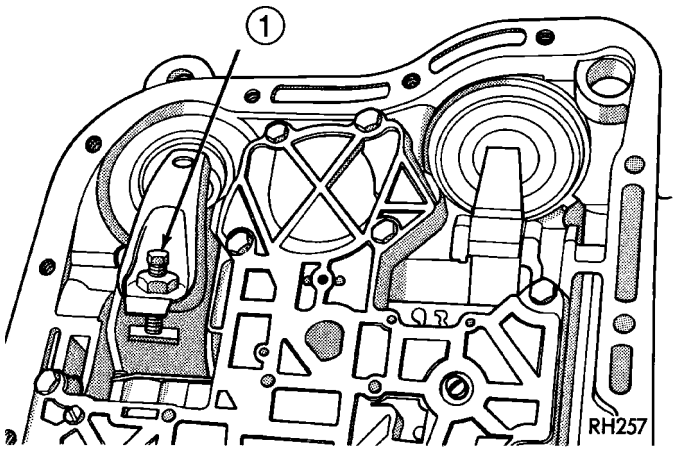


Fig. 75 Rear Band Adjustment Screw Location

1 - LOW-REVERSE BAND ADJUSTMENT

BRAKE TRANSMISSION SHIFT INTERLOCK SYSTEM

DESCRIPTION

The Brake Transmission Shifter Interlock (BTSI) (Fig. 76), is a solenoid operated system. It consists of a solenoid permanently mounted on the gearshift cable.

OPERATION

The system locks the shifter into the PARK position. The interlock system is engaged whenever the ignition switch is in the LOCK or ACCESSORY position. An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed approximately one-half an inch. A magnetic holding device in line with the park lock cable is energized when the ignition is in the RUN position. When the key is in the RUN position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK or ACCESSORY position, unless the shifter is fully locked into the PARK position.

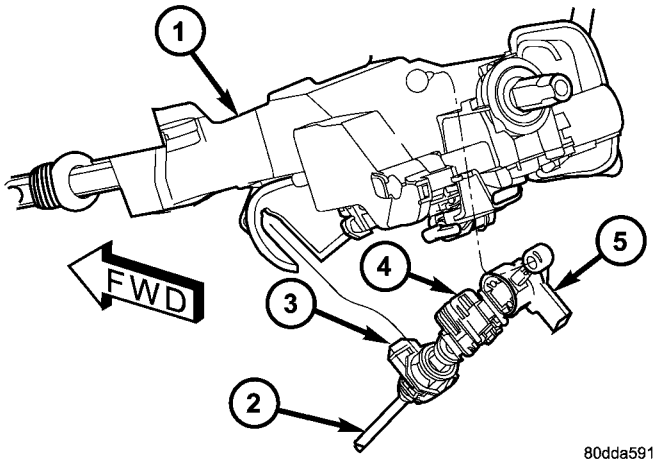


Fig. 76 Brake Transmission Interlock Mechanism

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

DIAGNOSIS AND TESTING - BRAKE TRANSMISSION SHIFT INTERLOCK

(1) Verify that the key can only be removed in the PARK position

(2) When the shift lever is in PARK And the shift handle pushbutton is in the “OUT” position, the ignition key cylinder should rotate freely from OFF to LOCK. When the shifter is in any other gear or neutral position, the ignition key cylinder should not rotate to the LOCK position.

(3) Shifting out of PARK should not be possible when the ignition key cylinder is in the OFF position.

(4) Shifting out of PARK should not be possible while applying normal pushbutton force and ignition key cylinder is in the RUN or START positions unless the foot brake pedal is depressed approximately 1/2 inch (12mm).

(5) Shifting out of PARK should not be possible when the ignition key cylinder is in the ACCESSORY or LOCK positions.

(6) Shifting between any gears, NEUTRAL or into PARK may be done without depressing foot brake pedal with ignition switch in RUN or START positions.

ADJUSTMENTS - BRAKE TRANSMISSION SHIFT INTERLOCK

Correct cable adjustment is important to proper interlock operation. The gearshift cable must be correctly adjusted in order to shift out of PARK.

ADJUSTMENT PROCEDURE

(1) Remove the steering column trim as necessary for access to the brake transmission shift interlock.

(2) Shift the transmission into the PARK position.

(3) Pull upward on both the BTSI lock tab and the gearshift cable lock tab (Fig. 77).

(4) Verify that the shift lever is in the PARK position.

(5) Verify positive engagement of the transmission park lock by attempting to rotate the propeller shaft. The shaft will not rotate when the park lock is engaged.

(6) Turn ignition switch to LOCK position. **Be sure ignition key cylinder is in the LOCK position. Cable will not adjust correctly in any other position.**

(7) Ensure that the cable is free to self-adjust by pushing cable rearward and releasing.

(8) Push the gearshift cable lock tab down until it snaps in place.

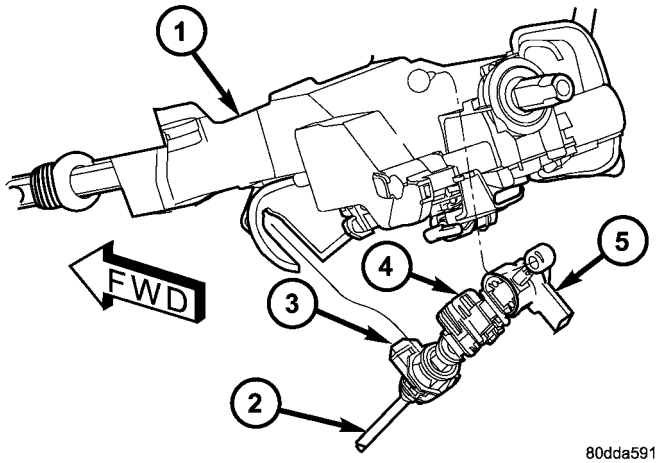


Fig. 77 Brake Transmission Interlock Mechanism

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

(9) Locate the BTSI alignment hole in the bottom of the BTSI mechanism between the BTSI lock tab and the BTSI connector.

(10) Move the BTSI assembly up or down on the gearshift cable until an appropriate size drill bit can be inserted into the alignment hole and through the assembly.

(11) Push the BTSI lock tab down until it snaps into place and remove the drill bit.

(12) Install any steering column trim previously removed.

BTSI FUNCTION CHECK

(1) Verify removal of ignition key allowed in PARK position only.

(2) When the shift lever is in PARK, the ignition key cylinder should rotate freely from off to lock. When the shifter is in any other position, the ignition key should not rotate from off to lock.

(3) Shifting out of PARK should be possible when the ignition key cylinder is in the off position.

(4) Shifting out of PARK should not be possible while applying normal force, and ignition key cylinder is in the run or start positions, unless the foot brake pedal is depressed approximately 1/2 inch (12mm).

(5) Shifting out of PARK should not be possible when the ignition key cylinder is in the accessory or lock position.

(6) Shifting between any gear and NEUTRAL, or PARK, may be done without depressing foot brake with ignition switch in run or start positions.

(7) Engine starts must be possible with shifter lever in PARK or NEUTRAL positions only. Engine starts must not be possible in any position other than PARK or NEUTRAL.

(8) With shifter lever in the:

- PARK position - Apply upward force on the shift arm and remove pressure. Engine starts must be possible.
- PARK position - Apply downward force on the shift arm and remove pressure. Engine starts must be possible.
- NEUTRAL position - Normal position. Engine starts must be possible.
- NEUTRAL position - Engine running and brakes applied, apply upward force on the shift arm. Transmission shall not be able to shift from neutral to reverse.

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)

ELECTRONIC GOVERNOR (Continued)

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. 78).

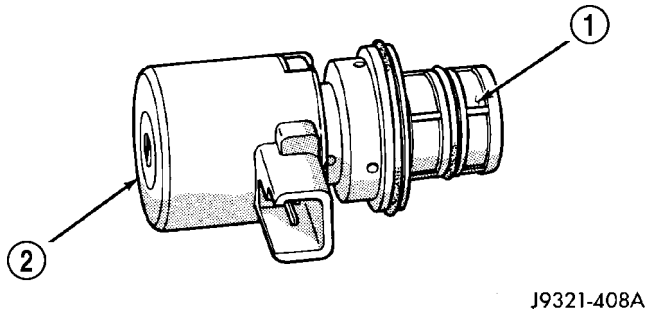


Fig. 78 Governor Pressure Solenoid Valve

1 - SOLENOID FILTER
2 - GOVERNOR PRESSURE SOLENOID

GOVERNOR PRESSURE SENSOR

The governor pressure sensor measures output pressure of the governor pressure solenoid valve (Fig. 79).

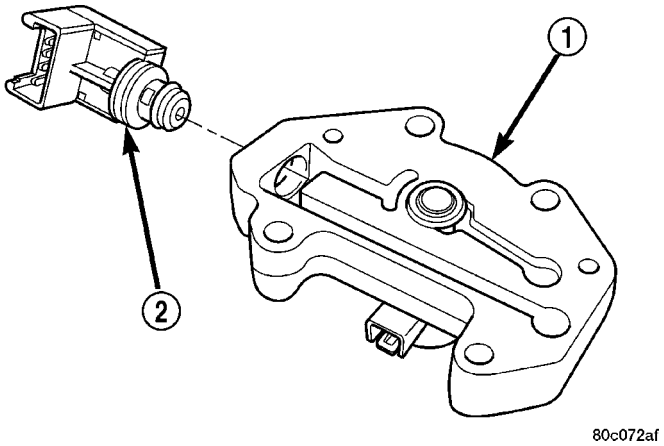


Fig. 79 Governor Pressure Sensor

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. 79).

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.

ELECTRONIC GOVERNOR (Continued)

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 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. 80).

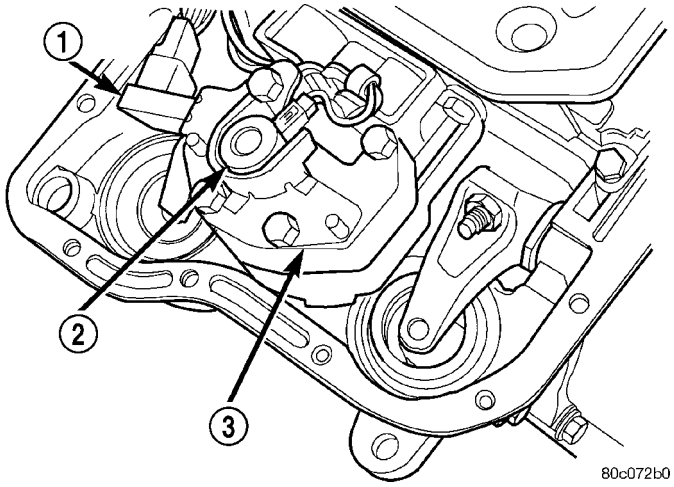


Fig. 80 Governor Solenoid And Pressure Sensor

1 - PRESSURE SENSOR
2 - PRESSURE SOLENOID
3 - GOVERNOR

ELECTRONIC GOVERNOR (Continued)

(4) Remove screws holding pressure solenoid retainer to governor body.

(5) Separate solenoid retainer from governor (Fig. 81).

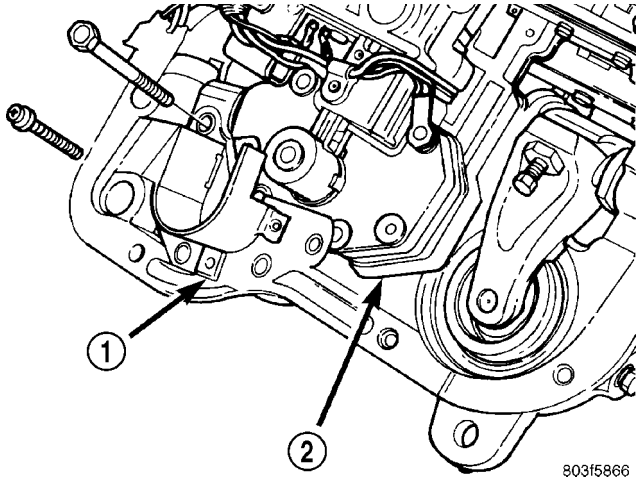


Fig. 81 Pressure Solenoid Retainer

1 - PRESSURE SOLENOID RETAINER
2 - GOVERNOR

(6) Pull solenoid from governor body (Fig. 82).

(7) Pull pressure sensor from governor body.

(8) Remove bolts holding governor body to valve body.

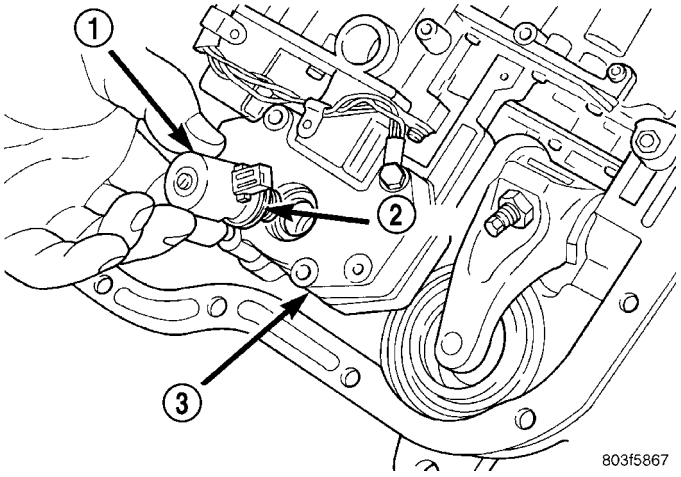


Fig. 82 Pressure Solenoid and O-ring

1 - PRESSURE SOLENOID
2 - O-RING
3 - GOVERNOR

(9) Separate governor body from valve body (Fig. 83).

(10) Remove governor body gasket.

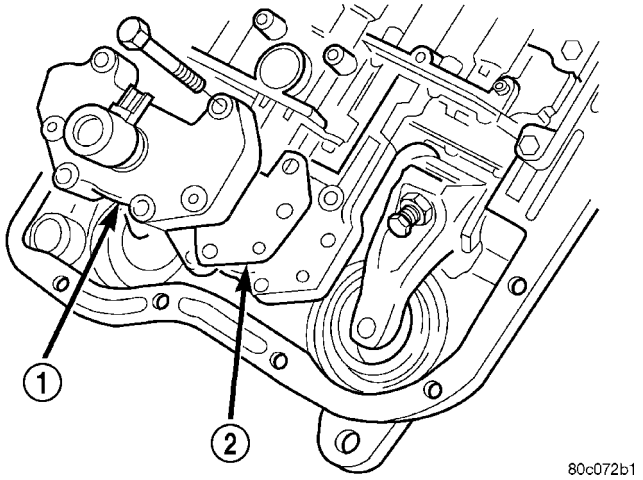


Fig. 83 Governor Body and Gasket

1 - GOVERNOR BODY
2 - 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. 84).

(2) Place governor body in position on valve body.

(3) Install bolts to hold governor body to valve body.

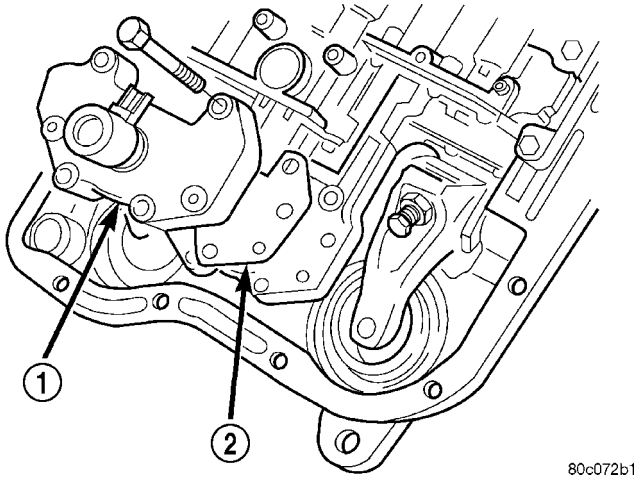


Fig. 84 Governor Body and Gasket

1 - GOVERNOR BODY
2 - GASKET

ELECTRONIC GOVERNOR (Continued)

(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. 85).
(9) Push solenoid into governor body.

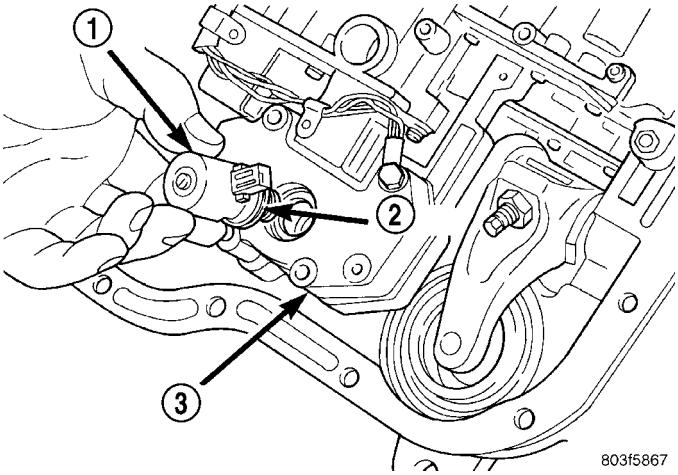


Fig. 85 Pressure Solenoid and O-ring

1 - PRESSURE SOLENOID
2 - O-RING
3 - GOVERNOR

(10) Place solenoid retainer in position on governor (Fig. 86).
(11) Install screws to hold pressure solenoid retainer to governor body.

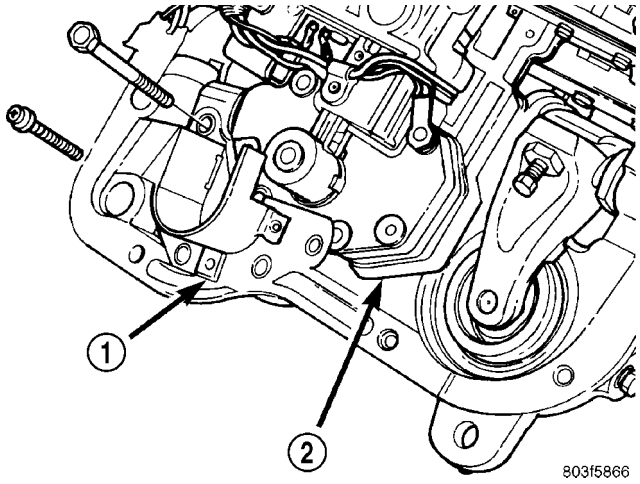


Fig. 86 Pressure Solenoid Retainer

1 - PRESSURE SOLENOID RETAINER
2 - GOVERNOR

(12) Engage wire connectors into pressure sensor and solenoid (Fig. 87).
(13) Install transmission fluid pan and (new) filter.
(14) Lower vehicle and road test to verify repair.

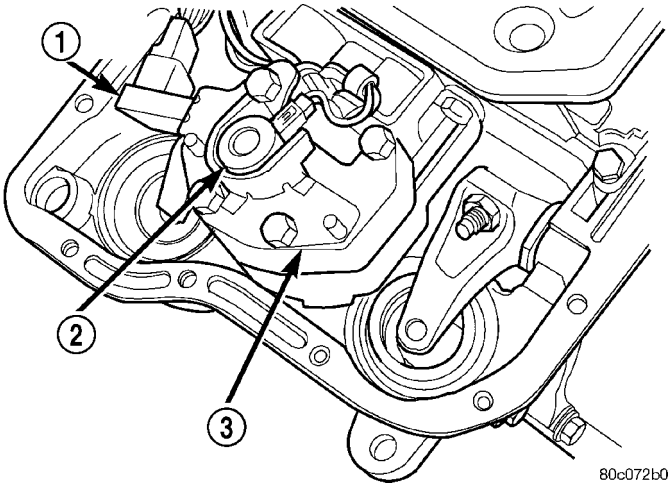


Fig. 87 Governor Solenoid And Pressure Sensor

1 - PRESSURE SENSOR
2 - PRESSURE SOLENOID
3 - GOVERNOR

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 a screw mounted in a slide hammer.

INSTALLATION

(1) Place seal in position on overdrive housing.
(2) Drive seal into overdrive housing with Seal Installer 9037 (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.

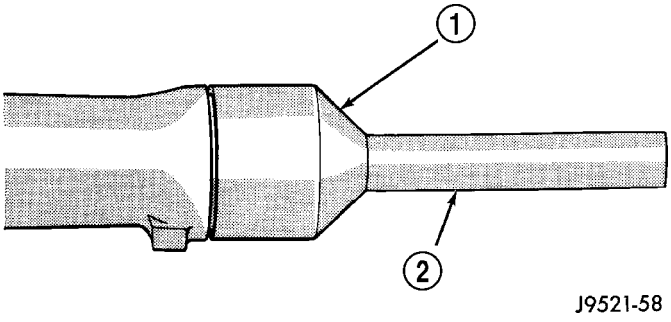


Fig. 88 Installing Overdrive Housing Yoke Seal

1 - SPECIAL TOOL 9037
2 - SPECIAL TOOL C-4171

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 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 torque converter should 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.

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

FLUID AND FILTER (Continued)

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.

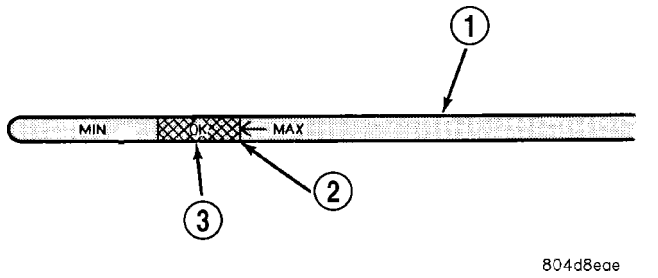


Fig. 89 Dipstick Fluid Level Marks—Typical

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 chart.

(9) Adjust transmission fluid level shown on the dipstick according to the chart (Fig. 90).

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.

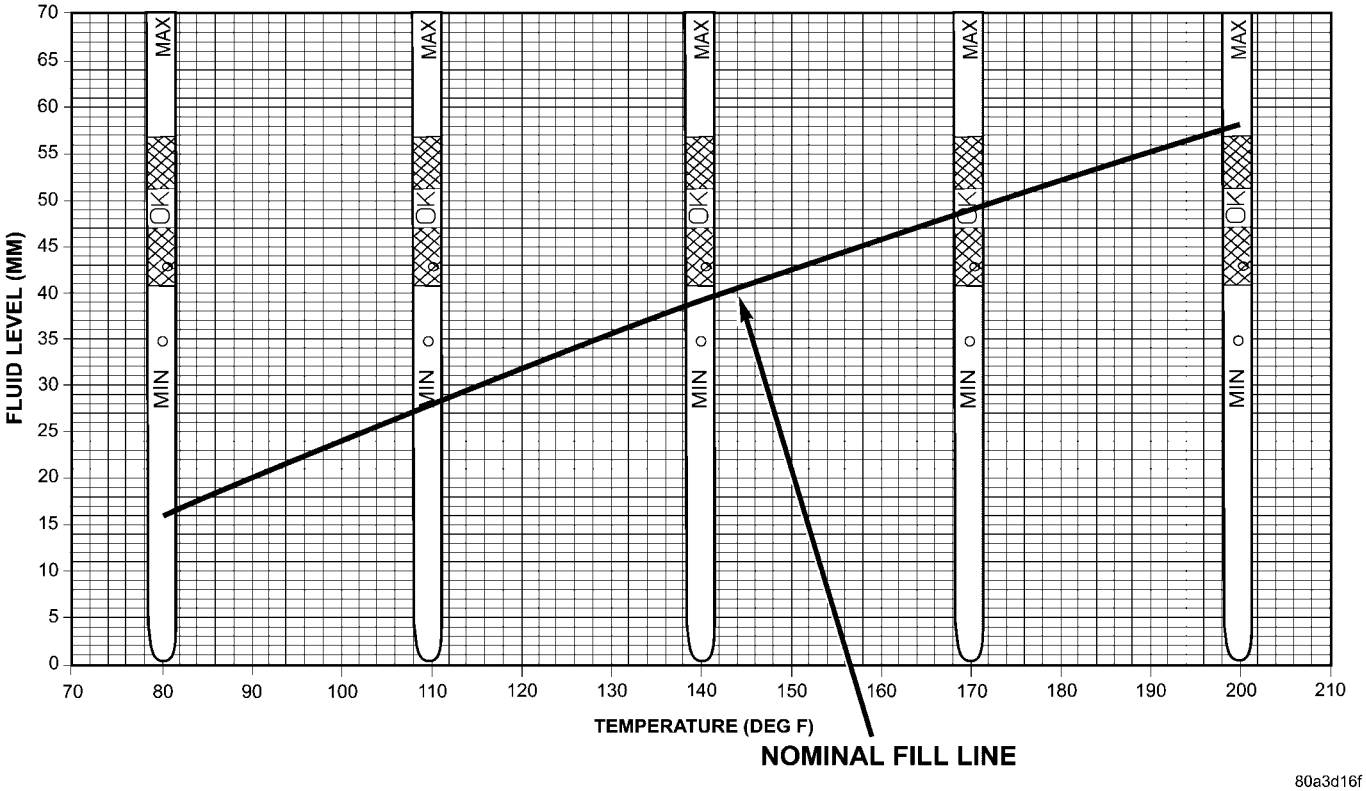


Fig. 90 48RE Fluid Fill Graph

FLUID AND FILTER (Continued)

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.

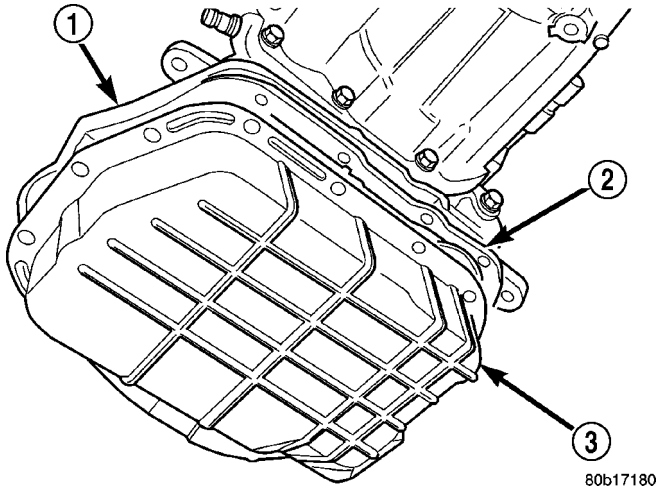


Fig. 91 Transmission Pan

1 - TRANSMISSION
2 - GASKET
3 - PAN

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.

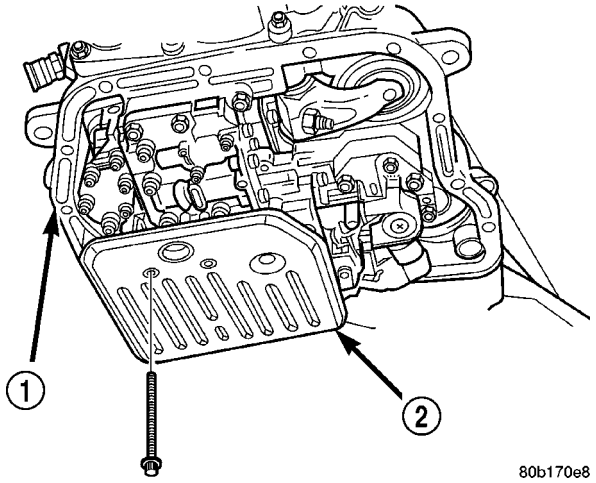


Fig. 92 Transmission Filter

1 - TRANSMISSION
2 - FILTER

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/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, Automatic Transmission Fluid, 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, or torque converter was replaced or drained, 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

FLUID AND FILTER (Continued)

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.

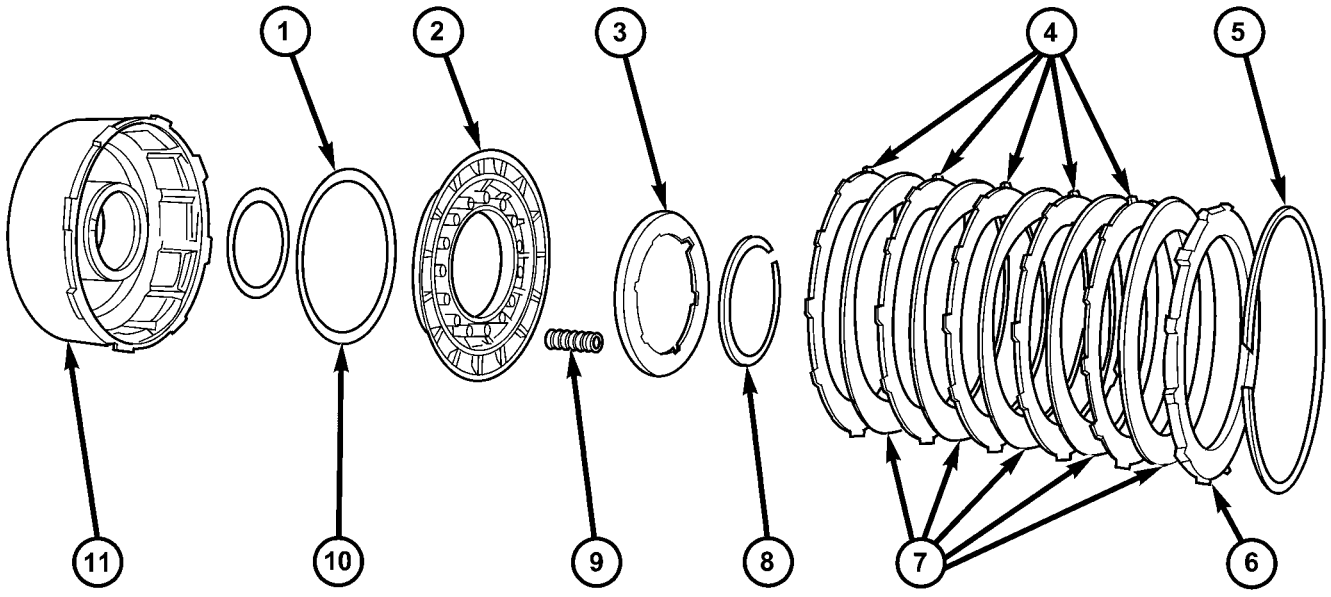
OPERATION

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.

DISASSEMBLY

(1) Remove the waved snap-ring, reaction plate, clutch plates, and clutch discs.



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Fig. 93 48RE 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
10 - OUTER PISTON SEAL
11 - FRONT CLUTCH RETAINER

FRONT CLUTCH (Continued)

(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 and number 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.

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.

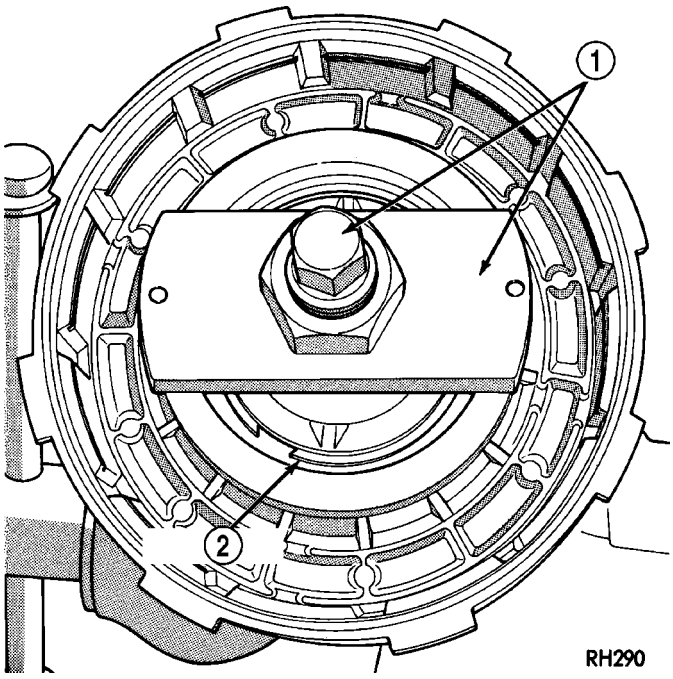


Fig. 94 Removing Front Clutch Spring Retainer Snap-Ring

1 - SPECIAL TOOL C-3863-A
2 - SNAP-RING

Replace the retainer bushing if worn, scored, or there is any doubt about bushing condition.

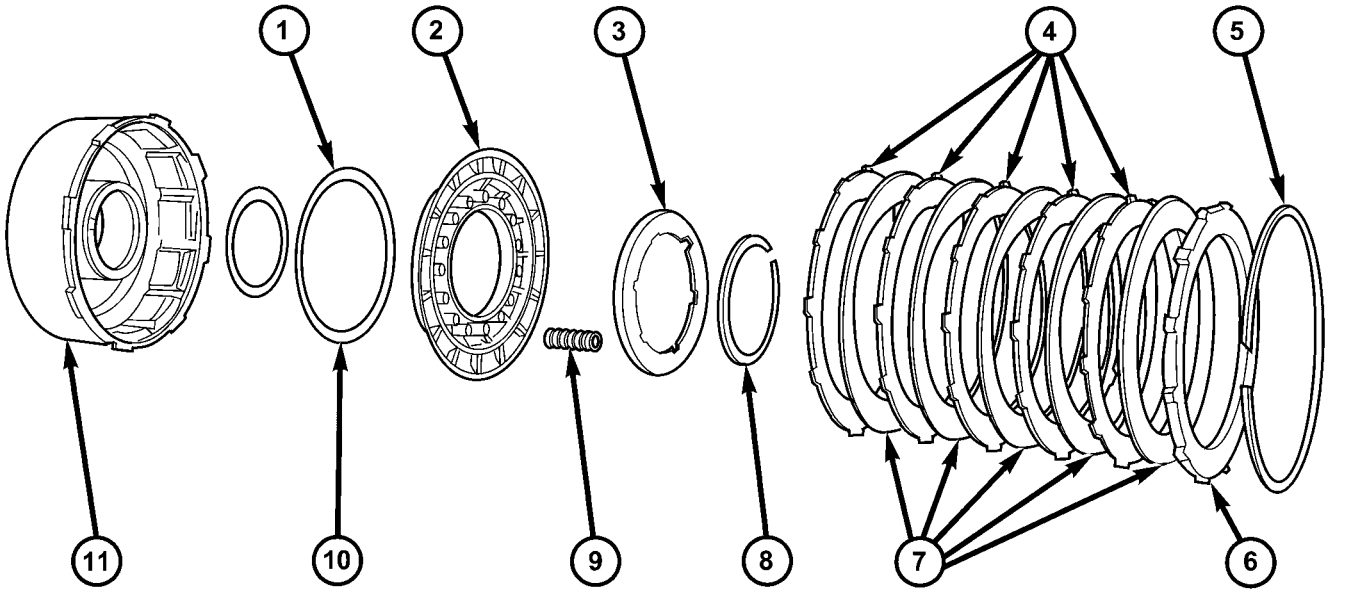


Fig. 95 48RE Front Clutch Components

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
10 - OUTER PISTON SEAL
11 - FRONT CLUTCH RETAINER

FRONT CLUTCH (Continued)

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 48RE transmission uses five plates and discs for the front clutch.

(1) Soak clutch discs in transmission fluid.

(2) Install new inner piston seal onto the outer diameter of the clutch retainer inner hub.

(3) Install new outer seal onto the clutch piston. Be sure seal lips of both seals face the interior of the retainer.

(4) Lubricate new inner and outer piston seals with petroleum jelly.

(5) Install clutch piston in retainer. Use twisting motion to seat piston in bottom of retainer. A thin strip of plastic (about 0.015 - 0.020 in. thick), can be used to guide seals into place if necessary.

CAUTION: Never push the clutch piston straight in. This will fold the seals over causing leakage and clutch slip. In addition, never use any type of metal tool to help ease the piston seals into place. Metal tools will cut, shave, or score the seals.

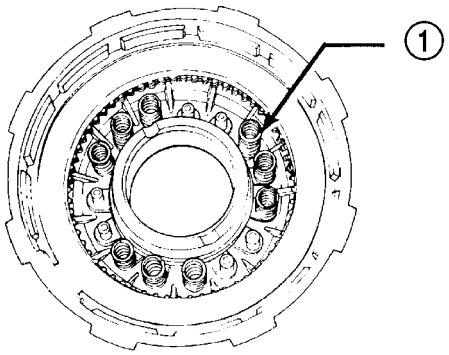


Fig. 96 Front Clutch Spring Position

1 - 9 SPRING CLUTCH

(6) Install and position nine clutch piston springs (Fig. 96).

(7) Install spring retainer on top of piston springs.

(8) Compress spring retainer and piston springs with Tool C-3863-A.

(9) Install spring retainer snap-ring and remove compressor tool.

(10) Install clutch plates and discs (Fig. 97). Five clutch discs, five steel plates and one reaction plate are required.

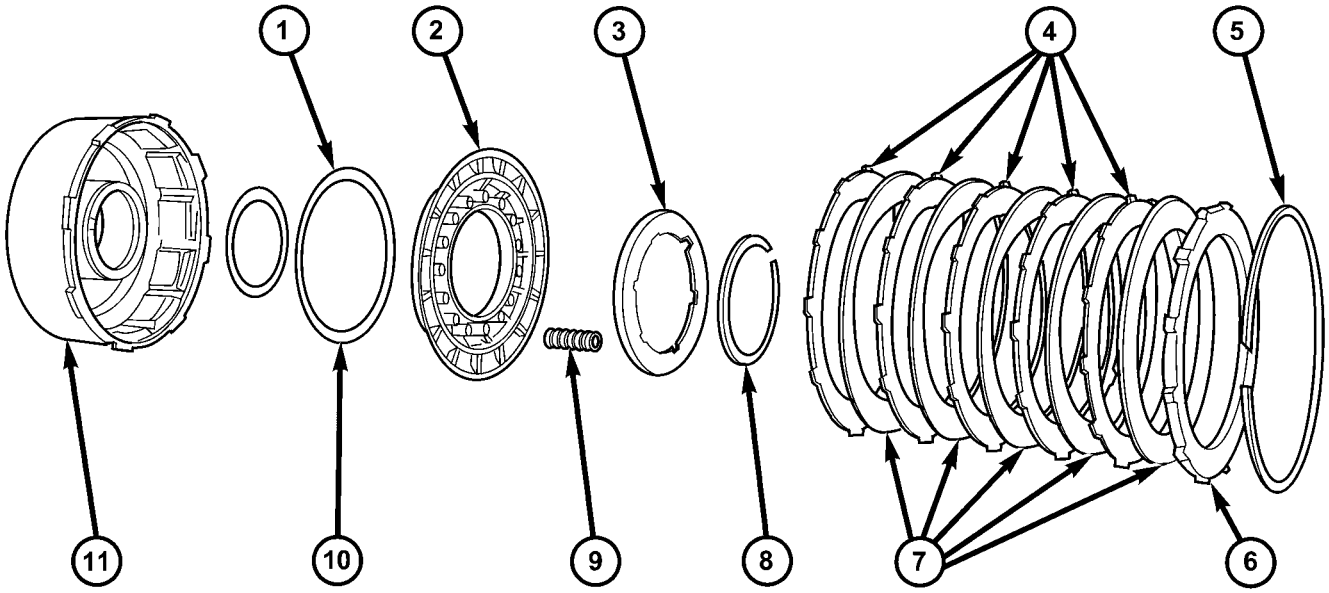


Fig. 97 48RE Front Clutch Components

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
10 - OUTER PISTON SEAL
11 - FRONT CLUTCH RETAINER

FRONT CLUTCH (Continued)

(11) Install reaction plate followed by waved snap-ring.

(12) Check clutch pack clearance with feeler gauge (Fig. 98). Clearance between waved spring and pressure plate should 2.5-4.09 mm (0.098-0.161 in.). If clearance is incorrect, clutch plates, clutch discs, snap-ring, or pressure plate may have to be changed.

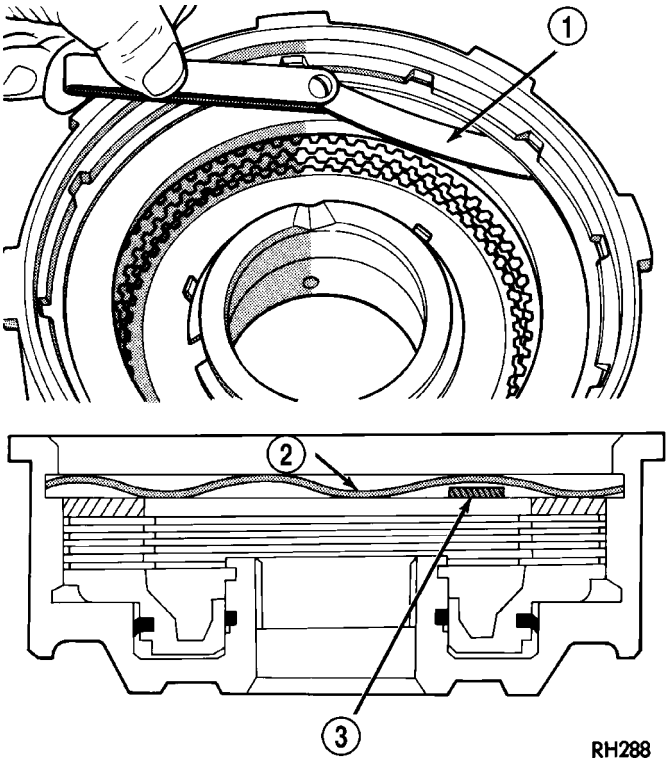


Fig. 98 Typical Method Of Measuring Front Clutch Pack Clearance

1 - FEELER GAUGE
2 - WAVED SNAP-RING
3 - FEELER GAUGE

FRONT SERVO

DESCRIPTION

The kickdown servo (Fig. 99) 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.

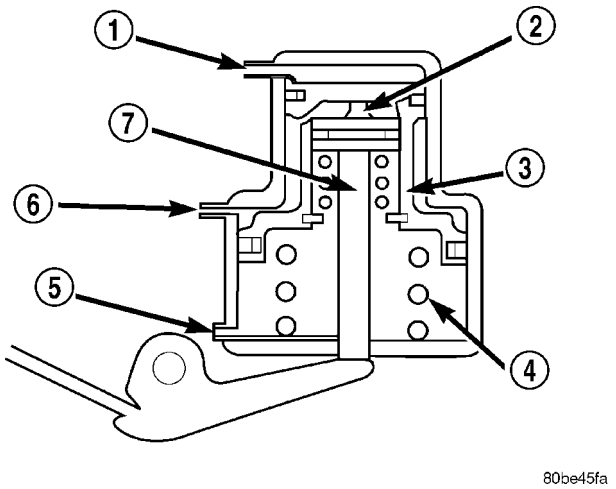


Fig. 99 Front Servo

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.

FRONT SERVO (Continued)

DISASSEMBLY

(1) Remove seal ring from rod guide (Fig. 100).

(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.

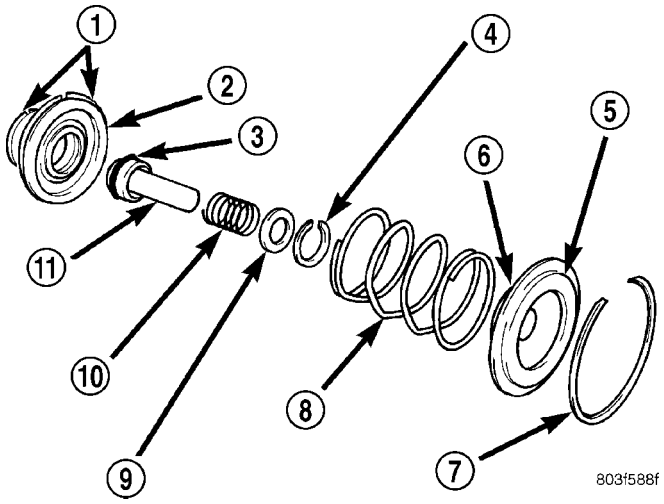


Fig. 100 Front Servo

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

CLEANING

Clean the servo piston components (Fig. 101) with solvent and dry them with compressed air.

INSPECTION

Inspect the servo components (Fig. 102). 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.

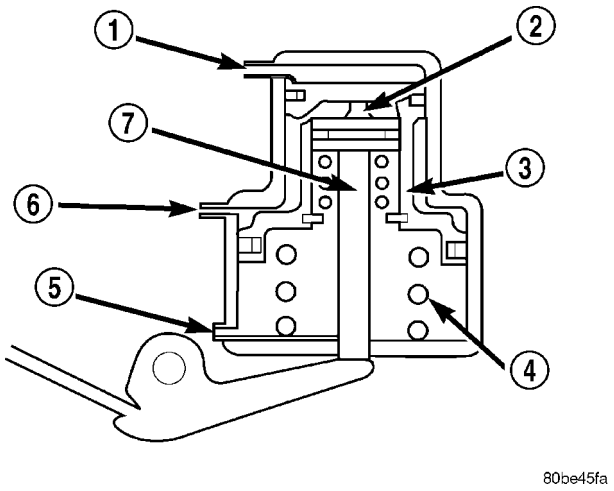


Fig. 101 Front Servo

1 - VENT
2 - INNER PISTON
3 - PISTON
4 - SPRING
5 - RELEASE PRESSURE
6 - APPLY PRESSURE
7 - PISTON ROD

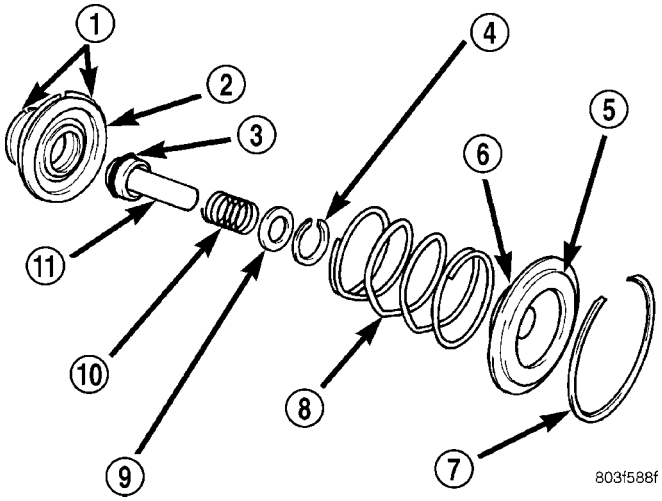


Fig. 102 Front Servo

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

FRONT SERVO (Continued)

(2) Install rod in piston. Install spring and washer on rod. Compress spring and install snap-ring (Fig. 103).

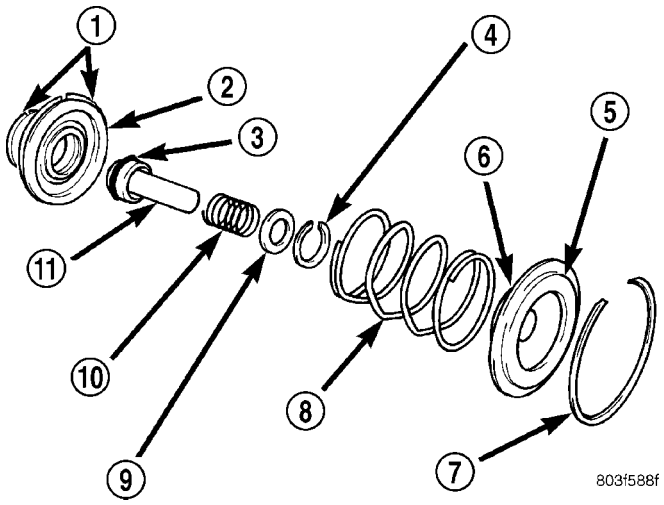


Fig. 103 Front Servo

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

GEARSHIFT CABLE

DIAGNOSIS AND TESTING - GEARSHIFT CABLE

(1) Engine starts must be possible with shift lever in PARK or NEUTRAL positions only. Engine starts must not be possible in any other gear position.

(2) With the shift lever in the:

(a) PARK position - Apply upward force on the shift arm and remove pressure. Engine starts must be possible.

(b) PARK position - Apply downward force on the shift arm and remove pressure. Engine starts must be possible.

(c) NEUTRAL position - Normal position. Engine starts must be possible.

(d) NEUTRAL position - Engine running and brakes applied, apply upward force on the shift arm. Transmission shall not be able to shift from neutral to reverse.

REMOVAL

(1) Shift transmission into PARK.

(2) Raise vehicle.

(3) Disengage cable eyelet at transmission shift lever and pull cable adjuster out of mounting bracket (Fig. 104) or (Fig. 105).

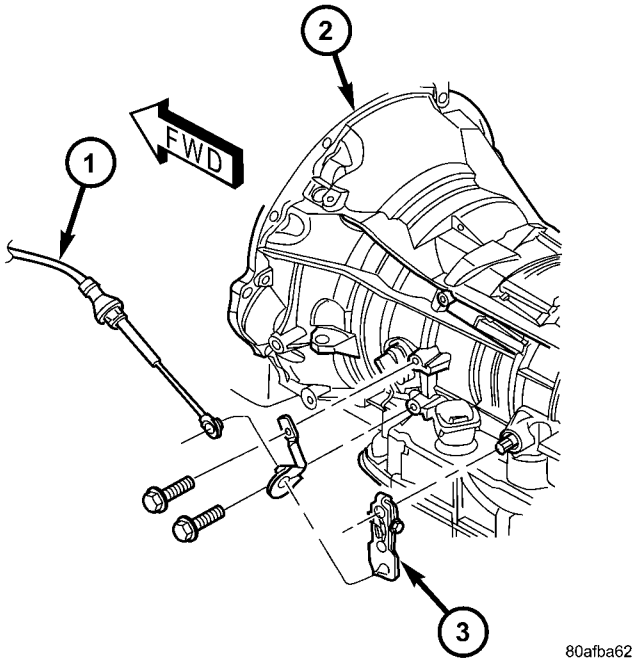


Fig. 104 Gearshift Cable at Transmission - RFE

1 - GEARSHIFT CABLE
2 - RFE TRANSMISSION
3 - MANUAL LEVER

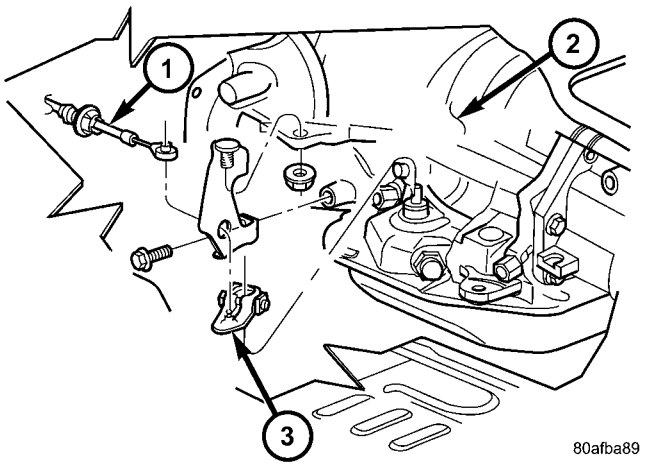


Fig. 105 Gearshift Cable at Transmission - RE

1 - GEARSHIFT CABLE
2 - RE TRANSMISSION
3 - MANUAL LEVER

GEARSHIFT CABLE (Continued)

(4) Lower the vehicle.

(5) Remove the dash panel insulation pad as necessary to access the gearshift cable grommet (Fig. 106).

(6) Remove grommet from the dash panel.

(7) Remove any steering column trim necessary to access the gearshift cable and BTSI mechanism.

(8) Disconnect the BTSI wiring connector.

(9) Disconnect cable at lower column bracket and shift lever pin and pull the cable through the dash panel opening into the vehicle (Fig. 107).

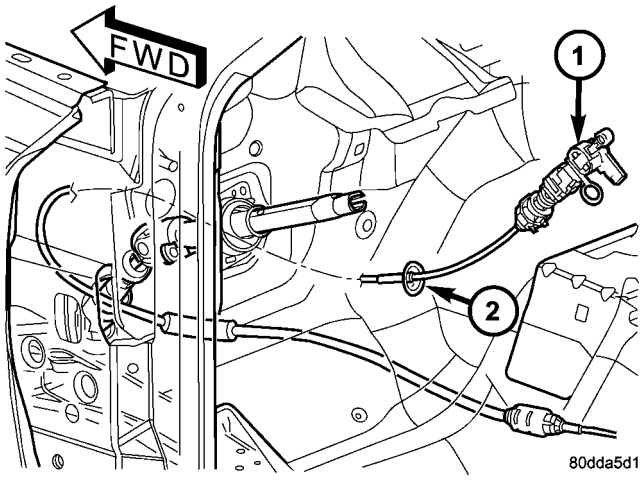


Fig. 106 Gearshift Cable at the Dash Panel

1 - GEARSHIFT CABLE
2 - GROMMET

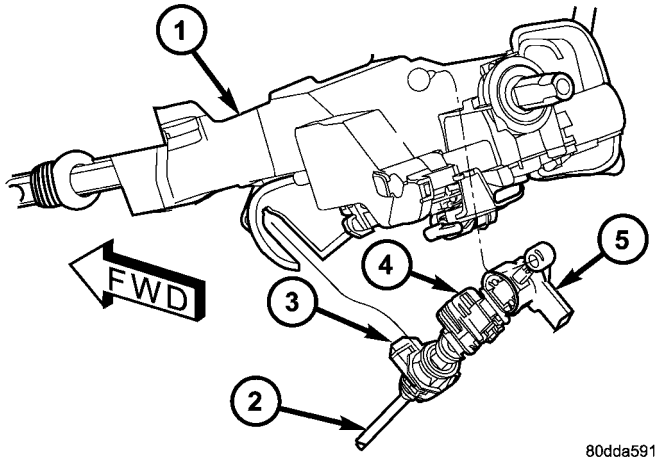


Fig. 107 Gearshift Cable at Steering Column

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

(10) Remove gearshift cable from vehicle.

INSTALLATION

(1) Route the transmission end of the gearshift cable through the opening in the dash panel (Fig. 108).

(2) Seat the cable grommet into the dash panel opening.

(3) Snap the cable into the steering column bracket so the retaining ears (Fig. 109) are engaged and snap the cable eyelet onto the shift lever ball stud.

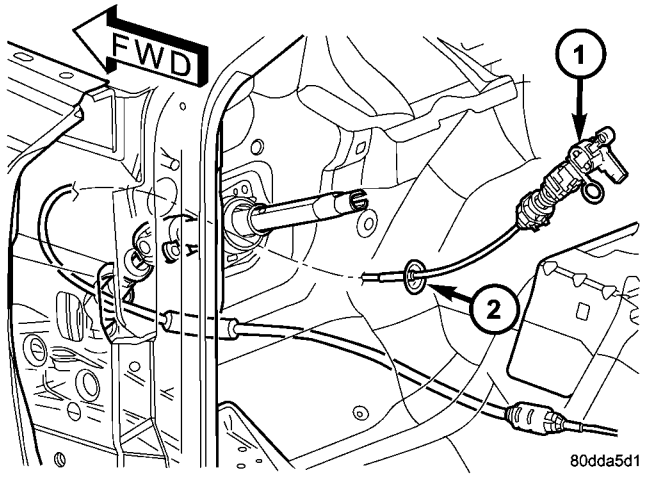


Fig. 108 Gearshift Cable at the Dash Panel

1 - GEARSHIFT CABLE
2 - GROMMET

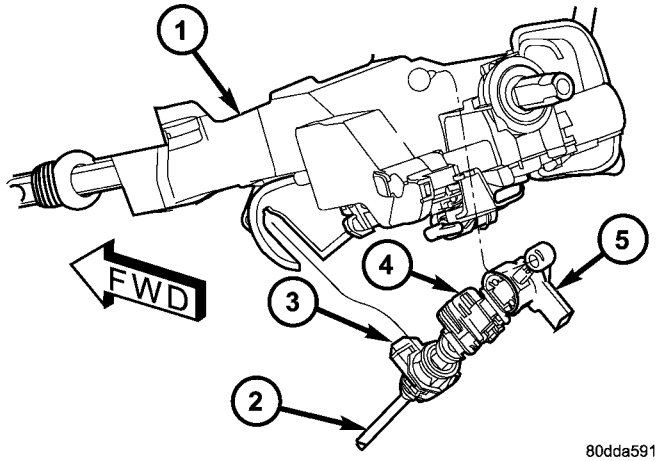


Fig. 109 Gearshift Cable at Steering Column

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

GEARSHIFT CABLE (Continued)

(4) Raise the vehicle.
(5) Place the transmission manual shift lever in the “PARK” detent (rearmost) position and rotate prop shaft to ensure transmission is in PARK.
(6) Route the gearshift cable through the transmission mounting bracket and secure the cable by snapping the cable retaining ears into the transmission bracket and snapping the cable eyelet on the manual shift lever ball stud.
(7) Lower vehicle.
(8) Lock the shift cable adjustment by pressing the cable adjuster lock tab downward until it snaps into place.
(9) Check for proper operation of the transmission range sensor.
(10) Adjust the gearshift cable and BTSI mechanism as necessary.

ADJUSTMENTS

GEARSHIFT CABLE

Check adjustment by starting the engine in PARK and NEUTRAL. Adjustment is CORRECT if the engine starts only in these positions. Adjustment is INCORRECT if the engine starts in one but not both positions. If the engine starts in any position other than PARK or NEUTRAL, or if the engine will not start at all, the transmission range sensor may be faulty.

Gearshift Adjustment Procedure

(1) Shift transmission into PARK.
(2) Release cable adjuster lock tab (underneath the steering column) (Fig. 110) to unlock cable.
(3) Raise vehicle.
(4) Disengage the cable eyelet from the transmission manual shift lever.
(5) Verify transmission shift lever is in PARK detent by moving lever fully rearward. Last rearward detent is PARK position.
(6) Verify positive engagement of transmission park lock by attempting to rotate propeller shaft. Shaft will not rotate when park lock is engaged.
(7) Snap the cable eyelet onto the transmission manual shift lever.
(8) Lower vehicle.
(9) Lock shift cable by pressing cable adjuster lock tab downward until it snaps into place.
(10) Check engine starting. Engine should start only in PARK and NEUTRAL

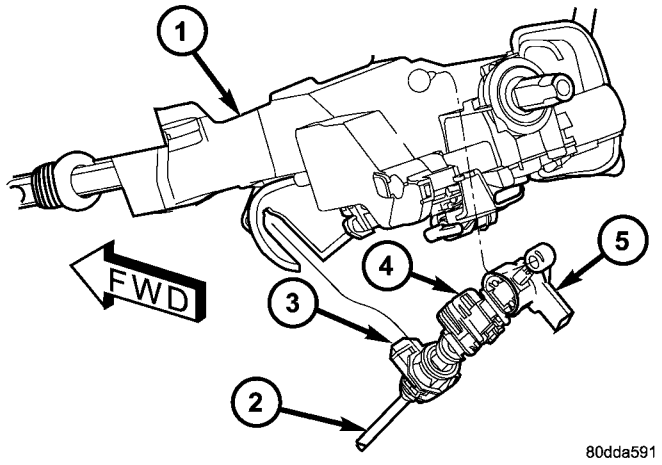


Fig. 110 Gearshift Cable at Steering Column

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

OIL PUMP

DESCRIPTION

The oil pump (Fig. 111) 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.

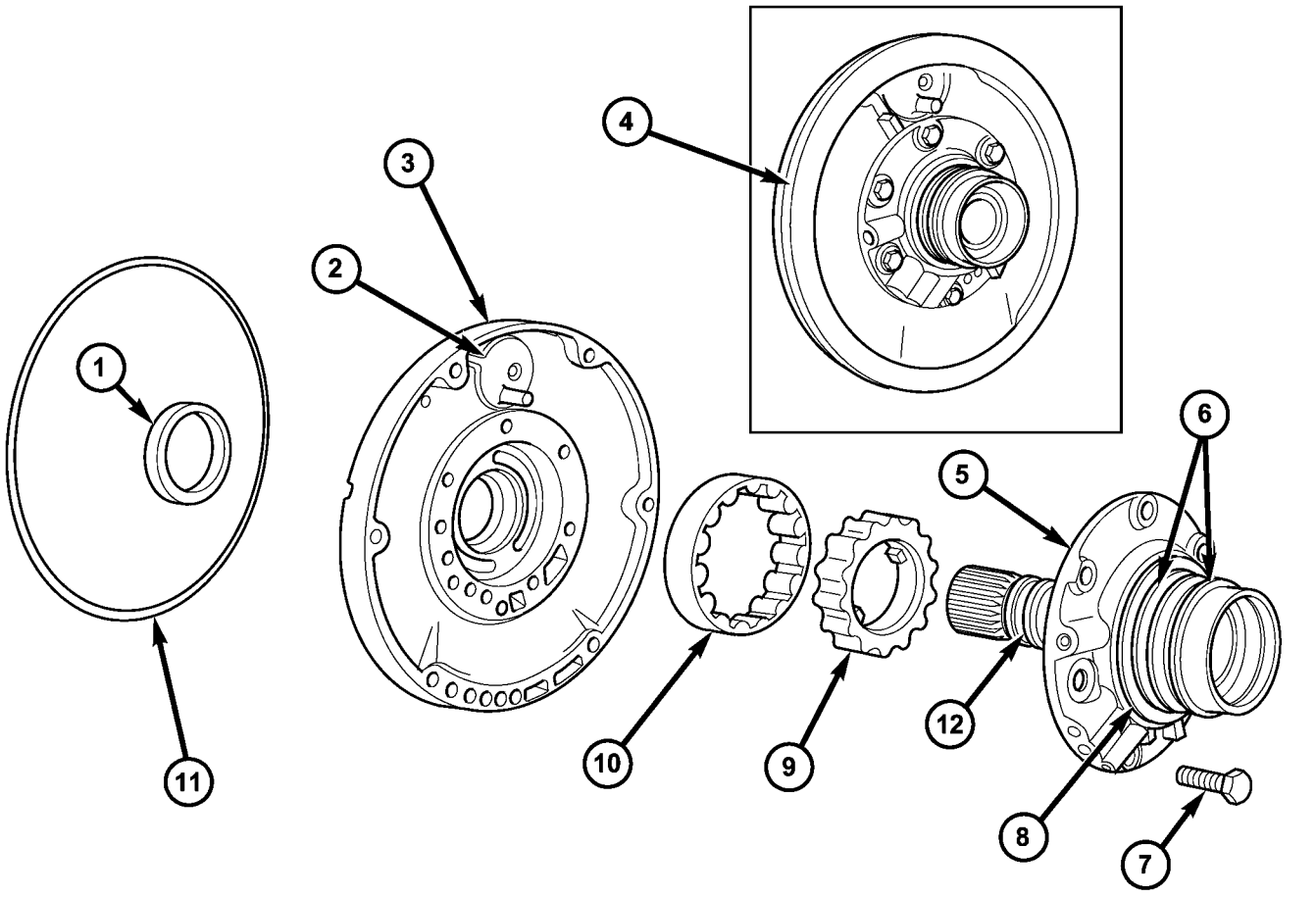


Fig. 111 Oil Pump Assembly

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
12 - TORQUE CONVERTER SEAL RING

OIL PUMP (Continued)

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. 112).

(4) Remove pump inner and outer gears (Fig. 113).

(5) Remove o-ring seal from pump body (Fig. 114). Discard seal after removal.

(6) Remove oil pump seal with Remover Tool C-3981. Discard seal after removal.

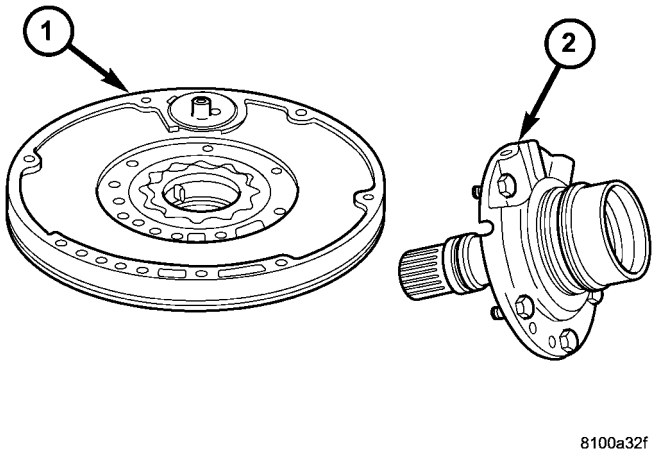


Fig. 112 Reaction Shaft Support

1 - OIL PUMP
2 - REACTION SHAFT SUPPORT

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:

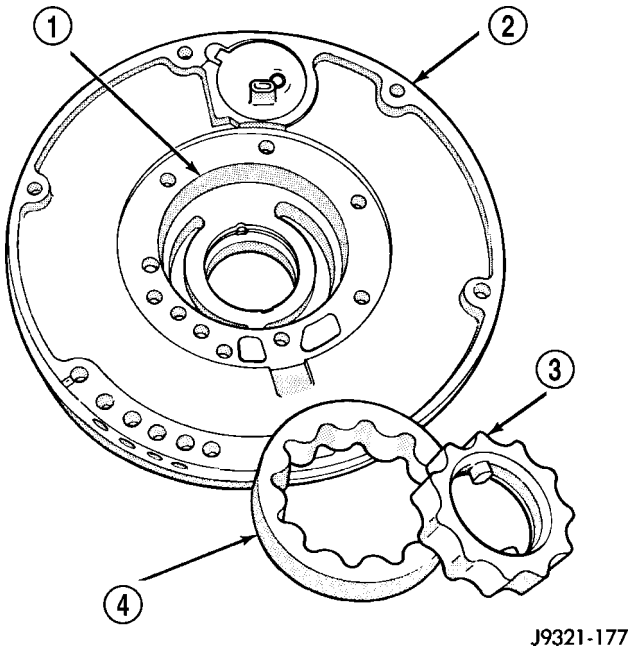


Fig. 113 Pump Gears

1 - GEAR BORE
2 - PUMP BODY
3 - INNER GEAR
4 - OUTER GEAR

(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 0.051 to 0.19 mm (0.002 to 0.0075 in.). Measure clearance with an appropriate feeler gauge (Fig. 115).

Clearance between outer gear and pump housing should be 0.10 to 0.229 mm (0.004 to 0.009 in.). Measure clearance with an appropriate feeler gauge.

ASSEMBLY

(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)

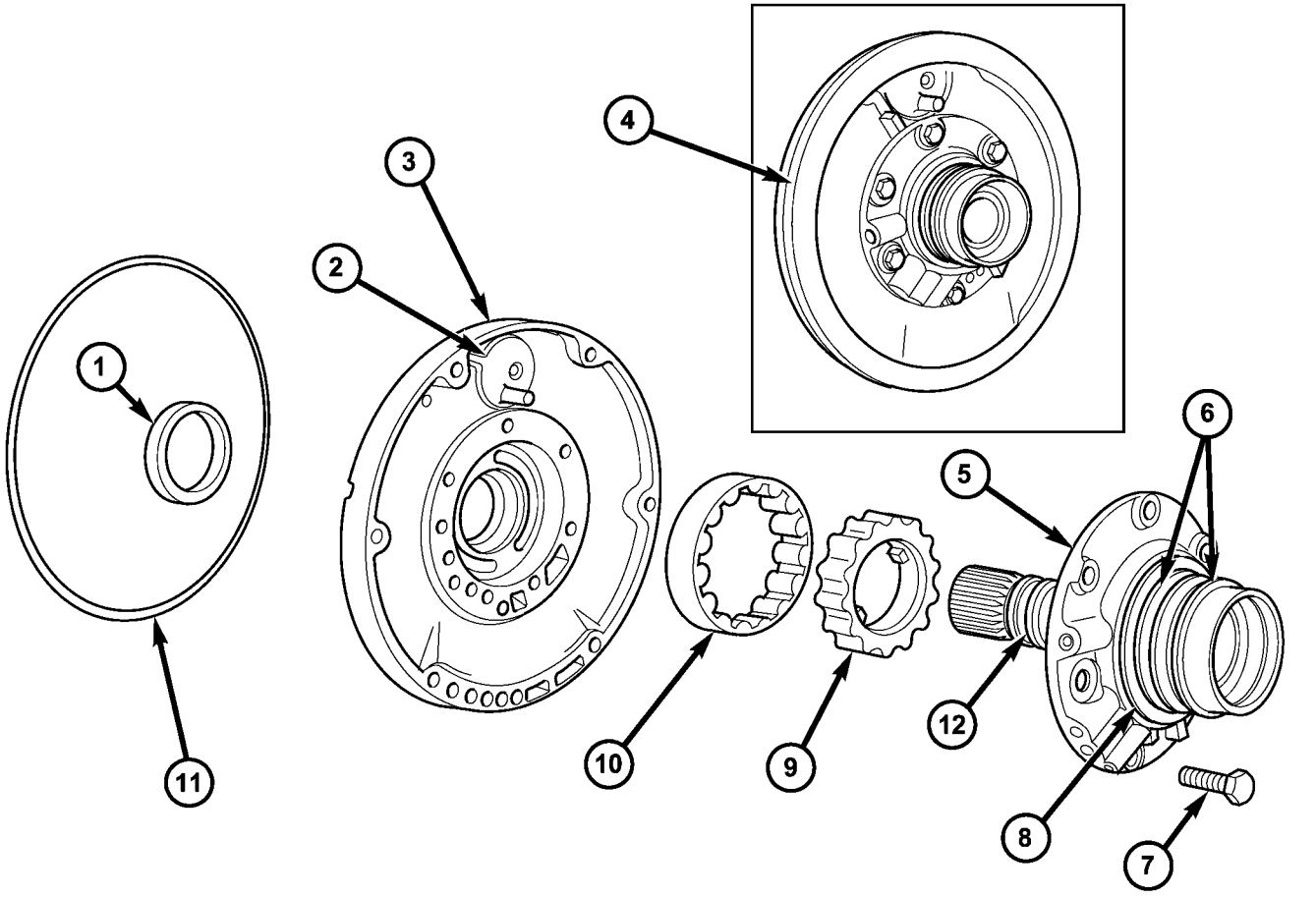


Fig. 114 Oil Pump Assembly

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
12 - TORQUE CONVERTER SEAL RING

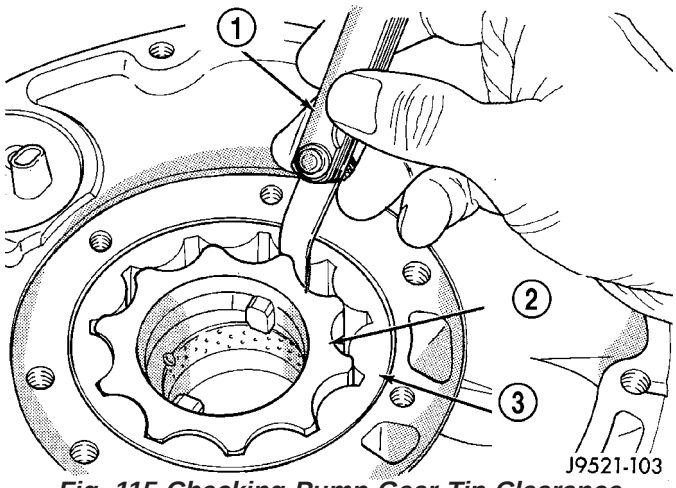


Fig. 115 Checking Pump Gear Tip Clearance

1 - FEELER GAUGE
2 - INNER GEAR
3 - OUTER GEAR

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.

OIL PUMP (Continued)

(6) Install new pump seal with Installer Tool C-3860-A (Fig. 116). 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.

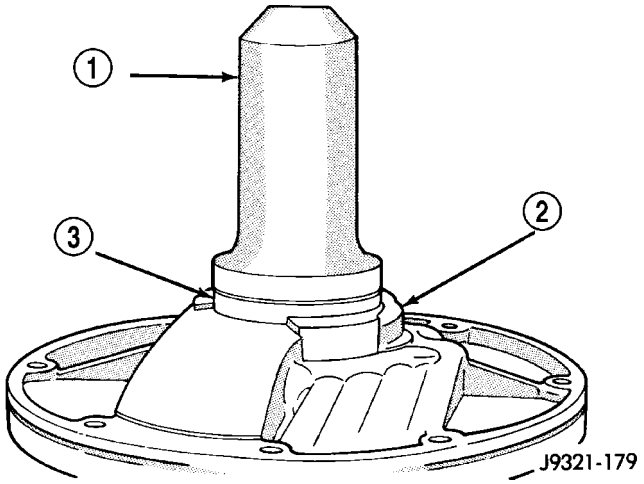


Fig. 116 Oil Pump Seal

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. 117).

(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.

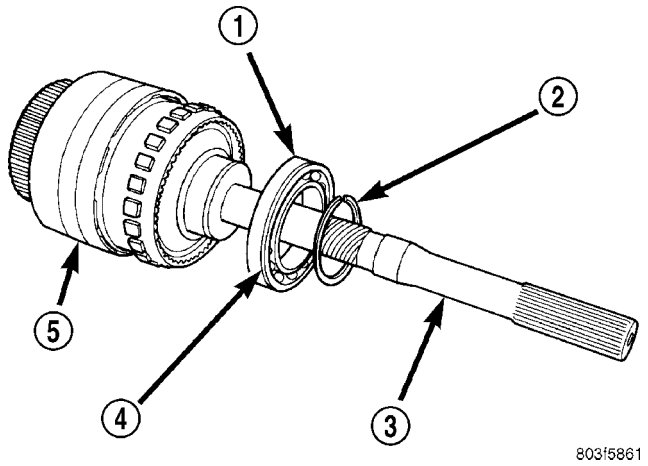


Fig. 117 Output Shaft Front Bearing

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/AUTOMATIC/OVERDRIVE - REMOVAL)

(2) Remove overdrive geartrain from housing.

(3) Remove snap-ring holding output shaft rear bearing into overdrive housing (Fig. 118).

(4) Using a suitable driver inserted through the rear end of housing, drive bearing from housing.

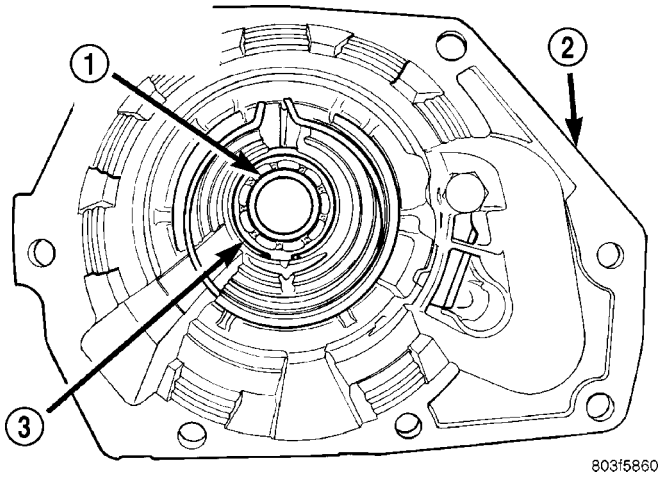


Fig. 118 Output Shaft Rear Bearing

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. 118).
(4) Install overdrive geartrain into housing.
(5) Install overdrive unit in vehicle.

OVERDRIVE CLUTCH

DESCRIPTION

The overdrive clutch (Fig. 119) 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 for the 5 disc version of the overdrive clutch. The 6 disc overdrive clutch does not use a waved snap-ring.

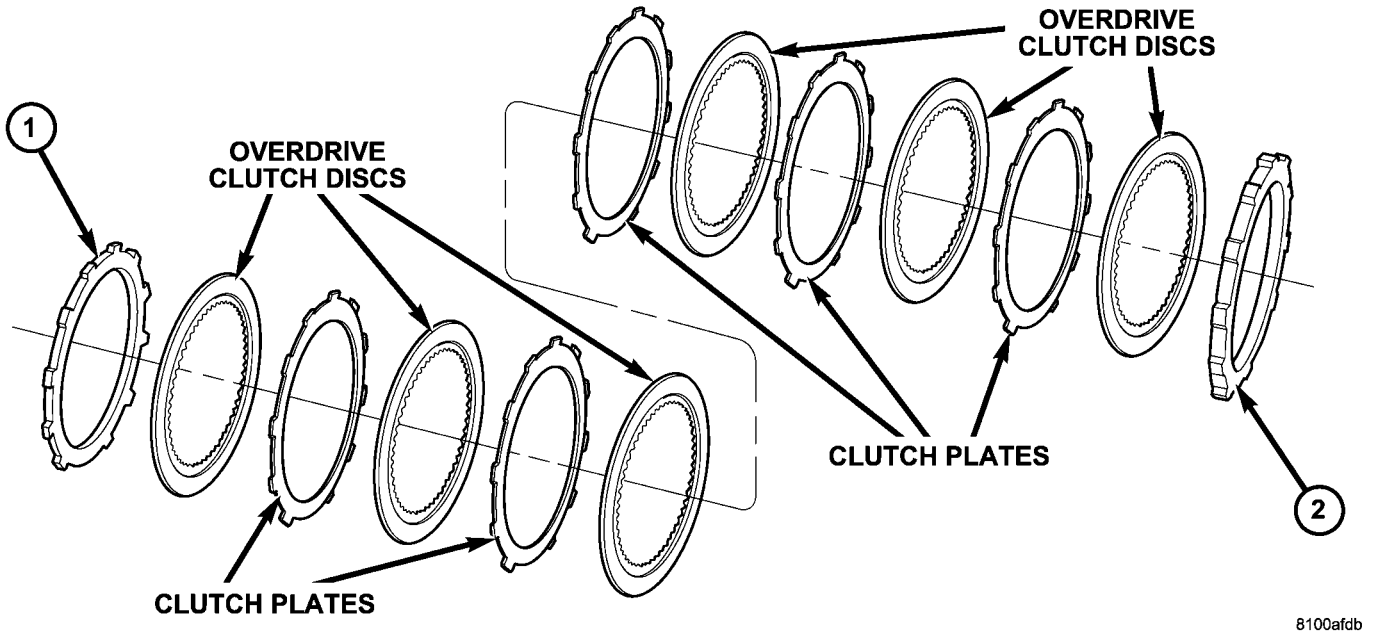


Fig. 119 Overdrive Clutch

1 - REACTION PLATE
2 - PRESSURE PLATE

OVERDRIVE SWITCH

DESCRIPTION

The overdrive OFF (control) switch is located in the shift lever arm (Fig. 120). The switch is a momentary contact device that signals the PCM to toggle current status of the overdrive function.

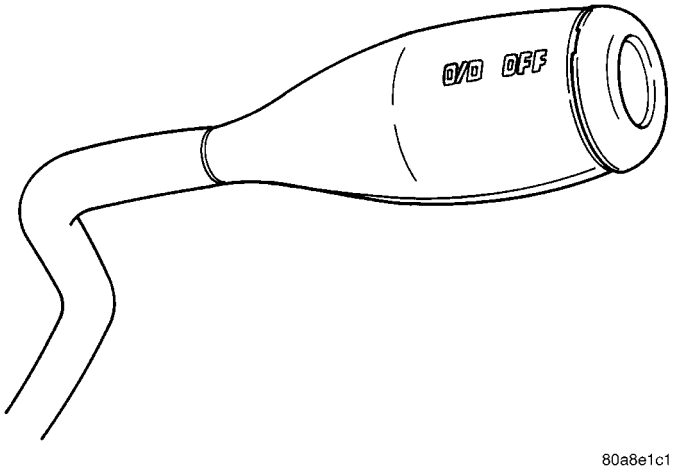


Fig. 120 Overdrive Off Switch

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. 121).

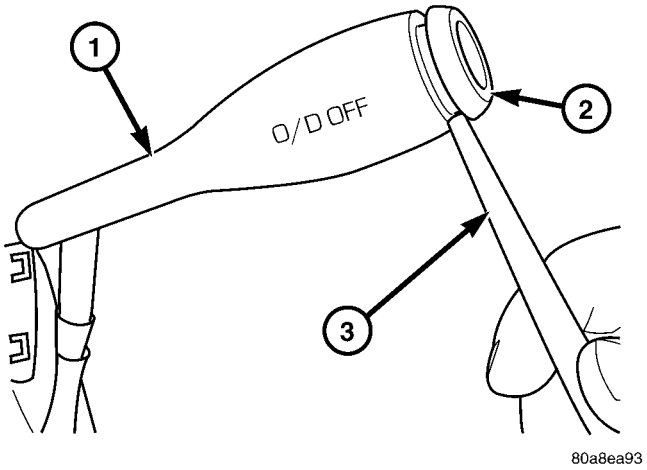


Fig. 121 Overdrive Off Switch Retainer

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. 122)

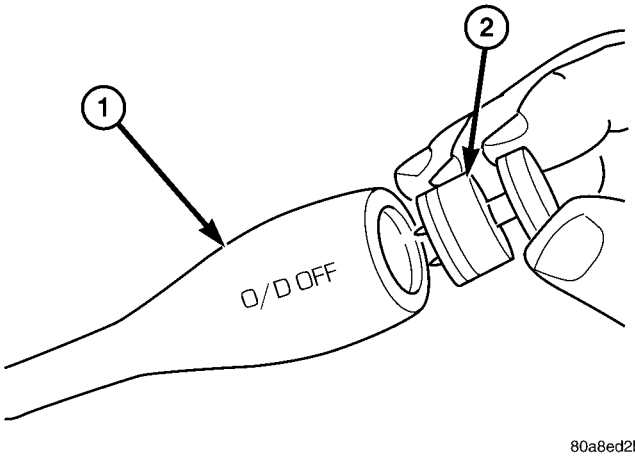


Fig. 122 Remove the Overdrive Off Switch

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.

OVERDRIVE SWITCH (Continued)

(2) Install the overdrive off switch into the connector (Fig. 123)

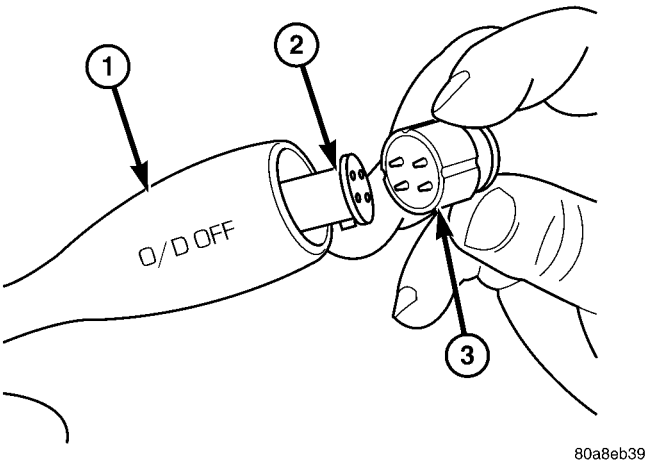


Fig. 123 Install the Overdrive Off Switch

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 necessary.

(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. 124).

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.

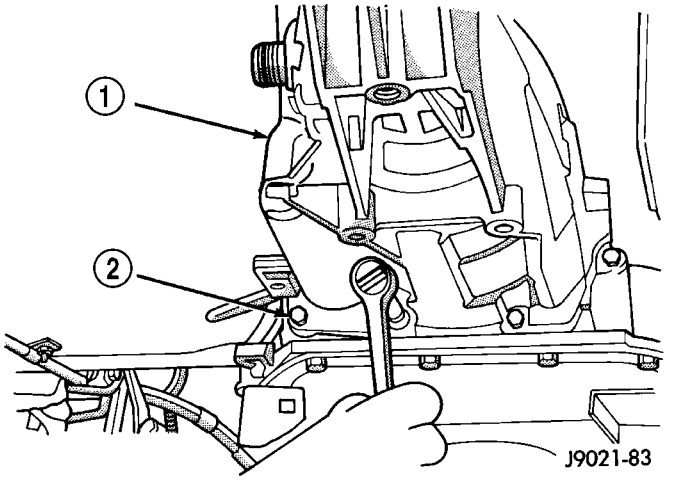


Fig. 124 Overdrive Unit Bolts

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.

OVERDRIVE UNIT (Continued)

DISASSEMBLY

(1) Remove transmission speed sensor and o-ring seal from overdrive case (Fig. 125).

(2) Remove overdrive piston thrust bearing (Fig. 126).

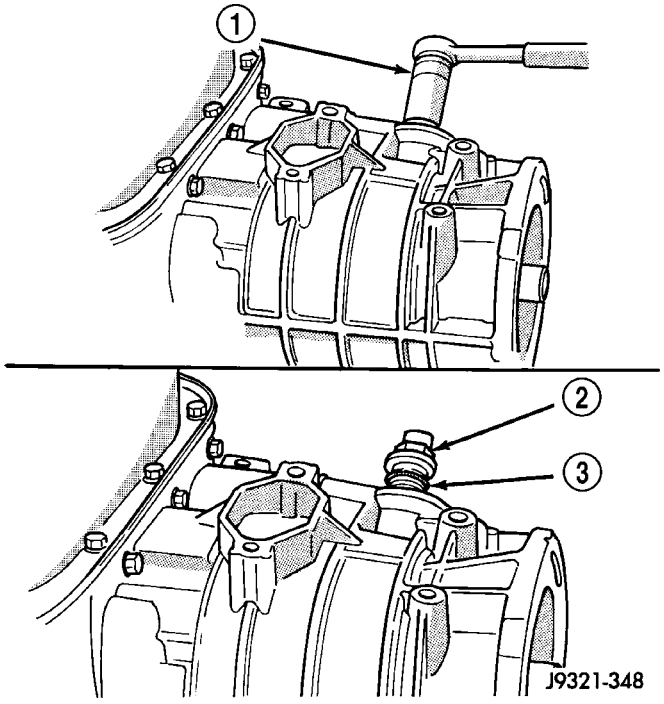


Fig. 125 Transmission Speed Sensor

1 - SOCKET AND WRENCH
2 - SPEED SENSOR
3 - O-RING

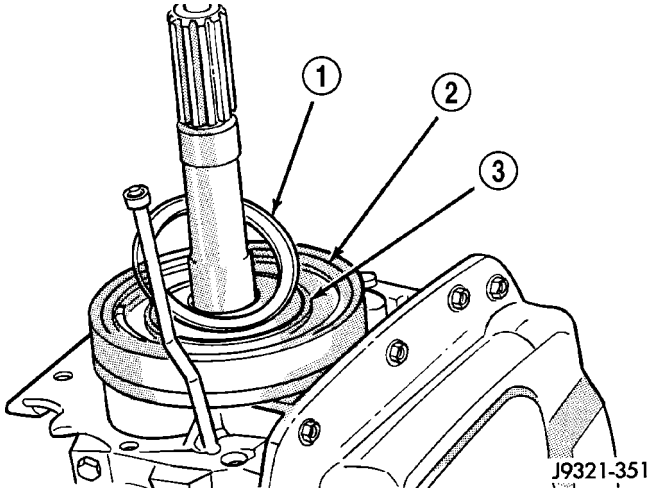


Fig. 126 Overdrive Piston Thrust Bearing Removal/ Installation

1 - THRUST BEARING
2 - OVERDRIVE PISTON
3 - THRUST PLATE

OVERDRIVE PISTON

(1) Remove overdrive piston thrust plate (Fig. 127). Retain thrust plate. It is a select fit part and may possibly be reused.

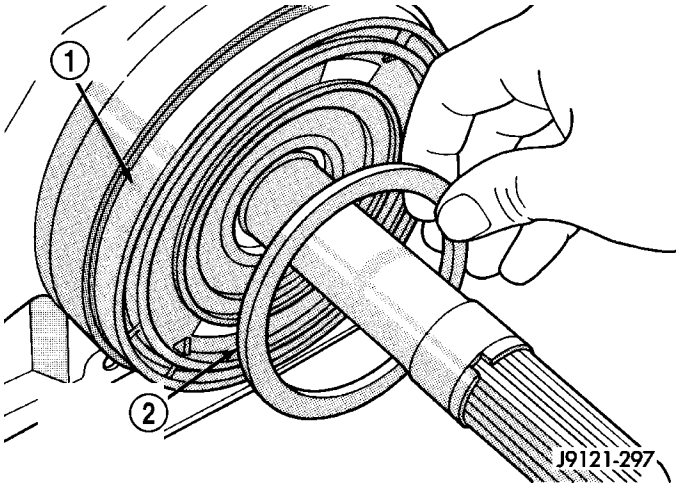


Fig. 127 Overdrive Piston Thrust Plate Removal/ Installation

1 - OVERDRIVE PISTON
2 - OVERDRIVE PISTON SPACER (SELECT FIT)

(2) Remove intermediate shaft spacer (Fig. 128). Retain spacer. It is a select fit part and may possibly be reused.

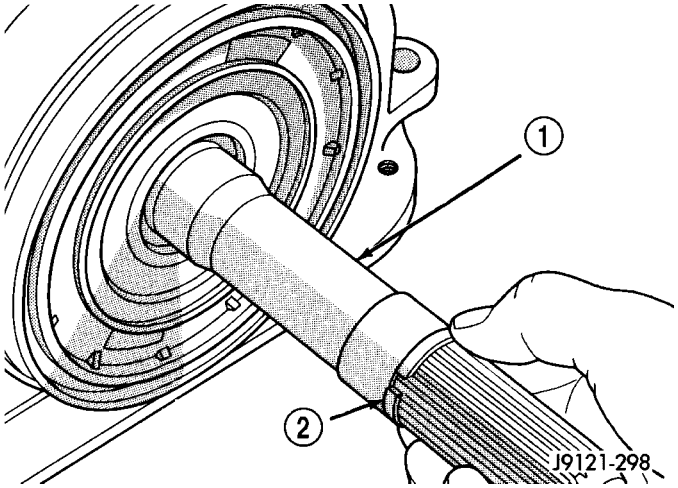


Fig. 128 Intermediate Shaft Spacer Location

1 - INTERMEDIATE SHAFT
2 - INTERMEDIATE SHAFT SPACER (SELECT FIT)

OVERDRIVE UNIT (Continued)

(3) Remove overdrive piston from retainer (Fig. 129).

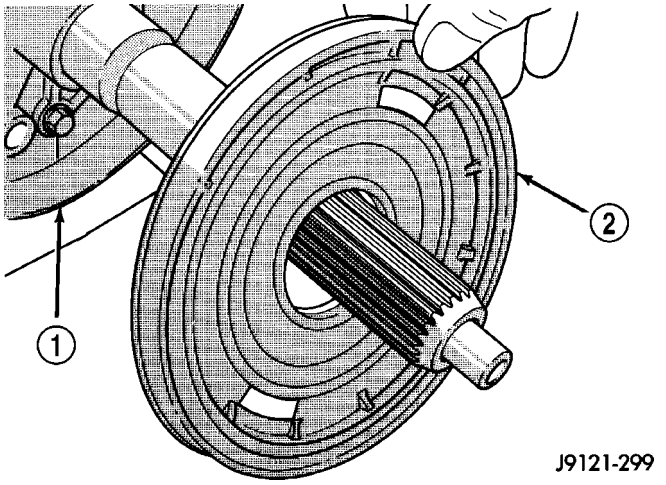


Fig. 129 Overdrive Piston Removal

1 - PISTON RETAINER
2 - OVERDRIVE PISTON

OVERDRIVE CLUTCH PACK

(1) Remove overdrive clutch pack wire retaining ring (Fig. 130).

(2) Remove overdrive clutch pack (Fig. 131).

(3) Note position of clutch pack components for assembly reference (Fig. 132).

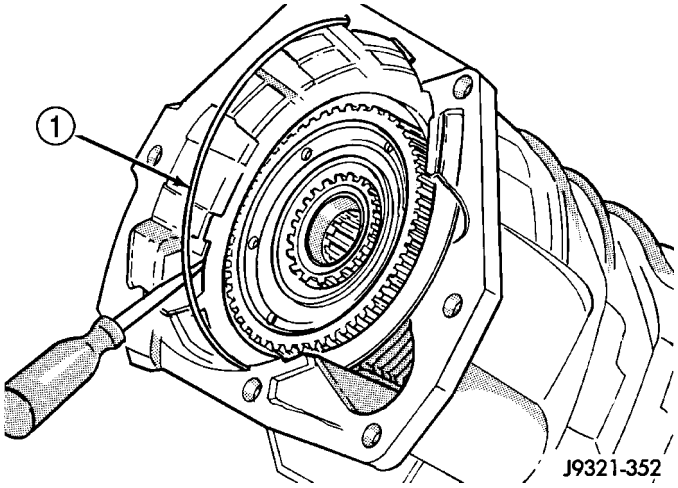


Fig. 130 Removing Overdrive Clutch Pack Retaining Ring

1 - OVERDRIVE CLUTCH PACK RETAINING RING

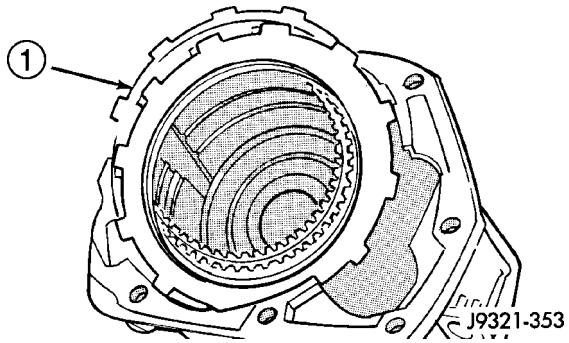


Fig. 131 Overdrive Clutch Pack Removal

1 - OVERDRIVE CLUTCH PACK

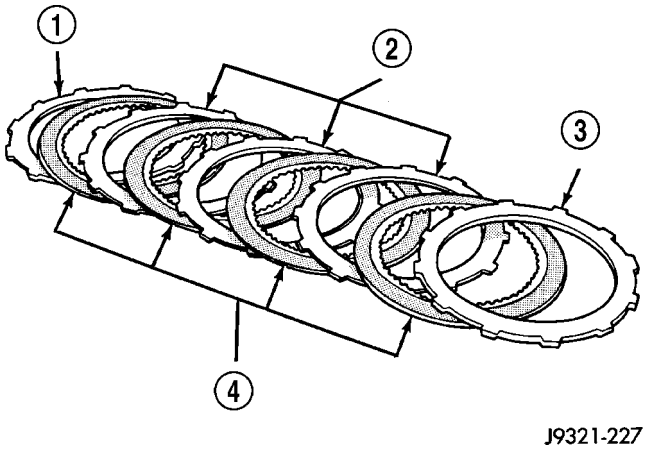


Fig. 132 Overdrive Clutch Component Position - Typical

1 - REACTION PLATE
2 - CLUTCH PLATES
3 - PRESSURE PLATE
4 - CLUTCH DISCS

OVERDRIVE GEARTRAIN

(1) Remove overdrive clutch wave spring (Fig. 133), 5 disc clutch only.

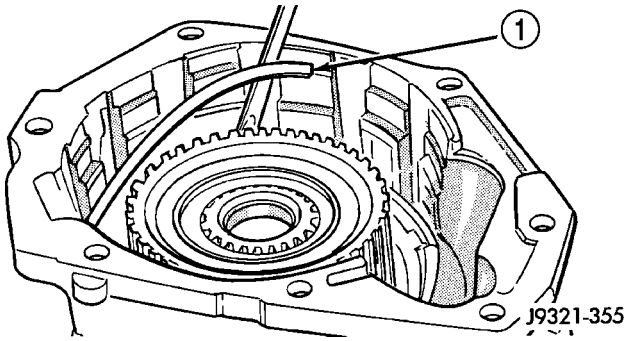


Fig. 133 Overdrive Clutch Wave Spring Removal - 5 Disc Clutch Only

1 - WAVE SPRING

OVERDRIVE UNIT (Continued)

(2) Remove overdrive clutch reaction snap-ring (Fig. 134). Note that snap-ring is located in same groove as wave spring.

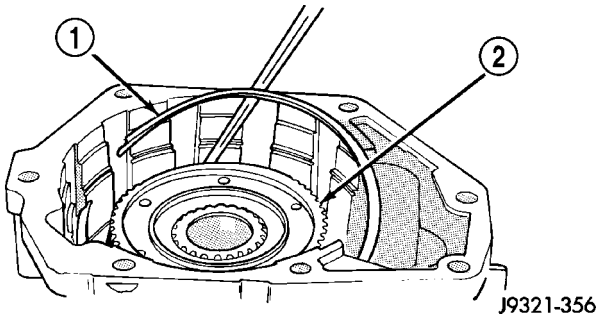


Fig. 134 Overdrive Clutch Reaction Snap-Ring Removal

1 - REACTION RING
2 - CLUTCH HUB

(3) Remove Torx™ head screws that attach access cover and gasket to overdrive case (Fig. 135).

(4) Remove access cover and gasket (Fig. 136).

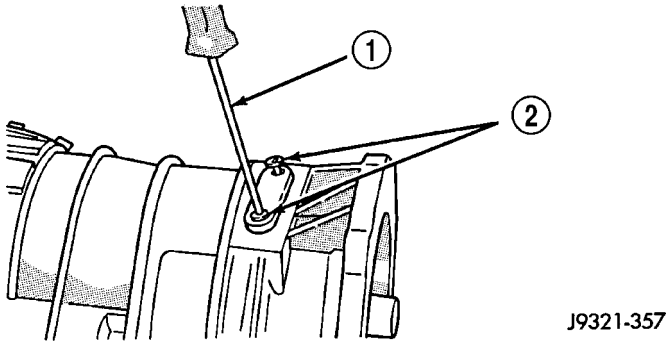


Fig. 135 Access Cover Screw Removal

1 - TORX SCREWDRIVER (T25)
2 - ACCESS COVER SCREWS

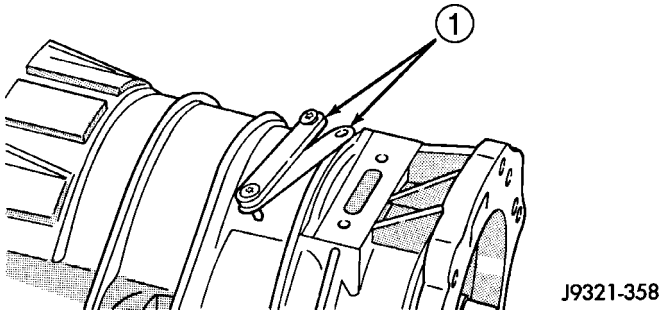


Fig. 136 Access Cover And Gasket Removal

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. 137).

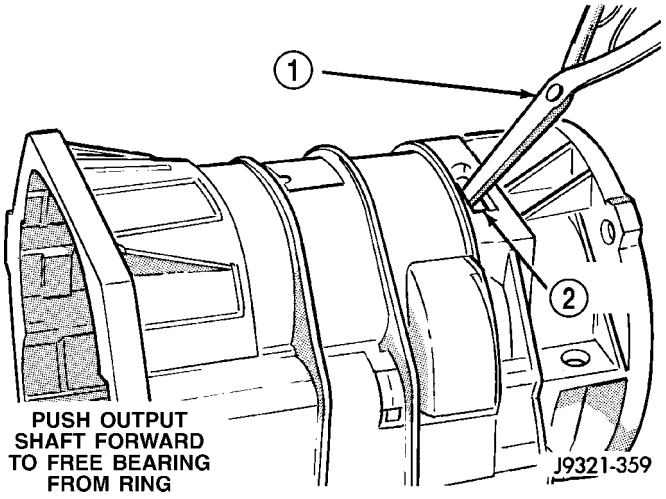


Fig. 137 Releasing Bearing From Locating Ring

1 - EXPAND BEARING LOCATING RING WITH SNAP-RING PLIERS
2 - ACCESS HOLE

(6) Lift gear case up and off geartrain assembly (Fig. 138).

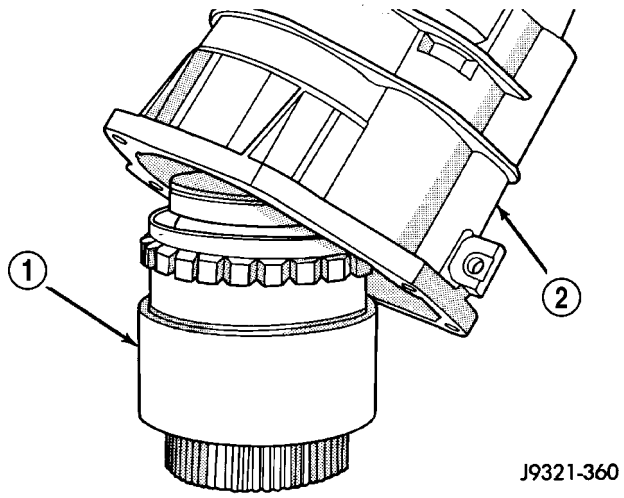


Fig. 138 Removing Geartrain

1 - GEARTRAIN ASSEMBLY
2 - GEAR CASE

OVERDRIVE UNIT (Continued)

(7) Remove snap-ring that retains rear bearing on output shaft.

(8) Remove rear bearing from output shaft (Fig. 139).

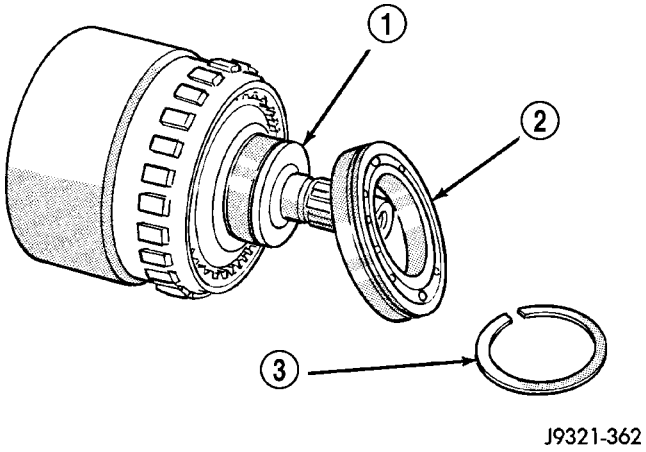


Fig. 139 Rear Bearing Removal

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. 140).

(2) Position Compressor Tool 6227-1 on clutch hub (Fig. 140). 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. 140).

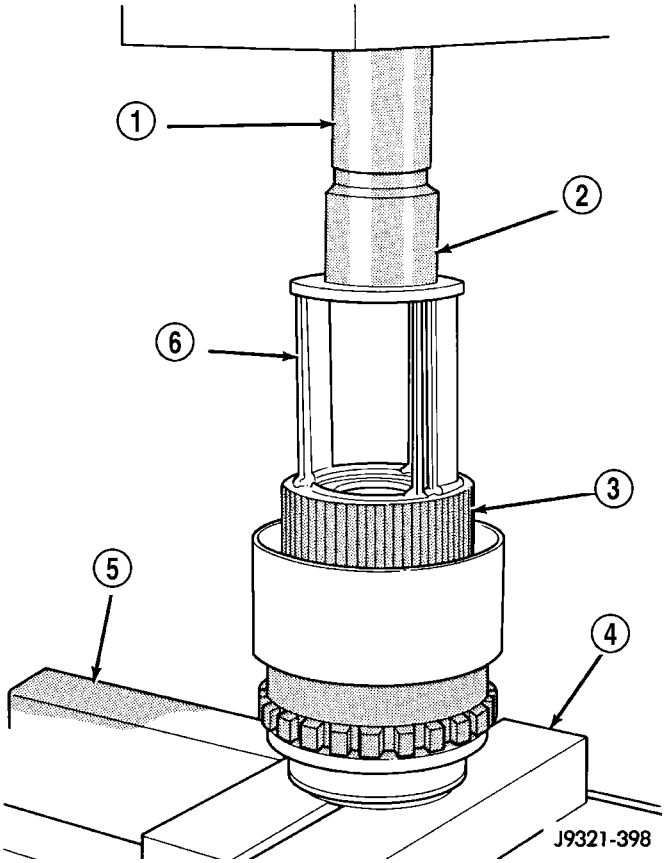


Fig. 140 Geartrain Mounted In Shop Press

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

OVERDRIVE UNIT (Continued)

(4) Remove direct clutch pack snap-ring (Fig. 141).
(5) Remove direct clutch hub retaining ring (Fig. 142).

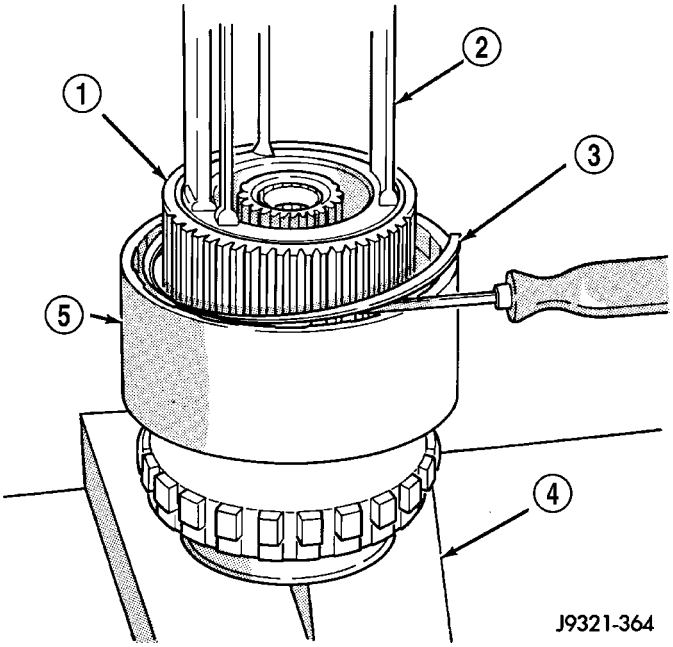


Fig. 141 Direct Clutch Pack Snap-Ring Removal

1 - CLUTCH HUB
2 - SPECIAL TOOL 6227-1
3 - DIRECT CLUTCH PACK SNAP-RING
4 - PRESS PLATES
5 - CLUTCH DRUM

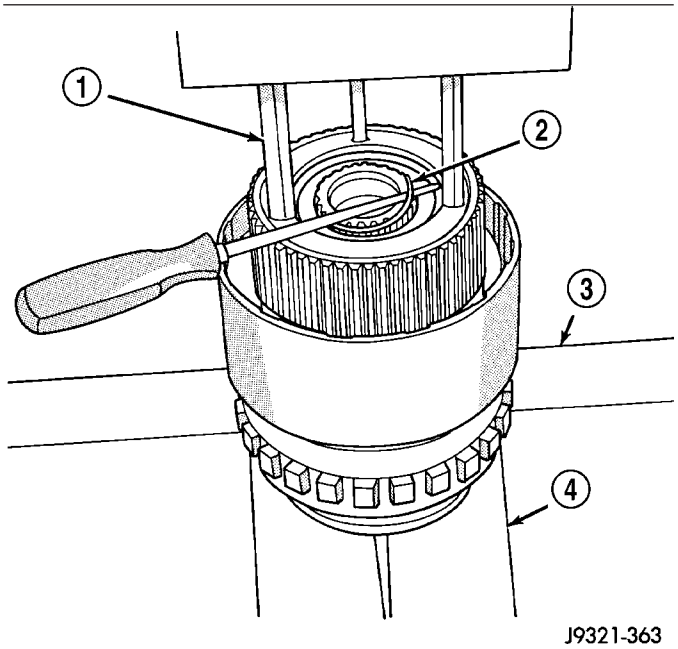


Fig. 142 Direct Clutch Hub Retaining Ring Removal

1 - SPECIAL TOOL 6227-1
2 - CLUTCH HUB RETAINING RING
3 - PRESS BED
4 - PRESS PLATES

(6) Release press load slowly and completely (Fig. 143).
(7) Remove Special Tool 6227-1. Then remove clutch pack from hub (Fig. 143). Note the orientation of the clutch discs. The clutch pack consists of 23 single-sided discs and they must be installed in the same orientation as they were removed.

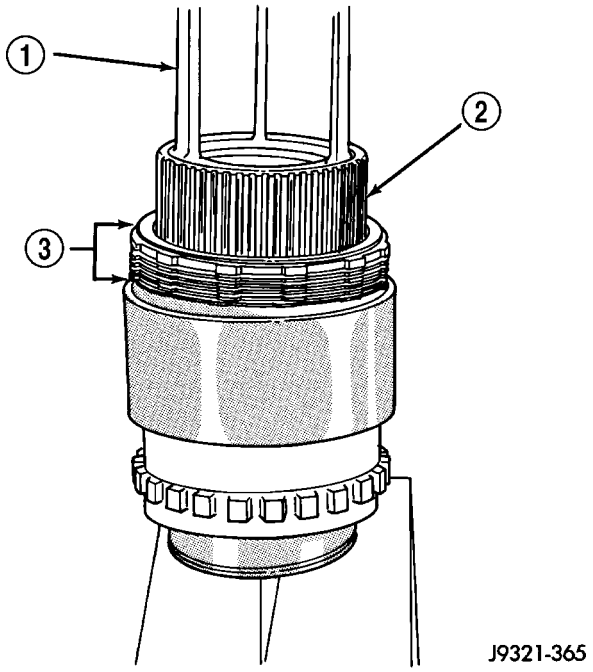


Fig. 143 Direct Clutch Pack Removal

1 - SPECIAL TOOL 6227-1
2 - DIRECT CLUTCH HUB
3 - DIRECT CLUTCH PACK

GEARTRAIN

(1) Remove direct clutch hub and spring (Fig. 144).

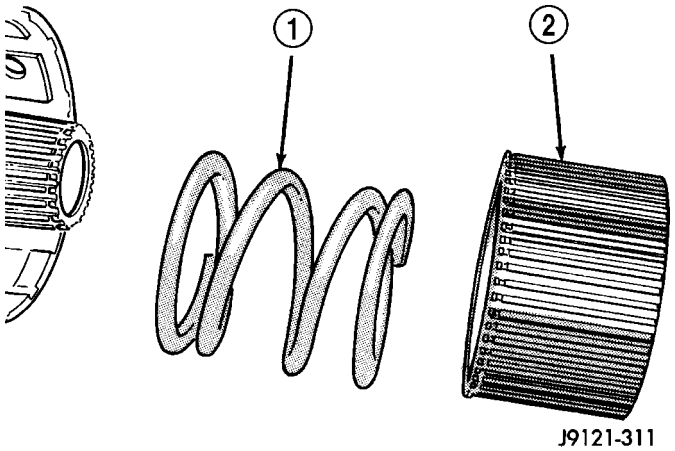


Fig. 144 Direct Clutch Hub And Spring Removal

1 - DIRECT CLUTCH SPRING
2 - DIRECT CLUTCH HUB

OVERDRIVE UNIT (Continued)

(2) Remove sun gear and spring plate. Then remove planetary thrust bearing and planetary gear (Fig. 145).

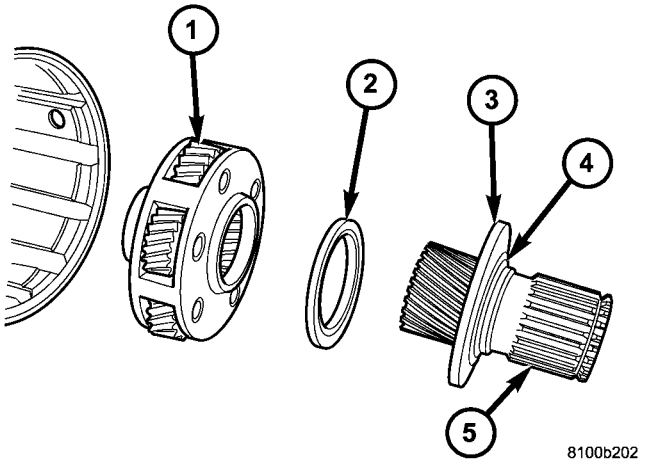


Fig. 145 Removing Sun Gear, Thrust Bearing And Planetary Gear

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. 146). 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.

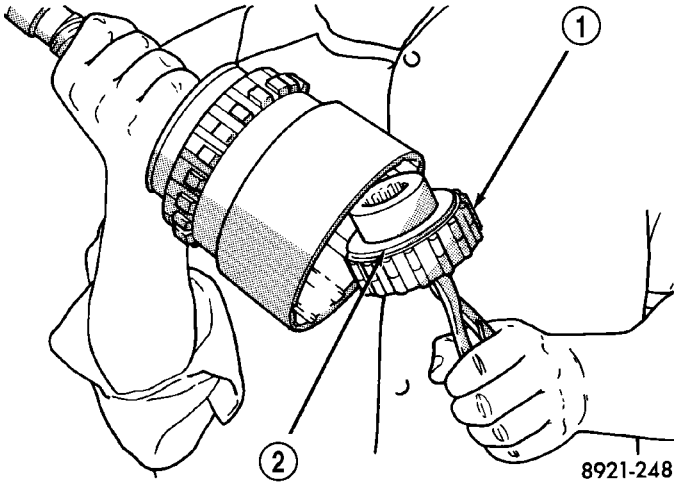


Fig. 146 Overrunning Clutch Assembly Removal/ Installation

1 - OVERRUNNING CLUTCH
2 - NEEDLE BEARING

(6) Mark position of annulus gear and direct clutch drum for assembly alignment reference (Fig. 147). Use small center punch or scriber to make alignment marks.

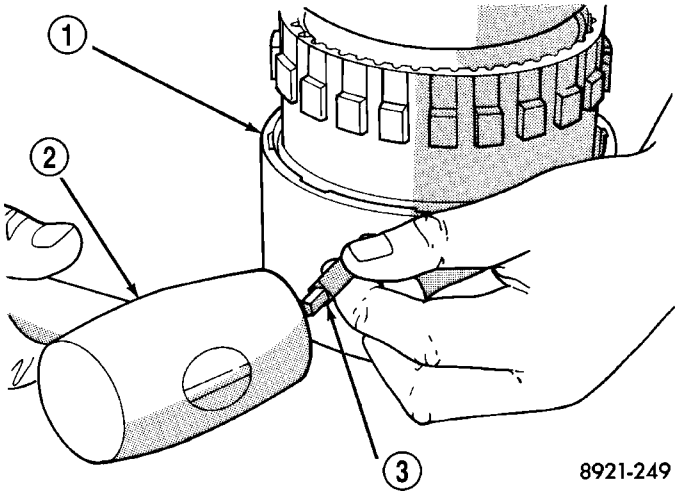


Fig. 147 Marking Direct Clutch Drum And Annulus Gear For Assembly Alignment

1 - DIRECT CLUTCH DRUM
2 - HAMMER
3 - PUNCH

(7) Remove direct clutch drum rear retaining ring (Fig. 148).

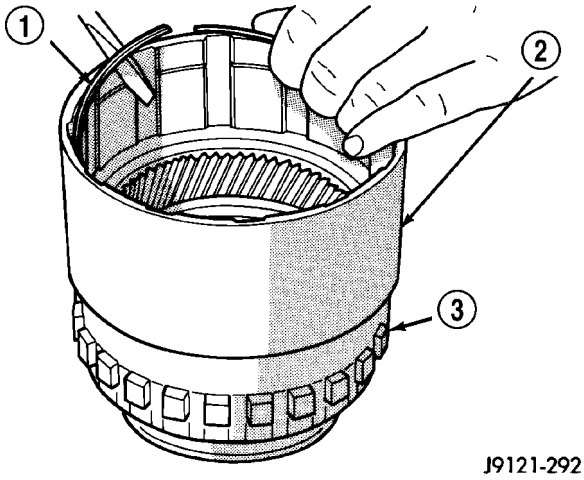


Fig. 148 Clutch Drum Inner Retaining Ring Removal

1 - INNER RETAINING RING
2 - DIRECT CLUTCH DRUM
3 - ANNULUS GEAR

OVERDRIVE UNIT (Continued)

(8) Remove direct clutch drum outer retaining ring (Fig. 149).

(9) Mark annulus gear and output shaft for assembly alignment reference (Fig. 150). Use punch or scriber to mark gear and shaft.

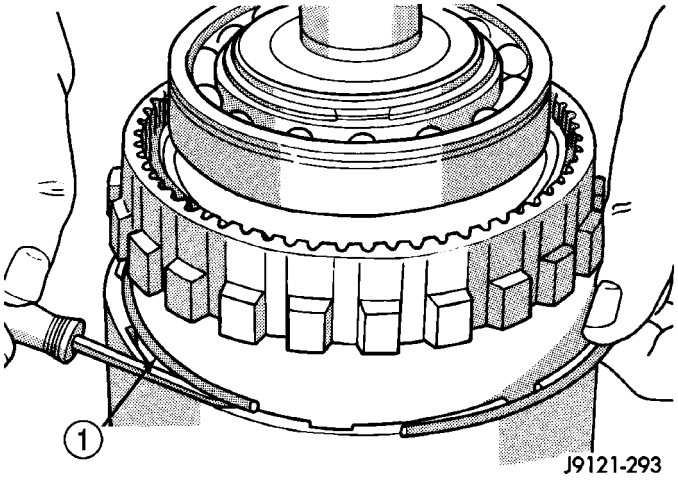


Fig. 149 Clutch Drum Outer Retaining Ring Removal

1 - OUTER RETAINING RING

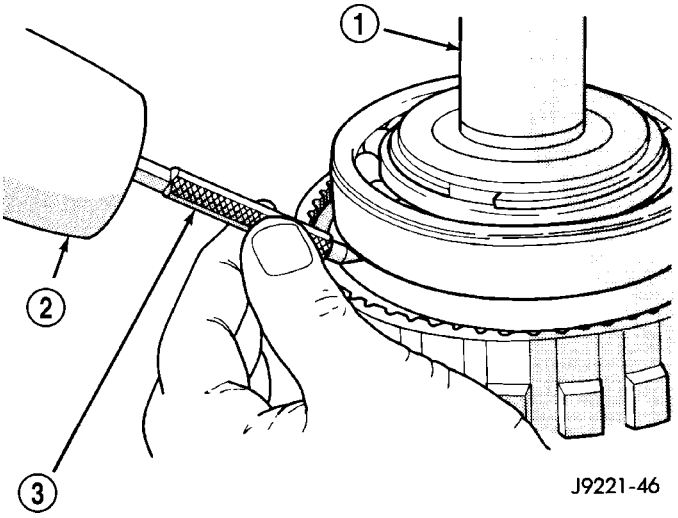


Fig. 150 Marking Annulus Gear And Output Shaft For Assembly Alignment

1 - OUTPUT SHAFT
2 - HAMMER
3 - PUNCH

(10) Remove snap-ring that secures annulus gear on output shaft (Fig. 151). Use two screwdrivers to unseat and work snap-ring out of groove as shown.

(11) Remove annulus gear from output shaft (Fig. 152). Use rawhide or plastic mallet to tap gear off shaft.

GEAR CASE AND PARK LOCK

(1) Remove locating ring from gear case.

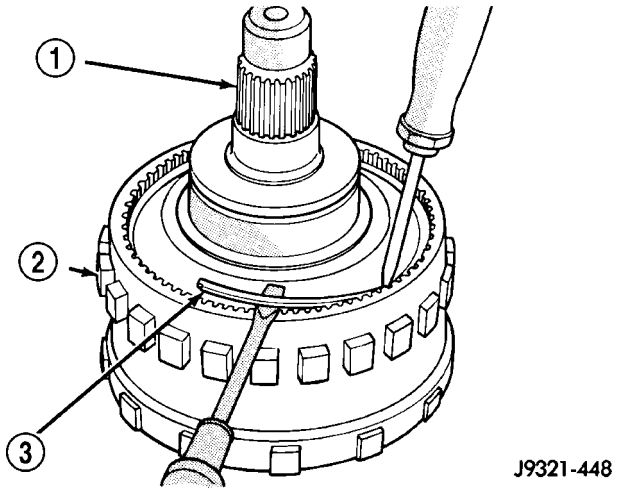


Fig. 151 Annulus Gear Snap-Ring Removal

1 - OUTPUT SHAFT
2 - ANNULUS GEAR
3 - SNAP-RING

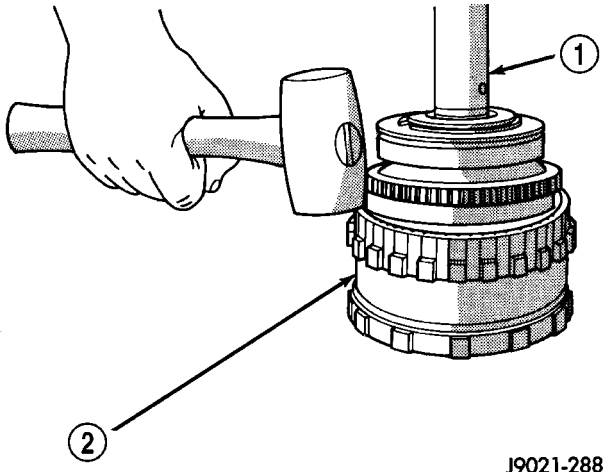


Fig. 152 Annulus Gear Removal

1 - OUTPUT SHAFT
2 - ANNULUS GEAR

(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 reus-

OVERDRIVE UNIT (Continued)

able. 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, Automatic Transmission fluid. Allow discs to soak for 10-20 minutes.

(2) Install annulus gear on output shaft, if removed. Then install annulus gear retaining snap-ring (Fig. 153).

(3) Align and install clutch drum on annulus gear (Fig. 154). Be sure drum is engaged in annulus gear lugs.

(4) Install clutch drum outer retaining ring (Fig. 154).

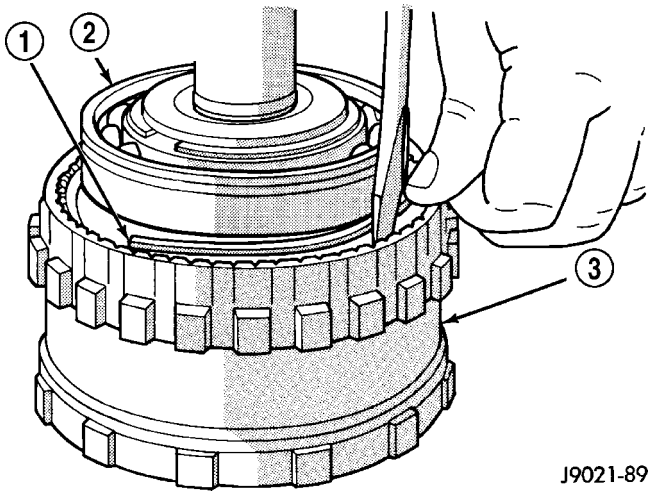


Fig. 153 Annulus Gear Installation

1 - SNAP-RING
2 - OUTPUT SHAFT FRONT BEARING
3 - ANNULUS GEAR

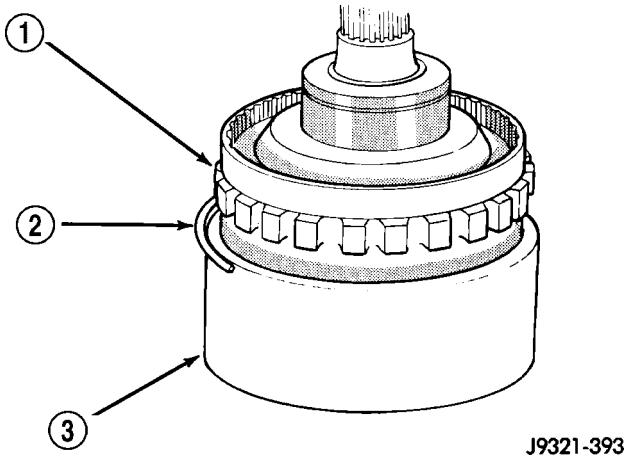


Fig. 154 Clutch Drum And Outer Retaining Ring Installation

1 - ANNULUS GEAR
2 - OUTER SNAP-RING
3 - CLUTCH DRUM

OVERDRIVE UNIT (Continued)

(5) Slide clutch drum forward and install inner retaining ring (Fig. 155).

(6) Install rear bearing and snap-ring on output shaft (Fig. 156). Be sure locating ring groove in bearing is toward rear.

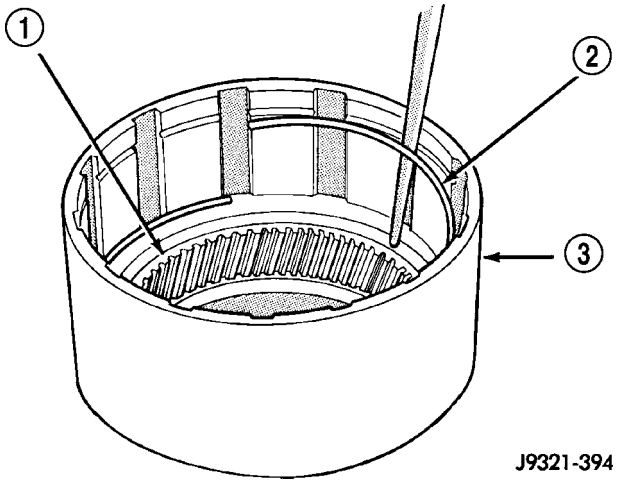


Fig. 155 Clutch Drum Inner Retaining Ring Installation

1 - ANNULUS GEAR
2 - INNER SNAP-RING
3 - CLUTCH DRUM

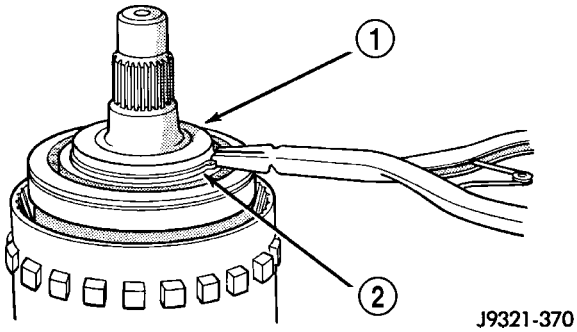


Fig. 156 Rear Bearing And Snap-Ring Installation

1 - REAR BEARING
2 - SNAP-RING

(7) Install overrunning clutch on hub (Fig. 157). Note that clutch only fits one way. Shoulder on clutch should seat in small recess at edge of hub.

(8) 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.

(9) Install overrunning clutch in output shaft (Fig. 158). Insert snap-ring pliers in hub splines. Expand pliers to grip hub. Then install assembly with counterclockwise, twisting motion.

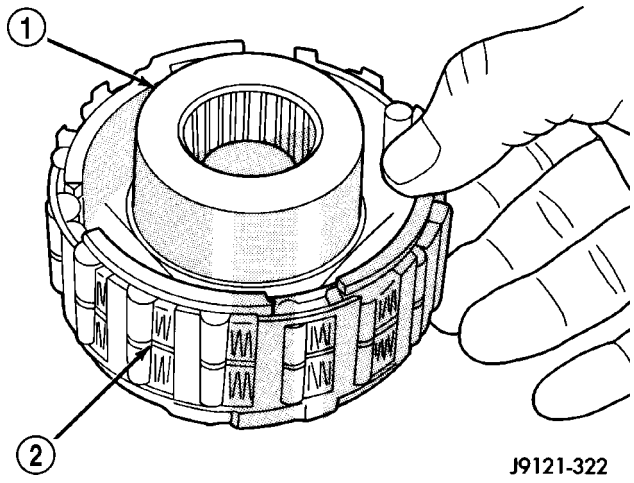


Fig. 157 Assembling Overrunning Clutch And Hub

1 - CLUTCH HUB
2 - OVERRUNNING CLUTCH

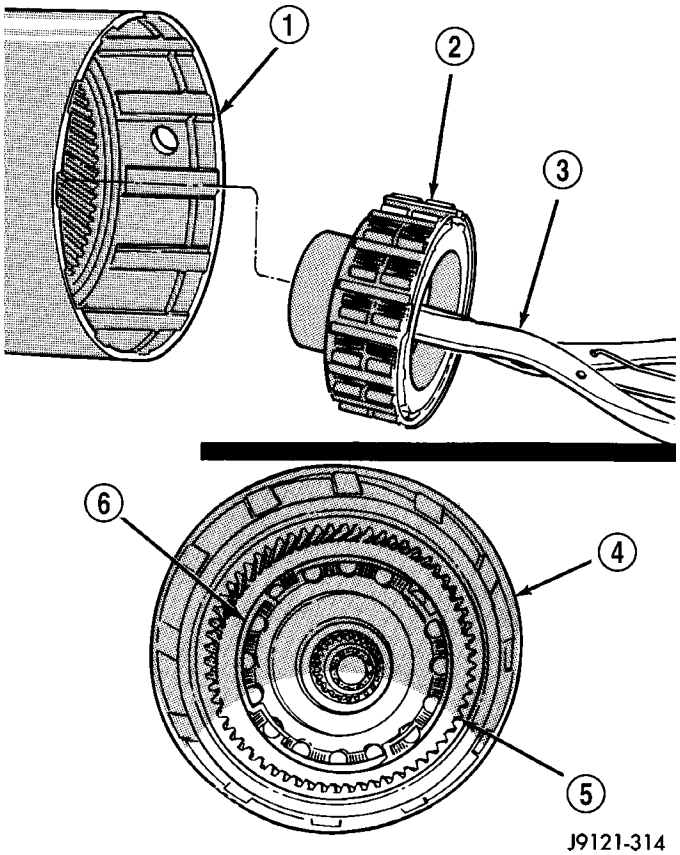


Fig. 158 Overrunning Clutch Installation

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

OVERDRIVE UNIT (Continued)

(10) Install planetary gear in annulus gear (Fig. 159). Be sure planetary pinions are fully seated in annulus gear before proceeding.

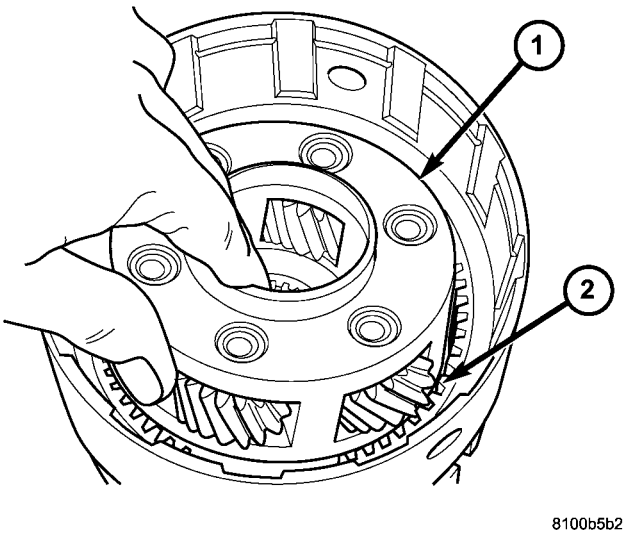


Fig. 159 Planetary Gear Installation

1 - PLANETARY GEAR
2 - ANNULUS GEAR

(11) 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.

(12) Install planetary thrust bearing on sun gear (Fig. 160). 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.

(13) Install assembled sun gear, spring plate and thrust bearing (Fig. 161). Be sure sun gear and thrust bearing are fully seated before proceeding.

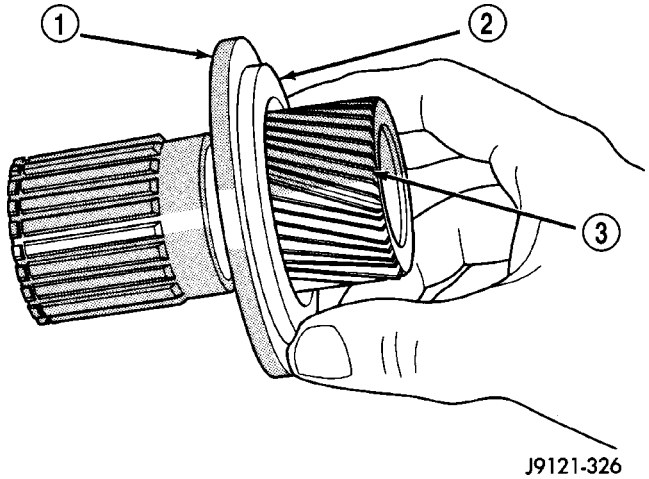


Fig. 160 Planetary Thrust Bearing Installation

1 - SPRING PLATE
2 - PLANETARY THRUST BEARING
3 - SUN GEAR

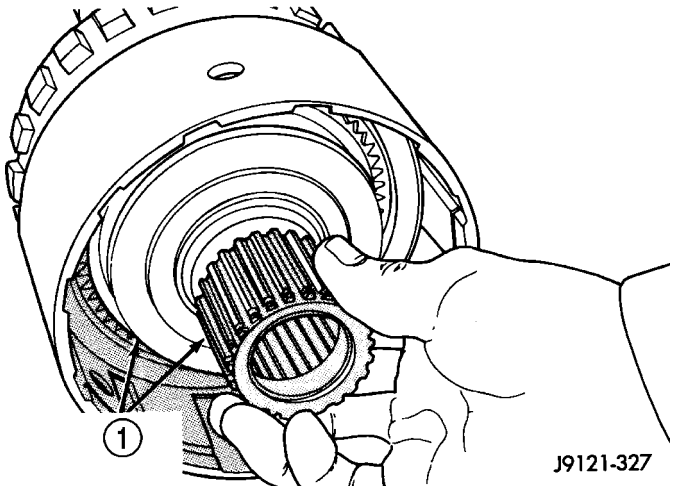


Fig. 161 Sun Gear Installation

1 - SUN GEAR AND SPRING PLATE ASSEMBLY

(14) 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.

(15) Align splines in hubs of planetary gear and overrunning clutch with Alignment tool 6227-2 (Fig. 162). Insert tool through sun gear and into splines of both hubs. Be sure alignment tool is fully seated before proceeding.

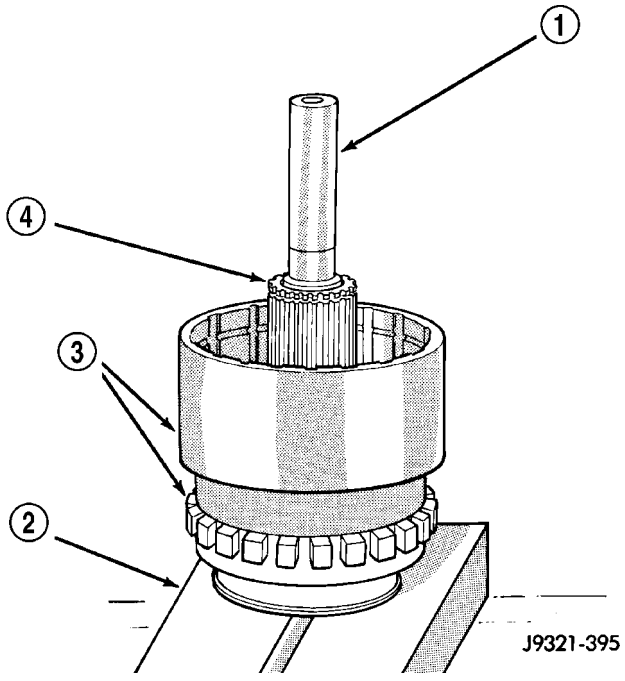


Fig. 162 Alignment Tool Installation

1 - SPECIAL TOOL 6227-2
2 - PRESS PLATES
3 - ASSEMBLED DRUM AND ANNULUS GEAR
4 - SUN GEAR

OVERDRIVE UNIT (Continued)

(16) Install direct clutch spring (Fig. 163). Be sure spring is properly seated on spring plate.

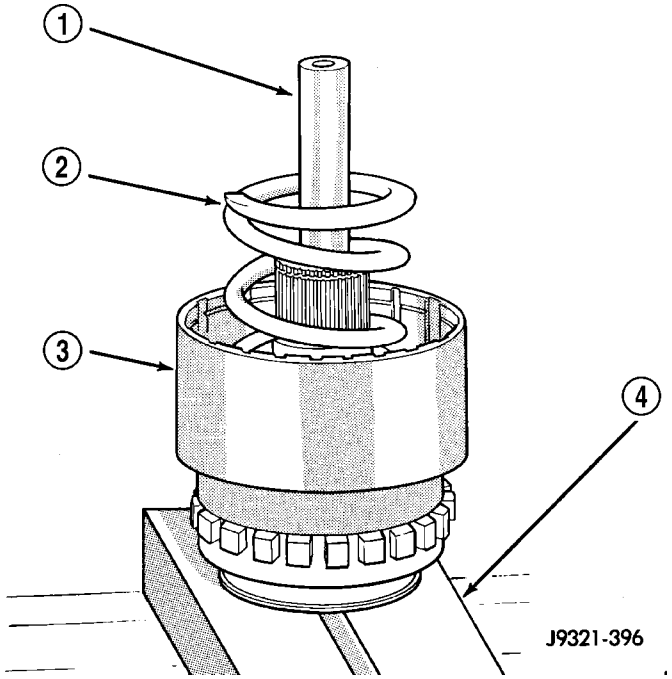


Fig. 163 Direct Clutch Spring Installation

1 - SPECIAL TOOL 6227-2
2 - DIRECT CLUTCH SPRING
3 - CLUTCH HUB
4 - PRESS PLATES

NOTE: The direct clutch in a 48RE transmission uses 23 single-sided clutch discs.

(17) Assemble and install direct clutch pack on hub as follows:

(a) 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. 164).

(b) Install first clutch disc with external lugs followed by a disc with internal spline teeth. Continue alternating internal and external discs until all discs have been installed.

(c) Install pressure plate. This is last clutch pack item to be installed. Be sure plate is installed with shoulder side facing upward (Fig. 165).

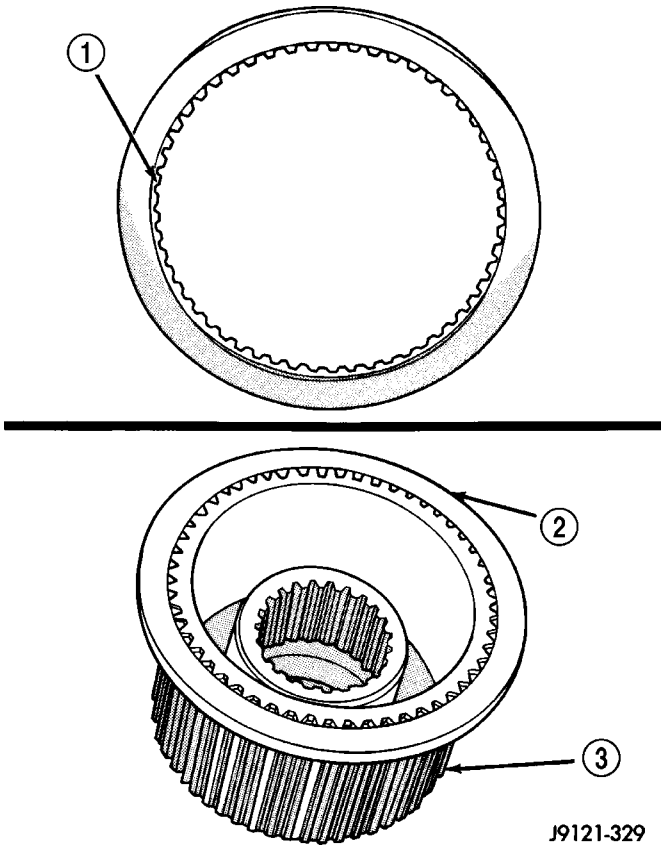


Fig. 164 Correct Position Of Direct Clutch Reaction Plate

1 - REACTION PLATE COUNTERBORE
2 - DIRECT CLUTCH REACTION PLATE (FLUSH WITH END OF HUB)
3 - CLUTCH HUB

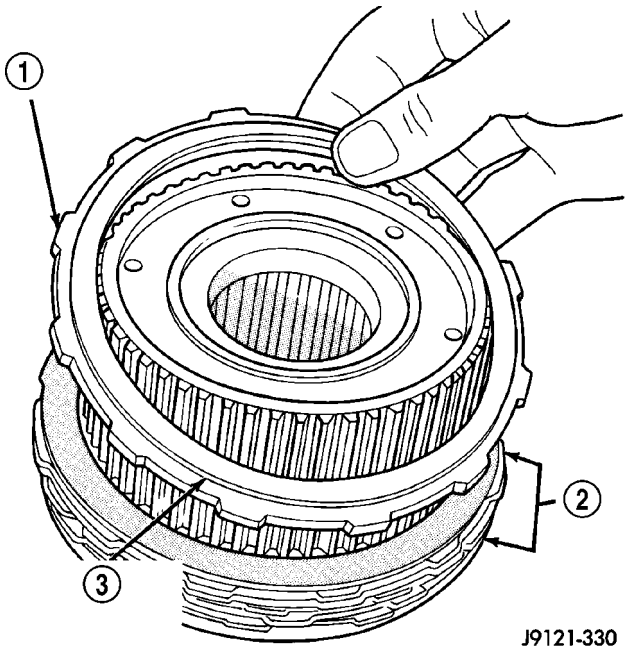


Fig. 165 Correct Position Of Direct Clutch

1 - DIRECT CLUTCH PRESSURE PLATE
2 - CLUTCH PACK
3 - BE SURE SHOULDER SIDE OF PLATE FACES UPWARD

OVERDRIVE UNIT (Continued)

(18) Install clutch hub and clutch pack on direct clutch spring (Fig. 166). Be sure hub is started on sun gear splines before proceeding.

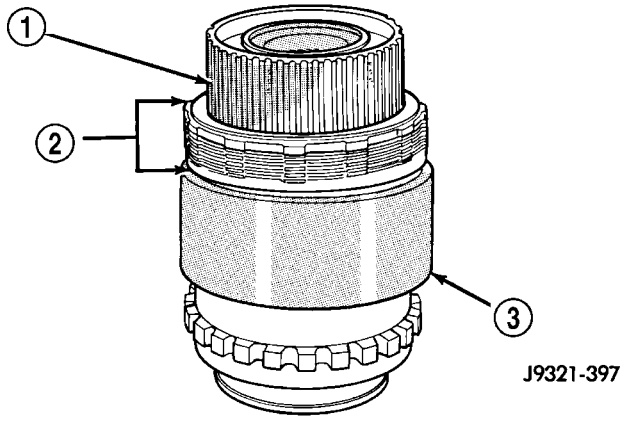


Fig. 166 Direct Clutch Pack And Clutch Hub Installation

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.

(19) Position Compressor Tool 6227-1 on clutch hub.

(20) Compress clutch hub and spring just enough to place tension on hub and hold it in place.

(21) 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.

(22) Realign clutch pack on hub and seat clutch discs and plates in clutch drum.

(23) Install direct clutch pack snap-ring (Fig. 167). Be very sure snap-ring is fully seated in clutch drum ring groove.

(24) Install clutch hub retaining ring (Fig. 168). Be very sure retaining ring is fully seated in sun gear ring groove.

(25) Slowly release press ram, remove compressor tools and remove geartrain assembly.

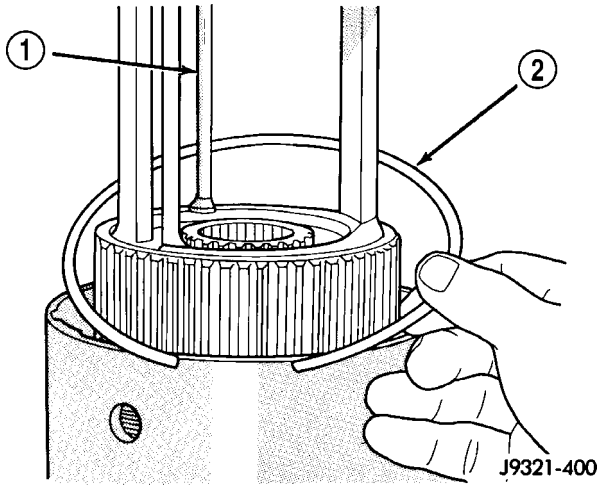


Fig. 167 Direct Clutch Pack Snap-Ring Installation

1 - SPECIAL TOOL 6227-1
2 - DIRECT CLUTCH PACK SNAP-RING

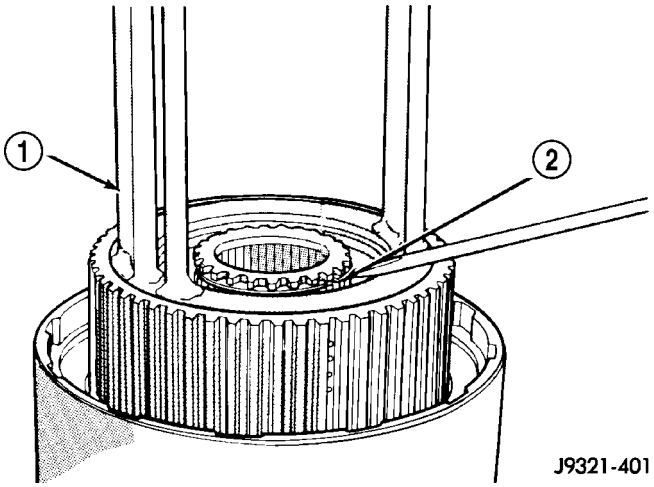


Fig. 168 Clutch Hub Retaining Ring Installation

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. 169). Be sure pin is seated in hole in case before installing snap-ring.

(4) Install reaction plug snap-ring (Fig. 170). Compress snap-ring only enough for installation; do not distort it.

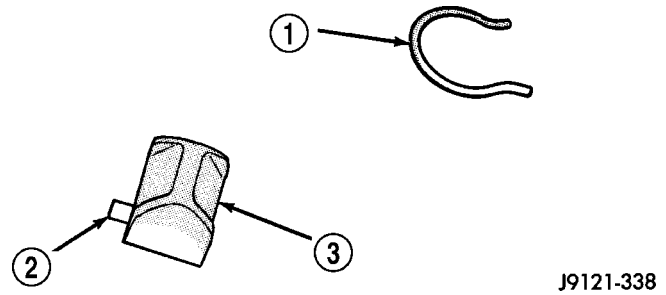


Fig. 169 Reaction Plug Locating Pin And Snap-Ring

1 - REACTION PLUG SNAP-RING (DO NOT OVERCOMPRESS TO INSTALL)
2 - LOCATING PIN
3 - PARK LOCK REACTION PLUG

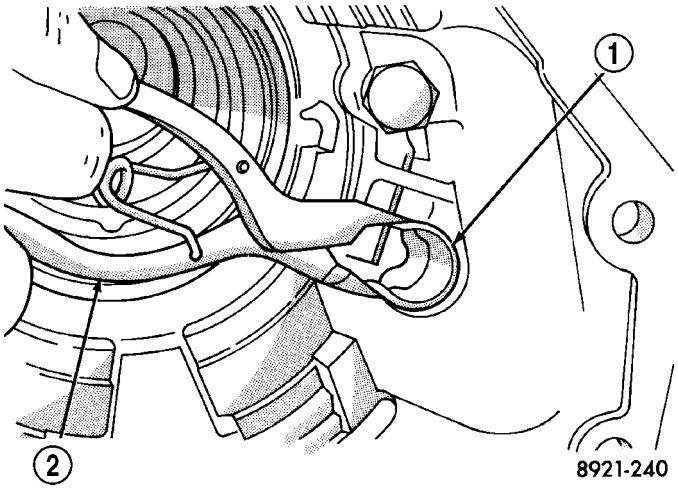


Fig. 170 Reaction Plug And Snap-Ring Installation

1 - REACTION PLUG SNAP-RING
2 - SNAP-RING PLIERS

(5) Verify that tab ends of rear bearing locating ring extend into access hole in gear case (Fig. 171).

(6) Support geartrain on Tool 6227-1 (Fig. 172). Be sure tool is securely seated in clutch hub.

(7) Install overdrive gear case on geartrain (Fig. 172).

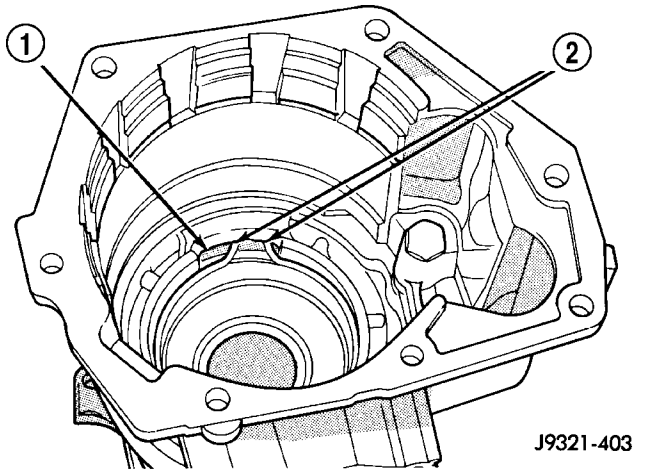


Fig. 171 Correct Rear Bearing Locating Ring Position

1 - CASE ACCESS HOLE
2 - TAB ENDS OF LOCATING RING

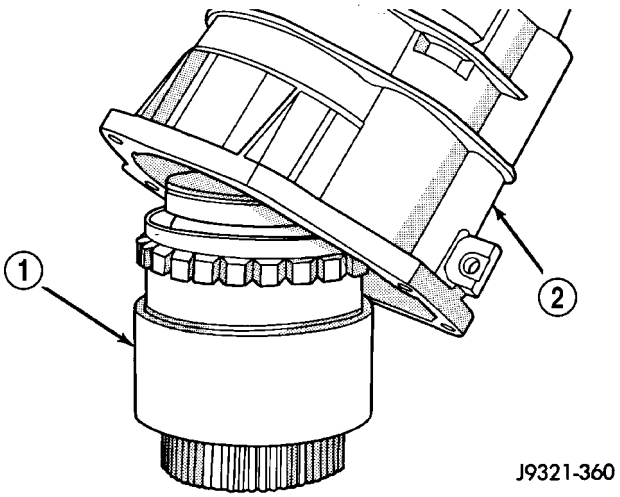


Fig. 172 Overdrive Gear Case Installation

1 - GEARTRAIN ASSEMBLY
2 - GEAR CASE

OVERDRIVE UNIT (Continued)

(8) Expand front bearing locating ring with snap-ring pliers (Fig. 173). Then slide case downward until locating ring locks in bearing groove and release snap-ring.

(9) Install locating ring access cover and gasket in overdrive unit case (Fig. 174).

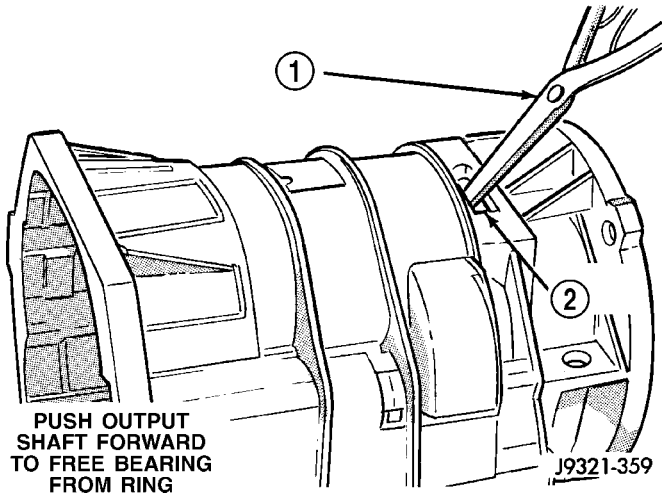


Fig. 173 Seating Locating Ring In Rear Bearing

1 - EXPAND BEARING LOCATING RING WITH SNAP-RING PLIERS
2 - ACCESS HOLE

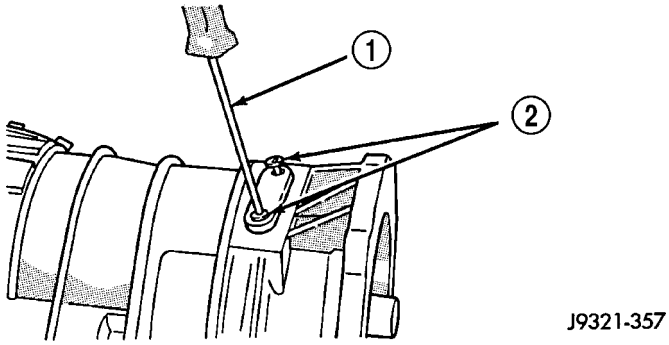


Fig. 174 Locating Ring Access Cover And Gasket Installation

1 - TORX SCREWDRIVER (T25)
2 - ACCESS COVER SCREWS

OVERDRIVE CLUTCH

NOTE: The overdrive clutch in a 48RE transmission uses 5 or 6 clutch discs depending on the application.

(1) Install overdrive clutch reaction ring first. Reaction ring is flat with notched ends (Fig. 175).

(2) For 5 disc overdrive clutch versions, install wave spring on top of reaction ring (Fig. 176). 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.

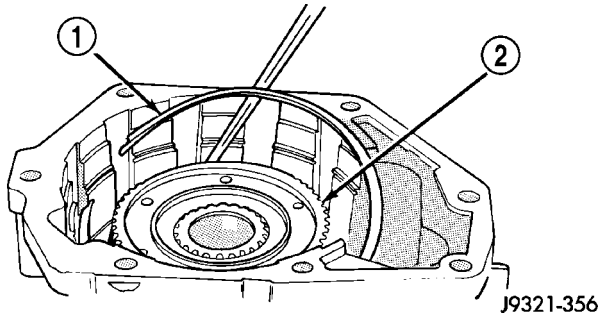


Fig. 175 Overdrive Clutch Reaction Ring Installation

1 - REACTION RING
2 - CLUTCH HUB

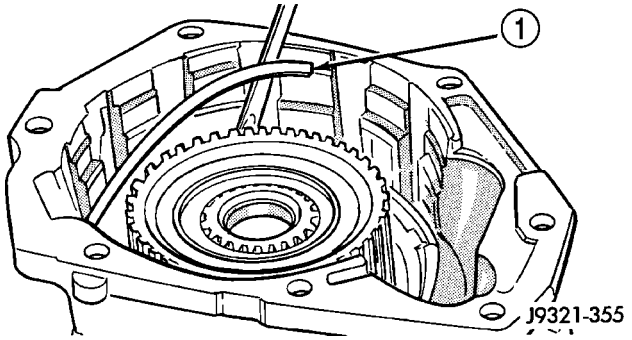


Fig. 176 Overdrive Clutch Wave Spring Installation - 5 Disc Clutch Only

1 - WAVE SPRING

(4) Install overdrive clutch reaction plate first.

(5) Install first clutch disc followed by first clutch plate. Then install remaining clutch discs and plates in same order.

(6) Install clutch pack pressure plate.

(7) Install clutch pack wire-type retaining ring (Fig. 177).

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)

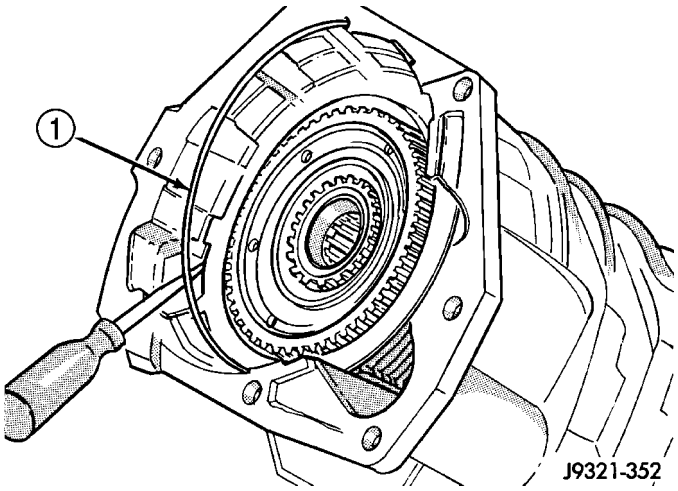


Fig. 177 Overdrive Clutch Pack Retaining Ring Installation

1 - OVERDRIVE CLUTCH PACK RETAINING RING

(b) Position Gauge Tool 6311 across face of overdrive case (Fig. 178). 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. 178).

(d) Select proper thickness end play spacer from spacer chart based on distance measured (Fig. 179).

(e) Remove Gauge Alignment Tool 6312.

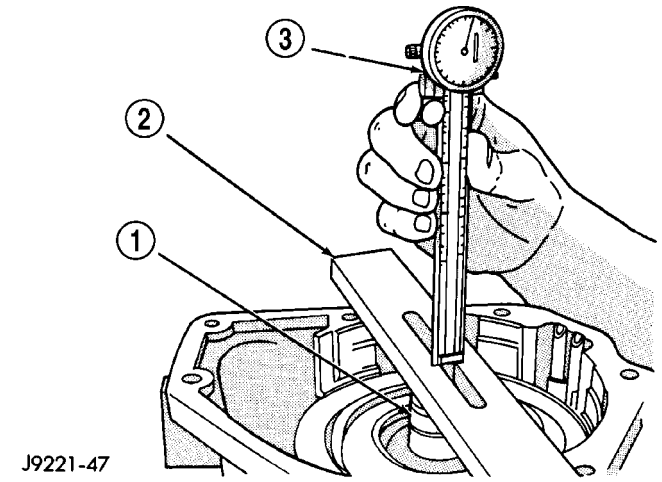


Fig. 178 Shaft End Play Measurement

1 - SPECIAL TOOL 6312
2 - SPECIAL TOOL 6311
3 - SPECIAL TOOL C-4962

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.

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. 179 Intermediate Shaft End Play Spacer Selection

(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. 180).

(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. 181).

(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.

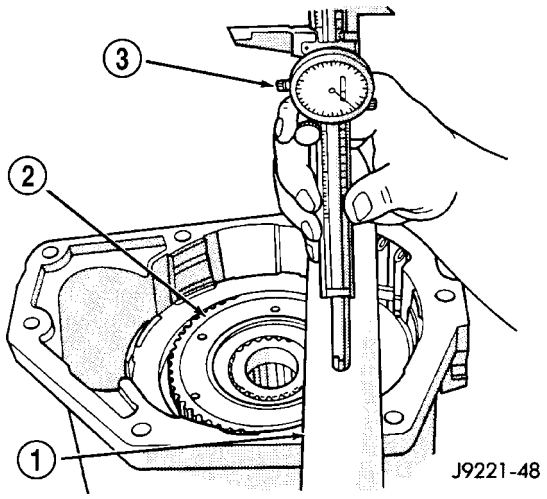


Fig. 180 Overdrive Piston Thrust Plate Measurement

1 - SPECIAL TOOL 6311
2 - DIRECT CLUTCH HUB THRUST BEARING SEAT
3 - SPECIAL TOOL C-4962

OVERDRIVE UNIT (Continued)

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. 181 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® ATF+4.

(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. 182).

(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.

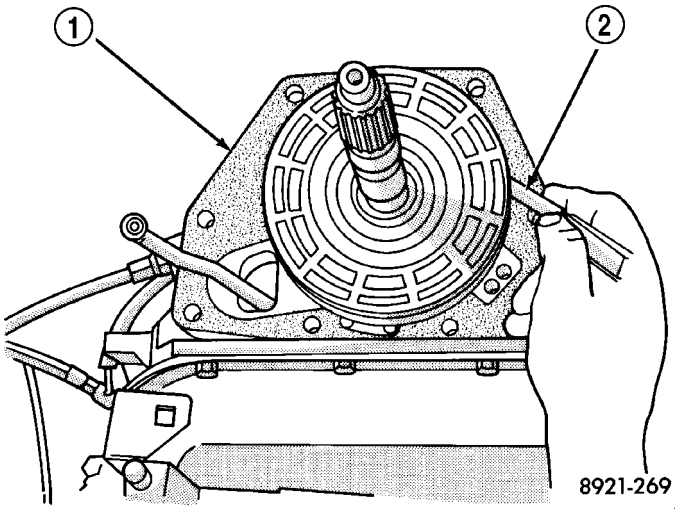


Fig. 182 Trimming Overdrive Case Gasket

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. 183).

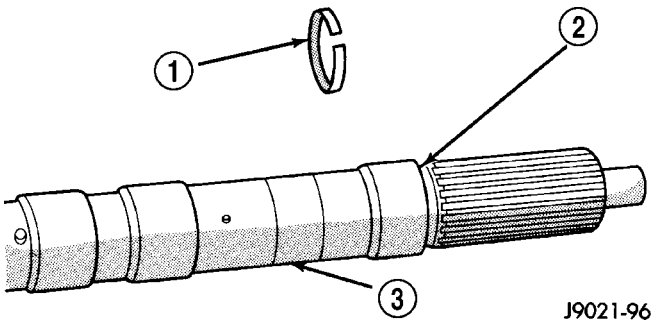


Fig. 183 Intermediate Shaft Selective Spacer Location

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 Align-

OVERDRIVE UNIT (Continued)

ment 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. 184) 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.

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.

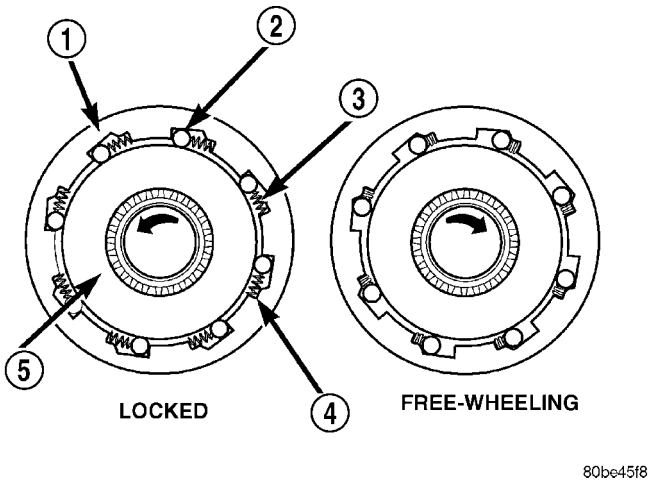


Fig. 184 Overrunning Clutch

1 - OUTER RACE (CAM)
2 - ROLLER
3 - SPRING
4 - SPRING RETAINER
5 - INNER RACE (HUB)

DISASSEMBLY

(1) Remove the overdrive piston (Fig. 185).
(2) Remove the overdrive piston retainer bolts.
(3) Remove overdrive piston retainer.
(4) Remove case gasket.

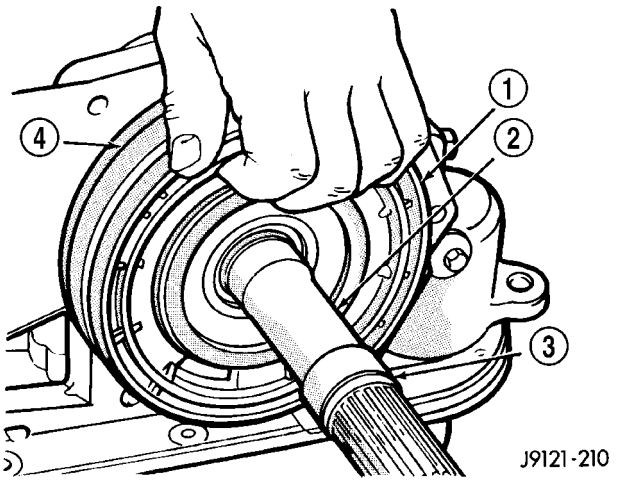


Fig. 185 Overdrive Piston Removal

1 - OVERDRIVE CLUTCH PISTON
2 - INTERMEDIATE SHAFT
3 - SELECTIVE SPACER
4 - PISTON RETAINER

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER (Continued)

(5) Tap old cam out of case with pin punch. Insert punch through bolt holes at rear of case (Fig. 186). 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.

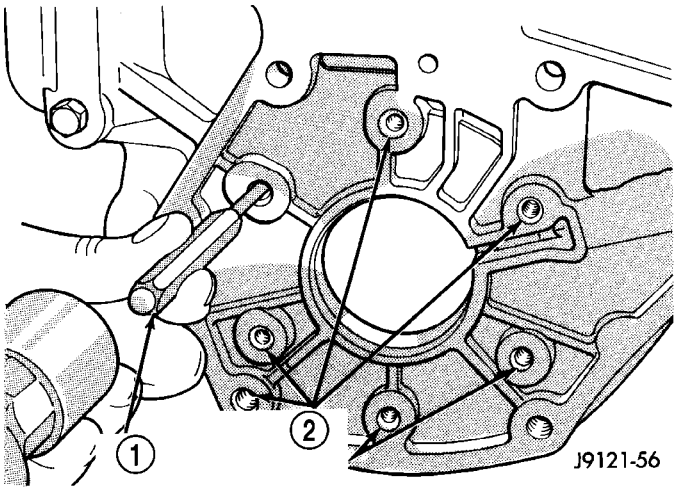


Fig. 186 Overrunning Clutch Cam

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. 187). 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. 187).

(4) Insert Adapter Tool SP-5124 into piston retainer (Fig. 188).

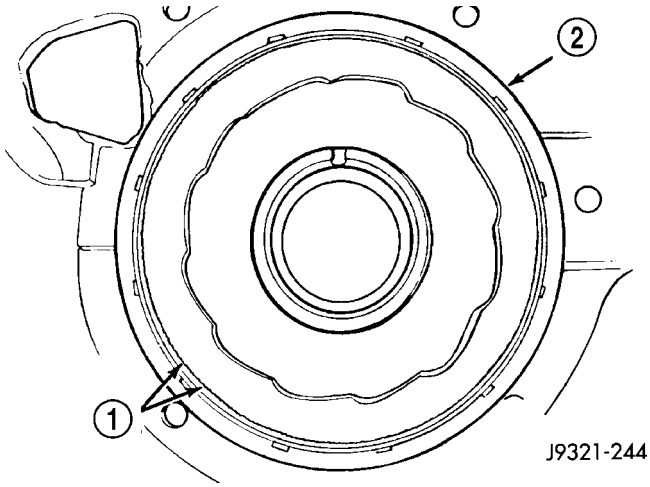


Fig. 187 Positioning Replacement Clutch Cam In Case

1 - ALIGN SERRATIONS ON CAM AND IN CASE
2 - CLUTCH CAM

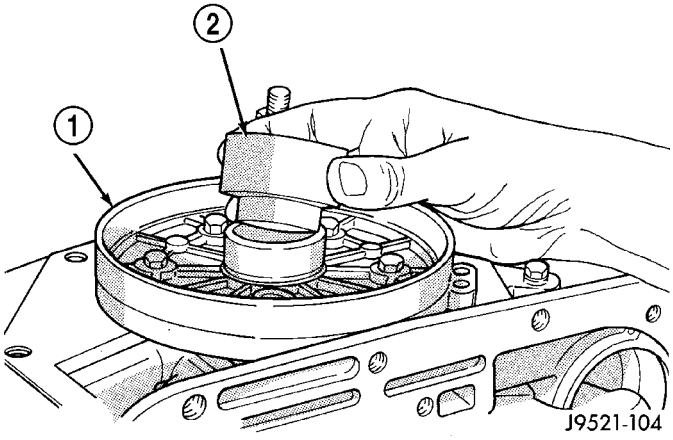


Fig. 188 Positioning Adapter Tool In Overdrive Piston Retainer

1 - PISTON RETAINER
2 - SPECIAL TOOL SP-5124

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER (Continued)

(5) Assemble Puller Bolt SP-3701 and Press Plate SP-3583-A (Fig. 189).

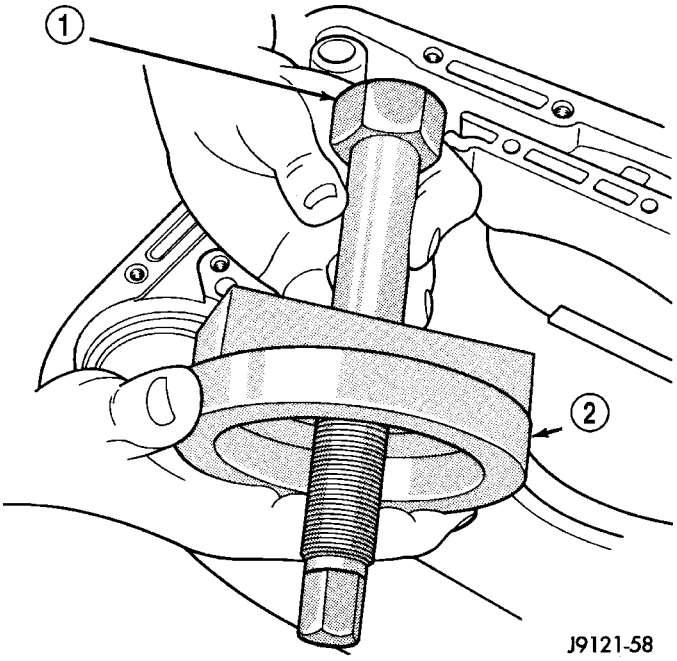


Fig. 189 Assembling Clutch Cam Puller Bolt And Press Plate

1 - PULLER BOLT SP-3701
2 - PRESS PLATE SP-3583-A

(6) Install assembled puller plate and bolt (Fig. 190). 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. 191).

(8) Tighten puller nut to press clutch cam into case (Fig. 191). 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.

(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.

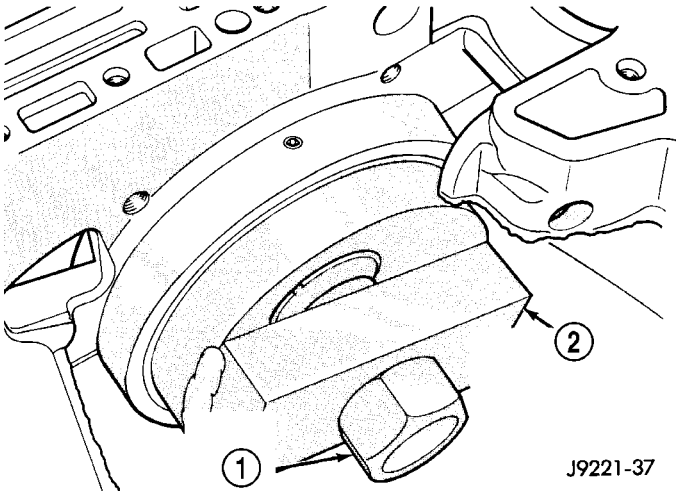


Fig. 190 Positioning Puller Plate On Clutch Cam

1 - SPECIAL TOOL SP-3701
2 - BE SURE PLATE SP-3583-A IS SEATED SQUARELY ON CAM

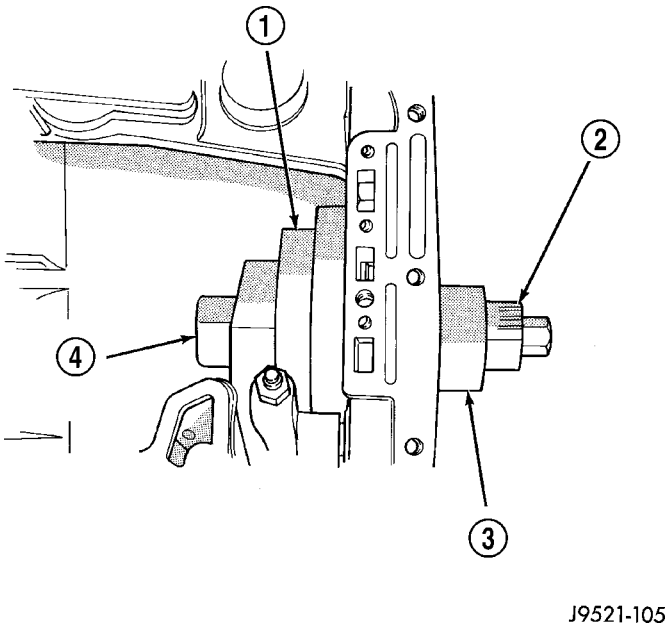


Fig. 191 Pressing Overrunning Clutch Cam Into Case

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

OVERRUNNING CLUTCH CAM/OVERDRIVE PISTON RETAINER (Continued)

(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. 192). 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. 193). Then install and tighten retainer bolts to 17 N·m (13 ft. lbs.) torque.

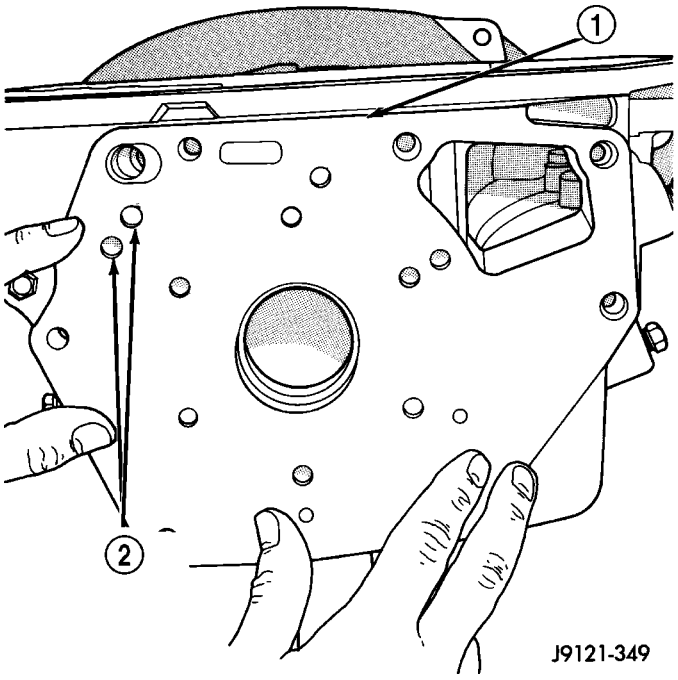


Fig. 192 Installing/Aligning Case Gasket

1 - CASE GASKET
2 - BE SURE GOVERNOR TUBE FEED HOLES IN CASE AND GASKET ARE ALIGNED

(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.

(c) Install piston over Seal Guide 8114-3 and inside Guide Ring 8114-1.

(d) Push overdrive piston into position in retainer.

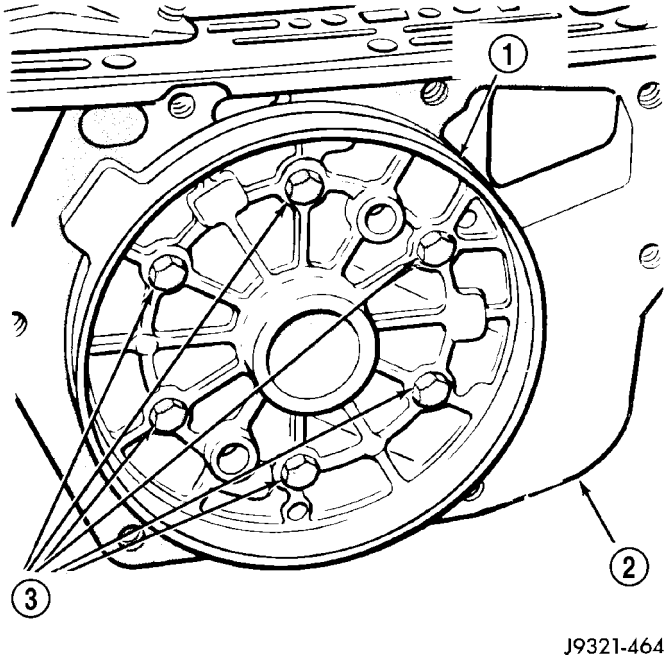


Fig. 193 Aligning Overdrive Piston Retainer

1 - PISTON RETAINER
2 - GASKET
3 - RETAINER BOLTS

(e) Verify that the locating lugs entered the lug bores in the retainer.

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."

PISTONS (Continued)

PRESSURE

Pressure (Fig. 194) 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.

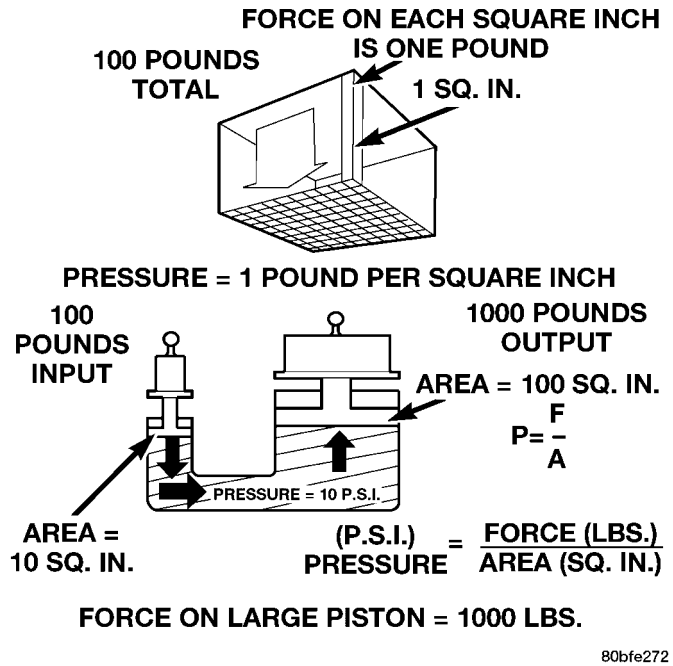


Fig. 194 Force and Pressure Relationship

PRESSURE ON A CONFINED FLUID

Pressure is exerted on a confined fluid (Fig. 195) 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.

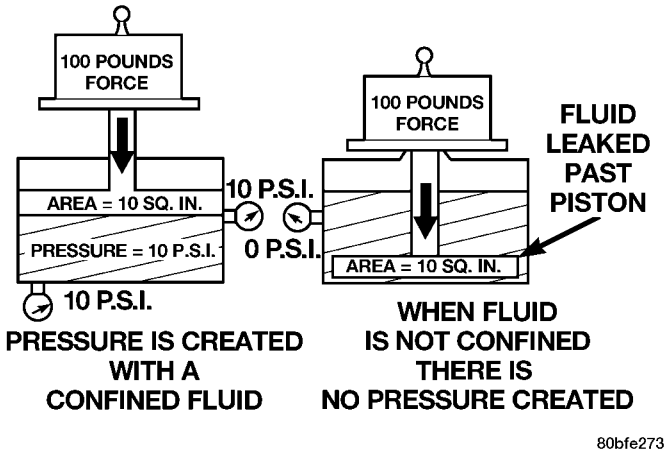


Fig. 195 Pressure on a Confined Fluid

FORCE MULTIPLICATION

Using the 10 PSI example used in the illustration (Fig. 196), 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. 196), 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.

