

TRANSMISSION AND TRANSFER CASE

CONTENTS

	page		page
AX 15 MANUAL TRANSMISSION	1	NP242 TRANSFER CASE	292
AW-4 AUTOMATIC TRANSMISSION	34	NP249 TRANSFER CASE	319
46RH AUTOMATIC TRANSMISSION	151	SPECIFICATIONS	345
NP231 TRANSFER CASE	271		

AX 15 MANUAL TRANSMISSION

INDEX

	page		page
General Information	1	Transmission Installation	4
Transmission Assembly and Adjustment	19	Transmission Lubricant	2
Transmission Diagnosis	2	Transmission Removal	3
Transmission Disassembly and Overhaul	5	Transmission Shift Pattern	2
Transmission Gear Ratios	2	Transmission Switch and Plug Locations	2
Transmission Identification	1		

GENERAL INFORMATION

The AX 15 is a five speed, synchromesh, manual transmission. Fifth gear is an overdrive range with a ratio of 0.79:1. The shift mechanism is integral and mounted in the shift tower portion of the adapter housing (Fig. 1).

TRANSMISSION IDENTIFICATION

The AX 15 identification code numbers are on the bottom surface of the transmission gear case (Fig. 2).

The first number represents year of manufacture. For example, 3 would represent 1993. The second and third numbers indicate month of manufacture.

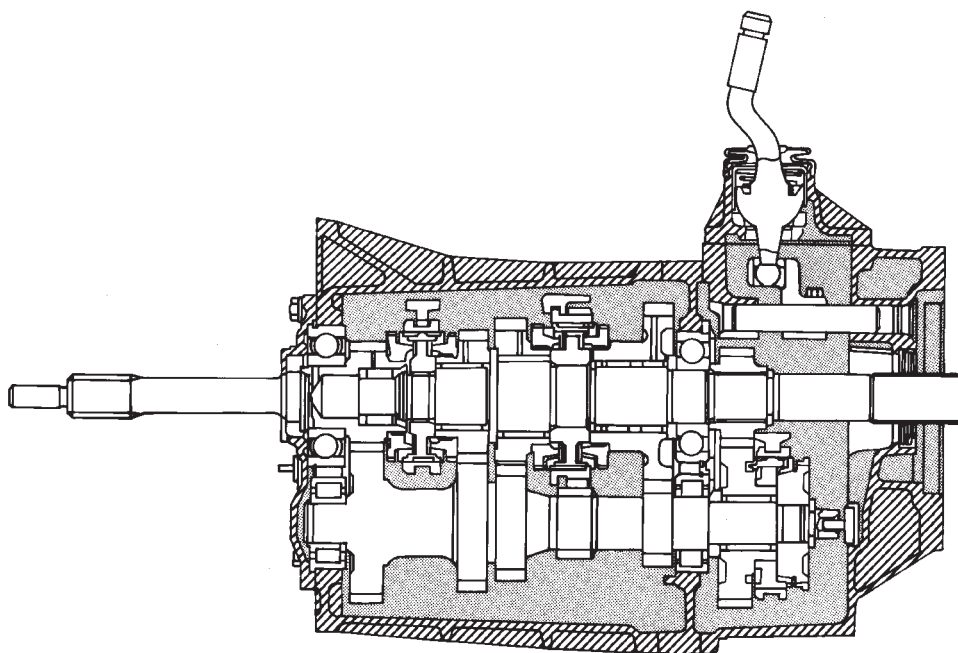


Fig. 1 AX 15 Manual Transmission

J8921-1023

For example, 11 would represent November. The last series of numbers is the transmission serial number.

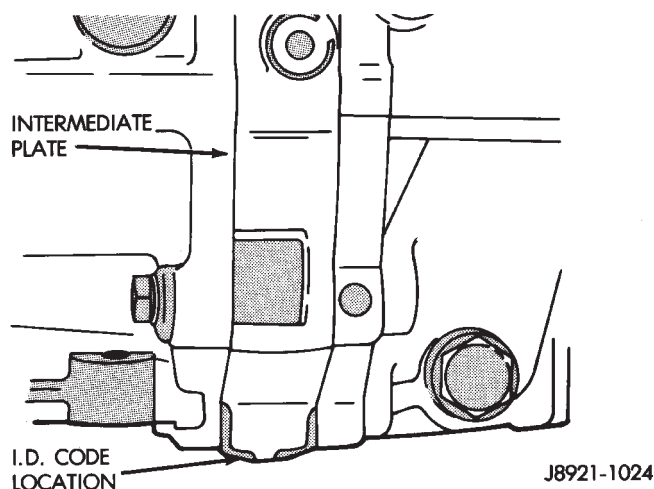


Fig. 2 Transmission Identification Code Location

TRANSMISSION SHIFT PATTERN

The AX 15 shift pattern is shown in Figure 3. First and second and third and fourth gear ranges are in an H pattern. Fifth and reverse gear ranges are also in line at the right of the H pattern (Fig. 3).

The AX 15 is equipped with a reverse lockout mechanism. The shift lever must be moved through the Neutral detent before making a shift to reverse.

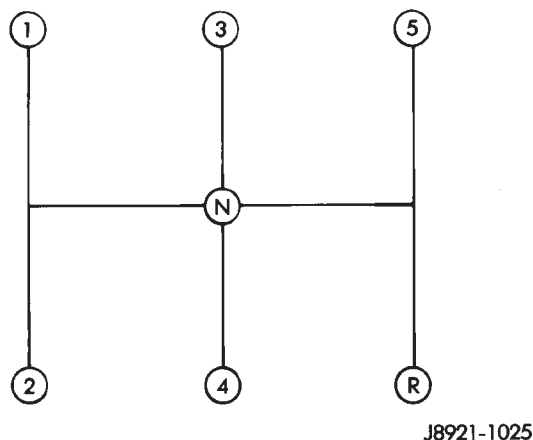


Fig. 3 AX 15 Shift Pattern

TRANSMISSION LUBRICANT

Recommended lubricant for AX 15 transmissions is Mopar SAE 75W-90, API Grade GL-5 gear lubricant.

Correct lubricant refill or top-off level is to the bottom edge of the fill plug hole.

Lubricant capacity is approximately 3.10 liters (3.27 qts.).

TRANSMISSION SWITCH AND PLUG LOCATIONS

The fill plug is at the driver side of the gear case (Fig. 4).

The drain plug and backup light switch are on the passenger side of the gear case (Fig. 5).

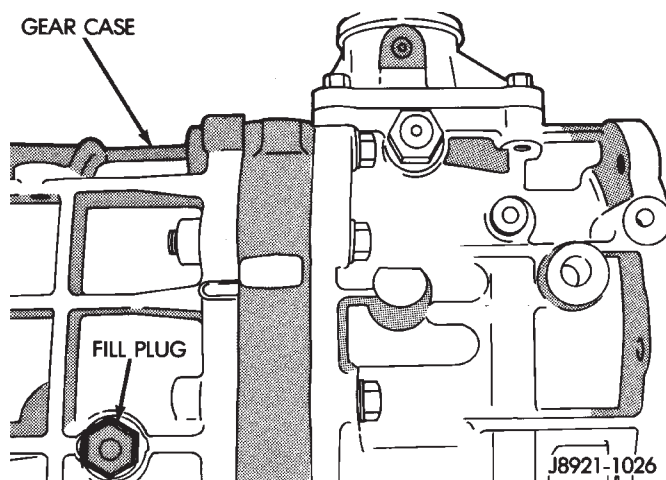


Fig. 4 Fill Plug Location

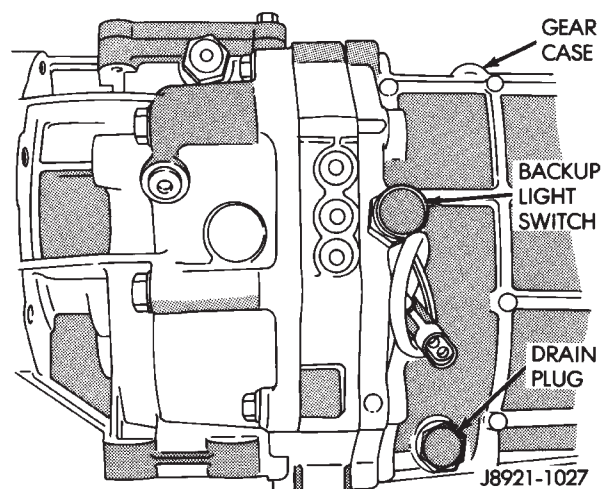


Fig. 5 Drain Plug And Backup Light Switch Location

TRANSMISSION GEAR RATIOS

AX 15 transmission gear ratios are:

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

TRANSMISSION DIAGNOSIS

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 adapter 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 adapter housing will be from the housing oil seals. Leaks at component mat-

ing 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 are from 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 slip, grab and chatter.

Transmissions filled from air or electrically powered lubricant containers can be underfilled. This generally happens when the container delivery mechanism is improperly calibrated. Always check the lubricant level after filling to avoid an under fill condition.

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

HARD SHIFTING

Hard shifting is usually the result of a low lubricant level, improper or contaminated lubricants, component damage, incorrect clutch adjustment, or by a damaged clutch pressure plate or disc.

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 a problem are hard shifting and noise.

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

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

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

TRANSMISSION NOISE

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

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

TRANSMISSION REMOVAL

- (1) Shift transmission into Neutral.
- (2) Raise vehicle on hoist.
- (3) Remove skid plate.
- (4) Mark front and rear propeller shafts for installation alignment (Fig. 1). Then remove shafts.

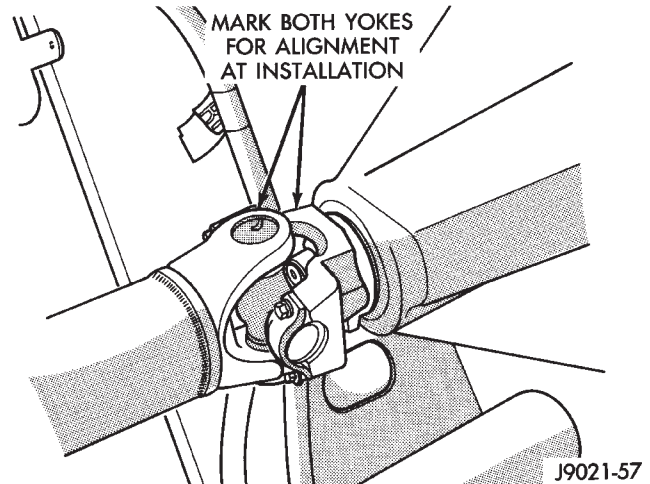


Fig. 1 Marking Propeller Shaft And Axle Yoke

- (5) Disconnect transfer case shift linkage from shift lever, or range lever.
- (6) Disconnect wire harness from distance sensor.
- (7) Remove harness wires from clips on transmission case.
- (8) Disconnect transmission and transfer case vent hoses.
- (9) Disconnect wires at transfer case electrical switch.
- (10) Support transmission with transmission jack. Secure transmission on jack with safety chains.
- (11) Support engine with jack positioned under clutch housing or oil pan flange.
- (12) Remove bolts/nuts attaching rear mount to crossmember (Fig. 2).
- (13) Remove rear crossmember.
- (14) Remove transfer case attaching nuts and remove transfer case from transmission.
- (15) Lower transmission enough to provide access to shift lever.
- (16) Reach up and around transmission case and unseat shift lever dust boot from transmission shift tower (Fig. 3). Move boot upward on shift lever for access to lever retainer.
- (17) Disengage transmission shift lever as follows:
 - (a) Reach up and around transmission case and press shift lever retainer downward with your fingers.
 - (b) Turn retainer counterclockwise to release it.
 - (c) Lift lever and retainer out of shift tower (Fig. 3). **It is not necessary to remove shift lever from floorpan boot. Simply leave lever in place for later installation.**

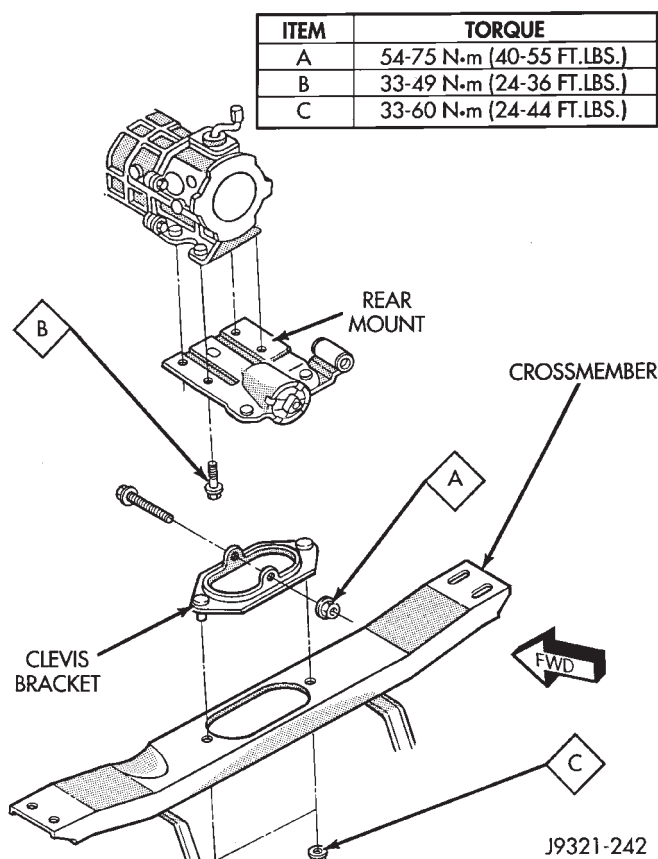


Fig. 2 Transmission Rear Mounting

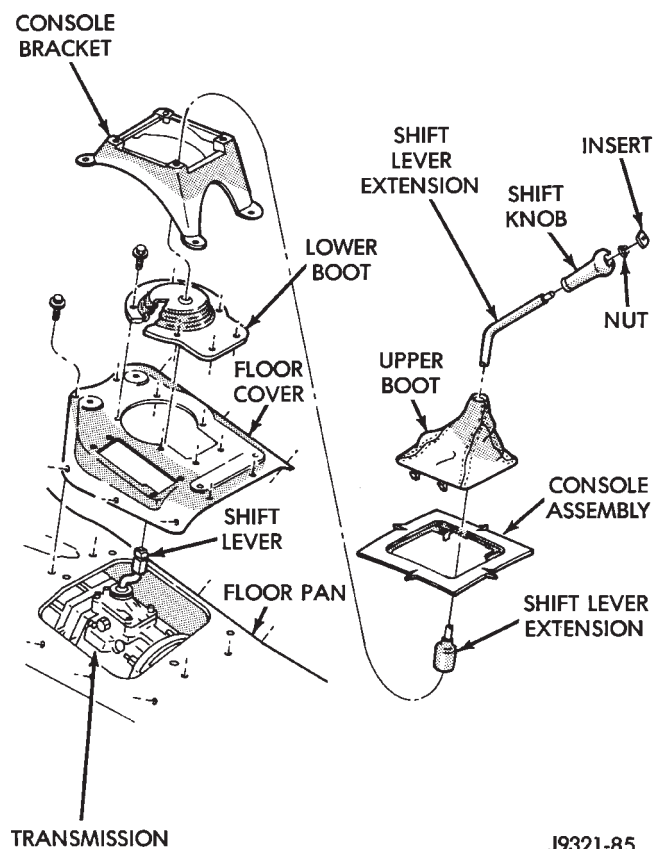


Fig. 3 Shift Lever Attachment

(18) Disconnect and remove engine timing sensor. Retain sensor attaching screws.

(19) Remove clutch slave cylinder from clutch housing. Move cylinder aside for working clearance and access to other components.

(20) Remove bolts attaching clutch housing to engine.

(21) Pull transmission rearward until clutch housing is clear of engine. Then remove transmission from under vehicle.

TRANSMISSION INSTALLATION

(1) Mount transmission and clutch housing assembly on transmission jack. Secure assembly with safety chains.

(2) Lubricate pilot bearing and transmission input shaft splines with Mopar high temperature grease.

(3) Align transmission input shaft and clutch disc splines and seat clutch housing on engine.

(4) Install and tighten bolts that clutch housing to engine. Tighten bolts to 61 N·m (45 ft. lbs.) torque.

(5) Lower transmission for access to transmission shift tower.

(6) 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.

(7) Align transfer case and transmission shafts and install transfer case. Tighten transfer attaching nuts to 35 N·m (26 ft. lbs.) torque.

(8) Move adjustable support stand from under engine and reposition it under transmission. Then remove transmission jack.

(9) Install rear crossmember. Tighten crossmember-to-frame bolts to 41 N·m (30 ft. lbs.) torque. Tighten transmission-to-rear support bolts/nuts to 45 N·m (33 ft. lbs.) torque.

(10) Install slave cylinder in clutch housing. Tighten cylinder attaching nuts securely.

(11) Connect or install engine timing sensor, if removed.

(12) Connect transfer case electrical switch wires.

(13) Connect transfer case shift rod to range lever.

(14) Connect transmission and transfer case vent hoses.

(15) Connect backup light switch wires.

(16) Connect distance sensor and sensor wires.

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

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

(19) Top off transmission and transfer lubricant levels.

(20) Lower vehicle.

TRANSMISSION DISASSEMBLY AND OVERHAUL

ADAPTER HOUSING REMOVAL

(1) Remove release bearing, release lever and release fork from clutch housing. Then remove clutch housing from transmission.

(2) Remove backup light switch. Then remove drain plug (Fig. 1) and drain transmission lubricant into pan.

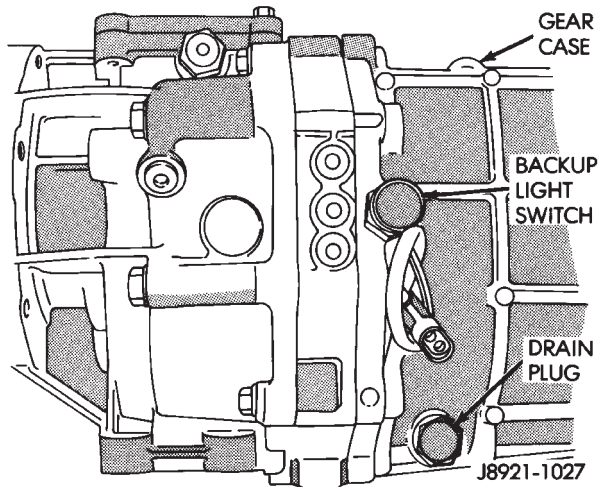


Fig. 1 Drain Plug And Backup Light Switch Location

(3) Remove shift tower bolts and remove tower from adapter or extension housing (Fig. 2).

(4) Remove gasket from shift tower (Fig. 3).

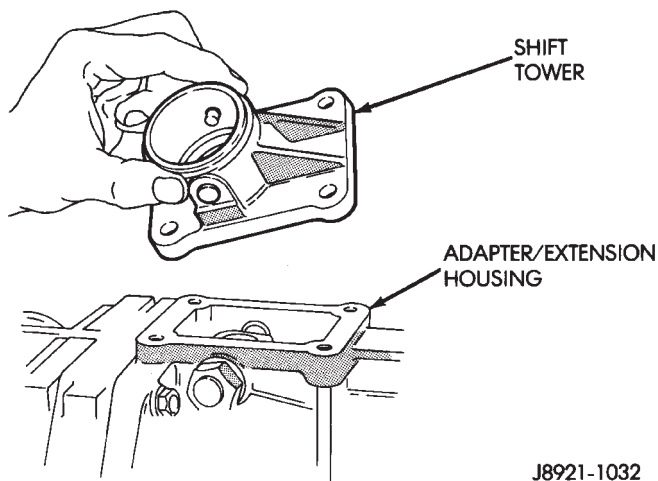


Fig. 2 Shift Tower Removal/Installation

- (5) Remove shift arm retainer bolt (Fig. 4).
- (6) Loosen and remove restrictor pins (Fig. 5).
- (7) Remove shift arm shaft plug (Fig. 6).
- (8) Remove shift arm shaft with large magnet (Fig. 7).
- (9) Remove shift arm (Fig. 8).
- (10) Remove plug for reverse shift head lock ball. Plug is at right side of adapter housing near backup light switch (Fig. 9).

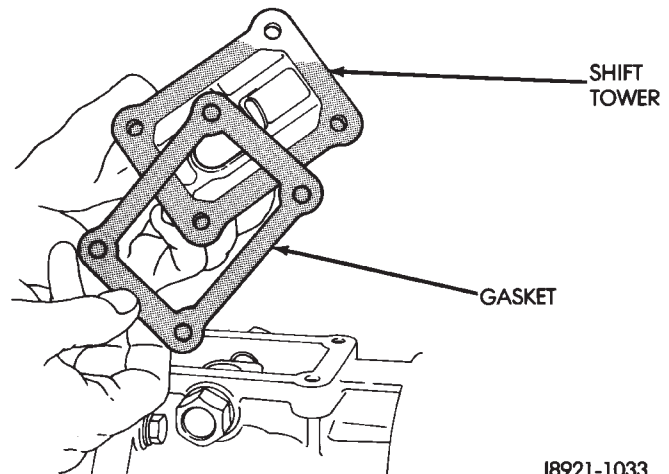


Fig. 3 Shift Tower Gasket Removal/Installation

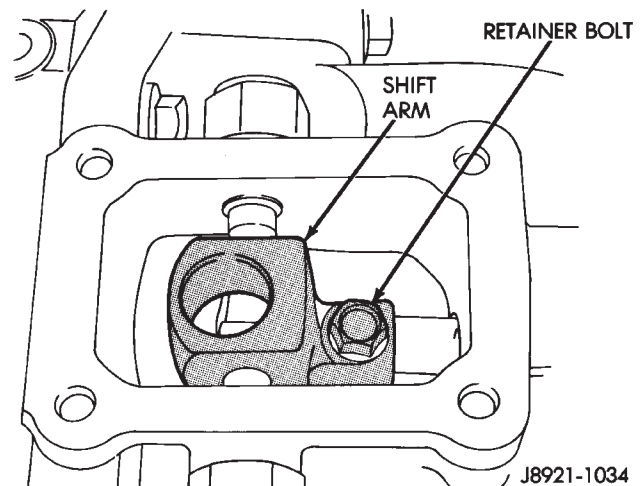


Fig. 4 Shift Arm Retainer Bolt Removal/Installation

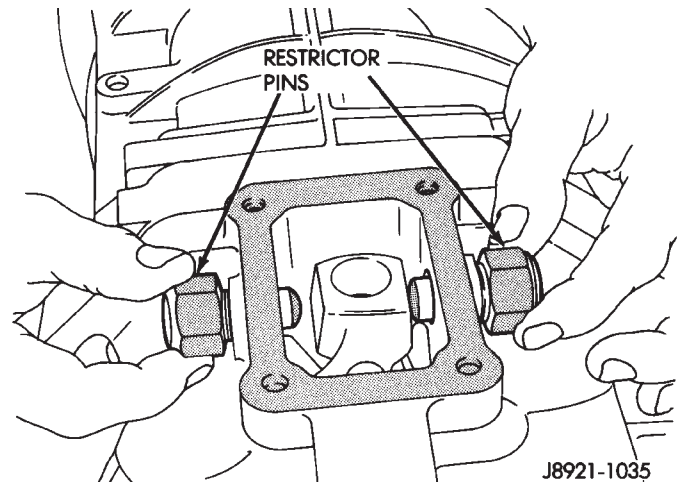


Fig. 5 Removing/Installing Restrictor Pins

- (11) Remove lock ball spring with pencil magnet (Fig. 10).

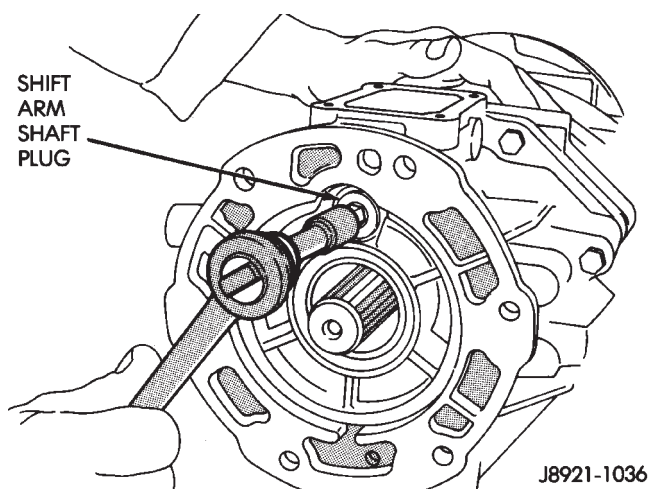


Fig. 6 Removing/Installing Shift Lever Shaft Plug

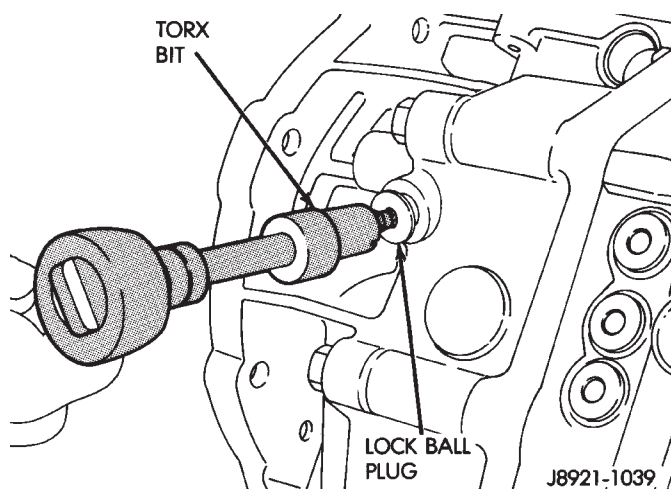


Fig. 9 Removing/Installing Lock Ball Plug

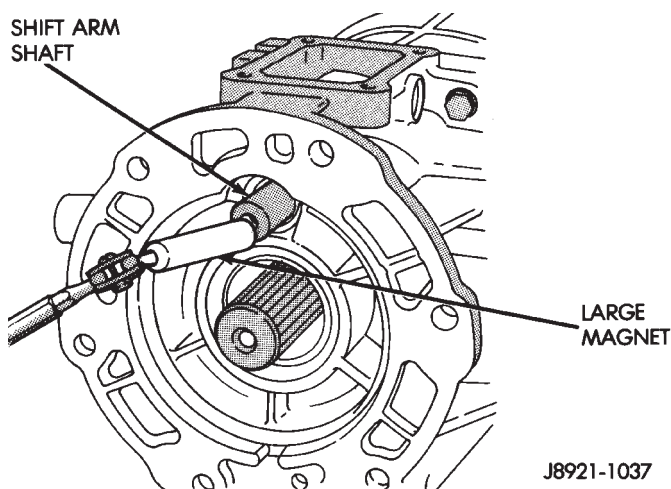


Fig. 7 Removing/Installing Shift Lever Shaft

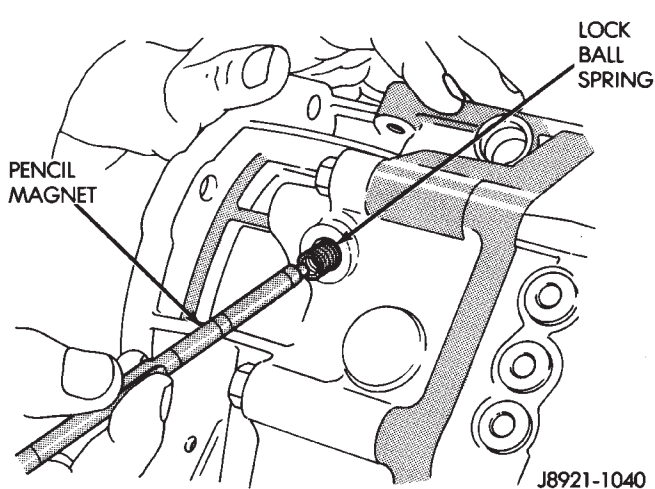


Fig. 10 Removing/Installing Lock Ball Spring

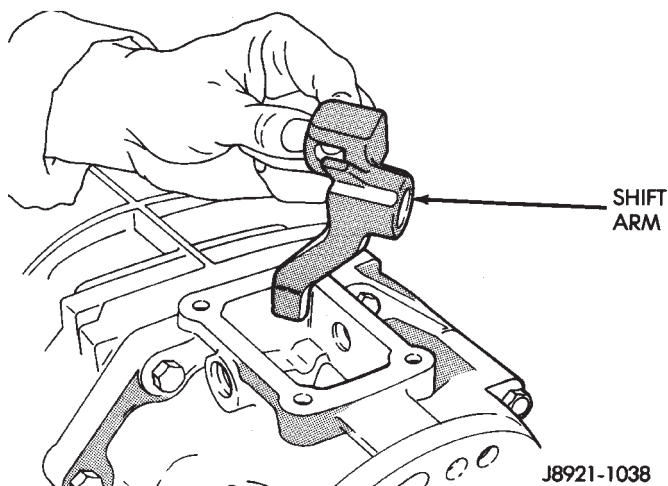


Fig. 8 Shift Arm Removal/Installation

- (12) Remove shift head lock ball with pencil magnet (Fig. 11).
- (13) Remove adapter housing bolts (Fig. 12).
- (14) Loosen adapter/extension housing with rubber mallet (Fig. 13).

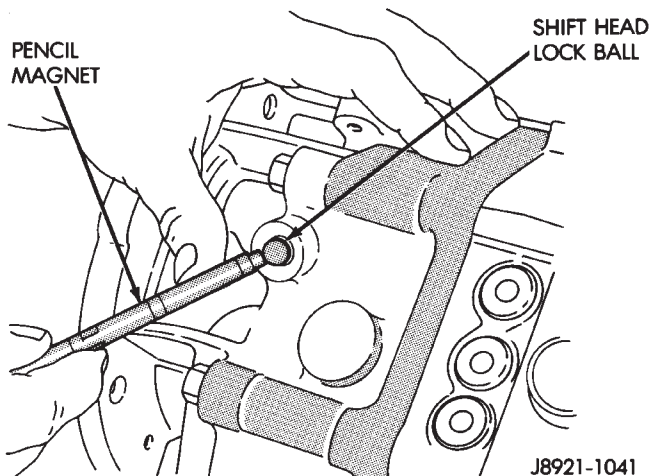


Fig. 11 Removing/Installing Shift Head Lock Ball

- (15) Remove housing after loosening it (Fig. 14)
- (16) Remove adapter housing oil seal with a pry tool (Fig. 15).

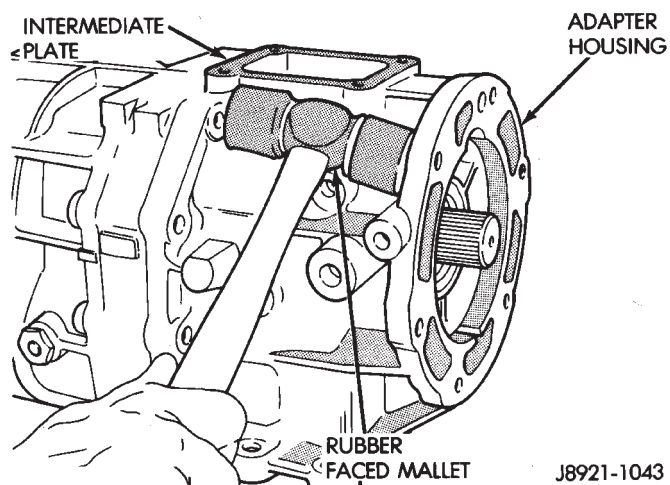


Fig. 13 Loosening Adapter Housing

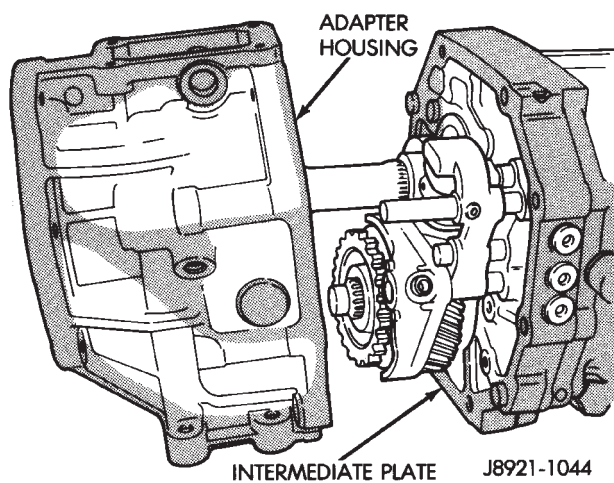
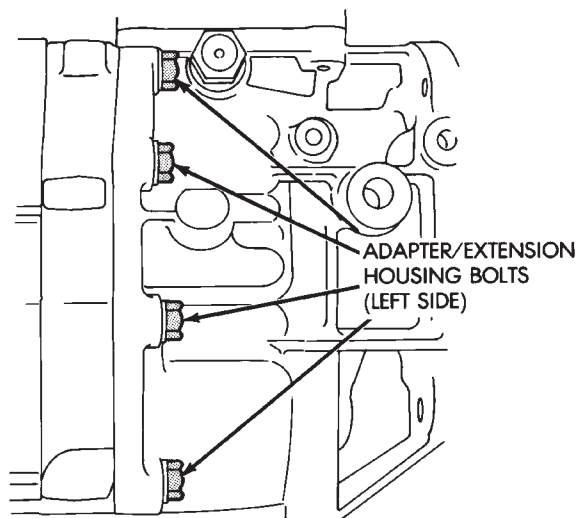


Fig. 14 Adapter Housing Removal

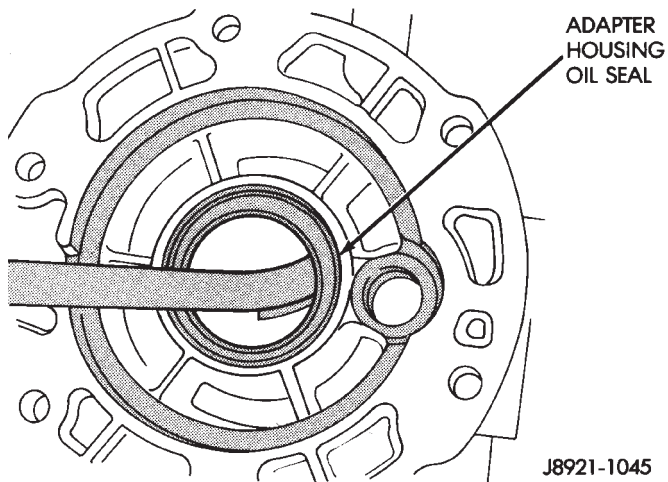
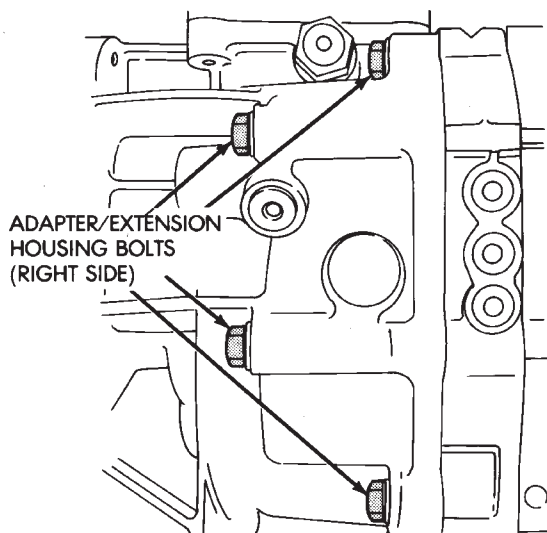


Fig. 15 Removing Adapter Housing Seal

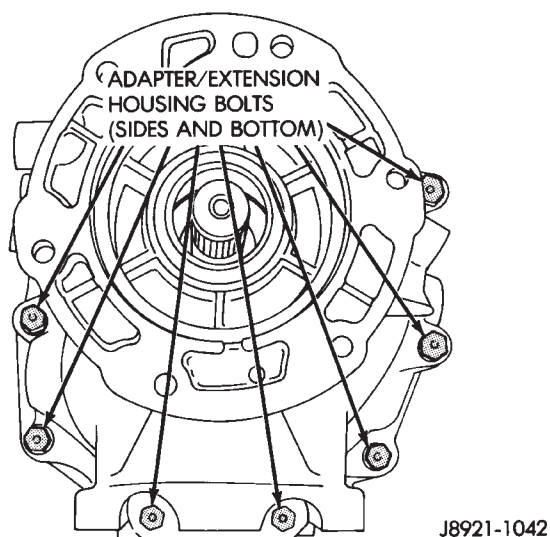
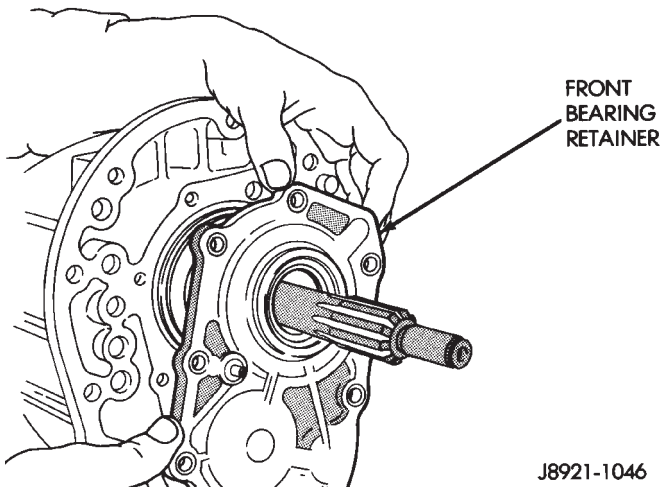
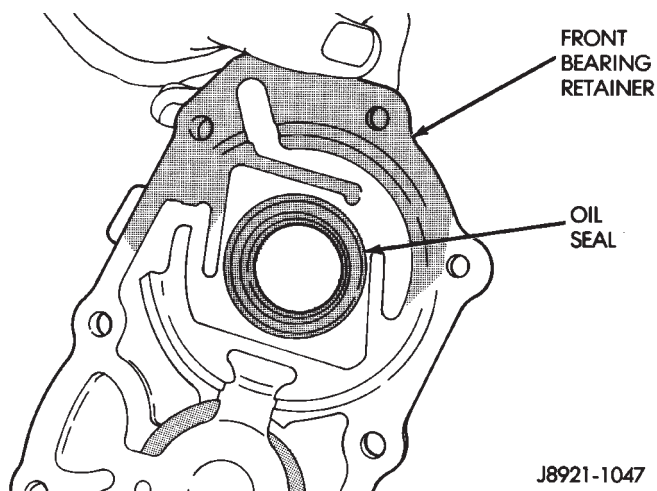


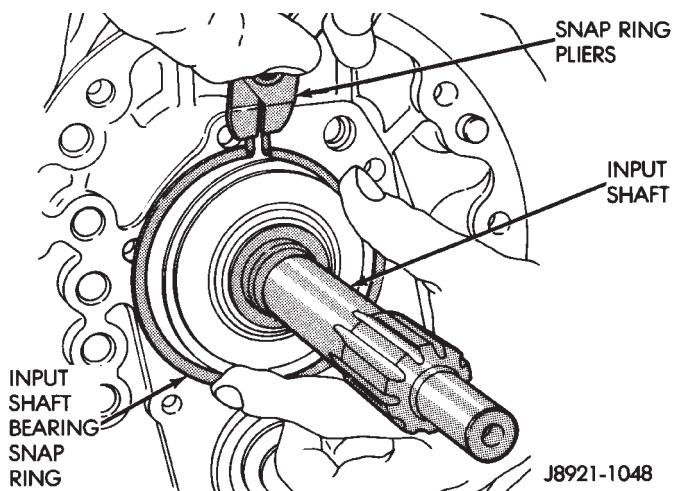
Fig. 12 Adapter Housing Bolt Locations

GEAR CASE REMOVAL

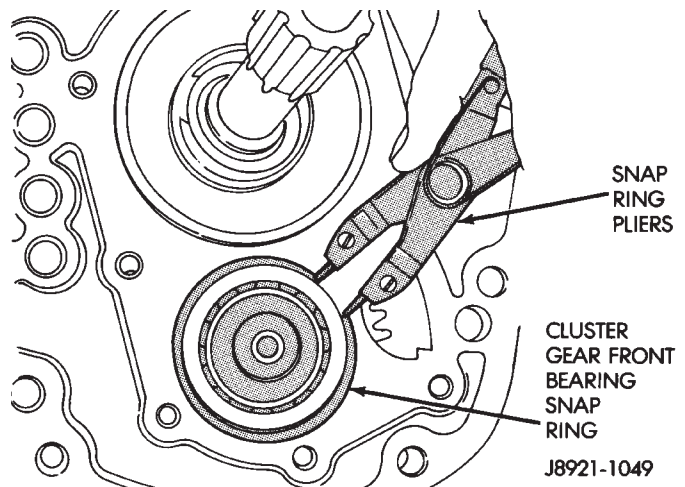
- (1) Remove bearing retainer bolts and remove retainer (Fig. 16).
- (2) Remove retainer oil seal with pry tool (Fig. 17).

