

TRANSMISSION AND TRANSFER CASE

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AX5 MANUAL TRANSMISSION

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GENERAL INFORMATION

AX5 MANUAL TRANSMISSION

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

TRANSMISSION IDENTIFICATION

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

ture. The next series of numbers is the transmission serial number.

GEAR RATIOS

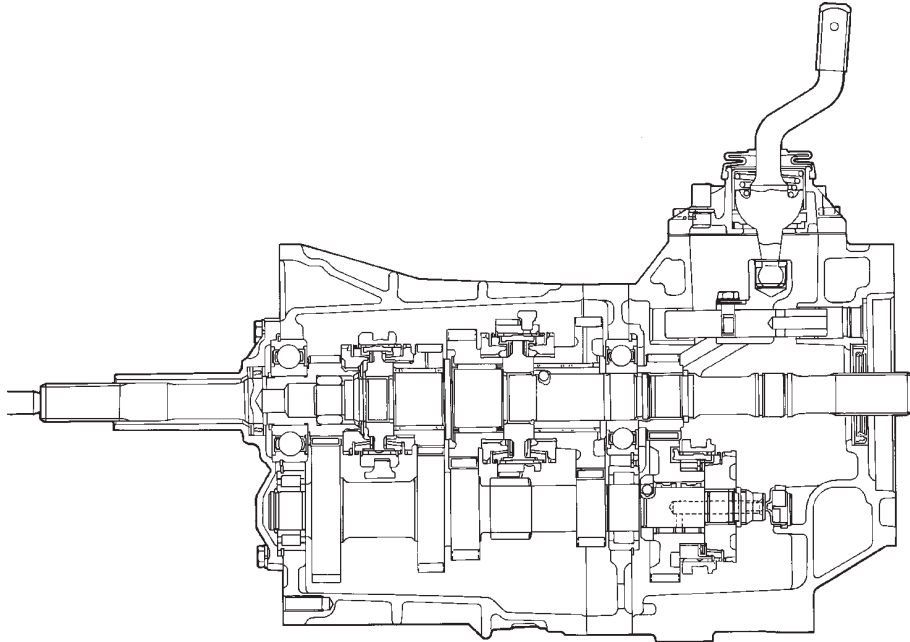
Gear ratios for the AX5 manual transmission are as follows:

- First gear: 3.93:1
- Second gear: 2.33:1
- Third gear: 1.45:1
- Fourth gear: 1.00:1
- Fifth gear: 0.85:1
- Reverse gear: 4.74:1

RECOMMENDED LUBRICANT

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

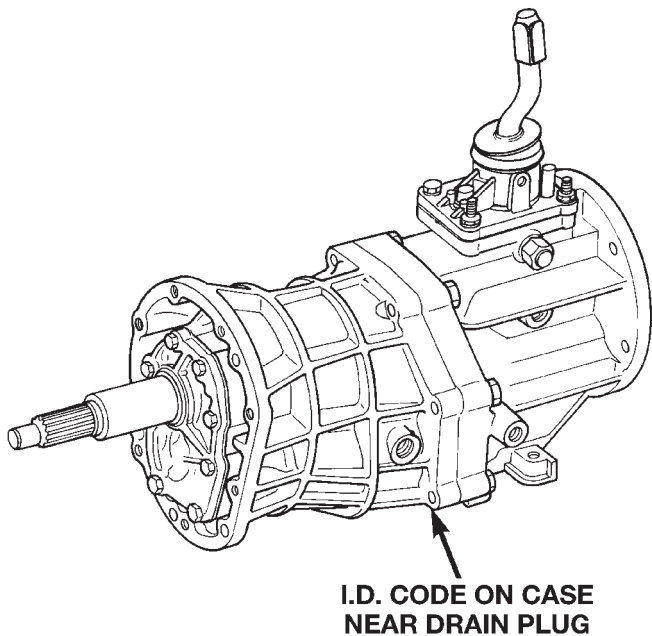
GENERAL INFORMATION (Continued)



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Fig. 1 AX5 Manual Transmission

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



**I.D. CODE ON CASE
NEAR DRAIN PLUG**

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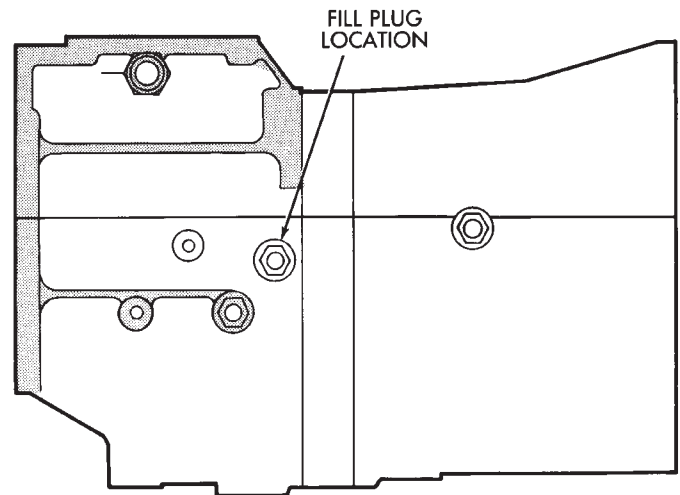
Fig. 2 Transmission Identification

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

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

Approximate dry fill lubricant capacity is:

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



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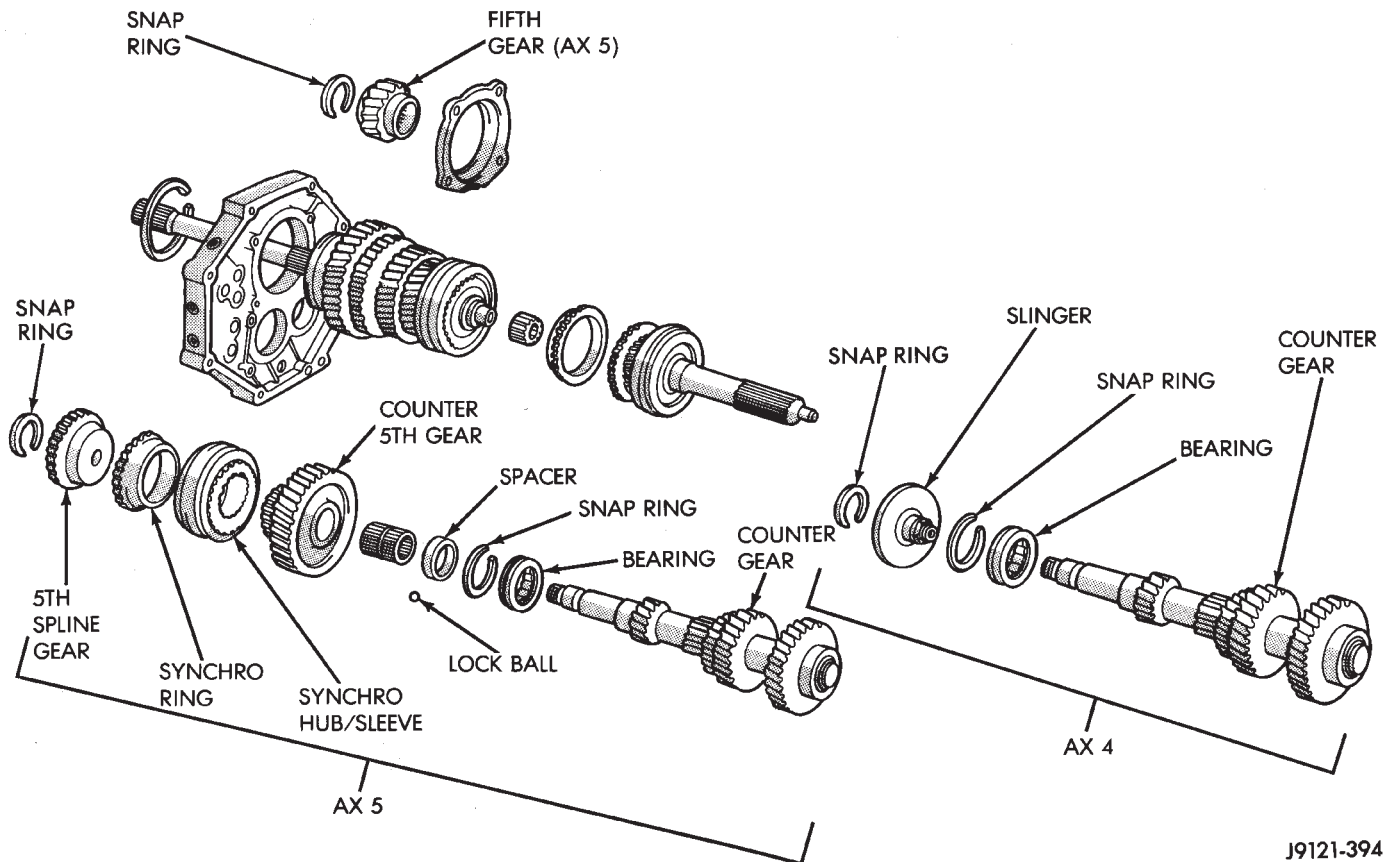
Fig. 3 Fill Plug Location

TRANSMISSION ASSEMBLY INFORMATION

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

Refer to (Fig. 4) during assembly for AX5 gear assembly identification.

GENERAL INFORMATION (Continued)



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Fig. 4 Geartrain Components

DIAGNOSIS AND TESTING

LOW LUBRICANT LEVEL

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

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

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

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

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

the lubricant level after any addition of fluid to avoid an incorrect lubricant level condition.

HARD SHIFTING

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

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

DIAGNOSIS AND TESTING (Continued)

TRANSMISSION NOISE

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

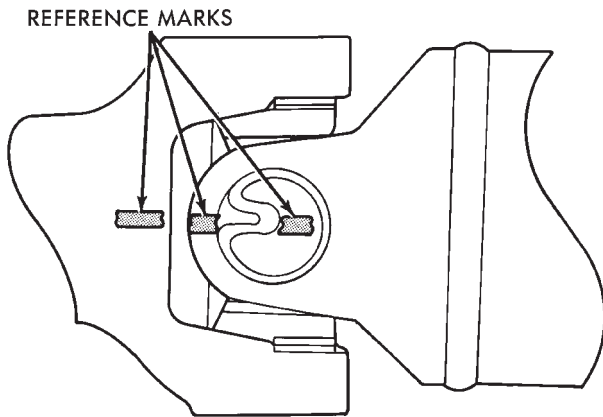
Severe, highly audible transmission noise is generally the initial indicator of a lubricant problem. Insufficient, improper, or contaminated lubricant will promote rapid wear of gears, synchros, shift rails, forks and bearings. The overheating caused by a lubricant problem, can also lead to gear breakage.

REMOVAL AND INSTALLATION

TRANSMISSION

REMOVAL

- (1) Shift transmission into first or third gear.
- (2) Raise and support vehicle on suitable safety stands.
- (3) Disconnect necessary exhaust system components.
- (4) Remove skid plate, if equipped.
- (5) Remove slave cylinder from clutch housing.
- (6) Mark rear propeller shaft and rear axle yokes for installation alignment (Fig. 5).



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Fig. 5 Marking Propeller Shaft And Axle Yokes

- (7) Mark front propeller shaft, axle, and transfer case yokes for installation alignment, if equipped.
- (8) Remove propeller shaft(s).
- (9) Unclip wire harnesses from transmission and transfer case, if equipped.
- (10) Disconnect transfer case vent hose, if equipped.
- (11) Disengage any wire connectors attached to transmission or transfer case, if equipped, components.
- (12) Support transfer case, if equipped, with transmission jack.

- (13) Secure transfer case, if equipped, to jack with safety chains.
- (14) Disconnect transfer case shift linkage at transfer case, if equipped.
- (15) Remove nuts attaching transfer case to transmission, if equipped.
- (16) Remove transfer case, if equipped.
- (17) Remove crankshaft position sensor (Fig. 6), (Fig. 7).

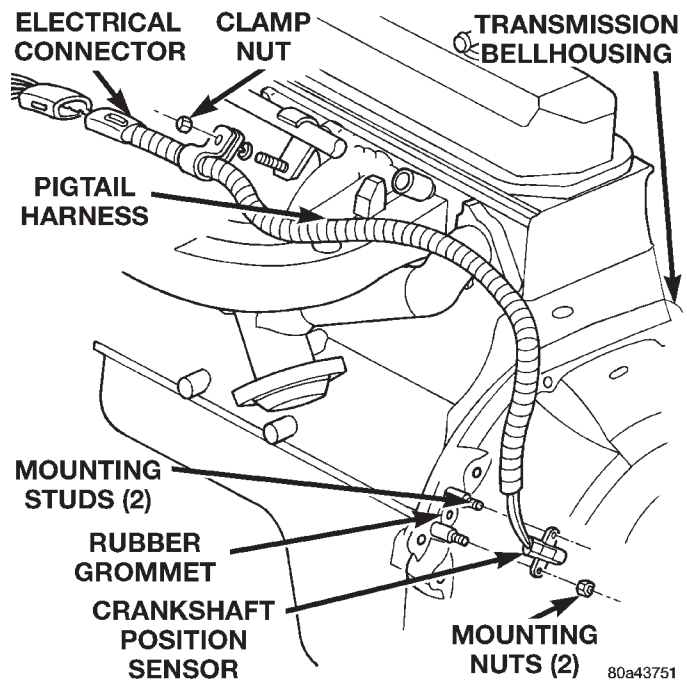


Fig. 6 Crankshaft Position Sensor—2.5L Engine

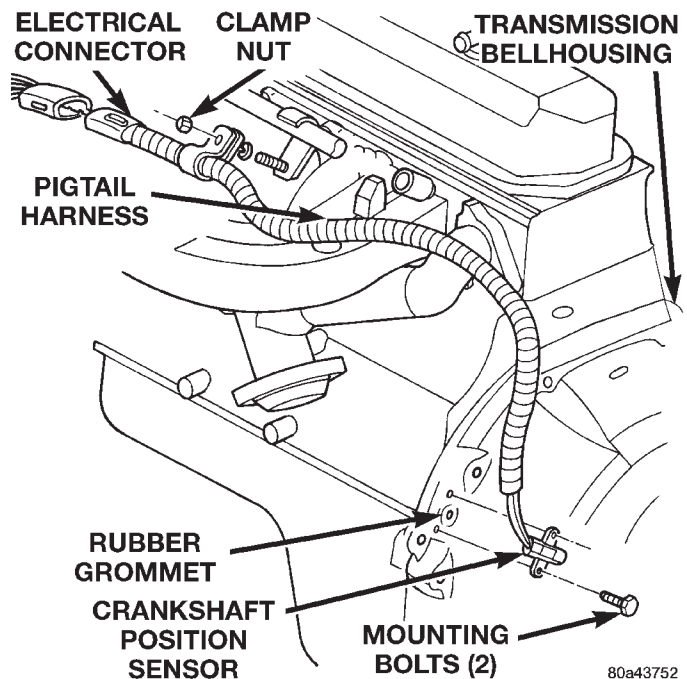


Fig. 7 Crankshaft Position Sensor —4.0L Engine

REMOVAL AND INSTALLATION (Continued)

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

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

(19) Support transmission with transmission jack.

(20) Secure transmission to jack with safety chains.

(21) Disconnect rear cushion and bracket from transmission.

(22) Remove rear crossmember.

(23) Disconnect transmission shift lever as follows:

(a) Lower transmission-transfer case assembly approximately 7-8 cm (3 in.) for access to shift lever.

(b) Reach up and around transmission case and unseat shift lever dust boot from transmission shift tower (Fig. 8). Move boot upward on shift lever for access to retainer that secures lever in shift tower.

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

(d) Lift lever and retainer out of shift tower (Fig. 8). Do not remove the shift lever from the floor console shifter boots. Leave the lever in place for transmission installation.

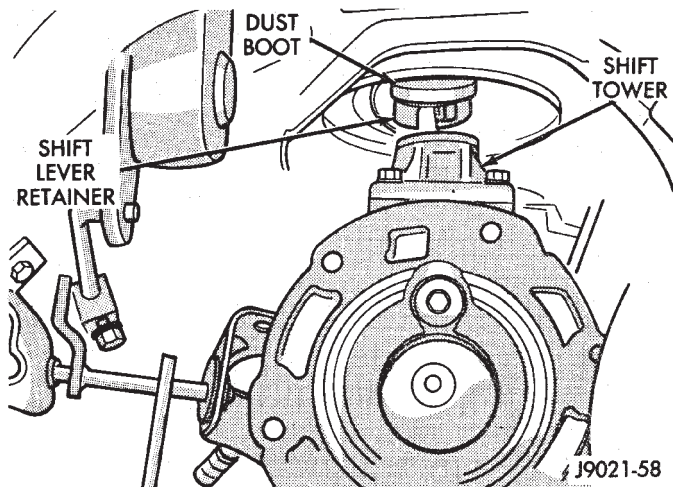


Fig. 8 Removing/Installing Shift Lever

(24) Remove clutch housing brace rod.
 (25) Remove clutch housing-to-engine bolts.
 (26) Pull transmission jack rearward until input shaft clears clutch. Then slide transmission out from under vehicle.

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

(28) Remove clutch housing from transmission (Fig. 9).

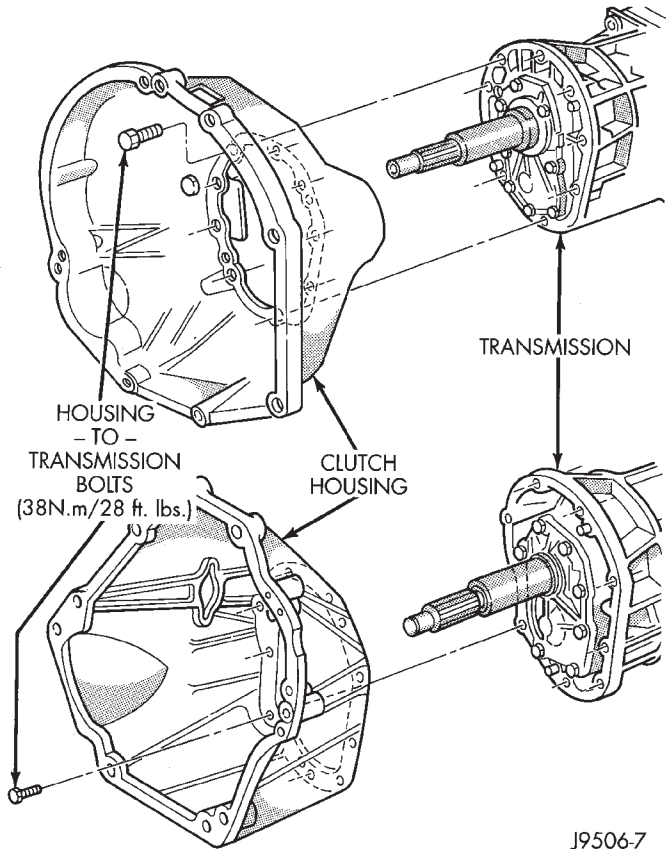


Fig. 9 Clutch Housing

INSTALLATION

(1) Install clutch housing on transmission. Tighten housing bolts to 37 N·m (27 ft. lbs.) torque.

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

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

(4) Position and secure transmission on transmission jack.

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

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

(7) Install and tighten clutch housing-to-engine bolts to 38 N·m (28 ft. lbs.) torque (Fig. 9). **Be sure the housing is properly seated on engine block before tightening bolts.**

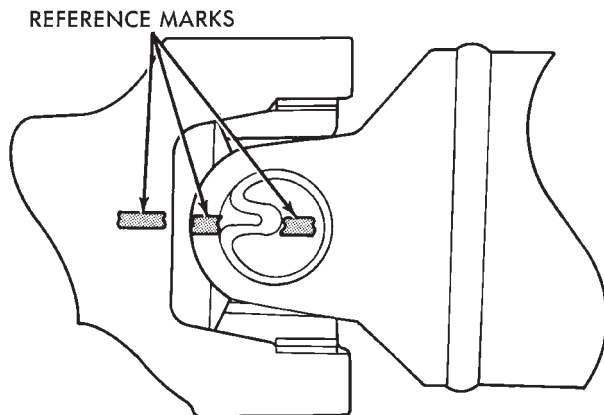
(8) Install clutch housing brace rod.

(9) Lower transmission approximately 7-8 cm (3 in.) for access to shift tower. Be sure transmission is in first or third gear.

(10) Reach up and around transmission and insert shift lever in shift tower. Press lever retainer downward and turn it clockwise to lock it in place. Then install lever dust boot on shift tower.

REMOVAL AND INSTALLATION (Continued)

- (11) Install rear crossmember. Tighten crossmember-to-frame bolts to 41 N·m (31 ft. lbs.) torque.
- (12) Install fasteners to hold rear cushion and bracket to transmission. Then tighten transmission-to-rear support bolts/nuts to 45 N·m (33 ft. lbs.) torque.
- (13) Remove support stands from engine and transmission.
- (14) Install and connect crankshaft position sensor.
- (15) Position transfer case on transmission jack, if equipped.
- (16) Secure transfer case to jack with safety chains, if equipped.
- (17) Raise transfer case, if equipped, and align transfer case input shaft to the transmission output shaft.
- (18) Slide transfer case forward until case is seated on transmission, if necessary.
- (19) Install nuts to attach transfer case to transmission, if equipped. Tighten transfer case-to-transmission nuts to 35 N·m (26 ft. lbs.) torque.
- (20) Connect transfer case shift linkage at transfer case, if equipped.
- (21) Connect transfer case vent hose, if equipped.
- (22) Secure wire harnesses in clips/tie straps on transmission and transfer case, if equipped.
- (23) Engage wire connectors attached to all necessary transmission or transfer case, if equipped, components.
- (24) Install rear propeller shaft slip yoke to transmission or transfer case, if equipped, output shaft.
- (25) Align marks on rear propeller shaft and rear axle yokes (Fig. 10).



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Fig. 10 Align Propeller Shaft And Rear Axle Yokes Alignment Marks

- (26) Install and tighten propeller shaft U-joint clamp bolts to 19 N·m (170 in. lbs.) torque.
- (27) Align marks on front propeller shaft, axle, and transfer case yokes, if equipped.

- (28) Install and tighten propeller shaft U-joint clamp bolts to 19 N·m (170 in. lbs.) torque.
- (29) Install slave cylinder in clutch housing.
- (30) Install skid plate, if equipped. Tighten bolts to 42 N·m (31 ft. lbs.) torque. Tighten stud nuts to 17 N·m (150 in. lbs.) torque.
- (31) Fill transmission and transfer case, if equipped, with recommended lubricants. Refer to the Lubricant Recommendation sections of the appropriate component for correct fluid.
- (32) Lower vehicle.

FRONT BEARING RETAINER SEAL

REMOVAL

- (1) Remove release bearing and lever from the transmission.
- (2) Remove the bolts holding the front bearing retainer to the transmission case.
- (3) Remove the front bearing retainer from the transmission case.
- (4) Using a suitable pry tool, remove the front bearing retainer seal.

INSTALLATION

- (1) Using Tool Handle C-4171 and Seal Installer 8211, install new seal in to the front bearing retainer (Fig. 11).

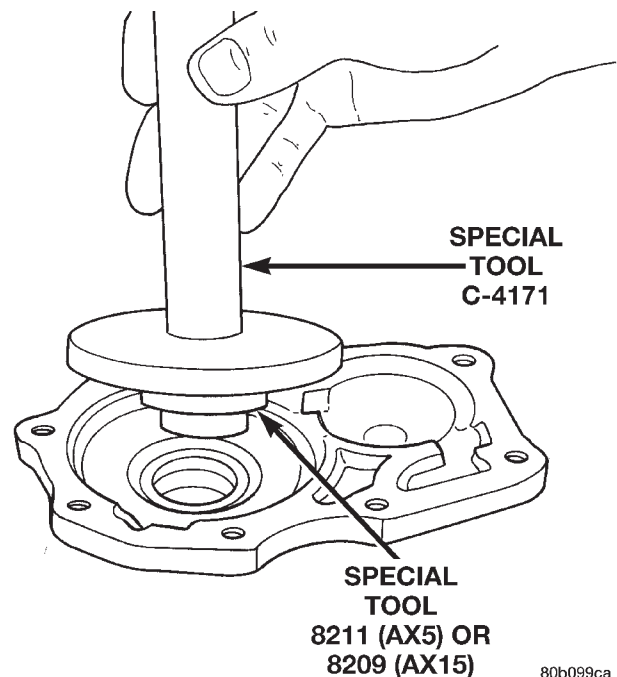


Fig. 11 Install Front Bearing Retainer Seal

- (2) Remove any residual gasket material from the sealing surfaces of the bearing retainer and the transmission case.
- (3) Install new front bearing retainer gasket to the front bearing retainer.

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REMOVAL AND INSTALLATION (Continued)

- (4) Install the front bearing retainer onto the transmission case.
- (5) Install the bolts to hold the bearing retainer onto the transmission case.
- (6) Tighten the bolts to 17 N·m (12 ft. lbs.).
- (7) Install release bearing and lever onto the transmission.

EXTENSION HOUSING SEAL

REMOVAL

- (1) Raise and support vehicle.
- (2) Remove propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedures.
- (3) Using a suitable seal puller or screw with a slide hammer, remove the extension housing seal (Fig. 12).

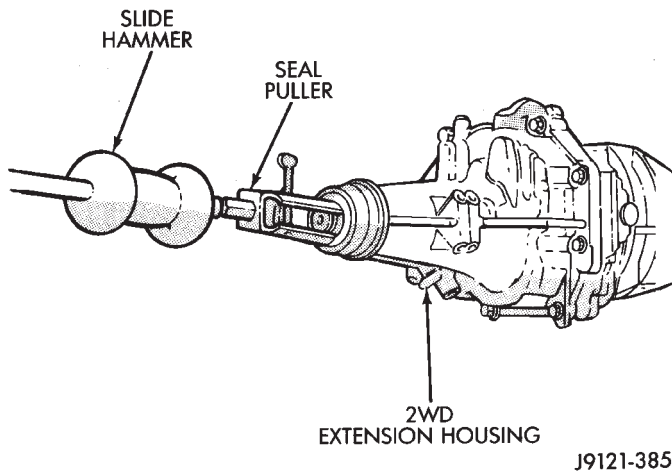


Fig. 12 Remove Extension Housing Seal

INSTALLATION

- (1) Clean seal bore of extension housing of any residual sealer material from original seal.
- (2) Using Tool Handle C-4171 and Seal Installer 8212, install new extension housing seal so that the seal is located 0 ± 0.5 mm (0 ± 0.02 in.) to the face of the extension housing (Fig. 13).
- (3) Install propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedures.
- (4) Check and add fluid to transmission as necessary. Refer to the Recommended Lubricant section for proper fluid requirements.
- (5) Lower vehicle.

ADAPTER HOUSING SEAL

REMOVAL

- (1) Hoist and support vehicle.
- (2) Remove transfer case.
- (3) Using a suitable pry tool, or a slide hammer mounted screw, remove the adapter housing seal (Fig. 14).

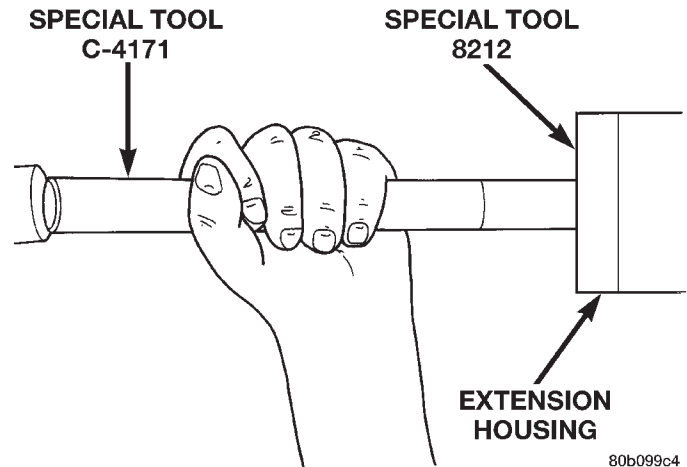


Fig. 13 Install Extension Housing Seal

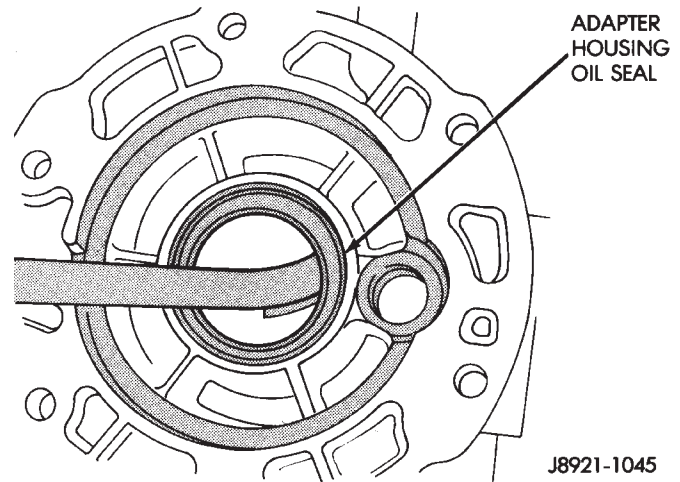


Fig. 14 Remove Adapter Housing Seal

INSTALLATION

- (1) Clean seal bore of adapter housing of any residual sealer material from original seal.
- (2) Using Tool Handle C-4171 and Seal Installer 8208, install new seal so that the seal is located 0 ± 0.2 mm (0 ± 0.008 in.) to the seal bore face of adapter housing (Fig. 15).
- (3) Install transfer case.
- (4) Check and add fluid to transmission as necessary. Refer to the Recommended Lubricant section for proper fluid requirements.
- (5) Lower vehicle.

REMOVAL AND INSTALLATION (Continued)

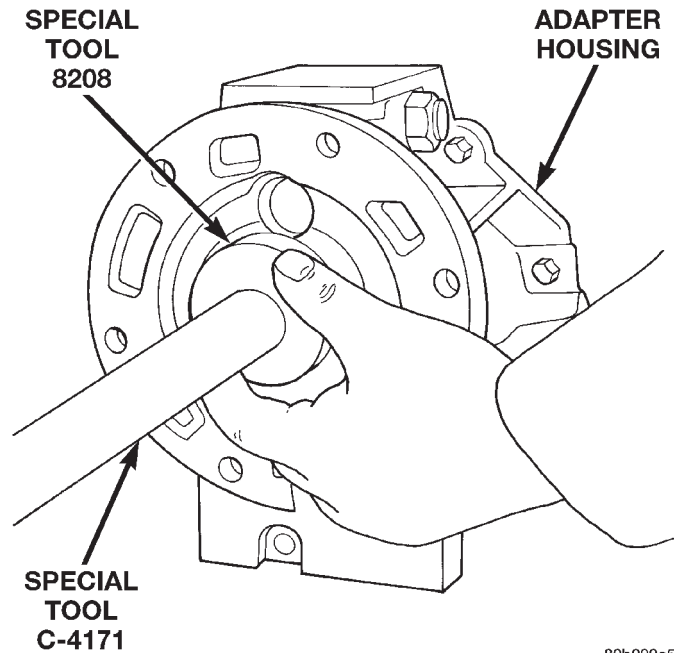


Fig. 15 Install Adapter Housing Seal

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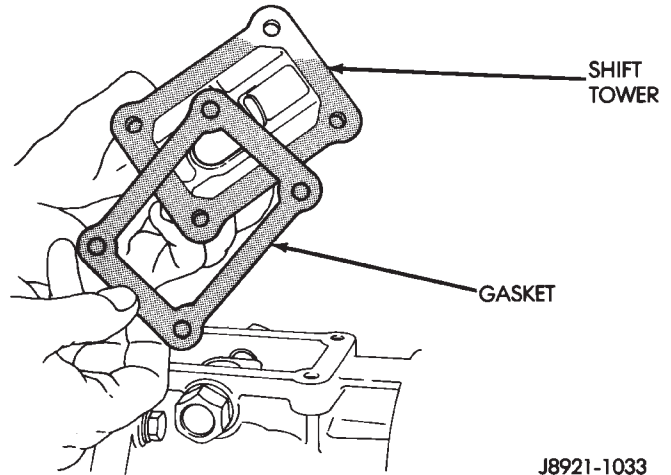


Fig. 17 Remove Shift Tower Gasket

- (8) Remove detent ball plug (Fig. 19).
- (9) Remove detent spring and ball with pencil magnet (Fig. 20), (Fig. 21).

DISASSEMBLY AND ASSEMBLY

ADAPTER/EXTENSION HOUSING AND FRONT BEARING RETAINER

DISASSEMBLY

- (1) Drain transmission lubricant, if necessary.
- (2) Remove release bearing and lever.
- (3) Remove clutch housing bolts and remove housing (Fig. 18).
- (4) Remove vehicle speed sensor and speedometer adapter, if necessary.
- (5) Remove bolts holding shift tower to transmission case.
- (6) Remove shift tower from transmission case (Fig. 16).
- (7) Remove shift tower gasket from shift tower or transmission case (Fig. 17).

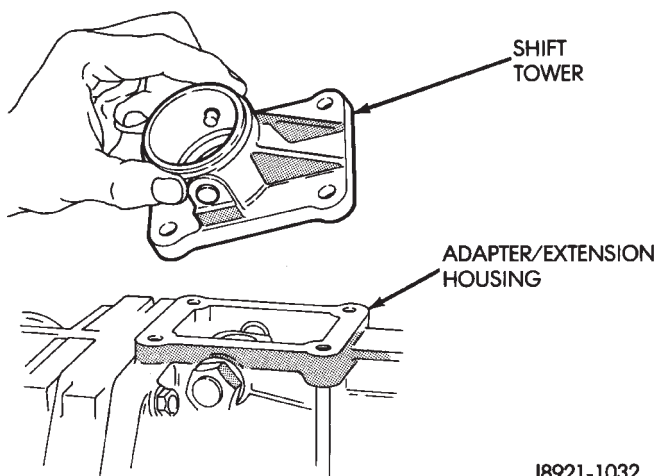


Fig. 16 Remove Shift Tower

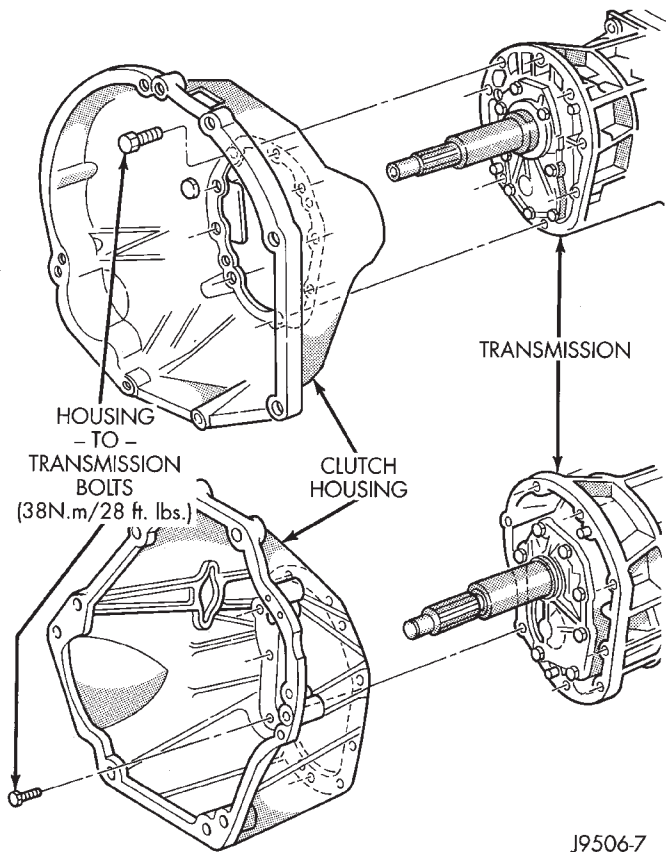


Fig. 18 Clutch Housing

DISASSEMBLY AND ASSEMBLY (Continued)

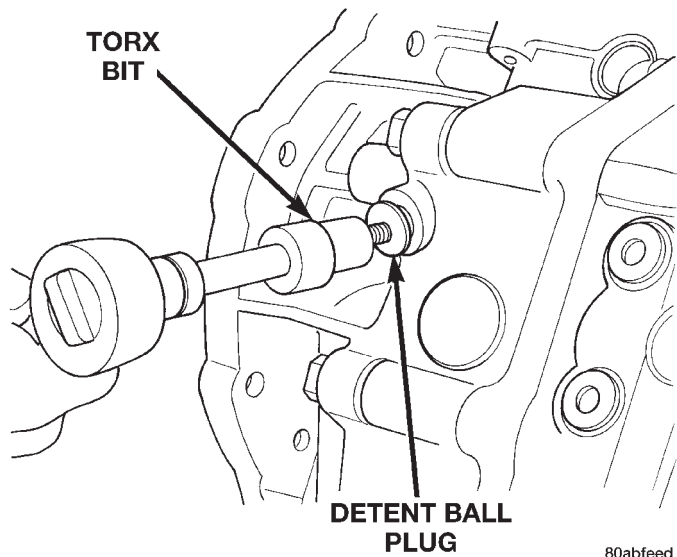


Fig. 19 Remove Detent Ball Plug

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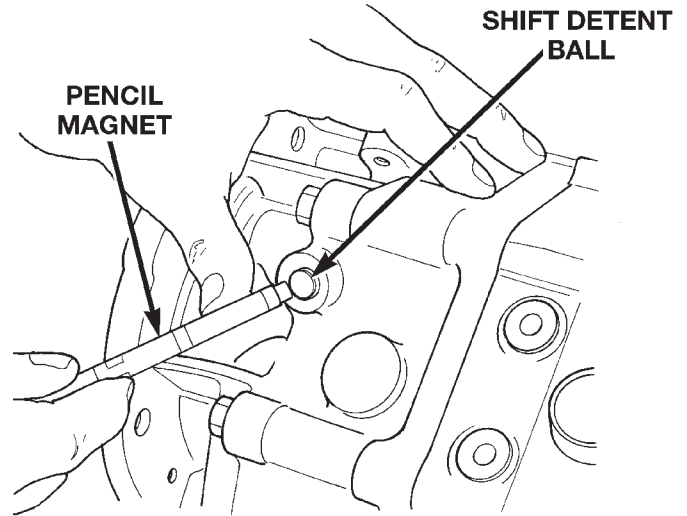


Fig. 21 Remove Detent Ball

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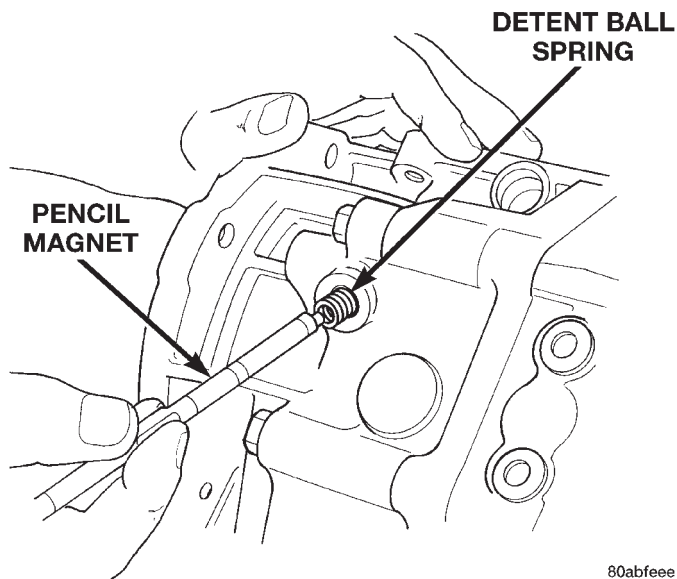


Fig. 20 Remove Detent Spring

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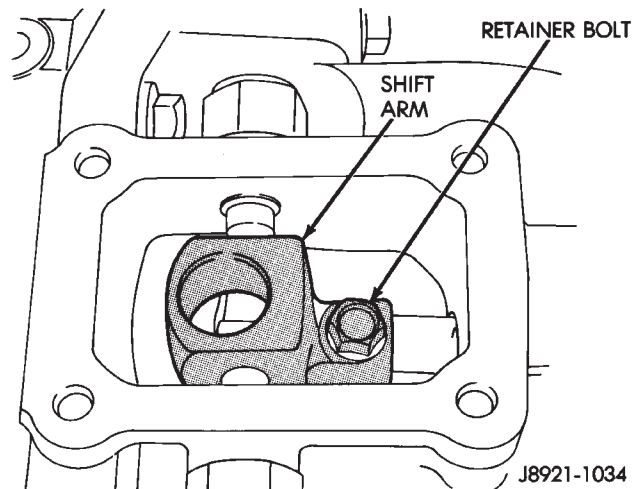


Fig. 22 Shift Arm Retainer Bolt Removal

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- (10) Remove shift arm retainer bolt (Fig. 22).
- (11) Remove shift arm restrictor pins (Fig. 23).
- (12) Remove shift lever shaft plug (Fig. 24).
- (13) Remove shifter shaft with large magnet (Fig. 25).
- (14) Remove the shift arm from the adapter housing.
- (15) Remove adapter/extension housing bolts.

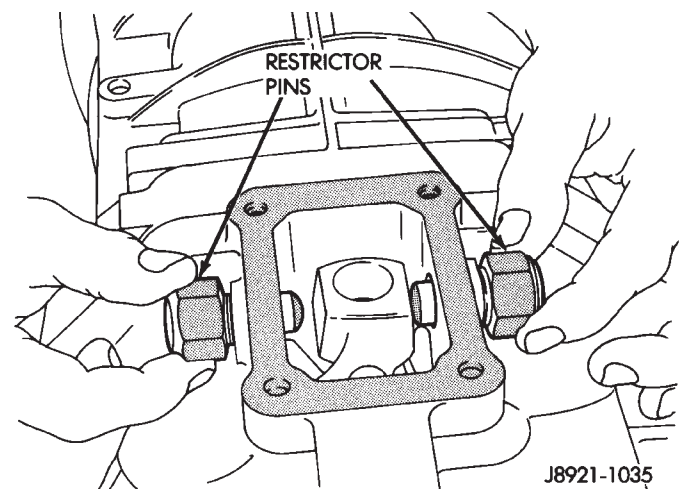
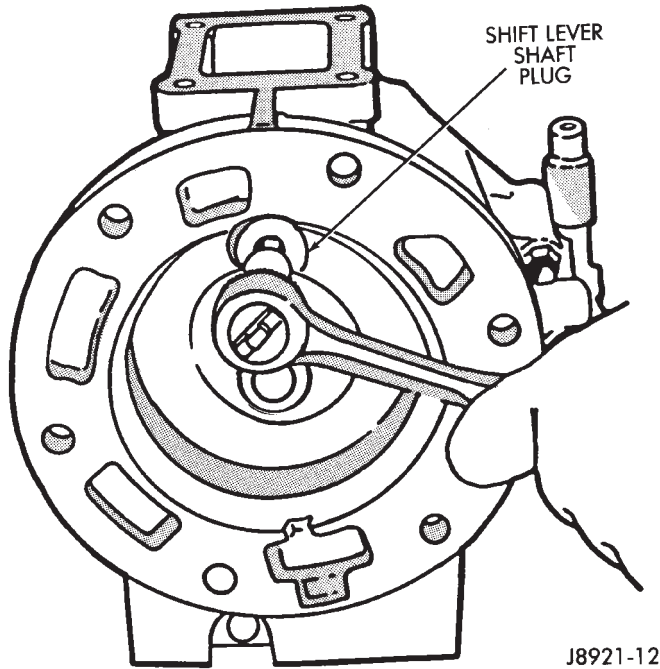


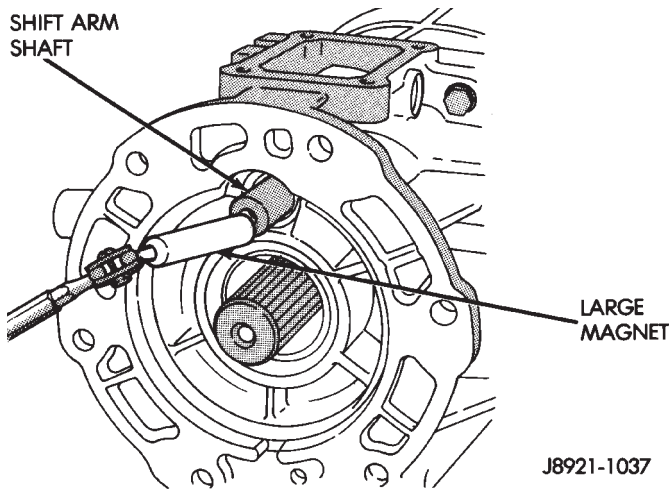
Fig. 23 Shift Arm Restrictor Pins

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Fig. 24 Removing Shift Lever Shaft Plug



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Fig. 25 Remove Shifter Shaft

(16) Loosen adapter/extension housing by tapping it loose with plastic mallet (Fig. 26).

(17) Remove adapter/extension housing (Fig. 27).

(18) On 4x2 transmissions;

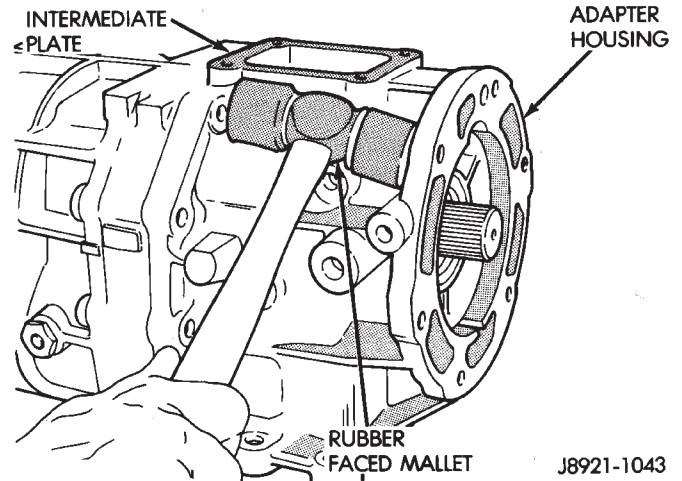
(a) Remove speedometer gear retaining snap-ring from output shaft.

(b) Remove speedometer gear from output shaft and remove speedometer gear lock ball from output shaft.

(c) Remove speedometer drive gear locating snap-ring (Fig. 28).

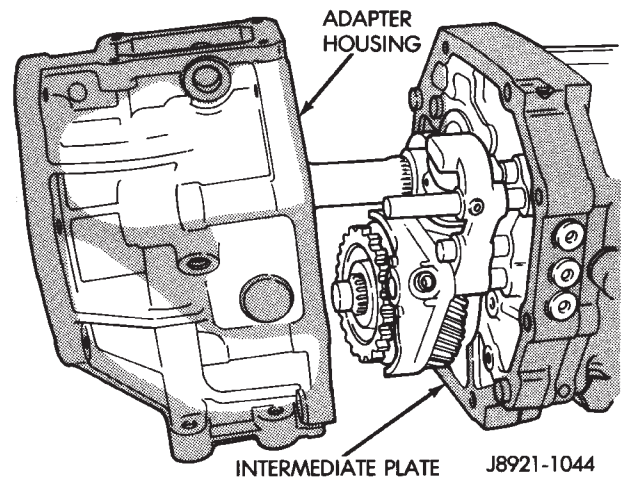
(19) Remove the bolts holding the front bearing retainer to the transmission case.

(20) Remove the bearing retainer from transmission case (Fig. 29).



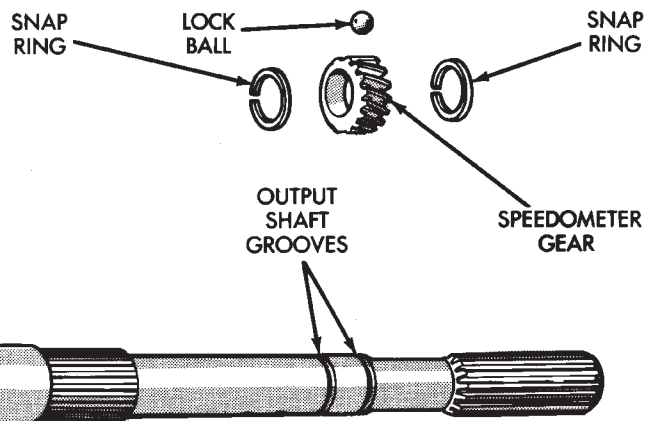
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Fig. 26 Loosen Adapter/Extension Housing



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Fig. 27 Remove Adapter/Extension Housing-Typical



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Fig. 28 Speedometer Drive Gear Assembly

(21) Remove input shaft bearing snap-ring (Fig. 30).

(22) Remove countershaft front bearing snap-ring.

DISASSEMBLY AND ASSEMBLY (Continued)

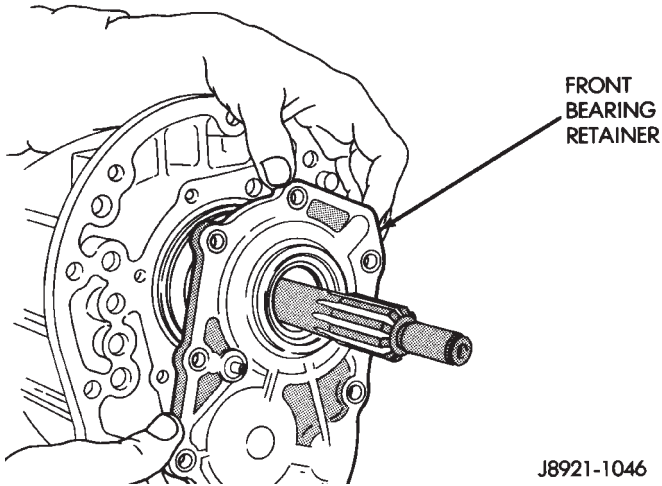


Fig. 29 Remove Front Bearing Retainer

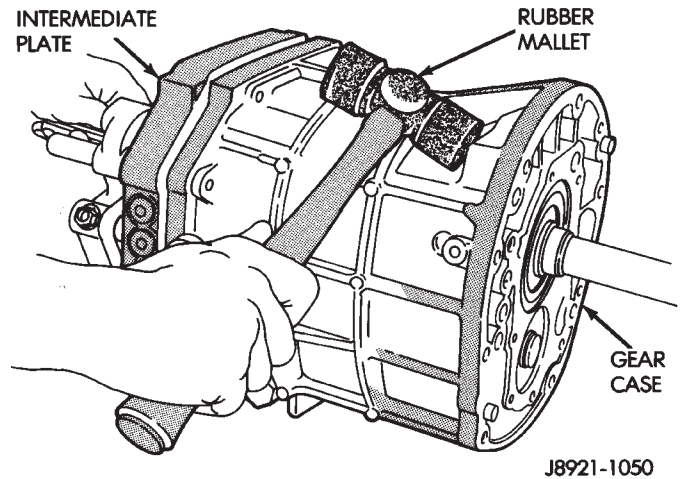


Fig. 31 Separate Intermediate Plate and Transmission Case

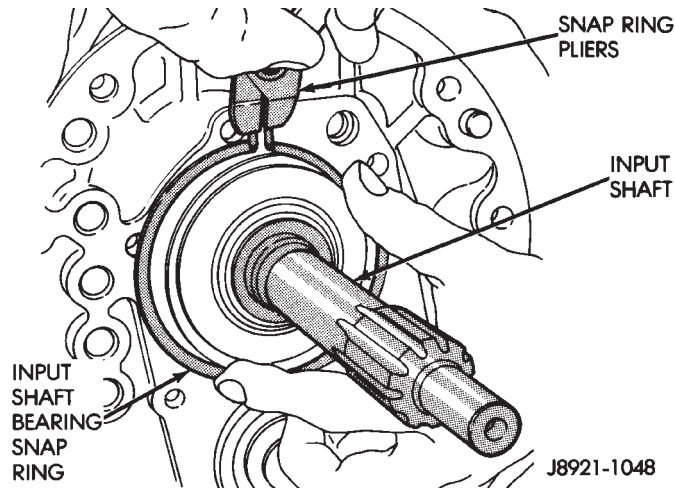


Fig. 30 Remove Input Shaft Bearing Snap-ring

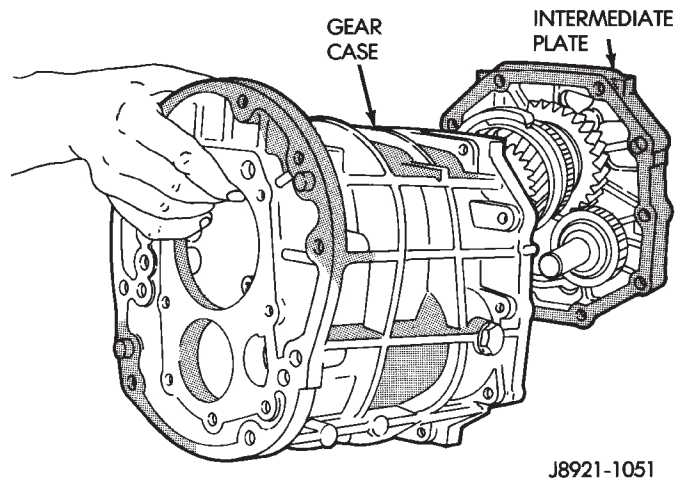


Fig. 32 Remove Intermediate Plate from Transmission Case

(23) Separate intermediate plate and transmission case by tapping them loose with plastic mallet (Fig. 31).

(24) Separate the intermediate plate from the transmission case (Fig. 32).

ASSEMBLY

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

(2) Apply a 1/8 to 3/16 inch wide bead of Threebond® Liquid Gasket TB1281, P/N 83504038, as shown, making sure to keep sealer bead to inside of bolt holes (Fig. 33).

(3) Align geartrain and shift rails with mating holes in transmission case and install transmission case to the intermediate plate (Fig. 34). Verify that the transmission case is seated on the intermediate plate locating pins.

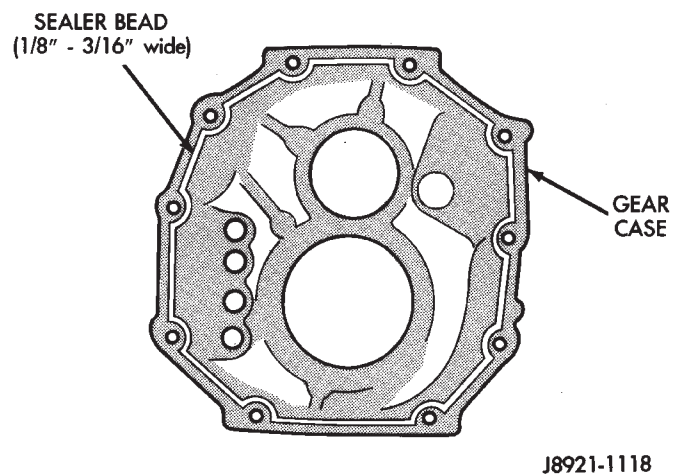


Fig. 33 Apply Sealer to Transmission Gear Case

DISASSEMBLY AND ASSEMBLY (Continued)

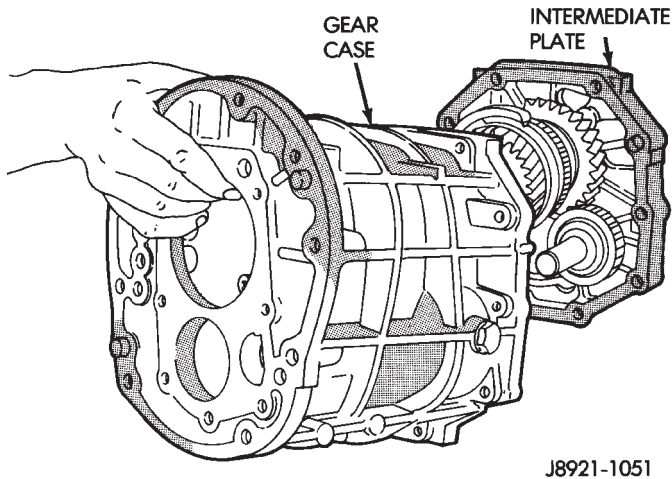


Fig. 34 Install Transmission Gear Case to the Intermediate Plate

- (4) Install new front bearing snap rings (Fig. 35).

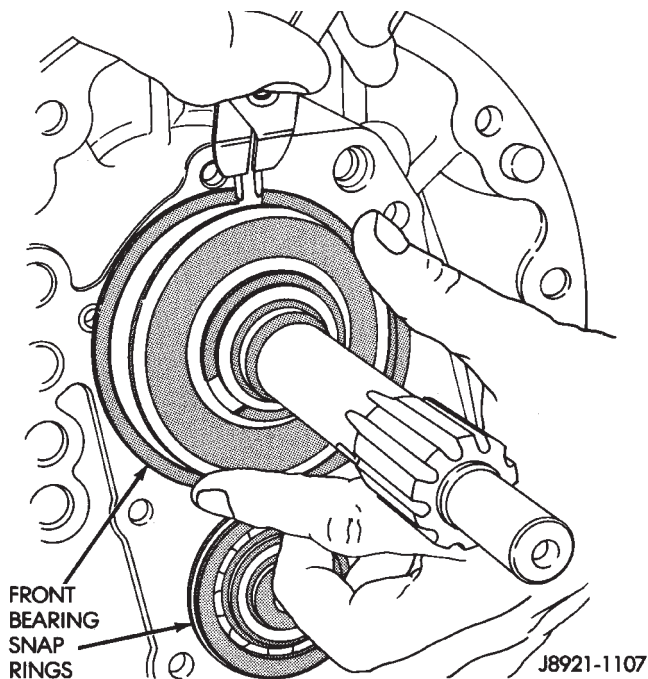


Fig. 35 Install Front Bearing Snap-rings

- (5) Install front bearing retainer gasket to front bearing retainer.
 (6) Install the front bearing retainer (Fig. 36) and tighten bolts to 17 N·m (12 ft. lbs.).
 (7) On 4x2 transmissions;
 (a) Install speedometer drive gear locating snap-ring (Fig. 37).
 (b) Install speedometer gear lock ball in output shaft and install speedometer gear onto output shaft.
 (c) Install speedometer gear retaining snap-ring onto output shaft.

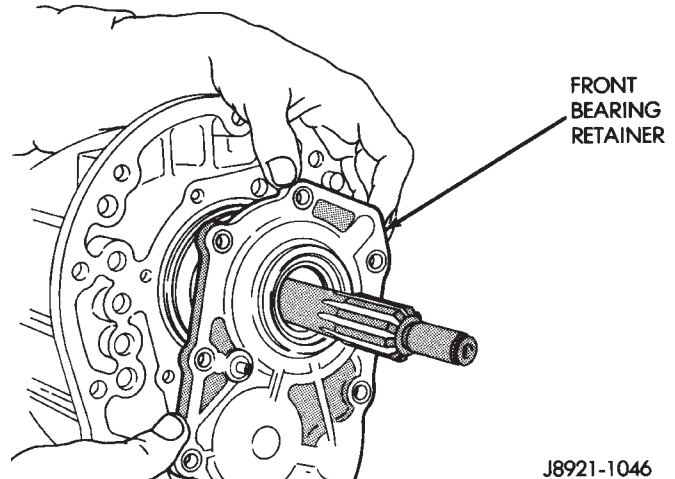


Fig. 36 Install Front Bearing Retainer

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

- (9) Install adapter or extension housing on intermediate plate (Fig. 38). Tighten housing bolts to 34 N·m (25 ft. lbs.) torque.

- (10) Position shift arm in shifter tower opening of adapter or extension housing (Fig. 39). Be sure that the shifter arm is engaged into the shift rails.

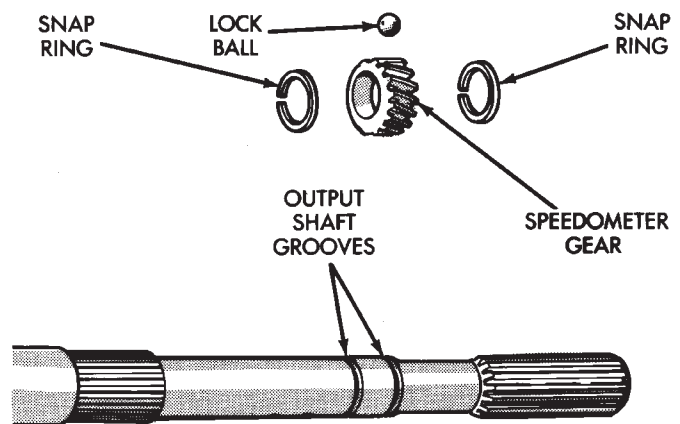


Fig. 37 Speedometer Drive Gear Assembly

- (11) Start shifter arm shaft in hole in back of adapter or extension housing. Align shift arm and shifter arm shaft and insert shifter arm shaft through the shifter arm and into the forward portion of the adapter or extension housing (Fig. 40).

- (12) Rotate the shifter arm shaft until the hole in the shifter arm is aligned with the hole in the shaft.

- (13) Install the shift arm retainer bolt and tighten to 38 N·m (28 ft. lbs.) (Fig. 41).

- (14) Install and tighten shifter arm shaft plug to 18 N·m (13 ft. lbs.) torque (Fig. 42).

- (15) Install shift restrictor pins in shift tower and tighten to 27 N·m (20 ft. lbs.) (Fig. 43).

DISASSEMBLY AND ASSEMBLY (Continued)

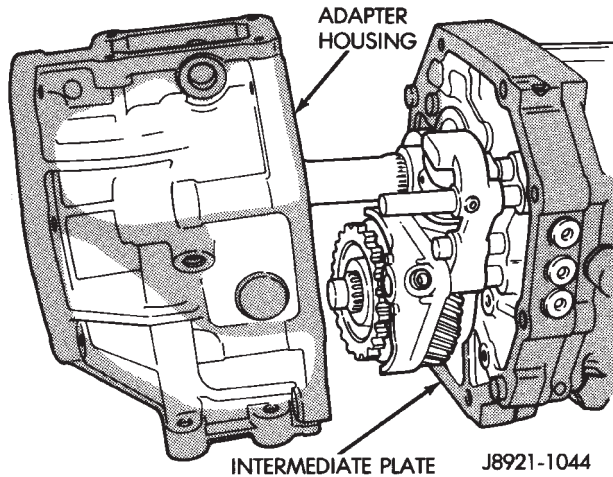


Fig. 38 Install Adapter/Extension Housing—Typical

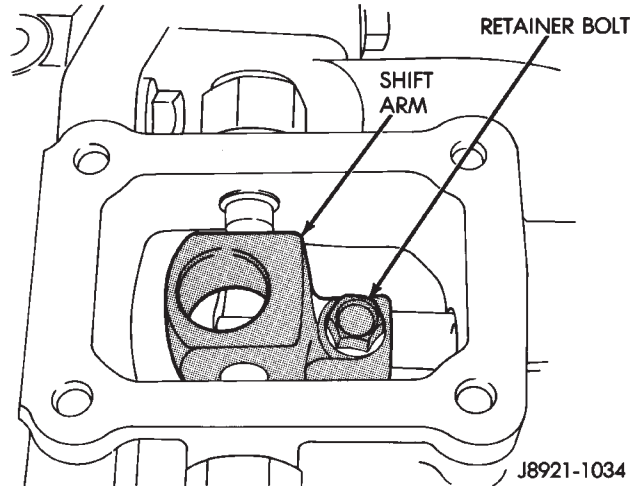


Fig. 41 Install Shift Arm Retainer Bolt

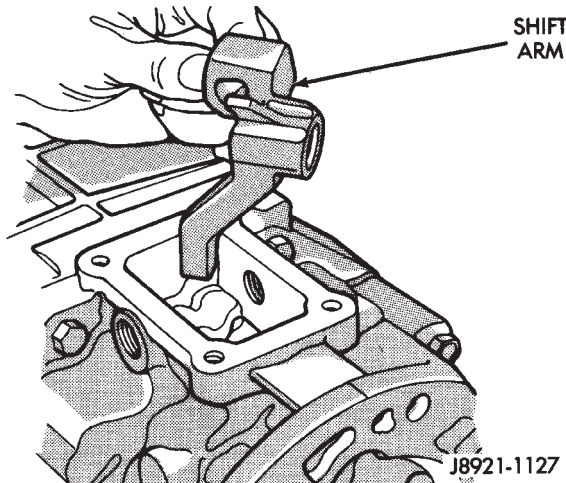


Fig. 39 Position Shift Arm in Adapter or Extension Housing

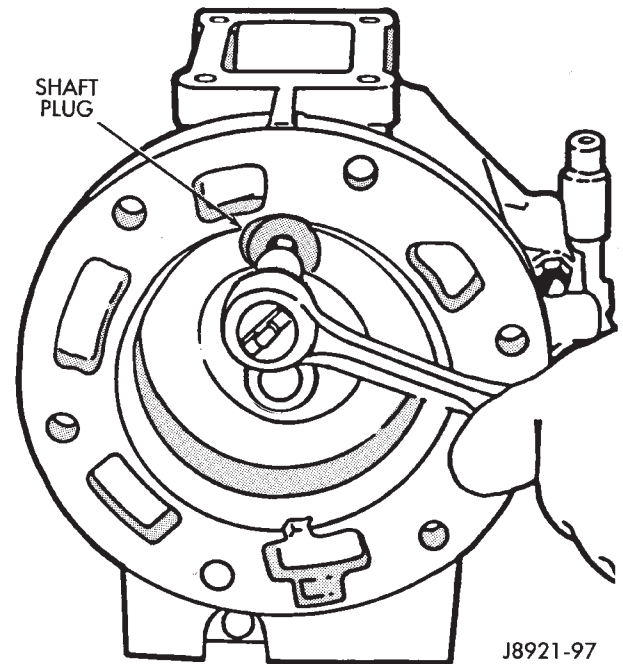


Fig. 42 Shifter Arm Shaft Plug Installation

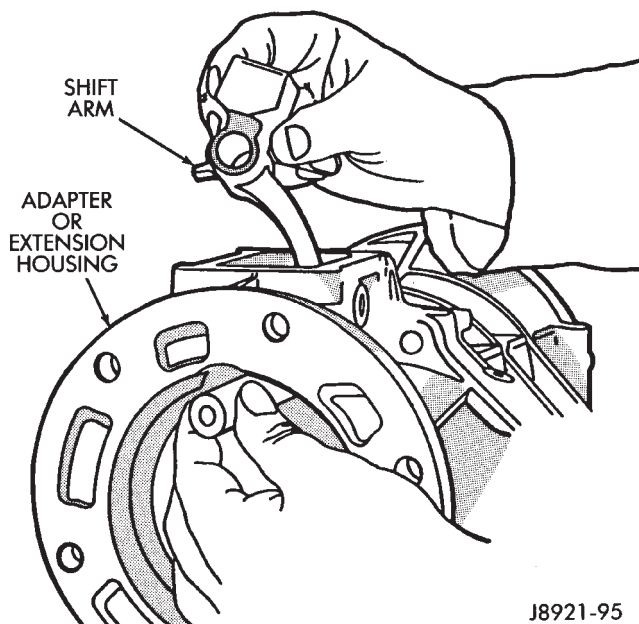


Fig. 40 Install Shifter Arm Shaft

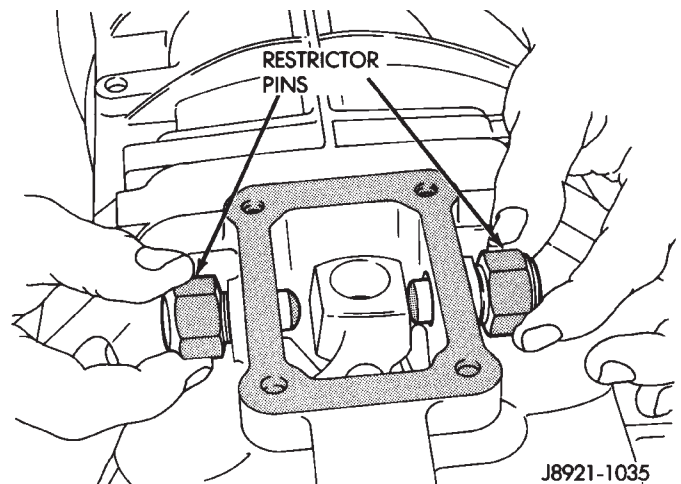


Fig. 43 Install Shifter Restrictor Pins

DISASSEMBLY AND ASSEMBLY (Continued)

(16) Install shift detent ball in detent opening of case (Fig. 44).

(17) Install detent spring in case (Fig. 45).

(18) Install detent plug and tighten to 19 N·m (14 ft. lbs.) (Fig. 46).

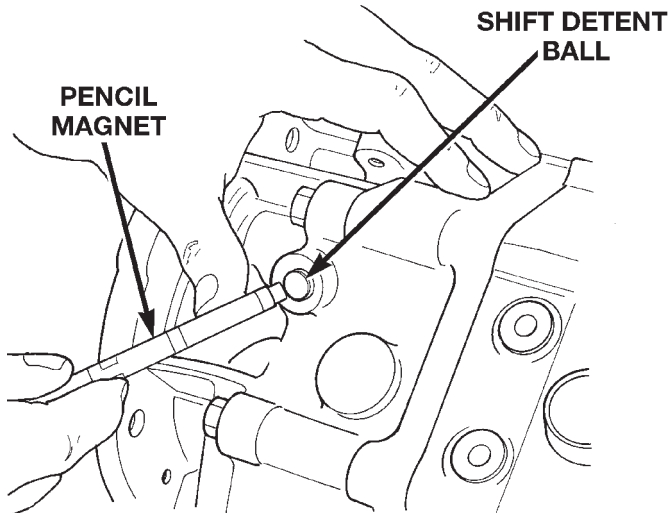


Fig. 44 Install Detent Ball

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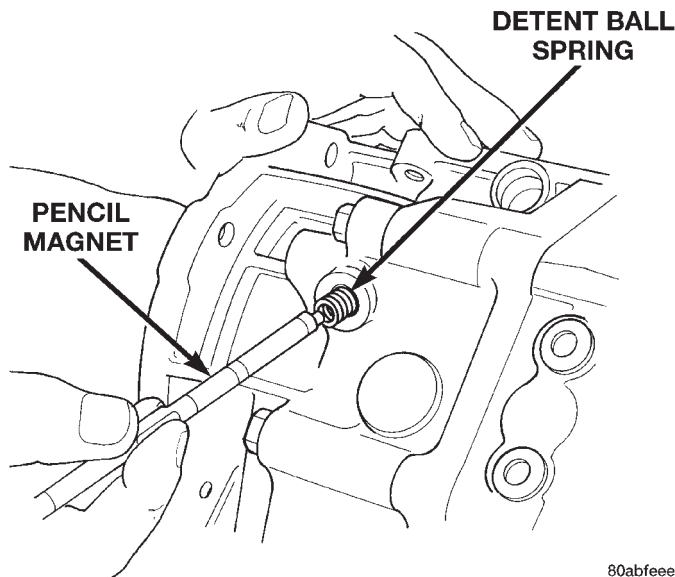


Fig. 45 Install Detent Spring

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(19) Install shift tower gasket onto shift tower.

(20) Install the shift tower oil deflector and gasket onto the adapter or extension housing.

(21) Install shift tower onto transmission case (Fig. 47).

(22) Install bolts to hold shift tower to transmission case. Tighten tower bolts to 18 N·m (13 ft. lbs.) torque.

(23) Install new metal o-ring onto the backup lamp switch.

(24) Install backup lamp switch (Fig. 48). Tighten switch to 44 N·m (32.5 ft. lbs.) torque.

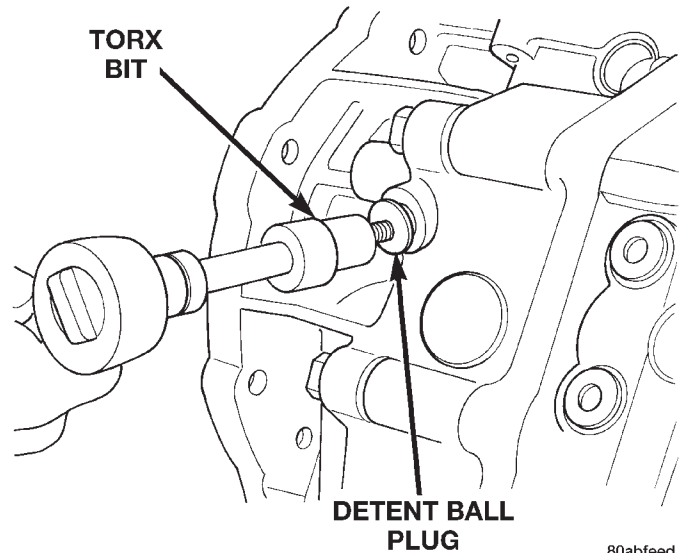


Fig. 46 Install Detent Ball Plug

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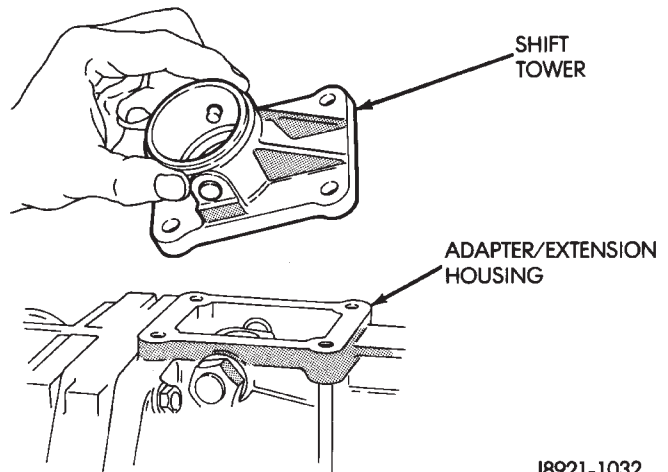


Fig. 47 Install Shift Tower

J8921-1032

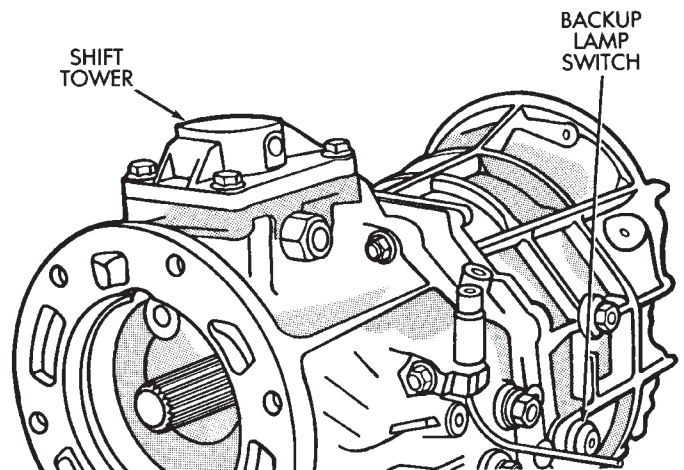


Fig. 48 Install Backup Lamp Switch

J8921-100

(25) Install new seal in adapter/extension housing.

(26) Install vehicle speed sensor, if necessary.

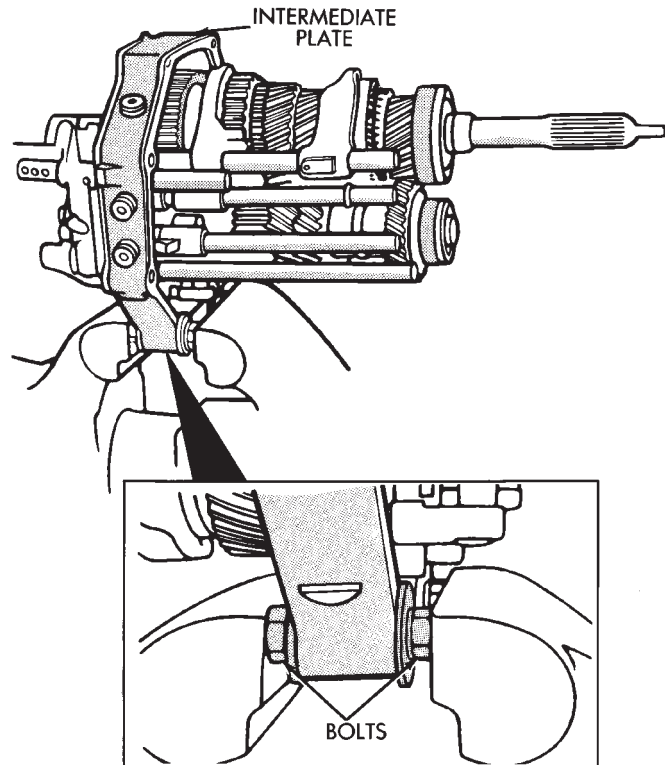
DISASSEMBLY AND ASSEMBLY (Continued)

(27) Install clutch housing, release bearing, release fork and retainer clip.

SHIFT MECHANISM AND GEARTRAIN

DISASSEMBLY

(1) Install suitable bolts and washers in intermediate plate (Fig. 49). Then clamp plate and gear assembly in vise. Use enough washers to prevent bolts from touching. Also be sure vise jaws are clamped on bolt heads.



J8921-15

Fig. 49 Positioning Intermediate Plate In Vise

- (2) Remove countershaft fifth gear retaining snap-ring (Fig. 50).
- (3) Remove bolt holding fifth gear shift fork to shift rail (Fig. 51).
- (4) Remove fifth gear blocker ring from countershaft assembly with Puller L-4407 (Fig. 52).
- (5) Remove fifth gear synchro ring (Fig. 53).
- (6) Remove the countershaft fifth gear assembly from countershaft (Fig. 54).
- (7) Remove fifth gear thrust ring from countershaft (Fig. 55).
- (8) Remove fifth gear thrust ring lock ball from countershaft (Fig. 56).

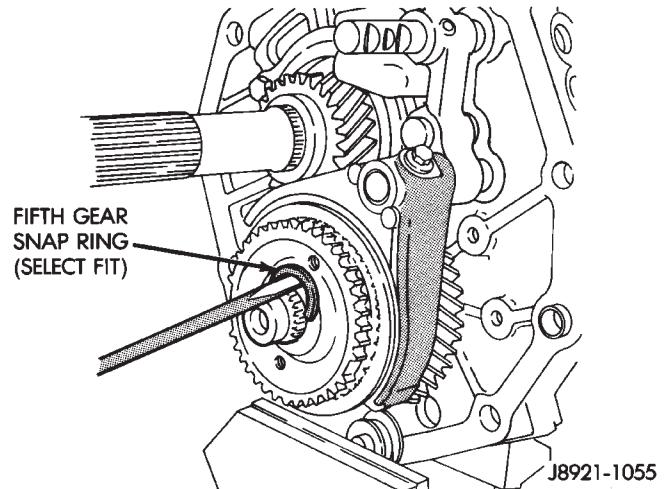


Fig. 50 Remove Fifth Gear Snap-ring

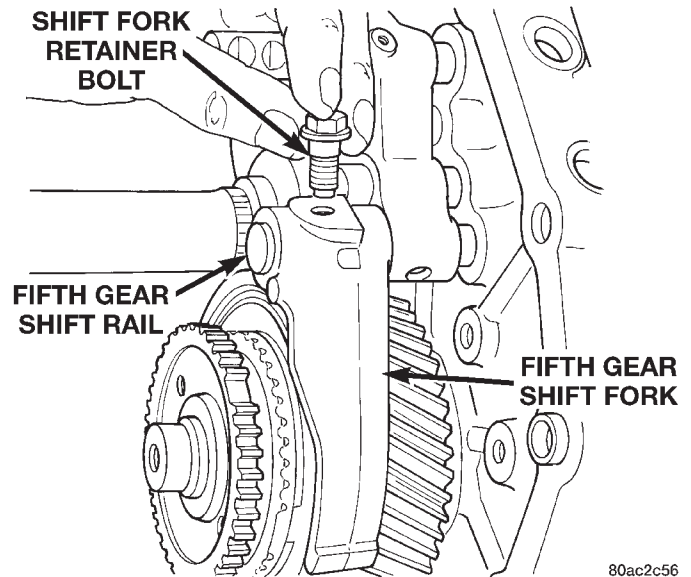


Fig. 51 Remove Shift Fork Retainer Bolt

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

- (9) Remove bolt holding reverse idler gear shaft lock plate to the intermediate plate.
- (10) Remove reverse idler gear shaft and reverse idler gear assembly (Fig. 57).

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

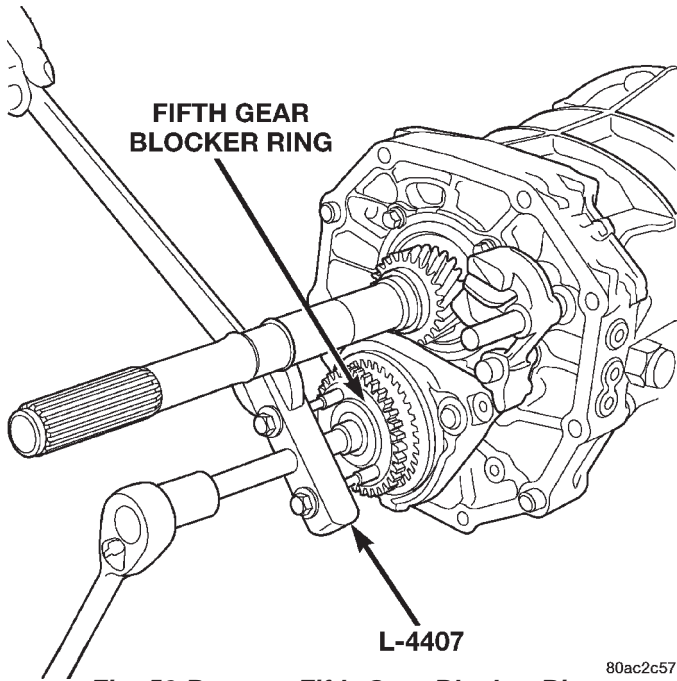


Fig. 52 Remove Fifth Gear Blocker Ring

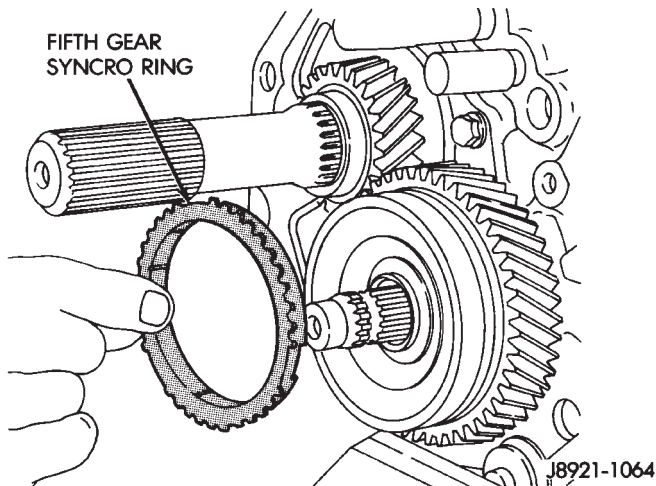


Fig. 53 Remove Fifth Gear Synchro Ring

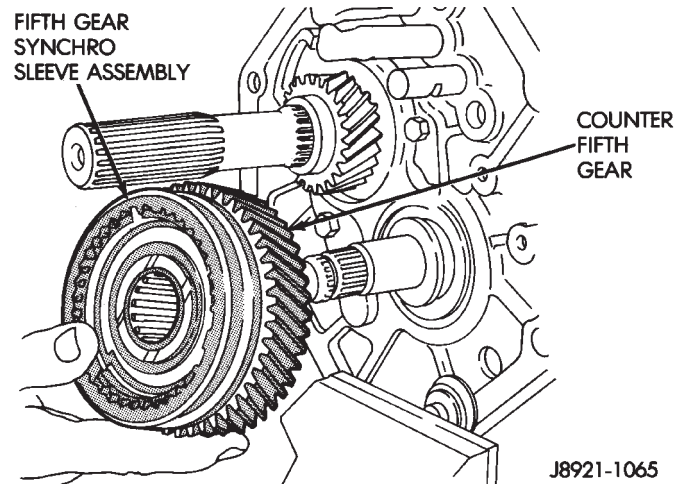


Fig. 54 Remove Fifth Gear and Synchro Assembly

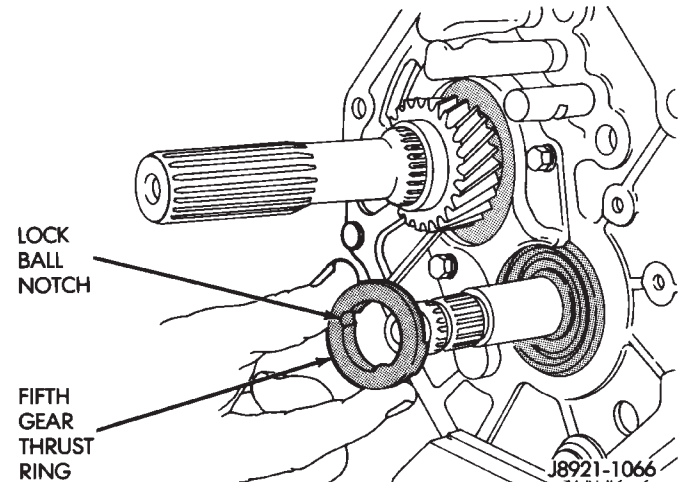


Fig. 55 Remove Fifth Gear Thrust Ring

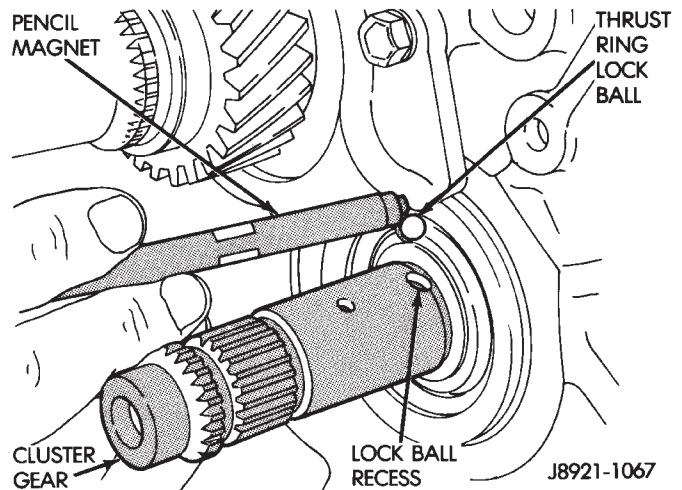


Fig. 56 Remove Fifth Gear Thrust Ring Lock Ball

(11) Remove bolts holding output shaft rear bearing retainer to the intermediate plate and remove retainer (Fig. 58).

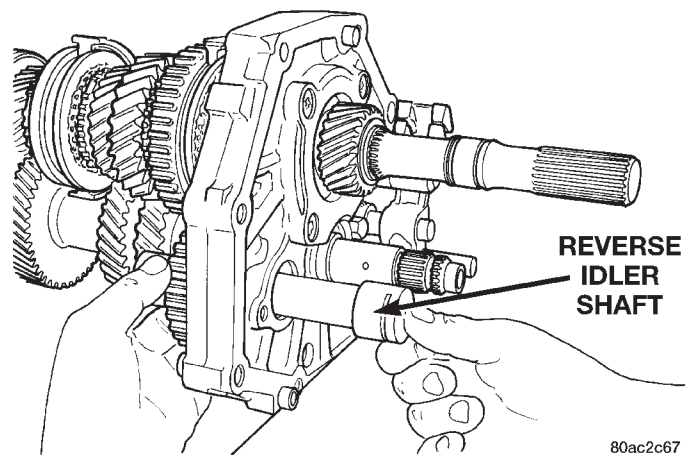


Fig. 57 Remove Reverse Idler Shaft

(12) Remove bolts holding 1-2 and 3-4 shift forks to the shift rails (Fig. 59) and discard bolts.

DISASSEMBLY AND ASSEMBLY (Continued)

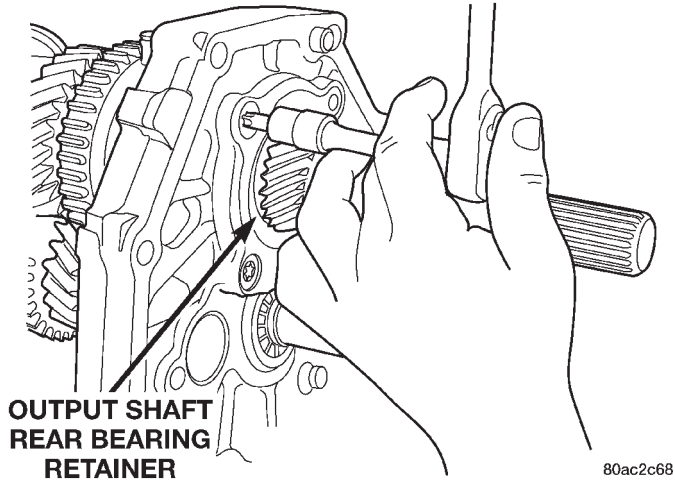


Fig. 58 Remove Output Shaft Rear Bearing Retainer
 (13) Remove bolts holding reverse shift arm bracket to intermediate plate (Fig. 60).

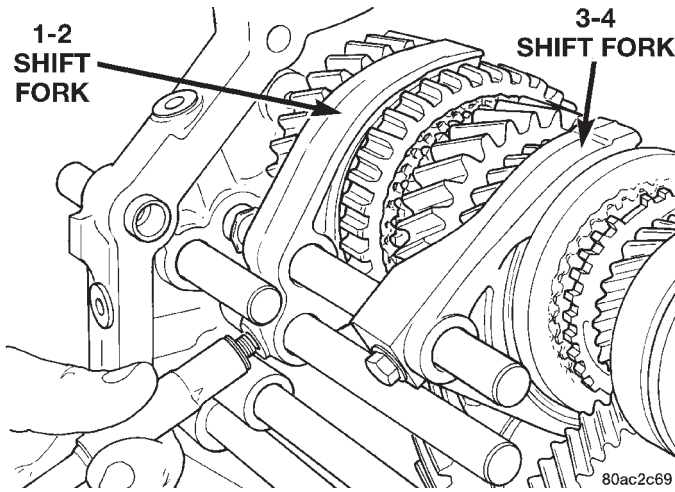


Fig. 59 Remove Shift Fork To Shift Rail Bolts

(14) Remove snap-ring holding output shaft rear bearing into the intermediate plate (Fig. 61).
 (15) Remove countershaft rear bearing snap-ring.
 (16) With aid of an assistant, support the mainshaft and countershaft. Tap on the rear of the mainshaft and countershaft with a suitable plastic mallet. This will release the countershaft from the countershaft rear bearing and the mainshaft rear bearing from the intermediate plate. The countershaft will release from the countershaft bearing first and can be removed by moving the countershaft rearward and downward (Fig. 62).

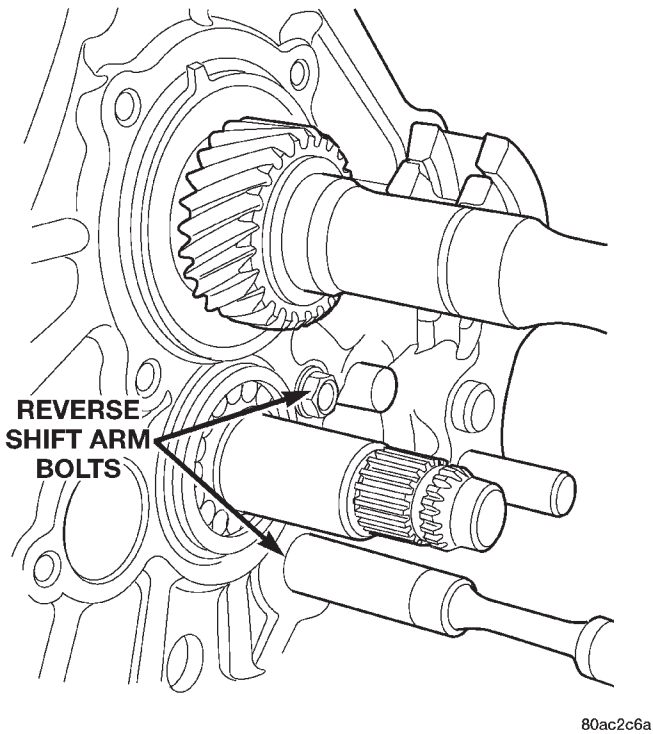


Fig. 60 Remove Reverse Shift Arm Bracket Bolts

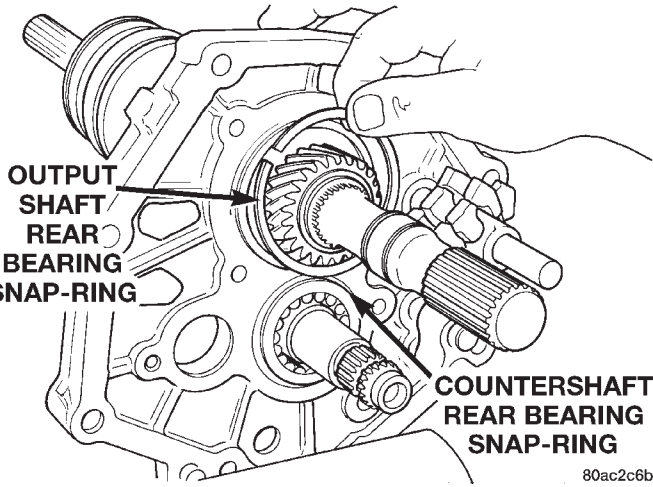


Fig. 61 Remove Output Shaft Rear Bearing Snap-ring

(17) Remove the mainshaft by moving the mainshaft forward until the mainshaft rear bearing is clear of the intermediate plate and then rotating the mainshaft downward out of the shift forks (Fig. 63).
 (18) Remove the 3-4 shift fork from the 3-4 shift rail (Fig. 64).

DISASSEMBLY AND ASSEMBLY (Continued)

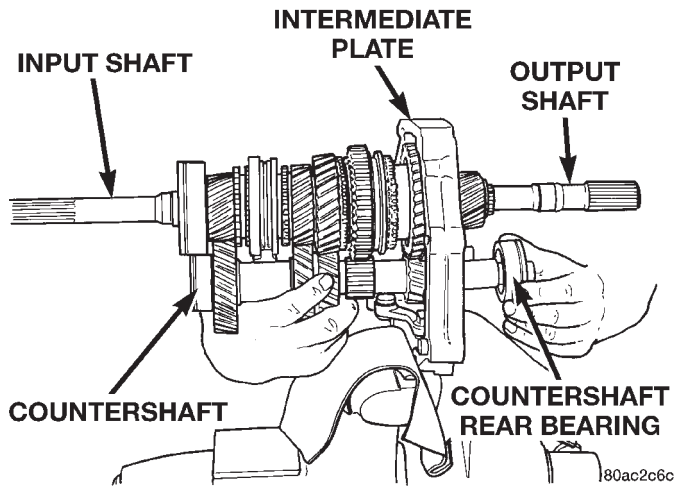


Fig. 62 Remove Countershaft and Countershaft Rear Bearing

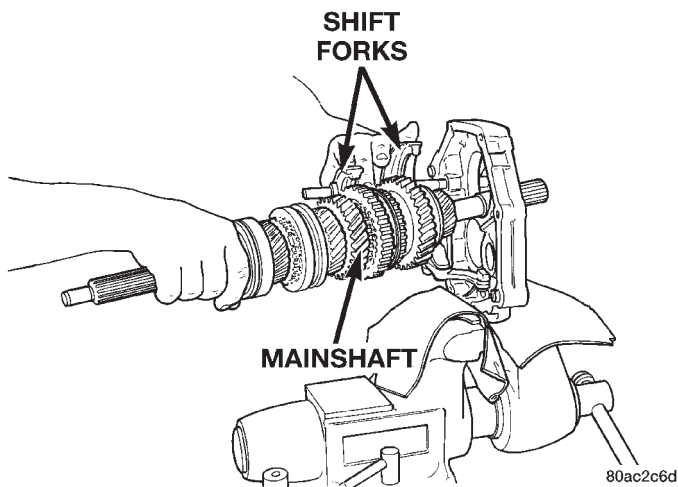


Fig. 63 Remove Mainshaft

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

(20) Remove the 1-2 shift fork from the 1-2 and the 3-4 shift rails (Fig. 65).

(21) Remove threaded plugs from intermediate plate. Then remove lock ball and spring from plug holes with pencil magnet (Fig. 66). Note that the bottom spring is shorter in length than the other two springs.

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

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

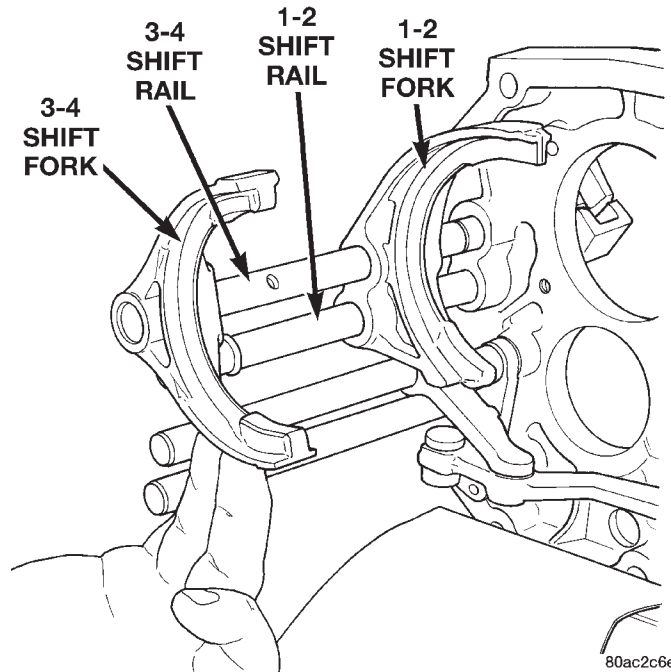


Fig. 64 Remove 3-4 Shift Fork

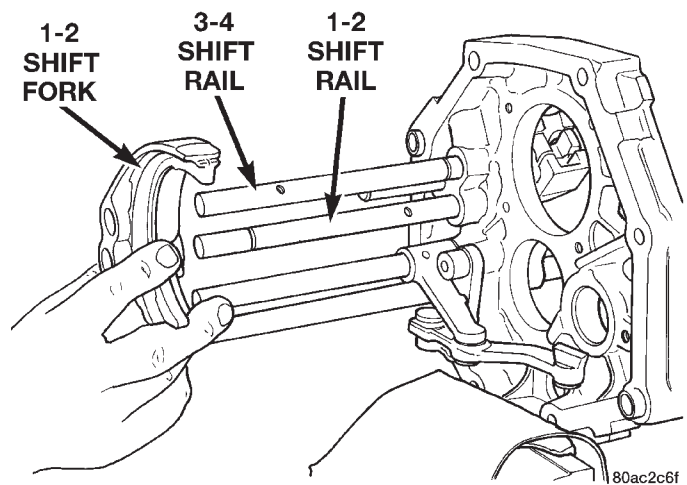


Fig. 65 Remove 1-2 Shift Fork

(23) Remove fifth gear shift rail (Fig. 67).

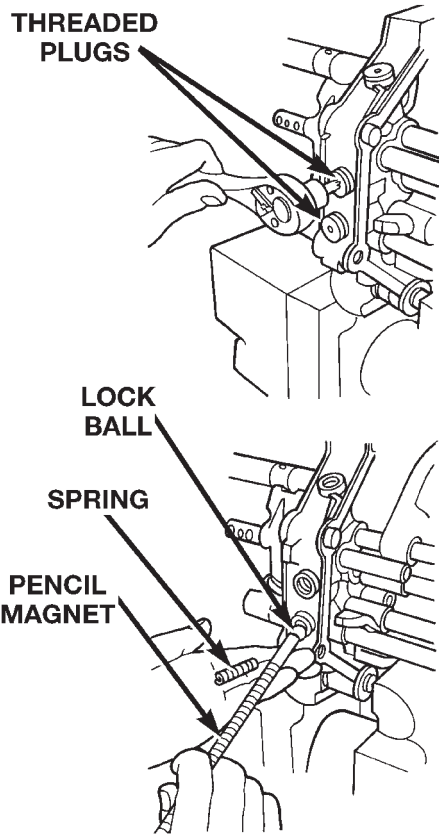
(24) Remove fifth gear check ball (Fig. 68) and interlock pin.

(25) Remove reverse shift head and rail assembly (Fig. 69).

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

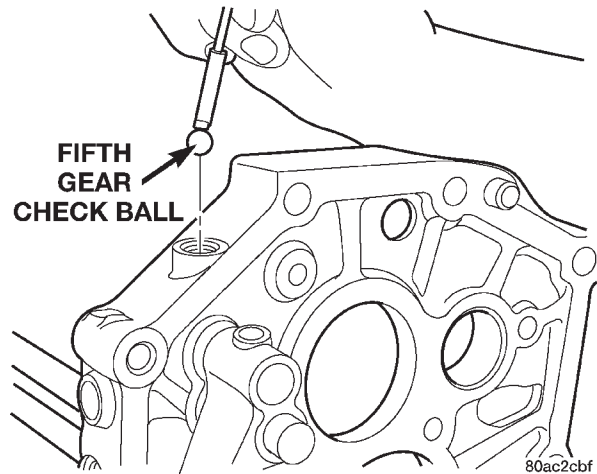
(27) Remove reverse shift rail and reverse shift fork and arm assembly from intermediate plate (Fig. 70).

DISASSEMBLY AND ASSEMBLY (Continued)



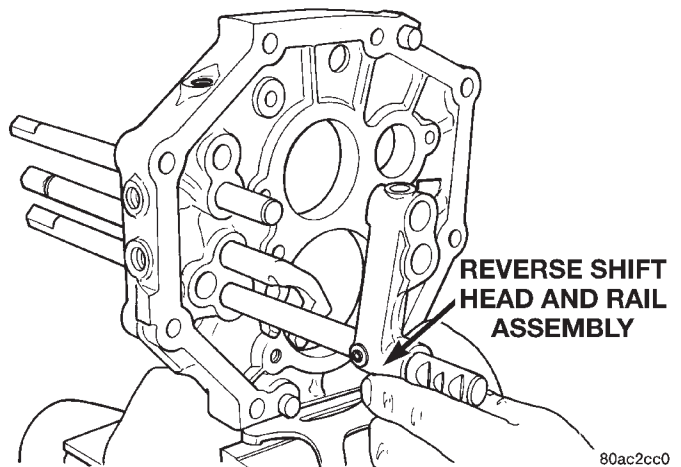
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Fig. 66 Remove Lock Ball And Spring



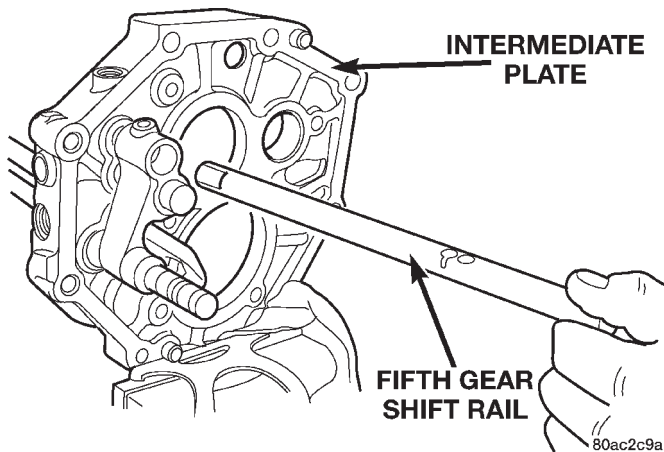
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Fig. 68 Remove Fifth Gear Check Ball



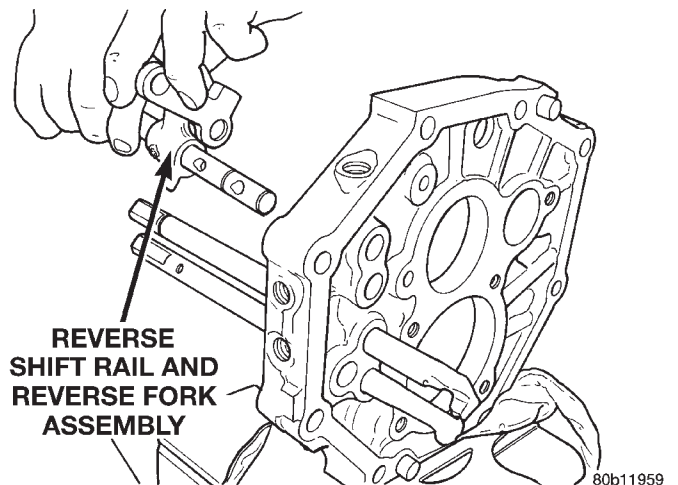
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Fig. 69 Remove Reverse Shift Head And Rail Assembly



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Fig. 67 Remove Fifth Gear Shift Rail

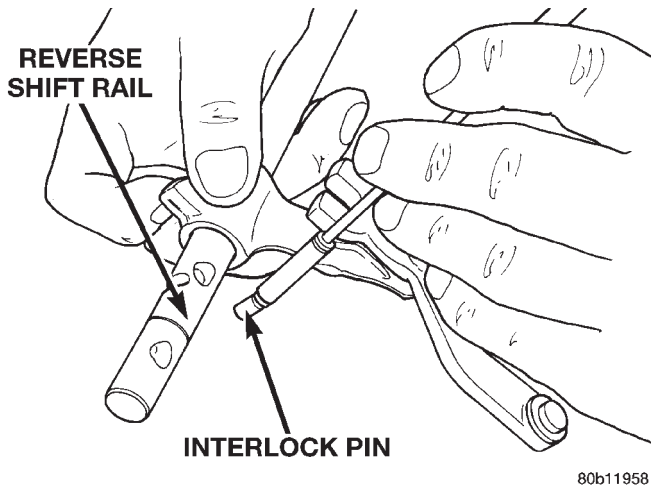


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Fig. 70 Remove Reverse Shift Rail

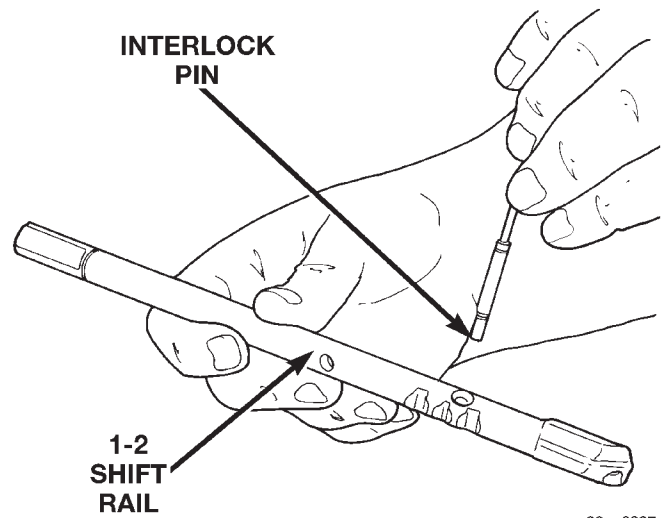
- (28) Remove interlock pin from reverse shift rail (Fig. 71).
- (29) Remove reverse elongated check ball (Fig. 72).
- (30) Remove snap-ring on 3-4 shift rail.
- (31) Remove 1-2 shift rail from intermediate plate.
- (32) Remove interlock pin from 1-2 shift rail (Fig. 73).
- (33) Remove 1-2 shift rail elongated check ball from intermediate plate (Fig. 74).
- (34) Remove 3-4 shift rail from intermediate plate.

DISASSEMBLY AND ASSEMBLY (Continued)



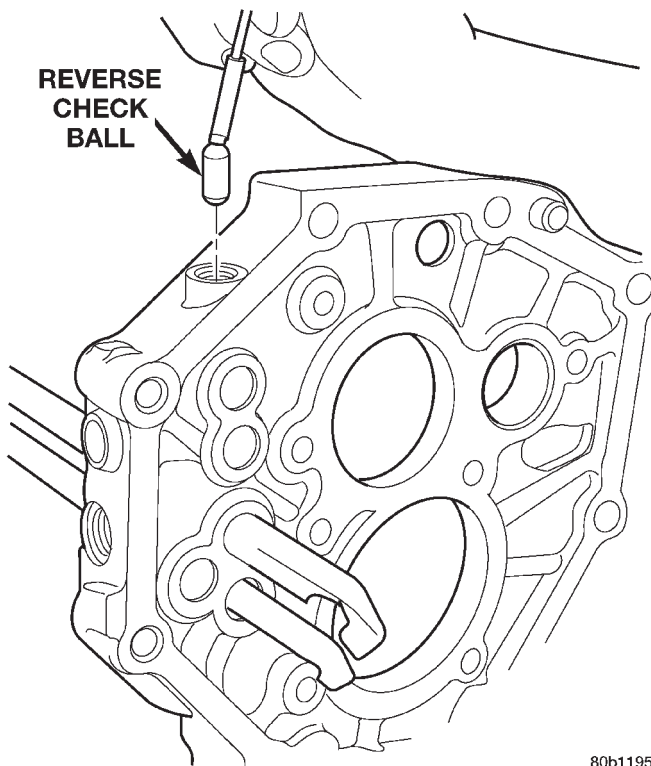
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Fig. 71 Remove Interlock Pin From Reverse Shift Rail



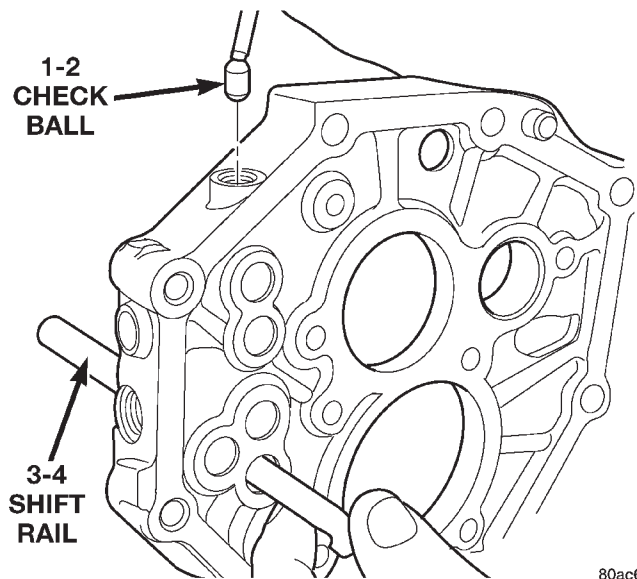
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Fig. 73 Remove 1-2 Shift Rail Interlock Pin



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Fig. 72 Remove Reverse Check Ball



80ac6998

Fig. 74 Remove 1-2 Check Ball

ASSEMBLY

Refer to (Fig. 75) while assembling and installing the shift rail components. Also, verify that all shift rail components are in their neutral position when installing the check balls and interlock pins.

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

(2) Install the 1-2 elongated check ball into the intermediate plate (Fig. 76).

(3) Install the interlock pin into the 1-2 shift rail (Fig. 77).

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

DISASSEMBLY AND ASSEMBLY (Continued)

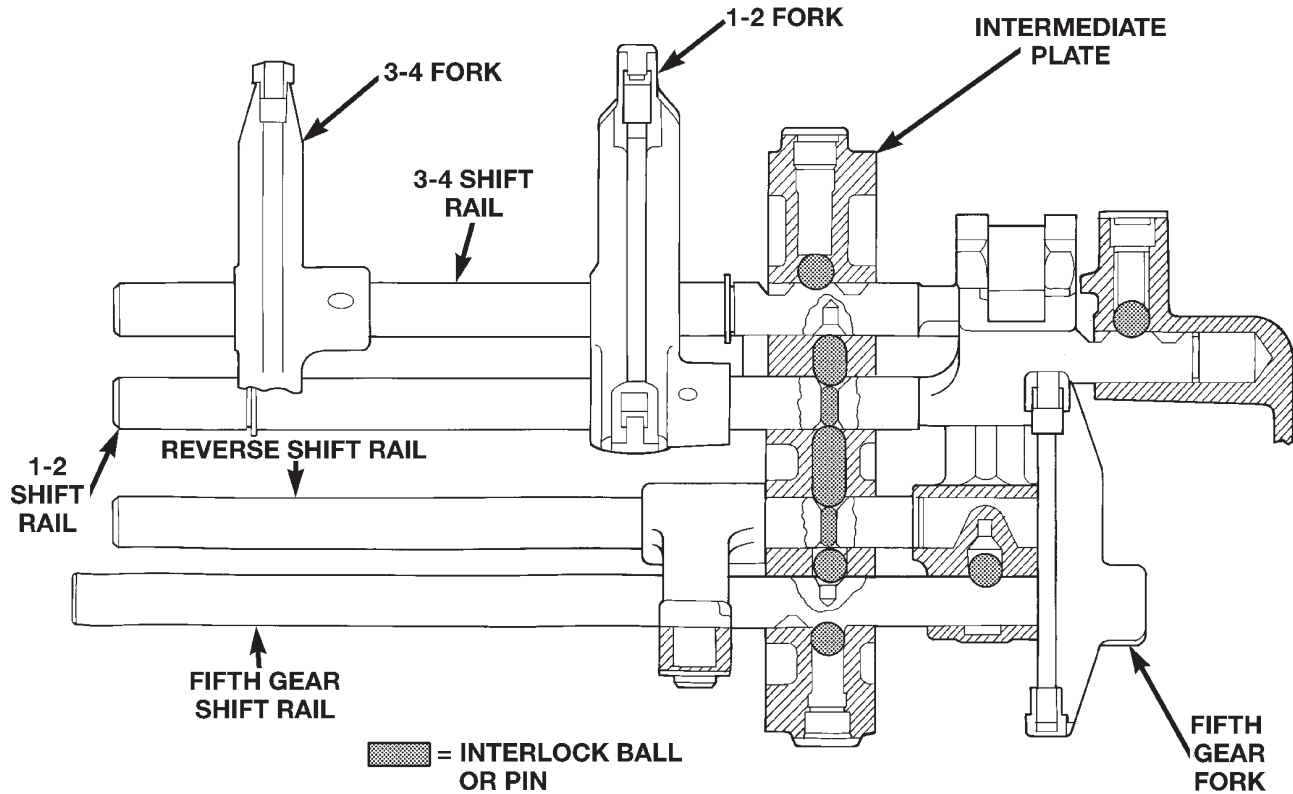


Fig. 75 Shift Rail Components

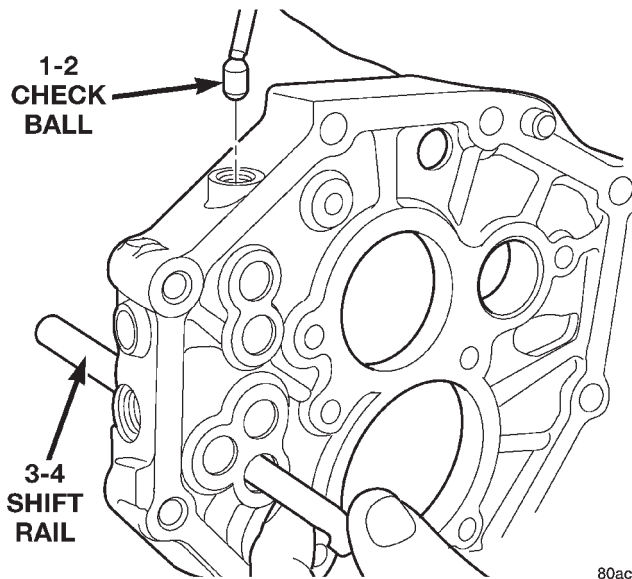


Fig. 76 Install 1-2 Check Ball

- (5) Install snap-ring onto 3-4 shift rail.
- (6) Install the reverse check ball into the intermediate plate (Fig. 78).

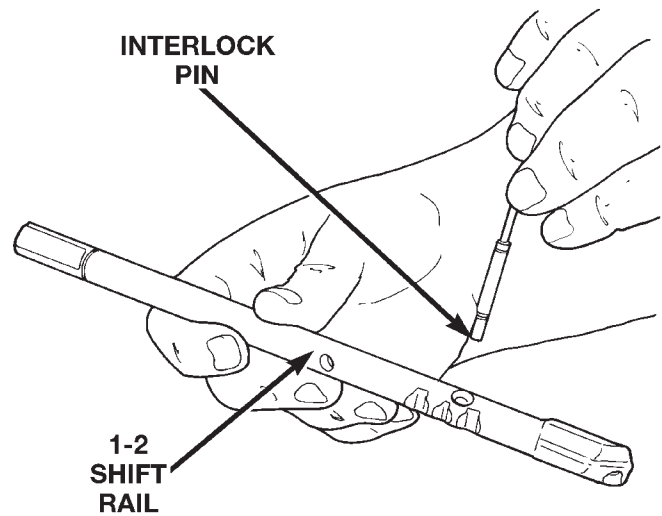


Fig. 77 Install 1-2 Shift Rail Interlock Pin

- (7) Install the interlock pin into the reverse shift rail (Fig. 79).
- (8) Assemble the reverse arm bracket to the reverse fork (Fig. 80).

DISASSEMBLY AND ASSEMBLY (Continued)

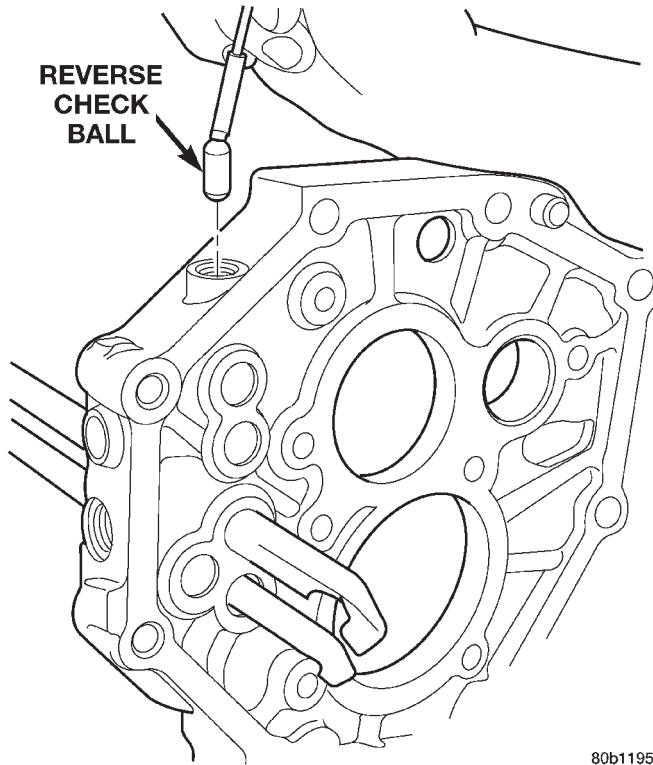


Fig. 78 Install Reverse Check Ball

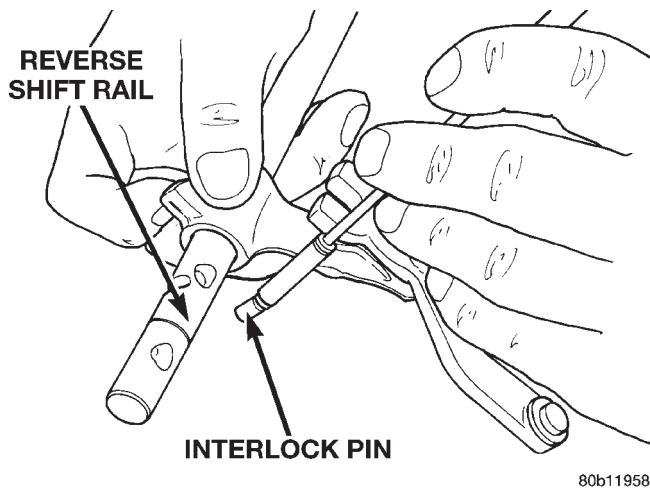


Fig. 79 Install Reverse Interlock Pin

(9) Install reverse shift rail into intermediate plate and position reverse arm bracket to intermediate plate (Fig. 81).

(10) Install snap-ring onto reverse shift rail (Fig. 82).

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

(12) Install the fifth gear interlock ball and check ball (Fig. 83).

(13) Install fifth gear shift rail (Fig. 84).

(14) Remove the intermediate plate from the vise, rotate the plate 180°, and reinstall the plate in the

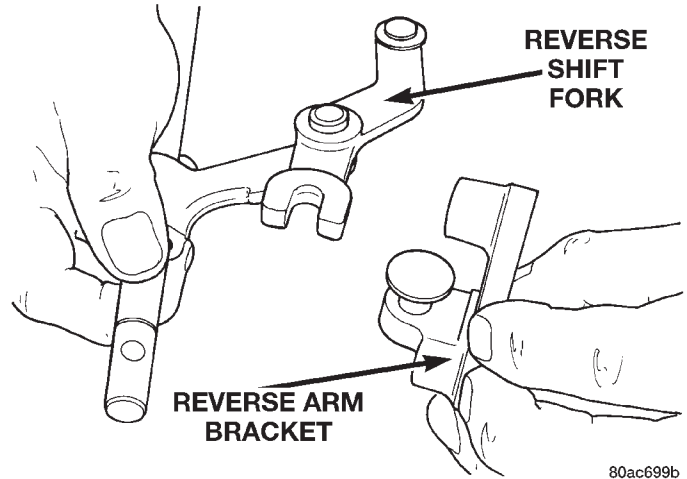


Fig. 80 Install Reverse Arm Bracket to Fork

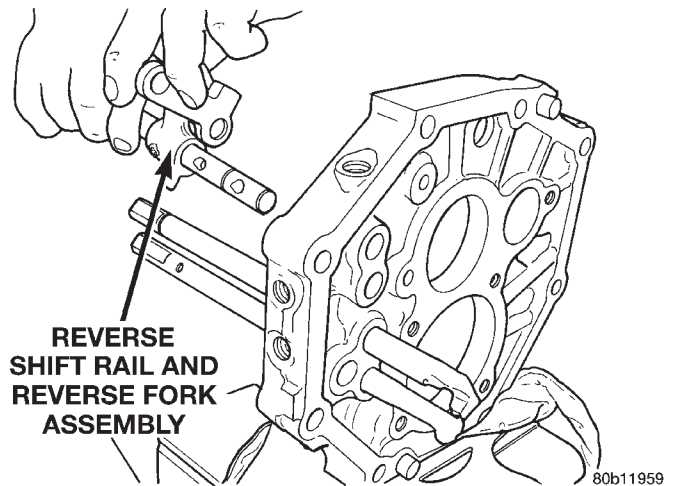


Fig. 81 Install Reverse Shift Rail

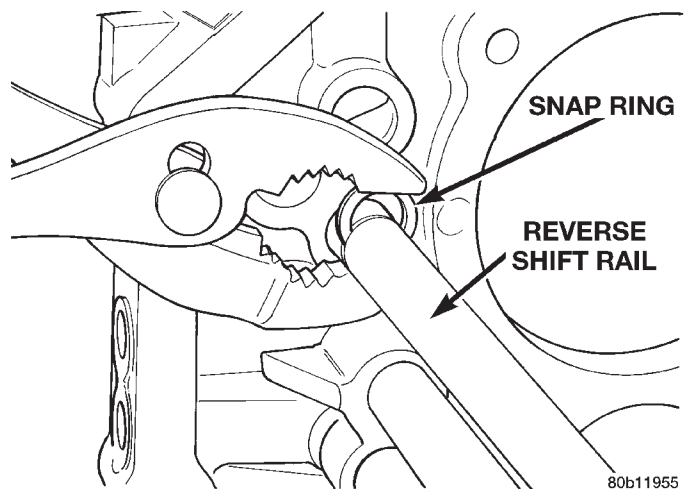


Fig. 82 Install Reverse Snap-ring

vise using the same bolt and washer mounting set-up.

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

DISASSEMBLY AND ASSEMBLY (Continued)

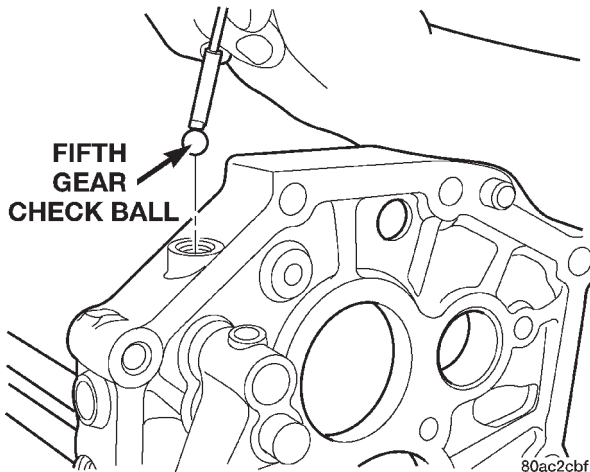


Fig. 83 Install Fifth Gear Check Ball

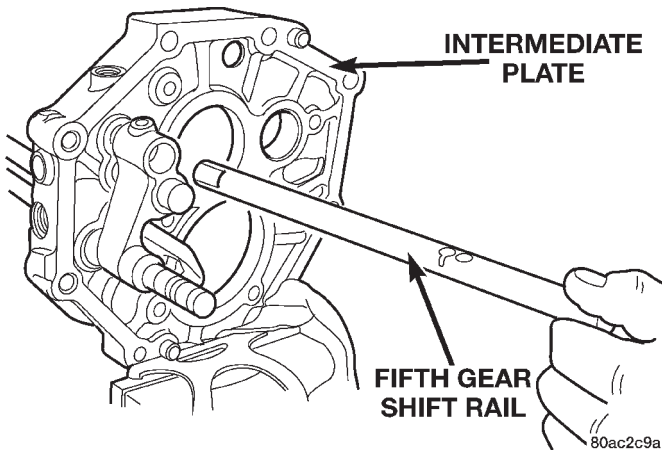


Fig. 84 Install Fifth Gear Shift Rail

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

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

(18) Install the 1-2 shift fork onto the 1-2 and 3-4 shift rails (Fig. 85).

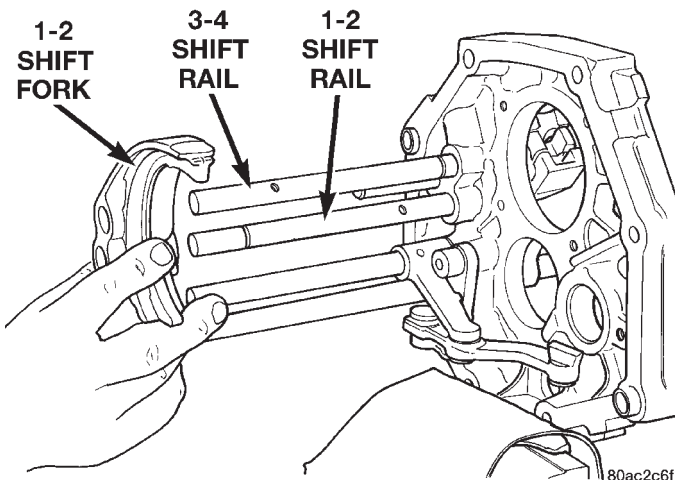


Fig. 85 Install 1-2 Shift Fork

(19) Install the snap-ring onto the 1-2 shift rail.
 (20) Install the 3-4 shift fork onto the 3-4 shift rail (Fig. 86).

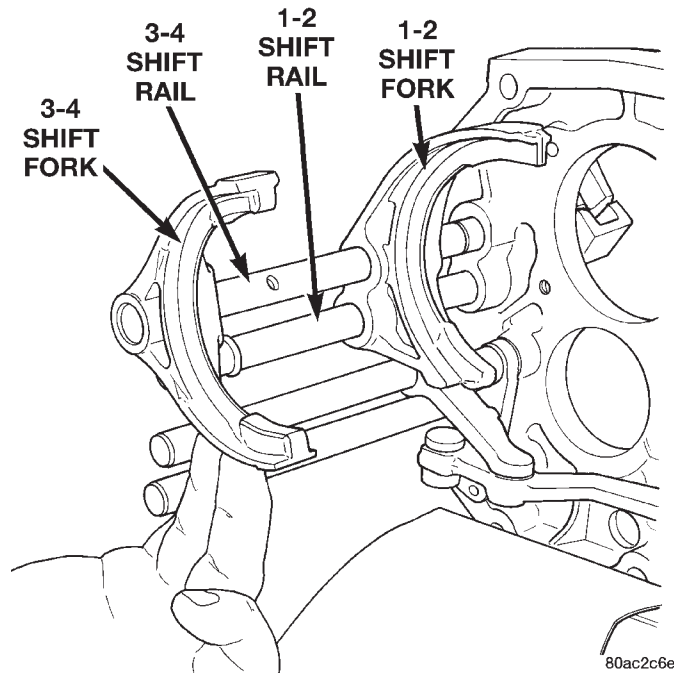


Fig. 86 Install 3-4 Shift Fork

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

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

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

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

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

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

(27) Install new bolts to hold the shift forks to the shift rails (Fig. 87).

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

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

DISASSEMBLY AND ASSEMBLY (Continued)

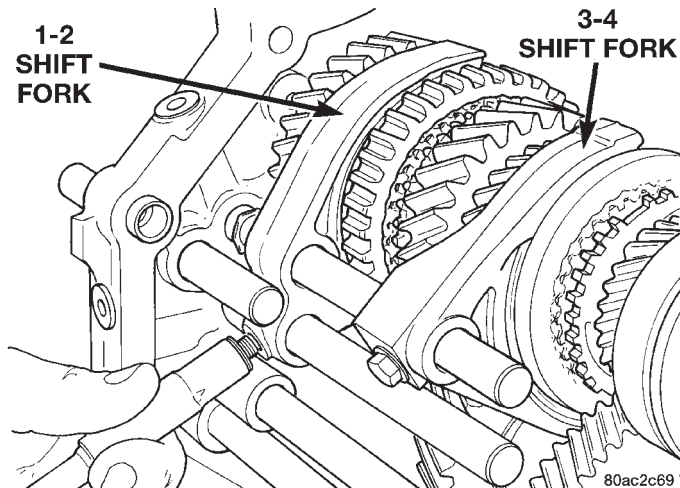


Fig. 87 Install Shift Fork Bolts

(30) Move the reverse shift arm into the reverse gear position. The reverse gear position is with the arm moved away from the intermediate plate (Fig. 88).

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

(32) Install the compression spring and pin into the reverse idler gear shaft (Fig. 89).

(33) Install the reverse idler shaft through the intermediate plate and reverse idler gear assembly (Fig. 90) until the idler shaft pin contacts the gear assembly. Make sure that the notched cut-out in the idler shaft is to the rear of the transmission.

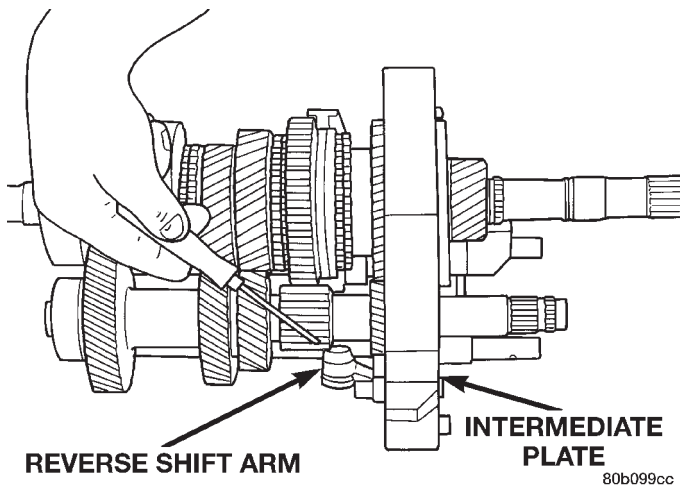


Fig. 88 Reverse Shift Arm Position

(34) Align the pin with the alignment notch in the reverse idler gear assembly (Fig. 91). The alignment notch in the reverse idler gear race/hub is a small relief cut above one of the main longitudinal slots. Be sure that the pin is aligned with the proper slot, the opposite slot has an oil drain hole which the pin will drop into. The assembly will then be locked onto the

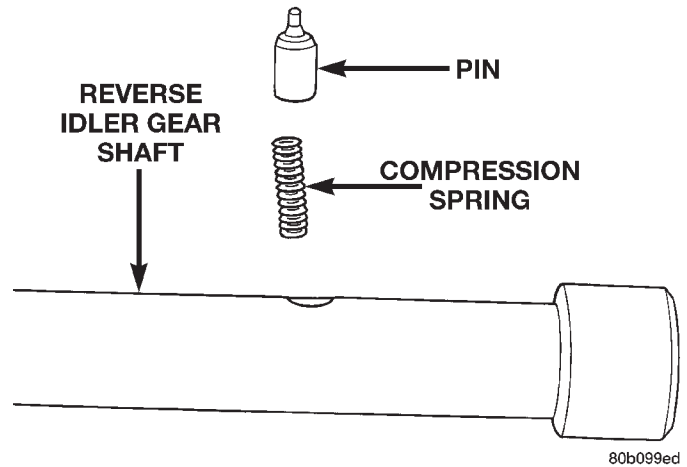


Fig. 89 Install Compression Spring And Pin

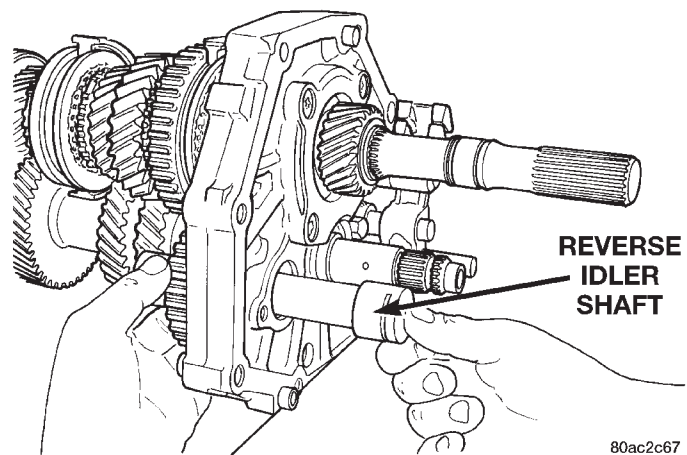


Fig. 90 Install Reverse Idler Shaft

shaft and will need to be disassembled in order to be removed.

(35) Depress compression spring and pin in reverse idler gear shaft (Fig. 92).

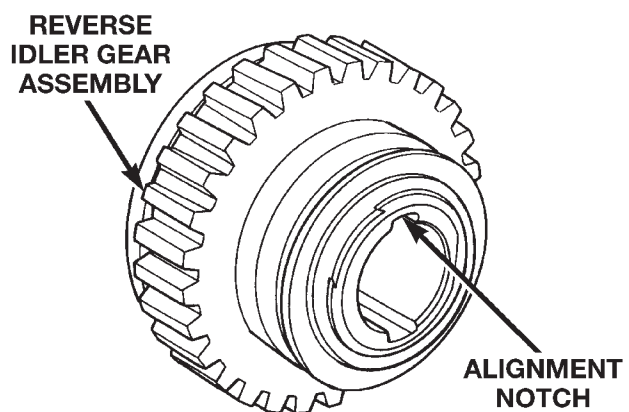


Fig. 91 Align Idler Shaft Pin

80b099ed

80ac2c67

80b099cc

80b099ce

DISASSEMBLY AND ASSEMBLY (Continued)

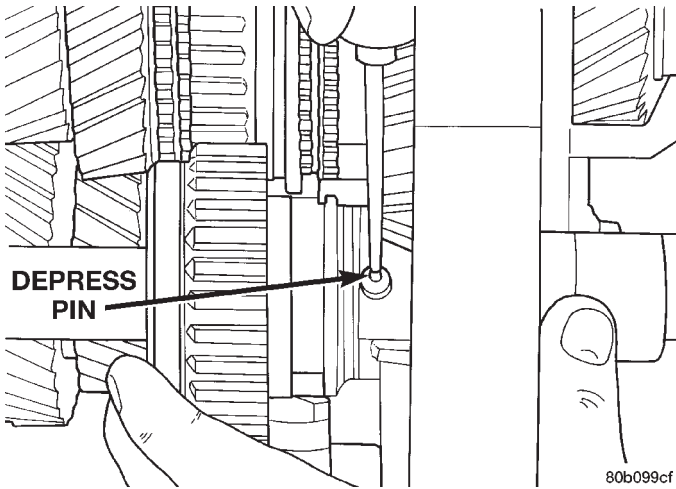


Fig. 92 Depress Pin In Reverse Idler Gear Shaft

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

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

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

(39) Install the fifth gear thrust ring lock ball to the countershaft (Fig. 93).

(40) Install the fifth gear thrust ring onto the countershaft and over the lock ball (Fig. 94).

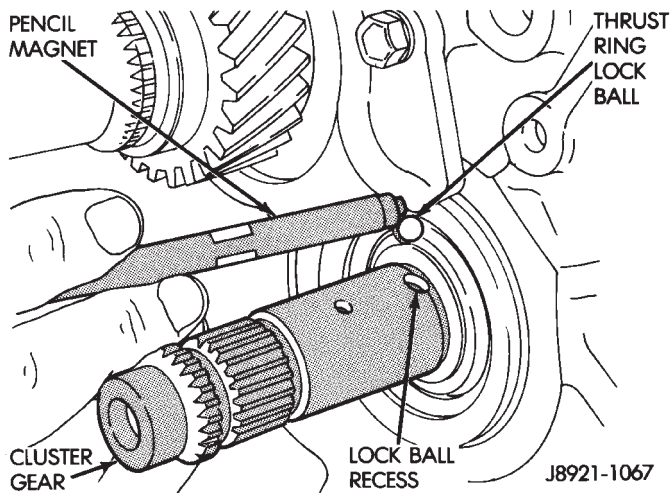


Fig. 93 Install Fifth Gear Thrust Ring Lock Ball

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

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

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

(44) Install the fifth gear synchro ring.

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

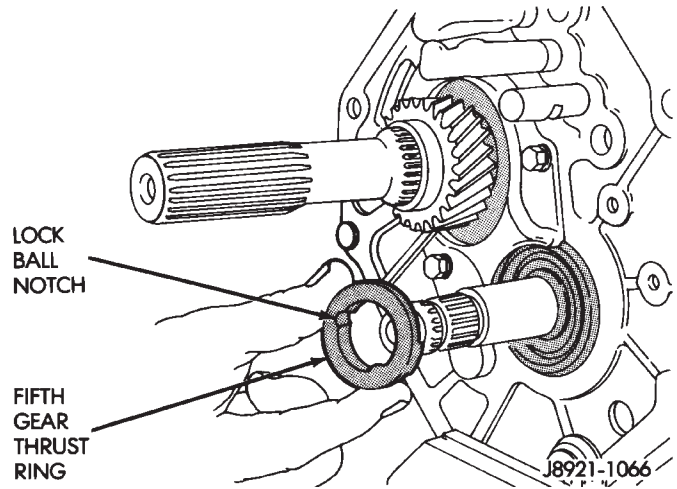


Fig. 94 Install Fifth Gear Thrust Ring

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

(47) Install new bolt to hold fifth gear shift fork to the fifth gear shift rail (Fig. 95).

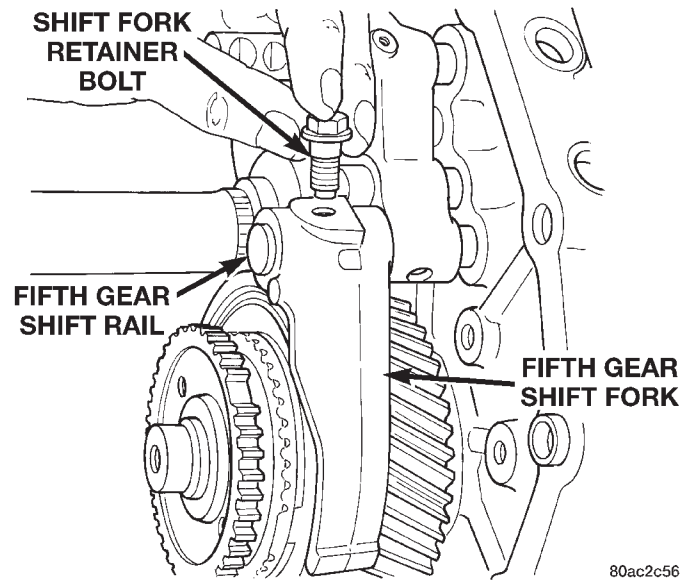


Fig. 95 Install Fifth Gear Retainer Bolt

(48) Measure countershaft fifth gear thrust clearance.

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

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

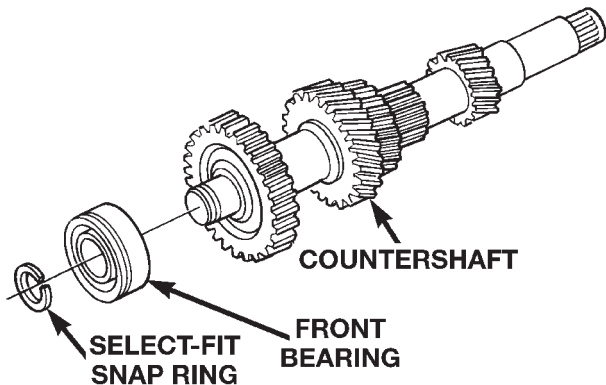
(51) Remove intermediate plate from vise and remove bolts and washers from intermediate.

DISASSEMBLY AND ASSEMBLY (Continued)

COUNTERSHAFT

DISASSEMBLY

- (1) Remove select fit snap-ring holding the countershaft front bearing onto the countershaft (Fig. 96).
- (2) Using Bearing Splitter P-334, a suitable spacer on center of countershaft, and a shop press, remove the countershaft front bearing from the countershaft.



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

80ac6a0a

Fig. 96 Countershaft Front Bearing Snap-ring

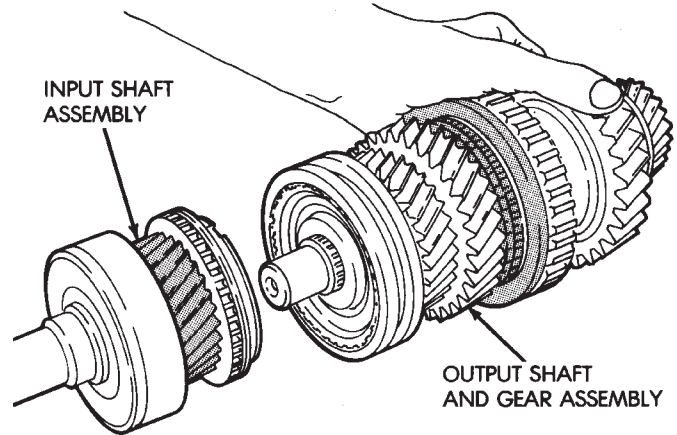
ASSEMBLY

- (1) Remove any nicks or burrs on countershaft hub with fine emery or crocus cloth.
- (2) Position countershaft front bearing on end of countershaft.
- (3) Using Special Tool 8109 and a shop press, press bearing onto countershaft.
- (4) Select the thickest snap-ring that will fit into the snap-ring groove of the countershaft (Fig. 96).
- (5) Install snap-ring to hold countershaft front bearing onto countershaft.

INPUT SHAFT

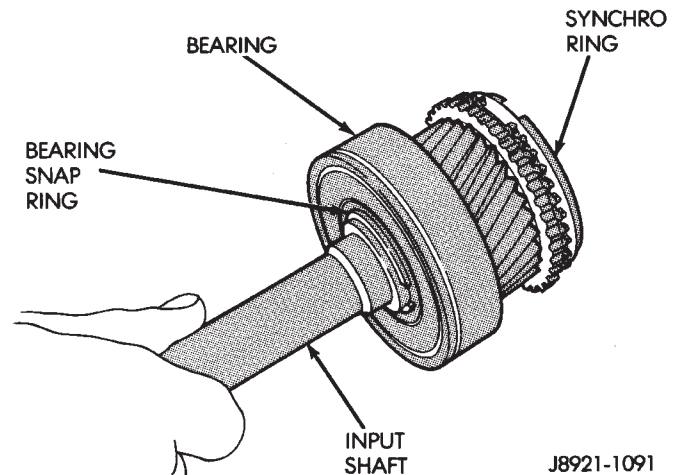
DISASSEMBLY

- (1) Verify that the 3-4 synchronizer is in the neutral position.
- (2) Separate input shaft from output shaft (Fig. 97). Note that the output shaft pilot bearing is an uncaged roller type bearing.
- (3) Remove the output shaft pilot bearing rollers from the input shaft and the output shaft.
- (4) Remove the fourth gear synchronizer ring from the input shaft (Fig. 98).



J8921-1089

Fig. 97 Separate Input and Output Shafts



J8921-1091

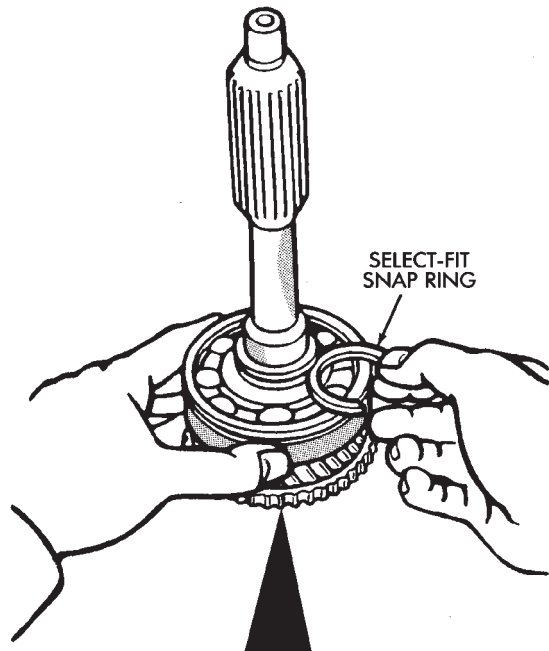
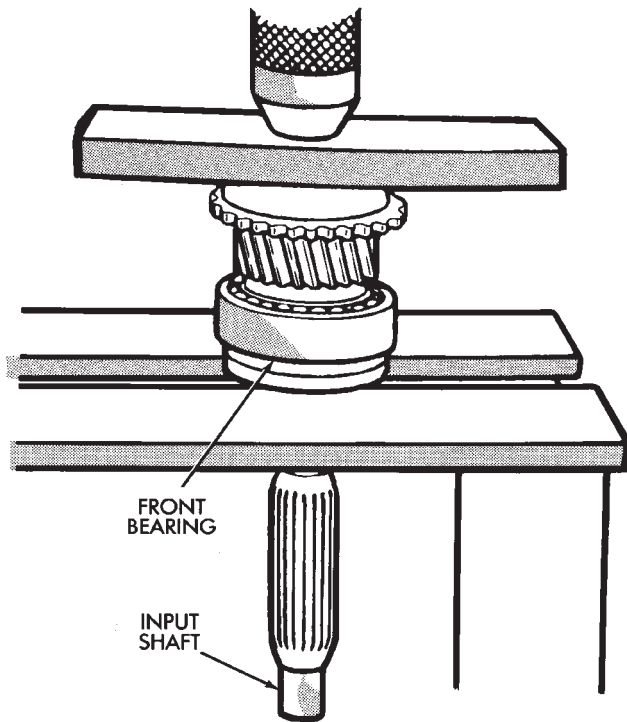
Fig. 98 Input Shaft Components

- (5) Remove the select fit snap-ring holding the input shaft bearing onto the input shaft.
- (6) Using Bearing Splitter P-334 and a shop press, remove the bearing from the input shaft.

ASSEMBLY

- (1) Position input shaft bearing onto input shaft.
- (2) Using Driver L-4507, drive bearing onto input shaft.
- (3) Select the thickest snap-ring that will fit into the snap-ring groove of the input shaft (Fig. 99).
- (4) Lubricate output shaft pilot bearing bore of input shaft with petroleum jelly.
- (5) Install output shaft pilot bearing rollers in input shaft bore (Fig. 100). Ensure to use sufficient petroleum jelly to hold rollers in position.
- (6) Install the fourth gear synchronizer ring onto the input shaft.
- (7) Install input shaft to output shaft. Use care when mating the two shafts not to displace any output shaft pilot bearing rollers.

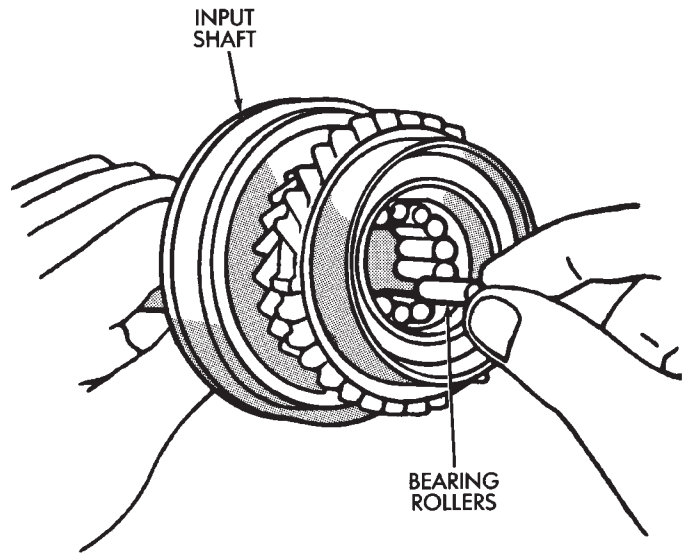
DISASSEMBLY AND ASSEMBLY (Continued)



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

J8921-50

Fig. 99 Select Input Shaft Bearing Snap-ring

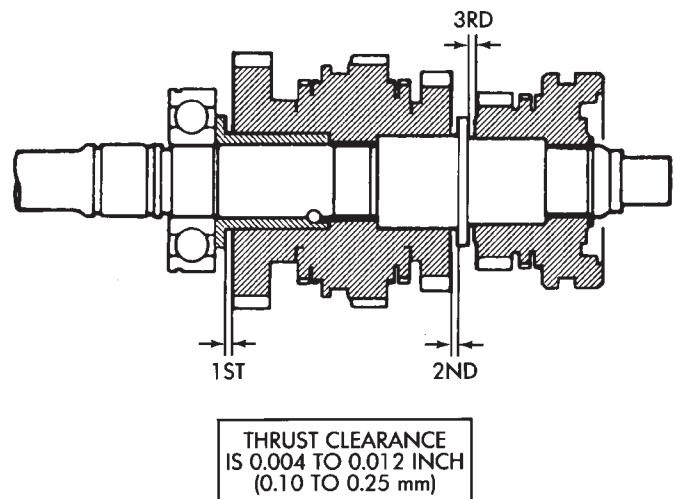


J8921-64

Fig. 100 Install Output Shaft Pilot Bearing Rollers
OUTPUT SHAFT

DISASSEMBLY

- (1) Remove input shaft and output shaft pilot bearing rollers from output shaft.
- (2) Measure and note thrust clearance of output shaft gears (Fig. 101). Clearance should be 0.10 - 0.25 mm (0.004 - 0.010 in.).



J8921-36

Fig. 101 Check Output Shaft Gear Thrust Clearance

- (3) Remove output shaft fifth gear snap ring with two screwdrivers (Fig. 102).
- (4) Using Bearing Splitter P-334 or suitable press plates positioned under first gear, press fifth gear, rear bearing, first gear, and first gear bearing inner race off output shaft (Fig. 103).

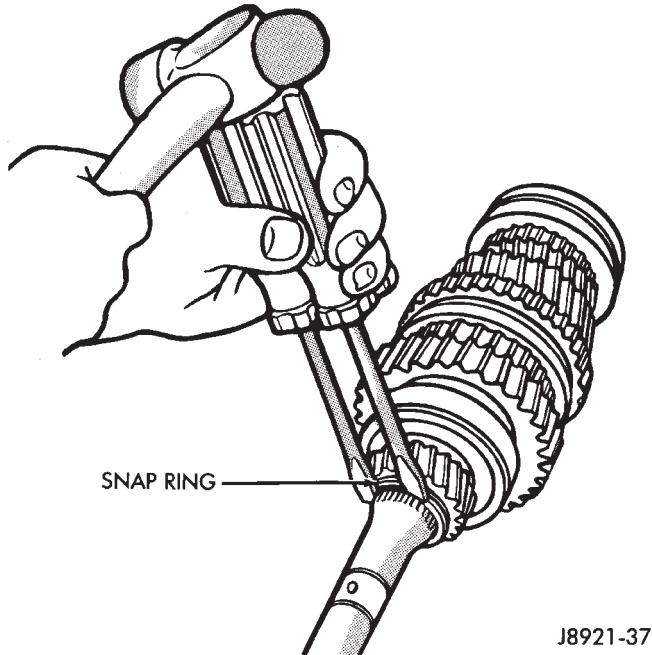


Fig. 102 Remove Fifth Gear Snap-ring

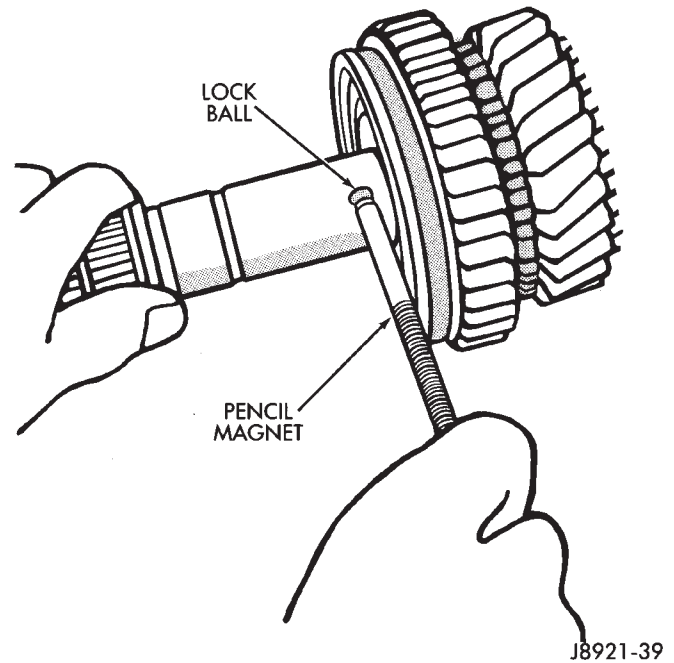


Fig. 104 Remove First Gear Bearing Inner Race Lock Ball

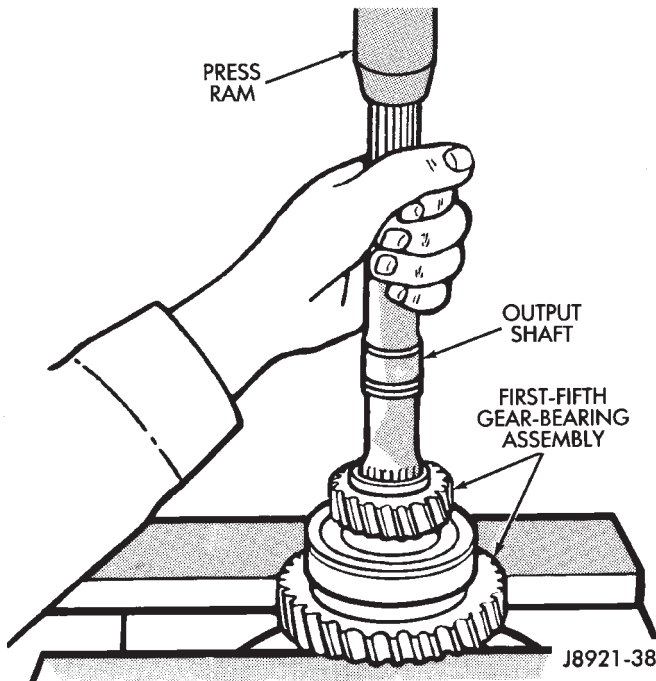


Fig. 103 Remove Fifth Gear, First Gear Bearing, And Race

- (5) Remove first gear needle roller bearing from output shaft.
- (6) Remove first gear bearing inner race lock ball with pencil magnet (Fig. 104).
- (7) Remove first gear synchronizer ring.
- (8) Using Bearing Splitter P-334 or suitable press plates positioned under second gear, press 1-2 synchronizer, reverse gear, and second gear from output shaft (Fig. 105).

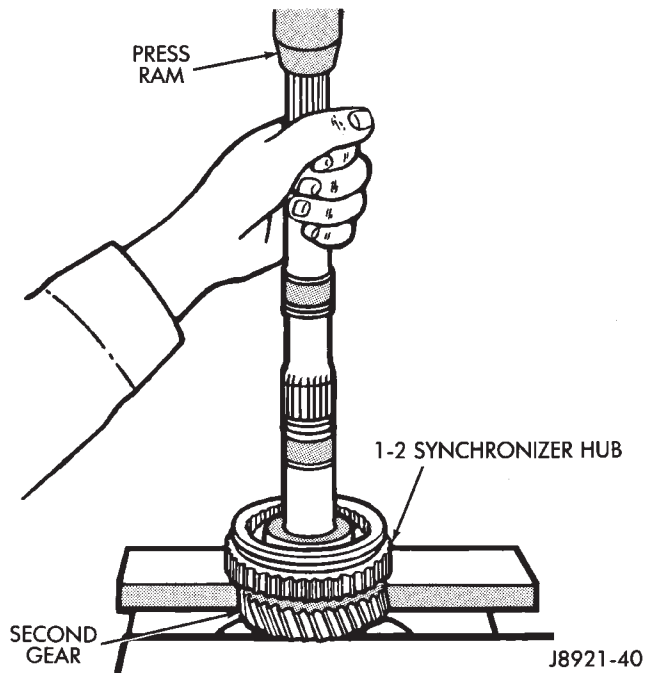


Fig. 105 Remove Second Gear, Reverse Gear, And 1-2 Synchronizer

- (9) Remove second gear needle roller bearing from the output shaft or second gear.
- (10) Remove select fit snap-ring holding the 3-4 synchronizer onto the output shaft (Fig. 106).
- (11) Using Bearing Splitter P-334 or suitable press plates positioned under third gear, press the 3-4 synchronizer and third gear from output shaft (Fig. 107).

DISASSEMBLY AND ASSEMBLY (Continued)

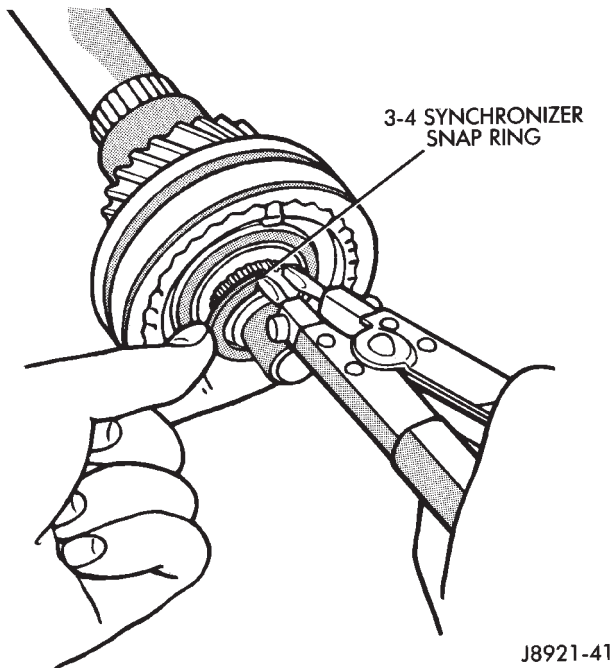


Fig. 106 Remove 3-4 Synchronizer Snap Ring

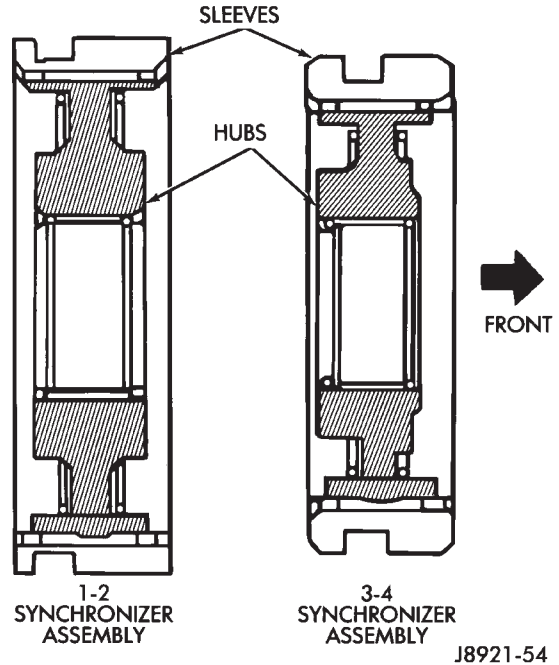


Fig. 108 Synchronizer Identification

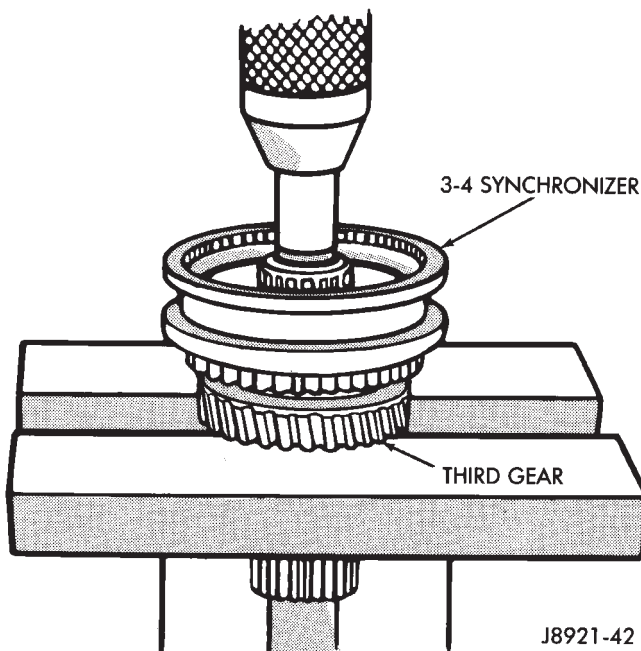


Fig. 107 Remove 3-4 Synchronizer And Third Gear

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

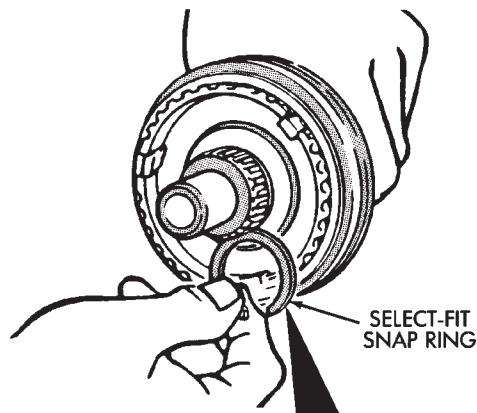
ASSEMBLY

(1) Lubricate transmission components with specified gear lubricant.

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

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

- (4) Install third gear over bearing and onto output shaft flange.
- (5) Install third gear synchronizer ring to third gear.
- (6) Position the 3-4 synchronizer onto the output shaft.
- (7) Using Adapter 6747-1A and a shop press, press the 3-4 synchronizer onto the output shaft.
- (8) Select the thickest snap-ring that will fit into the snap-ring groove of the output shaft (Fig. 109).



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

J8921-55

Fig. 109 Select 3-4 Synchronizer Snap-ring

DISASSEMBLY AND ASSEMBLY (Continued)

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

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

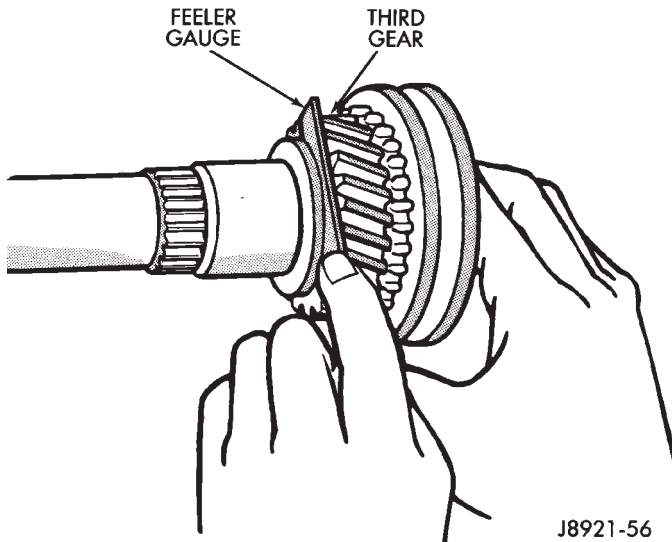


Fig. 110 Check Third Gear Clearance

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

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

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

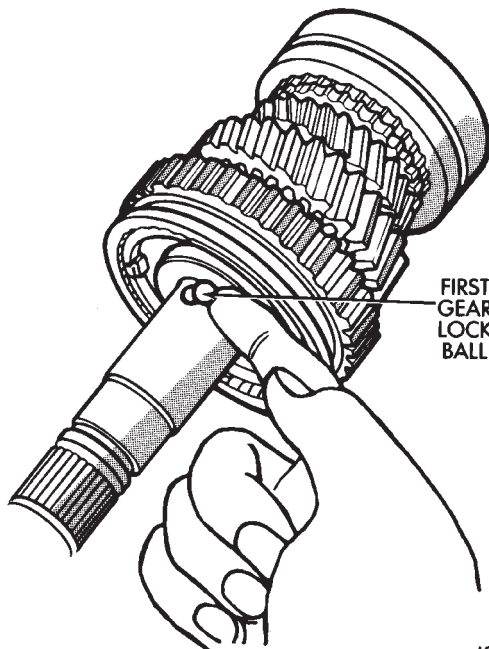


Fig. 111 Install First Gear Bearing Inner Race Lock Ball

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

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

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

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

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

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

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

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

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

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

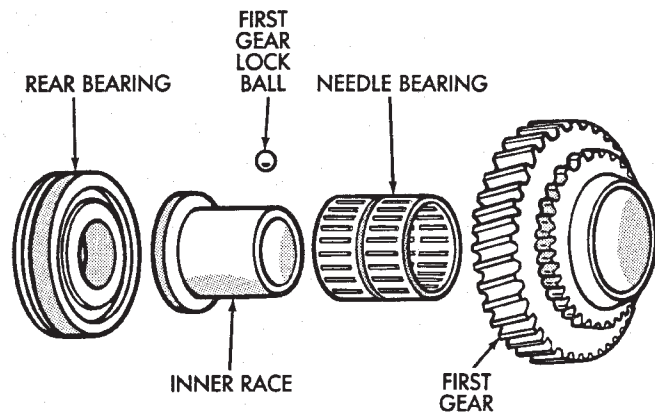
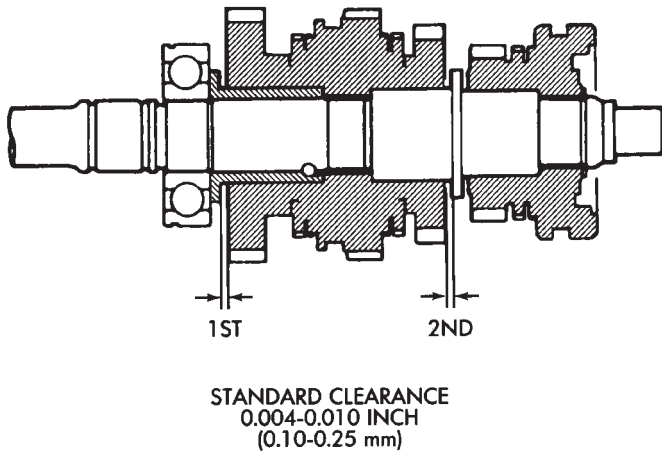


Fig. 112 First Gear Components

DISASSEMBLY AND ASSEMBLY (Continued)

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



J8921-61

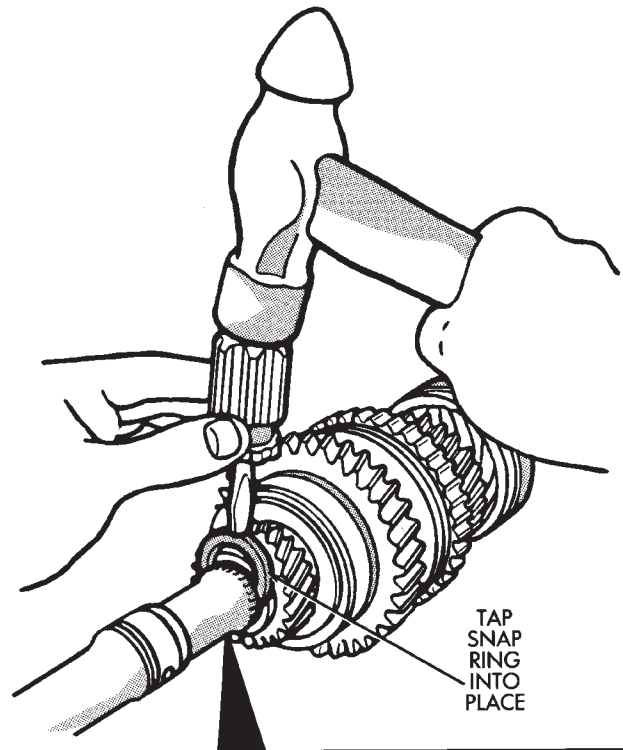
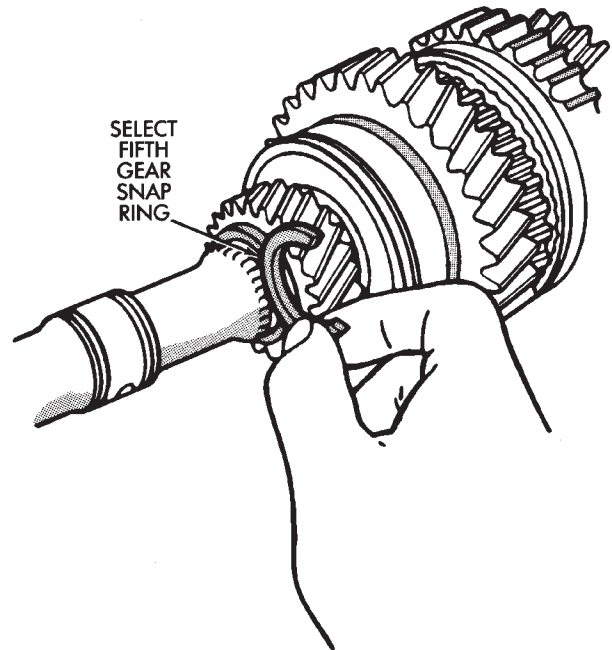
Fig. 113 Check First-Second Gear Thrust Clearance

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

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

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

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



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

J8921-63

Fig. 114 Select/Install Fifth Gear Snap Ring

DISASSEMBLY AND ASSEMBLY (Continued)

SEMI-SYNCHRONIZED REVERSE IDLER GEAR

DISASSEMBLY

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

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

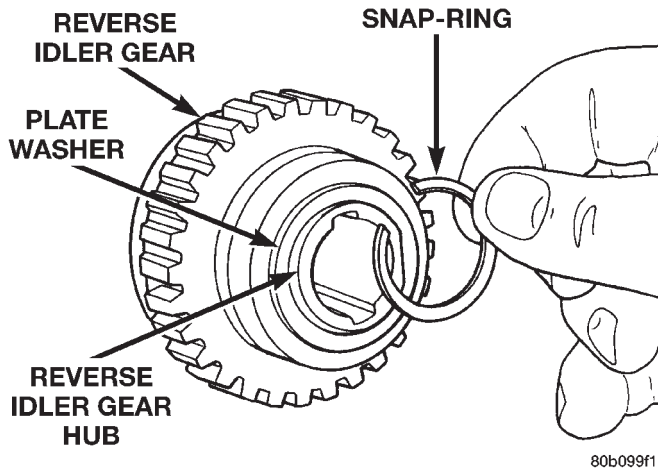


Fig. 115 Remove Reverse Idler Gear Snap-ring

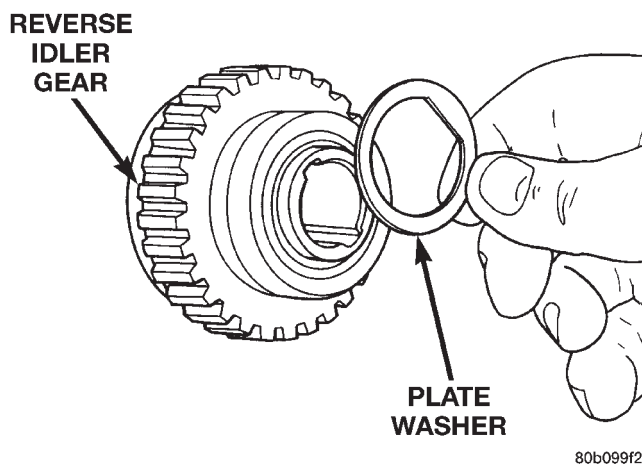


Fig. 116 Remove Reverse Idler Gear Plate Washer

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

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

ASSEMBLY

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

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

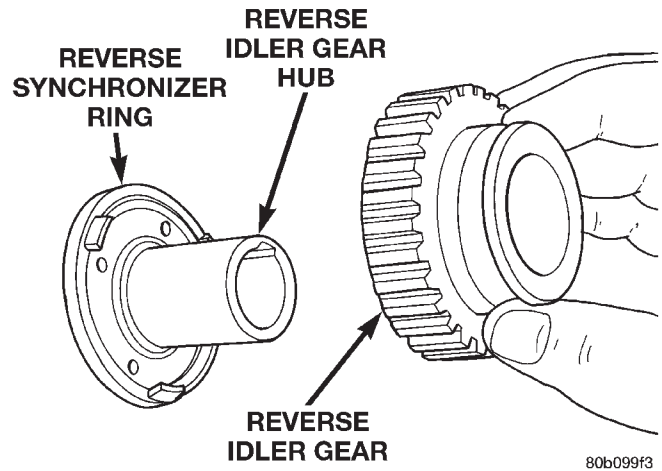


Fig. 117 Remove Reverse Idler Gear

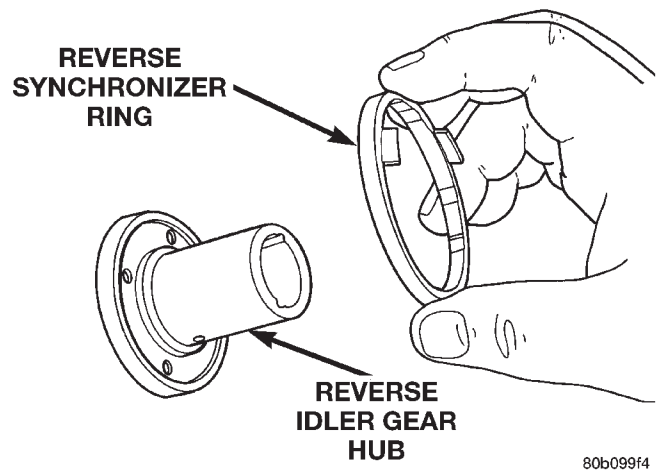


Fig. 118 Remove Reverse Idler Gear Synchronizer Ring

chronizer ring are properly engaged into the recesses of the reverse idler gear.

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

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

CLEANING AND INSPECTION

AX5 MANUAL TRANSMISSION COMPONENTS

GENERAL INFORMATION

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

If output shaft or inner race flange thickness is within specification but any gear thrust clearance is

CLEANING AND INSPECTION (Continued)

out of specification, replace the necessary gear and gear needle bearing as an assembly.

GEAR CASE, ADAPTER/EXTENSION HOUSING, INTERMEDIATE PLATE

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

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

OUTPUT SHAFT

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

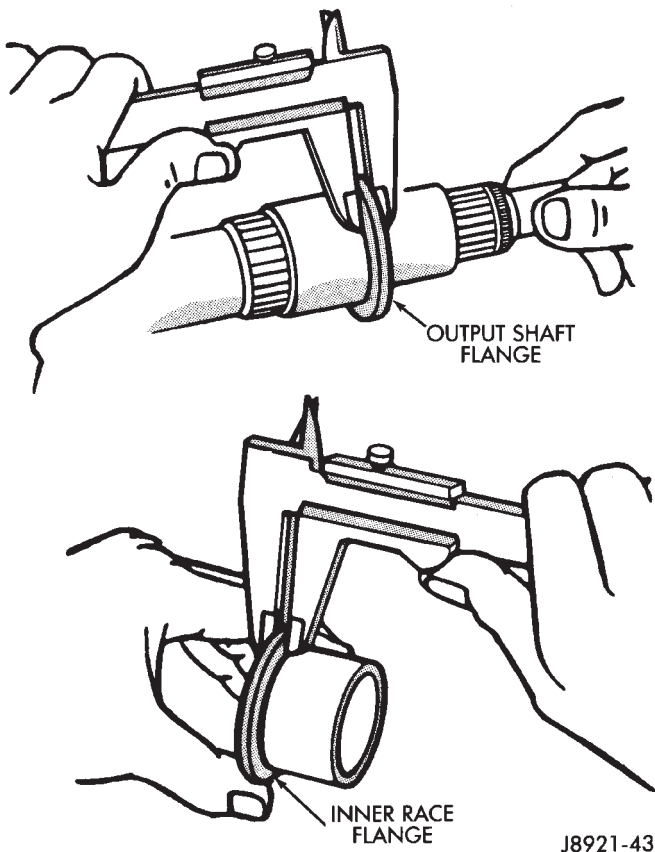


Fig. 119 Check Shaft And Bearing Race Flange Thickness

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

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

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

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

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

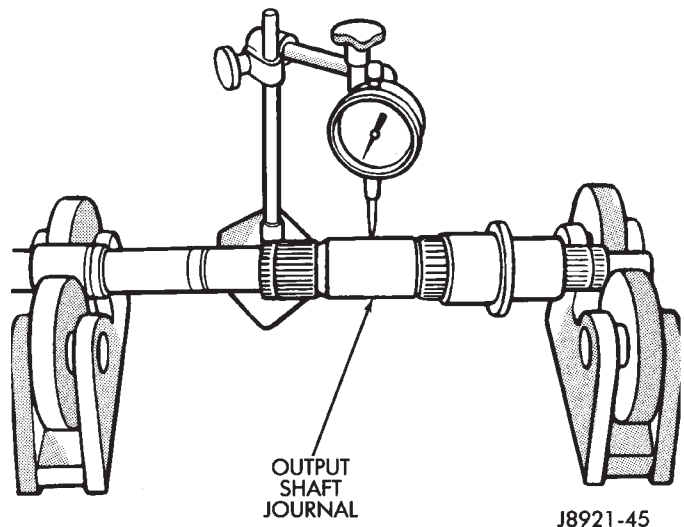


Fig. 120 Check Output Shaft Runout

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

COUNTERSHAFT

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

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

GEAR AND SYNCHRONIZER

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

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

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

CLEANING AND INSPECTION (Continued)

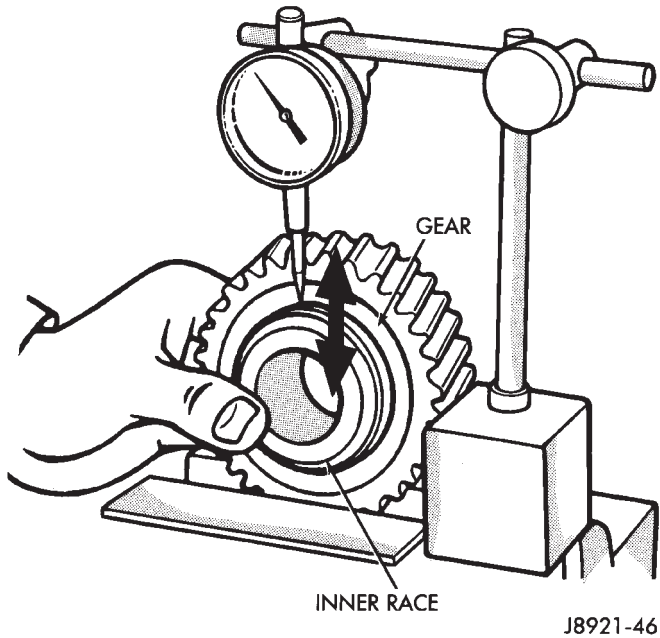


Fig. 121 Check Gear-To-Race Clearance

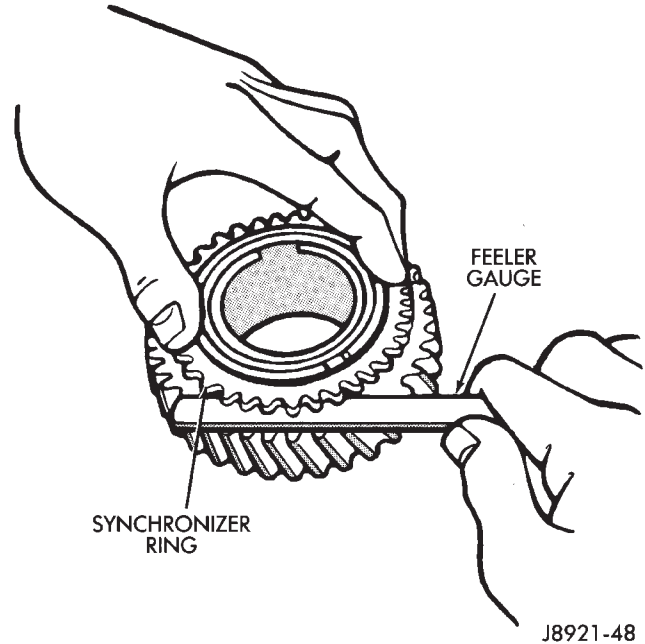


Fig. 123 Check Synchronizer Ring Wear

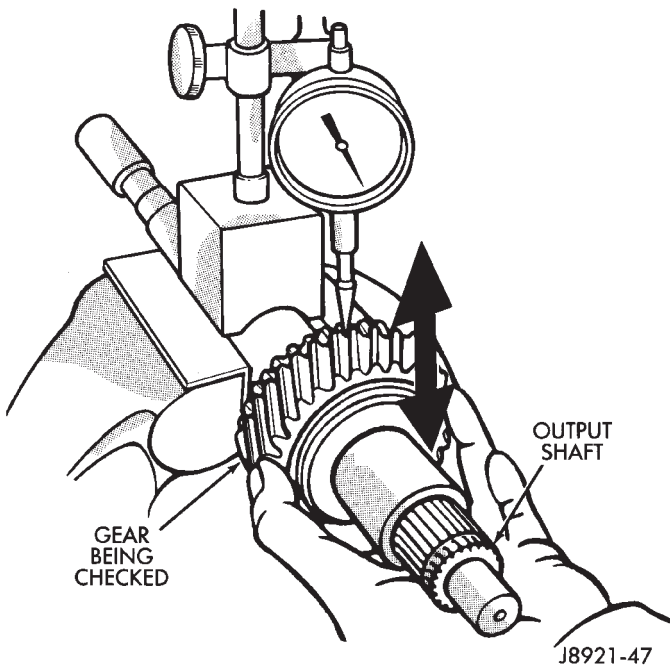


Fig. 122 Check Gear-To-Shaft Oil Clearance

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

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

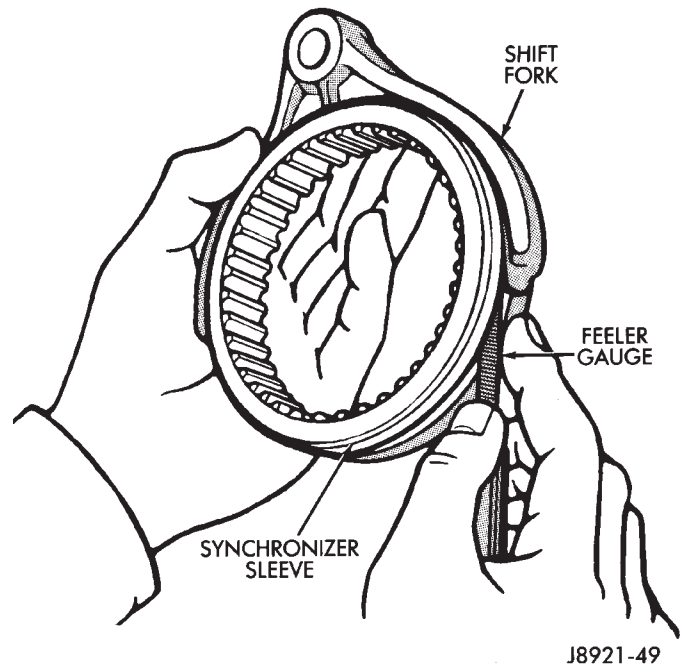
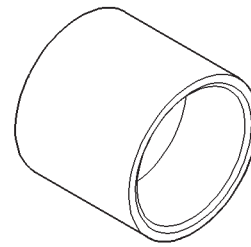


Fig. 124 Check Fork-To-Hub Clearance

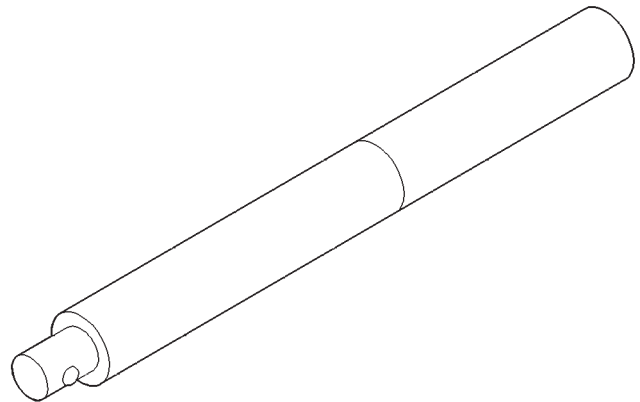
SPECIFICATIONS

TORQUE

DESCRIPTION	TORQUE
Plugs, Access	19 N·m (14 ft.lbs.)
Bolts, Adapter Housing	34 N·m (25 ft.lbs.)
Switch, Back-up Light	44 N·m (32.5 ft.lbs.)
Plugs, Drain and Fill	44 N·m (32.5 ft.lbs.)
Bolts, Front Bearing Retainer	17 N·m (12 ft.lbs.)
Plugs, Interlock and Detent	19 N·m (14 ft.lbs.)
Screws, Propeller Shaft Clamp	16–23 N·m (140–200 in.lbs.)
Bolts, Rear Mount to Transmission	33–60 N·m (24–44 ft.lbs.)
Nut, Rear Mount Clevis	54–75 N·m (40–55 ft.lbs.)
Nuts, Rear Mount to Crossmember	33–49 N·m (24–36 ft.lbs.)
Pins, Restrictor	27.4 N·m (20 ft.lbs.)
Bolts, Reverse Shift Arm Bracket	18 N·m (13 ft.lbs.)
Screw, Shift Arm Set	38 N·m (28 ft.lbs.)
Screws, Shift Fork Set	20 N·m (15 ft.lbs.)
Nut, Shift Knob	20–34 N·m (15–25 ft.lbs.)
Screws, Shifter Floor Cover	2–3 N·m (17–30 in.lbs.)
Bolts, Shift Tower	18 N·m (13 ft.lbs.)
Nuts, Transfer Case Mounting	30–41 N·m (22–30 ft.lbs.)



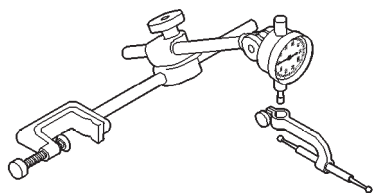
C-3995-A Installer, Extension Housing Seal



C-4171 Handle, Universal Tool

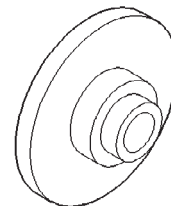
SPECIAL TOOLS

AX5

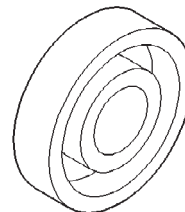


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C-3339 Dial Indicator Set

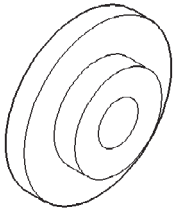


8211 Installer, Seal

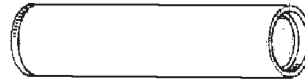


8212 Installer, Seal

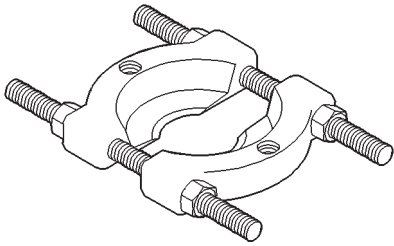
SPECIAL TOOLS (Continued)



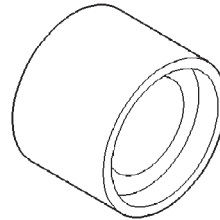
8208 Installer, Seal



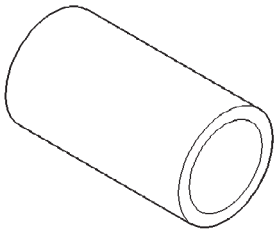
L-4507 Tube, Driver



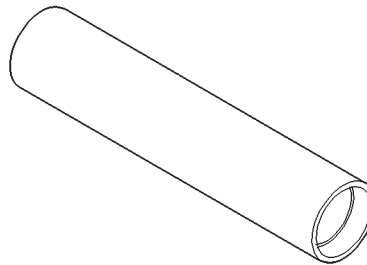
P-334 Splitter, Bearing



6747-1A Adapter, Fixture



8109 Cup, Installer



MD-998805 Installer, Seal

AX15 MANUAL TRANSMISSION

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GENERAL INFORMATION

AX15 MANUAL TRANSMISSION

The AX15 is a 5-speed, synchromesh, manual transmission. Fifth gear is an overdrive range with a ratio of 0.79:1. An adapter housing is used to attach the transmission to the transfer case on 4-wheel drive models. A standard extension housing is used on 2-wheel drive models. The shift mechanism is integral and mounted in the shift tower portion of the adapter housing (Fig. 1).

TRANSMISSION IDENTIFICATION

The AX15 identification code numbers are on the bottom surface of the intermediate plate (Fig. 2).

The first number is year of manufacture. The second and third numbers indicate month of manufacture. The next series of numbers is the transmission serial number.

TRANSMISSION GEAR RATIOS

Gear ratios for the AX15 manual transmission are as follows:

- First gear: 3.83:1
- Second gear: 2.33:1
- Third gear: 1.44:1
- Fourth gear: 1.00:1
- Fifth gear: 0.79:1
- Reverse: 4.22:1

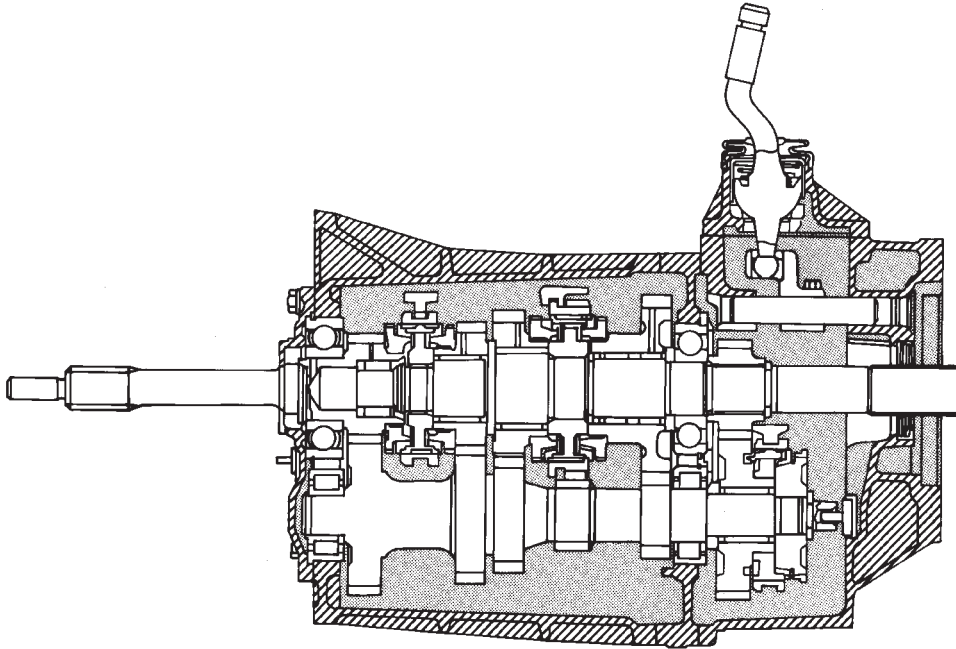
RECOMMENDED LUBRICANT

Recommended lubricant for AX15 transmissions is Mopar® 75W-90, API Grade GL-3 gear lubricant, or equivalent.

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

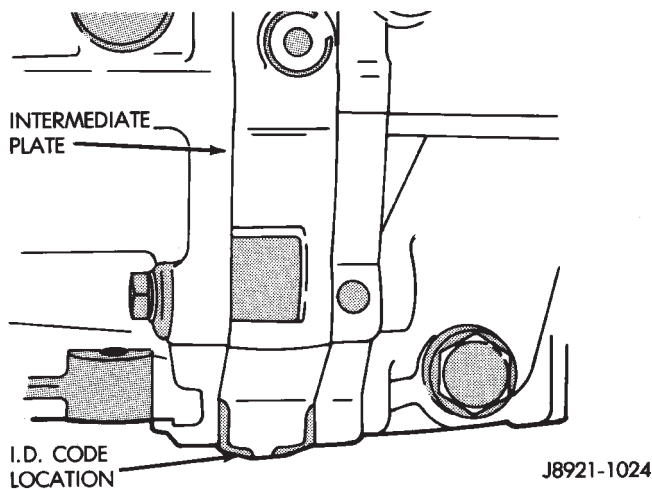
The fill plug is located on the driver's side of the transmission case (Fig. 3). The drain plug is located on the passenger side of the transmission case near the bottom (Fig. 4).

GENERAL INFORMATION (Continued)



J8921-1023

Fig. 1 AX15 Manual Transmission



J8921-1024

Fig. 2 Identification Code Number Location

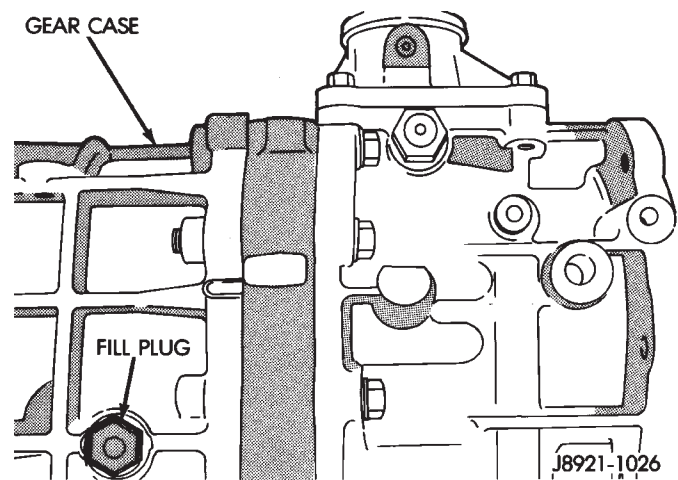
Approximate dry fill lubricant capacity is:

- 3.10 liters (3.27 qts.) for 4-wheel drive applications.
- 3.15 liters (3.32 qts.) for 2-wheel drive applications.

TRANSMISSION ASSEMBLY INFORMATION

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

Refer to (Fig. 5) during assembly for AX15 gear assembly identification.



J8921-1026

Fig. 3 Fill Plug Location

DIAGNOSIS AND TESTING**LOW LUBRICANT LEVEL**

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

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

Leaks at the rear of the extension or adaptor 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.

DIAGNOSIS AND TESTING (Continued)

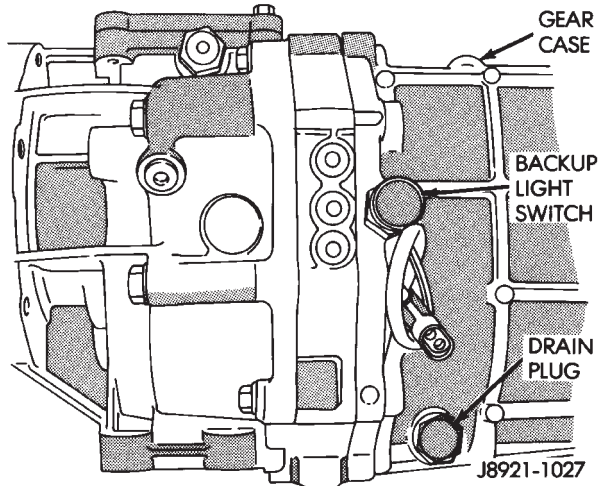


Fig. 4 Drain Plug Location

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

A correct lubricant level check can only be made when the vehicle is level. Also allow the lubricant to settle for a minute or so before checking. These recommendations will ensure an accurate check and

avoid an underfill or overfill condition. Always check the lubricant level after any addition of fluid to avoid an incorrect lubricant level condition.

HARD SHIFTING

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

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

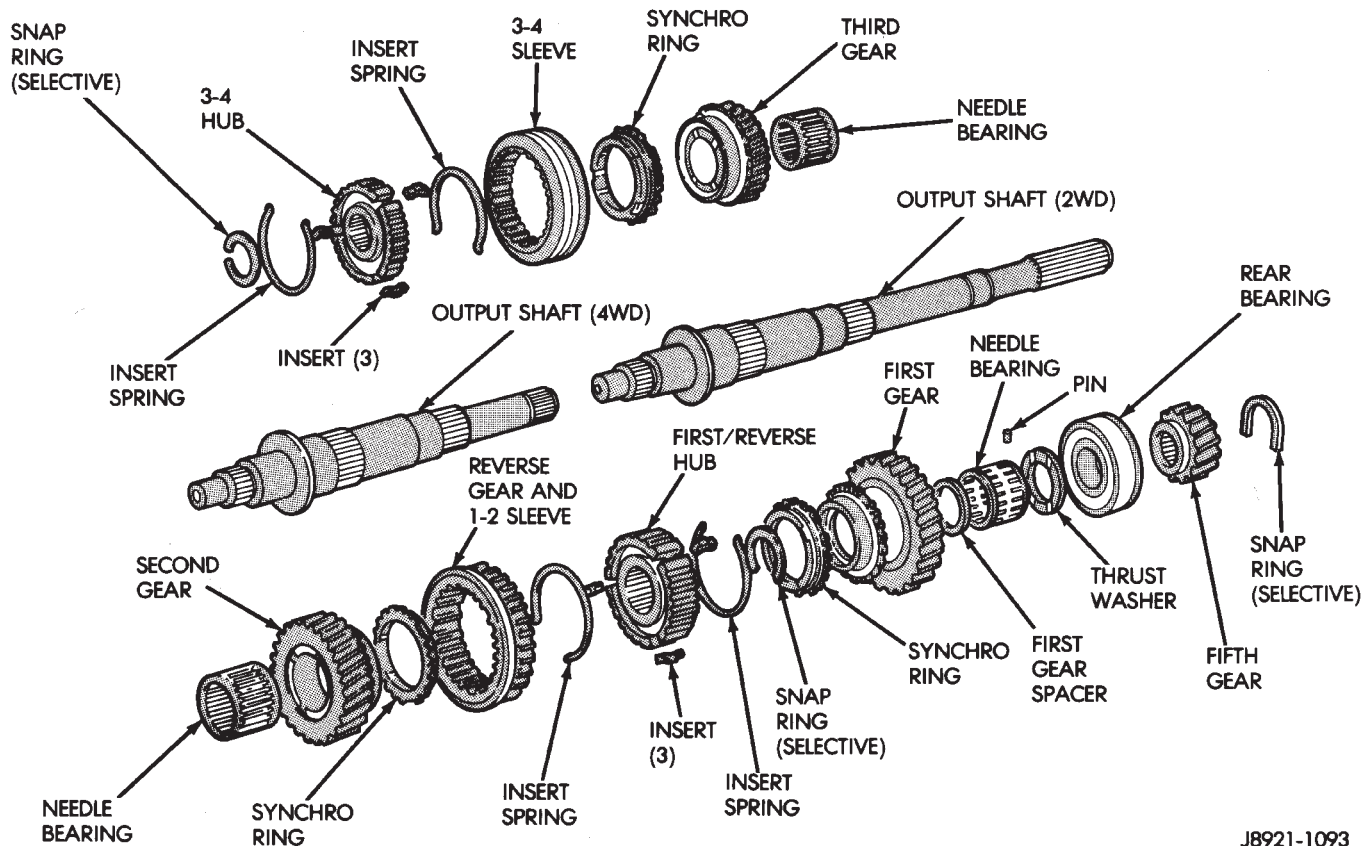


Fig. 5 Output Shaft and Gears

J8921-1093

DIAGNOSIS AND TESTING (Continued)

TRANSMISSION NOISE

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

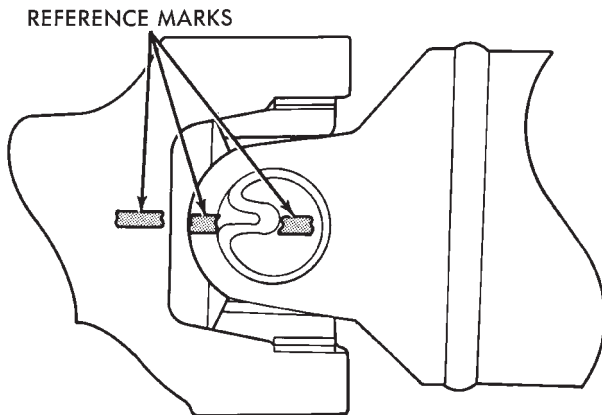
Severe, highly audible transmission noise is generally the initial indicator of a lubricant problem. Insufficient, improper, or contaminated lubricant will promote rapid wear of gears, synchros, shift rails, forks and bearings. The overheating caused by a lubricant problem, can also lead to gear breakage.

REMOVAL AND INSTALLATION

TRANSMISSION

REMOVAL

- (1) Shift transmission into first or third gear.
- (2) Raise and support vehicle on suitable safety stands.
- (3) Disconnect necessary exhaust system components.
- (4) Remove skid plate, if equipped.
- (5) Remove slave cylinder from clutch housing.
- (6) Mark rear propeller shaft and rear axle yokes for installation alignment (Fig. 6).



J9316-2

Fig. 6 Marking Propeller Shaft And Axle Yokes

- (7) Mark front propeller shaft, axle, and transfer case yokes for installation alignment, if equipped.
- (8) Remove propeller shaft(s).
- (9) Unclip wire harnesses from transmission and transfer case, if equipped.
- (10) Disconnect transfer case vent hose, if equipped.
- (11) Disengage any wire connectors attached to transmission or transfer case, if equipped, components.
- (12) Support transfer case, if equipped, with transmission jack.

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

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

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

(16) Remove transfer case, if equipped.

(17) Remove crankshaft position sensor (Fig. 7), (Fig. 8).

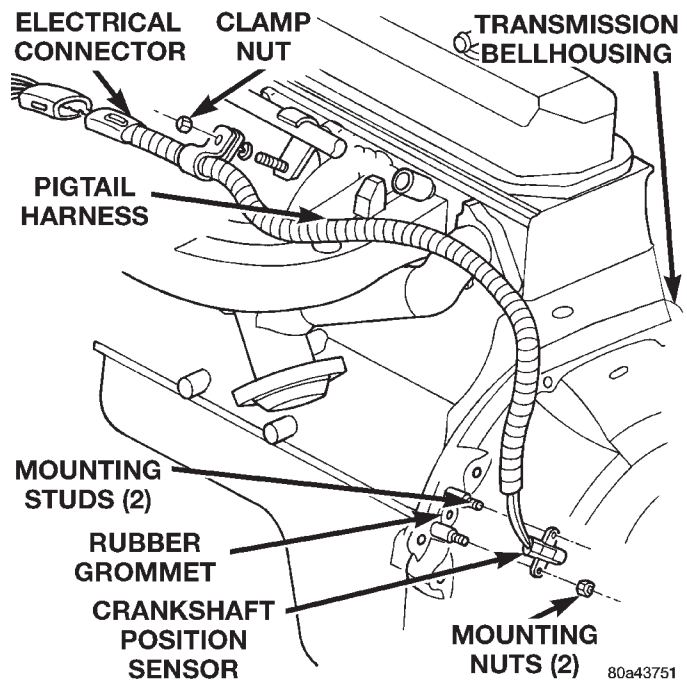


Fig. 7 Crankshaft Position Sensor—2.5L Engine

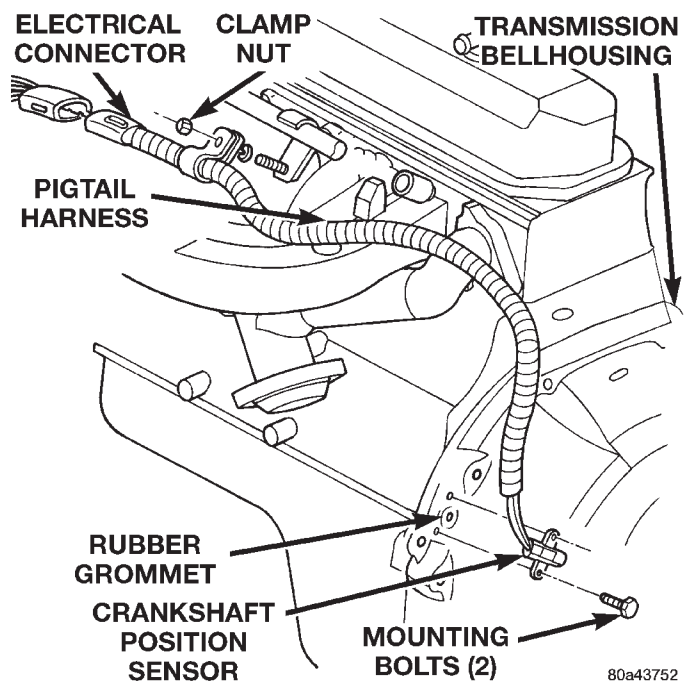


Fig. 8 Crankshaft Position Sensor —4.0L Engine

REMOVAL AND INSTALLATION (Continued)

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

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

(19) Support transmission with transmission jack.

(20) Secure transmission to jack with safety chains.

(21) Disconnect rear cushion and bracket from transmission.

(22) Remove rear crossmember.

(23) Disconnect transmission shift lever as follows:

(a) Lower transmission-transfer case assembly approximately 7-8 cm (3 in.) for access to shift lever.

(b) Reach up and around transmission case and unseat shift lever dust boot from transmission shift tower (Fig. 9). Move boot upward on shift lever for access to retainer that secures lever in shift tower.

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

(d) Lift lever and retainer out of shift tower (Fig. 9). Do not remove the shift lever from the floor console shifter boots. Leave the lever in place for transmission installation.

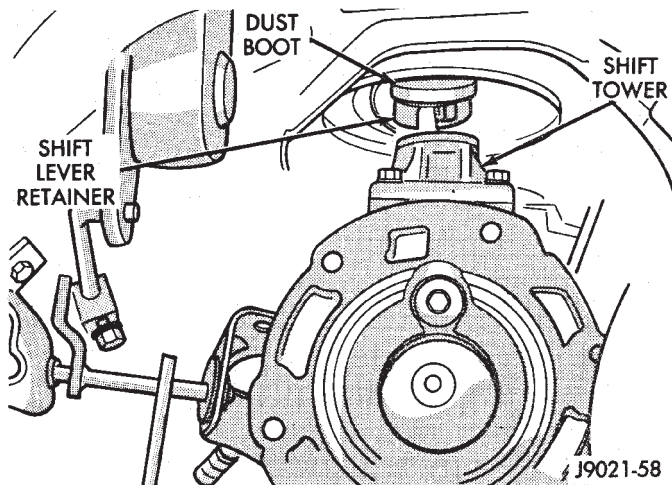


Fig. 9 Removing/Installing Shift Lever

(24) Remove clutch housing brace rod.

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

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

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

(28) Remove clutch housing from transmission (Fig. 10).