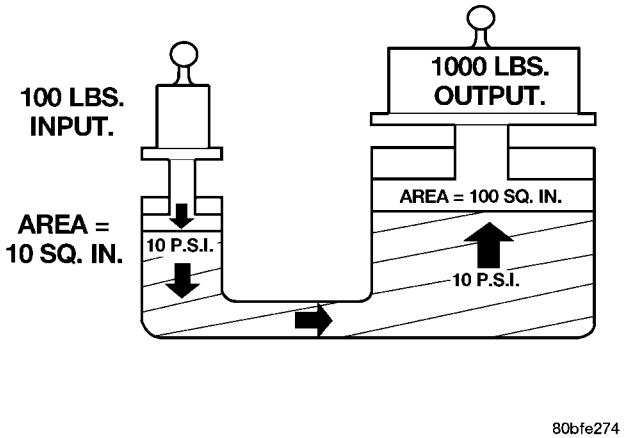
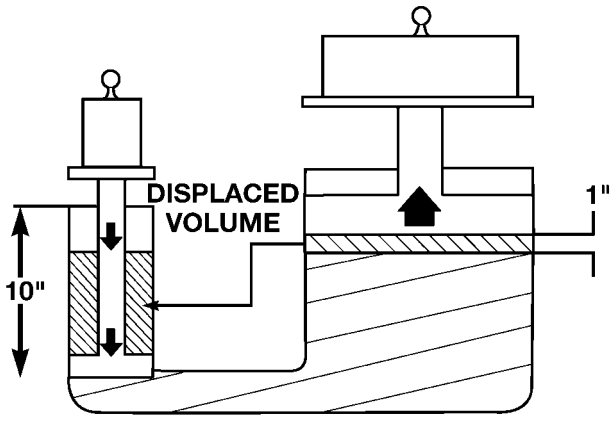


Fig. 196 Force Multiplication

PISTONS (Continued)

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. 197) 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.



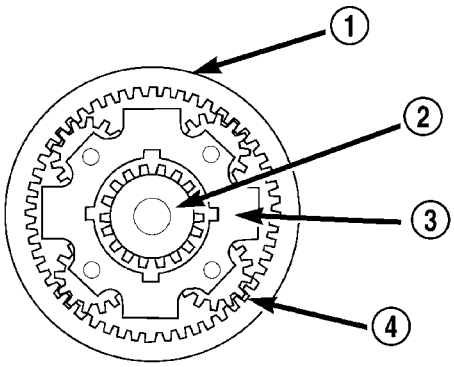
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Fig. 197 Piston Travel

PLANETARY GEARTRAIN/ OUTPUT SHAFT

DESCRIPTION

The planetary gearsets (Fig. 198) 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:



80be45f9

Fig. 198 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. 199). Discard snap-ring as it is not reusable.

(2) Remove front planetary gear and front annulus gear as assembly (Fig. 200).

(3) Remove front planetary gear and thrust washer from front annulus gear (Fig. 201). Note thrust washer position for assembly reference.

(4) Remove tabbed thrust washer from driving shell (Fig. 202). Note washer position for assembly reference.

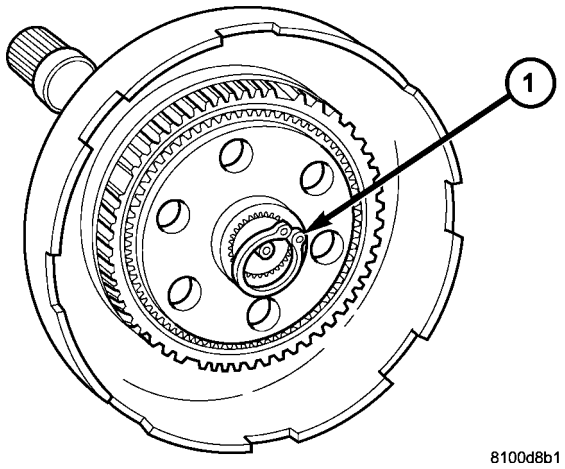


Fig. 199 Removing Planetary Snap-Ring

1 - PLANETARY SNAP-RING

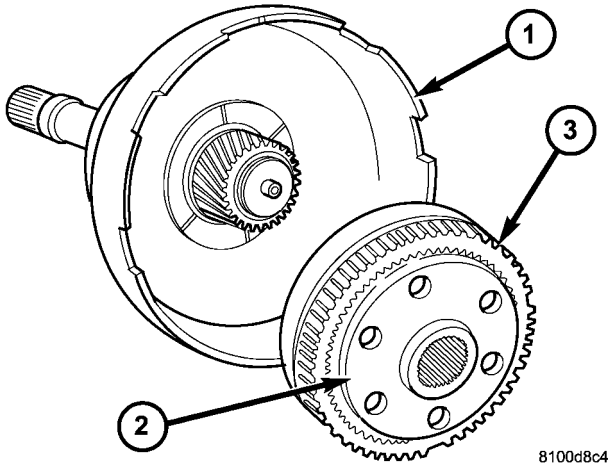


Fig. 200 Removing Front Planetary And Annulus Gears

1 - DRIVING SHELL
2 - FRONT ANNULUS GEAR
3 - FRONT PLANETARY GEAR

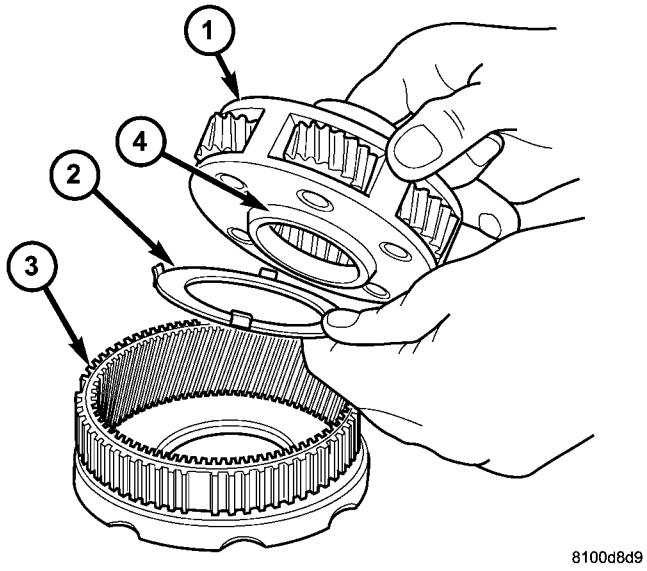


Fig. 201 Disassembling Front Planetary And Annulus Gears

1 - FRONT PLANETARY GEAR
2 - TABBED THRUST WASHER
3 - FRONT ANNULUS GEAR
4 - TORLON BUSHING

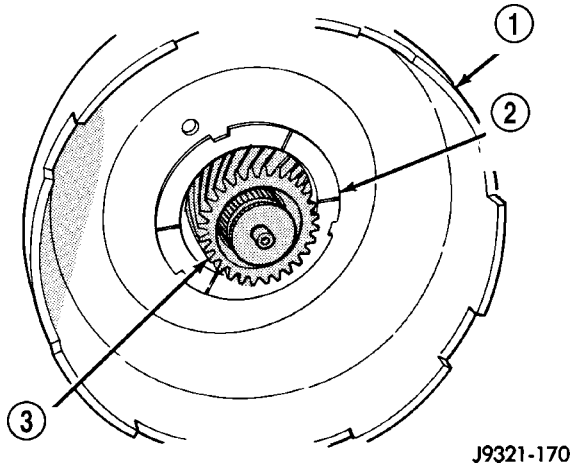


Fig. 202 Driving Shell Thrust Washer Removal

1 - DRIVING SHELL
2 - TABBED THRUST WASHER
3 - SUN GEAR

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

(5) Remove sun gear and driving shell as assembly (Fig. 203).

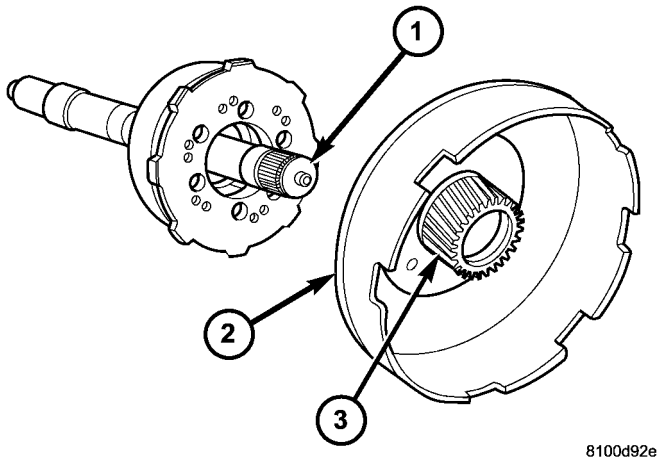


Fig. 203 Sun Gear And Driving Shell Removal

1 - INTERMEDIATE SHAFT
2 - DRIVING SHELL
3 - SUN GEAR

(6) Remove tabbed thrust washer from rear planetary gear (Fig. 204). Note washer position on gear for assembly reference.

(7) Remove rear planetary gear and rear annulus gear from intermediate shaft (Fig. 205).

(8) Remove thrust washer from rear planetary gear (Fig. 206).

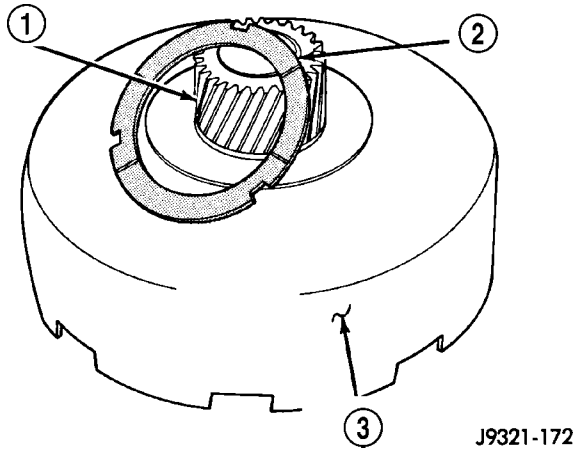


Fig. 204 Rear Planetary Thrust Washer Removal

1 - SUN GEAR
2 - REAR PLANETARY THRUST WASHER
3 - DRIVING SHELL

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.

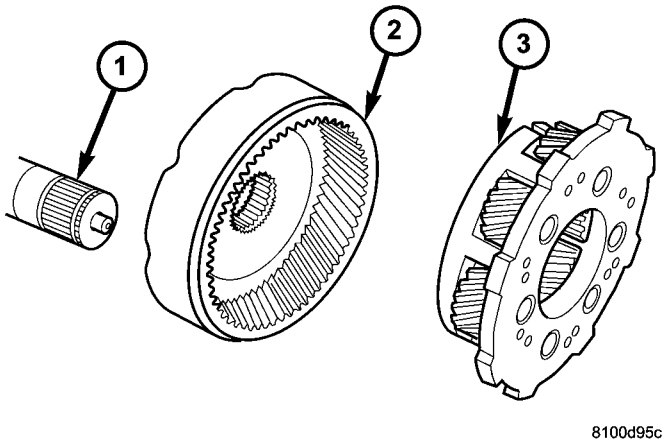


Fig. 205 Rear Planetary And Annulus Gear Removal

1 - INTERMEDIATE SHAFT
2 - REAR ANNULUS GEAR
3 - REAR PLANETARY GEAR

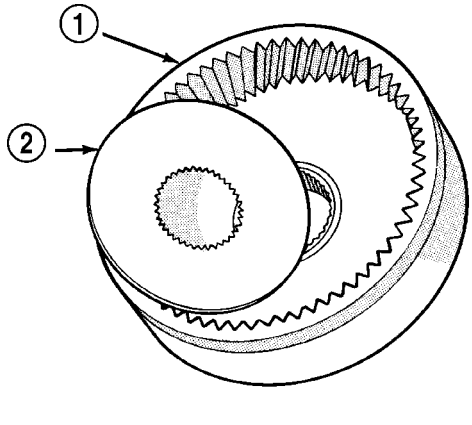


Fig. 206 Rear Annulus Thrust Washer Removal

1 - REAR ANNULUS GEAR
2 - THRUST WASHER

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.

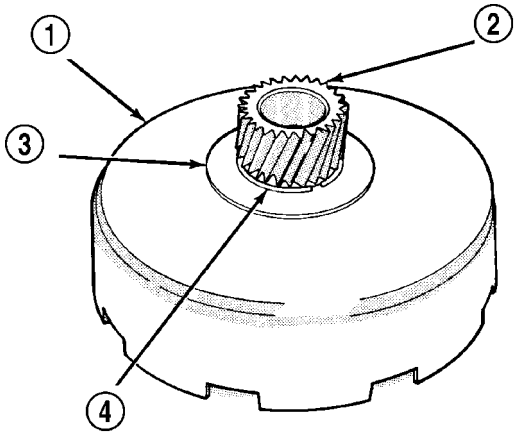
PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

ASSEMBLY

(1) Lubricate sun gear and planetary gears with transmission fluid during assembly. Use petroleum jelly to lubricate intermediate shaft bushing surfaces, thrust washers and thrust plates and to hold these parts in place during assembly.

(2) Install front snap-ring on sun gear and install gear in driving shell. Then install thrust plate over sun gear and against rear side of driving shell (Fig. 207). Install rear snap-ring to secure sun gear and thrust plate in driving shell. Note that the large ID chamfer on the sun gear goes forward.

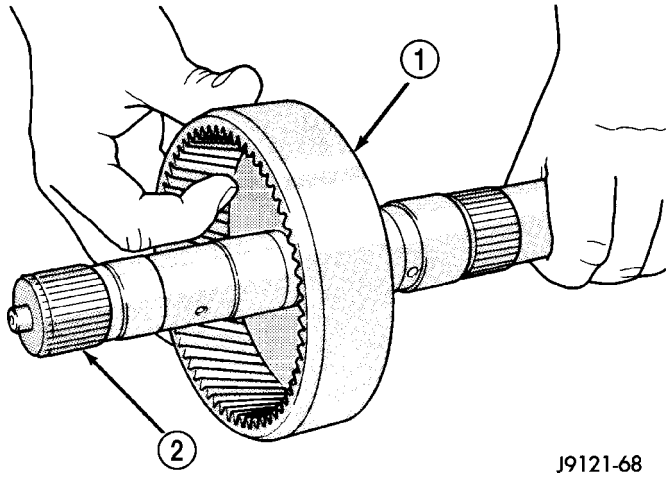
(3) Install rear annulus gear on intermediate shaft (Fig. 208).



J9321-175

Fig. 207 Sun Gear Installation

1 - DRIVING SHELL
2 - SUN GEAR
3 - THRUST PLATE
4 - SUN GEAR REAR RETAINING RING

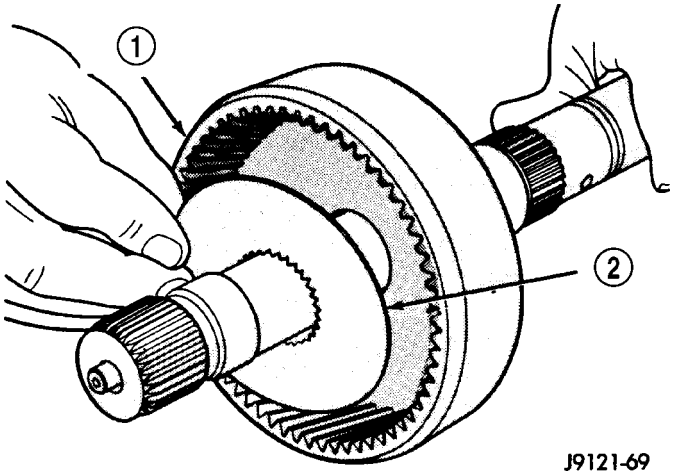


J9121-68

Fig. 208 Installing Rear Annulus Gear On Intermediate Shaft

1 - REAR ANNULUS GEAR
2 - OUTPUT SHAFT

(4) Install thrust washer to rear planetary gear (Fig. 209) using petroleum jelly. Be sure washer is seated against corner witht teh tabs completely in the locating holes.

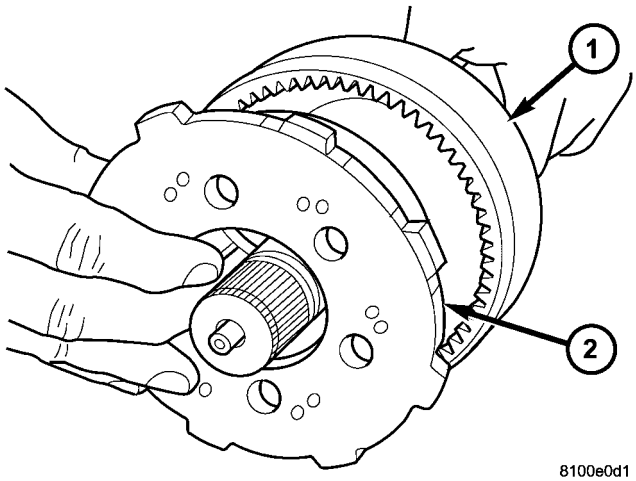


J9121-69

Fig. 209 Installing Rear Annulus Thrust Washer

1 - REAR ANNULUS GEAR
2 - THRUST WASHER

(5) Install rear planetary gear in rear annulus gear (Fig. 210). Be sure planetary carrier is seated against annulus gear.



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Fig. 210 Installing Rear Planetary Gear

1 - REAR ANNULUS GEAR
2 - REAR PLANETARY GEAR

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

(6) Install tabbed thrust washer on front face of rear planetary gear (Fig. 211). 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. 212). 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. 213), be sure washer tabs are seated in tab slots of driving shell. Use extra petroleum jelly to hold washer in place if desired.

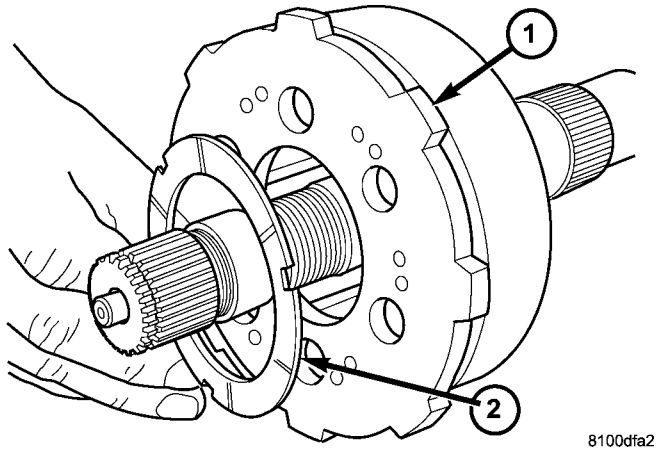


Fig. 211 Installing Rear Planetary Thrust Washer

1 - REAR PLANETARY GEAR
2 - TABBED THRUST WASHER

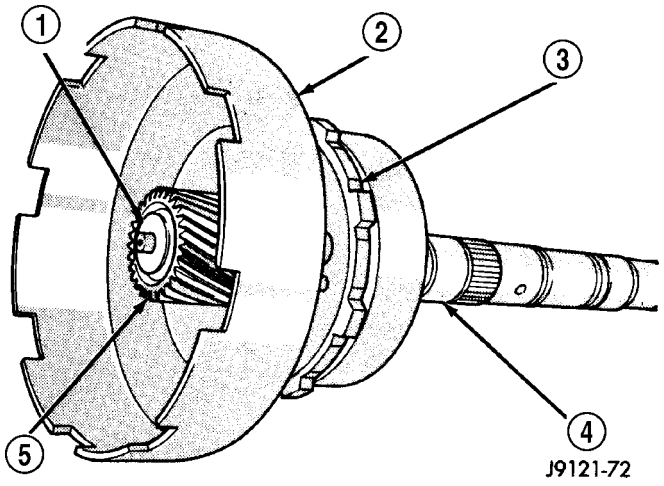


Fig. 212 Installing Sun Gear And Driving Shell

1 - OUTPUT SHAFT
2 - DRIVING SHELL
3 - REAR PLANETARY GEAR
4 - OUTPUT SHAFT
5 - SUN GEAR

(10) Install tabbed thrust washer on front planetary gear (Fig. 214). Seat washer tabs in matching

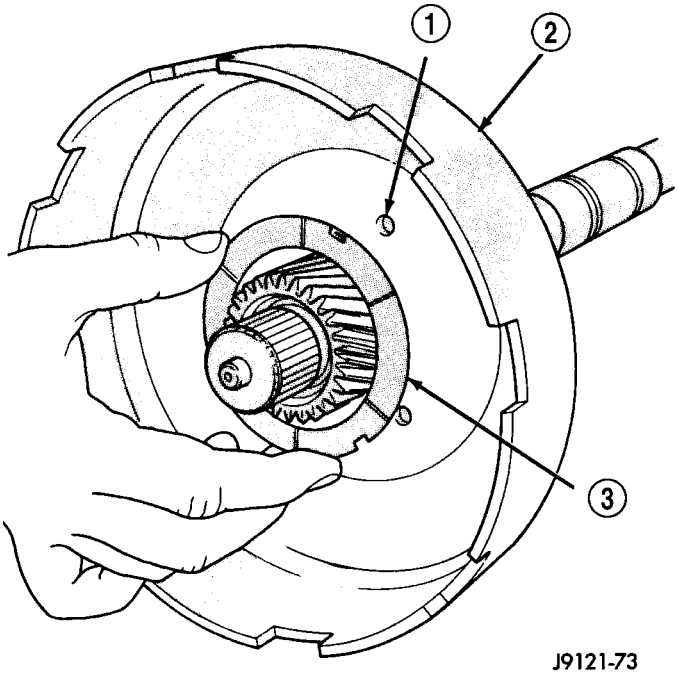


Fig. 213 Installing Driving Shell Thrust Washer

1 - TAB SLOTS (3)
2 - DRIVING SHELL
3 - TABBED THRUST WASHER

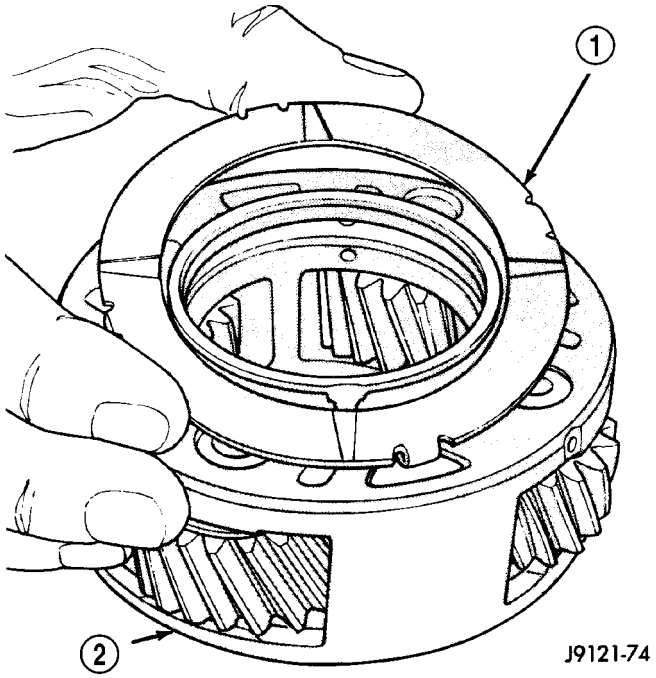


Fig. 214 Installing Thrust Washer On Front Planetary Gear

1 - TABBED THRUST WASHER
2 - FRONT PLANETARY GEAR

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

slots in face of gear carrier. Use extra petroleum jelly to hold washer in place if desired.

(11) Install the torlon bushing onto the front planetary carrier hub.

(12) Install front annulus gear over and onto front planetary gear (Fig. 215). Be sure gears are fully meshed and seated.

(13) Install front planetary and annulus gear assembly (Fig. 216). 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.

(14) 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.

(15) Install new planetary snap-ring in groove at end of intermediate shaft (Fig. 217).

(16) 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.

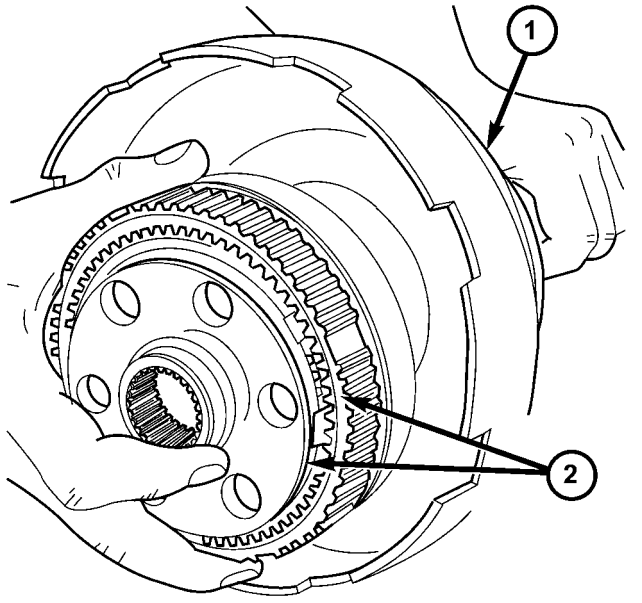


Fig. 216 Installing Front Planetary And Annulus Gear Assembly

1 - DRIVING SHELL
2 - ASSEMBLED FRONT PLANETARY AND ANNULUS GEARS

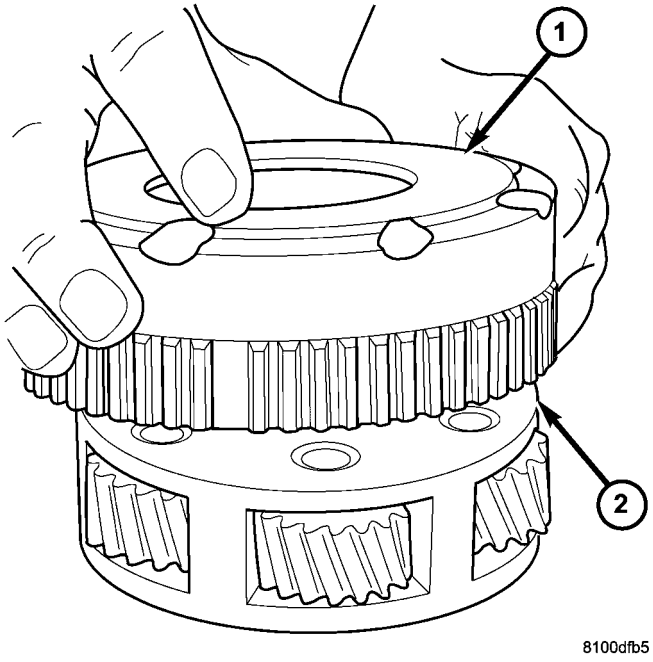


Fig. 215 Assembling Front Planetary And Annulus Gears

1 - FRONT ANNULUS GEAR
2 - FRONT PLANETARY GEAR

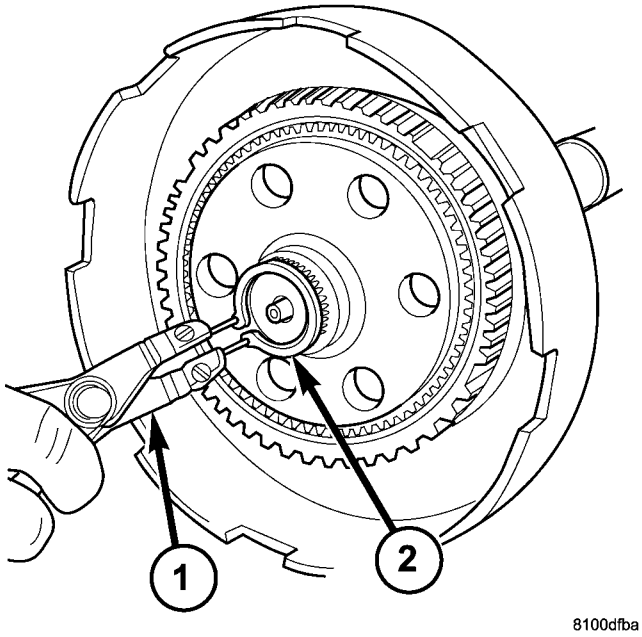


Fig. 217 Installing Planetary Snap

1 - SNAP-RING PLIERS
2 - PLANETARY SNAP-RING

PLANETARY GEARTRAIN/OUTPUT SHAFT (Continued)

(17) Check planetary geartrain end play with feeler gauge (Fig. 218). 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.).

(18) If end play is incorrect, install thinner/thicker planetary snap-ring as needed.

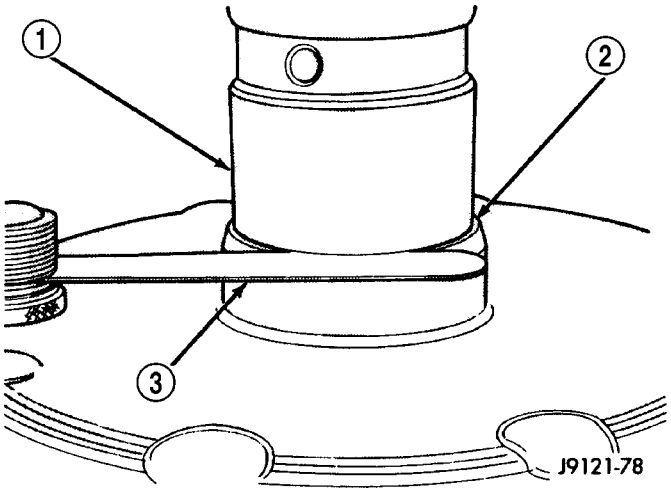


Fig. 218 Checking Planetary Geartrain End Play

1 - OUTPUT SHAFT
2 - REAR ANNULUS GEAR
3 - FEELER GAUGE

REAR CLUTCH

DESCRIPTION

The rear clutch assembly (Fig. 219) 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.

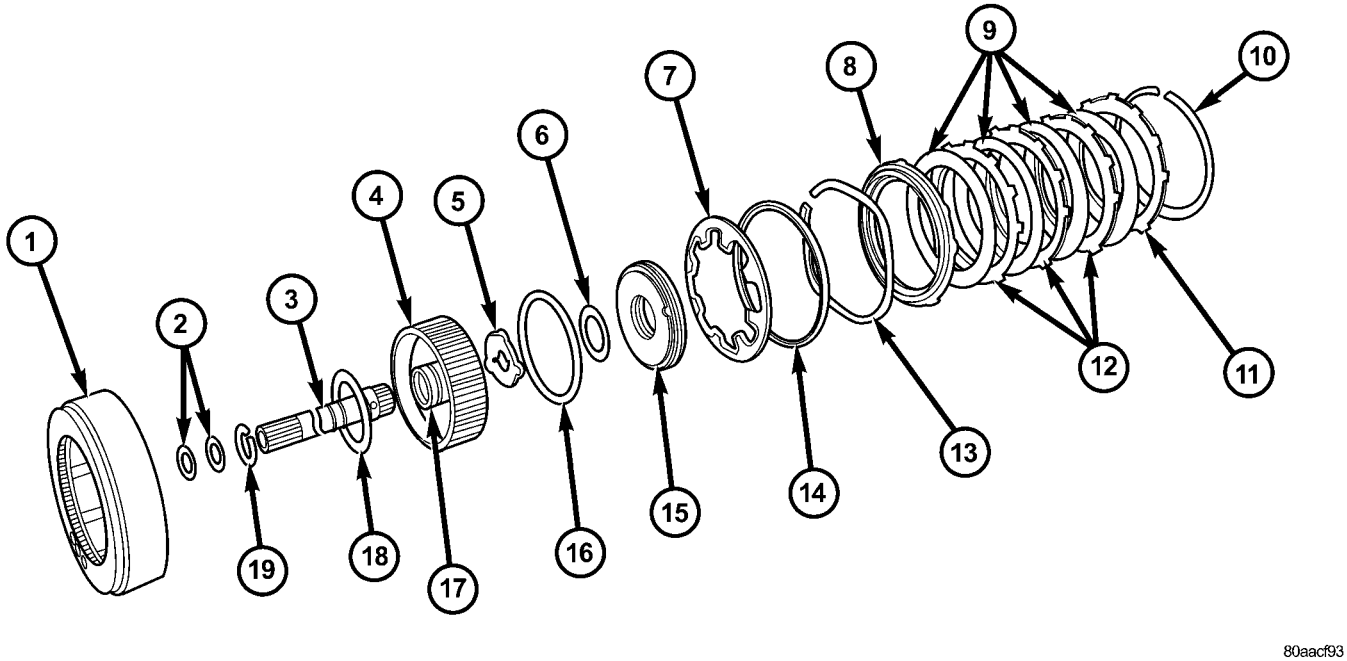


Fig. 219 Rear Clutch Components

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)

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.

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. 220).

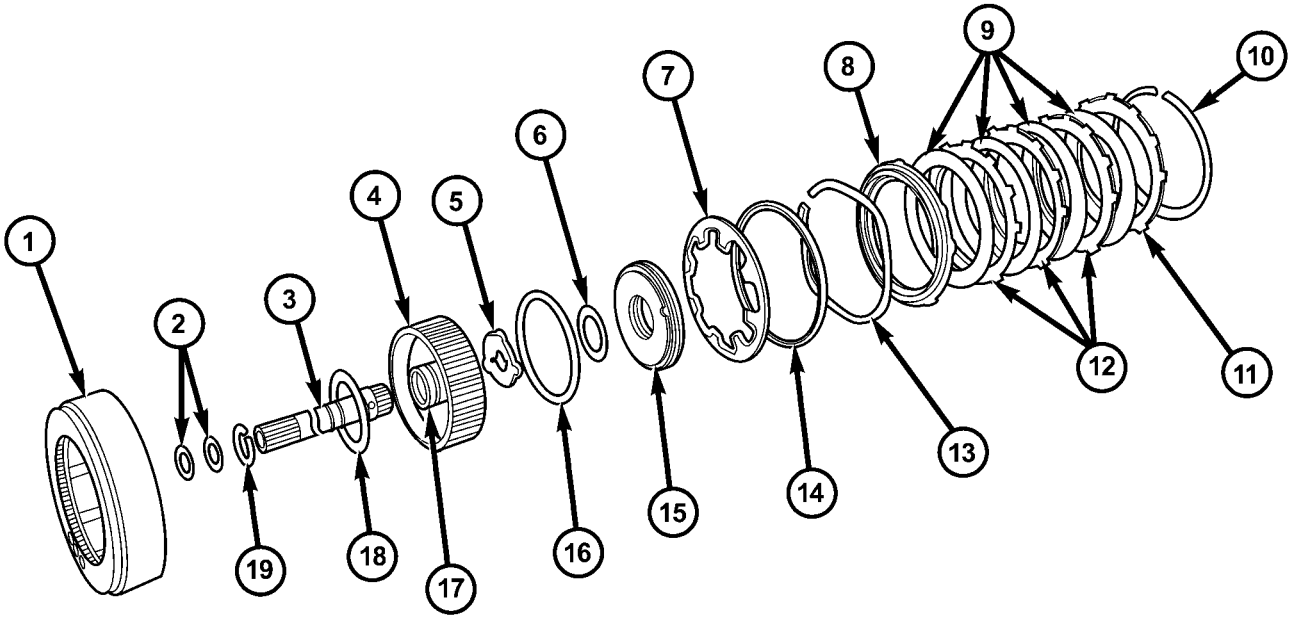
(4) Remove the reaction plate, clutch discs, steel plates, pressure plate, wave spring, spacer ring, and piston spring (Fig. 220).

(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.



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Fig. 220 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. 221). 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.

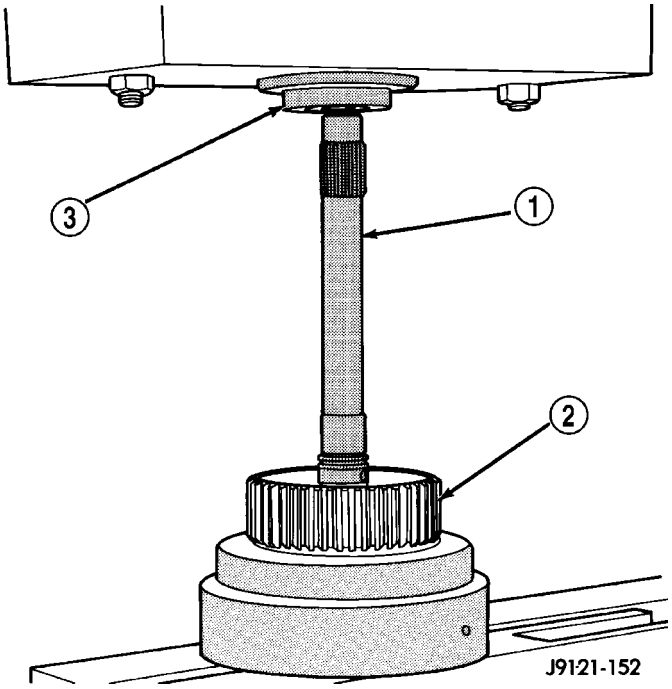


Fig. 221 Pressing Input Shaft Into Rear Clutch Retainer

1 - INPUT SHAFT
2 - REAR CLUTCH RETAINER
3 - PRESS RAM

(11) Install pressure plate (Fig. 220). 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

REAR CLUTCH (Continued)

by a clutch disc until entire clutch pack is installed (4 discs and 3 plates are required) (Fig. 220).

(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. 222).

(a) Position gauge bar across the clutch drum with the dial indicator pointer on the pressure plate (Fig. 222).

(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. 223). Use enough petroleum jelly to hold washer in place.

(17) Set rear clutch aside for installation during final assembly.

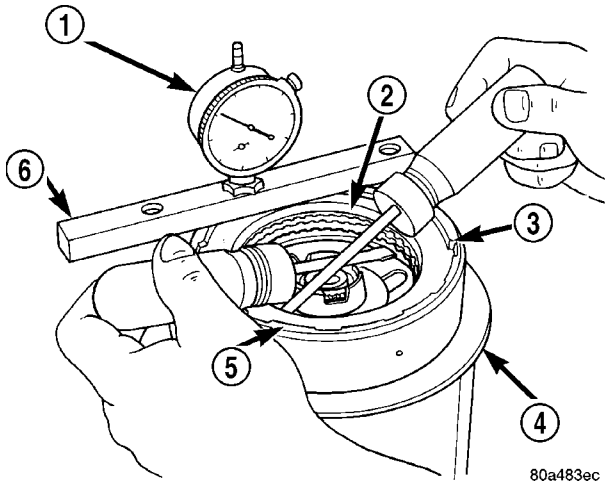


Fig. 222 Checking Rear Clutch Pack Clearance

1 - DIAL INDICATOR
2 - PRESSURE PLATE
3 - SNAP-RING
4 - STAND
5 - REAR CLUTCH
6 - GAUGE BAR

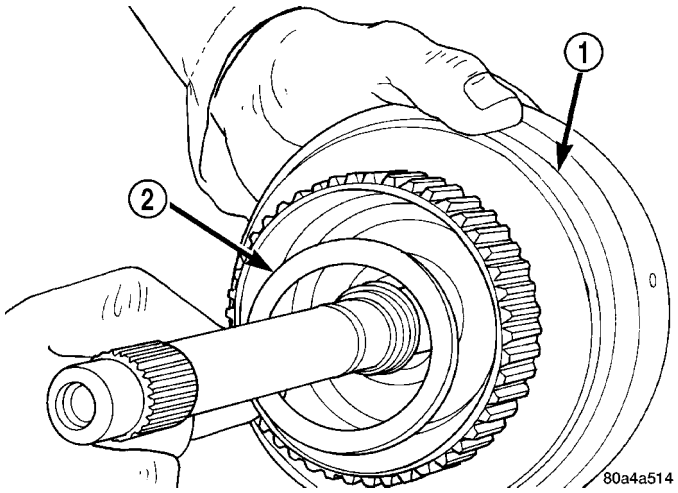


Fig. 223 Installing Rear Clutch Thrust Washer

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.

REAR SERVO (Continued)

DISASSEMBLY

(1) Remove small snap-ring and remove plug and spring from servo piston (Fig. 224).

(2) Remove and discard servo piston seal ring.

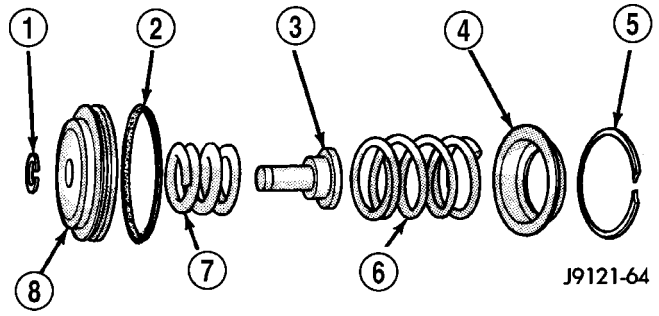


Fig. 224 Rear Servo Components

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. 225). Then clean the servo components with solvent and dry with compressed air. Replace either spring if collapsed, distorted or broken. Replace the plug and piston if cracked, bent, or worn. Discard the servo snap-rings and use new ones at assembly.

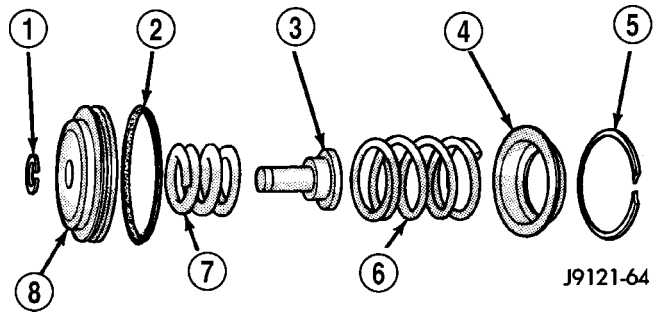


Fig. 225 Rear Servo Components

1 - SNAP-RING
2 - PISTON SEAL
3 - PISTON PLUG
4 - SPRING RETAINER
5 - SNAP-RING
6 - PISTON SPRING
7 - CUSHION SPRING
8 - PISTON

ASSEMBLY

(1) Lubricate piston and guide seals (Fig. 226) with petroleum jelly. Lubricate other servo parts with Mopar® ATF +4, Automatic 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.

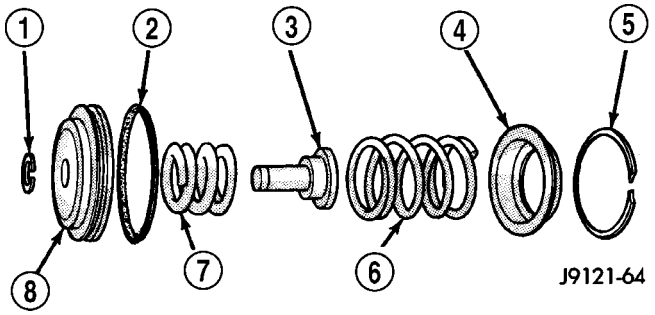


Fig. 226 Rear Servo Components

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).

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:

1. Increase the amount of current applied to the coil or
2. 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. 227) is located in the overdrive gear case. The sensor is positioned over the park gear and monitors transmission output shaft rotating speed.

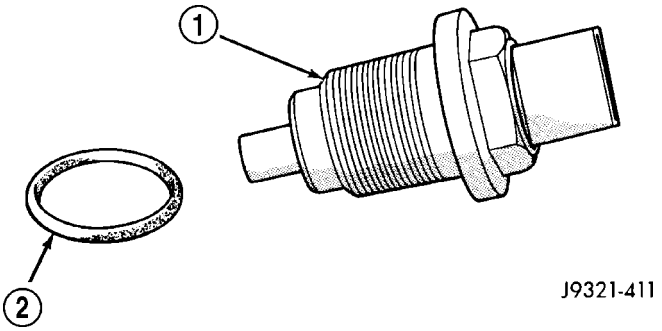


Fig. 227 Transmission Output Speed Sensor

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. 228) 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.

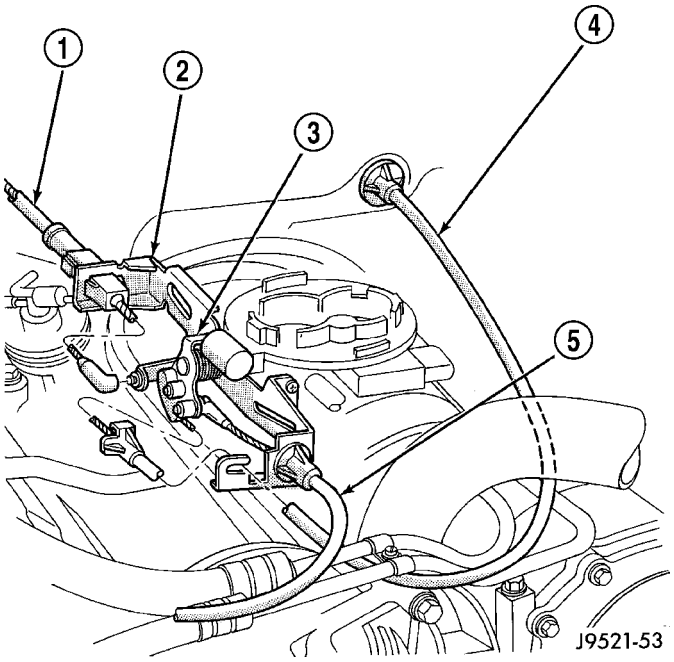


Fig. 228 Throttle Valve Cable Attachment - At Engine

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. 229). 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.

ADJUSTMENTS - 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.

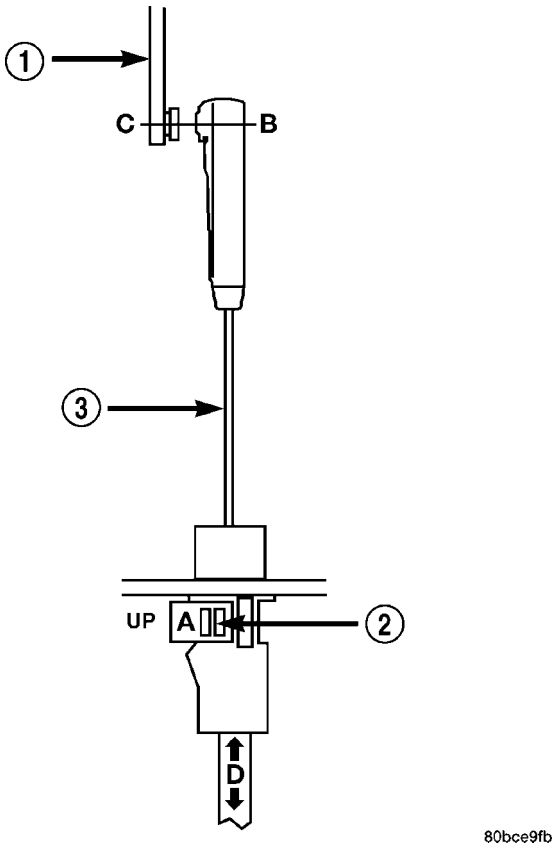


Fig. 229 Throttle Valve Cable at Throttle Linkage

1 - THROTTLE LINKAGE
2 - THROTTLE VALVE CABLE LOCKING CLIP
3 - THROTTLE VALVE CABLE

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. 230). Then verify that the transmission throttle lever (Fig. 231) is also at idle (fully forward) position.

(4) Slide cable off attachment stud on throttle body lever.

(5) Compare position of cable end to attachment stud on throttle body lever:

- Cable end and attachment stud should be aligned (or centered on one another) to within 1 mm (0.039 in.) in either direction (Fig. 232).
- 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.

THROTTLE VALVE CABLE (Continued)

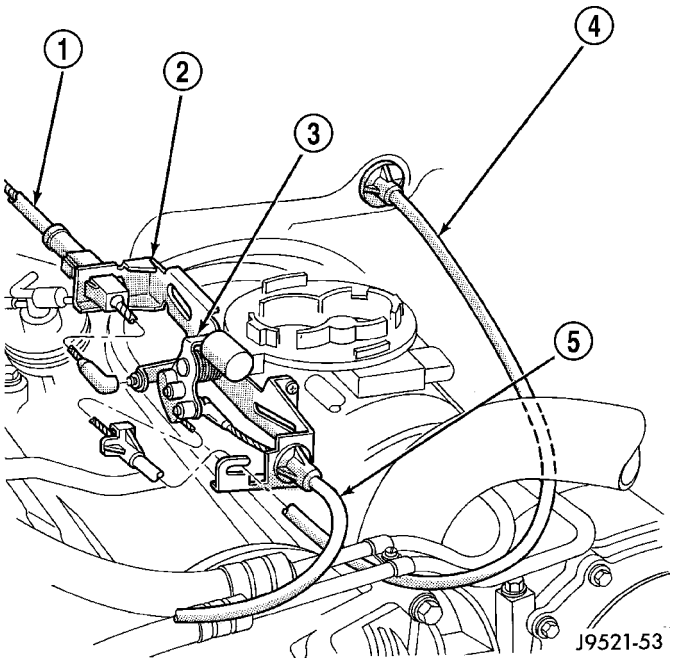


Fig. 230 Throttle Valve Cable Attachment - At Engine

1 - THROTTLE VALVE CABLE
2 - CABLE BRACKET
3 - THROTTLE BODY LEVER
4 - ACCELERATOR CABLE
5 - SPEED CONTROL CABLE

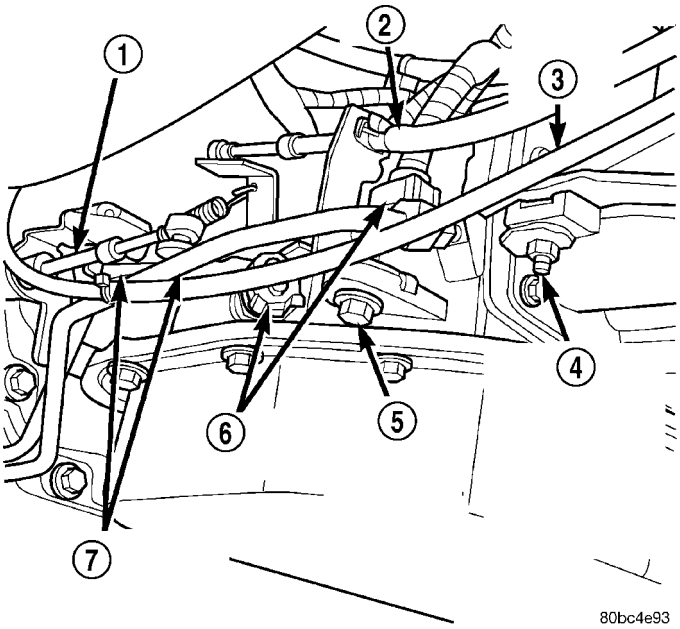


Fig. 231 Throttle Valve Cable at Transmission

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

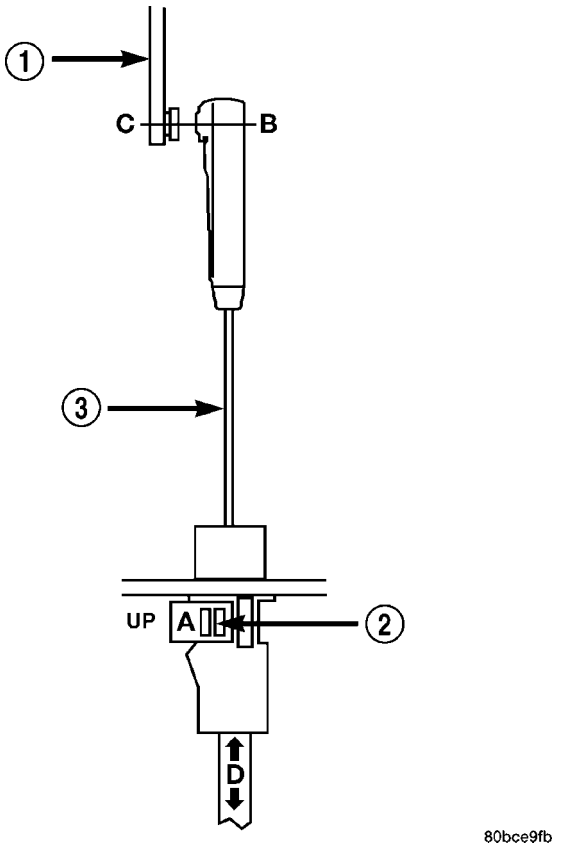


Fig. 232 Throttle Valve Cable at Throttle Linkage

1 - THROTTLE LINKAGE
2 - THROTTLE VALVE CABLE LOCKING CLIP
3 - THROTTLE VALVE CABLE

- 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.**
(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. 232). 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**

THROTTLE VALVE CABLE (Continued)

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. 232).

(7) While holding the T.V. cable in the set position push the T.V. cable lock (A) into the down position (Fig. 232). 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.

TORQUE CONVERTER

DESCRIPTION

The torque converter (Fig. 233) 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.

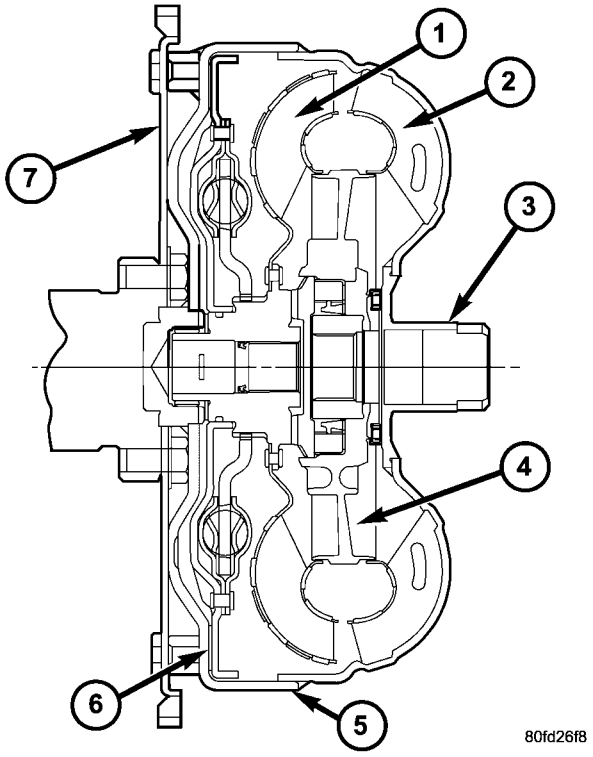


Fig. 233 Torque Converter Assembly

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. 234) 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.

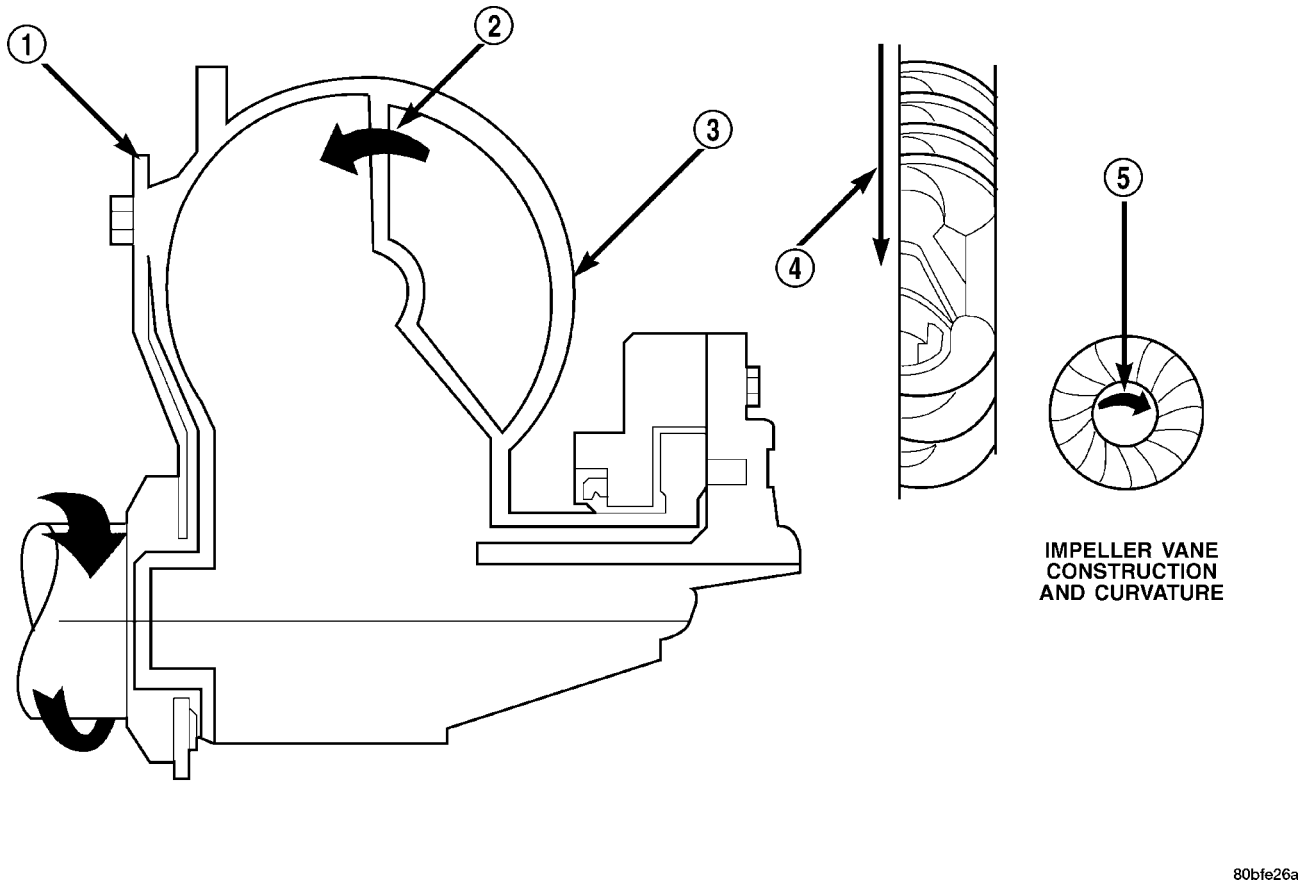


Fig. 234 Impeller

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. 235) 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.

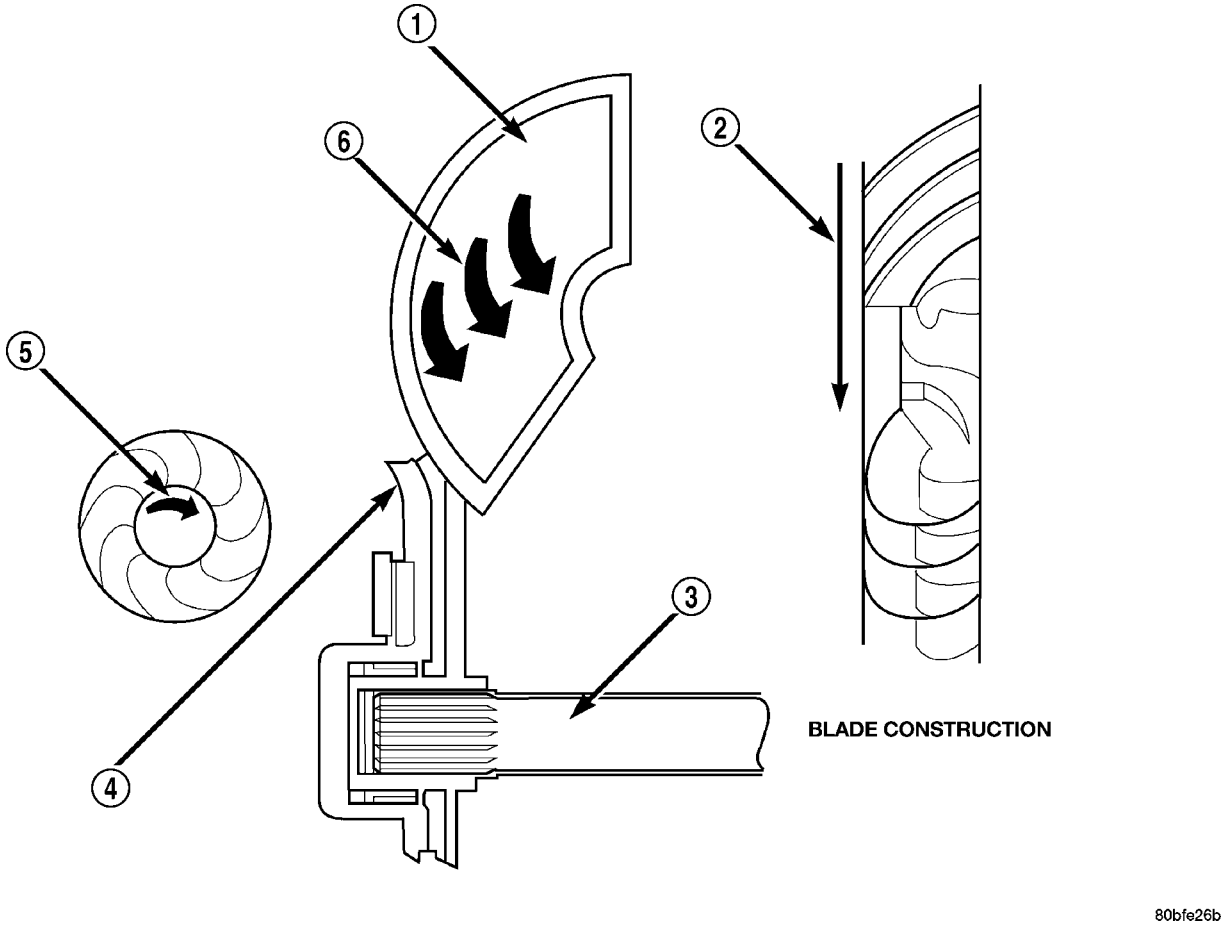


Fig. 235 Turbine

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. 236) 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. 237). 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.

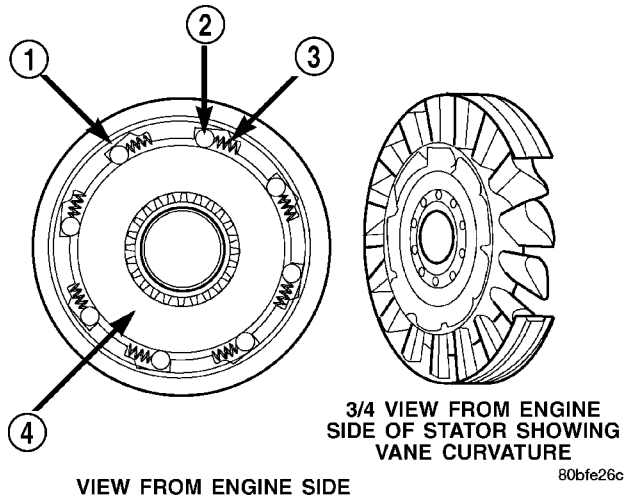


Fig. 236 Stator Components

1 - CAM (OUTER RACE)
2 - ROLLER
3 - SPRING
4 - INNER RACE

TORQUE CONVERTER CLUTCH (TCC)

The TCC (Fig. 238) 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.

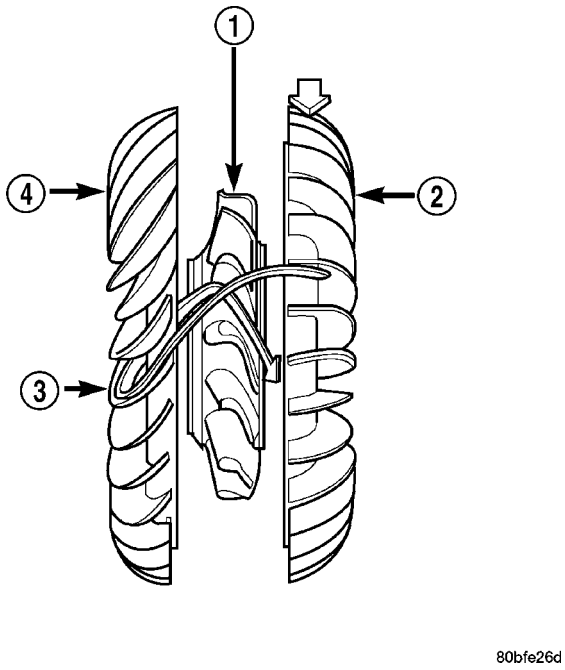


Fig. 237 Stator Location

1 - STATOR
2 - IMPELLER
3 - FLUID FLOW
4 - TURBINE

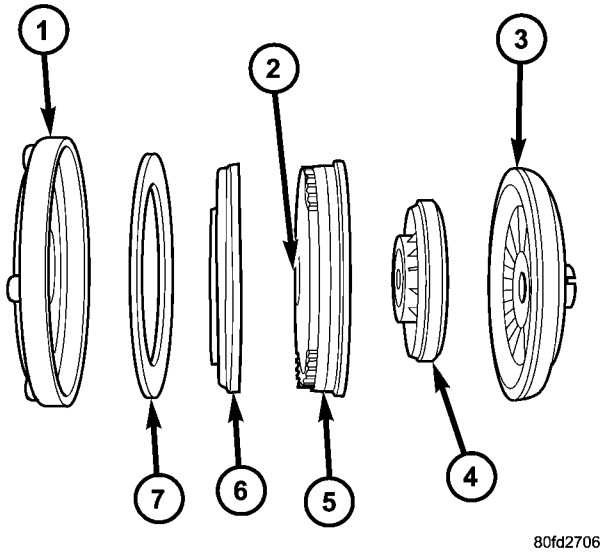


Fig. 238 Torque Converter Clutch (TCC)

1 - IMPELLER FRONT COVER
2 - THRUST WASHER ASSEMBLY
3 - IMPELLER
4 - STATOR
5 - TURBINE
6 - PISTON
7 - FRICTION DISC

TORQUE CONVERTER (Continued)

OPERATION

The converter impeller (Fig. 239) (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 a direction that would tend to slow it down.

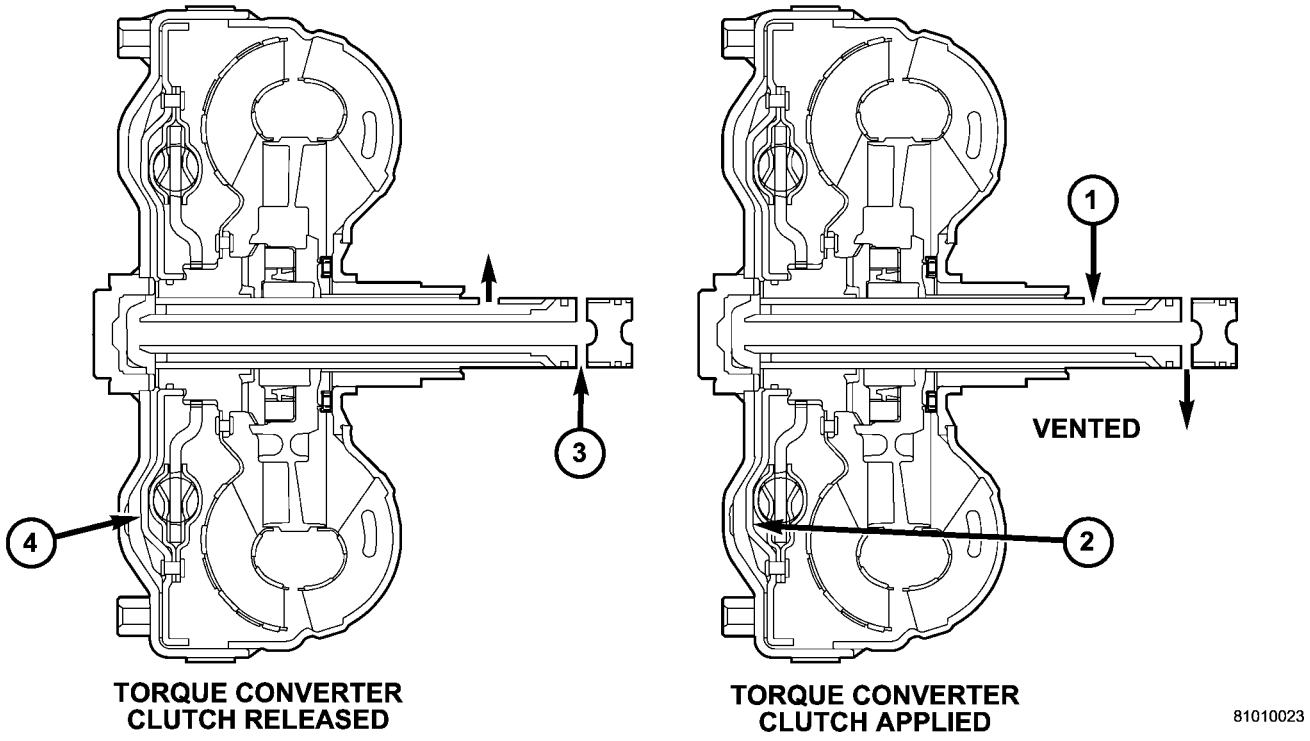


Fig. 239 Torque Converter Fluid Operation

1 - APPLY PRESSURE
2 - THE PISTON MOVES SLIGHTLY FORWARD
3 - RELEASE PRESSURE
4 - THE PISTON MOVES SLIGHTLY REARWARD

TORQUE CONVERTER (Continued)

STATOR

Torque multiplication is achieved by locking the stator's over-running clutch to its shaft (Fig. 240). Under stall conditions the turbine is stationary and 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 over-running clutch of the stator locks and holds the stator from rotating. With the stator locked, the oil strikes the stator blades and is redirected into a "helping" direction before it enters the impeller. This circulation of oil from impeller to turbine, turbine to stator, and stator to impeller, can produce a maximum torque multiplication of about 1.75:1. 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.

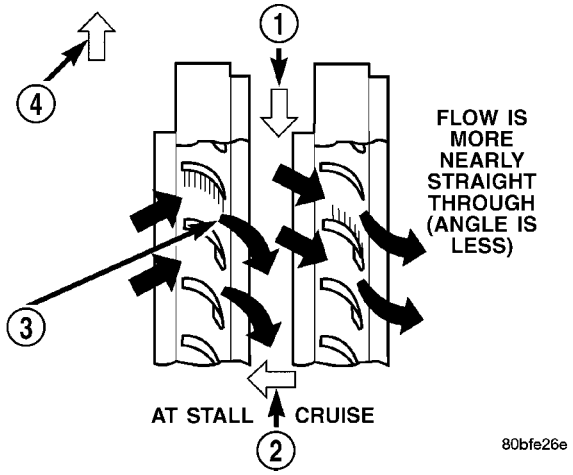


Fig. 240 Stator Operation

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 or released when fluid is feed or 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, or when the vehicle is cruising on a level surface after the vehicle has warmed up. The torque converter clutch may 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. 241). 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.

TORQUE CONVERTER (Continued)

(9) Fill the transmission with the recommended fluid.

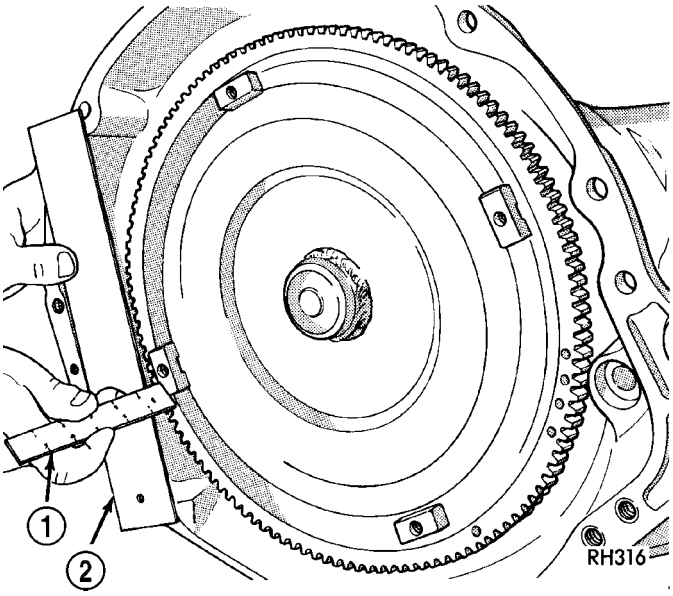


Fig. 241 Typical Method Of Checking Converter Seating

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 RANGE SENSOR

DESCRIPTION

The Transmission Range Sensor (TRS) (Fig. 242) has 3 primary functions:

- Provide a PARK/NEUTRAL start signal to the engine controller and the starter relay.
- Turn the Back-up lamps on when the transmission is in REVERSE and the engine (ignition) is on.
- Provide a transmission range signal to the instrument cluster.

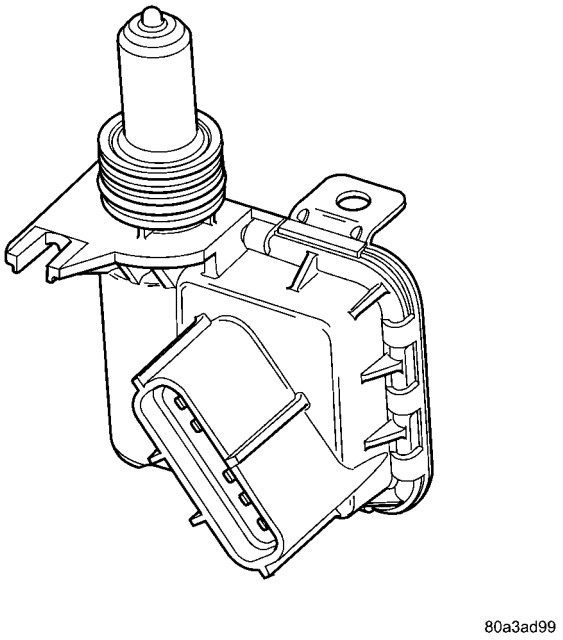


Fig. 242 Transmission Range Sensor

The sensor is mounted in the transmission housing near the valve body, just above the pan rail. It's in the same position as the Park/Neutral switch on other transmissions. The TRS contacts a cammed surface on the manual valve lever. The cammed surface translates the rotational motion of the manual lever into the linear motion of the sensor. The cammed surface on the manual lever is comprised of two parts controlling the TRS signal: The insulator portion contacts the switch poppet when the manual lever is not in PARK or NEUTRAL. The manual lever itself contacts the poppet when the lever is in PARK or NEUTRAL; providing a ground for the signal from the starter relay and the JTEC engine controller.

OPERATION

As the switch moves through its linear motion (Fig. 243) contacts slide across a circuit board which changes the resistance between the range sensing pins of the switch. A power supply on the instrument cluster provides a regulated voltage signal to the switch. The return signal is decoded by the cluster, which then controls the PRNDL display to correspond with the correct transmission range. A bus message of transmission range is also sent by the cluster. In REVERSE range a second contact set closes the circuit providing power to the reverse lamps.

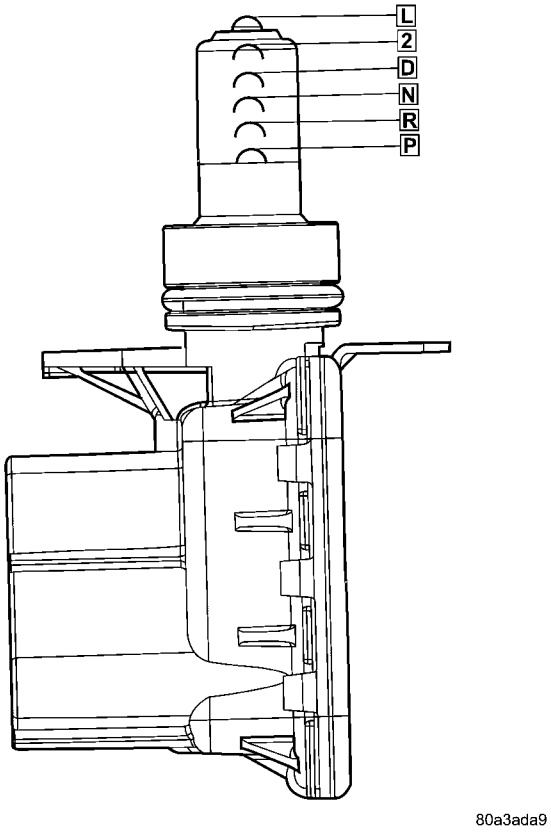


Fig. 243 Transmission Range Sensor Linear Movement

TRANSMISSION RANGE SENSOR (Continued)

Mechanical State	Electronic Display (Ignition Unlocked)	Electronic Display (Ignition On)		
Indicated Gear Position			Transmission Status	Column Shifter Position
P	P	P	Vehicle is in PARK with the pawl engaged.	In the PARK gate.
	R		The PARK pawl is disengaged and the vehicle is free to roll, but REVERSE is not engaged.	Between the PARK and REVERSE gates.
R	R	R	The transmission is hydraulically in REVERSE.	In the REVERSE gate.
	N		The transmission is transitioning between REVERSE and NEUTRAL.	Between the REVERSE and NEUTRAL gates.
N	N	N	The vehicle is in NEUTRAL.	In the NEUTRAL gate.
	N		The transmission is transitioning between NEUTRAL and DRIVE, but is not in DRIVE.	Between the NEUTRAL and DRIVE gates.
D	D	D	The transmission is hydraulically in DRIVE.	In the DRIVE gate,
2	2	2	The transmission is hydraulically in Manual SECOND.	In the SECOND gate.
1	1	1	The transmission is hydraulically in Manual FIRST.	In the FIRST gate.

DIAGNOSIS AND TESTING - TRANSMISSION RANGE SENSOR (TRS)

NOTE: For all circuit identification in the following steps, Refer to the appropriate Wiring Information.

(1) Raise vehicle on suitable hoist.

(2) Disconnect the vehicle's shift cable from the manual lever.

(3) With the manual lever in the PARK position (the PARK position is with the manual lever moved to the full rearward position), measure the resistance between the Park/Neutral Position Sense pin of the TRS and the transmission case. The resistance should be less than 5 ohms.

(4) With the manual lever in the NEUTRAL position (the NEUTRAL position is with the manual lever moved two detents forward of the full rearward position), measure the resistance between the Park/Neutral Position Sense pin of the TRS and the transmission case. The resistance should be less than 5 ohms.

(5) If the resistance is greater than 5 ohms in either of the previous steps, check for a dirty contact between the tip of the TRS rod and the valve body manual lever. If the contact is OK, replace the TRS.

(6) With the manual lever in the REVERSE position (the REVERSE position is with the manual lever moved one detent forward of the full rearward position), measure the resistance between the Fused Ignition Switch Output and the Back-up Lamp feed pins of the TRS. The resistance should be less than 5

TRANSMISSION RANGE SENSOR (Continued)

ohms. If the resistance is greater than 5 ohms, replace the TRS.

(7) With the manual lever in the PARK position (the PARK position is with the manual lever moved to the full rearward position), measure the resistance between the Transmission Range Sensor MUX and the Transmission Range Sensor 5V Supply pins of the TRS. The resistance should be 522.2 ohms. If the resistance is not correct, replace the TRS.

(8) With the manual lever in the REVERSE position (the REVERSE position is with the manual lever moved one detent forward of the full rearward position), measure the resistance between the Transmission Range Sensor MUX and the Transmission Range Sensor 5V Supply pins of the TRS. The resistance should be 206.2 ohms. If the resistance is not correct, replace the TRS.

(9) With the manual lever in the NEUTRAL position (the NEUTRAL position is with the manual lever moved two detents forward of the full rearward position), measure the resistance between the Transmission Range Sensor MUX and the Transmission Range Sensor 5V Supply pins of the TRS. The resistance should be 108.6 ohms. If the resistance is not correct, replace the TRS.

(10) With the manual lever in the DRIVE position (the DRIVE position is with the manual lever moved three detents forward of the full rearward position), measure the resistance between the Transmission Range Sensor MUX and the Transmission Range Sensor 5V Supply pins of the TRS. The resistance should be 59.9 ohms. If the resistance is not correct, replace the TRS.

(11) With the manual lever in the SECOND position (the SECOND position is with the manual lever moved one detent rearward of the full forward position), measure the resistance between the Transmission Range Sensor MUX and the Back-up Lamp feed pins of the TRS. The resistance should be 31.9 ohms. If the resistance is not correct, replace the TRS.

(12) With the manual lever in the LOW position (the LOW position is with the manual lever moved to the full forward position), measure the resistance between the Transmission Range Sensor MUX and the Back-up Lamp feed pins of the TRS. The resistance should be 13.7 ohms. If the resistance is not correct, replace the TRS.

REMOVAL

(1) Raise vehicle and position drain pan under the transmission range sensor (TRS).

(2) Move the transmission manual lever to the manual LOW position. The manual LOW position is with the manual lever in the forward-most detent.

(3) Disengage the wiring connector from the TRS.

(4) Remove the two screws holding the TRS to the TRS mounting bracket.

(5) Remove the TRS (Fig. 244) from the TRS mounting bracket by pulling it straight out of the bracket.

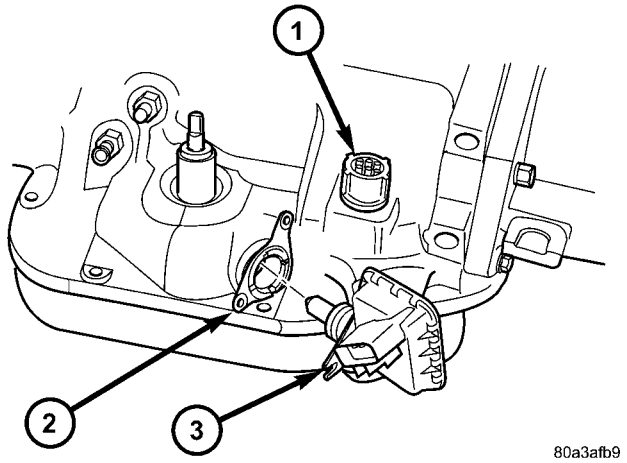


Fig. 244 Remove Transmission Range Sensor

1 - SOLENOID CASE CONNECTOR
2 - TRS MOUNTING BRACKET
3 - TRANSMISSION RANGE SENSOR

(6) Loosen the TRS mounting bracket in the transmission case using Adapter 8581 (Fig. 245).

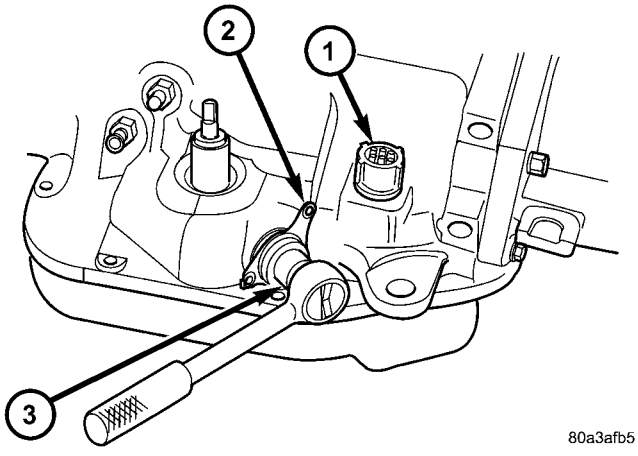


Fig. 245 Loosen the TRS Mounting Bracket

1 - SOLENOID CASE CONNECTOR
2 - TRS MOUNTING BRACKET
3 - ADAPTER 8581

TRANSMISSION RANGE SENSOR (Continued)

(7) Remove the TRS mounting bracket (Fig. 246) from the transmission case.

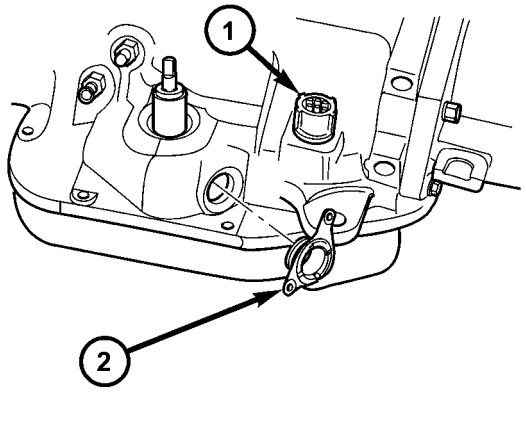


Fig. 246 Remove TRS Mounting Bracket

1 - SOLENOID CASE CONNECTOR
2 - TRS MOUNTING BRACKET

INSTALLATION

(1) Move the transmission manual shaft lever to the manual LOW position.

(2) Install the TRS mounting bracket into the transmission case. Using Adapter 8581 (Fig. 247), tighten the mounting bracket to 34 N·m (300 in.lbs.).

(3) Install the TRS (Fig. 248) into the mounting

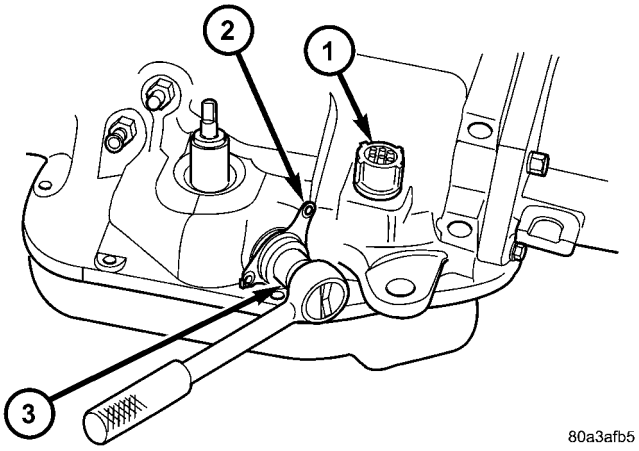


Fig. 247 Tighten the TRS Mounting Bracket

1 - SOLENOID CASE CONNECTOR
2 - TRS MOUNTING BRACKET
3 - ADAPTER 8581

bracket with the wiring connector facing the front of the transmission.

(4) Install the two screws to hold the TRS to the mounting bracket. Tighten the screws to 3.4 N·m (30 in.lbs.).

(5) Verify proper sensor operation (Fig. 249).

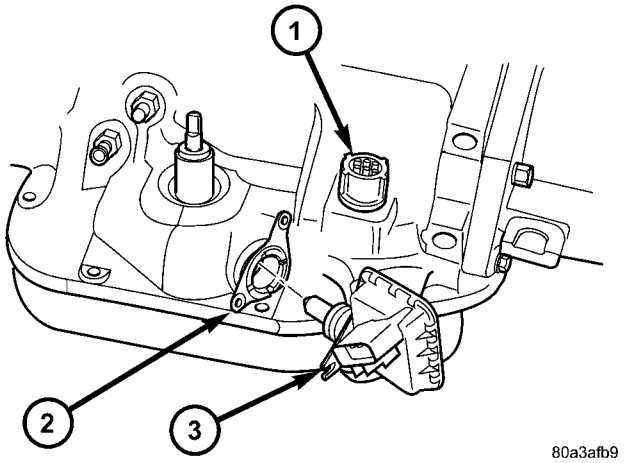


Fig. 248 Remove Transmission Range Sensor

1 - SOLENOID CASE CONNECTOR
2 - TRS MOUNTING BRACKET
3 - TRANSMISSION RANGE SENSOR

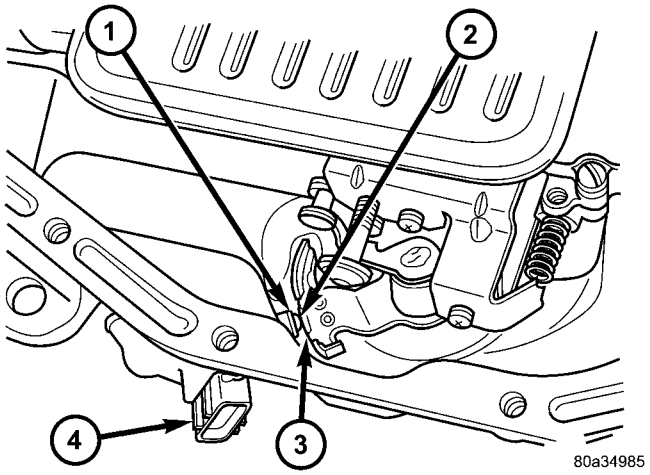


Fig. 249 Transmission Range Sensor Operation

1 - NEUTRAL CONTACT
2 - MANUAL LEVER AND SENSOR PLUNGER IN REVERSE POSITION
3 - PARK CONTACT
4 - TRANSMISSION RANGE SENSOR

(6) Move the transmission manual shaft lever to the PARK position.

(7) Connect TRS wiring connector to the TRS and lower vehicle.

(8) Refill the transmission fluid to the correct level.

TRANSMISSION TEMPERATURE SENSOR

DESCRIPTION

Transmission fluid temperature readings are supplied to the transmission control module by the thermistor (Fig. 250). 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.

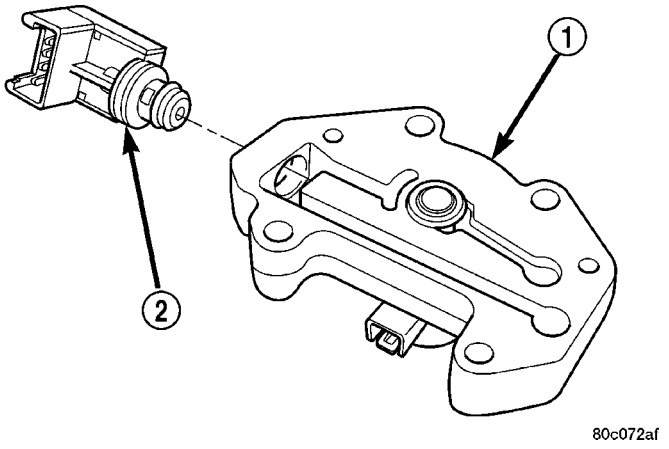


Fig. 250 Governor Pressure Sensor

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).

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. 251), (Fig. 252), (Fig. 253), and (Fig. 254):

- Regulator valve
- Regulator valve throttle pressure plug
- Line pressure 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
- 9 check balls

By adjusting the spring pressure acting on the regulator valve, transmission line pressure can be adjusted.

VALVE BODY (Continued)

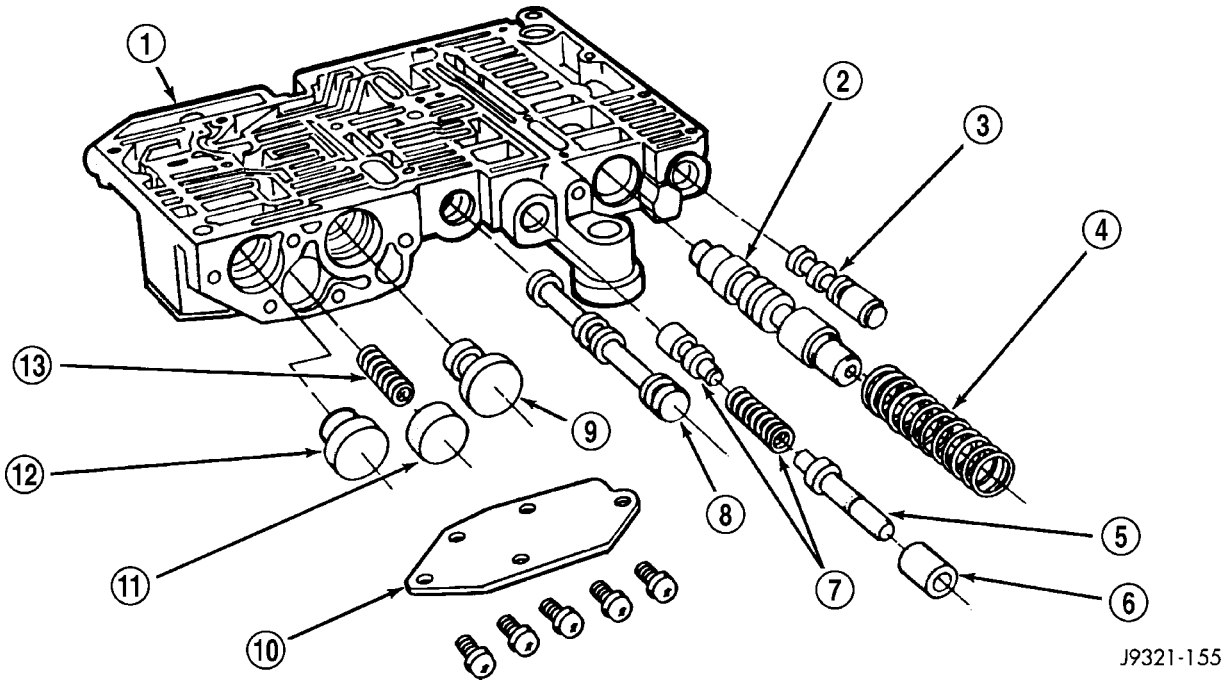


Fig. 251 Upper Housing Control Valve Locations

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)

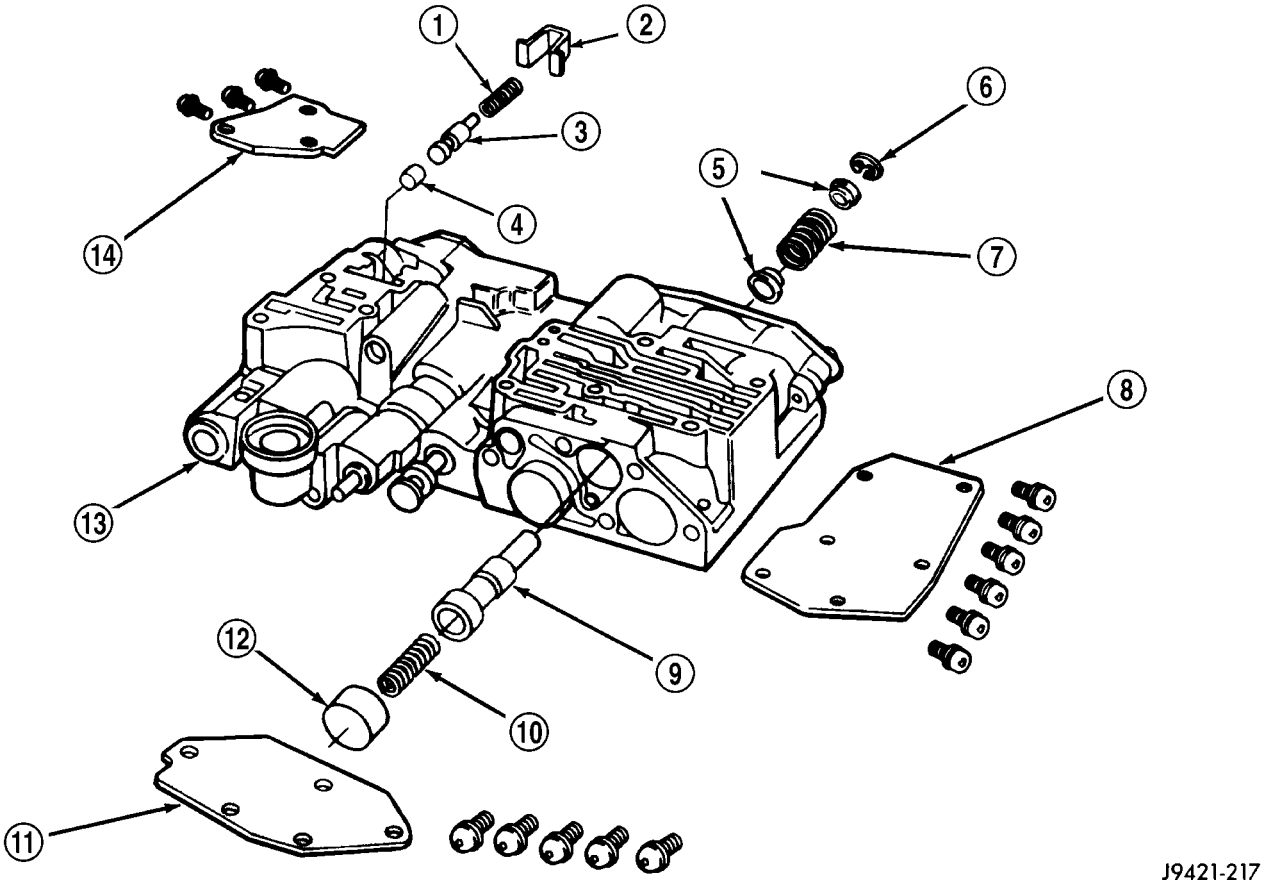


Fig. 252 Shuttle and Boost Valve Locations

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)

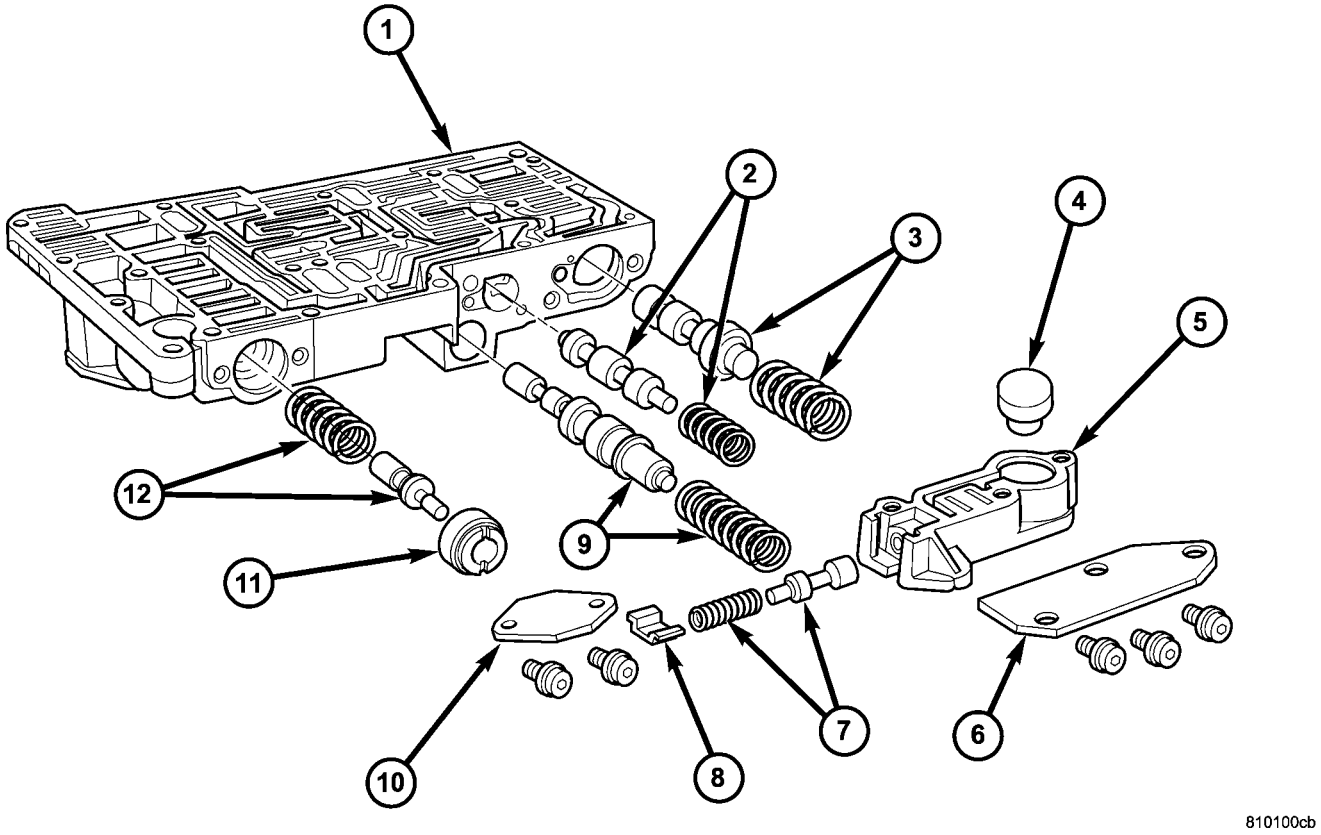


Fig. 253 Upper Housing Shift Valve and Pressure Plug Locations

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 - PLUG SLEEVE
12 - THROTTLE PRESSURE SPRING AND PLUG

VALVE BODY (Continued)

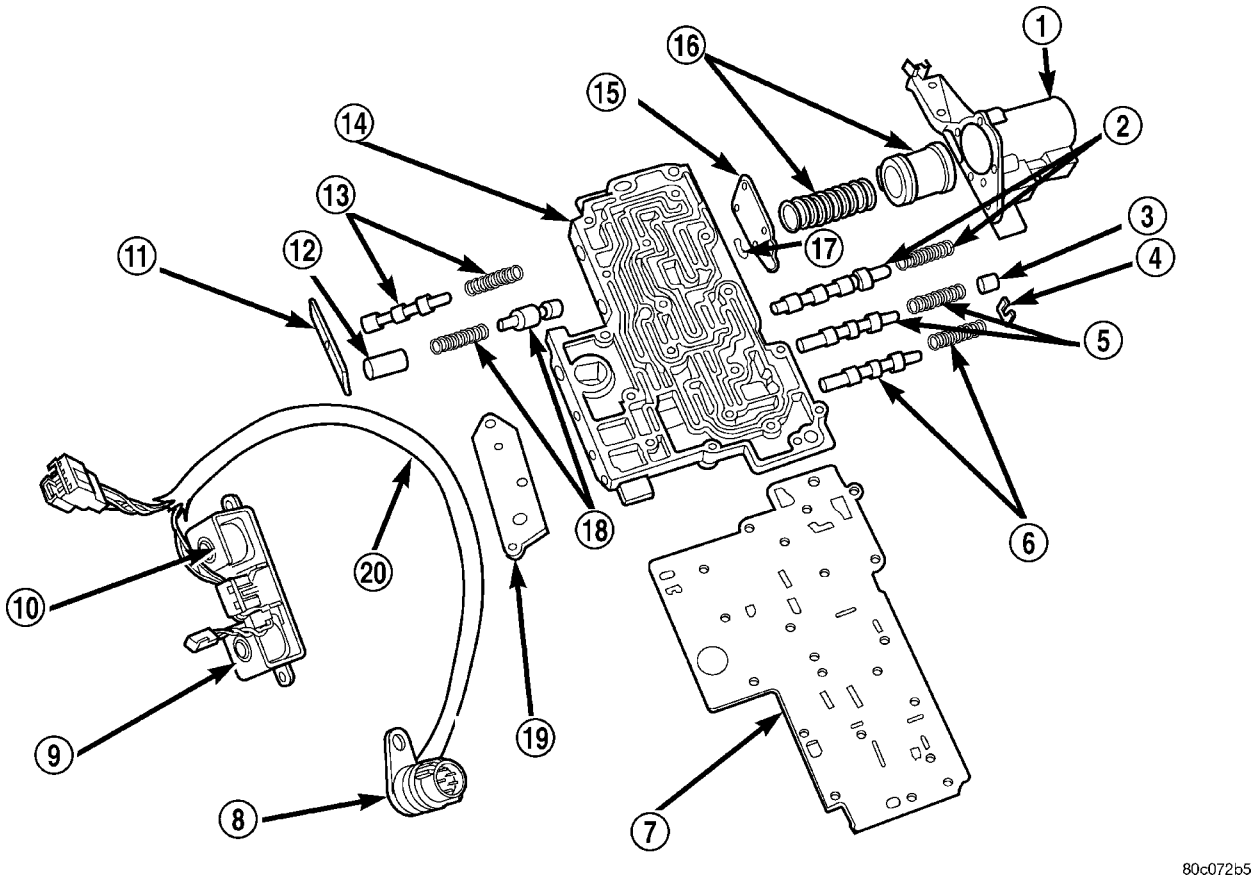


Fig. 254 Lower Housing Shift Valves and Springs

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.
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.
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.”

The regulator valve (Fig. 255) 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. 256), 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.

VALVE BODY (Continued)

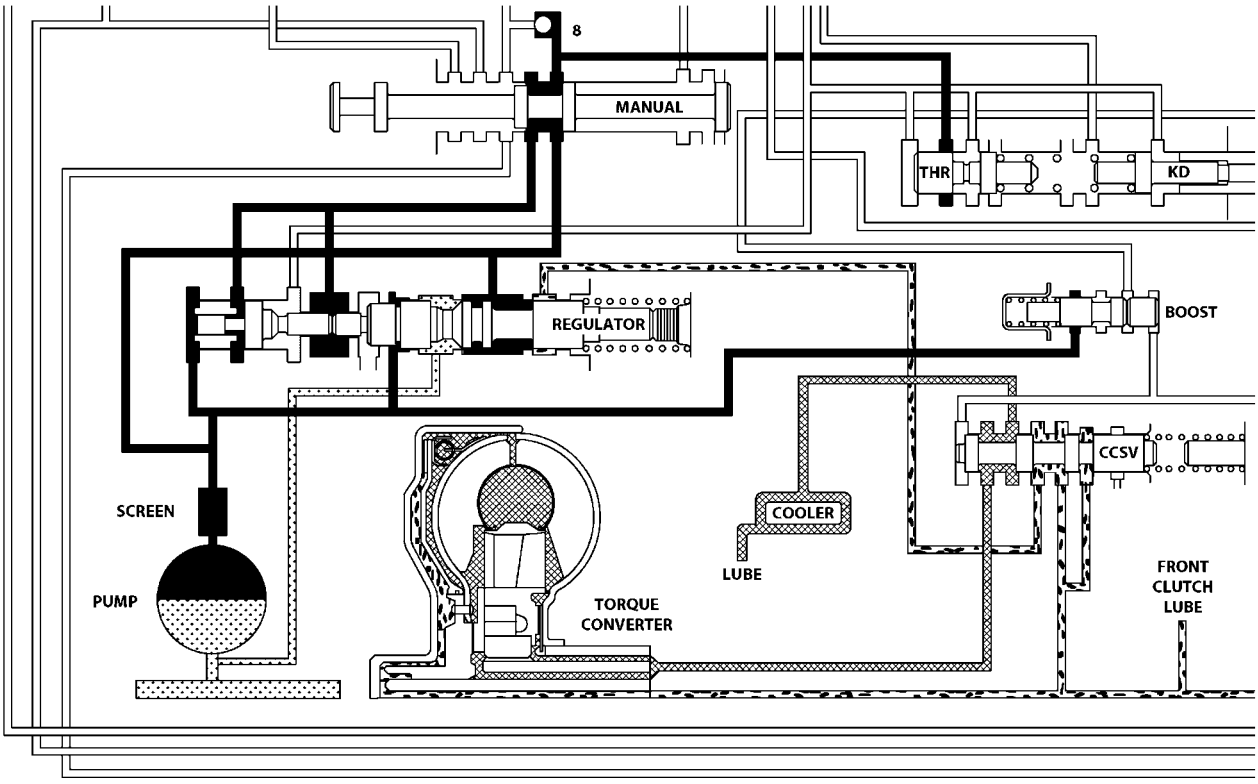


Fig. 255 Regulator Valve in Park Position

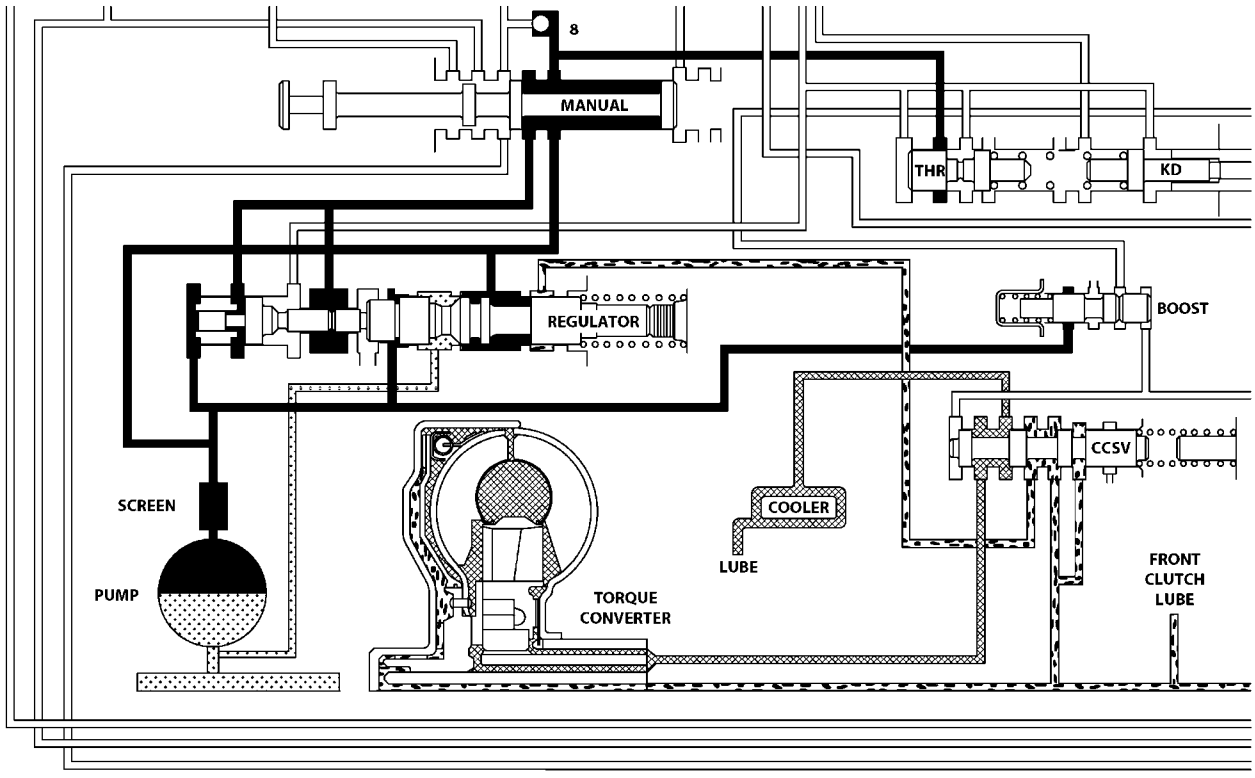


Fig. 256 Regulator Valve in Neutral Position

VALVE BODY (Continued)

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. 257). The regulated line pressure in REVERSE (Fig. 258) 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.

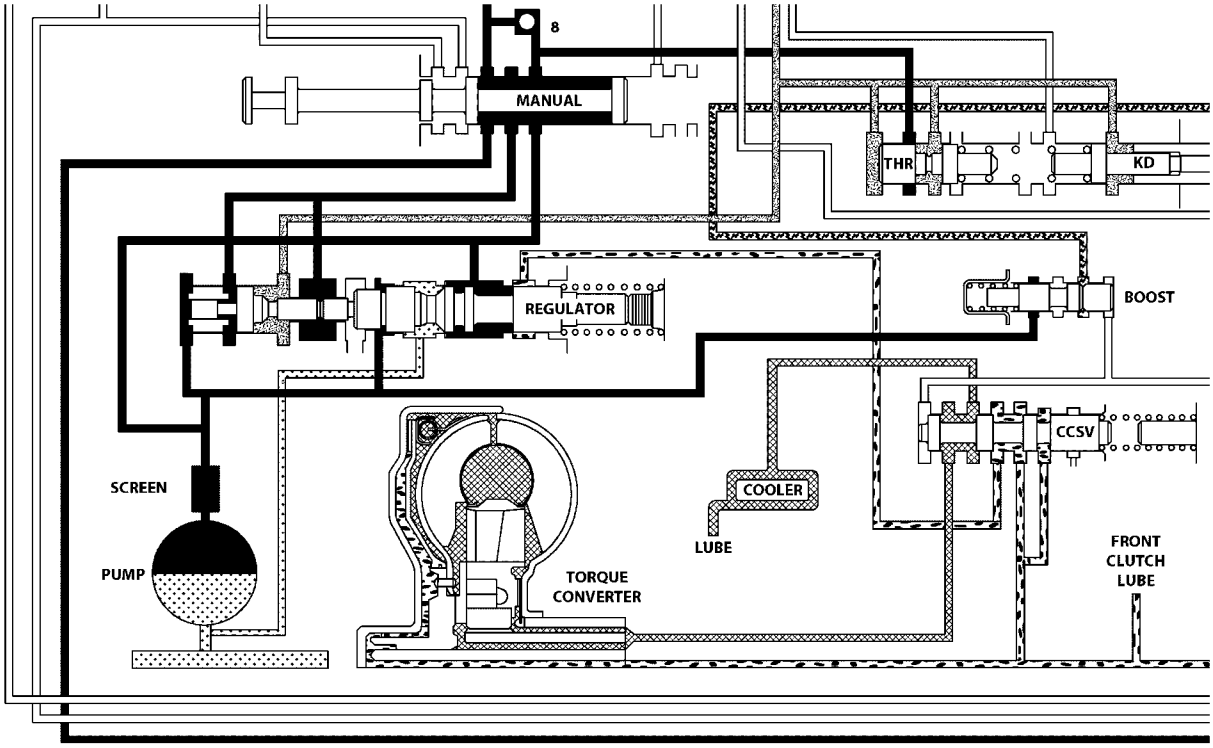


Fig. 257 Regulator Valve in Drive Position

VALVE BODY (Continued)

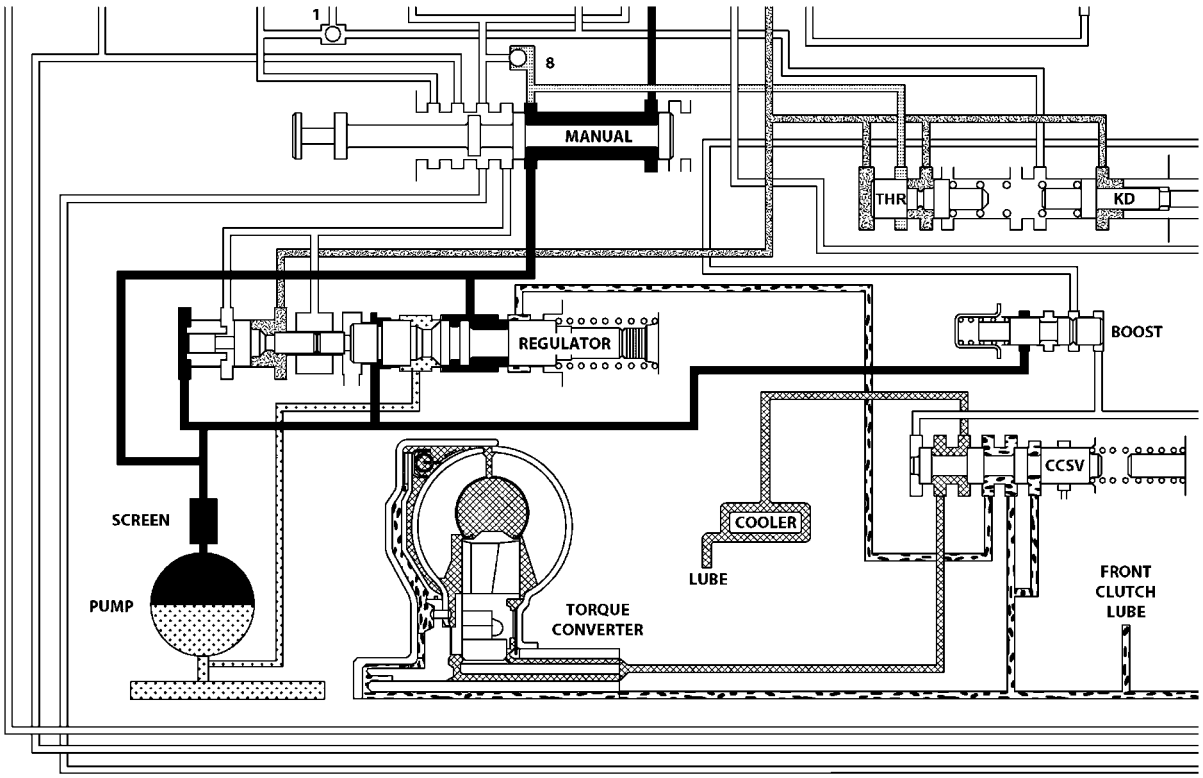


Fig. 258 Regulator Valve in Reverse Position

VALVE BODY (Continued)

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. 259) 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.

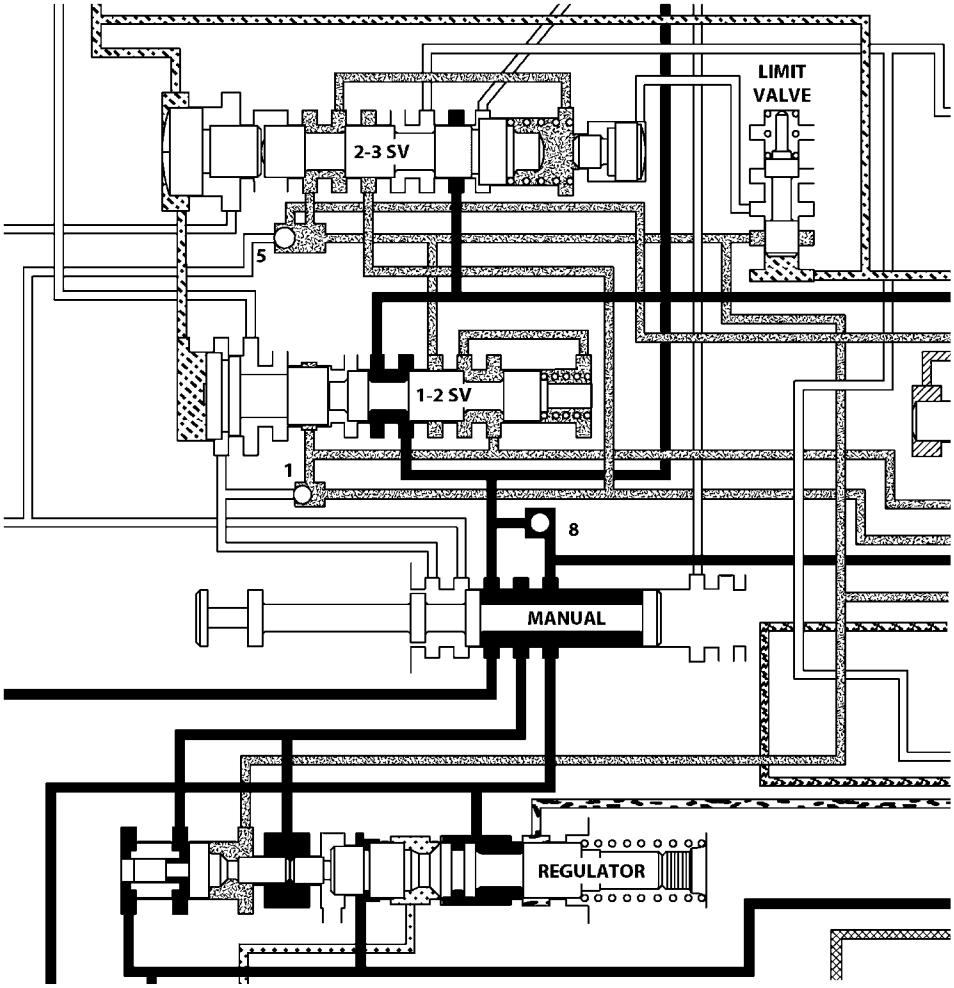


Fig. 259 Kickdown Valve - Wide Open Throttle

VALVE BODY (Continued)

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. 260) the limit valve does not come into play and does not affect the downshifts. As the vehicle's speed increases (Fig. 261), 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.

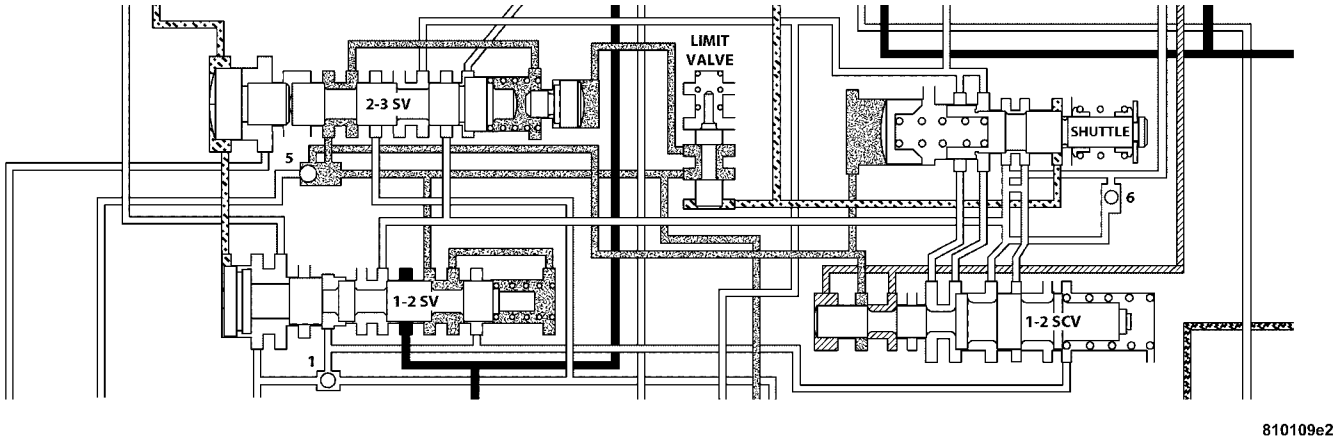


Fig. 260 Kickdown Limit Valve - Low Speeds

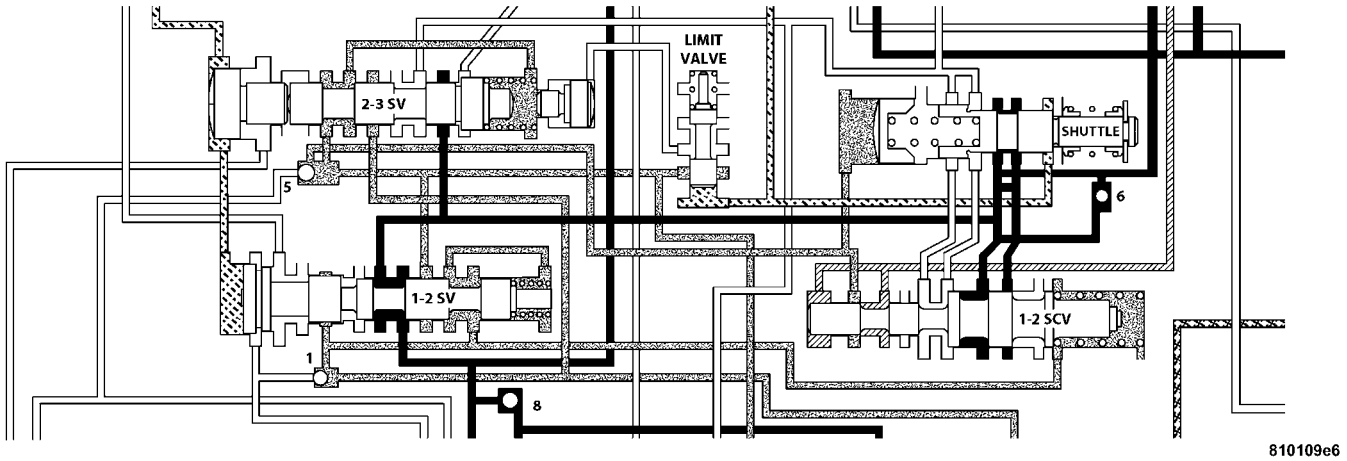


Fig. 261 Kickdown Limit Valve - High Speeds

VALVE BODY (Continued)

1-2 SHIFT VALVE

The 1-2 shift valve assembly (Fig. 262), 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. 263).

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.

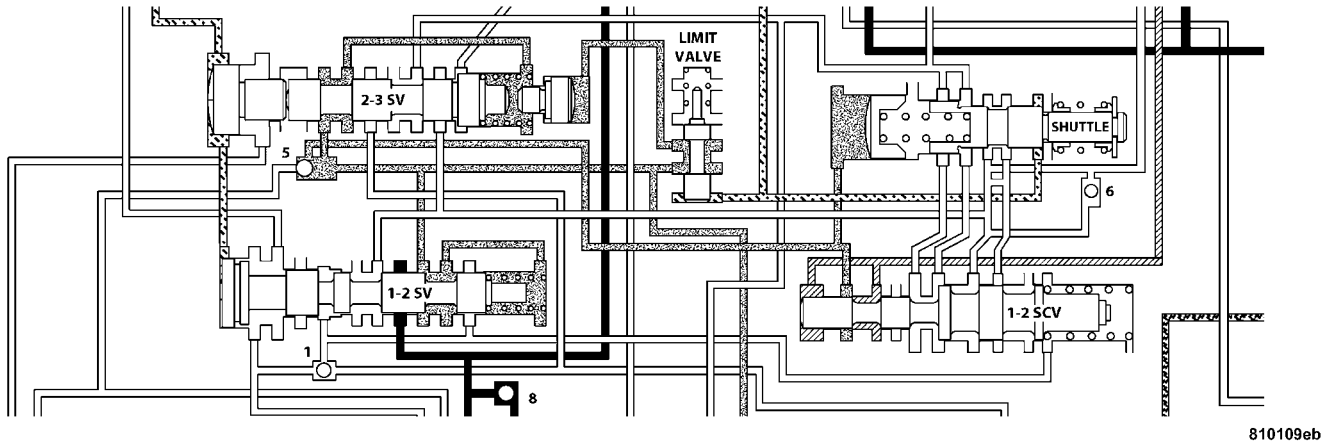


Fig. 262 1-2 Shift Valve - Before Shift

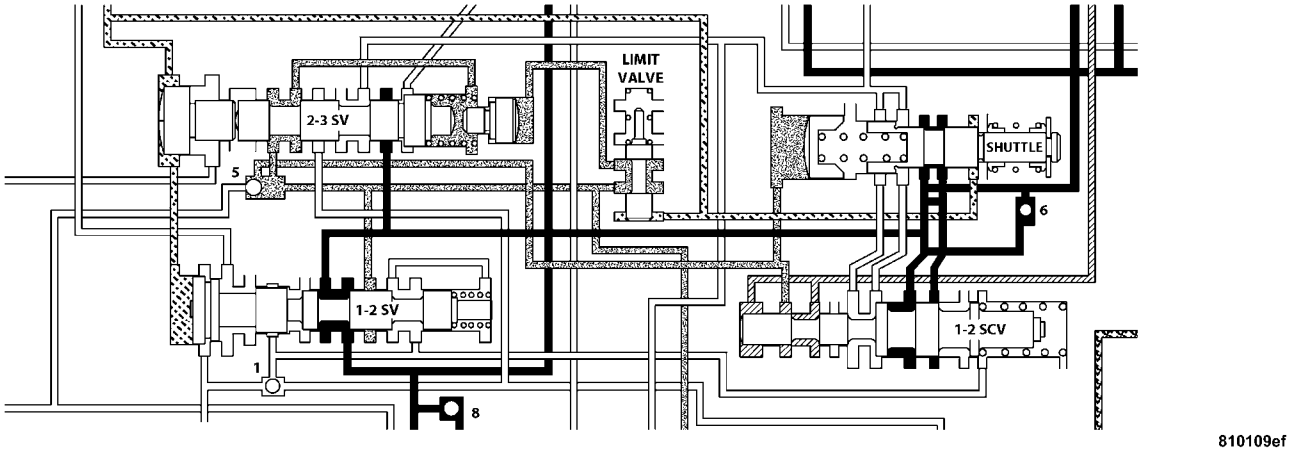


Fig. 263 1-2 Shift Valve - After Shift

VALVE BODY (Continued)

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. 264):

- 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.

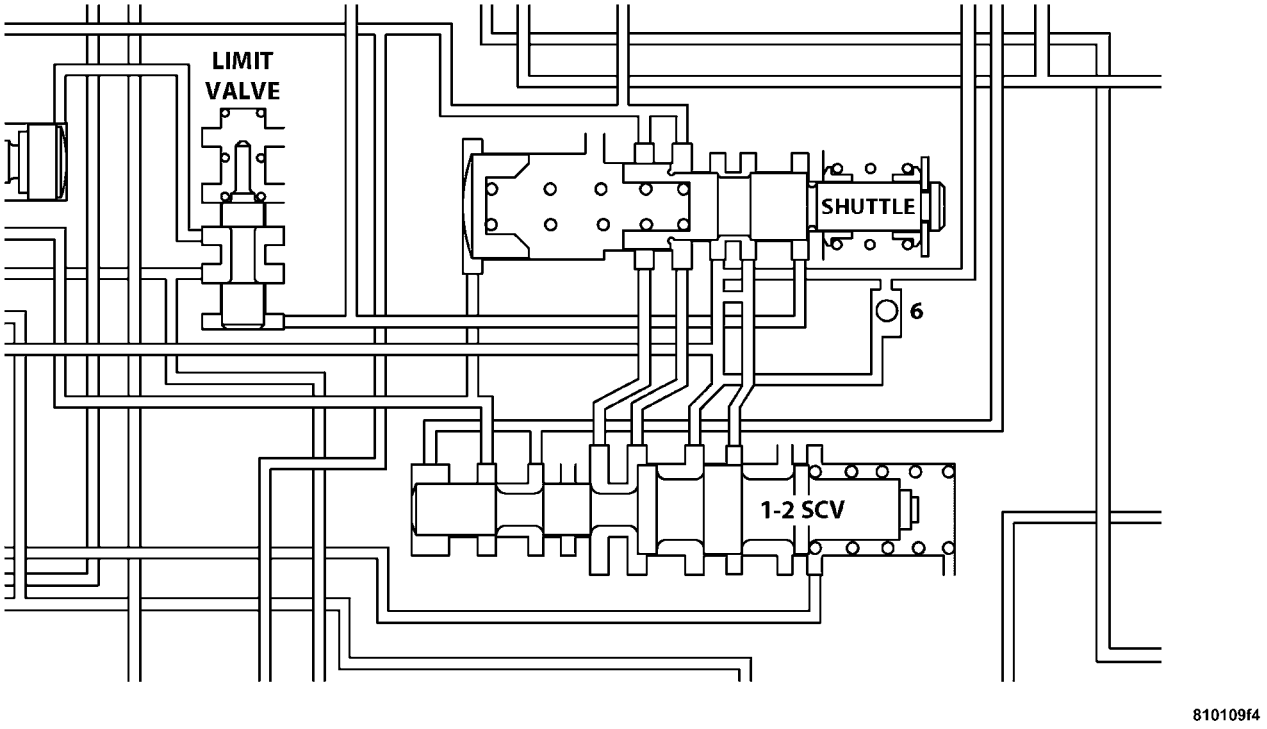


Fig. 264 1-2 Shift Control Valve

VALVE BODY (Continued)

2-3 SHIFT VALVE

The 2-3 shift valve mechanism (Fig. 265) 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.

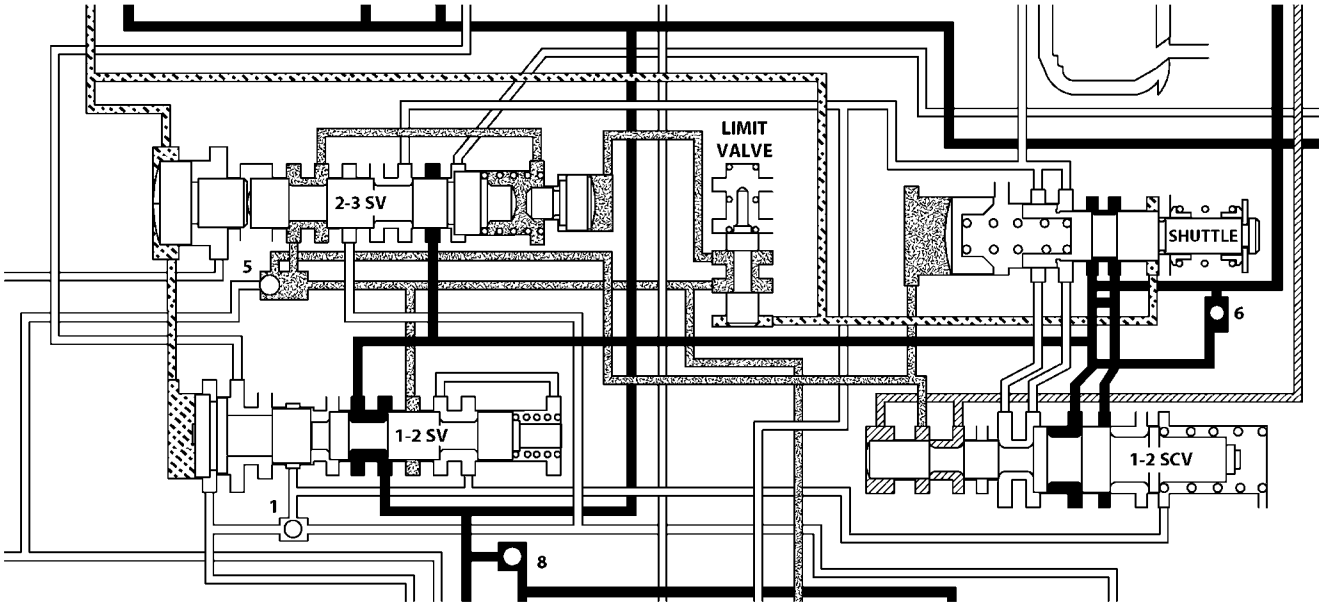
As vehicle speed increases, governor pressure increases proportionately, until it becomes great enough to overcome the combined throttle and spring pressure on the right side of the valve. Since the throttle pressure end of the 2-3 shift valve is larger in diameter than the 1-2 shift valve, the 2-3 shift 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. 266), line pressure is directed 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.

If the manual “2” or manual “1” gear position is selected from the drive position, the PCM will control the timing of the downshift by targeting for a high governor pressure. When a safe vehicle speed is reached, the PCM will switch to its normal control governor curve and the downshift will occur.

3-4 SHIFT VALVE

The PCM energizes the overdrive solenoid during the 3-4 upshift (Fig. 267). 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. 268). 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.



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Fig. 265 2-3 Shift Valve - Before Shift

VALVE BODY (Continued)

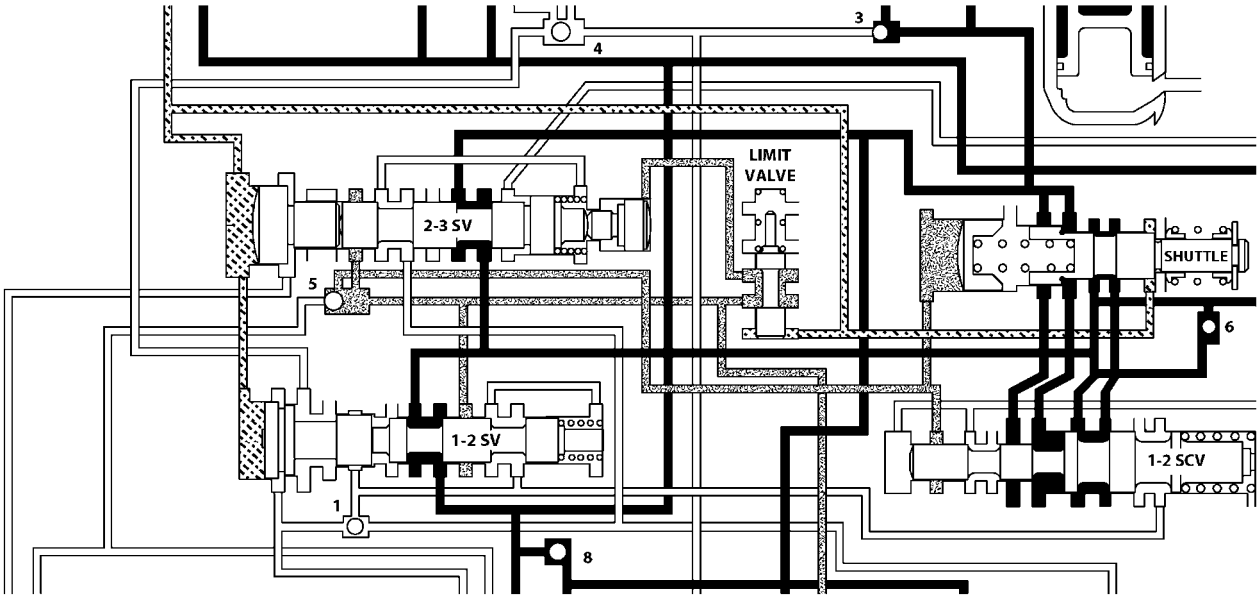


Fig. 266 2-3 Shift Valve - After Shift

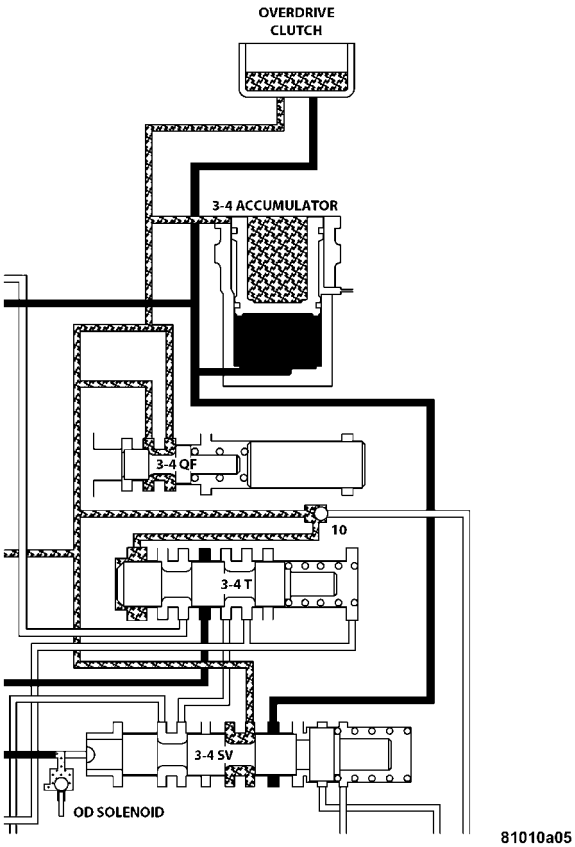


Fig. 267 3-4 Shift Valve Before Shift

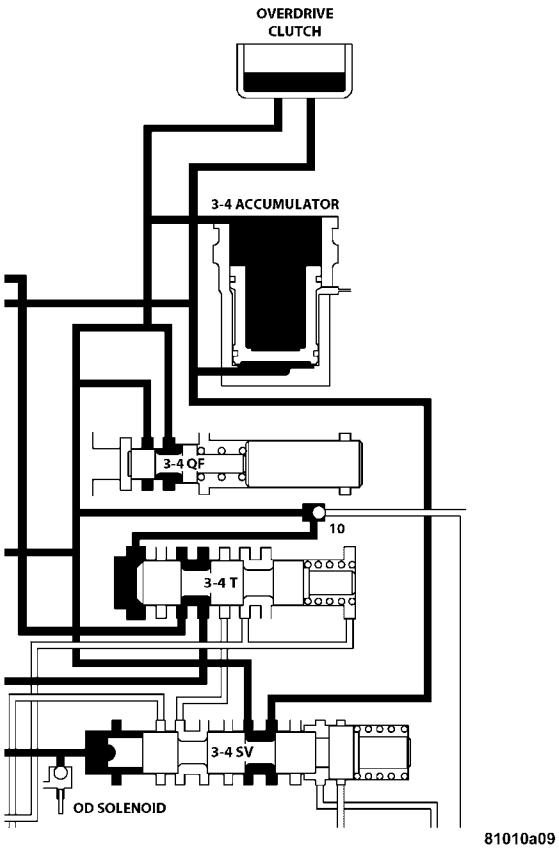


Fig. 268 3-4 Shift Valve After Shift

3-4 TIMING VALVE

The 3-4 timing valve is moved by line pressure coming through the 3-4 shift valve (Fig. 268) or the converter clutch valve. 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 while either the overdrive clutch or converter clutch is applied (Fig. 267).

VALVE BODY (Continued)

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. 267). 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. 268). Clutch fill is then completed through the regular feed orifice.

THROTTLE VALVE

In all gear positions the throttle valve (Fig. 269) 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 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.

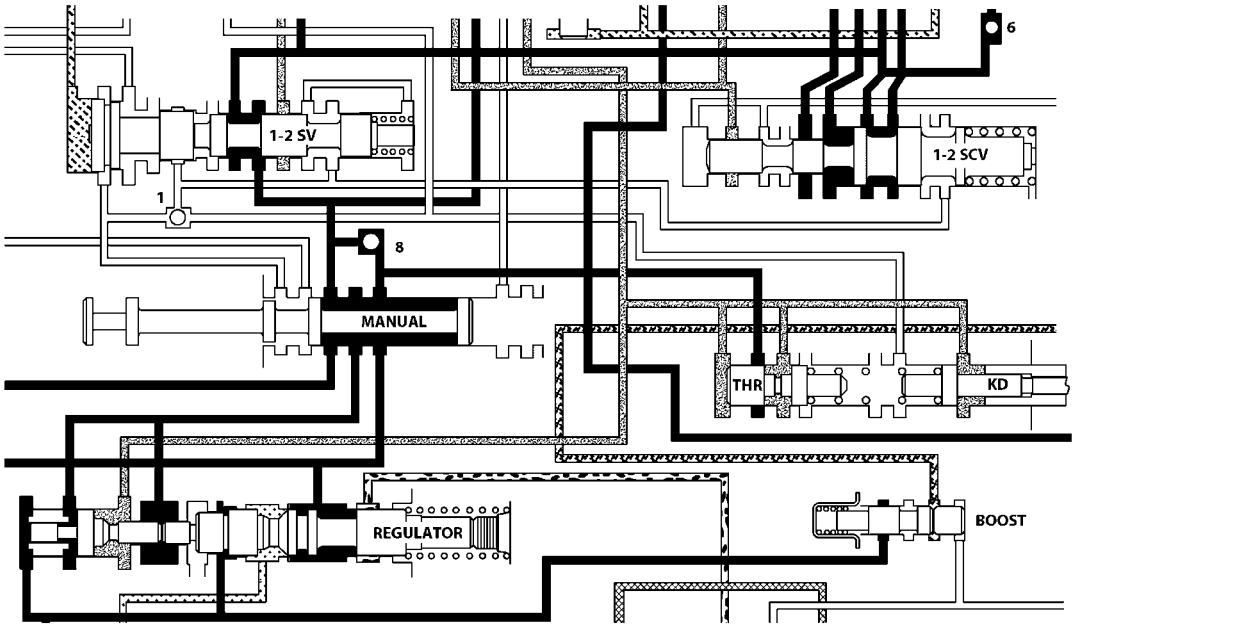


Fig. 269 Throttle Valve

VALVE BODY (Continued)

SWITCH VALVE

When the transmission is in Drive Second before the TCC application occurs (Fig. 270), 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.

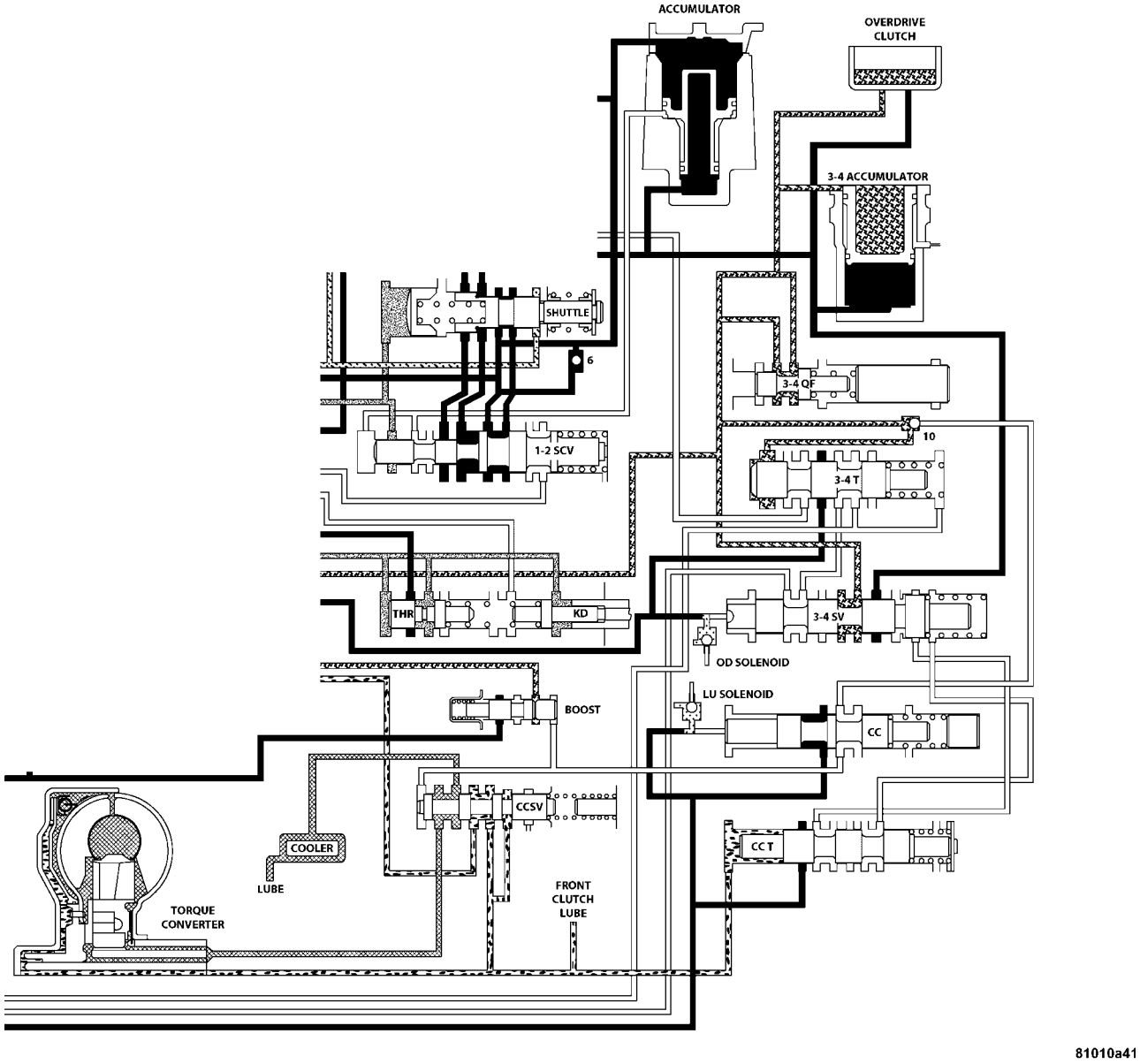


Fig. 270 Switch Valve - Torque Converter Unlocked

VALVE BODY (Continued)

Once the TCC control valve has moved to the right (Fig. 271), 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.

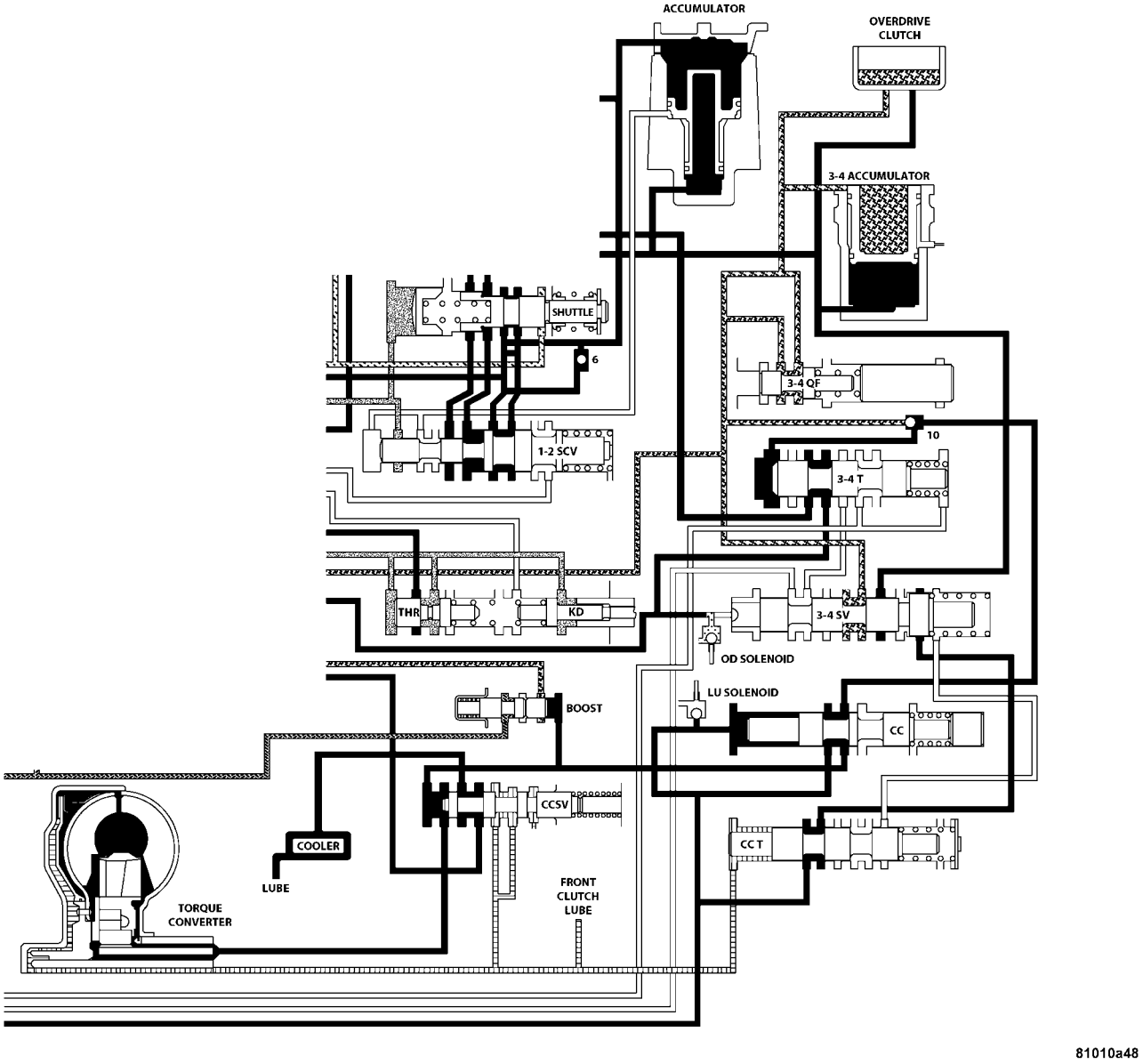


Fig. 271 Switch Valve - Torque Converter Locked

VALVE BODY (Continued)

MANUAL VALVE

The manual valve (Fig. 272) is a relay valve. The purpose of the manual valve is to direct fluid to the correct circuit needed for a specific gear or driving range. The manual valve, as the name implies, is manually operated by the driver with a lever located on the side of the valve body. The valve is connected mechanically by either a cable or linkage to the gear-shift mechanism. The valve is held in each of its positions by a spring-loaded roller or ball that engages the “roostercomb” of the manual valve 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.

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. 264) 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.

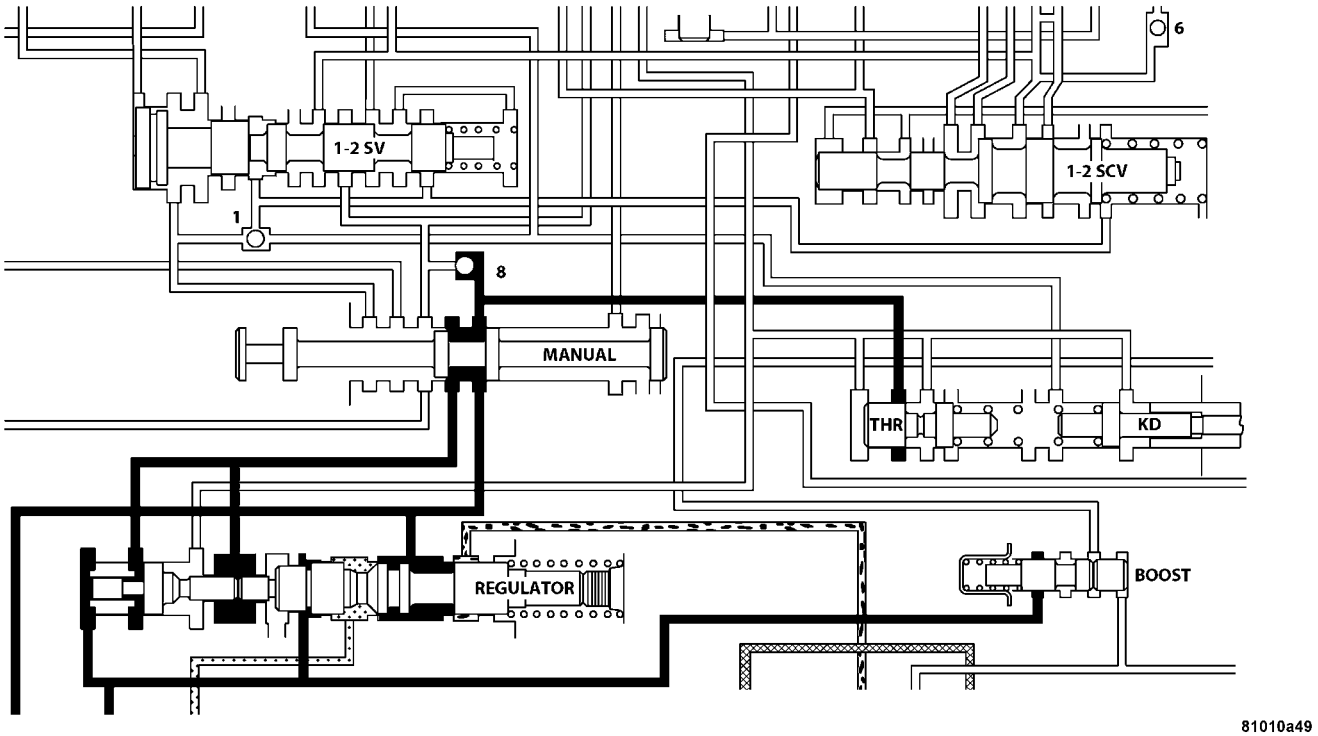


Fig. 272 Manual Valve

VALVE BODY (Continued)

BOOST VALVE

The boost valve (Fig. 273) provides increased fluid apply pressure to the overdrive clutch during 3-4 upshifts (Fig. 274), and when accelerating in fourth gear. The boost valve also serves to increase line pressure during torque converter lock-up.

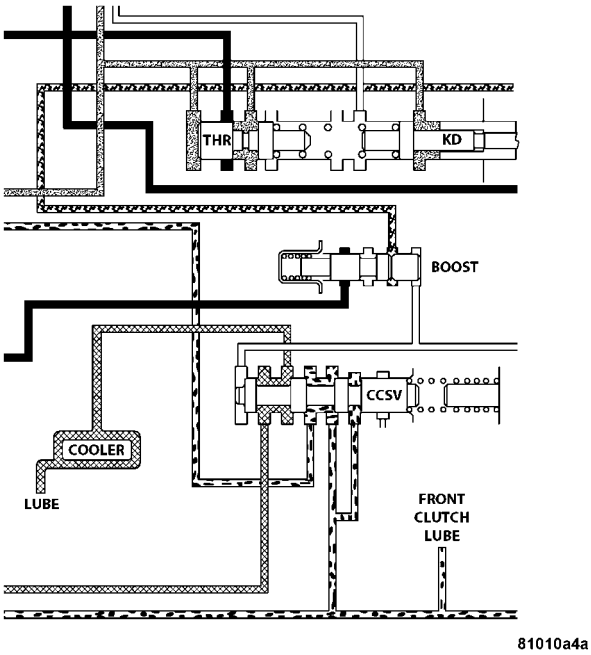


Fig. 273 Boost Valve Before Lock-up

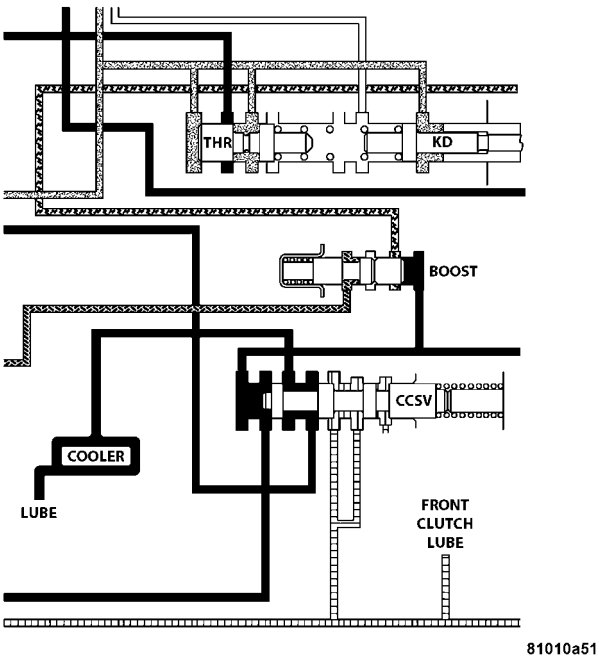


Fig. 274 Boost Valve After Lock-up

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. 275).

(5) Remove the transmission range sensor.

(6) Position drain pan under transmission oil pan.

(7) Remove transmission oil pan and gasket.

(8) Remove fluid filter from valve body.

(9) Remove bolts attaching valve body to transmission case.

(10) Lower valve body enough to remove accumulator piston and springs.

(11) Work manual lever shaft and electrical connector out of transmission case.

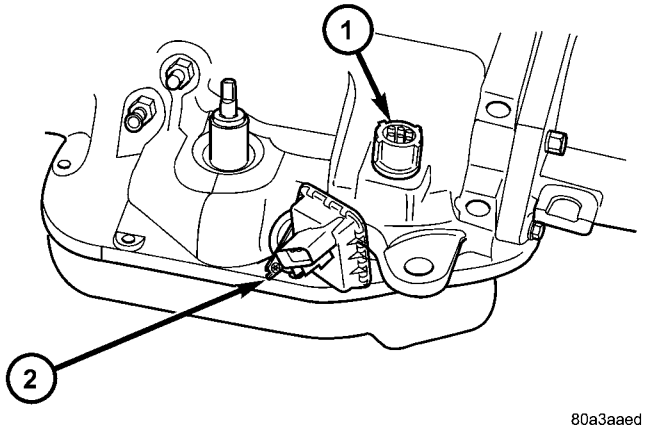


Fig. 275 Transmission Case Connector

1 - SOLENOID CASE CONNECTOR
2 - TRANSMISSION RANGE SENSOR

VALVE BODY (Continued)

(12) Lower valve body, rotate valve body away from case, pull park rod out of sprag, and remove valve body (Fig. 276).

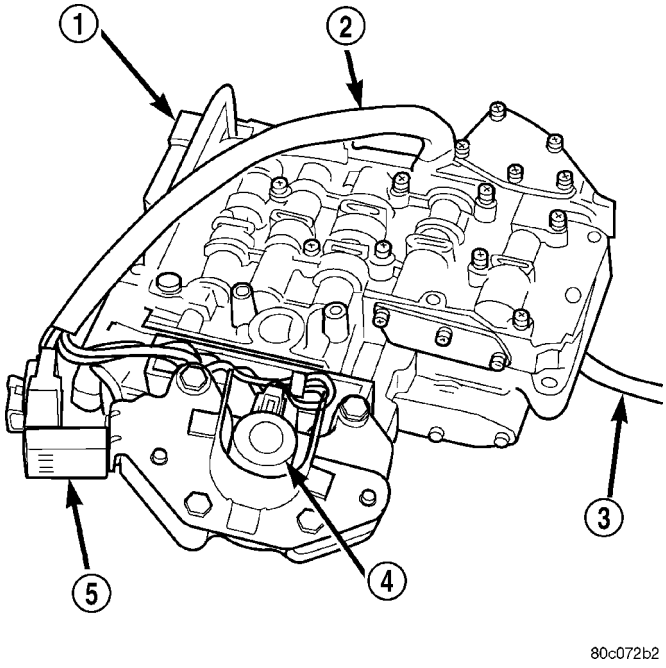


Fig. 276 Valve Body

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. 277). 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. 278).

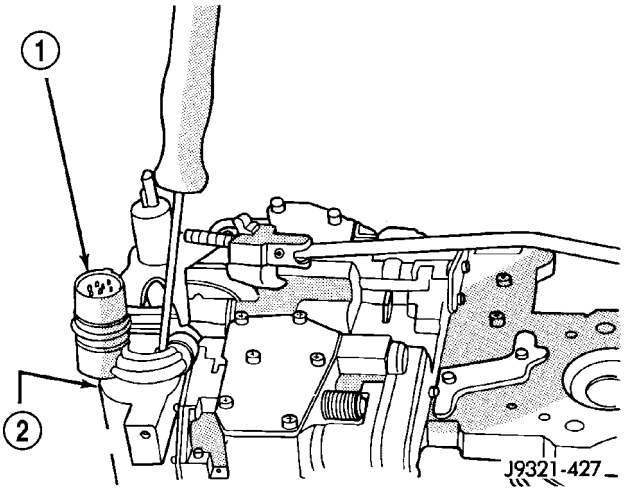


Fig. 277 Solenoid Harness Case Connector Shoulder Bolt

1 - SOLENOID HARNESS CASE CONNECTOR
2 - 3-4 ACCUMULATOR HOUSING

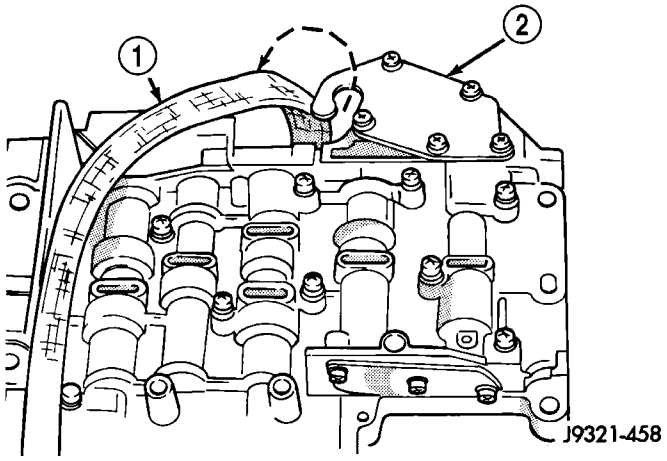


Fig. 278 Solenoid Harness Routing

1 - OVERDRIVE/CONVERTER SOLENOID WIRE HARNESS
2 - 3-4 ACCUMULATOR COVER PLATE

VALVE BODY (Continued)

(8) Turn valve body over and remove screws that attach overdrive/converter solenoid assembly to valve body (Fig. 279).

(9) Remove solenoid and harness assembly from valve body (Fig. 280).

(10) Remove boost valve cover (Fig. 281).

(11) Remove boost valve retainer, valve spring and boost valve (Fig. 282).

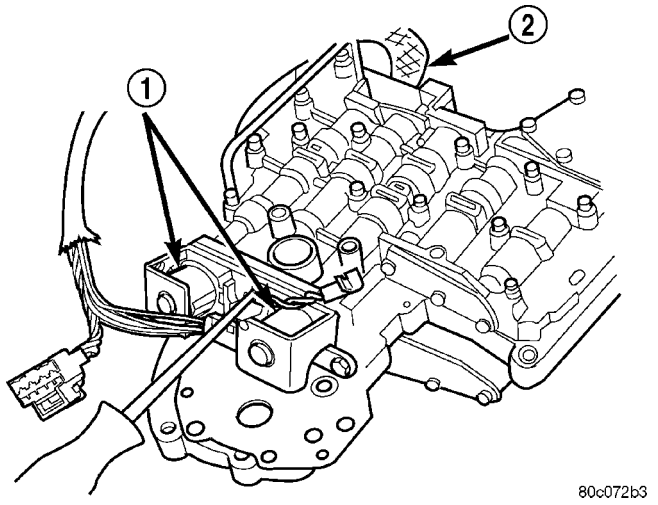


Fig. 279 Solenoid Assembly Screws

1 - OVERDRIVE/CONVERTER CLUTCH SOLENOID ASSEMBLY
2 - HARNESS

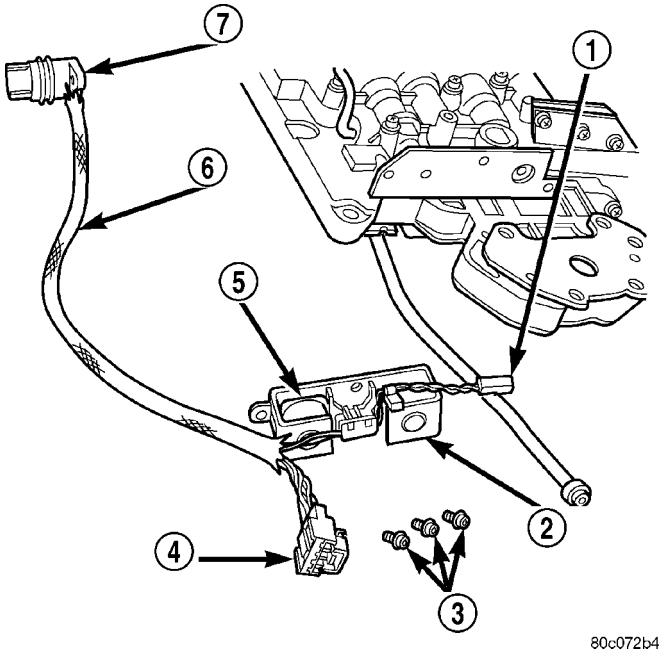


Fig. 280 Solenoid Assembly

1 - GOVERNOR SOLENOID WIRES
2 - CONVERTER CLUTCH SOLENOID
3 - SOLENOID SCREWS
4 - GOVERNOR SENSOR WIRES
5 - OVERDRIVE SOLENOID
6 - HARNESS
7 - CASE CONNECTOR

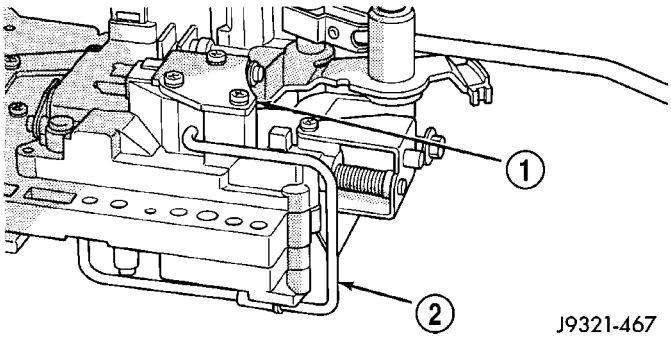


Fig. 281 Boost Valve Cover Location

1 - BOOST VALVE HOUSING AND COVER
2 - BOOST VALVE TUBE

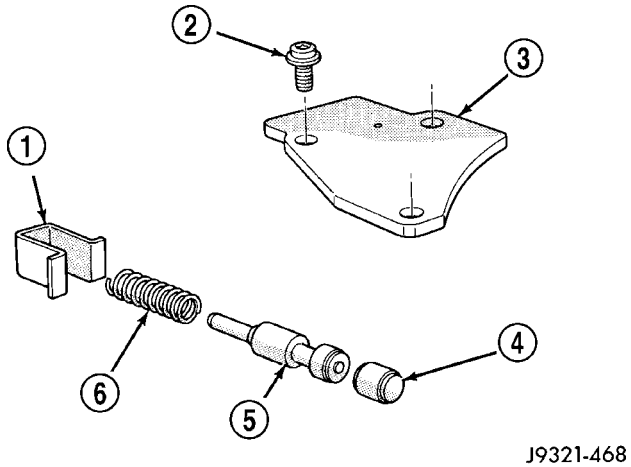


Fig. 282 Boost Valve Components

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. 283).

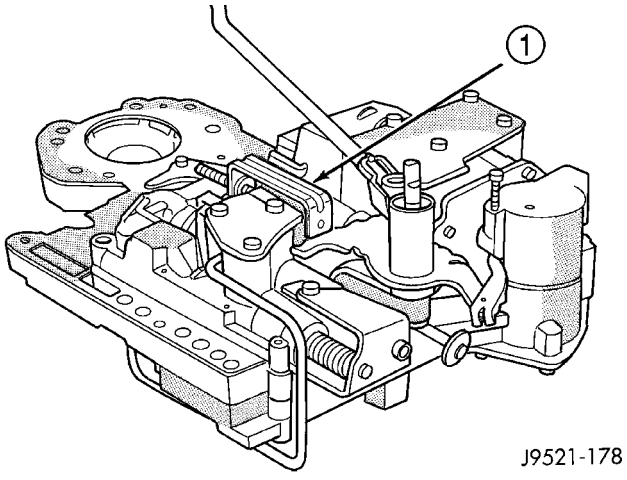


Fig. 283 Detent Ball Spring

1 - SPECIAL TOOL 6583 POSITIONED ON DETENT HOUSING

VALVE BODY (Continued)

(13) Remove park rod E-clip and separate rod from manual lever (Fig. 284).

(14) Remove E-clip and washer that retains throttle lever shaft in manual lever (Fig. 285).

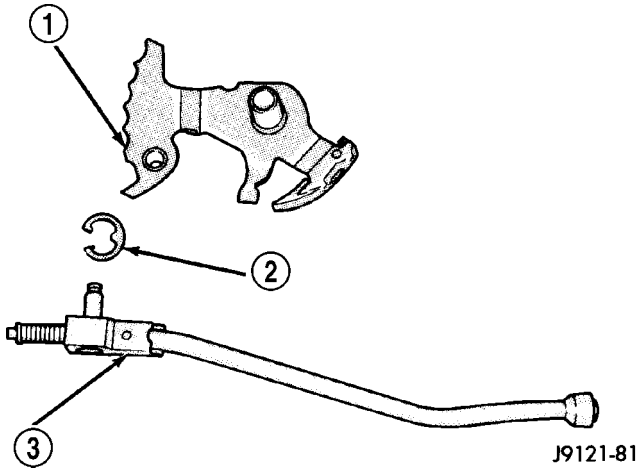


Fig. 284 Park Rod

1 - MANUAL LEVER
2 - E-CLIP
3 - PARK ROD

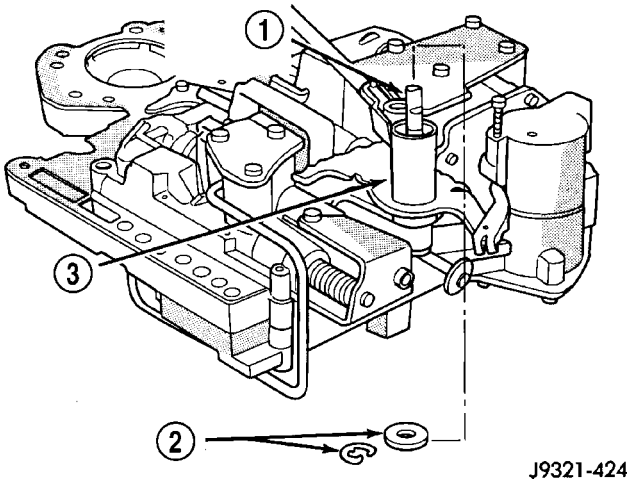


Fig. 285 Throttle Lever E-Clip And Washer

1 - THROTTLE LEVER SHAFT
2 - E-CLIP AND WASHER
3 - MANUAL SHAFT

(15) Remove manual lever and throttle lever (Fig. 286). 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. 287).

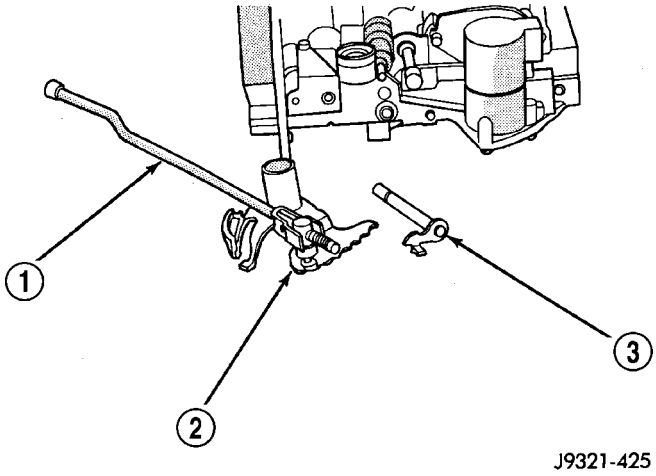


Fig. 286 Manual And Throttle Lever

1 - PARK ROD
2 - MANUAL LEVER ASSEMBLY
3 - THROTTLE LEVER

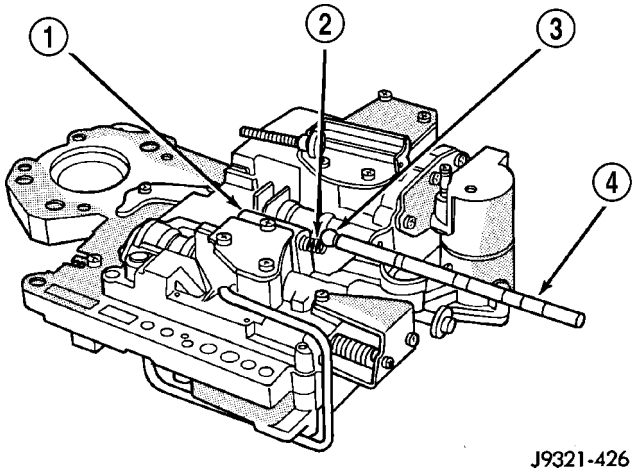


Fig. 287 Detent Ball And Spring

1 - DETENT HOUSING
2 - DETENT SPRING
3 - DETENT BALL
4 - PENCIL MAGNET

VALVE BODY (Continued)

(17) Remove screws attaching pressure adjusting screw bracket to valve body and transfer plate (Fig. 288). Hold bracket firmly against spring tension while removing last screw.

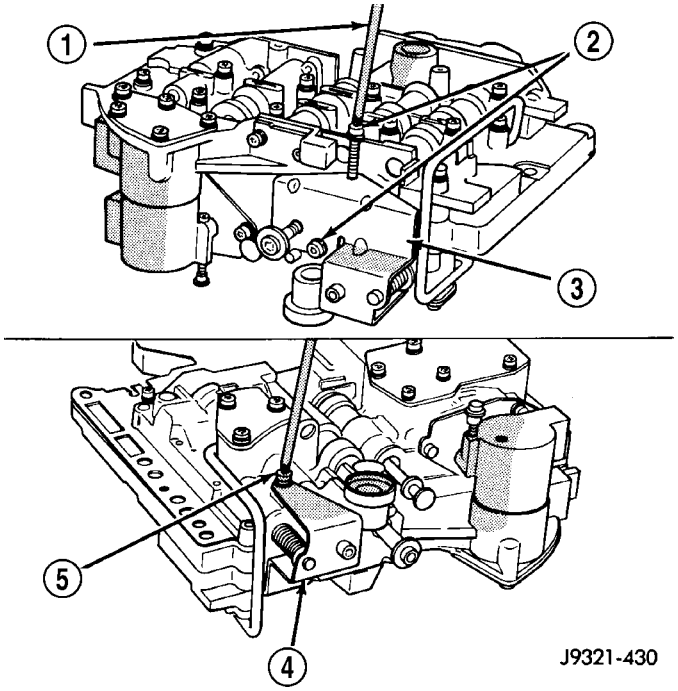


Fig. 288 Adjusting Screw Bracket Fastener

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. 289). Do not remove throttle pressure adjusting screw from bracket and do not disturb setting of either adjusting screw during removal.

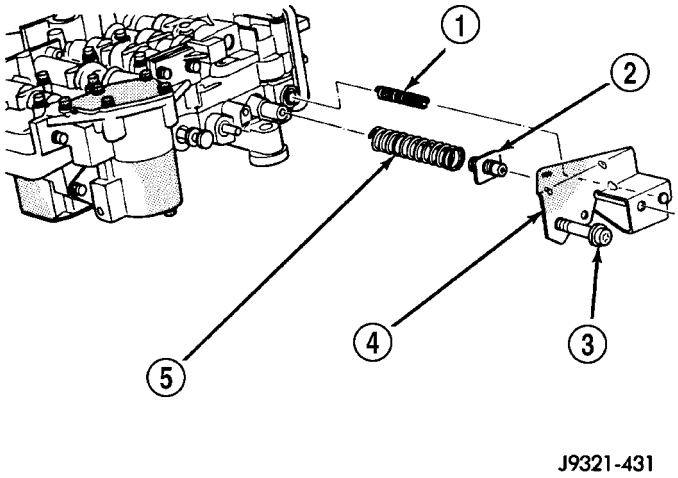


Fig. 289 Adjusting Screw Bracket

1 - SWITCH VALVE SPRING
2 - LINE PRESSURE SCREW
3 - THROTTLE PRESSURE ADJUSTING SCREW
4 - ADJUSTING SCREW BRACKET
5 - PRESSURE REGULATOR VALVE SPRING

(19) Turn upper housing over and remove switch valve, regulator valve and spring, and manual valve (Fig. 290).