**Fig. 16 Front Bearing Retainer Removal****Fig. 17 Front Bearing Retainer Seal Location**

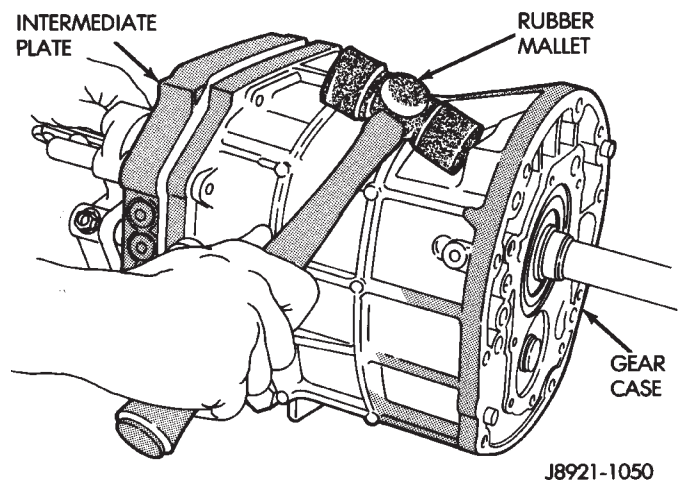
- (3) Remove input shaft bearing snap ring (Fig. 18).

**Fig. 18 Removing Input Shaft Bearing Snap Ring**

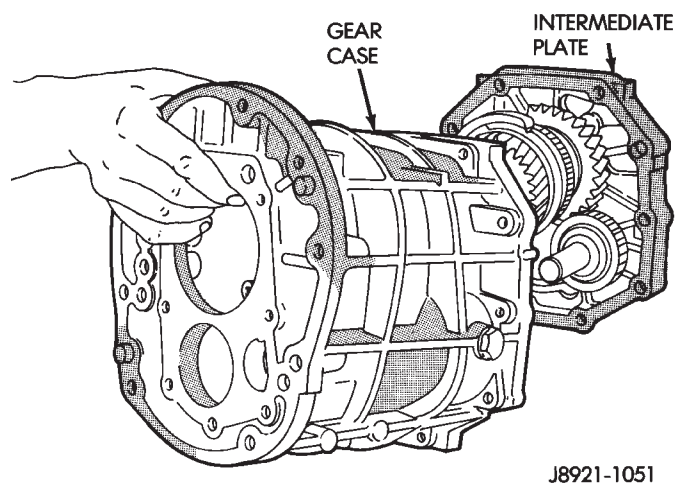
- (4) Remove cluster gear front bearing snap ring (Fig. 19).

**Fig. 19 Removing Cluster Gear Front Bearing Snap Ring**

- (5) Loosen gear case by tapping it away from intermediate plate with rubber mallet (Fig. 20).

**Fig. 20 Loosening Gear Case**

- (6) Remove gear case from geartrain and intermediate plate (Fig. 21).

**Fig. 21 Gear Case Removal**

(7) Remove speedometer gear snap ring and remove speedometer gear and spacer from output shaft.

FIFTH GEAR AND SYNCHRO ASSEMBLY REMOVAL

(1) Remove three lock ball plugs from intermediate plate (Fig. 22).

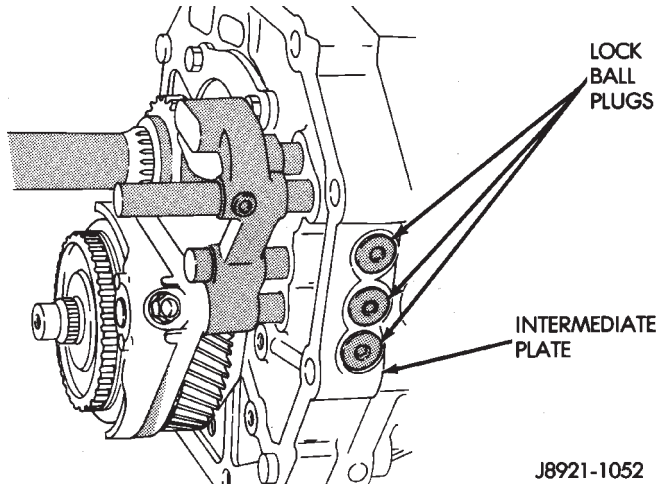


Fig. 22 Lock Ball Plug Locations

(2) Remove three lock ball springs and lock balls from intermediate plate with pencil magnet (Fig. 23).

(3) Mount intermediate plate and geartrain assembly in vise as follows:

(a) Insert two spare bolts in one bottom bolt hole in intermediate plate. Insert bolts from opposite sides of plates (Fig. 24).

(b) Install enough flat washers under each bolt head to prevent bolts from touching (Fig. 24).

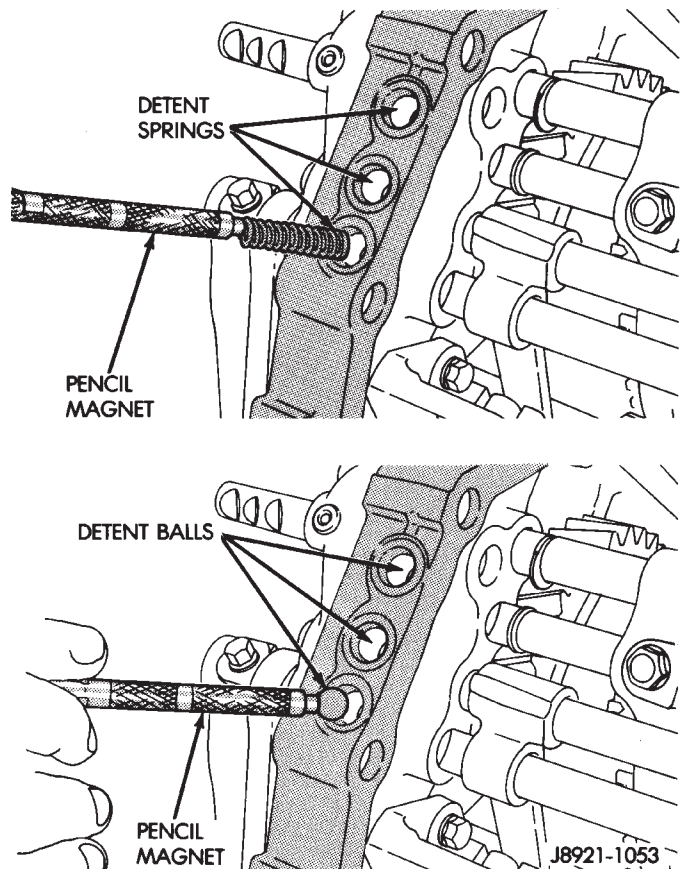


Fig. 23 Removing/Installing Lock Ball And Spring

(c) Tape bolts and washers in place and mount intermediate plate in vise (Fig. 24).

(d) Clamp vise jaws securely against bolt heads (Fig. 24). **Do not clamp vise jaws on intermediate plate. Clamp only on bolt heads.**

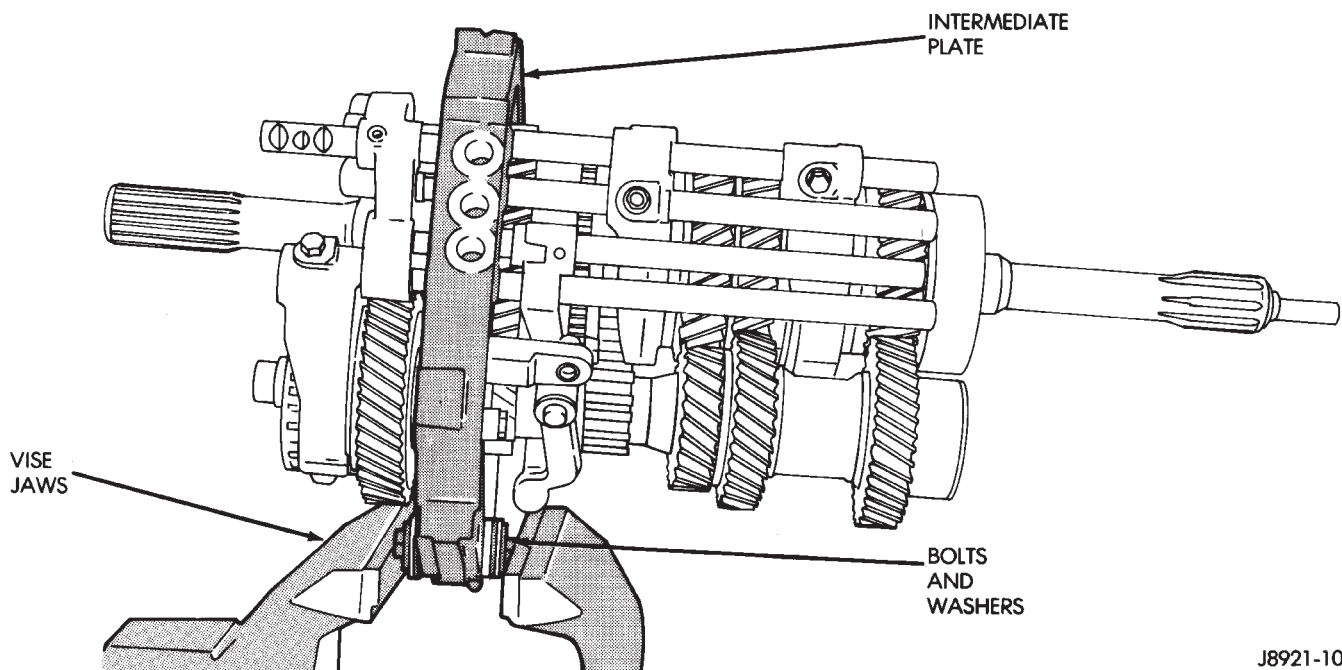


Fig. 24 Mounting Intermediate Plate And Geartrain In Vise

(4) Remove fifth gear snap ring (Fig. 25). Retain snap ring for assembly reference. It is a select fit component.

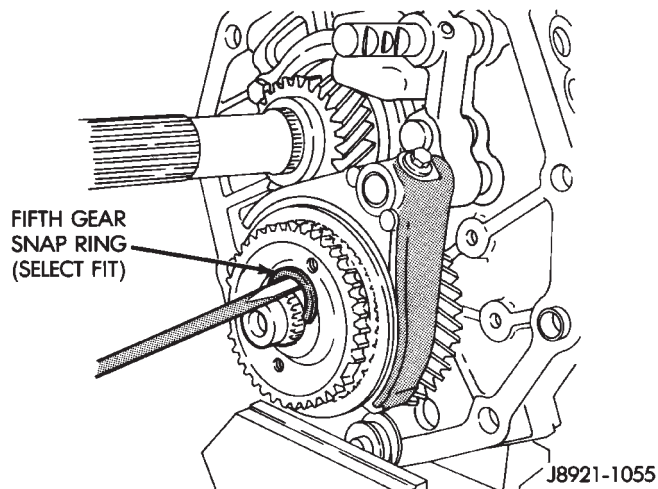


Fig. 25 Fifth Gear Snap Ring Removal

(5) Remove E-ring that secures reverse shift arm to fork (Fig. 26).

(6) Remove bolts attaching reverse shift arm bracket to intermediate plate. Then remove bracket (Fig. 27).

(7) Remove reverse shift arm and shoe (Fig. 28).

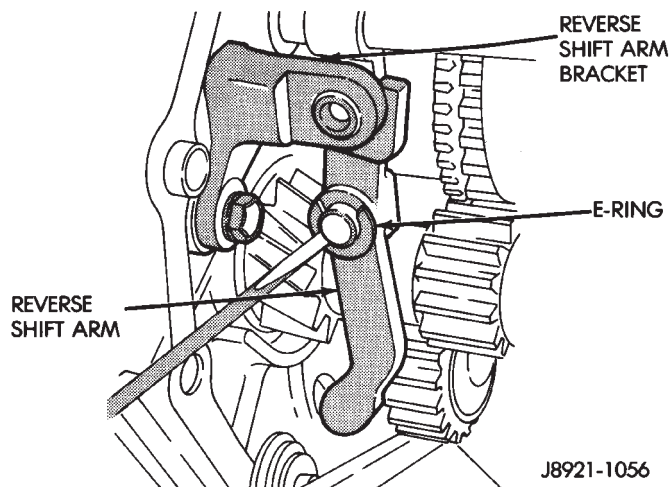


Fig. 26 Removing Reverse Shift Arm E-Ring

(8) Remove fifth gear shift fork set screw (Fig. 29).

(9) Move fifth gear shift rail forward until it clears shift fork.

(10) Remove fifth gear shift fork from synchro sleeve (Fig. 30).

(11) Remove reverse shift rail and reverse shift head as assembly (Fig. 31).

(12) Measure thrust clearance between counter 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.

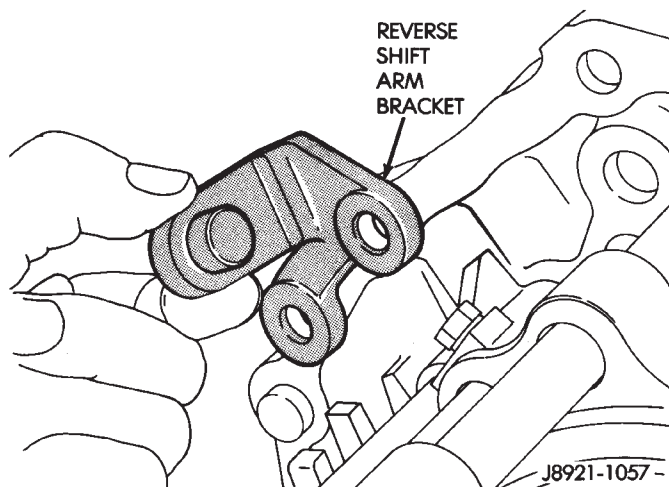


Fig. 27 Removing Reverse Shift Arm Bracket

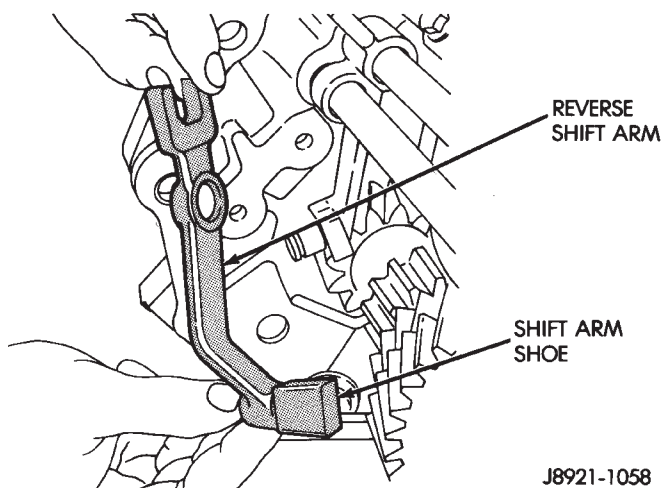


Fig. 28 Removing Reverse Shift Arm And Shoe

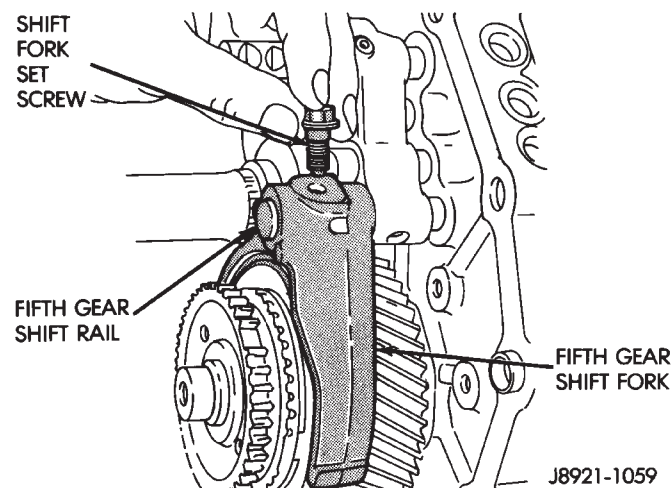


Fig. 29 Removing Fifth Gear Fork Set Screw

(13) Loosen fifth spline gear with standard two-jaw puller (Fig. 32). **Position puller jaws behind fifth counter gear as shown.**

(14) Remove fifth spline gear (Fig. 33).

(15) Remove fifth gear synchro ring (Fig. 34).

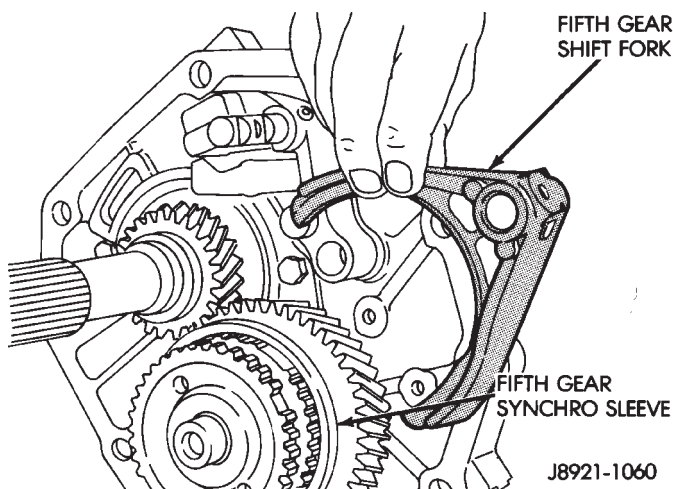


Fig. 30 Removing Fifth Gear Shift Fork

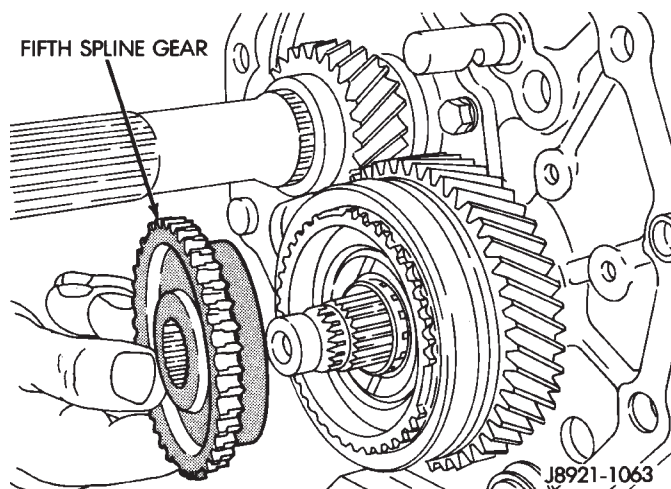


Fig. 33 Removing Fifth Spline Gear

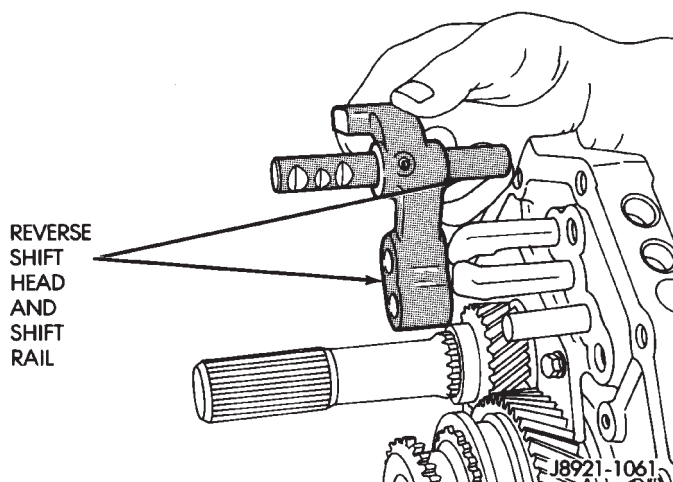


Fig. 31 Removing Reverse Shift Head And Rail

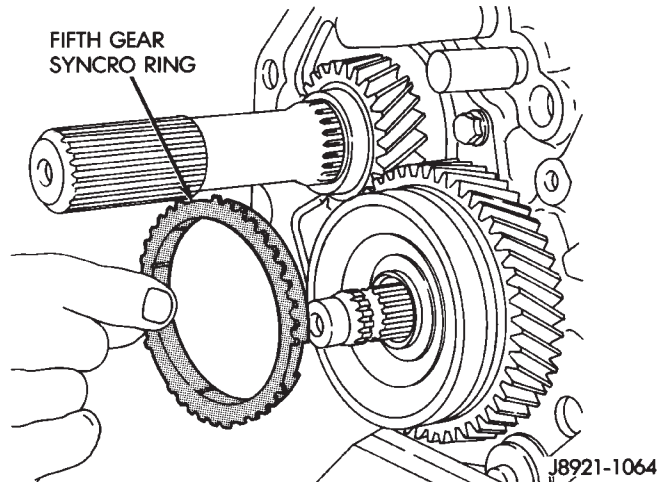


Fig. 34 Removing Fifth Gear Synchro Ring

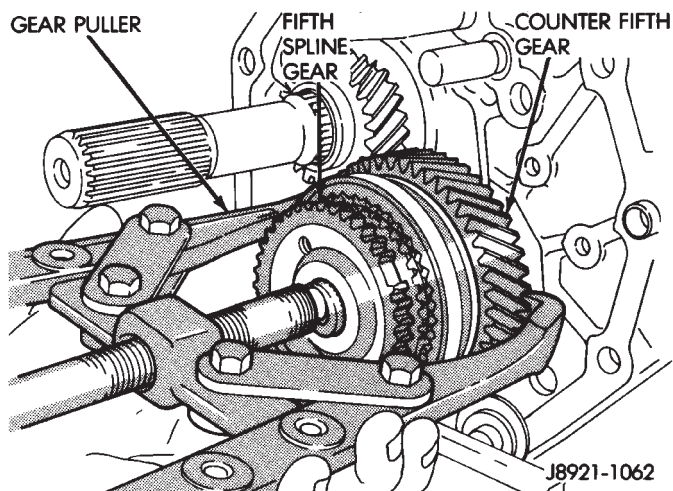


Fig. 32 Loosening Fifth Spline Gear

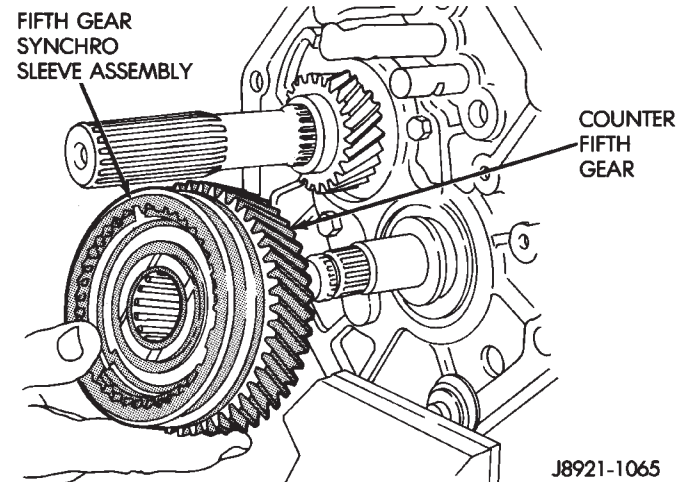


Fig. 35 Removing Counter Fifth Gear And Synchro Assembly

(16) Remove fifth gear synchro and sleeve assembly (Fig. 35).

(17) Remove counter fifth gear thrust ring (Fig. 36).

(18) Remove thrust ring lock ball with pencil magnet (Fig. 37).

(19) Remove bolts attaching output shaft rear bearing retainer to intermediate plate (Fig. 38).

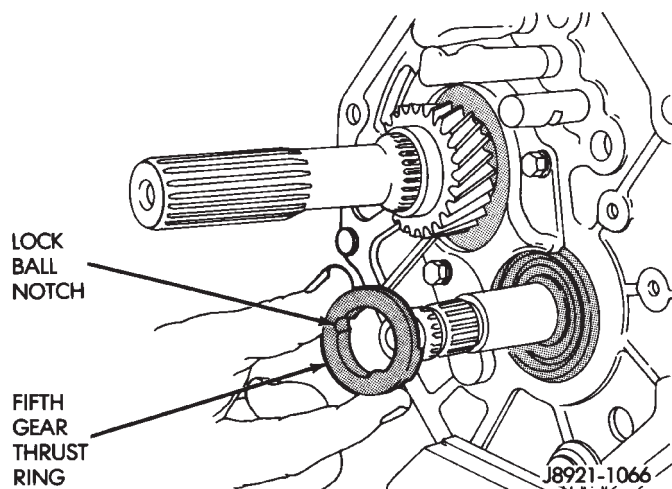


Fig. 36 Removing Fifth Gear Thrust Ring

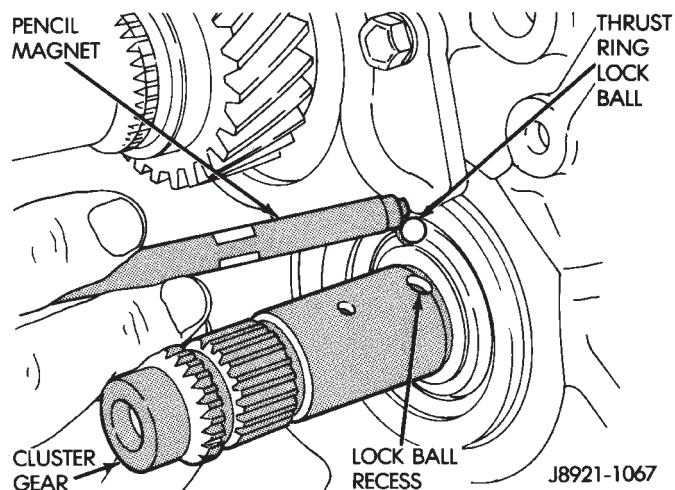


Fig. 37 Removing Thrust Ring Lock Ball

- (20) Remove rear bearing retainer (Fig. 39).
- (21) Remove reverse gear and shaft (Fig. 40).

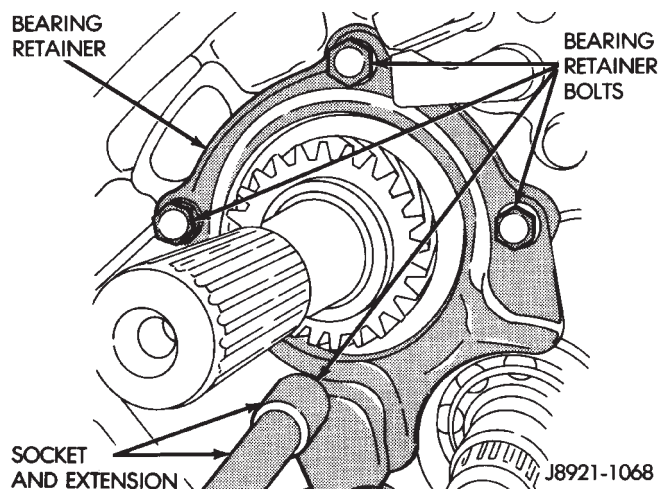


Fig. 38 Removing Output Shaft Rear Bearing Retainer Bolts

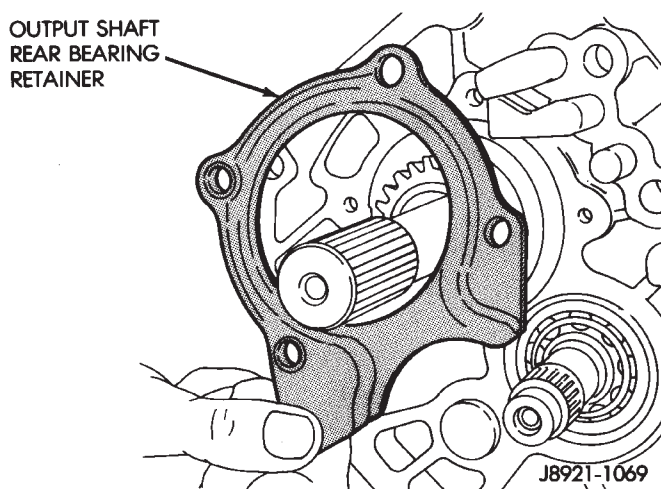


Fig. 39 Removing Output Shaft Rear Bearing Retainer

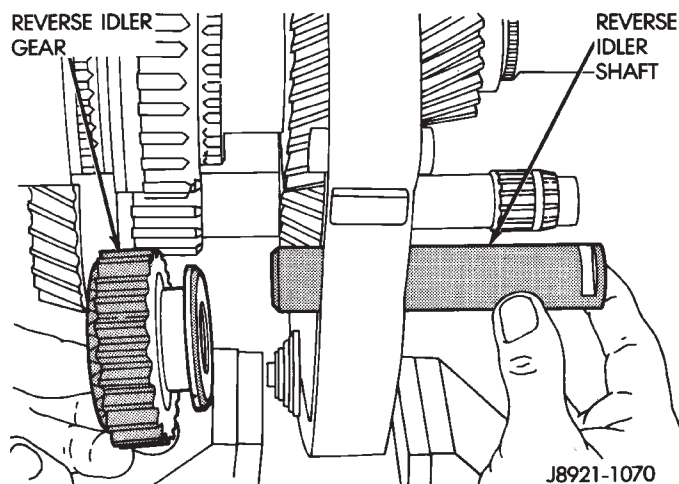


Fig. 40 Removing Reverse Idler Gear And Shaft

SHIFT RAIL AND FORK REMOVAL

There are a total of five shift rails in the AX 15 transmission. The 1-2, 3-4, fifth gear and front reverse shift rails are shown in Figure 41.

Two shift rails are used for reverse gear range. The front reverse rail is at the forward side of the intermediate plate (Fig. 41). The short rear reverse rail and reverse shift head are at the rear side of the intermediate plate.

It is not necessary to remove the shift rails if they are in good condition. Only the shift forks need be removed for access to the shafts and gears.

- (1) Remove fifth gear shift rail (Fig. 41). Catch lock ball in your hand as rail comes out of intermediate plate.
- (2) Remove 1-2 and 3-4 shift rail C-rings with two screwdrivers of equal size and length (Fig. 42).
- (3) Remove shift fork set screws (Fig. 43).
- (4) Remove 3-4 shift rail from shift fork and intermediate plate (Fig. 44).