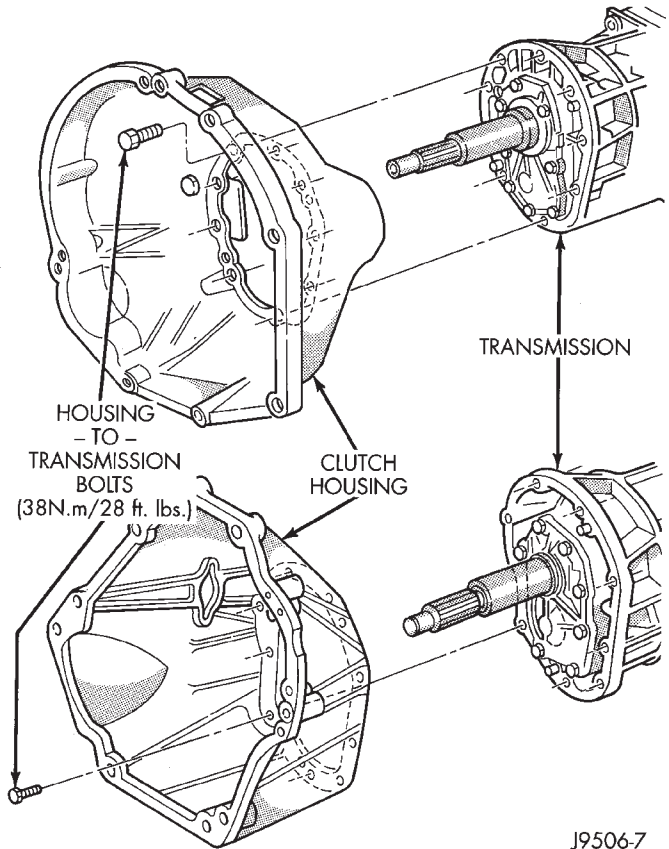


Fig. 10 Clutch Housing

INSTALLATION

(1) Install clutch housing on transmission. Tighten housing bolts to 37 N·m (27 ft. lbs.) torque.

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

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

(4) Position and secure transmission on transmission jack.

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

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

(7) Install and tighten clutch housing-to-engine bolts to 38 N·m (28 ft. lbs.) torque (Fig. 10). **Be sure the housing is properly seated on engine block before tightening bolts.**

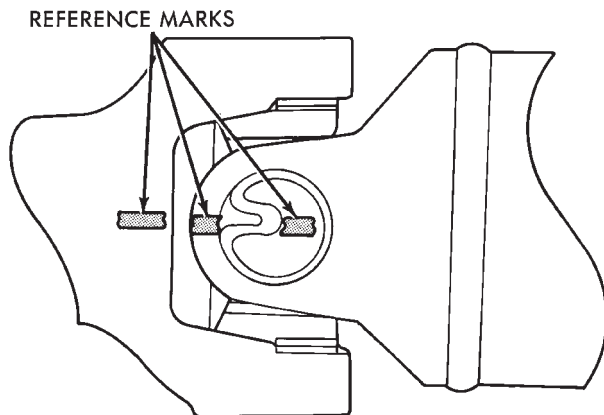
(8) Install clutch housing brace rod.

(9) Lower transmission approximately 7-8 cm (3 in.) for access to shift tower. Be sure transmission is in first or third gear.

(10) Reach up and around transmission and insert shift lever in shift tower. Press lever retainer downward and turn it clockwise to lock it in place. Then install lever dust boot on shift tower.

REMOVAL AND INSTALLATION (Continued)

- (11) Install rear crossmember. Tighten crossmember-to-frame bolts to 41 N·m (31 ft. lbs.) torque.
- (12) Install fasteners to hold rear cushion and bracket to transmission. Then tighten transmission-to-rear support bolts/nuts to 45 N·m (33 ft. lbs.) torque.
- (13) Remove support stands from engine and transmission.
- (14) Install and connect crankshaft position sensor.
- (15) Position transfer case on transmission jack, if equipped.
- (16) Secure transfer case to jack with safety chains, if equipped.
- (17) Raise transfer case, if equipped, and align transfer case input shaft to the transmission output shaft.
- (18) Slide transfer case forward until case is seated on transmission, if necessary.
- (19) Install nuts to attach transfer case to transmission, if equipped. Tighten transfer case-to-transmission nuts to 35 N·m (26 ft. lbs.) torque.
- (20) Connect transfer case shift linkage at transfer case, if equipped.
- (21) Connect transfer case vent hose, if equipped.
- (22) Secure wire harnesses in clips/tie straps on transmission and transfer case, if equipped.
- (23) Engage wire connectors attached to all necessary transmission or transfer case, if equipped, components.
- (24) Install rear propeller shaft slip yoke to transmission or transfer case, if equipped, output shaft.
- (25) Align marks on rear propeller shaft and rear axle yokes (Fig. 11).



J9316-2

Fig. 11 Align Propeller Shaft And Rear Axle Yokes Alignment Marks

- (26) Install and tighten propeller shaft U-joint clamp bolts to 19 N·m (170 in. lbs.) torque.
- (27) Align marks on front propeller shaft, axle, and transfer case yokes, if equipped.
- (28) Install and tighten propeller shaft U-joint clamp bolts to 19 N·m (170 in. lbs.) torque.

- (29) Install slave cylinder in clutch housing.
- (30) Install skid plate, if equipped. Tighten bolts to 42 N·m (31 ft. lbs.) torque. Tighten stud nuts to 17 N·m (150 in. lbs.) torque.
- (31) Fill transmission and transfer case, if equipped, with recommended lubricants. Refer to the Lubricant Recommendation sections of the appropriate component for correct fluid.
- (32) Lower vehicle.

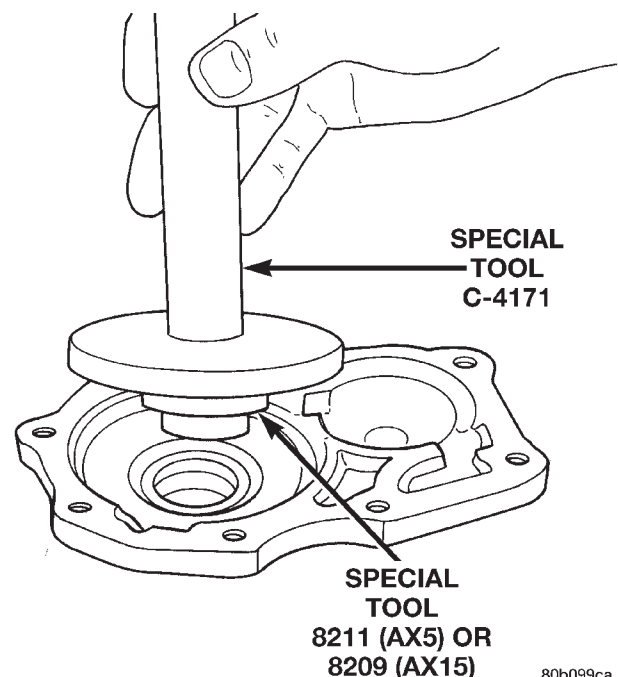
FRONT BEARING RETAINER SEAL

REMOVAL

- (1) Remove release bearing and lever from the transmission.
- (2) Remove the bolts holding the front bearing retainer to the transmission case.
- (3) Remove the front bearing retainer from the transmission case.
- (4) Using a suitable pry tool, remove the front bearing retainer seal.

INSTALLATION

- (1) Using Tool Handle C-4171 and Seal Installer 8209, install new seal in to the front bearing retainer (Fig. 12).



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Fig. 12 Install Front Bearing Retainer Seal

- (2) Remove any residual gasket material from the sealing surfaces of the bearing retainer and the transmission case.
- (3) Install new front bearing retainer gasket to the front bearing retainer.
- (4) Install the front bearing retainer onto the transmission case.

REMOVAL AND INSTALLATION (Continued)

- (5) Install the bolts to hold the bearing retainer onto the transmission case.
- (6) Tighten the bolts to 17 N·m (12 ft. lbs.).
- (7) Install release bearing and lever onto the transmission.

EXTENSION HOUSING SEAL

REMOVAL

- (1) Raise and support vehicle.
- (2) Remove propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedures.
- (3) Using a suitable seal puller or screw with a slide hammer, remove the extension housing seal (Fig. 13).

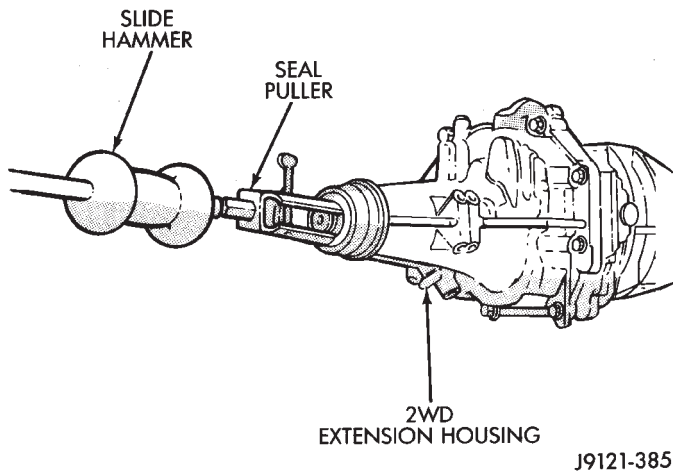


Fig. 13 Remove Extension Housing Seal

INSTALLATION

- (1) Clean seal bore of extension housing of any residual sealer material from original seal.
- (2) Using Tool Handle C-4171 and Seal Installer 8212, install new extension housing seal so that the seal is located 0 ± 0.5 mm (0 ± 0.02 in.) to the face of the extension housing (Fig. 14).

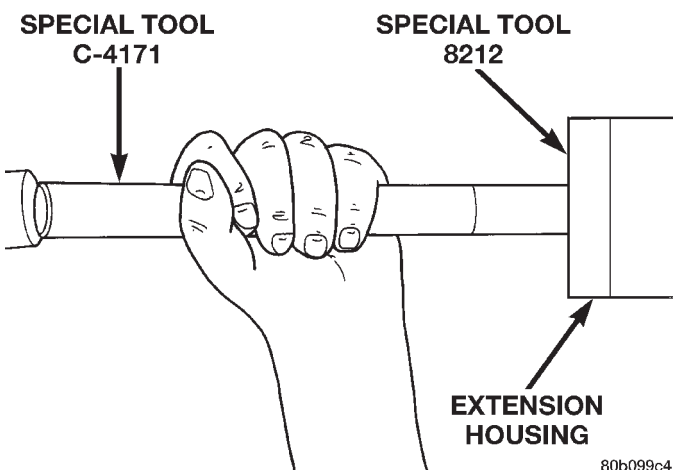


Fig. 14 Install Extension Housing Seal

- (3) Install propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedures.
- (4) Check and add fluid to transmission as necessary. Refer to the Recommended Lubricant section for proper fluid requirements.
- (5) Lower vehicle.

ADAPTER HOUSING SEAL

REMOVAL

- (1) Hoist and support vehicle.
- (2) Remove transfer case.
- (3) Using a suitable pry tool, or a slide hammer mounted screw, remove the adapter housing seal (Fig. 15).

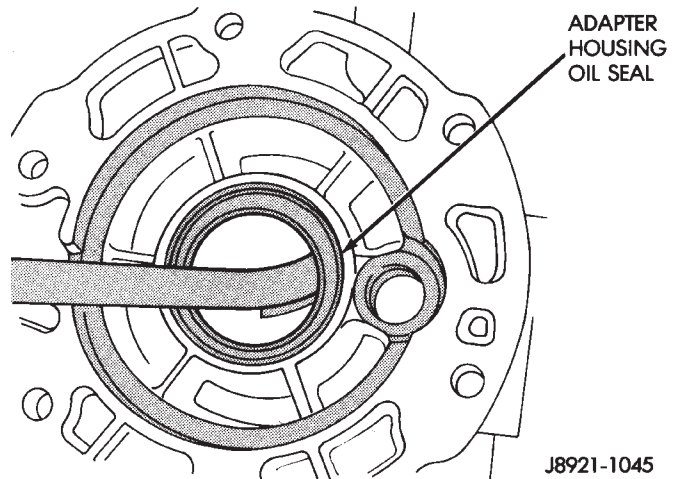


Fig. 15 Remove Adapter Housing Seal

INSTALLATION

- (1) Clean seal bore of adapter housing of any residual sealer material from original seal.
- (2) Using Tool Handle C-4171 and Seal Installer 8208, install new seal so that the seal is located 0 ± 0.2 mm (0 ± 0.008 in.) to the seal bore face of adapter housing (Fig. 16).
- (3) Install transfer case.
- (4) Check and add fluid to transmission as necessary. Refer to the Recommended Lubricant section for proper fluid requirements.
- (5) Lower vehicle.

REMOVAL AND INSTALLATION (Continued)

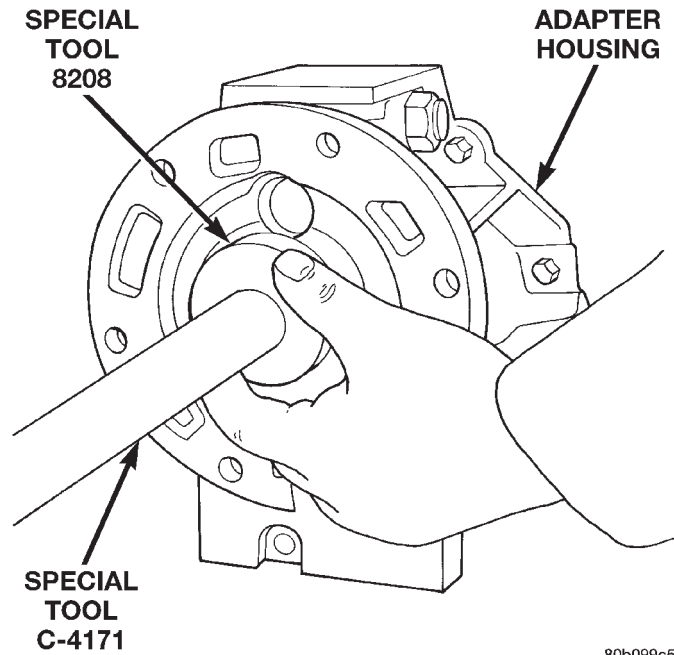


Fig. 16 Install Adapter Housing Seal

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(7) Remove shift tower gasket from shift tower or transmission case (Fig. 18).

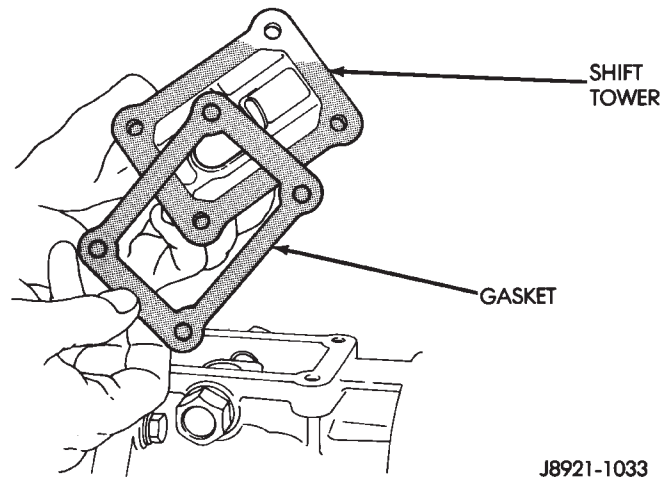


Fig. 18 Remove Shift Tower Gasket

(8) Remove reverse shift head detent ball plug (Fig. 20).

(9) Remove detent ball spring and ball with pencil magnet (Fig. 21), (Fig. 22).

DISASSEMBLY AND ASSEMBLY

ADAPTER/EXTENSION HOUSING AND FRONT BEARING RETAINER

DISASSEMBLY

- (1) Drain transmission lubricant, if necessary.
- (2) Remove release bearing and lever.
- (3) Remove clutch housing bolts and remove housing (Fig. 19).
- (4) Remove vehicle speed sensor and speedometer adapter, if necessary.
- (5) Remove bolts holding shift tower to transmission case.
- (6) Remove shift tower from transmission case (Fig. 17).

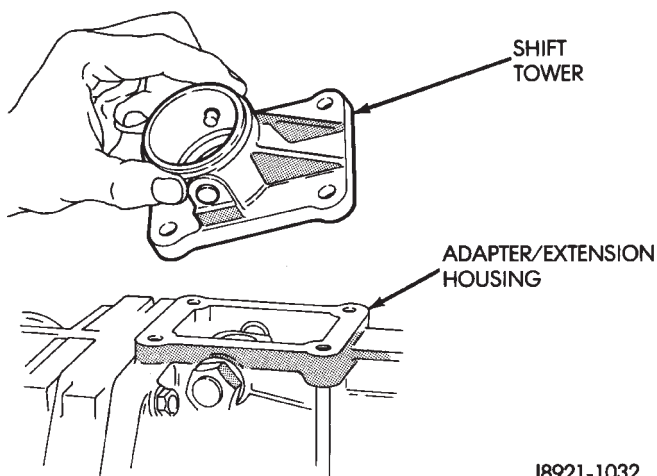


Fig. 17 Remove Shift Tower

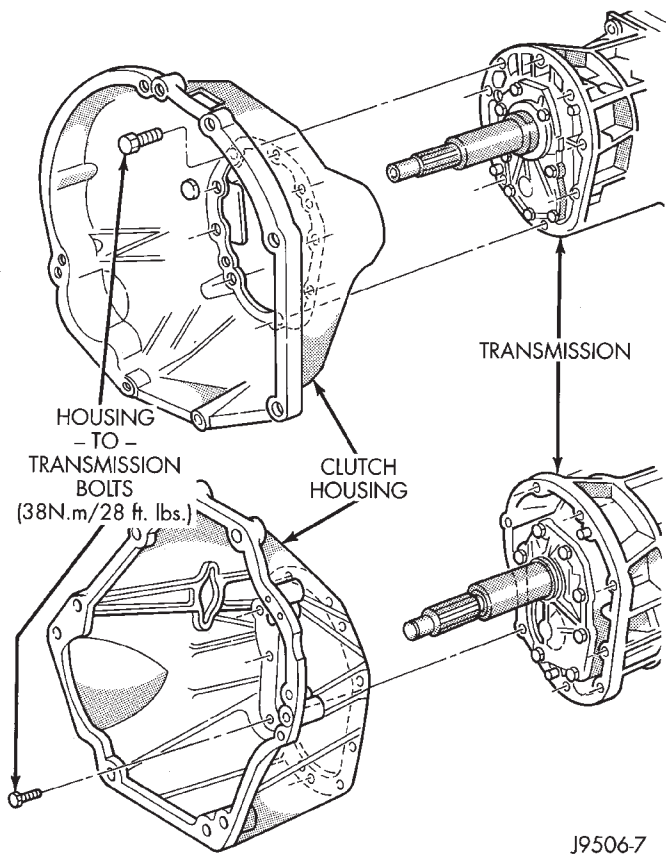


Fig. 19 Clutch Housing

DISASSEMBLY AND ASSEMBLY (Continued)

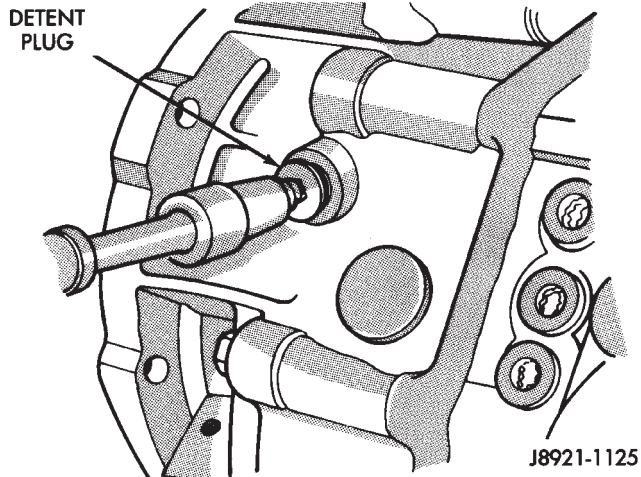


Fig. 20 Remove Detent Ball Plug

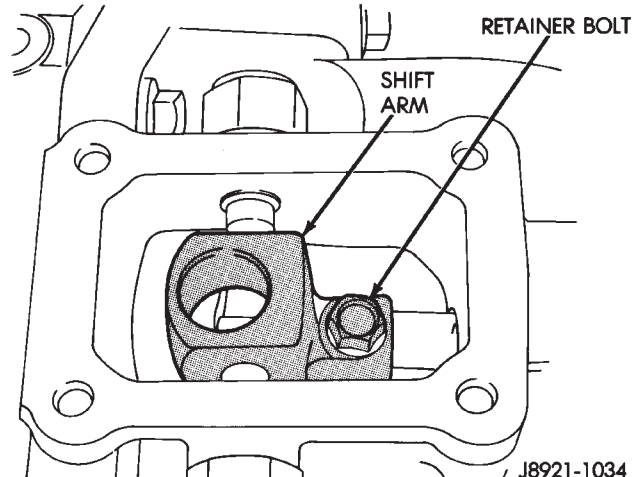


Fig. 23 Shift Arm Retainer Bolt Removal

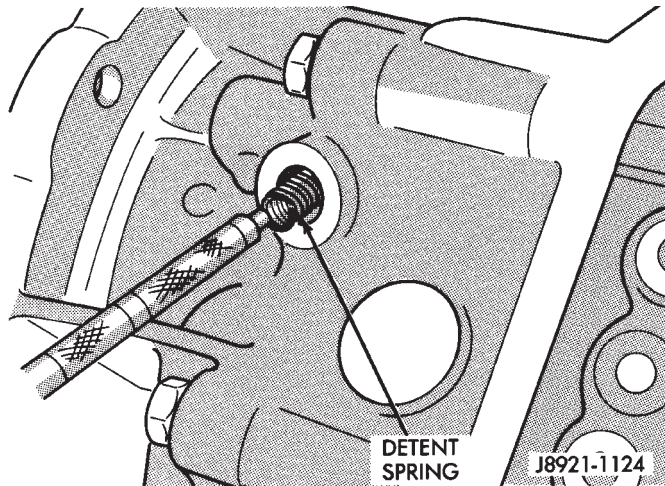


Fig. 21 Remove Detent Spring

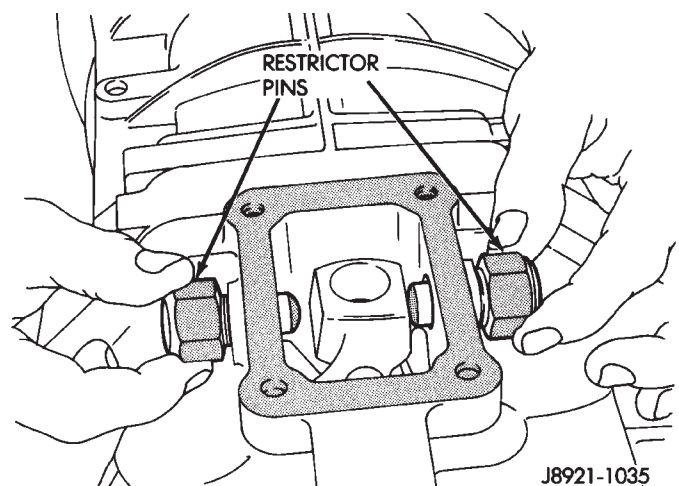


Fig. 24 Shift Arm Restrictor Pins

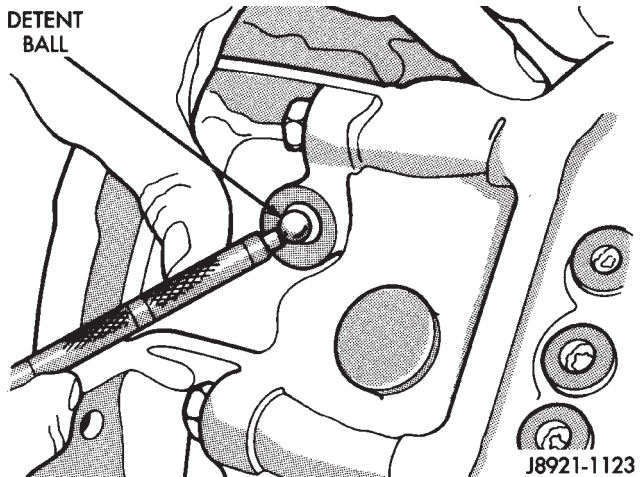


Fig. 22 Remove Detent Ball

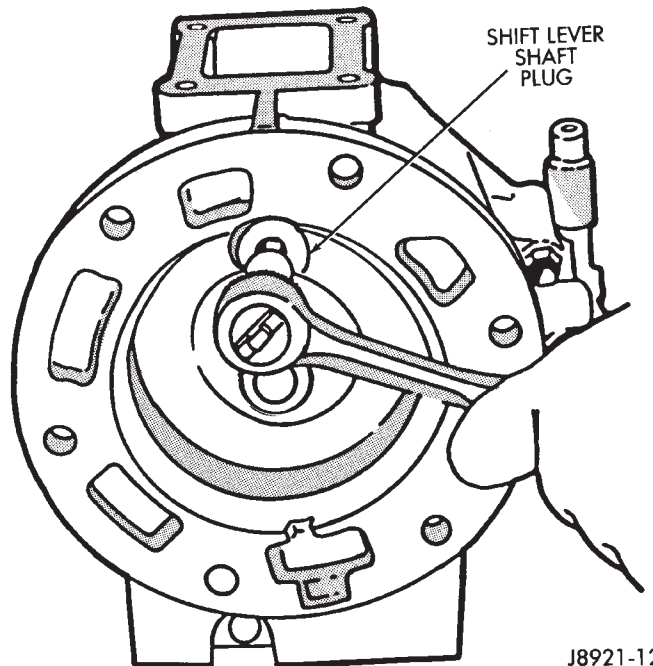


Fig. 25 Removing Shift Lever Shaft Plug

- (10) Remove shift arm retainer bolt (Fig. 23).
- (11) Remove shift arm restrictor pins (Fig. 24).
- (12) Remove shift lever shaft plug (Fig. 25).
- (13) Remove shifter shaft with large magnet (Fig. 26).
- (14) Remove the shift arm from the adapter housing.

DISASSEMBLY AND ASSEMBLY (Continued)

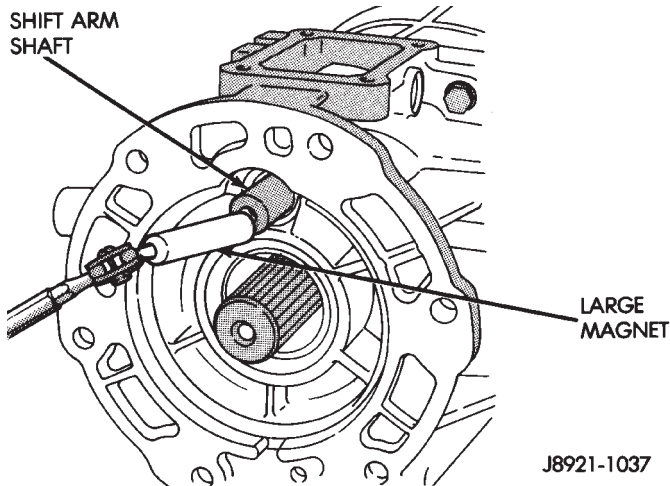


Fig. 26 Remove Shifter Shaft

(15) Remove adapter/extension housing bolts (Fig. 27).

(16) Loosen adapter/extension housing by tapping it loose with plastic mallet (Fig. 28).

(17) Remove adapter/extension housing (Fig. 29).

(18) On 4x2 transmissions;

(a) Remove speedometer gear retaining snap-ring from output shaft.

(b) Remove speedometer gear from output shaft and remove speedometer gear lock ball from output shaft.

(c) Remove speedometer drive gear locating snap-ring (Fig. 30).

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

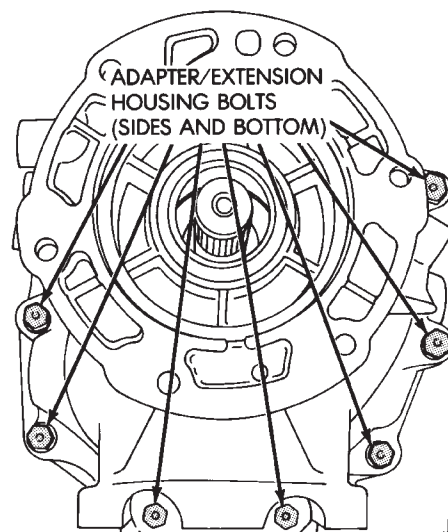
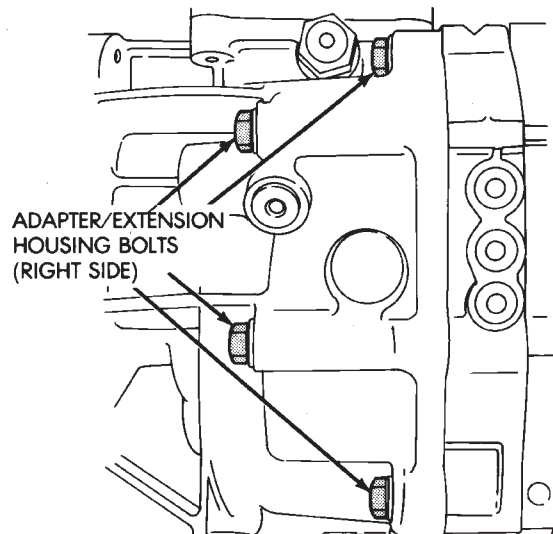
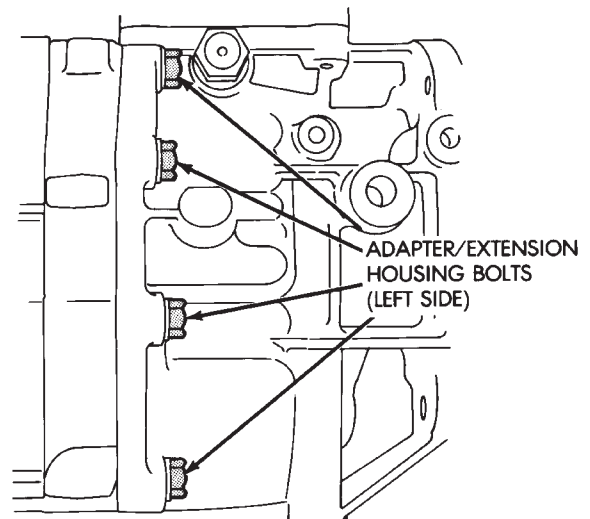
(20) Remove the bearing retainer from transmission case (Fig. 31).

(21) Remove input shaft bearing snap-ring (Fig. 32).

(22) Remove cluster gear bearing snap-ring (Fig. 33).

(23) Separate intermediate plate and transfer case by tapping them loose with plastic mallet (Fig. 34).

(24) Separate the intermediate plate from the transmission case (Fig. 35).



J8921-1042

Fig. 27 Adapter/Extension Housing Bolts

DISASSEMBLY AND ASSEMBLY (Continued)

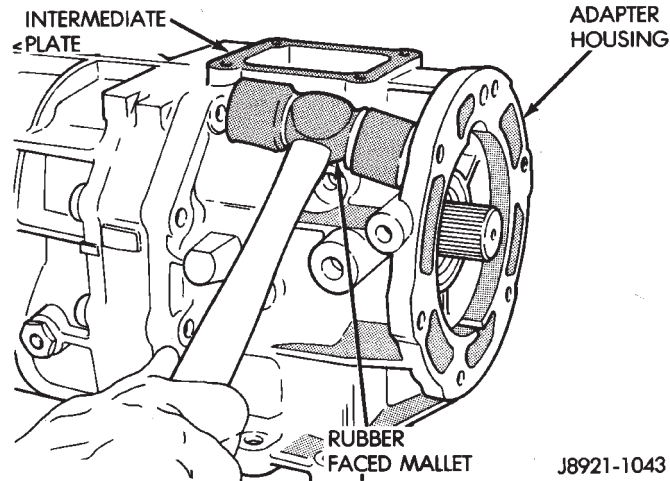


Fig. 28 Loosen Adapter/Extension Housing

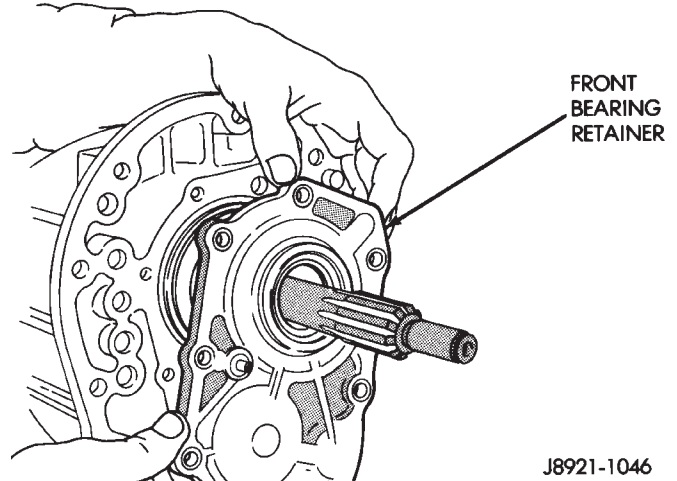


Fig. 31 Remove Front Bearing Retainer

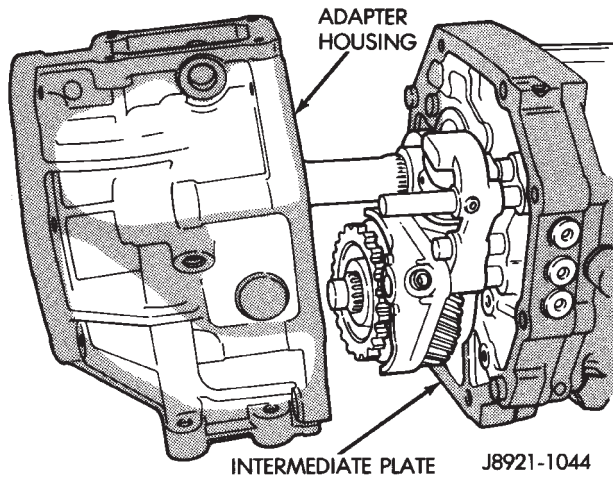


Fig. 29 Remove Adapter/Extension Housing

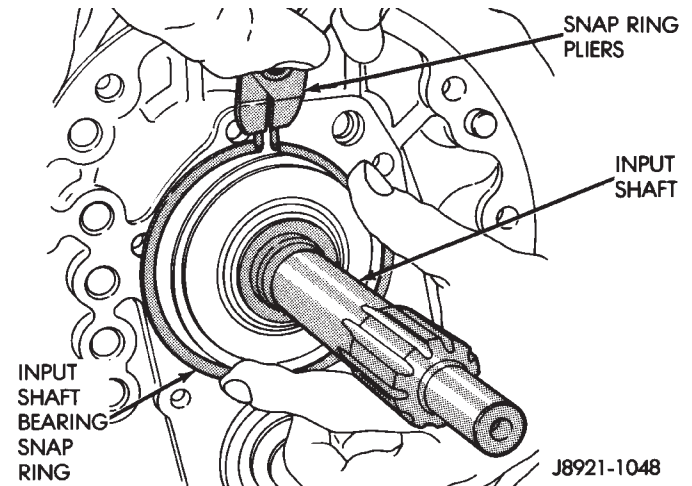


Fig. 32 Remove Input Shaft Bearing Snap-ring

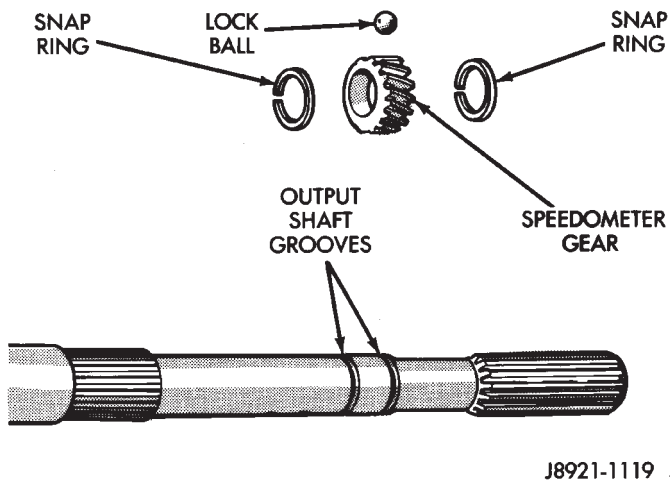


Fig. 30 Speedometer Drive Gear Assembly

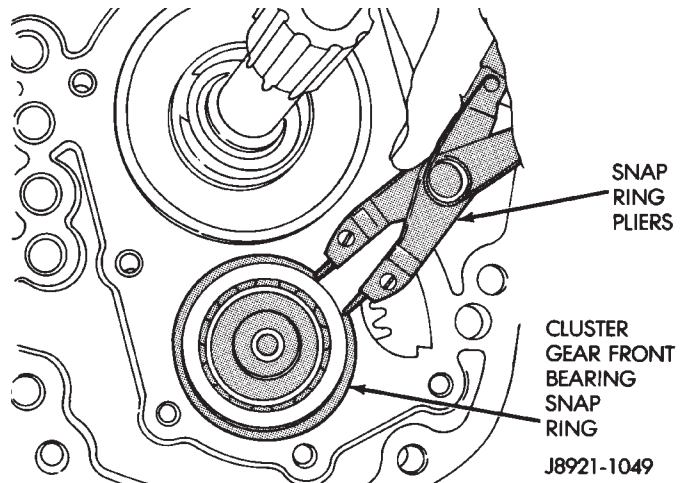


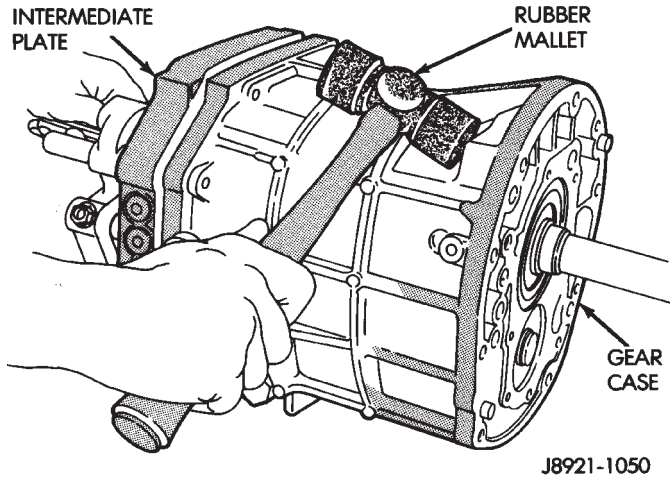
Fig. 33 Remove Cluster Gear Snap-ring

ASSEMBLY

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

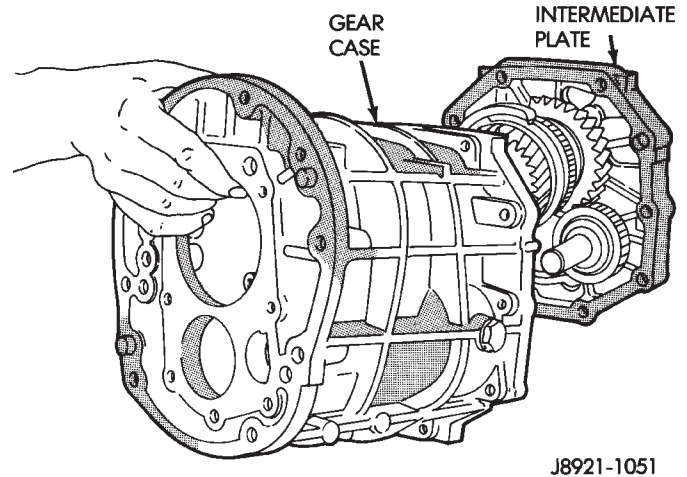
(2) Apply a 1/8 to 3/16 inch wide bead of Threebond® Liquid Gasket TB1281, P/N 83504038, as shown, making sure to keep sealer bead to inside of bolt holes (Fig. 36).

DISASSEMBLY AND ASSEMBLY (Continued)



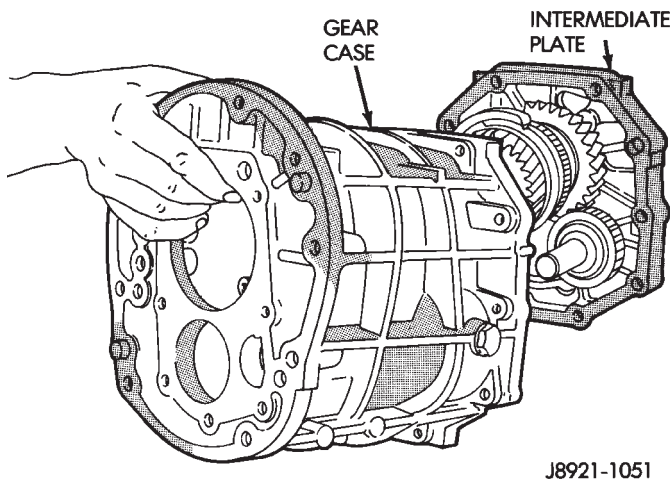
J8921-1050

Fig. 34 Separate Intermediate Plate and Transmission Case



J8921-1051

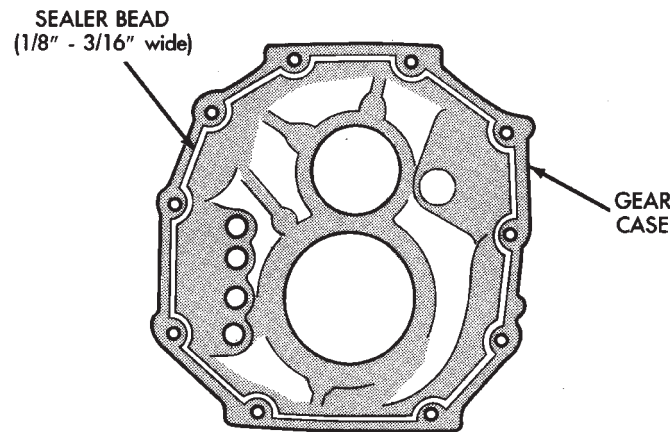
Fig. 37 Install Transmission Gear Case to the Intermediate Plate



J8921-1051

Fig. 35 Remove Intermediate Plate from Transmission Case

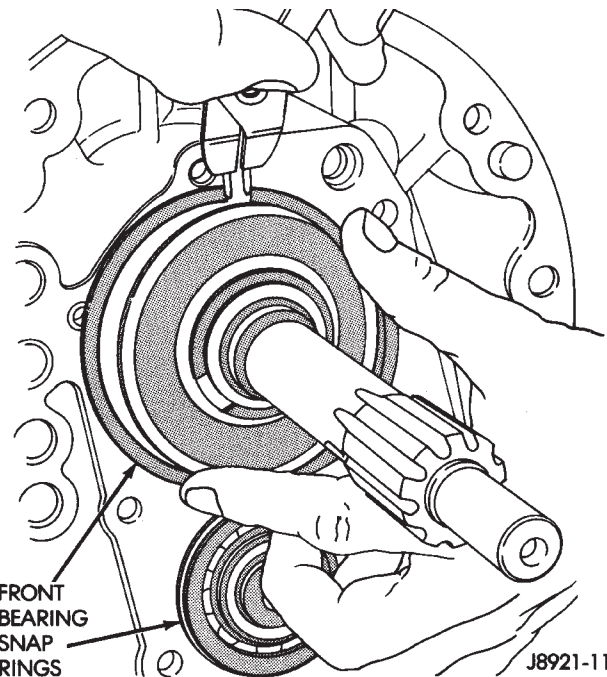
(3) Align geartrain and shift rails with mating holes in transmission case and install transmission case to the intermediate plate (Fig. 37). Verify that the transmission case is seated on the intermediate plate.



J8921-1118

Fig. 36 Apply Sealer to Transmission Gear Case

(4) Install new front bearing snap rings (Fig. 38).



J8921-1107

Fig. 38 Install Front Bearing Snap-rings

(5) Apply 1/8 inch wide bead of Threebond® Liquid Gasket TB1281, P/N 83504038, to the front bearing retainer sealing surface.

(6) Install the front bearing retainer (Fig. 39) and tighten bolts to 17 N·m (12 ft. lbs.).

(7) On 4x2 transmissions;

(a) Install speedometer drive gear locating snap-ring (Fig. 40).

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

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

DISASSEMBLY AND ASSEMBLY (Continued)

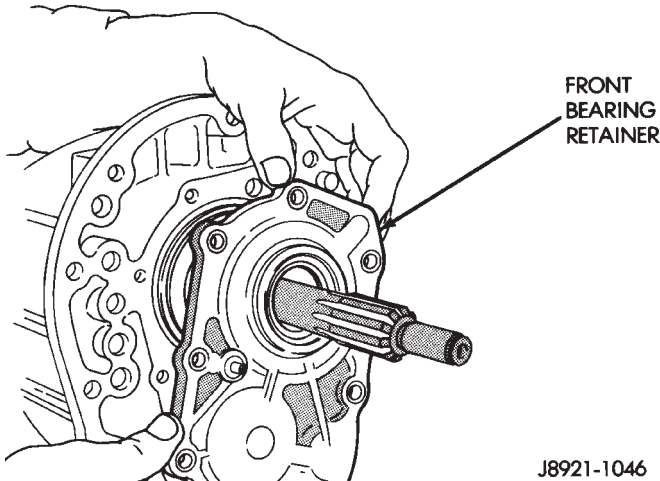


Fig. 39 Install Front Bearing Retainer

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

(9) Install adapter or extension housing on intermediate plate (Fig. 41). Tighten housing bolts to 37 N·m (27 ft. lbs.) torque.

(10) Position shift arm in shifter tower opening of adapter[extension] housing (Fig. 42). Be sure that the shifter arm is engaged into the shift rails.

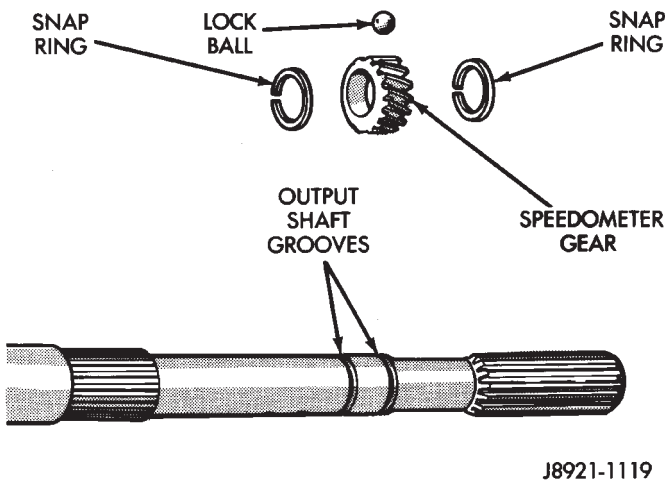


Fig. 40 Speedometer Drive Gear Assembly

(11) Start shifter arm shaft in hole in back of adapter[extension] housing. Align shift arm and shifter arm shaft and insert shifter arm shaft through the shifter arm and into the forward portion of the adapter[extension] housing (Fig. 43).

(12) Rotate the shifter arm shaft until the hole in the shift arm is aligned with the hole in the shaft.

(13) Install the shift arm retainer bolt and tighten to 38 N·m (28 ft. lbs.) (Fig. 44).

(14) Install and tighten shifter arm shaft plug to 18 N·m (13 ft. lbs.) torque (Fig. 45).

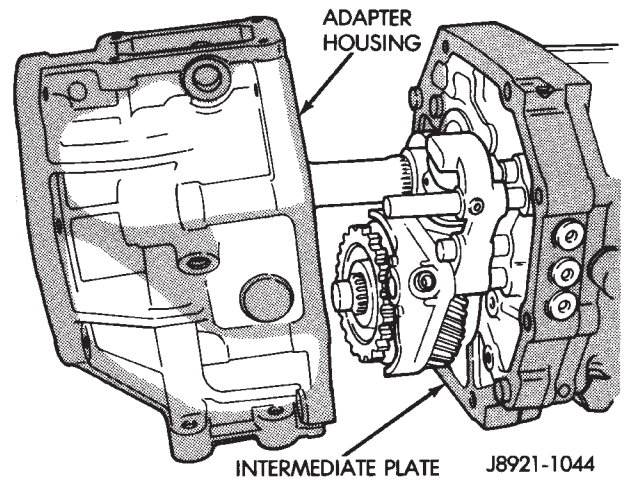


Fig. 41 Install Adapter/Extension Housing

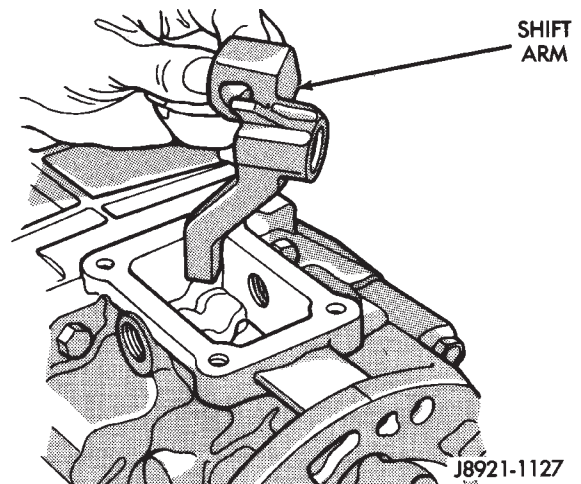


Fig. 42 Position Shift Arm in Transmission Case

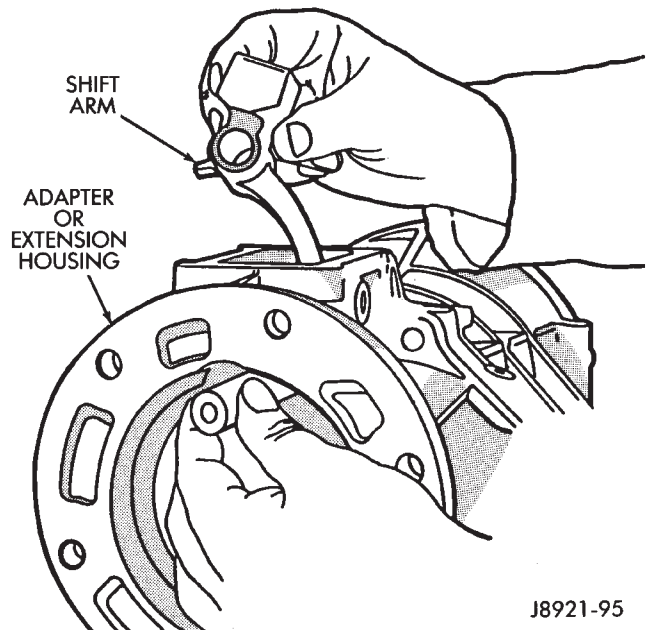


Fig. 43 Install Shifter Arm Shaft

DISASSEMBLY AND ASSEMBLY (Continued)

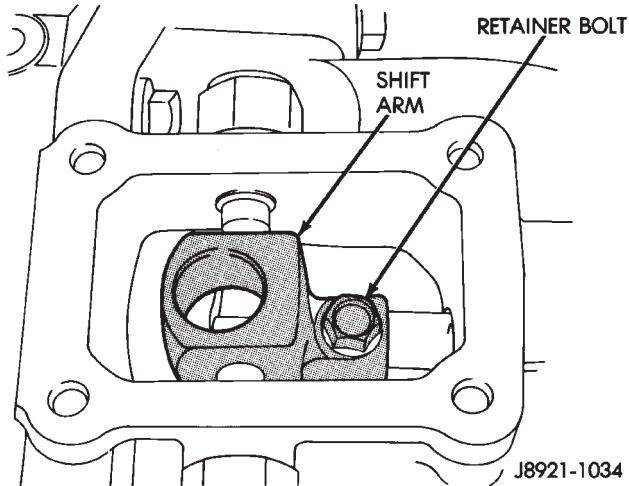


Fig. 44 Install Shift Arm Retainer Bolt

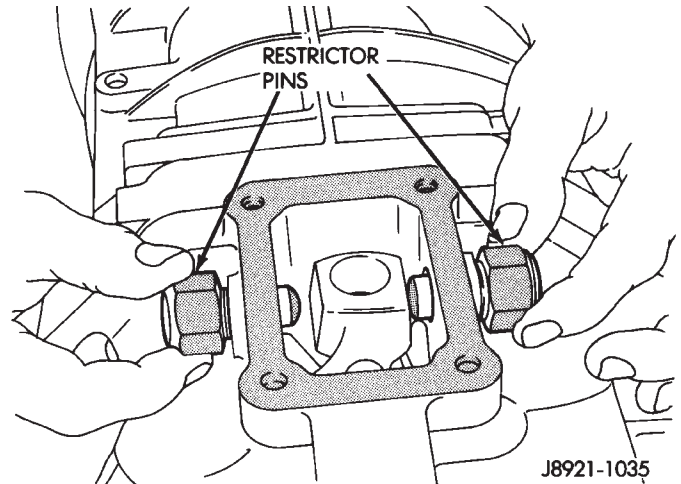


Fig. 46 Install Shifter Restrictor Pins

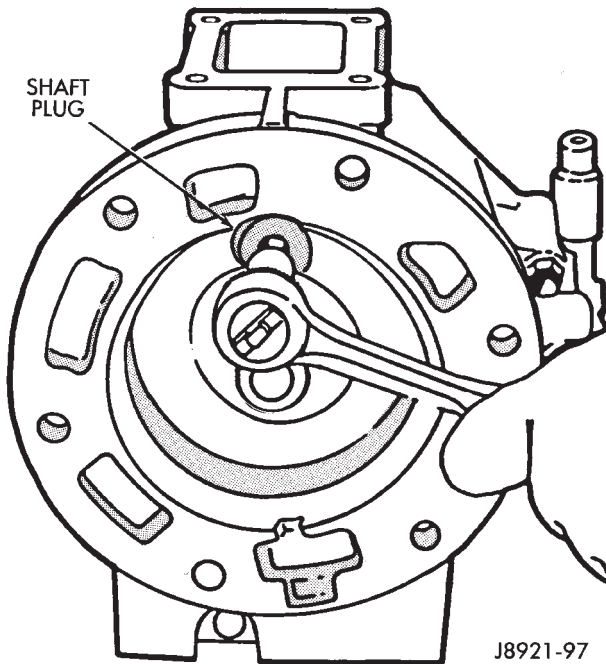


Fig. 45 Shifter Arm Shaft Plug Installation

(15) Install shifter restrictor pins in shift tower and tighten to 27 N·m (20 ft. lbs.) (Fig. 46).

(16) Install shift detent ball in detent opening (Fig. 47).

(17) Install detent spring (Fig. 48).

(18) Install detent plug and tighten to 19 N·m (14 ft. lbs.) (Fig. 49).

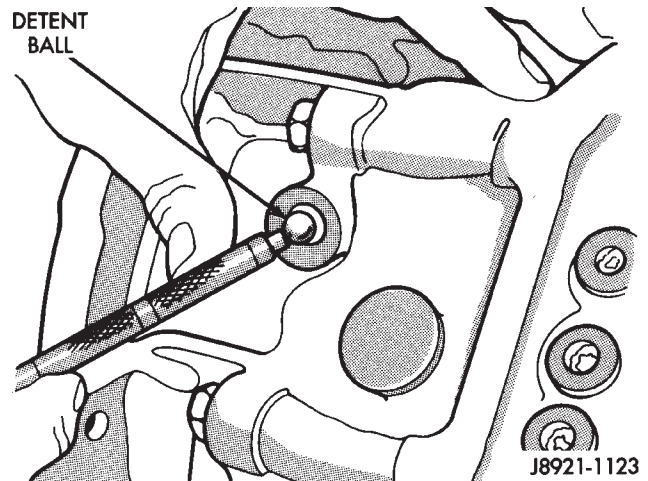


Fig. 47 Install Detent Ball

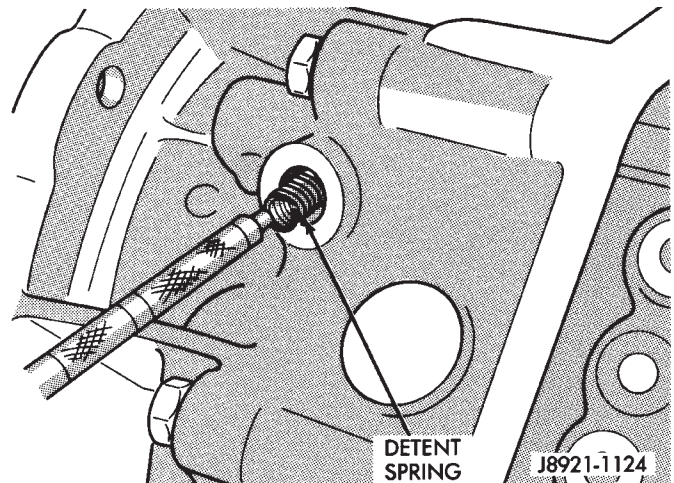


Fig. 48 Install Detent Spring

DISASSEMBLY AND ASSEMBLY (Continued)

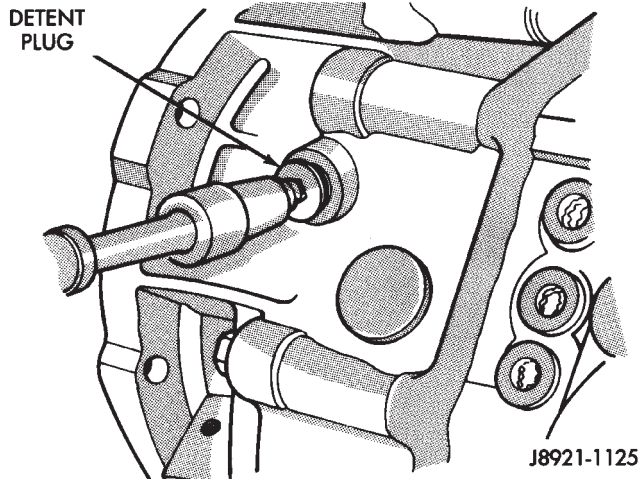


Fig. 49 Install Detent Ball Plug

J8921-1125

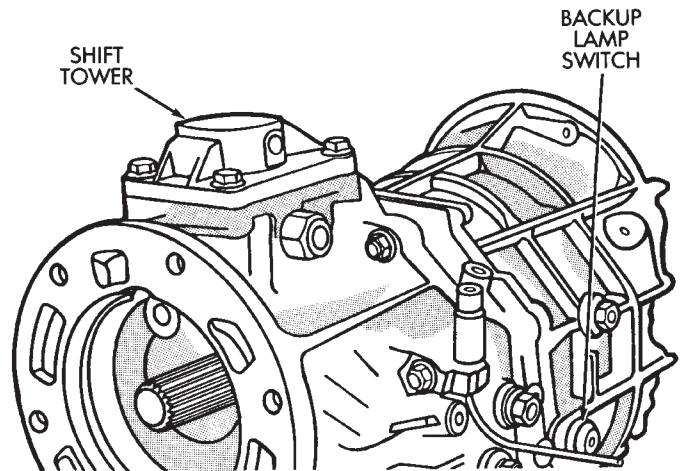


Fig. 50 Installing Shift Tower And Backup Lamp Switch

J8921-100

(19) Install shift tower and new gasket on housing (Fig. 50). Tighten tower bolts to 18 N·m (13 ft. lbs.) torque.

(20) Install new metal o-ring to the backup lamp switch.

(21) Install backup lamp switch (Fig. 50). Tighten switch to 37 N·m (27 ft. lbs.) torque.

(22) Install new seal in adapter/extension housing.

(23) Install vehicle speed sensor, if necessary.

(24) Install clutch housing, release bearing, release fork and retainer clip.

SHIFT MECHANISM AND GEARTRAIN

DISASSEMBLY

(1) Install suitable bolts and washers in intermediate plate (Fig. 51). Then clamp plate and gear assembly in vise. Use enough washers to prevent bolts from touching. Also be sure vise jaws are clamped on bolt heads.

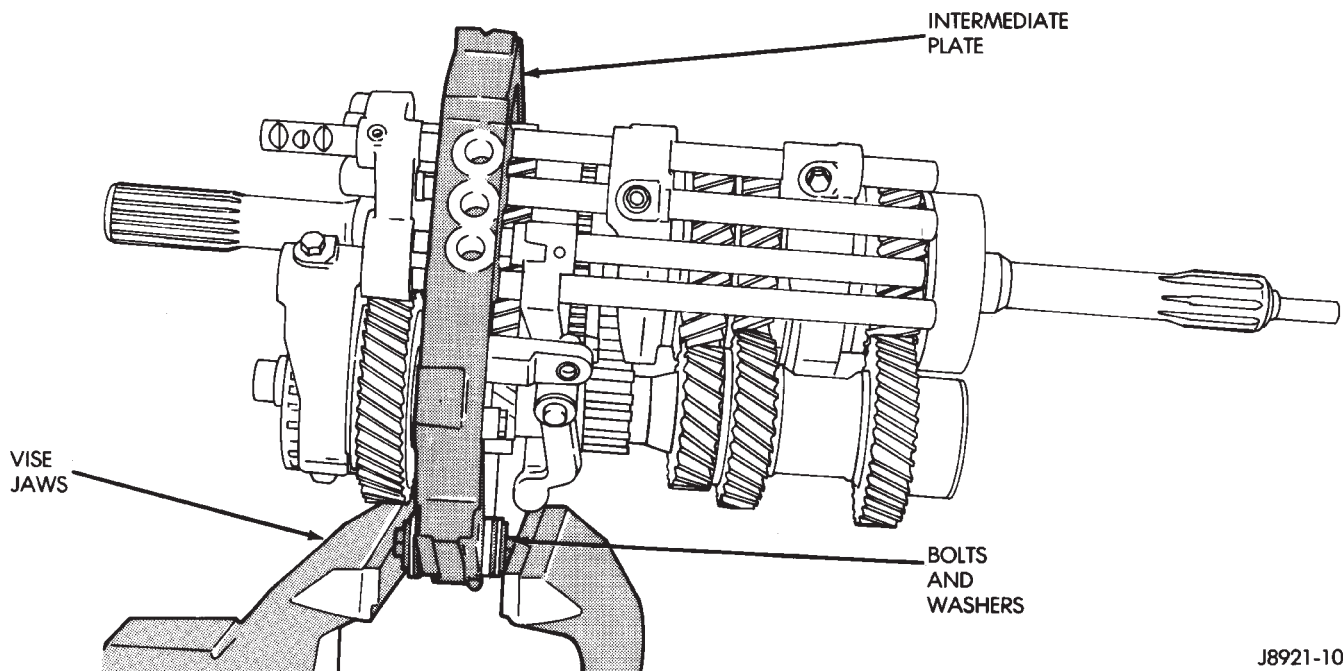


Fig. 51 Positioning Intermediate Plate In Vise

J8921-1054

DISASSEMBLY AND ASSEMBLY (Continued)

(2) Measure thrust clearance between countershaft fifth gear and thrust ring with feeler gauge. Clearance should be 0.10 to 0.40 mm (0.003 to 0.019 in.). If clearance exceeds limits, gear and/or ring will have to be replaced.

(3) Remove countershaft fifth gear retaining snap-ring (Fig. 52).

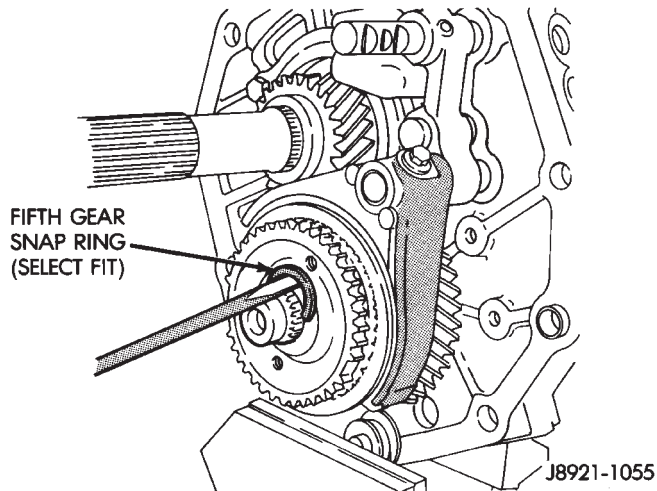


Fig. 52 Remove Fifth Gear Snap-ring

(4) Remove bolt holding fifth gear shift fork to shift rail (Fig. 53).

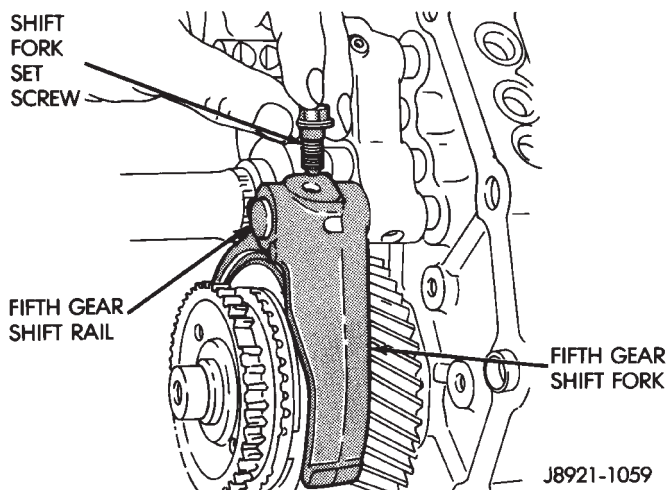


Fig. 53 Remove Fifth Gear Shift Fork Retainer Bolt

(5) Move fifth gear shift rail forward until the rail is clear of the shift fork.

(6) Remove the fifth gear shift fork from the synchronizer sleeve (Fig. 54).

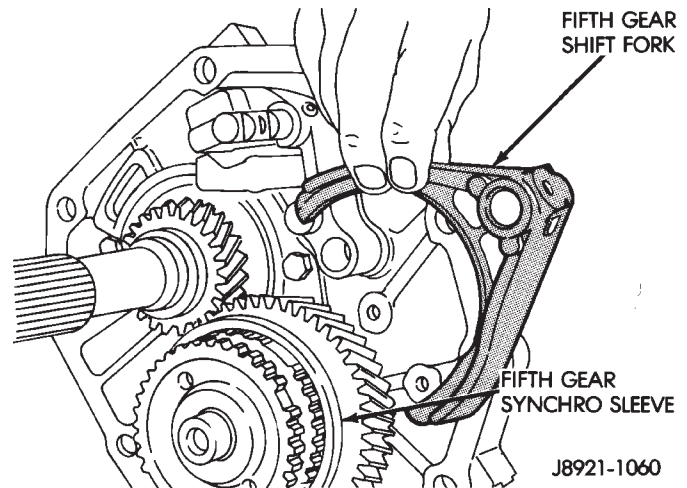


Fig. 54 Remove Fifth Gear Shift Fork

(7) Remove the reverse shift head and rail assembly from the intermediate plate (Fig. 55).

(8) Remove fifth gear blocker ring from countershaft assembly with Puller L-4407 (Fig. 56).

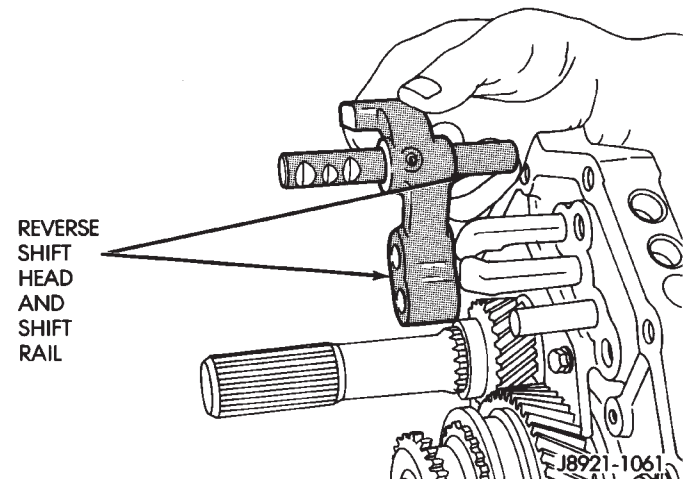


Fig. 55 Remove Reverse Shift Head Assembly

(9) Remove fifth gear synchro ring (Fig. 57).

(10) Remove the countershaft fifth gear assembly from countershaft (Fig. 58).

DISASSEMBLY AND ASSEMBLY (Continued)

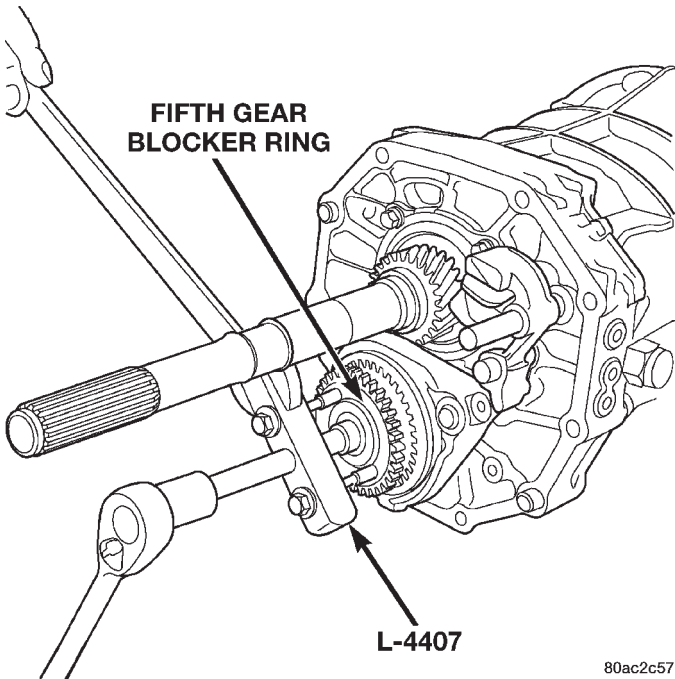


Fig. 56 Remove Fifth Gear Blocker Ring

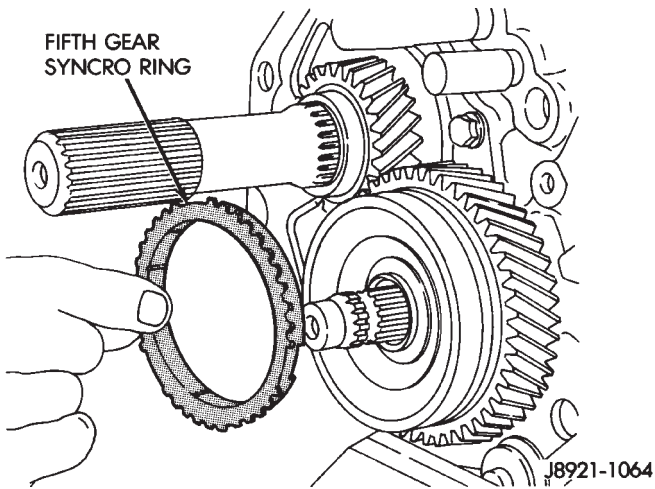


Fig. 57 Remove Fifth Gear Synchro Ring

(11) Remove fifth gear thrust ring from countershaft (Fig. 59).

(12) Remove fifth gear thrust ring lock ball from countershaft (Fig. 60).

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

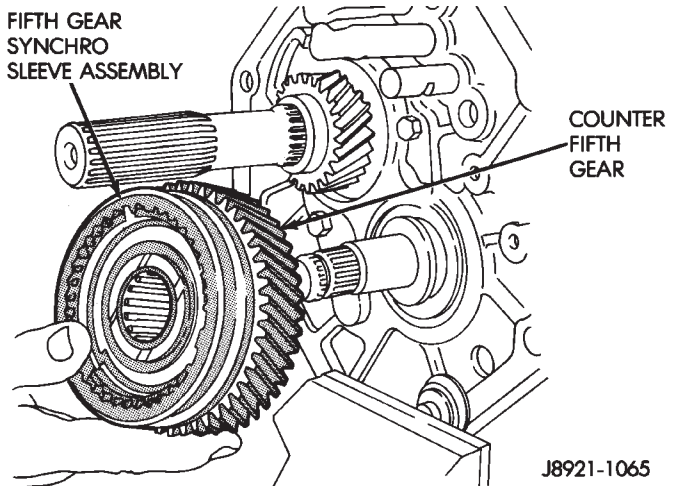


Fig. 58 Remove Fifth Gear And Synchro Assembly

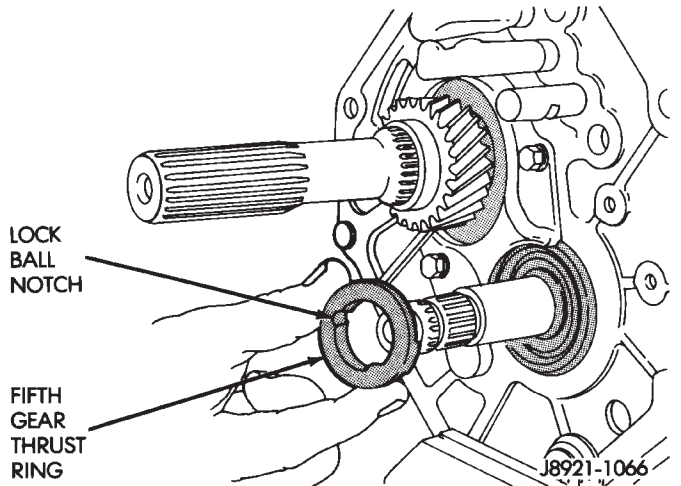


Fig. 59 Remove Fifth Gear Thrust Ring

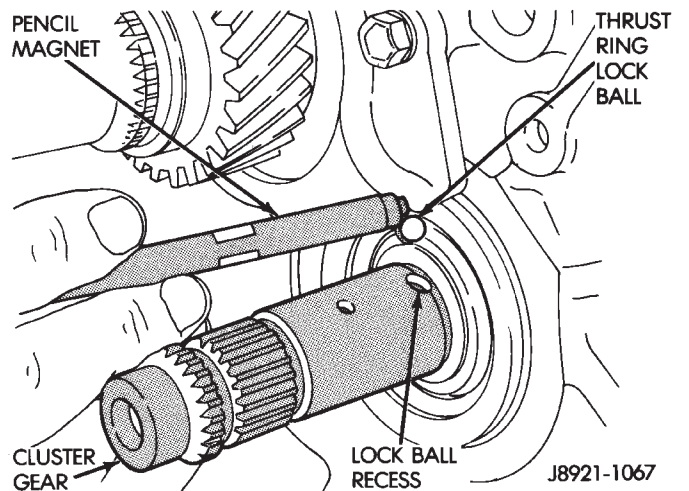


Fig. 60 Remove Fifth Gear Thrust Ring Lock Ball

DISASSEMBLY AND ASSEMBLY (Continued)

(13) Remove bolts holding output shaft rear bearing retainer to intermediate plate (Fig. 61).

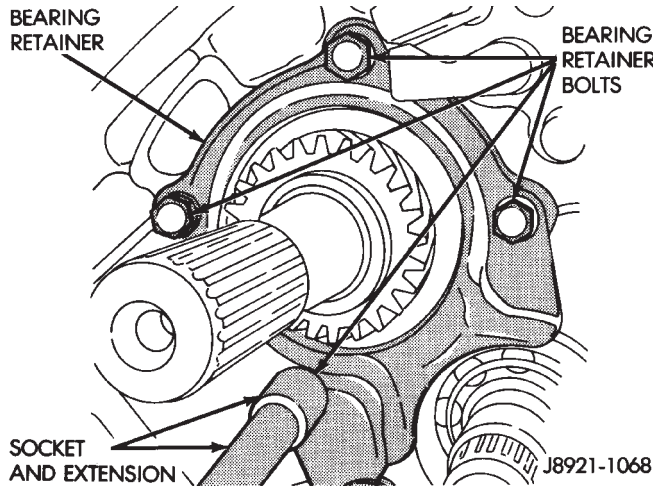


Fig. 61 Remove Output Shaft Rear Bearing Retainer Bolts

(14) Remove rear bearing retainer (Fig. 62).

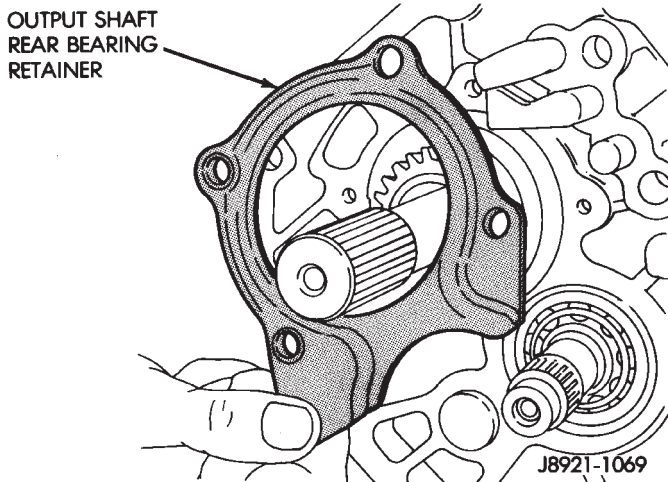


Fig. 62 Remove Output Shaft Rear Bearing Retainer

(15) Remove reverse idler gear shaft and gear (Fig. 63).

(16) Remove bolts holding reverse shift arm bracket to intermediate plate (Fig. 64).

(17) Remove threaded lock ball plugs from intermediate plate (Fig. 65).

(18) Then remove lock ball and spring from plug holes with pencil magnet (Fig. 66).

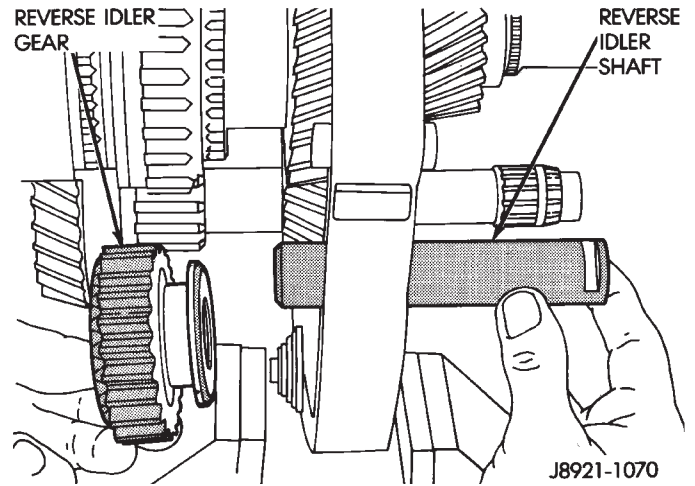


Fig. 63 Remove Reverse Idler Shaft And Gear

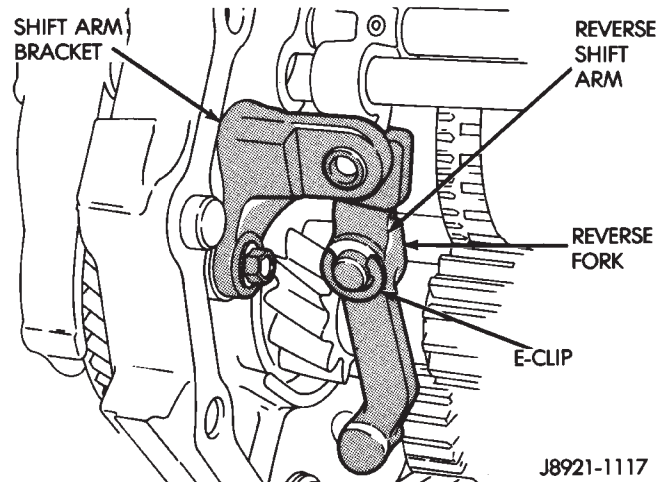


Fig. 64 Reverse Shift Arm Components

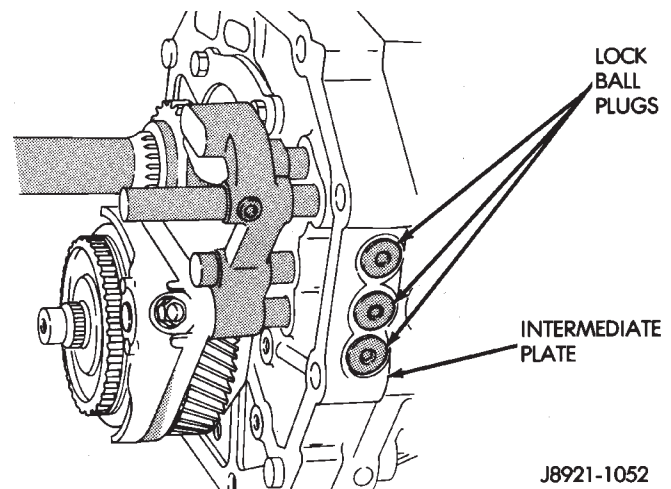


Fig. 65 Lock Ball Plug Locations

DISASSEMBLY AND ASSEMBLY (Continued)

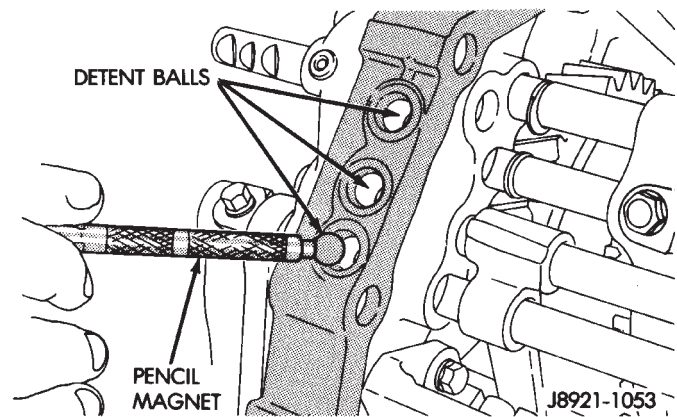
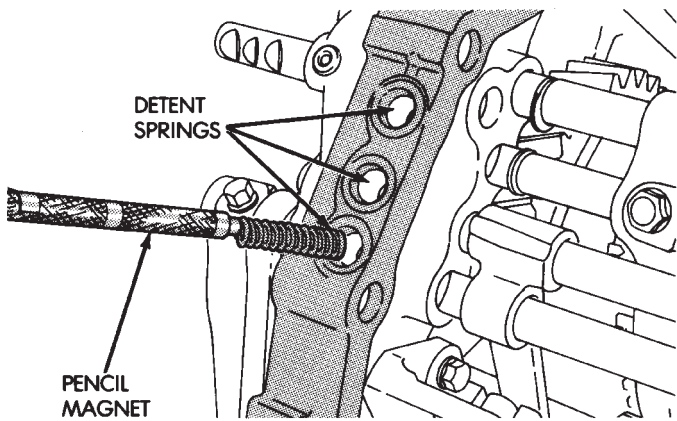


Fig. 66 Remove Lock Ball And Spring

- (19) Remove the fifth gear shift rail (Fig. 67).
- (20) Retrieve the fifth gear shift rail lock ball from the intermediate plate using a magnet (Fig. 68).

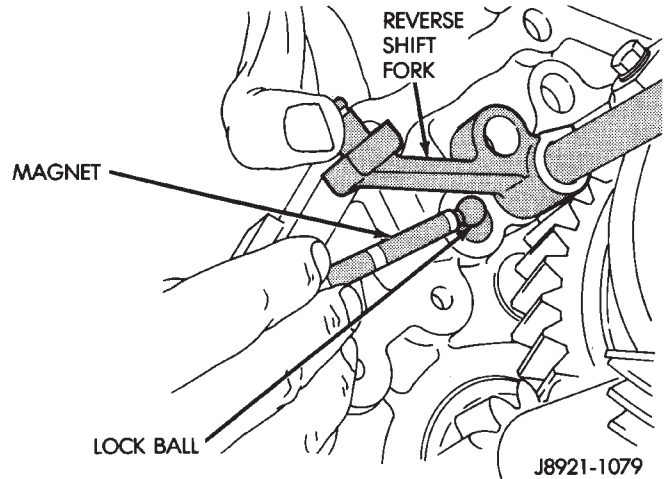


Fig. 68 Remove Fifth Gear Shift Rail Lock Ball

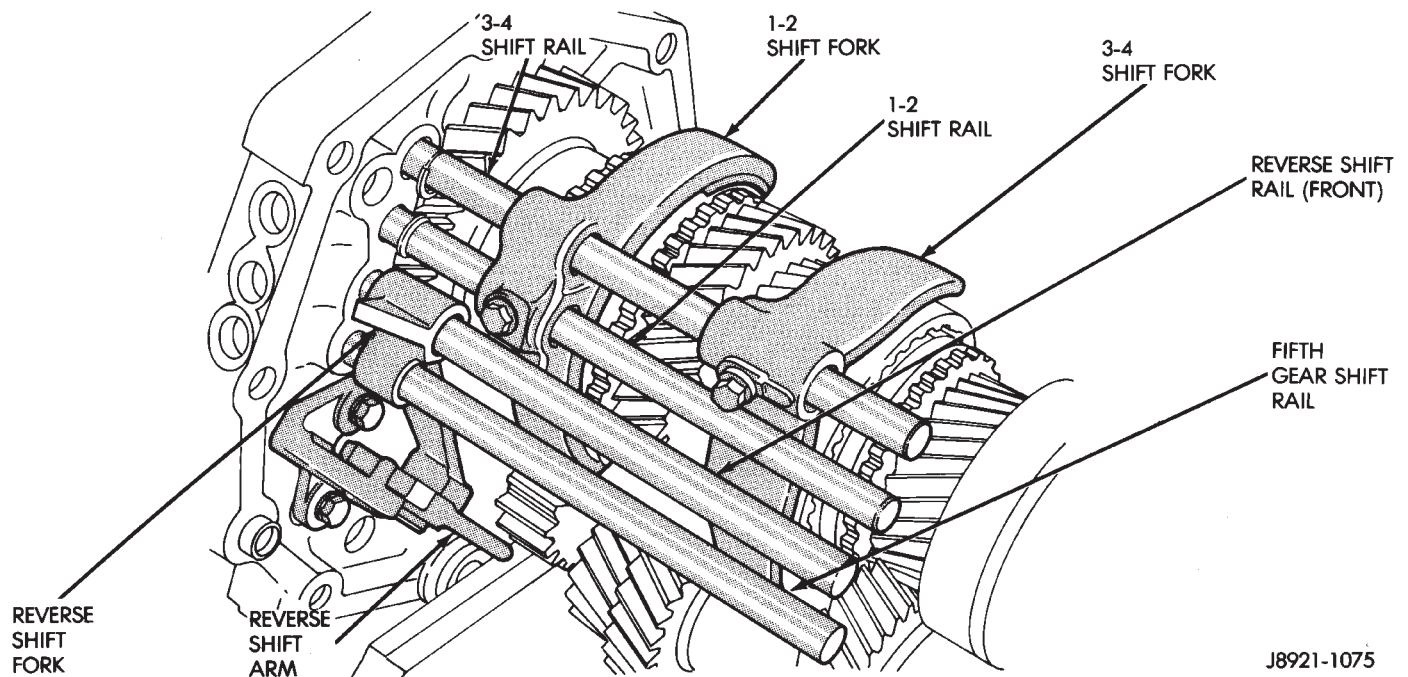


Fig. 67 Shift Rail Identification

DISASSEMBLY AND ASSEMBLY (Continued)

(21) Remove the 1-2 and 3-4 shift rail c-rings using two equally sized screwdrivers (Fig. 69).

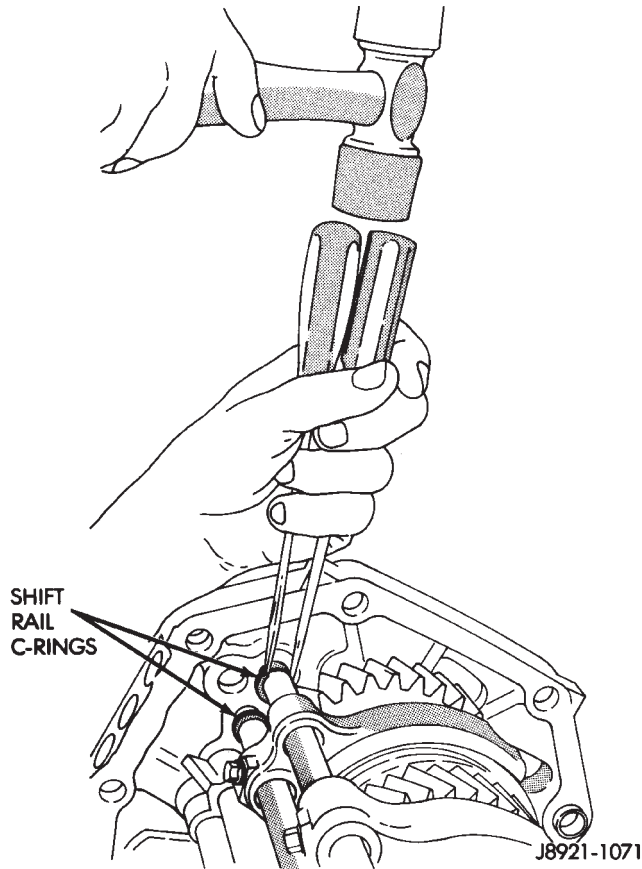


Fig. 69 Remove Shift Rail C-rings

(22) Remove bolts holding 1-2 and 3-4 shift forks to the shift rails (Fig. 70) and discard bolts.

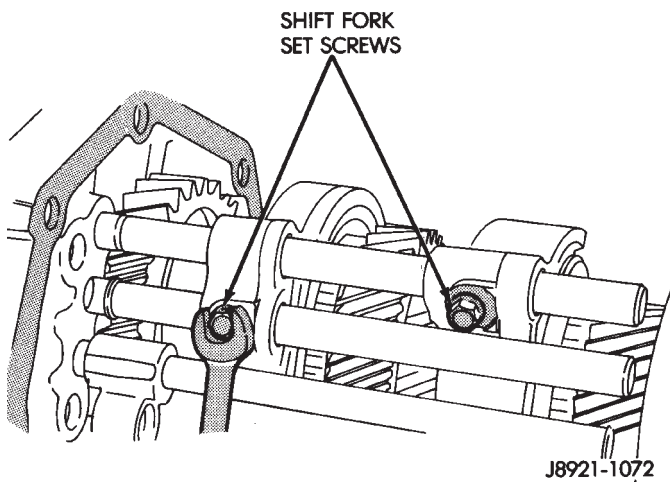


Fig. 70 Remove Shift Fork To Shift Rail Bolts

(23) Remove the 3-4 shift rail from the 1-2 and 3-4 shift forks and the intermediate plate (Fig. 71).

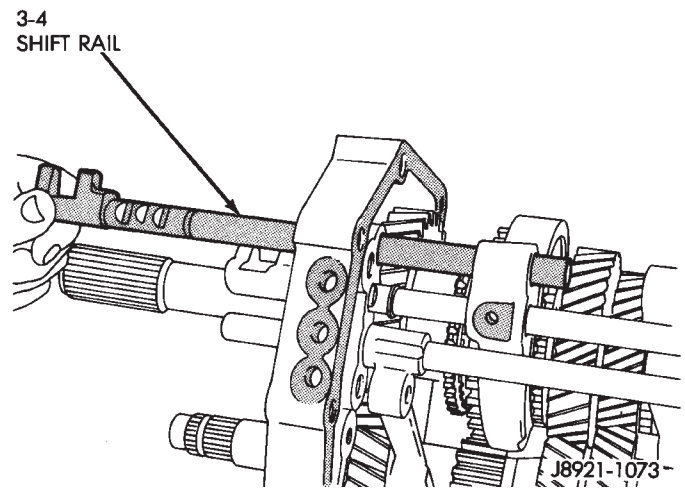


Fig. 71 Remove 3-4 Shift Rail

(24) Remove the 3-4 shift rail interlock plug from the intermediate plate with a small magnet (Fig. 72).

(25) Remove the 3-4 shift fork (Fig. 73).

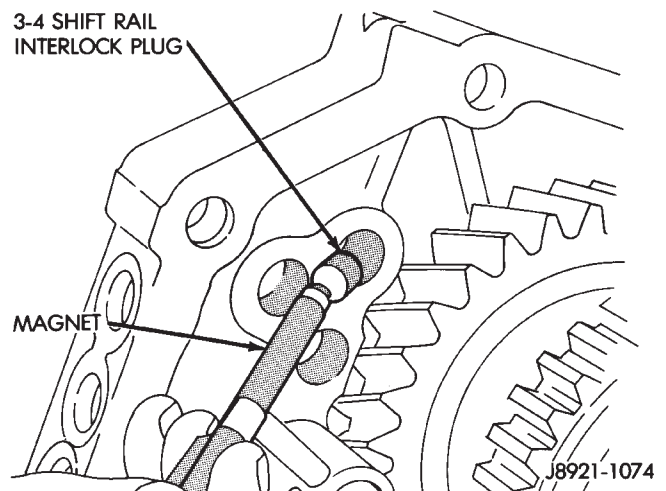
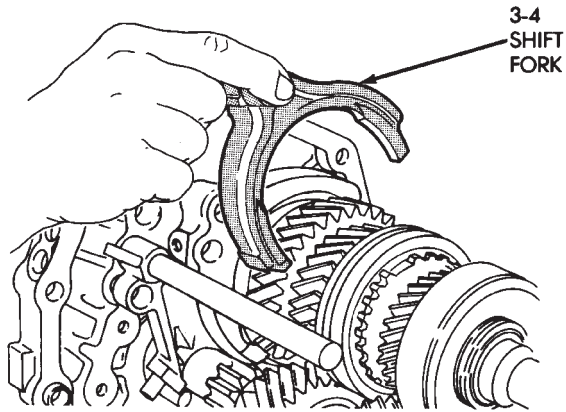
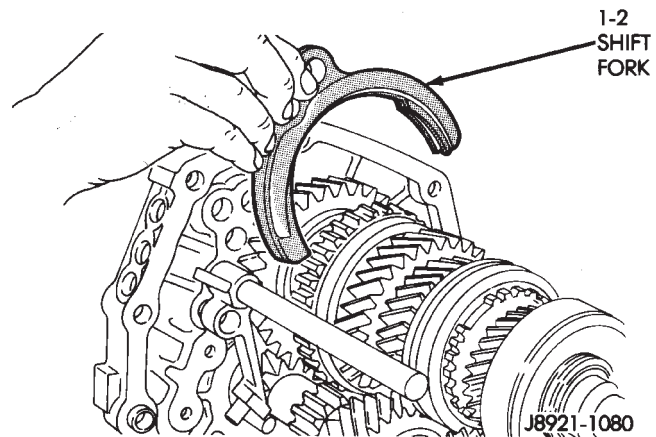


Fig. 72 Remove 3-4 Shift Rail Interlock Plug

DISASSEMBLY AND ASSEMBLY (Continued)



3-4
SHIFT
FORK



1-2
SHIFT
FORK

J8921-1080

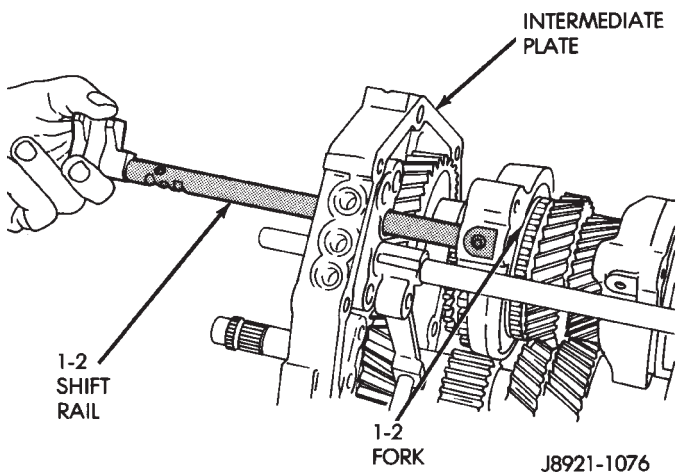
Fig. 73 Remove Shift Forks

(26) Remove the 1-2 shift rail from the 1-2 shift fork and the intermediate plate (Fig. 74).

(27) Remove the 1-2 shift rail interlock pin from the 1-2 shift rail (Fig. 75).

(28) Remove the 1-2 shift rail interlock plug from the intermediate plate (Fig. 76).

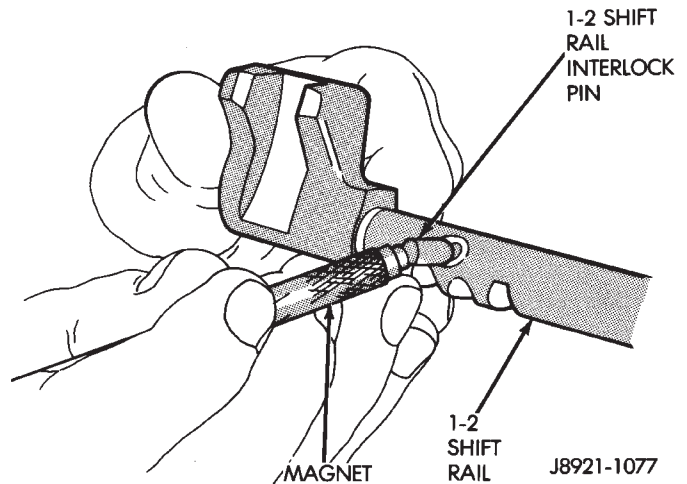
(29) Remove the 1-2 shift fork (Fig. 73).



1-2
SHIFT
RAIL

J8921-1076

Fig. 74 Remove 1-2 Shift Rail



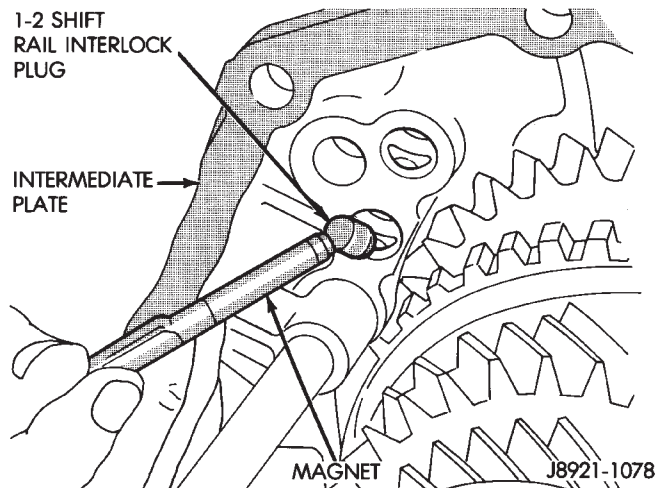
1-2 SHIFT
RAIL
INTERLOCK
PIN

MAGNET

1-2
SHIFT
RAIL

J8921-1077

Fig. 75 Remove 1-2 Shift Rail Interlock Pin



1-2 SHIFT
RAIL INTERLOCK
PLUG

INTERMEDIATE
PLATE

MAGNET

J8921-1078

Fig. 76 Remove 1-2 Shift Rail Interlock Plug

(30) Remove the c-ring holding the reverse shift rail into the intermediate plate using two equally sized screwdrivers (Fig. 77).

(31) Remove the reverse shift rail and fork from the intermediate plate (Fig. 78).

(32) Remove the interlock pin from the reverse shift rail (Fig. 79).

(33) Remove snap-ring holding output shaft rear bearing into the intermediate plate (Fig. 80).

(34) Remove countershaft rear bearing snap-ring.

(35) With aid of an assistant, support the mainshaft and countershaft. Tap on the rear of the mainshaft and countershaft with a suitable rubber mallet. This will release the countershaft from the countershaft rear bearing and the mainshaft rear bearing from the intermediate plate. The mainshaft will release from the intermediate plate first and can be removed by moving the mainshaft rearward and upward (Fig. 81).

DISASSEMBLY AND ASSEMBLY (Continued)

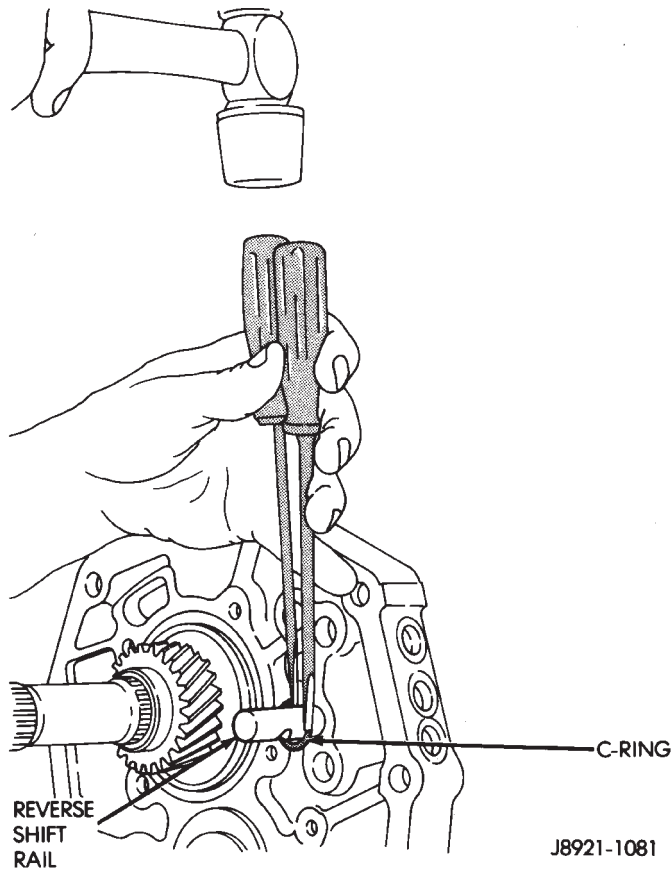


Fig. 77 Remove Reverse Shift Rail C-ring

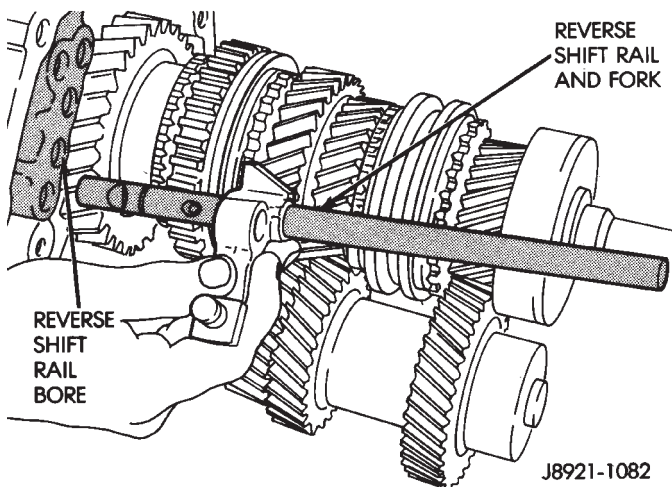


Fig. 78 Remove Reverse Shift Rail

(36) Remove the countershaft by moving the countershaft rearward until the countershaft is clear of the intermediate plate.

(37) Remove the countershaft rear bearing from the intermediate plate.

ASSEMBLY

(1) Lubricate countershaft journal and rear bearing with petroleum jelly or gear lubricant.

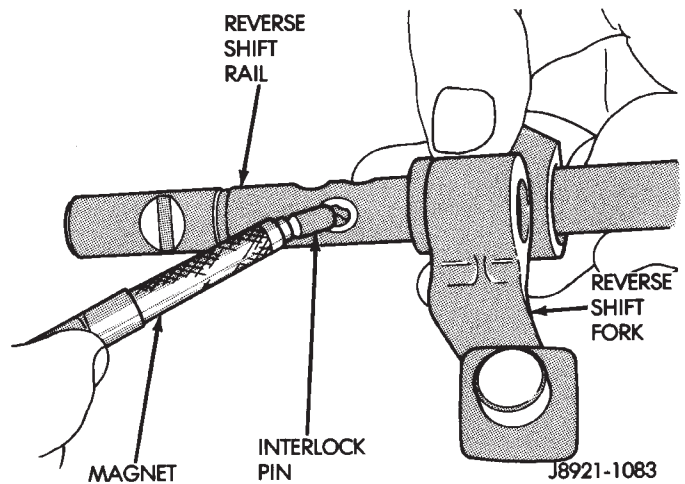


Fig. 79 Remove Reverse Shift Rail Interlock Pin

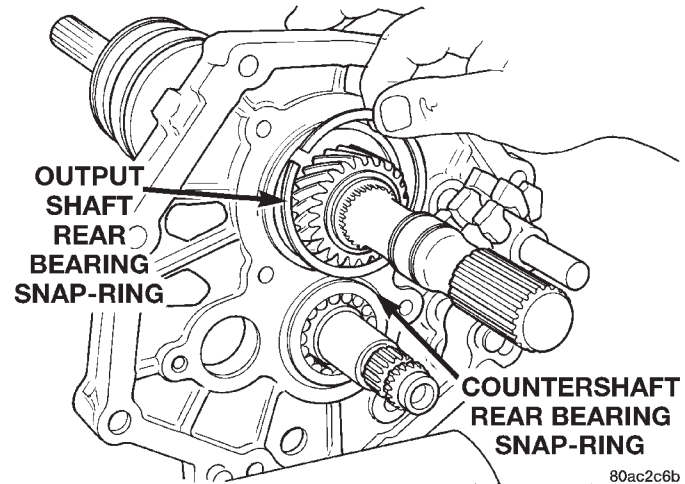


Fig. 80 Remove Output Shaft Rear Bearing Snap-ring

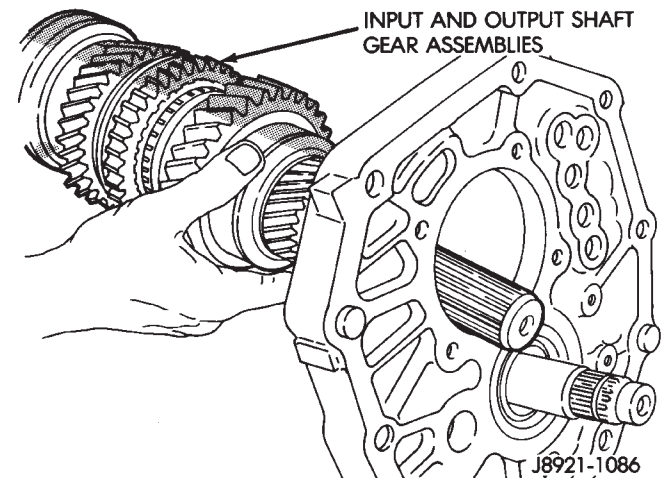


Fig. 81 Remove Mainshaft

(2) Position the mainshaft into the intermediate plate.

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Tap the mainshaft assembly rear bearing into the intermediate plate with a suitable rubber mallet.

(4) Install the countershaft thru the countershaft rear bearing journal of the intermediate plate.

(5) Align and mesh the mainshaft and countershaft gears as much as possible.

(6) Install the countershaft bearing over the countershaft bearing boss and into the intermediate plate. Be sure to leave the snap-ring groove in the bearing facing the rear of the unit. It may be necessary to tap on the bearing with a plastic mallet to fully seat the bearing into intermediate plate.

(7) Verify that the mainshaft and countershaft gears are correctly meshed and rotate properly.

(8) Install snap-ring to hold output shaft rear bearing into the intermediate plate (Fig. 66).

(9) Install countershaft rear bearing snap-ring.

NOTE: Coat all shift components with petroleum jelly during assembly. Petroleum jelly will hold components in position during installation.

(10) Install interlock pin in reverse shift rail (Fig. 82).

(11) Install the reverse shift rail in the intermediate plate (Fig. 83).

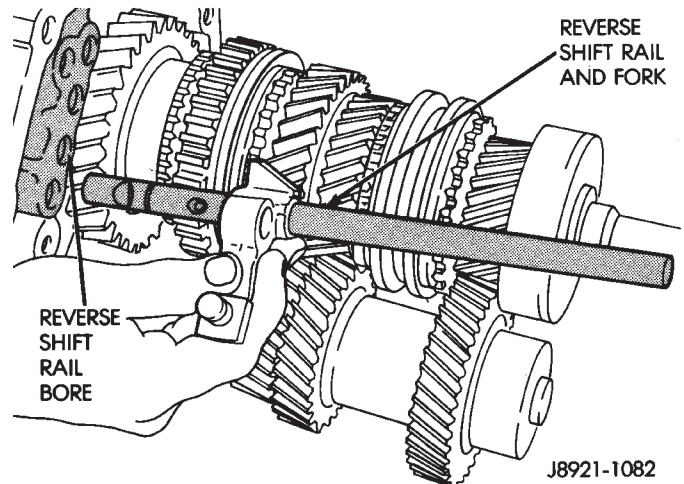


Fig. 83 Install Reverse Shift Rail

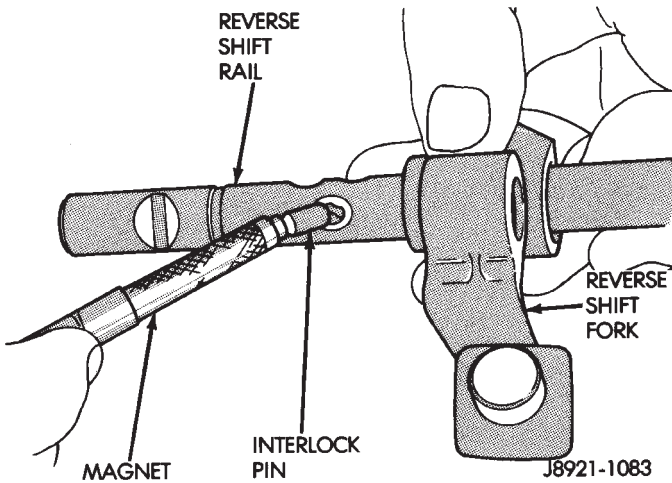


Fig. 82 Install Reverse Shift Rail Interlock Pin

(12) Install c-ring to hold the reverse shift rail into the intermediate plate.

(13) Install the 1-2 and 3-4 shift forks into the synchronizer sleeves (Fig. 84).

(14) Install 1-2 shift rail interlock plug in the intermediate plate (Fig. 85).

(15) Install interlock pin in 1-2 shift rail (Fig. 86).

(16) Install 1-2 shift rail through intermediate plate and 1-2 shift fork (Fig. 87).

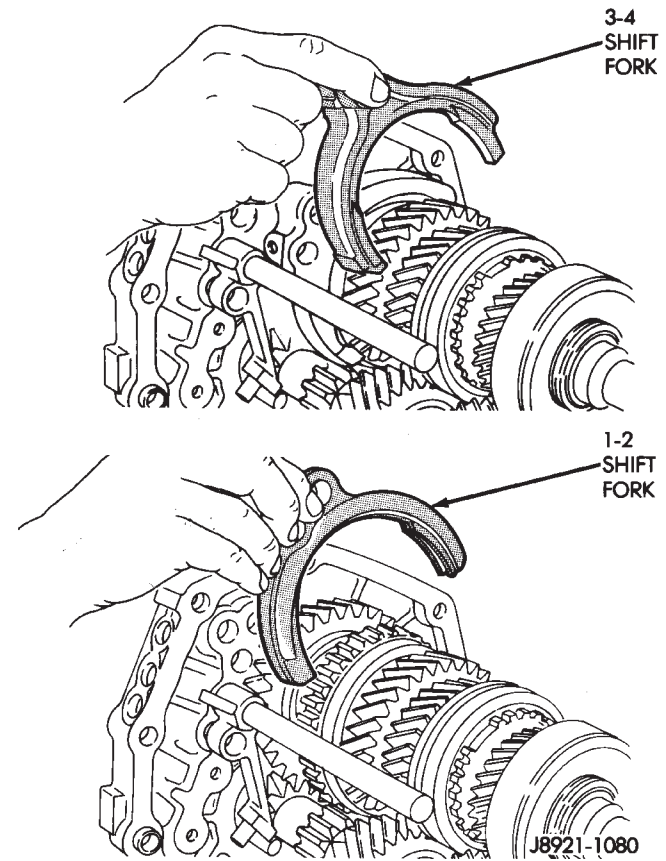


Fig. 84 Install Shift Forks

(17) Install 3-4 shift rail interlock plug into the intermediate plate (Fig. 88).

(18) Install the 3-4 shift rail through the intermediate plate, 1-2 and 3-4 shift forks (Fig. 89).

DISASSEMBLY AND ASSEMBLY (Continued)

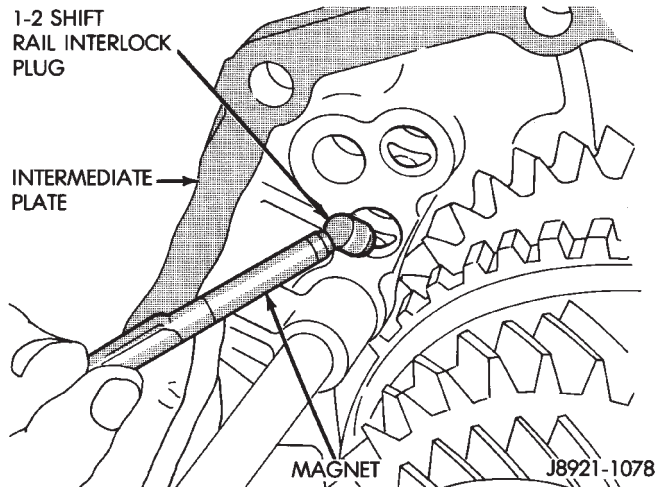


Fig. 85 Install 1-2 Shift Rail Interlock Plug

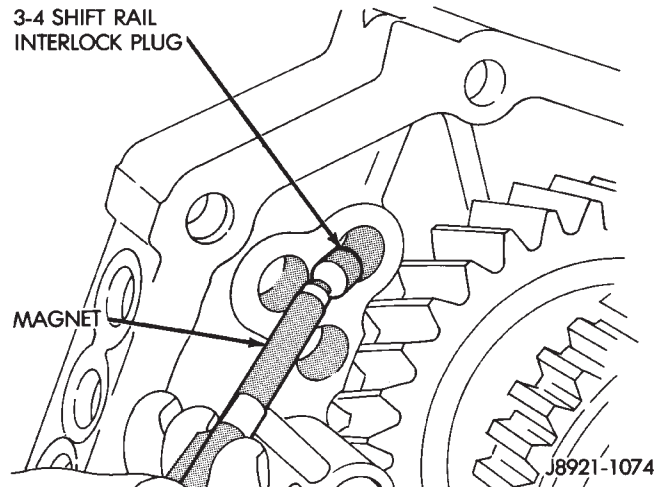


Fig. 88 Install 3-4 Shift Rail Interlock Plug

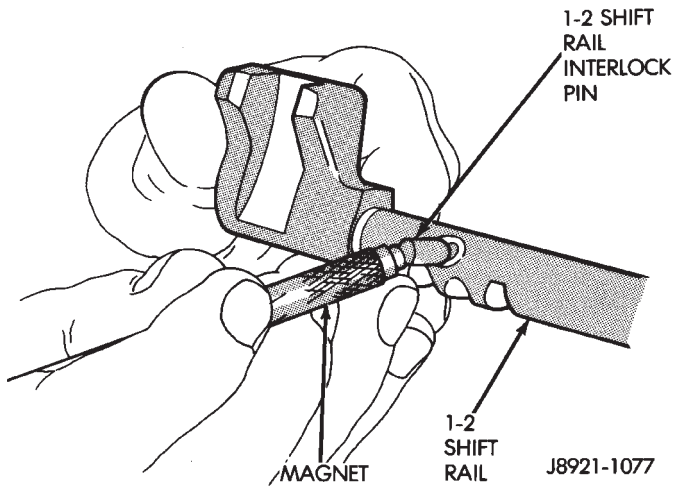


Fig. 86 Install 1-2 Shift Rail Interlock Pin

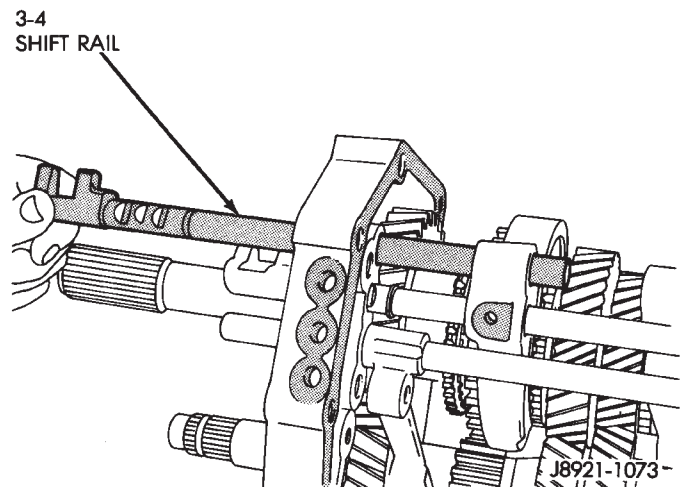


Fig. 89 Install 3-4 Shift Rail

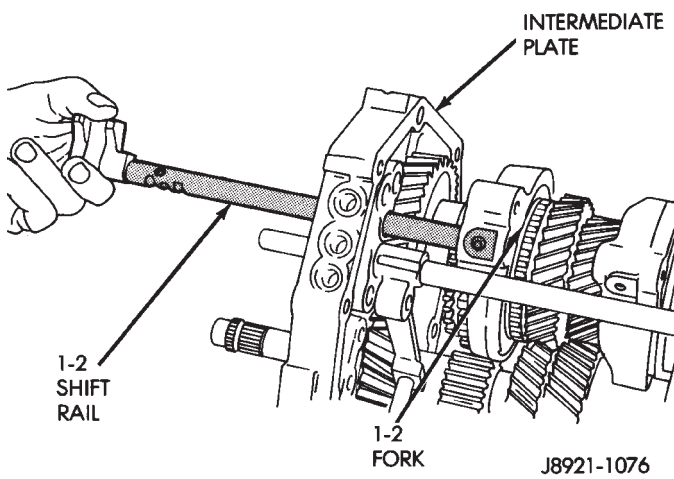


Fig. 87 Install 1-2 Shift Rail

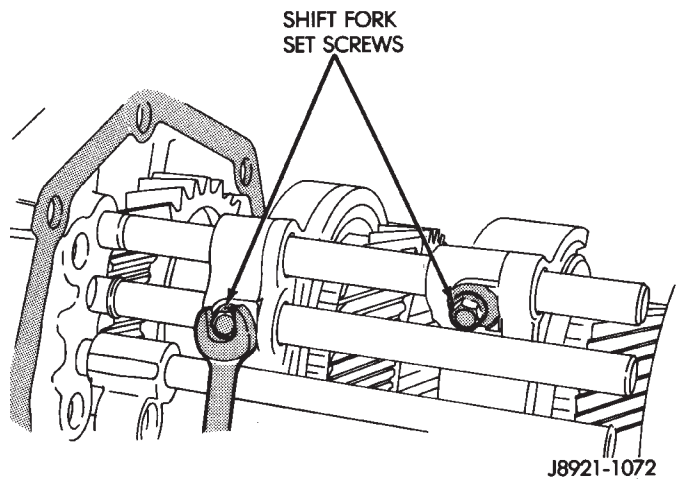


Fig. 90 Install Shift Fork To Shift Rail Bolts

(19) Install new bolts to hold the shift forks to the shift rails (Fig. 90).

(20) Install c-rings to 1-2 and 3-4 shift rails (Fig. 91).

(21) Install the fifth gear shift rail lock ball in the intermediate plate (Fig. 94).

(22) Install the fifth gear shift rail into the intermediate plate.

DISASSEMBLY AND ASSEMBLY (Continued)

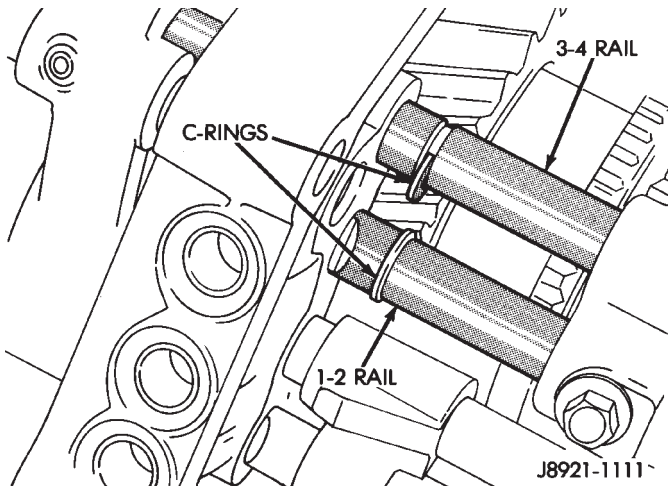


Fig. 91 Install Shift Rail C-rings

(23) Install reverse idler gear and idler gear shaft (Fig. 92). Verify that the notch in the idler shaft is to the rear of the transmission.

(24) Position output shaft rear bearing retainer on intermediate plate and into reverse idler shaft notch.

(25) Install new bolts to hold retainer to intermediate plate (Fig. 93).

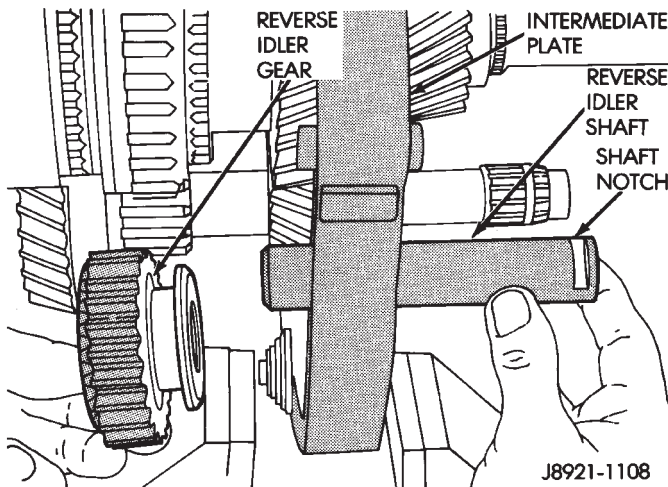


Fig. 92 Install Reverse Idler Gear And Shaft

(26) Install the fifth gear thrust ring lock ball into the countershaft (Fig. 95).

(27) Install fifth gear thrust ring onto countershaft and over lock ball (Fig. 96).

(28) Install countershaft fifth gear bearing halves into countershaft fifth gear assembly (Fig. 97).

(29) Install countershaft fifth gear assembly onto countershaft (Fig. 98).

(30) Install fifth gear synchronizer ring (Fig. 99).

(31) Position fifth gear blocker ring onto countershaft. Verify that blocker ring and countershaft splines are aligned.

(32) Using a suitable driver and mallet, seat the blocker ring onto the countershaft.

(33) Select the thickest snap-ring the will fit into the snap-ring groove of the countershaft.

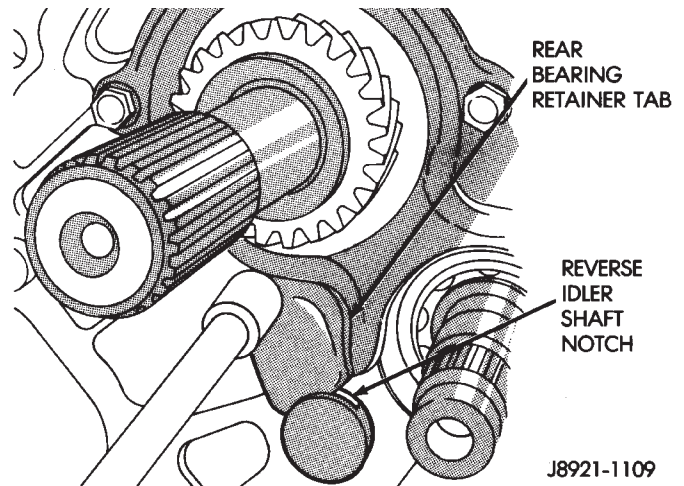


Fig. 93 Install Output Shaft Rear Bearing Retainer

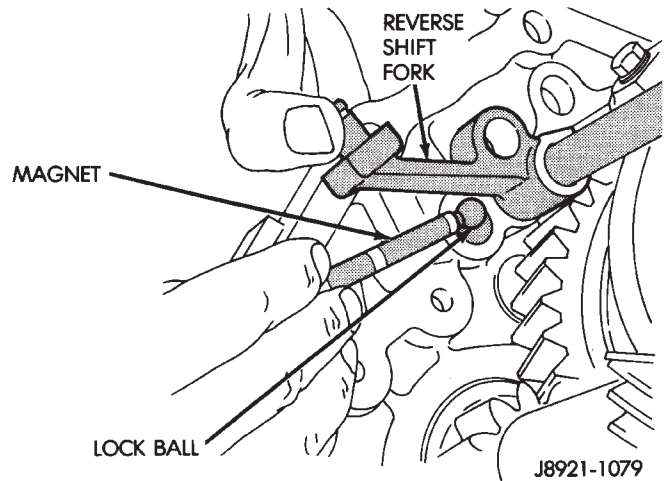


Fig. 94 Install Fifth Gear Shift Rail Lock Ball

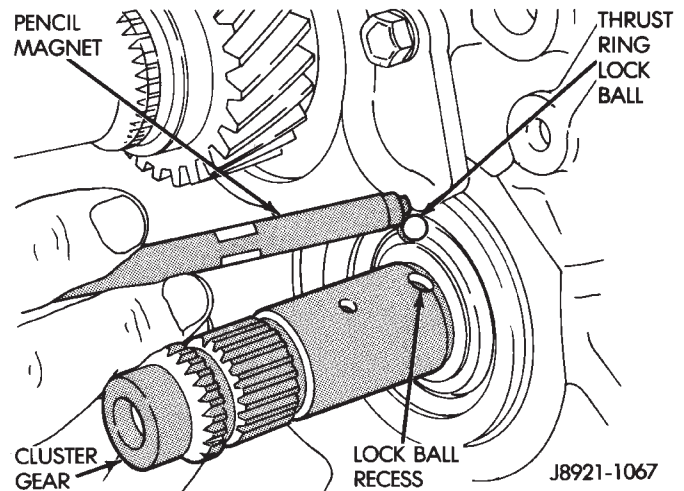


Fig. 95 Install Fifth Gear Thrust Ring Lock Ball

(34) Install snap-ring to hold the countershaft fifth gear assembly onto the countershaft (Fig. 100).

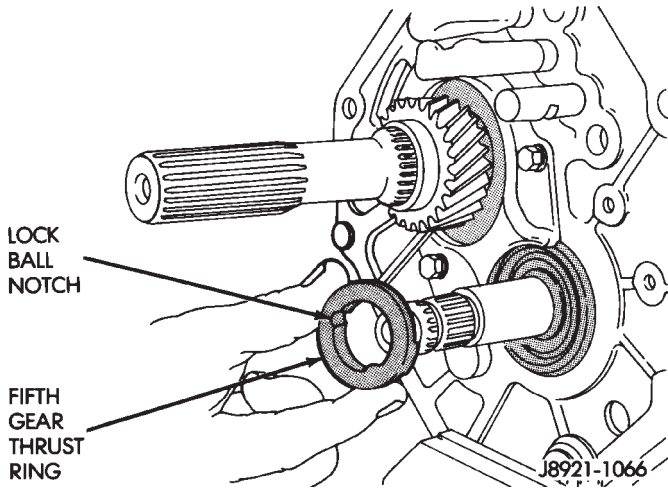


Fig. 96 Install Fifth Gear Thrust Ring

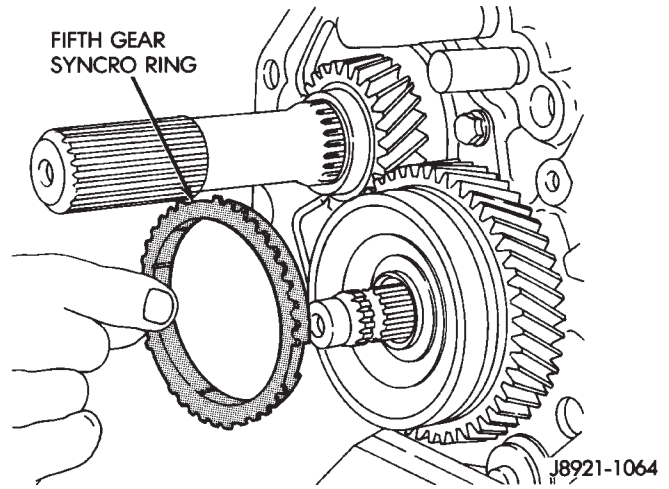


Fig. 99 Install Fifth Gear Synchronizer Ring

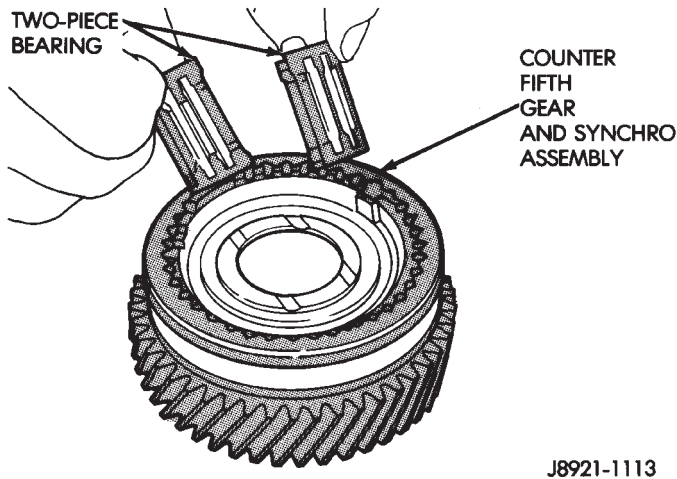


Fig. 97 Install Countershaft Fifth Gear Bearings

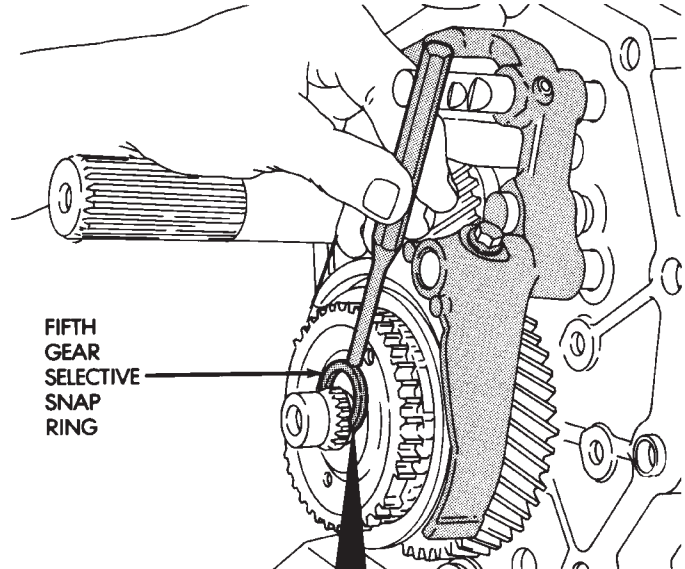


Fig. 100 Install Fifth Gear Snap-ring

I.D. MARK	SNAP RING THICKNESS	MM (IN.)
A	2.85 - 2.90	(0.1122 - 0.1142)
B	2.90 - 2.95	(0.1142 - 0.1161)
C	2.95 - 3.00	(0.1161 - 0.1181)
D	3.00 - 3.05	(0.1181 - 0.1201)
E	3.05 - 3.10	(0.1201 - 0.1220)
F	3.10 - 3.15	(0.1220 - 0.1240)
G	3.15 - 3.20	(0.1240 - 0.1260)
H	3.20 - 3.25	(0.1260 - 0.1280)

J8921-1114

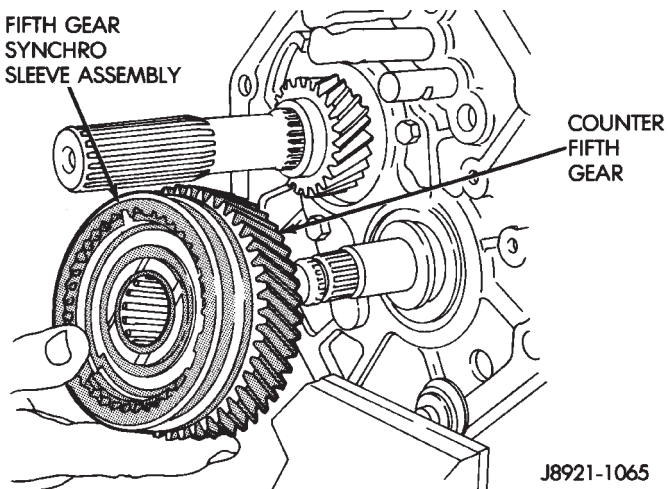


Fig. 98 Install Countershaft Fifth Gear Assembly

(35) Install the reverse shift head and rail assembly (Fig. 101).

(36) Move reverse shift rail forward as far as possible and install fifth gear shift fork onto synchronizer sleeve (Fig. 102).

(37) Install new bolt to hold fifth gear shift fork to shift rail (Fig. 103).

(38) Install detent balls and springs into openings in the intermediate plate (Fig. 104).

(39) Install new lock ball plugs into the intermediate plate. Tighten plugs to 19 N·m (14 ft. lbs.).

DISASSEMBLY AND ASSEMBLY (Continued)

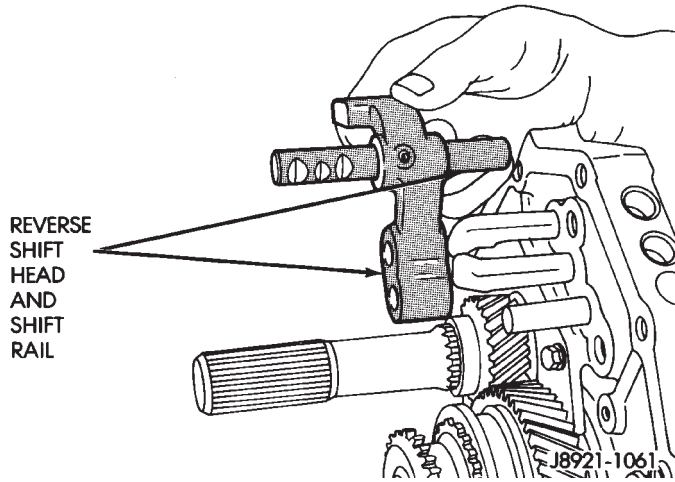


Fig. 101 Install Reverse Shift Head And Rail Assembly

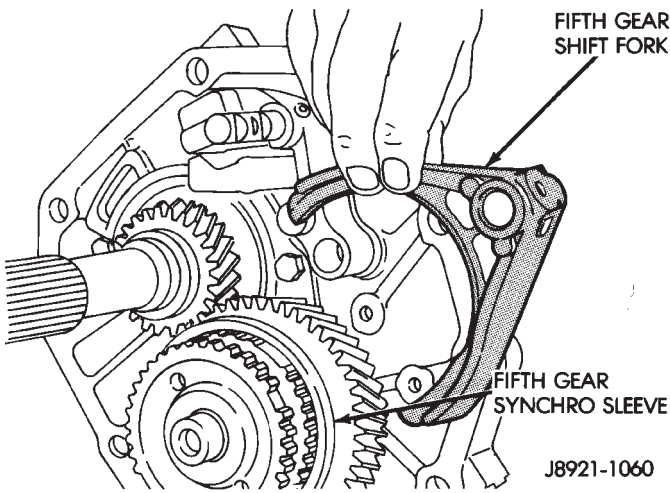


Fig. 102 Install Fifth Gear Shift Fork

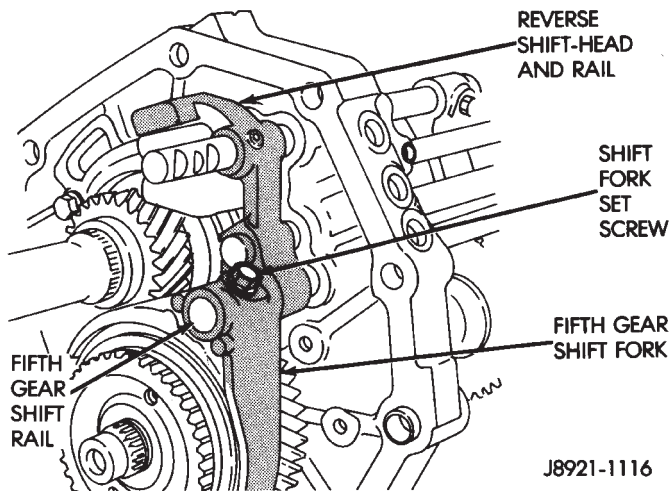


Fig. 103 Install Fifth Gear Shift Fork Retainer Bolt

(40) Install bolts to hold reverse shift arm to the intermediate plate. Tighten bolts to 18 N·m (13 ft. lbs.).

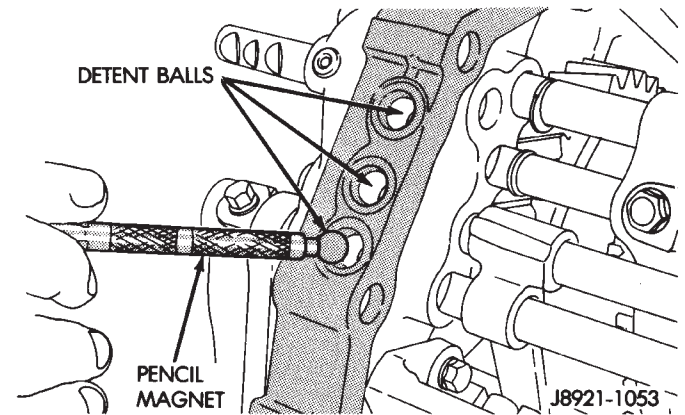
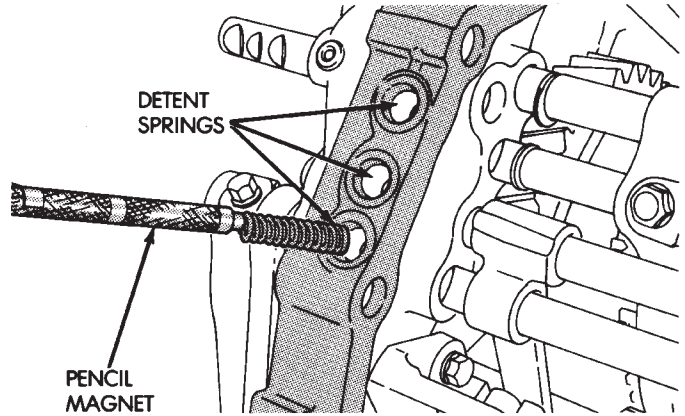


Fig. 104 Install Detent Balls And Springs

COUNTERSHAFT

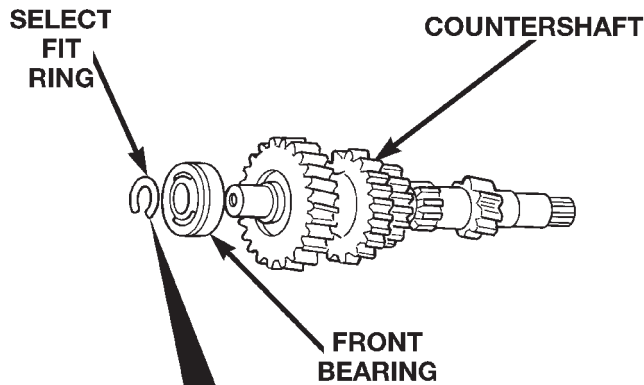
DISASSEMBLY

- (1) Remove select fit snap-ring holding the countershaft front bearing onto the countershaft (Fig. 105).
- (2) Using Bearing Splitter P-334, a suitable spacer on center of countershaft, and a shop press, remove the countershaft front bearing from the countershaft.

ASSEMBLY

- (1) Remove any nicks or burrs on countershaft hub with fine emery or crocus cloth.
- (2) Position countershaft front bearing on end of countershaft. Be sure the snap-ring groove in bearing is facing forward.
- (3) Using Special Tool 8109 and a shop press, press bearing onto countershaft.
- (4) Select the thickest snap-ring that will fit into the snap-ring groove of the countershaft (Fig. 105).
- (5) Install snap-ring to hold countershaft front bearing onto countershaft.

DISASSEMBLY AND ASSEMBLY (Continued)



I.D. MARK	SNAP RING THICKNESS MM (IN.)	
A	2.00 - 2.05	(0.0787 - 0.0807)
B	2.05 - 2.10	(0.0807 - 0.0827)
C	2.10 - 2.15	(0.0827 - 0.0846)
D	2.15 - 2.20	(0.0846 - 0.0866)
E	2.20 - 2.25	(0.0866 - 0.0886)

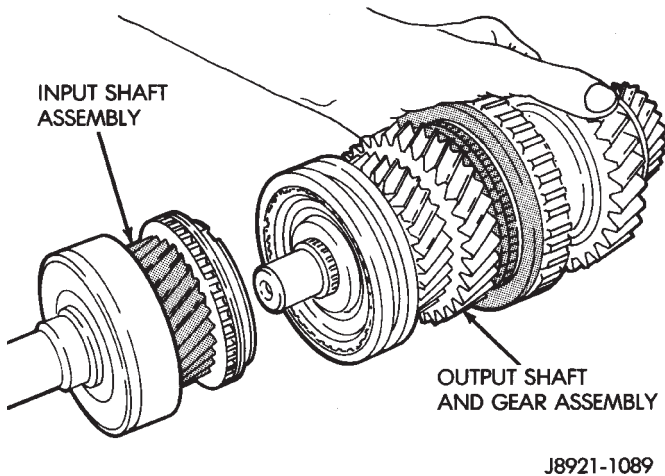
80ac6a0b

Fig. 105 Countershaft Front Bearing Snap-ring

INPUT SHAFT

DISASSEMBLY

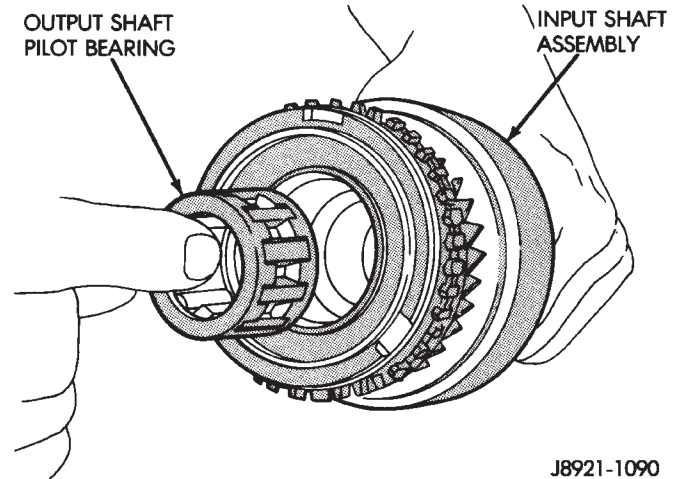
- (1) Verify that the 3-4 synchronizer is in the neutral position.
- (2) Separate input shaft from output shaft (Fig. 106).



J8921-1089

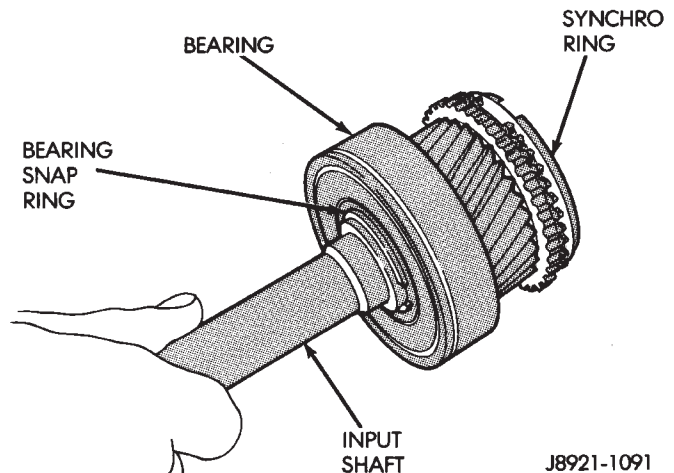
Fig. 106 Separate Input and Output Shafts

- (3) Remove the output shaft pilot bearing from the input shaft or output shaft (Fig. 107).
- (4) Remove the fourth gear synchronizer ring from the input shaft (Fig. 108).
- (5) Remove the select fit snap-ring holding the input shaft bearing onto the input shaft.
- (6) Using Bearing Splitter P-334 and a shop press, remove the bearing from the input shaft.



J8921-1090

Fig. 107 Remove Output Shaft Pilot Bearing



J8921-1091

Fig. 108 Input Shaft Components

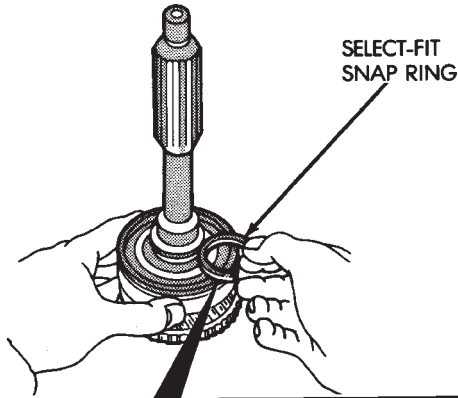
ASSEMBLY

- (1) Position input shaft bearing onto input shaft. Be sure that the snap-ring groove in the bearing is facing forward.
- (2) Using Driver 6052, drive bearing onto input shaft.
- (3) Select the thickest snap-ring that will fit into the snap-ring groove of the input shaft (Fig. 109).
- (4) Lubricate output shaft pilot bearing bore of input shaft with petroleum jelly.
- (5) Install output shaft pilot bearing in input shaft bore (Fig. 107).
- (6) Install the fourth gear synchronizer ring onto the input shaft.
- (7) Install input shaft to output shaft.

OUTPUT SHAFT

Refer to (Fig. 110) for parts identification during disassembly and assembly of the output shaft.

DISASSEMBLY AND ASSEMBLY (Continued)



I.D. MARK	SNAP RING THICKNESS	MM (IN.)
A	2.10 - 2.15	(0.0827 - 0.0846)
B	2.15 - 2.20	(0.0846 - 0.0866)
C	2.20 - 2.25	(0.0866 - 0.0886)
D	2.25 - 2.30	(0.0886 - 0.0906)
E	2.30 - 2.35	(0.0906 - 0.0925)
F	2.35 - 2.40	(0.0925 - 0.0945)
G	2.40 - 2.45	(0.0945 - 0.0965)

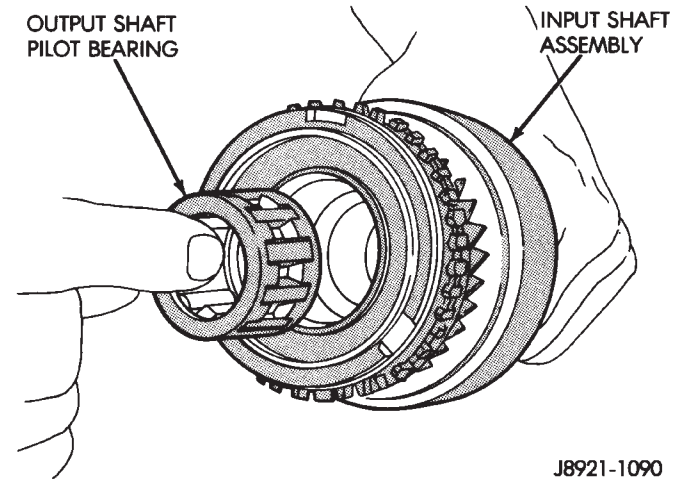
J8921-1097

Fig. 109 Select Input Shaft Bearing Snap-ring

DISASSEMBLY

(1) Remove input shaft and output shaft pilot bearing from output shaft (Fig. 111), if necessary.

(2) Measure and note thrust clearance of output shaft gears (Fig. 112). First gear clearance should be 0.10 - 0.40 mm (0.004 - 0.0197 in.). Second and third gear clearance should be 0.10 - 0.30 mm (0.003 - 0.0118 in.).

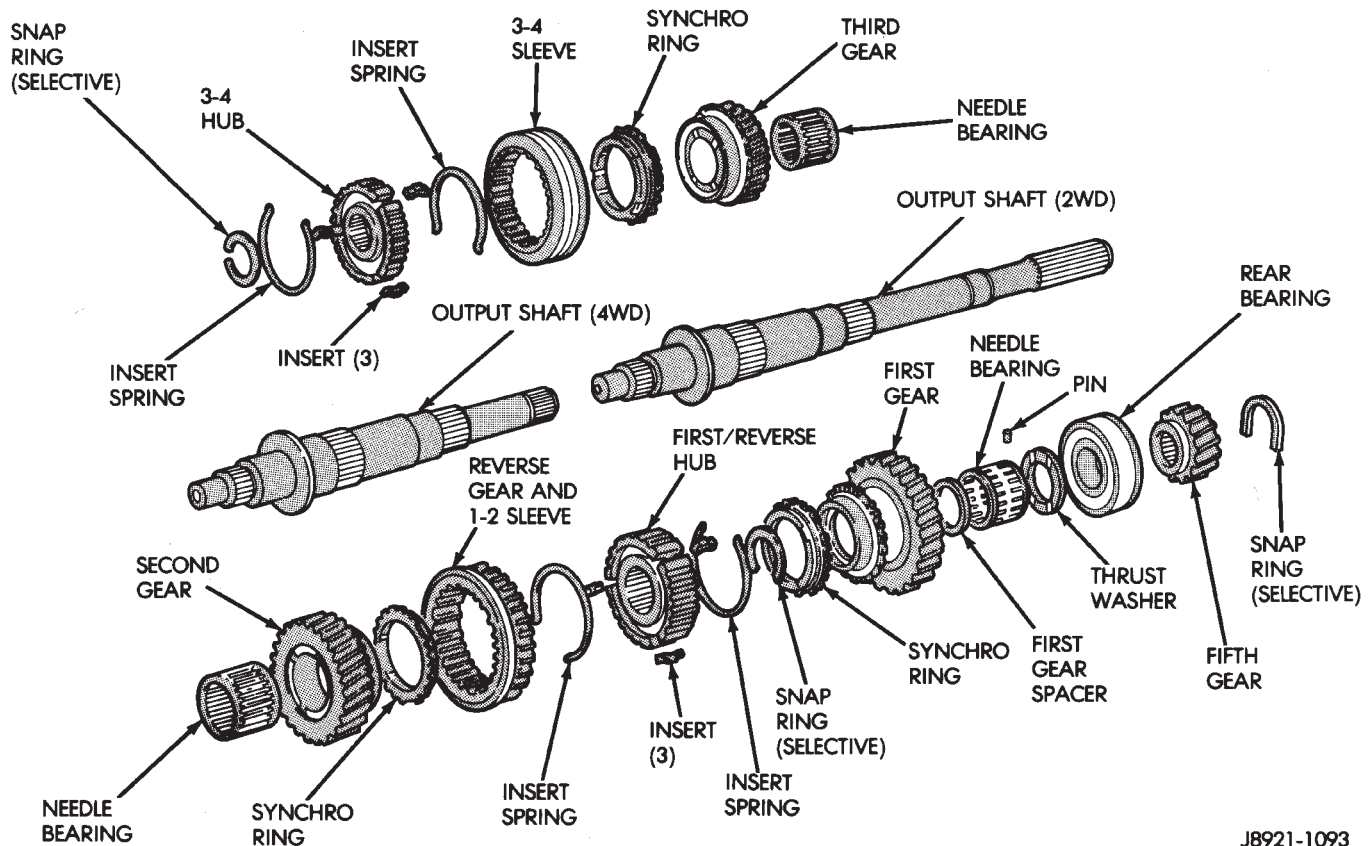


J8921-1090

Fig. 111 Remove Output Shaft Pilot Bearing

(3) Remove output shaft fifth gear snap ring with two screwdrivers (Fig. 113).

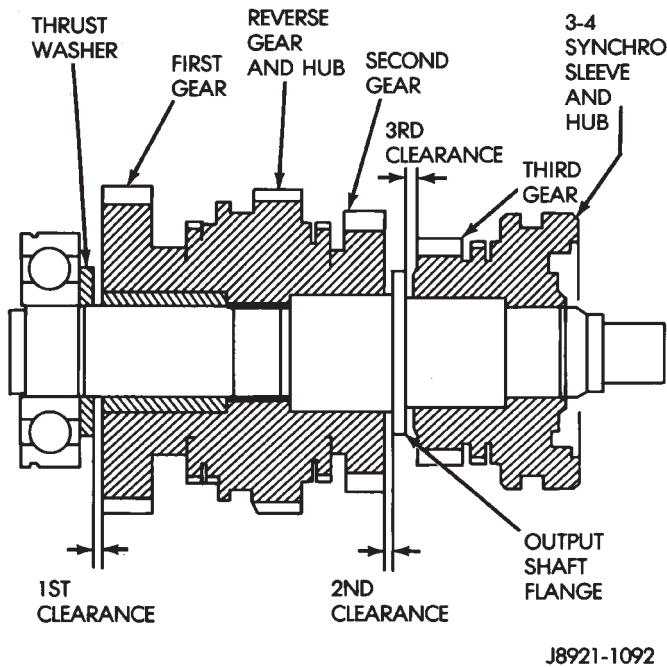
(4) Using Bearing Splitter P-334 or suitable press plates positioned under first gear, press fifth gear,



J8921-1093

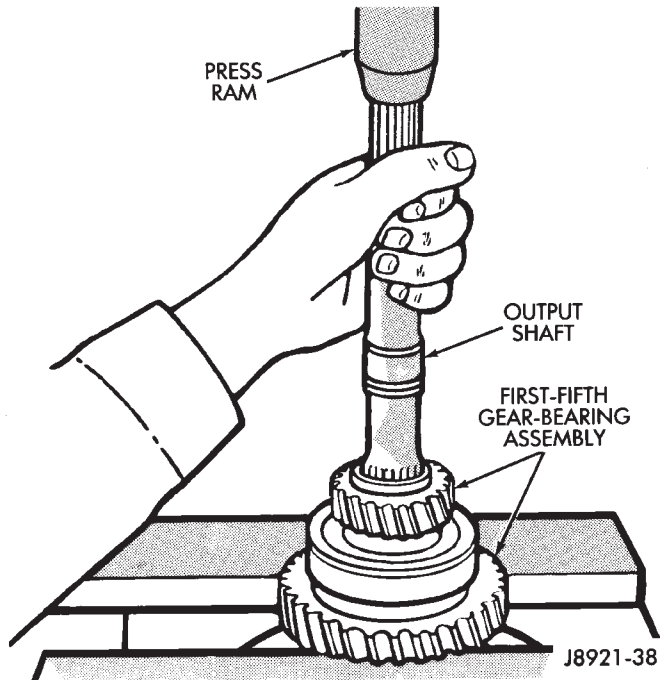
Fig. 110 Output Shaft And Gears

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-1092

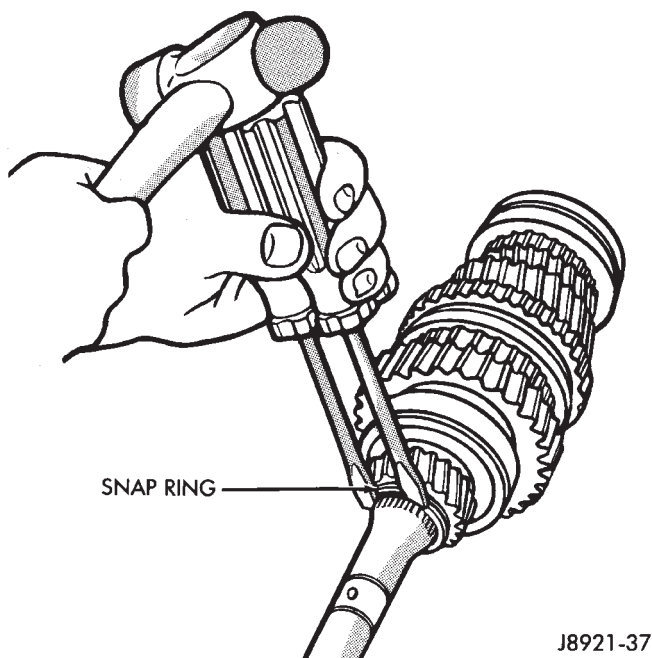
Fig. 112 Check Output Shaft Gear Thrust Clearance



J8921-38

Fig. 114 Remove Fifth Gear, First Gear Bearing, And Thrust Washer

(10) Using Bearing Splitter P-334 or suitable press plates positioned under second gear, press 1-2 synchronizer/reverse gear and second gear from output shaft (Fig. 115).



J8921-37

Fig. 113 Remove Fifth Gear Snap-ring

rear bearing, first gear, and first gear thrust washer off output shaft (Fig. 114).

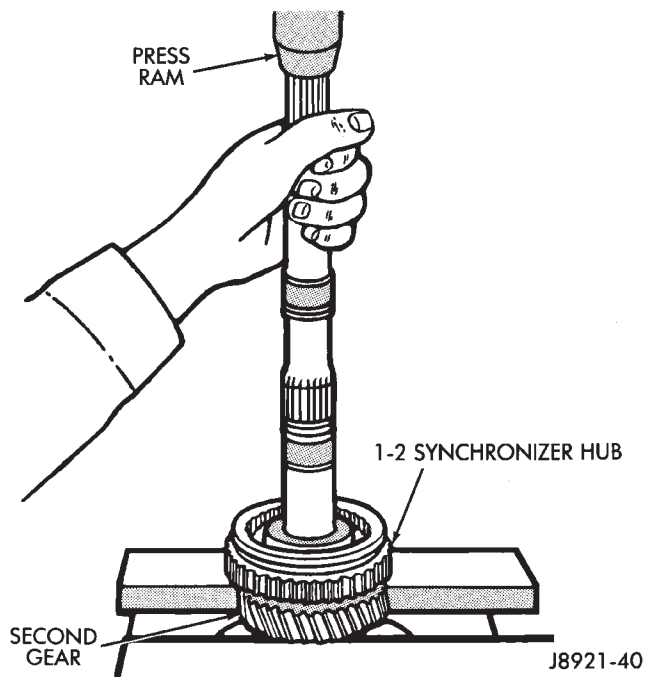
(5) Remove first gear thrust washer locating pin from output shaft.

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

(7) Remove first gear spacer from output shaft.

(8) Remove first gear synchronizer ring.

(9) Remove select fit snap-ring holding the 1-2 synchronizer/reverse gear onto the output shaft.



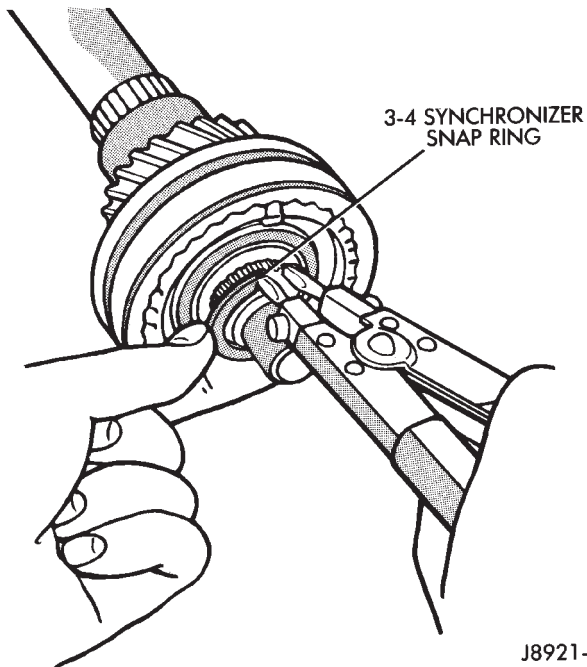
J8921-40

Fig. 115 Remove Second Gear And 1-2 Synchronizer/Reverse Gear

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

DISASSEMBLY AND ASSEMBLY (Continued)

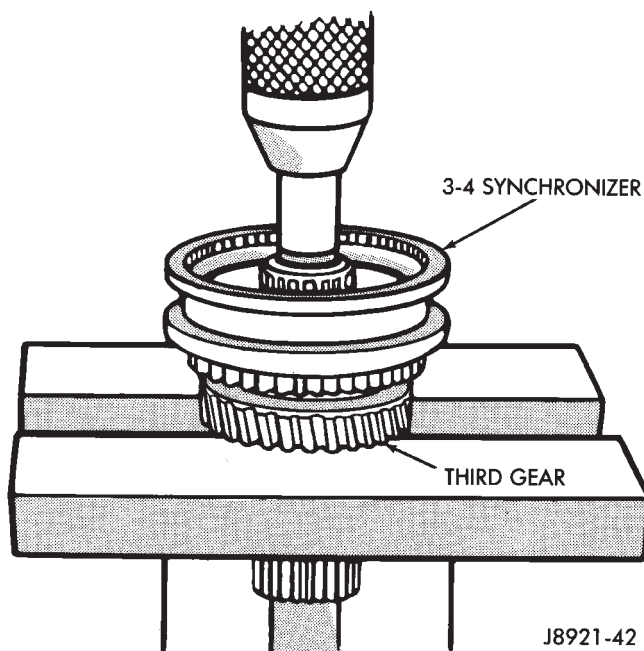
(12) Remove select fit snap-ring holding the 3-4 synchronizer onto the output shaft (Fig. 116).



J8921-41

Fig. 116 Remove 3-4 Synchronizer Snap Ring

(13) Using Bearing Splitter P-334 or suitable press plates positioned under third gear, press the 3-4 synchronizer and third gear from output shaft (Fig. 117).



J8921-42

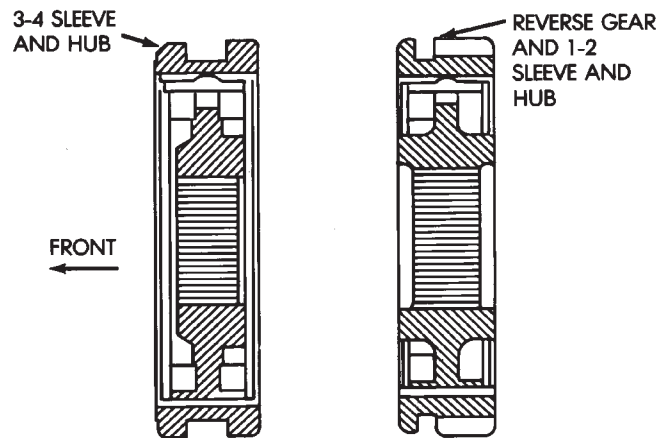
Fig. 117 Remove 3-4 Synchronizer And Third Gear

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

ASSEMBLY

(1) Lubricate transmission components with specified gear lubricant during assembly.

(2) If necessary, assemble 1-2 and 3-4 synchronizer hubs, sleeves, springs and key inserts (Fig. 118).



J8921-1099

Fig. 118 Synchronizer Identification

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

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

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

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

(7) Using Adapter 6761 and a shop press, press the 3-4 synchronizer onto the output shaft.

(8) Select the thickest snap-ring that will fit into the snap-ring groove of the output shaft (Fig. 119).

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

(10) Verify third gear thrust clearance with feeler gauge (Fig. 120). Clearance should be 0.10 - 0.30 mm (0.003 - 0.0118 in.). If clearance is out of specification, refer to Cleaning and Inspection section within this group.

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

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

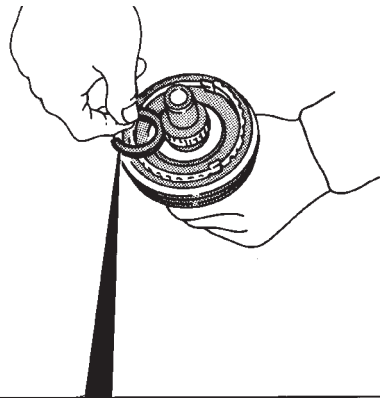
(13) Install second gear synchronizer ring onto second gear.

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

(15) Using Driver MD-998805, Adapter 6761, and a shop press, press the 1-2 synchronizer/reverse gear onto the output shaft.

(16) Select the thickest snap-ring that will fit into the snap-ring groove of the output shaft (Fig. 121).

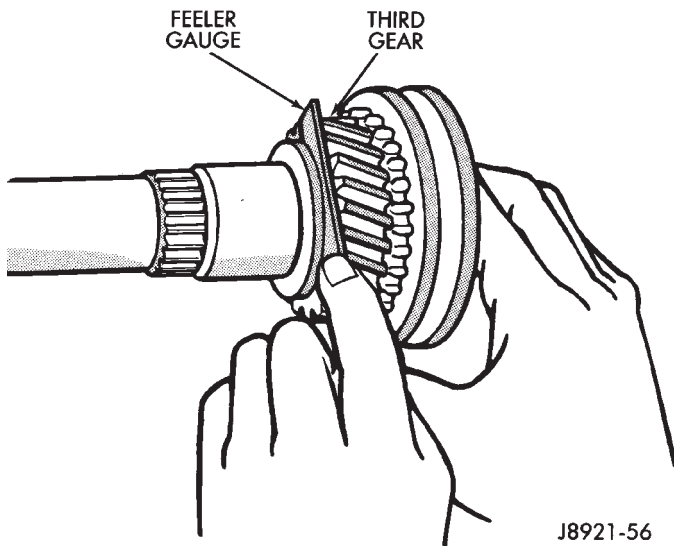
DISASSEMBLY AND ASSEMBLY (Continued)



I.D. MARK	SNAP RING THICKNESS	MM (IN.)
A	1.80 - 1.85	(0.0709 - 0.0728)
B	1.85 - 1.90	(0.0728 - 0.0748)
C	1.90 - 1.95	(0.0748 - 0.0768)
D	1.95 - 2.00	(0.0768 - 0.0787)
E	2.00 - 2.05	(0.0787 - 0.0807)
F	2.05 - 2.10	(0.0807 - 0.0827)
G	2.10 - 2.15	(0.0827 - 0.0846)

J8921-1101

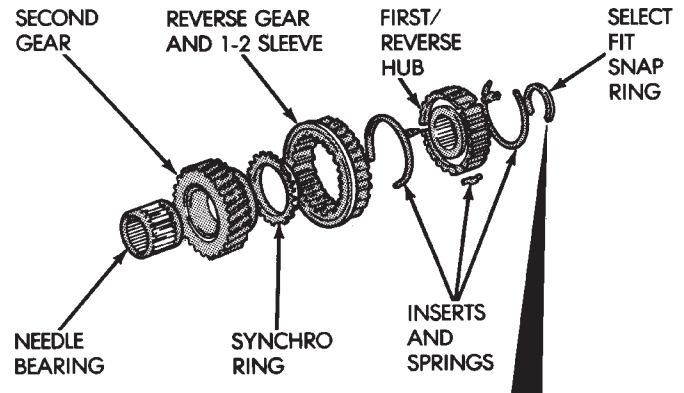
Fig. 119 Select 3-4 Synchronizer Snap-ring



J8921-56

Fig. 120 Check Third Gear Clearance

- (17) Install snap-ring to hold 1-2 synchronizer/reverse gear onto output shaft.
- (18) Install first gear synchronizer ring into 1-2 synchronizer/reverse gear.
- (19) Install the first gear spacer onto the input shaft and against the 1-2 synchronizer/reverse gear snap-ring.
- (20) Install first gear needle bearing onto output shaft (Fig. 122).
- (21) Install first gear onto output shaft and over bearing.
- (22) Install the first gear thrust washer locating pin into the output shaft.

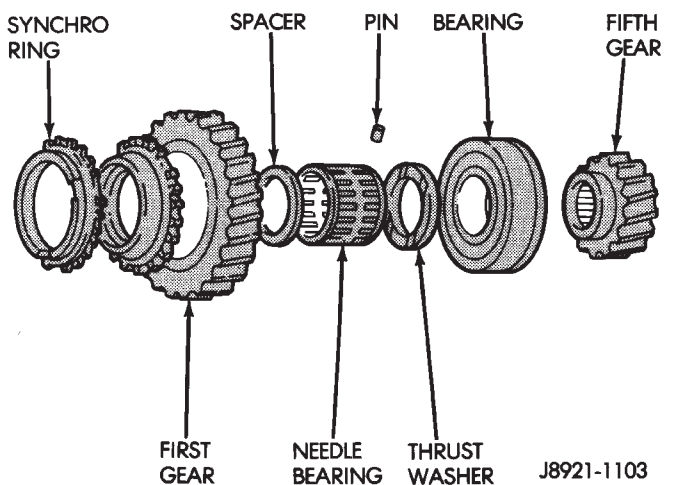


I.D. MARK	SNAP RING THICKNESS	MM (IN.)
B	2.35 - 2.40	(0.0925 - 0.0945)
C	2.40 - 2.45	(0.0945 - 0.0965)
D	2.45 - 2.50	(0.0965 - 0.0984)
E	2.50 - 2.55	(0.0984 - 0.1004)
F	2.55 - 2.60	(0.1004 - 0.1024)
G	2.60 - 2.65	(0.1024 - 0.1043)

J8921-1102

Fig. 121 Second Gear And Synchronizer Assembly

- (23) Install the first gear thrust washer onto the output shaft. Rotate the thrust washer until the washer locating pin aligns with the notch in the washer.
- (24) Position output shaft rear bearing onto output shaft. Ensure that the snap ring groove in bearing outer race is toward rear of output shaft.
- (25) Using Driver L-4507 and suitable mallet, drive bearing onto output shaft.
- (26) Install snap-ring onto output shaft rear bearing outer race.



J8921-1103

Fig. 122 First And Fifth Gear Components

- (27) Check first and second gear thrust clearance (Fig. 123). First gear clearance should be 0.10 - 0.40 mm (0.003 - 0.0197 in.). Second gear clearance should be 0.10 - 0.30 mm (0.003 - 0.0118 in.). If

DISASSEMBLY AND ASSEMBLY (Continued)

clearance is out of specification, refer to Cleaning and Inspection section within this group.

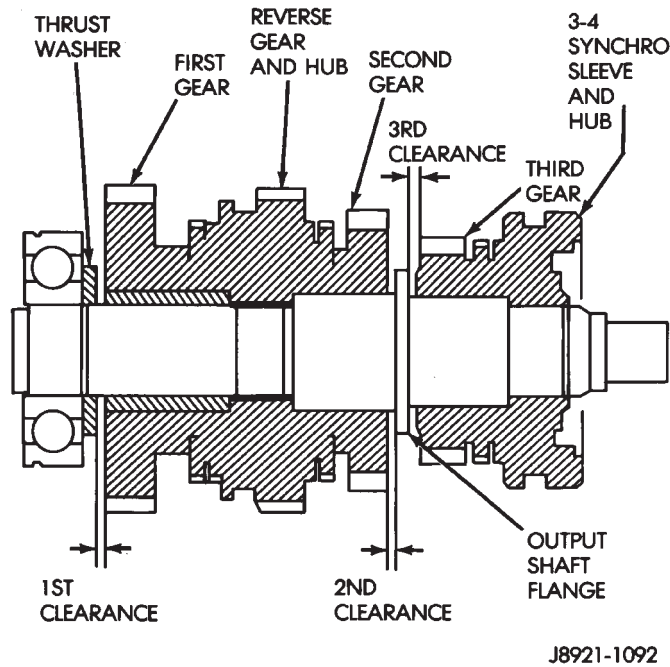


Fig. 123 Check First-Second Gear Thrust Clearance

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

(29) Using Adapter 6761, Driver L-4507, and a shop press, press fifth gear onto output shaft.

(30) Select the thickest snap-ring that will fit into the snap-ring groove of the output shaft (Fig. 124).

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

(32) Install output shaft pilot bearing into the input shaft.

(33) Install the input shaft to the output shafts.

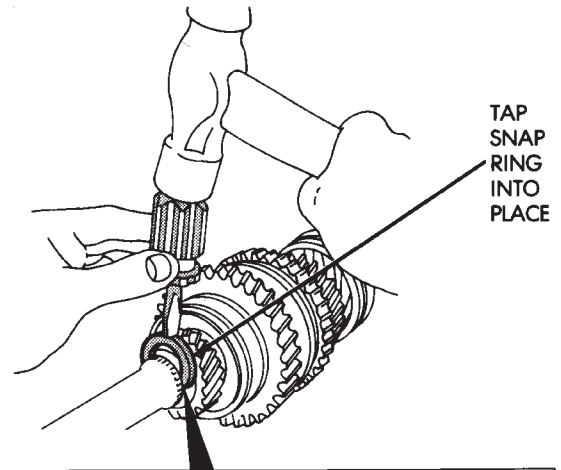
CLEANING AND INSPECTION

AX15 MANUAL TRANSMISSION COMPONENTS

GENERAL INFORMATION

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

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



I.D. MARK	SNAP RING THICKNESS	MM (IN.)
A	2.75 - 2.80	(0.1083 - 0.1102)
B	2.80 - 2.85	(0.1002 - 0.1122)
C	2.85 - 2.90	(0.1122 - 0.1142)
D	2.90 - 2.95	(0.1142 - 0.1161)
E	2.95 - 3.00	(0.1161 - 0.1181)
F	3.00 - 3.05	(0.1181 - 0.1201)
G	3.05 - 3.10	(0.1201 - 0.1220)
H	3.10 - 3.15	(0.1220 - 0.1240)
J	3.15 - 3.20	(0.1240 - 0.1260)
K	3.20 - 3.25	(0.1260 - 0.1280)
L	3.25 - 3.30	(0.1280 - 0.1299)
M	3.30 - 3.35	(0.1299 - 0.1319)

J8921-1104

Fig. 124 Select/Install Fifth Gear Snap Ring

GEAR CASE, ADAPTER/EXTENSION HOUSING, INTERMEDIATE PLATE

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

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

OUTPUT SHAFT

Check thickness of the output shaft flange with a micrometer or vernier calipers (Fig. 125). Minimum allowable flange thickness is 4.70 mm (0.185 in.).

Check diameter of the first, second, and third gear bearing surfaces on the output shaft. Minimum diameters are as follows:

- First gear bearing surface is 38.86 mm (1.529 in.).
- Second gear bearing surface is 46.86 mm (1.844 in.).
- Third gear bearing surface is 37.86 mm (1.490 in.).

CLEANING AND INSPECTION (Continued)

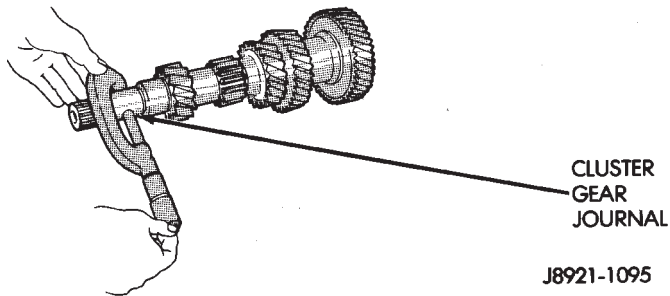


Fig. 125 Check Output Shaft Tolerances

Measure output shaft runout with a dial indicator and V-blocks (Fig. 125). Runout should not exceed 0.06 mm (0.0024 in.).

Replace output shaft if measurement of any surface is out of specification. Do not attempt to repair out of specification components.

COUNTERSHAFT

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

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

GEAR AND SYNCHRONIZER

Install the needle bearings in the first, second, third and counter fifth gears. Install the gears on the output shaft. Then check oil clearance between the gears and shaft with a dial indicator (Fig. 126). Oil clearance for all three gears is 0.16 mm (0.0063 in.) maximum.

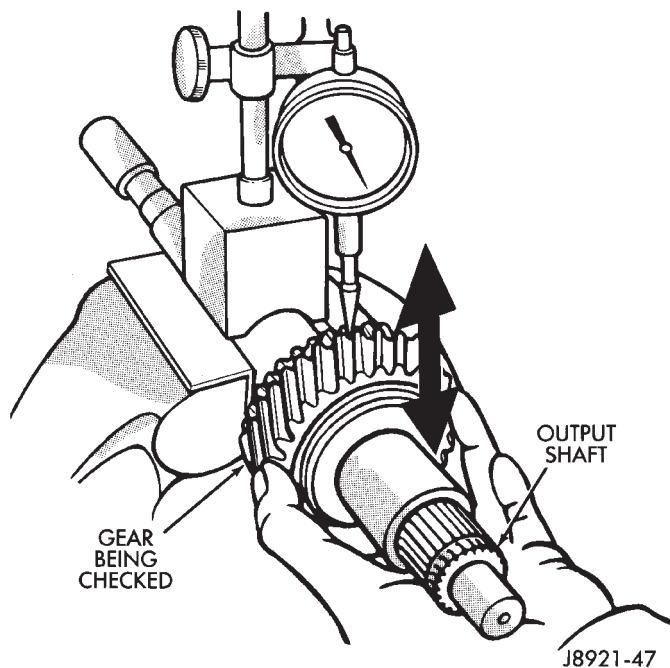


Fig. 126 Check Gear-To-Shaft Oil Clearance

Check synchronizer ring wear (Fig. 127). Insert each ring in matching gear. Measure clearance between each ring and gear with feeler gauge. Clearance should be 0.06 - 1.6 mm (0.024 - 0.063 in.).

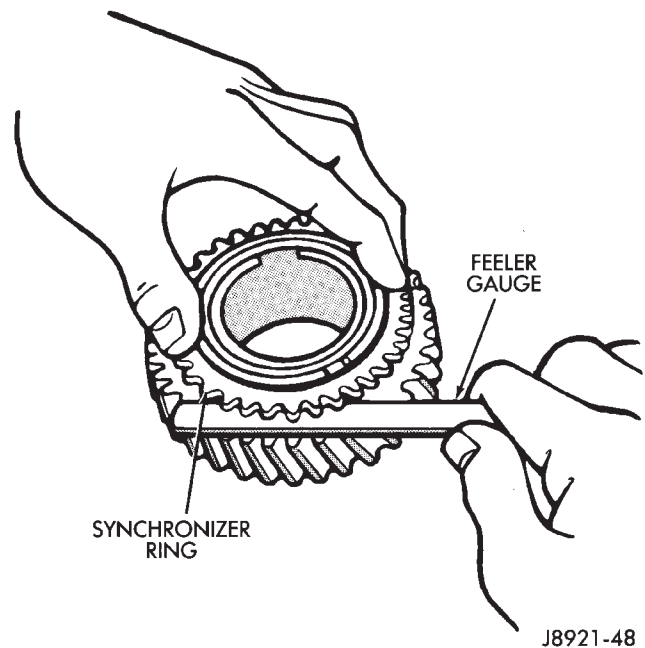


Fig. 127 Check Synchronizer Ring Wear

Check shift fork-to-synchronizer hub clearance with a feeler gauge (Fig. 128). Replace the fork if clearance exceeds 1.0 mm (0.039 in.).

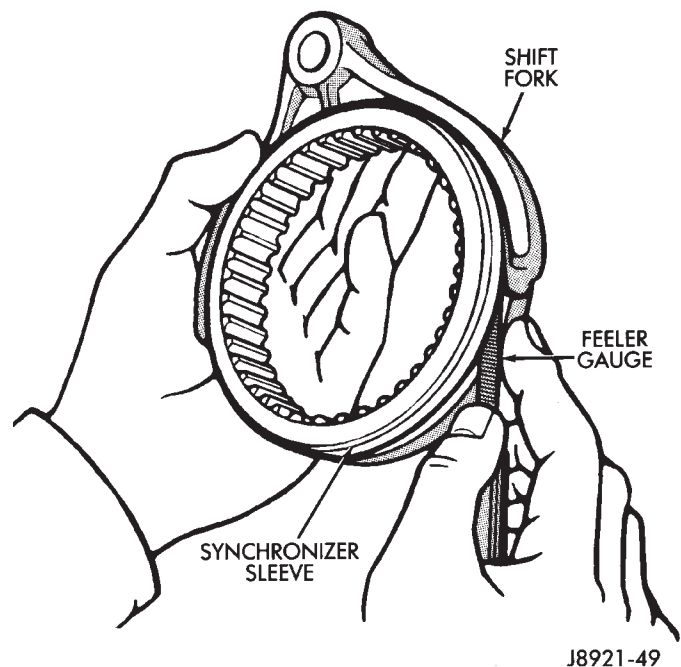


Fig. 128 Check Fork-To-Hub Clearance

Check the condition of the reverse idler gear bushing (Fig. 129). Replace the gear if the bushing is damaged or worn.

SPECIFICATIONS (Continued)

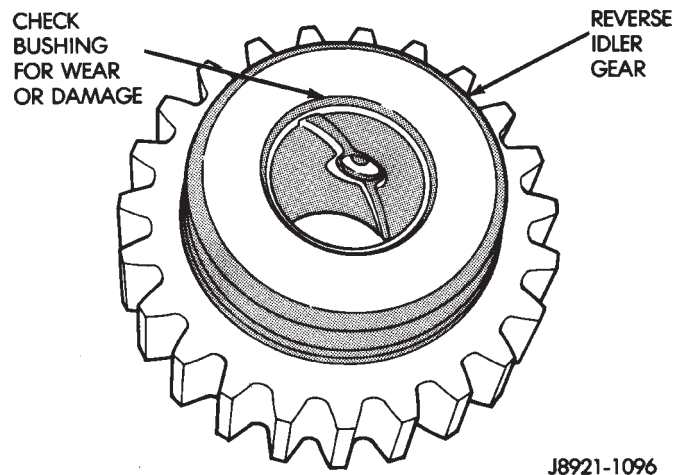
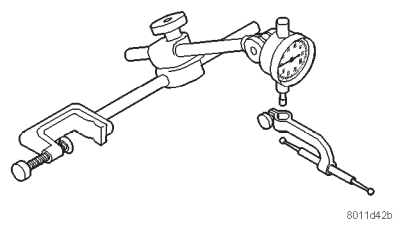


Fig. 129 Reverse Idler Gear Bushing

SPECIAL TOOLS

AX15

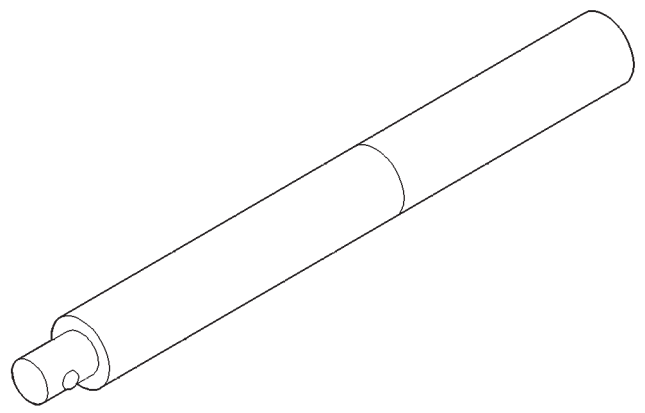


C-3339 Dial Indicator Set

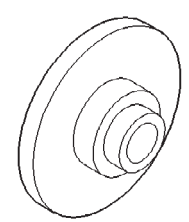
SPECIFICATIONS

TORQUE

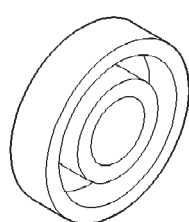
DESCRIPTION	TORQUE
Plugs, Access	19 N·m (14 ft.lbs.)
Bolts, Adapter Housing	34 N·m (25 ft.lbs.)
Switch, Back-up Light	44 N·m (32.5 ft.lbs.)
Plugs, Drain and Fill	44 N·m (32.5 ft.lbs.)
Bolts, Front Bearing Retainer	17 N·m (12 ft.lbs.)
Plugs, Interlock and Detent	19 N·m (14 ft.lbs.)
Screws, Propeller Shaft Clamp	16–23 N·m (140–200 in.lbs.)
Bolts, Rear Mount to Transmission	33–60 N·m (24–44 ft.lbs.)
Nut, Rear Mount Clevis	54–75 N·m (40–55 ft.lbs.)
Nuts, Rear Mount to Crossmember	33–49 N·m (24–36 ft.lbs.)
Pins, Restrictor	27.4 N·m (20 ft.lbs.)
Bolts, Reverse Shift Arm Bracket	18 N·m (13 ft.lbs.)
Screw, Shift Arm Set	38 N·m (28 ft.lbs.)
Screws, Shift Fork Set	20 N·m (15 ft.lbs.)
Nut, Shift Knob	20–34 N·m (15–25 ft.lbs.)
Screws, Shifter Floor Cover	2–3 N·m (17–30 in.lbs.)
Bolts, Shift Tower	18 N·m (13 ft.lbs.)
Nuts, Transfer Case Mounting	30–41 N·m (22–30 ft.lbs.)



C-4171 Handle, Universal Tool

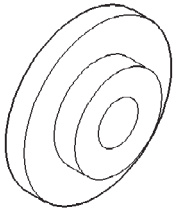


8209 Installer, Seal

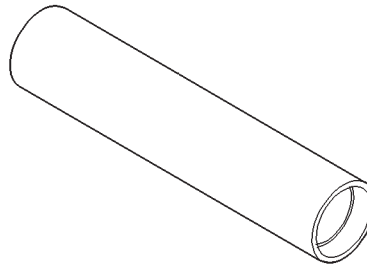


8212 Installer, Seal

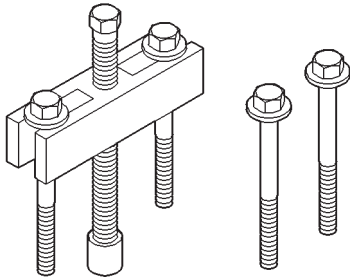
SPECIAL TOOLS (Continued)



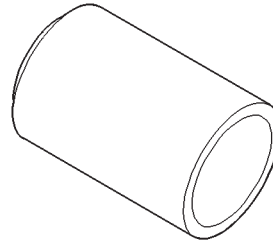
8208 Installer, Seal



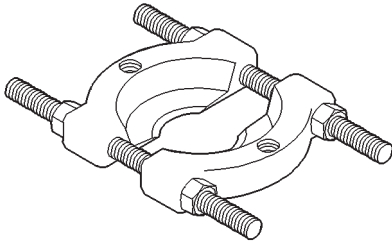
6052 Tube, Driver



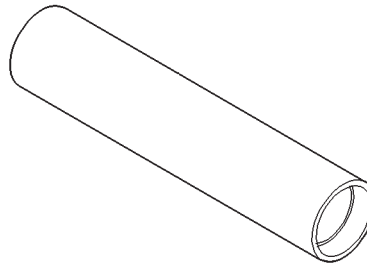
L-4407A Puller, Gear



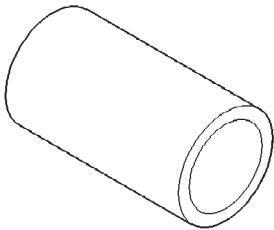
6761 Adapter, Installer



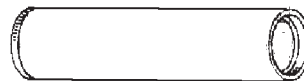
P-334 Splitter, Bearing



MD-998805 Tube, Driver



8109 Cup, Installer



L-4507 Tube, Driver

AUTOMATIC TRANSMISSION—30RH

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GENERAL INFORMATION

30RH AUTOMATIC TRANSMISSION

The 30RH automatic transmission is used with the 2.5L engine (Fig. 1). The 30RH is a three speed transmissions with a lock-up clutch in the torque converter. The torque converter clutch is controlled by the Powertrain Control Module (PCM). The torque converter clutch is hydraulically applied and is released when fluid is vented from the hydraulic circuit by the torque converter control (TCC) solenoid on the valve body. The torque converter clutch engages in third gear when the vehicle is cruising on a level plane after the vehicle has warmed up. The torque converter clutch will disengage when the vehicle begins to go uphill or the accelerator is applied. The torque converter clutch feature increases fuel economy and reduces the transmission fluid temperature. The 30RH transmission is cooled by an integral fluid cooler inside the radiator.

TRANSMISSION IDENTIFICATION

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

RECOMMENDED FLUID

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

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

EFFECTS OF INCORRECT FLUID LEVEL

A low fluid level allows the pump to take in air along with the fluid. Air in the fluid will cause fluid pressures to be low and develop slower than normal. If the transmission is overfilled, the gears churn the fluid into foam. This aerates the fluid and causing the same conditions occurring with a low level. In either case, air bubbles cause fluid overheating, oxidation and varnish buildup which interferes with valve, clutch and servo operation. Foaming also causes fluid expansion which can result in fluid overflow from the transmission vent or fill tube. Fluid overflow can easily be mistaken for a leak if inspection is not careful.

CAUSES OF BURNT FLUID

Burnt, discolored fluid is a result of overheating which has two primary causes.

(1) A result of restricted fluid flow through the main and/or auxiliary cooler. This condition is usually the result of a faulty or improperly installed

drainback valve, a damaged main cooler, or severe restrictions in the coolers and lines caused by debris or kinked lines.

(2) Heavy duty operation with a vehicle not properly equipped for this type of operation. Trailer towing or similar high load operation will overheat the transmission fluid if the vehicle is improperly equipped. Such vehicles should have an auxiliary transmission fluid cooler, a heavy duty cooling system, and the engine/axle ratio combination needed to handle heavy loads.

FLUID CONTAMINATION

Transmission fluid contamination is generally a result of:

- adding incorrect fluid
- failure to clean dipstick and fill tube when checking level
- engine coolant entering the fluid
- internal failure that generates debris
- overheat that generates sludge (fluid breakdown)
- failure to reverse flush cooler and lines after repair
- failure to replace contaminated converter after repair.

The use of non recommended fluids can result in transmission failure. The usual results are erratic shifts, slippage, abnormal wear and eventual failure due to fluid breakdown and sludge formation. Avoid this condition by using recommended fluids only.

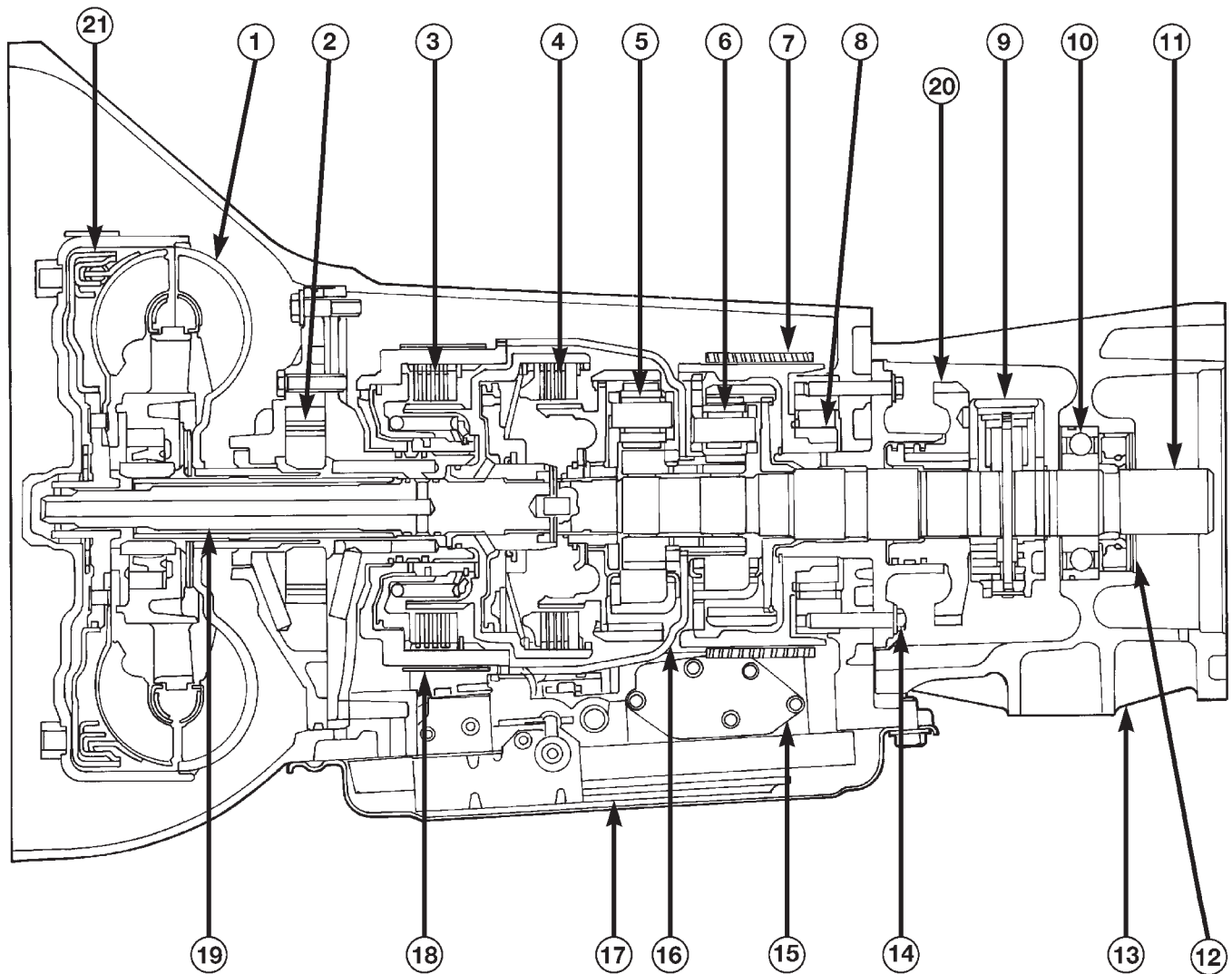
The dipstick cap and fill tube should be wiped clean before checking fluid level. Dirt, grease and other foreign material on the cap and tube could fall into the tube if not removed beforehand. Take the time to wipe the cap and tube clean before withdrawing the dipstick.

Engine coolant in the transmission fluid is generally caused by a cooler malfunction. The only remedy is to replace the radiator as the cooler in the radiator is not a serviceable part. If coolant has circulated through the transmission for some time, an overhaul may also be necessary; especially if shift problems had developed.

The transmission cooler and lines should be reverse flushed whenever a malfunction generates sludge and/or debris. The torque converter should also be replaced at the same time.

Failure to flush the cooler and lines will result in recontamination. Flushing applies to auxiliary coolers as well. The torque converter should also be replaced whenever a failure generates sludge and debris. This is necessary because normal converter flushing procedures will not remove all contaminants.

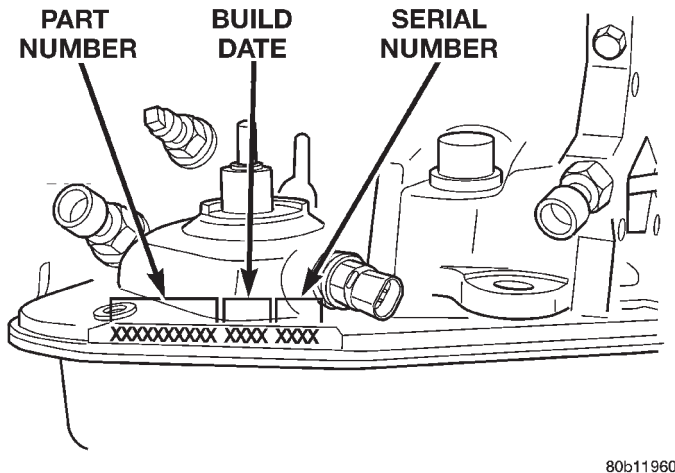
GENERAL INFORMATION (Continued)



- | | |
|-------------------------------|--------------------------|
| ① CONVERTER | ⑪ OUTPUT SHAFT |
| ② OIL PUMP | ⑫ SEAL |
| ③ FRONT CLUTCH | ⑬ ADAPTER HOUSING |
| ④ REAR CLUTCH | ⑭ PARK LOCK ROD |
| ⑤ FRONT PLANETARY GEAR SET | ⑮ VALVE BODY |
| ⑥ REAR PLANETARY GEAR SET | ⑯ SUN GEAR DRIVING SHELL |
| ⑦ LOW AND REVERSE (REAR) BAND | ⑰ OIL FILTER |
| ⑧ OVERRUNNING CLUTCH | ⑱ KICK DOWN (FRONT) BAND |
| ⑨ GOVERNOR | ⑲ INPUT SHAFT |
| ⑩ BEARING | ⑳ PARK GEAR |
| | ㉑ CONVERTER CLUTCH |

Fig. 1 30RH Automatic Transmission

GENERAL INFORMATION (Continued)



80b11960

Fig. 2 Transmission Part And Serial Number Location

TORQUE CONVERTER—ELECTRONIC CLUTCH

The torque converter 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. Torque multiplication is created when the stator directs the hydraulic flow from the turbine to rotate the impeller in the direction the engine crankshaft is turning. The turbine transfers power to the planetary gear sets in the transmission. The transfer of power into the impeller assists torque multiplication. At low vehicle speed, the overrunning clutch holds the stator (during torque multiplication) and allows the stator to free wheel at high vehicle speed. The converter clutch provides reduced engine speed and greater fuel economy when engaged. Clutch engagement also provides reduced transmission fluid temperatures. The converter clutch engages in third gear. The torque converter hub drives the transmission oil (fluid) pump.

The torque converter is a sealed, welded unit that is not repairable and is serviced as an assembly.

CAUTION: The torque converter must be replaced if a transmission failure resulted in large amounts of metal or fiber contamination in the fluid. If the fluid is contaminated, flush the fluid cooler and lines.

TRANSMISSION GEAR RATIOS

Forward gear ratios are:

- 2.74:1 (first gear)
- 1.54:1 (second gear)
- 1.00:1 (third gear)

GEARSHIFT MECHANISM

The shift mechanism is cable operated and provides six shift positions. The shift indicator is located on the console next to the gear shift. The shift positions are:

- Park (P)
- Reverse (R)
- Neutral (N)
- Drive (D)
- Manual Second (2)
- Manual Low (1)

Manual low (1) range provides first gear only. Over run braking is also provided in this range. Manual second (2) range provides first and second gear only. Drive range provides first, second, and third gear ranges.

DESCRIPTION AND OPERATION

HYDRAULIC CONTROL SYSTEM

The transmission hydraulic control system performs four basic functions.

- pressure supply
- pressure regulation
- flow control and lubrication
- clutch/band application

PRESSURE SUPPLY

The oil pump develops fluid pressure for clutch/band application and for lubrication. The pump is driven by the torque converter. The converter is driven by a driveplate attached to the engine crankshaft.

Pressure Regulation

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

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

Flow Control And Lubrication

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

The switch valve controls line pressure to the converter clutch. The valve also directs oil to the cooling and lubrication circuits. The switch valve regulates oil pressure to the torque converter by limiting maximum oil pressure to 130 psi.

DESCRIPTION AND OPERATION (Continued)

The 1-2 shift valve provide 1-2 and 2-1 shifts and the 2-3 shift valve provide 2-3 and 3-2 shifts.

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

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

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

The limit valve determines maximum speed at which a 3-2 part throttle kickdown can be made. Some transmissions do not have the limit valve and maximum speed for a 3-2 kickdown is at the detent position.

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

The fail safe valve restricts feed to the converter clutch if front clutch pressure drops. It permits clutch engagement only in direct (third) gear and provides fast clutch release during kickdown.

Clutch/Band Application

The front/rear clutch pistons and servo pistons are actuated by line pressure. When line pressure is removed, the pistons are released by spring tension.

On 2-3 upshifts, the front servo piston is released by spring tension and hydraulic pressure. The accumulator controls hydraulic pressure on the apply side of the front servo during 1-2 upshifts and at all throttle openings.

CONVERTER CLUTCH ENGAGEMENT

Converter clutch engagement in third gear is controlled by sensor inputs to the powertrain control module. Inputs that determine clutch engagement are: coolant temperature, vehicle speed and throttle position. The torque converter clutch is engaged by the clutch solenoid on the valve body. The clutch will engage at approximately 56 km/h (35 mph) with light throttle, after the shift to third gear.

CONVERTER DRAINBACK VALVE

The drainback valve is located in the transmission cooler outlet (pressure) line. The valve prevents fluid from draining from the converter into the cooler and lines when the vehicle is shut down for lengthy periods. Production valves have a hose nipple at one end, while the opposite end is threaded for a flare fitting.

All valves have an arrow (or similar mark) to indicate direction of flow through the valve.

BRAKE TRANSMISSION SHIFT INTERLOCK MECHANISM

The Brake Transmission Shifter/Ignition Interlock (BTSI), is a cable and solenoid operated system. It interconnects the automatic transmission floor mounted shifter to the steering column ignition switch (Fig. 3). The system locks the shifter into the PARK position. The Interlock system is engaged whenever the ignition switch is in the LOCK or ACCESSORY position. An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed at least one-half an inch. A magnetic holding device in line with the park/brake interlock cable is energized when the ignition is in the RUN position. When the key is in the RUN position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK or ACCESSORY position (Fig. 4) unless the shifter is fully locked into the PARK position.

DIAGNOSIS AND TESTING**AUTOMATIC TRANSMISSION DIAGNOSIS**

Automatic transmission problems can be a result of poor engine performance, incorrect fluid level, incorrect linkage or cable adjustment, band or hydraulic control pressure adjustments, hydraulic system malfunctions or electrical/mechanical component malfunctions. Begin diagnosis by checking the easily accessible items such as: fluid level and condition, linkage adjustments and electrical connections. A road test will determine if further diagnosis is necessary.

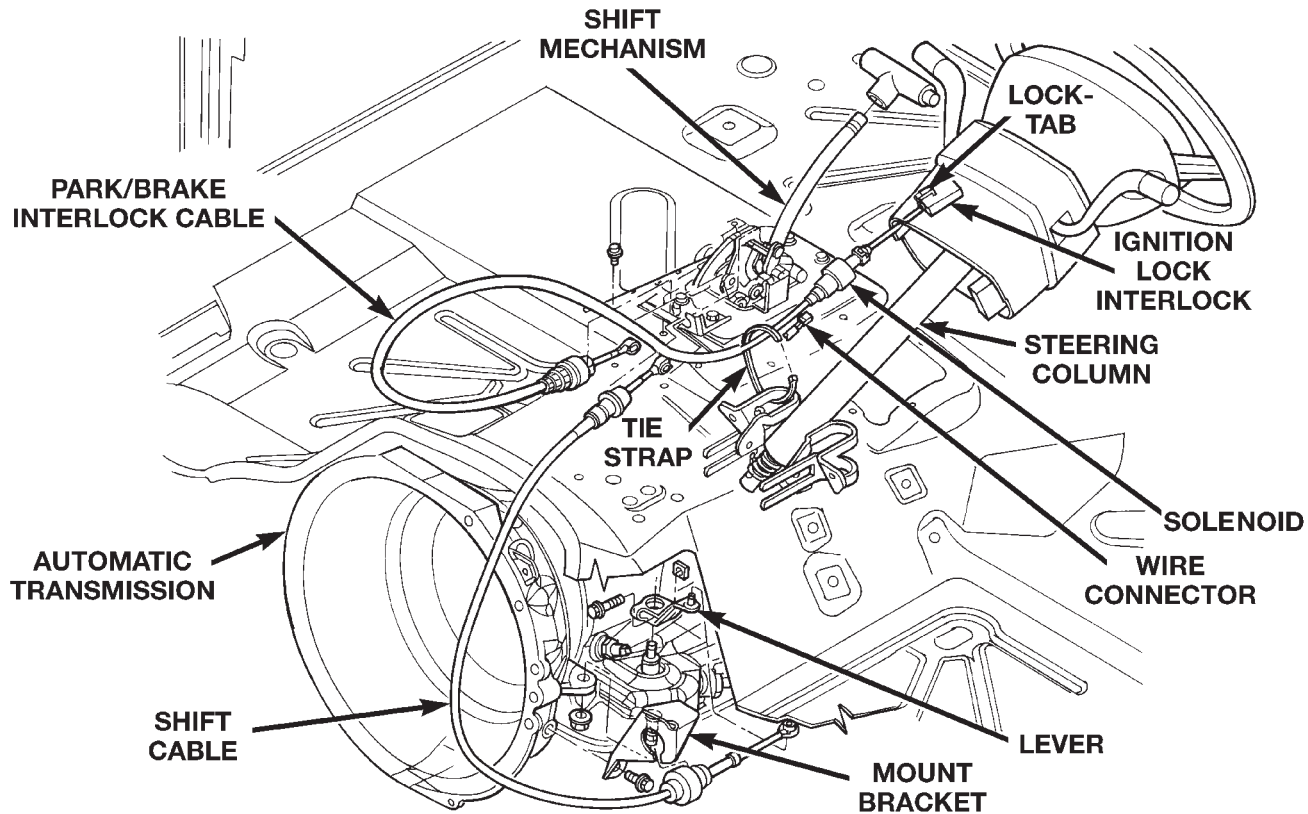
PRELIMINARY DIAGNOSIS

Two basic procedures are required. One procedure for vehicles that are drivable and an alternate procedure for disabled vehicles (will not back up or move forward).

VEHICLE IS DRIVEABLE

- (1) Check for transmission fault codes using DRB scan tool.
- (2) Check fluid level and condition.
- (3) Adjust throttle and gearshift linkage if complaint was based on delayed, erratic, or harsh shifts.
- (4) Road test and note how transmission upshifts, downshifts, and engages.
- (5) Perform stall test if complaint is based on sluggish acceleration. Or, if abnormal throttle opening is

DIAGNOSIS AND TESTING (Continued)



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Fig. 3 Ignition Interlock Cable Routing

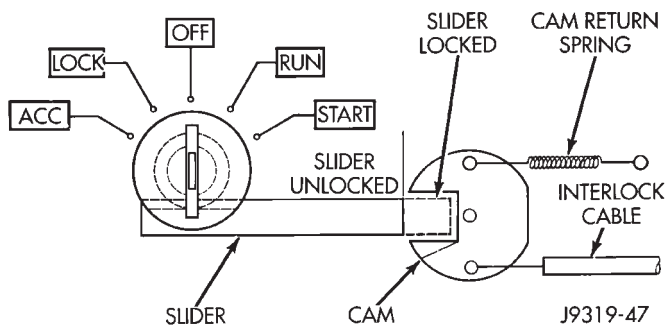


Fig. 4 Ignition Key Cylinder Actuation

needed to maintain normal speeds with a properly tuned engine.

(6) Perform hydraulic pressure test if shift problems were noted during road test.

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

VEHICLE IS DISABLED

- (1) Check fluid level and condition.
- (2) Check for broken or disconnected gearshift or throttle linkage.
- (3) Check for cracked, leaking cooler lines, or loose or missing pressure-port plugs.

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

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

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

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

PARK/NEUTRAL POSITION SWITCH

The center terminal of the park/neutral position switch is the starter-circuit terminal. It provides the ground for the starter solenoid circuit through the selector lever in PARK and NEUTRAL positions only. The outer terminals on the switch are for the backup lamp circuit.

SWITCH TEST

To test the switch, remove the wiring connector. Test for continuity between the center terminal and the transmission case. Continuity should exist only when the transmission is in PARK or NEUTRAL.

DIAGNOSIS AND TESTING (Continued)

Shift the transmission into REVERSE and test continuity at the switch outer terminals. Continuity should exist only when the transmission is in REVERSE. Continuity should not exist between the outer terminals and the case.

Check gearshift linkage adjustment before replacing a switch that tests faulty.

GEARSHIFT CABLE

(1) The floor shifter lever and gate positions should be in alignment with all transmission PARK, NEUTRAL, and gear detent positions.

(2) Engine starts must be possible with floor shift lever in PARK or NEUTRAL gate positions only. Engine starts must not be possible in any other gear position.

(3) With floor shift lever handle push-button not depressed and lever in:

(a) PARK position—Apply forward force on center of handle and remove pressure. Engine starts must be possible.

(b) PARK position—Apply rearward force on center of handle and remove pressure. Engine starts must be possible.

(c) NEUTRAL position—Normal position. Engine starts must be possible.

(d) NEUTRAL position—Engine running and brakes applied, apply forward force on center of shift handle. Transmission shall not be able to shift from neutral to reverse.

THROTTLE VALVE CABLE

Transmission throttle valve cable adjustment is extremely important to proper operation. This adjustment positions the throttle valve, which controls shift speed, quality, and part-throttle downshift sensitivity.

If cable setting is too loose, early shifts and slippage between shifts may occur. If the setting is too tight, shifts may be delayed and part throttle downshifts may be very sensitive. Refer to the Adjustments section for the proper adjustment procedure.

ROAD TESTING

Before road testing, be sure the fluid level and control cable adjustments have been checked and adjusted if necessary. Verify that diagnostic trouble codes have been resolved.

Observe engine performance during the road test. A poorly tuned engine will not allow accurate analysis of transmission operation.

Operate the transmission in all gear ranges. Check for shift variations and engine flare which indicates slippage. Note if shifts are harsh, spongy, delayed, early, or if part throttle downshifts are sensitive.

Slippage indicated by engine flare, usually means clutch, band or overrunning clutch problems. If the

condition is advanced, an overhaul will be necessary to restore normal operation.

A slipping clutch or band can often be determined by comparing which internal units are applied in the various gear ranges. The Clutch and Band Application chart provides a basis for analyzing road test results.

DRIVE ELEMENTS	Gearshift Lever Position								
	P	R	N	D			2		1
				1	2	3	1	2	
FRONT CLUTCH		•				•			
FRONT BAND (KICKDOWN)					•			•	
REAR CLUTCH				•	•	•	•	•	•
REAR BAND (LOW-REV.)		•							•
OVER-RUNNING CLUTCH				•			•		•

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Fig. 5 Clutch And Band Application

ANALYZING ROAD TEST

Refer to the Clutch and Band Application chart and note which elements are in use in the various gear ranges.