(20) Remove kickdown detent, kickdown valve, and throttle valve and spring (Fig. 290).

(21) Loosen left-side 3-4 accumulator housing attaching screw about 2-3 threads. Then remove center and right-side housing attaching screws (Fig. 291).

(22) Carefully rotate 3-4 accumulator housing upward and remove 3-4 shift valve spring and converter clutch valve plug and spring (Fig. 292).

VALVE BODY (Continued)

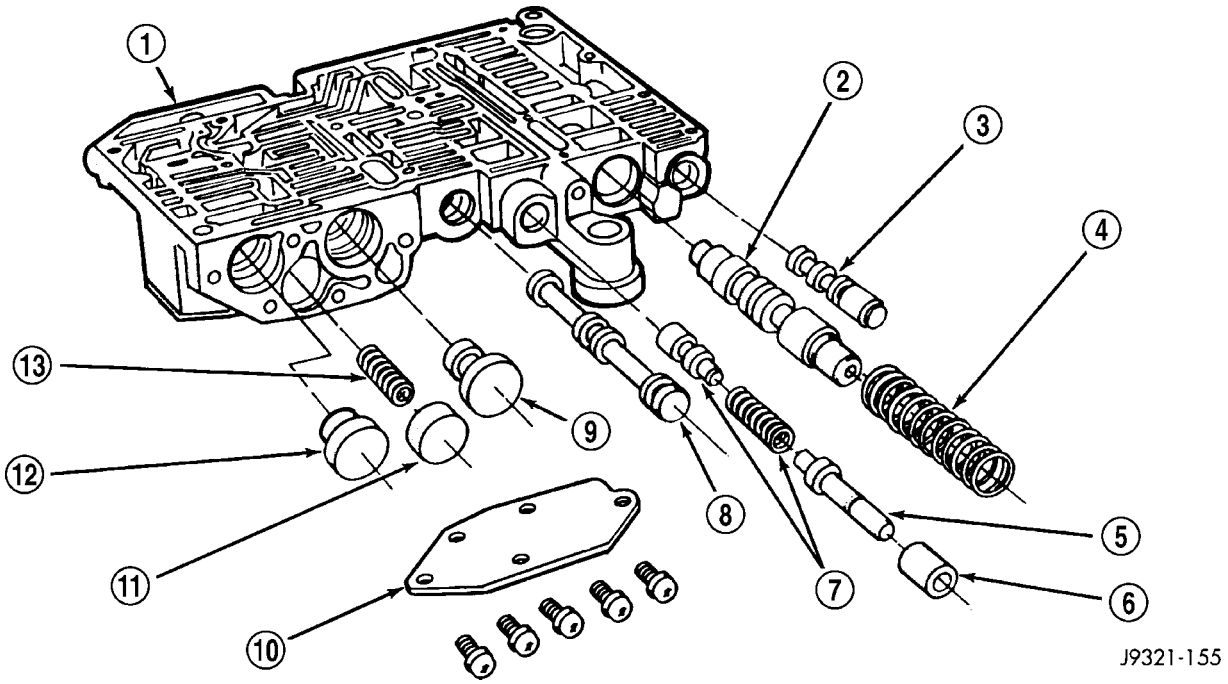


Fig. 290 Upper Housing Control Valve Locations

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

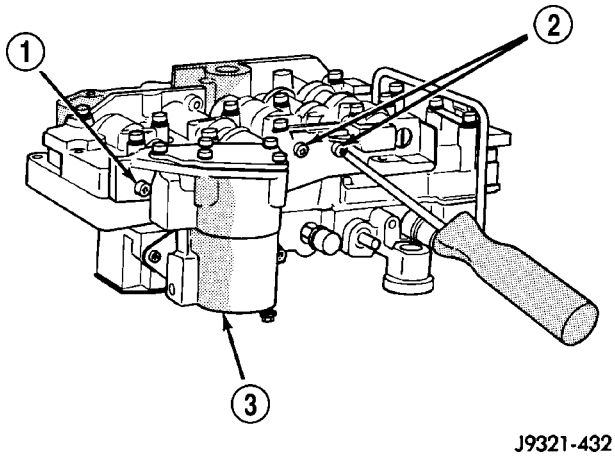


Fig. 291 Accumulator Housing Screw Locations

1 - LOOSEN THIS SCREW
2 - REMOVE THESE SCREWS
3 - 3-4 ACCUMULATOR HOUSING

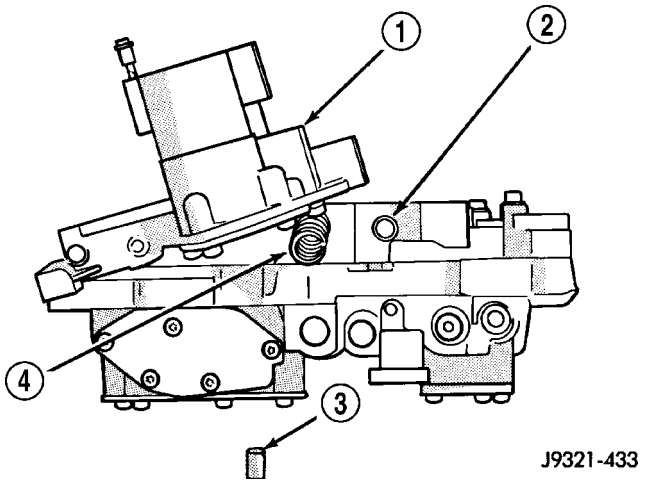


Fig. 292 3-4 Shift And Converter Clutch Valve Springs and Plug

1 - ACCUMULATOR HOUSING
2 - CONVERTER CLUTCH VALVE SPRING
3 - CLUTCH VALVE PLUG
4 - 3-4 SHIFT VALVE SPRING

VALVE BODY (Continued)

(23) Remove left-side screw and remove 3-4 accumulator housing from valve body (Fig. 293).

(24) Bend back tabs on boost valve tube brace (Fig. 294).

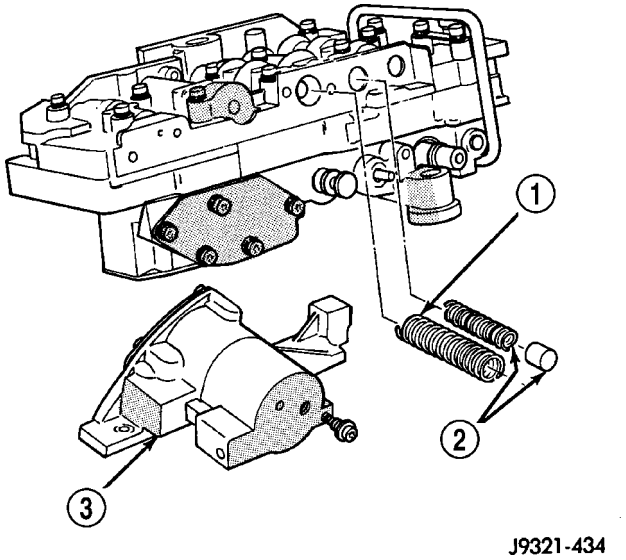


Fig. 293 Accumulator Housing, Valve Springs, and Plug

1 - 3-4 SHIFT VALVE SPRING
2 - CONVERTER CLUTCH VALVE SPRING AND PLUG
3 - 3-4 ACCUMULATOR HOUSING

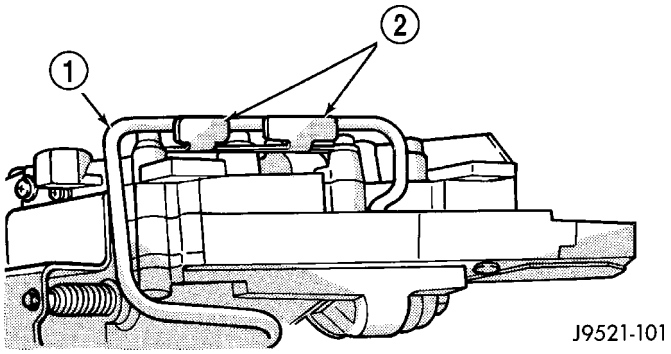


Fig. 294 Boost Valve Tube Brace

1 - BOOST VALVE TUBE
2 - TUBE BRACE (DOUBLE TAB)

(25) Remove boost valve connecting tube (Fig. 295). 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.

(26) Turn valve body over so lower housing is facing upward (Fig. 296). 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. 296). Note position of boost valve tube brace for assembly reference.

(28) Remove lower housing and overdrive separator plate from transfer plate (Fig. 296).

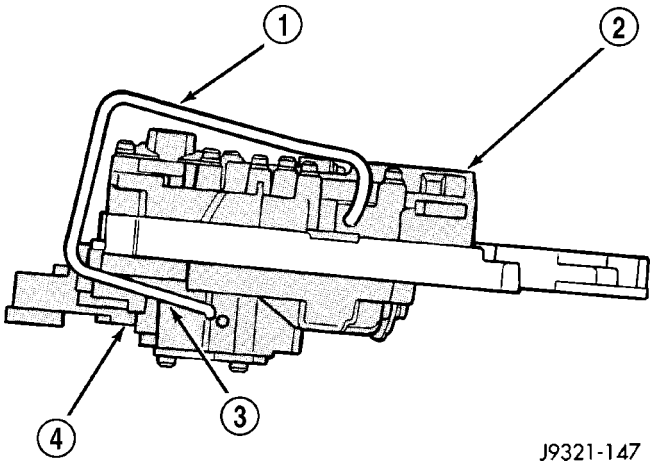


Fig. 295 Boost Valve Tube

1 - BOOST VALVE TUBE
2 - LOWER HOUSING
3 - DISENGAGE THIS END OF TUBE FIRST
4 - UPPER HOUSING

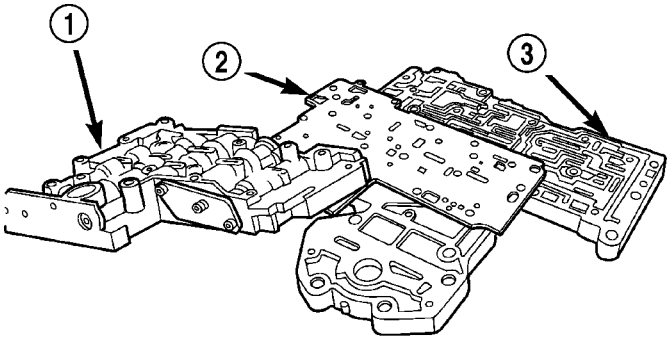


Fig. 296 Lower Housing

1 - LOWER HOUSING
2 - OVERDRIVE SEPARATOR PLATE
3 - TRANSFER PLATE AND UPPER HOUSING

VALVE BODY (Continued)

(29) Remove the Number 10 check ball from the transfer plate (Fig. 297). The check ball is approximately 4.8 mm (3/16 in.) in diameter.

(30) Remove transfer plate from upper housing (Fig. 298).

(31) Turn transfer plate over so upper housing separator plate is facing upward.

(32) Remove upper housing separator plate from transfer plate (Fig. 299). Note position of filter in separator plate for assembly reference.

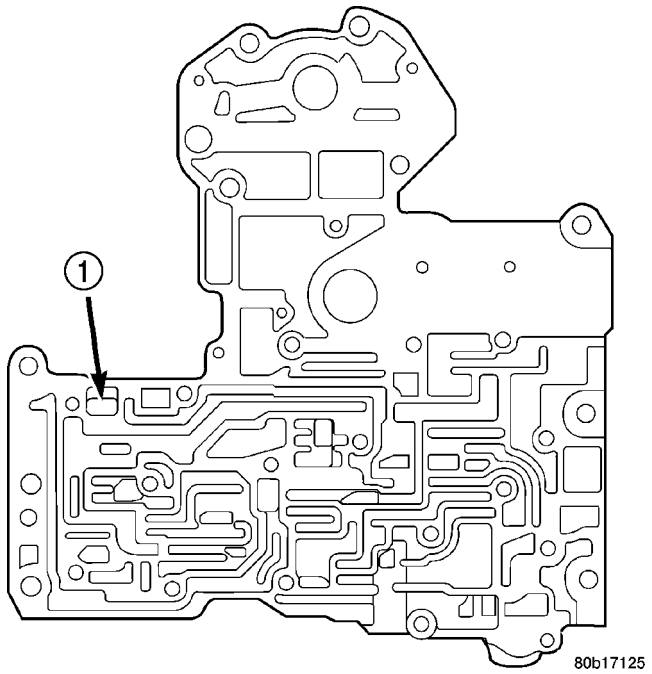


Fig. 297 Number 10 Check Ball

1 - NUMBER 10 CHECK BALL (3/16″)

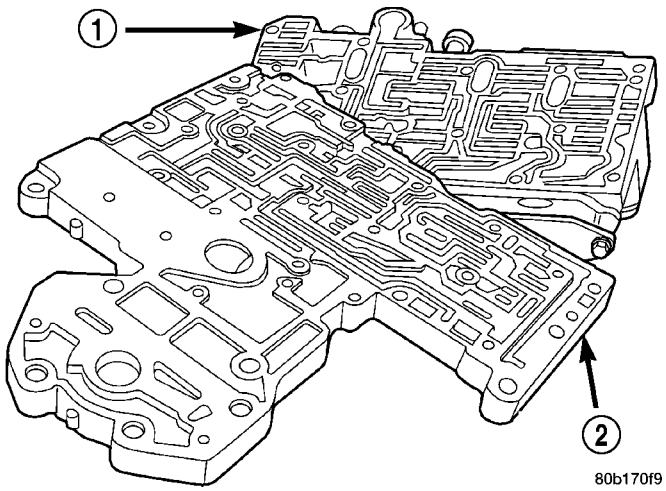


Fig. 298 Transfer Plate

1 - UPPER HOUSING
2 - TRANSFER PLATE

(33) Remove rear clutch and rear servo check balls from transfer plate. Note check ball location for assembly reference (Fig. 300).

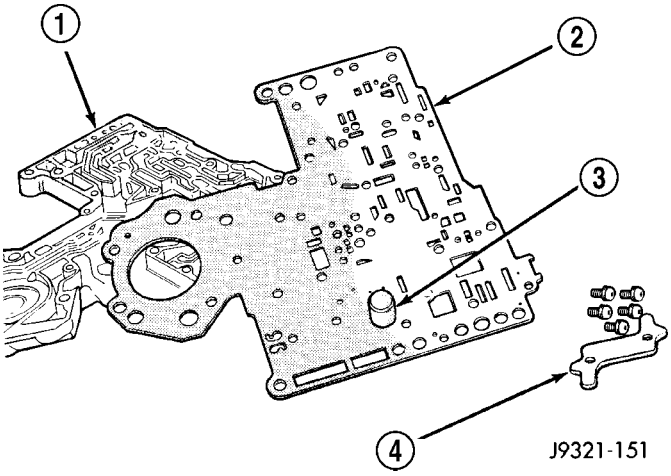


Fig. 299 Upper Housing Separator Plate

1 - TRANSFER PLATE
2 - UPPER HOUSING SEPARATOR PLATE
3 - FILTER SCREEN
4 - BRACE

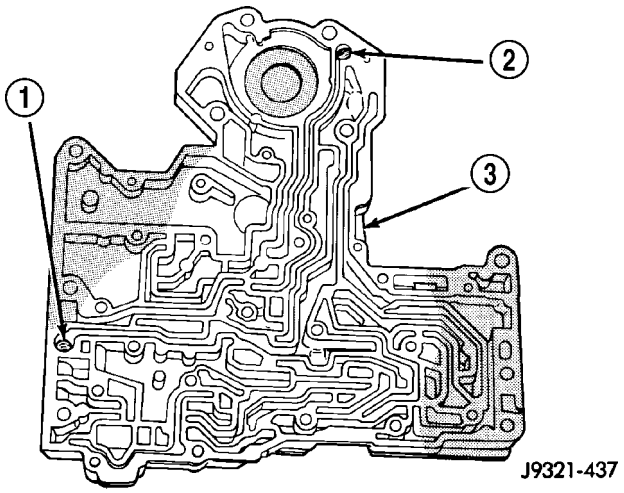


Fig. 300 Rear Clutch and Rear Servo Check Ball Locations

1 - REAR CLUTCH CHECK BALL
2 - REAR SERVO CHECK BALL
3 - TRANSFER PLATE

VALVE BODY (Continued)

VALVE BODY UPPER HOUSING

(1) Note location of check balls in valve body upper housing (Fig. 301). Then remove the one large diameter and the five smaller diameter check balls.

(2) Remove governor plug and shuttle valve covers (Fig. 303).

(3) Remove E-clip that secures shuttle valve secondary spring on valve stem (Fig. 302).

(4) Remove throttle plug, primary spring, shuttle valve, secondary spring, and spring guides (Fig. 303).

(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. 290).

(7) Turn upper housing around and remove limit valve and shift valve covers (Fig. 304).

(8) Remove limit valve housing. Then remove retainer, spring, limit valve, and 2-3 throttle plug from limit valve housing (Fig. 304).

(9) Remove 1-2 shift control valve and spring (Fig. 304).

(10) Remove 1-2 shift valve and spring (Fig. 304).

(11) Remove 2-3 shift valve and spring from valve body (Fig. 304).

(12) Remove pressure plug cover (Fig. 304).

(13) Remove line pressure sleeve, throttle pressure plug and spring (Fig. 304).

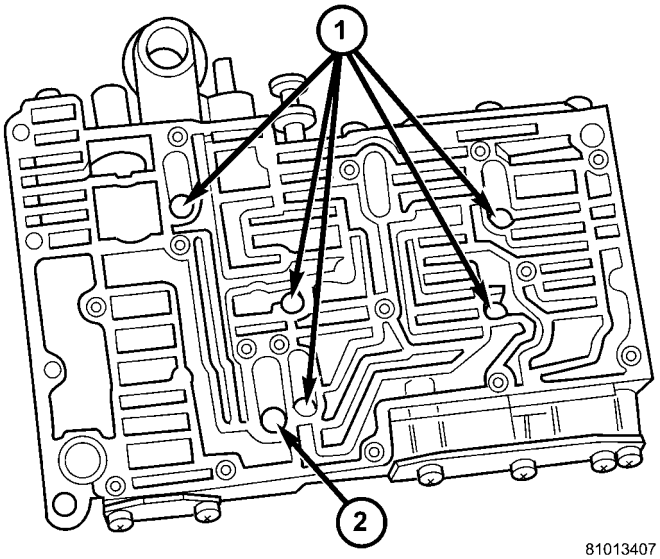


Fig. 301 Check Ball Locations In Upper Housing

1 - SMALL DIAMETER CHECK BALLS (5)
2 - LARGE DIAMETER CHECK BALL (1)

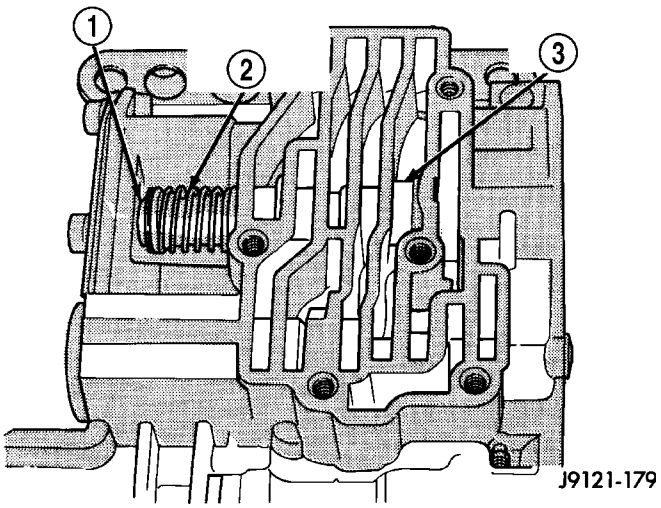


Fig. 302 Shuttle Valve E-Clip And Secondary Spring

1 - E-CLIP
2 - SECONDARY SPRING AND GUIDES
3 - SHUTTLE VALVE

VALVE BODY (Continued)

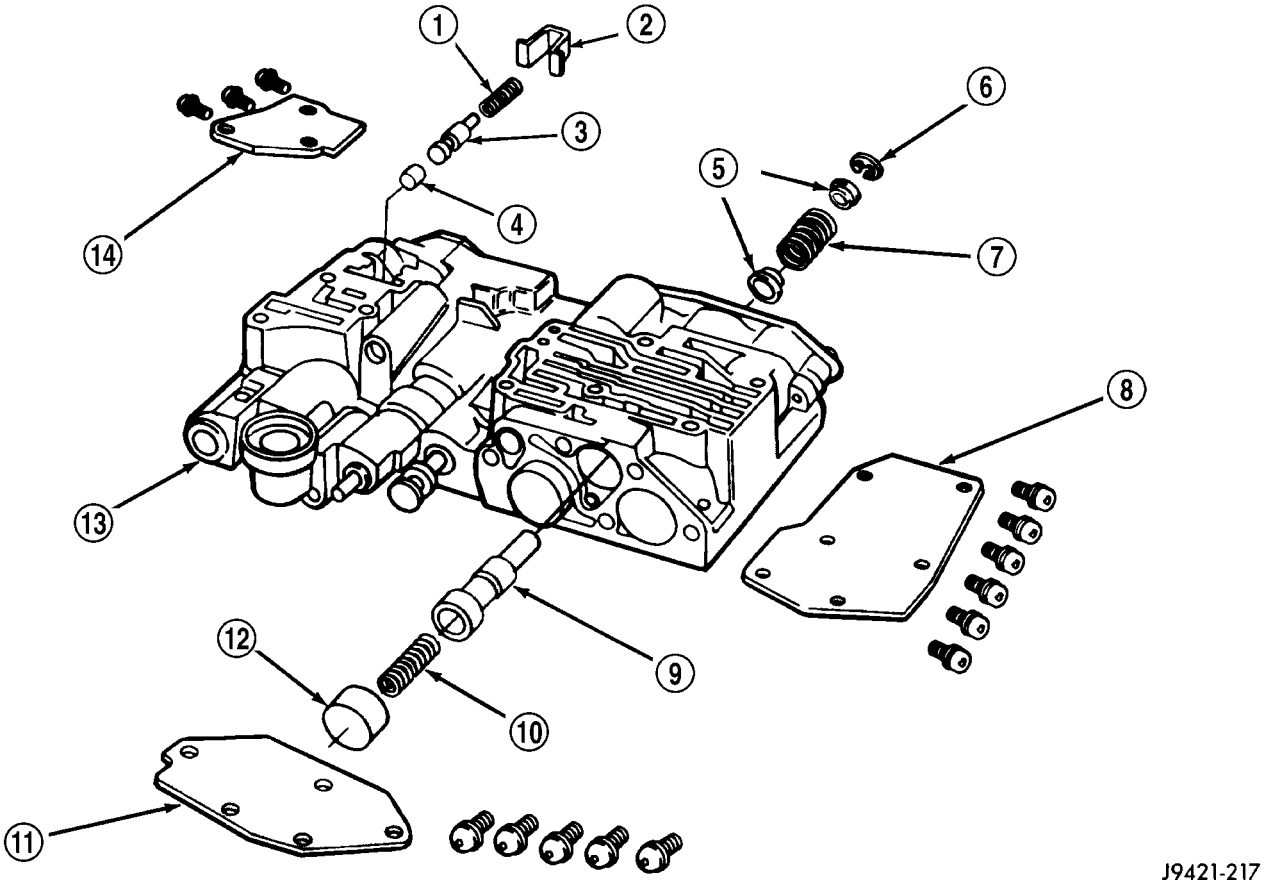


Fig. 303 Shuttle and Boost Valve Location

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)

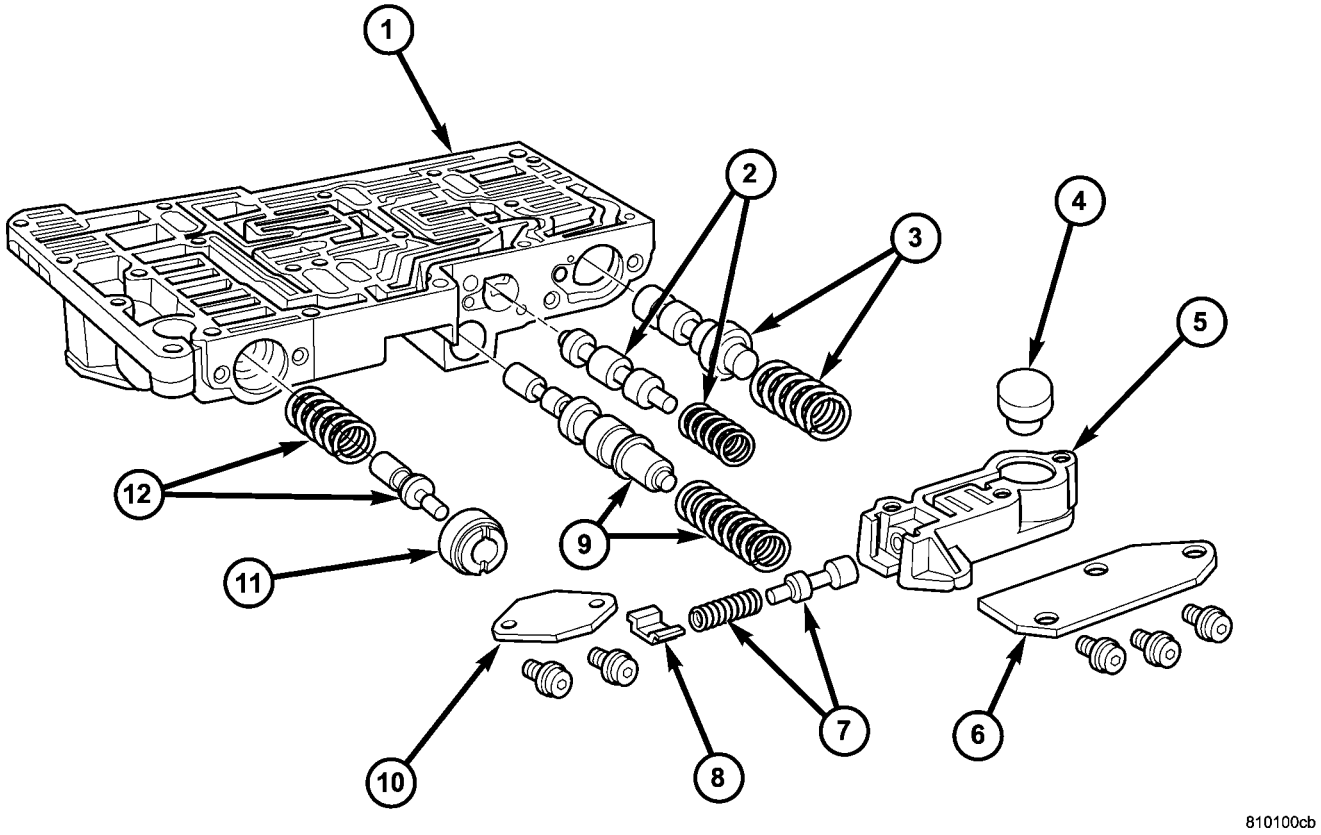


Fig. 304 Upper Housing Shift Valve and Pressure Plug Locations

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 - PLUG SLEEVE
12 - THROTTLE PRESSURE SPRING AND PLUG

VALVE BODY (Continued)

VALVE BODY LOWER HOUSING

(1) Remove timing valve cover.
(2) Remove 3-4 timing valve and spring.
(3) Remove 3-4 quick fill valve, spring and plug.
(4) Remove 3-4 shift valve and spring.
(5) Remove converter clutch valve, spring and plug (Fig. 305).
(6) Remove converter clutch timing valve, retainer and valve spring.

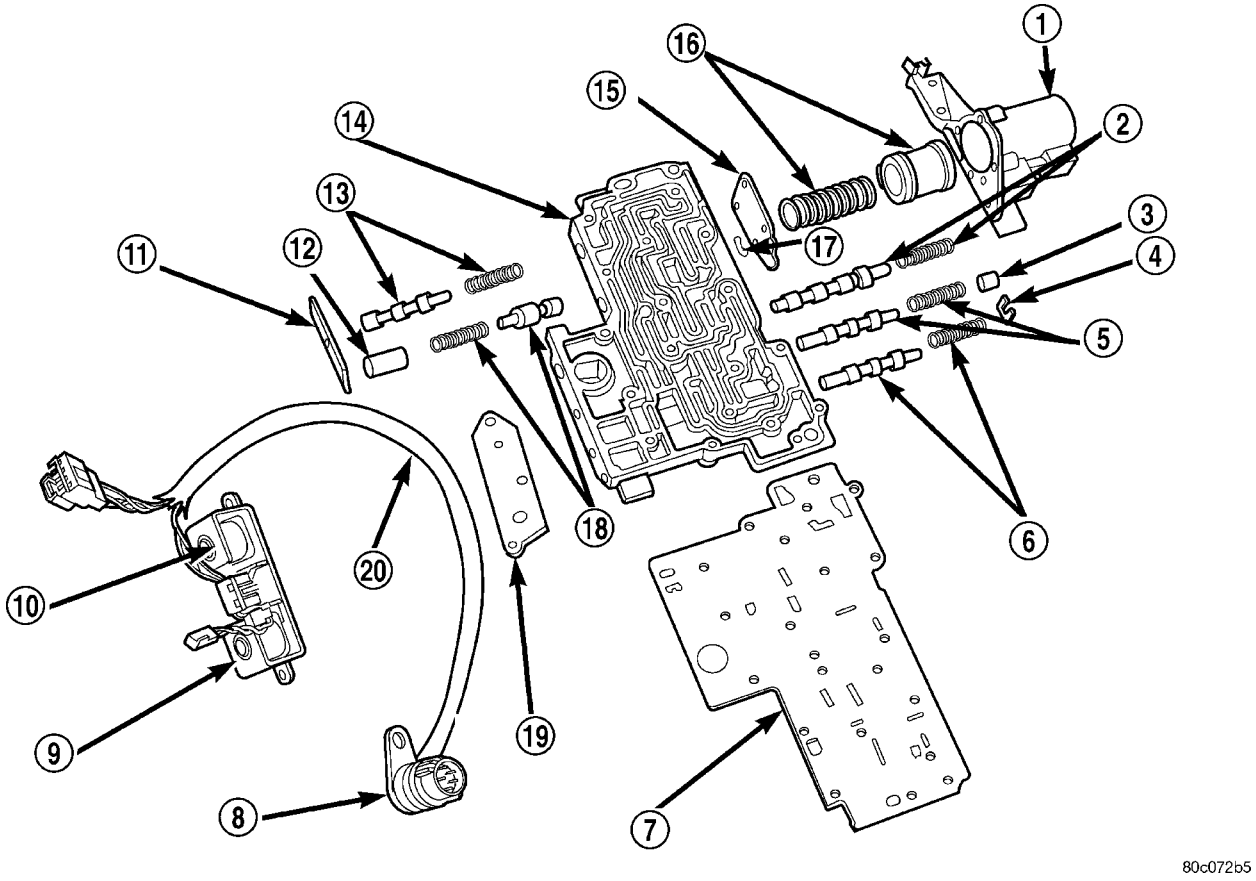


Fig. 305 Lower Housing Shift Valves and Springs

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)

3-4 ACCUMULATOR HOUSING

(1) Remove end plate from housing.
(2) Remove piston spring.
(3) Remove piston. Remove and discard piston seals (Fig. 306).

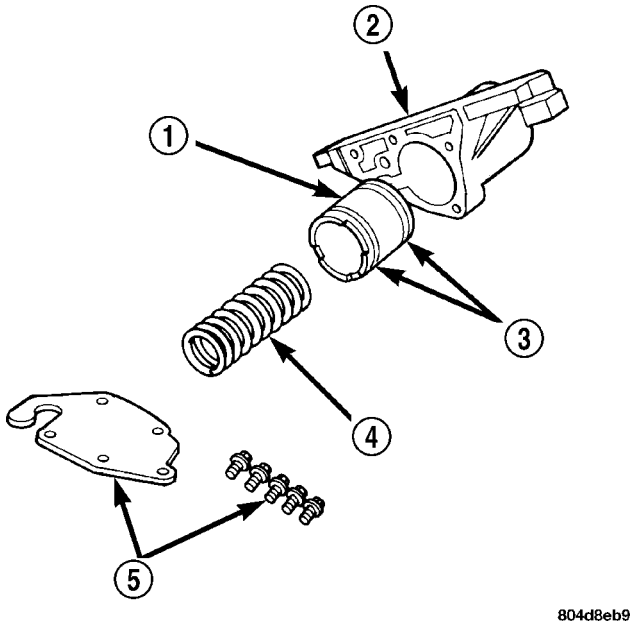


Fig. 306 3-4 Accumulator and Housing

1 - ACCUMULATOR PISTON
2 - 3-4 ACCUMULATOR HOUSING
3 - TEFLON SEALS
4 - PISTON SPRING
5 - COVER PLATE AND SCREWS

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.

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)

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. 307).

(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)

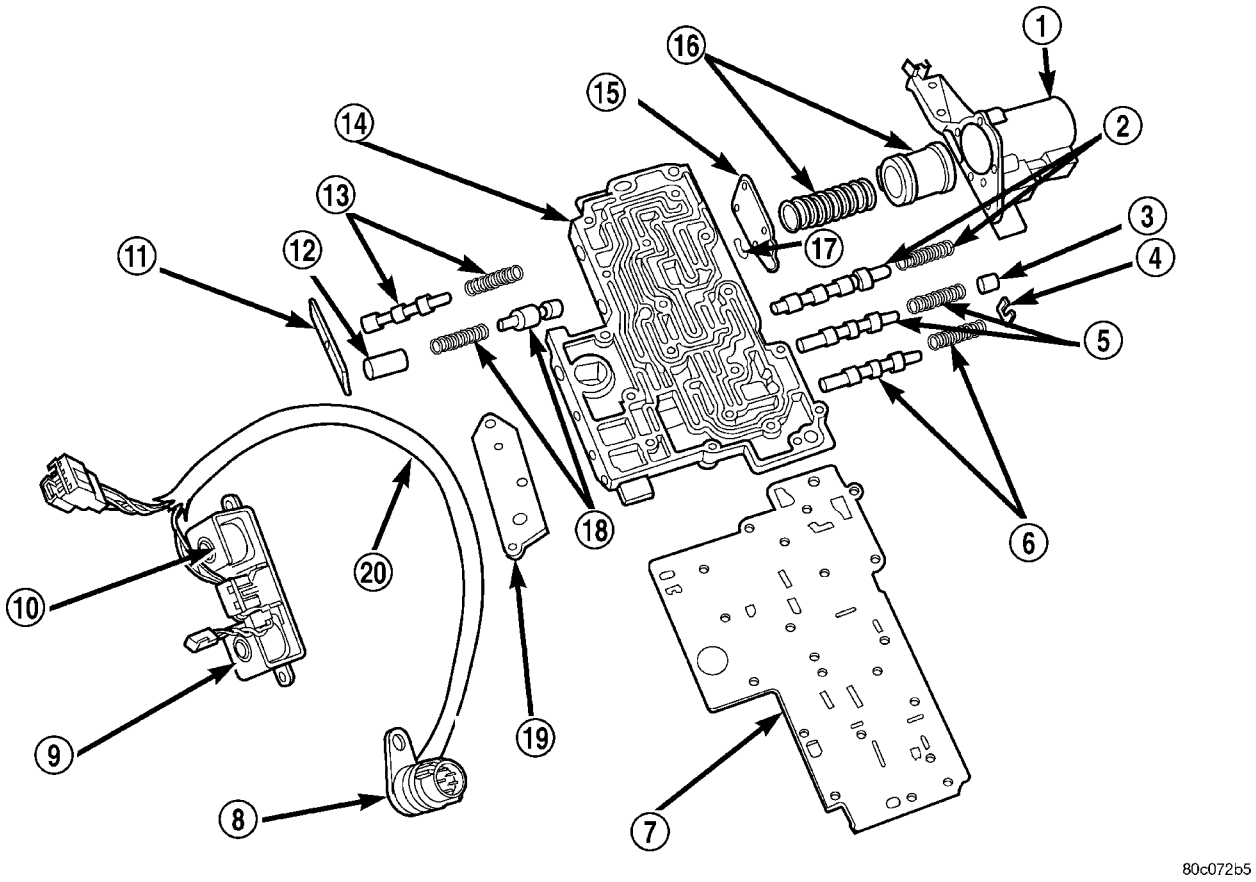


Fig. 307 Lower Housing Shift Valves and Springs

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)

3-4 ACCUMULATOR

(1) Lubricate accumulator piston, seals and housing piston bore with clean transmission fluid (Fig. 308).
(2) Install new seal rings on accumulator piston.
(3) Install piston and spring in housing.
(4) Install end plate on housing.

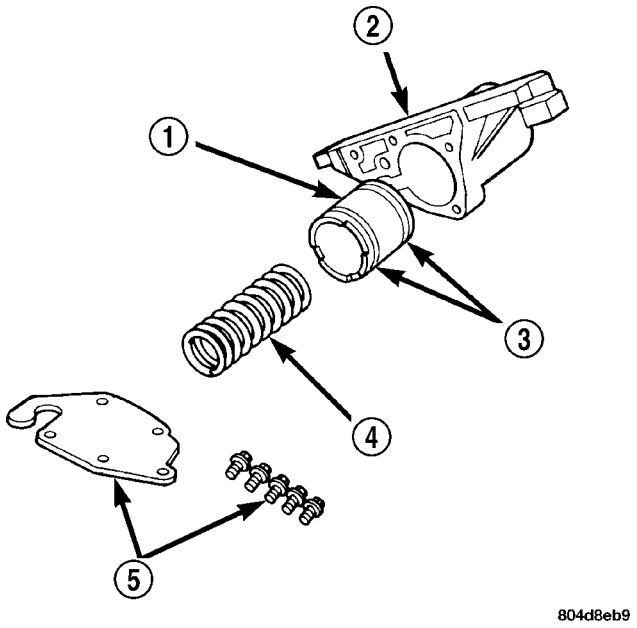


Fig. 308 3-4 Accumulator and Housing

1 - ACCUMULATOR PISTON
2 - 3-4 ACCUMULATOR HOUSING
3 - TEFLON SEALS
4 - PISTON SPRING
5 - COVER PLATE AND SCREWS

TRANSFER PLATE

(1) Install rear clutch and rear servo check balls in transfer plate (Fig. 309).
(2) Install filter screen in upper housing separator plate (Fig. 310).
(3) Align and position upper housing separator plate on transfer plate (Fig. 311).
(4) Install brace plate (Fig. 311). 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.

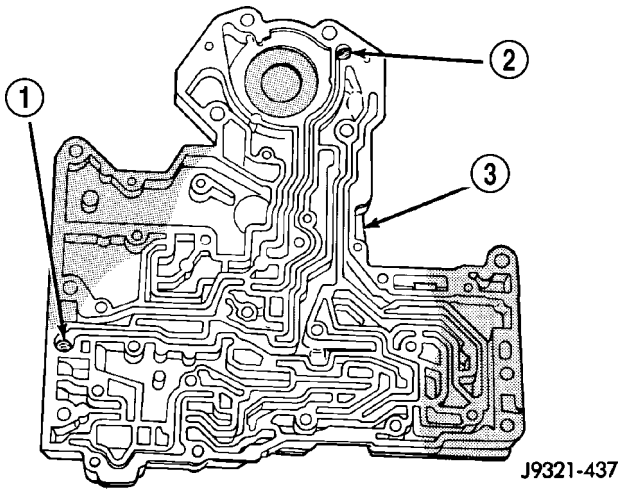


Fig. 309 Rear Clutch And Rear Servo Check Ball Locations

1 - REAR CLUTCH CHECK BALL
2 - REAR SERVO CHECK BALL
3 - TRANSFER PLATE

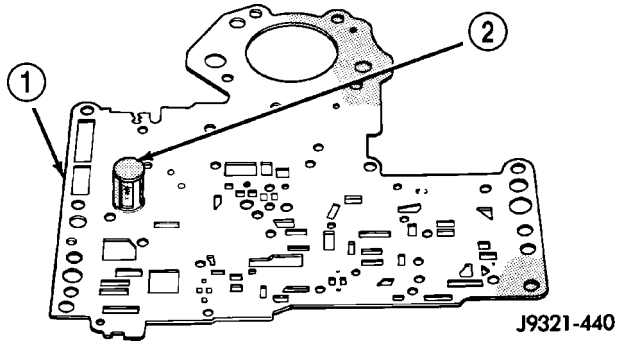


Fig. 310 Separator Plate Filter Screen Installation

1 - UPPER HOUSING SEPARATOR PLATE
2 - FILTER SCREEN

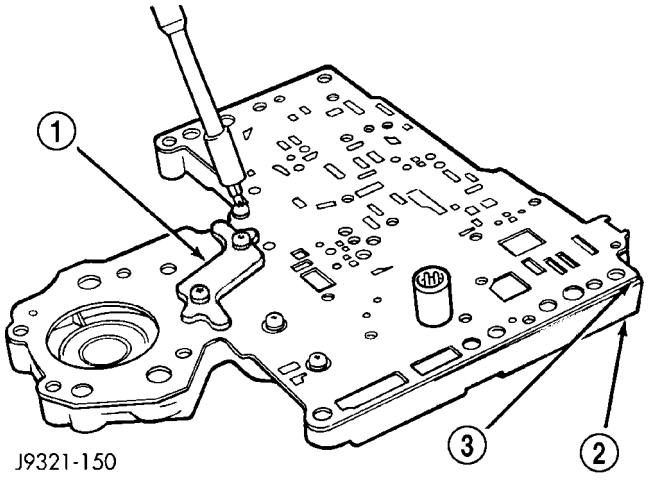


Fig. 311 Brace Plate

1 - BRACE
2 - TRANSFER PLATE
3 - SEPARATOR PLATE

VALVE BODY (Continued)

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. 312). Seven 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 5 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. 313). Be sure filter screen is seated in proper housing recess.

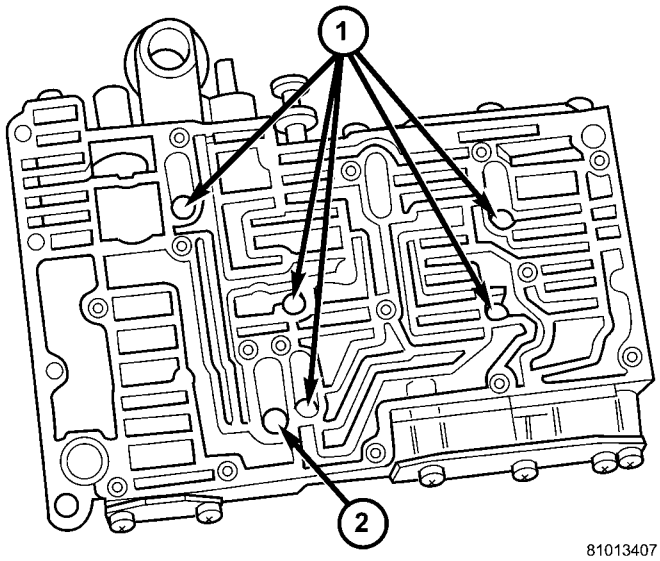


Fig. 312 Check Ball Locations In Upper Housing

1 - SMALL DIAMETER CHECK BALLS (5)
2 - LARGE DIAMETER CHECK BALL (1)

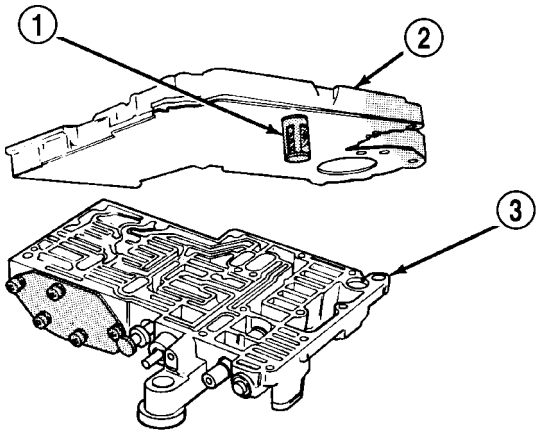


Fig. 313 Installing Transfer Plate On Upper Housing

1 - FILTER SCREEN
2 - TRANSFER PLATE/SEPARATOR PLATE ASSEMBLY
3 - UPPER HOUSING

(3) Install the Number 10 check ball into the transfer plate (Fig. 314). The check ball is approximately 4.8 mm (3/16 in.) in diameter.

(4) Position lower housing separator plate on transfer plate (Fig. 315).

(5) Install lower housing on assembled transfer plate and upper housing (Fig. 316).

(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. 316).

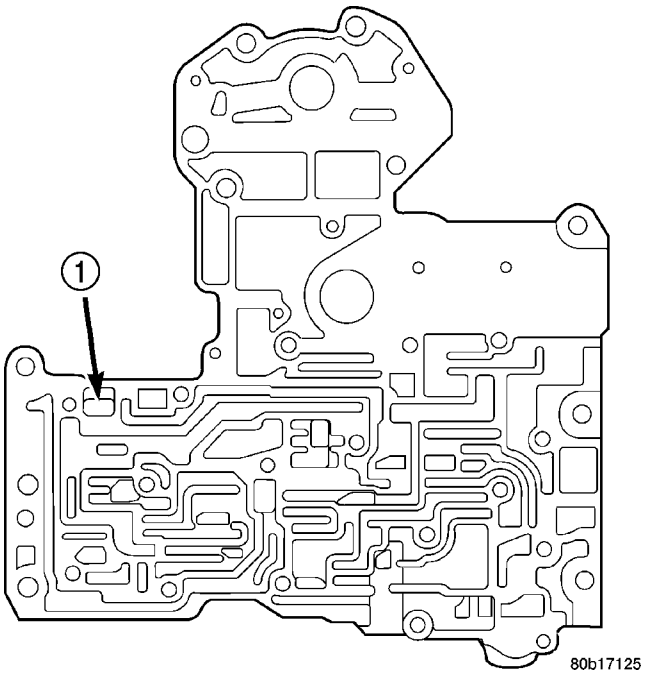


Fig. 314 Number 10 Check Ball

1 - NUMBER 10 CHECK BALL (3/16″)

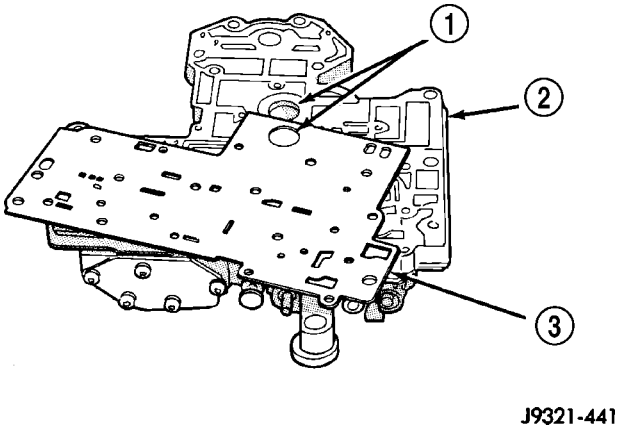


Fig. 315 Lower Housing Separator Plate

1 - BE SURE TO ALIGN BORES
2 - TRANSFER PLATE
3 - LOWER HOUSING (OVERDRIVE) SEPARATOR PLATE

VALVE BODY (Continued)

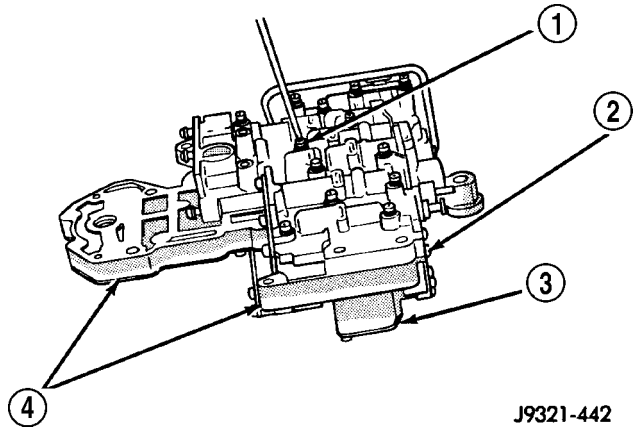


Fig. 316 Installing Lower Housing On Transfer Plate And Upper Housing

1 - VALVE BODY SCREWS (13)
2 - LOWER HOUSING
3 - UPPER HOUSING
4 - TRANSFER PLATE

UPPER HOUSING VALVE AND PLUG

Refer to (Fig. 317), (Fig. 318) and (Fig. 319) to perform the following steps.

(1) Lubricate valves, plugs, springs with clean transmission fluid.

(2) Assemble regulator valve line pressure 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.

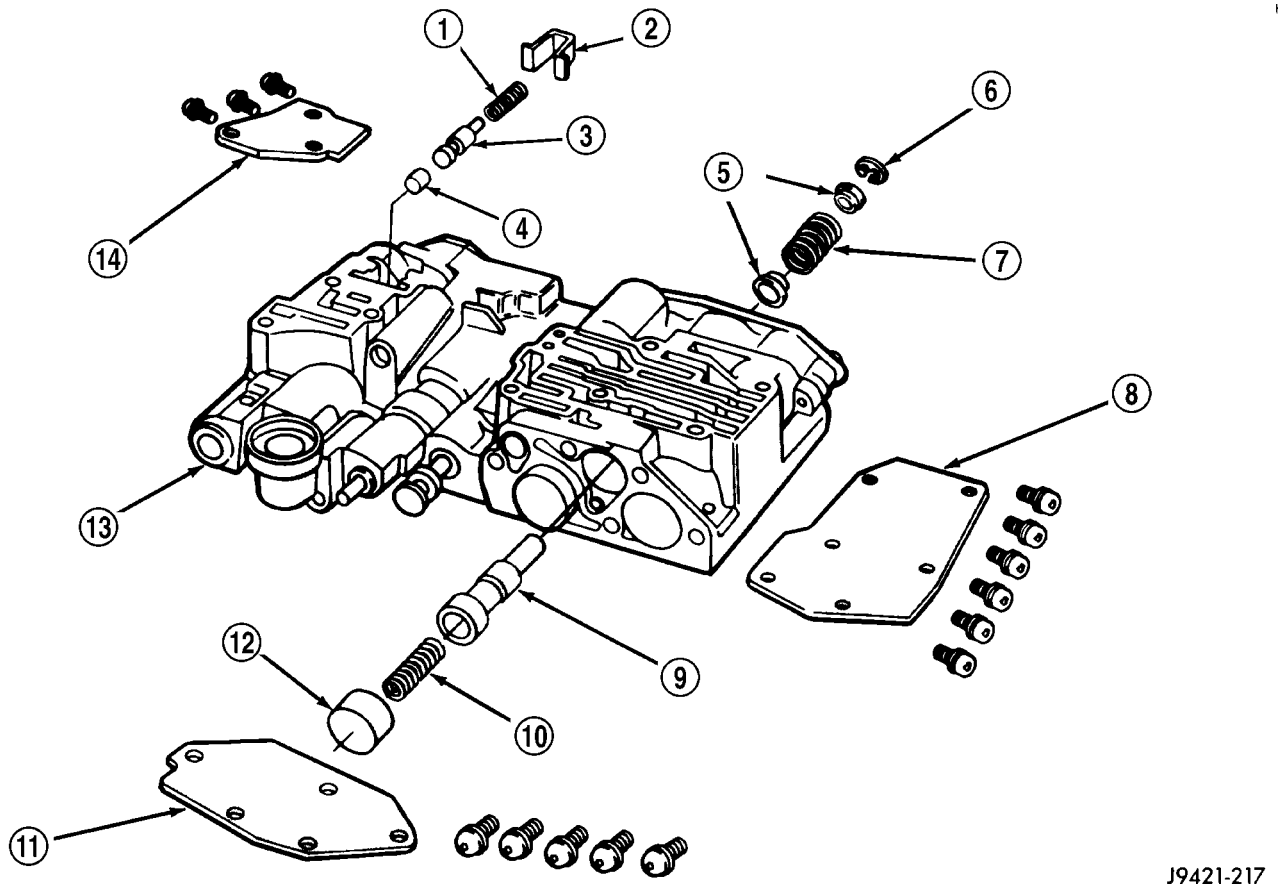


Fig. 317 Shuttle and Boost Valve Locations

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)

(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. 320).

(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. 320).

(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. 321).

(6) Install and finger tighten three screws that secure tube brace to valve body housings (Fig. 321).

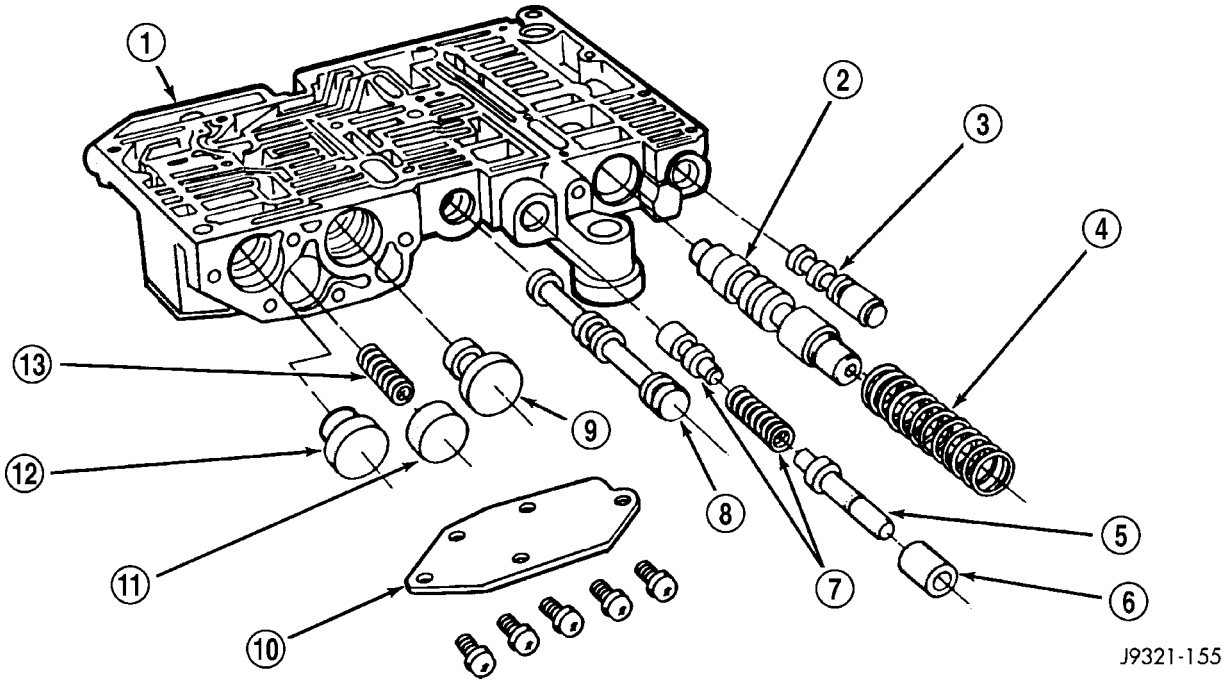


Fig. 318 Upper Housing Control Valve Locations

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)

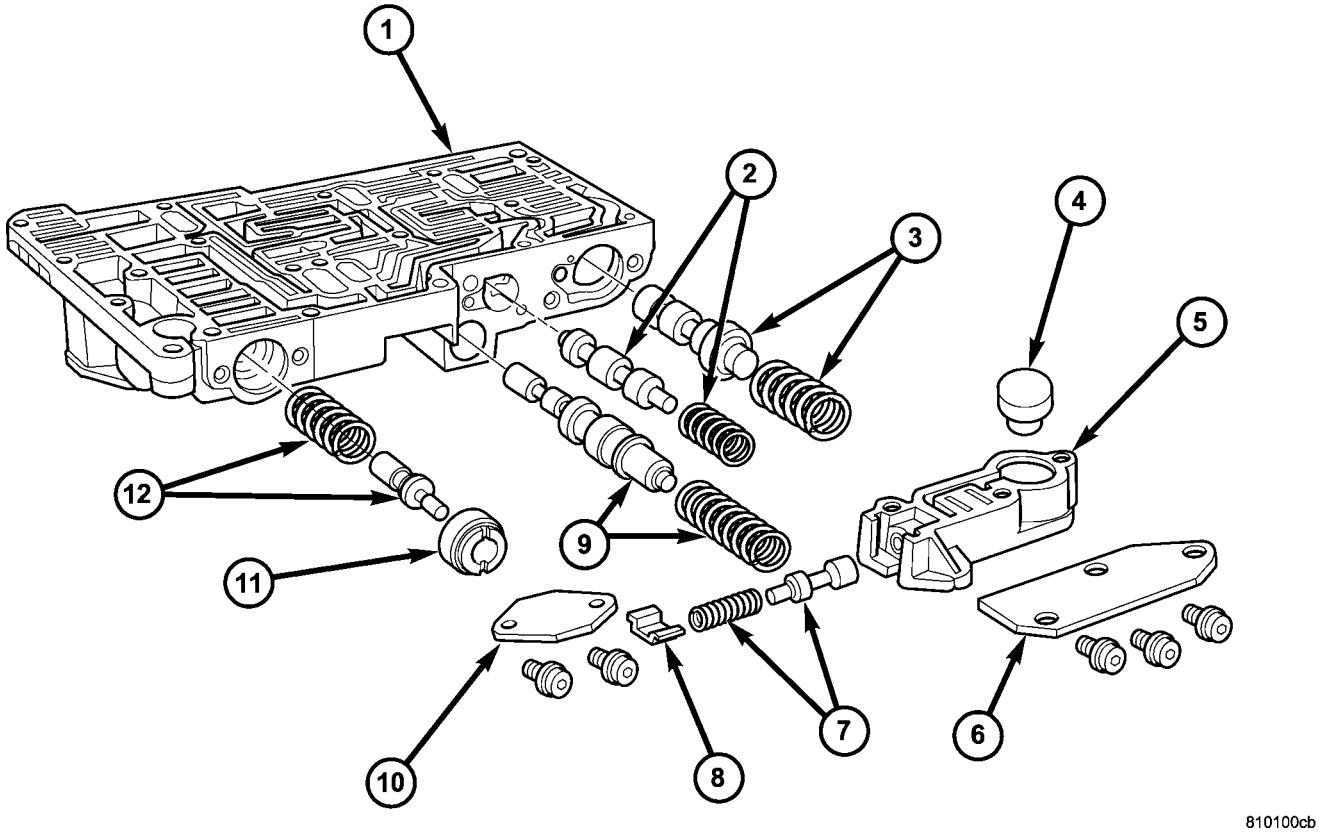


Fig. 319 Upper Housing Shift Valve and Pressure Plug Locations

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 - PLUG SLEEVE
12 - THROTTLE PRESSURE SPRING AND PLUG

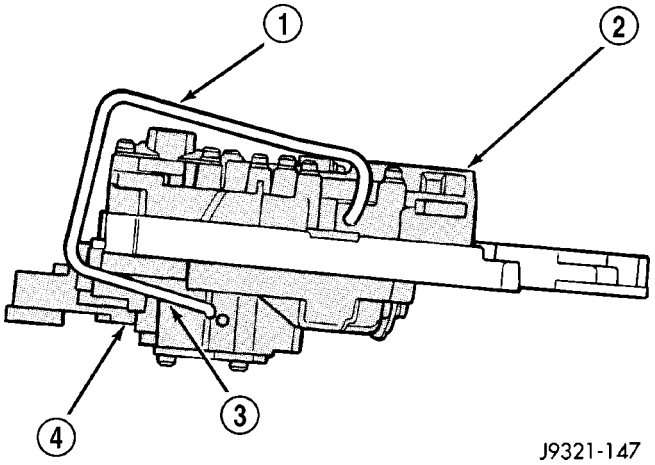


Fig. 320 Boost Valve Tube

1 - BOOST VALVE TUBE
2 - LOWER HOUSING
3 - DISENGAGE THIS END OF TUBE FIRST
4 - UPPER HOUSING

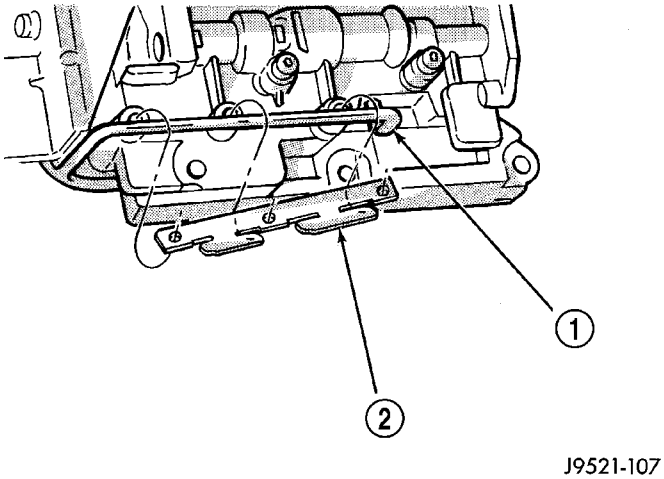


Fig. 321 Boost Valve Tube And Brace

1 - BOOST VALVE TUBE
2 - TUBE BRACE

VALVE BODY (Continued)

(7) Bend tube brace tabs up and against tube to hold it in position (Fig. 322).

(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.

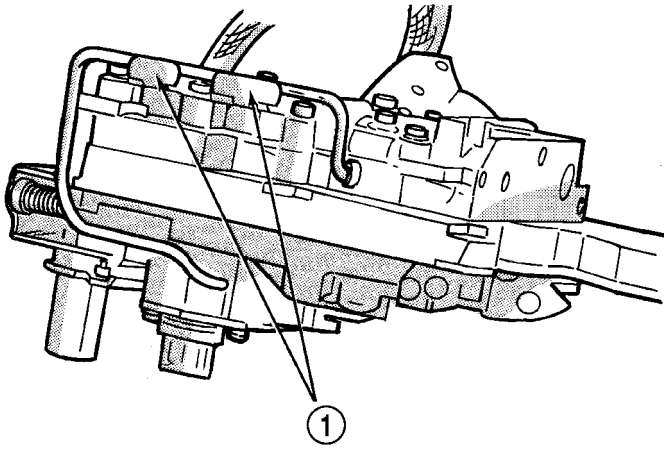


Fig. 322 Securing Boost Valve Tube With Brace Tabs

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. 323).

(2) Loosely attach accumulator housing with right-side screw (Fig. 323). 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. 324). Tighten screws to 4 N·m (35 in. lbs.).

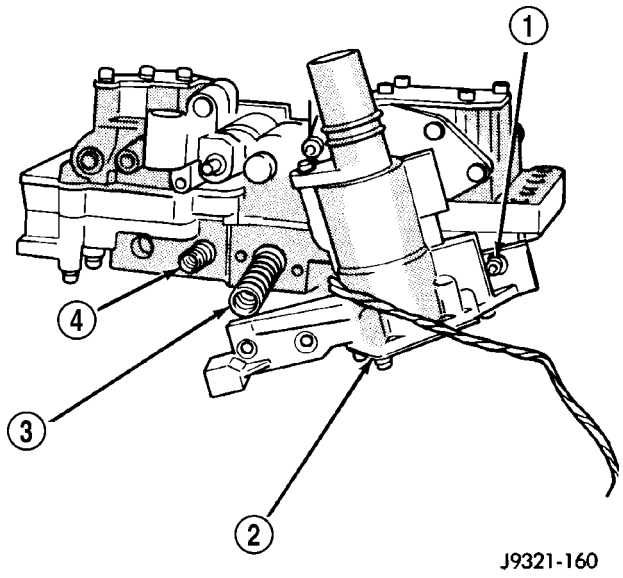


Fig. 323 Converter Clutch And 3-4 Shift Valve Springs

1 - RIGHT-SIDE SCREW
2 - 3-4 ACCUMULATOR
3 - 3-4 SHIFT VALVE SPRING
4 - CONVERTER CLUTCH VALVE SPRING

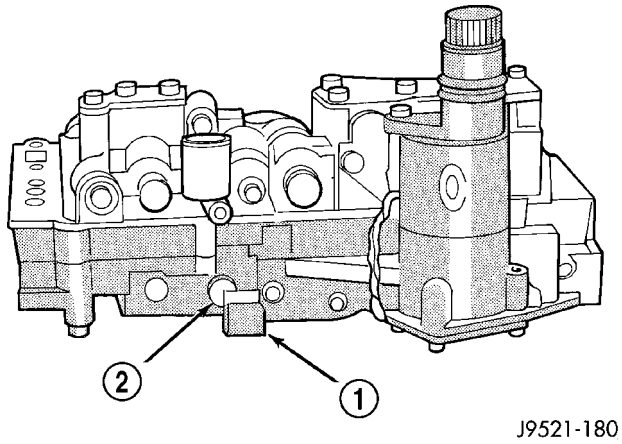


Fig. 324 Seating 3-4 Accumulator On Lower Housing

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. 325).

(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. 326).

(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.

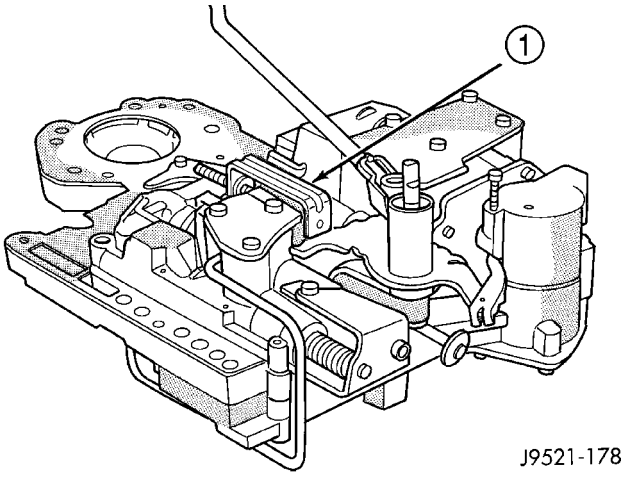


Fig. 325 Detent Ball Spring

1 - SPECIAL TOOL 6583 POSITIONED ON DETENT HOUSING

(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. 327). Seat tang in dimple before tightening connector screw.

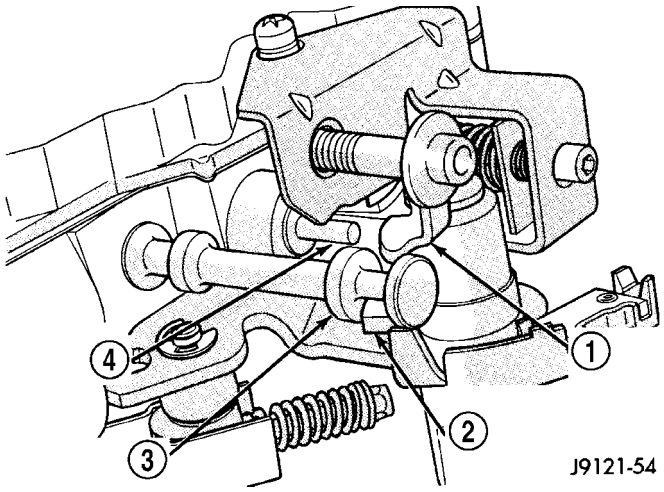


Fig. 326 Manual And Throttle Lever Alignment

1 - THROTTLE LEVER
2 - MANUAL LEVER VALVE ARM
3 - MANUAL VALVE
4 - KICKDOWN VALVE

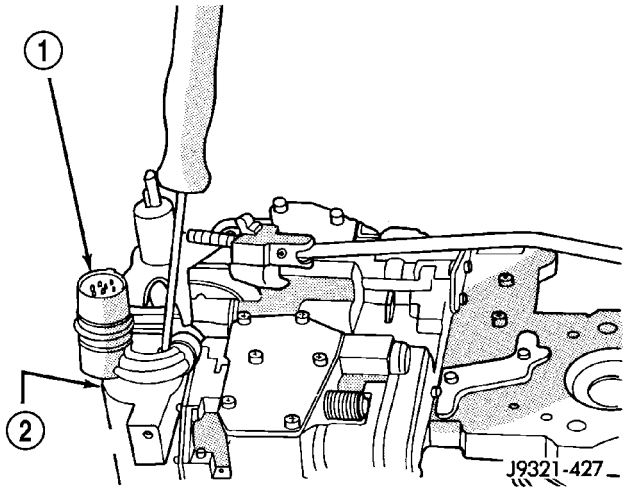


Fig. 327 Solenoid Harness Case Connector Shoulder Bolt

1 - SOLENOID HARNESS CASE CONNECTOR
2 - 3-4 ACCUMULATOR HOUSING

VALVE BODY (Continued)

(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. 328). Solenoid harness must be clear of manual lever and park rod and not be pinched between accumulator housing and cover.

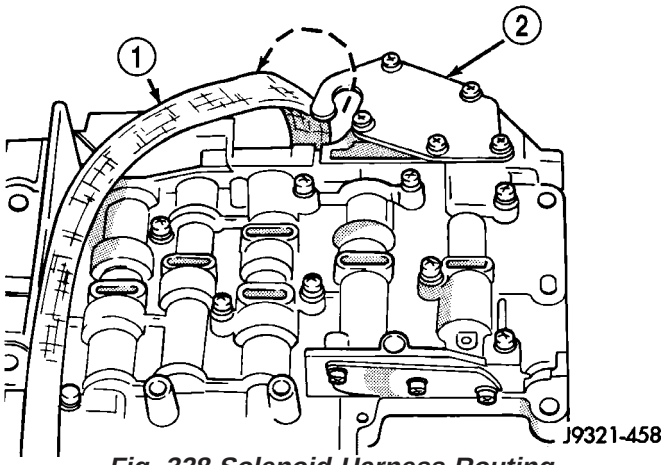


Fig. 328 Solenoid Harness Routing

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. 329). 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. 330).

(3) Check condition of seals on accumulator piston. Install new piston seals, if necessary.

(4) Verify that transmission range sensor is **NOT** installed. Valve body cannot be installed with sensor in place.

(5) Place valve body manual lever in low (1 position) so ball on park lock rod will be easier to install in sprag.

(6) Lubricate shaft of manual lever with petroleum jelly. This will ease inserting shaft through seal in case.

(7) Lubricate seal rings on valve body harness connector with petroleum jelly.

(8) 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.

(9) Install accumulator spring and piston into case. Then swing valve body over piston and outer spring to hold it in place.

(10) Align accumulator piston and outer spring, manual lever shaft and electrical connector in case.

(11) Then seat valve body in case and install one or two bolts to hold valve body in place.

(12) Tighten valve body bolts alternately and evenly to 11 N·m (100 in. lbs.) torque.

(13) Install new fluid filter on valve body. Tighten filter screws to 4 N·m (35 in. lbs.) torque.

(14) Install throttle and gearshift levers on valve body manual lever shaft.

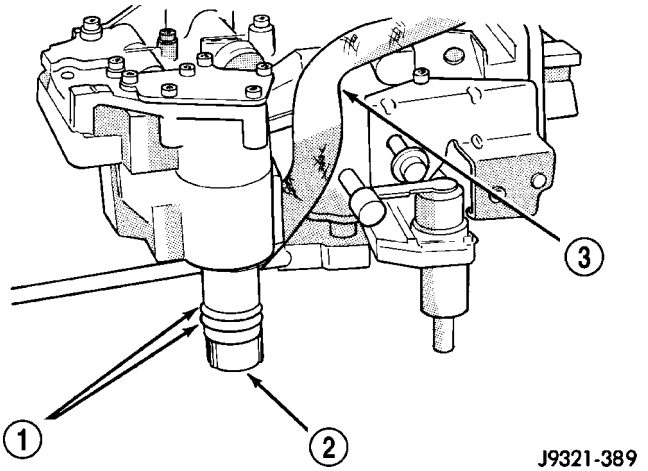


Fig. 329 Valve Body Harness Connector O-Ring Seal

1 - CONNECTOR O-RINGS
2 - VALVE BODY HARNESS CONNECTOR
3 - HARNESS

VALVE BODY (Continued)

(15) Check and adjust front and rear bands if necessary.
(16) Connect solenoid case connector wires.
(17) Install the transmission range sensor.
(18) Install oil pan and new gasket. Tighten pan bolts to 17 N·m (13 ft. lbs.) torque.
(19) Lower vehicle and fill transmission with Mopar® ATF +4, Automatic Transmission fluid.
(20) Check and adjust gearshift and throttle valve cables, if necessary.

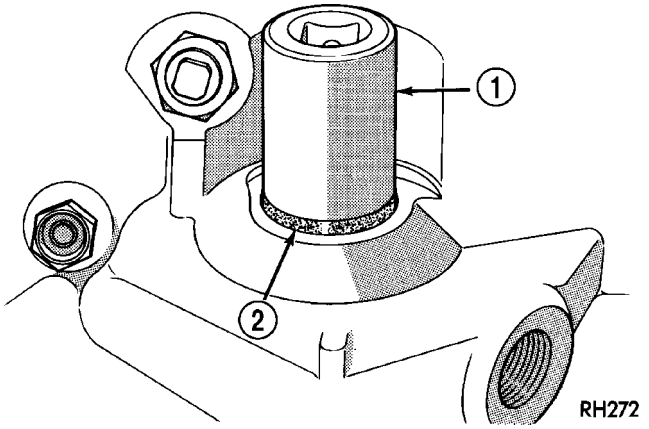


Fig. 330 Manual Lever Shaft Seal

1 - 15/16'' SOCKET
2 - SEAL

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. 331).

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.

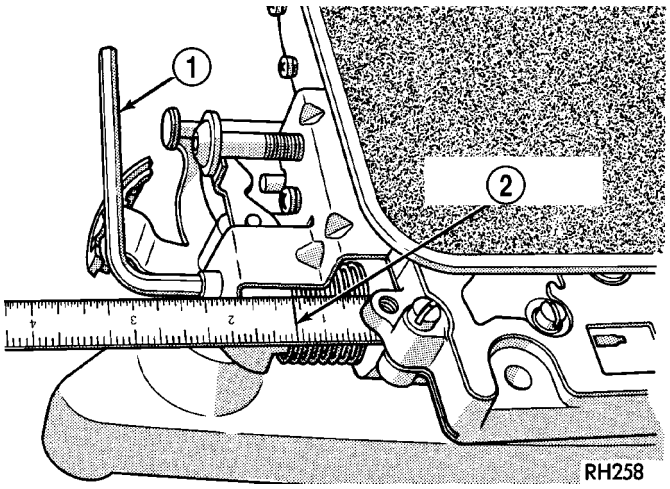


Fig. 331 Line Pressure Adjustment

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. 332).

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.

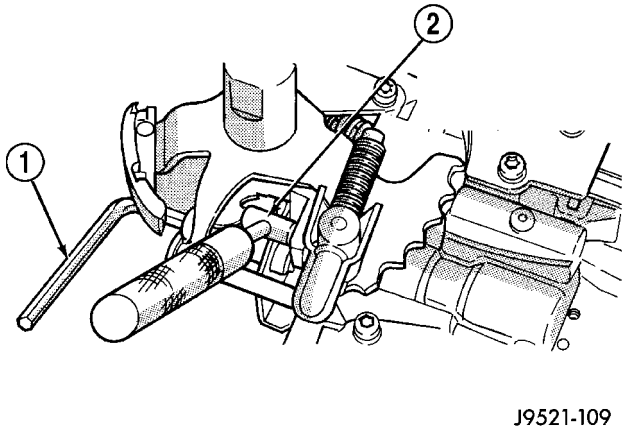


Fig. 332 Throttle Pressure Adjustment

1 - HEX WRENCH (IN THROTTLE LEVER ADJUSTING SCREW)
2 - SPECIAL TOOL C-3763 (POSITIONED BETWEEN THROTTLE LEVER AND KICKDOWN VALVE)

AUTOMATIC TRANSMISSION - 45RFE/545RFE

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AUTOMATIC TRANSMISSION - 45RFE/545RFE

DESCRIPTION

The 45RFE/545RFE automatic transmissions is a sophisticated, multi-range, electronically controlled transmission which combines optimized gear ratios for responsive performance, state of the art efficiency features and low NVH. Other features include driver adaptive shifting and three planetary gear sets to provide wide ratio capability with precise ratio steps for optimum driveability. The three planetary gear sets also make available a unique alternate second gear ratio. The primary 2nd gear ratio fits between 1st and 3rd gears for normal through-gear accelerations. The alternate second gear ratio (2prime) allows smoother 4-2 kickdowns at high speeds to provide 2nd gear passing performance over a wider highway cruising range.

The hydraulic portion of the transmission consists of the transmission fluid, fluid passages, hydraulic valves, and various line pressure control components.

The primary mechanical components of the transmission consist of the following:

- Three multiple disc input clutches
- Three multiple disc holding clutches
- Five hydraulic accumulators
- Three planetary gear sets
- Dual Stage Hydraulic oil pump
- Valve body
- Solenoid pack

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

TRANSMISSION IDENTIFICATION

Transmission identification numbers are stamped on the left side of the case just above the oil pan sealing surface (Fig. 1). Refer to this information when ordering replacement parts. A label is attached to the transmission case above the stamped numbers.

The label gives additional information which may also be necessary for identification purposes.

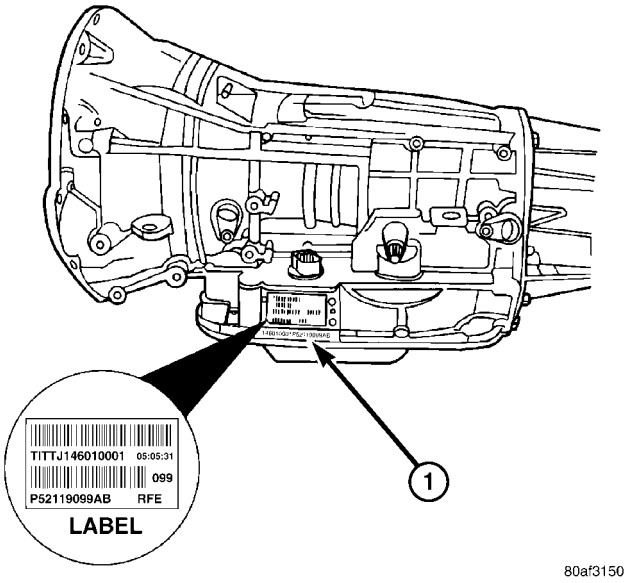


Fig. 1 Transmission Part And Serial Number Location

1 - IDENTIFICATION NUMBERS (STAMPED)

GEAR RATIOS

The 45RFE gear ratios are:

1st	3.00:1
2nd	1.67:1
2nd Prime	1.50:1
3rd	1.00:1
4th	0.75:1
Reverse	3.00:1

GEAR RATIOS

The 545RFE gear ratios are:

1st	3.00:1
2nd	1.67:1
2nd Prime	1.50:1
3rd	1.00:1
4th	0.75:1
5th	0.67:1
Reverse	3.00:1

OPERATION

The 45RFE/545RFE offers full electronic control of all automatic up and downshifts, and features real-time adaptive closed-loop shift and pressure control. Electronic shift and torque converter clutch controls help protect the transmission from damage due to high temperatures, which can occur under severe operating conditions. By altering shift schedules, line pressure, and converter clutch control, these controls reduce heat generation and increase transmission cooling.

To help reduce efficiency-robbing parasitic losses, the transmissions includes a dual-stage transmission fluid pump with electronic output pressure control. Under most driving conditions, pump output pressure greatly exceeds that which is needed to keep the clutches applied. The 45RFE/545RFE pump-pressure control system monitors input torque and adjusts the pump pressure accordingly. The primary stage of the pump works continuously; the second stage is bypassed when demand is low. The control system also monitors input and output speed and, if incipient clutch slip is observed, the pressure control solenoid duty cycle is varied, increasing pressure in proportion to demand.

A high-travel torque converter damper assembly allows earlier torque converter clutch engagement to reduce slippage. Needle-type thrust bearings reduce internal friction. The 45RFE/545RFE is packaged in a one-piece die-cast aluminum case. To reduce NVH, the case has high lateral, vertical and torsional stiffness. It is also designed to maximize the benefit of the structural dust cover that connects the bottom of the bell housing to the engine bedplate, enhancing overall power train stiffness. Dual filters protect the pump and other components. A pump return filter is added to the customary main sump filter. Independent lubrication and cooler circuits assure ample pressure for normal transmission operation even if the cooler is obstructed or the fluid cannot flow due to extremely low temperatures.

The hydraulic control system design (without electronic assist) provides the transmission with PARK, REVERSE, NEUTRAL, SECOND, and THIRD gears, based solely on driver shift lever selection. This design allows the vehicle to be driven (in “limp-in” mode) in the event of a electronic control system failure, or a situation that the Transmission Control Module (TCM) recognizes as potentially damaging to the transmission.

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

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - AUTOMATIC TRANSMISSION

CAUTION: Before attempting any repair on a RFE automatic transmission, check for Diagnostic Trouble Codes with the DRB® scan tool.

Transmission malfunctions may be caused by these general conditions:

- Poor engine performance
- Improper adjustments
- Hydraulic malfunctions
- Mechanical malfunctions
- Electronic malfunctions

Diagnosis of these problems should always begin by checking the easily accessible variables: fluid level and condition, gearshift cable adjustment. Then perform a road test to determine if the problem has been corrected or if more diagnosis is necessary. If the problem persists after the preliminary tests and corrections are completed, hydraulic pressure checks should be performed.

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 DRIVABLE

(1) Check for transmission fault codes using DRB® scan tool.

(2) Check fluid level and condition.

(3) Adjust gearshift cable 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 operation.

VEHICLE IS DISABLED

(1) Check fluid level and condition.

(2) Check for broken or disconnected gearshift cable.

(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 driveplate, 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 all 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, overrunning clutch, or line pressure problems.

A slipping clutch can often be determined by comparing which internal units are applied in the various gear ranges. The Clutch Application charts provide a basis for analyzing road test results.

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

45RFE CLUTCH APPLICATION CHART

SLP	UD	OD	R	2C	4C	L/R	OVERRUNNING
P–PARK						ON	
R–REVERSE			ON			ON	
N-NEUTRAL						ON	
D–OVERDRIVE FIRST	ON					ON*	ON
SECOND	ON			ON			
SECOND PRIME	ON				ON		
THIRD	ON	ON					
FOURTH		ON			ON		
LIMP-IN	ON	ON					
2–FIRST	ON					ON*	ON
SECOND	ON			ON			
LIMP-IN	ON			ON			
1–LOW	ON					ON	ON

*L/R clutch is on only with the output shaft speed below 150 rpm.

545RFE CLUTCH APPLICATION CHART

SLP	UD	OD	R	2C	4C	L/R	OVERRUNNING
P–PARK						ON	
R–REVERSE			ON			ON	
N-NEUTRAL						ON	
D–OVERDRIVE FIRST	ON					ON*	ON
SECOND	ON			ON			
SECOND PRIME	ON				ON		
THIRD	ON	ON					
FOURTH		ON			ON		
FIFTH		ON		ON			
LIMP-IN	ON	ON					
2–FIRST	ON					ON*	ON
SECOND	ON			ON			
LIMP-IN	ON			ON			
1–LOW	ON					ON	ON

*L/R clutch is on only with the output shaft speed below 150 rpm.

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

DIAGNOSIS AND TESTING - HYDRAULIC PRESSURE TEST

An accurate tachometer and pressure test gauges are required. Test Gauge C-3293-SP has a 300 psi range and is used at all locations where pressures exceed 100 psi.

Pressure Test Port Locations

Only two pressure ports are supplied on the transmission case. The torque converter clutch apply and release ports are located on the right side of the transmission case (Fig. 2).

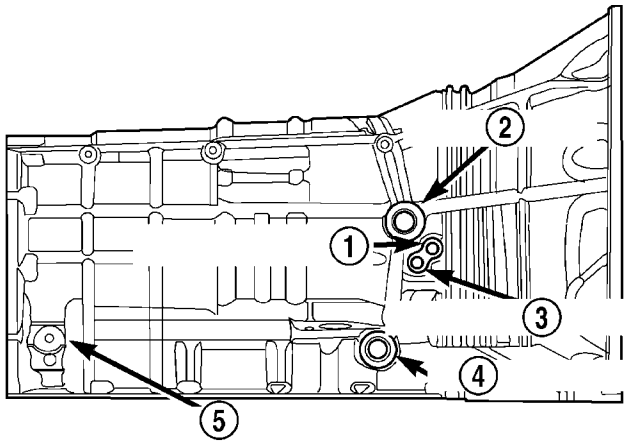


Fig. 2 Torque Converter Pressure Locations

1 - TCC RELEASE
2 - TO COOLER
3 - TCC APPLY
4 - FROM COOLER
5 - LINE PRESSURE SENSOR

To determine the line pressure, there are two available methods. The DRB® scan tool can be used to read line pressure from the line pressure sensor. The second method is to install Line Pressure Adapter 8259 (Fig. 4) into the transmission case and then install the pressure gauge and the original sensor into the adapter. This will allow a comparison of the DRB® readings and the gauge reading to determine the accuracy of the line pressure sensor. The DRB® line pressure reading should match the gauge reading within ±10 psi.

In order to access any other pressure tap locations, the transmission oil pan must be removed, the pressure port plugs removed and Valve Body Pressure Tap Adapter 8258-A (Fig. 5) installed. The extensions supplied with Adapter 8258-A will allow the installation of pressure gauges to the valve body. Refer to (Fig. 3) for correct pressure tap location identification.

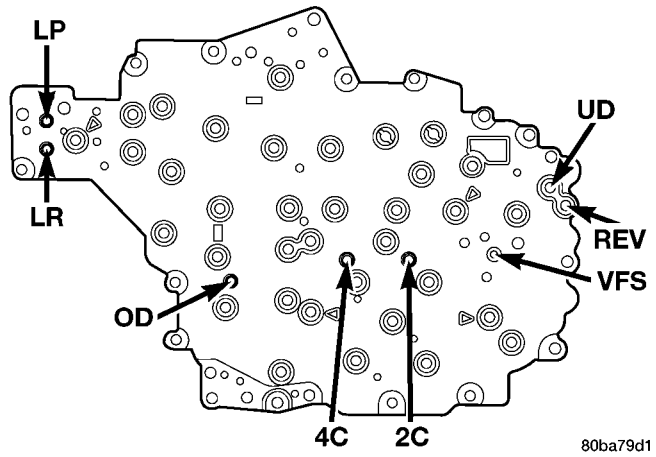


Fig. 3 Pressure Tap Locations

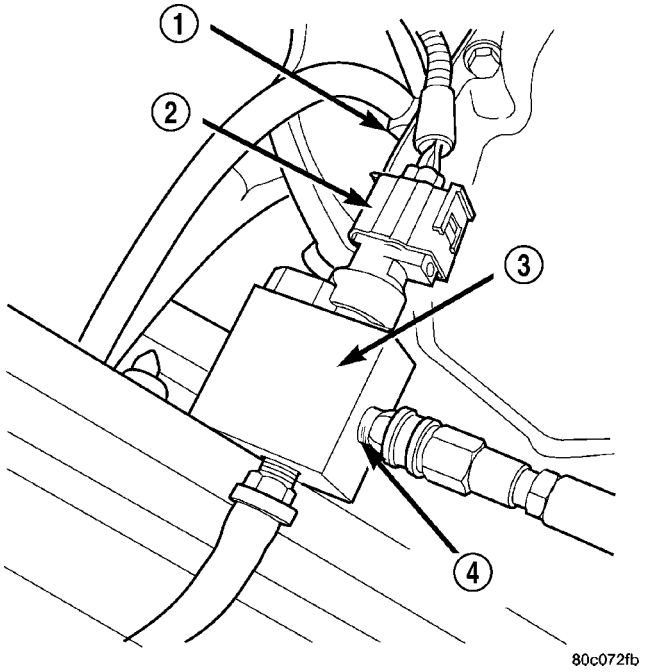


Fig. 4 Line Pressure Adapter 8259

1 - LINE PRESSURE SENSOR PORT
2 - LINE PRESSURE SENSOR
3 - TOOL 8259
4 - PRESSURE TAP

TEST PROCEDURE

All pressure readings should be taken with the transmission fluid level full, transmission oil at the normal operating temperature, and the engine at 1500 rpm. Check the transmission for proper operation in each gear position that is in question or if a specific element is in question, check the pressure readings in at least two gear positions that employ that element. Refer to the Hydraulic Schematics at the rear of this section to determine the correct pressures for each element in a given gear position.

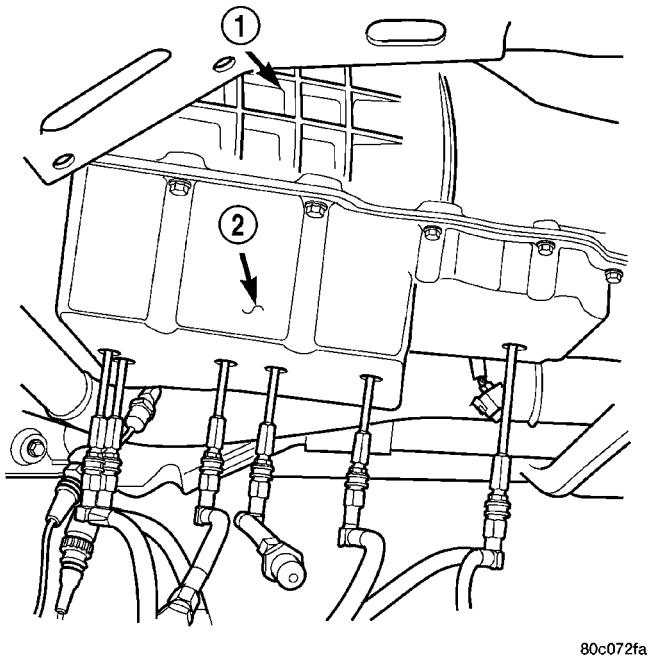


Fig. 5 Valve Body Pressure Tap Adapter 8258-A

1 - 45RFE TRANSMISSION
2 - TOOL 8258-A

NOTE: The 45RFE/545RFE utilizes closed loop control of pump line pressure. The pressure readings may therefore vary greatly but should always follow line pressure.

Some common pressures that can be measured to evaluate pump and clutch performance are the upshift/downshift pressures, garage shift pressures, and TCC pressure. The upshift/downshift pressure for all shifts are shown in UPSHIFT PRESSURES and DOWNSHIFT PRESSURES. In-gear maximum pressure for each gear position is shown in IN-GEAR PRESSURES. The garage shift pressure when performing a N-R shift is 220 psi for 3.7L/4.7L equipped vehicles and 250 psi for 5.7L equipped vehicles. The garage shift pressure for the R-N shift is 120 psi. The garage shift pressure for the N-1 shift is 135 psi for 3.7L/4.7L equipped vehicles and 165 psi for 5.7L equipped vehicles. Torque converter lock-up pressure is 120 psi for 3.7L/4.7L equipped vehicles and 125 psi for 5.7L equipped vehicles.

UPSHIFT PRESSURES

ENGINE	1-2	2-3	2prime-3	3-4	2prime-4	2-5	3-5	4-5
5.7L	150	125	125	135	135	135	135	135
3.7L/ 4.7L	120	120	120	120	120	120	120	130

DOWNSHIFT PRESSURES

ENG-INE	5-4	5-3	5-2	4-3	4-2 prime	3-2	3-2 prime	2 prime -1	2-1	3-1
5.7L	135	135	135	135	135	135	135	135	135	135
3.7L/ 4.7L	120	120	120	120	120	120	120	120	120	120

IN-GEAR PRESSURES

ENGINE	1	2	2 prime	3	4	5	NEUT-RAL	REV-ERSE
5.7L	160	135	135	135	135	135	120	250
3.7L/ 4.7L	135	120	120	120	120	120	120	220

DIAGNOSIS AND TESTING - AIR CHECKING TRANSMISSION CLUTCH OPERATION

Air-pressure testing can be used to check transmission clutch operation. The test can be conducted with the transmission either in the vehicle or on the work bench, as a final check.

Air-pressure testing requires that the oil pan and valve body be removed from the transmission. The clutch apply passages are shown (Fig. 6).

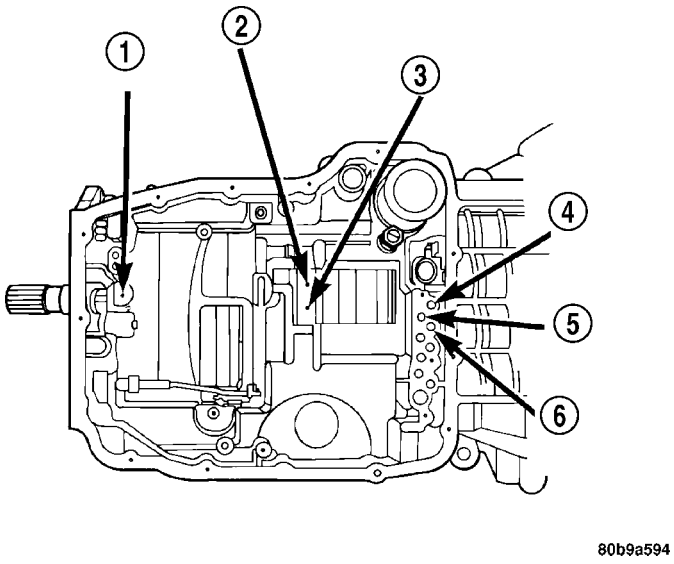


Fig. 6 Air Pressure Test Passages

1 - LOW REVERSE CLUTCH
2 - 4TH CLUTCH
3 - 2ND CLUTCH
4 - OVERDRIVE CLUTCH
5 - UNDERDRIVE CLUTCH
6 - REVERSE CLUTCH

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

NOTE: The air supply which is used must be free of moisture and dirt. Use a pressure of 30 psi to test clutch operation.

Apply air pressure at each port. If the clutch is functioning, a soft thump will be heard as the clutch is applied. The clutch application can also be felt by touching the appropriate element while applying air pressure. As the air pressure is released, the clutch should also release.

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. Torque converter seal leaks tend to move along the drive hub and onto the rear of the converter. Pump cover seal tend to run down the cover and the inside surface of the bellhousing.

Some leaks, or suspected leaks, may be particularly difficult to locate. If necessary, a Mopar® approved dye may be used to locate a leak.

TORQUE CONVERTER LEAK POINTS

Possible sources of converter leaks are:

(1) Leaks at the weld joint around the outside diameter weld (Fig. 7).

(2) Leaks at the converter hub weld (Fig. 7).

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

(1) Disconnect the negative battery cable.

(2) Raise and support the vehicle

(3) Remove any necessary skid plates. (Refer to 13 - FRAMES & BUMPERS/FRAME/TRANSFER CASE SKID PLATE - REMOVAL)

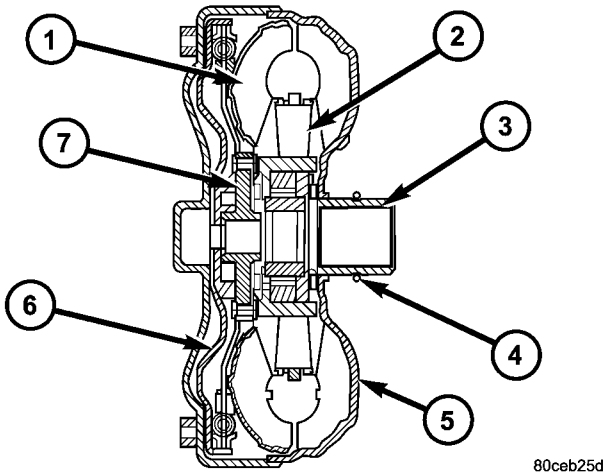


Fig. 7 Torque Converter Assembly

1 - TURBINE ASSEMBLY
2 - STATOR
3 - CONVERTER HUB
4 - O-RING
5 - IMPELLER ASSEMBLY
6 - CONVERTER CLUTCH PISTON
7 - TURBINE HUB

(4) Mark propeller shaft and axle companion flanges for assembly alignment.

(5) Remove the rear propeller shaft

(6) Remove the front propeller shaft, if necessary.

(7) Remove the engine to transmission collar (Fig. 8).

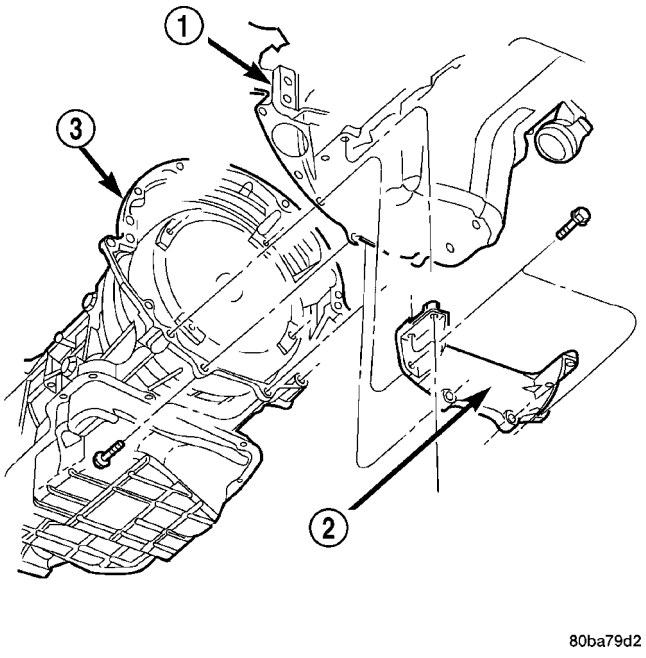


Fig. 8 Transmission Collar

1 - ENGINE
2 - ENGINE TO TRANSMISSION COLLAR
3 - TRANSMISSION

(8) Remove the exhaust support bracket from the rear of the transmission.

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

(9) Disconnect and lower or remove any necessary exhaust components.

(10) Remove the starter motor.

(11) Rotate crankshaft in clockwise direction until converter bolts are accessible. Then remove bolts one at a time. Rotate crankshaft with socket wrench on dampener bolt.

(12) Disengage the output speed sensor connector from the output speed sensor (Fig. 9).

(13) Disengage the input speed sensor connector from the input speed sensor (Fig. 10).

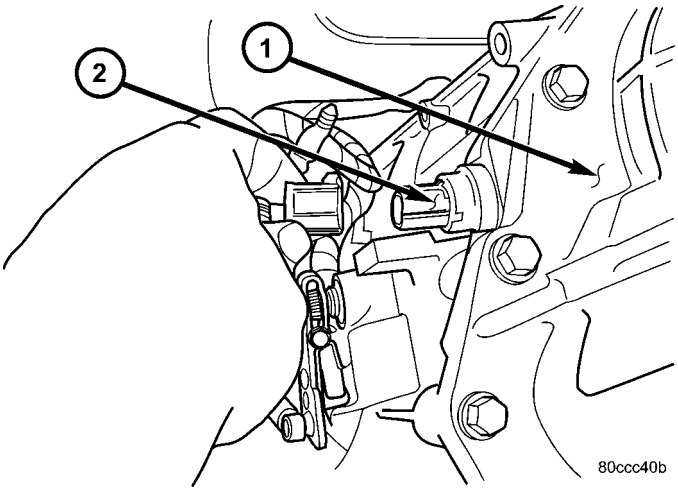


Fig. 9 Disconnect Output Speed Sensor

1 - TRANSMISSION
2 - OUTPUT SPEED SENSOR

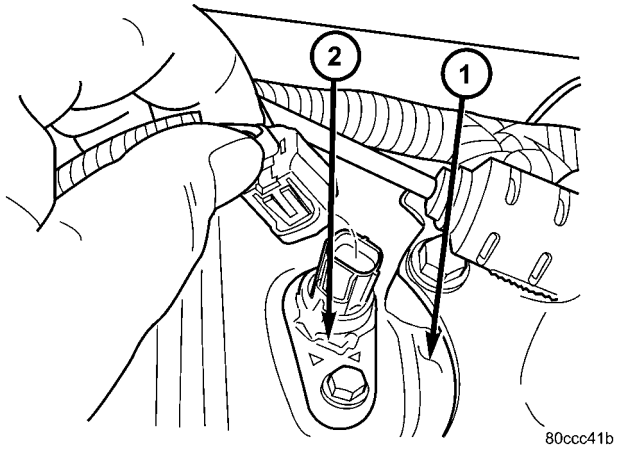


Fig. 10 Disconnect Input Speed Sensor

1 - TRANSMISSION
2 - INPUT SPEED SENSOR

(14) Disengage the transmission solenoid/TRS assembly connector from the transmission solenoid/ TRS assembly (Fig. 11).

(15) Disengage the line pressure sensor connector from the line pressure sensor (Fig. 12).

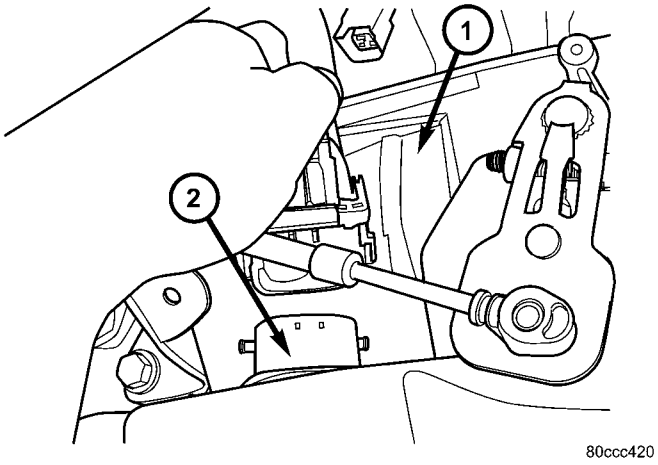


Fig. 11 Disconnect Transmission Solenoid/TRS Assembly

1 - TRANSMISSION
2 - TRANSMISSION SOLENOID/TRS ASSEMBLY

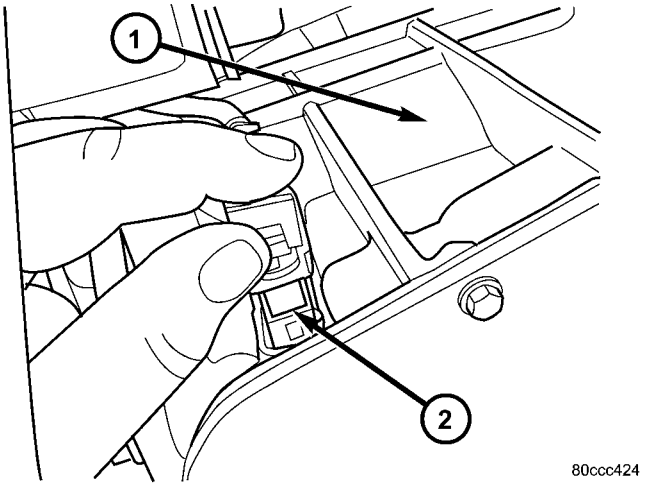


Fig. 12 Disconnect Line Pressure Sensor

1 - TRANSMISSION
2 - LINE PRESSURE SENSOR

(16) Disconnect gearshift cable from transmission manual valve lever (Fig. 13).

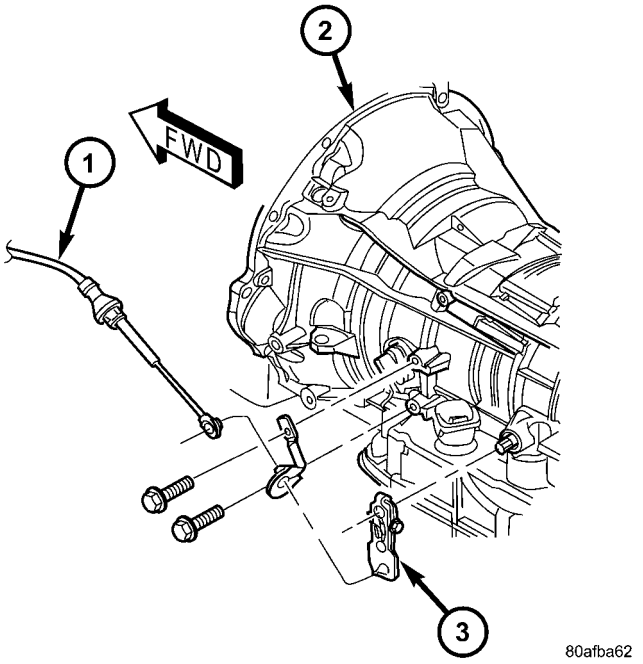


Fig. 13 Gearshift Cable at Transmission - RFE

1 - GEARSHIFT CABLE
2 - RFE TRANSMISSION
3 - MANUAL LEVER

(17) Disconnect the transmission vent hose from the transmission.

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

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

(20) Remove bolts securing rear support and cushion to transmission and crossmember.

(21) Remove transfer case, if necessary.

(22) Disconnect transmission fluid cooler lines at transmission fittings and clips.

(23) Remove all remaining converter housing bolts.

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

(25) Hold torque converter in place during transmission removal.

(26) Lower transmission and remove (Fig. 14) assembly from under the vehicle.

(27) To remove torque converter, carefully slide torque converter out of the transmission.

DISASSEMBLY

(1) Drain fluid from transmission.

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

(3) Remove the torque converter from the transmission.

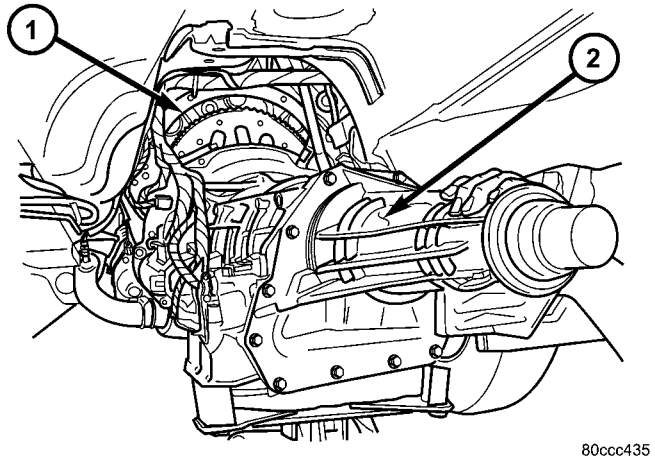


Fig. 14 Remove Transmission

1 - ENGINE
2 - TRANSMISSION

(4) Remove the manual shift lever from the transmission.

(5) Remove the input, output, and line pressure sensors from the transmission case (Fig. 15).

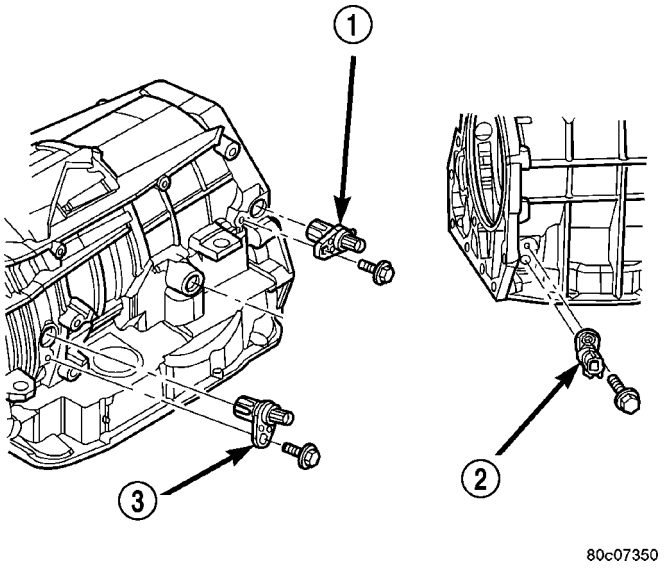


Fig. 15 Remove Input, Output, and Line Pressure Sensors

1 - OUTPUT SPEED SENSOR
2 - LINE PRESSURE SENSOR
3 - INPUT SPEED SENSOR

(6) Inspect the ends of the sensors for debris, which may indicate the nature of the transmission failure.

(7) Install Support Stand 8257 onto the transmission case (Fig. 16).

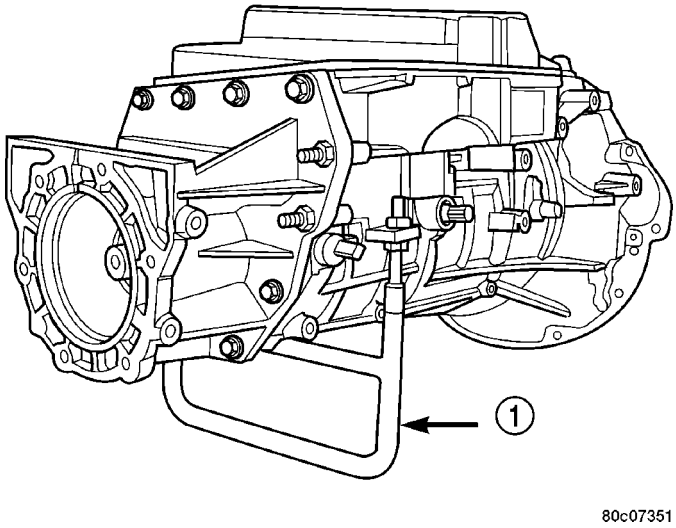


Fig. 16 Install Support Stand - Tool 8257

1 - TOOL 8257

(8) Using Adapter 8266-1 from End-Play Tool Set 8266 and Dial Indicator C-3339, measure and record the input shaft end-play (Fig. 17).

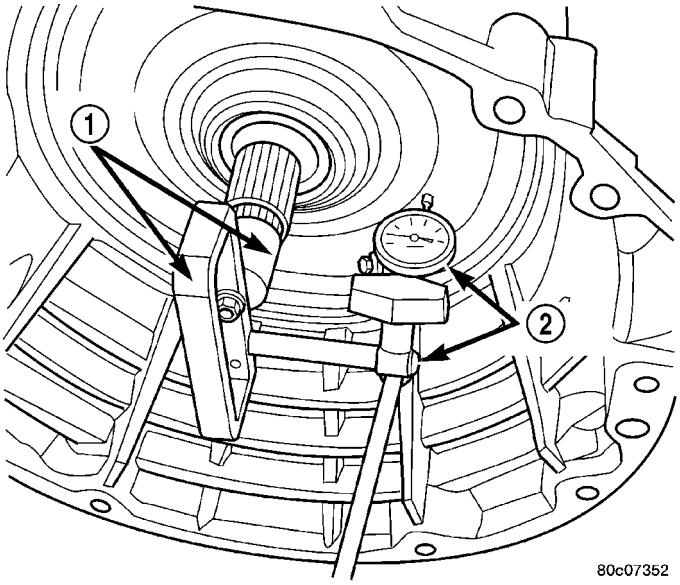


Fig. 17 Measure Input Shaft End Play

1 - TOOL 8266
2 - TOOL C-3339

NOTE: When measuring the input shaft end-play, two ″stops″ will be felt. When the input shaft is pushed inward and the dial indicator zeroed, the first ″stop″ felt when the input shaft is pulled outward is the movement of the input shaft in the input clutch housing hub. This value should not be included in the end-play measured value and therefore must be recorded and subtracted from the dial indicator reading.

(9) Remove the bolts holding the transmission extension/adapter housing to the transmission case.

(10) Remove the extension/adapter housing from the transmission case.

(11) Using Alignment Plate 8261, Adapter 8266-17 from End-Play Tool Set 8266 and Dial Indicator C-3339, measure and record the output shaft end-play (Fig. 18).

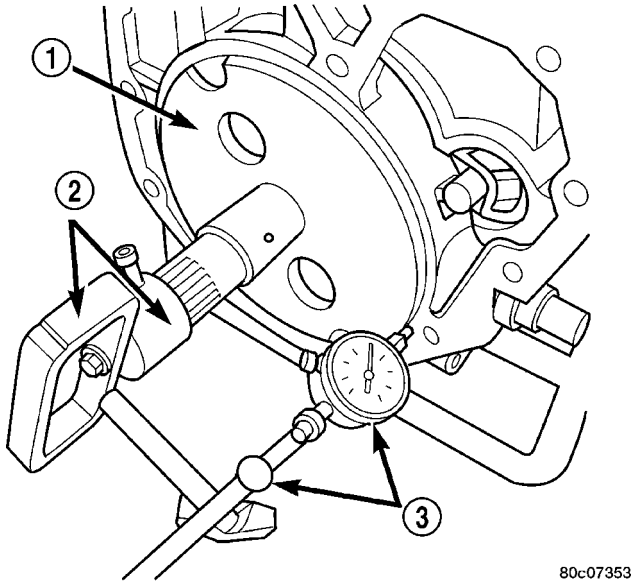


Fig. 18 Measure Output Shaft End Play

1 - TOOL 8261
2 - TOOL 8266
3 - TOOL C-3339

(12) Remove the bolts holding the transmission oil pan to the transmission case.

(13) Remove the transmission oil pan from the transmission case.

(14) Remove the primary oil filter and the oil cooler return filter (Fig. 19).

(15) Remove the cooler return filter bypass valve.

(16) Remove the bolts holding the valve body to the transmission case (Fig. 20).

(17) Remove the valve body from the transmission case.

(18) Remove the outer snap-ring securing the transmission front cover into the transmission case (Fig. 21).

(19) Remove the inner snap-ring securing the transmission front cover to the oil pump (Fig. 21).

(20) Reaching through a case opening in the valve body area with a long blunted tool, remove the transmission front cover from the transmission case.

(21) Remove the bolts holding the oil pump into the transmission case (Fig. 22).

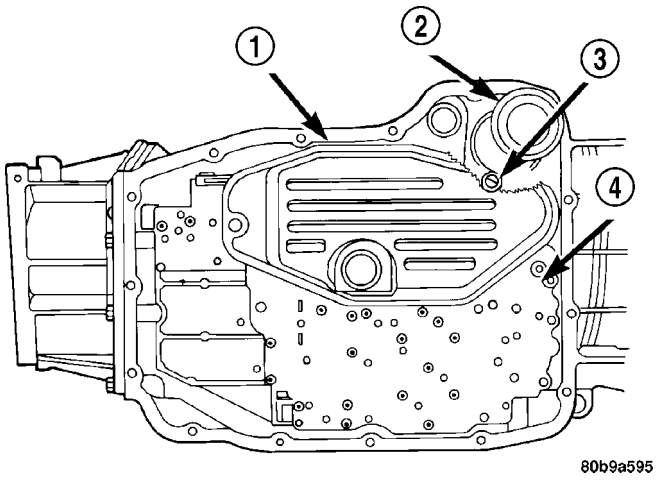


Fig. 19 Remove Primary Oil and Cooler Filters

1 - PRIMARY OIL FILTER
2 - COOLER RETURN FILTER
3 - COOLER RETURN FILTER BYPASS VALVE
4 - VALVE BODY

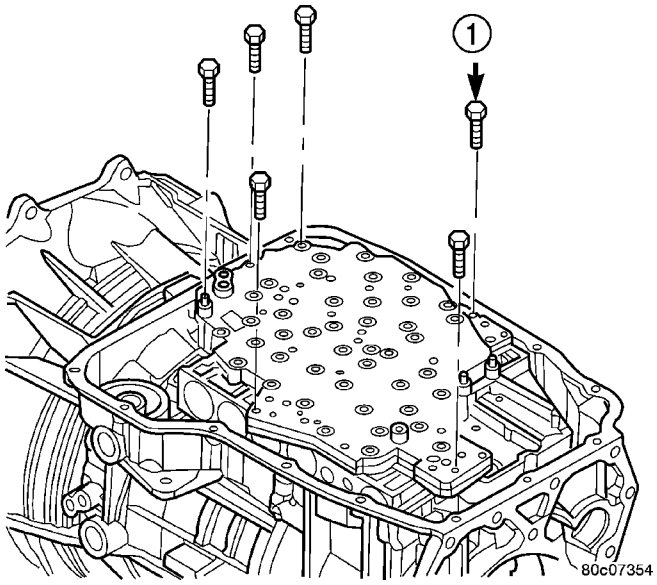


Fig. 20 Remove Valve Body Assembly

1 - VALVE BODY TO CASE BOLT (6)

(22) Remove the oil pump. Hold inward on the input shaft to prevent pulling the input clutch assembly with the oil pump (Fig. 22).

NOTE: If the input shaft is not held during oil pump removal, the input clutch assembly will attempt to move forward with the oil pump and the numbers 2, 3, or 4 bearings inside the input clutch assembly may become dislodged.

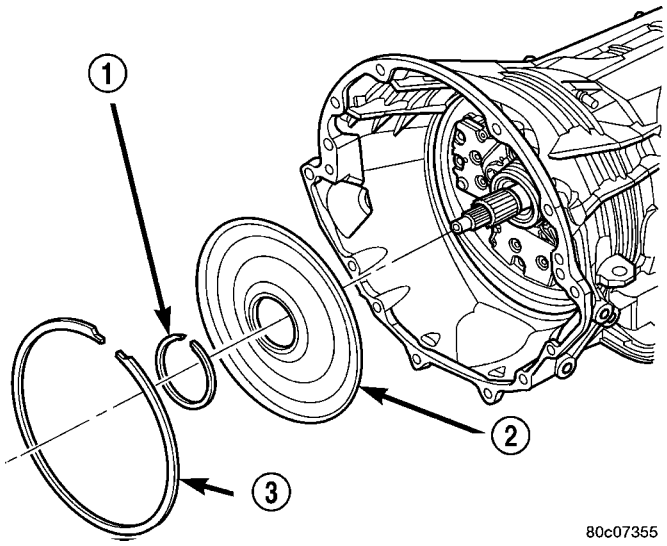


Fig. 21 Remove Transmission Front Cover

1 - INNER SNAP-RING
2 - TRANSMISSION COVER
3 - OUTER SNAP-RING

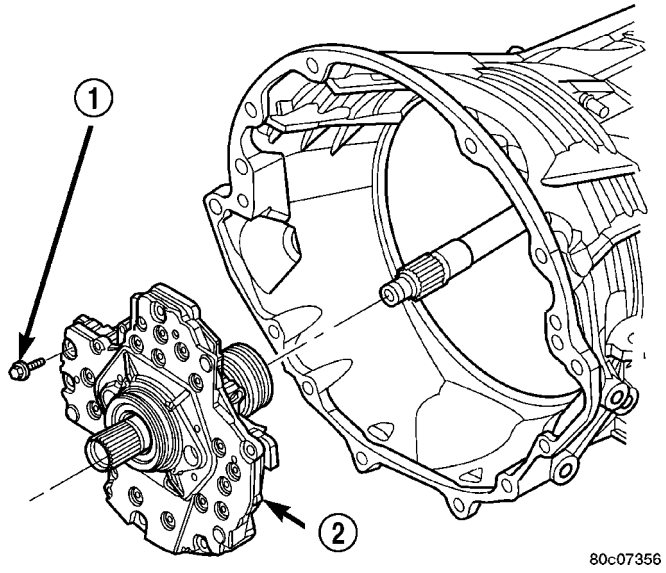


Fig. 22 Remove Oil Pump

1 - OIL PUMP TO CASE BOLT (6)
2 - OIL PUMP

(23) Remove the number 1 bearing from the input clutch assembly (Fig. 23).

(24) Remove the input clutch assembly from the transmission case (Fig. 23).

(25) Remove the number 5 bearing and selective thrust plate from the input clutch assembly (Fig. 23), or the 4C clutch retainer/bulkhead.

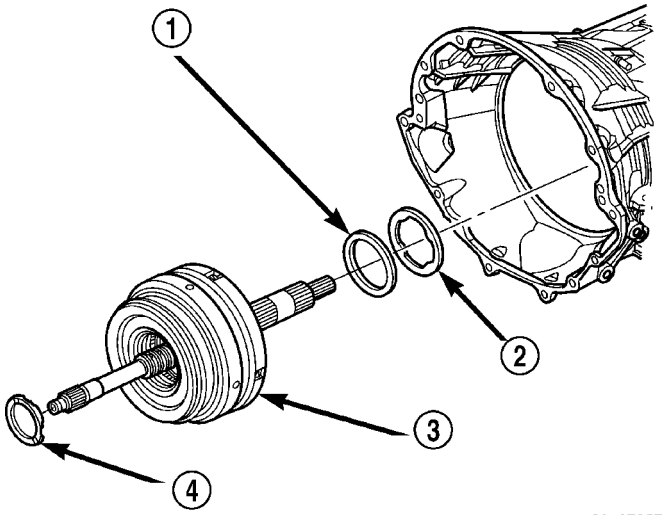


Fig. 23 Remove Input Clutch Assembly

1 - BEARING NUMBER 5
2 - THRUST PLATE (SELECT)
3 - INPUT CLUTCH ASSEMBLY
4 - BEARING NUMBER 1

(26) Remove the 4C clutch retainer/bulkhead tapered snap-ring from the transmission case (Fig. 24).

(27) Remove the 4C clutch retainer/bulkhead from the transmission case (Fig. 24).

(28) Remove the front 2C clutch pack snap-ring from the transmission case (Fig. 25).

(29) Remove the 2C clutch pack from the transmission case (Fig. 25).

(30) Remove the rear selective plate and number 6 bearing from the reaction annulus (Fig. 26).

(31) Remove the reaction annulus from the reaction planetary carrier (Fig. 26).

(32) Remove the number 7 bearing (Fig. 26).

(33) Remove the reaction sun gear (Fig. 26).

(34) Remove the number 8 bearing from the reaction planetary carrier (Fig. 26).

(35) Remove the reaction planetary carrier (Fig. 26). Note that this planetary gear set has three pinion gears.

(36) Remove the number 9 bearing from the reverse planetary gear set (Fig. 26).

(37) Remove the snap-ring holding the park sprag gear onto the output shaft (Fig. 27).

(38) Remove the park sprag gear from the output shaft (Fig. 28).

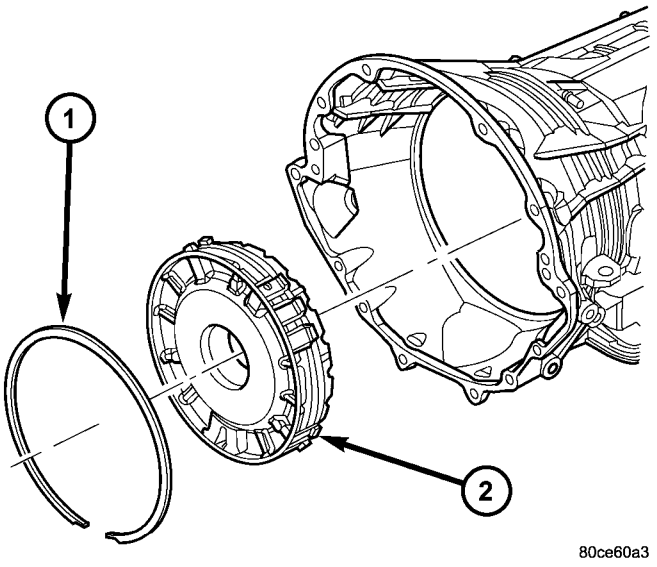


Fig. 24 Remove 4C Clutch Retainer/Bulkhead

1 - SNAP-RING
2 - 4C CLUTCH RETAINER/BULKHEAD

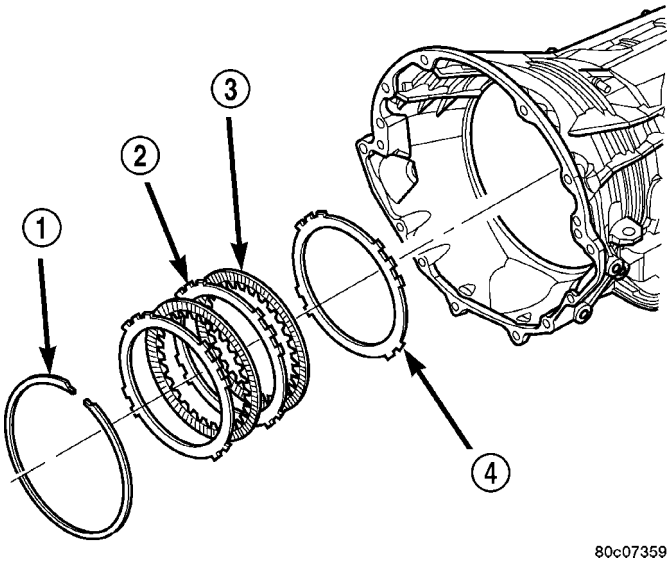


Fig. 25 Remove 2C Clutch Pack

1 - SNAP-RING
2 - PLATE
3 - DISC
4 - REACTION PLATE

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

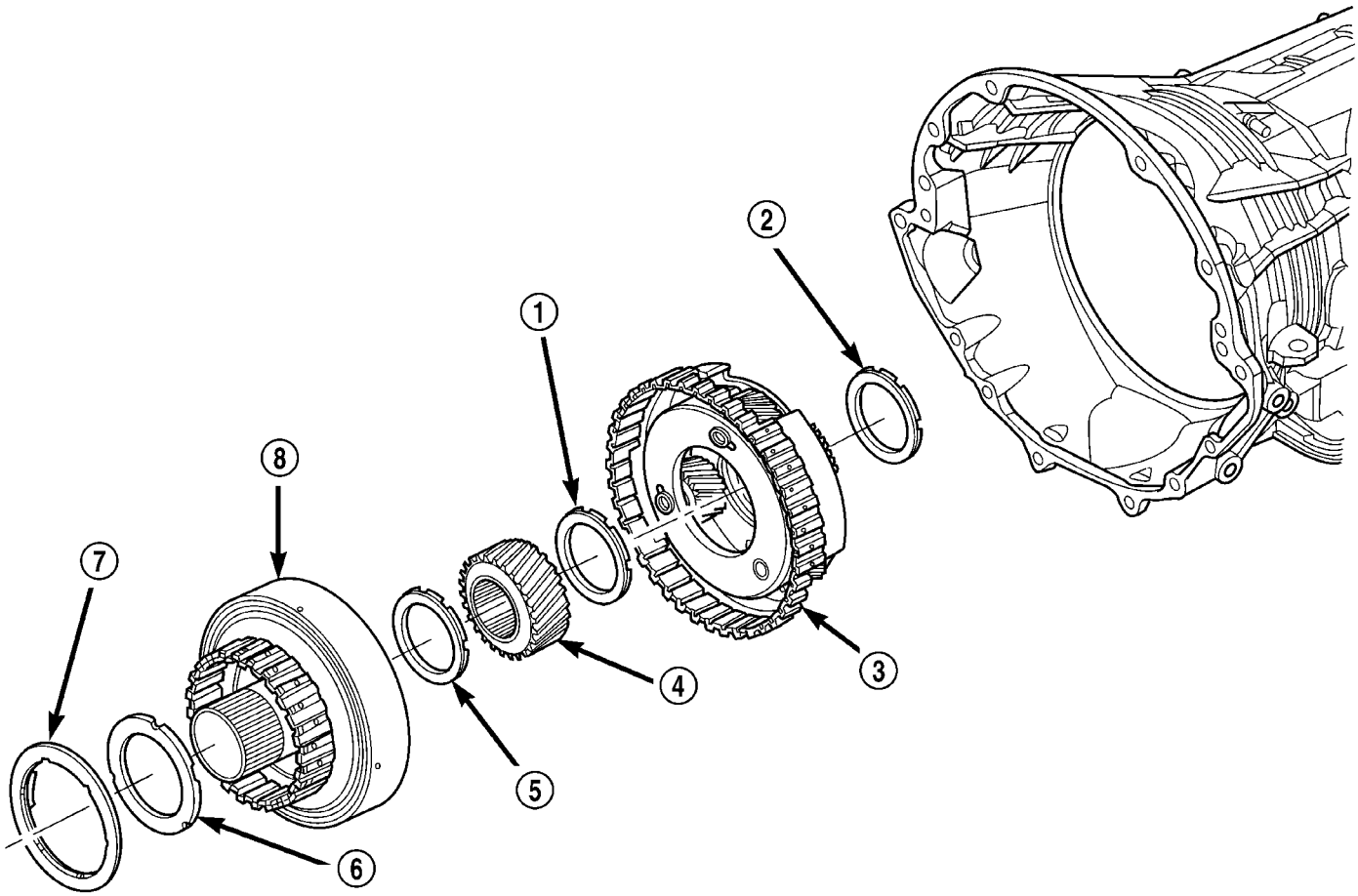


Fig. 26 Remove Reaction Annulus and Carrier

1 - BEARING NUMBER 8
2 - BEARING NUMBER 9
3 - REACTION PLANETARY CARRIER
4 - REACTION SUN GEAR
5 - BEARING NUMBER 7
6 - THRUST PLATE (SELECT)
7 - BEARING NUMBER 6
8 - REACTION ANNULUS

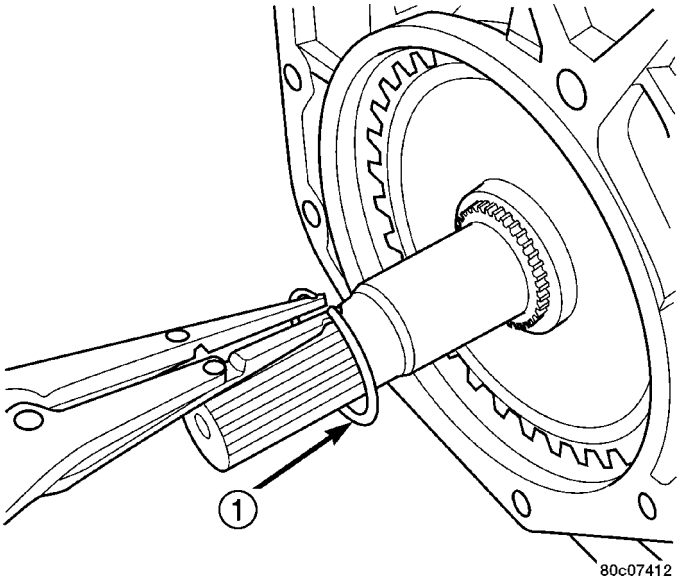


Fig. 27 Remove Park Sprag Snap-Ring

1 - SNAP-RING

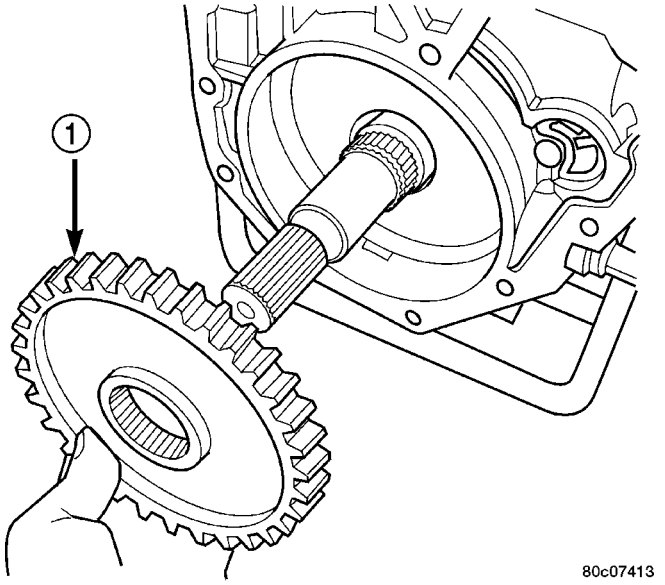


Fig. 28 Remove Park Sprag Gear

1 - PARK SPRAG GEAR

(39) Remove the input/reverse planetary assembly (Fig. 29).

(40) Remove the number 12 bearing from the input/reverse planetary assembly (Fig. 29).

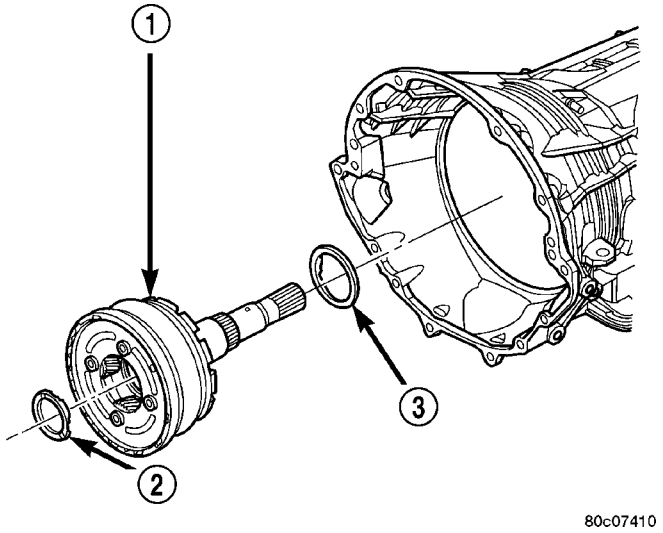


Fig. 29 Remove Input/Reverse Planetary Assembly

1 - INPUT/REVERSE PLANETARY ASSEMBLY
2 - BEARING NUMBER 9
3 - BEARING NUMBER 12

(41) Remove the snap-ring holding the low/reverse clutch retainer into the transmission case (Fig. 30).

(42) Remove the low/reverse clutch retainer from the transmission case (Fig. 30).

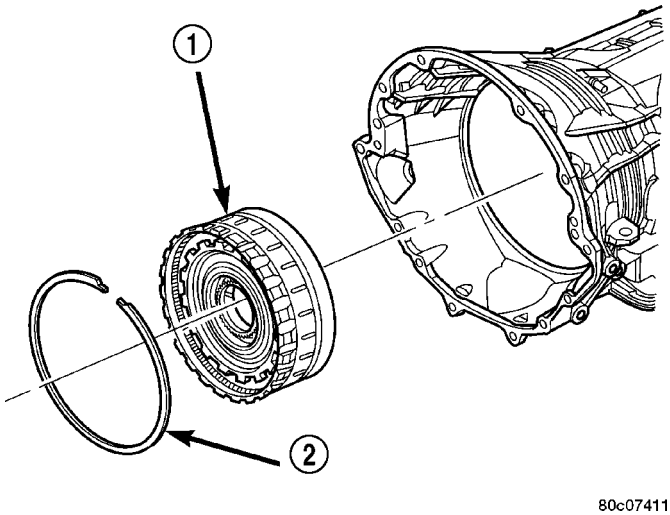


Fig. 30 Remove Low/Reverse Clutch Retainer

1 - LOW/REVERSE OVERRUNNING CLUTCH ASSEMBLY
2 - SNAP-RING

(43) Remove the park pawl rod and e-clip (Fig. 31).

(44) Remove the park pawl rod guide snap-ring (Fig. 31).

(45) Remove the park pawl rod guide (Fig. 31).

(46) Remove the park pawl pivot shaft, park pawl, and spring (Fig. 31).

(47) Remove the manual selector shaft (Fig. 31).

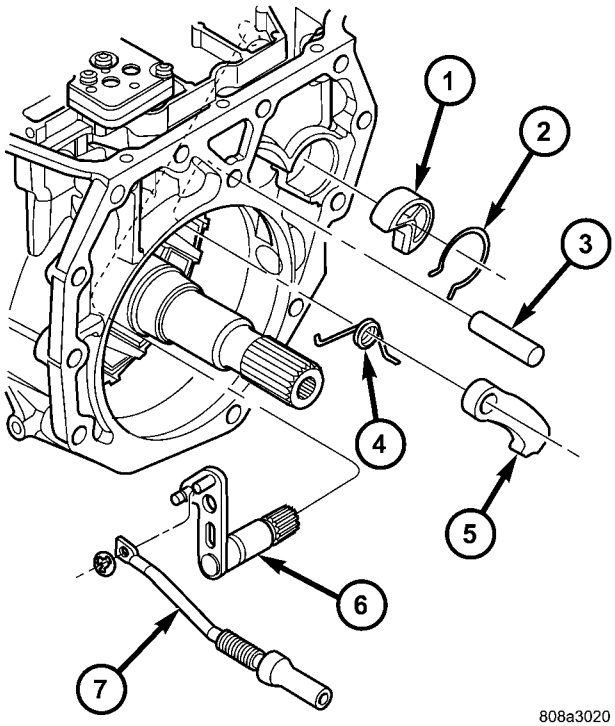


Fig. 31 Manual Shaft/Park Lock Components

1 - GUIDE
2 - SNAP-RING
3 - SHAFT
4 - SPRING
5 - PARK PAWL
6 - MANUAL SHAFT/LEVER
7 - PARK ROD

(48) Remove the manual selector shaft seal.

(49) Remove the dipstick tube seal.

CLEANING

The use of crocus cloth is permissible where necessary, providing it is used carefully. When used on shafts, or valves, use extreme care to avoid rounding off sharp edges. Sharp edges are vital as they prevent foreign matter from getting between the valve and valve bore.

Do not reuse oil seals, gaskets, seal rings, or O-rings during overhaul. Replace these parts as a matter of course. Also do not reuse snap rings or E-clips that are bent or distorted. Replace these parts as well.

Lubricate transmission parts with Mopar® ATF +4, Automatic 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.

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.

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.

ASSEMBLY

(1) Clean and inspect all components. Replace any components which show evidence of excessive wear or scoring.

(2) Install the cooler filter bypass valve.

(3) Torque the bypass valve to specification. The valve uses a tapered pipe thread and excessive torque can damage the transmission case. Tighten the cooler filter bypass valve to 4.5 N·m (40 in.lbs.).

(4) Install a new selector shaft seal using Seal Installer 8253 (Fig. 32).

(5) Install the manual selector shaft and retaining screw. Tighten the manual selector shaft retaining screw to 28 N·m (250 in.lbs.).

(6) Install the park pawl, spring, and shaft (Fig. 33).

(7) Install the park rod and e-clip (Fig. 33).

(8) Install the park rod guide and snap-ring (Fig. 33).

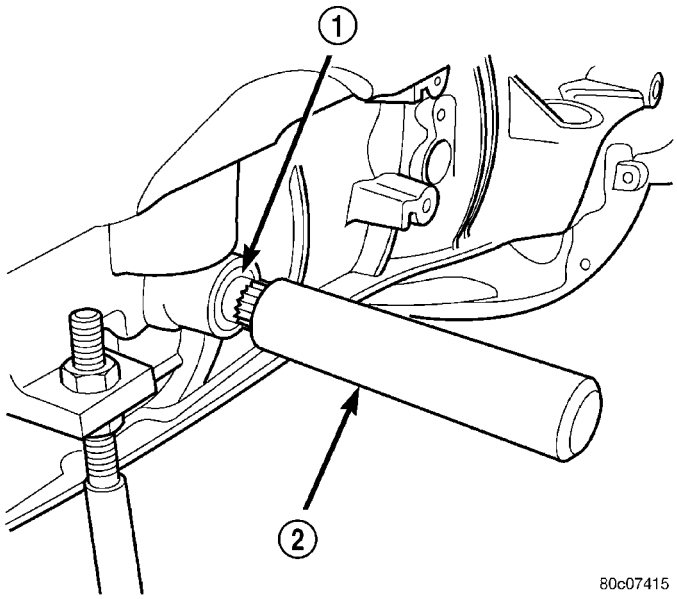


Fig. 32 Install Selector Shaft

1 - SEAL
2 - TOOL 8253

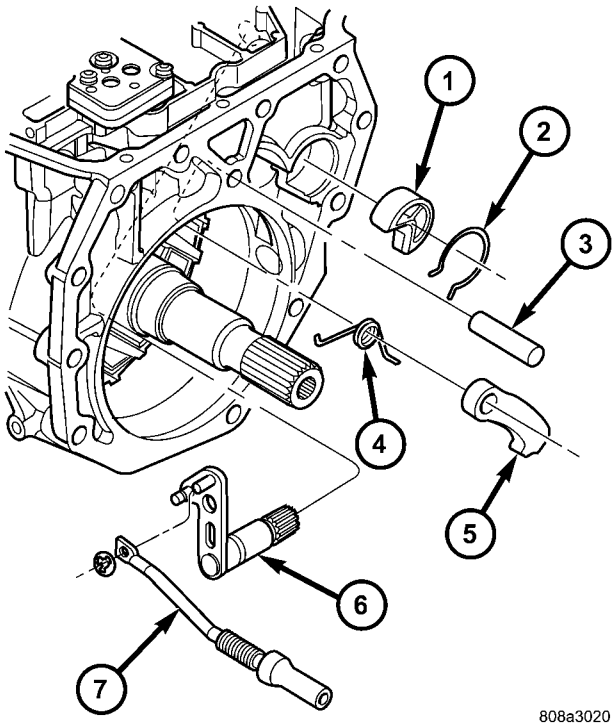


Fig. 33 Manual Shaft/Park Lock Components

1 - GUIDE
2 - SNAP-RING
3 - SHAFT
4 - SPRING
5 - PARK PAWL
6 - MANUAL SHAFT/LEVER
7 - PARK ROD

(9) Install a new dipstick tube seal using Seal Installer 8254 (Fig. 34).

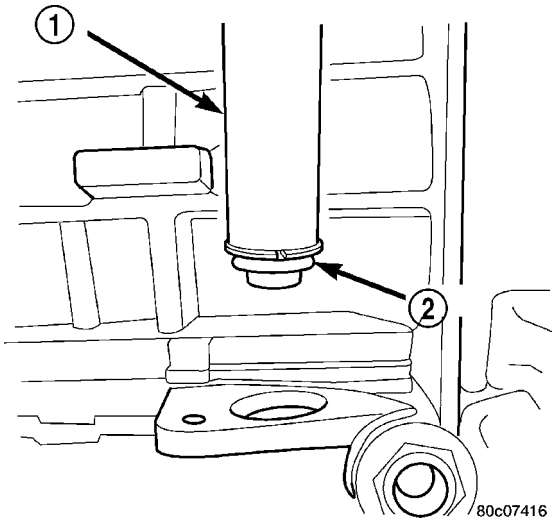


Fig. 34 Install Dipstick Tube Seal Using Tool 8254

1 - TOOL 8254
2 - SEAL

NOTE: Before final assembly of transmission centerline, the 2C/4C clutch components should be installed into position and measured as follows:

(10) Install the 2C reaction plate into the transmission case (Fig. 35). The reaction plate is directional. The plate must be installed with the flat side toward the front of the transmission.

(11) Install the 2C clutch pack into the transmission case (Fig. 35).

(12) Install the flat 2C clutch snap-ring into the transmission case (Fig. 35).

(13) Install the 4C retainer/bulkhead into the transmission case. Make sure that the oil feed holes are pointing toward the valve body area.

(14) Install the 4C retainer/bulkhead tapered snap-ring into the transmission case. Make sure that the open ends of the snap-ring are located in the case opening toward the valve body area.

(15) Using a feeler gauge through the opening in the rear of the transmission case, measure the 2C clutch pack clearance between the 2C reaction plate and the transmission case at four different points. The average of these measurements is the 2C clutch pack clearance. The correct clutch clearance is 0.455-1.335 mm (0.018-0.053 in.). The reaction plate is not selective. If the clutch pack clearance is not within specification, the reaction plate, all the friction discs, and steels must be replaced.

(16) Remove the 4C retainer/bulkhead and all of the 2C clutch components from the transmission case.

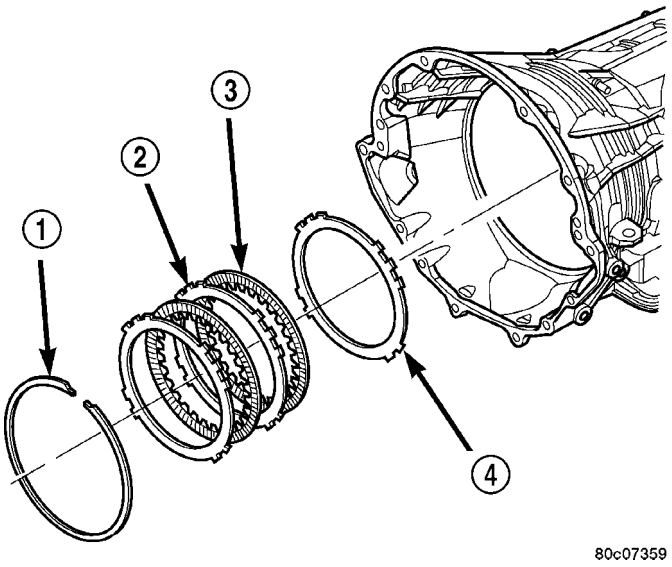


Fig. 35 Install 2C Clutch Pack

1 - SNAP-RING
2 - PLATE
3 - DISC
4 - REACTION PLATE

(17) Install the low/reverse clutch assembly (Fig. 36). Make sure that the oil feed hole points toward the valve body area and that the bleed orifice is aligned with the notch in the rear of the transmission case.

(18) Install the snap-ring to hold the low/reverse clutch retainer into the transmission case (Fig. 36). The snap-ring is tapered and must be installed with the tapered side forward. Once installed, verify that the snap-ring is fully seated in the snap-ring groove.

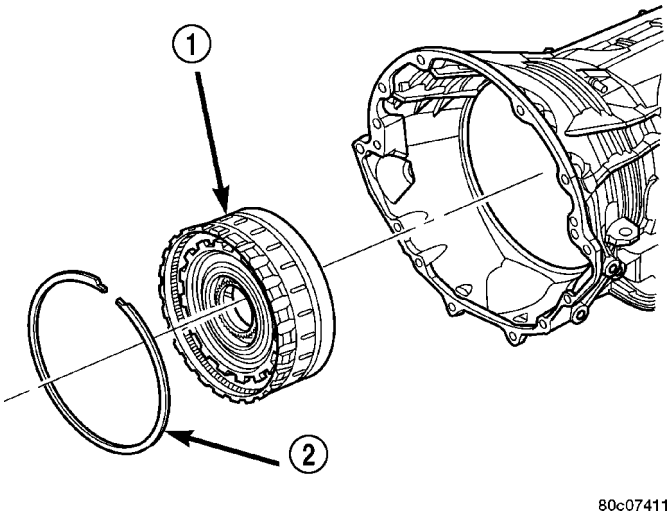


Fig. 36 Install Low/Reverse Clutch Retainer

1 - LOW/REVERSE OVERRUNNING CLUTCH ASSEMBLY
2 - SNAP-RING

(19) Air check the low/reverse clutch and verify correct overrunning clutch operation.

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

(20) Install the number 12 bearing over the output shaft and against the rear planetary gear set. The flat side of the bearing goes toward the planetary gearset and the raised tabs on the inner race should face the rear of the transmission.

(21) Install the reverse/input planetary assembly through the low/reverse clutch assembly (Fig. 37).

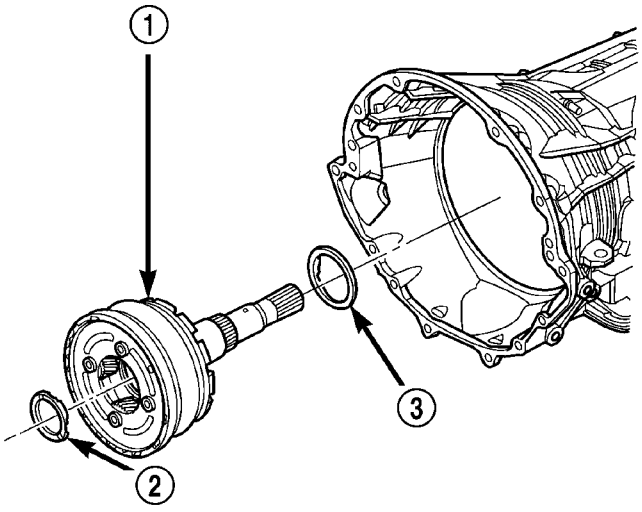


Fig. 37 Install Input/Reverse Planetary Assembly

1 - INPUT/REVERSE PLANETARY ASSEMBLY
2 - BEARING NUMBER 9
3 - BEARING NUMBER 12

(22) Install the park sprag onto the output shaft (Fig. 38).

(23) Install the snap-ring to hold the park sprag onto the output shaft (Fig. 39).

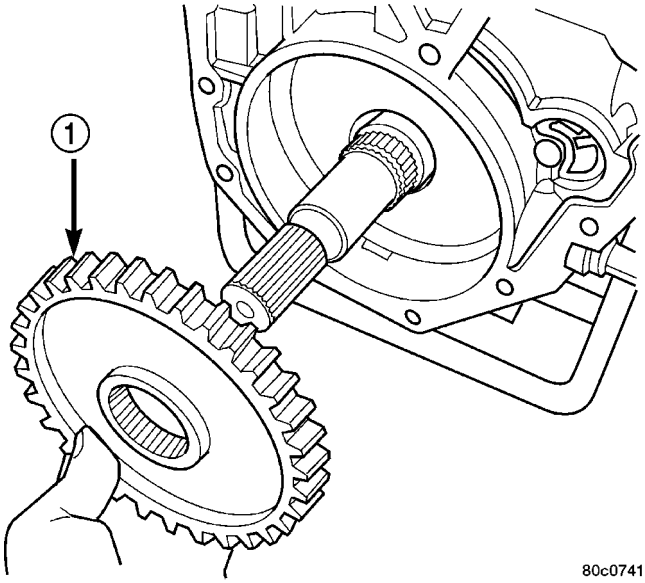


Fig. 38 Install Park Sprag Gear

1 - PARK SPRAG GEAR

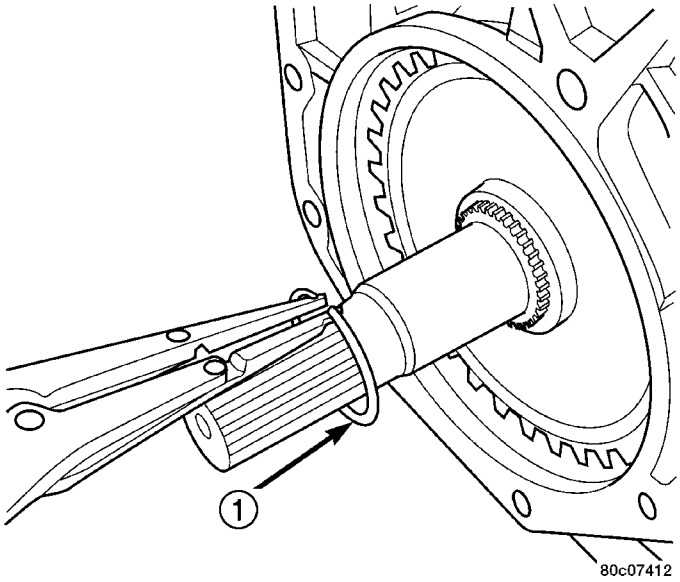


Fig. 39 Install Park Sprag Snap-Ring

1 - SNAP-RING

(24) Install the 2C reaction plate into the transmission case (Fig. 40). The reaction plate is directional. The plate must be installed with the flat side toward the front of the transmission.

(25) Install the 2C clutch pack into the transmission case (Fig. 40).

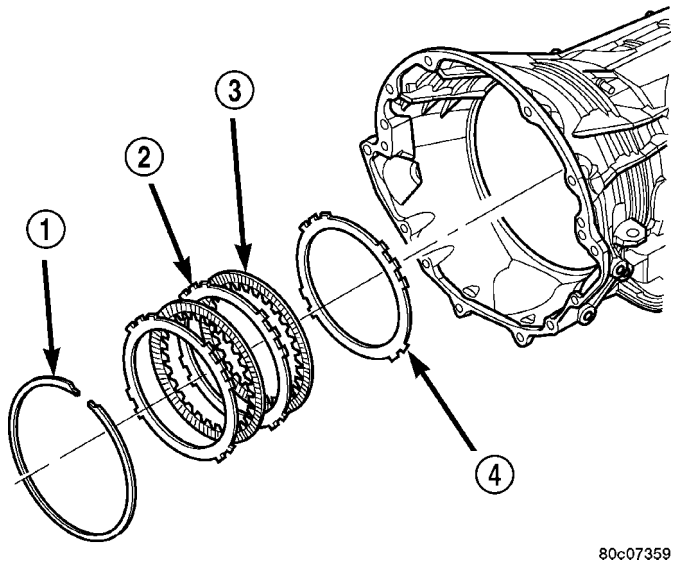


Fig. 40 Install 2C Clutch Pack

1 - SNAP-RING
2 - PLATE
3 - DISC
4 - REACTION PLATE

(26) Install the number 8 bearing inside the reaction carrier with the outer race against the reaction planetary carrier.

(27) Install the reaction planetary gear set and the number 9 bearing, with the inner race against the reaction planetary carrier, into the transmission case (Fig. 41).

(28) Install the flat 2C clutch snap-ring into the transmission case (Fig. 40).

(29) Install the reaction sun gear into the reaction planetary gear set. **Make sure** the small shoulder is facing the front of the transmission (Fig. 41).

(30) Install the number 7 bearing onto the reaction sun gear with the inner race against the sun gear (Fig. 41).

(31) Install the output shaft selective thrust plate onto the reaction annulus with the oil grooves facing the annulus gear and the tabs and notches aligned as shown in (Fig. 42).

(32) Install the number 6 bearing against the output shaft selective thrust plate with the flat side against the thrust plate (Fig. 41) and the raised tabs on the inner race facing the front of the transmission.

(33) Install the reaction annulus into the reaction planetary gear set (Fig. 41).

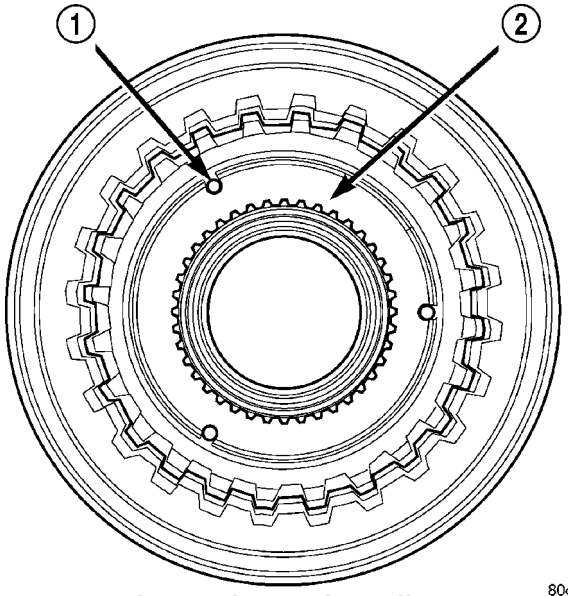


Fig. 42 Thrust Plate Alignment

1 - LOCATING LUG (3)
2 - THRUST PLATE

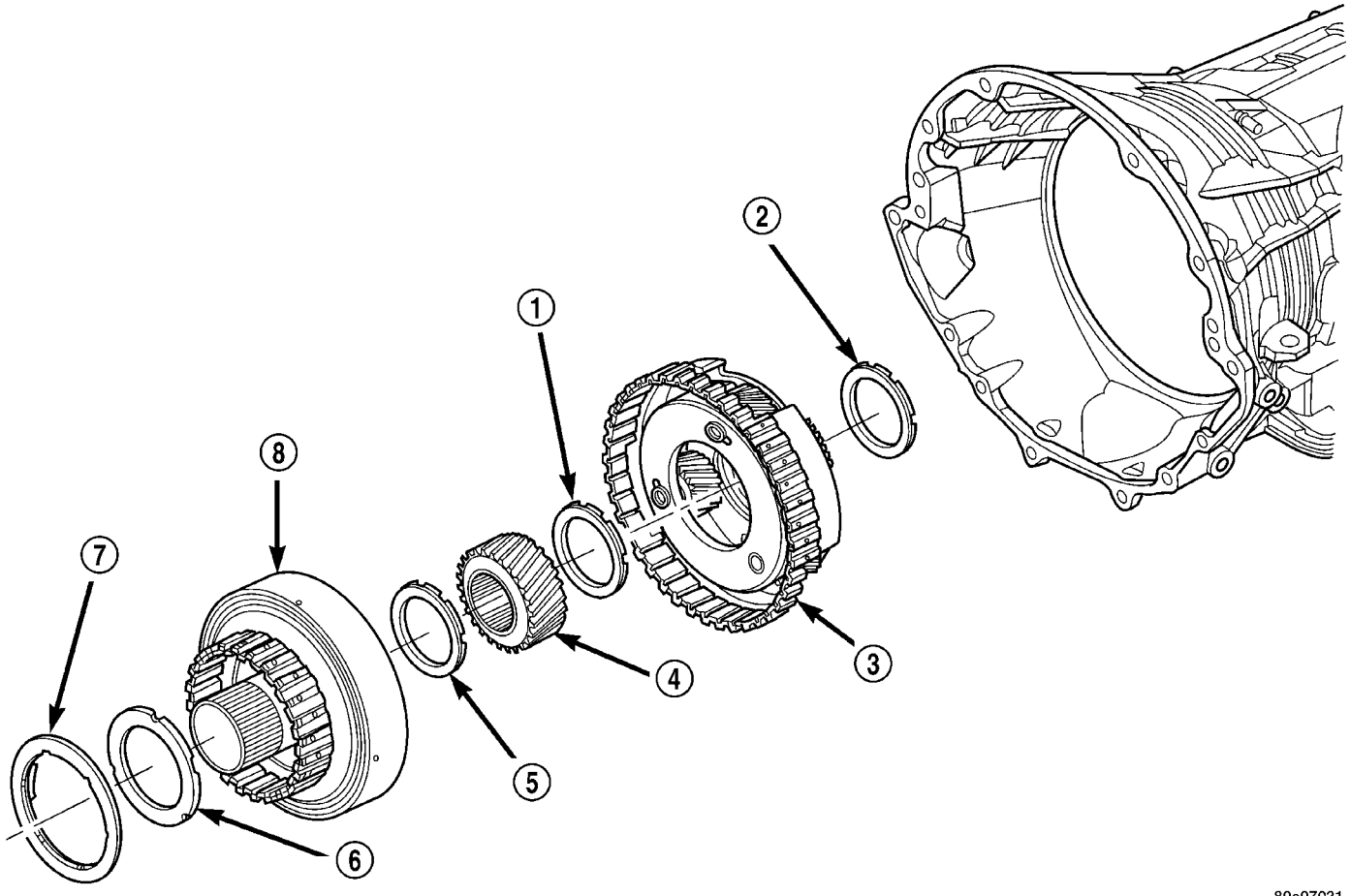


Fig. 41 Install Reaction Annulus and Carrier

1 - BEARING NUMBER 8
2 - BEARING NUMBER 9
3 - REACTION PLANETARY CARRIER
4 - REACTION SUN GEAR
5 - BEARING NUMBER 7
6 - THRUST PLATE (SELECT)
7 - BEARING NUMBER 6
8 - REACTION ANNULUS

(34) Install the 4C retainer/bulkhead into the transmission case. Make sure that the oil feed holes are pointing toward the valve body area. Rotate the reaction annulus during the installation of the 4C retainer/bulkhead to ease installation.

(35) Install the 4C retainer/bulkhead tapered snap-ring into the transmission case (Fig. 43) with the taper toward the front of the case. Make sure that the open ends of the snap-ring are located in the case opening toward the valve body area.

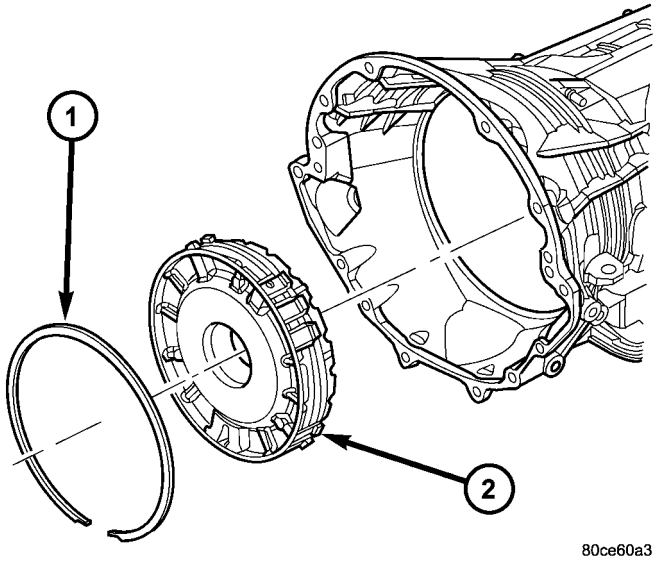


Fig. 43 Install 4C Clutch Retainer/Bulkhead

1 - SNAP-RING
2 - 4C CLUTCH RETAINER/BULKHEAD

(36) Air check the 2C and 4C clutch operation.

(37) Using Alignment Plate 8261, Adapter 8266-17 from End-Play Tool Set 8266 and Dial Indicator C-3339, measure and record the output shaft end-play (Fig. 44). The correct output shaft end-play is 0.22-0.55 mm (0.009-0.021 in.). Adjust as necessary. Install the chosen output shaft selective thrust plate and re-measure end-play to verify selection.

(38) Apply a bead of RTV silicone and install the extension/adapter housing onto the transmission case.

(39) Install and torque the bolts to hold the extension/adapter housing onto the transmission case. The correct torque is 54 N·m (40 ft.lbs.).

(40) Install the number 5 bearing and selective thrust plate onto the 4C retainer/bulkhead (Fig. 45). Be sure that the outer race of the bearing is against the thrust plate.

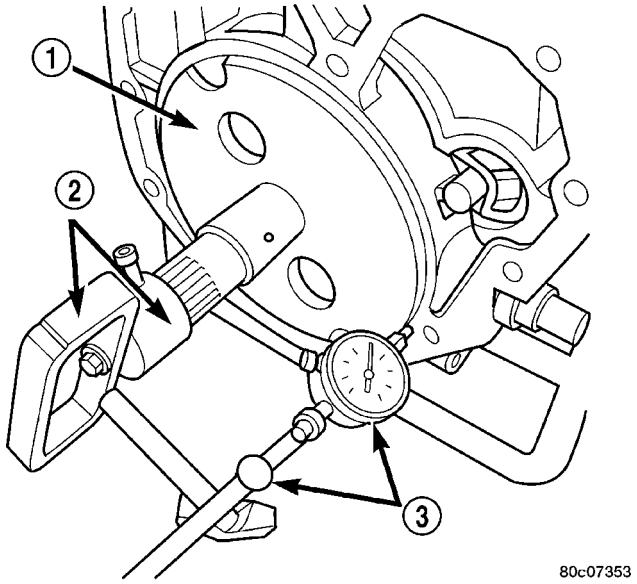


Fig. 44 Measure Output Shaft End Play

1 - TOOL 8261
2 - TOOL 8266
3 - TOOL C-3339

(41) Install the input clutch assembly into the transmission case (Fig. 45). Make sure that the input clutch assembly is fully installed by performing a visual inspection through the input speed sensor hole. If the tone wheel teeth on the input clutch assembly are centered in the hole, the assembly is fully installed.

(42) Install the number 1 bearing with the outer race up in the pocket of the input clutch assembly (Fig. 45).

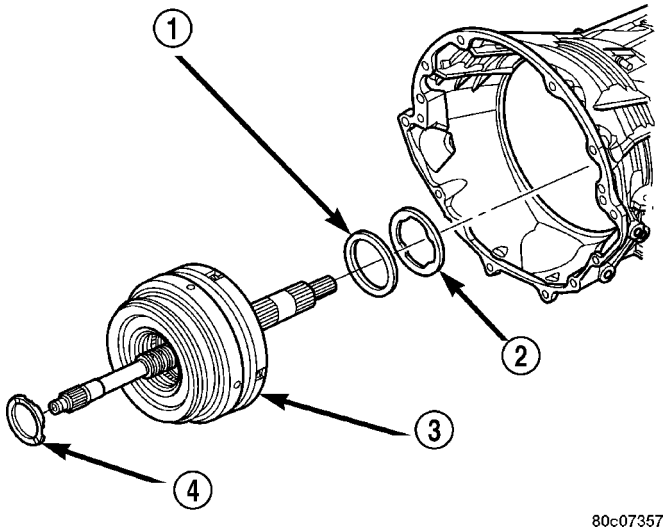


Fig. 45 Install Input Clutch Assembly

1 - BEARING NUMBER 5
2 - THRUST PLATE (SELECT)
3 - INPUT CLUTCH ASSEMBLY
4 - BEARING NUMBER 1

(43) Install the oil pump into the transmission case (Fig. 46).

(44) Install the bolts to hold the oil pump into the transmission case. Tighten the oil pump bolts to 28 N·m (250 in.lbs.).

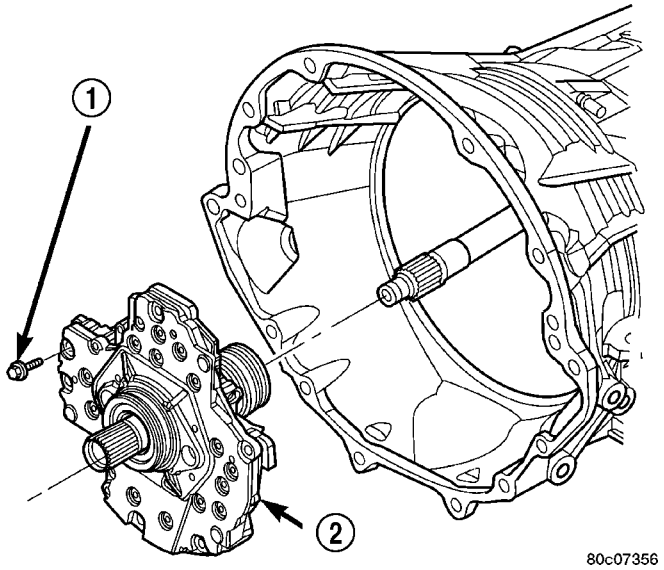


Fig. 46 Install Oil Pump

1 - OIL PUMP TO CASE BOLT (6)
2 - OIL PUMP

(45) Using Adapter 8266-1 from End-Play Tool Set 8266 and Dial Indicator C-3339, measure and record the input shaft end-play (Fig. 47). The correct end-play is 0.46-0.89 mm (0.018-0.035 in.). Adjust as necessary. Install the chosen thrust plate on the number 5 bearing and re-measure end-play to verify selection.

NOTE: When measuring the input shaft end-play, two ″stops″ will be felt. When the input shaft is pushed inward and the dial indicator zeroed, the first ″stop″ felt when the input shaft is pulled outward is the movement of the input shaft in the input clutch housing hub. This value should not be included in the end-play measured value and therefore must be recorded and subtracted from the dial indicator reading.

(46) Install the transmission front cover into the transmission case (Fig. 48).

(47) Install the outer snap-ring to hold the transmission front cover into the transmission case (Fig. 48).

(48) Partially install the inner transmission front cover snap-ring onto the oil pump (Fig. 48).

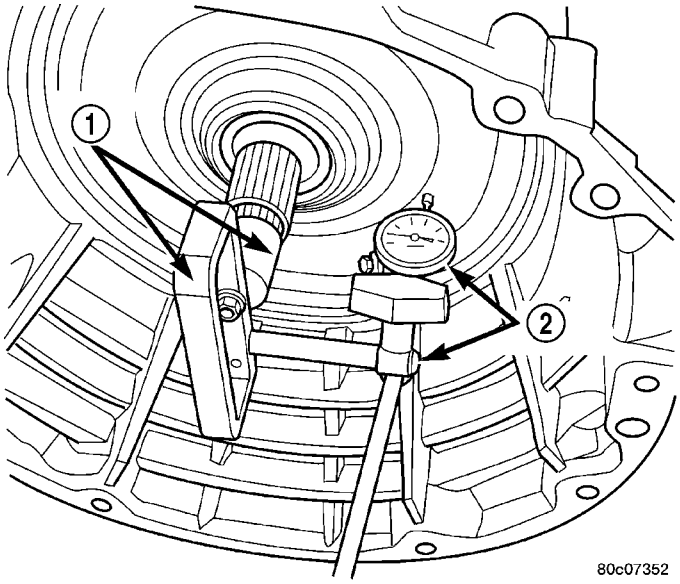


Fig. 47 Measure Input Shaft End Play

1 - TOOL 8266
2 - TOOL C-3339

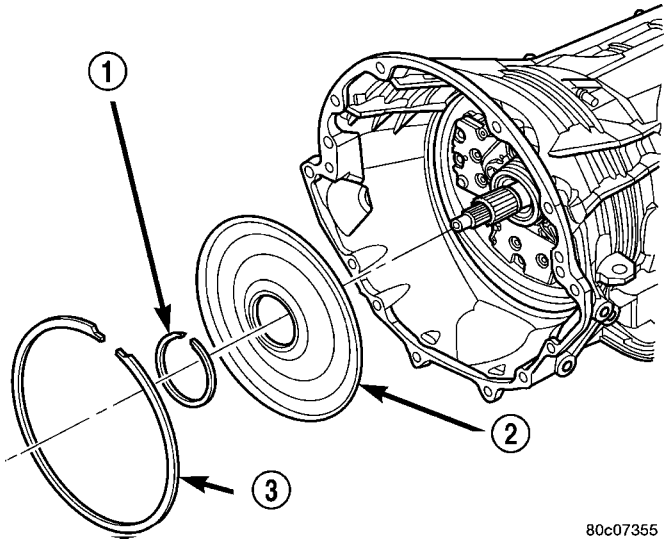


Fig. 48 Install the Transmission Front Cover

1 - INNER SNAP-RING
2 - TRANSMISSION COVER
3 - OUTER SNAP-RING

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

(49) Using Installer 8255, install the inner transmission front cover snap-ring the remainder of the way onto the oil pump (Fig. 49).

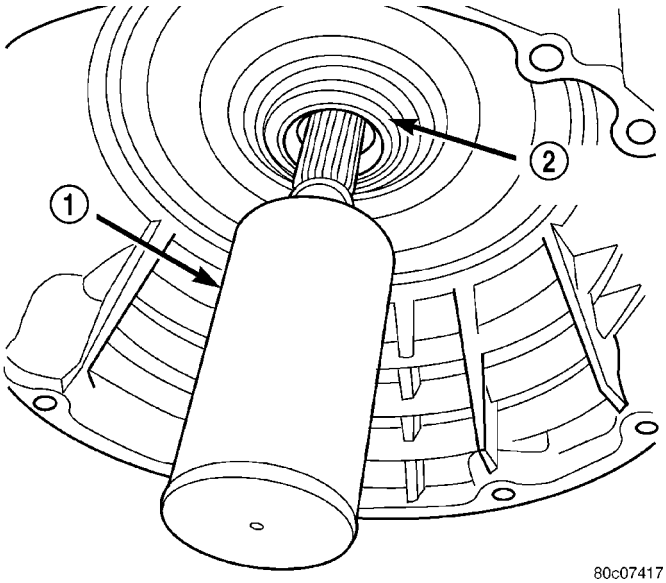


Fig. 49 Seat Snap-Ring Using Tool 8255

1 - TOOL 8255
2 - SNAP-RING

(50) Install the valve body (Fig. 50). Verify that the pin on the manual lever has properly engaged the TRS selector plate. Tighten the valve body to transmission case bolts to 12 N·m (105 in.lbs.).

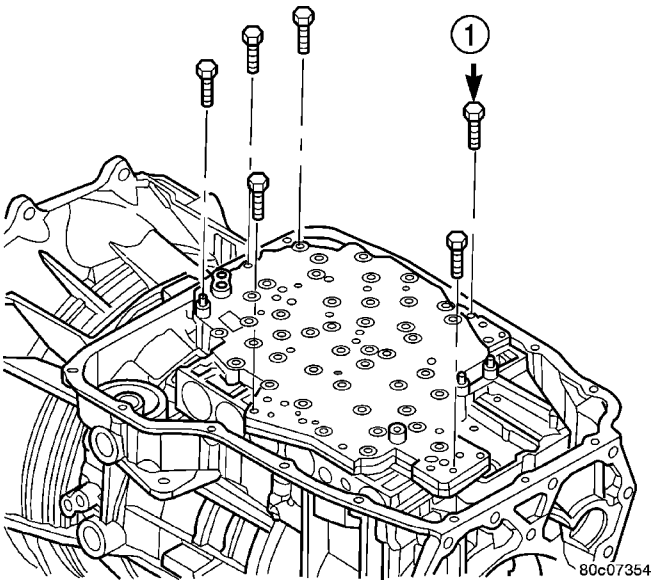


Fig. 50 Install Valve Body Assembly

1 - VALVE BODY TO CASE BOLT (6)

(51) Install a new primary oil filter seal in the oil pump inlet bore. Seat the seal in the bore with the butt end of a hammer, or other suitable tool.

CAUTION: The primary oil filter seal MUST be fully installed flush against the oil pump body. DO NOT install the seal onto the filter neck and attempt to install the filter and seal as an assembly. Damage to the transmission will result.

(52) Install the primary oil filter and the oil cooler return filter (Fig. 51). Tighten the screw to hold the primary oil filter to the valve body to 4.5 N·m (40 in.lbs.). Using Oil Filter Wrench 8321, tighten the cooler return oil filter to the transmission case to 14 N·m (125 in.lbs.).

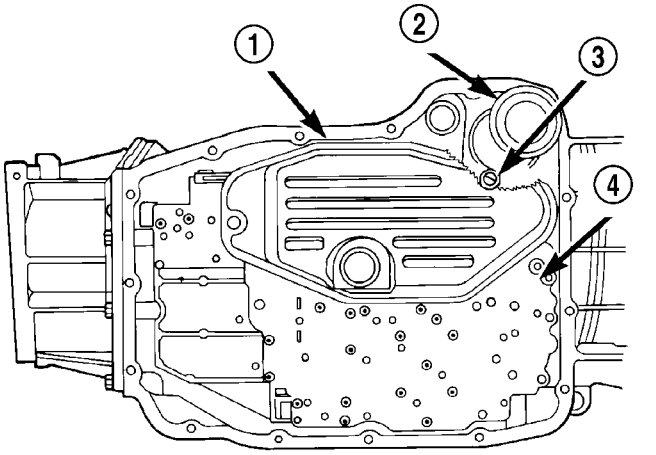


Fig. 51 Install Primary Oil and Cooler Filters

1 - PRIMARY OIL FILTER
2 - COOLER RETURN FILTER
3 - COOLER RETURN FILTER BYPASS VALVE
4 - VALVE BODY

(53) Apply RTV silicone to the oil pan and install the transmission oil pan. Tighten the bolts to 12 N·m (105 in.lbs.).

(54) Install the input, output, and line pressure sensors (Fig. 52). Tighten the bolts to 12 N·m (105 in.lbs.).

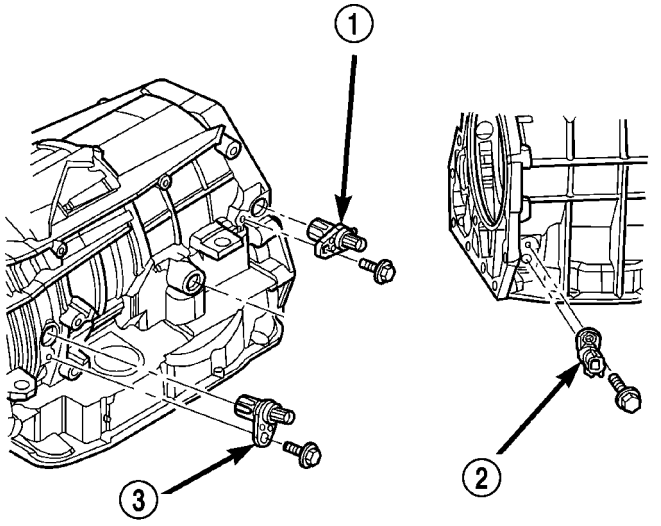


Fig. 52 Install Input, Output, and Line Pressure Sensors

1 - OUTPUT SPEED SENSOR
2 - LINE PRESSURE SENSOR
3 - INPUT SPEED SENSOR

(55) Install the manual shift lever from the transmission. Torque the retaining cross-bolt to 16 N·m (140 in.lbs.).

INSTALLATION

(1) Check torque converter hub and hub drive flats for sharp edges burrs, scratches, or nicks. Polish the hub and flats with 320/400 grit paper and crocus cloth if necessary. Verify that the converter hub o-ring is properly installed and is free of any debris. The hub must be smooth to avoid damaging pump seal at installation.

(2) If a replacement transmission is being installed, transfer any components necessary, such as the manual shift lever and shift cable bracket, from the original transmission onto the replacement transmission.

(3) Lubricate oil pump seal lip with transmission fluid.

(4) Align converter and 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. 53). Surface of converter lugs should be at least 13mm (1/2 in.) to rear of straightedge when converter is fully seated.

(7) Temporarily secure converter with C-clamp.

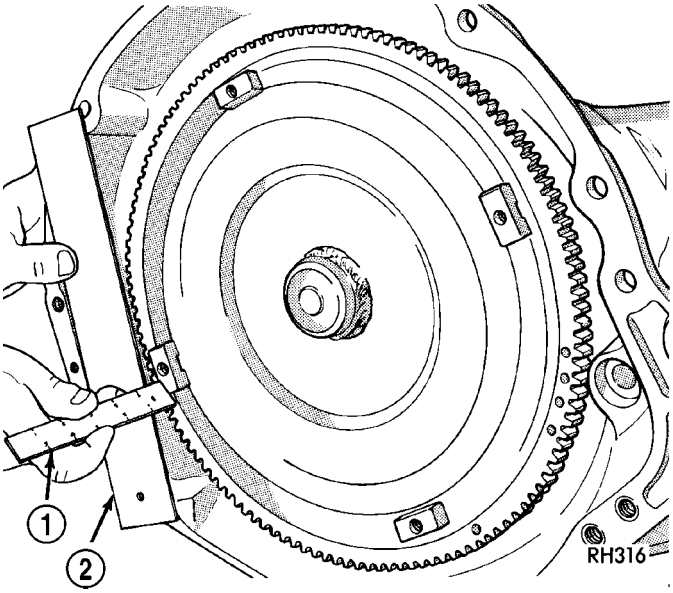


Fig. 53 Checking Torque Converter Seating - Typical

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) Apply a light coating of Mopar® High Temp Grease to the torque converter hub pocket in the rear pocket of the engine's crankshaft.