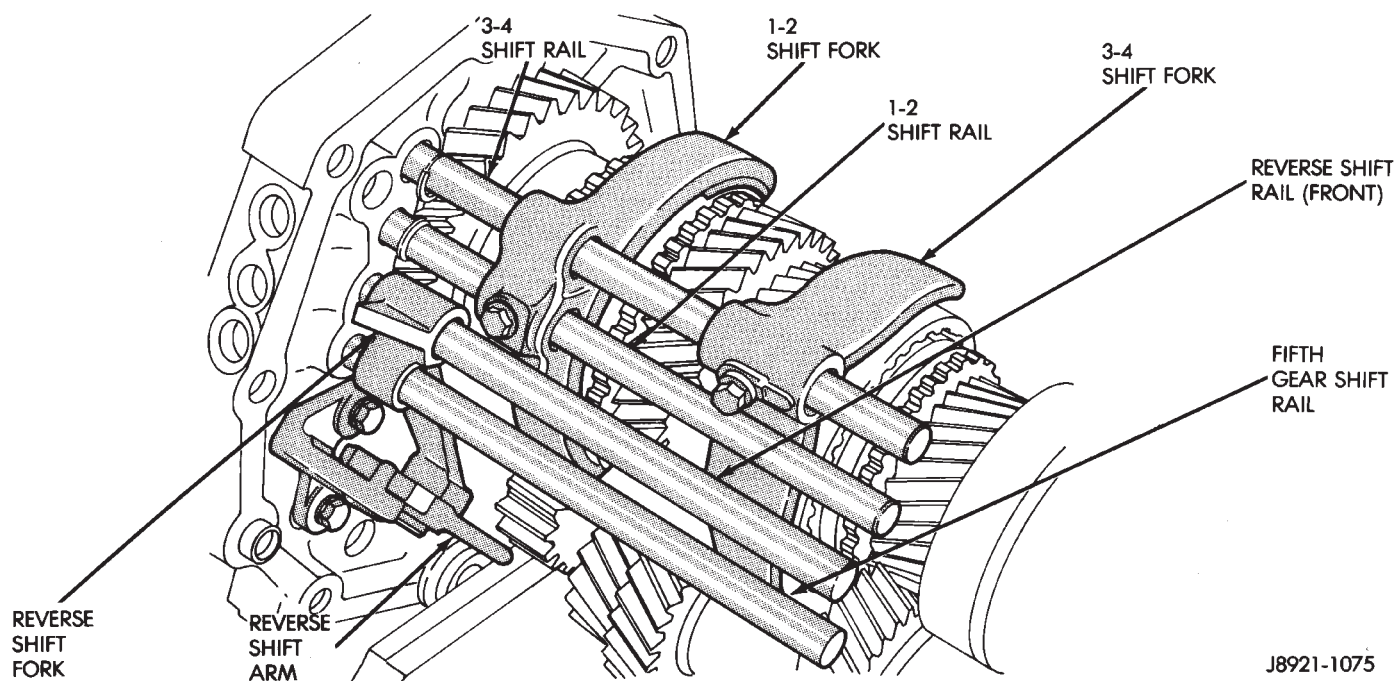


Fig. 41 Shift Rail Identification

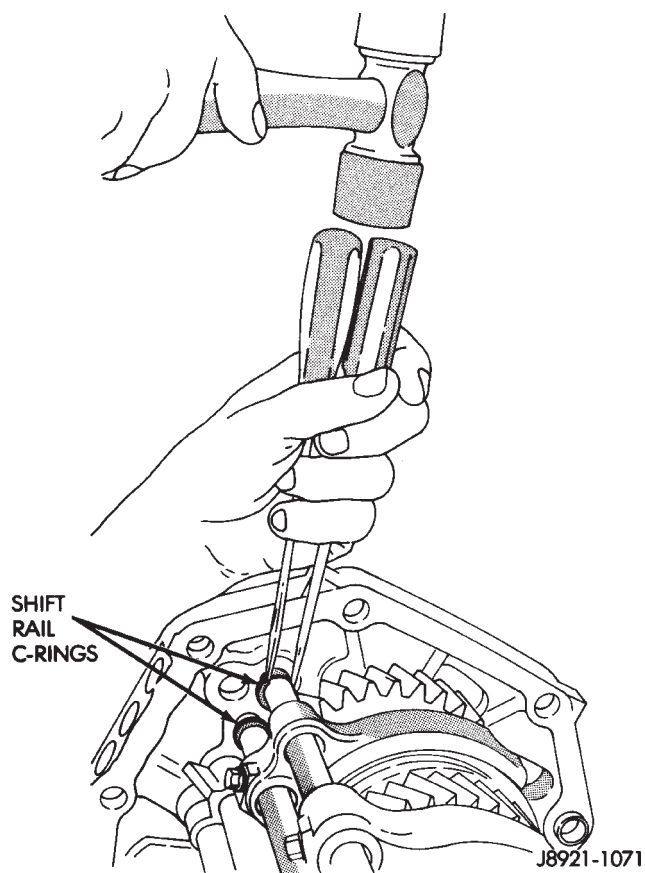


Fig. 42 Removing Shift Rail C-Rings

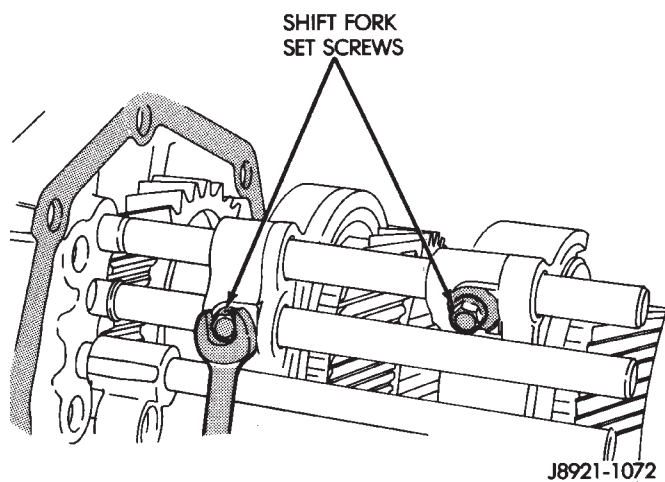


Fig. 43 Removing Shift Fork Set Screws

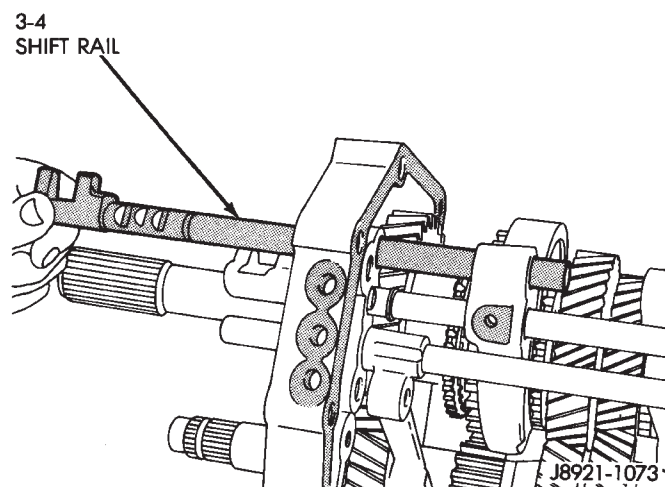


Fig. 44 Removing 3-4 Shift Rail

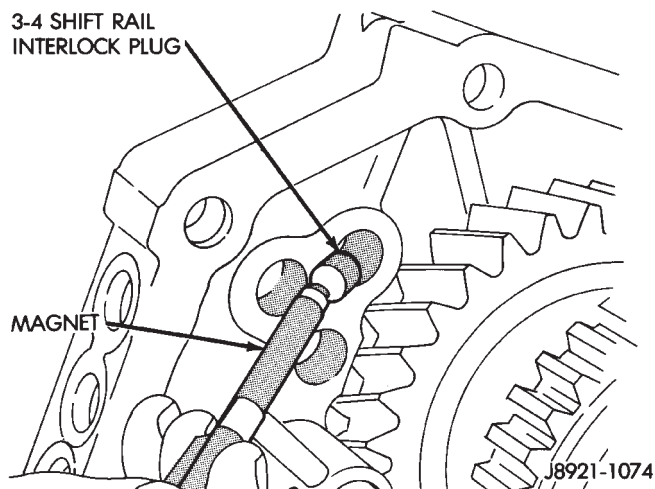


Fig. 45 Removing 3-4 Shift Rail Interlock Plug

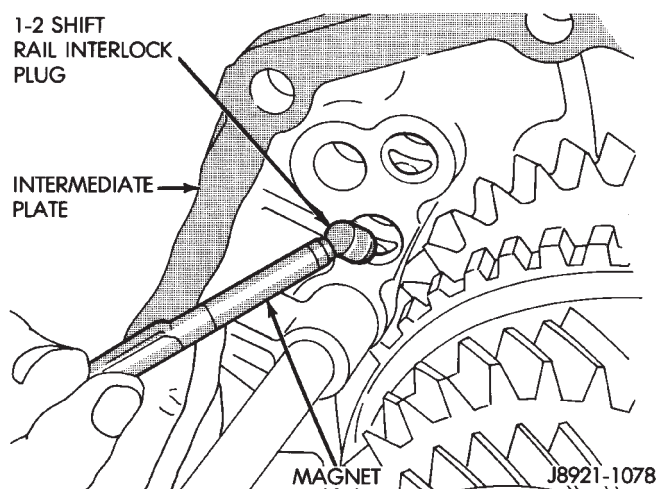


Fig. 48 Removing 1-2 Shift Rail Interlock Plug

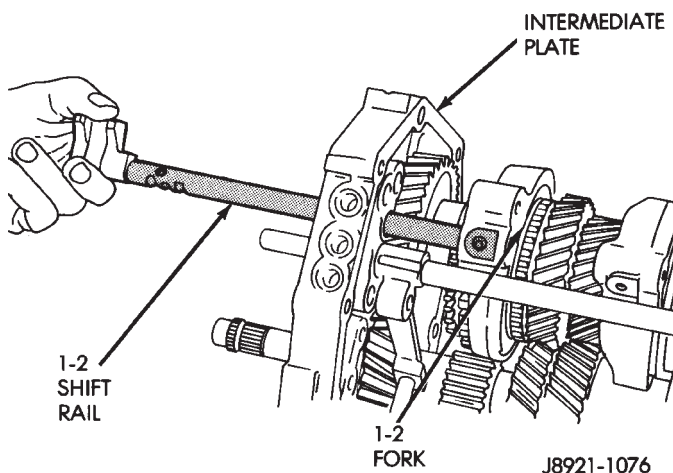


Fig. 46 Removing 1-2 Shift Rail

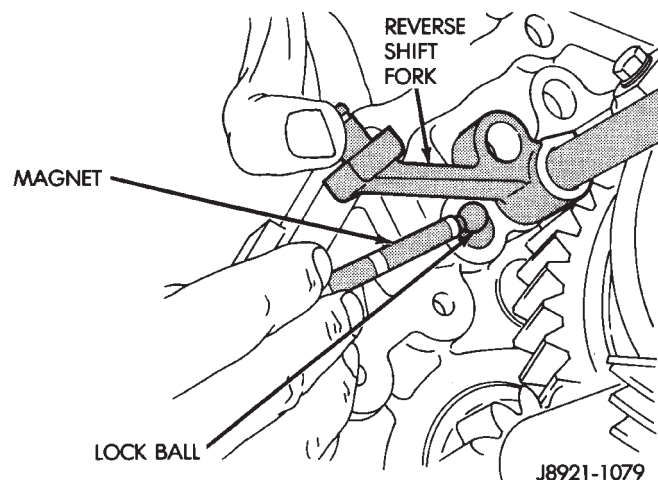


Fig. 49 Removing Fifth Gear Shift Rail Lock Ball

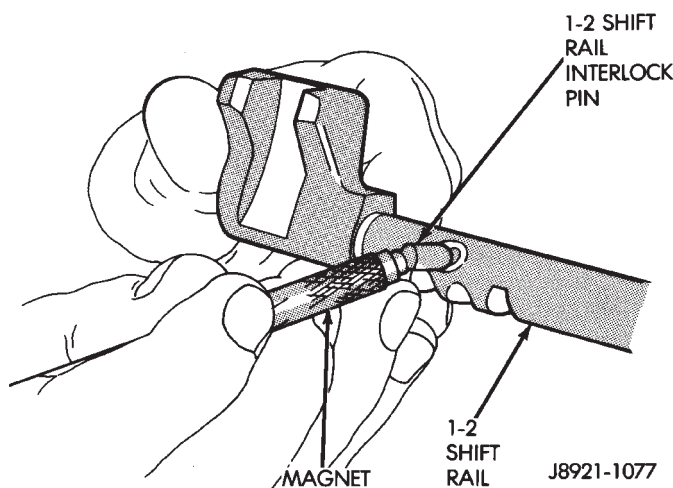


Fig. 47 Removing 1-2 Shift Rail Interlock Pin

(5) Remove 3-4 shift rail interlock plug from intermediate plate with magnet (Fig. 45).

(6) Remove 1-2 shift rail from shift fork and intermediate plate (Fig. 46).

(7) Remove 1-2 shift rail interlock pin from shift rail (Fig. 47).

(8) Remove 1-2 shift rail interlock plug from intermediate plate (Fig. 48).

(9) Lift reverse shift fork upward and remove fifth gear shift rail lock ball (Fig. 49).

(10) Remove 3-4 shift fork (Fig. 50).

(11) Remove 1-2 shift fork (Fig. 50).

(12) Remove reverse shift rail C-ring with two equal length and size screwdrivers (Fig. 51).

(13) Remove reverse shift rail and fork (Fig. 52).

(14) Remove interlock pin from reverse shift rail (Fig. 53).

(15) Position shift rails, shift forks, lock balls, interlock plugs and interlock pins on the workbench in order of removal. This will help in identifying components during inspection and assembly.

OUTPUT SHAFT AND CLUSTER GEAR REMOVAL

(1) Remove output shaft rear bearing snap ring (Fig. 54).

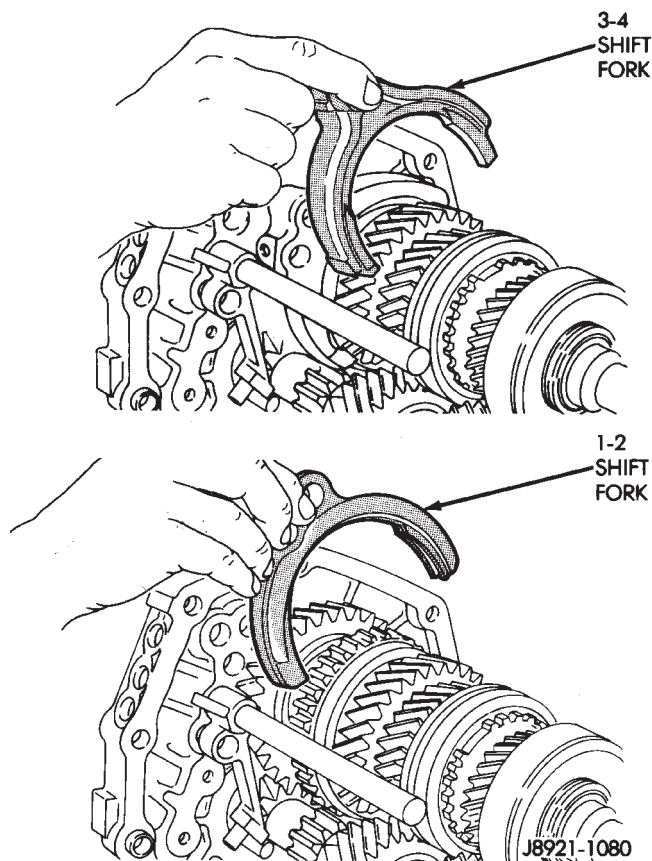


Fig. 50 Shift Fork Removal

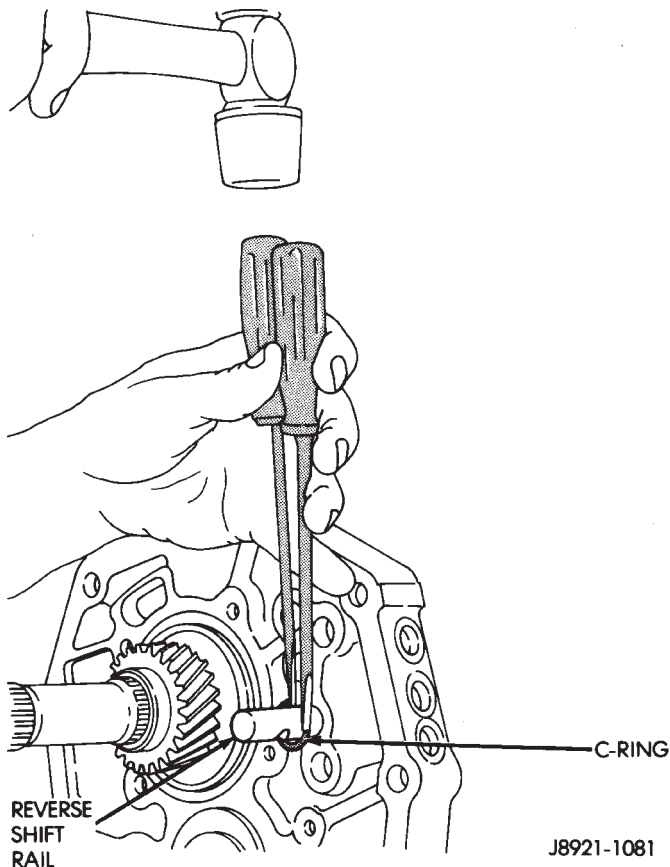


Fig. 51 Removing Reverse Shift Rail C-Ring

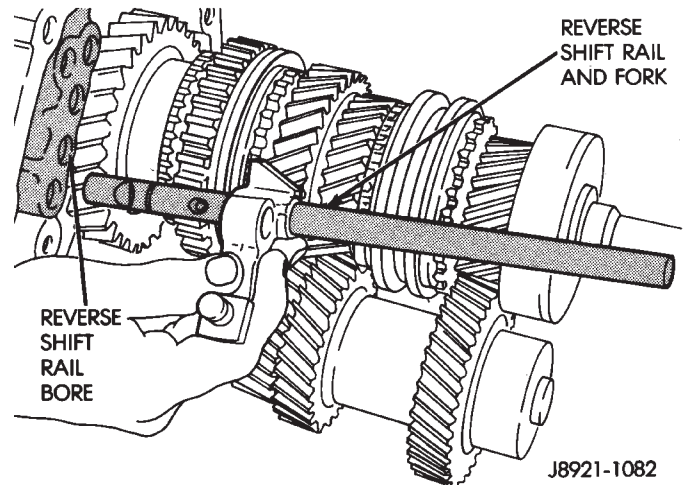


Fig. 52 Removing Reverse Shift Rail And Fork

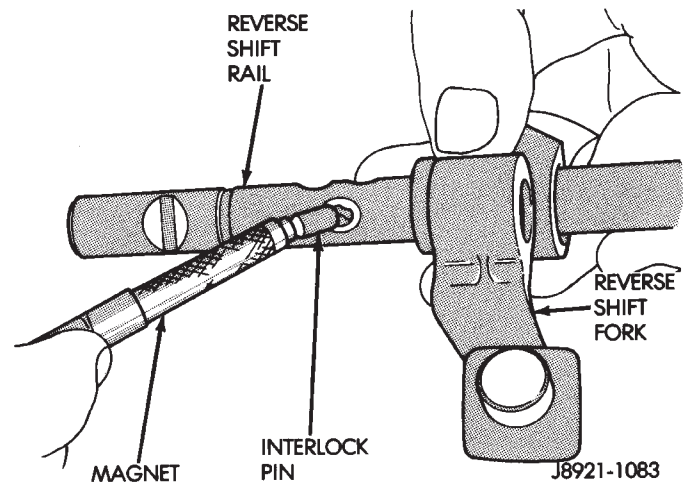


Fig. 53 Removing Reverse Shift Rail Interlock Pin

- (2) Remove cluster gear rear bearing snap ring (Fig. 54).
- (3) Tap end of output shaft with mallet to unseat and start rear bearing out of intermediate plate (Fig. 55).
- (4) Remove output shaft by rocking it lightly until rear bearing comes out of intermediate plate (Fig. 56).
- (5) Remove cluster gear by pulling it straight out of rear bearing (Fig. 57).
- (6) Remove cluster gear rear bearing from intermediate plate (Fig. 58).
- (7) Remove input shaft from output shaft (Fig. 59).
- (8) Remove output shaft pilot bearing from input shaft (Fig. 60).
- (9) Remove synchro ring from input shaft (Fig. 61).
- (10) Remove bearing snap ring and press bearing off input shaft (Fig. 61).

OUTPUT SHAFT DISASSEMBLY

- (1) Measure thrust clearance of output shaft first, second and third gears with feeler gauge (Fig. 62).

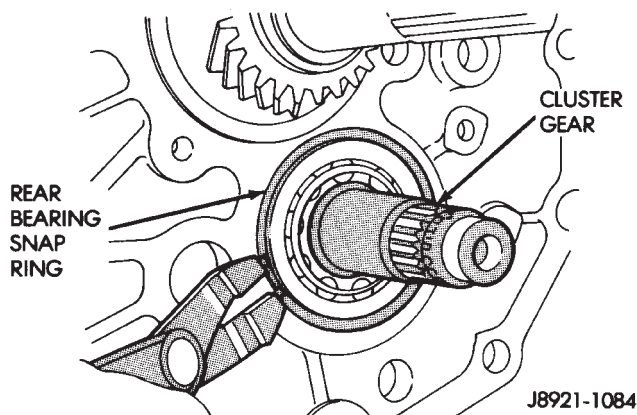
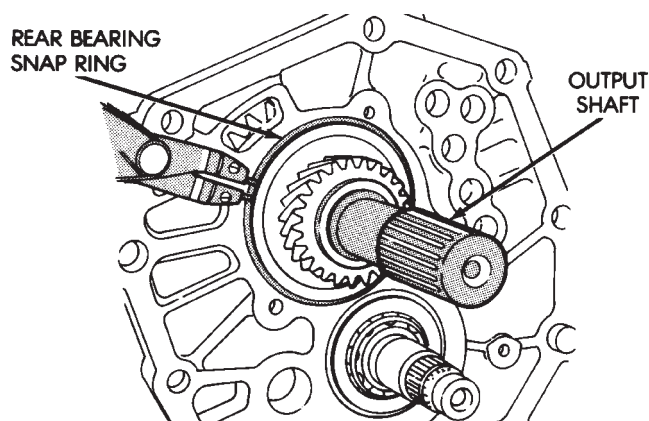


Fig. 54 Removing Bearing Snap Rings

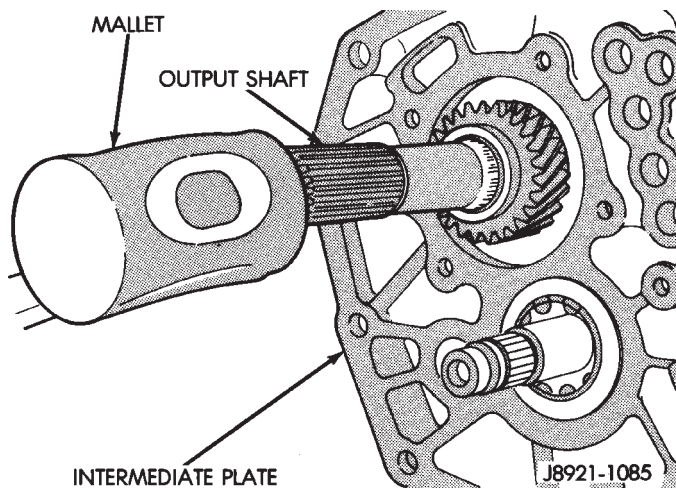


Fig. 55 Unseating Output Shaft Rear Bearing

- First gear clearance should be 0.10–0.40 mm (0.003–0.0197 in).
- Second–third gear clearance should be 0.10–0.30 mm (0.003–0.0118 in.).

(2) If first gear thrust clearance is incorrect, replace gear and thrust washer. If **second or third gear clearance is incorrect, either gear and bearing, or output shaft flange is worn. Refer to output shaft inspection in Cleaning and Inspection section.**

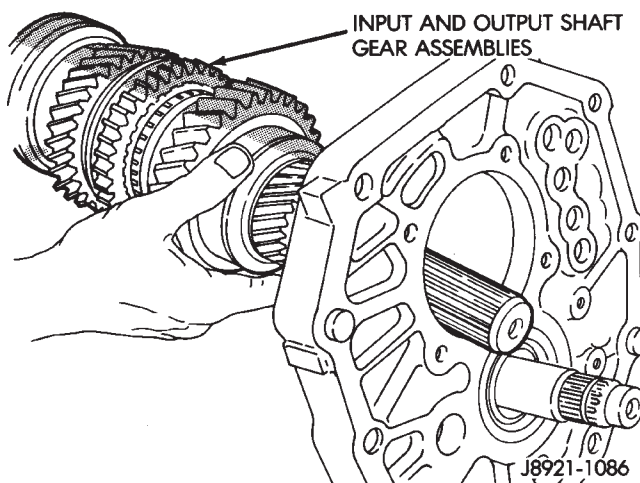


Fig. 56 Removing Assembled Input And Output Shaft

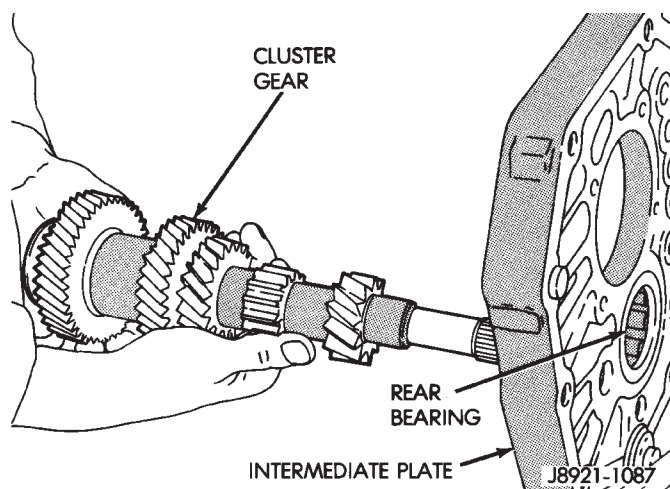


Fig. 57 Cluster Gear Removal

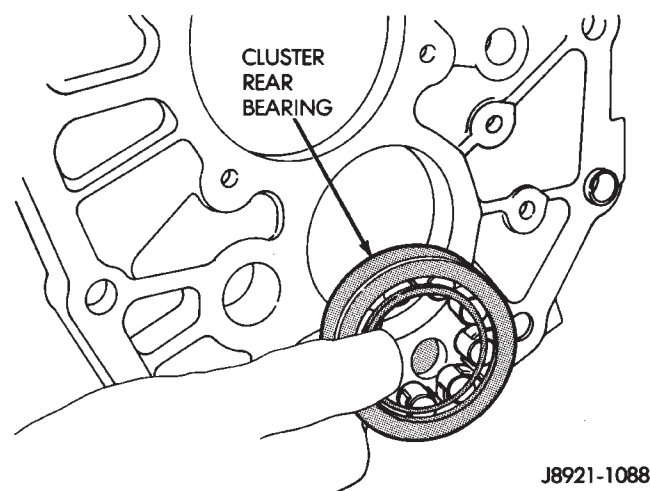
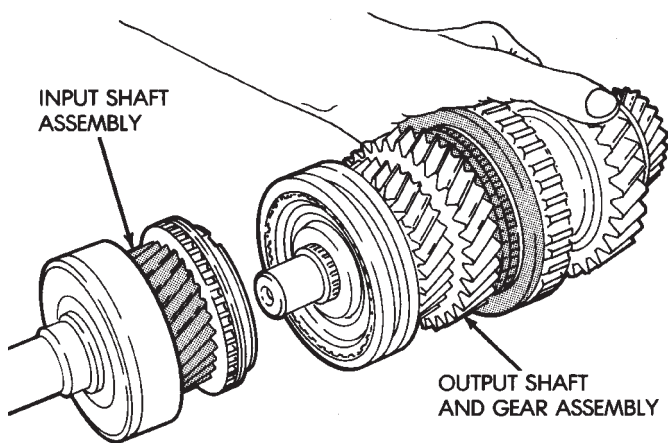


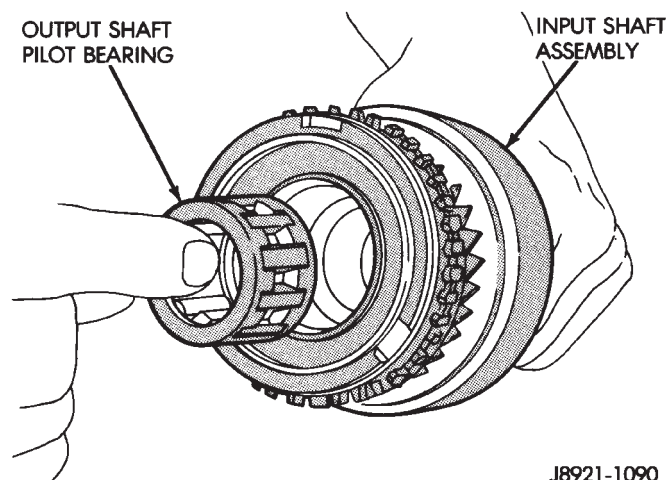
Fig. 58 Removing Cluster Gear Rear Bearing

- (3) Press fifth gear and rear bearing off rear of output shaft.
- (4) Remove thrust washer, pin, and first gear and bearing (Fig. 62).



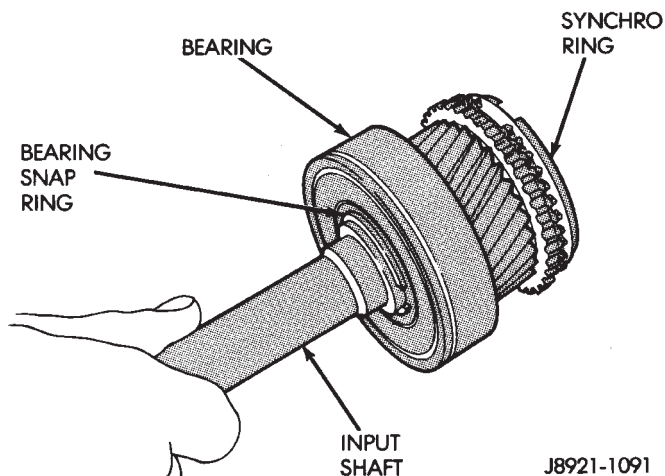
J8921-1089

Fig. 59 Input Shaft Removal



J8921-1090

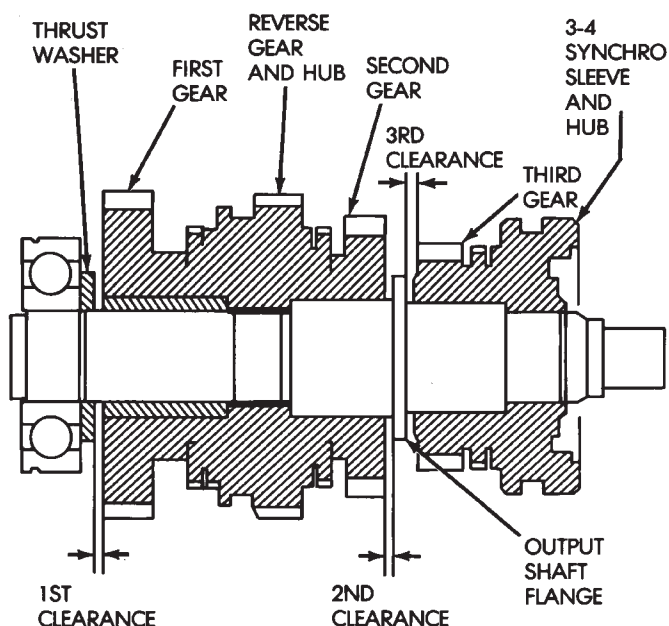
Fig. 60 Removing Input Shaft Pilot Bearing



J8921-1091

Fig. 61 Input Shaft Components

- (5) Remove first/reverse hub snap ring (Fig. 63).
- (6) Remove synchro ring.
- (7) Press reverse gear and first/reverse hub off shaft as assembly.
- (8) Remove remaining synchro ring and second gear and bearing (Fig. 63).



J8921-1092

Fig. 62 Checking Output Shaft Gear Thrust Clearance

- (9) Remove snap ring at front of output shaft (Fig. 63).
- (10) Press 3-4 hub and sleeve off output shaft as assembly (Fig. 63).
- (11) Remove synchro ring.
- (12) Remove third gear and needle bearing (Fig. 63).

TRANSMISSION CLEANING AND INSPECTION

Clean the transmission components in solvent. Then 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 damage the bearing rollers.**

Replace components that are obviously worn, cracked, chipped or damaged in any way.

Inspect the transmission case. Replace the case if cracked or porous or if any of the bearing and gear bores are damaged.

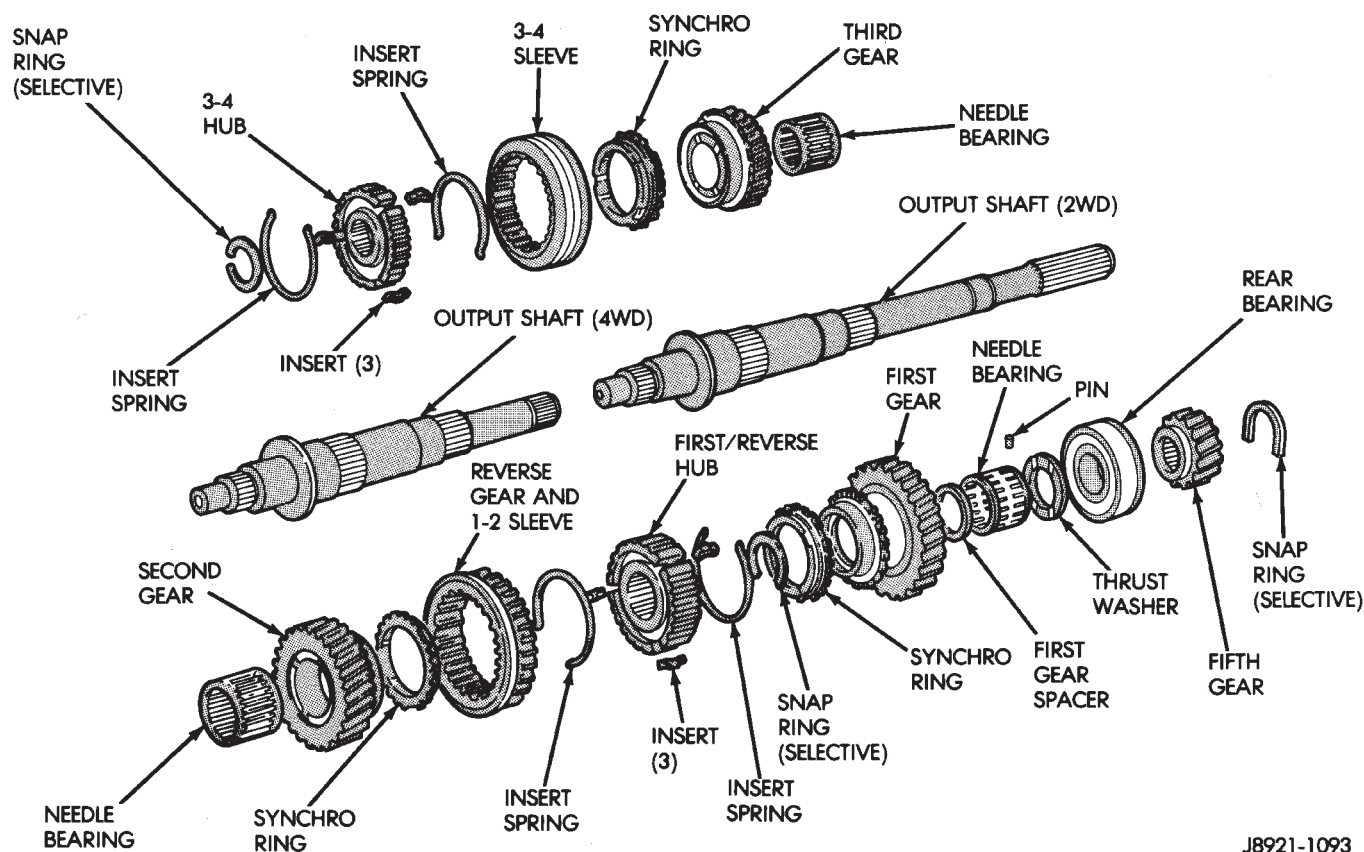
Output Shaft Inspection

Measure thickness of the output shaft flange with a micrometer (Fig. 64). Minimum allowable flange thickness is 4.70 mm (0.185 in).

If shaft flange thickness is OK but previously measured second/third gear thrust clearance was incorrect (Fig. 62), replace the necessary gear and needle bearing as an assembly.

Check diameter of the first, second and third gear bearing surfaces of the output shaft (Fig. 64). Minimum allowable diameters are:

- 38.86 mm (1.529 in.) for first gear surface
- 46.86 mm (1.844 in.) for second gear surface



J8921-1093

Fig. 63 Output Shaft And Gears

- 37.86 mm (1.490 in.) for third gear surface

Check output shaft runout with V-blocks and a dial indicator (Fig. 64). Maximum allowable runout is 0.06 mm (0.0024 in.).

Replace the output shaft if any surface measured fails to meet stated tolerance.

Cluster Gear Inspection

Inspect the cluster gear teeth. Replace the gear if any teeth are worn or damaged or if the bearing surfaces are damaged.

Check diameter of the cluster gear journal with a micrometer (Fig. 65). Minimum allowable diameter is 27.860 mm (1.096 in.).

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

GEAR AND SYNCHRO INSPECTION

Install the synchro rings on their respective gears. Rotate each ring on the gear and note synchro action. Replace any synchro ring that exhibits a lack of braking action or binds on the gear. Also replace any ring that is worn or has chipped or broken teeth.