Verify that the rear clutch is applied in all forward ranges (D, 2, 1). The transmission overrunning clutch is applied in first gear (D, 2 and 1 ranges) only. The rear band is applied in 1 and R range only.

Verify that the overdrive clutch is applied only in fourth gear and the overdrive direct clutch and overrunning clutch are applied in all ranges except fourth gear. For example: If slippage occurs in first gear in D and 2 range but not in 1 range, the transmission overrunning clutch is faulty. Similarly, if slippage occurs in any two forward gears, the rear clutch is slipping.

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

If slippage occurs during the third gear and the direct clutch were to fail, the transmission would lose both reverse gear and overrun braking in 2 position (manual second gear). If the transmission slips in any other forward gears, the transmission rear clutch is probably slipping.

DIAGNOSIS AND TESTING (Continued)

This process of elimination can be used to identify a slipping unit and check operation. Proper use of the Clutch and Band Application Chart is the key.

Although road test analysis will help determine the slipping unit, the actual cause of a malfunction usually cannot be determined until hydraulic and air pressure tests are performed. Practically any condition can be caused by leaking hydraulic circuits or sticking valves.

Unless a malfunction is obvious, such as no drive in D range first gear, do not disassemble the transmission. Perform the hydraulic and air pressure tests to help determine the probable cause.

HYDRAULIC PRESSURE TEST

Hydraulic test pressures range from a low of one psi (6.895 kPa) governor pressure, to 300 psi (2068 kPa) at the rear servo pressure port in reverse.

An accurate tachometer and two test gauges are required for the pressure test. Test Gauge C-3292 has a 100 psi range and is used at the accumulator, governor, and front servo pressure ports. Test Gauge C-3293-SP has a 300 psi range and is used at the rear servo port and overdrive test ports where pressures are higher. In cases where two test gauges are required, the 300 psi gauge can be used at any of the other test ports.

Pressure Test Port Locations

Pressure test ports locations are provided at the accumulator, front servo, and rear servo, governor passage, and overdrive clutch pressure passage (Fig. 6), (Fig. 7) and (Fig. 8).

Line pressure is checked at the accumulator port on the right side of the case. The front servo pressure port is at the right side of the case just behind the filler tube opening.

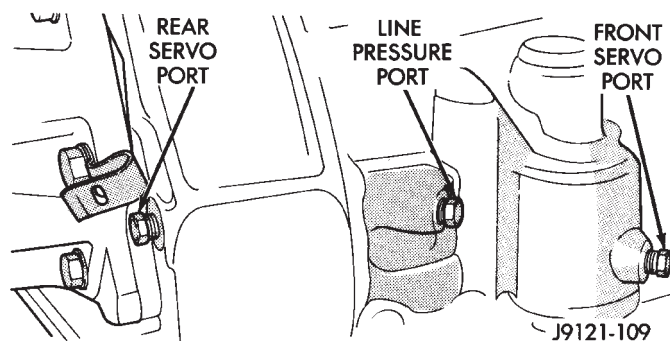


Fig. 6 Pressure Test Ports At Side Of Case

Connect a tachometer to the engine. Position the tachometer so it can be observed from under the vehicle. Raise the vehicle on a hoist that will allow the wheels to rotate freely.

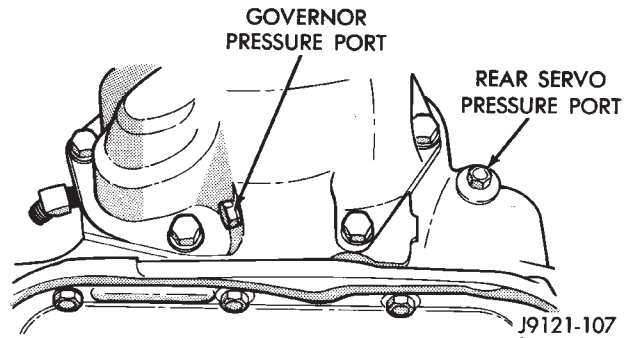


Fig. 7 Pressure Test Ports At Rear Of Case—2WD

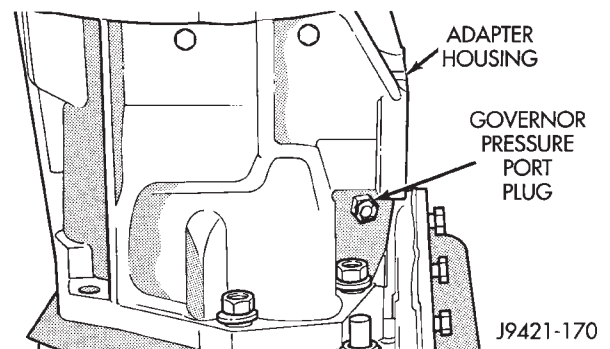


Fig. 8 Pressure Test Ports At Rear Of Case—4WD

PRESSURE TEST PROCEDURE

Test One - Transmission In 1 Range

This test checks pump output, pressure regulation, and condition of the rear clutch and servo circuit. Test Gauges C-3292 and C-3293-SP are required for this test. Gauge C-3292 has a 100 psi range. Gauge C-3293-SP has a 300 psi range.

- (1) Connect 100 psi Gauge C-3292 to accumulator port.
- (2) Connect 300 psi Gauge C-3293-SP to rear servo port (Fig. 6) and (Fig. 7).
- (3) Disconnect throttle and gearshift rods from manual and throttle levers.
- (4) Start and run engine at 1000 rpm.
- (5) Move shift lever (on manual lever shaft) all the way forward into 1 range.
- (6) Move transmission throttle lever from full forward to full rearward position and note pressures on both gauges.
- (7) Line pressure at accumulator port should be 54-60 psi (372-414 kPa) with throttle lever forward and gradually increase to 90-96 psi (621-662 kPa) as lever is moved rearward.
- (8) Rear servo pressure should be same as line pressure within 3 psi (20.68 kPa).

Test Two - Transmission In 2 Range

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

- (1) Connect test gauge to accumulator pressure port (Fig. 6) and (Fig. 7).

DIAGNOSIS AND TESTING (Continued)

- (2) Start and run engine at 1000 rpm.
- (3) Move shift lever on valve body manual lever shaft, one detent rearward from full forward position. This is 2 range.
- (4) Move transmission throttle lever from full forward to full rearward position and read pressure at both gauges.
- (5) Line pressure should be 54-60 psi (372-414 kPa) with throttle lever forward and gradually increase to 90-96 psi (621-662 kPa) as lever is moved rearward.

Test Three - Transmission In D Range

This test checks pressure regulation and condition of the clutch circuits. Use both pressure Test Gauges C-3292 and C-3293-SP for this test.

- (1) Connect test gauges to accumulator and front servo ports (Fig. 6) and (Fig. 7). Use either test gauge at the two ports.
- (2) Start and run engine at 1600 rpm for this test.
- (3) Move selector lever to D range. This is two detents rearward from full forward position.
- (4) Read pressures on both gauges as transmission throttle lever is moved from full forward to full rearward position.
- (5) Line pressure should be 54-60 psi (372-414 kPa) with throttle lever forward and gradually increase as lever is moved rearward.
- (6) Front servo is pressurized only in D range and should be same as line pressure within 3 psi (21 kPa) up to downshift point.

Test Four - Transmission In Reverse

This test checks pump output, pressure regulation and the front clutch and rear servo circuits. Use 300 psi Test Gauge C-3293-SP for this test.

- (1) Connect 300 psi gauge to rear servo port (Fig. 6) and (Fig. 7).
- (2) Start and run engine at 1600 rpm for test.
- (3) Move valve body selector lever four detents rearward from the full forward position. This is Reverse range.
- (4) Move throttle lever all way forward then all way rearward and note gauge readings.
- (5) Pressure should be 145 - 175 psi (1000-1207 kPa) with lever forward and increase to 230 - 280 psi (1586-1931 kPa) as lever is moved rearward.

Test Five - Governor Pressure

This test checks governor operation by measuring governor pressure response to changes in engine speed. It is usually not necessary to check governor operation unless shift speeds are incorrect or if the transmission will not downshift.

- (1) Connect 100 psi Test Gauge C-3292 to governor pressure port (Fig. 6) and (Fig. 7).
- (2) Move shift lever to D range.

- (3) Start and run engine at curb idle speed and note pressure. At idle and with vehicle stopped, pressure should be zero to 1.5 psi maximum. If pressure exceeds this figure, governor valve or weights are sticking open.

- (4) Slowly increase engine speed and observe speedometer and pressure test gauge. Governor pressure should increase in proportion to vehicle speed.

- (5) Pressure rise should be smooth and drop back to 0 to 1.5 psi when wheels stop rotating.

- (6) Compare results of pressure tests with analysis charts (Fig. 9).

TEST CONDITION	INDICATION
Line pressure OK during any one test	Pump and regulator valve OK
Line pressure OK in R but low in D, 2, 1	Leakage in rear clutch area (servo, clutch seals, governor support seal rings on park gear)
Pressure OK in 1, 2 but low in D3 and R	Leakage in front clutch area (servo, clutch seals, retainer bore, pump seal rings)
Pressure OK in 2 but low in R and 1	Leakage in rear servo
Front servo pressure in 2	Leakage in servo (broken servo ring or cracked servo piston)
Pressure low in all positions	Clogged filter, stuck pressure regulator valve, worn or defective pump
Governor pressure too high at idle speed	Governor valve sticking open
Governor pressure low at all mph figures	Governor valve sticking closed
Lubrication pressure low at all throttle positions	Clogged drainback valve, oil cooler or lines, seal rings leaking, output shaft plugged with debris, worn bushings in pump or clutch retainer

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Fig. 9 Pressure Test Analysis

CONVERTER STALL TEST

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

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

DIAGNOSIS AND TESTING (Continued)

STALL TEST PROCEDURE

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

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

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

STALL TEST ANALYSIS

Stall Speed Too High

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

Stall Speed Low

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

Stall Speed Normal But Acceleration Poor

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

Converter Noise During Test

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

and listen for noise coming from the converter housing.

AIR TESTING TRANSMISSION CLUTCH AND BAND OPERATION

Air-pressure testing can be used to check transmission front/rear clutch and band operation. The test can be conducted with the transmission either in the vehicle or on the work bench, as a final check, after overhaul.

Air-pressure testing requires that the oil pan and valve body be removed from the transmission. The servo and clutch apply passages are shown (Fig. 10).

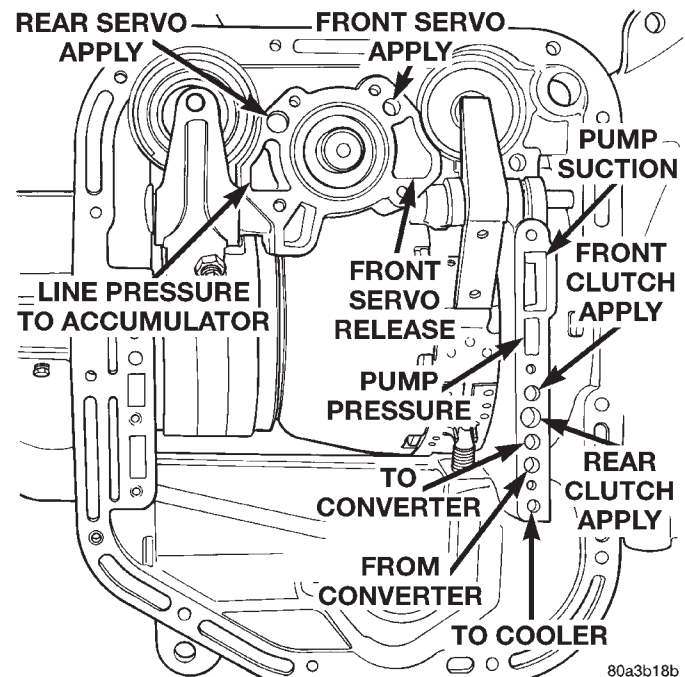


Fig. 10 Air Pressure Test Passages

Front Clutch Air Test

Place one or two fingers on the clutch housing and apply air pressure through front clutch apply passage. Piston movement can be felt and a soft thump heard as the clutch applies.

Rear Clutch Air Test

Place one or two fingers on the clutch housing and apply air pressure through rear clutch apply passage. Piston movement can be felt and a soft thump heard as the clutch applies.

Front Servo Apply Air Test

Apply air pressure to the front servo apply passage. The servo rod should extend and cause the band to tighten around the drum. Spring pressure should release the servo when air pressure is removed.

DIAGNOSIS AND TESTING (Continued)

Rear Servo Air Test

Apply air pressure to the rear servo apply passage. The servo rod should extend and cause the band to tighten around the drum. Spring pressure should release the servo when air pressure is removed.

CONVERTER HOUSING FLUID LEAK DIAGNOSIS

When diagnosing converter housing fluid leaks, two items must be established before repair.

- (1) Verify that a leak condition actually exists.
- (2) Determined the true source of the leak.

Some suspected converter housing fluid leaks may not be leaks at all. They may only be the result of residual fluid in the converter housing, or excess fluid spilled during factory fill or fill after repair. Converter housing leaks have several potential sources. Through careful observation, a leak source can be identified before removing the transmission for repair. Pump seal leaks tend to move along the drive hub and onto the rear of the converter. Pump O-ring or pump body leaks follow the same path as a seal leak (Fig. 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 seal or gasket leaks usually travel down the inside of the converter housing. Front band lever pin plug leaks are generally deposited on the housing and not on the converter.

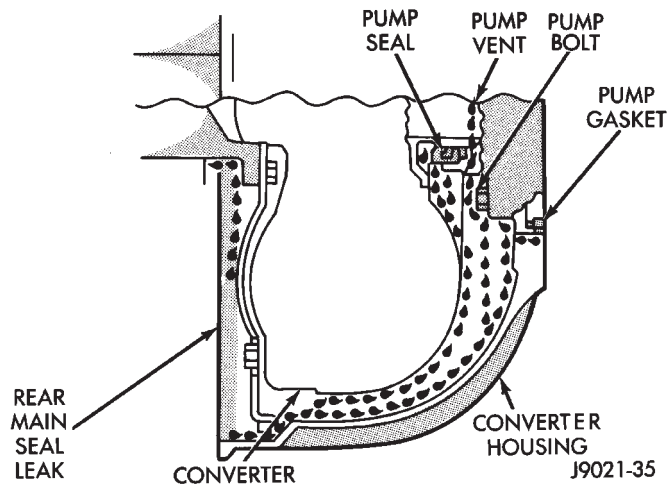


Fig. 11 Converter Housing Leak Paths

TORQUE CONVERTER LEAK POINTS

Possible sources of converter leaks are:

- (1) Leaks at the weld joint around the outside diameter weld (Fig. 12).
- (2) Leaks at the converter hub weld (Fig. 12).

CONVERTER HOUSING AREA LEAK CORRECTION

- (1) Remove converter.

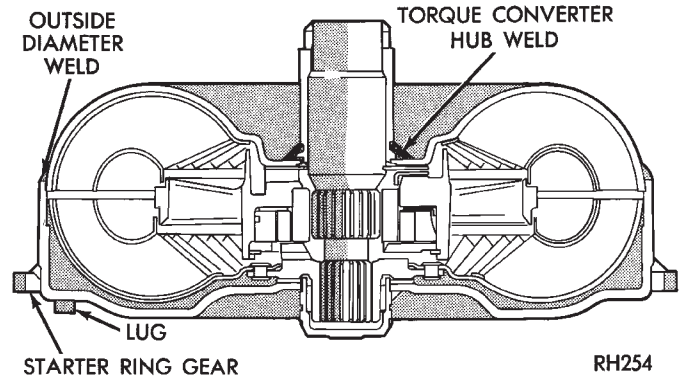


Fig. 12 Converter Leak Points—Typical

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

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

(4) Inspect pump bushing and converter hub. If bushing is scored, replace it. If converter hub is scored, either polish it with crocus cloth or replace converter.

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

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

(7) Adjust front band.

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

(9) Install transmission and converter housing dust shield.

(10) Lower vehicle.

DIAGNOSIS CHARTS

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

The hydraulic flow charts, in the Schematics and Diagrams section of this group, outline fluid flow and hydraulic circuitry. Circuit operation is provided for neutral, third, fourth and reverse gear ranges. Normal working pressures are also supplied for each of the gear ranges.

DIAGNOSIS AND TESTING (Continued)

DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSES	CORRECTION
HARSH ENGAGEMENT FROM NEUTRAL TO DRIVE OR REVERSE	1. Fluid Level Low.	1. Add Fluid.
	2. Throttle Linkage Misadjusted.	2. Adjust linkage - setting may be too long.
	3. Mount and Driveline Bolts Loose.	3. Check engine mount, transmission mount, propeller shaft, rear spring to body bolts, rear control arms, crossmember and axle bolt torque. Tighten loose bolts and replace missing bolts.
	4. U-Joint Worn/Broken.	4. Remove propeller shaft and replace U-Joint.
	5. Axle Backlash Incorrect.	5. Check per Service Manual. Correct as needed.
	6. Hydraulic Pressure Incorrect.	6. Check pressure. Remove, overhaul or adjust valve body as needed.
	7. Band Misadjusted.	7. Adjust rear band.
	8. Valve Body Check Balls Missing.	8. Inspect valve body for proper check ball installation.
	9. Axle Pinion Flange Loose.	9. Replace nut and check pinion threads before installing new nut. Replace pinion gear if threads are damaged.
	10. Clutch, band or planetary component Damaged.	10. Remove, disassemble and repair transmission as necessary.
	11. Converter Clutch (if equipped) Faulty.	11. Replace converter and flush cooler and line before installing new converter.
DELAYED ENGAGEMENT FROM NEUTRAL TO DRIVE OR REVERSE	1. Fluid Level Low.	1. Correct level and check for leaks.
	2. Filter Clogged.	2. Change filter.
	3. Gearshift Linkage Misadjusted.	3. Adjust linkage and repair linkage if worn or damaged.
	4. Rear Band Misadjusted.	4. Adjust band.
	5. Valve Body Filter Plugged.	5. Replace fluid and filter. If oil pan and old fluid were full of clutch disc material and/or metal particles, overhaul will be necessary.
	6. Oil Pump Gears Worn/Damaged.	6. Remove transmission and replace oil pump.
	7. Hydraulic Pressure Incorrect.	7. Perform pressure test, remove transmission and repair as needed.
	8. Reaction Shaft Seal Rings Worn/Broken.	8. Remove transmission, remove oil pump and replace seal rings.
	9. Rear Clutch/Input Shaft, Rear Clutch Seal Rings Damaged.	9. Remove and disassemble transmission and repair as necessary.
	10. Governor Valve Stuck.	10. Remove and inspect governor components. Replace worn or damaged parts.
	11. Regulator Valve Stuck.	11. Clean.
	12. Cooler Plugged.	12. Flush transmission cooler and inspect convertor drainback valve.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO DRIVE RANGE (REVERSE OK)	1. Fluid Level Low.	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. Perform lube flow test. Flush oil. Replace cooler as necessary.
	5. Oil Pump Damaged.	5. Perform pressure test to confirm low pressure. Replace pump body assembly if necessary.
	6. Valve Body Malfunctioned.	6. Check press and inspect valve body. Replace valve body (as assembly) if any valve or bore is damaged. Clean and reassemble correctly if all parts are in good condition.
	7. Transmission Internal Component Damaged.	7. Remove and disassemble transmission. Repair or replace failed components as needed. Remove and disassemble transmission. Repair or replace failed components as needed.
	8. Park Sprag not Releasing.	8. Remove, disassemble, repair.
	9. Torque Converter Damage.	9. Check Stall Speed, Worn/Damaged/Stuck. Inspect and replace as required.

DIAGNOSIS AND TESTING (Continued)

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

DIAGNOSIS AND TESTING (Continued)

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

DIAGNOSIS AND TESTING (Continued)

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

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
GROWLING, GRATING OR SCRAPING NOISES	1. Drive Plate Broken.	1. Replace.
	2. Torque Converter Bolts Hitting Dust Shield.	2. Dust shield bent. Replace or repair.
	3. Planetary Gear Set Broken/ Seized.	3. Check for debris in oil pan and repair as required.
	4. Overrunning Clutch Worn/Broken.	4. Inspect and check for debris in oil pan. Repair as required.
	5. Oil Pump Components Scored/ Binding.	5. Remove, inspect and repair as required.
	6. Output Shaft Bearing or Bushing Damaged.	6. Remove, inspect and repair as required.
	7. Clutch Operation Faulty.	7. Perform air pressure check and repair as required.
	8. Front and Rear Bands Misadjusted.	8. Adjust bands.
DRAGS OR LOCKS UP	1. Fluid Level Low.	1. Check and adjust level.
	2. Clutch Dragging/Failed.	2. Air pressure check clutch operation and repair as required.
	3. Front or Rear Band Misadjusted.	3. Adjust bands.
	4. Case Leaks Internally.	4. Check for leakage between passages in case.
	5. Servo Band or Linkage Malfunction.	5. Air pressure check servo operation and repair as required.
	6. Overrunning Clutch Worn.	6. Remove and inspect clutch. Repair as required.
	7. Planetary Gears Broken.	7. Remove, inspect and repair as required (look for debris in oil pan).
	8. Converter Clutch Dragging.	8. Check for plugged cooler. Perform flow check. Inspect pump for excessive side clearance. Replace pump as required.
WHINE/NOISE RELATED TO ENGINE SPEED	1. Fluid Level Low.	1. Add fluid and check for leaks.
	2. Shift Cable Incorrect Routing.	2. Check shift cable for correct routing. Should not touch engine or bell housing.
TORQUE CONVERTER LOCKS UP IN SECOND AND/OR THIRD GEAR	Lockup Solenoid, Relay or Wiring Shorted/Open.	Test solenoid, relay and wiring for continuity, shorts or grounds. Replace solenoid and relay if faulty. Repair wiring and connectors as necessary.
HARSH 1-2 OR 2-3 SHIFTS	Lockup Solenoid Malfunction.	Remove valve body and replace solenoid assembly.

DIAGNOSIS AND TESTING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO START IN PARK OR NEUTRAL	1. Gearshift Linkage/Cable Misadjusted.	1. Adjust linkage/cable.
	2. Neutral Switch Wire Open/Cut.	2. Check continuity with test lamp. Repair as required.
	3. Neutral Switch Faulty.	3. Refer to service section for test and replacement procedure.
	4. Neutral Switch Connect Faulty.	4. Connectors spread open. Repair.
	5. Valve Body Manual Lever Assembly Bent/Worn/Broken.	5. Inspect lever assembly and replace if damaged.
NO REVERSE (OR SLIPS IN REVERSE)	1. Direct Clutch Pack (front clutch) Worn.	1. Disassemble unit and rebuild clutch pack.
	2. Rear Band Misadjusted.	2. Adjust band.
	3. Front Clutch Malfunctioned/Burnt.	3. Air pressure test clutch operation. Remove and rebuild if necessary.
OIL LEAKS (ITEMS LISTED REPRESENT POSSIBLE LEAK POINTS AND SHOULD ALL BE CHECKED.)	1. Speedometer Adapter Leaks.	1. Replace both adapter seals.
	2. Fluid Lines and Fittings Loose/Leaks/Damaged.	2. Tighten fittings. If leaks persist, replace fittings and lines if necessary.
	3. Filler Tube (where tube enters case) Leaks/Damaged.	3. Replace O-ring seal. Inspect tube for cracks in tube.
	4. Pressure Port Plug Loose Loose/Damaged.	4. Tighten to correct torque. Replace plug or reseal if leak persists.
	5. Pan Gasket Leaks.	5. Tighten pan screws to 150 inch pounds. If leaks persist, replace gasket. Do no over tighten screws.
	6. Valve Body Manual Lever Shaft Seal Leaks/Worn.	6. Replace shaft seal.
	7. Rear Bearing Access Plate Leaks.	7. Replace gasket. Tighten screws.
	8. Gasket Damaged or Bolts are Loose.	8. Replace bolts or gasket or tighten both.
	9. Adapter/Extension Gasket Damaged Leaks/Damaged.	9. Replace gasket.
	10. Neutral Switch Leaks/Damaged.	10. Replace switch and gasket.
	11. Converter Housing Area Leaks.	11. Check for leaks at seal caused by worn seal or burr on converter hub (cutting seal), worn bushing, missing oil return, oil in front pump housing or hole plugged. Check for leaks past O-ring seal on pump or past pump-to-case bolts; pump housing porous, oil coming out vent due to overfill or leak past front band shaft access plug.
	12. Pump Seal Leaks/Worn/Damaged.	12. Replace seal.
	13. Torque Converter Weld Leak/Cracked Hub.	13. Replace converter.
	14. Case Porosity Leaks.	14. Replace case.

SERVICE PROCEDURES

FLUID LEVEL CHECK

Transmission fluid level should be checked monthly under normal operation. If the vehicle is used for trailer towing or similar heavy load hauling, check fluid level and condition weekly. Fluid level is checked with the engine running at curb idle speed, the transmission in NEUTRAL and the transmission fluid at normal operating temperature.

FLUID LEVEL CHECK PROCEDURE

- (1) Transmission fluid must be at normal operating temperature for accurate fluid level check. Drive vehicle if necessary to bring fluid temperature up to normal hot operating temperature of 82°C (180°F).
- (2) Position vehicle on level surface.
- (3) Start and run engine at curb idle speed.
- (4) Apply parking brakes.
- (5) Shift transmission momentarily into all gear ranges. Then shift transmission back to Neutral.
- (6) Clean top of filler tube and dipstick to keep dirt from entering tube.
- (7) Remove dipstick (Fig. 13) and check fluid level as follows:
 - (a) Correct acceptable level is in crosshatch area.
 - (b) Correct maximum level is to MAX arrow mark.
 - (c) Incorrect level is at or below MIN line.
 - (d) If fluid is low, add only enough Mopar® ATF Plus 3 to restore correct level. Do not overfill.

CAUTION: Do not overfill the transmission. Overfilling may cause leakage out the pump vent which can be mistaken for a pump seal leak. Overfilling will also cause fluid aeration and foaming as the excess fluid is picked up and churned by the gear train. This will significantly reduce fluid life.

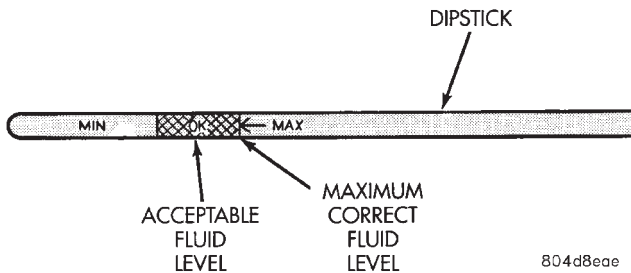


Fig. 13 Dipstick Fluid Level Marks—Typical

FLUID AND FILTER REPLACEMENT

Refer to the Maintenance Schedules in Group 0, Lubrication and Maintenance, for proper service intervals. The service fluid fill after a filter change is approximately 3.8 liters (4.0 quarts).

REMOVAL

- (1) Hoist and support vehicle on safety stands.
- (2) Place a large diameter shallow drain pan beneath the transmission pan.
- (3) Remove bolts holding front and sides of pan to transmission (Fig. 14).
- (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 screws holding filter to valve body (Fig. 15).
- (10) Separate filter from valve body and pour fluid in filter into drain pan.
- (11) Dispose used trans fluid and filter properly.

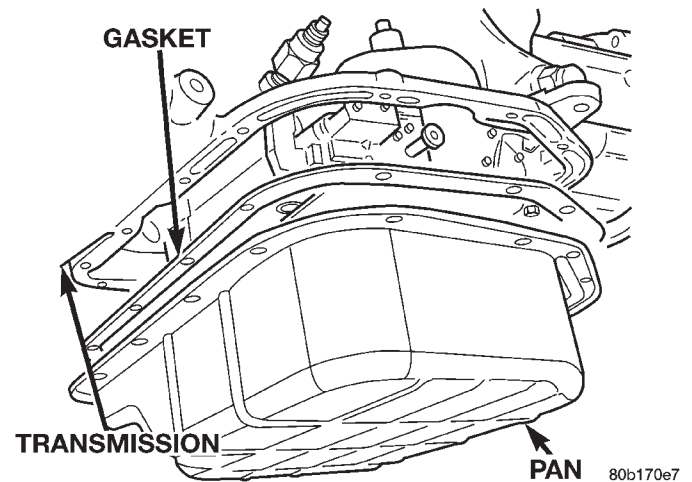


Fig. 14 Transmission Pan

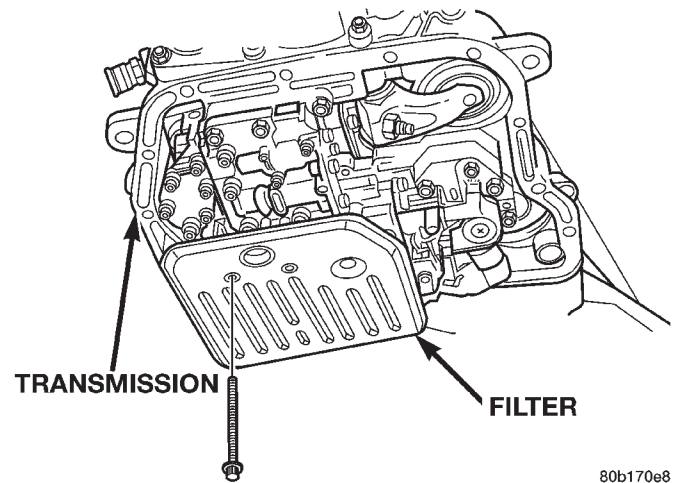


Fig. 15 Transmission Filter

SERVICE PROCEDURES (Continued)

INSPECTION

Inspect bottom of pan and magnet for excessive amounts of metal or fiber contamination. A light coating of clutch or band material on the bottom of the pan does not indicate a problem unless accompanied by slipping condition or shift lag. If fluid and pan are contaminated with excessive amounts or debris, refer to the diagnosis section of this group.

Check the adjustment of the front and rear bands, adjust if necessary. Refer to Adjustment section of this group for proper procedure.

CLEANING

(1) Using a suitable solvent, clean pan and magnet.

(2) Using a suitable gasket scraper, clean gasket material from gasket surface of transmission case and the gasket flange around the pan.

INSTALLATION

(1) Place replacement filter in position on valve body.

(2) Install screws to hold filter to valve body (Fig. 15). Tighten screws to 4 N·m (35 in. lbs.) torque.

(3) Place new gasket in position on pan. and install pan on transmission.

(4) Place pan in position on transmission.

(5) Install screws to hold pan to transmission (Fig. 14). Tighten bolts to 17 N·m (150 in. lbs.) torque.

(6) Lower vehicle and fill transmission with Mopar® ATF Plus 3, type 7176 fluid.

TRANSMISSION FILL PROCEDURE

To avoid overfilling transmission after a fluid change or overhaul, perform the following procedure:

(1) Remove dipstick and insert clean funnel in transmission fill tube.

(2) Add following initial quantity of Mopar® ATF Plus 3 to transmission:

(a) If only fluid and filter were changed, add **3 pints (1-1/2 quarts)** of ATF Plus 3 to transmission.

(b) If transmission was completely overhauled, torque converter was replaced or drained, and cooler was flushed, add **12 pints (6 quarts)** of ATF Plus 3 to transmission.

(3) Apply parking brakes.

(4) Start and run engine at normal curb idle speed.

(5) Apply service brakes, shift transmission through all gear ranges then back to NEUTRAL, set parking brake, and leave engine running at curb idle speed.

(6) Remove funnel, insert dipstick and check fluid level. If level is low, **add fluid to bring level to MIN mark on dipstick.** Check to see if the oil level

is equal on both sides of the dipstick. If one side is noticeably higher than the other, the dipstick has picked up some oil from the dipstick tube. Allow the oil to drain down the dipstick tube and re-check.

(7) Drive vehicle until transmission fluid is at normal operating temperature.

(8) With the engine running at curb idle speed, the gear selector in NEUTRAL, and the parking brake applied, check the transmission fluid level.

CAUTION: Do not overfill transmission, fluid foaming and shifting problems can result.

(9) Add fluid to bring level up to MAX arrow mark.

When fluid level is correct, shut engine off, release park brake, remove funnel, and install dipstick in fill tube.

CONVERTER DRAINBACK CHECK VALVE SERVICE

The converter drainback check valve is located in the cooler outlet (pressure) line near the radiator tank. The valve prevents fluid drainback when the vehicle is parked for lengthy periods. The valve check ball is spring loaded and has an opening pressure of approximately 2 psi.

The valve is serviced as an assembly; it is not repairable. Do not clean the valve if restricted, or contaminated by sludge, or debris. If the valve fails, or if a transmission malfunction occurs that generates significant amounts of sludge and/or clutch particles and metal shavings, the valve must be replaced.

The valve must be removed whenever the cooler and lines are reverse flushed. The valve can be flow tested when necessary. The procedure is exactly the same as for flow testing a cooler.

If the valve is restricted, installed backwards, or in the wrong line, it will cause an overheating condition and possible transmission failure.

CAUTION: The drainback valve is a one-way flow device. It must be properly oriented in terms of flow direction for the cooler to function properly. The valve must be installed in the pressure line. Otherwise flow will be blocked and would cause an overheating condition and eventual transmission failure.

OIL PUMP VOLUME CHECK

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

SERVICE PROCEDURES (Continued)

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

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

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

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

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

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

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

FLUSHING COOLERS AND TUBES

When a transmission failure has contaminated the fluid, the oil cooler(s) must be flushed. The torque converter must also be replaced. This will insure that metal particles or sludged oil are not later transferred back into the reconditioned (or replaced) transmission.

The only recommended procedure for flushing coolers and lines is to use Tool 6906 Cooler Flusher.

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

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

KEEP THE AREA WELL VENTILATED.

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

COOLER FLUSH USING TOOL 6906

(1) Remove cover plate filler plug on Tool 6906. Fill reservoir 1/2 to 3/4 full of fresh flushing solution. Flushing solvents are petroleum based solutions generally used to clean automatic transmission compo-

nents. **DO NOT** use solvents containing acids, water, gasoline, or any other corrosive liquids.

(2) Reinstall filler plug on Tool 6906.

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

(4) Disconnect the cooler lines at the transmission.

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

NOTE: The converter drainback valve must be removed and an appropriate replacement hose installed to bridge the space between the transmission cooler line and the cooler fitting. Failure to remove the drainback valve will prevent reverse flushing the system.

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

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

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

(8) Turn pump OFF.

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

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

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

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

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

ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum 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.

SERVICE PROCEDURES (Continued)

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

REMOVAL AND INSTALLATION

TRANSMISSION

CAUTION: The transmission and torque converter must be removed as an assembly to avoid component damage. The converter drive plate, pump bushing, or oil seal can be damaged if the converter is left attached to the driveplate during removal.

REMOVAL

- (1) Disconnect battery negative cable.
- (2) Disconnect and lower or remove necessary exhaust components.
- (3) Remove engine-to-transmission bending braces.
- (4) Disconnect fluid cooler lines at transmission.
- (5) Remove starter motor.
- (6) Disconnect and remove crankshaft position sensor. Retain sensor attaching bolts.

CAUTION: The crankshaft position sensor can be damaged during transmission removal (or installation) if the sensor is still bolted to the engine block. To avoid damage, remove the sensor before removing the transmission.

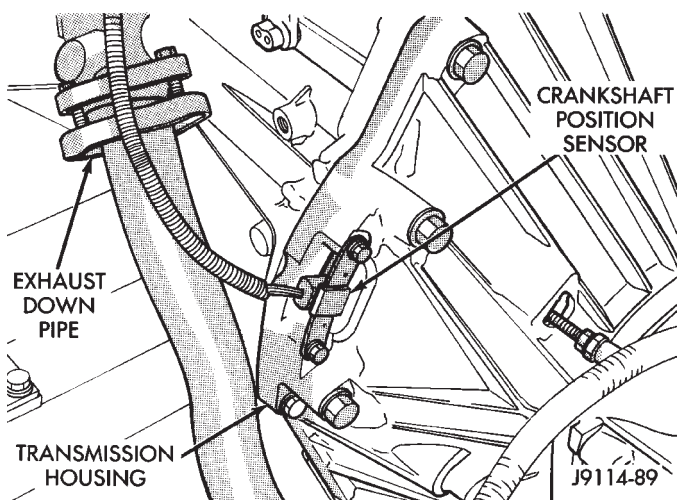


Fig. 16 Crankshaft Position Sensor—2.5L Engine

- (7) Remove torque converter access cover.
- (8) If transmission is being removed for overhaul, remove transmission oil pan, drain fluid and reinstall pan.
- (9) Remove skid plate for access, if necessary.
- (10) Remove fill tube bracket bolts and pull tube out of transmission. Retain fill tube seal. On 4 x 4

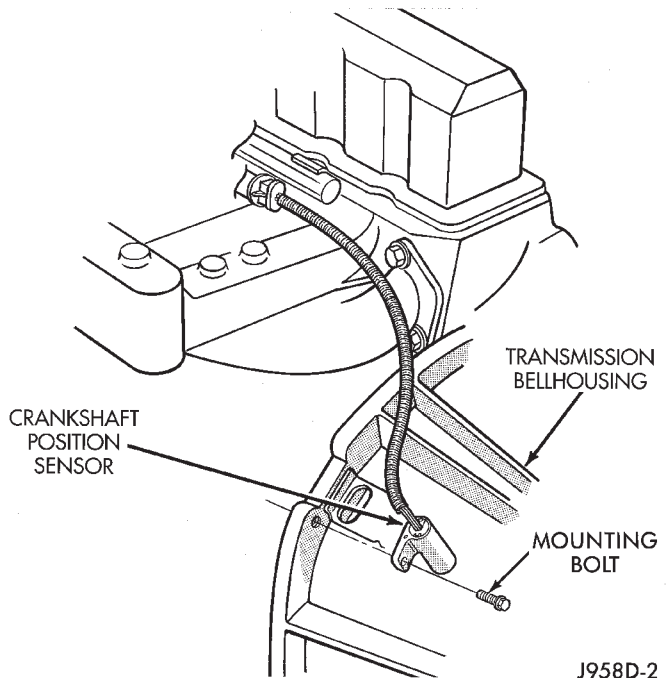


Fig. 17 Crankshaft Position Sensor—4.0L Engine

models, it will also be necessary to remove bolt attaching transfer case vent tube to converter housing.

(11) Mark torque converter and drive plate for assembly alignment. Note that bolt holes in crankshaft flange, drive plate and torque converter all have one offset hole.

(12) 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.

(13) Mark propeller shaft and axle yokes for assembly alignment. Then disconnect and remove propeller shaft. On 4 x 4 models, remove both propeller shafts.

(14) Disconnect wires from park/neutral position switch and vehicle speed sensor.

(15) Disconnect gearshift cable from transmission manual valve lever.

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

(17) On 4 x 4 models, disconnect shift rod from transfer case shift lever or remove shift lever from transfer case.

(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. Raise transmission slightly, slide exhaust hanger arm from bracket and remove rear support.

REMOVAL AND INSTALLATION (Continued)

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

(22) Disconnect transfer case vent hose. Then disconnect vacuum switch harness.

(23) On 4 x 4 models, remove transfer case.

(24) Remove all converter housing bolts.

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

(26) Hold torque converter in place during transmission removal.

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

(28) To remove torque converter, carefully slide torque converter out of the transmission.

INSTALLATION

(1) Check torque converter hub and hub drive notches for sharp edges burrs, scratches, or nicks. Polish the hub and notches with 320/400 grit paper and crocus cloth if necessary. The hub must be smooth to avoid damaging pump seal at installation.

(2) Lubricate converter drive hub and oil pump seal lip with transmission fluid.

(3) Lubricate converter pilot hub 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. 18). 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.

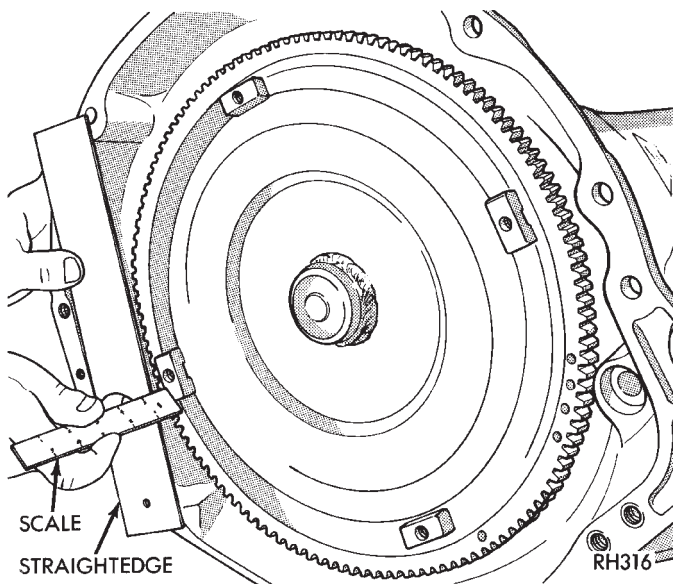


Fig. 18 Typical Method Of Checking Converter Seating

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

(9) Check condition of converter driveplate. Replace the plate if cracked, distorted or damaged. **Also be sure transmission dowel pins are seated in engine block and protrude far enough to hold transmission in alignment.**

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

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

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

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

(14) Install and tighten bolts that attach transmission converter housing to engine block (Fig. 19).

CAUTION: Be sure the converter housing is fully seated on the engine block dowels before tightening any bolts.

(15) Install torque converter attaching bolts. Tighten bolts to following torque.

- 54 N·m (40 ft. lbs.) with 9.5 in. 3-lug converter
- 74 N·m (55 ft. lbs.) with 9.5 in. 4-lug converter
- 74 N·m (55 ft. lbs.) with 10.0 in. 4-lug converter
- 31 N·m (270 in. lbs.) with 10.75 in. 4-lug converter

verter

(16) Install crankshaft position sensor.

(17) Install transmission fill tube and seal. Install new fill tube seal in transmission before installation.

(18) Connect transmission cooler lines to transmission.

(19) Install transfer case onto transmission.

(20) Install rear crossmember and attach transmission rear support to crossmember.

(21) Remove engine support fixture.

(22) Remove transmission jack.

(23) Connect vehicle speed sensor wires.

(24) Connect wires to park/neutral position switch.

(25) Install crankshaft position sensor.

(26) Install converter housing access cover.

(27) Install exhaust pipes and support brackets, if removed.

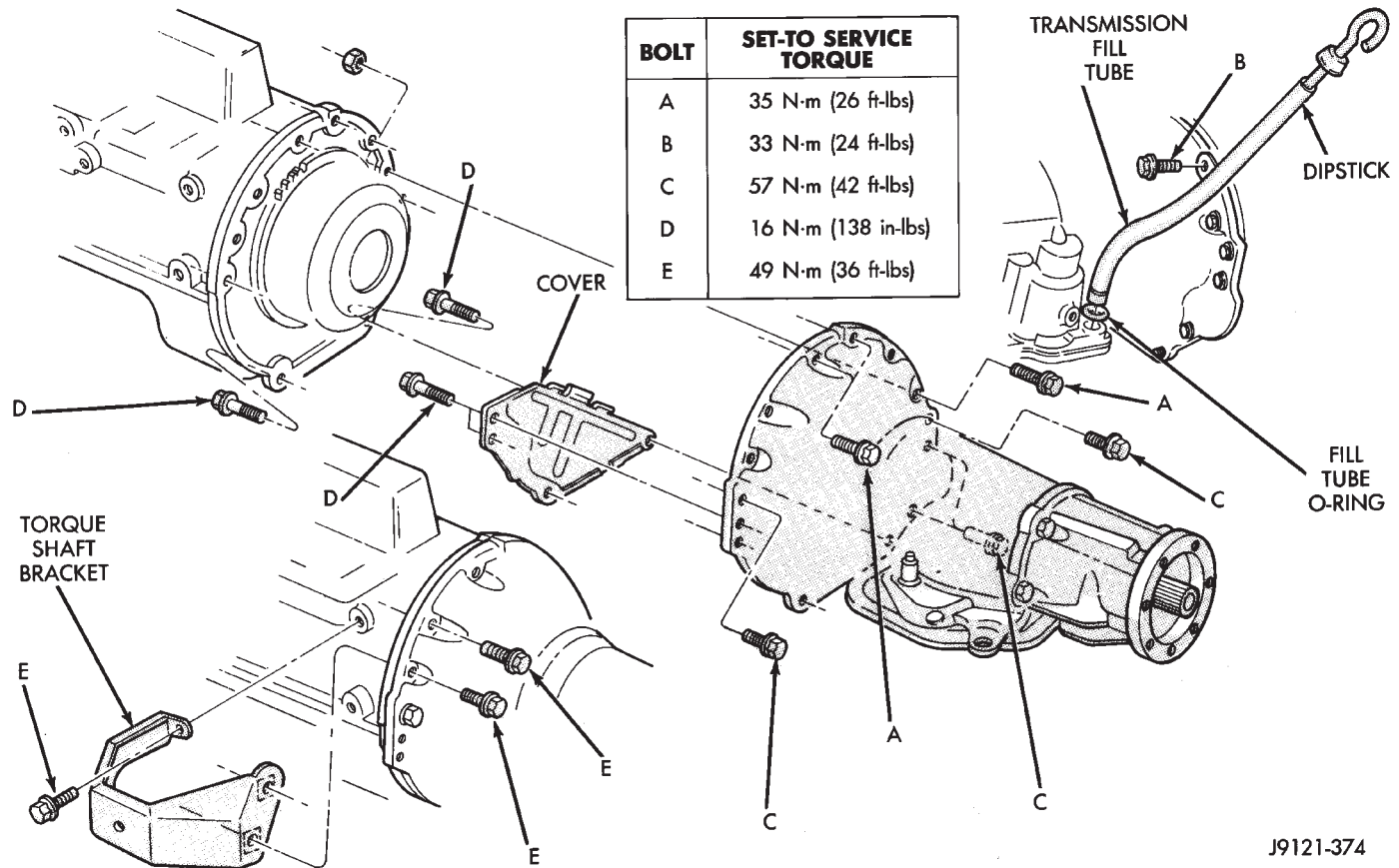
(28) Install starter motor and cooler line bracket.

(29) Install new plastic retainer grommet on any shift linkage rod or lever that was disconnected. Grommets should not be reused. Use pry tool to remove rod from grommet and cut away old grommet. Use pliers to snap new grommet into lever and to snap rod into grommet at assembly.

(30) Connect gearshift and linkage and throttle cable.

(31) Connect transfer case shift linkage.

REMOVAL AND INSTALLATION (Continued)



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Fig. 19 Transmission Attachment

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

(33) Align and connect propeller shaft(s).

(34) Install skid plate, rear cushion and bracket, if removed.

(35) Fill transfer case to bottom edge of fill plug hole.

(36) Lower vehicle and fill transmission to correct level with Mopar® ATF Plus 3, type 7176 fluid.

TORQUE CONVERTER**REMOVAL**

(1) Remove transmission and torque converter from vehicle.

(2) Place a suitable drain pan under the converter housing end of the transmission.

CAUTION: Verify that transmission is secure on the lifting device or work surface, the center of gravity of the transmission will shift when the torque converter is removed creating an unstable condition.

The torque converter is a heavy unit. Use caution when separating the torque converter from the transmission.

(3) Pull the torque converter forward until the center hub clears the oil pump seal.

(4) Separate the torque converter from the transmission.

INSTALLATION

Check converter hub and drive notches for sharp edges, burrs, scratches, or nicks. Polish the hub and notches with 320/400 grit paper or crocus cloth if necessary. The hub must be smooth to avoid damaging the pump seal at installation.

(1) Lubricate converter hub and oil pump seal lip with transmission fluid.

(2) Place torque converter in position on transmission.

CAUTION: Do not damage oil pump seal or bushing while inserting torque converter into the front of the transmission.

(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.

REMOVAL AND INSTALLATION (Continued)

(6) Check converter seating with a scale and straightedge (Fig. 20). 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.

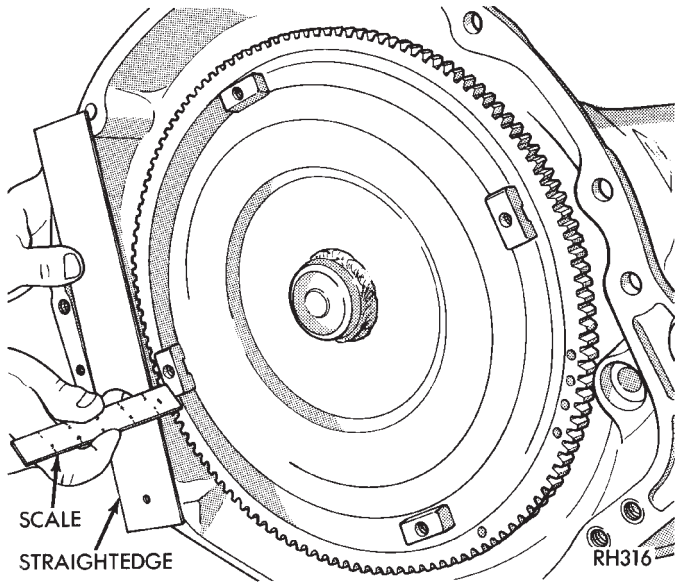


Fig. 20 Checking Torque Converter Seating

YOKE SEAL REPLACEMENT

REMOVAL

- (1) Raise vehicle.
- (2) Mark propeller shaft and axle yoke for alignment reference.
- (3) Disconnect and remove propeller shaft.
- (4) Remove old seal with Seal Remover C-3985-B (Fig. 21) from extension housing.

INSTALLATION

- (1) Place seal in position on extension housing.
- (2) Drive seal into extension housing with Seal Installer C-3995-A or C-3972 (Fig. 22).
- (3) Carefully guide propeller shaft slip yoke into housing and onto output shaft splines. Align marks made at removal and connect propeller shaft to rear axle pinion yoke.

EXTENSION HOUSING BUSHING

REMOVAL

- (1) Remove housing yoke seal.
- (2) Insert Remover 6957 into extension housing. Tighten tool to bushing and remove bushing (Fig. 23).

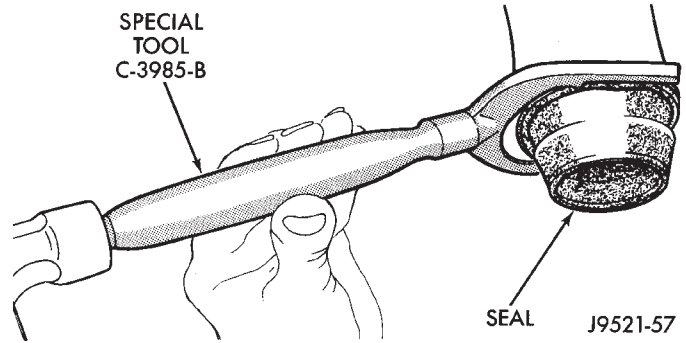
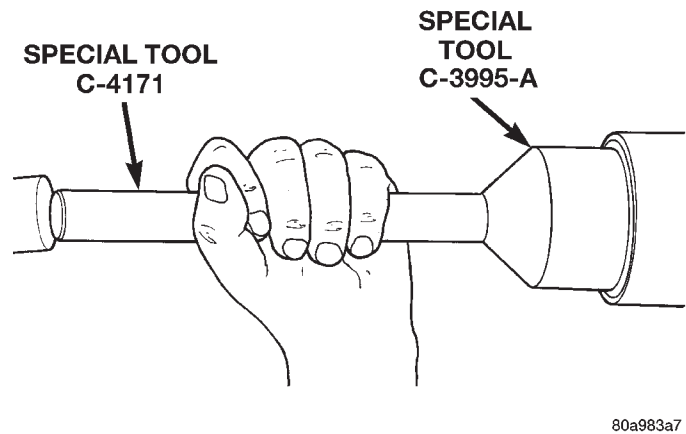
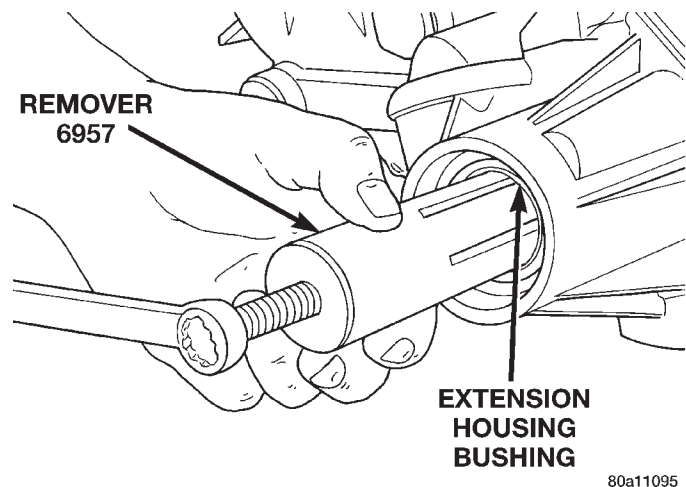


Fig. 21 Removing Extension Housing Yoke Seal



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Fig. 22 Installing Extension Housing Yoke Seal



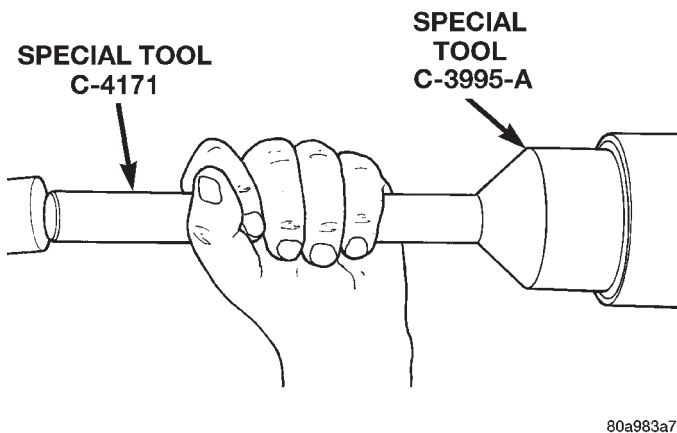
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Fig. 23 Bushing Removal—Typical

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. 24).

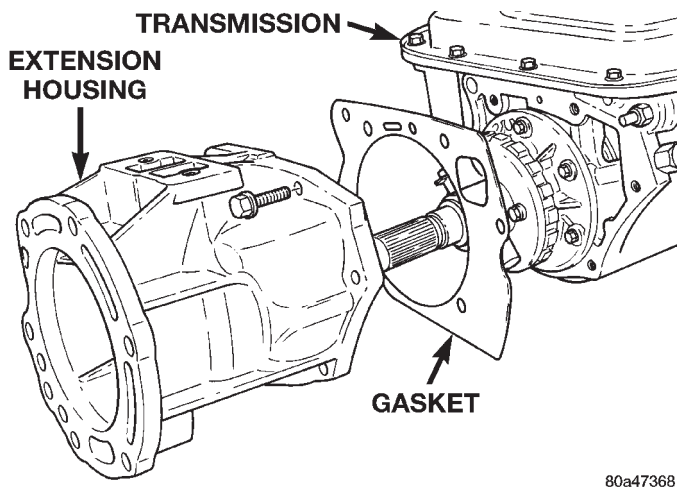
REMOVAL AND INSTALLATION (Continued)



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Fig. 24 Extension Housing Seal Installation**EXTENSION HOUSING****REMOVAL**

- (1) Hoist and support vehicle on safety stands.
- (2) Support transmission with a suitable lifting device.
- (3) Remove transmission skid plate. Refer to Group 13, Frame and Bumpers, for proper procedure.
- (4) Remove propeller shafts. Refer to Group 3, Differential and Driveline, for proper procedure.
- (5) Remove transfer case.
- (6) Remove bolts holding extension housing to transmission case (Fig. 25).
- (7) Separate extension housing from transmission.
- (8) Slide extension housing rearward and off output shaft (Fig. 25).



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Fig. 25 Extension Housing**INSTALLATION**

Clear gasket material from sealing surfaces on extension housing and rear of transmission. Replace output shaft bearing, if necessary.

(1) Install new rear seal in extension housing. Use Tool Handle C-4171 and Seal Installer C-3860-A to install seal.

(2) Place extension housing gasket in position on rear of transmission.

(3) Slide extension housing forward and over output shaft (Fig. 25).

(4) Guide park shaft into park sprag and push extension housing forward until rod passes through opening behind sprag. It may be necessary to use a wire to hold sprag to the side for rod to pass through.

(5) Install bolts to hold extension housing to rear of transmission.

(6) Install transfer case.

(7) Install propeller shafts.

(8) Install rear transmission mount and skid plate.

(9) Lower vehicle and verify transmission fluid level. Add fluid as necessary.

SPEEDOMETER ADAPTER

Rear axle gear ratio and tire size determine speedometer pinion requirements.

REMOVAL

- (1) Raise vehicle.
- (2) Disconnect wires from vehicle speed sensor.
- (3) Remove adapter clamp and screw (Fig. 26).
- (4) Remove speed sensor and speedometer adapter as assembly.
- (5) Remove speed sensor retaining screw and remove sensor from adapter.
- (6) Remove speedometer pinion from adapter.
- (7) Inspect sensor and adapter O-rings (Fig. 26). Remove and discard O-rings if worn or damaged.
- (8) Inspect terminal pins in speed sensor. Clean pins with Mopar® electrical spray cleaner if dirty or oxidized. Replace sensor if faulty, or pins are loose, severely corroded, or damaged.

INSTALLATION

(1) Thoroughly clean adapter flange and adapter mounting surface in housing. Surfaces must be clean for proper adapter alignment and speedometer operation.

(2) Install new O-rings on speed sensor and speedometer adapter if necessary (Fig. 26).

(3) Lubricate sensor and adapter O-rings with transmission fluid.

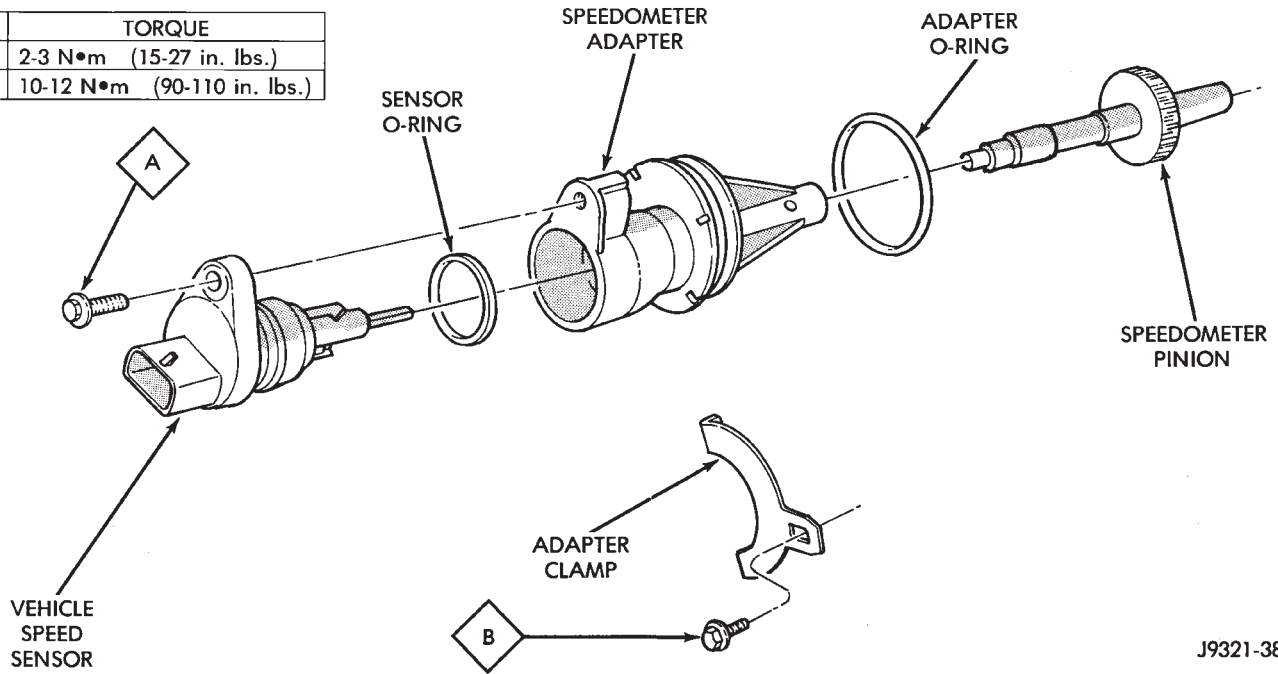
(4) Install vehicle speed sensor in speedometer adapter. Tighten sensor attaching screw to 2-3 N·m (15-27 in. lbs.) torque.

(5) Install speedometer pinion in adapter.

(6) Count number of teeth on speedometer pinion. Do this before installing assembly in housing. Then lubricate pinion teeth with transmission fluid.

REMOVAL AND INSTALLATION (Continued)

ITEM	TORQUE
A	2-3 N•m (15-27 in. lbs.)
B	10-12 N•m (90-110 in. lbs.)



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Fig. 26 Speedometer Pinion Adapter Components

(7) Note index numbers on adapter body (Fig. 27). These numbers will correspond to number of teeth on pinion.

(8) Install speedometer assembly in housing.

(9) Rotate adapter until required range numbers are at 6 o'clock position. Be sure range index numbers correspond to number of teeth on pinion gear.

(10) Install speedometer adapter clamp and retaining screw. Tighten clamp screw to 10-12 N•m (90-110 in. lbs.) torque.

(11) Connect wires to vehicle speed sensor.

(12) Lower vehicle and top off transmission fluid level, if necessary.

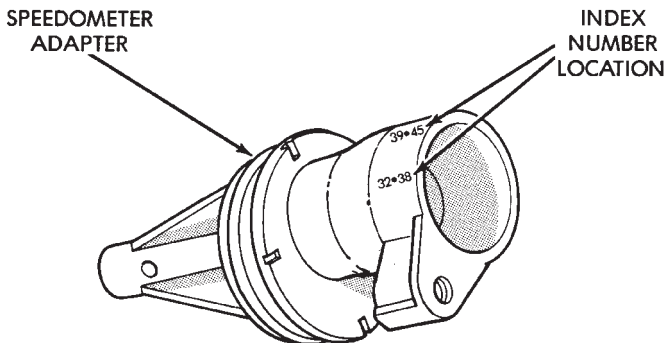
PARK/NEUTRAL POSITION SWITCH

REMOVAL

- (1) Raise vehicle and position drain pan under switch.
- (2) Disconnect switch wires.
- (3) Remove switch from case.

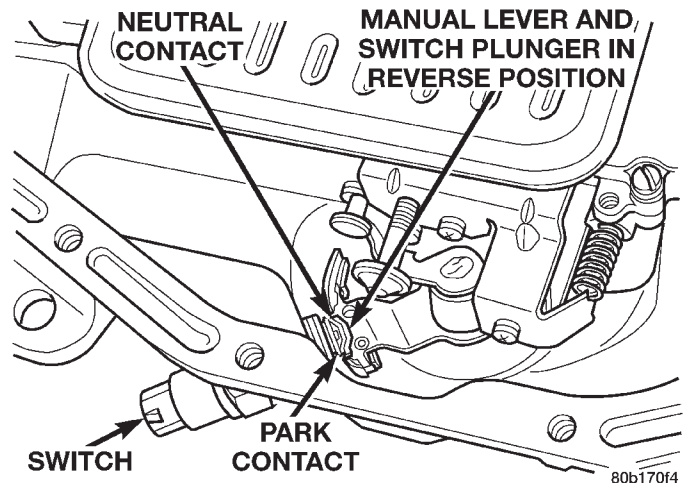
INSTALLATION

(1) Move shift lever to Park and Neutral positions. Verify that switch operating lever fingers are centered in switch opening in case (Fig. 28).



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Fig. 27 Index Numbers On Speedometer Pinion Adapter



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Fig. 28 Park/Neutral Position Switch

(2) Install new seal on switch and install switch in case. Tighten switch to 34 N•m (25 ft. lbs.) torque.

REMOVAL AND INSTALLATION (Continued)

- (3) Test continuity of new switch with 12V test lamp.
- (4) Connect switch wires and lower vehicle.
- (5) Top off transmission fluid level.

GEARSHIFT CABLE

REMOVAL

- (1) Shift transmission into Park.
- (2) Remove shift lever bezel and necessary console parts for access to shift lever assembly.
- (3) Disconnect cable at shift lever and feed cable through dash panel opening to underside of vehicle.
- (4) Raise vehicle.
- (5) Disengage cable eyelet at transmission shift lever and pull cable adjuster out of mounting bracket. Then remove old cable from vehicle.

INSTALLATION

- (1) Route cable through hole in dash panel. Fully seat cable grommet into dash panel.
- (2) Place the auto transmission manual shift control lever in "Park" detent (rear-most) position and rotate prop shaft to ensure transmission is in park.
- (3) Connect shift cable to shifter mechanism by snapping cable retaining ears into shifter bracket and press cable end fitting onto lever ball stud.
- (4) Place the floor shifter lever in park position. Ensure that the pawl is seated within the confines of the adjustment gauge clip.
- (5) Snap the cable into the transmission bracket so the retaining ears are engaged and connect cable end fitting onto the manual control lever ball stud.
- (6) Lock shift cable into position by pushing upward on the adjusting lock button.
- (7) Remove and discard the shift cable adjustment gauge clip from the park gate of the shifter.

BRAKE TRANSMISSION SHIFT INTERLOCK

REMOVAL

- (1) Remove lower steering column cover. Refer to Group 8E, Instrument Panel and Gauges, for proper procedure.
- (2) Remove lower steering column shroud. Refer to Group 19, Steering, for proper procedure.
- (3) Remove tie strap near the solenoid retaining the brake transmission interlock cable to the steering column.
- (4) Disengage wire connector from solenoid.
- (5) With the ignition removed or in the unlocked position, disengage lock tab holding cable end to steering column (Fig. 29).
- (6) Pull cable end from steering column.
- (7) Remove the floor console and related trim. Refer to Group 23, Body, for proper procedure.

- (8) Disconnect the cable eyelet from the bellcrank (Fig. 30).

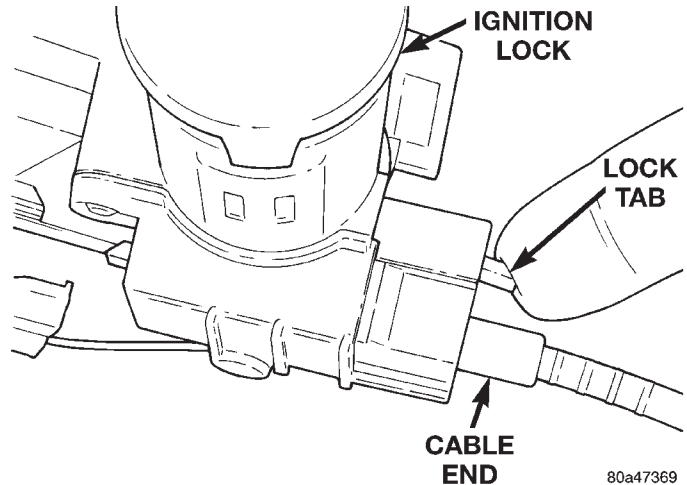


Fig. 29 Brake/Park Interlock Cable

- (9) Disconnect and remove the cable from the shift bracket.

INSTALLATION

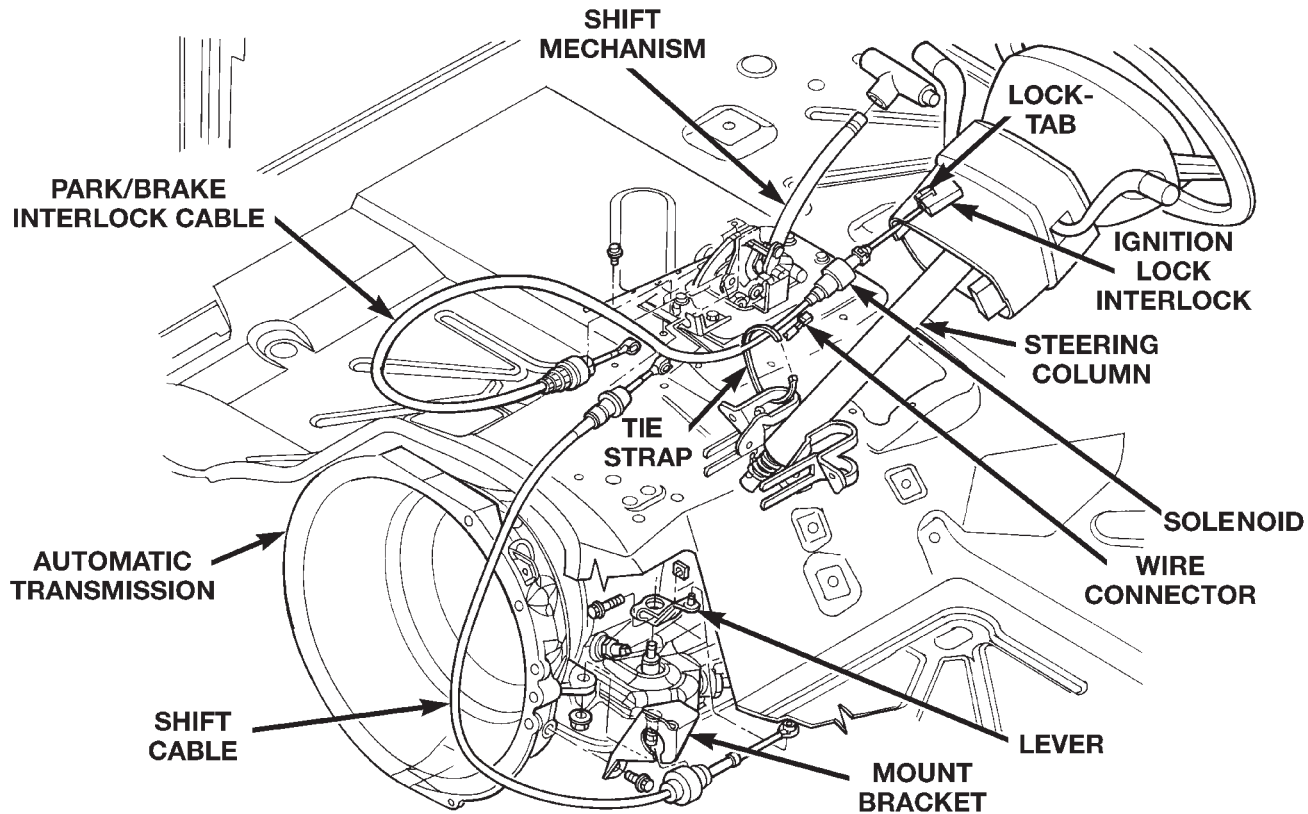
- (1) Route replacement cable behind instrument panel and under floor console area to shift mechanism (Fig. 30).
- (2) Insert cable end into opening in steering column hub under ignition lock. Push cable inward until lock tab engages.
- (3) Connect the cable end eyelet onto shifter bellcrank pin.
- (4) Place gear selector in PARK.
- (5) Push the spring-loaded cable adjuster forward and snap cable into bracket.
- (6) Adjust the brake transmission shifter interlock cable. Refer to the Adjustment portion of this section for proper procedures.
- (7) Verify that the cable adjuster lock clamp is pushed downward to the locked position.
- (8) Test the park-lock cable operation.
- (9) Install the floor console and related trim.
- (10) Install tie strap to hold cable to base of steering column.
- (11) Install lower steering column shroud and ignition lock.
- (12) Install lower steering column cover.

VALVE BODY

REMOVAL

- (1) Raise vehicle.
- (2) Remove oil pan and drain fluid.
- (3) Loosen clamp bolts and remove throttle and manual valve levers from manual lever shaft.
- (4) Remove park/neutral position switch.
- (5) Remove filter from valve body.

REMOVAL AND INSTALLATION (Continued)

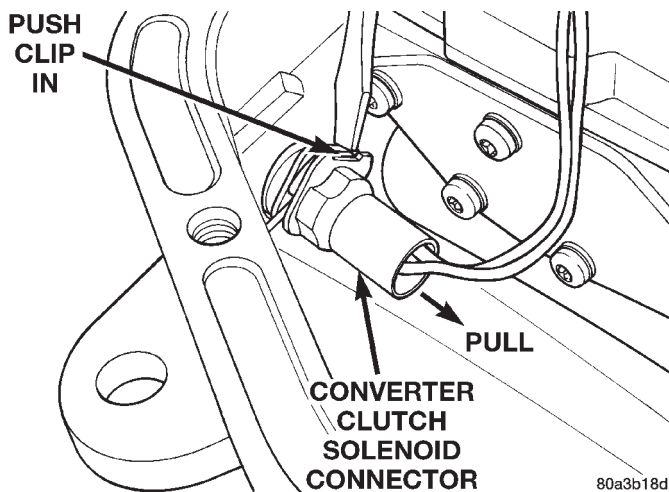


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Fig. 30 Cable and Shifter

(6) Depress retaining clip and pull solenoid wire from case connector (Fig. 31).

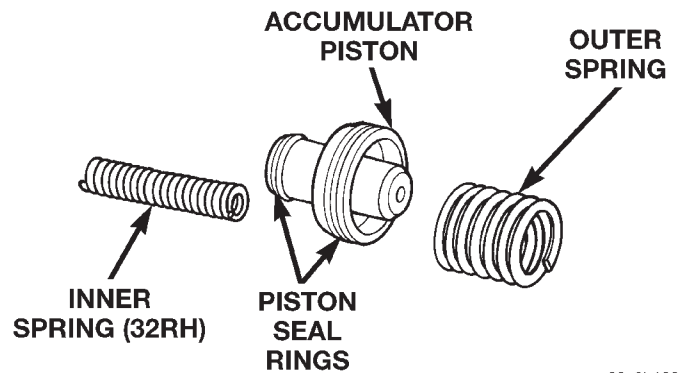
(11) Lower valve body, rotate it away from case, pull park lock rod out of sprag, and remove valve body (Fig. 33).



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Fig. 31 Solenoid Wire Connector

- (7) Remove valve body attaching screws.
- (8) Lower valve body enough to remove accumulator piston and piston spring (Fig. 32).
- (9) Pull valve body forward to disengage park rod.
- (10) Push manual lever shaft and solenoid case connector out of transmission case.



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Fig. 32 Accumulator Piston And Springs

INSTALLATION

- (1) Verify that park/neutral position switch is **NOT** installed. Valve body cannot be installed with switch in place. Remove switch if necessary.
- (2) Install new seals on accumulator piston if necessary, and install piston in case. Use small amount of petroleum jelly to hold piston in place.
- (3) Place valve body manual lever in low (1 position) to ease inserting park rod into sprag.

REMOVAL AND INSTALLATION (Continued)

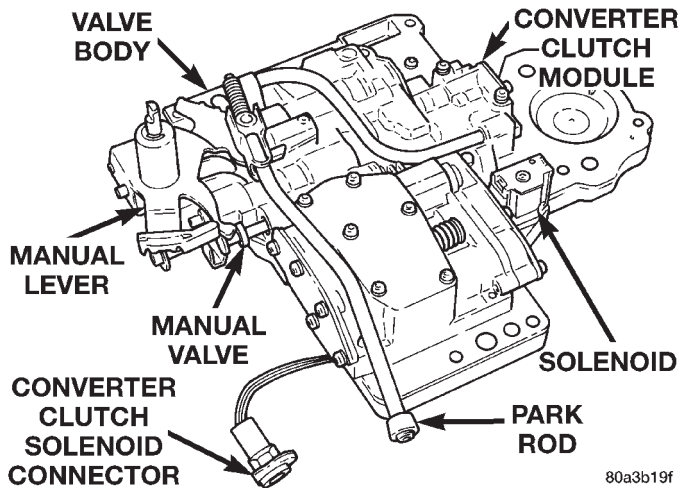


Fig. 33 Valve Body

(4) Use screwdriver to push park sprag into engagement with park gear. This makes clearance for knob on lock rod to move past sprag when valve body is installed. Rotate output shaft to verify sprag engagement.

(5) Position accumulator spring between accumulator piston and valve body.

(6) Position valve body on transmission and work knob on park lock rod past sprag. Be sure accumulator piston and spring remain in position.

(7) Hold valve body in position and install valve body screws finger tight.

(8) Install park/neutral position switch.

(9) Tighten valve body screws alternately and evenly to 11 N·m (100 in. lbs.) torque.

(10) Install new fluid filter on valve body. Install and tighten filter screws to 4 N·m (35 in. lbs.) torque.

(11) Connect solenoid wire to case connector.

(12) Install manual and throttle levers on throttle lever shaft. Tighten lever clamp screws and check for free operation. Shaft and levers must operate freely without any bind.

(13) Install oil pan and new gasket. Tighten pan bolts to 17 N·m (150 in. lbs.) torque. Install gasket dry; do not use sealer.

(14) Connect park/neutral position switch and converter clutch solenoid wires.

(15) Install speedometer pinion gear, adapter and speed sensor.

(16) Lower vehicle.

(17) Fill transmission with Mopar® ATF Plus 3, Type 7176 fluid.

(18) Adjust gearshift and throttle cable if necessary.

OUTPUT SHAFT REAR BEARING

REMOVAL

(1) Remove extension housing.

(2) Remove snap ring that retains rear bearing on output shaft (Fig. 34).

(3) Remove bearing from output shaft.

INSTALLATION

(1) Install bearing on output shaft. Be sure retaining ring groove in outer circumference of bearing is toward the governor.

(2) Install rear bearing retaining snap ring (Fig. 34).

(3) Install extension housing.

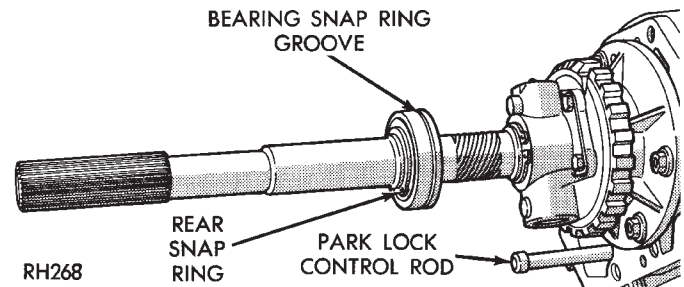


Fig. 34 Output Shaft Rear Bearing—Typical GOVERNOR AND PARK GEAR

REMOVAL

(1) Hoist and support vehicle on safety stands.

(2) Mark propeller shaft and axle yoke for assembly reference. Then disconnect and remove shaft.

(3) Disconnect parking brake cable at equalizer and disconnect exhaust components as necessary.

(4) Support transmission on a suitable lifting device.

(5) Remove skid plate and rear transmission mount.

(6) Remove extension housing.

(7) Loosen but do not remove bolts that hold governor body to park gear.

(8) Rotate transmission output shaft until governor weight assembly is accessible.

(9) Remove E-clip at end of governor valve shaft (Fig. 35).

(10) Remove governor valve and shaft from governor body (Fig. 35).

(11) Remove snap rings and spacer that retain governor body and park gear assembly on output shaft (Fig. 36).

(12) Remove bolts holding governor body to park gear (Fig. 37).

(13) Separate governor from park gear.

(14) Pull park gear from rear support.

INSTALLATION

(1) Install park gear into rear support so crown on curved boss is in line with hole through output shaft.

(2) Install governor filter in park gear.

REMOVAL AND INSTALLATION (Continued)

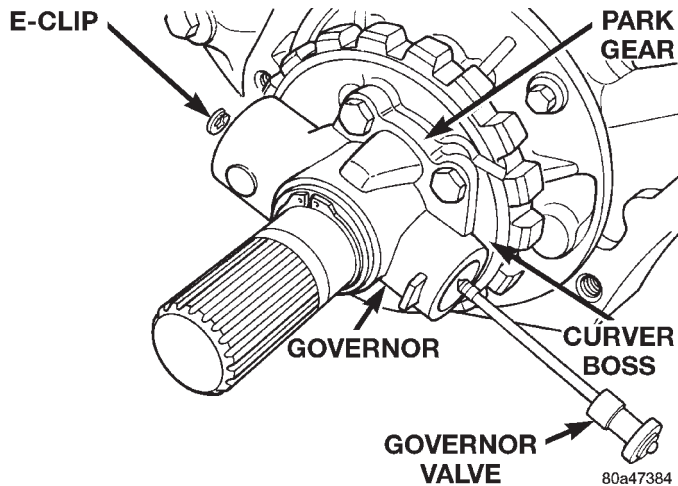


Fig. 35 Governor Valve

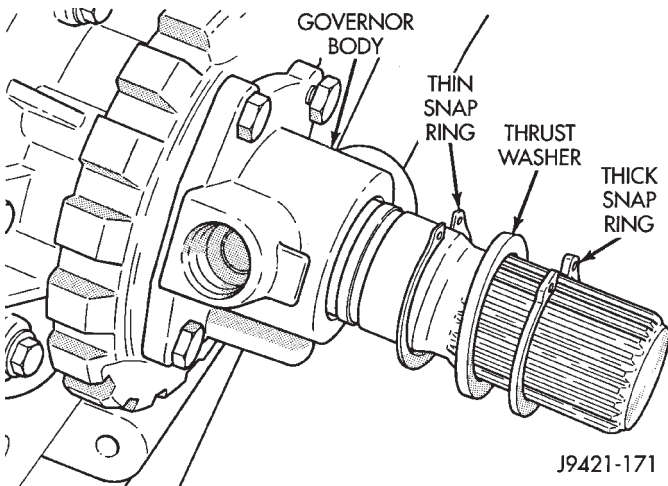


Fig. 36 Snap Rings And Spacer

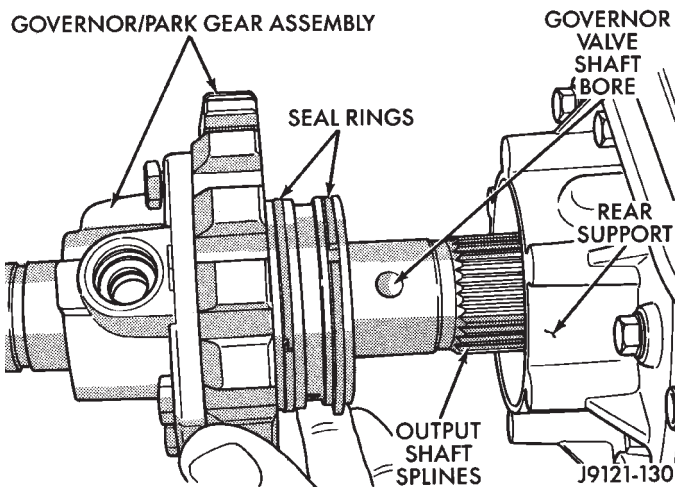


Fig. 37 Governor Body

- (3) Slip governor body over output shaft and align port to filter.
- (4) Install bolts to hold governor body to park gear. Tighten bolts to 11 N·m (95 in. lbs.) torque (Fig. 37).

- (5) Install governor body-park gear snap rings and washer on output shaft as follows:

- (a) Install thin snap ring first. Then install thrust washer second, and thick snap ring last (Fig. 36).

- (b) Verify correct position of snap rings. **Be sure flat side of each snap ring is toward governor body.**

- (6) Insert governor valve and shaft through governor and install E-clip (Fig. 35).

- (7) Install extension housing and gasket on transmission. Tighten housing bolts to 32 N·m (24 ft. lbs.).

- (8) Install rear transmission mount and skid plate.

- (9) Install speed sensor and speedometer components and connect speed sensor wires.

- (10) Connect exhaust components and brake cable, if removed.

- (11) Install propeller shaft.

- (12) Remove supports and lower vehicle.

- (13) Check transmission fluid level. Add fluid if necessary.

PARK LOCK

REMOVAL

- (1) Raise vehicle and remove propeller shaft.
- (2) Remove extension housing.
- (3) Slide sprag shaft out of extension housing and remove sprag and spring (Fig. 38).
- (4) Remove snap ring and slide reaction plug and pin assembly out of housing.
- (5) If park rod requires service, it will be necessary to remove valve body.

INSTALLATION

- (1) Inspect sprag shaft for scores and free movement in housing and sprag. Inspect sprag and control rod springs for distortion and loss of tension. replace worn, damaged parts as necessary.

- (2) Inspect square lug on sprag for broken edges. Check lugs on park gear for damage. Inspect knob on end of control rod for wear grooves, or being seized on rod. Replace rod if bent, if knob is worn/grooved, or it has seized on rod. Replace park gear if lugs are damaged. Replace the park lock rod if it is suspected that the rod is not the correct length.

- (3) Install reaction plug and pin assembly in housing and secure with new snap ring (Fig. 38).

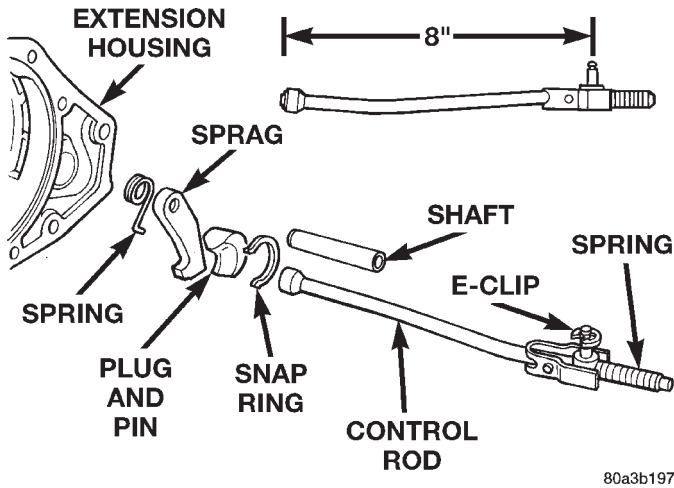
- (4) Position sprag and spring in housing and insert sprag shaft. Be sure square lug on sprag is toward park gear. Also be sure spring is positioned so it moves sprag away from gear.

- (5) Install extension housing.

- (6) Install propeller shaft and lower vehicle.

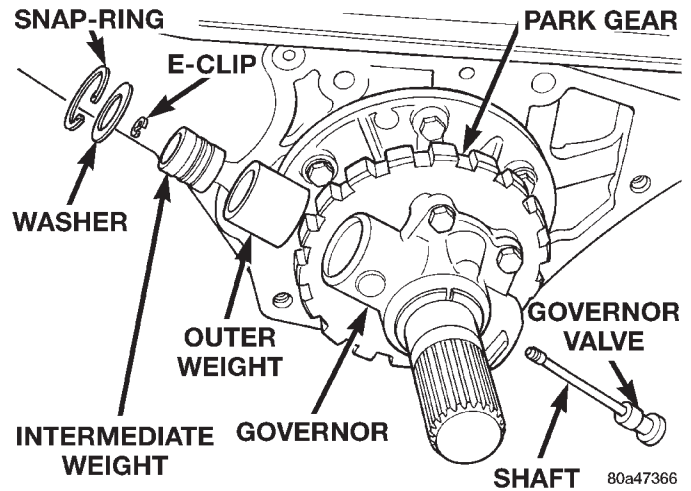
- (7) Check transmission fluid level. Add fluid if necessary.

DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 38 Park Lock



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Fig. 40 Snap Ring, Washer, and Outer Weight

DISASSEMBLY AND ASSEMBLY

GOVERNOR AND PARK GEAR

DISASSEMBLY

- (1) Remove governor body from transmission.
- (2) Clean and inspect governor filter (Fig. 39).
- (3) Remove snap ring and washer that secure governor weight assembly in body (Fig. 40).
- (4) Remove governor weight assembly from governor body bore.
- (5) Slide intermediate and inner weight from outer weight.
- (6) Position intermediate weight on suitable size socket (Fig. 41).
- (7) Push inner weight downward with nut driver. Then remove inner weight snap ring with Miller Plier Tool 6823 (Fig. 41).
- (8) Remove inner weight and spring from intermediate weight.

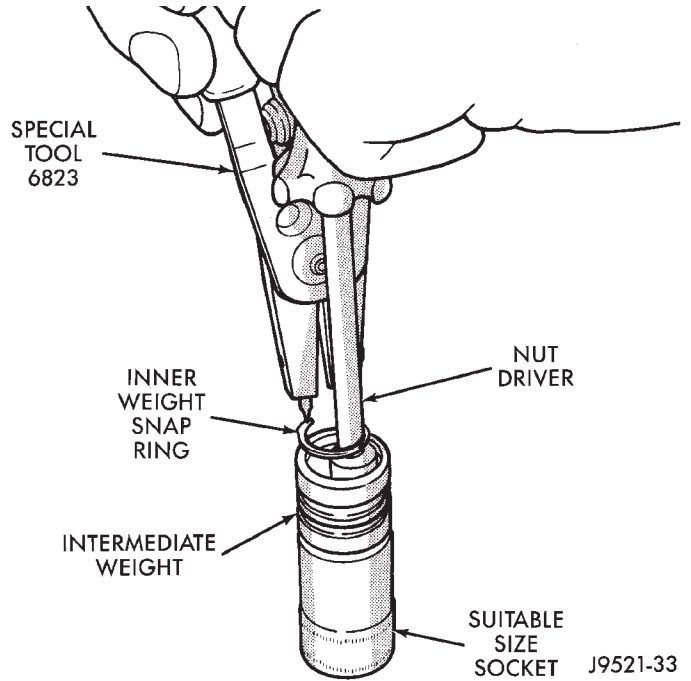
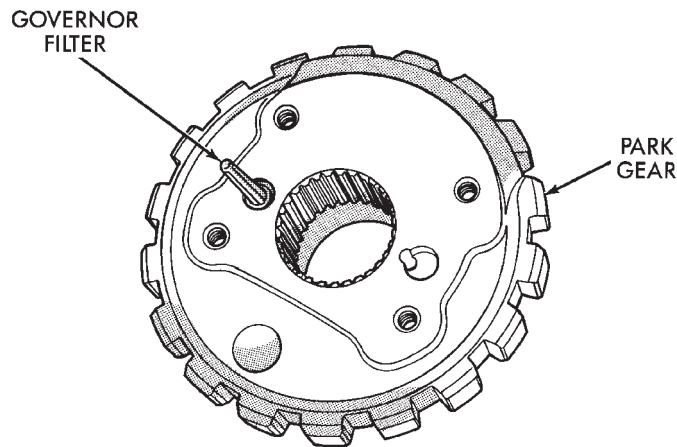


Fig. 41 Inner Weight Snap Ring



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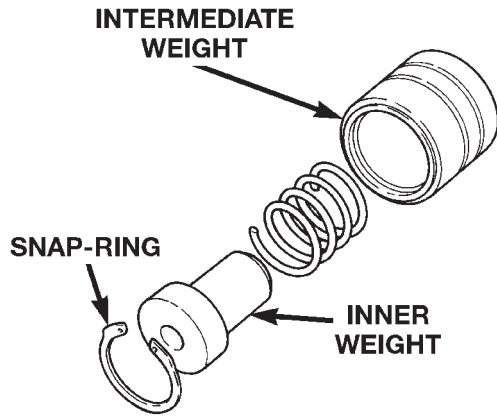
Fig. 39 Governor Filter

ASSEMBLY

CAUTION: Exercise care when installing the rings. They are easily broken if overspread or twisted during installation.

If it was necessary to remove the park gear, inspect the seal rings and bore in rear support. Install new seal rings on park gear hub only if original rings are damaged, or worn. Install ring with interlock ends first and ring with plain ends last. Slip each ring on hub and seat them in grooves. Verify that rear ring ends are securely interlocked before proceeding. If the bore in rear support is damaged, replace the rear support.

DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 42 Intermediate and Inner Governor Weights

(1) Lubricate governor components with Mopar® ATF Plus 3, Type 7176 transmission fluid before assembly.

(2) Clean and inspect governor weights and bores for scoring or wear. Replace the governor body and weights if damaged. Refer to Cleaning and Inspection section of this group for proper procedure.

(3) Insert spring into intermediate weight.

(4) Insert inner weight into intermediate weight and install snap-ring (Fig. 42). Verify snap-ring is fully seated in groove in intermediate weight (Fig. 41).

(5) Assemble governor weights into governor body (Fig. 40).

(6) Install washer and snap ring to hold weights in governor body.

(7) Install governor body in transmission.

VALVE BODY

DISASSEMBLY

Position the valve body on a clean work surface to avoid contamination.

CAUTION: Do not clamp any part of the valve body assembly (Fig. 43) in a vise. This practice will distort the valve body and transfer plate resulting in valve bind. Slide valves and plugs out carefully. Do not use force at any time. The valves and valve body will be damaged if force is used. Also tag or mark the valve body springs for reference as they are removed. Do not allow them to become inter-mixed.

(1) Remove screws attaching adjusting screw bracket to valve body and transfer plate. Hold bracket firmly against spring force while removing last screw.

(2) Remove adjusting screw bracket, line pressure adjusting screw (Fig. 44).

(3) Remove switch valve and spring, pressure regulator valve and spring, kickdown valve and spring, and throttle valve from valve body (Fig. 44).

(4) Secure detent ball and spring in housing with Retainer Tool 6583 (Fig. 45).

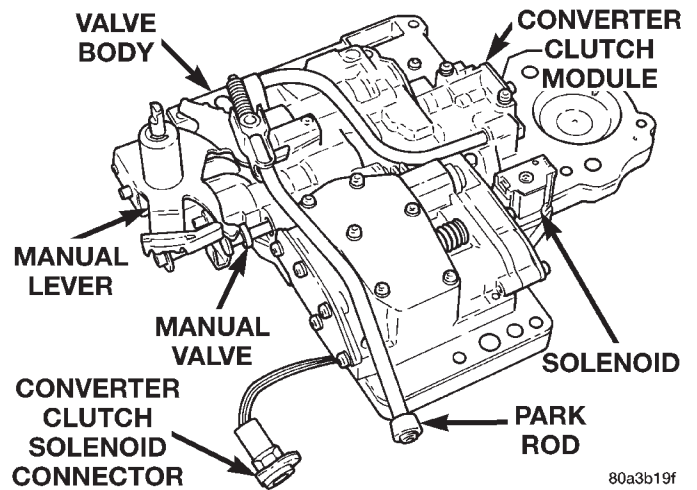
(5) Remove manual shaft E-clip, washer, and seal (Fig. 46).

(6) Pull manual shaft and park rod assembly upward out of valve body and off throttle lever (Fig. 46).

(7) Remove manual valve from valve body (Fig. 47).

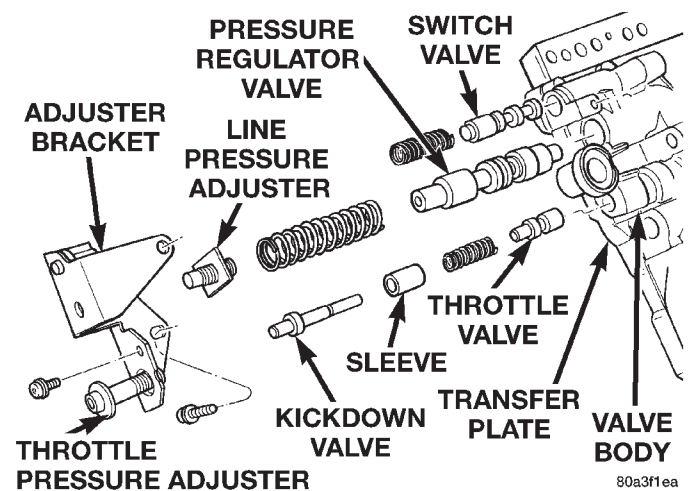
(8) Remove Retainer Tool 6583. Then remove and retain detent ball and spring (Fig. 46).

(9) Remove throttle lever (Fig. 46).



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Fig. 43 Valve Body Assembly



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Fig. 44 Adjusting Screw Bracket, Springs, Valve Removal

(10) Remove park rod E-clip and separate rod from manual lever (Fig. 48).

DISASSEMBLY AND ASSEMBLY (Continued)

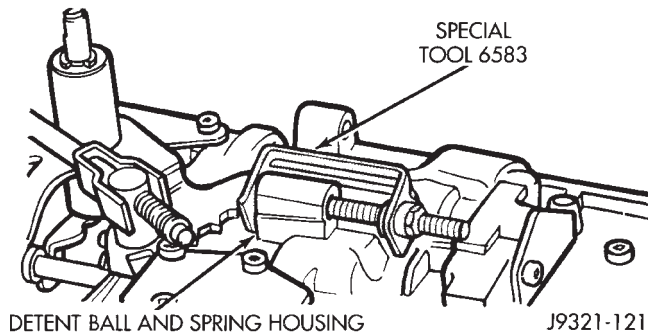


Fig. 45 Securing Detent Ball And Spring With Retainer Tool

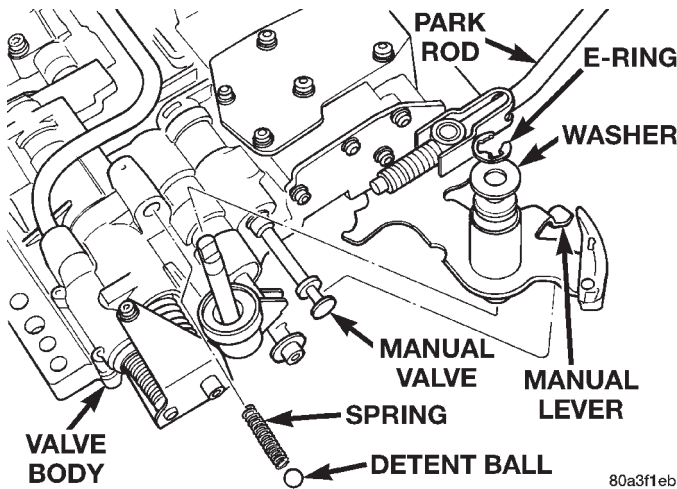


Fig. 46 Manual And Throttle Levers

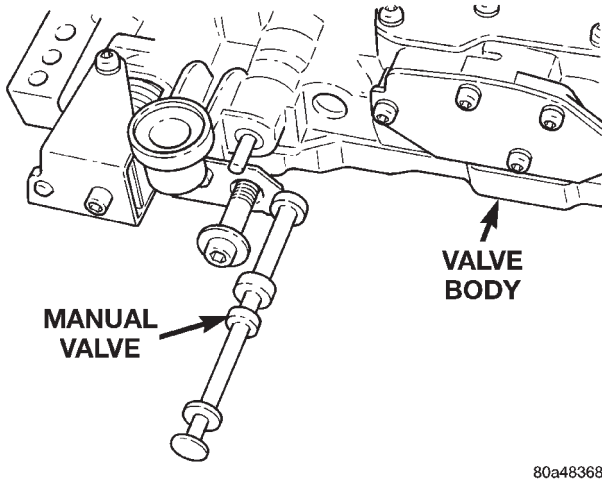


Fig. 47 Manual Valve

(11) Remove converter clutch solenoid from separator plate (Fig. 49). A T25 torx bit is required to remove solenoid attaching screw.

(12) Remove screws attaching converter clutch module to valve body and remove module and connecting tube (Fig. 50).

(13) Remove screws attaching end cover plate to torque converter module (Fig. 51).

(14) Remove converter clutch valve, fail safe valve, and springs (Fig. 51).

(15) Turn valve body over so transfer plate is facing upward (Fig. 52). With valve body in this position, valve body check balls will remain in place and not fall out when transfer plate is removed.

(16) Remove screws attaching transfer plate to valve body (Fig. 52).

(17) Remove transfer plate and separator plate from valve body (Fig. 52). Note position of filter and clutch solenoid for reference. Remove valve body check balls.

(18) Position transfer plate on bench so separator plate, and filter are facing up. This will avoid having rear clutch and rear servo check balls fall out when plates are separated.

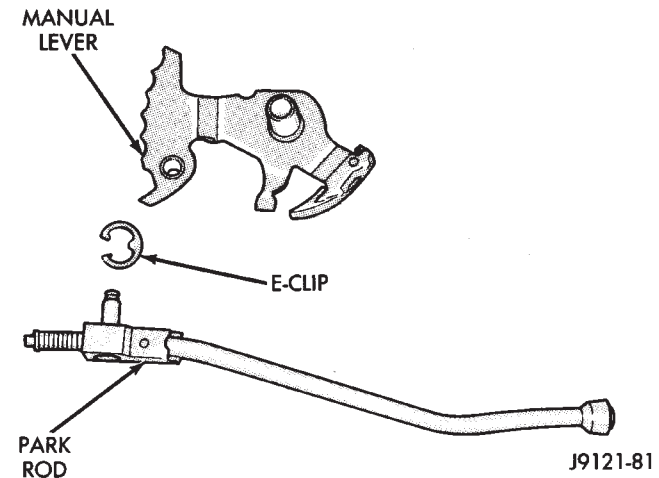


Fig. 48 Park Rod

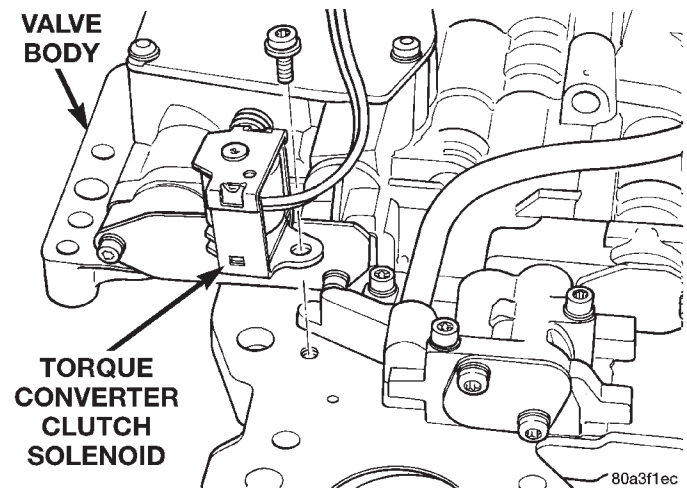
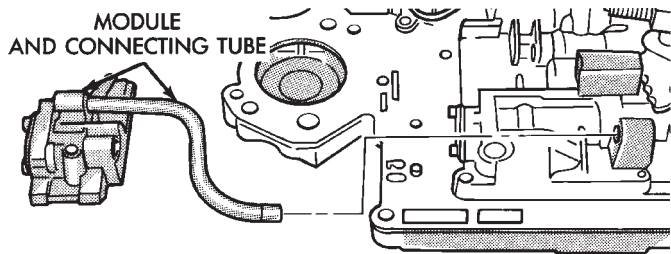


Fig. 49 Converter Clutch Solenoid

(19) Remove screws attaching separator plate to transfer plate (Fig. 53).

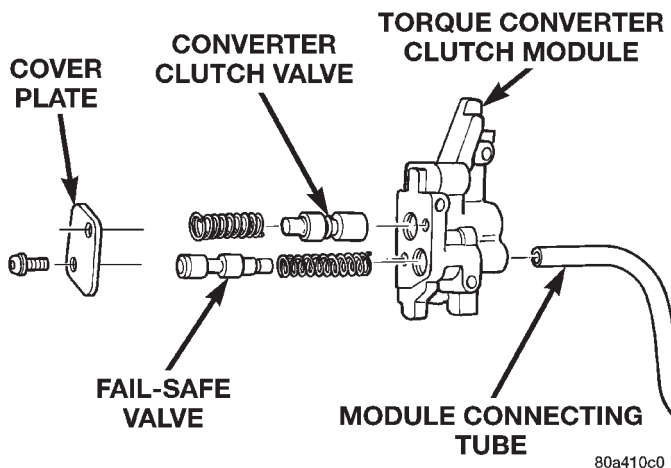
(20) Note position of filter, rear clutch servo and rear servo check balls for assembly reference (Fig. 53) and (Fig. 54).

DISASSEMBLY AND ASSEMBLY (Continued)



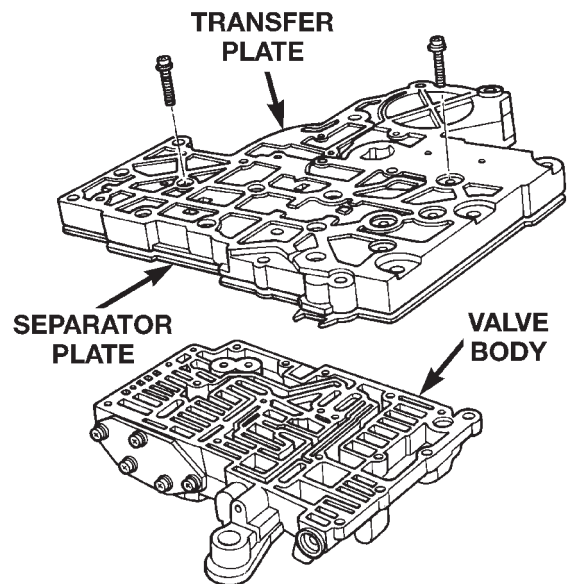
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Fig. 50 Clutch Module And Connecting Tube



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Fig. 51 Converter Clutch and Fail Safe Valves

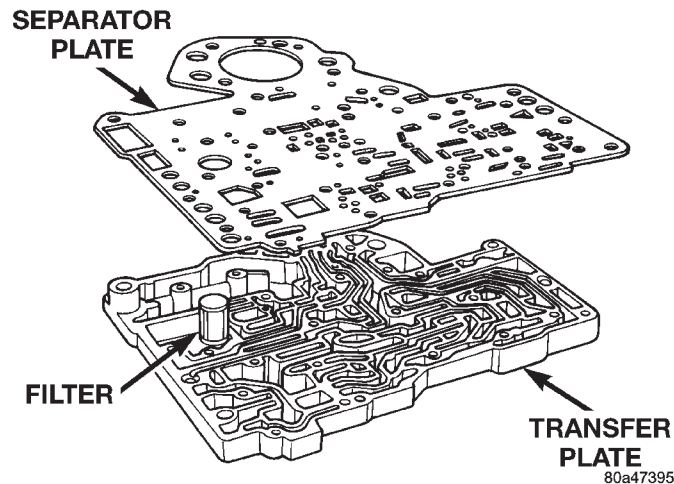


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Fig. 52 Valve Body Transfer Plate Screws

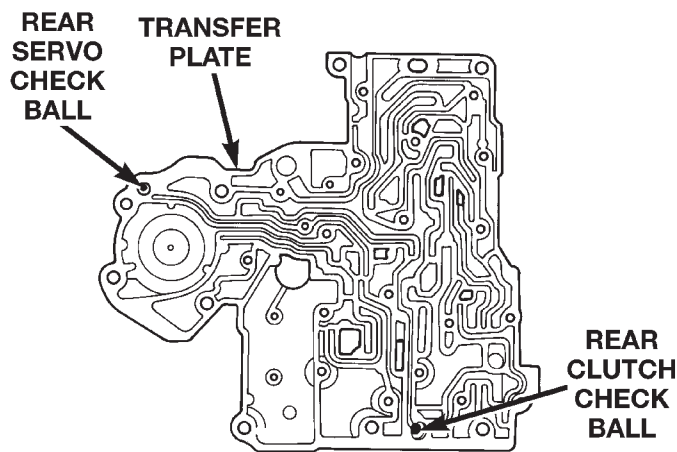
(21) Remove shuttle valve end plate (Fig. 55).

(22) Remove shuttle valve E-clip and remove secondary spring and spring guides from end of valve (Fig. 56).



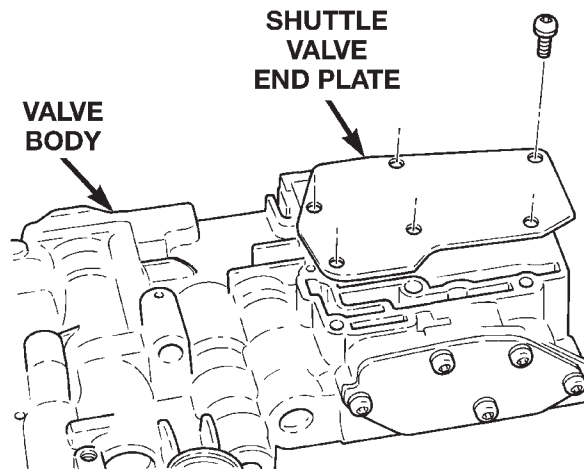
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Fig. 53 Transfer And Separator Plates



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Fig. 54 Rear Servo and Rear Clutch Check Balls



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Fig. 55 Shuttle Valve End Plate

(23) Remove governor plug end plate (Fig. 57).

DISASSEMBLY AND ASSEMBLY (Continued)

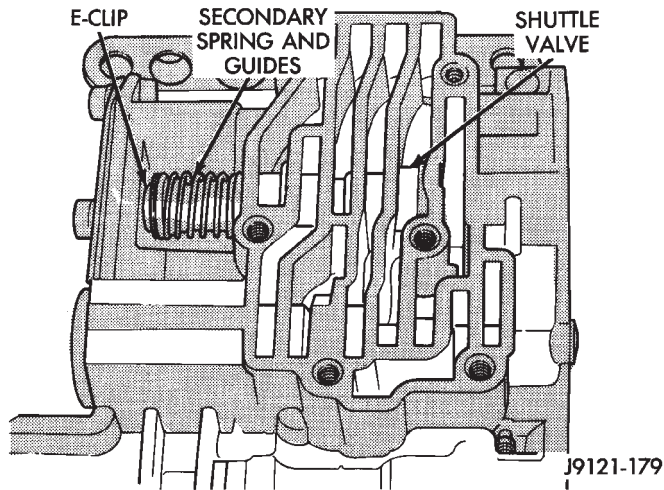


Fig. 56 Shuttle Valve E-Clip And Secondary Spring

- (24) Remove 1-2 and 2-3 shift valve governor plugs from valve body (Fig. 57).
- (25) Remove shuttle valve throttle plug, primary spring and shuttle valve from valve body (Fig. 57).
- (26) Remove screws attaching kickdown limit valve body to valve body (Fig. 57).
- (27) Remove 1-2 shift control valve and spring from valve body (Fig. 57).

- (28) Remove 2-3 shift valve and spring from valve body (Fig. 57).
- (29) Remove 1-2 shift valve and spring from valve body (Fig. 57).
- (30) Remove throttle pressure plug from kickdown limit valve body (Fig. 57).
- (31) Remove retainer from end of kickdown limit valve body (Fig. 57).
- (32) Remove kickdown limit valve and spring from kickdown limit valve body (Fig. 57).
- (33) Remove regulator valve end plate from valve body (Fig. 57).
- (34) Remove regulator valve line pressure plug, pressure plug sleeve, regulator valve throttle pressure plug and spring (Fig. 57).

ASSEMBLY

Clean and inspect all valve body components for damage or wear. Refer to the Cleaning and Inspection section of this group for proper procedure.

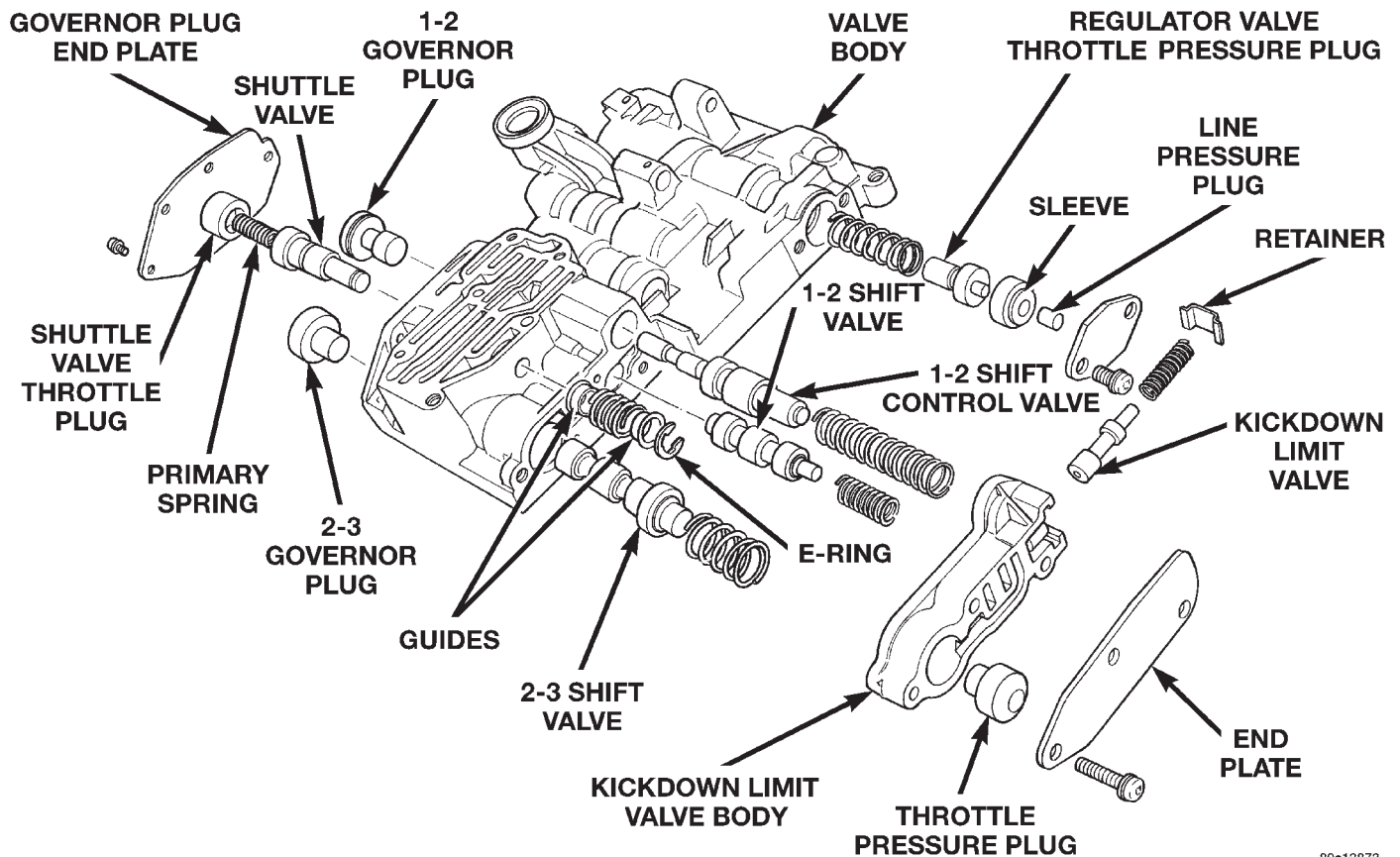


Fig. 57 Control Valves, Shift Valves, And Governor Plugs

DISASSEMBLY AND ASSEMBLY (Continued)

CAUTION: Do not force valves or plugs into place during reassembly. If the valve body bores, valves, and plugs are free of distortion or burrs, the valve body components should all slide into place easily. In addition, do not overtighten the transfer plate and valve body screws during reassembly. Overtightening can distort the valve body resulting in valve sticking, cross leakage and unsatisfactory operation. Tighten valve body screws to recommended torque only.

(1) Lubricate valve body bores, valves and plugs with Mopar® ATF Plus 3, Type 7176, transmission fluid.

(2) Install regulator valve line pressure plug, pressure plug sleeve, regulator valve throttle pressure plug, and spring into valve body (Fig. 57). Verify valve components slide freely.

(3) Install regulator valve end plate on valve body (Fig. 57).

(4) Install kickdown limit valve and spring in kickdown limit valve body (Fig. 57). Verify valve components slide freely.

(5) Compress spring into kickdown limit valve body.

(6) Install retainer in grooves at end of kickdown limit valve body (Fig. 57).

(7) Install throttle pressure plug in kickdown limit valve body (Fig. 57).

(8) Install 1-2 shift valve and spring into valve body (Fig. 57).

(9) Install 2-3 shift valve and spring into valve body (Fig. 57).

(10) Install 1-2 shift control valve and spring into valve body (Fig. 57).

(11) Verify valve components slide freely.

(12) Place kickdown limit valve body and end plate in position on valve body and compress springs (Fig. 57).

(13) Install screws to attach kickdown limit valve body to valve body (Fig. 57).

(14) Install shuttle valve throttle plug, primary spring and shuttle valve into valve body (Fig. 57). Verify valve components slide freely.

(15) Install 1-2 and 2-3 shift valve governor plugs into valve body (Fig. 57). Verify valve components slide freely.

(16) Place governor plug end plate in position on valve body and compress spring.

(17) Install screws to attach governor plug end plate to valve body (Fig. 57).

(18) Assemble shuttle valve spring and guides (Fig. 57). Place spring and guides in position on shuttle valve stem.

(19) Compress spring and install E-clip in groove on shuttle valve stem (Fig. 58).

(20) Place shuttle valve end plate in position on valve body (Fig. 59).

(21) Install screws to attach shuttle valve end plate to valve body (Fig. 59).

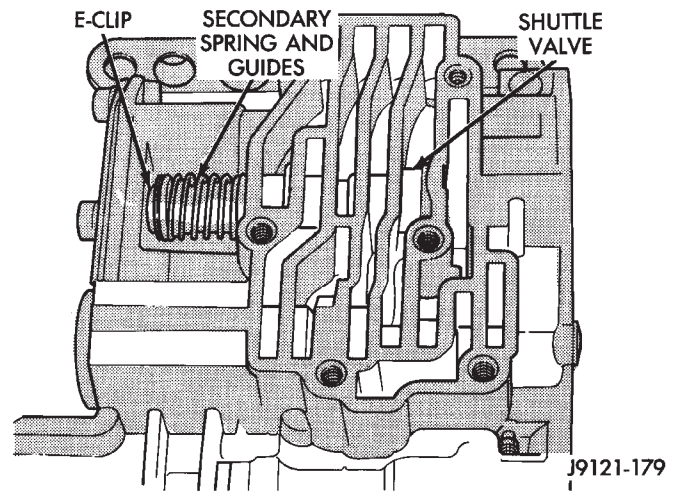


Fig. 58 Shuttle Valve E-Clip And Secondary Spring

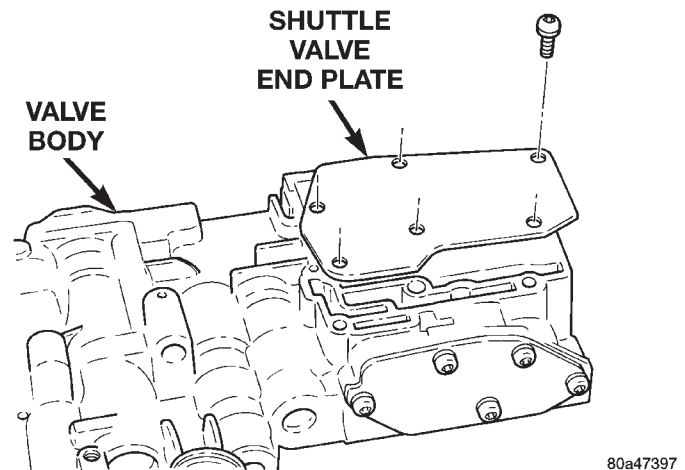


Fig. 59 Shuttle Valve End Plate

(22) Install rear clutch servo and rear servo check balls in proper cavities in transfer plate (Fig. 60).

(23) Insert filter into opening in separator plate (Fig. 61).

(24) Place separator plate in position on transfer plate and install screws to attach separator plate to transfer plate (Fig. 61).

(25) Place one 11/32 in. check ball and six 1/4 in. check balls in the proper cavities in the valve body (Fig. 62).

(26) Place transfer plate in position on valve body (Fig. 63).

(27) Install screws to attach transfer plate to valve body (Fig. 63).

(28) Turn valve body over to expose the separator plate.

DISASSEMBLY AND ASSEMBLY (Continued)

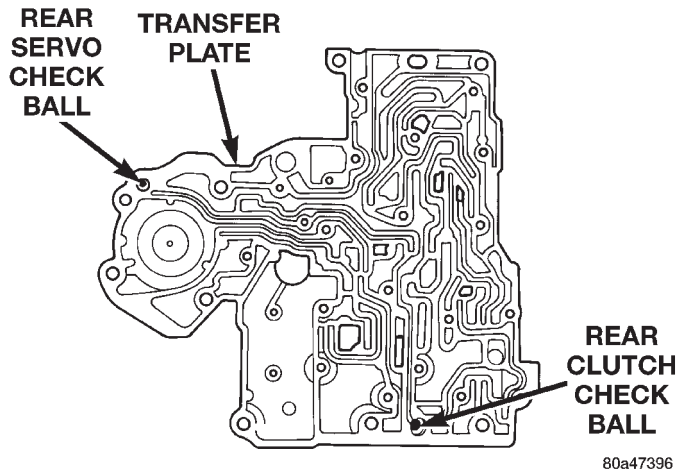


Fig. 60 Rear Servo and Rear Clutch Check Balls

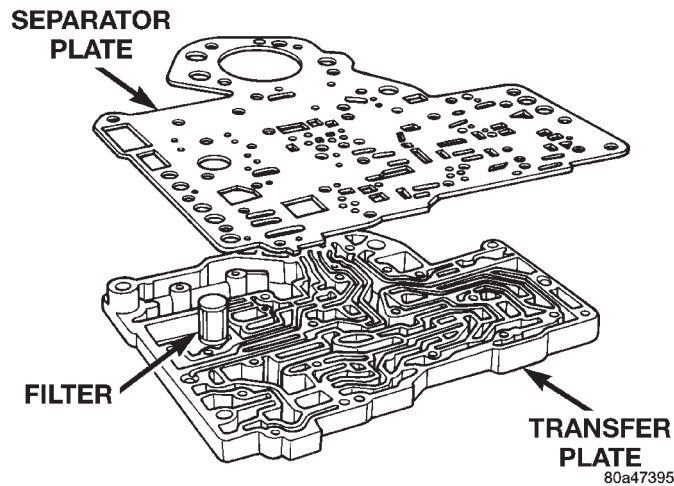


Fig. 61 Transfer And Separator Plates

(29) Insert converter clutch valve and spring into converter clutch valve module (Fig. 64). Verify valve components slide freely.

(30) Insert spring and fail-safe valve into converter clutch valve module (Fig. 64). Verify valve components slide freely.

(31) Place cover plate in position on converter clutch valve module (Fig. 64).

(32) Install screws to attach cover to converter clutch valve module (Fig. 64).

(33) Insert connecting tube into converter clutch valve module (Fig. 64).

(34) Insert connecting tube into valve body opening (Fig. 65).

(35) Place converter clutch valve module in position on separator plate. Install screws to attach converter clutch module to valve body (Fig. 65).

(36) If necessary, install a new O-ring on converter clutch solenoid (Fig. 66).

(37) Insert converter clutch solenoid into transfer plate (Fig. 66).

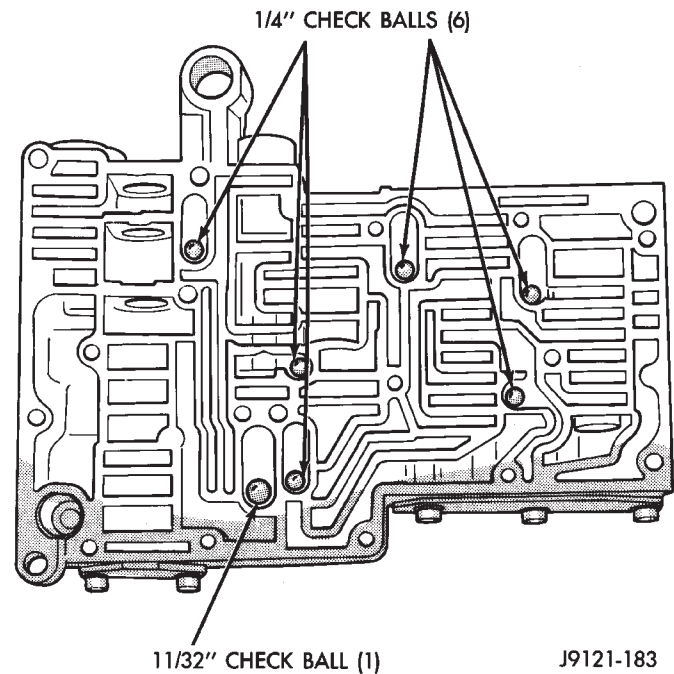


Fig. 62 Correct Position Of Valve Body Check Balls

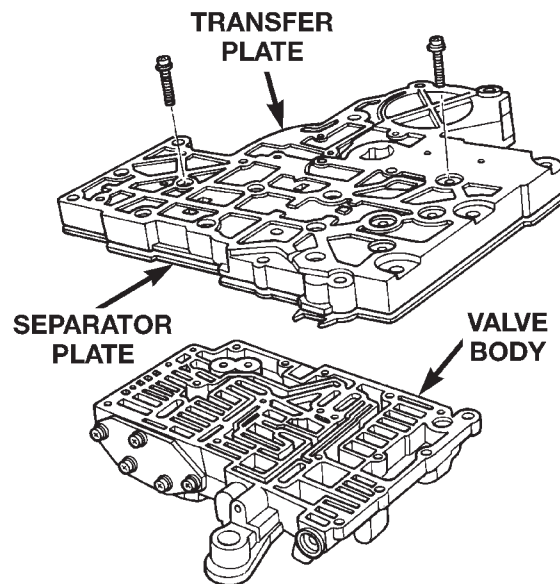


Fig. 63 Valve Body Transfer Plate Screws

(38) Install screw to attach solenoid to transfer plate (Fig. 66).

(39) If necessary, insert park rod end into manual lever and install E-clip (Fig. 67).

(40) Insert detent spring and ball into opening in valve body and install Retainer Tool 6583 (Fig. 68).

(41) Install manual valve into valve body (Fig. 69).

(42) Insert throttle lever through transfer plate side of valve body and upward (Fig. 70).

DISASSEMBLY AND ASSEMBLY (Continued)

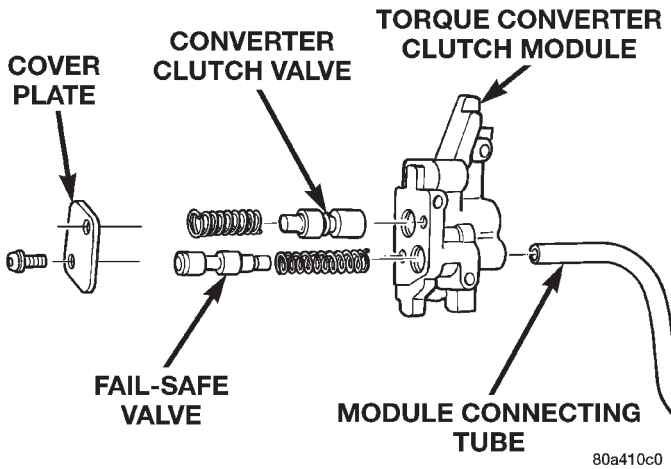


Fig. 64 Converter Clutch Valve Module

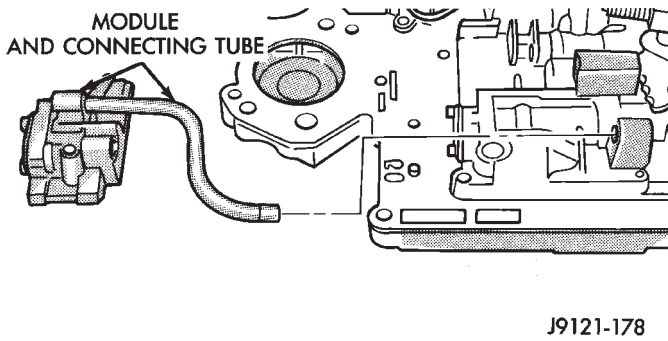


Fig. 65 Clutch Module And Connecting Tube

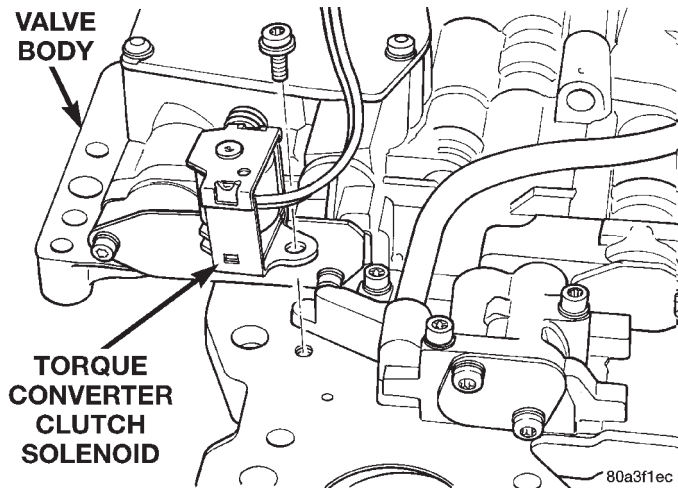


Fig. 66 Converter Clutch Solenoid

(43) Insert throttle lever into groove in manual valve (Fig. 71).

(44) Install seal, washer, and E-clip to retain manual shaft to valve body (Fig. 70).

(45) Install switch valve and spring, pressure regulator valve and spring, kickdown valve and spring, and throttle valve into valve body (Fig. 72).

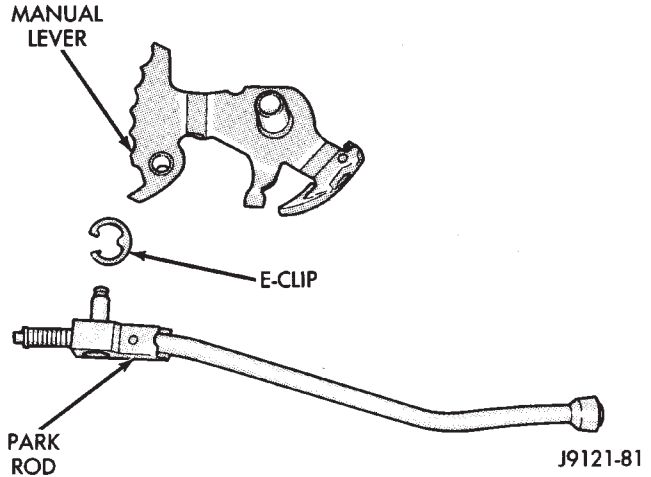


Fig. 67 Park Rod

(46) Place adjusting screw bracket and line pressure adjusting screw in position on valve body and compress springs (Fig. 44).

(47) Install screws to attach adjuster bracket to valve body.

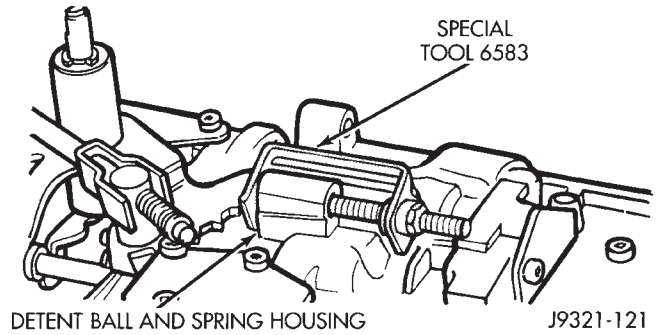


Fig. 68 Securing Detent Ball And Spring With Retainer Tool

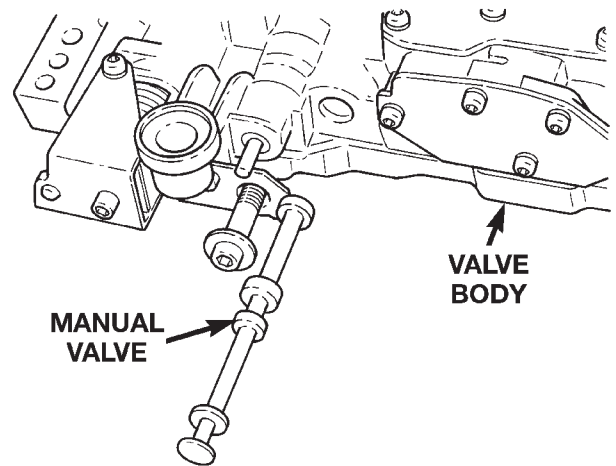


Fig. 69 Manual Valve

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DISASSEMBLY AND ASSEMBLY (Continued)

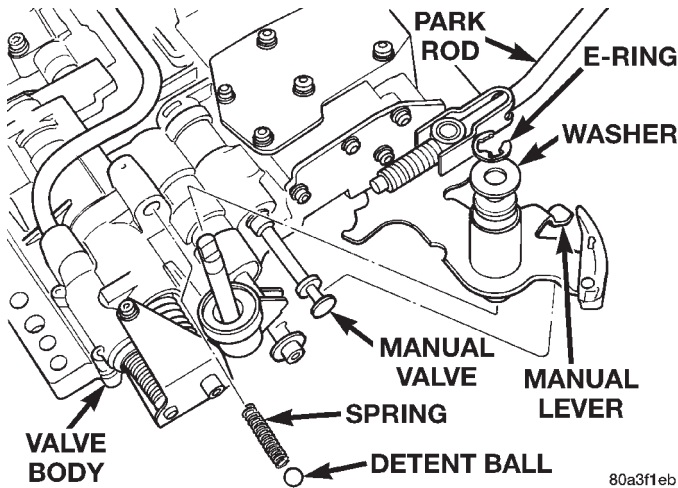


Fig. 70 Manual And Throttle Levers

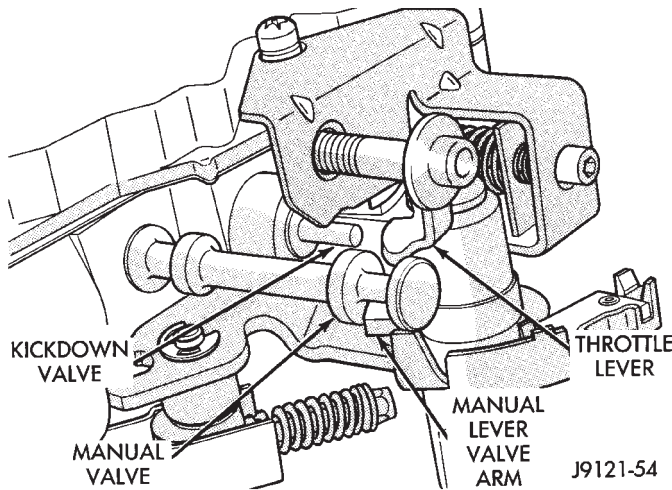


Fig. 71 Manual Valve And Throttle Lever Alignment

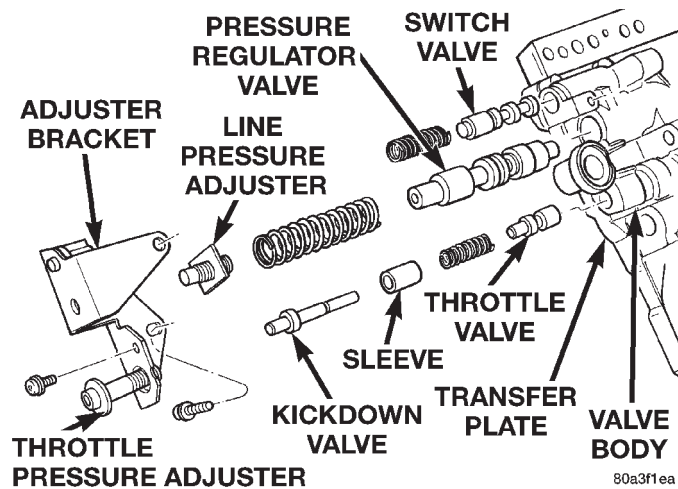


Fig. 72 Adjusting Screw Bracket, Springs, and Valves

TRANSMISSION

DISASSEMBLY

- (1) Remove transmission from vehicle.
- (2) Install a suitable tail shaft housing plug to avoid contaminating internal components with cleaning solvents.
- (3) Clean exterior of transmission with suitable solvent or pressure washer.
- (4) Remove torque converter from transmission.
- (5) Remove throttle and shift levers from valve body manual shaft and throttle lever shaft.
- (6) Mount transmission in repair stand C-3750-B or similar type stand (Fig. 73).
- (7) Remove extension housing.
- (8) Remove fluid pan.
- (9) Remove park/neutral position switch and seal (Fig. 74).
- (10) Remove valve body.
- (11) Remove accumulator spring and piston (Fig. 75).

TRANSMISSION

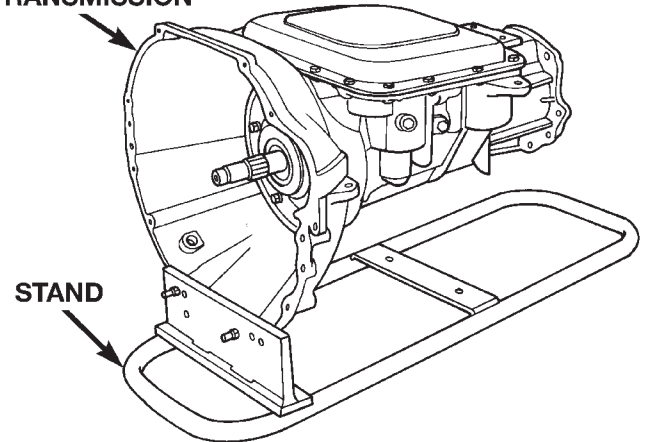


Fig. 73 Repair Stand

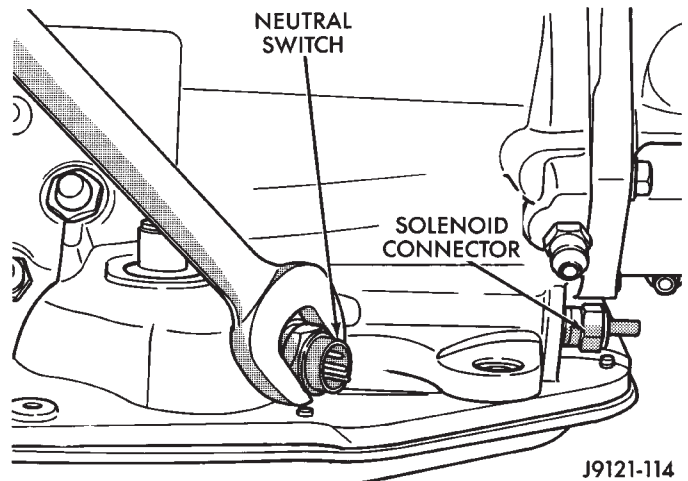


Fig. 74 Park/Neutral Position Switch

DISASSEMBLY AND ASSEMBLY (Continued)

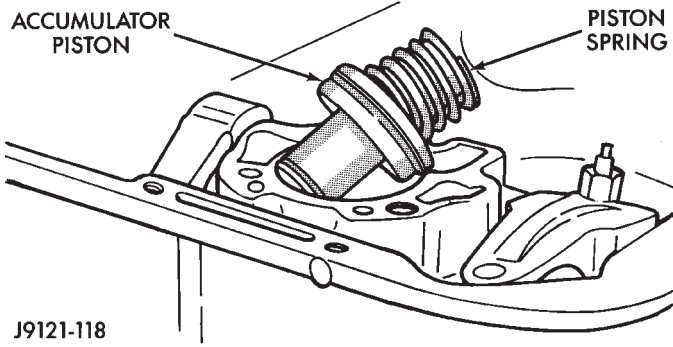


Fig. 75 Accumulator Piston And Spring

(12) Loosen front band adjusting screw lock nut (Fig. 76) 4-5 turns. Then tighten band adjusting screw until band is tight around front clutch. This prevents front/rear clutches from coming out with pump and possibly damaging clutch or pump components.

(13) Remove oil pump bolts.

(14) Thread bolts of Slide Hammer Tools C-3752 into threaded holes in pump body flange (Fig. 77).

(15) Bump slide hammer weights outward to remove pump and reaction shaft support assembly from case (Fig. 77).

(16) Loosen front band adjusting screw until band is completely loose (Fig. 76).

(17) Squeeze front band together and remove band strut (Fig. 78).

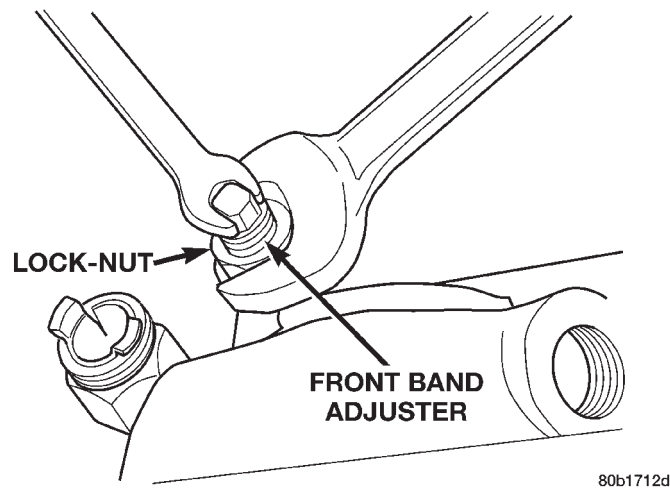


Fig. 76 Front Band Adjusting Screw Lock Nut

(18) Remove front and rear clutch units as an assembly. Grasp input shaft, hold clutch units together and remove them from case (Fig. 79).

(19) Lift front clutch off rear clutch (Fig. 80). Set clutch units aside for overhaul.

(20) Remove output shaft thrust washer from output shaft (or from rear clutch hub) (Fig. 81).

(21) Remove output shaft thrust plate and washer from output shaft hub (Fig. 81).

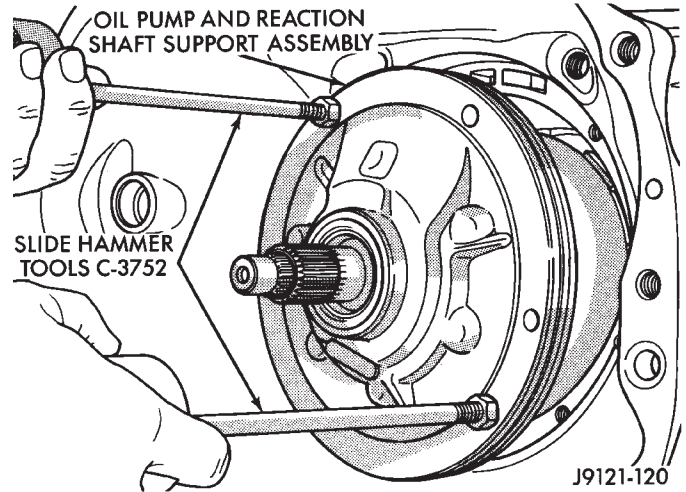


Fig. 77 Oil Pump/Reaction Shaft Support

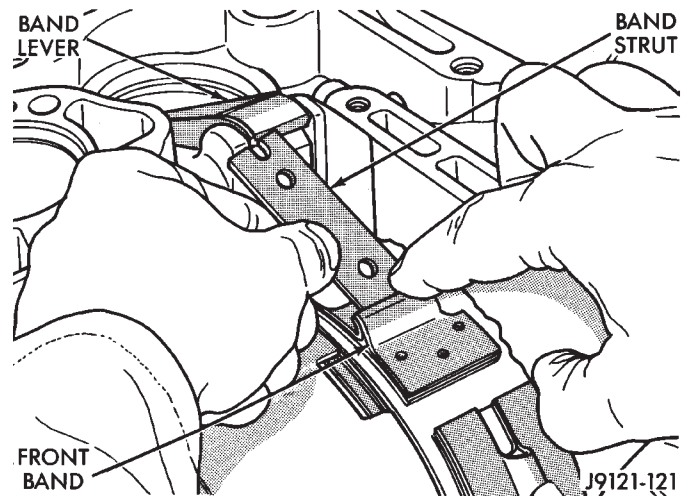


Fig. 78 Front Band Strut

(22) Remove front band from case (Fig. 82).

(23) Remove extension housing from transmission case.

(24) Remove governor body and park gear from output shaft.

(25) Remove output shaft and planetary geartrain as assembly (Fig. 83). Support geartrain with both hands during removal. Do not allow machined surfaces on output shaft to become nicked or scratched.

(26) Loosen rear band adjusting screw 4-5 turns (Fig. 84).

(27) Remove snap ring that secures low-reverse drum to rear support hub, however do not remove drum (Fig. 85).

(28) Remove bolts attaching rear support to transmission case and pull support from low-reverse drum (Fig. 86).

(29) Remove bolts attaching overrunning clutch cam and low-reverse drum to transmission case (Fig. 87).

DISASSEMBLY AND ASSEMBLY (Continued)

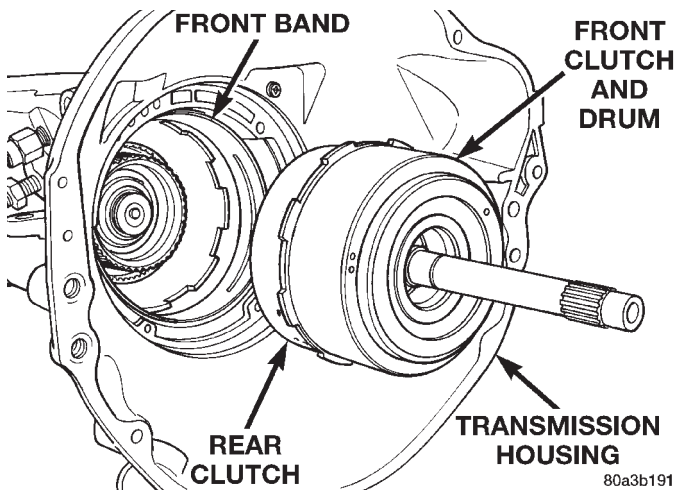


Fig. 79 Front/Rear Clutch Assemblies

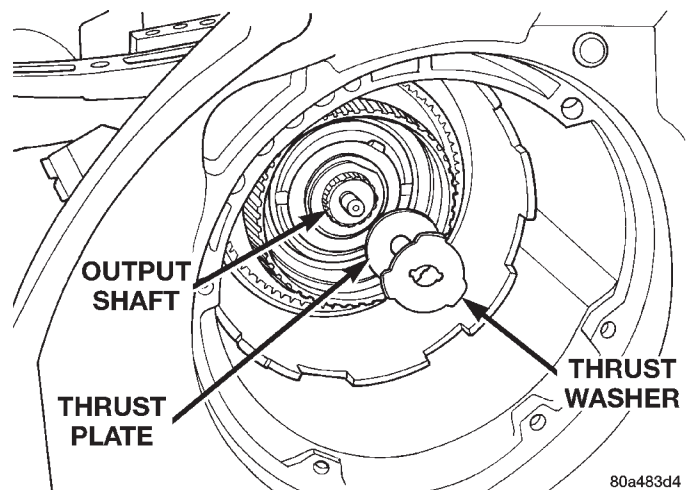


Fig. 81 Output Shaft Thrust Plate and Washer

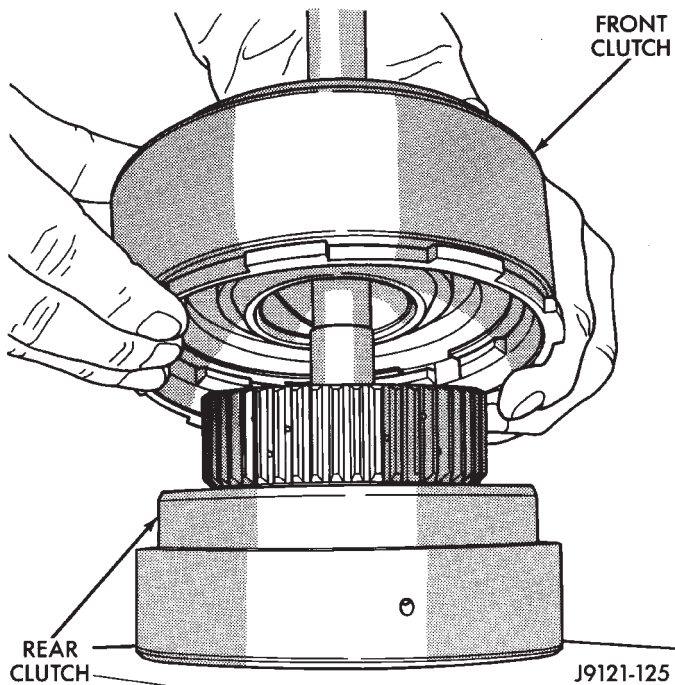


Fig. 80 Separating Front Clutch From Rear Clutch

(30) Using snap-ring plier, pull rear band anchor pin (located on the servo side of the rear support) from transmission case.

(31) Remove rear band and link from transmission (Fig. 88).

(32) Separate link from rear band (Fig. 89).

(33) If necessary remove front and rear band servo levers. All transmission components can be serviced without removing the levers.

(a) Using a 1/4 inch drive extension remove front band reaction pin access plug (Fig. 90).

(b) Remove front band reaction pin with pencil magnet. Pin is accessible from converter housing side of case (Fig. 91).

(c) Remove front band lever (Fig. 92).

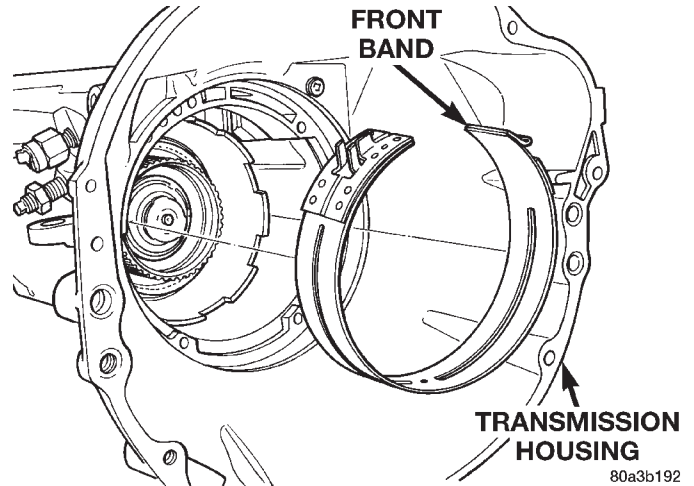


Fig. 82 Front Band

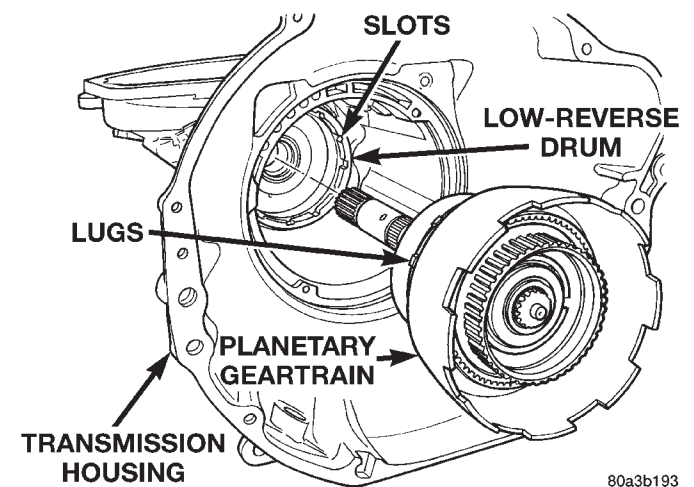


Fig. 83 Planetary Geartrain

(d) Using snap-ring plier, pull rear band lever pivot from transmission case (Fig. 93).

(e) Separate rear band servo lever from transmission.

DISASSEMBLY AND ASSEMBLY (Continued)

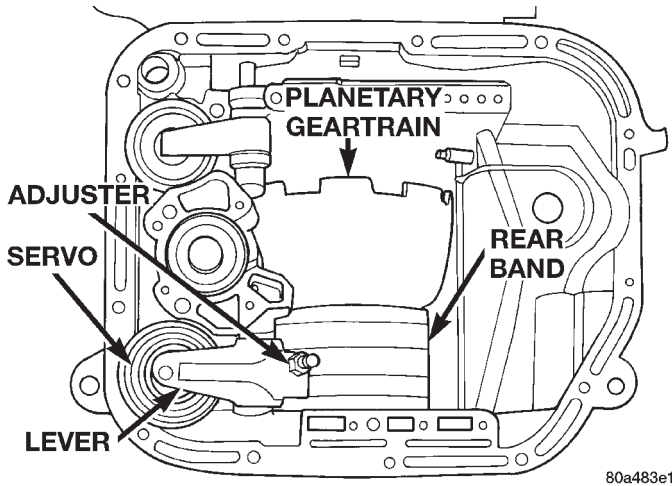


Fig. 84 Rear Band Adjuster Location

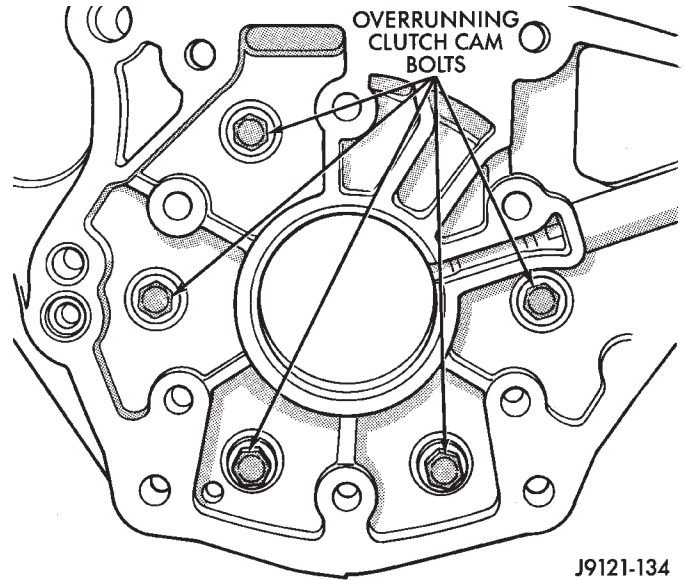


Fig. 87 Overrunning Clutch Cam Bolt Locations

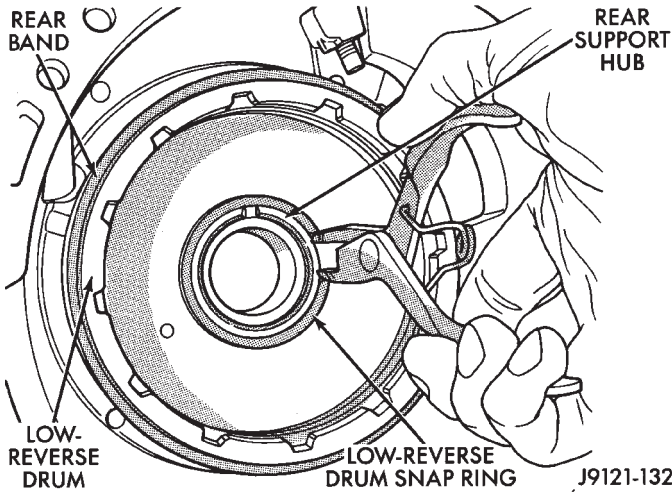


Fig. 85 Low-Reverse Drum Snap Ring

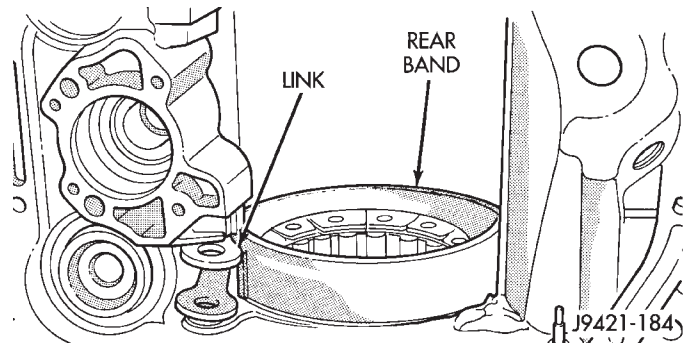


Fig. 88 Rear Band and Link

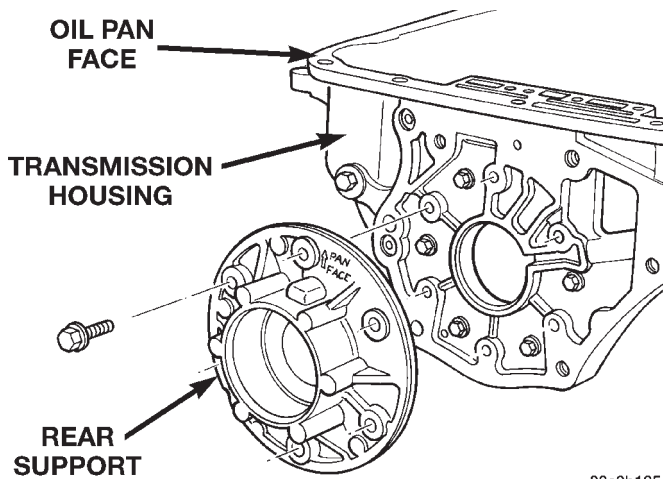


Fig. 86 Rear Support

(34) Compress front servo rod guide about 1/8 in. with large C-clamp and Tool C-4470, or Spring Compressor Tool C-3422-B (Fig. 94).

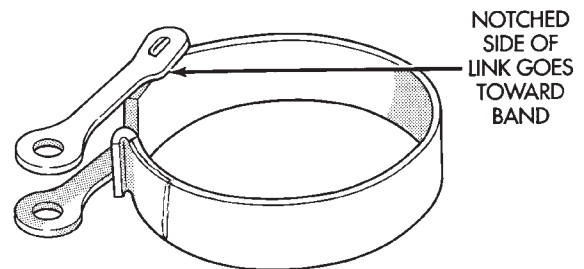


Fig. 89 Rear Band and Link

(35) Remove front servo rod guide snap ring (Fig. 94). **Exercise caution when removing snap ring. Servo bore can be scratched or nicked if care is not exercised.**

(36) Remove compressor tools and remove front servo rod guide, spring and servo piston.

(37) Compress rear servo spring retainer about 1/16 in. with C-clamp and Tool C-4470 or SP-5560 (Fig. 95). Valve Spring Compressor C-3422-B can also be used to compress spring retainer.

DISASSEMBLY AND ASSEMBLY (Continued)

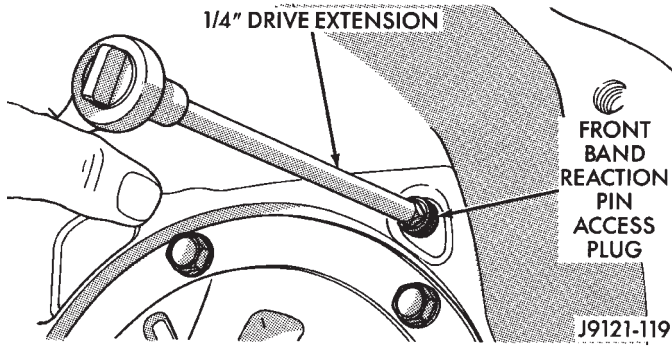


Fig. 90 Front Band Reaction Pin Access Plug

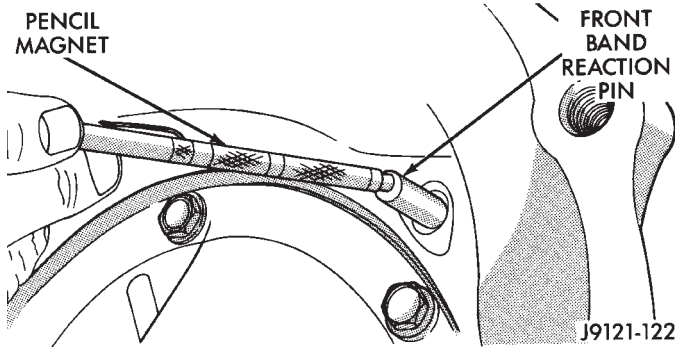


Fig. 91 Front Band Reaction Pin

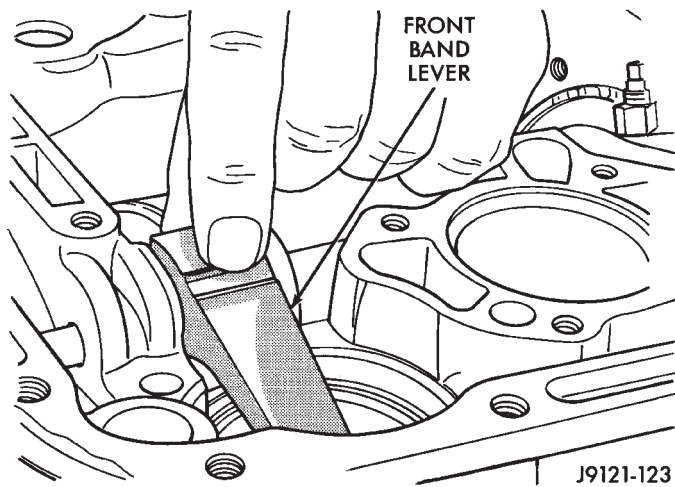


Fig. 92 Front Band Lever

(38) Remove rear servo spring retainer snap ring. Then remove compressor tools and remove rear servo spring and piston.

ASSEMBLY

(1) Install rear servo piston, spring and spring retainer. Compress rear servo spring and retainer with Compressor Tool C-3422-B (Fig. 95) or a large C-clamp.

(2) Install front servo piston, spring, and rod guide. Compress front servo rod guide with Valve

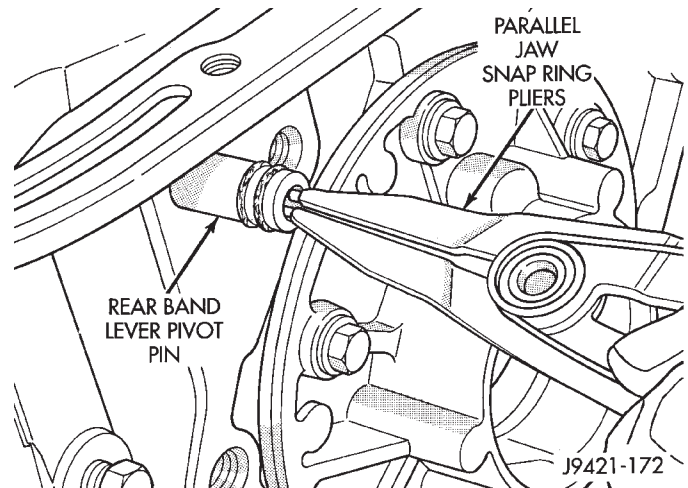


Fig. 93 Rear Band Servo Lever Pin

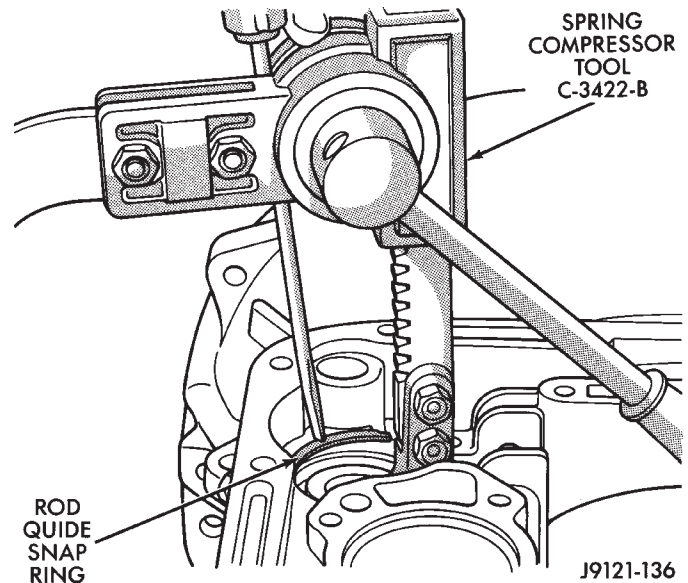


Fig. 94 Compressing Front Servo

Spring Compressor C-3422-B and install servo snap ring (Fig. 94).

(3) Assemble link bar to band. Notched side of link toward band (Fig. 93).

(4) Insert rear band through pan opening in transmission case.

(5) Insert hook on band onto adjuster lever.

(6) Align holes in link bar with hole in transmission case outboard of rear support opening (Fig. 92).

(7) Insert anchor pin into case through link bar.

(8) Examine bolt holes in overrunning clutch cam. Note that one hole is **not threaded** (Fig. 96). This hole must align with blank area in clutch cam bolt circle.

NOTE: The bolt holes in cam are slightly counter-sunk on one side. This side of cam faces rearward (toward rear support).

DISASSEMBLY AND ASSEMBLY (Continued)

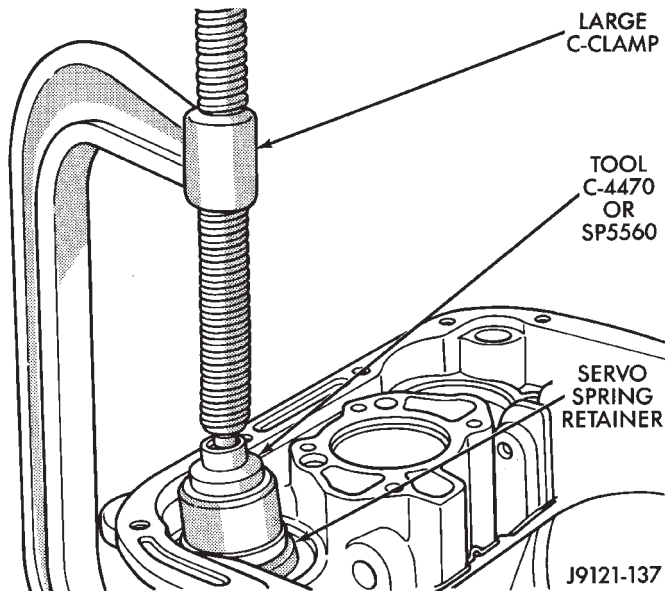


Fig. 95 Compressing Rear Servo Spring

(9) Lubricate overrunning clutch rollers, springs and cam with Mopar® ATF Plus 3, type 7176, transmission fluid.

(10) Position overrunning clutch on a clean, flat work surface with countersunk holes downward.

(11) Place rear of low-reverse drum over overrunning clutch and align clutch rollers to hub of drum.

(12) While slightly pivoting low-reverse drum, push hub of drum into overrunning clutch. Verify that countersunk holes are facing outward. **Cam should be able to rotate in the drum clockwise only.**

(13) Insert a suitable awl through the rear support mounting hole closest to the pan sealing face. The awl should be next to the wide space area at the back of transmission case.

(14) Insert low-reverse drum and overrunning clutch into front of transmission case and into rear band.

(15) Insert awl tip into the threaded hole next to the non-threaded hole in the overrunning clutch cam. Verify that non-threaded hole is aligned with wide space area on transmission case.

(16) Push low-reverse drum rearward to close gap between cam and case.

(17) Install overrunning clutch cam bolts. **Clutch cam bolts are shorter than rear support bolts.** Tighten cam bolts to 17 N·m (150 in. lbs. or 13 ft. lbs.) torque.

(18) Hold low-reverse drum in position so rear support will not push it out of overrunning clutch.

(19) Insert rear support into opening at rear of transmission case (Fig. 97).

(20) Align support with the embossed arrow in the direction of the pan face.

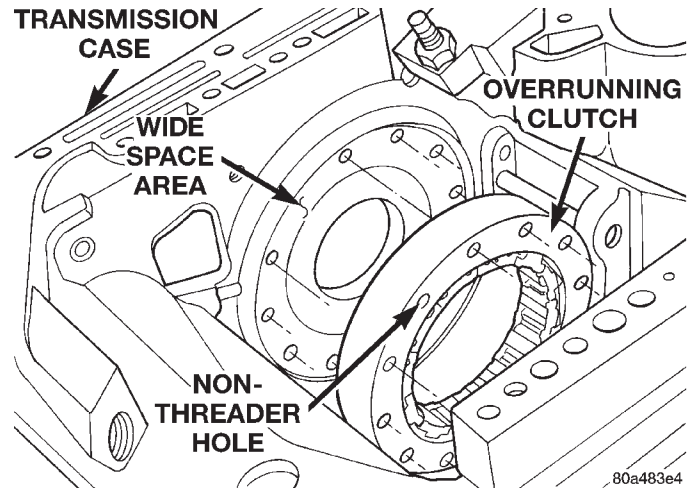


Fig. 96 Clutch Cam Alignment

(21) Install and tighten rear support bolts to 17 N·m (150 in. lbs.) torque.

(22) Install snap ring to retain low-reverse drum to hub of rear support (Fig. 98).

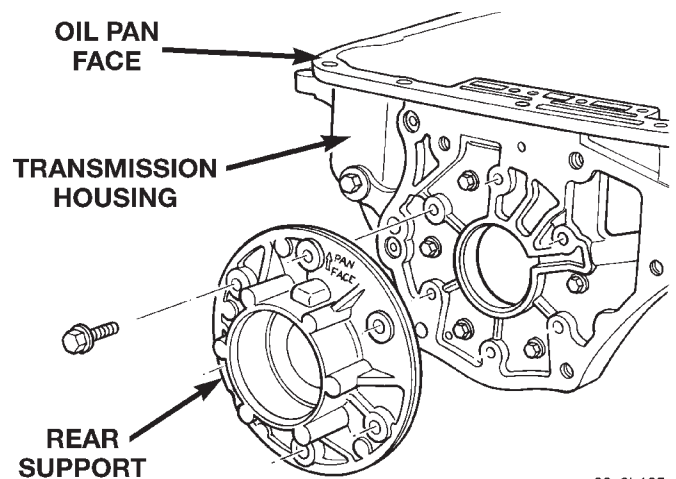


Fig. 97 Rear Support

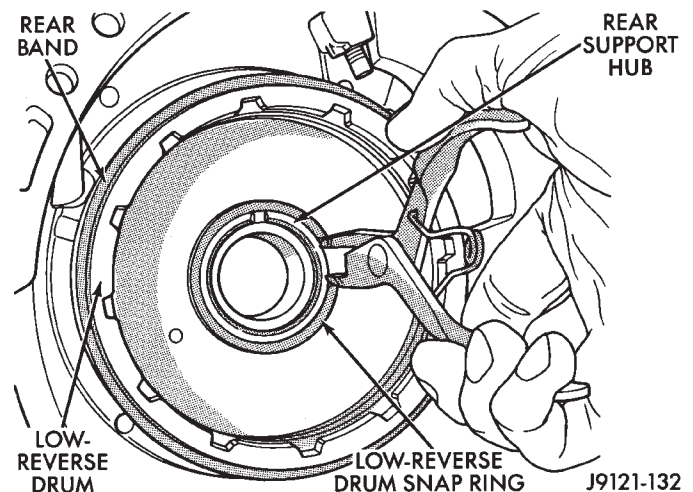


Fig. 98 Low-Reverse Drum Snap Ring

DISASSEMBLY AND ASSEMBLY (Continued)

(23) Lubricate output shaft, rear support bore and low-reverse drum hub with transmission fluid.

(24) Install assembled output shaft and planetary geartrain in case (Fig. 99).

(25) Align drive lugs on rear planetary gear with slots in low-reverse drum (Fig. 99). Then seat planetary assembly in drum.

(26) Install governor on output shaft.

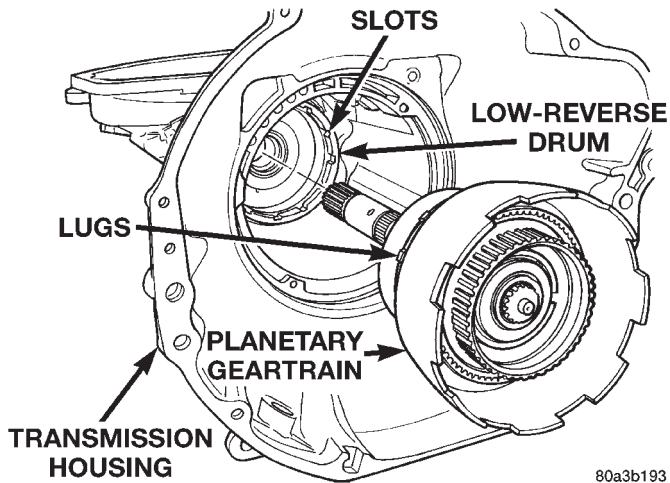


Fig. 99 Output Shaft And Planetary Geartrain

(27) Turn and secure transmission so that front opening is upward.

(28) Assemble front and rear clutches together.

(a) Check input shaft seal rings (Fig. 100). Verify that diagonal-cut ends of Teflon™ seal ring are properly joined and ends of metal ring are correctly hooked together. Also be sure rings are installed in sequence shown.

(b) Align teeth on clutch discs in line.

(c) Insert input shaft on rear clutch into center of front clutch (Fig. 101).

(d) Engage teeth on rear clutch hub into teeth on clutch (Fig. 103). Rotate front clutch retainer back and forth until completely seated on rear clutch.

(29) Install output shaft thrust plate on shaft hub in planetary geartrain driving shell (Fig. 102). Use petroleum jelly to hold thrust plate in place.

(30) Check rear clutch thrust washer. Use additional petroleum jelly to hold washer in place if necessary.

(31) Coat output shaft thrust washer with petroleum jelly. Install washer in rear clutch hub (Fig. 104). Use enough petroleum jelly to hold washer in place. **Be sure grooved side of washer faces rearward (toward output shaft) as shown. Also note that washer only fits one way in clutch hub.**

(32) Align drive teeth on rear clutch discs with small screwdriver (Fig. 105). This will make installation into front of planetary geartrain easier.

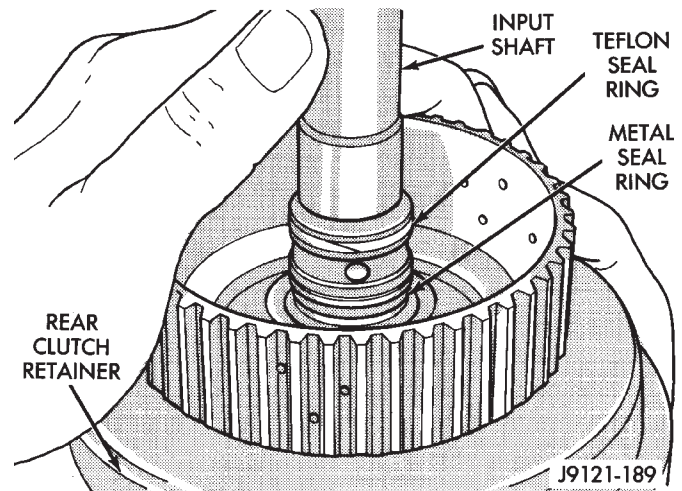


Fig. 100 Input Shaft Seal Ring Location

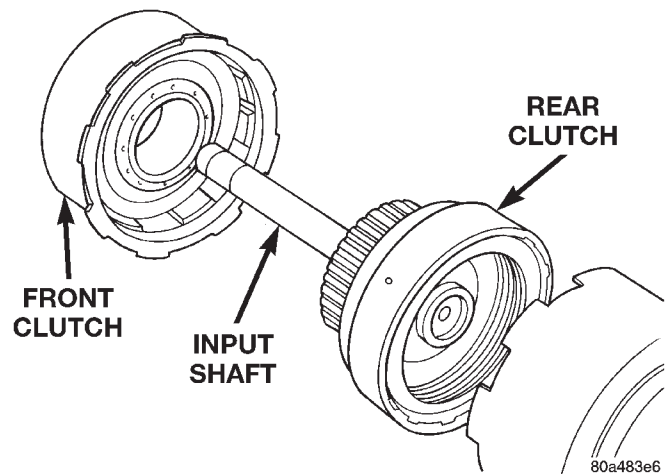


Fig. 101 Front and Rear Clutches

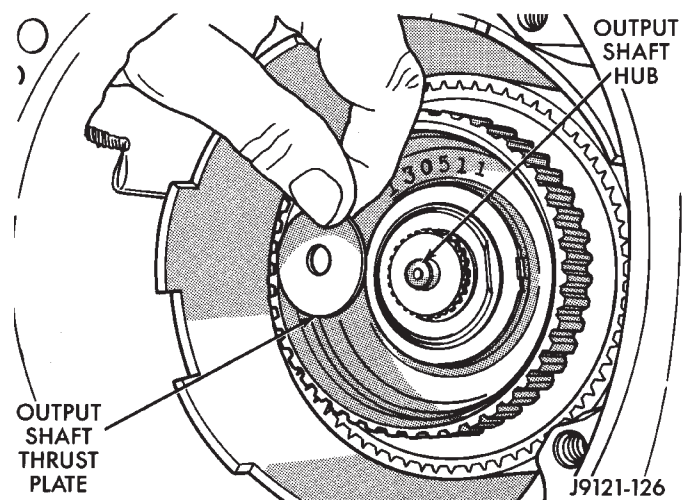


Fig. 102 Output Shaft Thrust Plate

(33) Insert front band into opening at front of transmission case (Fig. 106).

(34) Install front and rear clutch units as assembly (Fig. 107). Align rear clutch with front annulus gear

DISASSEMBLY AND ASSEMBLY (Continued)

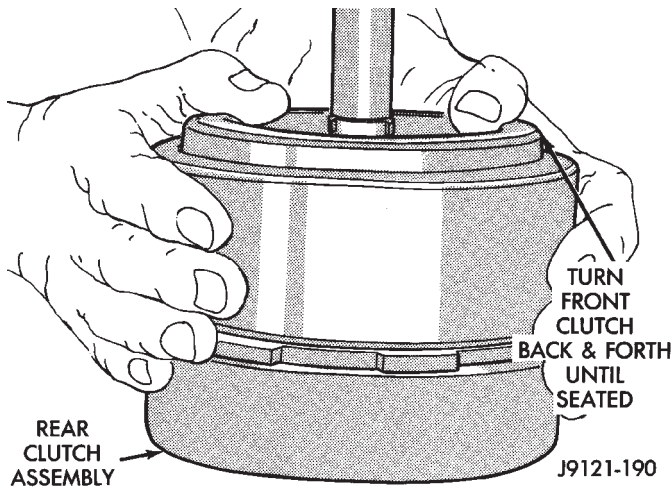


Fig. 103 Assembling Front And Rear Clutch Units

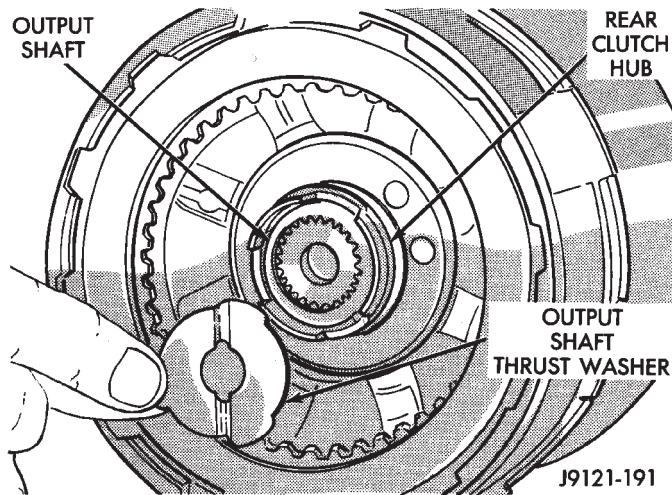


Fig. 104 Output Shaft Thrust Washer

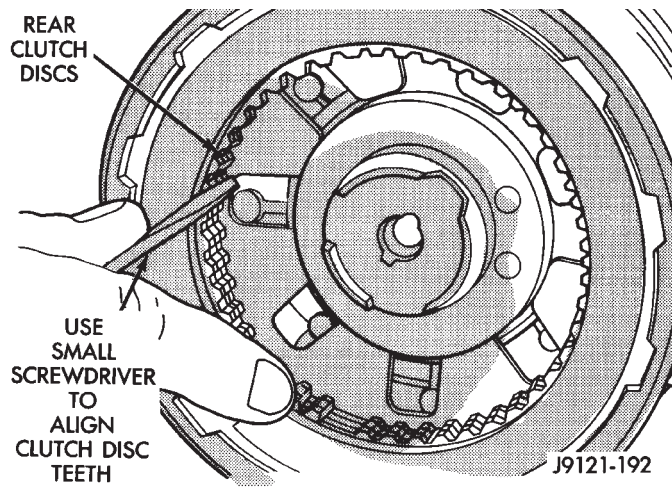


Fig. 105 Aligning Rear Clutch Disc Lugs

and install assembly in driving shell. Be sure output shaft thrust washer and thrust plate are not displaced during installation.

(35) Carefully work assembled clutches back and forth to engage and seat rear clutch discs on front annulus gear. Verify that front clutch drive lugs are fully engaged in slots of driving shell after installation.

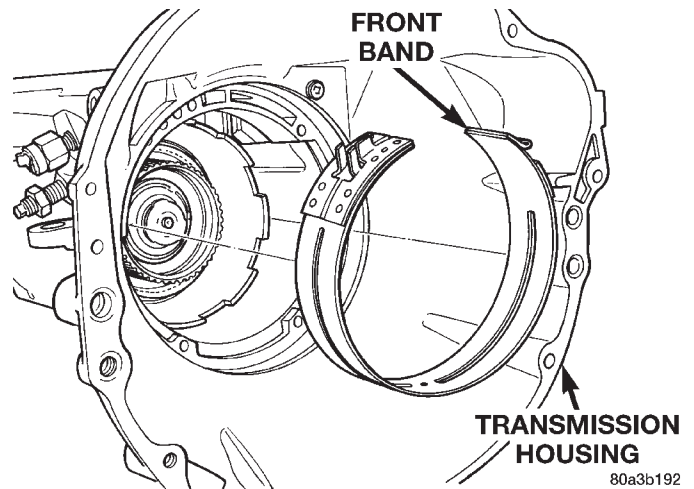


Fig. 106 Front Band

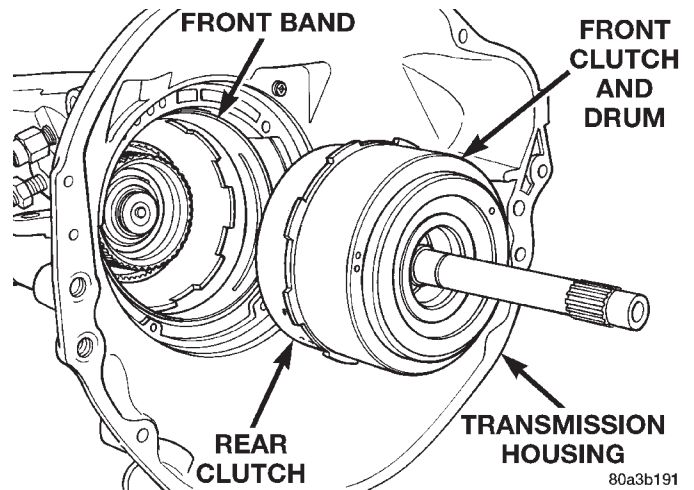


Fig. 107 Installing Front/Rear Clutch

(36) Engage front band on adjusting screw and hold band in place.

(37) Install strut between band lever and front band (Fig. 108).

(38) Tighten front band adjusting screw until band just grips clutch retainer. Verify that front/rear clutches are still seated before continuing.

(39) Verify that reaction shaft support hub seal rings are hooked together (Fig. 109).

(40) Coat front clutch thrust washer with petroleum jelly to hold it in place. Then install washer over reaction shaft hub and seat it on pump (Fig. 110).

DISASSEMBLY AND ASSEMBLY (Continued)

CAUTION: The thrust washer bore (I.D.), is chamfered on one side. Make sure the chamfered side is installed so it faces the pump.

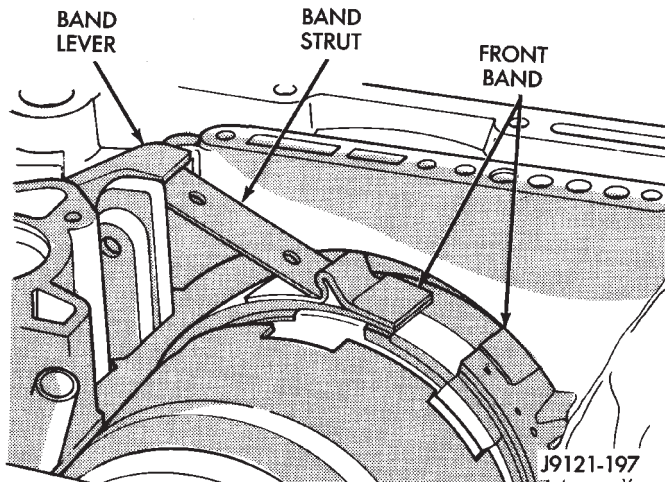


Fig. 108 Front Band Linkage Installation

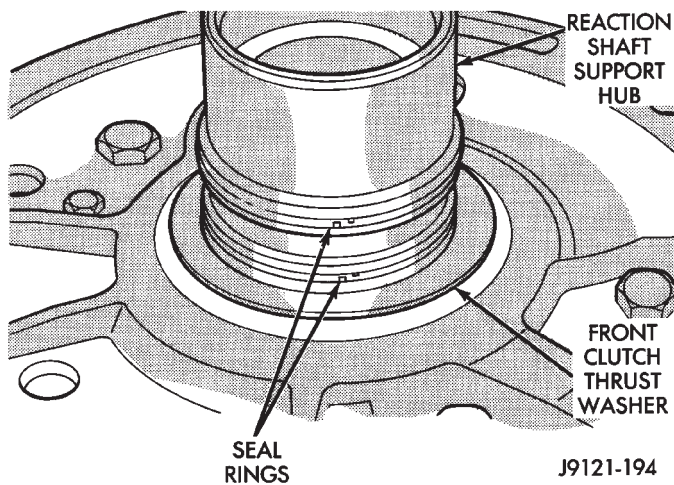


Fig. 109 Reaction Shaft Support Seal Rings

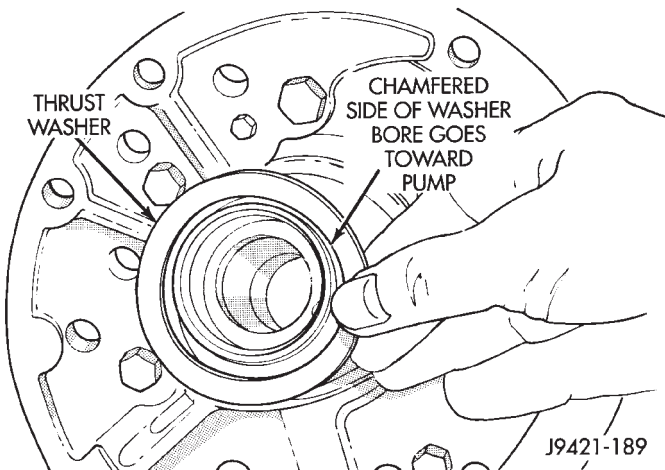


Fig. 110 Front Clutch Thrust Washer Installation

(41) Thread two Pilot Stud Tools C-3288-B into bolt holes in oil pump flange (Fig. 111).

(42) Align and install oil pump gasket (Fig. 111).

(43) Lubricate oil pump seals with Mopar® Door-Ease, or Ru-Glyde, Door Eze, or ATF Plus 3.

(44) Install oil pump (Fig. 112). Align and position pump on pilot studs. Slide pump down studs and work it into front clutch hub and case by hand. Then install two or three pump bolts to hold pump in place.

(45) Remove pilot stud tools and install remaining oil pump bolts. Tighten bolts alternately in diagonal pattern to 20 N·m (15 ft. lbs.).

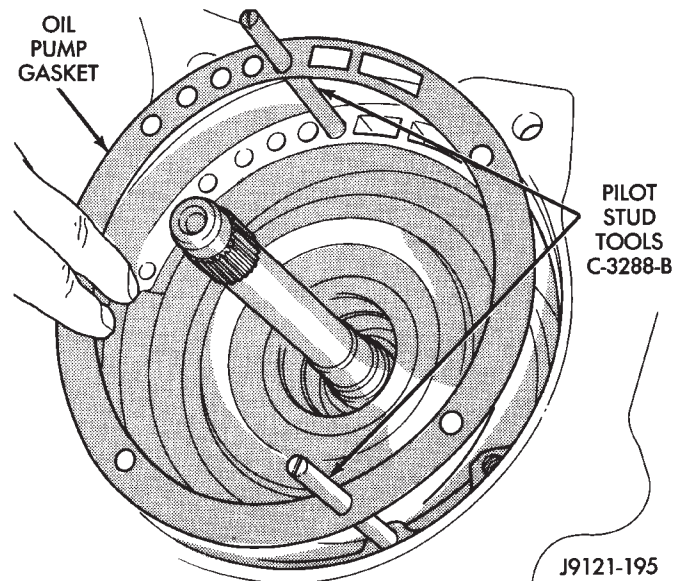


Fig. 111 Installing Pilot Studs And Oil Pump Gasket

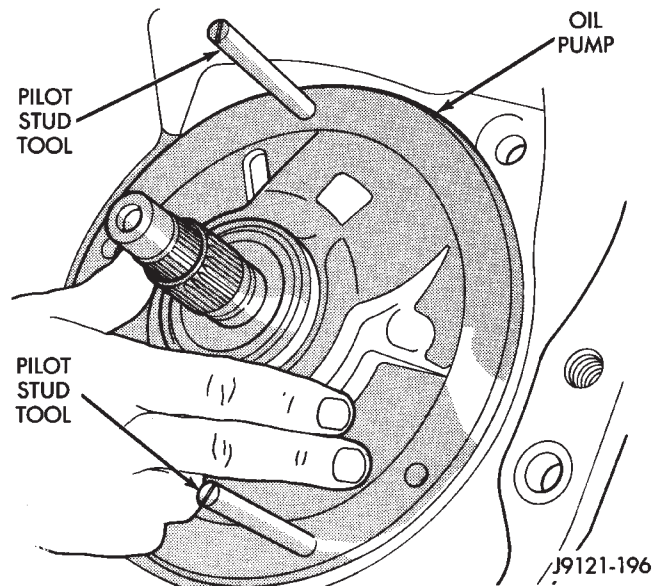


Fig. 112 Installing Oil Pump And Reaction Shaft Support

(46) Measure input shaft end play (Fig. 113).

DISASSEMBLY AND ASSEMBLY (Continued)

NOTE: If end play is incorrect, transmission is incorrectly assembled, or output shaft thrust washer and/or thrust plate are worn and need to be changed.

- (a) Attach dial indicator (C-3339) to converter housing. Position indicator plunger against input shaft and zero indicator.
- (b) Move input shaft in and out and record reading. End play should be 0.56 - 2.31 mm (0.022 - 0.091 in.).

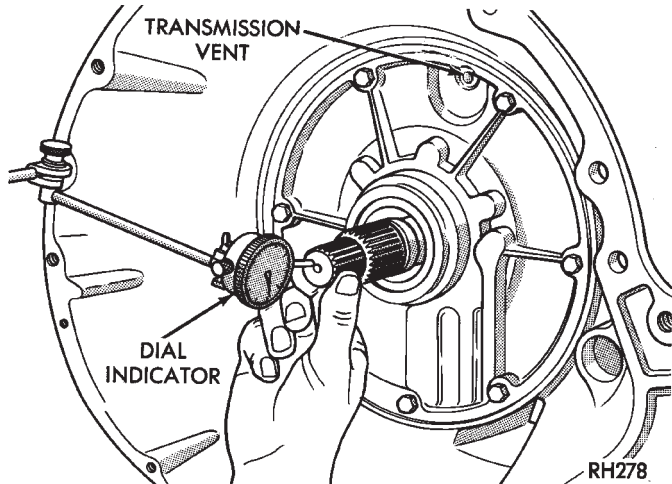


Fig. 113 Checking Input Shaft End Play

- (47) Position transmission on work surface with pan face upward.
- (48) Install valve body.
- (49) Adjust front and rear bands.
- (50) Install fluid filter and pan.
- (51) Install rear extension housing.
- (52) Install torque converter.

OVERRUNNING CLUTCH/LOW-REVERSE DRUM

DISASSEMBLY

- (1) If the clutch assembly came out with the low-reverse drum, thread two clutch cam bolts into the cam. Then lift the cam out of the drum with the bolts (Fig. 114). Rotate the cam back and forth to ease removal if necessary.
- (2) Remove the clutch roller and spring assembly from the overrunning clutch race.

ASSEMBLY

- (1) Assemble clutch rollers and springs in retainer if necessary (Fig. 115).
- (2) Install overrunning clutch roller, spring and retainer assembly in clutch cam (Fig. 116).
- (3) Temporarily assemble and check overrunning clutch operation as follows:
 - (a) Assemble cam and clutch.

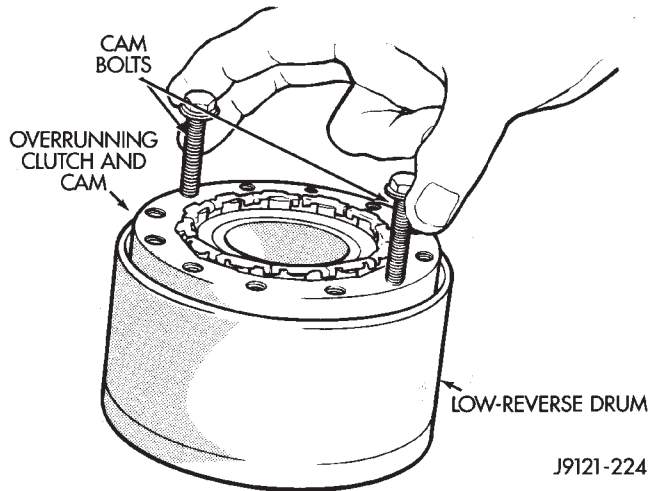


Fig. 114 Removing Overrunning Clutch From Low-Reverse Drum

- (b) Install clutch assembly on low-reverse drum with twisting motion (Fig. 117).
- (c) Install drum-clutch assembly in case and install clutch cam bolts.
- (d) Install rear support and support attaching bolts.
- (e) Check low-reverse drum rotation. **Drum should rotate freely in clockwise direction and lock when turned in counterclockwise direction (as viewed from front of case).**

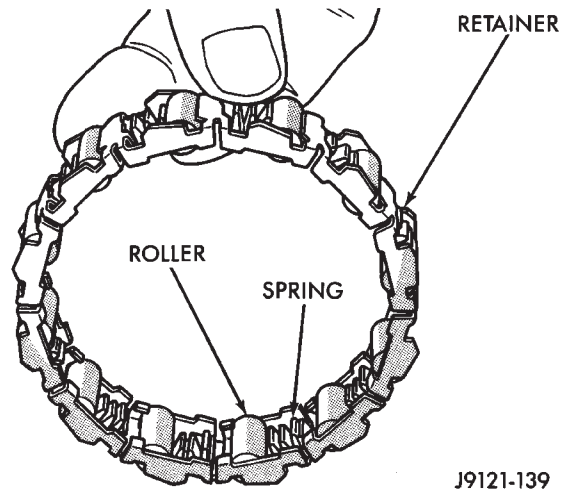


Fig. 115 Overrunning Clutch Rollers, Springs, Retainer

FRONT SERVO PISTON

DISASSEMBLY

- (1) Remove seal ring from rod guide (Fig. 119).
- (2) Remove small snap ring from servo piston rod. Then remove piston rod, spring and washer from piston.

DISASSEMBLY AND ASSEMBLY (Continued)

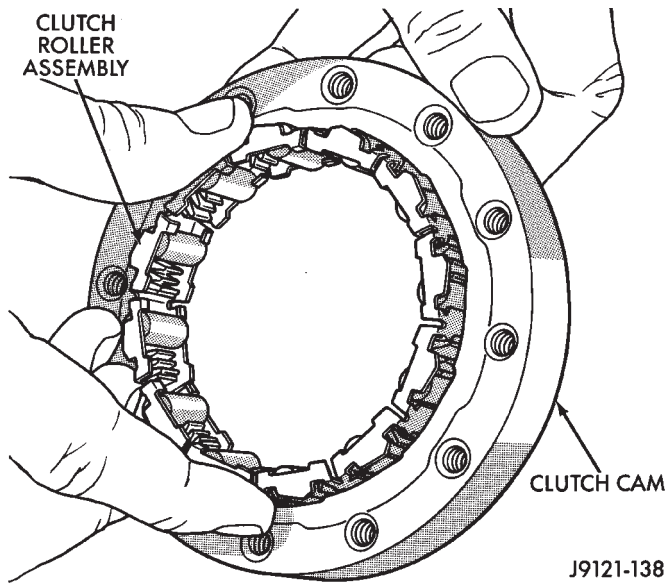
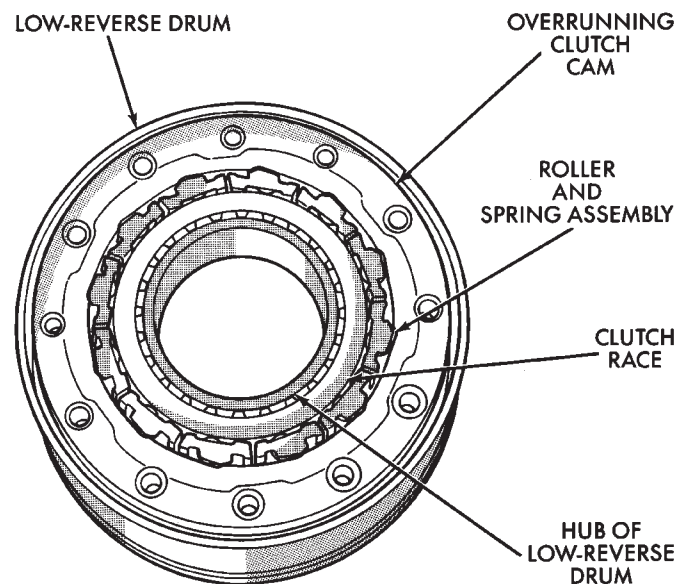
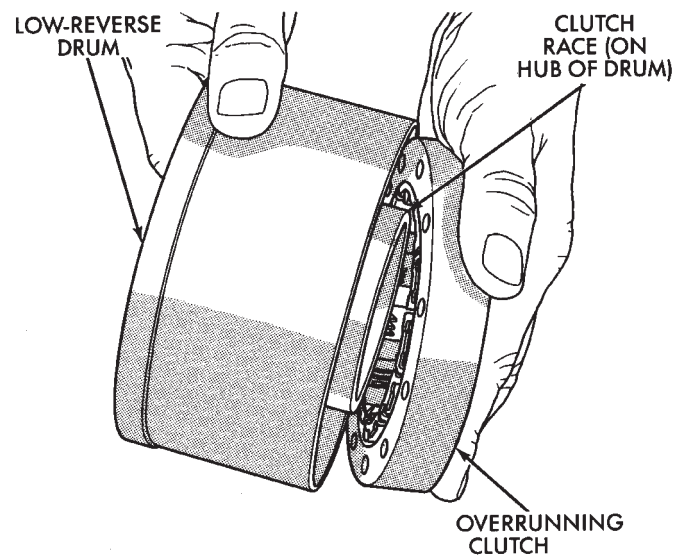


Fig. 116 Assembling Overrunning Clutch And Cam



J9121-140



J9121-135

Fig. 117 Temporary Assembly Of Clutch And Drum To Check Operation

(3) Remove and discard servo component O-ring and seal rings.

ASSEMBLY

(1) Lubricate new O-ring and seal rings with petroleum jelly and install them on piston, guide and rod.

(2) Install rod in piston. Install spring and washer on rod. Compress spring and install snap ring (Fig. 119).

(3) Set servo components aside for installation during transmission reassembly.

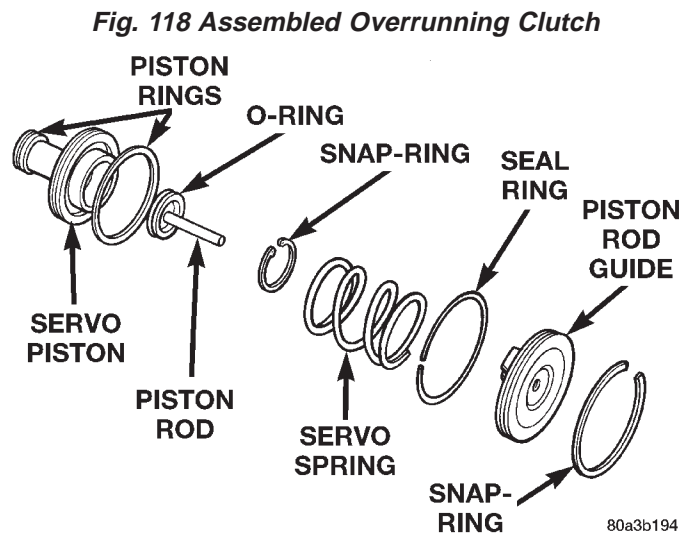


Fig. 118 Assembled Overrunning Clutch

Fig. 119 Front Servo

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REAR SERVO PISTON

DISASSEMBLY

(1) Remove small snap ring and remove plug and spring from servo piston (Fig. 120).

(2) Remove and discard servo piston seal ring.

ASSEMBLY

(1) Lubricate piston and guide seals with petroleum jelly. Lubricate other servo parts with Mopar® ATF Plus 3, Type 7176, transmission fluid.

(2) Install new seal ring on servo piston.

(3) Assemble piston, plug, spring and new snap ring.

(4) Lubricate piston seal lip with petroleum jelly.

DISASSEMBLY AND ASSEMBLY (Continued)

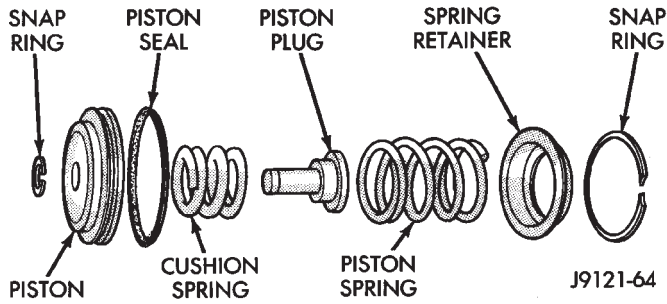


Fig. 120 Rear Servo Components

OIL PUMP AND REACTION SHAFT SUPPORT

DISASSEMBLY

- (1) Remove seal ring from housing and reaction shaft support (Fig. 121).
- (2) Mark pump housing and support assembly for alignment reference.
- (3) Remove bolts attaching pump body to support (Fig. 122).

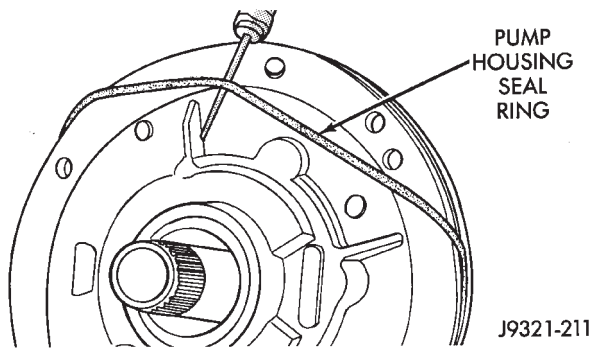


Fig. 121 Removing Pump Seal Ring

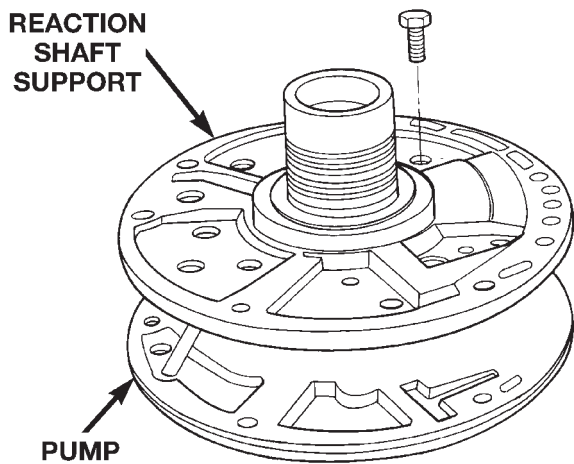


Fig. 122 Pump Support Bolts

- (4) Separate support from pump housing (Fig. 123).
- (5) Remove inner and outer gears from reaction shaft support (Fig. 124).

- (6) If pump seal was not removed during transmission disassembly, remove seal with punch and hammer.
- (7) Remove front clutch thrust washer from support hub (Fig. 125).

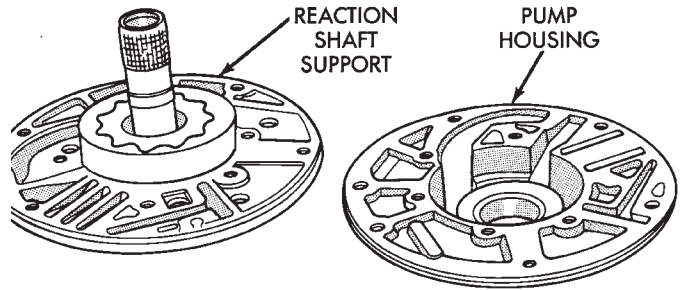


Fig. 123 Separating Pump Housing From Reaction Shaft Support

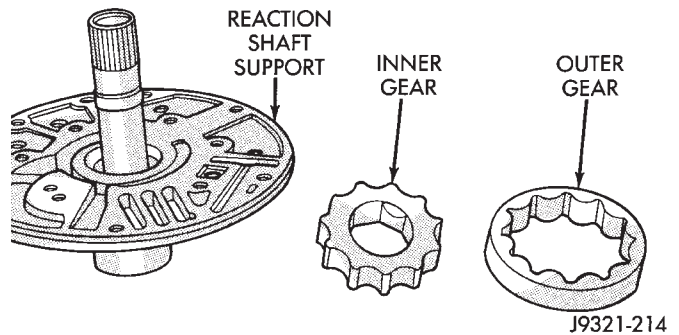


Fig. 124 Pump Gear Removal

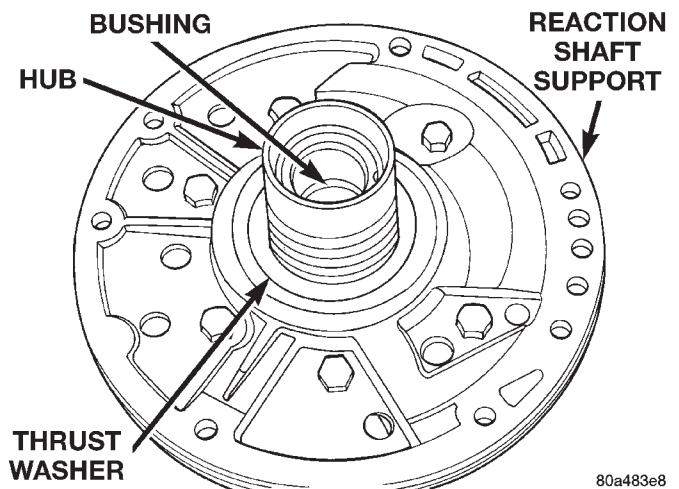


Fig. 125 Support Hub Thrust Washer

OIL PUMP BUSHING REPLACEMENT

- (1) Remove pump bushing with Tool Handle C-4171 and Bushing Remover SP-3551 from Tool Set C-3887-J (Fig. 126).
- (2) Install new pump bushing with Tool Handle C-4171 and Bushing Installer SP-5117 (Fig. 126). Bushing should be flush with pump housing bore.

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Stake new pump bushing in two places with blunt punch (Fig. 127). Remove burrs from stake points with knife blade afterward.

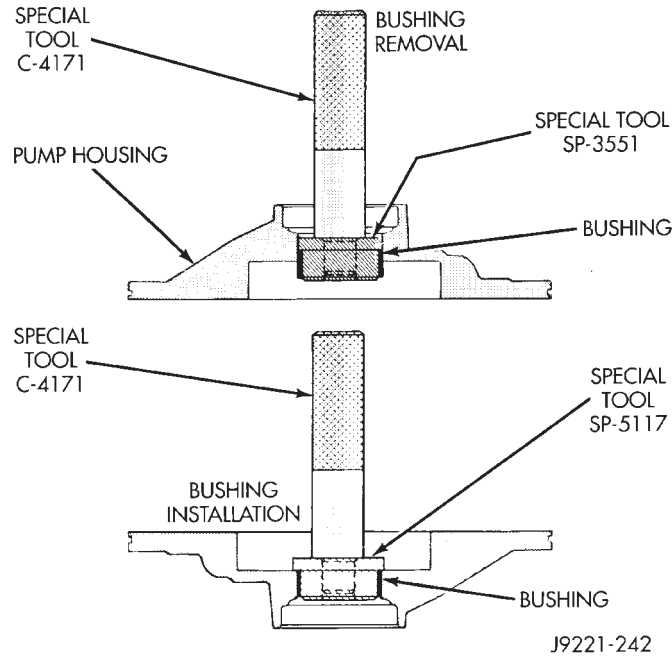


Fig. 126 Removing Oil Pump Bushing

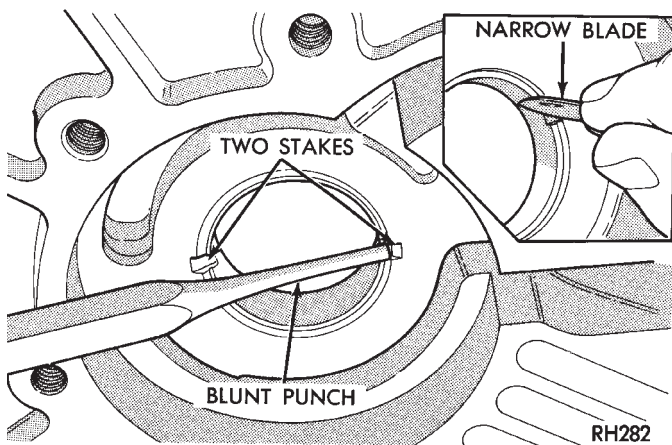


Fig. 127 Staking Oil Pump Bushing

REACTION SHAFT SUPPORT BUSHING REMOVAL

(1) Assemble Bushing Remover Tools SP-1191, 3633 and 5324 (Fig. 128). **Do not clamp any part of reaction shaft or support in vise.**

(2) Hold Cup Tool SP-3633 firmly against reaction shaft and thread remover SP-5324 into bushing as far as possible by hand. Then thread remover tool 3-4 additional turns into bushing with a wrench.