(11) Raise transmission (Fig. 54) and align the torque converter with the drive plate and transmission converter housing with the engine block.

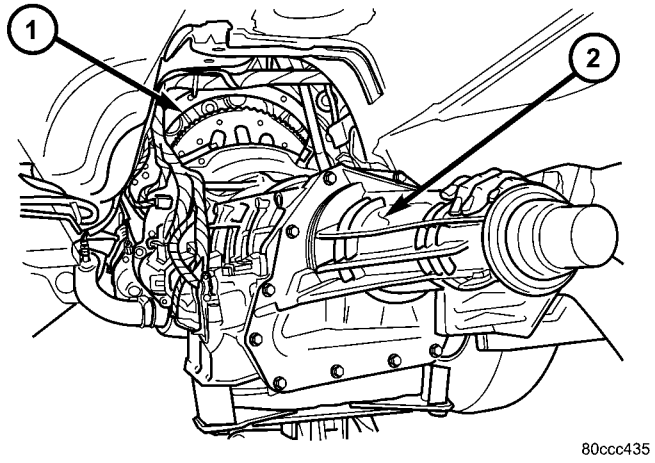


Fig. 54 Install Transmission

1 - ENGINE
2 - TRANSMISSION

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

(13) Carefully work transmission forward and over engine block dowels until converter hub is seated in crankshaft. Verify that no wires, or the transmission vent hose, have become trapped between the engine block and the transmission.

(14) Install two bolts to attach the transmission to the engine.

(15) Install remaining torque converter housing to engine bolts. Tighten to 68 N·m (50 ft.lbs.).

(16) Install transfer case, if equipped. Tighten transfer case nuts to 35 N·m (26 ft.lbs.).

(17) Install rear support to transmission. Tighten bolts to 47 N·m (35 ft.lbs.).

(18) Lower transmission onto crossmember and install bolts attaching transmission mount to crossmember. Tighten clevis bracket to crossmember bolts to 47 N·m (35 ft.lbs.). Tighten the clevis bracket to rear support bolt to 68 N·m (50 ft.lbs.).

(19) Remove engine support fixture.

(20) Connect gearshift cable to transmission.

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

(21) Connect wires to solenoid and pressure switch assembly (Fig. 55) connector, input (Fig. 56) and output (Fig. 57) speed sensors, and line pressure sensor (Fig. 58). Be sure transmission harnesses are properly routed.

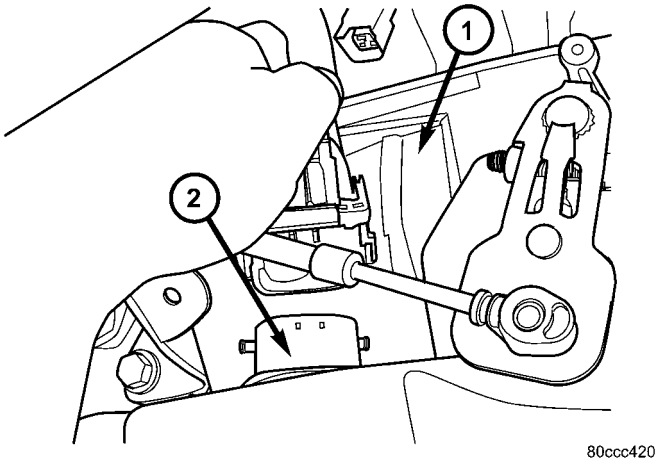


Fig. 55 Connect Transmission Solenoid

1 - TRANSMISSION
2 - TRANSMISSION SOLENOID/TRS ASSEMBLY

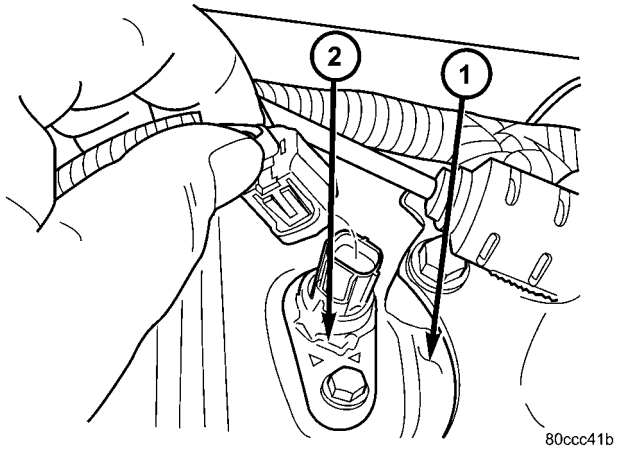


Fig. 56 Connect Input Speed Sensor

1 - TRANSMISSION
2 - INPUT SPEED SENSOR

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.

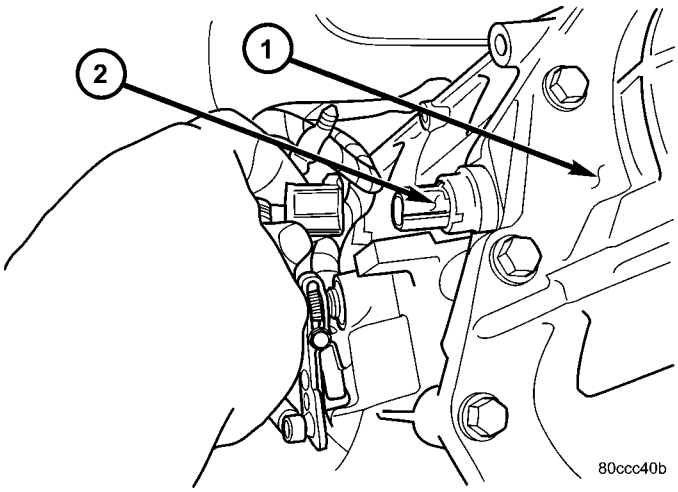


Fig. 57 Connect Output Speed Sensor

1 - TRANSMISSION
2 - OUTPUT SPEED SENSOR

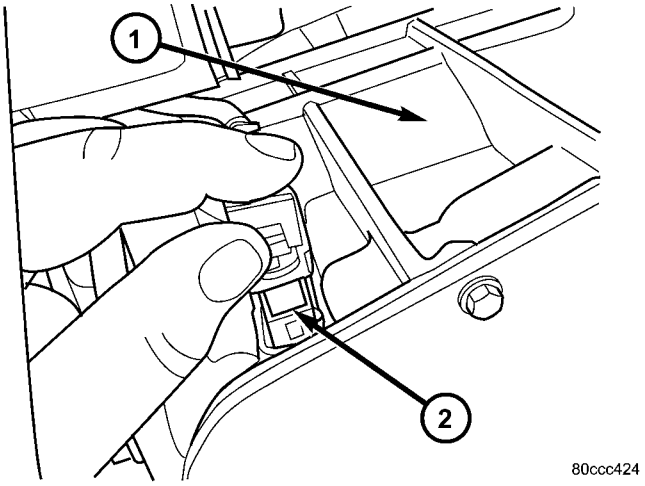


Fig. 58 Connect Line Pressure Sensor

1 - TRANSMISSION
2 - LINE PRESSURE SENSOR

(22) Install torque converter-to-driveplate bolts. Tighten bolts to 31 N·m (270 in. lbs.).
(23) Install starter motor and cooler line bracket.
(24) Connect cooler lines to transmission.
(25) Install transmission fill tube.
(26) Install exhaust components, if necessary.

(27) Install the engine collar (Fig. 59) onto the transmission and the engine. Tighten the bolts to 54 N·m (40 ft.lbs.).

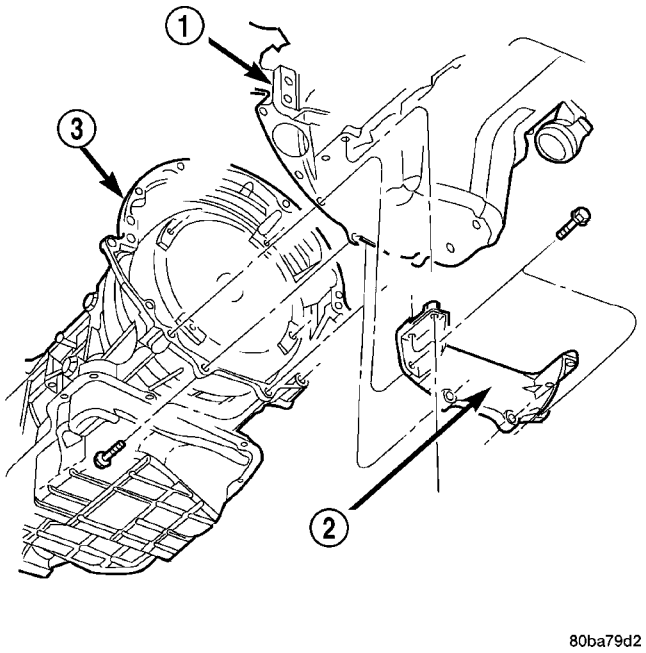


Fig. 59 Transmission Collar

1 - ENGINE
2 - ENGINE TO TRANSMISSION COLLAR
3 - TRANSMISSION

(28) Align and connect propeller shaft(s).

(29) Adjust gearshift cable if necessary.

(30) Install any skid plates removed previously. (Refer to 13 - FRAMES & BUMPERS/FRAME/ TRANSFER CASE SKID PLATE - INSTALLATION)

(31) Lower vehicle.

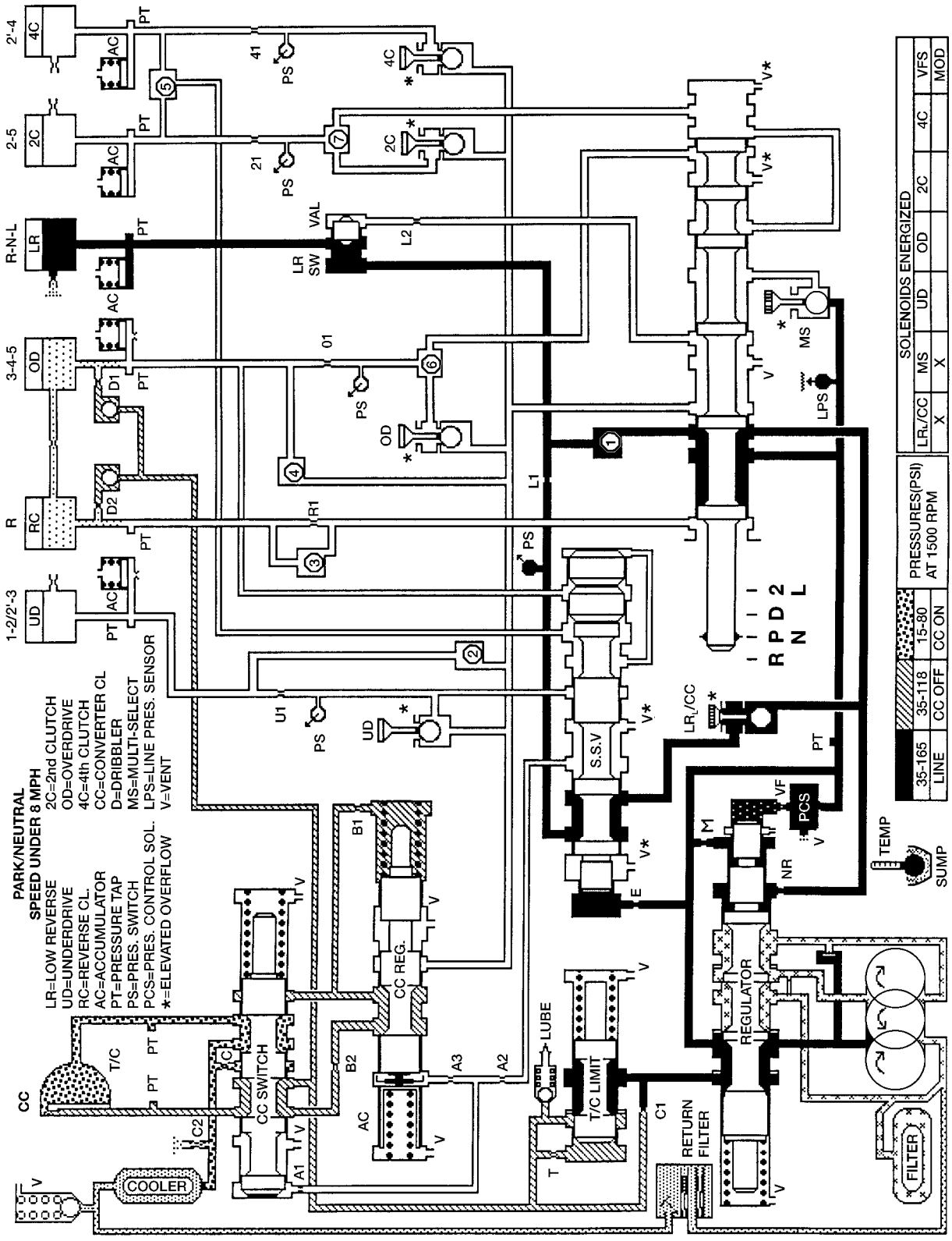
(32) Fill transmission with Mopar® ATF +4, Automatic Transmission Fluid.

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

SCHEMATICS AND DIAGRAMS

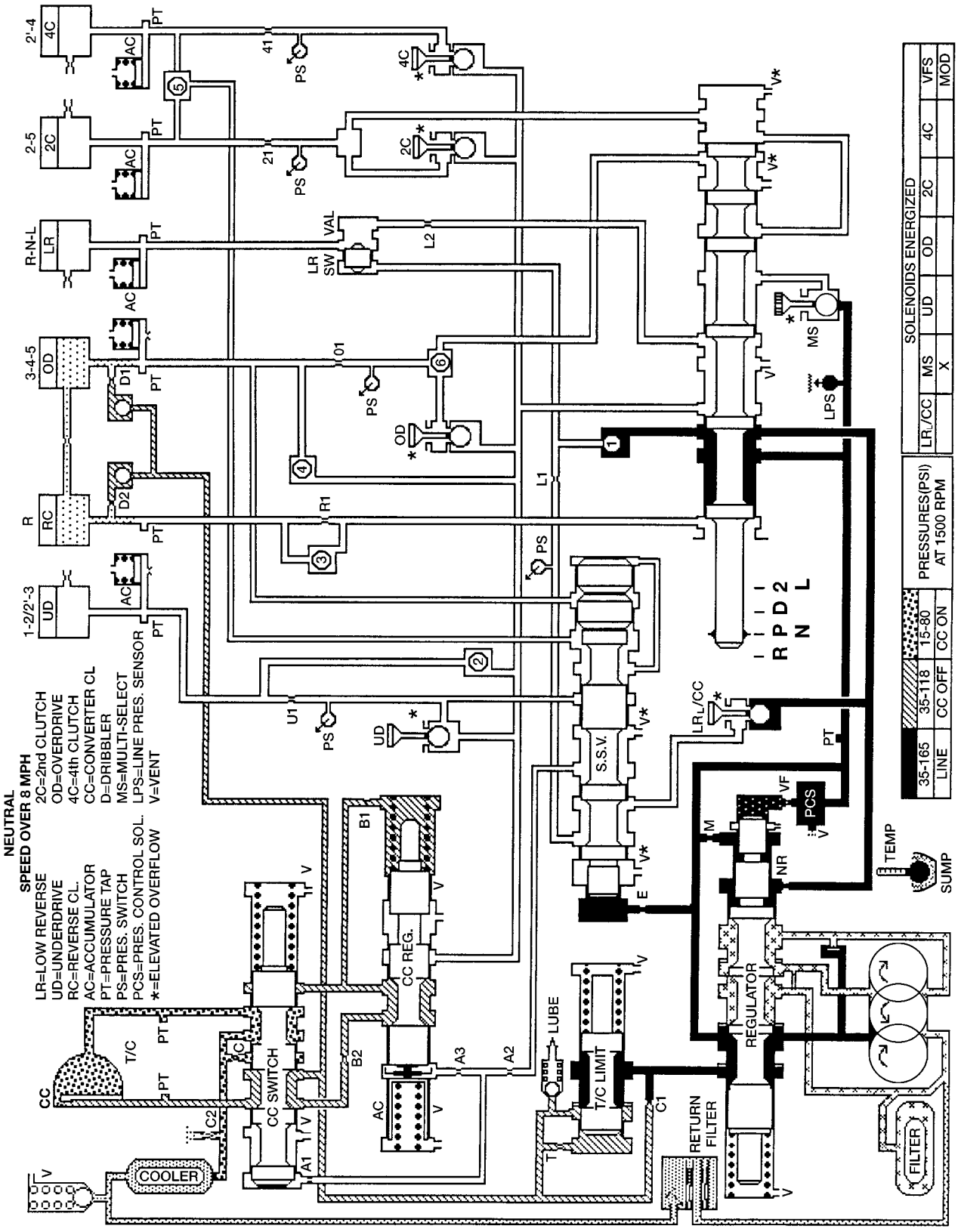
HYDRAULIC SCHEMATICS

80a0df0a



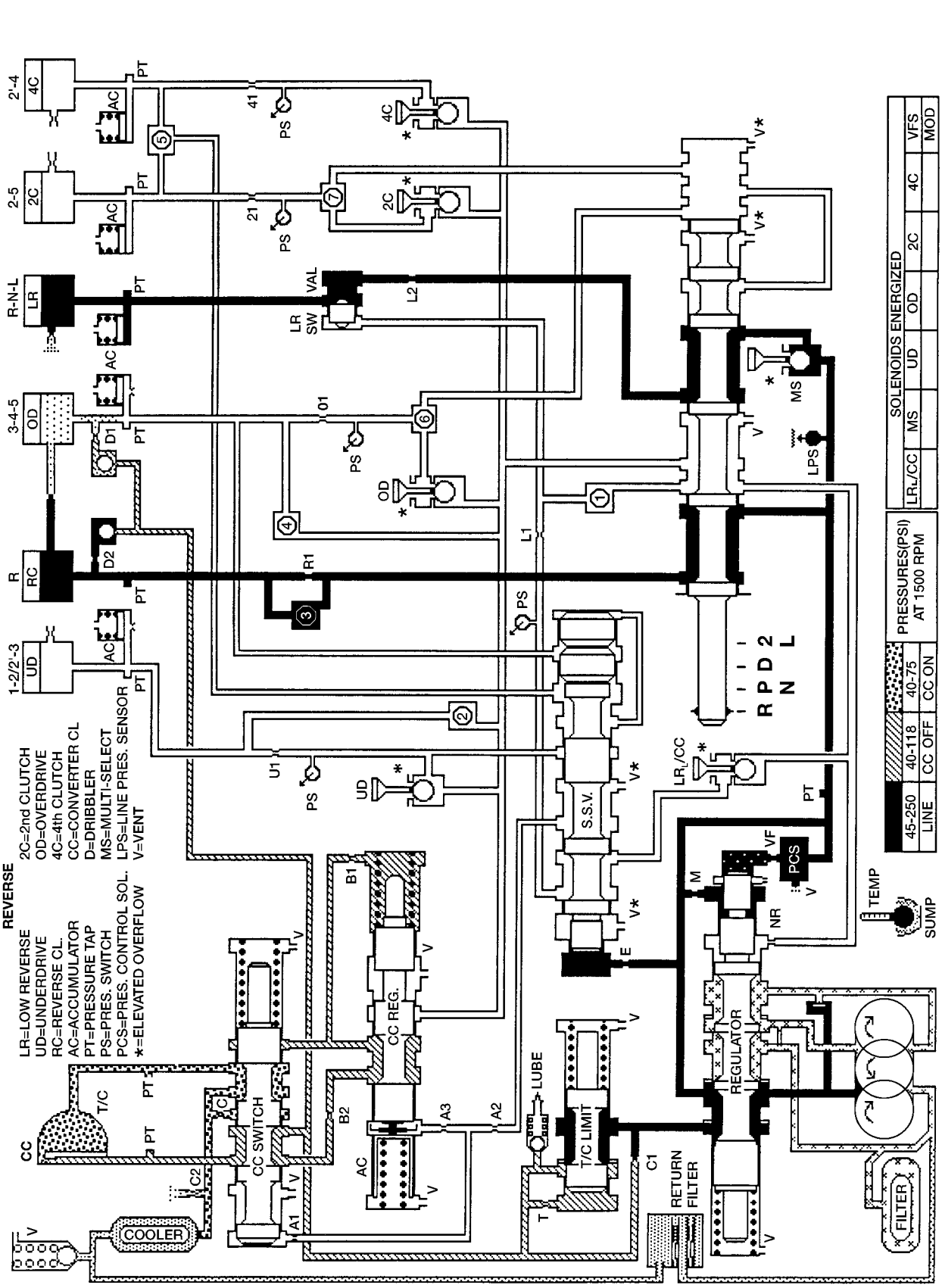
HYDRAULIC FLOW IN PARK/NEUTRAL

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

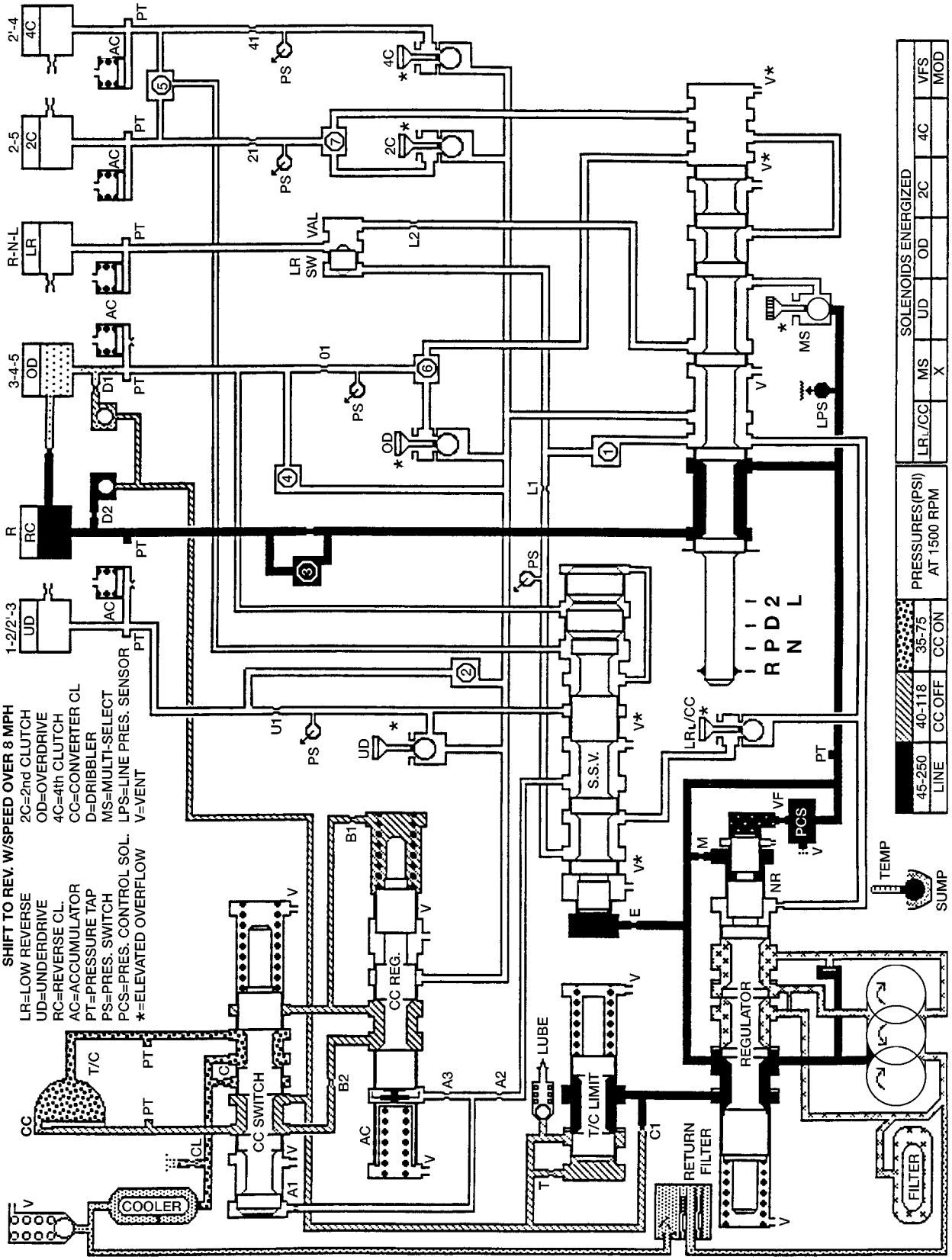


HYDRAULIC FLOW IN NEUTRAL OVER 8MPH

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



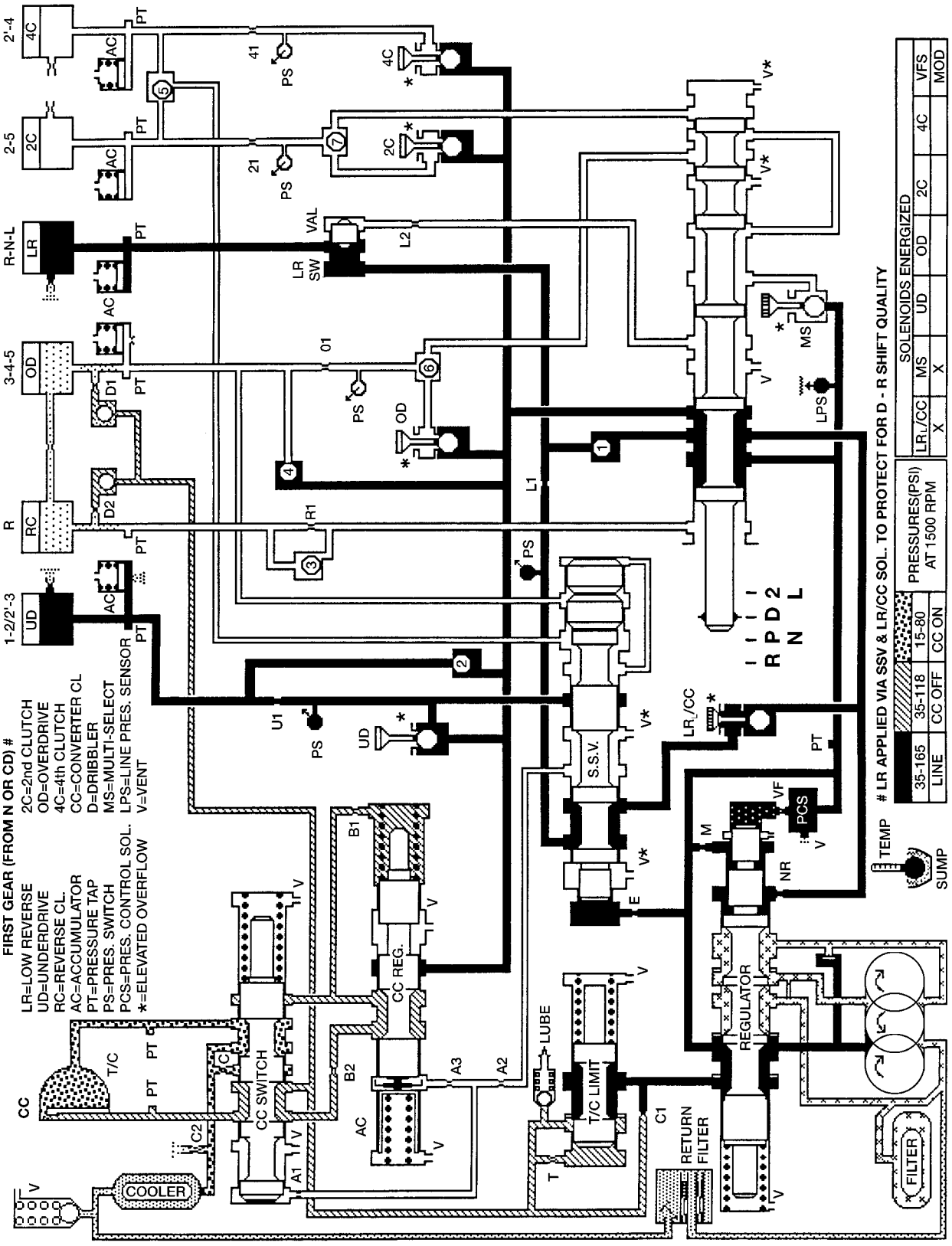
AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



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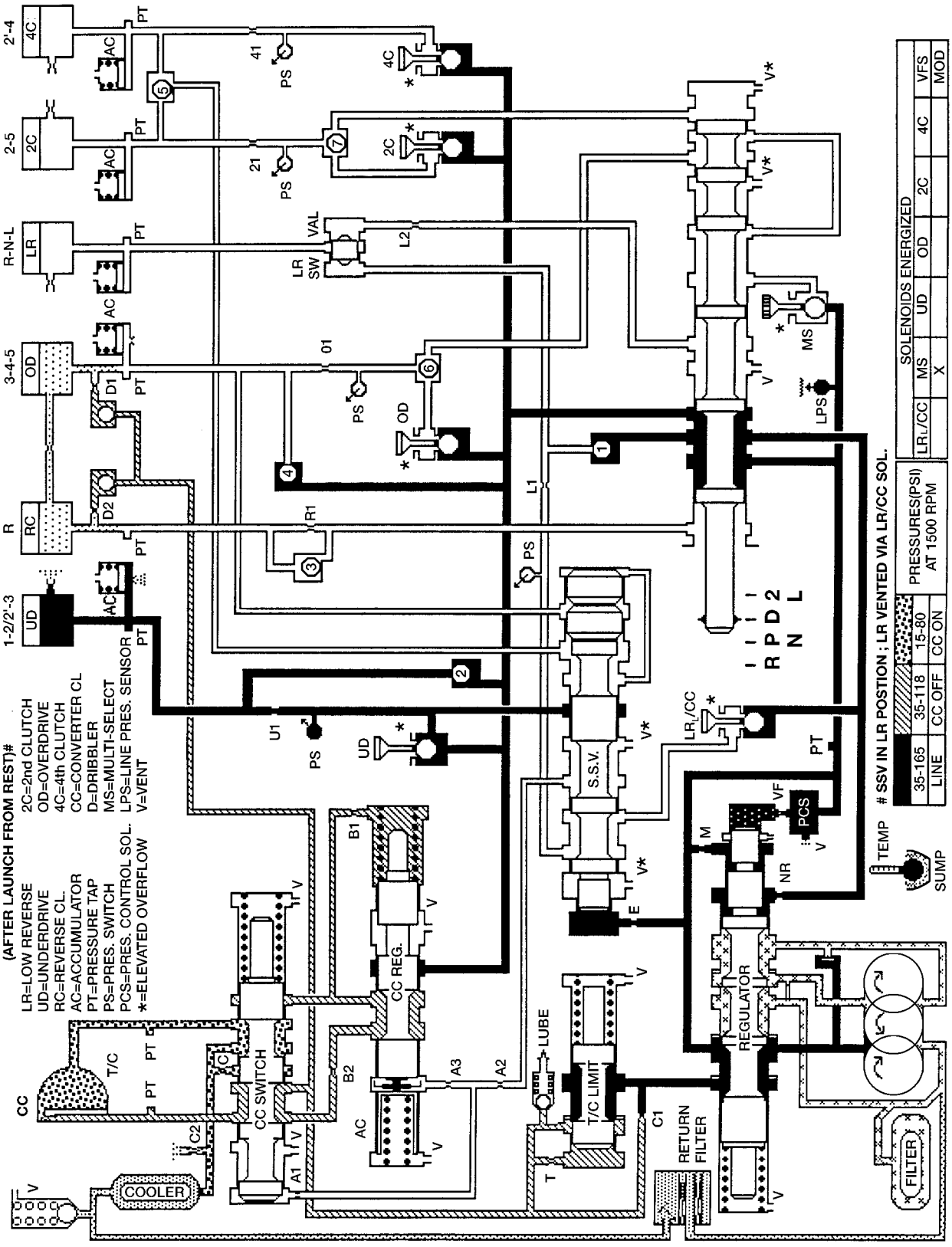
HYDRAULIC FLOW IN REVERSE BLOCK

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



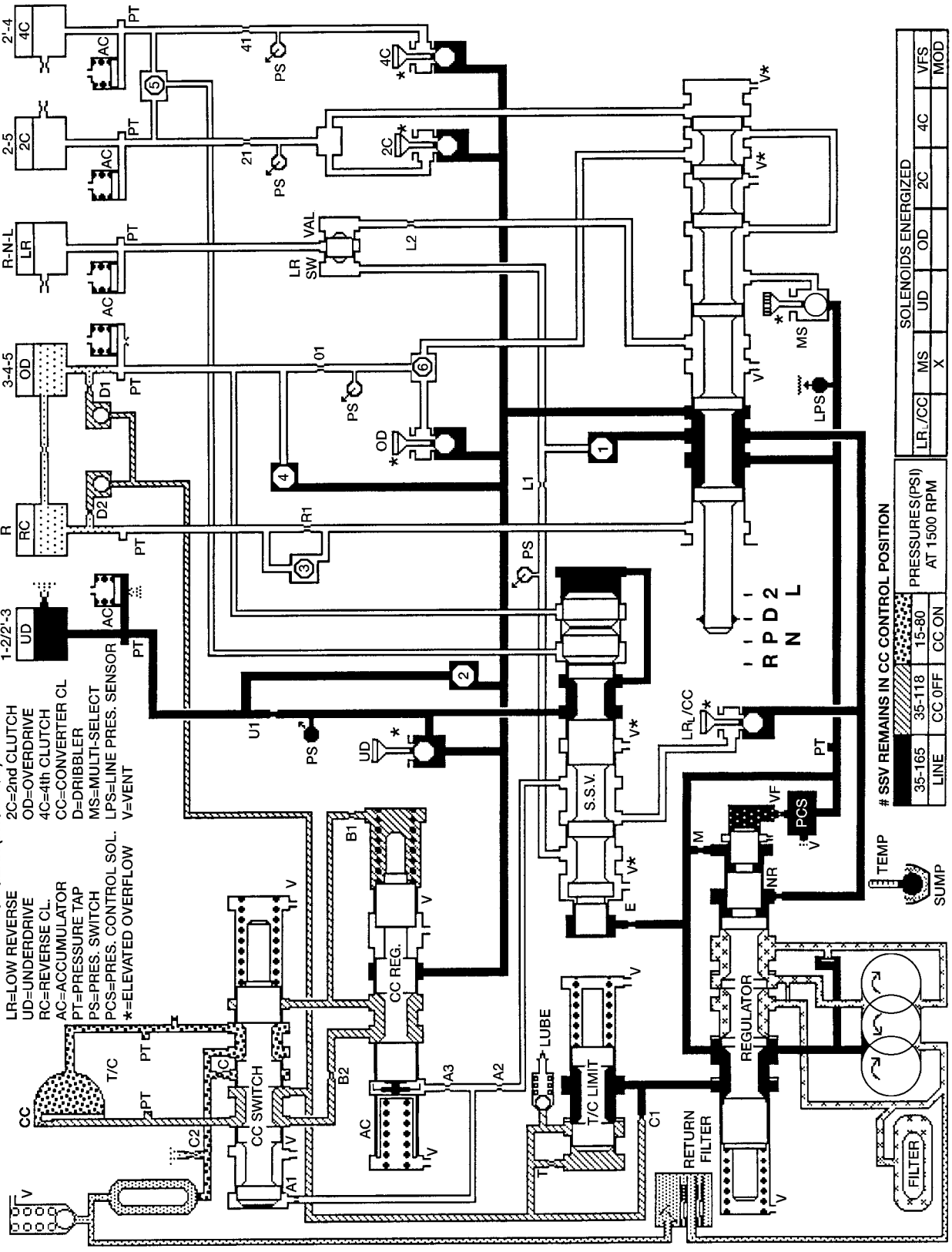
HYDRAULIC FLOW IN FIRST GEAR (FROM N OR OD)

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



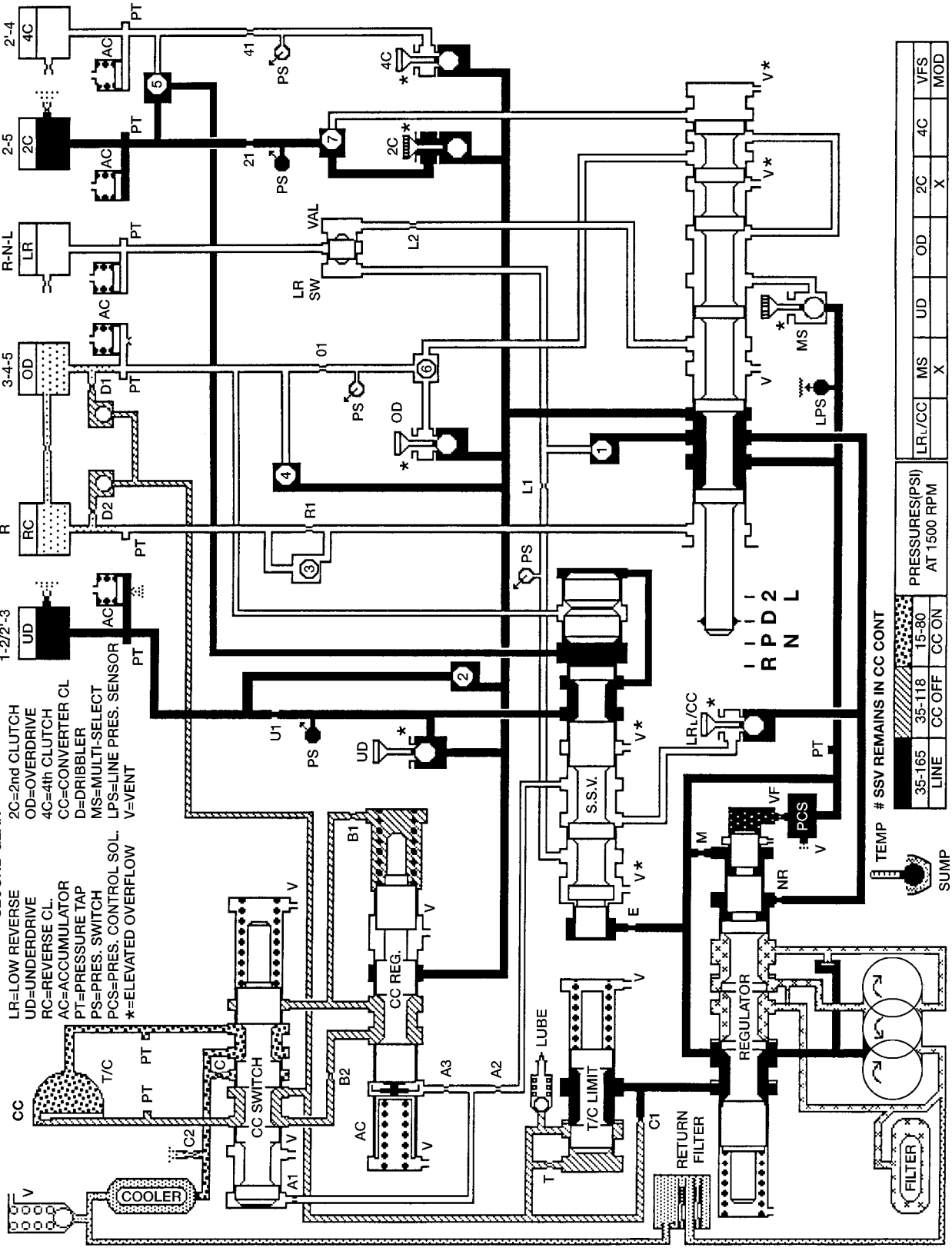
HYDRAULIC FLOW IN FIRST GEAR (AFTER LAUNCH FROM REST)

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

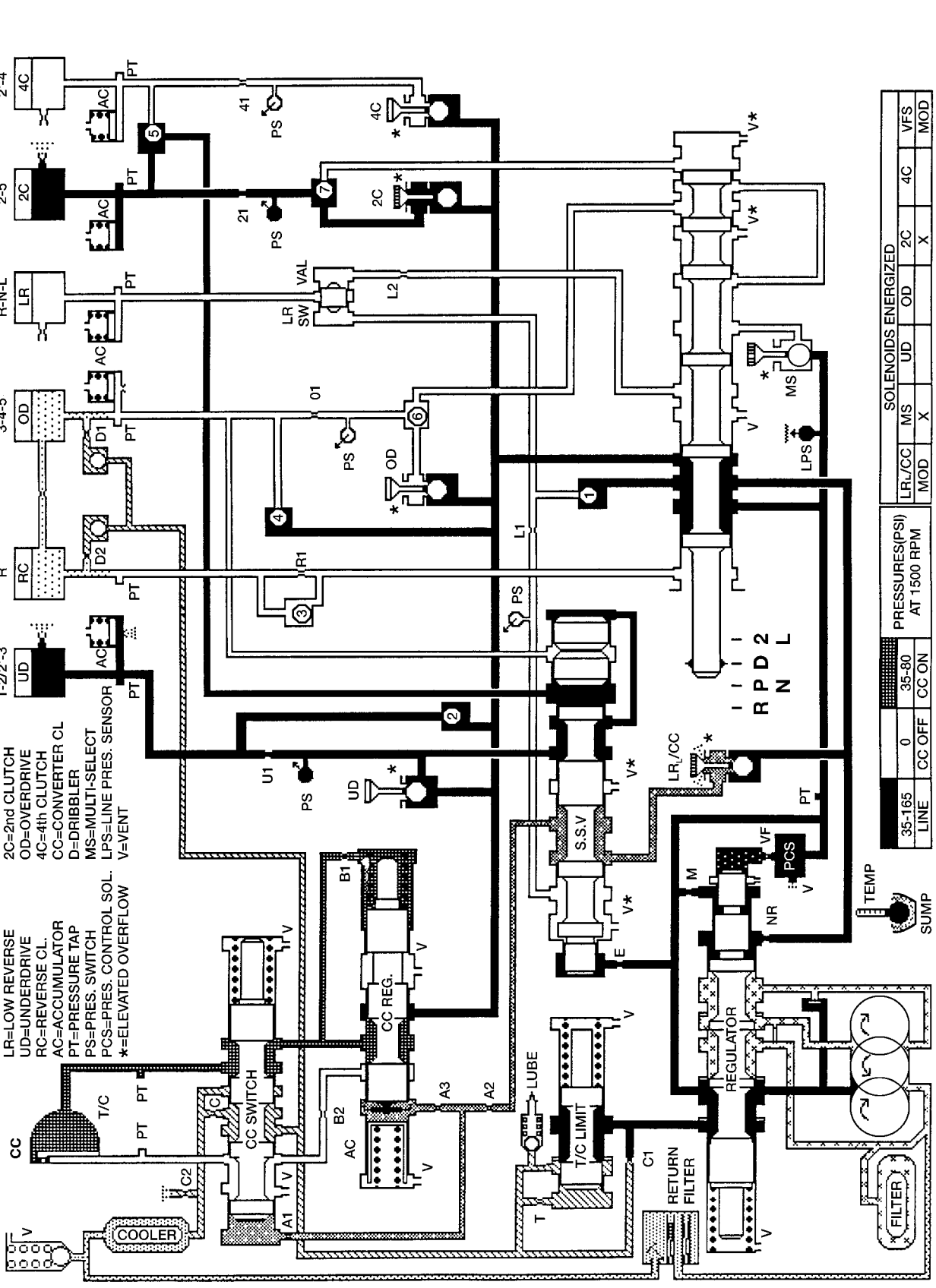


HYDRAULIC FLOW IN FIRST GEAR (FROM K/D)

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

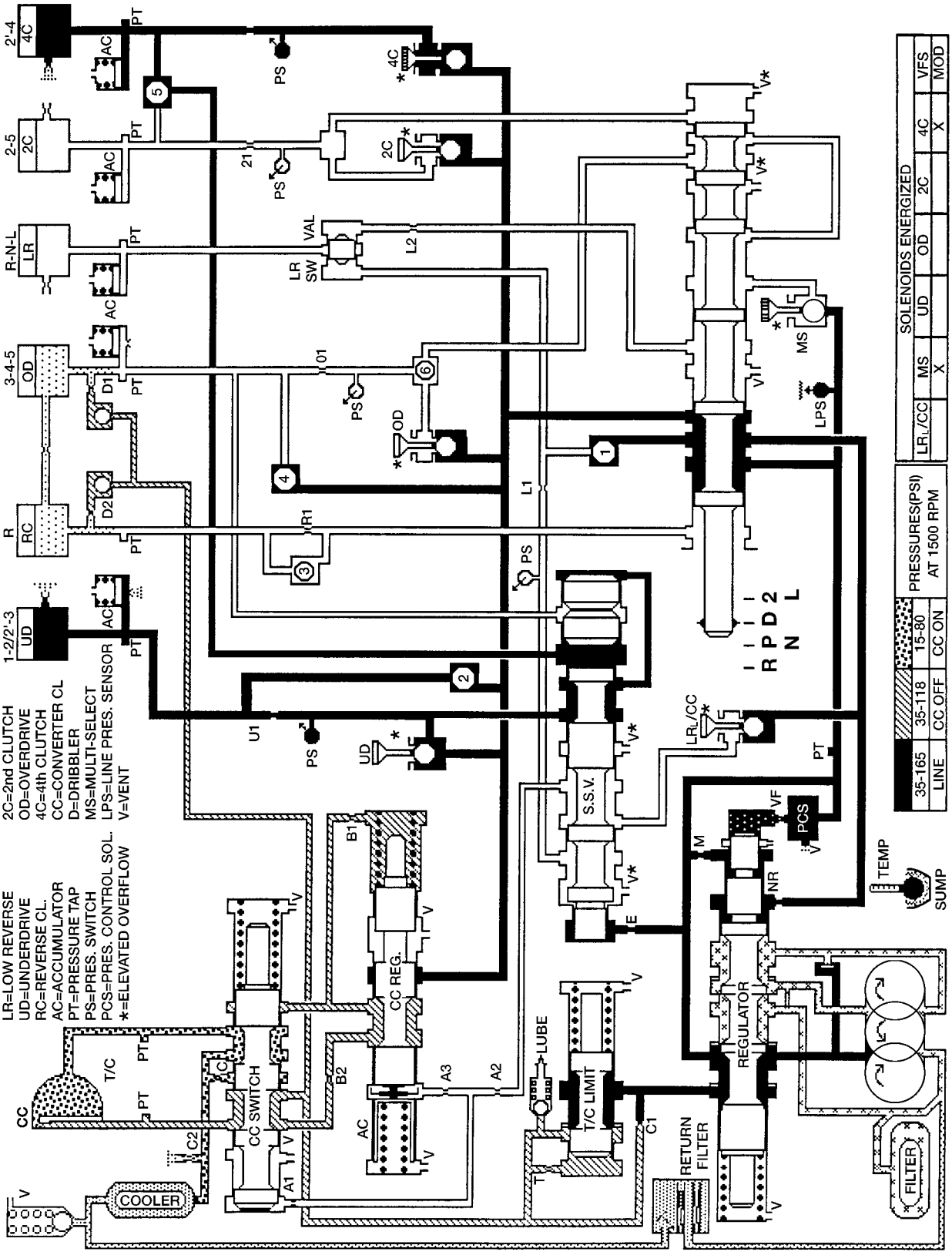


AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



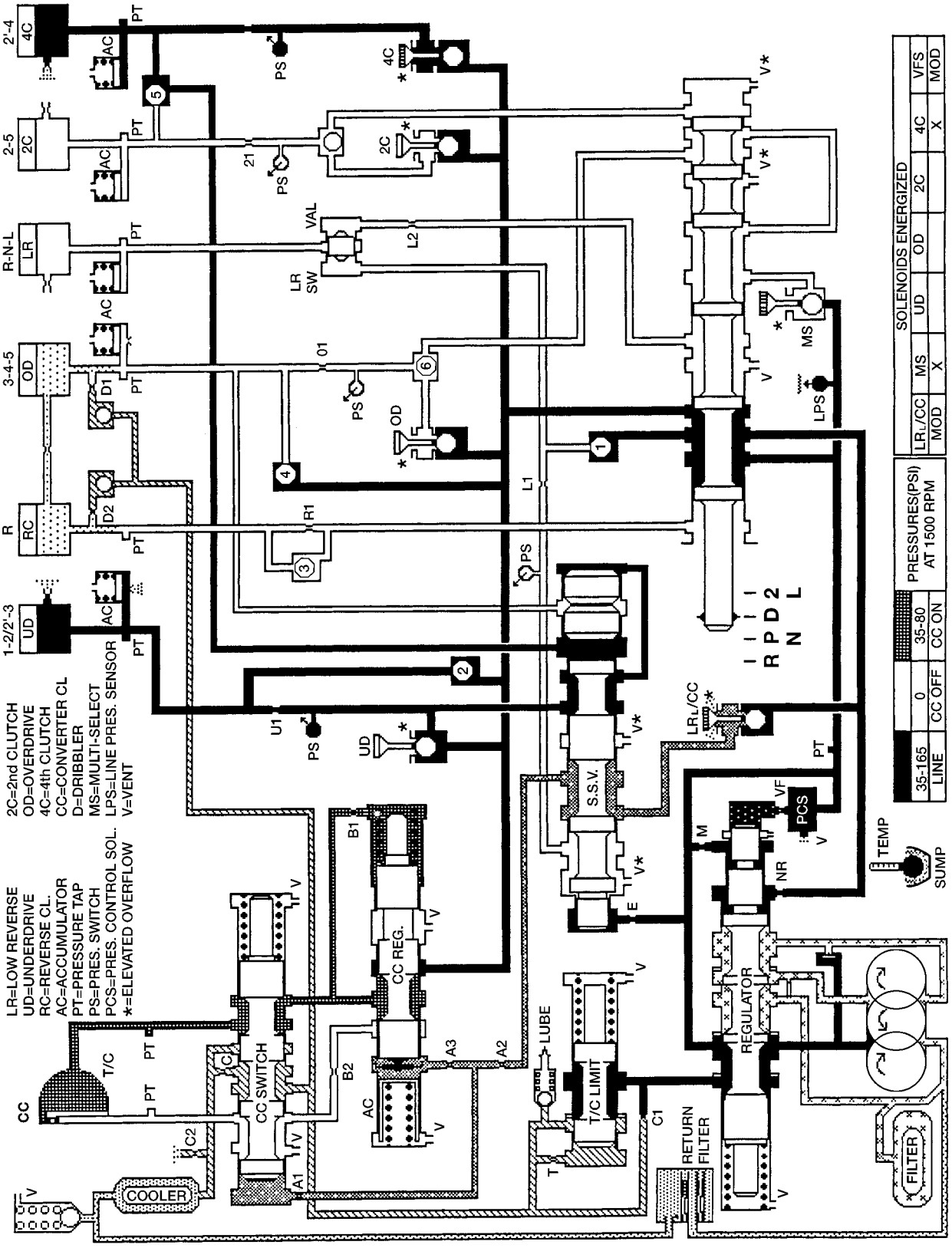
HYDRAULIC FLOW IN SECOND GEAR EMCC

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



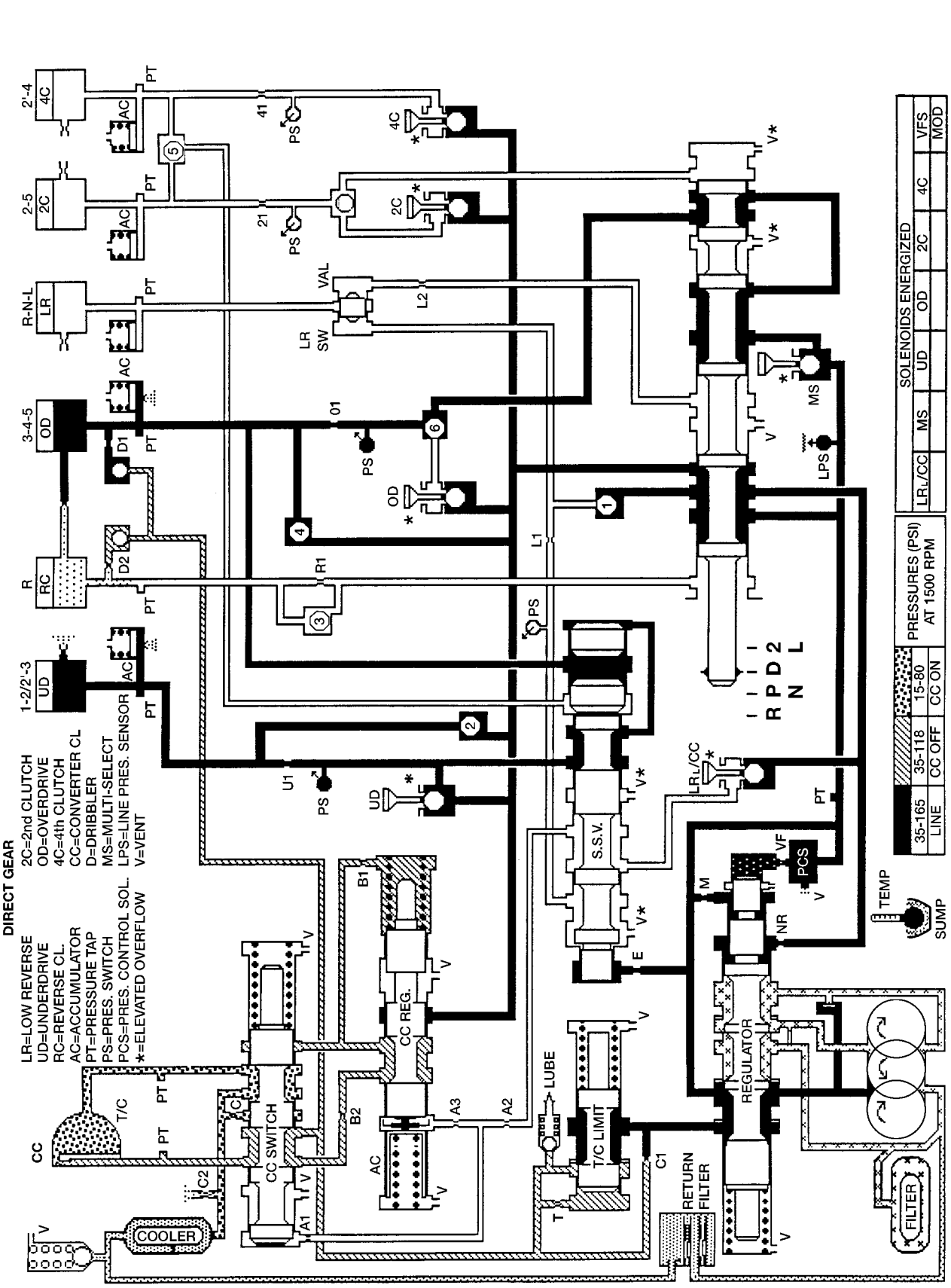
HYDRAULIC FLOW IN SECOND PRIME GEAR

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

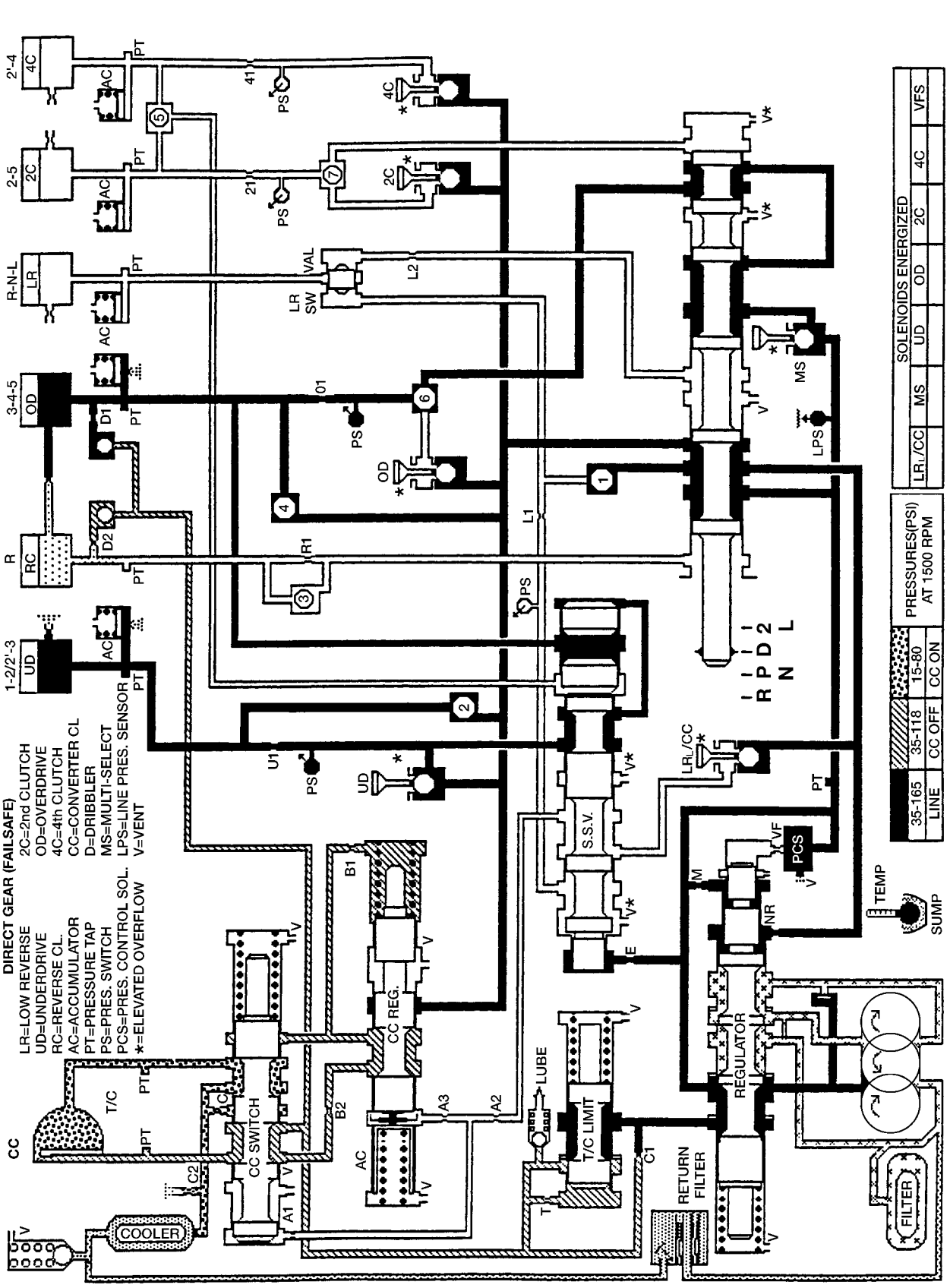


HYDRAULIC FLOW IN SECOND PRIME GEAR EMCC

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

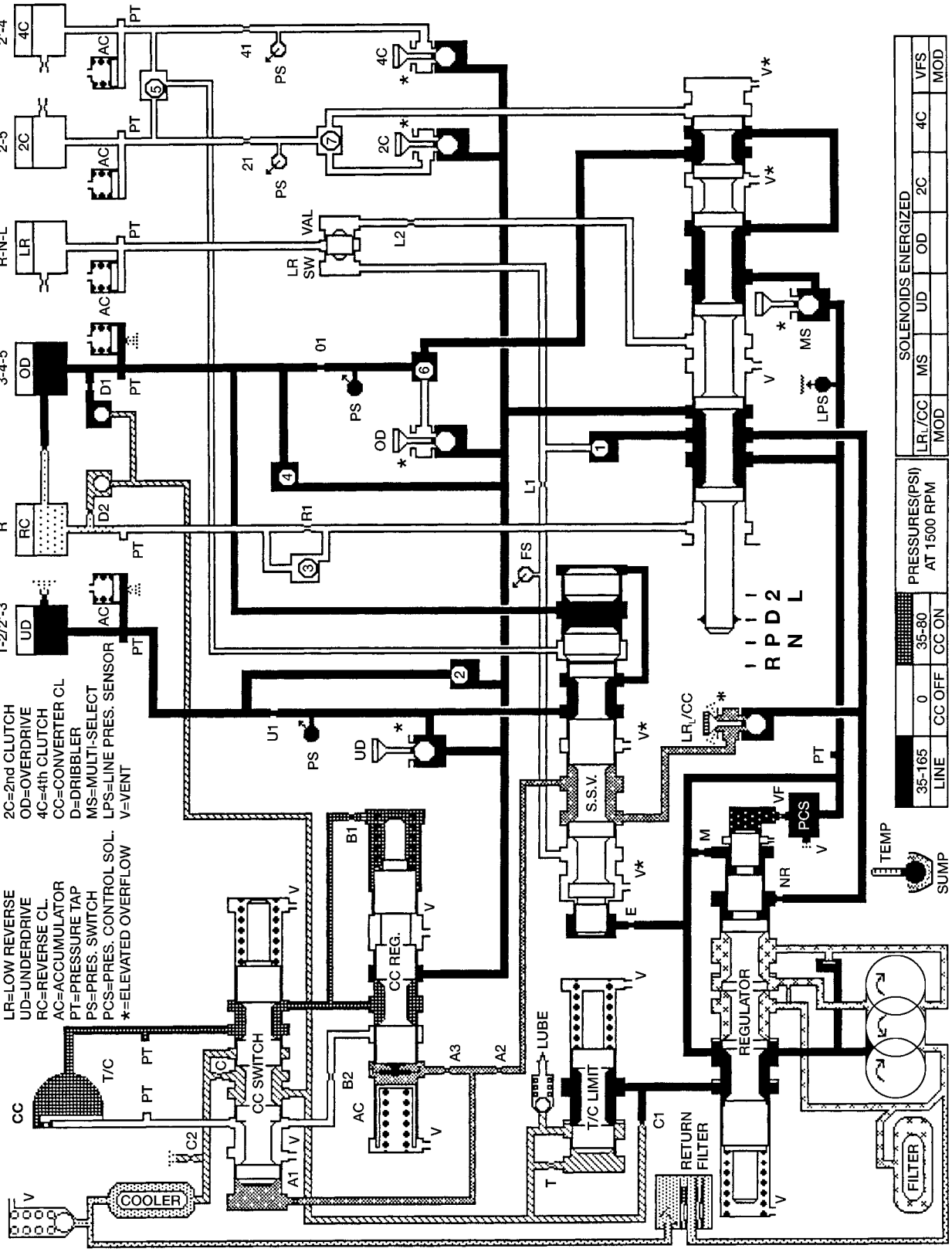


AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



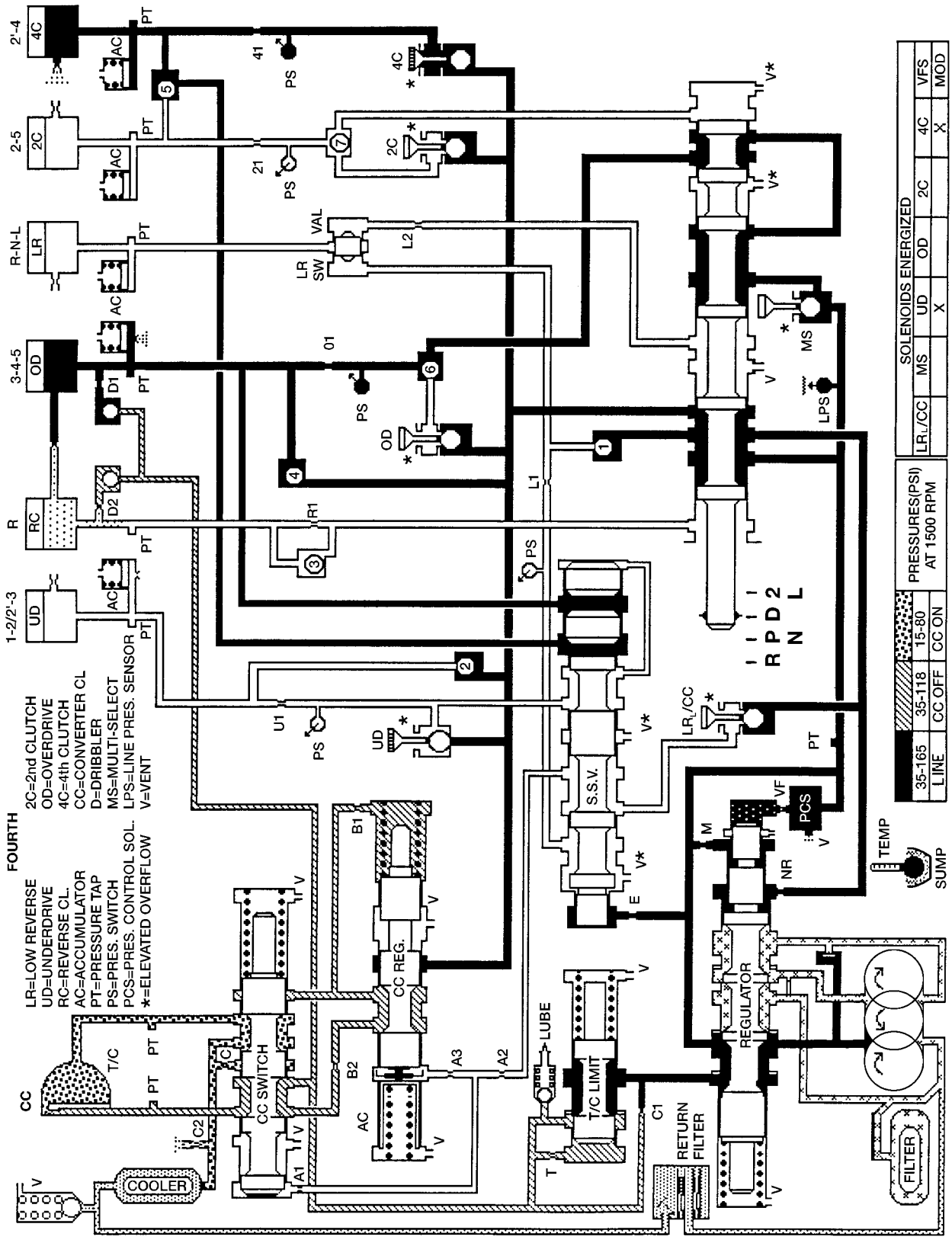
HYDRAULIC FLOW IN DIRECT GEAR (FAILSAFE)

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

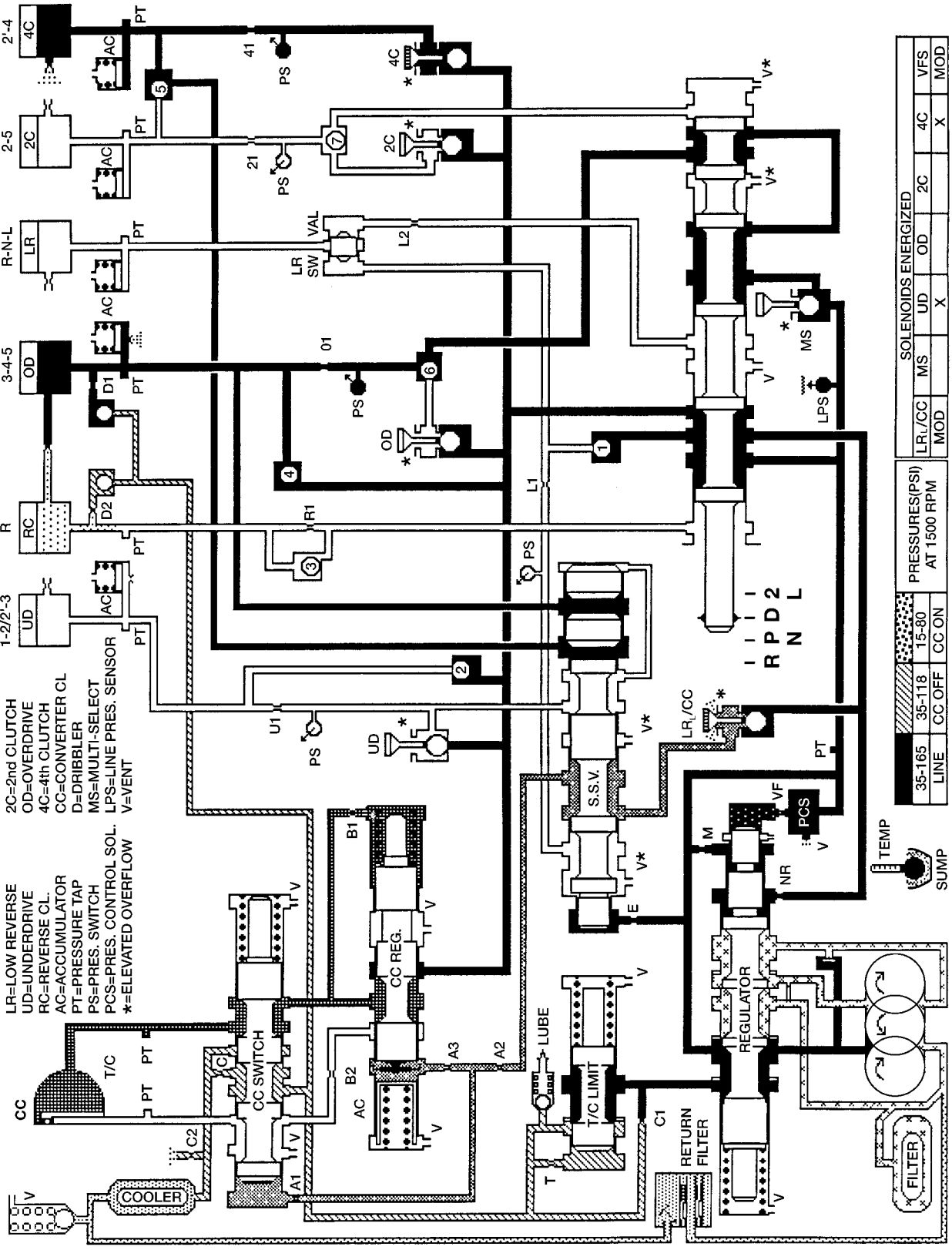


HYDRAULIC FLOW IN DIRECT GEAR EMCC

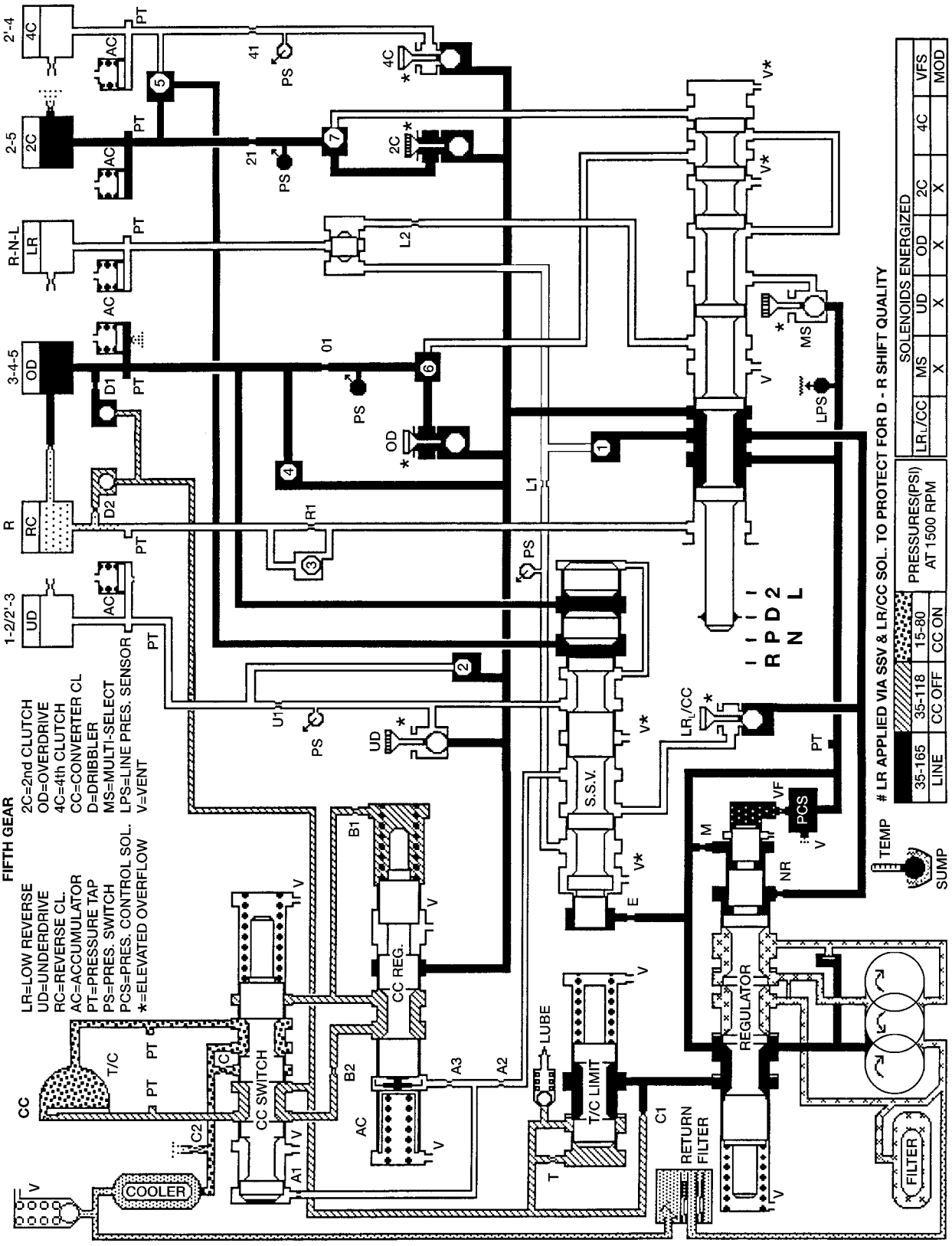
AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



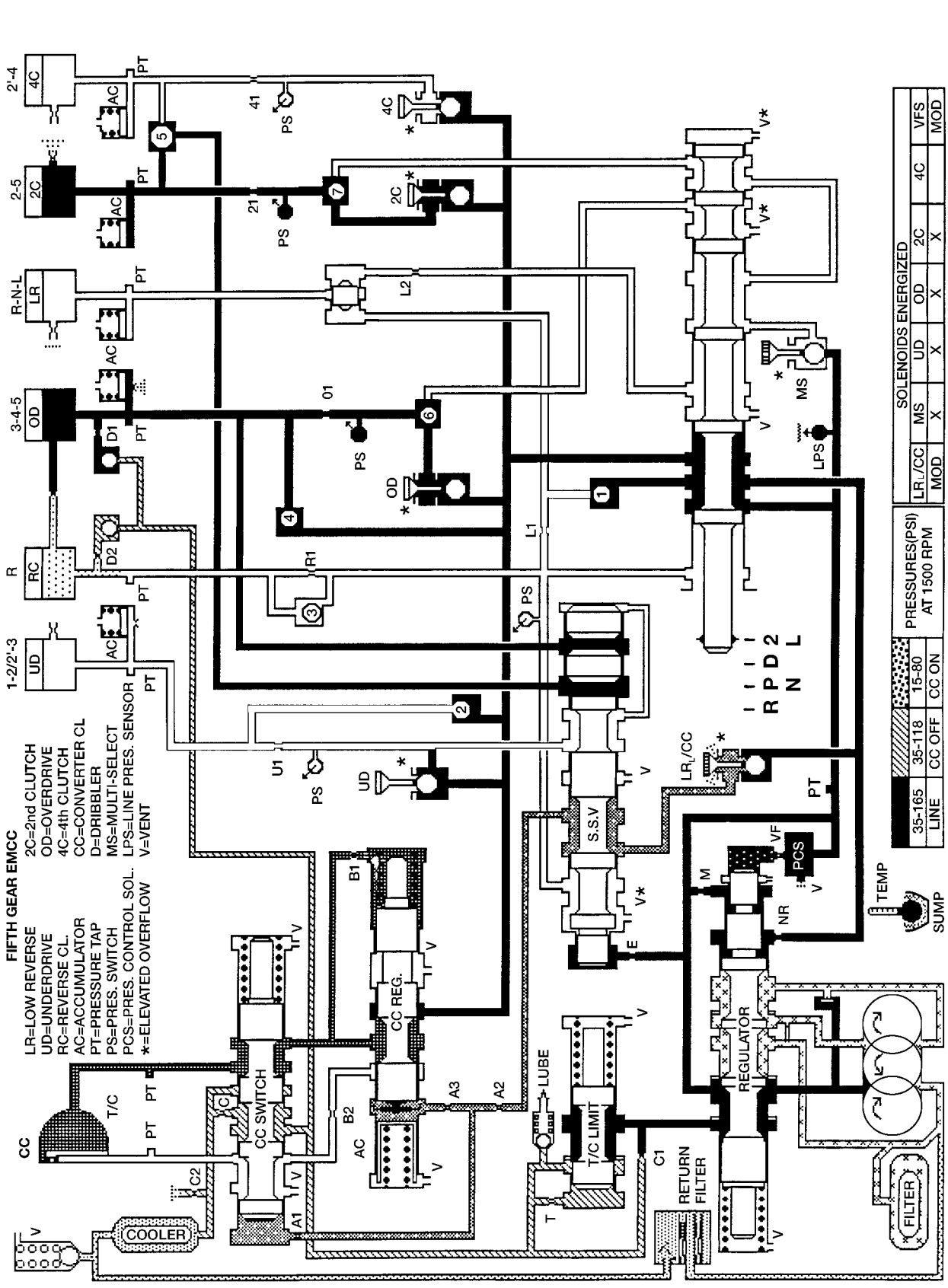
AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

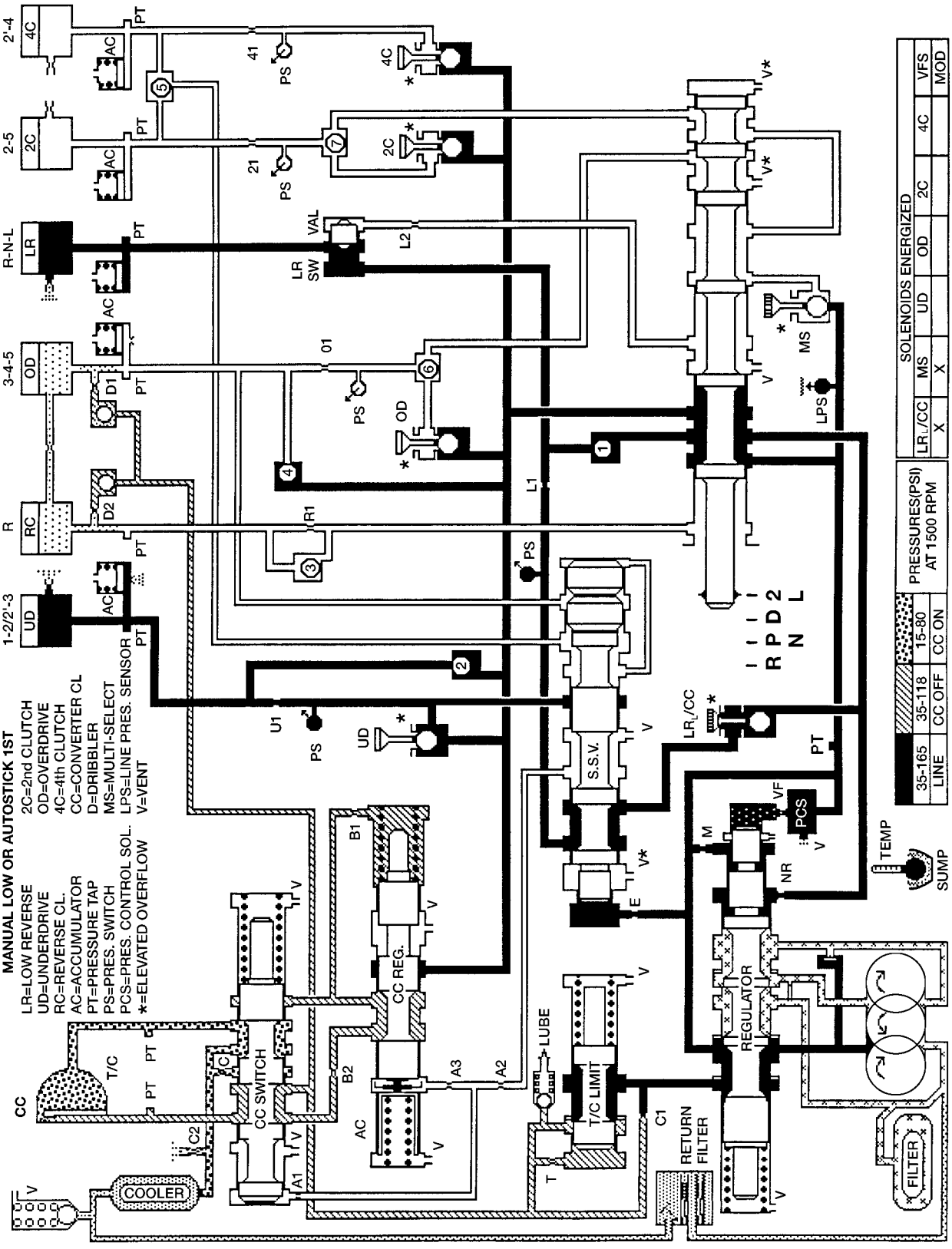


AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



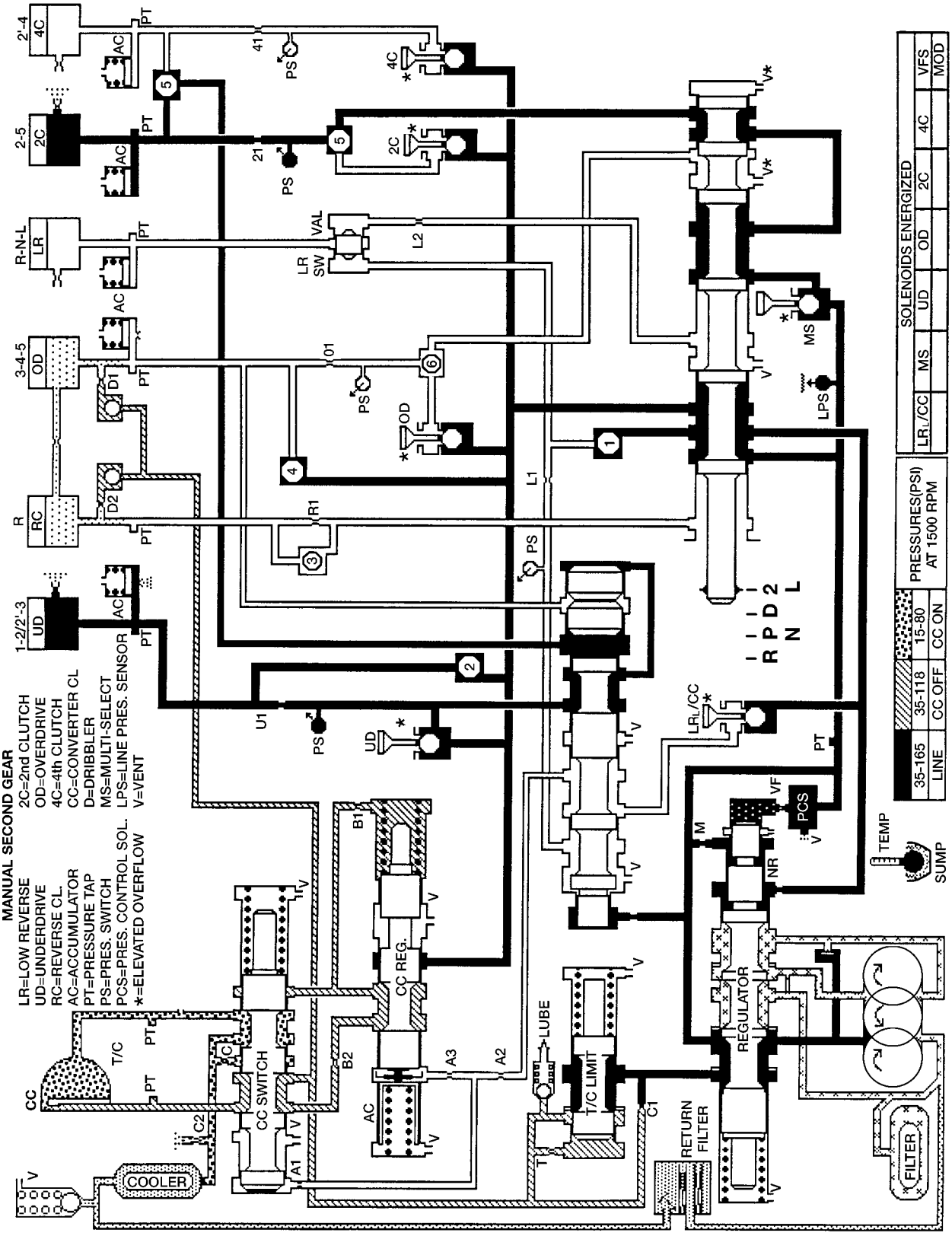
HYDRAULIC FLOW IN FIFTH EMCC

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



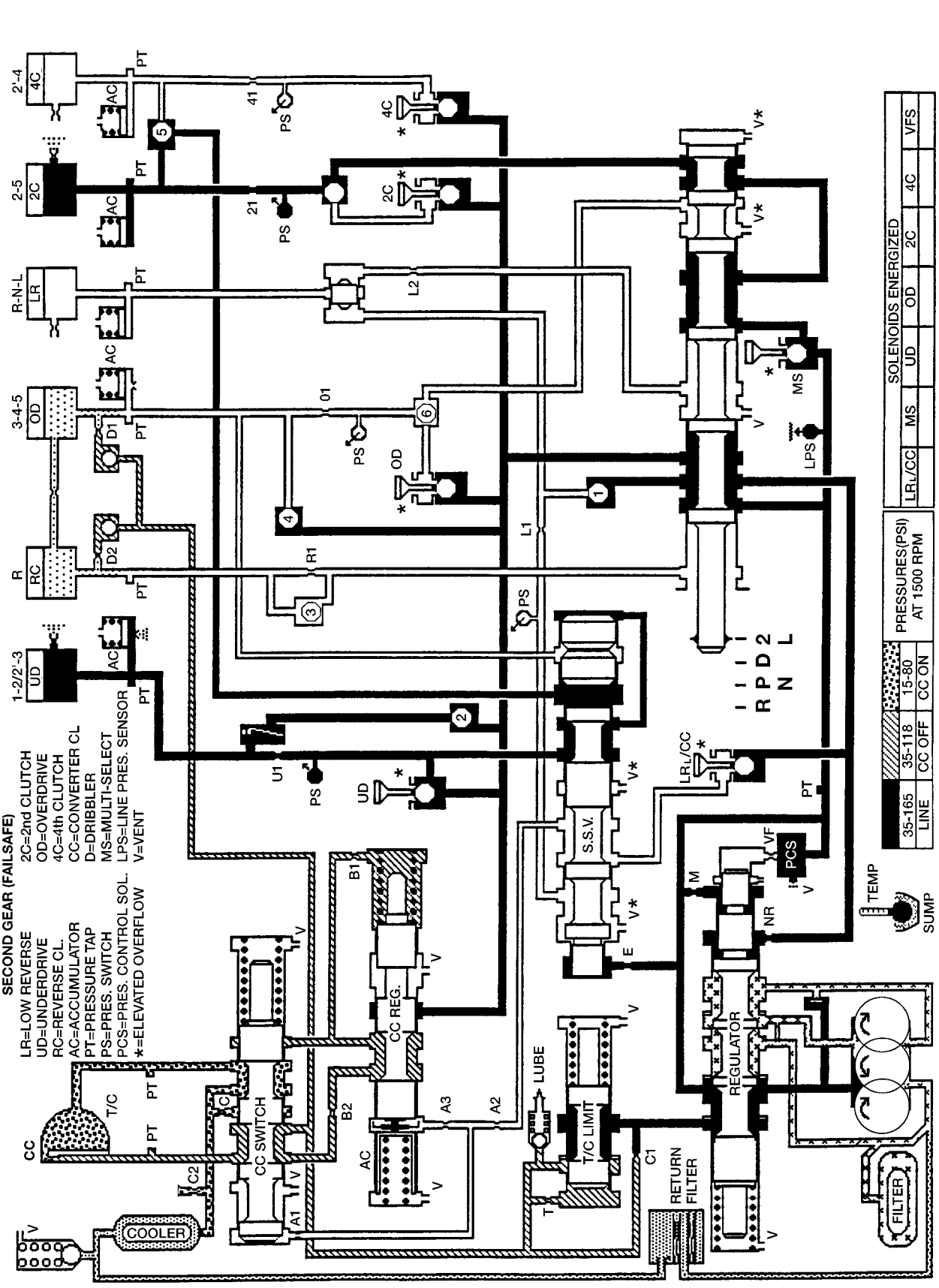
HYDRAULIC FLOW IN MANUAL LOW OR AUTOSTICK 1ST

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



HYDRAULIC FLOW IN MANUAL SECOND

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



HYDRAULIC FLOW IN MANUAL SECOND (FAILSAFE)

AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

SPECIFICATIONS

TRANSMISSION

GENERAL

Component	Metric	Inch
Output Shaft End Play	0.22-0.55 mm	0.009-0.021 in.
Input Shaft End Play	0.46-0.89 mm	0.018-0.035 in.
2C Clutch Pack Clearance	0.455-1.335 mm	0.018-0.053 in.
4C Clutch Pack Clearance	0.770-1.390 mm	0.030-0.055 in.
L/R Clutch Pack Clearance	1.00-1.74 mm	0.039-0.069 in.
OD Clutch Pack Clearance	1.103-1.856 mm	0.043-0.073 in.
UD Clutch Pack Clearance	0.84-1.54 mm	0.033-0.061 in.
Reverse Clutch Pack Clearance	0.81-1.24 mm	0.032-0.049 in.
Recommended fluid	Mopar® ATF +4	

GEAR RATIOS

1ST	3.00:1
2ND	1.67:1
2ND Prime	1.50:1
3RD	1.0:1
4TH	0.75:1
5TH	0.67:1
REVERSE	3.00:1

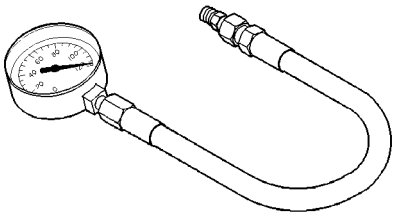
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Fitting, cooler line at trans	17.5	-	155
Bolt, torque convertor	31	23	-
Bolt/nut, crossmember	68	50	-
Bolt, driveplate to crankshaft	75	55	-
Bolt, oil pan	11.8	-	105
Screw, primary fluid filter	4.5	-	40
Bolt, oil pump	28.2	-	250
Bolt, oil pump body to cover	4.5	-	40
Screw, plate to oil pump body	4.5	-	40
Bolt, valve body to case	11.8	-	105
Plug, pressure test port	5.1	-	45
Bolt, reaction shaft support	11.8	-	105
Screw, valve body to transfer plate	5.6	-	50
Screw, solenoid module to transfer plate	5.7	-	50
Screw, accumulator cover	4.5	-	40
Screw, detent spring	4.5	-	40
Bolt, input speed sensor	11.8	-	105
Bolt, output speed sensor	11.8	-	105
Bolt, line pressure sensor	11.8	-	105
Bolt, extension housing	54	40	-
Valve, cooler return filter bypass	4.5	-	40
Screw, manual valve cam retaining	4.5	-	40
Bolt, manual lever	28.2	-	250

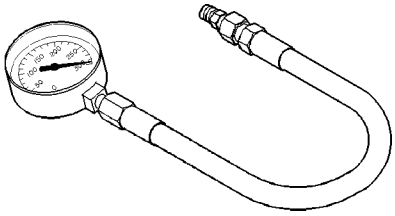
AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)

SPECIAL TOOLS

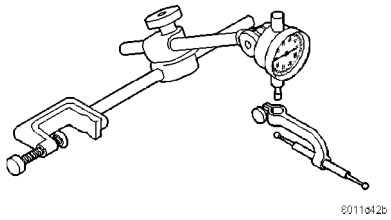
RFE TRANSMISSION



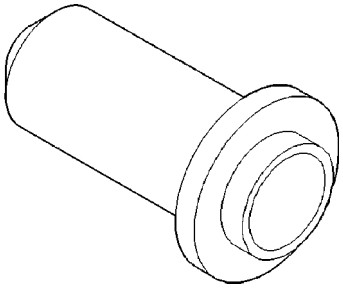
Gauge, Oil Pressure - C-3292



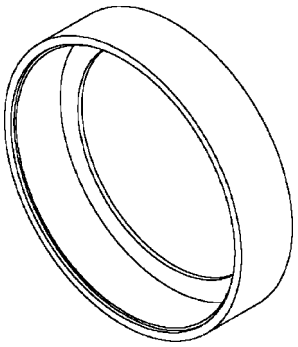
Gauge, Oil Pressure - C-3293SP



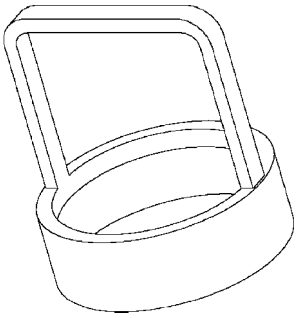
Dial Indicator - C-3339



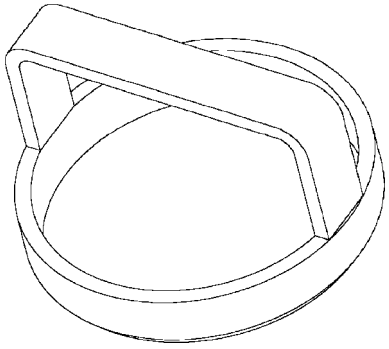
Installer, Seal - C-3860-A



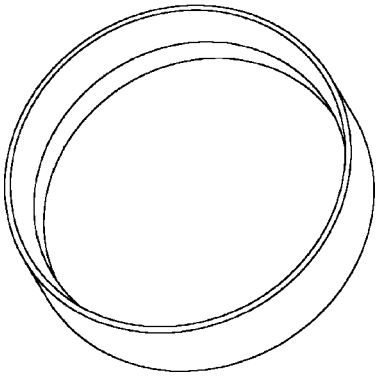
Compressor, Spring - 8249



Compressor, Spring - 8250

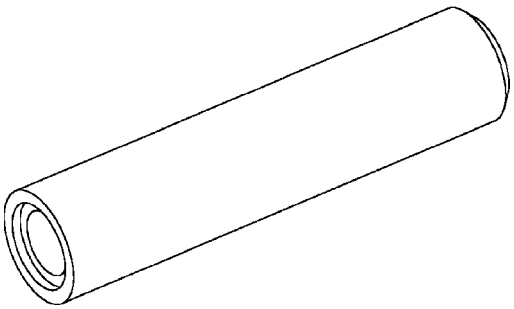


Compressor, Spring - 8251

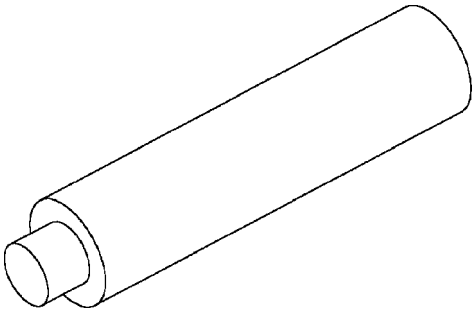


Installer, Piston - 8252

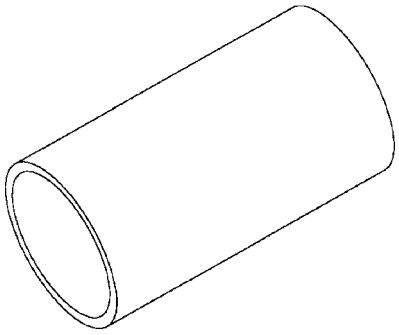
AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



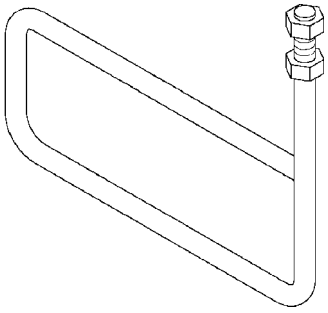
Installer, Seal - 8253



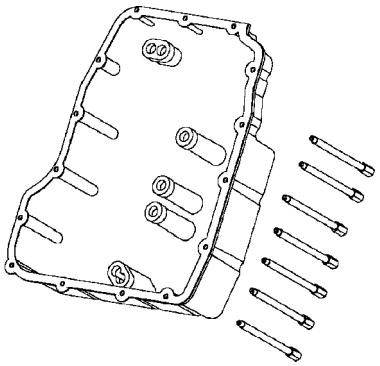
Installer, Seal - 8254



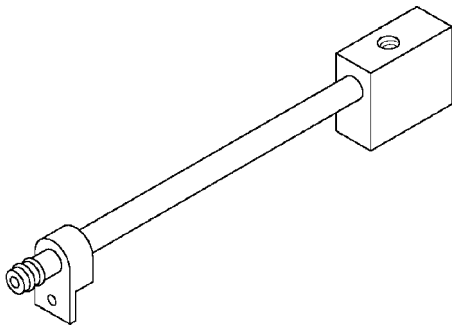
Installer, Snap-ring - 8255



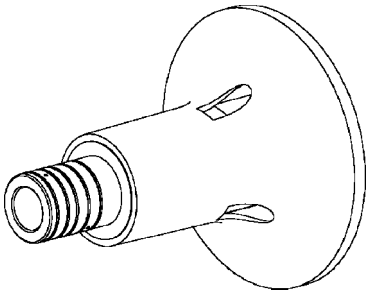
Stand, Support - 8257



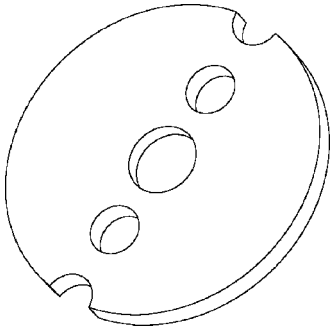
Adapter, Pressure Tap - 8258-A



Adapter, Line Pressure - 8259

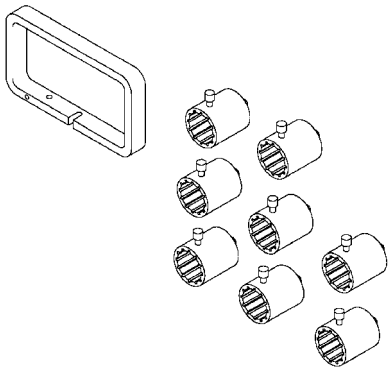


Fixture, Input Clutch Pressure - 8260

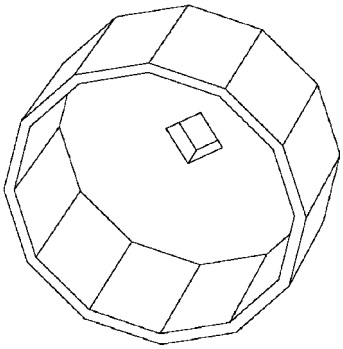


Plate, Alignment - 8261

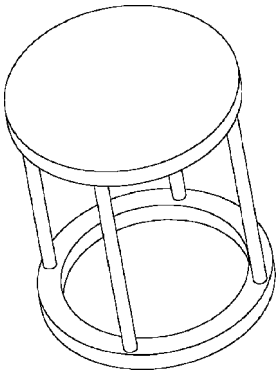
AUTOMATIC TRANSMISSION - 45RFE/545RFE (Continued)



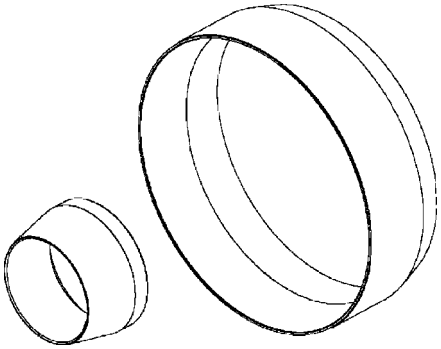
End Play Set - 8266



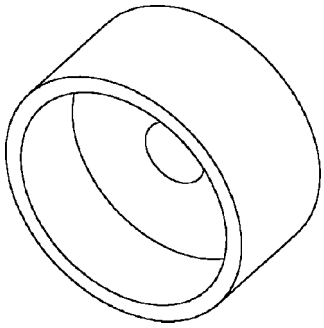
Wrench, Filter - 8321



Compressor, Spring - 8285



Installer, Piston - 8504



Installer, Bearing - 8320

4C RETAINER/BULKHEAD

DISASSEMBLY

(1) Remove the 2C piston belleville spring snap-ring from the 4C retainer /bulkhead (Fig. 60).

(2) Remove the 2C piston Belleville spring from the retainer/bulkhead (Fig. 60).

(3) Remove the 2C piston from the retainer/bulkhead. Use 20 psi of air pressure to remove the piston if necessary.

(4) Remove the 4C clutch snap-ring from the retainer/bulkhead (Fig. 60).

(5) Remove the 4C clutch pack from the retainer/bulkhead (Fig. 60).

(6) Using Spring Compressor 8250 and a suitable shop press, compress the 4C piston return spring and remove the snap-ring (Fig. 60).

(7) Remove the 4C piston return spring and piston from the retainer/bulkhead (Fig. 60). Use 20 psi of air pressure to remove the piston if necessary.

ASSEMBLY

(1) Clean and inspect all components. Replace any components which show evidence of excessive wear or scoring.

(2) Install new seals on the 2C and 4C pistons (Fig. 60).

(3) Lubricate all seals with Mopar® ATF +4 prior to installation.

(4) Install the 4C piston into the 4C retainer/bulkhead (Fig. 60).

(5) Position the 4C piston return spring onto the 4C piston.

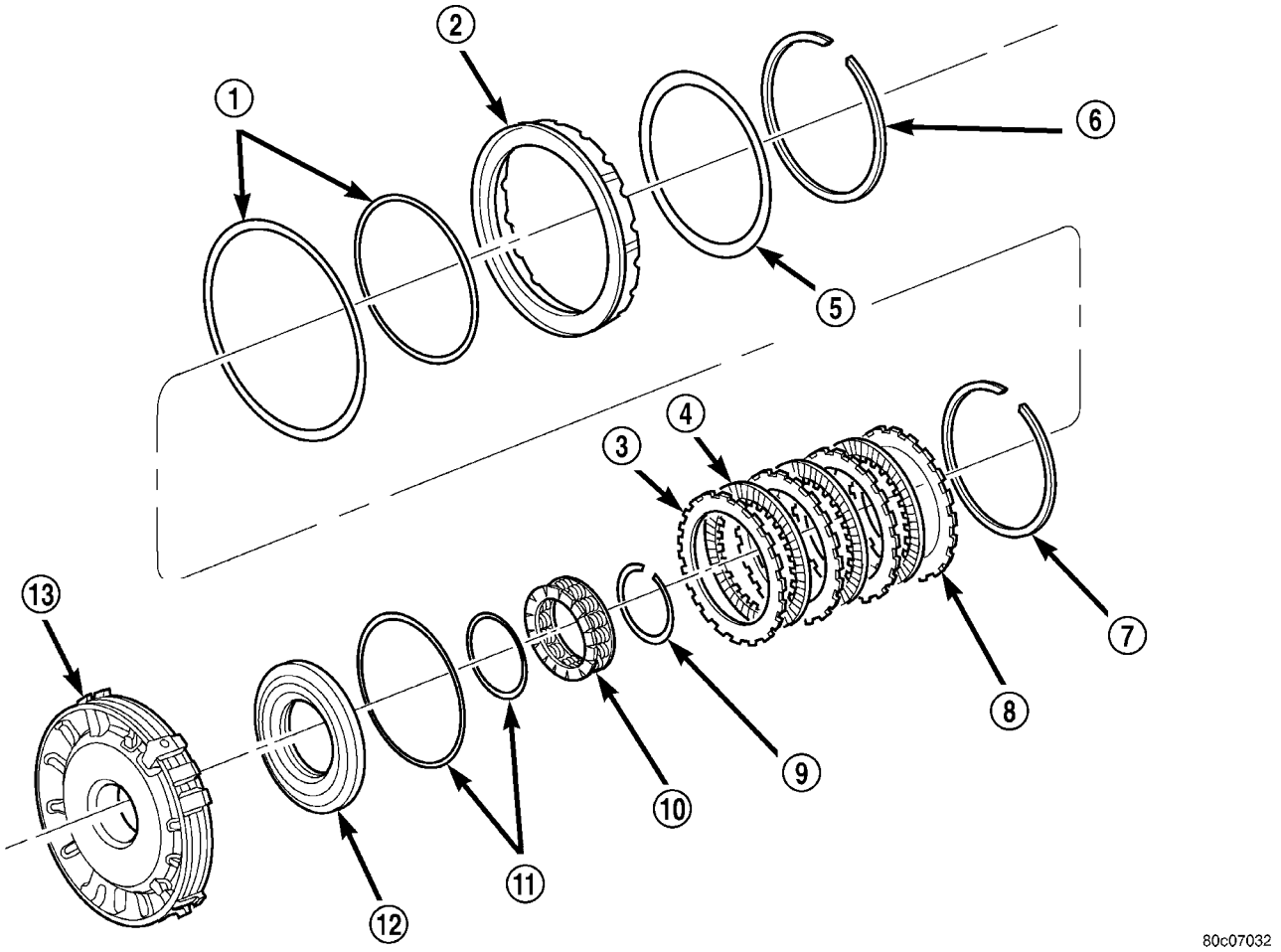


Fig. 60 4C Retainer/Bulkhead Components

1 - SEAL
2 - 2C PISTON
3 - PLATE
4 - DISC
5 - 2C BELLEVILLE SPRING
6 - SNAP-RING
7 - SNAP-RING (SELECT)
8 - REACTION PLATE
9 - SNAP-RING
10 - RETURN SPRING
11 - SEAL
12 - 4C PISTON
13 - 4C RETAINER/BULKHEAD

4C RETAINER/BULKHEAD (Continued)

(6) Using Spring Compressor 8250 and a suitable shop press, compress the 4C piston return spring and install the snap-ring (Fig. 61).

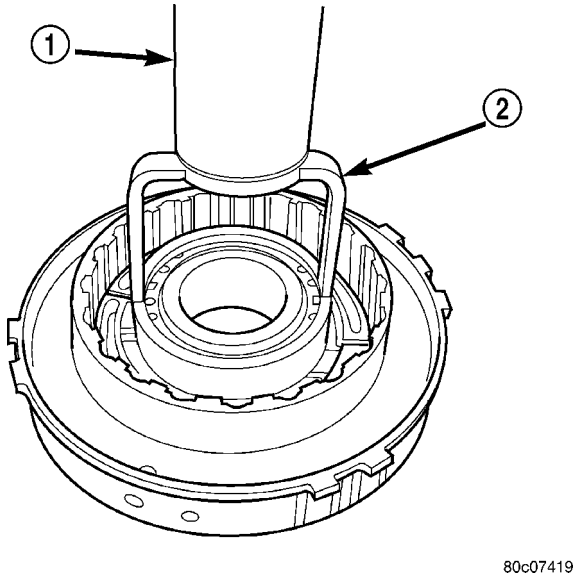


Fig. 61 Compress 4C Piston Return Spring Using Tool 8250

1 - PRESS
2 - TOOL 8250

(7) Assemble and install the 4C clutch pack into the retainer/bulkhead (Fig. 60) with the steel separator plate against the piston.

(8) Install the 4C reaction plate and snap-ring into the retainer/bulkhead (Fig. 60). The 4C reaction plate is non-directional.

(9) Measure the 4C clutch clearance. The correct clutch clearance is 0.77-1.39 mm (0.030-0.055 in.). The snap-ring is selectable. Install the chosen snap-ring and re-measure to verify the selection.

(10) Install the 2C piston into the retainer/bulkhead (Fig. 60).

(11) Position the 2C Belleville spring onto the 2C piston.

(12) Position the 2C Belleville spring snap-ring onto the 2C Belleville spring (Fig. 60).

(13) Using Spring Compressor 8249 and a suitable shop press (Fig. 62), compress the belleville spring until the snap-ring is engaged with the snap-ring groove in the retainer/bulkhead.

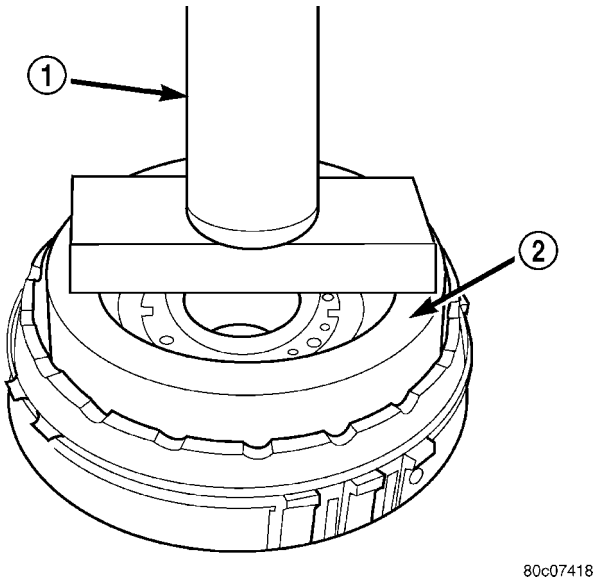


Fig. 62 Compress 2C Belleville Spring Using Tool 8249

1 - PRESS
2 - TOOL 8249

ADAPTER HOUSING SEAL

REMOVAL

(1) Remove the transfer case from the transmission.

(2) Using a screw mounted on a slide hammer, remove the adapter housing seal.

INSTALLATION

(1) Clean the adapter seal bore in the adapter housing of any residue or particles remaining from the original seal.

(2) Install new oil seal in the adapter housing using Seal Installer C-3860-A (Fig. 63). A properly installed seal is flush to the face of the seal bore.

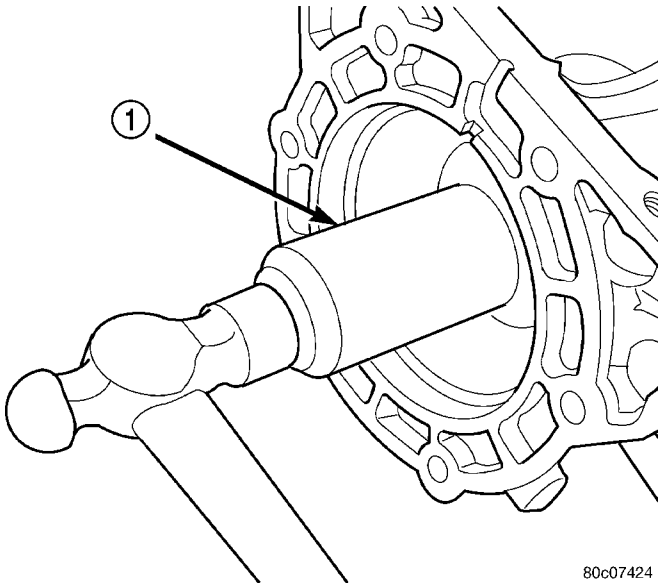


Fig. 63 Adapter Housing Seal Installation

1 - TOOL C-3860-A

(3) Install the transfer case onto the transmission.

BRAKE TRANSMISSION SHIFT INTERLOCK SYSTEM

DESCRIPTION

The Brake Transmission Shifter Interlock (BTSI) (Fig. 64), is a solenoid operated system. It consists of a solenoid permanently mounted on the gearshift cable.

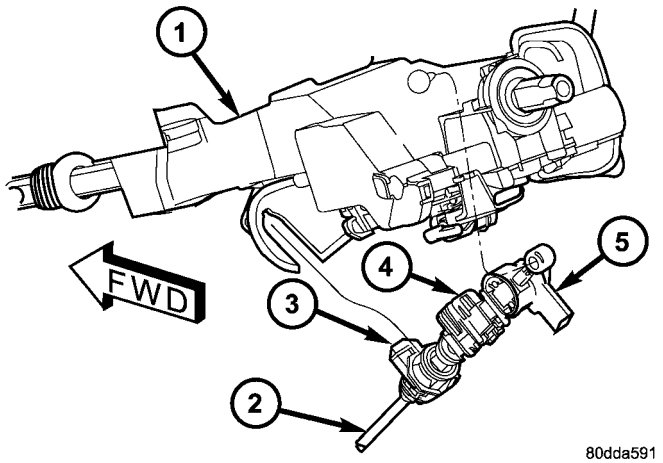


Fig. 64 Brake Transmission Interlock Mechanism

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

OPERATION

The system locks the shifter into the PARK position. The interlock system is engaged whenever the ignition switch is in the LOCK or ACCESSORY position. An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed approximately one-half an inch. A magnetic holding device in line with the park lock cable is energized when the ignition is in the RUN position. When the key is in the RUN position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK or ACCESSORY position, unless the shifter is fully locked into the PARK position.

DIAGNOSIS AND TESTING - BRAKE TRANSMISSION SHIFT INTERLOCK

(1) Verify that the key can only be removed in the PARK position

(2) When the shift lever is in PARK And the shift handle pushbutton is in the “OUT” position, the ignition key cylinder should rotate freely from OFF to LOCK. When the shifter is in any other gear or neutral position, the ignition key cylinder should not rotate to the LOCK position.

(3) Shifting out of PARK should not be possible when the ignition key cylinder is in the OFF position.

(4) Shifting out of PARK should not be possible while applying normal pushbutton force and ignition key cylinder is in the RUN or START positions unless the foot brake pedal is depressed approximately 1/2 inch (12mm).

(5) Shifting out of PARK should not be possible when the ignition key cylinder is in the ACCESSORY or LOCK positions.

(6) Shifting between any gears, NEUTRAL or into PARK may be done without depressing foot brake pedal with ignition switch in RUN or START positions.

ADJUSTMENTS - BRAKE TRANSMISSION SHIFT INTERLOCK

Correct cable adjustment is important to proper interlock operation. The gearshift cable must be correctly adjusted in order to shift out of PARK.

ADJUSTMENT PROCEDURE

(1) Remove the steering column trim as necessary for access to the brake transmission shift interlock.

(2) Shift the transmission into the PARK position.

(3) Pull upward on both the BTSI lock tab and the gearshift cable lock tab (Fig. 65).

(4) Verify that the shift lever is in the PARK position.

(5) Verify positive engagement of the transmission park lock by attempting to rotate the propeller shaft. The shaft will not rotate when the park lock is engaged.

(6) Turn ignition switch to LOCK position. **Be sure ignition key cylinder is in the LOCK position. Cable will not adjust correctly in any other position.**

(7) Ensure that the cable is free to self-adjust by pushing cable rearward and releasing.

(8) Push the gearshift cable lock tab down until it snaps in place.

(9) Locate the BTSI alignment hole in the bottom of the BTSI mechanism between the BTSI lock tab and the BTSI connector.

(10) Move the BTSI assembly up or down on the gearshift cable until an appropriate size drill bit can be inserted into the alignment hole and through the assembly.

(11) Push the BTSI lock tab down until it snaps into place and remove the drill bit.

(12) Install any steering column trim previously removed.

BRAKE TRANSMISSION SHIFT INTERLOCK SYSTEM (Continued)

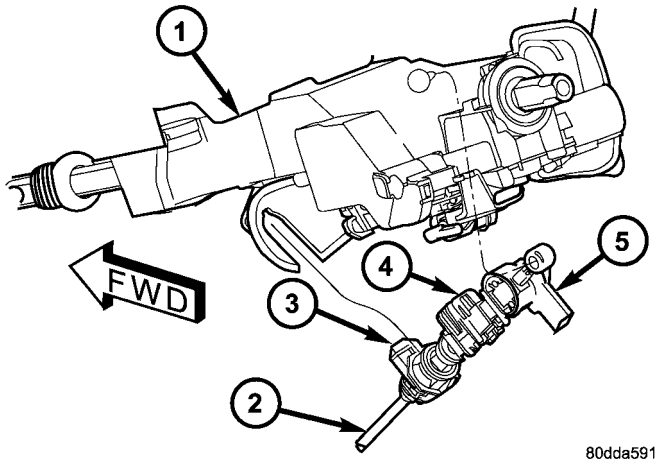


Fig. 65 Brake Transmission Interlock Mechanism

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

BTSI FUNCTION CHECK

(1) Verify removal of ignition key allowed in PARK position only.

(2) When the shift lever is in PARK, the ignition key cylinder should rotate freely from off to lock. When the shifter is in any other position, the ignition key should not rotate from off to lock.

(3) Shifting out of PARK should be possible when the ignition key cylinder is in the off position.

(4) Shifting out of PARK should not be possible while applying normal force, and ignition key cylinder is in the run or start positions, unless the foot brake pedal is depressed approximately 1/2 inch (12mm).

(5) Shifting out of PARK should not be possible when the ignition key cylinder is in the accessory or lock position.

(6) Shifting between any gear and NEUTRAL, or PARK, may be done without depressing foot brake with ignition switch in run or start positions.

(7) Engine starts must be possible with shifter lever in PARK or NEUTRAL positions only. Engine starts must not be possible in any position other than PARK or NEUTRAL.

(8) With shifter lever in the:

- PARK position - Apply upward force on the shift arm and remove pressure. Engine starts must be possible.
- PARK position - Apply downward force on the shift arm and remove pressure. Engine starts must be possible.
- NEUTRAL position - Normal position. Engine starts must be possible.
- NEUTRAL position - Engine running and brakes applied, apply upward force on the shift arm. Transmission shall not be able to shift from neutral to reverse.

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 three primary causes.

(1) Internal clutch slippage, usually caused by low line pressure, inadequate clutch apply pressure, or clutch seal failure.

(2) 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.

(3) 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

FLUID AND FILTER (Continued)

- internal failure that generates debris
- overheat that generates sludge (fluid breakdown)
- 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 torque converter should 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.

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.

The torque converter fills in both the P (PARK) and N (NEUTRAL) positions. Place the selector lever in P (PARK) to be sure that the fluid level check is accurate. **The engine should be running at idle speed for at least one minute, with the vehicle on level ground.** At normal operating temperature (approximately 82 C. or 180 F.), the fluid level is correct if it is in the HOT region (cross-hatched area) on the oil level indicator. The fluid level will be approximately at the upper COLD hole of the dipstick at 70° F fluid temperature.

NOTE: Engine and Transmission should be at normal operating temperature before performing this procedure.

(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 transmission.
(6) Select sensors.
(7) Read the transmission temperature value.
(8) Compare the fluid temperature value with the chart. (Fig. 66)
(9) Adjust transmission fluid level shown on the dipstick according to the chart.

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).

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.
(4) Loosen bolts holding rear of pan to transmission.
(5) Slowly separate front of pan away from transmission allowing the fluid to drain into drain pan.
(6) Hold up pan and remove remaining bolts holding pan to transmission.
(7) While holding pan level, lower pan away from transmission.
(8) Pour remaining fluid in pan into drain pan.
(9) Remove screw holding filter to valve body (Fig. 67).

FLUID AND FILTER (Continued)

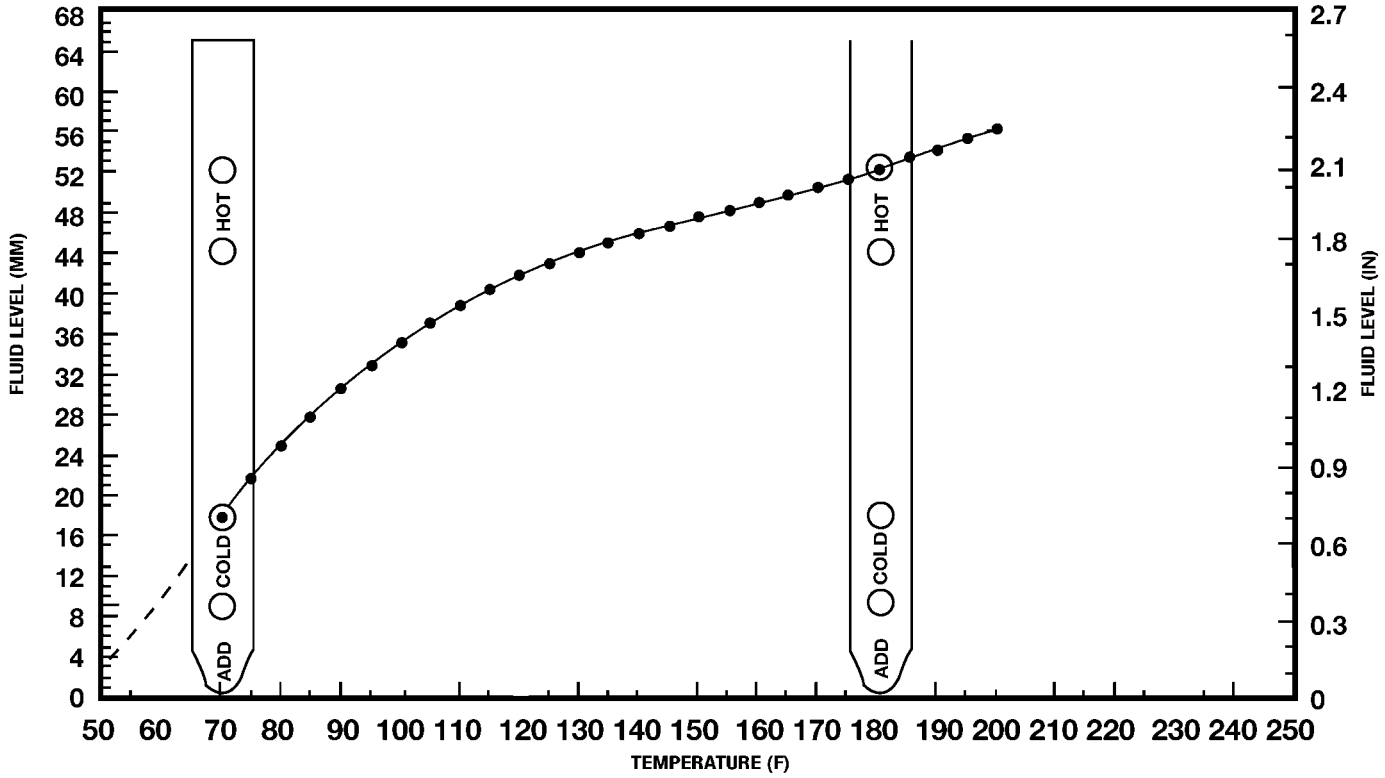


Fig. 66 Transmission Fluid Temperature Chart

(10) Separate filter from valve body and oil pump and pour fluid in filter into drain pan.

(11) Remove and discard the oil filter seal from the bottom of the oil pump.

(12) If replacing the cooler return filter, use Oil Filter Wrench 8321 to remove the filter from the transmission.

(13) Dispose of used trans fluid and filter(s) properly.

INSPECTION

Inspect bottom of pan and magnet for excessive amounts of metal. A light coating of clutch material on the bottom of the pan does not indicate a problem unless accompanied by a slipping condition or shift lag. If fluid and pan are contaminated with excessive amounts of debris, refer to the diagnosis section of this group.

CLEANING

(1) Using a suitable solvent, clean pan and magnet.

(2) Using a suitable gasket scraper, clean original sealing material from surface of transmission case and the transmission pan.

INSTALLATION

(1) Install a new primary oil filter seal in the oil pump inlet bore. Seat the seal in the bore with the butt end of a hammer, or other suitable tool.

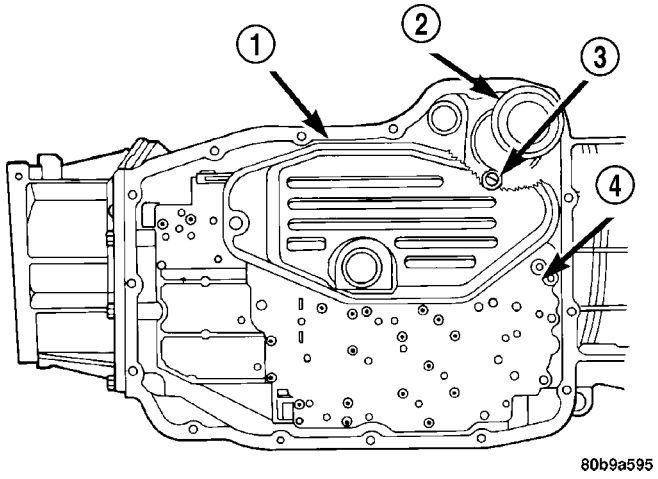


Fig. 67 Transmission Filters - 4X4 Shown

1 - PRIMARY OIL FILTER
2 - COOLER RETURN FILTER
3 - COOLER RETURN FILTER BYPASS VALVE
4 - VALVE BODY

CAUTION: The primary oil filter seal MUST be fully installed flush against the oil pump body. DO NOT install the seal onto the filter neck and attempt to install the filter and seal as an assembly. Damage to the transmission will result.

FLUID AND FILTER (Continued)

(2) Place replacement filter in position on valve body and into the oil pump.

(3) Install screw to hold filter to valve body (Fig. 67). Tighten screw to 4.5 N·m (40 in. lbs.) torque.

(4) Install new cooler return filter onto the transmission, if necessary. Torque the filter to 14.12 N·m (125 in.lbs.).

(5) Place bead of Mopar® RTV sealant onto the transmission case sealing surface.

(6) Place pan in position on transmission.

(7) Install bolts to hold pan to transmission. Tighten bolts to 11.8 N·m (105 in. lbs.) torque.

(8) Lower vehicle and fill transmission with Mopar® ATF +4.

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 to transmission:

(a) If only fluid and filter were changed, add **10 pints (5 quarts)** of ATF +4 to transmission.

(b) If transmission was completely overhauled and the torque converter was replaced or drained, add **24 pints (12 quarts)** of ATF +4 to transmission.

(3) Check the transmission fluid (Refer to 21 - TRANSMISSION/AUTOMATIC - RFE/FLUID - STANDARD PROCEDURE) and adjust as required.

GEARSHIFT CABLE

DIAGNOSIS AND TESTING - GEARSHIFT CABLE

(1) Engine starts must be possible with shift lever in PARK or NEUTRAL positions only. Engine starts must not be possible in any other gear position.

(2) With the shift lever in the:

(a) PARK position - Apply upward force on the shift arm and remove pressure. Engine starts must be possible.

(b) PARK position - Apply downward force on the shift arm and remove pressure. Engine starts must be possible.

(c) NEUTRAL position - Normal position. Engine starts must be possible.

(d) NEUTRAL position - Engine running and brakes applied, apply upward force on the shift arm. Transmission shall not be able to shift from neutral to reverse.

REMOVAL

(1) Shift transmission into PARK.

(2) Raise vehicle.

(3) Disengage cable eyelet at transmission shift lever and pull cable adjuster out of mounting bracket (Fig. 68) or (Fig. 69).

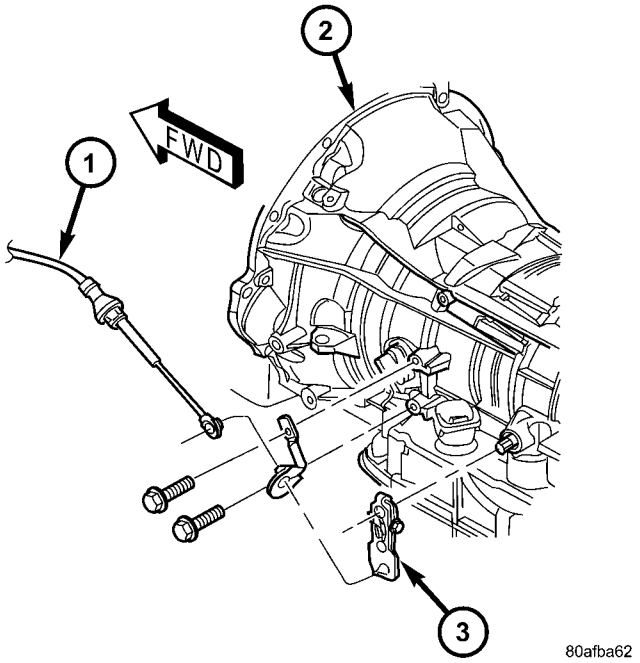


Fig. 68 Gearshift Cable at Transmission - RFE

1 - GEARSHIFT CABLE
2 - RFE TRANSMISSION
3 - MANUAL LEVER

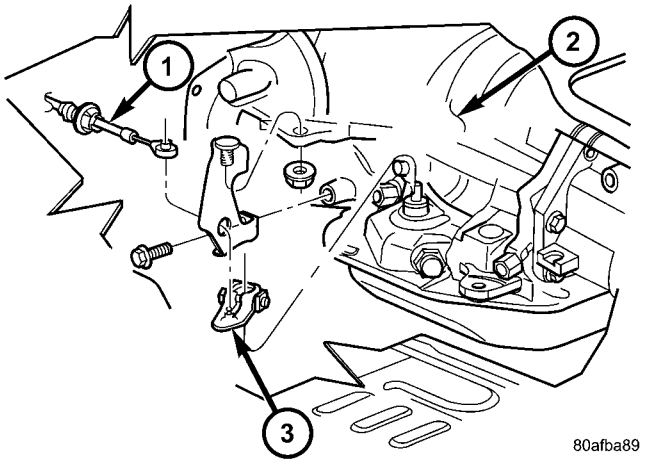


Fig. 69 Gearshift Cable at Transmission - RE

1 - GEARSHIFT CABLE
2 - RE TRANSMISSION
3 - MANUAL LEVER

GEARSHIFT CABLE (Continued)

(4) Lower the vehicle.

(5) Remove the dash panel insulation pad as necessary to access the gearshift cable grommet (Fig. 70).

(6) Remove grommet from the dash panel.

(7) Remove any steering column trim necessary to access the gearshift cable and BTSI mechanism.

(8) Disconnect the BTSI wiring connector.

(9) Disconnect cable at lower column bracket and shift lever pin and pull the cable through the dash panel opening into the vehicle (Fig. 71).

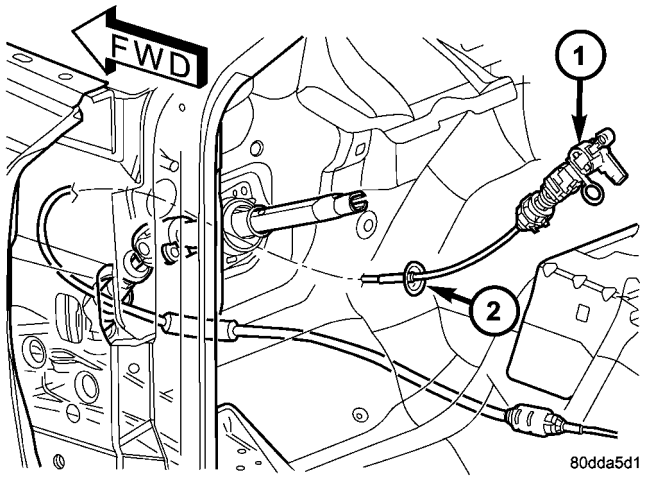


Fig. 70 Gearshift Cable at the Dash Panel

1 - GEARSHIFT CABLE
2 - GROMMET

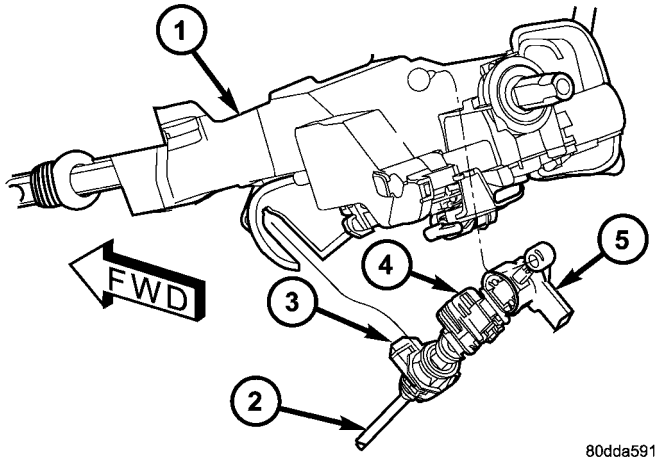


Fig. 71 Gearshift Cable at Steering Column

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

(10) Remove gearshift cable from vehicle.

INSTALLATION

(1) Route the transmission end of the gearshift cable through the opening in the dash panel (Fig. 72).

(2) Seat the cable grommet into the dash panel opening.

(3) Snap the cable into the steering column bracket so the retaining ears (Fig. 73) are engaged and snap the cable eyelet onto the shift lever ball stud.

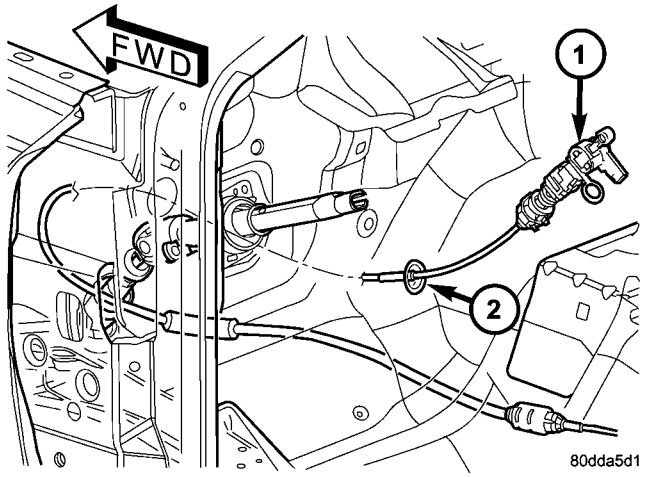


Fig. 72 Gearshift Cable at the Dash Panel

1 - GEARSHIFT CABLE
2 - GROMMET

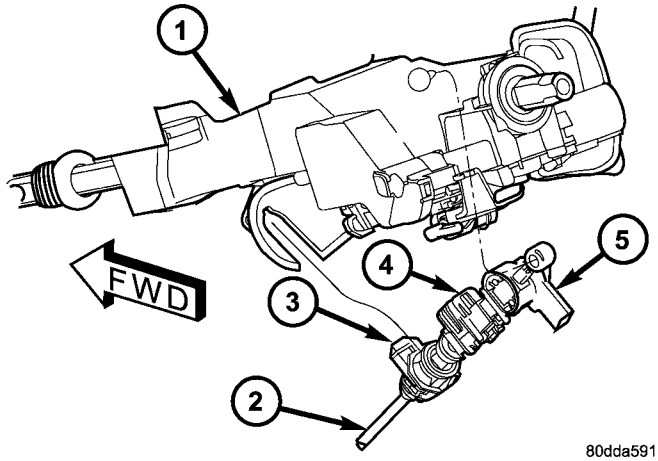


Fig. 73 Gearshift Cable at Steering Column

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

GEARSHIFT CABLE (Continued)

(4) Raise the vehicle.

(5) Place the transmission manual shift lever in the “PARK” detent (rearmost) position and rotate prop shaft to ensure transmission is in PARK.

(6) Route the gearshift cable through the transmission mounting bracket and secure the cable by snapping the cable retaining ears into the transmission bracket and snapping the cable eyelet on the manual shift lever ball stud.

(7) Lower vehicle.

(8) Lock the shift cable adjustment by pressing the cable adjuster lock tab downward until it snaps into place.

(9) Check for proper operation of the transmission range sensor.

(10) Adjust the gearshift cable and BTSI mechanism as necessary.

ADJUSTMENTS

GEARSHIFT CABLE

Check adjustment by starting the engine in PARK and NEUTRAL. Adjustment is CORRECT if the engine starts only in these positions. Adjustment is INCORRECT if the engine starts in one but not both positions. If the engine starts in any position other than PARK or NEUTRAL, or if the engine will not start at all, the transmission range sensor may be faulty.

Gearshift Adjustment Procedure

(1) Shift transmission into PARK.

(2) Release cable adjuster lock tab (underneath the steering column) (Fig. 74) to unlock cable.

(3) Raise vehicle.

(4) Disengage the cable eyelet from the transmission manual shift lever.

(5) Verify transmission shift lever is in PARK detent by moving lever fully rearward. Last rearward detent is PARK position.

(6) Verify positive engagement of transmission park lock by attempting to rotate propeller shaft. Shaft will not rotate when park lock is engaged.

(7) Snap the cable eyelet onto the transmission manual shift lever.

(8) Lower vehicle.

(9) Lock shift cable by pressing cable adjuster lock tab downward until it snaps into place.

(10) Check engine starting. Engine should start only in PARK and NEUTRAL

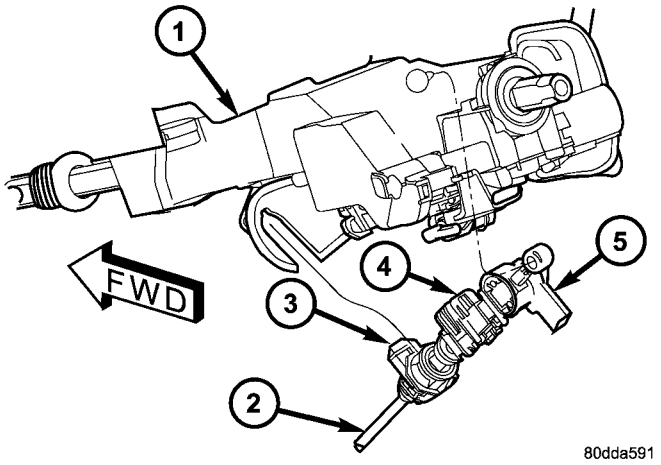


Fig. 74 Gearshift Cable at Steering Column

1 - STEERING COLUMN
2 - GEARSHIFT CABLE
3 - GEARSHIFT CABLE LOCK TAB
4 - BTSI SOLENOID LOCK TAB
5 - BTSI CONNECTOR

HOLDING CLUTCHES

DESCRIPTION

Three hydraulically applied multi-disc clutches are used to hold some planetary geartrain components stationary while the input clutches drive others. The 2C, 4C, and Low/Reverse clutches are considered holding clutches. The 2C and 4C clutches are located in the 4C retainer/bulkhead (Fig. 75), while the Low/Reverse clutch is located at the rear of the transmission case (Fig. 76).

OPERATION

2C CLUTCH

The 2C clutch is hydraulically applied in second and fifth gear by pressurized fluid against the 2C piston. When the 2C clutch is applied, the reverse sun gear assembly is held or grounded to the transmission case by holding the reaction planetary carrier.

HOLDING CLUTCHES (Continued)

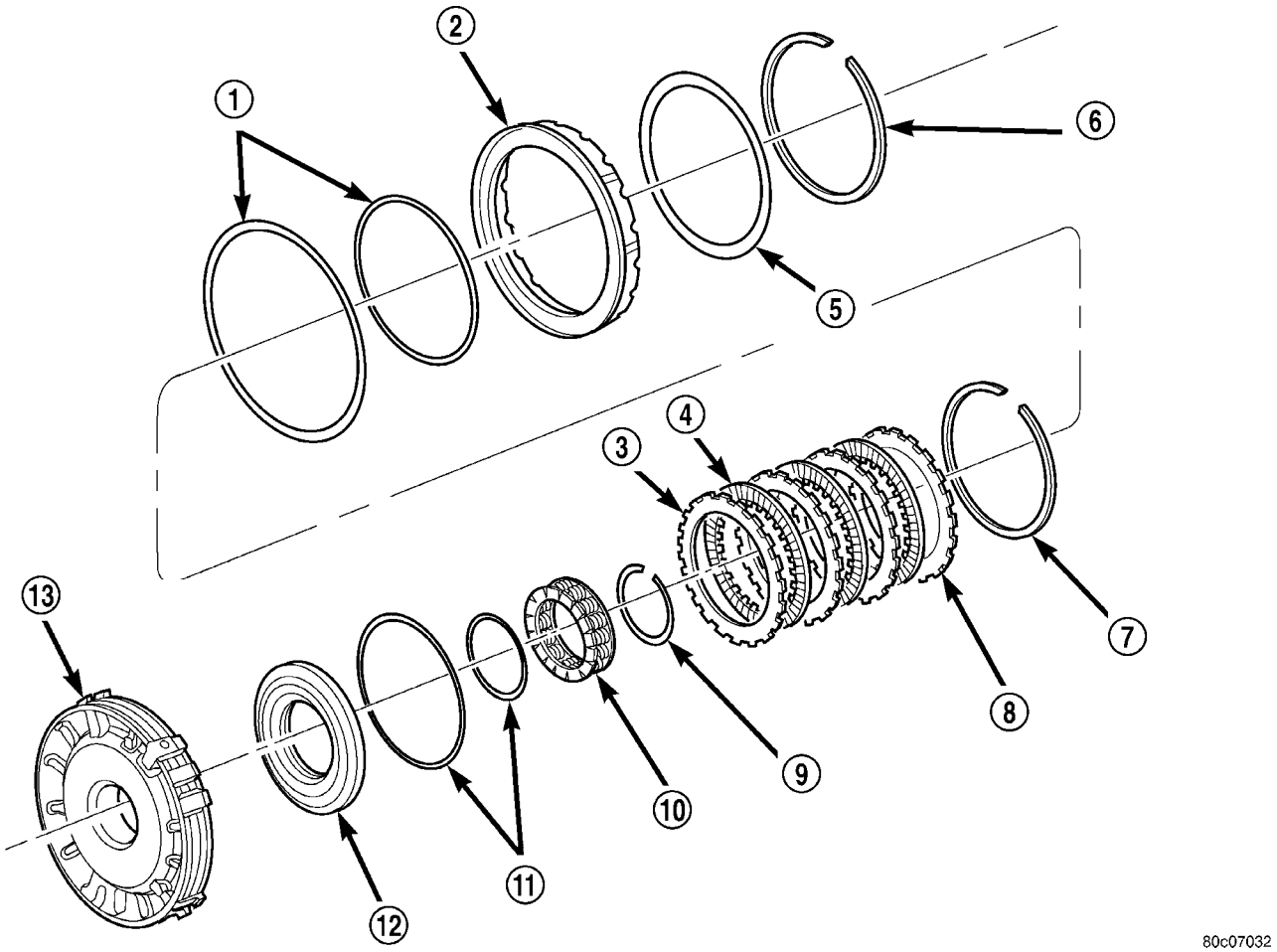


Fig. 75 2C and 4C Clutches

1 - SEAL
2 - 2C PISTON
3 - PLATE
4 - DISC
5 - 2C BELLEVILLE SPRING
6 - SNAP-RING
7 - SNAP-RING (SELECT)
8 - REACTION PLATE
9 - SNAP-RING
10 - RETURN SPRING
11 - SEAL
12 - 4C PISTON
13 - 4C RETAINER/BULKHEAD

4C CLUTCH

The 4C clutch is hydraulically applied in second prime and fourth gear by pressurized fluid against the 4C clutch piston. When the 4C clutch is applied, the reaction annulus gear is held or grounded to the transmission case.

LOW/REVERSE CLUTCH

The Low/Reverse clutch is hydraulically applied in park, reverse, neutral, and first gear, only at low speeds, by pressurized fluid against the Low/Reverse clutch piston. When the Low/Reverse clutch is applied, the input annulus assembly is held or grounded to the transmission case.

HOLDING CLUTCHES (Continued)

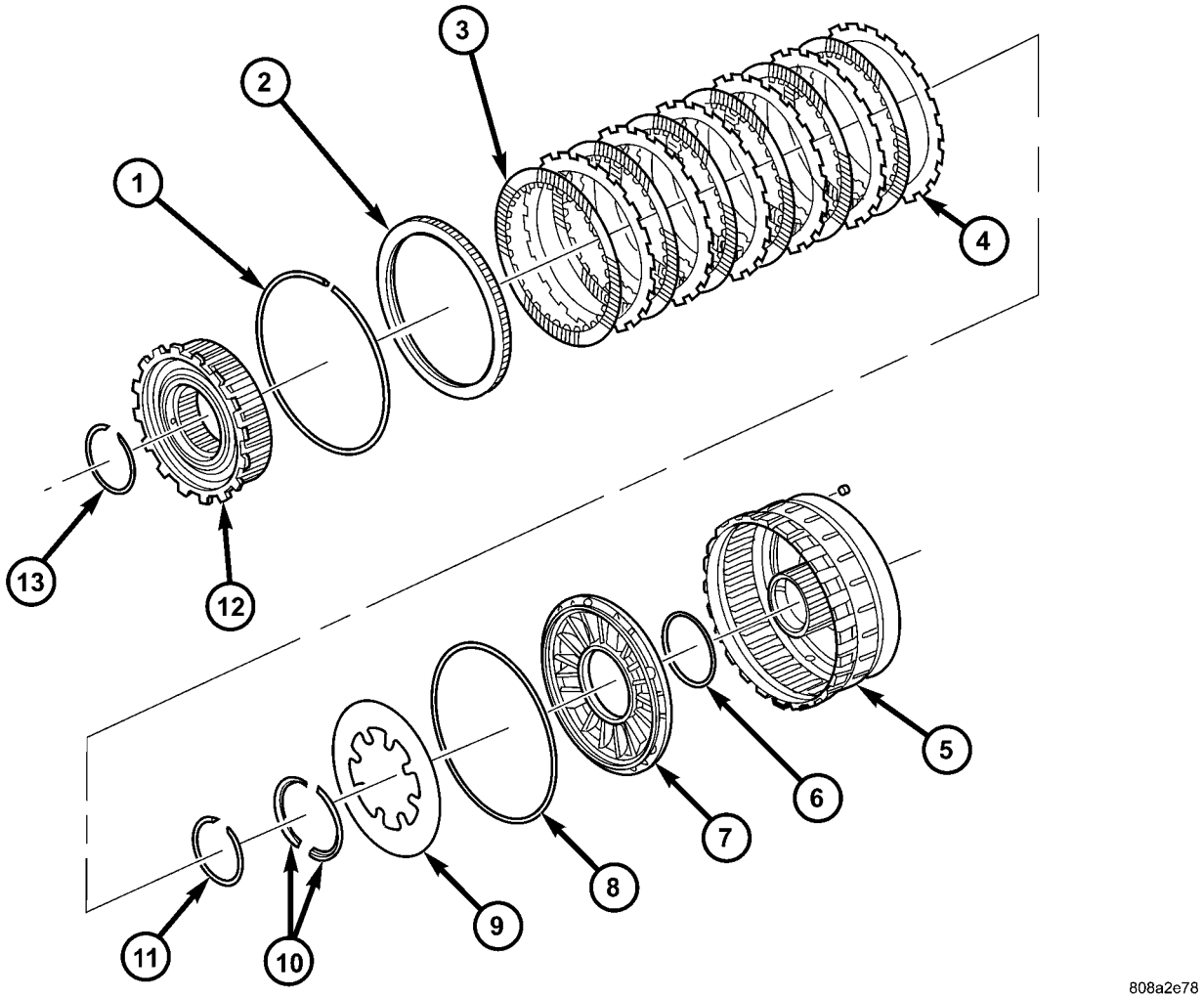


Fig. 76 Low/Reverse Clutch

1 - SNAP-RING (SELECT)
2 - REACTION PLATE
3 - DISC
4 - PLATE
5 - L/R CLUTCH RETAINER
6 - SEAL
7 - PISTON
8 - SEAL
9 - BELLEVILLE SPRING
10 - RETAINER
11 - SNAP-RING
12 - OVERRUNNING CLUTCH
13 - SNAP-RING

INPUT CLUTCH ASSEMBLY

DESCRIPTION

Three hydraulically applied input clutches are used to drive planetary components. The underdrive, overdrive, and reverse clutches are considered input clutches and are contained within the input clutch assembly (Fig. 77) and (Fig. 78). The input clutch assembly also contains:

- Input shaft
- Input hub
- Clutch retainer
- Underdrive piston
- Overdrive/reverse piston
- Overdrive hub
- Underdrive hub

OPERATION

The three input clutches are responsible for driving different components of the planetary geartrain.

UNDERDRIVE CLUTCH

The underdrive clutch is hydraulically applied in first, second, second prime, and third (direct) gears by pressurized fluid against the underdrive piston. When the underdrive clutch is applied, the underdrive hub drives the input sun gear.

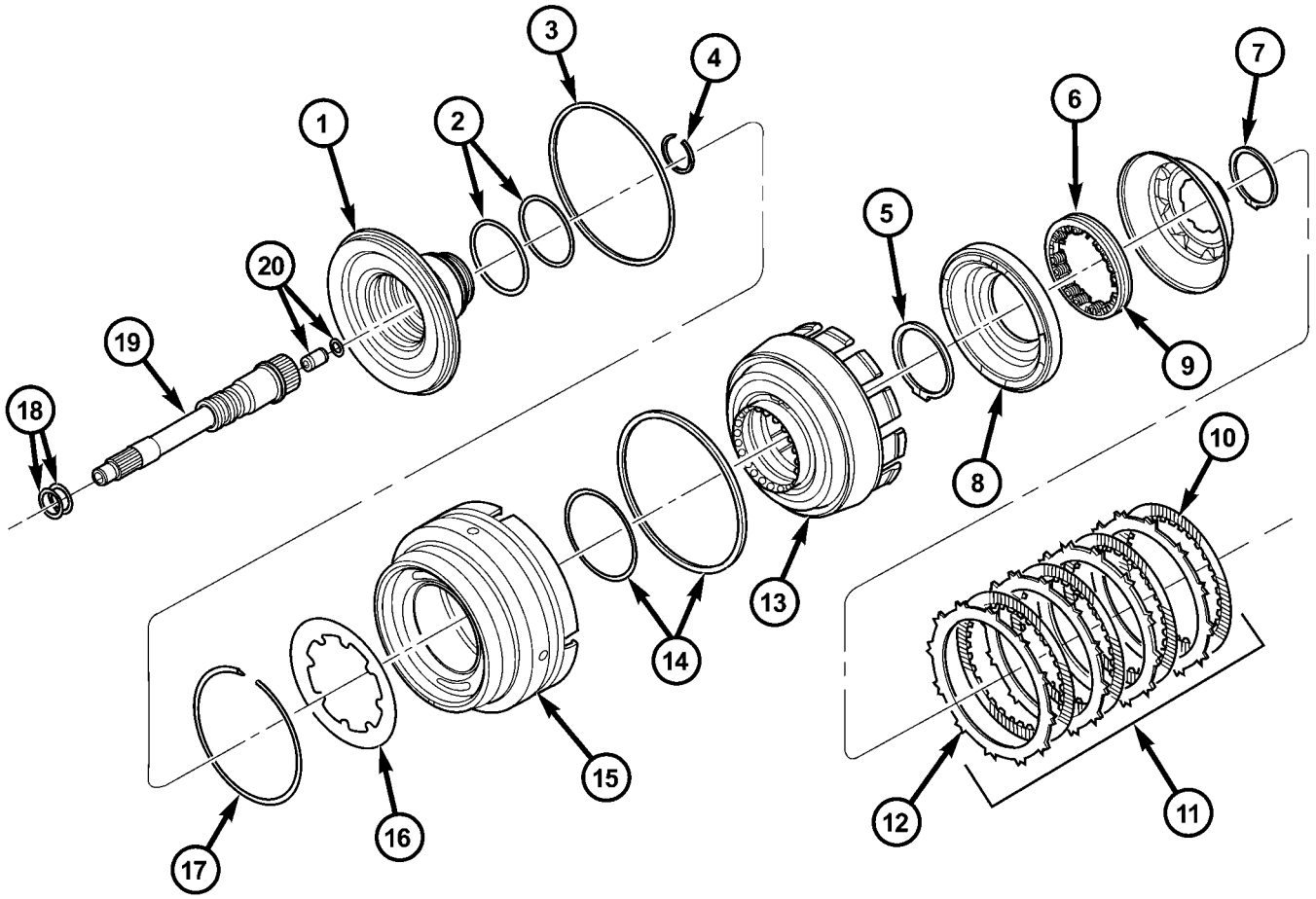


Fig. 77 Input Clutch Assembly - Part 1

1 - INPUT CLUTCH HUB
2 - O-RING SEALS
3 - SEAL
4 - SNAP-RING
5 - SNAP-RING
6 - UD BALANCE PISTON
7 - SNAP-RING
8 - UD PISTON
9 - SPRING
10 - DISC
11 - UD CLUTCH
12 - PLATE
13 - CLUTCH RETAINER
14 - SEAL
15 - OD/REV PISTON
16 - BELLEVILLE SPRING
17 - SNAP-RING
18 - SEAL RINGS
19 - INPUT SHAFT
20 - LUBRICATION CHECK VALVE AND SNAP-RING

INPUT CLUTCH ASSEMBLY (Continued)

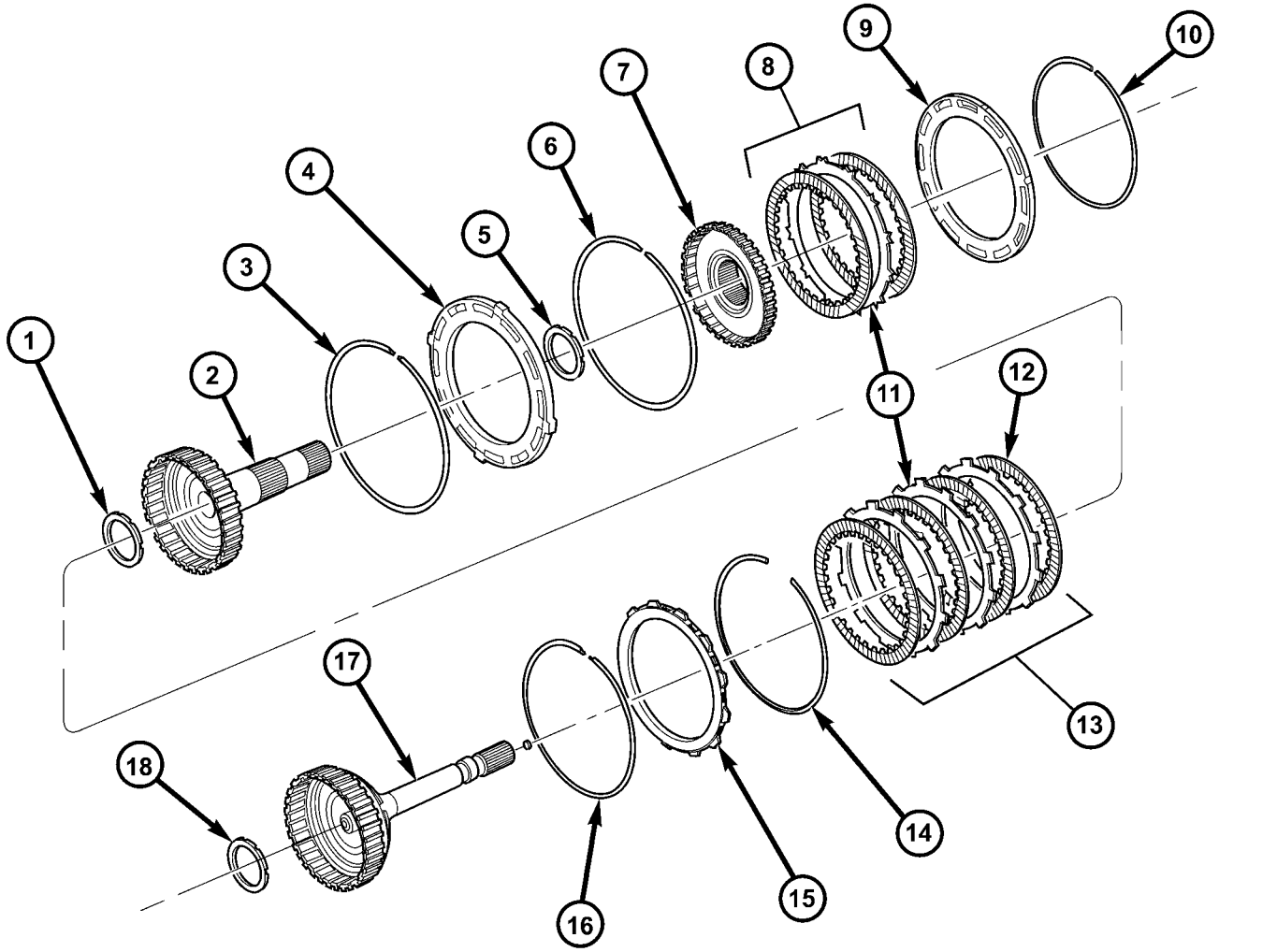


Fig. 78 Input Clutch Assembly - Part 2

1 - BEARING NUMBER 3
2 - OD HUB/SHAFT
3 - SNAP-RING (WAVE)
4 - REV/OD REACTION PLATE
5 - BEARING NUMBER 4
6 - SNAP-RING (FLAT)
7 - REVERSE HUB/SHAFT
8 - REVERSE CLUTCH
9 - REVERSE REACTION PLATE
10 - SNAP-RING (SELECT)
11 - PLATE
12 - DISC
13 - OD CLUTCH
14 - SNAP-RING (TAPERED)
15 - UD/OD REACTION PLATE
16 - SNAP-RING (FLAT)
17 - UD HUB/SHAFT
18 - BEARING NUMBER 2

OVERDRIVE CLUTCH

The overdrive clutch is hydraulically applied in third (direct), fourth, and fifth gears by pressurized fluid against the overdrive/reverse piston. When the overdrive clutch is applied, the overdrive hub drives the reverse carrier/input annulus assembly.

REVERSE CLUTCH

The reverse clutch is hydraulically applied in reverse gear by pressurized fluid against the overdrive/reverse piston. When the reverse clutch is applied, the reaction annulus gear is driven.

DISASSEMBLY

(1) Remove the reverse reaction plate selective snap-ring from the input clutch retainer (Fig. 79).

(2) Remove the reverse reaction plate from the input clutch retainer.

(3) Remove the reverse hub and reverse clutch pack from the input clutch retainer.

(4) Remove the number 4 bearing from the overdrive hub.

(5) Remove the overdrive hub from the input clutch retainer (Fig. 79).

INPUT CLUTCH ASSEMBLY (Continued)

(6) Remove the number 3 bearing from the underdrive hub.

(7) Remove the OD/reverse reaction plate snap-ring from the input clutch retainer.

(8) Remove the underdrive hub, overdrive clutch, and overdrive reaction plate from the input clutch retainer (Fig. 79).

NOTE: The overdrive friction discs and steel discs are thicker than the matching components in the underdrive and reverse clutches.

(9) Remove the number 2 bearing from the input clutch hub.

(10) Remove the overdrive clutch wave snap-ring from the input clutch retainer.

(11) Remove the UD/OD reaction plate tapered snap-ring from the input clutch retainer.

(12) Remove the UD/OD reaction plate from the input clutch retainer.

(13) Remove the UD/OD reaction plate flat snap-ring from the input clutch retainer (Fig. 79).

(14) Remove the underdrive clutch pack from the input clutch retainer (Fig. 81).

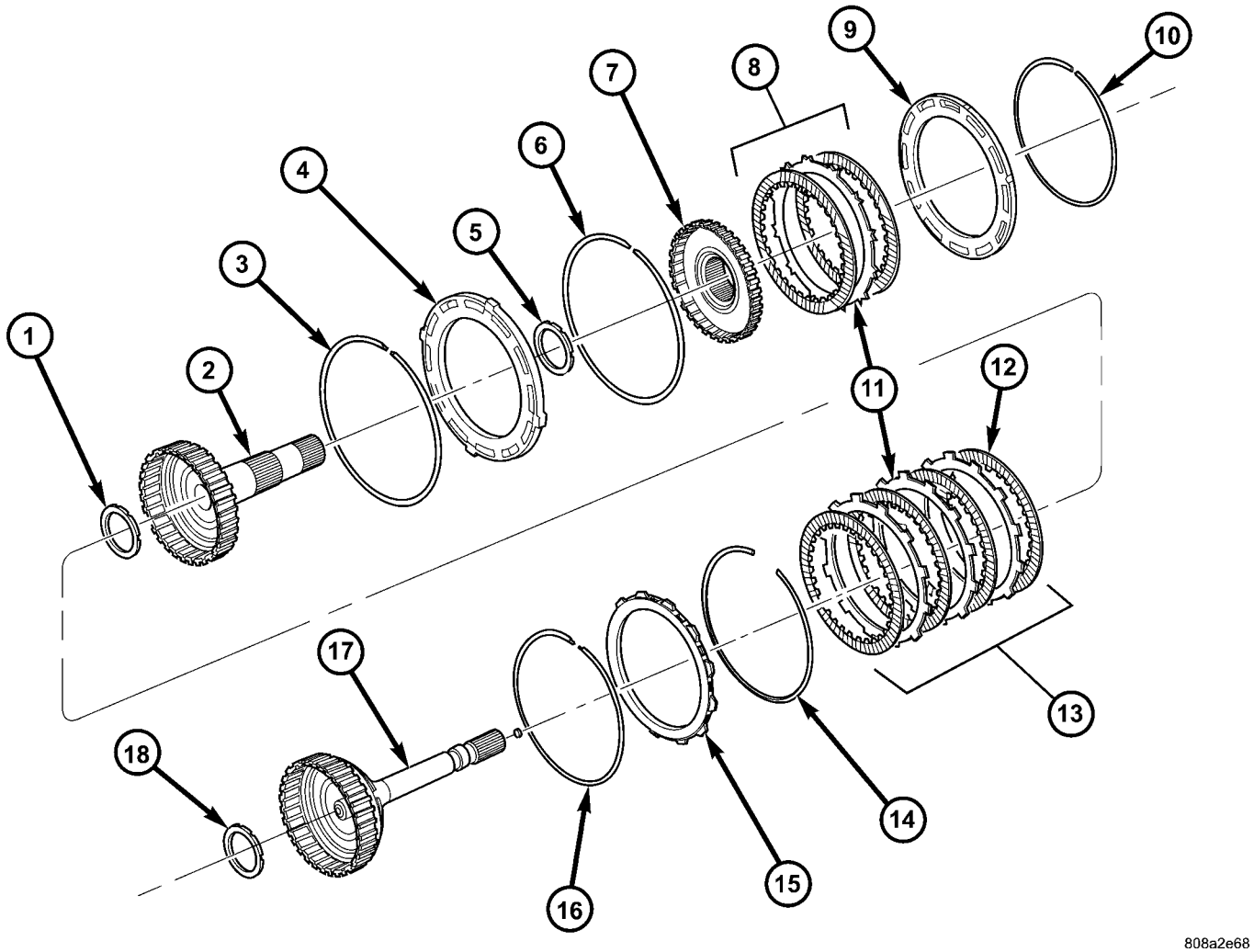


Fig. 79 Input Clutch Assembly - Part 2

1 - BEARING NUMBER 3
2 - OD HUB/SHAFT
3 - SNAP-RING (WAVE)
4 - REV/OD REACTION PLATE
5 - BEARING NUMBER 4
6 - SNAP-RING (FLAT)
7 - REVERSE HUB/SHAFT
8 - REVERSE CLUTCH
9 - REVERSE REACTION PLATE
10 - SNAP-RING (SELECT)
11 - PLATE
12 - DISC
13 - OD CLUTCH
14 - SNAP-RING (TAPERED)
15 - UD/OD REACTION PLATE
16 - SNAP-RING (FLAT)
17 - UD HUB/SHAFT
18 - BEARING NUMBER 2

INPUT CLUTCH ASSEMBLY (Continued)

(15) Using Spring Compressor 8251, compress the UD/OD balance piston and remove the snap-ring from the input clutch hub (Fig. 80).

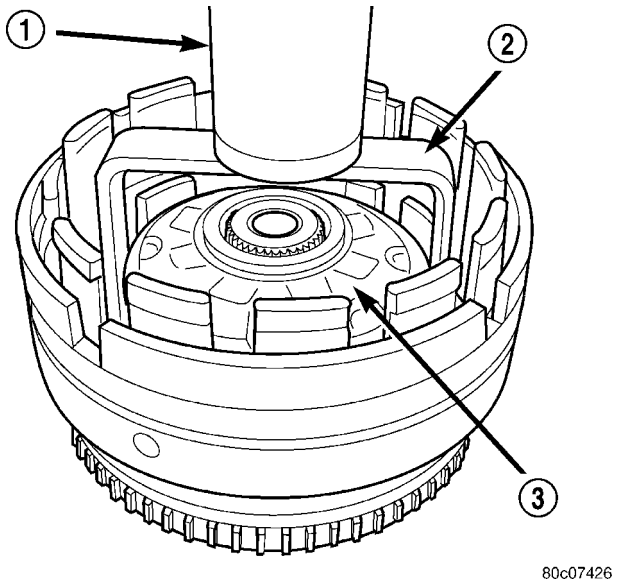


Fig. 80 Compressing UD/OD Balance Piston Using Tool 8251

1 - PRESS
2 - TOOL 8251
3 - BALANCE PISTON

(16) Remove the UD/OD balance piston and piston return spring from the input clutch retainer (Fig. 81).

(17) Remove the underdrive piston from the input clutch retainer (Fig. 81).

NOTE: Both the UD/OD balance piston and the underdrive piston have seals molded onto them. If the seal is damaged, do not attempt to install a new seal onto the piston. The piston/seal must be replaced as an assembly.

(18) Remove the input clutch retainer tapered snap-ring.

(19) Separate input clutch retainer from input clutch hub.

(20) Separate OD/reverse piston from input clutch hub retainer (Fig. 81).

(21) Remove all seals and o-rings from the input shaft and input hub. The o-rings on the input hub are color coded. Be sure to make note of which o-ring belongs in which location.

ASSEMBLY

(1) Install all new seals and o-rings onto the input shaft and input hub. The o-rings on the input hub are color coded. Be sure to install the correct o-ring in the correct location.

(2) Check the transmission lubrication check valve located in the input shaft using shop air. The valve should only allow air flow in one direction. If the valve allows no air flow, or air flow in both directions, the valve will need to be replaced.

(3) Lubricate all seals with Mopar® ATF +4, Automatic Transmission Fluid, prior to installation.

(4) Assemble the OD/reverse piston onto the input clutch hub (Fig. 82).

(5) Assemble the input clutch retainer onto the input clutch hub.

INPUT CLUTCH ASSEMBLY (Continued)

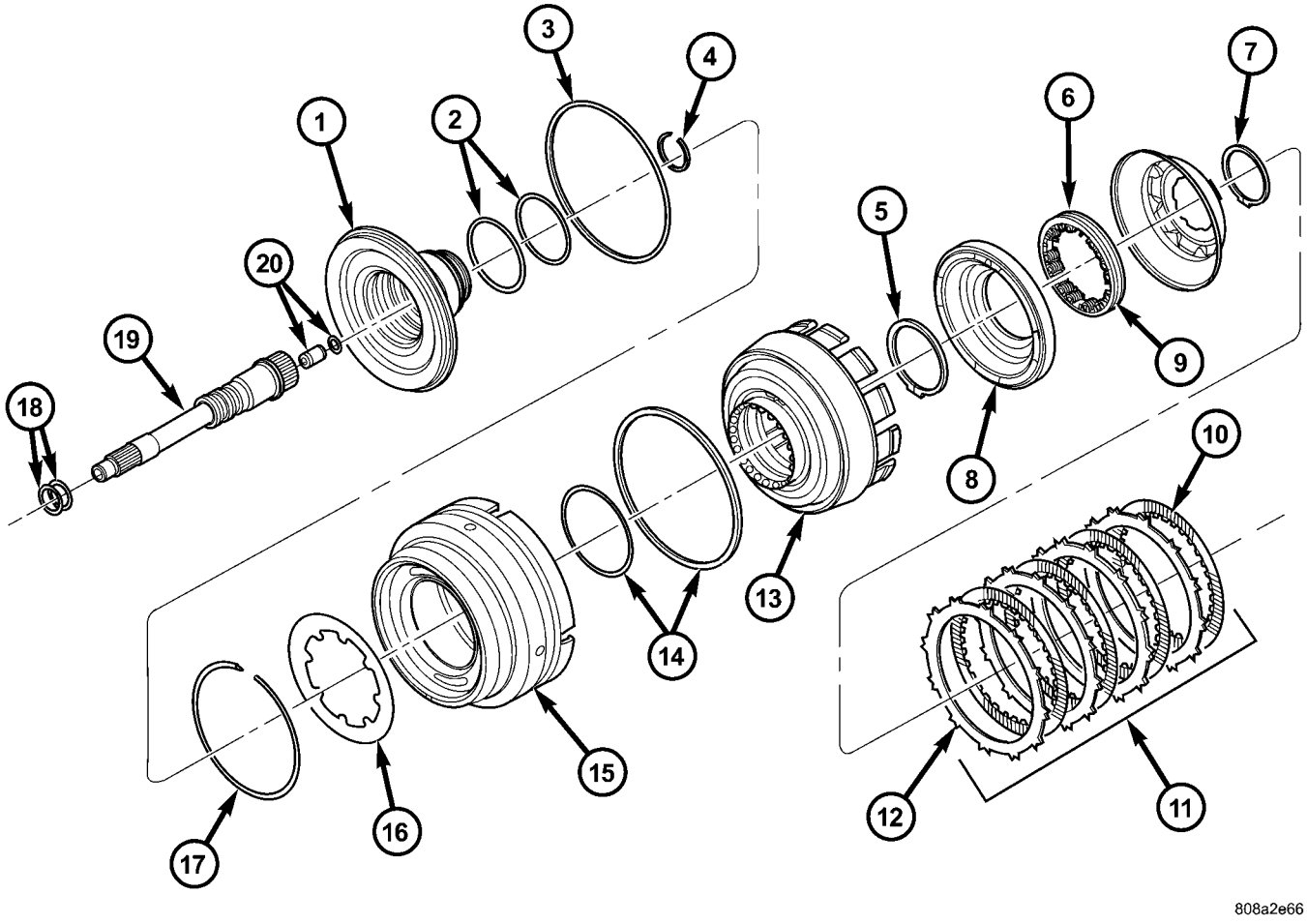


Fig. 81 Input Clutch Assembly - Part 1

1 - INPUT CLUTCH HUB
2 - O-RING SEALS
3 - SEAL
4 - SNAP-RING
5 - SNAP-RING
6 - UD BALANCE PISTON
7 - SNAP-RING
8 - UD PISTON
9 - SPRING
10 - DISC
11 - UD CLUTCH
12 - PLATE
13 - CLUTCH RETAINER
14 - SEAL
15 - OD/REV PISTON
16 - BELLEVILLE SPRING
17 - SNAP-RING
18 - SEAL RINGS
19 - INPUT SHAFT
20 - LUBRICATION CHECK VALVE AND SNAP-RING

INPUT CLUTCH ASSEMBLY (Continued)

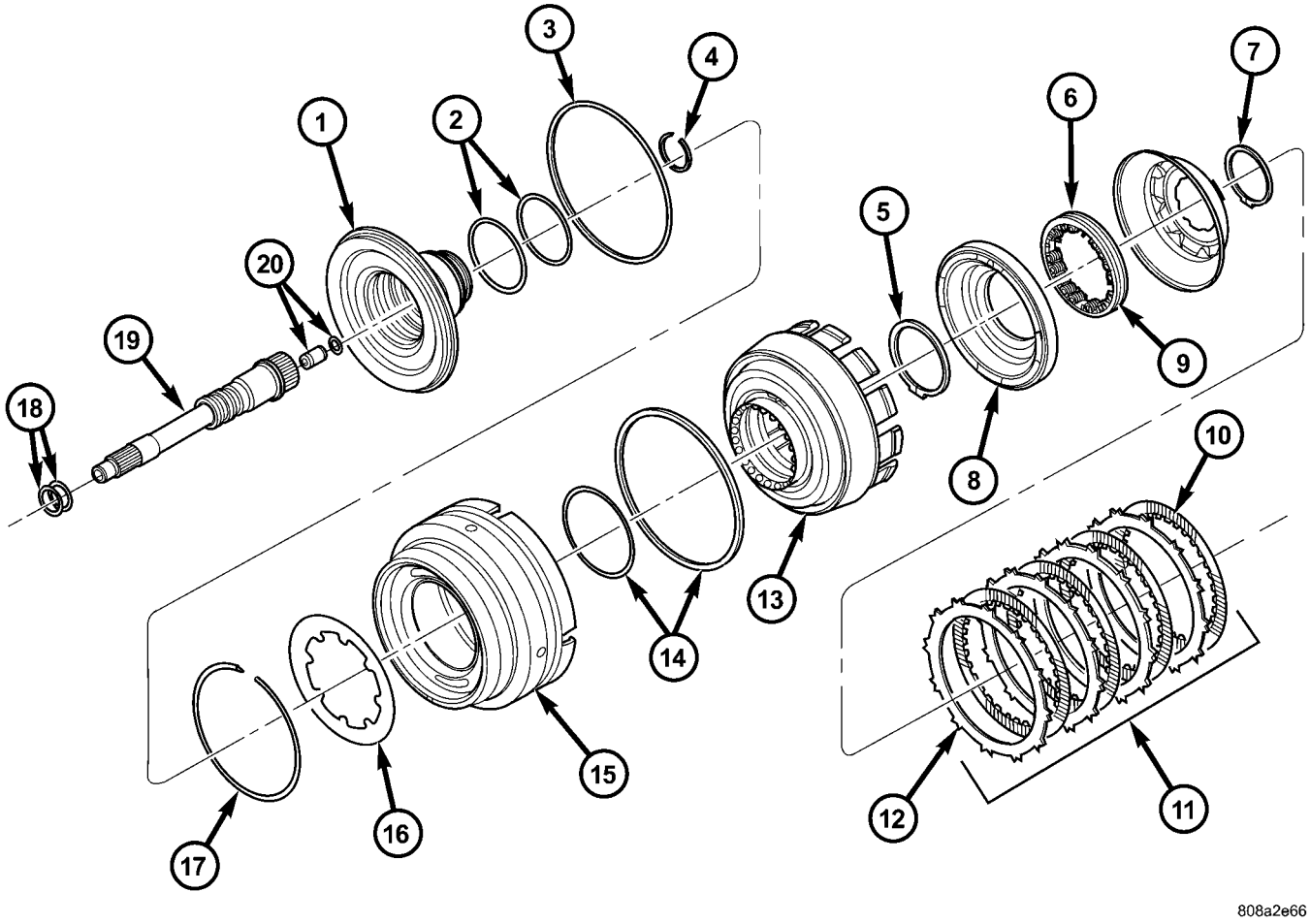


Fig. 82 Input Clutch Assembly - Part I

1 - INPUT CLUTCH HUB
2 - O-RING SEALS
3 - SEAL
4 - SNAP-RING
5 - SNAP-RING
6 - UD BALANCE PISTON
7 - SNAP-RING
8 - UD PISTON
9 - SPRING
10 - DISC
11 - UD CLUTCH
12 - PLATE
13 - CLUTCH RETAINER
14 - SEAL
15 - OD/REV PISTON
16 - BELLEVILLE SPRING
17 - SNAP-RING
18 - SEAL RINGS
19 - INPUT SHAFT
20 - LUBRICATION CHECK VALVE AND SNAP-RING

INPUT CLUTCH ASSEMBLY (Continued)

(6) Install the input clutch retainer tapered snap-ring with tapered side up onto the input clutch hub.

(7) Install Piston Guides 8504 into the input clutch retainer (Fig. 83) and onto the input clutch hub to guide the inner and outer underdrive piston seals into position.

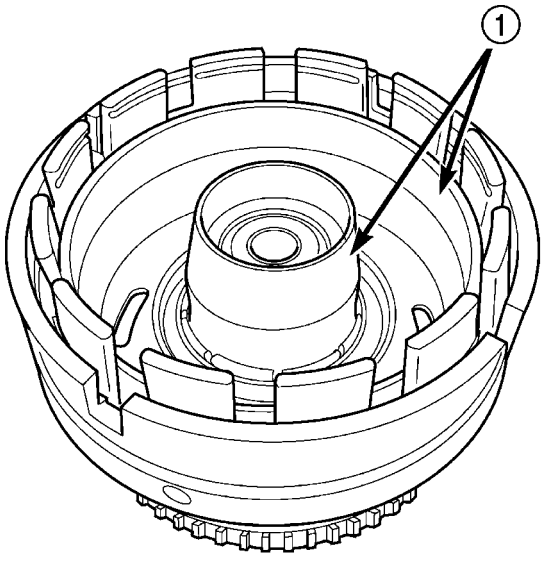


Fig. 83 Install Underdrive Piston Using Tool 8504

1 - TOOL 8504

(8) Install the underdrive piston into the input clutch retainer and over the input clutch hub (Fig. 82).

(9) Install the UD/OD balance piston return spring pack into the input clutch retainer.

(10) Install Piston Guide 8252 into the input clutch retainer (Fig. 84) to guide the UD/OD balance piston seal into position inside the underdrive piston.