Measure end clearance between the synchro ring and the gear with a feeler gauge (Fig. 66). Clearance should be 0.06 mm to 1.6 mm (0.024 to 0.063 in.).

Install the needle bearings in the first, second and third gears. Then install the gears on the output shaft and check shaft-to-gear clearance with a dial indicator (Fig. 67).

Maximum allowable clearance is 0.16 mm (0.0063 in.). If any gear exhibits excessive clearance, replace the gear and needle bearing.

Check clearance between the shift forks and synchro sleeves with a feeler gauge (Fig. 68). Clearance should not exceed 1.0 mm (0.039 in.). Replace the synchro sleeve (and matching hub) if clearance exceeds the stated limit.

Check condition of the reverse idler gear bushing (Fig. 69). Replace the gear if the bushing is scored or worn.

Gear Case, Housing And Intermediate Plate

Clean the case, housing and plate with solvent and dry with compressed air. Replace any component that is cracked, warped or damaged in any way.

Inspect the threads in the case, housing and plate. Minor thread damage can be repaired with steel thread inserts if necessary. However, do not attempt to repair if the cracks are evident around any threaded hole.

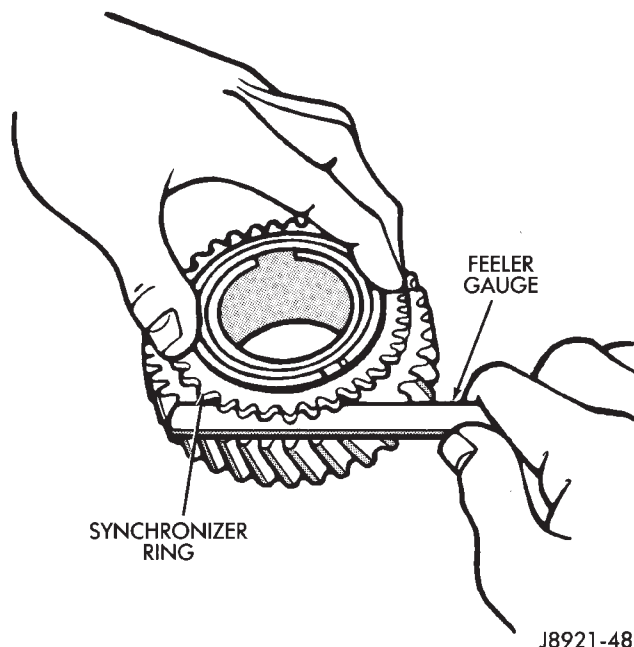
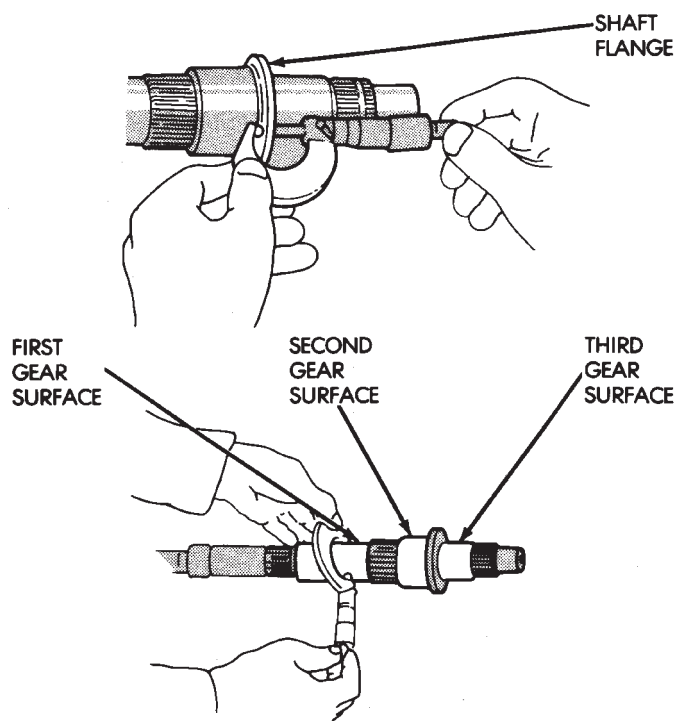


Fig. 66 Checking Synchro Ring End Clearance

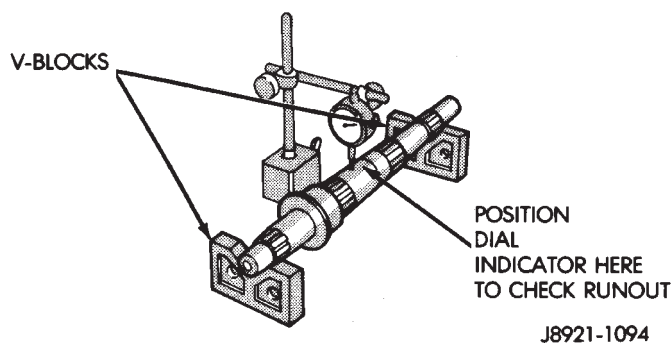


Fig. 64 Checking Output Shaft Tolerances

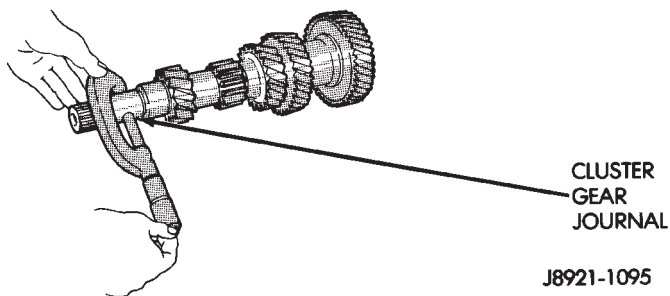


Fig. 65 Checking Cluster Gear Journal Diameter

Inspect the reverse pin in the adapter/extension housing. Replace the pin if worn or damaged. Refer to the replacement procedure in the Transmission Assembly section.

TRANSMISSION ASSEMBLY AND ADJUSTMENT

Lubricate the transmission components with gear

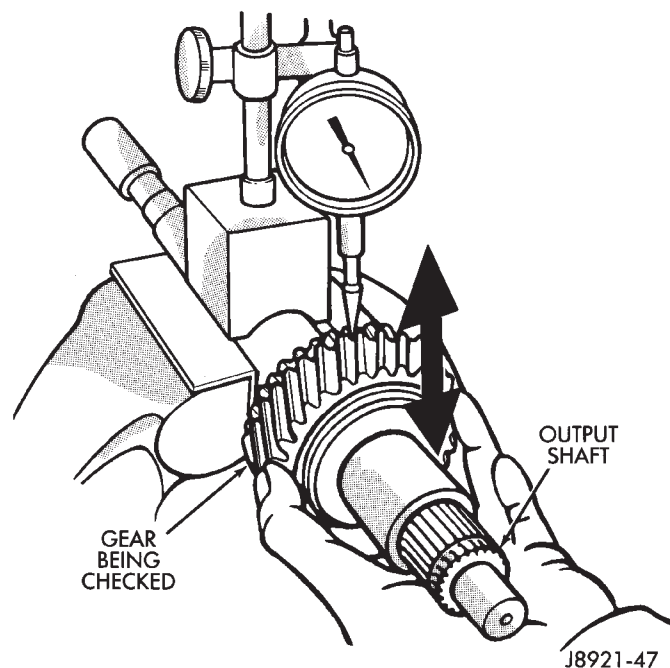


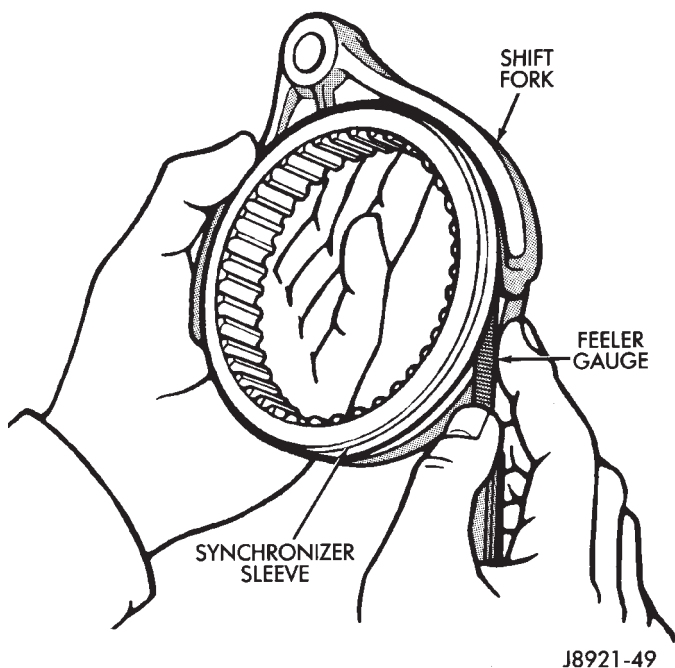
Fig. 67 Checking Gear-To-Shaft Clearance

lubricant during assembly. Use petroleum jelly to lubricate seal lips and/or hold parts in place during installation.

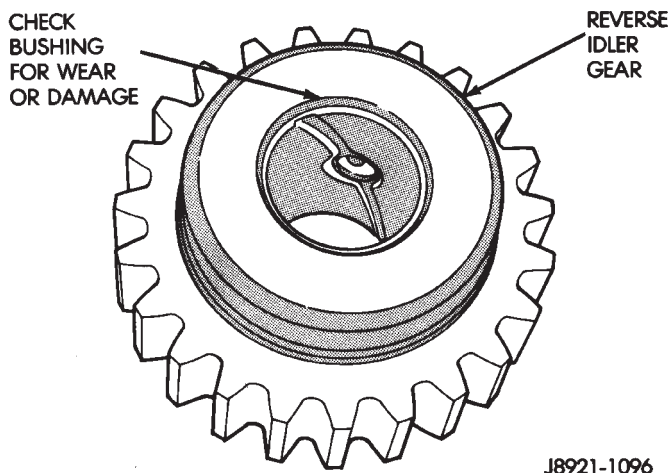
FRONT BEARING/BEARING SEAL/REVERSE SHAFT PIN INSTALLATION

(1) Press front bearing on input shaft. Then secure bearing with thickest snap ring that will fit in shaft groove (Fig. 70).

(2) Press front bearing on cluster gear. Then secure bearing with thickest snap ring that will fit in ring groove on gear (Fig. 71).



J8921-49

Fig. 68 Checking Shift Fork-To-Sleeve Clearance

J8921-1096

Fig. 69 Reverse Idler Gear Bushing

(3) Install new oil seals in front bearing retainer and adapter housing (Fig. 72). Installation depth for bearing retainer seal is 10.5 to 11.5 mm (0.414 to 0.453 in.).

(4) Install reverse shaft and shaft retaining pin in adapter housing. Then install access hole plug with torx bit (Fig. 73).

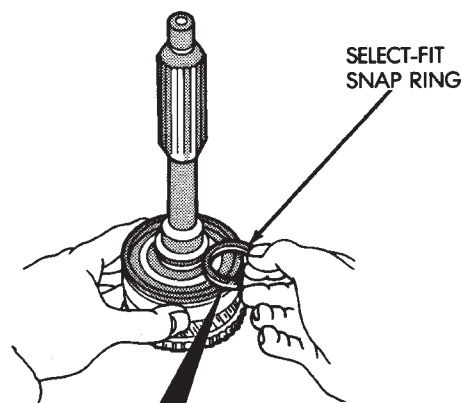
(5) Lubricate reverse shaft and gear components with Mopar 75W-90 gear lubricant.

OUTPUT SHAFT ASSEMBLY

(1) Lubricate output shaft journals, gears and needle bearings with recommended gear lubricant.

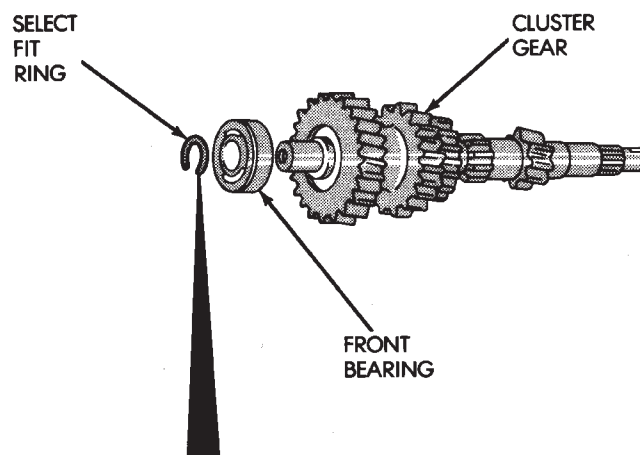
(2) Install third gear and needle bearing on shaft (Fig. 63)

(3) Install synchro ring on third gear (Fig. 63).



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. 70 Selecting Input Shaft Front Bearing Snap Ring

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)

J8921-1098

Fig. 71 Selecting Cluster Gear Front Bearing Snap Ring

(4) Assemble 1-2 and 3-4 synchro hubs and sleeves (Fig. 74).

(5) Install inserts and springs in synchro sleeves. Position open ends of springs 180° apart as shown (Fig. 75).

(6) Install 3-4 synchro hub and sleeve on output shaft. Press hub onto shaft if necessary.

(7) Install 3-4 synchro hub snap ring (Fig. 76). Use thickest snap ring that will fit in shaft groove.

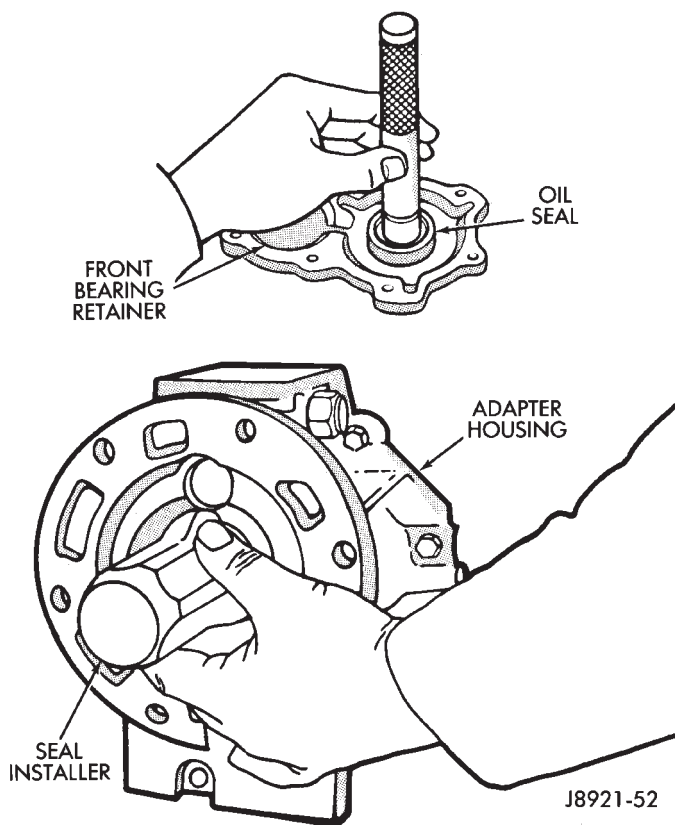


Fig. 72 Oil Seal Installation

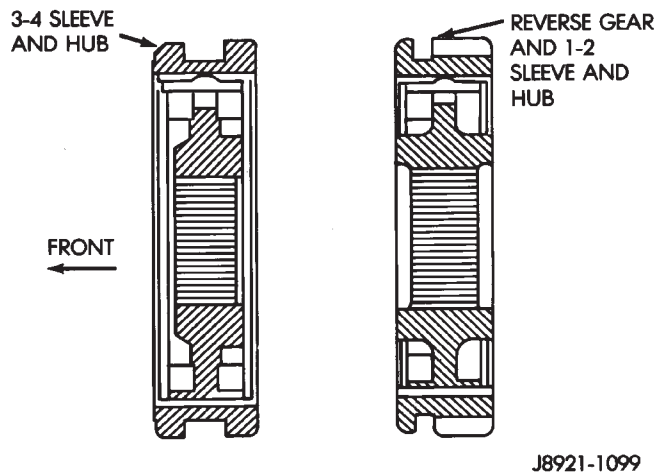


Fig. 74 Synchro Sleeve And Hub Identification

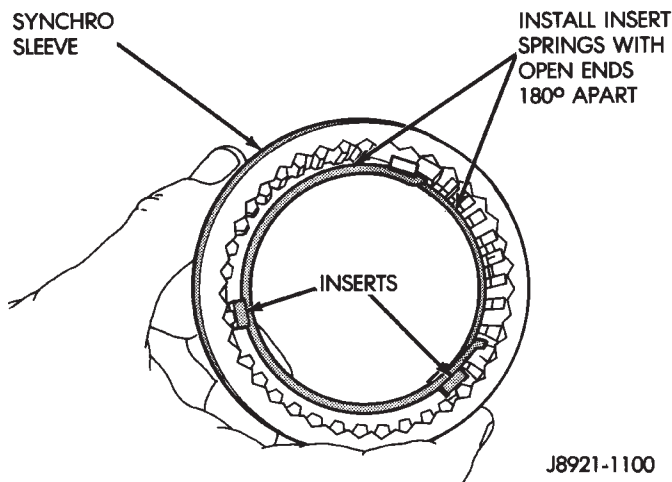


Fig. 75 Insert Spring Position

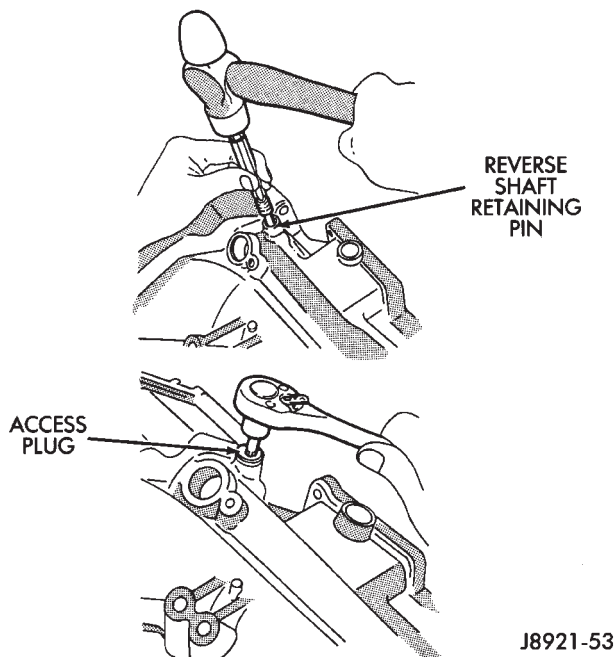
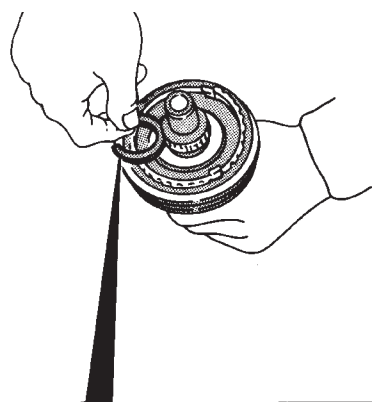


Fig. 73 Installing Reverse Shaft Pin

(8) Verify third gear thrust clearance with feeler gauge (Fig. 56). Clearance should be 0.10 to 0.25 mm (0.004 to 0.010 in.).

(9) Lubricate remaining output shaft gears and bearings with gear lubricant.



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. 76 Installing 3-4 Synchro Hub Snap Ring

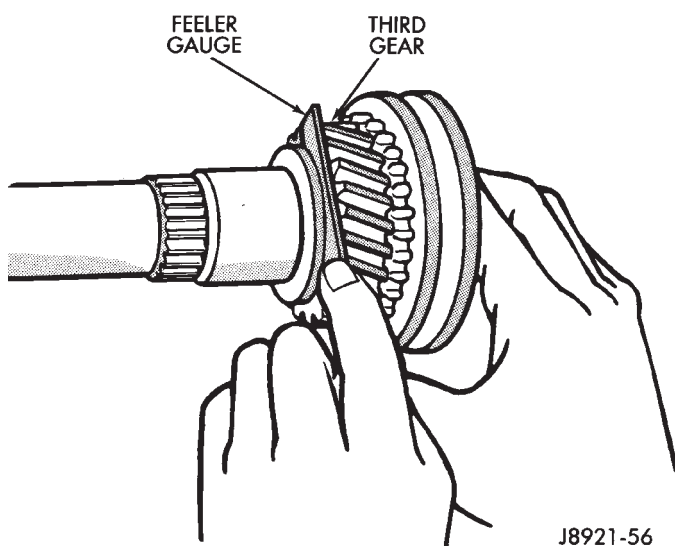


Fig. 77 Checking Third Gear Clearance

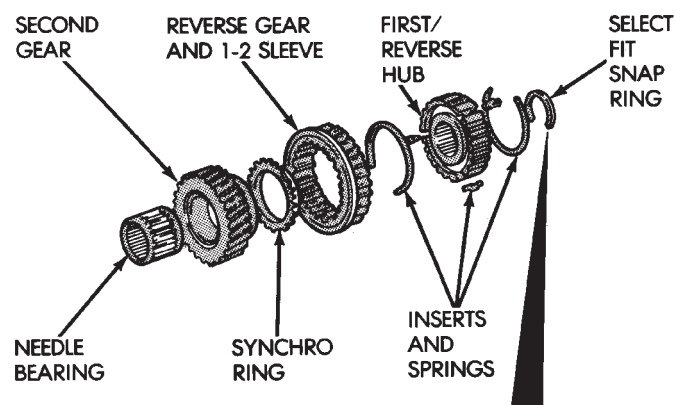
(10) Install second gear and needle bearing on shaft (Fig. 78).

(11) Install synchro ring on second gear (Fig. 78).

(12) Assemble first/reverse hub, insert springs, inserts, reverse gear and 1-2 sleeve (Fig. 78). **Be sure spring ends are 180° apart. Note that splines in hub bore are chamfered on one side. Install hub so chamfered side faces front of output shaft.**

(13) Press assembled hub and sleeve on output shaft.

(14) Install selective snap ring (Fig. 78). Use thickest snap ring that will fit in output shaft groove.



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. 78 Second Gear And Synchro Assembly

(15) Install synchro ring on first gear (Fig. 79).

(16) Install first gear spacer on shaft and against selective fit snap ring (Fig. 79).

(17) Install first gear and needle bearing (Fig. 79) on output shaft.

(18) Install locating pin and thrust washer on shaft (Fig. 79).

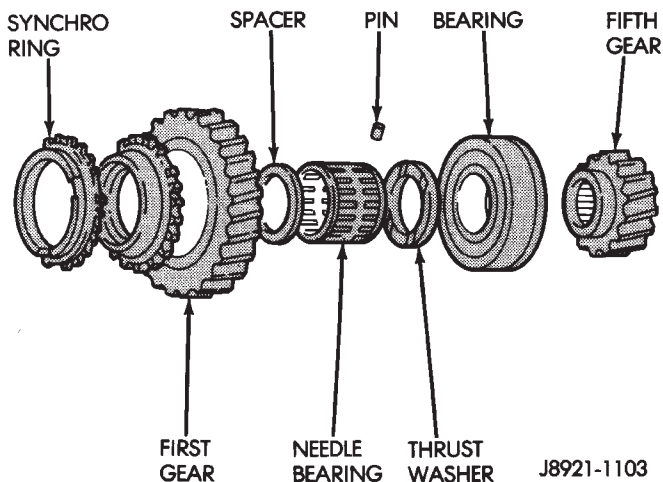


Fig. 79 First And Fifth Gear Components

(19) Press rear bearing on shaft. Position bearing snap ring groove so it is closest to end of output shaft.

(20) Check first and second gear thrust clearance with feeler gauge (Fig. 62).

- First gear clearance should be 0.10 to 0.40 mm (0.003 to 0.0197 in.)

- Second gear clearance should be 0.10 to 0.30 mm (0.003 to 0.0118 in.)

(21) Press fifth gear onto output shaft. Then install select fit snap ring (Fig. 80). Use thickest snap ring that will fit in shaft groove.

(22) Lubricate input shaft pilot bearing with petroleum jelly and install bearing in shaft (Fig. 60).

(23) Install input shaft on output shaft (Fig. 59). Be sure output shaft hub is fully seated in pilot bearing.

OUTPUT SHAFT AND CLUSTER GEAR INSTALLATION

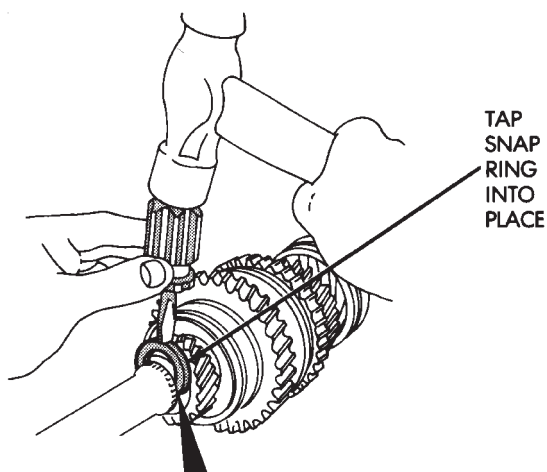
(1) Mount intermediate plate in vise (Fig. 24).

(2) Lubricate cluster gear journal and rear bearing with petroleum jelly or gear lubricant.

(3) Install cluster gear rear bearing in intermediate plate (Fig. 81). Be sure snap ring groove in bearing is rearward as shown.

(4) Start cluster gear into bearing (Fig. 57). Then hold bearing and push gear into place. Use plastic or rawhide mallet to seat bearing if necessary.

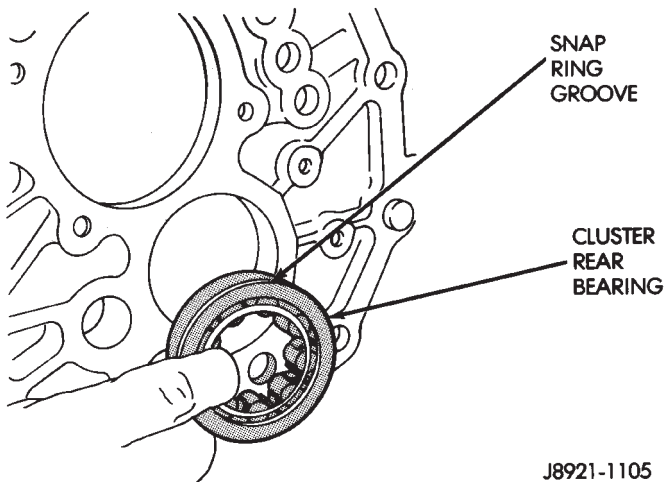
(5) Start output shaft rear bearing in intermediate plate. Push shaft rearward and tap intermediate plate with mallet to seat bearing.



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. 80 Selecting Fifth Gear Snap Ring



J8921-1105

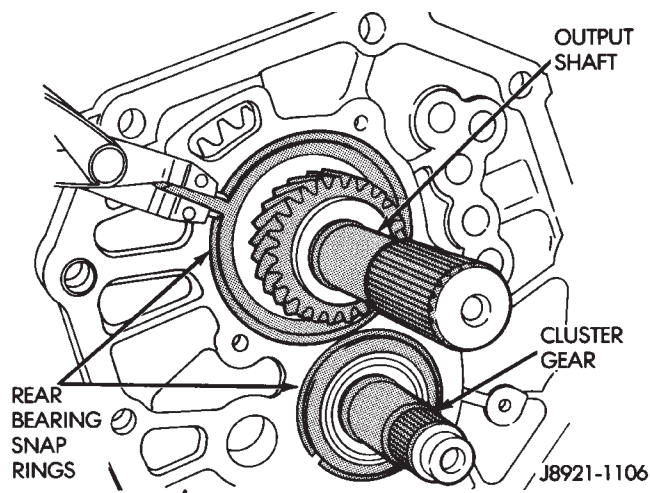
Fig. 81 Installing Cluster Gear Rear Bearing

(6) Install snap rings on cluster and output shaft rear bearings only (Fig. 82). Do not install front bearing snap rings at this time.

(7) Install reverse idler gear and shaft (Fig. 83).

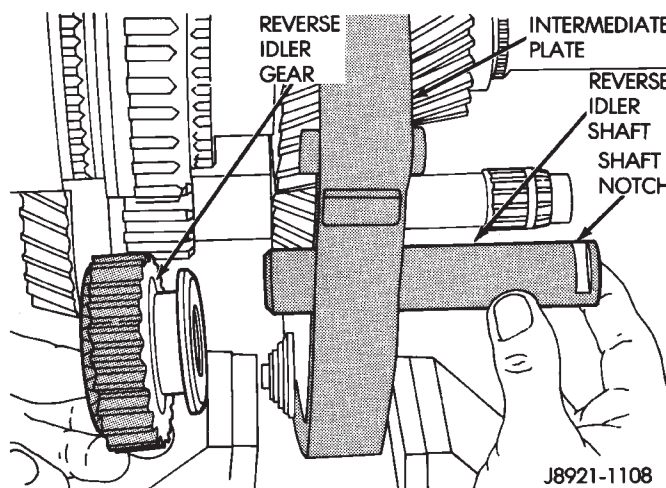
(8) Position rear bearing retainer over output shaft and rear bearing. **Be sure bearing retainer tab is engaged in reverse idler shaft notch (Fig. 84).**

(9) Install and tighten rear bearing retainer bolts to 18 N•m (13 ft-lbs).



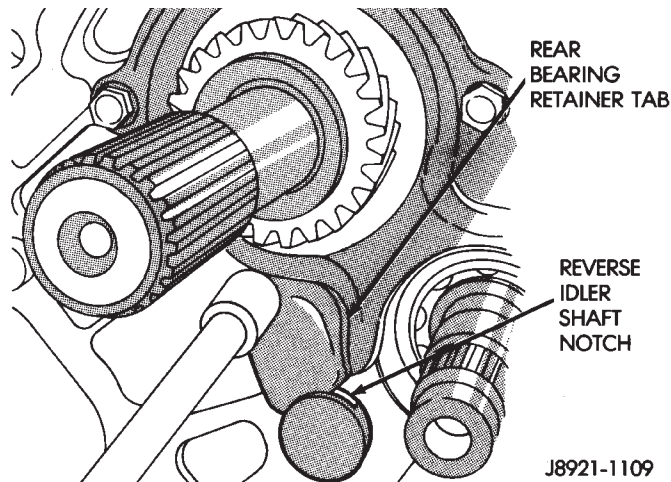
J8921-1106

Fig. 82 Installing Rear Bearing Snap Rings



J8921-1108

Fig. 83 Installing Reverse Idler Gear And Shaft



J8921-1109

Fig. 84 Installing Rear Bearing Retainer

SHIFT RAIL AND FORK INSTALLATION

The shift rail interlock pins, balls and plugs must be installed in the correct sequence for proper shifting. Refer to the installation diagram (Fig. 85) during assembly.

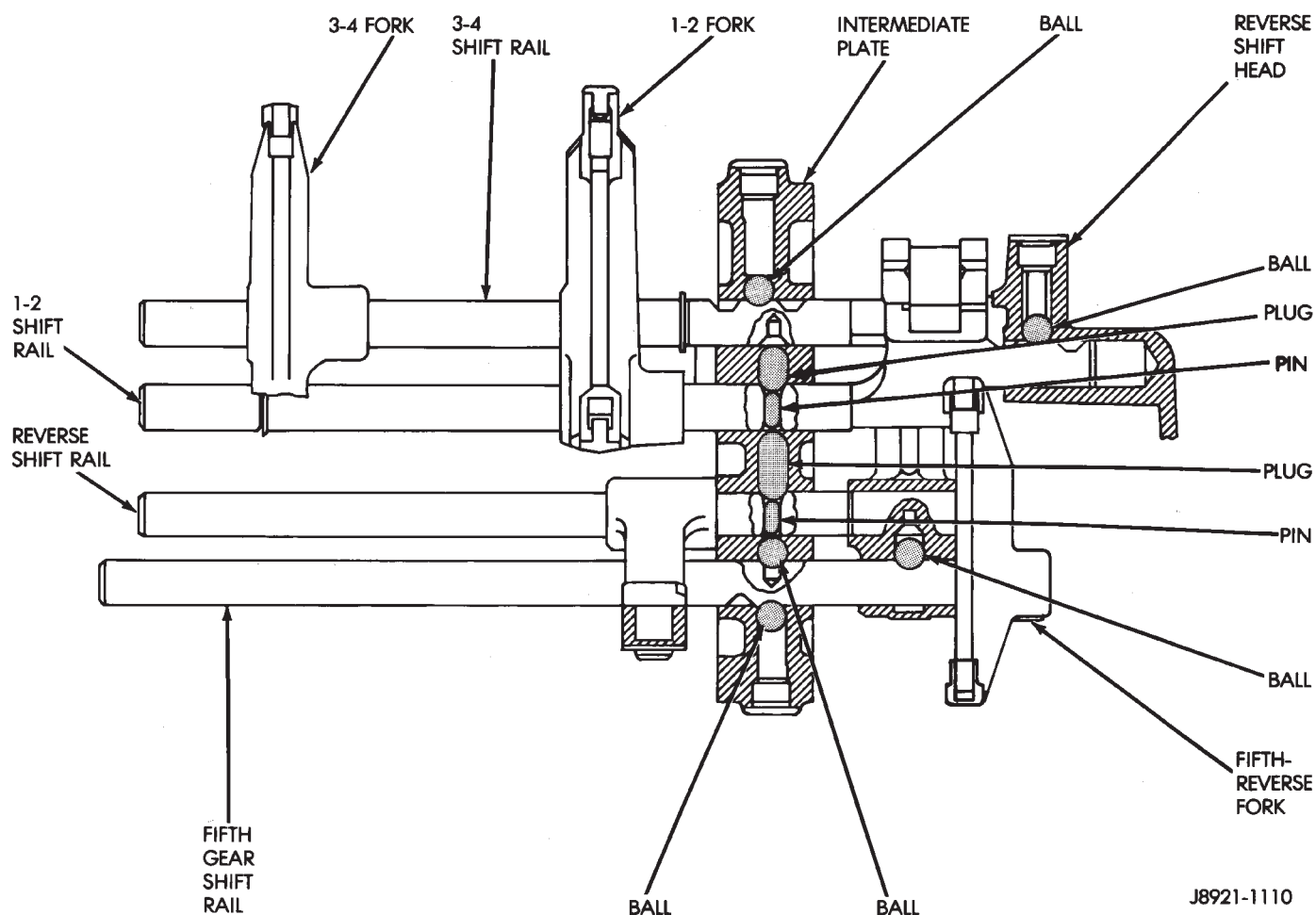


Fig. 85 Shift Rail Ball-Plug-Pin Position

Coat the intermediate plate shift rail bores and the interlock balls, pins and plugs with a thick covering of petroleum jelly before assembly. The jelly will hold the interlock components in place making installation easier. Use a pencil magnet to hold and insert the interlocks. Then use a small screwdriver to push the interlock components into place.

- (1) Coat reverse rail interlock pin with petroleum jelly and install pin in rail (Fig. 86).
- (2) Install reverse shift rail in intermediate plate (Fig. 87).
- (3) Install reverse shift rail C-ring (Fig. 51).

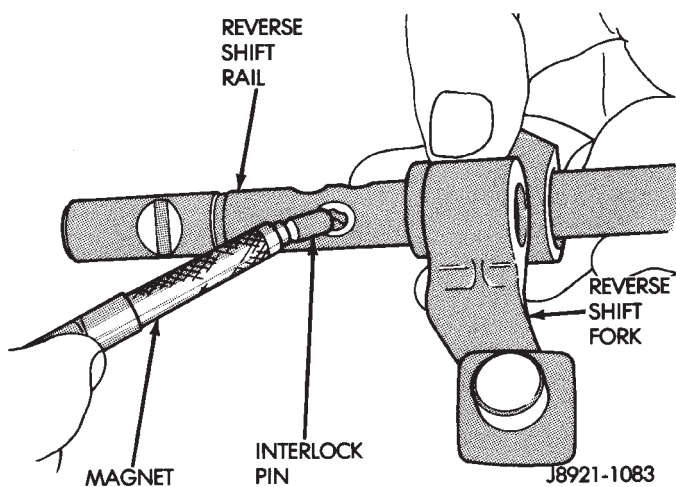


Fig. 86 Installing Reverse Shift Rail Interlock Pin

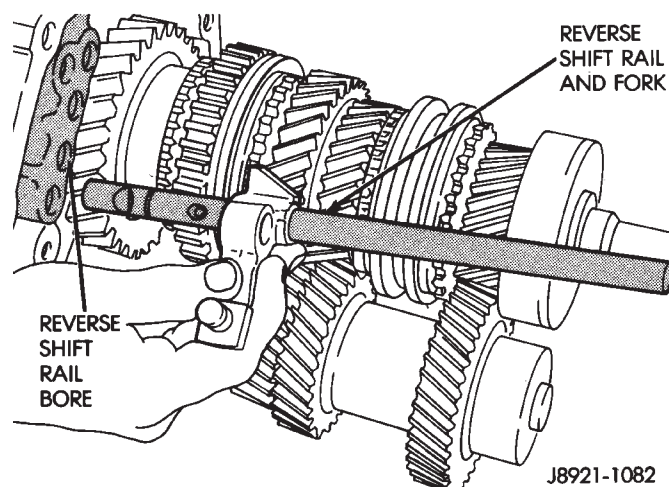


Fig. 87 Installing Reverse Shift Rail And Fork

(4) Position 1-2 and 3-4 shift forks in synchro sleeves (Fig. 88). (5) Coat reverse rail lock ball with petroleum jelly. Then tilt reverse shift fork upward and insert ball in intermediate plate (Fig. 89).