(3) Turn remover tool hex nut down against remover cup to pull bushing from shaft. Clean all chips from shaft after bushing removal.

(4) Lightly grip old bushing in vise or with pliers and back remover tool out of bushing.

(5) Assemble Bushing Installer Tools C-4171 and SP-5325 (Fig. 128).

(6) Slide new bushing onto Installer Tool SP-5325.

(7) Position reaction shaft support upright on a clean smooth surface.

(8) Align bushing in bore. Then tap bushing into place until Bushing Installer SP-5325 bottoms.

(9) Clean reaction shaft support thoroughly after installing bushing.

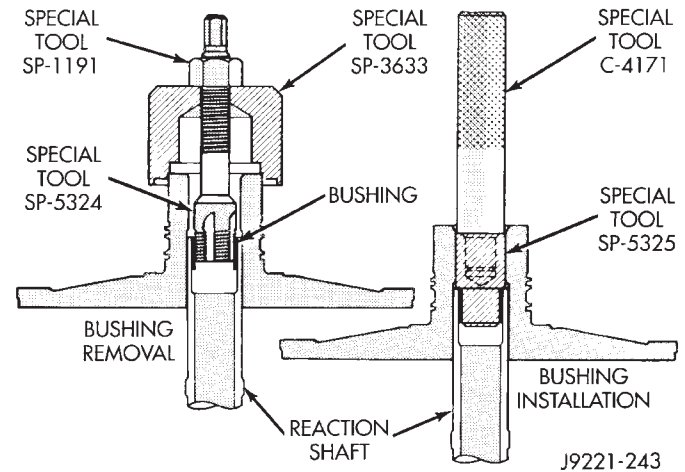


Fig. 128 Replacing Reaction Shaft Support Bushing

ASSEMBLY

(1) Lubricate gear bore in pump housing with transmission fluid.

(2) Lubricate pump gears with transmission fluid.

(3) Support pump housing on wood blocks (Fig. 129).

(4) Install outer gear in pump housing (Fig. 129). Gear can be installed either way (it is not a one-way fit).

(5) Install pump inner gear (Fig. 130).

CAUTION: The pump inner gear is a one way fit. The bore on one side of the gear inside diameter (I.D.) is chamfered. Be sure the chamfered side faces forward (to front of pump).

(6) Install new thrust washer on hub of reaction shaft support. Lubricate washer with transmission fluid or petroleum jelly.

(7) If reaction shaft seal rings are being replaced, install new seal rings on support hub (Fig. 131). Lubricate seal rings with transmission fluid or petroleum jelly after installation. Squeeze each ring until ring ends are securely hooked together.

DISASSEMBLY AND ASSEMBLY (Continued)

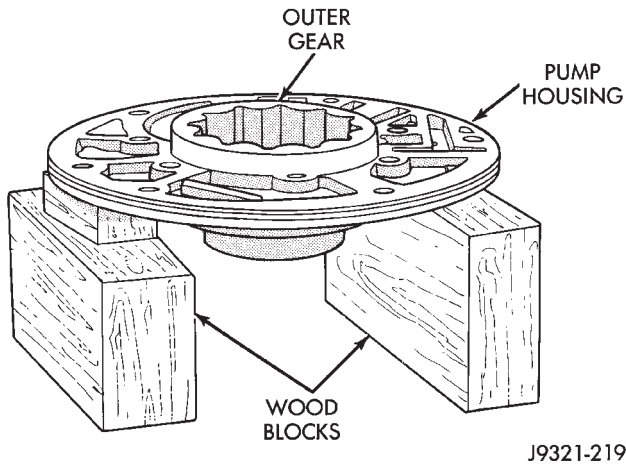


Fig. 129 Supporting Pump And Installing Outer Gear

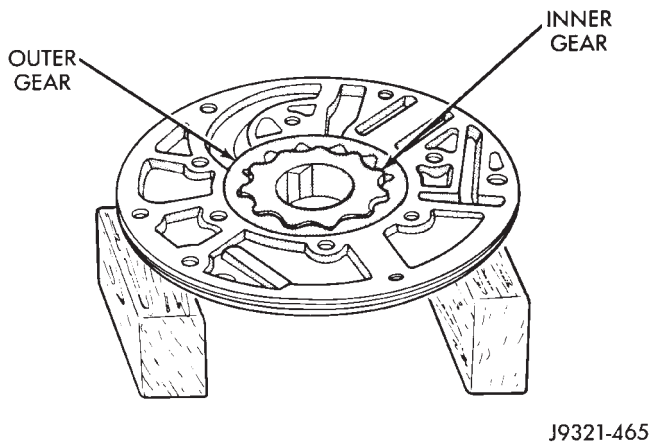


Fig. 130 Pump Inner Gear Installation

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.

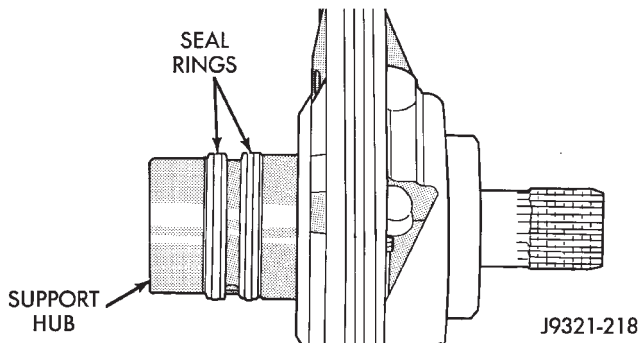


Fig. 131 Hub Seal Ring Position

(8) Install reaction shaft support on pump housing (Fig. 132).

(9) Align reaction support on pump housing. Use alignment marks made at disassembly. Or, rotate support until bolt holes in support and pump housing are all aligned (holes are offset for one-way fit).

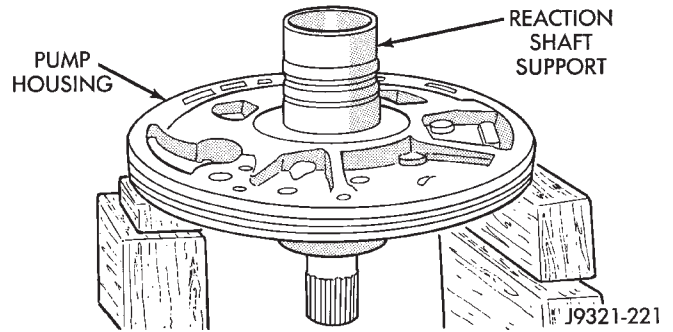


Fig. 132 Assembling Reaction Shaft Support And Pump Housing

(10) Install all bolts that attach support to pump housing. Then tighten bolts finger tight.

(11) Tighten support-to-pump bolts to required torque as follows:

(a) Reverse pump assembly and install it in transmission case. Position pump so bolts are facing out and are accessible.

(b) Secure pump assembly in case with 2 or 3 bolts, or with pilot studs.

(c) Tighten support-to-pump bolts to 20 N·m (15 ft. lbs.).

(d) Remove pump assembly from transmission case.

(12) Install new oil seal in pump with Special Tool C-4193 and Tool Handle C-4171 (Fig. 133). Be sure seal lip faces inward.

(13) Install new seal ring around pump housing. Be sure seal is properly seated in groove.

(14) Lubricate lip of pump oil seal and O-ring seal with transmission fluid.

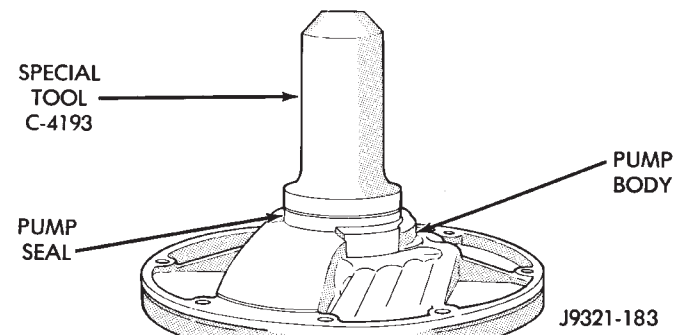
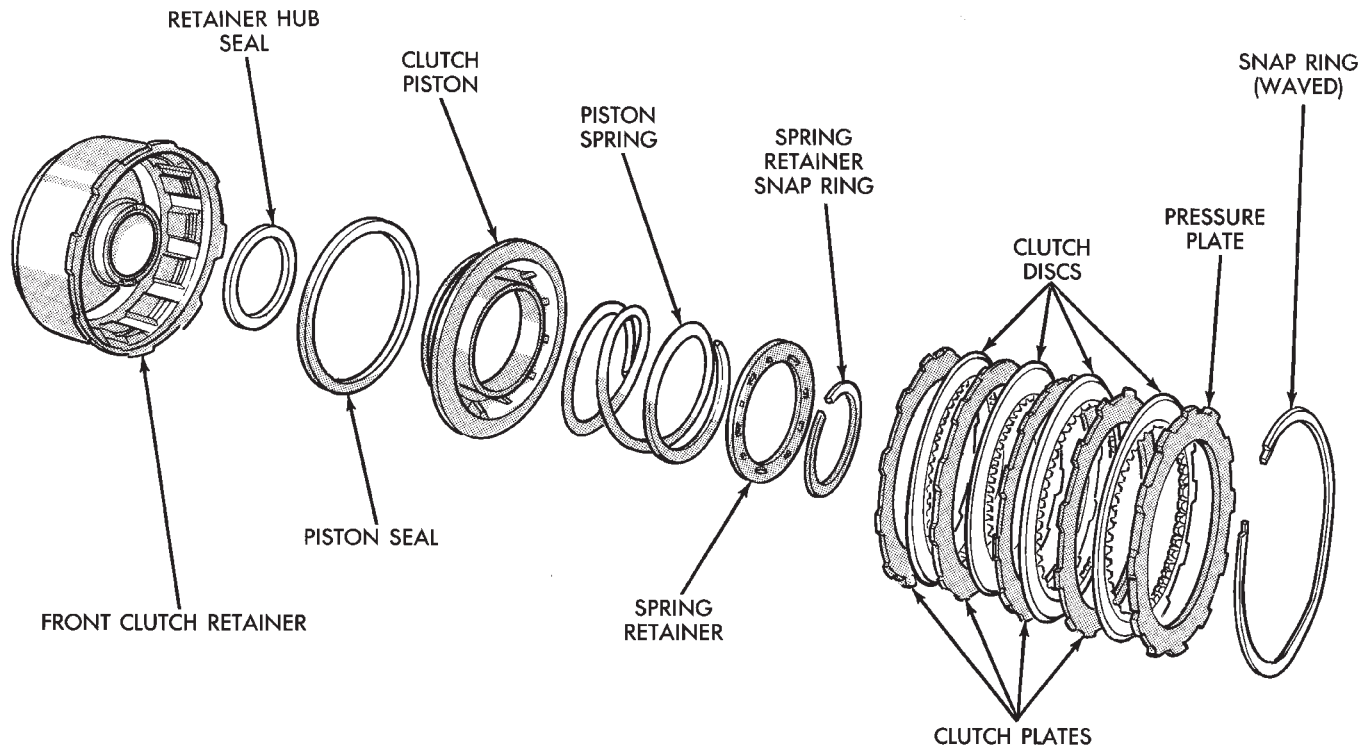


Fig. 133 Pump Oil Seal Installation

DISASSEMBLY AND ASSEMBLY (Continued)



J9321-222

Fig. 134 Front Clutch Components

FRONT CLUTCH

DISASSEMBLY

- (1) Remove waved snap ring and remove pressure plate, clutch plates and clutch discs (Fig. 134).
- (2) Compress clutch piston spring with Compressor Tool C-3575-A (Fig. 135). Be sure legs of tool are seated squarely on spring retainer before compressing spring.
- (3) Remove retainer snap ring and remove compressor tool.
- (4) Remove spring retainer and clutch spring. Note position of retainer on spring for assembly reference.
- (5) Remove clutch piston from clutch retainer. Remove piston by rotating it up and out of retainer.
- (6) Remove seals from clutch piston and clutch retainer hub. Discard both seals as they are not reusable.

ASSEMBLY

- (1) Soak clutch discs in transmission fluid while assembling other clutch parts.
- (2) Install new seals on piston and in hub of retainer. Be sure lip of each seal faces interior of clutch retainer.
- (3) Lubricate lips of piston and retainer seals with liberal quantity of Mopar® Door Ease, or Ru-Glyde.

Then lubricate retainer hub, bore and piston with light coat of transmission fluid.

- (4) Install clutch piston in retainer (Fig. 136). 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.

- (5) Position spring in clutch piston (Fig. 137).
- (6) Position spring retainer on top of piston spring (Fig. 138). **Make sure retainer is properly installed. Small raised tabs should be facing upward. Semicircular lugs on underside of retainer are for positioning retainer in spring.**
- (7) Compress piston spring and retainer with Compressor Tool C-3575-A (Fig. 135). Then install new snap ring to secure spring retainer and spring.
- (8) Install clutch plates and discs (Fig. 134). Install steel plate then disc until all plates and discs are installed. The front clutch uses 4 clutch discs.

DISASSEMBLY AND ASSEMBLY (Continued)

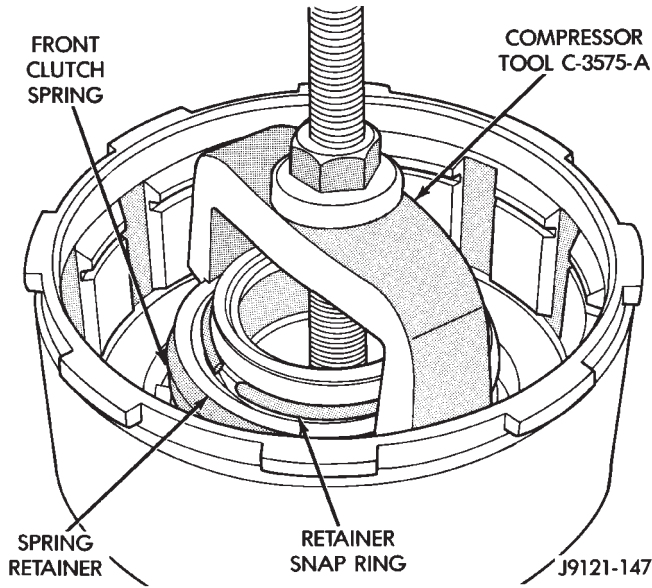


Fig. 135 Compressing Front Clutch Piston Spring

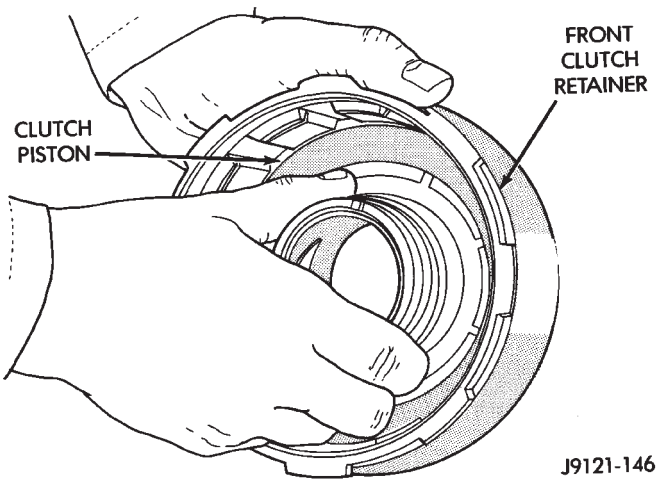


Fig. 136 Front Clutch Piston Installation

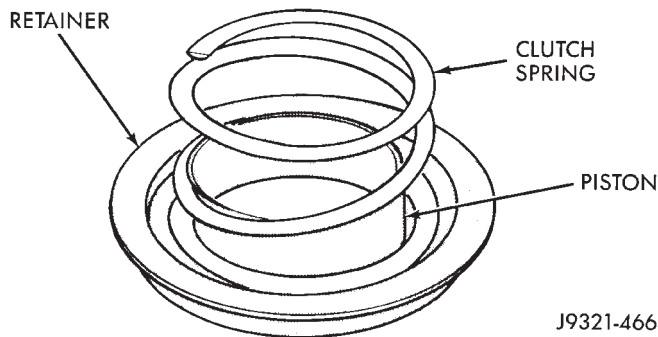


Fig. 137 Clutch Piston Spring Installation

(9) Install pressure plate and waved snap ring (Fig. 134).

(10) Using a suitable gauge bar and dial indicator, measure clutch plate clearance (Fig. 139).

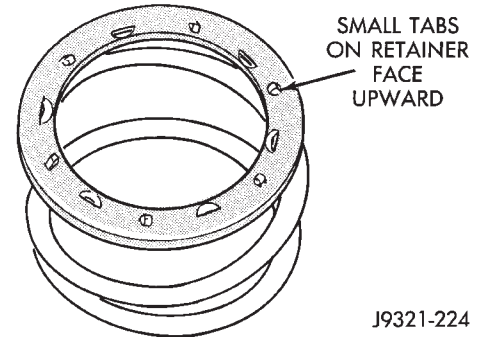


Fig. 138 Correct Spring Retainer Installed Position

(a) Position gauge bar across the clutch drum with the dial indicator pointer on the pressure plate (Fig. 139).

(b) Using two small screw drivers, lift the pressure plate and compress the waved snap-ring. This will assure that the snap-ring is at the top of the groove.

(c) Release the pressure plate and zero the dial indicator.

(d) Lift the pressure plate until it contacts the waved snap-ring and record the dial indicator reading.

Clearance should be 1.70 to 3.40 mm (0.067 to 0.134 in.). If clearance is incorrect, clutch discs, plates pressure plates and snap ring may have to be changed.

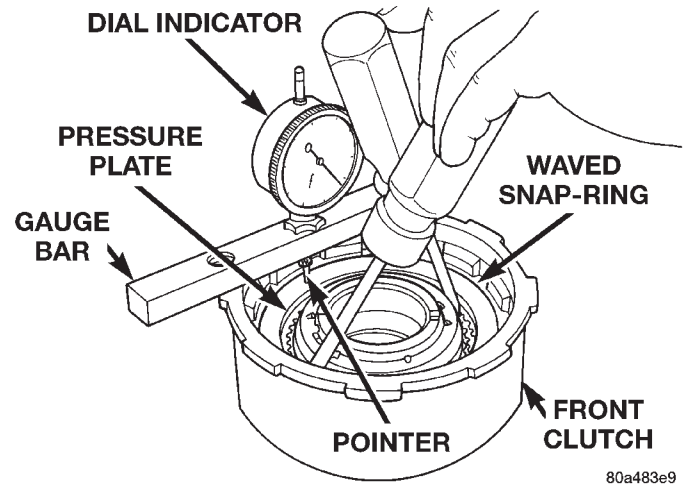


Fig. 139 Measuring Front Clutch Pack Clearance

REAR CLUTCH

DISASSEMBLY

(1) Remove thrust washer from forward side of clutch retainer.

(2) Remove input shaft front/rear seal rings.

(3) Remove selective clutch pack snap ring (Fig. 140).

DISASSEMBLY AND ASSEMBLY (Continued)

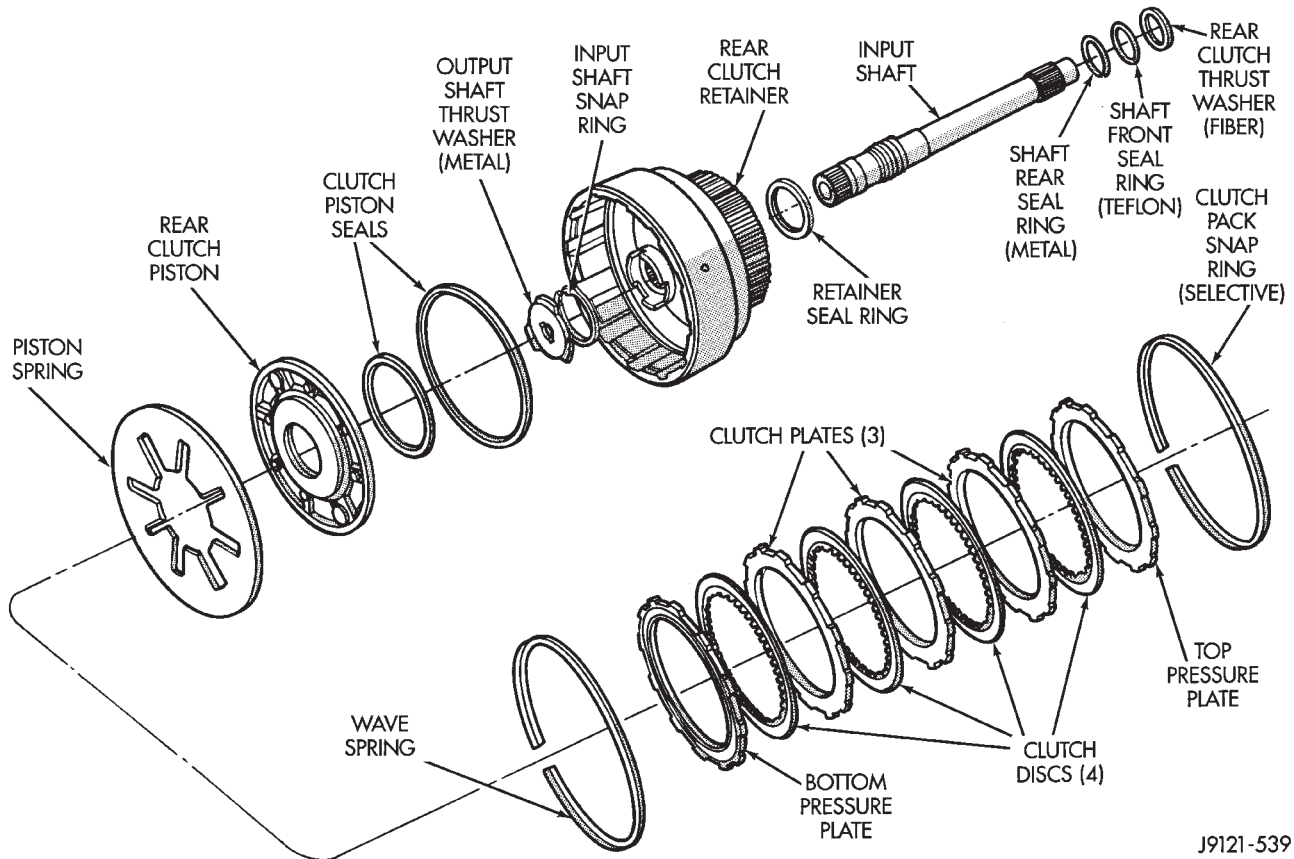


Fig. 140 Rear Clutch Components

(4) Remove top pressure plate, clutch discs, steel plates, bottom pressure plate and wave snap ring and wave spring (Fig. 140).

(5) Remove clutch piston with rotating motion.

(6) Remove and discard piston seals.

(7) Remove input shaft snap-ring (Fig. 141). It may be necessary to press the input shaft in slightly to relieve tension on the snap-ring.

(8) Press input shaft out of retainer with shop press and suitable size press tool. Use a suitably sized press tool to support the retainer as close to the input shaft as possible.

ASSEMBLY

(1) Soak clutch discs in transmission fluid while assembling other clutch parts.

(2) Install new seal rings on clutch retainer hub and input shaft if necessary (Fig. 142).

(a) Be sure clutch hub seal ring is fully seated in groove and is not twisted.

(3) Lubricate splined end of input shaft and clutch retainer with transmission fluid. Then press input shaft into retainer. Use a suitably sized press tool to support retainer as close to input shaft as possible.

(4) Install input shaft snap-ring (Fig. 141).

(5) Invert retainer and press input shaft in opposite direction until snap-ring is seated.

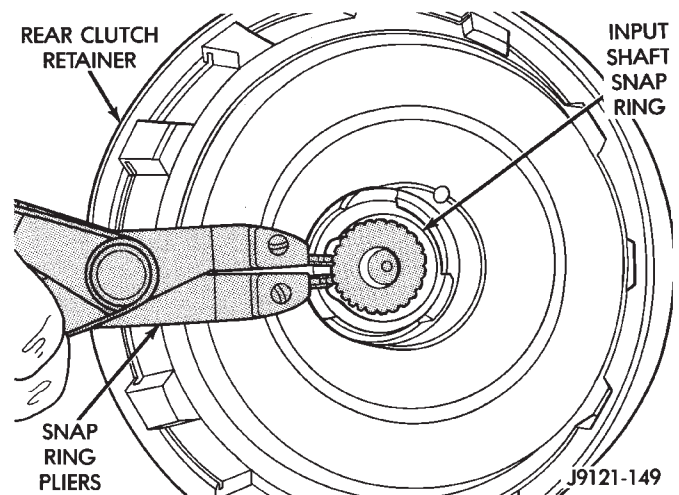


Fig. 141 Removing/Installing Input Shaft Snap-Ring

(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

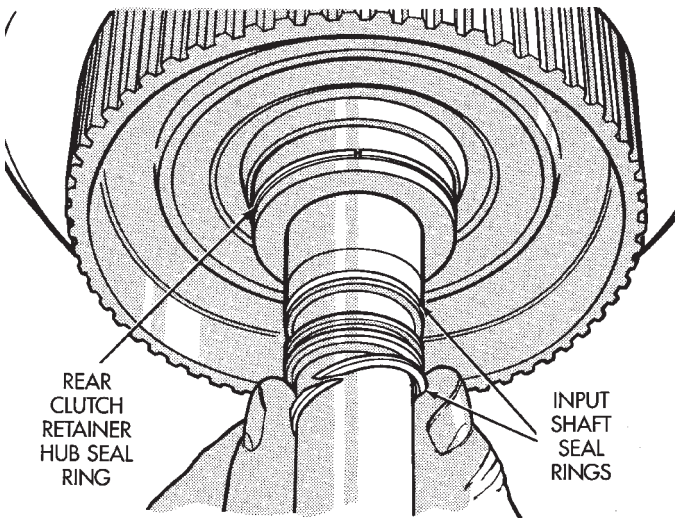
DISASSEMBLY AND ASSEMBLY (Continued)

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 (Fig. 145). Concave side of spring faces downward (toward piston).

(10) Install wave spring in retainer (Fig. 145). Be sure spring is completely seated in retainer groove.



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Fig. 142 Rear Clutch Retainer And Input Shaft Seal Ring Installation

(11) Install bottom pressure plate (Fig. 140). Ridged side of plate faces downward (toward piston) and flat side toward clutch pack.

(12) Install first clutch disc in retainer on top of bottom pressure plate. Then install a clutch plate followed by a clutch disc until entire clutch pack is installed (4 discs and 3 plates are required) (Fig. 140).

(13) Install top pressure plate.

(14) Install selective snap ring. Be sure snap ring is fully seated in retainer groove.

(15) Using a suitable gauge bar and dial indicator, measure clutch pack clearance (Fig. 146).

(a) Position gauge bar across the clutch drum with the dial indicator pointer on the pressure plate (Fig. 146).

(b) Using two small screw drivers, lift the pressure plate and release it.

(c) Zero the dial indicator.

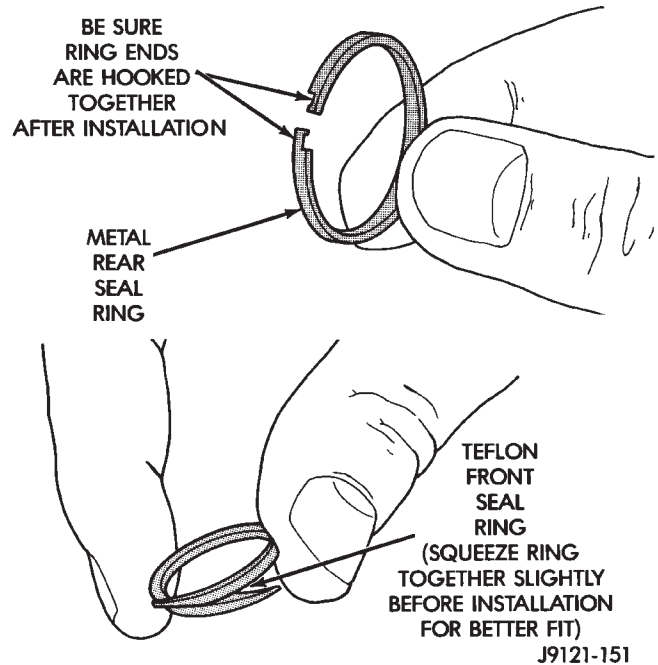


Fig. 143 Input Shaft Seal Ring Identification

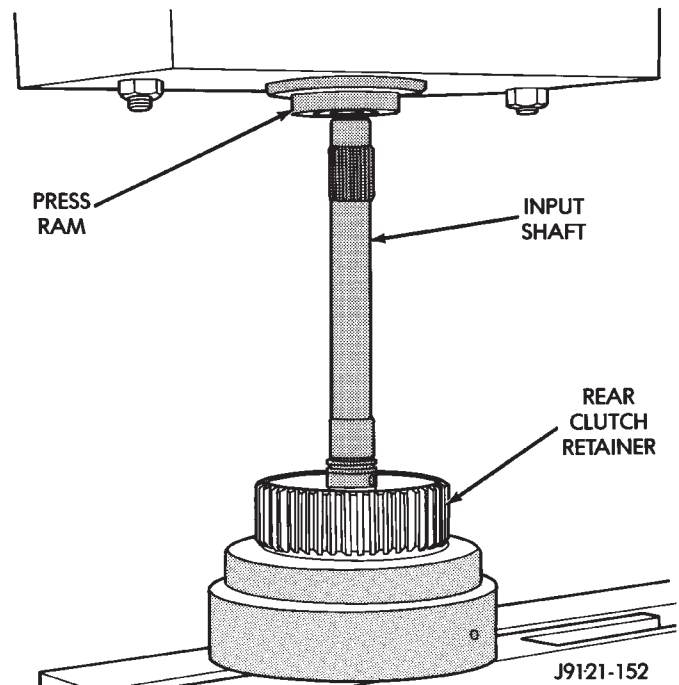


Fig. 144 Pressing Input Shaft Into Rear Clutch Retainer

(d) Lift the pressure plate until it contacts the snap-ring and record the dial indicator reading.

Clearance should be 0.64 - 1.14 mm (0.025 - 0.045 in.). If clearance is incorrect, steel plates, discs, selective snap ring and pressure plates may have to be changed.

The selective snap ring thicknesses are:

- .107-.109 in.

DISASSEMBLY AND ASSEMBLY (Continued)

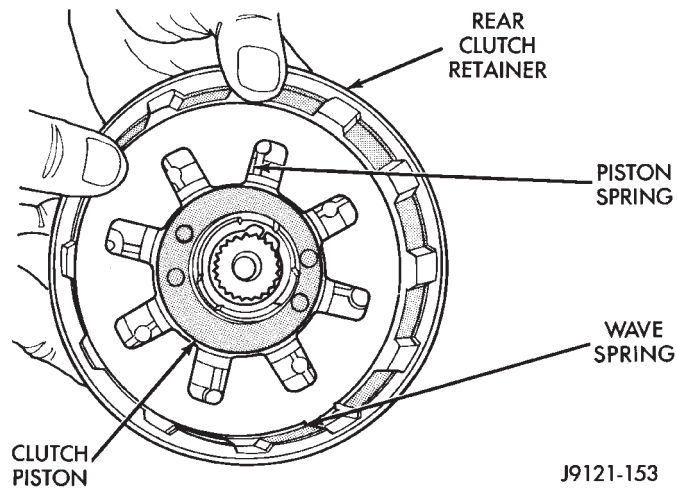


Fig. 145 Piston Spring/Wave Spring Position

- .098-.100 in.
- .095-.097 in.
- .083-.085 in.
- .076-.078 in.
- .071-.073 in.
- .060-.062 in.

(16) Coat rear clutch thrust washer with petroleum jelly and install washer over input shaft and into clutch retainer (Fig. 147). Use enough petroleum jelly to hold washer in place.

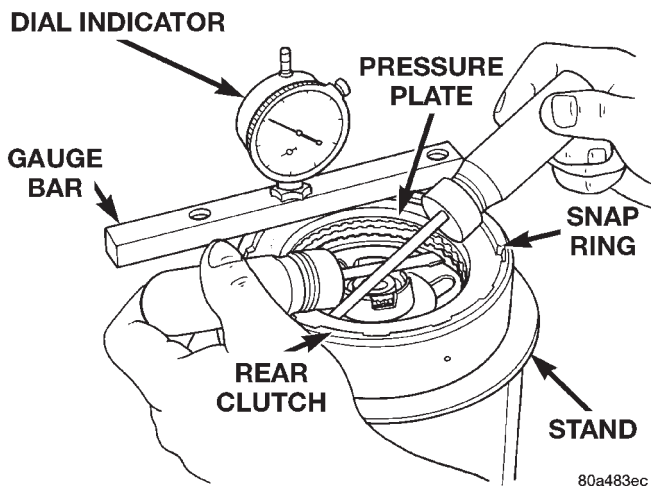


Fig. 146 Checking Rear Clutch Pack Clearance

PLANETARY GEARTRAIN/OUTPUT SHAFT

DISASSEMBLY

- (1) Remove planetary snap ring (Fig. 148).
- (2) Remove front annulus and planetary assembly from driving shell (Fig. 148).
- (3) Remove snap ring that retains front planetary gear in annulus gear (Fig. 149).
- (4) Remove tabbed thrust washer and tabbed thrust plate from hub of front annulus (Fig. 150).

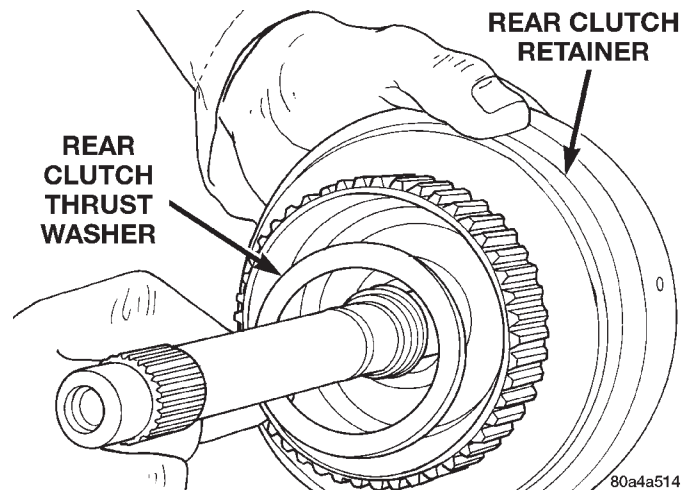


Fig. 147 Installing Rear Clutch Thrust Washer

(5) Separate front annulus and planetary gears (Fig. 150).

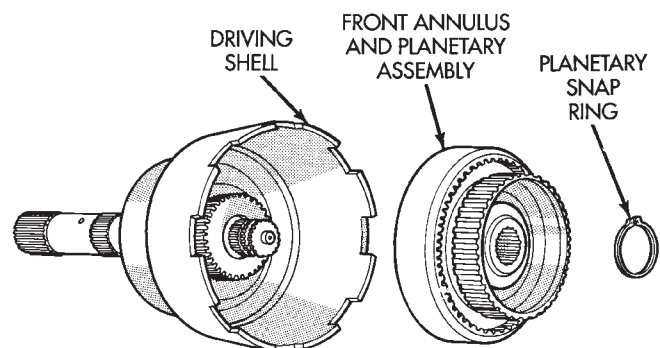
(6) Remove front planetary gear front thrust washer from annulus gear hub.

(7) Separate and remove driving shell, rear planetary and rear annulus from output shaft (Fig. 151).

(8) Remove front planetary rear thrust washer from driving shell.

(9) Remove tabbed thrust washers from rear planetary gear.

(10) Remove lock ring that retains sun gear in driving shell. Then remove sun gear, spacer and thrust plates.



J9421-175

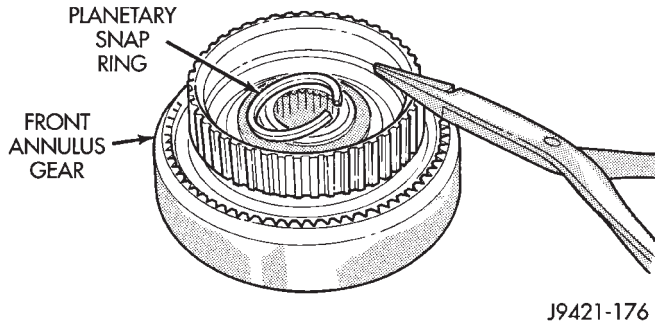
Fig. 148 Front Annulus And Planetary Assembly Removal

ASSEMBLY

(1) Lubricate output shaft and planetary components with transmission fluid. Use petroleum jelly to lubricate and hold thrust washers and plates in position.

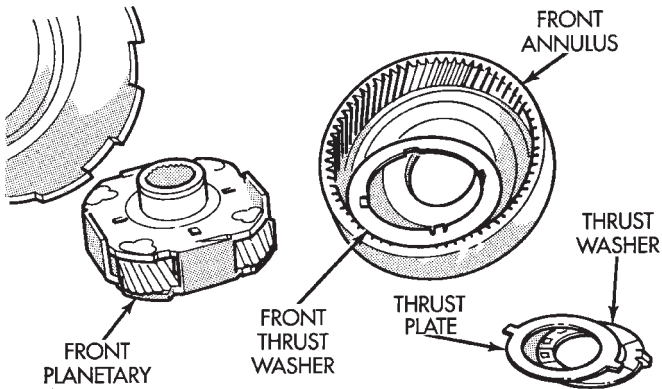
(2) Assemble rear annulus gear and support if disassembled. Be sure support snap ring is seated and

DISASSEMBLY AND ASSEMBLY (Continued)



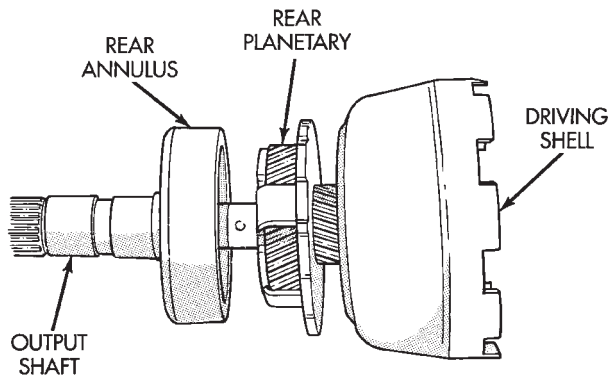
J9421-176

Fig. 149 Front Planetary Snap Ring Removal



J9421-177

Fig. 150 Front Planetary And Annulus Gear Disassembly



J9421-178

Fig. 151 Removing Driving Shell, Rear Planetary And Rear Annulus

that shoulder-side of support faces rearward (Fig. 152).

(3) Install rear thrust washer on rear planetary gear. Use enough petroleum jelly to hold washer in place. Also be sure all four washer tabs are properly engaged in gear slots.

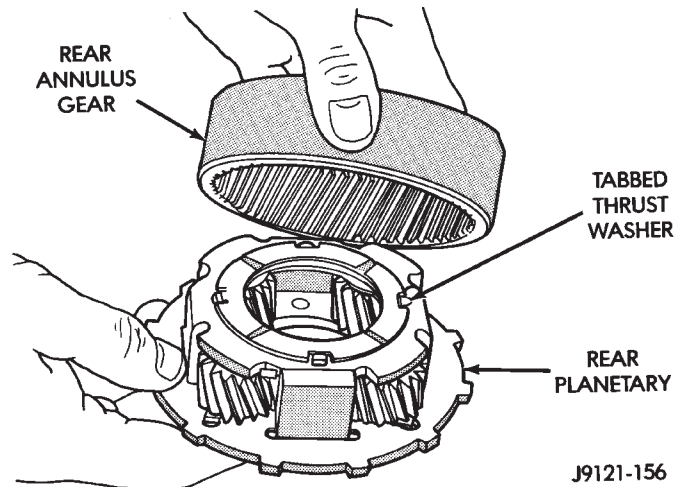
(4) Install rear annulus over and onto rear planetary gear (Fig. 152).

(5) Install assembled rear planetary and annulus gear on output shaft (Fig. 153). Verify that assembly is fully seated on shaft.

(6) Install front thrust washer on rear planetary gear (Fig. 154). Use enough petroleum jelly to hold washer on gear. Be sure all four washer tabs are seated in slots.

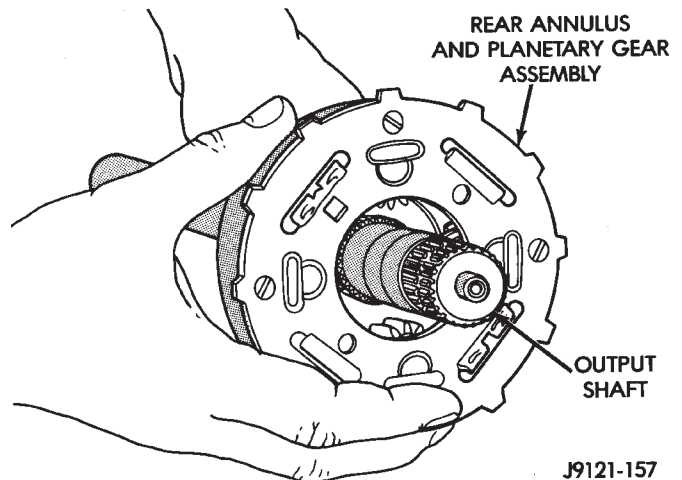
(7) Install spacer on sun gear (Fig. 155).

(8) Install thrust plate on sun gear (Fig. 156). Note that driving shell thrust plates are interchangeable. Use either plate on sun gear and at front/rear of shell.



J9121-156

Fig. 152 Assembling Rear Annulus And Planetary Gear



J9121-157

Fig. 153 Installing Rear Annulus And Planetary On Output Shaft

(9) Hold sun gear in place and install thrust plate over sun gear at rear of driving shell (Fig. 157).

(10) Position wood block on bench and support sun gear on block (Fig. 158). This makes it easier to align and install sun gear lock ring. Keep wood block

DISASSEMBLY AND ASSEMBLY (Continued)

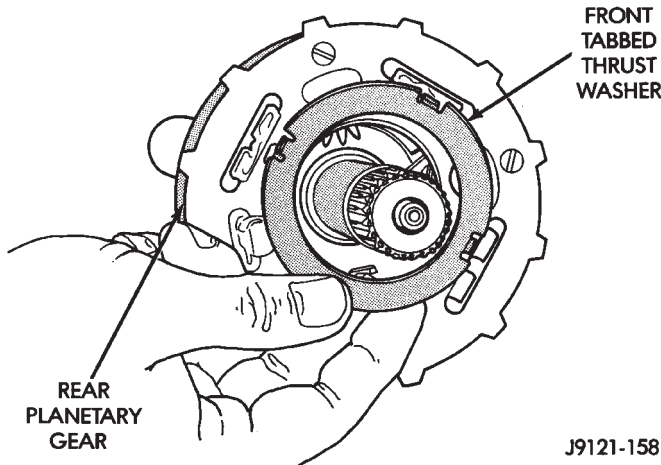


Fig. 154 Installing Rear Planetary Front Thrust Washer

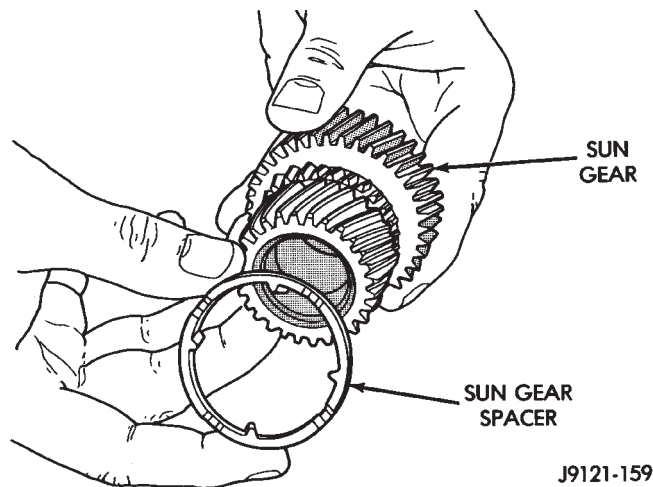


Fig. 155 Installing Spacer On Sun Gear

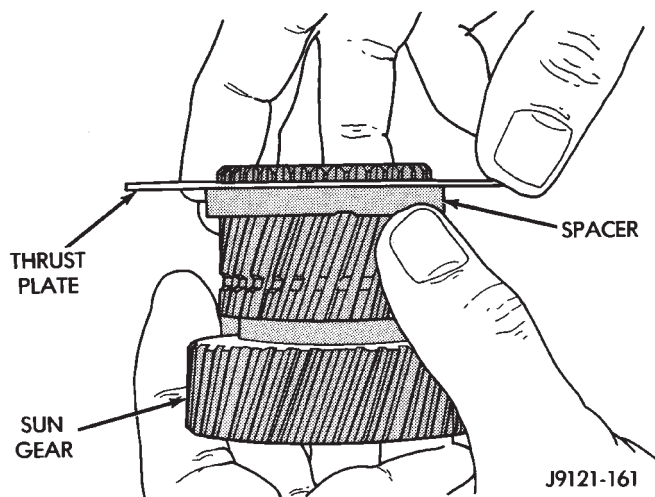


Fig. 156 Installing Driving Shell Front Thrust Plate On Sun Gear

handy as it will also be used for geartrain end play check.

(11) Align rear thrust plate on driving shell and install sun gear lock ring. Be sure ring is fully seated in sun gear ring groove (Fig. 159).

(12) Install assembled driving shell and sun gear on output shaft (Fig. 160).

(13) Install rear thrust washer on front planetary gear (Fig. 161). Use enough petroleum jelly to hold washer in place and be sure all four washer tabs are seated.

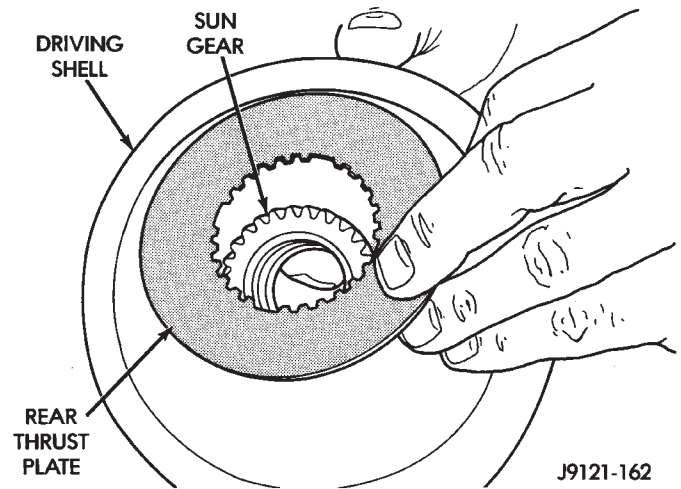


Fig. 157 Installing Driving Shell Rear Thrust Plate

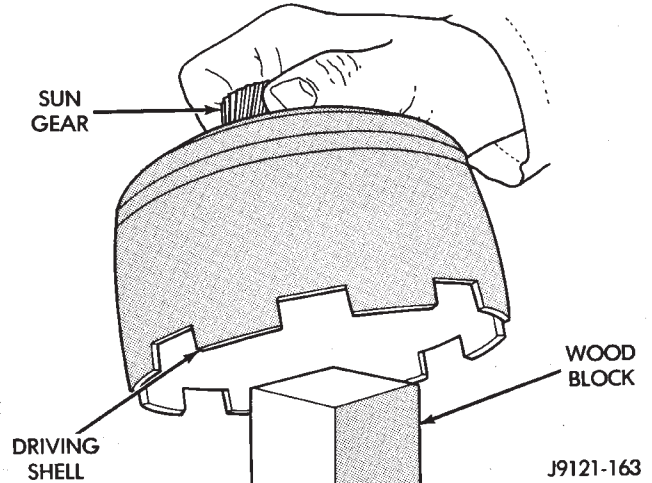


Fig. 158 Supporting Sun Gear On Wood Block

(14) Install front planetary gear on output shaft and in driving shell (Fig. 162).

(15) Install front thrust washer on front planetary gear. Use enough petroleum jelly to hold washer in place and be sure all four washer tabs are seated.

(16) Assemble front annulus gear and support, if necessary. Be sure support snap ring is seated.

(17) Install front annulus on front planetary (Fig. 162).

(18) Position thrust plate on front annulus gear support (Fig. 163). **Note that plate has two tabs on it. These tabs fit in notches of annulus hub.**

DISASSEMBLY AND ASSEMBLY (Continued)

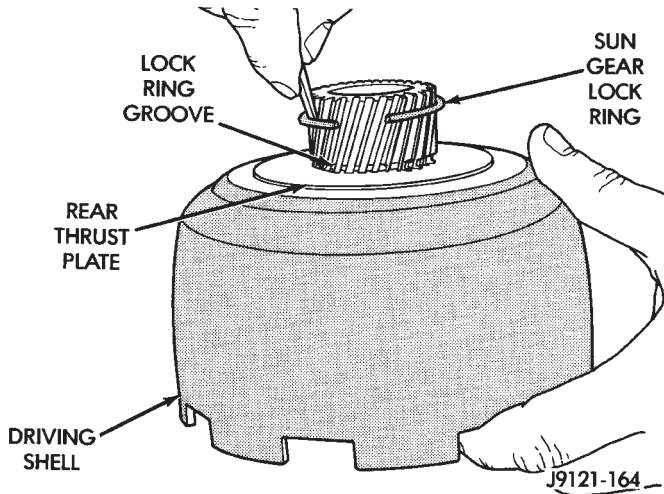


Fig. 159 Installing Sun Gear Lock Ring

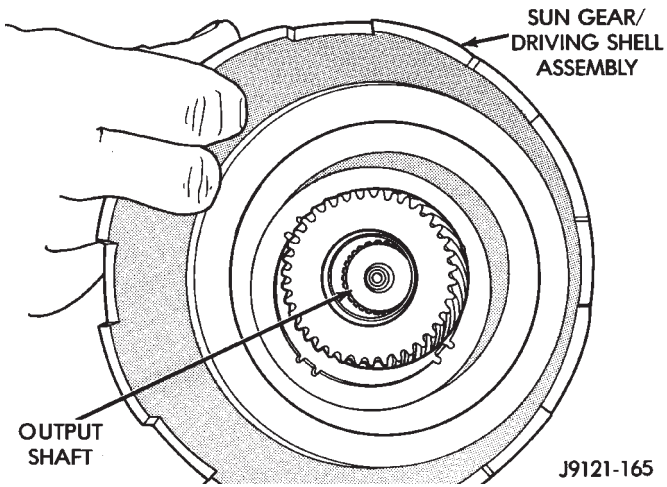


Fig. 160 Installing Assembled Sun Gear And Driving Shell On Output Shaft

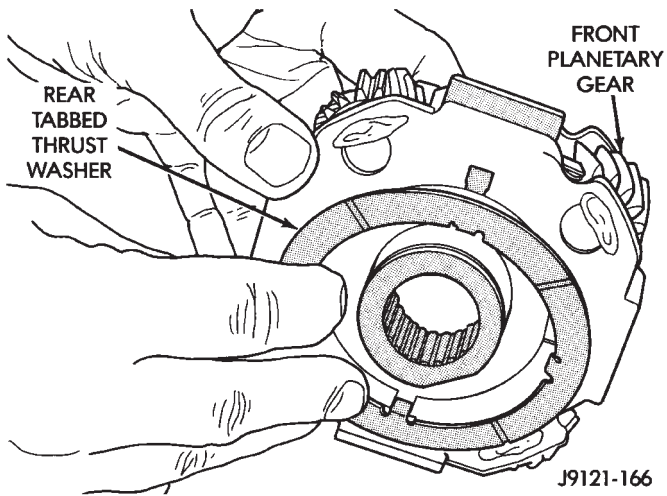


Fig. 161 Installing Rear Thrust Washer On Front Planetary Gear

(19) Install thrust washer in front annulus (Fig. 164). **Align flat on washer with flat on planetary hub. Also be sure washer tab is facing up.**

(20) Install front annulus snap ring (Fig. 165). Use snap ring pliers to avoid distorting ring during installation. Also be sure ring is fully seated.

(21) Install planetary selective snap ring with snap ring pliers (Fig. 166). Be sure ring is fully seated.

(22) Turn planetary geartrain assembly over so driving shell is facing workbench. Then support geartrain on wood block positioned under forward end of output shaft. This allows geartrain components to move forward for accurate end play check.

(23) Check planetary geartrain end play with feeler gauge (Fig. 167). Gauge goes between shoulder on output shaft and end of rear annulus support.

(24) Geartrain end play should be 0.12 to 1.22 mm (0.005 to 0.048 in.). If end play is incorrect, snap ring (or thrust washers) may have to be replaced. Snap ring is available in three different thicknesses for adjustment purposes.

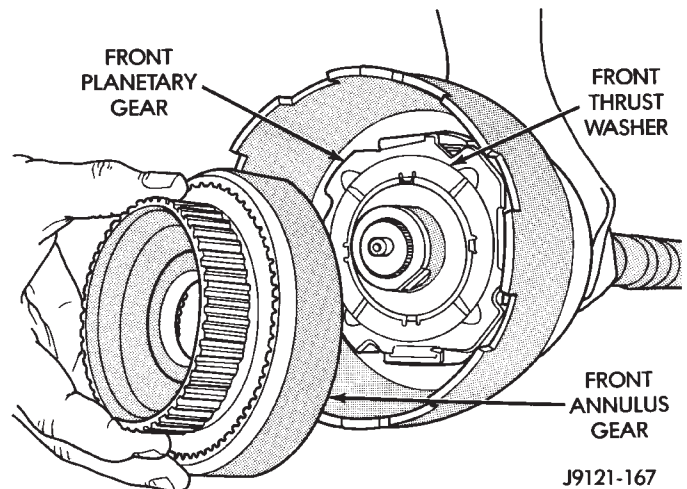


Fig. 162 Installing Front Planetary And Annulus Gears

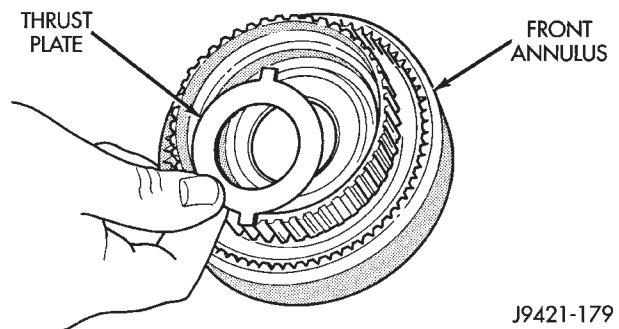


Fig. 163 Positioning Thrust Plate On Front Annulus Support

DISASSEMBLY AND ASSEMBLY (Continued)

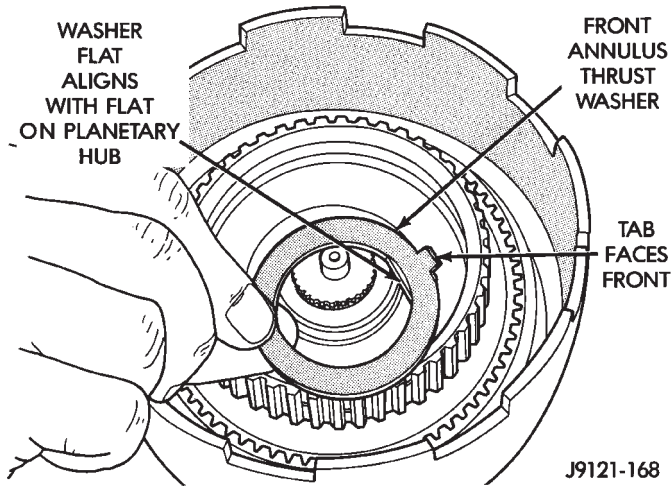


Fig. 164 Installing Front Annulus Thrust Washer

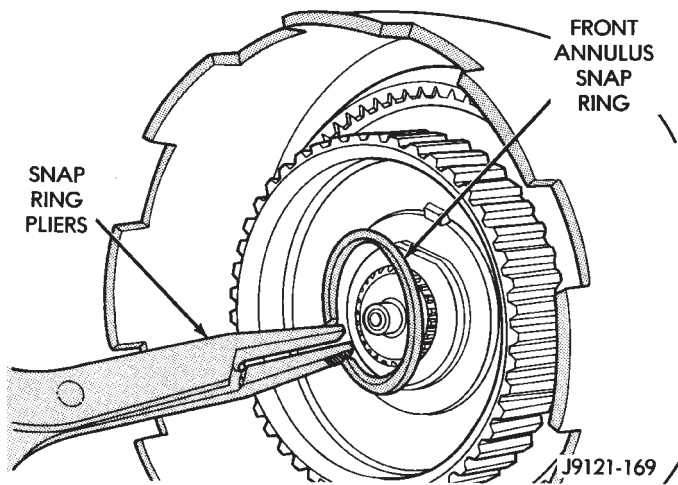


Fig. 165 Installing Front Annulus Snap Ring

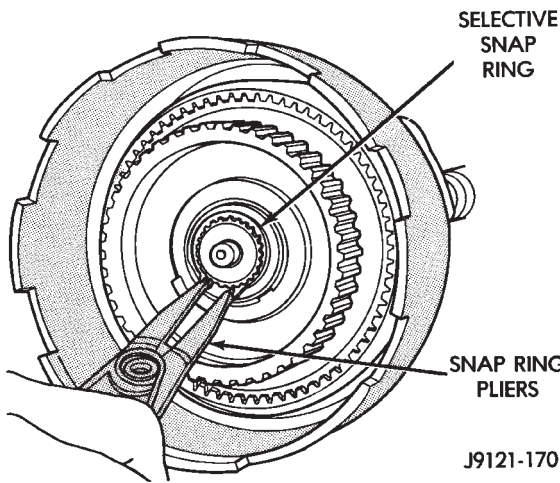


Fig. 166 Installing Planetary Selective Snap Ring

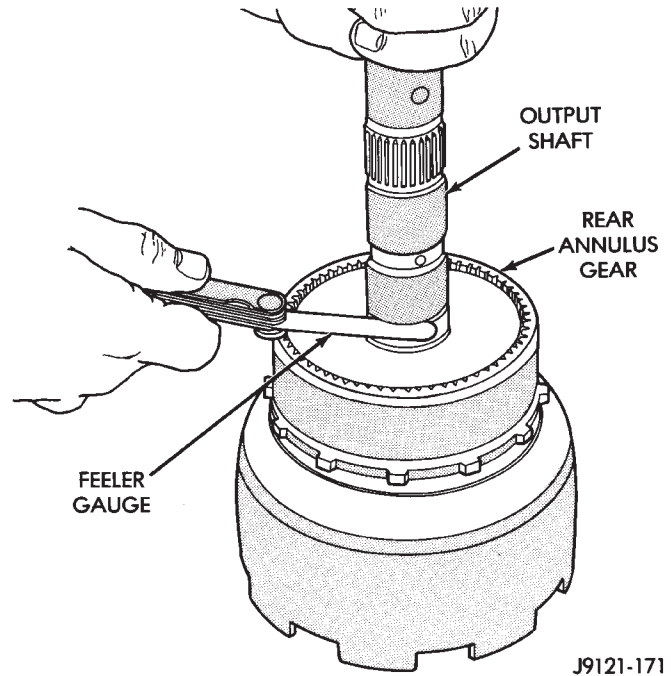


Fig. 167 Checking Planetary Geartrain End Play

CLEANING AND INSPECTION

GOVERNOR AND PARK GEAR

Thoroughly clean all the governor parts in a suitable cleaning solution but do not use any type of caustic cleaning agents.

The governor weight components (Fig. 168) and the governor valve (Fig. 169), must slide freely in their bores when clean and dry. Minor surface scratches and burrs can be smoothed with crocus cloth.

The aluminum governor valve and outer weight have a hard coating on them. Check condition of this coating carefully. Do not reuse either part if the coating is damaged.

Inspect the governor weight spring for distortion. Replace the spring, if distorted, collapsed, or broken. Clean the filter in solvent and dry it with compressed air. Replace the filter, if damaged. Inspect the park gear for chipped or worn gear teeth or damaged ring grooves. Replace the gear, if damaged.

Check the teeth on the park gear for wear or damage. Replace the gear if necessary. Inspect the metal seal rings on the park gear hub. Replace the rings only if severely worn, or broken.

CLEANING AND INSPECTION (Continued)

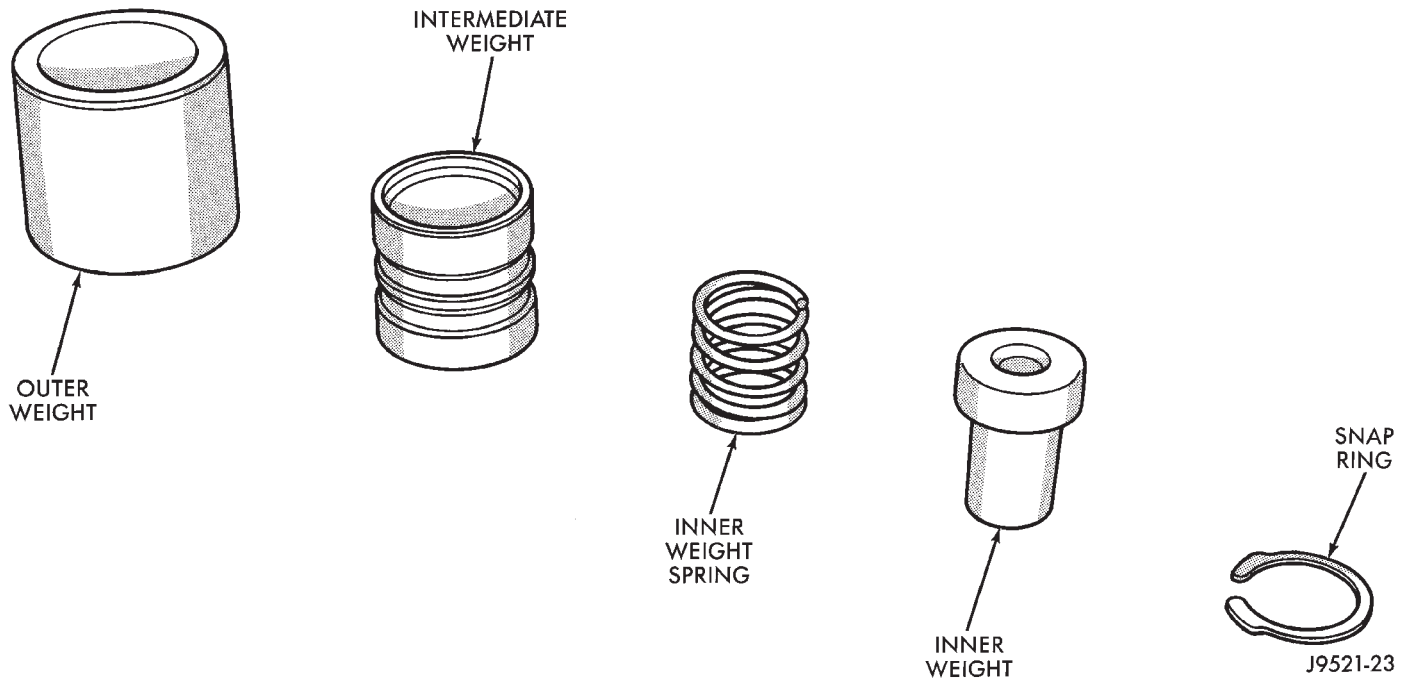


Fig. 168 Governor Weights

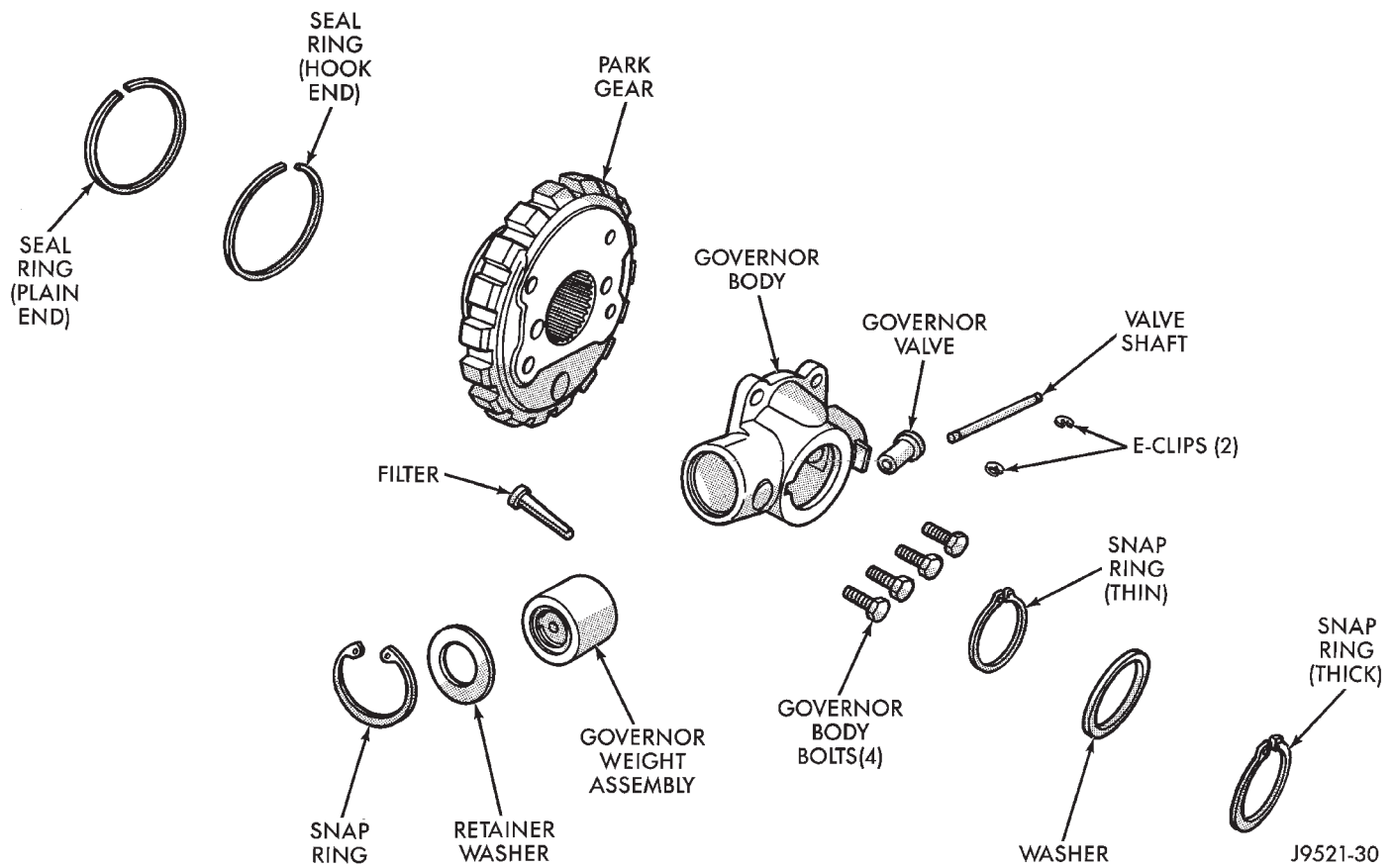


Fig. 169 Governor Components

CLEANING AND INSPECTION (Continued)

EXTENSION HOUSING AND PARK LOCK

Clean the housing and park lock components in solvent and dry them with compressed air.

Examine the park lock components in the housing. If replacement is necessary, remove the shaft with parallel jaw snap ring pliers (Fig. 170) and remove the sprag and spring. Then remove the spring clip and reaction plug (Fig. 171). **Compress the reaction plug spring clip only enough to remove and install it. Do not distort the clip during removal or installation.**

Be sure a replacement sprag is installed so the sprag locking lug will face the park gear (Fig. 172). Also be sure the spring is correctly positioned as shown (Fig. 172). The sprag may not retract if the spring is improperly installed.

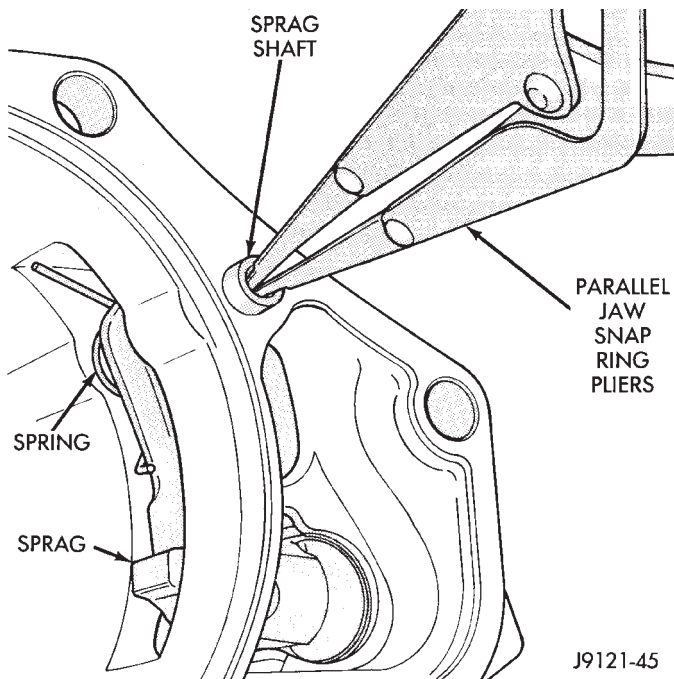


Fig. 170 Park Sprag, Shaft And Spring

VALVE BODY

Serviceable valve body components are:

- park lock rod and E-clip
- switch valve and spring
- pressure adjusting screw bracket
- throttle valve lever
- manual lever
- manual lever shaft seal, washer, E-clip and detent ball
- fluid filter
- converter clutch solenoid

The remaining valve body components are serviced only as part of a complete valve body assembly.

Clean the valve body components in a parts cleaning solution only. Do not use gasoline, kerosene, or any type of caustic solution. Dry the parts with com-

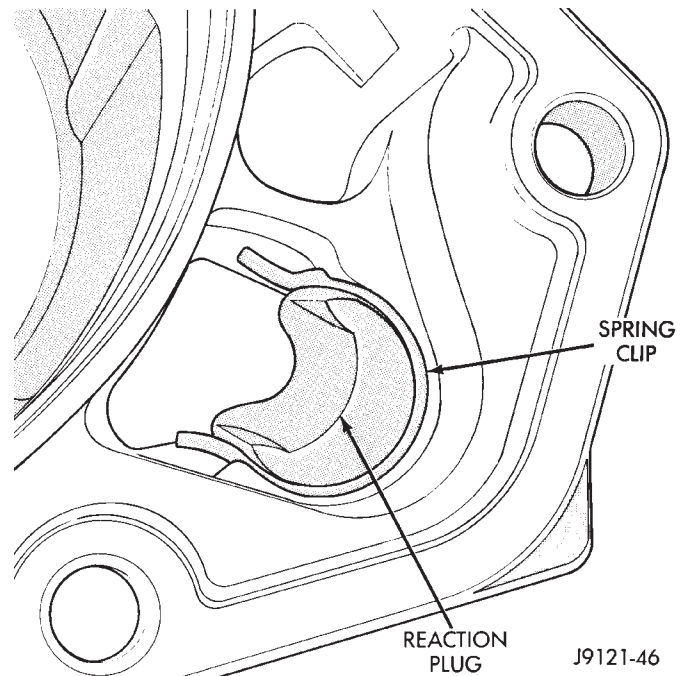


Fig. 171 Park Sprag Reaction Plug And Spring Location

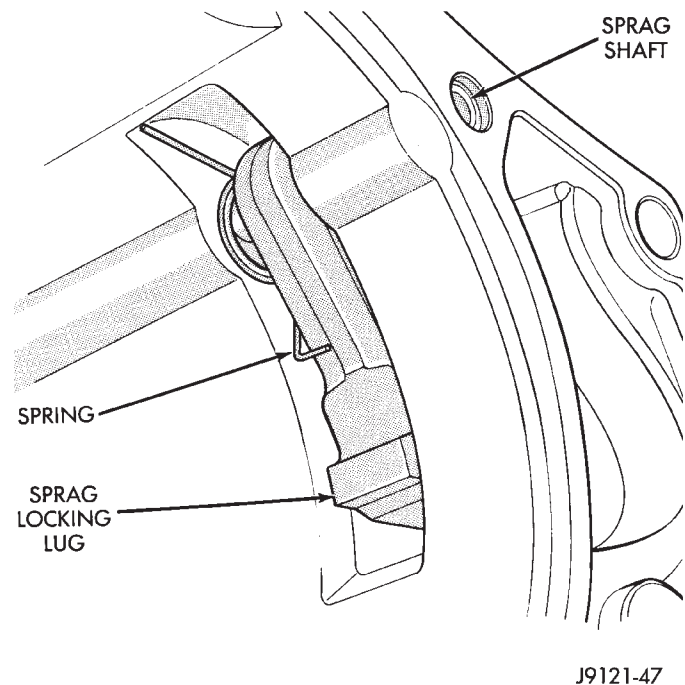


Fig. 172 Correct Position Of Sprag And Spring

pressed air. Make sure all passages are clean and free from obstructions.

NOTE: Do not use rags or shop towels to wipe off valve body components. Lint from these materials will adhere to the valve body components. Lint will interfere with valve operation and may clog filters and fluid passages.

CLEANING AND INSPECTION (Continued)

Inspect the throttle and manual valve levers and shafts. Do not attempt to straighten a bent shaft or correct a loose lever. Replace these components if worn, bent, loose or damaged in any way.

Inspect all of the valve body mating surfaces for scratches, nicks, burrs, or distortion. Use a straight-edge to check surface flatness. Minor scratches may be removed with crocus cloth using only very light pressure.

Minor distortion of a valve body mating surface may be corrected by smoothing the surface with crocus cloth. The cloth should be in sheet form and be positioned on a surface plate, sheet of plate glass, or equally flat surface. However, if distortion is severe or any surfaces are heavily scored, the valve body will have to be replaced.

CAUTION: Many of the valve body valves and plugs are made of coated aluminum. Aluminum components can be identified by the dark color of the special coating applied to the surface (or by testing with a magnet). **DO NOT** polish or sand aluminum valves or plugs with any type of material, or under any circumstances. This practice might damage the special coating and cause the valves and plugs to stick and bind.

Inspect the valves and plugs for scratches, burrs, nicks, or scores. Also inspect the coating on the aluminum valves and plugs (Fig. 173). If the coating is damaged or worn through, the valve (or valve body) should be replaced.

Aluminum valves and plugs should not be sanded or polished under any circumstances. However, minor burrs or scratches on steel valves and plugs can be removed with crocus cloth but do not round off the valve or plug edges. Squareness of these edges is vitally important. These edges prevent foreign matter from lodging between the valves, plugs and bore.

Inspect all the valve and plug bores in the valve body. Use a penlight to view the bore interiors. Replace the valve body if any bores are distorted or scored. Inspect all of the valve body springs. The springs must be free of distortion, warpage or broken coils.

Trial fit each valve and plug in its bore to check freedom of operation. When clean and dry, the valves and plugs should drop freely into the bores. Valve body bores do not change dimensionally with use. If the valve body functioned correctly when new, it will continue to operate properly after cleaning and inspection. It should not be necessary to replace a valve body assembly unless it is damaged in handling.

TRANSMISSION

Clean the case in a solvent tank. Flush the case bores and fluid passages thoroughly with solvent. Dry the case and all fluid passages with compressed air. Be sure all solvent is removed from the case and that all fluid passages are clear.

NOTE: Do not use shop towels or rags to dry the case (or any other transmission component) unless they are made from lint-free materials. Lint will readily adhere to case surfaces and transmission components and will circulate throughout the transmission after assembly. A sufficient quantity of lint can block fluid passages and interfere with valve body operation.

Inspect the case for cracks, porous spots, worn servo bores, or damaged threads. However, the case will have to be replaced if it exhibits damage or wear.

Lubricate the front band adjusting screw and locknut with petroleum jelly and thread it part way into the case. Be sure the screw turns freely and does not bind. Install the locknut on the screw after checking screw thread operation.

Inspect all the transmission bushings during overhaul. Bushing condition is important as worn, scored bushings contribute to low pressures, clutch slip and accelerated wear of other components. Replace worn, or scored bushings, or if doubt exists about bushing condition.

Use recommended tools to replace bushings. The tools are sized and designed to remove, install and seat bushings correctly. The bushing replacement tools are included in Bushing Tool Sets C-3887-B, or C-3887-J.

Pre-sized service bushings are available for replacement purposes. Only the sun gear bushings are not serviced. Replace the gear as an assembly if the bushings are severely scored, or worn.

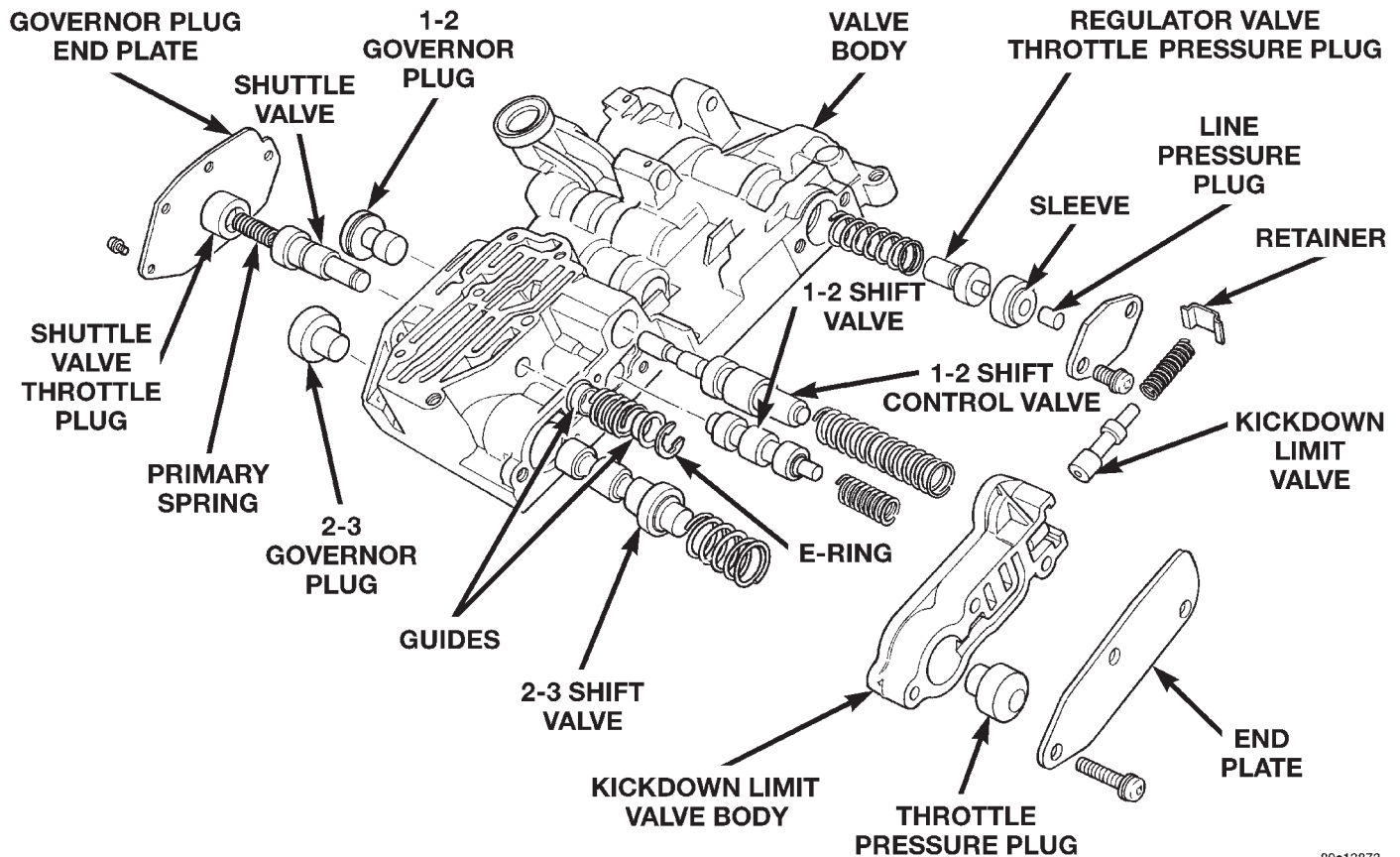
Heli-Coil inserts are recommended for repairing damaged, stripped or worn threads in aluminum parts. Stainless steel inserts are preferred.

The use of crocus cloth is permissible where necessary, providing it is used carefully. When used on valves, use extreme care to avoid rounding off sharp edges. Sharp edges are vital as they prevent foreign matter from getting between the valve and valve bore.

Do not reuse oil seals, gaskets, seal rings, or O-rings during overhaul. Replace these parts as a matter of course. Also do not reuse snap rings or E-clips that are bent or distorted. Replace these parts as well.

Lubricate transmission parts with Mopar® ATF Plus 3, Type 7176 transmission fluid during assembly. Use Mopar® Door Ease, or Ru-Glyde to lubricate

CLEANING AND INSPECTION (Continued)



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Fig. 173 Valve Body Components

piston seals and O-rings. Use petroleum jelly on thrust washers and to hold parts in place during reassembly.

OVERRUNNING CLUTCH/LOW-REVERSE DRUM/OVERDRIVE PISTON RETAINER

Clean the overrunning clutch assembly, clutch cam, low-reverse drum, and overdrive piston retainer in solvent. Dry them with compressed air after cleaning.

Inspect condition of each clutch part after cleaning. Replace the overrunning clutch roller and spring assembly if any rollers or springs are worn or damaged, or if the roller cage is distorted, or damaged. Replace the cam if worn, cracked or damaged.

Replace the low-reverse drum if the clutch race, roller surface or inside diameter is scored, worn or damaged. **Do not remove the clutch race from the low-reverse drum under any circumstances. Replace the drum and race as an assembly if either component is damaged.**

Examine the overdrive piston retainer carefully for wear, cracks, scoring or other damage. Be sure the retainer hub is a snug fit in the case and drum. Replace the retainer if worn or damaged.

FRONT SERVO

Clean the servo piston components with solvent and dry them with compressed air. Wipe the band clean with lint free shop towels.

Replace the front band if distorted, lining is burned, flaking off, or worn to the point where the grooves in the lining material are no longer visible.

Inspect the servo components (Fig. 174). Replace the springs if collapsed, distorted or broken. Replace the guide, rod and piston if cracked, bent, or worn. Discard the servo snap ring if distorted or warped.

Check the servo piston bore for wear. If the bore is severely scored, or damaged, it will be necessary to replace the case.

Replace any servo component if doubt exists about condition. Do not reuse suspect parts.

REAR SERVO

Remove and discard the servo piston seal ring (Fig. 175). Then clean the servo components with solvent and dry with compressed air. Replace either spring if collapsed, distorted or broken. Replace the plug and piston if cracked, bent, or worn. Discard the servo snap rings and use a new ones at assembly.

CLEANING AND INSPECTION (Continued)

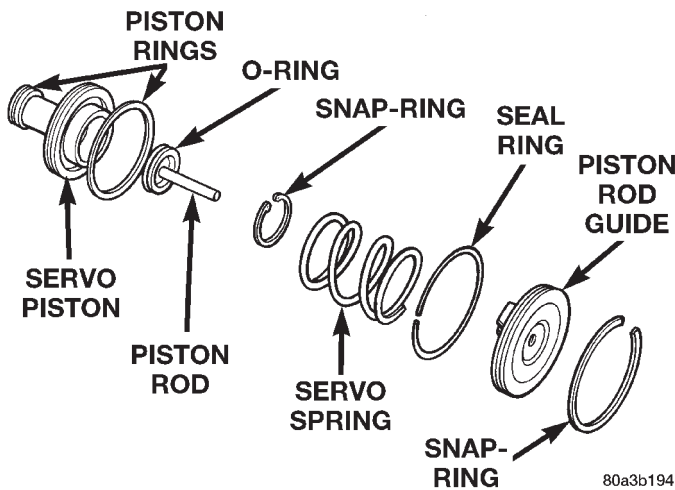


Fig. 174

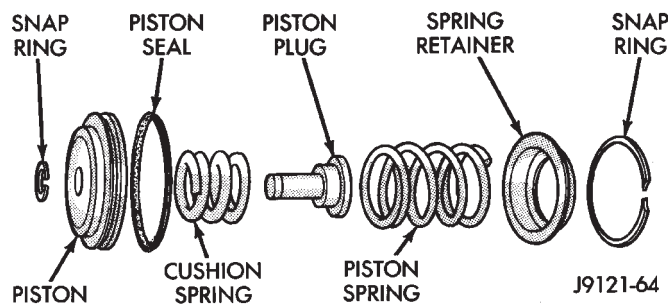


Fig. 175 Rear Servo Components

OIL PUMP AND REACTION SHAFT SUPPORT

(1) Clean pump and support components with solvent and dry them with compressed air.

(2) Check condition of the seal rings and thrust washer on the reaction shaft support. The seal rings do not need to be replaced unless cracked, broken, or severely worn.

(3) Inspect the pump and support components. Replace the pump or support if the seal ring grooves or machined surfaces are worn, scored, pitted, or damaged. Replace the pump gears if pitted, worn chipped, or damaged.

(4) Inspect the pump bushing. Then check the reaction shaft support bushing. Replace either bushing only if heavily worn, scored or damaged. It is not necessary to replace the bushings unless they are actually damaged.

(5) Install the gears in the pump body and measure pump component clearances as follows:

(a) Clearance between outer gear and reaction shaft housing should be 0.010 to 0.063 mm (0.0004 to 0.0025 in.). Clearance between inner gear and reaction shaft housing should be 0.010 to 0.063 mm (0.0004 to 0.0025 in.). Both clearances can be measured at the same time by:

(I) Installing the pump gears in the pump housing.

(II) Position an appropriate piece of Plastigage™ across both gears.

(III) Align the plastigage to a flat area on the reaction shaft housing.

(IV) Install the reaction shaft to the pump housing.

(V) Separate the reaction shaft housing from the pump housing and measure the Plastigage™ following the instructions supplied with it.

(b) Clearance between inner gear tooth and outer gear should be 0.08 to 0.19 mm (0.0035 to 0.0075 in.). Measure clearance with an appropriate feeler gauge.

(c) Clearance between outer gear and pump housing should also be 0.010 to 0.19 mm (0.0035 to 0.0075 in.). Measure clearance with an appropriate feeler gauge.

FRONT CLUTCH

Clean and inspect the front clutch components. Replace the clutch discs if warped, worn, scored, burned or charred, or if the facing is flaking off. Replace the steel plates if heavily scored, warped, or broken. Be sure the driving lugs on the plates are in good condition. The lugs must not be bent, cracked or damaged in any way.

Replace the clutch spring and spring retainer if either is distorted, warped or broken.

Check the lug grooves in the clutch retainer. The steel plates should slide freely in the slots. Replace the retainer if the grooves are worn or damaged.

Check action of the check ball in the retainer (Fig. 176). The ball must move freely and not stick.

NOTE: Inspect the clutch retainer bushings carefully (Fig. 177). The retainer bushings are NOT serviceable. It will be necessary to replace the retainer if either bushing is scored, or worn.

Inspect the piston and retainer seal surfaces for nicks or scratches. Minor scratches can be removed with crocus cloth. However, replace the piston and/or retainer if the seal surfaces are seriously scored.

REAR CLUTCH

Clean the clutch components with solvent and dry them with compressed air.

Check condition of the input shaft seal rings. It is not necessary to remove or replace rings unless they are broken, cracked, or no longer securely hooked together.

Inspect the input shaft splines and machined surfaces. Very minor nicks or scratches can be smoothed off with crocus cloth. replace the shaft if the splines are damaged, or any of the machined surfaces are severely scored.

CLEANING AND INSPECTION (Continued)

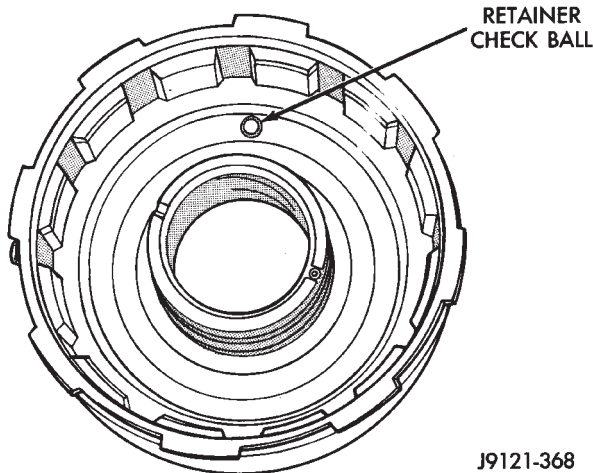


Fig. 176 Front Clutch Piston Retainer Check Ball Location

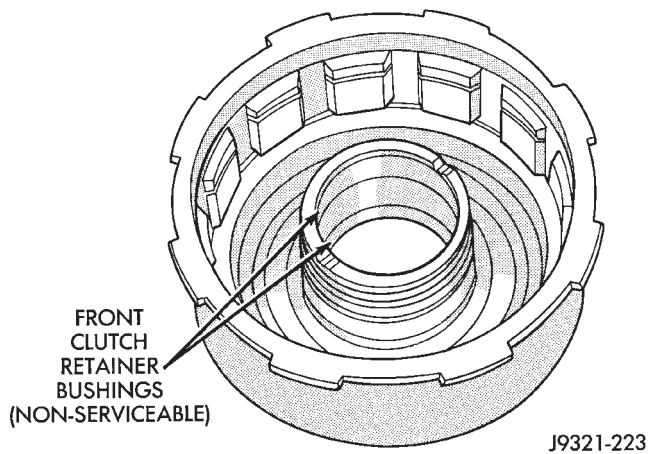


Fig. 177 Retainer Bushing Location/Inspection

Replace the clutch discs if warped, worn, scored, burned/charred, the lugs are damaged, or if the facing is flaking off.

Replace the steel plates and the pressure plate if heavily scored, warped, or broken. Be sure the driving lugs on the discs and plates are also in good condition. The lugs must not be bent, cracked or damaged in any way.

Replace the piston spring and wave spring if either part is distorted, warped or broken.

Check the lug grooves in the clutch retainer. The steel plates should slide freely in the slots. Replace the retainer if the grooves are worn or damaged. Also check action of the retainer check ball. The ball must move freely and not stick.

Inspect the piston and retainer seal surfaces for nicks or scratches. Minor scratches can be removed with crocus cloth. However, replace the piston and/or retainer if the seal surfaces are seriously damaged.

Check thrust washer condition. Washer thickness should be 1.55 to 1.60 mm (0.061 to 0.063 in.). Replace the washer if worn or damaged.

Check condition of the two seal rings on the input shaft and the single seal ring on the piston retainer hub. Replace the seal rings only if severely worn, cracked, or cannot be hooked together.

PLANETARY GEARTRAIN/OUTPUT SHAFT

Clean the intermediate shaft and planetary components in solvent and dry them with compressed air. Do not spin the planetary pinion gears with compressed air.

Inspect the planetary gear sets and annulus gears. The planetary pinions, shafts, washers, and retaining pins are serviceable. However, if a pinion carrier is damaged, the entire planetary gear set must be replaced as an assembly.

Replace the annulus gears if the teeth are chipped, broken, or worn, or the gear is cracked. Replace the planetary thrust plates and the tabbed thrust washers if cracked, scored or worn.

Inspect the machined surfaces of the output shaft. Be sure the oil passages are open and clear. Replace the shaft if scored, pitted, or damaged.

Inspect the sun gear and driving shell. If either component is worn or damaged, remove the sun gear rear retaining ring and separate the sun gear and thrust plate from the driving shell. Then replace the necessary component.

Replace the sun gear as an assembly if the gear teeth are chipped or worn. Also replace the gear as an assembly if the bushings are scored or worn. The sun gear bushings are not serviceable. Replace the thrust plate if worn, or severely scored. Replace the driving shell if distorted, cracked, or damaged in any way.

Replace all snap rings during geartrain assembly. Reusing snap rings is not recommended.

ADJUSTMENTS

GEARSHIFT CABLE

Check adjustment by starting the engine in Park and Neutral. Adjustment is OK if the engine starts only in these positions. Adjustment is incorrect if the engine starts in one but not both positions. If the engine starts in any position other than Park or Neutral, or if the engine will not start at all, the park/neutral position switch may be faulty.

Gearshift Adjustment Procedure

- (1) Shift transmission into Park.
- (2) Raise vehicle.

ADJUSTMENTS (Continued)

(3) Release cable adjuster clamp (at transmission end of cable) to unlock cable.

(4) Unsnap cable from cable mounting bracket on transmission (Fig. 178).

(5) Slide cable eyelet off transmission shift lever.

(6) Verify transmission shift lever is in Park detent by moving lever fully rearward. Last rearward detent is Park position.

(7) Verify positive engagement of transmission park lock by attempting to rotate propeller shaft. Shaft will not rotate when park lock is engaged.

(8) Slide cable eyelet onto transmission shift lever.

(9) Snap shift cable adjuster into mounting bracket on transmission.

(10) Lock shift cable by pressing cable adjuster clamp down until it snaps into place.

(11) Lower vehicle and check engine starting. Engine should start only in Park and Neutral.

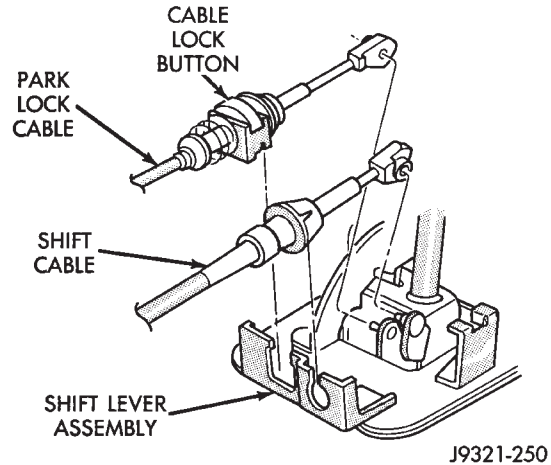


Fig. 179 Park Lock Cable Attachment

(a) Check movement of release shift handle button (floor shift) or release lever (column shift). You should not be able to press button inward or move column lever.

(b) Turn ignition switch to RUN position.

(c) Shifting out of park should not be possible.

(d) Apply the brake and attempt to shift out of PARK. Shifting should be possible.

(e) While the transmission is shifted out of PARK, release the brake and attempt to shift through all gears. Release the shift button at least once during this procedure. The ignition key should not go to the LOCK position.

(f) Return transmission to the PARK position without applying the brake.

(8) Move shift lever back to PARK and check ignition switch operation. You should be able to turn switch to LOCK position and shift lever release button/lever should not move.

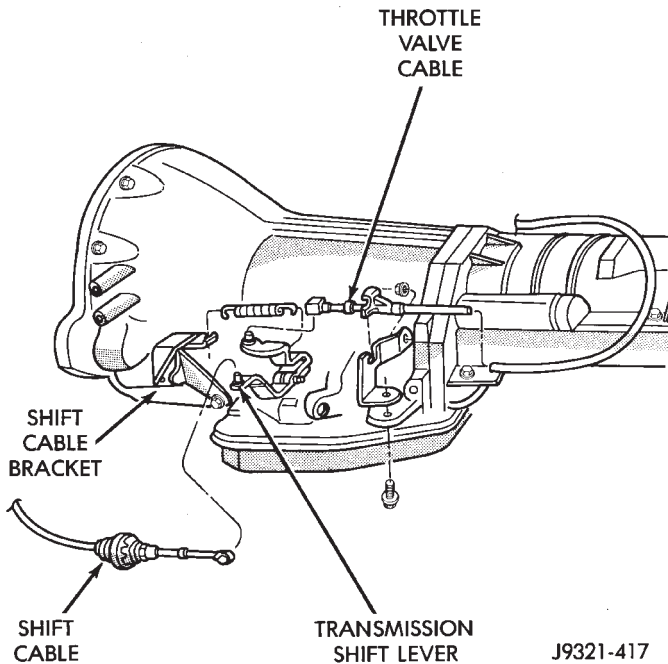


Fig. 178 Shift Cable Attachment At Transmission—Typical

BRAKE TRANSMISSION SHIFT INTERLOCK CABLE ADJUSTMENT

(1) Shift transmission into PARK.

(2) Remove shift lever bezel and console screws. Raise bezel and console for access to cable.

(3) Pull cable lock button up to release cable (Fig. 179).

(4) Turn ignition switch to LOCK position.

(5) Use a spacer to create a one millimeter gap between the shifter pawl and top of the shift gate.

(6) Pull cable forward. Then release cable and press cable lock button down until it snaps in place.

(7) Check adjustment as follows:

TRANSMISSION THROTTLE VALVE CABLE ADJUSTMENT

The transmission throttle valve is operated by a cam on the throttle lever. The throttle lever is operated by an adjustable cable (Fig. 180). The cable is attached to an arm mounted on the throttle lever shaft. A retaining clip at the engine-end of the cable is removed to provide for cable adjustment. The retaining clip is then installed back onto the throttle valve cable to lock in the adjustment.

A correctly adjusted throttle valve cable will cause the throttle lever on the transmission to move simultaneously with the throttle body lever from the idle position. Proper adjustment will allow simultaneous movement without causing the transmission throttle lever to either move ahead of, or lag behind the lever on the throttle body.

ADJUSTMENTS (Continued)

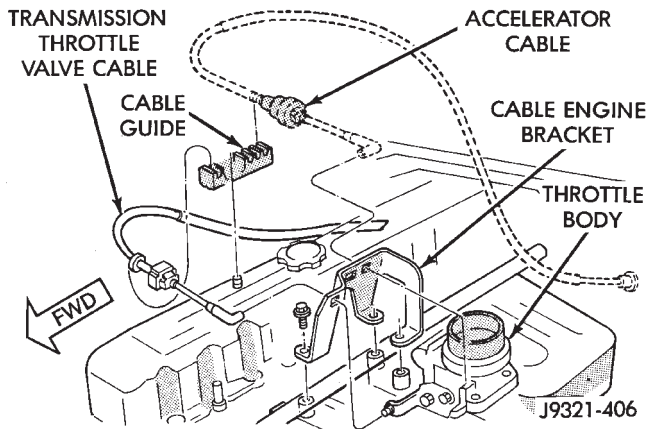


Fig. 180 Throttle Cable Attachment At Engine

Checking Throttle Valve Cable Adjustment

- (1) Turn ignition key to OFF position.
- (2) Remove air cleaner.
- (3) Verify that lever on throttle body is at curb idle position. Then verify that transmission throttle lever (Fig. 181) is also at idle (fully forward) position.

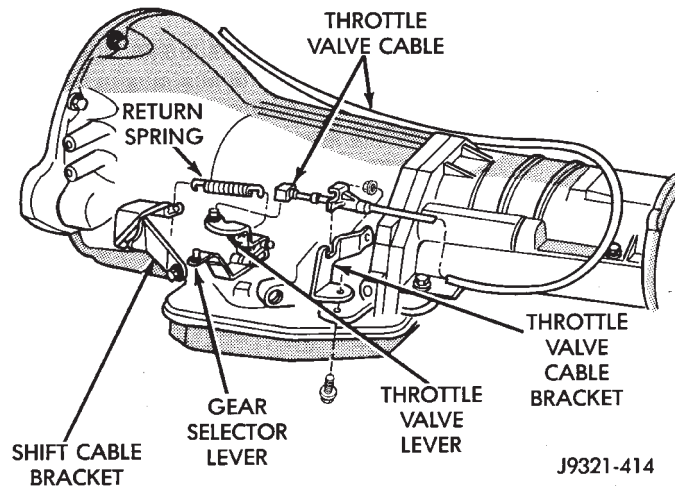


Fig. 181 Throttle Cable Attachment At Transmission

- (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.

- If cable end and attachment stud are misaligned (off center), cable will have to be adjusted as described in Throttle Valve Cable Adjustment procedure.

- (6) Reconnect cable end to attachment stud. Then with aid of a helper, observe movement of transmission throttle lever and lever on throttle body.

- If both levers move simultaneously from idle to half-throttle and back to idle position, adjustment is correct.

- If transmission throttle lever moves ahead of, or lags behind throttle body lever, cable adjustment will be necessary. Or, if throttle body lever prevents transmission lever from returning to closed position, cable adjustment will be necessary.

Throttle Valve Cable Adjustment Procedure

- (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) Insert a small screwdriver under edge of retaining clip and remove retaining clip.

- (6) Center cable end on attachment stud to within 1 mm (0.039 in.).

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.

- (7) Install retaining clip onto cable housing.

- (8) Check cable adjustment. Verify transmission throttle lever and lever on throttle body move simultaneously.

FRONT BAND ADJUSTMENT

The front (kickdown) band adjusting screw is located on the left side of the transmission case above the manual valve and throttle valve levers.

- (1) Raise vehicle.

- (2) Loosen band adjusting screw locknut (Fig. 182). Then back locknut off 3-5 turns. Be sure adjusting screw turns freely in case. Apply lubricant to screw threads if necessary.

- (3) Tighten band adjusting screw to 8 N·m (72 in. lbs.) torque with Inch Pound Torque Wrench C-3380-A, a 3-in. extension and 5/16 socket.

CAUTION: If Adapter C-3705 is needed to reach the adjusting screw (Fig. 183), tighten the screw to only 5 N·m (47-50 in. lbs.) torque.

- (4) Back off front band adjusting screw 2-1/2 turns.

- (5) Hold adjuster screw in position and tighten locknut to 41 N·m (30 ft. lbs.) torque.

- (6) Lower vehicle.

ADJUSTMENTS (Continued)

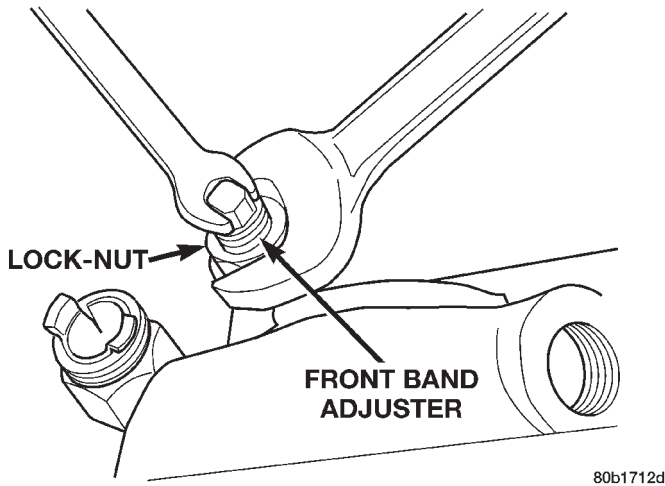


Fig. 182 Front Band Adjustment Screw Location

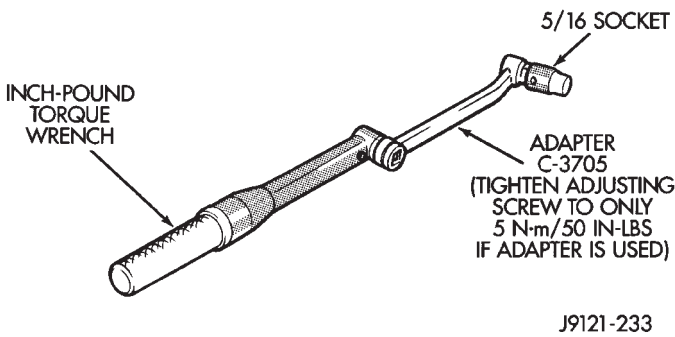


Fig. 183 Band Adjustment Adapter Tool

REAR BAND ADJUSTMENT

The transmission oil pan must be removed for access to the rear band adjusting screw.

- (1) Raise vehicle.
- (2) Remove transmission oil pan and drain fluid.
- (3) Loosen band adjusting screw locknut 5-6 turns. Be sure adjusting screw turns freely in lever.
- (4) Tighten adjusting screw to 5 N-m (41 in. lbs.) (Fig. 184).
- (5) Back off adjusting screw 7 turns.
- (6) Hold adjusting screw in place and tighten locknut to 34 N-m (25 ft. lbs.) torque.
- (7) Position new gasket on oil pan and install pan on transmission. Tighten pan bolts to 17 N-m (13 ft. lbs.) torque.
- (8) Lower vehicle and refill transmission with Mopar® ATF Plus 3, Type 7176, fluid.

VALVE BODY

CONTROL PRESSURE ADJUSTMENTS

There are two control pressure adjustments on the valve body;

- Line Pressure
- Throttle Pressure

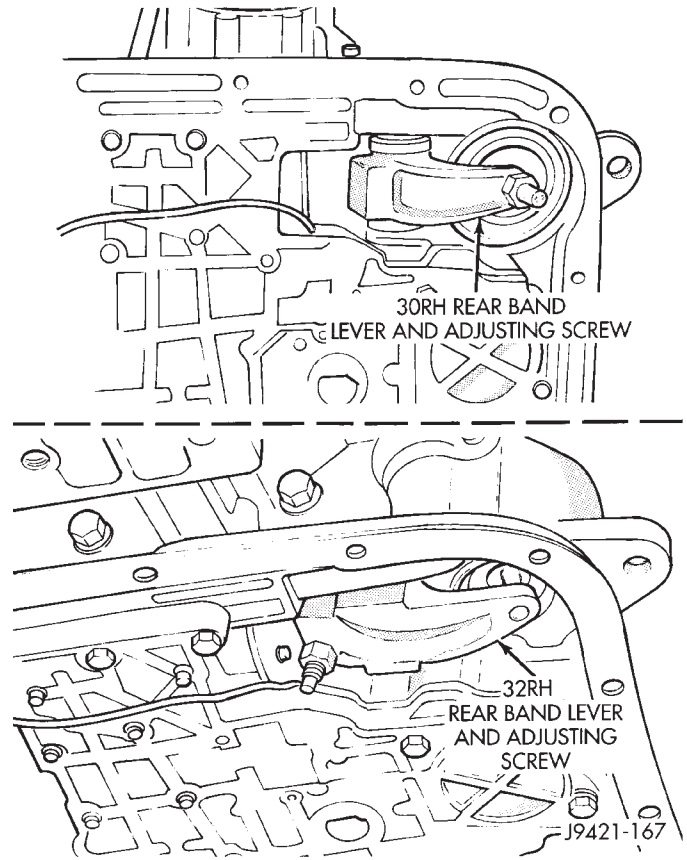


Fig. 184 Rear Band Adjustment Screw Location

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. 185).

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.

ADJUSTMENTS (Continued)

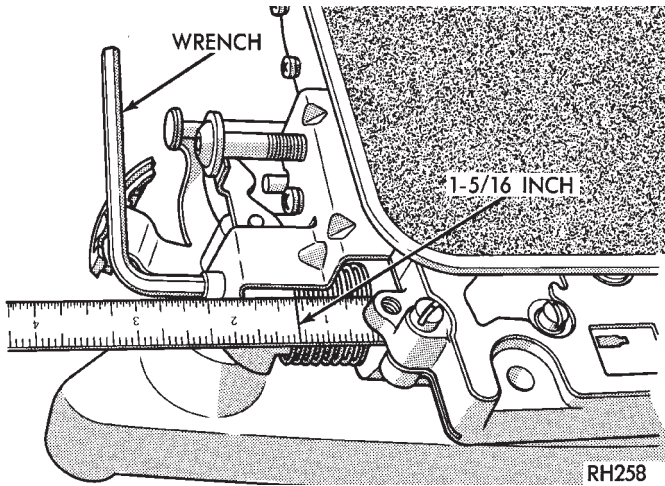


Fig. 185 Line Pressure Adjustment

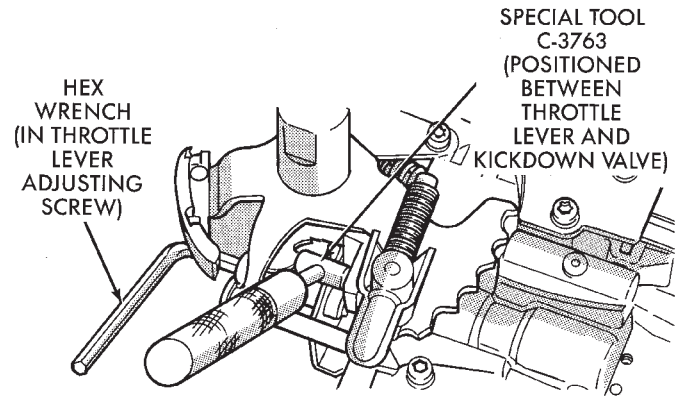
THROTTLE PRESSURE ADJUSTMENT

Insert Gauge Tool C-3763 between the throttle lever cam and the kickdown valve stem (Fig. 186).

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.



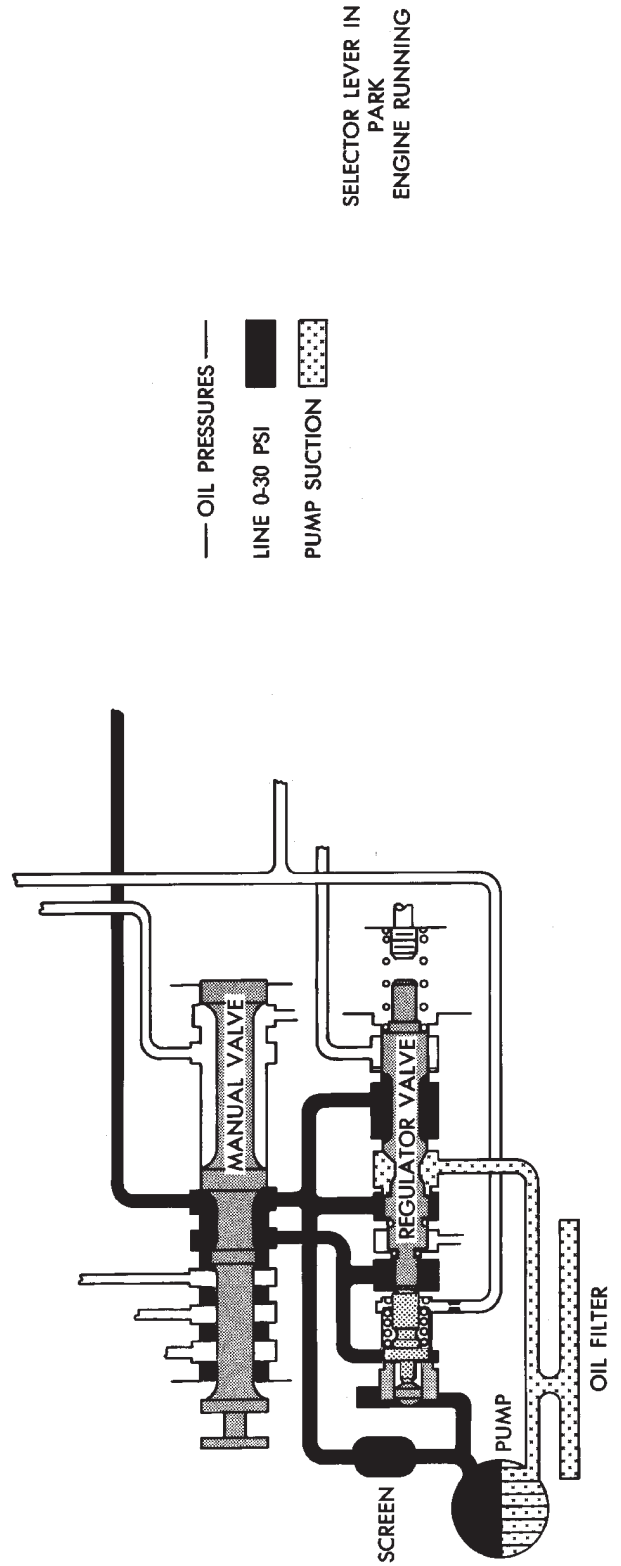
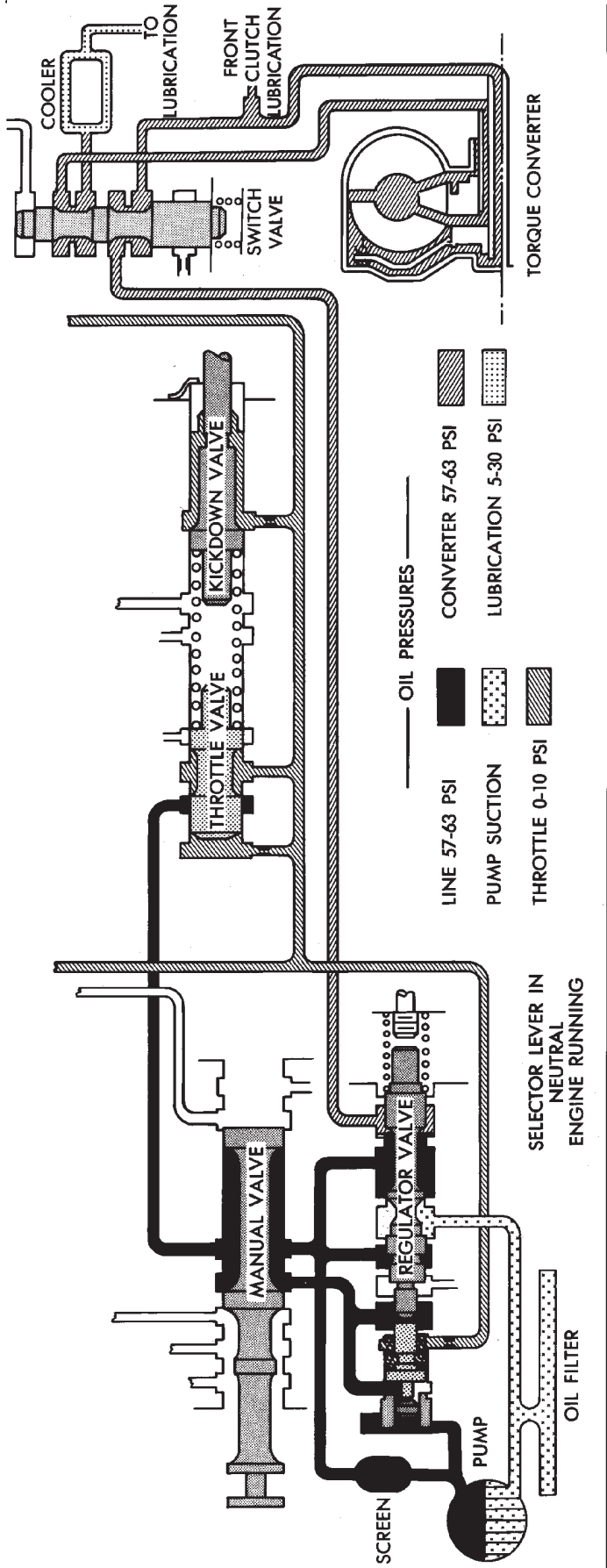
J9521-109

Fig. 186 Throttle Pressure Adjustment

SCHEMATICS AND DIAGRAMS

HYDRAULIC SCHEMATICS

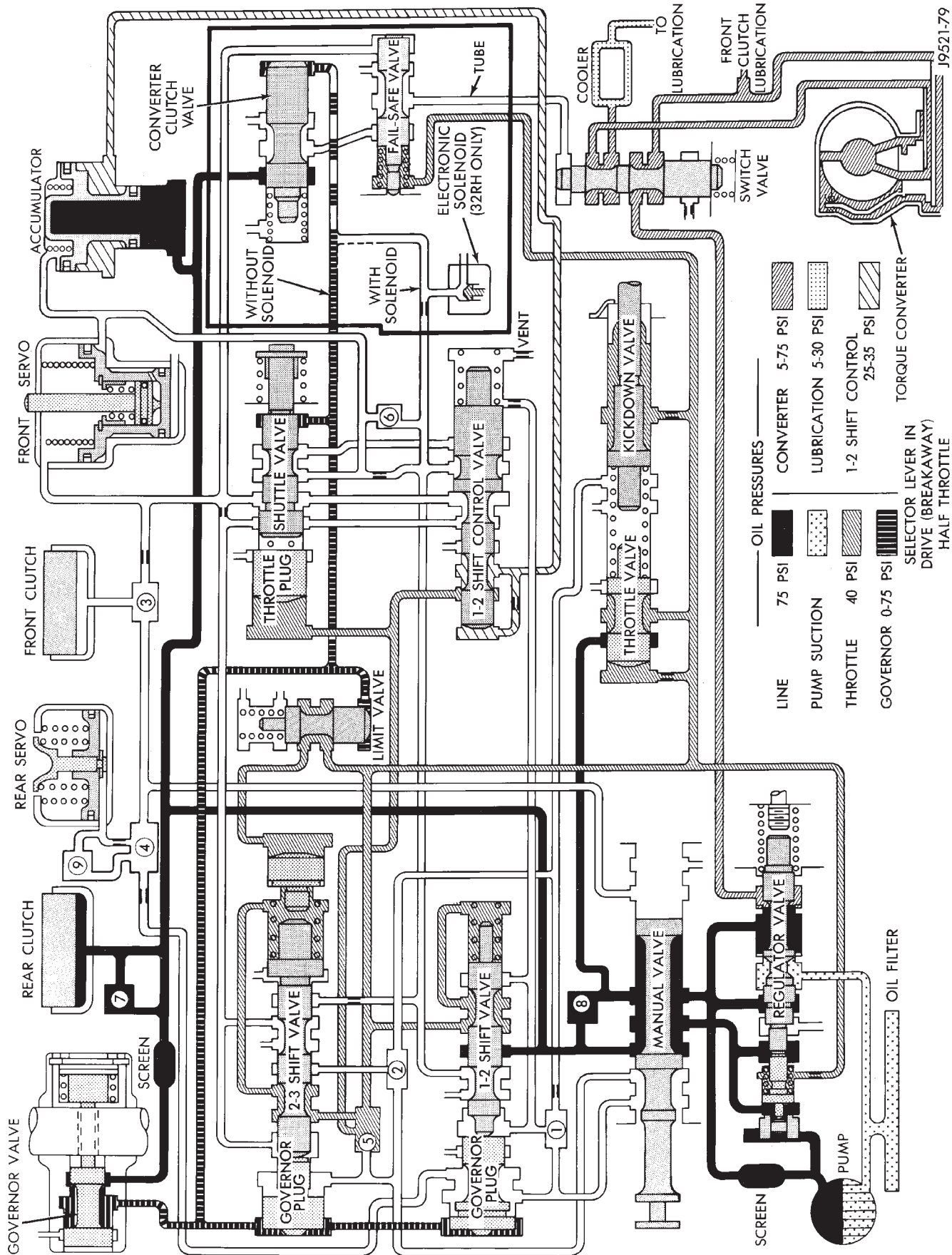
SCHEMATICS AND DIAGRAMS (Continued)



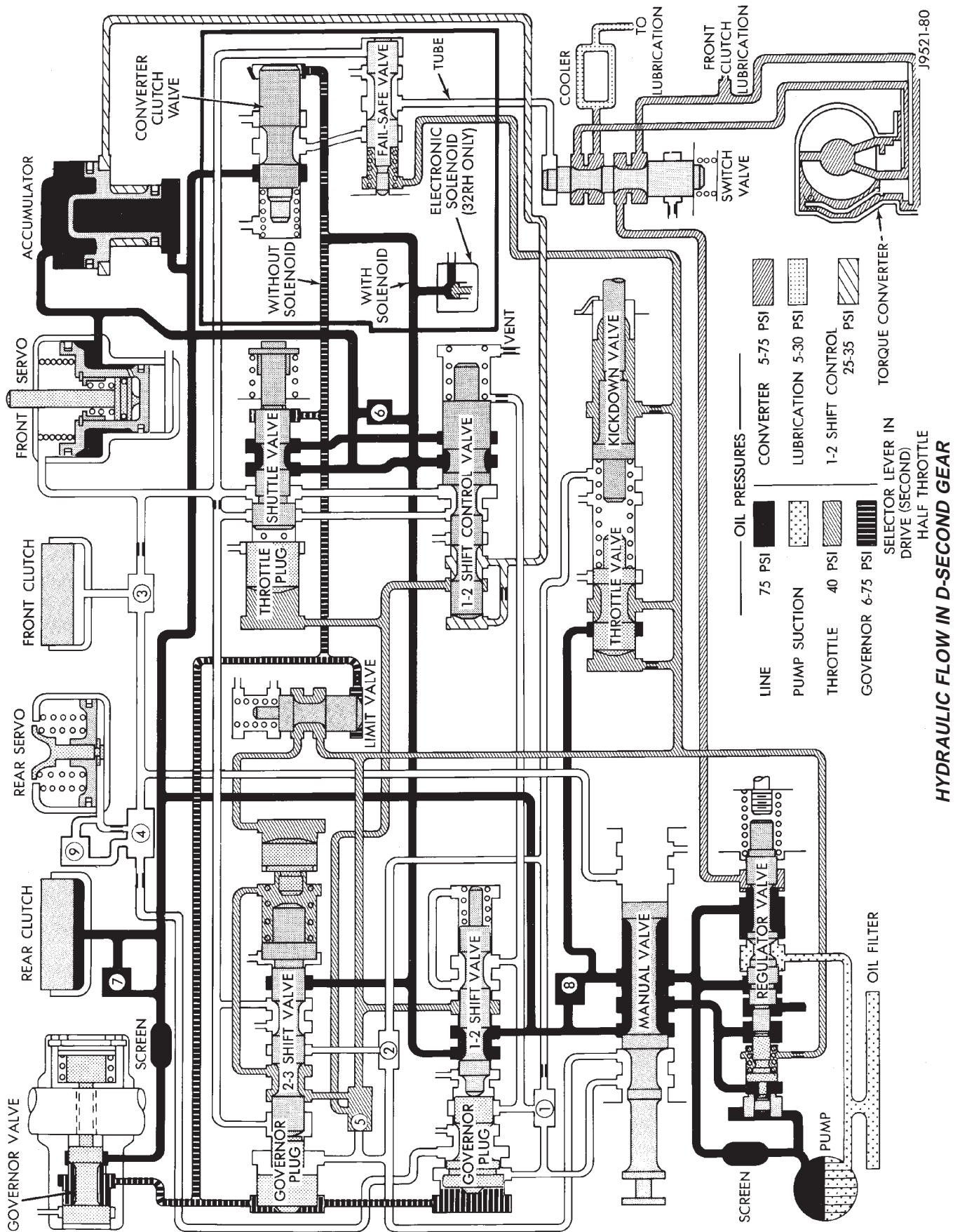
HYDRAULIC FLOW IN PARK/NEUTRAL

J9021-160

SCHEMATICS AND DIAGRAMS (Continued)

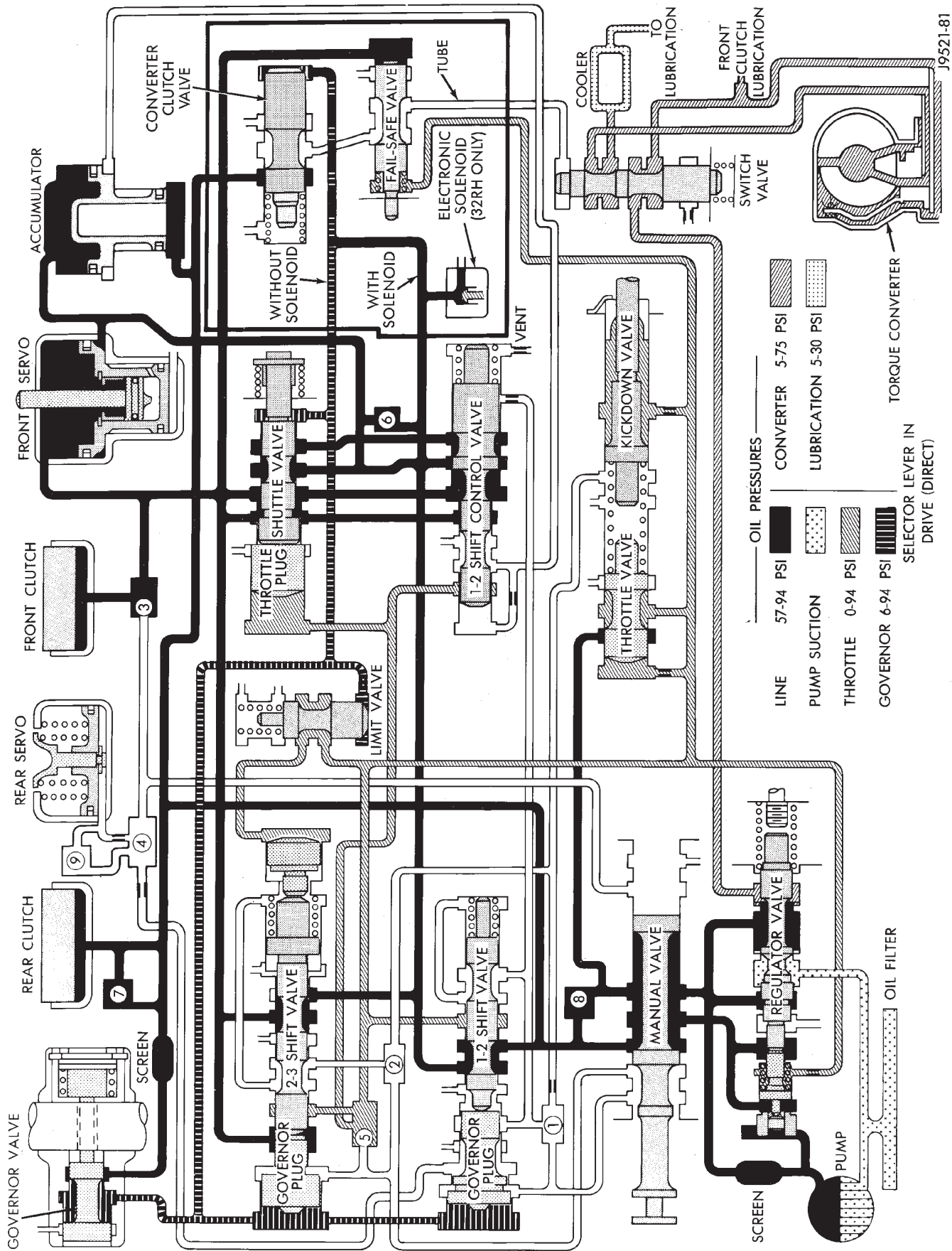


SCHEMATICS AND DIAGRAMS (Continued)



HYDRAULIC FLOW IN D-SECOND GEAR

SCHEMATICS AND DIAGRAMS (Continued)



OIL PRESSURES

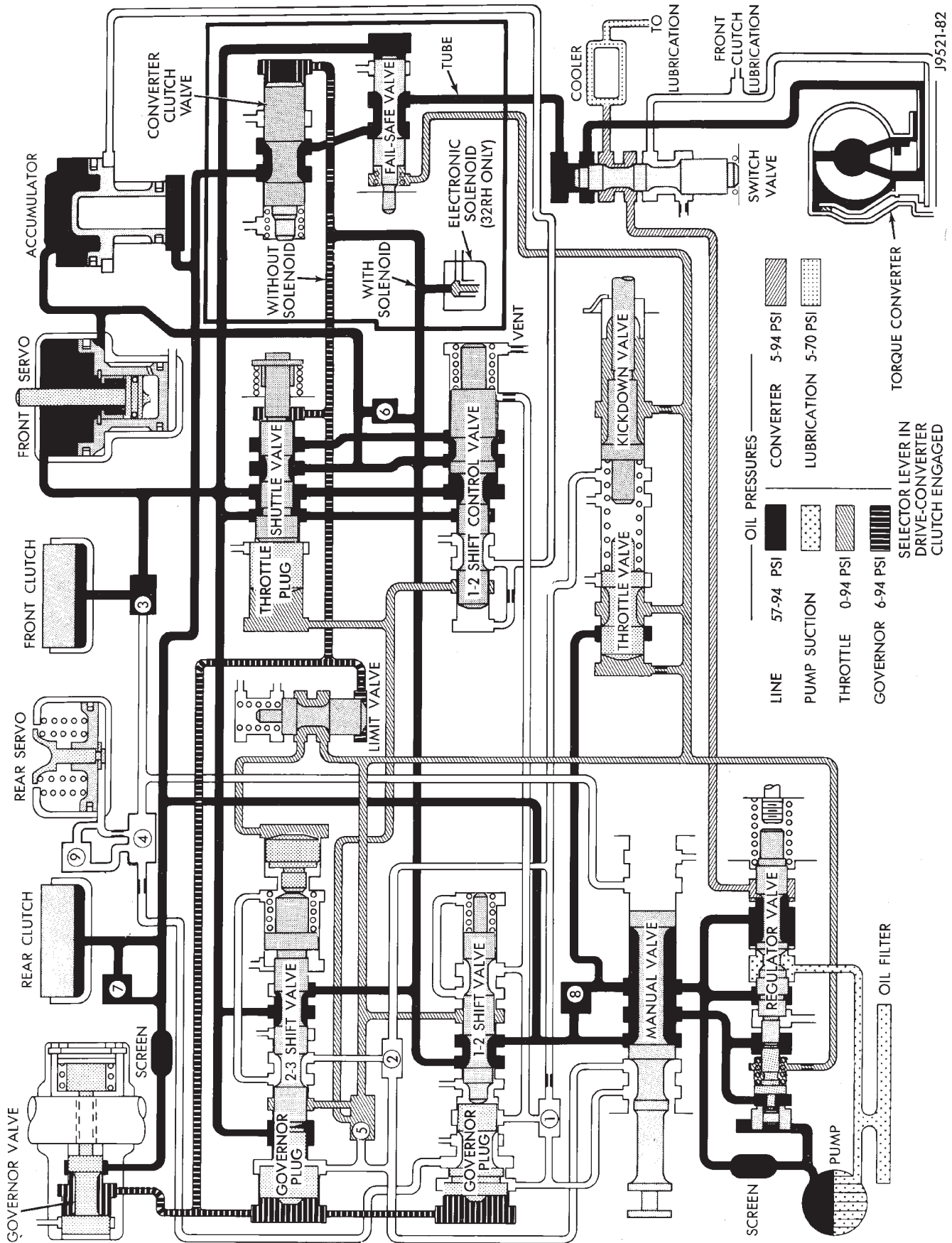
LINE	57-94 PSI	CONVERTER	5-75 PSI
PUMP SUCTION		LUBRICATION	5-30 PSI
THROTTLE	0-94 PSI		
GOVERNOR	6-94 PSI		

SELECTOR LEVER IN DRIVE (DIRECT)

HYDRAULIC FLOW IN D-THIRD GEAR

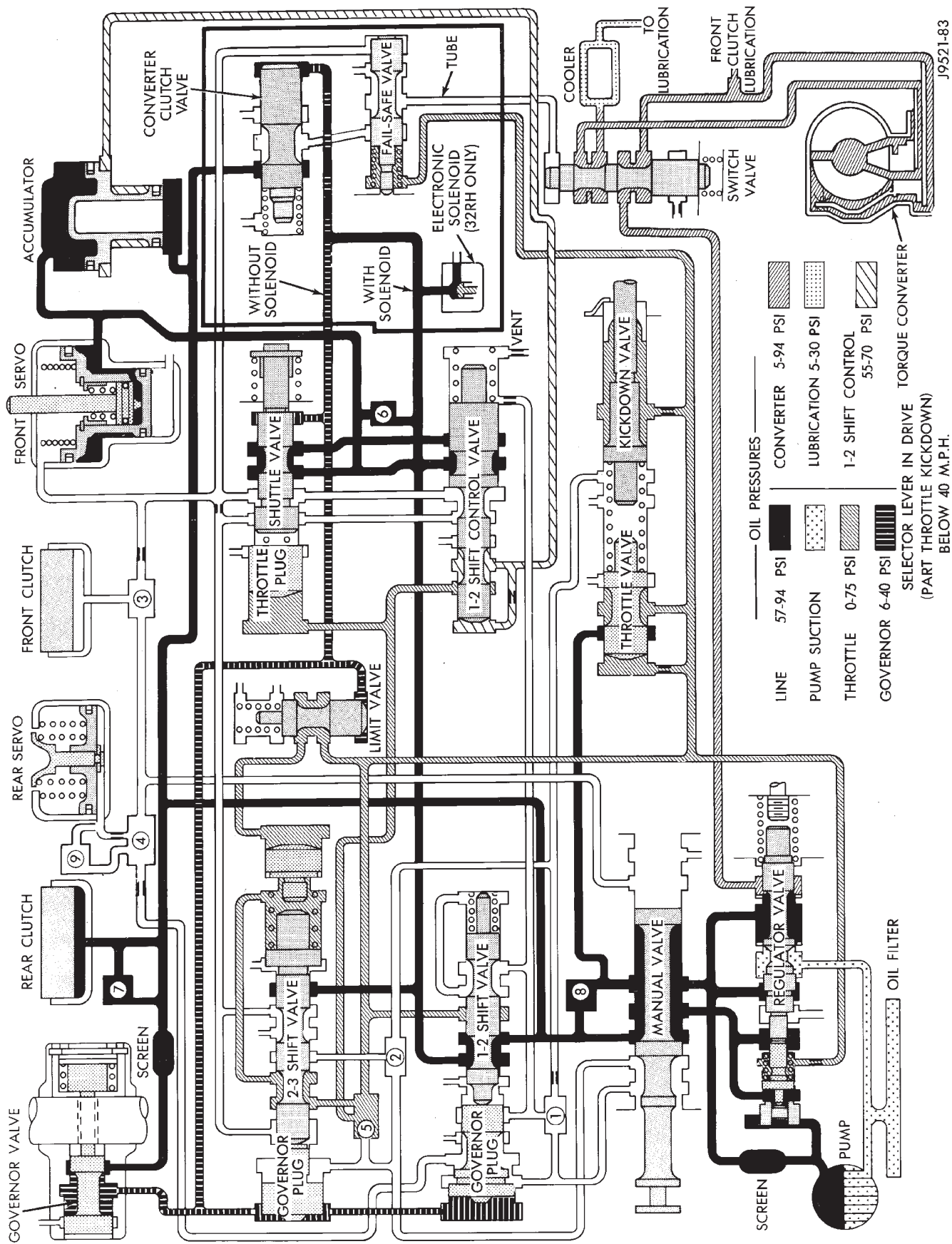
J9521-81

SCHEMATICS AND DIAGRAMS (Continued)



HYDRAULIC FLOW IN D-THIRD GEAR (CONVERTER CLUTCH APPLIED)

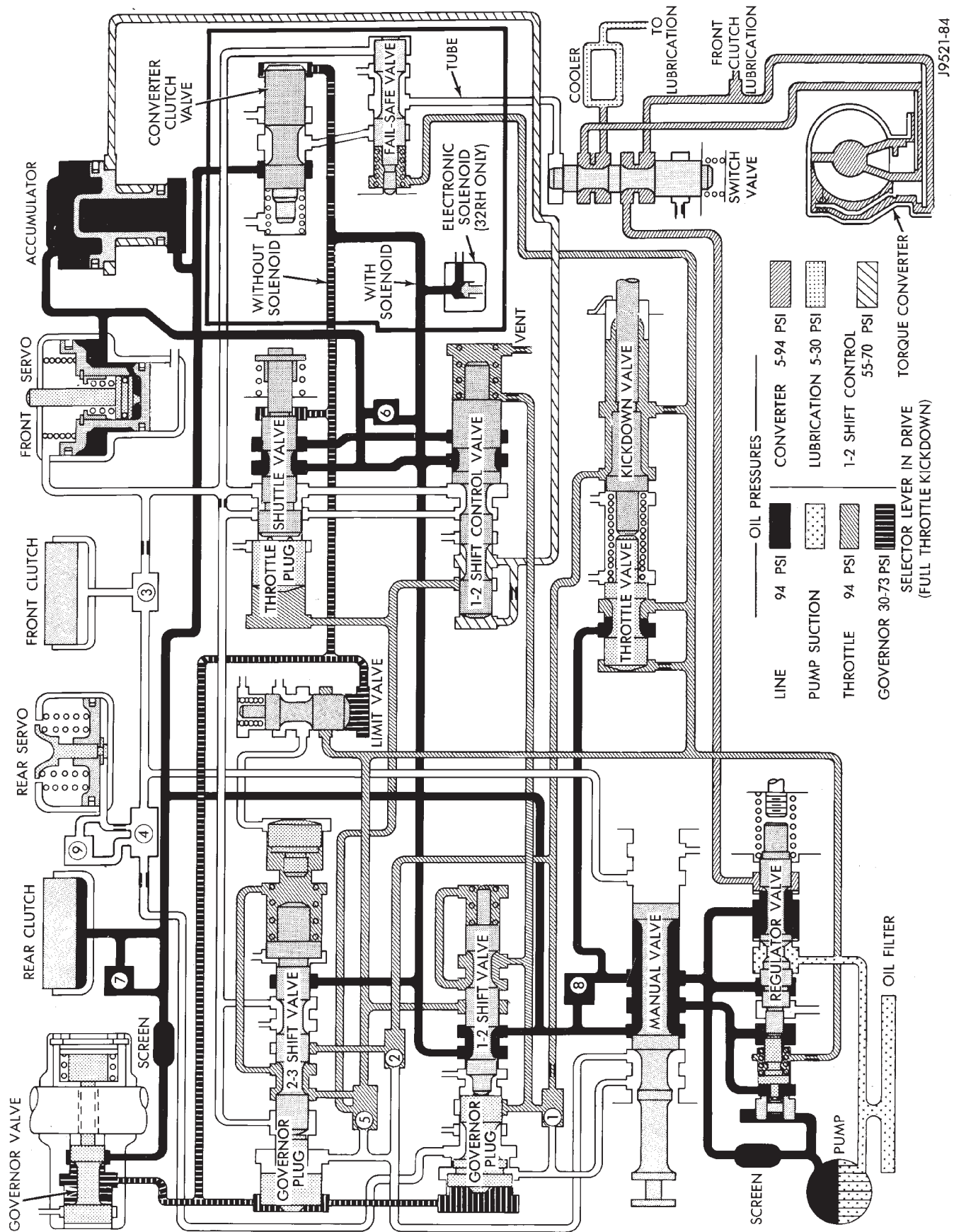
SCHEMATICS AND DIAGRAMS (Continued)



HYDRAULIC FLOW AT PART THROTTLE 3-2 KICKDOWN

J9521-83

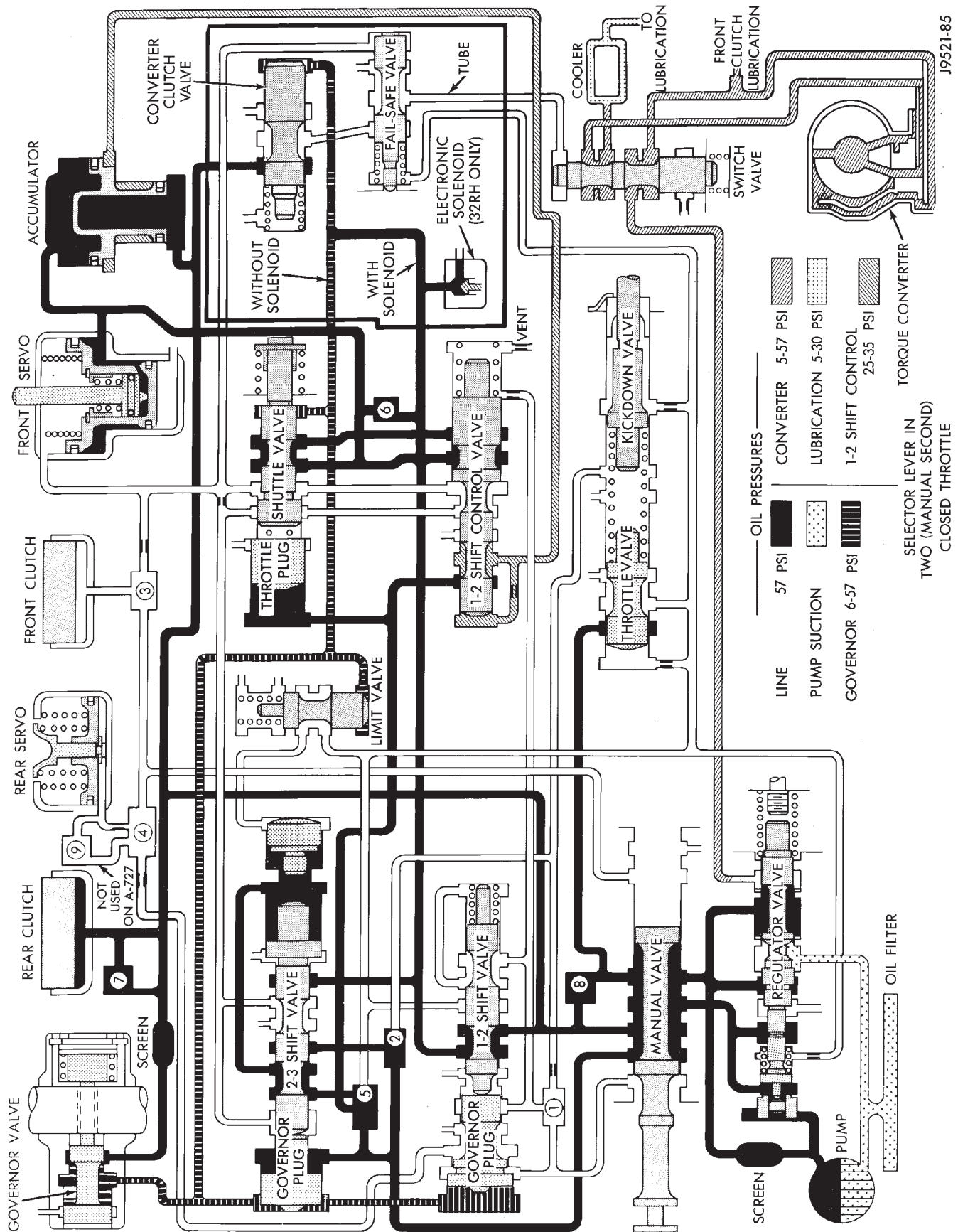
SCHEMATICS AND DIAGRAMS (Continued)



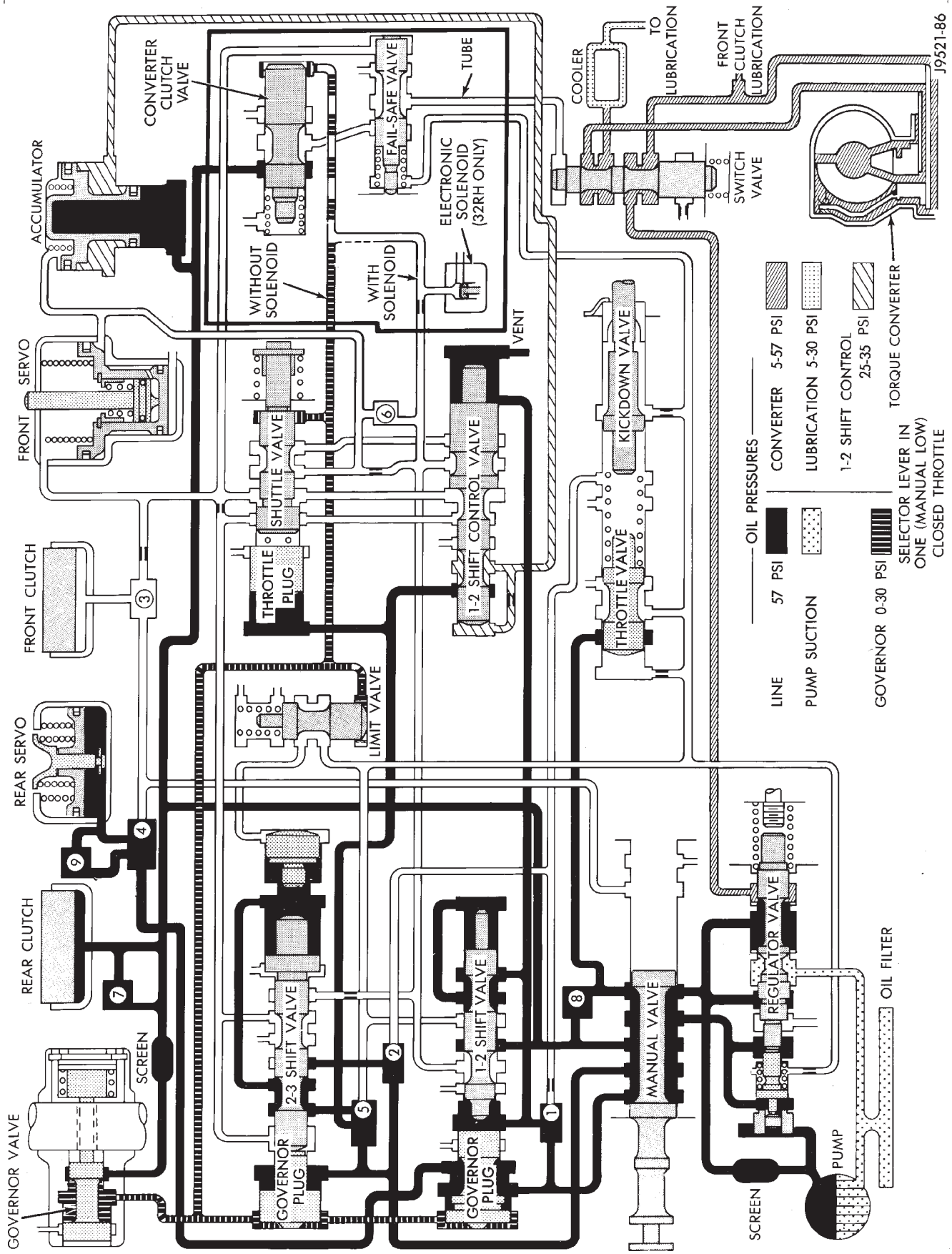
HYDRAULIC FLOW AT FULL THROTTLE 3-2 KICKDOWN

J9521-84

SCHEMATICS AND DIAGRAMS (Continued)



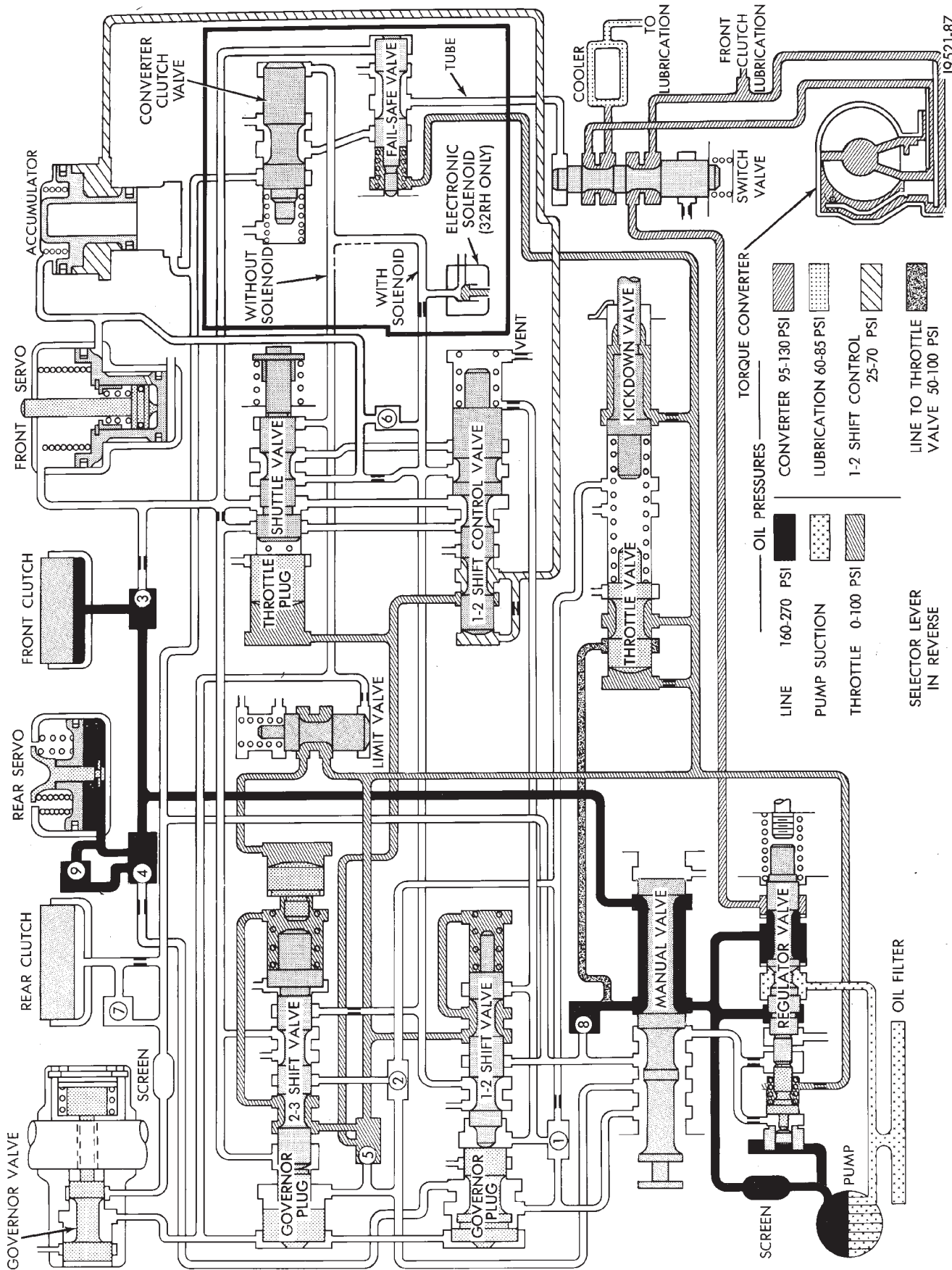
SCHEMATICS AND DIAGRAMS (Continued)



HYDRAULIC FLOW IN MANUAL LOW

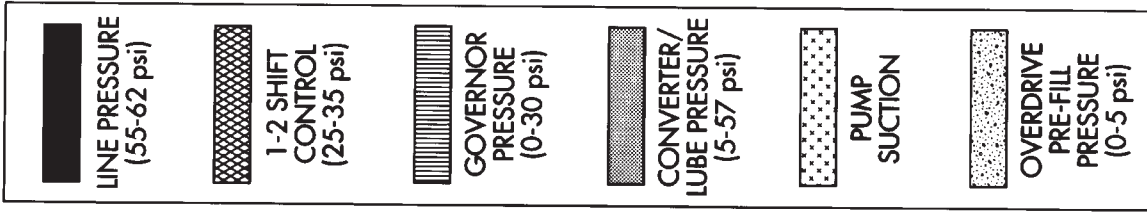
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SCHEMATICS AND DIAGRAMS (Continued)

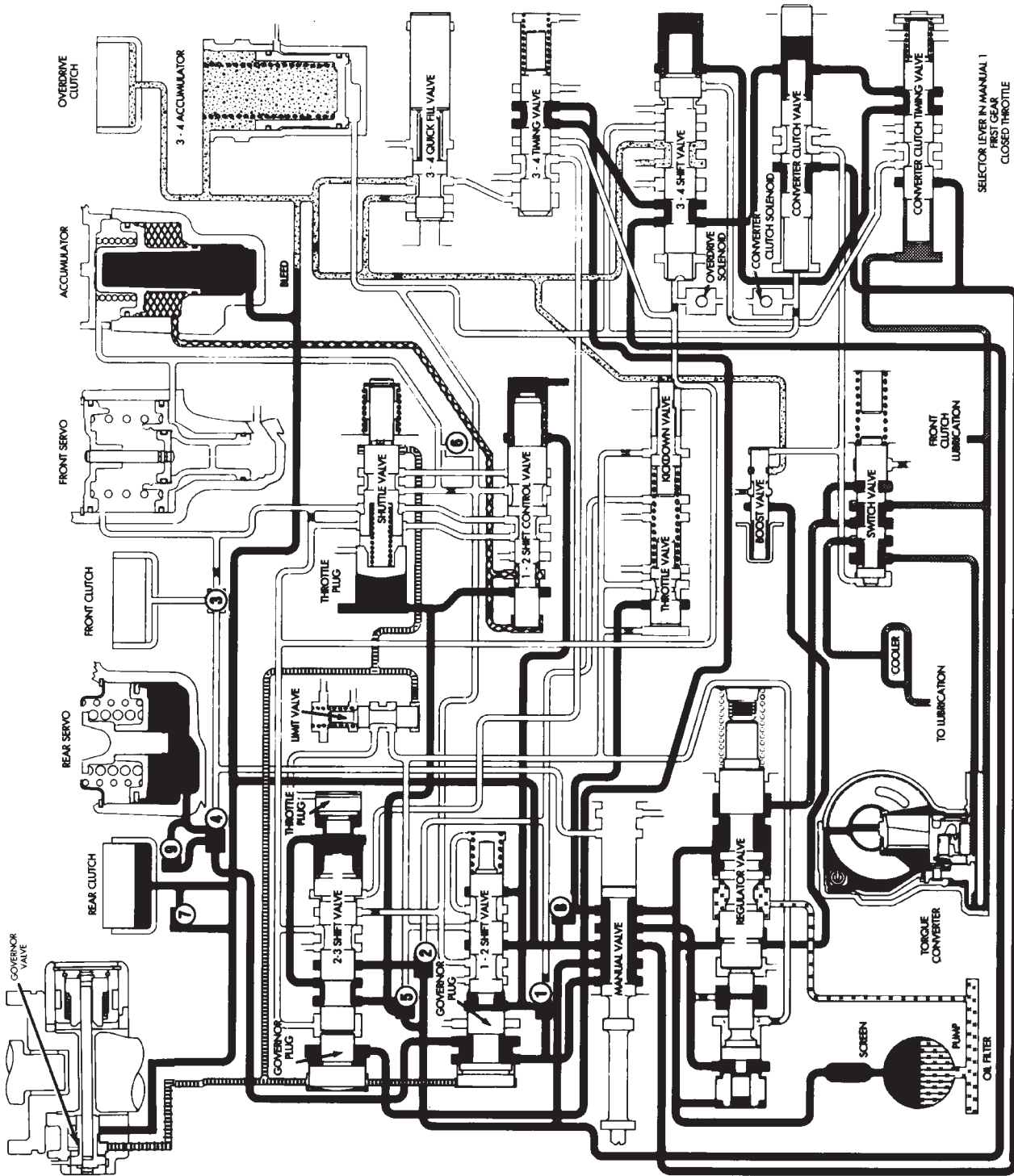


HYDRAULIC FLOW IN REVERSE

SCHEMATICS AND DIAGRAMS (Continued)



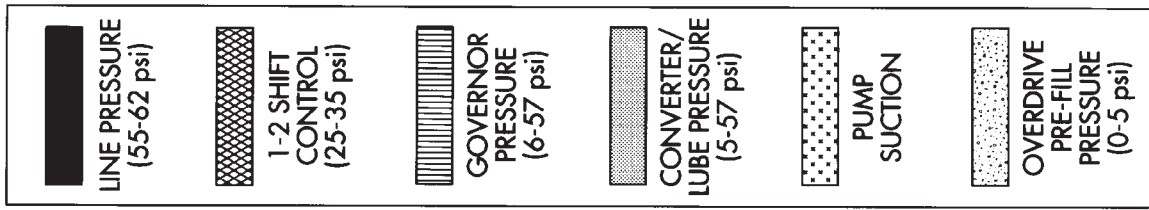
J9421-163



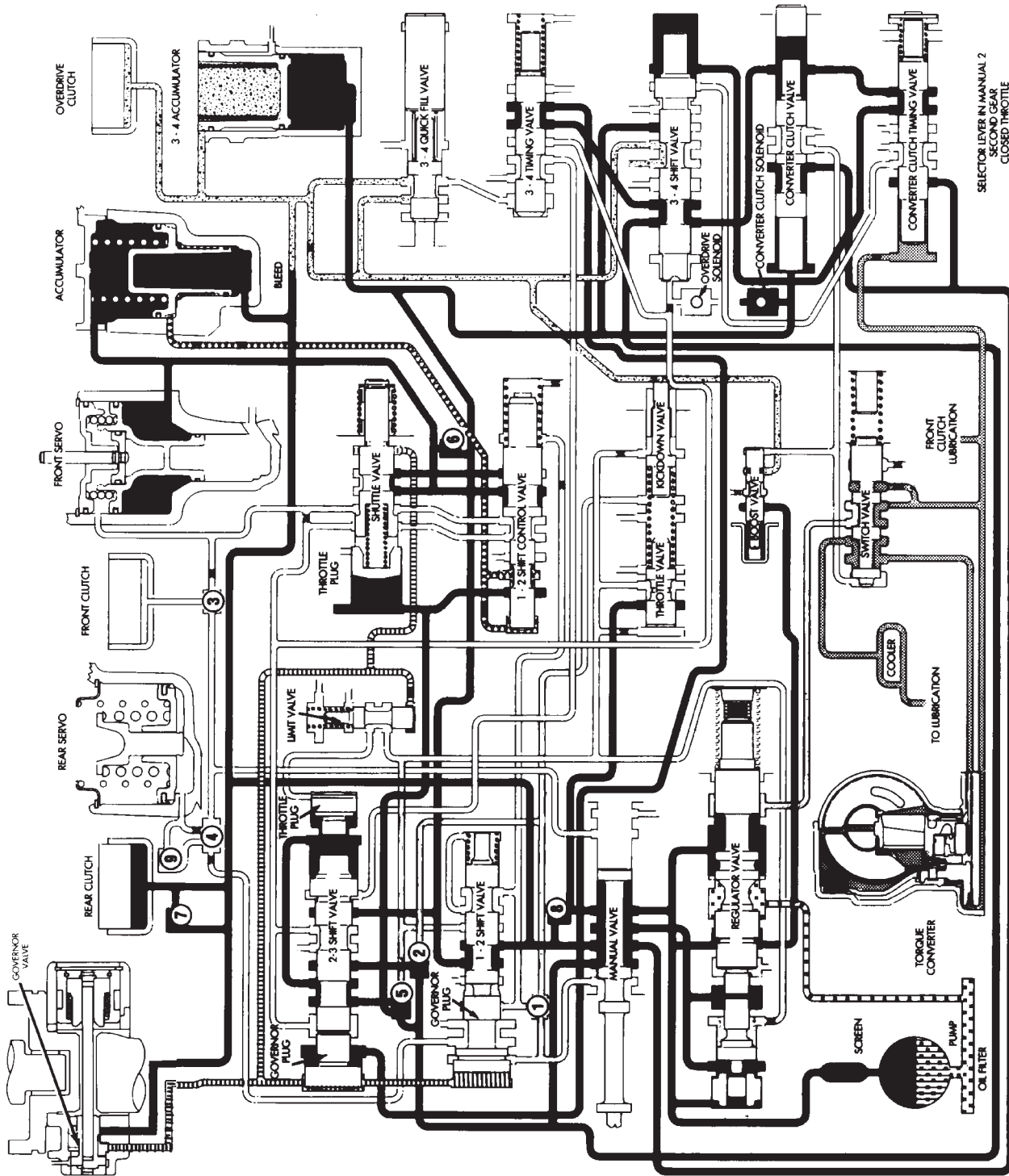
HYDRAULIC FLOW IN MANUAL FIRST GEAR (1)

SELECTOR LEVER IN MANUAL 1
FIRST GEAR
CLOSED THROTTLE

SCHEMATICS AND DIAGRAMS (Continued)



J9421-164



HYDRAULIC FLOW IN MANUAL SECOND GEAR (2)

SPECIFICATIONS

30RH AUTOMATIC TRANSMISSION

GENERAL

COMPONENT	METRIC	INCH
Oil pump gear tip clearance	0.089-0.190 mm	0.0035-0.0075 in.
Planetary end play	0.125-1.19 mm	0.001-0.047 in.
Input shaft end play	0.56-2.31 mm	0.022-0.091 in.
Clutch pack clearance/Front 4-disc.	1.70-3.40 mm	0.067-0.134 in.
Clutch pack clearance/Rear 4-disc.	0.559-0.940 mm	0.022-0.037 in.
Front clutch spring usage	1 spring	
30RH-Front Band adjustment from 72 in. lbs.	Back off 2.5 turns	
30RH-Rear Band adjustment from 41 in. lbs.	Back off 7 turns	
Recommended fluid	Mopar®, ATF Plus 3, Type 7176	

THRUST WASHER/SPACER/SNAP RING DIMENSIONS

COMPONENT	METRIC	INCH
Front clutch thrust washer (reaction shaft support hub)	1.55 mm	0.061 in.
Rear clutch thrust washer (clutch retainer)	1.55 mm	0.061 in.
Output shaft thrust plate (output shaft pilot hub)	1.5-1.6mm	0.060-0.063 in.
Output shaft thrust washer (rear clutch hub)	1.3-1.4 mm	0.052-0.054 in.
	1.7-1.8 mm	0.068-0.070 in.
	2.1-2.2 mm	0.083-0.086 in.
Rear clutch pack snap ring	1.5-1.6 mm	0.06-0.062 in.
	1.7-1.8 mm	0.068-0.070 in.
	1.9-2.0 mm	0.076-0.078 in.
Planetary geartrain snap ring (at front of output shaft)	1.0-1.1 mm	0.040-0.044 in.
	1.6-1.7 mm	0.062-0.066 in.
	2.1-2.2 mm	0.082-0.086 in.

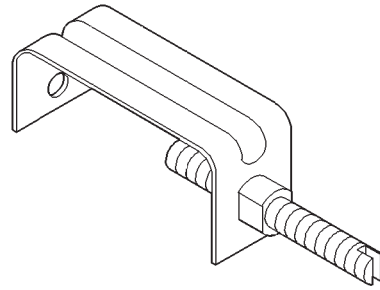
PRESSURE TEST—ALL

ITEM	RANGE	PRESSURE
Line pressure (at accumulator)	Closed throttle	372-414 kPa (54-60 psi).
Front servo	Third gear only	No more than 21 kPa (3 psi) lower than line pressure.
Rear servo	1 range	No more than 21 kPa (3 psi) lower than line pressure. 1103 kPa (160 psi) at idle, builds to 1862 kPa (270 psi) at 1600 rpm.
	R range	
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.

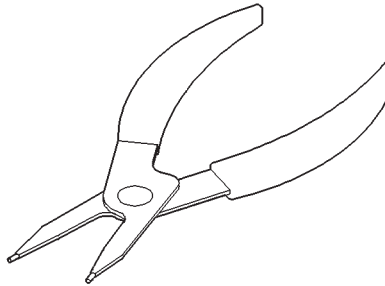
SPECIFICATIONS (Continued)

TORQUE

DESCRIPTION	TORQUE
Bolt, torque convertor	31 N·m (23 ft. lbs.)
Bolt/nut, crossmember	68 N·m (50 ft. lbs.)
Bolt, driveplate to crankshaft . . .	75 N·m (55 ft. lbs.)
Plug, front band reaction	17 N·m (13 ft. lbs.)
Locknut, front band adj.	34 N·m (25 ft. lbs.)
Switch, park/neutral	34 N·m (25 ft. lbs.)
Bolt, fluid pan	17 N·m (13 ft. lbs.)
Bolt, oil pump	20 N·m (15 ft. lbs.)
Bolt, overrunning clutch cam . . .	17 N·m (13 ft. lbs.)
Plug, pressure test port	14 N·m (10 ft. lbs.)
Bolt, reaction shaft support	20 N·m (15 ft. lbs.)
Locknut, rear band	41 N·m (30 ft. lbs.)
Bolt, speedometer adapter	11 N·m (8 ft. lbs.)
Screw, fluid filter	4 N·m (35 in. lbs.)
Bolt, valve body to case	12 N·m (100 in. lbs.)



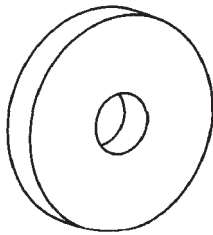
Retainer, Detent Ball and Spring—6583



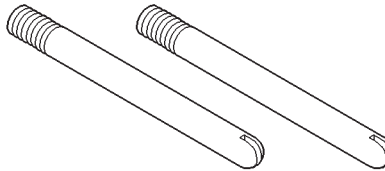
Snap-ring Plier—6823

SPECIAL TOOLS

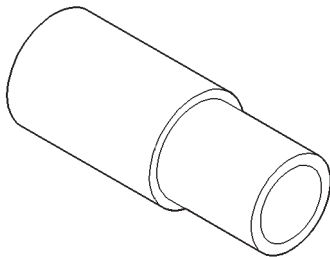
30RH TRANSMISSIONS



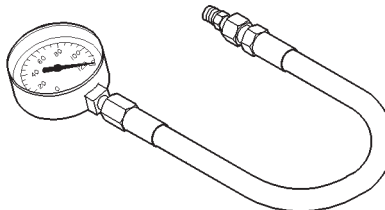
Remover—6957



Pilot Stud—C-3288-B

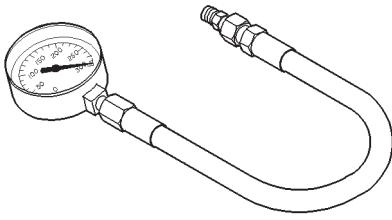


Installer—6951

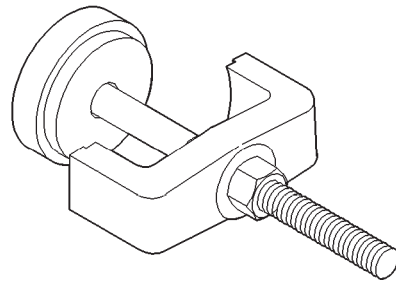


Pressure Gauge—C-3292

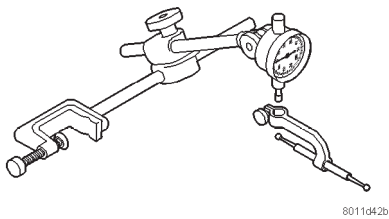
SPECIAL TOOLS (Continued)



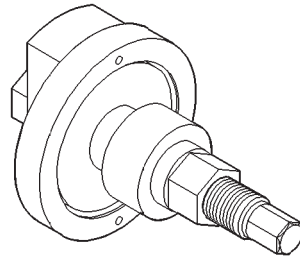
Pressure Gauge—C-3293SP



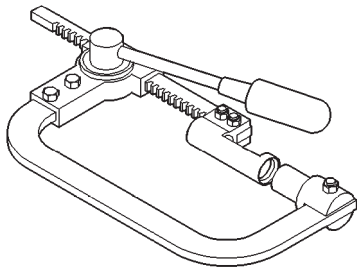
Spring Compressor—C-3575-A



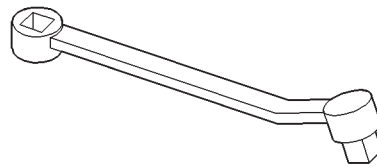
Dial Indicator—C-3339



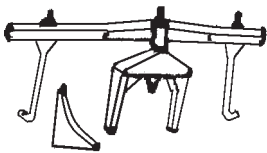
Spring Compressor—C-3863-A



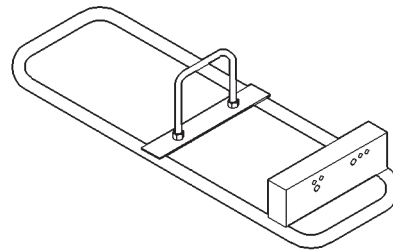
Spring Compressor—C-3422-B



Adapter, Band Adjuster—C-3705

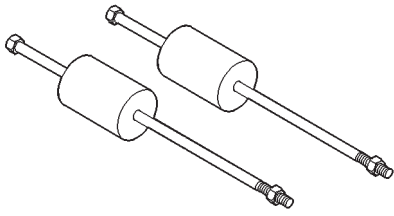


Fixture, Engine Support—C-3487-A

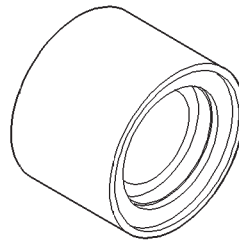


Transmission Repair Stand—C-3750-B

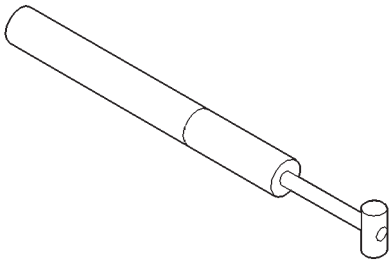
SPECIAL TOOLS (Continued)



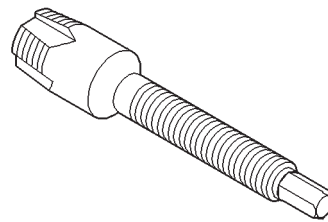
Puller, Slide Hammer—C-3752



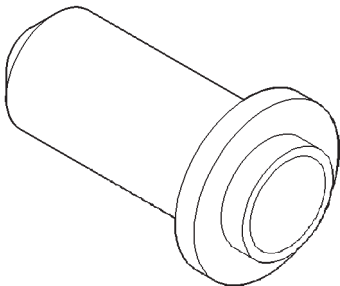
Cup, Remover—SP-3633



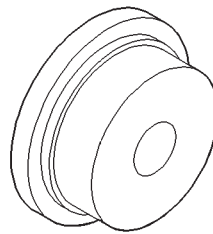
Gauge, Throttle Setting—C-3763



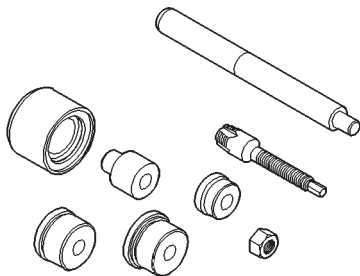
Remover, Bushing—SP-5301



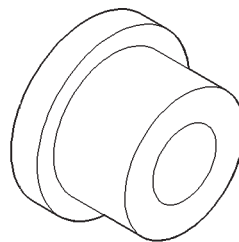
Seal Installer—C-3860-A



Installer, Bushing—SP-5118

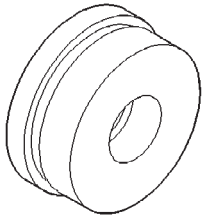


Bushing Remover/Installer—C-3887-J

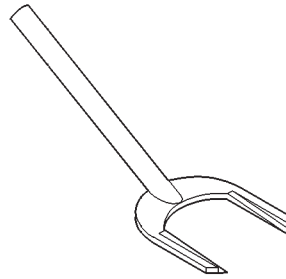


Installer, Bushing—SP-5302

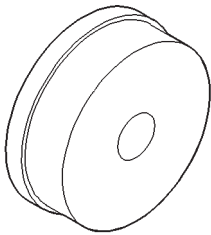
SPECIAL TOOLS (Continued)



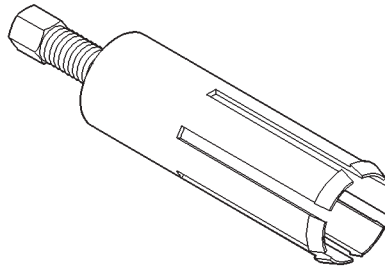
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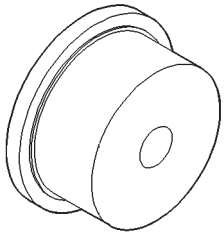
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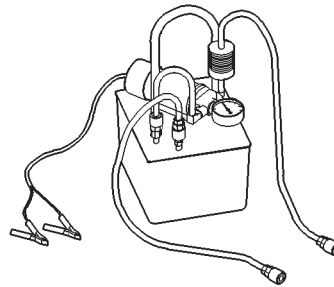
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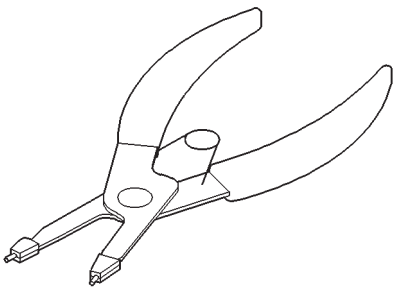
Bushing, Remover—6957



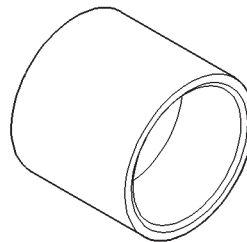
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Flusher, Oil Cooler—6906

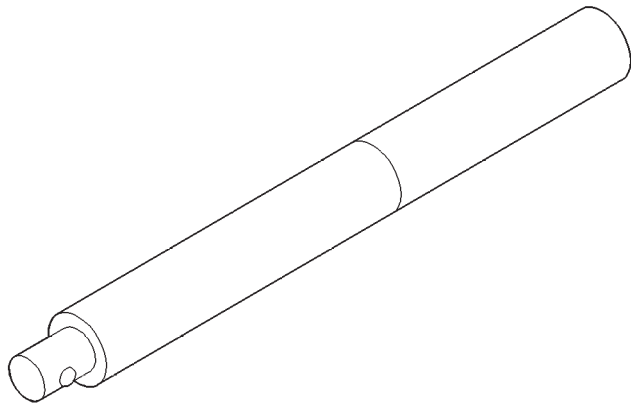


Snap-ring Plier—C-3915

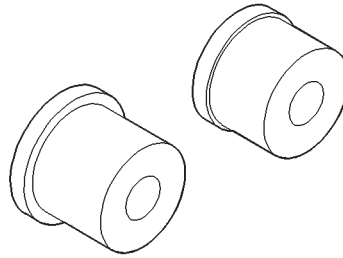


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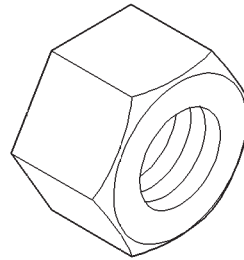
SPECIAL TOOLS (Continued)



Universal Handle—C-4171



Remover/Installer—C-4470



Nut, Bushing Remover—SP-1191

AW-4 AUTOMATIC TRANSMISSION

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GENERAL INFORMATION

AW-4 AUTOMATIC TRANSMISSION

The AW-4 is a 4-speed, electronically controlled automatic transmission (Fig. 1).

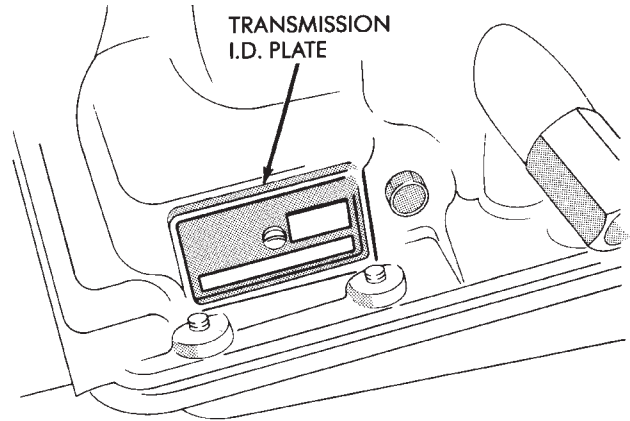
The running gear consists of an oil pump, planetary gear sets, clutch and brake units, hydraulic accumulators, a valve body with electrical solenoids, and a transmission control module (TCM). Cables are used to provide shift and throttle pressure control information. A park/neutral position switch permits engine starting in the Park and Neutral ranges only.

The valve body solenoids are controlled by signals from the transmission control module (TCM). Signal sequence is determined by inputs from various sensors to the TCM.

Fourth gear is an 0.75:1 ratio overdrive range. First, second, third and reverse gear are conventional ranges. Third gear ratio is 1:1. A separate planetary gear set provides overdrive operation in fourth gear.

TRANSMISSION IDENTIFICATION

The transmission I.D. plate is attached to the case (Fig. 2). The plate contains the transmission serial and model numbers. Refer to the information on this plate when ordering service parts.



J8921-400

Fig. 2 Transmission Identification

RECOMMENDED FLUID CAPACITY

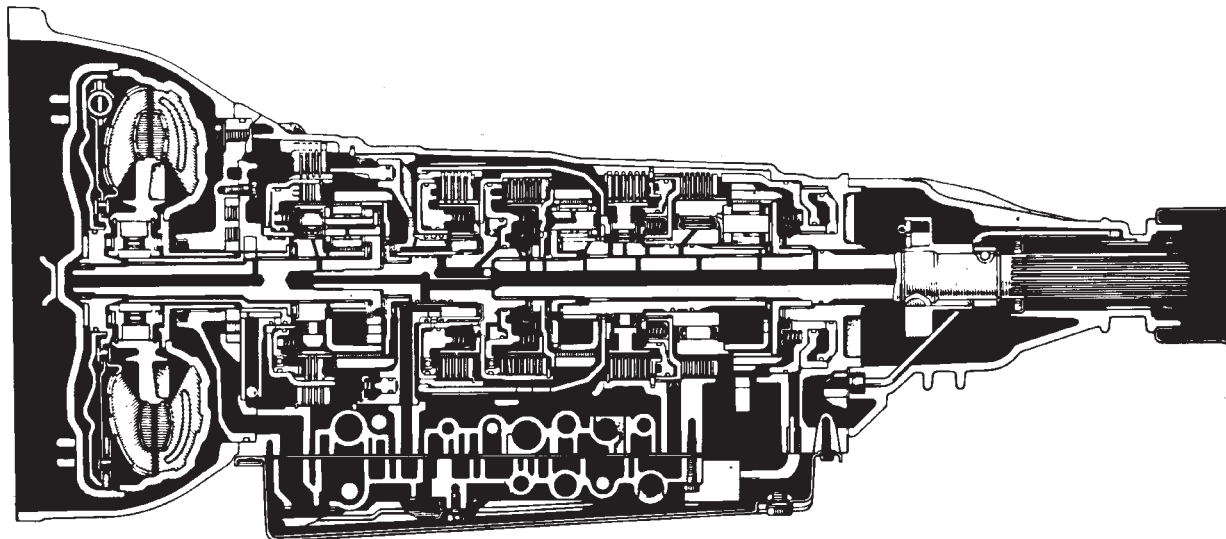
Recommended and preferred fluid for the AW-4 transmission is Mopar Dexron IIE/Mercon.

Mopar Dexron II can be used but only in emergency situations where Mercon fluid is not available.

Approximate refill capacity for the AW-4 is 8.0 liters (16.9 pints).

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.



J8921-398

Fig. 1 AW-4 Automatic Transmission

GENERAL INFORMATION (Continued)

If the transmission is overfilled, the gears churn the fluid into foam. This aerates the fluid and causing the same conditions occurring with a low level. In either case, air bubbles cause fluid overheating, oxidation and varnish buildup which interferes with valve, clutch and servo operation. Foaming also causes fluid expansion which can result in fluid overflow from the transmission vent or fill tube. Fluid overflow can easily be mistaken for a leak if inspection is not careful.

CAUSES OF BURNT FLUID

Burnt, discolored fluid is a result of overheating which has two primary causes.

(1) A result of restricted fluid flow through the main and/or auxiliary cooler. This condition is usually the result of a faulty or improperly installed drainback valve, a damaged main cooler, or severe restrictions in the coolers and lines caused by debris or kinked lines.

(2) Heavy duty operation with a vehicle not properly equipped for this type of operation. Trailer towing or similar high load operation will overheat the transmission fluid if the vehicle is improperly equipped. Such vehicles should have an auxiliary transmission fluid cooler, a heavy duty cooling system, and the engine/axle ratio combination needed to handle heavy loads.

FLUID CONTAMINATION

Transmission fluid contamination is generally a result of:

- adding incorrect fluid
- failure to clean dipstick and fill tube when checking level
- engine coolant entering the fluid
- internal failure that generates debris
- overheat that generates sludge (fluid breakdown)
- failure to reverse flush cooler and lines after repair
- failure to replace contaminated converter after repair

The use of non recommended fluids can result in transmission failure. The usual results are erratic shifts, slippage, abnormal wear and eventual failure due to fluid breakdown and sludge formation. Avoid this condition by using recommended fluids only.

The dipstick cap and fill tube should be wiped clean before checking fluid level. Dirt, grease and other foreign material on the cap and tube could fall into the tube if not removed beforehand. Take the time to wipe the cap and tube clean before withdrawing the dipstick.

Engine coolant in the transmission fluid is generally caused by a cooler malfunction. The only remedy

is to replace the radiator as the cooler in the radiator is not a serviceable part. If coolant has circulated through the transmission for some time, an overhaul may also be necessary; especially if shift problems had developed.

The transmission cooler and lines should be reverse flushed whenever a malfunction generates sludge and/or debris. The torque converter should also be replaced at the same time.

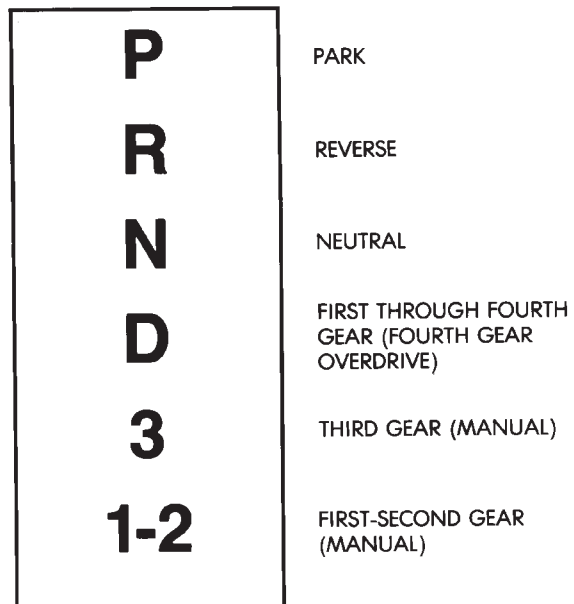
Failure to flush the cooler and lines will result in recontamination. Flushing applies to auxiliary coolers as well. The torque converter should also be replaced whenever a failure generates sludge and debris. This is necessary because normal converter flushing procedures will not remove all contaminants.

TRANSMISSION RANGES AND SHIFT LEVER POSITIONS

The AW-4 transmission has six ranges and shift lever positions. Park, Reverse and Neutral are conventional and mechanically operated. The 1-2, 3 and D ranges provide electronically controlled shifting.

The 1-2 position provides first and second gear only. The 3 position provides first, second and third gear.

The D range provides first through fourth gear. Overdrive fourth gear range is available only when the shift lever is in D position (Fig. 3).



J8921-399

Fig. 3 AW-4 Shift Lever Positions And Transmission Ranges

DESCRIPTION AND OPERATION

ELECTRONIC CONTROLS

The AW-4 is electronically controlled in 1, 2, 3 and D ranges. Controls consist of the transmission control module (TCM), valve body solenoids and various sensors. The sensors monitor vehicle speed, throttle opening, shift lever position and brake pedal application.

TRANSMISSION CONTROL MODULE (TCM)

The module determines shift and converter clutch engagement timing based on signals from sensors. The valve body solenoids are activated, or deactivated accordingly.

The TCM has a self diagnostic program. Component and circuitry malfunctions can be diagnosed with the DRB scan tool. Once a malfunction is noted and stored in control module memory, it is retained even after the problem has been corrected. To cancel a stored malfunction, disconnect and reconnect the "Trans." fuse in the module harness.

TRANSMISSION VALVE BODY SOLENOIDS

The solenoids are mounted on the valve body and operated by the TCM. The solenoids control operation of the converter clutch and shift valves in response to input signals from the module.

SENSORS

Sensors include:

- throttle position sensor (TPS)
- transmission speed sensor
- vehicle speed sensor
- park/neutral position switch
- brake switch

The throttle position sensor is mounted on the throttle body. It electronically determines throttle position and relays this information to the transmission control module to determine shift points and converter clutch engagement.

The transmission speed sensor consists of a rotor and magnet on the transmission output shaft and a switch in the extension housing or adapter. The sensor switch is activated each time the rotor and magnet complete one revolution. Sensor signals are sent to the transmission control module.

The park/neutral position switch is mounted on the valve body manual shaft. The switch signals shift linkage and manual valve position to the transmission control module through an interconnecting harness. The switch prevents engine starting in all gears other than Park or Neutral.

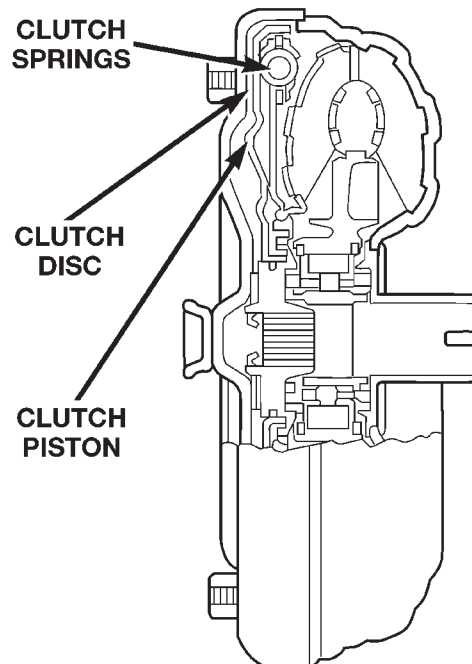
The brake switch is in circuit with the torque converter clutch solenoid. The switch disengages the converter clutch whenever the brakes are applied.

The switch is mounted on the brake pedal bracket and signals the transmission control module when the pedal is pressed or released.

TORQUE CONVERTER

A three element torque converter is used for all applications. The converter contains an impeller, stator, and turbine.

The AW-4 converters are all equipped with a converter clutch mechanism. The clutch consists of a sliding clutch piston, clutch springs and the clutch disc material (Fig. 4). The clutch provides optimum torque transfer and economy when engaged.



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Fig. 4 Torque Converter (With Clutch)

The clutch disc is attached to the converter front cover. The clutch piston and clutch springs are attached to the turbine hub. The springs dampen engine firing impulses and loads during the initial phase of converter clutch engagement.

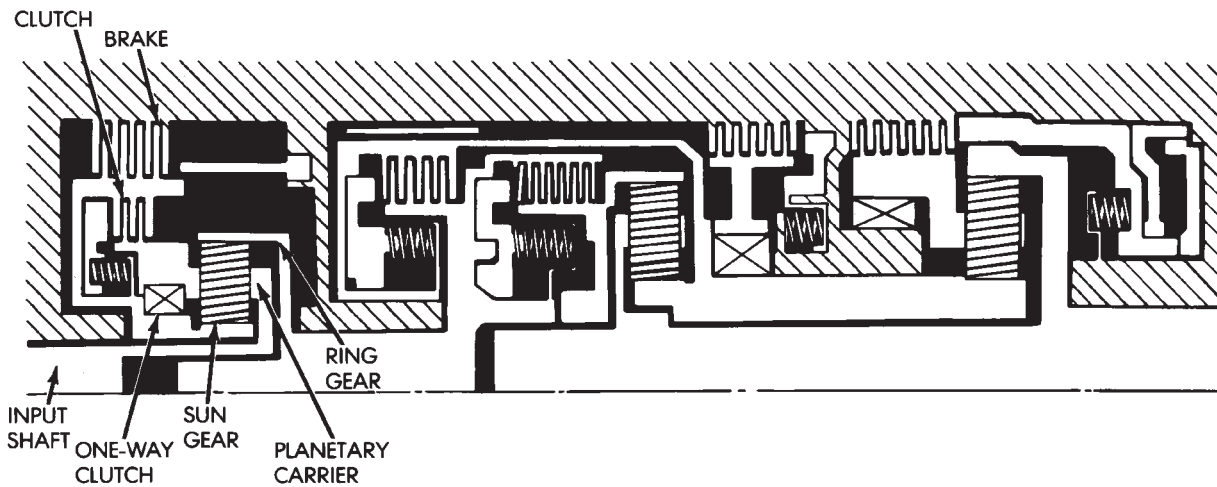
Clutch engagement is controlled by transmission valve body solenoid number three and by the converter clutch relay valve. The solenoid channels line pressure to the clutch through the relay valve at clutch engagement speeds.

Torque converter clutch engagement occurs in second gear in 1-2 position; third gear in 3 position and third and fourth gear in D position.

FOURTH GEAR OVERDRIVE COMPONENTS

The overdrive system consists of the input shaft, one-way clutch, planetary sun gear, ring gear, planetary carrier, overdrive clutch and overdrive brake (Fig. 5). The overdrive elements are controlled and

DESCRIPTION AND OPERATION (Continued)



J8921-402

Fig. 5 Fourth Gear Overdrive Components

applied through transmission valve body solenoid number two.

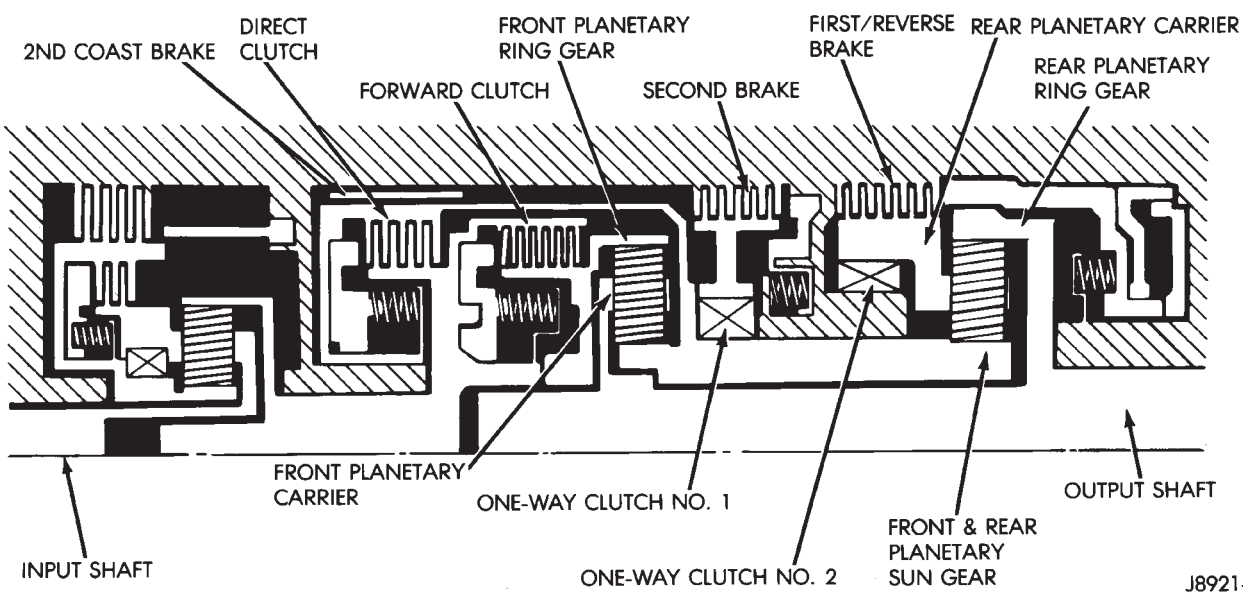
In fourth gear, the overdrive brake prevents the overdrive sun gear from turning. The overdrive input shaft and planetary carrier rotate as a unit. The sun gear and overdrive direct clutch drum are in mesh and operate as a single unit. The direct clutch splines function as the hub for the overdrive brake. The one-way clutch outer race is in mesh with the planetary carrier. The inner race is fixed to the sun gear shaft.

FIRST/SECOND/THIRD/REVERSE GEAR COMPONENTS

First through third and reverse gear components are outlined in (Fig. 6).

The input shaft is meshed with the direct clutch hub and the forward clutch drum. These elements rotate as a unit. The forward clutch hub rotates as a unit with the front planetary ring gear. The direct clutch drum is meshed with the forward end of the planetary sun gear.

The second brake hub serves as the outer race of one-way clutch No. 1. The clutch inner race is locked with the front/rear sun gear. The inner race of one-way clutch No. 2 is splined to the transmission case



J8921-403

Fig. 6 First/Second/Third/Reverse Gear Components

DESCRIPTION AND OPERATION (Continued)

and is locked. The outer race rotates as a unit with the rear planetary carrier.

The rear planetary ring gear is splined to the output shaft. The front planetary carrier and rear carrier ring gear are meshed and rotate as a unit with the output shaft.

The Component Function Chart describes basic function of various geartrain elements. The Component Application Chart indicates which elements (including valve body solenoids), are applied in the various gear ranges.

GEARTRAIN OPERATION AND APPLICATION CHARTS

Operation and application of the first through fourth and reverse gear elements are outlined in the function and application charts.

COMPONENT FUNCTION CHART

COMPONENT NAME	COMPONENT FUNCTION
Overdrive Direct Clutch	Connects overdrive sun gear and overdrive carrier.
Overdrive Brake	Prevents overdrive sun gear from turning either clockwise or counter-clockwise.
Overdrive One-Way Clutch	When transmission is driven by engine, connects overdrive sun gear and overdrive carrier.
Forward Clutch	Connects input shaft and front ring gear.
Direct Clutch	Connects input shaft to the front and rear ring gears.
Second Coast Brake	Prevents front and rear sun gear from turning either clockwise or counter-clockwise.
Second Brake	Prevents outer race of number 1 one-way clutch from turning either clockwise or counter-clockwise, thus preventing the front and rear sun gears from turning counter-clockwise.
First/Reverse Brake	Prevents the rear planetary carrier from turning either clockwise or counter-clockwise.
Number 1 One-way Clutch	When second brake is operating, prevents the front and rear sun gears from turning counter-clockwise.
Number 2 One-Way Clutch	Prevents the rear planetary carrier from turning counter-clockwise.

DESCRIPTION AND OPERATION (Continued)

HYDRAULIC SYSTEM

body section (Fig. 8). The remaining control and shift

COMPONENT APPLICATION CHART

Shift Lever Position	Gear	Valve Body Solenoid No. 1	Valve Body Solenoid No. 2	OVERDRIVE CLUTCH	FORWARD CLUTCH	DIRECT CLUTCH	OVERDRIVE BRAKE	SECOND COAST BRAKE	SECOND BRAKE	FIRST/REVERSE BRAKE	OVERDRIVE ONE-WAY CLUTCH	NO. 1 ONE-WAY CLUTCH	NO. 2 ONE-WAY CLUTCH
P	Park	ON	OFF	•									
R	Reverse	ON	OFF	•		•				•	•		
N	Neutral	ON	OFF	•									
D	First	ON	OFF	•	•						•		•
	Second	ON	ON	•	•				•		•	•	
	Third	OFF	ON	•	•	•			•		•		
	OD	OFF	OFF		•	•	•		•				
3	First	ON	OFF	•	•						•		•
	Second	ON	ON	•	•			•	•		•	•	
	Third	OFF	ON	•	•	•			•		•		
1-2	First	ON	OFF	•	•					•	•		•
	Second	ON	ON	•	•			•	•		•	•	

• = Applied

J8921-405

The hydraulic system consists of the pump, valve body and solenoids, and four hydraulic accumulators. The oil pump provides lubrication and operating pressure.

The valve body controls application of the clutches, brakes, second coast band, and the converter clutch. The valve body solenoids control sequencing of the 1-2, 2-3 and 3-4 shift valves. The solenoids are activated by signals from the transmission control module.

The accumulators are used in the clutch and brake feed circuits to control initial apply pressure. Spring loaded accumulator pistons modulate the initial surge of apply pressure for smooth engagement.

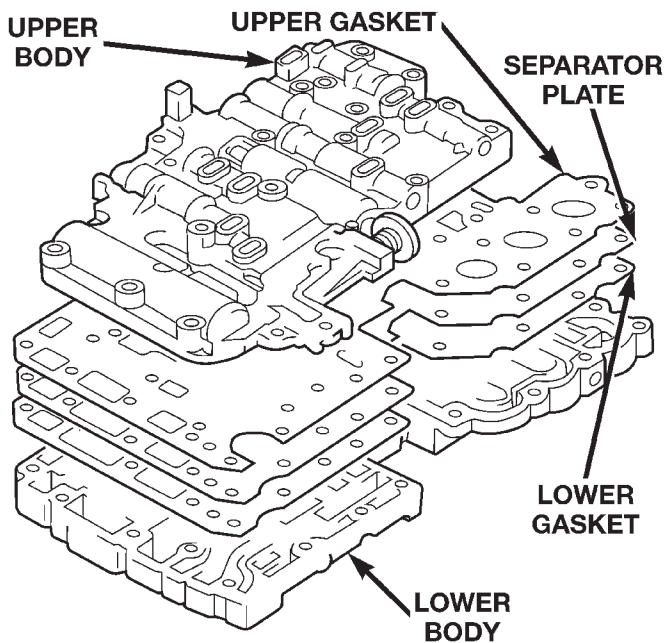
OIL PUMP

A gear-type oil pump is used. The pump gears are mounted in the pump body. The pump drive gear is operated by the torque converter hub. Drive tangs on the hub engage in drive slots in the drive gear.

TRANSMISSION VALVE BODY COMPONENTS

Transmission operating pressure is supplied to the clutch and brake apply circuits through the transmission valve body. The valve body consists of an upper body, lower body, separator plate and upper and lower gaskets (Fig. 7). The various spool valves, sleeves, plugs and springs are located within the two body sections.

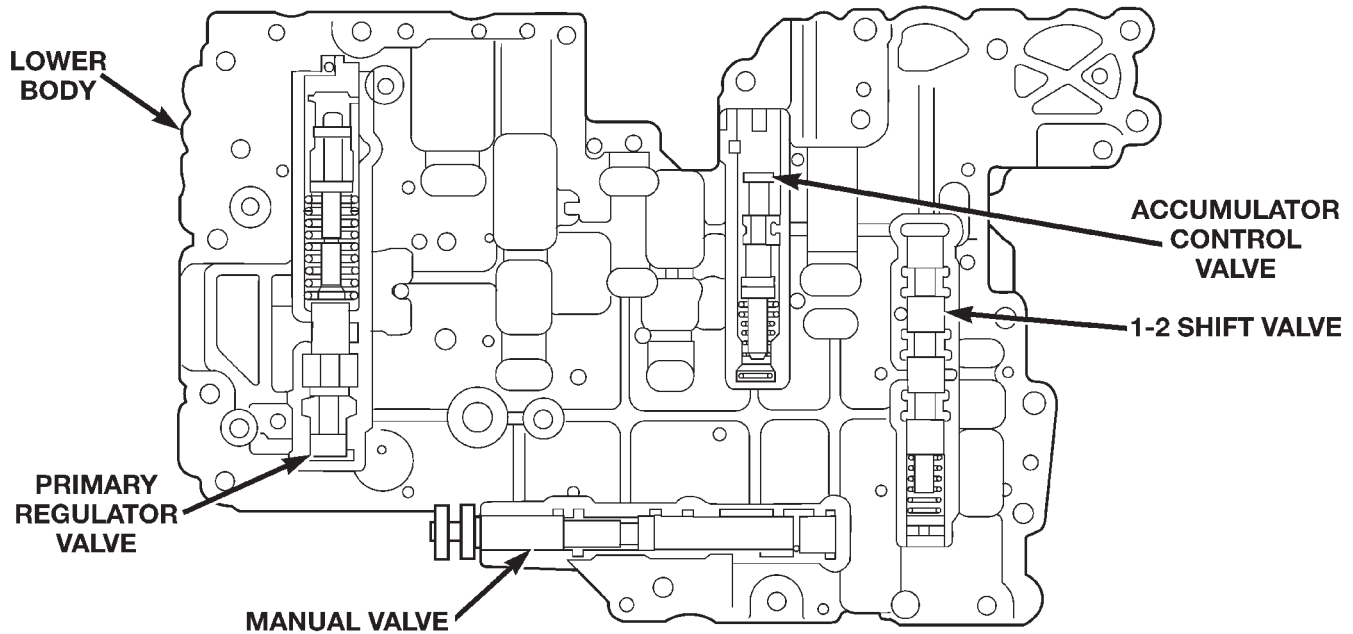
The manual valve, 1-2 shift valve, primary regulator valve, accumulator control valve, check balls, solenoids and oil strainers are located in the lower



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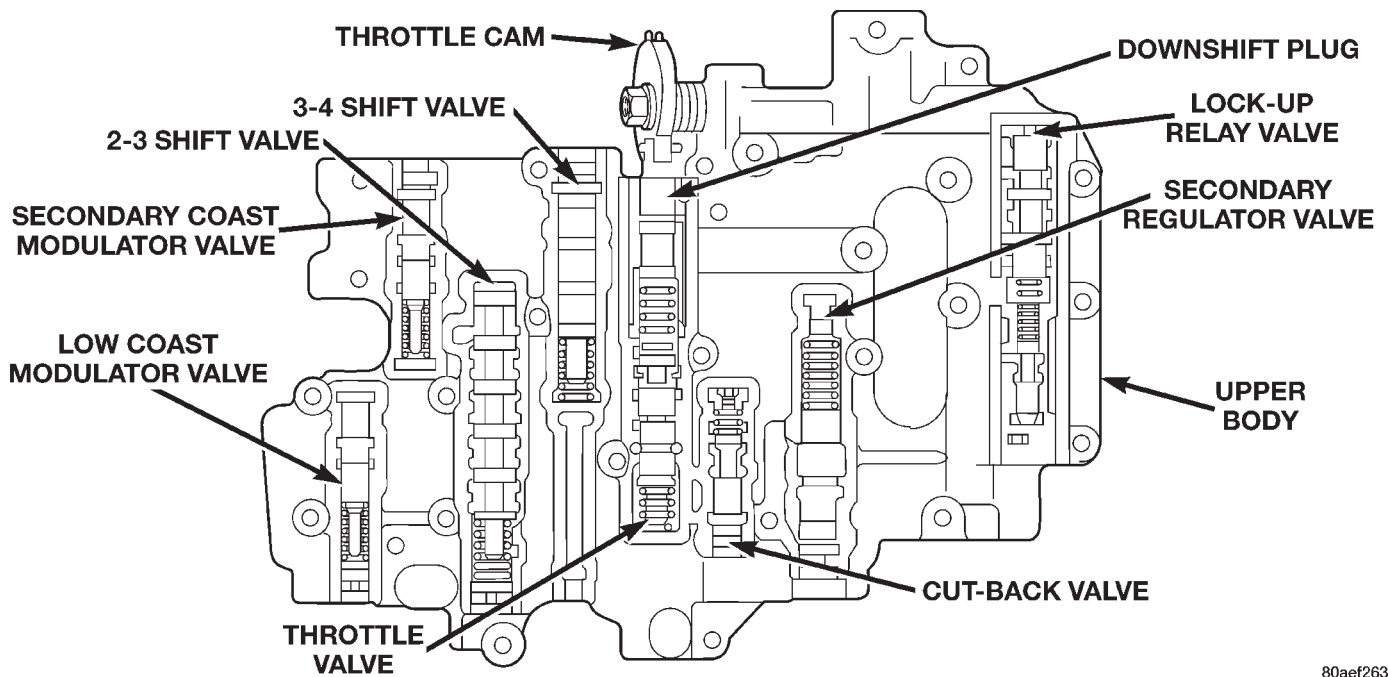
Fig. 7 Two-Section Transmission Valve Body valves plus check balls and one additional oil strainer are located in the upper body section (Fig. 9).

DESCRIPTION AND OPERATION (Continued)



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Fig. 8 Upper Body Components



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Fig. 9 Lower Body Components

MANUAL VALVE

The manual valve is operated by the gearshift linkage. The valve diverts fluid to the apply circuits according to shift lever position (Fig. 10).

PRIMARY REGULATOR VALVE

The primary regulator valve (Fig. 11) modulates line pressure to the clutches and brakes according to

engine load. The valve is actuated by throttle valve pressure.

During high load operation, the valve increases line pressure to maintain positive clutch and brake engagement. At light load, the valve decreases line pressure just enough to maintain smooth engagement.

DESCRIPTION AND OPERATION (Continued)

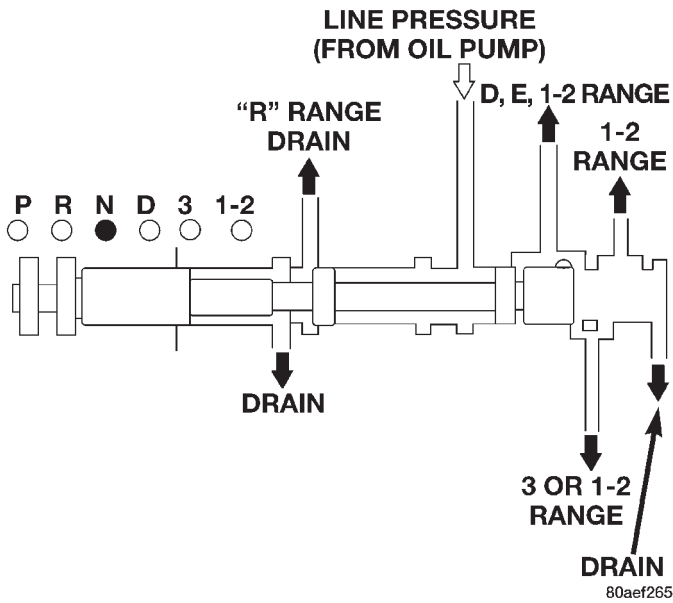


Fig. 10 Manual Valve

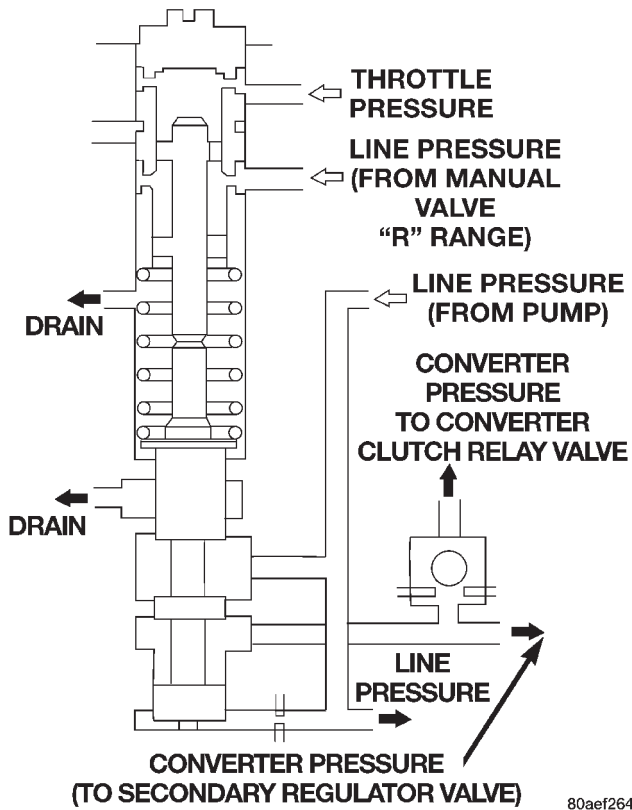


Fig. 11 Primary Regulator Valve

THROTTLE VALVE AND DOWNSHIFT PLUG

The throttle valve and downshift plug (Fig. 12) control throttle pressure to the primary regulator valve.