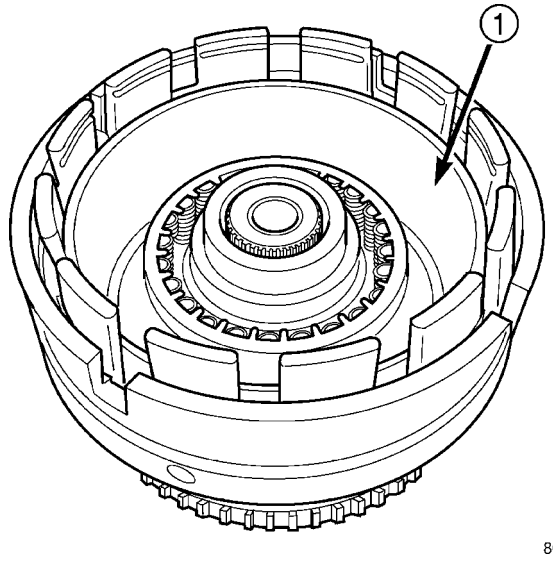


Fig. 84 Install Balance Piston Using Tool 8252

1 - TOOL 8252

(11) Install the UD/OD balance piston into the input clutch retainer and the underdrive piston.

(12) Using Spring Compressor 8251, compress the UD/OD return spring pack and secure the piston in place with the snap-ring (Fig. 85).

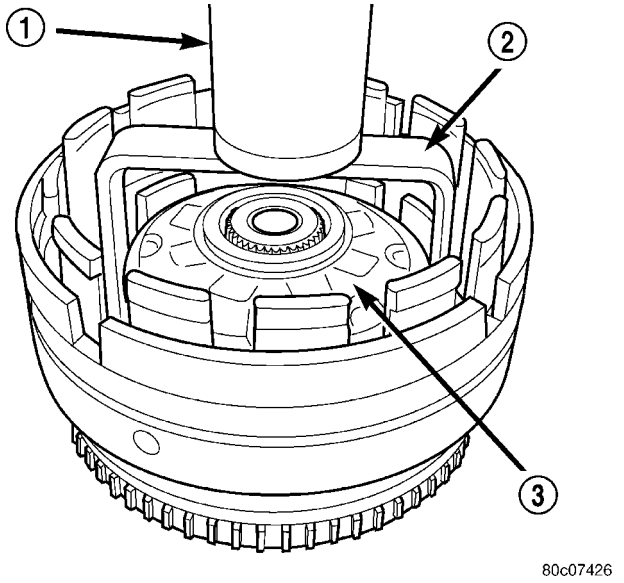


Fig. 85 Compressing UD/OD Balance Piston Using Tool 8251

1 - PRESS
2 - TOOL 8251
3 - BALANCE PISTON

INPUT CLUTCH ASSEMBLY (Continued)

(13) Install the underdrive clutch pack into the input clutch retainer (Fig. 82).

(14) Install the UD/OD reaction plate lower flat snap-ring (Fig. 86). The correct snap-ring can be identified by the two tabbed ears.

(15) Install the UD/OD reaction plate into the input clutch retainer. The reaction plate is to be installed with the big step down.

(16) Install the UD/OD reaction plate upper tapered snap-ring with tapered side up.

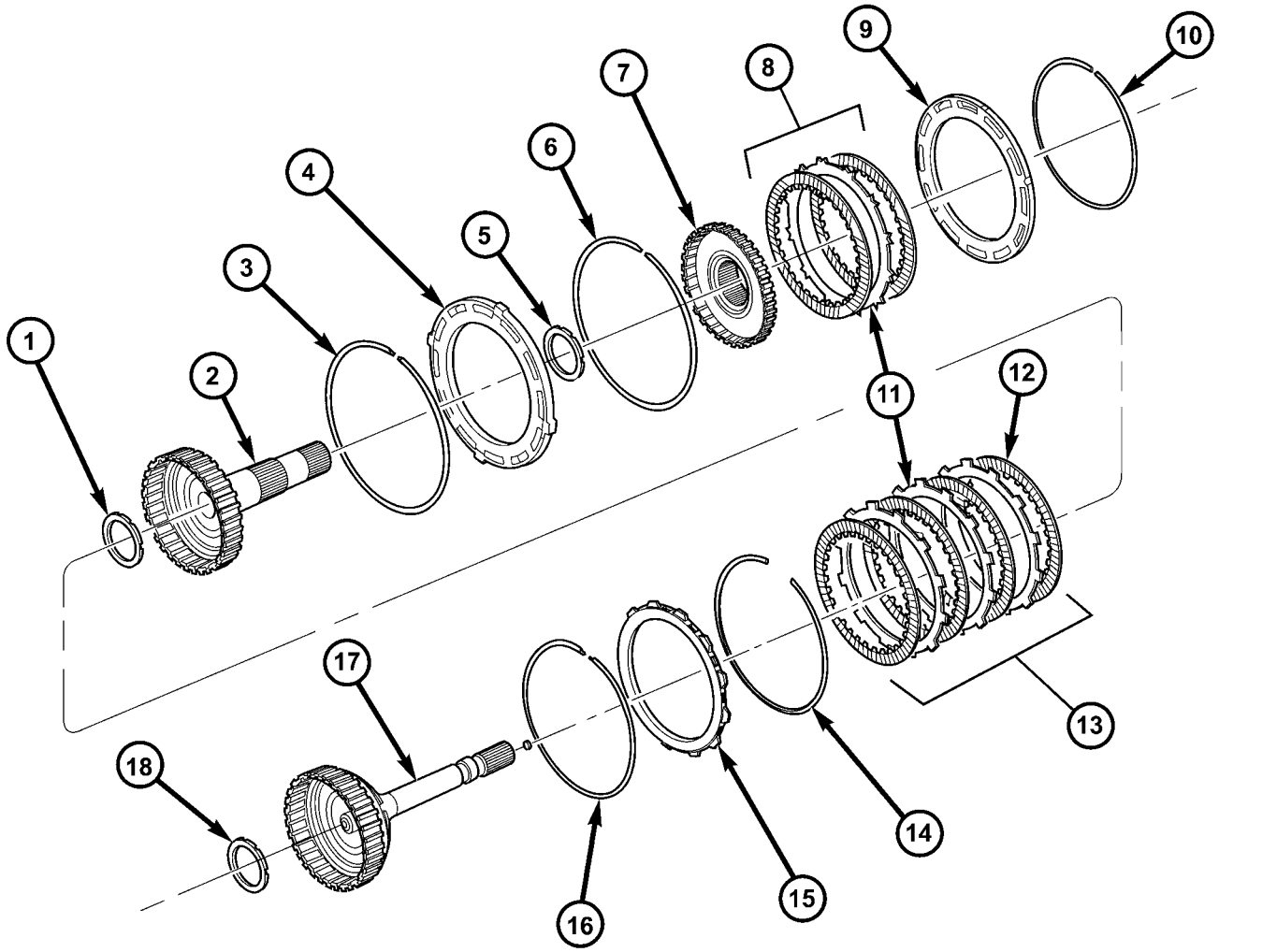


Fig. 86 Input Clutch Assembly - Part II

1 - BEARING NUMBER 3
2 - OD HUB/SHAFT
3 - SNAP-RING (WAVE)
4 - REV/OD REACTION PLATE
5 - BEARING NUMBER 4
6 - SNAP-RING (FLAT)
7 - REVERSE HUB/SHAFT
8 - REVERSE CLUTCH
9 - REVERSE REACTION PLATE
10 - SNAP-RING (SELECT)
11 - PLATE
12 - DISC
13 - OD CLUTCH
14 - SNAP-RING (TAPERED)
15 - UD/OD REACTION PLATE
16 - SNAP-RING (FLAT)
17 - UD HUB/SHAFT
18 - BEARING NUMBER 2

INPUT CLUTCH ASSEMBLY (Continued)

(17) Install the input clutch assembly into Input Clutch Pressure Fixture 8260 (Fig. 87). Mount a dial indicator to the assembly, push down on the clutch discs and zero the indicator against the underdrive clutch discs (Fig. 88). Apply 20 psi of air pressure to the underdrive clutch and record the dial indicator reading. Measure and record UD clutch pack measurement in four (4) places, 90° apart. Take average of four measurements and compare with UD clutch pack clearance specification. The correct clutch clearance is 0.84-1.54 mm (0.033-0.061 in.). The reaction plate is not selective. If the clutch clearance is not within specification, replace the reaction plate along with all the friction and steel discs.

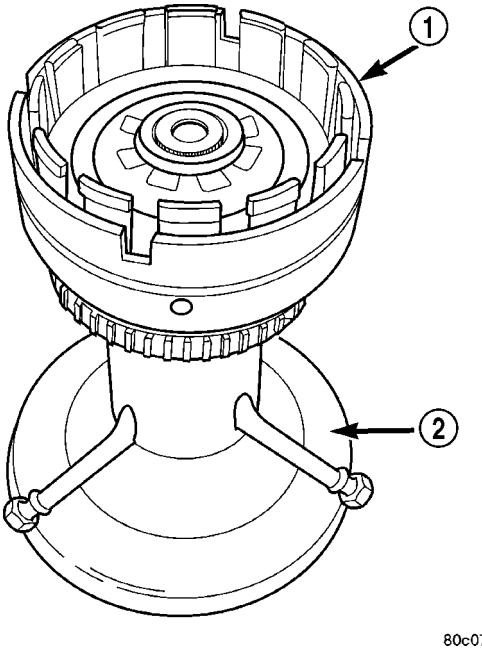


Fig. 87 Input Clutch Assembly Mounted on Tool 8260

1 - INPUT CLUTCH ASSEMBLY
2 - TOOL 8260

(18) Install the overdrive clutch pack into the input clutch retainer (Fig. 86). The overdrive steel separator plates can be identified by the lack of the half-moon cuts in the locating tabs.

(19) Install the overdrive clutch wavy snap-ring with the two tabbed ears into the input clutch retainer.

(20) Install the OD/reverse reaction plate into the input clutch retainer. The reaction plate is non-directional (Fig. 86).

(21) Install the OD/reverse reaction plate flat snap-ring into the input clutch retainer.

(22) Mount a dial indicator to the assembly and zero the indicator against the OD/reverse reaction plate (Fig. 89). Apply 20 psi of air pressure to the overdrive clutch and record the dial indicator reading. Measure and record OD clutch pack measurement in four (4) places, 90° apart. Take average of four measurements and compare with OD clutch pack clearance specification.Verify that the clutch clearance is 1.103-1.856 mm (0.043-0.073 in.). The reaction plate is not selective. If the clutch clearance is not within specification, replace the reaction plate along with all the friction and steel discs.

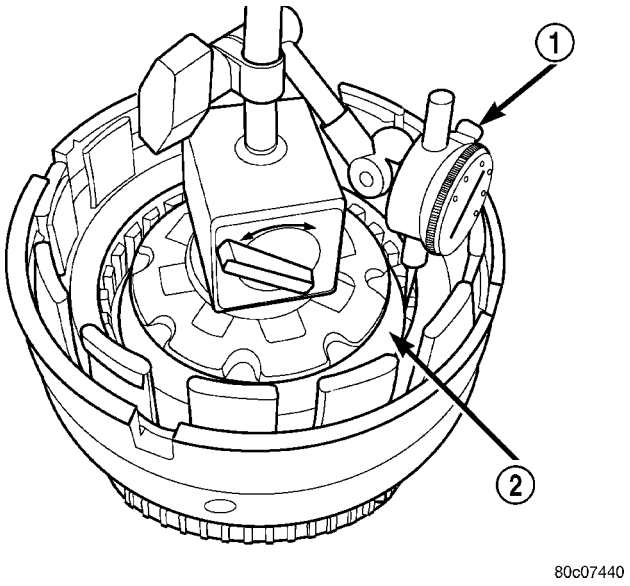


Fig. 88 Measuring UD Clutch Clearance

1 - TOOL C-3339
2 - UNDERDRIVE CLUTCH PACK

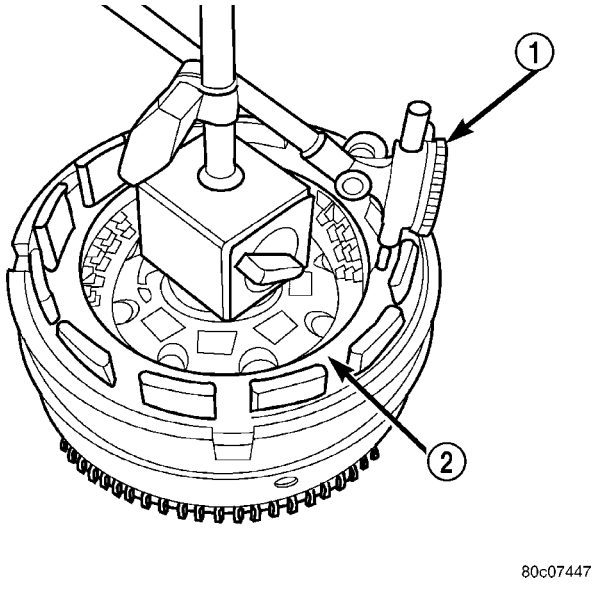


Fig. 89 Measuring OD Clutch Clearance

1 - TOOL C-3339
2 - OD/REV REACTION PLATE

(23) Install the reverse clutch pack into the input clutch retainer (Fig. 86).

INPUT CLUTCH ASSEMBLY (Continued)

(24) Install the reverse reaction plate into the input clutch retainer.

(25) Install the reverse reaction plate selective snap-ring into the input clutch retainer.

(26) Mount a dial indicator to the assembly, push down on the clutch discs, pull up on the reaction plate to ensure the plate is properly seated and zero the indicator against the reverse clutch discs (Fig. 90). Apply 20 psi of air pressure to the reverse clutch and record the dial indicator reading. Measure and record Reverse clutch pack measurement in four (4) places, 90° apart. Take average of four measurements and compare with Reverse clutch pack clearance specification. The correct clutch clearance is 0.58-1.47 mm (0.023-0.058 in.). Adjust as necessary. Install the chosen snap-ring and re-measure to verify selection.

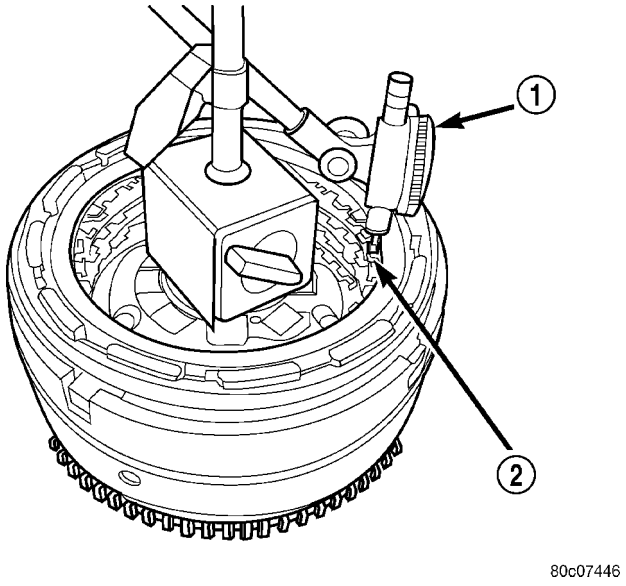


Fig. 90 Measuring Reverse Clutch Clearance

1 - TOOL C-3339
2 - REVERSE CLUTCH PACK

(27) Remove the reverse clutch pack from the input clutch retainer.

(28) Install the number 2 bearing onto the underdrive hub with outer race against the hub with petroleum jelly.

(29) Install the underdrive hub into the input clutch retainer.

(30) Install the number 3 bearing into the overdrive hub with the outer race against the hub with petroleum jelly.

(31) Install the overdrive hub into the input clutch retainer.

(32) Install the number 4 bearing into the reverse hub with outer race against the hub with petroleum jelly.

(33) Install the reverse hub into the input clutch retainer.

(34) Install the complete reverse clutch pack.

(35) Install the reverse reaction plate and snap-ring.

(36) Push up on reaction plate to allow reverse clutch to move freely.

INPUT SPEED SENSOR

DESCRIPTION

The Input and Output Speed Sensors are two-wire magnetic pickup devices that generate AC signals as rotation occurs. They are mounted in the left side of the transmission case and are considered primary inputs to the Transmission Control Module (TCM).

OPERATION

The Input Speed Sensor provides information on how fast the input shaft is rotating. As the teeth of the input clutch hub pass by the sensor coil, an AC voltage is generated and sent to the TCM. The TCM interprets this information as input shaft rpm.

The Output Speed Sensor generates an AC signal in a similar fashion, though its coil is excited by rotation of the rear planetary carrier lugs. The TCM interprets this information as output shaft rpm.

The TCM compares the input and output speed signals to determine the following:

- Transmission gear ratio
- Speed ratio error detection
- CVI calculation

The TCM also compares the input speed signal and the engine speed signal to determine the following:

- Torque converter clutch slippage
- Torque converter element speed ratio

INPUT SPEED SENSOR (Continued)

REMOVAL

(1) Raise vehicle.
(2) Place a suitable fluid catch pan under the transmission.
(3) Remove the wiring connector from the input speed sensor (Fig. 91).
(4) Remove the bolt holding the input speed sensor to the transmission case.
(5) Remove the input speed sensor from the transmission case.

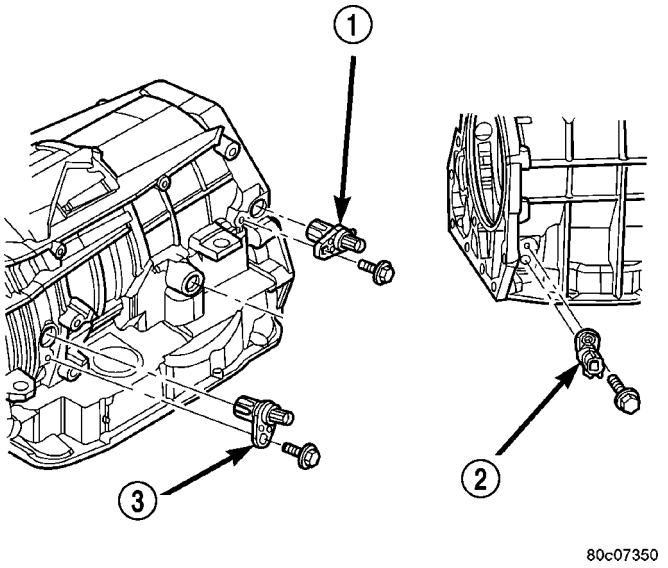


Fig. 91 Input Speed Sensor

1 - OUTPUT SPEED SENSOR
2 - LINE PRESSURE SENSOR
3 - INPUT SPEED SENSOR

INSTALLATION

(1) Install the input speed sensor into the transmission case.
(2) Install the bolt to hold the input speed sensor into the transmission case. Tighten the bolt to 11.9 N·m (105 in.lbs.).
(3) Install the wiring connector onto the input speed sensor
(4) Verify the transmission fluid level. Add fluid as necessary.
(5) Lower vehicle.

LINE PRESSURE (LP) SENSOR

DESCRIPTION

The TCM utilizes a closed-loop system to control transmission line pressure. The system contains a variable force style solenoid, the Pressure Control Solenoid, mounted on the side of the solenoid and pressure switch assembly. The solenoid is duty cycle controlled by the TCM to vent the unnecessary line pressure supplied by the oil pump back to the sump. The system also contains a variable pressure style sensor, the Line Pressure Sensor, which is a direct input to the TCM. The line pressure solenoid monitors the transmission line pressure and completes the feedback loop to the TCM. The TCM uses this information to adjust its control of the pressure control solenoid to achieve the desired line pressure.

OPERATION

The TCM calculates the desired line pressure based upon inputs from the transmission and engine. The TCM calculates the torque input to the transmission and uses that information as the primary input to the calculation. The line pressure is set to a predetermined value during shifts and when the transmission is in the PARK and NEUTRAL positions. This is done to ensure consistent shift quality. During all other operation, the actual line pressure is compared to the desired line pressure and adjustments are made to the pressure control solenoid duty cycle.

REMOVAL

(1) Raise vehicle.
(2) Place a suitable fluid catch pan under the transmission.
(3) Remove the wiring connector from the line pressure sensor (Fig. 92).
(4) Remove the bolt holding the line pressure sensor to the transmission case.
(5) Remove the line pressure sensor from the transmission case.

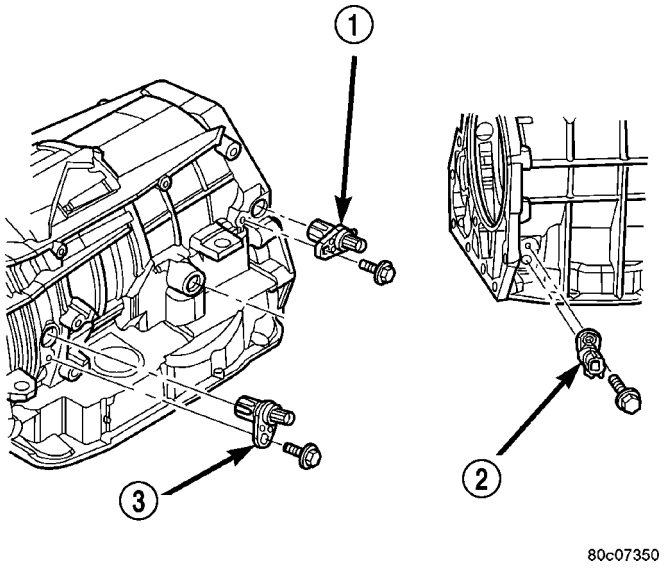


Fig. 92 Line Pressure Sensor

1 - OUTPUT SPEED SENSOR
2 - LINE PRESSURE SENSOR
3 - INPUT SPEED SENSOR

LINE PRESSURE (LP) SENSOR (Continued)

INSTALLATION

(1) Install the line pressure sensor into the transmission case.

(2) Install the bolt to hold the line pressure sensor into the transmission case. Tighten the bolt to 11.9 N·m (105 in.lbs.).

(3) Install the wiring connector onto the line pressure sensor

(4) Verify the transmission fluid level. Add fluid as necessary.

(5) Lower vehicle.

LOW/REVERSE CLUTCH

DISASSEMBLY

(1) Remove the inner overrunning clutch snap-ring from the low/reverse clutch retainer (Fig. 93).

(2) Remove the outer low/reverse reaction plate flat snap-ring (Fig. 93).

(3) Remove the low/reverse clutch and the overrunning clutch from the low/reverse clutch retainer as an assembly (Fig. 93).

(4) Separate the low/reverse clutch from the overrunning clutch.

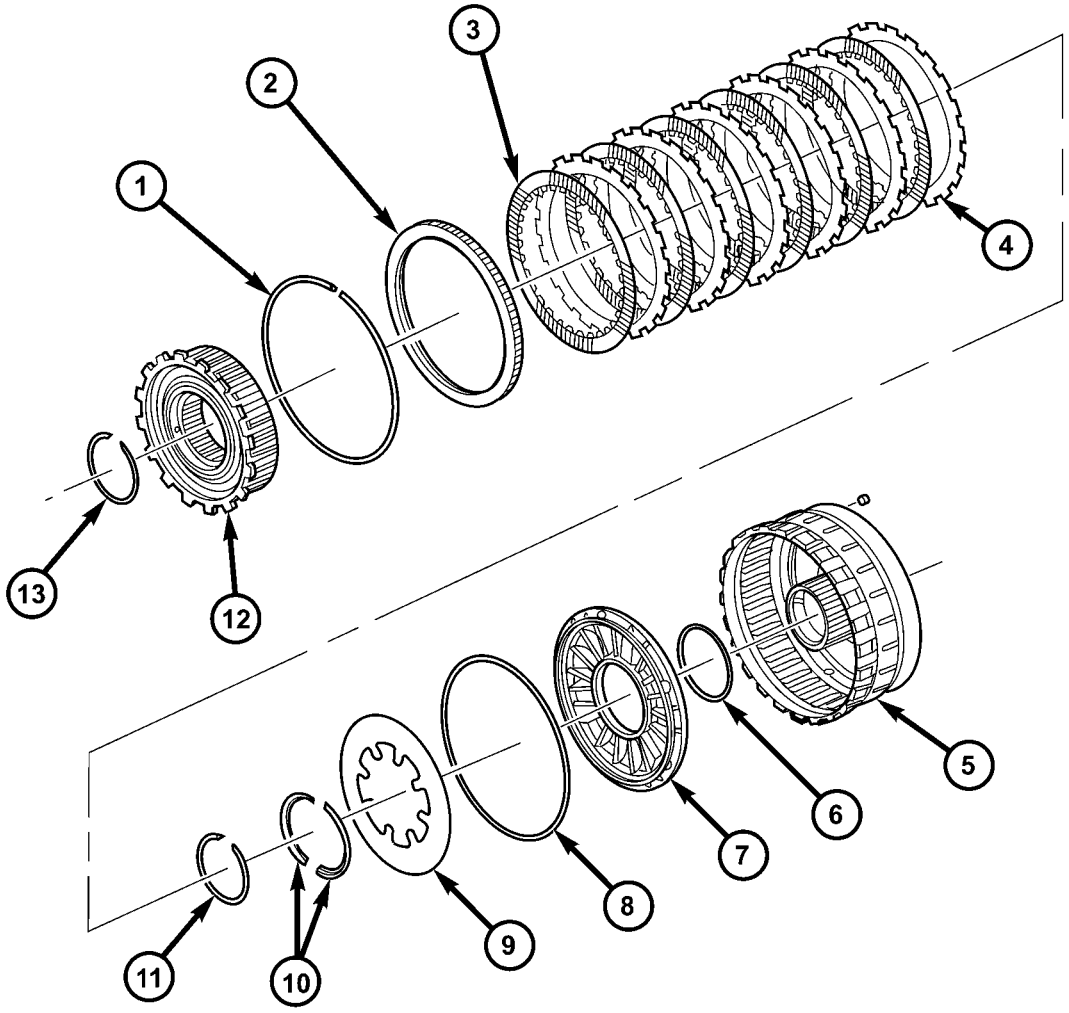


Fig. 93 Low/Reverse Clutch Assembly

1 - SNAP-RING (SELECT)
2 - REACTION PLATE
3 - DISC
4 - PLATE
5 - L/R CLUTCH RETAINER
6 - SEAL
7 - PISTON
8 - SEAL
9 - BELLEVILLE SPRING
10 - RETAINER
11 - SNAP-RING
12 - OVERRUNNING CLUTCH
13 - SNAP-RING

LOW/REVERSE CLUTCH (Continued)

(5) Remove the overrunning clutch snap-ring (Fig. 94).

(6) Remove the spacer from the overrunning clutch (Fig. 94).

(7) Separate the inner and outer races of the overrunning clutch (Fig. 94).

(8) Remove the overrunning clutch lower snap-ring (Fig. 94).

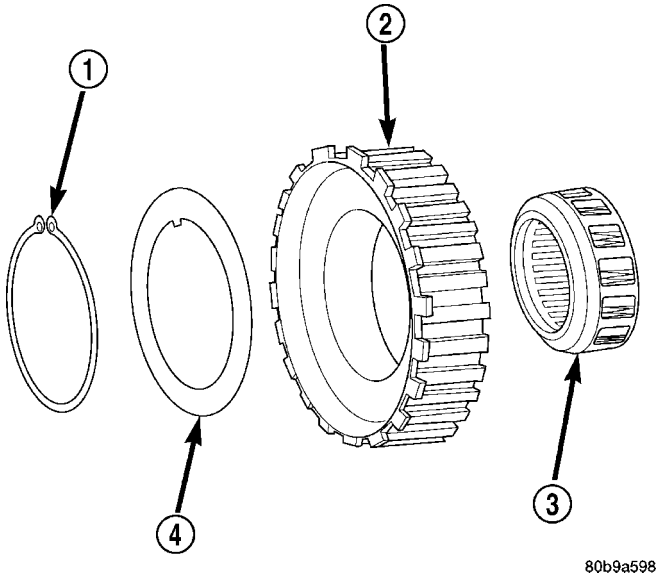


Fig. 94 Overrunning Clutch

1 - SNAP-RING
2 - OUTER RACE
3 - OVERRUNNING CLUTCH
4 - SPACER

(9) Using Spring Compressor 8285 and a suitable shop press (Fig. 95), compress the low/reverse piston Belleville spring and remove the split retaining ring holding the Belleville spring into the low/reverse clutch retainer.

(10) Remove the low/reverse clutch Belleville spring and piston from the low/reverse clutch retainer. Use 20 psi of air pressure to remove the piston if necessary.

CLEANING

Clean the overrunning clutch assembly, clutch cam, and low-reverse clutch retainer. 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 clutch retainer if the clutch race, roller surface or inside diameter is scored, worn or damaged.

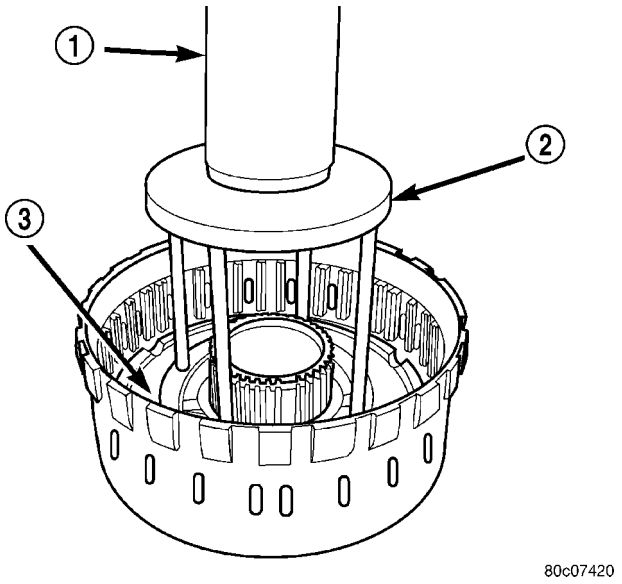


Fig. 95 Compress Low/Reverse Belleville Spring Using Tool 8285

1 - PRESS
2 - TOOL 8285
3 - BELLEVILLE SPRING

ASSEMBLY

(1) Check the bleed orifice to ensure that it is not plugged or restricted.

(2) Install a new seal on the low/reverse piston. Lubricate the seal with Mopar® ATF +4, Automatic Transmission Fluid, prior to installation.

(3) Install the low/reverse piston into the low/reverse clutch retainer.

(4) Position the low/reverse piston Belleville spring on the low/reverse piston.

(5) Using Spring Compressor 8285 and a suitable shop press (Fig. 95), compress the low/reverse piston Belleville spring and install the split retaining ring to hold the Belleville spring into the low/reverse clutch retainer.

(6) Install the lower overrunning clutch snap-ring (Fig. 94).

(7) Assemble the inner and outer races of the overrunning clutch (Fig. 94).

(8) Position the overrunning clutch spacer on the overrunning clutch.

(9) Install the upper overrunning clutch snap-ring (Fig. 94).

(10) Assemble and install the low/reverse clutch pack into the low/reverse clutch retainer (Fig. 93).

(11) Install the low/reverse reaction plate into the low/reverse clutch retainer (Fig. 93). The reaction plate is directional and must be installed with the flat side down.

(12) Install the low/reverse clutch pack snap-ring (Fig. 93). The snap-ring is selectable and should be chosen to give the correct clutch pack clearance.

LOW/REVERSE CLUTCH (Continued)

(13) Measure the low/reverse clutch pack clearance and adjust as necessary. The correct clutch clearance is 1.00-1.74 mm (0.039-0.075 in.).

(14) Install the overrunning clutch into the low/reverse clutch retainer making sure that the index splines are aligned with the retainer.

(15) Install the overrunning clutch inner snap-ring.

OIL PUMP

DESCRIPTION

The oil pump (Fig. 96) is located at the front of the transmission inside the bell housing and behind the transmission front cover. The oil pump consists of two independent pumps (Fig. 97), a number of valves (Fig. 98), a front seal (Fig. 99), and a bolt on reaction shaft. The converter clutch switch and regulator valves, pressure regulator valve, and converter pressure limit valve are all located in the oil pump valve body.

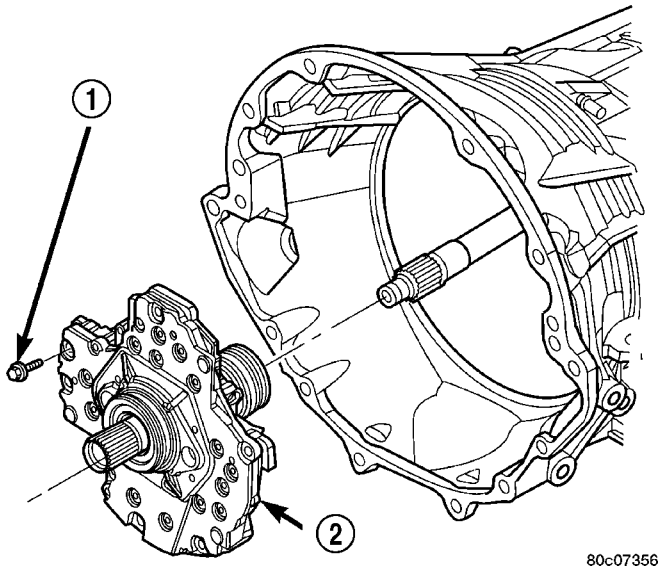


Fig. 96 Oil Pump

1 - OIL PUMP TO CASE BOLT (6)
2 - OIL PUMP

OPERATION

As the torque converter rotates, the converter hub rotates the oil pump drive gear. As the drive gear rotates both driven gears, a vacuum is created when the gear teeth come out of mesh. This suction draws fluid through the pump inlet from the oil pan. As the gear teeth come back into mesh, pressurized fluid is forced into the pump outlet and to the oil pump valves.

At low speeds, both sides of the pump supply fluid to the transmission. As the speed of the torque converter increases, the flow from both sides increases until the flow from the primary side alone is sufficient to meet system demands. At this point, the check valve located between the two pumps closes. The secondary side is shut down and the primary side supplies all the fluid to the transmission.

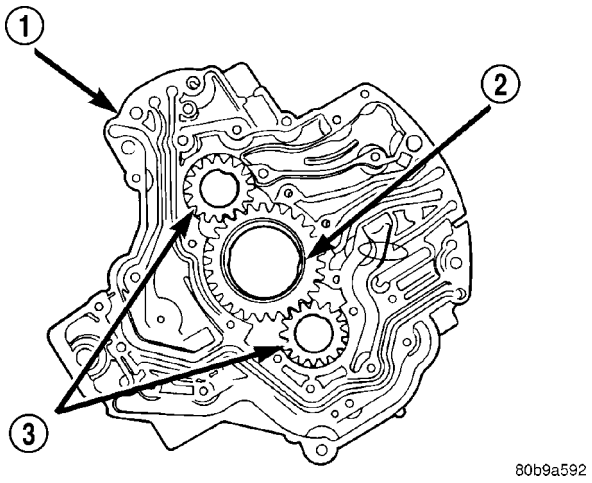


Fig. 97 Oil Pump Gears

1 - PUMP HOUSING
2 - DRIVE GEAR
3 - DRIVEN GEARS

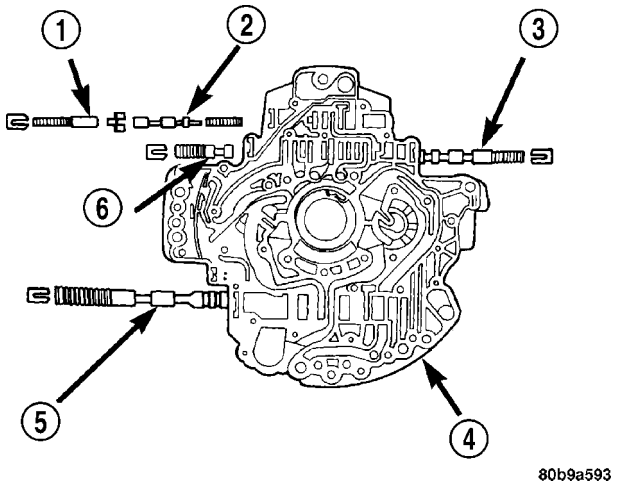


Fig. 98 Oil Pump Valves

1 - TORQUE CONVERTER CLUTCH ACCUMULATOR VALVE
2 - TORQUE CONVERTER CLUTCH CONTROL VALVE
3 - TORQUE CONVERTER CLUTCH SWITCH VALVE
4 - PUMP VALVE BODY
5 - PRESSURE REGULATOR VALVE
6 - TORQUE CONVERTER CLUTCH LIMIT VALVE

CONVERTER CLUTCH SWITCH VALVE

The converter clutch switch valve is used to control the hydraulic pressure supplied to the front (OFF) side of the torque converter clutch.

OIL PUMP (Continued)

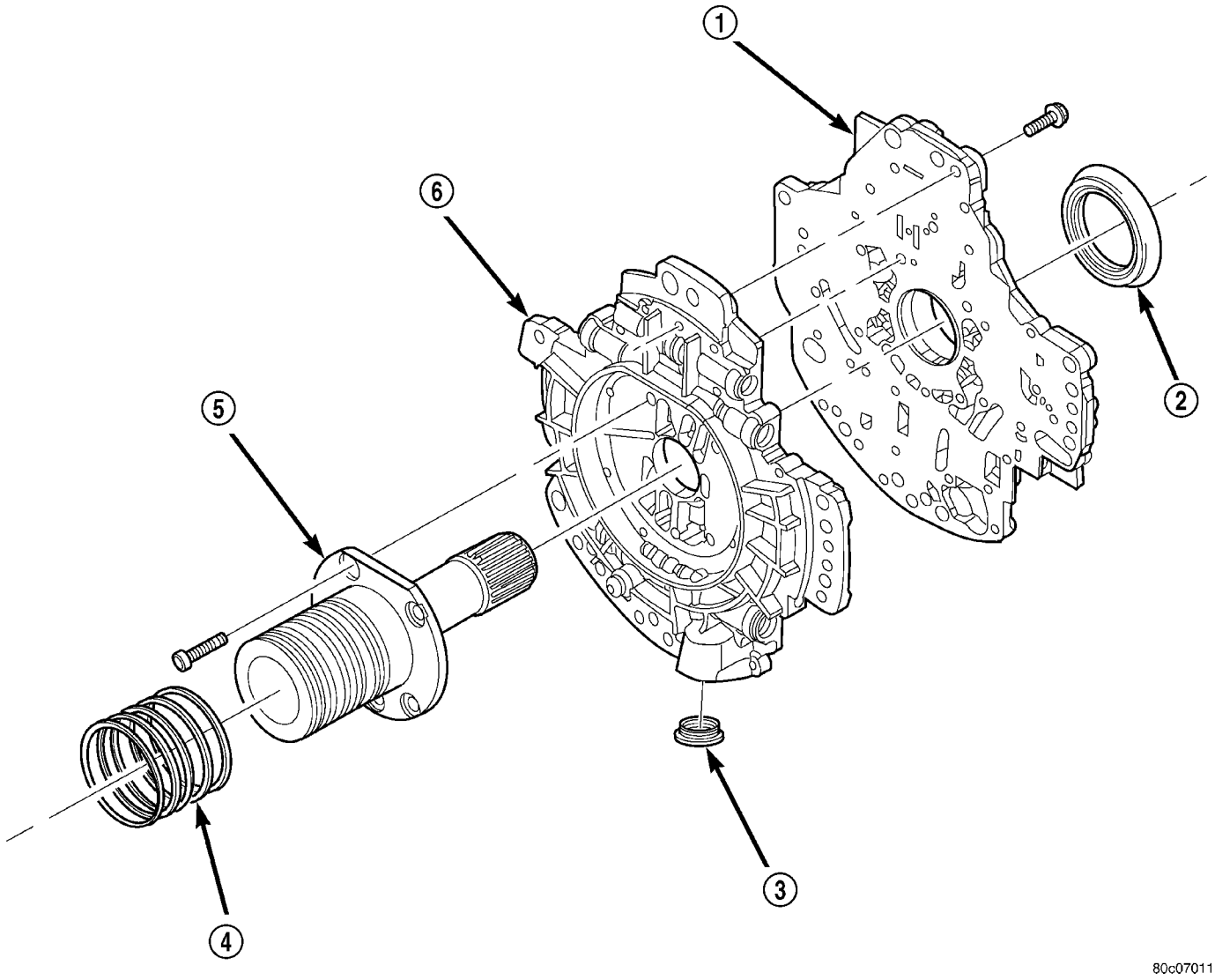


Fig. 99 Oil Pump Reaction Shaft

1 - PUMP HOUSING
2 - SEAL
3 - OIL FILTER SEAL
4 - SEAL RING (5)
5 - REACTION SHAFT SUPPORT
6 - PUMP VALVE BODY

CONVERTER CLUTCH REGULATOR VALVE

The converter clutch regulator valve is used to control the hydraulic pressure supplied to the back (ON) side of the torque converter clutch.

TORQUE CONVERTER LIMIT VALVE

The torque converter limit valve serves to limit the available line pressure to the torque converter clutch.

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, 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 1800 rpm**, with the shift selector in neutral. Verify that the transmission fluid temperature is below 104.5° C (220° F) for this test.

OIL PUMP (Continued)

(3) If one quart of transmission fluid is collected in the container in 30 seconds or less, oil pump flow volume is within acceptable limits. If fluid flow is intermittent, or it takes more than 30 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) Remove the bolts holding the reaction shaft support to the oil pump (Fig. 100).

(2) Remove the reaction shaft support from the oil pump (Fig. 100).

(3) Remove all bolts holding the oil pump halves together (Fig. 100).

(4) Using suitable prying tools, separate the oil pump sections by inserting the tools in the supplied areas and prying the halves apart.

NOTE: The oil pump halves are aligned to each other through the use of two dowels. Be sure to pry upward evenly to prevent damage to the oil pump components.

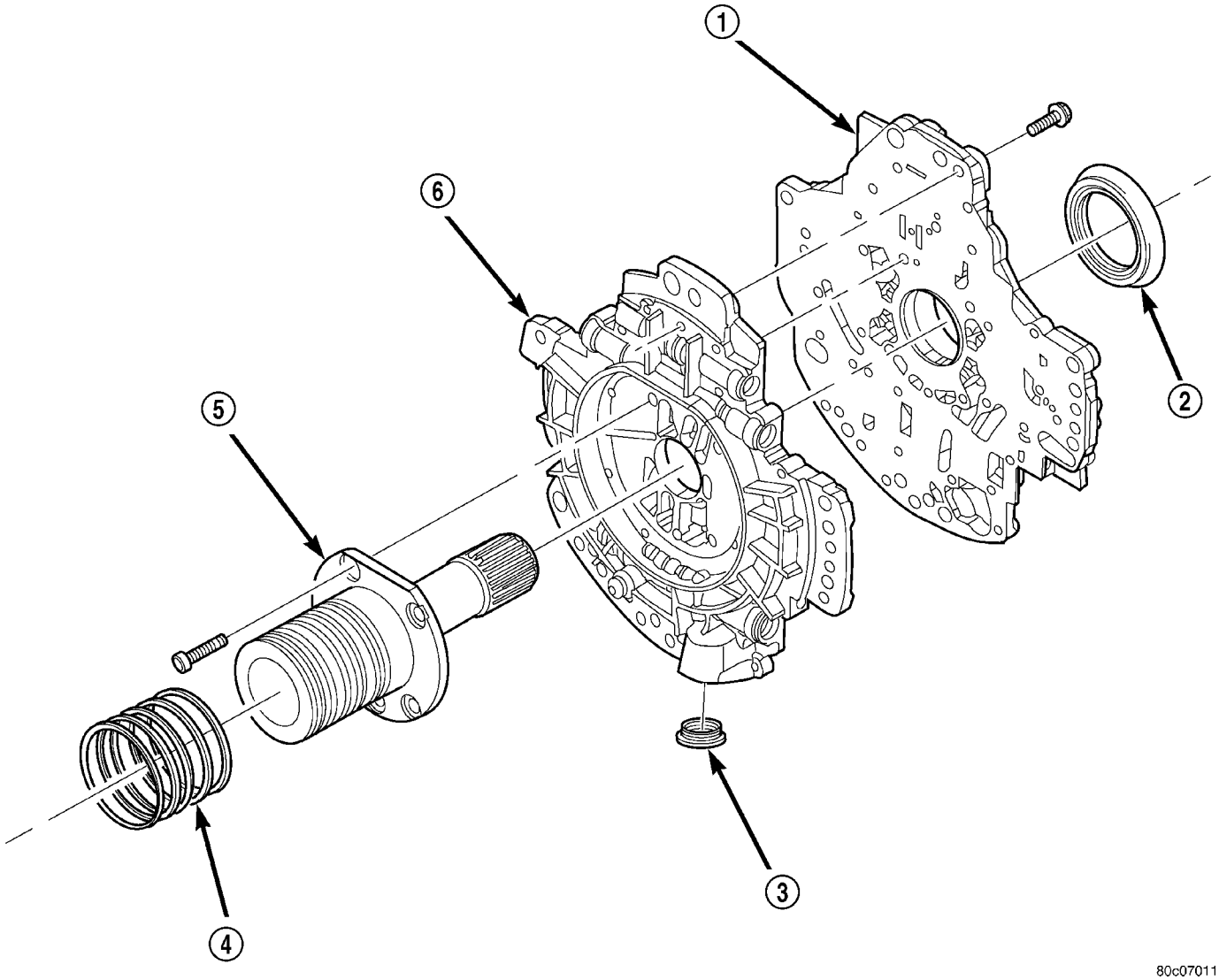


Fig. 100 Oil Pump Assembly

1 - PUMP HOUSING
2 - SEAL
3 - OIL FILTER SEAL
4 - SEAL RING (5)
5 - REACTION SHAFT SUPPORT
6 - PUMP VALVE BODY

OIL PUMP (Continued)

(5) Remove the screws holding the separator plate onto the oil pump body (Fig. 101).

(6) Remove the separator plate from the oil pump body (Fig. 101).

(7) Mark all gears for location. The gears are select fit and if the oil pump is to be reused, the gears must be returned to their original locations.

(8) Remove the oil pump gears from the oil pump case (Fig. 101).

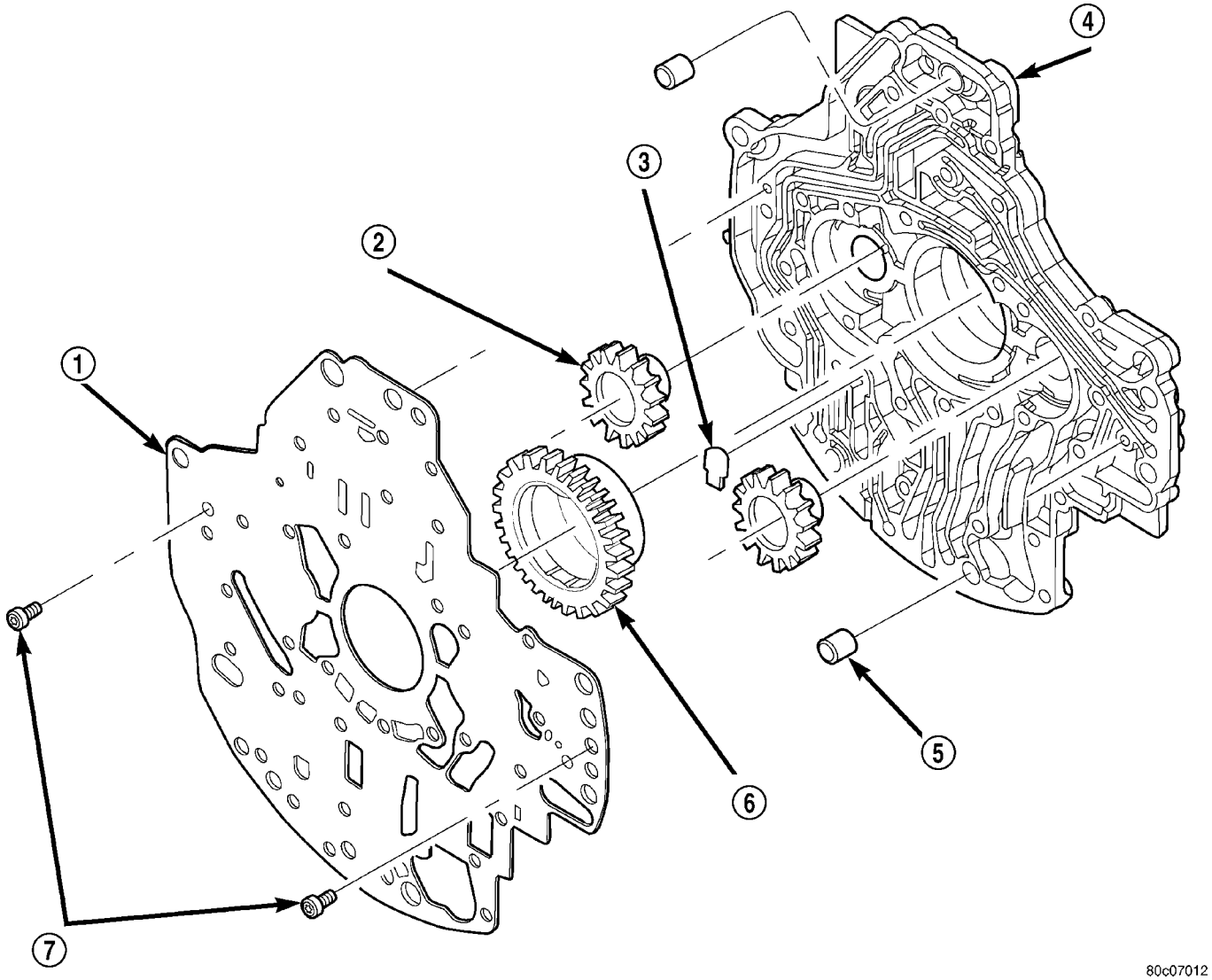


Fig. 101 Oil Pump Housing and Gears

1 - SEPARATOR PLATE
2 - DRIVEN GEAR (2)
3 - CHECK VALVE
4 - PUMP HOUSING
5 - DOWEL (2)
6 - DRIVE GEAR
7 - SCREW

OIL PUMP (Continued)

(9) Remove the oil pump valve retainers and associated valve and spring one at a time (Fig. 102) (Fig. 103). Mark the combination of components as a group and tag them as to the location from which they were removed.

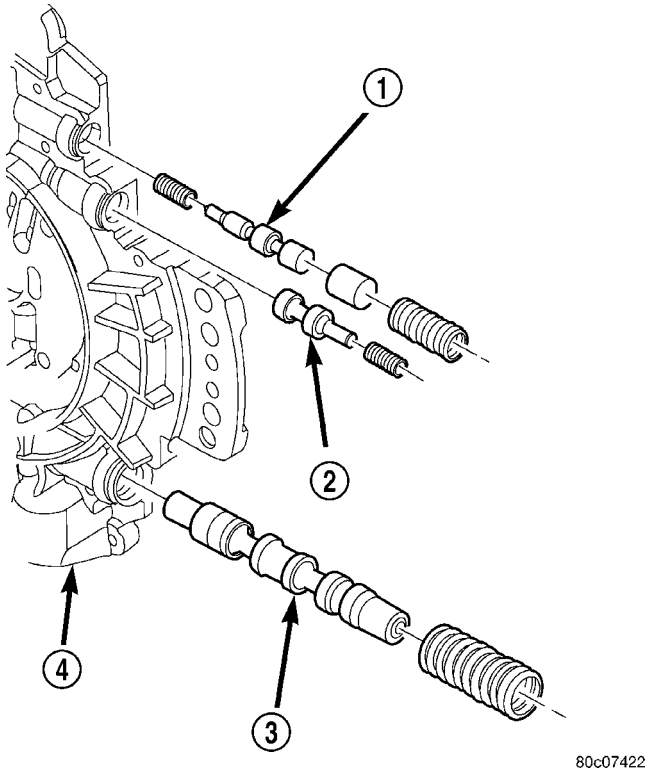


Fig. 102 Oil Pump Valve Body

1 - T/C REGULATOR VALVE
2 - T/C LIMIT VALVE
3 - REGULATOR VALVE
4 - OIL PUMP VALVE BODY

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 reaction shaft support bushings. Replace either bushing only if heavily worn, scored or damaged. It is not necessary to replace the bushings unless they are actually damaged.

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

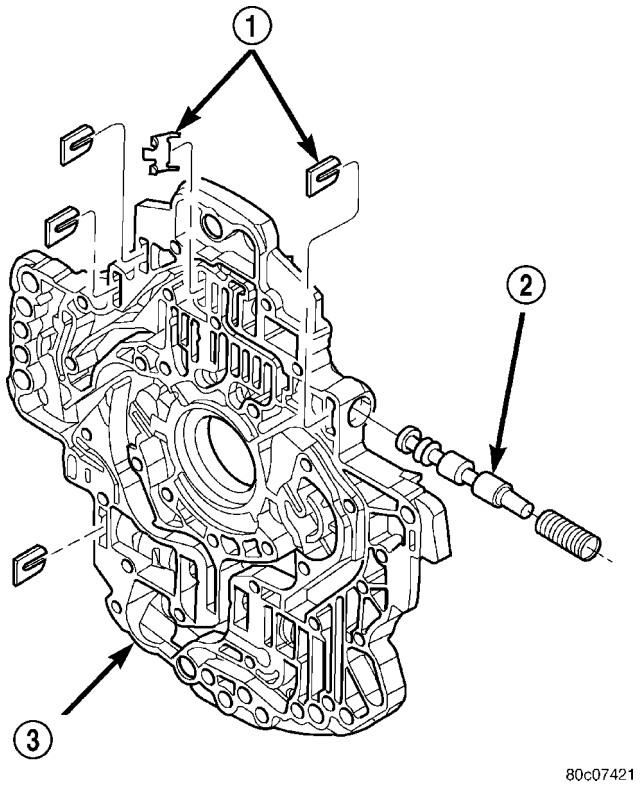


Fig. 103 T/C Switch Valve

1 - RETAINER
2 - T/C SWITCH VALVE
3 - OIL PUMP VALVE BODY

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 oil pump cover. Use a penlight to view the bore interiors. Replace the oil pump if any bores are distorted or scored. Inspect all of the valve springs. The springs must be free of distortion, warpage or broken coils.

Trial fit each valve and plug in its bore to check freedom of operation. When clean and dry, the valves and plugs should drop freely into the bores.

ASSEMBLY

(1) Clean and inspect all components. Make sure that all passages are thoroughly cleaned and are free from dirt or debris. Make sure that all valves move freely in their proper bore. Make sure that all gear pockets and bushings are free from excessive wear and scoring. Replace the oil pump if any excessive wear or scoring is found.

(2) Coat the gears with Mopar® ATF +4 and install into their original locations.

(3) Lubricate the oil pump valves with Mopar® ATF +4 and install the valve, spring and retainer

OIL PUMP (Continued)

into the appropriate oil pump valve body bore (Fig. 102) (Fig. 103).

(4) Place the separator plate onto the oil pump body (Fig. 101).

(5) Install the screws to hold the separator plate onto the oil pump body (Fig. 101). Tighten the screws to 4.5 N·m (40 in.lbs.).

(6) Position the oil pump cover onto the locating dowels (Fig. 100).

(7) Seat the two oil pump halves together and install all bolts finger tight.

(8) Torque all bolts down slowly starting in the center and working outward. The correct torque is 4.5 N·m (40 in.lbs.).

(9) Verify that the oil pump gears rotate freely and smoothly.

(10) Position the reaction shaft support into the oil pump (Fig. 100).

(11) Install and torque the bolts to hold the reaction shaft support to the oil pump (Fig. 100). The correct torque is 12 N·m (105 in.lbs.).

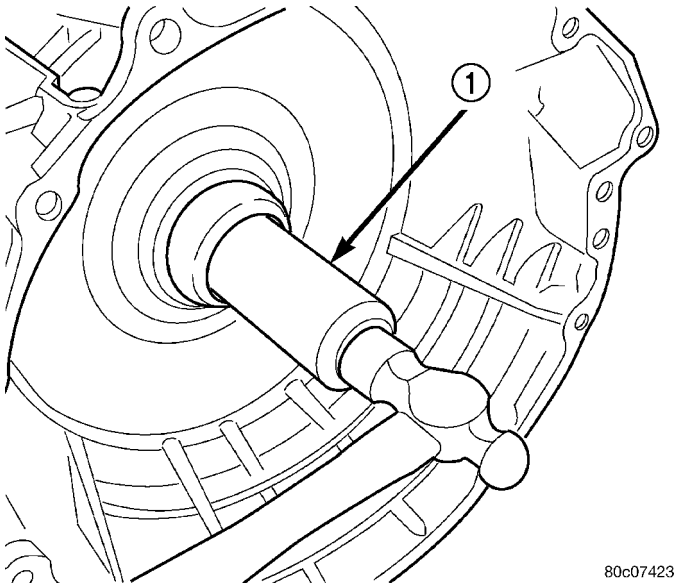


Fig. 104 Install Oil Pump Front Seal

1 - TOOL C-3860-A

OIL PUMP FRONT SEAL

REMOVAL

(1) Remove transmission from the vehicle.

(2) Remove the torque converter from the transmission.

(3) Using a screw mounted in a slide hammer, remove the oil pump front seal.

INSTALLATION

(1) Clean seal bore of the oil pump of any residue or particles from the original seal.

(2) Install new oil seal in the oil pump housing using Seal Installer C-3860-A (Fig. 104).

OUTPUT SPEED SENSOR

DESCRIPTION

The Input and Output Speed Sensors are two-wire magnetic pickup devices that generate AC signals as rotation occurs. They are mounted in the left side of the transmission case and are considered primary inputs to the Transmission Control Module (TCM).

OPERATION

The Input Speed Sensor provides information on how fast the input shaft is rotating. As the teeth of the input clutch hub pass by the sensor coil, an AC voltage is generated and sent to the TCM. The TCM interprets this information as input shaft rpm.

The Output Speed Sensor generates an AC signal in a similar fashion, though its coil is excited by rotation of the rear planetary carrier lugs. The TCM interprets this information as output shaft rpm.

The TCM compares the input and output speed signals to determine the following:

- Transmission gear ratio
- Speed ratio error detection
- CVI calculation

The TCM also compares the input speed signal and the engine speed signal to determine the following:

- Torque converter clutch slippage
- Torque converter element speed ratio

REMOVAL

(1) Raise vehicle.

(2) Place a suitable fluid catch pan under the transmission.

(3) Remove the wiring connector from the output speed sensor (Fig. 105).

(4) Remove the bolt holding the output speed sensor to the transmission case.

(5) Remove the output speed sensor from the transmission case.

INSTALLATION

(1) Install the output speed sensor into the transmission case.

(2) Install the bolt to hold the output speed sensor into the transmission case. Tighten the bolt to 11.9 N·m (105 in.lbs.).

(3) Install the wiring connector onto the output speed sensor

(4) Verify the transmission fluid level. Add fluid as necessary.

(5) Lower vehicle.

OVERDRIVE SWITCH (Continued)

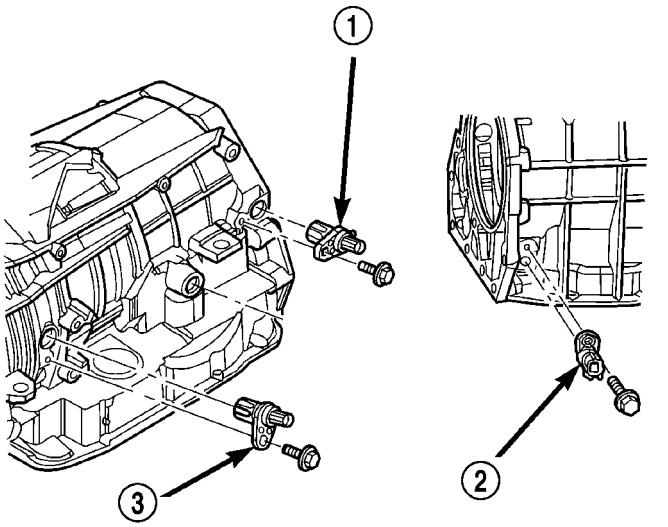


Fig. 105 Output Speed Sensor

1 - OUTPUT SPEED SENSOR
2 - LINE PRESSURE SENSOR
3 - INPUT SPEED SENSOR

OVERDRIVE SWITCH

DESCRIPTION

The overdrive OFF (control) switch is located in the shift lever arm (Fig. 106). The switch is a momentary contact device that signals the PCM to toggle current status of the overdrive function.

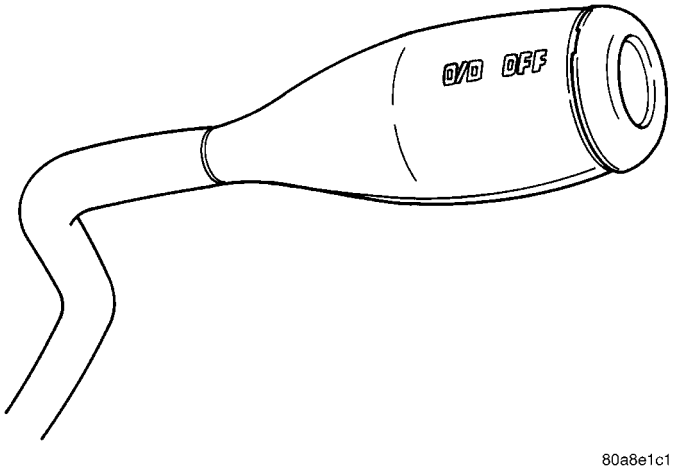


Fig. 106 Overdrive Off Switch

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.

REMOVAL

(1) Using a plastic trim tool, remove the overdrive off switch retainer from the shift lever (Fig. 107).

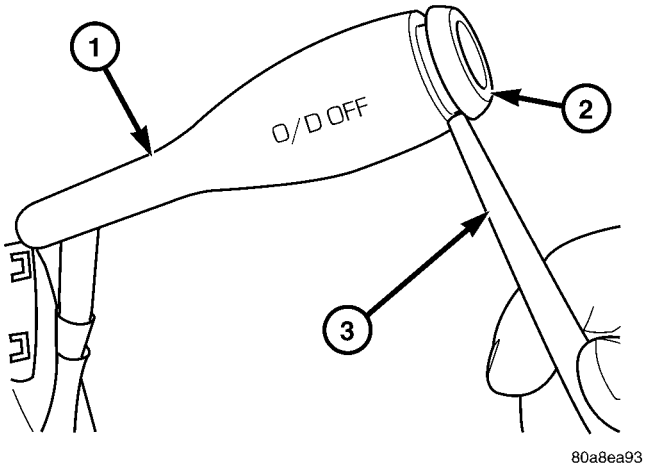


Fig. 107 Overdrive Off Switch Retainer

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. 108)

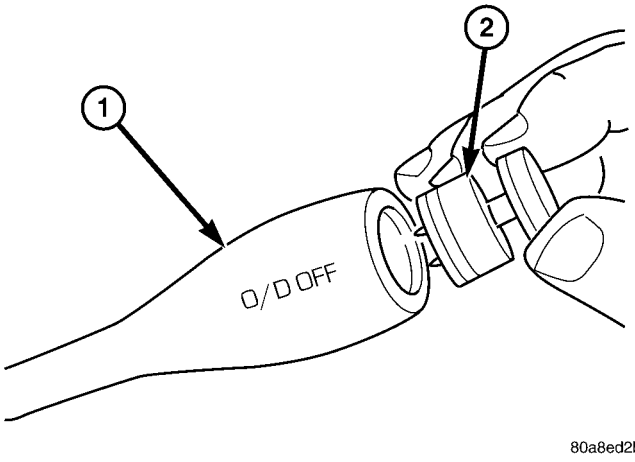


Fig. 108 Remove the Overdrive Off Switch

1 - GEAR SHIFT LEVER
2 - OVERDRIVE OFF SWITCH

OVERDRIVE SWITCH (Continued)

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. 109)

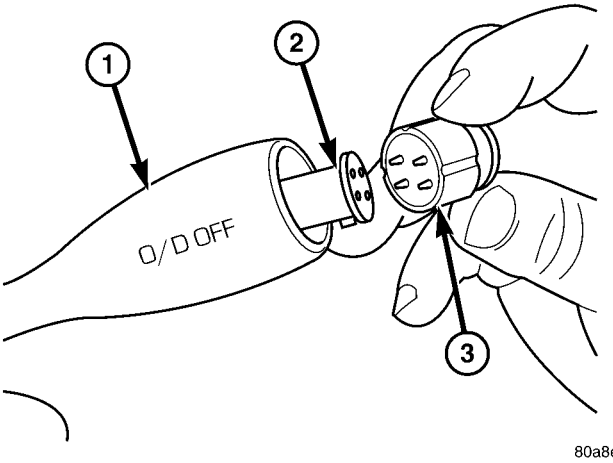


Fig. 109 Install the Overdrive Off Switch

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.

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. 110) 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.

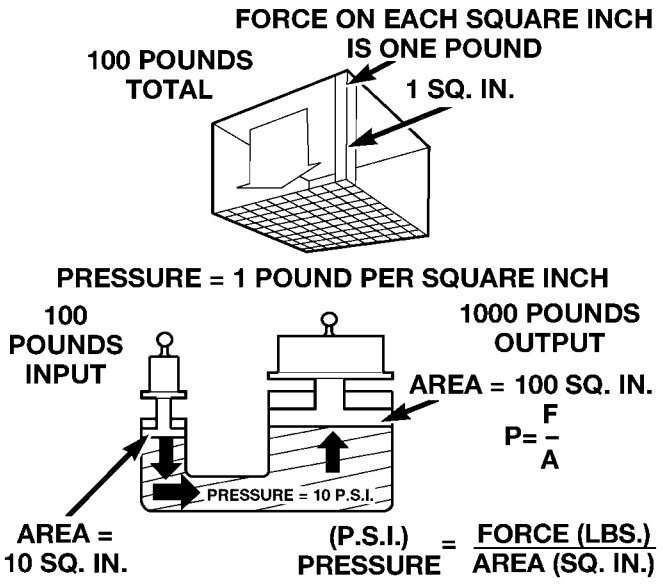


Fig. 110 Force and Pressure Relationship

PRESSURE ON A CONFINED FLUID

Pressure is exerted on a confined fluid (Fig. 111) 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

PISTONS (Continued)

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.

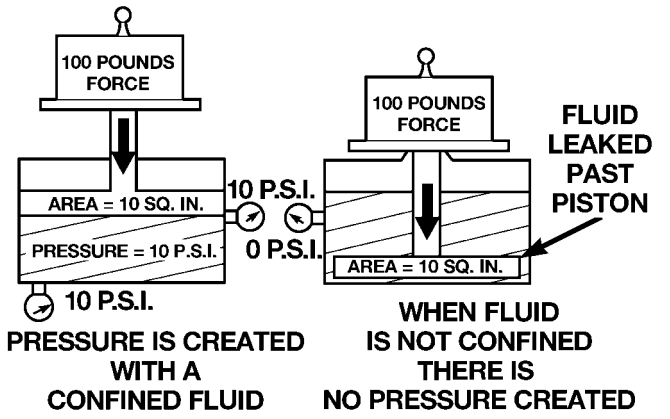


Fig. 111 Pressure on a Confined Fluid

FORCE MULTIPLICATION

Using the 10 PSI example used in the illustration (Fig. 112), 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. 112), shows an area that is ten times larger than the original area. The pressure created with the smaller 100 lb. input is 10 PSI. The concept "pressure is the same everywhere" means that the pressure underneath the larger piston is also 10 PSI. Pressure is equal to the force applied divided by the contact area. Therefore, by means of simple algebra, the output force may be found. This concept is extremely important, as it is also used in the design and operation of all shift valves and limiting valves in the valve body, as well as the pistons, of the transmission, which activate the clutches and bands. It is nothing more than using a difference of area to create a difference in pressure to move an object.

PISTON TRAVEL

The relationship between hydraulic lever and a mechanical lever is the same. With a mechanical lever it's a weight-to-distance output rather than a pressure-to-area output. Using the same forces and areas as in the previous example, the smaller piston

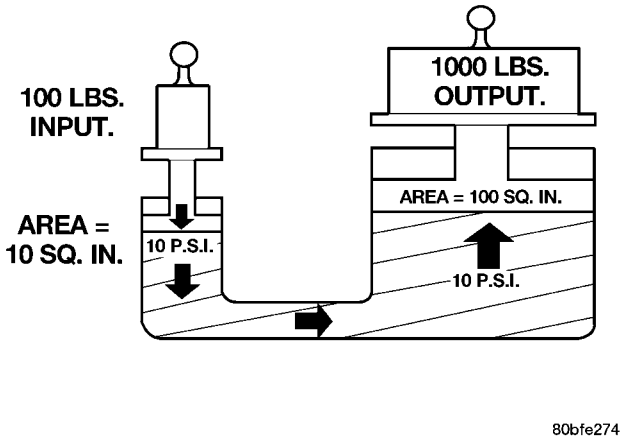


Fig. 112 Force Multiplication

(Fig. 113) 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.

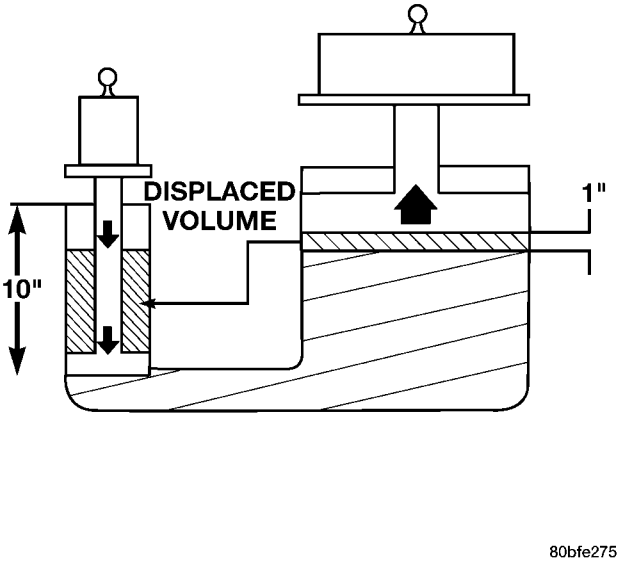


Fig. 113 Piston Travel

PLANETARY GEARTRAIN

DESCRIPTION

The planetary geartrain is located behind the 4C retainer/bulkhead, toward the rear of the transmission. The planetary geartrain consists of three primary assemblies:

- Reaction (Fig. 114).
- Reverse (Fig. 115).
- Input (Fig. 115).

OPERATION

REACTION PLANETARY GEARTRAIN

The reaction planetary carrier and reverse sun gear of the reaction planetary geartrain are a single component which is held by the 2C clutch when required. The reaction annulus gear is a stand alone component that can be driven by the reverse clutch or held by the 4C clutch. The reaction sun gear is driven by the overdrive clutch.

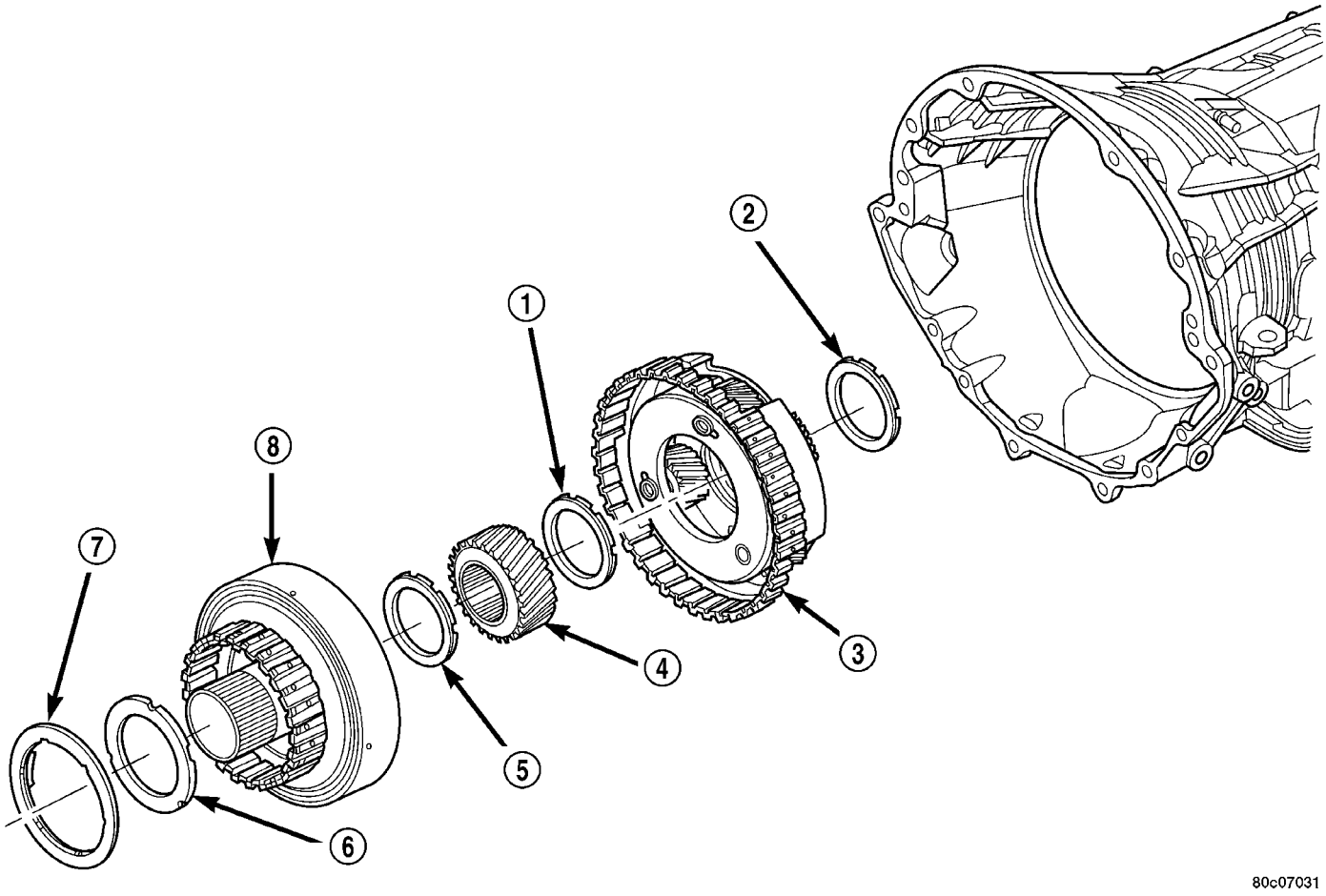


Fig. 114 Reaction Planetary Geartrain

1 - BEARING NUMBER 8
2 - BEARING NUMBER 9
3 - REACTION PLANETARY CARRIER
4 - REACTION SUN GEAR
5 - BEARING NUMBER 7
6 - THRUST PLATE (SELECT)
7 - BEARING NUMBER 6
8 - REACTION ANNULUS

PLANETARY GEARTRAIN (Continued)

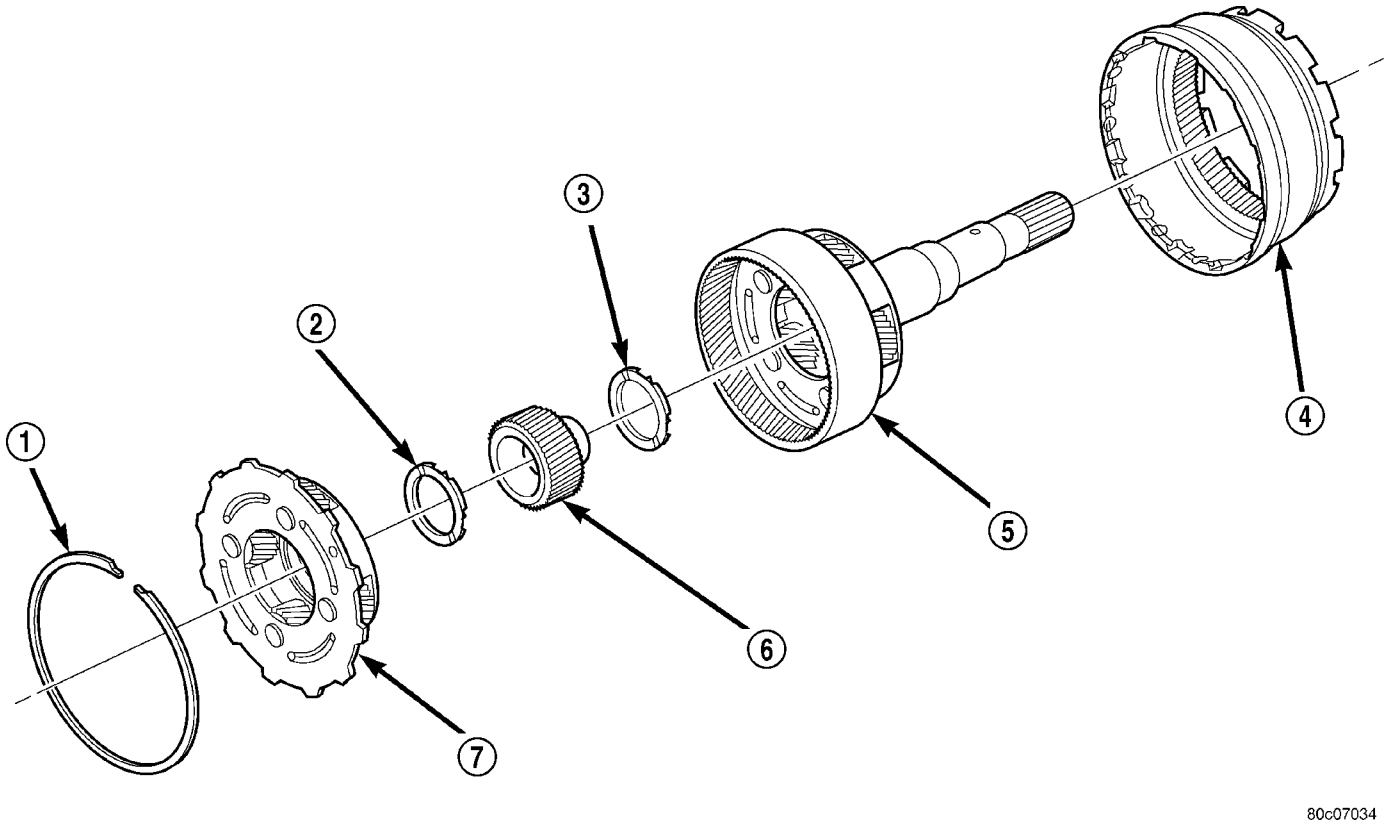


Fig. 115 Reverse/Input Planetary Geartrain

1 - SNAP-RING
2 - BEARING NUMBER 10
3 - BEARING NUMBER 11
4 - INPUT ANNULUS
5 - INPUT PLANETARY CARRIER
6 - INPUT SUN GEAR
7 - REVERSE PLANETARY CARRIER

REVERSE PLANETARY GEARTRAIN

The reverse planetary geartrain is the middle of the three planetary sets. The reverse planetary carrier can be driven by the overdrive clutch as required. The reverse planetary carrier is also splined to the input annulus gear, which can be held by the low/reverse clutch. The reverse planetary annulus, input planetary carrier, and output shaft are all one piece.

INPUT PLANETARY GEARTRAIN

The input sun gear of the input planetary geartrain is driven by the underdrive clutch.

PLANETARY GEARTRAIN (Continued)

DISASSEMBLY

(1) Remove the snap-ring holding the input annulus into the input carrier (Fig. 116).

(2) Remove the input annulus from the input carrier (Fig. 116).

(3) Remove the number 9 bearing from the reverse planetary carrier. Note that this planetary carrier has four pinion gears.

(4) Remove the reverse planetary gear carrier (Fig. 116).

(5) Remove the number 10 bearing from the input sun gear (Fig. 116).

(6) Remove the input sun gear from the input carrier (Fig. 116).

(7) Remove the number 11 bearing from the input carrier (Fig. 116).

CLEANING

Clean the planetary components in solvent and dry them with compressed air.

INSPECTION

Check sun gear and driving shell condition. Replace the gear if damaged or if the bushings are scored or worn. The bushings are not serviceable. Replace the driving shell if worn, cracked or damaged.

Replace planetary gear sets if gears, pinion pins, or carrier are damaged in any way. Replace the annulus gears and supports if either component is worn or damaged.

Replace the output shaft if the machined surfaces are scored, pitted, or damaged in any way. Also replace the shaft if the splines are damaged, or exhibits cracks at any location.

ASSEMBLY

(1) Clean and inspect all components. Replace any components which show evidence of excessive wear or scoring.

(2) Install the number 11 bearing into the input planetary carrier so that the inner race will be toward the front of the transmission (Fig. 116).

(3) Install the input sun gear into the input carrier (Fig. 116).

(4) Install the number 10 bearing onto the rear of the reverse planetary carrier with the inner race toward the carrier (Fig. 116).

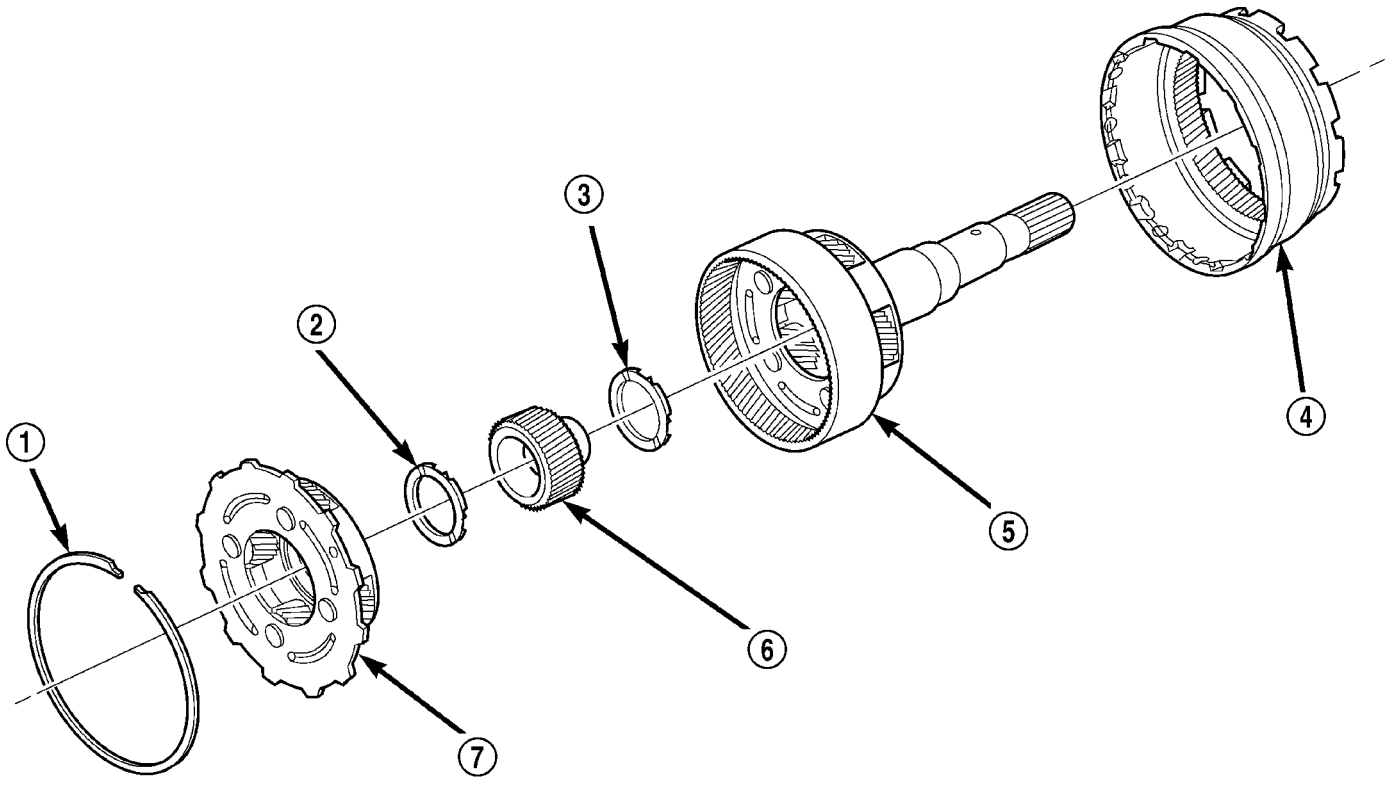


Fig. 116 Reverse/Input Planetary Carrier Assembly

1 - SNAP-RING
2 - BEARING NUMBER 10
3 - BEARING NUMBER 11
4 - INPUT ANNULUS
5 - INPUT PLANETARY CARRIER
6 - INPUT SUN GEAR
7 - REVERSE PLANETARY CARRIER

PLANETARY GEARTRAIN (Continued)

(5) Install the number 9 bearing onto the front of the reverse planetary carrier with the outer race toward the carrier and the inner race facing upward (Fig. 116).

(6) Install the reverse planetary gear carrier into the input carrier (Fig. 116).

(7) Install the input annulus gear into the input carrier (Fig. 116).

(8) Install the snap-ring to hold the input annulus gear into the input carrier (Fig. 116).

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, OVERDRIVE FOURTH, and OVERDRIVE FIFTH (if applicable) gear ranges. The shift into OVERDRIVE FOURTH and FIFTH (if applicable) gear ranges 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 or 4-5 (if applicable) shifts.

The FOURTH and FIFTH (if applicable) gear upshifts occur automatically when the overdrive selector switch is in the ON position. No upshift to FOURTH or FIFTH (if applicable) gears 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 or 4-5 (if applicable) shifts to occur.

Upshifts into FOURTH or FIFTH (if applicable) will be delayed when the transmission fluid temperature is below 4.5° C (40° F) or above 115.5° C (240° F).

SOLENOID SWITCH VALVE

DESCRIPTION

The Solenoid Switch Valve (SSV) is located in the valve body and controls the direction of the transmission fluid when the L/R-TCC solenoid is energized.

OPERATION

The Solenoid Switch Valve controls line pressure from the LR-TCC solenoid. In 1st gear, the SSV will be in the downshifted position, thus directing fluid to the L/R clutch circuit. In 2nd, 3rd, 4th, and 5th (if applicable) gears, the solenoid switch valve will be in the upshifted position and directs the fluid into the torque converter clutch (TCC) circuit.

When shifting into 1st gear, a special hydraulic sequence is performed to ensure SSV movement into the downshifted position. The L/R pressure switch is monitored to confirm SSV movement. If the movement is not confirmed (the L/R pressure switch does not close), 2nd gear is substituted for 1st. A DTC will be set after three unsuccessful attempts are made to get into 1st gear in one given key start.

SOLENOIDS

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.

SOLENOIDS (Continued)

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:

1. Increase the amount of current applied to the coil or
2. 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.

TORQUE CONVERTER

DESCRIPTION

The torque converter (Fig. 117) 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 and contains an o-ring seal to better control oil flow.

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.

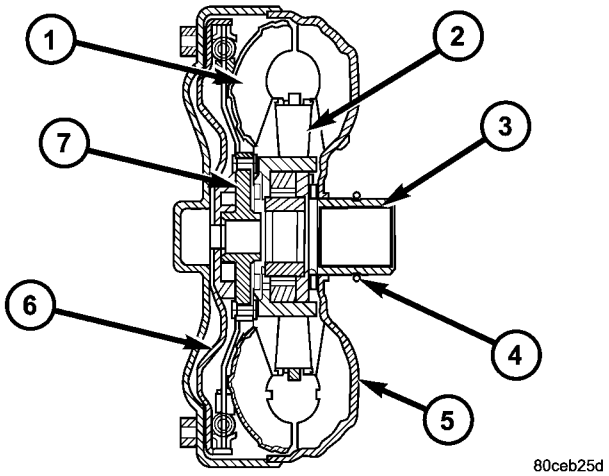


Fig. 117 Torque Converter Assembly

1 - TURBINE ASSEMBLY
2 - STATOR
3 - CONVERTER HUB
4 - O-RING
5 - IMPELLER ASSEMBLY
6 - CONVERTER CLUTCH PISTON
7 - TURBINE HUB

TORQUE CONVERTER (Continued)

IMPELLER

The impeller (Fig. 118) 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.

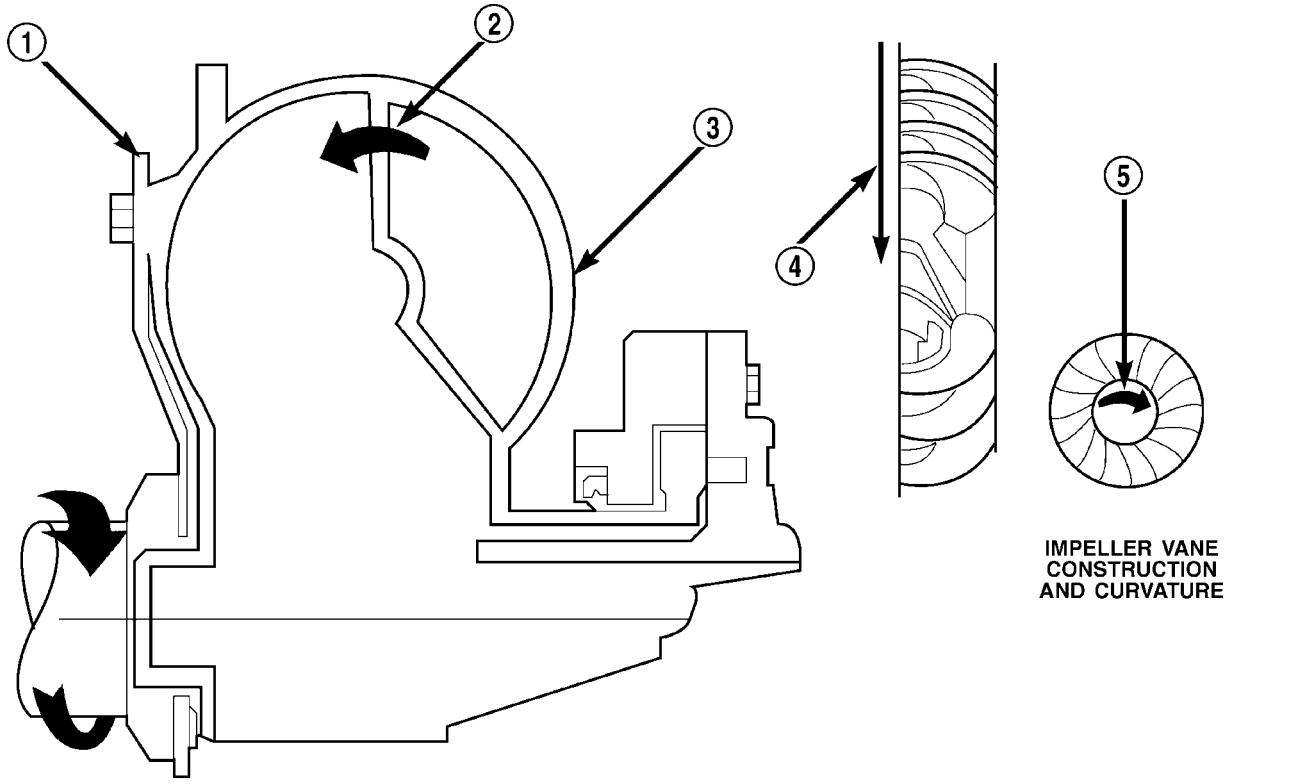


Fig. 118 Impeller

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. 119) 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.

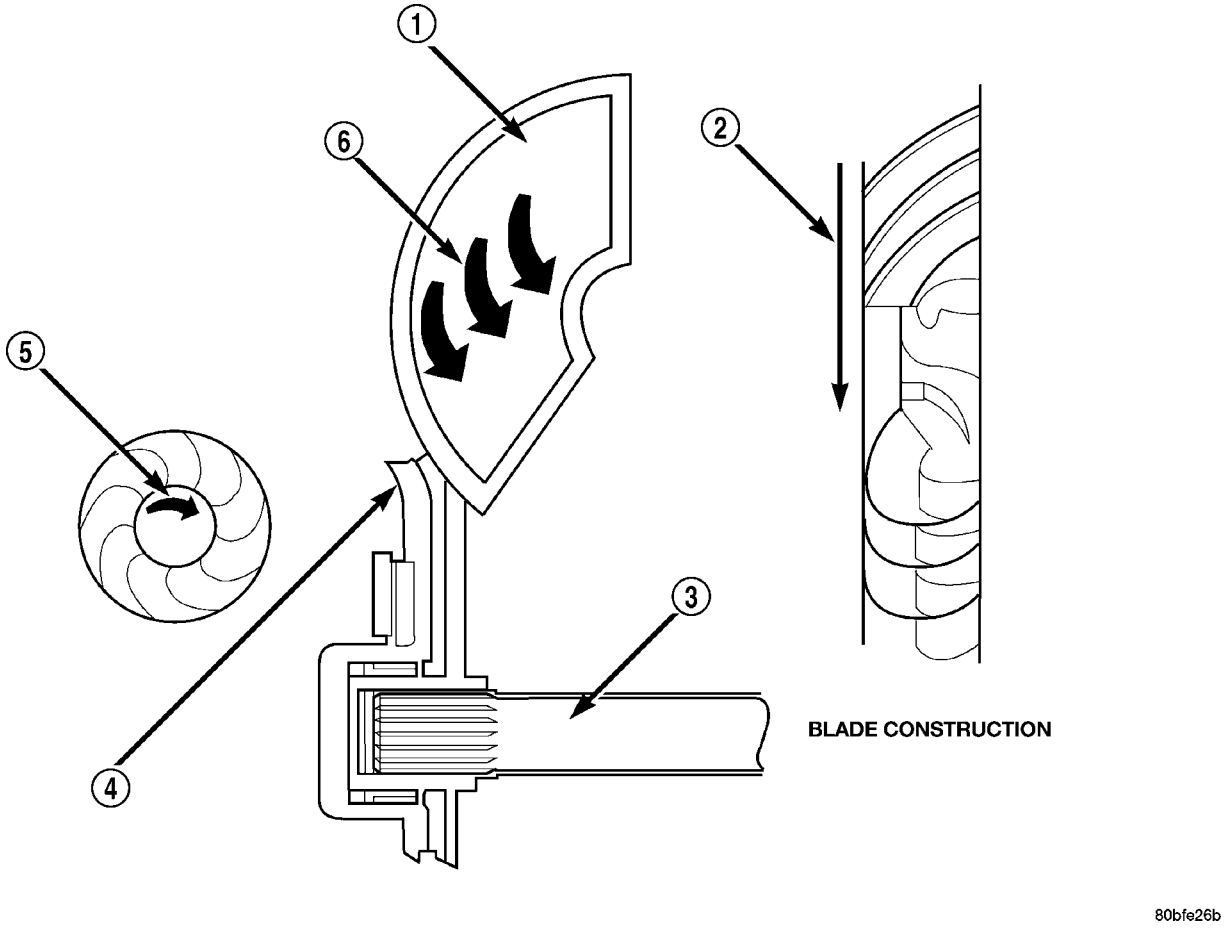


Fig. 119 Turbine

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. 120) 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. 121). 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.

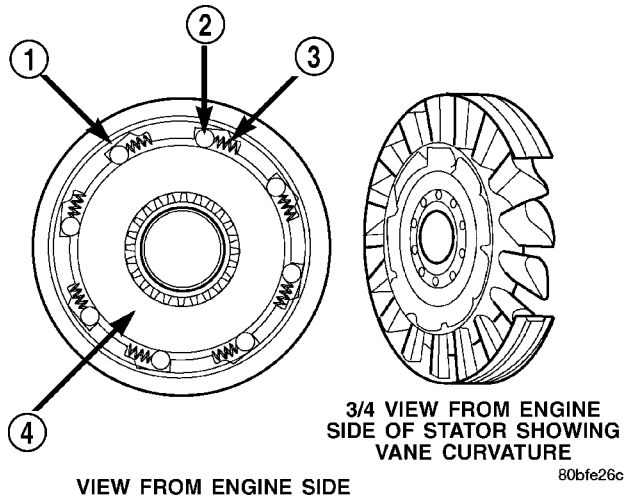


Fig. 120 Stator Components

1 - CAM (OUTER RACE)
2 - ROLLER
3 - SPRING
4 - INNER RACE

TORQUE CONVERTER CLUTCH (TCC)

The TCC (Fig. 122) 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 with friction material was added to the turbine assembly to provide this mechanical lock-up.

In order to reduce heat build-up in the transmission and buffer the powertrain against torsional vibrations, the TCM can duty cycle the L/R-CC Solenoid to achieve a smooth application of the torque converter clutch. This function, referred to as Electronically Modulated Converter Clutch (EMCC) can occur at various times depending on the following variables:

- Shift lever position
- Current gear range
- Transmission fluid temperature
- Engine coolant temperature
- Input speed
- Throttle angle
- Engine speed

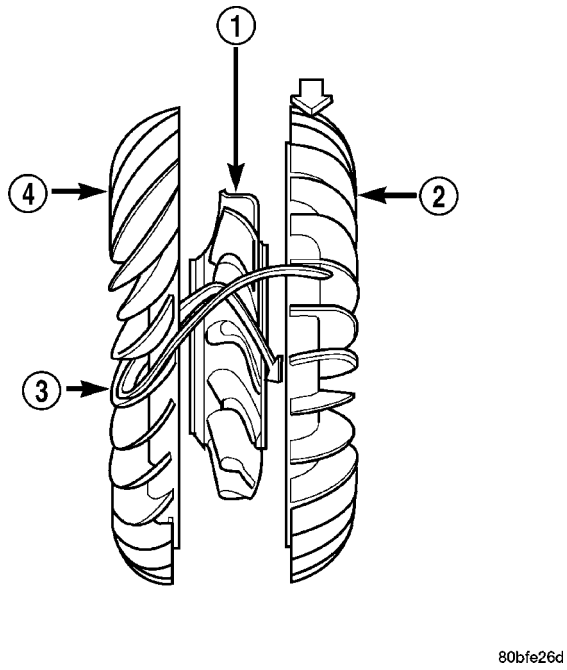


Fig. 121 Stator Location

1 - STATOR
2 - IMPELLER
3 - FLUID FLOW
4 - TURBINE

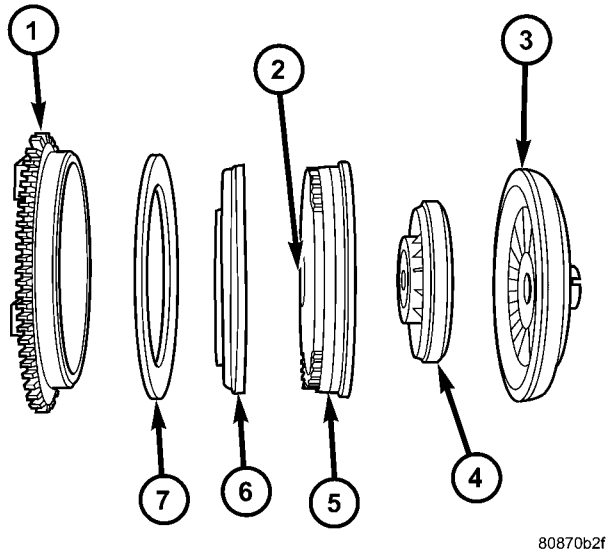


Fig. 122 Torque Converter Clutch (TCC)

1 - IMPELLER FRONT COVER
2 - THRUST WASHER ASSEMBLY
3 - IMPELLER
4 - STATOR
5 - TURBINE
6 - PISTON
7 - FRICTION DISC

TORQUE CONVERTER (Continued)

OPERATION

The converter impeller (Fig. 123) (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. 124). 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 over-running clutch of the stator locks and holds the stator from rotating. With the stator locked, the oil strikes the stator blades and is redirected into a "helping" direction before it enters the impeller. This circulation of oil from impeller to turbine, turbine to stator, and stator to impeller, can produce a maximum torque multiplication of about 2.4:1. As the turbine begins to match the speed of the impeller, the fluid that was hitting the stator in such 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 CLUTCH (TCC)

In a standard torque converter, the impeller and turbine are rotating at about the same speed and the stator is freewheeling, providing no torque multiplication. By applying the turbine's piston and friction material to the front cover, a total converter engagement can be obtained. The result of this engagement is a direct 1:1 mechanical link between the engine and the transmission.

The clutch can be engaged in second, third, fourth, and fifth (if appicable) gear ranges depending on overdrive control switch position. If the overdrive control switch is in the normal ON position, the clutch will engage after the shift to fourth gear. If the

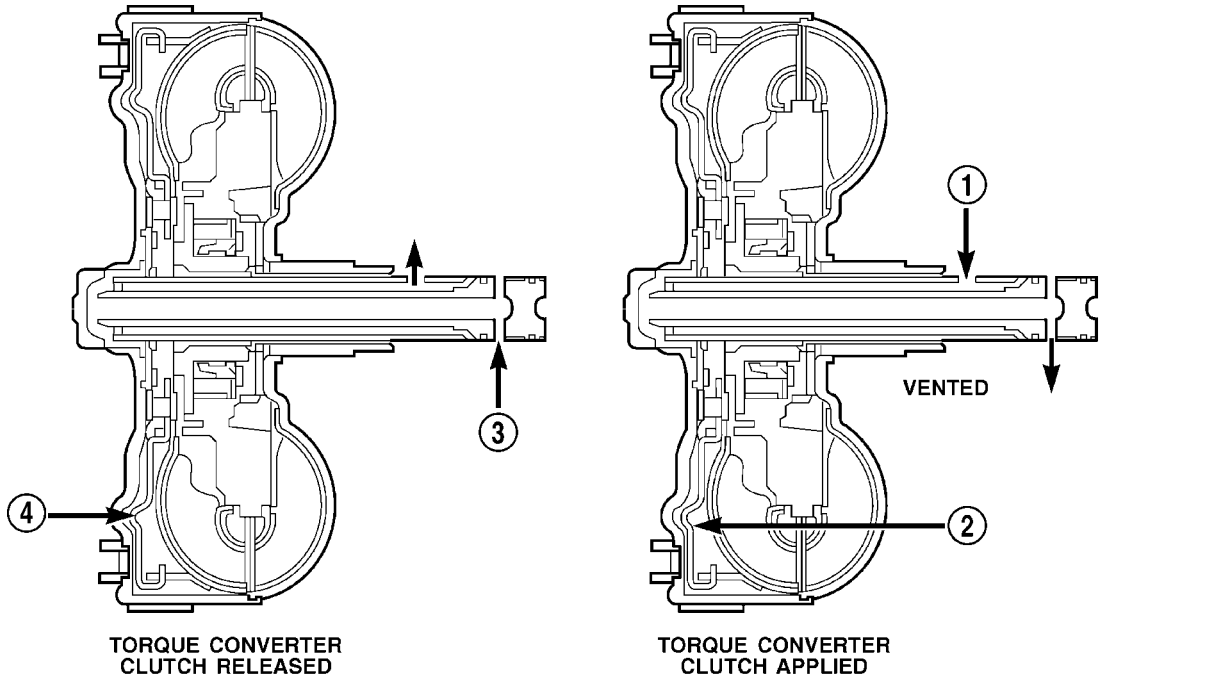


Fig. 123 Torque Converter Fluid Operation - Typical

1 - APPLY PRESSURE
2 - THE PISTON MOVES SLIGHTLY FORWARD
3 - RELEASE PRESSURE
4 - THE PISTON MOVES SLIGHTLY REARWARD

TORQUE CONVERTER (Continued)

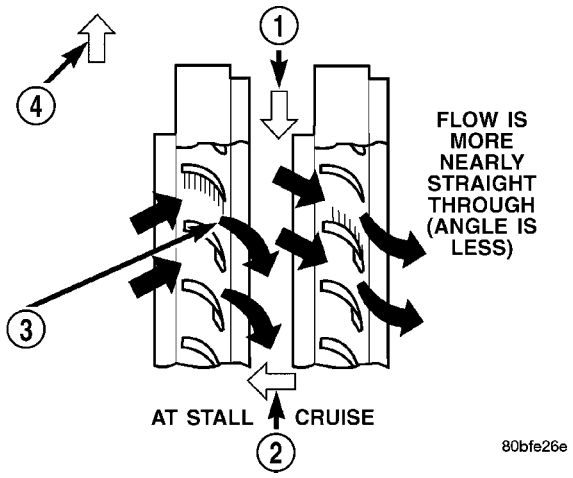


Fig. 124 Stator Operation

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

control switch is in the OFF position, the clutch will engage after the shift to third gear.

The TCM controls the torque converter by way of internal logic software. The programming of the software provides the TCM with control over the L/R-CC Solenoid. There are four output logic states that can be applied as follows:

- No EMCC
- Partial EMCC
- Full EMCC
- Gradual-to-no EMCC

NO EMCC

Under No EMCC conditions, the L/R Solenoid is OFF. There are several conditions that can result in NO EMCC operations. No EMCC can be initiated due to a fault in the transmission or because the TCM does not see the need for EMCC under current driving conditions.

PARTIAL EMCC

Partial EMCC operation modulates the L/R Solenoid (duty cycle) to obtain partial torque converter clutch application. Partial EMCC operation is maintained until Full EMCC is called for and actuated. During Partial EMCC some slip does occur. Partial EMCC will usually occur at low speeds, low load and light throttle situations.

FULL EMCC

During Full EMCC operation, the TCM increases the L/R Solenoid duty cycle to full ON after Partial EMCC control brings the engine speed within the desired slip range of transmission input speed relative to engine rpm.

GRADUAL-TO-NO EMCC

This operation is to soften the change from Full or Partial EMCC to No EMCC. This is done at mid-throttle by decreasing the L/R Solenoid duty cycle.

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 flats for sharp edges, burrs, scratches, or nicks. Polish the hub and flats with 320/400 grit paper or crocus cloth if necessary. Verify that the converter hub o-ring is properly installed and is free from debris. 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 converter hub o-ring 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. 125). Surface of converter lugs should be at least 13 mm (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.

TORQUE CONVERTER (Continued)

(9) Fill the transmission with the recommended fluid.

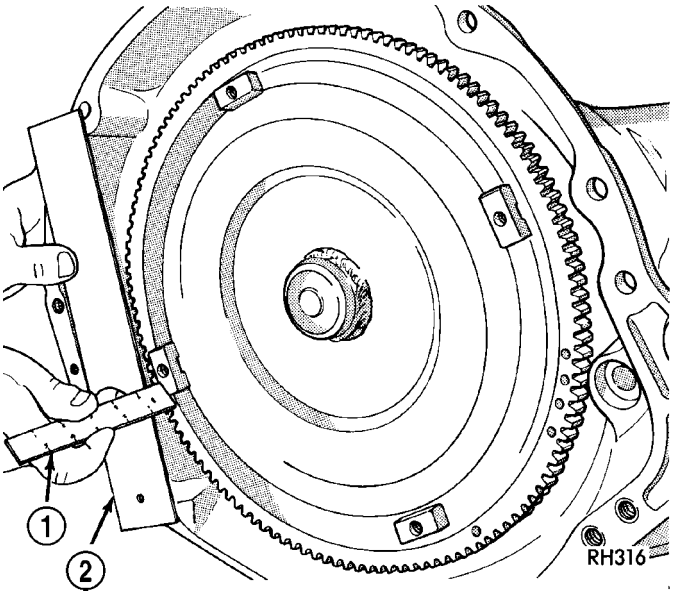


Fig. 125 Checking Torque Converter Seating-Typical

1 - SCALE
2 - STRAIGHTEDGE

TRANSMISSION CONTROL RELAY

DESCRIPTION

The relay is supplied fused B+ voltage, energized by the TCM, and is used to supply power to the solenoid pack when the transmission is in normal operating mode.

OPERATION

When the relay is “off”, no power is supplied to the solenoid pack and the transmission is in “limp-in” mode. After a controller reset, the TCM energizes the relay. Prior to this, the TCM verifies that the contacts are open by checking for no voltage at the switched battery terminals. After this is verified, the voltage at the solenoid pack pressure switches is checked. After the relay is energized, the TCM monitors the terminals to verify that the voltage is greater than 3 volts.

TRANSMISSION RANGE SENSOR

DESCRIPTION

The Transmission Range Sensor (TRS) is part of the solenoid module, which is mounted to the top of the valve body inside the transmission.

The Transmission Range Sensor (TRS) has five switch contact pins that:

- Determine shift lever position
- Supply ground to the Starter Relay in Park and Neutral only.
- Supply +12 V to the backup lamps in Reverse only.

The TRS also has an integrated temperature sensor (thermistor) that communicates transmission temperature to the TCM and PCM.

OPERATION

The Transmission Range Sensor (TRS) communicates shift lever position to the TCM as a combination of open and closed switches. Each shift lever position has an assigned combination of switch states (open/closed) that the TCM receives from four sense circuits. The TCM interprets this information and determines the appropriate transmission gear position and shift schedule.

There are many possible combinations of open and closed switches (codes). Seven of these possible codes are related to gear position and five are recognized as “between gear” codes. This results in many codes which should **never occur**. These are called “invalid” codes. An invalid code will result in a DTC, and the TCM will then determine the shift lever position based on pressure switch data. This allows reasonably normal transmission operation with a TRS failure.

GEAR	C5	C4	C3	C2	C1
Park	CL	OP	OP	CL	CL
Temp 1	CL	OP	OP	CL	OP
Reverse	OP	OP	OP	CL	OP
Temp 2	OP	OP	CL	CL	OP
Neutral 1	OP	OP	CL	CL	CL
Neutral 2	OP	CL	CL	CL	CL
Temp 3	OP	CL	CL	CL	OP
Drive	OP	CL	CL	OP	OP
Temp 4	OP	CL	OP	OP	OP
Manual 2	CL	CL	OP	OP	OP
Temp 5	CL	OP	OP	OP	OP
Manual 1	CL	OP	CL	OP	OP

TRANSMISSION SOLENOID/ TRS ASSEMBLY

DESCRIPTION

The transmission solenoid/TRS assembly is internal to the transmission and mounted on the valve body assembly (Fig. 126). The assembly consists of six solenoids that control hydraulic pressure to the six friction elements (transmission clutches), and the torque converter clutch. The pressure control solenoid is located on the side of the solenoid/TRS assembly. The solenoid/TRS assembly also contains five pressure switches that feed information to the TCM.

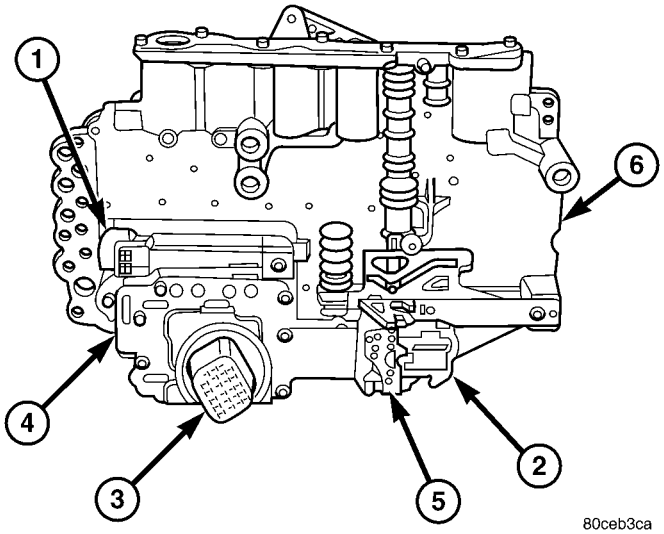


Fig. 126 Transmission Solenoid/TRS Assembly

1 - PRESSURE CONTROL SOLENOID
2 - TRANSMISSION RANGE SELECTOR PLATE
3 - 23-WAY CONNECTOR
4 - SOLENOID PACK
5 - TRANSMISSION RANGE SENSOR
6 - VALVE BODY

OPERATION

SOLENOIDS

Solenoids are used to control the L/R, 2C, 4C, OD, and UD friction elements. The reverse clutch is controlled by line pressure and the position of the manual valve in the valve body. All the solenoids are contained within the Solenoid and Pressure Switch Assembly. The solenoid and pressure switch assembly contains one additional solenoid, Multi-Select (MS), which serves primarily to provide 2nd and 3rd gear limp-in operation.

The solenoids receive electrical power from the Transmission Control Relay through a single wire. The TCM energizes or operates the solenoids individually by grounding the return wire of the solenoid as necessary. When a solenoid is energized, the solenoid valve shifts, and a fluid passage is opened or closed (vented or applied), depending on its default operating state. The result is an apply or release of a frictional element.

The MS and UD solenoids are normally applied to allow transmission limp-in in the event of an electrical failure.

The continuity of the solenoids and circuits are periodically tested. Each solenoid is turned on or off depending on its current state. An inductive spike should be detected by the TCM during this test. If no spike is detected, the circuit is tested again to verify the failure. In addition to the periodic testing, the solenoid circuits are tested if a speed ratio or pressure switch error occurs.

PRESSURE SWITCHES

The TCM relies on five pressure switches to monitor fluid pressure in the L/R, 2C, 4C, UD, and OD hydraulic circuits. The primary purpose of these switches is to help the TCM detect when clutch circuit hydraulic failures occur. The switches close at 23 psi and open at 11 psi, and simply indicate whether or not pressure exists. The switches are continuously monitored by the TCM for the correct states (open or closed) in each gear as shown in the following charts 45RFE PRESSURE SWITCH STATES and 545RFE PRESSURE SWITCH STATES :

45RFE PRESSURE SWITCH STATES

GEAR	L/R	2C	4C	UD	OD
R	OP	OP	OP	OP	OP
P/N	CL	OP	OP	OP	OP
1ST	CL*	OP	OP	CL	OP
2ND	OP	CL	OP	CL	OP
2ND PRIME	OP	OP	CL	CL	OP
D	OP	OP	OP	CL	CL
FOURTH	OP	OP	CL	OP	CL

*L/R is closed if output speed is below 100 rpm in Drive and Manual 2. L/R is open in Manual 1.

TRANSMISSION SOLENOID/TRS ASSEMBLY (Continued)

545RFE PRESSURE SWITCH STATES

GEAR	L/R	2C	4C	UD	OD
R	OP	OP	OP	OP	OP
P/N	CL	OP	OP	OP	OP
1ST	CL*	OP	OP	CL	OP
2ND	OP	CL	OP	CL	OP
2ND PRIME	OP	OP	CL	CL	OP
D	OP	OP	OP	CL	CL
4TH	OP	OP	CL	OP	CL
5TH	OP	CL	OP	OP	CL

*L/R is closed if output speed is below 100 rpm in Drive and Manual 2. L/R is open in Manual 1.

A Diagnostic Trouble Code (DTC) will set if the TCM senses any switch open or closed at the wrong time in a given gear.

REMOVAL

(1) Remove the valve body from the transmission (Fig. 127).

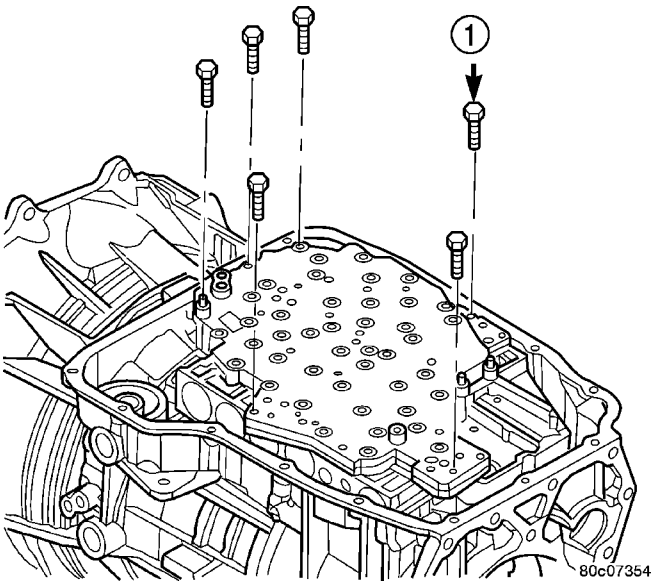


Fig. 127 Valve Body Bolts

1 - VALVE BODY TO CASE BOLT (6)

(2) Remove the screws holding the transmission solenoid/TRS assembly onto the valve body (Fig. 128).

(3) Separate the transmission solenoid/TRS assembly from the valve body.

INSTALLATION

(1) Place TRS selector plate in the PARK position.

(2) Position the transmission solenoid/TRS assembly onto the valve body. Be sure that both alignment dowels are fully seated in the valve body and that the TRS switch contacts are properly positioned in the selector plate

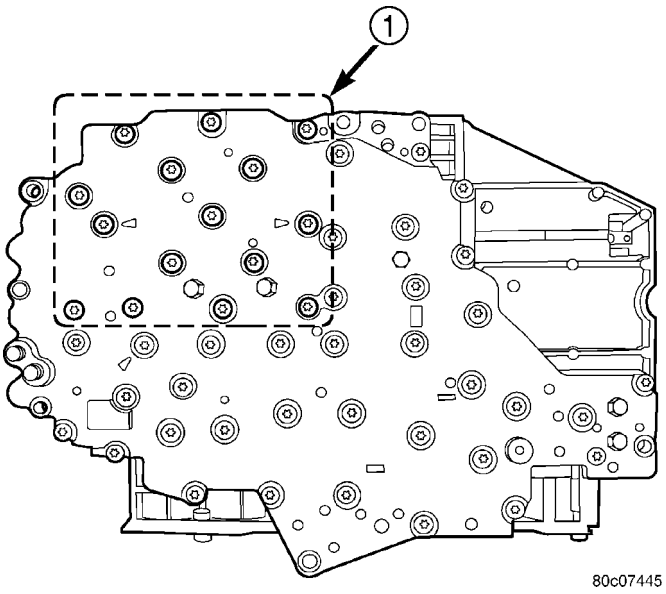


Fig. 128 Ttransmission Solenoid/TRS Assembly Screws

1 - SOLENOID PACK BOLTS (15)

(3) Install the screws to hold the transmission solenoid/TRS assembly onto the valve body.

(4) Tighten the solenoid assembly screws adjacent to the arrows cast into the bottom of the valve body first. Tighten the screws to 5.7 N·m (50 in.lbs.).

(5) Tighten the remainder of the solenoid assembly screws to 5.7 N·m (50 in.lbs.).

(6) Install the valve body into the transmission.

TRANSMISSION TEMPERATURE SENSOR

DESCRIPTION

The transmission temperature sensor is a thermistor that is integral to the Transmission Range Sensor (TRS).

OPERATION

The transmission temperature sensor is used by the TCM to sense the temperature of the fluid in the sump. Since fluid temperature can affect transmission shift quality and convertor lock up, the TCM requires this information to determine which shift schedule to operate in.

Calculated Temperature

A failure in the temperature sensor or circuit will result in calculated temperature being substituted for actual temperature. Calculated temperature is a pre-

TRANSMISSION TEMPERATURE SENSOR (Continued)

dicted fluid temperature which is calculated from a combination of inputs:

- Battery (ambient) temperature
- Engine coolant temperature
- In-gear run time since start-up

VALVE BODY

DESCRIPTION

The valve body consists of a cast aluminum valve body, a separator plate, and a 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. 129) and (Fig. 130):

- Solenoid switch valve
- Manual valve
- Low/reverse switch valve
- 5 Accumulators
- 7 check balls

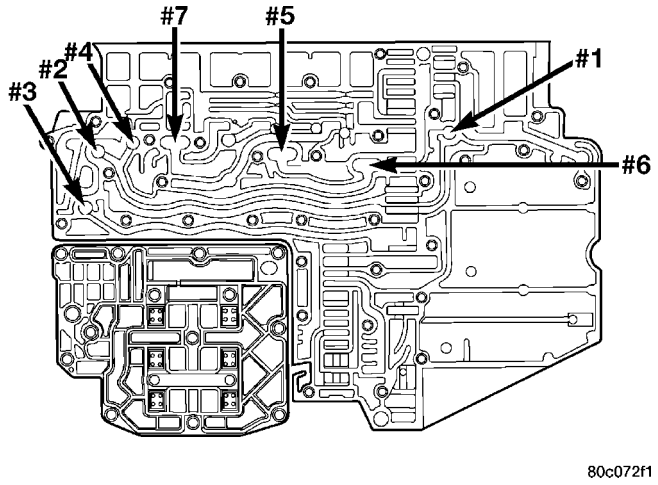


Fig. 130 Check Ball Locations

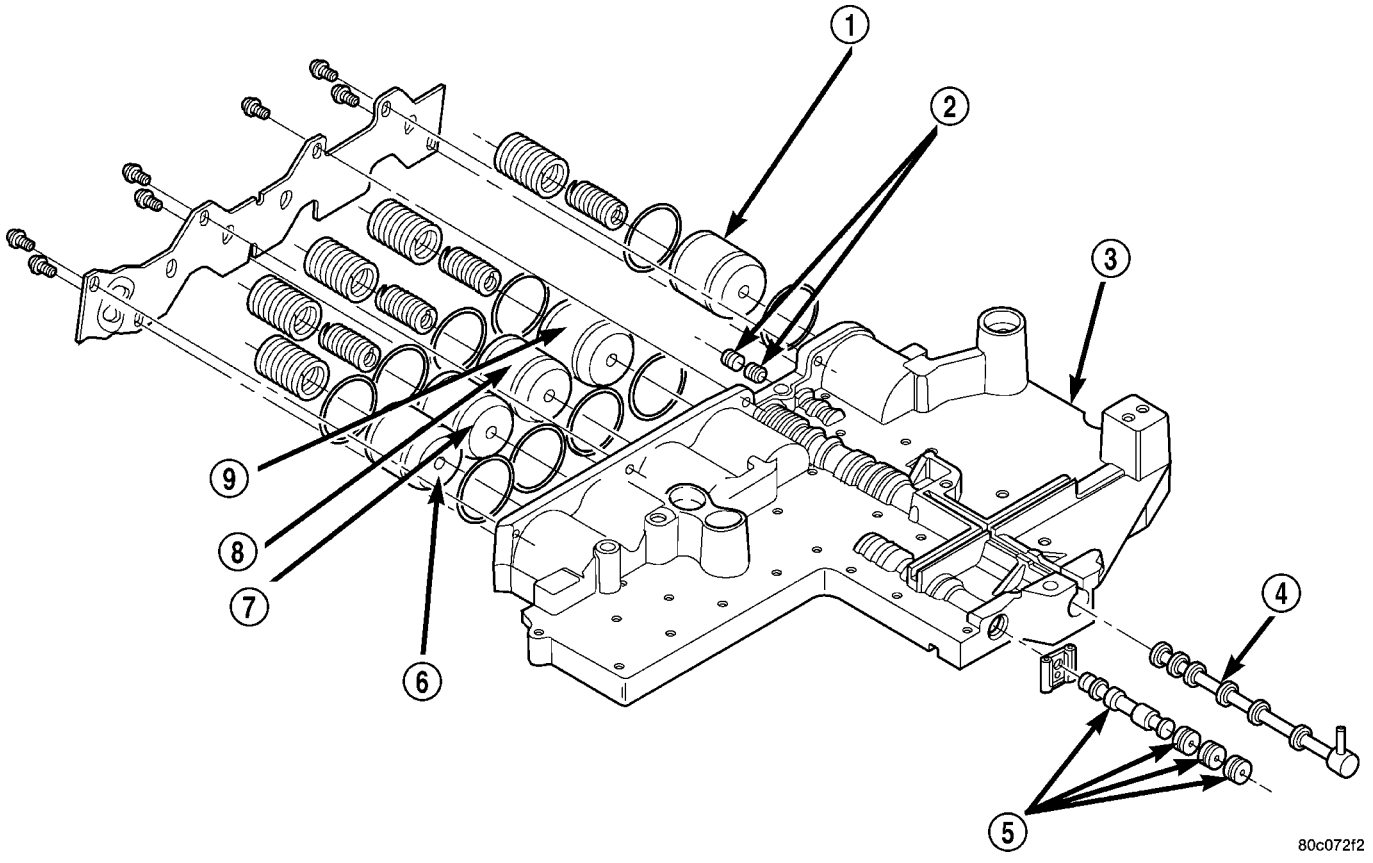


Fig. 129 Valve Body Components

1 - LOW/REVERSE ACCUMULATOR
2 - LOW/REVERSE SWITCH VALVE
3 - UPPER VALVE BODY
4 - MANUAL VALVE
5 - SOLENOID SWITCH VALVE
6 - OVERDRIVE ACCUMULATOR
7 - UNDERDRIVE ACCUMULATOR
8 - 4C ACCUMULATOR
9 - 2C ACCUMULATOR

VALVE BODY (Continued)

OPERATION

NOTE: Refer to the Hydraulic Schematics for a visual aid in determining valve location, operation and design.

SOLENOID SWITCH VALVE

The Solenoid Switch Valve (SSV) controls the direction of the transmission fluid when the L/R-TCC solenoid is energized.

When shifting into 1st gear, a special hydraulic sequence is performed to ensure SSV movement into the downshifted position. The L/R pressure switch is monitored to confirm SSV movement. If the movement is not confirmed (the L/R pressure switch does not close), 2nd gear is substituted for 1st. A DTC will be set after three unsuccessful attempts are made to get into 1st gear in one given key start.

MANUAL VALVE

The manual valve 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 top of the valve body. The valve is connected mechanically by a cable to the gearshift mechanism. The valve is held in each of its positions by a roller detent spring (Fig. 131) that engages the “roostercomb” of the TRS selector plate.

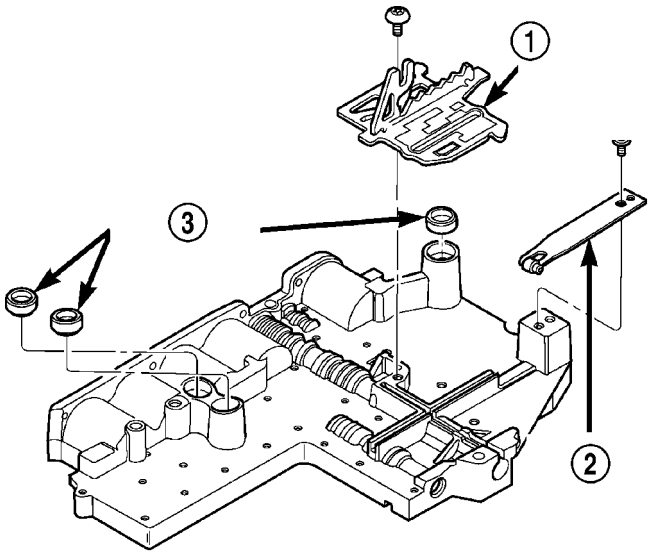


Fig. 131 TRS Selector Plate and Detent Spring

1 - TRS SELECTOR PLATE
2 - DETENT SPRING
3 - CLUTCH PASSAGE SEALS

LOW/REVERSE SWITCH VALVE

The low/reverse switch valve allows the low/reverse clutch to be operated by either the LR/CC solenoid or the MS solenoid.

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. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 45RFE/VALVE BODY - DISASSEMBLY)

(1) Shift transmission into PARK.

(2) Raise vehicle.

(3) Disconnect wires at the solenoid and pressure switch assembly connector.

(4) Position drain pan under transmission oil pan.

(5) Remove transmission oil pan.

(6) Remove the primary oil filter from valve body. (Fig. 132)

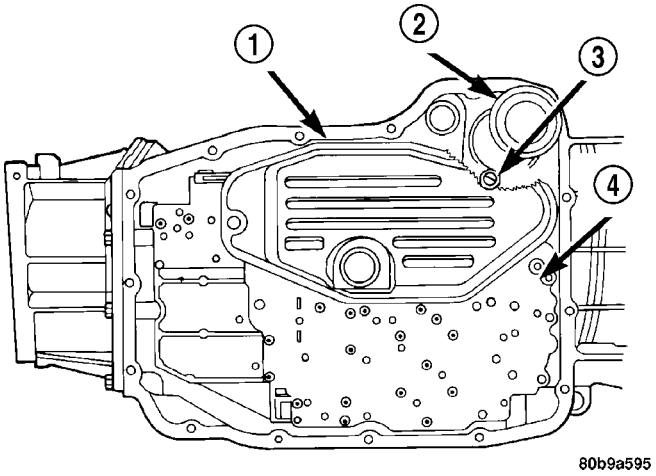


Fig. 132 Remove Primary Oil Filter

1 - PRIMARY OIL FILTER
2 - COOLER RETURN FILTER
3 - COOLER RETURN FILTER BYPASS VALVE
4 - VALVE BODY

VALVE BODY (Continued)

(7) Remove bolts attaching valve body to transmission case (Fig. 133).

(8) Lower the valve body and work the electrical connector out of transmission case.

(9) Separate the valve body from the transmission.

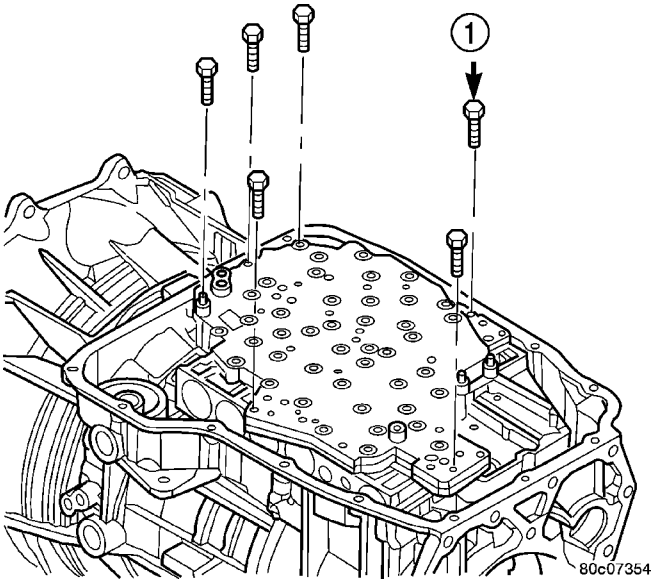


Fig. 133 Valve Body Bolts

1 - VALVE BODY TO CASE BOLT (6)

DISASSEMBLY

(1) Remove the screws holding the solenoid and pressure switch assembly to the valve body (Fig. 134). Do not remove the screws on the top of the solenoid and pressure switch assembly.

(2) Separate the solenoid and pressure switch assembly from the valve body.

(3) Remove the screw holding the detent spring (Fig. 135) onto the valve body.

(4) Remove the detent spring from the valve body.

(5) Remove the TRS selector plate from the valve body and the manual valve.

(6) Remove the clutch passage seals from the valve body, if necessary.

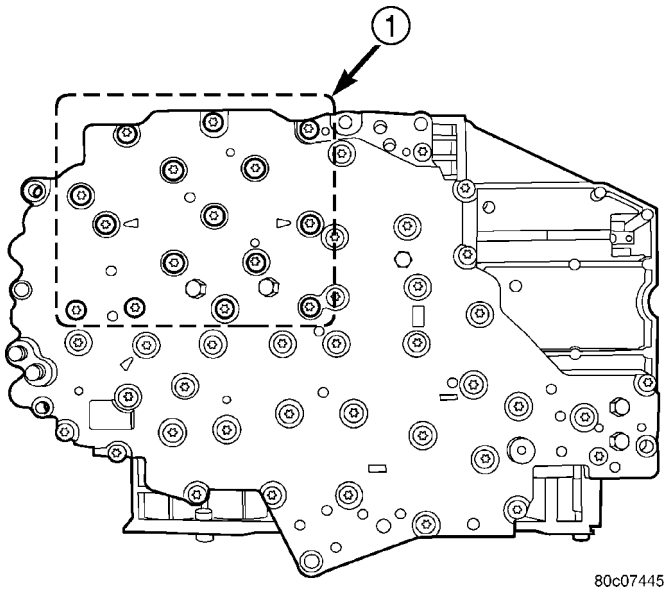


Fig. 134 Solenoid and Pressure Switch Assembly Screws

1 - SOLENOID PACK BOLTS (15)

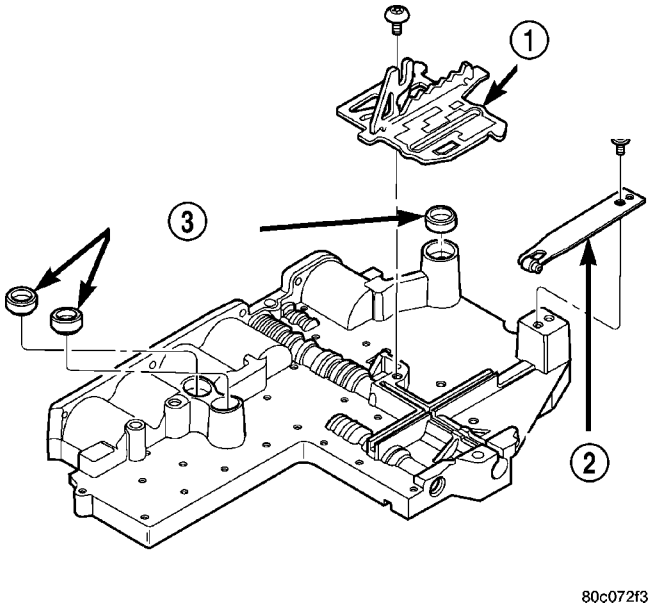


Fig. 135 Valve Body External Components

1 - TRS SELECTOR PLATE
2 - DETENT SPRING
3 - CLUTCH PASSAGE SEALS

VALVE BODY (Continued)

(7) Remove the screws holding the accumulator cover onto the valve body (Fig. 136).

(8) Remove the accumulator springs and pistons from the valve body. Note which accumulator piston and spring belong in each location.

(9) Place the valve body on the bench with the transfer plate upward.

NOTE: The valve body contains seven check balls. The transfer plate must be placed upward to prevent losing the check balls when the transfer plate is removed from the valve body.

(10) Remove the screws holding the valve body to the valve body transfer plate.

(11) Remove the transfer plate from the valve body. Note the location of all check balls (Fig. 137).

(12) Remove the check balls from the valve body.

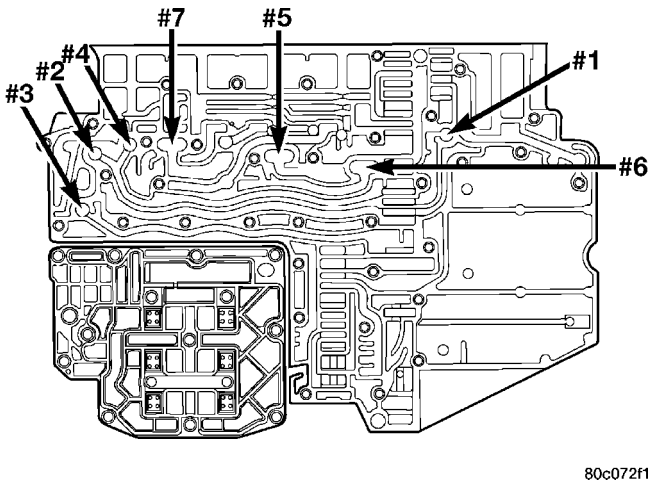


Fig. 137 Check Ball Locations

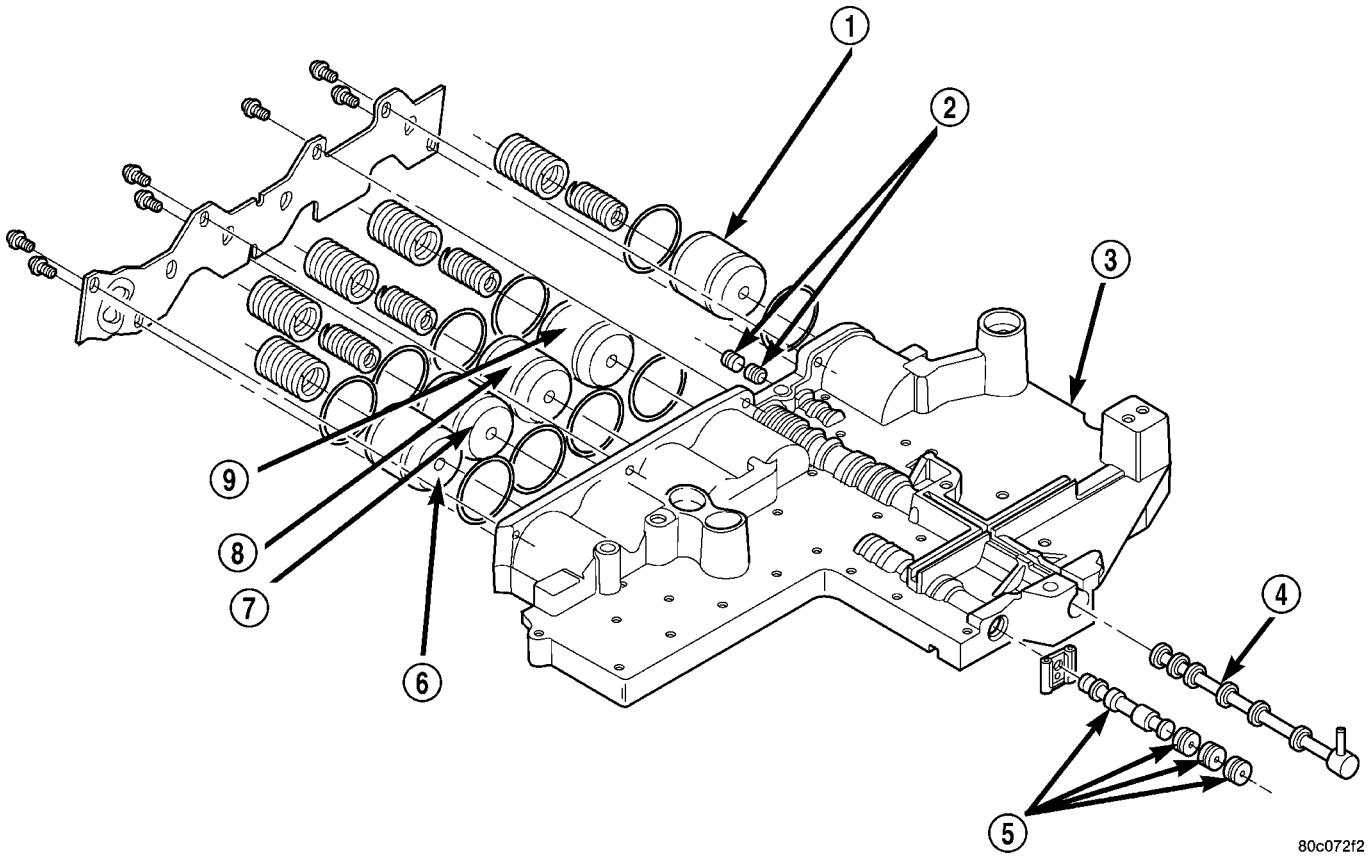


Fig. 136 Valve Body Components

1 - LOW/REVERSE ACCUMULATOR
2 - LOW/REVERSE SWITCH VALVE
3 - UPPER VALVE BODY
4 - MANUAL VALVE
5 - SOLENOID SWITCH VALVE
6 - OVERDRIVE ACCUMULATOR
7 - UNDERDRIVE ACCUMULATOR
8 - 4C ACCUMULATOR
9 - 2C ACCUMULATOR

VALVE BODY (Continued)

(13) Remove the retainers securing the solenoid switch valve, manual valve, and the low/reverse switch valve into the valve body and remove the associated valve and spring. Tag each valve and spring combination with location information to aid in assembly. (Fig. 138)

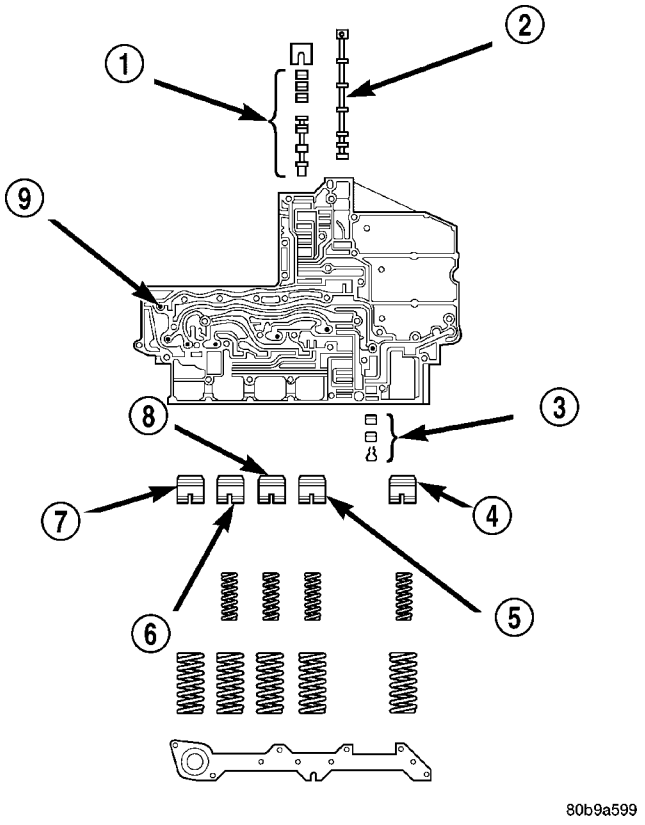


Fig. 138 Valve Body Components

1 - SOLENOID SWITCH VALVE
2 - MANUAL VALVE
3 - LOW REVERSE SWITCH VALVE
4 - LOW REVERSE ACCUMULATOR
5 - 2ND CLUTCH ACCUMULATOR
6 - UNDERDRIVE ACCUMULATOR
7 - OVERDRIVE ACCUMULATOR
8 - 4TH CLUTCH ACCUMULATOR
9 - CHECK BALLS (7)

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. (Fig. 139)

Do not immerse any of the electrical components in cleaning solution. Clean the electrical components 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.**

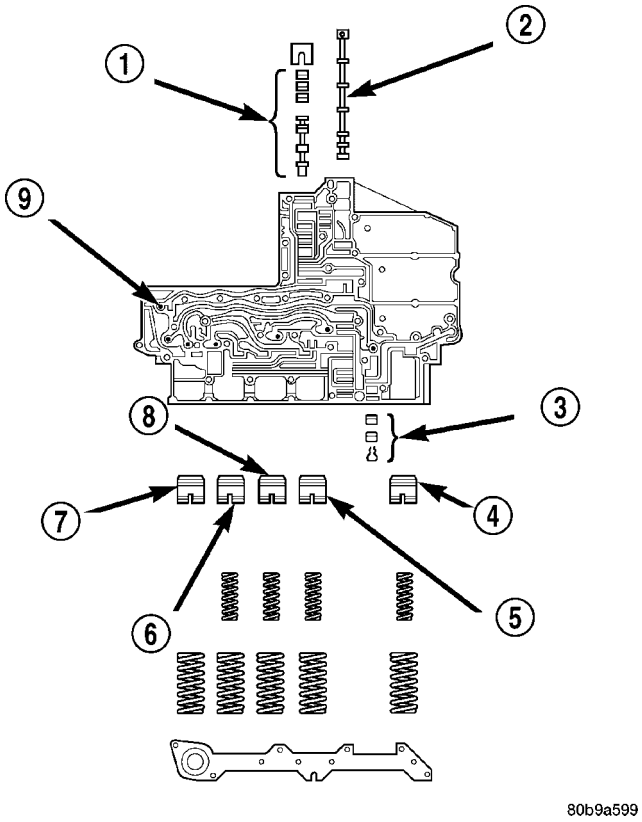


Fig. 139 Valve Body Components

1 - SOLENOID SWITCH VALVE
2 - MANUAL VALVE
3 - LOW REVERSE SWITCH VALVE
4 - LOW REVERSE ACCUMULATOR
5 - 2ND CLUTCH ACCUMULATOR
6 - UNDERDRIVE ACCUMULATOR
7 - OVERDRIVE ACCUMULATOR
8 - 4TH CLUTCH ACCUMULATOR
9 - CHECK BALLS (7)

INSPECTION

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)

Inspect the valves and plugs (Fig. 140) 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.

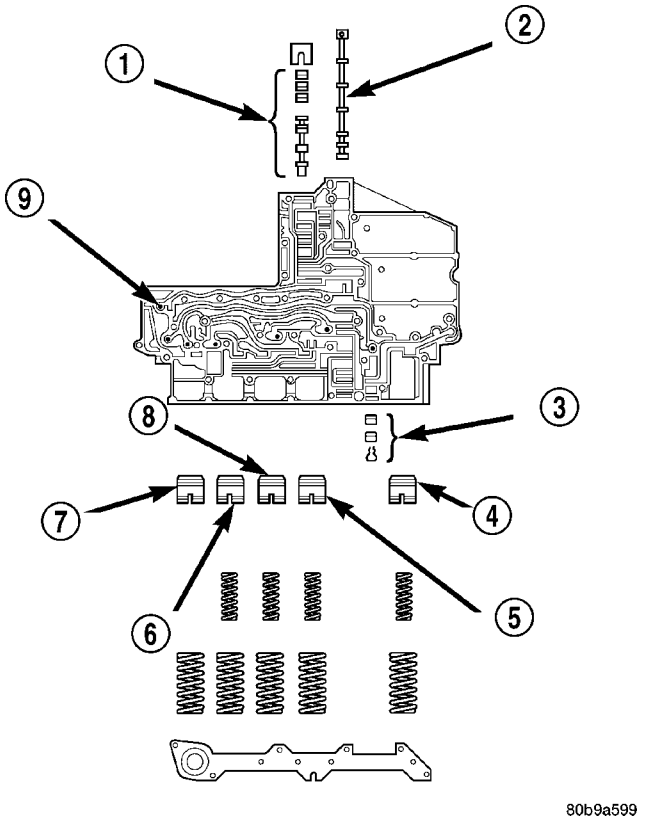


Fig. 140 Valve Body Components

1 - SOLENOID SWITCH VALVE
2 - MANUAL VALVE
3 - LOW REVERSE SWITCH VALVE
4 - LOW REVERSE ACCUMULATOR
5 - 2ND CLUTCH ACCUMULATOR
6 - UNDERDRIVE ACCUMULATOR
7 - OVERDRIVE ACCUMULATOR
8 - 4TH CLUTCH ACCUMULATOR
9 - CHECK BALLS (7)

Inspect all the valve and plug bores in the valve body. Use a penlight to view the bore interiors. Replace the valve body if any bores are distorted or scored. Inspect all of the valve body springs. The springs must be free of distortion, warpage or broken coils.

Trial fit each valve and plug in its bore to check freedom of operation. When clean and dry, the valves and plugs should drop freely into the bores.

Valve body bores do not change dimensionally with use. If the valve body functioned correctly when new, it will continue to operate properly after cleaning and inspection. It should not be necessary to replace a valve body assembly unless it is damaged in handling.

Inspect all the accumulator 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 accumulator springs. The springs must be free of distortion, warpage or broken coils.

Inspect all the fluid seals on the valve body (Fig. 141). Replace any seals that are cracked, distorted, or damaged in any way. These seals pass fluid pressure directly to the clutches. Any pressure leak at these points, may cause transmission performance problems.

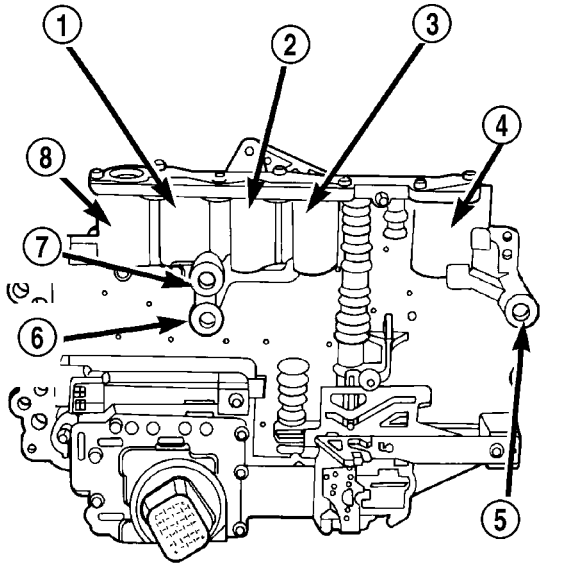


Fig. 141 Valve Body Seals

1 - UNDERDRIVE ACCUMULATOR (2 SPRINGS)
2 - 4TH CLUTCH ACCUMULATOR (2 SPRINGS)
3 - 2ND CLUTCH ACCUMULATOR (2 SPRINGS)
4 - LOW REVERSE ACCUMULATOR (2 SPRINGS)
5 - LOW/REVERSE PASSAGE SEAL
6 - 2ND CLUTCH PASSAGE SEAL
7 - 4TH CLUTCH PASSAGE SEAL
8 - OVERDRIVE ACCUMULATOR (1 SPRING)

VALVE BODY (Continued)

ASSEMBLY

(1) Lubricate valves, springs, and the housing valve bores with clean transmission fluid.

(2) Install solenoid switch valve, manual valve, and the low/reverse switch valve into the valve body.

(3) Install the retainers to hold each valve into the valve body.

(4) Install the valve body check balls into their proper locations.

(5) Position the transfer plate onto the valve body.

(6) Install the screws to hold the transfer plate to the valve body. Tighten the screws to 5.6 N·m (50 in. lbs.).

(7) Install the accumulator pistons and springs into the valve body in the location from which they were removed. Note that all accumulators except the overdrive have two springs. The overdrive accumulator piston has only one spring.

(8) Position the accumulator cover onto the valve body.

(9) Install the screws to hold the accumulator cover onto the valve body. Tighten the screws to 4.5 N·m (40 in. lbs.).

(10) Install the TRS selector plate onto the valve body and the manual valve.

(11) Install the solenoid and pressure switch assembly onto the valve body.

(12) Install the screws to hold the solenoid and pressure switch assembly onto the valve body. Tighten the screws to 5.7 N·m (50 in. lbs.). Tighten the screws adjacent to the arrows cast into the bottom of the transfer plate first.

(13) Position the detent spring onto the valve body.

(14) Install the screw to hold the detent spring onto the valve body. Tighten the screw to 4.5 N·m (40 in. lbs.).

(15) Install new clutch passage seals onto the valve body, if necessary

INSTALLATION

(1) Check condition of seals on valve body and the solenoid and pressure switch assembly. Replace seals if cut or worn.

(2) Place TRS selector plate in the PARK position.

(3) Place the transmission in the PARK position.

(4) Lubricate seal on the solenoid and pressure switch assembly connector with petroleum jelly.

(5) Position valve body in transmission and align the manual lever on the valve body to the pin on the transmission manual shift lever.

(6) Seat valve body in case and install one or two bolts to hold valve body in place.

(7) Tighten valve body bolts alternately and evenly to 12 N·m (105 in. lbs.) torque.

(8) Install a new primary oil filter seal in the oil pump inlet bore. Seat the seal in the bore with the butt end of a hammer, or other suitable tool.

CAUTION: The primary oil filter seal MUST be fully installed flush against the oil pump body. DO NOT install the seal onto the filter neck and attempt to install the filter and seal as an assembly. Damage to the transmission will result.

(9) Place replacement filter in position on valve body and into the oil pump.

(10) Install screw to hold filter to valve body. Tighten screw to 4.5 N·m (40 in. lbs.) torque.

(11) Connect the solenoid and pressure switch assembly connector.

(12) Install oil pan. Tighten pan bolts to 12 N·m (105 in. lbs.) torque.

(13) Lower vehicle and fill transmission with Mopar® ATF +4.

(14) Check and adjust gearshift cable, if necessary.

TRANSFER CASE - NV241 GENII

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TRANSFER CASE - NV241 GENII

DESCRIPTION

The NV241 GENII 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 gear cases and extension are all of aluminum (Fig. 1). 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.

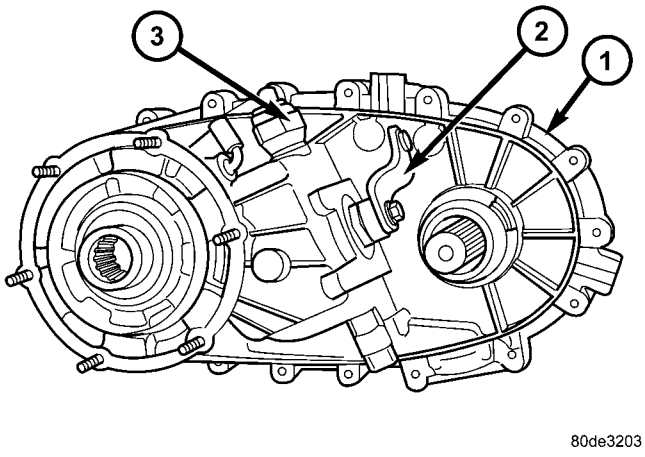


Fig. 1 Transfer Case - Front View

1 - TRANSFER CASE
2 - MANUAL LEVER
3 - POSITION SENSOR

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.

OPERATION

OPERATING RANGE

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

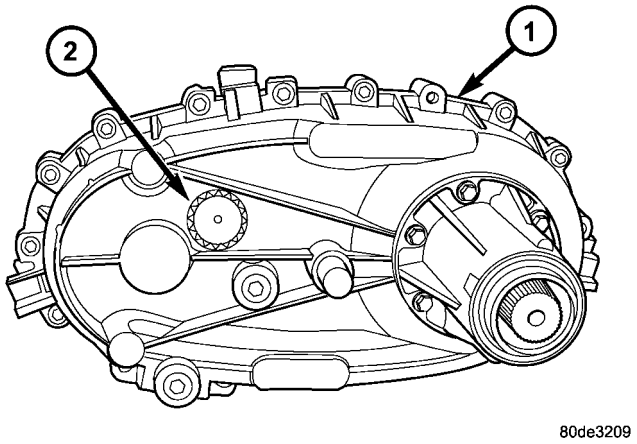


Fig. 2 Transfer Case - Rear View

1 - TRANSFER CASE
2 - IDENTIFICATION TAG

power in off road situations. Low range reduction ratio is 2.72:1.

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 transfer case can 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 and out of the 4L operating range.

DIAGNOSIS AND TESTING - TRANSFER CASE - NV241 GENII

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, 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, Automatic Transmission fluid.

TRANSFER CASE - NV241 GENII (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 transfer case position sensor connector.

(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) Mark front and rear propeller shafts for assembly reference.

(9) Remove front and rear propeller shafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)

(10) Support transfer case with suitable jack. Secure transfer case to jack with safety chains.

(11) Remove nuts attaching transfer case to transmission.

(12) Move transfer case assembly rearward until free of transmission output shaft.

(13) 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 - NV241 GENII (Continued)

SHIFT LEVER AND FRONT OUTPUT SHAFT SEAL

(1) Shift transfer case into NEUTRAL.

(2) Remove nut that retains the shift lever to sector shaft. Then remove shift lever from shaft (Fig. 3).

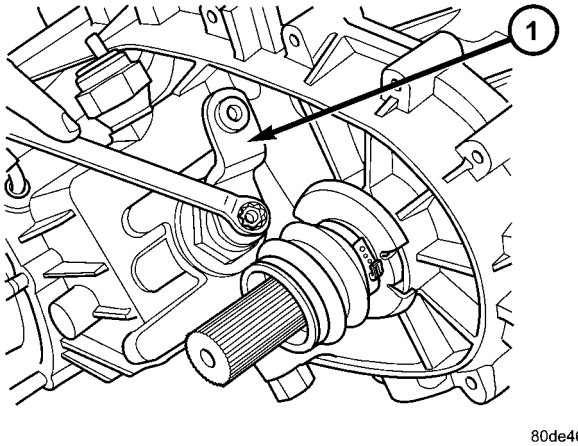


Fig. 3 Remove Range Lever Nut

1 - RANGE LEVER

(3) Remove the front propeller shaft seal boot retaining clamp (Fig. 4).

(4) Remove the front propeller shaft seal boot (Fig. 5).

(5) Remove the front output shaft seal slinger by bending (Fig. 6) the slinger ears away from the transfer case.

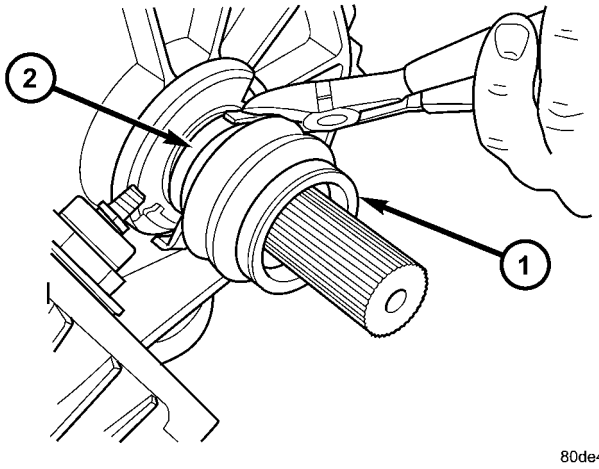


Fig. 4 Remove Boot Clamp

1 - SEAL BOOT
2 - BOOT CLAMP

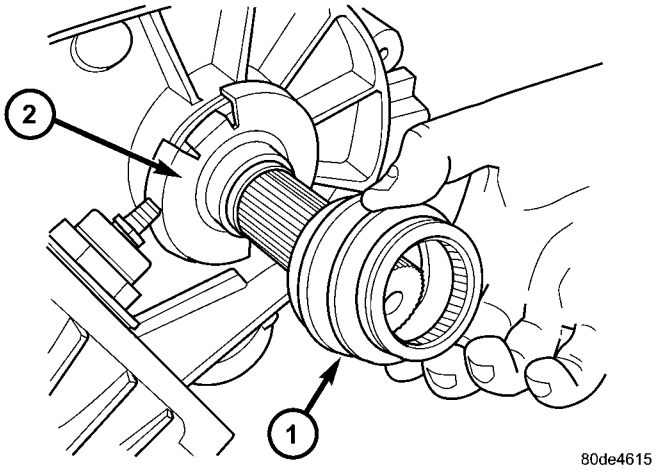


Fig. 5 Remove Seal Boot

1 - SEAL BOOT
2 - SEAL SLINGER

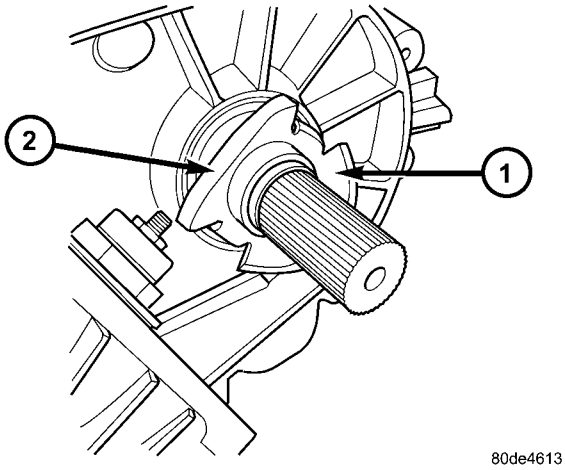


Fig. 6 Bend Slinger Ears

1 - SLINGER
2 - BEND UPWARD

TRANSFER CASE - NV241 GENII (Continued)

(6) Using a suitable pry tool (Fig. 7), remove the slinger from the output shaft using care not to damage the shaft.

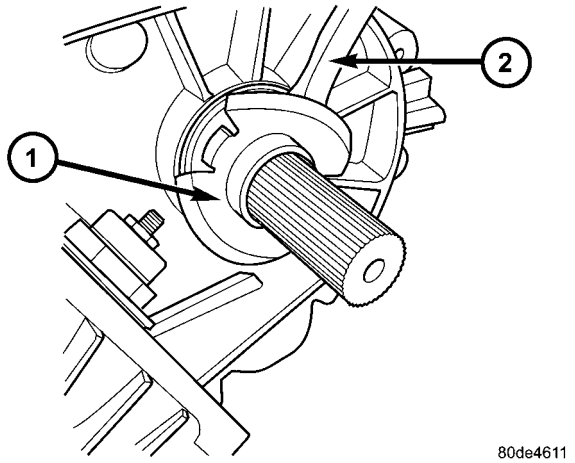


Fig. 7 Remove Slinger From Shaft

1 - SLINGER
2 - PRY TOOL

(7) Using a screw and a slide hammer, remove the front output shaft seal.

REAR EXTENSION

(1) Remove rear extension bolts (Fig. 8).

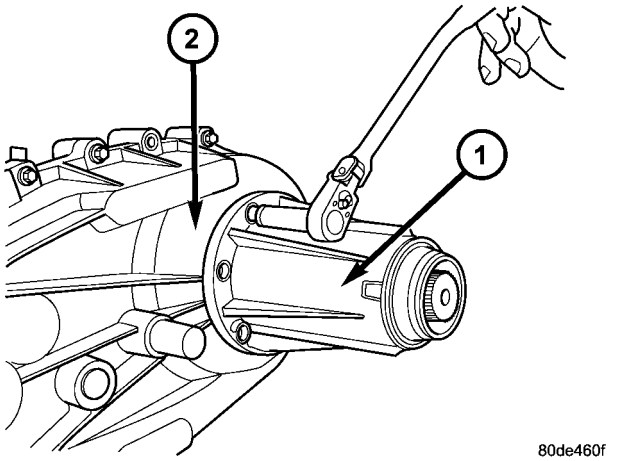


Fig. 8 Remove Rear Extension Bolts

1 - EXTENSION HOUSING
2 - TRANSFER CASE

(2) Remove rear extension housing (Fig. 9). Tap extension once or twice with a plastic mallet to break sealer bead and loosen it.

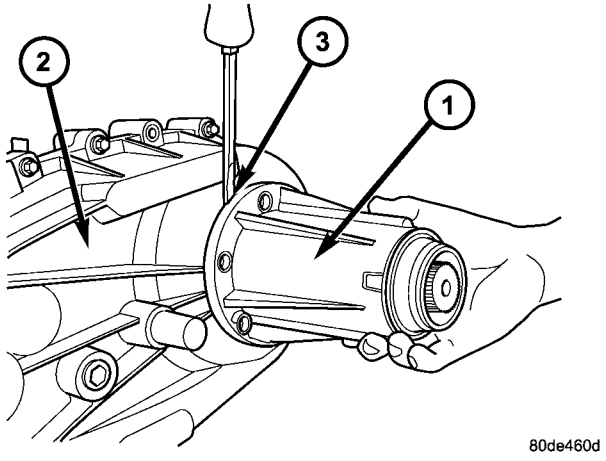


Fig. 9 Remove Rear Extension

1 - EXTENSION HOUSING
2 - TRANSFER CASE
3 - PRY SLOT

(3) Remove output bearing retaining ring with heavy duty snap-ring pliers (Fig. 10).

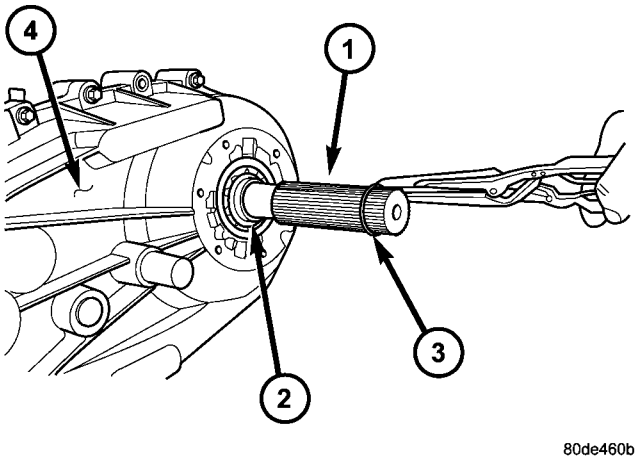


Fig. 10 Remove Output Shaft Retaining Ring

1 - REAR OUTPUT SHAFT
2 - OUTPUT SHAFT BEARING
3 - RETAINING RING
4 - TRANSFER CASE

OIL PUMP AND REAR CASE

(1) Remove rear case-to-front case bolts (Fig. 11).

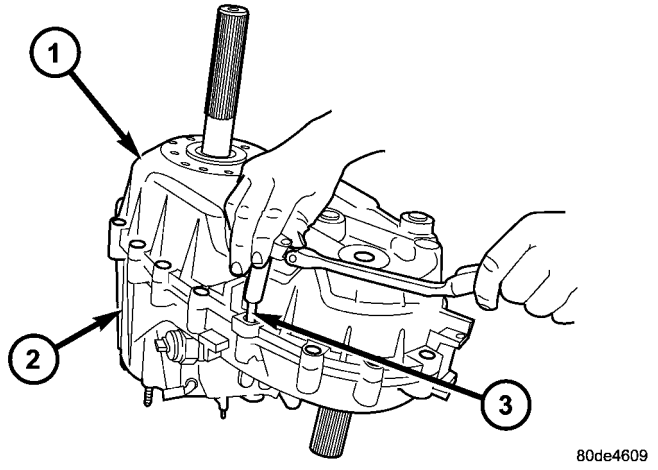


Fig. 11 Remove Case Bolts

1 - REAR CASE
2 - FRONT CASE
3 - BOLT

(2) Loosen rear case with pry tool to break sealer bead. Insert tool in slot at each end of case (Fig. 12).

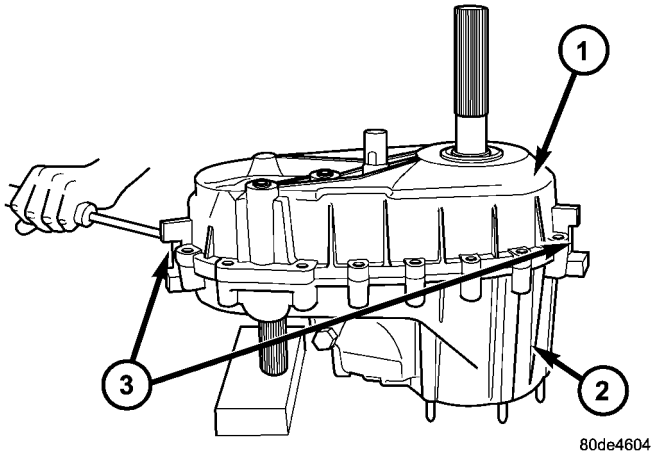


Fig. 12 Loosen Case Halves

1 - REAR CASE
2 - FRONT CASE
3 - PRY SLOTS

(3) Unseat rear case from alignment dowels.

(4) Remove rear case and oil pump assembly from front case (Fig. 13).

CAUTION: Do not remove the bolts holding the oil pump cover to the rear case half. The oil pump cover is aligned to the rear output shaft bearing inner race and will become mis-aligned if the bolts are loosened. If the transfer case failure has generated any debris which may have become trapped in the oil pump, the rear case and oil pump assembly MUST be replaced.

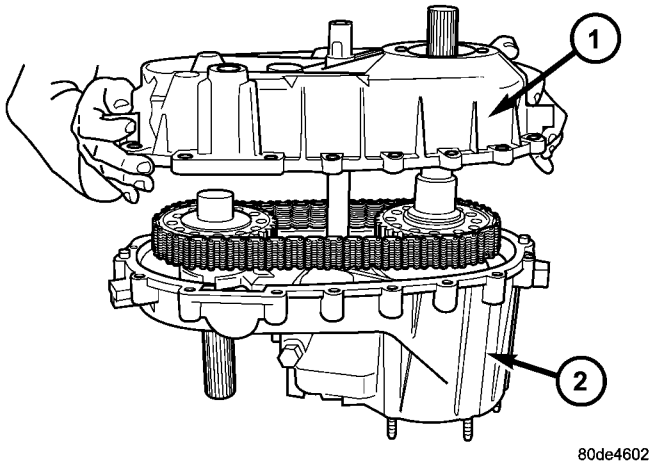


Fig. 13 Remove Rear Case

1 - REAR CASE
2 - FRONT CASE

FRONT OUTPUT SHAFT AND DRIVE CHAIN

(1) Remove shift rail cup and spring (Fig. 14).

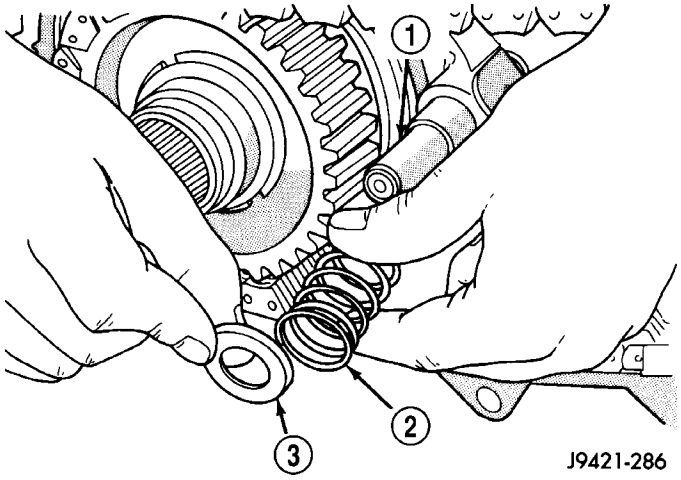


Fig. 14 Shift Rail Cup And Spring Removal

1 - SHIFT RAIL
2 - SPRING
3 - CUP

TRANSFER CASE - NV241 GENII (Continued)

(2) Remove front sprocket retaining ring (Fig. 15).

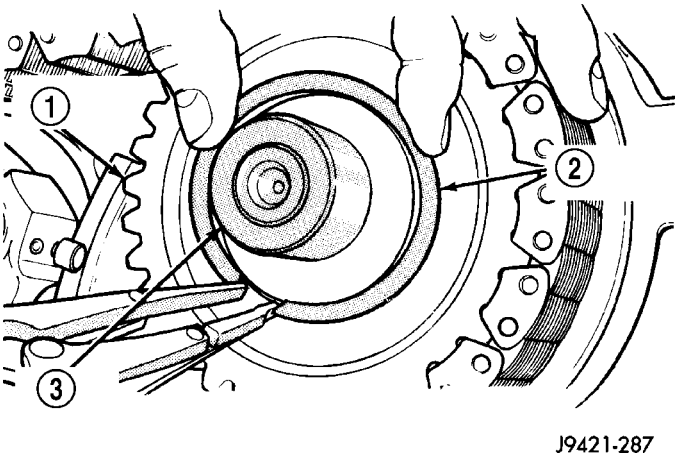


Fig. 15 Removing Front Sprocket Retaining Ring

1 - FRONT SPROCKET
2 - RETAINING RING
3 - FRONT OUTPUT SHAFT

(3) Pull mainshaft, front sprocket and chain outward about 25.4 mm (1-inch) simultaneously (Fig. 16).

(4) Remove chain from mainshaft drive sprocket and remove front sprocket and chain as assembly.

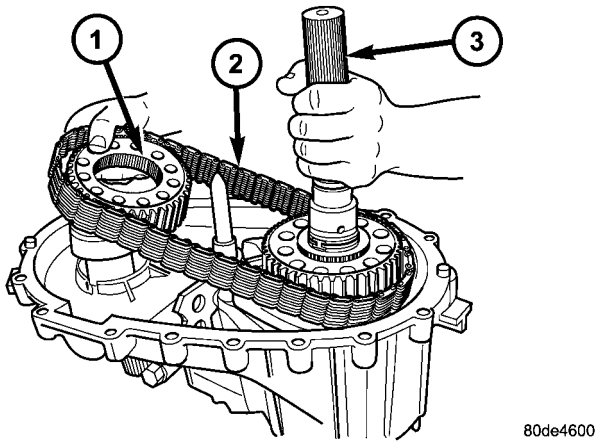


Fig. 16 Remove Front Sprocket and Drive Chain

1 - FRONT DRIVE SPROCKET
2 - DRIVE CHAIN
3 - MAINSHAFT

SHIFT FORKS AND MAINSHAFT

(1) Remove the transfer case position sensor (Fig. 17).

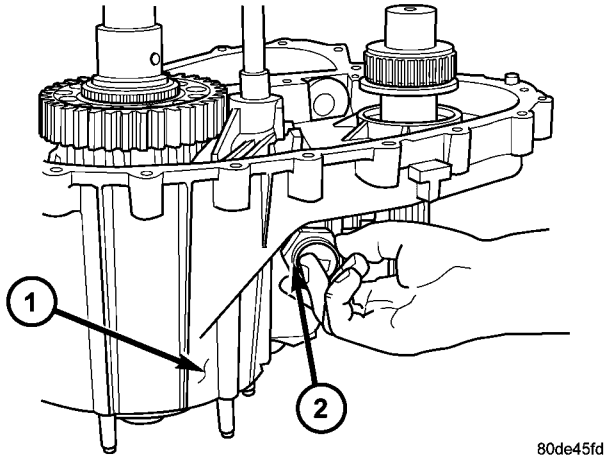


Fig. 17 Remove Position Sensor

1 - FRONT CASE
2 - POSITION SENSOR

(2) Loosen detent plug.

(3) Remove detent plug, spring, and plunger (Fig. 18). Note that the plug has an O-ring seal. Remove and discard this seal.

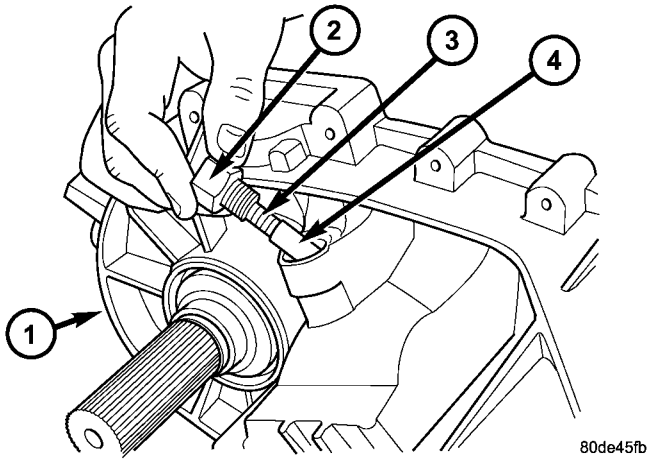


Fig. 18 Remove Detent Plug, Spring, and Plunger

1 - FRONT CASE
2 - DETENT PLUG
3 - DETENT SPRING
4 - DETENT PLUNGER

TRANSFER CASE - NV241 GENII (Continued)

(4) Remove the front output shaft snap-ring (Fig. 19).

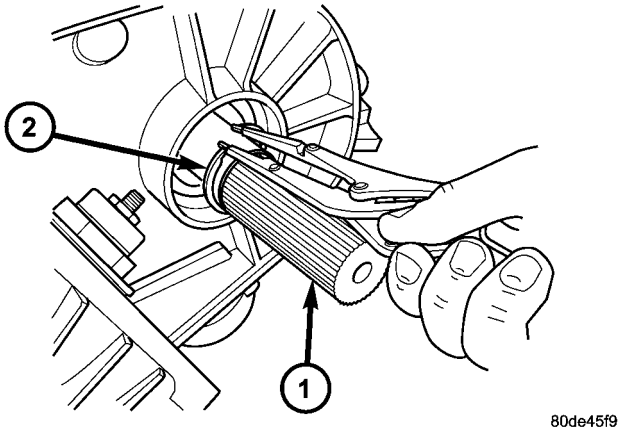


Fig. 19 Remove Front Output Shaft Snap-ring

1 - FRONT OUTPUT SHAFT
2 - SNAP-RING

(5) Remove front output shaft from bearing in case (Fig. 20).

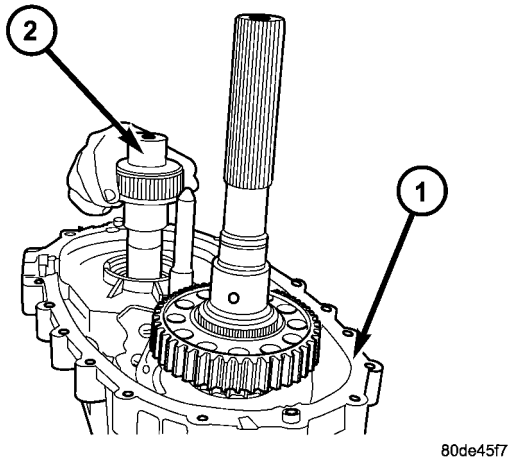


Fig. 20 Remove Front Output Shaft

1 - FRONT CASE
2 - FRONT OUTPUT SHAFT

(6) Pull mainshaft assembly out of input gear, mode sleeve, and case (Fig. 21).

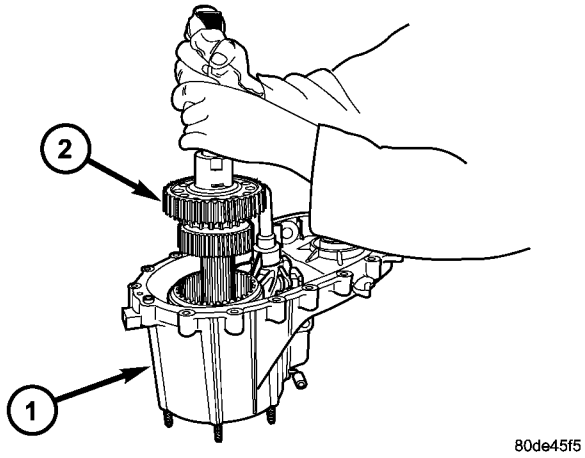


Fig. 21 Remove Mainshaft

1 - FRONT CASE
2 - MAINSHAFT

(7) Remove mode fork, mode sleeve, and shift rail as assembly (Fig. 22). Note which way the sleeve fits in the fork (long side of sleeve goes to front).