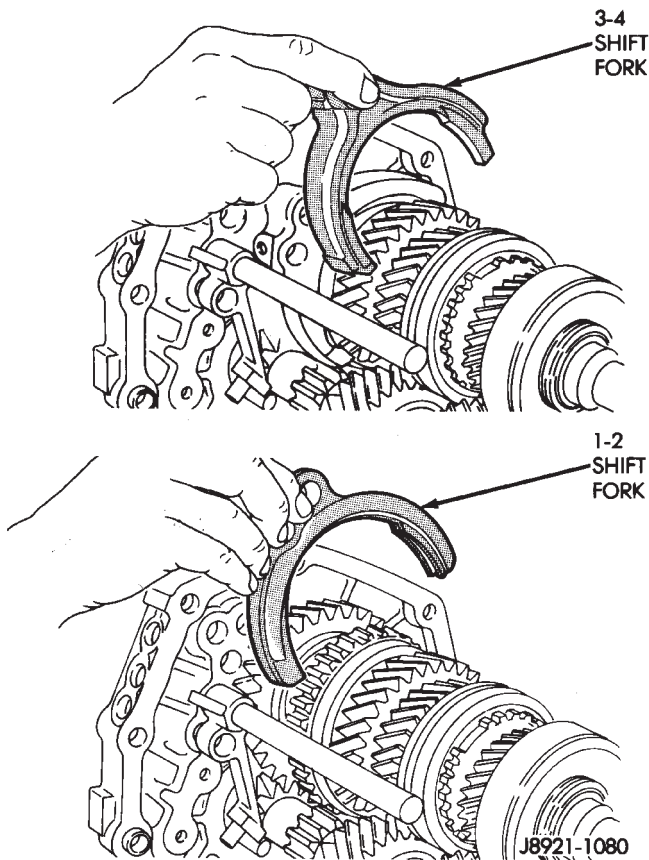


Fig. 88 Shift Fork Installation

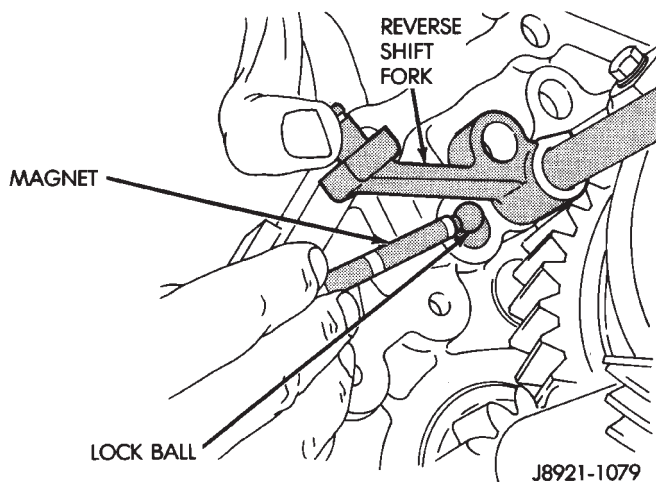


Fig. 89 Installing Reverse Shift Rail Lock Ball

(6) Coat 1-2 shift rail interlock plug with petroleum jelly and install it in intermediate plate bore (Fig. 90).

(7) Coat 1-2 shift rail interlock pin with petroleum jelly and insert it in shift rail (Fig. 91).

(8) Install 1-2 shift rail in intermediate plate and 1-2 fork (Fig. 92).

(9) Coat 3-4 shift rail interlock plug with petroleum

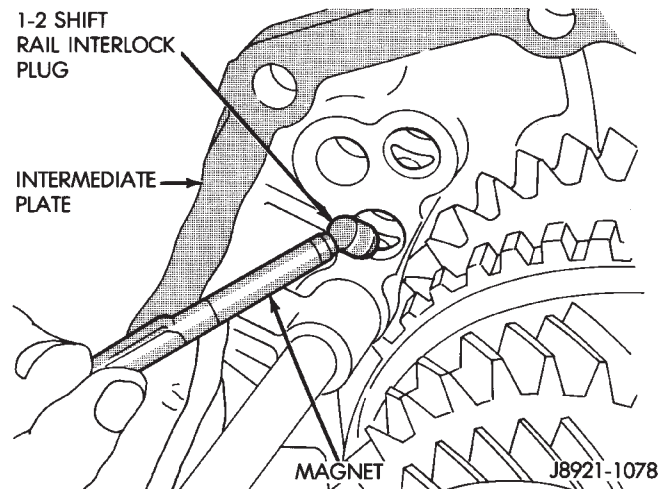


Fig. 90 Installing 1-2 Shift Rail Interlock Plug

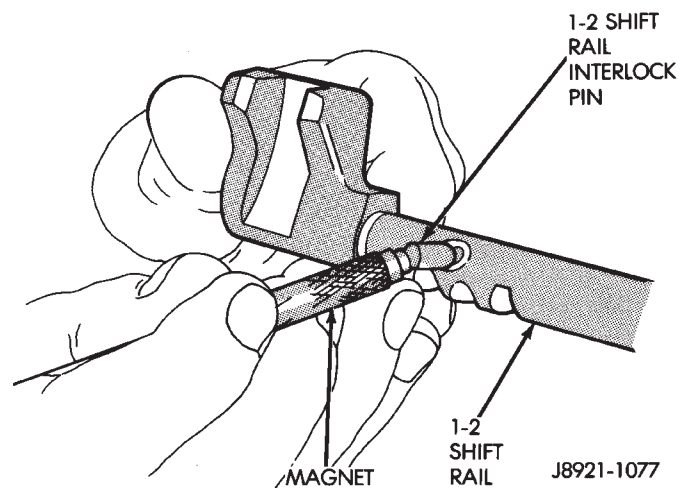


Fig. 91 Installing 1-2 Shift Rail Interlock Pin

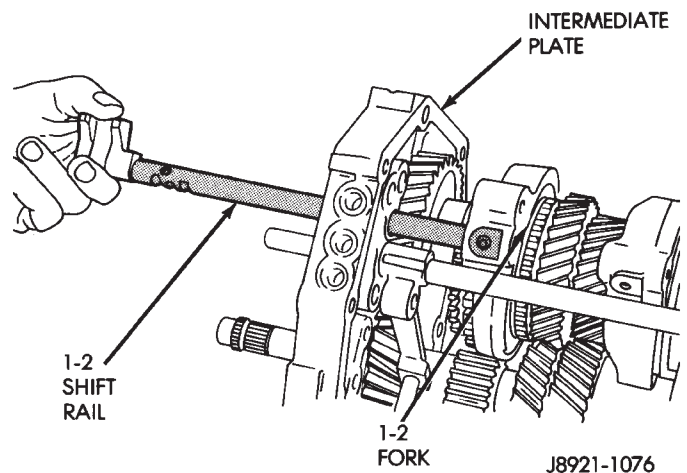


Fig. 92 Installing 1-2 Shift Rail

jelly and install plug in intermediate plate (Fig. 93).

(10) Install 3-4 shift rail in intermediate plate and in both shift forks (Fig. 94).

(11) Verify that none of the interlock balls, plugs,

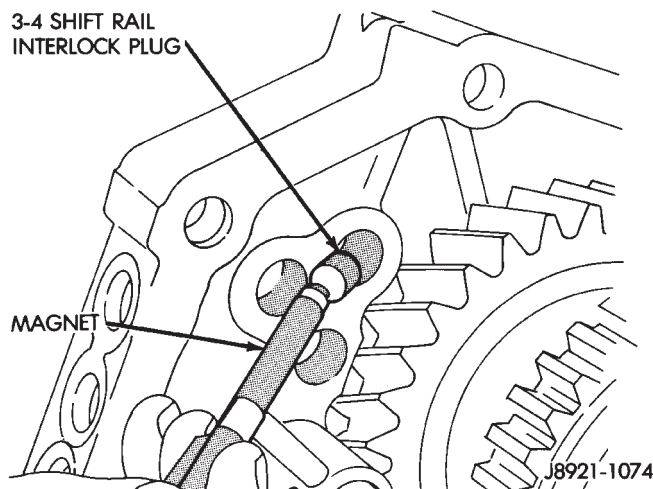


Fig. 93 Installing 3-4 Shift Rail Interlock Plug

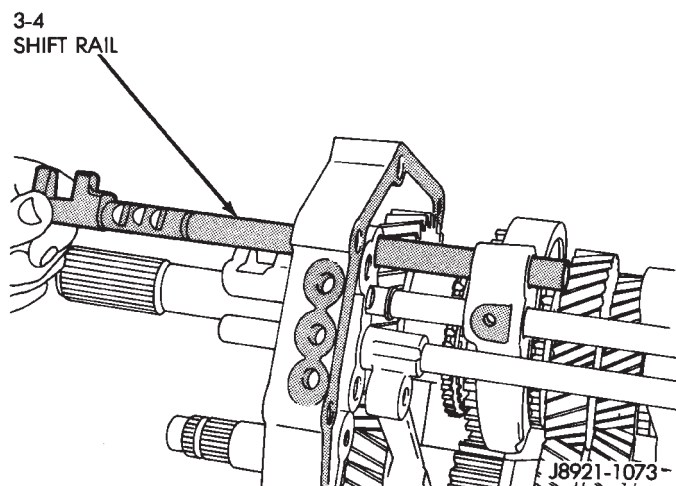


Fig. 94 Installing 3-4 Shift Rail

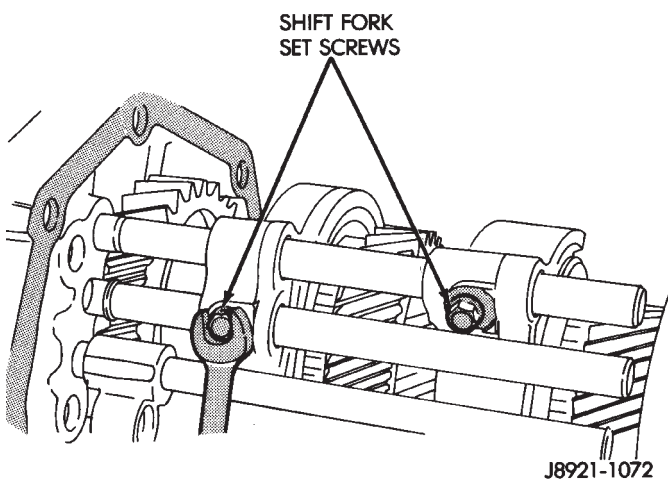


Fig. 95 Installing Shift Fork Set Screws

or pins were displaced during shift rail installation.

(12) Install and tighten shift fork setscrews to 20 N•m (14 ft. lbs.) torque (Fig. 95).

(13) Install 1-2 and 3-4 shift rail C-rings (Fig. 96).

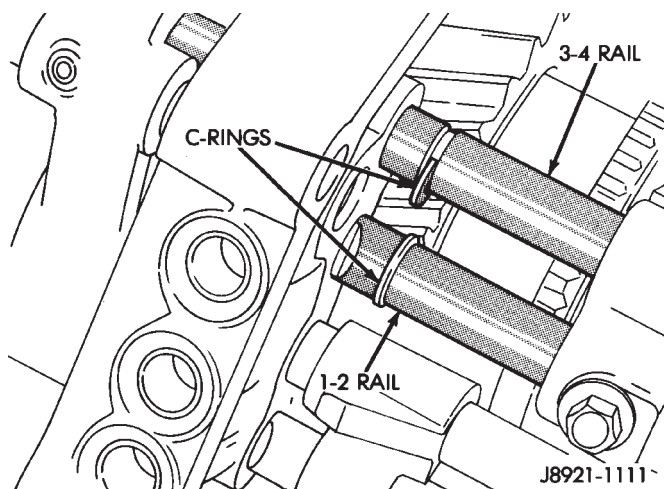


Fig. 96 Installing Shift Rail C-Rings

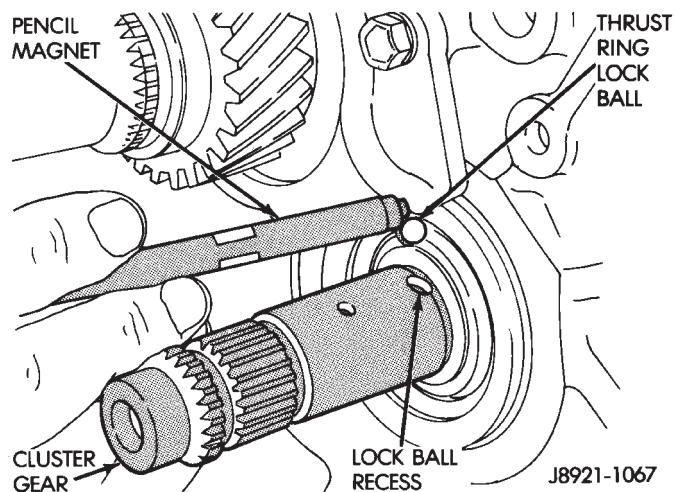


Fig. 97 Installing Thrust Ring Lock Ball

(14) Insert fifth gear shift rail through reverse shift fork. **Then slide rail into intermediate plate just far enough to secure interlock ball. Do not fully install shift rail at this time.**

FIFTH-REVERSE GEAR AND SHIFT COMPONENT INSTALLATION

(1) Install thrust ring lock ball in cluster gear journal (Fig. 97). Use petroleum jelly to hold ball in place.

(2) Install fifth gear thrust ring (Fig. 98). Be sure thrust ring notch fits over lock ball.

(3) Assemble counter fifth gear, synchro sleeve, inserts and insert springs (Fig. 99).

(4) Lubricate two-piece bearing with petroleum jelly and install it in counter fifth gear (Fig. 100).

(5) Install counter fifth gear and synchro assembly on cluster gear journal (Fig. 101).

(6) Install synchro ring in synchro sleeve (Fig. 102).

(7) Install fifth spline gear on cluster journal (Fig. 103). Tap spline gear into place with plastic mallet if necessary.

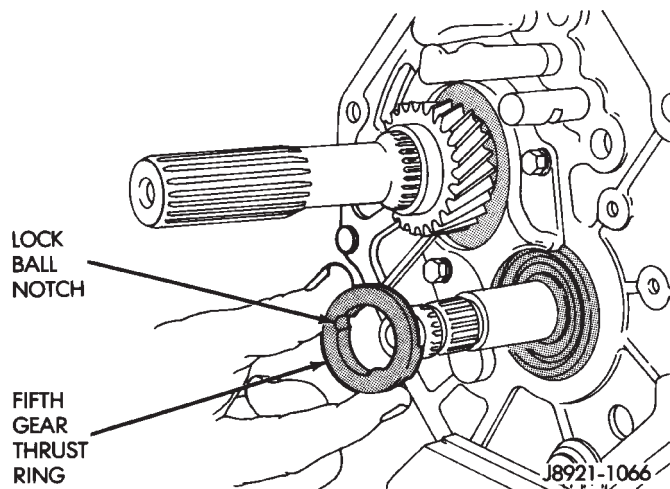


Fig. 98 Installing Fifth Gear Thrust Ring

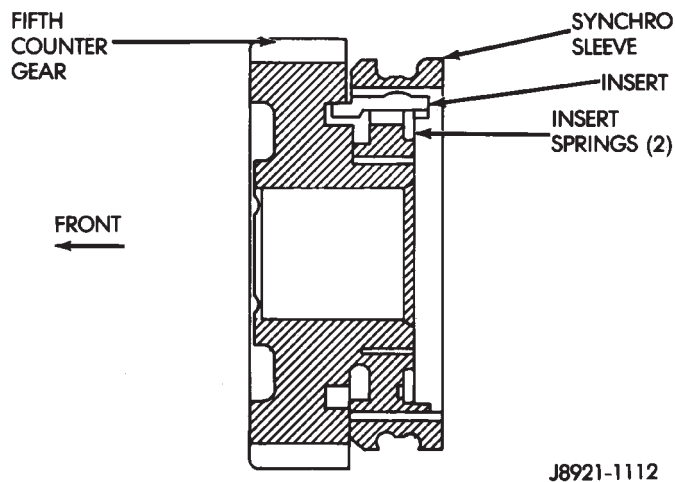


Fig. 99 Assembling Fifth Gear And Synchro Assembly

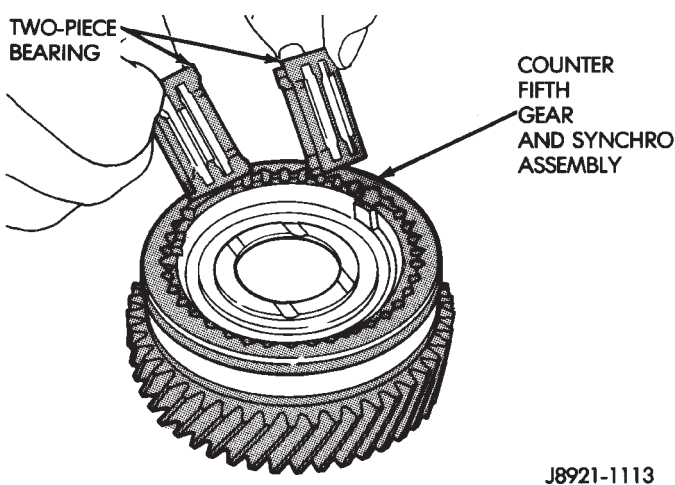


Fig. 100 Installing Counter Fifth Gear Bearing

(8) Install fifth gear selective snap ring (Fig. 104). Use thickest snap ring that will fit in shaft groove.

(9) Install reverse shift head and rail (Fig. 105). Then install lock ball in shift head.

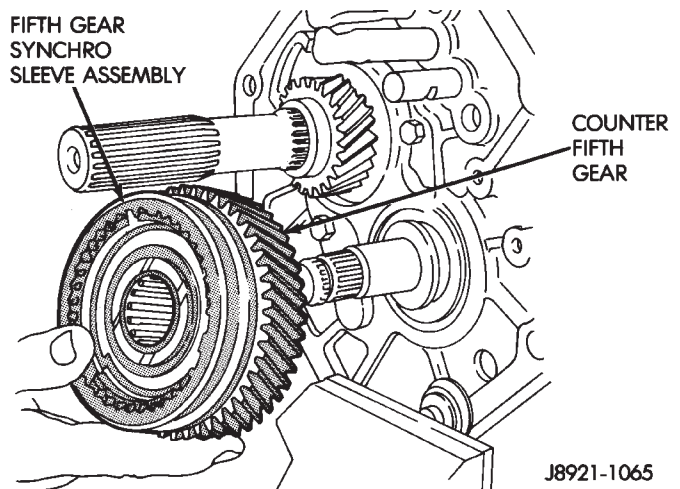


Fig. 101 Installing Counter Fifth Gear And Sleeve

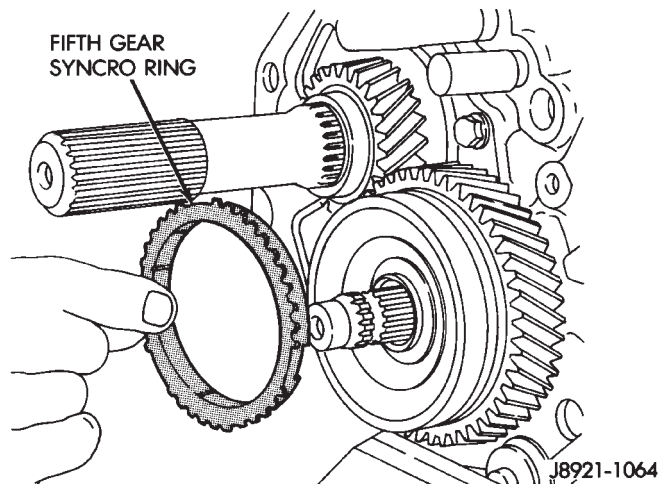


Fig. 102 Installing Fifth Gear Synchro Ring

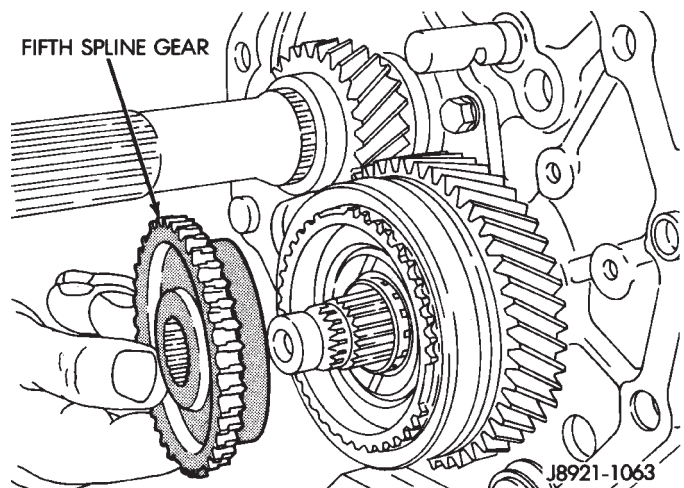
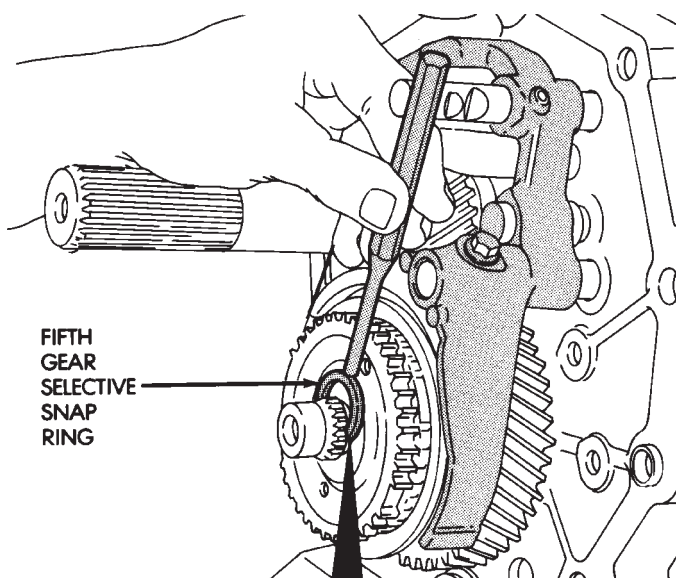


Fig. 103 Installing Fifth Spline Gear

(10) Position fifth gear shift fork in synchro sleeve (Fig. 106).



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. 104 Installing Fifth Gear Snap Ring

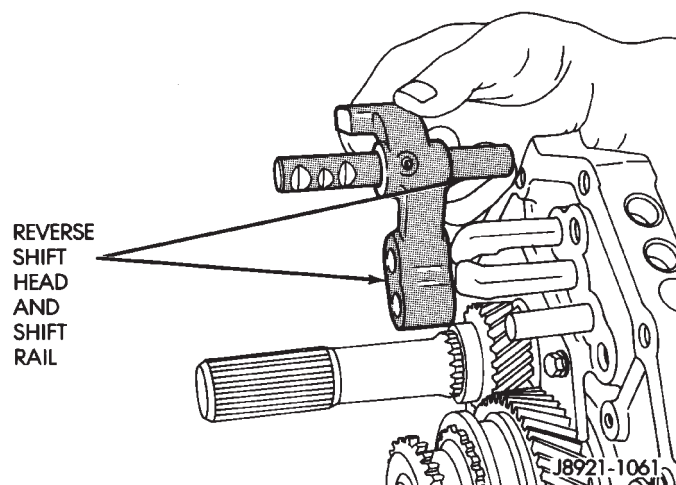


Fig. 105 Installing Reverse Shift Head And Rail

(11) Install fifth gear shift rail (Fig. 107). Slide rail through fork, shift head, intermediate plate and reverse shift fork. Be sure interlock ball is not displaced during installation.

(12) Align screw holes in shift fork and rail and install set screw (Fig. 108). Tighten screw to 20 N•m (15 ft. lbs.) torque.

(13) Install lock balls and springs in intermediate plate (Fig. 109). Then install and tighten lock ball plugs to 19 N•m (14 ft. lbs.) torque.

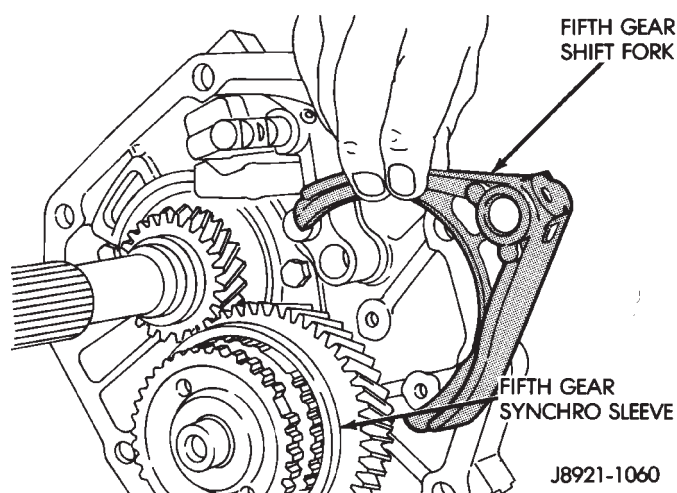


Fig. 106 Installing Fifth Gear Shift Fork

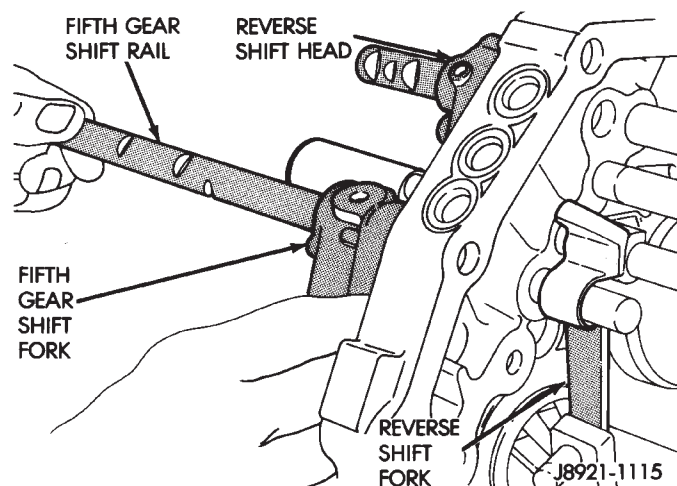


Fig. 107 Installing Fifth Gear Shift Rail

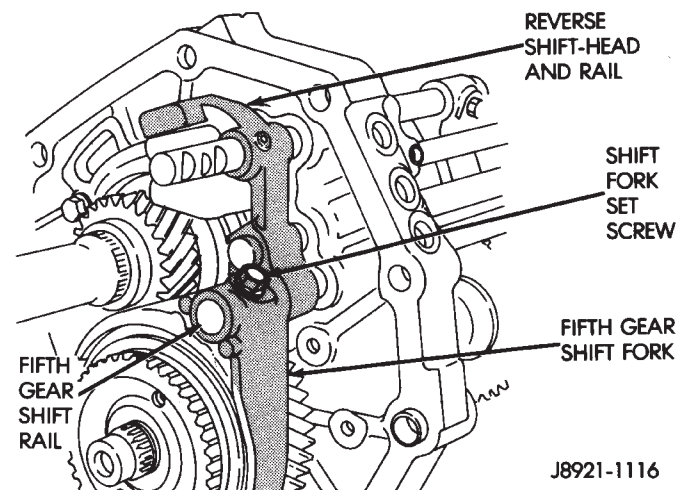


Fig. 108 Shift Fork Set Screw Installation

(14) Install reverse shift arm bracket (Fig. 110). Tighten bracket bolts to 18 N•m (13 ft. lbs.) torque.

(15) Install reverse shift arm (Fig. 110). Position arm on reverse fork pin and engage it with pin on shift arm bracket.

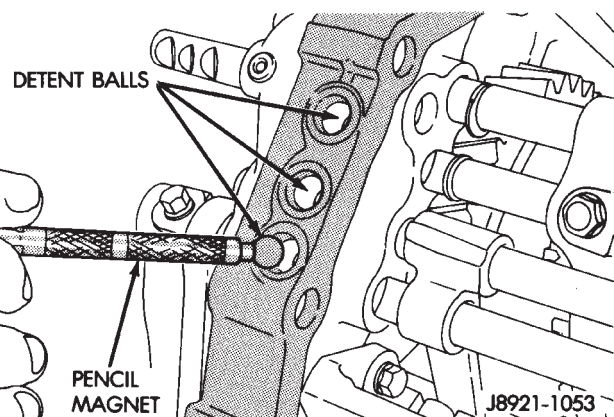
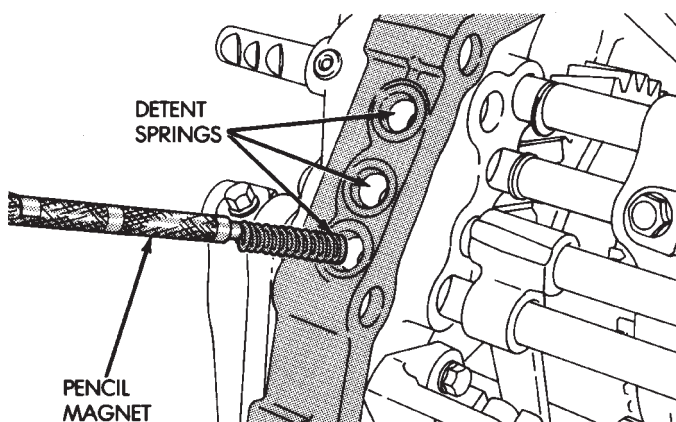


Fig. 109 Detent Ball And Spring Installation

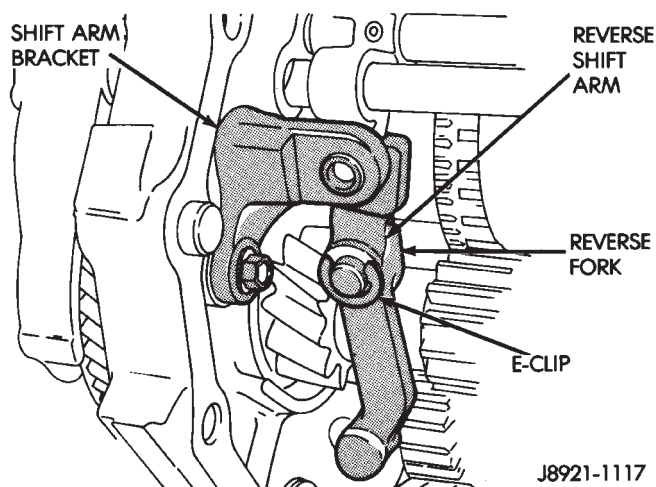


Fig. 110 Reverse Shift Arm And Bracket Installation

(16) Verify that shift arm shoe is engaged in reverse idler gear. Then secure shift arm to pin on reverse fork with new E-clip.

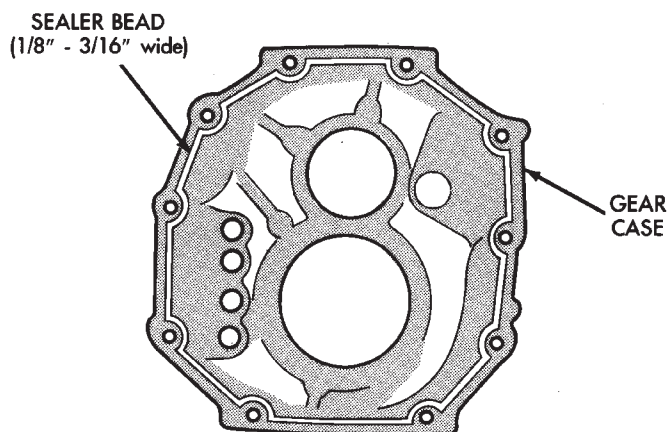
GEAR CASE AND ADAPTER INSTALLATION

(1) Dismount intermediate plate and gear assemblies from vise.

(2) Clean mating surfaces of intermediate plate and transmission gear case with wax and grease remover. Then wipe dry with a clean cloth.

(3) Apply 3 mm (1/8 in.) wide bead of Mopar Gasket

Maker, or Loctite 518 to mating surface of gear case. Keep sealer bead inside bolt holes as shown (Fig. 111).

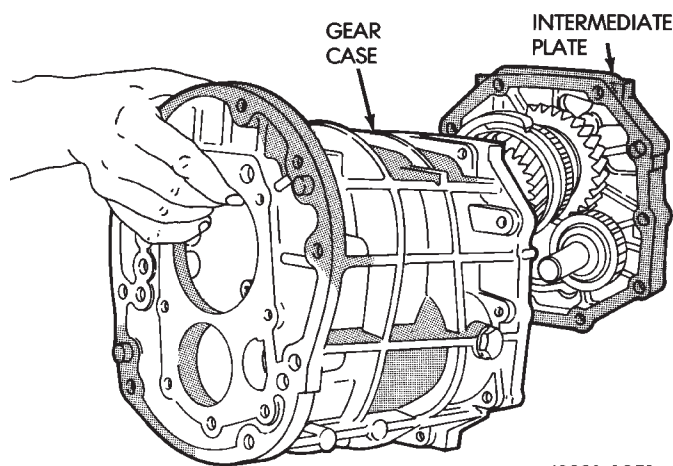


J8921-1118

Fig. 111 Applying Sealer To Gear Case

(4) Install gear case (Fig. 112). Align shift rails and bearings in case and tap case into position.

(5) Verify that gear case is seated on intermediate plate dowel pins.



J8921-1051

Fig. 112 Installing Gear Case

(6) Install front bearing snap rings (Fig. 113).

(7) Clean gear case and front bearing retainer sealing surfaces with wax and grease remover. Then wipe dry with a clean cloth.

(8) Install new seal in front bearing retainer. Then lubricate seal lip with petroleum jelly. **Installation depth for seal is 10.5 to 11.5 mm (0.413 to 0.453 in.).**

(9) Apply a 3 mm (1/8 in.) wide bead of Mopar Gasket Maker, or Loctite 518 to front bearing retainer sealing surface.

(10) Align and install front bearing retainer (Fig. 114). Be sure retainer is properly seated on case and bearings.