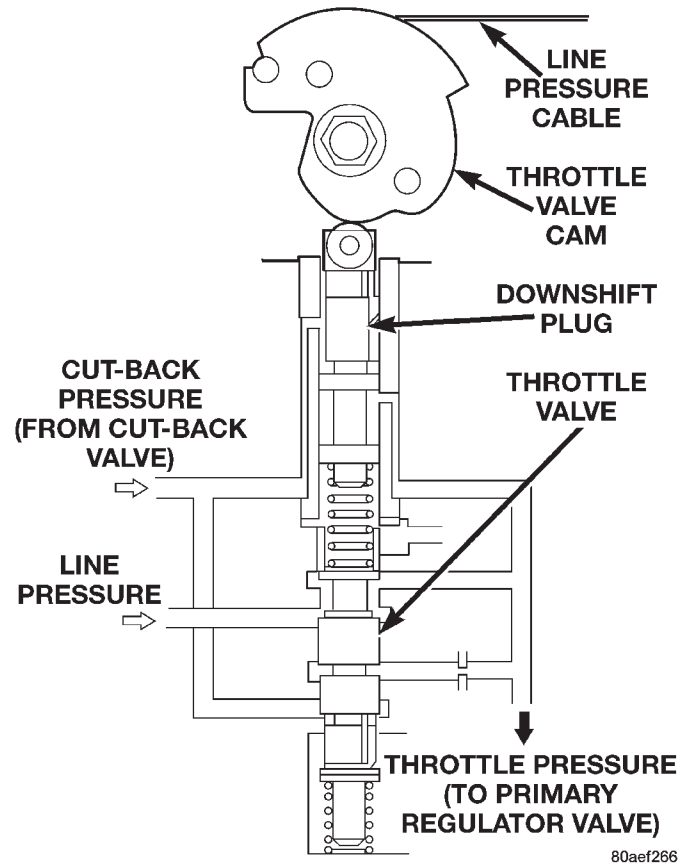


Fig. 12 Throttle Valve And Downshift Plug

The downshift plug and throttle valve are operated by the throttle valve cam and throttle cable in response to engine throttle position. Throttle valve pressure is also modulated by the cut-back valve in second, third and fourth gear ranges.

CUT-BACK VALVE

The cut-back valve (Fig. 13) helps prevent excessive pump pressure buildup in second, third and fourth gear. The valve is actuated by throttle pressure and by line pressure from the second brake. The valve also helps regulate line pressure by controlling the amount of cut-back pressure to the throttle valve.

SECONDARY REGULATOR VALVE

The secondary regulator valve (Fig. 14) regulates converter clutch and transmission lubrication pressure. When primary regulator valve pressure exceeds requirements for clutch engagement or transmission lubrication, the secondary regulator valve is moved upward exposing the drain port. Excess pressure

DESCRIPTION AND OPERATION (Continued)

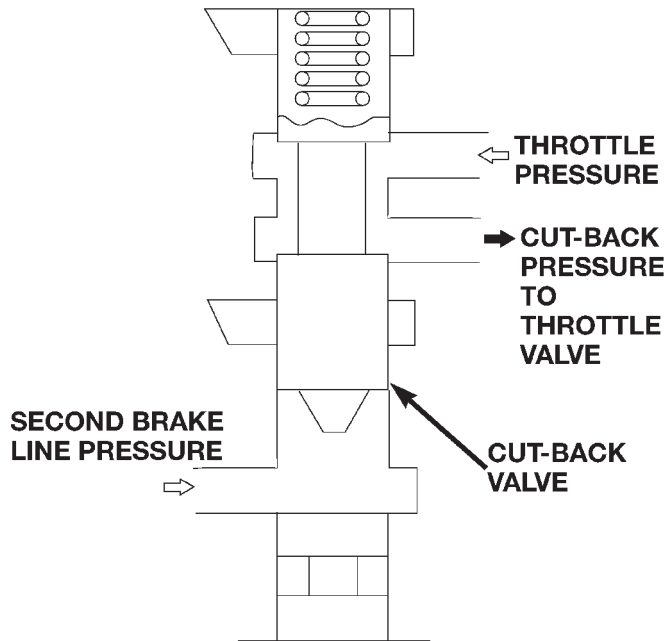


Fig. 13 Cut-Back Valve

then bleeds off as needed. As pressure drops, spring tension moves the valve downward closing the drain port.

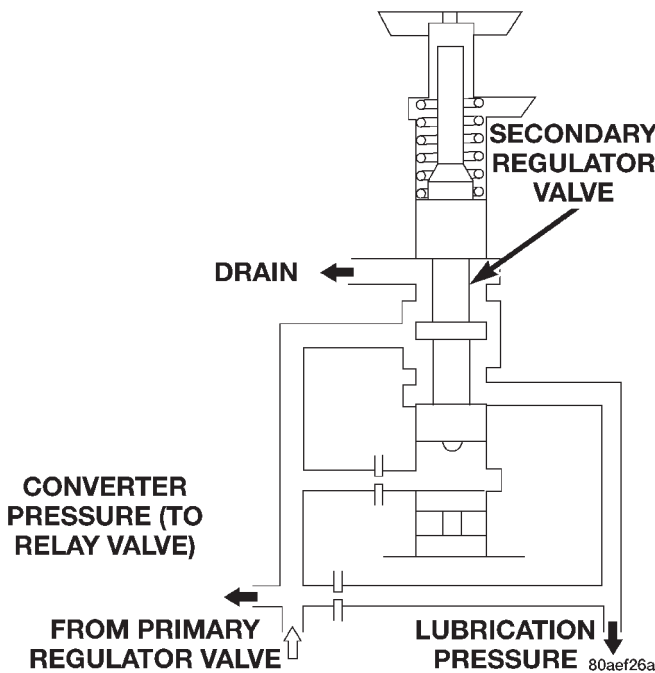


Fig. 14 Secondary Regulator Valve

CONVERTER CLUTCH RELAY VALVE

The converter clutch relay valve (Fig. 15) controls fluid flow to the converter clutch. The valve is operated by line pressure from the 1-2 shift valve and is controlled by solenoid valve number three.

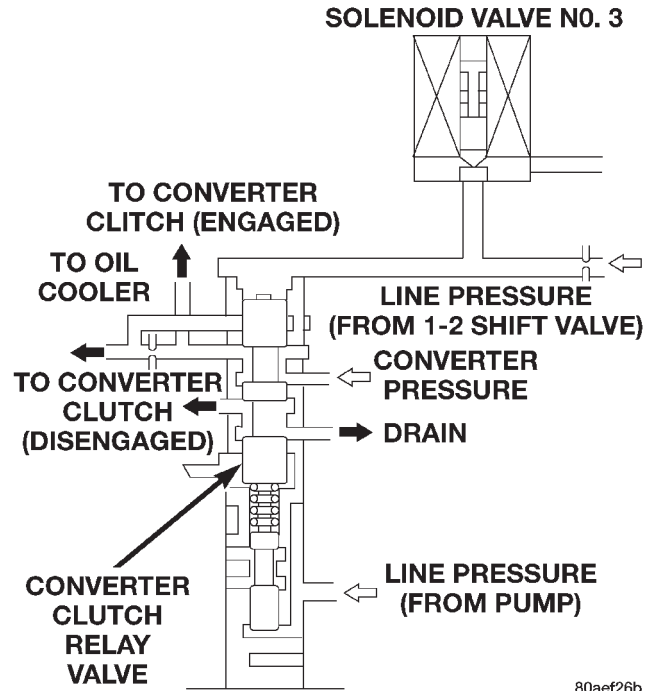


Fig. 15 Converter Clutch Relay Valve

1-2 SHIFT VALVE

The 1-2 shift valve (Fig. 16) controls the 1-2 upshifts and downshifts. The valve is operated by the No. 2 valve body solenoid and line pressure from the manual valve, second coast modulator valve and the 2-3 shift valve.

When the transmission control module deactivates the solenoid, line pressure at the top of the valve moves the valve down closing the second brake accumulator feed port. As the solenoid is activated and the drain port opens, spring force moves the valve up exposing the second brake feed port for the shift to second gear.

2-3 SHIFT VALVE

The 2-3 shift valve (Fig. 17) controls the 2-3 upshifts and downshifts. The valve is actuated by the No. 1 valve body solenoid and by line pressure from the manual valve and primary regulator valve.

When the TCM activates solenoid No. 1, line pressure at the top of the 2-3 valve is released through the solenoid drain port. Spring tension moves the valve up to hold the valve in second gear position. As the solenoid is deactivated, line pressure then moves the valve down exposing the direct clutch feed port for the shift to third gear.

DESCRIPTION AND OPERATION (Continued)

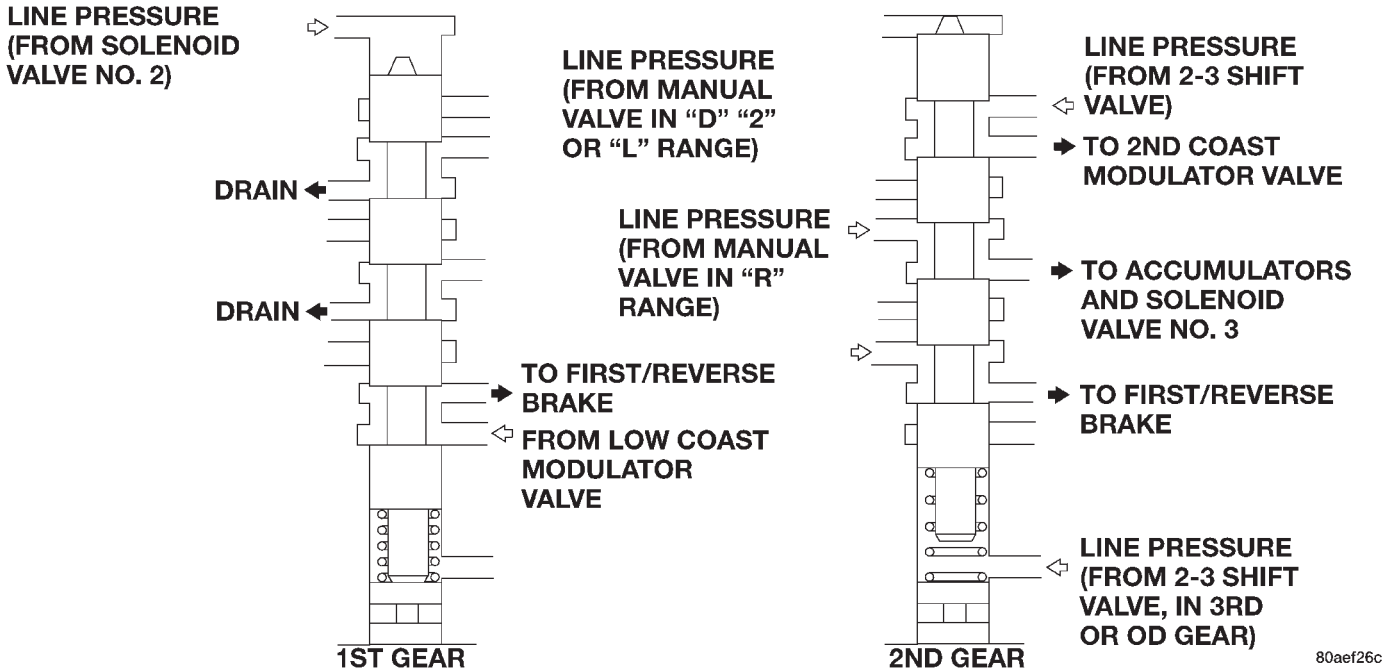


Fig. 16 1-2 Shift Valve

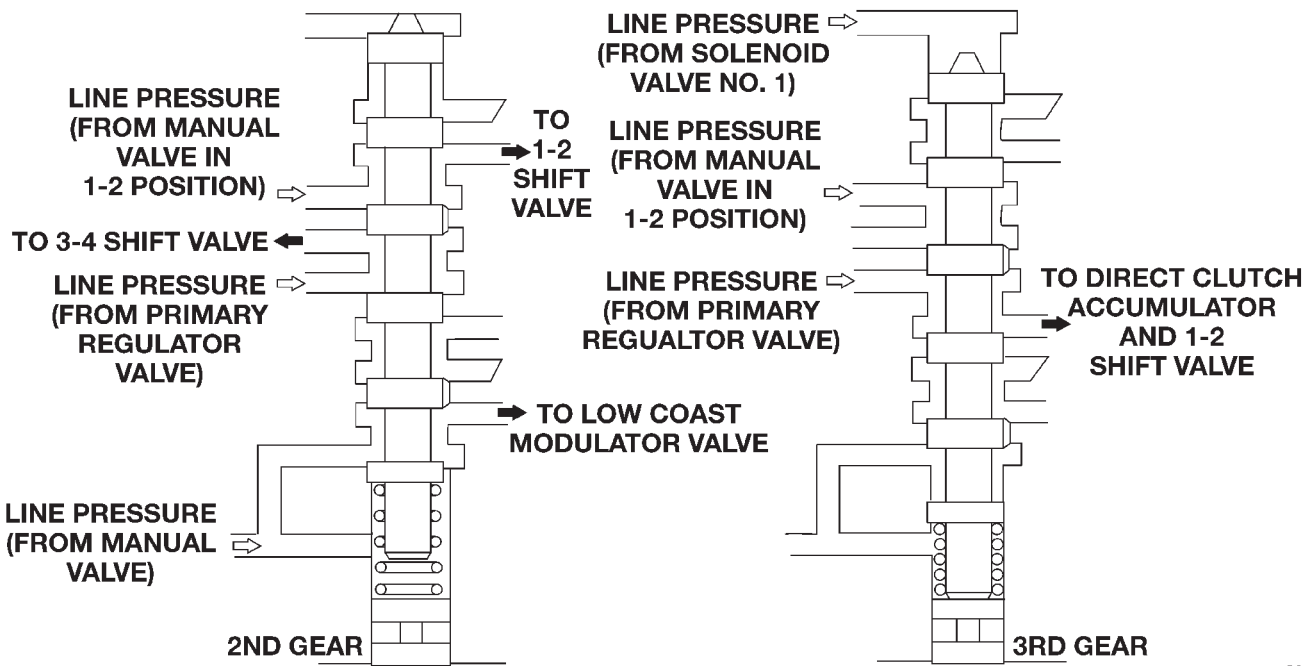


Fig. 17 2-3 Shift Valve

3-4 SHIFT VALVE

The 3-4 shift valve (Fig. 18) is operated by the No. 2 solenoid and by line pressure from the manual valve, 2-3 valve and primary regulator valve.

Energizing the No. 2 solenoid causes line pressure at the top of the 3-4 valve to be released through the solenoid valve drain port. Spring tension moves the valve up exposing the overdrive clutch accumulator feed port to apply the clutch.

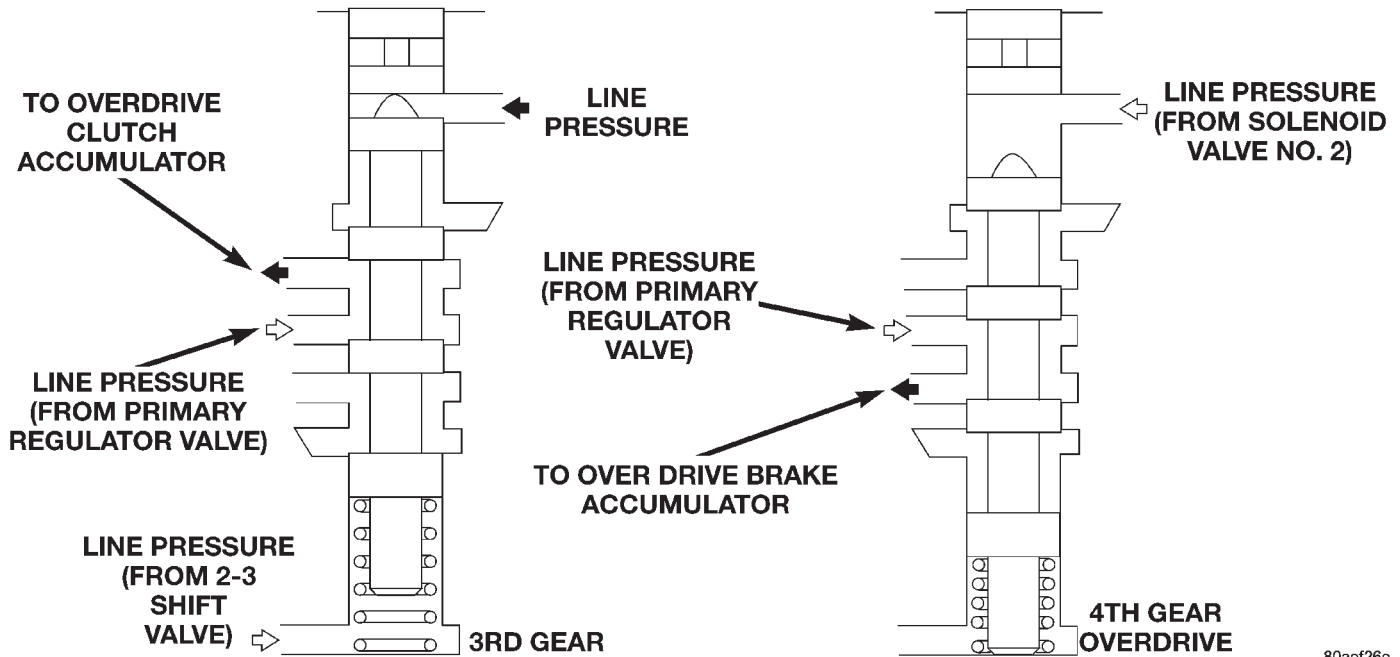
De-energizing the solenoid causes the drain port to close. Line pressure then moves the valve down exposing the overdrive brake accumulator feed port for the shift to fourth gear.

In the 1-2 or 3 gearshift lever positions, line pressure from the 2-3 shift valve is applied to the lower end of the 3-4 valve. This holds the valve upward, closing off the overdrive brake feed port preventing a shift into fourth gear.

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DESCRIPTION AND OPERATION (Continued)

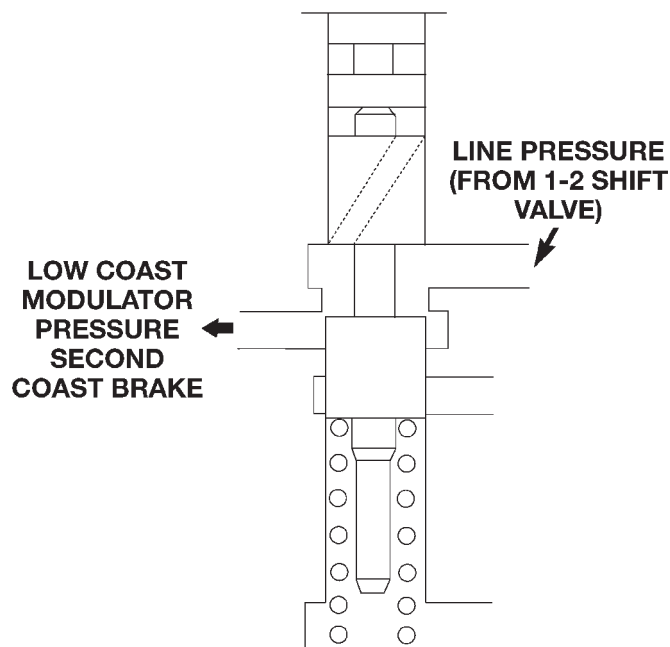


80aef26e

Fig. 18 3-4 Shift Valve

SECOND COAST MODULATOR VALVE

The second coast modulator valve (Fig. 19) momentarily reduces line pressure from the 1-2 shift valve. This cushions application of the second coast brake. The valve is operative when the shift lever and manual valve are in the 3 position.



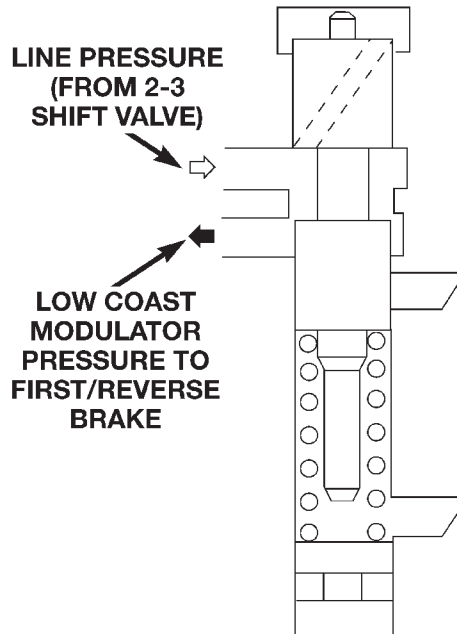
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Fig. 19 Second Coast Modulator Valve

LOW COAST MODULATOR VALVE

The low coast modulator valve (Fig. 20) momentarily reduces line pressure from the 2-3 shift valve;

this action cushions application of the first/reverse brake. The modulator valve operates when the shift lever and manual valve are in the 1-2 position.



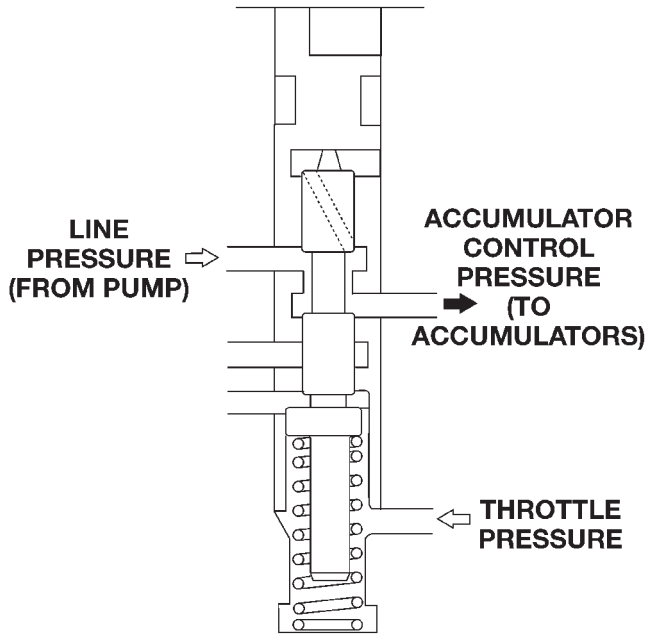
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Fig. 20 Low Coast Modulator Valve

DESCRIPTION AND OPERATION (Continued)

ACCUMULATOR CONTROL VALVE

The accumulator control valve (Fig. 21) cushions the transmission clutch and brake applications. This is achieved by reducing back pressure to the accumulators when throttle opening is small. The valve is operated by line and throttle pressure.



80aef271

Fig. 21 Accumulator Control Valve

ACCUMULATORS

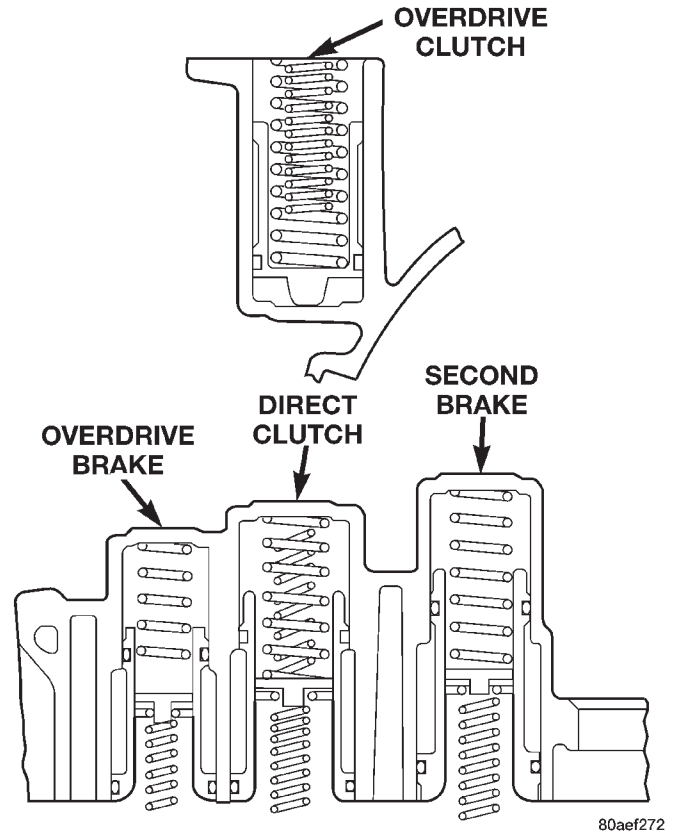
Four accumulators are used to cushion clutch and brake application. The accumulators (Fig. 22), consist of spring loaded pistons. The pistons dampen the initial surge of apply pressure to provide smooth engagement during shifts.

Control pressure from the accumulator control valve is continuously applied to the back pressure side of the accumulator pistons. This pressure plus spring tension holds the pistons down. As line pressure from the shift valves enters the opposite end of the piston bore, control pressure and spring tension momentarily delay application of full line pressure to cushion engagement. The accumulators are all located in the transmission case (Fig. 22).

TRANSMISSION VALVE BODY SOLENOIDS

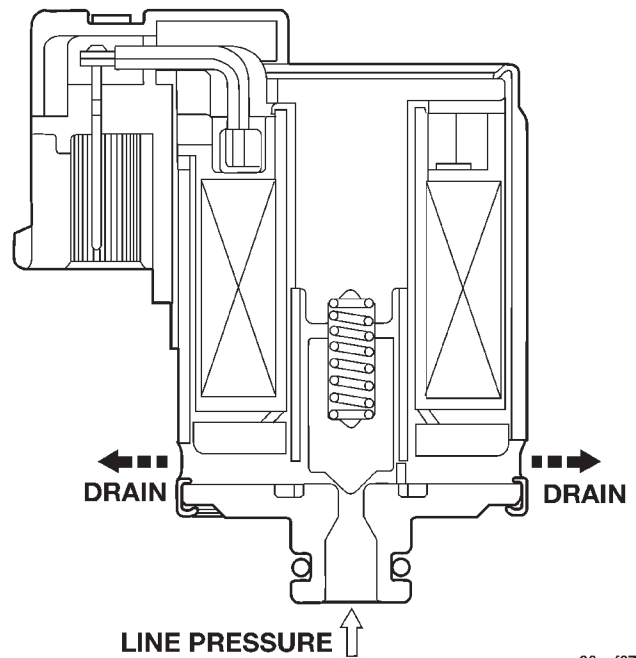
Three solenoids are used (Fig. 23). The No. 1 and 2 solenoids control shift valve operation by applying or releasing line pressure. The signal to apply or release pressure is provided by the transmission control module.

The No. 3 solenoid controls operation of the torque converter clutch. The solenoid operates in response to signals from the transmission control module.



80aef272

Fig. 22 Accumulators



80aef273

Fig. 23 Transmission Valve Body Solenoids

When the No. 1 and 2 solenoids are activated, the solenoid plunger is moved off its seat opening the drain port to release line pressure. When either solenoid is deactivated, the plunger closes the drain port.

DESCRIPTION AND OPERATION (Continued)

The No. 3 solenoid operates in reverse. When the solenoid is deactivated, the solenoid plunger is moved off its seat opening the drain port to release line pressure. When the solenoid is activated, the plunger closes the drain port.

TRANSMISSION COOLER

MAIN COOLER

The transmission main cooler is located in the radiator. The main cooler can be flushed when necessary, however, the cooler is not a repairable component. If the cooler is damaged, plugged, or leaking, the radiator will have to be replaced.

AUXILIARY COOLER

The auxiliary cooler is mounted in front of the radiator at the driver side of the vehicle (Fig. 24). The cooler can be flushed when necessary, while mounted in the vehicle. The cooler can also be removed for access, repair, or replacement as needed.

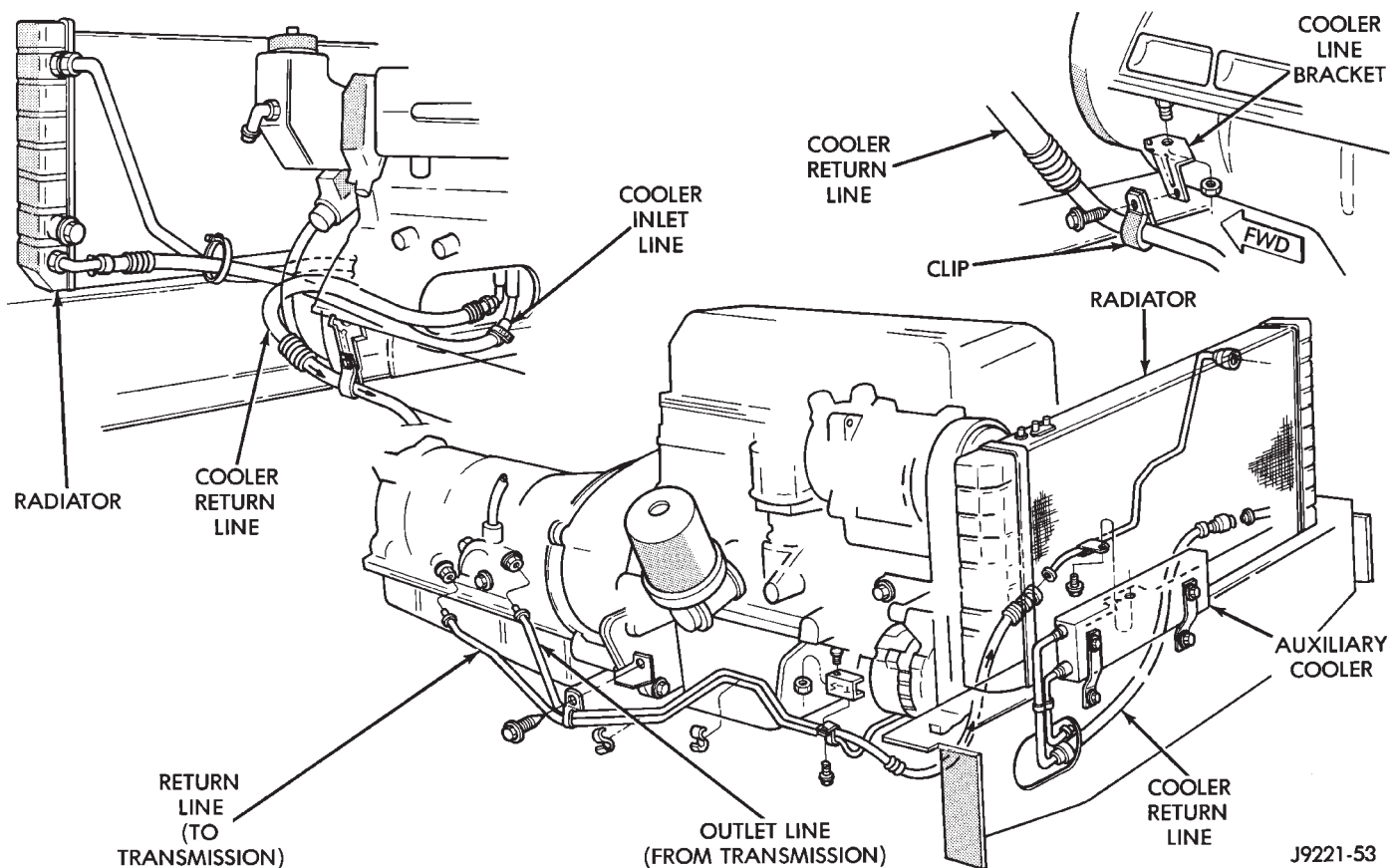
The main and auxiliary coolers should both be flushed whenever a transmission or converter clutch malfunction generates sludge, debris, or particles of clutch friction material.

COOLER SERVICE

The main cooler (and radiator) and the auxiliary cooler can be removed for service or access to other components. Auxiliary cooler removal requires that the front bumper and radiator support be removed for access to the cooler lines and attaching bracket.

BRAKE TRANSMISSION SHIFT INTERLOCK MECHANISM

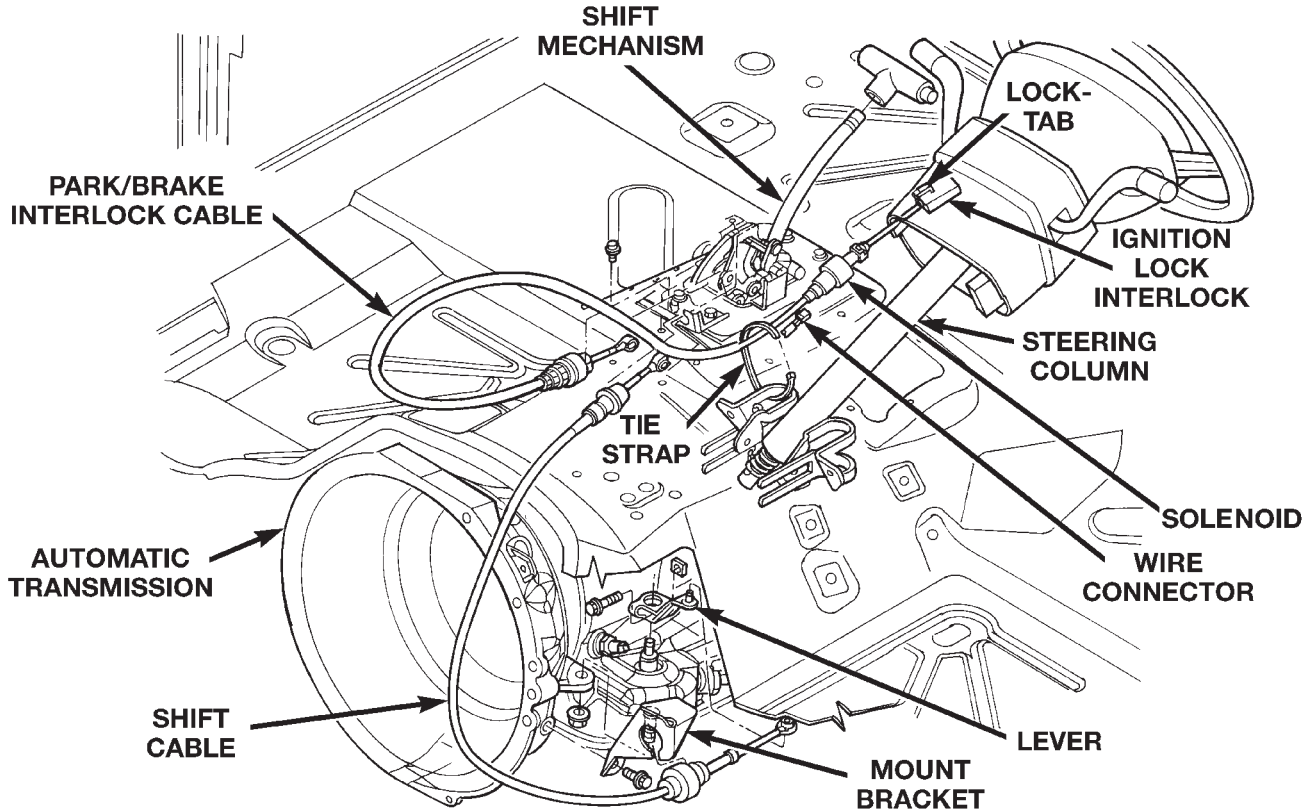
The Brake Transmission Shifter/Ignition Interlock (BTSI), is a cable and solenoid operated system. It interconnects the automatic transmission floor mounted shifter to the steering column ignition switch (Fig. 25). The system locks the shifter into the PARK position. The Interlock system is engaged whenever the ignition switch is in the LOCK or ACCESSORY position. An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed at least one-half an inch. A magnetic holding device in line with the park/brake interlock cable is energized when the ignition is in the RUN position. When the key is in the RUN position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK or



J9221-53

Fig. 24 Auxiliary Cooler Mounting (Left Hand Drive)

DESCRIPTION AND OPERATION (Continued)



80a13876

Fig. 25 Ignition Interlock Cable Routing

ACCESSORY position (Fig. 26) unless the shifter is fully locked into the PARK position.

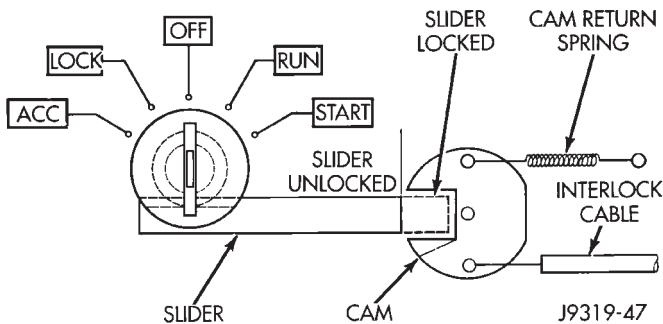


Fig. 26 Ignition Key Cylinder Actuation

DIAGNOSIS AND TESTING

GENERAL DIAGNOSIS INFORMATION

Shift points are controlled by the transmission control module (TCM). Before attempting repair, determine if a malfunction is electrical or mechanical.

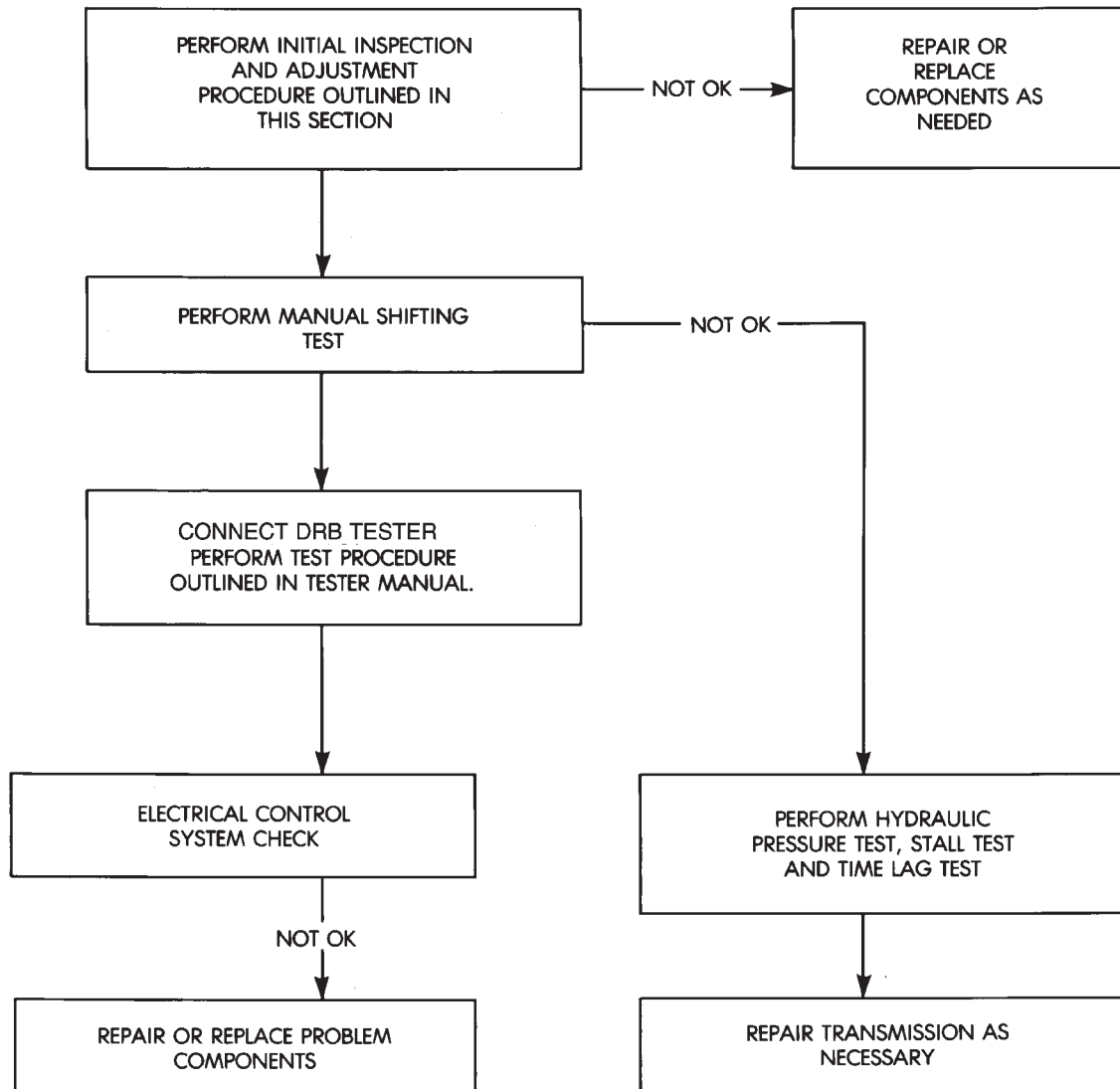
The TCM used with the AW-4 transmission has a self-diagnostic program compatible with the DRBIII scan tool. The tester will identify faults in the electrical control system.

Diagnosis should begin with the Preliminary Inspection And Adjustment procedure. It will help determine if a problem is mechanical or electrical. The first procedure step is Initial Inspection and Adjustment.

PRELIMINARY INSPECTION AND ADJUSTMENT

- (1) Check and adjust transmission shift cable if necessary.
- (2) Verify transmission throttle cable operation. Repair or replace cable if necessary.
- (3) Check engine throttle operation. Operate accelerator pedal and observe injector throttle plate movement. Adjust linkage if throttle plate does not reach wide open position.
- (4) Check transmission fluid level when fluid is at normal operating temperature. Start engine. Shift transmission through all gear ranges then back to Neutral. Correct level is to Full or Add mark on dipstick with engine at curb idle speed.
- (5) Check and adjust park/neutral position switch if necessary.
- (6) Check throttle position sensor adjustment and operation. Adjust the sensor if necessary.

DIAGNOSIS AND TESTING (Continued)



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Preliminary Diagnosis Check Procedure**MANUAL SHIFTING TEST**

(1) This test determines if problem is related to mechanical or electrical component.

(2) Stop engine and disconnect transmission control module or module fuse.

(3) Road test vehicle. Shift transmission into each gear range. Transmission should operate as follows:

- lock in Park
- back up in Reverse
- not move in Neutral
- provide first gear only with shift lever in 1-2 position
 - operate in third gear only with shift lever in 3 position
 - operate in overdrive fourth gear in D position.

(4) If transmission operates as described, proceed to next step. However, if forward gear ranges were

difficult to distinguish (all feel the same), or vehicle would not back up, refer to diagnosis charts. Do not perform stall or time lag tests.

CAUTION: Do not over speed the engine during the next test step. Ease off the throttle and allow the vehicle to slow before downshifting.

(5) Continue road test. Manually downshift transmission from D to 3, and from 3 to 1-2 position. Then manually upshift transmission through forward ranges again.

(6) If transmission operation is OK, perform stall, time lag and pressure tests. If transmission shifting problem is encountered, refer to diagnosis charts.

(7) If a problem still exists, continue testing with DRB scan tool.

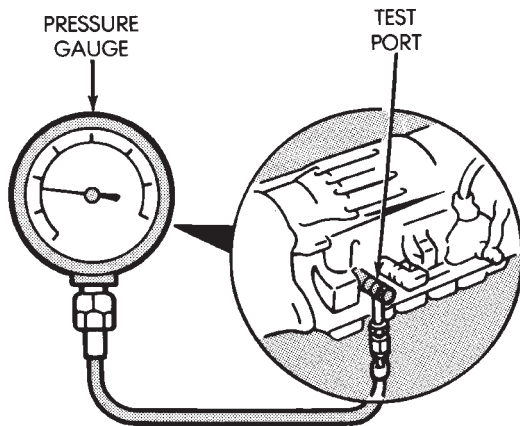
DIAGNOSIS AND TESTING (Continued)

HYDRAULIC PRESSURE TEST

Pressure Test Procedure

(1) Connect pressure test gauge to test port on passenger side of transmission (Fig. 27). Use Adapter 7554 to connect gauge. Be sure test gauge has minimum capacity of 300 psi (2100 kPa).

(2) Be sure transmission fluid is at normal operating temperature.



J8921-424

Fig. 27 Pressure Test Gauge Connection

(3) Apply parking brakes and block wheels.

WARNING: DO NOT ALLOW ANYONE TO STAND AT THE FRONT OR REAR OF THE VEHICLE WHILE PERFORMING THE FOLLOWING STEPS IN THE PRESSURE TEST.

(4) Check and adjust engine curb idle speed.

(5) Apply (and hold) service brakes.

(6) Shift transmission into D range and note line pressure with engine at curb idle speed. Pressure should be 61-to-70 psi (421-to-481 kPa).

(7) Press accelerator pedal to wide open throttle position and note line pressure. Pressure should be 173-to-209 psi (1196-to-1442 kPa).

CAUTION: Do not hold wide open throttle for more than 3-4 seconds at a time.

(8) Shift transmission into Reverse and note line pressure with engine at curb idle speed. Pressure should be 75-to-90 psi (519-to-618 kPa).

(9) Press accelerator to wide open throttle position and note line pressure in Reverse. Pressure should be 213-to-263 psi (1471-to-1814 kPa).

CAUTION: Do not hold wide open throttle for more than 4 seconds.

(10) If line pressure is not within specifications, adjust transmission throttle cable and repeat pressure test.

PRESSURE TEST ANALYSIS

If pressures in D and Reverse are higher than specified in test, check for the following:

- throttle cable loose, worn, binding or out of adjustment
- throttle valve, downshift plug, throttle cam, or primary regulator valve are sticking, worn or damaged

If pressures in D and Reverse are lower than specified in test, check for following:

- throttle cable loose, worn, binding or out of adjustment
- throttle valve, downshift plug, or throttle cam sticking, worn or damaged
- primary regulator valve sticking, worn, or damaged

- oil pump gears or housing worn, or damaged

- overdrive clutch worn, or damaged

If pressures are low in D range only, check for following:

- forward clutch worn or damaged
- fluid leakage in D range circuit (component seal and O-rings)

If pressures are low in Reverse only, check for following:

- shift cable and manual valve out of adjustment
- fluid leakage in reverse circuit (component seal and O-rings)
- direct clutch worn or damaged
- first/reverse brake worn or damaged.

TORQUE CONVERTER STALL TEST

Stall testing checks the holding ability of the transmission clutches and brakes and of the torque converter stator overrunning clutch. **Stall speeds are checked in both Drive and Reverse ranges with the AW-4 transmission.**

(1) Before starting test, be sure fluid level is correct and fluid is at normal operating temperature.

(2) Connect tachometer to engine. Position tachometer so it can be viewed from drivers seat.

(3) Apply parking brakes and block wheels.

(4) Apply and hold service brakes.

(5) Shift transfer case into 2H position.

(6) Start engine.

WARNING: DO NOT ALLOW ANYONE TO STAND AT THE FRONT OR REAR OF THE VEHICLE DURING THE TEST.

DIAGNOSIS AND TESTING (Continued)

(7) Shift transmission into D range.

(8) Open throttle completely and record maximum engine rpm registered on tachometer. It takes anywhere from 4 to 10 seconds to reach maximum rpm. However, once maximum rpm has been achieved, **do not hold wide open throttle for more than 3-4 seconds.**

CAUTION: Stalling the converter causes a rapid increase in fluid temperature. To avoid fluid overheating, hold wide open throttle for no more than 4 seconds after reaching peak rpm. In addition, if more than one stall test is required, run the engine at 1000 rpm with the transmission in Neutral for at least 20 seconds to cool the fluid.

(9) Stall speed should be in 2100-2400 rpm range in Drive.

(10) Release throttle, shift transmission into Neutral, and run engine for 20-30 seconds to cool fluid.

(11) Shift transmission into Reverse.

(12) Repeat stall test.

(13) Stall speed in Reverse should also be in 2100-2400 rpm range.

(14) Release accelerator pedal, shift transmission into Neutral, and run engine for 20-30 seconds to cool fluid.

STALL SPEED TEST ANALYSIS

If engine rpm is lower than specified in D and Reverse, check for the following:

- engine output/performance insufficient
- stator overrunning clutch in torque converter not holding if engine speed was 1500 rpm or less.

If stall speed in D range is higher than specified, check for the following:

- line pressure low
- forward clutch slipping
- No. 2 one-way clutch not holding
- overdrive one-way clutch not holding

If stall speed in Reverse was higher than specified, check for the following:

- line pressure low
- direct clutch slipping
- first/ reverse brake slipping
- overdrive one-way clutch not holding

If stall speeds were higher than specified in both D and Reverse, check for the following:

- low fluid level
- line pressure low
- overdrive one-way clutch not holding.

TIME LAG TEST

This test checks general condition of the overdrive clutch, forward clutch, rear clutch and first/reverse brake. Condition is indicated by the amount of time required for clutch/brake engagement with the

engine at curb idle speed. Engagement time is measured for D and Reverse positions. A stop watch is recommended for test accuracy.

TEST PROCEDURE

(1) Check and adjust transmission fluid level if necessary.

(2) Bring transmission to normal operating temperature.

(3) Apply parking brakes and turn off air conditioning unit.

(4) Shift transfer case into 2H range.

(5) Start engine and check curb idle speed. Adjust speed if necessary. Curb idle must be correct to ensure accurate test results.

(6) Shift transmission into Neutral and set stop watch.

(7) During following test steps, start stop watch as soon as shift lever reaches D and Reverse ranges.

(8) Shift transmission into D range and record time it takes for engagement. Repeat test two more times.

(9) Reset stop watch and shift transmission back to Neutral.

(10) Shift transmission into Reverse and record time it takes for engagement. Repeat test two more times.

(11) Engagement time in D range should be a maximum of 1.2 seconds. Engagement time for Reverse should be a maximum of 1.5 seconds.

TIME LAG TEST ANALYSIS

If engagement time is longer than specified for D range, check for the following:

- shift cable misadjusted
- line pressure low
- forward clutch worn
- overdrive clutch worn or damaged.

If engagement time is longer than specified for Reverse, check for the following:

- shift cable misadjusted
- line pressure low
- direct clutch worn
- first/reverse brake worn
- overdrive clutch worn or damaged.

SERVICE DIAGNOSIS

TRANSMISSION SOLENOID TESTING

Test solenoid resistance with an ohmmeter. Connect the ohmmeter leads to the solenoid mounting bracket and to the solenoid wire terminal (Fig. 28).

Solenoid resistance should be 11-15 ohms. Replace the solenoid if resistance is above or below the specified range.

DIAGNOSIS AND TESTING (Continued)

DIAGNOSIS TABLE

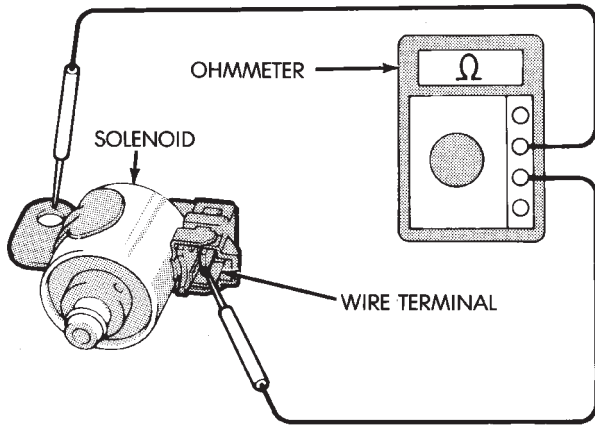
CONDITION	POSSIBLE CAUSE	CORRECTION
VEHICLE WILL NOT BACK UP OR MOVE FORWARD	Shift cable out of adjustment or damaged Valve body or primary regulator faulty Park lock pawl faulty Torque converter faulty Converter drive plate broken Oil pump intake screen blocked Transmission faulty	Adjust cable or replace cable Inspect/repair valve body Repair park pawl Replace torque converter Replace drive plate Clean screen Disassemble and repair transmission
SHIFT LEVER POSITION INCORRECT	Shift cable out of adjustment Manual valve and lever faulty	Adjust cable Repair valve body
HARSH ENGAGEMENT	Throttle cable out of adjustment Valve body or primary regulator faulty Accumulator pistons faulty Transmission faulty	Adjust throttle cable Repair valve body Repair pistons Disassemble and repair transmission
DELAYED 1-2, 2-3 OR 3-4 UP-SHIFT, OR DOWN-SHIFTS FROM 4-3 OR 3-2 AND SHIFTS BACK TO 4 OR 3	Electronic control problem Valve body faulty Solenoid faulty	Locate problem with DRB Tester Repair valve body Repair solenoid
SLIPS ON 1-2, 2-3 OR 3-4 UP-SHIFT, OR SLIPS OR SHUDDERS DURING ACCELERATION	Shift cable out of adjustment Throttle cable out of adjustment Valve body faulty Solenoid faulty Transmission faulty	Adjust cable Adjust cable Repair valve body Replace solenoid Disassemble and repair transmission
DRAG OR BIND ON 1-2, 2-3 OR 3-4 UP-SHIFT	Shift cable out of adjustment Valve body faulty Transmission faulty	Adjust cable Repair valve body Disassemble and repair transmission
CONVERTER CLUTCH DOES NOT ENGAGE IN 2ND, 3RD OR 4TH	Electronic control problem Valve body faulty Solenoid faulty Transmission faulty	Check with DRB Tester Repair valve body Replace solenoid Disassemble and repair transmission
HARSH DOWN-SHIFT	Throttle cable out of adjustment Throttle cable and cam faulty Accumulator pistons faulty Valve body faulty Transmission faulty	Adjust cable Replace cable and cam Repair pistons Repair valve body Disassemble and repair transmission
NO DOWN-SHIFT WHEN COASTING	Valve body faulty Solenoid faulty Electronic control problem	Repair valve body Replace solenoid Locate problem with DRB Tester

DIAGNOSIS AND TESTING (Continued)

DIAGNOSIS TABLE CONTINUED

CONDITION	POSSIBLE CAUSE	CORRECTION
DOWN-SHIFT LATE OR EARLY DURING COAST	Throttle cable faulty Valve body faulty Transmission faulty Solenoid faulty Electronic control problem	Replace cable Repair valve body Disassemble and repair transmission Replace solenoid Locate problem with DRB Tester
NO 4-3, 3-2 OR 2-1 KICKDOWN	Solenoid faulty Electronic control problem Valve body faulty	Replace solenoid Locate problem with DRB Tester Repair valve body
NO ENGINE BRAKING IN 1-2 POSITION	Solenoid faulty Electronic control problem Valve body faulty Transmission faulty	Replace solenoid Locate problem with DRB Tester Repair valve body Disassemble and repair transmission
VEHICLE DOES NOT HOLD IN PARK	Shift cable out of adjustment Parking lock pawl cam and spring faulty	Adjust cable Replace cam and spring
OVERHEAT DURING NORMAL OPERATION (FLUID DISCOLORED, SMELLS BURNED)	Low fluid level Fluid cooler, lines blocked, or cooler cracked (oil in engine coolant)	Add fluid and check for leaks Flush cooler and lines and replace radiator if transmission fluid has entered coolant
OVERHEAT DURING COMMERCIAL OPERATION OR WHILE TRAILER TOWING (FLUID DARK AND BURNED WITH SOME SLUDGE FORMATION)	Vehicle not properly equipped for trailer towing or commercial use Vehicle not equipped with auxiliary fluid cooler Extensive idling time or operation in heavy traffic in hot weather Tow vehicle overloaded (exceeding vehicle tow capacity) Air flow to auxiliary cooler blocked by snow plow, front mounted spare tire, bug screen, or similar item	Be sure vehicle is equipped with recommended optional components (i.e., HD springs, transmission, axle, larger CID engine, auxiliary cooler, correct axle ratio, etc.). If vehicle is not so equipped, it should not be used for severe service operation Drain fluid, change filter, and install auxiliary cooler Cut down on idling time; shift into neutral every so often and run engine at 1000 rpm to help circulate fluid through cooler Be sure vehicle is properly equipped to handle load; do not tow Class III-type loads with a vehicle that is only rated for Class I or II operation Remove or reposition item causing air flow blockage
OIL COMES OUT FILLER TUBE	Transmission overfilled Breather vent in oil pump blocked Fluid cooler or cooler lines plugged	Drain fluid to correct level; remove neutral switch and drain through switch hole with suction gun Inspect and clear blockage Flush cooler and lines

DIAGNOSIS AND TESTING (Continued)



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Fig. 28 Testing Transmission Valve Body Solenoid PARK/NEUTRAL POSITION SWITCH

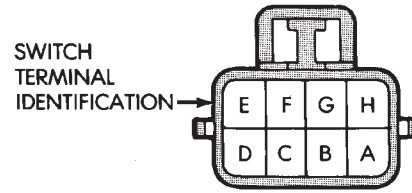
SWITCH TESTING

Test switch continuity with an ohmmeter. Disconnect the switch and check continuity at the connector terminal positions and in the gear ranges indicated in Figure 3. Switch continuity should be as follows:

- Continuity should exist between terminals B and C with the transmission in Park and Neutral only (Fig. 29).
- Continuity should exist between terminals A and E with the transmission in Reverse (Fig. 29).
- Continuity should exist between terminals A and G with the transmission in third gear (Fig. 29).
- Continuity should exist between terminals A and H with the transmission in first and/or second gear (Fig. 29).
- Continuity should not exist in D position.

GEARSHIFT CABLE

- (1) The floor shifter lever and gate positions should be in alignment with all transmission PARK, NEUTRAL, and gear detent positions.
- (2) Engine starts must be possible with floor shift lever in PARK or NEUTRAL gate positions only. Engine starts must not be possible in any other gear position.
- (3) With floor shift lever handle push-button not depressed and lever in:
 - (a) PARK position—Apply forward force on center of handle and remove pressure. Engine starts must be possible.
 - (b) PARK position—Apply rearward force on center of handle and remove pressure. Engine starts must be possible.



	B	C	A	E	G	H
P	○—○					
R			○—○			
N	○—○					
D						
3			○—○		○	
1-2			○—○			○

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Fig. 29 Park/Neutral Position Switch Terminals And Testing

- (c) NEUTRAL position—Normal position. Engine starts must be possible.
- (d) NEUTRAL position—Engine running and brakes applied, apply forward force on center of shift handle. Transmission shall not be able to shift from neutral to reverse.

THROTTLE VALVE CABLE

Transmission throttle valve cable adjustment is extremely important to proper operation. This adjustment positions the throttle valve, which controls shift speed, quality, and part-throttle downshift sensitivity. If cable setting is too loose, early shifts and slippage between shifts may occur. If the setting is too tight, shifts may be delayed and part throttle downshifts may be very sensitive. Refer to the Adjustments section for the proper adjustment procedure.

SPEED SENSOR TESTING

Test the speed sensor with an ohmmeter. Place the ohmmeter leads on the terminals in the sensor connector (Fig. 30). Rotate the transmission output shaft and observe the ohmmeter needle. The needle should deflect indicating the switch is opening/closing as the rotor moves past the sensor (Fig. 30). Replace the sensor if the ohmmeter does not display any kind of reading. If a digital ohmmeter is being used, the sensor should generate an ohmmeter readout each time the switch opens and closes.

DIAGNOSIS AND TESTING (Continued)

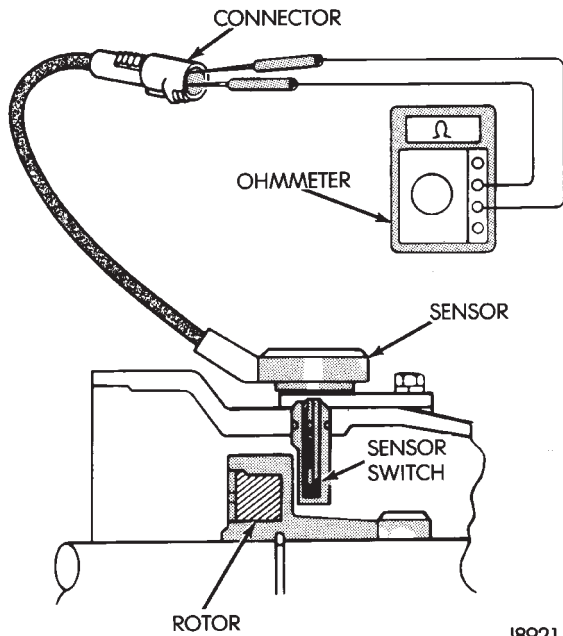


Fig. 30 Speed Sensor Testing

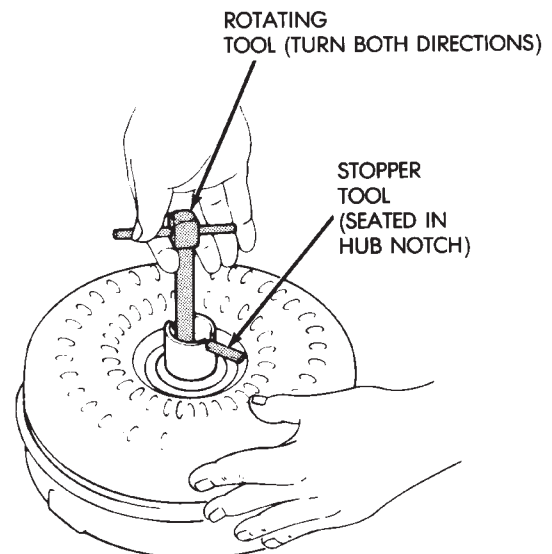
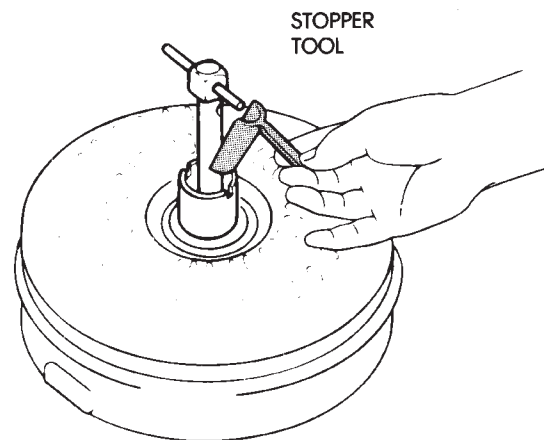
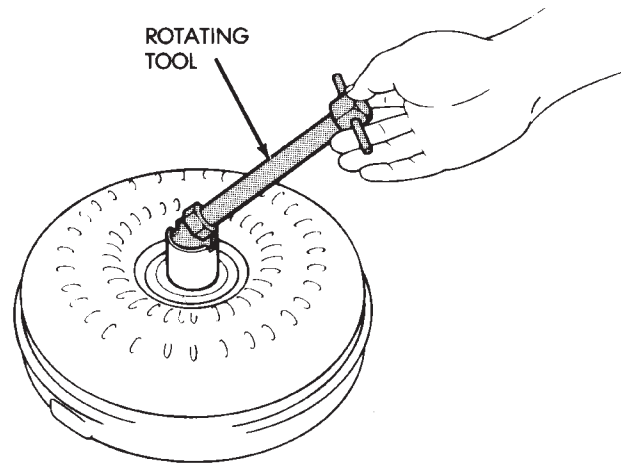
FLOW TESTING TRANSMISSION MAIN COOLER

Cooler flow is checked by measuring the amount of fluid flow through the cooler in a 20 second time period. The test is performed with the engine running and transmission in neutral. Fluid is then pumped through the cooler by the transmission oil pump.

- (1) Disconnect cooler inlet line at transmission fitting.
- (2) Securely attach hose to end of inlet line and position line in a one quart test container.
- (3) Add extra quart of fluid to transmission.
- (4) Use stopwatch to check flow test time.
- (5) Shift transmission into neutral and set parking brake.
- (6) Start and run engine at curb idle speed and immediately note cooler flow. Approximately one quart of fluid should flow into test container in 20 second period.
- (7) If cooler flow is intermittent, flows less than one quart in 20 seconds, or does not flow at all, cooler is faulty and must be replaced.

TORQUE CONVERTER STATOR CLUTCH INSPECTION

- (1) Insert Rotating Tool 7547 into converter hub and seat tool in one-way clutch (Fig. 31).
- (2) Insert Stopper Tool 7548 in one converter hub notch and into outer race of rotating tool.
- (3) Turn rotating tool clockwise. Converter clutch should rotate freely and smoothly. Less than 2.5 N·m



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Fig. 31 Checking Operation Of Torque Converter Stator One-Way Clutch

DIAGNOSIS AND TESTING (Continued)

(22 in. lbs.) of torque should be required to rotate clutch in clockwise direction.

(4) Turn rotating tool in counterclockwise direction. Converter clutch should lock.

(5) Replace converter if clutch binds or will not lock.

SERVICE PROCEDURES

CHECKING FLUID LEVEL

(1) Be sure transmission fluid is at normal operating temperature. Normal operating temperature is reached after approximately 15 miles (25 km) of operation.

(2) Position vehicle on level surface. This is important for an accurate fluid level check.

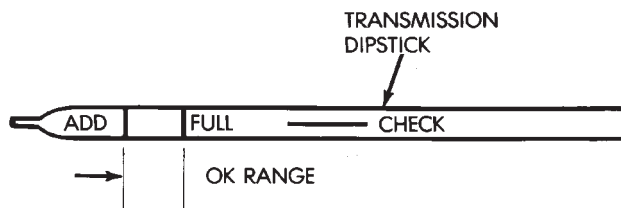
(3) Shift transmission through all gear ranges and back to Park.

(4) Apply parking brakes.

(5) Verify that transmission is in Park.

(6) Wipe off dipstick handle to prevent dirt from entering fill tube. Then remove dipstick and check fluid level and condition.

(7) Correct fluid level is **to FULL mark on dipstick when fluid is at normal operating temperature** (Fig. 32).



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Fig. 32 Transmission Fluid Level

(8) If fluid level is low, top off level with Mopar Dexron IIE/Mercon. Mopar Dexron II can be used but only if Mercon is not available. **Do not overfill transmission. Add only enough fluid to bring level to Full mark.**

(9) If too much fluid was added, excess amount can be removed with suction gun and appropriate diameter plastic tubing. Tubing only has to be long enough to extend into oil pan.

CHECKING FLUID CONDITION

Inspect the appearance of the fluid during the fluid level check. Fluid color should range from dark red to pink and be free of foreign material, or particles. If the fluid is dark brown or black in color and smells burnt, the fluid has been overheated and must be changed.

Transmission operation should also be checked if the fluid is severely discolored and contains quantities of foreign material, metal particles, or clutch disc friction material.

A small quantity of friction material or metal particles in the oil pan is normal. The particles are usually generated during the break-in period and indicate normal seating of the various transmission components.

REFILLING AFTER OVERHAUL OR FLUID/FILTER CHANGE

The best way to refill the transmission after a fluid change or overhaul is as follows:

(1) If transmission has been overhauled, install transmission in vehicle.

(2) Remove dipstick and insert clean funnel in transmission fill tube.

(3) Add following initial quantity of Mopar Dexron IIE/Mercon to transmission:

(4) If fluid/filter change was performed, add **4 pints (2 quarts)** of fluid to transmission.

(a) If transmission was completely overhauled and torque converter was replaced or drained, add **10 pints (5 quarts)** of fluid to transmission.

(b) Remove funnel and install dipstick.

(5) Operate vehicle until fluid reaches normal operating temperature.

(6) Apply parking brakes.

(7) Let engine run at normal curb idle speed, apply service brakes. Then shift transmission through all gear ranges and back to PARK (leave engine running).

(8) Remove dipstick and check fluid level. Add only enough fluid to bring level to Full mark on dipstick. Do not overfill. **If too much fluid is added, excess amount can be removed with suction gun and plastic tubing. Tubing only has to be long enough to extend into oil pan.**

(9) When fluid level is correct, shut engine off, release park brake, remove funnel, and reseat dipstick in fill tube.

TRANSMISSION CONTROL MODULE (TCM) SERVICE

Use the DRB scan tool to diagnose transmission control module function whenever a fault is suspected. Replace the module only when the scan tool indicates the module is actually faulty.

OIL PUMP VOLUME CHECK

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

SERVICE PROCEDURES (Continued)

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

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

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

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

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

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

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

FLUSHING COOLERS AND TUBES

When a transmission failure has contaminated the fluid, the oil cooler(s) must be flushed. The torque converter must also be replaced. This will insure that metal particles or sludged oil are not later transferred back into the reconditioned (or replaced) transmission.

The only recommended procedure for flushing coolers and lines is to use Tool 6906 Cooler Flusher.

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

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

KEEP THE AREA WELL VENTILATED.

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

COOLER FLUSH USING TOOL 6906

(1) Remove cover plate filler plug on Tool 6906. Fill reservoir 1/2 to 3/4 full of fresh flushing solution. Flushing solvents are petroleum based solutions generally used to clean automatic transmission compo-

nents. **DO NOT** use solvents containing acids, water, gasoline, or any other corrosive liquids.

(2) Reinstall filler plug on Tool 6906.

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

(4) Disconnect the cooler lines at the transmission.

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

NOTE: The converter drainback valve must be removed and an appropriate replacement hose installed to bridge the space between the transmission cooler line and the cooler fitting. Failure to remove the drainback valve will prevent reverse flushing the system.

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

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

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

(8) Turn pump OFF.

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

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

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

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

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

ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum 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.

SERVICE PROCEDURES (Continued)

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

REMOVAL AND INSTALLATION

TRANSMISSION AND TORQUE CONVERTER

REMOVAL

- (1) Raise vehicle.
- (2) Drain transmission fluid and reinstall oil pan drain plug.
- (3) On models with 2-piece fill tube, remove upper half of tube (Fig. 33).

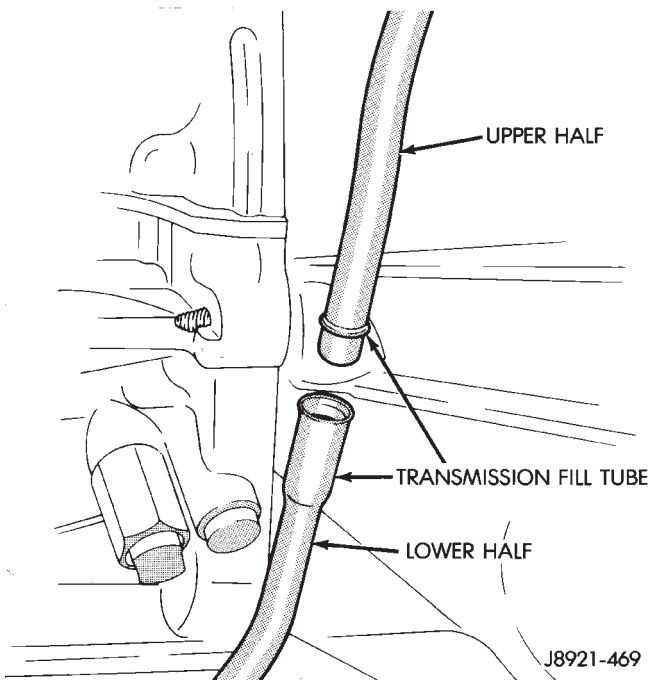


Fig. 33 Transmission Fill Tube (Two-Piece)

- (4) Disconnect cooler lines at transmission.
- (5) Support engine with safety stand and support transmission with jack.
- (6) Disconnect transmission and transfer case shift linkage.
- (7) Remove necessary exhaust components.
- (8) Disconnect vehicle speed sensor wires
- (9) Mark position of front and rear propeller shafts for alignment reference. Then remove shafts from vehicle.
- (10) Remove rear crossmember.
- (11) Disconnect transmission shift cable at transmission. Then disconnect transmission throttle valve cable at engine.
- (12) Disconnect necessary vacuum and fluid hoses.
- (13) Remove transfer case from transmission.
- (14) Disconnect and remove crankshaft position sensor (Fig. 34).

CAUTION: The crankshaft position sensor can be damaged during transmission removal (or installation) if the sensor is still bolted to the engine block. To avoid damage, remove the sensor before removing the transmission.

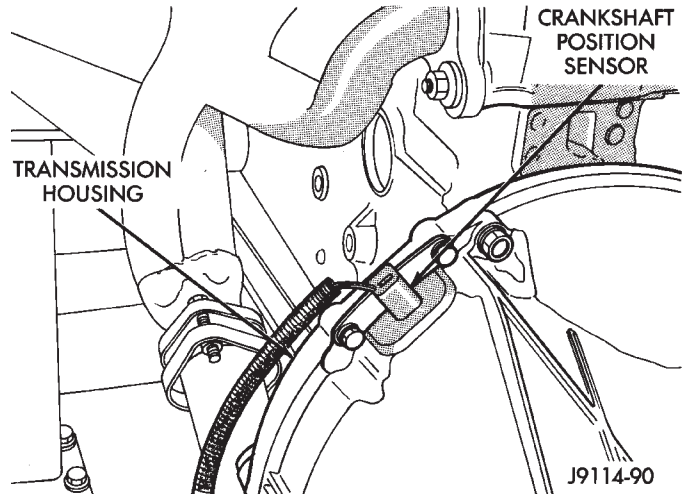


Fig. 34 Crankshaft Position Sensor

- (15) Remove starter motor.
- (16) Remove bolts attaching converter to drive plate.
- (17) Remove bolts attaching converter housing to engine.
- (18) Secure transmission to jack with safety chains.
- (19) Pull transmission rearward for access to converter. Then secure converter in pump with C-clamp or strap bolted to converter housing.
- (20) Remove transmission from under vehicle.
- (21) Remove torque converter if converter or oil pump seal are to be serviced.

INSTALLATION

- (1) Mount transmission on transmission jack. Then secure transmission to jack with safety chains.
- (2) Lubricate converter drive hub and oil pump seal lip with transmission fluid. Then install converter. Be sure converter is fully seated in oil pump gears before proceeding. Hold converter in place with C-clamp or strap attached to converter housing.
- (3) Align and position transmission and converter on engine.
- (4) Remove clamp or strap used to hold torque converter in place.
- (5) Move transmission forward seat and it on engine. Be sure torque converter hub is fully seated.
- (6) Install converter housing-to-engine bolts (Fig. 35).
- (7) Install converter-to-drive plate bolts.
- (8) Install and connect starter motor.
- (9) Install and connect crankshaft position sensor.

REMOVAL AND INSTALLATION (Continued)

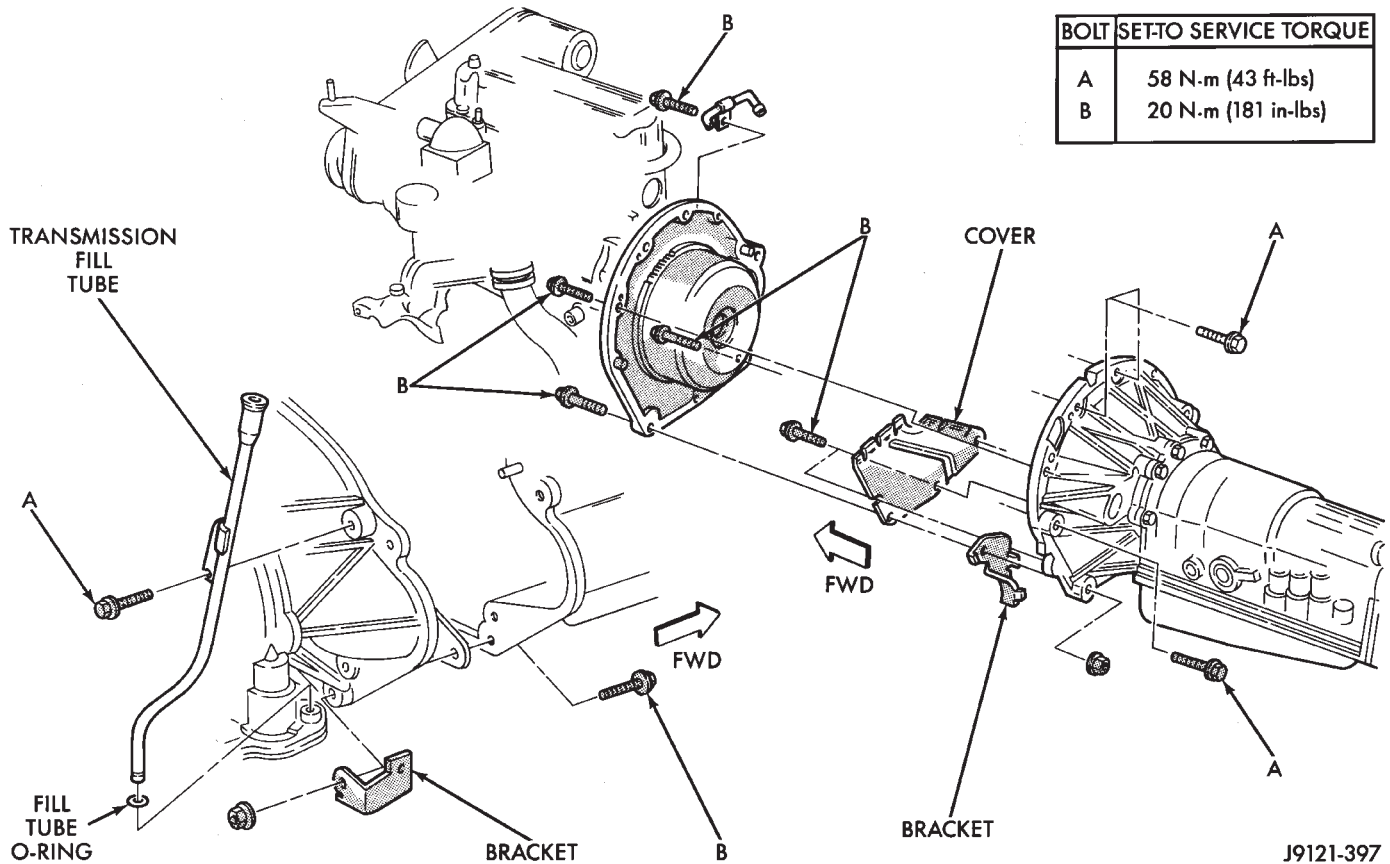


Fig. 35 Transmission Mounting

- (10) Install transfer case on transmission.
- (11) Connect transfer case shift linkage and vacuum hoses.
- (12) Connect exhaust components.
- (13) Install rear crossmember and remove jack used to support transmission assembly.
- (14) Connect speed sensor wire harness to sensor.
- (15) Connect wire harness to park/neutral position switch.
- (16) Align and connect front and rear propeller shafts.
- (17) Connect transmission wire harnesses and transfer case vacuum and wire harnesses.
- (18) Connect transmission cooler lines.
- (19) Connect transmission throttle cable at engine.
- (20) Install new O-ring seal on upper half of transmission fill tube. Then connect upper and lower tube halves.
- (21) Lower vehicle.
- (22) Fill transmission with Mopar Dexron IIE/Mercon automatic transmission fluid.

TORQUE CONVERTER

REMOVAL

- (1) Remove transmission and torque converter from vehicle.

- (2) Place a suitable drain pan under the converter housing end of the transmission.

CAUTION: Verify that transmission is secure on the lifting device or work surface, the center of gravity of the transmission will shift when the torque converter is removed creating an unstable condition.

The torque converter is a heavy unit. Use caution when separating the torque converter from the transmission.

- (3) Pull the torque converter forward until the center hub clears the oil pump seal.

- (4) Separate the torque converter from the transmission.

INSTALLATION

Check converter hub and drive notches for sharp edges, burrs, scratches, or nicks. Polish the hub and notches with 320/400 grit paper or crocus cloth if necessary. The hub must be smooth to avoid damaging the pump seal at installation.

- (1) Lubricate converter hub and oil pump seal lip with transmission fluid.
- (2) Place torque converter in position on transmission.

REMOVAL AND INSTALLATION (Continued)

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. 36). 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.

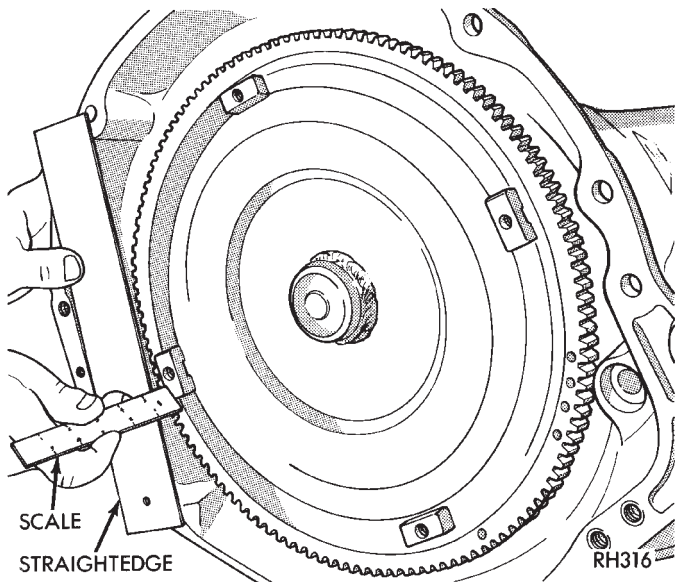
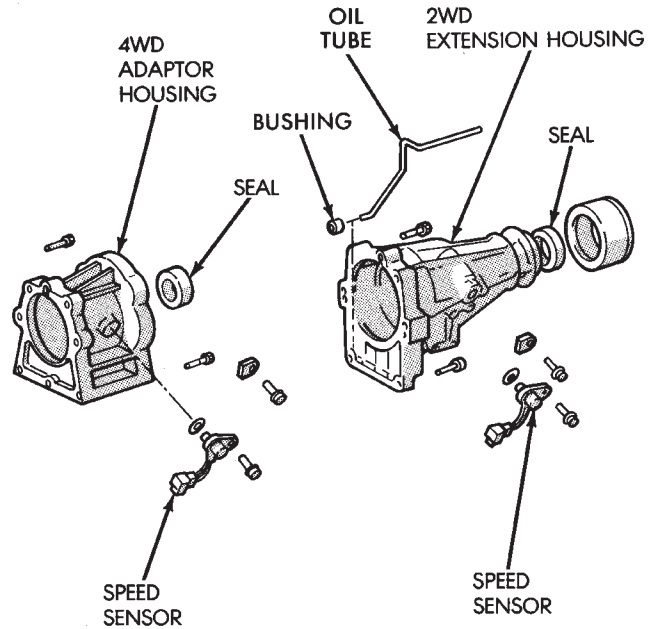


Fig. 36 Checking Torque Converter Seating

ADAPTER HOUSING SEAL

REMOVAL

- (1) Raise vehicle.
- (2) Disconnect or remove components necessary to gain access to seal (e.g. propeller shaft, crossmember, shift linkage, transfer case, exhaust components, hoses, wires).
- (3) On 4X2 vehicles, remove dust shield from the adapter housing by tapping gently with a brass drift and hammer (Fig. 37).
- (4) On 4X2 vehicles, remove the adapter housing seal with Seal Puller 7550.
- (5) On 4X4 vehicles, remove the adapter housing seal using a slide hammer mounted screw.



J9121-379

Fig. 37 Adapter Housing Seals

INSTALLATION

- (1) Install new adapter housing seal with Seal Installer 7888.
- (2) On 4X2 vehicles, install dust shield using Special Tool D-187-B.
- (3) Reinstall components removed to gain access to seal.
- (4) Top off transmission fluid if necessary.

SPEED SENSOR

REMOVAL

- (1) Disconnect sensor wire harness connector.
- (2) Remove sensor retainer bolt and remove sensor (Fig. 38).
- (3) Remove and discard speed sensor O-ring.

INSTALLATION

- (1) Install new O-ring on speed sensor and install sensor in transmission case.
- (2) Install sensor bracket and retainer bolt. Tighten bolt to 7.4 N-m (65 in. lbs.) torque.
- (3) Connect sensor wire harness connector.

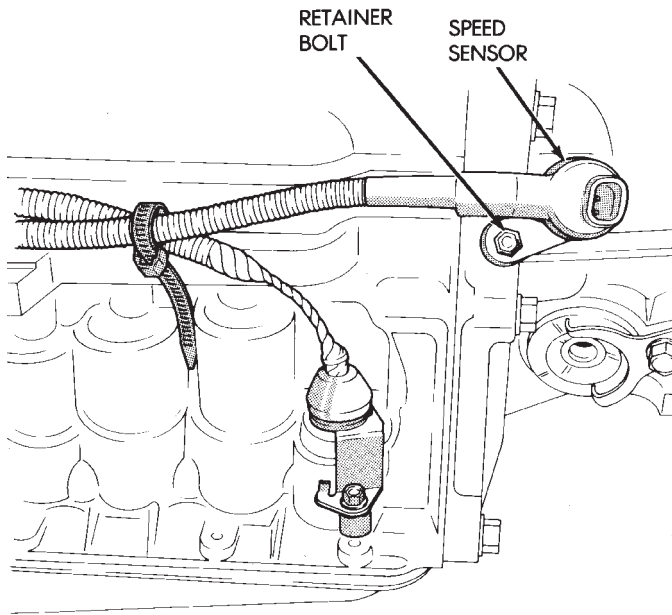
SPEEDOMETER ADAPTER

Rear axle gear ratio and tire size determine speedometer pinion requirements.

REMOVAL

- (1) Raise vehicle.
- (2) Disconnect wires from vehicle speed sensor.
- (3) Remove adapter clamp and screw (Fig. 39).

REMOVAL AND INSTALLATION (Continued)



J8921-463

Fig. 38 Transmission Speed Sensor Removal/Installation

- (4) Remove speed sensor and speedometer adapter as assembly.
- (5) Remove speed sensor retaining screw and remove sensor from adapter.
- (6) Remove speedometer pinion from adapter.
- (7) Inspect sensor and adapter O-rings (Fig. 39). Remove and discard O-rings if worn or damaged.
- (8) Inspect terminal pins in speed sensor. Clean pins with Mopar® electrical spray cleaner if dirty or oxidized. Replace sensor if faulty, or pins are loose, severely corroded, or damaged.

INSTALLATION

- (1) Thoroughly clean adapter flange and adapter mounting surface in housing. Surfaces must be clean for proper adapter alignment and speedometer operation.
- (2) Install new O-rings on speed sensor and speedometer adapter if necessary (Fig. 39).
- (3) Lubricate sensor and adapter O-rings with transmission fluid.
- (4) Install vehicle speed sensor in speedometer adapter. Tighten sensor attaching screw to 2-3 N·m (15-27 in. lbs.) torque.
- (5) Install speedometer pinion in adapter.
- (6) Count number of teeth on speedometer pinion. Do this before installing assembly in housing. Then lubricate pinion teeth with transmission fluid.
- (7) Note index numbers on adapter body (Fig. 40). These numbers will correspond to number of teeth on pinion.
- (8) Install speedometer assembly in housing.

(9) Rotate adapter until required range numbers are at 6 o'clock position. Be sure range index numbers correspond to number of teeth on pinion gear.

(10) Install speedometer adapter clamp and retaining screw. Tighten clamp screw to 10-12 N·m (90-110 in. lbs.) torque.

(11) Connect wires to vehicle speed sensor.

(12) Lower vehicle and top off transmission fluid level, if necessary.

SPEED SENSOR ROTOR-SPEEDOMETER DRIVE GEAR

REMOVAL

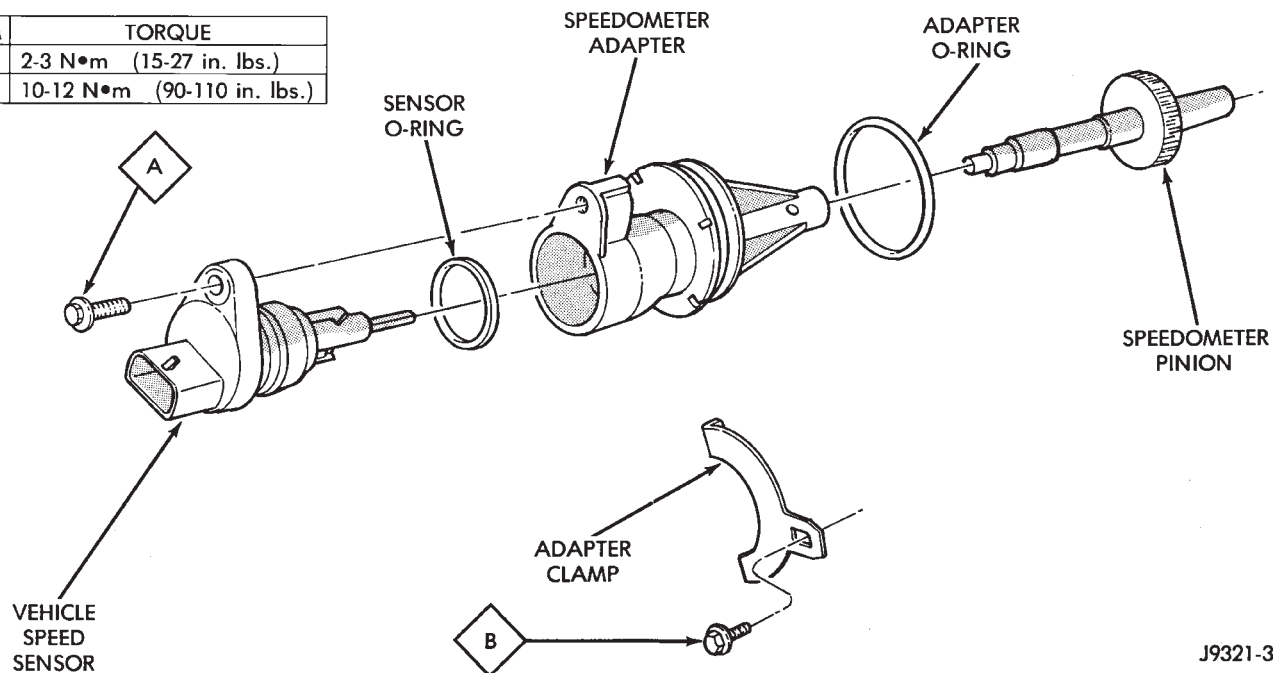
- (1) Raise vehicle.
- (2) Remove components necessary to gain access to rotor and drive gear such as propeller shaft, transfer case, crossmember, and shift linkage.
- (3) Disengage wire connector from the output speed sensor.
- (4) Remove the bolt holding the output speed sensor to the adapter housing.
- (5) Remove the output speed sensor from the adapter housing.
- (6) Remove the bolts holding the adapter housing to the transmission case.
- (7) Tap the adapter housing at the joint line gently with a rubber mallet to separate the adapter housing from the transmission case.
- (8) Remove the adapter housing from the transmission case.
- (9) Remove speedometer drive gear snap ring (Fig. 41).
- (10) Remove the speedometer drive gear and spacer, if equipped.
- (11) Remove rotor from the output shaft. It may be necessary to use a wood dowel or hammer handle (Fig. 42) to gently pry the rotor from the output shaft. Be sure to retrieve the rotor locating key from the output shaft or rotor.

INSTALLATION

- (1) Clean sealing surfaces of transmission case and extension/adaptor housing.
- (2) Install rotor, spacer (if equipped) and drive gear on output shaft. Then install drive gear snap ring (Fig. 41).
- (3) Apply 1/8 3/16 inch wide bead of Threebond® Liquid Gasket TB1281, P/N 83504038, to transmission case sealing surface and install extension/adaptor housing on case.
- (4) Tighten adaptor housing bolts to 34 N·m (25 ft. lbs.) torque.
- (5) Install components removed to gain access to rotor and drive gear.

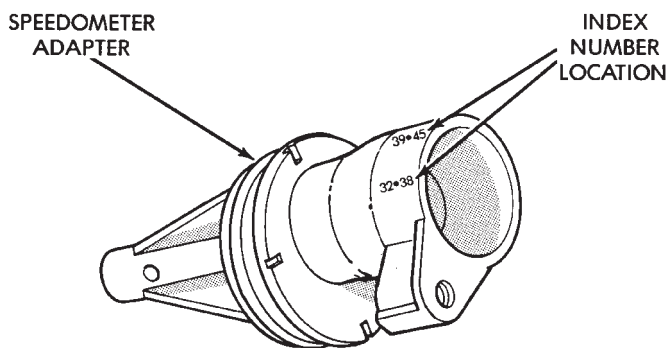
REMOVAL AND INSTALLATION (Continued)

ITEM	TORQUE
A	2-3 N•m (15-27 in. lbs.)
B	10-12 N•m (90-110 in. lbs.)



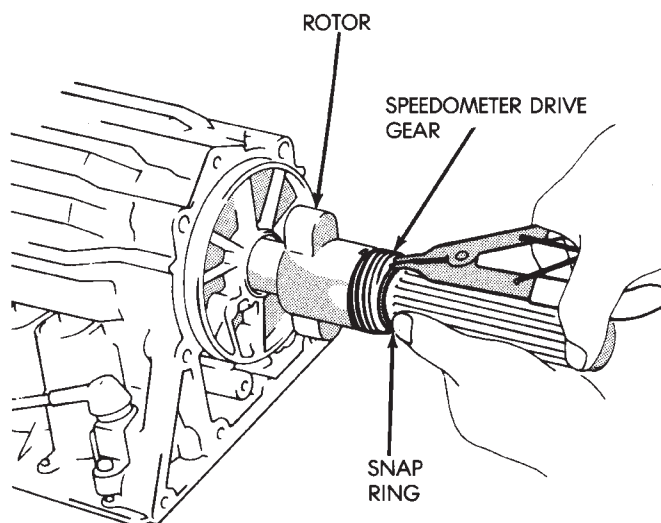
J9321-385

Fig. 39 Speedometer Pinion Adapter Components



J9321-386

Fig. 40 Index Numbers On Speedometer Pinion Adapter



J8921-464

Fig. 41 Removing/Installation Speedometer Drive Gear

PARK/NEUTRAL POSITION SWITCH

REMOVAL

- (1) Raise vehicle.
- (2) Disconnect switch wire harness connector.
- (3) Pry washer lock tabs upward and remove switch attaching nut and tabbed washer (Fig. 43).
- (4) Remove switch adjusting bolt (Fig. 43).
- (5) Slide switch off manual valve shaft.

INSTALLATION

- (1) Disconnect shift linkage rod from shift lever on left side of transmission.

- (2) Rotate manual shift lever all the way rearward. Then rotate lever forward two detent positions to Neutral.

- (3) Install switch on manual valve shaft and install switch adjusting bolt finger tight. Do not tighten bolt at this time.

- (4) Install tabbed washer on manual valve shaft and install switch attaching nut. Tighten nut to 6.9 N•m (61 in. lbs.) torque but do not bend washer lock tabs over nut at this time.

REMOVAL AND INSTALLATION (Continued)

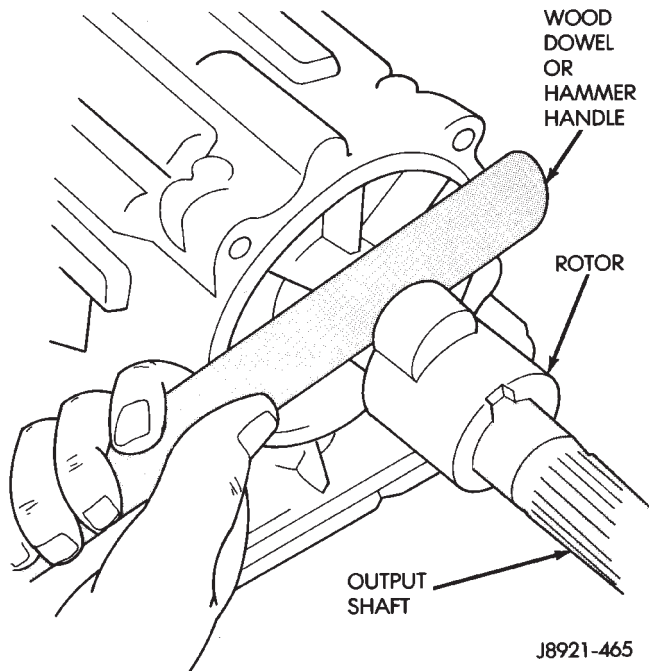


Fig. 42 Removing Speed Sensor Rotor

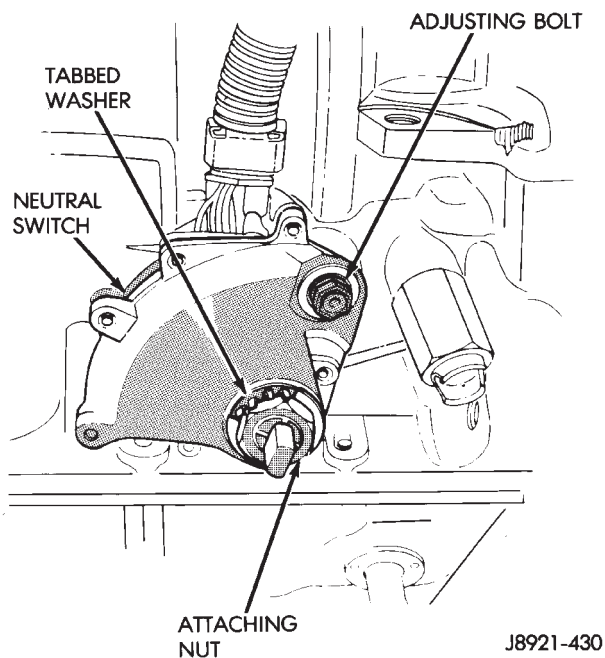


Fig. 43 Park/Neutral Position Switch Removal/Installation

- (5) Verify that transmission is in Neutral.
- (6) Rotate switch to align neutral standard line with vertical groove on manual valve shaft (Fig. 44).
- (7) Align switch standard line with groove or flat on manual valve shaft.
- (8) Tighten switch adjusting bolt to 13 N·m (9 ft. lbs.) torque.
- (9) Bend at least two washer lock tabs over switch attaching nut to secure it.

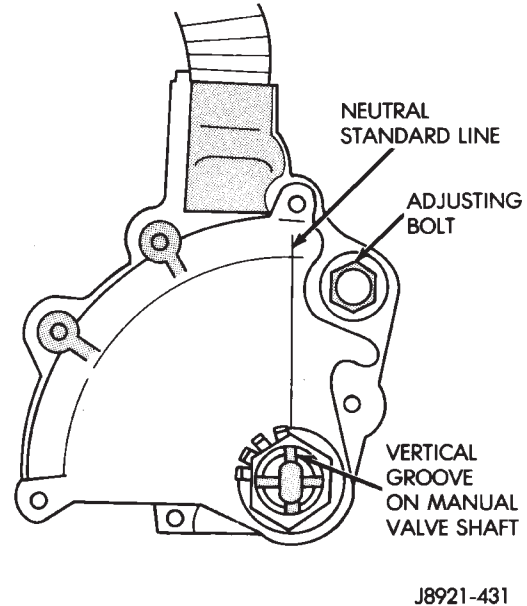


Fig. 44 Park/Neutral Position Switch Adjustment

- (10) Connect shift linkage rod to shift lever on left side of case.
- (11) Connect switch wires to harness and lower vehicle.
- (12) Check switch operation. Engine should start in Park and Neutral only.

GEARSHIFT CABLE

REMOVAL

- (1) Shift transmission into Park.
- (2) Remove shift lever bezel and necessary console parts for access to shift lever assembly.
- (3) Disconnect cable at shift lever and feed cable through dash panel opening to underside of vehicle.
- (4) Raise vehicle.
- (5) Disengage cable eyelet at transmission shift lever and pull cable adjuster out of mounting bracket. Then remove old cable from vehicle.

INSTALLATION

- (1) Route cable through hole in dash panel. Fully seat cable grommet into dash panel.
- (2) Place the auto transmission manual shift control lever in "Park" detent (rearmost) position and rotate prop shaft to ensure transmission is in park.
- (3) Connect shift cable to shifter mechanism by snapping cable retaining ears into shifter bracket and press cable end fitting onto lever ball stud.
- (4) Place the floor shifter lever in park position. Ensure that the pawl is seated within the confines of the adjustment gauge clip.
- (5) Snap the cable into the transmission bracket so the retaining ears are engaged and connect cable end fitting onto the manual control lever ball stud.

REMOVAL AND INSTALLATION (Continued)

(6) Lock shift cable into position by pushing upward on the adjusting lock button.

(7) Remove and discard the shift cable adjustment gauge clip from the park gate of the shifter.

BRAKE TRANSMISSION SHIFT INTERLOCK**REMOVAL**

(1) Remove lower steering column cover. Refer to Group 8E, Instrument Panel and Gauges, for proper procedure.

(2) Remove lower steering column shroud. Refer to Group 19, Steering, for proper procedure.

(3) Remove tie strap near the solenoid retaining the brake transmission interlock cable to the steering column.

(4) Disengage wire connector from solenoid.

(5) With the ignition removed or in the unlocked position, disengage lock tab holding cable end to steering column (Fig. 45).

(6) Pull cable end from steering column.

(7) Remove the floor console and related trim. Refer to Group 23, Body, for proper procedure.

(8) Disconnect the cable eyelet from the bellcrank (Fig. 46).

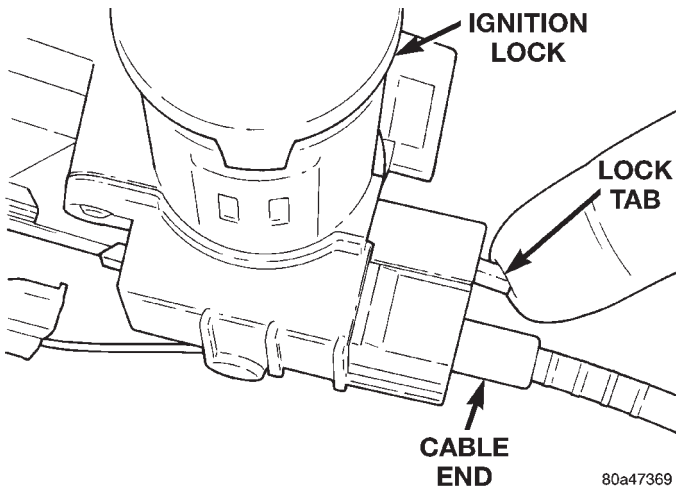


Fig. 45 Brake/Park Interlock Cable

(9) Disconnect and remove the cable from the shift bracket.

INSTALLATION

(1) Route replacement cable behind instrument panel and under floor console area to shift mechanism (Fig. 46).

(2) Insert cable end into opening in steering column hub under ignition lock. Push cable inward until lock tab engages.

(3) Connect the cable end eyelet onto shifter bellcrank pin.

(4) Place gear selector in PARK.

(5) Push the spring-loaded cable adjuster forward and snap cable into bracket.

(6) Adjust the brake transmission shifter interlock cable. Refer to the Adjustment portion of this section for proper procedures.

(7) Verify that the cable adjuster lock clamp is pushed downward to the locked position.

(8) Test the park-lock cable operation.

(9) Install the floor console and related trim.

(10) Install tie strap to hold cable to base of steering column.

(11) Install lower steering column shroud and ignition lock.

(12) Install lower steering column cover.

TRANSMISSION VALVE BODY SOLENOIDS**REMOVAL**

(1) Remove transmission oil pan drain plug and drain fluid.

(2) Remove pan bolts and remove oil pan.

(3) Remove oil screen bolts and remove screen (Fig. 47) and gasket. Discard the gasket.

(4) Disconnect solenoid wire connector (Fig. 48).

(5) If all solenoids are being removed, mark or tag wires for assembly reference before disconnecting them.

(6) Remove bolt attaching solenoids to valve body and remove solenoids (Fig. 49). Do not allow any valve body components to fall out when solenoids are removed.

(7) Clean oil filter and pan with solvent and dry with compressed air.

(8) Remove old sealer material from oil pan and transmission case.

INSTALLATION

(1) Position solenoids on valve body and install solenoid bolts. Tighten bolts to 10 N·m (7 ft. lbs.) torque.

(2) Connect feed wires to solenoids.

(3) Install new gaskets on oil screen and install screen. Tighten screen bolts to 10 N·m (7 ft. lbs.) torque.

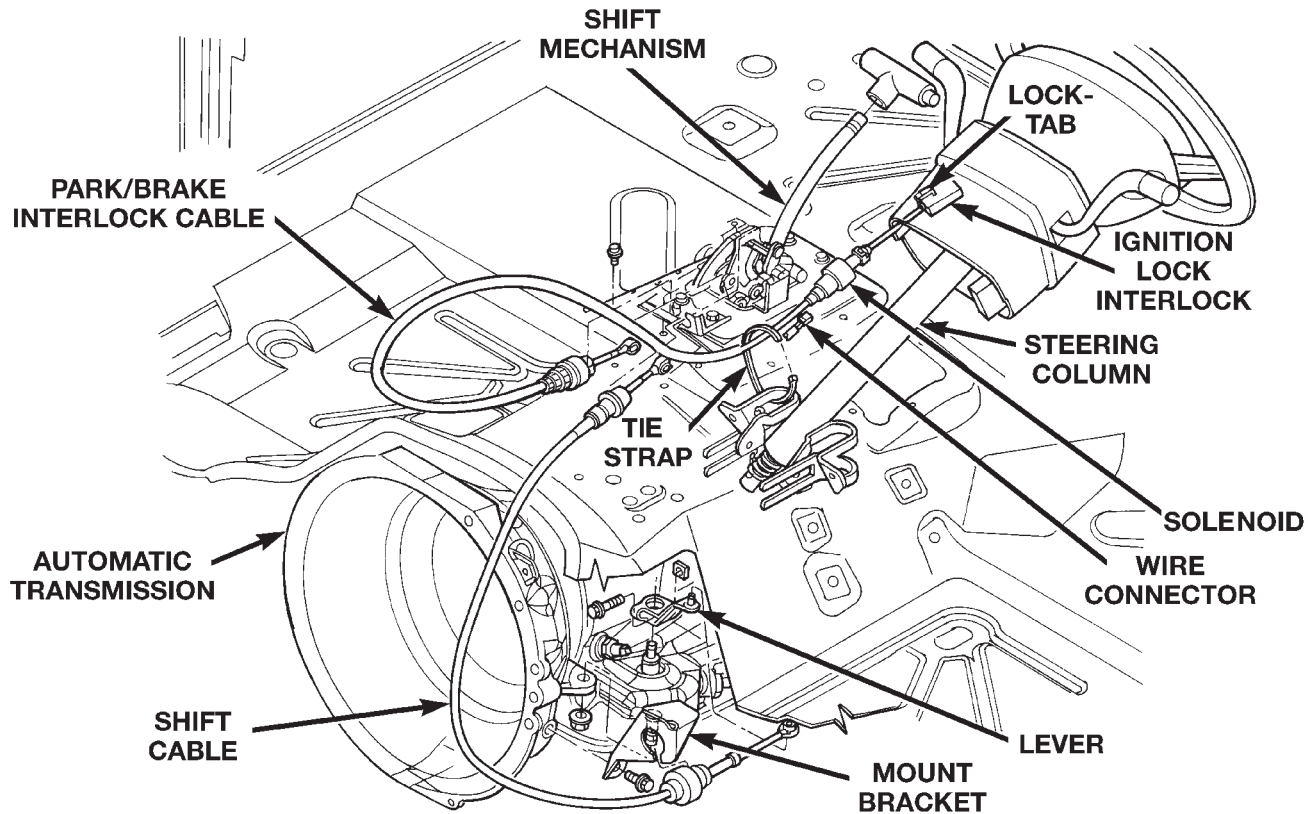
(4) Apply bead of Threebond® Liquid Gasket TB1281, P/N 83504038, sealer to oil pan sealing surface. Sealer bead should be at least 3.0 mm (1/8 in.) wide.

(5) Install oil pan on transmission. Tighten pan bolts to 7 N·m (65 in. lbs.) torque.

(6) Install and tighten oil pan drain plug to 20 N·m (15 ft. lbs.) torque.

(7) Fill transmission with Mopar® Dexron IIE/Mercon.

REMOVAL AND INSTALLATION (Continued)



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Fig. 46 Cable and Shifter

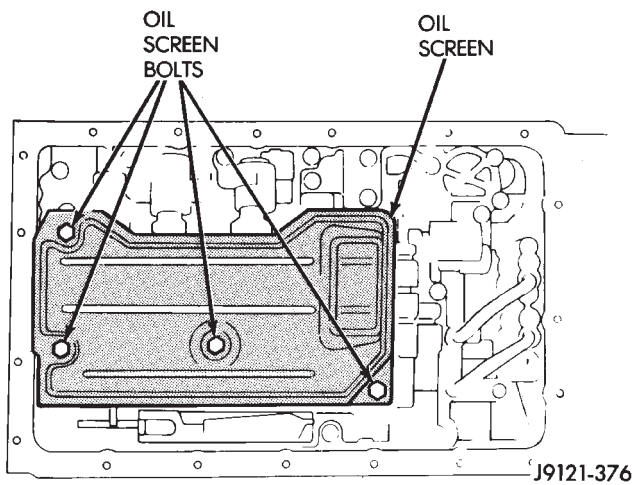


Fig. 47 Oil Screen Removal/Installation

TRANSMISSION VALVE BODY

J8921-433

REMOVAL

- (1) Remove oil pan plug and drain transmission fluid.
- (2) Remove oil pan and oil screen. Clean pan and screen in solvent and dry them with compressed air.
- (3) Disconnect solenoid wire connectors (Fig. 50). Mark wires for assembly reference.

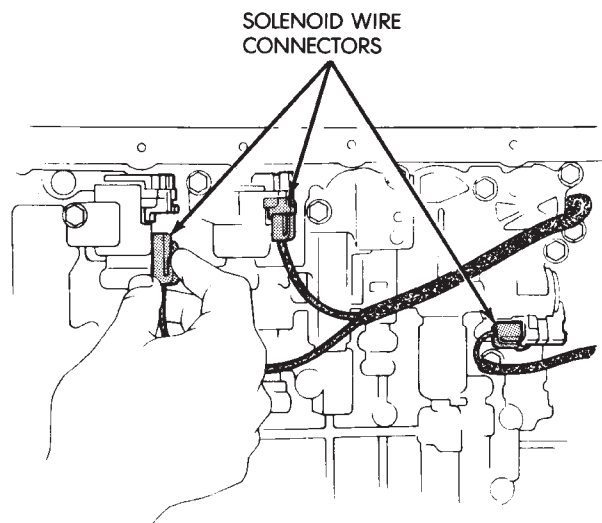
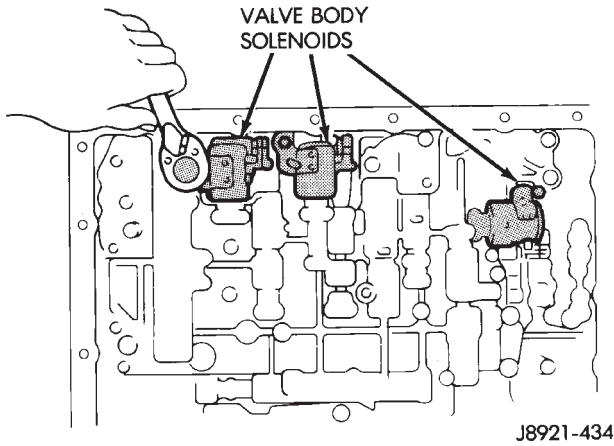


Fig. 48 Solenoid Wire Connectors

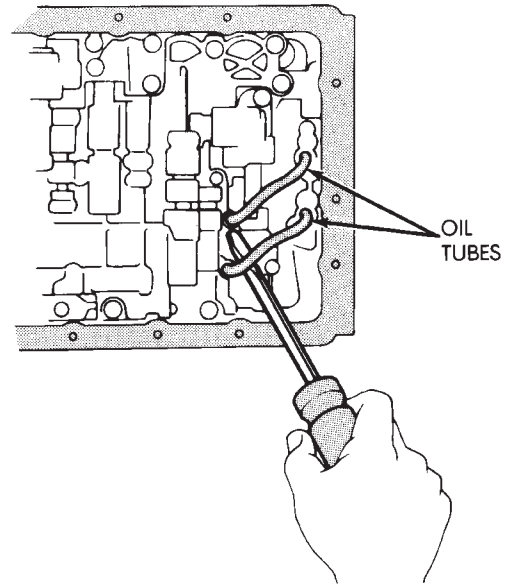
- (4) Remove valve body oil tubes (Fig. 51). Carefully pry tubes out of valve body with screwdriver.
- (5) Disconnect throttle cable from throttle cam (Fig. 52).

REMOVAL AND INSTALLATION (Continued)



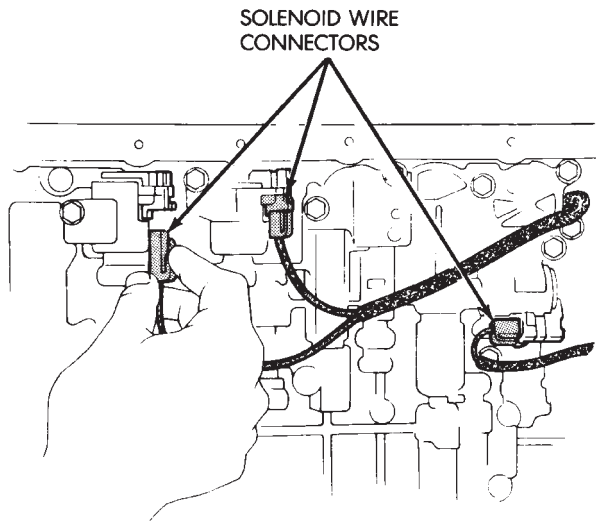
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Fig. 49 Transmission Valve Body Solenoids



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Fig. 51 Removing Transmission Valve Body Oil Tubes



J8921-433

Fig. 50 Solenoid Wire Connectors

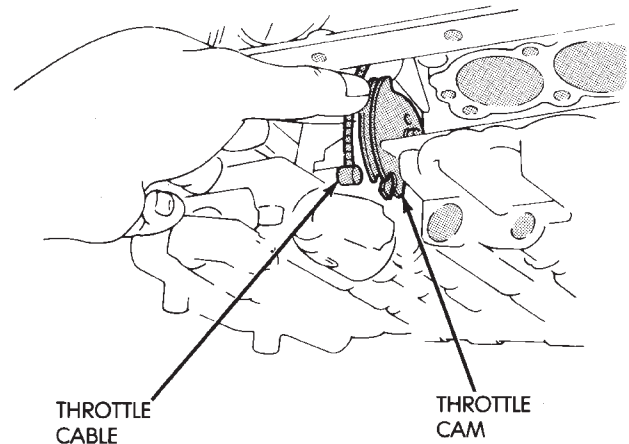
(6) Remove valve body bolts. Bolt locations are outlined in (Fig. 53).

(7) Lower valve body and remove overdrive clutch accumulator springs, direct clutch accumulator springs and second brake accumulator spring (Fig. 54).

(8) Remove valve body and check ball and spring (Fig. 55).

INSTALLATION

- (1) Connect cable to throttle cam (Fig. 52).
- (2) Install check ball and spring (Fig. 55).
- (3) Position accumulator springs and spacers on valve body.
- (4) Align valve body manual valve with shift sector (Fig. 56) and carefully position valve body on case.
- (5) Install valve body bolts (Fig. 53). Tighten bolts evenly to 10 N·m (7 ft. lbs.) torque.



J8921-438

Fig. 52 Removing/Installing Throttle Cable

(6) Install valve body oil tubes. Be sure tube ends (L) and (M) are installed as shown in (Fig. 57).

(7) Remove old sealer material from oil pan and transmission case.

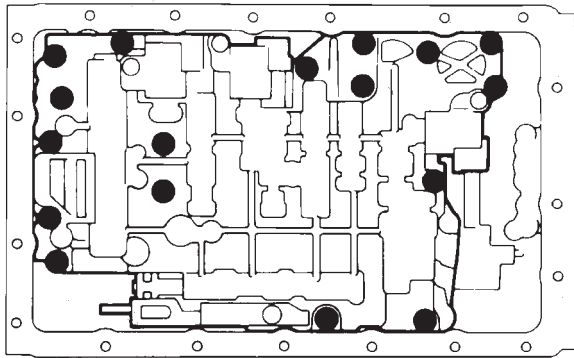
(8) Clean oil screen and oil pan with solvent (if not done previously). Dry both components with compressed air only. Do not use shop towels.

(9) Install new gaskets on oil screen and install screen on case. Tighten screen attaching bolts to 10 N·m (7 ft. lbs.) torque.

(10) Apply bead of Threebond® Liquid Gasket TB1281, P/N 83504038 to sealing surface of oil pan. Sealer bead should be at least 3 mm (1/8 in.) wide.

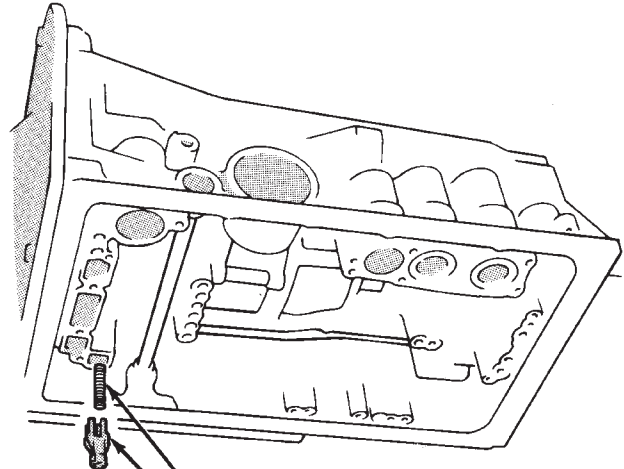
REMOVAL AND INSTALLATION (Continued)

● = BOLT LOCATIONS



J8921-439

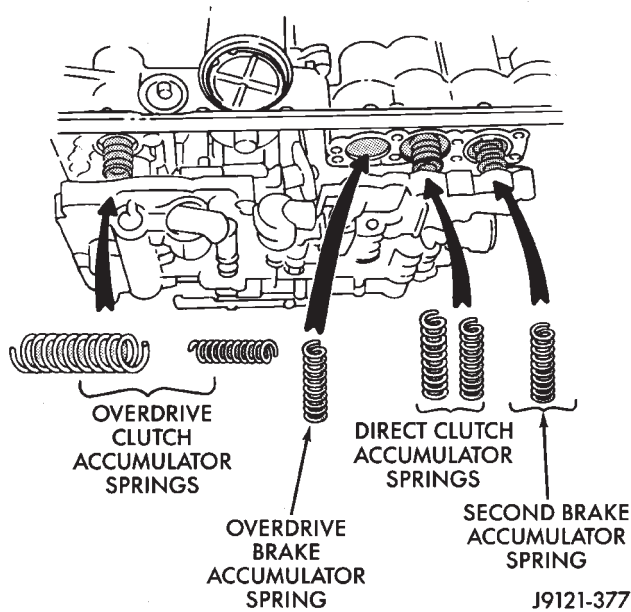
Fig. 53 Transmission Valve Body Bolt Locations



CHECK BALL AND SPRING

J8921-441

Fig. 55 Removing/Installing Check Ball And Spring



J9121-377

Fig. 54 Accumulator Springs

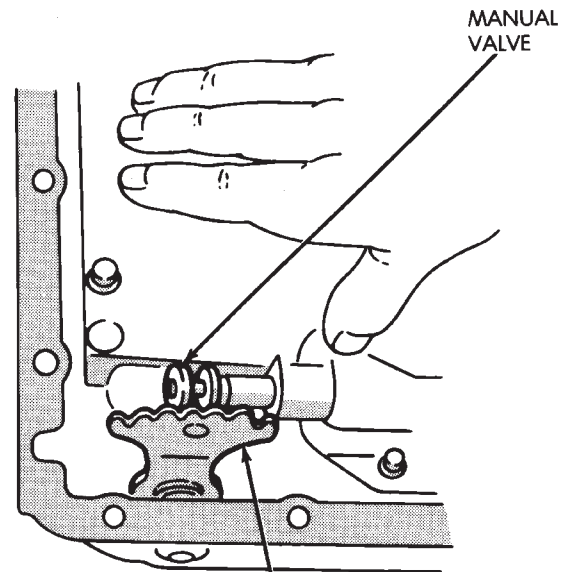
Then install oil pan and tighten pan bolts to 7.4 N·m (65 in. lbs.) torque.

(11) Install new gasket on oil pan drain plug and install plug in pan. Tighten plug to 20 N·m (15 ft. lbs.) torque.

(12) Fill transmission with Mopar® Dexron IIE/Mercon.

TRANSMISSION CONTROL MODULE

The transmission control module is mounted under the instrument panel. On left hand drive models, it is at the driver side of the lower finish panel (Fig. 58). On right hand drive models, it is at the passenger side of the lower finish panel (Fig. 59).



SHIFT SECTOR

MANUAL VALVE

J8921-442

Fig. 56 Shift Sector And Manual Valve Alignment

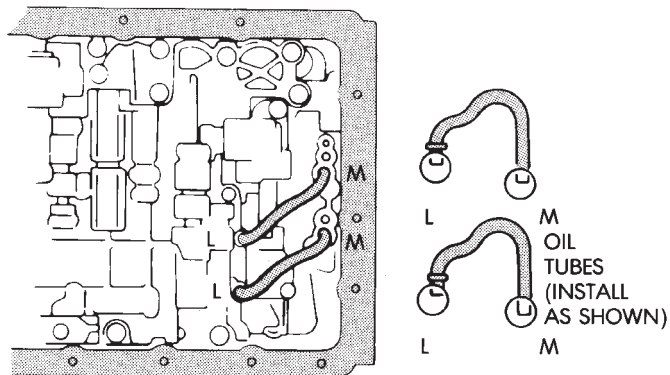
To remove the module, disconnect the wire harness, remove the mounting screws and remove the module from the finish panel. Tighten the module mounting screws securely after installation. Also be sure the wire harness is not twisted, kinked or touching any body panels.

SOLENOID HARNESS ADAPTER SEAL

REMOVAL

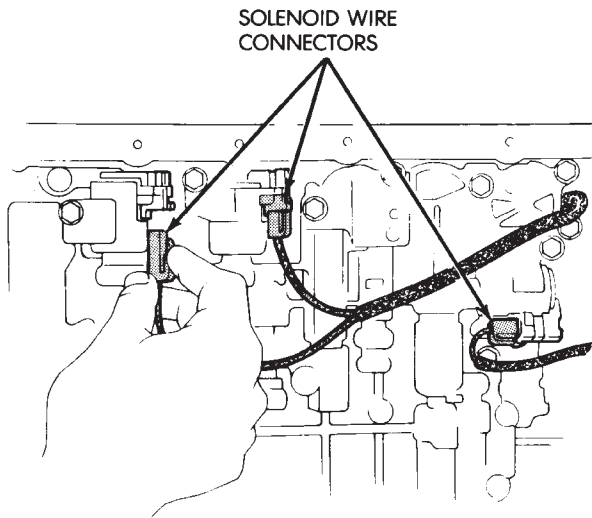
- (1) Remove oil pan and oil screen.
- (2) Disconnect solenoid wire connectors (Fig. 60).

REMOVAL AND INSTALLATION (Continued)



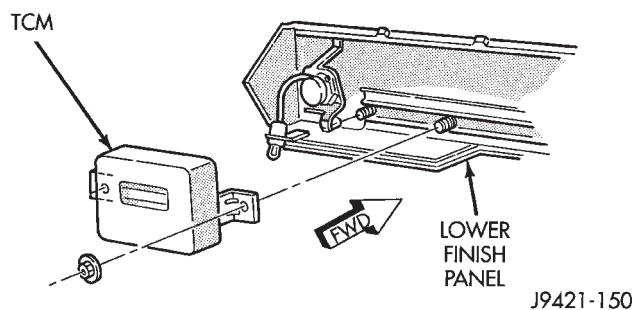
J8921-443

Fig. 57 Installing Transmission Valve Body Oil Tubes



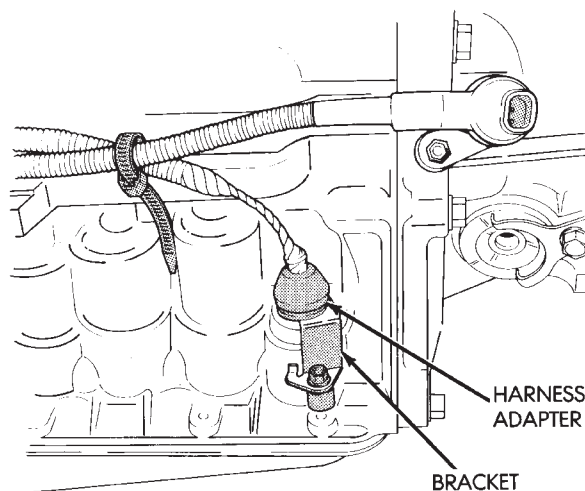
J8921-433

Fig. 60 Solenoid Wire Connectors



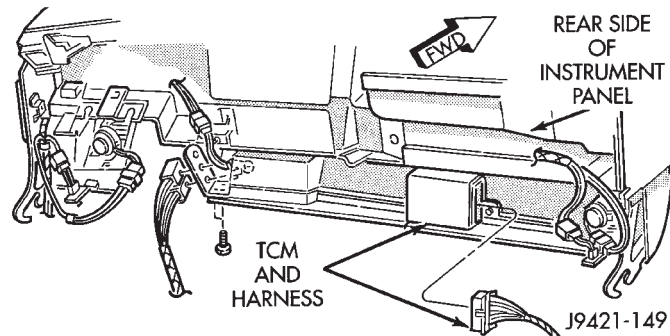
J9421-150

Fig. 58 TCM Location (Left Hand Drive)



J8921-436

Fig. 61 Harness Adapter Removal/Installation



J9421-149

Fig. 59 TCM Location (Right Hand Drive)

- (3) Remove bracket securing solenoid harness adaptor (Fig. 61) to case.
- (4) Pull harness adaptor and wires out of case.
- (5) Remove and discard adapter O-ring.

INSTALLATION

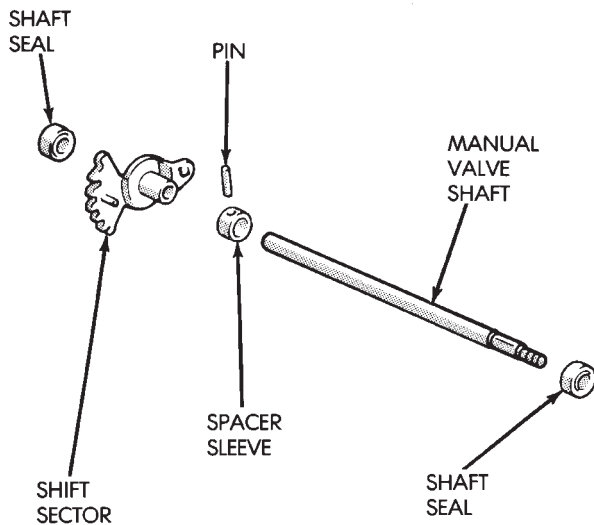
- (1) Lubricate new O-ring and install it on adapter.
- (2) Install solenoid wire harness and adapter in case.
- (3) Install adapter bracket and bracket bolt.

- (4) Connect wires to solenoids.
- (5) Install oil screen.
- (6) Apply bead of Threebond® Liquid Gasket TB1281, P/N 83504038, to oil pan seal surface. Sealer bead should be at least 3 mm (1/8 in.) wide.
- (7) Install oil pan on transmission. Tighten pan bolts to 7 N·m (65 in. lbs.) torque.
- (8) Install and tighten oil pan drain plug to 20 N·m (15 ft. lbs.) torque.
- (9) Fill transmission with Mopar Dexron IIE/Mercon.

REMOVAL AND INSTALLATION (Continued)

MANUAL VALVE SHAFT SEAL

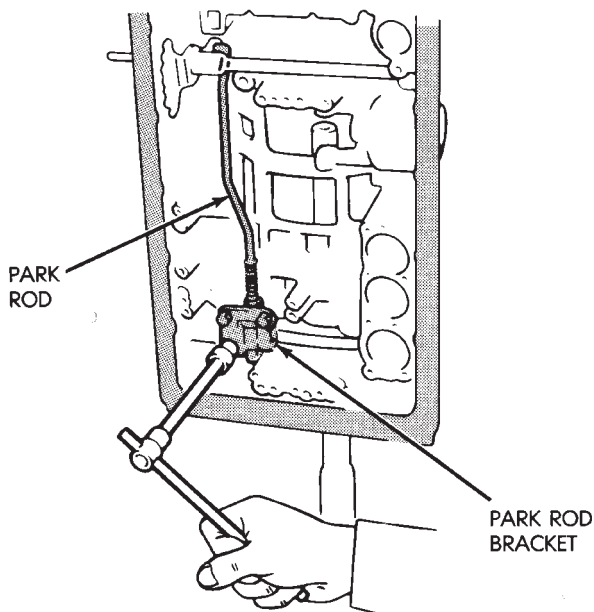
REMOVAL



J8921-444

Fig. 62 Manual Valve Shaft And Seals

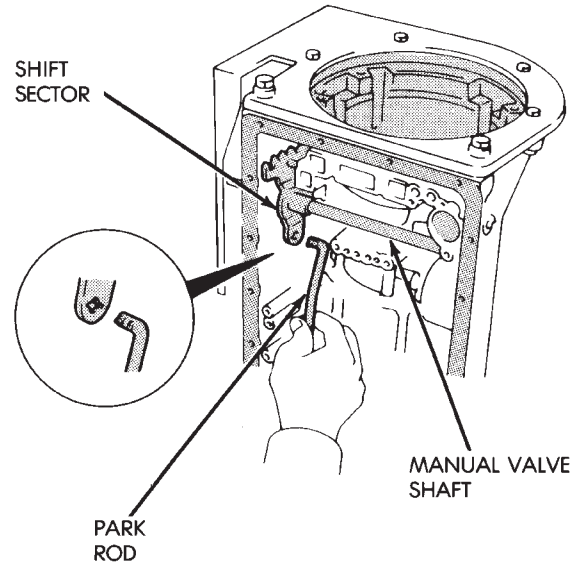
- (1) Remove park/neutral position switch and disconnect transmission shift lever (Fig. 62).
- (2) Remove oil pan and valve body.
- (3) Remove bolts attaching park rod bracket to case (Fig. 63).



J8921-445

Fig. 63 Removing/Installing Park Rod Bracket

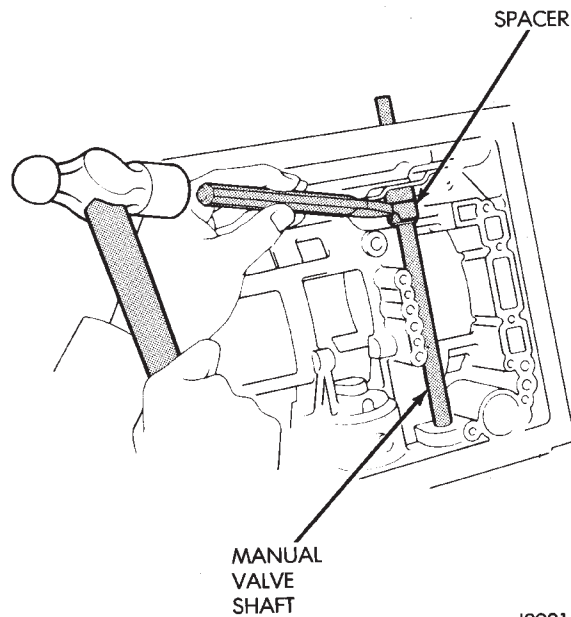
- (4) Remove park rod from shift sector (Fig. 64).



J8921-446

Fig. 64 Removing/Installing Park Rod

- (5) Cut spacer sleeve with chisel and remove it from manual valve shaft (Fig. 65).
- (6) Remove pin from shaft and sector with pin punch.



J8921-447

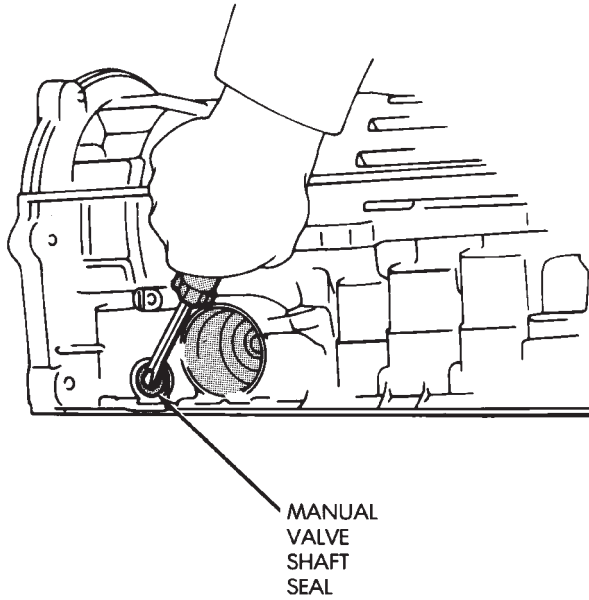
Fig. 65 Cutting Spacer Sleeve

- (7) Remove shaft and sector from case.
- (8) Pry shaft seals out of case (Fig. 66).

INSTALLATION

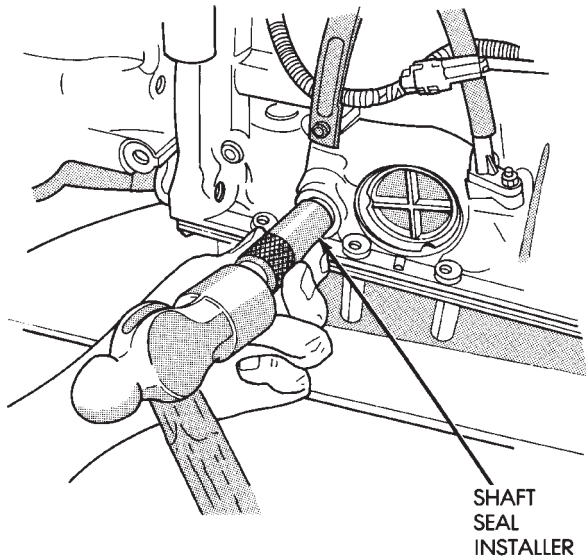
- (1) Inspect the manual valve shaft and sector. Replace either component if worn or damaged.
- (2) Coat replacement shaft seals with petroleum jelly and seat them in the case using an appropriately sized driver/socket (Fig. 67).

REMOVAL AND INSTALLATION (Continued)



J8921-448

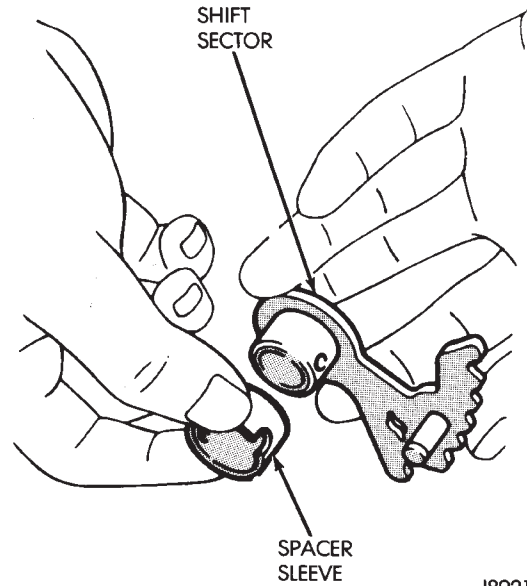
Fig. 66 Removing Manual Valve Shaft Seals



J8921-449

Fig. 67 Installing Manual Valve Shaft Seals

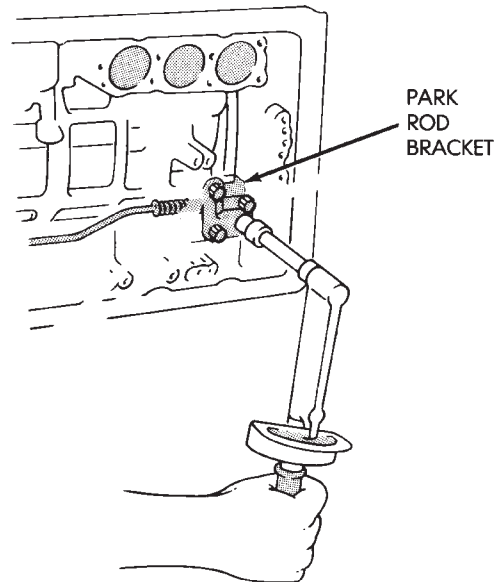
- (3) Install new spacer sleeve on sector (Fig. 68).
- (4) Lubricate manual valve shaft with petroleum jelly and install it through the left side of the transmission case.
- (5) Lubricate sector and sleeve with petroleum jelly and install them on shaft.
- (6) Install the manual valve shaft through the remainder of the transmission case.
- (7) Align hole in spacer sleeve with notch in sector. Then install shift sector roll pin. Tap pin into sector and shaft and securely stake sleeve to sector and shaft.



J8921-450

Fig. 68 Installing Spacer Sleeve On Sector

- (8) Connect park rod to sector (Fig. 64).
- (9) Install park rod bracket (Fig. 69). Tighten bracket bolts to 10 N·m (7 ft. lbs.) torque.



J8921-451

Fig. 69 Installing Park Rod Bracket

- (10) Install valve body, oil screen and oil pan.
- (11) Install park/neutral position switch.

ACCUMULATOR PISTONS AND SPRINGS

REMOVAL

- (1) Remove valve body.
- (2) Remove accumulator pistons with compressed air (Fig. 70). Apply air through small feed hole next

REMOVAL AND INSTALLATION (Continued)

to each piston bore. Catch each piston in a shop towel as it exits bore.

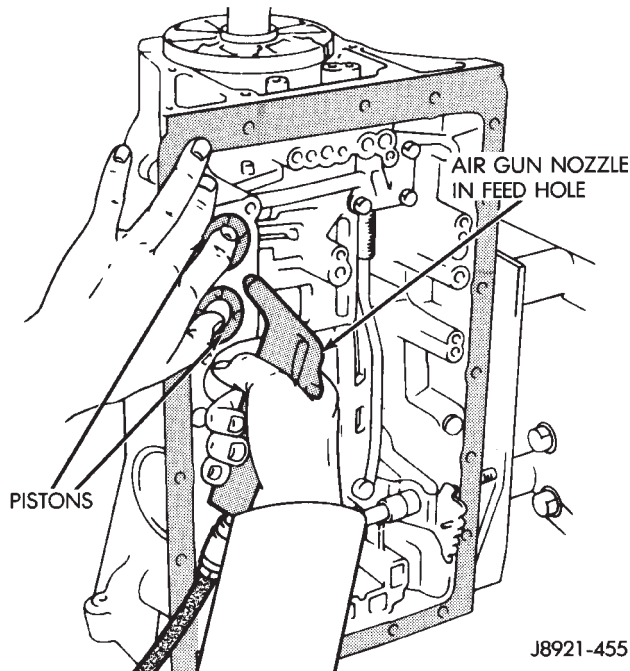


Fig. 70 Accumulator Piston Removal

CAUTION: Use only enough air pressure to ease each piston out of the bore. In addition, remove the pistons one at a time and tag the pistons and springs for assembly reference. Do not intermix them.

(3) Remove and discard piston O-ring seals. Then clean pistons and springs with solvent.

INSTALLATION

(1) Inspect pistons, springs and piston bores. Replace worn damaged pistons. Replace broken, collapsed or distorted springs. Replace case if piston bores are damaged.

(2) If small cushion spring in any piston must be replaced, remove spring retainer clip and remove spring from piston (Fig. 71). A small hooked tool or small thin blade screwdriver can be used to remove clip. A thin wall, deep socket, or pin punch can be used to seat clip after spring replacement.

(3) Install new O-ring seals on pistons. Lubricate seals and pistons and piston bores with transmission fluid.

(4) Install pistons and springs (Fig. 72).

(5) Install valve body, oil screen and oil pan.

SECOND COAST BRAKE SERVO

REMOVAL

(1) Remove valve body.

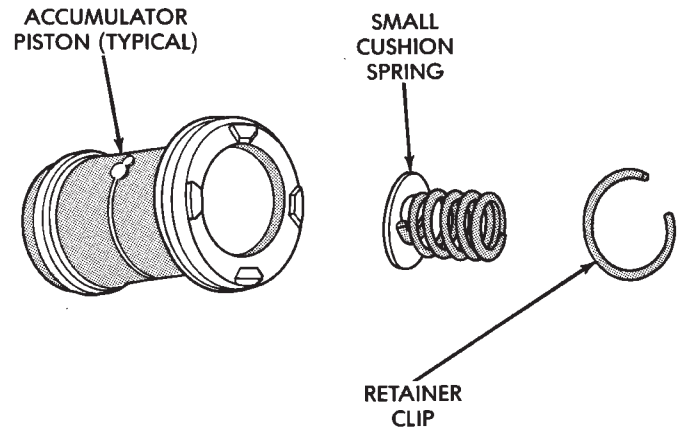
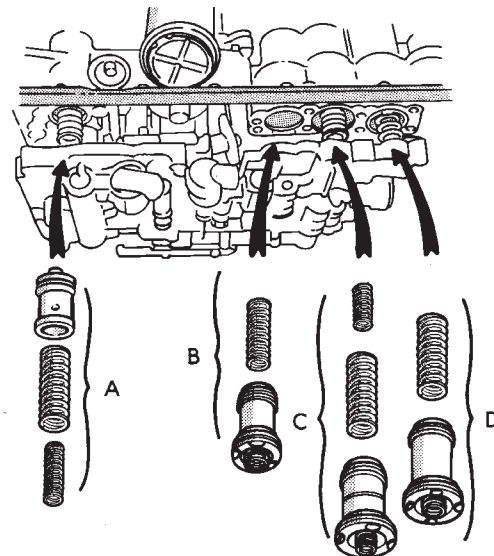


Fig. 71 Small Cushion Spring Retention



- A. OVERDRIVE CLUTCH ACCUMULATOR PISTON AND SPRINGS
- B. OVERDRIVE BRAKE ACCUMULATOR PISTON AND SPRINGS
- C. DIRECT CLUTCH ACCUMULATOR PISTON AND SPRINGS
- D. SECOND BRAKE ACCUMULATOR PISTON AND SPRINGS

J9121-378

Fig. 72 Accumulator Pistons, Springs And Spacers

(2) Remove servo piston cover snap ring with snap ring pliers (Fig. 73).

(3) Remove servo piston and cover with compressed air. Apply compressed air through oil hole in servo boss to ease piston out of bore (Fig. 74).

(4) Remove and discard seal and O-rings from cover and piston (Fig. 75). Inspect E-ring, piston, spring and retainer, piston rod and piston spring. Replace worn or damaged parts.

REMOVAL AND INSTALLATION (Continued)

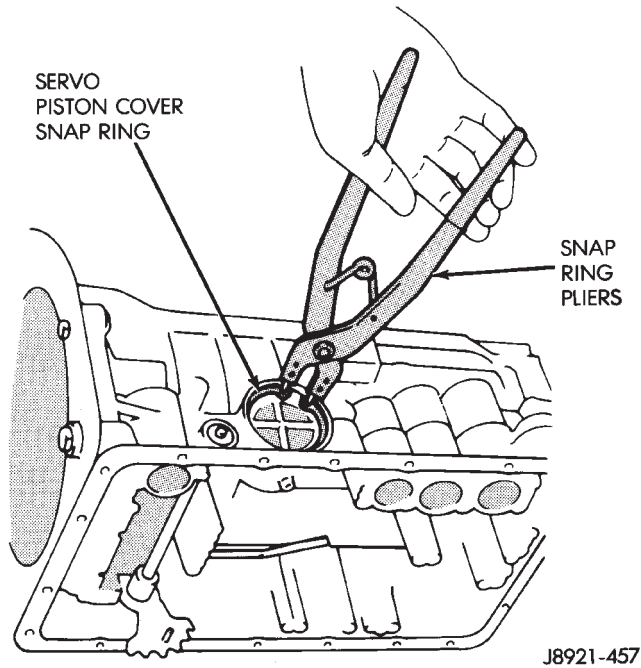


Fig. 73 Removing/Installing Servo Piston Cover Snap Ring

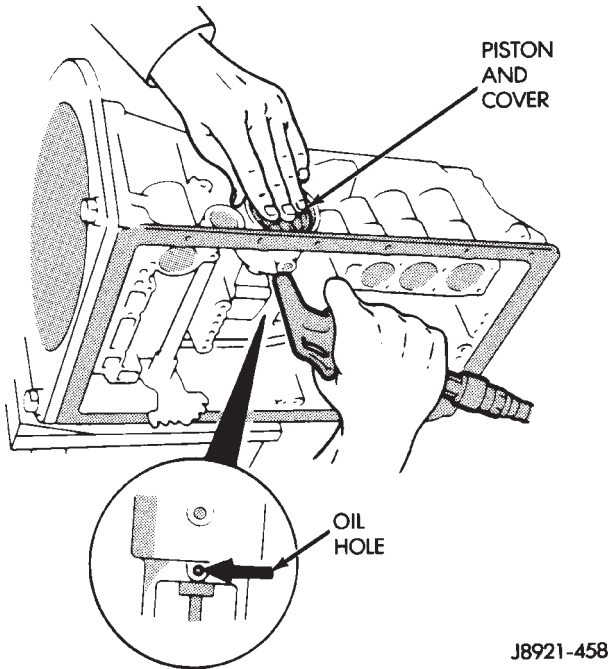


Fig. 74 Removing Servo Cover And Piston

INSTALLATION

- (1) Install new seals on cover and piston.
- (2) Lubricate servo components with transmission fluid.
- (3) Assemble and install servo components in case. Be sure servo piston rod is properly engaged in the second coast brake band.
- (4) Compress cover and piston and install cover snap ring.

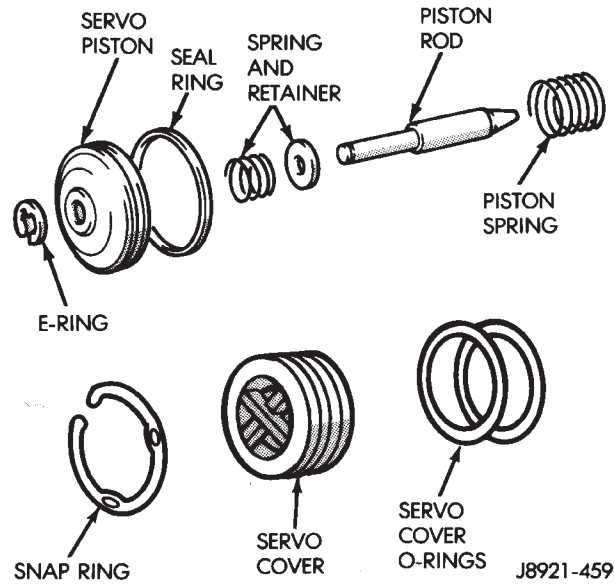


Fig. 75 Second Coast Brake Servo Components

- (5) Install valve body, oil screen and oil pan.

PARK ROD AND PAWL

REMOVAL

- (1) Remove valve body as outlined in this section.
- (2) Remove bolts attaching park rod bracket to case (Fig. 76).

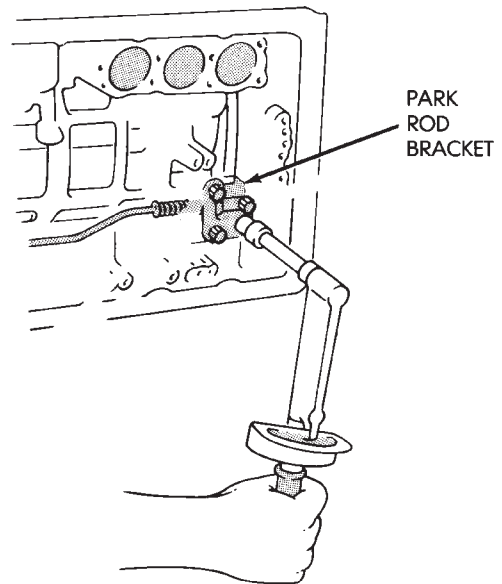


Fig. 76 Removing/Installing Park Rod Bracket

J8921-451

REMOVAL AND INSTALLATION (Continued)

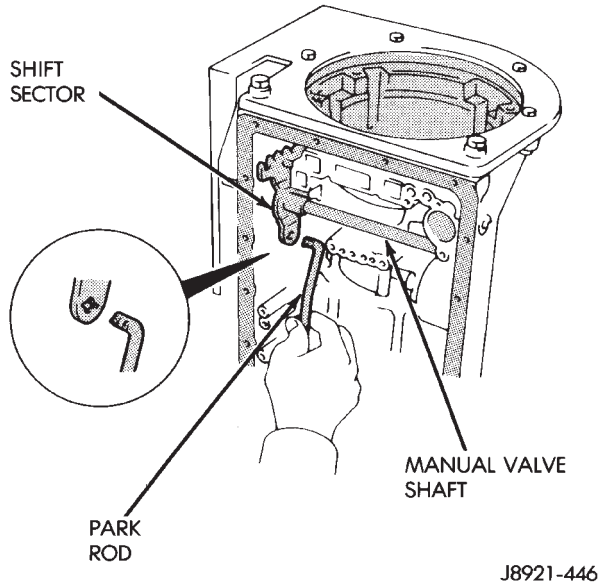


Fig. 77 Removing/Installing Park Rod

- (3) Remove park rod from manual valve shaft sector (Fig. 77).
- (4) Remove park rod.
- (5) Remove park pawl, pin and spring (Fig. 78).

INSTALLATION

- (1) Examine park rod, pawl, pin and spring. Replace any component that is worn or damaged.
- (2) Install pawl in case. Insert pin and install spring. Be sure spring is positioned as shown in Figure 35.
- (3) Install park rod and bracket (Fig. 76). Tighten bracket bolts to 10 N·m (7 ft. lbs.) torque.
- (4) Install valve body, oil screen and oil pan.

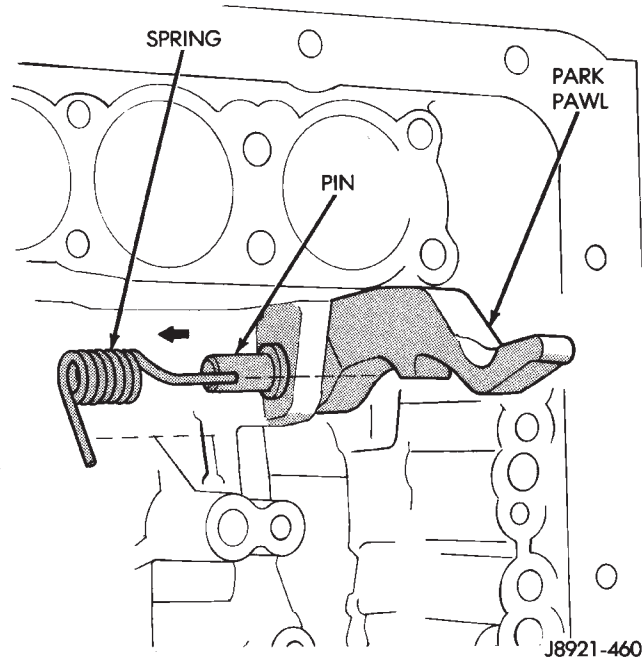


Fig. 78 Removing/Installing Park Pawl, Pin And Spring

TRANSMISSION THROTTLE CABLE

REMOVAL

- (1) In engine compartment, disconnect cable from throttle linkage. Then compress cable mounting ears and remove cable from engine bracket (Fig. 79).

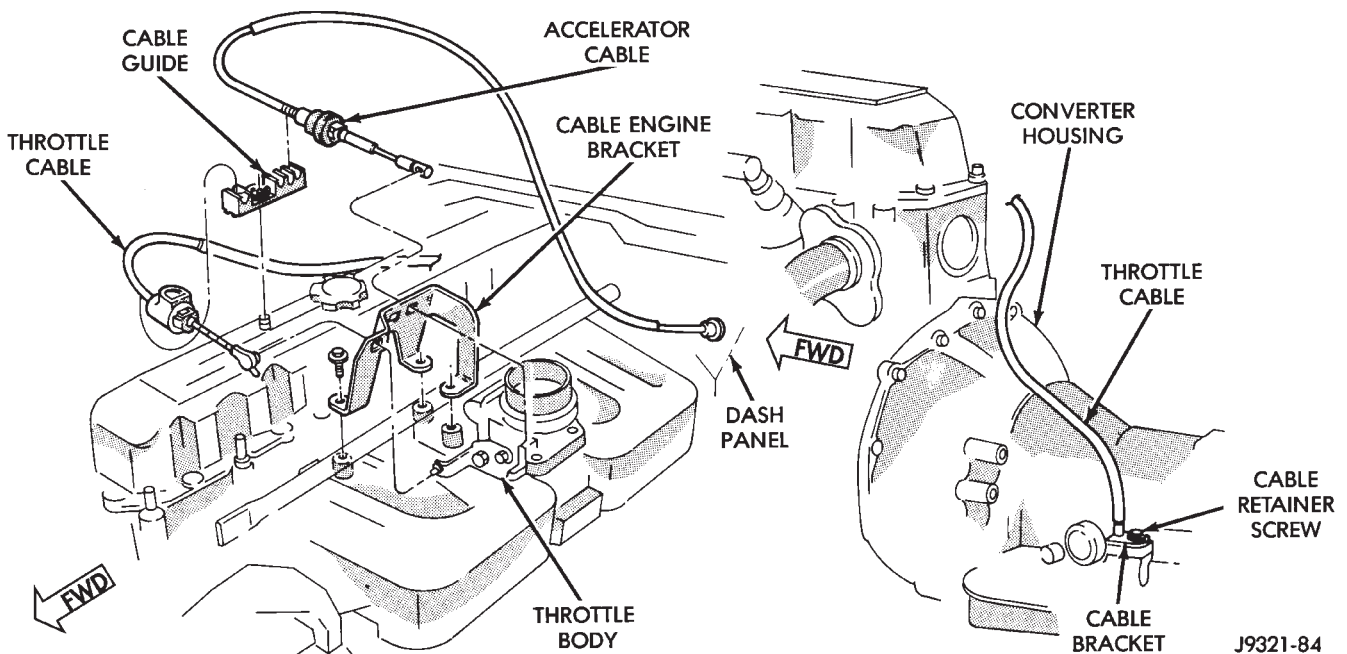
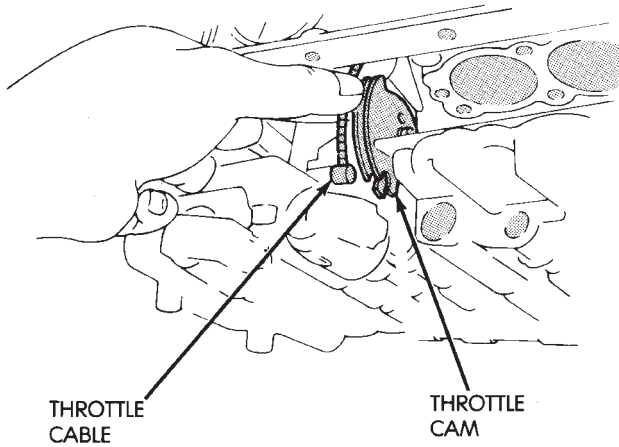


Fig. 79 Transmission Throttle Cable Attachment

REMOVAL AND INSTALLATION (Continued)

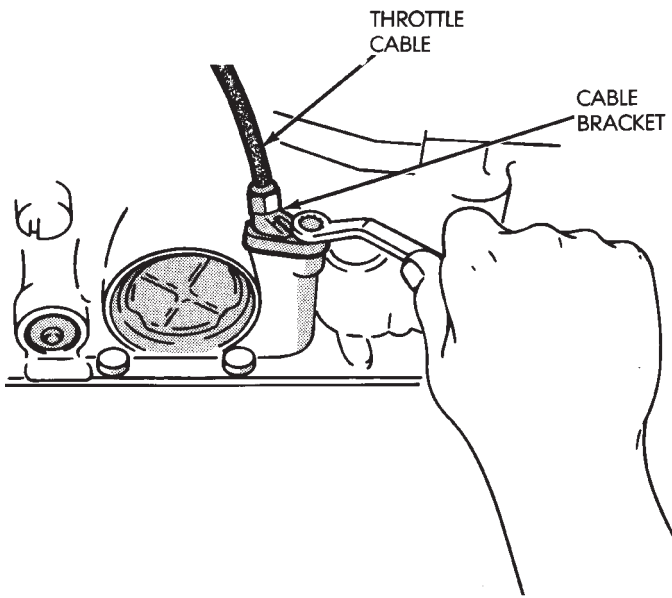
- (2) Raise vehicle.
- (3) Remove transmission oil pan.
- (4) Disengage cable from throttle valve cam (Fig. 80).



J8921-438

Fig. 80 Removing/Installing Transmission Throttle Cable

- (5) Remove cable bracket bolt and remove cable and bracket from case (Fig. 81).



J8921-452

Fig. 81 Removing/Installing Transmission Throttle Cable And Bracket

- (6) Remove and discard cable seal.

INSTALLATION

- (1) Lubricate and install new seal on cable.
- (2) Insert cable in transmission case.
- (3) Attach cable to throttle cam (Fig. 80).

- (4) Install cable bracket on case and tighten attaching bolt to 10 N·m (7 ft. lbs.) torque (Fig. 81).
- (5) Install pan and tighten pan bolts to 7 N·m (65 in. lbs.) torque.
- (6) Install new gasket on oil pan drain plug. Install and tighten plug to 20 N·m (15 ft. lbs.) torque.
- (7) Connect cable to engine bracket and throttle linkage.
- (8) Fill transmission with Mopar® Dexron/Mercon IIE.
- (9) Adjust the cable as described in cable adjustment procedure.

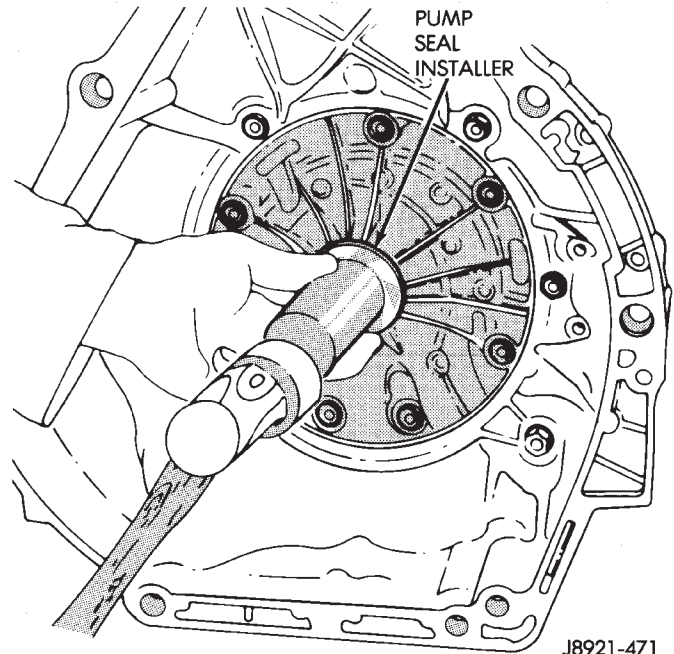
OIL PUMP SEAL

REMOVAL

- (1) Remove converter.
- (2) Remove old seal. Use blunt punch to collapse seal and pry seal out of pump housing. Do not scratch or damage seal bore.

INSTALLATION

- (1) Lubricate lip of new seal with transmission fluid and install seal in pump with tool 7549 (Fig. 82).



J8921-471

Fig. 82 Installing Oil Pump Seal

- (2) Lubricate converter drive hub with transmission fluid.
- (3) Align and install converter n oil pump.

DISASSEMBLY AND ASSEMBLY

TRANSMISSION

DISASSEMBLY

- (1) Remove torque converter.
- (2) Remove clamps attaching wire harness and throttle cable (Fig. 83) to transmission.

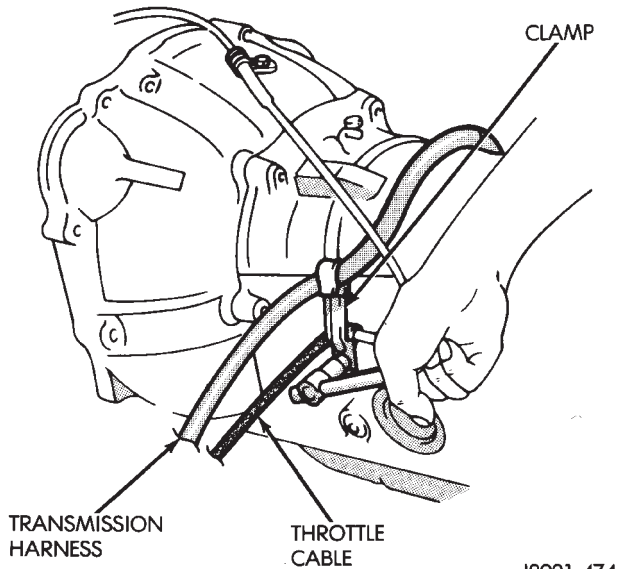


Fig. 83 Typical Harness And Cable Clamp Attachment

- (3) Remove shift lever from manual valve shaft at left side of transmission.
- (4) Remove park/neutral position switch.
- (5) Remove speed sensor.
- (6) Remove converter housing bolts and remove housing (Fig. 84) from case.

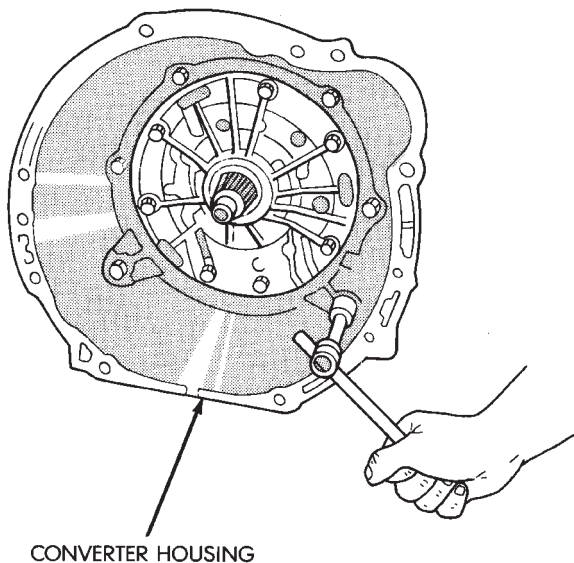


Fig. 84 Converter Housing Removal

- (7) Remove adapter housing, speedometer drive gear, and speed sensor rotor.
- (8) Remove transmission oil pan, oil screen and screen gaskets (Fig. 85).

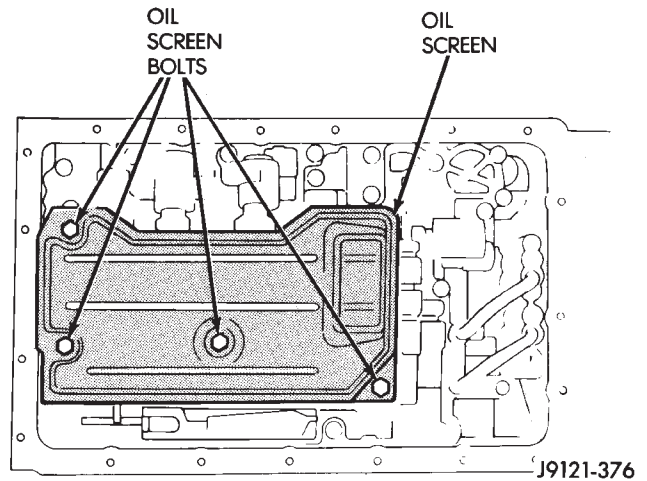


Fig. 85 Removing Oil Screen

- (9) Remove valve body oil feed tubes (Fig. 86).

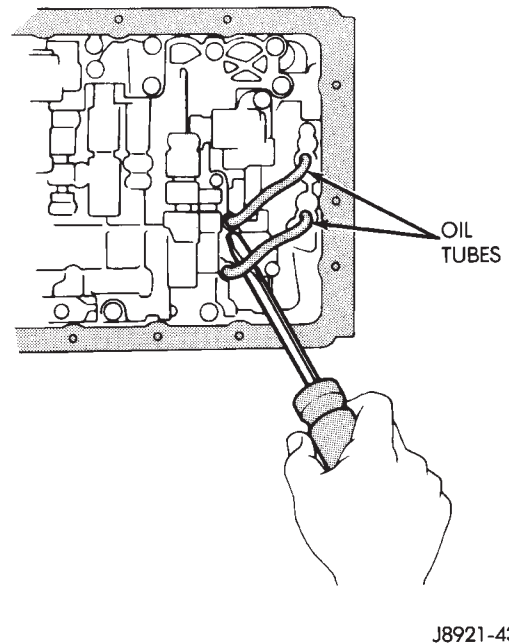
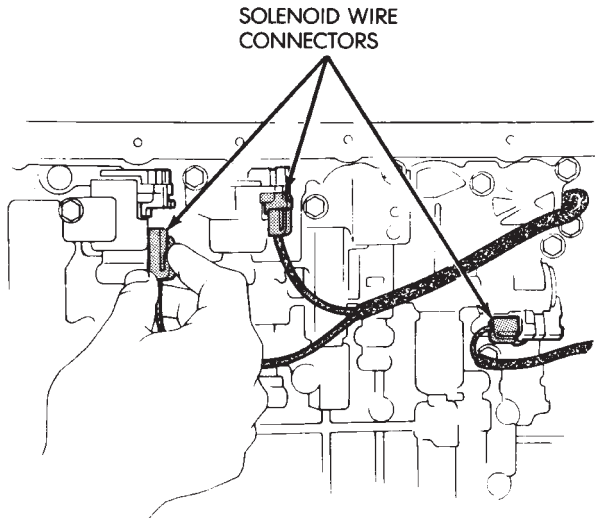


Fig. 86 Valve Body Oil Tube Removal

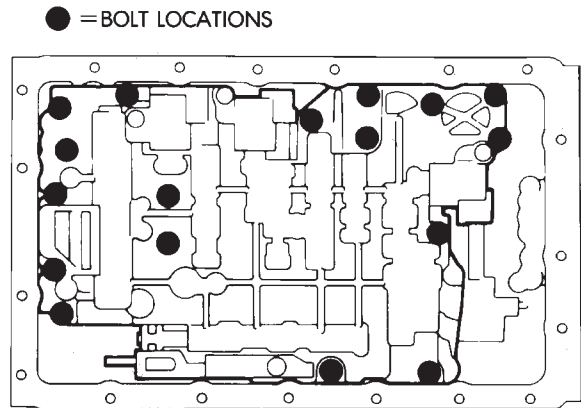
- (10) Disconnect valve body solenoid wires (Fig. 87).
- (11) Remove harness bracket bolt and remove harness and bracket (Fig. 88).

DISASSEMBLY AND ASSEMBLY (Continued)



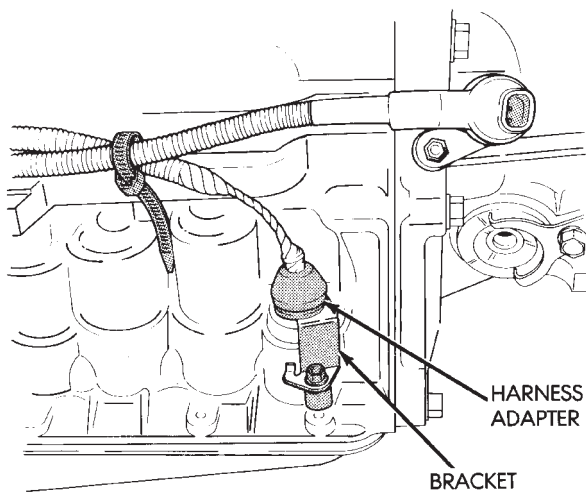
J8921-433

Fig. 87 Solenoid Wire Location



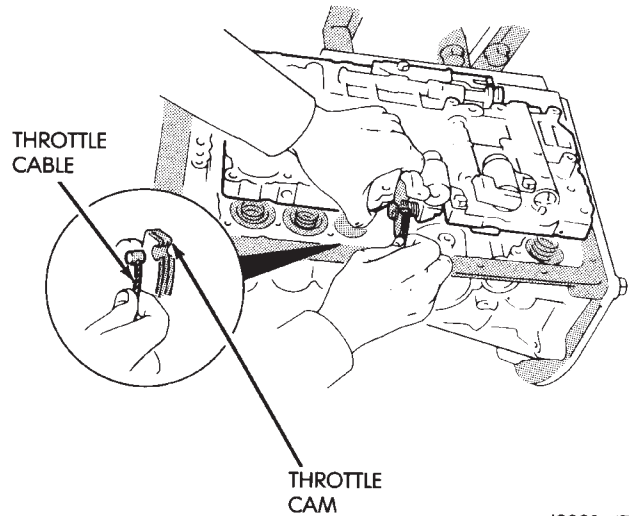
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Fig. 89 Valve Body Bolt Locations



J8921-436

Fig. 88 Removing Bracket And Harness



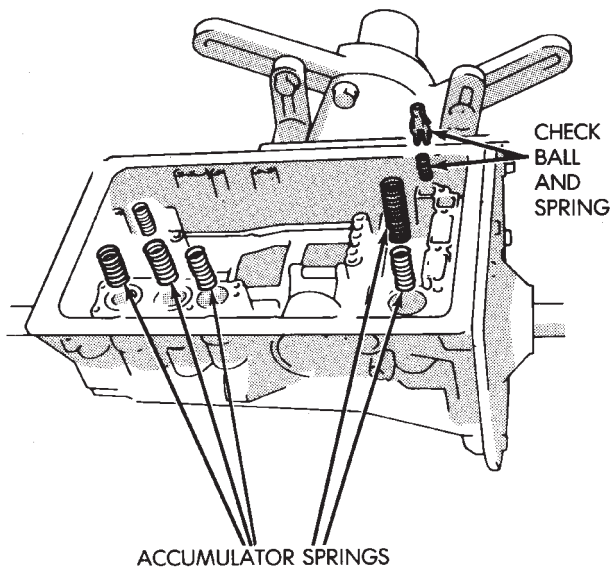
J8921-478

Fig. 90 Disconnecting Throttle Cable

- (12) Remove valve body bolts (Fig. 89).
- (13) Disconnect throttle cable from throttle cam (Fig. 90).

DISASSEMBLY AND ASSEMBLY (Continued)

(14) Remove valve body from case. Then remove accumulator springs, check ball, and spring (Fig. 91).



J9121-381

Fig. 91 Removing Accumulator Springs, Spacers And Check Ball

(15) Remove second brake and clutch accumulator pistons with compressed air (Fig. 92). Apply air pressure through feed port and ease the pistons and springs out of the bore. Note and identify the original location of all springs.

(16) Remove overdrive brake accumulator piston with compressed air (Fig. 92). Note and identify the original location of all springs.

(17) Remove overdrive clutch accumulator piston with compressed air (Fig. 92).

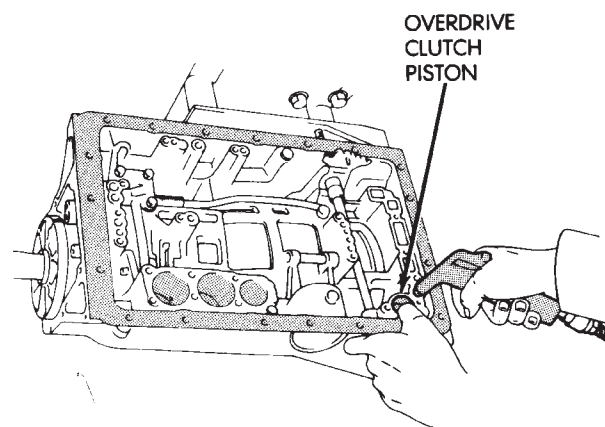
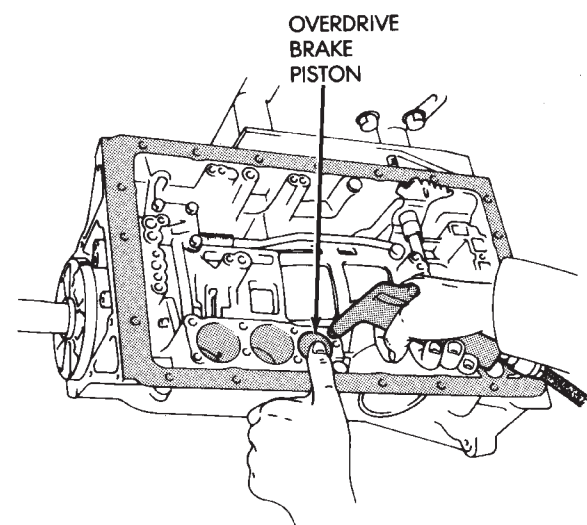
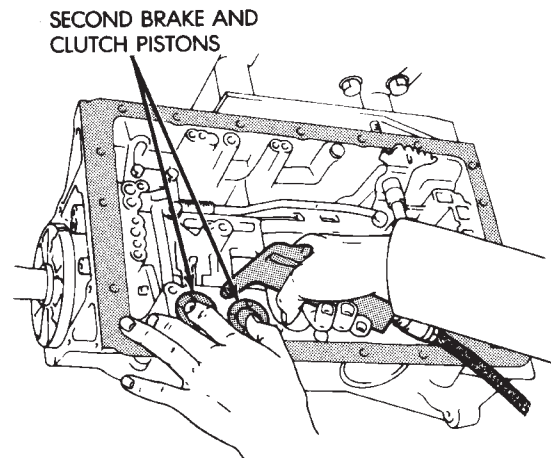
(18) Remove throttle cable.

(19) Remove oil pump bolts and remove pump with bridge-type Puller 7536 (Fig. 93).

(20) Remove race from oil pump (Fig. 94).

(21) Remove overdrive planetary gear and clutch assembly (Fig. 95).

(22) Remove race from overdrive planetary (Fig. 96).



J8921-480

Fig. 92 Accumulator Piston Removal

DISASSEMBLY AND ASSEMBLY (Continued)

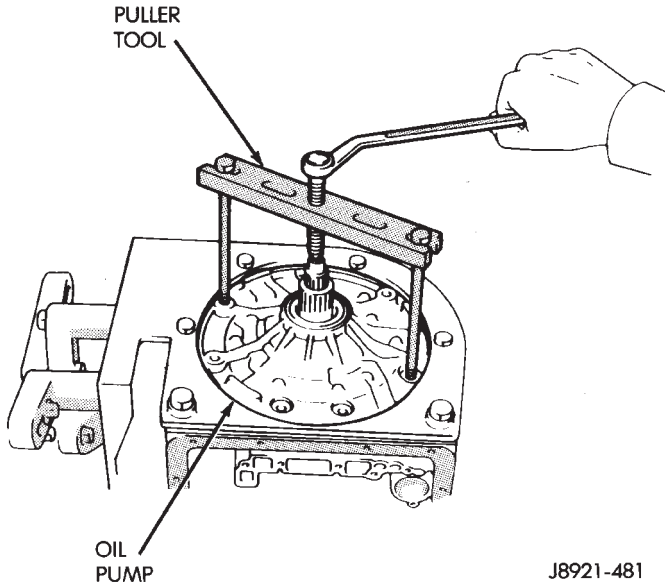
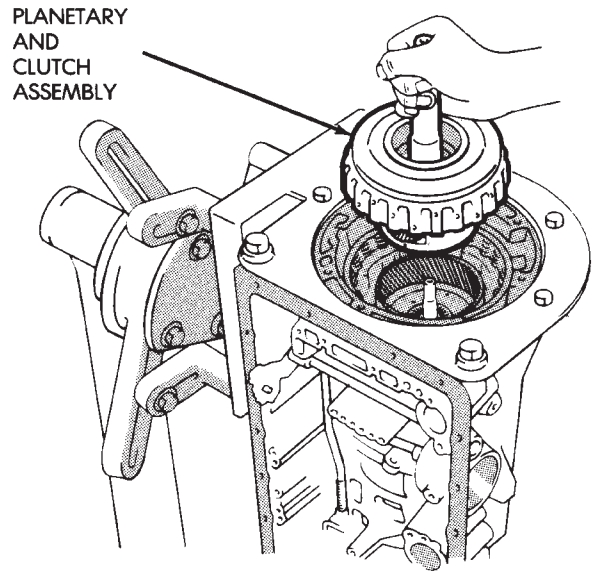


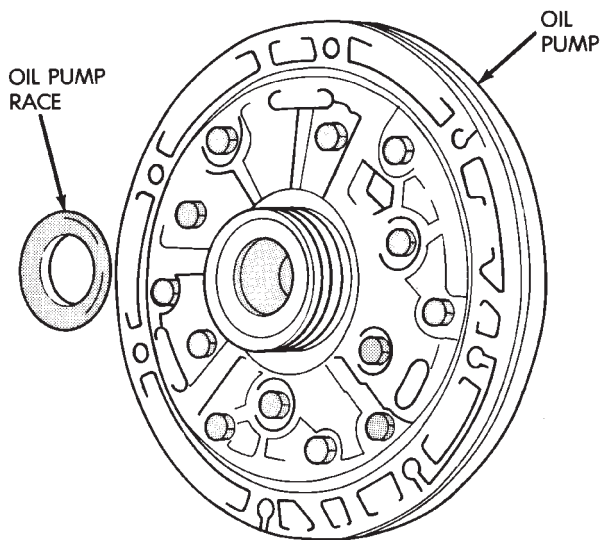
Fig. 93 Oil Pump Removal

J8921-481



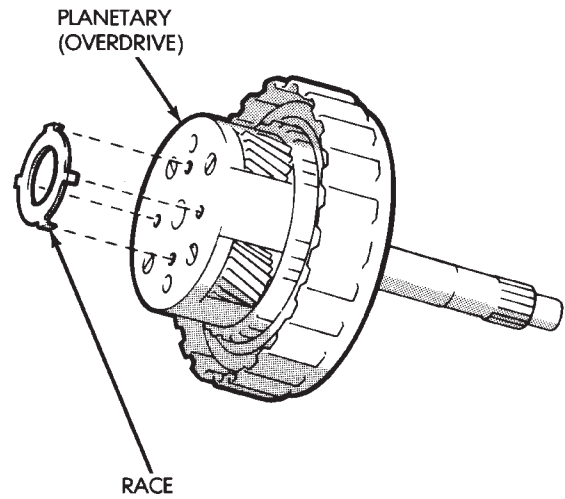
J8921-483

Fig. 95 Removing Overdrive Planetary And Clutch Assembly



J8921-482

Fig. 94 Oil Pump Race Removal

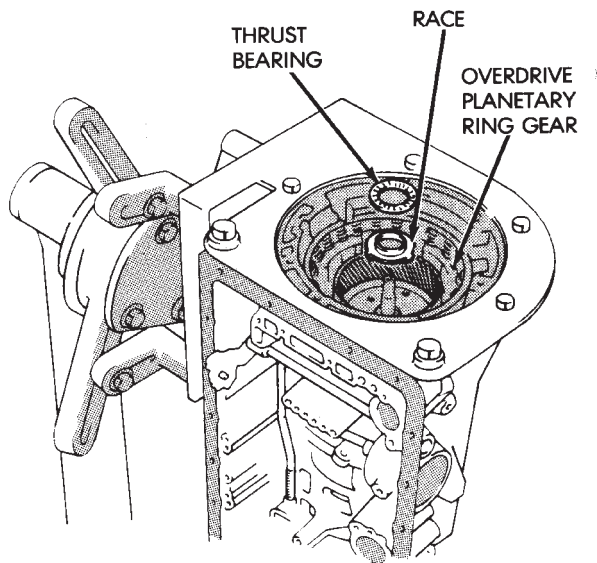


J8921-484

Fig. 96 Fourth Gear Planetary Race Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(23) Remove thrust bearing, race and overdrive planetary ring gear (Fig. 97).



J8921-485

Fig. 97 Removing Bearing, Race And Planetary Ring Gear

(24) Measure stroke length of overdrive brake piston as follows:

(a) Mount dial indicator on case using Miller Tool C-3339 and a suitable bolt threaded into the transmission case.

(b) Verify that the dial indicator is mounted solidly and square to the direction of the piston travel.

(c) Apply 57–114 psi air pressure through piston apply port and note piston stroke on dial indicator. Stroke length should be: 1.40 – 1.70 mm (0.055 – 0.0699 in.).

(d) Record the reading for use during re-assembly.

(e) Remove the dial indicator set-up from the transmission.

(25) Measure stroke length of second coast brake piston rod as follows:

(a) Install a small wire tie strap around the second coast brake piston rod tight against the transmission case.

(b) Apply 57–114 psi air pressure through piston feed hole and check stroke length with Gauge Tool 7552.

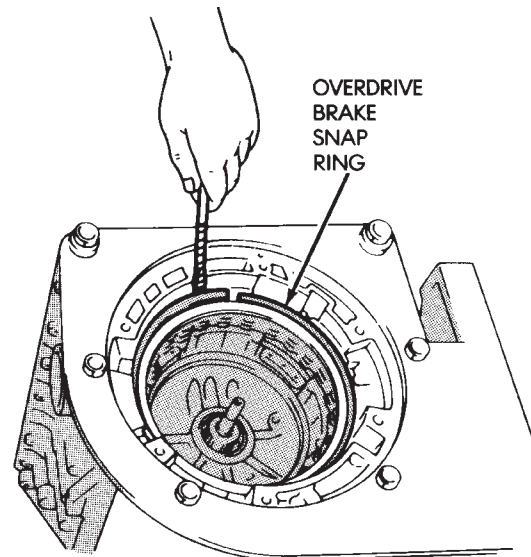
(c) Stroke length should be 1.5 – 3.0 mm (0.059 – 0.118 in.).

(d) Record the reading for use during re-assembly.

(26) Remove the bolt holding the input speed sensor to the transmission case.

(27) Remove the input speed sensor from the transmission case.

(28) Remove overdrive brake pack snap ring (Fig. 98).

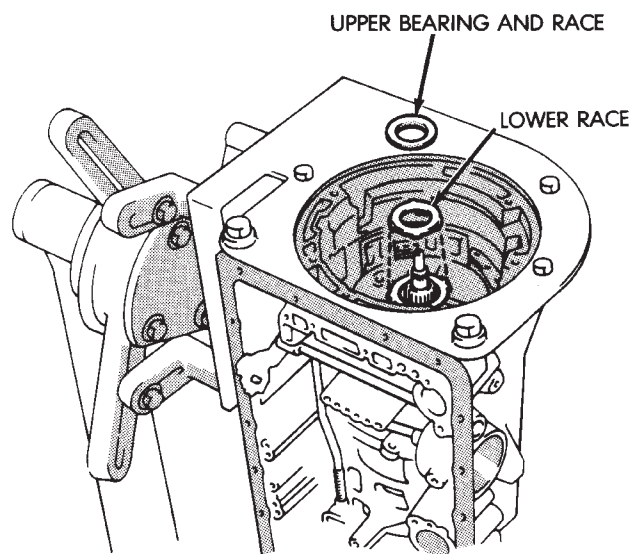


J8921-487

Fig. 98 Removing Overdrive Brake Pack Snap Ring

(29) Remove overdrive brake pack discs and plates. Inspect and replace as necessary.

(30) Remove overdrive support lower race and upper bearing and race assembly (Fig. 99).

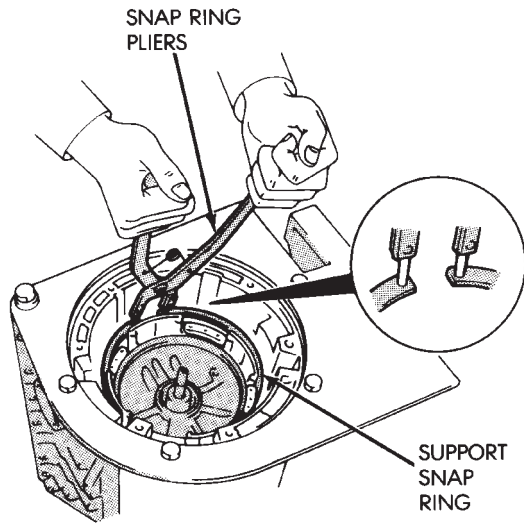


J8921-489

Fig. 99 Overdrive Support Bearing/Race Removal

DISASSEMBLY AND ASSEMBLY (Continued)

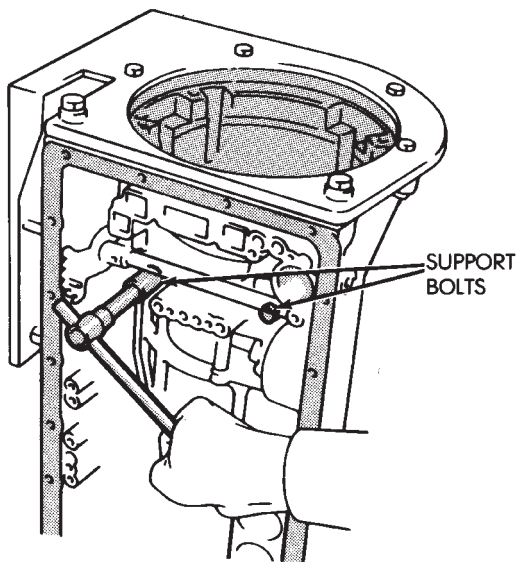
(31) Remove overdrive support snap ring with Snap Ring Plier Tool 7540 (Fig. 100).



J8921-491

Fig. 100 Overdrive Support Snap Ring Removal/Installation

(32) Remove overdrive support bolts (Fig. 101).

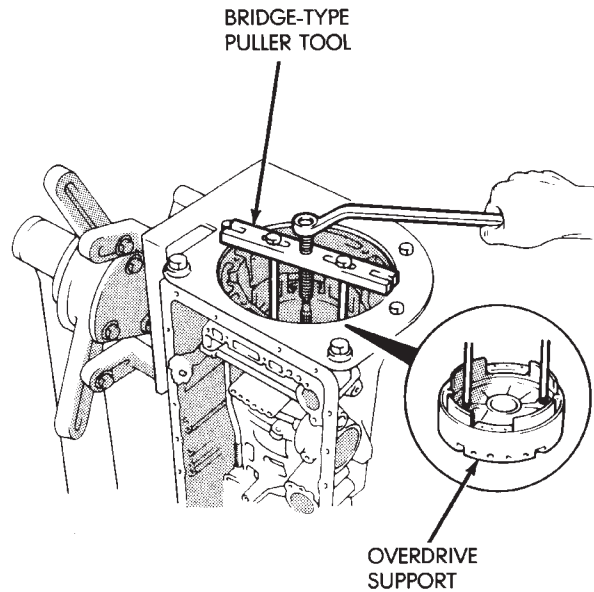


J8921-490

Fig. 101 Overdrive Support Bolt Removal

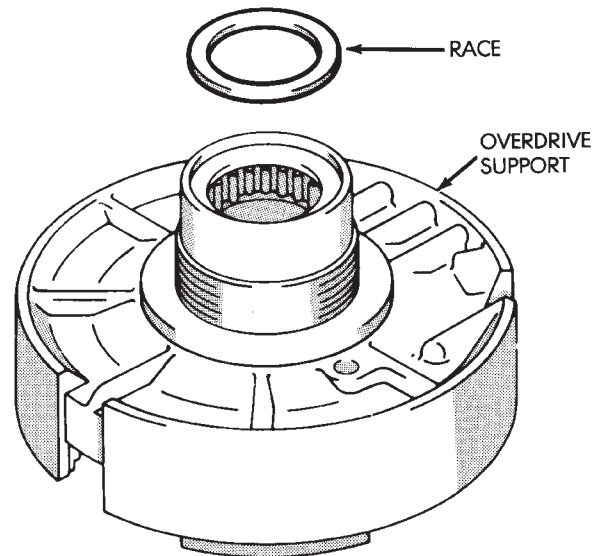
(33) Remove overdrive support (Fig. 102) with bridge-type Puller 7536.

(34) Remove race from hub of overdrive support (Fig. 103).



J8921-492

Fig. 102 Removing Overdrive Support



J8921-493

Fig. 103 Remove Overdrive Support Race

(35) Remove second coast brake piston snap ring with Snap Ring Plier Tool 7540. Then remove piston cover and piston assembly.

(36) Disassemble second coast brake piston (Fig. 104), if necessary.

DISASSEMBLY AND ASSEMBLY (Continued)

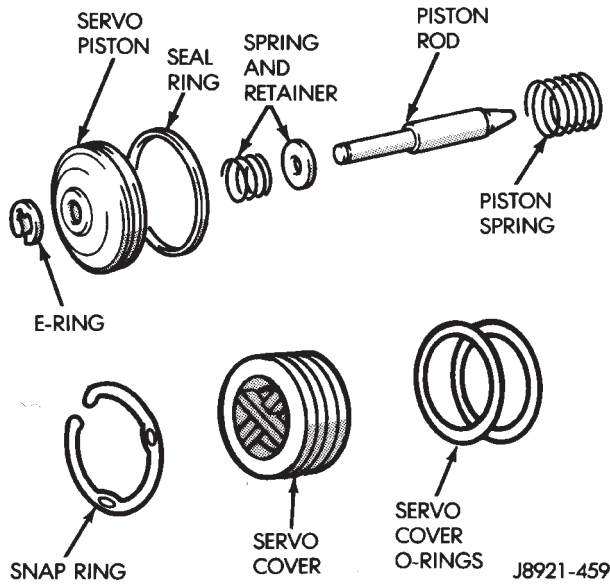


Fig. 104 Second Coast Brake Piston Components

(37) Remove direct and forward clutch assembly (Fig. 105).

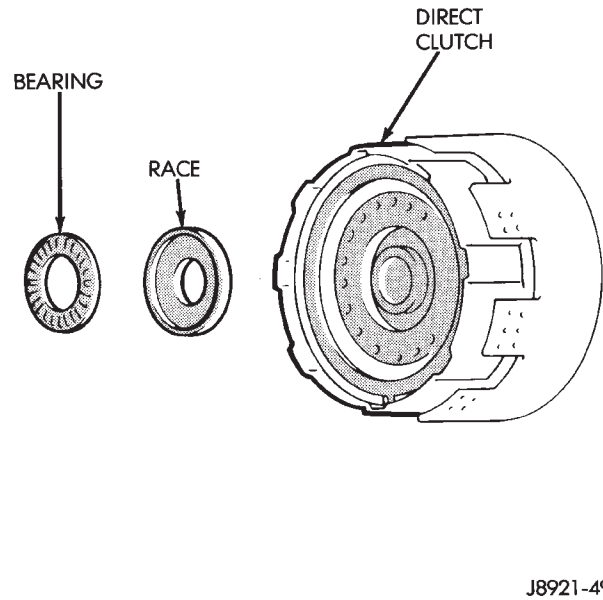


Fig. 106 Bearing And Race Removal From Clutch Hub

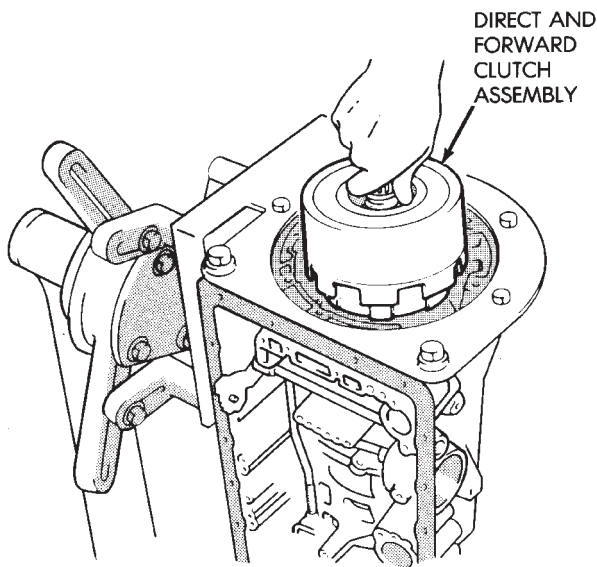


Fig. 105 Removing Direct And Forward Clutch Assembly

(38) Remove thrust bearing and race from clutch hub (Fig. 106).

(39) Remove second coast brake band E-ring from band pin and remove pin and brake band (Fig. 107).

(40) Remove front planetary bearing race and remove front planetary ring gear (Fig. 108).

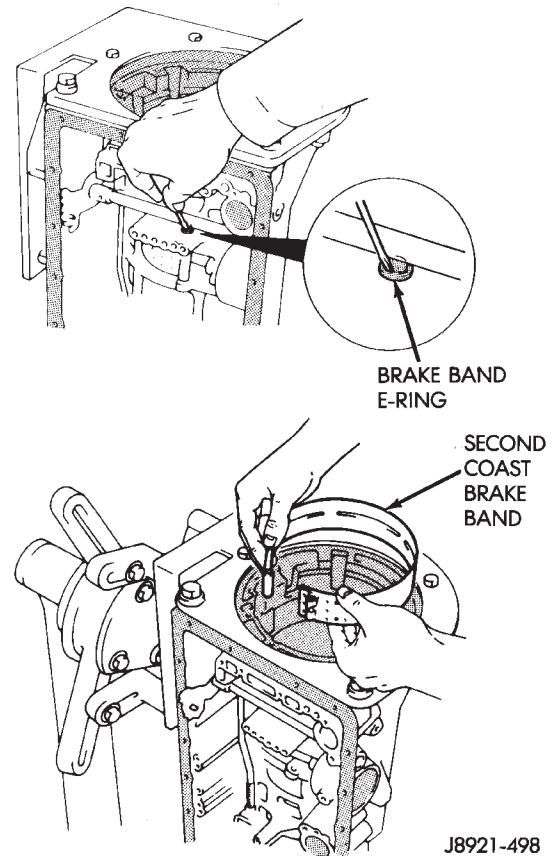
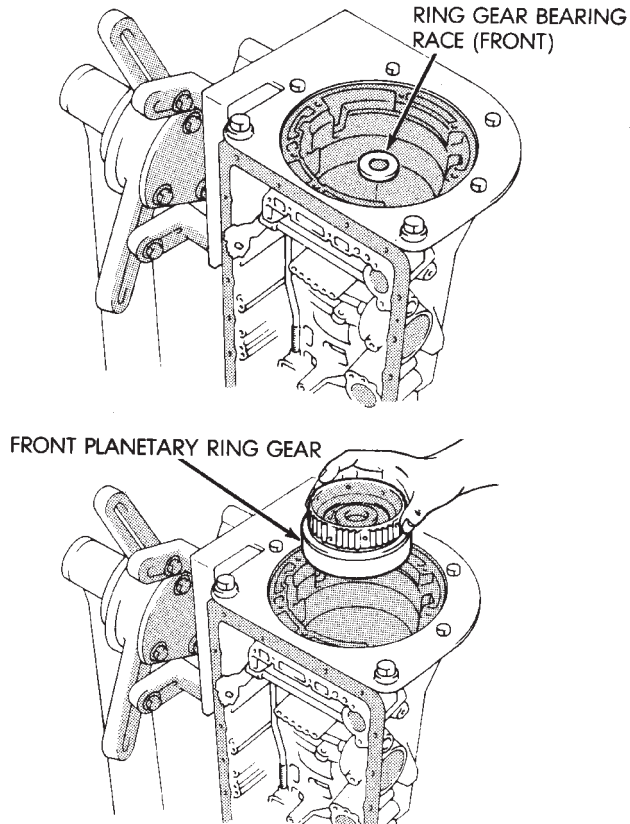


Fig. 107 Second Coast Brake Band Removal

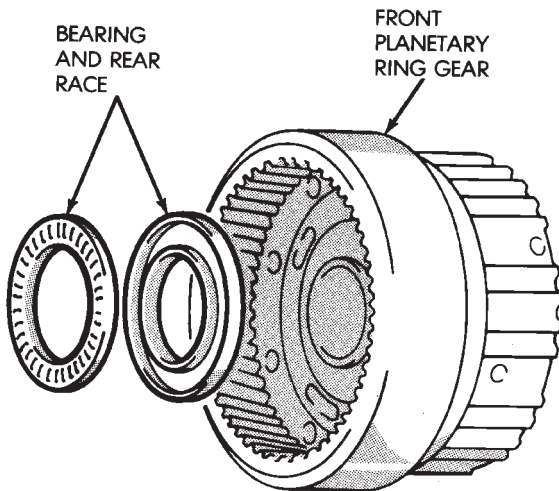
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-499

Fig. 108 Front Planetary Ring Gear Removal

(41) Remove thrust bearing and rear race from ring gear (Fig. 109).

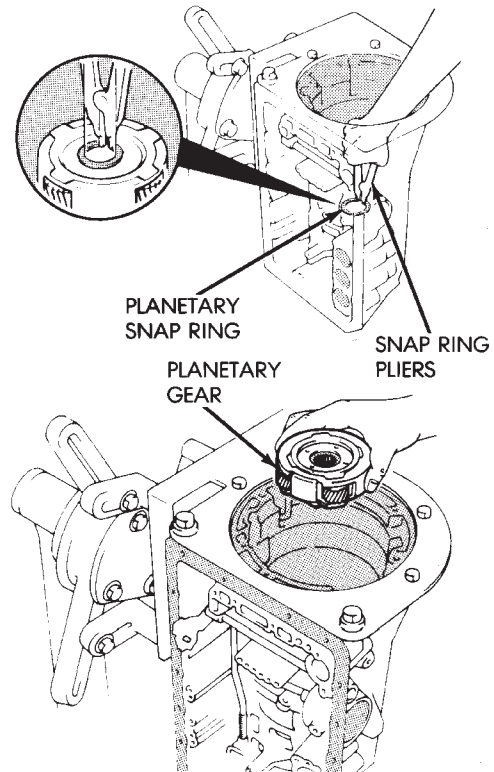


J8921-500

Fig. 109 Removing Ring Gear Bearing And Rear Race

(42) Remove planetary thrust race.
 (43) Push forward on output shaft to relieve the load on the planetary snap ring.

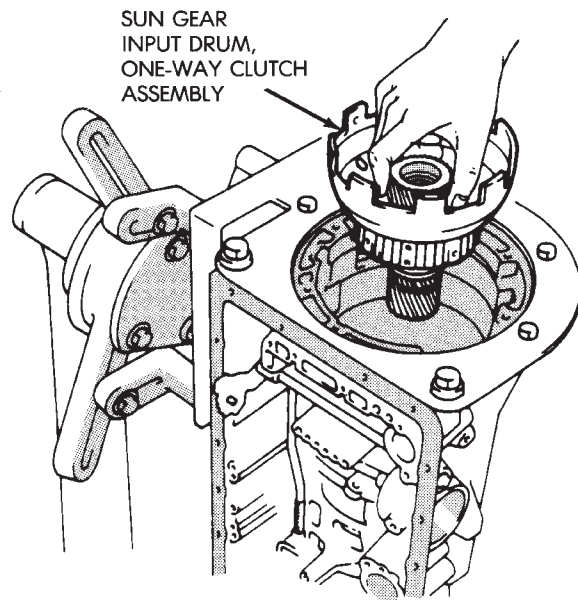
(44) Remove planetary snap ring and remove planetary gear (Fig. 110).



J8921-502

Fig. 110 Removing Planetary Snap Ring And Gear

(45) Remove sun gear, input drum, one-way clutch, and thrust washer as assembly (Fig. 111).

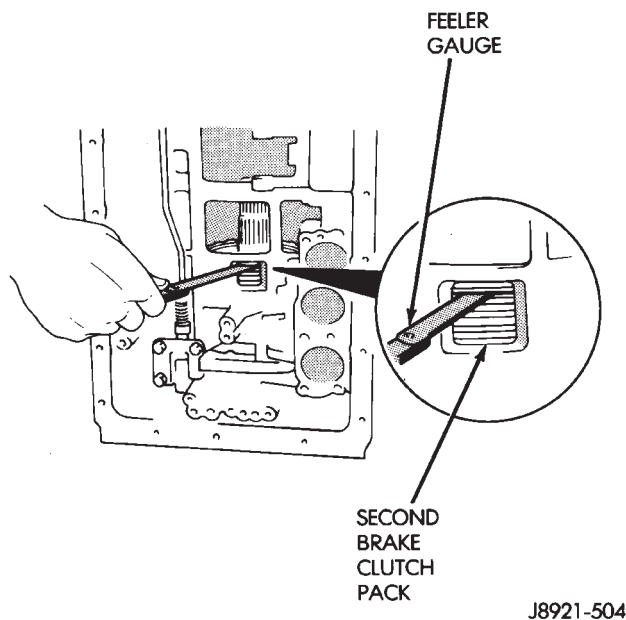


J8921-503

Fig. 111 Removing Sun Gear, Input Drum And One-Way Clutch

DISASSEMBLY AND ASSEMBLY (Continued)

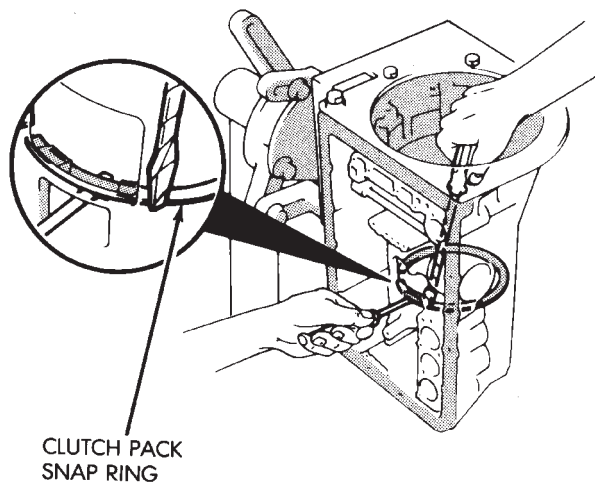
(46) Measure second brake clutch pack clearance (Fig. 112). Clearance should be 0.62 – 1.98 mm (0.0244 – 0.0780 in.). Record measurement for use during re-assembly.



J8921-504

Fig. 112 Checking Second Brake Clutch Pack Clearance

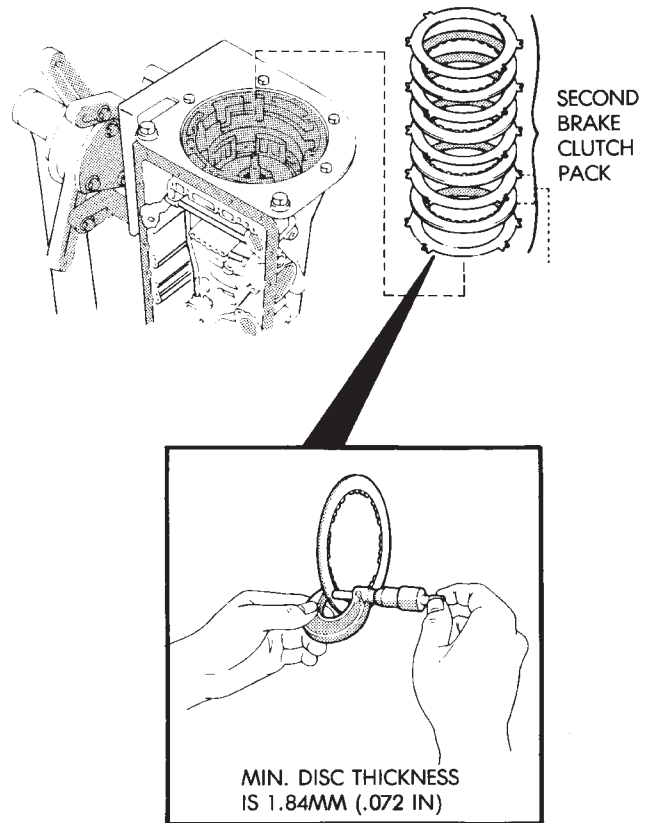
(47) Remove second brake clutch pack snap ring (Fig. 113).



J8921-505

Fig. 113 Removing Second Brake Clutch Pack Snap Ring

(48) Remove second brake clutch pack (Fig. 114). Inspect and replace as necessary.



J8921-506

Fig. 114 Removing/Measuring Second Brake Clutch Disc Thickness

(49) Remove bolts attaching park rod bracket to case. Then disconnect park rod from manual shaft lever and remove rod and bracket (Fig. 115).

(50) Remove park pawl spring, pin and pawl (Fig. 116).

(51) Measure clearance of first-reverse brake clutch pack (Fig. 117). Clearance should be: 0.70 – 1.2 mm (0.028 – 0.047 in.). record measurement for use during re-assembly.

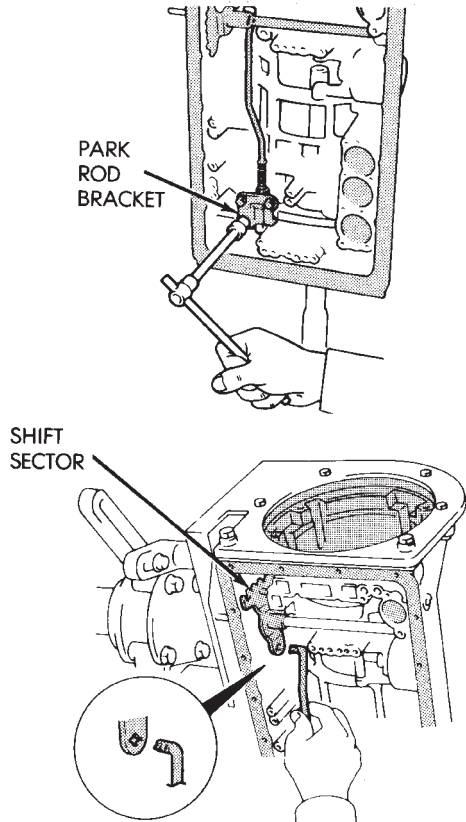
(52) Remove second brake piston sleeve (Fig. 118).

(53) Remove second brake snap-ring.

(54) Remove rear planetary gear, second brake drum and output shaft as an assembly (Fig. 119).

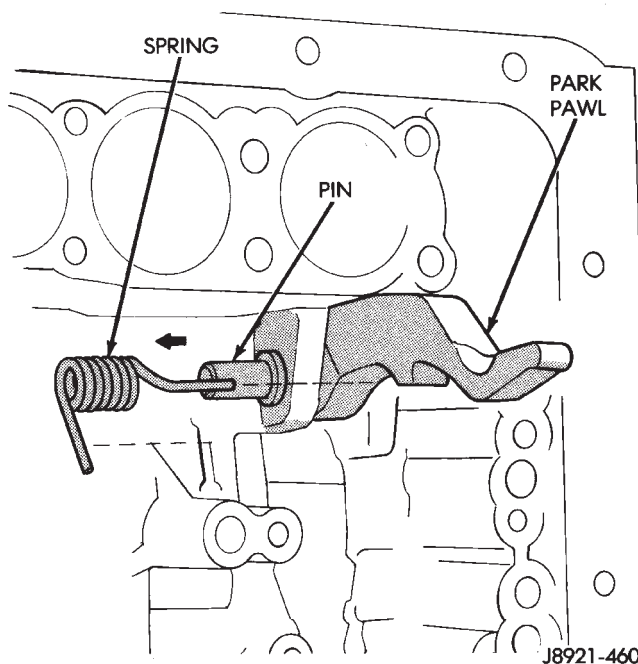
(55) Remove planetary and brake drum thrust bearing and race assembly (Fig. 120).

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-507

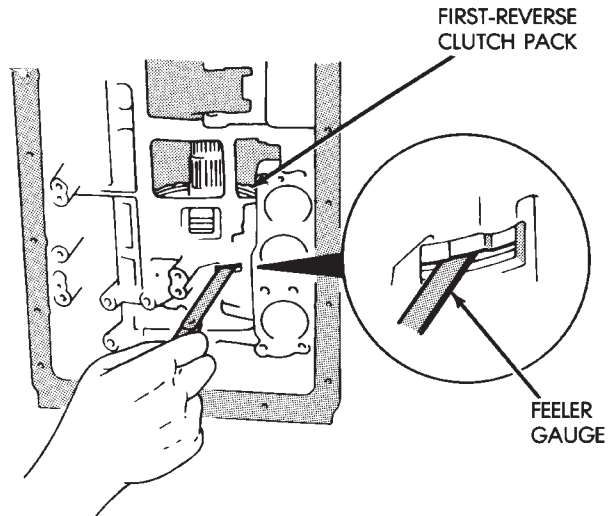
Fig. 115 Removing Park Rod And Bracket



J8921-460

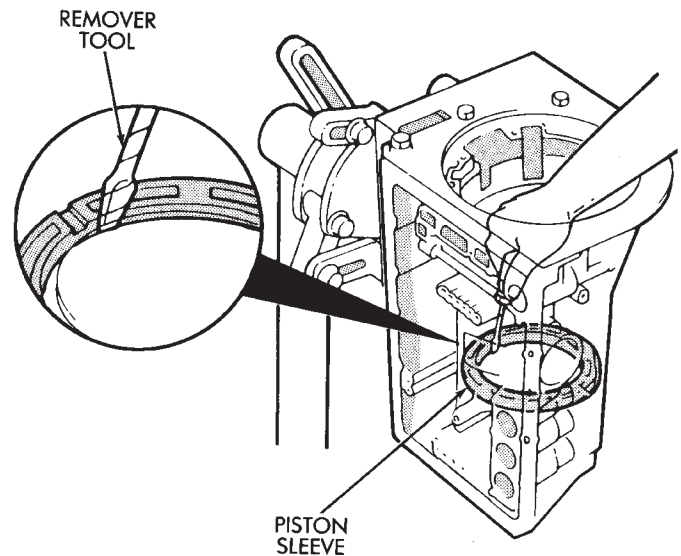
Fig. 116 Removing Park Pawl, Pin And Spring

(56) Remove second brake drum gasket from case with screwdriver.