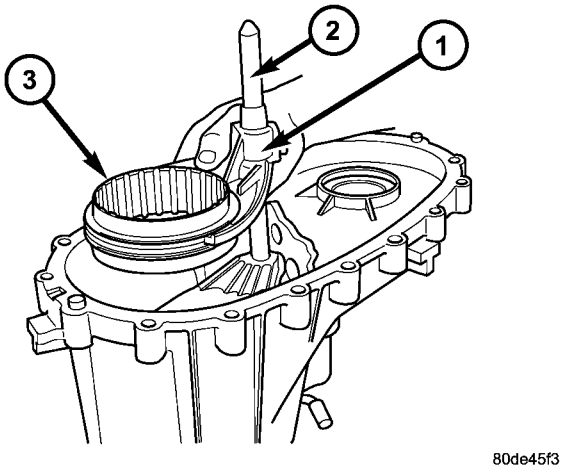


Fig. 22 Remove Mode Fork and Shift Rail

1 - MODE FORK
2 - SHIFT RAIL
3 - MODE SLEEVE

TRANSFER CASE - NV241 GENII (Continued)

(8) Remove range fork retaining ring.

(9) Remove range fork and hub as an assembly (Fig. 23). Note fork position for installation reference.

(10) Remove the shift sector support (Fig. 24).

(11) Remove shift sector (Fig. 25).

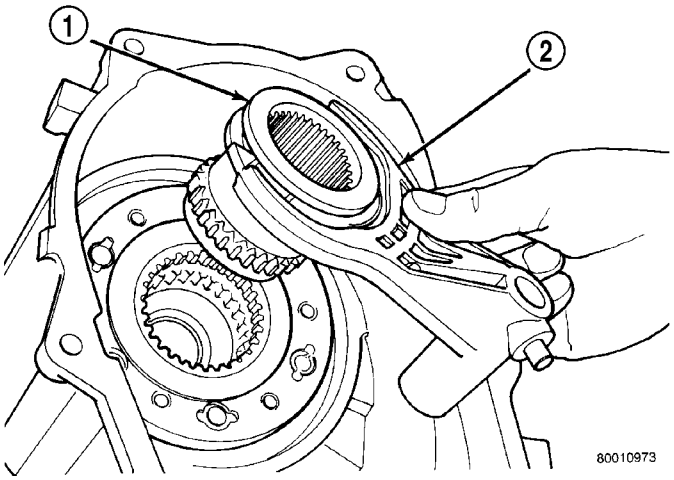


Fig. 23 Range Fork And Hub Removal

1 - RANGE HUB
2 - RANGE FORK

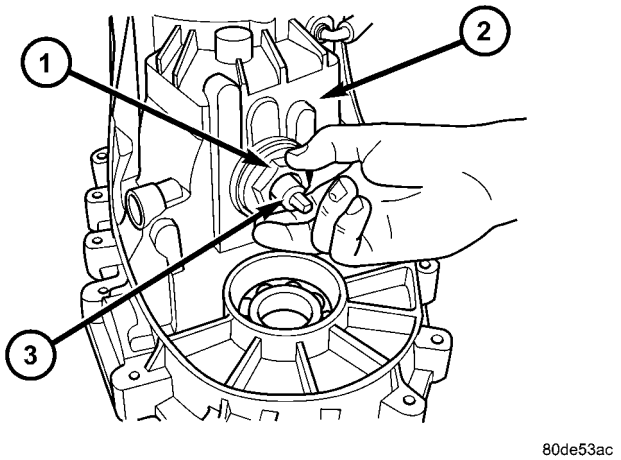


Fig. 24 Remove Sector Support

1 - SECTOR SUPPORT
2 - FRONT CASE
3 - SECTOR SHAFT

MAINSHAFT

(1) Remove the drive sprocket retaining ring (Fig. 26) from the output shaft.

(2) Remove the drive sprocket thrust washer (Fig. 27) from the output shaft.

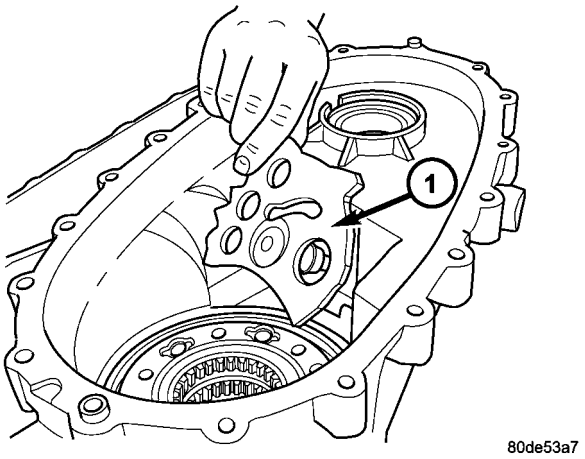


Fig. 25 Remove Shift Sector

1 - SHIFT SECTOR

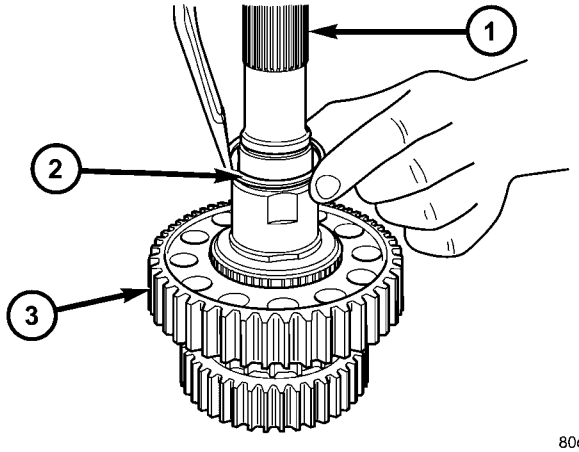


Fig. 26 Remove The Drive Sprocket Retaining Ring

1 - OUTPUT SHAFT
2 - RETAINING RING
3 - DRIVE SPROCKET

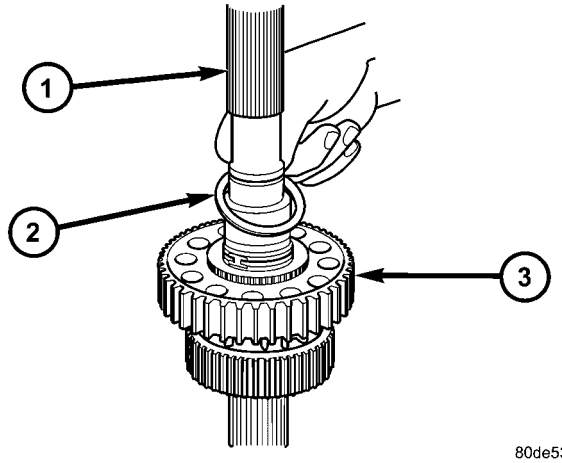


Fig. 27 Remove Drive Sprocket Thrust Washer

1 - OUTPUT SHAFT
2 - THRUST WASHER
3 - DRIVE SPROCKET

TRANSFER CASE - NV241 GENII (Continued)

(3) Remove drive sprocket (Fig. 28) from the output shaft.

(4) Remove the clutch gear (Fig. 29) and hub (Fig. 30) from the output shaft.

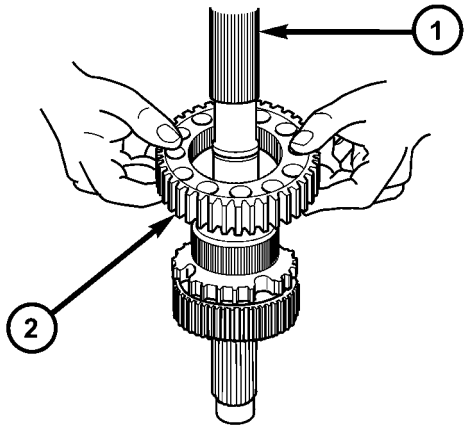


Fig. 28 Remove Drive Sprocket

1 - OUTPUT SHAFT
2 - DRIVE SPROCKET

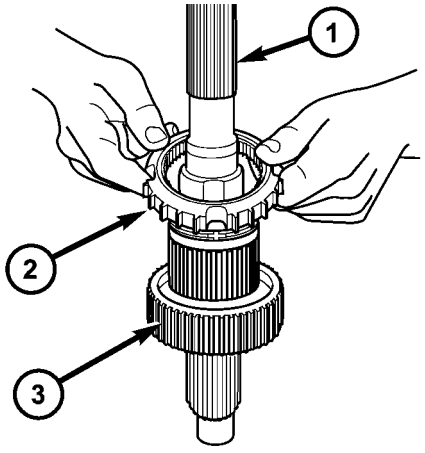


Fig. 29 Remove Clutch Gear

1 - OUTPUT SHAFT
2 - CLUTCH GEAR
3 - MODE HUB

(5) Remove the mode hub retaining ring (Fig. 31) from the output shaft.

(6) Remove the mode hub (Fig. 32) from the output shaft.

INPUT AND PLANETARY GEAR

(1) Remove input gear seal with suitable screw and slide hammer.

(2) Remove input gear retaining ring (Fig. 33) with heavy duty snap-ring pliers.

(3) Place front case in horizontal position. Then remove input gear and low range gear as an assem-

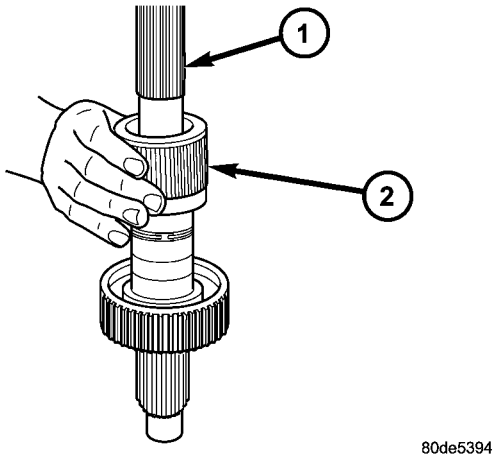


Fig. 30 Remove Sprocket Hub

1 - OUTPUT SHAFT
2 - SPROCKET HUB

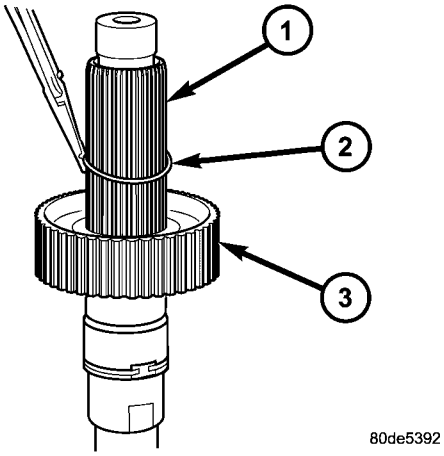


Fig. 31 Remove Retaining Ring

1 - OUTPUT SHAFT
2 - RETAINING RING
3 - MODE HUB

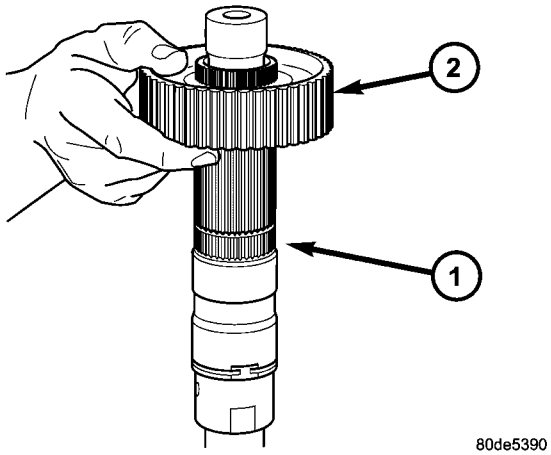


Fig. 32 Remove Mode Hub

1 - OUTPUT SHAFT
2 - MODE HUB

TRANSFER CASE - NV241 GENII (Continued)

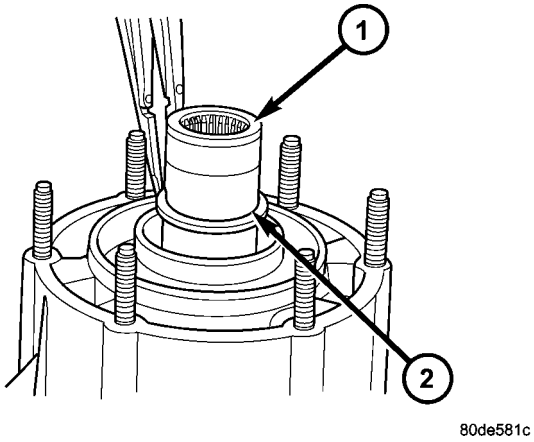


Fig. 33 Remove Input Gear Retaining Ring

1 - INPUT GEAR
2 - RETAINING RING

bly (Fig. 34). Tap gear out of bearing with plastic mallet, if necessary.

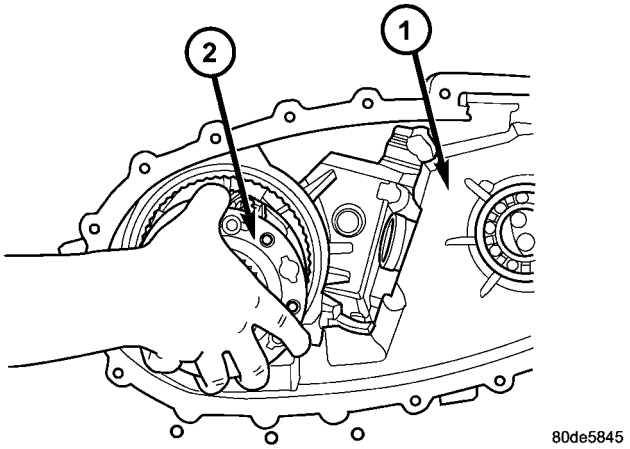


Fig. 34 Remove Input Planetary Assembly

1 - FRONT CASE
2 - INPUT PLANETARY ASSEMBLY

INPUT AND PLANETARY GEAR

(1) Remove snap-ring that retains input gear in low range gear (Fig. 35).

(2) Remove retainer (Fig. 36).

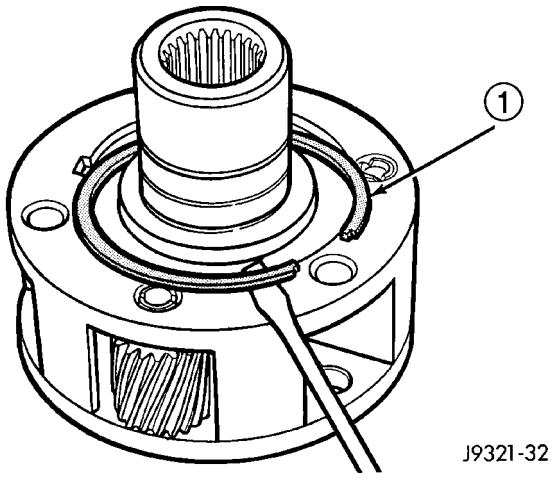


Fig. 35 Input Gear Snap-Ring Removal

1 - INPUT GEAR SNAP-RING

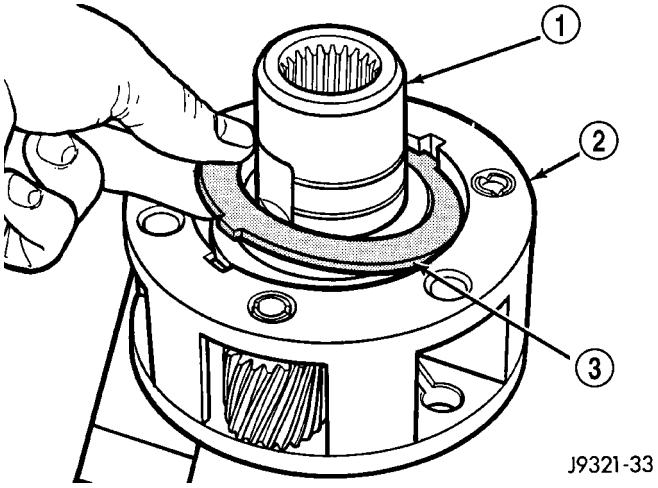


Fig. 36 Input Gear Retainer Removal

1 - INPUT GEAR
2 - LOW RANGE GEAR
3 - RETAINER

(3) Remove front tabbed thrust washer (Fig. 37).
(4) Remove input gear (Fig. 38).
(5) Remove rear tabbed thrust washer from low range gear (Fig. 39).

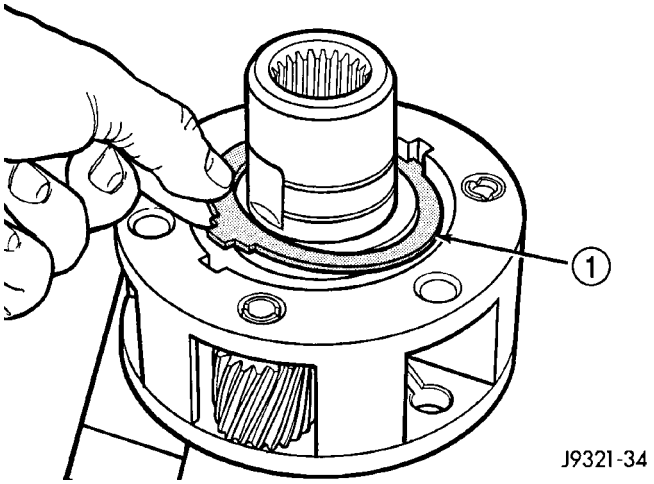


Fig. 37 Front Tabbed Thrust Washer Removal

1 - FRONT TABBED THRUST WASHER

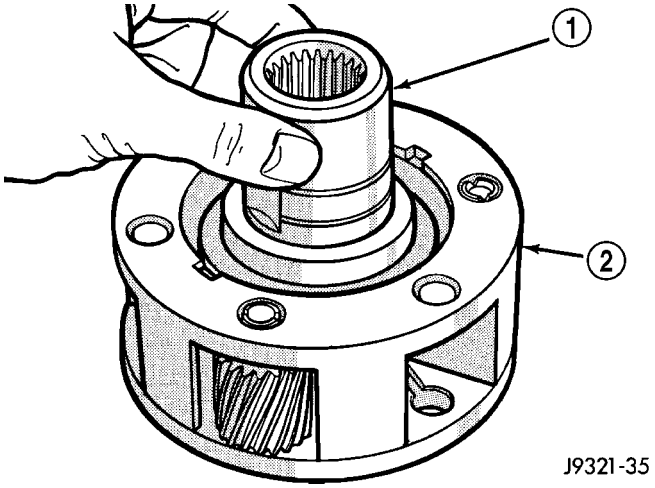


Fig. 38 Input Gear Removal

1 - INPUT GEAR
2 - LOW RANGE GEAR

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.

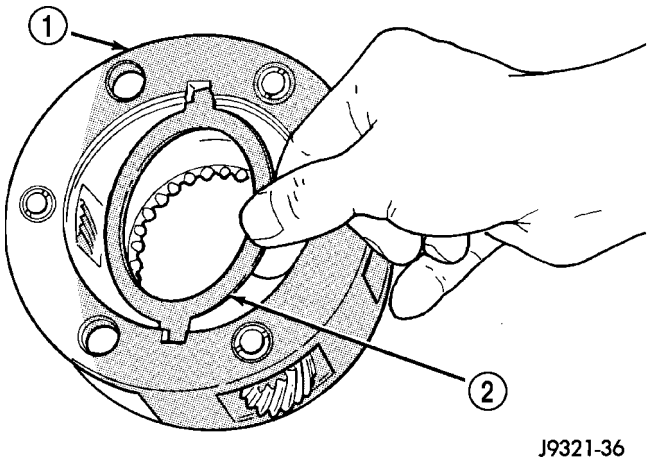


Fig. 39 Rear Tabbed Thrust Washer Removal

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. Minor nicks and scratches can be smoothed with an oilstone, however, replace any part that is damaged.

Check the contact surfaces in the sprocket bore and on the mainshaft. Minor nicks and scratches can be smoothed with 320-400 grit emery cloth but do not try to salvage the shaft if nicks or wear is severe.

INPUT GEAR AND PLANETARY CARRIER

Check the teeth on the gear (Fig. 40). Minor nicks can be dressed off with an oilstone but replace the gear if any teeth are broken, cracked, or chipped. The bearing surface on the gear can be smoothed with 300-400 grit emery cloth if necessary.

Examine the carrier body and pinion gears for wear or damage. The carrier will have to be replaced as an assembly if the body, pinion pins, or pinion gears are damaged.

Check the lock ring and both thrust washers for wear or cracks. Replace them if necessary. Also replace the lock retaining ring if bent, distorted, or broken.

SHIFT FORKS/HUBS/SLEEVES

Check condition of the shift forks and mode fork shift rail (Fig. 41). Minor nicks on the shift rail can be smoothed with 320-400 grit emery cloth.

Inspect the shift fork wear pads (Fig. 42). The mode fork pads are serviceable and can be replaced if necessary. The range fork pads are not serviceable. The fork must be replaced as an assembly if the pads are worn or damaged.

Check both of the sleeves for wear or damage, especially on the interior teeth. Replace the sleeves if wear or damage is evident.

TRANSFER CASE - NV241 GENII (Continued)

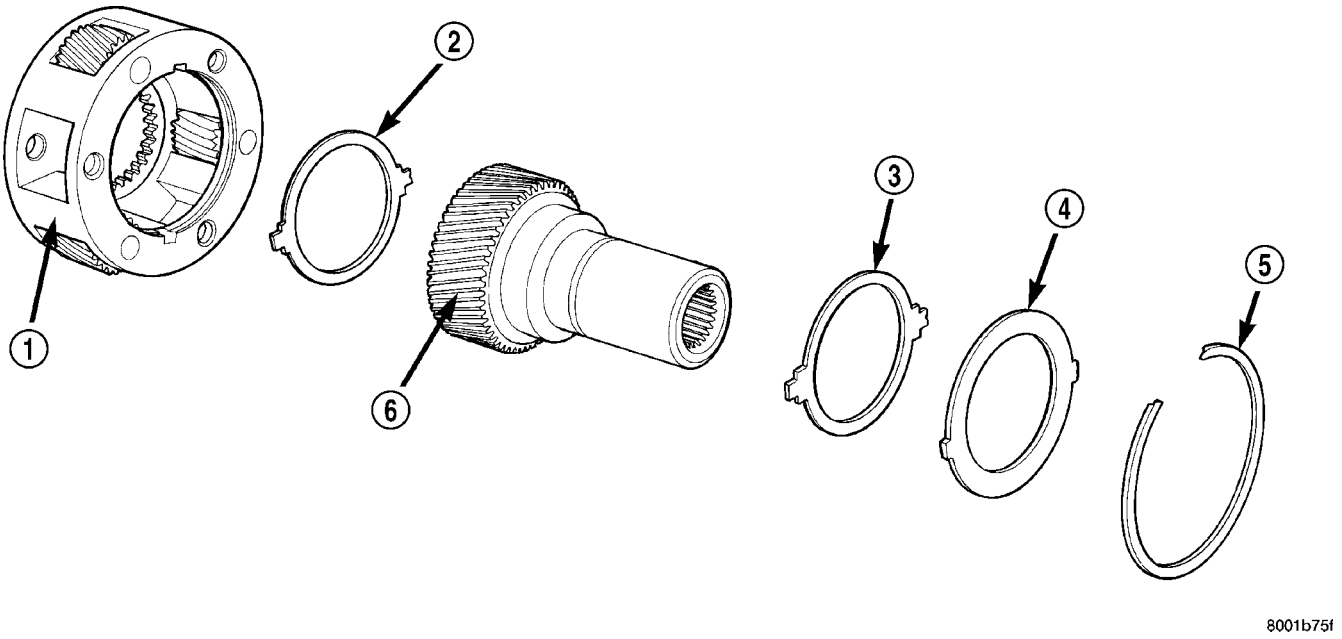


Fig. 40 Input Gear And Carrier Components

1 - PLANETARY CARRIER
2 - REAR THRUST WASHER
3 - FRONT THRUST WASHER
4 - CARRIER LOCK RING
5 - CARRIER LOCK RETAINING RING
6 - INPUT GEAR

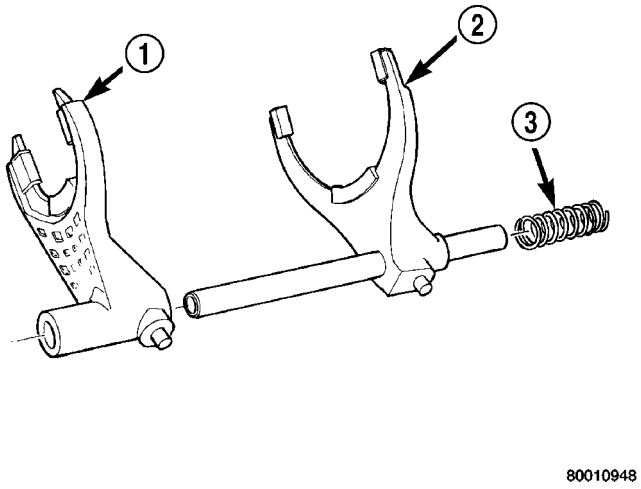


Fig. 41 Shift Forks

1 - RANGE FORK
2 - MODE FORK AND RAIL
3 - MODE SPRING

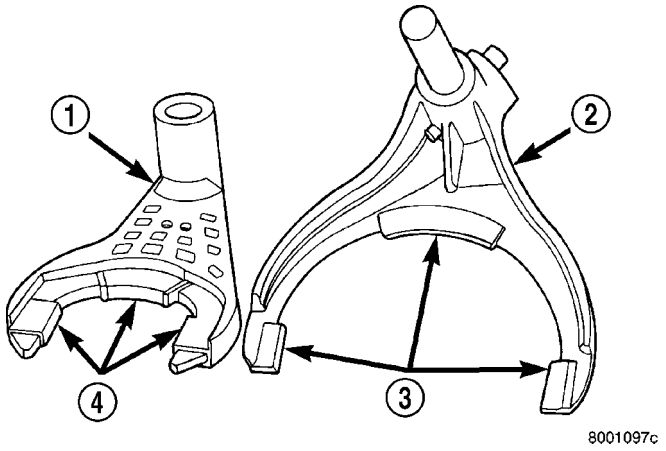


Fig. 42 Shift Fork And Wear Pad Locations

1 - RANGE FORK
2 - MODE FORK
3 - WEAR PADS (SERVICEABLE)
4 - WEAR PADS (SERVICEABLE)

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.

TRANSFER CASE - NV241 GENII (Continued)

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. 43)

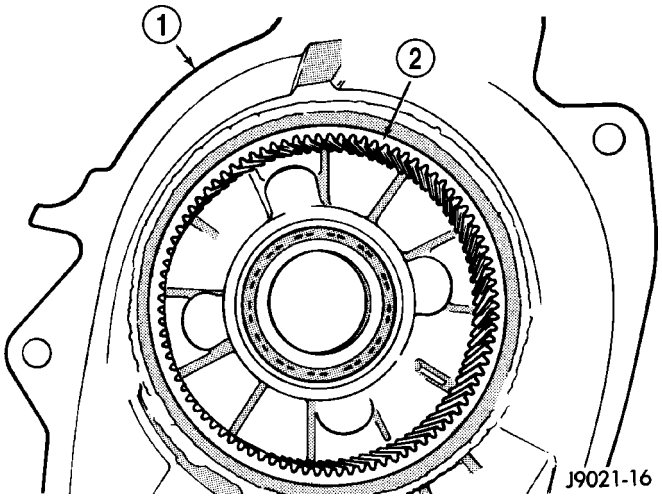


Fig. 43 Low Range Annulus Gear

1 - FRONT CASE
2 - LOW RANGE ANNULUS GEAR

FRONT CASE AND REAR CASE

Inspect the cases for wear and damage.

Check case condition. If leaks were a problem, look for gouges and severe scoring of case sealing surfaces. Also make sure the front case mounting studs are in good condition.

Check the front case mounting studs and vent tube. The tube can be secured with Loctite™ 271 or 680 if loose. The stud threads can be cleaned up with a die if necessary. Also check condition of the fill/drain plug threads in the rear case. The threads can be repaired with a thread chaser or tap if necessary. Or the threads can be repaired with Helicoil™ stainless steel inserts if required.

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) Remove the input shaft bearing (Fig. 44) from the front case with suitable snap-ring pliers.

(2) Transfer the retaining ring to the new bearing if necessary and install the bearing into the front case.

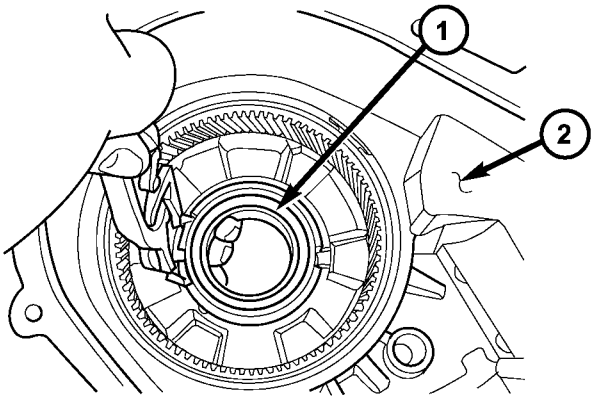


Fig. 44 Remove Input Gear Bearing

1 - INPUT GEAR BEARING
2 - FRONT CASE

(3) Using Installer 6436 and Handle C-4171 (Fig. 45), remove front output shaft bearing.

(4) Start front output shaft bearing in case. Then seat bearing with Handle C-4171 and Installer 6953.

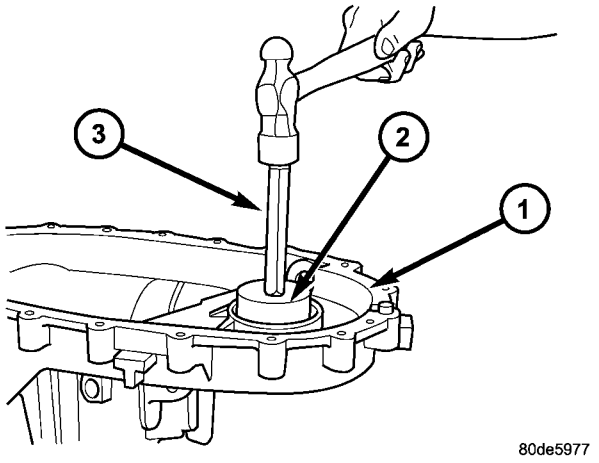


Fig. 45 Remove Front Output Shaft Bearing

1 - FRONT CASE
2 - INSTALLER 6436
3 - HANDLE C-4171

TRANSFER CASE - NV241 GENII (Continued)

(5) Install front output shaft bearing retaining ring.

(6) 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. 46).

(7) Install new pilot bearing with Remover/Installer 8684.

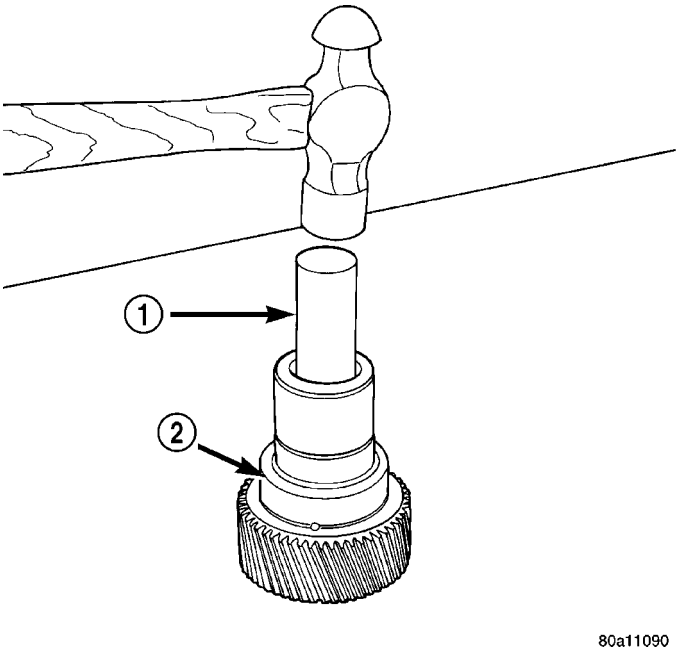


Fig. 46 Remove Input Gear Cup Plug

1 - DRIFT
2 - INPUT GEAR

(8) Remove the front output shaft rear bearing with the screw and jaws from Remover L-4454 and Cup 8148 (Fig. 47).

(9) Install new bearing with Tool Handle C-4171 and Installer 5066 (Fig. 48). The bearing bore is chamfered at the top. Install the bearing so it is flush with the lower edge of this chamfer (Fig. 49).

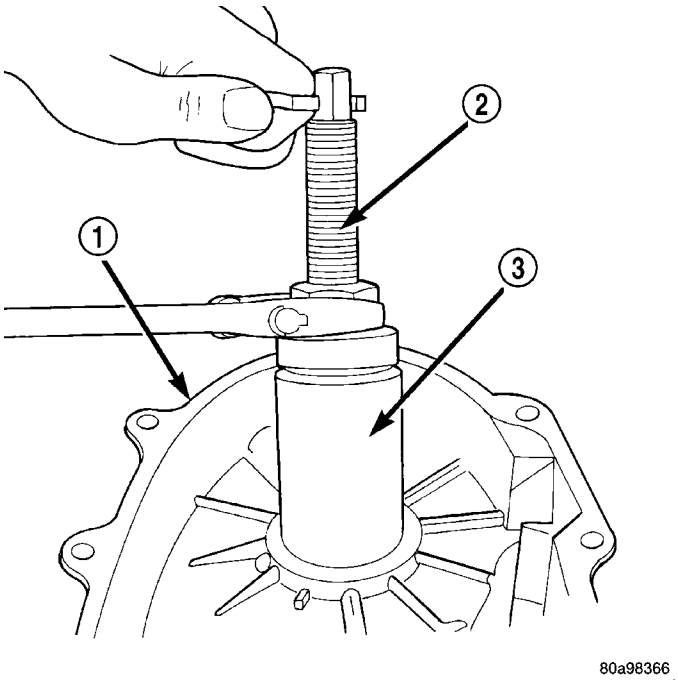


Fig. 47 Front Output Shaft Rear Bearing Removal

1 - REAR CASE
2 - SPECIAL TOOL L-4454-1 AND L-4454-3
3 - SPECIAL TOOL 8148

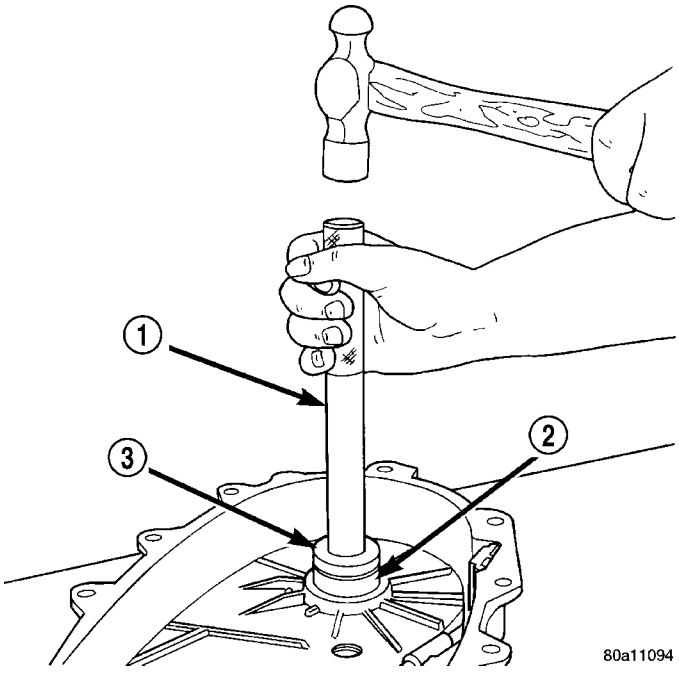


Fig. 48 Output Shaft Rear Bearing Installation

1 - HANDLE C-4171
2 - OUTPUT SHAFT INNER BEARING
3 - INSTALLER 5066

TRANSFER CASE - NV241 GENII (Continued)

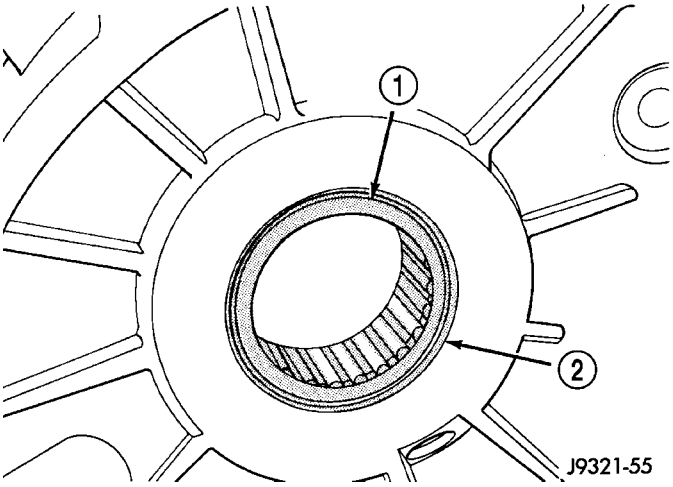


Fig. 49 Output Shaft Rear Bearing Installation Depth

1 - BEARING (SEATED) AT LOWER EDGE OF CHAMFER
2 - CHAMFER

(10) Remove the rear output shaft bearing from the rear case using Remover/Installer 8684 and Handle C-4171 (Fig. 50).

(11) Install the rear output shaft bearing (Fig. 51) into the rear case using Remover/Installer 6953 and Handle C-4171.

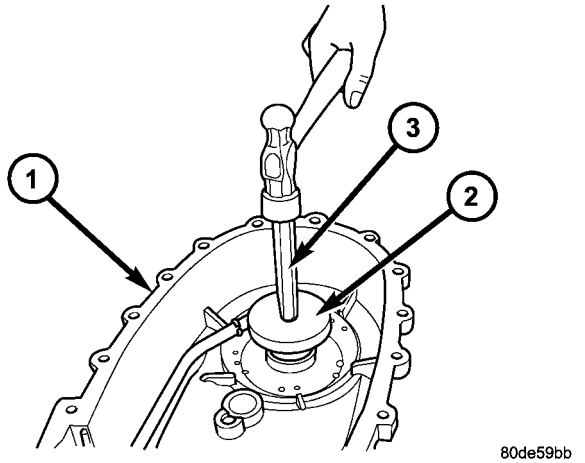


Fig. 50 Remove Rear Output Shaft Bearing

1 - REAR CASE
2 - REMOVER/INSTALLER 8684
3 - HANDLE C-4171

INPUT AND PLANETARY GEAR

(1) Lubricate gears and thrust washers (Fig. 52) with recommended transmission fluid.

(2) Install first thrust washer in low range gear (Fig. 52). 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.

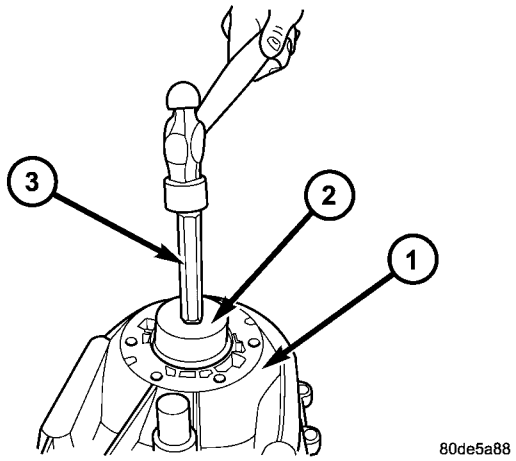


Fig. 51 Install Rear Output Shaft Bearing

1 - REAR CASE
2 - REMOVER/INSTALLER 6953
3 - HANDLE C-4171

(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.

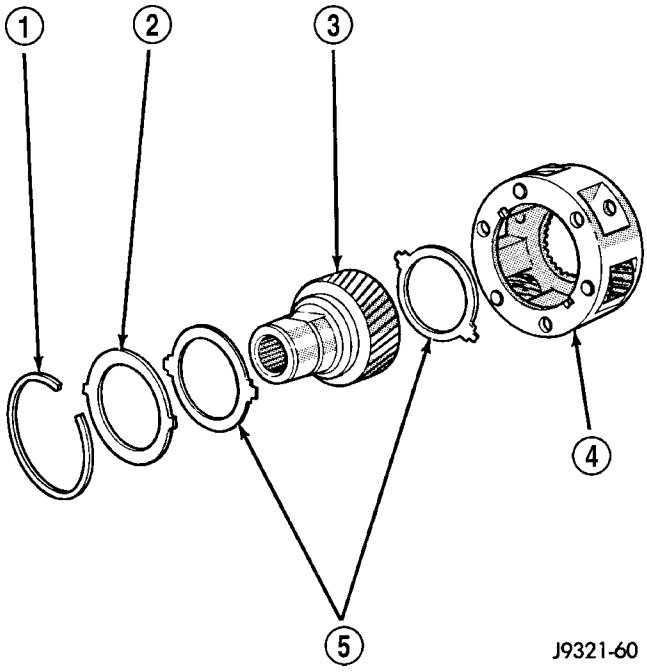


Fig. 52 Input/Low Range Gear Components

1 - SNAP-RING
2 - RETAINER PLATE
3 - INPUT GEAR
4 - LOW RANGE GEAR
5 - THRUST WASHERS

TRANSFER CASE - NV241 GENII (Continued)

(6) Align and install low range/input gear assembly in front case (Fig. 53). 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. 54).

(8) Install a new input gear seal using Installer 8841 and Handle C-4171.

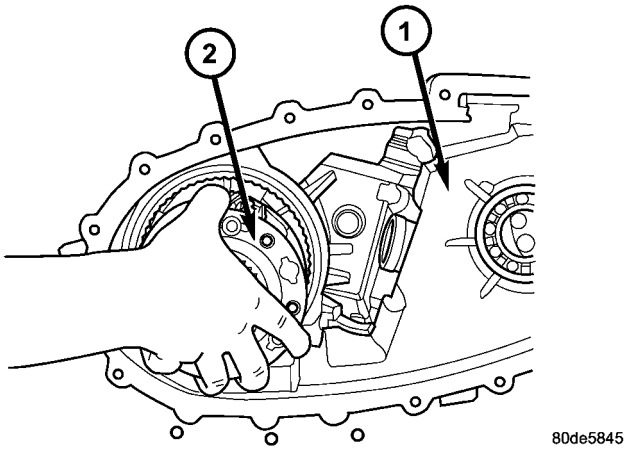


Fig. 53 Install Input Planetary Assembly

1 - FRONT CASE
2 - INPUT PLANETARY ASSEMBLY

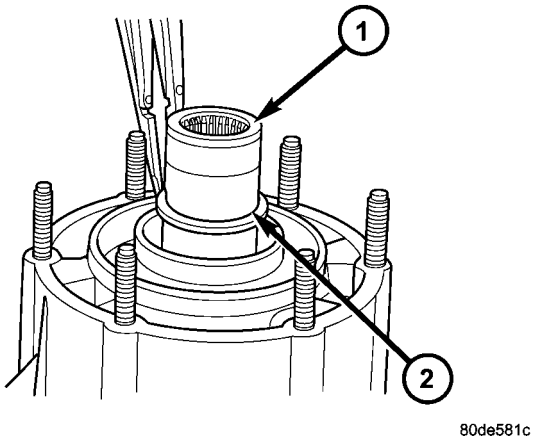


Fig. 54 Install Input Gear Retaining Ring

1 - INPUT GEAR
2 - RETAINING RING

SHIFT FORKS AND MAINSHAFT

(1) Lubricate mainshaft splines with recommended transmission fluid.

(2) Install the mode hub (Fig. 55) onto the output shaft.

(3) Install the mode hub retaining ring (Fig. 56) onto the output shaft.

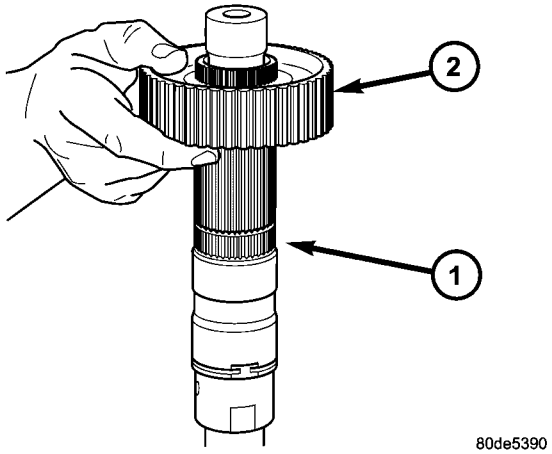


Fig. 55 Install Mode Hub

1 - OUTPUT SHAFT
2 - MODE HUB

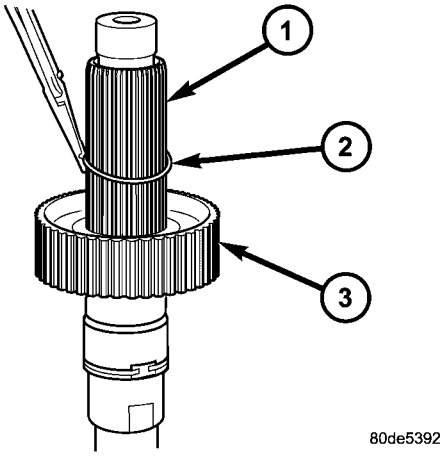


Fig. 56 Install Mode Hub Retaining Ring

1 - OUTPUT SHAFT
2 - RETAINING RING
3 - MODE HUB

TRANSFER CASE - NV241 GENII (Continued)

(4) Install the sprocket hub (Fig. 57) onto the output shaft.

(5) Install the clutch gear (Fig. 58) onto the output shaft.

(6) Install the drive sprocket (Fig. 59) onto the output shaft.

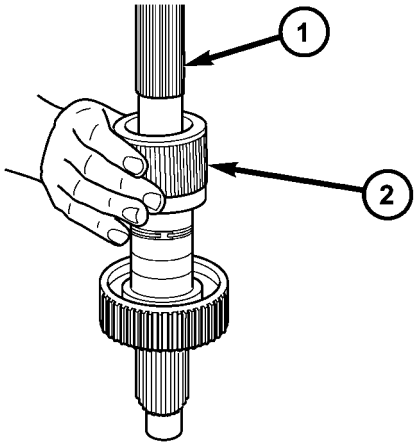


Fig. 57 Install Sprocket Hub

1 - OUTPUT SHAFT
2 - SPROCKET HUB

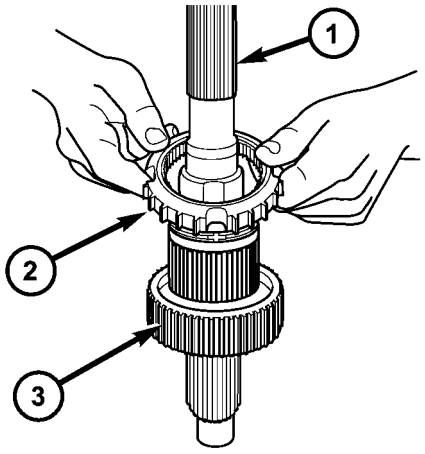


Fig. 58 Install Clutch Gear

1 - OUTPUT SHAFT
2 - CLUTCH GEAR
3 - MODE HUB

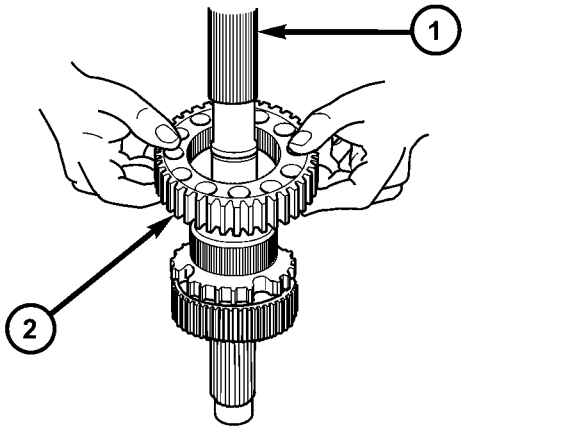


Fig. 59 Install Drive Sprocket

1 - OUTPUT SHAFT
2 - DRIVE SPROCKET

(7) Install the drive sprocket thrust washer (Fig. 60) onto the output shaft.

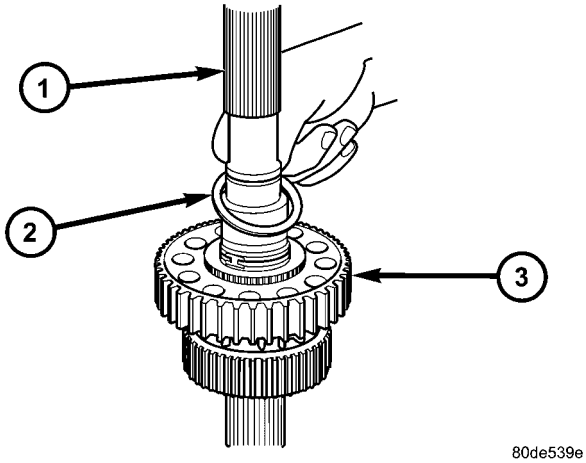


Fig. 60 Install Drive Sprocket Thrust Washer

1 - OUTPUT SHAFT
2 - THRUST WASHER
3 - DRIVE SPROCKET

TRANSFER CASE - NV241 GENII (Continued)

(8) Install the drive sprocket retaining ring (Fig. 61) onto the output shaft.

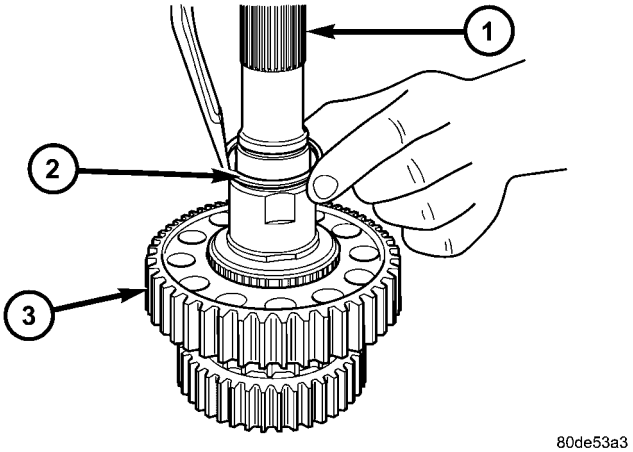


Fig. 61 Install The Drive Sprocket Retaining Ring

1 - OUTPUT SHAFT
2 - RETAINING RING
3 - DRIVE SPROCKET

(9) Lubricate sector shaft with transmission fluid and install shift sector in case (Fig. 62). Position slot in sector so it will be aligned with shift fork pin when shift forks are installed.

(10) Install the shift sector support (Fig. 63). Tighten the sector support to 27-42 N·m (20-30 ft.lbs.).

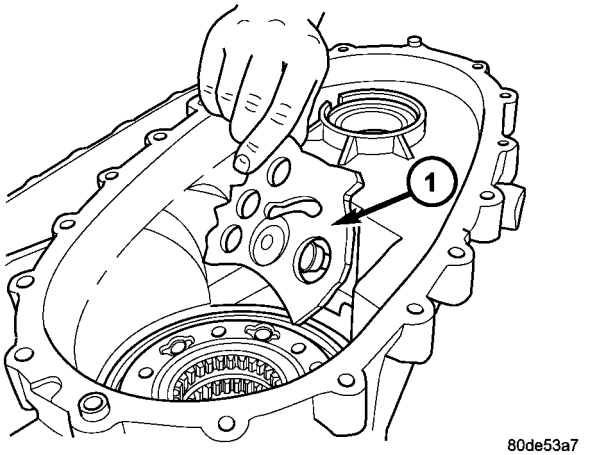


Fig. 62 Install Shift Sector

1 - SHIFT SECTOR

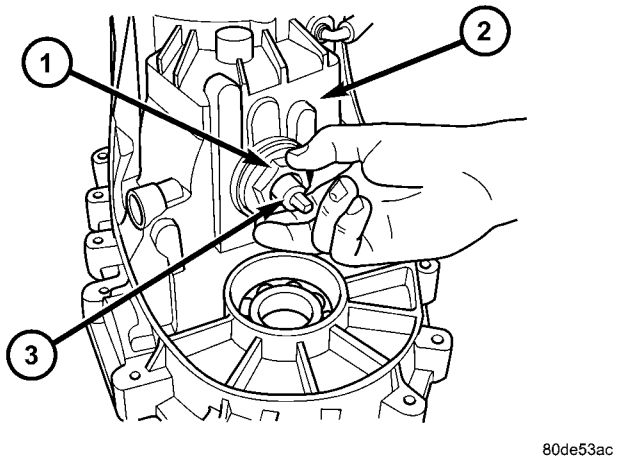


Fig. 63 Install Sector Support

1 - SECTOR SUPPORT
2 - FRONT CASE
3 - SECTOR SHAFT

(11) Assemble and install range fork and hub (Fig. 64). 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 the range fork retaining ring.

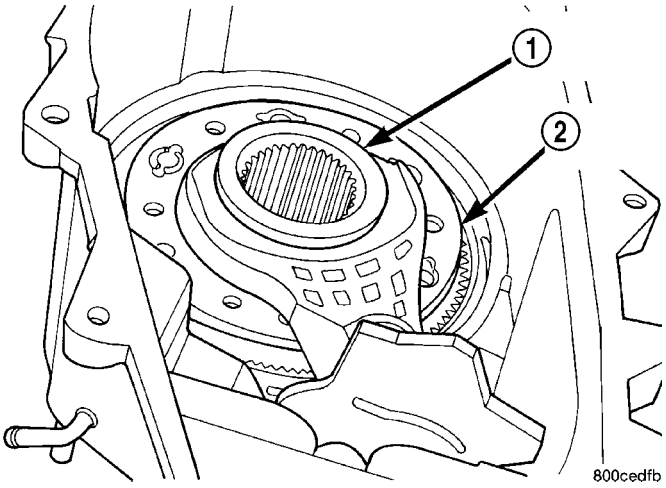


Fig. 64 Install Range Fork And Hub Assembly

1 - RANGE HUB
2 - RANGE FORK

TRANSFER CASE - NV241 GENII (Continued)

(14) Install mode fork and shift rail onto the mode sleeve.

(15) Install the mode fork, sleeve, and shift rail into the transfer case (Fig. 65).

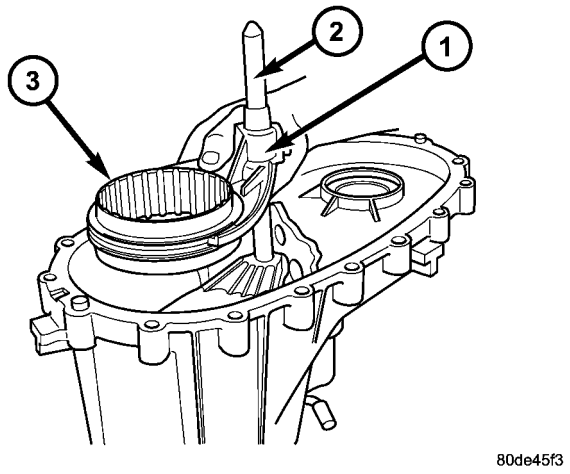


Fig. 65 Install Mode Fork and Shift Rail

1 - MODE FORK
2 - SHIFT RAIL
3 - MODE SLEEVE

(16) Install mainshaft into the transfer case (Fig. 66). Guide mainshaft through the mode and range sleeves and into the input gear.

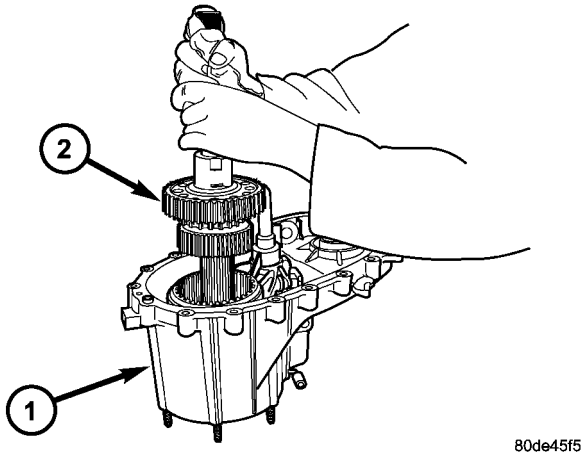


Fig. 66 Install Mainshaft

1 - FRONT CASE
2 - MAINSHAFT

(17) Install the transfer case position sensor (Fig. 67). Tighten the sensor to 20-34 N·m (16-25 ft. lbs.) torque.

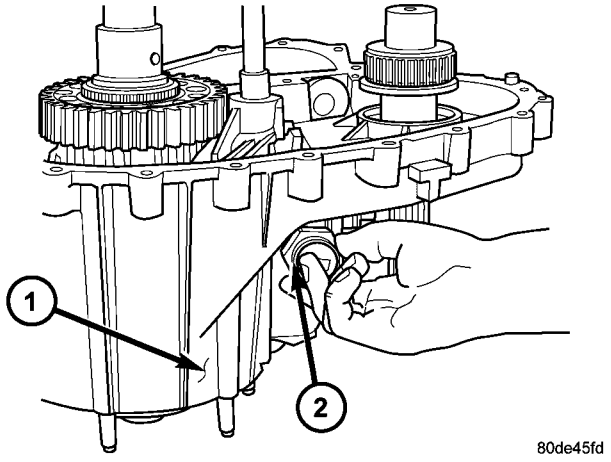


Fig. 67 Install Position Sensor

1 - FRONT CASE
2 - POSITION SENSOR

(18) Install range lever on sector shaft (Fig. 68).

(19) 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.

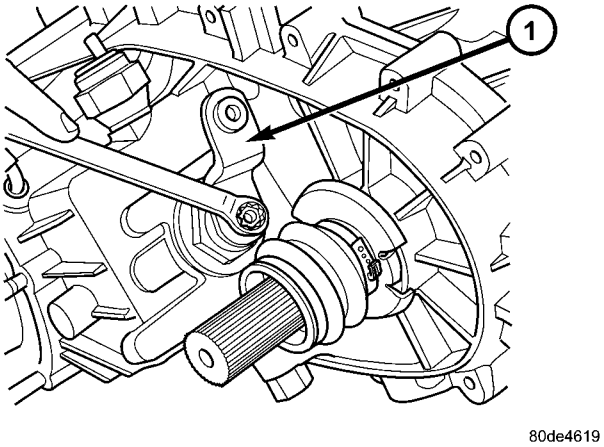


Fig. 68 Install Range Lever Nut

1 - RANGE LEVER

TRANSFER CASE - NV241 GENII (Continued)

(20) Install new o-ring on detent plug (Fig. 69).

(21) Install detent plunger, spring, and plug (Fig. 70). Tighten the plug to 16-25 N·m (12-18 ft. lbs.).

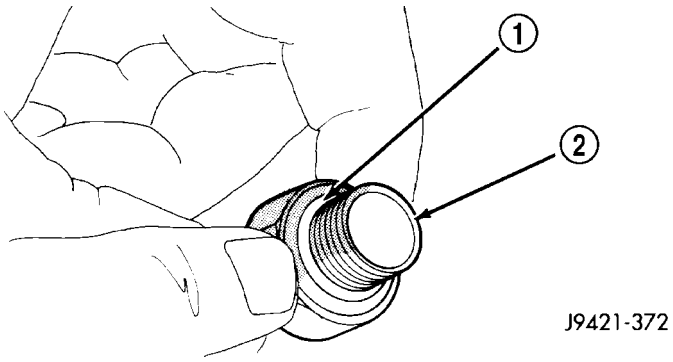


Fig. 69 O-Ring Installation On Detent Plug

1 - O-RING
2 - DETENT PLUG

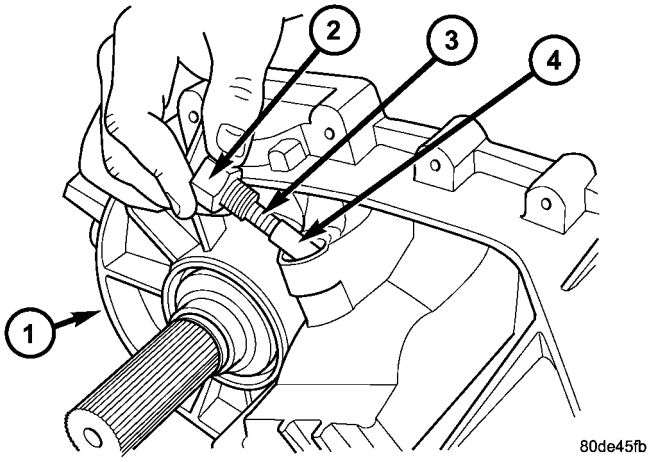


Fig. 70 Install Detent Plug, Spring, and Plunger

1 - FRONT CASE
2 - DETENT PLUG
3 - DETENT SPRING
4 - DETENT PLUNGER

FRONT OUTPUT SHAFT AND DRIVE CHAIN

(1) Install the front output shaft (Fig. 71) into the front output shaft bearing.

(2) Install the front output shaft retaining ring (Fig. 72) onto the output shaft.

(3) Install the new front output shaft seal with Installer MB991168A

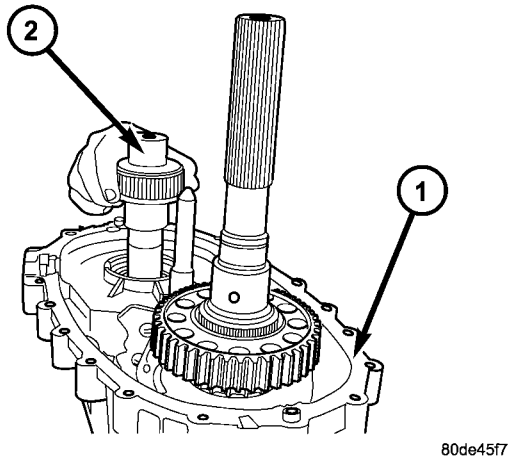


Fig. 71 Install Front Output Shaft

1 - FRONT CASE
2 - FRONT OUTPUT SHAFT

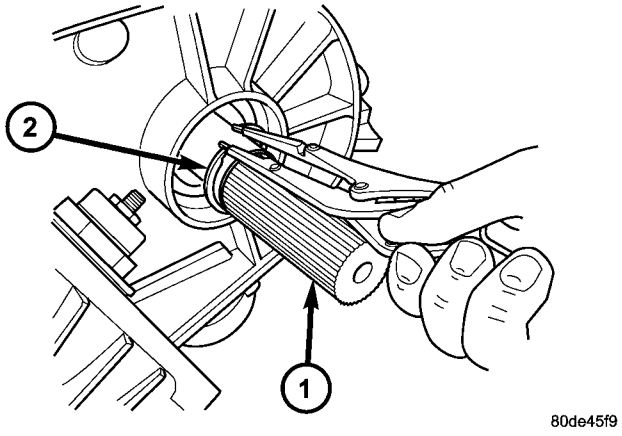


Fig. 72 Install Front Output Shaft Snap-ring

1 - FRONT OUTPUT SHAFT
2 - SNAP-RING

TRANSFER CASE - NV241 GENII (Continued)

(4) Insert front sprocket in drive chain.

(5) Install drive chain around mainshaft sprocket (Fig. 73). Then position front sprocket over front shaft.

(6) Raise mainshaft about 2.54 cm (one inch) and seat front sprocket on front output shaft.

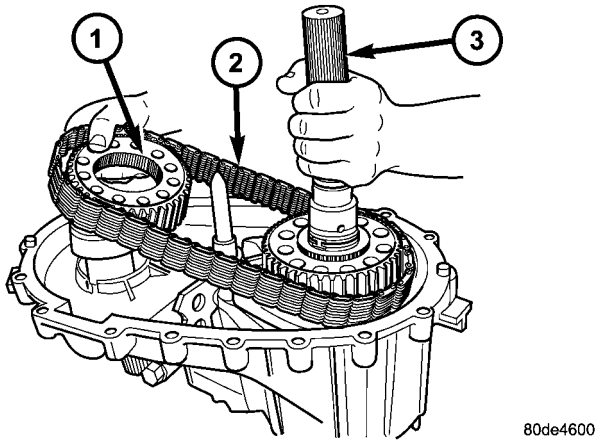


Fig. 73 Install Front Sprocket and Drive Chain

1 - FRONT DRIVE SPROCKET
2 - DRIVE CHAIN
3 - MAINSHAFT

(7) If mainshaft and mode sleeve were unseated during chain installation, align and reseat mainshaft in input gear and hub.

(8) Install front sprocket retaining ring (Fig. 74).

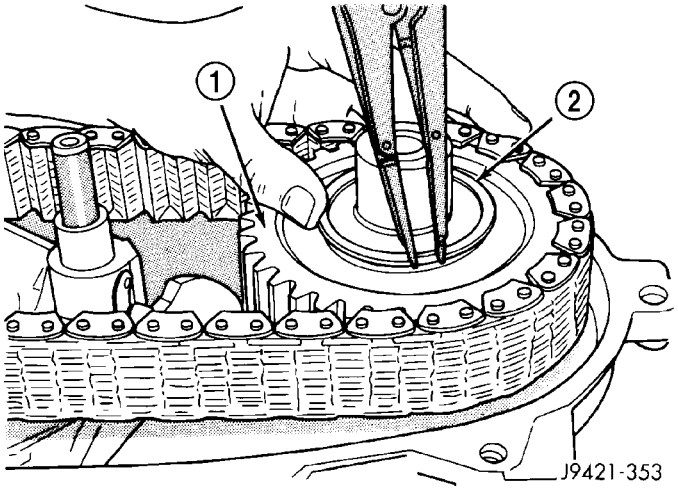


Fig. 74 Front Sprocket Retaining Ring Installation

1 - FRONT SPROCKET
2 - RETAINING RING

(9) Install spring and cup on shift rail (Fig. 75).

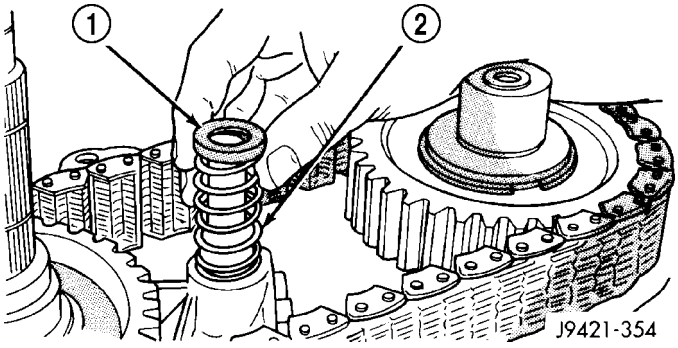


Fig. 75 Shift Rail Spring And Cup Installation

1 - CUP
2 - SPRING

(10) Insert magnet in front case pocket (Fig. 76).

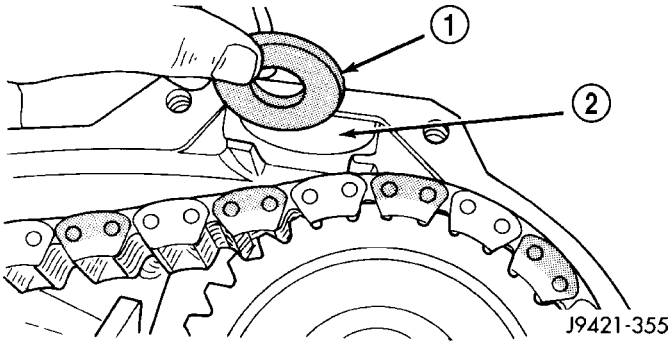


Fig. 76 Case Magnet Installation

1 - MAGNET
2 - CASE POCKET

OIL PUMP AND REAR CASE

CAUTION: Do not remove the bolts holding the oil pump cover to the rear case half. The oil pump cover is aligned to the rear output shaft inner bearing race and will become mis-aligned if the bolts are loosened. If the transfer case failure has generated any debris which may have become trapped in the oil pump. the rear case and oil pump assembly MUST be replaced.

(1) 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.

TRANSFER CASE - NV241 GENII (Continued)

(2) Align oil pump with mainshaft and align shift rail with bore in rear case. Then install rear case and oil pump assembly (Fig. 77).

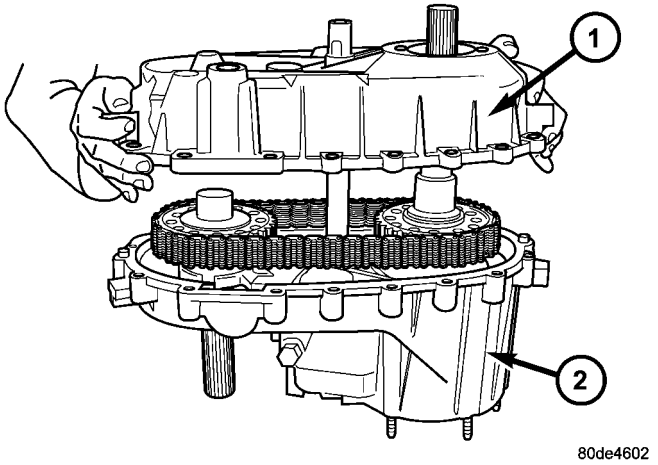


Fig. 77 Install Rear Case

1 - REAR CASE
2 - FRONT CASE

(3) Install 4-5 rear case-to-front case bolts (Fig. 78) to hold rear case in position. Tighten bolts snug but not to specified torque at this time.

CAUTION: Verify that shift rail, and case alignment dowels are seated before installing any bolts. Case could be cracked if shaft rail or dowels are misaligned.

(4) Apply Loctite™ 242 to remainder of rear case-to-front case bolt threads and install bolts. Tighten bolts to 20-27 N·m (15-24 ft. lbs.),

(5) Install rear output bearing snap-ring (Fig. 79) to output shaft.

SEAL BOOT

(1) Install the front output shaft seal slinger with Installer 8840. Install the slinger onto the shaft until the tool contacts the rear of the output shaft.

(2) Install a new seal boot clamp onto the seal boot.

(3) Install the seal boot and clamp onto the slinger hub and tighten the clamp with Crimp Tool C-4975-A.

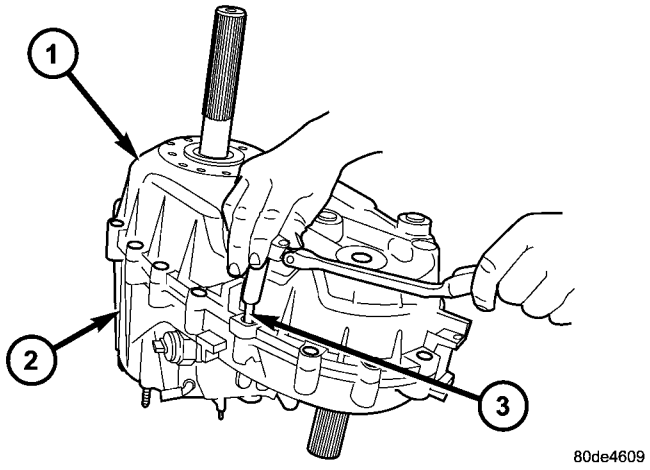


Fig. 78 Install Case Bolts

1 - REAR CASE
2 - FRONT CASE
3 - BOLT

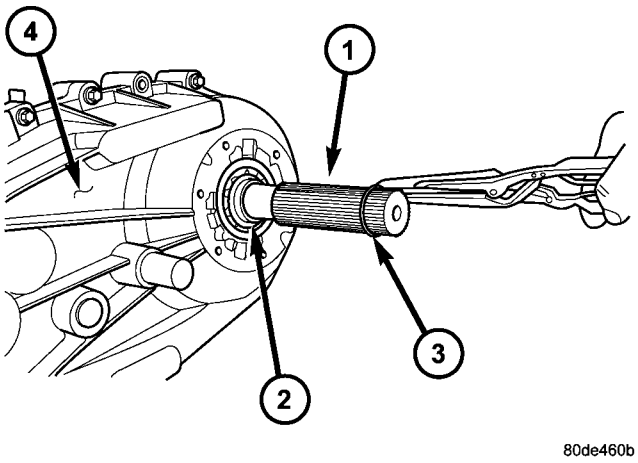


Fig. 79 Install Output Shaft Retaining Ring

1 - REAR OUTPUT SHAFT
2 - OUTPUT SHAFT BEARING
3 - RETAINING RING
4 - TRANSFER CASE

TRANSFER CASE - NV241 GENII (Continued)

REAR EXTENSION

(1) Install new seal in rear extension housing seal with Installer D-163 and Handle C-4171..

(2) 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.

(3) Align and install rear extension on retainer (Fig. 80).

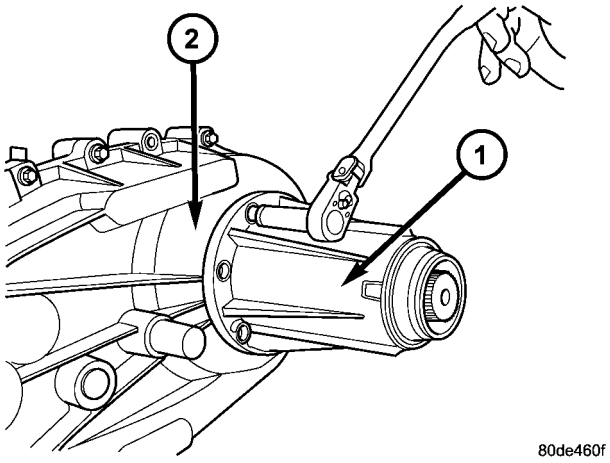


Fig. 80 Install Rear Extension Bolts

1 - EXTENSION HOUSING
2 - TRANSFER CASE

(4) Apply Mopar® Silicone Sealer to threads of rear extension housing bolts. Then install and tighten bolts to 16-24 N·m (12-18 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) Remove jack stand from under transmission.

(4) Align and connect propeller shafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

(5) Connect vent hose and transfer case position sensor connector.

(6) Connect shift rod to transfer case lever or floor shift arm. Use channel lock style pliers to press rod back into lever grommet.

(7) Adjust shift linkage, if necessary.

(8) Fill transfer case with recommended transmission fluid and install fill plug.

(9) Install skid plate, if equipped. (Refer to 13 - FRAMES & BUMPERS/FRAME/TRANSFER CASE SKID PLATE - INSTALLATION)

(10) Lower vehicle

SPECIFICATIONS

TRANSFER CASE - NV241 GENII

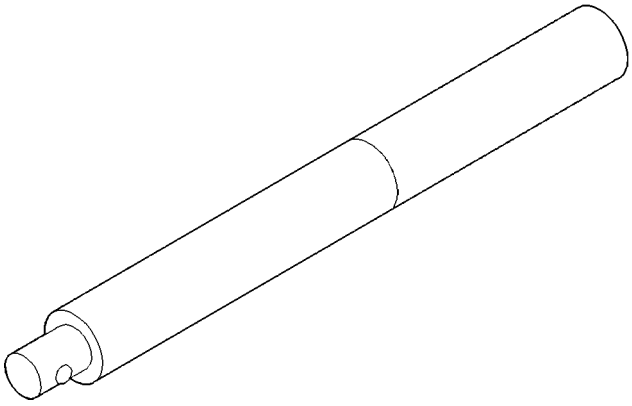
TORQUE SPECIFICATIONS

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Plug, Detent	16-24	12-18	-
Plug, Drain/Fill	40-45	30-40	-
Bolt, Extension Housing	16-24	12-18	-
Bolt, Case Half	20-27	15-24	-
Screw, Oil Pump	12-16	8-12	-
Nut, Range Lever	27-34	20-25	-
Sector Support	27-42	20-30	-
Nuts, Mounting	30-41	20-30	-
Position Sensor	20-34	16-25	-

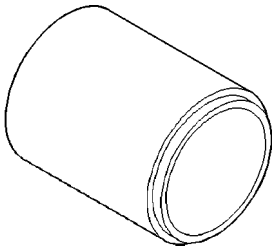
TRANSFER CASE - NV241 GENII (Continued)

SPECIAL TOOLS

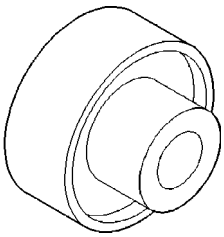
TRANSFER CASE - NV241/NV243



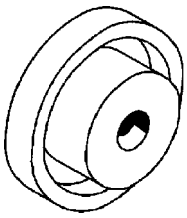
Handle, Universal - C-4171



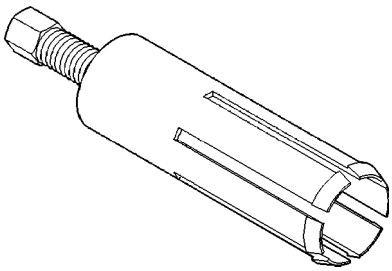
Installer, Seal - 6888



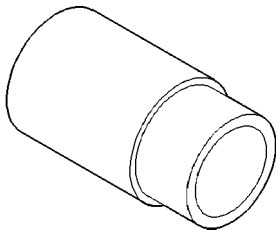
Installer, Bearing - 6953



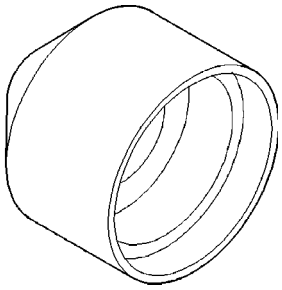
Installer, Seal - C-4210



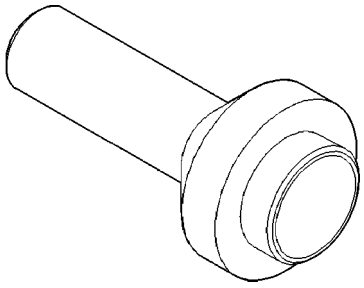
Remover, Bushing - 6957



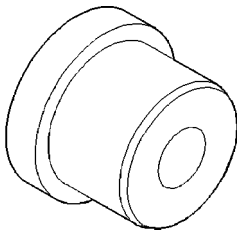
Installer, Bushing - 8157



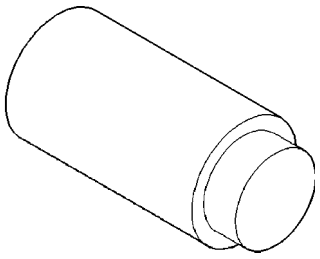
Installer, Seal - D-163



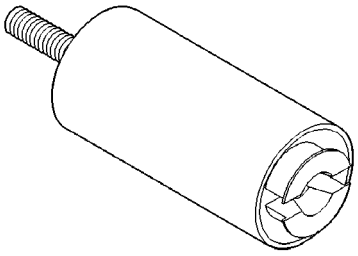
Installer, Seal - 7884



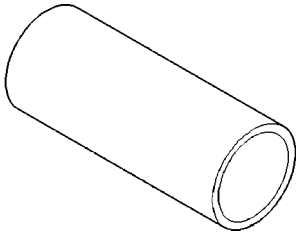
Installer, Bushing - 5066



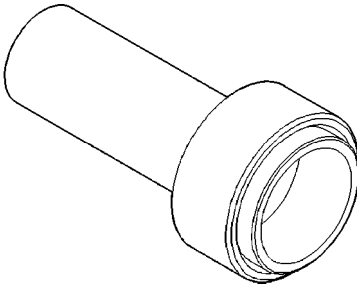
Plug, Extension - C-293-3



Remover - L-4454



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. 81).

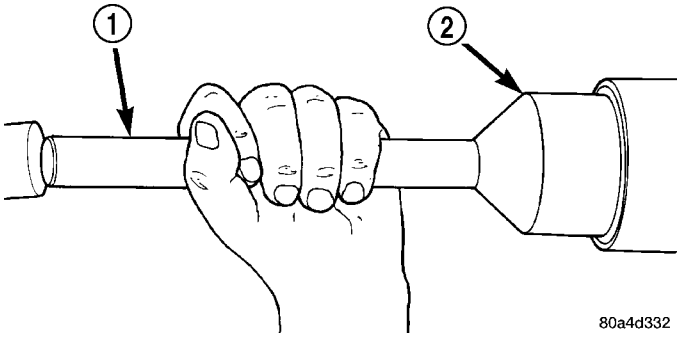


Fig. 81 Install Rear Seal in Extension Housing

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. 82).

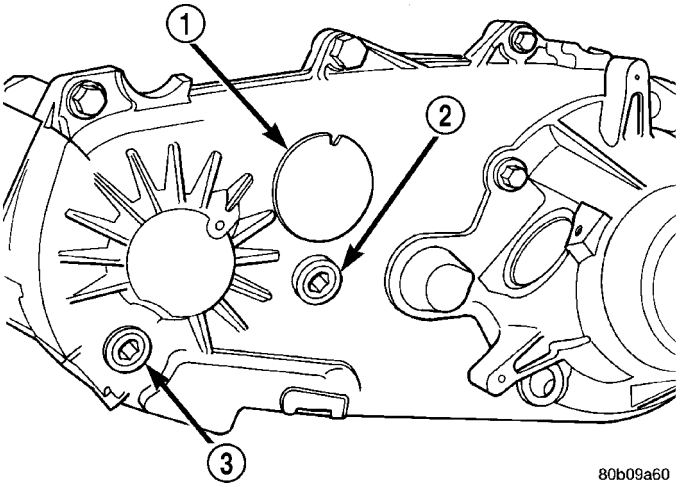


Fig. 82 Fill/Drain Plug and I.D. Tag Location - Typical

1 - I.D. TAG
2 - FILL PLUG
3 - DRAIN PLUG

(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, 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) Remove the front propeller shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL).
(2) Remove the front propeller shaft seal boot retaining clamp (Fig. 83).
(3) Remove the front propeller shaft seal boot (Fig. 84).

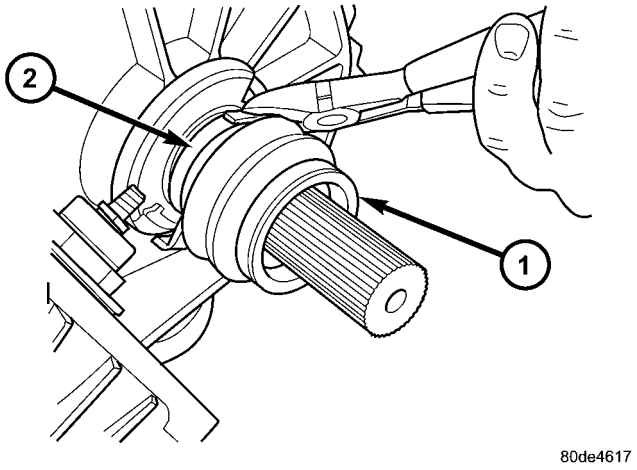


Fig. 83 Remove Boot Clamp

1 - SEAL BOOT
2 - BOOT CLAMP

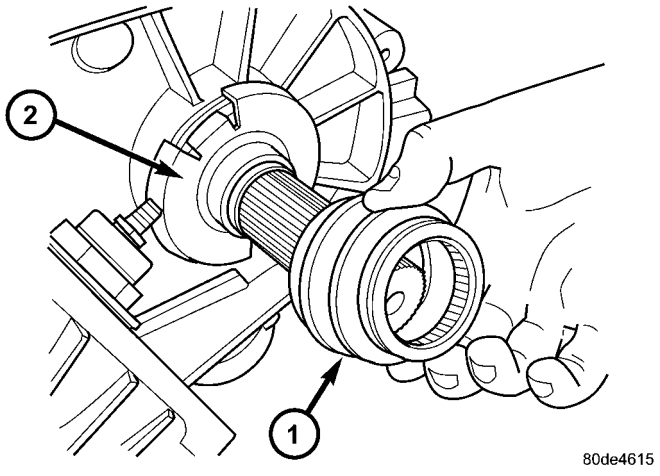


Fig. 84 Remove Seal Boot

1 - SEAL BOOT
2 - SEAL SLINGER

FRONT OUTPUT SHAFT SEAL (Continued)

(4) Remove the front output shaft seal slinger by bending (Fig. 85) the slinger ears away from the transfer case.

(5) Using a suitable pry tool (Fig. 86), remove the slinger from the output shaft using care not to damage the shaft.

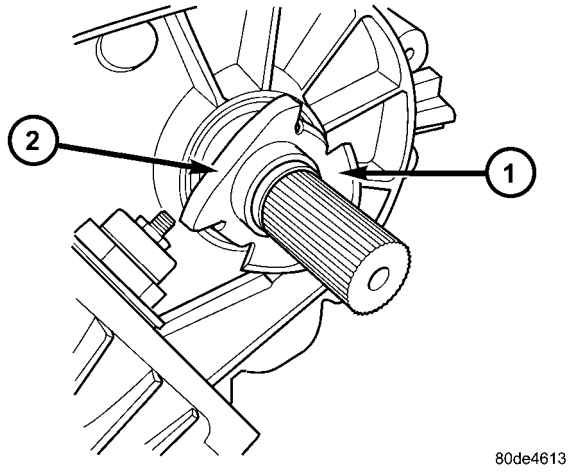


Fig. 85 Bend Slinger Ears

1 - SLINGER
2 - BEND UPWARD

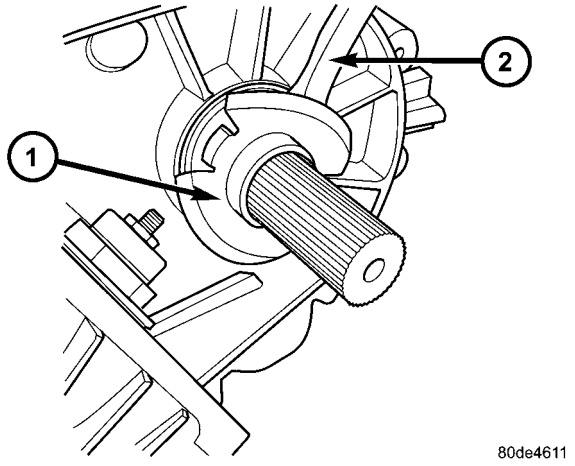


Fig. 86 Remove Slinger From Shaft

1 - SLINGER
2 - PRY TOOL

(6) Using a screw and a slide hammer, remove the front output shaft seal.

INSTALLATION

(1) Install the new front output shaft seal with Installer MB991168A

(2) Install the front output shaft seal slinger with Installer 8840. Install the slinger onto the shaft until the tool contacts the rear of the output shaft.

(3) Install a new seal boot clamp onto the seal boot.

(4) Install the seal boot and clamp onto the slinger hub and tighten the clamp with Crimp Tool C-4975-A.

(5) Install front propeller shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION).

POSITION SENSOR

DESCRIPTION

The transfer case position sensor is an electronic device whose output can be interpreted to indicate the transfer case's current operating mode. The sensor consists of a five position, resistive multiplexed circuit which returns a specific resistance value to the Powertrain Control Module (PCM) for each transfer case operating mode. The sensor is located on the top of the transfer case, just left of the transfer case centerline and rides against the sector plate roostercomb. The PCM supplies 5VDC (+/- 0.5V) to the sensor and monitors the return voltage to determine the sector plate, and therefore the transfer case, position.

POSITION SENSOR (Continued)

OPERATION

During normal vehicle operation, the Powertrain Control Module (PCM) monitors the transfer case position sensor return voltage to determine the operating mode of the transfer case. Refer to the Operating Mode Versus Resistance table for the correct resistance for each position (Fig. 87).

OPERATING MODE VERSUS RESISTANCE

SENSOR POSITION	OPERATING MODE	SENSOR RESISTANCE (ohms)
1	2H	1124-1243
2	4H	650-719
3	NEUTRAL	389-431
4	4L	199-221
5	NOT USED	57-64

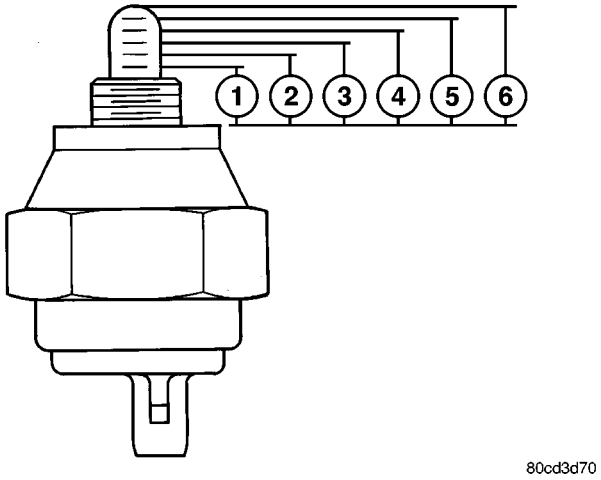


Fig. 87 Position Sensor Linear Movement

1 - POSITION 1 - 10mm ±0.5mm
2 - POSITION 2 - 12mm ±0.5mm
3 - POSITION 3 - 14mm ±0.5mm
4 - POSITION 4 - 16mm ±0.5mm
5 - POSITION 5 - 18mm ±0.5mm
6 - POSITION 6 - 20mm±0.5mm - FULL EXTENSION

REMOVAL

(1) Raise and support the vehicle.
(2) Disengage the transfer case position sensor connector from the position sensor.
(3) Remove the position sensor from the transfer case.

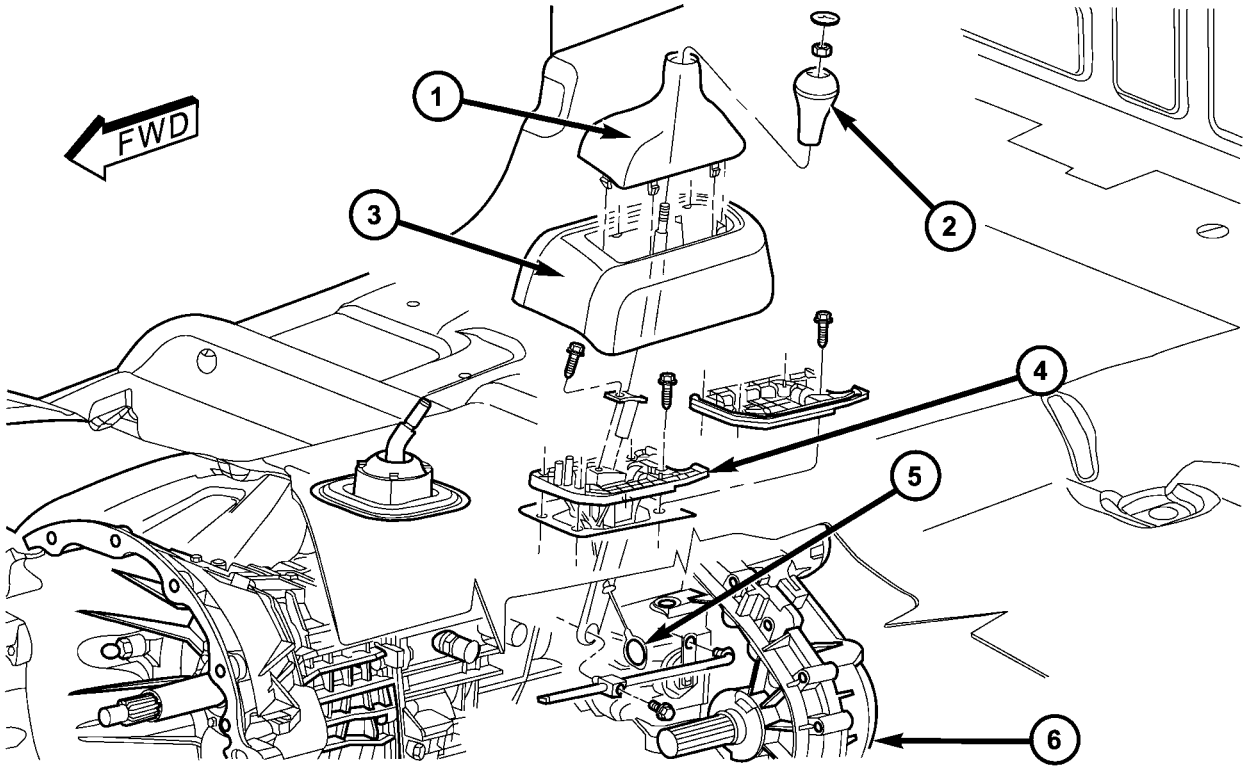
INSTALLATION

(1) Inspect the o-ring seal on the transfer case position sensor. Replace the o-ring if necessary.
(2) Install the transfer case position sensor into the transfer case. Torque the sensor to 20-34 N·m (15-25 ft.lbs.).
(3) Engage the transfer case position sensor connector to the position sensor.
(4) Lower vehicle.
(5) Verify proper sensor operation.

SHIFT LEVER

REMOVAL

(1) Shift transfer case into 2H.
(2) Raise and support the vehicle.
(3) 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.
(4) Lower vehicle.
(5) Remove transfer case shifter knob cap.
(6) Remove nut holding shifter knob to shift lever.
(7) Remove shifter knob.
(8) Remove the shift boot from the shifter console.
(9) Remove the bolts securing the shifter mechanism to the floor pan (Fig. 88).
(10) Separate shift lever mechanism from the vehicle.



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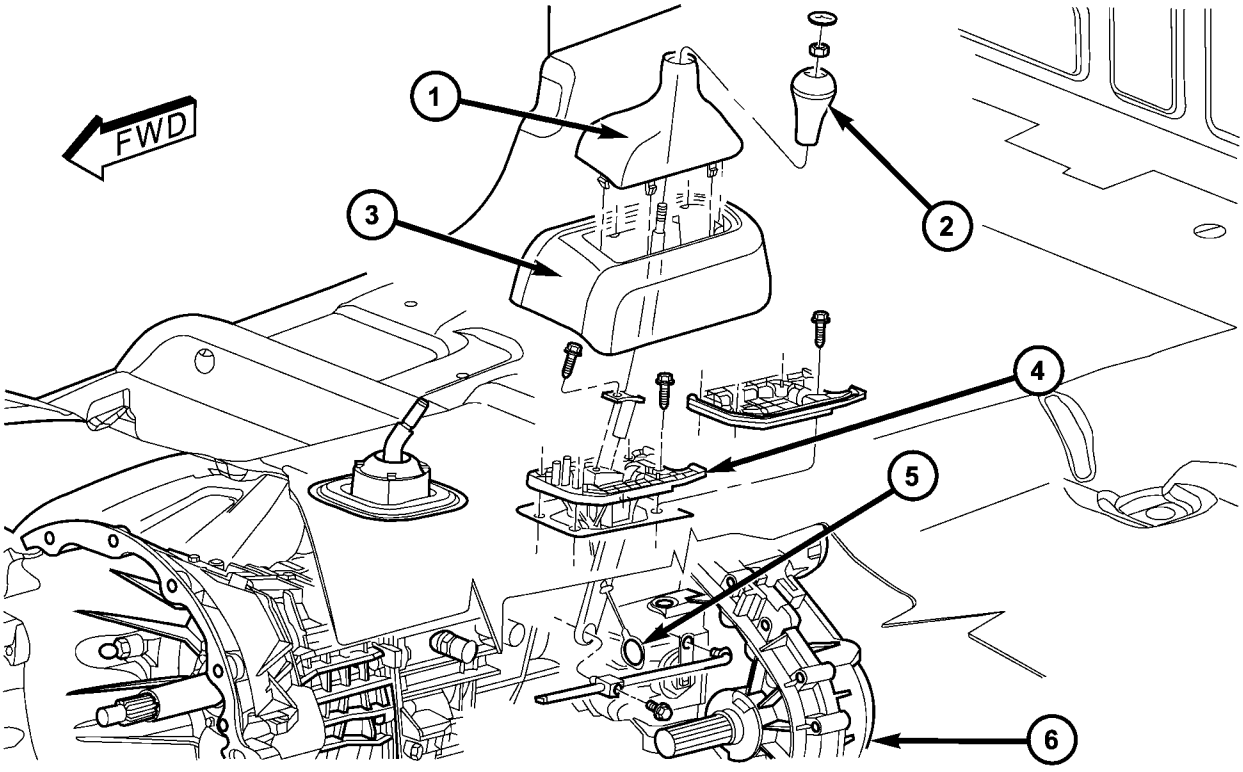
Fig. 88 Transfer Case Shifter

1 - SHIFTER BOOT
2 - SHIFTER KNOB
3 - SHIFTER CONSOLE
4 - SHIFTER MECHANISM
5 - ALIGNMENT PIN
6 - TRANSFER CASE

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. 89).
(2) Position shift lever in vehicle.
(3) Install the bolts to hold the shifter mechanism to the floor pan.
(4) Raise vehicle.
(5) Verify that the transfer case is still in the 2H position. The 2H detent position on the transfer case shift arm is the second position from full forward.
(6) Install trunnion to shift lever, if necessary.
(7) Install shift rod to trunnion, if necessary.
(8) Tighten the shift rod lock bolt to 10 N·m (90 in.lbs.).
(9) Remove the shifter adjustment locating pin from the adjustment channel and the locating hole.
(10) Lower vehicle.
(11) Install the transfer case shifter console.
(12) Install the shifter boot and the shifter knob onto the shifter lever.
(13) Install nut to hold shifter knob to shift lever.
(14) Install shifter knob cap.
(15) Verify transfer case operation.



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Fig. 89 Transfer Case Shifter

1 - SHIFTER BOOT
2 - SHIFTER KNOB
3 - SHIFTER CONSOLE
4 - SHIFTER MECHANISM
5 - ALIGNMENT PIN
6 - TRANSFER CASE

SHIFT LEVER (Continued)

ADJUSTMENTS

ADJUSTMENT - SHIFT LEVER

(1) Move shift lever into 2H position.
(2) Raise vehicle.
(3) Loosen shift rod lock bolt at trunnion.
(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.
(6) Align the adjustment locating hole on the lower shifter lever with the adjustment channel on the shifter bracket assembly (Fig. 90).
(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.

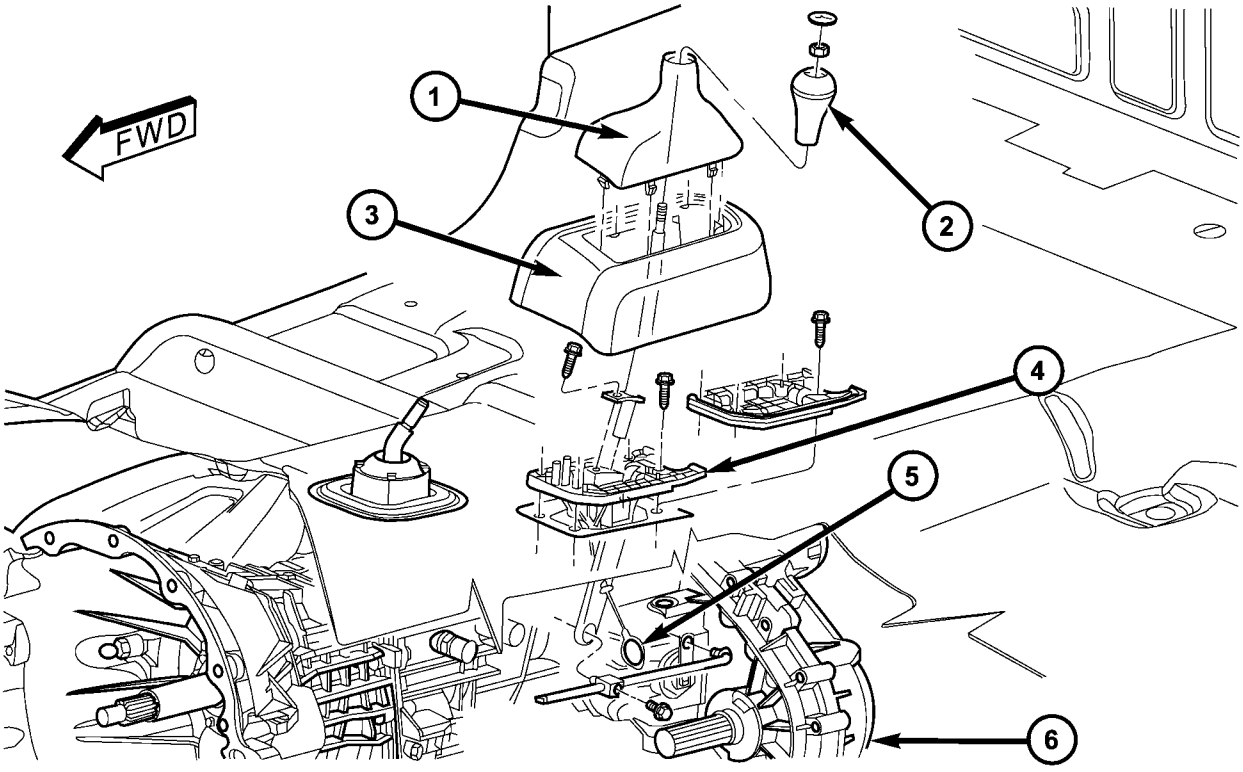


Fig. 90 Transfer Case Shifter

1 - SHIFTER BOOT
2 - SHIFTER KNOB
3 - SHIFTER CONSOLE
4 - SHIFTER MECHANISM
5 - ALIGNMENT PIN
6 - TRANSFER CASE

TRANSFER CASE - NV271

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TRANSFER CASE - NV271

DESCRIPTION

The NV271 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 gear cases and extension are all of aluminum (Fig. 1). 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. 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.

OPERATION

OPERATING RANGE

Transfer case operating ranges are:

- 2H (2-wheel drive)
- 4H (4-wheel drive)
- 4LO (4-wheel drive low range

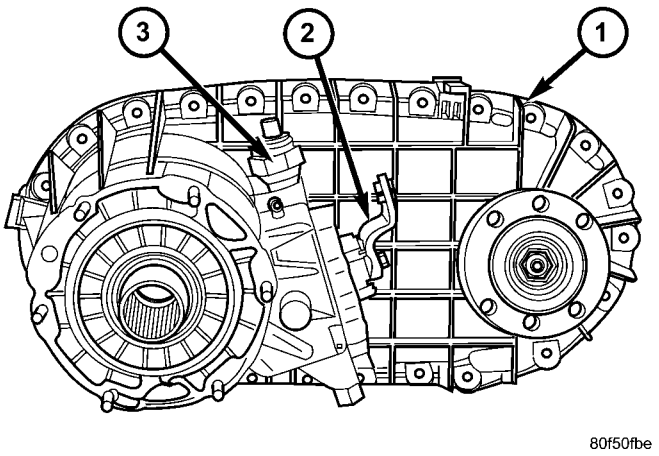


Fig. 1 Transfer Case - Front View

1 - TRANSFER CASE
2 - MANUAL LEVER
3 - POSITION SENSOR

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.

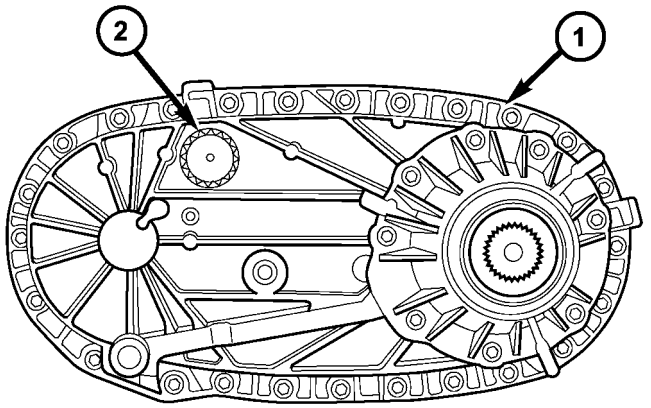


Fig. 2 Transfer Case - Rear View

1 - TRANSFER CASE
2 - IDENTIFICATION TAG

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 transfer case can 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 and out of the 4L operating range.

DIAGNOSIS AND TESTING - TRANSFER CASE - NV271

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, 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, Automatic Transmission fluid.

TRANSFER CASE - NV271 (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 transfer case position sensor connector.

(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) Mark front and rear propeller shafts for assembly reference.

(9) Remove front and rear propeller shafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)

(10) Support transfer case with suitable jack. Secure transfer case to jack with safety chains.

(11) Remove nuts attaching transfer case to transmission.

(12) Move transfer case assembly rearward until free of transmission output shaft.

(13) 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.

COMPANION FLANGE AND EXTENSION HOUSING

(1) Install two bolts 180° apart into the front output shaft companion flange.

(2) Place holder over the bolts and against the companion flange (Fig. 3).

(3) Remove and discard the front companion flange nut.

TRANSFER CASE - NV271 (Continued)

(4) Remove the companion flange from the front output shaft. It may be necessary to use Flange puller 8992 to remove the companion flange.

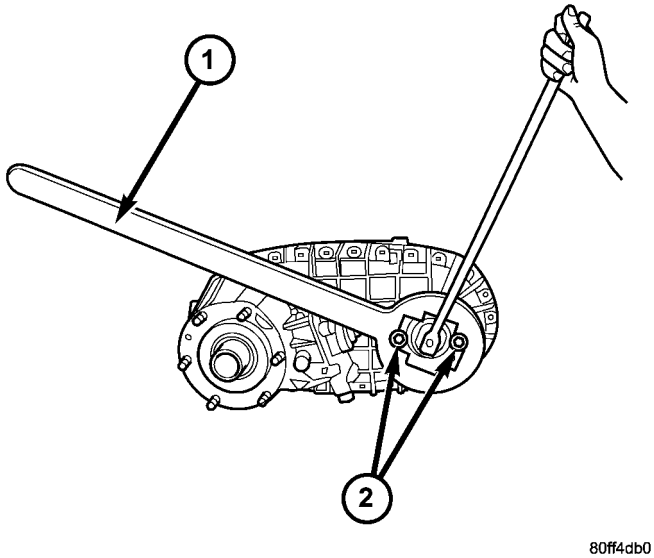


Fig. 3 Remove Companion Flange Nut

1 - HOLDER 6719
2 - BOLTS

(5) Use a suitable chisel or pry tool to remove the rear extension housing dust boot (Fig. 4).

(6) Use a suitable chisel or pry tool to remove the rear extension housing seal.

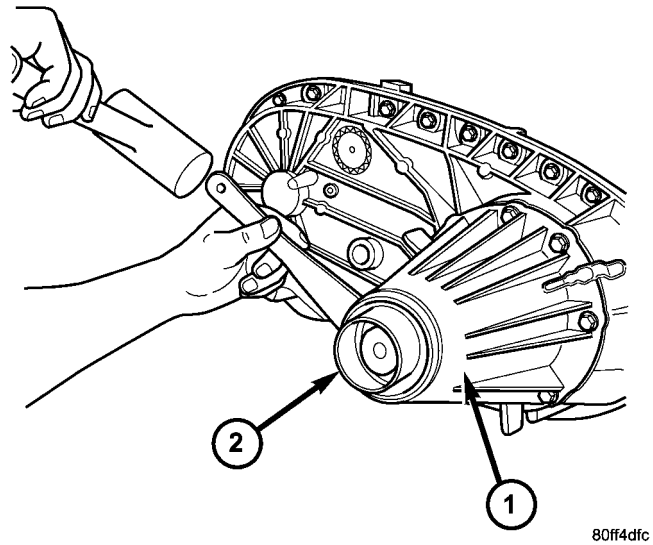


Fig. 4 Remove Extension Housing Dust Boot

1 - EXTENSION HOUSING
2 - DUST BOOT

(7) Remove rear extension bolts (Fig. 5).

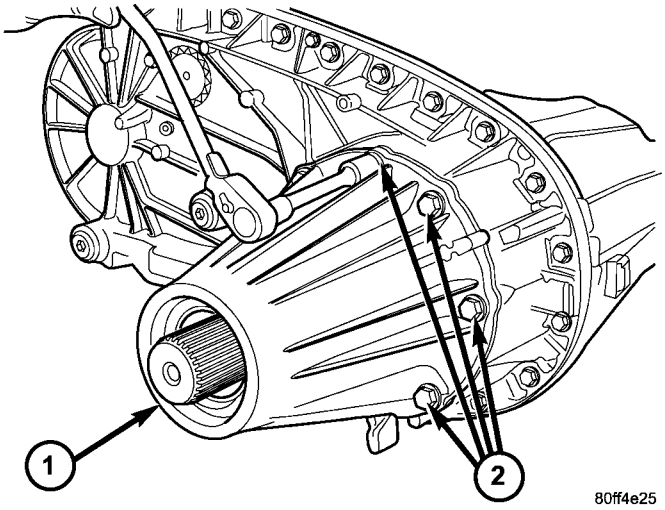


Fig. 5 Remove Extension Housing Bolts

1 - EXTENSION HOUSING
2 - BOLTS

(8) Remove rear extension housing (Fig. 6). Tap extension once or twice with a plastic mallet to break sealer bead and loosen it.

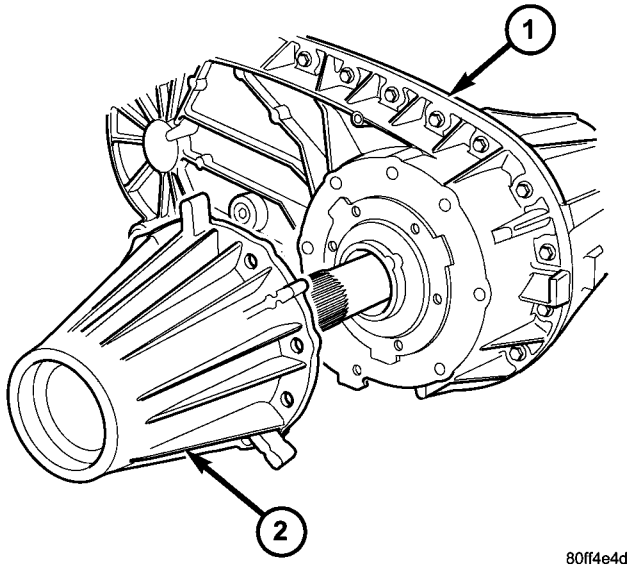


Fig. 6 Remove Extension Housing

1 - REAR CASE HALF
2 - EXTENSION HOUSING

TRANSFER CASE - NV271 (Continued)

OIL PUMP AND REAR CASE

(1) Disengage the oil pump pick-up tube (Fig. 7) from the oil pump.

NOTE: The oil pump pick-up tube seals to the oil pump with an o-ring. Verify that the o-ring was removed with the tube and is in good condition. Replace the o-ring if necessary.

(2) Remove the oil pump (Fig. 8).

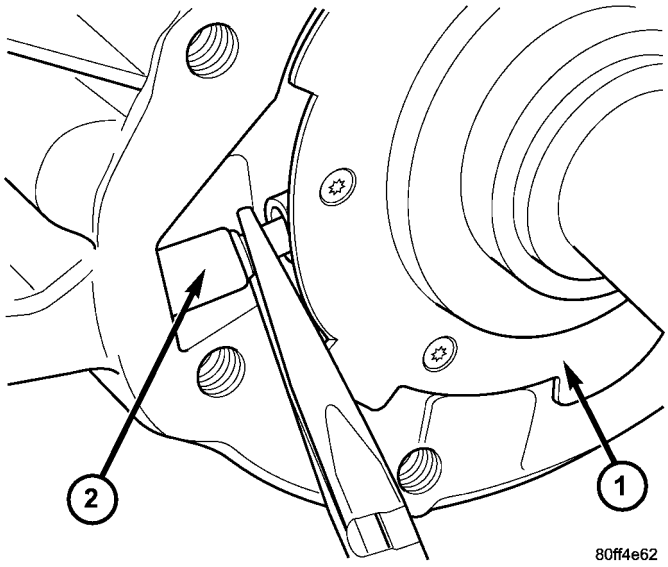


Fig. 7 Disengage The Oil Pick-up From Oil Pump

1 - OIL PUMP
2 - OIL PICK-UP TUBE

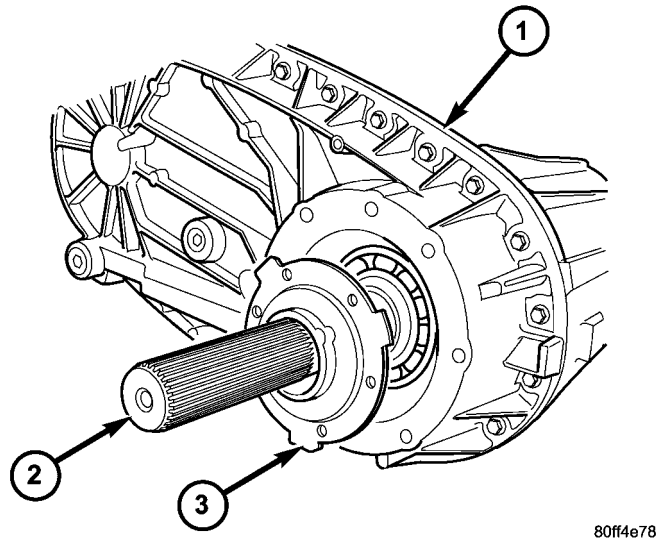


Fig. 8 Remove Oil Pump

1 - REAR CASE HALF
2 - REAR OUTPUT SHAFT
3 - OIL PUMP

(3) Remove rear case-to-front case bolts (Fig. 9).

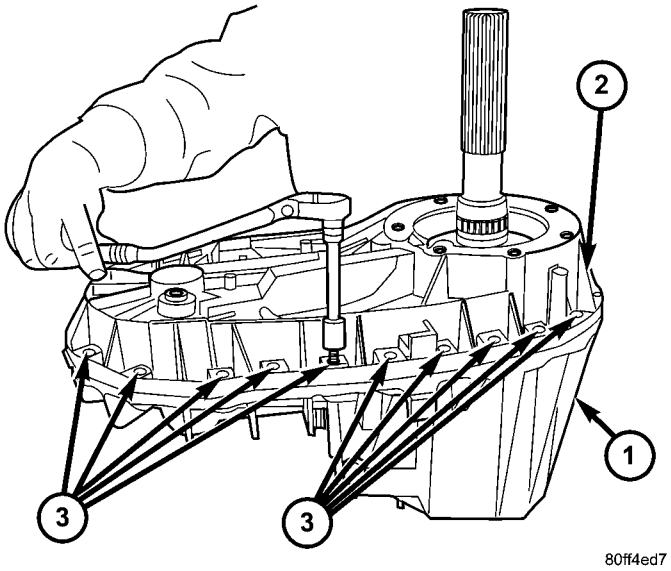


Fig. 9 Remove Case Half Bolts

1 - FRONT CASE HALF
2 - REAR CASE HALF
3 - BOLTS

(4) Remove the rear output shaft bearing inner snap-ring (Fig. 10) from the output shaft using suitable snap-ring pliers.

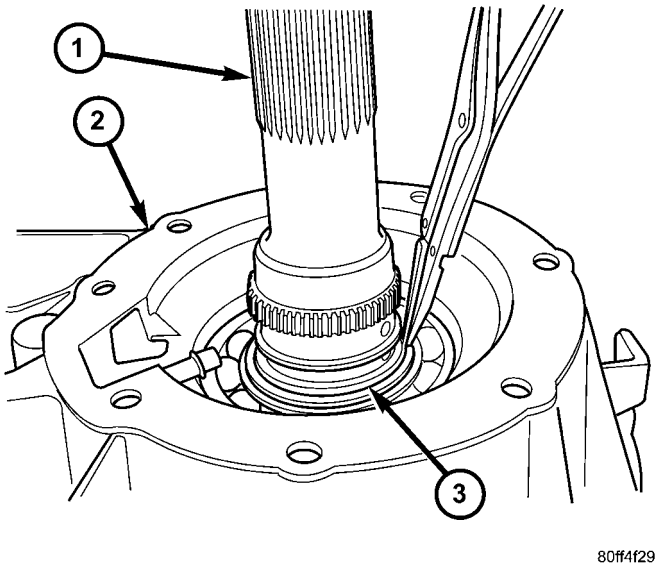


Fig. 10 Remove Rear Bearing Inner Snap-Ring

1 - OUTPUT SHAFT
2 - REAR CASE HALF
3 - SNAP-RING

TRANSFER CASE - NV271 (Continued)

(5) Remove the rear output shaft bearing inner snap-ring (Fig. 11) from the output shaft.

(6) Loosen rear case with pry tool to break sealer bead. Insert tool at each end of case (Fig. 12).

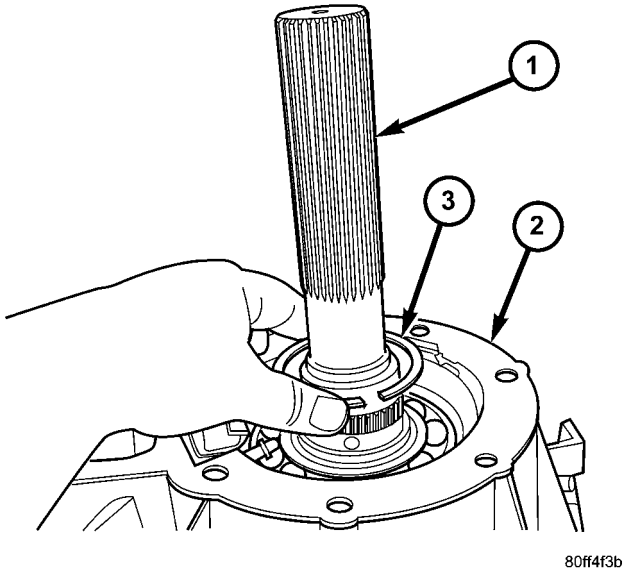


Fig. 11 Remove Rear Bearing Inner Snap-Ring

1 - OUTPUT SHAFT
2 - REAR CASE HALF
3 - SNAP-RING

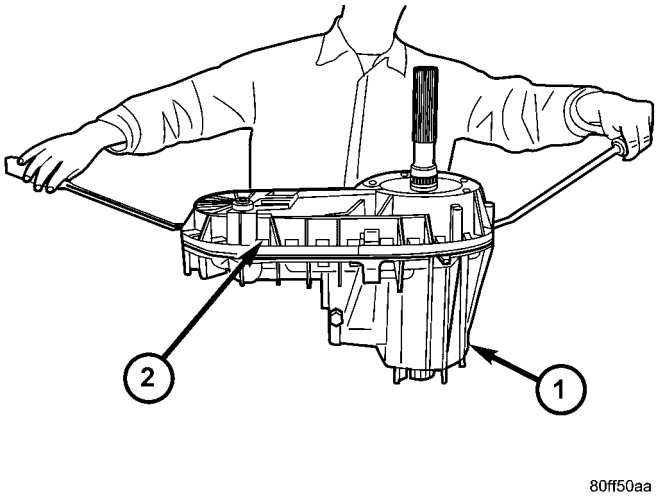


Fig. 12 Separate Front and Rear Case Halves

1 - FRONT CASE HALF
2 - REAR CASE HALF

(7) Unseat rear case from alignment dowels.

(8) Remove the rear case from the front case (Fig. 13).

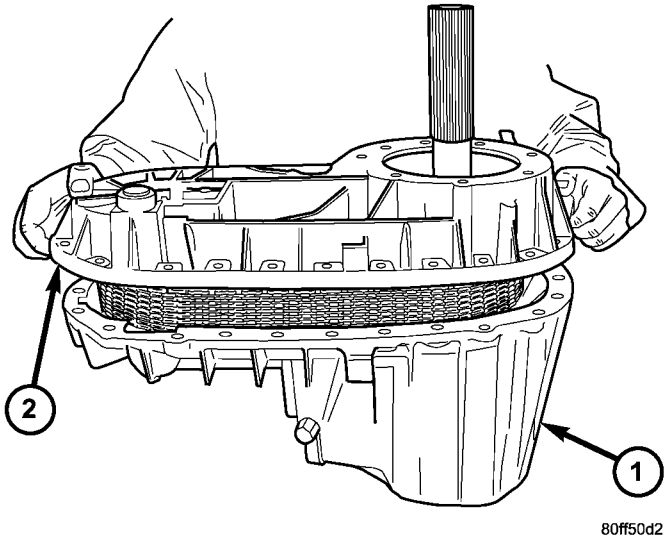


Fig. 13 Remove Rear Case Half

1 - FRONT CASE HALF
2 - REAR CASE HALF

FRONT OUTPUT SHAFT AND DRIVE CHAIN

(1) Remove the oil pick-up tube (Fig. 14) and screen from the front case half.

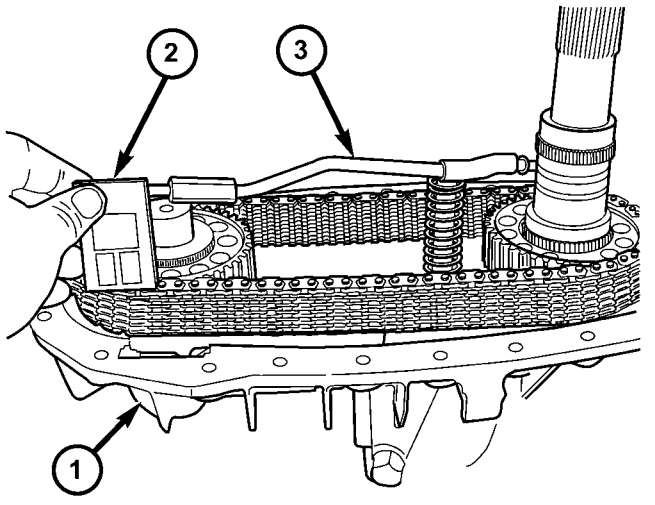


Fig. 14 Remove Oil Pick-Up Tube and Screen

1 - FRONT CASE HALF
2 - OIL SCREEN
3 - PICK-UP TUBE

TRANSFER CASE - NV271 (Continued)

(2) Remove the shift rail spring (Fig. 15).

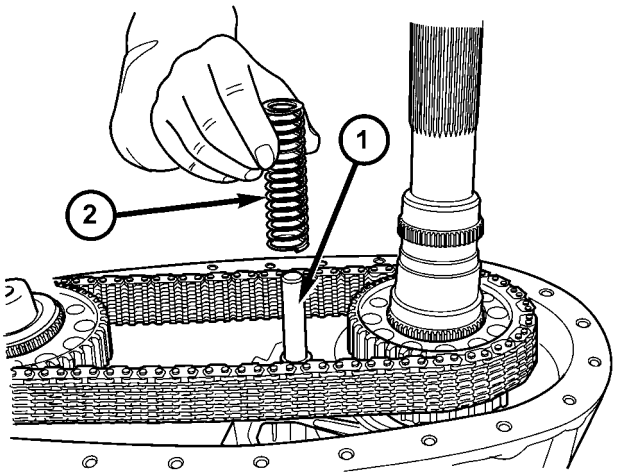


Fig. 15 Remove Shift Rail Spring

1 - SHIFT RAIL
2 - SPRING

(3) Remove the front output shaft drive sprocket retaining ring (Fig. 16).

(4) Remove the rear output shaft drive sprocket retaining ring (Fig. 17).

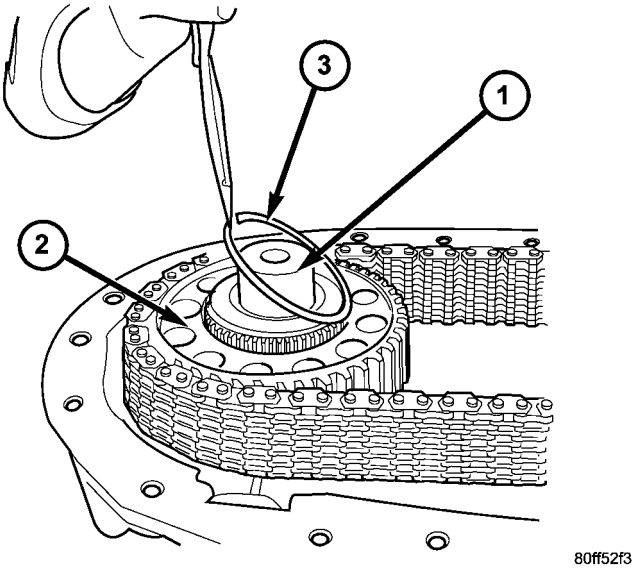


Fig. 16 Remove Front Output Shaft Sprocket Retaining Ring

1 - FRONT OUTPUT SHAFT
2 - DRIVE SPROCKET
3 - RETAINING RING

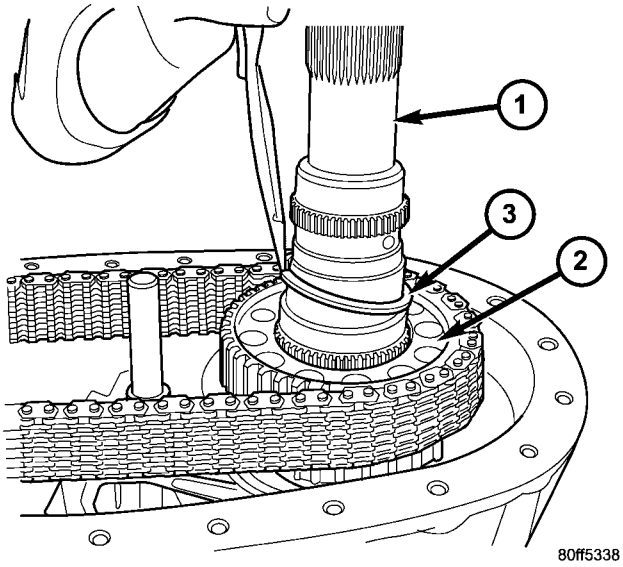


Fig. 17 Remove Rear Output Shaft Sprocket Retaining Ring

1 - REAR OUTPUT SHAFT
2 - DRIVE SPROCKET
3 - RETAINING RING

(5) Pull front sprocket (Fig. 18), rear sprocket, and chain upward until clear of the front and rear output shaft sprocket splines.

(6) Remove chain and sprockets as an assembly.

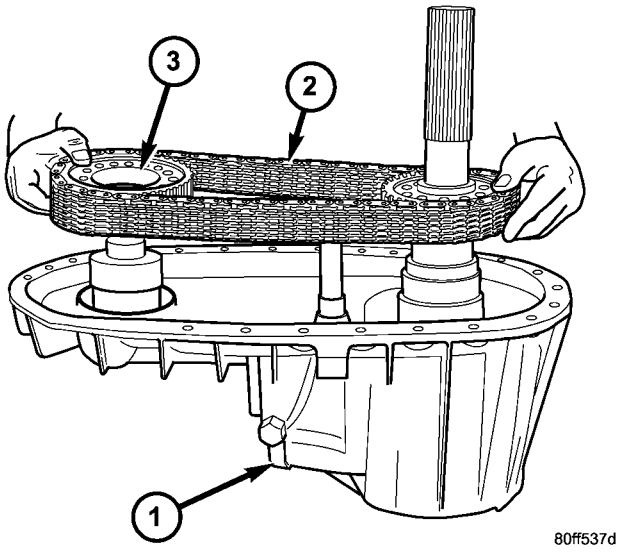


Fig. 18 Remove Drive Chain and Sprockets

1 - FRONT CASE HALF
2 - CHAIN
3 - DRIVE SPROCKETS

TRANSFER CASE - NV271 (Continued)

SHIFT FORKS AND MAINSHAFT

(1) Shift transfer case into NEUTRAL.
(2) Remove nut that retains the shift lever to sector shaft. Then remove shift lever (Fig. 19) and spacer from the shaft.
(3) Remove the sector support with Socket 9033.
(4) Remove the transfer case position sensor (Fig. 20).

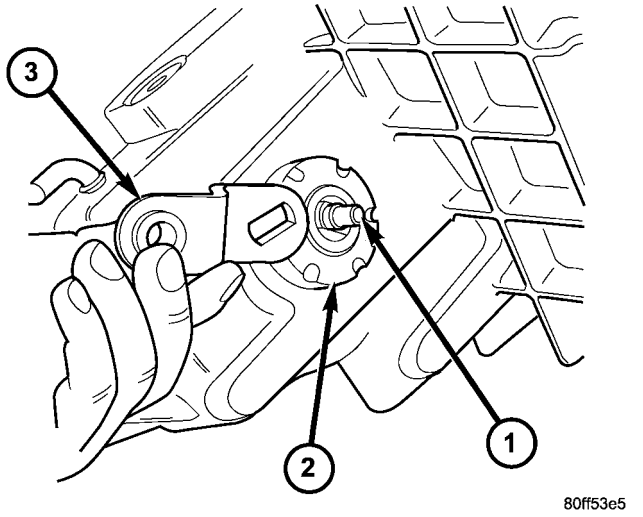


Fig. 19 Remove Manual Shift Lever

1 - SHIFT SECTOR
2 - SECTOR SUPPORT
3 - MANUAL SHIFT LEVER

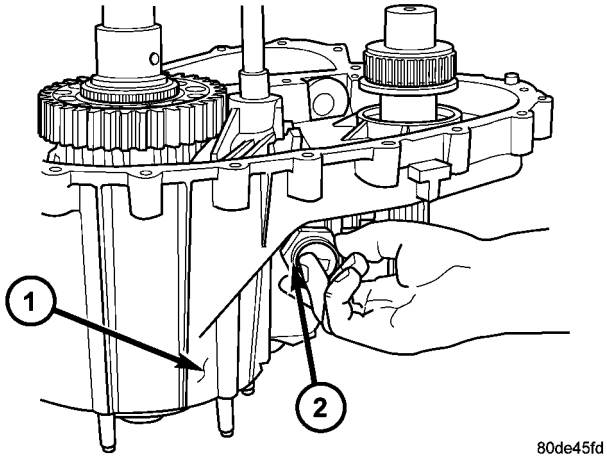


Fig. 20 Remove Position Sensor

1 - FRONT CASE
2 - POSITION SENSOR

(5) Loosen detent plug (Fig. 21).
(6) Remove detent plug, spring, and plunger (Fig. 22). Note that the plug has an O-ring seal. Remove and discard this seal.

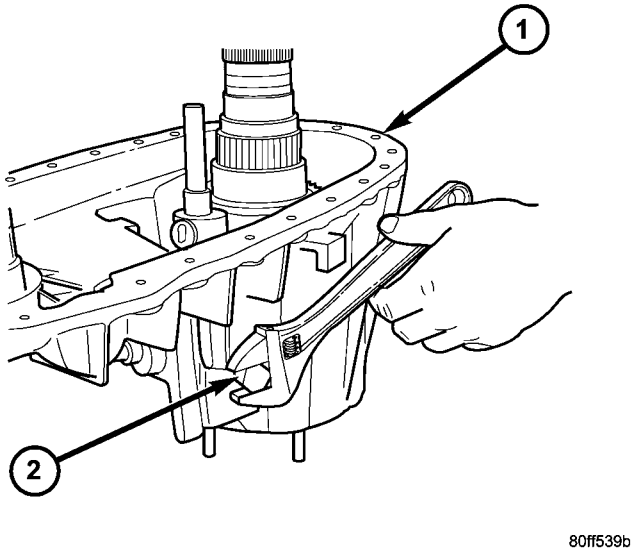


Fig. 21 Loosen the Detent Plug

1 - FRONT CASE HALF
2 - DETENT PLUG

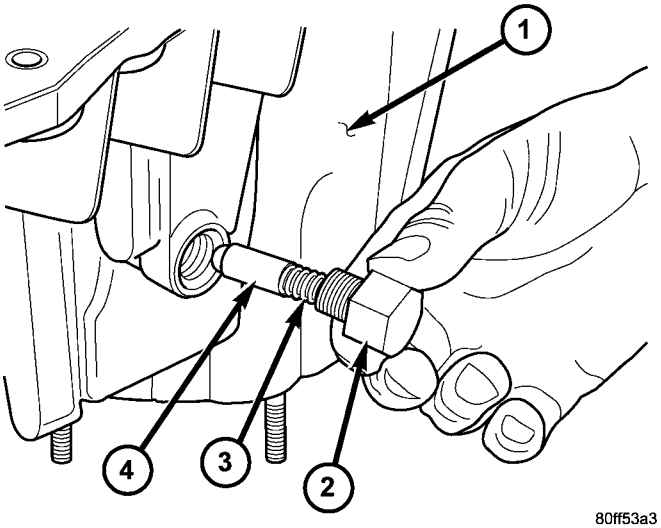


Fig. 22 Remove Detent plug, Spring, and Plunger

1 - FRONT CASE HALF
2 - DETENT PLUG
3 - SPRING
4 - PLUNGER

TRANSFER CASE - NV271 (Continued)

(7) Using a screw mounted in a slide hammer, remove the front output shaft seal.

(8) Remove the front output shaft snap-ring (Fig. 23).

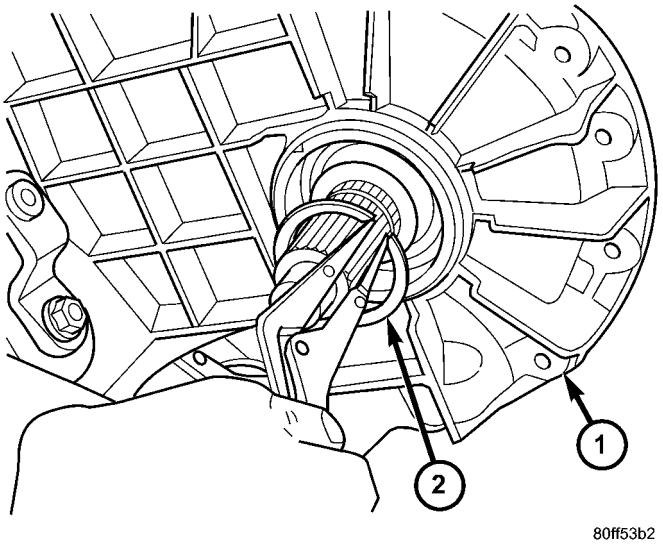


Fig. 23 Remove Front Output Shaft Bearing Inner Snap-Ring

1 - FRONT CASE HALF
2 - SNAP-RING

(9) Remove front output shaft from bearing in case (Fig. 24).

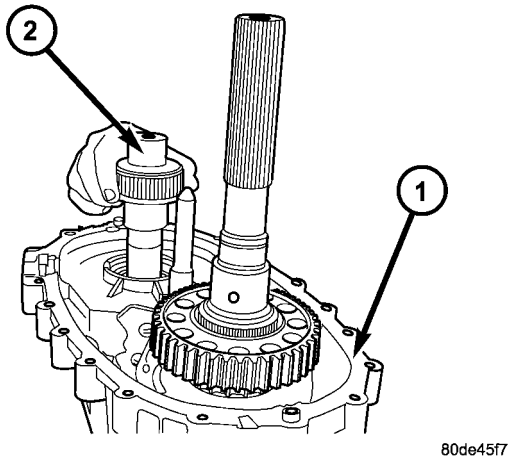


Fig. 24 Remove Front Output Shaft

1 - FRONT CASE
2 - FRONT OUTPUT SHAFT

(10) Pull mainshaft assembly out of input gear, mode sleeve, and case (Fig. 25).

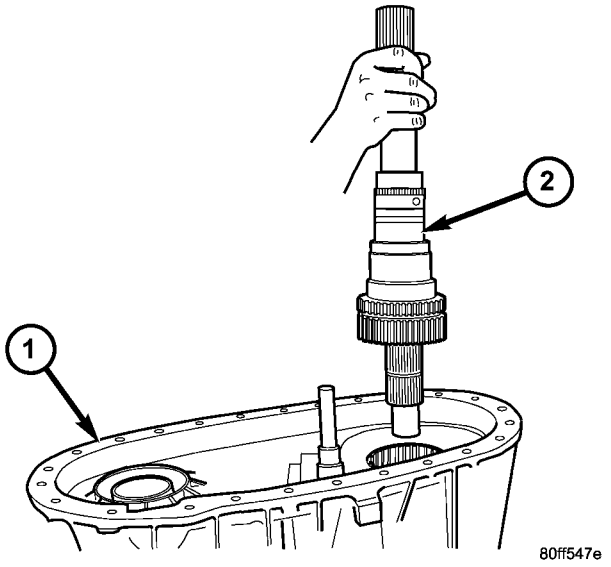


Fig. 25 Remove Mainshaft Assembly

1 - FRONT CASE HALF
2 - MAINSHAFT ASSEMBLY

(11) Remove mode fork, mode sleeve, and shift rail as assembly (Fig. 26). Note which way the sleeve fits in the fork (long side of sleeve goes to front or the points on the sleeve teeth go to the rear of case).

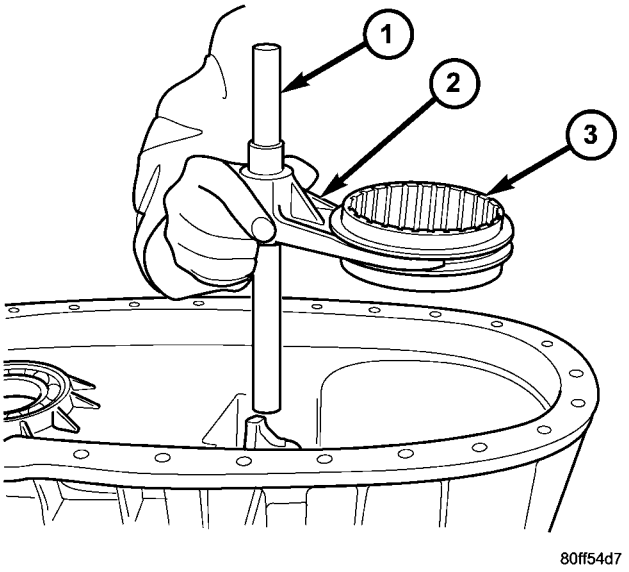


Fig. 26 Remove Mode Fork, Sleeve, and Shift Rail Assembly

1 - SHIFT RAIL
2 - MODE FORK
3 - MODE SLEEVE

TRANSFER CASE - NV271 (Continued)

(12) Remove range fork and hub as an assembly (Fig. 27). Note fork position for installation reference.
(13) Remove shift sector (Fig. 28).

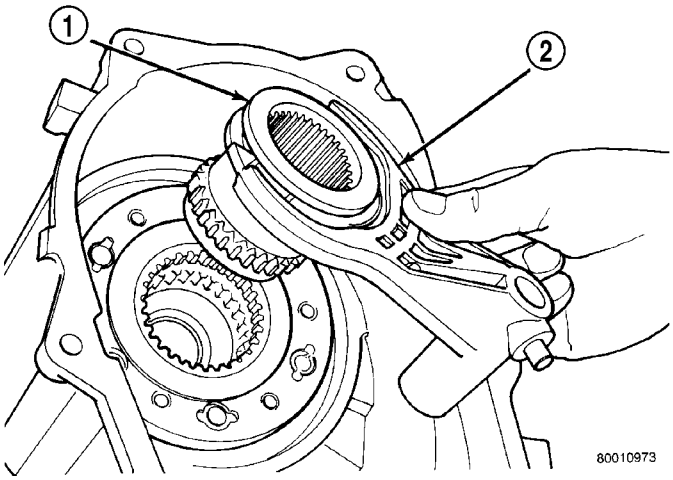


Fig. 27 Range Fork And Hub Removal

1 - RANGE HUB
2 - RANGE FORK

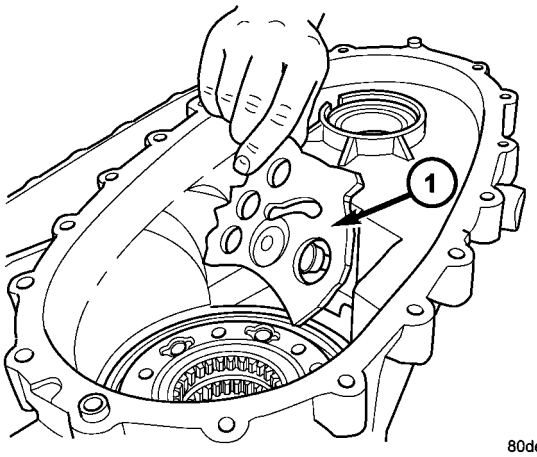


Fig. 28 Remove Shift Sector

1 - SHIFT SECTOR

MAINSHAFT

(1) Remove the clutch gear (Fig. 29) from the output shaft.

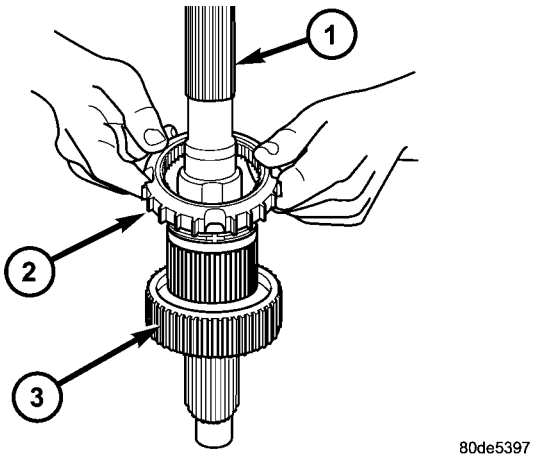


Fig. 29 Remove Clutch Gear

1 - OUTPUT SHAFT
2 - CLUTCH GEAR
3 - MODE HUB

(2) Remove the mode hub retaining ring (Fig. 30) from the mainshaft.

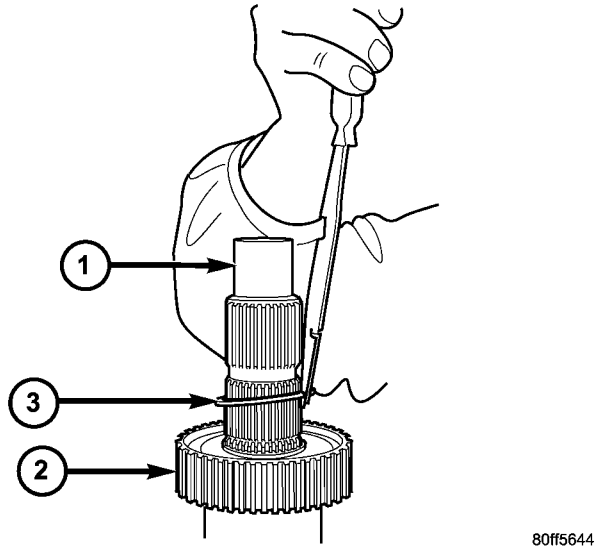


Fig. 30 Remove Mode Hub Retaining Ring

1 - MAINSHAFT
2 - MODE HUB
3 - RETAINING RING

TRANSFER CASE - NV271 (Continued)

(3) Remove the mode hub (Fig. 31) from the mainshaft.

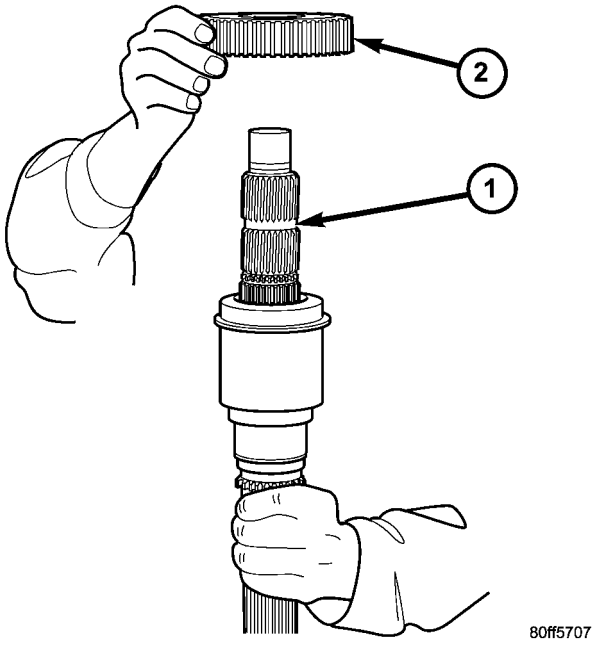


Fig. 31 Remove Mode Hub

1 - MAINSHAFT
2 - MODE HUB

(4) Remove the drive sprocket drive hub (Fig. 32) from the mainshaft.

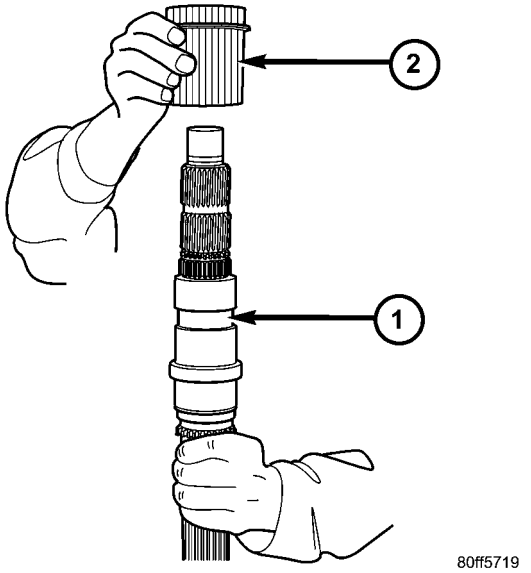


Fig. 32 Remove the Drive Sprocket Drive Hub

1 - MAINSHAFT
2 - DRIVE SPROCKET DRIVE HUB

INPUT AND PLANETARY GEAR

(1) Remove input gear seal with suitable screw and slide hammer.

(2) Remove input gear retaining ring (Fig. 33) with heavy duty snap-ring pliers.

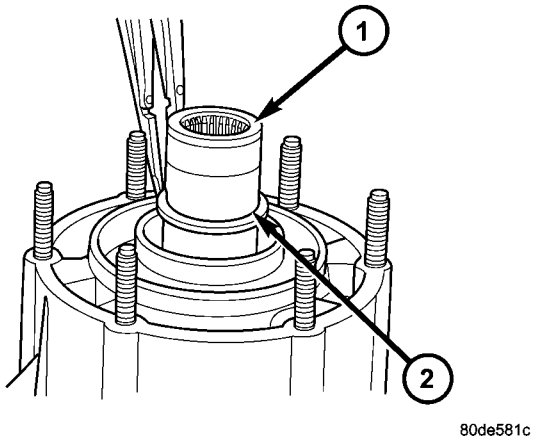


Fig. 33 Remove Input Gear Retaining Ring

1 - INPUT GEAR
2 - RETAINING RING

(3) Place front case in horizontal position. Then remove input gear and low range gear as an assembly (Fig. 34). Tap gear out of bearing with plastic mallet, if necessary.

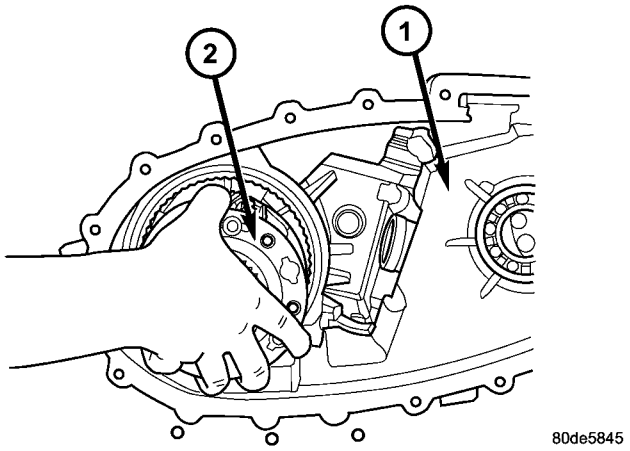


Fig. 34 Remove Input Planetary Assembly

1 - FRONT CASE
2 - INPUT PLANETARY ASSEMBLY

TRANSFER CASE - NV271 (Continued)

(4) Remove snap-ring that retains input gear in the low range gear (Fig. 35).
(5) Remove retainer (Fig. 36).
(6) Remove front thrust plate (Fig. 37).

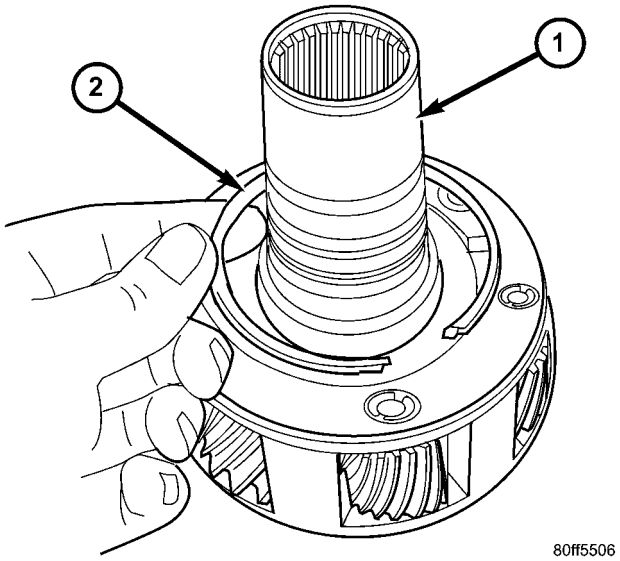


Fig. 35 Remove Input Gear Retaining Ring

1 - INPUT GEAR
2 - RETAINING RING

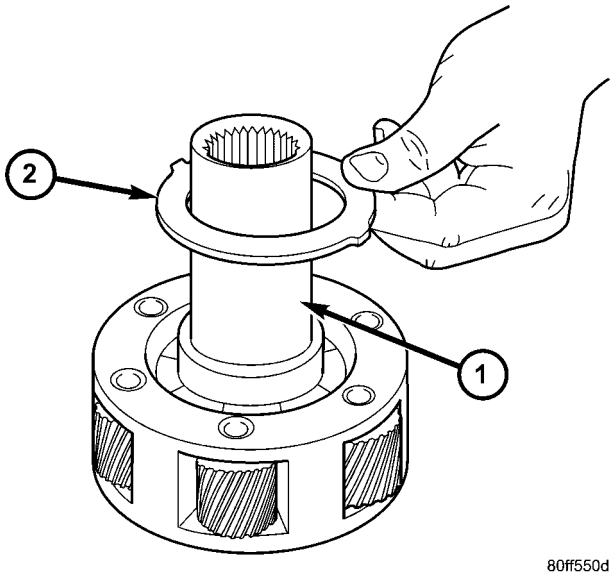


Fig. 36 Remove Input Gear Retainer

1 - INPUT GEAR
2 - RETAINER

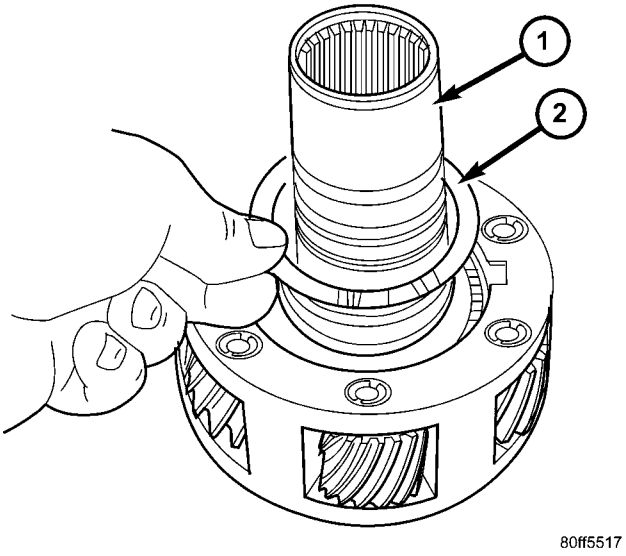


Fig. 37 Remove Input Gear Thrust Plate

1 - INPUT GEAR
2 - THRUST PLATE

(7) Remove input gear (Fig. 38).

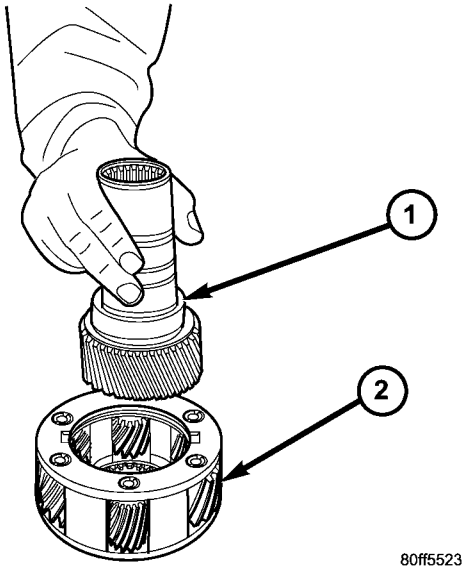


Fig. 38 Remove Input Gear From Planetary

1 - INPUT GEAR
2 - LOW RANGE PLANETARY

TRANSFER CASE - NV271 (Continued)

(8) Remove bottom tabbed thrust washer from low range planetary (Fig. 39).

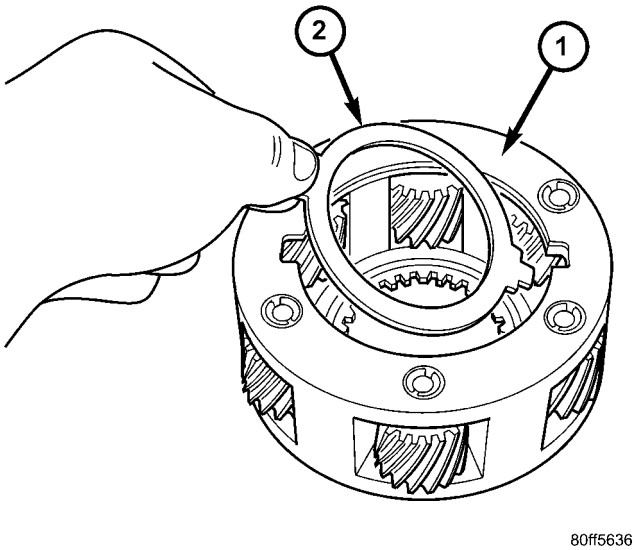


Fig. 39 Remove Bottom Input Gear Thrust Plate

1 - PLANETARY
2 - THRUST PLATE

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

MAINSHAFT/SPROCKET/HUB

Inspect the splines on the hub and shaft and the teeth on the sprocket. Minor nicks and scratches can be smoothed with an oilstone, however, replace any part that is damaged.

Check the contact surfaces in the sprocket bore and on the mainshaft. Minor nicks and scratches can be smoothed with 320-400 grit emery cloth but do not try to salvage the shaft if nicks or wear is severe.

INPUT GEAR AND PLANETARY CARRIER

Check the teeth on the gear (Fig. 40). 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.

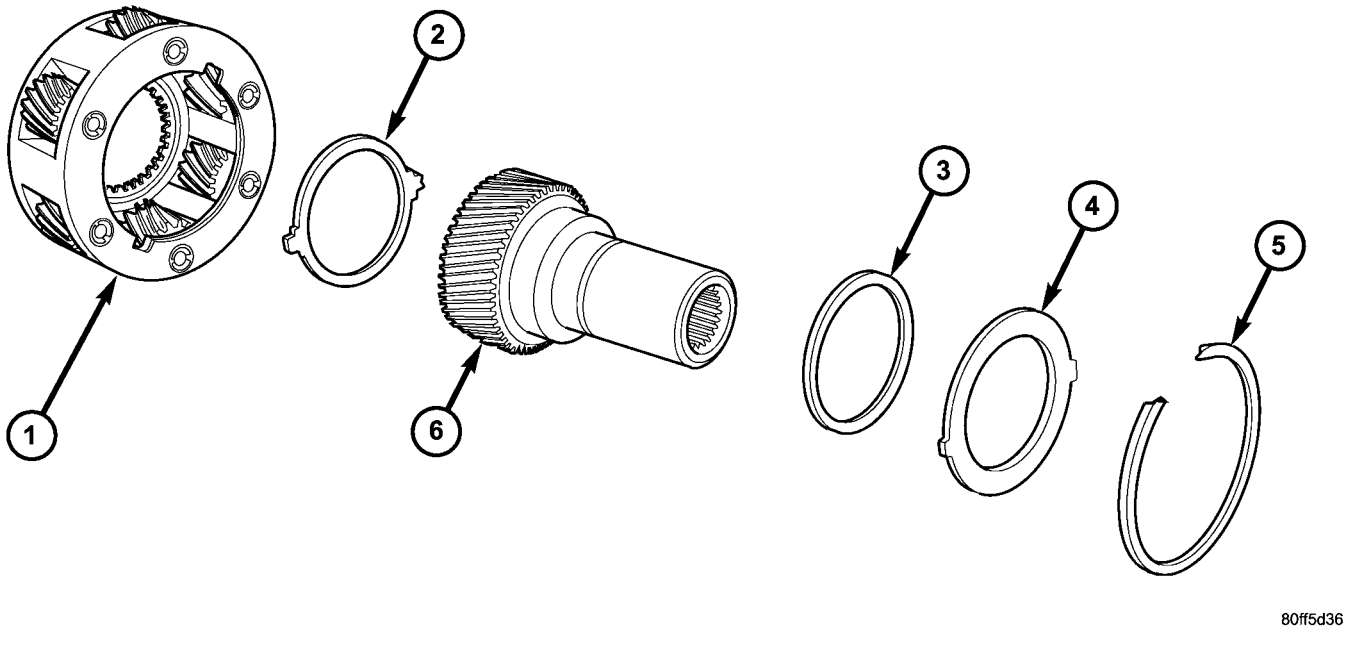


Fig. 40 Input Gear And Carrier Components

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 - NV271 (Continued)

Examine the carrier body and pinion gears for wear or damage. Check the pinion gear thrust washers on the pinon pins for damage. The carrier will have to be replaced as an assembly if the body, pinion pins, or pinion gears are damaged.

Check the lock ring and both thrust washers for wear or cracks. Replace them if necessary. Also replace the lock retaining ring if bent, distorted, or broken.

SHIFT FORKS/HUBS/SLEEVES

Check condition of the shift forks and mode fork shift rail (Fig. 41). Minor nicks on the shift rail can be smoothed with 320-400 grit emery cloth.

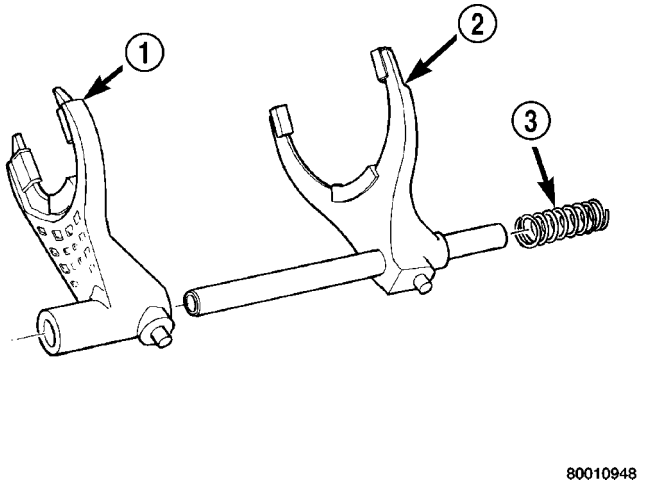


Fig. 41 Shift forks

1 - RANGE FORK
2 - MODE FORK AND RAIL
3 - MODE SPRING

Inspect the shift fork wear pads (Fig. 42). The mode and range fork pads are serviceable and can be replaced if necessary.

Check both of the sleeves for wear or damage, especially on the interior teeth. Replace the sleeves if wear or damage is evident.

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. 43)

FRONT CASE AND REAR CASE

Inspect the cases for wear and damage.

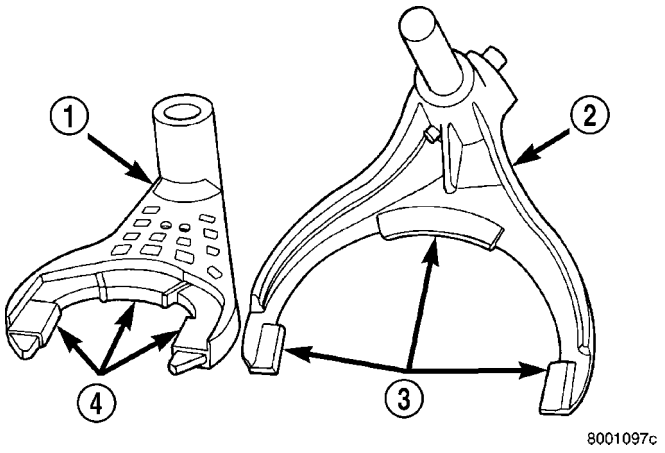


Fig. 42 Shift Fork And Wear Pad Locations

1 - RANGE FORK
2 - MODE FORK
3 - WEAR PADS (SERVICEABLE)
4 - WEAR PADS (SERVICEABLE)

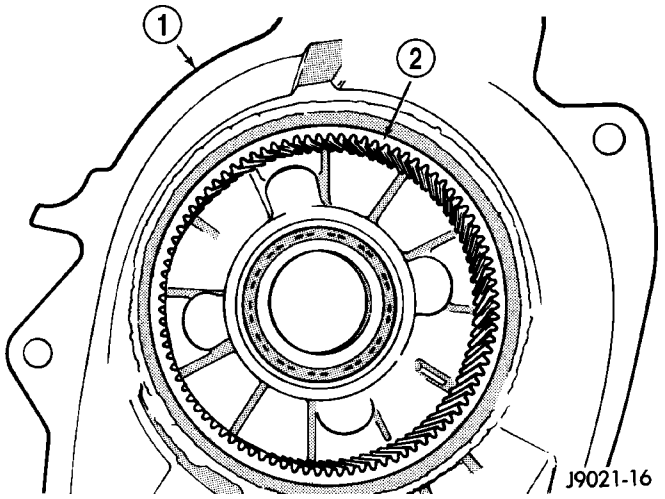


Fig. 43 Low Range Annulus Gear

1 - FRONT CASE
2 - LOW RANGE ANNULUS GEAR

Check case condition. If leaks were a problem, look for gouges and severe scoring of case sealing surfaces. Also make sure the front case mounting studs are in good condition.

Check the front case mounting studs and vent tube. The tube can be secured with Loctite™ 271 or 680 if loose. The stud threads can be cleaned up with a die if necessary. Also check condition of the fill/drain plug threads in the rear case. The threads can be repaired with a thread chaser or tap if necessary. Or the threads can be repaired with Helicoil™ stainless steel inserts if required.

OIL PUMP/OIL PICKUP

Examine the oil pump pickup parts. Replace the pump if any part appears to be worn or damaged. Do

TRANSFER CASE - NV271 (Continued)

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) Remove the input shaft bearing snap-ring from the front case half with suitable snap-ring pliers.

(2) Remove the input shaft bearing from the front case half with Installer 6953 and Handle C-4171 (Fig. 44).

(3) Install the input shaft bearing into the front case half with Installer 8151 inverted on Handle C-4171 (Fig. 45).

(4) Install the input shaft bearing snap-ring into the front case half with suitable snap-ring pliers.

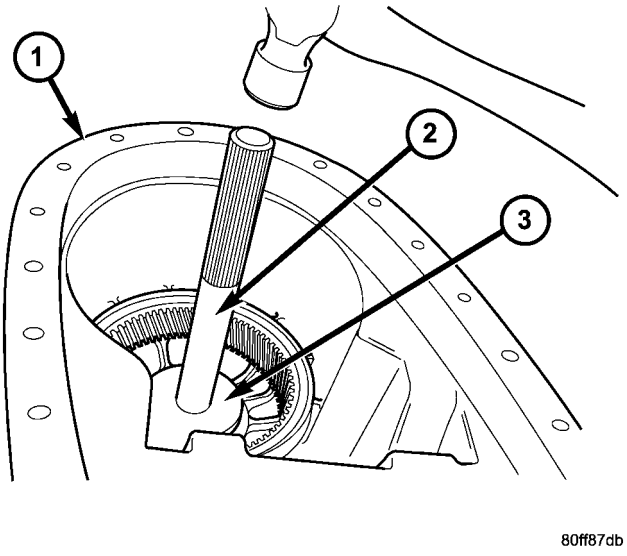


Fig. 44 Remove Input Gear Bearing

1 - FRONT CASE HALF
2 - HANDLE C-4171
3 - INSTALLER 6953

(5) Remove the front output shaft front bearing snap-ring from the front case half.

(6) Using Installer 6953 and Handle C-4171 (Fig. 46), remove the front output shaft front bearing.

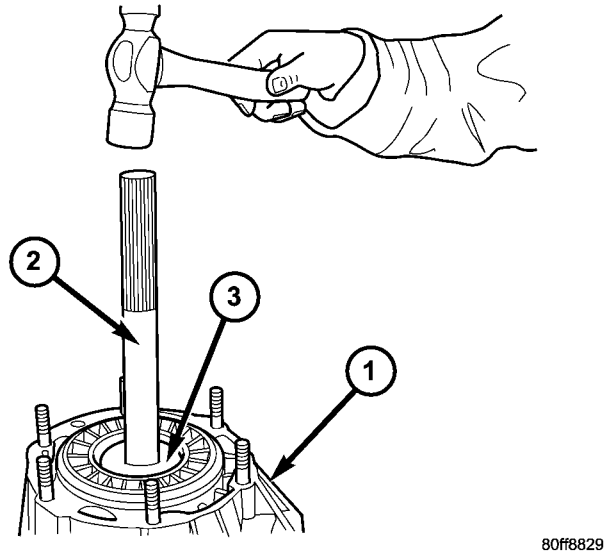


Fig. 45 Install Input Gear Bearing

1 - FRONT CASE HALF
2 - HANDLE C-4171
3 - INSTALLER 8151 (INVERTED)

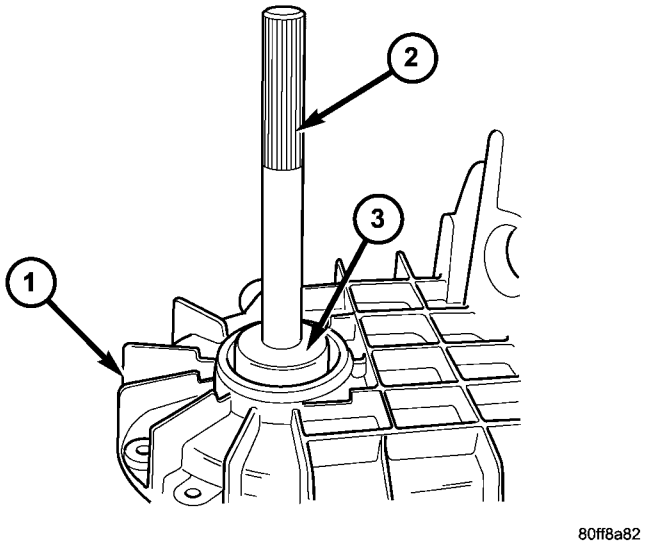


Fig. 46 Remove Front Output Shaft Front Bearing

1 - FRONT CASE HALF
2 - HANDLE C-4171
3 - INSTALLER 6953

TRANSFER CASE - NV271 (Continued)

(7) Start front output shaft front bearing in case. Then seat bearing with Installer 8891 (Fig. 47).

(8) Install front output shaft bearing retaining ring.

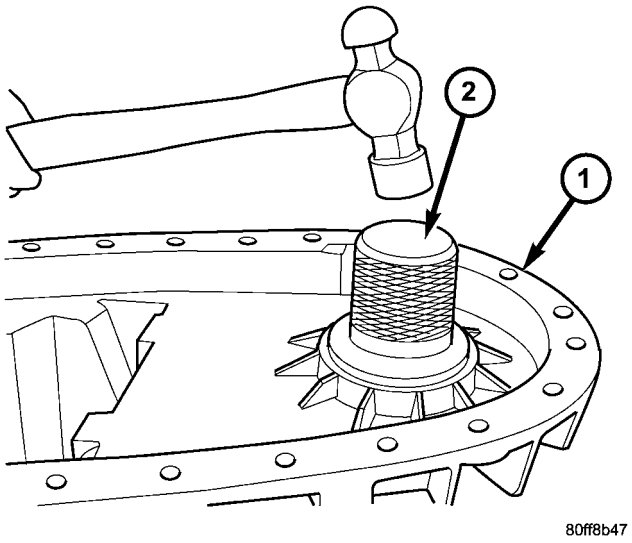


Fig. 47 Install Front Output Shaft Front Bearing

1 - FRONT CASE HALF
2 - INSTALLER 8891

(9) 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. 48).

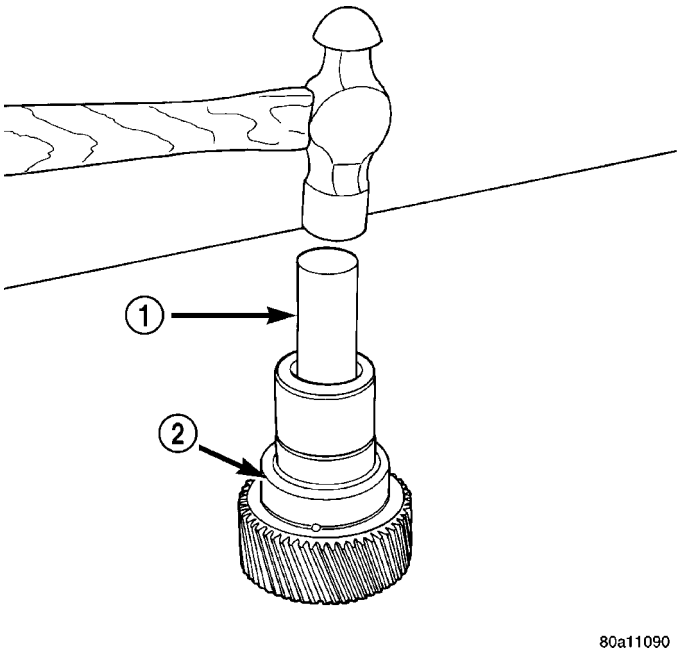


Fig. 48 Remove Input Gear Cup Bearing

1 - DRIFT
2 - INPUT GEAR

(10) Install new pilot bearing with Installer 9035.

(11) Remove the front output shaft rear bearing with the screw and jaws from Remover L-4454 and Cup 8148 (Fig. 49).

(12) Install new bearing with Tool Handle C-4171 and Installer 8128 (Fig. 50). The bearing bore is chamfered at the top. Install the bearing so it is flush with the lower edge of this chamfer (Fig. 51).

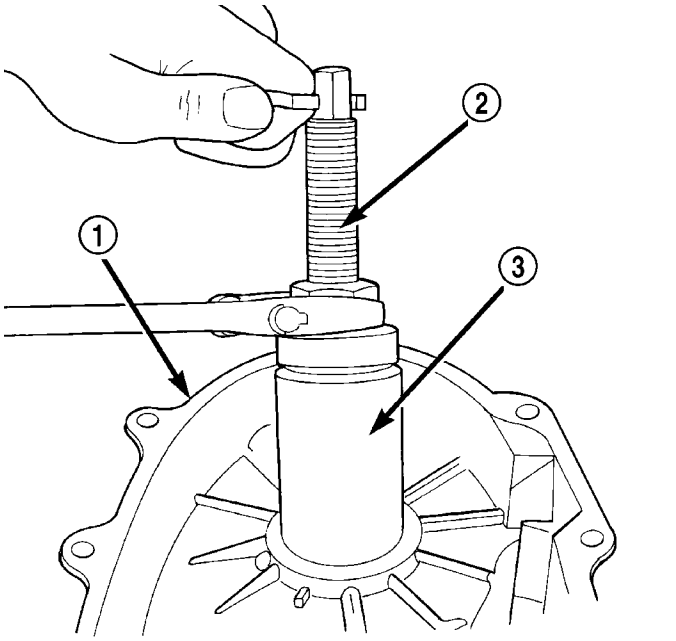


Fig. 49 Front Output Shaft Rear Bearing Removal

1 - REAR CASE
2 - SPECIAL TOOL L-4454-1 AND L-4454-3
3 - SPECIAL TOOL 8148

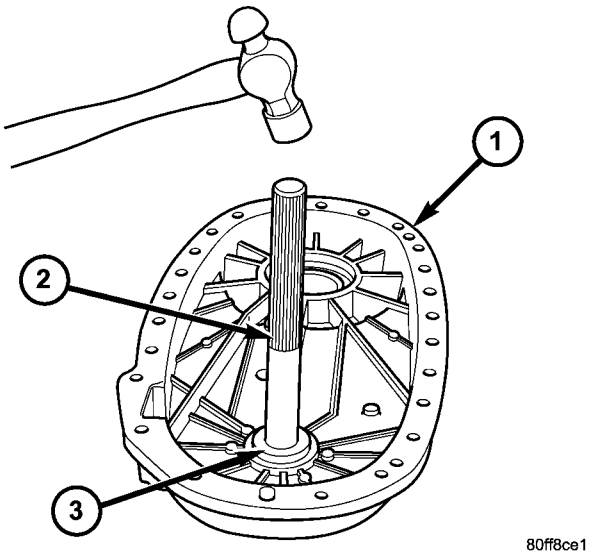


Fig. 50 Install Front Output Shaft Rear Bearing

1 - REAR CASE HALF
2 - HANDLE C-4171
3 - INSTALLER 8128

TRANSFER CASE - NV271 (Continued)

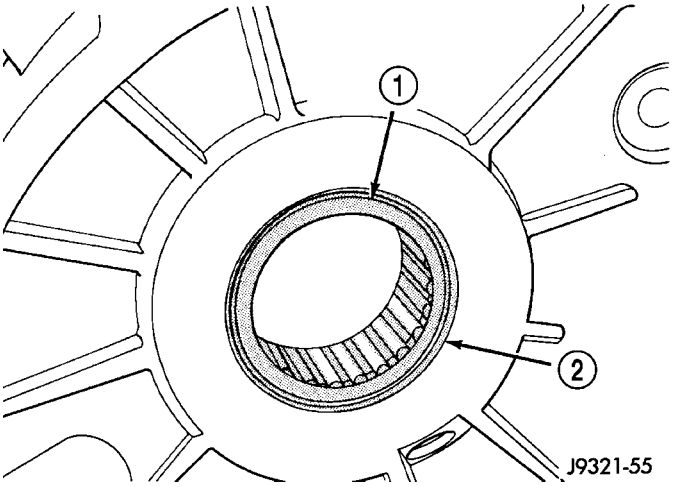


Fig. 51 Output Shaft Rear Bearing Installation Depth

1 - BEARING (SEATED) AT LOWER EDGE OF CHAMFER
2 - CHAMFER

(13) Remove seal from oil pump with suitable pry tool.

(14) Install new seal in oil pump with Installer 7888 (Fig. 52).

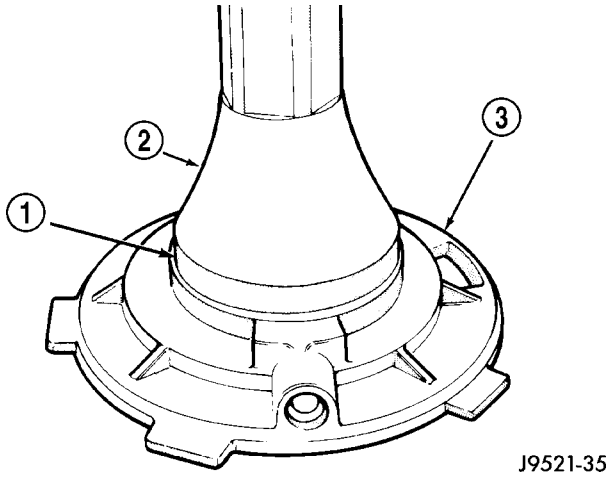


Fig. 52 Oil Pump Seal Installation

1 - HOUSING SEAL
2 - SPECIAL TOOL 7888
3 - OIL PUMP FEED HOUSING

(15) Remove the rear output shaft bearing snap-ring (Fig. 53) from the rear case half.

(16) Remove the rear output shaft bearing from the rear case using Installer 7888 (Fig. 54).