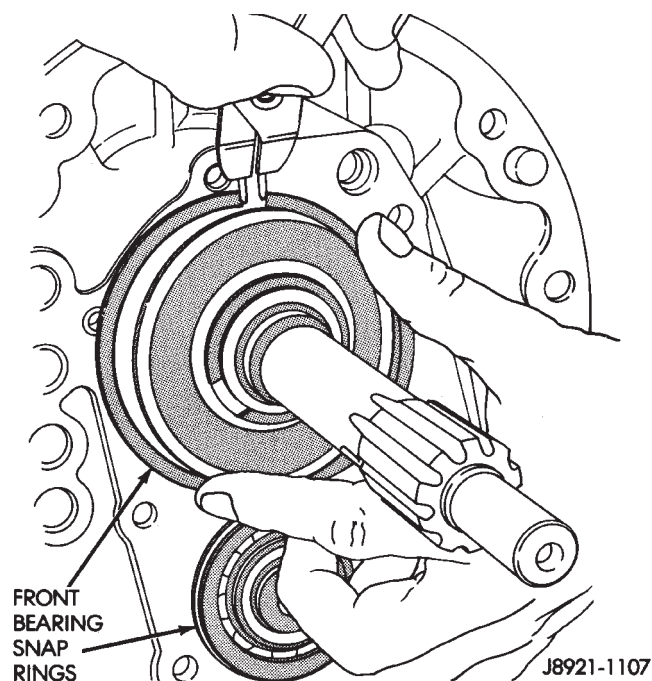


Fig. 113 Installing Front Bearing Snap Rings

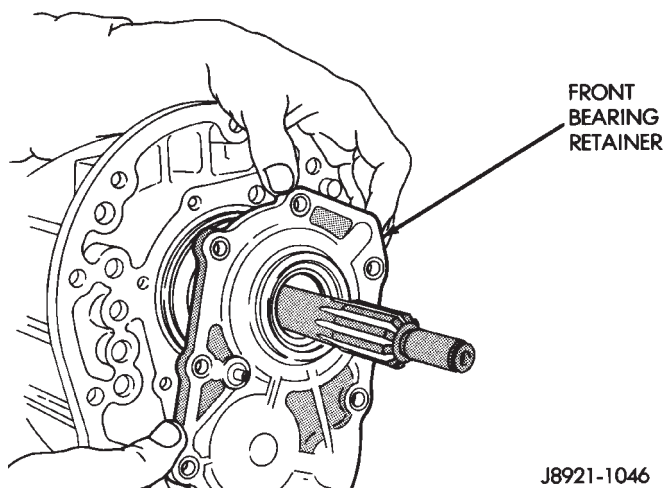


Fig. 114 Installing Front Bearing Retainer

(11) Install and tighten front bearing retainer bolts to 17 N•m (12 ft. lbs.) torque.

(12) On models with extension housing, install speedometer gear, lock ball and retaining rings (Fig. 115). Be sure lock ball is engaged in gear.

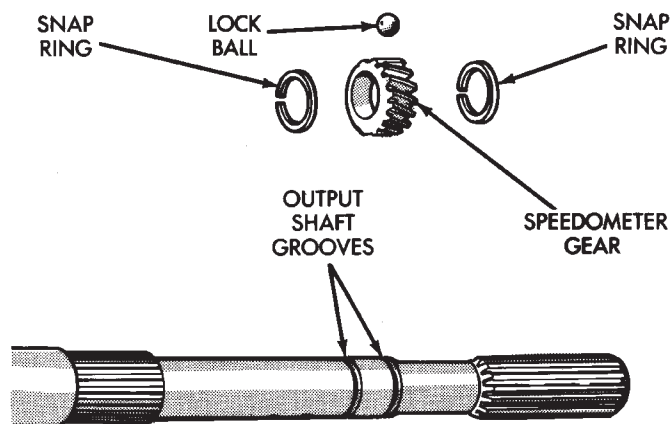
(13) Inspect condition of reverse pin in adapter/extension housing (Fig. 116). If pin is worn or damaged, replace it as follows:

(a) Remove roll pin access plug (Fig. 117).

(b) Tap roll pin out of housing with pin punch (Fig. 118). Then remove old reverse pin.

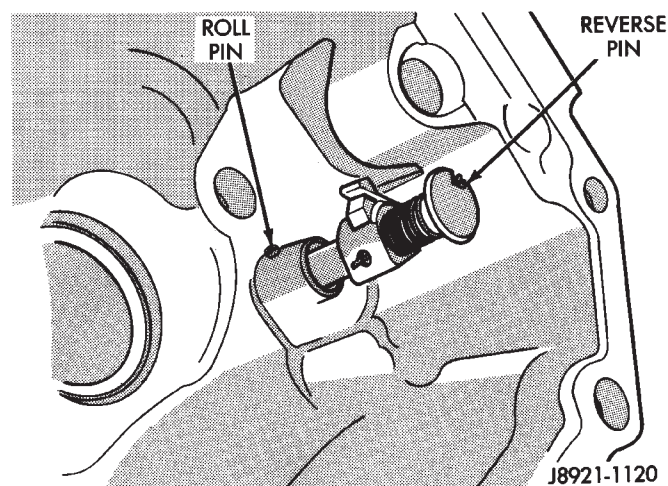
(c) Install new reverse pin and secure it with roll pin. Then install and tighten access plug to 19 N•m (14 ft. lbs.) torque.

(14) Clean sealing surfaces of adapter or extension housing and intermediate plate with wax and grease remover. Then wipe dry with a clean cloth.



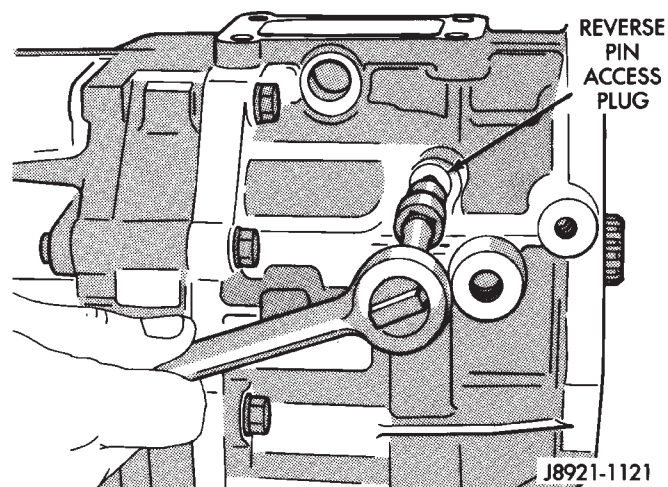
J8921-1119

Fig. 115 Speedometer Gear Installation (2WD Models)



J8921-1120

Fig. 116 Reverse Pin Position



J8921-1121

Fig. 117 Access Plug Removal/Installation

(15) Apply 3 mm (1/8 in.) wide bead of Mopar Gasket Maker, or Loctite 518 to sealing surface of adapter or extension housing. Keep sealer bead inside bolt holes as shown in Figure 111.

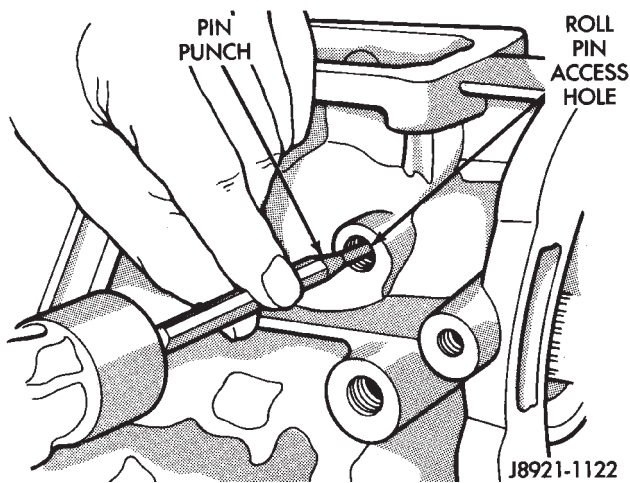


Fig. 118 Roll Pin Removal/Installation

(16) Align and install adapter or extension housing on intermediate plate (Fig. 119). Be sure housing is seated on intermediate plate dowel pins.

(17) Coat threads of housing attaching bolts with Mopar silicone sealer. Then install and tighten bolts to 37 N•m (27 ft. lbs.) torque.

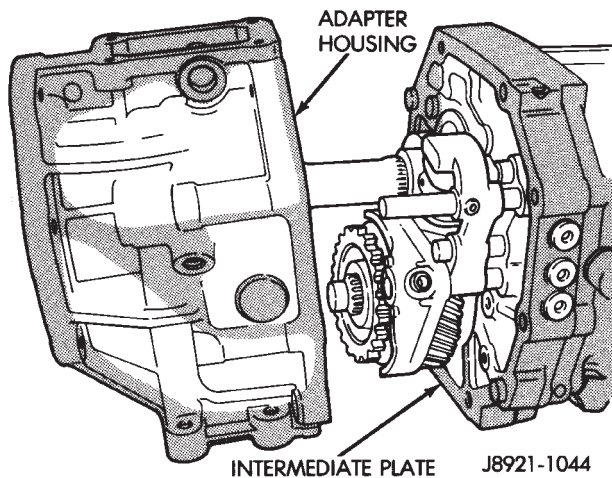


Fig. 119 Adapter/Extension Housing Installation

(18) Install detent ball (Fig. 120).

(19) Install detent spring (Fig. 121).

(20) Install detent access plug (Fig. 122). Tighten plug to 19 N•m (14 ft. lbs.) torque.

(21) Lubricate shift arm shaft and install it in adapter housing (Fig. 123).

(22) Position shift arm in adapter housing (Fig. 124). Be sure arm is engaged in shift rails.

(23) Align shift arm with shaft and push shaft into arm.

(24) Rotate shift arm shaft until set screw holes in shaft and arm are aligned.

(25) Install and tighten shift arm set screw to 38 N•m (28 ft. lbs.) torque (Fig. 125).

(26) Install and tighten restrictor pins to 19 N•m (14 ft. lbs.) torque (Fig. 125).

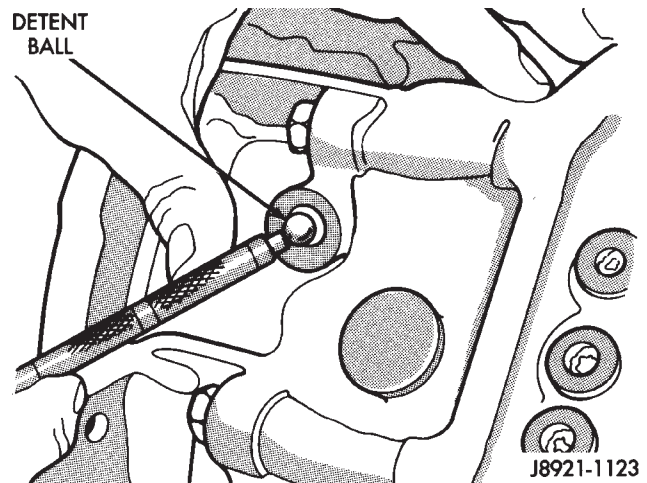


Fig. 120 Installing Detent Ball

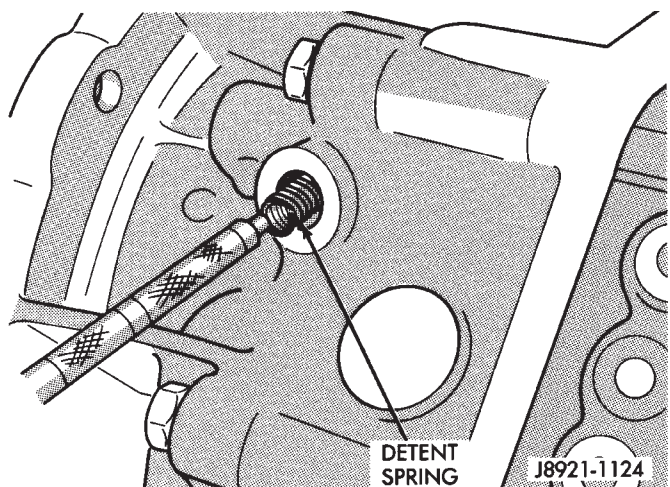


Fig. 121 Installing Detent Spring

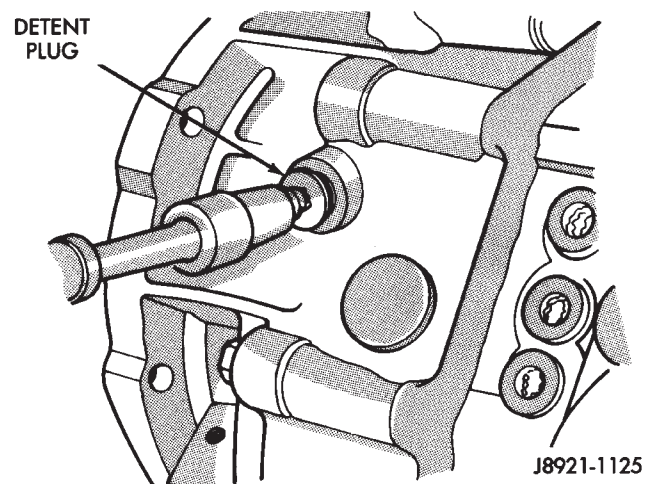


Fig. 122 Installing Detent Access Plug

(27) Install and tighten shift arm shaft access plug to 19 N•m (14 ft. lbs.) torque (Fig. 126).

(28) Position new shift tower gasket on adapter housing (Fig. 127).

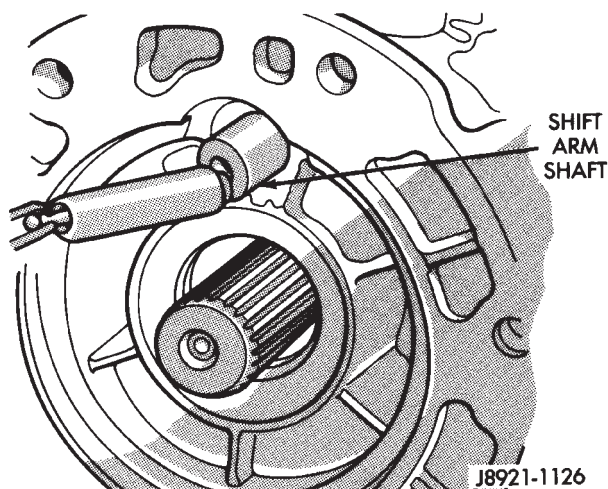


Fig. 123 Installing Shift Arm Shaft

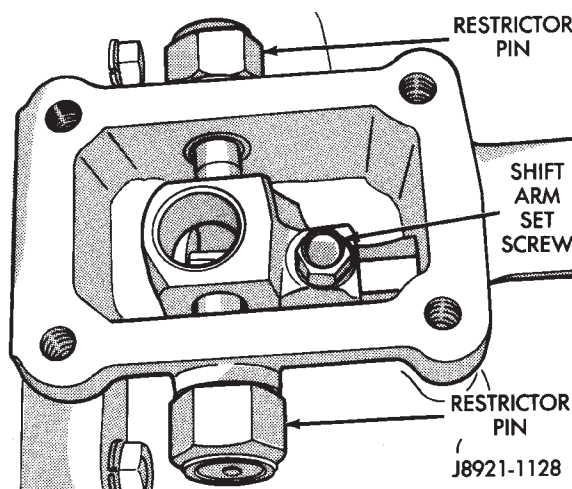


Fig. 125 Set Screw And Restrictor Pin Installation

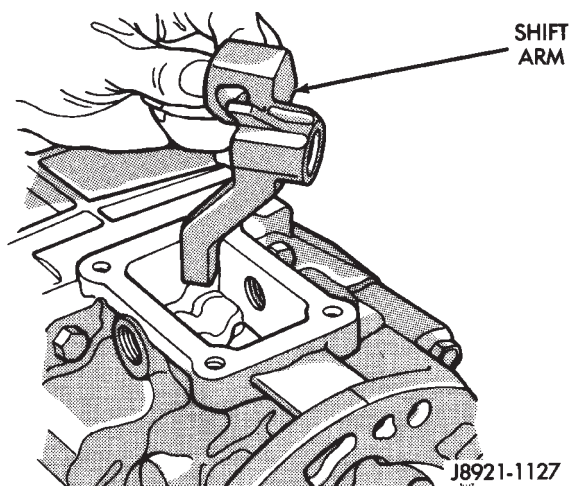


Fig. 124 Shift Arm Installation

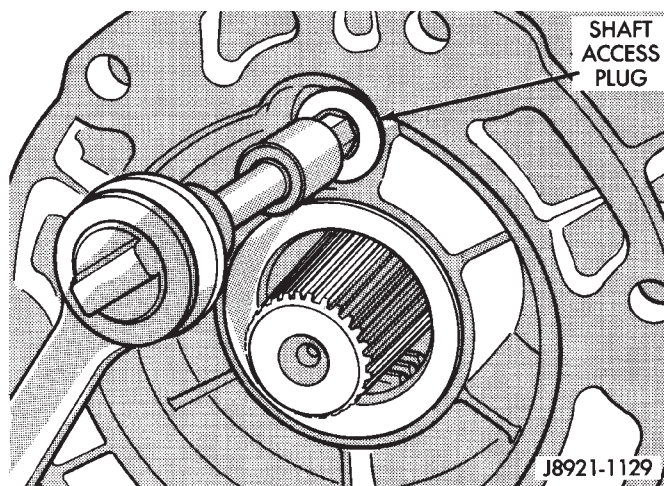


Fig. 126 Access Plug Installation

(29) Install shift tower (Fig. 128). Tighten tower attaching bolts to 18 N•m (13 ft. lbs.) torque.

(30) Install new gasket on backup light switch and install switch. Tighten switch to 37 N•m (27 ft. lbs.) torque.

(31) Install new washer on drain plug. Then install and tighten plug to 37 N•m (27 ft. lbs.) torque.

(32) If transmission will be filled with gear lubricant before installation, place transmission in a level position. Then fill with Mopar 75W-90, grade GL-5 gear lubricant. Correct fill level is to bottom edge of fill plug hole.

(33) Install new washer on fill plug. Then install and tighten plug to 37 N•m (27 ft. lbs.) torque.

(34) Install clutch housing and hydraulic concentric bearing.

(35) On models with extension housing, install new seal in housing with suitable size installer tool (Fig. 129). Lubricate seal lips with petroleum jelly before installation.

(36) On models with extension housing, install speedometer driven gear, speedometer adapter and speed sensor.

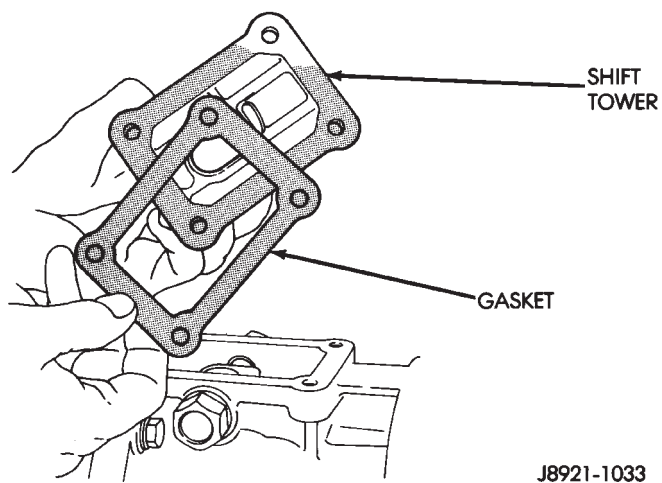


Fig. 127 Shift Tower Gasket Installation

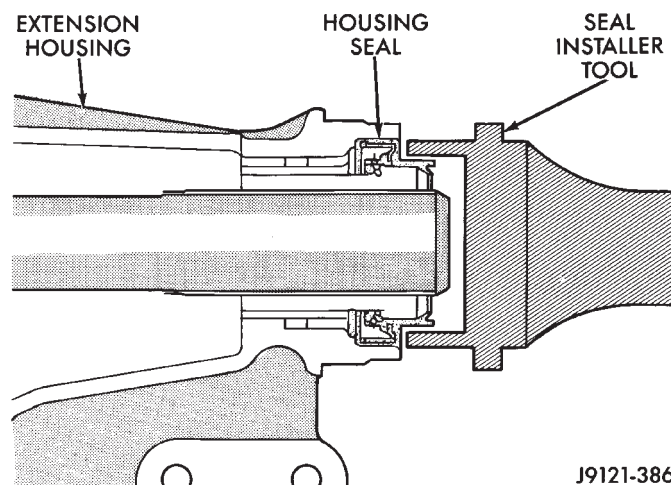


Fig. 129 Installing Extension Housing Seal

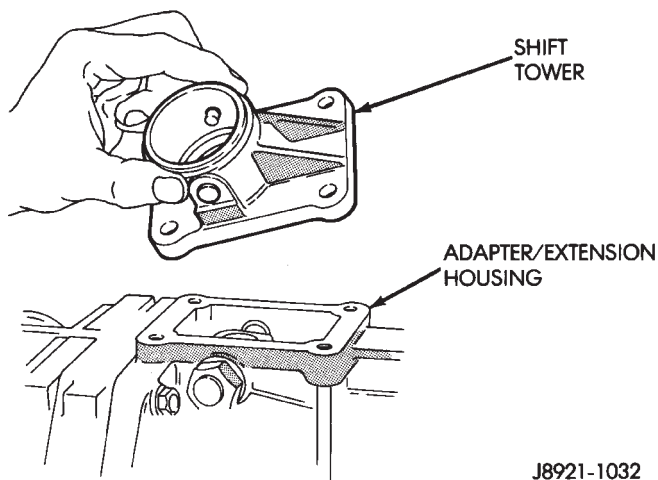


Fig. 128 Shift Tower Installation

AW-4 AUTOMATIC TRANSMISSION

CONTENTS

	page		page
GENERAL INFORMATION	34	INSTALLATION	69
AW-4 IN-VEHICLE SERVICE	51	AW-4 TRANSMISSION OVERHAUL	72
AW-4 TRANSMISSION DIAGNOSIS	45	SPECIFICATIONS	345
AW-4 TRANSMISSION/CONVERTER REMOVAL AND			

GENERAL INFORMATION

INDEX

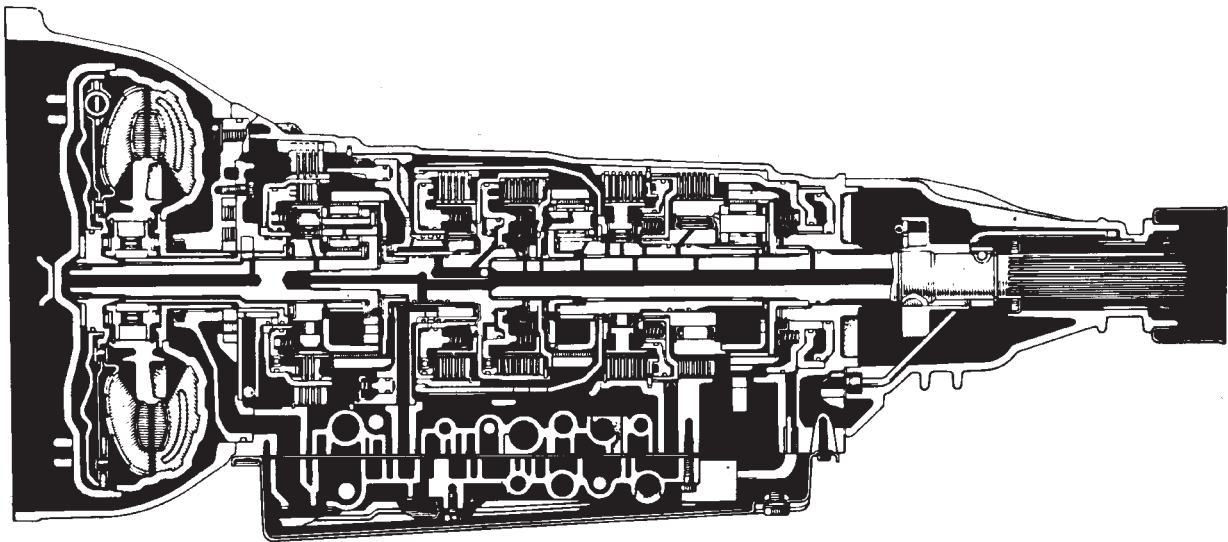
	page		page
Components and Operation	35	Hydraulic System	38
Description	34	Torque Converter	36
First—Third—Reverse Gear Components	37	Transmission Identification	35
Fourth Gear Overdrive Components	36	Transmission Ranges and Shift Lever Positions ..	35
Geartrain Operation and Application Charts	37		

DESCRIPTION

The AW-4 is a 4-speed, electronically controlled automatic transmission (Fig. 1). Running gear consists of a torque converter, oil pump, three planetary gear sets, clutch and brake units, hydraulic accumulators, a valve body with electrical solenoids and a transmission control module (TCM).

Cables are used for shifting and transmission throttle pressure control. A park/neutral position switch permits engine starting in Park and Neutral range only.

The valve body solenoids are controlled by signals from a transmission control module (TCM). Signal sequence is determined by vehicle speed and throttle position.



J8921-398

Fig. 1 AW-4 Automatic Transmission

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 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 with the shift lever in D position (Fig. 2).

P	PARK
R	REVERSE
N	NEUTRAL
D	FIRST THROUGH FOURTH GEAR (FOURTH GEAR OVERDRIVE)
3	THIRD GEAR (MANUAL)
1-2	FIRST-SECOND GEAR (MANUAL)

J8921-399

Fig. 2 AW-4 Shift Lever Positions And Transmission Ranges

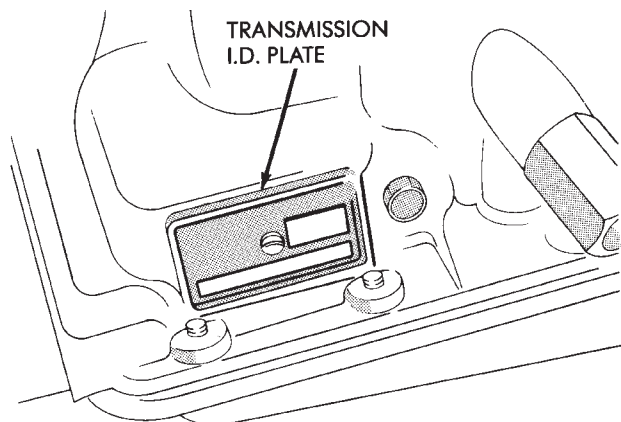
TRANSMISSION IDENTIFICATION

The transmission identification plate is attached to the case (Fig. 3). The plate contains the transmission serial and model numbers. Refer to the information on this plate when ordering service parts.

COMPONENTS AND OPERATION

ELECTRONIC CONTROLS

The AW-4 is electronically controlled in the 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.



J8921-400

Fig. 3 Transmission Identification

TRANSMISSION CONTROL MODULE (TCM)

The module determines shift and converter clutch engagement timing based on signals from the sensors. The valve body solenoids are activated, or deactivated accordingly.

The module has a self diagnostic program. Component and circuitry malfunctions can be diagnosed with the DRB II 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, simply 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 transmission control module. The solenoids control operation of the converter clutch and shift valves in response to input signals from the module.

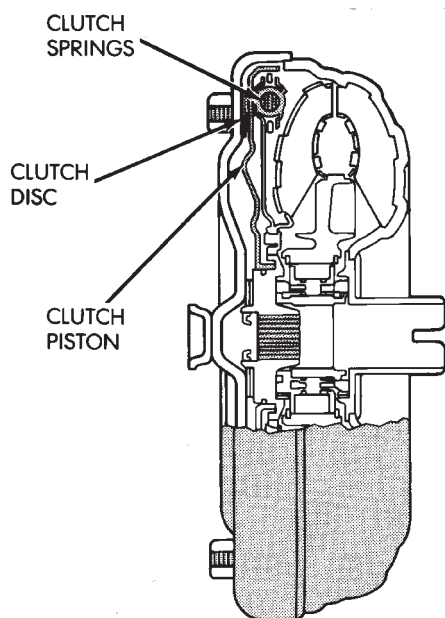
SENSORS

The sensors include the throttle position sensor (TPS), transmission output speed sensor, vehicle speed sensor, park/neutral position switch and 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 har-



J8921-401

Fig. 4 Torque Converter With Modulated Clutch

ness. 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 consists of an impeller, stator, and turbine. The converter also contains an electronic modulated converter clutch mechanism and an overrunning clutch in the stator hub.

The converter modulated clutch mechanism consists of a sliding clutch piston, clutch springs and the clutch disc friction material (Fig. 4). The clutch provides optimum torque transfer and fuel economy when engaged.

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.

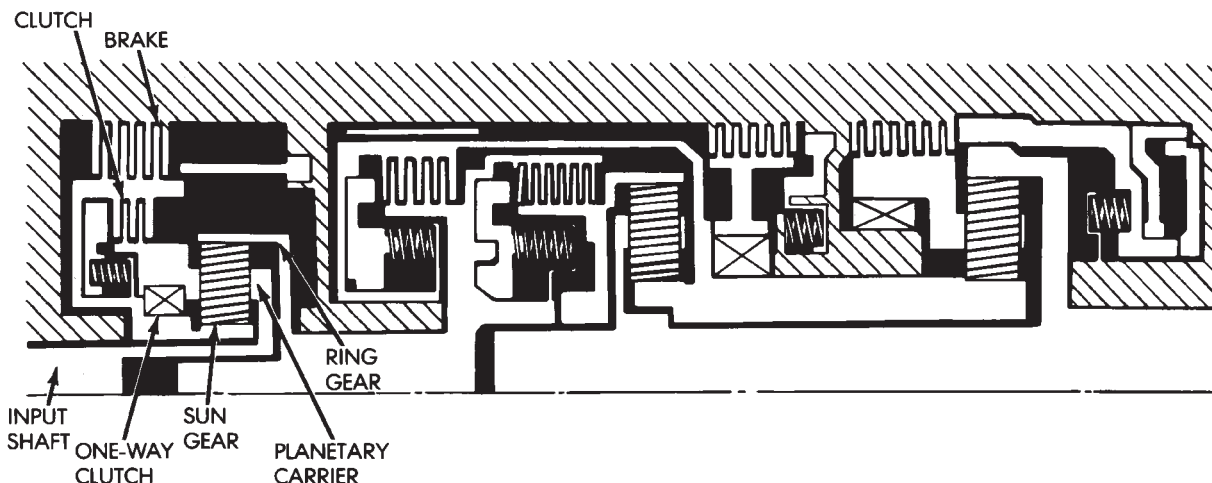
Torque converter clutch engagement occurs in second gear in 1-2 position; third gear in 3 position and third and fourth gear in D position.

FOURTH GEAR OVERDRIVE COMPONENTS

The overdrive system consists of the input shaft, one-way clutch, planetary sun gear, ring gear, planetary carrier, direct clutch and overdrive brake (Fig. 5). The overdrive elements are controlled and applied through transmission valve body solenoid number two.

In overdrive fourth gear, the brake prevents the overdrive sun gear from turning. During operation, the overdrive elements operate as follows:

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.



J8921-402

Fig. 5 Fourth Gear Overdrive Components

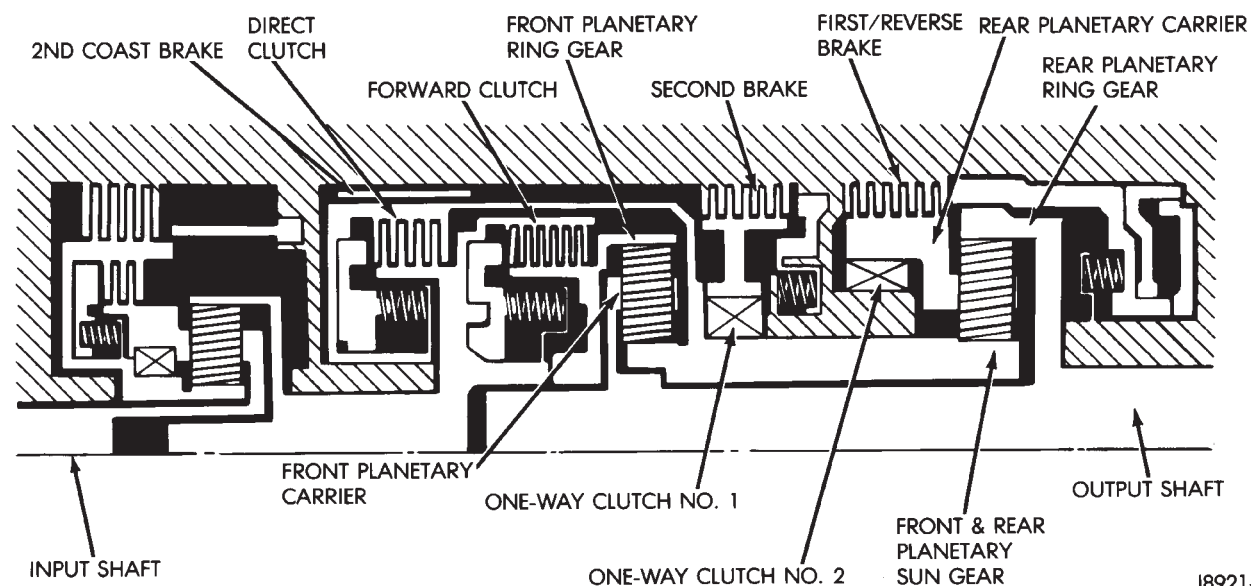


Fig. 6 First-Third-Reverse Gear Components

FIRST—THIRD—REVERSE GEAR COMPONENTS

First, third and reverse gear components are outlined in Figure 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 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.

GEARTRAIN OPERATION AND APPLICATION CHARTS

Operation and application of the first through fourth and reverse gear elements are outlined in the function and application charts.

The Component Function Chart (Fig. 7), describes basic function of various geartrain elements. The Component Application Chart (Fig. 8), indicates

NOMENCLATURE	FUNCTION
Overdrive Direct Clutch	Connects overdrive sun gear and overdrive carrier
Overdrive Brake	Prevents overdrive sun gear from turning either clockwise or counterclockwise
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 and front and rear sun gear
Second Coast Brake	Prevents front and rear sun gear from turning either clockwise or counterclockwise
Second Brake	Prevents outer race of No. 1 one-way clutch from turning either clockwise or counterclockwise, thus preventing front and rear sun gear from turning counterclockwise
First/Reverse Brake	Prevents rear planetary carrier from turning either clockwise or counterclockwise
One-Way Clutch No. 1	When second brake is operating, prevents front and rear sun gear from turning counterclockwise
One-Way Clutch No. 2	Prevents rear planetary carrier from turning counterclockwise

Fig. 7 Component Function 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

Fig. 8 Component Application Chart

which elements (including valve body solenoids), are applied in the various gear ranges.

HYDRAULIC SYSTEM

The basic hydraulic system consists of the oil pump, valve body and solenoids and four hydraulic accumulators. The oil pump provides the necessary system lubrication and operating pressure.

The valve body controls application of the clutches, brakes, second coast band and the torque converter clutch. The valve body solenoids control sequencing of the 1-2, 2-3 and 3-4 shift valves within the valve body. 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.