J8921-508

Fig. 117 Checking First-Reverse Brake Clutch Pack Clearance



J8921-509

Fig. 118 Removing Second Brake Piston Sleeve

(57) Measure inside diameter of transmission case rear bushing with bore gauge or inside micrometer (Fig. 121). Maximum allowable diameter is 38.18 mm (1.5031 in.). **Replace transmission case if bushing I.D. is greater than specified. Bushing is not serviceable.**

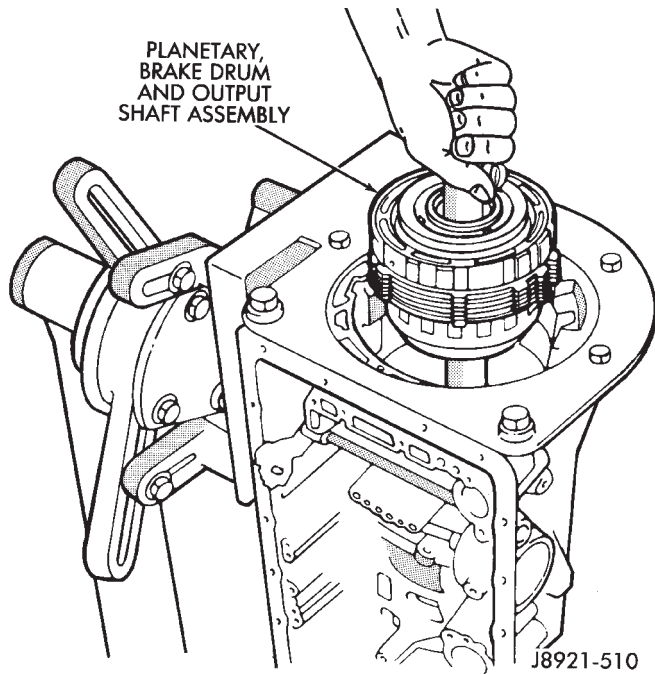


Fig. 119 Removing Rear Planetary, Second Brake Drum And Output Shaft

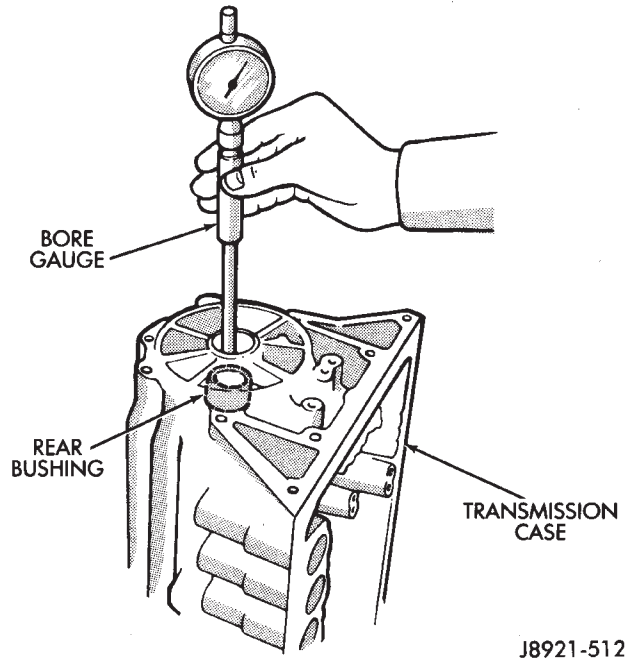


Fig. 121 Checking Rear Bushing Inside Diameter

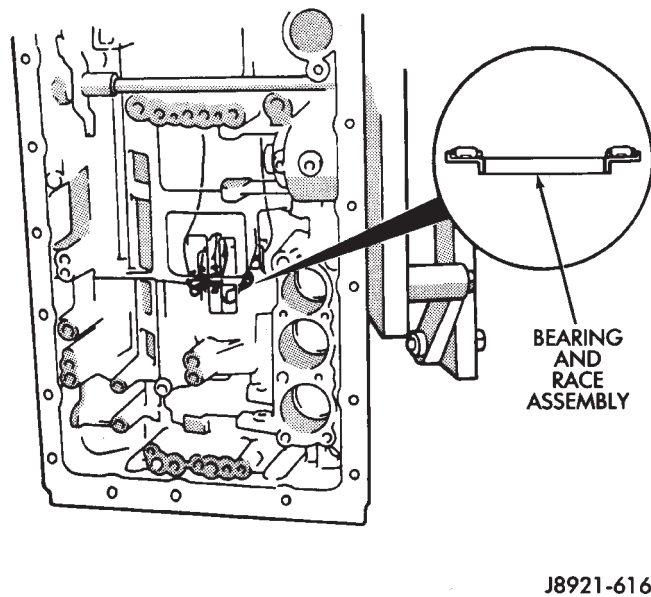


Fig. 120 Removing/Installing Bearing And Race Assembly

(58) Check first/reverse brake piston operation with compressed air (Fig. 122). Piston should move smoothly and not bind or stick. If piston operation is incorrect, case or piston may require replacement.

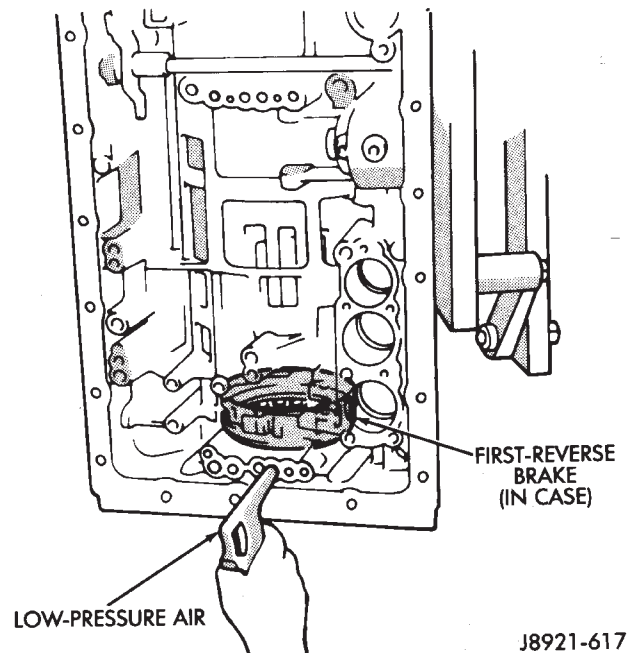
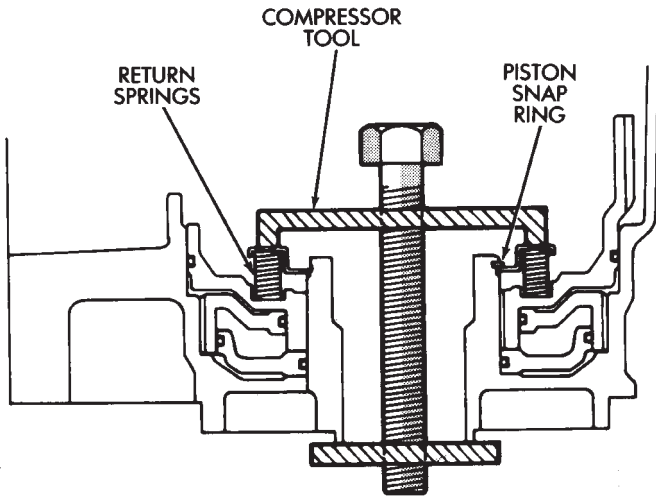


Fig. 122 Checking First-Reverse Brake Piston Operation

DISASSEMBLY AND ASSEMBLY (Continued)

(59) Compress piston return springs with Tool 7539 and remove piston snap ring (Fig. 123).



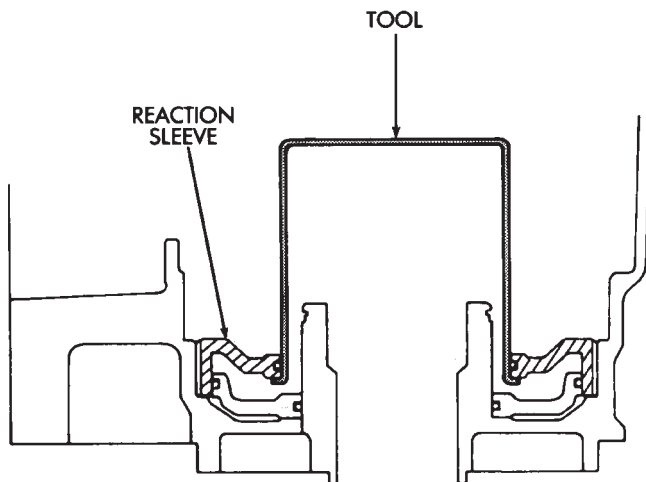
J8921-618

Fig. 123 Removing/Installing Piston Snap Ring

(60) Remove Tool 7539 and remove piston return springs.

(61) Remove No. 2 first–reverse brake piston with compressed air. Apply air through same transmission feed hole used for checking piston operation.

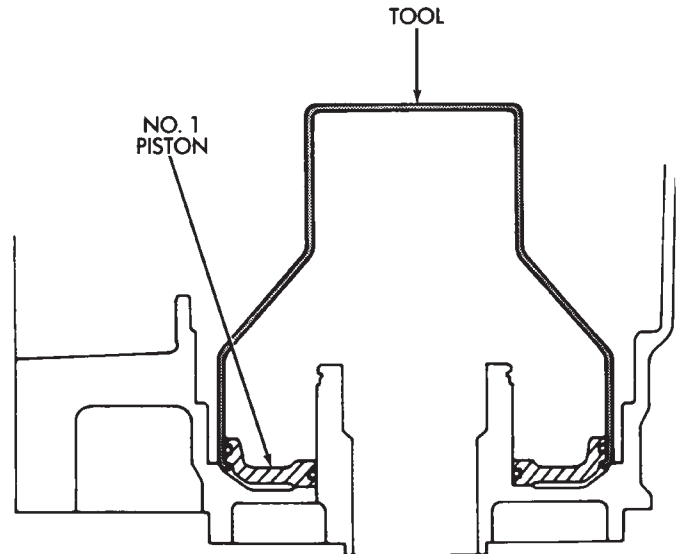
(62) Remove reaction sleeve with Sleeve Remover Tool 7542 (Fig. 124). Insert tool flanges under sleeve and lift tool and sleeve out of case.



J8921-619

Fig. 124 Removing/Installing Reaction Sleeve

(63) Remove No. 1 first/reverse brake piston with Piston Puller 7543 (Fig. 125). Slip tool under piston and lift tool and piston out of case.



J8921-620

Fig. 125 Removing/Installing First–Reverse Brake No.1 Piston

ASSEMBLY

(1) During assembly, lubricate components with transmission fluid or petroleum jelly as indicated.

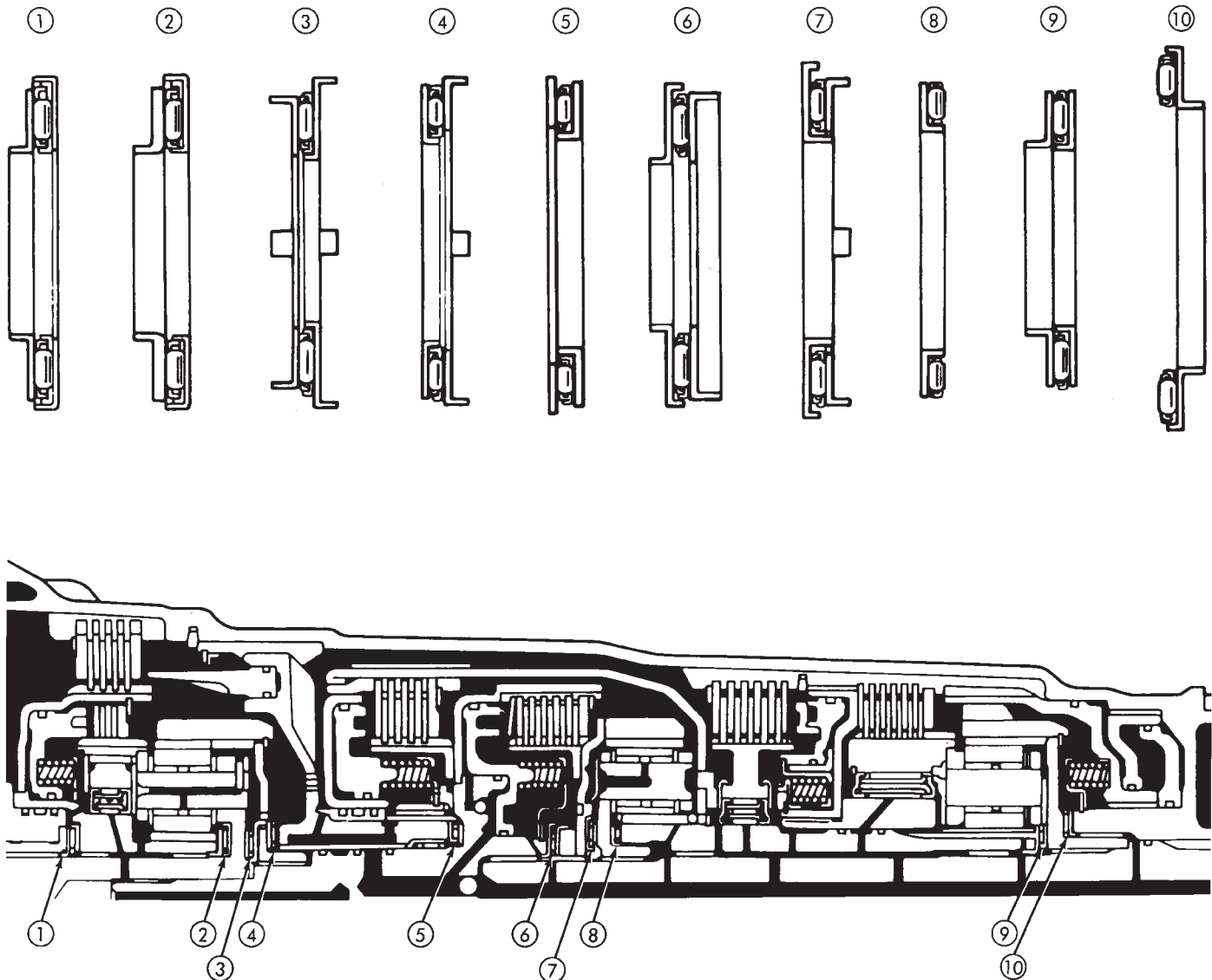
(2) Verify thrust bearing and race installation during assembly. Refer to the Thrust Bearing Chart (Fig. 126) for bearing and race location and correct positioning.

(3) Install new seals onto the No.1 first-reverse brake piston. Lubricate seals with transmission fluid.

(4) Install the No.1 first-reverse brake piston into the transmission case.

(5) Install new seal onto the first-reverse brake piston reaction sleeve. Lubricate seals with transmission fluid.

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-669

Fig. 126 Thrust Bearing Chart

(6) Install the first-reverse brake piston reaction sleeve into the transmission case.

(7) Install new seal onto the No. 2 first-reverse brake piston. Lubricate seals with transmission fluid.

(8) Install the No. 2 first-reverse brake piston into the transmission case.

(9) Install the spring plate into the No. 2 first-reverse brake piston.

(10) Install Spring Compressor 7539 onto the first-reverse brake piston.

(11) Compress the first-reverse brake piston spring and install the first-reverse brake piston snap-ring.

(12) Remove Spring Compressor 7539.

(13) Install rear planetary gear, second brake drum and output shaft as outlined in following steps:

(14) Verify No. 10 thrust bearing and race (Fig. 126). Bearing and race outer diameter is 57.7 mm (2.272 in.) and inside diameter is 39.2 mm (1.543 in.).

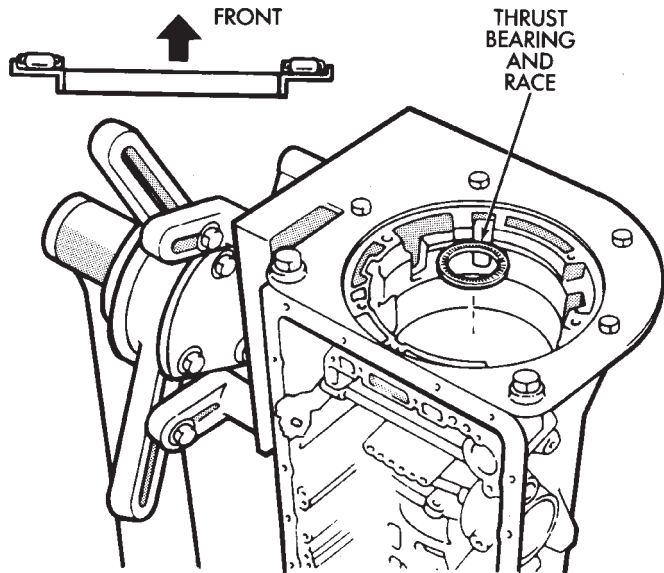
(15) Coat thrust bearing and race assembly with petroleum jelly and install in case (Fig. 127). Race faces down. Bearing rollers face up.

(16) Align teeth of second brake drum and clutch pack (Fig. 128).

(17) Align rear planetary-output shaft assembly teeth with case slots and install assembly in case (Fig. 129).

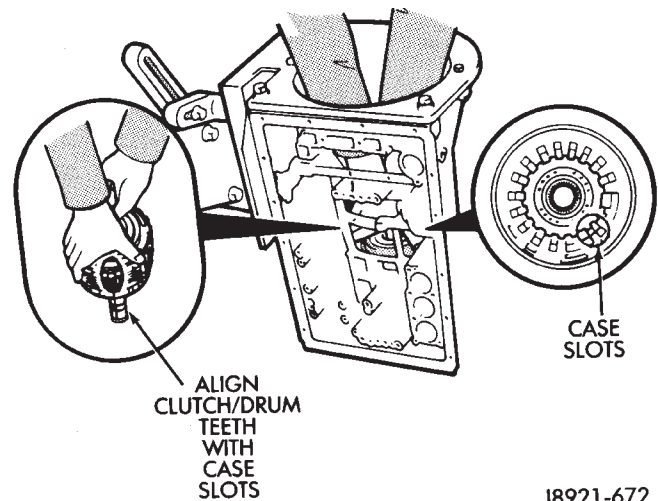
(18) Install rear planetary snap ring with snap ring pliers. Chamfered side of snap ring faces up and toward case front (Fig. 130).

DISASSEMBLY AND ASSEMBLY (Continued)



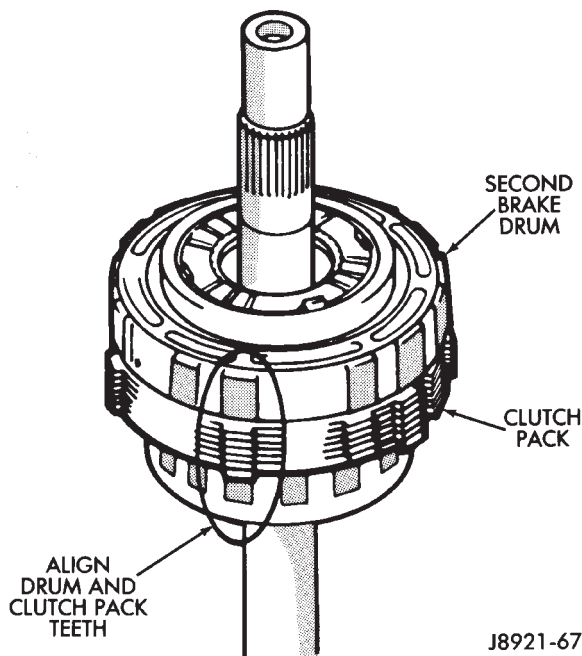
J8921-670

Fig. 127 Installing Thrust Bearing And No. 10 Race



J8921-672

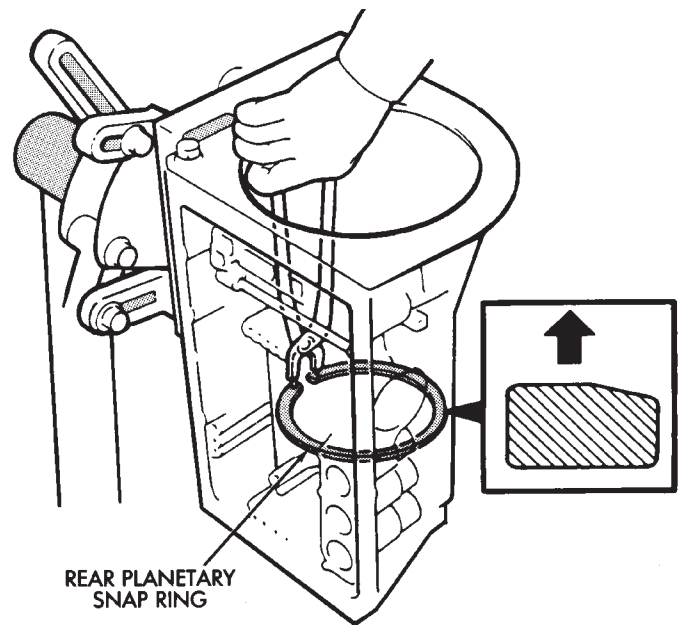
Fig. 129 Output Shaft/Rear Planetary Assembly Installation



J8921-671

Fig. 128 Aligning Second Brake Drum And Clutch Pack Teeth

(19) Check first-reverse brake pack clearance with feeler gauge (Fig. 131). Clearance should be 0.70 - 1.20 mm (0.028 - 0.047 in.). If clearance is incorrect, planetary assembly, thrust bearing or snap ring is not properly seated in case. Remove and reinstall components if necessary.

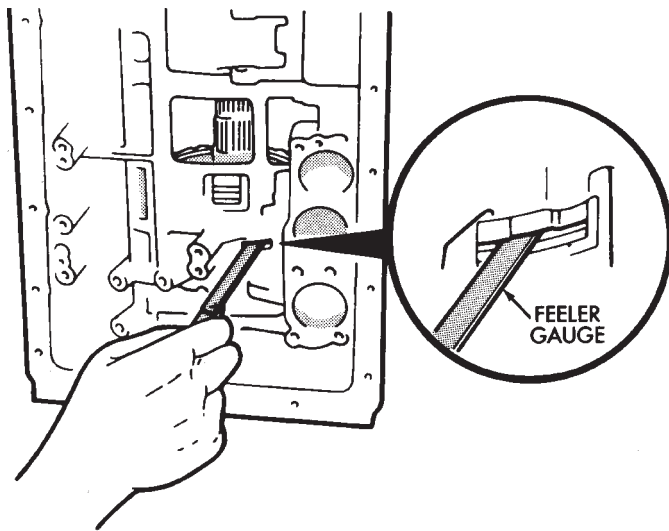


J8921-673

Fig. 130 Planetary Snap Ring Installation

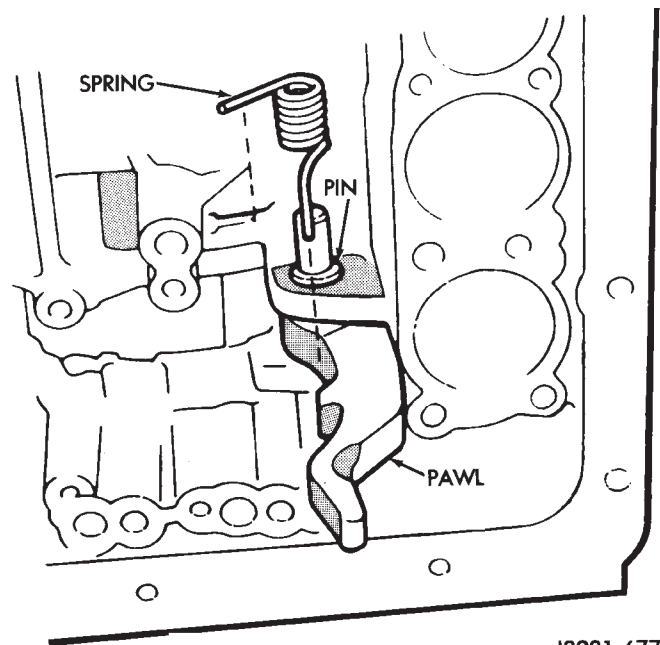
- (20) Install second brake piston sleeve (Fig. 132). Sleeve lip faces up and toward case front as shown.
- (21) Install second brake drum gasket.
- (22) Install park lock pawl, spring and pin (Fig. 133).
- (23) Install the manual valve shift assembly.
- (24) Connect park lock rod to manual valve shift sector (Fig. 134).

DISASSEMBLY AND ASSEMBLY (Continued)



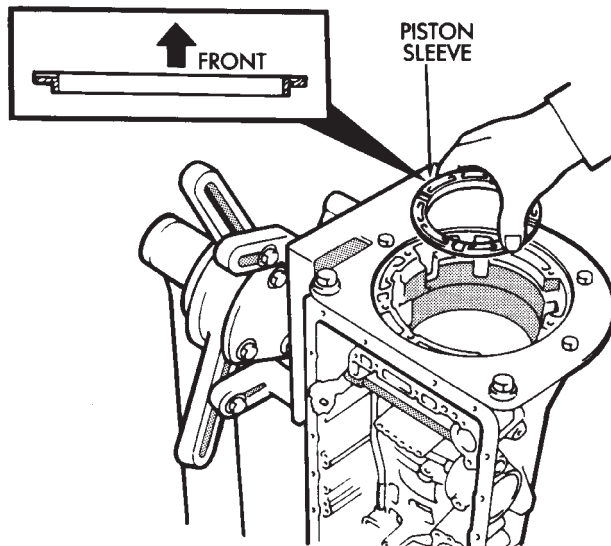
J8921-674

Fig. 131 Checking First-Reverse Brake Pack Clearance



J8921-677

Fig. 133 Park Lock Pin, Spring And Pawl Installation

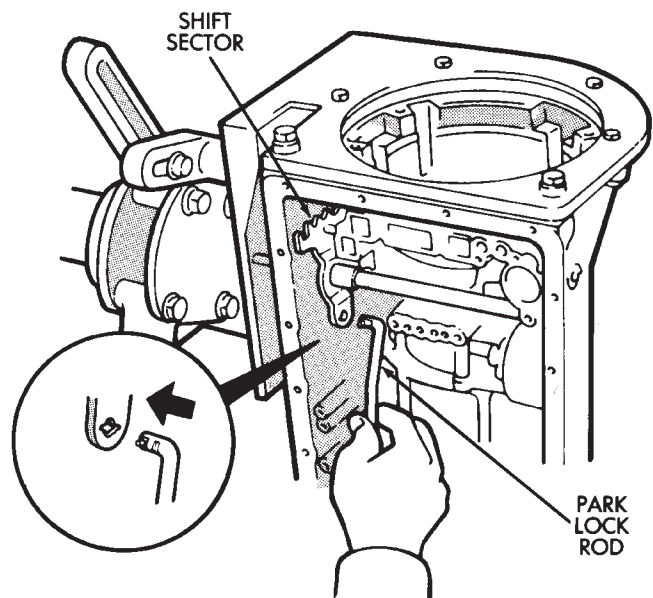


J8921-675

Fig. 132 Second Brake Piston Sleeve Installation

(25) Position park lock rod bracket on case and tighten bracket attaching bolts to 10 N·m (7 ft. lbs.) torque (Fig. 135).

(26) Verify park lock operation. Move shift sector to Park position. Park pawl should be firmly engaged (locked) in planetary ring gear (Fig. 136).



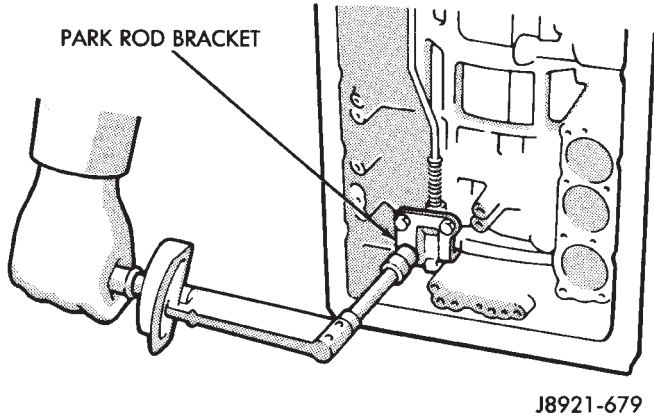
J8921-678

Fig. 134 Park Lock Rod Installation

(27) Install No. 1 one-way clutch (Fig. 137). Short flanged side of clutch faces up and toward case front.

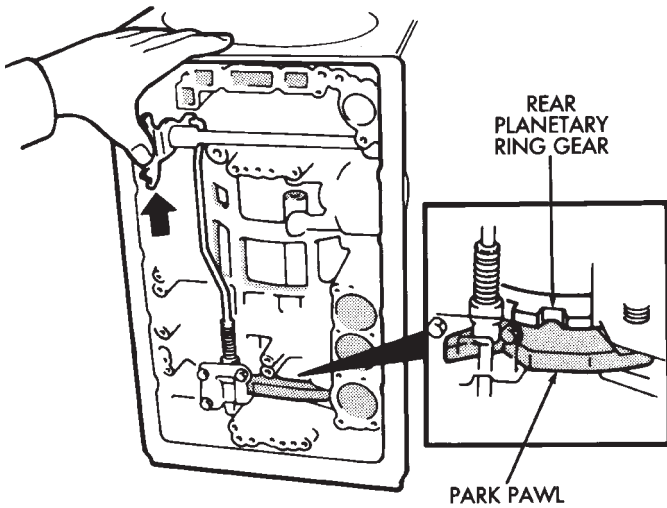
(28) Install second brake pack (Fig. 138). Install disc then plate. Continue installation sequence until five discs and five plates are installed.

DISASSEMBLY AND ASSEMBLY (Continued)



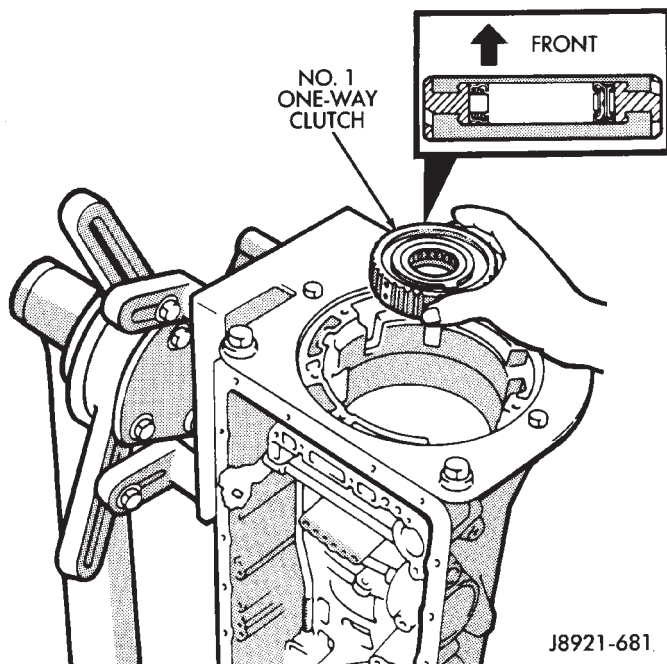
J8921-679

Fig. 135 Park Rod Bracket Installation



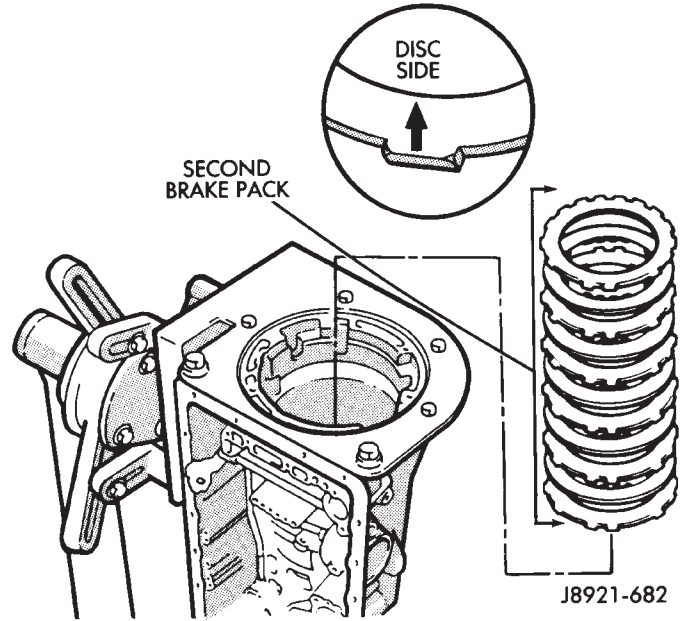
J8921-680

Fig. 136 Checking Park Pawl Engagement



J8921-681

Fig. 137 Installing No. 1 One-Way Clutch



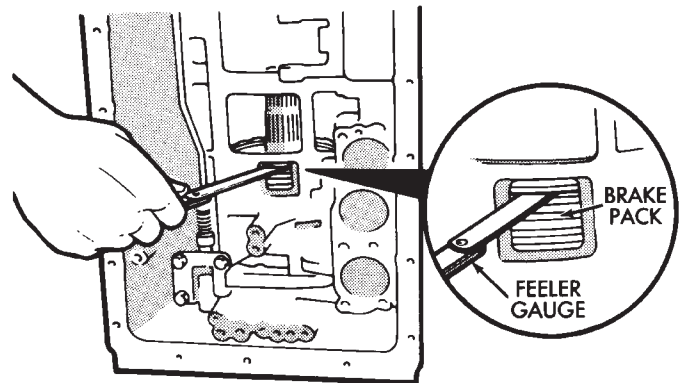
J8921-682

Fig. 138 Second Brake Pack Installation

(29) Install second brake pack retainer with rounded edge of retainer facing disc.

(30) Install second brake pack snap ring.

(31) Check brake pack clearance with feeler gauge (Fig. 139). Clearance should be 0.062 - 1.98 mm (0.024 - 0.078 in.). If brake pack clearance is not correct, brake pack components are not seated. Reassemble brake pack if necessary.



J8921-683

Fig. 139 Checking Second Brake Pack Clearance

(32) Install planetary sun gear and input drum (Fig. 140). Be sure drum thrust washer tabs are seated in drum. Use petroleum jelly to hold thrust washer in position if necessary.

(33) Install front planetary gear on sun gear (Fig. 141).

(34) Support output shaft with wood blocks (Fig. 142).

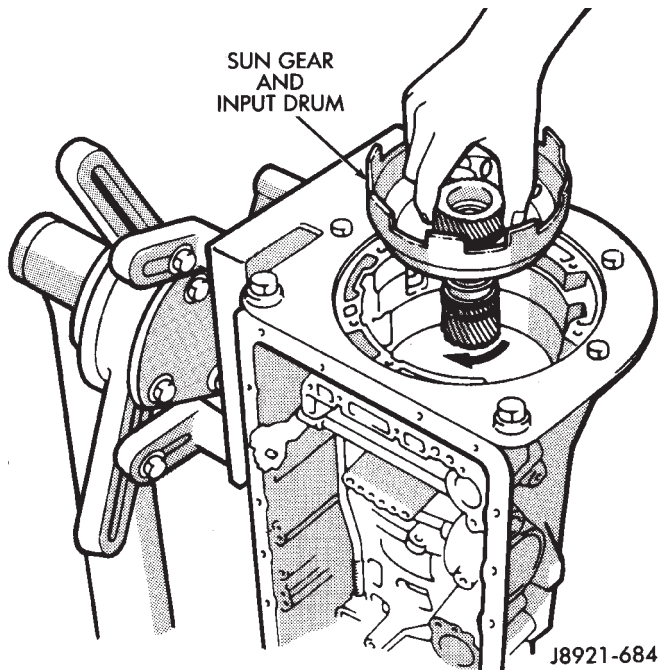


Fig. 140 Installing Sun Gear And Input Drum

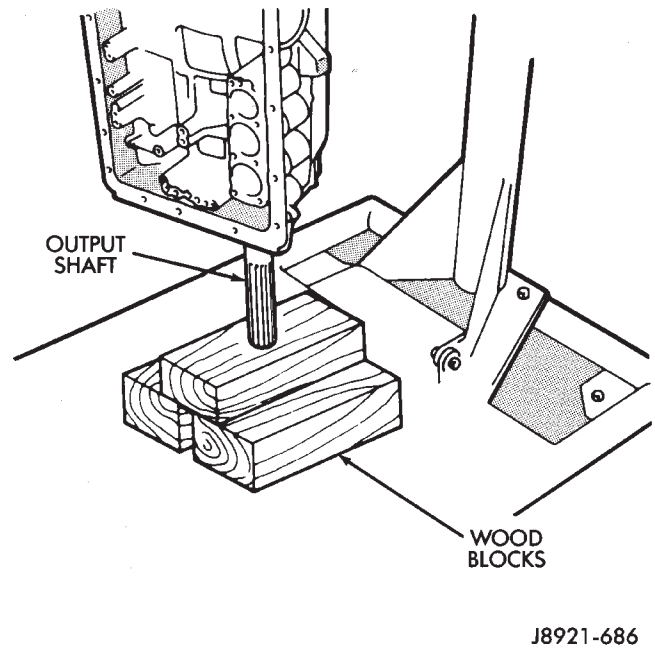


Fig. 142 Supporting Output Shaft

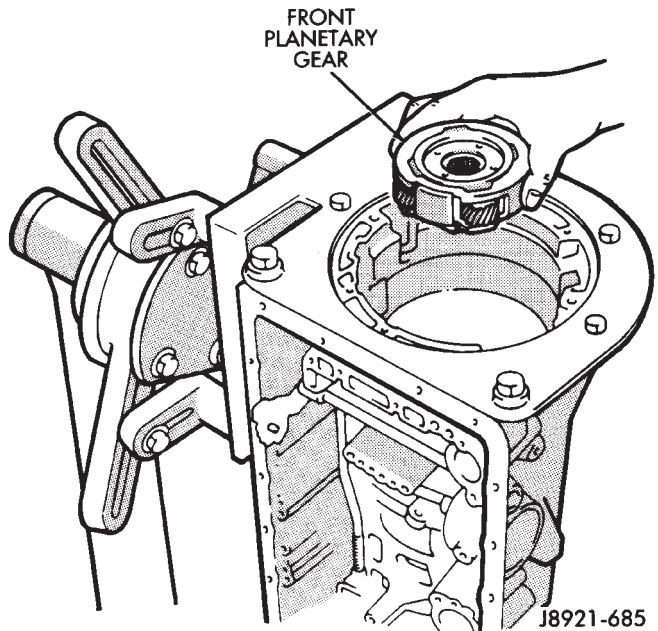


Fig. 141 Installing Front Planetary Gear

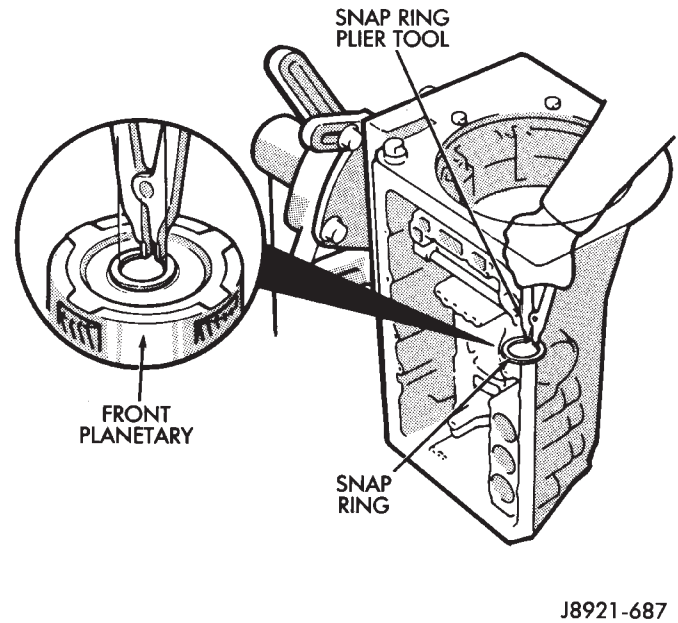


Fig. 143 Installing Front Planetary Snap Ring

(35) Install planetary snap ring on sun gear with snap ring plier tool 7541 (Fig. 143).

(36) Install tabbed thrust race on front planetary gear. Washer tabs face down and toward gear. Race outer diameter is 47.8 mm (1.882 in.). Inside diameter is 34.3 mm (1.350 in.).

DISASSEMBLY AND ASSEMBLY (Continued)

(37) Install second coast brake band (Fig. 144).

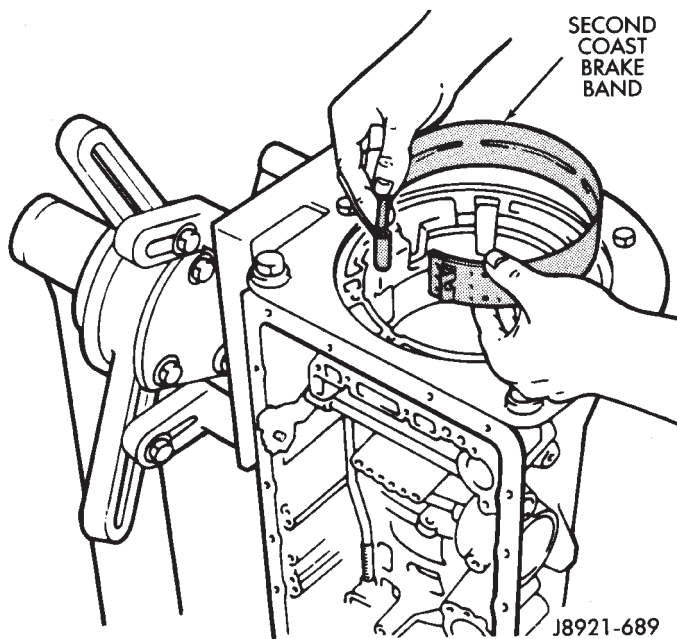


Fig. 144 Installing Second Coast Brake Band

(38) Install pin in second coast brake band. Then install retaining ring on pin (Fig. 145).

(39) Install thrust bearing and race in forward-direct clutch (Fig. 146). Coat bearing/race with petroleum jelly to hold them in place.

(40) Verify forward-direct clutch thrust bearing size.

- Race outer diameter is 48.9 mm (1.925 in.) and inside diameter is 26.0 mm (1.024 in.).

- Bearing outer diameter is 46.7 mm (1.839 in.) and inside diameter is 26.0 mm (1.024 in.).

(41) Coat front planetary ring gear race with petroleum jelly and install it in ring gear (Fig. 147).

(42) Verify ring gear race size. Outer diameter is 47.0 mm (1.850 in.) and inside diameter is 26.5 mm (1.045 in.).

(43) Align forward-direct clutch disc splines with screwdriver (Fig. 148).

(44) Align and install front planetary ring gear in forward-direct clutch (Fig. 149).

(45) Coat bearing and race with petroleum jelly and install them in ring gear (Fig. 150). Verify bearing/race size.

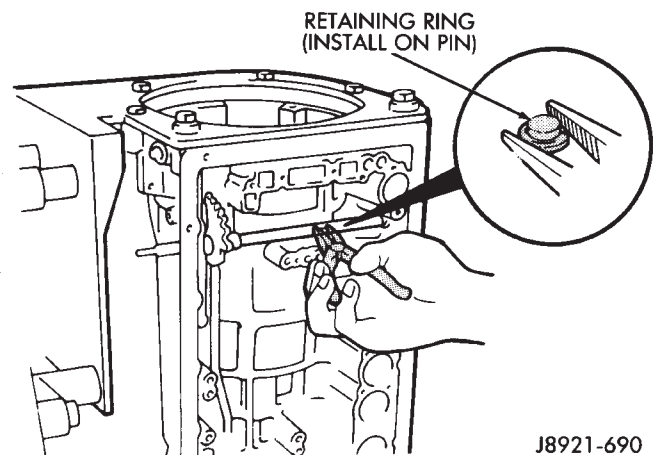
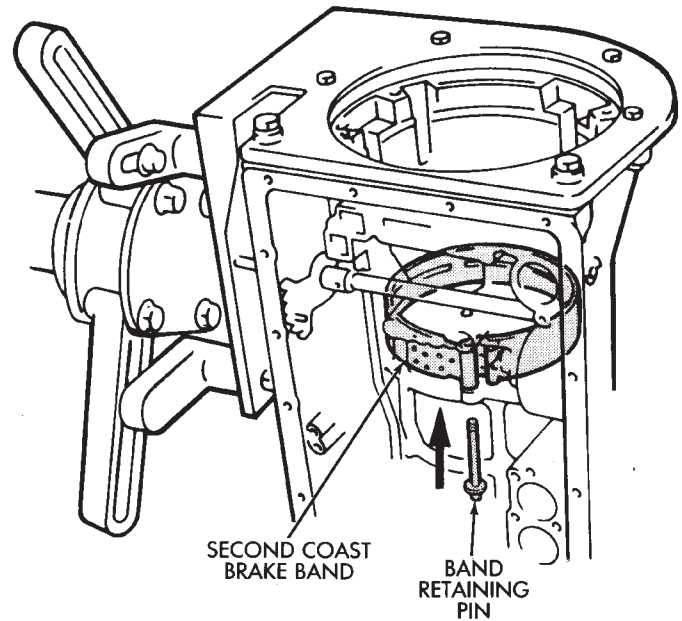
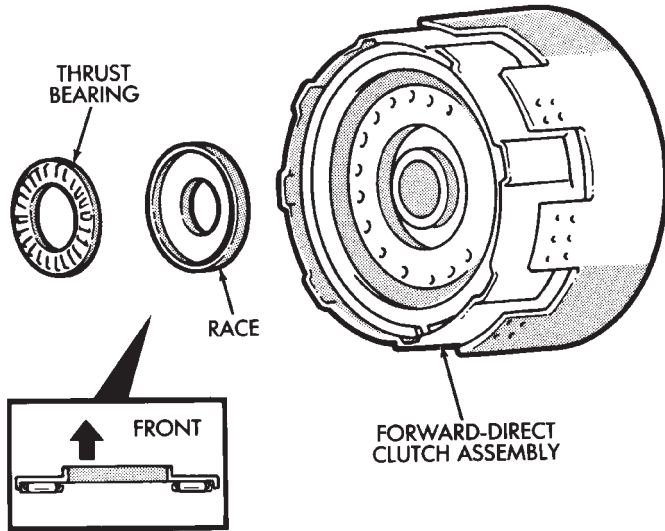
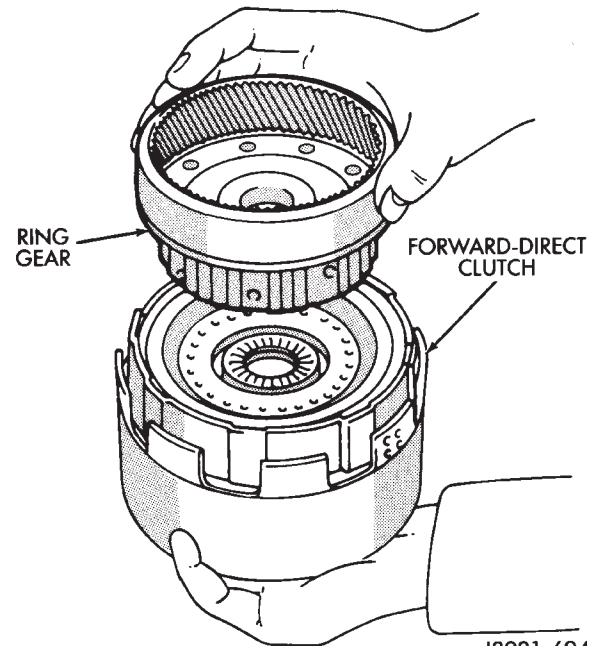


Fig. 145 Installing Second Coast Brake Band Retaining Pin



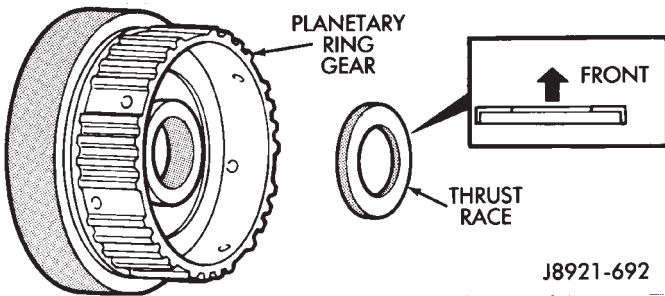
J8921-691

Fig. 146 Installing Forward-Direct Clutch Thrust Bearing And Race



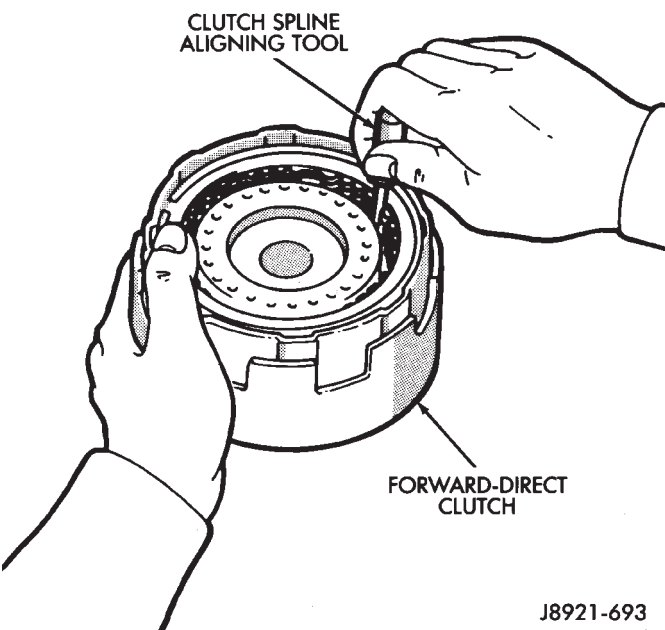
J8921-694

Fig. 149 Installing Front Planetary Ring Gear



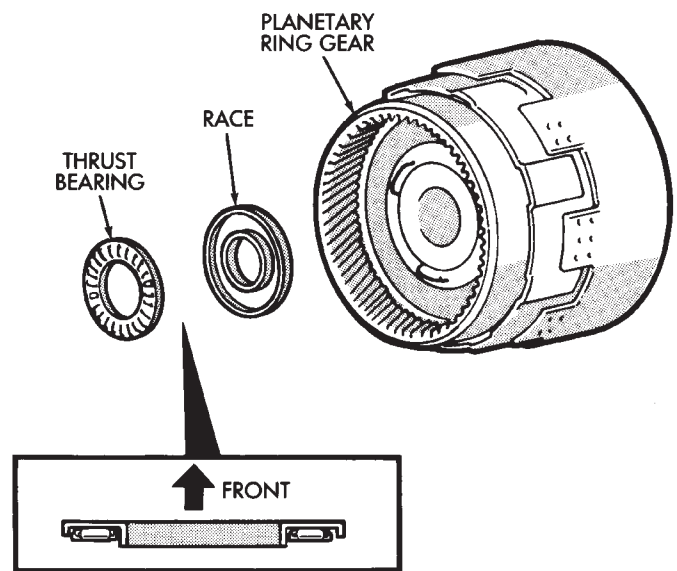
J8921-692

Fig. 147 Installing Planetary Ring Gear Race



J8921-693

Fig. 148 Aligning Forward-Direct Clutch Splines



J8921-695

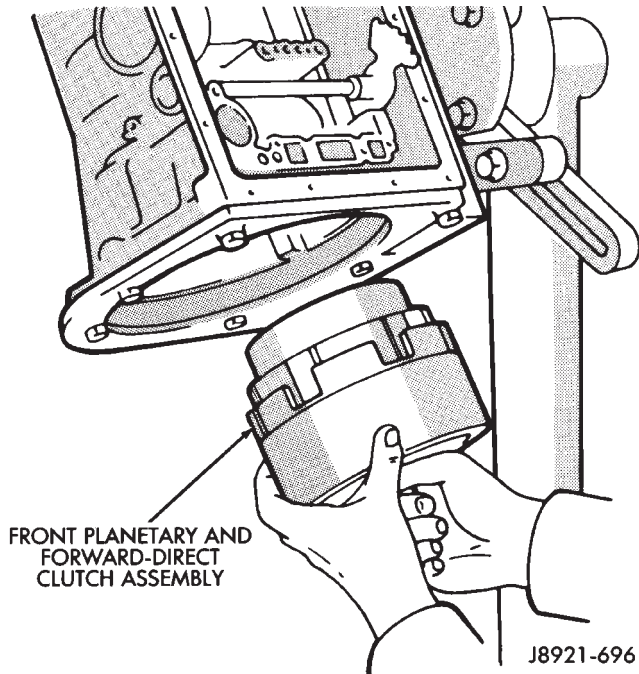
Fig. 150 Installing Ring Gear Bearing And Race

- Bearing outer diameter is 47.7 mm (1.878 in.) and inside diameter is 32.6 mm (1.283 in.).
- Race outer diameter is 53.6 mm (2.110 in.) and inside diameter is 30.6 mm (1.205 in.).

(46) Install assembled planetary gear/forward-direct clutch (Fig. 151).

(47) Check clearance between sun gear input drum and direct clutch drum (Fig. 152). Clearance should be 9.8 – 11.8 mm (0.386 – 0.465 in.). If clearance is incorrect, planetary gear/forward-direct clutch assembly is not seated or is improperly assembled. Remove, and correct if necessary.

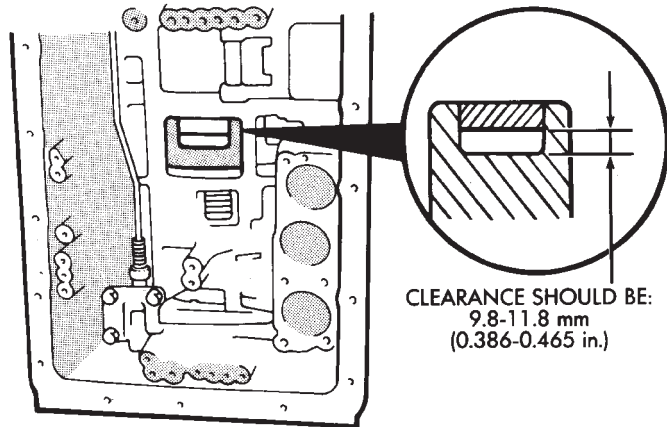
DISASSEMBLY AND ASSEMBLY (Continued)



FRONT PLANETARY AND FORWARD-DIRECT CLUTCH ASSEMBLY

J8921-696

Fig. 151 Installing Front Planetary And Forward-Direct Clutch Assembly



CLEARANCE SHOULD BE:
9.8-11.8 mm
(0.386-0.465 in.)

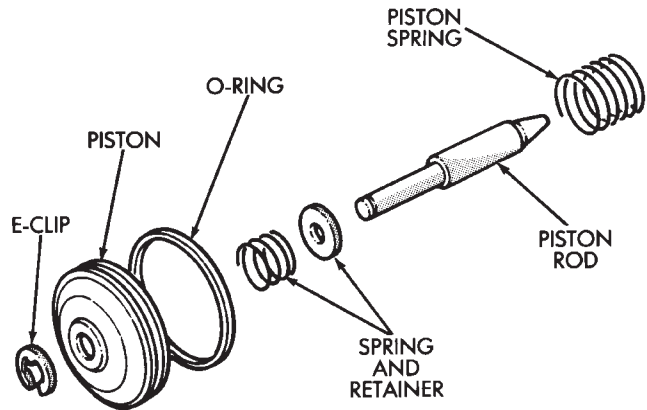
J8921-697

Fig. 152 Checking Input Drum-To-Direct Clutch Drum Clearance

(48) Coat thrust bearing and race assembly with petroleum jelly and install it on clutch shaft. Bearing faces up and toward case front as shown. Verify bearing/race size. Bearing and race outer diameter is 47.8 mm (1.882 in.) and inside diameter is 33.6 mm (1.301 in.).

(49) Assemble second coast brake piston components (Fig. 153).

(50) Install assembled second coast brake piston in case. Verify that the piston rod contacts the second coast brake band.

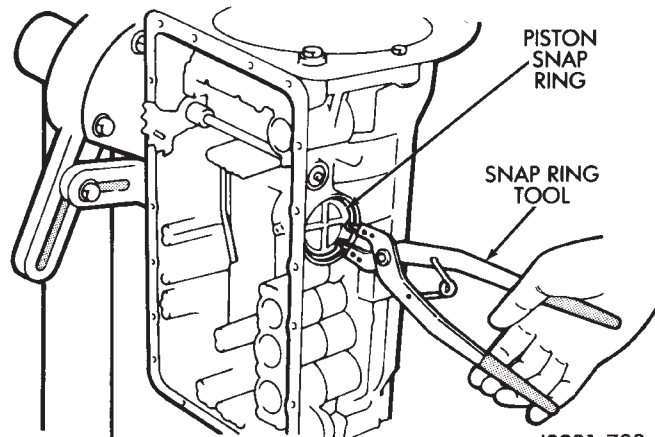


J8921-699

Fig. 153 Assembling Second Coast Brake Piston

(51) Install replacement seals on second coast brake piston cover and install cover in case.

(52) Install second coast brake piston snap ring with snap ring plier tool (Fig. 154).



J8921-700

Fig. 154 Installing Second Coast Brake Piston Snap Ring

(53) Check second coast brake piston stroke as follows:

(a) Install a small wire tie strap around the second coast brake piston rod tight against the transmission case.

(b) Apply 57-114 psi air pressure through piston feed hole and check stroke length with Gauge Tool 7552.

(c) Stroke length should be 1.5 - 3.0 mm (0.059 - 0.118 in.).

(d) If stroke length is incorrect, piston, cover or snap ring is not seated. Reassemble and check stroke again if necessary.

(54) Coat thrust race and tabbed washer with petroleum jelly and install them on overdrive support (Fig. 157). Verify race size. Race outer diameter is 50.9 mm (2.004 in.) and inside diameter is 36.2 mm (1.426 in.).

DISASSEMBLY AND ASSEMBLY (Continued)

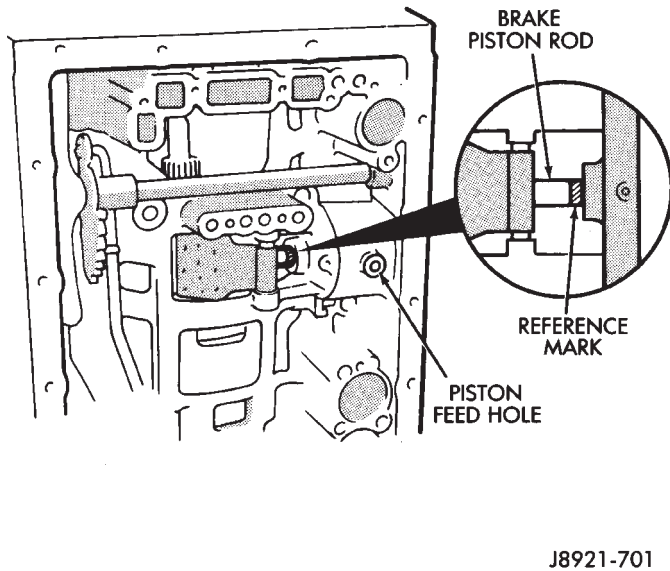


Fig. 155 Marking Brake Piston Rod

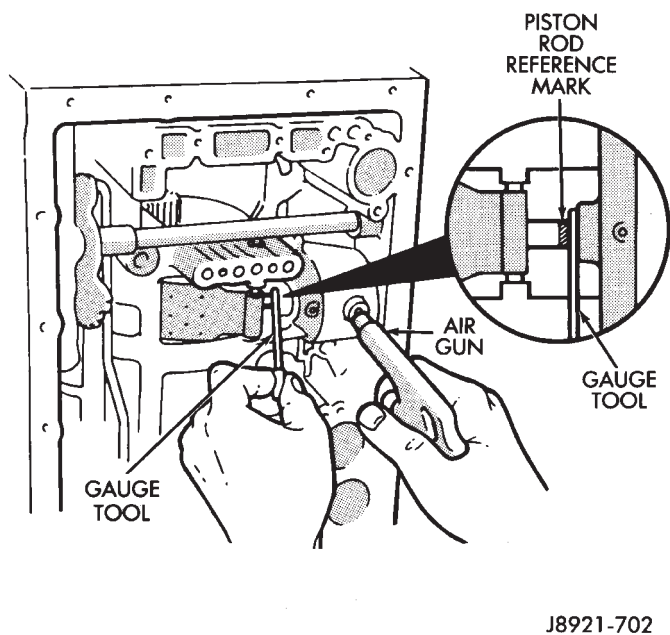


Fig. 156 Checking Second Coast Brake Piston Stroke

(55) Install overdrive support in case. Use two long bolts to help align and guide support into position (Fig. 158).

(56) Install overdrive support snap ring with Snap Ring Plier Tool 7540 (Fig. 159). Chamfered side of snap ring faces up and toward case front. **Snap ring ends must be aligned with case opening with ring ends approximately 24 mm (0.94 in.) from center line of case opening.**

(57) Install and tighten overdrive support bolts to 25 N·m (19 ft. lbs.) torque (Fig. 160).

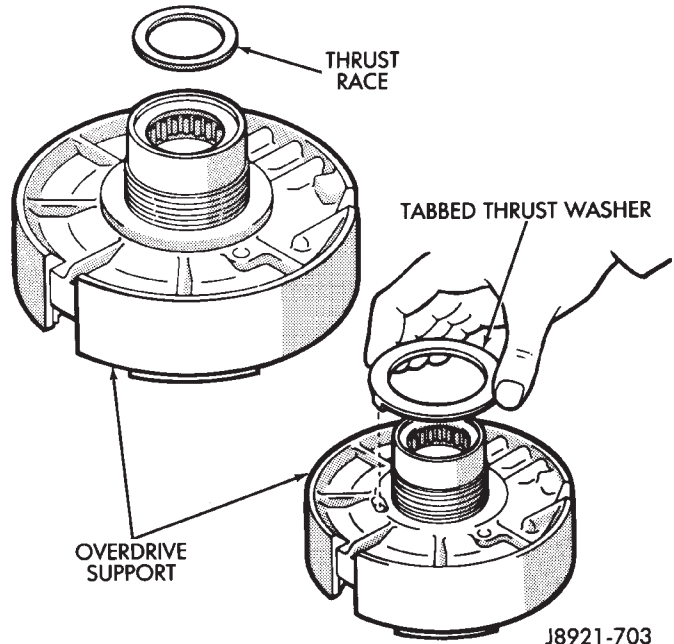


Fig. 157 Installing Overdrive Support Thrust Race And Washer

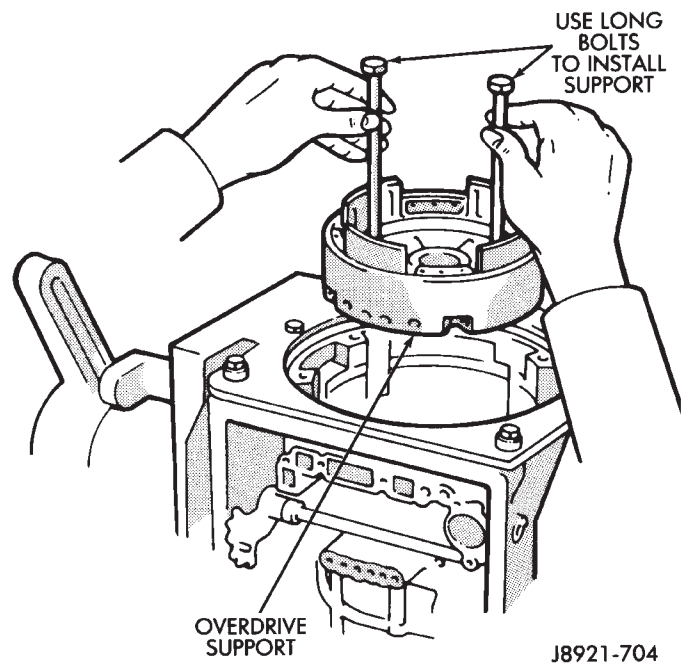


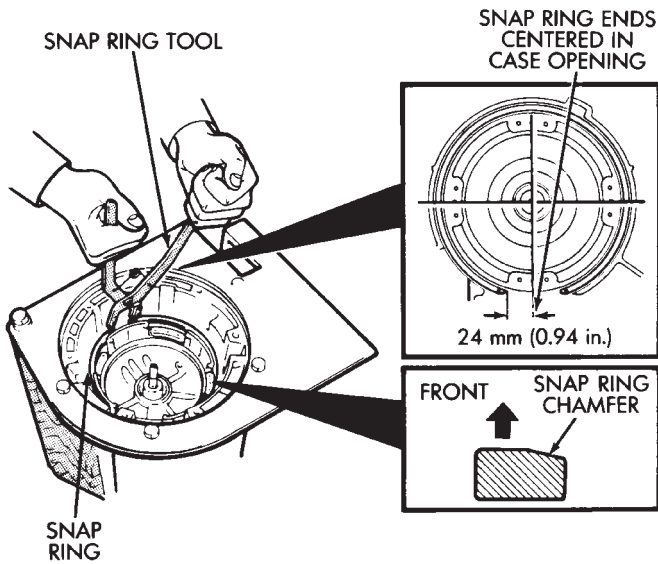
Fig. 158 Installing Overdrive Support

(58) Check output shaft end play with dial indicator (Fig. 161). End play should be 0.27 – 0.86 mm (0.0106 – 0.0339 in.).

(59) If output shaft end play is incorrect, one or more of installed components is not seated. Reassemble as necessary and check end play again.

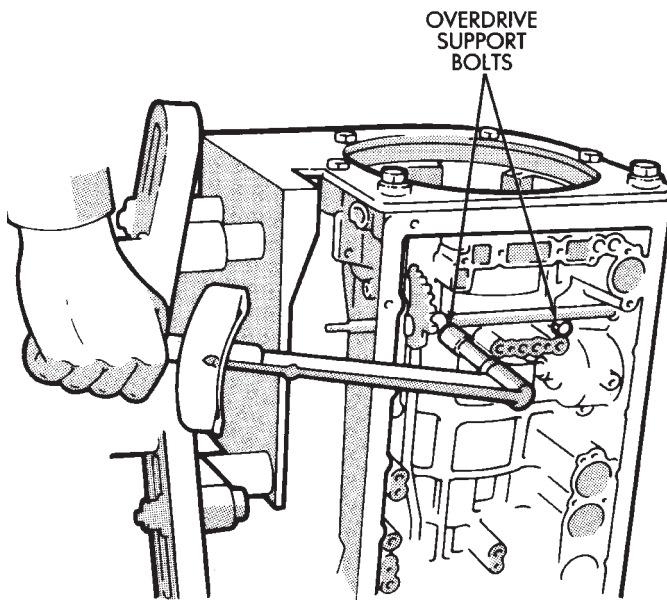
(60) Install overdrive brake clutch pack (Fig. 162). Install thickest clutch plate first. Rounded edge of plate faces up. Install first disc followed by another plate until four discs and three plates are installed.

DISASSEMBLY AND ASSEMBLY (Continued)



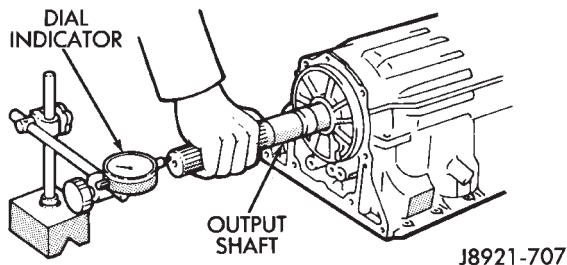
J8921-705

Fig. 159 Installing Overdrive Support Snap Ring



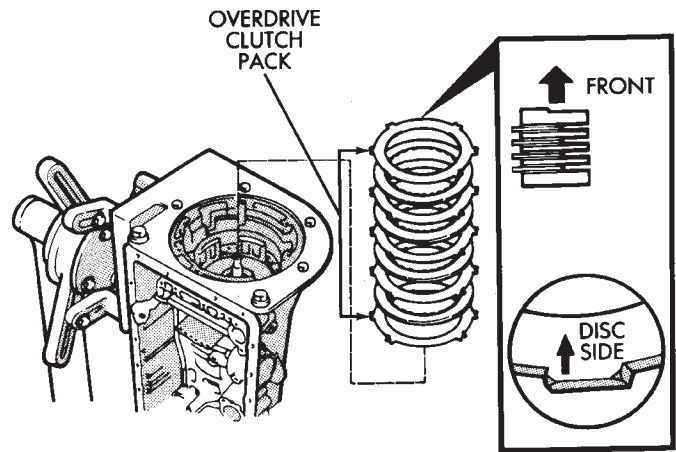
J8921-706

Fig. 160 Installing Overdrive Support Bolts



J8921-707

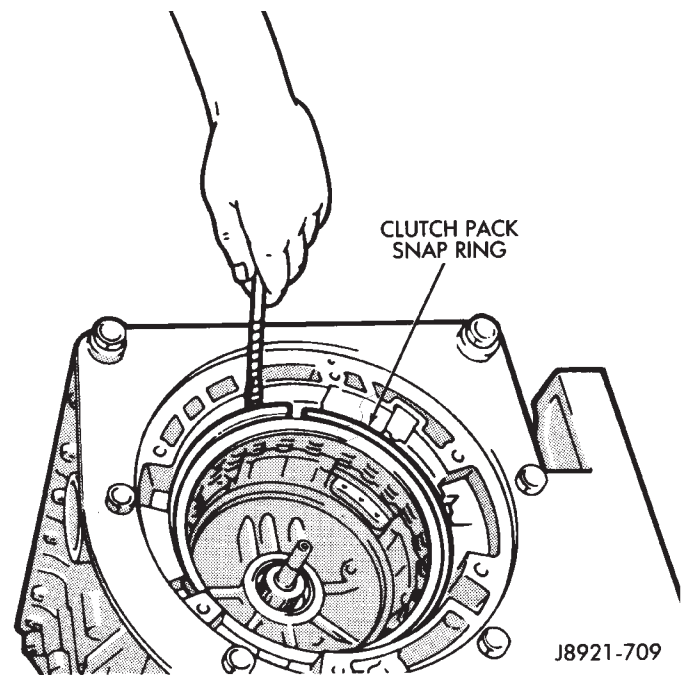
Fig. 161 Checking Output Shaft End Play



J8921-708

Fig. 162 Installing Overdrive Brake Clutch Pack

(61) Install stepped ring retainer plate with flat side facing disc. Then install brake pack snap ring (Fig. 163).



J8921-709

Fig. 163 Installing Overdrive Brake Snap Ring

(62) Check overdrive brake piston stroke as follows:

(a) Mount dial indicator on case using Miller Tool C-3339 and a suitable bolt threaded into the transmission case.

(b) Verify that the dial indicator is mounted solidly and square to the direction of the piston travel.

DISASSEMBLY AND ASSEMBLY (Continued)

(c) Apply 57–114 psi air pressure through piston apply port and note piston stroke on dial indicator. Stroke length should be: 1.40 – 1.70 mm (0.055 – 0.0699 in.).

(d) If stroke is incorrect, brake pack or piston is installed incorrectly. Check and correct as necessary and measure piston stroke again.

(e) Remove the dial indicator set-up from the transmission.

(63) Coat overdrive lower race, thrust bearing and upper race with petroleum jelly and install them in overdrive support (Fig. 164). Be sure races and bearing are assembled and installed as shown.

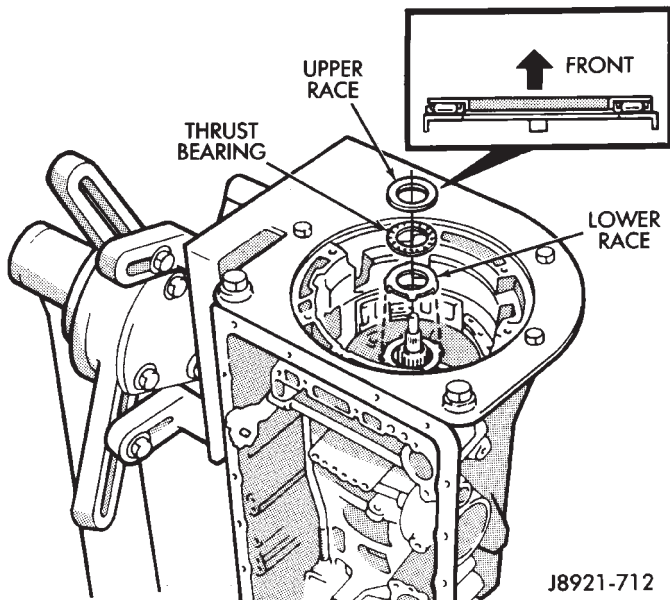


Fig. 164 Installing Overdrive Support Thrust Bearing And Races

(64) Verify bearing/race sizes before proceeding. Bearing race sizes are:

- Outer diameter of lower race is 47.8 mm (1.882 in.) and inside diameter is 34.3 mm (1.350 in.).
- Outer diameter of bearing is 47.7 mm (1.878 in.) and inside diameter is 32.7 mm (1.287 in.).
- Outer diameter of upper race is 47.8 mm (1.882 in.) and inside diameter is 30.7 mm (1.209 in.).

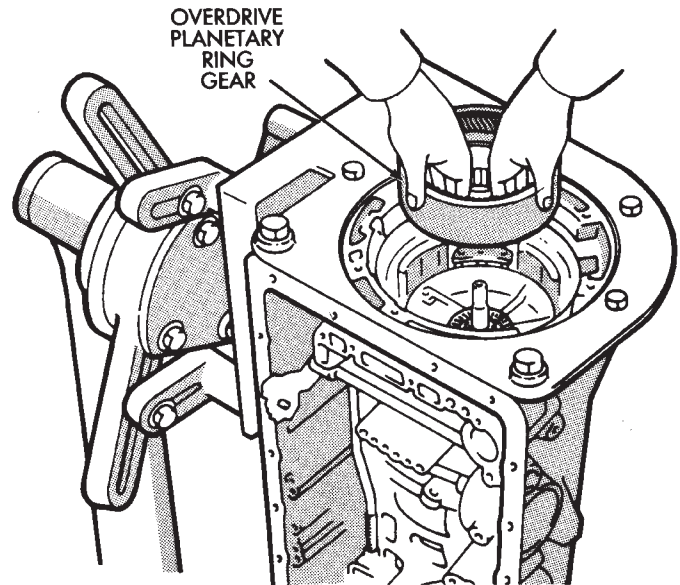
(65) Install overdrive planetary ring gear in support (Fig. 165).

(66) Coat ring gear thrust race and thrust bearing assembly with petroleum jelly and install them in gear (Fig. 166).

(67) Verify bearing/race size before proceeding.

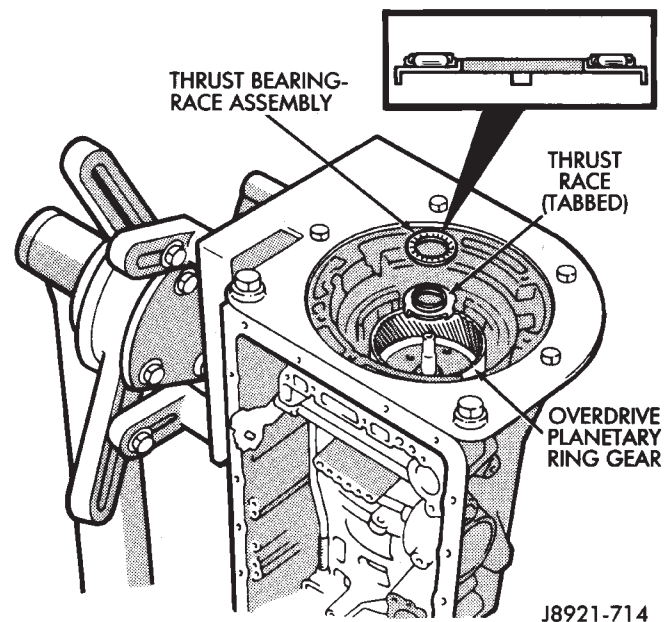
- Outer diameter of ring gear race-bearing is 47.8 mm (1.882 in.) and inside diameter is 24.2 mm (0.953 in.).
- Outer diameter of bearing is 46.8 mm (1.844 in.) and inside diameter is 26.0 mm (1.024 in.).

(68) Coat tabbed thrust race with petroleum jelly and install it on planetary gear (Fig. 167). Race outer



J8921-713

Fig. 165 Installing Overdrive Planetary Ring Gear



J8921-714

Fig. 166 Installing Ring Gear Thrust Bearing And Race

diameter is 41.8 mm (1.646 in.) and inside diameter is 27.1 mm (1.067 in.).

(69) Install assembled overdrive planetary gear and clutch (Fig. 168).

(70) Coat thrust bearing and race assembly with petroleum jelly and install it on clutch input shaft (Fig. 169). Bearing and race outer diameter is 50.2 mm (1.976 in.) and inside diameter is 28.9 mm (1.138 in.).

(71) Coat thrust bearing race with petroleum jelly and install it in oil pump (Fig. 170). Bearing race

DISASSEMBLY AND ASSEMBLY (Continued)

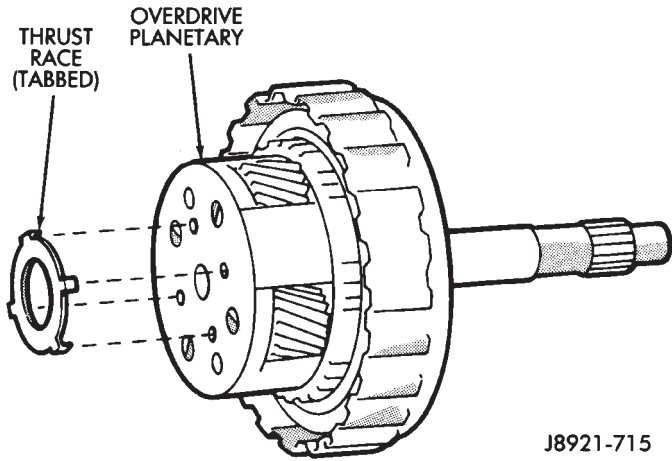


Fig. 167 Installing Planetary thrust Race

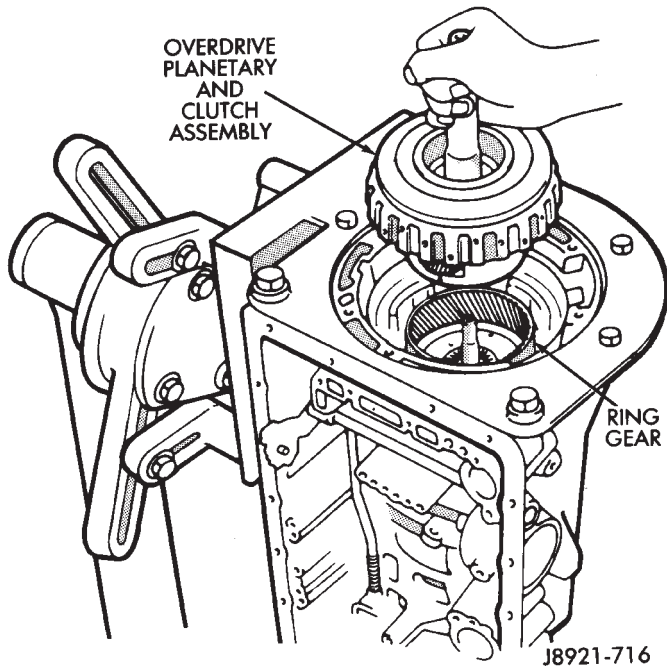


Fig. 168 Installing Overdrive Planetary And Clutch Assembly

outer diameter is 47.2 mm (1.858 in.) and inside diameter is 28.1 mm (1.106 in.).

(72) Lubricate and install replacement O-ring on oil pump body.

(73) Install oil pump in case. Align pump and case bolt holes and carefully ease pump into place.

CAUTION: Do not use force to seat the pump. The seal rings on the stator shaft could be damaged if they bind or stick to the direct clutch drum.

(74) Tighten oil pump bolts to 22 N·m (16 ft. lbs.) torque.

(75) Verify input shaft rotation. Shaft should rotate smoothly and not bind.

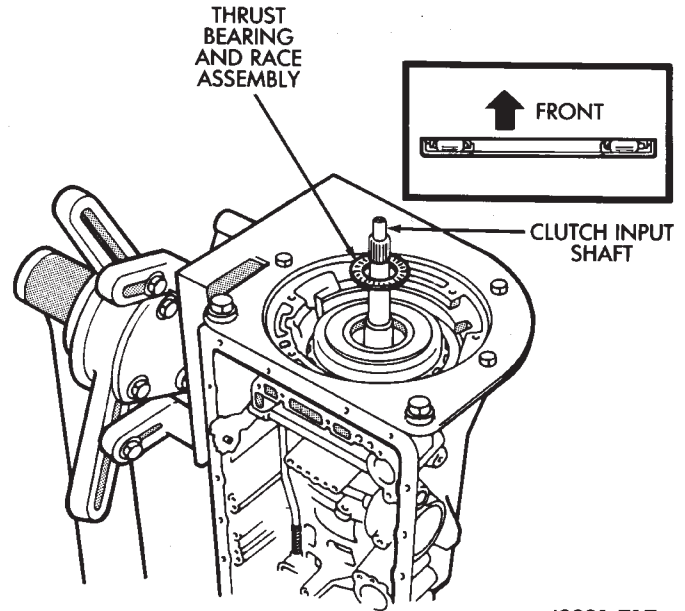


Fig. 169 Installing Input Shaft Thrust Bearing And Race Assembly

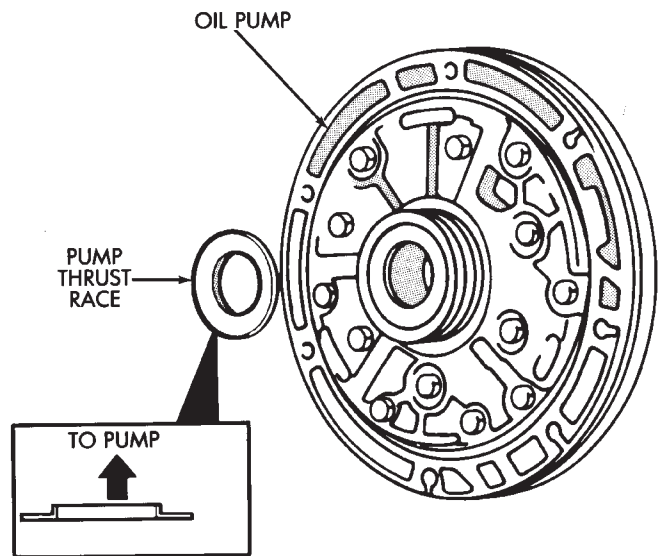
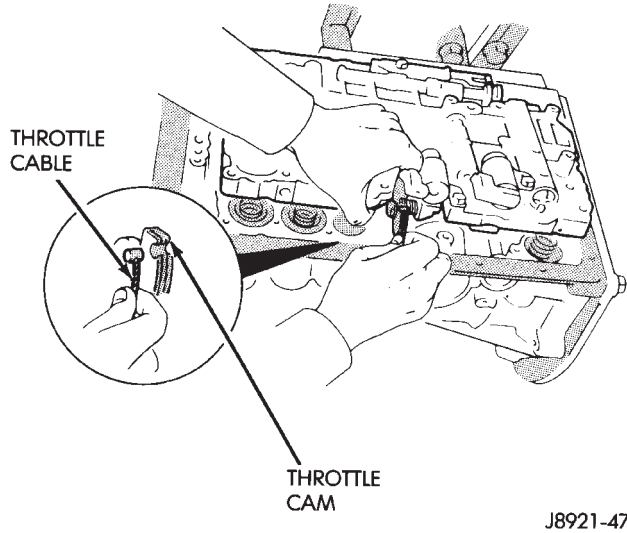


Fig. 170 Installing Oil Pump Thrust Race

(76) Lubricate and install new O-ring on transmission throttle cable adapter and install cable in case (Fig. 171).

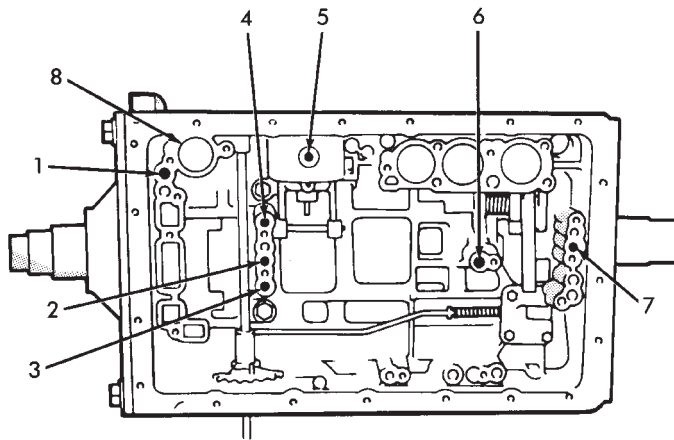
(77) Check clutch and brake operation. Operate clutches and brakes with compressed air applied through feed holes in case (Fig. 172). Listen for clutch and brake application. If you do not hear a clutch or brake apply, disassemble transmission and repair fault before proceeding. **It is necessary to block the overdrive clutch accumulator feed hole No. 8 (Fig. 172) in order to check direct clutch operation.**

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-478

Fig. 171 Installing Transmission Throttle Cable



1. OVERDRIVE DIRECT CLUTCH FEED
2. DIRECT CLUTCH FEED
3. FORWARD CLUTCH FEED
4. OVERDRIVE BRAKE FEED
5. SECOND COAST BRAKE FEED
6. SECOND BRAKE FEED
7. FIRST-REVERSE BRAKE FEED
8. OVERDRIVE CLUTCH ACCUMULATOR PISTON HOLE (BLOCK THIS HOLE WHEN CHECKING DIRECT CLUTCH OPERATION)

J8921-721

Fig. 172 Clutch And Brake Feed Hole Locations

(78) Lubricate and install new O-rings on accumulator pistons (Fig. 173).

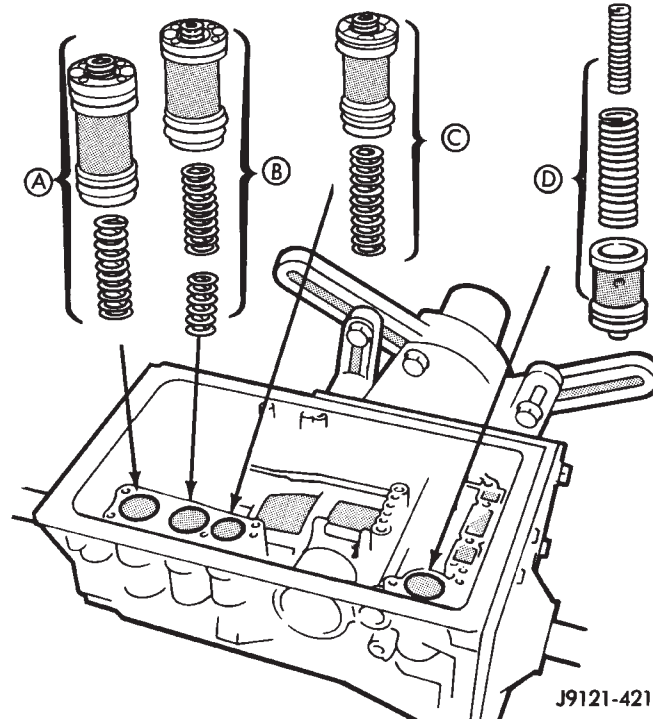
(79) Assemble and install accumulator pistons and springs (Fig. 173).

(80) Install new check ball body and spring (Fig. 174).

(81) Position valve body on case (Fig. 175).

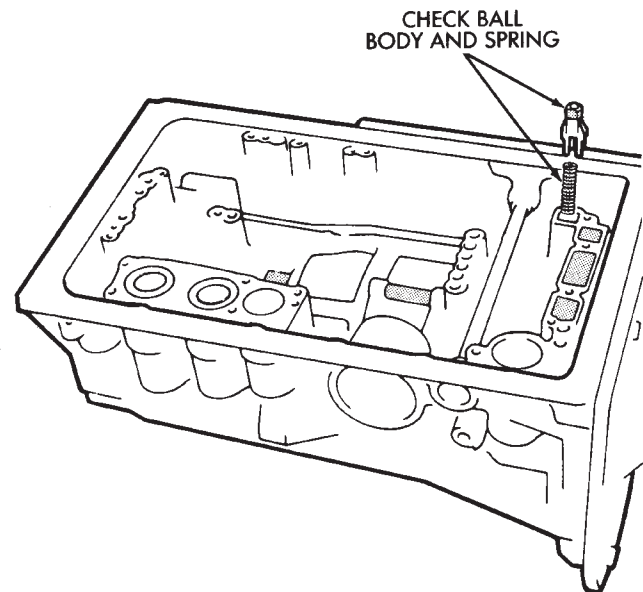
(82) Install detent spring (Fig. 175).

- (A) SECOND BRAKE ACCUMULATOR PISTON
- (B) DIRECT CLUTCH ACCUMULATOR PISTON
- (C) OVERDRIVE BRAKE ACCUMULATOR PISTON
- (D) OVERDRIVE CLUTCH ACCUMULATOR PISTON



J9121-421

Fig. 173 Accumulator Piston And Spring Installation



J8921-723

Fig. 174 Installing Check Ball Body And Spring

(83) Align manual valve, detent spring and shift sector (Fig. 175).

(84) Connect transmission throttle cable to throttle valve cam (Fig. 176).

DISASSEMBLY AND ASSEMBLY (Continued)

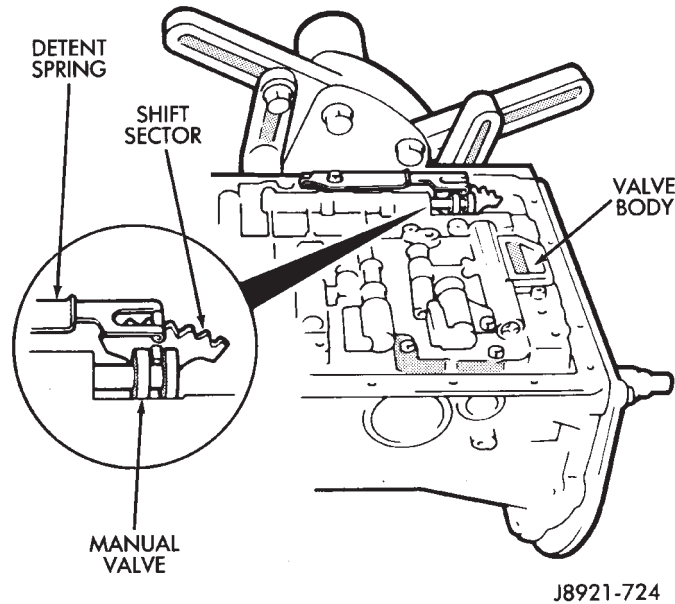


Fig. 175 Aligning Manual Valve, Shift Sector And Detent Spring

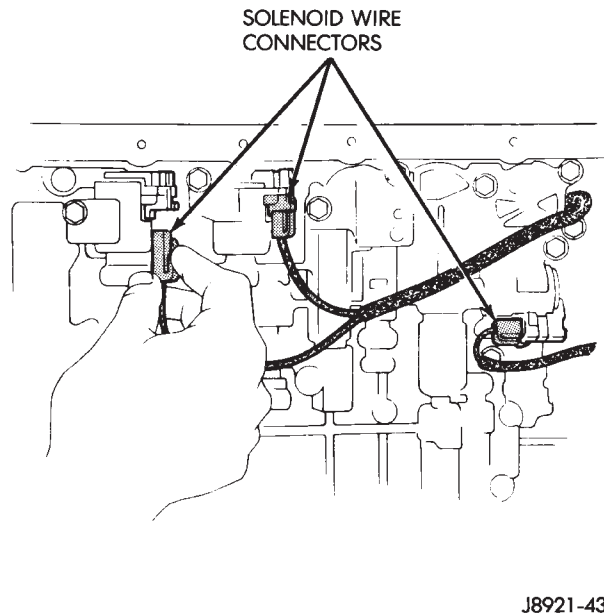


Fig. 177 Connecting Valve Body Solenoid Wires

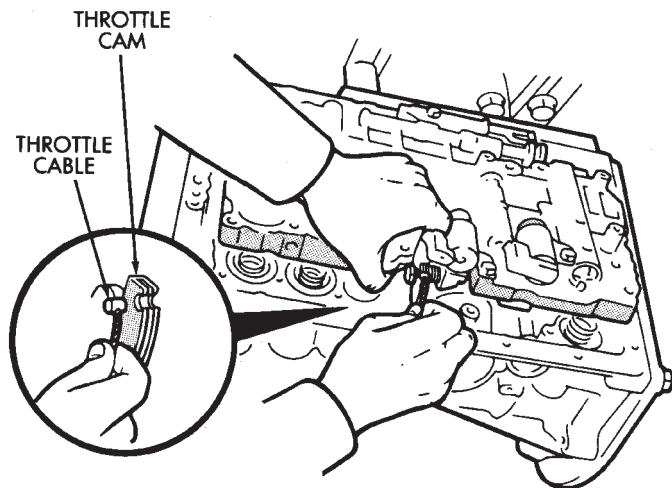


Fig. 176 Connecting Transmission Throttle Cable

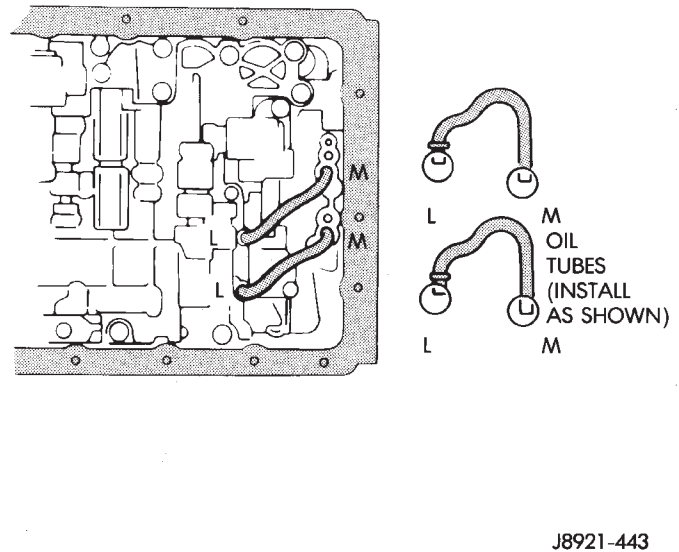


Fig. 178 Installing Valve Body Oil Tubes

(85) Install and tighten valve body-to-case bolts to 10 N·m (7 ft. lbs.) torque.

(86) Connect valve body solenoid wires to solenoids (Fig. 177).

(87) Install new O-ring on solenoid harness adapter and secure adapter to case.

(88) Install valve body oil tubes (Fig. 178). Tap tubes into place with a plastic mallet. Be sure the flanged tube ends and straight tube ends are installed as shown.

(89) Install new gaskets on oil screen and install screen on valve body. Tighten screen bolts to 10 N·m (7 ft. lbs.) torque.

(90) Install magnet in oil pan. Be sure magnet does not interfere with valve body oil tubes.

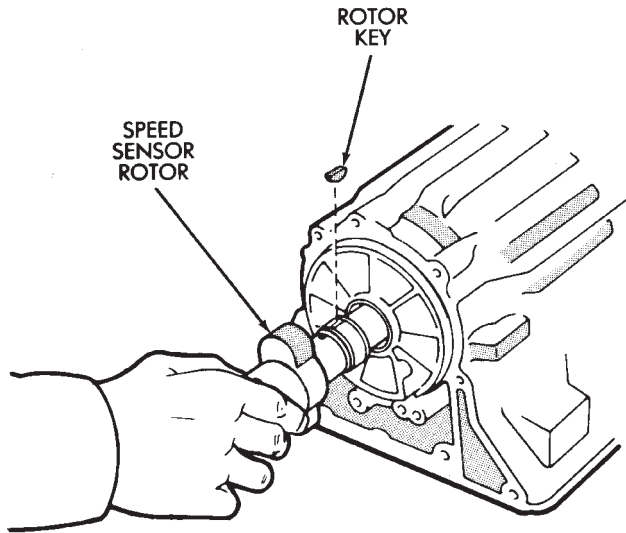
(91) Apply Threebond® Liquid Gasket TB1281, P/N 83504038, to sealing surface of oil pan. Sealer bead should be at least 3 mm (1/8 in.) wide. Install pan on case and tighten pan bolts to 7 N·m (65 in. lbs.) torque.

(92) Install transmission speed sensor rotor and key on output shaft (Fig. 179).

(93) Install spacer and speedometer drive gear on output shaft. Then install retaining snap ring (Fig. 180).

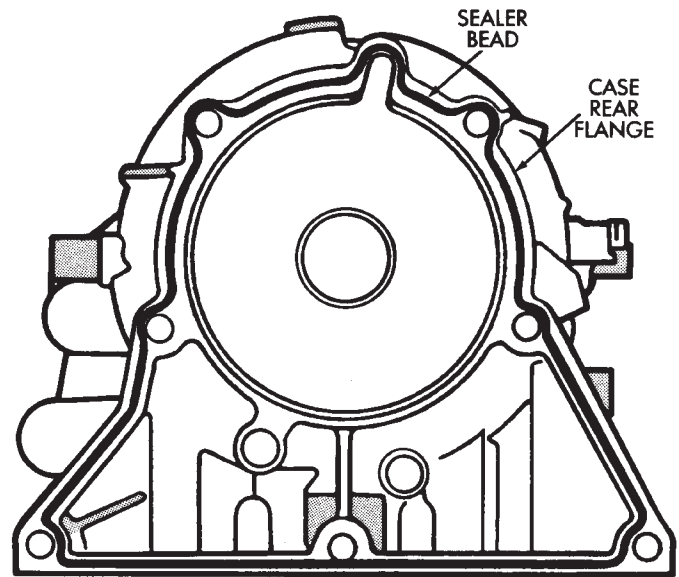
(94) Apply bead of Threebond® Liquid Gasket TB1281, P/N 83504038, to sealing surface at rear of case (Fig. 181).

DISASSEMBLY AND ASSEMBLY (Continued)



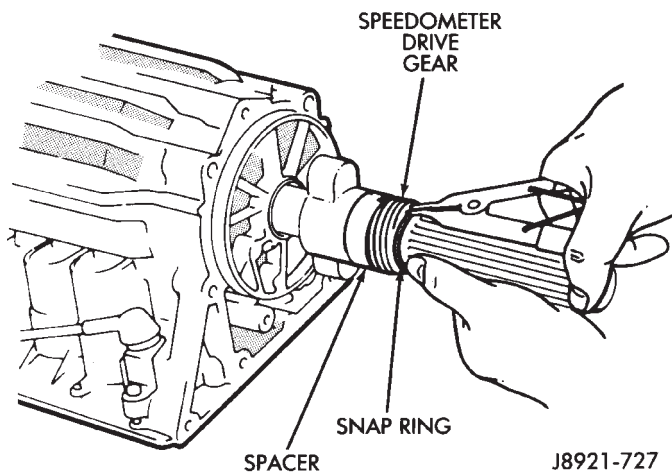
J8921-726

Fig. 179 Installing Transmission Speed Sensor Rotor And Key



J8921-728

Fig. 181 Applying Sealer To Case Rear Flange



J8921-727

Fig. 180 Installing Spacer And Speedometer Drive Gear

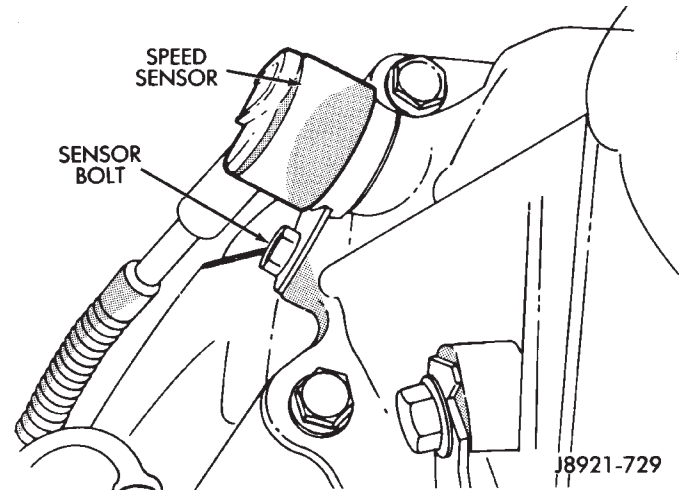
(95) Install adapter housing on transmission. Tighten adapter bolts to 34 N·m (25 ft. lbs.) torque.

(96) Install transmission speed sensor (Fig. 182). Tighten sensor bolt to 7.4 N·m (65 in. lbs.) torque and connect sensor wire harness connector.

(97) Install converter housing (Fig. 183). Tighten 12 mm diameter housing bolts to 57 N·m (42 ft. lbs.) torque. Tighten 10 mm diameter housing bolts to 34 N·m (25 ft. lbs.) torque.

(98) Install transmission shift lever on manual valve shaft. Do not install lever attaching nut at this time.

(99) Move transmission shift lever fully rearward. Then move lever two detent positions forward.



J8921-729

Fig. 182 Installing Transmission Speed Sensor

(100) Mount park/neutral position switch on manual valve shaft and tighten switch adjusting bolt just enough to keep switch from moving (Fig. 184).

(101) Install park/neutral position switch tabbed washer and retaining nut (Fig. 184). Tighten nut to 6.9 N·m (61 in. lbs.) torque, but do not bend any of the washer tabs against the nut at this time.

(102) Align park/neutral position switch standard line with groove or flat on manual shaft (Fig. 184).

(103) Tighten park/neutral position switch adjusting bolt to 13 N·m (9 ft. lbs.) torque.

(104) Install transmission shift lever on manual valve shaft. Tighten lever attaching nut to 16 N·m (12 ft. lbs.) torque.

(105) Install retaining clamp for wire harness and throttle cable (Fig. 185).

DISASSEMBLY AND ASSEMBLY (Continued)

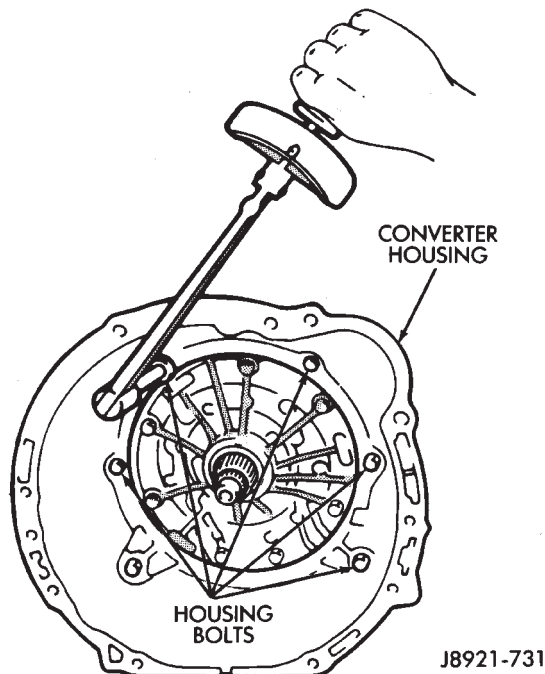


Fig. 183 Installing Converter Housing

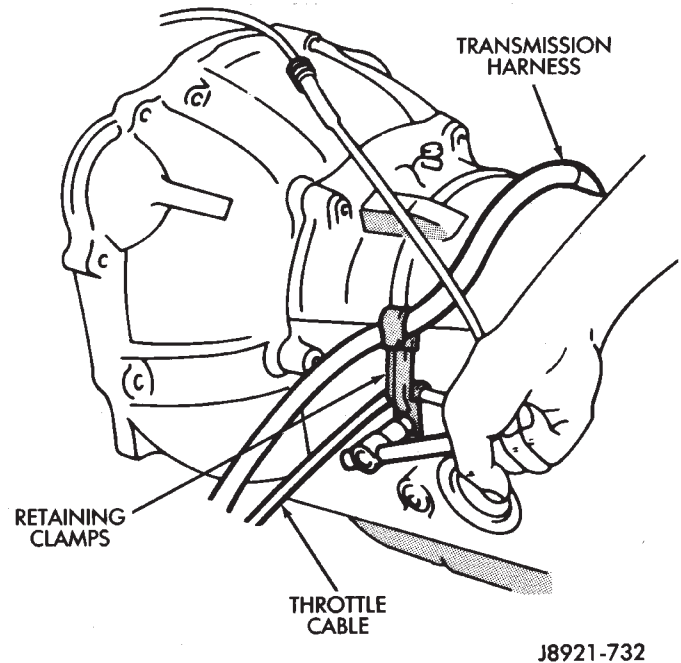


Fig. 185 Installing Cable/Harness Clamps

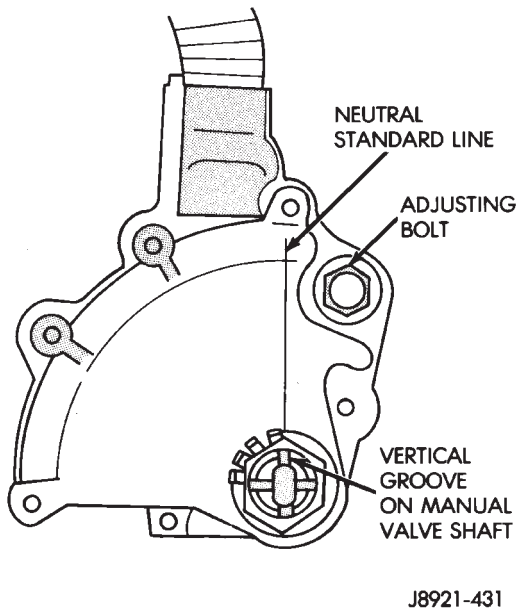


Fig. 184 Park/Neutral Position Switch Installation/ Adjustment

- (106) Install torque converter.
- (107) Verify that converter is seated by measuring distance between converter housing flange and one of the converter mounting pads (Fig. 186). Use straight-edge and vernier calipers to measure distance. On 6-cyl. transmissions, distance should be 16.5 mm (0.650 in.).
- (108) Secure converter in transmission with C-clamp or metal strapping. Do this before mounting transmission on jack or moving transmission under vehicle.

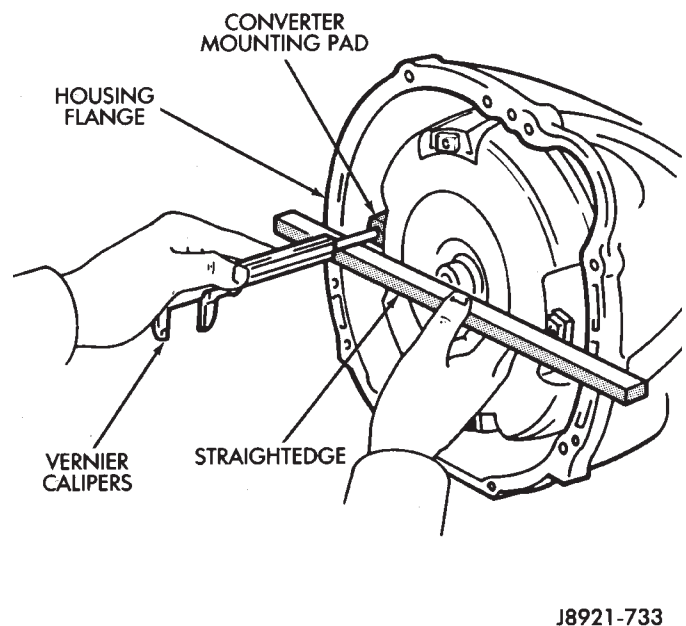
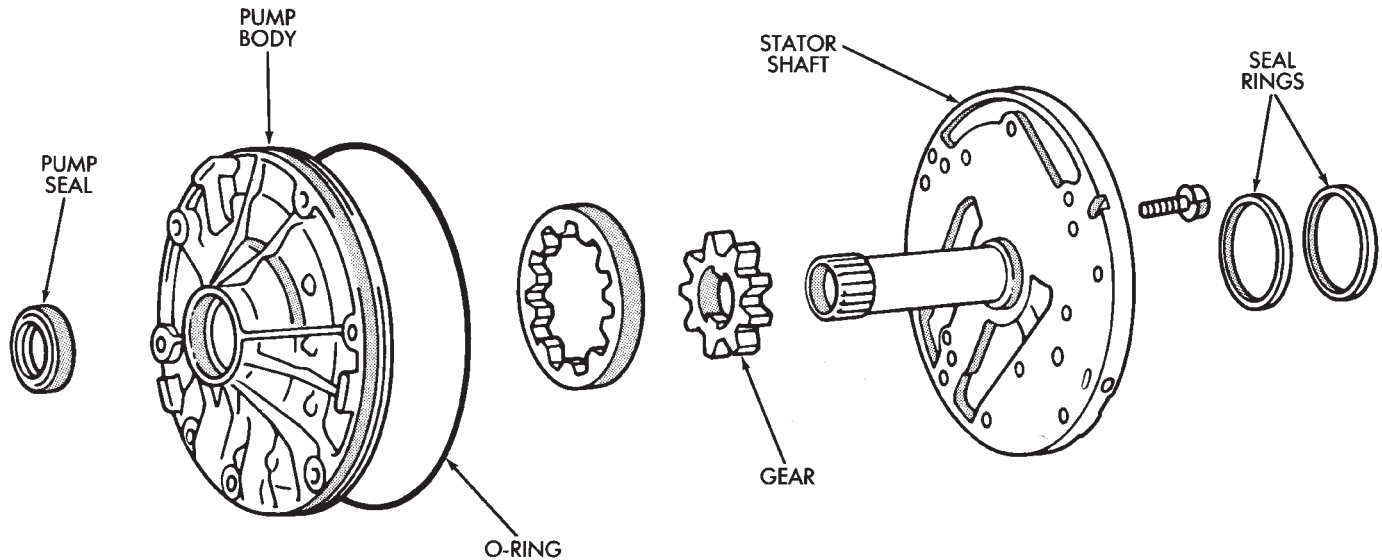


Fig. 186 Checking Converter Installation

- (109) Install lower half of transmission fill tube (install upper half after transmission is in vehicle).

CAUTION: The transmission cooler and lines must be reverse flushed if overhaul corrected a malfunction that generated sludge, metal particles, or clutch friction material. The torque converter should also be replaced if contaminated by the same malfunction. Debris and residue not flushed from the cooler and lines will flow back into the transmission and converter. The result will be a repeat failure and shop comeback.

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-516

Fig. 187 Oil Pump Components**OIL PUMP****DISASSEMBLY**

- (1) Remove pump body O-ring (Fig. 187).
- (2) Remove pump seal.
- (3) Remove pump seal rings (Fig. 187).
- (4) Remove bolts attaching stator shaft to pump body and separate components.
- (5) Remove drive gear and driven gear from pump body (Fig. 187).

ASSEMBLY

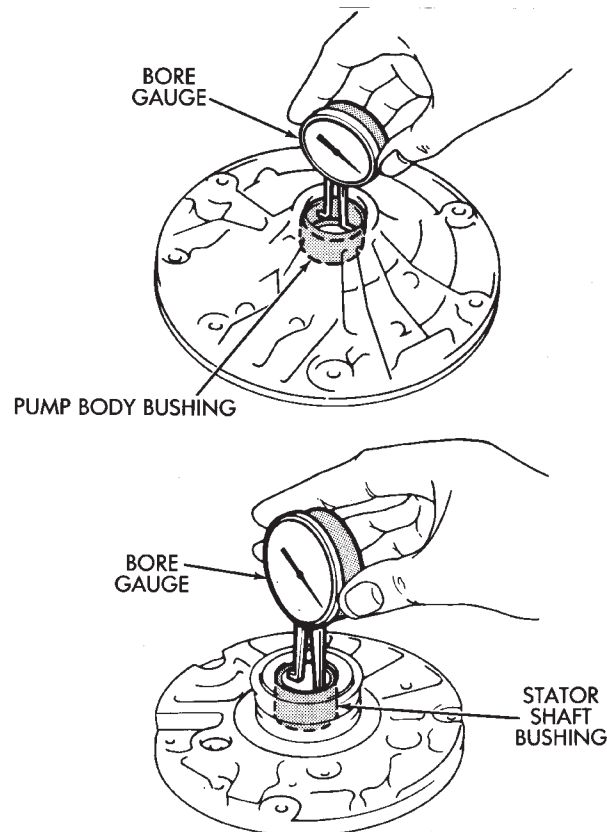
(1) Measure inside diameter of pump body bushing with bore gauge or inside micrometer (Fig. 188). Diameter should be maximum of 38.19 mm (1.5035 in.). Replace pump body if bushing I.D. is greater than specified.

(2) Measure inside diameter of stator shaft bushing (Fig. 188). Take measurements at front and rear of bushing. Diameter should be maximum of 21.58 mm (0.8496 in.) at front and 27.08 mm (1.0661 in.) at rear. Replace stator shaft if bushing diameter is greater than specified.

(3) Measure oil pump clearances (Fig. 189).

- Clearance between pump driven gear and pump body should be maximum of 0.3 mm (0.012 in.).
- Clearance between tips of pump gear teeth should be maximum of 0.3 mm (0.012 in.).
- Clearance between rear surface of pump housing and pump gears should be maximum of 0.1 mm (0.004 in.).

(4) Replace pump body and gears if any clearance is greater than specified.

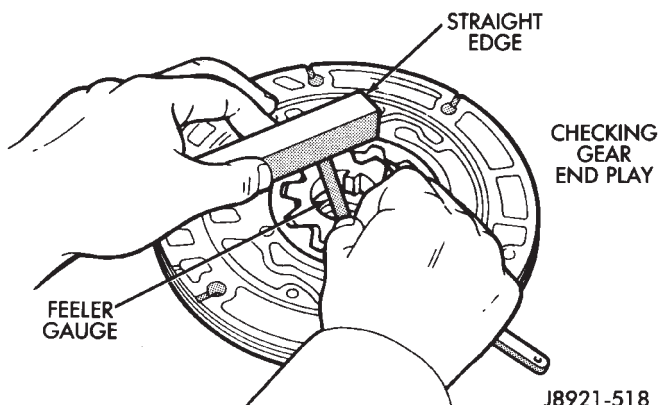
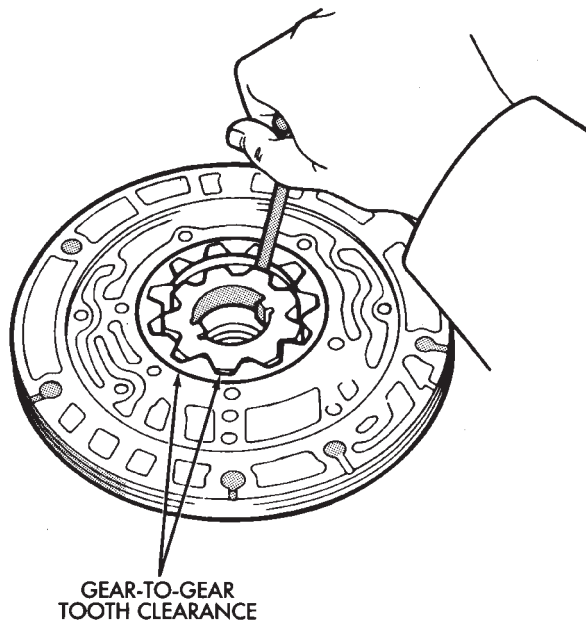
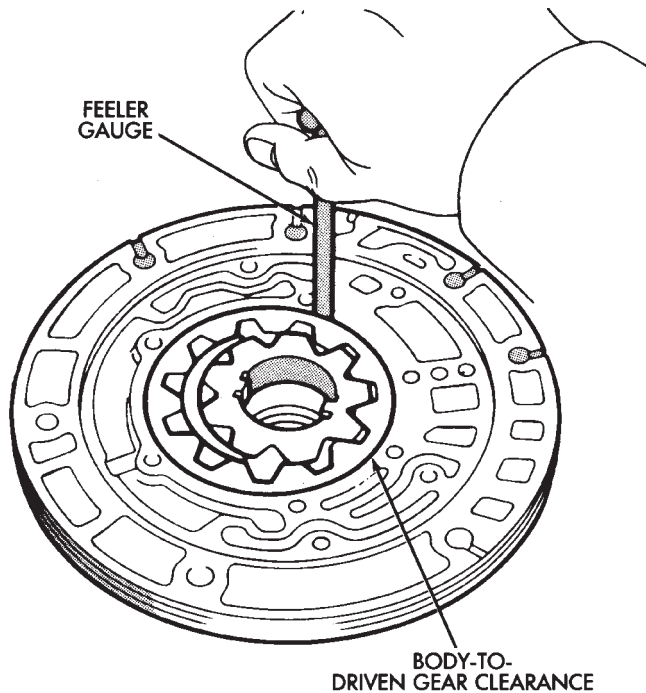


J8921-517

Fig. 188 Checking Pump/Stator Shaft Bushings

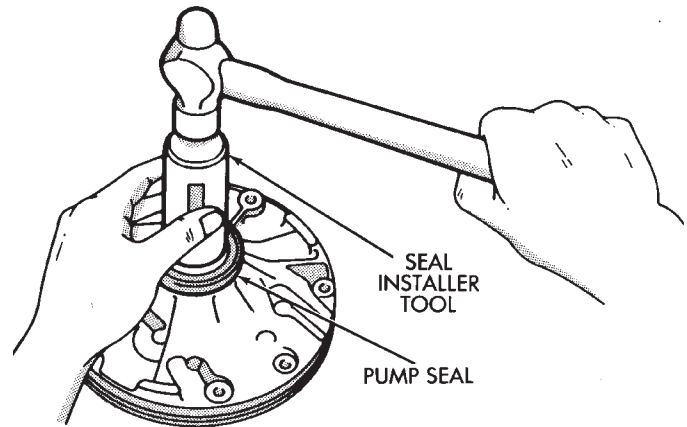
- (5) Install new seal with Seal Installer 7549 (Fig. 190).
- (6) Lubricate and install gears in pump body.
- (7) Assemble stator shaft and pump body. Tighten shaft-to-body bolts to 10 N·m (7 ft. lbs.) torque.

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-518

Fig. 189 Checking Pump Gear Clearances



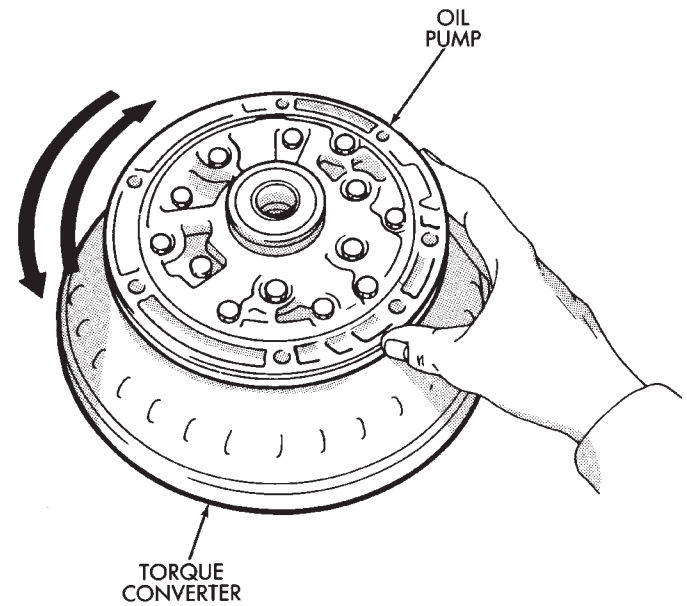
J8921-519

Fig. 190 Installing Pump Seal

(8) Install new O-ring on pump body and new seal rings on stator shaft.

(9) Install pump in torque converter and check pump gear rotation (Fig. 191). Gears must rotate smoothly when turned clockwise and counterclockwise.

(10) Lubricate pump O-ring and seal rings with petroleum jelly.



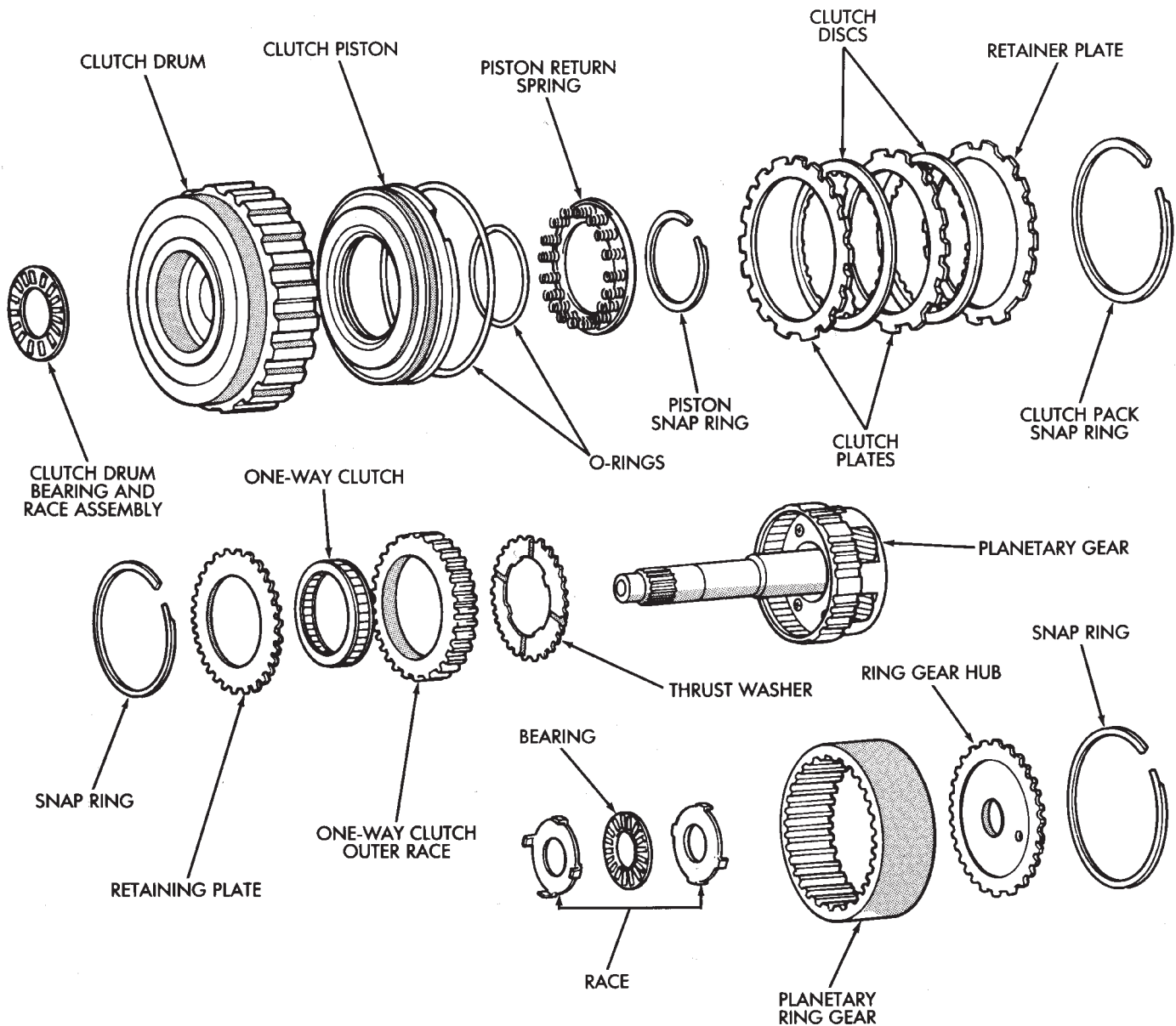
J8921-520

Fig. 191 Checking Pump Gear Rotation

DISASSEMBLY AND ASSEMBLY (Continued)

OVERDRIVE PLANETARY GEAR AND CLUTCH

DISASSEMBLY



J8921-521

Overdrive Planetary Gear And Clutch Components

(1) Check operation of one-way clutch in clutch drum (Fig. 192). Hold drum and turn planetary shaft clockwise and counterclockwise. Shaft should turn clockwise freely but lock when turned counterclockwise. Replace one-way clutch if necessary.

(2) Remove overdrive clutch from planetary gear (Fig. 193).

(3) Measure stroke length of overdrive clutch piston as follows:

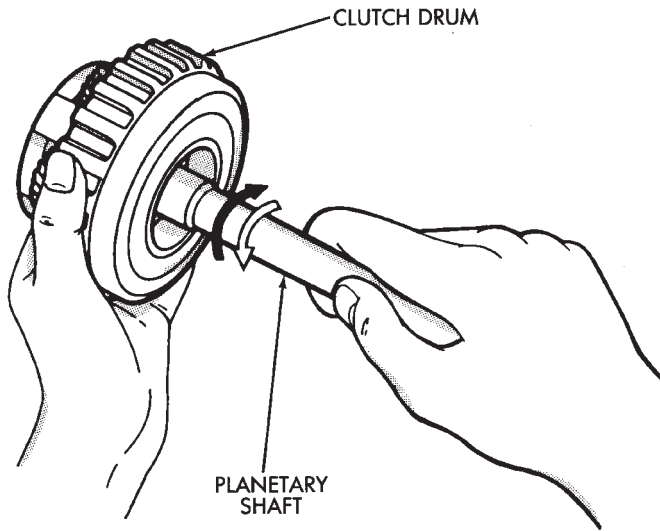
(a) Mount oil pump on torque converter. Then mount clutch on oil pump (Fig. 194).

(b) Install a suitable threaded bolt/rod into oil pump for use in mounting Miller Tool C-3339 dial indicator components securely.

(c) Mount dial indicator on the bolt/rod and position the dial indicator squarely on the clutch piston.

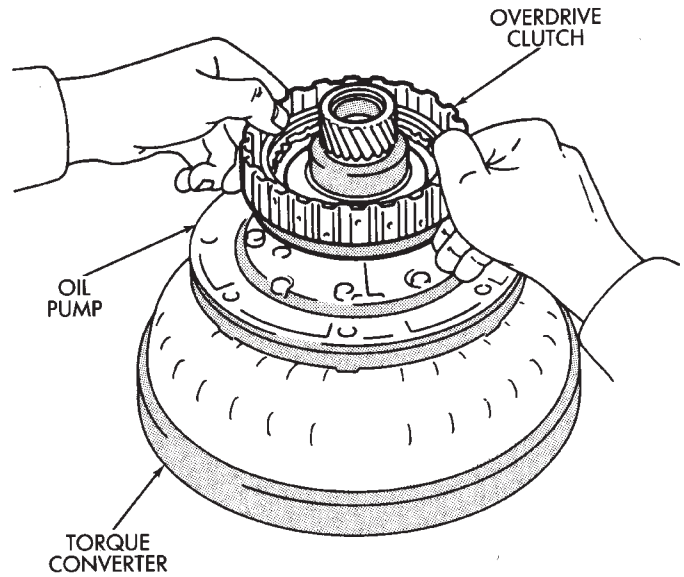
(d) Apply compressed air through clutch feed hole in oil pump and note piston stroke length. Stroke length should be 1.85 - 2.15 mm (0.0728 - 0.0846 in.).

DISASSEMBLY AND ASSEMBLY (Continued)



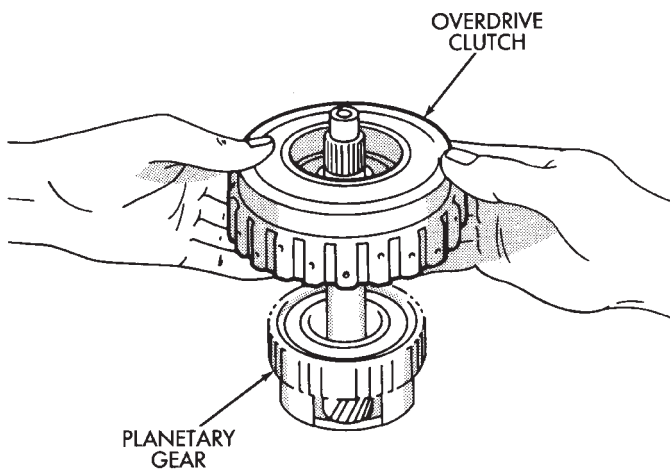
J8921-522

Fig. 192 Checking One-Way Clutch



J8921-525

Fig. 194 Assembling Converter, Pump And Clutch For Test



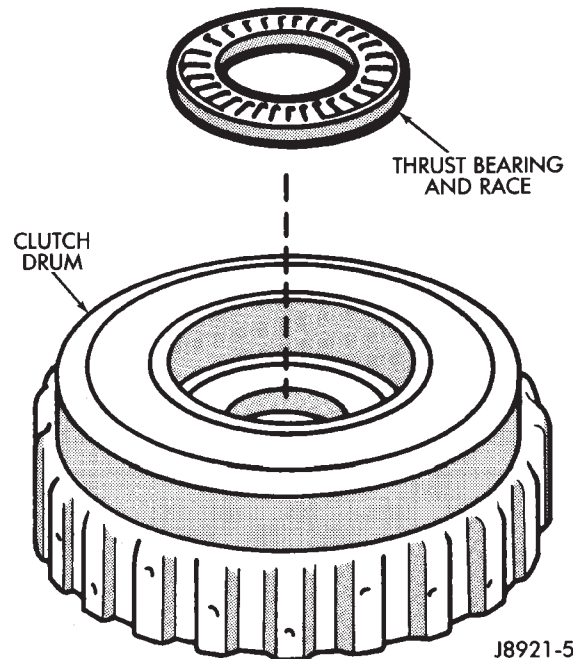
J8921-523

Fig. 193 Removing Overdrive Clutch From Gear

(4) Remove thrust bearing and race assembly from clutch drum (Fig. 195).

(5) Remove clutch pack snap ring and remove the clutch pack (Fig. 196).

(6) Measure overdrive clutch disc thickness. Minimum allowable thickness is 1.84 mm (0.0724 in.).

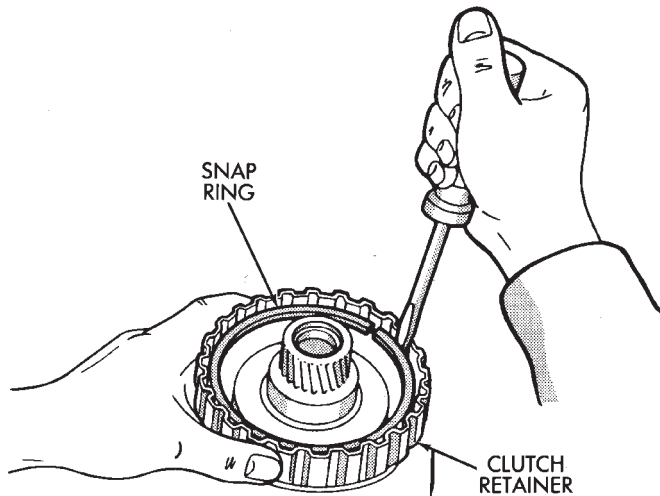


J8921-524

Fig. 195 Removing Clutch Drum Bearing And Race

(7) If the clutch pack stroke length is out of specification or any clutch disc fails to meet the minimum thickness, new discs will need to be installed during assembly.

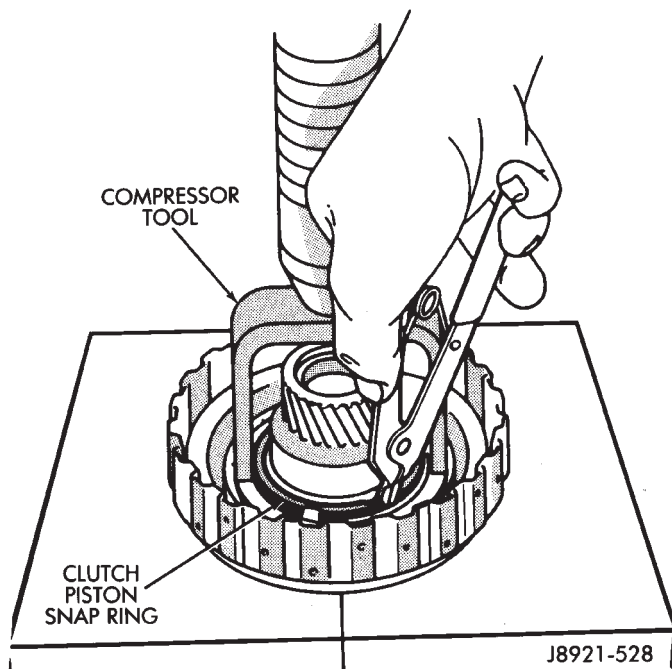
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-527

Fig. 196 Removing Clutch Pack Snap Ring

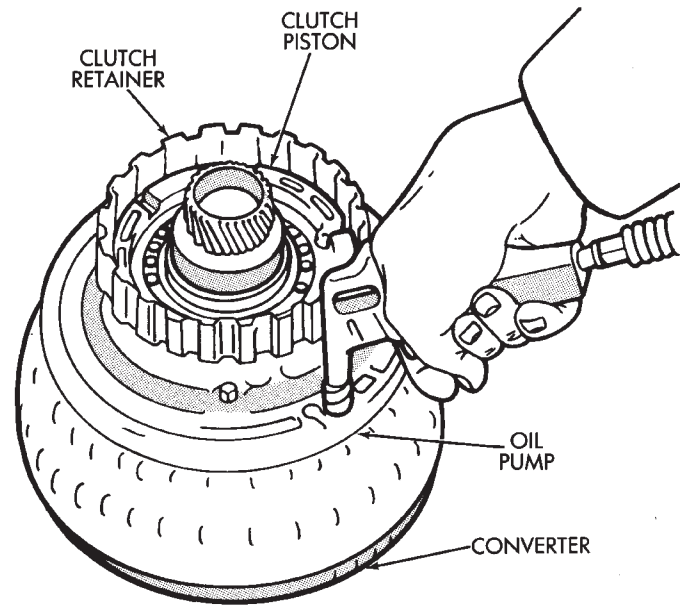
(8) Compress piston return spring with Tool 7538 (Fig. 197). Remove snap ring and remove compressor tool.



J8921-528

Fig. 197 Removing Clutch Piston Snap Ring

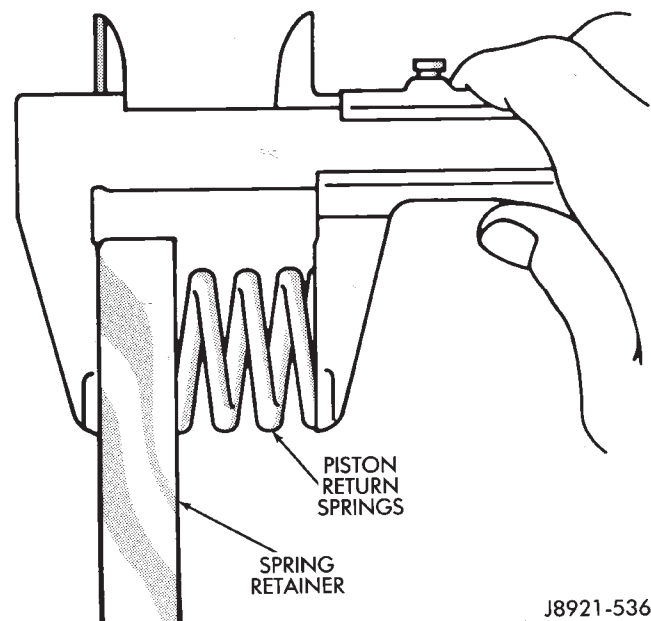
(9) Remove the piston return springs.
 (10) Mount oil pump on converter. Then mount clutch on oil pump (Fig. 198).
 (11) Hold clutch piston by hand and apply compressed air through oil pump feed hole to ease piston out (Fig. 198). Apply only enough air pressure to remove piston.



J8921-529

Fig. 198 Removing Overdrive Clutch Piston

(12) Measure free length of piston return springs with springs in retainer (Fig. 199). Length should be 16.8 mm (0.661 in.). Replace spring and retainer assembly if necessary.

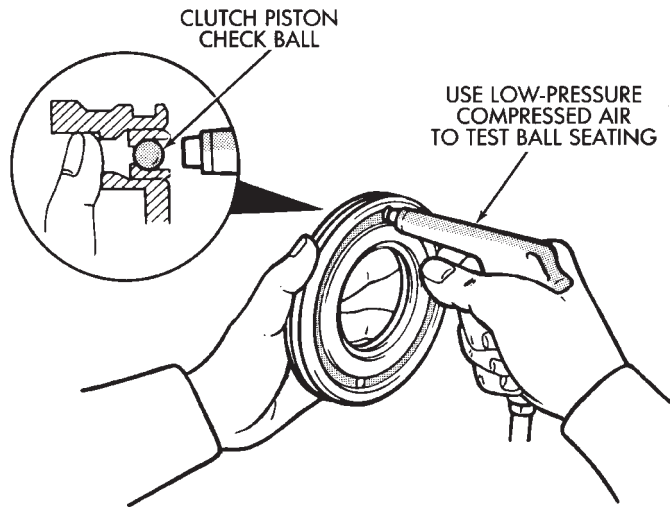


J8921-536

Fig. 199 Checking Piston Return Spring Length

(13) Check clutch piston check ball (Fig. 200). Shake piston to see if ball moves freely. Then check ball sealing by applying low pressure compressed air to ball inlet as shown. Air should not leak past check ball.

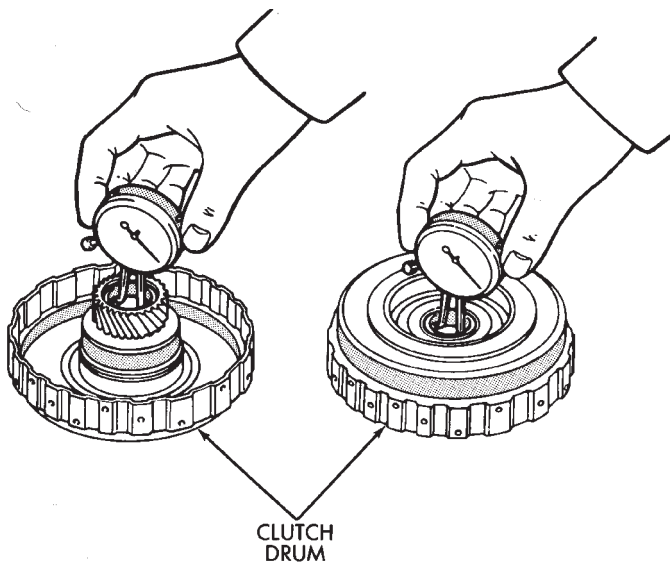
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-537

Fig. 200 Testing Clutch Piston Check Ball

(14) Check inside diameter of clutch drum bushings with bore gauge or inside micrometer (Fig. 201). Maximum inside diameter is 27.11 mm (1.0673 in.). Replace drum if bushing inside diameter is greater than specified.

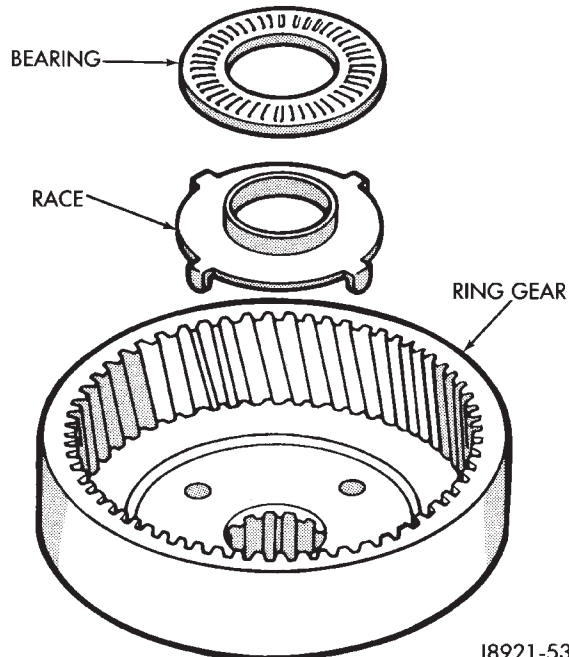


J8921-538

Fig. 201 Checking Clutch Drum Bushings

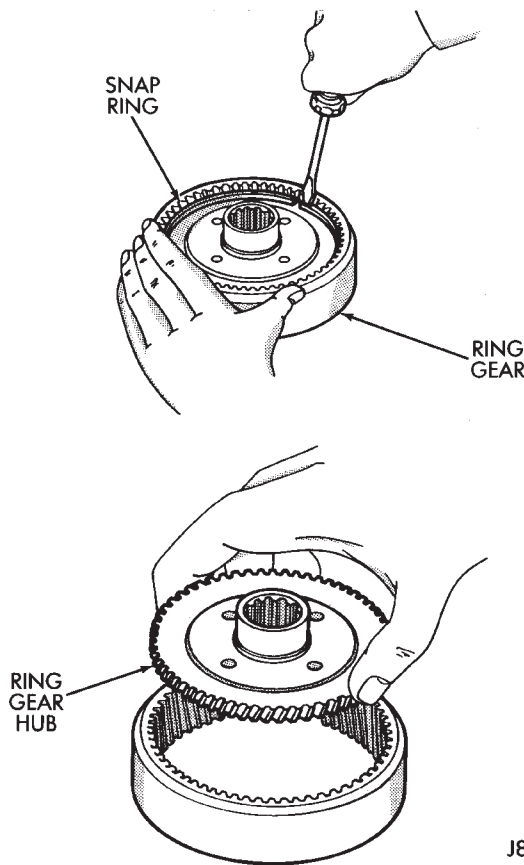
(15) Remove bearing and race from ring gear (Fig. 202).

(16) Remove snap ring from ring gear and remove ring gear hub (Fig. 203).



J8921-530

Fig. 202 Removing Ring Gear Bearing And Race



J8921-531

Fig. 203 Removing Ring Gear Hub

DISASSEMBLY AND ASSEMBLY (Continued)

(17) Remove race from planetary gear (Fig. 204).

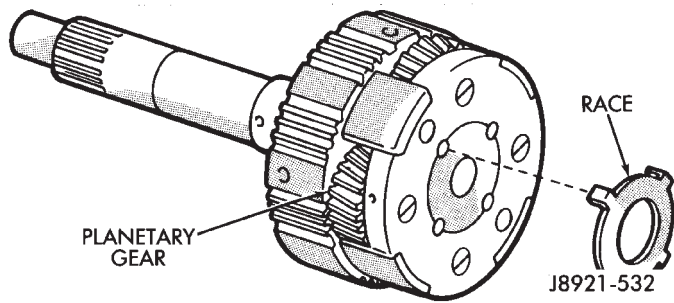


Fig. 204 Remove Planetary Gear Race

(18) Remove snap ring and remove retaining plate (Fig. 205).

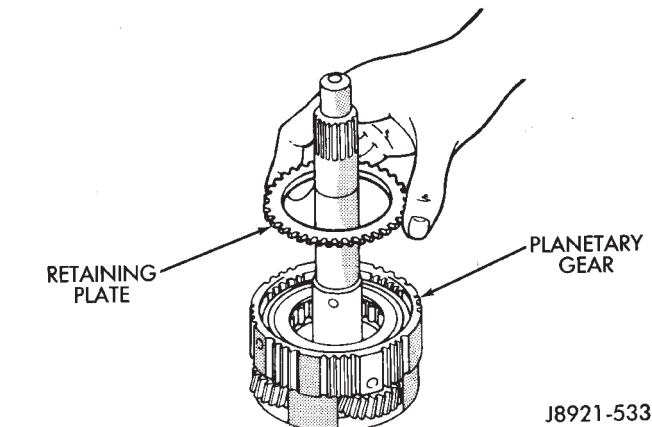
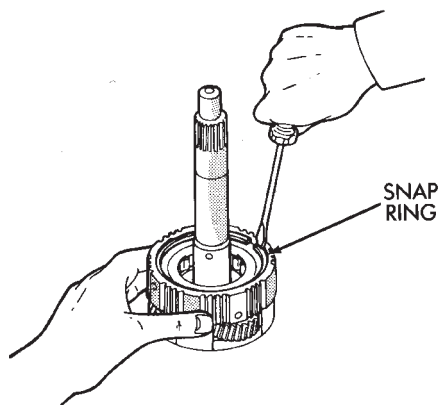


Fig. 205 Removing Snap Ring And Retaining Plate

(19) Remove one-way clutch and outer race as assembly. Then separate race from clutch (Fig. 206).

(20) Remove thrust washer (Fig. 207).

(21) Check inside diameter of planetary gear bushing (Fig. 208). Maximum inside diameter is 11.27 mm (0.4437 in.). Replace planetary gear if bushing inside diameter is greater than specified.

ASSEMBLY

(1) Install thrust washer in planetary gear (Fig. 209). **Grooved side of washer faces up and toward front.**

(2) Install clutch race into planetary gear.

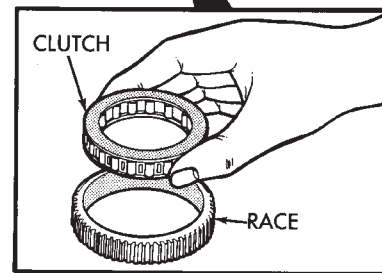
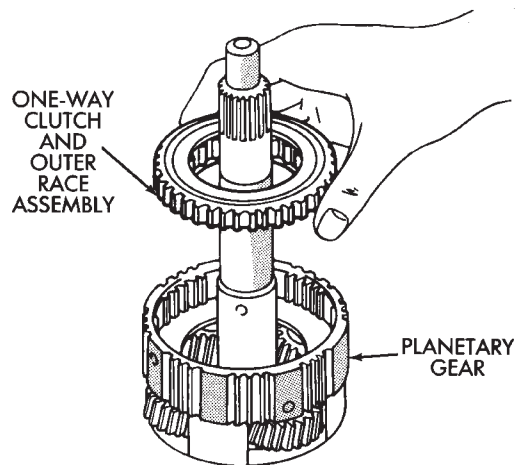


Fig. 206 Removing One-Way Clutch

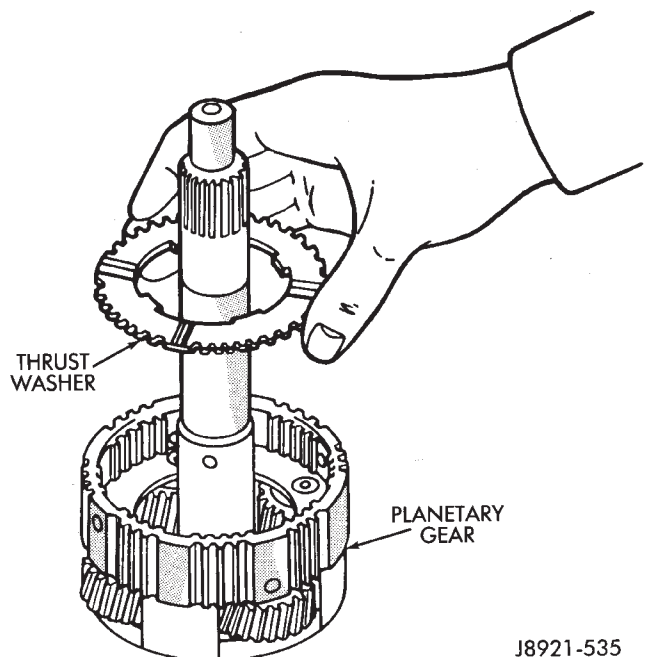


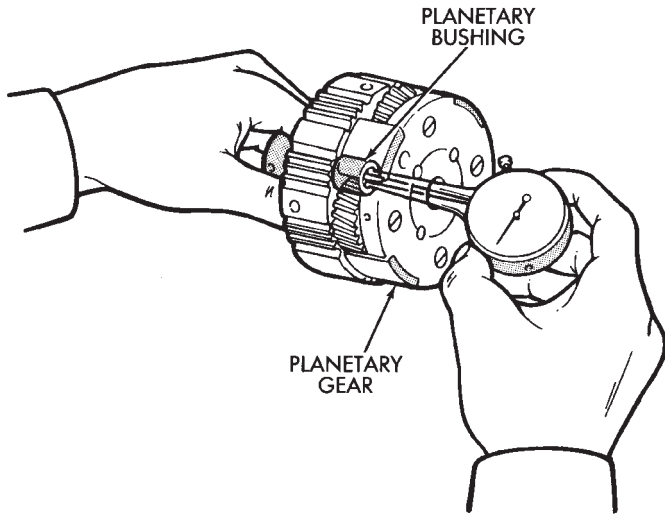
Fig. 207 Removing Planetary Thrust Washer

(3) Install one-way clutch into the outer race (Fig. 210). Be sure flanged side of clutch is facing upward.

(4) Install clutch retaining plate and snap ring in planetary gear.

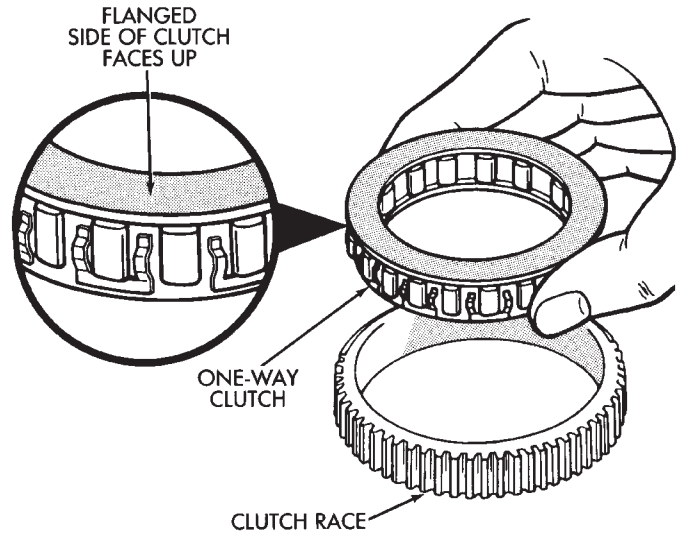
(5) Coat planetary race with petroleum jelly and install it on planetary gear. Outside diameter of race

DISASSEMBLY AND ASSEMBLY (Continued)



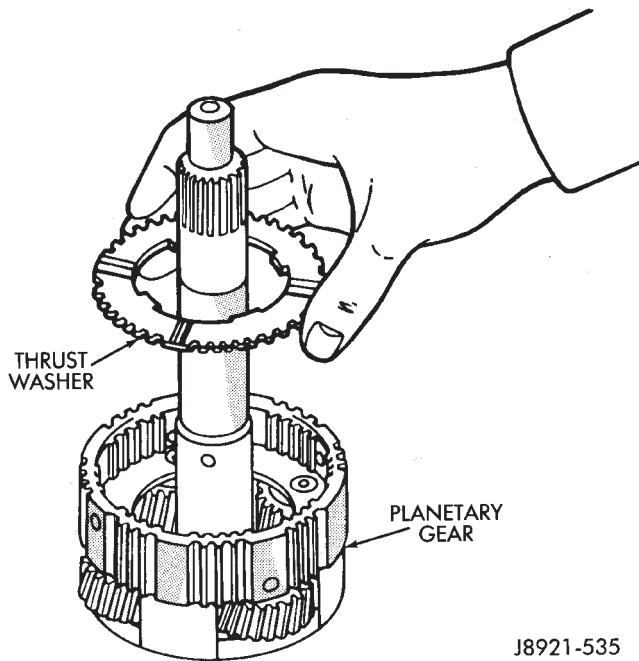
J8921-539

Fig. 208 Checking Planetary Bushing



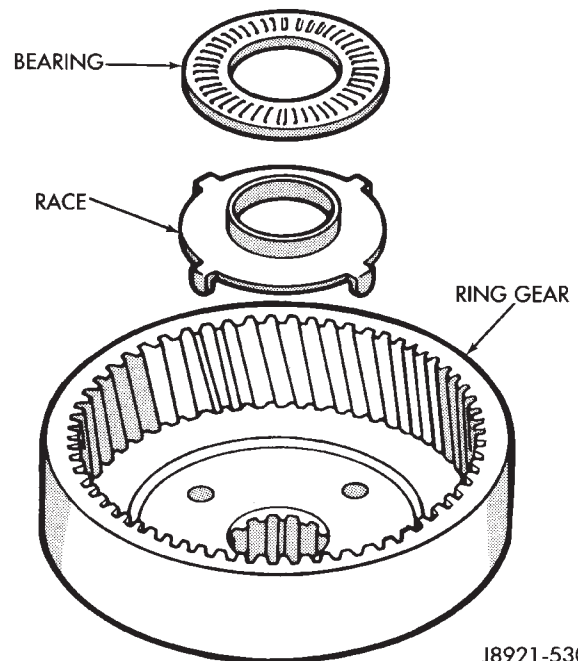
J8921-540

Fig. 210 Assembling One-Way Clutch And Race



J8921-535

Fig. 209 Install Planetary Thrust Washer



J8921-530

Fig. 211 Install Ring Gear Bearing And Race

should be 41.8 mm (1.646 in.); inside diameter is 27.1 mm (1.067 in.).

(6) Install hub in planetary ring gear and install snap ring.

(7) Coat race and bearing with petroleum jelly and install in planetary ring gear (Fig. 211).

(8) Verify bearing/race size. Outside diameter of race is 47.8 mm (1.882 in.) and inside diameter is 24.2 mm (0.953 in.). Outside diameter of bearing is 46.8 mm (1.843 in.) and inside diameter is 26 mm (1.024 in.).

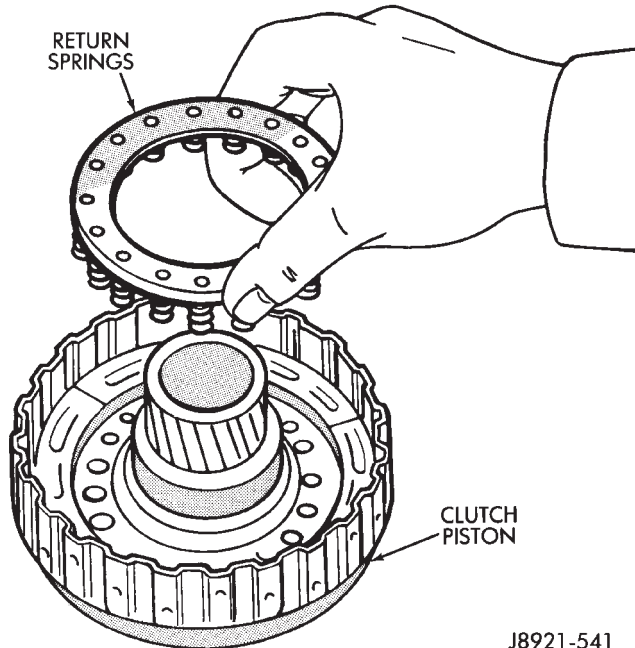
(9) Lubricate new clutch piston O-rings with Mopar® Door Ease, or Ru-Glyde. Then install rings on clutch piston and install piston in clutch drum.

(10) Install piston return springs in clutch piston (Fig. 212).

(11) Install piston snap ring. Compress piston return springs with Tool 7538 and shop press (Fig. 213).

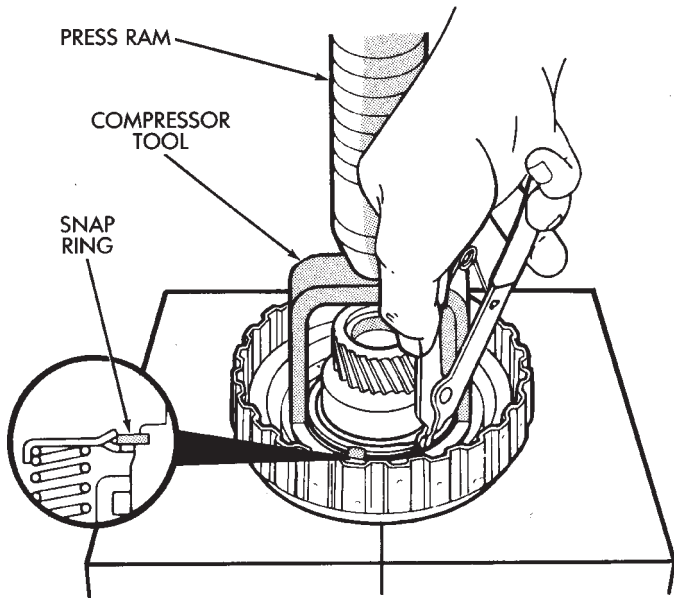
(12) Install overdrive clutch pack in drum. Install steel plate first, then a disc (Fig. 214). Continue installation sequence until required number of discs and plates have been installed.

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-541

Fig. 212 Installing Piston Return Springs



J8921-542

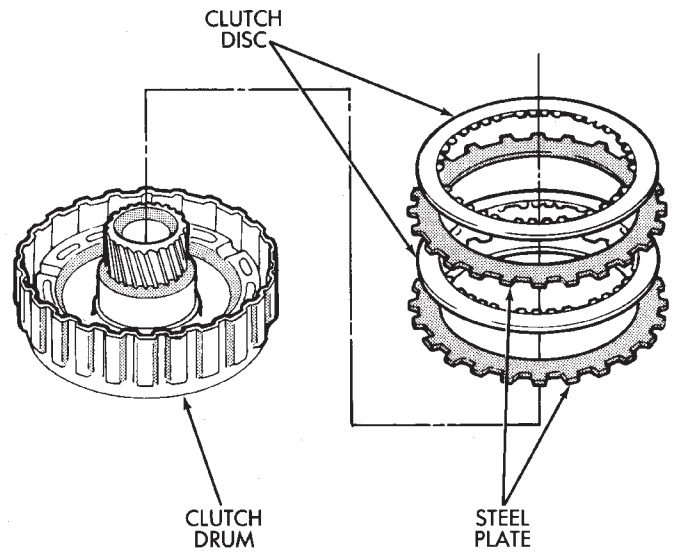
Fig. 213 Installing Clutch Piston Snap Ring

(13) Install clutch pack retainer with flat side facing downward. Then install retainer snap ring (Fig. 215). Compress springs with suitable tool.

(14) Install clutch drum bearing and race assembly (Fig. 216). Be sure bearing rollers face upward as shown. Outside diameter of assembled bearing and race is 50.2 mm (1.976 in.). Inside diameter is 28.9 mm (1.138 in.).

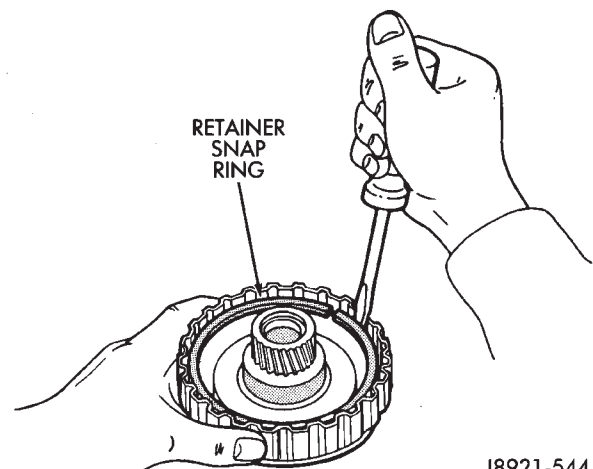
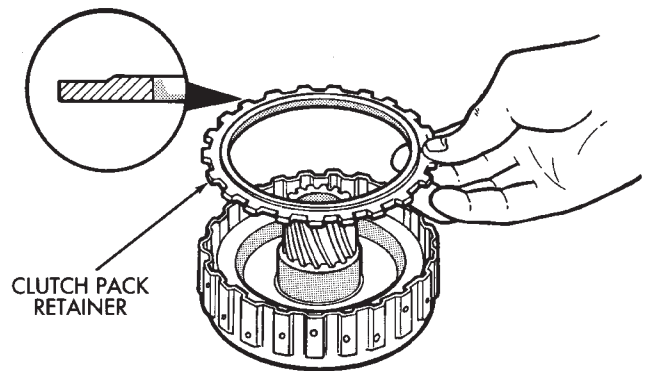
(15) Install clutch on planetary gear.

(16) Verify one-way clutch operation. Hold drum and turn planetary shaft clockwise and counterclockwise. Shaft should turn clockwise freely but lock when turned counterclockwise.



J8921-543

Fig. 214 Installing Overdrive Clutch Discs And Plates



J8921-544

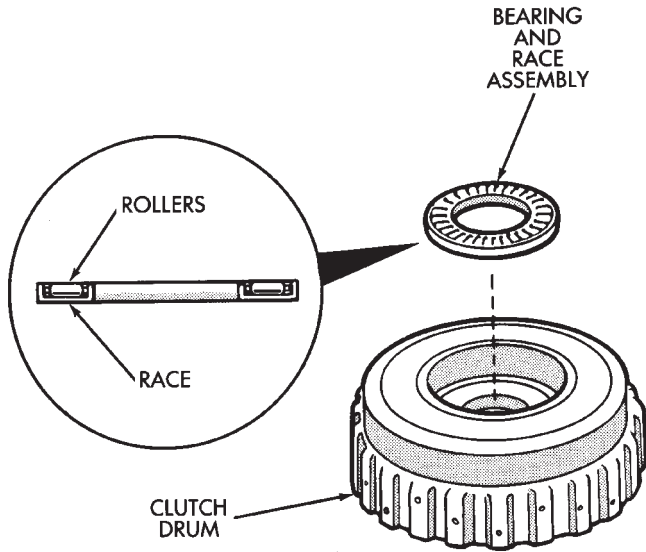
Fig. 215 Installing Retainer And Snap Ring

OVERDRIVE SUPPORT

DISASSEMBLY

(1) Check brake piston operation. Mount support on clutch (Fig. 217).

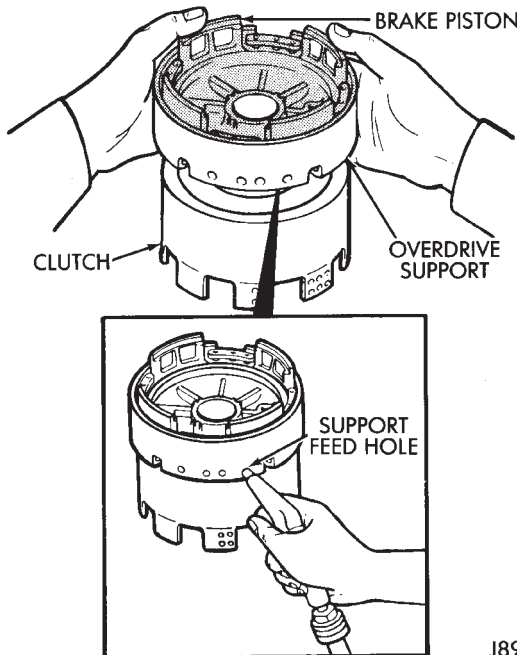
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-545

Fig. 216 Installing Clutch Drum Bearing And Race Assembly

(2) Apply compressed air through support feed hole and observe brake piston movement (Fig. 217). Piston should move smoothly and not bind or stick. If operation is incorrect, replace piston and support.

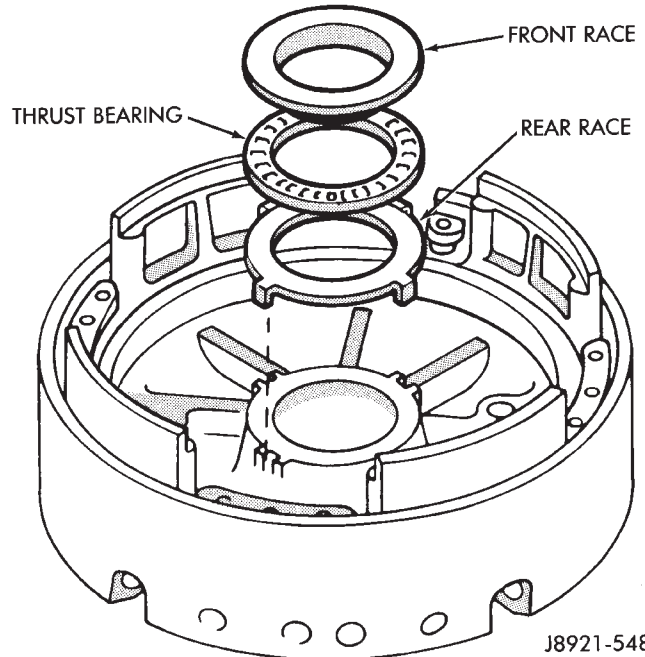


J8921-547

Fig. 217 Checking Brake Piston Movement

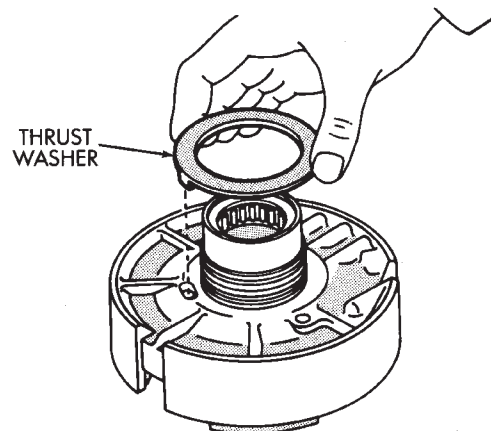
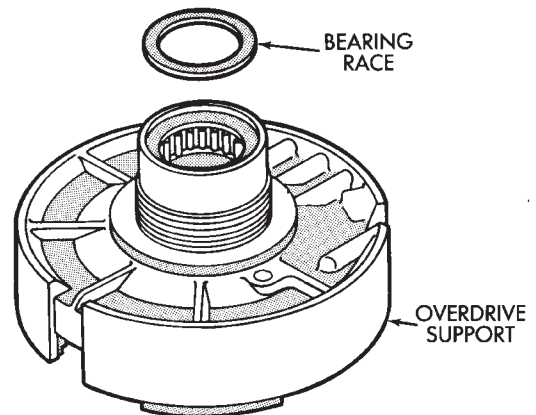
(3) Remove thrust bearing front race, thrust bearing and rear race (Fig. 218).

(4) Turn overdrive support over and remove bearing race and clutch drum thrust washer (Fig. 219).



J8921-548

Fig. 218 Removing Support Thrust Bearing And Races

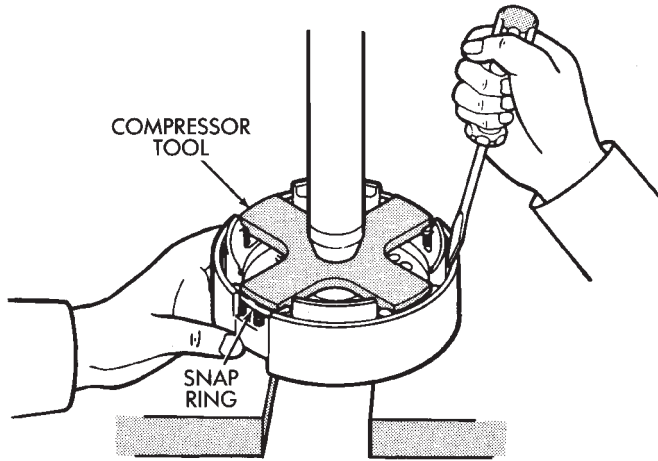


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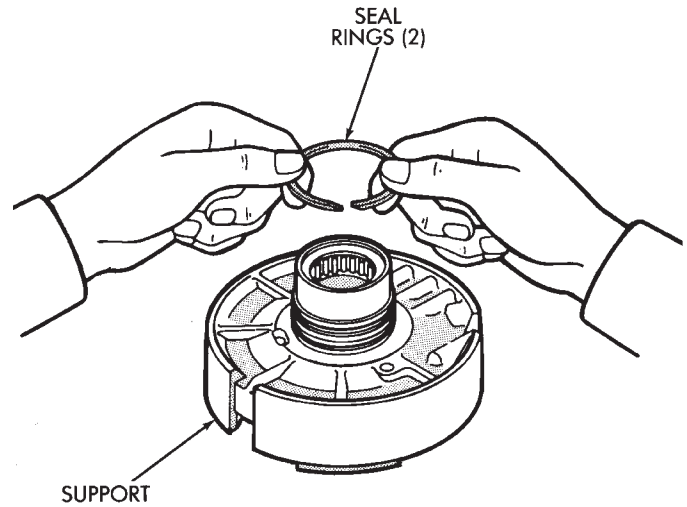
Fig. 219 Removing Clutch Drum Thrust Washer And Race

(5) Compress piston return spring with Spring Compressor 7537 and remove piston snap ring (Fig. 220).

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-550



J8921-551

Fig. 220 Removing/Installing Piston Snap Ring

(6) Mount support in direct clutch and remove brake piston with compressed air. Apply air to same feed hole used when checking piston operation.

(7) Remove and discard support O-rings (Fig. 221).

(8) Remove support seal rings (Fig. 222).

(9) Measure free length of piston return springs with springs mounted in retainer (Fig. 223). Length should be 17.23 mm (0.678 in.).

(10) Clean support components and dry them with compressed air.

(11) Inspect overdrive support and brake piston. Replace support and piston if either part is worn or damaged.

Fig. 222 Removing Support Seal Rings

ASSEMBLY

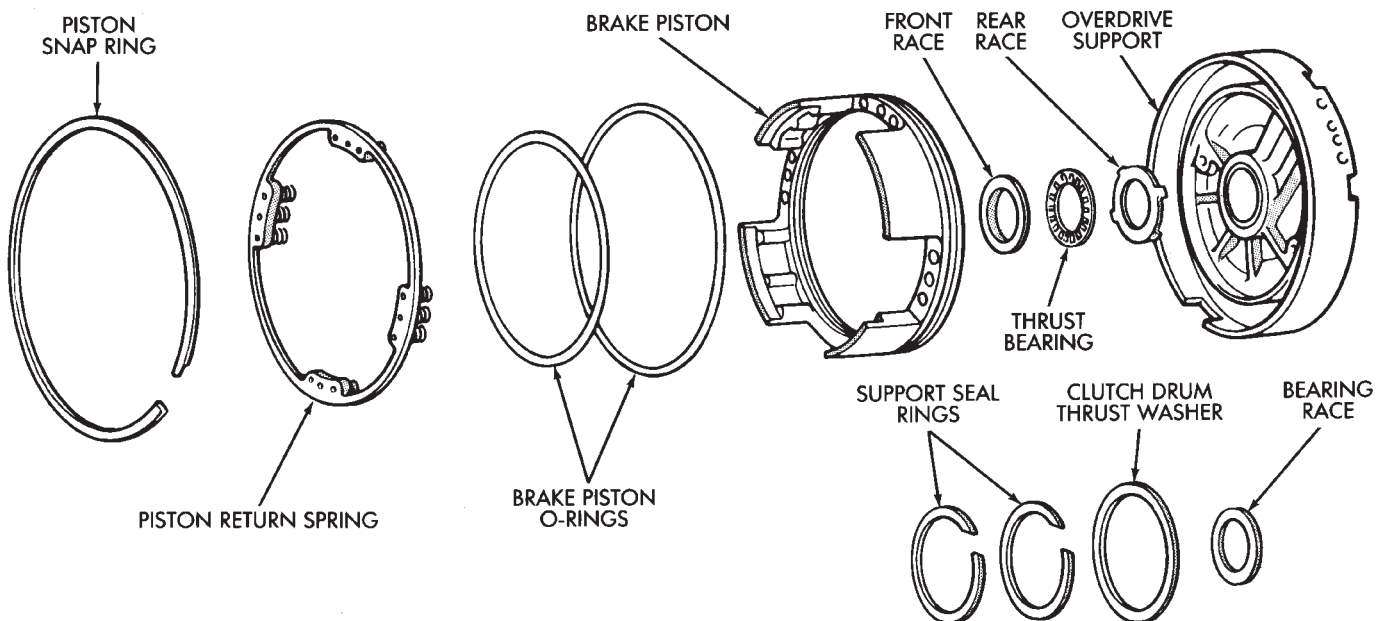
(1) Lubricate new support seal rings. Then compress rings and install them on support (Fig. 224).

(2) Lubricate and install new O-rings on brake piston. Then carefully seat piston in support.

(3) Install return springs on brake piston.

(4) Compress return springs with Spring Compressor 7537 (Fig. 220) and install piston snap ring.

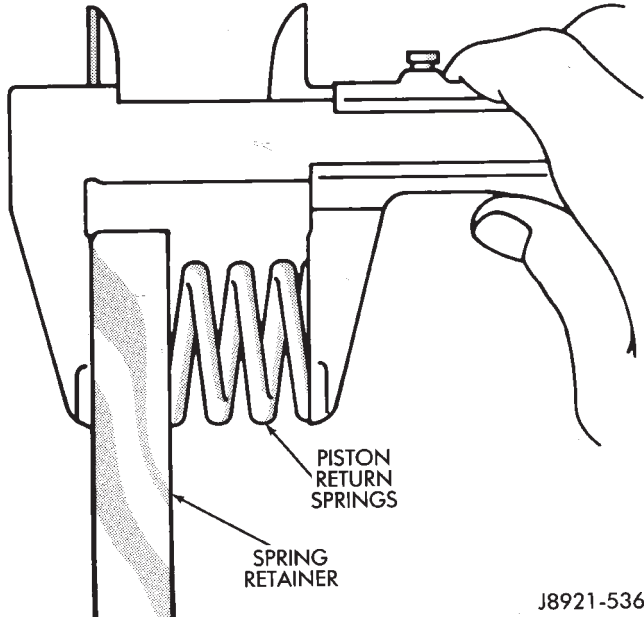
(5) Install support bearing race and clutch drum thrust washer (Fig. 219).



J8921-546

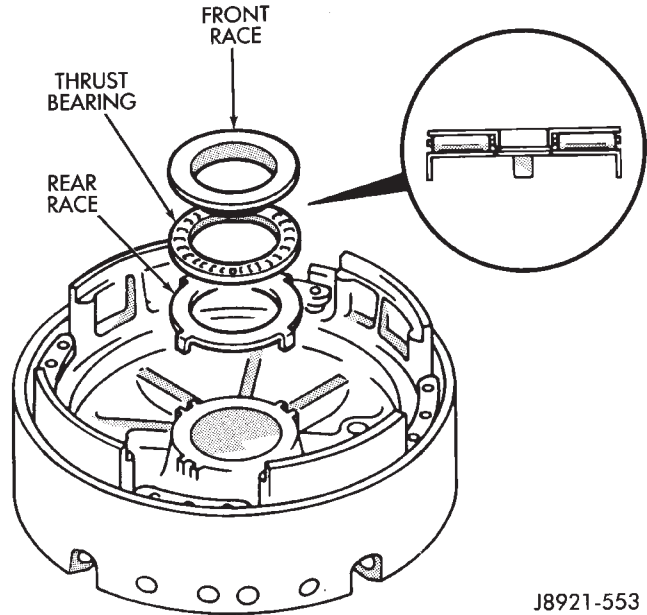
Fig. 221 Overdrive Support Components

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-536

Fig. 223 Checking Piston Return Spring Length



J8921-553

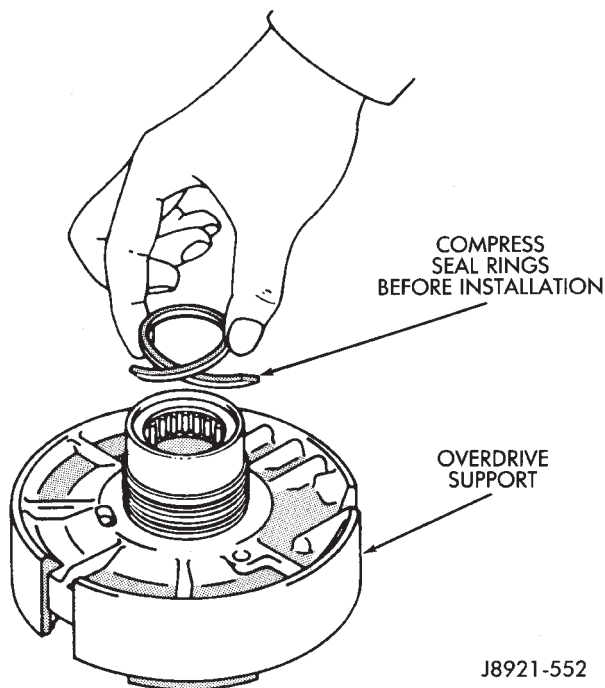
Fig. 225 Installing Support Thrust Bearing And Races

(8) Verify brake piston operation. Use same procedure described at beginning of disassembly. Piston should operate smoothly and not bind or stick.

DIRECT CLUTCH

DISASSEMBLY

(1) Remove direct clutch from forward clutch (Fig. 226).



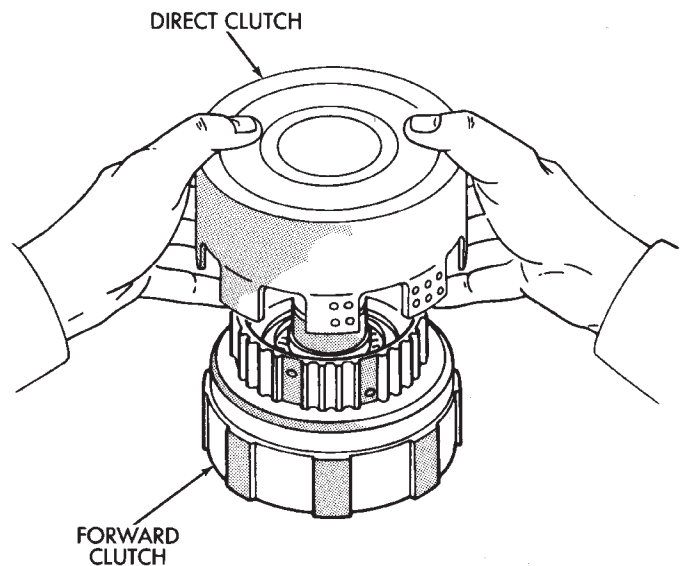
J8921-552

Fig. 224 Installing Support Seal Rings

(6) Install thrust bearing and front and rear bearing races. Thrust bearing rollers should face upward as shown (Fig. 224).

(7) Verify thrust bearing/race sizes (Fig. 225).

- Front race outer diameter is 47.8 mm (1.882 in.) and inside diameter is 30.7 mm (1.209 in.).
- Rear race outer diameter is 47.8 mm (1.882 in.) and inside diameter is 34.3 mm (1.350 in.).
- Bearing outer diameter is 47.7 mm (1.878 in.) and inside diameter is 32.7 mm (1.287 in.).

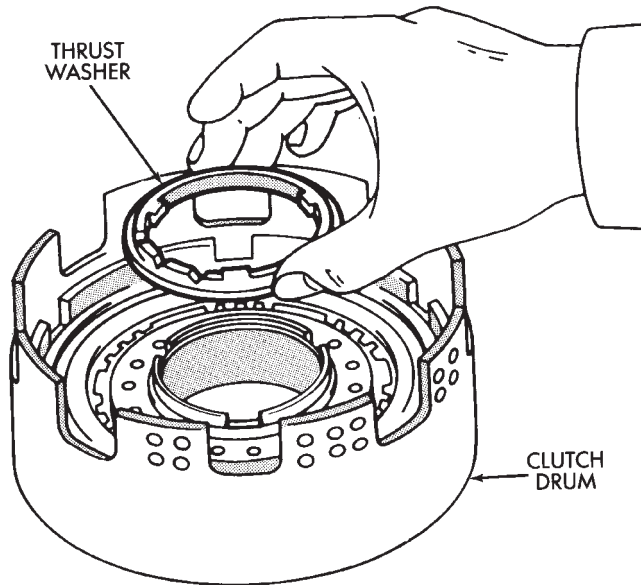


J8921-555

Fig. 226 Separate Direct Clutch From Forward Clutch

(2) Remove clutch drum thrust washer (Fig. 227).

DISASSEMBLY AND ASSEMBLY (Continued)

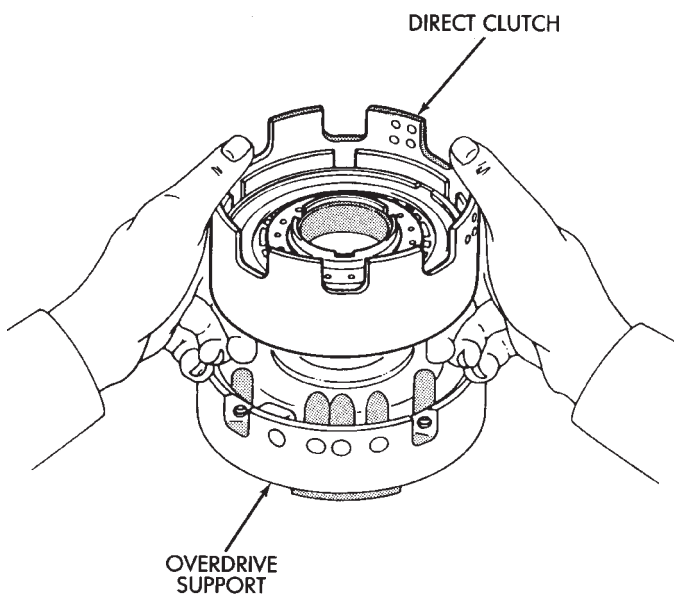


J8921-556

Fig. 227 Removing Clutch Drum Thrust Washer

(3) Check clutch piston stroke length as outlined in following steps.

(4) Mount direct clutch on overdrive support assembly (Fig. 228).



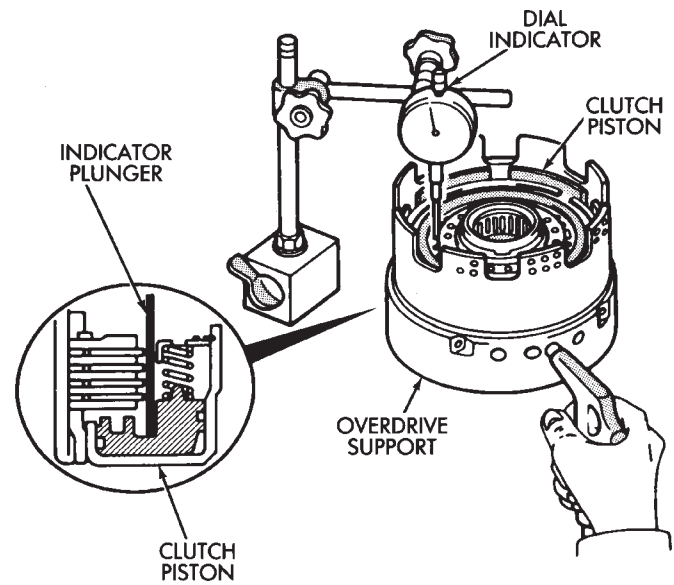
J8921-557

Fig. 228 Mount Direct Clutch On Overdrive Support

(5) Mount dial indicator on clutch and position indicator plunger on clutch piston (Fig. 229).

(6) Apply 57–114 psi air pressure through feed hole in overdrive support and note piston stroke length (Fig. 229). Check stroke at least twice.

(7) Piston stroke length should be 1.37 mm – 1.67 mm (0.054 – 0.065 in.). If stroke length is incorrect,

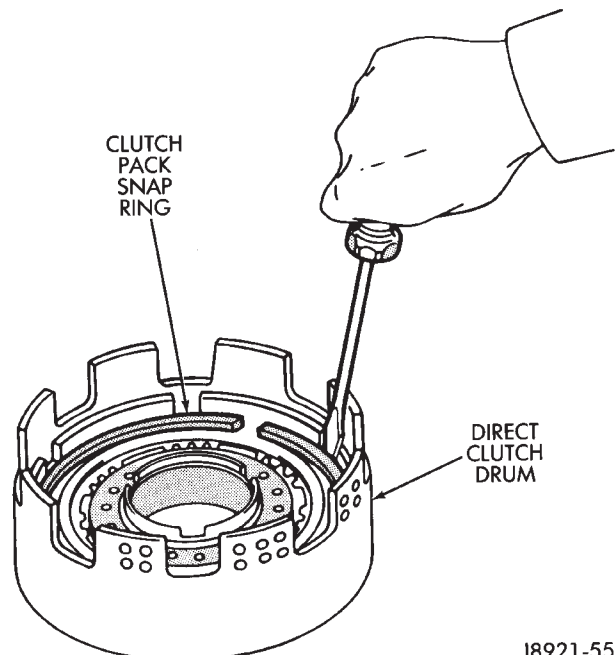


J8921-558

Fig. 229 Checking Direct Clutch Piston Stroke Length

either the clutch pack retainer or clutch discs will have to be replaced.

(8) Remove clutch pack snap ring and remove retainer and clutch pack from drum (Fig. 230).



J8921-559

Fig. 230 Removing Clutch Pack Snap Ring

(9) Compress clutch piston return springs with tool 7538 and remove clutch piston snap ring (Fig. 231).

(10) Remove compressor tool and return spring.

(11) Remove clutch piston. Remount clutch on overdrive support (Fig. 232). Apply compressed air

DISASSEMBLY AND ASSEMBLY (Continued)

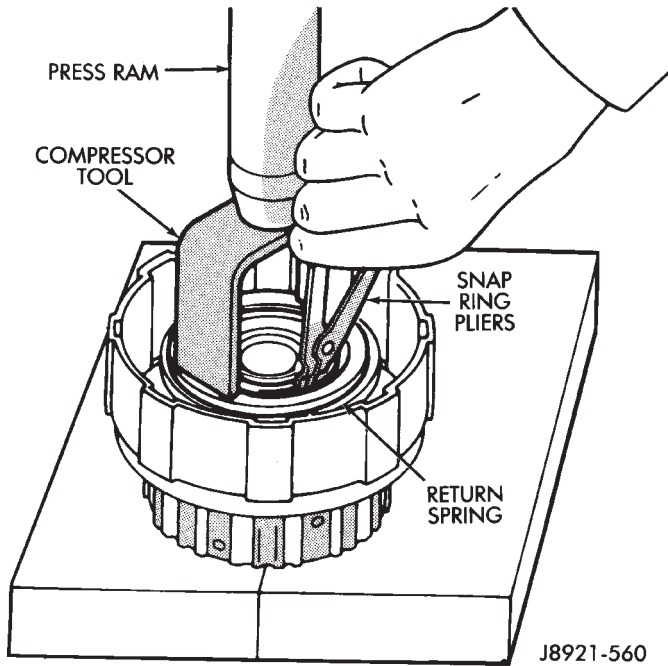


Fig. 231 Removing Piston Return Spring

through piston feed hole in support to remove piston. Use only enough air to ease piston out.

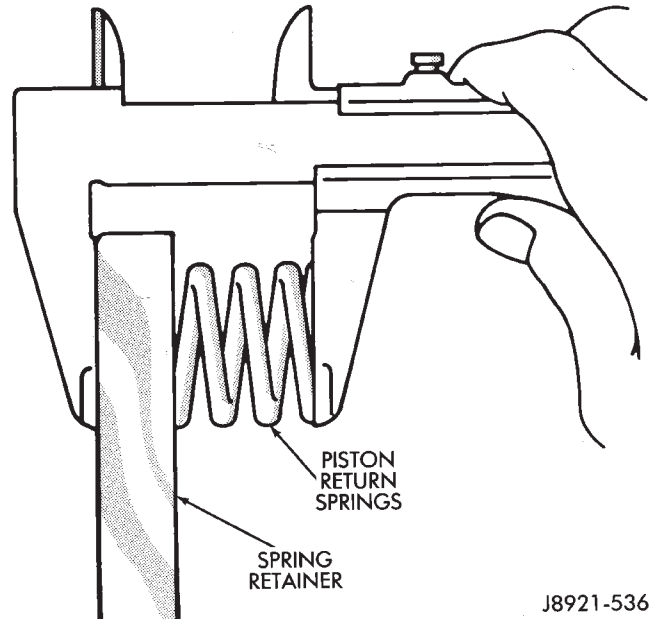


Fig. 233 Checking Piston Return Spring Length

(15) Check clutch piston check ball (Fig. 234). Shake piston to see if ball moves freely. Then check ball seating by applying low pressure compressed air to ball inlet as shown. Air should not leak past check ball.

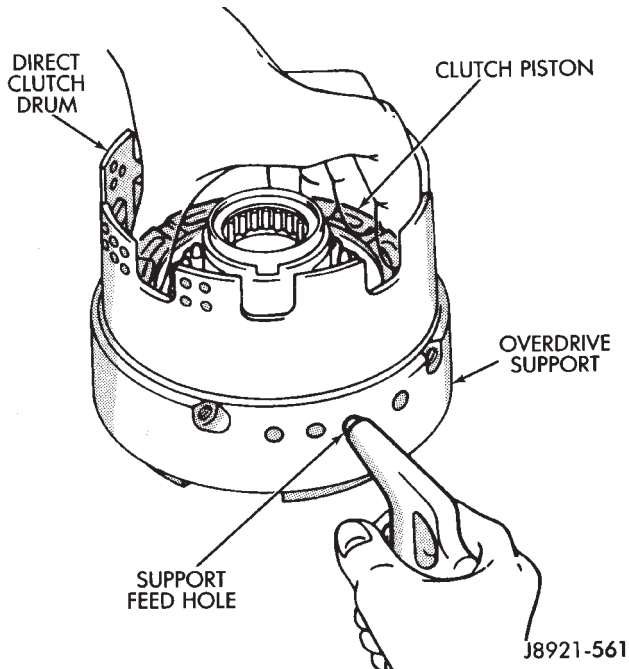


Fig. 232 Removing Direct Clutch Piston

(12) Remove and discard clutch piston O-rings.
 (13) Measure clutch disc thickness. Minimum allowable thickness is 1.84 mm (0.0724 in.). Replace clutch pack if any disc is below minimum thickness.
 (14) Measure free length of piston return springs with springs in retainer (Fig. 233). Length should be 21.32 mm (0.839 in.). Replace return springs if not within specification.

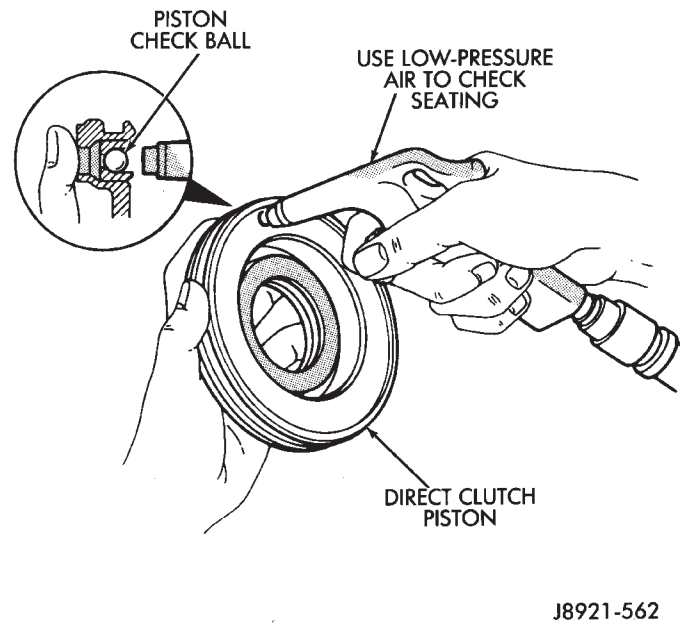


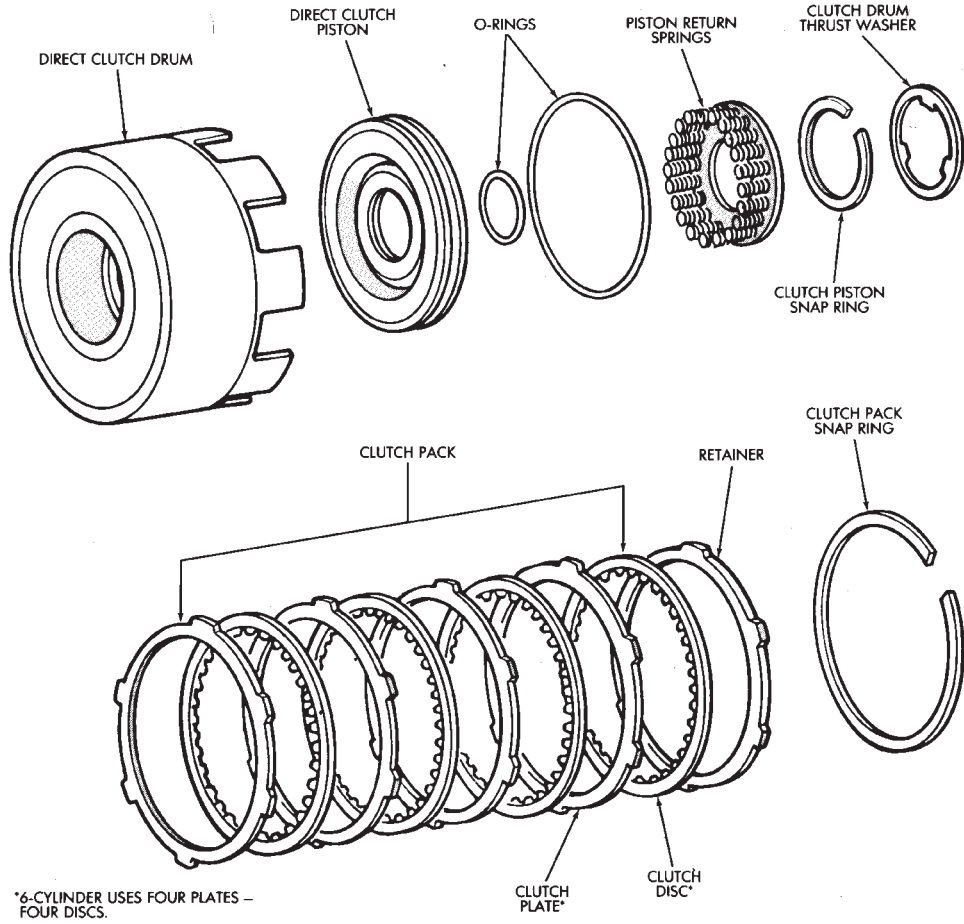
Fig. 234 Testing Piston Check Ball Seating

(16) Measure inside diameter of clutch drum bushing. Inside diameter should be no more than 53.97 mm (2.1248 in.). Replace drum if bushing inside diameter is greater than specified.

ASSEMBLY

(1) Lubricate and install replacement O-rings on clutch piston (Fig. 235).

DISASSEMBLY AND ASSEMBLY (Continued)



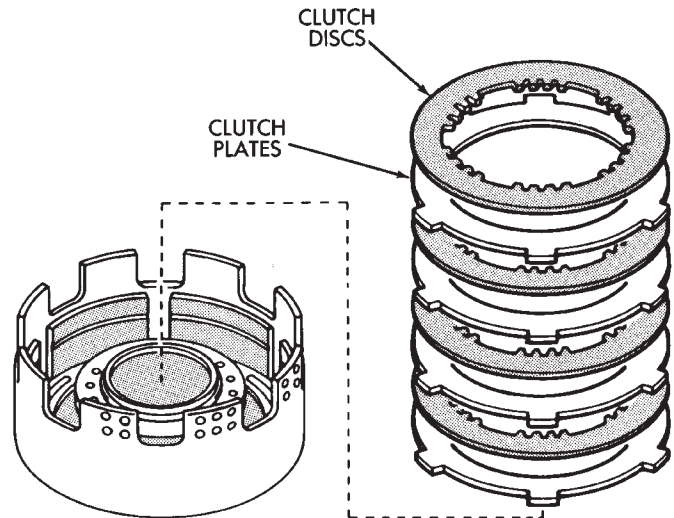
J8921-554

Fig. 235 Direct Clutch Components

(2) Install clutch piston in drum and install return springs on piston.

(3) Compress piston return springs with Tool 7538 and install snap ring (Fig. 231). Be sure snap ring end gap is not aligned with spring retainer tab.

(4) Install clutch discs and plates (Fig. 236). Install plate then disc until all plates and discs are installed. Four plates and discs are required.

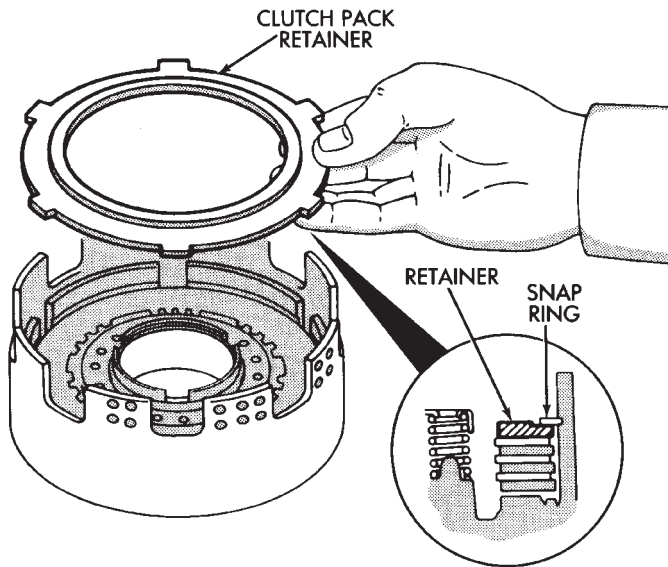


J8921-563

Fig. 236 Installing Direct Clutch Discs And Plates

DISASSEMBLY AND ASSEMBLY (Continued)

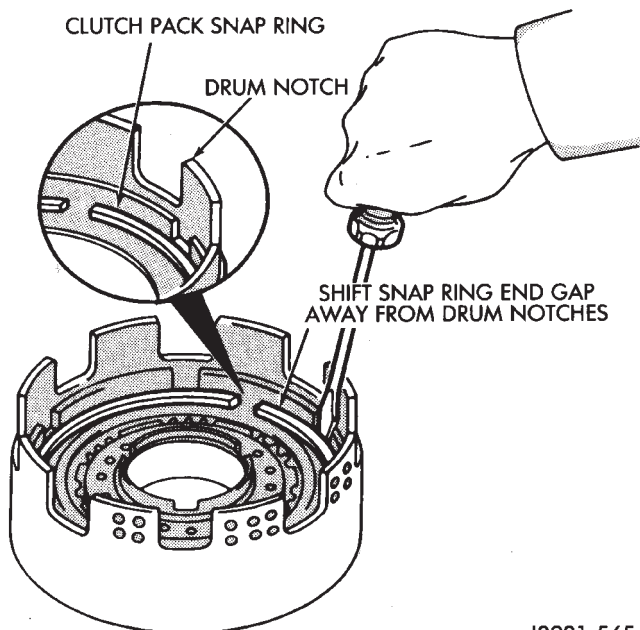
- (5) Install clutch pack retainer in drum (Fig. 237).
- (6) Install clutch pack snap ring (Fig. 237).



J8921-564

Fig. 237 Install Clutch Pack Retainer

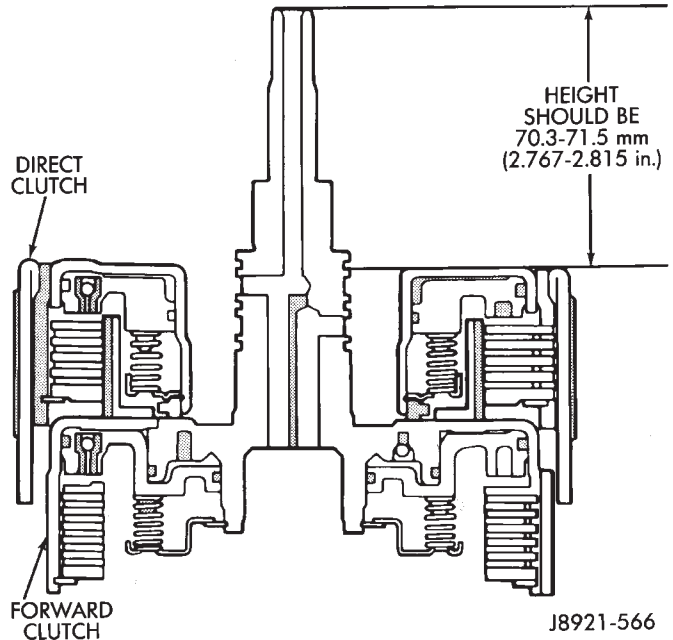
- (7) Check snap ring position. If necessary, shift snap ring until end gap is **not** aligned with any notches in clutch drum (Fig. 238).



J8921-565

Fig. 238 Adjusting Clutch Pack Snap Ring Position

- (8) Lubricate clutch drum thrust washer with petroleum jelly and install it in drum (Fig. 228).
- (9) Mount direct clutch assembly on forward clutch assembly and check assembled height (Fig. 239). Height should be 70.3 to 71.5 mm (2.767 to 2.815 in.).

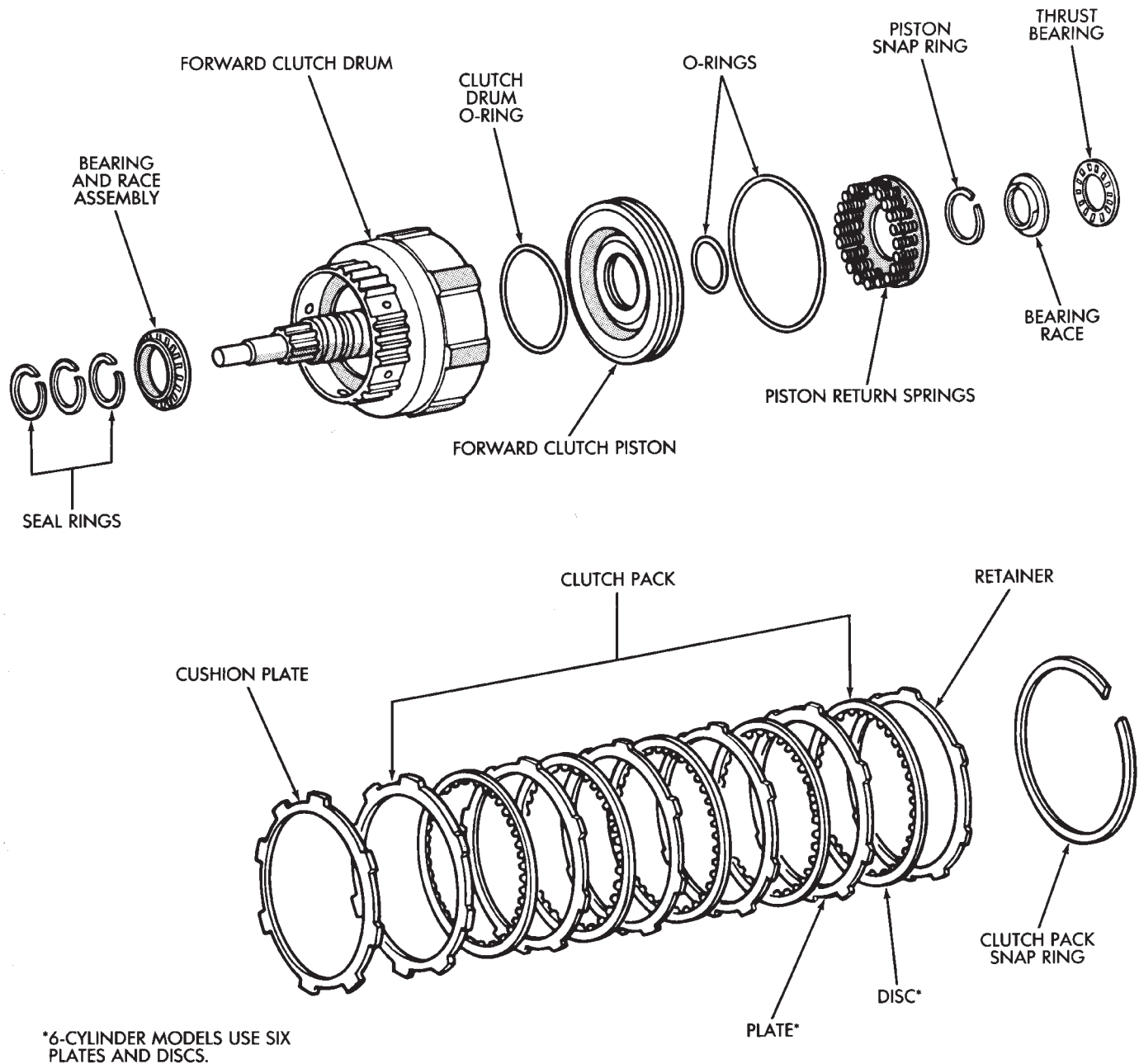
**Fig. 239 Checking Direct Clutch Assembled Height**

- (10) If assembled height is incorrect, clutches are not seated.

FORWARD CLUTCH**DISASSEMBLY**

- (1) Check clutch piston stroke as outlined in following steps.
- (2) Position overdrive support on wood blocks and mount forward clutch drum on support (Fig. 241).
- (3) Remove bearing and race from forward clutch drum (Fig. 241).
- (4) Install a suitable threaded bolt/rod into the side of the overdrive support.
- (5) Mount Miller Tool C-3339 dial indicator components onto the threaded rod as necessary.
- (6) Position dial indicator plunger squarely against clutch piston.
- (7) Apply compressed air through right side feed hole in support and note piston stroke length on dial indicator.
- (8) Stroke length should be 3.55 – 3.73 mm (0.1348 – 0.1469 in.).
- (9) Replace clutch discs if stroke length is incorrect.
- (10) Remove clutch pack snap ring and remove retainer and clutch pack (Fig. 242).
- (11) Remove clutch pack cushion plate (Fig. 243).
- (12) Compress clutch springs with Tool 7538 and remove piston snap ring.
- (13) Remove spring compressor tool and piston return springs.
- (14) Remount forward clutch drum on overdrive support (Fig. 244).

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-567

Fig. 240 Forward Clutch Components

(15) Apply compressed air through feed hole in support to remove piston (Fig. 244). Use only enough air pressure to ease piston out of drum.

(16) Remove and discard clutch piston O-rings (Fig. 245).

(17) Remove clutch drum O-ring from rear hub of drum.

(18) Remove three seal rings from clutch drum shaft (Fig. 246).

(19) Remove thrust bearing and race assembly from clutch drum (Fig. 247).

(20) Measure clutch disc thickness (Fig. 248). Minimum allowable thickness is 1.51 mm (0.0595 in.). Replace clutch pack if any disc falls below specified minimum thickness.

(21) Measure free length of piston return springs with springs mounted in retainer (Fig. 249). Length should be 19.47 mm (0.767 in.). Replace springs and retainer if length is incorrect.

(22) Inspect clutch piston check ball (Fig. 250). Ball should move freely within piston. Check ball seating by applying low pressure compressed air to

DISASSEMBLY AND ASSEMBLY (Continued)

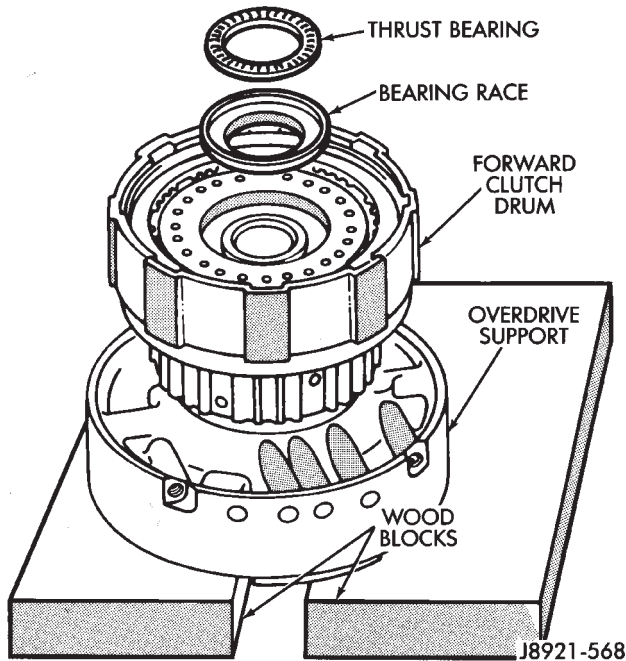


Fig. 241 Positioning Drum And Support On Wood Blocks

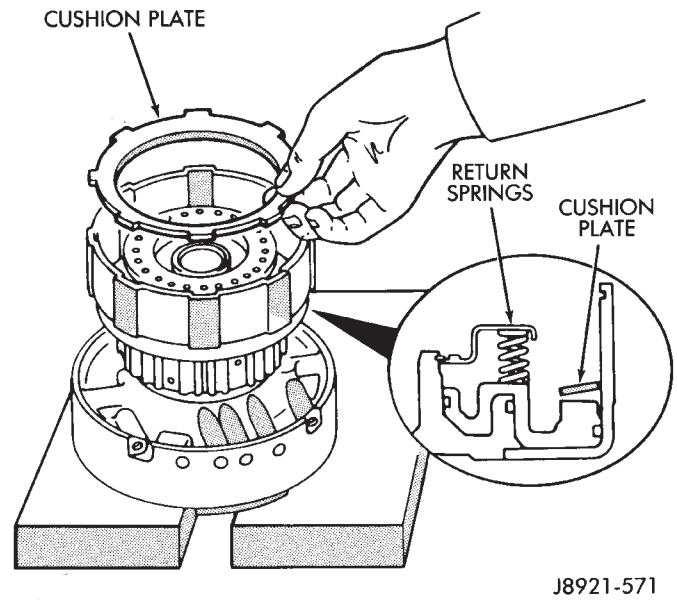


Fig. 243 Removing Cushion Plate

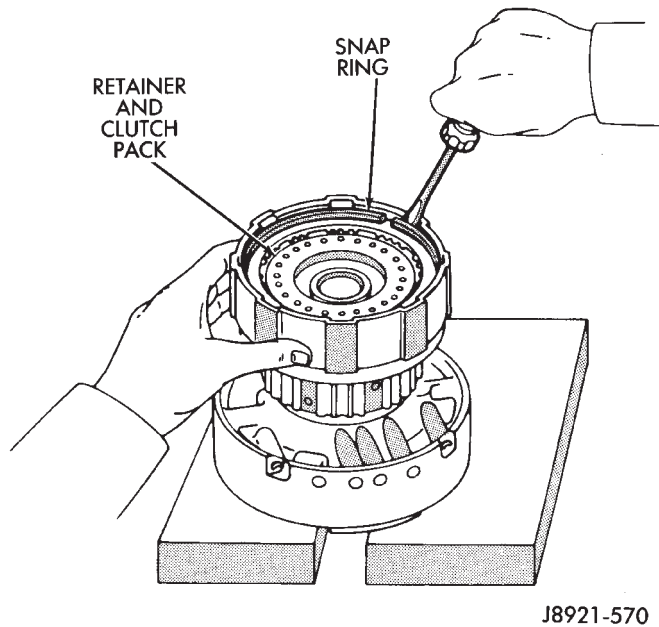


Fig. 242 Removing Retainer And Clutch Pack

ball feed hole. Ball should seat firmly and not leak air.