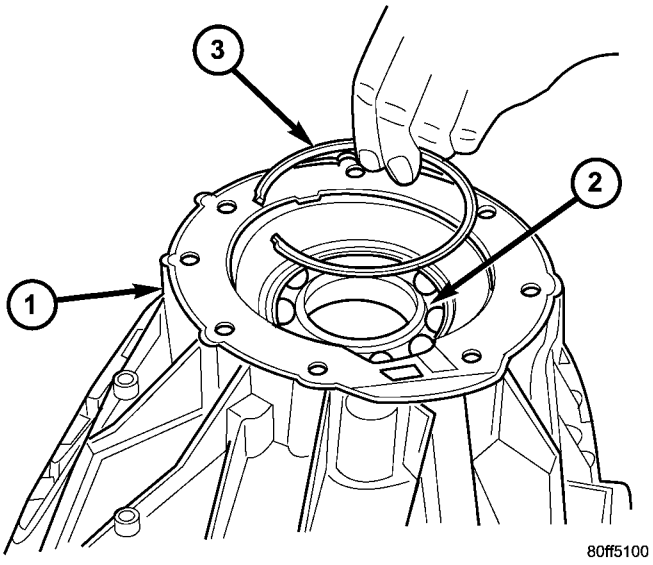


Fig. 53 Remove Rear Output Bearing Outer Snap-Ring

1 - REAR CASE HALF
2 - REAR OUTPUT SHAFT BEARING
3 - SNAP-RING

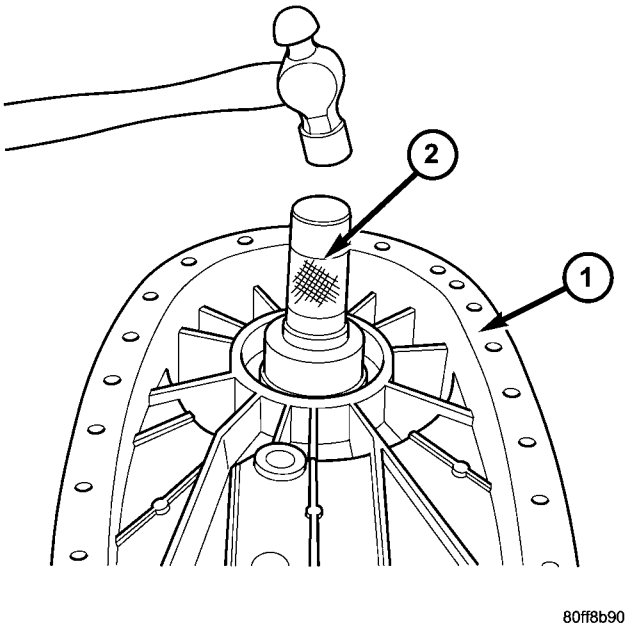


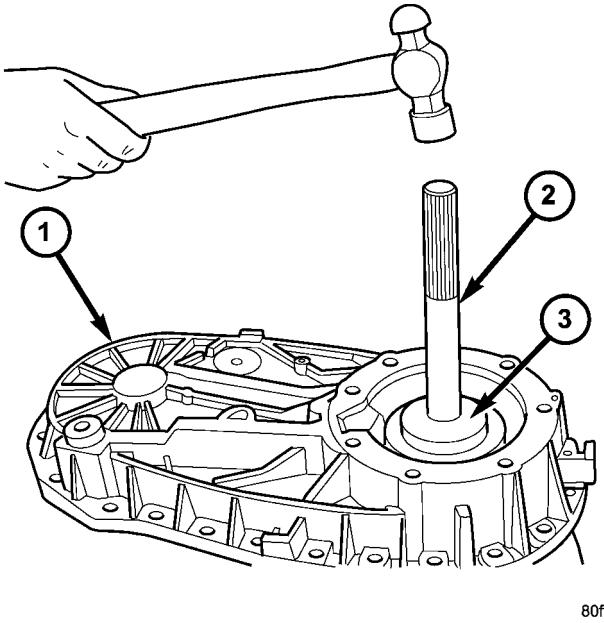
Fig. 54 Remove Rear Output Shaft Bearing

1 - REAR CASE HALF
2 - INSTALLER 7888

TRANSFER CASE - NV271 (Continued)

(17) Install the rear output shaft bearing (Fig. 55) into the rear case using Installer 8152 and Handle C-4171.

(18) Install the rear output shaft bearing snap-ring into the rear case half.



80ff8b9a

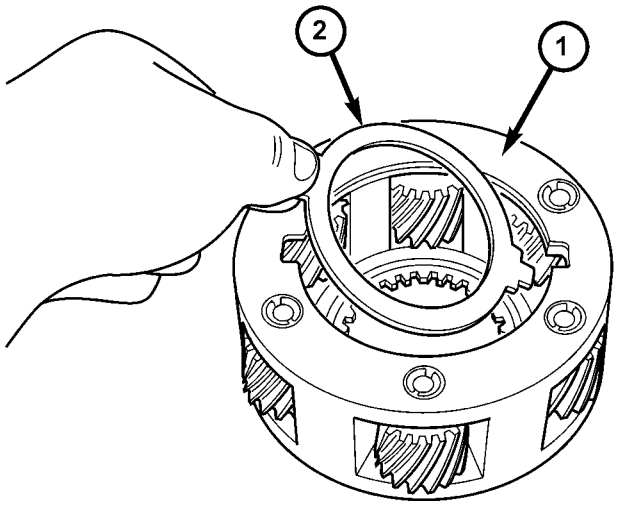
Fig. 55 Install Rear Output Shaft Bearing

1 - REAR CASE HALF
2 - HANDLE C-4171
3 - INSTALLER 8152

INPUT AND PLANETARY GEAR

(1) Lubricate gears and thrust washers with recommended transmission fluid.

(2) Install bottom thrust washer (Fig. 56) in low range gear planetary. Be sure washer tabs are properly aligned in gear notches.

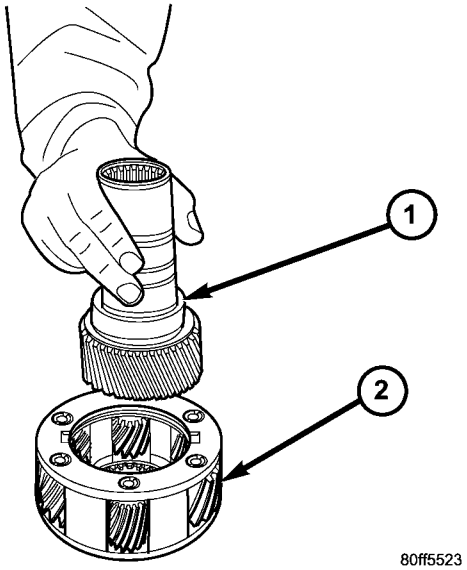


80ff5636

Fig. 56 Install Bottom Input Gear Thrust Plate

1 - PLANETARY
2 - THRUST PLATE

(3) Install input gear in low range gear (Fig. 57). Be sure input gear is fully seated.

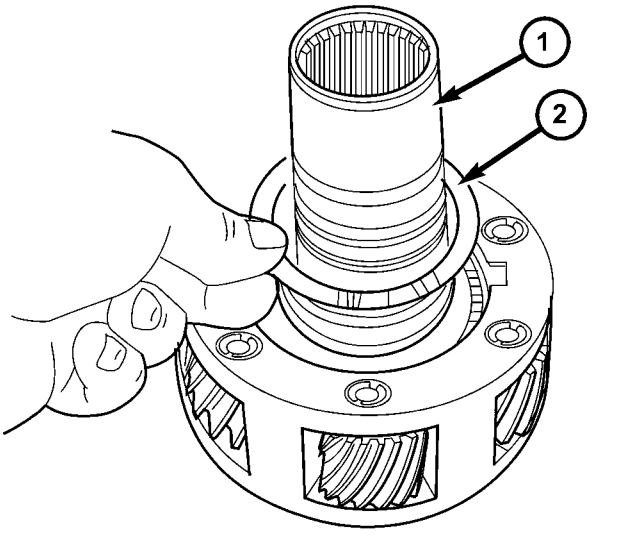


80ff5523

Fig. 57 Install Input Gear From Planetary

1 - INPUT GEAR
2 - LOW RANGE PLANETARY

(4) Install remaining thrust washer (Fig. 58) in low range gear and on top of input gear.



80ff5517

Fig. 58 Install Input Gear Thrust Plate

1 - INPUT GEAR
2 - THRUST PLATE

TRANSFER CASE - NV271 (Continued)

(5) Install retainer (Fig. 59) on input gear and install snap-ring (Fig. 60).

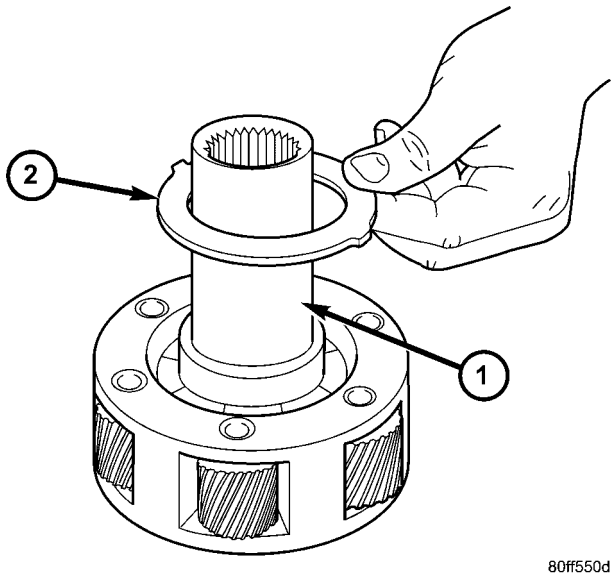


Fig. 59 Install Input Gear Retainer

1 - INPUT GEAR
2 - RETAINER

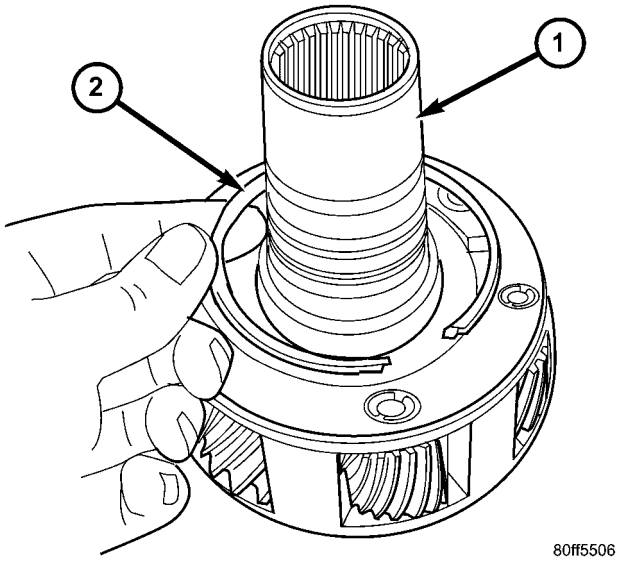


Fig. 60 Install Input Gear Retaining Ring

1 - INPUT GEAR
2 - RETAINING RING

(6) Align and install low range/input gear assembly in front case (Fig. 61). 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. 62).

(8) Install a new input gear seal using Installer 8841 and Handle C-4171.

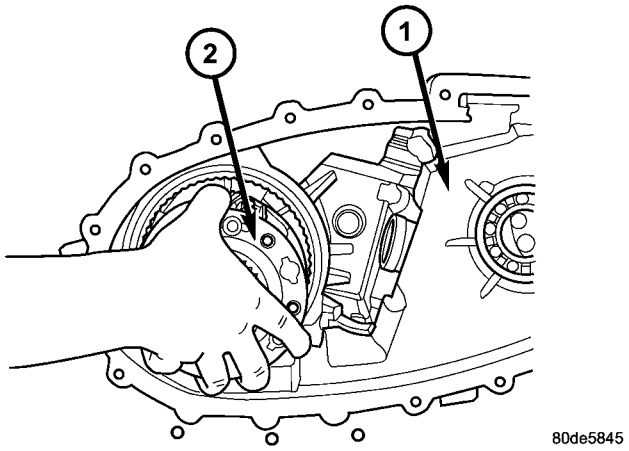


Fig. 61 Install Input Planetary Assembly

1 - FRONT CASE
2 - INPUT PLANETARY ASSEMBLY

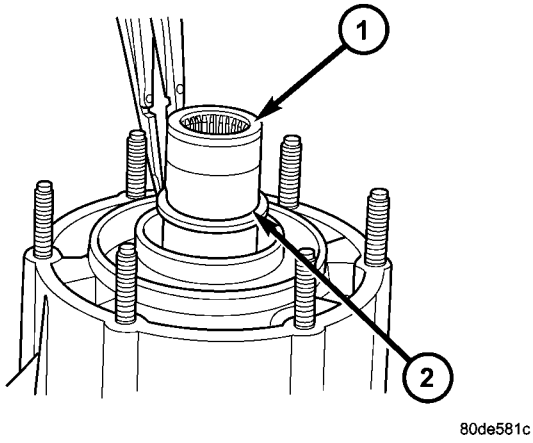


Fig. 62 Install Input Gear Retaining Ring

1 - INPUT GEAR
2 - RETAINING RING

(9) Install a new input gear oil seal with Installer 9036 and Handle C-4171.

TRANSFER CASE - NV271 (Continued)

SHIFT FORKS AND MAINSHAFT

(1) Lubricate mainshaft splines with recommended transmission fluid.

(2) Coat the interior of the drive sprocket hub with ATF+4 and install the drive sprocket drive hub (Fig. 63) onto the mainshaft.

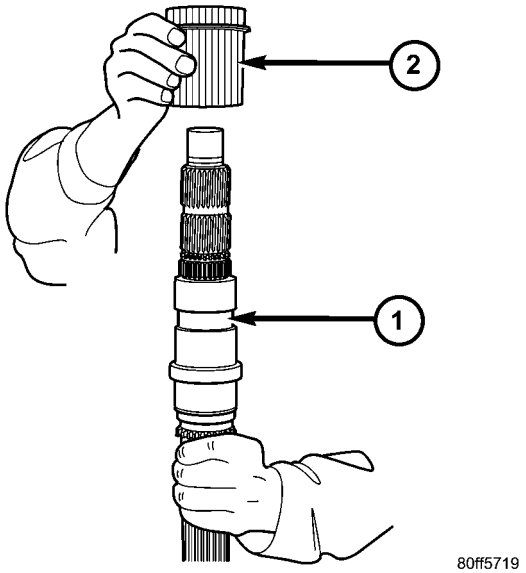


Fig. 63 Install the Drive Sprocket Drive Hub

1 - MAINSHAFT
2 - DRIVE SPROCKET DRIVE HUB

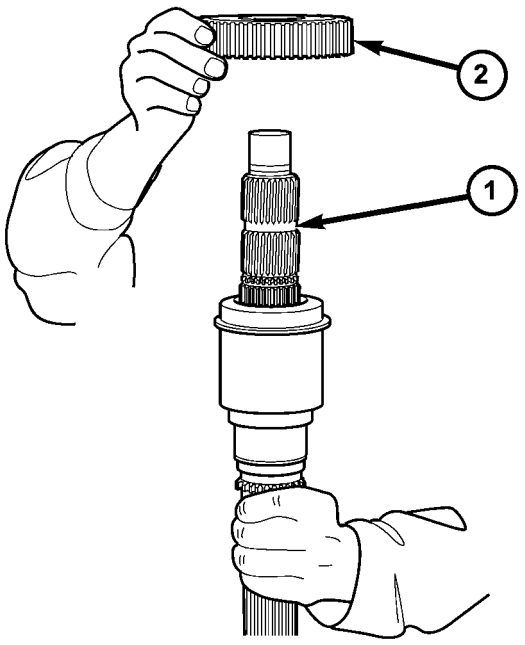


Fig. 64 Install Mode Hub

1 - MAINSHAFT
2 - MODE HUB

(3) Install the mode hub (Fig. 64) onto the mainshaft.

(4) Install the mode hub retaining ring (Fig. 65) onto the mainshaft.

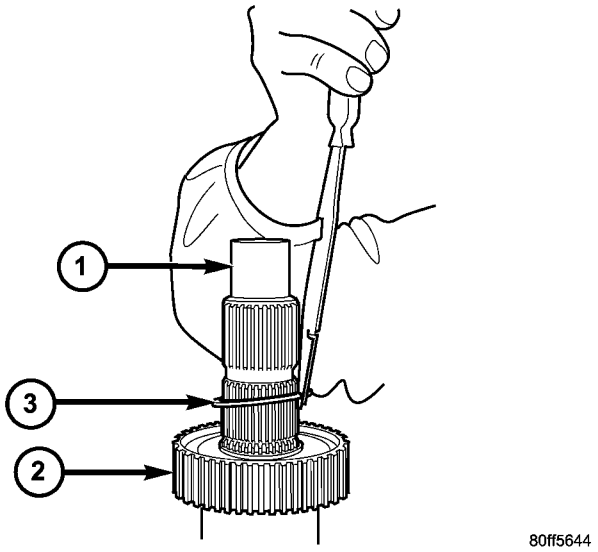


Fig. 65 Install Mode Hub Retaining Ring

1 - MAINSHAFT
2 - MODE HUB
3 - RETAINING RING

(5) Install the clutch gear (Fig. 66) onto the output shaft. Verify that the pointed ends of the clutch gear teeth are pointing to the front of the mainshaft.

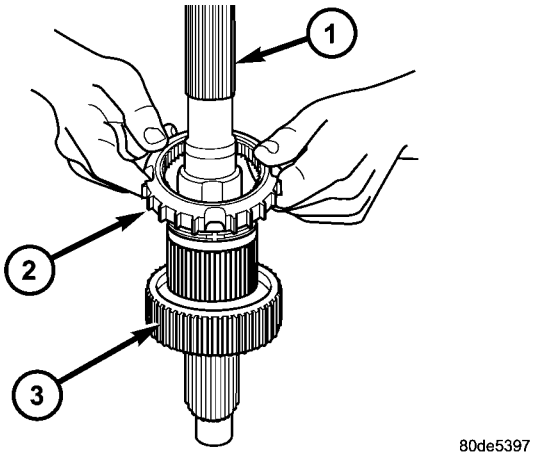


Fig. 66 Install Clutch Gear

1 - OUTPUT SHAFT
2 - CLUTCH GEAR
3 - MODE HUB

TRANSFER CASE - NV271 (Continued)

(6) Lubricate sector shaft with transmission fluid and install shift sector in case (Fig. 67). Position slot in sector so it will be aligned with shift fork pin when shift forks are installed.

(7) Apply Loctite™ 242, or equivalent, to the threads of the sector support to replentish the factory applied patch. Install the shift sector support. Tighten the sector support with Socket 9033 to 27-34 N·m (20-25 ft.lbs.).

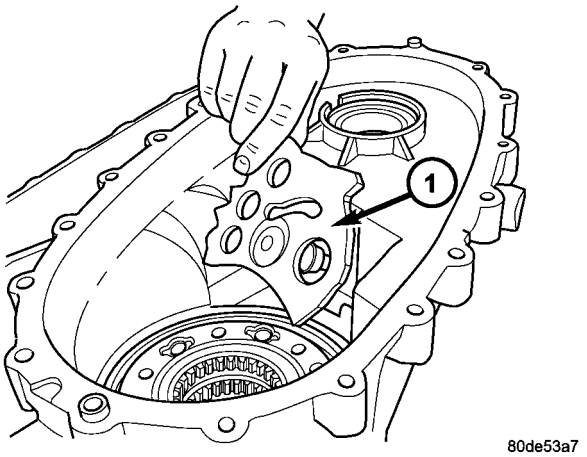


Fig. 67 Install Shift Sector

1 - SHIFT SECTOR

(8) Assemble and install range fork and hub (Fig. 68). Be sure hub is properly seated in low range gear and engaged to the input gear.

(9) Align and insert range fork pin in shift sector slot.

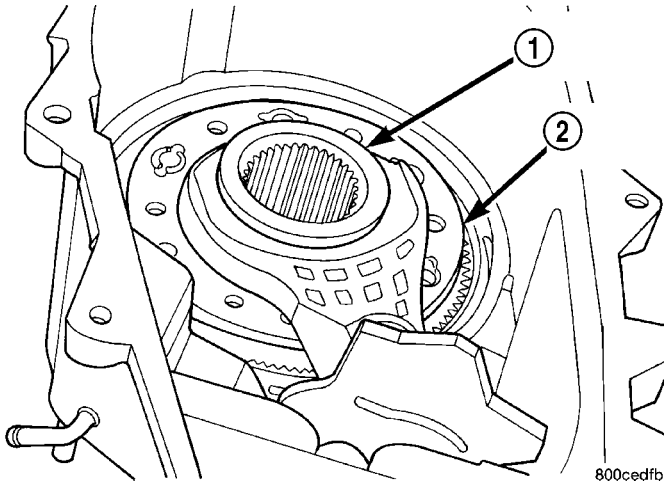


Fig. 68 Install Range Fork And Hub Assembly

1 - RANGE HUB
2 - RANGE FORK

(10) Install mode fork and shift rail onto the mode sleeve.

(11) Install the mode fork, sleeve, and shift rail into the transfer case (Fig. 69).

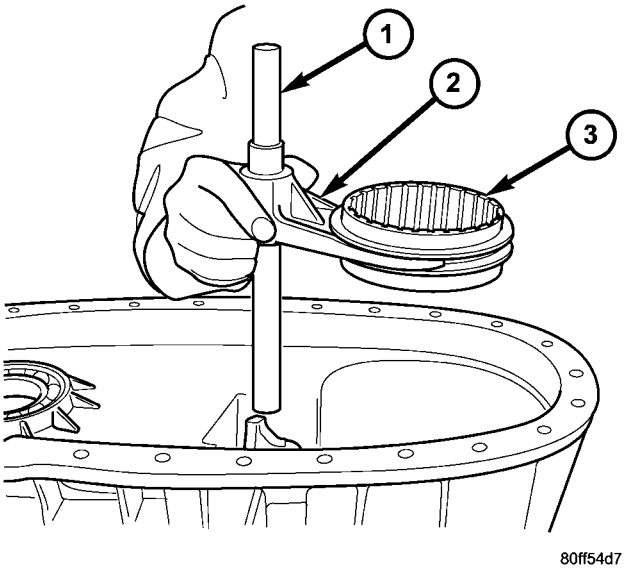


Fig. 69 Install Mode Fork, Sleeve, and Shift Rail Assembly

1 - SHIFT RAIL
2 - MODE FORK
3 - MODE SLEEVE

(12) Install mainshaft into the transfer case (Fig. 70). Guide mainshaft through the mode and range sleeves and into the input gear.

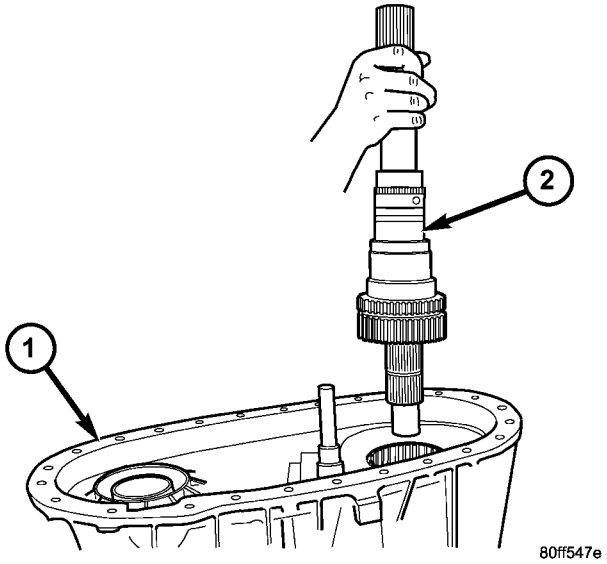


Fig. 70 Install Mainshaft Assembly

1 - FRONT CASE HALF
2 - MAINSHAFT ASSEMBLY

TRANSFER CASE - NV271 (Continued)

(13) Install the transfer case position sensor (Fig. 71). Tighten the sensor to 20-34 N·m (15-25 ft. lbs.) torque.

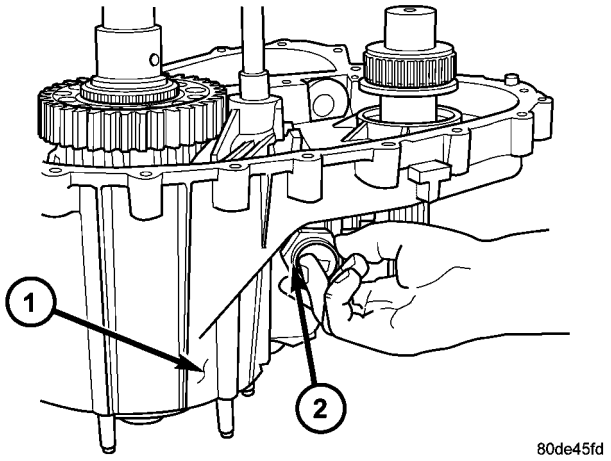


Fig. 71 Install Position Sensor

1 - FRONT CASE
2 - POSITION SENSOR

(14) Install manual shift lever and spacer onto sector shaft (Fig. 72).

(15) 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.

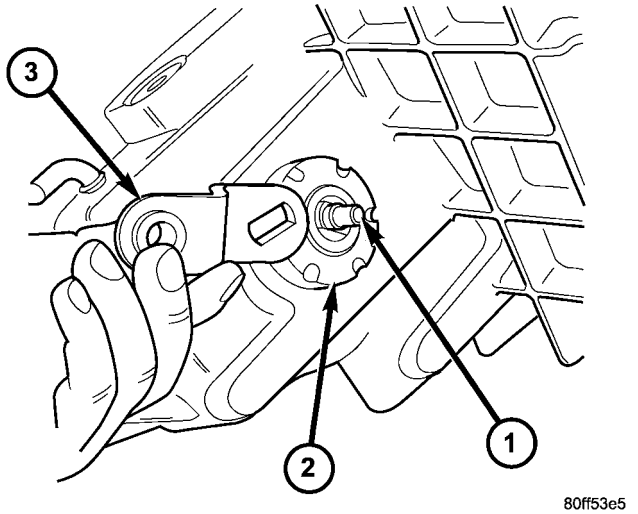


Fig. 72 Install Manual Shift Lever

1 - SHIFT SECTOR
2 - SECTOR SUPPORT
3 - MANUAL SHIFT LEVER

(16) Install new o-ring on detent plug (Fig. 73).

(17) Install detent plunger, spring, and plug (Fig. 74). Tighten the plug to 16-25 N·m (12-18 ft. lbs.).

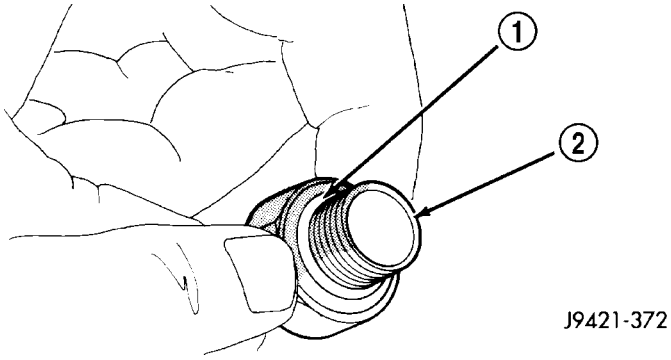


Fig. 73 O-Ring Installation On Detent Plug

1 - O-RING
2 - DETENT PLUG

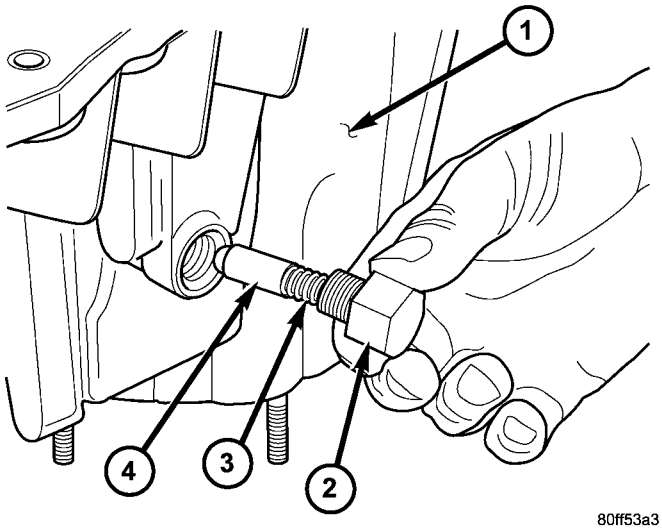


Fig. 74 Install Detent plug, Spring, and Plunger

1 - FRONT CASE HALF
2 - DETENT PLUG
3 - SPRING
4 - PLUNGER

TRANSFER CASE - NV271 (Continued)

FRONT OUTPUT SHAFT AND DRIVE CHAIN

(1) Install the front output shaft (Fig. 75) into the front output shaft front bearing.

(2) Install the front output shaft bearing inner snap-ring (Fig. 76) onto the output shaft.

(3) Install the new front output shaft seal with Installer MB991168A

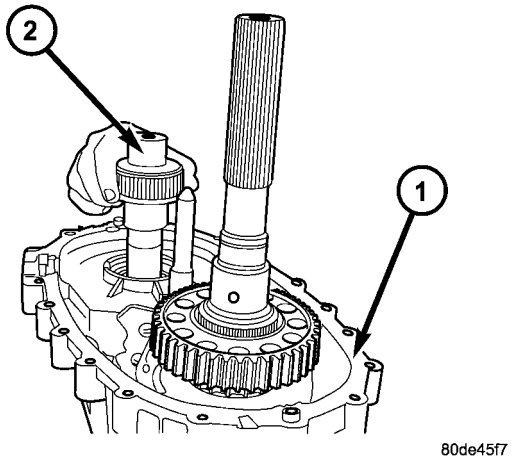


Fig. 75 Install Front Output Shaft

1 - FRONT CASE
2 - FRONT OUTPUT SHAFT

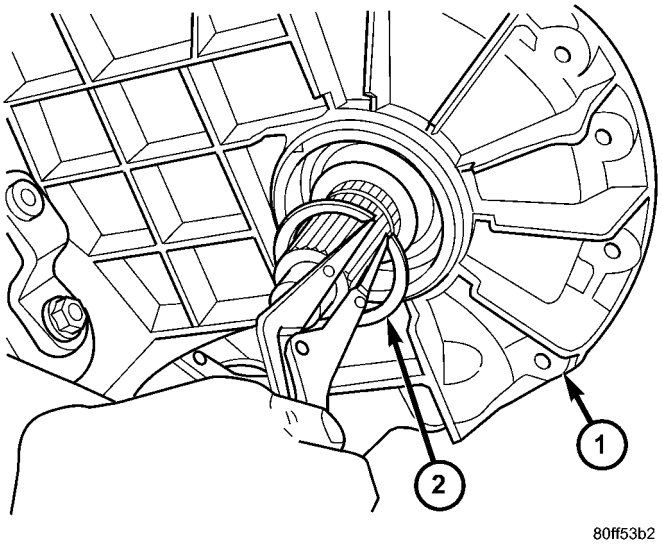


Fig. 76 Install Front Output Shaft Bearing Inner Snap-Ring

1 - FRONT CASE HALF
2 - SNAP-RING

(4) Insert front drive sprocket in drive chain.

(5) Install drive chain around rear drive sprocket.

(6) Position rear drive sprocket (Fig. 77) over the output shaft and lower the sprocket and chain assembly until the front sprocket is positioned over the front output shaft.

(7) Align the splines in the sprockets to the splines on the output shafts and install the sprockets onto the output shafts.

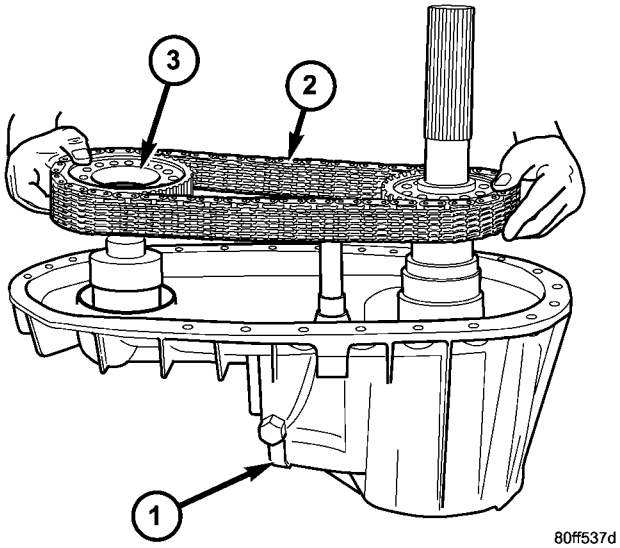


Fig. 77 Install Drive Chain and Sprockets

1 - FRONT CASE HALF
2 - CHAIN
3 - DRIVE SPROCKETS

(8) Install front sprocket retaining ring (Fig. 78).

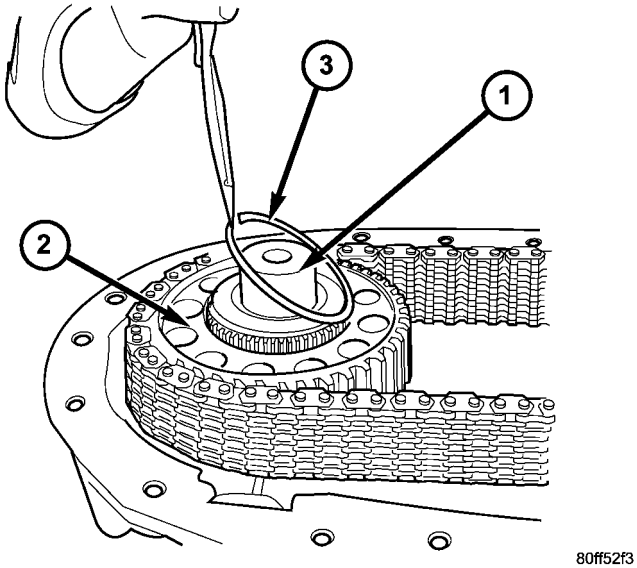


Fig. 78 Install Front Output Shaft Sprocket Retaining Ring

1 - FRONT OUTPUT SHAFT
2 - DRIVE SPROCKET
3 - RETAINING RING

TRANSFER CASE - NV271 (Continued)

(9) Install rear sprocket retaining ring (Fig. 79).
(10) Install spring onto shift rail (Fig. 80).

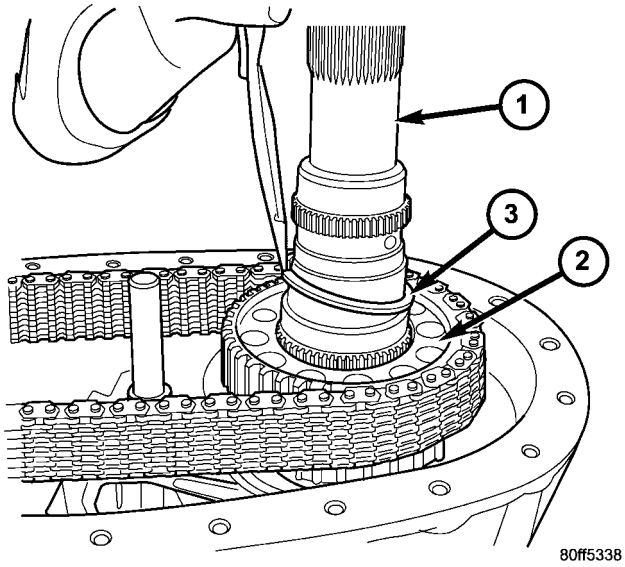


Fig. 79 Install Rear Output Shaft Sprocket Retaining Ring

1 - REAR OUTPUT SHAFT
2 - DRIVE SPROCKET
3 - RETAINING RING

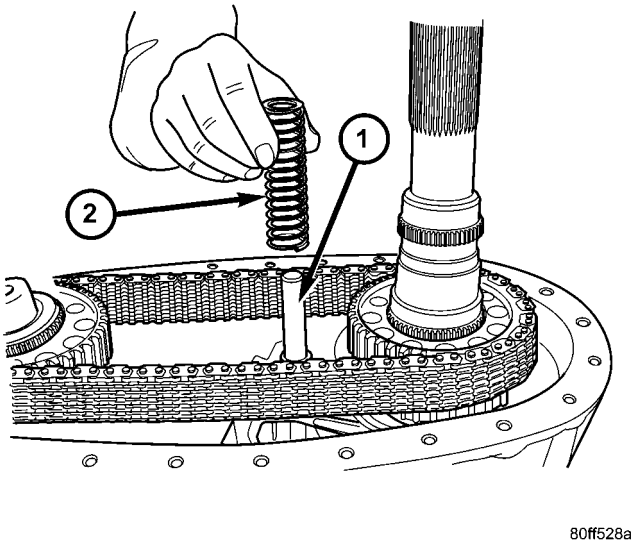


Fig. 80 Install Shift Rail Spring

1 - SHIFT RAIL
2 - SPRING

(11) Insert magnet in front case pocket (Fig. 81).

REAR CASE

(1) Install the oil pick-up tube and screen into the rear case half.

(2) 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.

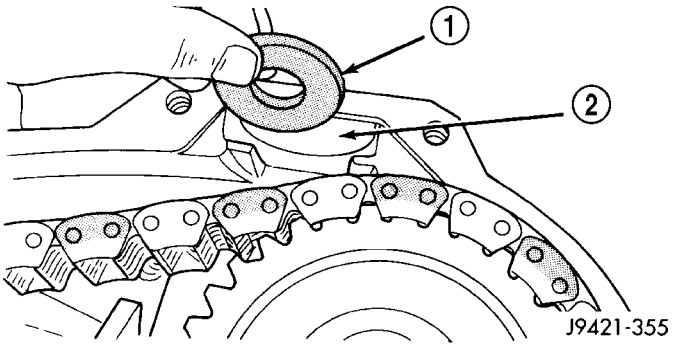


Fig. 81 Case Magnet Installation

1 - MAGNET
2 - CASE POCKET

(3) Align mainshaft with he rear output shaft bearing and align shift rail with bore in rear case. Then install rear case (Fig. 82). Verify that the case alignment dowels correctly seat into their mating recesses.

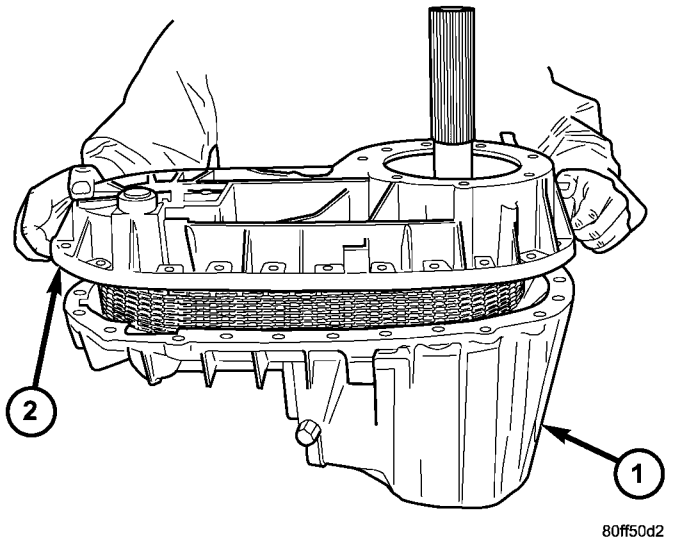


Fig. 82 Install Rear Case Half

1 - FRONT CASE HALF
2 - REAR CASE HALF

(4) Install 4-5 rear case-to front case bolts (Fig. 83) to hold rear case in position. Tighten bolts snug but not to specified torque at this time.

CAUTION: Verify that shift rail, and case alignment dowels are seated before installing any bolts. Case could be cracked if shaft rail or dowels are misaligned.

(5) Tighten bolts to 27-34 N·m (20-25 ft. lbs.),

TRANSFER CASE - NV271 (Continued)

(6) Install rear output bearing inner snap-ring (Fig. 84) to output shaft.

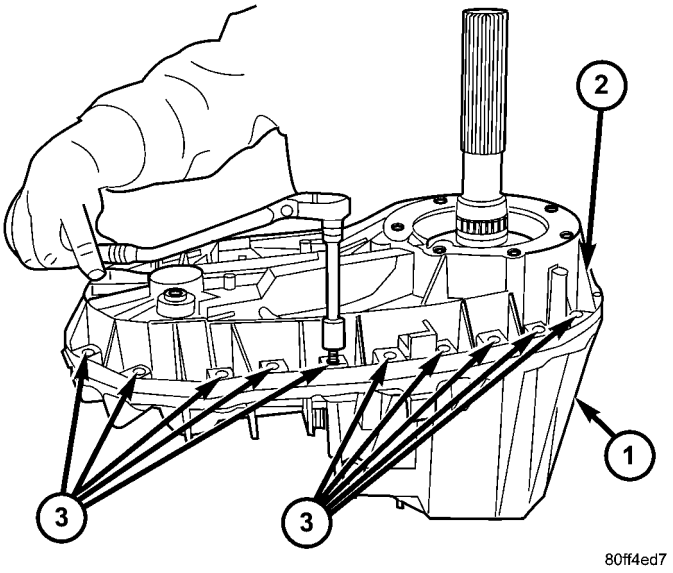


Fig. 83 Install Case Half Bolts

1 - FRONT CASE HALF
2 - REAR CASE HALF
3 - BOLTS

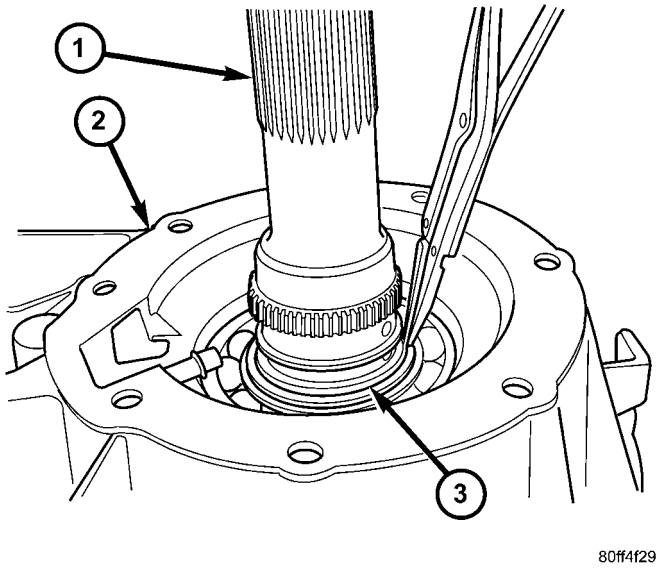


Fig. 84 Install Rear Bearing Inner Snap-Ring

1 - OUTPUT SHAFT
2 - REAR CASE HALF
3 - SNAP-RING

OIL PUMP AND REAR EXTENSION

(1) Install the oil pump (Fig. 85) onto the output shaft.

(2) Engage the oil pump pick-up tube (Fig. 86) into the oil pump. Verify that the pick-up tube o-ring is on the tube and is correctly installed to the oil pump.

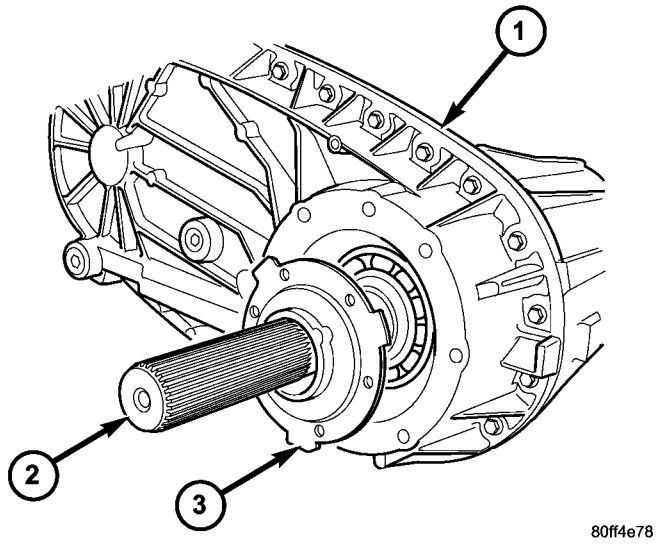


Fig. 85 Install Oil Pump

1 - REAR CASE HALF
2 - REAR OUTPUT SHAFT
3 - OIL PUMP

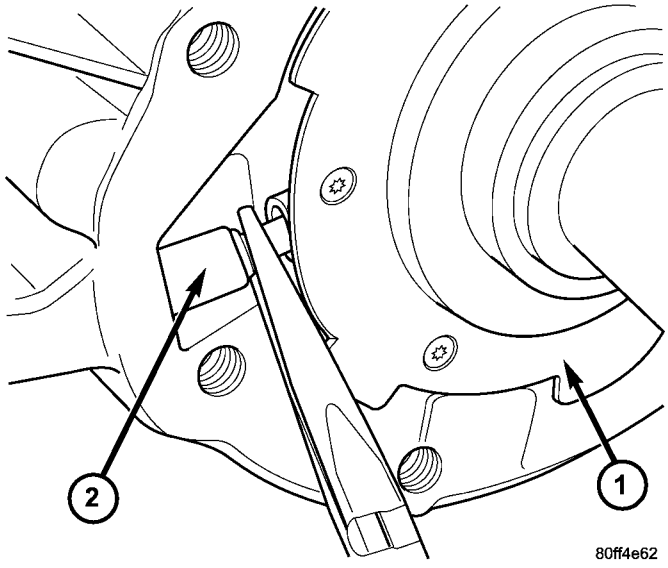


Fig. 86 Engage The Oil Pick-up To Oil Pump

1 - OIL PUMP
2 - OIL PICK-UP TUBE

TRANSFER CASE - NV271 (Continued)

(3) 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.

(4) Install extension housing (Fig. 87) onto the rear case half.

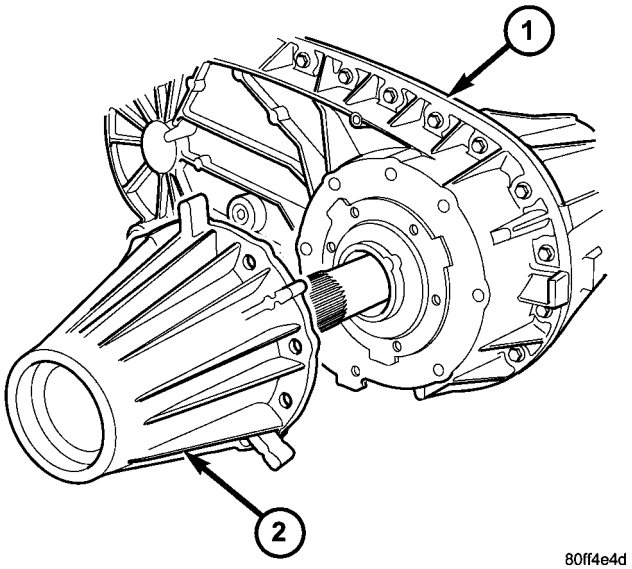


Fig. 87 Install Extension Housing

1 - REAR CASE HALF
2 - EXTENSION HOUSING

(5) Install rear extension bolts (Fig. 88). Tighten the bolts to 27-34 N·m (20-25 ft.lbs.).

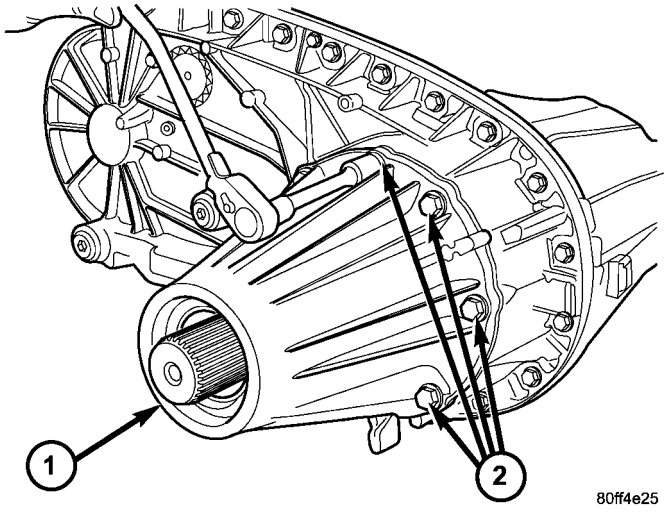


Fig. 88 Install Extension Housing Bolts

1 - EXTENSION HOUSING
2 - BOLTS

(6) Install the extension housing boot and seal assembly with Installer 9037 and Handle C-4171 (Fig. 89).

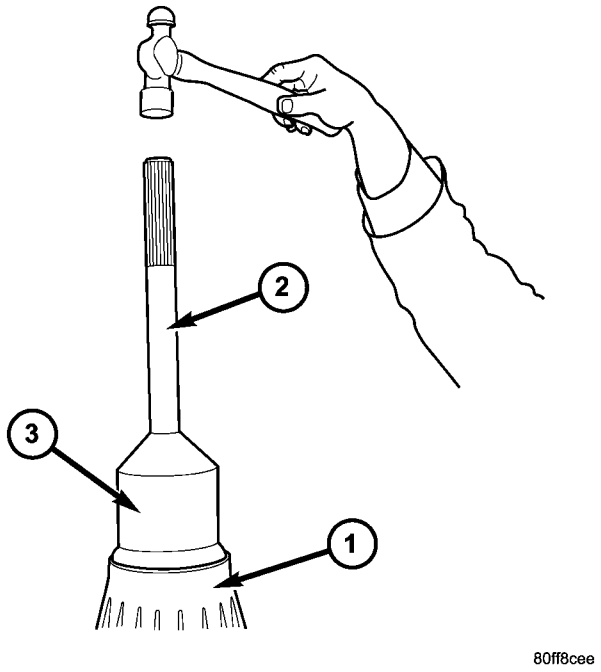


Fig. 89 Install Extension Housing Seal

1 - EXTENSION HOUSING
2 - HANDLE C-4171
3 - INSTALLER 9037

TRANSFER CASE - NV271 (Continued)

(7) Install the front companion flange onto the front output shaft.

(8) Install two bolts 180° apart into the front output shaft companion flange.

(9) Place holder over the bolts and against the companion flange (Fig. 90).

(10) Install a new front companion flange nut. Tighten the companion flange nut to 176-271 N·m (130-200 ft.lbs.).

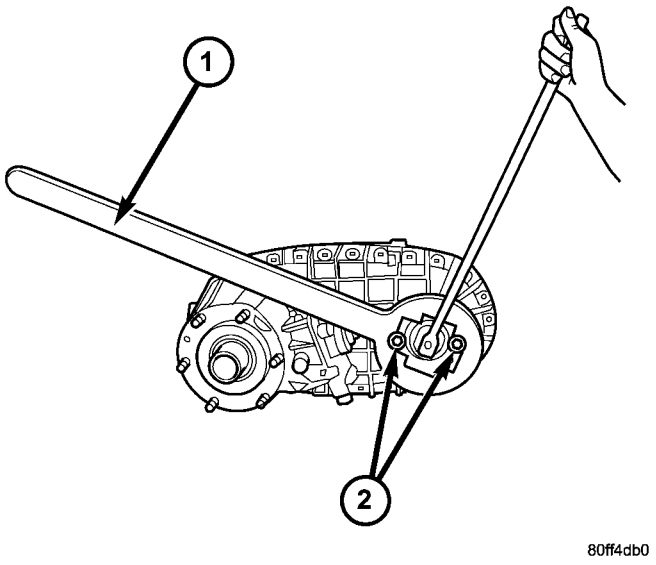


Fig. 90 Install Companion Flange Nut

1 - HOLDER 6719
2 - BOLTS

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) Remove jack stand from under transmission.

(4) Align and connect propeller shafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

(5) Connect vent hose and transfer case position sensor connector.

(6) Connect shift rod to transfer case lever or floor shift arm. Use channel lock style pliers to press rod back into lever grommet.

(7) Adjust shift linkage, if necessary.

(8) Fill transfer case with recommended transmission fluid and install fill plug.

(9) Install skid plate, if equipped. (Refer to 13 - FRAMES & BUMPERS/FRAME/TRANSFER CASE SKID PLATE - INSTALLATION)

(10) Lower vehicle

SPECIFICATIONS

TRANSFER CASE - NV271

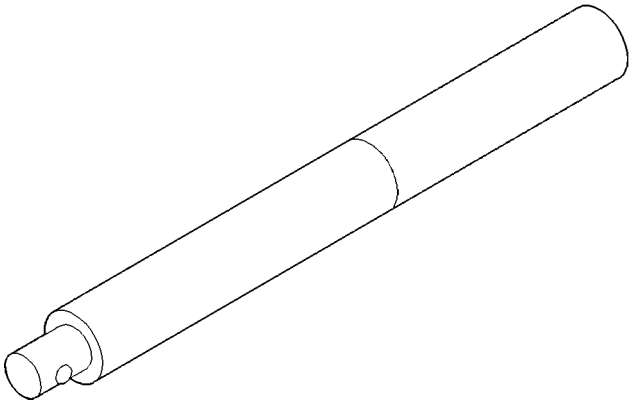
TORQUE SPECIFICATIONS

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Plug, Detent	16-25	12-18	-
Plug, Drain/Fill	20-34	15-25	-
Bolt, Extension Housing	27-34	20-25	-
Bolt, Case Half	27-34	20-25	-
Nut, Range Lever	27-34	20-25	-
Sector Support	27-34	20-25	-
Nuts, Mounting	30-41	20-30	-
Position Sensor	20-34	15-25	-
Nut, Companion Flange	176-271	130-200	-

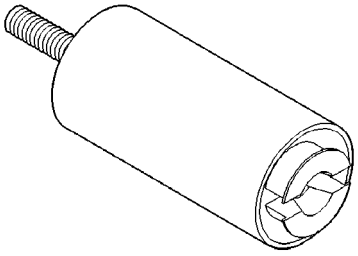
TRANSFER CASE - NV271 (Continued)

SPECIAL TOOLS

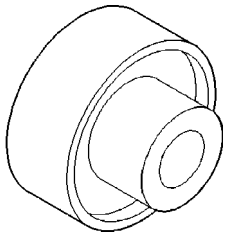
TRANSFER CASE NV271/NV273



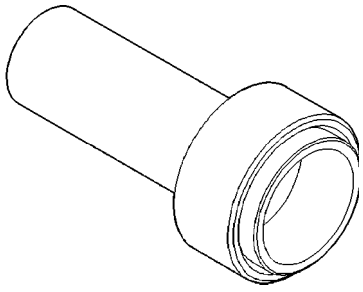
Handle, Universal - C-4171



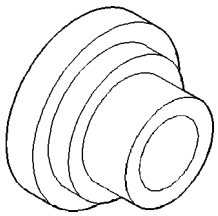
Remover - L-4454



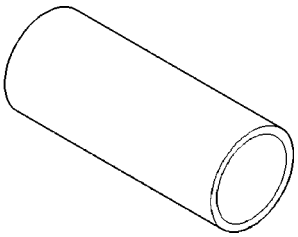
Installer, Bearing - 6953



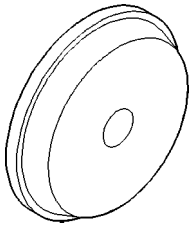
Installer, Pump Housing Seal - 7888



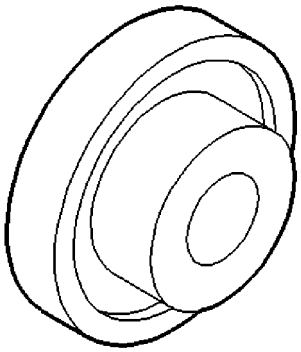
Installer, Bearing - 8128



Cup - 8148

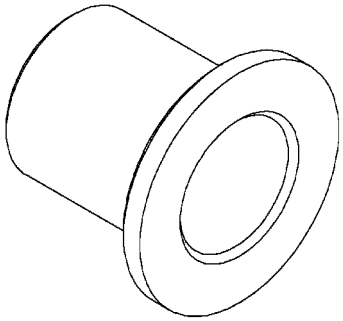


Installer - 8151

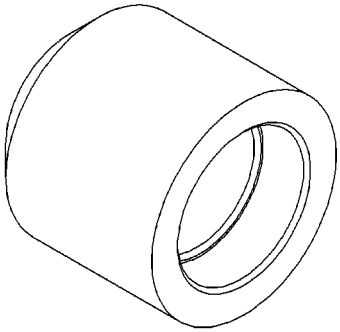


Installer - 8152

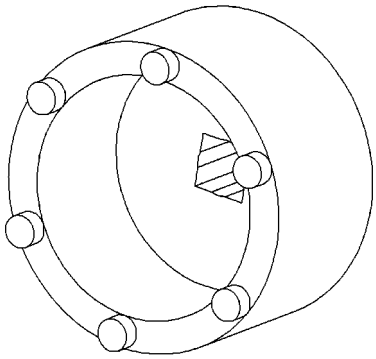
TRANSFER CASE - NV271 (Continued)



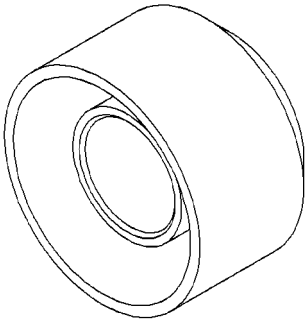
Installer - 8891



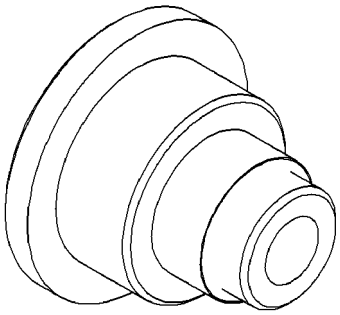
Installer, Seal - 9036



Socket - 9033



Installer, Seal - 9037



Installer, Bearing - 9035

EXTENSION HOUSING SEAL AND DUST BOOT

REMOVAL

(1) Raise and support vehicle.

(2) Remove rear propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)

(3) Use a suitable chisel or pry tool to remove the rear extension housing dust boot (Fig. 91).

(4) Use a suitable chisel or pry tool to remove the rear extension housing seal.

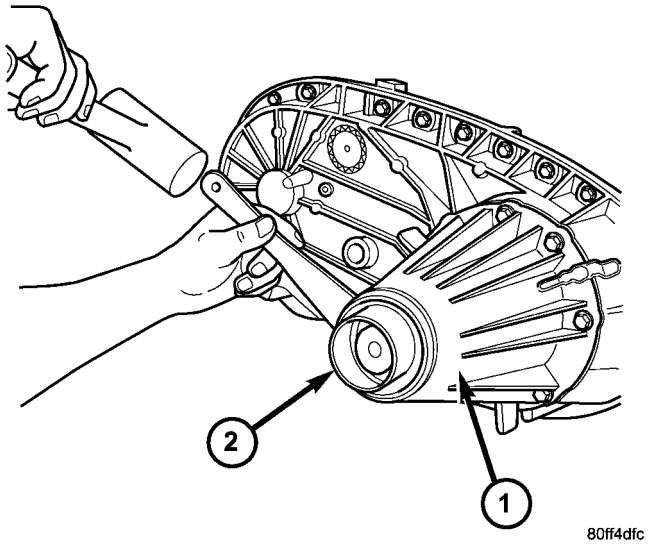


Fig. 91 Remove Extension Housing Dust Boot

1 - EXTENSION HOUSING
2 - DUST BOOT

INSTALLATION

(1) Clean fluid residue from sealing surface and inspect for defects.

(2) Install the extension housing dust boot and seal assembly with Installer 9037 and Handle C-4171 (Fig. 92).

(3) Install propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

(4) Verify proper transfer case fluid level.

(5) Lower vehicle.

FLUID

STANDARD PROCEDURE - FLUID DRAIN AND REFILL

The fill and drain plugs are both in the rear case (Fig. 93).

(1) Raise vehicle.

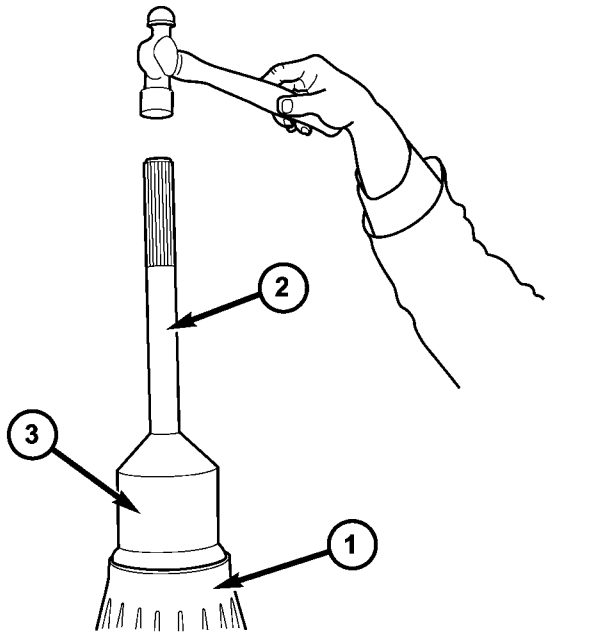


Fig. 92 Install Extension Housing Seal

1 - EXTENSION HOUSING
2 - HANDLE C-4171
3 - INSTALLER 9037

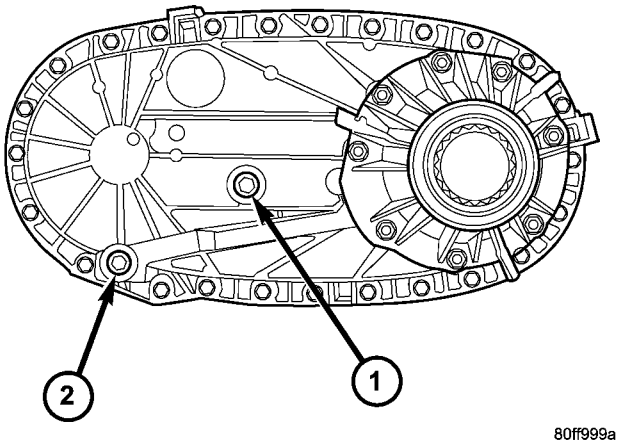


Fig. 93 Drain and Fill Locations

1 - FILL HOLE
2 - DRAIN HOLE

(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, 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) Remove the front propeller shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL).

(2) Install two bolts 180° apart into the front output shaft companion flange.

(3) Place holder over the bolts and against the companion flange (Fig. 94).

(4) Remove and discard the front companion flange nut.

(5) Remove the companion flange from the front output shaft. It may be necessary to use Flange puller 8992 to remove the companion flange.

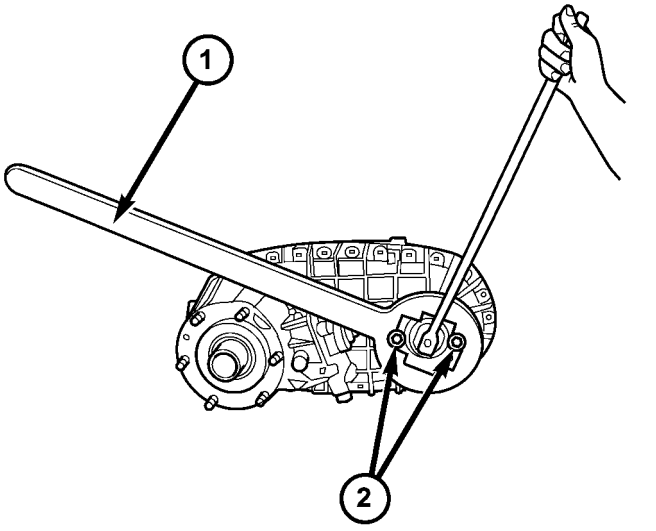


Fig. 94 Remove Companion Flange Nut

1 - HOLDER 6719
2 - BOLTS

(6) Using a screw and a slide hammer, remove the front output shaft seal.

INSTALLATION

(1) Install the new front output shaft seal with Installer MB991168A.

(2) Install the front companion flange onto the front output shaft.

(3) Install two bolts 180° apart into the front output shaft companion flange.

(4) Place holder over the bolts and against the companion flange (Fig. 95).

(5) Install a new front companion flange nut. Tighten the companion flange nut to 258-312 N·m (190-230 ft.lbs.).

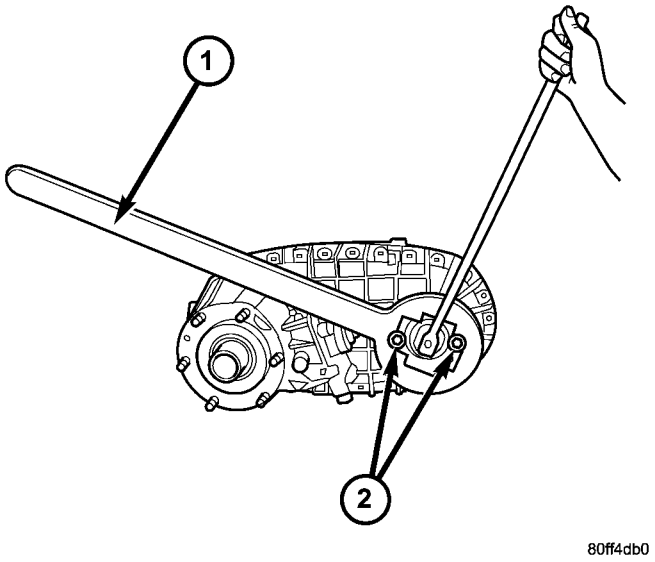


Fig. 95 Install Companion Flange Nut

1 - HOLDER 6719
2 - BOLTS

(6) Install front propeller shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION).

POSITION SENSOR

DESCRIPTION

The transfer case position sensor is an electronic device whose output can be interpreted to indicate the transfer case's current operating mode. The sensor consists of a five position, resistive multiplexed circuit which returns a specific resistance value to the Powertrain Control Module (PCM) for each transfer case operating mode. The sensor is located on the top of the transfer case, just left of the transfer case centerline and rides against the sector plate roostercomb. The PCM supplies 5VDC (+/- 0.5V) to the sensor and monitors the return voltage to determine the sector plate, and therefore the transfer case, position.

OPERATION

During normal vehicle operation, the Powertrain Control Module (PCM) monitors the transfer case position sensor return voltage to determine the operating mode of the transfer case. Refer to the Operating Mode Versus Resistance table for the correct resistance for each position (Fig. 96).

OPERATING MODE VERSUS RESISTANCE

SENSOR POSITION	OPERATING MODE	SENSOR RESISTANCE (ohms)
1	2H	1172-1195
2	4H	677-691
3	NEUTRAL	406-415
4	4L	208-213
5	NOT USED	60-61

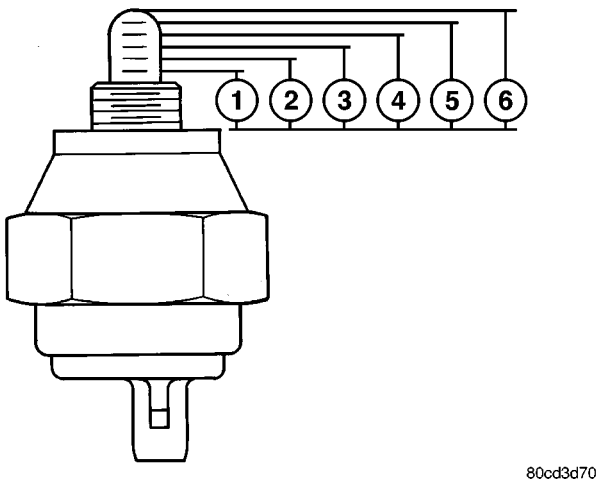


Fig. 96 Position Sensor Linear Movement

1 - POSITION 1 - 10mm ±0.5mm
2 - POSITION 2 - 12mm ±0.5mm
3 - POSITION 3 - 14mm ±0.5mm
4 - POSITION 4 - 16mm ±0.5mm
5 - POSITION 5 - 18mm ±0.5mm
6 - POSITION 6 - 20mm±0.5mm - FULL EXTENSION

REMOVAL

(1) Raise and support the vehicle.
(2) Disengage the transfer case position sensor connector from the position sensor.
(3) Remove the position sensor from the transfer case.

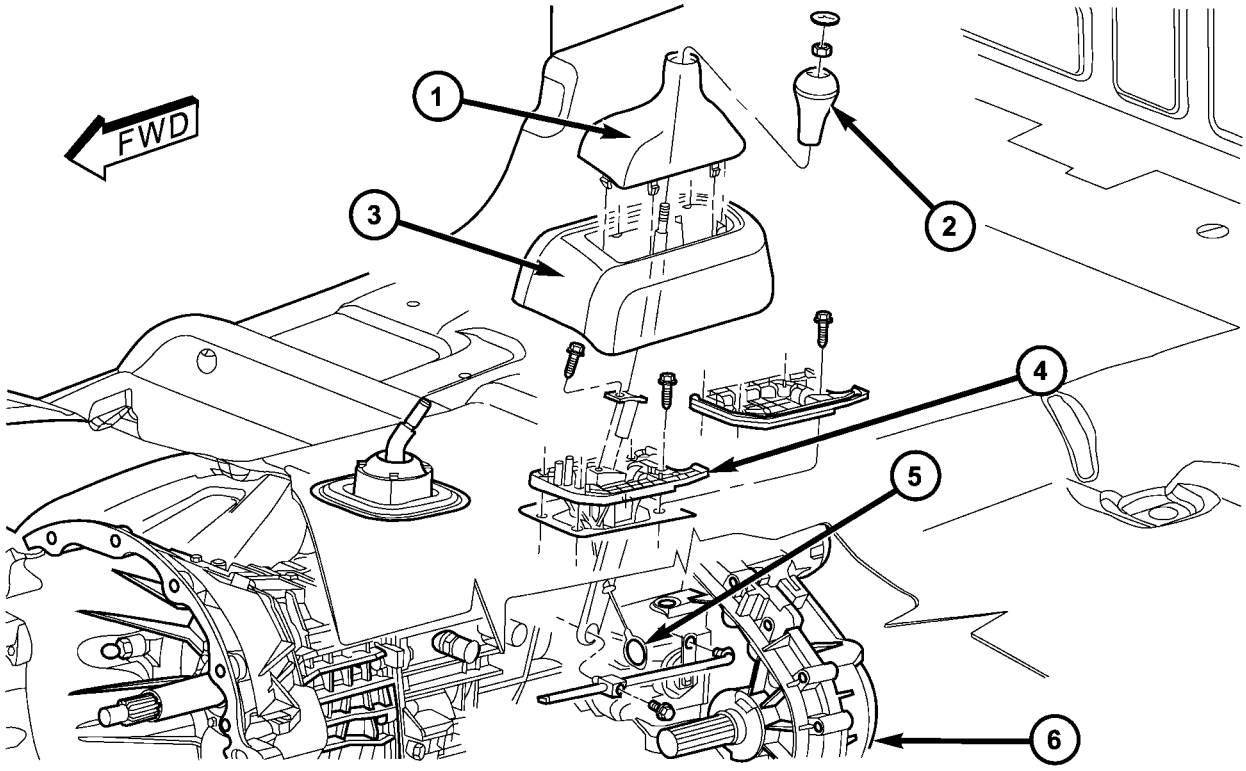
INSTALLATION

(1) Inspect the o-ring seal on the transfer case position sensor. Replace the o-ring if necessary.
(2) Install the transfer case position sensor into the transfer case. Torque the sensor to 20-34 N·m (15-25 ft.lbs.).
(3) Engage the transfer case position sensor connector to the position sensor.
(4) Lower vehicle.
(5) Verify proper sensor operation.

SHIFT LEVER

REMOVAL

(1) Shift transfer case into 2H.
(2) Raise and support the vehicle.
(3) 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.
(4) Lower vehicle.
(5) Remove transfer case shifter knob cap.
(6) Remove nut holding shifter knob to shift lever.
(7) Remove shifter knob.
(8) Remove the shift boot from the shifter console.
(9) Remove the bolts securing the shifter mechanism to the floor pan (Fig. 97).
(10) Separate shift lever mechanism from the vehicle.



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Fig. 97 Transfer Case Shifter

1 - SHIFTER BOOT
2 - SHIFTER KNOB
3 - SHIFTER CONSOLE
4 - SHIFTER MECHANISM
5 - ALIGNMENT PIN
6 - TRANSFER CASE

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. 98).

(2) Position shift lever in vehicle.

(3) Install the bolts to hold the shifter mechanism to the floor pan.

(4) Raise vehicle.

(5) Verify that the transfer case is still in the 2H position. The 2H detent position on the transfer case shift arm is the second position from full forward.

(6) Install trunnion to shift lever, if necessary.

(7) Install shift rod to trunnion, if necessary.

(8) Tighten the shift rod lock bolt to 10 N·m (90 in.lbs.).

(9) Remove the shifter adjustment locating pin from the adjustment channel and the locating hole.

(10) Lower vehicle.

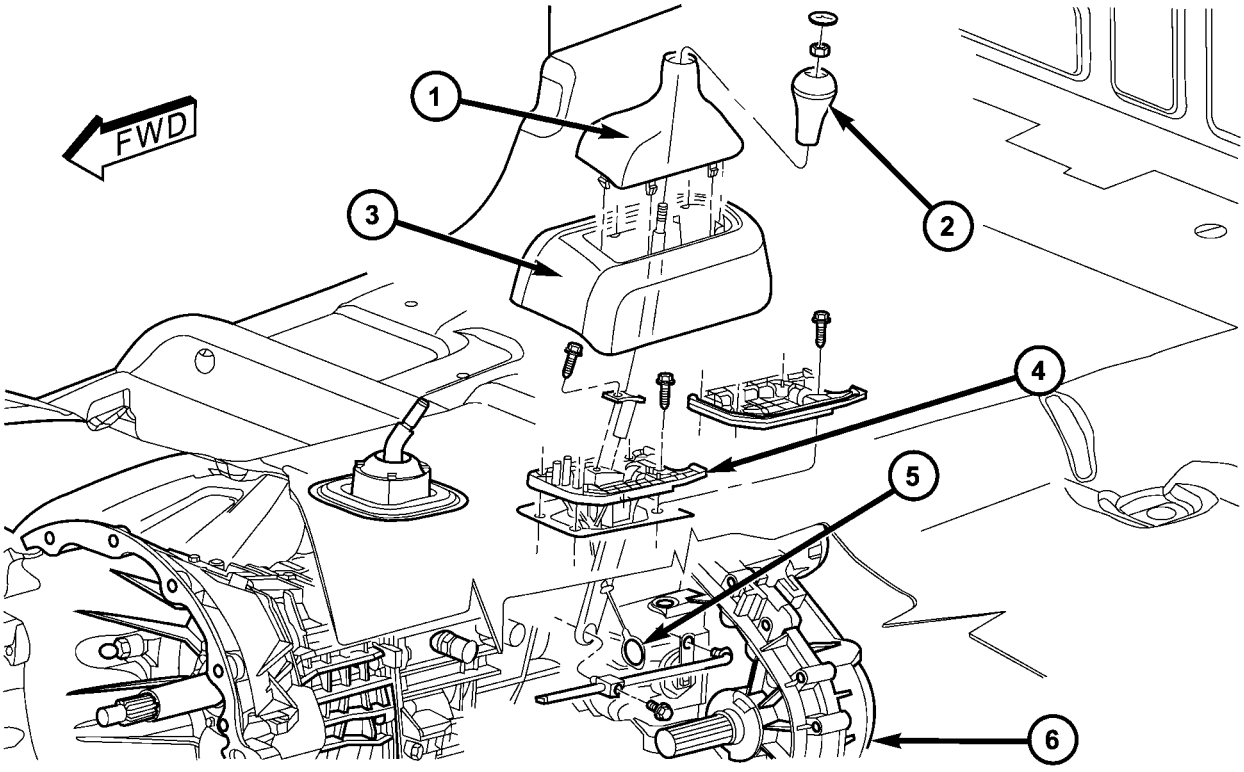
(11) Install the transfer case shifter console.

(12) Install the shifter boot and the shifter knob onto the shifter lever.

(13) Install nut to hold shifter knob to shift lever.

(14) Install shifter knob cap.

(15) Verify transfer case operation.



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Fig. 98 Transfer Case Shifter

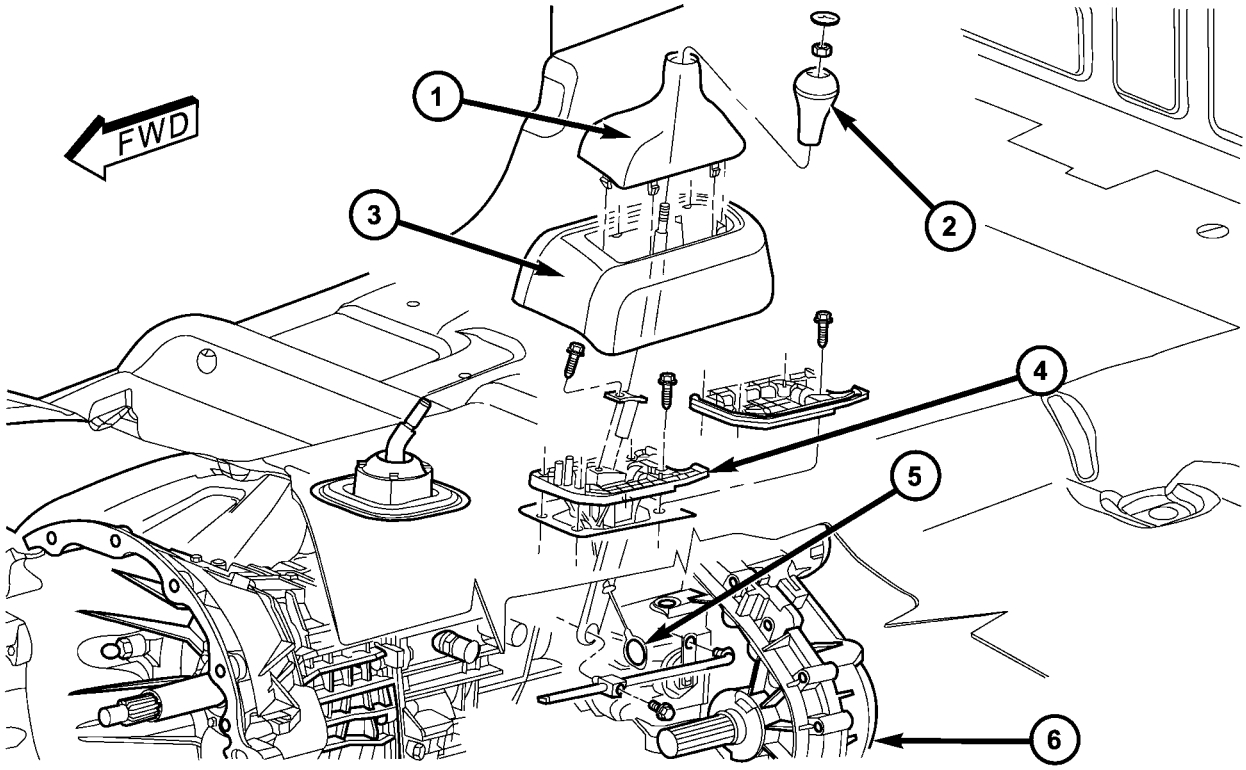
1 - SHIFTER BOOT
2 - SHIFTER KNOB
3 - SHIFTER CONSOLE
4 - SHIFTER MECHANISM
5 - ALIGNMENT PIN
6 - TRANSFER CASE

SHIFT LEVER (Continued)

ADJUSTMENTS

ADJUSTMENT - SHIFT LEVER

(1) Move shift lever into 2H position.
(2) Raise vehicle.
(3) Loosen shift rod lock bolt at trunnion.
(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.
(6) Align the adjustment locating hole on the lower shifter lever with the adjustment channel on the shifter bracket assembly (Fig. 99).
(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.



80de77d0

Fig. 99 Transfer Case Shifter

1 - SHIFTER BOOT
2 - SHIFTER KNOB
3 - SHIFTER CONSOLE
4 - SHIFTER MECHANISM
5 - ALIGNMENT PIN
6 - TRANSFER CASE

TRANSFER CASE - NV243

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TRANSFER CASE - NV243

DESCRIPTION

The NV243 is an electronically controlled part-time transfer case with a low range gear reduction system. The NV243 has three operating ranges plus a NEUTRAL position. The low range system provides a gear reduction ratio for increased low speed torque capability.

The geartrain is mounted in two aluminum case halves attached with bolts. The mainshaft front and rear bearings are mounted in aluminum retainer housings bolted to the case halves.

OPERATING RANGES

Transfer case operating ranges are:

- 2WD (2-wheel drive)
- 4HI (4-wheel drive)
- 4LO (4-wheel drive low range)
- NEUTRAL

The 2WD range is for use on any road surface at any time.

The 4HI 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 wet or slippery or 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.

SHIFT MECHANISM

Operating ranges are selected with a dash mounted shift selector switch. The shift selector switch provides a input to the Transfer Case Control Module (TCCM) to indicate the driver's desire to change operating ranges. The TCCM uses this input, along with input from the transfer case mounted mode sensor and information from the vehicle's bus, to determine if a shift is permitted. If the TCCM decides the shift is permitted, the TCCM controls the shift motor, mounted to the exterior of the transfer case, to perform the shift.

TRANSFER CASE - NV243 (Continued)

IDENTIFICATION

A circular ID tag is attached to the rear case of each transfer case (Fig. 1). The ID tag provides the transfer case model number, assembly number, serial number, and low range ratio.

The transfer case serial number also represents the date of build.

OPERATION

The input gear is splined to the transmission output shaft. The input gear drives the mainshaft through the planetary assembly and range sleeve. The front output shaft is operated by a drive chain that connects the shaft to a drive sprocket on the mainshaft. The drive sprocket is engaged/disengaged by the mode fork, which operates the mode sleeve and hub. The sleeve and hub are not equipped with a synchronizer mechanism for shifting.

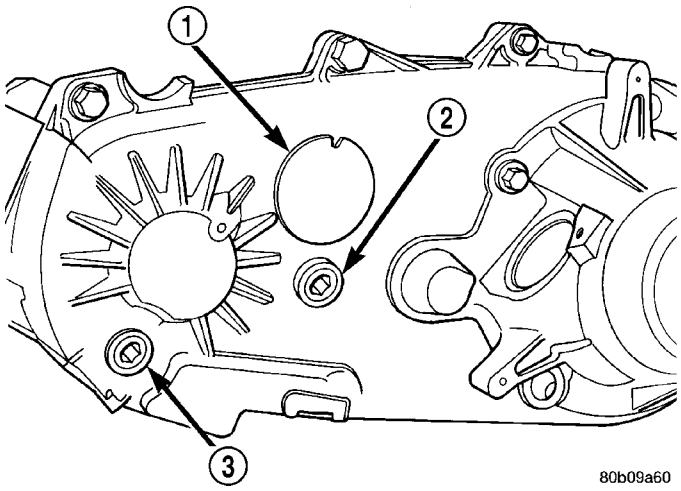


Fig. 1 Fill/Drain Plug And I.D. Tag Locations - Typical

1 - I.D. TAG
2 - FILL PLUG
3 - DRAIN PLUG

DIAGNOSIS AND TESTING - TRANSFER CASE - NV243

DIAGNOSIS CHART

Condition	Possible Cause	Correction
Transfer case difficult to shift or will not shift into desired range.	1) Transfer case electronically controlled shift system malfunction.	1) Verify proper operation per the appropriate diagnostic manual.
	2) If vehicle was operated for an extended period in 4HI mode on dry surface, driveline torque load may cause difficulty.	2) Drive the vehicle in a straight line and momentarily release the accelerator. The transfer case can then be shifted to the desired mode.
	3) Insufficient or incorrect lubricant.	3) Drain and refill transfer case with the correct quantity of Mopar® ATF +4, Automatic Transmission Fluid.
	4) Internal transfer case components binding, worn, or damaged.	4) Repair or replace components as necessary.
Transfer case noisy in all drive modes.	1) Insufficient or incorrect lubricant.	1) Drain and refill transfer case with the correct quantity of Mopar® ATF +4, type 9602, Automatic Transmission Fluid.
	2) Internal transfer case components binding, worn, or damaged.	2) Repair or replace components as necessary.

TRANSFER CASE - NV243 (Continued)

Condition	Possible Cause	Correction
Transfer case noisy while in, or jumps out of, 4LO mode.	1) Transfer case not completely engaged in 4LO position.	1) While rolling 2-3 MPH and the transmission in NEUTRAL, or clutch depressed on vehicles equipped with a manual transmission, shift transfer case to the 2WD or 4HI position, and then back into the 4LO position.
	2) Range fork damaged, inserts worn, or fork is binding on the shift rail.	2) Repair or replace components as necessary.
	3) Low range gear worn or damaged.	3) Repair or replace components as necessary.
Lubricant leaking from transfer case seals or vent.	1) Transfer case overfilled.	1) Drain lubricant to the correct level.
	2) Transfer case vent closed or restricted.	2) Clean or replace vent as necessary.
	3) Transfer case seals damaged or installed incorrectly.	3) Replace suspect seal.
Abnormal tire wear.	1) Extended operation in 4HI mode on dry surfaces,	1) Operate vehicle in 2WD mode on dry surfaces.

REMOVAL

(1) Shift transfer case into 2WD.
(2) Raise vehicle.
(3) Drain transfer case lubricant.
(4) Mark front and rear propeller shafts for alignment reference.
(5) Support transmission with jack stand.
(6) Remove the transfer case skid plate, if equipped.
(7) Disconnect front and rear propeller shafts at transfer case.
(8) Disconnect transfer case shift motor and mode sensor wire connectors.
(9) Disconnect transfer case vent hose.
(10) Support transfer case with transmission jack.
(11) Secure transfer case to jack with chains.
(12) Remove nuts attaching transfer case to transmission (Fig. 2).
(13) Pull transfer case and jack rearward to disengage transfer case.
(14) Remove transfer case from under vehicle.

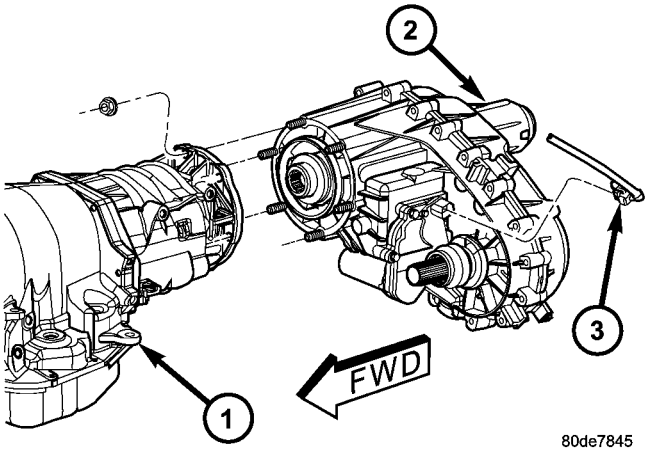


Fig. 2 Remove Transfer Case - Typical

1 - TRANSMISSION
2 - TRANSFER CASE
3 - MODE SENSOR CONNECTOR

DISASSEMBLY

Position transfer case in a shallow drain pan. Remove drain plug and drain any remaining lubricant remaining in case.

TRANSFER CASE - NV243 (Continued)

SHIFT MOTOR ASSEMBLY AND FRONT OUTPUT SHAFT SEAL

(1) Remove the bolts (Fig. 3) which hold the shift motor and mode sensor assembly to the transfer case.

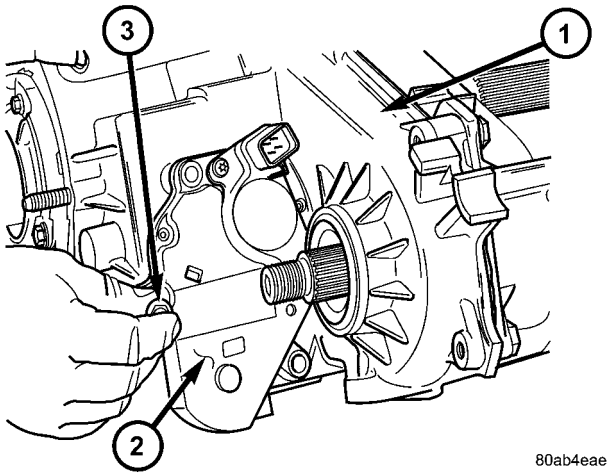


Fig. 3 Remove the Shift Motor and Mode Sensor Assembly Bolts - Typical

1 - TRANSFER CASE
2 - SHIFT MOTOR AND MODE SENSOR ASSEMBLY
3 - BOLT

(2) Remove the shift motor and mode sensor assembly from the transfer case.

(3) Remove the front propeller shaft seal boot retaining clamp (Fig. 4).

(4) Remove the front propeller shaft seal boot (Fig. 5).

(5) Remove the front output shaft seal slinger by bending (Fig. 6) the slinger ears away from the transfer case.

(6) Using a suitable pry tool (Fig. 7), remove the slinger from the output shaft using care not to damage the shaft.

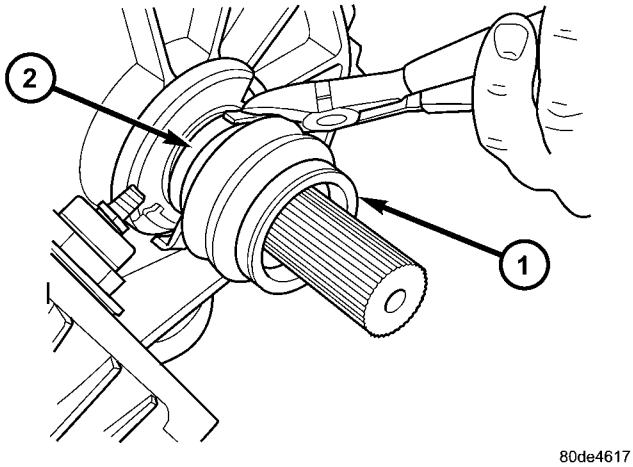


Fig. 4 Remove Boot Clamp - Typical

1 - SEAL BOOT
2 - BOOT CLAMP

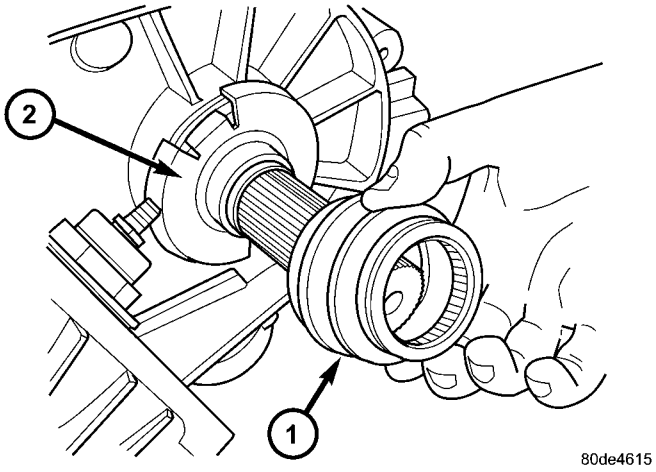


Fig. 5 Remove Seal Boot - Typical

1 - SEAL BOOT
2 - SEAL SLINGER

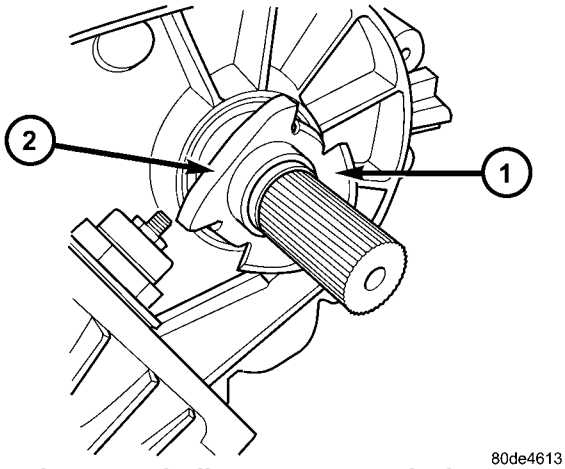


Fig. 6 Bend Slinger Ears - Typical

1 - SLINGER
2 - BEND UPWARD

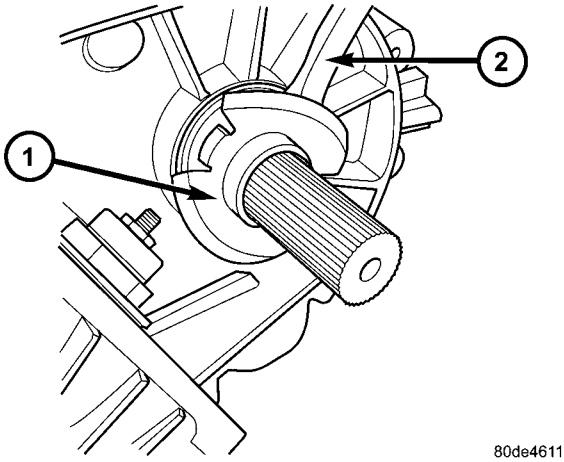


Fig. 7 Remove Slinger From Shaft - Typical

1 - SLINGER
2 - PRY TOOL

TRANSFER CASE - NV243 (Continued)

(7) Using a screw and a slide hammer, remove the front output shaft seal.

REAR EXTENSION

(1) Remove rear extension bolts (Fig. 8).

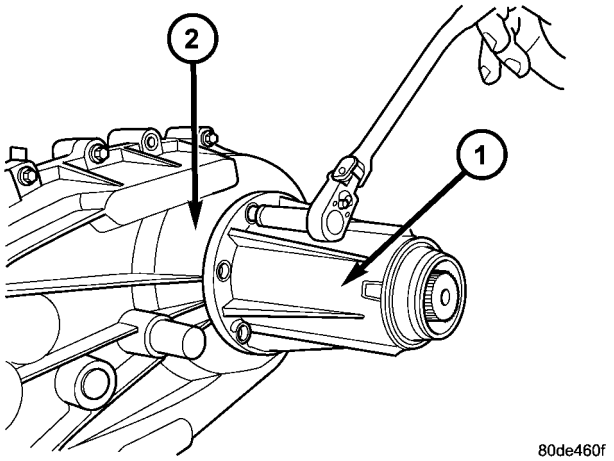


Fig. 8 Remove Rear Extension Bolts

1 - EXTENSION HOUSING
2 - TRANSFER CASE

(2) Remove rear extension housing (Fig. 9). Tap extension once or twice with a plastic mallet to break sealer bead and loosen it.

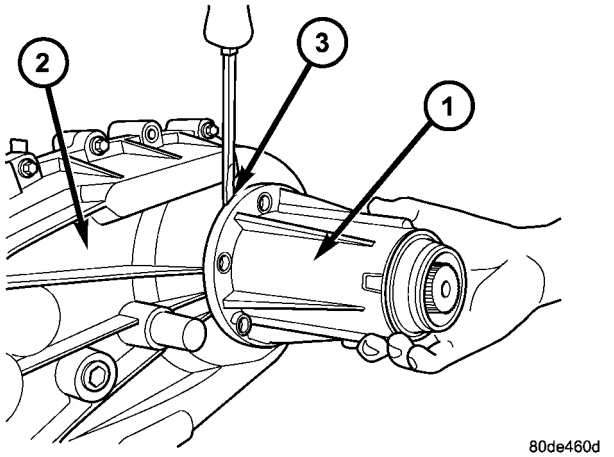


Fig. 9 Remove Rear Extension

1 - EXTENSION HOUSING
2 - TRANSFER CASE
3 - PRY SLOT

(3) Remove output bearing retaining ring with heavy duty snap-ring pliers (Fig. 10).

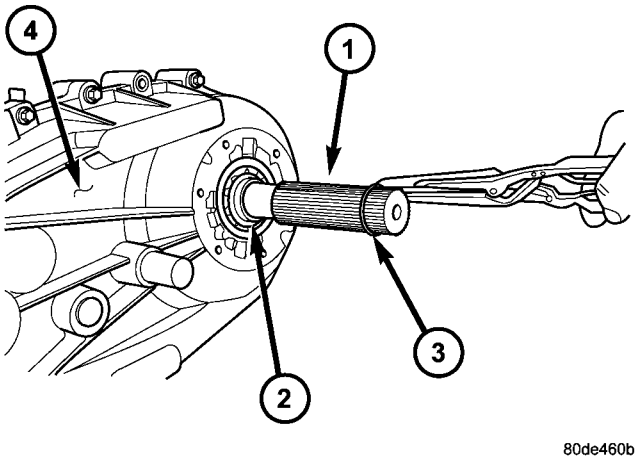


Fig. 10 Remove Output Shaft Retaining Ring

1 - REAR OUTPUT SHAFT
2 - OUTPUT SHAFT BEARING
3 - RETAINING RING
4 - TRANSFER CASE

OIL PUMP AND REAR CASE

(1) Remove rear case-to-front case bolts (Fig. 11).

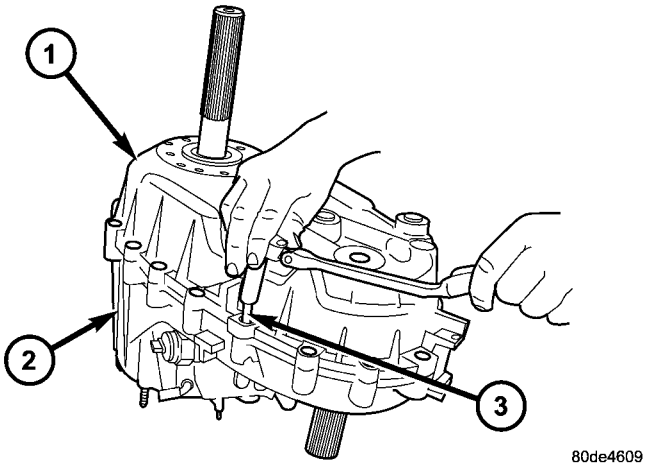


Fig. 11 Remove Case Bolts

1 - REAR CASE
2 - FRONT CASE
3 - BOLT

TRANSFER CASE - NV243 (Continued)

(2) Loosen rear case with pry tool to break sealer bead. Insert tool in slot at each end of case (Fig. 12).

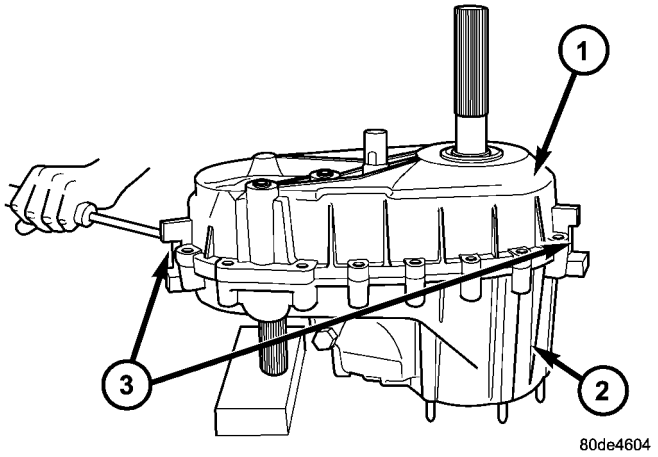


Fig. 12 Loosen Case Halves

1 - REAR CASE
2 - FRONT CASE
3 - PRY SLOTS

(3) Unseat rear case from alignment dowels.

(4) Remove rear case and oil pump assembly from front case (Fig. 13).

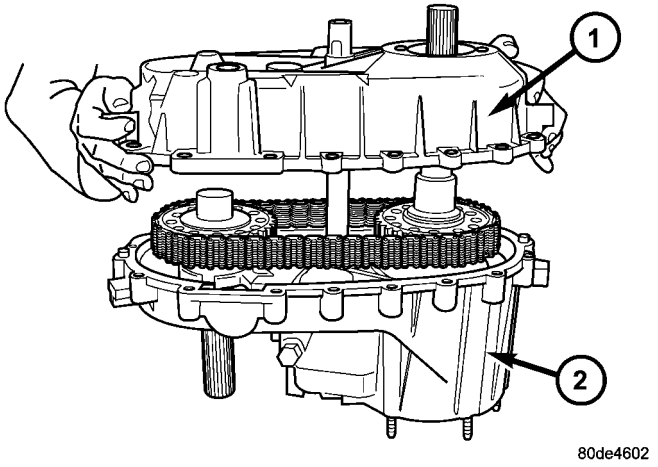


Fig. 13 Remove Rear Case

1 - REAR CASE
2 - FRONT CASE

CAUTION: Do not remove the bolts holding the oil pump cover to the rear case half. The oil pump cover is aligned to the rear output shaft inner bearing race and will become mis-aligned if the bolts are loosened. If the transfer case failure has generated any debris which may have become trapped in the oil pump. the rear case and oil pump assembly MUST be replaced.

(5) Remove the oil pump pickup tube.

FRONT OUTPUT SHAFT AND DRIVE CHAIN

(1) Remove shift rail cup and spring (Fig. 14).

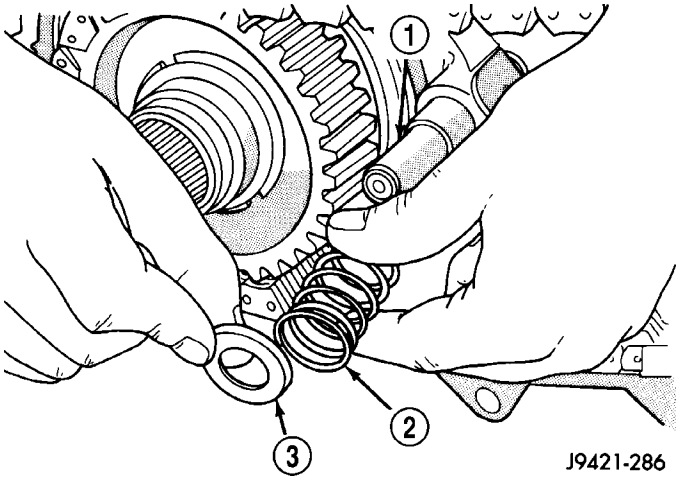


Fig. 14 Shift Rail Cup And Spring Removal

1 - SHIFT RAIL
2 - SPRING
3 - CUP

(2) Remove front sprocket retaining ring (Fig. 15).

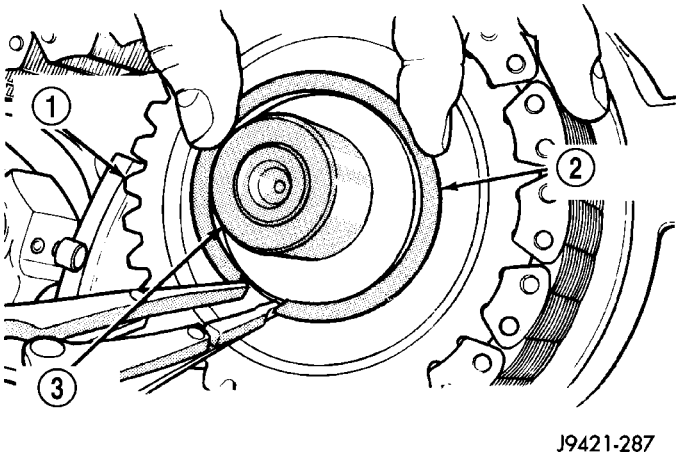


Fig. 15 Removing Front Sprocket Retaining Ring

1 - FRONT SPROCKET
2 - RETAINING RING
3 - FRONT OUTPUT SHAFT

TRANSFER CASE - NV243 (Continued)

(3) Pull mainshaft, front sprocket and chain outward about 25.4 mm (1-inch) simultaneously (Fig. 16).

(4) Remove chain from mainshaft drive sprocket and remove front sprocket and chain as assembly.

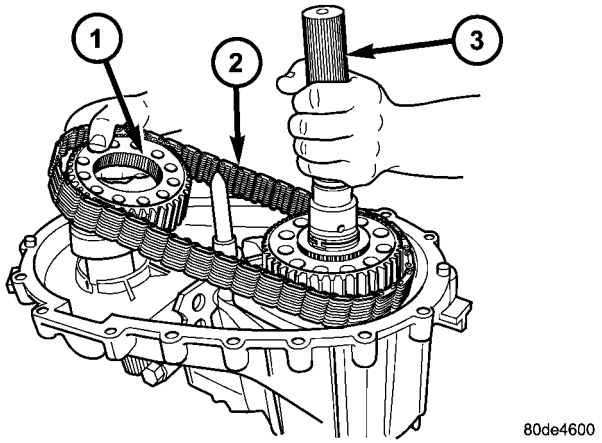


Fig. 16 Remove Front Sprocket and Drive Chain

1 - FRONT DRIVE SPROCKET
2 - DRIVE CHAIN
3 - MAINSHAFT

SHIFT FORKS AND MAINSHAFT

(1) Loosen detent plug.

(2) Remove detent plug, spring, and plunger (Fig. 17). Note that the plug has an O-ring seal. Remove and discard this seal.

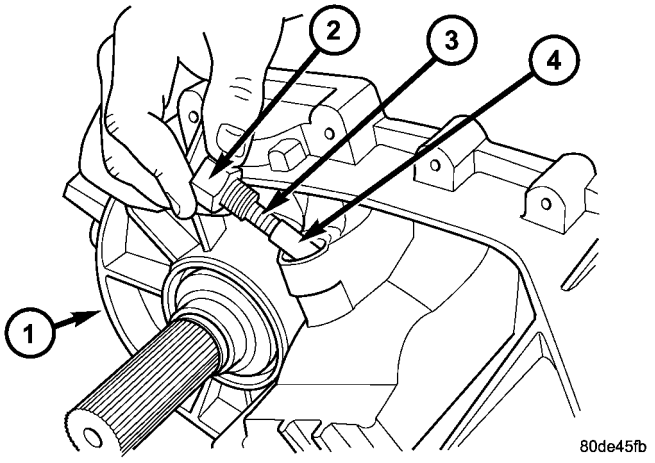


Fig. 17 Remove Detent Plug, Spring, and Plunger

1 - FRONT CASE
2 - DETENT PLUG
3 - DETENT SPRING
4 - DETENT PLUNGER

(3) Remove the front output shaft snap-ring (Fig. 18).

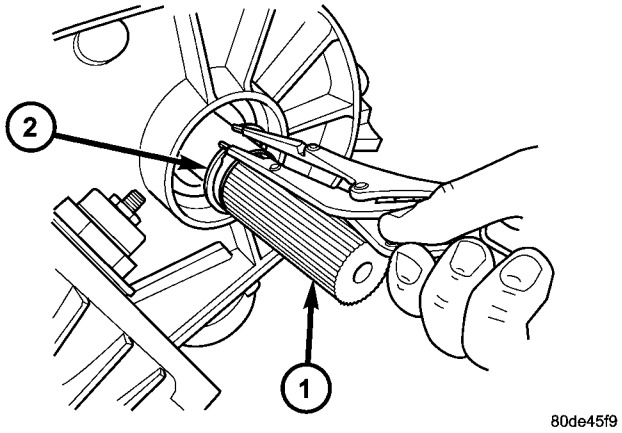


Fig. 18 Remove Front Output Shaft Snap-ring - Typical

1 - FRONT OUTPUT SHAFT
2 - SNAP-RING

(4) Remove front output shaft from bearing in case (Fig. 19).

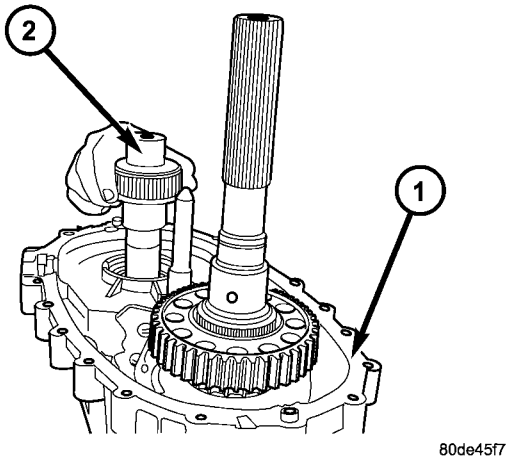


Fig. 19 Remove Front Output Shaft

1 - FRONT CASE
2 - FRONT OUTPUT SHAFT

TRANSFER CASE - NV243 (Continued)

(5) Pull mainshaft assembly out of input gear, mode sleeve, and case (Fig. 20).

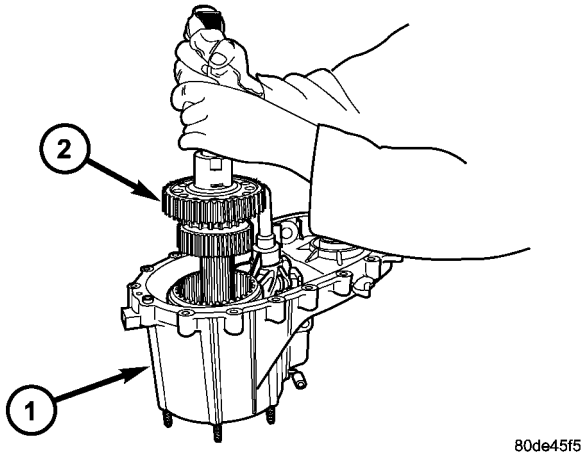


Fig. 20 Remove Mainshaft

1 - FRONT CASE
2 - MAINSHAFT

(6) Remove mode fork, mode sleeve, and shift rail as assembly (Fig. 21). Note which way the sleeve fits in the fork (long side of sleeve goes to front).

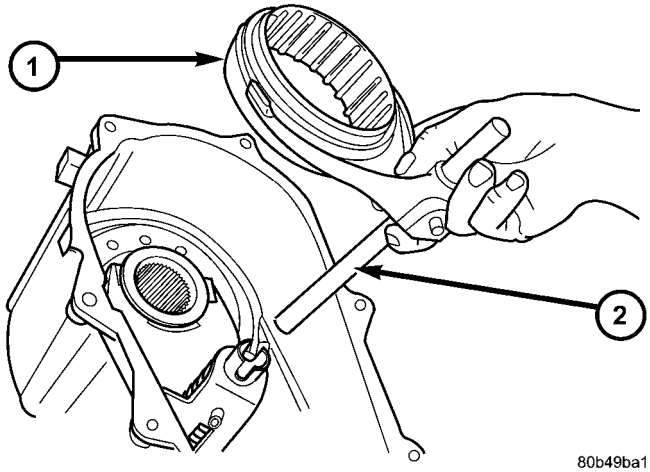


Fig. 21 Mode Fork And Sleeve Removal

1 - MODE SLEEVE
2 - MODE FORK AND RAIL

(7) Remove range fork retaining ring.

(8) Remove range fork and hub as an assembly (Fig. 22). Note fork position for installation reference.

(9) Remove shift sector (Fig. 23).

(10) Remove the shift sector o-ring (Fig. 24).

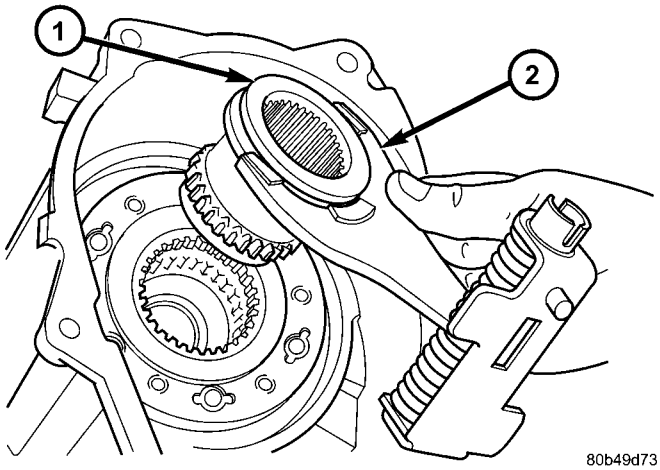


Fig. 22 Range Fork And Hub Removal

1 - RANGE HUB
2 - RANGE FORK

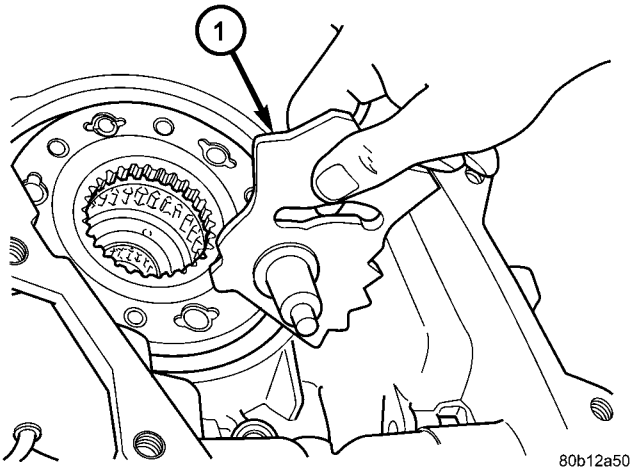


Fig. 23 Shift Sector Removal

1 - SHIFT SECTOR

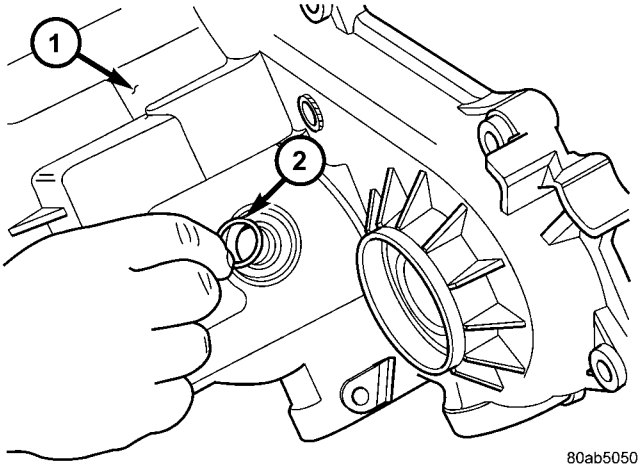


Fig. 24 Remove the Shift Sector O-Ring

1 - TRANSFER CASE FRONT HOUSING
2 - SHIFT SECTOR O-RING

TRANSFER CASE - NV243 (Continued)

MAINSHAFT

(1) Remove the drive sprocket retaining ring (Fig. 25) from the output shaft.

(2) Remove the drive sprocket thrust washer (Fig. 26) from the output shaft.

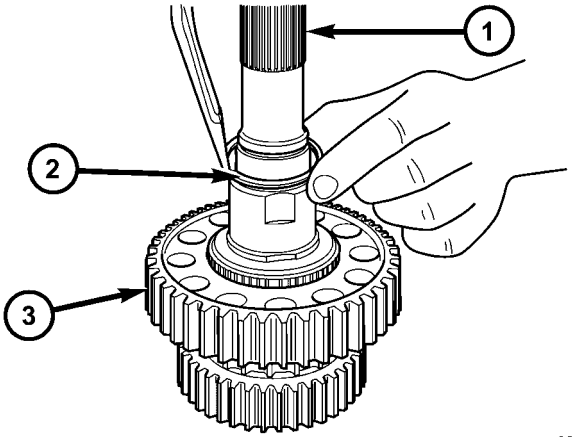


Fig. 25 Remove The Drive Sprocket Retaining Ring

1 - OUTPUT SHAFT
2 - RETAINING RING
3 - DRIVE SPROCKET

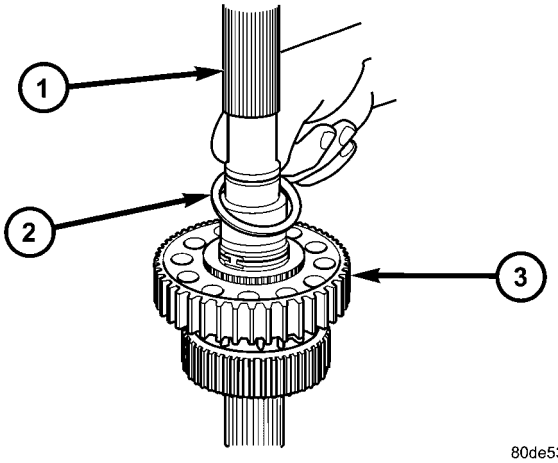


Fig. 26 Remove Drive Sprocket Thrust Washer

1 - OUTPUT SHAFT
2 - THRUST WASHER
3 - DRIVE SPROCKET

(3) Remove drive sprocket (Fig. 27) from the output shaft.

(4) Remove the clutch gear (Fig. 28) and hub (Fig. 29) from the output shaft.

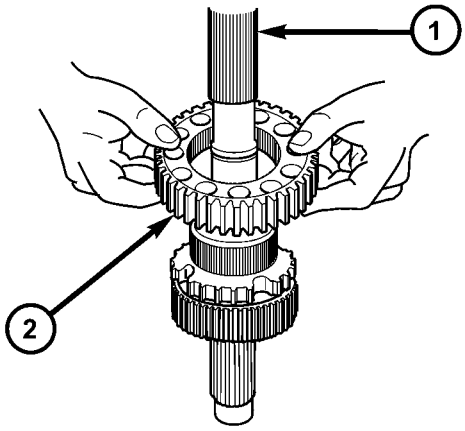


Fig. 27 Remove Drive Sprocket

1 - OUTPUT SHAFT
2 - DRIVE SPROCKET

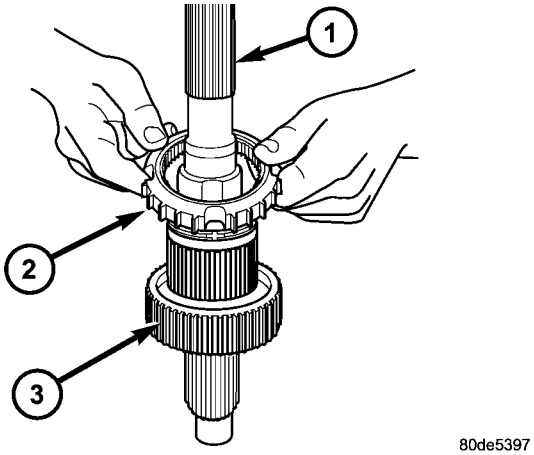


Fig. 28 Remove Clutch Gear

1 - OUTPUT SHAFT
2 - CLUTCH GEAR
3 - MODE HUB

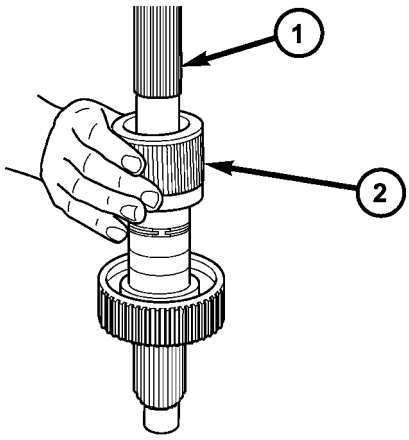


Fig. 29 Remove Sprocket Hub

1 - OUTPUT SHAFT
2 - SPROCKET HUB

TRANSFER CASE - NV243 (Continued)

(5) Remove the mode hub retaining ring (Fig. 30) from the output shaft.

(6) Remove the mode hub (Fig. 31) from the output shaft.

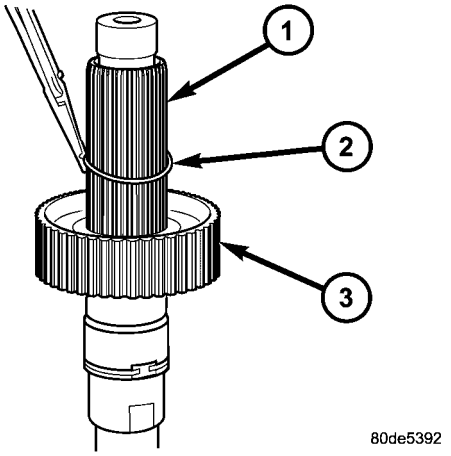


Fig. 30 Remove Retaining Ring

1 - OUTPUT SHAFT
2 - RETAINING RING
3 - MODE HUB

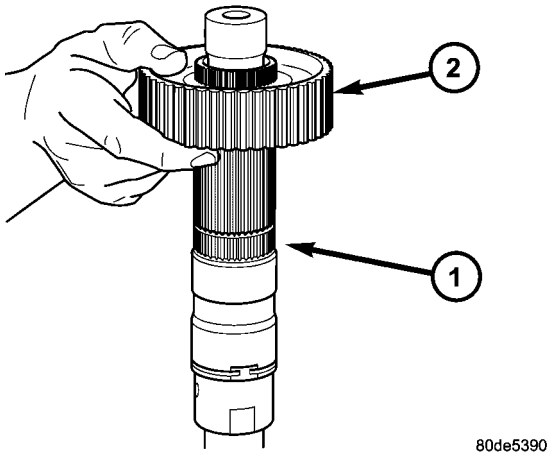


Fig. 31 Remove Mode Hub

1 - OUTPUT SHAFT
2 - MODE HUB

INPUT AND PLANETARY GEAR

(1) Remove input gear seal with suitable screw and slide hammer.

(2) Remove input gear retaining ring (Fig. 32) with heavy duty snap-ring pliers.

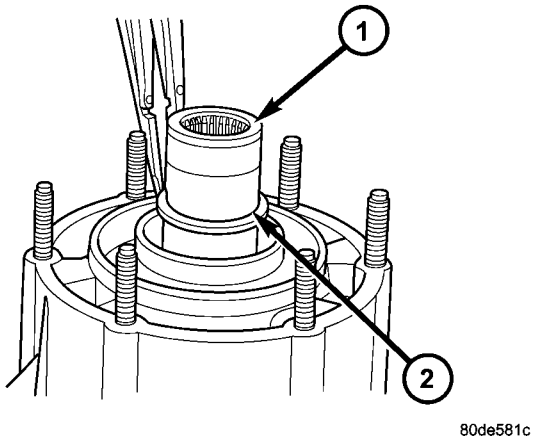


Fig. 32 Remove Input Gear Retaining Ring

1 - INPUT GEAR
2 - RETAINING RING

(3) Place front case in horizontal position. Then remove input gear and low range gear as an assembly (Fig. 33). Tap gear out of bearing with plastic mallet, if necessary.

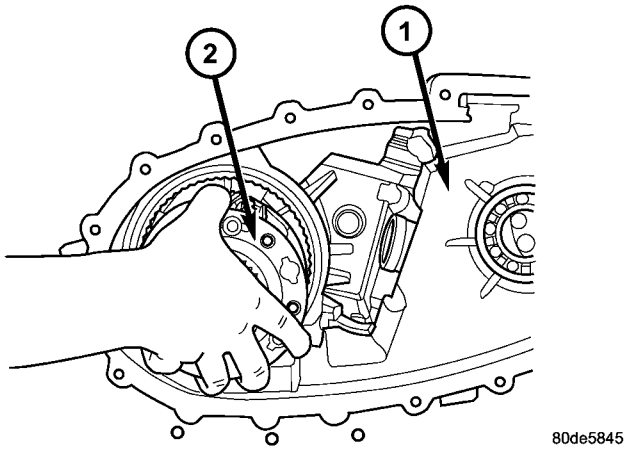


Fig. 33 Remove Input Planetary Assembly

1 - FRONT CASE
2 - INPUT PLANETARY ASSEMBLY

TRANSFER CASE - NV243 (Continued)

INPUT AND PLANETARY GEAR

(1) Remove snap-ring that retains input gear in low range gear (Fig. 34).
(2) Remove retainer (Fig. 35).
(3) Remove front tabbed thrust washer (Fig. 36).
(4) Remove input gear (Fig. 37).
(5) Remove rear tabbed thrust washer from low range gear (Fig. 38).

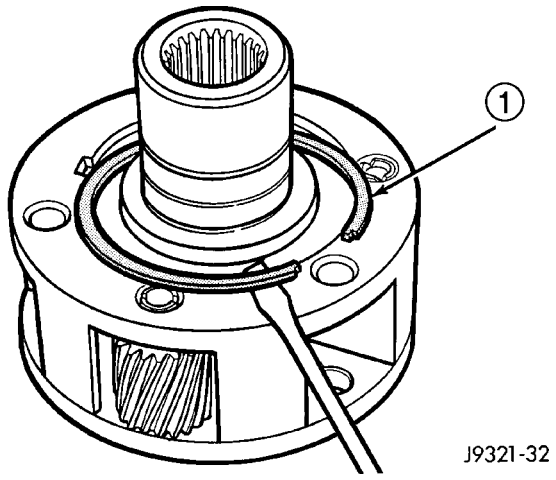


Fig. 34 Input Gear Snap-Ring Removal

1 - INPUT GEAR SNAP-RING

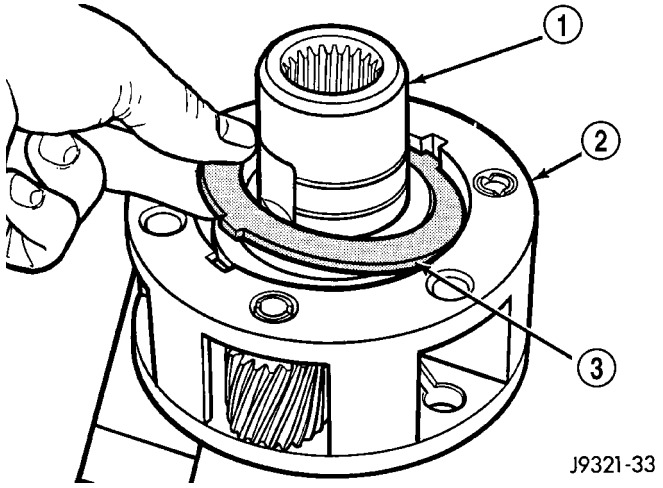


Fig. 35 Input Gear Retainer Removal

1 - INPUT GEAR
2 - LOW RANGE GEAR
3 - RETAINER

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.

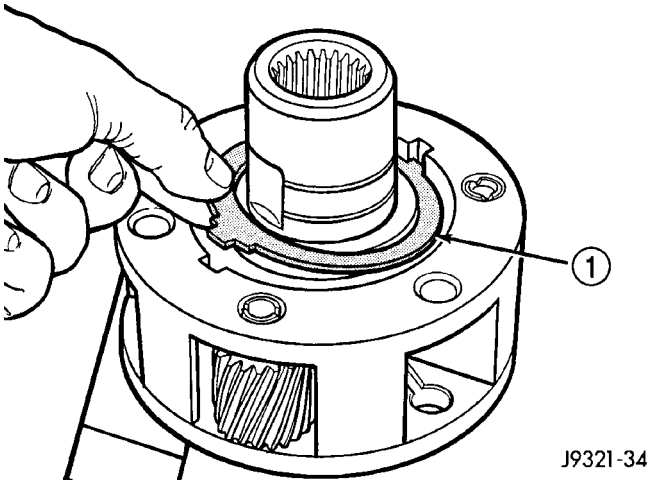


Fig. 36 Front Tabbed Thrust Washer Removal

1 - FRONT TABBED THRUST WASHER

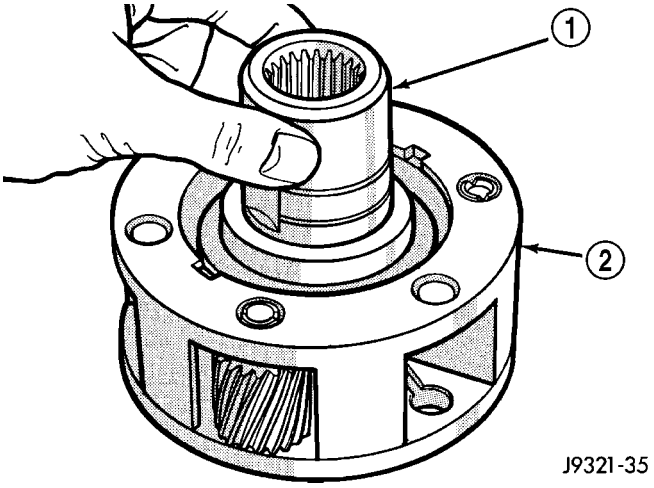


Fig. 37 Input Gear Removal

1 - INPUT GEAR
2 - LOW RANGE GEAR

INSPECTION

MAINSHAFT/SPROCKET/HUB INSPECTION

Inspect the splines on the hub and shaft and the teeth on the sprocket. Minor nicks and scratches can be smoothed with an oilstone. However, replace any part that is damaged.

Check the contact surfaces in the sprocket bore and on the mainshaft. Minor nicks and scratches can be smoothed with 320-400 grit emery cloth but do not try to salvage the shaft if nicks or wear is severe.

INPUT GEAR AND PLANETARY CARRIER

Check the teeth on the gear (Fig. 39). 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.

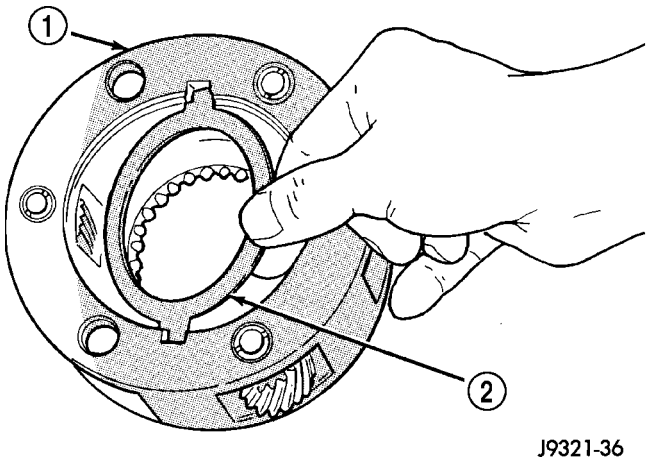


Fig. 38 Rear Tabbed Thrust Washer Removal

1 - LOW RANGE GEAR
2 - REAR TABBED THRUST WASHER

Examine the carrier body and pinion gears for wear or damage. The carrier will have to be replaced as an assembly if the body, pinion pins, or pinion gears are damaged.

Check the lock ring and both thrust washers for wear or cracks. Replace them if necessary. Also replace the lock retaining ring if bent, distorted, or broken.

SHIFT FORKS/HUBS/SLEEVES

Check condition of the shift forks and mode fork shift rail (Fig. 40). Minor nicks on the shift rail can be smoothed with 320-400 grit emery cloth.

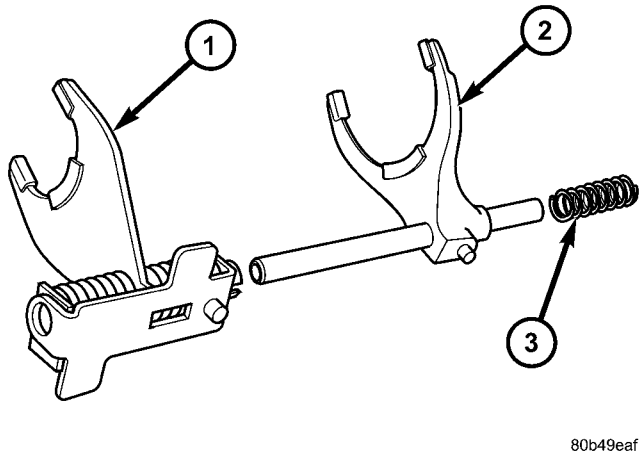


Fig. 40 Shift Forks

1 - RANGE FORK
2 - MODE FORK AND RAIL
3 - MODE SPRING

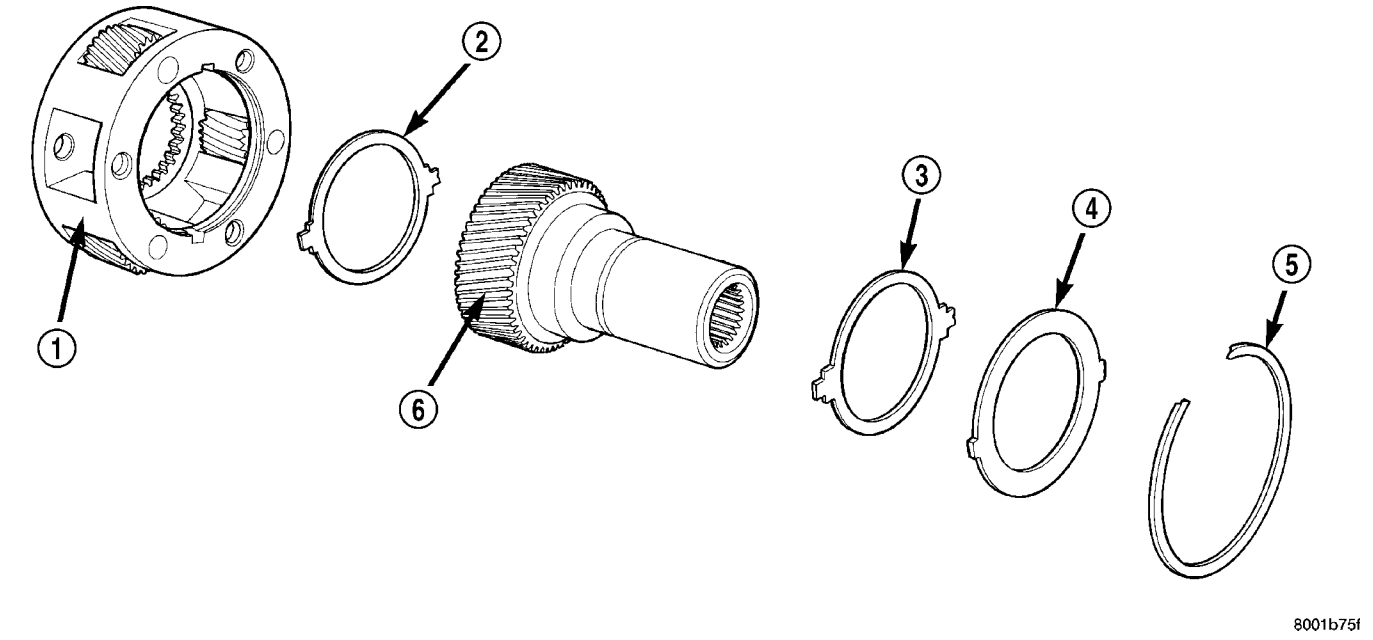


Fig. 39 Input Gear and Carrier Components

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 - NV243 (Continued)

Inspect the shift fork wear pads (Fig. 41). The mode and range fork pads are serviceable and can be replaced if necessary.

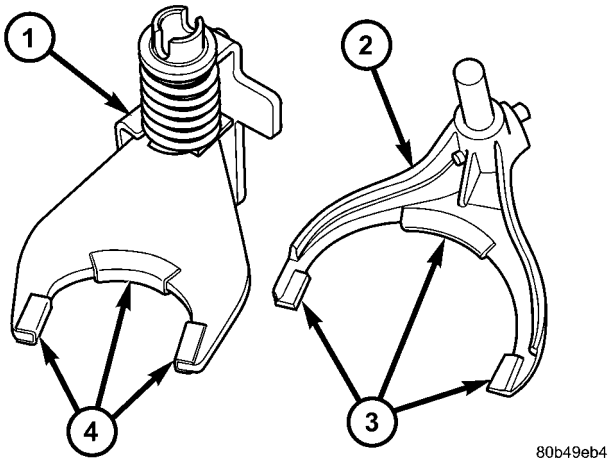


Fig. 41 Shift Fork And Wear Pad Locations

1 - RANGE FORK
2 - MODE FORK
3 - WEAR PADS (SERVICEABLE)
4 - WEAR PADS (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 EXTENSION HOUSING

Inspect the extension housing seal and bushing. Replace both components if either show any sign of wear or damage.

FRONT OUTPUT SHAFT AND DRIVE CHAIN

Inspect the shaft threads, sprocket teeth, and bearing surfaces. Minor nicks on the teeth can be smoothed with an oilstone. Use 320-400 grit emery to smooth minor scratches on the shaft bearing surfaces. Rough threads on the shaft can be chased if necessary. Replace the shaft if the threads are damaged, bearing surfaces are scored, or if any sprocket teeth are cracked or broken.

Examine the drive chain and shaft bearings. Replace the chain and both sprockets if the chain is stretched, distorted, or if any of the links bind. Replace the bearings if rough, or noisy.

LOW RANGE ANNULUS GEAR

Inspect annulus gear condition carefully. The gear is only serviced as part of the front case. If the gear is damaged, it will be necessary to replace the gear and front case as an assembly. Do not attempt to remove the gear (Fig. 42)

FRONT AND REAR CASES

Inspect the cases for wear and damage.

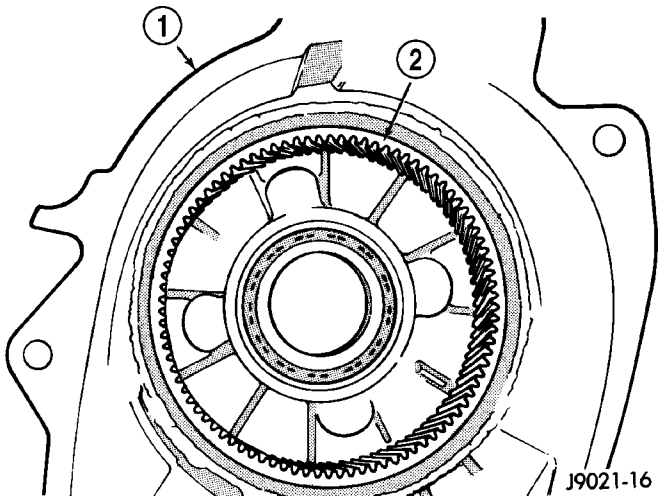


Fig. 42 Low Range Annulus Gear

1 - FRONT CASE
2 - LOW RANGE ANNULUS GEAR

Check case condition. If leaks were a problem, look for gouges and severe scoring of case sealing surfaces. Also make sure the front case mounting studs are in good condition.

Check the front case mounting studs and vent tube. The tube can be secured with Loctite™ 271 or 680 if loose. The stud threads can be cleaned up with a die if necessary. Also check condition of the fill/drain plug threads in the rear case. The threads can be repaired with a thread chaser or tap if necessary. Or the threads can be repaired with Helicoil® stainless steel inserts if required.

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) Remove the input shaft bearing (Fig. 43) from the front case with suitable snap-ring pliers.

(2) Transfer the retaining ring to the new bearing if necessary and install the bearing into the front case.

(3) Using Installer 6436 and Handle C-4171 (Fig. 44), remove front output shaft bearing.

(4) Start front output shaft bearing in case. Then seat bearing with Handle C-4171 and Installer 6953.

(5) Install front output shaft bearing retaining ring.

TRANSFER CASE - NV243 (Continued)

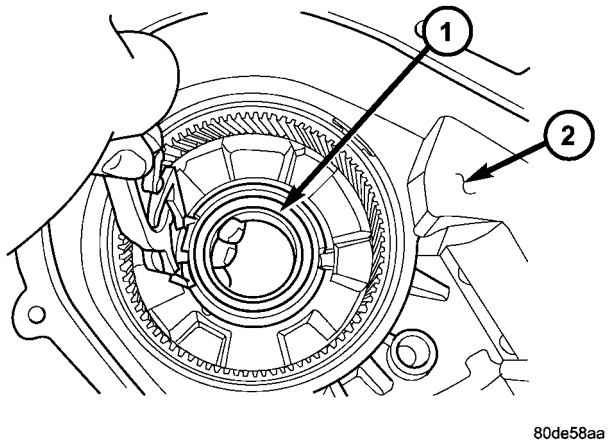


Fig. 43 Remove Input Gear Bearing

1 - INPUT GEAR BEARING
2 - FRONT CASE

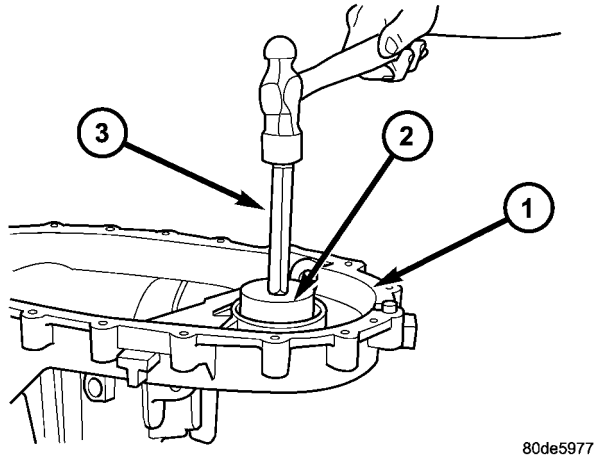


Fig. 44 Remove Front Output Shaft Bearing

1 - FRONT CASE
2 - INSTALLER 6436
3 - HANDLE C-4171

(6) 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. 45).

(7) Install new pilot bearing with Remover/Installer 8684.

(8) Remove the front output shaft rear bearing with the screw and jaws from Remover L-4454 and Cup 8148 (Fig. 46).

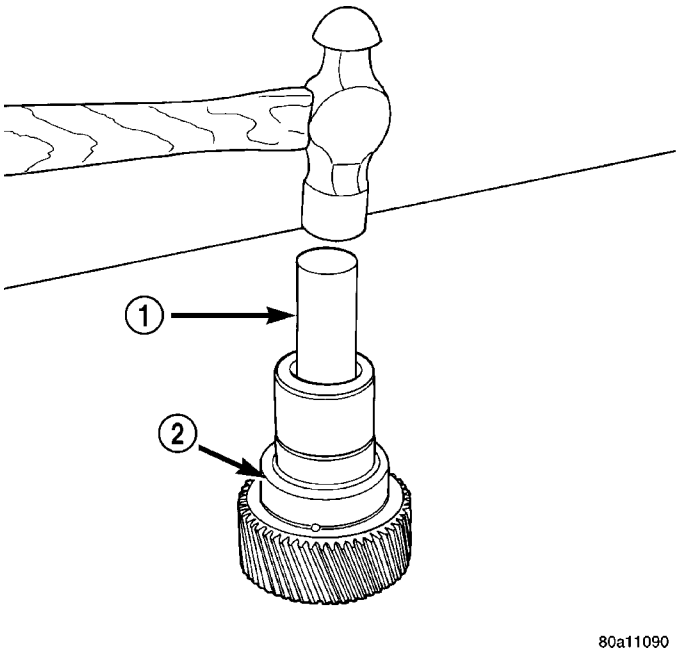


Fig. 45 Remove Input Gear Pilot Bearing

1 - DRIFT
2 - INPUT GEAR

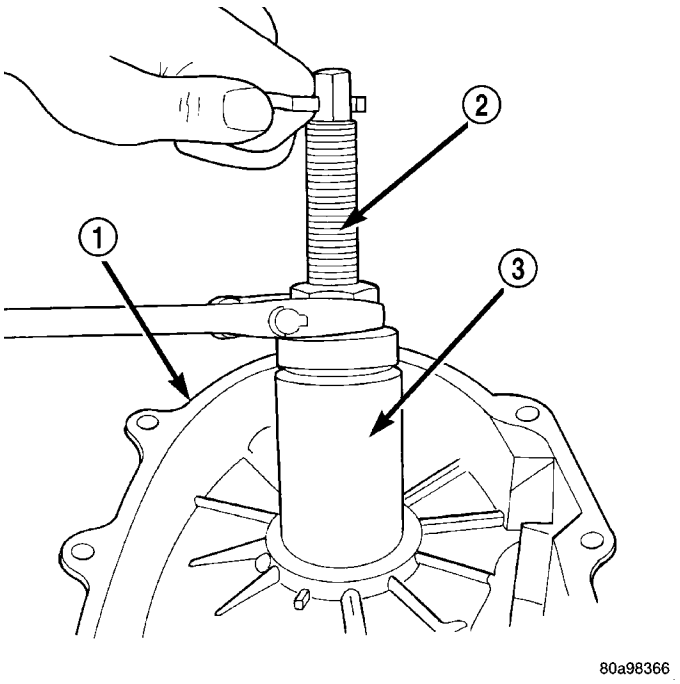


Fig. 46 Front Output Shaft Rear Bearing Removal

1 - REAR CASE
2 - SPECIAL TOOL L-4454-1 AND L-4454-3
3 - SPECIAL TOOL 8148

TRANSFER CASE - NV243 (Continued)

(9) Install new bearing with Tool Handle C-4171 and Installer 5066 (Fig. 47). The bearing bore is chamfered at the top. Install the bearing so it is flush with the lower edge of this chamfer (Fig. 48).

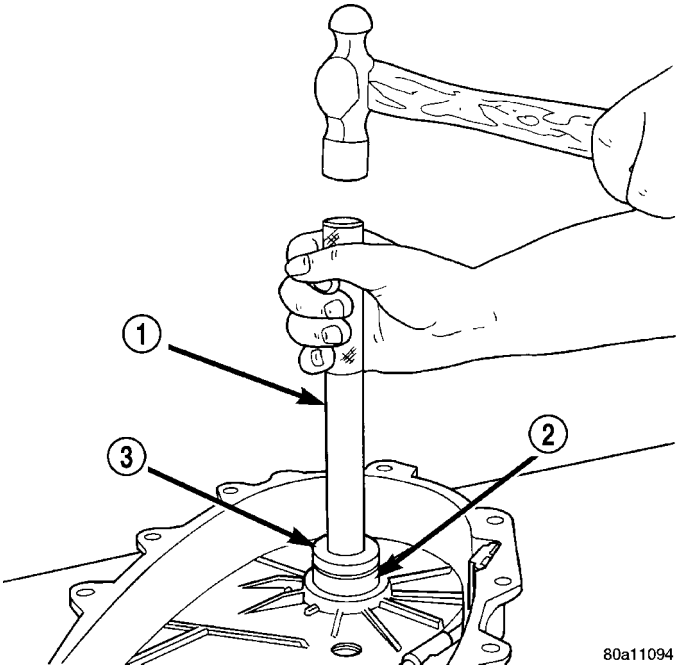


Fig. 47 Output Shaft Rear Bearing Installation

1 - HANDLE C-4171
2 - OUTPUT SHAFT INNER BEARING
3 - INSTALLER 5066

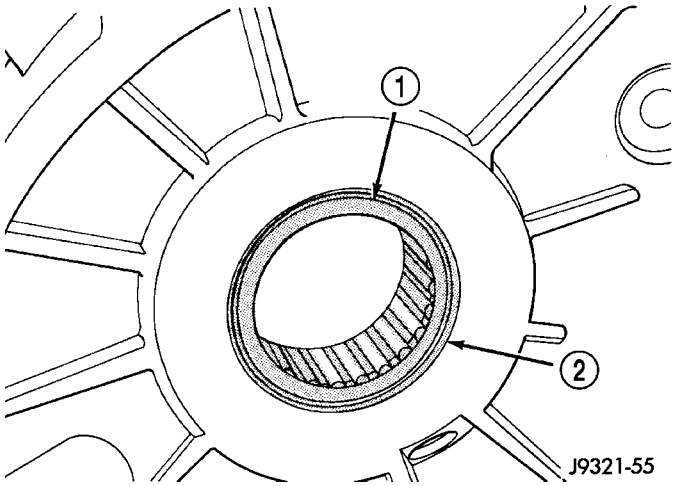


Fig. 48 Output Shaft Rear Bearing Installation Depth

1 - BEARING (SEATED) AT LOWER EDGE OF CHAMFER
2 - CHAMFER

(10) Remove the rear output shaft bearing from the rear case using Remover/Installer 8684 and Handle C-4171 (Fig. 49).

(11) Install the rear output shaft bearing (Fig. 50) into the rear case using Remover/Installer 6953 and Handle C-4171.

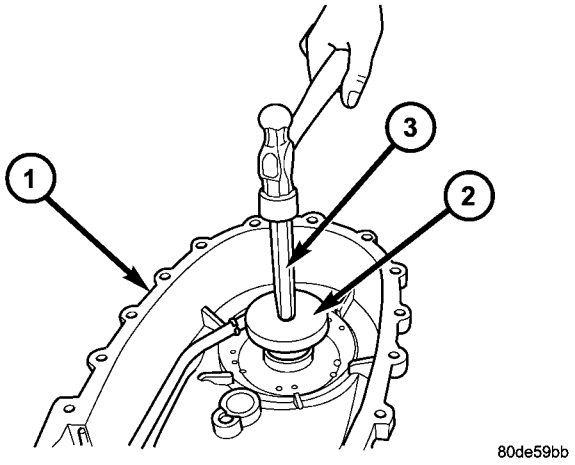


Fig. 49 Remove Rear Output Shaft Bearing

1 - REAR CASE
2 - REMOVER/INSTALLER 8684
3 - HANDLE C-4171

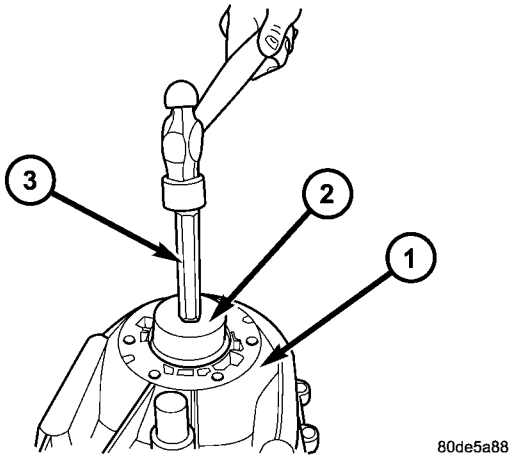


Fig. 50 Install Rear Output Shaft Bearing

1 - REAR CASE
2 - REMOVER/INSTALLER 6953
3 - HANDLE C-4171

TRANSFER CASE - NV243 (Continued)

INPUT AND PLANETARY GEAR

(1) Lubricate gears and thrust washers (Fig. 51) with recommended transmission fluid.

(2) Install first thrust washer in low range gear (Fig. 51). 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.

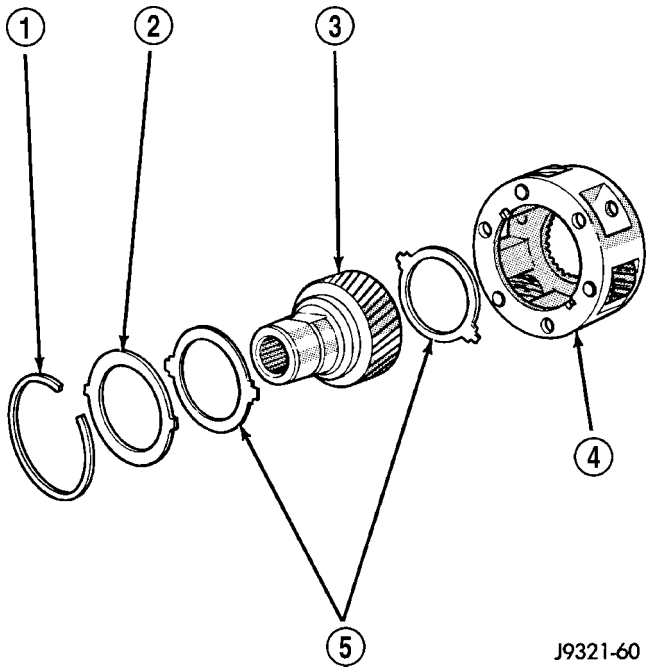


Fig. 51 Input/Low Range Gear Components

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. 52). 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. 53).

(8) Install a new input gear seal using Installer 8841 and Handle C-4171.

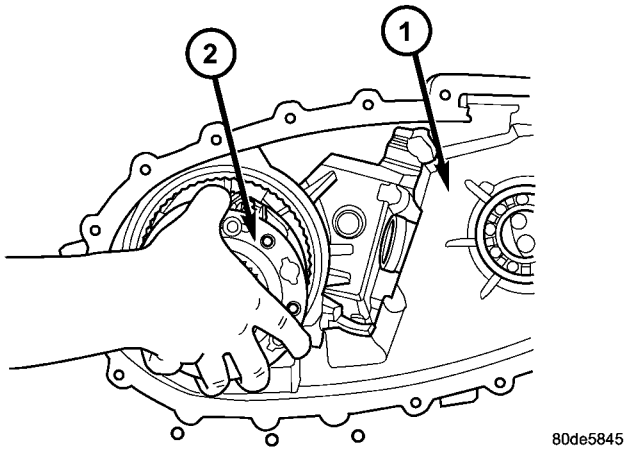


Fig. 52 Install Input Planetary Assembly

1 - FRONT CASE
2 - INPUT PLANETARY ASSEMBLY

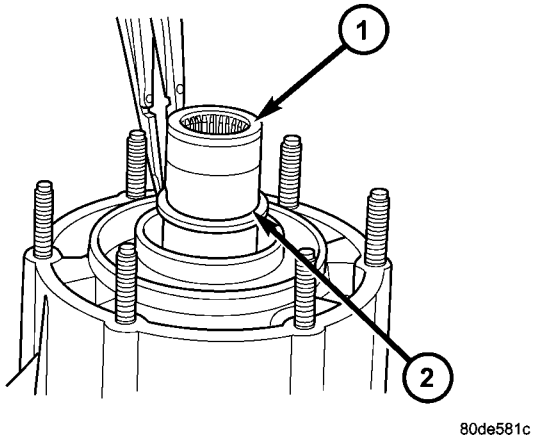


Fig. 53 Install Input Gear Retaining Ring

1 - INPUT GEAR
2 - RETAINING RING

TRANSFER CASE - NV243 (Continued)

SHIFT FORKS AND MAINSHAFT

(1) Lubricate mainshaft splines with recommended transmission fluid.

(2) Install the mode hub (Fig. 54) onto the output shaft.

(3) Install the mode hub retaining ring (Fig. 55) onto the output shaft.

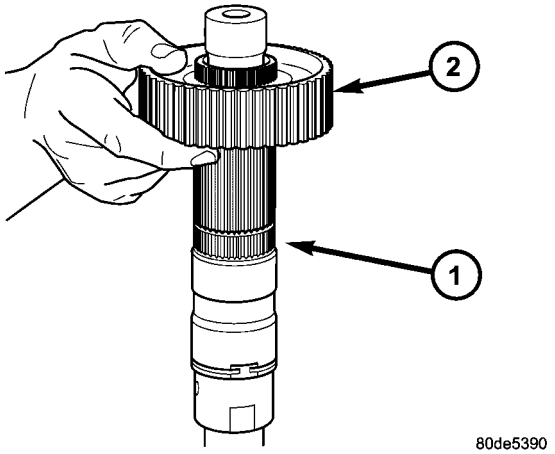


Fig. 54 Install Mode Hub

1 - OUTPUT SHAFT
2 - MODE HUB

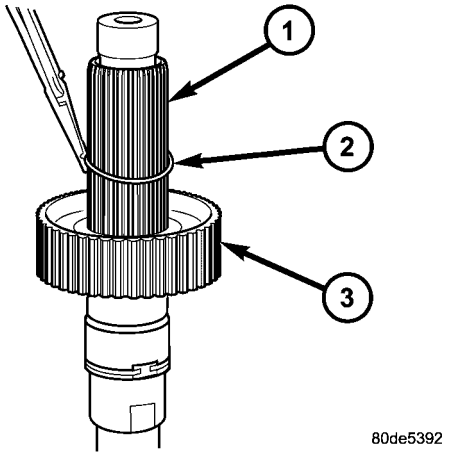


Fig. 55 Install Mode Hub Retaining Ring

1 - OUTPUT SHAFT
2 - RETAINING RING
3 - MODE HUB

(4) Install the sprocket hub (Fig. 56) onto the output shaft.

(5) Install the clutch gear (Fig. 57) onto the output shaft.

(6) Install the drive sprocket (Fig. 58) onto the output shaft.

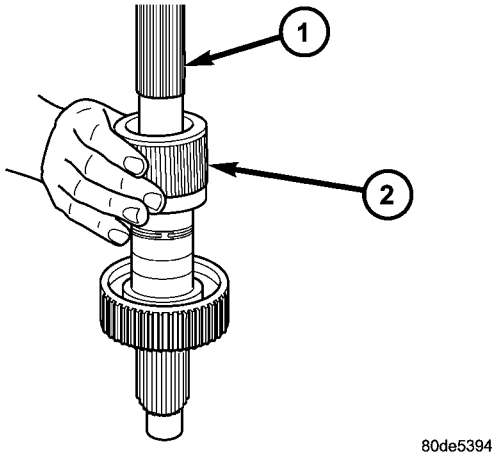


Fig. 56 Install Sprocket Hub

1 - OUTPUT SHAFT
2 - SPROCKET HUB

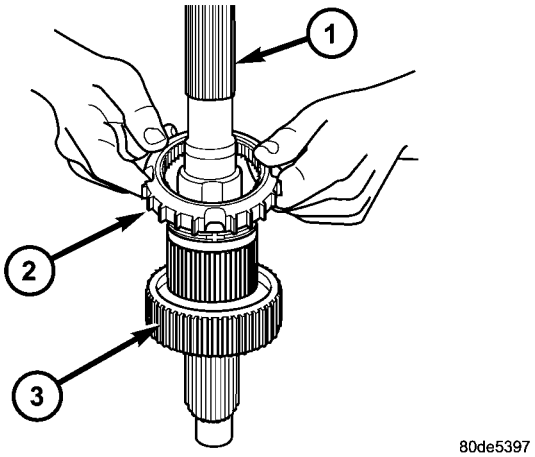


Fig. 57 Install Clutch Gear

1 - OUTPUT SHAFT
2 - CLUTCH GEAR
3 - MODE HUB

TRANSFER CASE - NV243 (Continued)

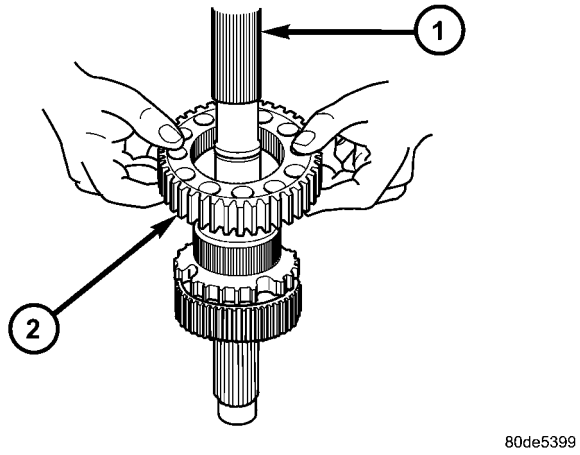


Fig. 58 Install Drive Sprocket

1 - OUTPUT SHAFT
2 - DRIVE SPROCKET

(7) Install the drive sprocket thrust washer (Fig. 59) onto the output shaft.

(8) Install the drive sprocket retaining ring (Fig. 60) onto the output shaft.

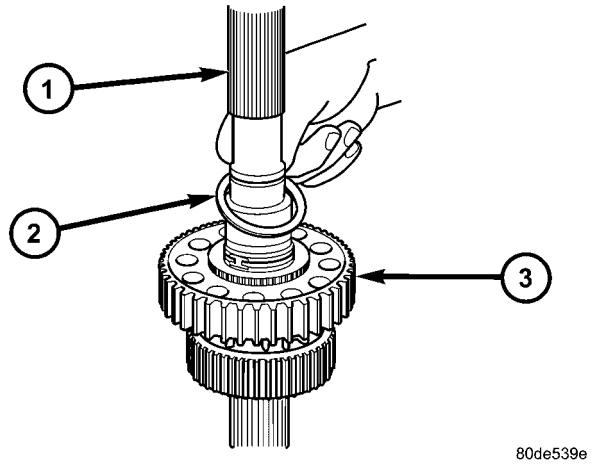


Fig. 59 Install Drive Sprocket Thrust Washer

1 - OUTPUT SHAFT
2 - THRUST WASHER
3 - DRIVE SPROCKET

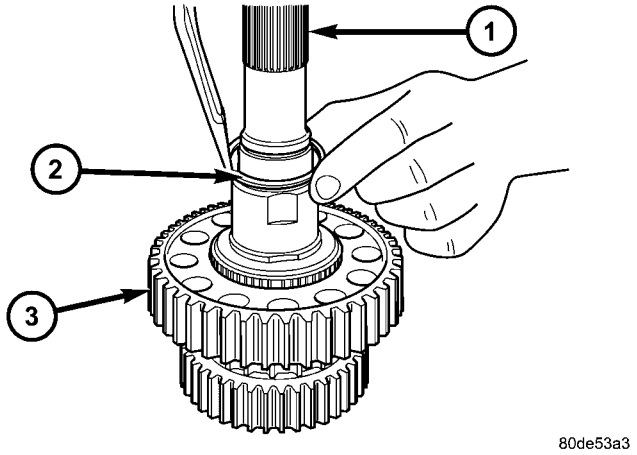


Fig. 60 Install The Drive Sprocket Retaining Ring

1 - OUTPUT SHAFT
2 - RETAINING RING
3 - DRIVE SPROCKET

(9) Lubricate sector shaft with transmission fluid and install shift sector in case (Fig. 61). Position slot in sector so it will be aligned with shift fork pin when shift forks are installed.

(10) Install the shift sector o-ring.

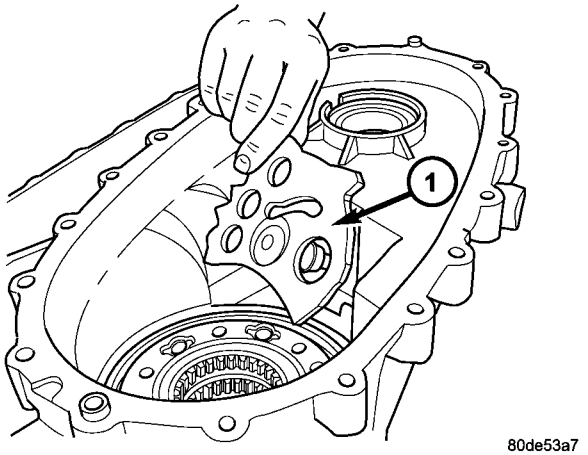


Fig. 61 Install Shift Sector

1 - SHIFT SECTOR

TRANSFER CASE - NV243 (Continued)

(11) Assemble and install range fork and hub (Fig. 62). 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 the range fork retaining ring.

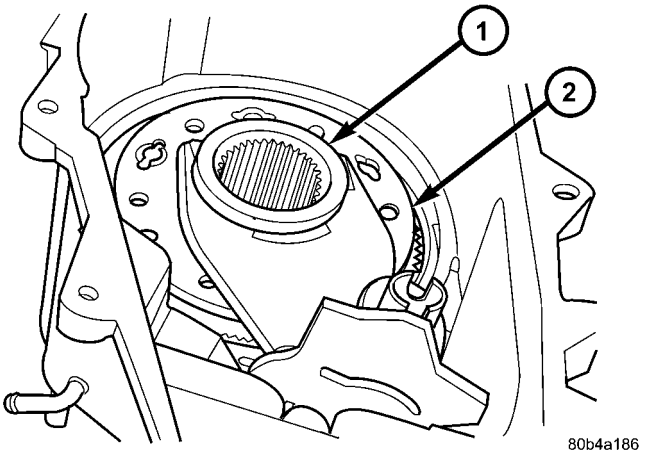


Fig. 62 Install Range Fork And Hub Assembly

1 - RANGE HUB
2 - RANGE FORK

(14) Install mode fork and shift rail onto the mode sleeve.

(15) Install the mode fork, sleeve, and shift rail into the transfer case (Fig. 63).

(16) Install mainshaft into the transfer case (Fig. 64). Guide mainshaft through the mode and range sleeves and into the input gear.

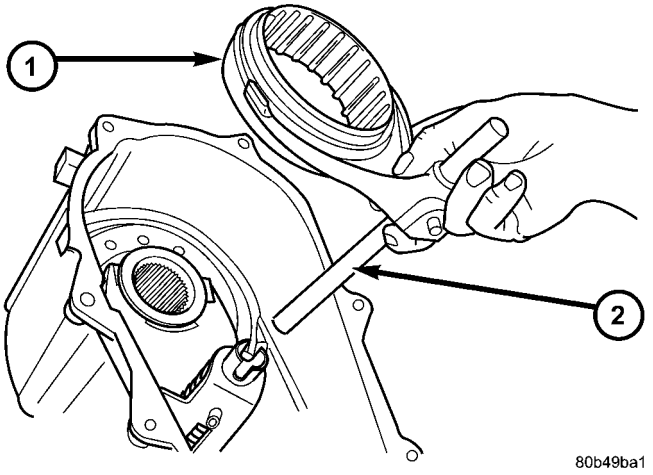


Fig. 63 Mode Fork And Sleeve Installation

1 - MODE SLEEVE
2 - MODE FORK AND RAIL

(17) Install new o-ring on detent plug (Fig. 65).

(18) Install detent plunger, spring, and plug (Fig. 66). Tighten the plug to 16-25 N·m (12-18 ft. lbs.).

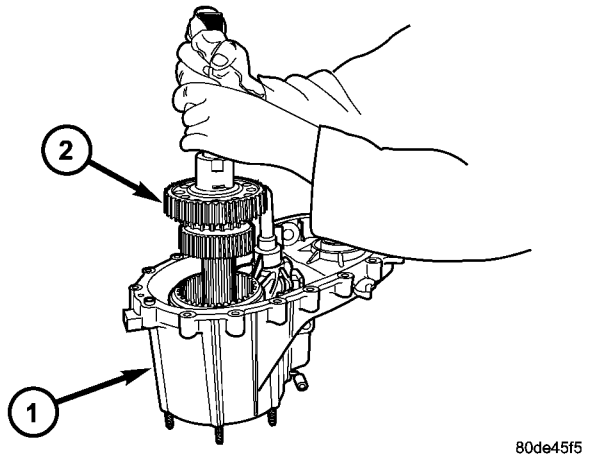


Fig. 64 Install Mainshaft

1 - FRONT CASE
2 - MAINSHAFT

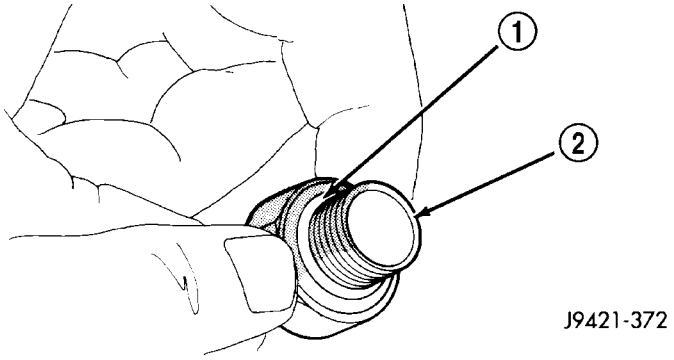


Fig. 65 O-Ring Installation On Detent Plug

1 - O-RING
2 - DETENT PLUG

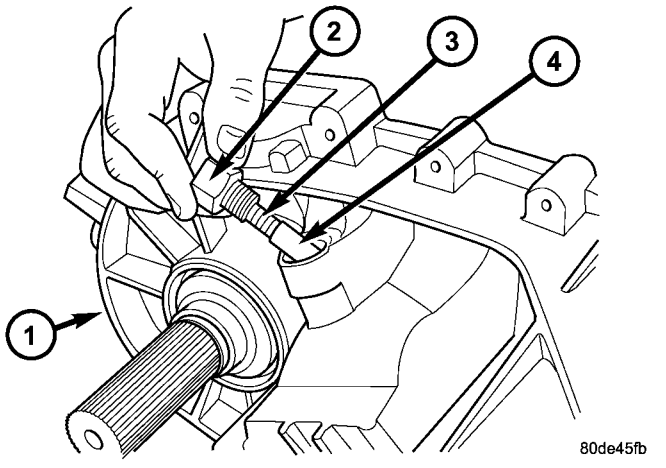


Fig. 66 Install Detent Plug, Spring, and Plunger

1 - FRONT CASE
2 - DETENT PLUG
3 - DETENT SPRING
4 - DETENT PLUNGER

TRANSFER CASE - NV243 (Continued)

FRONT OUTPUT SHAFT AND DRIVE CHAIN

(1) Install the front output shaft (Fig. 67) into the front output shaft bearing.

(2) Install the front output shaft retaining ring (Fig. 68) onto the output shaft.

(3) Install the new front output shaft seal with Installer MB991168A

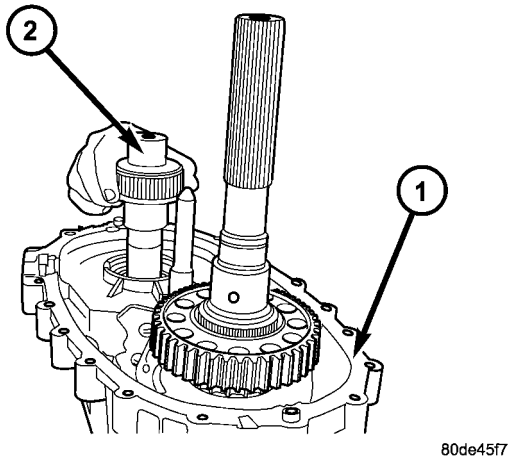


Fig. 67 Install Front Output Shaft

1 - FRONT CASE
2 - FRONT OUTPUT SHAFT

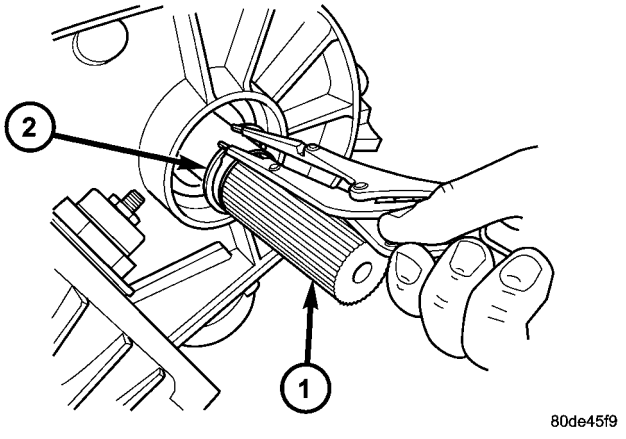


Fig. 68 Install Front Output Shaft Snap-ring - Typical

1 - FRONT OUTPUT SHAFT
2 - SNAP-RING

(4) Insert front sprocket in drive chain.

(5) Install drive chain around mainshaft sprocket (Fig. 69). Then position front sprocket over front shaft.

(6) Raise mainshaft about 2.54 cm (one inch) and seat front sprocket on front output shaft.

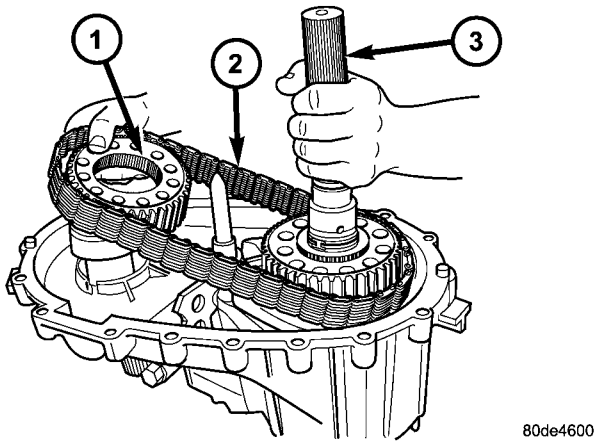


Fig. 69 Install Front Sprocket and Drive Chain

1 - FRONT DRIVE SPROCKET
2 - DRIVE CHAIN
3 - MAINSHAFT

(7) If mainshaft and mode sleeve were unseated during chain installation, align and reseat mainshaft in input gear and hub.

(8) Install front sprocket retaining ring (Fig. 70).

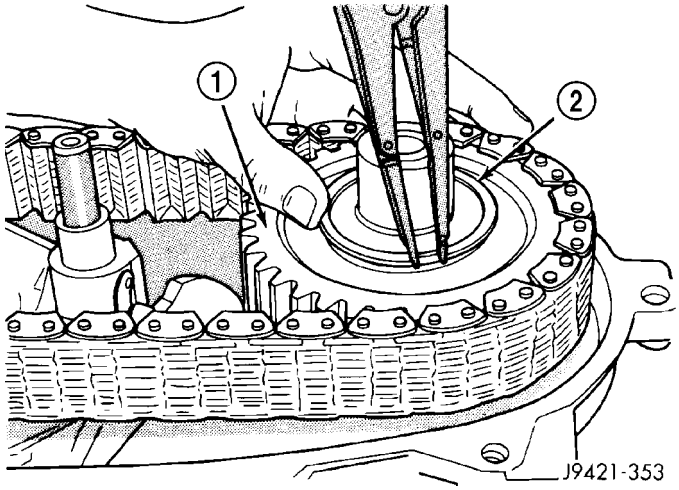


Fig. 70 Front Sprocket Retaining Ring Installation

1 - FRONT SPROCKET
2 - RETAINING RING

TRANSFER CASE - NV243 (Continued)

(9) Install spring and cup on shift rail (Fig. 71).

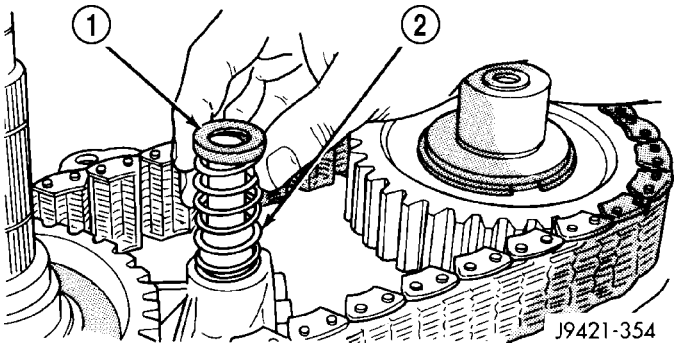


Fig. 71 Shift Rail Spring And Cup Installation

1 - CUP
2 - SPRING

(10) Insert magnet in front case pocket (Fig. 72).

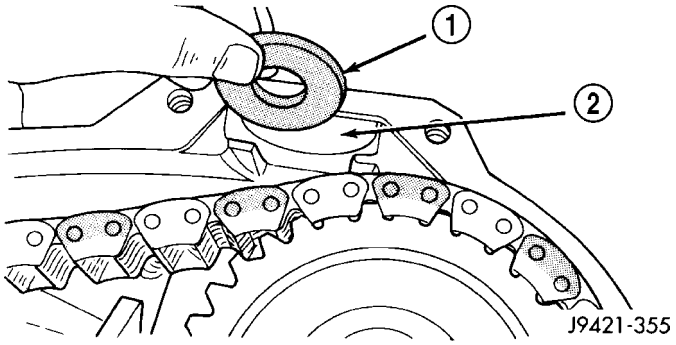


Fig. 72 Case Magnet Installation

1 - MAGNET
2 - CASE POCKET

OIL PUMP AND REAR CASE

Lubricate the oil pump components with transmission fluid before installation. Prime the oil pickup tube by pouring a little oil into the tube before installation.

CAUTION: Do not remove the bolts holding the oil pump cover to the rear case half. The oil pump cover is aligned to the rear output shaft inner bearing race and will become mis-aligned if the bolts are loosened. If the transfer case failure has generated any debris which may have become trapped in the oil pump. the rear case and oil pump assembly MUST be replaced.

(1) Install new o-ring in pickup tube inlet of oil pump.

(2) Insert oil pickup tube into the oil pump.

(3) 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.

(4) Align oil pump with mainshaft and align shift rail with bore in rear case. Then install rear case and oil pump assembly (Fig. 73).

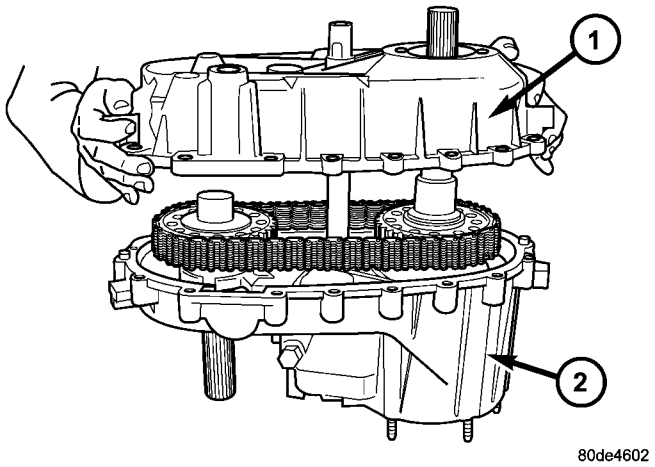


Fig. 73 Install Rear Case

1 - REAR CASE
2 - FRONT CASE

(5) Install 4-5 rear case-to front case bolts (Fig. 74) to hold rear case in position. Tighten bolts snug but not to specified torque at this time.

CAUTION: Verify that shift rail, and case alignment dowels are seated before installing any bolts. Case could be cracked if shaft rail or dowels are mis-aligned.

(6) Apply Loctite™ 242 to remainder of rear case-to-front case bolt threads and install bolts. Tighten bolts to 20-27 N·m (15-24 ft. lbs.),

(7) Install rear output bearing snap-ring (Fig. 75) to output shaft.

SEAL BOOT AND SHIFT MOTOR ASSEMBLY

(1) Install the front output shaft seal slinger with Installer 8840. Install the slinger onto the shaft until the tool contacts the rear of the output shaft.

(2) Install a new seal boot clamp onto the seal boot.

(3) Install the seal boot and clamp onto the slinger hub and tighten the clamp with Crimp Tool C-4975-A.

(4) Position the shift motor and mode sensor assembly onto the transfer case.

(5) Install the bolts to hold the shift motor and mode sensor assembly to the transfer case. Tighten the bolts to 16-25 N·m (12-18 ft. lbs.).

REAR EXTENSION

(1) Install new seal in rear extension housing seal with Installer D-163 and Handle C-4171..

TRANSFER CASE - NV243 (Continued)

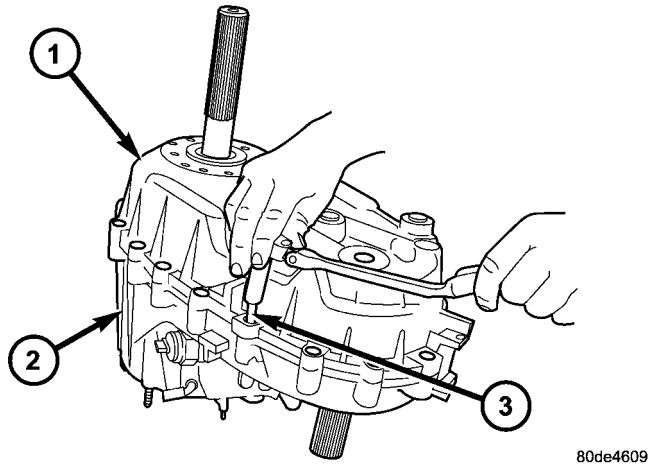


Fig. 74 Install Case Bolts - Typical

1 - REAR CASE
2 - FRONT CASE
3 - BOLT

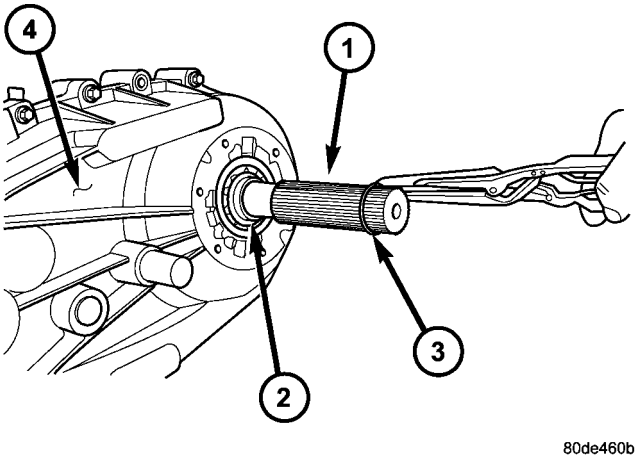


Fig. 75 Install Output Shaft Retaining Ring

1 - REAR OUTPUT SHAFT
2 - OUTPUT SHAFT BEARING
3 - RETAINING RING
4 - TRANSFER CASE

(2) 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.