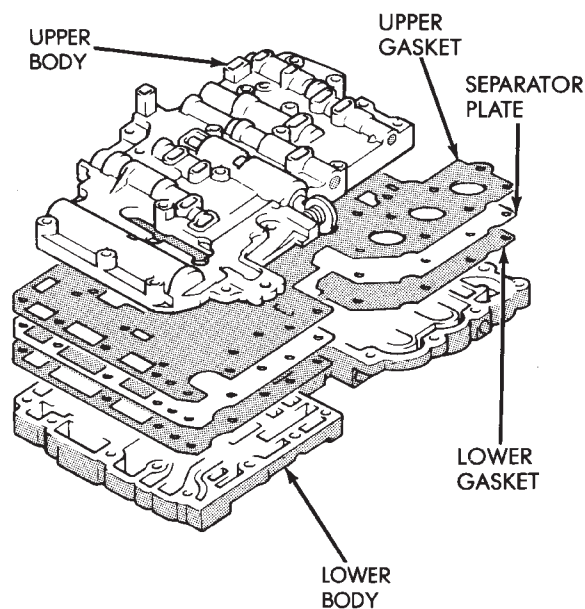
OIL PUMP

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 valve body. The valve body consists of an upper body, lower body, separator plate and upper and lower gaskets (Fig. 9). The shift 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 body



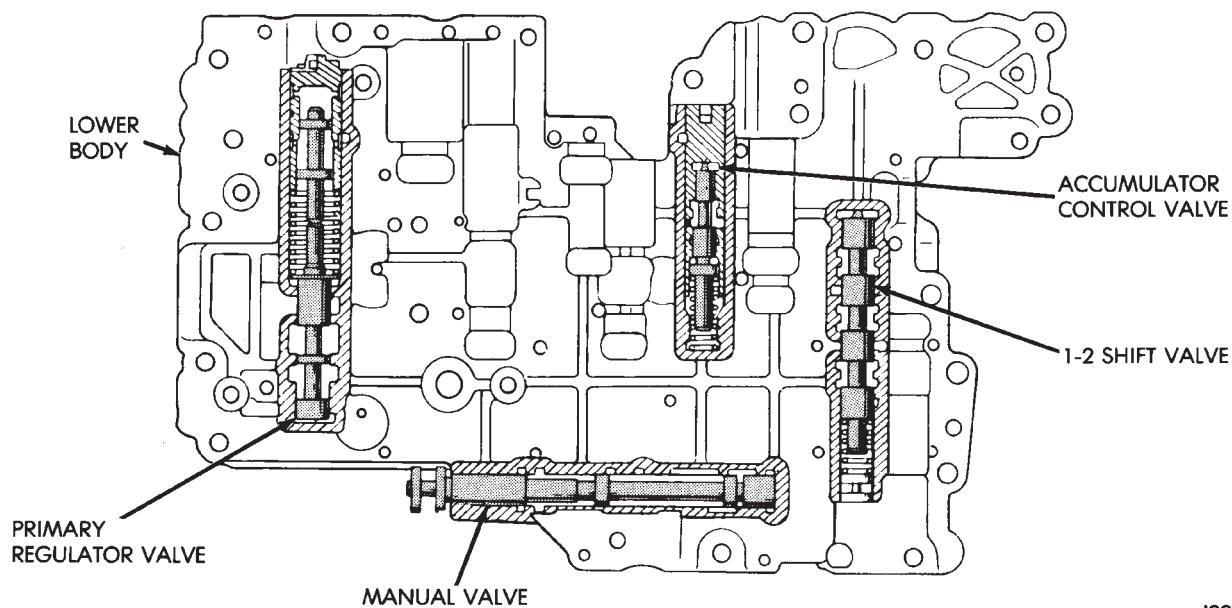
J8921-406

Fig. 9 Two-Section Transmission Valve Body

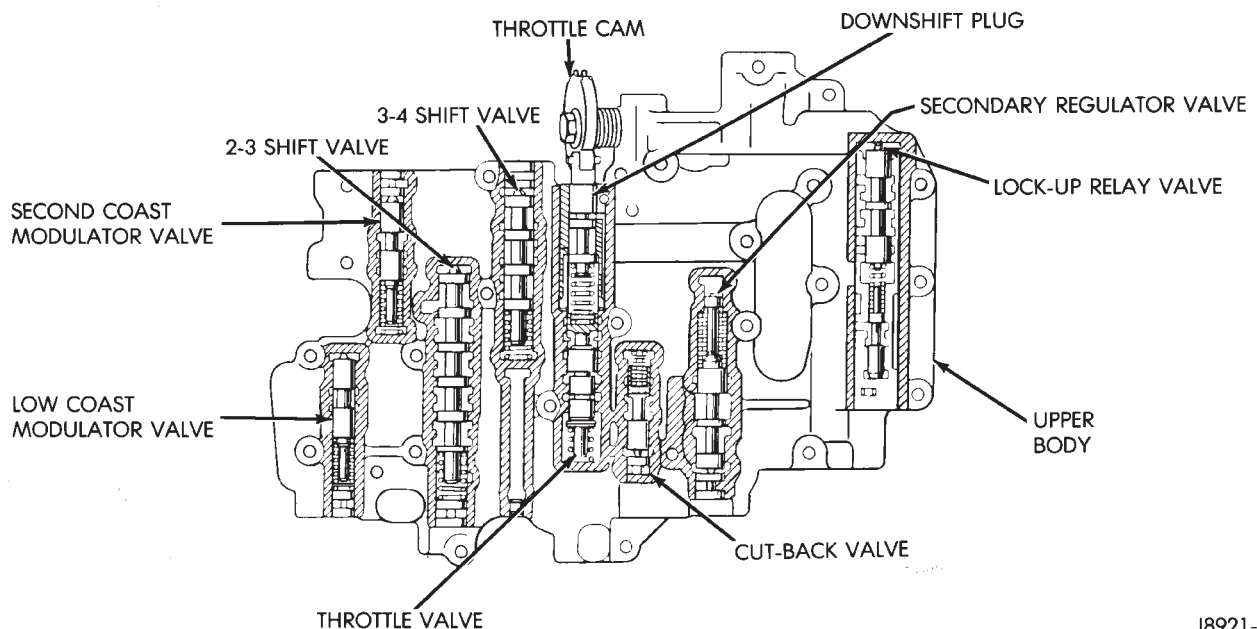
section (Fig. 10). The remaining control and shift valves plus check balls and one additional oil strainer are located in the upper body section (Fig. 11).

Manual Valve

The manual valve is operated by the gearshift linkage. The valve diverts fluid to the apply circuits according to shift lever position.



J8921-407

Fig. 10 Upper Body Components

J8921-408

Fig. 11 Lower Body Components**Primary Regulator Valve**

The primary regulator valve (Fig. 13) 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.

Throttle Valve and Downshift Plug

The throttle valve and downshift plug (Fig. 14) control throttle pressure to the primary regulator valve.

The downshift plug and throttle valve are operated by the throttle valve cam and throttle cable in response to engine throttle position. Throttle valve pressure is also modulated by the cut-back valve in second, third and fourth gear ranges.

Cut-Back Valve

The cut-back valve (Fig. 15) helps prevent excessive pump pressure buildup in second, third and

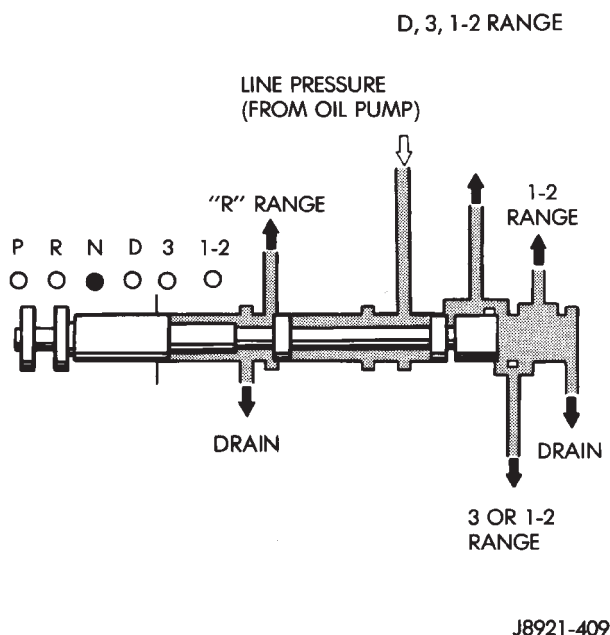


Fig. 12 Manual Valve

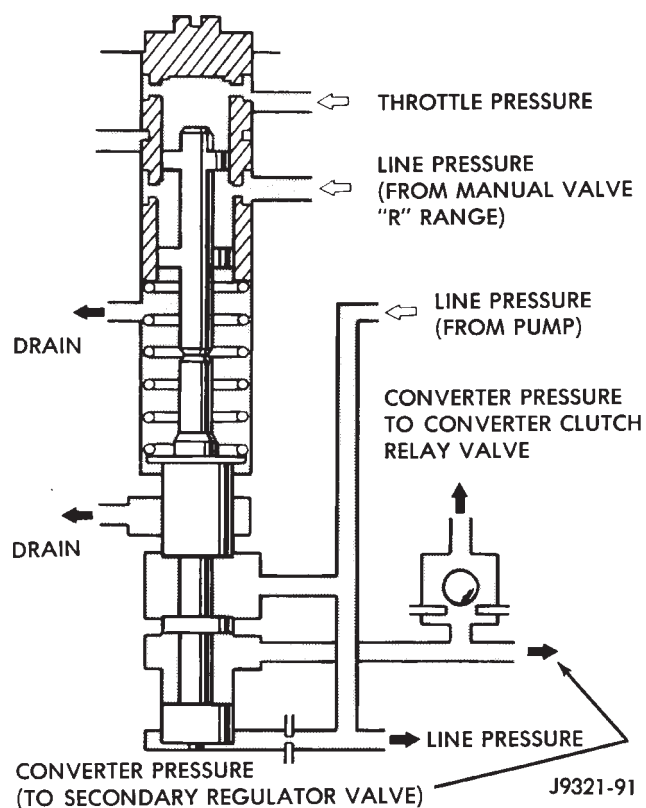


Fig. 13 Primary Regulator Valve

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.

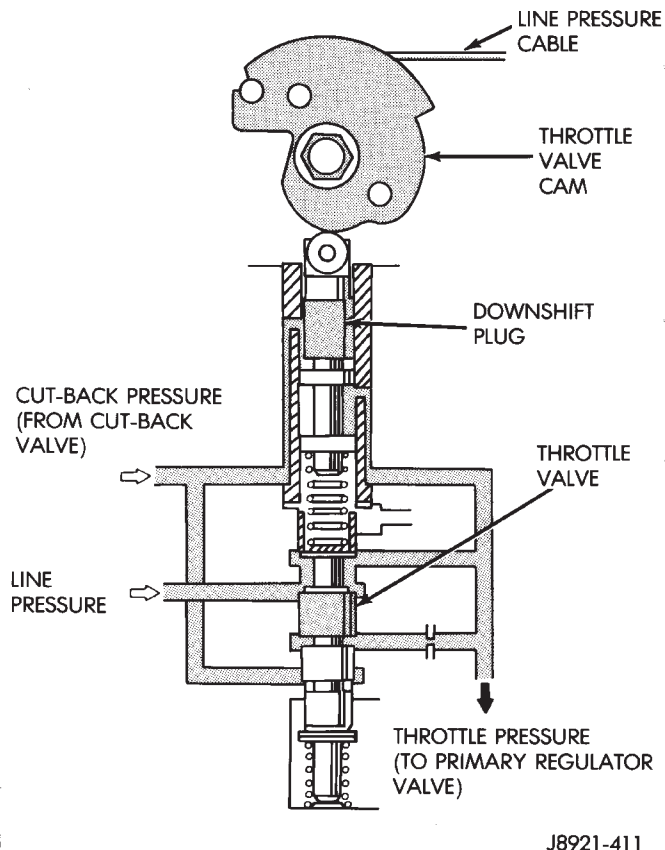


Fig. 14 Throttle Valve And Downshift Plug

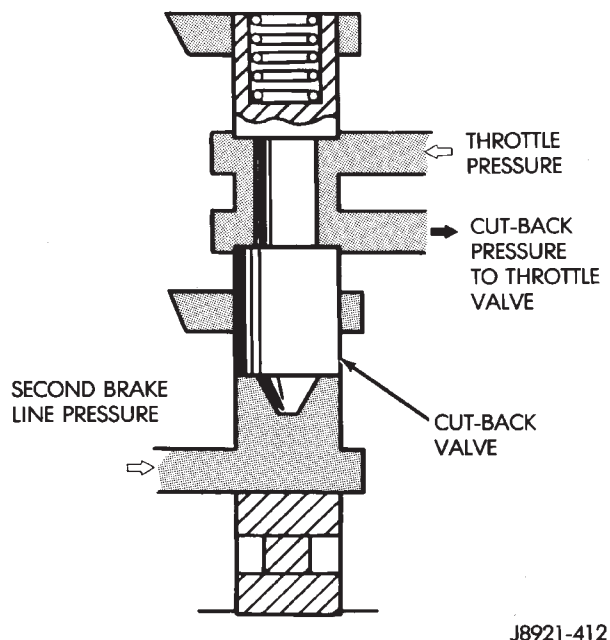


Fig. 15 Cut-Back Valve

Secondary Regulator Valve

The secondary regulator valve (Fig. 16) 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

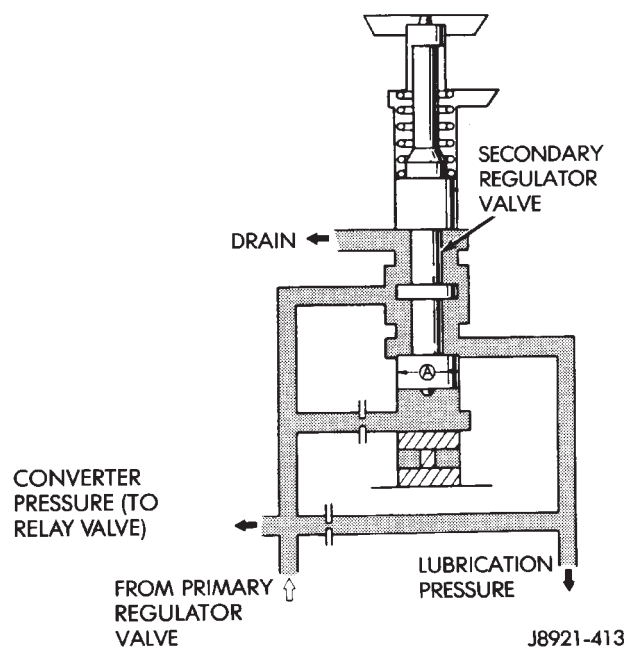


Fig. 16 Secondary Regulator Valve

upward exposing the drain port. Excess pressure then bleeds off as needed. As pressure drops, spring tension moves the valve downward closing the drain port.

Converter Clutch Relay Valve

The relay valve (Fig. 17) 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.

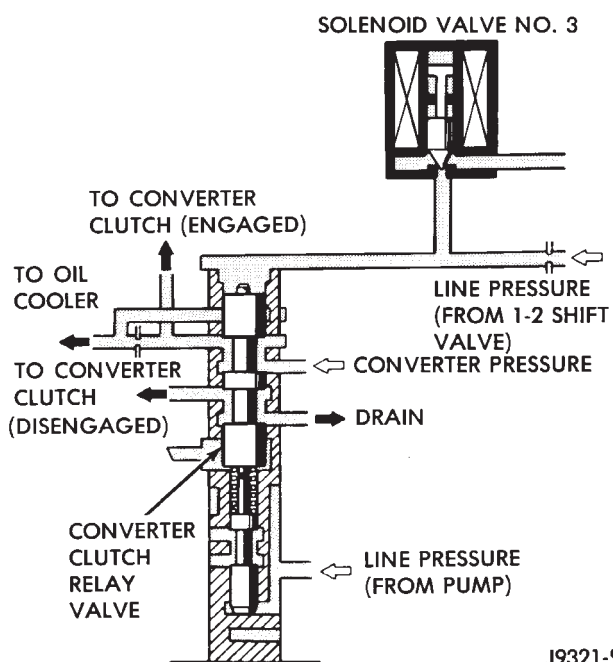


Fig. 17 Converter Clutch Relay Valve

1-2 Shift Valve

The 1-2 shift valve (Fig. 18) controls 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

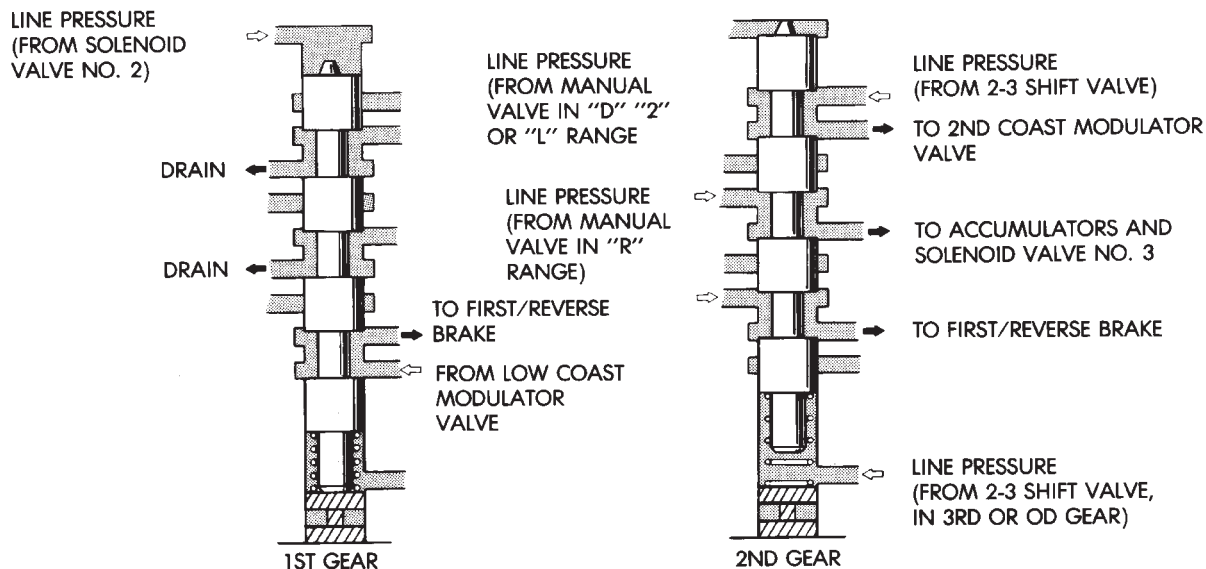
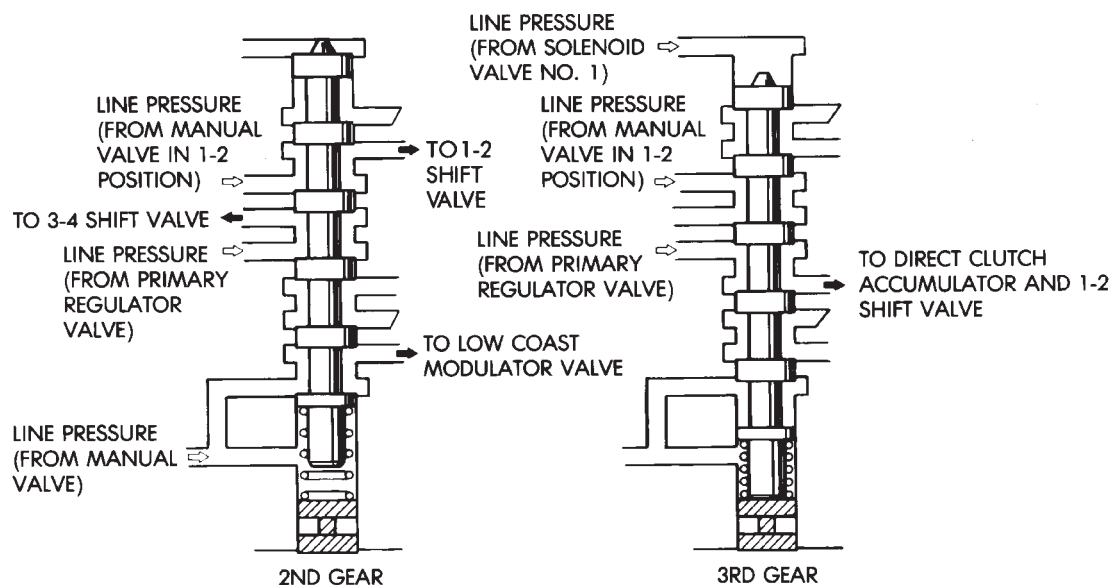


Fig. 18 1-2 Shift Valve



J8921-416

Fig. 19 2-3 Shift Valve

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. 19) controls 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.

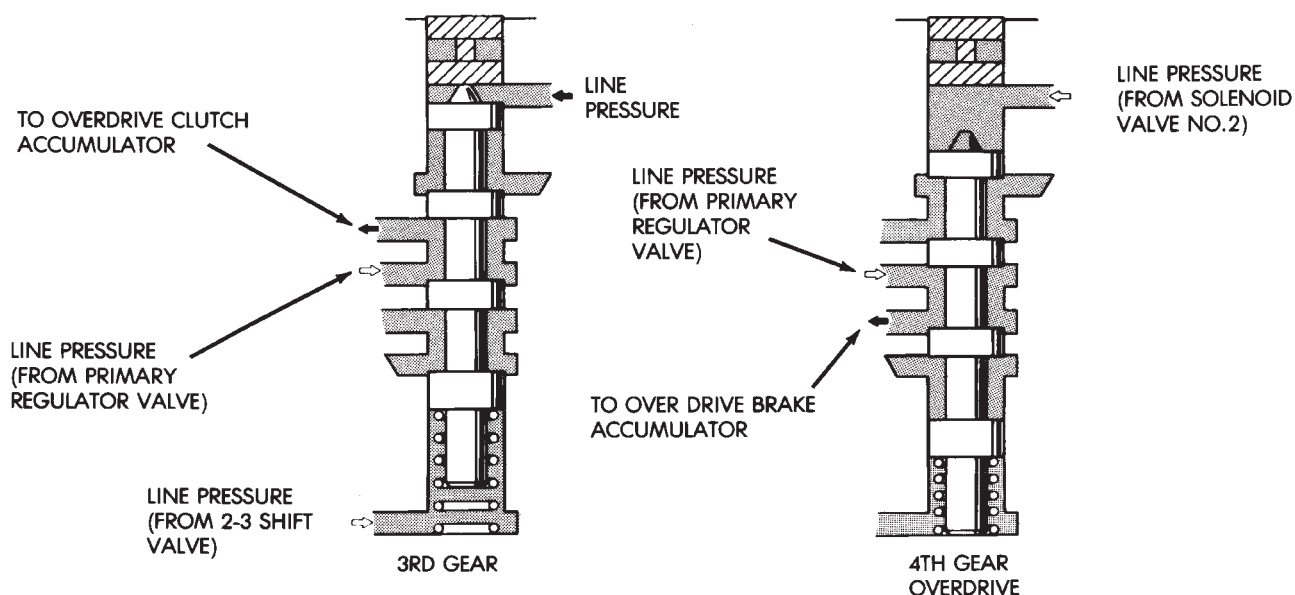
When the transmission control module activates solenoid No. 1, line pressure at the top of the 2-3 valve is released through the solenoid drain port. Spring tension moves the valve up to hold the valve in sec-

ond 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.

3-4 Shift Valve

The 3-4 shift valve (Fig. 20) 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.



J8921-417

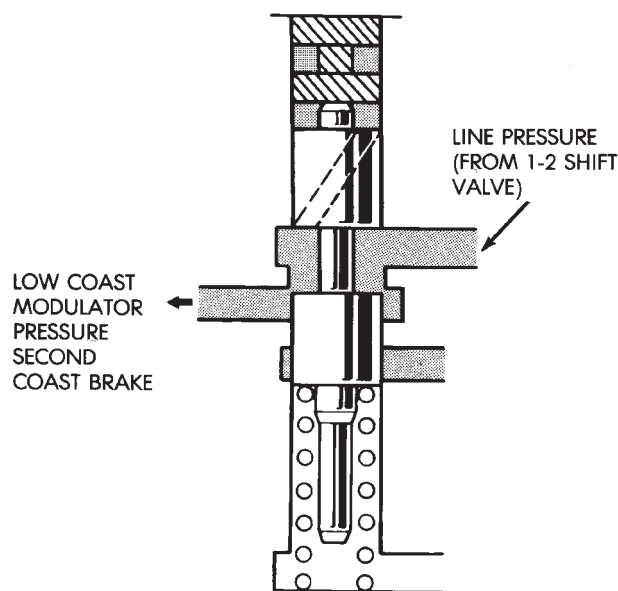
Fig. 20 3-4 Shift Valve

De-energizing the solenoid causes the drain port to close. Line pressure then moves the valve down exposing the overdrive brake accumulator feed port for the shift to fourth gear.

In the 1-2 or 3 gearshift lever positions, line pressure from the 2-3 shift valve is applied to the lower end of the 3-4 valve. This holds the valve upward, closing off the overdrive brake feed port preventing a shift into fourth gear.

Second Coast Modulator Valve

The second coast modulator valve (Fig. 21) 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.



J8921-418

Fig. 21 Second Coast Modulator Valve

Low Coast Modulator Valve

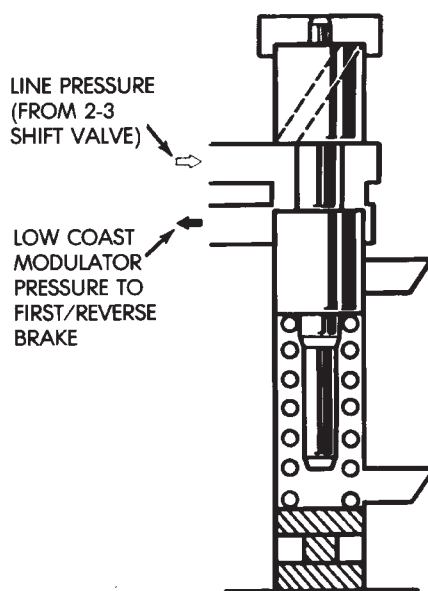
The low coast modulator valve (Fig. 22) momentarily reduces line pressure from the 2-3 shift valve to cushion application of the first/reverse brake. The valve operates when the shift lever and manual valve are in the 1-2 position.

Accumulator Control Valve

The accumulator control valve (Fig. 23) cushions clutch and brake application by reducing back pressure to the accumulators when throttle opening is small. The valve is operated by oil pump (line) pressure and by throttle pressure.

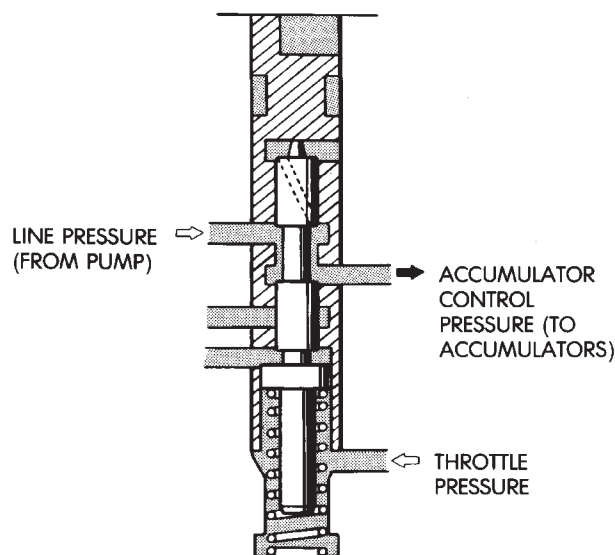
Accumulators

Four accumulators are used to cushion application of the clutches and brakes (Fig. 24). The accumulators



J8921-419

Fig. 22 Low Coast Modulator Valve

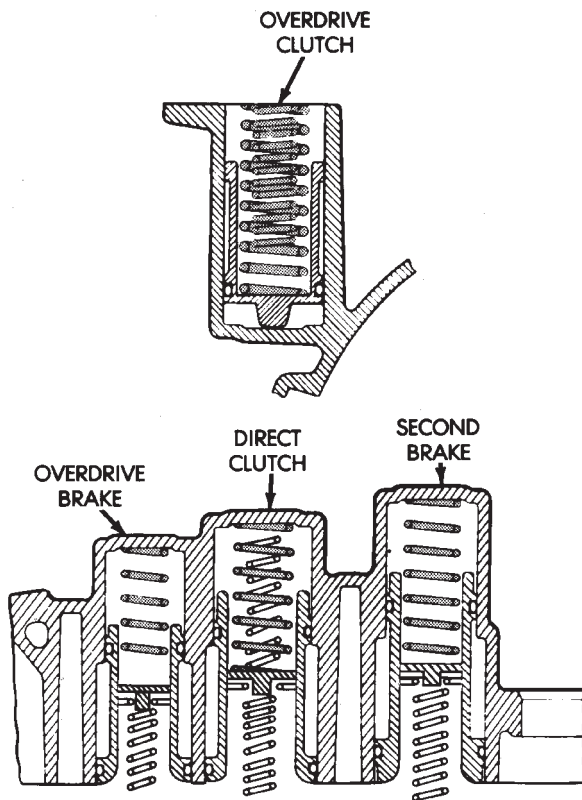


J8921-420

Fig. 23 Accumulator Control Valve

tors consist of spring loaded pistons which dampen the initial surge of apply pressure to provide smooth engagement during shifts.

Control pressure from the accumulator control valve is constantly 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. 24).



J9121-375

Fig. 24 Accumulators**Transmission Valve Body Solenoids**

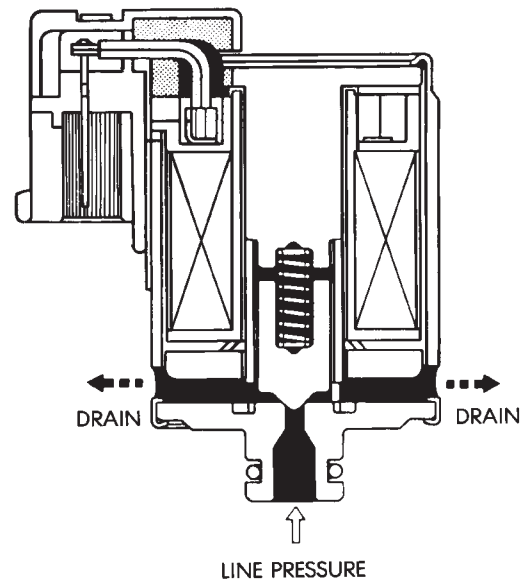
Three solenoids are used (Fig. 25). The No. 1 and 2 solenoids control shift valve operation by applying or

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.

When the No. 1 and 2 solenoids are activated, the solenoid plunger is moved off its seat opening the drain port to release line pressure. When either solenoid is deactivated, the plunger closes the drain port.

The No. 3 solenoid operates in reverse. When the solenoid is deactivated, the solenoid plunger is moved off its seat opening the drain port to release line pressure. When the solenoid is activated, the plunger closes the drain port.



J8921-422

Fig. 25 Transmission Valve Body Solenoids

AW-4 TRANSMISSION DIAGNOSIS

INDEX

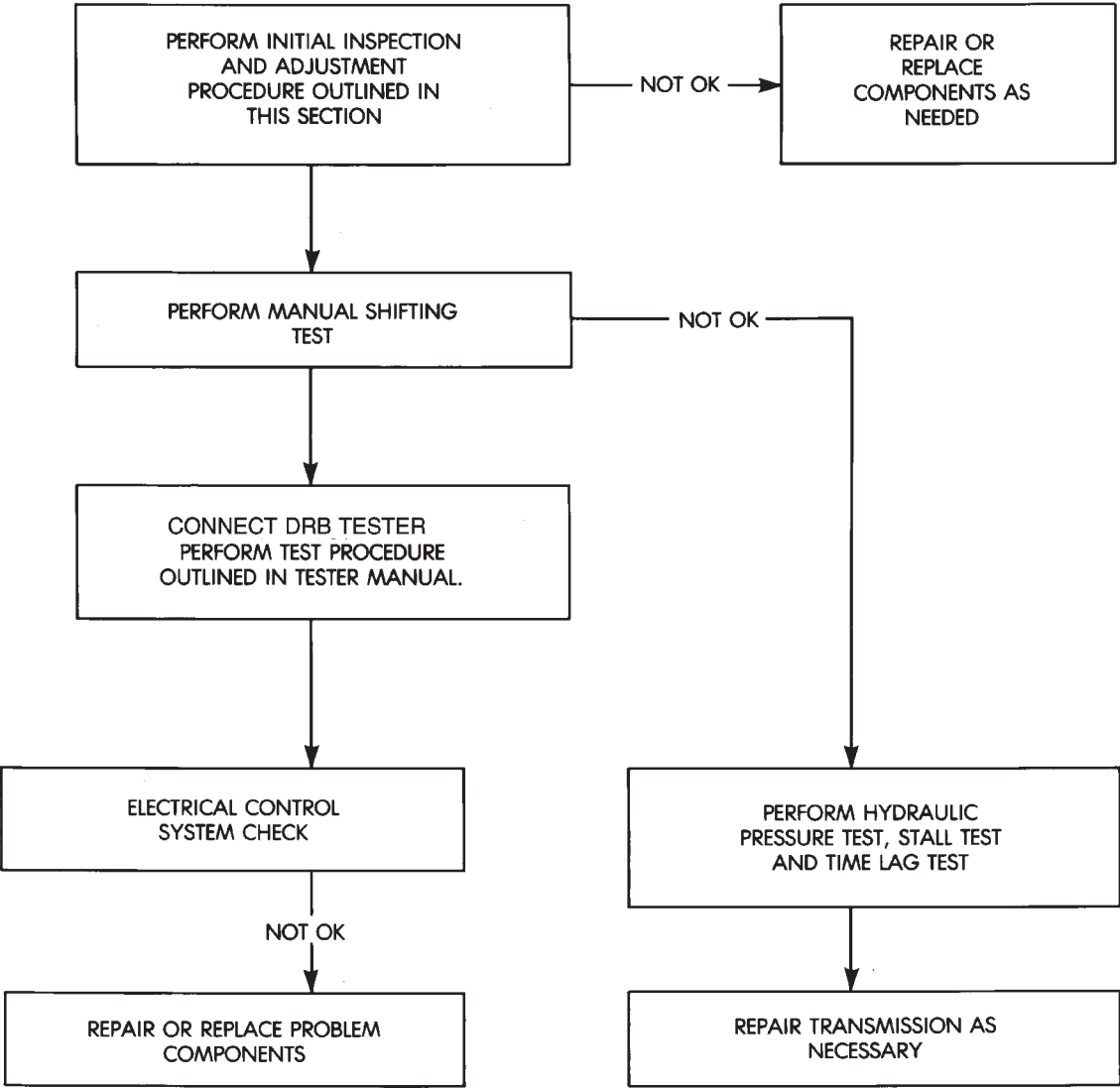
	page		page
General Diagnosis Information	45	Preliminary Inspection and Adjustment	46
Hydraulic Pressure Test	46	Time Lag Test	47
Manual Shifting Test	46	Torque Converter Stall Test	47

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 DRB II scan tool. The tester will identify faults in the electrical control system.

Diagnosis should begin with the Preliminary Inspection And Adjustment procedure. It is will help determine if a problem is mechanical or electrical. The first procedure step is Initial Inspection and Adjustment.



J8921-423

Fig. 26 Preliminary Diagnosis Check Procedure

PRELIMINARY INSPECTION AND ADJUSTMENT

(1) Check and adjust transmission shift cable if necessary.

(2) Verify transmission throttle cable operation. Repair or replace cable if necessary.

(3) Check engine throttle operation. Operate accelerator pedal and observe injector throttle plate movement. Adjust linkage if throttle plate does not reach wide open position.

(4) Check transmission fluid level when fluid is at normal operating temperature. Start engine. Shift transmission through all gear ranges then back to Neutral. Correct level is to Full or Add mark on dipstick with engine at curb idle speed.

(5) Check and adjust park/neutral position switch if necessary.

(6) Check throttle position sensor adjustment and operation. Adjust the sensor if necessary.

MANUAL SHIFTING TEST

(1) This test determines if problem is related to mechanical or electrical component.

(2) Stop engine and disconnect transmission control module or module fuse.

(3) Road test vehicle. Shift transmission into each gear range. Transmission should operate as follows:

- lock in Park
- back up in Reverse
- not move in Neutral
- provide first gear only with shift lever in 1-2 position
- operate in third gear only with shift lever in 3 position
- operate in overdrive fourth gear in D position

(4) If transmission operates as described, proceed to next step. However, if forward gear ranges were difficult to distinguish (all feel the same), or vehicle would not back up, refer to diagnosis charts. Do not perform stall or time lag tests.

CAUTION: Do not overspeed 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.

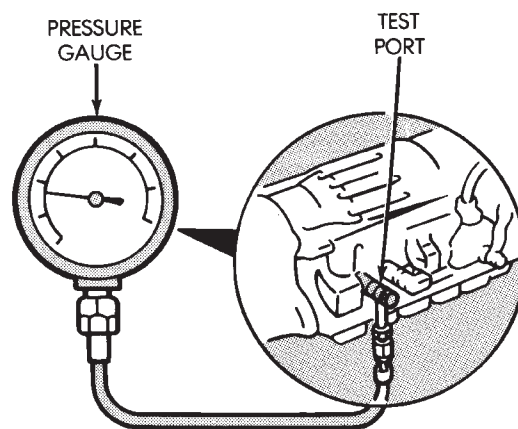
(7) If a problem still exists, continue testing with DRB II scan tool.

HYDRAULIC PRESSURE TEST

PRESSURE TEST PROCEDURE

(1) Connect pressure test gauge to test port on passenger side of transmission. Use Adapter 7554 to connect gauge. Be sure test gauge has minimum capacity of 2100 kPa (300 psi).

(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 service brakes.

(6) Shift transmission into D range and note line pressure with engine at curb idle speed. Pressure should be 421-481 kPa (61-70 psi).

(7) Press accelerator pedal to wide open throttle position and note line pressure. Pressure should be 1196-1442 kPa (173-209 psi).

CAUTION: Do not maintain wide open throttle for more than three or four seconds at a time.

(8) Shift transmission into Reverse and note line pressure with engine at curb idle speed. Pressure should be 519-618 kPa (75-90 psi).

(9) Press accelerator to wide open throttle position and note line pressure in Reverse. Pressure should be 1471-1814 kPa (213-263 psi).

CAUTION: Do not maintain wide open throttle for more than 3-4 seconds at a time.

(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, 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, check for following:

- throttle cable loose, worn, binding or out of adjustment
- throttle valve, downshift plug, 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.

(1) Be sure transmission 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. On models with NP249 transfer case, leave transfer case in 4H position.

(6) Start engine.

WARNING: DO NOT ALLOW ANYONE TO STAND AT THE FRONT OR REAR OF THE VEHICLE DURING THE TEST.

(7) Shift transmission into D range.