(23) Measure inside diameter of bushing in clutch drum hub. Maximum allowable diameter is 24.08 mm (0.9480 in.). Replace clutch drum if bushing inside diameter is greater than specified.

ASSEMBLY

(1) Lubricate bearing and race assembly with petroleum jelly and install it in clutch drum (Fig.

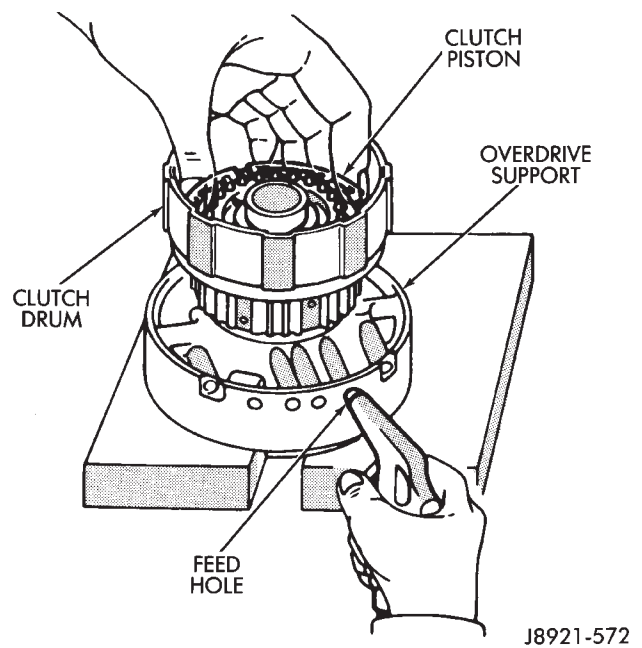


Fig. 244 Removing Forward Clutch Piston

251). Race side of assembly faces downward and toward drum. Bearing rollers face up (Fig. 251)

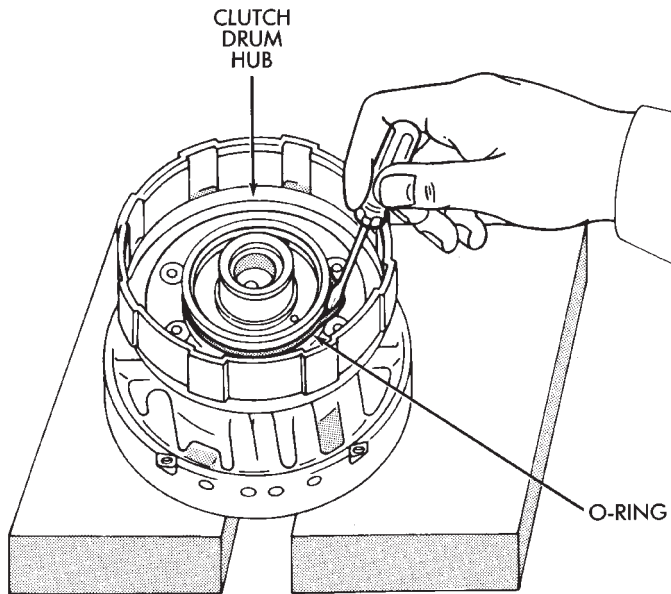
(2) Coat new clutch drum shaft seal rings with petroleum jelly. Before installing drum shaft seal rings, squeeze each ring so ring ends overlap (Fig. 252). This tightens ring making clutch installation easier.

(3) Install seal rings on shaft. Keep rings closed as tightly as possible during installation. Avoid over-spreading them.

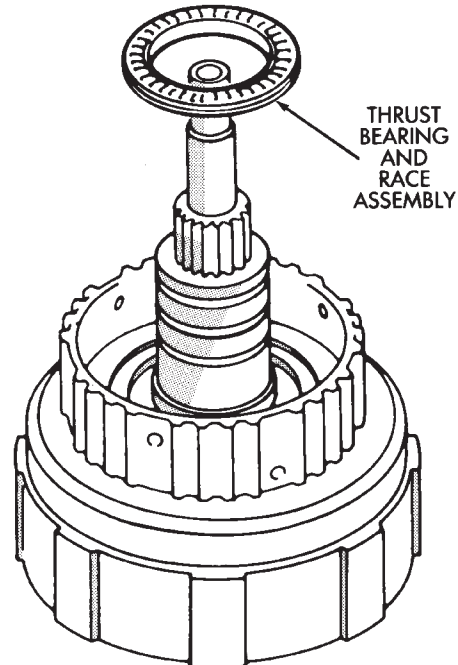
(4) Mount clutch drum on overdrive support.

(5) Lubricate and install new O-ring on clutch drum hub (Fig. 245).

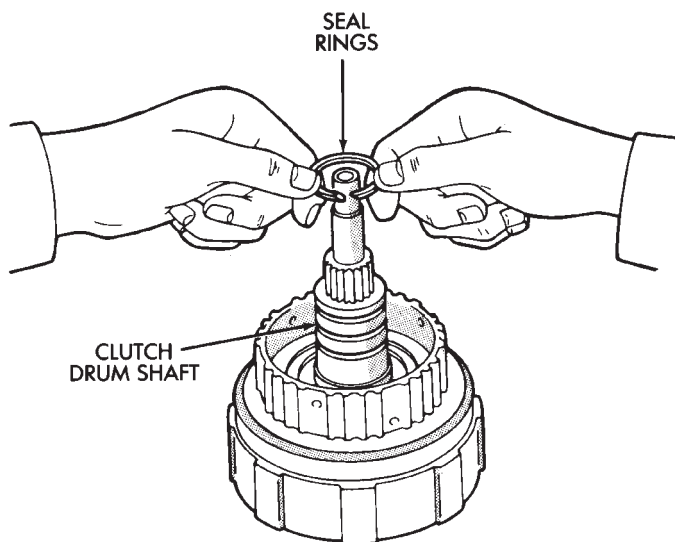
DISASSEMBLY AND ASSEMBLY (Continued)



J8921-573

Fig. 245 Removing/Installing Clutch Drum O-Ring

J8921-575

Fig. 247 Removing Clutch Drum Thrust Bearing Assembly

J8921-574

Fig. 246 Removing Clutch Drum Seal Rings

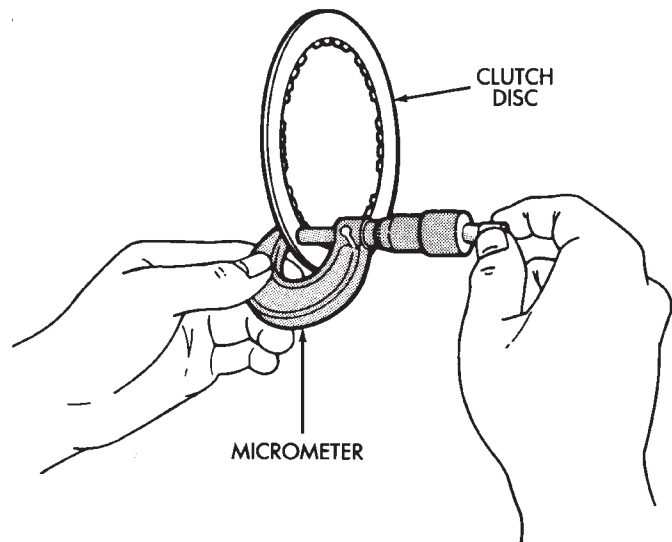
(6) Lubricate new clutch piston O-rings with Mopar Door Ease, or Ru-Glyde. Install rings on clutch piston and install piston in drum.

(7) Install piston return springs.

(8) Compress piston return springs with Tool 7538 and shop press and install piston snap ring. Be sure snap ring end gap is not aligned with any notches in drum.

(9) Install cushion plate in drum. Concave side of plate faces downward (Fig. 243).

(10) Install clutch discs, plates and retainer (Fig. 253). Install tabbed plate followed by disc until



J8921-576

Fig. 248 Measuring Clutch Disc Thickness

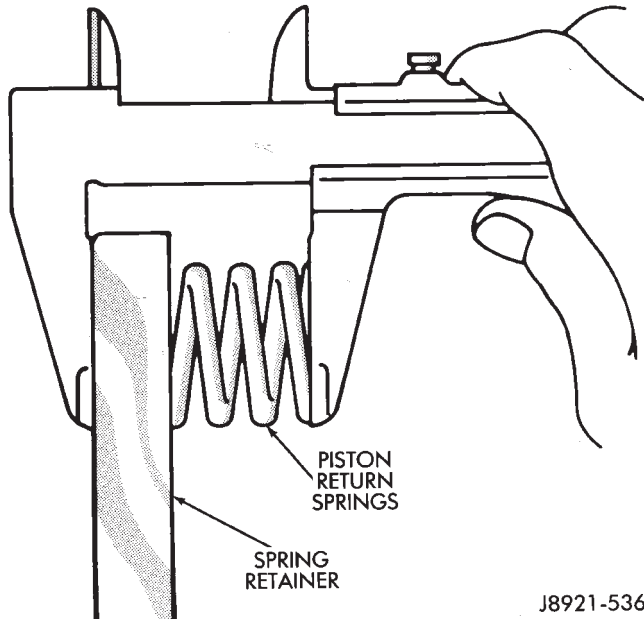
required number of plates and discs are installed. Use six plates and discs.

(11) Install clutch pack snap ring.

(12) Recheck clutch piston stroke length using same method outlined at beginning of disassembly procedure. If stroke length is not within specified limits, replace clutch discs.

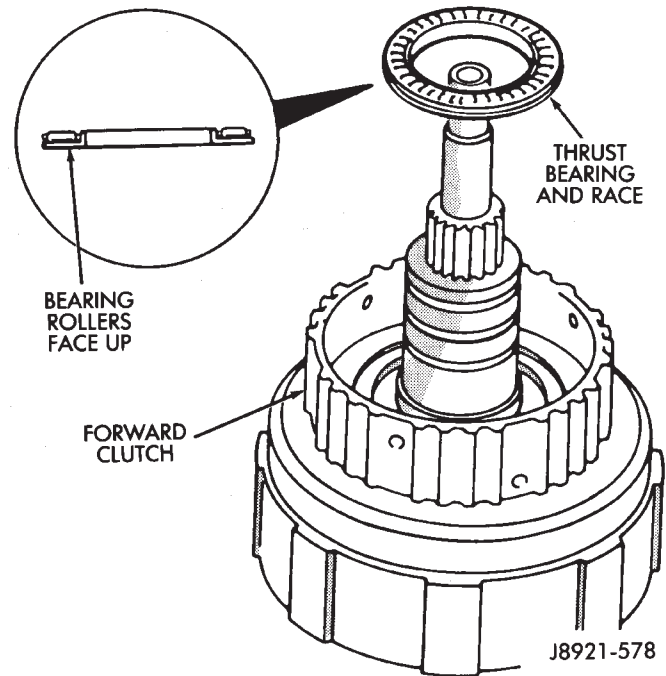
(13) Lubricate race and bearing with petroleum jelly and install them in clutch drum (Fig. 254). Be

DISASSEMBLY AND ASSEMBLY (Continued)



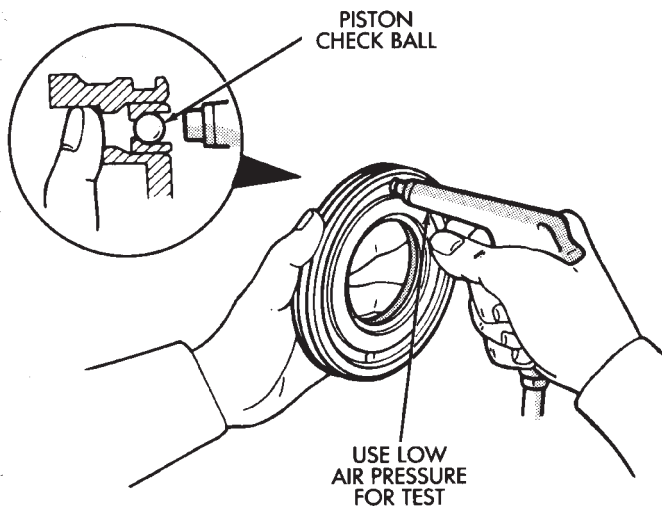
J8921-536

Fig. 249 Checking Return Spring Length



J8921-578

Fig. 251 Installing Thrust Bearing And Race



J8921-577

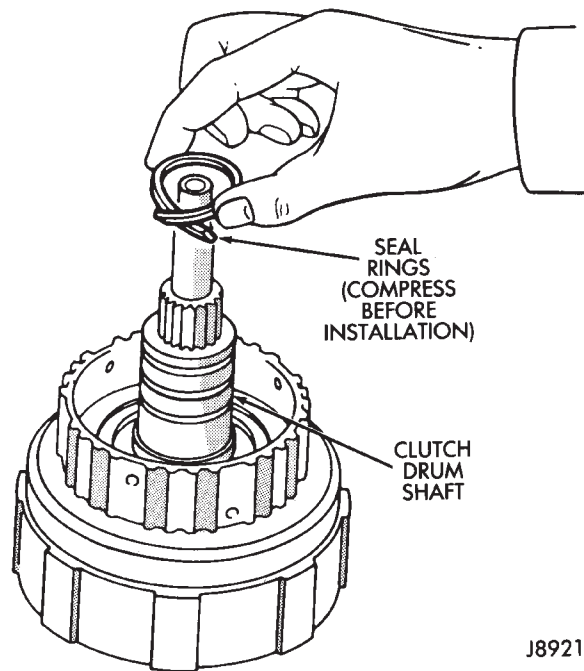
Fig. 250 Testing Piston Check Ball

sure bearing rollers face up and race lip seats in drum as shown.

(14) Verify bearing and race size.

- Outer diameter of bearing is 46.7 mm (1.839 in.).
- Outer diameter of race is 48.9 mm (1.925 in.).
- Inner diameter of bearing and race is 26.0 mm (1.024 in.).

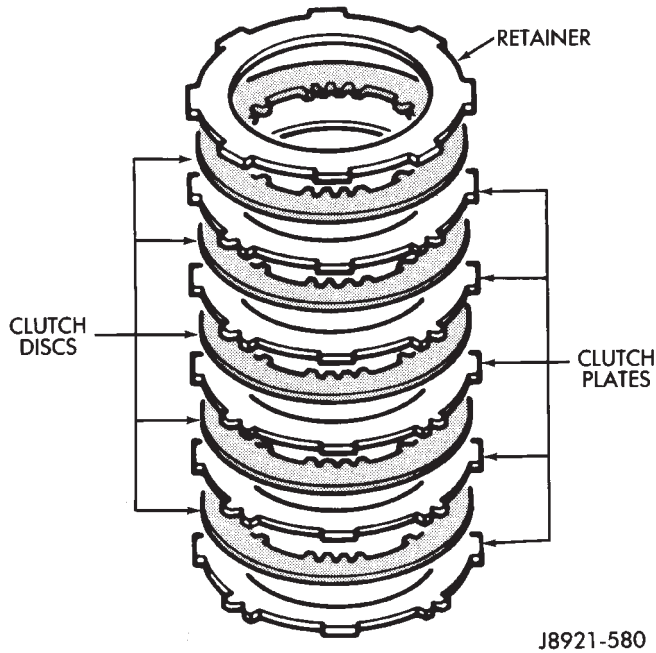
(15) Mount forward clutch on direct clutch and check assembled height (Fig. 255). Height should be 70.3 – 71.5 mm (2.767 – 2.815 in.).



J8921-579

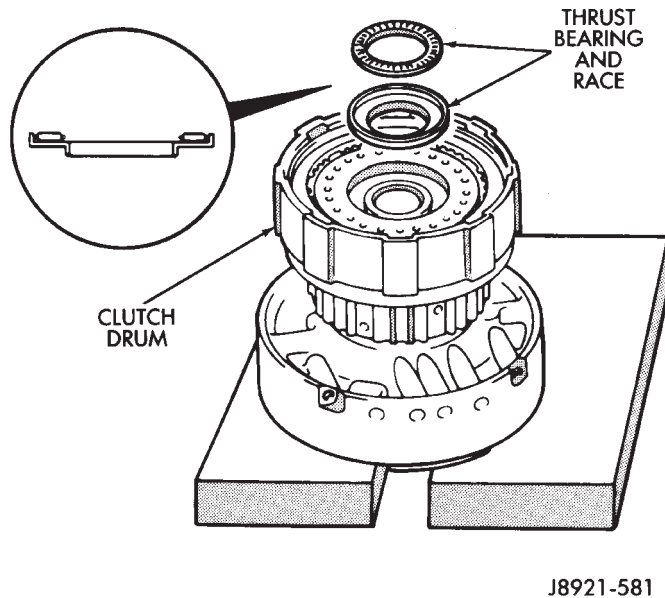
Fig. 252 Installing Clutch Drum Shaft Seal Rings

DISASSEMBLY AND ASSEMBLY (Continued)



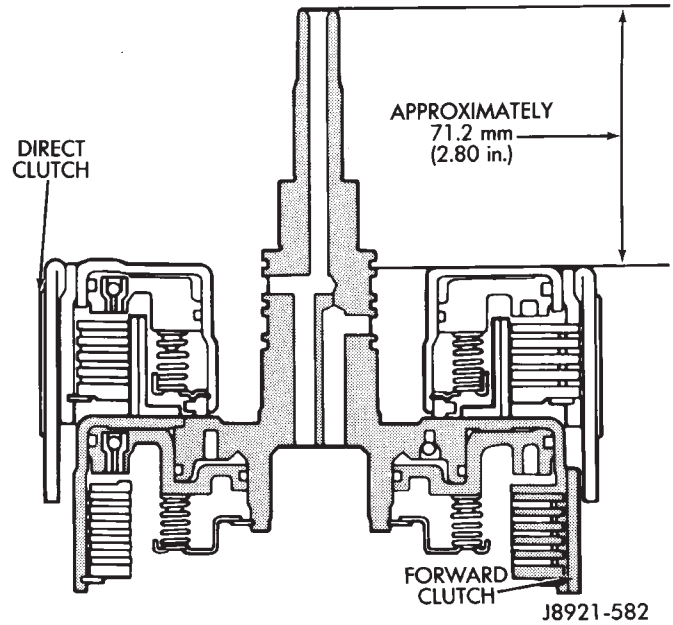
J8921-580

Fig. 253 Installing Forward Clutch Discs And Plates



J8921-581

Fig. 254 Installing Thrust Bearing And Race



J8921-582

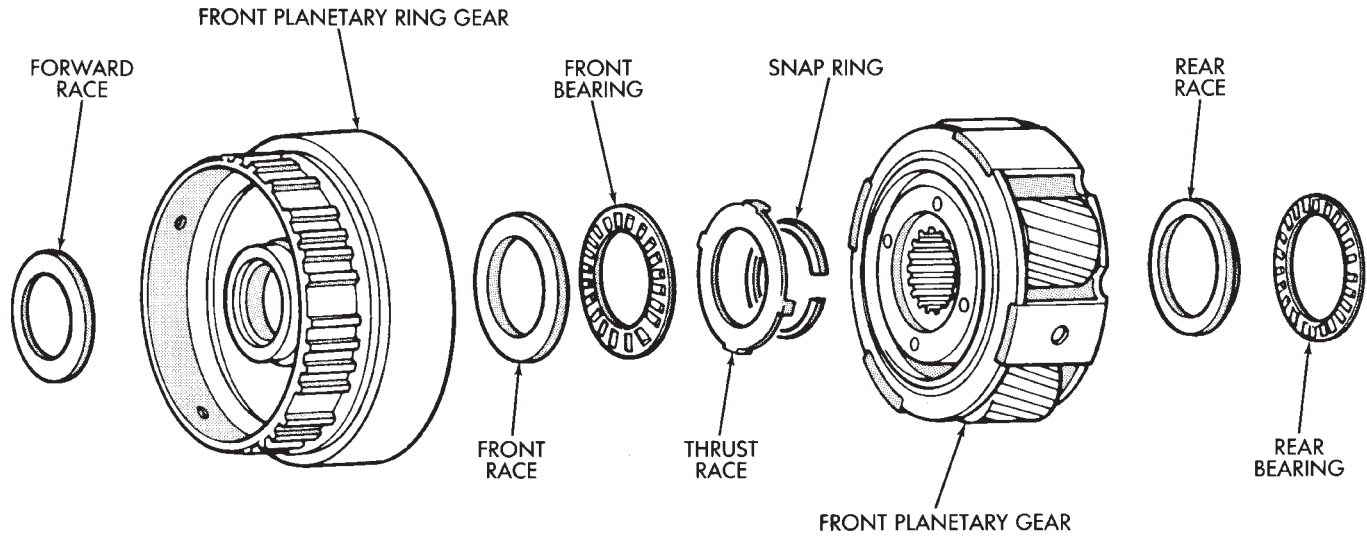
Fig. 255 Checking Forward Clutch Assembled Height

FRONT PLANETARY GEAR

DISASSEMBLY

- (1) Remove ring gear from planetary gear (Fig. 256).
- (2) Remove front bearing and the two races from ring gear (Fig. 256).
- (3) Remove tabbed thrust race from planetary gear (Fig. 256).
- (4) Remove snap ring attaching planetary gear to shaft and remove gear.
- (5) Remove rear bearing and race from planetary gear.
- (6) Measure inside diameter of ring gear bushing. Maximum allowable diameter is 24.08 mm (0.9480 in.). Replace ring gear if bushing inside diameter is greater than specified.
- (7) Check condition of planetary gear. Replace gear if teeth are worn, pins are loose, or carrier is cracked, distorted, or worn.

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-583

Fig. 256 Front Planetary Gear Components

ASSEMBLY

(1) Lubricate planetary and ring gear bearings and races with petroleum jelly.

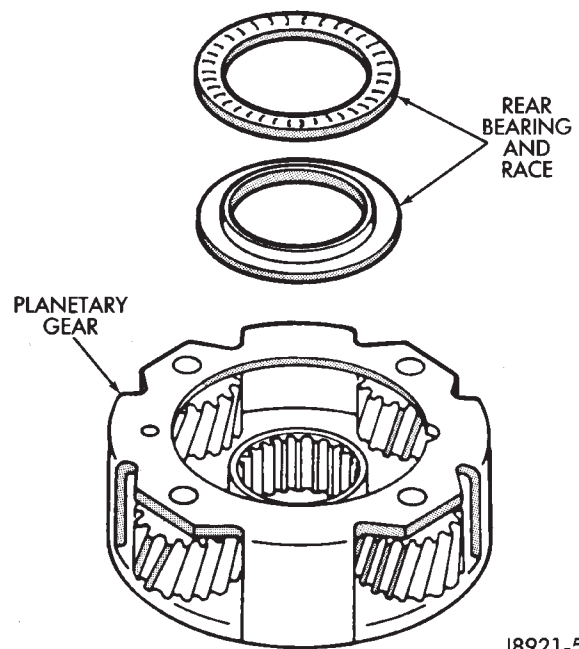
(2) Identify planetary bearings and races before installation. (Fig. 256). Bearings and races can be identified by following dimensions:

- Outer diameter of rear bearing is 47.7 mm (1.878 in.). Inner diameter is 35.5 mm (1.398 in.).
- Outer diameter of rear race 47.6 mm (1.874 in.). Inner diameter is 33.7 mm (1.327 in.).
- Outer diameter of front race is 53.6 mm (2.110 in.). Inner diameter is 30.5 mm (1.201 in.).
- Outer diameter of front bearing is 47.7 mm (1.878 in.). Inner diameter is 32.6 (1.283 in.).
- Outer diameter of forward race is 47.0 mm (1.850 in.). Inner diameter is 26.5 mm 1.043 in.).

(3) Install rear race and bearing in gear (Fig. 257).

(4) Turn planetary over and install thrust race (Fig. 258).

(5) Install front race and bearing and forward race in ring gear (Fig. 259).



J8921-584

Fig. 257 Front Planetary Rear Bearing and Race Installation

DISASSEMBLY AND ASSEMBLY (Continued)

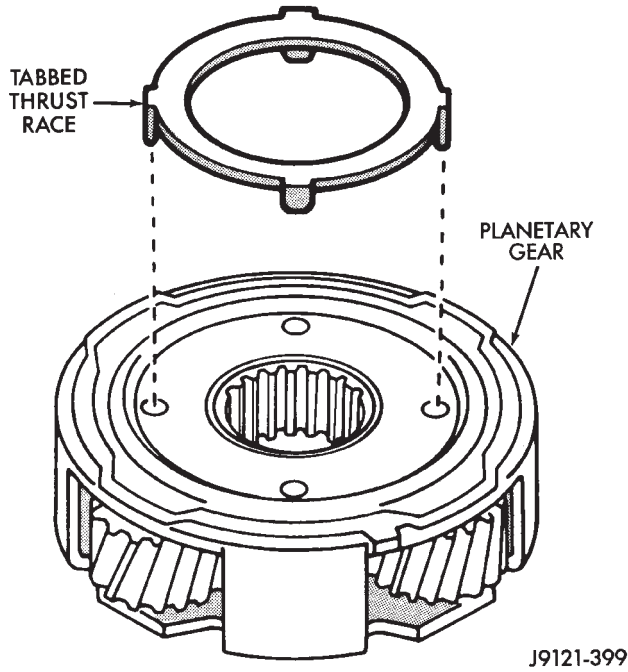


Fig. 258 Front Planetary Thrust Race Installation

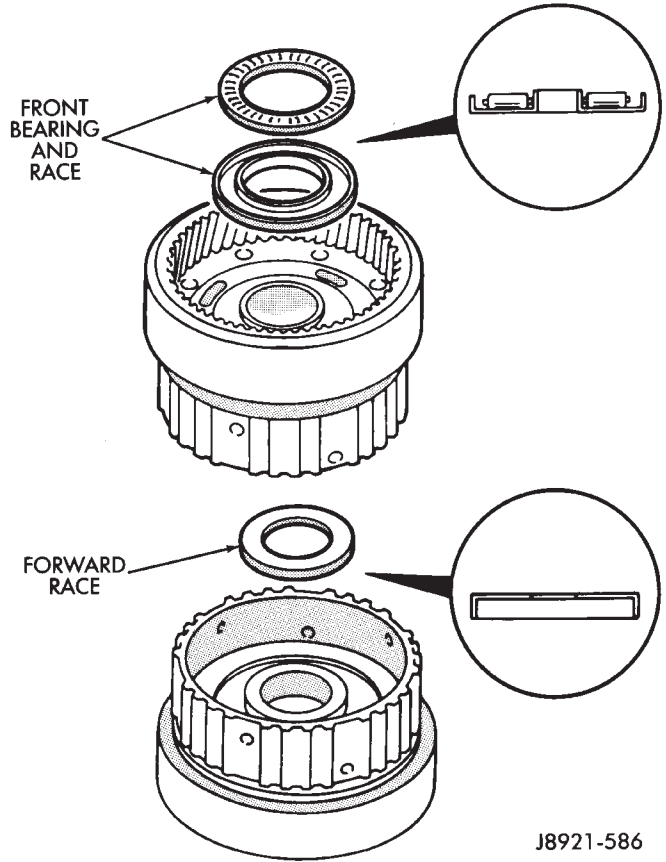
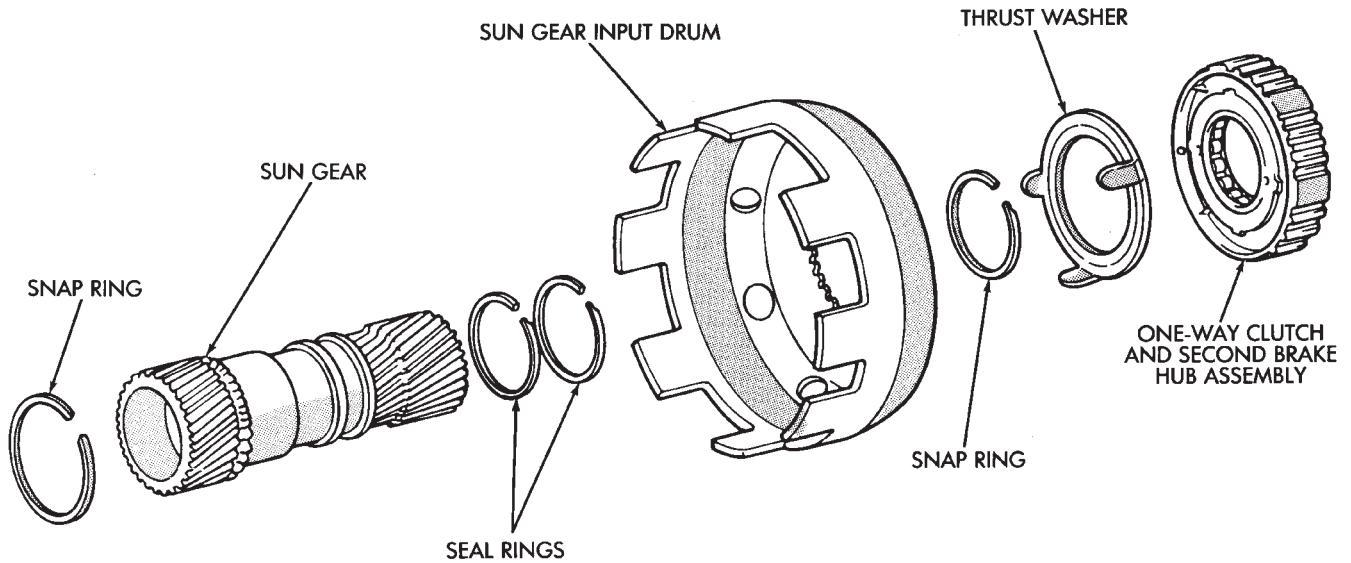


Fig. 259 Front Planetary Front Bearing And Races Installation

SUN GEAR AND NO. 1 ONE-WAY CLUTCH



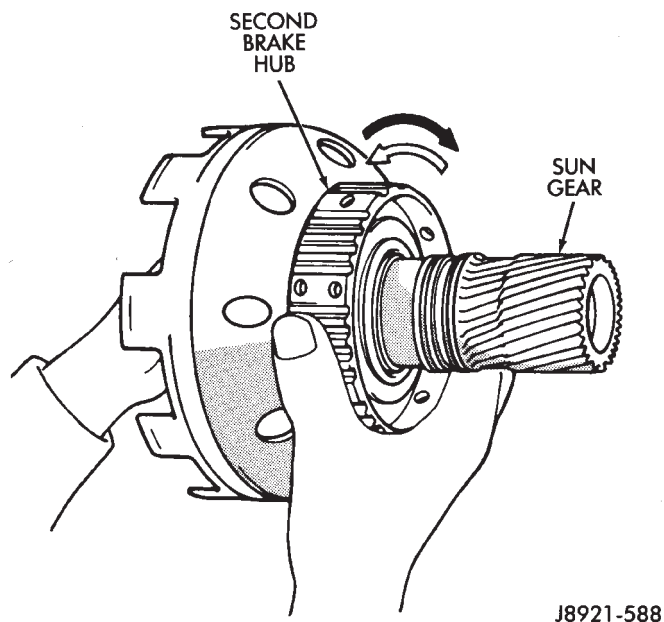
J9121-400

Sun Gear And One-Way Clutch Components

DISASSEMBLY AND ASSEMBLY (Continued)

DISASSEMBLY

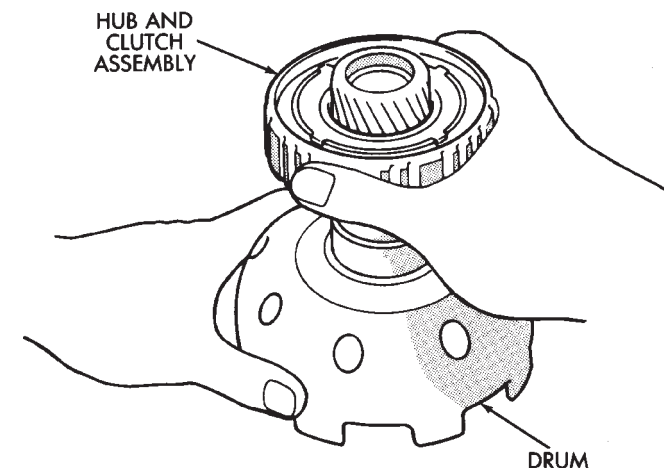
(1) Hold sun gear and turn second brake hub clockwise and counterclockwise (Fig. 260). Hub should rotate freely clockwise but lock when turned counterclockwise. Replace one-way clutch and hub if they do not operate properly.



J8921-588

Fig. 260 Checking One-Way Clutch Operation

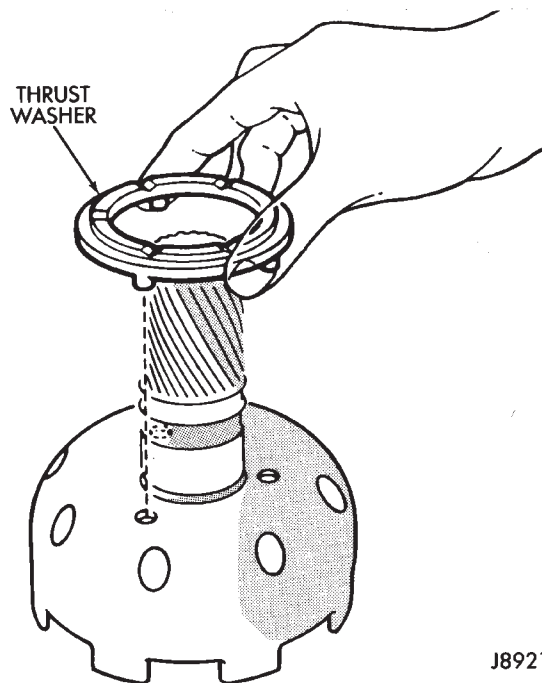
(2) Remove one-way clutch/second brake hub assembly from drum (Fig. 261).



J8921-589

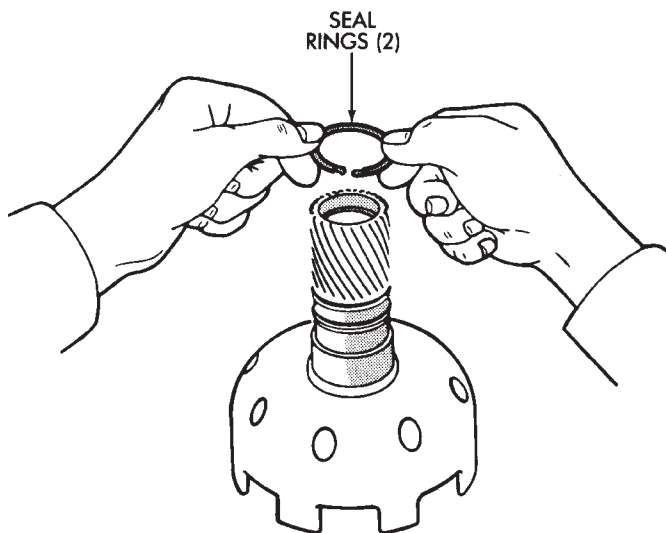
Fig. 261 Removing/Installing Brake Hub And Clutch Assembly

(3) Remove thrust washer from drum (Fig. 262).
 (4) Remove two seal rings from sun gear (Fig. 263).



J8921-590

Fig. 262 Removing/Installing Thrust Washer



J8921-591

Fig. 263 Removing/Installing Sun Gear Seal Rings

(5) Support sun gear on wood block (Fig. 264). Then remove first sun gear snap ring and separate drum from gear.

(6) Remove remaining snap ring from sun gear (Fig. 265).

(7) Measure inside diameter of sun gear bushings with bore gauge or inside micrometer (Fig. 266). Maximum allowable diameter is 27.08 mm (1.0661 in.). Replace sun gear if bushing inside diameter is greater than specified.

DISASSEMBLY AND ASSEMBLY (Continued)

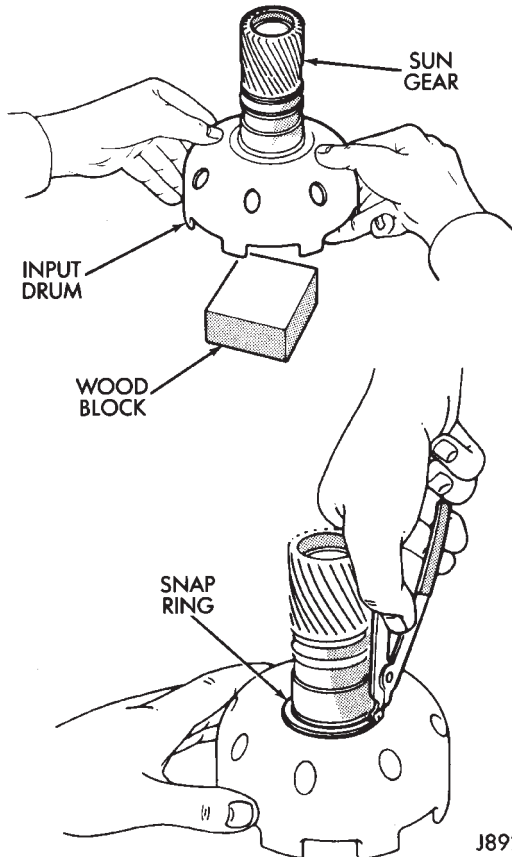


Fig. 264 Removing/Installing Sun Gear

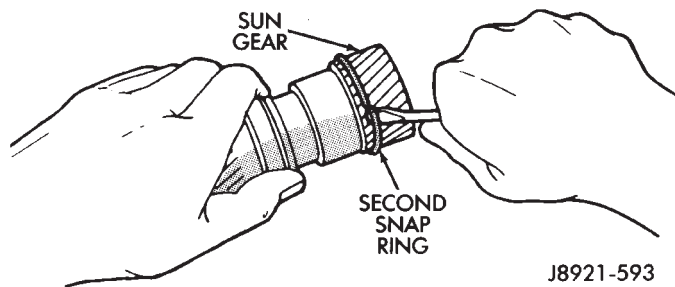


Fig. 265 Removing/Installing Second Snap Ring

ASSEMBLY

- (1) Install first snap ring on sun gear.
- (2) Install sun gear in drum and install remaining snap ring.
- (3) Coat replacement seal rings with petroleum jelly and install them on sun gear. **Be sure seal ring ends are interlocked.**
- (4) Install thrust washer. Be sure washer tabs are seated in drum slots.
- (5) Install one-way clutch/second brake hub assembly on sun gear. Deep side of hub flange faces upward (Fig. 267).
- (6) Check one-way clutch operation again (Fig. 260). Hold sun gear and turn second brake hub clock-

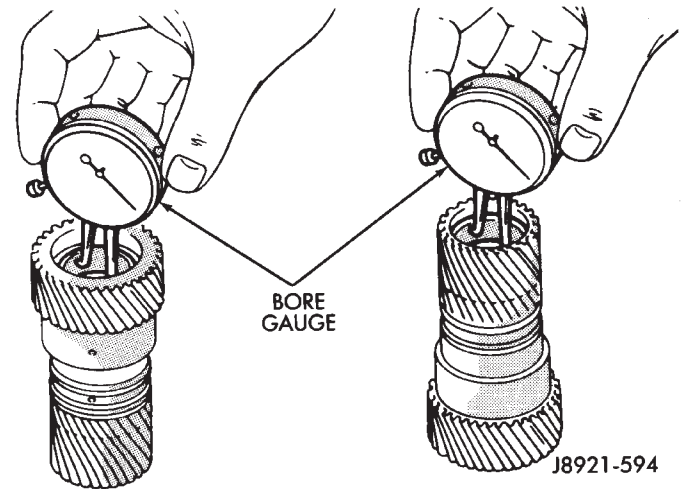


Fig. 266 Checking Sun Gear Bushings

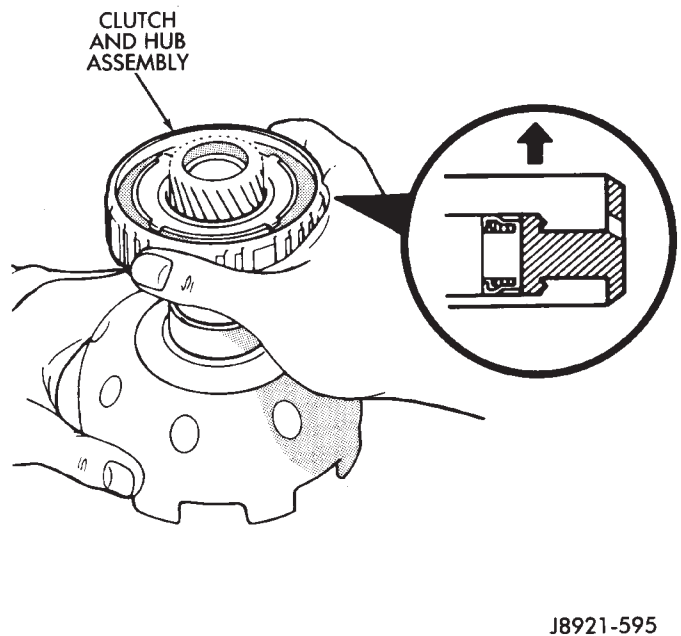


Fig. 267 Installing Clutch And Hub Assembly On Sun Gear

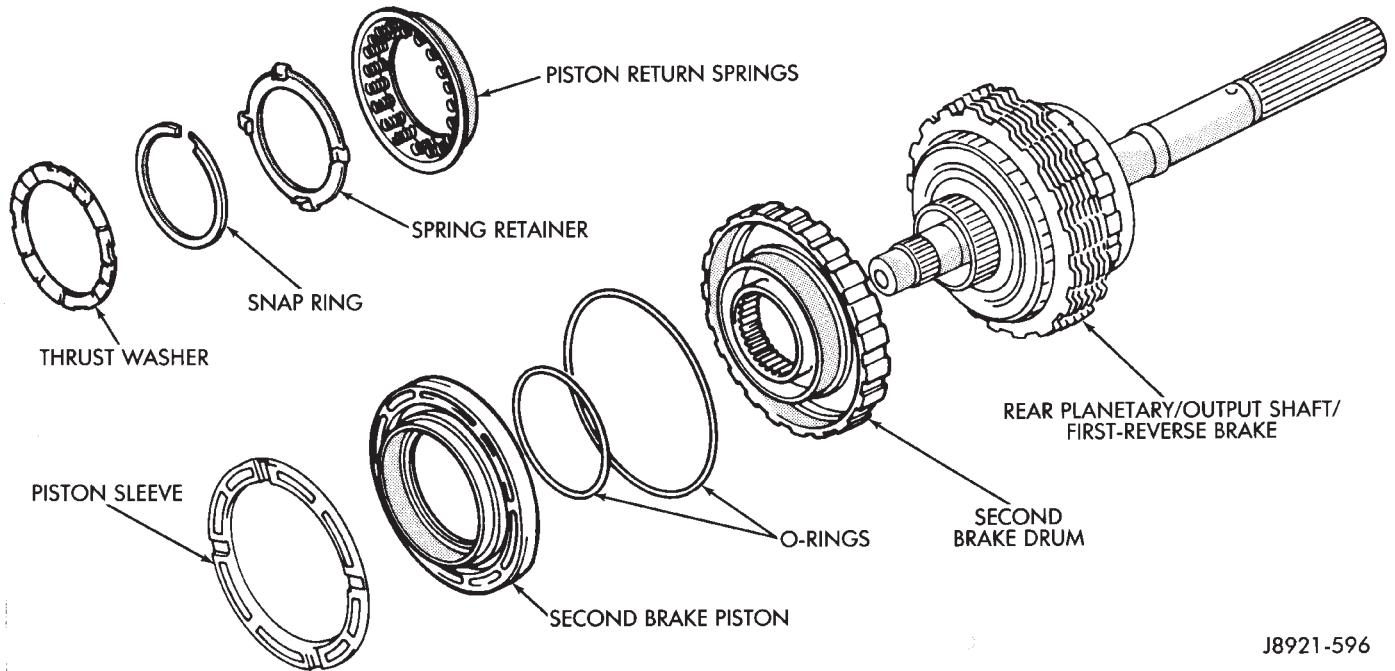
wise and counterclockwise. Hub should turn clockwise freely, but lock when turned counterclockwise.

SECOND BRAKE

DISASSEMBLY

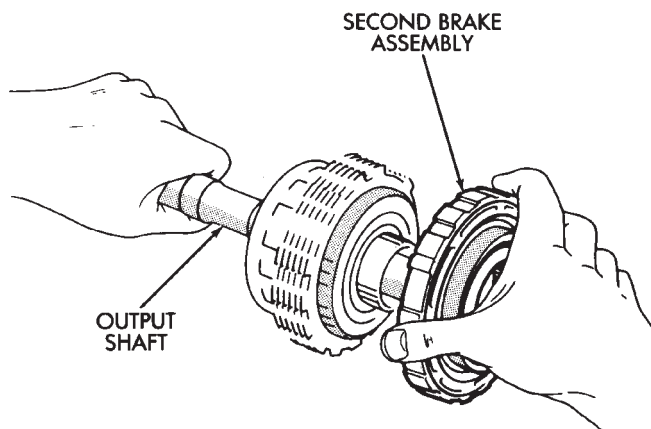
- (1) Remove second brake drum from output shaft (Fig. 268).
- (2) Remove thrust washer from second brake drum (Fig. 269).
- (3) Compress piston return springs with shop press and tool 7538. Then remove piston snap ring (Fig. 270).
- (4) Remove compressor tool and remove spring retainer and return springs.

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-596

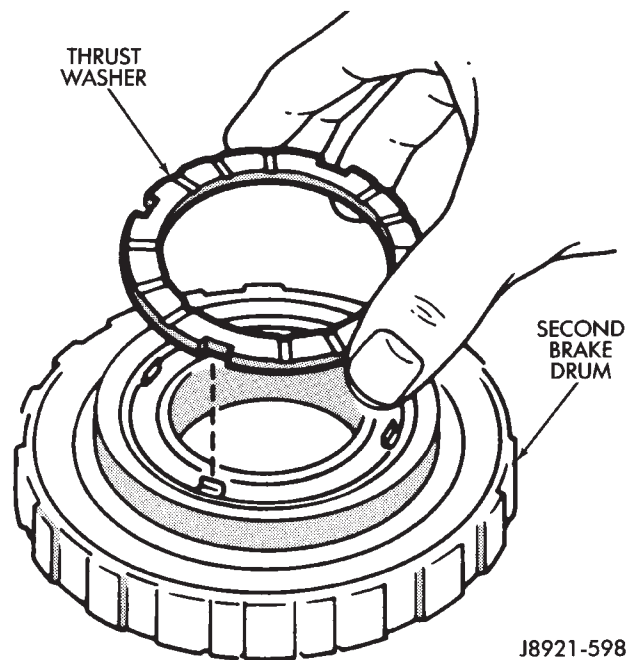
Second Brake Components



J8921-597

Fig. 268 Removing/Installing Second Brake Assembly

- (5) Remove second brake piston and sleeve from drum with compressed air (Fig. 271). Use only enough air pressure to ease piston out of drum.
- (6) Remove and discard brake piston O-rings.

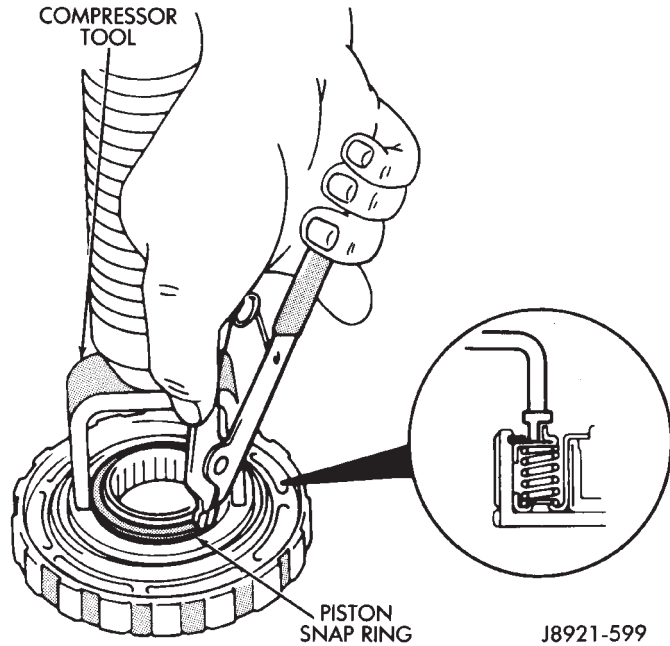


J8921-598

Fig. 269 Removing/Installing Second Brake Drum Thrust Washer

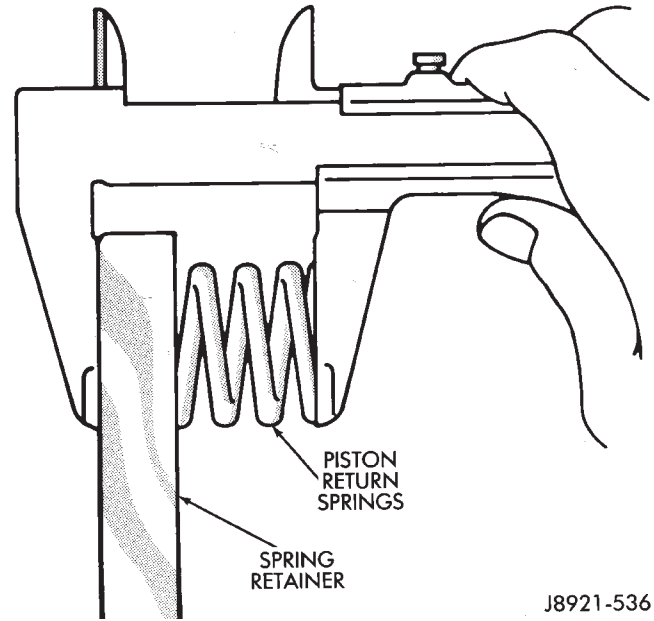
- (7) Measure free length of piston return springs with springs mounted in retainer (Fig. 272). Length should be approximately 16.05 mm (0.632 in.). Replace return springs if length is less than specified.

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-599

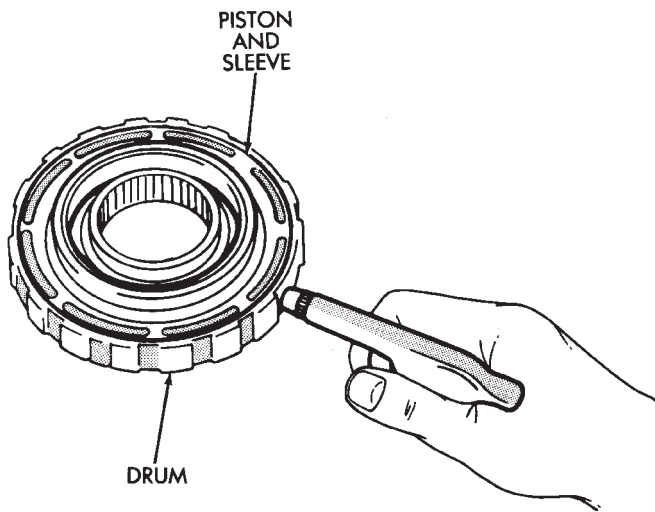
Fig. 270 Removing/Installing Second Brake Piston Snap Ring



J8921-536

Fig. 272 Measuring Second Brake Piston Return Springs

(4) Check brake piston operation with low pressure compressed air (Fig. 273). Apply air pressure through feed hole in drum. Piston should move smoothly when applying-releasing air pressure.

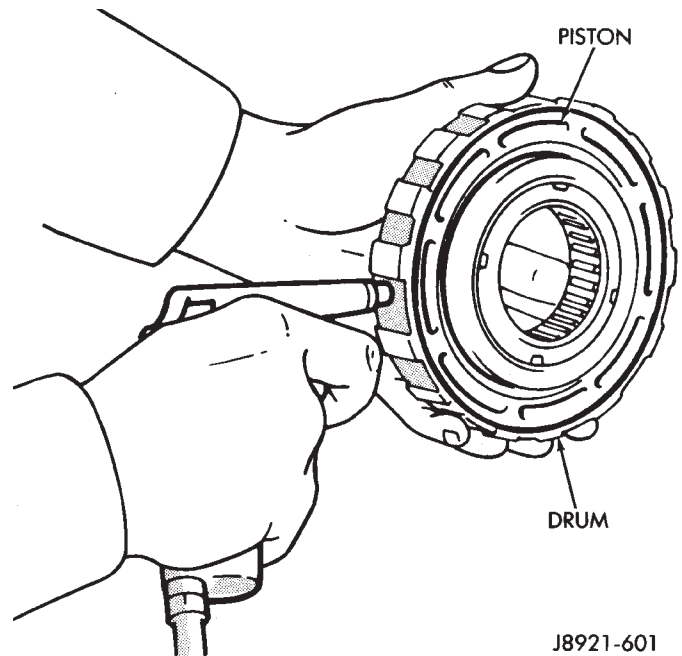


J8921-600

Fig. 271 Removing/Installing Piston And Sleeve

ASSEMBLY

- (1) Lubricate and install new O-rings on brake piston. Then install brake piston in drum.
- (2) Install return springs and retainer on brake piston.
- (3) Compress return springs with shop press and Compressor Tool 7538. Install piston snap ring and remove brake assembly from press.



J8921-601

Fig. 273 Checking Second Brake Piston Operation

DISASSEMBLY AND ASSEMBLY (Continued)

(5) Coat thrust washer with petroleum jelly and install it in drum. Be sure washer notches are aligned with tabs on spring retainer (Fig. 274).

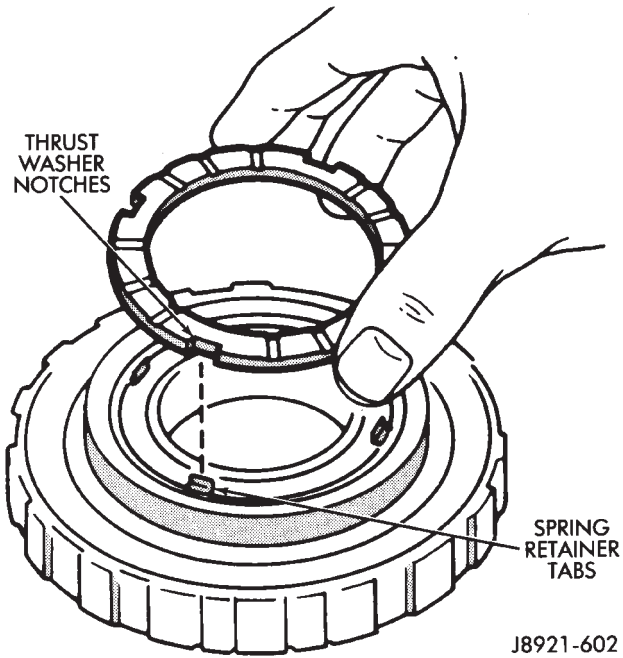
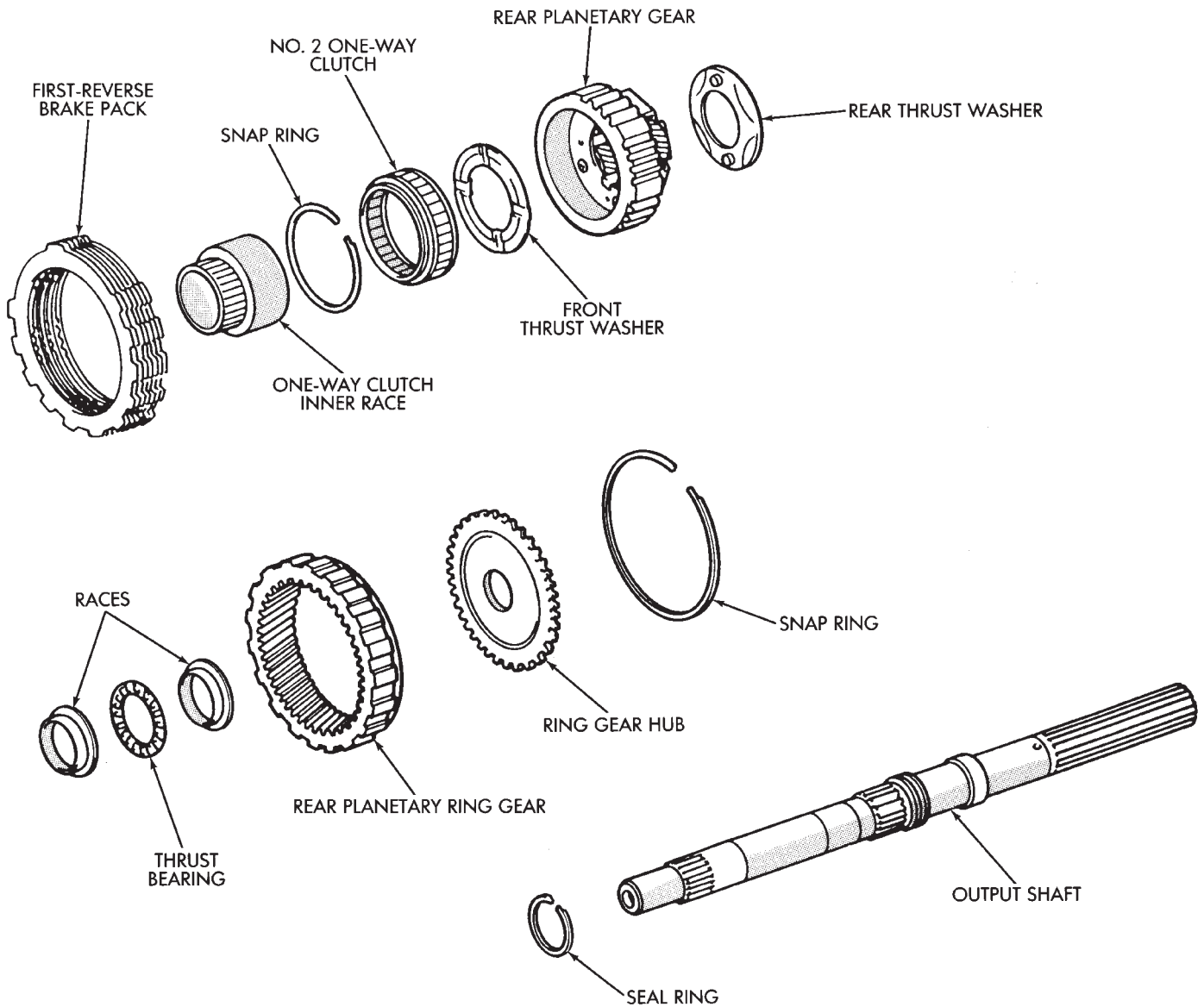


Fig. 274 Installing Second Brake Thrust Washer

DISASSEMBLY AND ASSEMBLY (Continued)

PLANETARY/BRAKE PACK/OUTPUT SHAFT

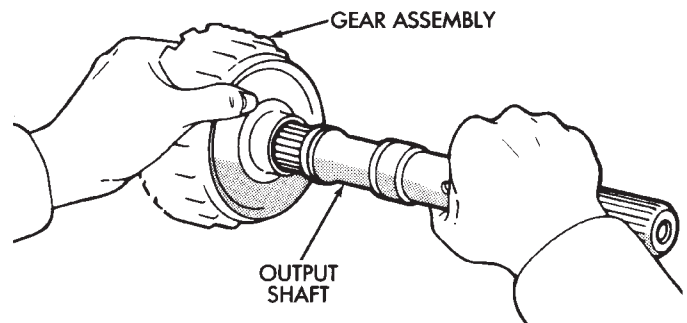


J8921-603

Rear Planetary, Brake Pack, Output Shaft Components

DISASSEMBLY

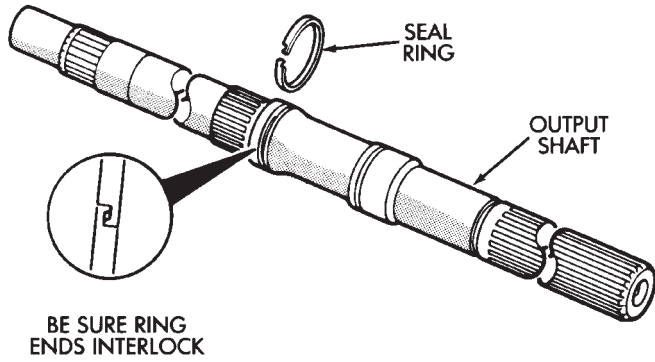
- (1) Remove output shaft from gear assembly (Fig. 275).
- (2) Remove and discard shaft seal ring (Fig. 276).
- (3) Remove brake pack from planetary gear (Fig. 277).
- (4) Remove planetary gear from ring gear (Fig. 278).



J8921-604

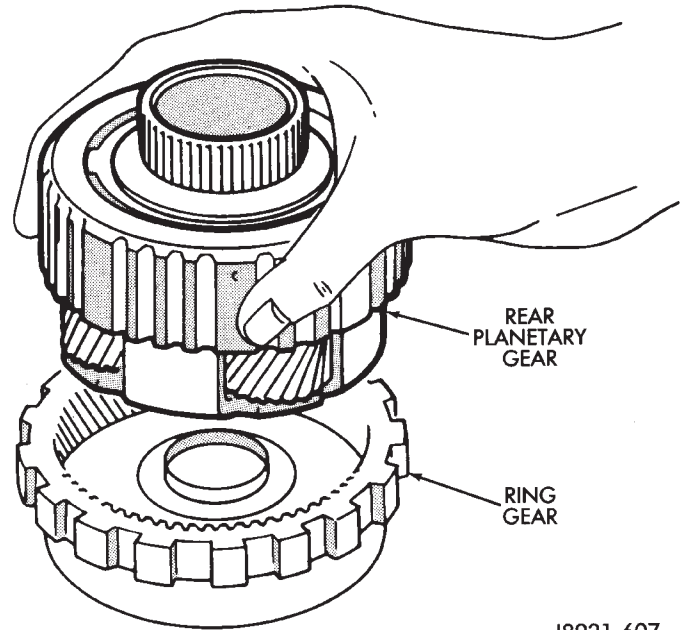
Fig. 275 Removing/Installing Output Shaft

DISASSEMBLY AND ASSEMBLY (Continued)



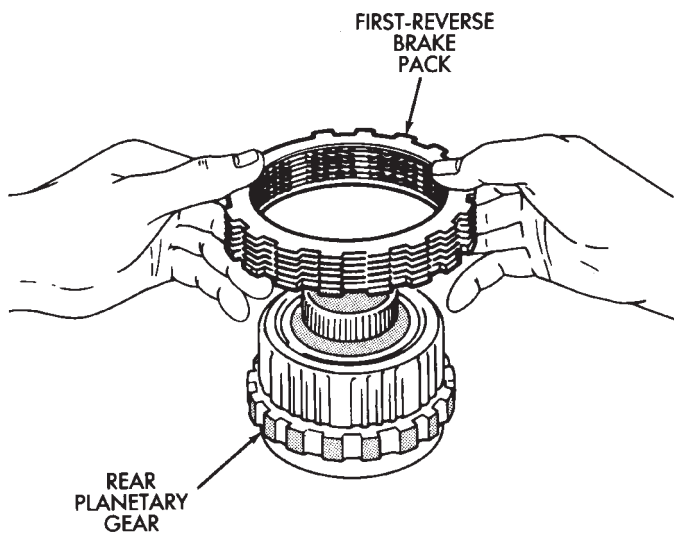
J8921-605

Fig. 276 Removing/Installing Shaft Seal Ring



J8921-607

Fig. 278 Removing/Installing Rear Planetary



J8921-606

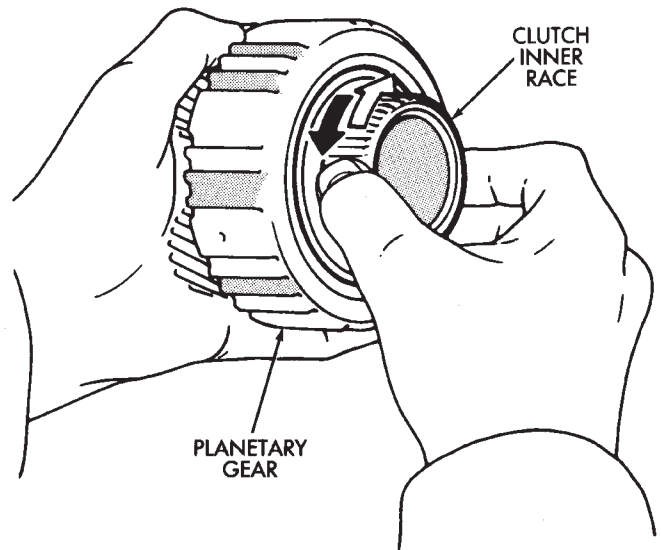
Fig. 277 Removing/Installing First-Reverse Brake Pack

(5) Check No. 2 one-way clutch (Fig. 279). Hold planetary gear and turn clutch inner race in both directions. Race should turn freely counterclockwise, but lock when turned clockwise. Replace one-way clutch if necessary.

(6) Remove clutch inner race from planetary gear (Fig. 280).

(7) Remove clutch snap ring and remove No. 2 one-way clutch top end cap from planetary.

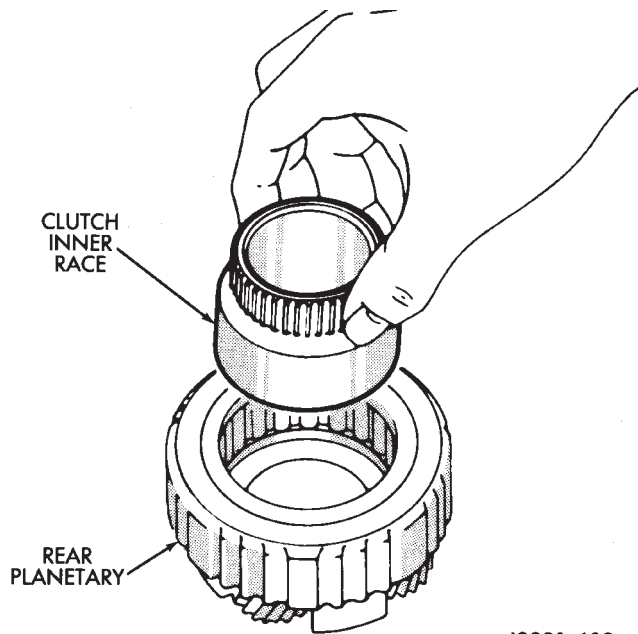
(8) Remove No. 2 one-way clutch from planetary (Fig. 281).



J8921-608

Fig. 279 Checking No. 2 One-Way Clutch Operation

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-609

Fig. 280 Removing/Installing Clutch Inner Race

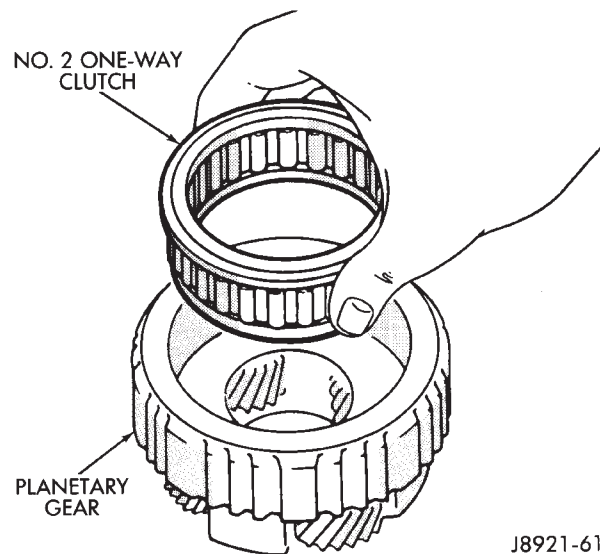
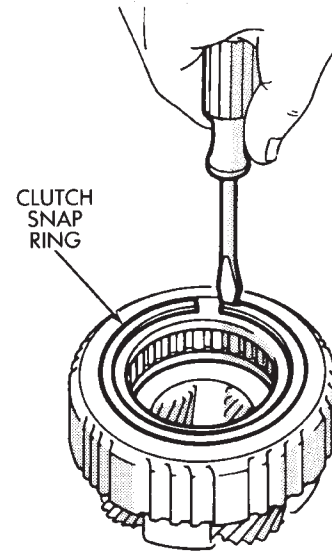
(9) Remove No. 2 one-way clutch bottom end cap from planetary.

(10) Remove front and rear thrust washers from planetary gear (Fig. 282).

(11) Remove thrust bearing and washers from ring gear (Fig. 283).

(12) Remove ring gear snap ring and remove ring gear hub (Fig. 284).

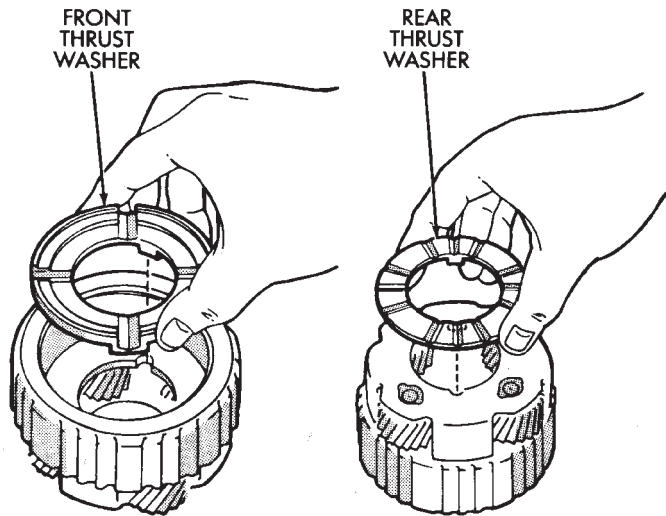
(13) Inspect and replace any worn or damaged planetary gear components.



J8921-610

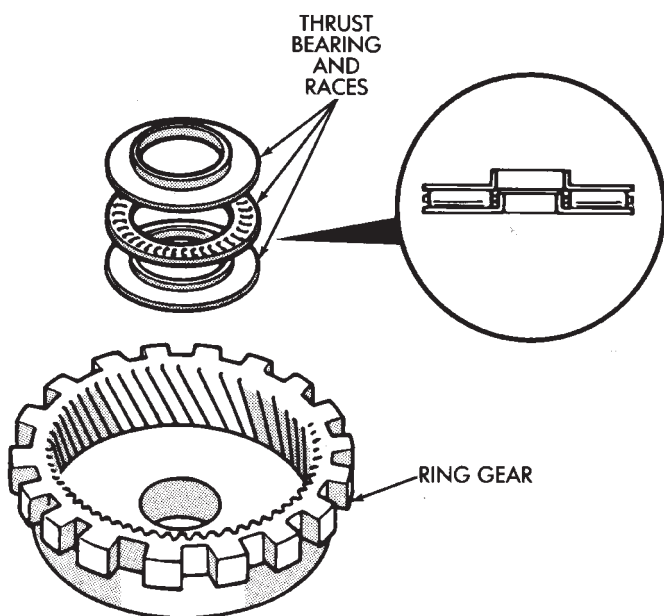
Fig. 281 Removing/Installing One-Way Clutch

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-611

Fig. 282 Removing/Installing Rear Planetary Thrust Washers

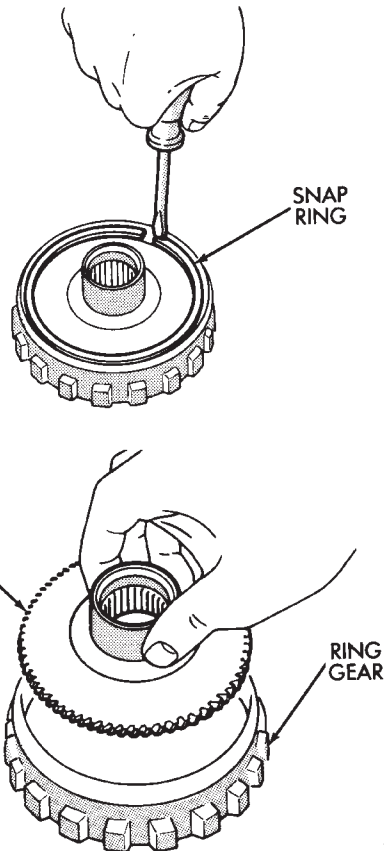


J8921-612

Fig. 283 Removing/Installing Ring Gear Thrust Bearing And Races

ASSEMBLY

- (1) Measure thickness of each brake pack disc. Minimum thickness is 1.51 mm (0.0594 in.). Replace all discs if any disc is thinner than specified.
- (2) Install hub and snap ring in ring gear (Fig. 284)
- (3) Identify ring gear thrust bearing and races by following dimensions (Fig. 283):

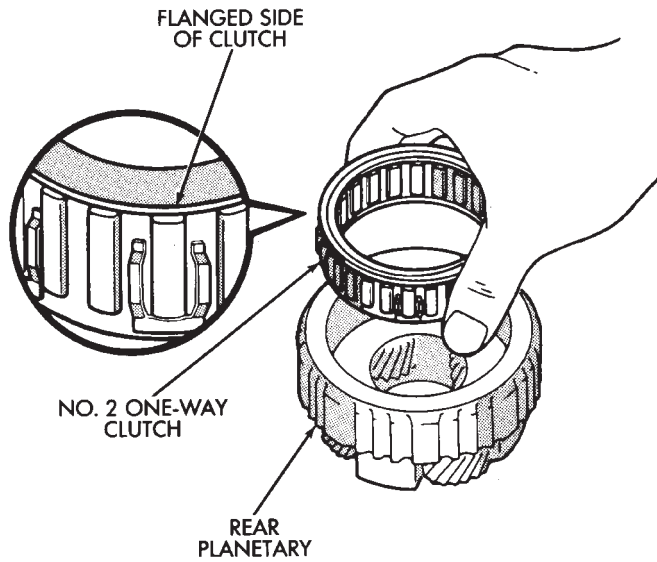


J8921-613

Fig. 284 Removing/Installing Ring Gear Hub

- Outer diameter of bottom race is 44.8 mm (1.764 in.) and inner diameter is 27.6 mm (1.087 in.).
 - Outer diameter of bearing is 44.7 mm (1.760 in.) and inner diameter is 30.1 mm (1.185 in.).
 - Outer diameter of upper race is 44.8 mm (1.764 in.) and inner diameter is 28.8 mm (1.134 in.).
- (4) Lubricate ring gear thrust bearing and races with petroleum jelly and install them in ring gear (Fig. 283).
 - (5) Coat planetary thrust washers with petroleum jelly and install them in gear (Fig. 282).
 - (6) Install No. 2 one-way clutch bottom end cap into the planetary gear.
 - (7) Install No. 2 one-way clutch in planetary gear. Be sure flanged side of clutch faces upward (Fig. 285).
 - (8) Install No. 2 one-way clutch top end cap into the planetary gear.
 - (9) Install clutch retaining snap ring and install clutch inner race (Fig. 280). Turn race counterclockwise to ease installation.
 - (10) Verify one-way clutch operation. Hold gear and turn inner race in both directions. Race should turn freely counterclockwise, but lock when turned clockwise.
 - (11) Install planetary gear in ring gear.

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-614

Fig. 285 Installing No. 2 One-Way Clutch

(12) Install thrust bearing and washers onto the ring gear (Fig. 283).

(13) Assemble clutch discs and clutch plates (Fig. 277). Sequence is disc first, then a plate. Use seven discs and plates.

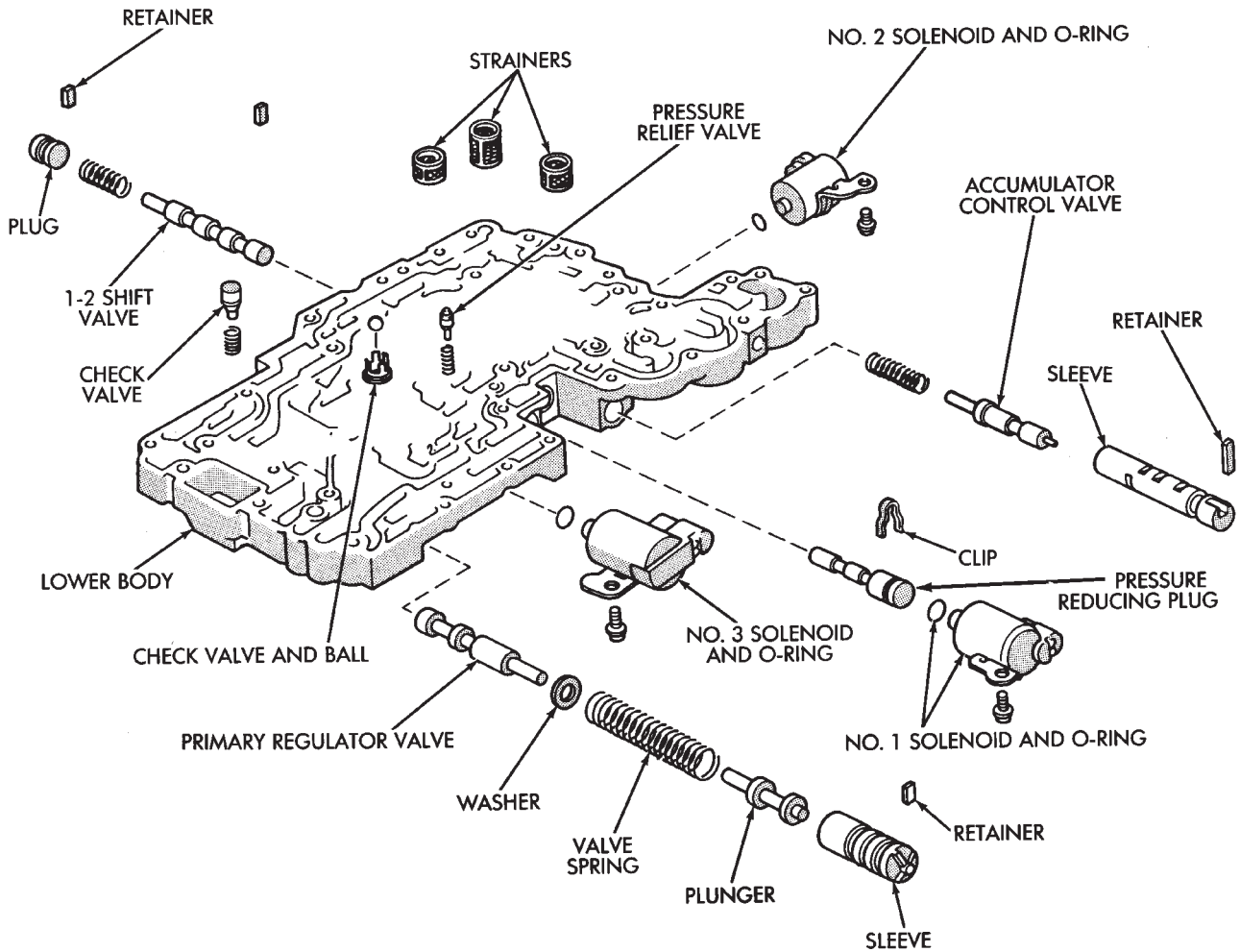
(14) Install brake pack on planetary gear (Fig. 277).

(15) Install new seal ring on output shaft (Fig. 276). Be sure ring ends are interlocked as shown.

TRANSMISSION VALVE BODY

The valve body assembly consists of two sections which are the upper body and lower body (Fig. 286) and (Fig. 287). Disassembly, inspection and overhaul procedures for each section are outlined separately. Refer to the appropriate procedure as needed.

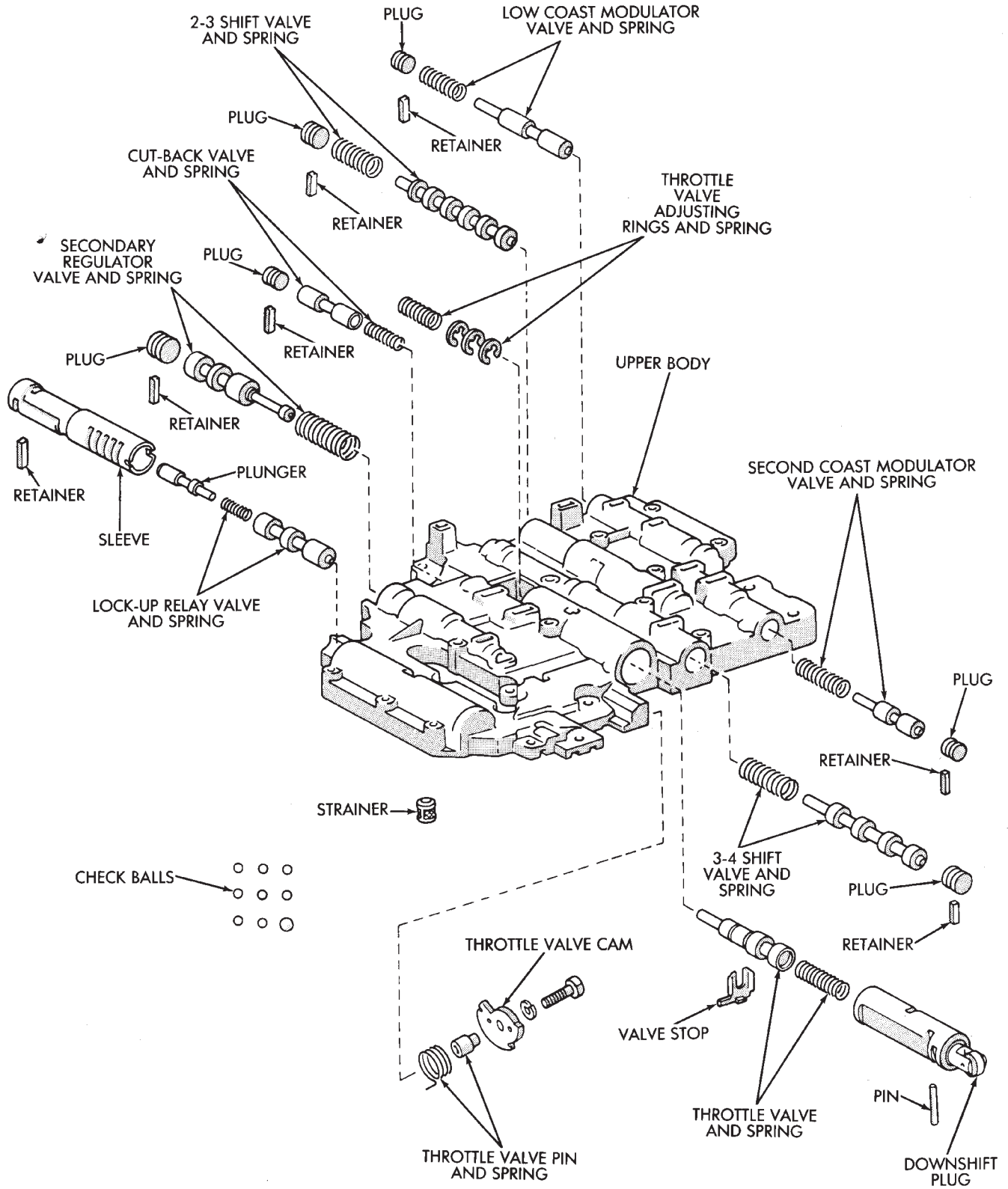
DISASSEMBLY AND ASSEMBLY (Continued)



J9121-384

Fig. 286 Lower Body Components

DISASSEMBLY AND ASSEMBLY (Continued)



J8921-625

Fig. 287 Upper Body Components

CLEANING AND INSPECTION

TRANSMISSION PARTS CLEANING AND INSPECTION

Clean the transmission components with solvent and dry them with compressed air only. Do not use shop towels or rags.

Blow compressed air through all oil feed passages and channels to be sure they are clear. Inspect the transmission components for wear and damage. Replace components that are damaged or worn beyond the limits specified in the individual overhaul procedures.

Replace all O-rings, gaskets and seals. These components are not reusable. Also replace any snap ring that is distorted or damaged.

During overhaul assembly operations, lubricate the transmission components with Mopar Mercon™ automatic transmission fluid or petroleum jelly as indicated. Petroleum jelly should be used to prelubricate thrust bearings, washers and races. It can also be used to hold parts in position during assembly.

Soak replacement clutch and brake pack components in transmission fluid for at least 30 minutes before installation.

ADJUSTMENTS

GEARSHIFT CABLE

Check adjustment by starting the engine in Park and Neutral. Adjustment is OK if the engine starts only in these positions. Adjustment is incorrect if the engine starts in one but not both positions. If the engine starts in any position other than Park or Neutral, or if the engine will not start at all, the park/neutral position switch may be faulty.

Gearshift Adjustment Procedure

- (1) Shift transmission into Park.
- (2) Raise vehicle.
- (3) Release cable adjuster clamp (at transmission end of cable) to unlock cable.
- (4) Unsnap cable from cable mounting bracket on transmission (Fig. 288).
- (5) Slide cable eyelet off transmission shift lever.
- (6) Verify transmission shift lever is in Park detent by moving lever fully rearward. Last rearward detent is Park position.
- (7) Verify positive engagement of transmission park lock by attempting to rotate propeller shaft. Shaft will not rotate when park lock is engaged.
- (8) Slide cable eyelet onto transmission shift lever.
- (9) Snap shift cable adjuster into mounting bracket on transmission.

(10) Lock shift cable by pressing cable adjuster clamp down until it snaps into place.

(11) Lower vehicle and check engine starting. Engine should start only in Park and Neutral.

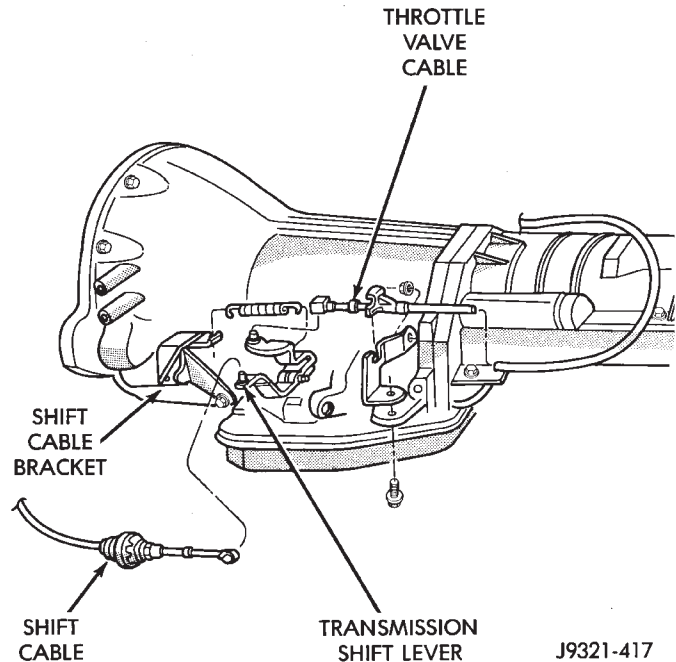


Fig. 288 Shift Cable Attachment At Transmission—Typical

BRAKE TRANSMISSION SHIFT INTERLOCK CABLE ADJUSTMENT

- (1) Shift transmission into PARK.
- (2) Remove shift lever bezel and console screws. Raise bezel and console for access to cable.
- (3) Pull cable lock button up to release cable (Fig. 289).
- (4) Turn ignition switch to LOCK position.

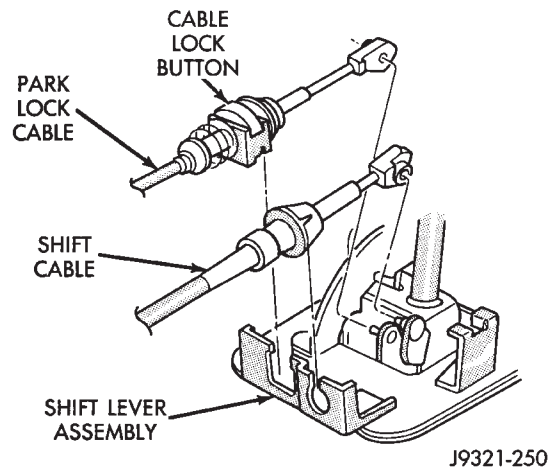


Fig. 289 Park Lock Cable Attachment

ADJUSTMENTS (Continued)

(5) Use a spacer to create a one millimeter gap between the shifter pawl and top of the shift gate.

(6) Pull cable forward. Then release cable and press cable lock button down until it snaps in place.

(7) Check adjustment as follows:

(a) Check movement of release shift handle button (floor shift) or release lever (column shift). You should not be able to press button inward or move column lever.

(b) Turn ignition switch to RUN position.

(c) Shifting out of park should not be possible.

(d) Apply the brake and attempt to shift out of PARK. Shifting should be possible.

(e) While the transmission is shifted out of PARK, release the brake and attempt to shift through all gears. Release the shift button at least once during this procedure. The ignition key should not go to the LOCK position.

(f) Return transmission to the PARK position without applying the brake.

(8) Move shift lever back to PARK and check ignition switch operation. You should be able to turn switch to LOCK position and shift lever release button/lever should not move.

TRANSMISSION THROTTLE VALVE CABLE ADJUSTMENT

The transmission throttle valve is operated by a cam on the throttle lever. The throttle lever is operated by an adjustable cable (Fig. 290). The cable is attached to an arm mounted on the throttle lever shaft. A retaining clip at the engine-end of the cable is removed to provide for cable adjustment. The retaining clip is then installed back onto the throttle valve cable to lock in the adjustment.

A correctly adjusted throttle valve cable will cause the throttle lever on the transmission to move simultaneously with the throttle body lever from the idle position. Proper adjustment will allow simultaneous movement without causing the transmission throttle lever to either move ahead of, or lag behind the lever on the throttle body.

Checking Throttle Valve Cable Adjustment

(1) Turn ignition key to OFF position.

(2) Remove air cleaner.

(3) Verify that lever on throttle body is at curb idle position. Then verify that transmission throttle lever (Fig. 291) 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.

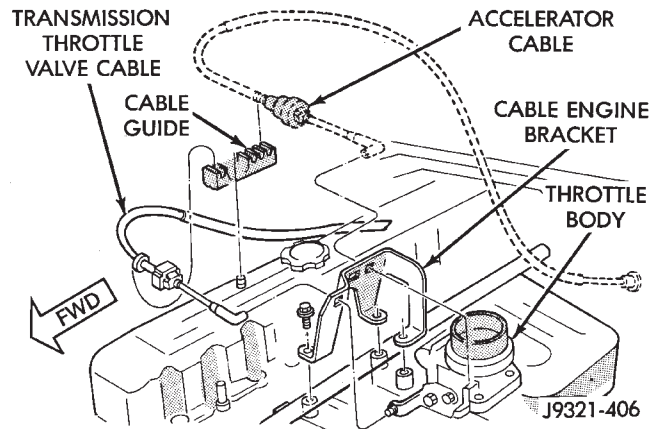


Fig. 290 Throttle Cable Attachment At Engine

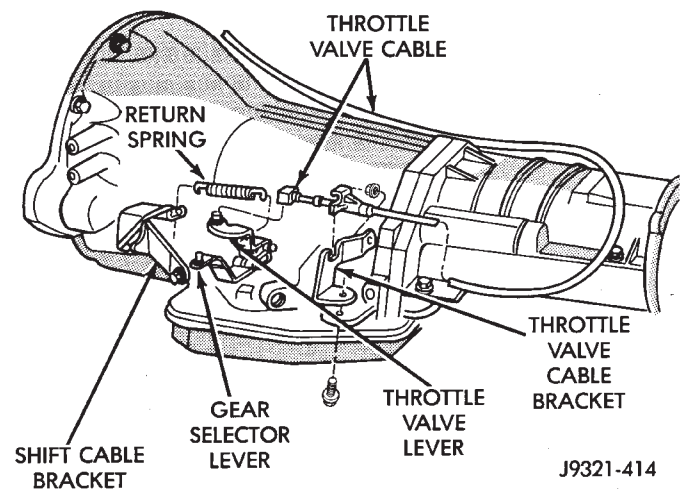


Fig. 291 Throttle Cable Attachment At Transmission

- If cable end and attachment stud are misaligned (off center), cable will have to be adjusted as described in Throttle Valve Cable Adjustment procedure.

(6) Reconnect cable end to attachment stud. Then with aid of a helper, observe movement of transmission throttle lever and lever on throttle body.

- If both levers move simultaneously from idle to half-throttle and back to idle position, adjustment is correct.

- If transmission throttle lever moves ahead of, or lags behind throttle body lever, cable adjustment will be necessary. Or, if throttle body lever prevents transmission lever from returning to closed position, cable adjustment will be necessary.

Throttle Valve Cable Adjustment Procedure

(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.

ADJUSTMENTS (Continued)

(4) Verify that transmission throttle lever is in fully closed position. Then be sure lever on throttle body is at curb idle position.

(5) Insert a small screwdriver under edge of retaining clip and remove retaining clip.

(6) Center cable end on attachment stud to within 1 mm (0.039 in.).

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.

(7) Install retaining clip onto cable housing.

(8) Check cable adjustment. Verify transmission throttle lever and lever on throttle body move simultaneously.

SPECIFICATIONS

AW-4 AUTOMATIC TRANSMISSION

SPECIFICATIONS (Continued)

AW-4 GENERAL SPECIFICATIONS

Gear Ratios:

First	2.804:1
Second	1.531:1
Third	1.000:1
Fourth (Overdrive)	0.753:1
Reverse	2.393:1

Transmission Fluid Jeep automatic transmission fluid or DEXRON® II

Fluid Level To "Full" mark with fluid hot (normal operating temperature)

Fluid Capacity (all models) 8.0 Liters (8.45 qts.)

Test Specifications

Stall Speed:

In D Range and Reverse 2100–2400 rpm

Line Pressure:

In D at Curb Idle 61–70 psi (421–481 kPa)

In D at WOT 173–209 psi (1196–1442 kPa)

In Reverse at Curb Idle 75–90 psi (519–618 kPa)

In Reverse at WOT 213–263 psi (1471–1814 kPa)

Time Lag Test:

Engagement in D Range 1.2 seconds

Engagement in Reverse 1.5 seconds

Valve Body Solenoid Resistance 11–15 ohms

Transmission Fluid Normal Operating Temperature 50–80°C (122–176°F)

TPS Input Voltage (AU) 5.0 Volts (approx.)

TPS Output Voltage

4-Cylinder 0.2 Volts (approx.)

6-Cylinder 4.2 Volts (approx.)

SPECIFICATIONS (Continued)

AW-4 OIL PUMP WEAR LIMITS

Drive Gear

Tip Clearance:

Standard 0.11-0.14 mm (0.0043-0.0055 in.)
 Maximum Allowance 0.3 mm (0.012 in.)

Gear-to-Pump Body

End Clearance:

Standard 0.02-0.05 mm (0.0008-0.0020 in.)
 Maximum Allowance 0.1 mm (0.004 in.)

Driven Gear-to-Pump

Body Clearance:

Standard 0.07-0.15 mm (0.0028-0.0059 in.)
 Maximum Allowance 0.3 mm (0.012 in.)
 J8921-740

AW-4 CLUTCH DISC AND PLATE THICKNESS

Component	Minimum Allowable Thickness
Clutch Disc (all except first-reverse and forward clutch discs)	1.84 mm (0.0724 in.)
6-Cylinder Forward Clutch Disc	1.51 mm (0.0594 in.)
6 Cylinder Direct Clutch Plates: Thin Plate (1) Thick Plates (3)	2.3 mm (0.905 in.) 3.0 mm (0.118 in.)
6-Cylinder Forward Clutch Plate	1.8 mm (0.070 in.)
First-Reverse Brake Disc (all)	1.51 mm (0.0594 in.)

SPECIFICATIONS (Continued)

AW-4 BUSHING AND PISTON CLEARANCE

BUSHING INSIDE DIAMETER (MAXIMUM)

Bushing Location	Maximum Allowance Inside Diameter
Extension Housing	38.09 mm (1.4996 in.)
Direct Clutch Drum	53.97 mm (2.1248 in.)
Overdrive Planetary Gear	11.27 mm (.4437 in.)
Overdrive Direct Clutch Drum	27.11 mm (1.0673 in.)
Stator Shaft (Front)	21.58 mm (.8496 in.)
Stator Shaft (Rear)	27.08 mm (1.0661 in.)
Oil Pump Body	38.19 mm (1.5035 in.)
Transmission Case	38.18 mm (1.5031 in.)

PISTON STROKE LENGTH

Piston Location	Specification
Direct Clutch (all)	1.37–1.67 mm (.0539–.0657 in.)
6-Cylinder Overdrive Brake	1.40–1.70 mm (.0551–.0669 in.)
Second Coast Brake (all)	1.5–3.0 mm (.059–.118 in.)
6-Cylinder Forward Clutch	3.55–3.73 (.1397–.1468 in.)
Overdrive Direct Clutch (all)	1.85–2.15 mm (.0728–.0846 in.)

END PLAY AND CLEARANCE

Component	Specification
Output Shaft End Play	.27–.86 mm (.0106–.0339 in.)
6-Cylinder First-Reverse Brake Pack Clearance	.70–1.20 mm (.028–.047 in.)
6-Cylinder Second Brake Pack Clearance	.62–1.98 mm (.024–.078 in.)

SPECIFICATIONS (Continued)

AW-4 RETAINER AND PISTON SPECIFICATIONS

OVERDRIVE BRAKE RETAINER SELECTION

Retainer No.	Thickness	Retainer No.	Thickness
26	3.3 mm (.130 in.)	11	3.8 mm (.150 in.)
25	3.5 mm (.138 in.)	23	3.9 mm (.154 in.)
12	3.6 mm (.142 in.)	Not Marked	4.0 mm (.157 in.)
24	3.7 mm (.146 in.)	—	—

DIRECT CLUTCH RETAINER SELECTION

Retainer No.	Thickness	Retainer No.	Thickness
33	3.0 mm (.118 in.)	29	3.4 mm (.134 in.)
32	3.1 mm (.122 in.)	28	3.5 mm (.138 in.)
31	3.2 mm (.126 in.)	27	3.6 mm (.142 in.)
30	3.3 mm (.130 in.)	34	3.7 mm (.146 in.)

OVERDRIVE CLUTCH RETAINER SELECTION

Retainer No.	Thickness	Retainer No.	Thickness
16	3.6 mm (.142 in.)	19	3.3 mm (.130 in.)
17	3.5 mm (.138 in.)	20	3.2 mm (.126 in.)
18	3.4 mm (.134 in.)	21	3.1 mm (.122 in.)

SECOND COAST BRAKE PISTON ROD SELECTION

Rod	Rod Length
No. 1	71.4 mm (2.811 in.)
No. 2	72.9 mm (2.870 in.)

FORWARD CLUTCH RETAINER SELECTION

Retainer No.	Thickness	Retainer No.	Thickness
42	4.0 mm (.157 in.)	61	3.0 mm (.118 in.)
44	3.8 mm (.149 in.)	62	3.6 mm (.142 in.)
45	3.4 mm (.134 in.)	63	4.2 mm (.165 in.)
60	3.2 mm (.126 in.)	64	4.4 mm (.173 in.)

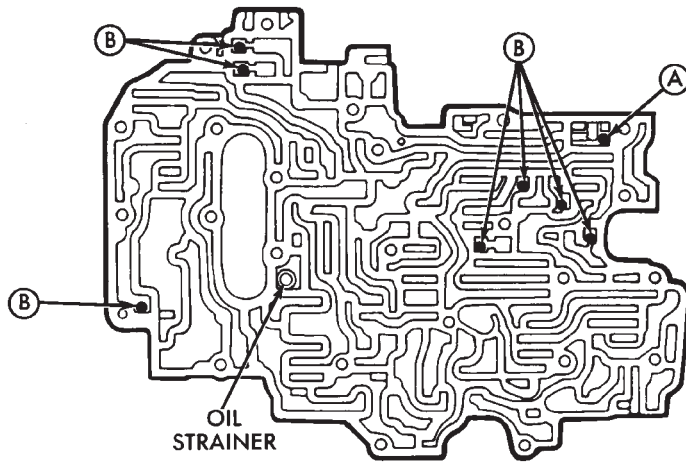
FIRST-REVERSE BRAKE CLEARANCE SELECTION

Retainer No.	Thickness	Retainer No.	Thickness
50	5.0 mm (.197 in.)	53	4.4 mm (.173 in.)
51	4.8 mm (.189 in.)	54	4.2 mm (.165 in.)
52	4.6 mm (.181 in.)	55	4.0 mm (.157 in.)

SPECIFICATIONS (Continued)

AW-4 VALVE BODY BALL DIMENSIONS

Check Ball	Diameter
(A) Rubber Ball	6.35 mm (0.250 in.)
(B) Rubber Ball	5.535 mm (.218 in.)



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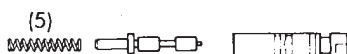
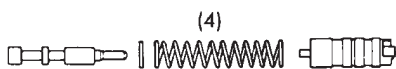
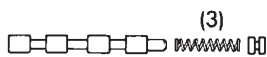
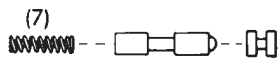
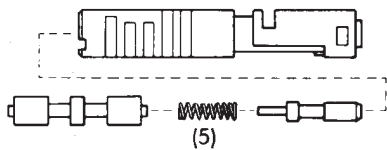
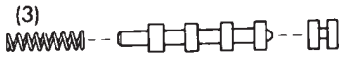
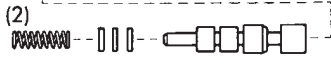
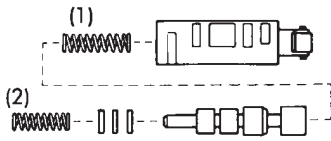
AW-4 CLUTCH AND BRAKE PACK REQUIREMENTS

Component	Discs Required	Plates Required	Retainers Required
6-Cylinder Overdrive Brake	4	3	2
6-Cylinder Second Brake	5	5	1
6-Cylinder Overdrive Direct Clutch	2	2	1
6-Cylinder Direct Clutch	4	4	1
6-Cylinder Forward Clutch	6	6	1
6-Cylinder First-Reverse Brake	7	7	1

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SPECIFICATIONS (Continued)

AW-4 VALVE AND SPRING IDENTIFICATION



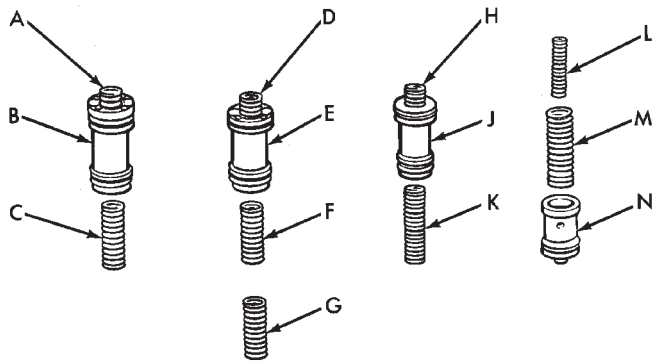
Spring	Free Length
(1) Downshift Plug	27.3 mm (1.074 in.)
(2) Throttle Valve	20.6 mm (.811 in.)
(3) 3-4 Shift Valve	30.8 mm (1.212 in.)
(4) Second Coast Modulator Valve	25.3 mm (.996 in.)
(5) Lockup Relay Valve	21.4 mm (.843 in.)
(6) Secondary Regulator Valve	30.9 mm (1.217 in.)
(7) Cut-Back Valve	21.8 mm (.858 in.)
(8) 2-3 Shift Valve	30.8 mm (1.212 in.)
(9) Low Coast Modulator Valve	27.8 mm (1.094)

Spring	Spring Length
(1) Check Valve	20.2 mm (.797 in.)
(2) Pressure Relief Valve	11.2 mm (.441 in.)
(3) 1-2 Shift Valve	30.8 mm (1.213 in.)
(4) Primary Regulator Valve	62.3 mm (2.453 in.)
(5) Accumulator Control Valve	29.8 mm (1.173 in.)

SPECIFICATIONS (Continued)

AW-4 ACCUMULATOR COMPONENT IDENTIFICATION

	Component	Approximate Outside Diameter
SECOND BRAKE ACCUMULATOR	SPRING A	14.17 mm (.558 in.)
	PISTON B	36.9 mm (1.453 in.)
	SPRING C	19.91 mm (.784 in.)
DIRECT CLUTCH ACCUMULATOR	SPRING D	12.07 mm (.475 in.)
	PISTON E	36.9 mm (1.453 in.)
	SPRING F	20.19 mm (.795 in.)
	SPRING G	14.81 mm (.583 in.)
OVERDRIVE BRAKE ACCUMULATOR	SPRING H	14.10 mm (.555 in.)
	PISTON J	31.9 mm (1.256 in.)
	SPRING K	19.99 mm (.785 in.)
OVERDRIVE CLUTCH ACCUMULATOR	SPRING L	14.0 mm (0.551 in.)
	SPRING M	20.3 mm (0.799 in.)
	PISTON N	29.9 mm (1.177 in.)



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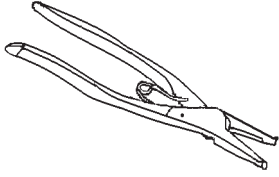
SPECIFICATIONS (Continued)

AW-4 TORQUE SPECIFICATIONS

Description	Torque	Description	Torque
Converter Housing Bolts		Rear Mount-To-Transmission	
10 mm	32-36 N•m (23-27 ft. lbs.)	Bolts	60-81 N•m (44-66 ft. lbs.)
12 mm	55-59 N•m (40-43 ft. lbs.)	Rear Mount-To-Clevis Bracket	
Cooler Line Retaining		Bolt/Nut	54-75 N•m (40-55 ft. lbs.)
Clip Nuts	2-4 N•m (18-35 in. lbs.)	Rear Mount Clevis Bracket-To-	
Cooler Line Bracket		Crossmember Nuts	33-49 N•m (24-36 ft. lbs.)
Nuts	5-11 N•m (48-96 in. lbs.)	Shift Cable Bracket Screws	
Cooler Line Fitting Nuts		At Transmission	25-39 N•m (221-345 in. lbs.)
(at auto. trans. fittings)	18-23 N•m (160-200 in. lbs.)	Shift Lever Mounting	
Detent Spring Bolt	9-11 N•m (80-96 in. lbs.)	Cover Screws	1-2 N•m (9-20 in. lbs.)
Dust Cover Nuts/Bolts	18-23 N•m (159-203 in. lbs.)	Shift Lever Housing Nuts	16-26 N•m (141-230 in. lbs.)
Extension Housing Bolts	32-36 N•m (23-27 ft. lbs.)	Solenoid Harness Bolt	6-8 N•m (57-75 in. lbs.)
Fill Tube Bracket Bolt	50-64 N•m (37-47 ft. lbs.)	Speedometer Adapter	
Neutral Switch		Clamp Screw	10-12 N•m (90-110 in. lbs.)
Bolt	12-14 N•m (8-10 ft. lbs.)	Speed Sensor Coupling Nut	14-20 N•m (125-175 in. lbs.)
Nut	6-8 N•m (53-70 in. lbs.)	Throttle Cable Engine	
OD Support Bolt (to case)	23-27 N•m (18-20 ft. lbs.)	Bracket Screws	7-11 N•m (63-94 in. lbs.)
Oil Pan Bolts	6-8 N•m (53-70 in. lbs.)	Throttle Cable Retaining	
Oil Pan Drain Plug	19-21 N•m (14-16 ft. lbs.)	Screw (at transmission)	8-10 N•m (70-98 in. lbs.)
Oil Pump Bolt		Transfer Case Mounting Nuts	30-41 N•m (22-30 ft. lbs.)
(to case)	21-23 N•m (16-18 ft. lbs.)	Transmission Shift Lever Nut	15-17 N•m (134-154 in. lbs.)
Oil Pump Bolt		Transmission-To-Engine	
(to stator shaft)	9-11 N•m (80-96 in. lbs.)	Block Bolts	50-64 N•m (37-47 ft. lbs.)
Oil Screen Bolt	9-11 N•m (80-96 in. lbs.)	Valve Body Bolts (to case)	9-11 N•m (80-96 in. lbs.)
Park Pawl Bracket	9-11 N•m (80-96 in. lbs.)	Valve Body Bolts (to valve body)	6-7 N•m (54-58 in. lbs.)
Propeller Shaft Clamp			
Screws	16-23 N•m (140-200 in. lbs.)		

SPECIAL TOOLS

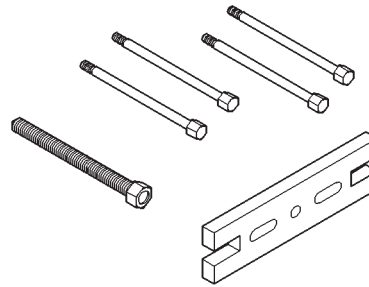
AW-4



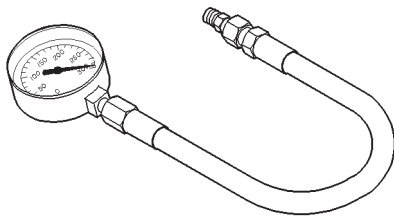
C-484 Snap Ring Plier



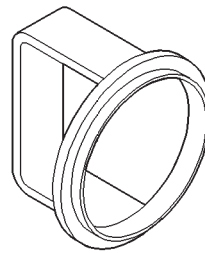
C-4960 Micrometer



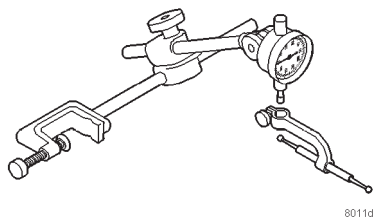
7536 Puller, Oil Pump



C-3293-SP Gauge

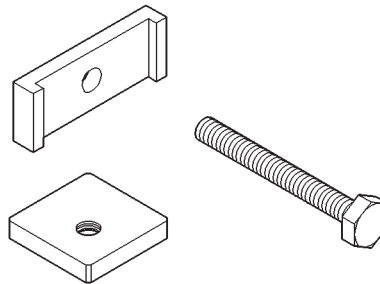


7538 Compressor, Piston #2 Spring

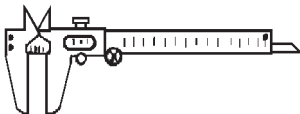


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C-3339 Dial Indicator Set

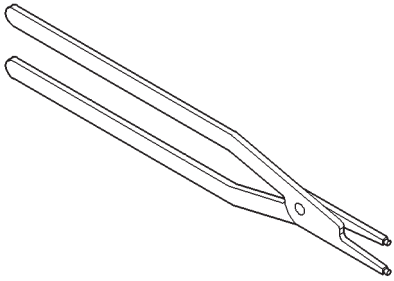


7539 Compressor, Piston #3 Spring

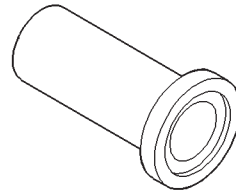


C-4959 Caliper, Metric Vernier

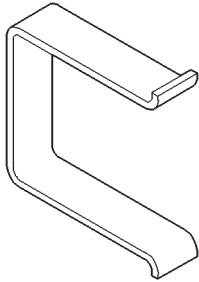
SPECIAL TOOLS (Continued)



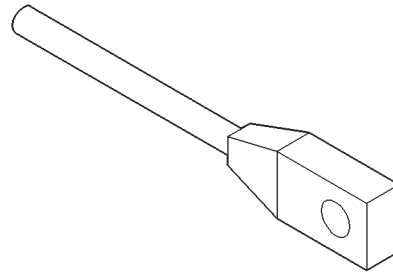
7540 Pliers, Large Snap Ring



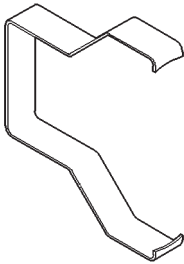
7549 Installer, Seal



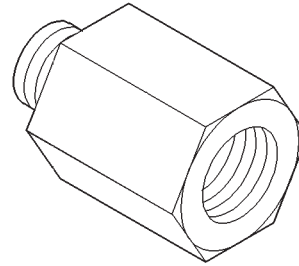
7542 Puller, Reaction Sleeve



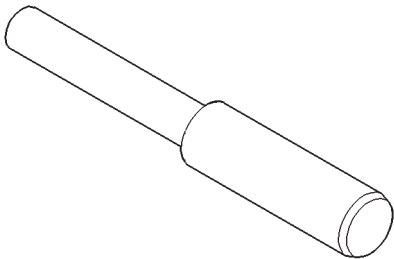
7552 Gauge, 3.0 mm Wire



7543 Puller, Piston #1



7554 Adapter, Pressure Port



7544 Installer, Brake Drum Seal

NV231 TRANSFER CASE

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GENERAL INFORMATION

NV231 TRANSFER CASE

The NV231 is a part-time transfer case with a low range reduction gear system. The NV231 has three operating ranges plus a Neutral position. A low range system provides a reduction ratio for increased low speed torque capability.

The input gear is splined to the transmission output shaft. The input gear drives the mainshaft through the planetary assembly and range hub. The front output shaft is operated by a drive chain that connects the shaft to a drive sprocket on the mainshaft. The drive sprocket is engaged/disengaged by the mode fork, which operates the mode sleeve and hub. The sleeve and hub are not equipped with a synchronizer mechanism for shifting.

The geartrain is mounted in two aluminum case halves attached with bolts. The mainshaft front and rear bearings are mounted in aluminum retainer housings bolted to the case halves.

OPERATING RANGES

Transfer case operating ranges are:

- 2WD (2-wheel drive)
- 4x4 (4-wheel drive)
- 4 Lo (4-wheel drive low range)

The 2WD range is for use on any road surface at any time.

The 4x4 and 4 Lo ranges are for off road use only. They are not for use on hard surface roads. The only exception being when the road surface is wet or slippery or covered by ice and snow.

The low range reduction gear system is operative in 4 Lo range only. This range is for extra pulling

power in off road situations. Low range reduction ratio is 2.72:1.

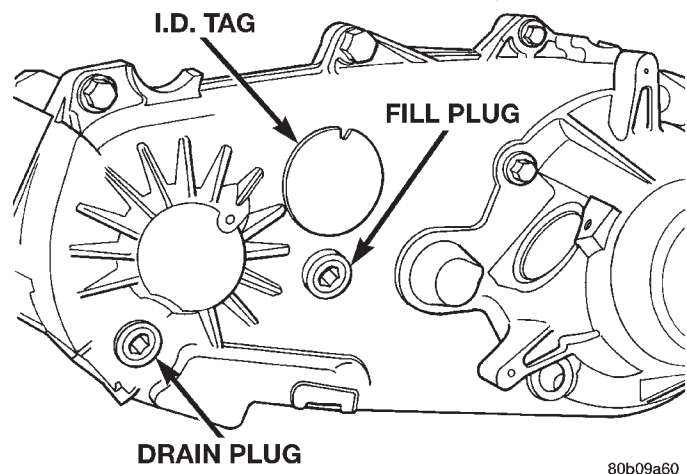
SHIFT MECHANISM

Operating ranges are selected with a floor mounted shift lever. The shift lever is connected to the transfer case range lever by an adjustable linkage rod. A straight line shift pattern is used. Range positions are marked on the shifter bezel cover plate.

TRANSFER CASE 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.



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Fig. 1 Fill/Drain Plug And I.D. Tag Locations

GENERAL INFORMATION (Continued)

RECOMMENDED LUBRICANT AND FILL LEVEL

Recommended lubricant for the NV231 transfer case is Mopar® Dexron II, or ATF Plus 3, type 7176. Approximate lubricant fill capacity is 1.2 liters (2.5 pints).

The fill and drain plugs are both in the rear case (Fig. 1). Correct fill level is to the bottom edge of the

fill plug hole. Be sure the vehicle is level to ensure an accurate fluid level check.

DIAGNOSIS AND TESTING

NV231 DIAGNOSIS

DIAGNOSIS CHART

Condition	Possible Cause	Correction
Transfer case difficult to shift or will not shift into desired range.	1) Vehicle speed too great to permit shifting.	1) Slow vehicle and shift into desired range.
	2) If vehicle was operated for an extended period in 4H mode on dry surface, driveline torque load may cause difficulty.	2) Stop vehicle and shift transfer case to Neutral position. Transfer case can then be shifted to the desired mode.
	3) Transfer case shift linkage binding.	3) Repair or replace linkage as necessary.
	4) Insufficient or incorrect lubricant.	4) Drain and refill transfer case with the correct type and quantity of lubricant.
	5) Internal transfer case components binding, worn, or damaged.	5) Repair or replace components as necessary.
Transfer case noisy in all drive modes.	1) Insufficient or incorrect lubricant.	1) Drain and refill transfer case with the correct type and quantity of lubricant.
Transfer case noisy while in, or jumps out of, 4L mode.	1) Transfer case not completely engaged in 4L position.	1) Slow vehicle, shift transfer case to the Neutral position, and then shift into the 4L mode.
	2) Transfer case shift linkage out of adjustment.	2) Adjust linkage as necessary.
	3) Transfer case shift linkage loose or binding.	3) Repair, replace, or tighten linkage components as necessary.
	4) Range fork damaged, inserts worn, or fork is binding on the shift rail.	4) Repair or replace components as necessary.
	5) Low range gear worn or damaged.	5) Repair or replace components as necessary.
Lubricant leaking from transfer case seals or vent.	1) Transfer case overfilled.	1) Drain lubricant to the correct level.
	2) Transfer case vent closed or restricted.	2) Clean or replace vent as necessary.
	3) Transfer case seals damaged or installed incorrectly.	3) Replace suspect seal.
Abnormal tire wear.	1) Extended operation in 4H mode on dry surfaces,	1) Operate vehicle in 2H mode on dry surfaces.

REMOVAL AND INSTALLATION

TRANSFER CASE

REMOVAL

- (1) Shift transfer case into Neutral.
- (2) Raise vehicle.
- (3) Drain transfer case lubricant.
- (4) Mark front and rear propeller shaft yokes for alignment reference.
- (5) Support transmission with jack stand.
- (6) Remove rear crossmember, or skid plate.
- (7) Disconnect front/rear propeller shafts at transfer case.
- (8) Disconnect vehicle speed sensor wires.
- (9) Disconnect transfer case linkage rod from range lever.
- (10) Disconnect transfer case vent hose (Fig. 2) and indicator switch harness, if necessary.
- (11) Support transfer case with transmission jack.
- (12) Secure transfer case to jack with chains.
- (13) Remove nuts attaching transfer case to transmission.
- (14) Pull transfer case and jack rearward to disengage transfer case.
- (15) Remove transfer case from under vehicle.

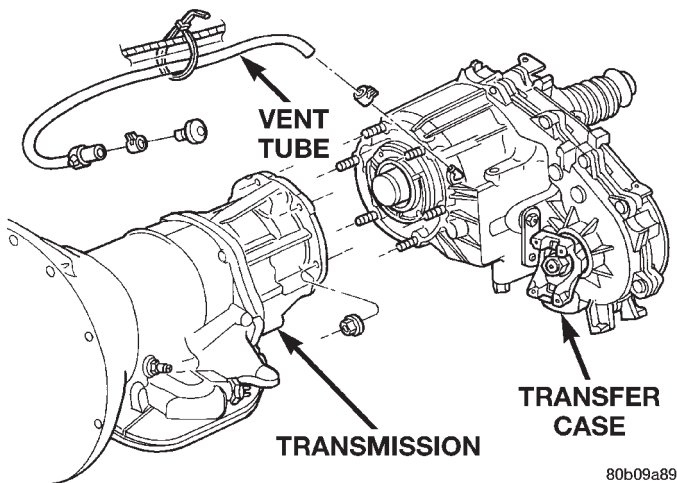


Fig. 2 Transfer Case Mounting

INSTALLATION

- (1) Mount transfer case on a transmission jack.
- (2) Secure transfer case to jack with chains.
- (3) Position transfer case under vehicle.
- (4) Align transfer case and transmission shafts and install transfer case on transmission.
- (5) Install and tighten transfer case attaching nuts to 35 N·m (26 ft. lbs.) torque (Fig. 2).
- (6) Connect vehicle speed sensor wires, and vent hose.

(7) Connect indicator switch harness to transfer case switch, if necessary. Secure wire harness to clips on transfer case.

(8) Align and connect propeller shafts. Refer to Group 3, Differential and Driveline, for proper procedures and specifications.

(9) Fill transfer case with correct fluid. Check transmission fluid level. Correct as necessary.

(10) Install rear crossmember, or skid plate. Tighten crossmember bolts to 41 N·m (30 ft. lbs.) torque.

(11) Remove transmission jack and support stand.

(12) Connect shift rod to transfer case range lever.

(13) Adjust transfer case shift linkage.

(14) Lower vehicle and verify transfer case shift operation.

SHIFT LEVER

REMOVAL

- (1) Shift transfer case into 4L.
- (2) Raise vehicle.
- (3) Loosen adjusting trunnion locknut and slide shift rod out of trunnion (Fig. 3). If rod lacks enough travel to come out of trunnion, push trunnion out of torque shaft.
- (4) Lower vehicle.
- (5) Remove console. Refer to Group 23, Body, for proper procedures.
- (6) Remove screws attaching lever assembly to floorpan and remove assembly and shift rod (if left attached).

INSTALLATION

(1) If shift rod was not removed from lever assembly, work rod down through floorpan opening. Then position lever assembly on floorpan and install assembly attaching screws.

(2) Install console. Refer to Group 23, Body, for proper procedures.

(3) Raise vehicle.

(4) Connect trunnion to torque shaft arm. Or, slide shift rod into trunnion on range lever. Be sure shift rod slides freely in trunnion.

(5) Verify that range lever is in 4L position. Then tighten trunnion lock bolt.

(6) Lower vehicle and check transfer case shift operation.

SPEEDOMETER

REMOVAL

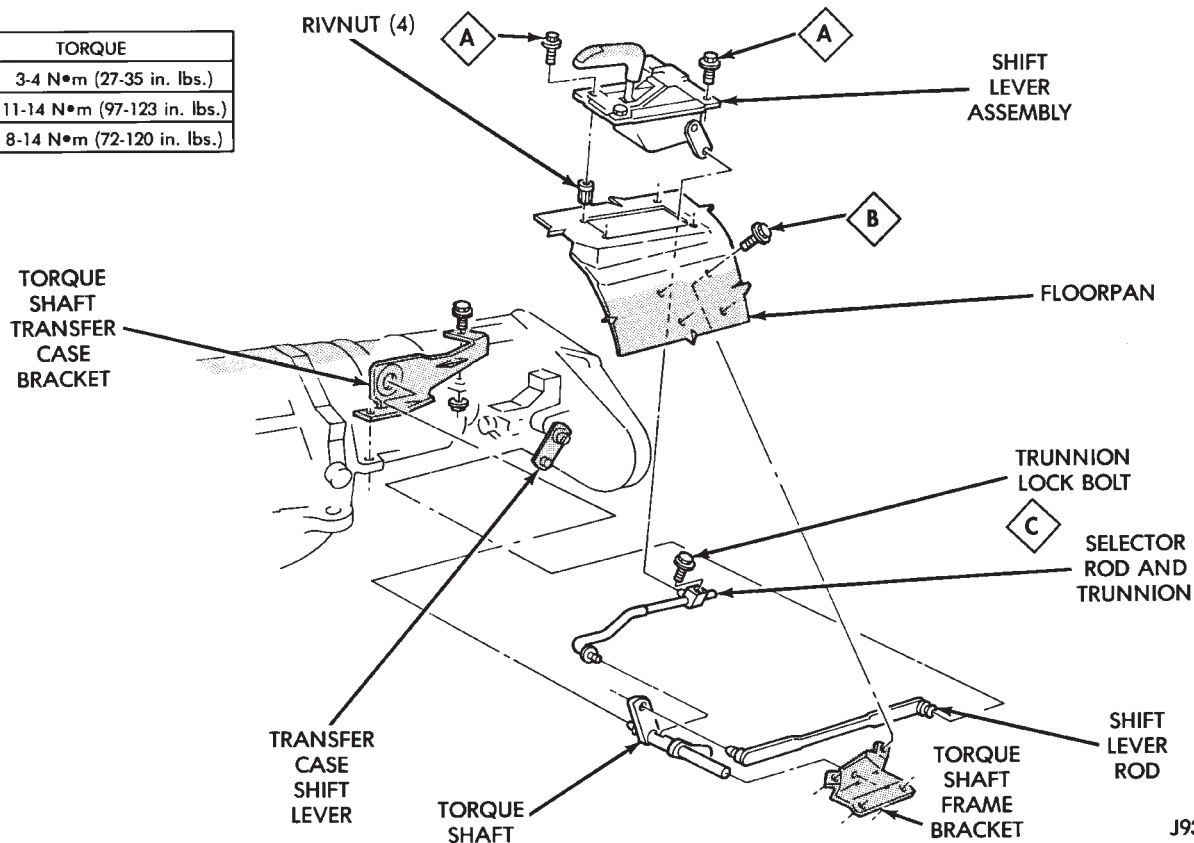
(1) Raise vehicle.

(2) Disconnect wires from vehicle speed sensor.

(3) Remove adapter clamp and screw (Fig. 4).

REMOVAL AND INSTALLATION (Continued)

TORQUE	
A	3-4 N•m (27-35 in. lbs.)
B	11-14 N•m (97-123 in. lbs.)
C	8-14 N•m (72-120 in. lbs.)



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Fig. 3 Shift Linkage

(4) Remove speed sensor and speedometer adapter as an assembly.

(5) Remove speed sensor retaining screw and remove sensor from adapter.

(6) Remove speedometer pinion from adapter. Replace pinion if chipped, cracked, or worn.

(7) Inspect sensor and adapter O-rings (Fig. 4). Remove and discard O-rings if worn or damaged.

(8) Inspect terminal pins in speed sensor. Clean pins with Mopar® electrical spray cleaner if dirty or oxidized. Replace sensor if faulty, or if pins are loose, severely corroded, or damaged.

INSTALLATION AND INDEXING

(1) Thoroughly clean adapter flange and adapter mounting surface in housing. Surfaces must be clean for proper adapter alignment and speedometer operation.

(2) Install new O-rings on speed sensor and speedometer adapter (Fig. 4), if necessary.

(3) Lubricate sensor and adapter O-rings with transmission fluid.

(4) Install vehicle speed sensor in speedometer adapter. Tighten sensor attaching screw to 2-3 N•m (15-27 in. lbs.) torque.

(5) Install speedometer pinion in adapter.

(6) Count number of teeth on speedometer pinion. Do this before installing assembly in housing. Then lubricate pinion teeth with transmission fluid.

(7) Note index numbers on adapter body (Fig. 5). These numbers will correspond to number of teeth on pinion.

(8) Install speedometer assembly in housing.

(9) Rotate adapter until required range numbers are at 6 o'clock position. Be sure range index numbers correspond to number of teeth on pinion gear.

(10) Install speedometer adapter clamp and retaining screw. Tighten clamp screw to 10-12 N•m (90-110 in. lbs.) torque.

(11) Connect wires to vehicle speed sensor.

(12) Lower vehicle and top off transmission fluid level if necessary.

FRONT OUTPUT SHAFT SEAL**REMOVAL**

(1) Raise vehicle.

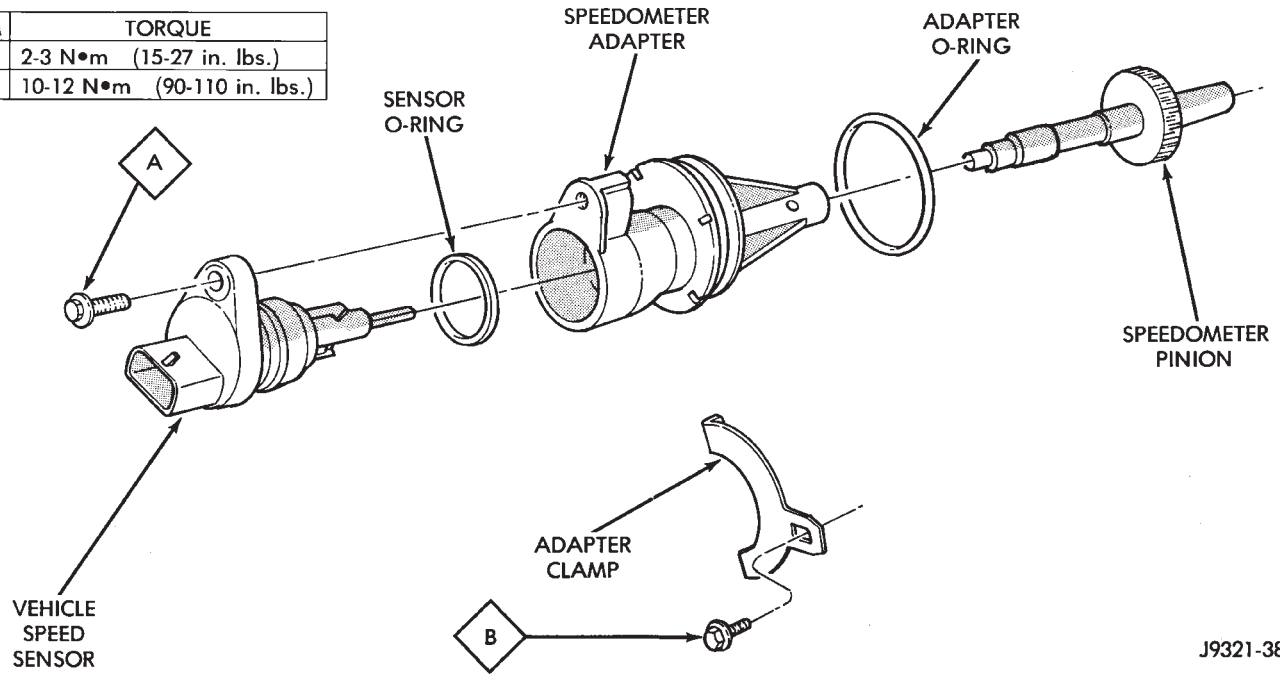
(2) Remove front propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedure.

(3) Remove front output shaft yoke.

(4) Remove seal from front case with pry tool (Fig. 6).

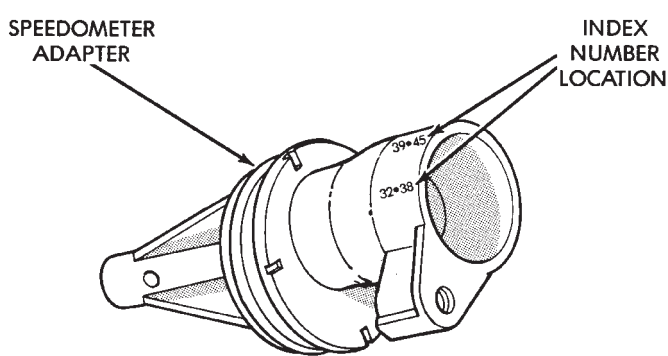
REMOVAL AND INSTALLATION (Continued)

ITEM	TORQUE
A	2-3 N•m (15-27 in. lbs.)
B	10-12 N•m (90-110 in. lbs.)



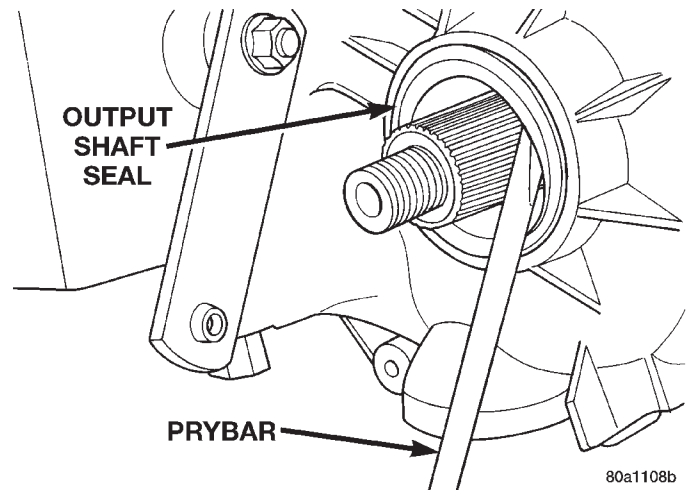
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Fig. 4 Speedometer Components



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Fig. 5 Location Of Index Numbers On Speedometer Adapter



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Fig. 6 Remove Front Output Shaft Seal

INSTALLATION

(1) Install new front output seal in front case with Installer Tool 8143 as follows:

(a) Place new seal on tool. Garter spring on seal goes toward interior of case.

(b) Start seal in bore with light taps from hammer (Fig. 7). Once seal is started, continue tapping seal into bore until installer tool seats against case.

REMOVAL AND INSTALLATION (Continued)

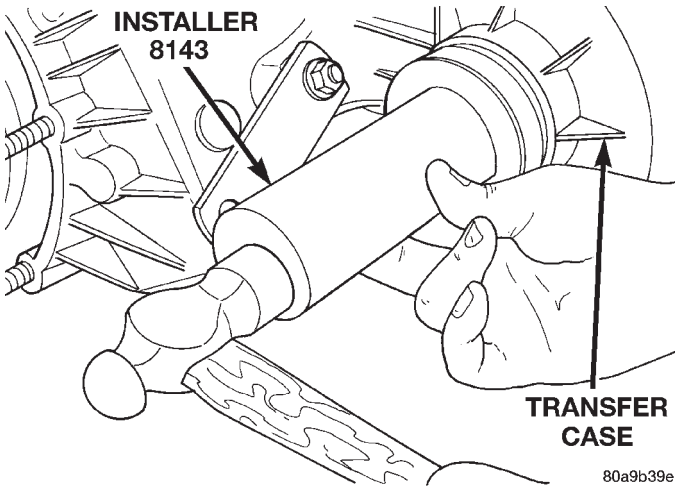


Fig. 7 Front Output Seal Installation

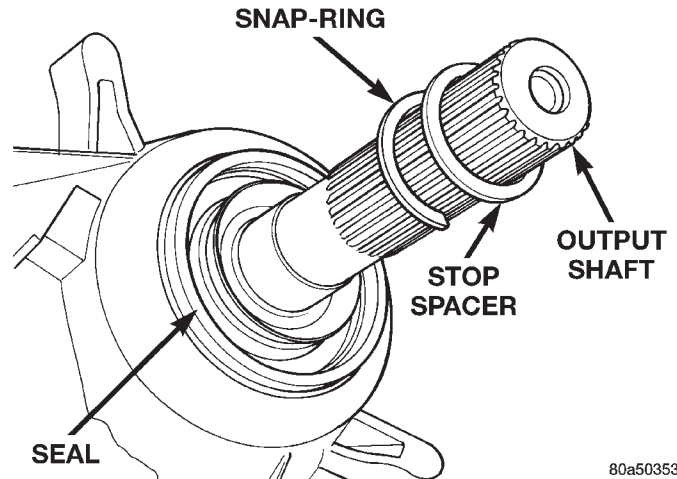


Fig. 9 Slinger Stop Spacer and Snap-ring

DISASSEMBLY AND ASSEMBLY

NV231 TRANSFER CASE

DISASSEMBLY

Position transfer case on shallow drain pan. Remove drain plug and drain lubricant remaining in case.

REAR RETAINER AND OIL PUMP REMOVAL

- (1) Remove the speedometer adapter.
- (2) Spread band clamp which holds output shaft boot to slinger with a suitable awl, or equivalent.
- (3) Remove output shaft boot from slinger and output shaft.
- (4) Using Puller MD-998056-A, remove rear slinger (Fig. 8).
- (5) Remove slinger stop spacer and snap-ring from output shaft (Fig. 9).

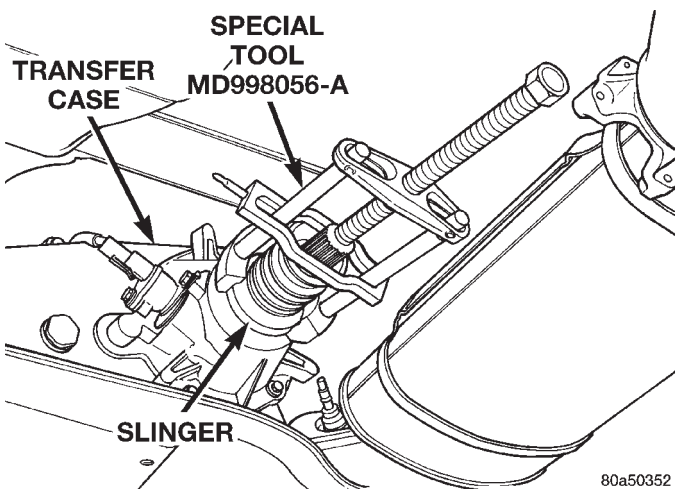


Fig. 8 Rear Slinger Removal

(6) Use a suitable pry tool, or a slide hammer mounted screw, to remove the seal from the rear retainer (Fig. 10).

(7) Remove the rear output bearing I.D. retaining ring (Fig. 11).

(8) Remove the bolts holding the rear retainer to the rear case half.

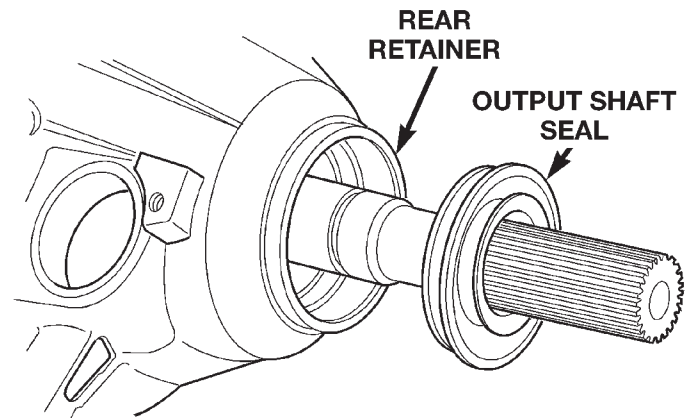


Fig. 10 Rear Retainer Seal

(9) Tap rear retainer with rawhide or rubber mallet to loosen sealer bead.

(10) Remove rear retainer from rear case half (Fig. 12).

(11) Remove snap-ring holding oil pump in position on output shaft.

(12) Disengage oil pickup tube from oil pump and remove oil pump assembly. Remove oil pump by tilting the edge of the oil pump from under the edge of the rear case half and sliding the pump (Fig. 13).

(13) Remove pick-up tube o-ring from oil pump (Fig. 14), if necessary. Do not disassemble the oil pump, it is not serviceable.

DISASSEMBLY AND ASSEMBLY (Continued)

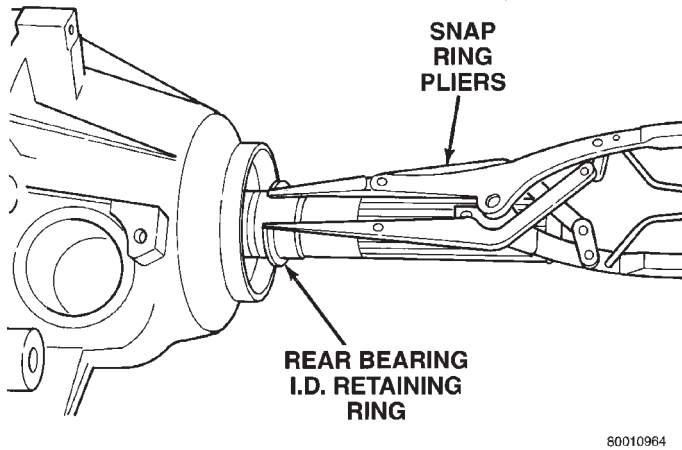


Fig. 11 Output Shaft Rear Bearing Retaining Ring

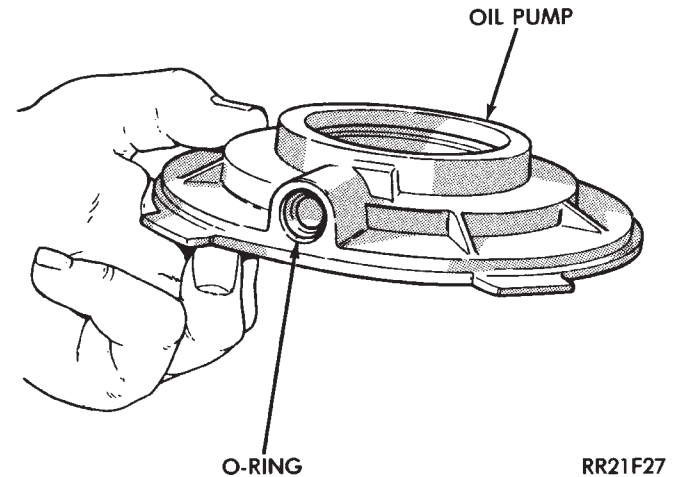


Fig. 14 Pick-up Tube O-ring Location

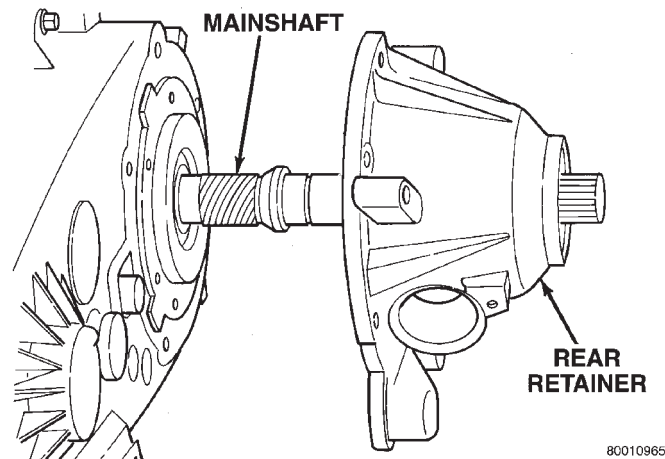


Fig. 12 Rear Retainer Removal

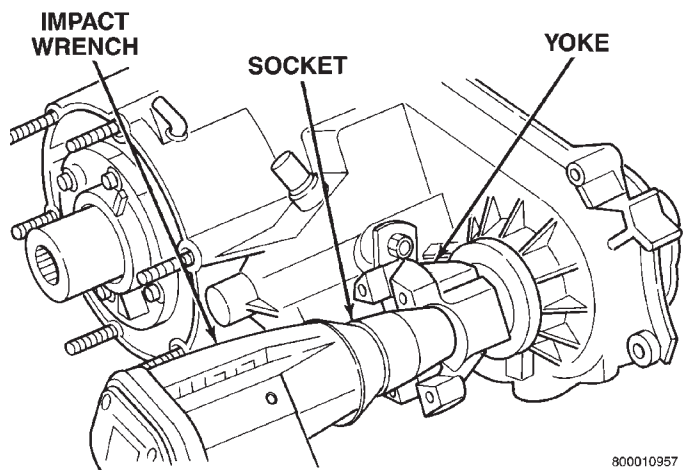


Fig. 15 Yoke Nut Removal

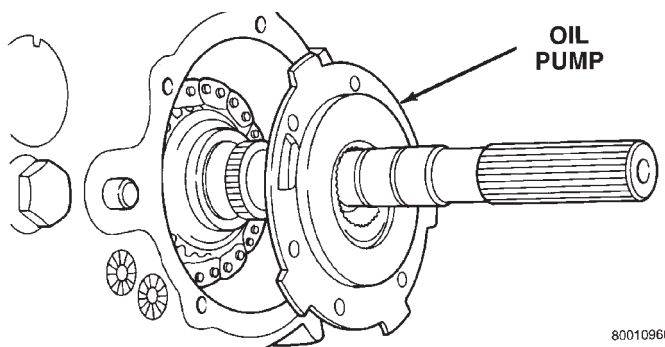


Fig. 13 Oil Pump Removal

YOKE AND RANGE LEVER REMOVAL

- (1) Remove transfer case indicator switch.
- (2) Remove front yoke nut as follows:
 - (a) Move range lever to 4L position.
 - (b) Then remove nut with socket and impact wrench (Fig. 15).
- (3) Remove yoke. If yoke is difficult to remove by hand, remove it with bearing splitter, or with stan-

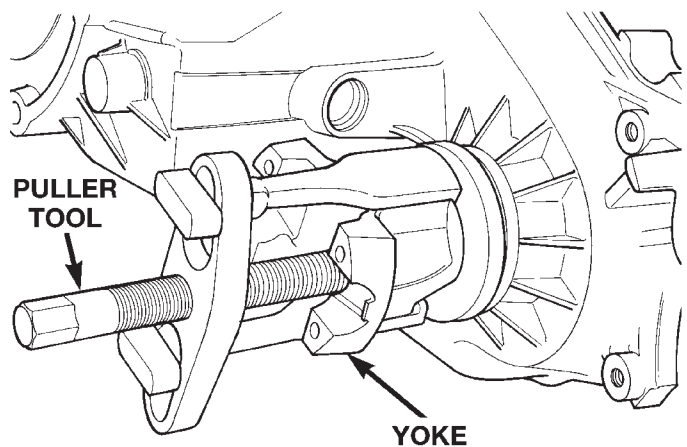


Fig. 16 Yoke Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(4) Remove seal washer from front output shaft. Discard washer as it should not be reused.

(5) Remove nut and washer that attach range lever to sector shaft. Then move sector to neutral position and remove range lever from shaft (Fig. 17).

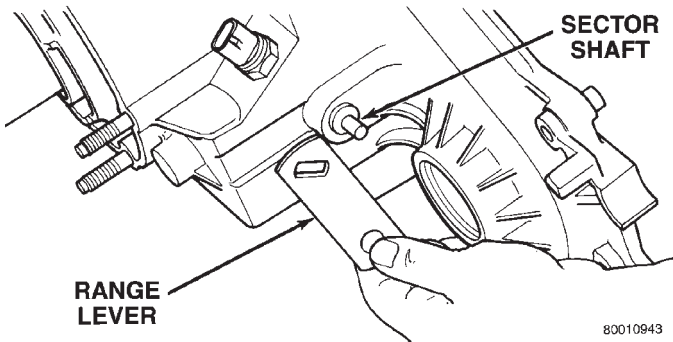


Fig. 17 Range Lever Removal

FRONT OUTPUT SHAFT AND DRIVE CHAIN REMOVAL

(1) Support transfer case so rear case is facing upward.

(2) Remove bolts holding front case to rear case. The case alignment bolts require flat washers (Fig. 18).

(3) Loosen rear case with flat blade screwdriver to break sealer bead. Insert pry tool blade only into notches provided at each end of case (Fig. 19).

(4) Remove rear case from front case.

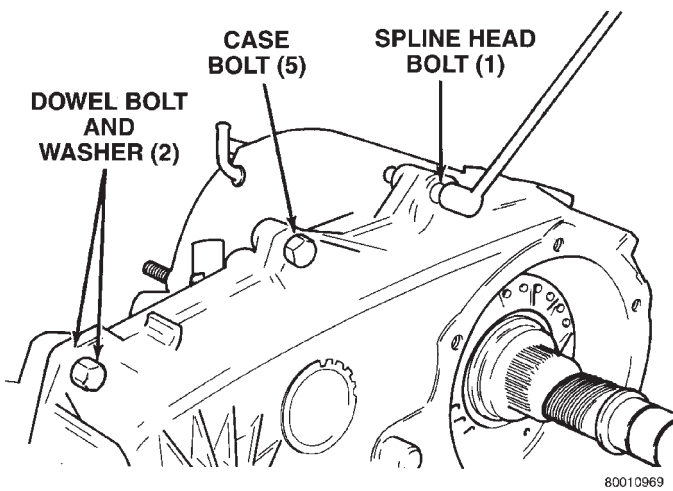


Fig. 18 Rear Case Alignment Bolt Locations

(5) Remove oil pickup tube from rear case (Fig. 20).

(6) Remove mode fork spring (Fig. 21).

(7) Pull front output shaft upward and out of front output shaft bearing (Fig. 22).

(8) Remove front output shaft and chain.

SHIFT FORKS AND MAINSHAFT REMOVAL

(1) Remove detent plug, O-ring, detent spring and detent plunger (Fig. 23).

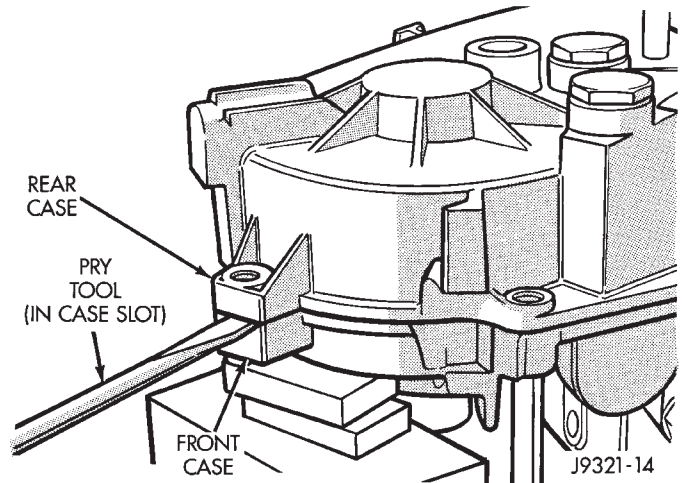


Fig. 19 Loosening Rear Case

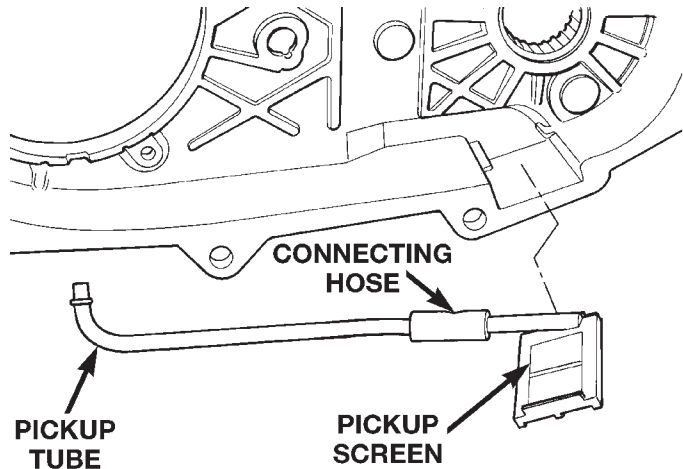


Fig. 20 Oil Pickup Tube Removal

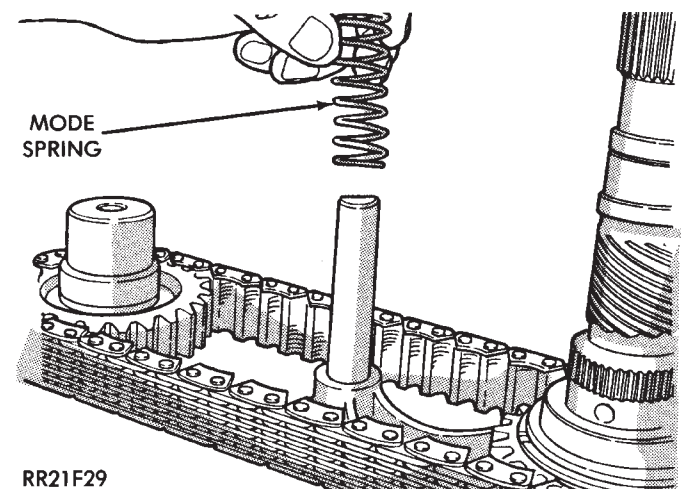
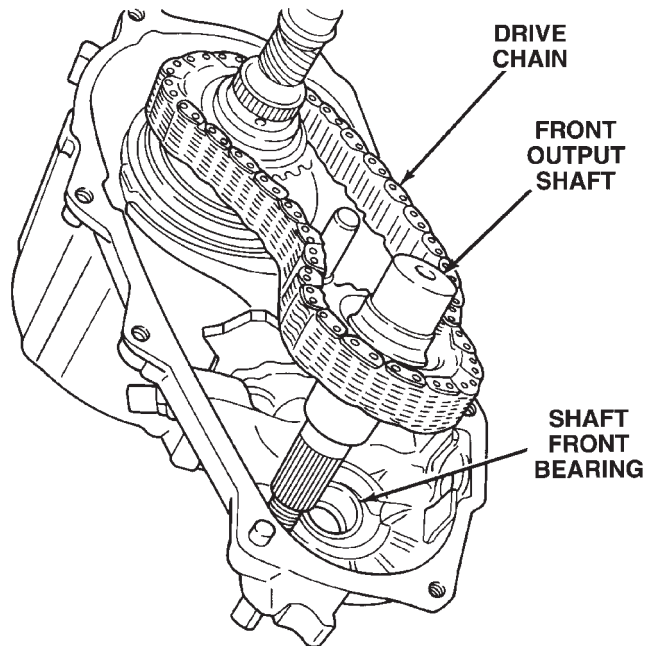


Fig. 21 Mode Fork Spring Removal

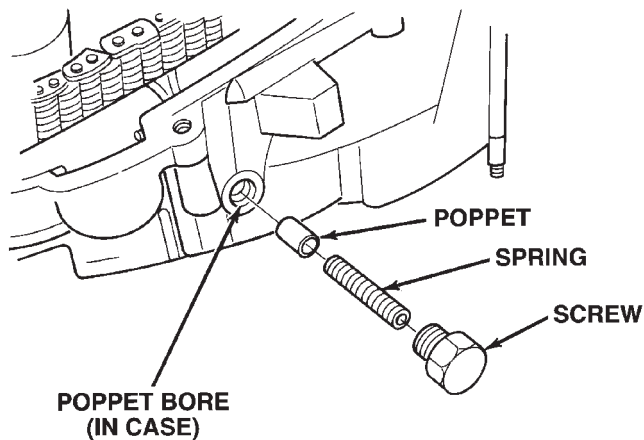
(2) Remove mainshaft from mode sleeve and input gear pilot bearing.

DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 22 Remove Front Output Shaft And Chain



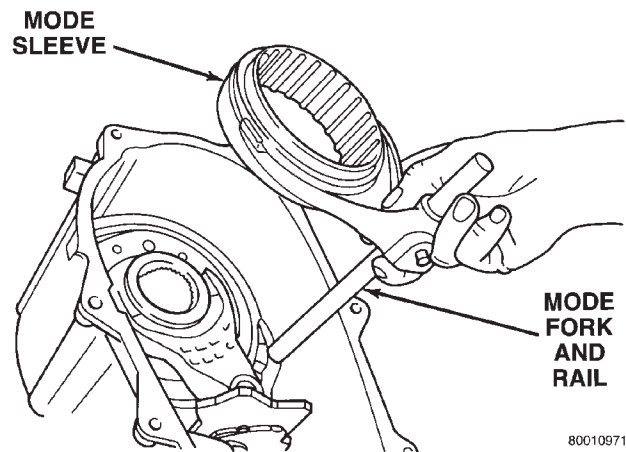
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Fig. 23 Detent Plug, Spring And Plunger Removal

- (3) Remove mode fork and sleeve as an assembly (Fig. 24). Note position of sleeve for assembly reference. The short side of the sleeve faces upward.
- (4) Remove range fork and hub as an assembly (Fig. 25). Note fork position for installation reference.
- (5) Remove shift sector from front case (Fig. 26).
- (6) Remove shift sector bushing and O-ring (Fig. 27).

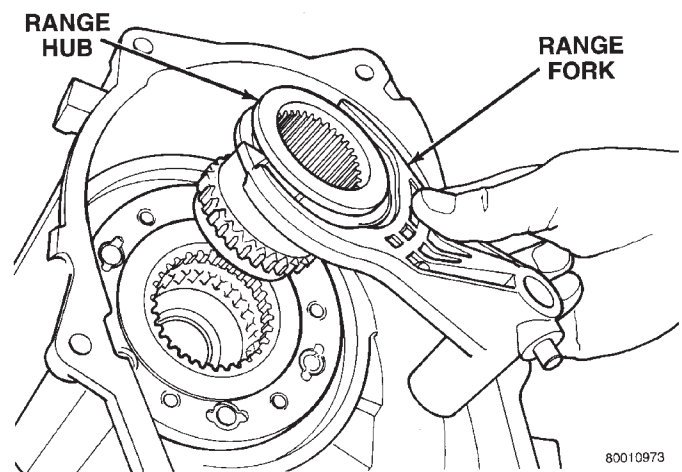
MAINSHAFT DISASSEMBLY

- (1) Remove mode hub retaining ring with heavy duty snap-ring pliers (Fig. 28).
- (2) Slide mode hub off mainshaft (Fig. 29).
- (3) Slide drive sprocket off mainshaft (Fig. 30).



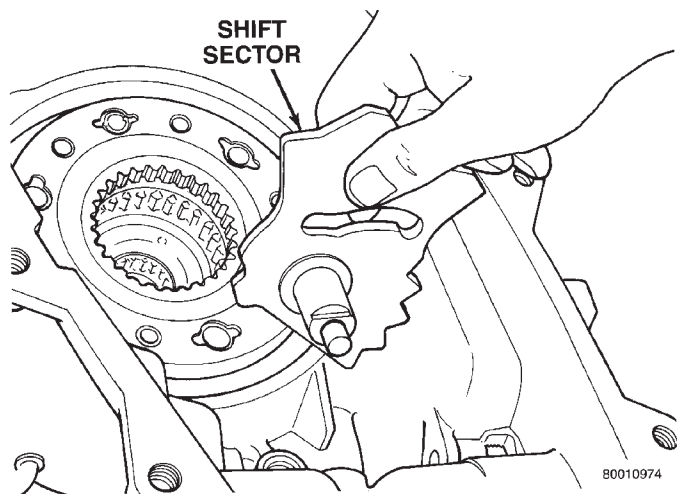
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Fig. 24 Mode Fork And Sleeve Removal



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Fig. 25 Range Fork And Hub Removal



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Fig. 26 Shift Sector Removal

INPUT GEAR AND LOW RANGE GEAR REMOVAL

- (1) Remove front bearing retainer attaching bolts (Fig. 31).

DISASSEMBLY AND ASSEMBLY (Continued)

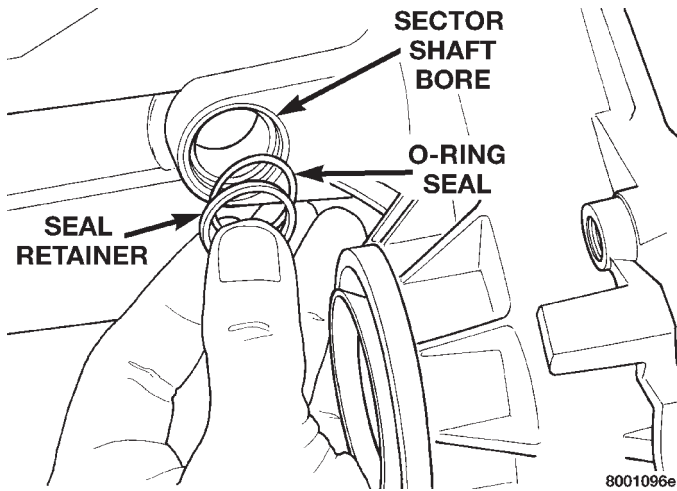


Fig. 27 Sector Bushing And O-Ring Removal

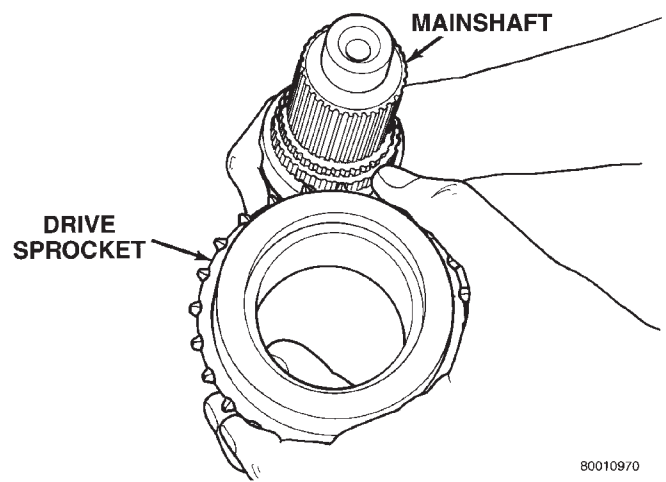


Fig. 30 Drive Sprocket Removal

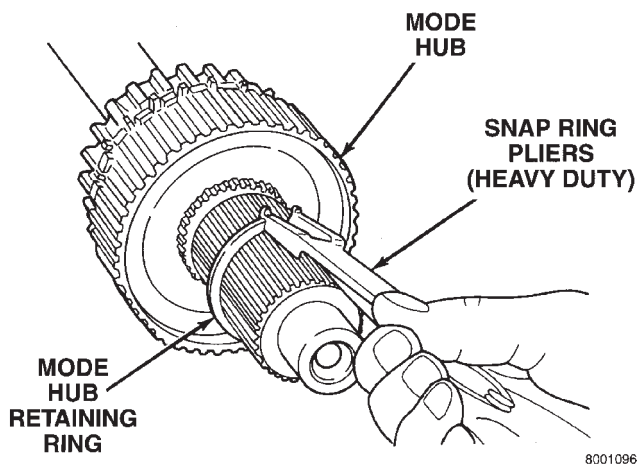


Fig. 28 Mode Hub Retaining Ring Removal

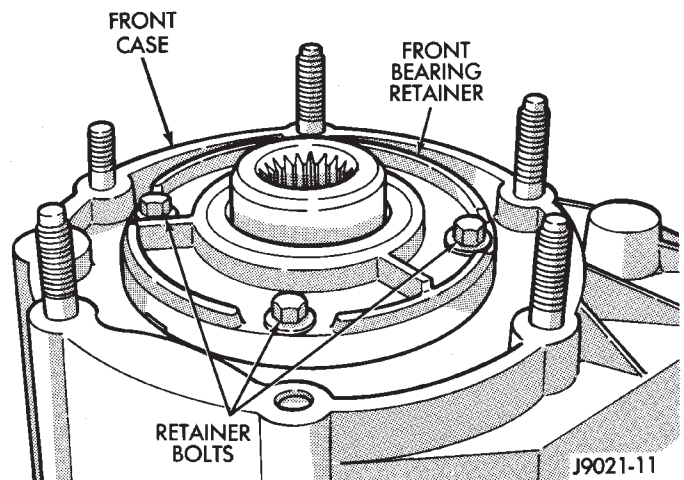


Fig. 31 Front Bearing Retainer Bolts

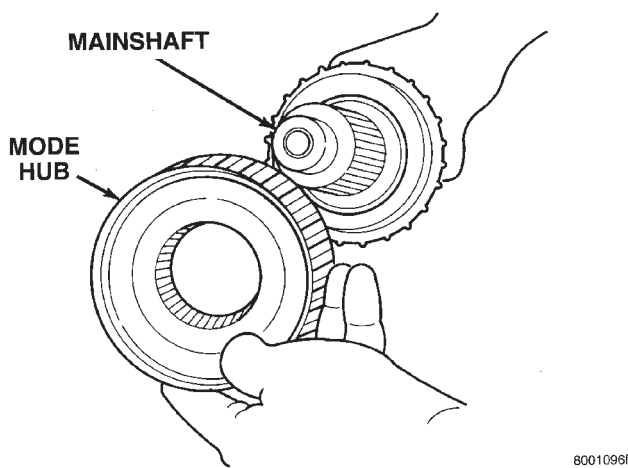


Fig. 29 Mode Hub Removal

(2) Remove front bearing retainer. Pry retainer loose with pry tool positioned in slots at each end of retainer (Fig. 32).

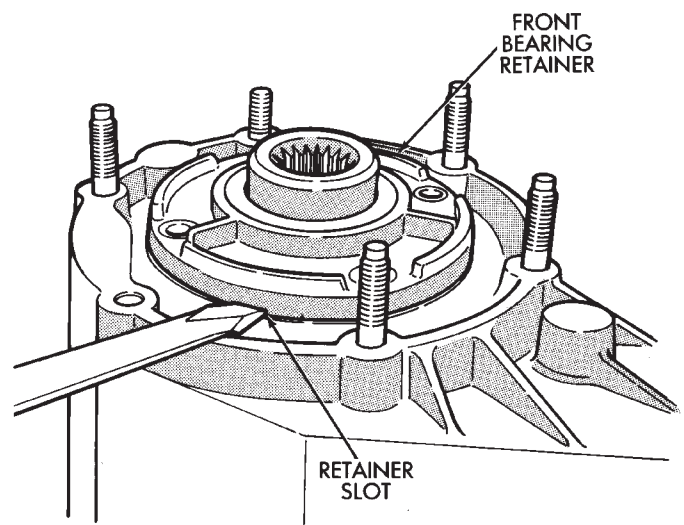


Fig. 32 Front Bearing Retainer Removal

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Remove front bearing retainer seal. Tap seal out with drift and hammer.

(4) Remove input gear retaining ring with heavy duty snap-ring pliers (Fig. 33)

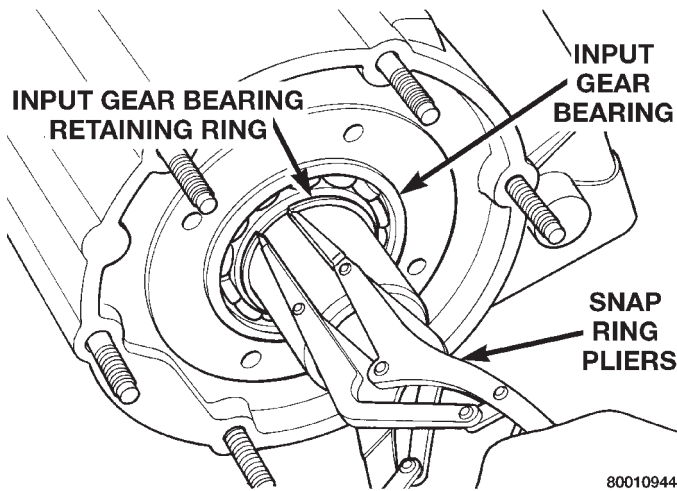


Fig. 33 Removing Input Gear Retaining Ring

(5) Place front case in horizontal position. Then remove input gear and low range gear as an assembly (Fig. 34). Tap gear out of bearing with plastic mallet if necessary.

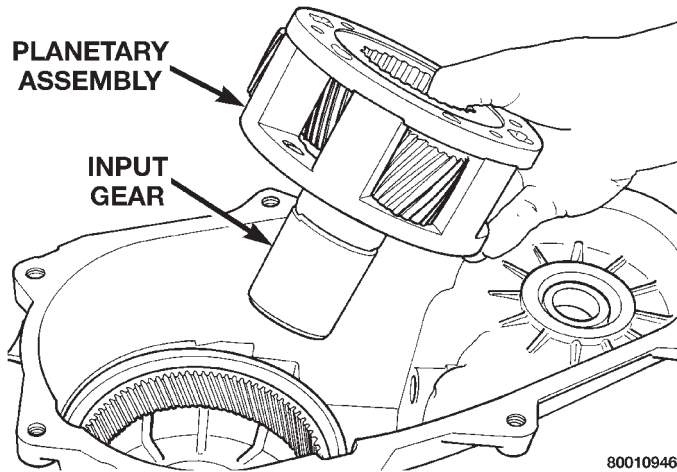


Fig. 34 Input Gear And Planetary Carrier Removal

INPUT AND LOW RANGE GEAR DISASSEMBLY

(1) Remove snap-ring that retains input gear in low range gear (Fig. 35).

(2) Remove retainer (Fig. 36).

(3) Remove front tabbed thrust washer (Fig. 37).

(4) Remove input gear (Fig. 38).

(5) Remove rear tabbed thrust washer from low range gear (Fig. 39).

ASSEMBLY

Lubricate transfer case components with Mopar® Dexron II automatic transmission fluid or petroleum jelly (where indicated) during assembly.

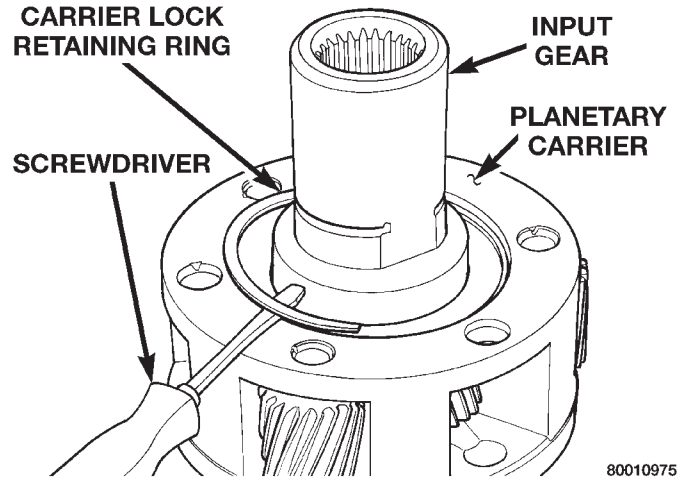


Fig. 35 Input Gear Snap-Ring Removal

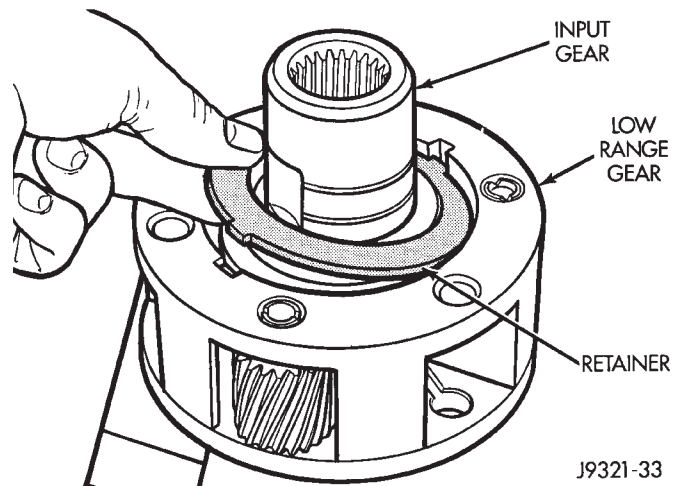


Fig. 36 Input Gear Retainer Removal

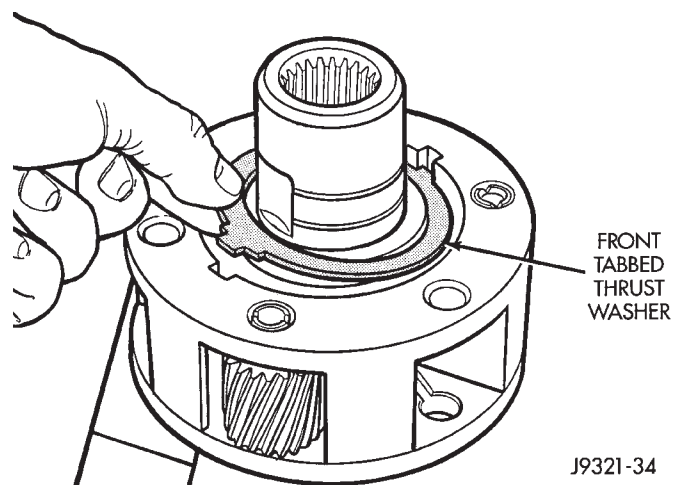


Fig. 37 Front Tabbed Thrust Washer Removal

DISASSEMBLY AND ASSEMBLY (Continued)

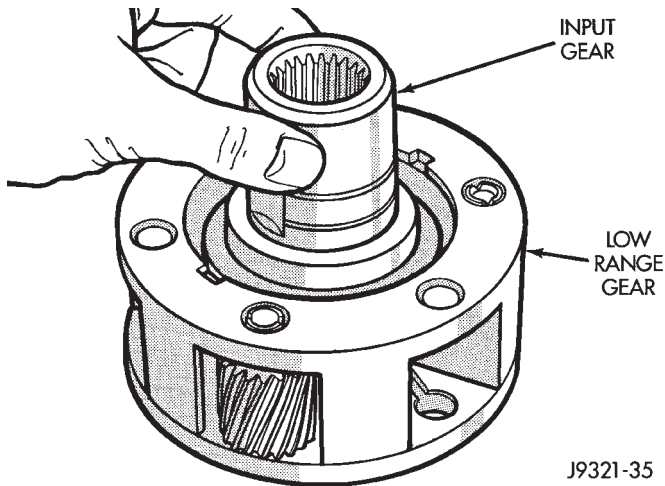


Fig. 38 Input Gear Removal

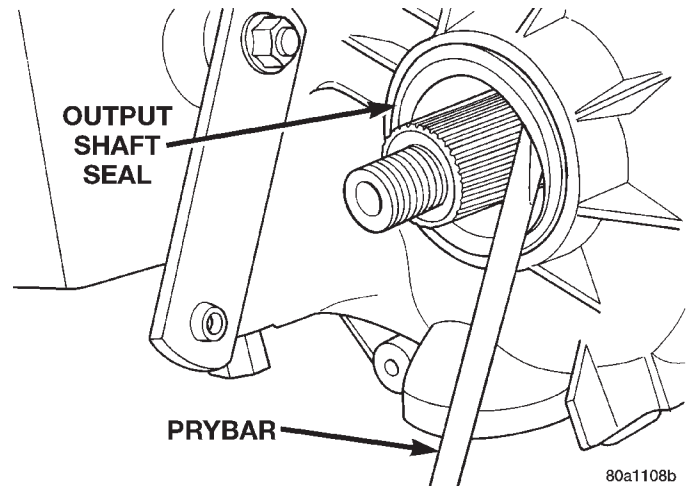


Fig. 40 Front Output Seal Removal

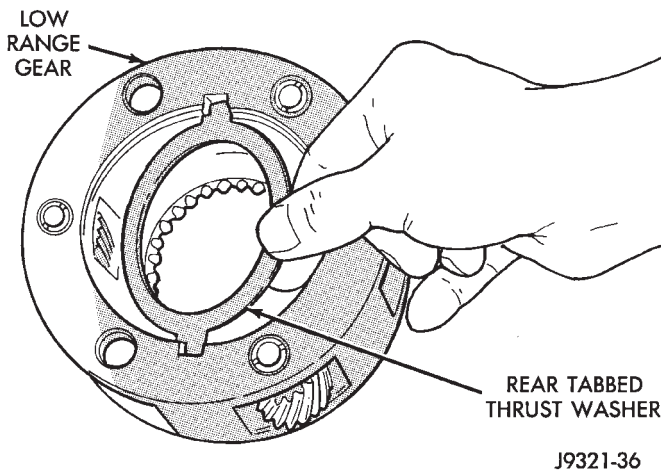


Fig. 39 Rear Tabbed Thrust Washer Removal

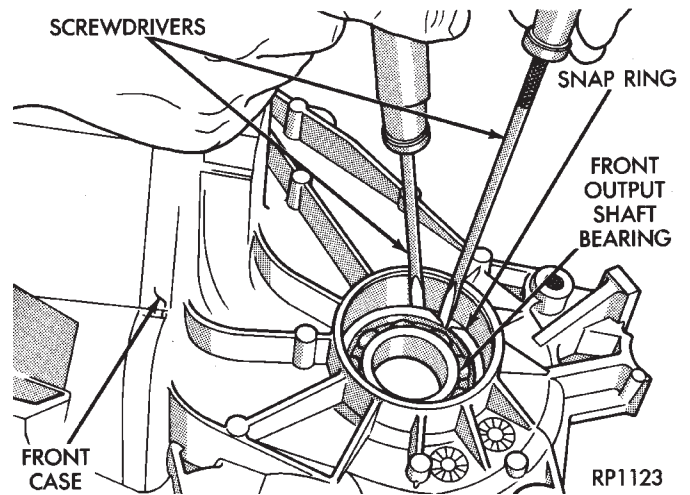


Fig. 41 Front Output Shaft Bearing Retaining Ring Removal

BEARING AND SEAL INSTALLATION

CAUTION: The bearing bores in various transfer case components contain oil feed holes. Make sure replacement bearings do not block the holes.

- (1) Remove the front output shaft seal from case with pry tool (Fig. 40).
- (2) Remove the front output shaft bearing retaining ring with screwdriver (Fig. 41).
- (3) Remove bearing with Tool Handle C-4171 and Tool 5065 (Fig. 42).
- (4) Install front output shaft front bearing in case with Tool Handle C-4171 and Installer 5064 (Fig. 43).
- (5) Install output shaft front bearing retaining ring (Fig. 44). Start ring into place by hand. Then use small screwdriver to work ring into case groove. Be sure ring is fully seated before proceeding.
- (6) Install new front output seal in front case with Installer Tool 8143 as follows:
 - (a) Place new seal on tool. **Garther spring on seal goes toward interior of case.**

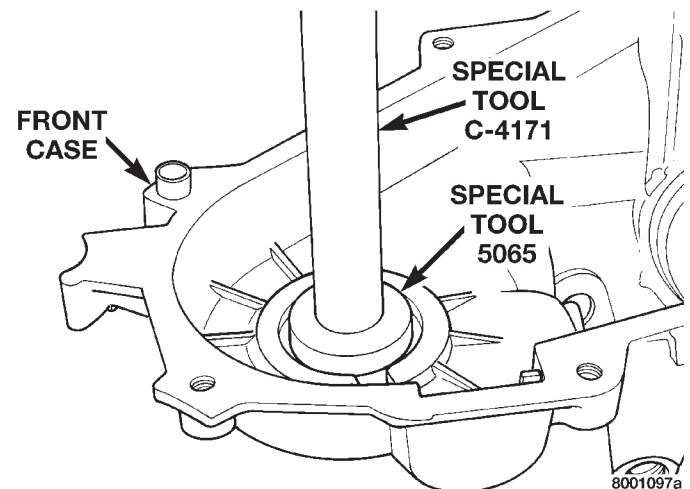


Fig. 42 Front Output Shaft Bearing Removal

- (b) Start seal in bore with light taps from hammer (Fig. 45). Once seal is started, continue tap-

DISASSEMBLY AND ASSEMBLY (Continued)

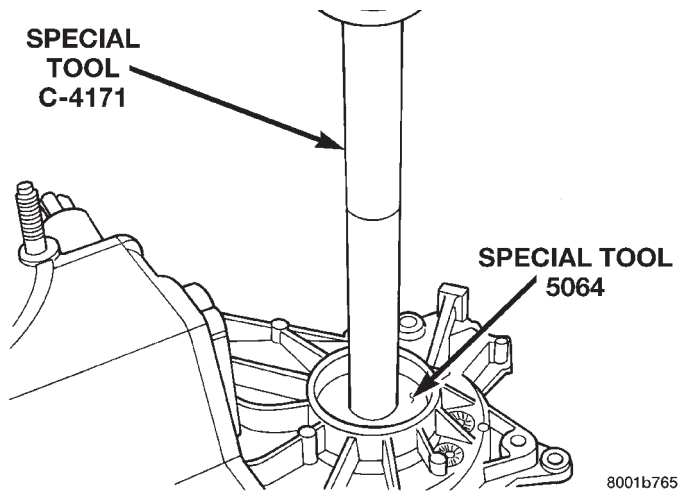


Fig. 43 Front Output Shaft Bearing Installation

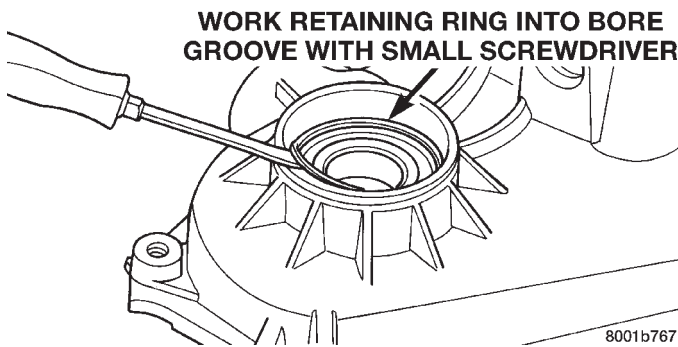


Fig. 44 Installing Output Shaft Front Bearing Retaining Ring

ping seal into bore until installer tool bottoms against case.

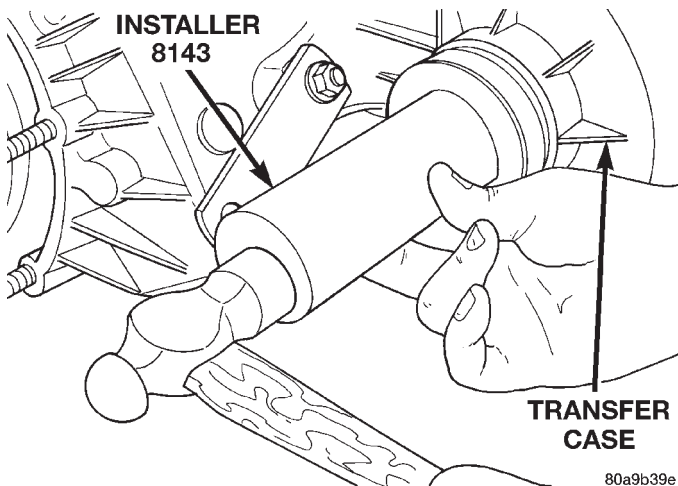


Fig. 45 Front Output Seal Installation

(7) Remove the output shaft rear bearing with the screw and jaws from Remover L-4454 and Cup 8148 (Fig. 46).

(8) Install new bearing with Tool Handle C-4171 and Installer 5066 (Fig. 47). The bearing bore is

chamfered at the top. Install the bearing so it is flush with the lower edge of this chamfer (Fig. 48).

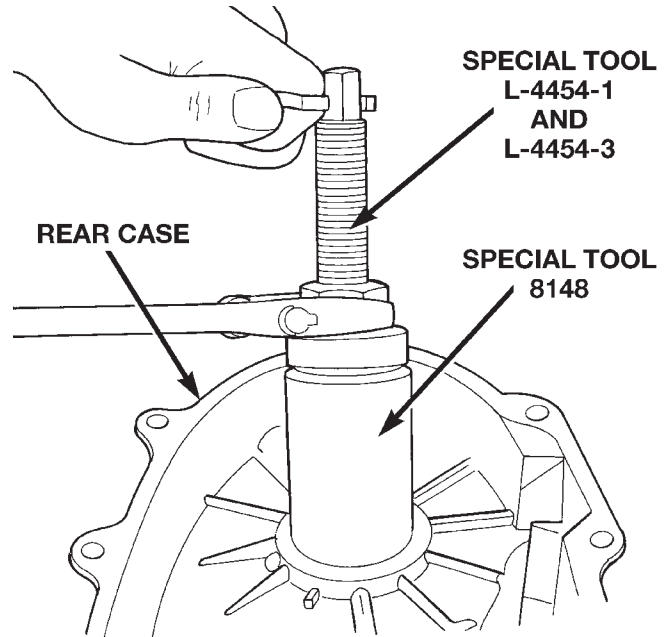


Fig. 46 Output Shaft Rear Bearing Removal

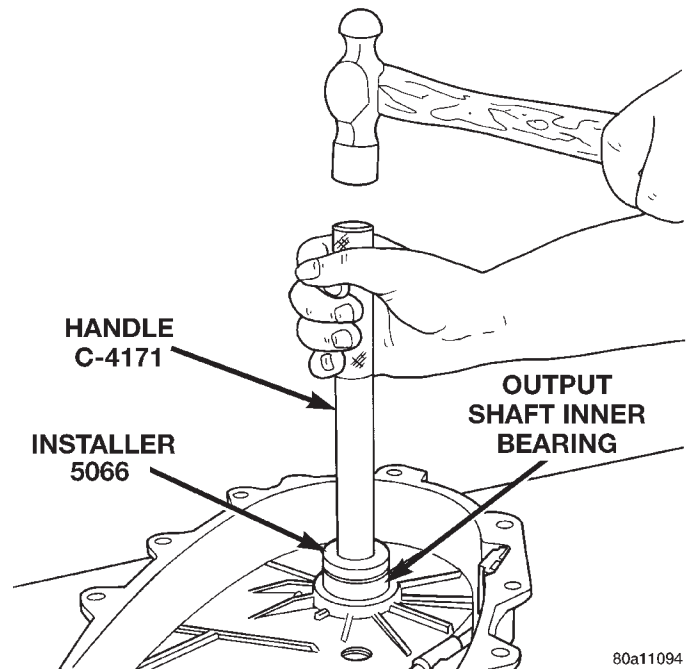


Fig. 47 Output Shaft Rear Bearing Installation

(9) Using Remover C-4210 and Handle C-4171, drive input shaft bearing from inside the annulus gear opening in the case. (Fig. 49).

(10) Install locating ring on new bearing.

(11) Position case so forward end is facing upward.

(12) Using Remover C-4210 and Handle C-4171, drive input shaft bearing into case. The bearing

DISASSEMBLY AND ASSEMBLY (Continued)

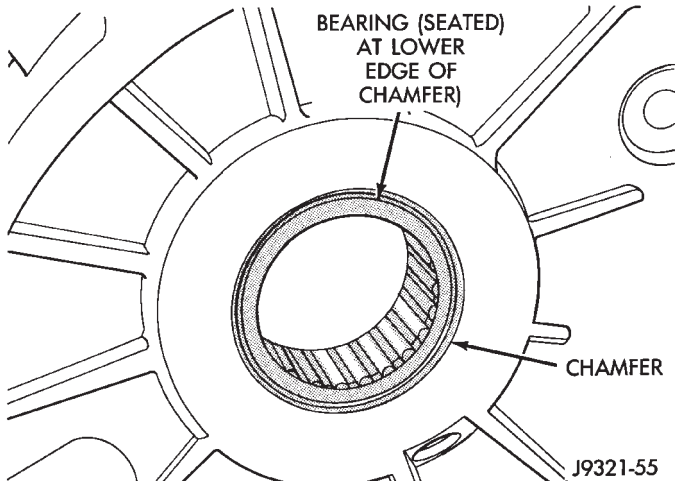


Fig. 48 Output Shaft Rear Bearing Installation Depth

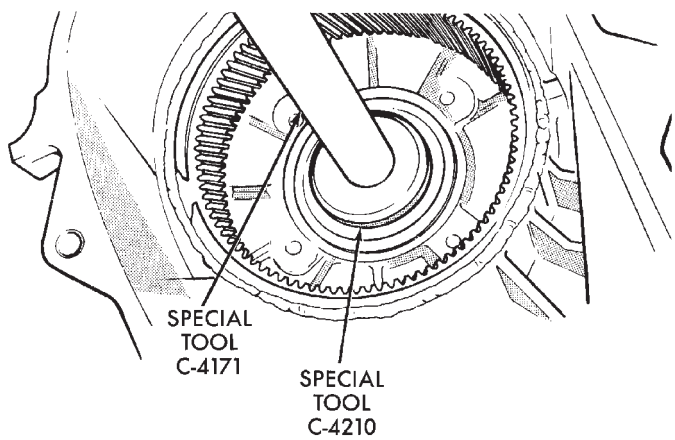


Fig. 49 Input Shaft Bearing Removal

locating ring must be fully seated against case surface (Fig. 50).

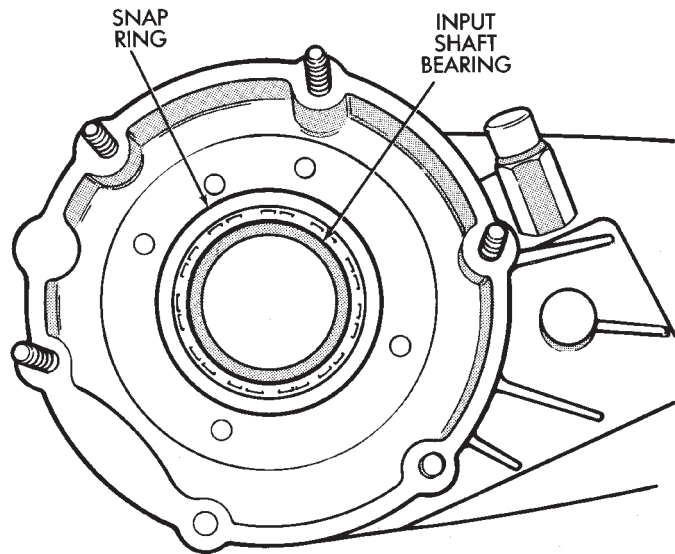


Fig. 50 Seating Input Shaft Bearing

(13) Remove input gear pilot bearing by inserting a suitably sized drift into the splined end of the input gear and driving the bearing out with the drift and a hammer (Fig. 51).

(14) Install new pilot bearing with Installer 5065 and Handle C-4171 (Fig. 52).

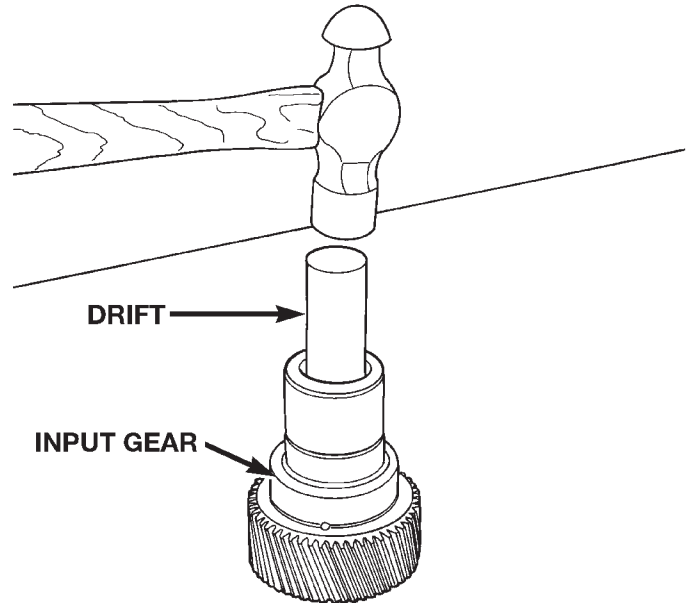


Fig. 51 Remove Input Gear Pilot Bearing

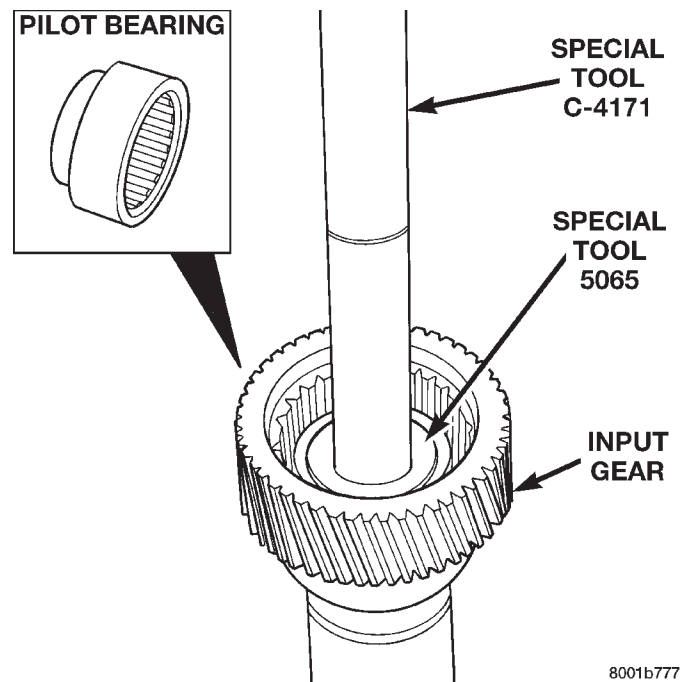
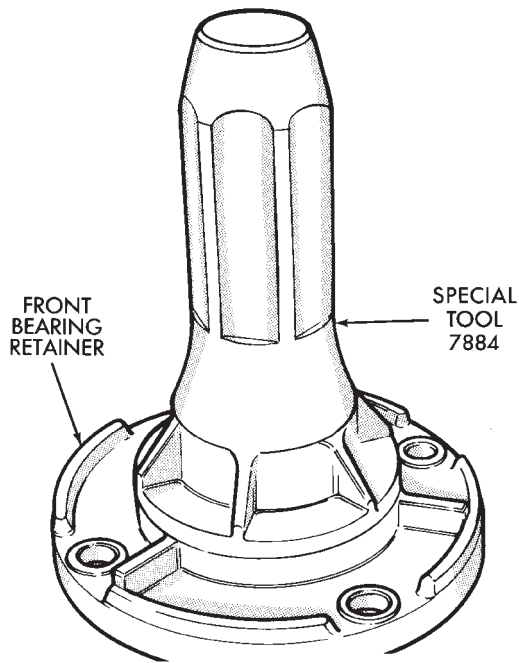


Fig. 52 Install Input Gear Pilot Bearing

(15) Remove front bearing retainer seal with suitable pry tool.

DISASSEMBLY AND ASSEMBLY (Continued)

(16) Install new front bearing retainer seal with Installer 7884 (Fig. 53).

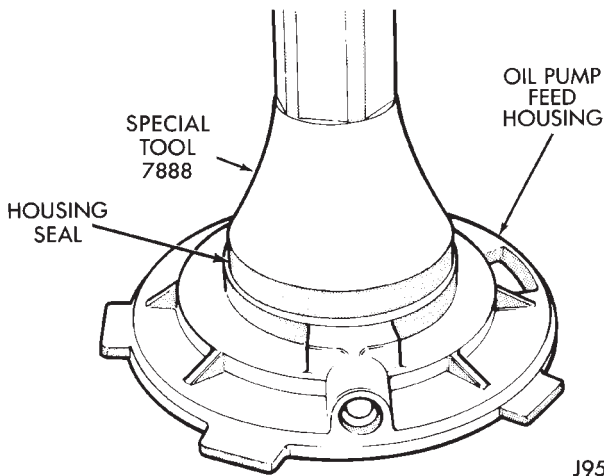


J9521-41

Fig. 53 Install Front Bearing Retainer Seal

(17) Remove seal from oil pump housing with a suitable pry tool.

(18) Install new seal in oil pump housing with Installer 7888 (Fig. 54).

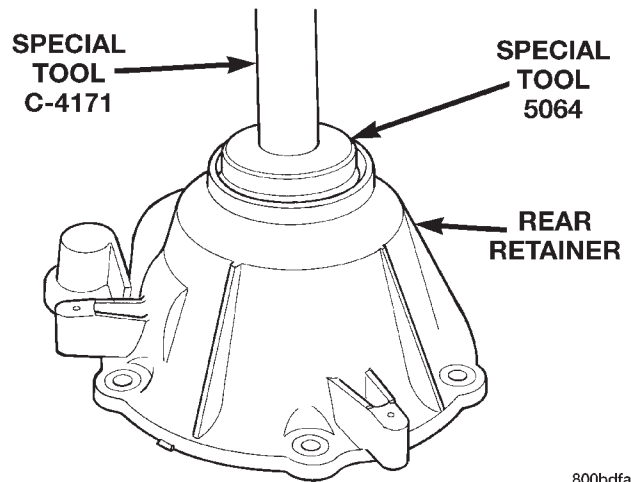


J9521-35

Fig. 54 Oil Pump Seal Installation

(19) Remove rear retainer bearing with Installer 8128 and Handle C-4171.

(20) Install rear bearing in retainer with Handle C-4171 and Installer 5064 (Fig. 55).



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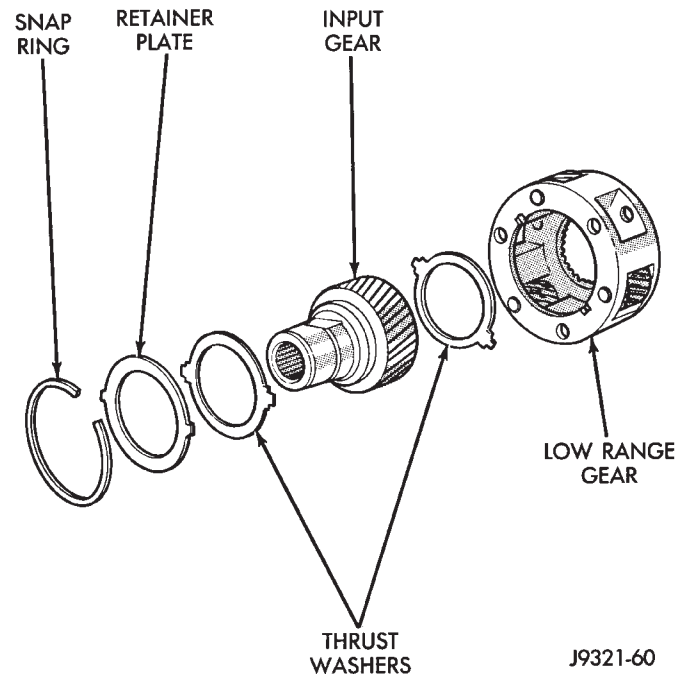
Fig. 55 Installing Rear Bearing In Retainer

(2) Install first thrust washer in low range gear (Fig. 56). Be sure washer tabs are properly aligned in gear notches.

(3) Install input gear in low range gear. Be sure input gear is fully seated.

(4) Install remaining thrust washer in low range gear and on top of input gear. Be sure washer tabs are properly aligned in gear notches.

(5) Install retainer on input gear and install snapping.



J9321-60

Fig. 56 Input/Low Range Gear Components

INPUT GEAR AND LOW RANGE GEAR INSTALLATION

(1) Align and install low range/input gear assembly in front case (Fig. 57). Be sure low range gear pinions are engaged in annulus gear and that input gear shaft is fully seated in front bearing.

INPUT AND LOW RANGE GEAR ASSEMBLY

(1) Lubricate gears and thrust washers (Fig. 56) with recommended transmission fluid.

DISASSEMBLY AND ASSEMBLY (Continued)

(2) Install snap-ring to hold input/low range gear into front bearing (Fig. 58).

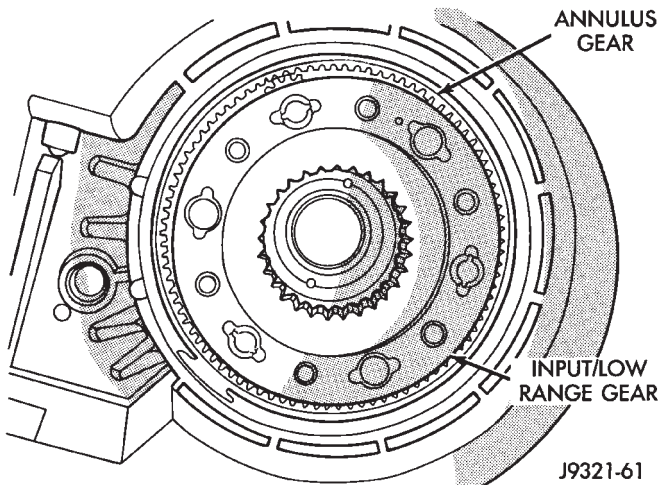


Fig. 57 Input/Low Range Gear Installation

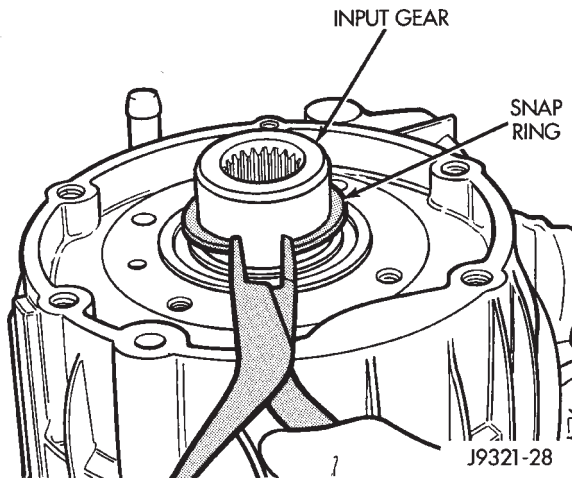


Fig. 58 Install Snap-Ring

(3) Clean gasket sealer residue from retainer and inspect retainer for cracks or other damage.

(4) Apply a 3 mm (1/8 in.) bead of Mopar® gasket maker or silicone adhesive to sealing surface of retainer.

(5) Align cavity in seal retainer with fluid return hole in front of case.

CAUTION: Do not block fluid return cavity on sealing surface of retainer when applying Mopar® gasket maker or silicone adhesive sealer. Seal failure and fluid leak can result.

(6) Install bolts to hold retainer to transfer case (Fig. 59). Tighten to 21 N·m (16 ft. lbs.) of torque.

MAINSHAFT ASSEMBLY

(1) Lubricate mainshaft splines with recommended transmission fluid.

(2) Slide drive sprocket onto mainshaft.

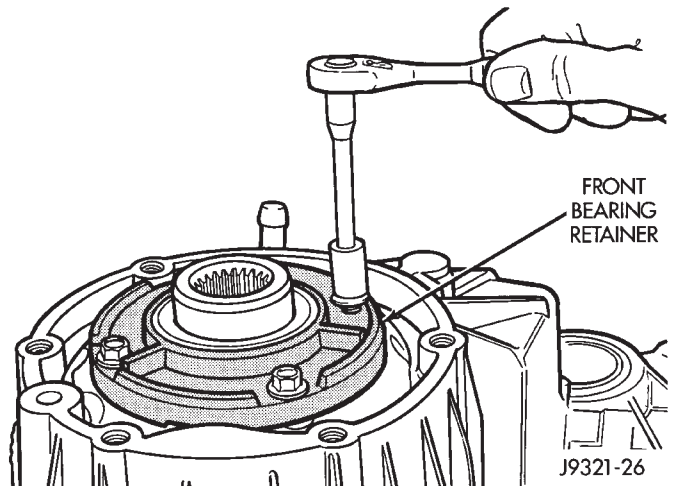


Fig. 59 Install Front Bearing Retainer

(3) Slide mode hub onto mainshaft.

(4) Install mode hub retaining ring. Verify that the retaining ring is fully seated in mainshaft groove.

SHIFT FORKS AND MAINSHAFT INSTALLATION

(1) Install new sector shaft O-ring and bushing (Fig. 60).

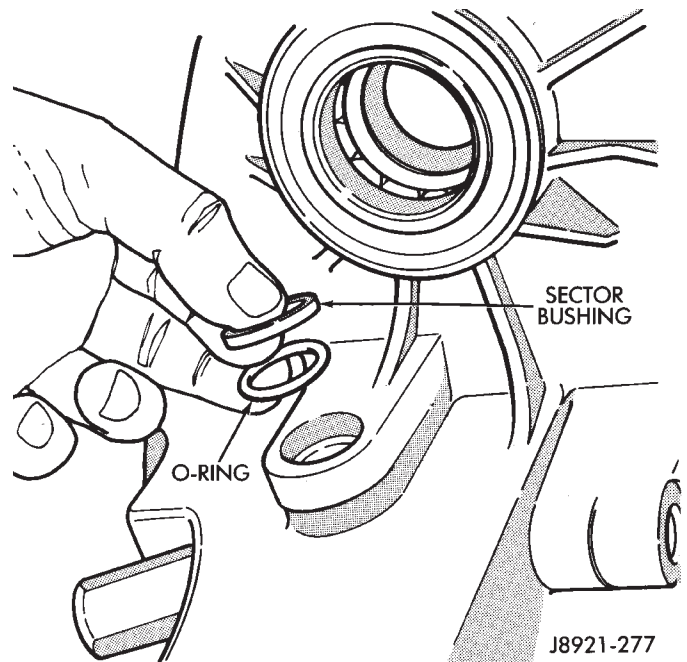


Fig. 60 Sector O-Ring And Bushing Installation

(2) Install shift sector in case (Fig. 61). Lubricate sector shaft with transmission fluid before installation.

(3) Install range lever, washer, and nut on sector shaft (Fig. 62). Tighten range lever nut to 27–34 N·m (20–25 ft. lbs.) torque.

(4) Assemble and install range fork and hub (Fig. 63). Be sure hub is properly seated in low range gear and engaged to the input gear.

DISASSEMBLY AND ASSEMBLY (Continued)

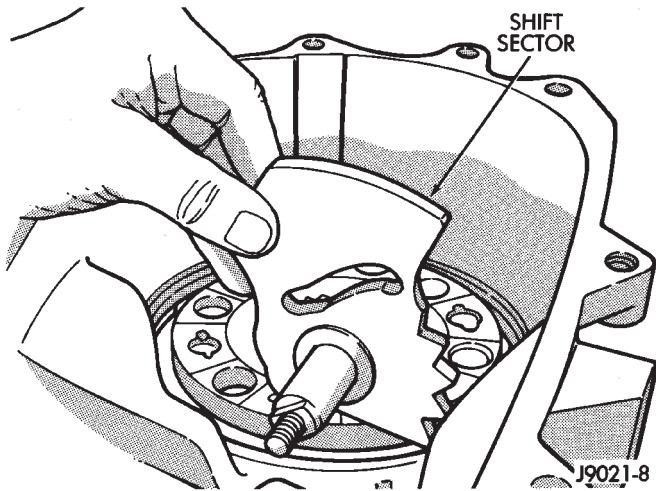


Fig. 61 Shift Sector Installation

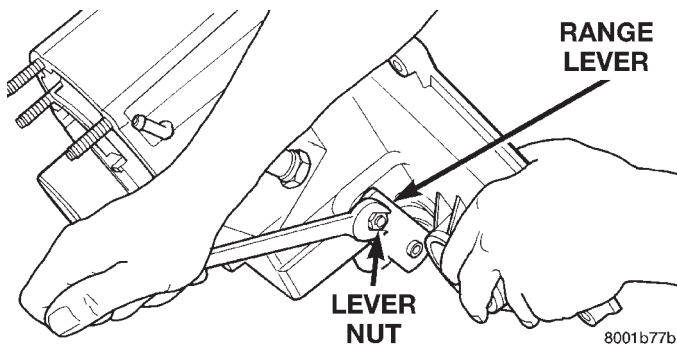


Fig. 62 Range Lever Installation

(5) Align and insert range fork pin in shift sector slot.

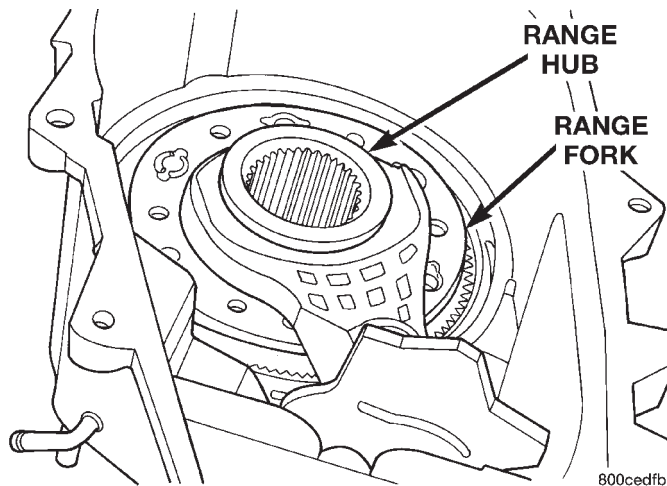
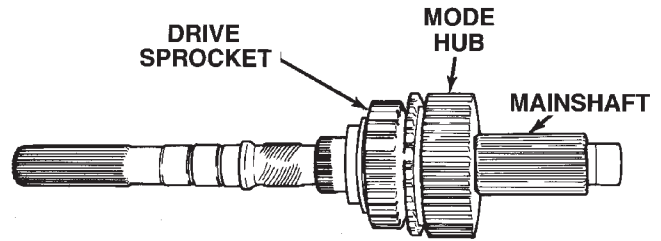


Fig. 63 Install Range Fork And Hub Assembly

(6) Install assembled mainshaft (Fig. 64). Be sure shaft is seated in pilot bearing and input gear.

(7) Install new pads on mode fork if necessary.