(3) Align and install rear extension on retainer (Fig. 76).

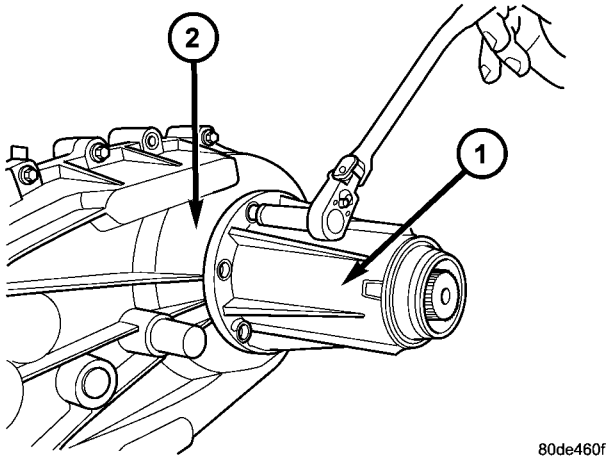


Fig. 76 Install Rear Extension Bolts

1 - EXTENSION HOUSING
2 - TRANSFER CASE

(4) Apply Mopar® Silicone Sealer to threads of rear extension housing bolts. Then install and tighten bolts to 16-24 N·m (12-18 ft. lbs.) torque.

INSTALLATION

(1) Mount transfer case on a transmission jack.
(2) Secure transfer case to jack with chains.
(3) Position transfer case under vehicle.
(4) Align transfer case and transmission shafts and install transfer case onto the transmission.
(5) Install and tighten transfer case attaching nuts to 27-34 N·m (20-25 ft. lbs.) torque.
(6) Connect the vent hose.
(7) Connect the shift motor and mode sensor wiring connectors. Secure wire harness to clips on transfer case.
(8) Align and connect the propeller shafts.
(9) Fill transfer case with correct fluid. (Refer to 21 - TRANSMISSION/TRANSFER CASE/FLUID - STANDARD PROCEDURE)
(10) Install skid plate, if equipped.
(11) Remove transmission jack and support stand.
(12) Lower vehicle and verify transfer case shift operation.

TRANSFER CASE - NV243 (Continued)

SPECIFICATIONS

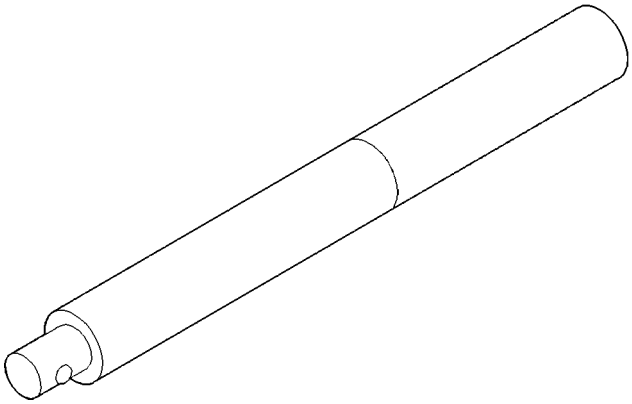
TRANSFER CASE - NV243

TORQUE SPECIFICATIONS

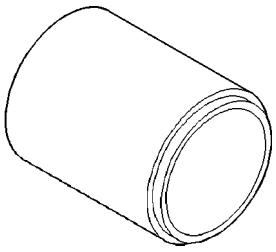
DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Plug, Detent	16-24	12-18	-
Plug, Drain/Fill	40-45	30-40	-
Bolt, Extension Housing	16-24	12-18	-
Bolt, Case Half	20-27	15-24	-
Screw, Oil Pump	12-16	8-12	-
Nuts, Mounting	30-41	20-30	-
Bolts, Shift Motor and Mode Sensor Assembly	16-24	12-18	-

SPECIAL TOOLS

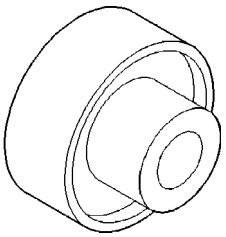
TRANSFER CASE - NV241/NV243



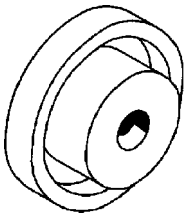
Handle, Universal - C-4171



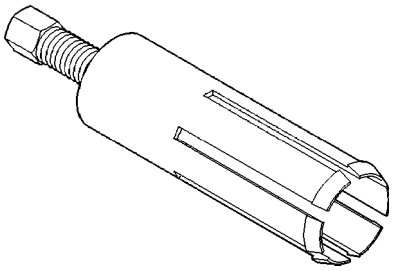
Installer, Seal - 6888



Installer, Bearing - 6953

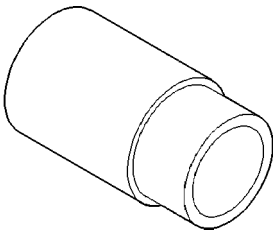


Installer, Seal - C-4210

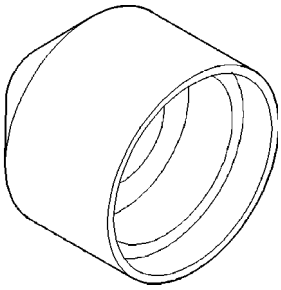


Remover, Bushing - 6957

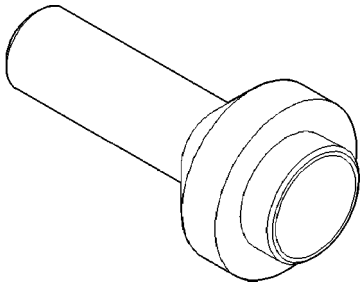
TRANSFER CASE - NV243 (Continued)



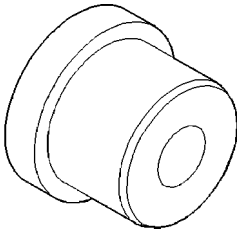
Installer, Bushing - 8157



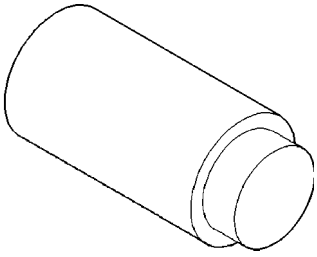
Installer, Seal - D-163



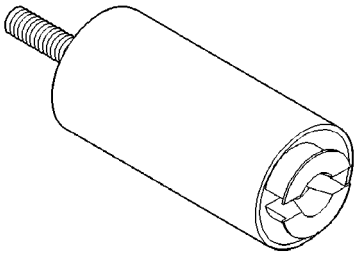
Installer, Seal - 7884



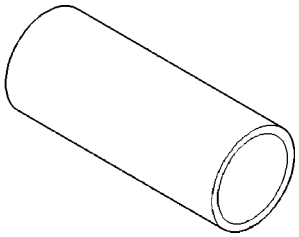
Installer, Bushing - 5066



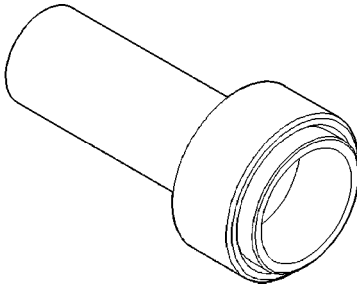
Plug, Extension - C-293-3



Remover - L-4454



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. 77).

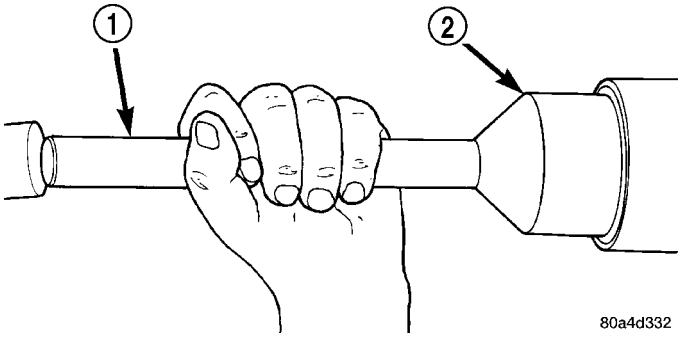


Fig. 77 Install Rear Seal in Extension Housing

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. 78).

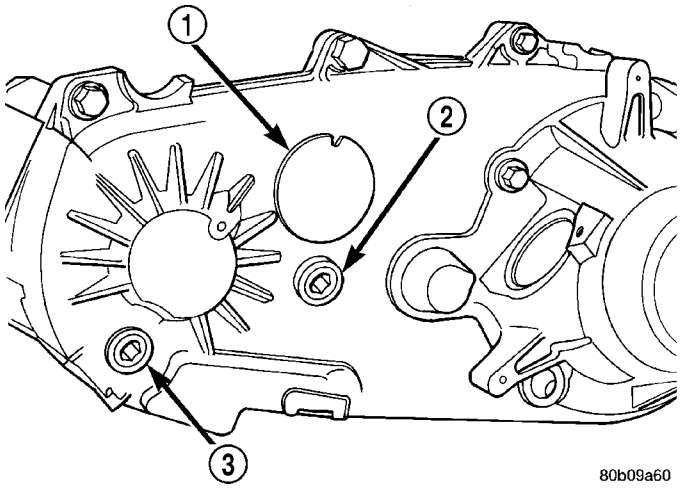


Fig. 78 Fill/Drain Plug and I.D. Tag Location - Typical

1 - I.D. TAG
2 - FILL PLUG
3 - DRAIN PLUG

(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, 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) Remove the front propeller shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL).

(2) Remove the front propeller shaft seal boot retaining clamp (Fig. 79).

(3) Remove the front propeller shaft seal boot (Fig. 80).

(4) Remove the front output shaft seal slinger by bending (Fig. 81) the slinger ears away from the transfer case.

(5) Using a suitable pry tool (Fig. 82), remove the slinger from the output shaft using care not to damage the shaft.

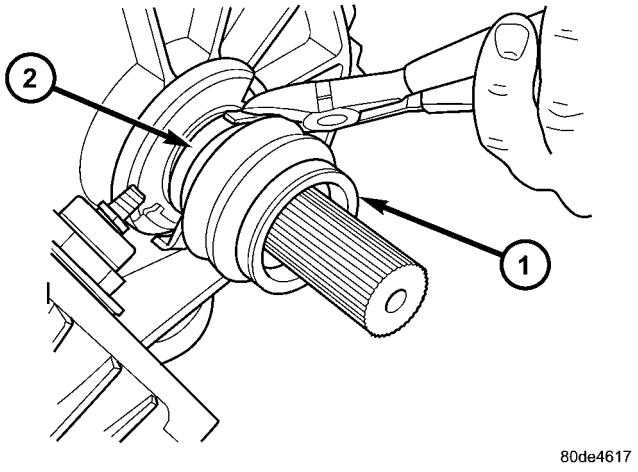


Fig. 79 Remove Boot Clamp

1 - SEAL BOOT
2 - BOOT CLAMP

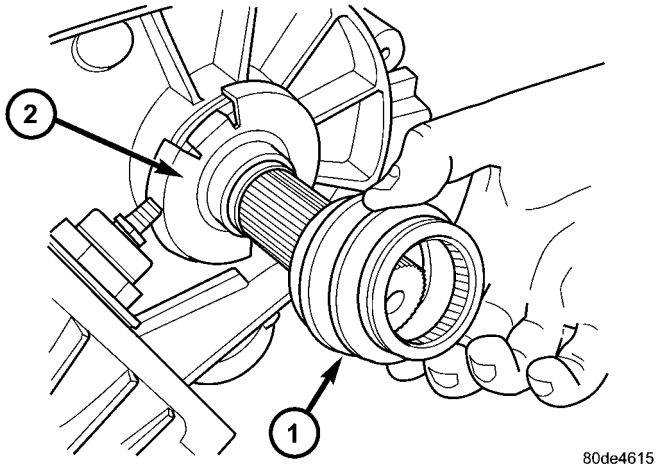


Fig. 80 Remove Seal Boot

1 - SEAL BOOT
2 - SEAL SLINGER

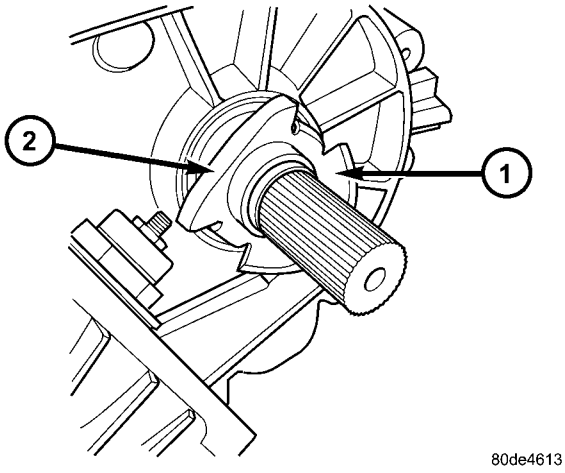


Fig. 81 Bend Slinger Ears

1 - SLINGER
2 - BEND UPWARD

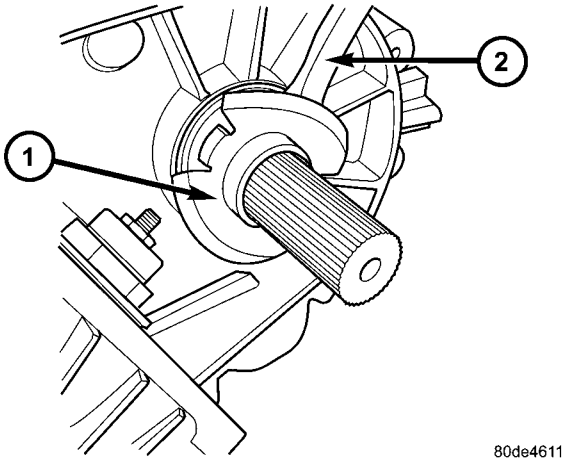


Fig. 82 Remove Slinger From Shaft

1 - SLINGER
2 - PRY TOOL

(6) Using a screw and a slide hammer, remove the front output shaft seal.

INSTALLATION

(1) Install the new front output shaft seal with Installer MB991168A

(2) Install the front output shaft seal slinger with Installer 8840. Install the slinger onto the shaft until the tool contacts the rear of the output shaft.

(3) Install a new seal boot clamp onto the seal boot.

(4) Install the seal boot and clamp onto the slinger hub and tighten the clamp with Crimp Tool C-4975-A.

(5) Install front propeller shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION).

MODE SENSOR

DESCRIPTION

The transfer case mode sensor (Fig. 83) is an electronic device whose output can be interpreted to indicate the shift motor shaft's rotary position. The sensor consists of a magnetic ring and four Hall Effect Transistors to create a 4 channel digital device (non-contacting) whose output converts the motor shaft position into a coded signal. The TCCM must supply 5VDC (+/- 0.5v) to the sensor and monitor the shift motor position. The four channels are denoted A, B, C, and D. The sensor is mechanically linked to the shaft of the cam which causes the transfer case shifting. The mode sensor draws less than 53 mA.

OPERATION

During normal vehicle operation, the Transfer Case Control Module (TCCM) monitors the mode sensor outputs at least every 250 (+/-50) milliseconds when the shift motor is stationary and 400 microseconds when the shift motor is active. A mode sensor signal between 3.8 Volts and 0.8 Volts is considered to be undefined.

Refer to SECTOR ANGLES vs. TRANSFER CASE POSITION for the relative angles of the transfer case shift sector versus the interpreted transfer case gear operating mode. Refer to MODE SENSOR CHANNEL STATES for the sensor codes returned to the TCCM for each transfer case mode sensor position. The various between gears positions can also be referred as the transfer case's coarse position. These coarse positions come into play during shift attempts.

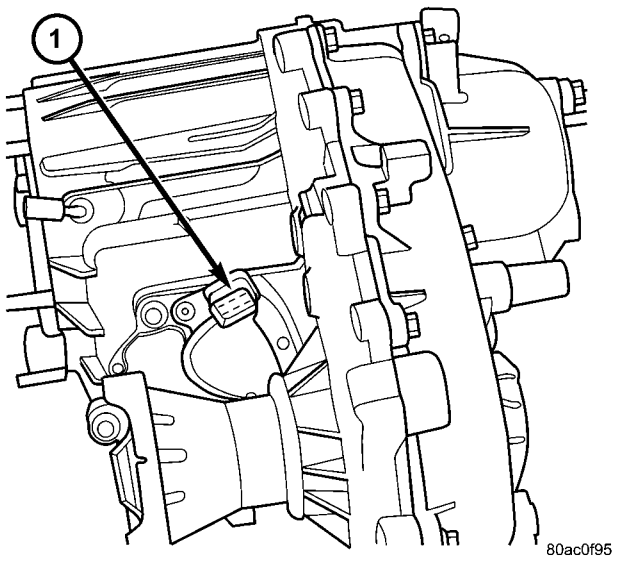


Fig. 83 Mode Sensor

1 - MODE SENSOR

SECTOR ANGLES VS. TRANSFER CASE POSITION

Shaft Angle (Degrees)	Transfer Case Position
+40	4LO
+20	N
0	2WD/AWD
-20	4HI

MODE SENSOR CHANNEL STATES

Transfer Case Angle (degrees)	Sensor Channel A	Sensor Channel B	Sensor Channel C	Sensor Channel D
Between Gears	H	H	L	H
+40 (4LO)	H	H	L	L
Between Gears	H	H	L	H
Between Gears	H	L	L	H
+20 (NEUTRAL)	H	L	L	L
Between Gears	H	L	L	H
Between Gears	H	L	H	H
0 (2WD/AWD)	H	L	H	L
Between Gears	H	L	H	H
Between Gears	L	L	H	H
-20 (4HI)	L	L	H	L
Between Gears	L	L	H	H
Between Gears	L	H	H	H

SELECTOR SWITCH

DESCRIPTION

The selector switch assembly (Fig. 84) is mounted in the left side of the vehicle's Instrument Panel (IP) and consists of a rotary knob connected to a resistive network for the mode and range shift selections. Also located in this assembly is a recessed, normally open momentary switch for making shifts into and out of transfer case NEUTRAL. A pen, or similar instrument, is used to make a NEUTRAL shift selection, thus reducing the likelihood of an inadvertent shift request.

The selector switch also contains four light emitting diode's (LED's) to indicate the transfer case position and whether a shift is in progress.

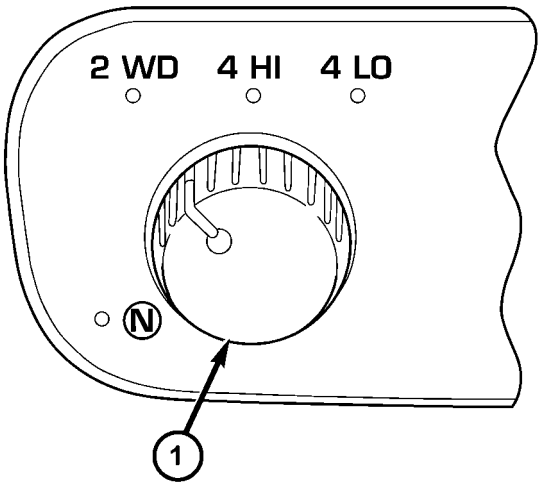


Fig. 84 Transfer Case Selector Switch

1 - SELECTOR SWITCH

OPERATION

As the position of the selector switch varies, the resistance between the Mode Sensor supply voltage pin and the Mode Sensor output will vary. Hardware, software, and calibrations within the Transfer Case Control Module (TCCM) are provided that interpret the selector switch resistance as given in the table below: SELECTOR SWITCH INTERPRETATION

SELECTOR SWITCH INTERPRETATION

Step	Resistance Range (ohms)	Required Interpretation
A	<200	Shorted
B	400-700	NEUTRAL
C	1050-1450	4LO
D	1850-2300	4HI
E	3050-5950	2WD (Default)
F	9.5-12.5K	In between positions
G	>15.5K	Open

For resistances between the ranges B-E shown for each valid position (T-Case NEUTRAL, 4LO, 4HI, 2WD), the TCCM may interpret the resistance as:

- either of the neighboring valid positions.
- as an invalid fault position.

For resistances between the ranges E and F shown for 2WD and in-between positions, the TCCM may interpret the resistance as:

- the 2WD position.
- an invalid fault position.
- a valid in-between position.

For resistances between the ranges F and G shown for in-between positions and fault condition (open), the TCCM may interpret the resistance as:

- a valid in-between position.
- an invalid fault position.

For resistances between the ranges A and B shown for the fault condition (short) and , T-Case NEUTRAL, the TCCM may interpret the resistance as:

- the T-Case NEUTRAL position.
- an invalid fault position.

The LED's in the selector assembly are illuminated/flashed in the following manner to indicate a particular condition or state.

- A solidly illuminated LED indicates a successfully completed shift and the current operating mode of the transfer case. While a shift has been requested but not yet completed, the LED for the desired transfer case position is flashed.

SELECTOR SWITCH (Continued)

- A flashing operating mode LED for the desired gear indicates that a shift to that position has been requested, but all of the driver controllable conditions have not been met. This is in an attempt to notify the driver that the transmission needs to be put into NEUTRAL, the vehicle speed is too great, or some other condition outlined (other than a diagnostic failure that would prevent this shift) elsewhere (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSFER CASE CONTROL MODULE - OPERATION) is not met. Note that this flashing will continue indefinitely until the conditions are eventually met, or the selector switch position is changed, or if diagnostic routines no longer allow the requested shift.
- If the driver attempts to make a shift into transfer case NEUTRAL, and any of the driver controllable conditions are not met, the request will be ignored until all of the conditions are met or until the NEUTRAL select button is released. Additionally the neutral lamp will flash, or begin to flash while the button is depressed and operator controllable conditions are not being met. All of the LED's except the Neutral will flash if any of the operator controllable conditions for shifting are not met while the Neutral button is depressed. This ″toggle″ type of feature is necessary because the TCCM would interpret another request immediately after the shift into transfer case NEUTRAL has completed.
- No LED's illuminated indicate a fault in the transfer case control system.

SHIFT MOTOR

DESCRIPTION

The shift motor (Fig. 85) consists of a permanent magnet D.C. motor with gear reduction to convert a high speed-low torque device into a low speed-high torque device. The output of the device is coupled to a shaft which internally moves the mode and range forks that change the transfer case operating ranges. The motor is rated at 25 amps maximum at 72° F with 10 volts at the motor leads.

OPERATION

The transfer case shift motor responds to the Transfer Case Control Module (TCCM) commands to move the transfer case shift sector bi-directionally, as required, to obtain the transfer case operating mode indicated by the instrument panel mounted selector switch.

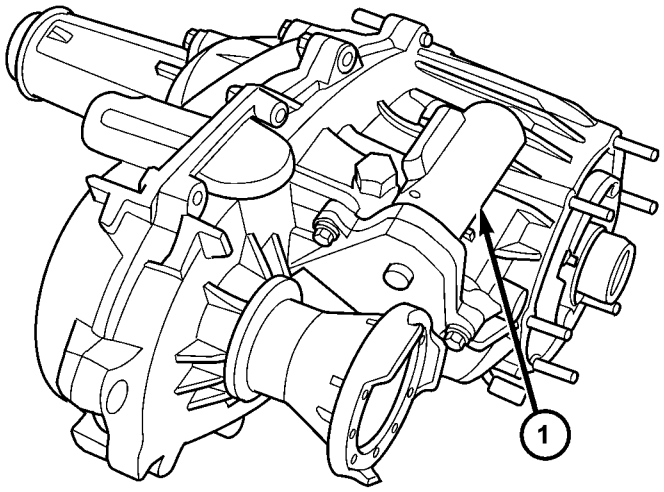


Fig. 85 Shift Motor - Shown Inverted - Typical

1 - SHIFT MOTOR

REMOVAL

(1) Raise the vehicle on a suitable hoist.
(2) Disengage the wiring connectors from the shift motor and mode sensor.
(3) Remove the bolts holding the shift motor and mode sensor assembly onto the transfer case.
(4) Separate the shift motor and mode sensor assembly from the transfer case.

INSTALLATION

(1) Verify that the shift sector o-ring is clean and properly positioned over the shift sector and against the transfer case.
(2) Position the shift motor and mode sensor assembly onto the transfer case.
(3) Install the bolts to hold the assembly onto the transfer case. Tighten the bolts to 16-24 N·m (12-18 ft.lbs.).

CAUTION: If the original shift motor and mode sensor assembly bolts are reused, be sure to use Mopar® Lock & Seal or Loctite™ 242 to replenish the lock patch material originally found on the bolts

(4) Engage the wiring connectors to the shift motor and mode sensor.
(5) Refill the transfer case as necessary.
(6) Lower vehicle and verify transfer case operation.

TRANSFER CASE - NV273

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TRANSFER CASE - NV273

DESCRIPTION

The NV273 is an electronically controlled part-time transfer case with a low range gear reduction system. The NV273 has three operating ranges plus a NEUTRAL position. The low range system provides a gear reduction ratio for increased low speed torque capability.

The geartrain is mounted in two aluminum case halves attached with bolts. The mainshaft front and rear bearings are mounted in aluminum case halves.

OPERATING RANGES

Transfer case operating ranges are:

- 2WD (2-wheel drive)
- 4HI (4-wheel drive)
- 4LO (4-wheel drive low range)
- NEUTRAL

The 2WD range is for use on any road surface at any time.

The 4HI 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 wet or slippery or 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.

SHIFT MECHANISM

Operating ranges are selected with a dash mounted shift selector switch. The shift selector switch provides a input to the Transfer Case Control Module (TCCM) to indicate the driver's desire to change operating ranges. The TCCM uses this input, along with input from the transfer case mounted mode sensor and information from the vehicle's bus, to determine if a shift is permitted. If the TCCM decides the shift is permitted, the TCCM controls the shift motor, mounted to the exterior of the transfer case, to perform the shift.

TRANSFER CASE - NV273 (Continued)

IDENTIFICATION

A circular ID tag is attached to the rear case of each transfer case (Fig. 1). The ID tag provides the transfer case model number, assembly number, serial number, and low range ratio.

The transfer case serial number also represents the date of build.

OPERATION

The input gear is splined to the transmission output shaft. The input gear drives the mainshaft through the planetary assembly and range sleeve. The front output shaft is operated by a drive chain that connects the shaft to a drive sprocket on the mainshaft. The drive sprocket is engaged/disengaged by the mode fork, which operates the mode sleeve and hub. The sleeve and hub are not equipped with a synchronizer mechanism for shifting.

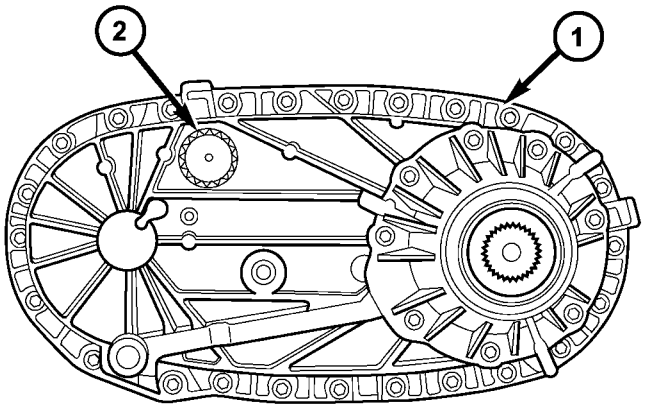


Fig. 1 Transfer Case - Rear View

1 - TRANSFER CASE
2 - IDENTIFICATION TAG

DIAGNOSIS AND TESTING - TRANSFER CASE - NV273

DIAGNOSIS CHART

Condition	Possible Cause	Correction
Transfer case difficult to shift or will not shift into desired range.	1) Transfer case electronically controlled shift system malfunction.	1) Verify proper operation per the appropriate diagnostic manual.
	2) If vehicle was operated for an extended period in 4HI mode on dry surface, driveline torque load may cause difficulty.	2) Drive the vehicle in a straight line and momentarily release the accelerator. The transfer case can then be shifted to the desired mode.
	3) Insufficient or incorrect lubricant.	3) Drain and refill transfer case with the correct quantity of Mopar® ATF +4, Automatic Transmission Fluid.
	4) Internal transfer case components binding, worn, or damaged.	4) Repair or replace components as necessary.
Transfer case noisy in all drive modes.	1) Insufficient or incorrect lubricant.	1) Drain and refill transfer case with the correct quantity of Mopar® ATF +4, type 9602, Automatic Transmission Fluid.
	2) Internal transfer case components binding, worn, or damaged.	2) Repair or replace components as necessary.

TRANSFER CASE - NV273 (Continued)

Condition	Possible Cause	Correction
Transfer case noisy while in, or jumps out of, 4LO mode.	1) Transfer case not completely engaged in 4LO position.	1) While rolling 2-3 MPH and the transmission in NEUTRAL, or clutch depressed on vehicles equipped with a manual transmission, shift transfer case to the 2WD or 4HI position, and then back into the 4LO position.
	2) Range fork damaged, inserts worn, or fork is binding on the shift rail.	2) Repair or replace components as necessary.
	3) Low range gear worn or damaged.	3) Repair or replace components as necessary.
Lubricant leaking from transfer case seals or vent.	1) Transfer case overfilled.	1) Drain lubricant to the correct level.
	2) Transfer case vent closed or restricted.	2) Clean or replace vent as necessary.
	3) Transfer case seals damaged or installed incorrectly.	3) Replace suspect seal.
Abnormal tire wear.	1) Extended operation in 4HI mode on dry surfaces,	1) Operate vehicle in 2WD mode on dry surfaces.

REMOVAL

(1) Shift transfer case into 2WD.
(2) Raise vehicle.
(3) Drain transfer case lubricant.
(4) Mark front and rear propeller shafts for alignment reference.
(5) Support transmission with jack stand.
(6) Remove the transfer case skid plate, if equipped.
(7) Disconnect front and rear propeller shafts at transfer case.
(8) Disconnect transfer case shift motor and mode sensor wire connectors.
(9) Disconnect transfer case vent hose.
(10) Support transfer case with transmission jack.
(11) Secure transfer case to jack with chains.
(12) Remove nuts attaching transfer case to transmission (Fig. 2).
(13) Pull transfer case and jack rearward to disengage transfer case.
(14) Remove transfer case from under vehicle.

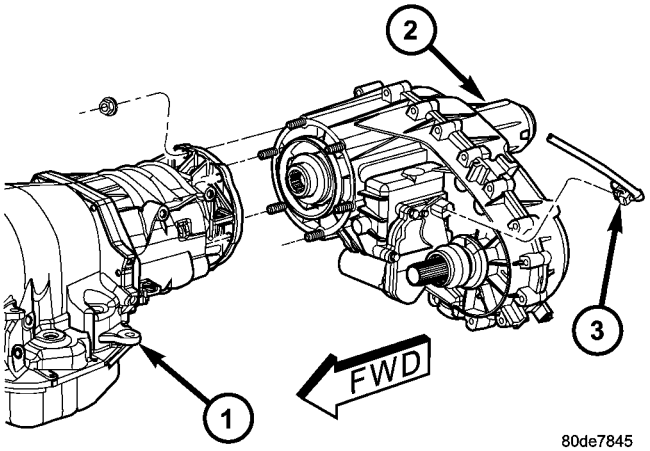


Fig. 2 Remove Transfer Case - Typical

1 - TRANSMISSION
2 - TRANSFER CASE
3 - MODE SENSOR CONNECTOR

DISASSEMBLY

Position transfer case in a shallow drain pan. Remove drain plug and drain any remaining lubricant remaining in case.

TRANSFER CASE - NV273 (Continued)

COMPANION FLANGE AND EXTENSION HOUSING

(1) Install two bolts 180° apart into the front output shaft companion flange.

(2) Place holder over the bolts and against the companion flange (Fig. 3).

(3) Remove and discard the front companion flange nut.

(4) Remove the companion flange from the front output shaft. It may be necessary to use Flange puller 8992 to remove the companion flange.

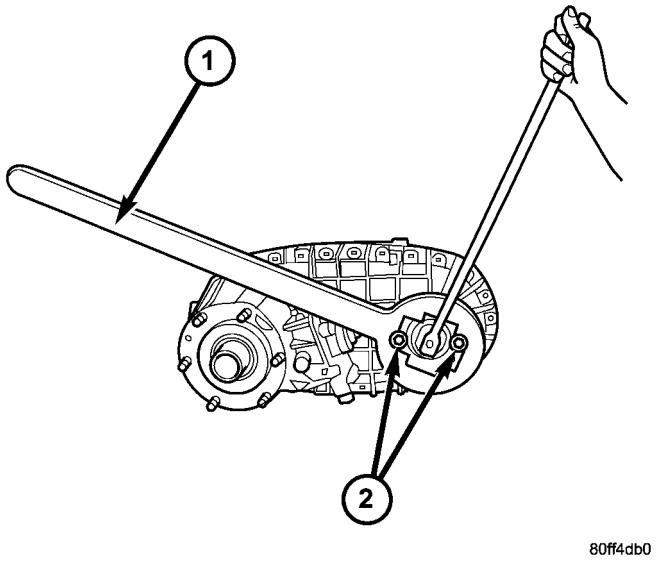


Fig. 3 Remove Companion Flange Nut - Typical

1 - HOLDER 6719
2 - BOLTS

(5) Use a suitable chisel or pry tool to remove the rear extension housing dust boot (Fig. 4).

(6) Use a suitable chisel or pry tool to remove the rear extension housing seal.

(7) Remove rear extension bolts (Fig. 5).

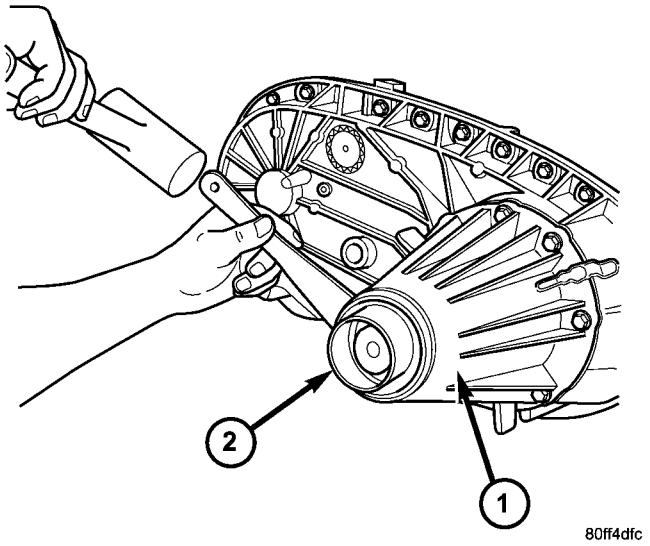


Fig. 4 Remove Extension Housing Dust Boot

1 - EXTENSION HOUSING
2 - DUST BOOT

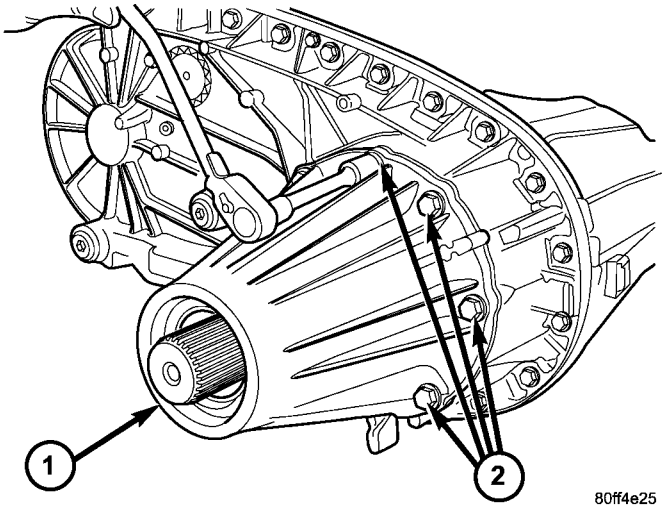


Fig. 5 Remove Extension Housing Bolts

1 - EXTENSION HOUSING
2 - BOLTS

TRANSFER CASE - NV273 (Continued)

(8) Remove rear extension housing (Fig. 6). Tap extension once or twice with a plastic mallet to break sealer bead and loosen it.

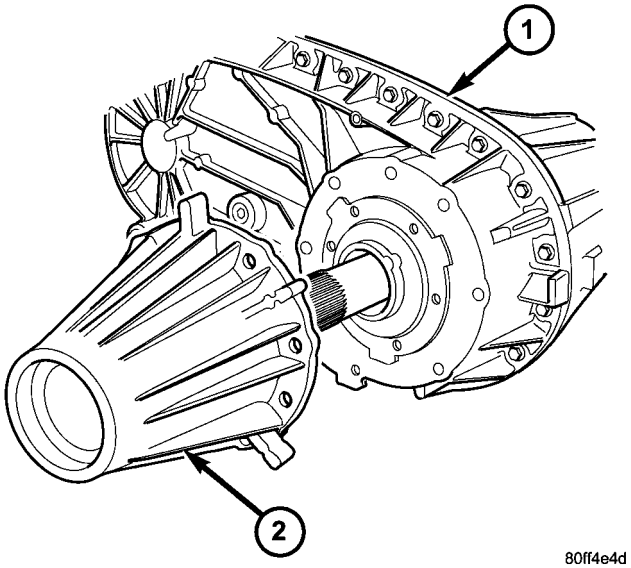


Fig. 6 Remove Extension Housing

1 - REAR CASE HALF
2 - EXTENSION HOUSING

OIL PUMP AND REAR CASE

(1) Disengage the oil pump pick-up tube (Fig. 7) from the oil pump.

NOTE: The oil pump pick-up tube seals to the oil pump with an o-ring. Verify that the o-ring was removed with the tube and is in good condition. Replace the o-ring if necessary.

(2) Remove the oil pump (Fig. 8).

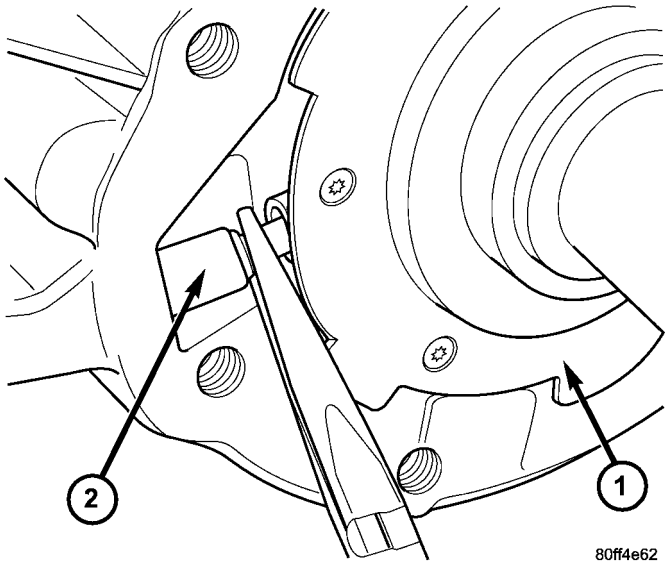


Fig. 7 Disengage The Oil Pick-up From Oil Pump

1 - OIL PUMP
2 - OIL PICK-UP TUBE

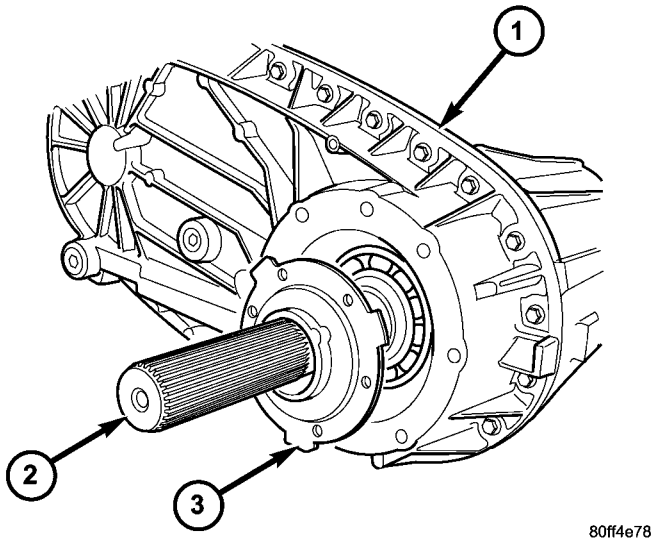


Fig. 8 Remove Oil Pump

1 - REAR CASE HALF
2 - REAR OUTPUT SHAFT
3 - OIL PUMP

(3) Remove rear case-to-front case bolts (Fig. 9).

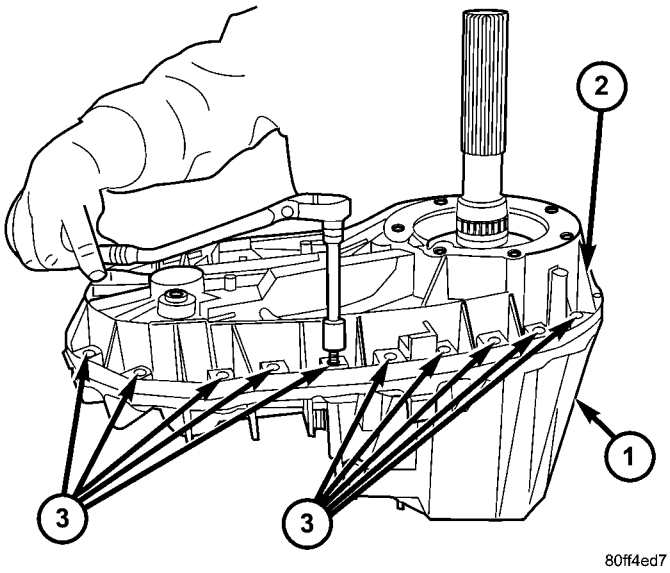


Fig. 9 Remove Case Half Bolts

1 - FRONT CASE HALF
2 - REAR CASE HALF
3 - BOLTS

TRANSFER CASE - NV273 (Continued)

(4) Remove the rear output shaft bearing inner snap-ring (Fig. 10) from the output shaft using suitable snap-ring pliers.

(5) Remove the rear output shaft bearing inner snap-ring (Fig. 11) from the output shaft.

(6) Loosen rear case with pry tool to break sealer bead. Insert tool at each end of case (Fig. 12).

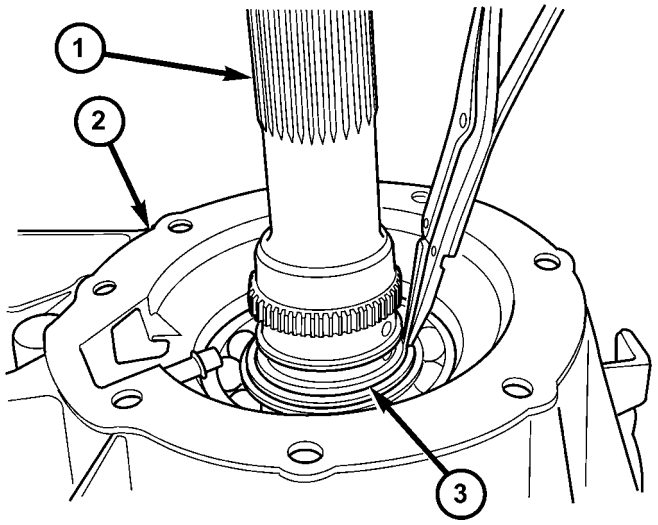


Fig. 10 Remove Rear Bearing Inner Snap-Ring

1 - OUTPUT SHAFT
2 - REAR CASE HALF
3 - SNAP-RING

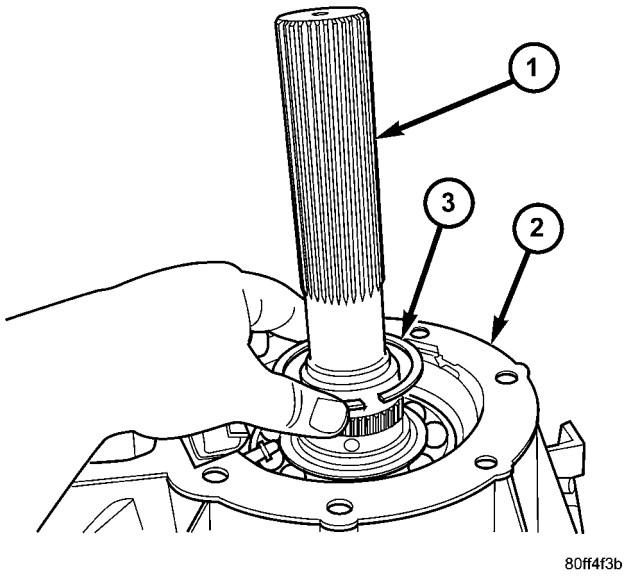


Fig. 11 Remove Rear Bearing Inner Snap-Ring

1 - OUTPUT SHAFT
2 - REAR CASE HALF
3 - SNAP-RING

(7) Unseat rear case from alignment dowels.

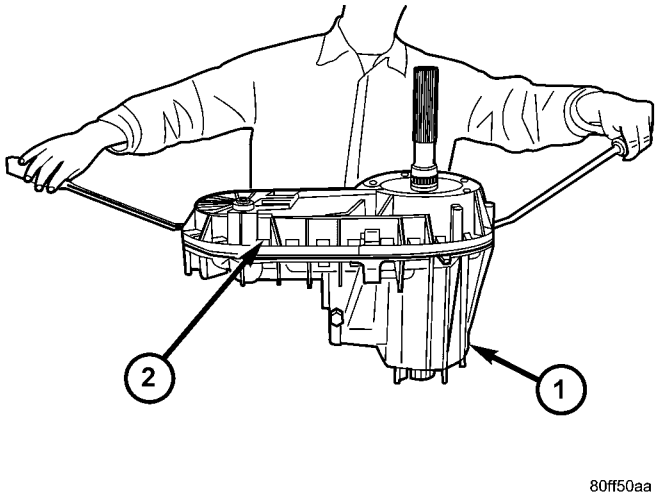


Fig. 12 Separate Front and Rear Case Halves

1 - FRONT CASE HALF
2 - REAR CASE HALF

(8) Remove the rear case from the front case (Fig. 13).

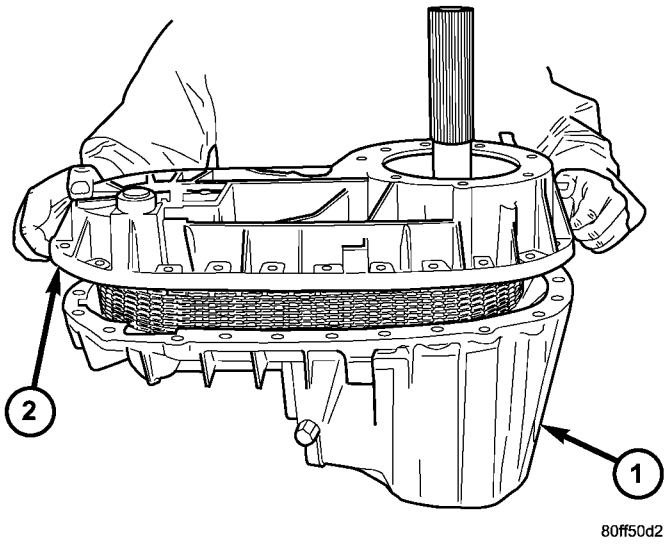


Fig. 13 Remove Rear Case Half

1 - FRONT CASE HALF
2 - REAR CASE HALF

TRANSFER CASE - NV273 (Continued)

FRONT OUTPUT SHAFT AND DRIVE CHAIN

(1) Remove the oil pick-up tube (Fig. 14) and screen from the front case half.

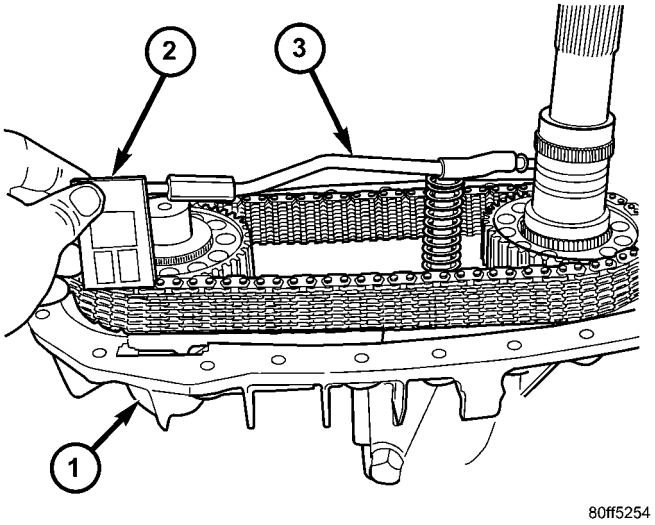


Fig. 14 Remove Oil Pick-Up Tube and Screen

1 - FRONT CASE HALF
2 - OIL SCREEN
3 - PICK-UP TUBE

(2) Remove the front output shaft drive sprocket retaining ring (Fig. 15).

(3) Remove the rear output shaft drive sprocket retaining ring (Fig. 16).

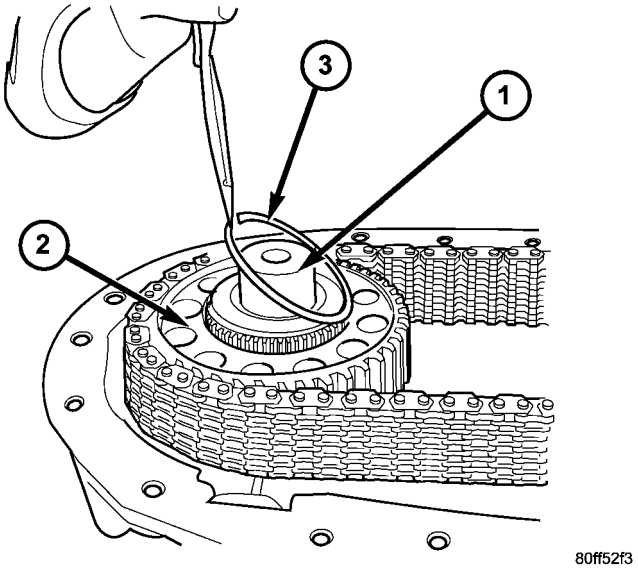


Fig. 15 Remove Front Output Shaft Sprocket Retaining Ring

1 - FRONT OUTPUT SHAFT
2 - DRIVE SPROCKET
3 - RETAINING RING

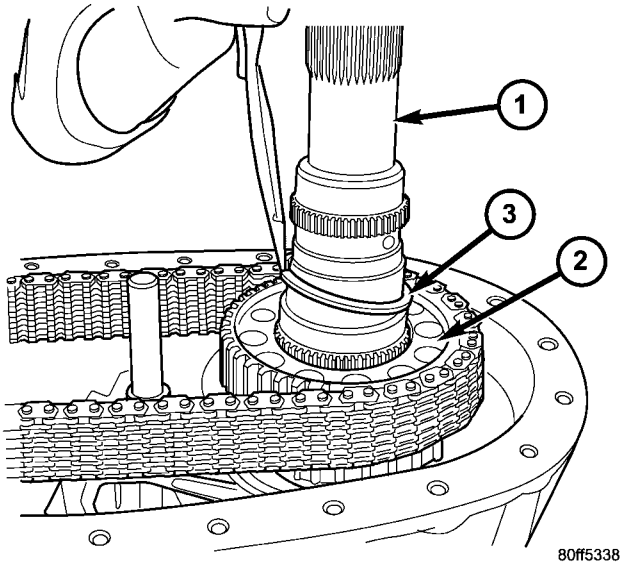


Fig. 16 Remove Rear Output Shaft Sprocket Retaining Ring

1 - REAR OUTPUT SHAFT
2 - DRIVE SPROCKET
3 - RETAINING RING

(4) Pull front sprocket (Fig. 17), rear sprocket, and chain upward until clear of the front and rear output shaft sprocket splines.

(5) Remove chain and sprockets as an assembly.

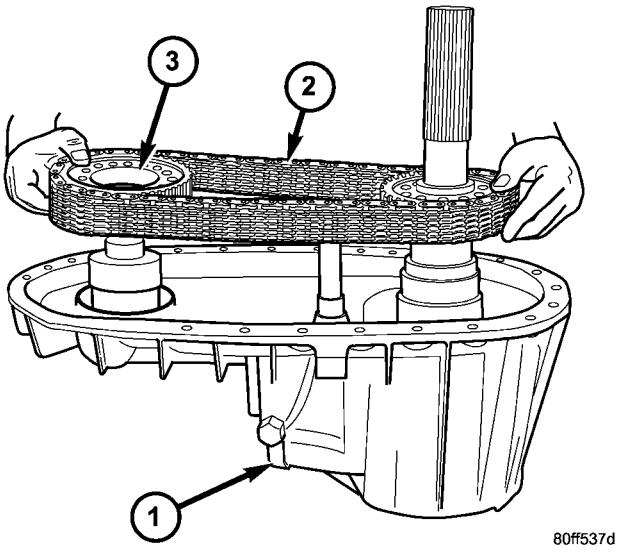


Fig. 17 Remove Drive Chain and Sprockets

1 - FRONT CASE HALF
2 - CHAIN
3 - DRIVE SPROCKETS

TRANSFER CASE - NV273 (Continued)

SHIFT FORKS AND MAINSHAFT

(1) Remove the bolts (Fig. 18) that hold the shift motor assembly to the transfer case.

(2) Remove the shift motor assembly (Fig. 19) from the transfer case.

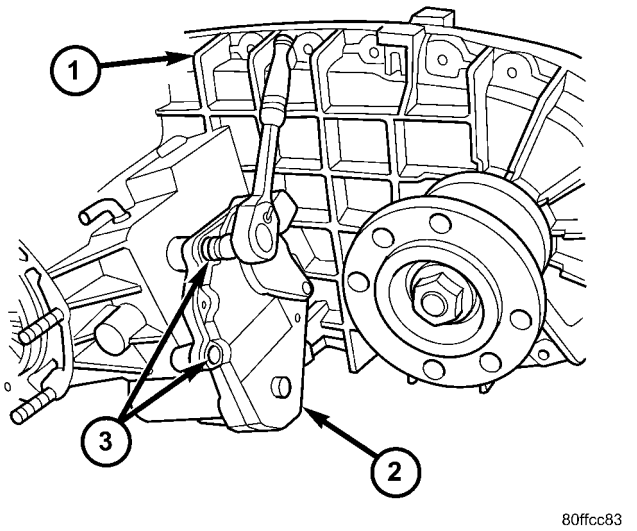


Fig. 18 Remove Shift Motor Assembly Bolts

1 - TRANSFER CASE
2 - SHIFT MOTOR ASSEMBLY
3 - BOLTS

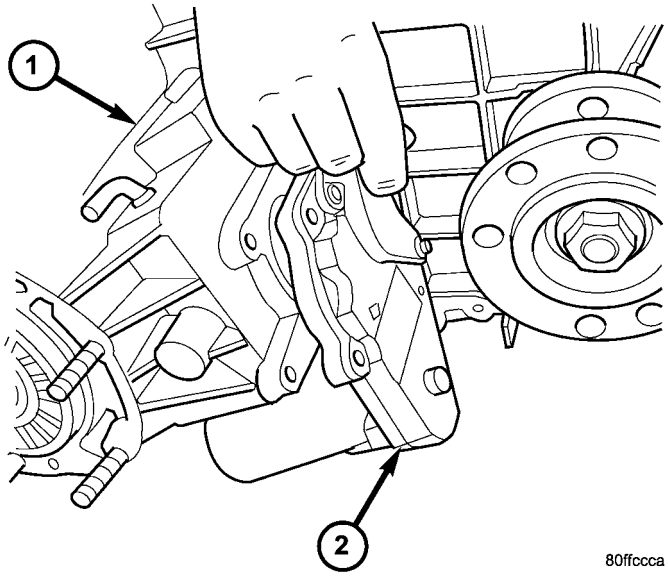


Fig. 19 Remove Shift Motor Assembly From Transfer Case

1 - TRANSFER CASE
2 - SHIFT MOTOR ASSEMBLY

(3) Remove the sector support with Socket 9033.

(4) Loosen detent plug (Fig. 20).

(5) Remove detent plug, spring, and plunger (Fig. 21). Note that the plug has an O-ring seal. Remove and discard this seal.

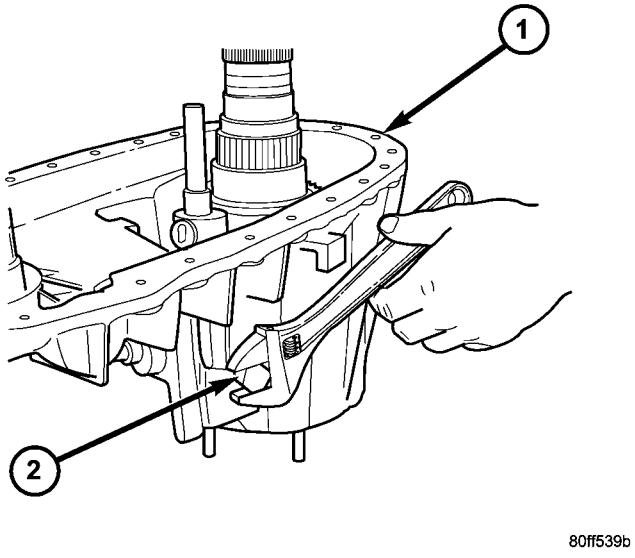


Fig. 20 Loosen the Detent Plug

1 - FRONT CASE HALF
2 - DETENT PLUG

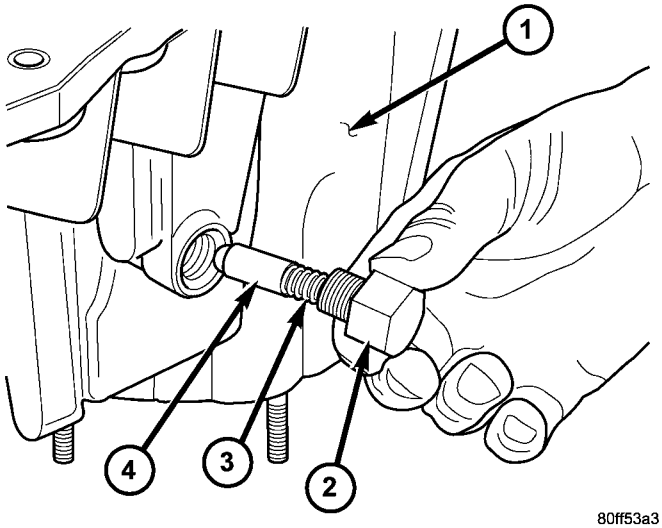


Fig. 21 Remove Detent plug, Spring, and Plunger

1 - FRONT CASE HALF
2 - DETENT PLUG
3 - SPRING
4 - PLUNGER

TRANSFER CASE - NV273 (Continued)

(6) Using a screw mounted in a slide hammer, remove the front output shaft seal.

(7) Remove the front output shaft snap-ring (Fig. 22).

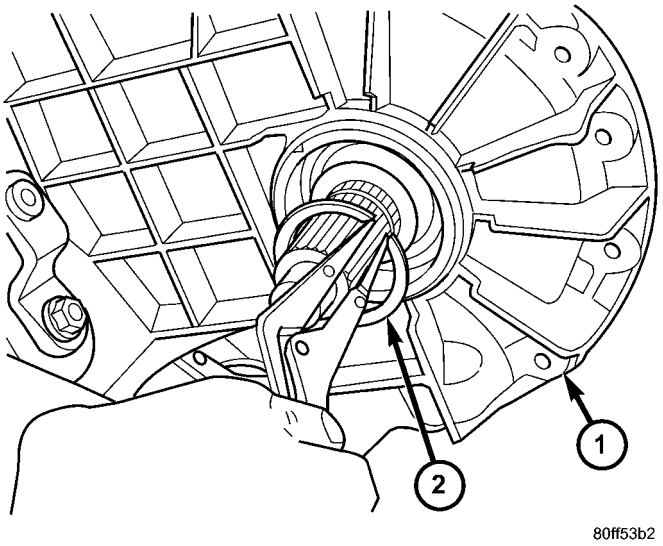


Fig. 22 Remove Front Output Shaft Bearing Inner Snap-Ring

1 - FRONT CASE HALF
2 - SNAP-RING

(8) Remove front output shaft from bearing in case (Fig. 23).

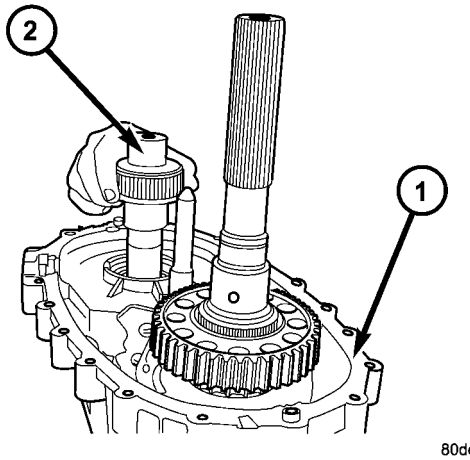


Fig. 23 Remove Front Output Shaft

1 - FRONT CASE
2 - FRONT OUTPUT SHAFT

(9) Pull mainshaft assembly out of input gear, mode sleeve, and case (Fig. 24).

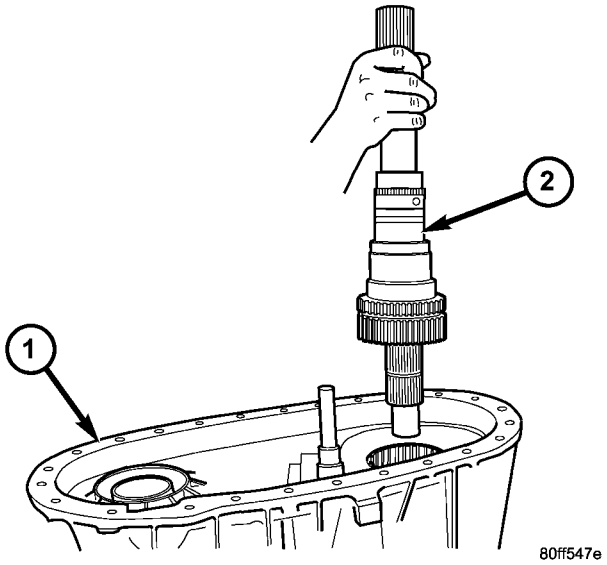


Fig. 24 Remove Mainshaft Assembly

1 - FRONT CASE HALF
2 - MAINSHAFT ASSEMBLY

(10) Remove mode fork, mode sleeve, and shift rail as assembly (Fig. 25). Note which way the sleeve fits in the fork (long side of sleeve goes to front or the points on the sleeve teeth go to the rear of case).

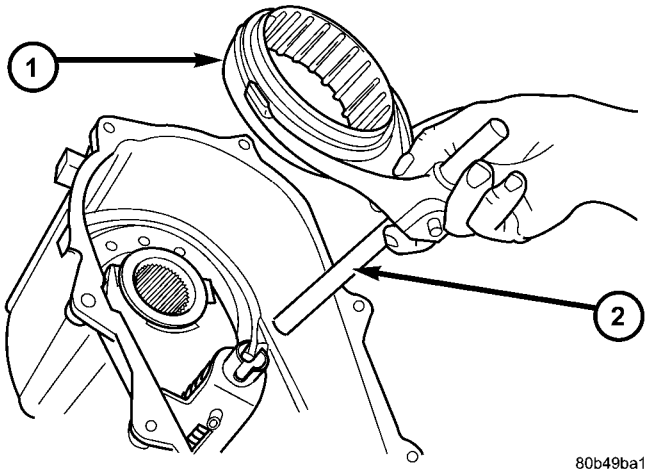


Fig. 25 Mode Fork And Sleeve Removal

1 - MODE SLEEVE
2 - MODE FORK AND RAIL

TRANSFER CASE - NV273 (Continued)

(11) Remove range fork and hub as an assembly (Fig. 26). Note fork position for installation reference.
(12) Remove the shift sector (Fig. 27).

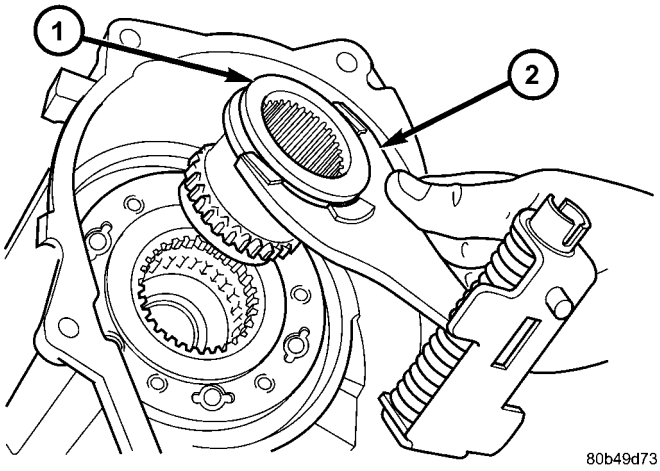


Fig. 26 Range Fork And Hub Removal

1 - RANGE HUB
2 - RANGE FORK

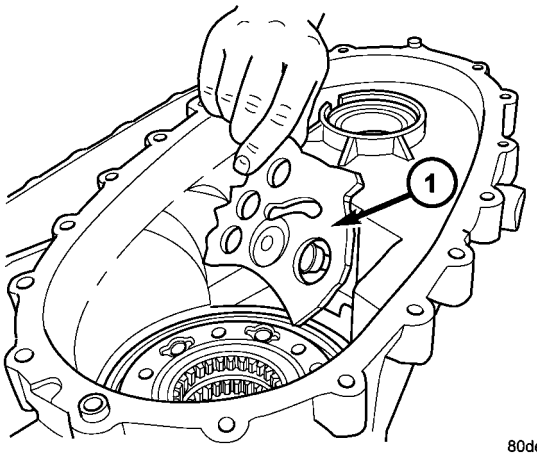


Fig. 27 Remove Shift Sector

1 - SHIFT SECTOR

MAINSHAFT

(1) Remove the clutch gear (Fig. 28) from the output shaft.

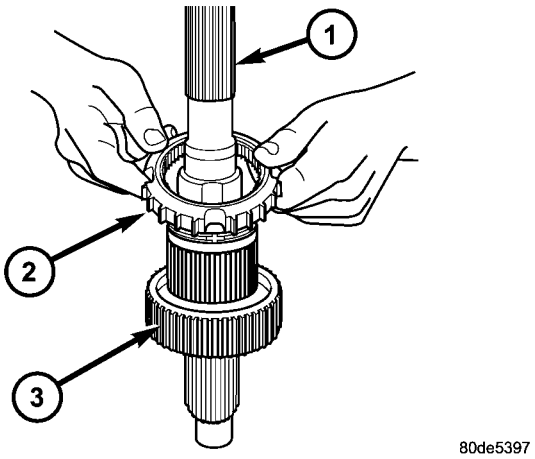


Fig. 28 Remove Clutch Gear

1 - OUTPUT SHAFT
2 - CLUTCH GEAR
3 - MODE HUB

(2) Remove the mode hub retaining ring (Fig. 29) from the mainshaft.
(3) Remove the mode hub (Fig. 30) from the mainshaft.

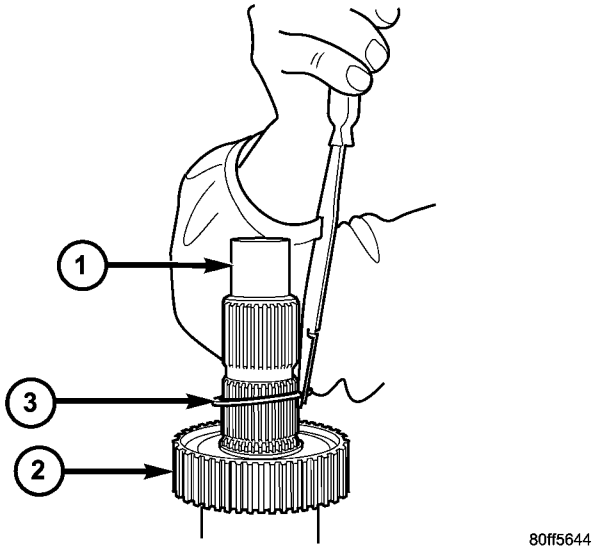


Fig. 29 Remove Mode Hub Retaining Ring

1 - MAINSHAFT
2 - MODE HUB
3 - RETAINING RING

TRANSFER CASE - NV273 (Continued)

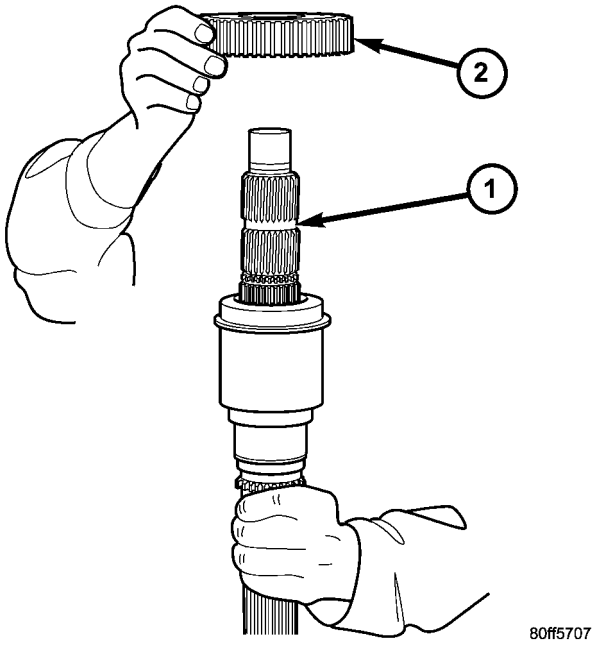


Fig. 30 Remove Mode Hub

1 - MAINSHAFT
2 - MODE HUB

(4) Remove the drive sprocket drive hub (Fig. 31) from the mainshaft.

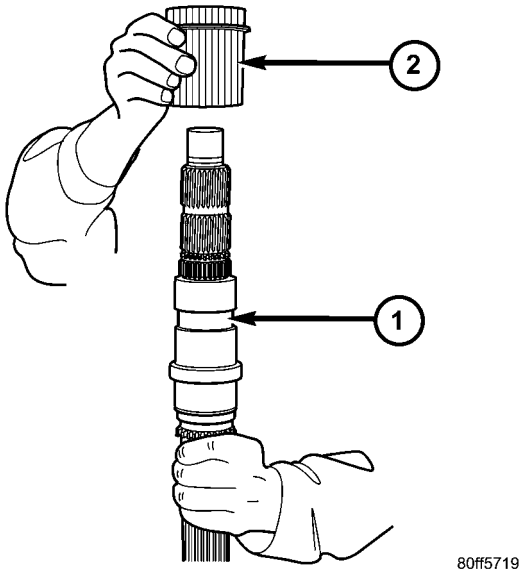


Fig. 31 Remove the Drive Sprocket Drive Hub

1 - MAINSHAFT
2 - DRIVE SPROCKET DRIVE HUB

INPUT AND PLANETARY GEAR

(1) Remove input gear seal with suitable screw and slide hammer.

(2) Remove input gear retaining ring (Fig. 32) with heavy duty snap-ring pliers.

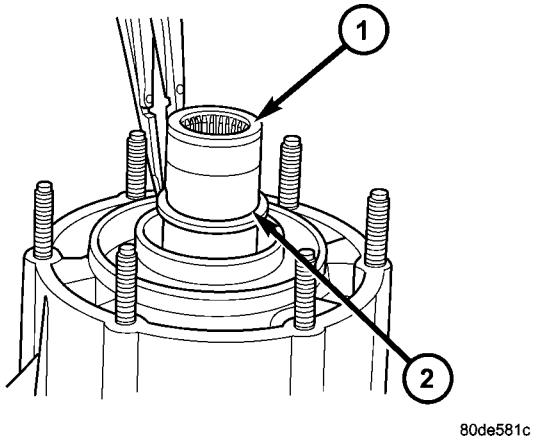


Fig. 32 Remove Input Gear Retaining Ring

1 - INPUT GEAR
2 - RETAINING RING

(3) Place front case in horizontal position. Then remove input gear and low range gear as an assembly (Fig. 33). Tap gear out of bearing with plastic mallet, if necessary.

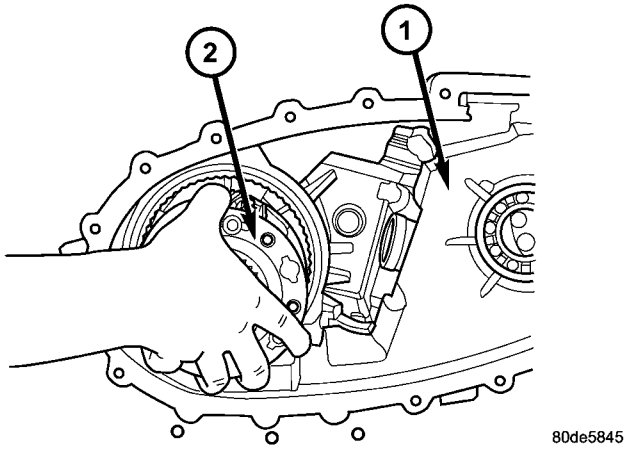


Fig. 33 Remove Input Planetary Assembly

1 - FRONT CASE
2 - INPUT PLANETARY ASSEMBLY

TRANSFER CASE - NV273 (Continued)

(4) Remove snap-ring that retains input gear in the low range gear (Fig. 34).
(5) Remove retainer (Fig. 35).
(6) Remove front thrust plate (Fig. 36).

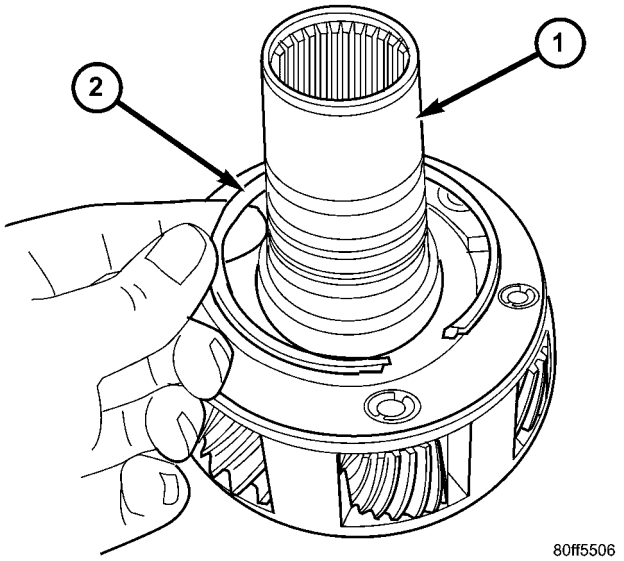


Fig. 34 Remove Input Gear Retaining Ring

1 - INPUT GEAR
2 - RETAINING RING

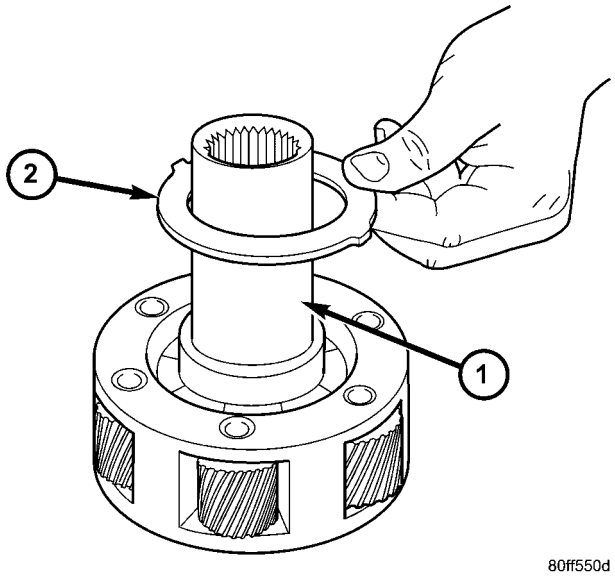


Fig. 35 Remove Input Gear Retainer

1 - INPUT GEAR
2 - RETAINER

(7) Remove input gear (Fig. 37).
(8) Remove bottom tabbed thrust washer from low range planetary (Fig. 38).

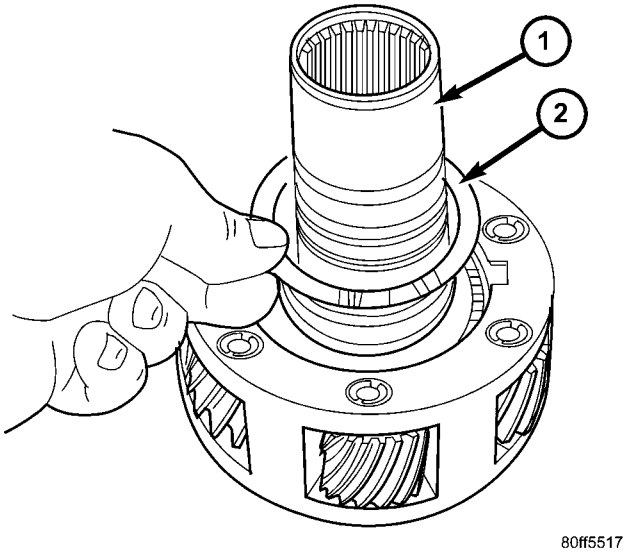


Fig. 36 Remove Input Gear Thrust Plate

1 - INPUT GEAR
2 - THRUST PLATE

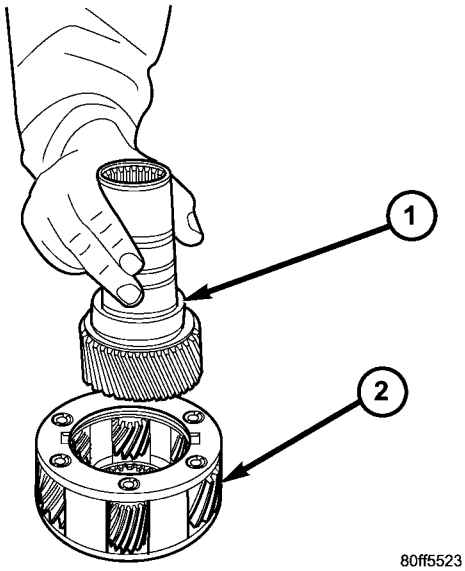


Fig. 37 Remove Input Gear From Planetary

1 - INPUT GEAR
2 - LOW RANGE PLANETARY

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.

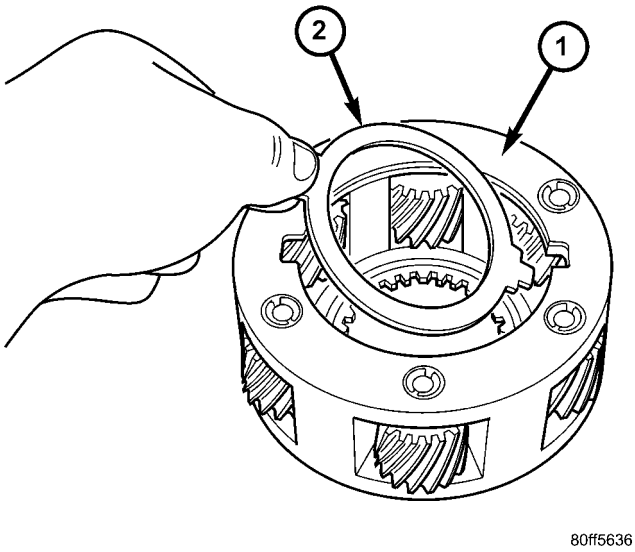


Fig. 38 Remove Bottom Input Gear Thrust Plate

1 - PLANETARY
2 - THRUST PLATE

INSPECTION

MAINSHAFT/SPROCKET/HUB INSPECTION

Inspect the splines on the hub and shaft and the teeth on the sprocket. Minor nicks and scratches can be smoothed with an oilstone. However, replace any part that is damaged.

Check the contact surfaces in the sprocket bore and on the mainshaft. Minor nicks and scratches can be smoothed with 320-400 grit emery cloth but do not try to salvage the shaft if nicks or wear is severe.

INPUT GEAR AND PLANETARY CARRIER

Check the teeth on the gear (Fig. 39). 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. Check the pinion gear thrust washers on the pinon pins for 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.

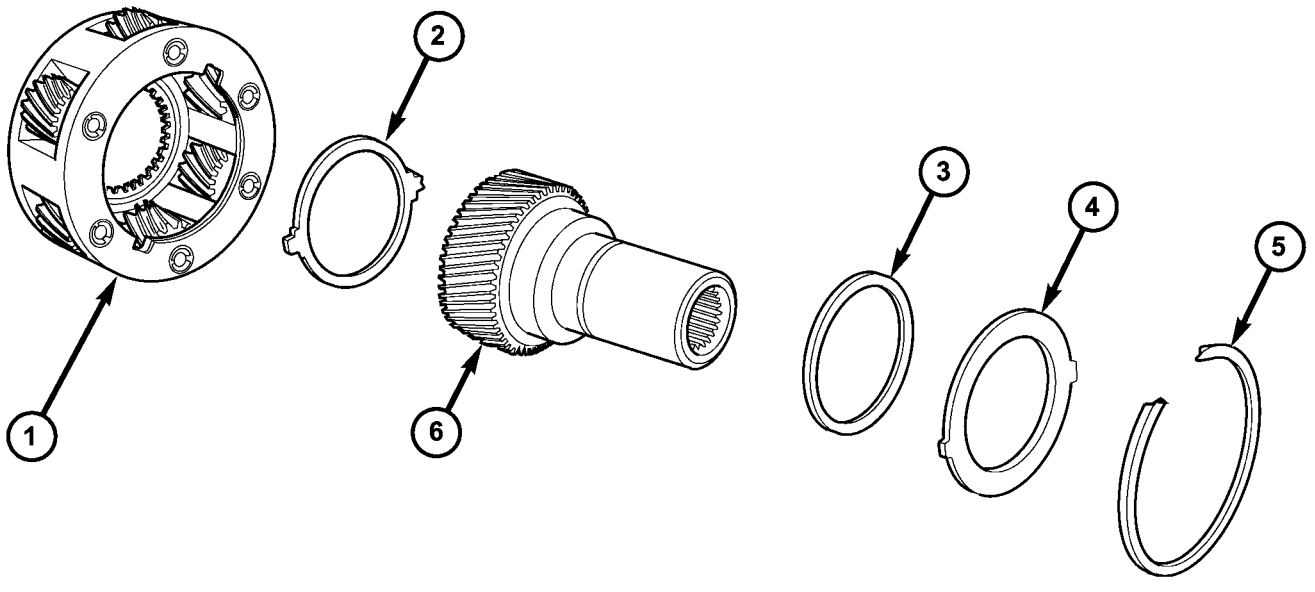


Fig. 39 Input Gear And Carrier Components

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 - NV273 (Continued)

SHIFT FORKS/HUBS/SLEEVES

Check condition of the shift forks and mode fork shift rail (Fig. 40). Minor nicks on the shift rail can be smoothed with 320-400 grit emery cloth.

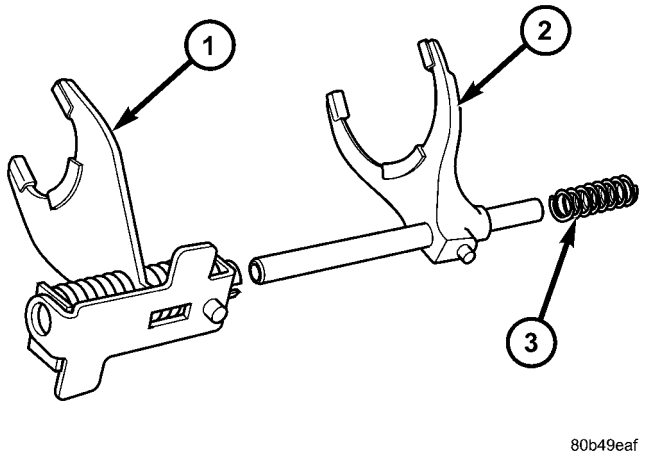


Fig. 40 Shift Forks

1 - RANGE FORK
2 - MODE FORK AND RAIL
3 - MODE SPRING

Inspect the shift fork wear pads (Fig. 41). The mode and range fork pads are serviceable and can be replaced if necessary.

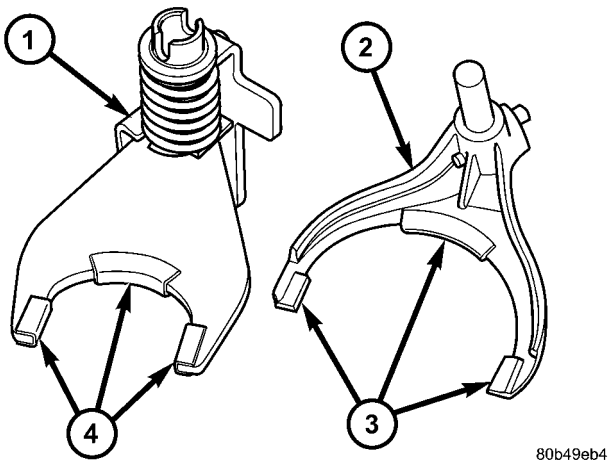


Fig. 41 Shift Fork And Wear Pad Locations

1 - RANGE FORK
2 - MODE FORK
3 - WEAR PADS (SERVICEABLE)
4 - WEAR PADS (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 EXTENSION HOUSING

Inspect the extension housing seal and bushing. Replace both components if either show any sign of wear or damage.

FRONT OUTPUT SHAFT AND DRIVE CHAIN

Inspect the shaft threads, sprocket teeth, and bearing surfaces. Minor nicks on the teeth can be smoothed with an oilstone. Use 320-400 grit emery to smooth minor scratches on the shaft bearing surfaces. Rough threads on the shaft can be chased if necessary. Replace the shaft if the threads are damaged, bearing surfaces are scored, or if any sprocket teeth are cracked or broken.

Examine the drive chain and shaft bearings. Replace the chain and both sprockets if the chain is stretched, distorted, or if any of the links bind. Replace the bearings if rough, or noisy.

LOW RANGE ANNULUS GEAR

Inspect annulus gear condition carefully. The gear is only serviced as part of the front case. If the gear is damaged, it will be necessary to replace the gear and front case as an assembly. Do not attempt to remove the gear (Fig. 42)

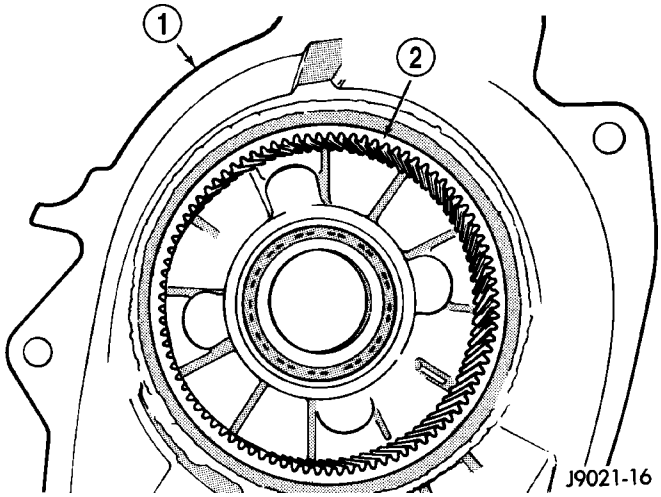


Fig. 42 Low Range Annulus Gear

1 - FRONT CASE
2 - LOW RANGE ANNULUS GEAR

FRONT AND REAR CASES

Inspect the cases for wear and damage.

Check case condition. If leaks were a problem, look for gouges and severe scoring of case sealing surfaces. Also make sure the front case mounting studs are in good condition.

Check the front case mounting studs and vent tube. The tube can be secured with Loctite™ 271 or 680 if loose. The stud threads can be cleaned up with a die if necessary. Also check condition of the fill/drain plug threads in the rear case. The threads can

be repaired with a thread chaser or tap if necessary. Or the threads can be repaired with Helicoil® stainless steel inserts if required.

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) Remove the input shaft bearing snap-ring from the front case half with suitable snap-ring pliers.

(2) Remove the input shaft bearing from the front case half with Installer 6953 and Handle C-4171 (Fig. 43).

(3) Install the input shaft bearing into the front case half with Installer 8151 inverted on Handle C-4171 (Fig. 44).

(4) Install the input shaft bearing snap-ring into the front case half with suitable snap-ring pliers.

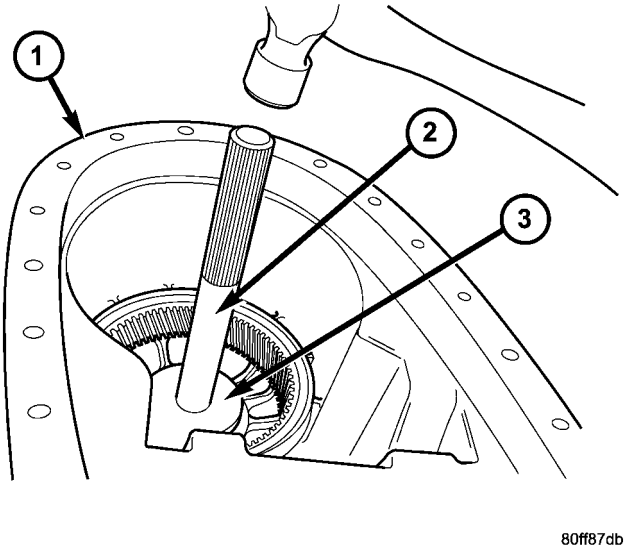


Fig. 43 Remove Input Gear Bearing

1 - FRONT CASE HALF
2 - HANDLE C-4171
3 - INSTALLER 6953

(5) Remove the front output shaft front bearing snap-ring from the front case half.

(6) Using Installer 6953 and Handle C-4171 (Fig. 45), remove the front output shaft front bearing.

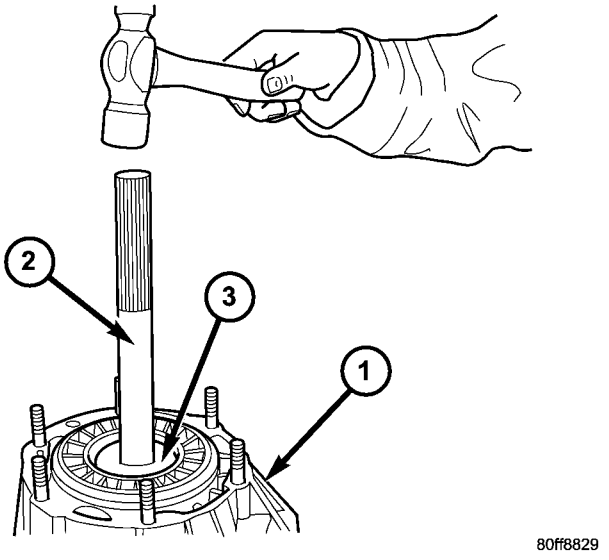


Fig. 44 Install Input Gear Bearing

1 - FRONT CASE HALF
2 - HANDLE C-4171
3 - INSTALLER 8151 (INVERTED)

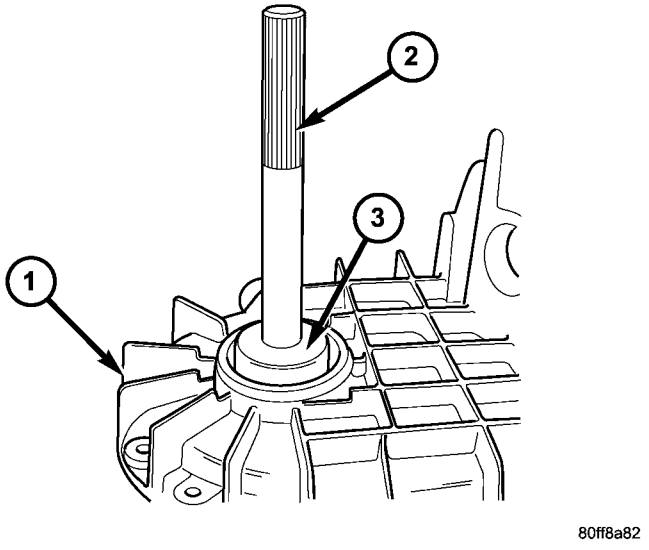


Fig. 45 Remove Front Output Shaft Front Bearing

1 - FRONT CASE HALF
2 - HANDLE C-4171
3 - INSTALLER 6953

TRANSFER CASE - NV273 (Continued)

(7) Start front output shaft front bearing in case. Then seat bearing with Installer 8891 (Fig. 46).

(8) Install front output shaft bearing retaining ring.

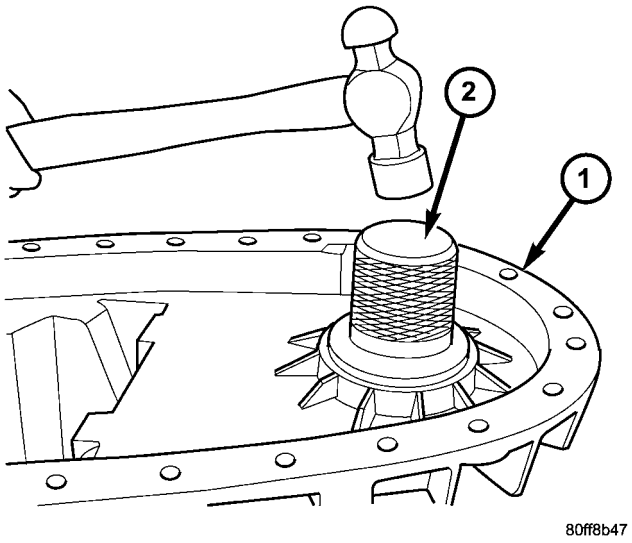


Fig. 46 Install Front Output Shaft Front Bearing

1 - FRONT CASE HALF
2 - INSTALLER 8891

(9) 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. 47).

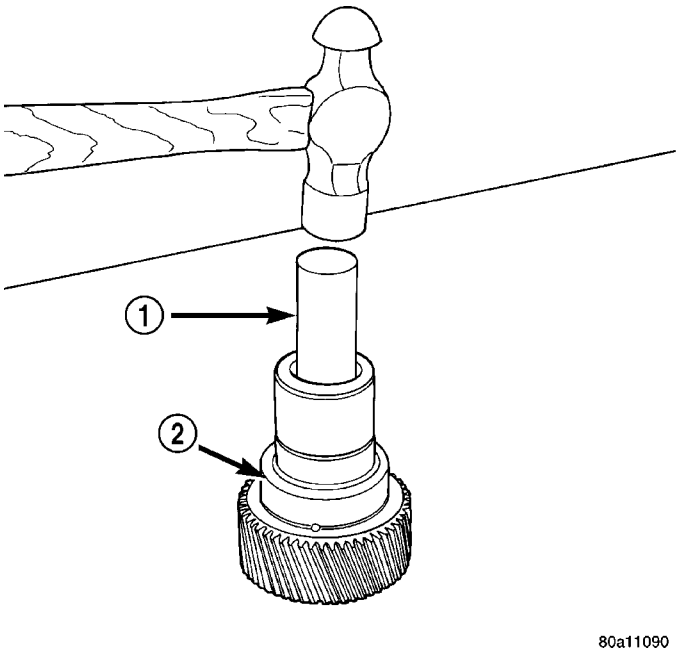


Fig. 47 Remove Input Gear Cup Bearing

1 - DRIFT
2 - INPUT GEAR

(10) Install new pilot bearing with Installer 9035.

(11) Remove the front output shaft rear bearing with the screw and jaws from Remover L-4454 and Cup 8148 (Fig. 48).

(12) Install new bearing with Tool Handle C-4171 and Installer 8128 (Fig. 49). The bearing bore is

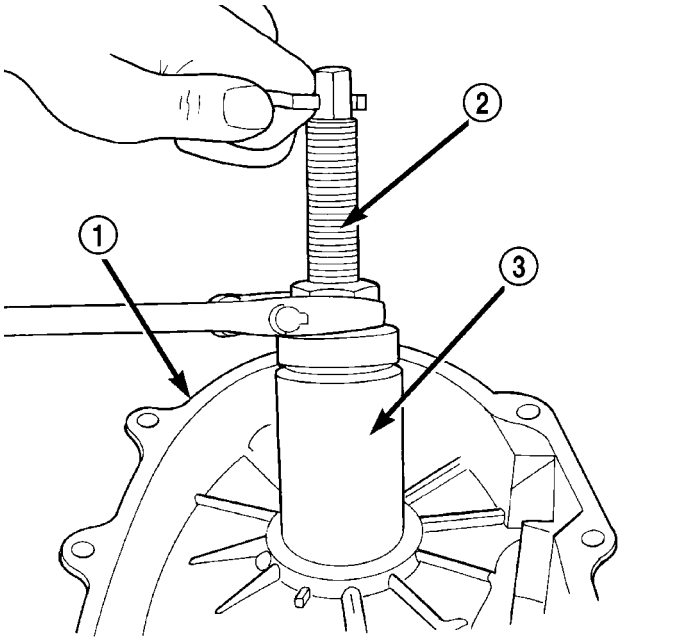


Fig. 48 Front Output Shaft Rear Bearing Removal

1 - REAR CASE
2 - SPECIAL TOOL L-4454-1 AND L-4454-3
3 - SPECIAL TOOL 8148

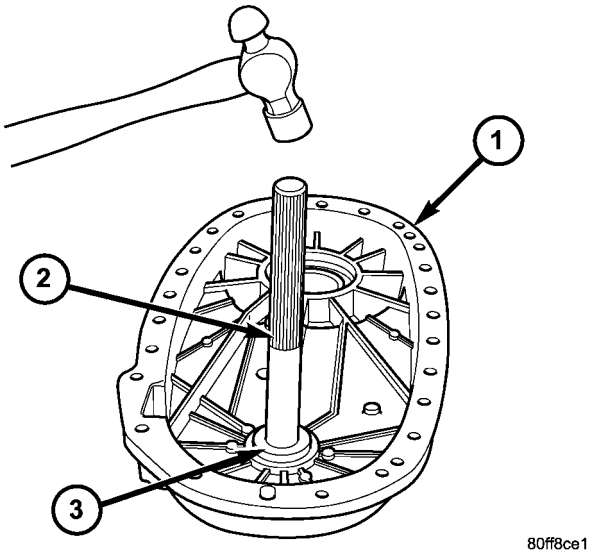


Fig. 49 Install Front Output Shaft Rear Bearing

1 - REAR CASE HALF
2 - HANDLE C-4171
3 - INSTALLER 8128

TRANSFER CASE - NV273 (Continued)

chamfered at the top. Install the bearing so it is flush with the lower edge of this chamfer (Fig. 50).

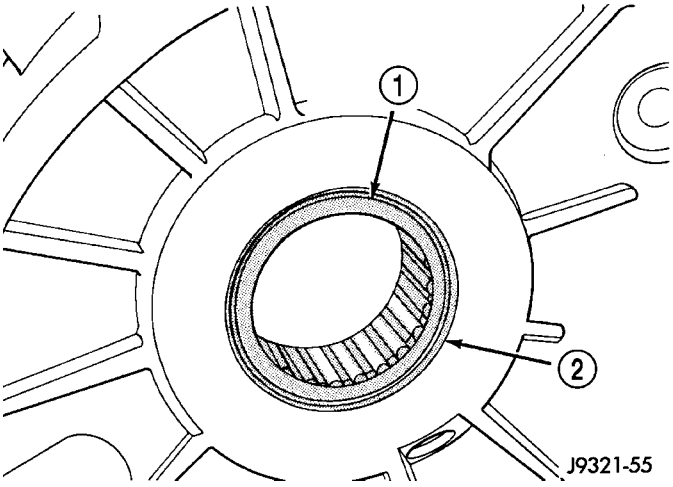


Fig. 50 Output Shaft Rear Bearing Installation Depth

1 - BEARING (SEATED) AT LOWER EDGE OF CHAMFER
2 - CHAMFER

(13) Remove seal from oil pump with suitable pry tool.

(14) Install new seal in oil pump with Installer 7888 (Fig. 51).

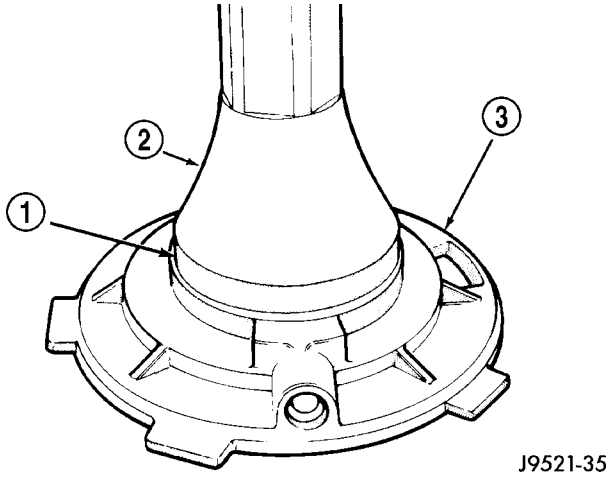


Fig. 51 Oil Pump Seal Installation

1 - HOUSING SEAL
2 - SPECIAL TOOL 7888
3 - OIL PUMP FEED HOUSING

(15) Remove the rear output shaft bearing snap-ring (Fig. 52) from the rear case half.

(16) Remove the rear output shaft bearing from the rear case using Installer 7888 (Fig. 53).

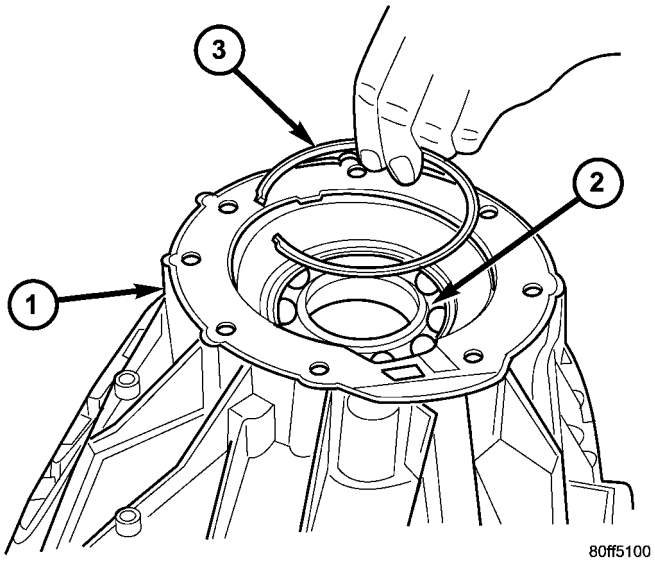


Fig. 52 Remove Rear Output Bearing Outer Snap-Ring

1 - REAR CASE HALF
2 - REAR OUTPUT SHAFT BEARING
3 - SNAP-RING

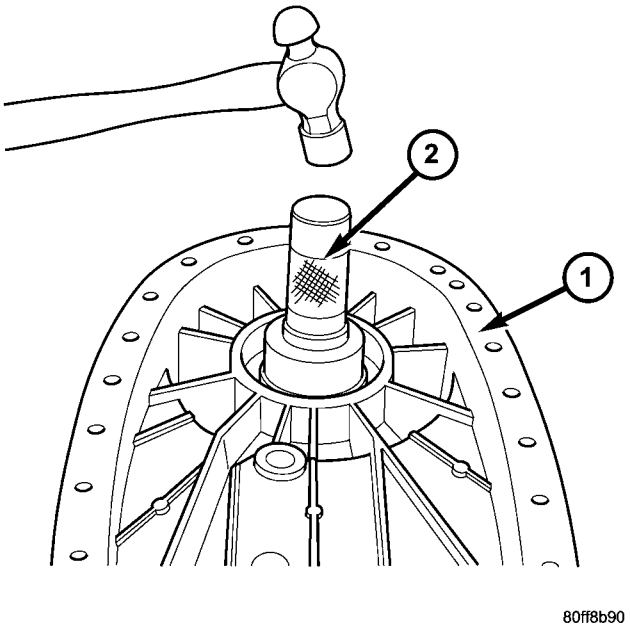


Fig. 53 Remove Rear Output Shaft Bearing

1 - REAR CASE HALF
2 - INSTALLER 7888

TRANSFER CASE - NV273 (Continued)

(17) Install the rear output shaft bearing (Fig. 54) into the rear case using Installer 8152 and Handle C-4171.

(18) Install the rear output shaft bearing snap-ring into the rear case half.

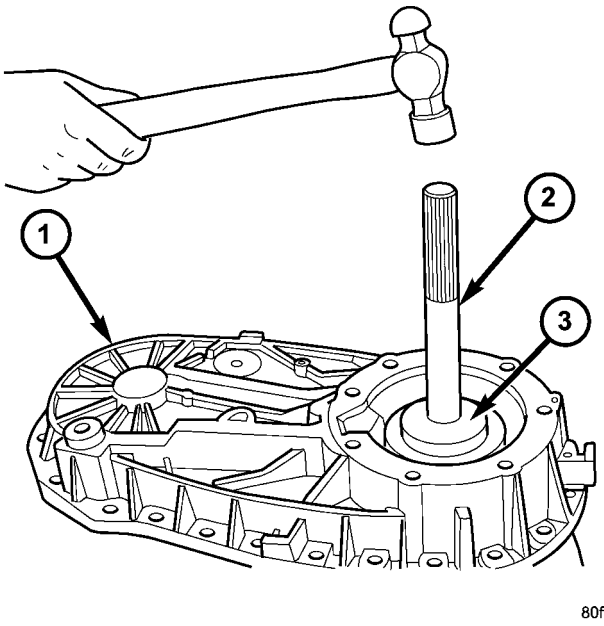


Fig. 54 Install Rear Output Shaft Bearing

1 - REAR CASE HALF
2 - HANDLE C-4171
3 - INSTALLER 8152

INPUT AND PLANETARY GEAR

(1) Lubricate gears and thrust washers with recommended transmission fluid.

(2) Install bottom thrust washer (Fig. 55) in low range gear planetary. Be sure washer tabs are properly aligned in gear notches.

(3) Install input gear in low range gear (Fig. 56). Be sure input gear is fully seated.

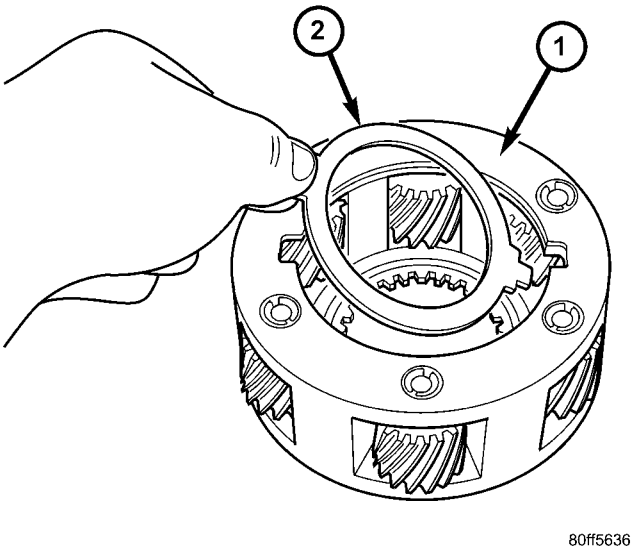


Fig. 55 Install Bottom Input Gear Thrust Plate

1 - PLANETARY
2 - THRUST PLATE

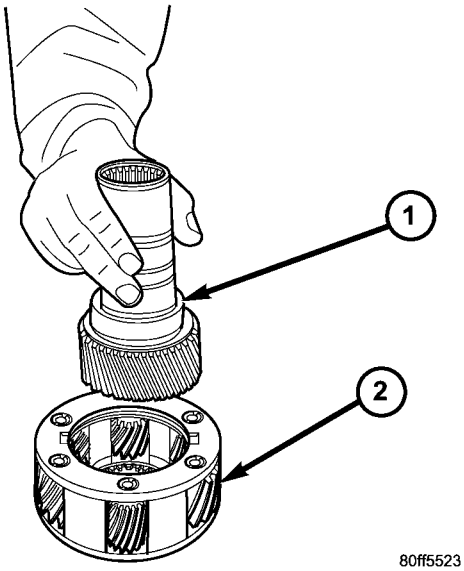


Fig. 56 Install Input Gear From Planetary

1 - INPUT GEAR
2 - LOW RANGE PLANETARY

TRANSFER CASE - NV273 (Continued)

(4) Install remaining thrust washer (Fig. 57) in low range gear and on top of input gear.

(5) Install retainer (Fig. 58) on input gear and install snap-ring (Fig. 59).

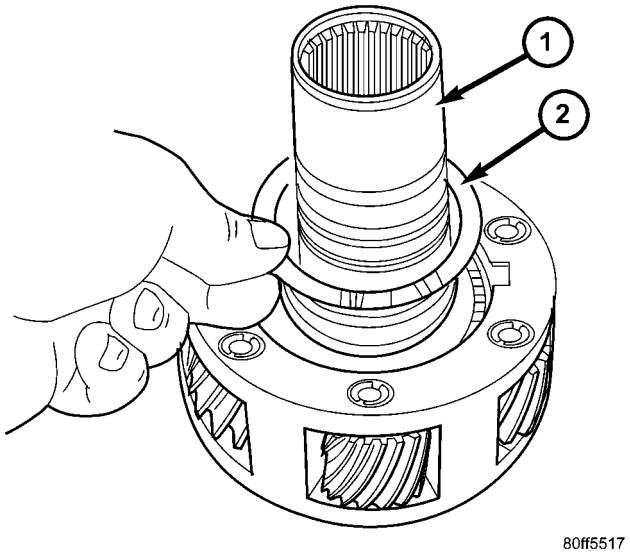


Fig. 57 Install Input Gear Thrust Plate

1 - INPUT GEAR
2 - THRUST PLATE

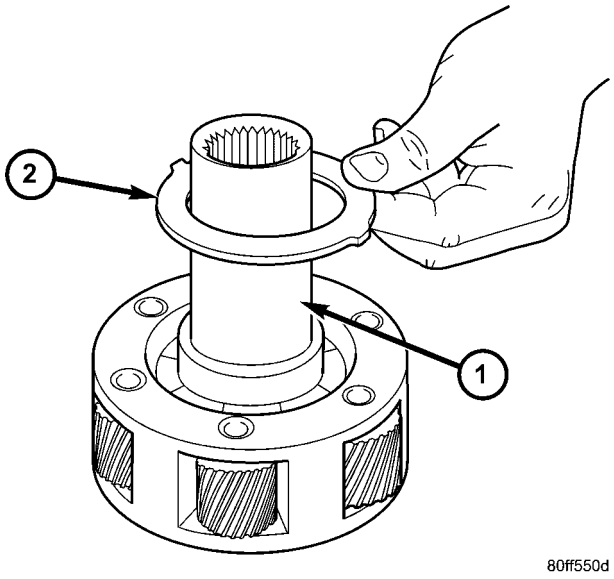


Fig. 58 Install Input Gear Retainer

1 - INPUT GEAR
2 - RETAINER

(6) Align and install low range/input gear assembly in front case (Fig. 60). Be sure low range gear pinions are engaged in annulus gear and that input gear shaft is fully seated in front bearing.

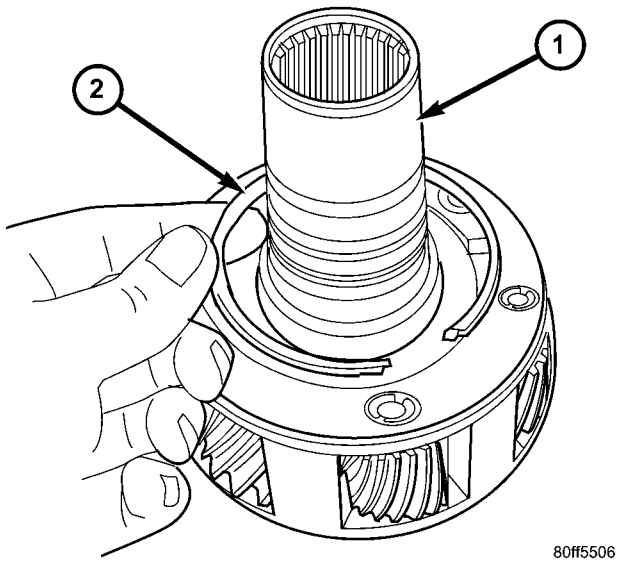


Fig. 59 Install Input Gear Retaining Ring

1 - INPUT GEAR
2 - RETAINING RING

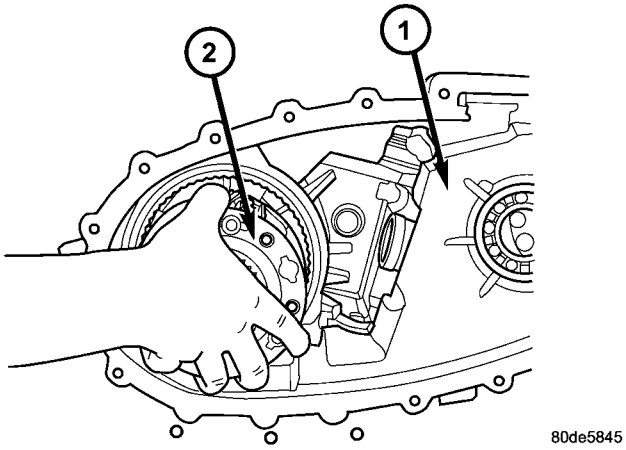


Fig. 60 Install Input Planetary Assembly

1 - FRONT CASE
2 - INPUT PLANETARY ASSEMBLY

TRANSFER CASE - NV273 (Continued)

(7) Install snap-ring to hold input/low range gear into front bearing (Fig. 61).

(8) Install a new input gear seal using Installer 8841 and Handle C-4171.

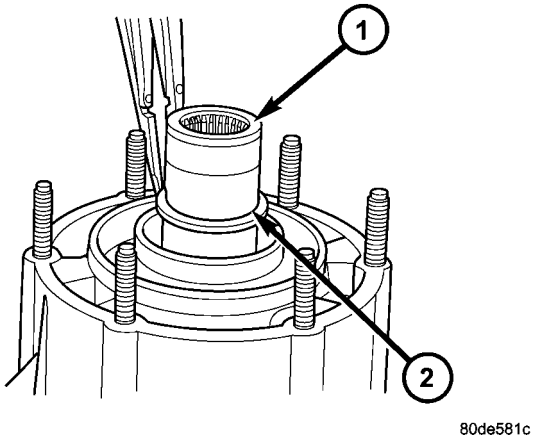


Fig. 61 Install Input Gear Retaining Ring

1 - INPUT GEAR
2 - RETAINING RING

(9) Install a new input gear oil seal with Installer 9036 and Handle C-4171.

SHIFT FORKS AND MAINSHAFT

(1) Lubricate mainshaft splines with recommended transmission fluid.

(2) Coat the interior of the drive sprocket hub with ATF+4 and install the drive sprocket drive hub (Fig. 62) onto the mainshaft.

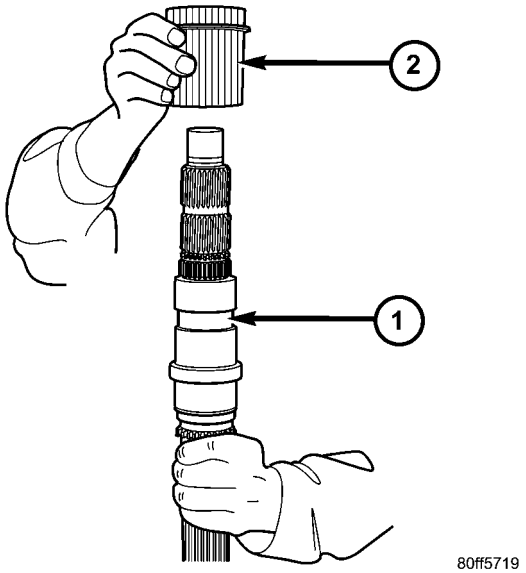


Fig. 62 Install the Drive Sprocket Drive Hub

1 - MAINSHAFT
2 - DRIVE SPROCKET DRIVE HUB

(3) Install the mode hub (Fig. 63) onto the mainshaft.

(4) Install the mode hub retaining ring (Fig. 64) onto the mainshaft.

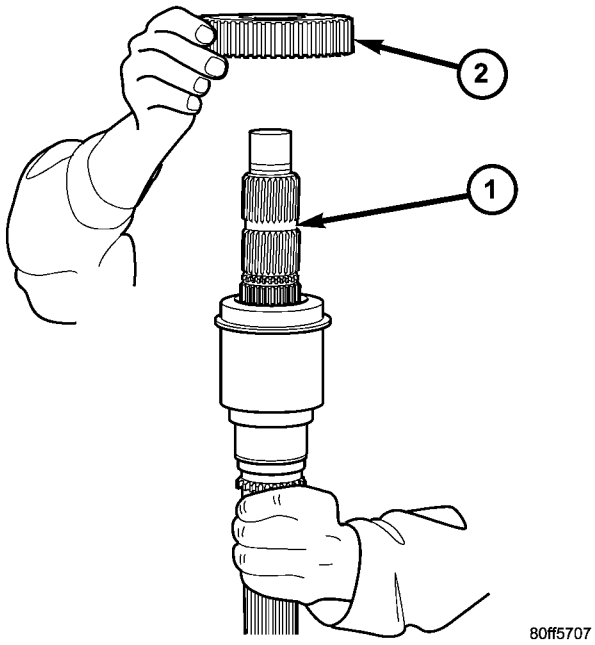


Fig. 63 Install Mode Hub

1 - MAINSHAFT
2 - MODE HUB

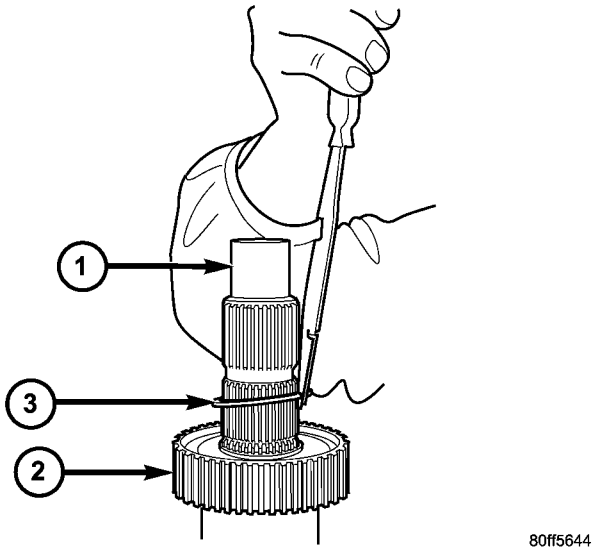


Fig. 64 Install Mode Hub Retaining Ring

1 - MAINSHAFT
2 - MODE HUB
3 - RETAINING RING

TRANSFER CASE - NV273 (Continued)

(5) Install the clutch gear (Fig. 65) onto the output shaft. Verify that the pointed ends of the clutch gear teeth are pointing to the front of the mainshaft.

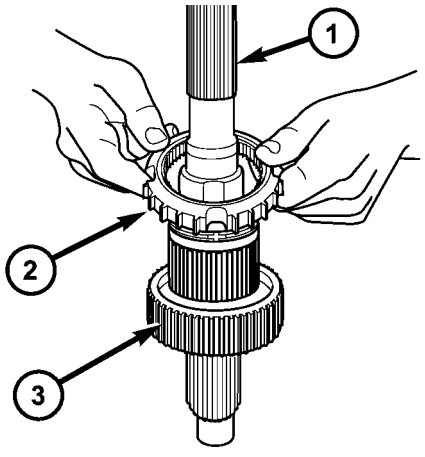


Fig. 65 Install Clutch Gear

1 - OUTPUT SHAFT
2 - CLUTCH GEAR
3 - MODE HUB

(6) Lubricate sector shaft with transmission fluid and install shift sector in case (Fig. 66). Position slot in sector so it will be aligned with shift fork pin when shift forks are installed.

(7) Apply Loctite™ 242, or equivalent, to the threads of the sector support to replentish the factory applied patch. Install the shift sector support. Tighten the sector support with Socket 9033 to 27-34 N·m (20-25 ft.lbs.).

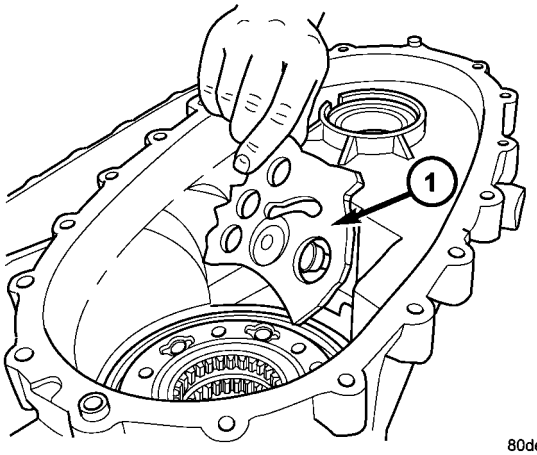


Fig. 66 Install Shift Sector

1 - SHIFT SECTOR

(8) Assemble and install range fork and hub (Fig. 67). Be sure hub is properly seated in low range gear and engaged to the input gear.

(9) Align and insert range fork pin in shift sector slot.

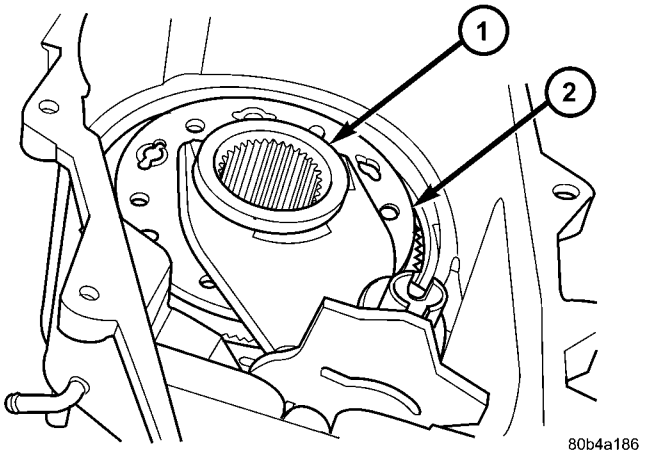


Fig. 67 Install Range Fork And Hub Assembly

1 - RANGE HUB
2 - RANGE FORK

(10) Install mode fork and shift rail onto the mode sleeve.

(11) Install the mode fork, sleeve, and shift rail into the transfer case (Fig. 68).

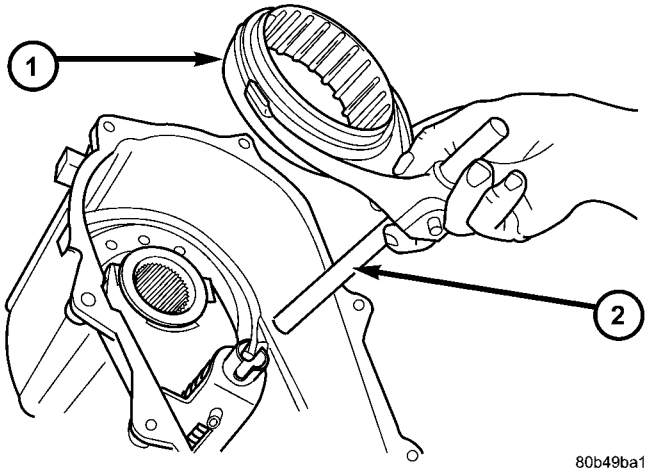


Fig. 68 Mode Fork And Sleeve Installation

1 - MODE SLEEVE
2 - MODE FORK AND RAIL

TRANSFER CASE - NV273 (Continued)

(12) Install new o-ring on detent plug (Fig. 69).

(13) Install detent plunger, spring, and plug (Fig. 70). Tighten the plug to 16-25 N·m (12-18 ft. lbs.).

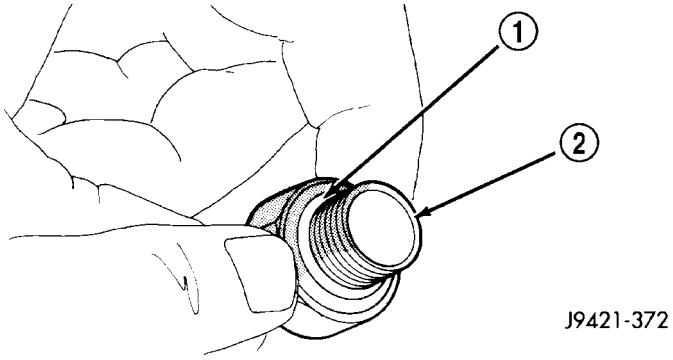


Fig. 69 O-Ring Installation On Detent Plug

1 - O-RING
2 - DETENT PLUG

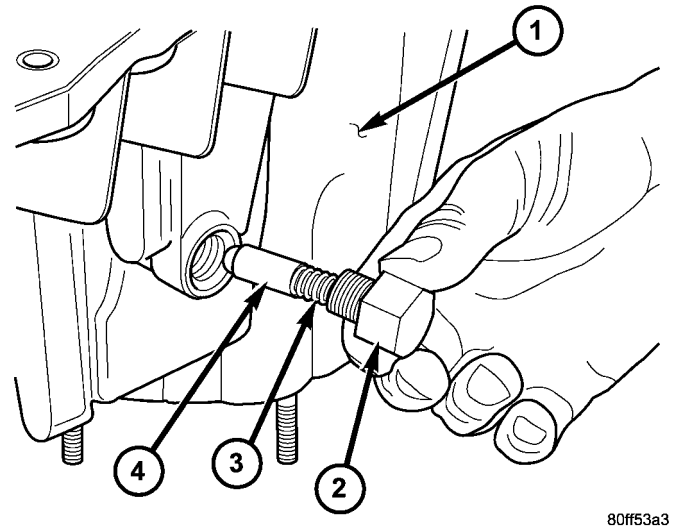


Fig. 70 Install Detent plug, Spring, and Plunger

1 - FRONT CASE HALF
2 - DETENT PLUG
3 - SPRING
4 - PLUNGER

(1) Position the shift motor and mode sensor assembly (Fig. 71) onto the transfer case.

(2) Install the bolts (Fig. 72) to hold the shift motor and mode sensor assembly to the transfer case. Tighten the bolts to 16-25 N·m (12-18 ft. lbs.).

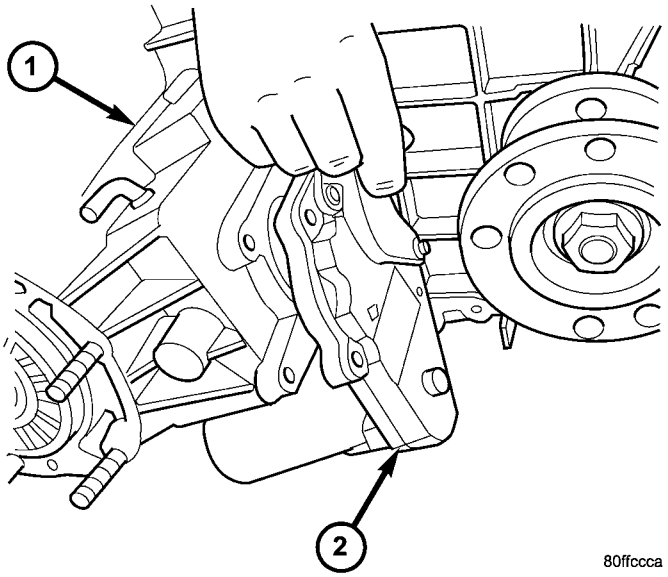


Fig. 71 Install Shift Motor Assembly Onto Transfer Case

1 - TRANSFER CASE
2 - SHIFT MOTOR ASSEMBLY

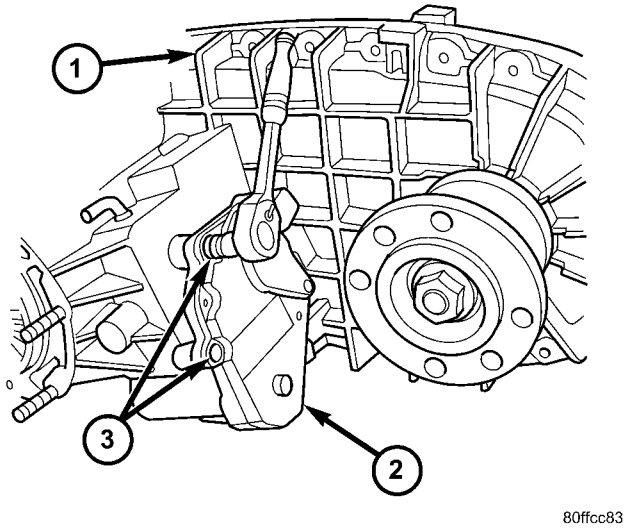


Fig. 72 Install Shift Motor Assembly Bolts

1 - TRANSFER CASE
2 - SHIFT MOTOR ASSEMBLY
3 - BOLTS

TRANSFER CASE - NV273 (Continued)

(3) Install mainshaft into the transfer case (Fig. 73). Guide mainshaft through the mode and range sleeves and into the input gear.

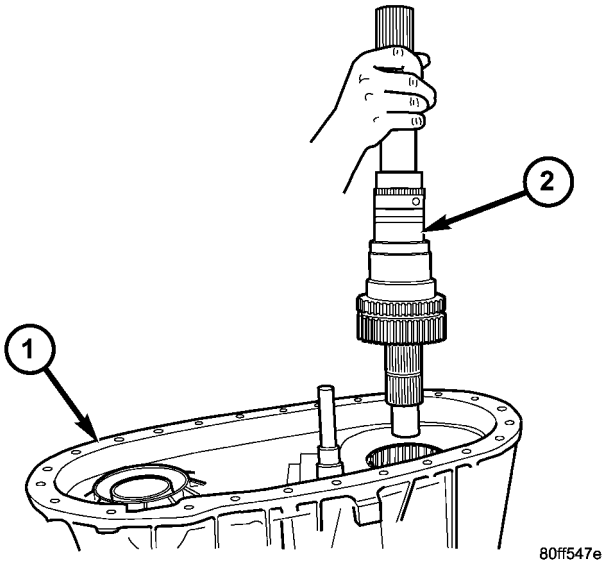


Fig. 73 Install Mainshaft Assembly

1 - FRONT CASE HALF
2 - MAINSHAFT ASSEMBLY

FRONT OUTPUT SHAFT AND DRIVE CHAIN

(1) Install the front output shaft (Fig. 74) into the front output shaft front bearing.

(2) Install the front output shaft bearing inner snap-ring (Fig. 75) onto the output shaft.

(3) Install the new front output shaft seal with Installer MB991168A

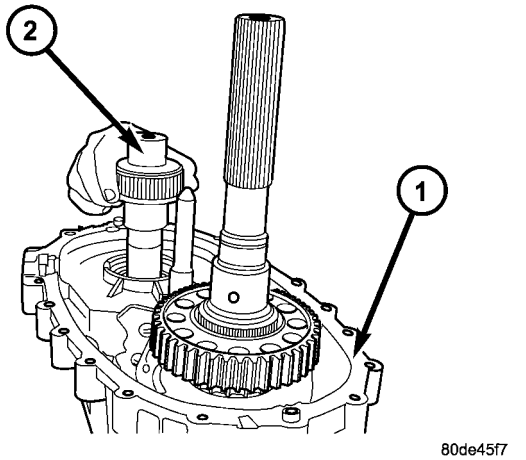


Fig. 74 Install Front Output Shaft

1 - FRONT CASE
2 - FRONT OUTPUT SHAFT

(4) Insert front drive sprocket in drive chain.

(5) Install drive chain around rear drive sprocket.

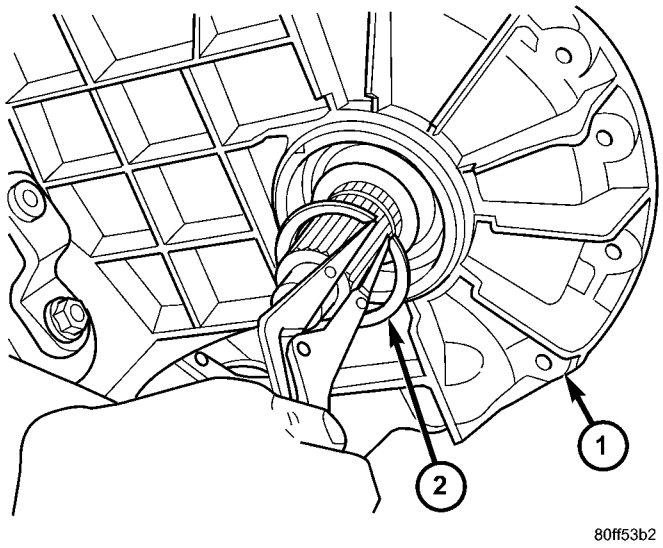


Fig. 75 Install Front Output Shaft Bearing Inner Snap-Ring

1 - FRONT CASE HALF
2 - SNAP-RING

(6) Position rear drive sprocket (Fig. 76) over the output shaft and lower the sprocket and chain assembly until the front sprocket is positioned over the front output shaft.

(7) Align the splines in the sprockets to the splines on the output shafts and install the sprockets onto the output shafts.

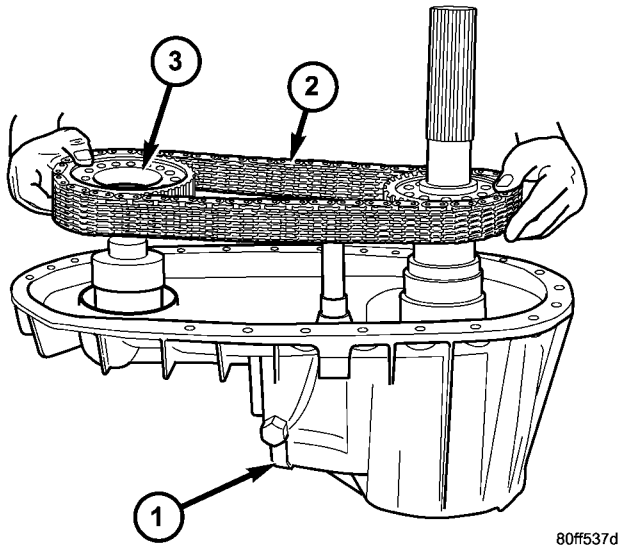


Fig. 76 Install Drive Chain and Sprockets

1 - FRONT CASE HALF
2 - CHAIN
3 - DRIVE SPROCKETS

TRANSFER CASE - NV273 (Continued)

(8) Install front sprocket retaining ring (Fig. 77).
(9) Install rear sprocket retaining ring (Fig. 78).

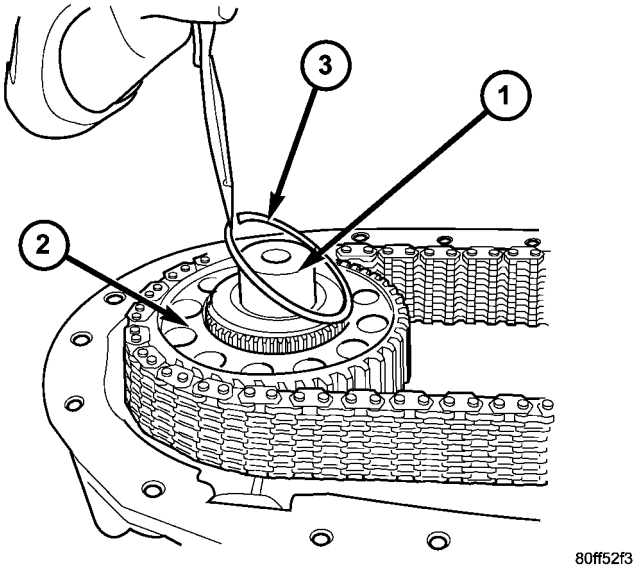


Fig. 77 Install Front Output Shaft Sprocket Retaining Ring

1 - FRONT OUTPUT SHAFT
2 - DRIVE SPROCKET
3 - RETAINING RING

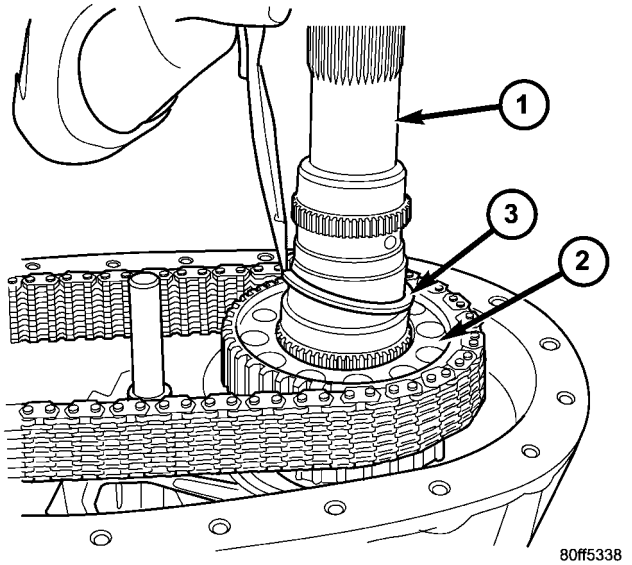


Fig. 78 Install Rear Output Shaft Sprocket Retaining Ring

1 - REAR OUTPUT SHAFT
2 - DRIVE SPROCKET
3 - RETAINING RING

(10) Insert magnet in front case pocket (Fig. 79).

REAR CASE

(1) Install the oil pick-up tube and screen into the rear case half.

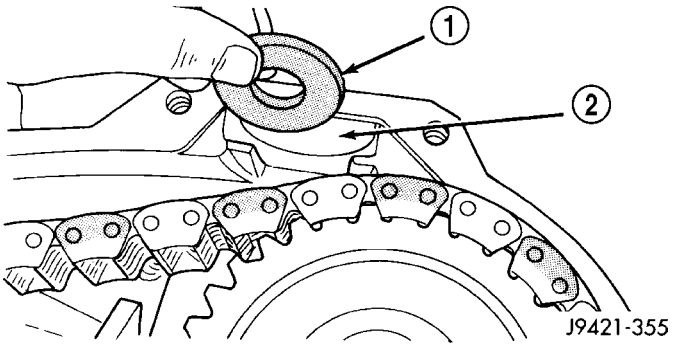


Fig. 79 Case Magnet Installation

1 - MAGNET
2 - CASE POCKET

(2) 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.

(3) Align mainshaft with the rear output shaft bearing and align shift rail with bore in rear case. Then install rear case (Fig. 80). Verify that the case alignment dowels correctly seat into their mating recesses.

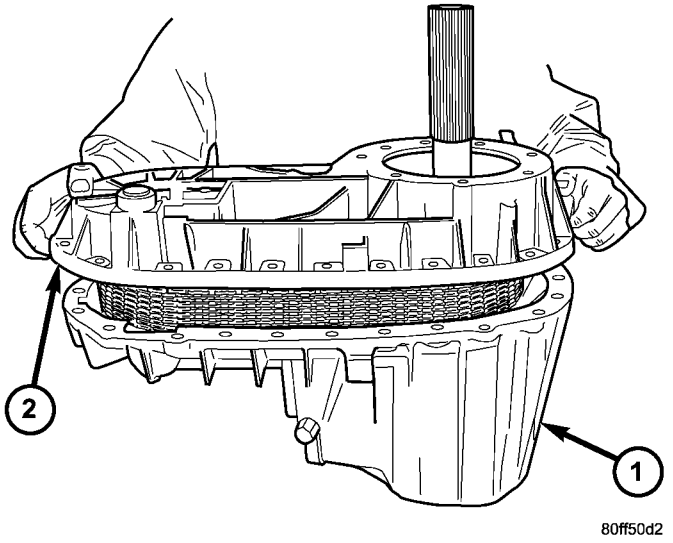


Fig. 80 Install Rear Case Half

1 - FRONT CASE HALF
2 - REAR CASE HALF

TRANSFER CASE - NV273 (Continued)

(4) Install 4-5 rear case-to front case bolts (Fig. 81) to hold rear case in position. Tighten bolts snug but not to specified torque at this time.

CAUTION: Verify that shift rail, and case alignment dowels are seated before installing any bolts. Case could be cracked if shaft rail or dowels are misaligned.

(5) Tighten bolts to 27-34 N·m (20-25 ft. lbs.),

(6) Install rear output bearing inner snap-ring (Fig. 82) to output shaft.

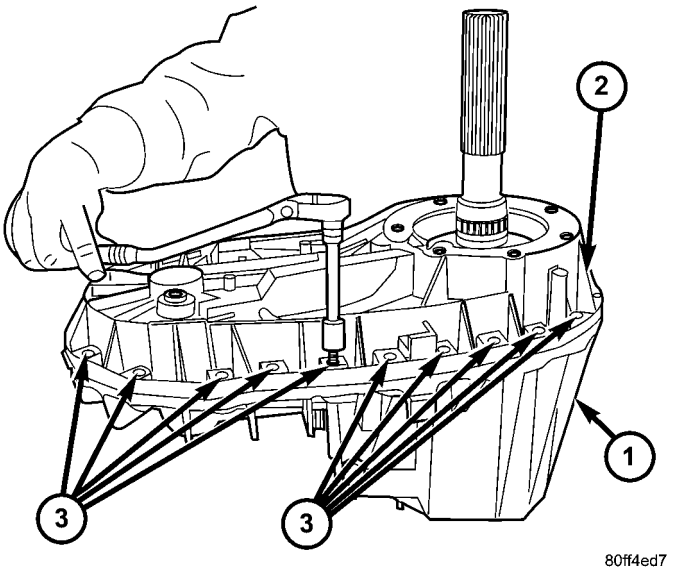


Fig. 81 Install Case Half Bolts

1 - FRONT CASE HALF
2 - REAR CASE HALF
3 - BOLTS

OIL PUMP AND REAR EXTENSION

(1) Install the oil pump (Fig. 83) onto the output shaft.

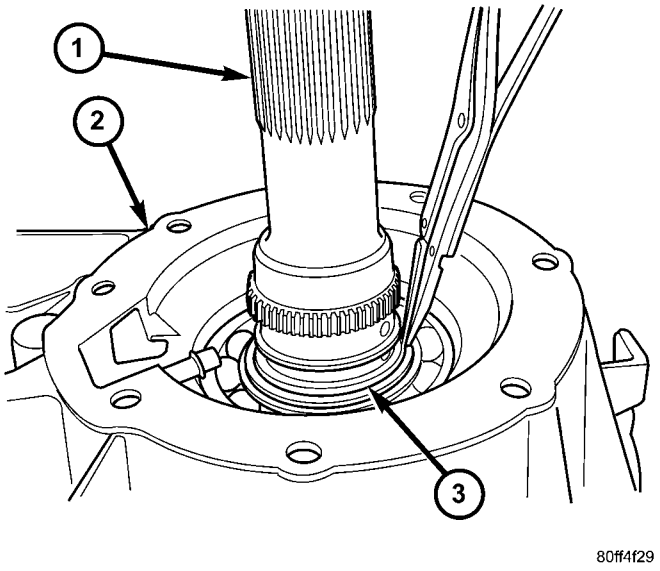


Fig. 82 Install Rear Bearing Inner Snap-Ring

1 - OUTPUT SHAFT
2 - REAR CASE HALF
3 - SNAP-RING

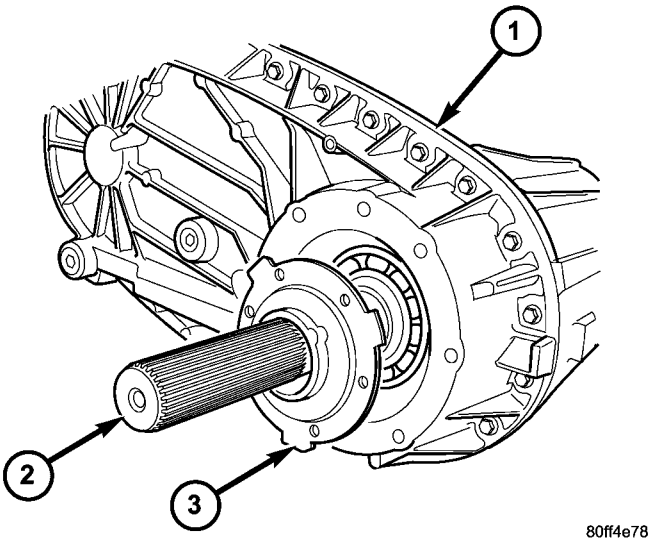


Fig. 83 Install Oil Pump

1 - REAR CASE HALF
2 - REAR OUTPUT SHAFT
3 - OIL PUMP

TRANSFER CASE - NV273 (Continued)

(2) Engage the oil pump pick-up tube (Fig. 84) into the oil pump. Verify that the pick-up tube o-ring is on the tube and is correctly installed to the oil pump.

(3) 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.

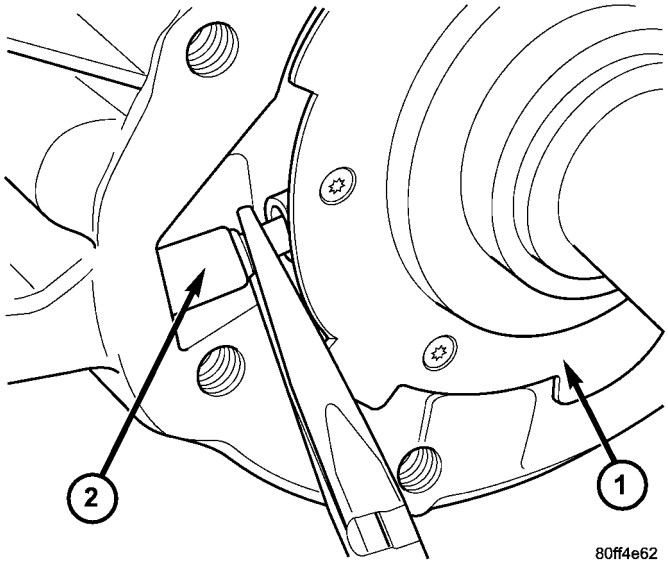


Fig. 84 Engage The Oil Pick-up To Oil Pump

1 - OIL PUMP
2 - OIL PICK-UP TUBE

(4) Install extension housing (Fig. 85) onto the rear case half.

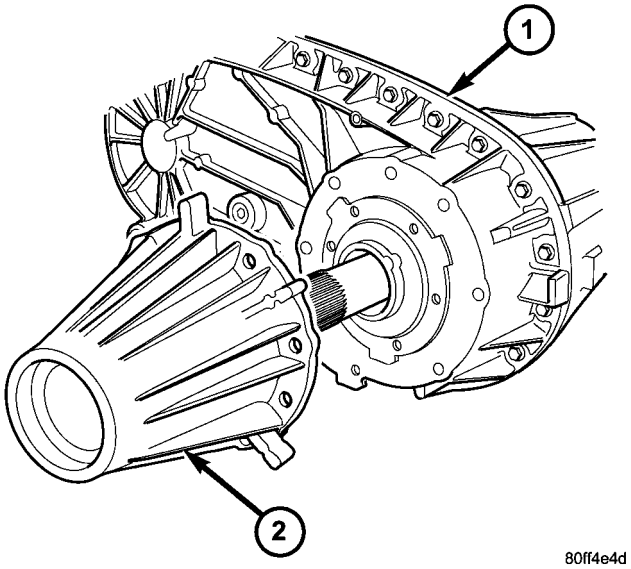


Fig. 85 Install Extension Housing

1 - REAR CASE HALF
2 - EXTENSION HOUSING

(5) Install rear extension bolts (Fig. 86). Tighten the bolts to 27-34 N·m (20-25 ft.lbs.).

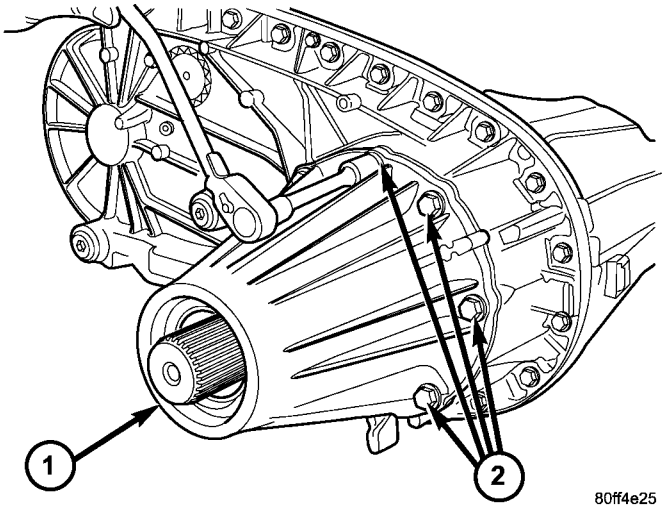


Fig. 86 Install Extension Housing Bolts

1 - EXTENSION HOUSING
2 - BOLTS

(6) Install the extension housing dust boot and seal assembly with Installer 9037 and Handle C-4171 (Fig. 87).

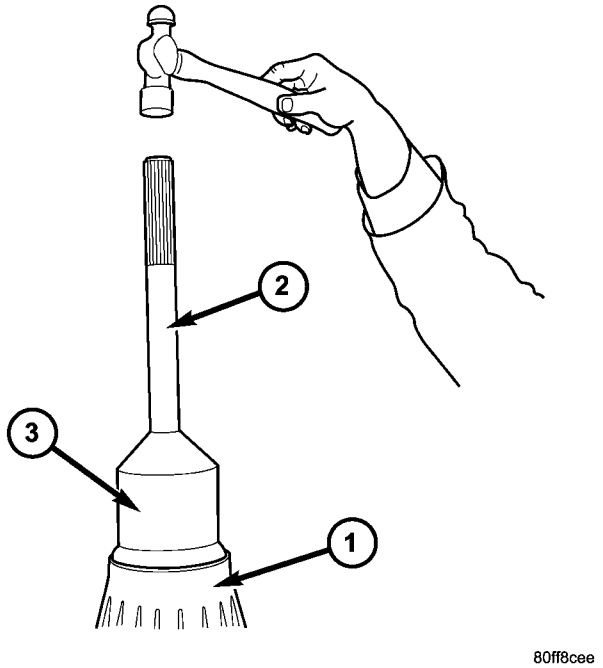


Fig. 87 Install Extension Housing Seal

1 - EXTENSION HOUSING
2 - HANDLE C-4171
3 - INSTALLER 9037

TRANSFER CASE - NV273 (Continued)

(7) Install the front companion flange onto the front output shaft.
(8) Install two bolts 180° apart into the front output shaft companion flange.
(9) Place holder over the bolts and against the companion flange (Fig. 88).
(10) Install a new front companion flange nut. Tighten the companion flange nut to 176-271 N·m (130-200 ft.lbs.).

INSTALLATION

(1) Mount transfer case on a transmission jack.
(2) Secure transfer case to jack with chains.
(3) Position transfer case under vehicle.
(4) Align transfer case and transmission shafts and install transfer case onto the transmission.
(5) Install and tighten transfer case attaching nuts to 27-34 N·m (20-25 ft. lbs.) torque.
(6) Connect the vent hose.
(7) Connect the shift motor and mode sensor wiring connectors. Secure wire harness to clips on transfer case.
(8) Align and connect the propeller shafts.
(9) Fill transfer case with correct fluid. (Refer to 21 - TRANSMISSION/TRANSFER CASE/FLUID - STANDARD PROCEDURE)
(10) Install skid plate, if equipped.

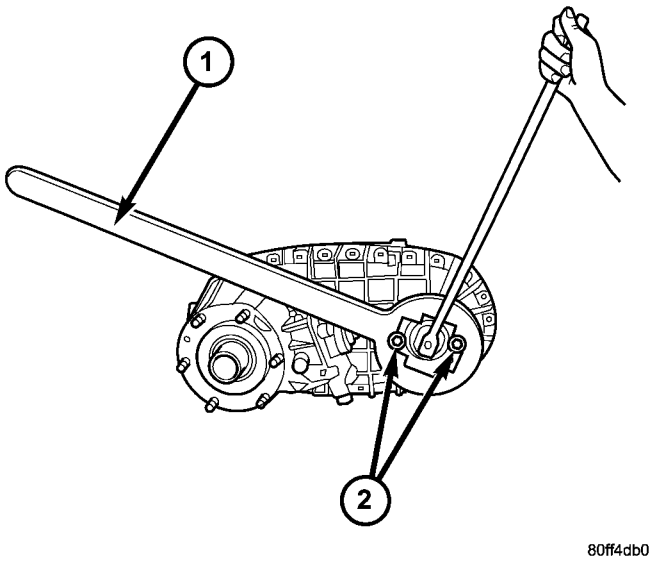


Fig. 88 Install Companion Flange Nut

1 - HOLDER 6719
2 - BOLTS

(11) Remove transmission jack and support stand.
(12) Lower vehicle and verify transfer case shift operation.

SPECIFICATIONS

TRANSFER CASE - NV273

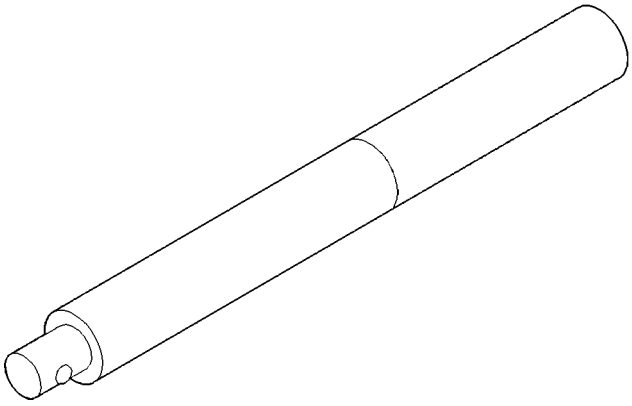
TORQUE SPECIFICATIONS

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Plug, Detent	16-24	12-18	-
Plug, Drain/Fill	20-34	15-25	-
Bolt, Extension Housing	27-34	20-25	-
Bolt, Case Half	27-34	20-25	-
Support, Sector	27-34	20-25	-
Nuts, Mounting	30-41	20-30	-
Bolts, Shift Motor and Mode Sensor Assembly	16-25	12-18	-
Nut, Companion Flange	176-271	130-200	-

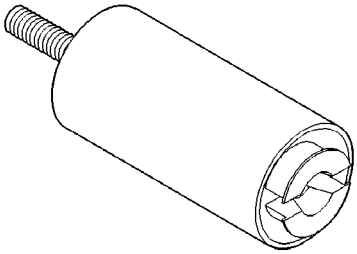
TRANSFER CASE - NV273 (Continued)

SPECIAL TOOLS

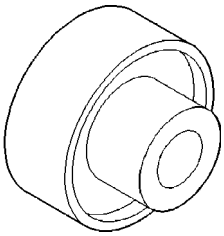
TRANSFER CASE NV271/NV273



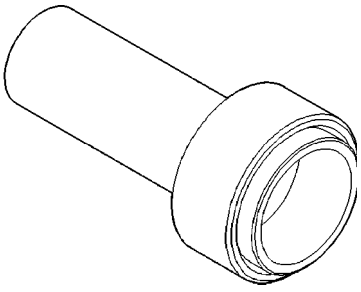
Handle, Universal - C-4171



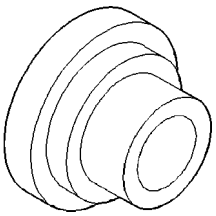
Remover - L-4454



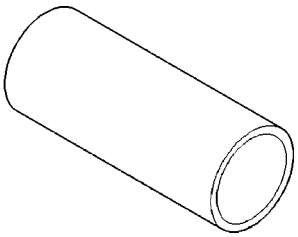
Installer, Bearing - 6953



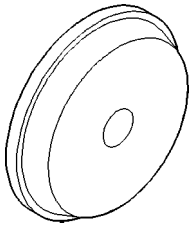
Installer, Pump Housing Seal - 7888



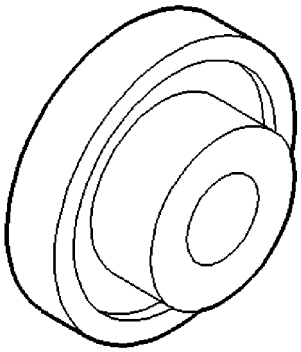
Installer, Bearing - 8128



Cup - 8148

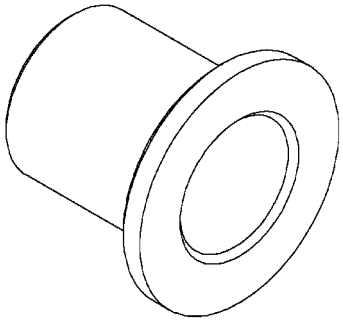


Installer - 8151

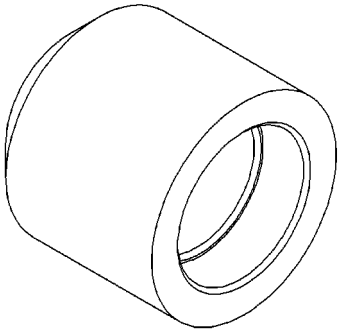


Installer - 8152

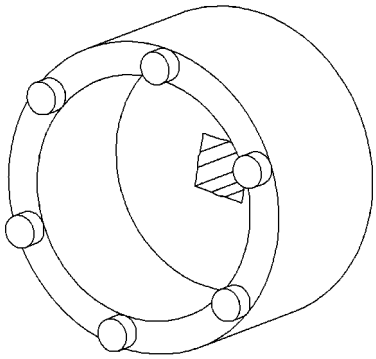
TRANSFER CASE - NV273 (Continued)



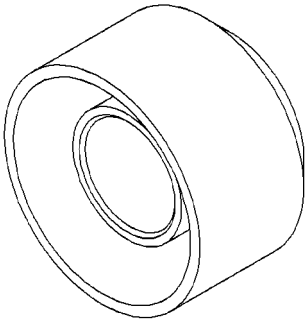
Installer - 8891



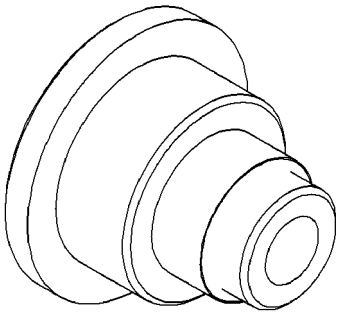
Installer, Seal - 9036



Socket - 9033



Installer, Seal - 9037



Installer, Bearing - 9035

EXTENSION HOUSING SEAL AND DUST BOOT

REMOVAL

(1) Raise and support vehicle.

(2) Remove rear propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL)

(3) Use a suitable chisel or pry tool to remove the rear extension housing dust boot (Fig. 89).

(4) Use a suitable chisel or pry tool to remove the rear extension housing seal.

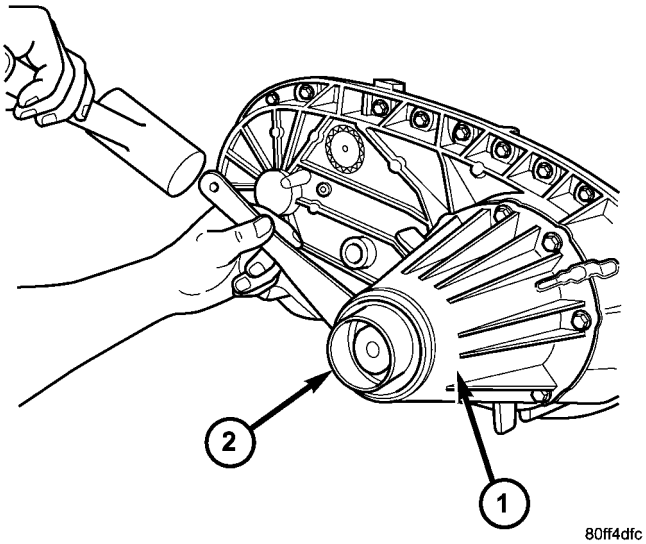


Fig. 89 Remove Extension Housing Dust Boot

1 - EXTENSION HOUSING
2 - DUST BOOT

INSTALLATION

(1) Clean fluid residue from sealing surface and inspect for defects.

(2) Install the extension housing dust boot and seal assembly with Installer 9037 and Handle C-4171 (Fig. 90).

(3) Install propeller shaft. (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION)

(4) Verify proper transfer case fluid level.

(5) Lower vehicle.

FLUID

STANDARD PROCEDURE - FLUID DRAIN AND REFILL

The fill and drain plugs are both in the rear case (Fig. 91).

(1) Raise vehicle.

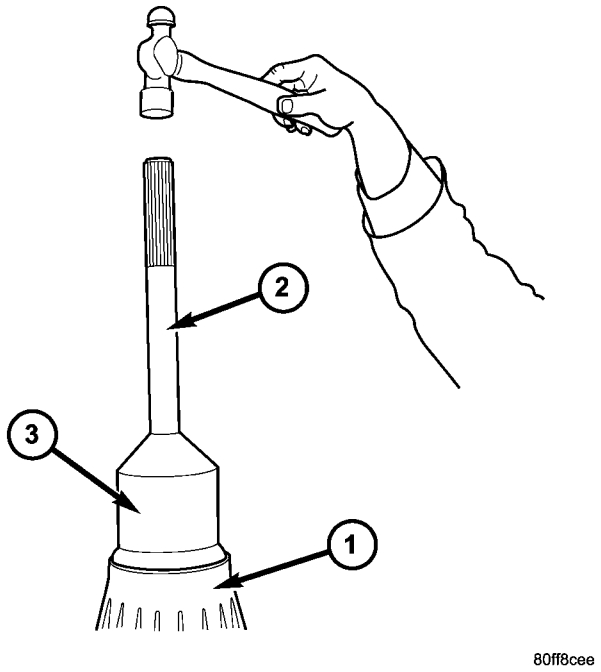


Fig. 90 Install Extension Housing Seal

1 - EXTENSION HOUSING
2 - HANDLE C-4171
3 - INSTALLER 9037

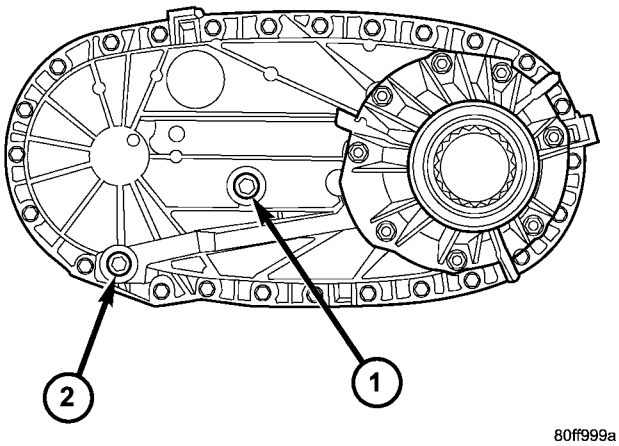


Fig. 91 Drain and Fill Locations

1 - FILL HOLE
2 - DRAIN HOLE

(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.

FLUID (Continued)

(6) Fill transfer case to bottom edge of fill plug opening with Mopar® ATF +4, 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) Remove the front propeller shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - REMOVAL).

(2) Install two bolts 180° apart into the front output shaft companion flange.

(3) Place holder over the bolts and against the companion flange (Fig. 92).

(4) Remove and discard the front companion flange nut.

(5) Remove the companion flange from the front output shaft. It may be necessary to use Flange puller 8992 to remove the companion flange.

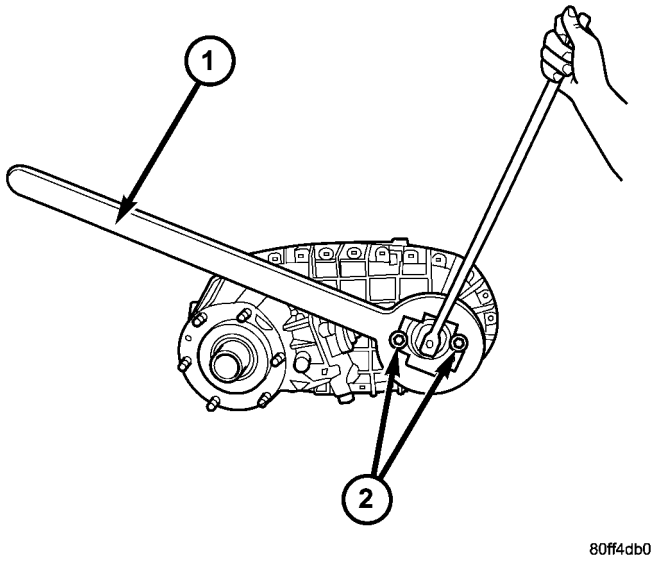


Fig. 92 Remove Companion Flange Nut

1 - HOLDER 6719
2 - BOLTS

(6) Using a screw and a slide hammer, remove the front output shaft seal.

INSTALLATION

(1) Install the new front output shaft seal with Installer MB991168A.

(2) Install the front companion flange onto the front output shaft.

(3) Install two bolts 180° apart into the front output shaft companion flange.

(4) Place holder over the bolts and against the companion flange (Fig. 93).

(5) Install a new front companion flange nut. Tighten the companion flange nut to 258-312 N·m (190-230 ft.lbs.).

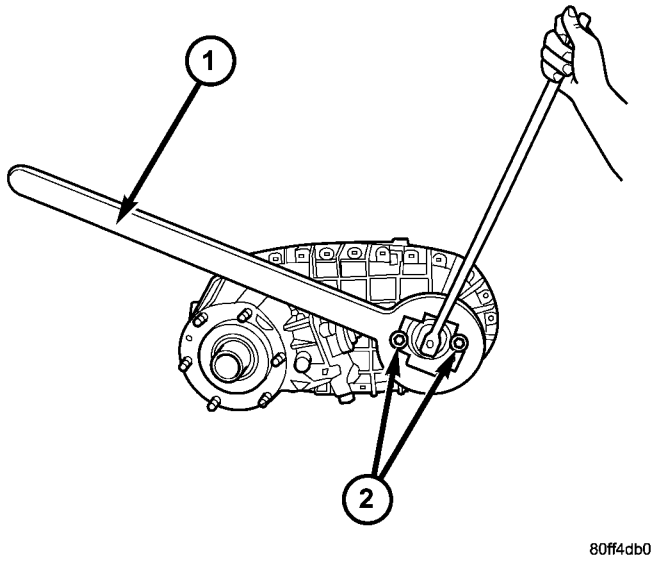


Fig. 93 Install Companion Flange Nut

1 - HOLDER 6719
2 - BOLTS

(6) Install front propeller shaft (Refer to 3 - DIFFERENTIAL & DRIVELINE/PROPELLER SHAFT/PROPELLER SHAFT - INSTALLATION).

MODE SENSOR

DESCRIPTION

The transfer case mode sensor (Fig. 94) is an electronic device whose output can be interpreted to indicate the shift motor shaft's rotary position. The sensor consists of a magnetic ring and four Hall Effect Transistors to create a 4 channel digital device (non-contacting) whose output converts the motor shaft position into a coded signal. The TCCM must supply 5VDC (+/- 0.5v) to the sensor and monitor the shift motor position. The four channels are denoted A, B, C, and D. The sensor is mechanically linked to the shaft of the cam which causes the transfer case shifting. The mode sensor draws less than 53 mA.

OPERATION

During normal vehicle operation, the Transfer Case Control Module (TCCM) monitors the mode sensor outputs at least every 250 (+/-50) milliseconds when the shift motor is stationary and 400 microseconds when the shift motor is active. A mode sensor signal between 3.8 Volts and 0.8 Volts is considered to be undefined.

Refer to SECTOR ANGLES vs. TRANSFER CASE POSITION for the relative angles of the transfer case shift sector versus the interpreted transfer case gear operating mode. Refer to MODE SENSOR CHANNEL STATES for the sensor codes returned to the TCCM for each transfer case mode sensor position. The various between gears positions can also be referred as the transfer case's coarse position. These coarse positions come into play during shift attempts.

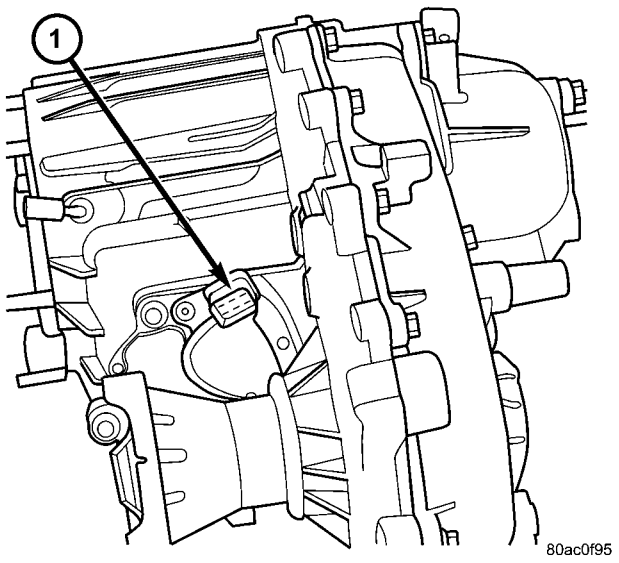


Fig. 94 Mode Sensor

1 - MODE SENSOR

SECTOR ANGLES VS. TRANSFER CASE POSITION

Shaft Angle (Degrees)	Transfer Case Position
+40	4LO
+20	N
0	2WD/AWD
-20	4HI

MODE SENSOR CHANNEL STATES

Transfer Case Angle (degrees)	Sensor Channel A	Sensor Channel B	Sensor Channel C	Sensor Channel D
Between Gears	H	H	L	H
+40 (4LO)	H	H	L	L
Between Gears	H	H	L	H
Between Gears	H	L	L	H
+20 (NEUTRAL)	H	L	L	L
Between Gears	H	L	L	H
Between Gears	H	L	H	H
0 (2WD/AWD)	H	L	H	L
Between Gears	H	L	H	H
Between Gears	L	L	H	H
-20 (4HI)	L	L	H	L
Between Gears	L	L	H	H
Between Gears	L	H	H	H

SELECTOR SWITCH

DESCRIPTION

The selector switch assembly (Fig. 95) is mounted in the left side of the vehicle's Instrument Panel (IP) and consists of a rotary knob connected to a resistive network for the mode and range shift selections. Also located in this assembly is a recessed, normally open momentary switch for making shifts into and out of transfer case NEUTRAL. A pen, or similar instrument, is used to make a NEUTRAL shift selection, thus reducing the likelihood of an inadvertent shift request.

The selector switch also contains four light emitting diode's (LED's) to indicate the transfer case position and whether a shift is in progress.

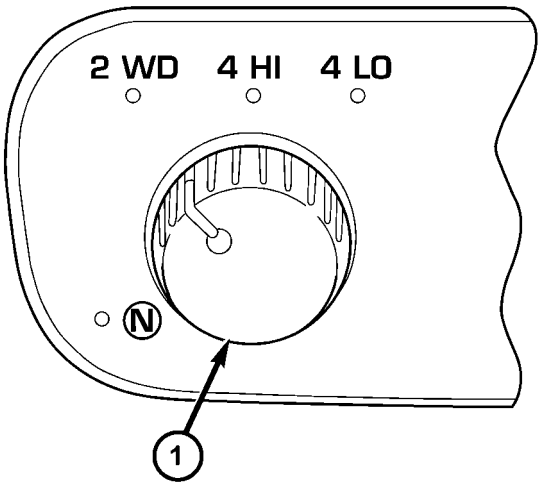


Fig. 95 Transfer Case Selector Switch

1 - SELECTOR SWITCH

OPERATION

As the position of the selector switch varies, the resistance between the Mode Sensor supply voltage pin and the Mode Sensor output will vary. Hardware, software, and calibrations within the Transfer Case Control Module (TCCM) are provided that interpret the selector switch resistance as given in the table below: SELECTOR SWITCH INTERPRETATION

SELECTOR SWITCH INTERPRETATION

Step	Resistance Range (ohms)	Required Interpretation
A	<200	Shorted
B	400-700	NEUTRAL
C	1050-1450	4LO
D	1850-2300	4HI
E	3050-5950	2WD (Default)
F	9.5-12.5K	In between positions
G	>15.5K	Open

For resistances between the ranges B-E shown for each valid position (T-Case NEUTRAL, 4LO, 4HI, 2WD), the TCCM may interpret the resistance as:

- either of the neighboring valid positions.
- as an invalid fault position.

For resistances between the ranges E and F shown for 2WD and in-between positions, the TCCM may interpret the resistance as:

- the 2WD position.
- an invalid fault position.
- a valid in-between position.

For resistances between the ranges F and G shown for in-between positions and fault condition (open), the TCCM may interpret the resistance as:

- a valid in-between position.
- an invalid fault position.

For resistances between the ranges A and B shown for the fault condition (short) and , T-Case NEUTRAL, the TCCM may interpret the resistance as:

- the T-Case NEUTRAL position.
- an invalid fault position.

The LED's in the selector assembly are illuminated/flashed in the following manner to indicate a particular condition or state.

- A solidly illuminated LED indicates a successfully completed shift and the current operating mode of the transfer case. While a shift has been requested but not yet completed, the LED for the desired transfer case position is flashed.

SELECTOR SWITCH (Continued)

- A flashing operating mode LED for the desired gear indicates that a shift to that position has been requested, but all of the driver controllable conditions have not been met. This is in an attempt to notify the driver that the transmission needs to be put into NEUTRAL, the vehicle speed is too great, or some other condition outlined (other than a diagnostic failure that would prevent this shift) elsewhere (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSFER CASE CONTROL MODULE - OPERATION) is not met. Note that this flashing will continue indefinitely until the conditions are eventually met, or the selector switch position is changed, or if diagnostic routines no longer allow the requested shift.
- If the driver attempts to make a shift into transfer case NEUTRAL, and any of the driver controllable conditions are not met, the request will be ignored until all of the conditions are met or until the NEUTRAL select button is released. Additionally the neutral lamp will flash, or begin to flash while the button is depressed and operator controllable conditions are not being met. All of the LED's except the Neutral will flash if any of the operator controllable conditions for shifting are not met while the Neutral button is depressed. This ″toggle″ type of feature is necessary because the TCCM would interpret another request immediately after the shift into transfer case NEUTRAL has completed.
- No LED's illuminated indicate a fault in the transfer case control system.

SHIFT MOTOR

DESCRIPTION

The shift motor (Fig. 96) consists of a permanent magnet D.C. motor with gear reduction to convert a high speed-low torque device into a low speed-high torque device. The output of the device is coupled to a shaft which internally moves the mode and range forks that change the transfer case operating ranges. The motor is rated at 25 amps maximum at 72° F with 10 volts at the motor leads.

OPERATION

The transfer case shift motor responds to the Transfer Case Control Module (TCCM) commands to move the transfer case shift sector bi-directionally, as required, to obtain the transfer case operating mode indicated by the instrument panel mounted selector switch.

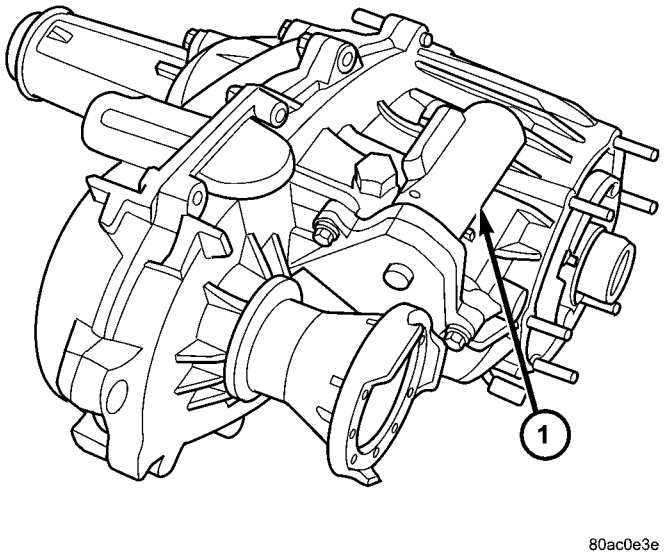


Fig. 96 Shift Motor - Shown Inverted - Typical

1 - SHIFT MOTOR

REMOVAL

(1) Raise the vehicle on a suitable hoist.
(2) Disengage the wiring connectors from the shift motor and mode sensor.
(3) Remove the bolts holding the shift motor and mode sensor assembly onto the transfer case.
(4) Separate the shift motor and mode sensor assembly from the transfer case.

INSTALLATION

(1) Verify that the shift sector o-ring is clean and properly positioned over the shift sector and against the transfer case.
(2) Position the shift motor and mode sensor assembly onto the transfer case.
(3) Install the bolts to hold the assembly onto the transfer case. Tighten the bolts to 16-24 N·m (12-18 ft.lbs.).

CAUTION: If the original shift motor and mode sensor assembly bolts are reused, be sure to use Mopar® Lock & Seal or Loctite™ 242 to replenish the lock patch material originally found on the bolts

(4) Engage the wiring connectors to the shift motor and mode sensor.
(5) Refill the transfer case as necessary.
(6) Lower vehicle and verify transfer case operation.