(8) Insert mode sleeve in mode fork mode fork. Be sure long side of sleeve is toward long end of shift rail (Fig. 65).



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Fig. 64 Mainshaft Assembly Installation

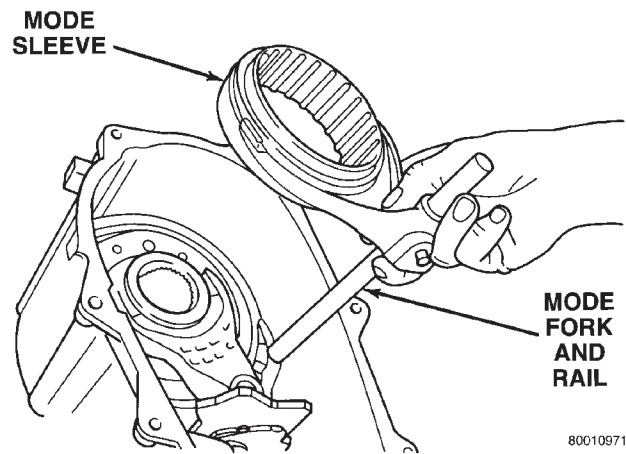


Fig. 65 Assembling Mode Fork And Sleeve

(9) Install assembled mode fork and sleeve (Fig. 66). Be sure fork rail goes through range fork and into case bore. Also be sure sleeve is aligned and seated on mainshaft hub.

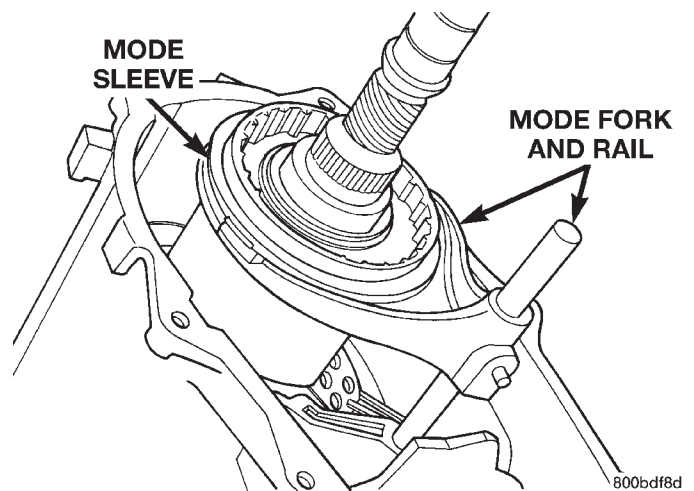


Fig. 66 Mode Fork And Sleeve Installation

(10) Rotate sector to Neutral position.

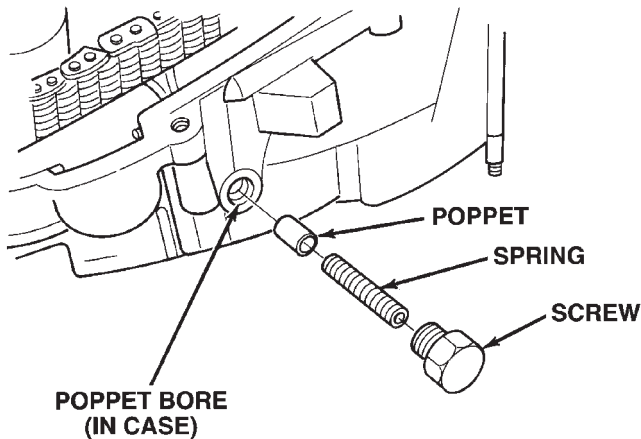
(11) Install new O-ring on detent plug (Fig. 67).

(12) Lubricate detent plunger with transmission fluid or light coat of petroleum jelly.

DISASSEMBLY AND ASSEMBLY (Continued)

(13) Install detent plunger, spring and plug (Fig. 67).

(14) Verify that plunger is properly engaged in sector.



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Fig. 67 Shift Detent Components

FRONT OUTPUT SHAFT AND DRIVE CHAIN INSTALLATION

(1) Lubricate front output shaft-sprocket assembly, drive chain, and drive sprocket with transmission fluid.

(2) Assemble drive chain and front output shaft (Fig. 68).

(3) Start chain on mainshaft drive sprocket.

(4) Guide front shaft into bearing and drive sprocket onto mainshaft drive gear (Fig. 68).

(5) Install mode spring on upper end of mode fork shift rail (Fig. 69).

OIL PUMP AND REAR CASE ASSEMBLY/INSTALLATION

(1) Install magnet in front case pocket (Fig. 70).

(2) Assemble oil pickup screen, connecting hose, and tube.

(3) Install new pickup tube O-ring in oil pump (Fig. 71).

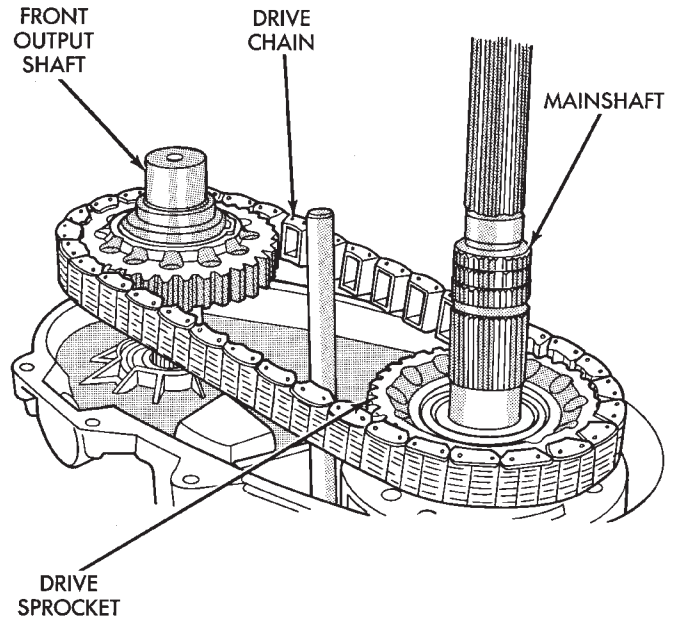
(4) Insert oil pickup tube in oil pump inlet.

(5) Position assembled oil pump and pickup tube in rear case. Be sure pickup screen is securely seated in case slot. Also be sure oil pump locating tabs are outside rear case (Fig. 72).

(6) Apply 3 mm (1/8 in.) wide bead of Mopar® gasket maker or silicone adhesive sealer to mounting flange of front case. Work sealer bead around bolt holes.

(7) Lift rear case and oil pump and carefully position assembly on front case. Be sure case dowels are aligned and that mode fork rail extends through rear case before seating rear case on front case.

(8) Install case attaching bolts. Alignment bolts at each end of case are only ones requiring washers (Fig. 73).



J9321-72

Fig. 68 Installing Drive Chain And Front Output Shaft

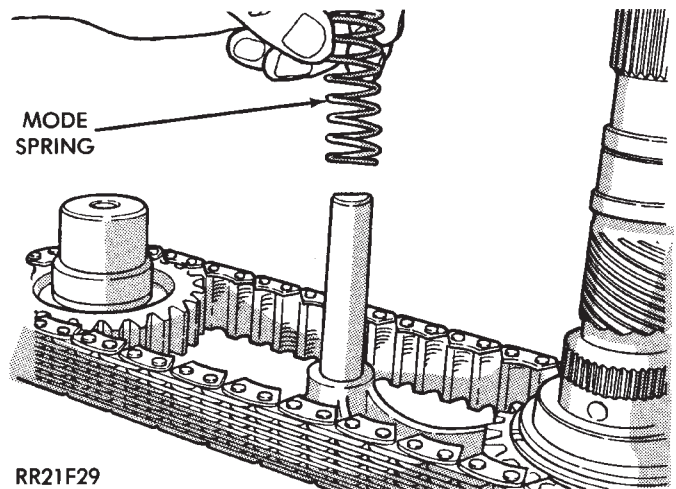


Fig. 69 Install Mode Fork Spring

(9) Tighten case bolts to 27-34 N·m (20-25 ft. lbs.) torque.

YOKE AND RANGE LEVER INSTALLATION

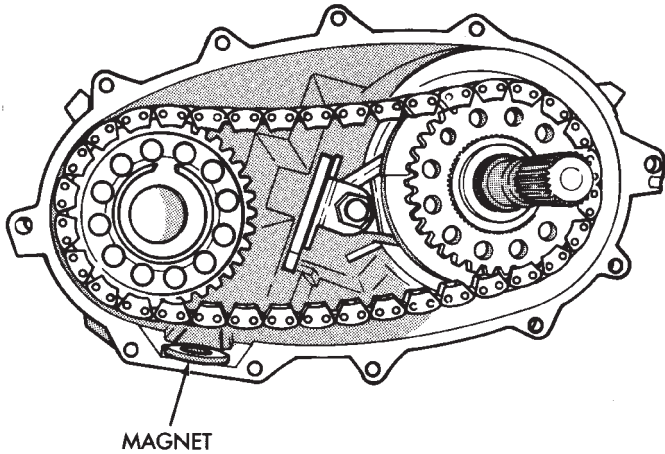
(1) Install indicator switch in front case. Tighten switch to 20-34 N·m (15-25 ft. lbs.) torque.

(2) Install range lever, washer and locknut on sector shaft (Fig. 74). Tighten locknut to 27-34 N·m (20-25 ft. lbs.) torque.

(3) Install new seal washer on front output shaft (Fig. 76).

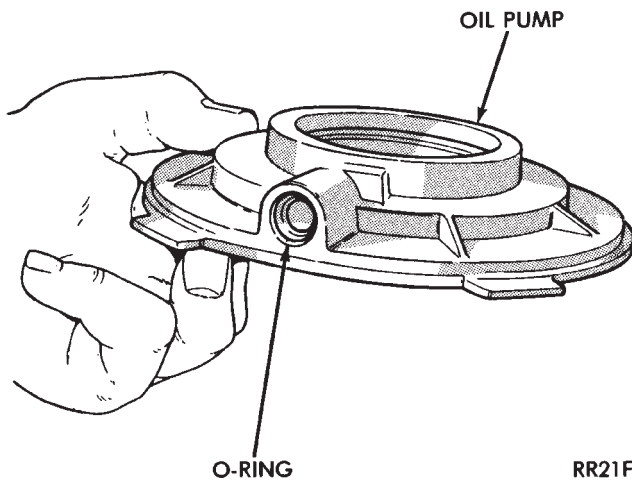
(4) Lubricate yoke hub with transmission fluid and install yoke on front shaft.

(5) Install new seal washer on front shaft.



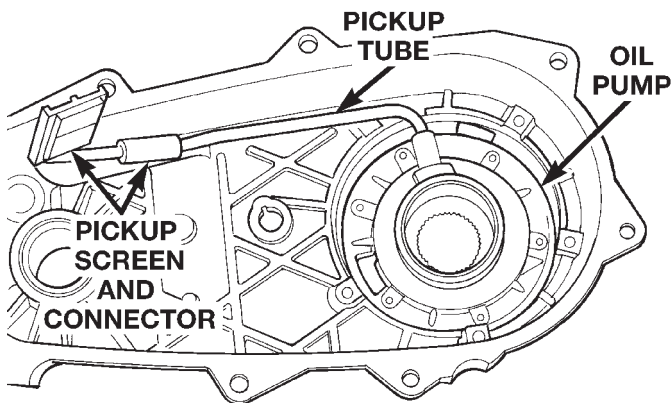
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Fig. 70 Installing Case Magnet



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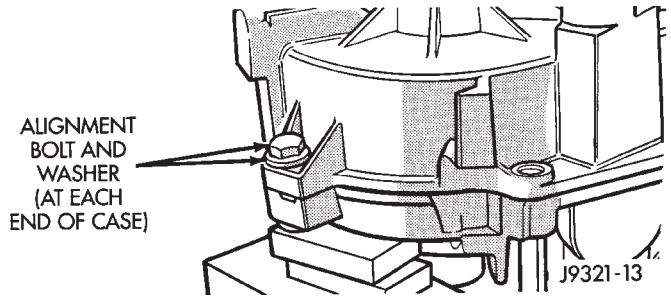
Fig. 71 Pickup Tube O-Ring Position



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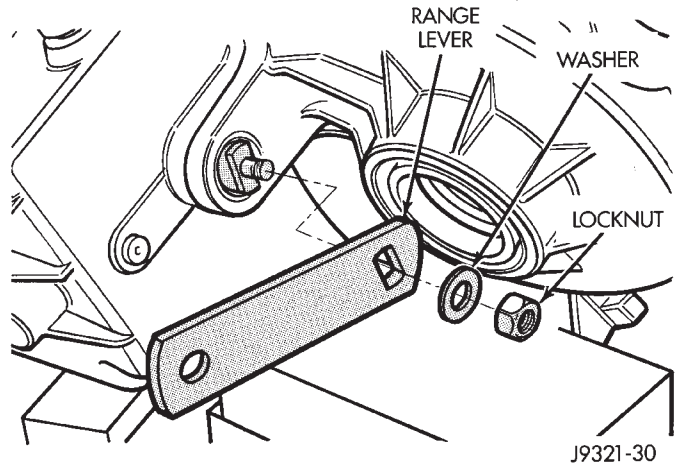
Fig. 72 Oil Pump And Pickup Tube Installation

(6) Install yoke and new yoke nut on front output shaft (Fig. 75).



J9321-13

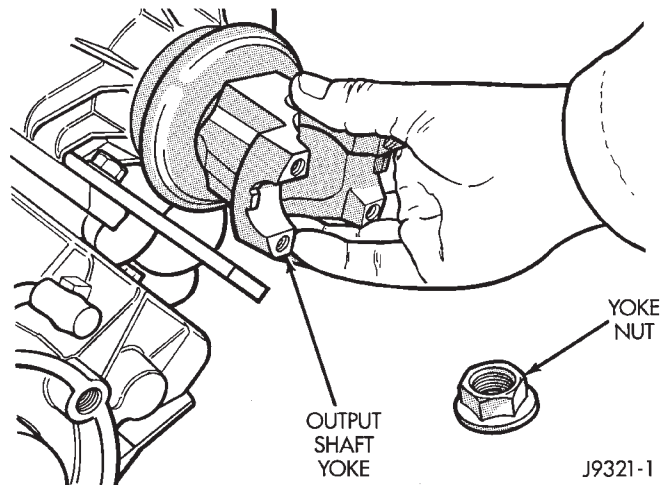
Fig. 73 Alignment Bolt Location



J9321-30

Fig. 74 Range Lever Installation

(7) Tighten yoke nut to 122-176 N·m (90-130 ft. lbs.) torque. Use Tool C-3281, or similar tool to hold yoke while tightening yoke nut.



J9321-1

Fig. 75 Output Shaft Yoke Installation

REAR RETAINER INSTALLATION

(1) Apply bead of Mopar® Sealer P/N 82300234, or Loctite® Ultra Gray, to mating surface of rear retainer. Sealer bead should be a maximum of 3/16 inch.

(2) Install rear retainer on rear case. Tighten retainer bolts to 20-27 N·m (15-20 ft. lbs.) torque.

DISASSEMBLY AND ASSEMBLY (Continued)

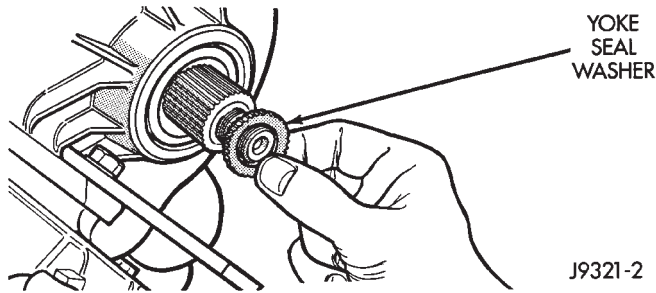


Fig. 76 Yoke Seal Washer Installation

(3) Install rear bearing I.D. retaining ring and spacer on output shaft.

(4) Apply liberal quantity of petroleum jelly to new rear seal and to output shaft. Petroleum jelly is needed to protect seal lips during installation.

(5) Slide seal onto Seal Protector 6992 (Fig. 77). Slide seal protector and seal onto output shaft.

(6) Slide Installer C-4076-B onto seal protector with the recessed side of the tool toward the seal. Drive seal into rear bearing retainer with installer C-4076-B and handle MD-998323 (Fig. 78).

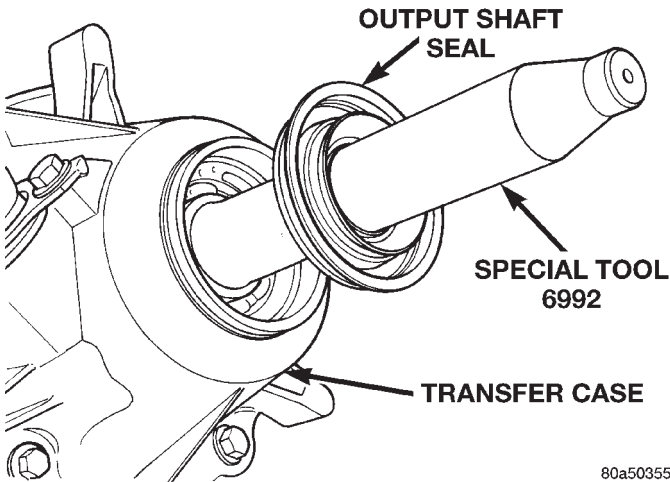


Fig. 77 Output Shaft Seal and Protector

(7) Install rear slinger with installer C-4076-A and handle MD-998323 (Fig. 78).

(8) Install boot on output shaft slinger and crimp retaining clamp with tool C-4975-A (Fig. 79).

CLEANING AND INSPECTION

NV231 TRANSFER CASE

Clean the transfer case parts with a standard parts cleaning solvent. Remove all traces of sealer from the cases and retainers with a scraper and 3M all purpose cleaner. Use compressed air to remove solvent residue from oil feed passages in the case halves, retainers, gears, and shafts.

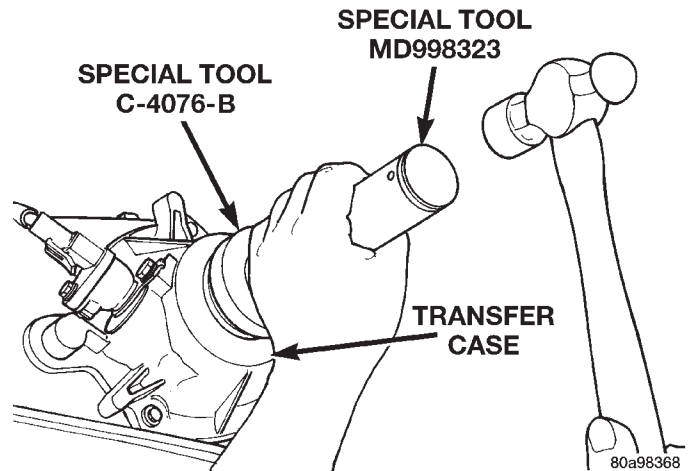


Fig. 78 Rear Seal Installation

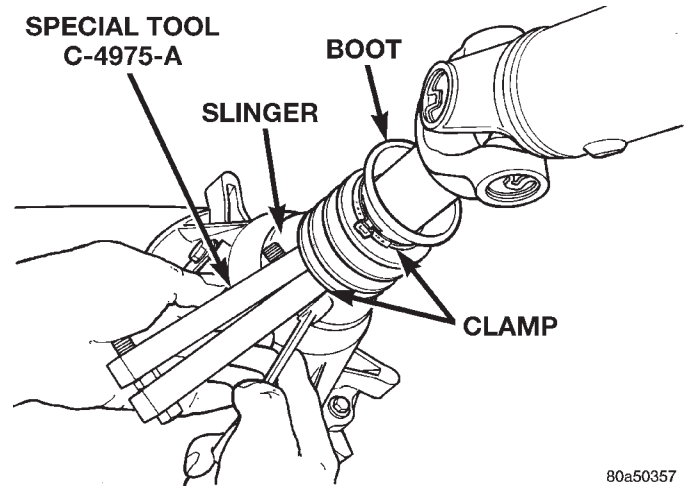


Fig. 79 Slinger Boot Installation

The oil pickup screen can be cleaned with solvent. Shake excess solvent from the screen after cleaning and allow it to air dry. Do not use compressed air.

MAINSHAFT/SPROCKET/HUB INSPECTION

Inspect the splines on the hub and shaft and the teeth on the sprocket (Fig. 80). Minor nicks and scratches can be smoothed with an oilstone. However, replace any part that is damaged.

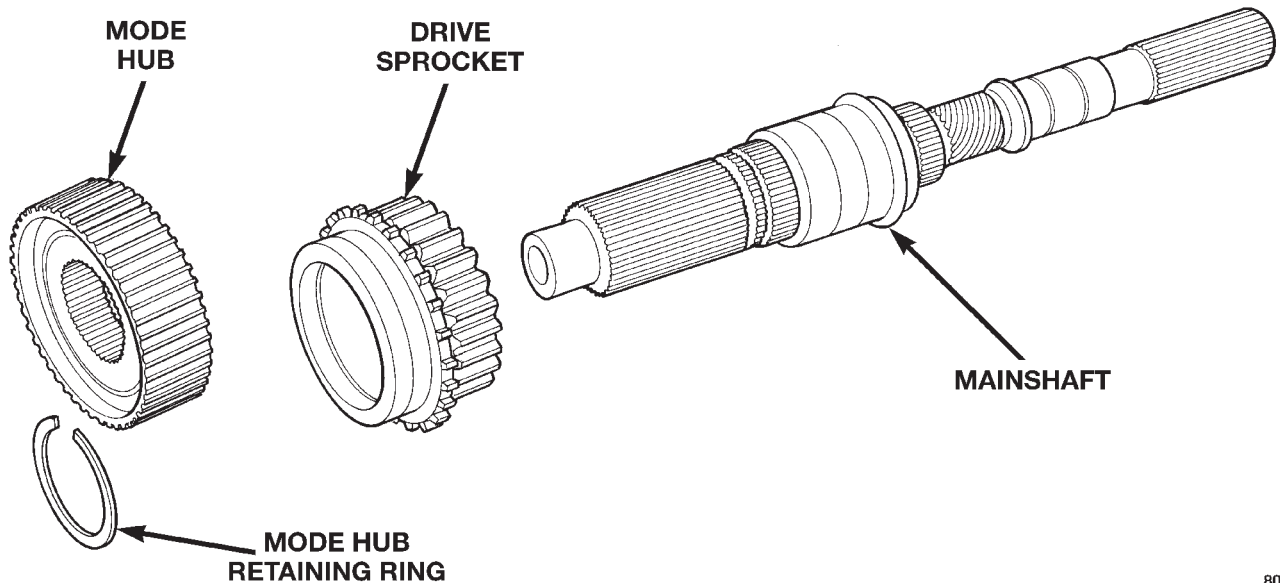
Check the contact surfaces in the sprocket bore and on the mainshaft. Minor nicks and scratches can be smoothed with 320-400 grit emery cloth but do not try to salvage the shaft if nicks or wear is severe.

INPUT GEAR AND PLANETARY CARRIER

Check the teeth on the gear (Fig. 81). Minor nicks can be dressed off with an oilstone but replace the gear if any teeth are broken, cracked, or chipped. The bearing surface on the gear can be smoothed with 300-400 grit emery cloth if necessary.

Examine the carrier body and pinion gears for wear or damage. The carrier will have to be replaced

CLEANING AND INSPECTION (Continued)



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Fig. 80 Mainshaft, Mode Hub, And Drive Sprocket

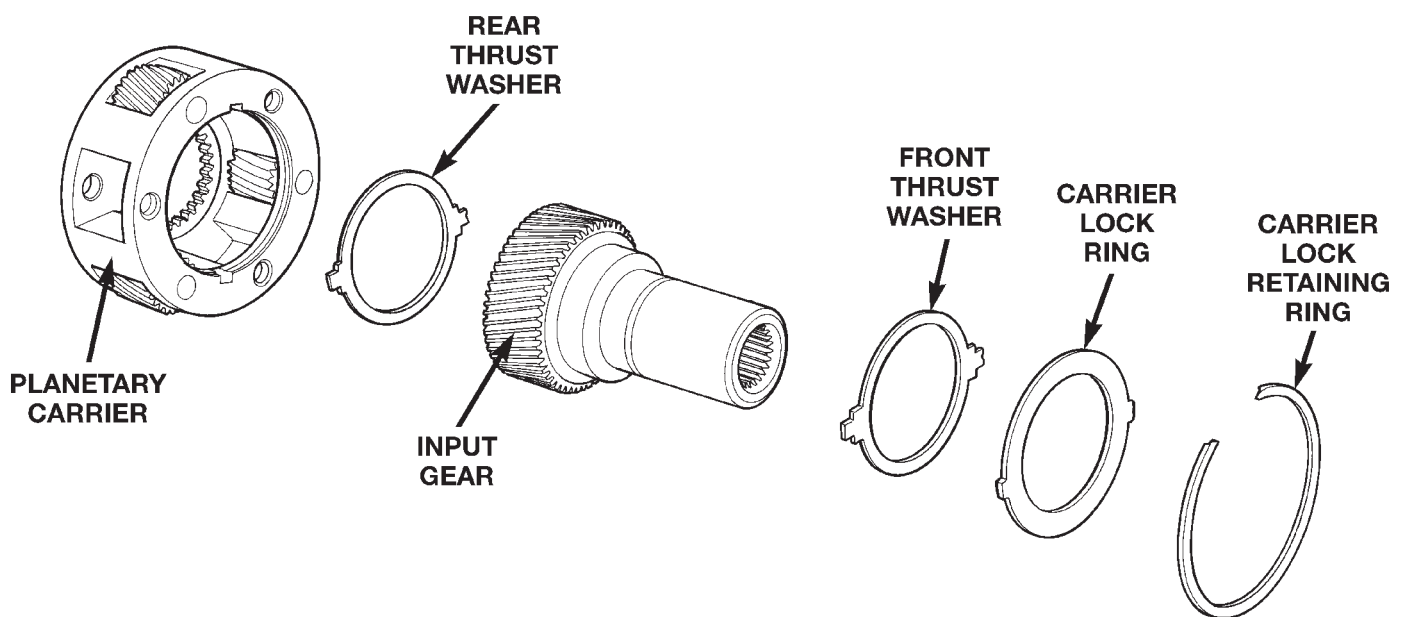
as an assembly if the body, pinion pins, or pinion gears are damaged.

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. 82). Minor nicks on the shift rail can be smoothed with 320–400 grit emery cloth.

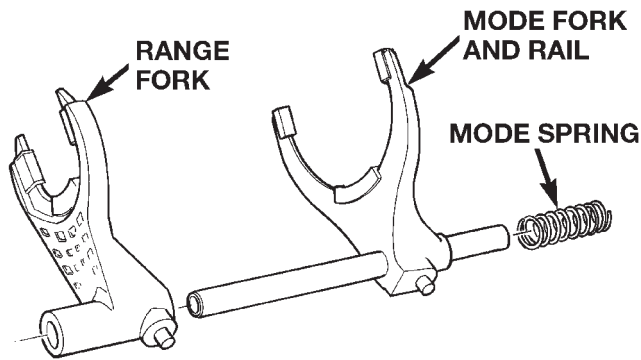
Inspect the shift fork wear pads (Fig. 83). The mode fork pads are serviceable and can be replaced if necessary. The range fork pads are not serviceable.



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Fig. 81 Input Gear And Carrier Components

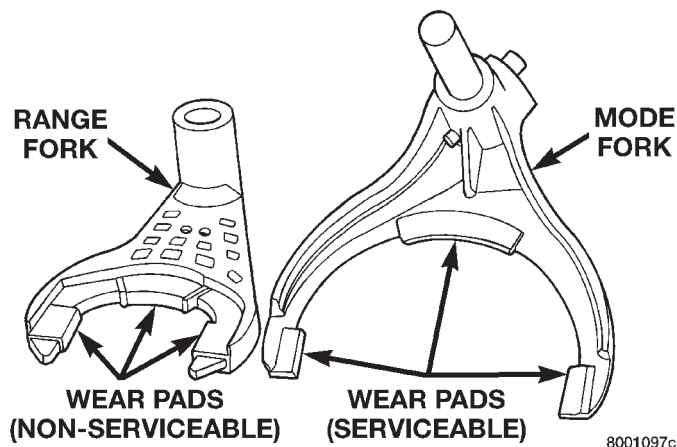
CLEANING AND INSPECTION (Continued)



80010948

Fig. 82 Shift forks

The fork must be replaced as an assembly if the pads are worn or damaged.



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Fig. 83 Shift Fork And Wear Pad Locations

Check both of the sleeves for wear or damage, especially on the interior teeth. Replace the sleeves if wear or damage is evident.

REAR RETAINER/BEARING/SEAL/SLINGER/BOOT

Inspect the retainer components (Fig. 84). Replace the bearing if rough or noisy. Check the retainer for cracks or wear in the bearing bore. Clean the retainer sealing surfaces with a scraper and 3M all purpose cleaner. This will ensure proper adhesion of the sealer during reassembly.

Replace the slinger and seal outright; do not reuse either part.

Inspect the retaining rings and washers. Replace any part if distorted, bent, or broken. Reuse is not recommended. Also replace the boot if cut or torn. Replace the boot band clamps, do not reuse them.

REAR OUTPUT SHAFT/YOKE/DRIVE CHAIN

Check condition of the seal contact surfaces of the yoke slinger (Fig. 85). This surface must be clean and smooth to ensure proper seal life. Replace the yoke nut and seal washer as neither part should be reused.

Inspect the shaft threads, sprocket teeth, and bearing surfaces. Minor nicks on the teeth can be smoothed with an oilstone. Use 320–400 grit emery to smooth minor scratches on the shaft bearing surfaces. Rough threads on the shaft can be chased if necessary. Replace the shaft if the threads are damaged, bearing surfaces are scored, or if any sprocket teeth are cracked or broken.

Examine the drive chain and shaft bearings. Replace the chain and both sprockets if the chain is stretched, distorted, or if any of the links bind. Replace the bearings if rough, or noisy.

LOW RANGE ANNULUS GEAR

Inspect annulus gear condition carefully. The gear is only serviced as part of the front case. If the gear is damaged, it will be necessary to replace the gear and front case as an assembly. Do not attempt to remove the gear (Fig. 86).

FRONT-REAR CASES AND FRONT RETAINER

Inspect the cases and retainer for wear and damage. Clean the sealing surfaces with a scraper and 3M all purpose cleaner. This will ensure proper sealer adhesion at assembly. Replace the input retainer seal; do not reuse it.

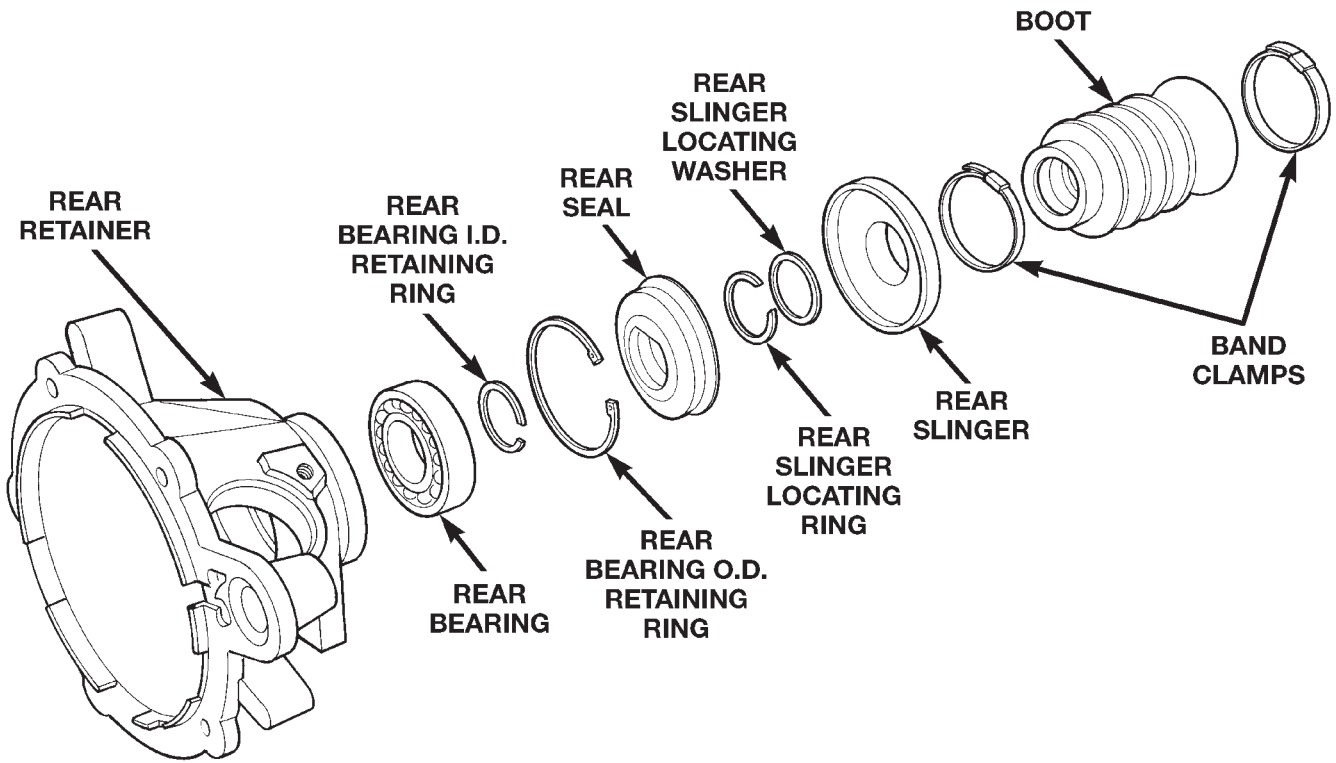
Check case condition. If leaks were a problem, look for gouges and severe scoring of case sealing surfaces. Also make sure the front case mounting studs are in good condition.

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

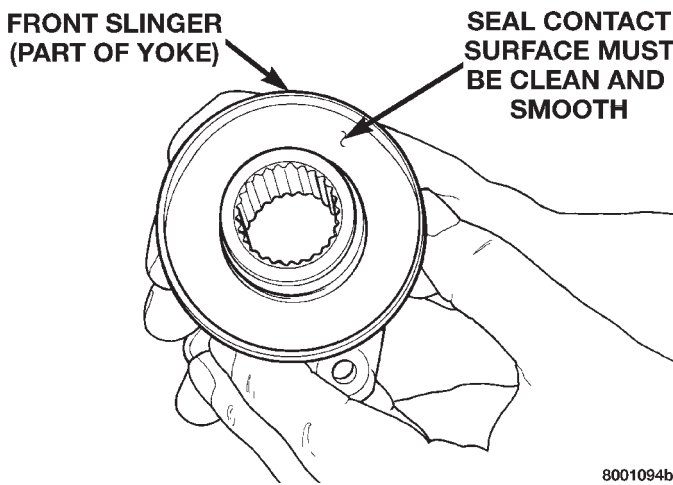
Examine the oil pump pickup parts. Replace the pump if any part appears to be worn or damaged. Do not disassemble the pump as individual parts are not available. The pump is only available as a complete assembly. The pickup screen, hose, and tube are the only serviceable parts and are available separately.

CLEANING AND INSPECTION (Continued)



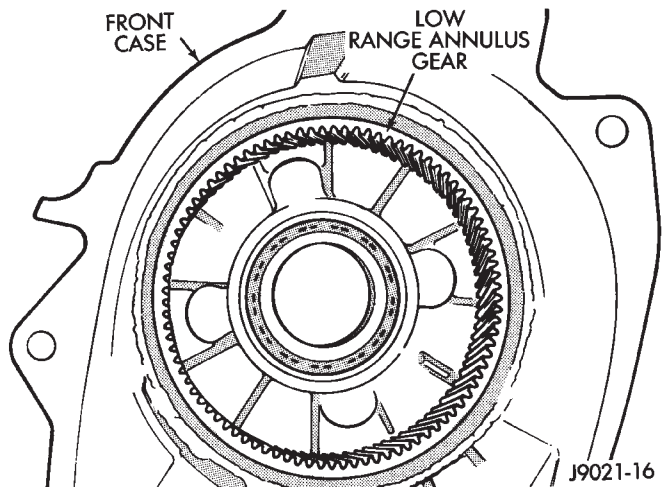
80010949

Fig. 84 Rear Retainer Components



8001094b

Fig. 85 Seal Contact Surface Of Yoke Slinger



J9021-16

Fig. 86 Low Range Annulus Gear

ADJUSTMENTS

SHIFT LINKAGE ADJUSTMENT

- (1) Shift transfer case into 4L position.
- (2) Raise vehicle.
- (3) Loosen lock bolt on adjusting trunnion (Fig. 87).
- (4) Be sure linkage rod slides freely in trunnion. Clean rod and apply spray lube if necessary.
- (5) Verify that transfer case range lever is fully engaged in 4L position.
- (6) Tighten adjusting trunnion lock bolt.
- (7) Lower vehicle.

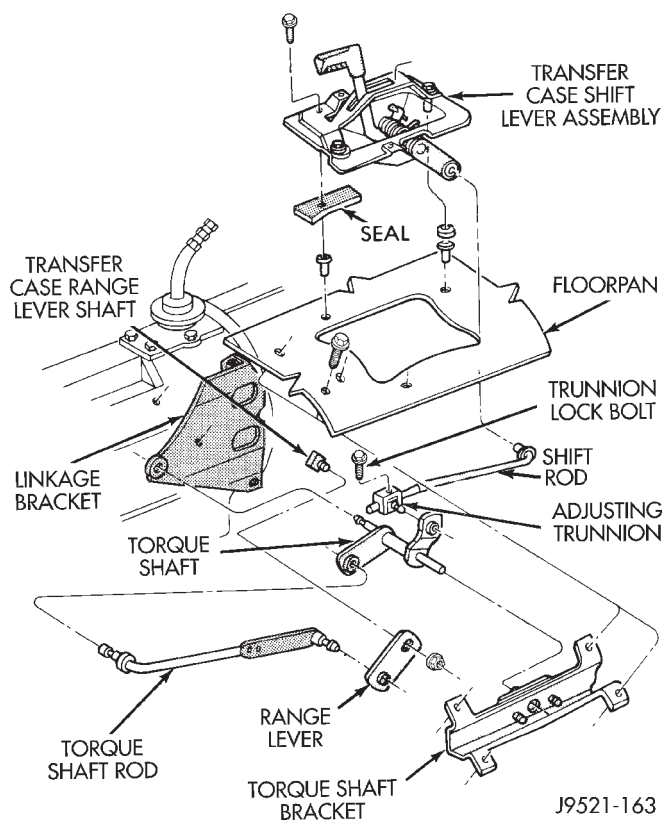


Fig. 87 Shift Linkage

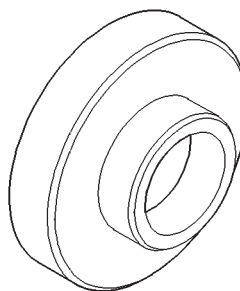
SPECIFICATIONS

TORQUE

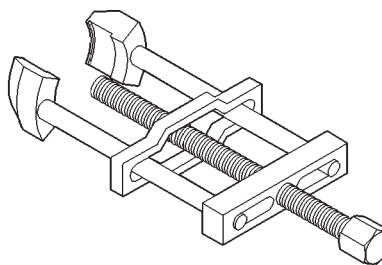
DESCRIPTION	TORQUE
Plug, Detent	16–24 N·m (12–18 ft. lbs.)
Plug, Drain/Fill	20–34 N·m (15–25 ft. lbs.)
Bolt, Front Brg. Retainer	21 N·m (16 ft. lbs.)
Bolt, Front Brg. Retainer	21 N·m (16 ft. lbs.)
Bolt, Case Half	27–34 N·m (20–25 ft. lbs.)
Nut, Front Yoke	122–176 N·m (90–130 ft. lbs.)
Nut, Range Lever	27–34 N·m (20–25 ft. lbs.)
Bolt, Rear Retainer	35–46 N·m (26–34 ft. lbs.)
Nuts, Mounting	35–47 N·m (26–35 ft. lbs.)
Switch, Indicator	20–34 N·m (15–25 ft. lbs.)

SPECIAL TOOLS

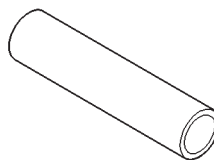
NV231



Installer—C-4076-B

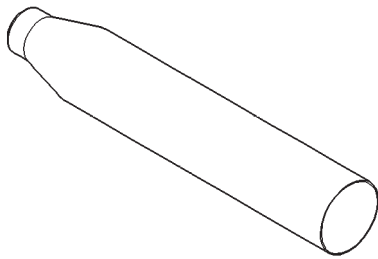


Puller, Slinger—MD-998056-A

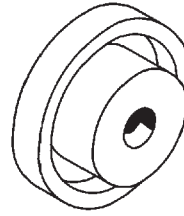


Installer—MD-998323

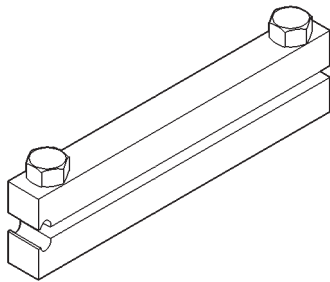
SPECIAL TOOLS (Continued)



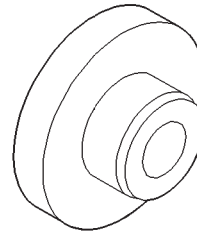
Seal Protector—6992



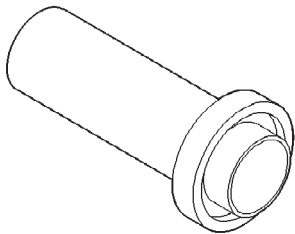
Installer, Seal—C-4210



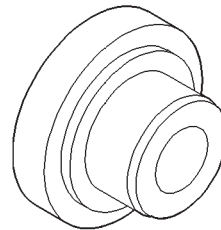
Installer, Boot Clamp—C-4975-A



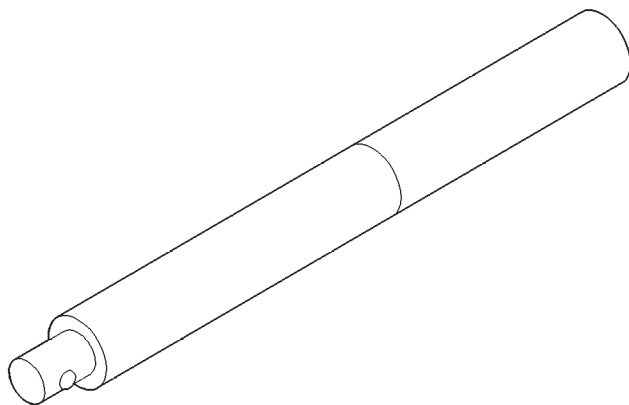
Installer, Bearing—5064



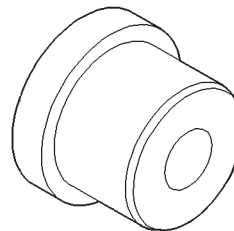
Installer, Seal—8143



Installer, Bearing—5065

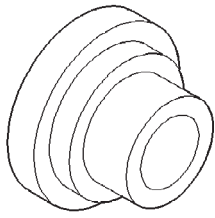


Handle, Universal—C-4171

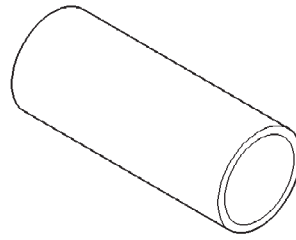


Installer, Bushing—5066

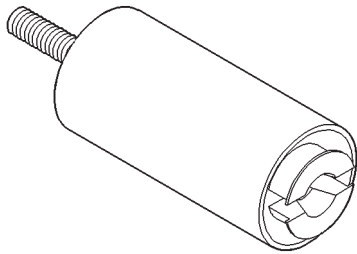
SPECIAL TOOLS (Continued)



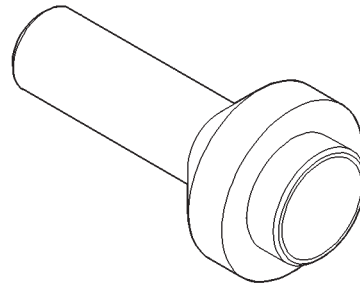
Installer, Bearing—8128



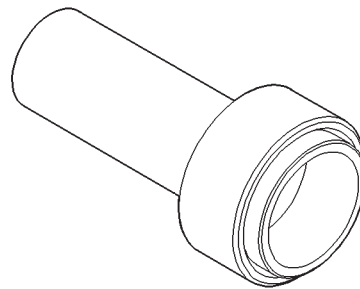
Cup—8148



Remover—L-4454



Installer, Seal—7884



Installer, Pump Housing Seal—7888

NV242 TRANSFER CASE

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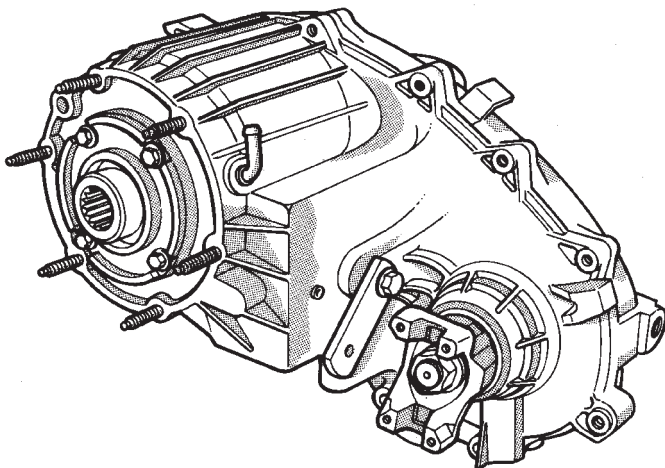
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GENERAL INFORMATION

NV242 TRANSFER CASE

The NV242 is a full and part-time transfer case (Fig. 1). It provides full time 2-wheel, or 4-wheel drive operation.

A differential in the transfer case is used to control torque transfer to the front and rear axles. A low range gear provides increased low speed torque capability for off road operation. The low range provides a 2.72:1 reduction ratio.



J8921-243

Fig. 1 NV242 Transfer Case

The input gear is splined to the transmission output shaft. It drives the mainshaft through the planetary gear and range hub. The front output shaft is

operated by a drive chain that connects the shaft to a drive sprocket on the mainshaft. The drive sprocket is engaged/disengaged by the mode fork, which operates the mode sleeve and hub. The sleeve and hub are not equipped with a synchro mechanism for shifting.

The geartrain is mounted in two aluminum case halves attached with bolts. The mainshaft front and rear bearings are mounted in aluminum retainer housings bolted to the case halves.

OPERATING RANGES

NV242 operating ranges are 2WD (2-wheel drive), 4x4 part-time, 4x4 full time, and 4 Lo.

The 2WD and 4x4 full time ranges can be used at any time and on any road surface.

The 4x4 part-time and 4 Lo ranges are for off road use only. The only time these ranges can be used on hard surface roads, is when the surface is covered with snow and ice.

SHIFT MECHANISM

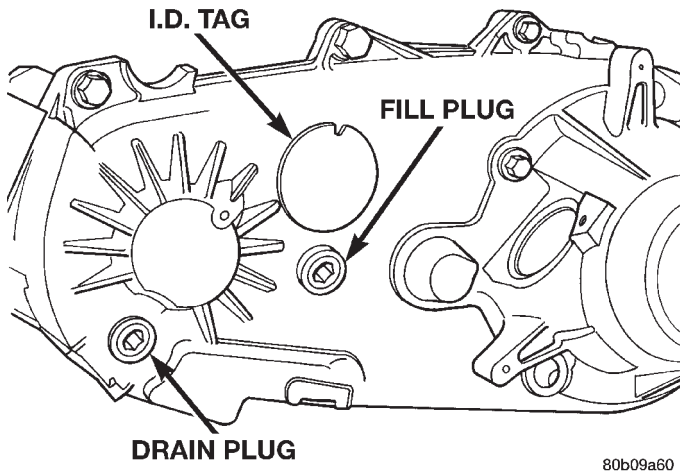
Operating ranges are selected with a floor mounted shift lever. The shift lever is connected to the transfer case range lever by an adjustable linkage rod. A straight line shift pattern is used. Range positions are marked on the shifter bezel cover plate, or on the shift knob.

TRANSFER CASE IDENTIFICATION

A circular ID tag is attached to the rear case of each transfer case (Fig. 2). The ID tag provides the transfer case model number, assembly number, serial number, and low range ratio.

The transfer case serial number also represents the date of build.

GENERAL INFORMATION (Continued)



Approximate lubricant fill capacity is 1.35 liters (2.85 pints).

The fill and drain plugs are both in the rear case (Fig. 1). Correct fill level is to the bottom edge of the fill plug hole. Be sure the vehicle is level to ensure an accurate fluid level check.

Fig. 2 Fill/Drain Plug And I.D. Tag Locations

RECOMMENDED LUBRICANT AND FILL LEVEL

Recommended lubricant for the NV242 transfer case is Mopar® Dexron II, or ATF Plus, type 7176.

DIAGNOSIS AND TESTING

NV242 DIAGNOSIS

DIAGNOSIS CHART

Condition	Possible Cause	Correction
Transfer case difficult to shift or will not shift into desired range.	1) Transfer case shift linkage binding.	1) Repair or replace linkage as necessary.
	2) Insufficient or incorrect lubricant.	3) Drain and refill transfer case with the correct type and quantity of lubricant.
	3) Internal transfer case components binding, worn, or damaged.	3) Repair or replace components as necessary.
Transfer case noisy in all drive modes.	1) Insufficient or incorrect lubricant.	1) Drain and refill transfer case with the correct type and quantity of lubricant.
Lubricant leaking from transfer case seals or vent.	1) Transfer case overfilled.	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.
Transfer case will not shift through 4X4 part time range (light remains on)	1) Incomplete shift due to drivetrain torque load.	1) Momentarily release the accelerator pedal to complete the shift.
	2) Incorrect tire pressure.	2) Correct tire pressure as necessary.
	3) Excessive Tire wear.	3) Correct tire condition as necessary.
	4) Excessive vehicle loading.	4) Correct as necessary.

REMOVAL AND INSTALLATION

TRANSFER CASE

REMOVAL

- (1) Shift transfer case into Neutral.
- (2) Raise vehicle.
- (3) Drain transfer case lubricant.
- (4) Mark front and rear propeller shaft yokes for alignment reference.
- (5) Support transmission with jack stand.
- (6) Remove rear crossmember, or skid plate.
- (7) Disconnect front/rear propeller shafts at transfer case.
- (8) Disconnect vehicle speed sensor wires.
- (9) Disconnect transfer case linkage rod from range lever.
- (10) Disconnect transfer case vent hose (Fig. 3) and indicator switch harness, if necessary.
- (11) Support transfer case with transmission jack.
- (12) Secure transfer case to jack with chains.
- (13) Remove nuts attaching transfer case to transmission.
- (14) Pull transfer case and jack rearward to disengage transfer case.
- (15) Remove transfer case from under vehicle.

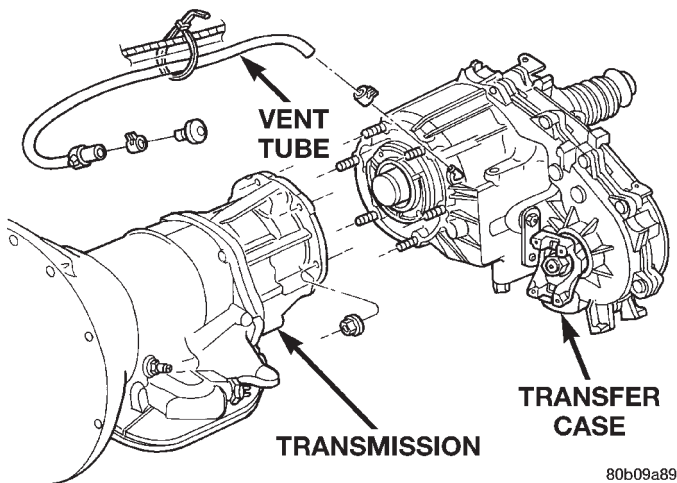


Fig. 3 Transfer Case Mounting

INSTALLATION

- (1) Mount transfer case on a transmission jack.
- (2) Secure transfer case to jack with chains.
- (3) Position transfer case under vehicle.
- (4) Align transfer case and transmission shafts and install transfer case on transmission.
- (5) Install and tighten transfer case attaching nuts to 35 N·m (26 ft. lbs.) torque (Fig. 3).
- (6) Connect vehicle speed sensor wires, and vent hose.

(7) Connect indicator switch harness to transfer case switch, if necessary. Secure wire harness to clips on transfer case.

(8) Align and connect propeller shafts. Refer to Group 3, Differential and Driveline, for proper procedures and specifications.

(9) Fill transfer case with correct fluid. Check transmission fluid level. Correct as necessary.

(10) Install rear crossmember, or skid plate. Tighten crossmember bolts to 41 N·m (30 ft. lbs.) torque.

(11) Remove transmission jack and support stand.

(12) Connect shift rod to transfer case range lever.

(13) Adjust transfer case shift linkage.

(14) Lower vehicle and verify transfer case shift operation.

SHIFT LEVER

REMOVAL

- (1) Shift transfer case into 4L.
- (2) Raise vehicle.
- (3) Loosen adjusting trunnion locknut and slide shift rod out of trunnion (Fig. 4). If rod lacks enough travel to come out of trunnion, push trunnion out of torque shaft.
- (4) Lower vehicle.
- (5) Remove console. Refer to Group 23, Body, for proper procedures.
- (6) Remove screws attaching lever assembly to floorpan and remove assembly and shift rod (if left attached).

INSTALLATION

(1) If shift rod was not removed from lever assembly, work rod down through floorpan opening. Then position lever assembly on floorpan and install assembly attaching screws.

(2) Install console. Refer to Group 23, Body, for proper procedures.

(3) Raise vehicle.

(4) Connect trunnion to torque shaft arm. Or, slide shift rod into trunnion on range lever. Be sure shift rod slides freely in trunnion.

(5) Verify that range lever is in 4L position. Then tighten trunnion lock bolt.

(6) Lower vehicle and check transfer case shift operation.

SPEEDOMETER

REMOVAL

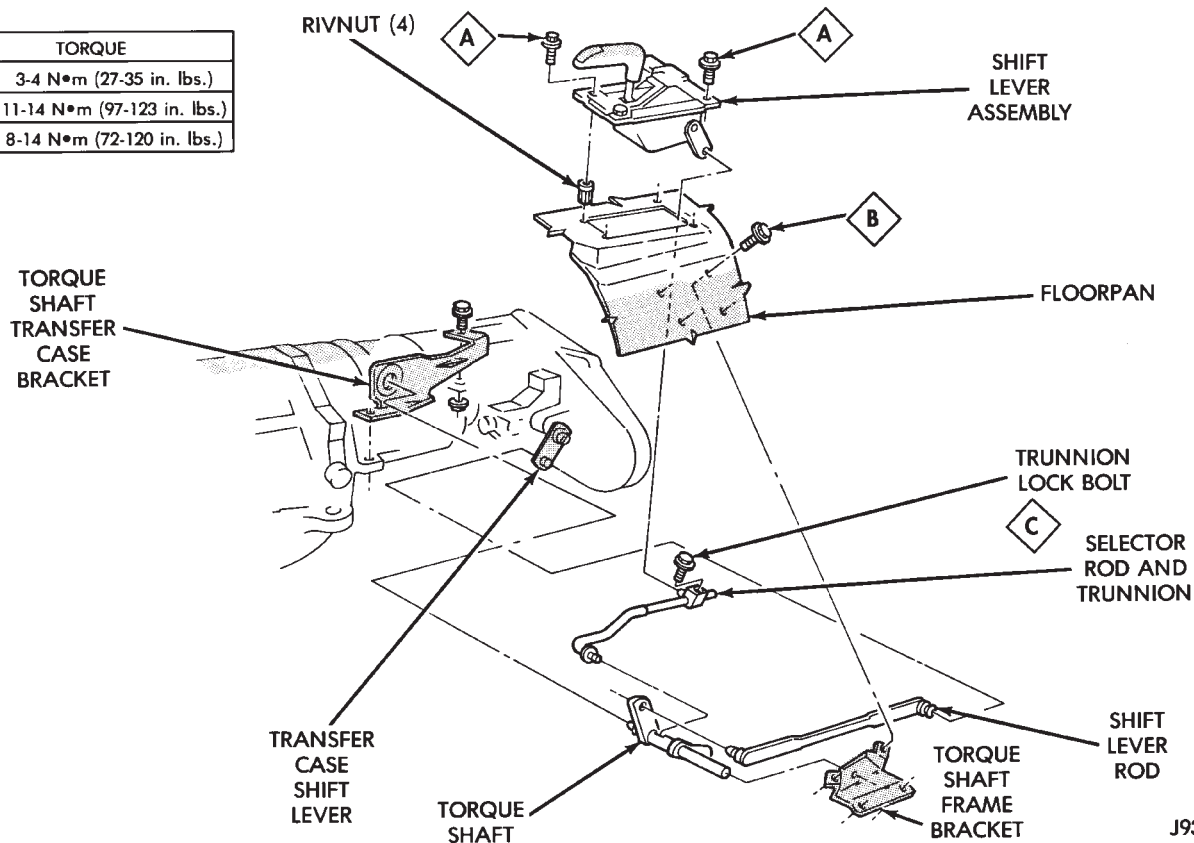
(1) Raise vehicle.

(2) Disconnect wires from vehicle speed sensor.

(3) Remove adapter clamp and screw (Fig. 5).

REMOVAL AND INSTALLATION (Continued)

TORQUE	
A	3-4 N•m (27-35 in. lbs.)
B	11-14 N•m (97-123 in. lbs.)
C	8-14 N•m (72-120 in. lbs.)



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Fig. 4 Shift Linkage

(4) Remove speed sensor and speedometer adapter as an assembly.

(5) Remove speed sensor retaining screw and remove sensor from adapter.

(6) Remove speedometer pinion from adapter. Replace pinion if chipped, cracked, or worn.

(7) Inspect sensor and adapter O-rings (Fig. 5). Remove and discard O-rings if worn or damaged.

(8) Inspect terminal pins in speed sensor. Clean pins with Mopar® electrical spray cleaner if dirty or oxidized. Replace sensor if faulty, or if pins are loose, severely corroded, or damaged.

INSTALLATION AND INDEXING

(1) Thoroughly clean adapter flange and adapter mounting surface in housing. Surfaces must be clean for proper adapter alignment and speedometer operation.

(2) Install new O-rings on speed sensor and speedometer adapter (Fig. 5), if necessary.

(3) Lubricate sensor and adapter O-rings with transmission fluid.

(4) Install vehicle speed sensor in speedometer adapter. Tighten sensor attaching screw to 2-3 N•m (15-27 in. lbs.) torque.

(5) Install speedometer pinion in adapter.

(6) Count number of teeth on speedometer pinion. Do this before installing assembly in housing. Then lubricate pinion teeth with transmission fluid.

(7) Note index numbers on adapter body (Fig. 6). These numbers will correspond to number of teeth on pinion.

(8) Install speedometer assembly in housing.

(9) Rotate adapter until required range numbers are at 6 o'clock position. Be sure range index numbers correspond to number of teeth on pinion gear.

(10) Install speedometer adapter clamp and retaining screw. Tighten clamp screw to 10-12 N•m (90-110 in. lbs.) torque.

(11) Connect wires to vehicle speed sensor.

(12) Lower vehicle and top off transmission fluid level if necessary.

FRONT OUTPUT SHAFT SEAL**REMOVAL**

(1) Raise vehicle.

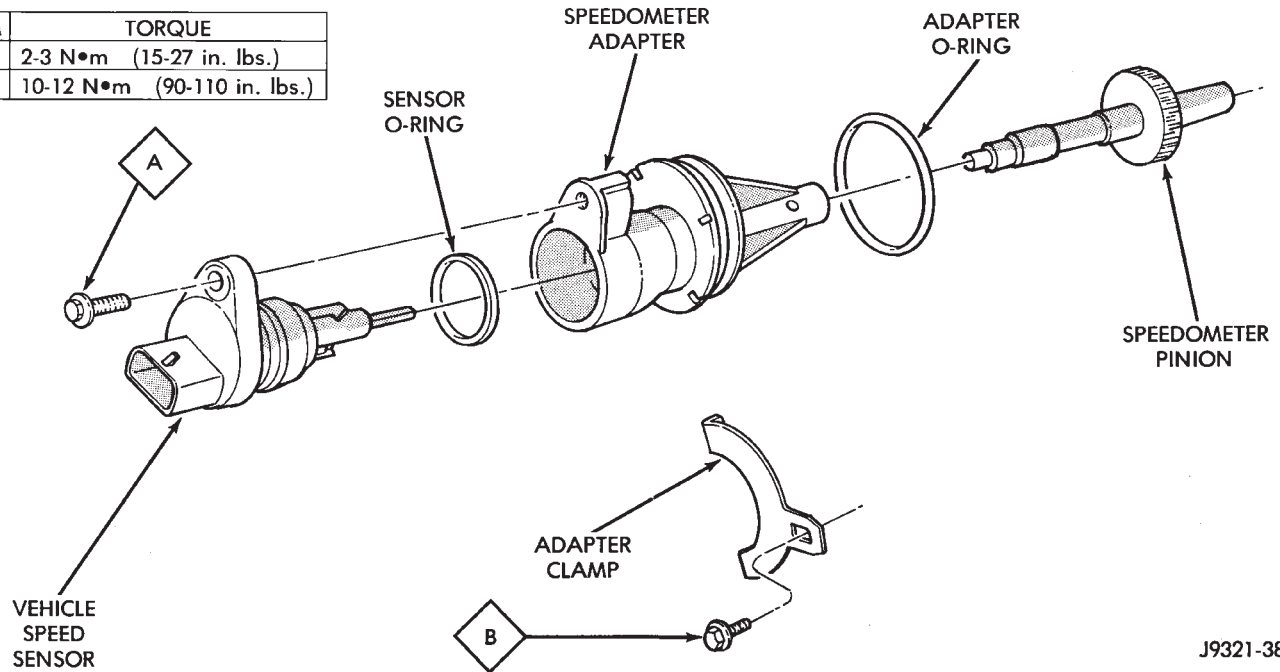
(2) Remove front propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedure.

(3) Remove front output shaft yoke.

(4) Remove seal from front case with pry tool (Fig. 7).

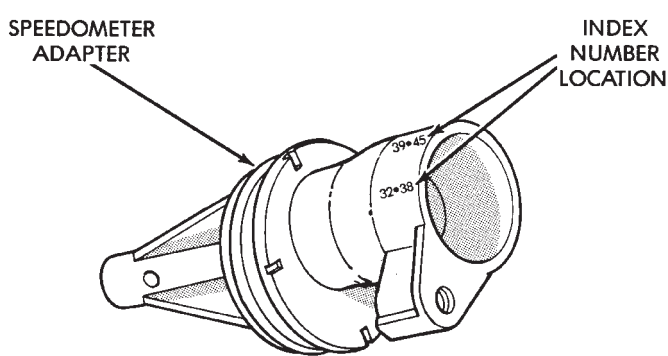
REMOVAL AND INSTALLATION (Continued)

ITEM	TORQUE
A	2-3 N•m (15-27 in. lbs.)
B	10-12 N•m (90-110 in. lbs.)



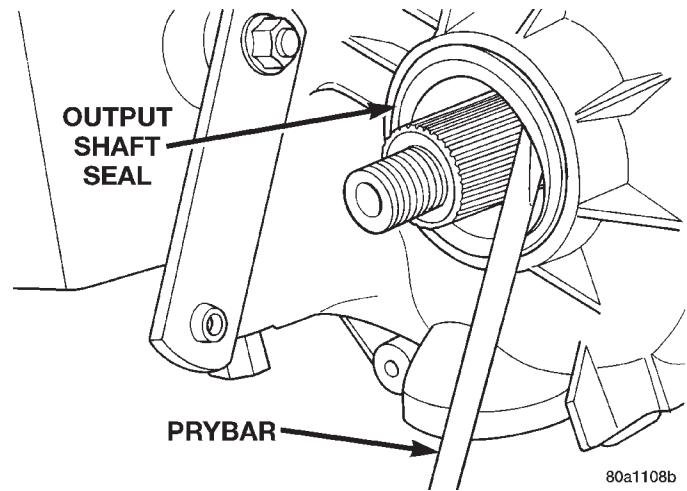
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Fig. 5 Speedometer Components



J9321-386

Fig. 6 Location Of Index Numbers On Speedometer Adapter



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Fig. 7 Remove Front Output Shaft Seal

INSTALLATION

(1) Install new front output seal in front case with Installer Tool 6952-A as follows:

(a) Place new seal on tool. Garter spring on seal goes toward interior of case.

(b) Start seal in bore with light taps from hammer (Fig. 8). Once seal is started, continue tapping seal into bore until installer tool seats against case.

REMOVAL AND INSTALLATION (Continued)

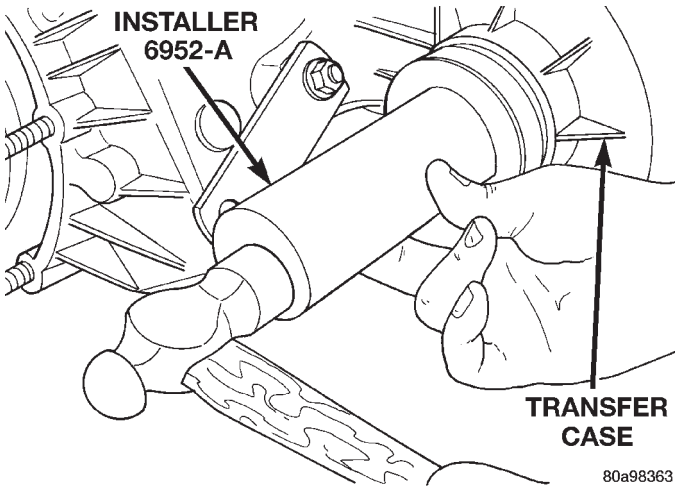


Fig. 8 Front Output Seal Installation

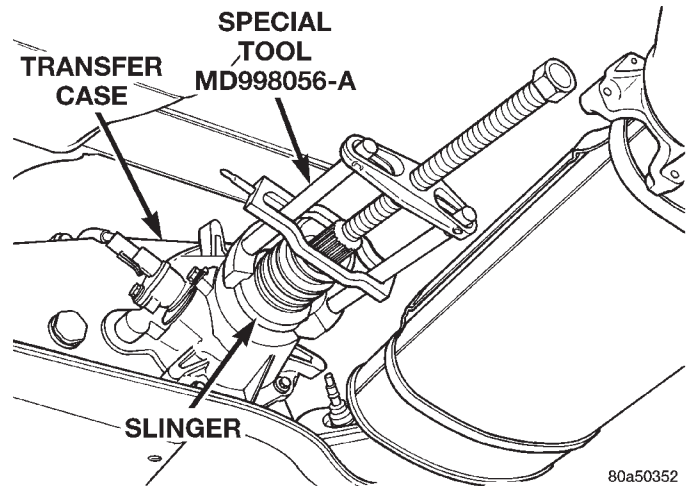


Fig. 10 Rear Slinger Removal

DISASSEMBLY AND ASSEMBLY

NV242 TRANSFER CASE

DISASSEMBLY

REAR RETAINER REMOVAL

(1) Remove output shaft boot. Spread band clamp that secures boot on slinger with a suitable awl. Then slide boot off shaft (Fig. 9).

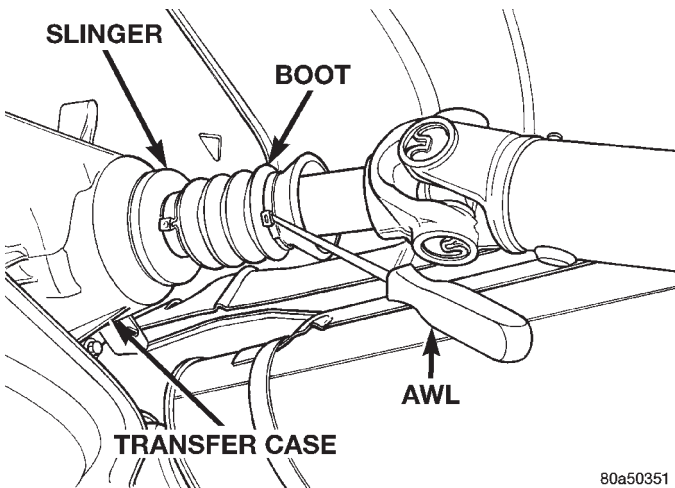


Fig. 9 Output Boot—Typical

(2) Using puller MD-998056-A, remove rear slinger (Fig. 10).

(3) Remove slinger stop spacer and snap-ring from output shaft (Fig. 11).

(4) Remove rear seal from retainer (Fig. 12). Use pry tool, or collapse seal with punch to remove it.

(5) Remove rear output bearing I.D. retaining ring (Fig. 13).

(6) Remove speedometer adapter.

(7) Remove rear retainer bolts.

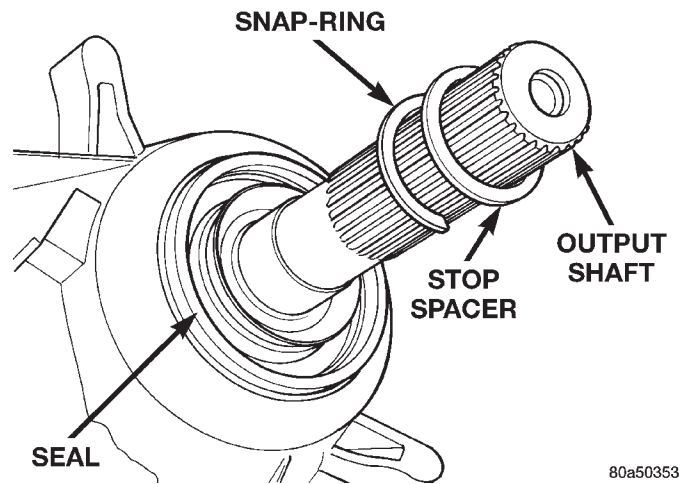


Fig. 11 Slinger Stop Spacer and Snap-ring

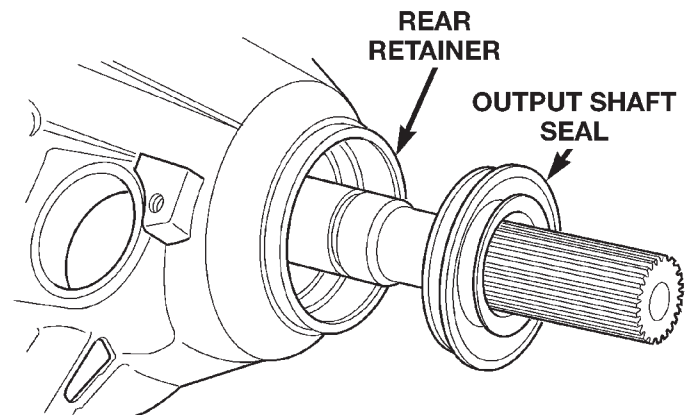


Fig. 12 Rear Seal Removal

(8) Remove rear retainer. Tap retainer with mallet and pry upward to break sealer bead. Then slide retainer off case and output shaft (Fig. 14).

DISASSEMBLY AND ASSEMBLY (Continued)

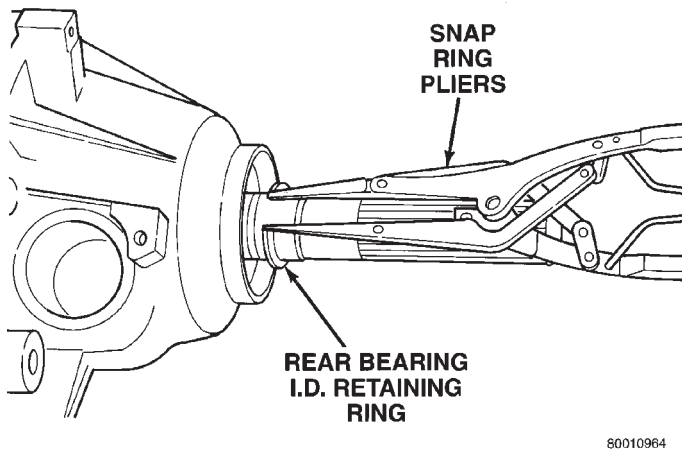


Fig. 13 Rear Bearing I.D. Retaining Ring Removal

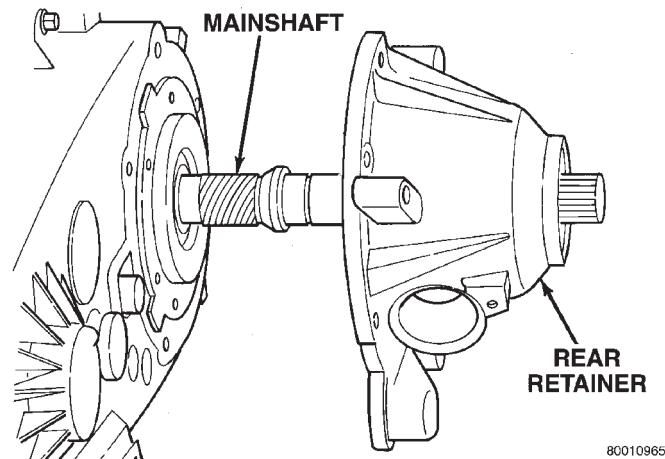


Fig. 14 Rear Retainer Removal

(9) Remove rear bearing O.D. retaining ring with snap ring pliers. Then tilt pump and slide it off output shaft (Fig. 15).

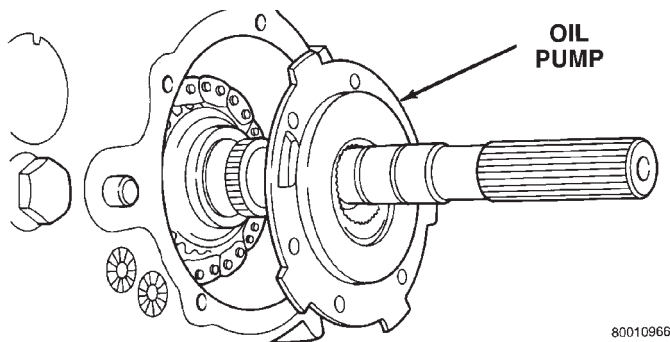


Fig. 15 Oil Pump Removal

(10) Remove pickup tube O-ring from pump (Fig. 16) but do not disassemble pump; it is not a repairable part.

(11) Remove seal from oil pump with pry tool.

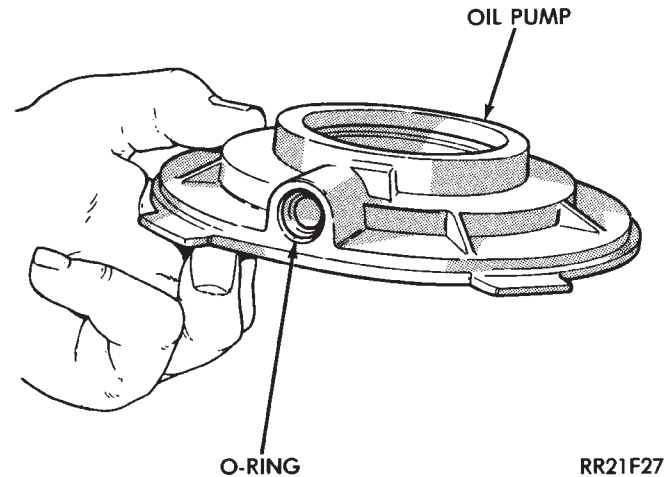


Fig. 16 Pickup Tube O-Ring Location

(12) Remove bolts attaching rear case to front case (Fig. 17). Note position of the two black finish bolts at each end of the case. These bolts go through the case dowels and require a washer under the bolt head.

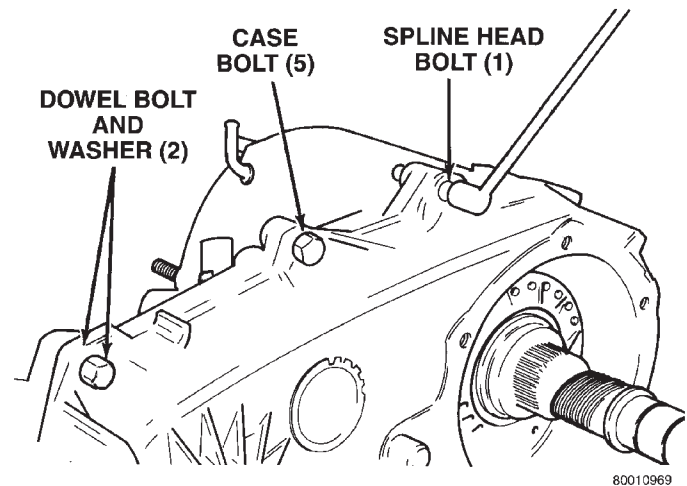


Fig. 17 Spline And Dowel Bolt Locations

(13) Remove rear case from front case (Fig. 18). Insert screwdrivers into slots cast into each end of case. Then pry upward to break sealer bead and remove rear case.

CAUTION: Do not pry on the sealing surface of either case half as the surfaces will become damaged.

(14) Remove oil pickup tube and screen from rear case (Fig. 19).

YOKE AND RANGE LEVER REMOVAL

(1) Remove front yoke nut:

(a) Move range lever to 4L position.

(b) Remove nut with socket and impact wrench (Fig. 20).

DISASSEMBLY AND ASSEMBLY (Continued)

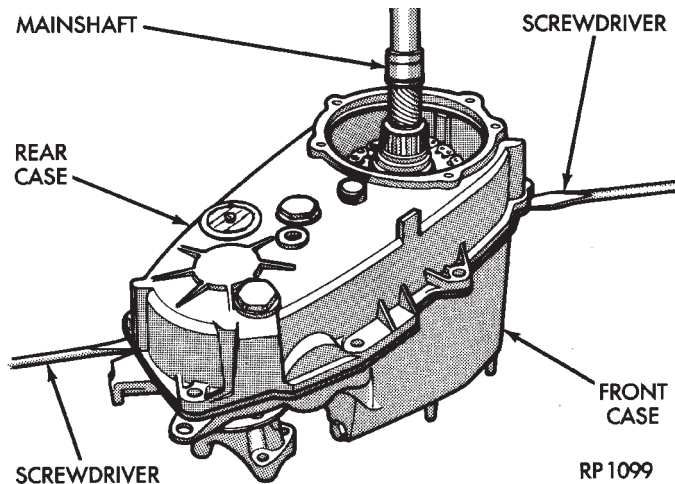


Fig. 18 Loosening/Removing Rear case

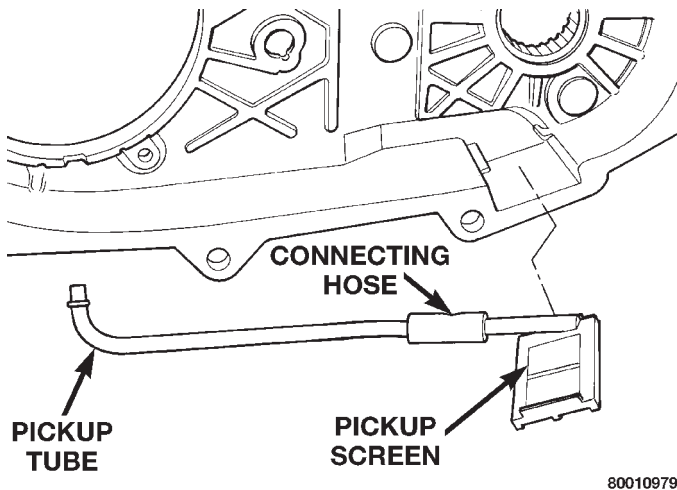


Fig. 19 Oil Pickup Screen, Hose And Tube Removal

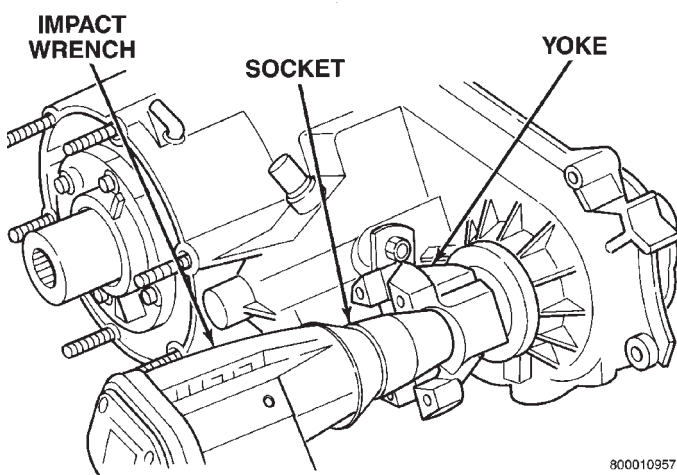


Fig. 20 Yoke Nut Removal

(2) Remove yoke. If yoke is difficult to remove by hand, remove it with bearing splitter, or with standard two jaw puller (Fig. 21). Be sure puller tool is

positioned on yoke and not on slinger as slinger will be damaged.

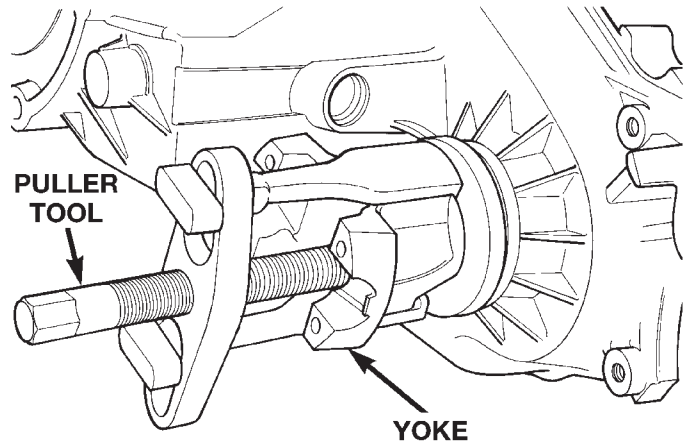


Fig. 21 Yoke Removal

(3) Remove seal washer from front output shaft. Discard washer as it should not be reused.

(4) Remove nut and washer that attach range lever to sector shaft. Then move sector to neutral position and remove range lever from shaft (Fig. 22).

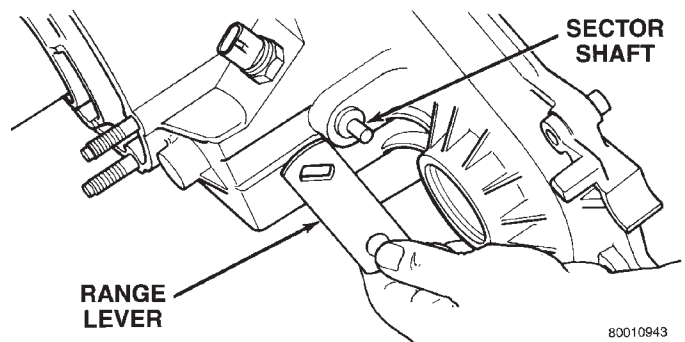


Fig. 22 Range Lever Removal

FRONT OUTPUT SHAFT AND DRIVE CHAIN REMOVAL

- (1) Remove drive sprocket snap-ring (Fig. 23).
- (2) Remove drive sprocket and chain (Fig. 24).
- (3) Remove front output shaft (Fig. 25).

SHIFT FORKS AND MAINSHAFT REMOVAL AND DISASSEMBLY

(1) Remove shift detent plug, spring and pin (Fig. 26).

(2) Remove seal plug from low range fork lockpin access hole. Then move shift sector to align low range fork lockpin with access hole.

(3) Remove range fork lockpin with size number one easy-out tool as follows:

(a) Insert easy-out tool through access hole in side of transfer case and into lock-pin.

(b) Tap easy-out tool into lock-pin with hammer until tool is securely engaged into the lock-pin.

DISASSEMBLY AND ASSEMBLY (Continued)

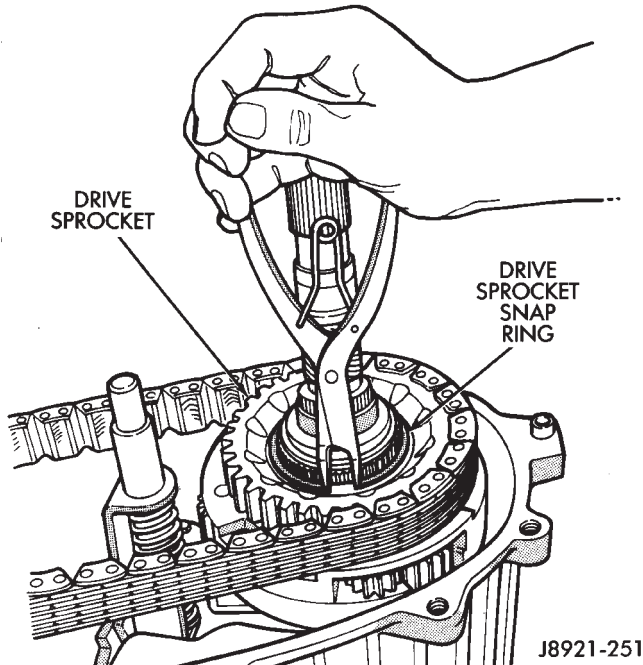


Fig. 23 Drive Sprocket Snap-Ring Removal

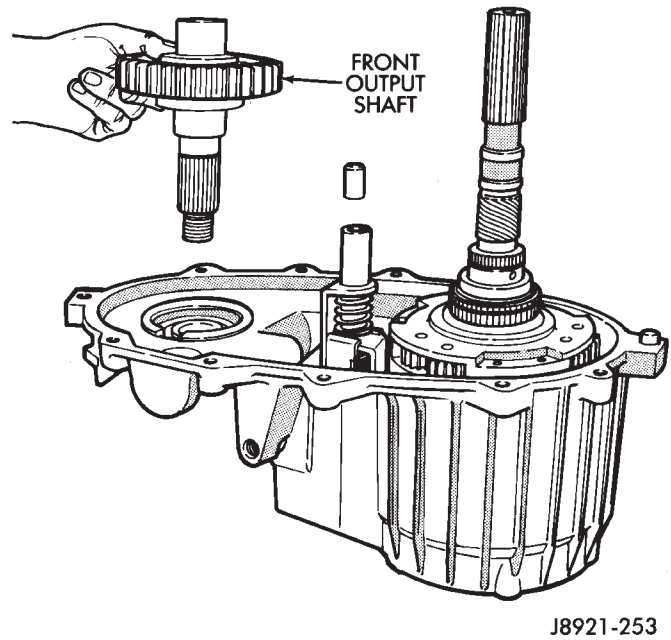


Fig. 25 Removing Front Output Shaft

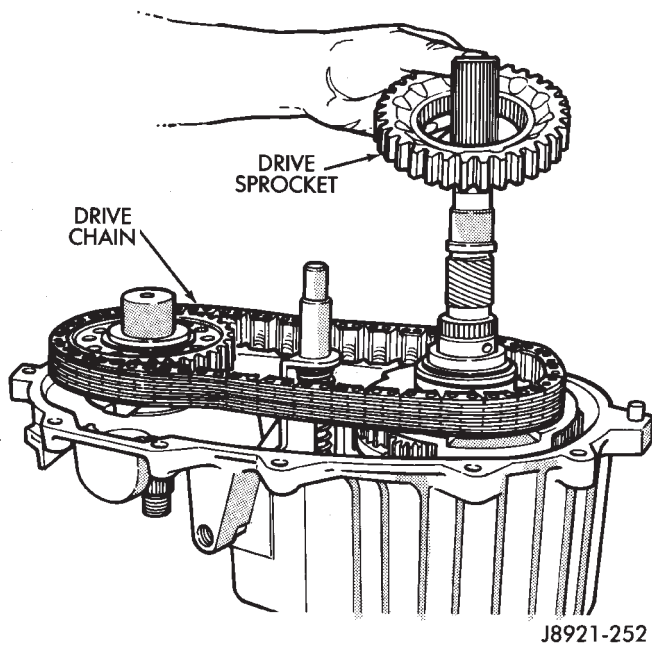


Fig. 24 Drive Sprocket And Chain Removal

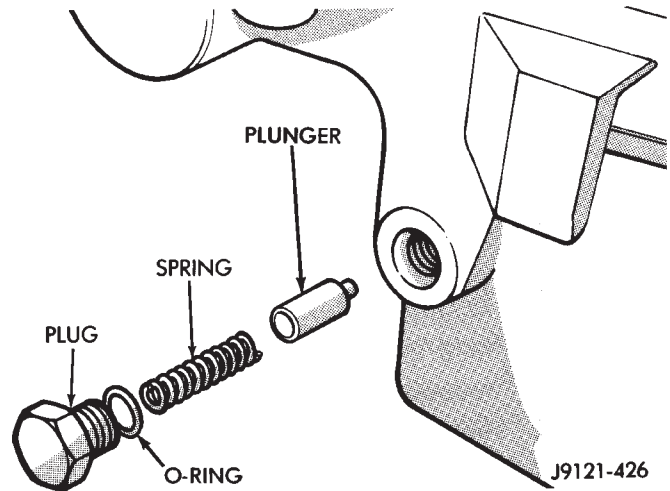


Fig. 26 Detent Component Removal

- (c) Install a t-handle, such as from a tap and die set, onto the easy-out tool.
- (d) Securely tighten the t-handle onto the tool.
- (e) In one motion, pull upward and turn the t-handle counter-clockwise to remove the lock-pin.
- (4) Remove shift rail by pulling it straight up and out of fork (Fig. 27).

- (5) Remove mode fork and mainshaft as assembly (Fig. 28).
- (6) Remove mode shift sleeve and mode fork assembly from mainshaft (Fig. 29). Note position of mode sleeve in fork and remove sleeve.

DISASSEMBLY AND ASSEMBLY (Continued)

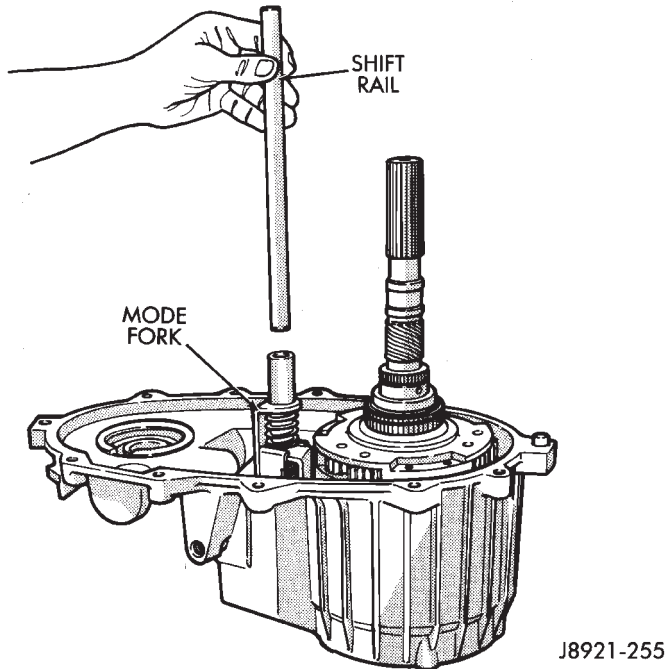
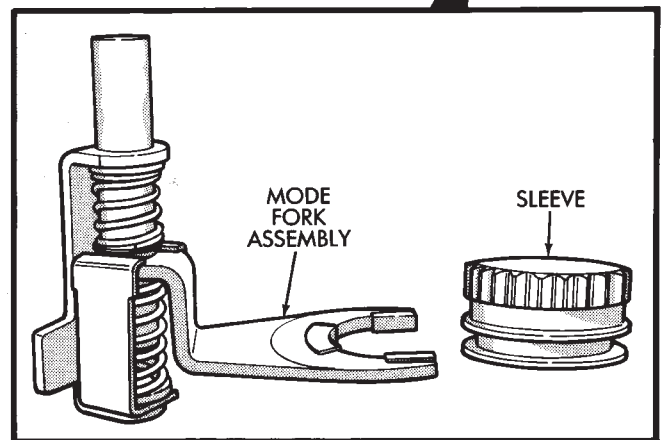
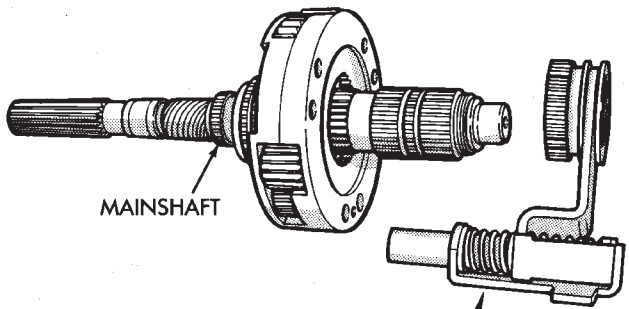


Fig. 27 Shift Rail Removal



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Fig. 29 Mode Fork And Sleeve Removal

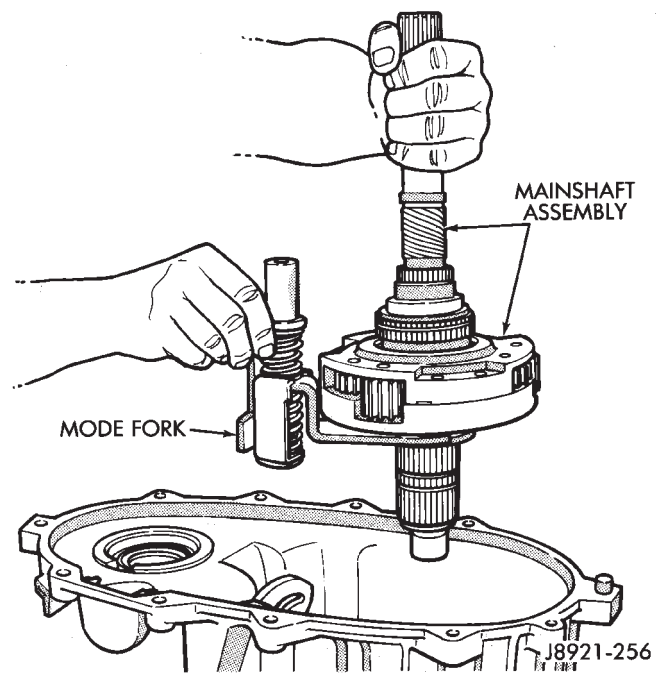
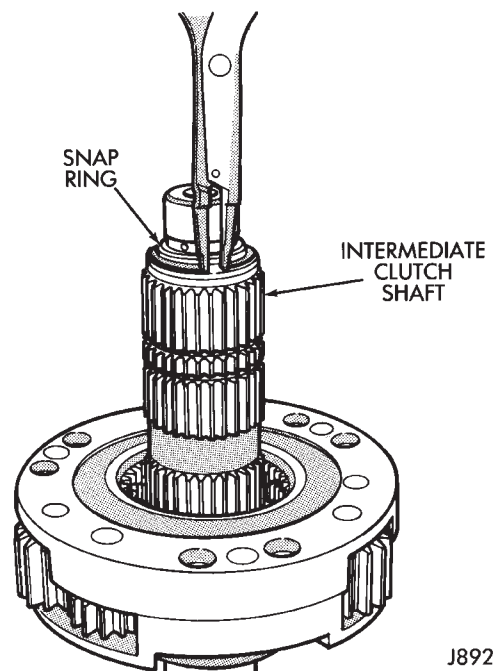


Fig. 28 Mode Fork And Mainshaft Removal

- (7) Remove intermediate clutch shaft snap-ring (Fig. 30).
- (8) Remove clutch shaft thrust ring (Fig. 31).
- (9) Remove intermediate clutch shaft (Fig. 32).
- (10) Remove differential snap-ring (Fig. 33).



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Fig. 30 Intermediate Clutch Shaft Snap-Ring Removal

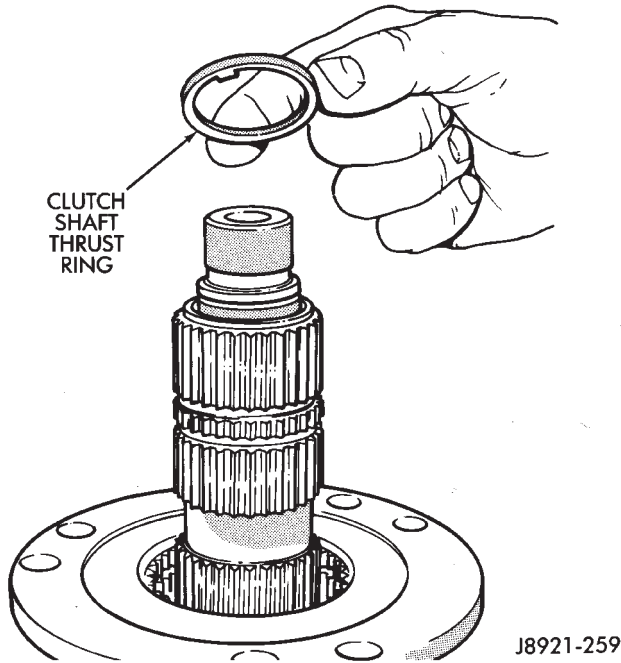


Fig. 31 Clutch Shaft Thrust Ring Removal

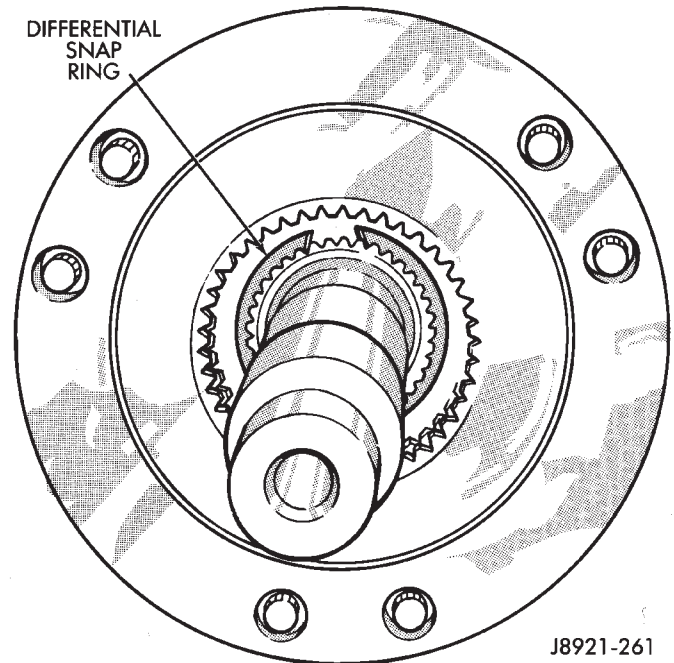


Fig. 33 Differential Snap-Ring Removal

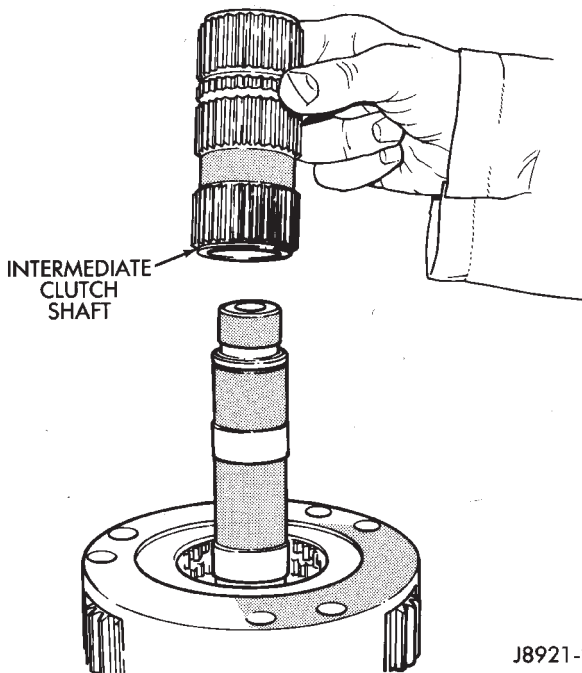


Fig. 32 Intermediate Clutch Shaft Removal

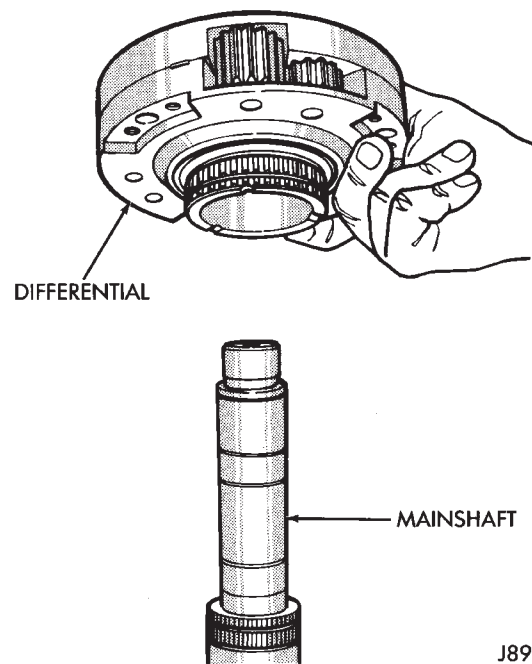


Fig. 34 Differential Removal

- (11) Remove differential (Fig. 34).
- (12) Remove differential needle bearings and both needle bearing thrust washers from mainshaft.
- (13) Slide low range fork pin out of shift sector slot (Fig. 35).

- (14) Remove low range fork and hub (Fig. 36).
- (15) Remove shift sector (Fig. 37).
- (16) Remove shift sector bushing and O-ring (Fig. 38).

DISASSEMBLY AND ASSEMBLY (Continued)

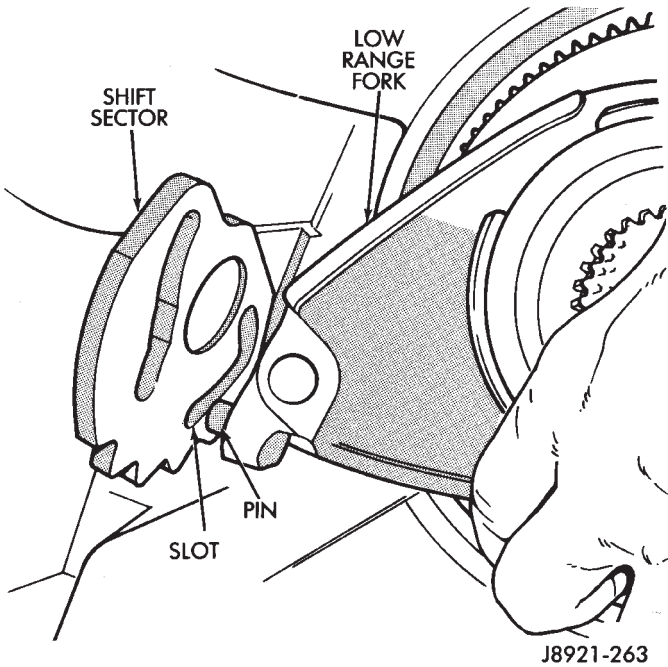


Fig. 35 Disengaging Low Range Fork

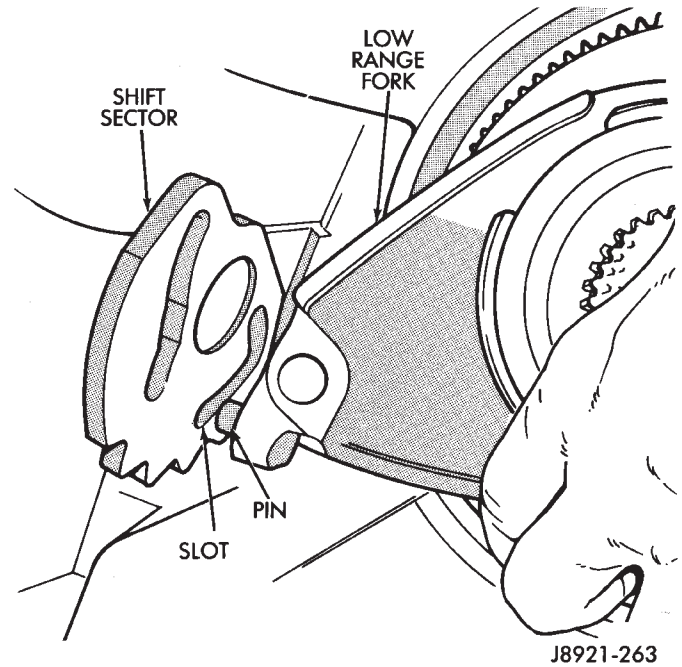


Fig. 37 Shift Sector Position

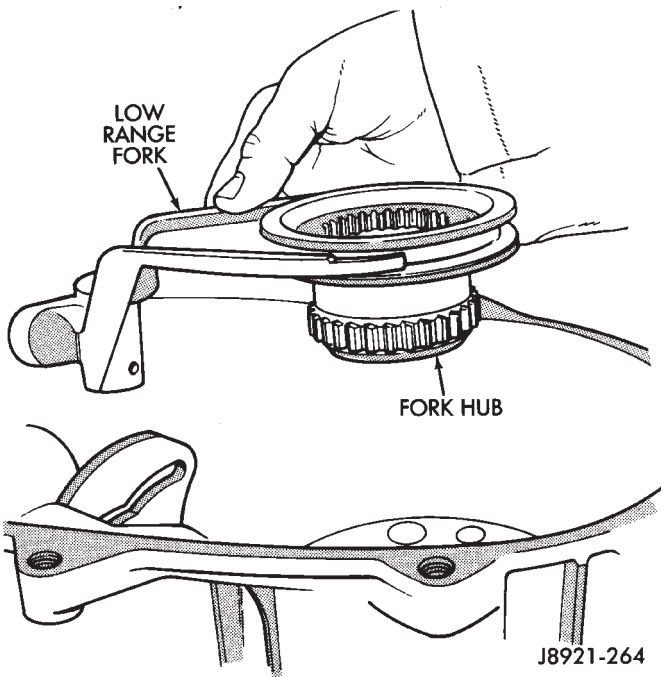


Fig. 36 Low Range Fork And Hub Removal

INPUT GEAR/LOW RANGE ASSEMBLY REMOVAL AND DISASSEMBLY

- (1) Remove front bearing retainer bolts.
- (2) Remove front bearing retainer. Carefully pry retainer loose with screwdriver (Fig. 39). Position screwdriver in slots cast into retainer.
- (3) Remove input gear snap-ring (Fig. 40).
- (4) Remove input/low range gear assembly from bearing with Tool Handle C-4171 and Tool 7829A (Fig. 41).

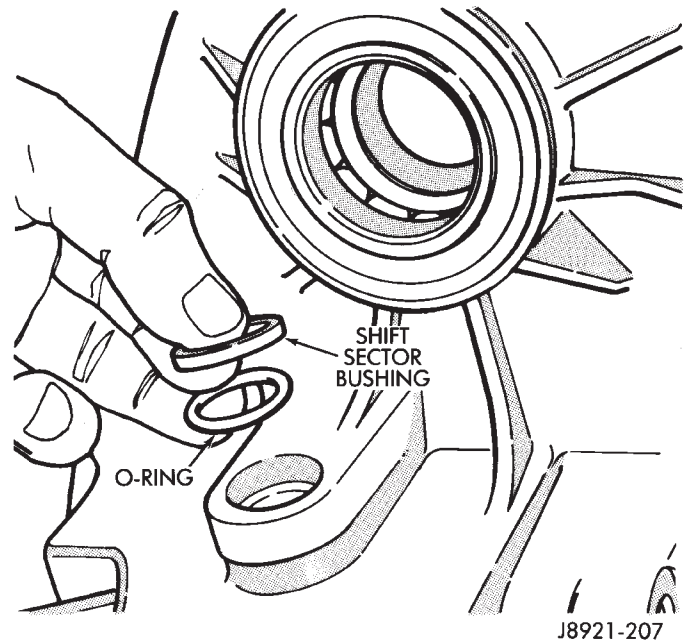
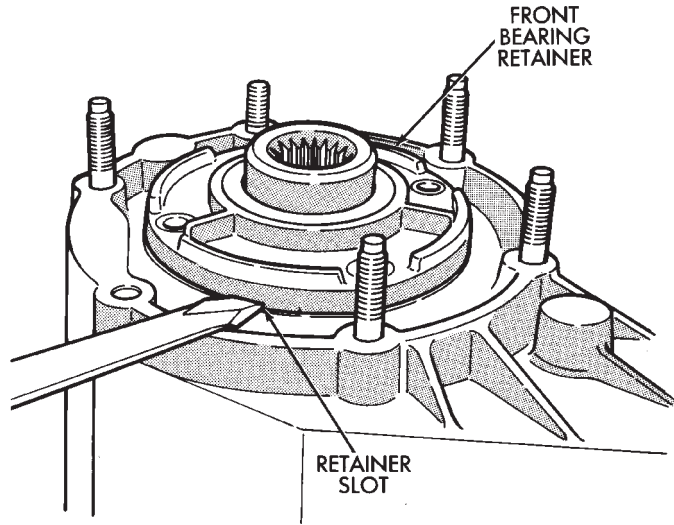


Fig. 38 Sector Bushing And O-Ring Removal

- (5) Remove low range gear snap-ring (Fig. 42).
- (6) Remove input gear retainer, thrust washers and input gear from low range gear (Fig. 43).
- (7) Inspect low range annulus gear (Fig. 44). **Gear is not a serviceable component. If damaged, replace gear and front case as assembly.**
- (8) Remove oil seals from following components:
 - front bearing retainer.
 - rear retainer.
 - oil pump.
 - case halves.

DISASSEMBLY AND ASSEMBLY (Continued)



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Fig. 39 Front Bearing Retainer Removal

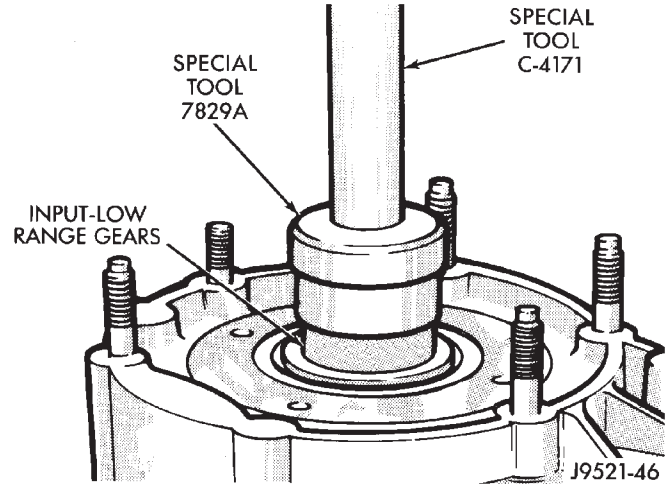
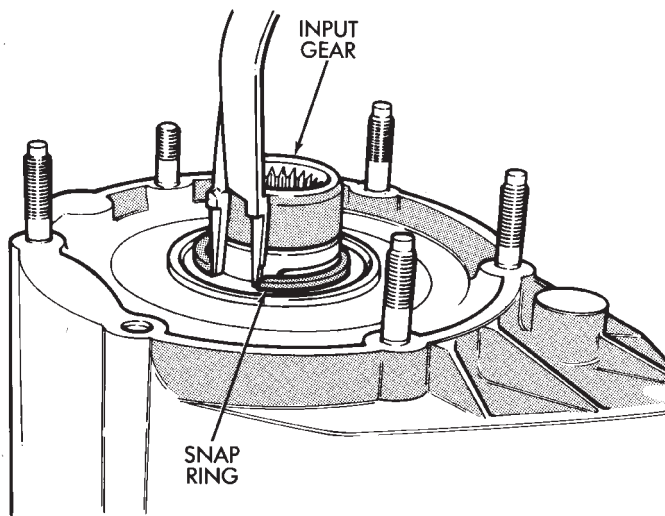
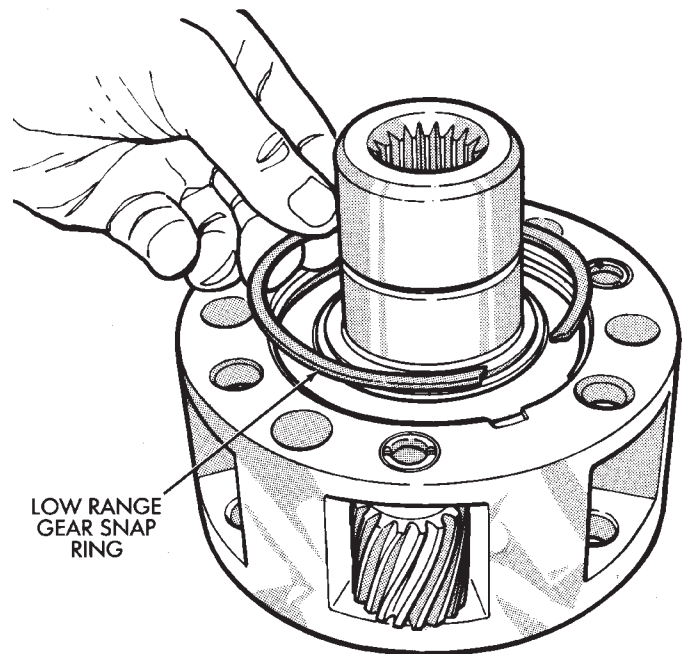


Fig. 41 Input And Low Range Gear Assembly Removal



J8921-267

Fig. 40 Input Gear Snap-Ring Removal



J8921-269

Fig. 42 Low Range Gear Snap-Ring Removal/Installation

DIFFERENTIAL DISASSEMBLY

- (1) Mark differential case halves for reference.
- (2) Remove differential case bolts.
- (3) Invert differential on workbench.
- (4) Separate top case from bottom case. Use slots in case halves to pry them apart (Fig. 45).

- (5) Remove thrust washers and planet gears from case pins (Fig. 46).

- (6) Remove mainshaft and sprocket gears from bottom case (Fig. 47). Note gear position for reference before separating them.

DISASSEMBLY AND ASSEMBLY (Continued)

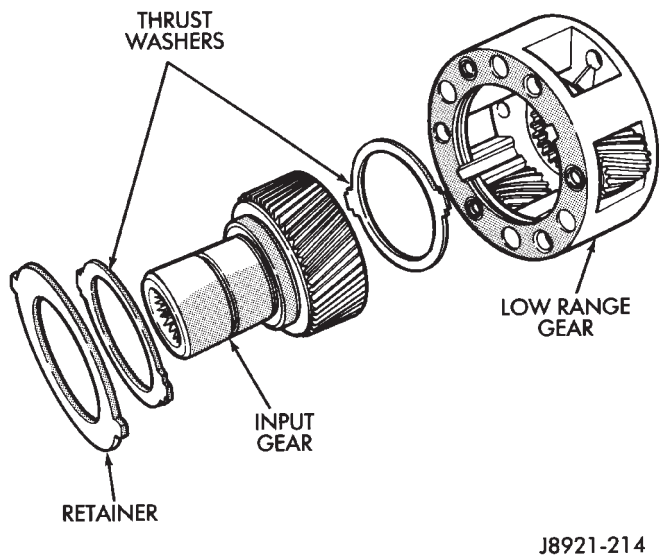


Fig. 43 Low Range Gear Disassembly

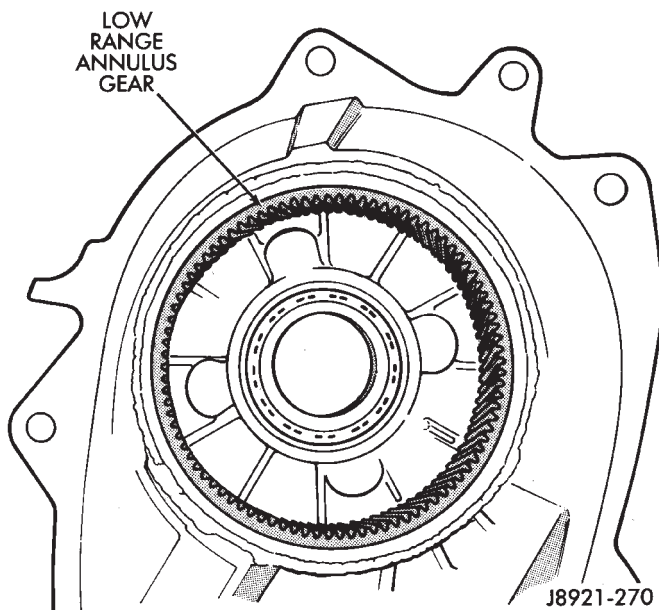


Fig. 44 Inspecting Low Range Annulus Gear

ASSEMBLY

Lubricate transfer case components with automatic transmission fluid or petroleum jelly (where indicated) during assembly.

CAUTION: The bearing bores in various transfer case components contain oil feed holes. Make sure replacement bearings do not block the holes.

BEARING AND SEAL INSTALLATION

(1) Remove snap-ring that retains front output shaft front bearing in case (Fig. 48). Then remove bearing. Use hammer handle, or hammer and brass punch to tap bearing out of case.

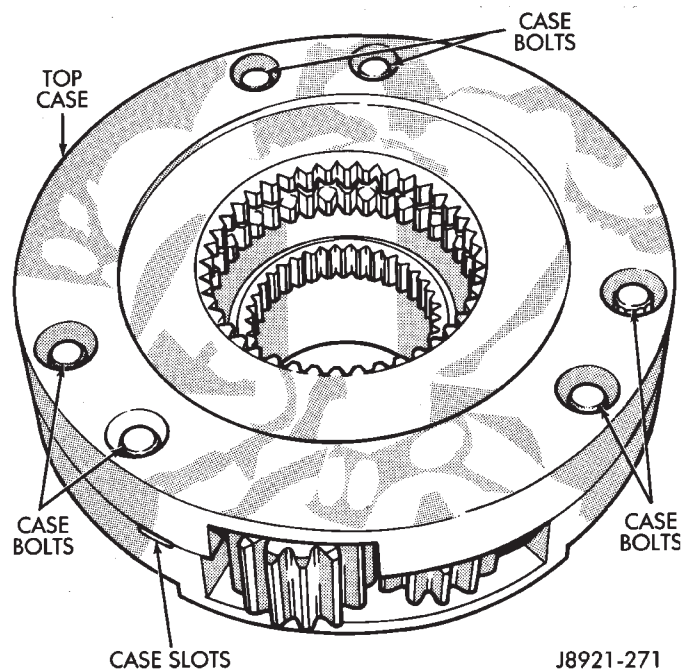


Fig. 45 Separating Differential Case Halves

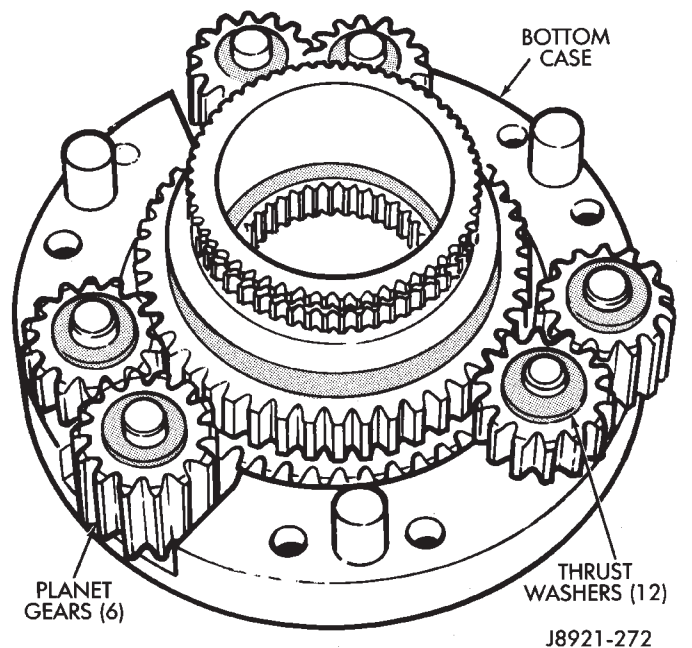


Fig. 46 Planet Gears And Thrust Washer Removal

(2) Install new front output shaft front bearing with Tool Handle C-4171 and Installer 8033A with the tapered cone upward (Fig. 49).

(3) Install front bearing snap-ring (Fig. 48).

(4) Remove front output shaft seal using an appropriate pry tool (Fig. 50) or slide-hammer mounted screw.

(5) Install new front output shaft oil seal with Installer 6952-A (Fig. 51).

DISASSEMBLY AND ASSEMBLY (Continued)

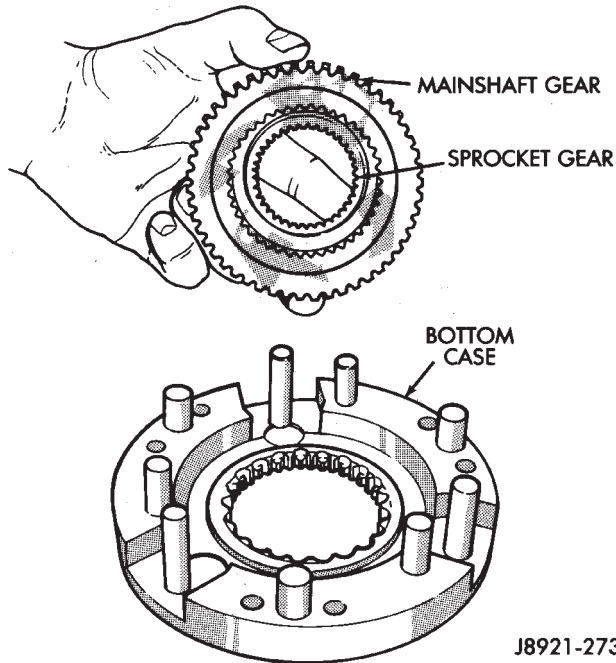


Fig. 47 Mainshaft and Sprocket Gear Removal

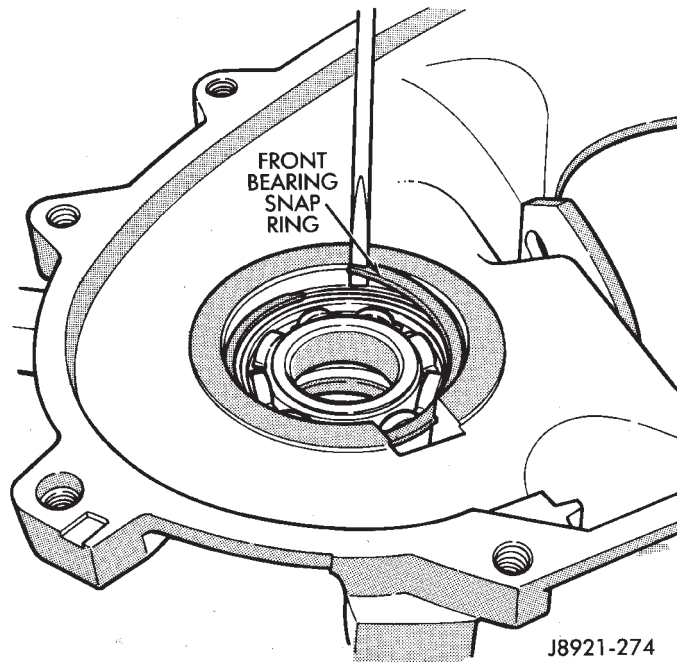


Fig. 48 Front Output Shaft Front Bearing Snap-Ring Removal

- (6) Remove input gear bearing with Tool Handle C-4171 and Remover C-4210 (Fig. 52).
- (7) Install snap-ring on new input gear bearing.
- (8) Install new input gear bearing with Tool Handle C-4171 and Remover C-4210. Install bearing far enough to seat snap-ring against case (Fig. 53).
- (9) Remove the input gear pilot bearing by inserting a suitably sized drift into the splined end of the

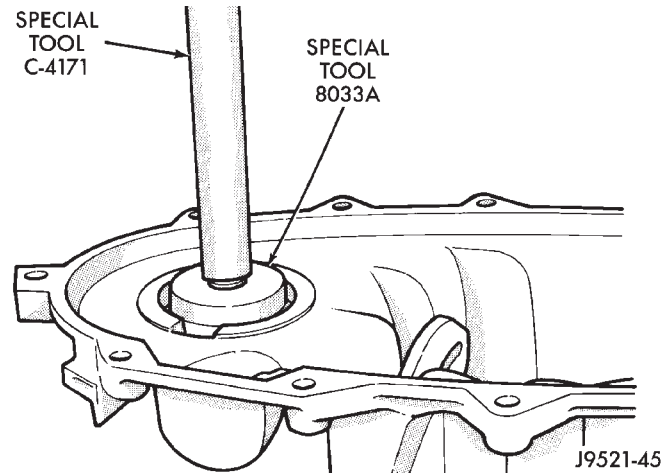


Fig. 49 Front Output Shaft Front Bearing Installation

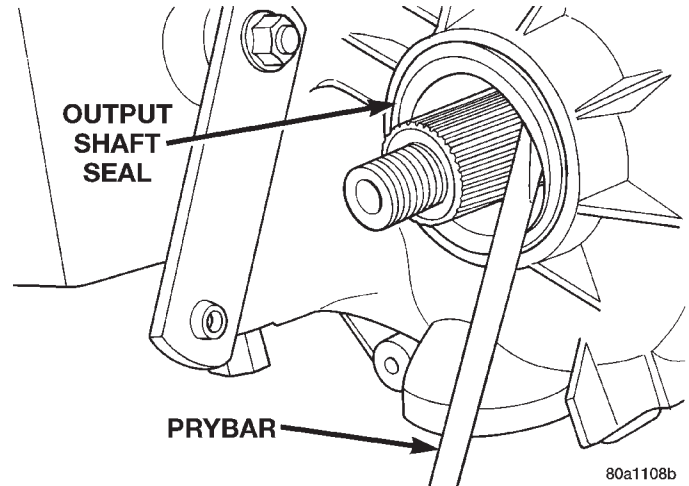


Fig. 50 Remove Front Output Shaft Seal

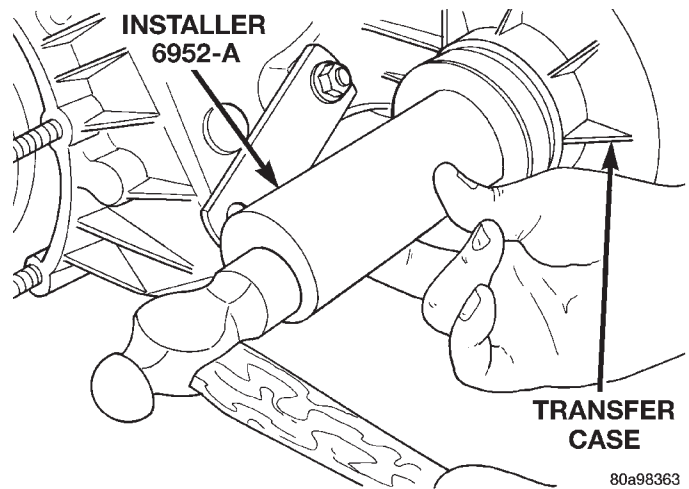
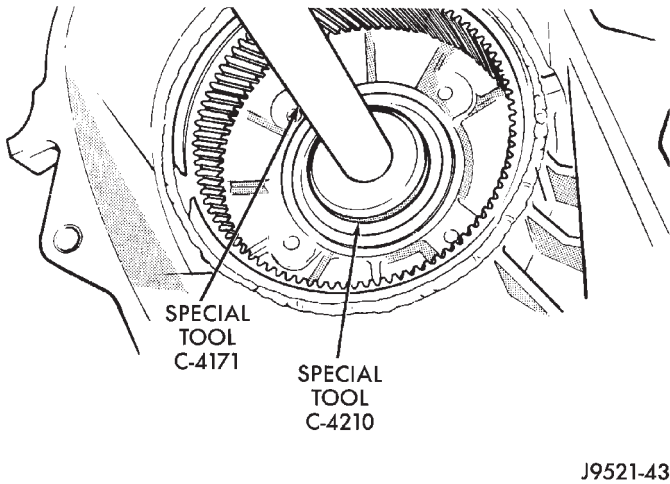


Fig. 51 Install Front Output Shaft Seal

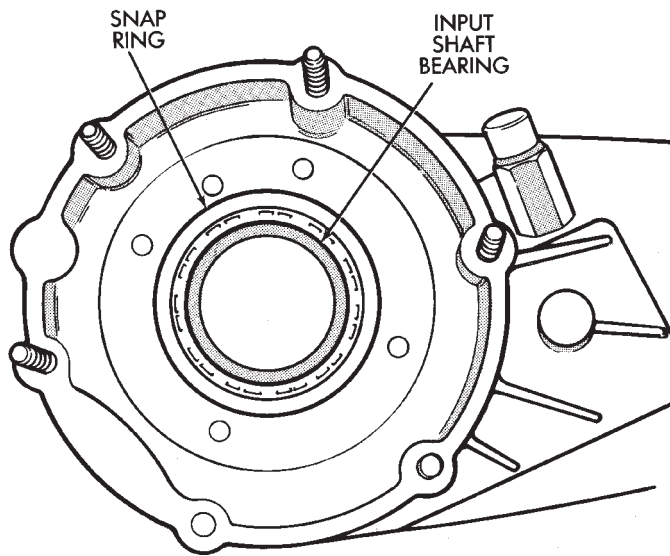
- input gear and driving the bearing out with the drift and a hammer (Fig. 54).
- (10) Install new pilot bearing with Installer 8128 and Handle C-4171 (Fig. 55).

DISASSEMBLY AND ASSEMBLY (Continued)



J9521-43

Fig. 52 Input Gear Bearing Removal



J8921-219

Fig. 53 Seating Input Gear Bearing

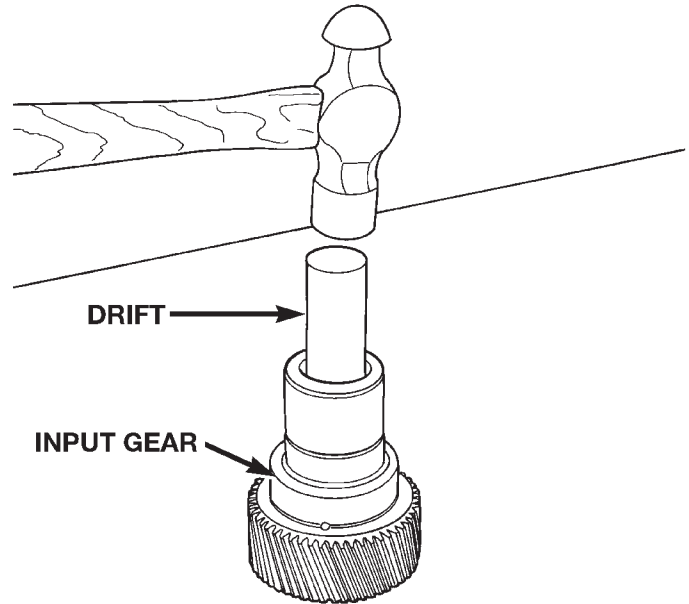
(11) Install new seal in front bearing retainer with Installer 7884 (Fig. 56).

(12) Remove output shaft rear bearing with the screw and jaws from Remover L-4454 and Cup 8148 (Fig. 57).

(13) Install new bearing with Tool Handle C-4171 and Installer 5066 (Fig. 58). Lubricate bearing after installation.

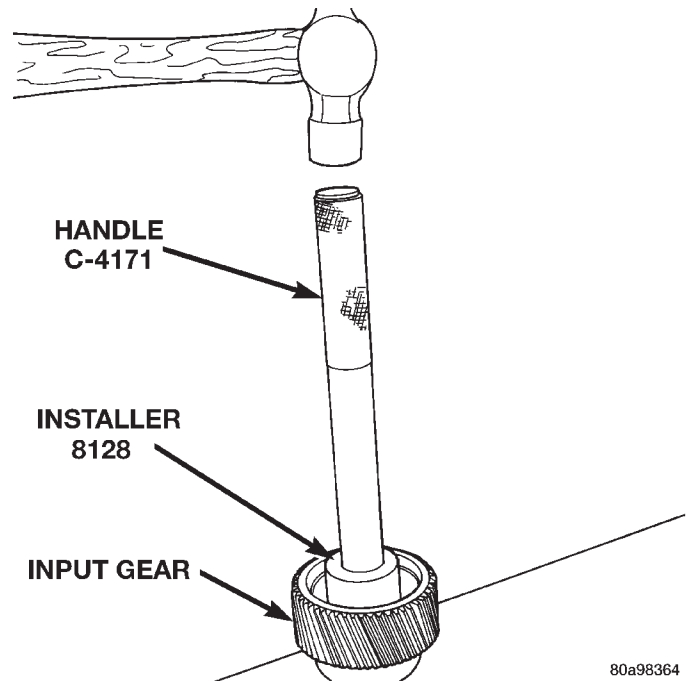
(14) Install new seal in oil pump feed housing with Special Tool 7888 (Fig. 59).

(15) Install new pickup tube O-ring in oil pump (Fig. 60).



80a11090

Fig. 54 Remove Input Gear Pilot Bearing



80a98364

Fig. 55 Install Input Gear Pilot Bearing

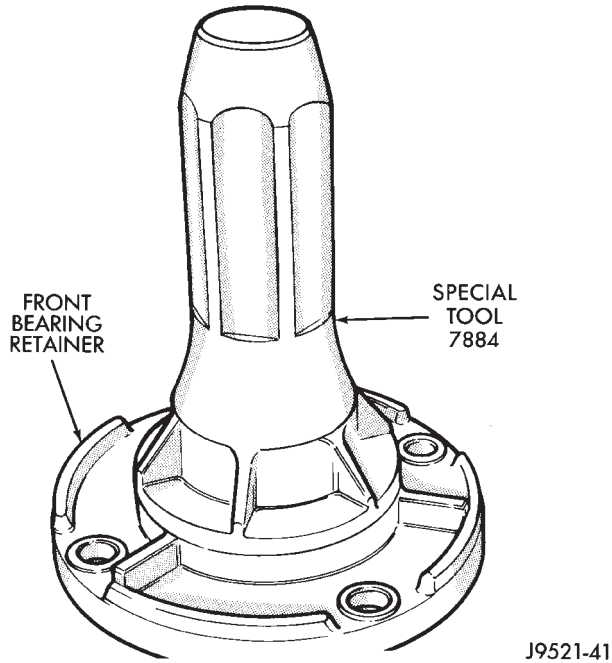


Fig. 56 Front Bearing Retainer Seal Installation

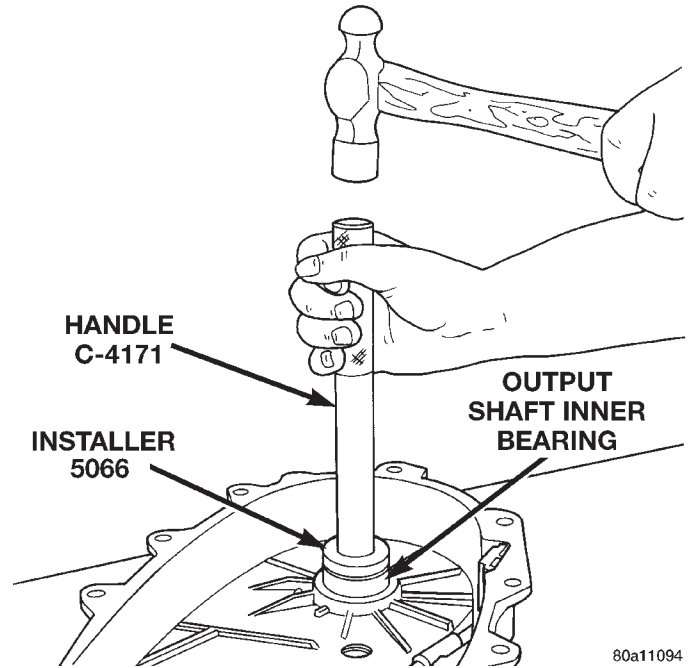


Fig. 58 Install Front Output Shaft Rear Bearing

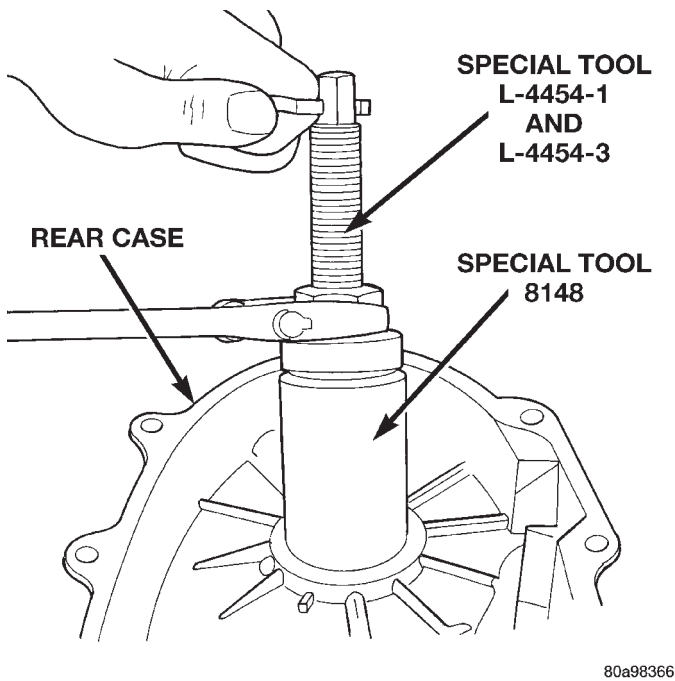


Fig. 57 Remove Front Output Shaft Rear Bearing
DIFFERENTIAL ASSEMBLY

- (1) Lubricate differential components with automatic transmission fluid.
- (2) Install sprocket gear in differential bottom case (Fig. 61).
- (3) Install differential planet gears and new thrust washers (Fig. 62). **Be sure thrust washers are installed at top and bottom of each planet gear.**
- (4) Install differential mainshaft gear (Fig. 62).

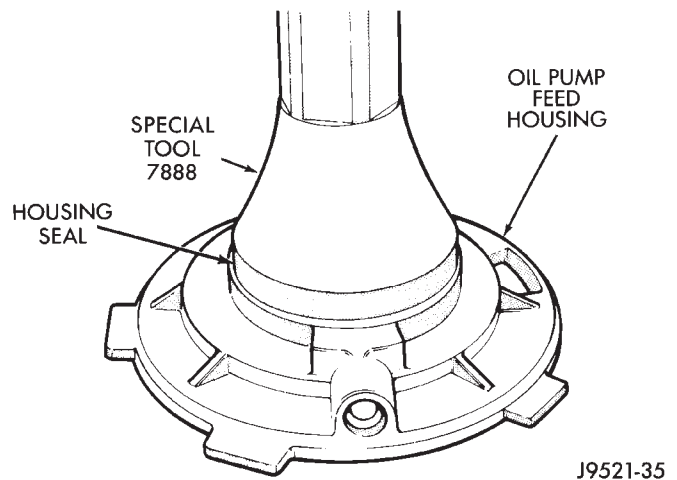
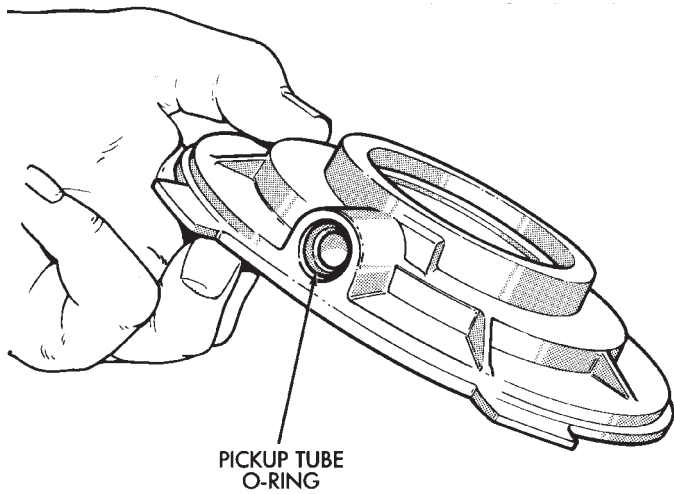


Fig. 59 Oil Pump Seal Installation

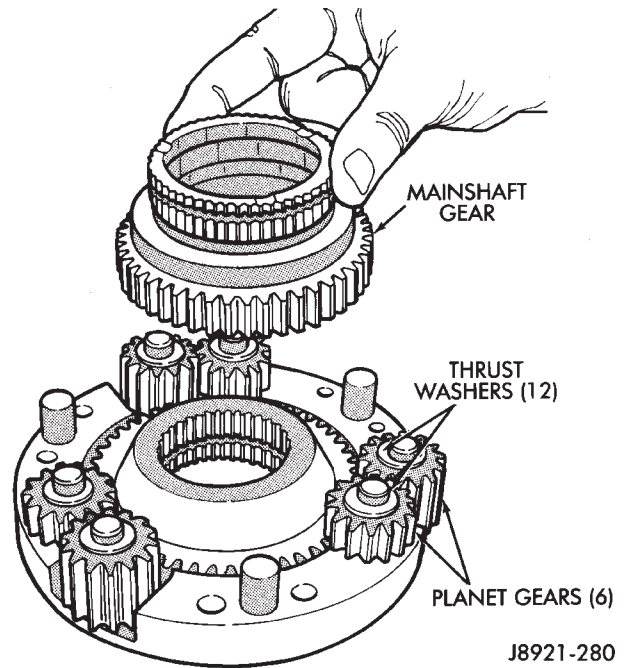
- (5) Align and position differential top case on bottom case (Fig. 63). Align using scribe marks made at disassembly.
- (6) While holding differential case halves together, invert the differential and start the differential case bolts.
- (7) Tighten differential case bolts to specified torque.

DISASSEMBLY AND ASSEMBLY (Continued)



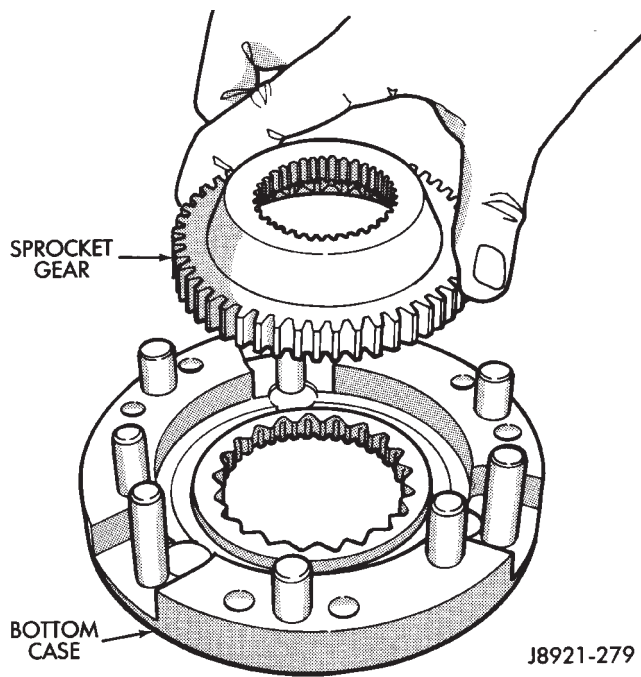
J8921-286

Fig. 60 Pickup Tube O-Ring Installation



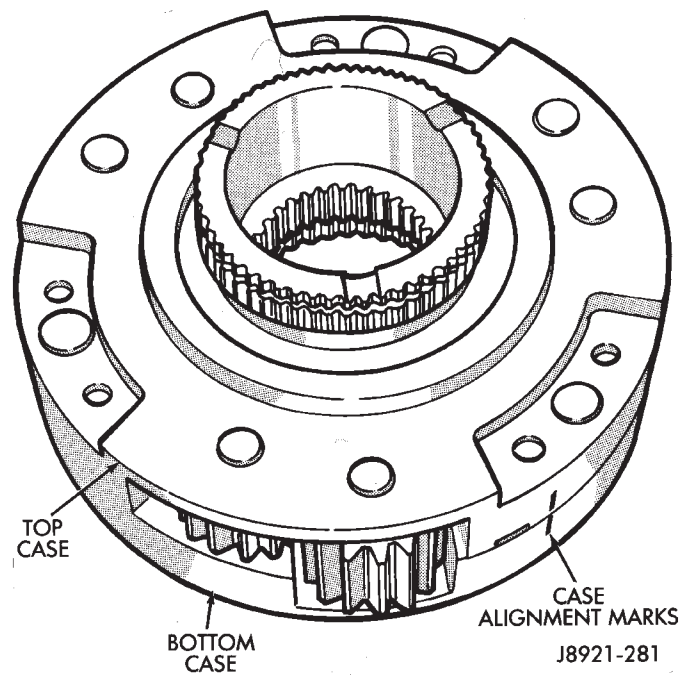
J8921-280

Fig. 62 Installing Mainshaft And Planet Gears



J8921-279

Fig. 61 Installing Differential Sprocket Gear



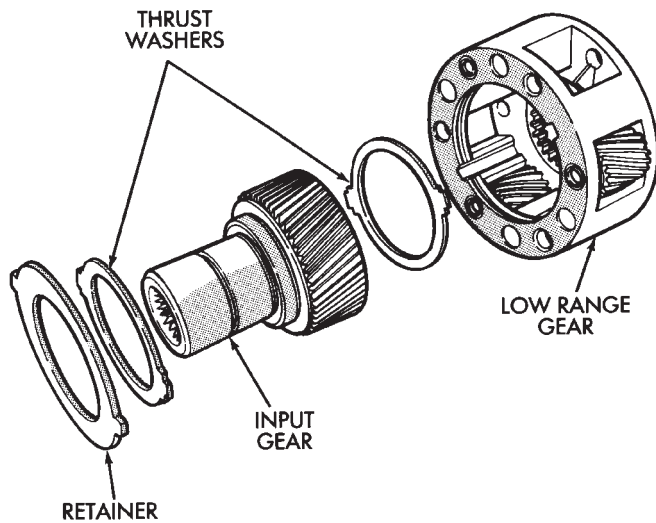
J8921-281

Fig. 63 Differential Case Assembly

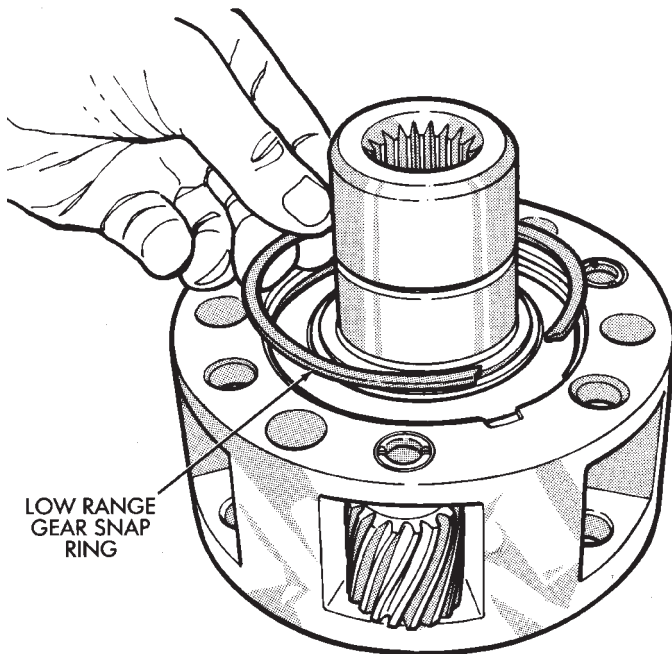
DISASSEMBLY AND ASSEMBLY (Continued)

INPUT GEAR/LOW RANGE ASSEMBLY

- (1) Assemble low range gear, input gear thrust washers, input gear and input gear retainer (Fig. 64).
- (2) Install low range gear snap ring (Fig. 65).



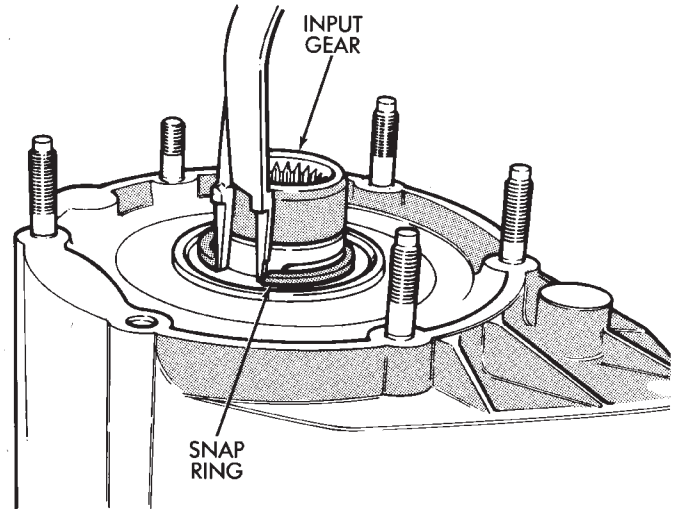
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Fig. 64 Low Range And Input Gear Assembly

J8921-269

Fig. 65 Install Low Range Gear Snap Ring

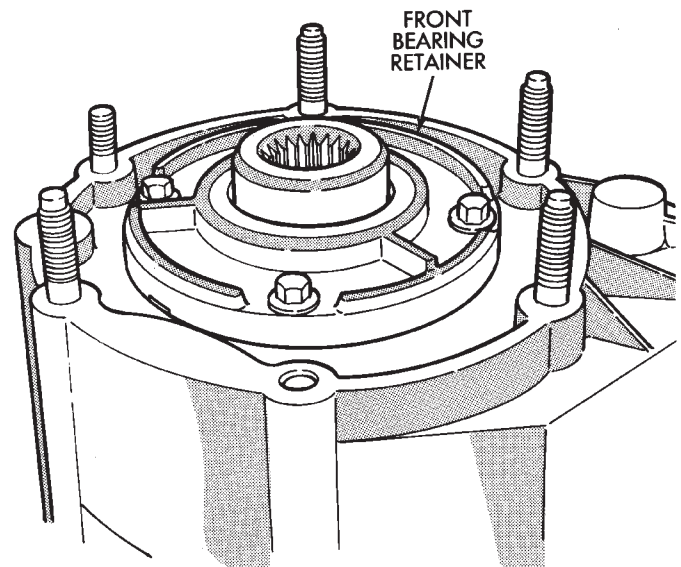
- (3) Lubricate input gear and low range gears with automatic transmission fluid.
- (4) Start input gear shaft into front case bearing.
- (5) Press input gear shaft into front bearing.
- (6) Install new input gear snap ring (Fig. 66).
- (7) Apply 3 mm (1/8 in.) wide bead of Mopar® gasket maker or silicone adhesive sealer to seal surface of front bearing retainer.



J8921-267

Fig. 66 Input Gear Snap Ring Installation

- (8) Install front bearing retainer (Fig. 67). Tighten retainer bolts to 16 ft. lbs. (21 N-m) torque.



J8921-276

Fig. 67 Installing Front Bearing Retainer

SHIFT FORKS AND MAINSHAFT INSTALLATION

- (1) Install new sector shaft O-ring and bushing (Fig. 68).
- (2) Install shift sector.
- (3) Install new pads on low range fork, if necessary, (Fig. 69).
- (4) Assemble low range fork and hub (Fig. 69).
- (5) Position low range fork and hub in case. Be sure low range fork pin is engaged in shift sector slot (Fig. 70).

DISASSEMBLY AND ASSEMBLY (Continued)

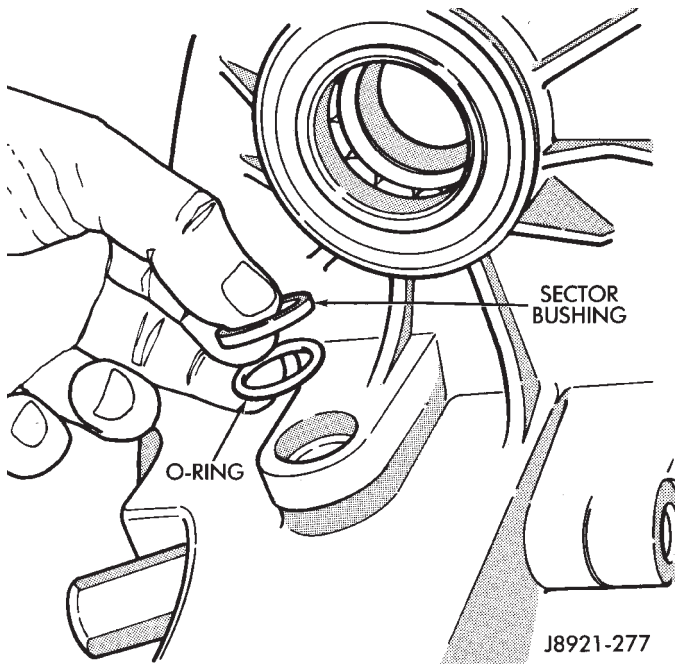


Fig. 68 Sector O-Ring And Bushing Installation

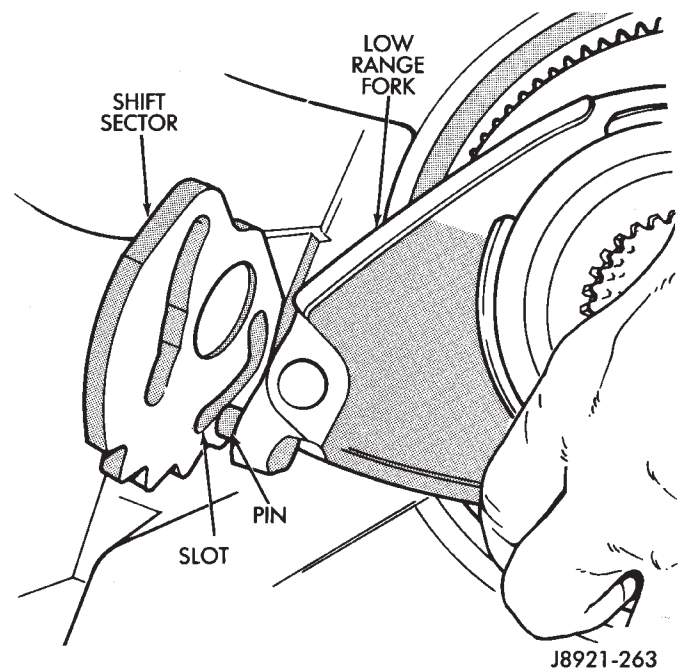


Fig. 70 Positioning Low Range Fork

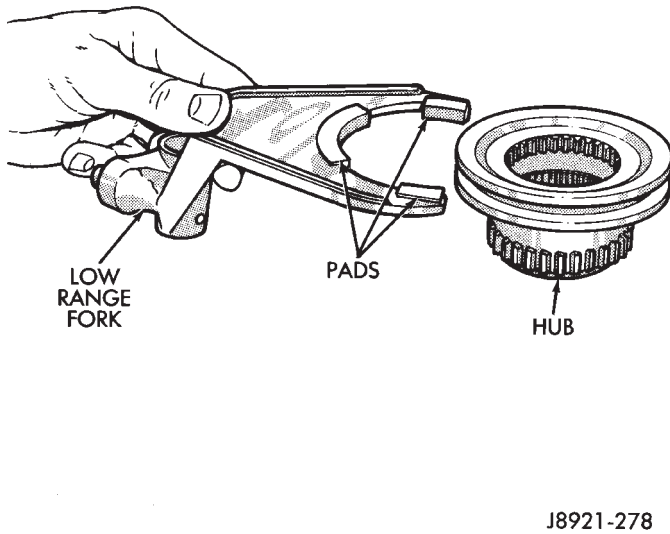


Fig. 69 Assembling Low Range Fork And Hub

(6) Install first mainshaft bearing spacer on mainshaft (Fig. 71).

(7) Install bearing rollers on mainshaft (Fig. 71). **Coat bearing rollers with generous quantity of petroleum jelly to hold them in place.**

(8) Install remaining bearing spacer on mainshaft (Fig. 71). Do not displace any bearings while installing spacer.

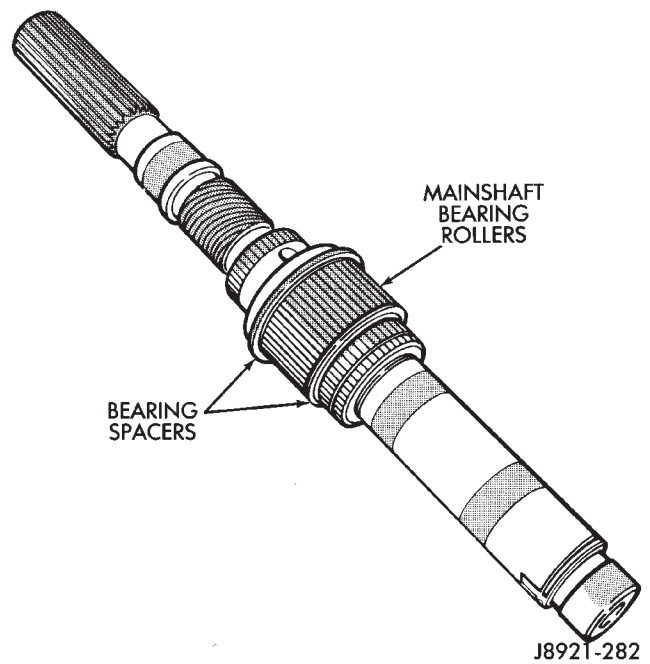
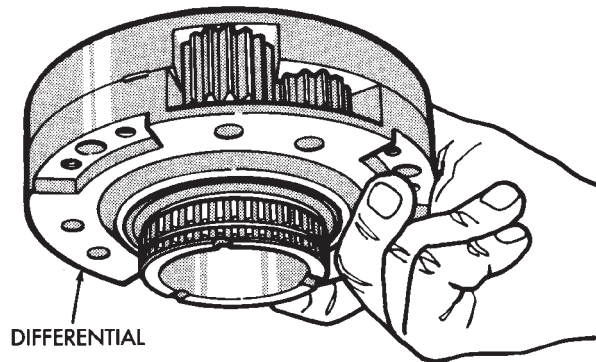


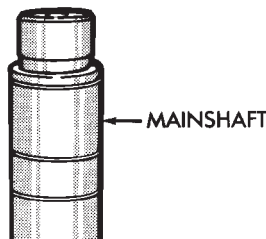
Fig. 71 Installing Mainshaft Bearing Rollers and Spacers

DISASSEMBLY AND ASSEMBLY (Continued)

- (9) Install differential (Fig. 72). **Do not displace mainshaft bearings when installing differential.**
- (10) Install differential snap-ring (Fig. 73).
- (11) Install intermediate clutch shaft (Fig. 74).



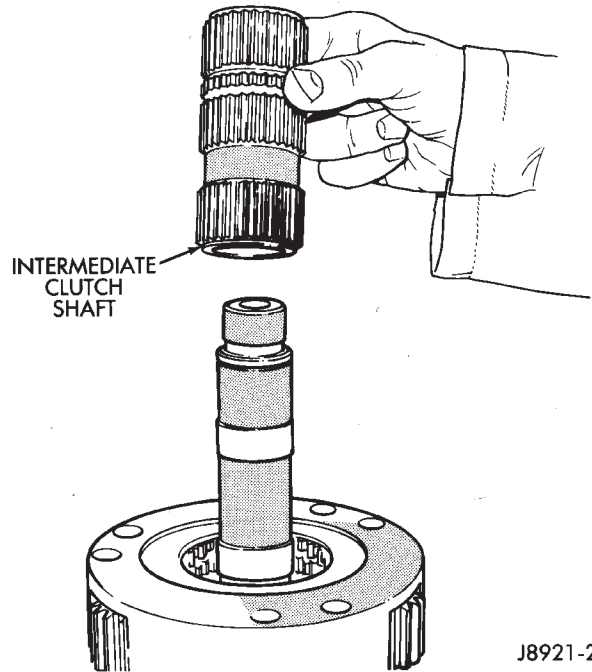
DIFFERENTIAL



MAINSHAFT

J8921-283

Fig. 72 Differential Installation

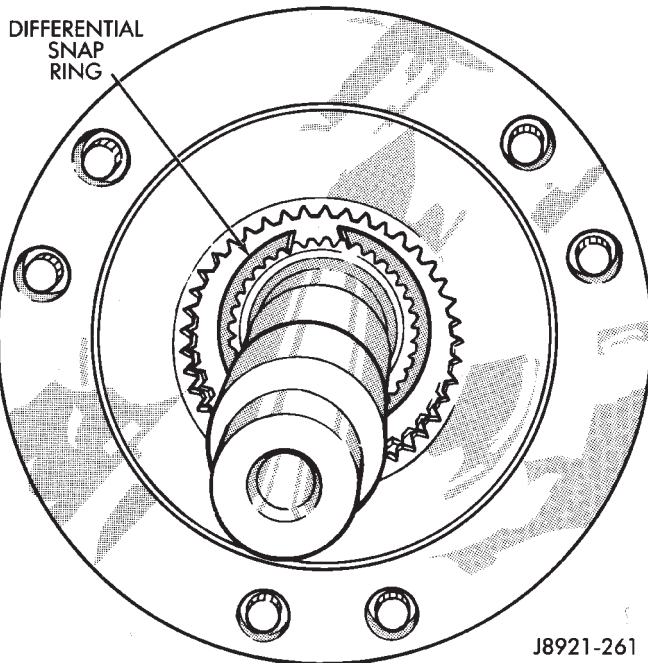


INTERMEDIATE CLUTCH SHAFT

J8921-260

Fig. 74 Installing Intermediate Clutch Shaft

check springs and slider bracket (Fig. 77). Replace worn, damaged components.

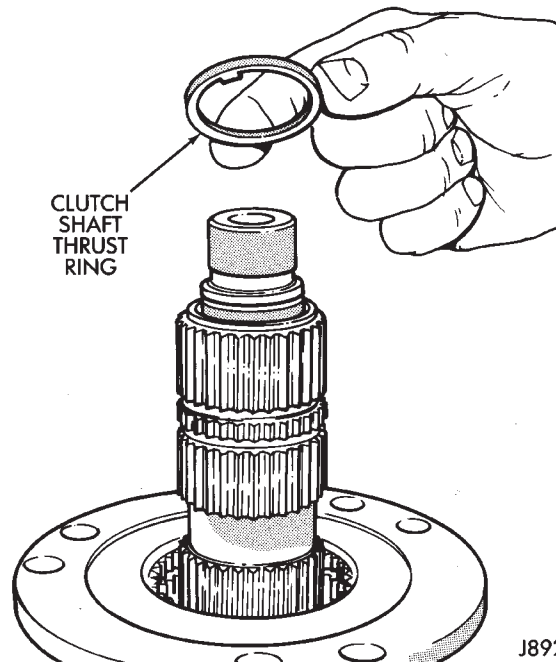


DIFFERENTIAL SNAP RING

J8921-261

Fig. 73 Installing Differential Snap-Ring

- (12) Install clutch shaft thrust washer (Fig. 75).
- (13) Install clutch shaft snap-ring (Fig. 76).
- (14) Inspect mode fork assembly (Fig. 77). Replace pads and bushing if necessary. Replace fork tube if bushings inside tube are worn or damaged. Also



CLUTCH SHAFT THRUST RING

J8921-259

Fig. 75 Installing Clutch Shaft Thrust Washer

(15) Install mode sleeve in mode fork (Fig. 78). Then install assembled sleeve and fork on mainshaft. Be sure mode sleeve splines are engaged in differential splines.

(16) Install mode fork and mainshaft assembly in case (Fig. 79). Rotate mainshaft slightly to engage shaft with low range gears.

DISASSEMBLY AND ASSEMBLY (Continued)

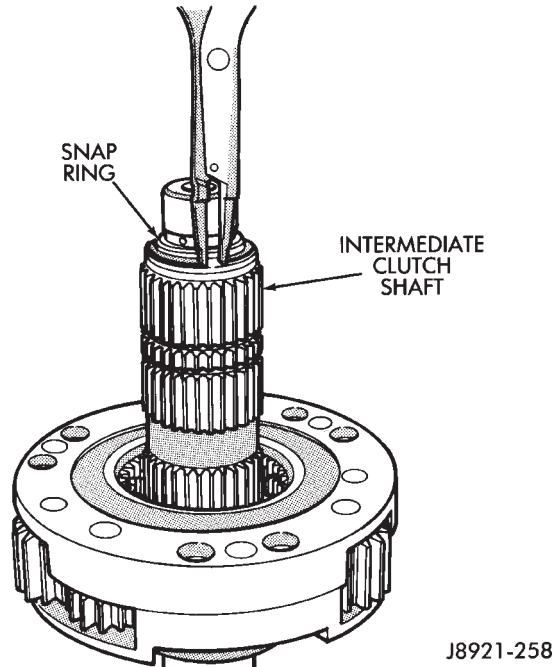


Fig. 76 Installing Clutch Shaft Snap-Ring

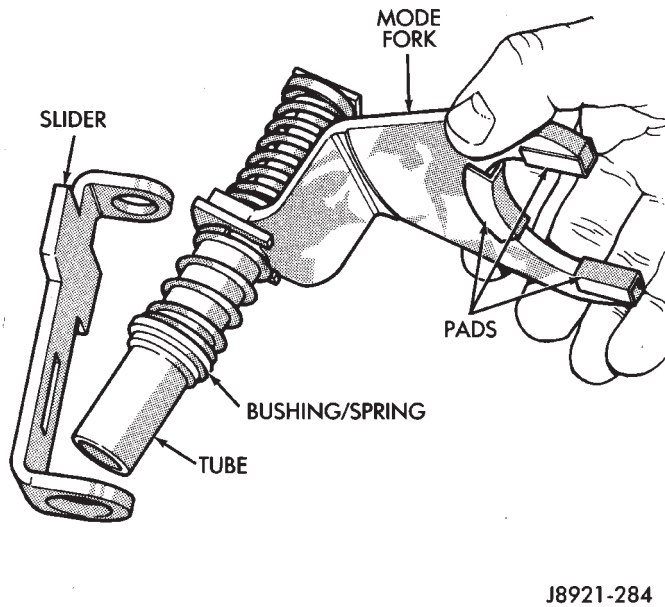


Fig. 77 Mode Fork Assembly Inspection

(17) Rotate mode fork pin into shift sector slot.
 (18) Install shift rail (Fig. 80). **Be sure rail is seated in both shift forks.**

(19) Rotate shift sector to align lockpin hole in low range fork with access hole in case.

(20) Insert an easy-out in range fork lockpin to hold it securely for installation (Fig. 81). **Lockpin is slightly tapered on one end. Insert tapered end into fork and rail.**

(21) Insert lockpin through access hole and into shift fork (Fig. 81). Then remove easy-out and seat the pin with pin punch.

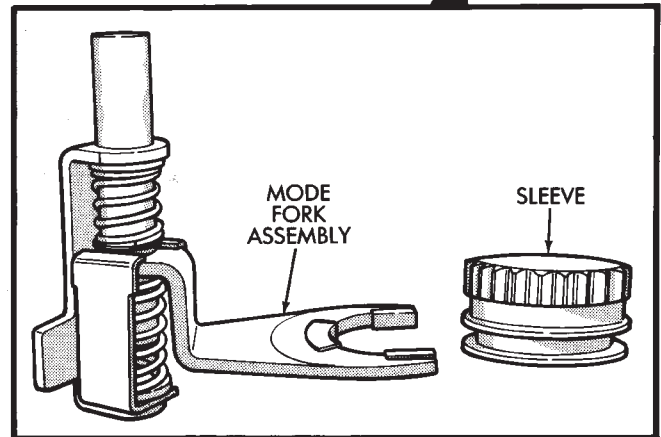
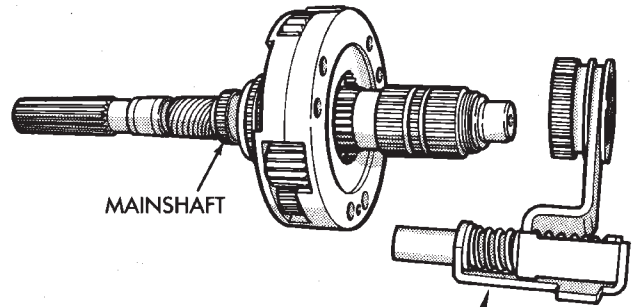


Fig. 78 Installing Mode Fork And Sleeve

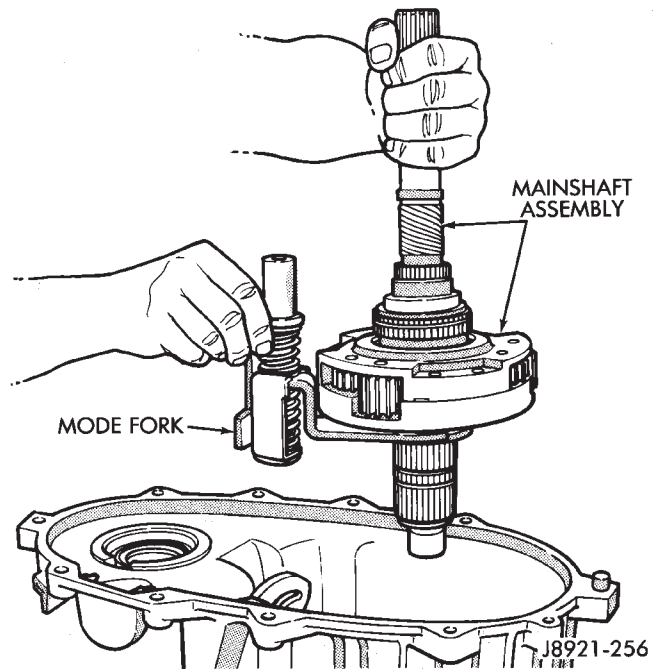


Fig. 79 Assembled Mainshaft And Mode Fork Installation

(22) Install plug in lockpin access hole.
 (23) Install detent plunger, detent spring and detent plug in case (Fig. 82).

DISASSEMBLY AND ASSEMBLY (Continued)

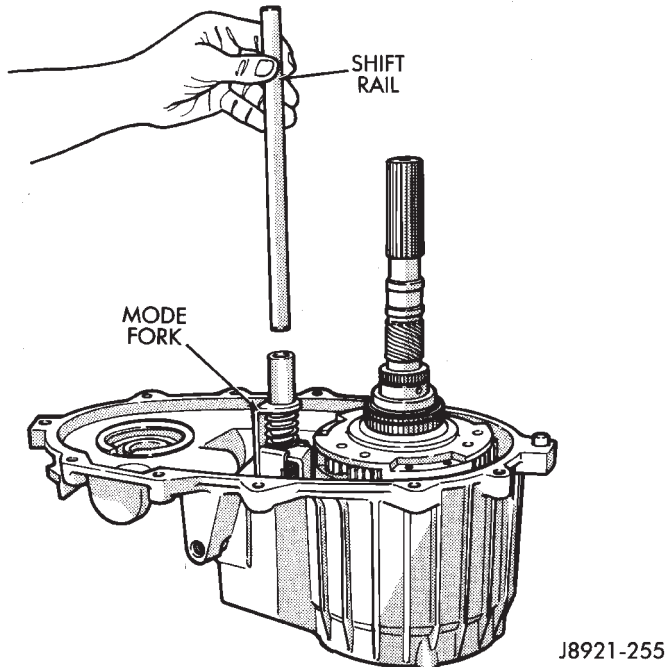


Fig. 80 Shift Rail Installation

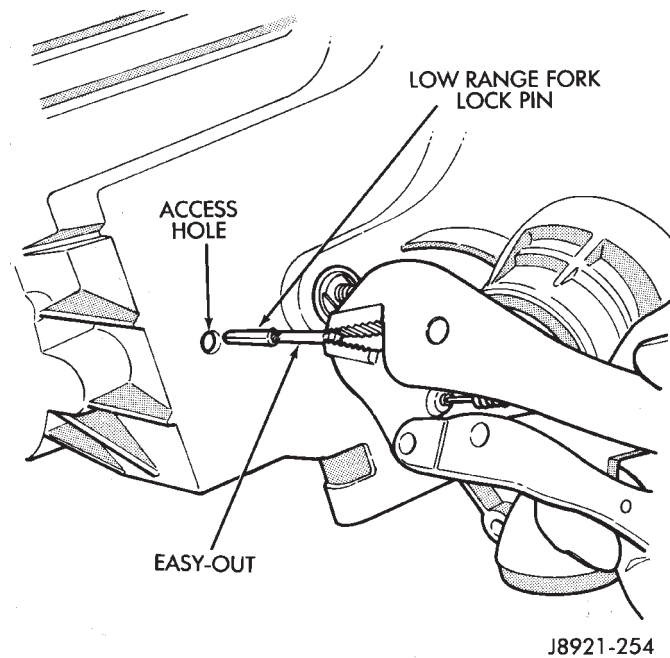


Fig. 81 Installing Low Range Fork Lockpin

FRONT OUTPUT SHAFT AND DRIVE CHAIN INSTALLATION

- (1) Install front output shaft (Fig. 83).
- (2) Install drive chain (Fig. 83). Engage chain with front output shaft sprocket teeth.
- (3) Install drive sprocket (Fig. 83). Engage drive sprocket teeth with chain. Then engage sprocket splines with mainshaft splines.
- (4) Install drive sprocket snap-ring (Fig. 84).

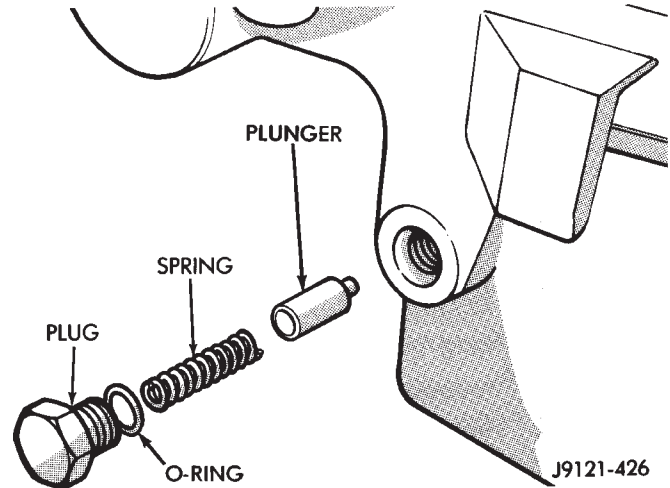


Fig. 82 Detent Pin, Spring And Plug Installation

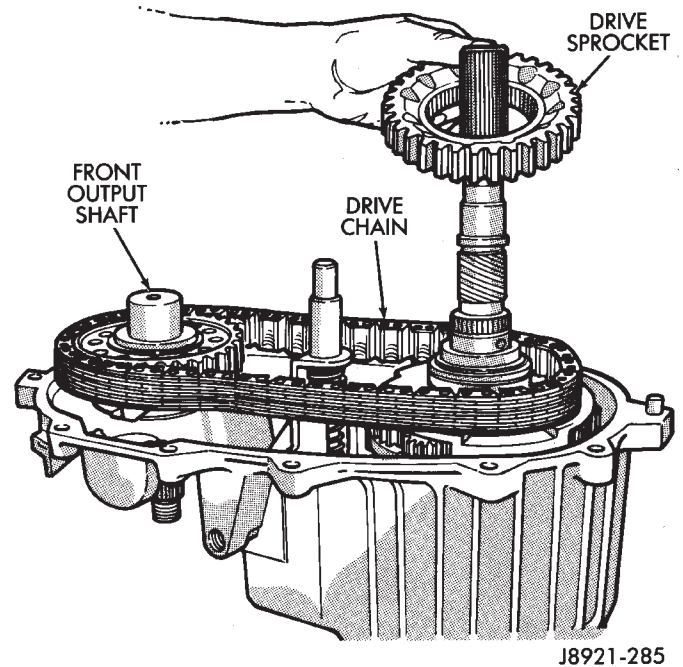


Fig. 83 Drive Chain And Sprocket Installation

OIL PUMP AND REAR CASE INSTALLATION

- (1) Insert oil pickup tube in oil pump and attach oil screen and connector hose to pickup tube. Then install assembled pump, tube and screen in rear case (Fig. 85). Be sure screen is seated in case slot as shown.
- (2) Install magnet in front case pocket (Fig. 86).
- (3) Apply 3 mm (1/8 in.) wide bead of Mopar gasket maker or silicone adhesive sealer to seal surface of front case.
- (4) Align and install rear case on front case. Be sure case locating dowels are in place and that mainshaft splines are engaged in oil pump inner gear.
- (5) Install and tighten front case-to-rear case bolts to 41 N-m (30 ft. lbs.) torque. **Be sure to install a**

DISASSEMBLY AND ASSEMBLY (Continued)

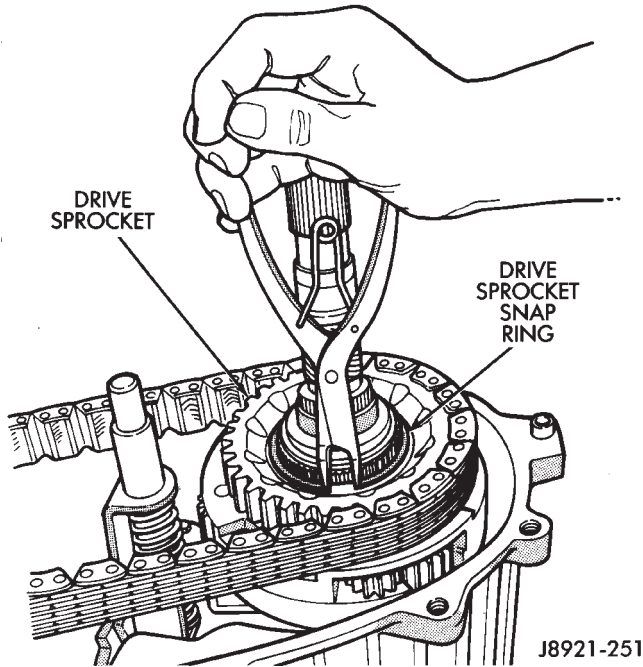


Fig. 84 Drive Sprocket Snap-Ring Installation

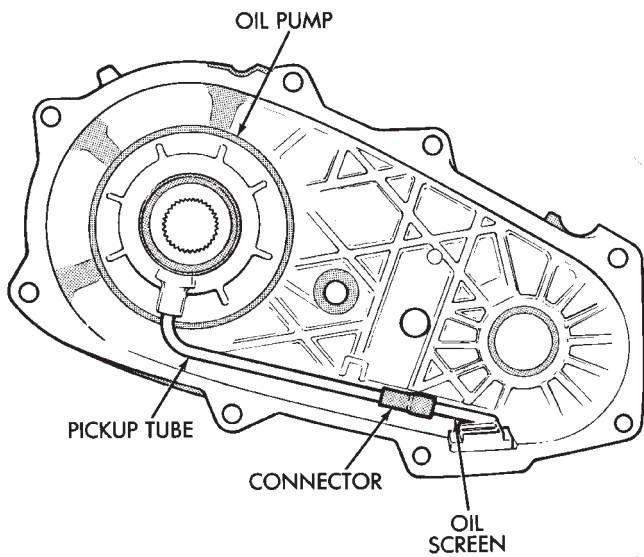


Fig. 85 Oil Screen And Pickup Tube Installation

washer under each bolt used at case dowel locations.

REAR RETAINER INSTALLATION

- (1) Remove rear bearing in retainer using Installer 8128 and Handle C-4171.
- (2) Install rear bearing in retainer with Tools C-4171 and 5064 (Fig. 87).
- (3) Install rear bearing O.D. retaining ring with snap-ring pliers (Fig. 88). Be sure retaining ring is fully seated in retainer groove.

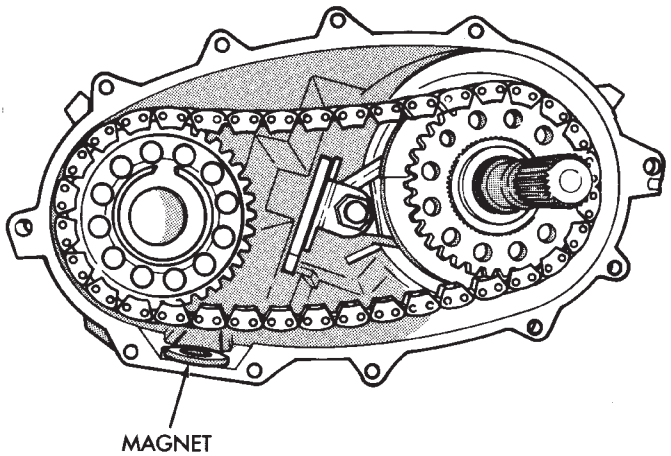


Fig. 86 Installing Case Magnet

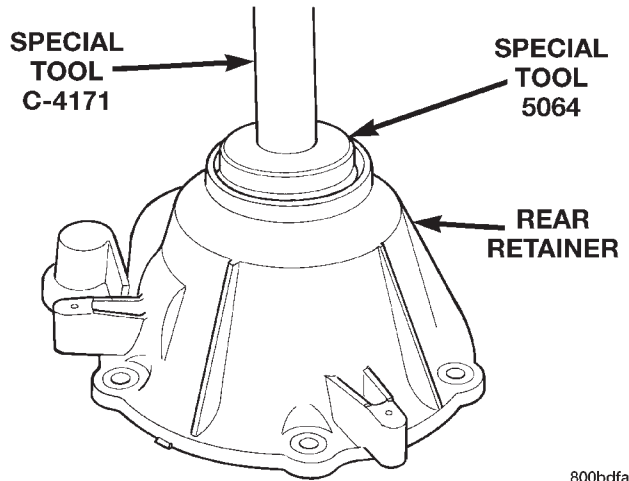


Fig. 87 Installing Rear Bearing In Retainer

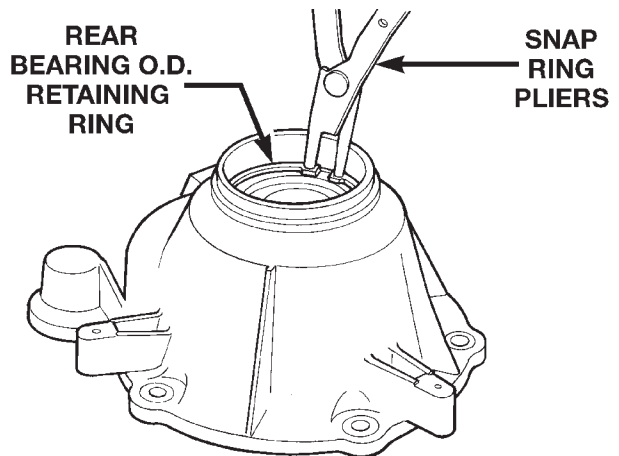


Fig. 88 Rear Bearing Retaining Ring Installation

- (4) Apply bead of Mopar® Sealer P/N 82300234, or Loctite™ Ultra Gray, to mating surface of rear

DISASSEMBLY AND ASSEMBLY (Continued)

retainer. Sealer bead should be a maximum of 3/16 in.

(5) Install rear retainer on rear case. Tighten retainer bolts to 20–27 N·m (15–20 ft. lbs.) torque.

(6) Install rear bearing I.D. retaining ring and spacer on output shaft.

(7) Apply liberal quantity of petroleum jelly to new rear seal and to output shaft. Petroleum jelly is needed to protect seal lips during installation.

(8) Slide seal onto Seal Protector 6992 (Fig. 89). Slide seal protector and seal onto output shaft.

(9) Slide Installer C-4076-B onto seal protector with the recessed side of the tool toward the seal. Drive seal into rear bearing retainer with installer C-4076-B and handle MD-998323 (Fig. 90).

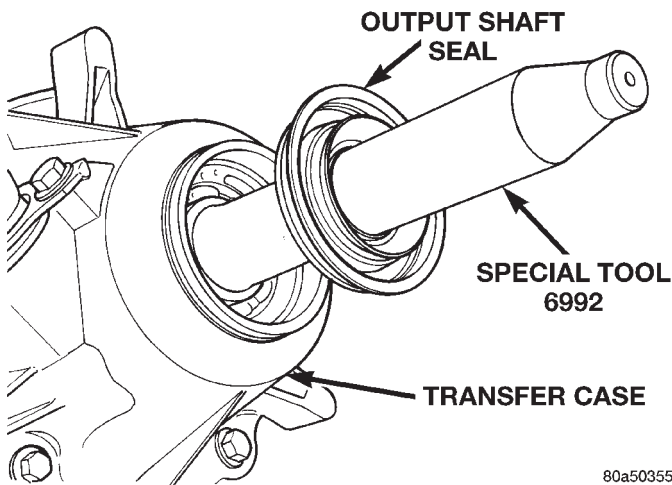


Fig. 89 Output Shaft Seal and Protector

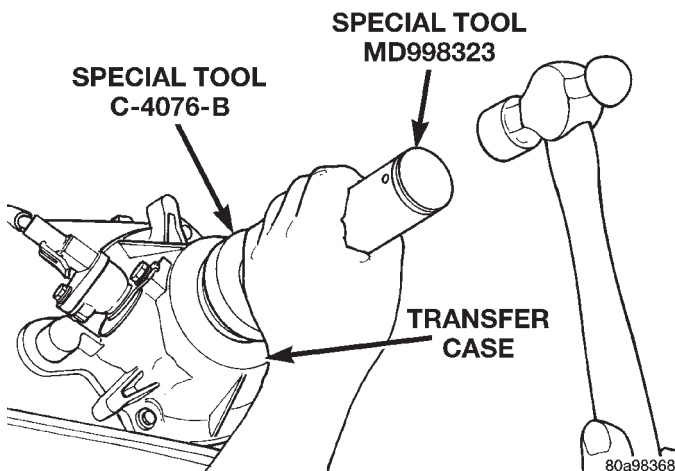


Fig. 90 Rear Seal Installation

(10) Install rear slinger with installer C-4076-A and handle MD-998323 (Fig. 90).

(11) Install boot on output shaft slinger and crimp retaining clamp with tool C-4975-A (Fig. 91).

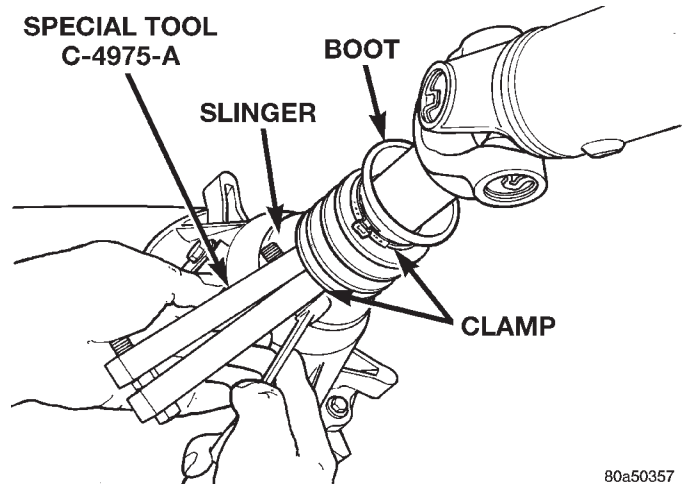


Fig. 91 Slinger Boot Installation

FRONT YOKE AND SWITCH INSTALLATION

(1) Install indicator switch in front case. Tighten switch to 20–34 N·m (15–25 ft. lbs.) torque.

(2) Lubricate yoke hub with transmission fluid and install yoke on front shaft.

(3) Install new seal washer on front shaft.

(4) Install yoke on front shaft. Secure yoke with new nut.

CLEANING AND INSPECTION

NV242 TRANSFER CASE

Clean the transfer case parts with a standard parts cleaning solvent. Remove all traces of sealer from the cases and retainers with a scraper and all purpose cleaner. Use compressed air to remove solvent residue from oil feed passages in the case halves, retainers, gears, and shafts.

The oil pickup screen can be cleaned with solvent. Shake excess solvent from the screen after cleaning and allow it to air dry. Do not use compressed air.

MAINSHAFT/SPROCKET/HUB INSPECTION

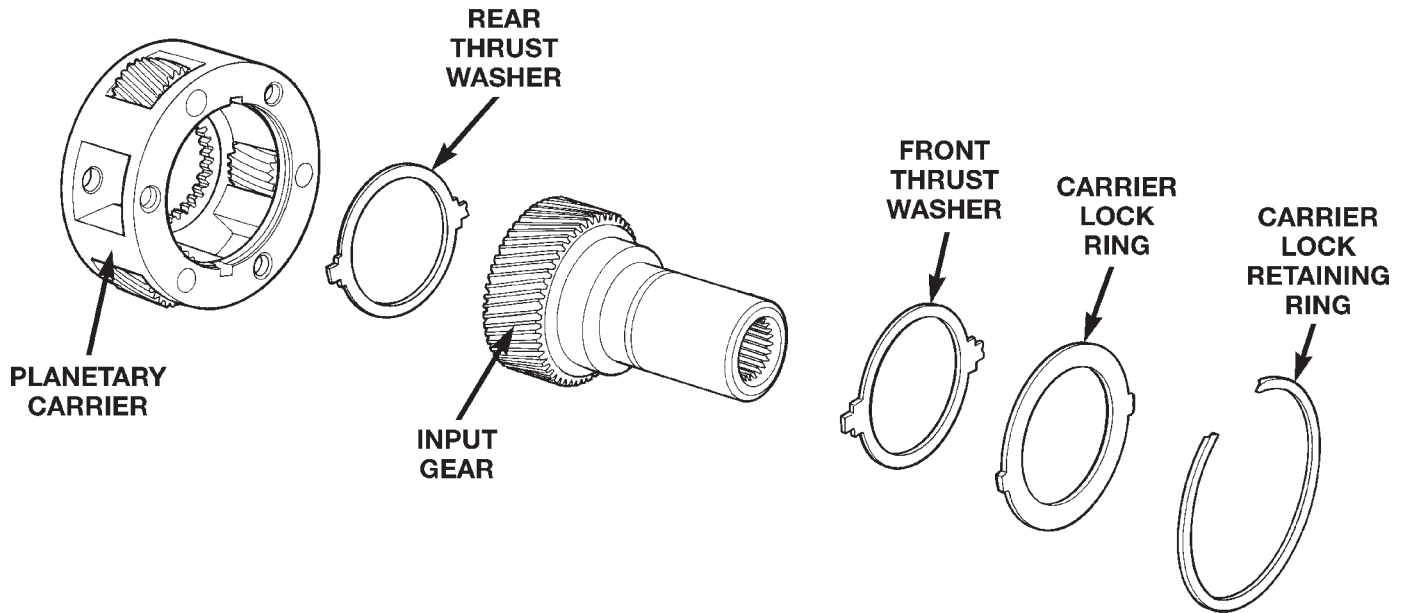
Inspect the splines on the hub and shaft and the teeth on the sprocket. Minor nicks and scratches can be smoothed with an oilstone. However, replace any part is damaged.

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. 92). Minor nicks can be dressed off with an oilstone but replace the gear if any teeth are broken, cracked, or chipped. The bearing surface on the gear can be smoothed with 300–400 grit emery cloth if necessary.

CLEANING AND INSPECTION (Continued)



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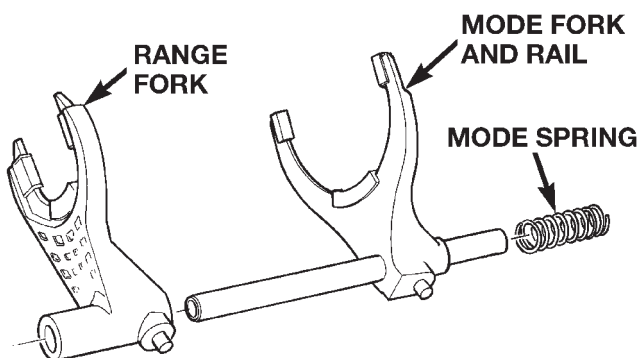
Fig. 92 Input Gear And Carrier Components

Examine the carrier body and pinion gears for wear or damage. The carrier will have to be replaced as an assembly if the body, pinion pins, or pinion gears are damaged.

Check the lock ring and both thrust washers for wear or cracks. Replace them if necessary. Also replace the lock retaining ring if bent, distorted, or broken.

SHIFT FORKS/HUBS/SLEEVES

Check condition of the shift forks and mode fork shift rail (Fig. 93). Minor nicks on the shift rail can be smoothed with 320–400 grit emery cloth.



80010948

Fig. 93 Shift forks

Inspect the shift fork wear pads. The mode fork pads are serviceable and can be replaced if necessary. The range fork pads are also serviceable.

Check both of the sleeves for wear or damage, especially on the interior teeth. Replace the sleeves if wear or damage is evident.

REAR RETAINER/BEARING/ SEAL/SLINGER/BOOT

Inspect the retainer components (Fig. 94). Replace the bearing if rough or noisy. Check the retainer for cracks or wear in the bearing bore. Clean the retainer sealing surfaces with a scraper and all purpose cleaner. This will ensure proper adhesion of the sealer during reassembly.

Replace the slinger and seal outright; do not reuse either part.

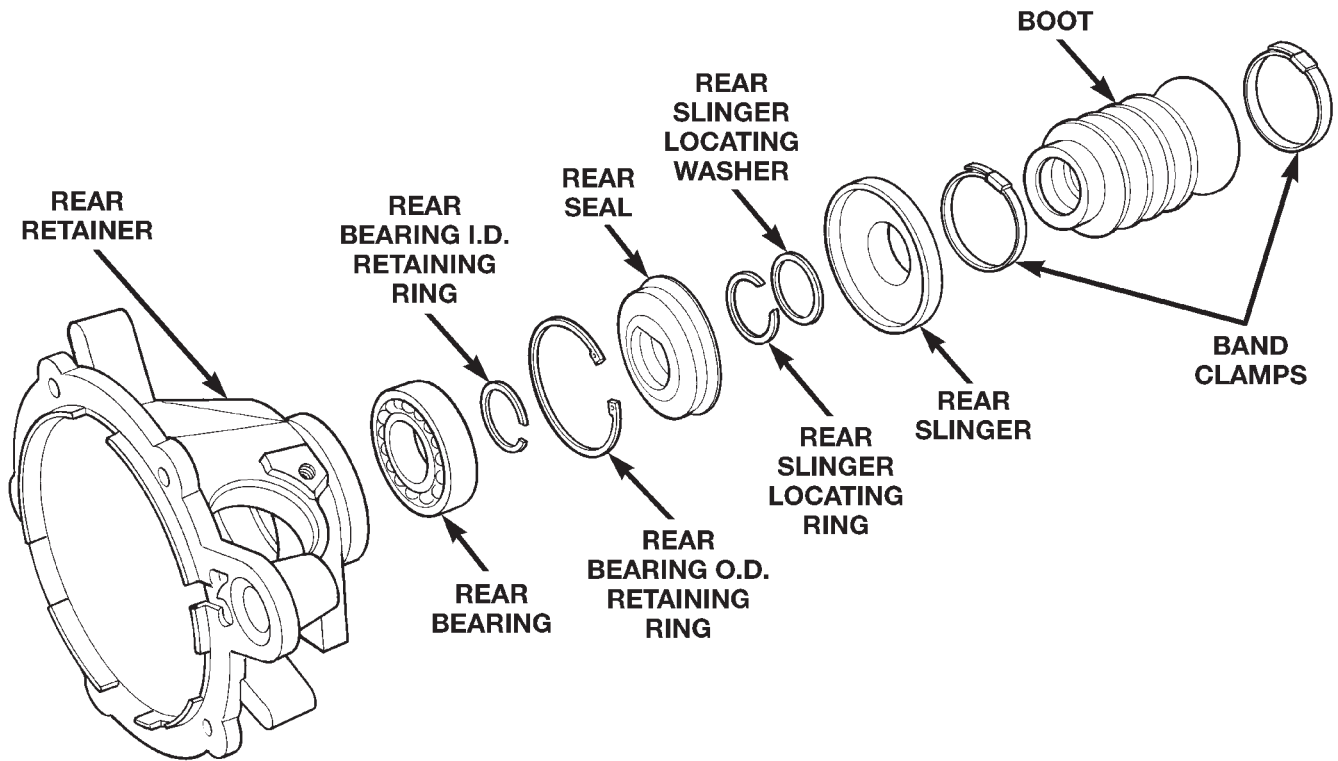
Inspect the retaining rings and washers. Replace any part if distorted, bent, or broken. Reuse is not recommended. Also replace the boot if cut or torn. Replace the boot band clamps, do not reuse them.

REAR OUTPUT SHAFT/YOKE/DRIVE CHAIN

Check condition of the seal contact surfaces of the yoke slinger (Fig. 95). This surface must be clean and smooth to ensure proper seal life. Replace the yoke nut and seal washer as neither part should be reused.

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 dam-

CLEANING AND INSPECTION (Continued)



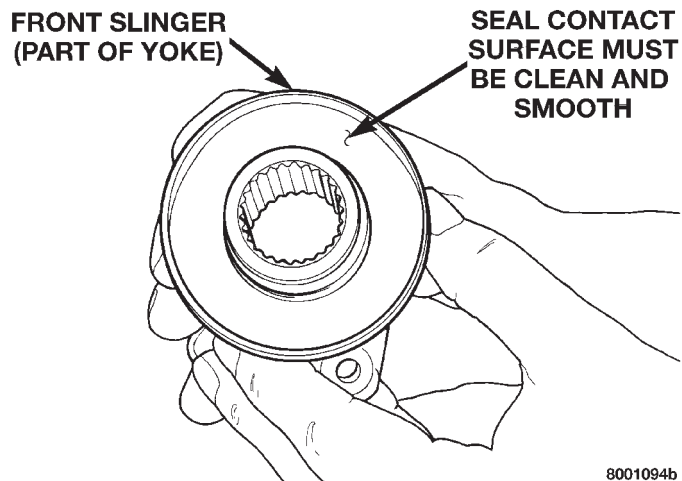
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Fig. 94 Rear Retainer Components

aged, 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.

is damaged, it will be necessary to replace the gear and front case as an assembly. Do not attempt to remove the gear (Fig. 96).

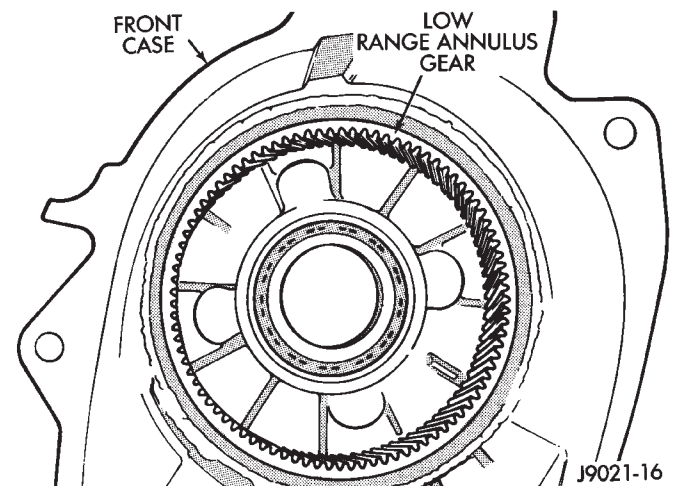


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Fig. 95 Seal Contact Surface Of Yoke Slinger

LOW RANGE ANNULUS GEAR

Inspect annulus gear condition carefully. The gear is only serviced as part of the front case. If the gear



J9021-16

Fig. 96 Low Range Annulus Gear

FRONT-REAR CASES AND FRONT RETAINER

Inspect the cases and retainer for wear and damage. Clean the sealing surfaces with a scraper and all purpose cleaner. This will ensure proper sealer adhesion at assembly. Replace the input retainer seal; do not reuse it.

CLEANING AND INSPECTION (Continued)

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.

ADJUSTMENTS

SHIFT LINKAGE ADJUSTMENT

- (1) Shift transfer case into 4L position.
- (2) Raise vehicle.
- (3) Loosen lock bolt on adjusting trunnion (Fig. 97).
- (4) Be sure linkage rod slides freely in trunnion. Clean rod and apply spray lube if necessary.
- (5) Verify that transfer case range lever is fully engaged in 4L position.
- (6) Tighten adjusting trunnion lock bolt.
- (7) Lower vehicle.

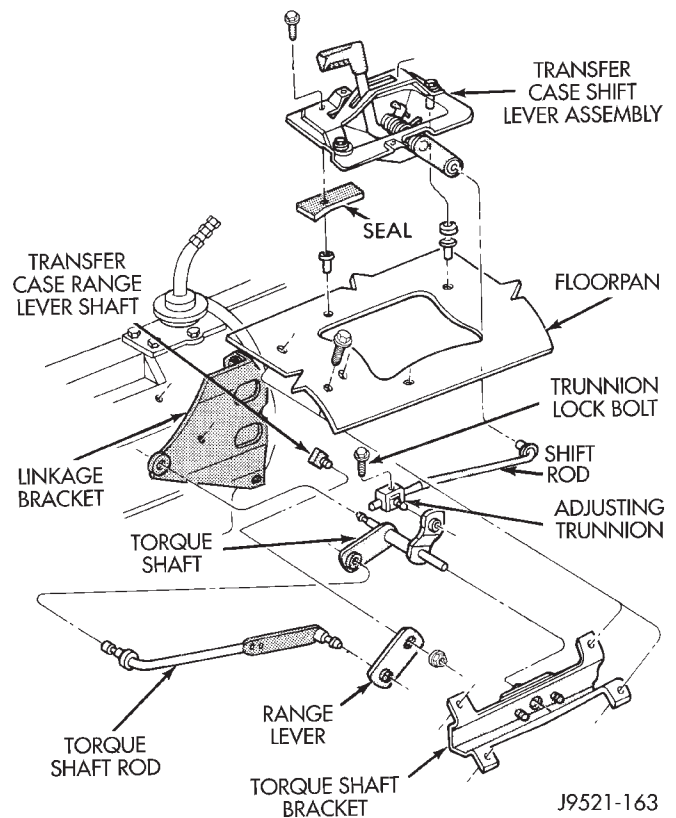


Fig. 97 Shift Linkage

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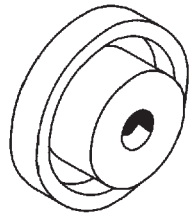
SPECIFICATIONS

TORQUE

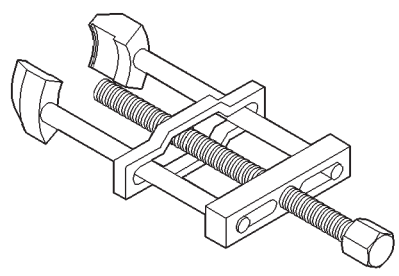
DESCRIPTION	TORQUE
Plug, Detent	16–24 N·m (12–18 ft. lbs.)
Bolt, Diff. Case	17–27 N·m (15–24 ft. lbs.)
Plug, Drain/Fill	20–25 N·m (15–25 ft. lbs.)
Bolt, Front Brg. Retainer	16–27 N·m (12–20 ft. lbs.)
Bolt, Case Half	35–46 N·m (26–34 ft. lbs.)
Nut, Front Yoke	122–176 N·m (90–130 ft. lbs.)
Screw, Oil Pump	1.2–1.8 N·m (12–15 in. lbs.)
Nut, Range Lever	27–34 N·m (20–25 ft. lbs.)
Bolt, Rear Retainer	35–46 N·m (26–34 ft. lbs.)
Nuts, Mounting	35 N·m (26 ft. lbs.)
Bolts, U-Joint	19 N·m (17 ft. lbs.)

SPECIAL TOOLS

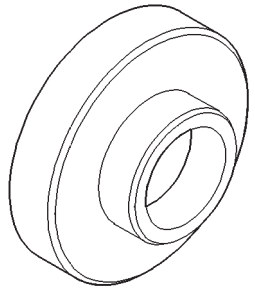
NV242



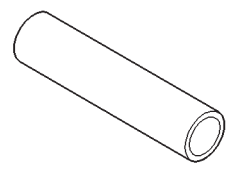
Remover—C-4210



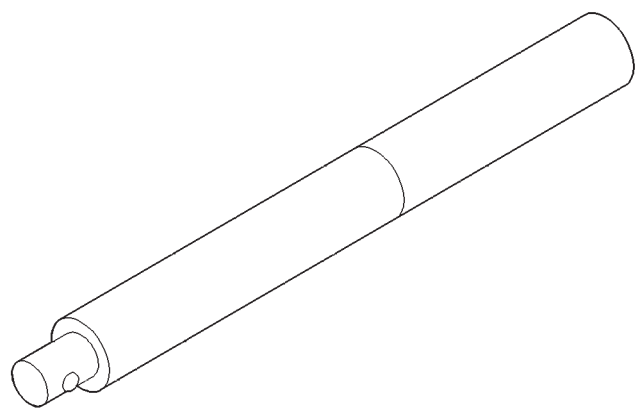
Puller, Slinger—MD-998056-A



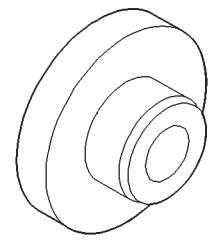
Installer—C-4076-B



Installer—MD-998323

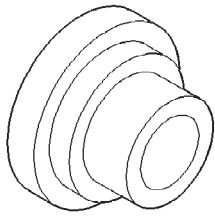


Handle, Universal—C-4171

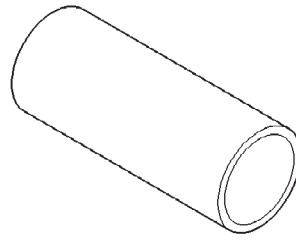


Installer, Bearing—5064

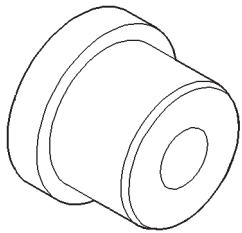
SPECIAL TOOLS (Continued)



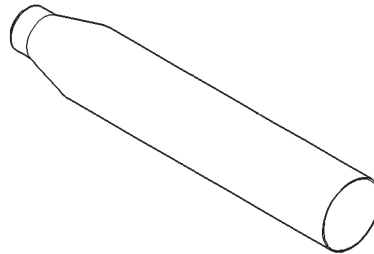
Installer—8128



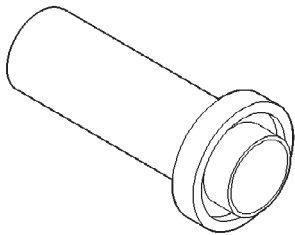
Cup—8148



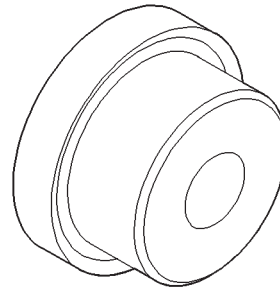
Installer—5066



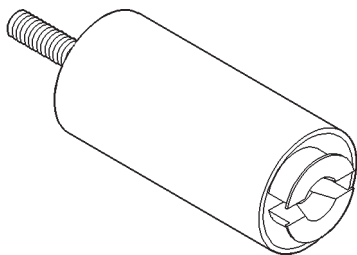
Seal Protector—6992



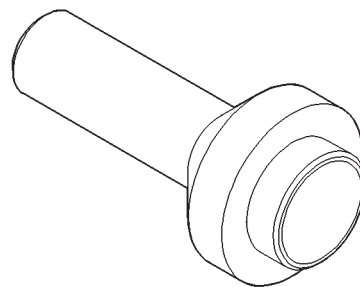
Installer—6952-A



Installer, Input Gear Bearing—7829-A

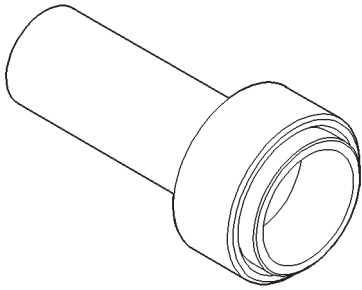


Remover—L-4454

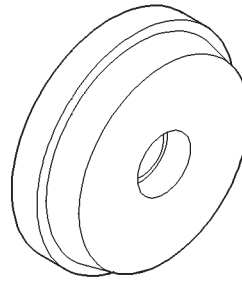


Installer, Seal—7884

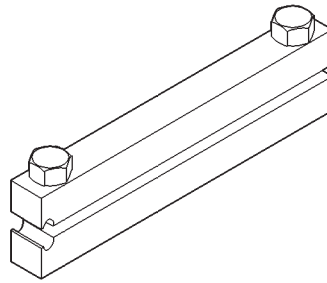
SPECIAL TOOLS (Continued)



Installer, Pump Housing Seal—7888



Installer, Bearing—8033-A



Installer, Boot Clamp—C-4975-A