(8) Press accelerator pedal to wide open throttle position and note maximum engine rpm. Stall speed should be 2100 to 2400 rpm in D range.

CAUTION: Do not maintain wide open throttle for more than 3-4 seconds at a time.

(9) Release throttle and shift transmission into Neutral. Allow transmission fluid to cool for 15-20 seconds.

(10) Shift transmission into Reverse.

(11) Press accelerator down to wide open throttle position and note maximum engine rpm. Stall speed should be 2100-2400 rpm in Reverse.

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. On models with NP249 transfer case, leave transfer case in 4H 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

AW-4 TRANSMISSION DIAGNOSIS

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
DRAW 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

AW-4 TRANSMISSION DIAGNOSIS

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

AW-4 IN-VEHICLE SERVICE

INDEX

	page		page
Accumulator Pistons and Springs	57	Console	64
Adapter Housing Seal Replacement	60	Shift Lever Assembly Removal—With Mini Console	65
Checking Transmission Fluid Level and Condition	51	Speed Sensor	61
Manual Valve Shaft Seal Replacement	56	Speed Sensor Rotor—Speedometer Drive Gear	61
Park Interlock Cable Adjustment	66	Throttle Position Sensor (TPS) Service	62
Park Rod and Pawl Service	60	Transmission Control Module (TCM) Service	51
Park/Neutral Position Switch	52	Transmission Cooler Line Fittings	68
Second Coast Brake Servo	59	Transmission Cooler Service	66
Shift Cable Adjustment	65	Transmission Throttle Cable Adjustment	64
Shift Lever Assembly Installation—With Full Console	65	Transmission Throttle Cable Replacement	62
Shift Lever Assembly Installation—With Mini Console	65	Valve Body Installation	55
Shift Lever Assembly Removal—With Full Console	65	Valve Body Removal	55
		Valve Body Solenoid Replacement	53

CHECKING TRANSMISSION FLUID LEVEL AND CONDITION

Recommended fluid for AW-4 transmissions is Mopar Mercon automatic transmission fluid. Mopar Dexron II may be used if Mercon fluid is not readily available.

CHECKING FLUID LEVEL

(1) Be sure transmission fluid is at normal operating temperature. Normal operating temperature is reached after approximately 25 km (15 miles) 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.

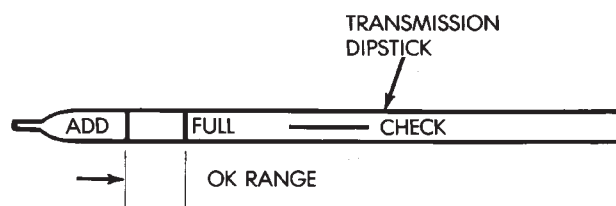
(6) Wipe off dipstick handle to prevent dirt from entering fill tube. Then remove dipstick and check fluid level and condition.

(7) Correct fluid level is **to FULL mark on dipstick when fluid is at normal operating temperature** (Fig. 1).

(8) If fluid level is low, top off level with Mopar Mercon. Mopar Dexron II may also be used if Mercon is not available. **Do not overfill transmission. Add only enough fluid to bring level to Full mark.**

CHECKING FLUID CONDITION

Inspect the appearance of the fluid during the fluid level check. The fluid should be clear and 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 should be replaced.



J8921-427

Fig. 1 Transmission Fluid Level

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.

TRANSMISSION CONTROL MODULE (TCM) SERVICE

Use the DRB II scan tool to diagnose transmission control module function whenever a fault is suspected. Replace the module only when actually faulty.

TRANSMISSION CONTROL MODULE REPLACEMENT

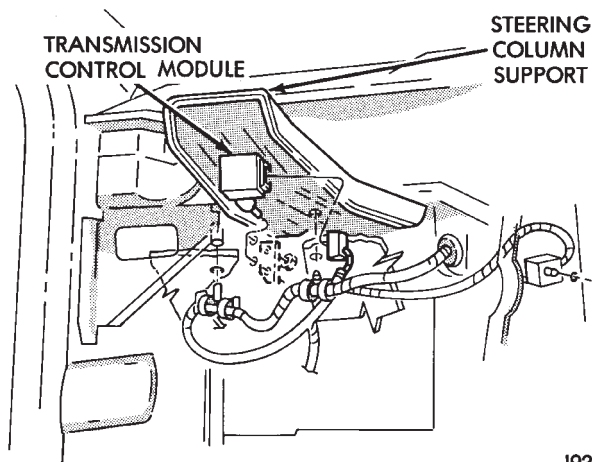
The transmission control module is under the driver side of the instrument panel. It is bolted to the dash panel at the upper left side of the steering column support (Fig. 2).

A nut plate is used to secure the module to the dash panel. The plate is next to the power brake

booster on the driver side of the dash. The module attaching nuts are accessible from the engine compartment side.

To remove the module, remove the attaching nuts and nut plate from the engine compartment side of the dash. Then work the module out from under the instrument, disconnect the module wire harness and remove the module.

To install the module, work the module into position on the dash panel and connect the module harness wires. Then slip the nut plate over the module studs and install the attaching nuts.



J9321-87

Fig. 2 Transmission Control Module

PARK/NEUTRAL POSITION SWITCH

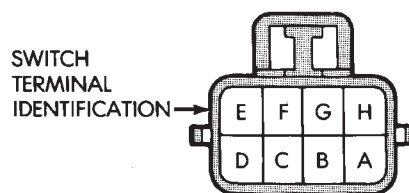
SWITCH TESTING

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. 3).
- Continuity should exist between terminals A and E with the transmission in Reverse (Fig. 3).
- Continuity should exist between terminals A and G with the transmission in third gear (Fig. 3).
- Continuity should exist between terminals A and H with the transmission in first and/or second gear (Fig. 3).
- Continuity should not exist in D position.

PARK/NEUTRAL POSITION SWITCH REMOVAL

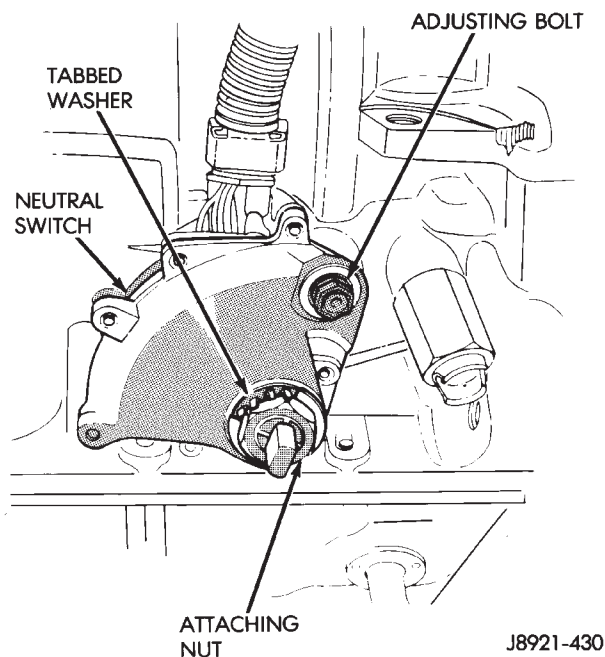
- (1) Raise vehicle.
- (2) Disconnect switch wire harness connector.
- (3) Pry washer lock tabs upward and remove switch attaching nut and tabbed washer (Fig. 4).
- (4) Remove switch adjusting bolt (Fig. 4).
- (5) Slide switch off manual valve shaft.



	B	C	A	E	G	H
P	○	○				
R			○	○		
N	○	○				
D						
3			○		○	
1-2			○			○

J8921-429

Fig. 3 Park/Neutral Position Switch Terminals And Testing



J8921-430

Fig. 4 Park/Neutral Position Switch Removal/Installation

PARK/NEUTRAL POSITION SWITCH INSTALLATION AND ADJUSTMENT

(1) Disconnect shift linkage rod from shift lever on left side of transmission.

(2) Rotate manual shift lever all the way rearward. Then rotate lever forward two detent positions to Neutral.

(3) Install switch on manual valve shaft and install switch adjusting bolt finger tight. Do not tighten bolt at this time.

(4) Install tabbed washer on manual valve shaft and install switch attaching nut. Tighten nut to 6.9 N•m (61 in. lbs.) torque but do not bend washer lock tabs over nut at this time.

(5) Verify that transmission is in Neutral.

(6) Rotate switch to align neutral standard line with vertical groove on manual valve shaft (Fig. 5).

(7) Align switch standard line with groove or flat on manual valve shaft.

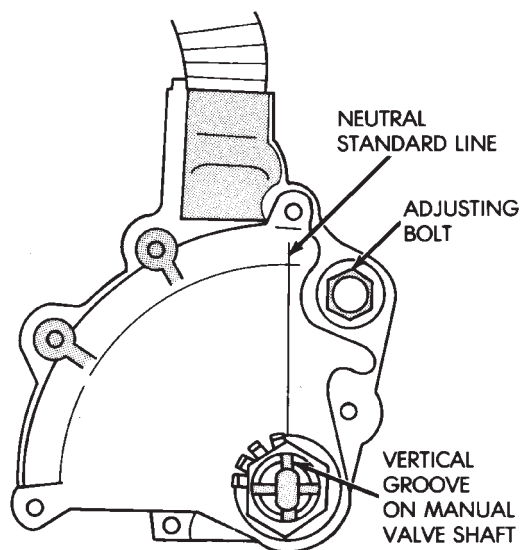
(8) Tighten switch adjusting bolt to 13 N•m (9 ft. lbs.) torque.

(9) Bend at least two washer lock tabs over switch attaching nut to secure it.

(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.



J8921-431

Fig. 5 Park/Neutral Position Switch Adjustment

VALVE BODY SOLENOID REPLACEMENT

SOLENOID 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. 6) and gasket. Discard the gasket.

(4) Disconnect solenoid wire connector (Fig. 7).

(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. 8). Do not allow any valve body components to fall out when solenoids are removed.

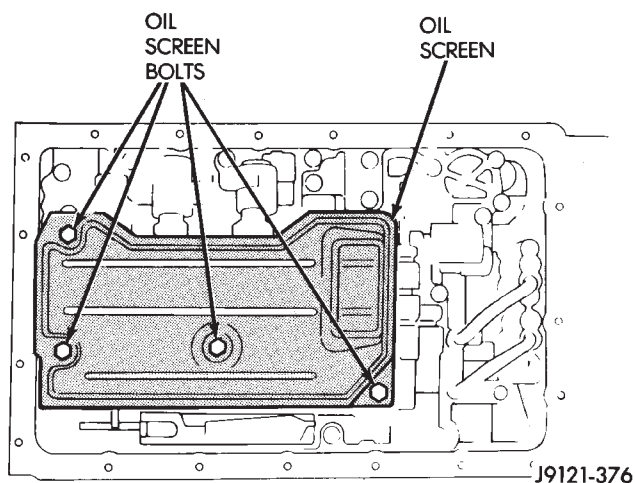


Fig. 6 Oil Screen Removal/Installation

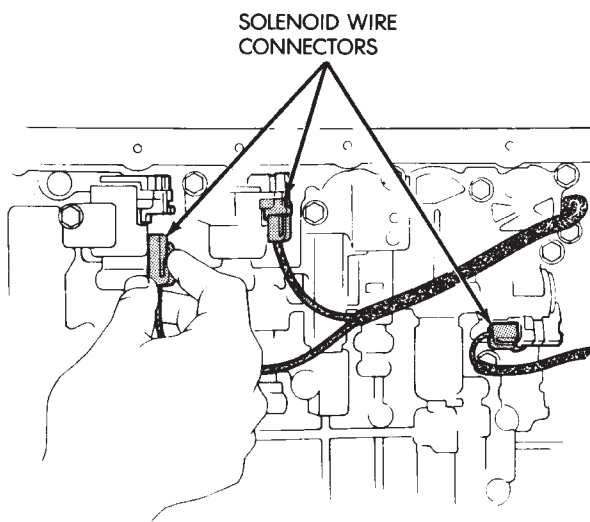


Fig. 7 Solenoid Wire Connectors

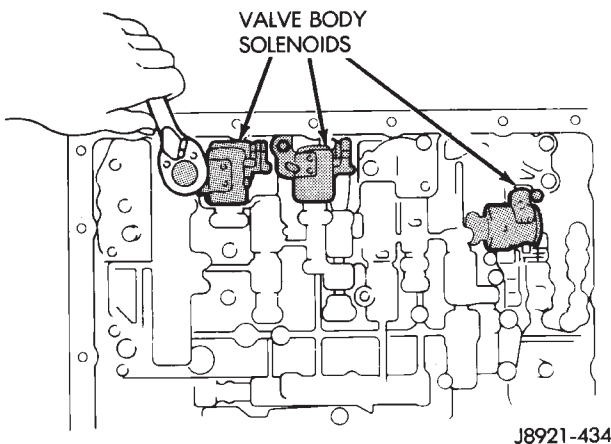


Fig. 8 Transmission Valve Body Solenoids

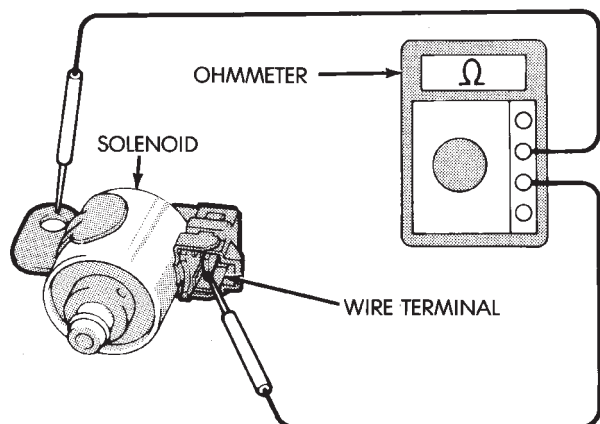
(7) Clean oil filter and pan with solvent and dry with compressed air.

(8) Remove old sealer material from oil pan and transmission case.

Solenoid Testing

Test solenoid resistance with an ohmmeter. Connect the ohmmeter leads to the solenoid mounting bracket and to the solenoid wire terminal (Fig. 9).

Solenoid resistance should be 11-15 ohms. Replace the solenoid if resistance is above or below the specified range.



J8921-435

Fig. 9 Testing Transmission Valve Body Solenoid
SOLENOID 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 Mopar or Loctite 599 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 Mercon or Dexron II.

SOLENOID HARNESS ADAPTER SEAL REPLACEMENT

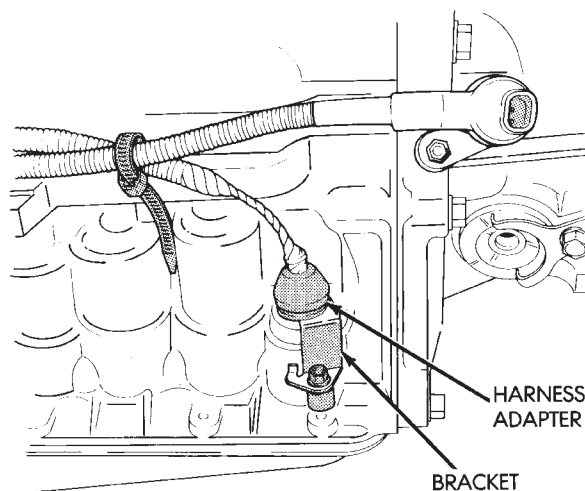
(1) Remove oil pan and oil screen. Refer to Solenoid Removal procedure.

(2) Disconnect solenoid wire connectors (Fig. 7).

(3) Remove bracket securing solenoid harness adaptor (Fig. 10) to case.

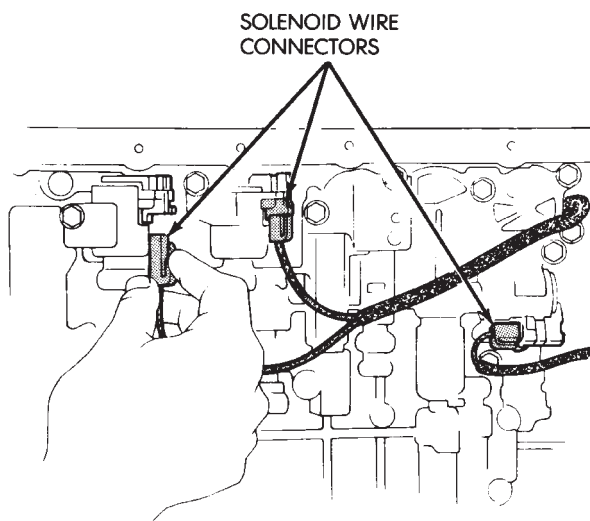
(4) Pull harness adapter and wires out of case.

(5) Remove and discard adapter O-ring.



J8921-436

Fig. 10 Harness Adapter Removal/Installation



J8921-433

Fig. 11 Solenoid Wire Connections

(6) Lubricate new O-ring and install it on adapter.

(7) Install solenoid wire harness and adapter in case.

(8) Install adapter bracket and bracket bolt.

(9) Connect wires to solenoids and install oil screen.

(10) Apply bead of Mopar or Loctite 599 sealer to sealing surface of oil pan. Sealer bead should be at least 3 mm (1/8 in.) wide. Then install oil pan and tighten pan bolts to 7 N•m (65 in. lbs.) torque.

(11) Install new gasket on oil pan drain plug and install plug. Tighten plug to 20 N•m (15 ft. lbs.) torque.

(12) Fill transmission with Mopar Mercon fluid.

VALVE BODY REMOVAL

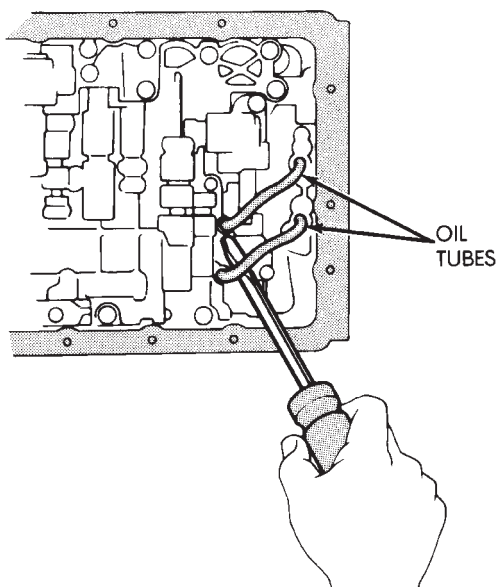
Removal and installation are the only valve body service procedures covered in this section. Refer to the transmission overhaul section for valve body disassembly, cleaning, inspection and reassembly.

(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. 7). Mark wires for assembly reference.

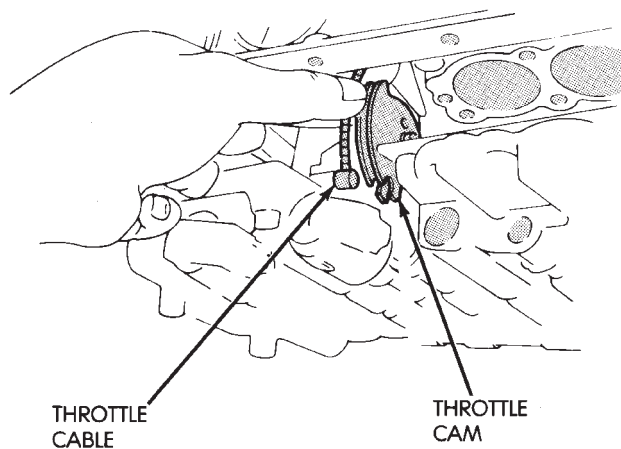
(4) Remove valve body oil tubes (Fig. 12). Carefully pry tubes out of valve body with screwdriver.



J8921-437

Fig. 12 Removing Transmission Valve Body Oil Tubes

(5) Disconnect throttle cable from throttle cam (Fig. 13).

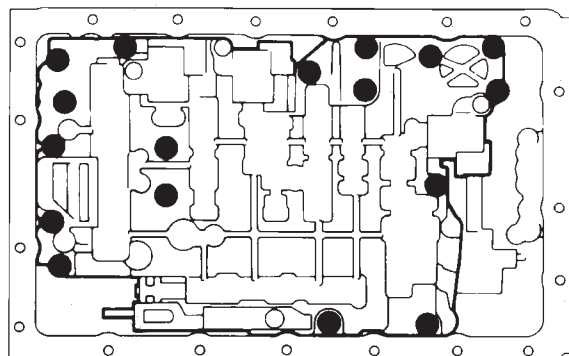


J8921-438

Fig. 13 Removing/Installing Throttle Cable

(6) Remove valve body bolts. Bolt locations are outlined in Figure 14.

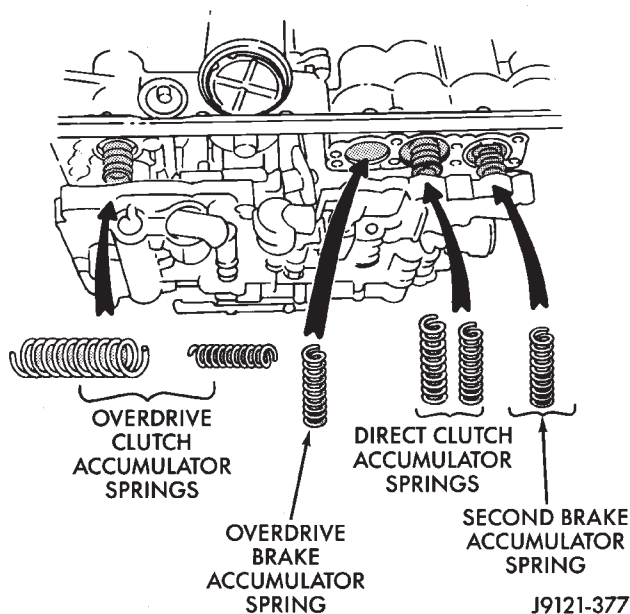
● = BOLT LOCATIONS



J8921-439

Fig. 14 Transmission Valve Body Bolt Locations

(7) Lower valve body and remove overdrive clutch accumulator springs, direct clutch accumulator springs and second brake accumulator spring (Fig. 15).



J9121-377

Fig. 15 Accumulator Springs

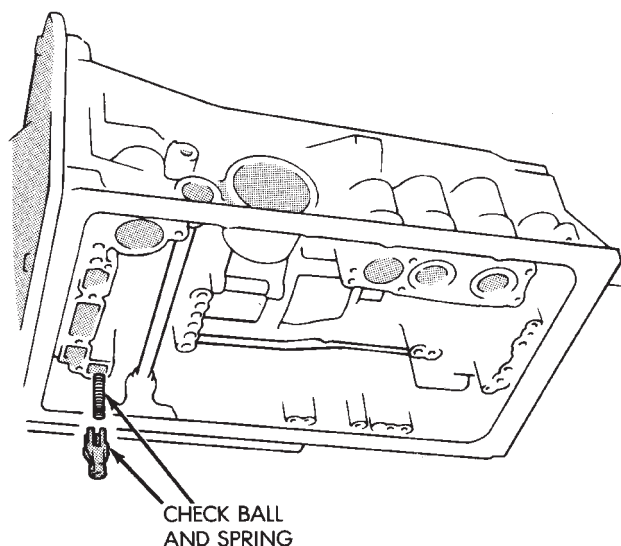
(8) Remove valve body and check ball and spring (Fig. 16).

VALVE BODY INSTALLATION

(1) Connect cable to throttle cam (Fig. 13).

(2) Install check ball and spring (Fig. 16).

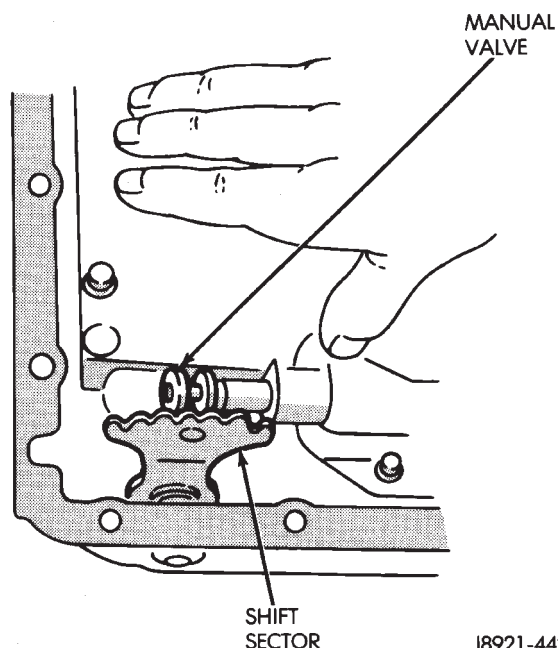
(3) Position accumulator springs and spacers on valve body.



J8921-441

Fig. 16 Removing/Installing Check Ball And Spring

- (4) Align valve body manual valve with shift sector (Fig. 17) and carefully position valve body on case.
- (5) Install valve body bolts (Fig. 14). Tighten bolts



J8921-442

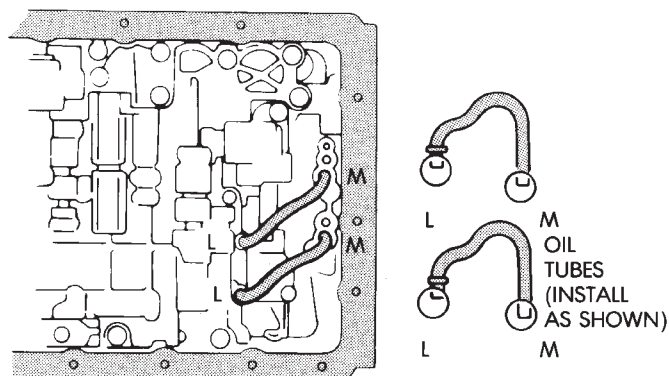
Fig. 17 Shift Sector And Manual Valve Alignment

evenly to 10 N•m (7 ft. lbs.) torque.

- (6) Install valve body oil tubes. Be sure tube ends (L) and (M) are installed as shown in Figure 18.

- (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.



J8921-443

Fig. 18 Installing Transmission Valve Body Oil Tubes

- (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 Mopar or Loctite 599 sealer to sealing surface of oil pan. Sealer bead should be at least 3 mm (1/8 in.) wide. Then install oil pan and tighten pan bolts to 7.4 N•m (65 in. lbs.) torque.

- (11) Install new gasket on oil pan drain plug and install plug in pan. Tighten plug to 20 N•m (15 ft. lbs.) torque.

- (12) Fill transmission with Mopar Mercon™ fluid.

MANUAL VALVE SHAFT SEAL REPLACEMENT

- (1) Remove park/neutral position switch and disconnect transmission shift lever.

- (2) Remove oil pan and valve body.

- (3) Remove bolts attaching park rod bracket to case (Fig. 20).

- (4) Remove park rod from shift sector (Fig. 21).

- (5) Cut spacer sleeve with chisel and remove it from manual valve shaft (Fig. 22).

- (6) Remove pin from shaft and sector with pin punch.

- (7) Remove shaft and sector from case.

- (8) Pry shaft seals out of case (Fig. 23).

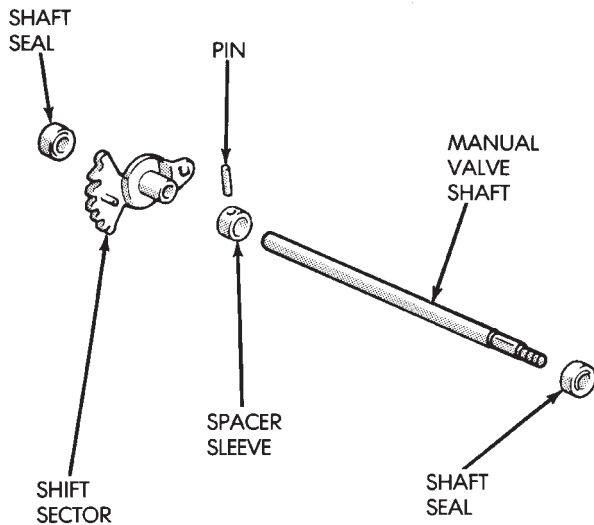
- (9) Inspect the manual valve shaft and sector. Replace either component if worn or damaged.

- (10) Coat replacement shaft seals with petroleum jelly and seat them in the case (Fig. 24).

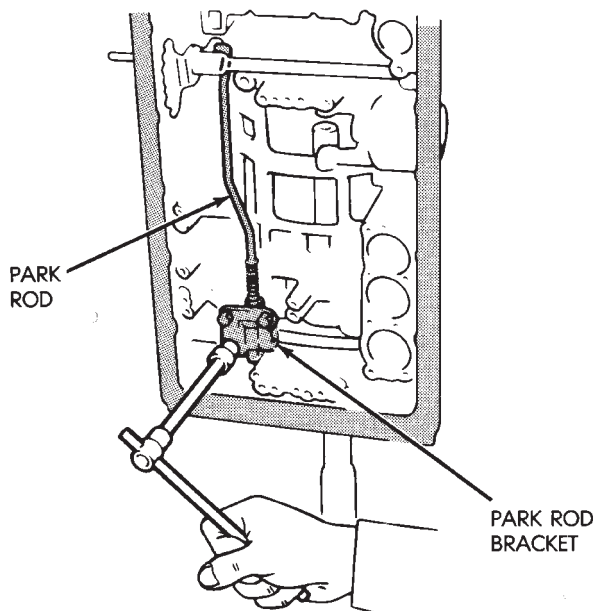
- (11) Install new spacer sleeve on sector (Fig. 25).

- (12) Lubricate manual valve shaft with petroleum jelly and install it in case.

- (13) Lubricate sector and sleeve with petroleum jelly and install them on shaft.



J8921-444

Fig. 19 Manual Valve Shaft And Seals

J8921-445

Fig. 20 Removing/Installing Park Rod Bracket

(14) Align hole in spacer sleeve with notch in sector. Then install shift sector roll pin. Tap pin into sector and shaft and stake sleeve to sector and shaft securely.

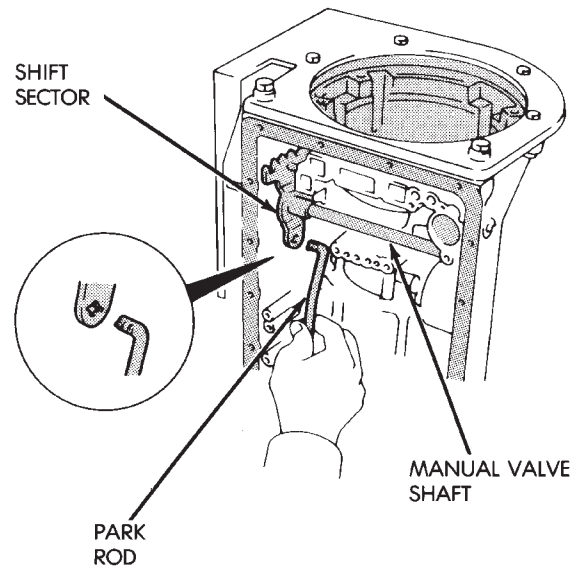
(15) Connect park rod to sector (Fig. 21).

(16) Install park rod bracket (Fig. 26). Tighten bracket bolts to 10 N•m (7 ft. lbs.) torque.

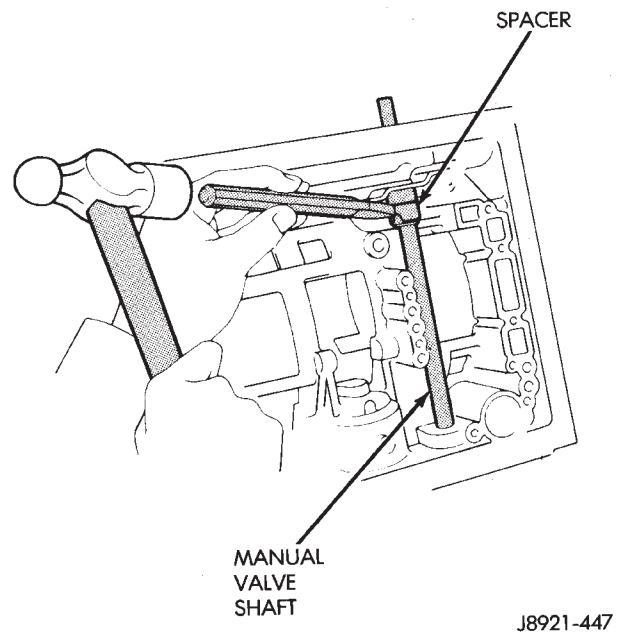
(17) Install valve body and oil screen.

(18) Apply Loctite 599 to oil pan seal surface and install pan and drain plug. Use new gasket on drain plug if necessary.

(19) Install park/neutral position switch.



J8921-446

Fig. 21 Removing/Installing Park Rod

J8921-447

Fig. 22 Cutting Spacer Sleeve

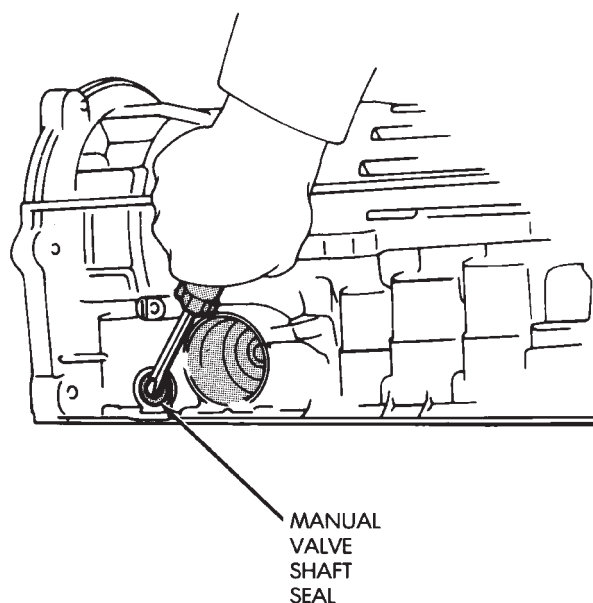
(20) Fill transmission with Mopar Mercon fluid.

ACCUMULATOR PISTONS AND SPRINGS

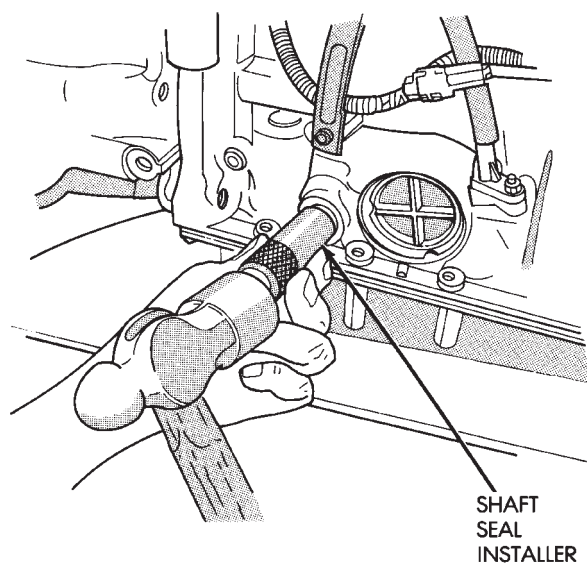
ACCUMULATOR PISTON AND SPRING REMOVAL

(1) Remove valve body. Refer to procedure in this section.

(2) Remove accumulator pistons with compressed air (Fig. 27). Apply air through small feed hole next to each piston bore. Catch each piston in a shop towel as it exits bore.



J8921-448

Fig. 23 Removing Manual Valve Shaft Seals

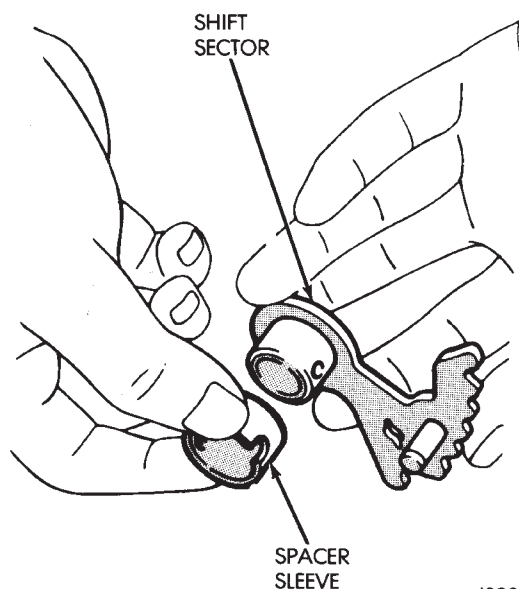
J8921-449

Fig. 24 Installing Manual Valve Shaft Seals

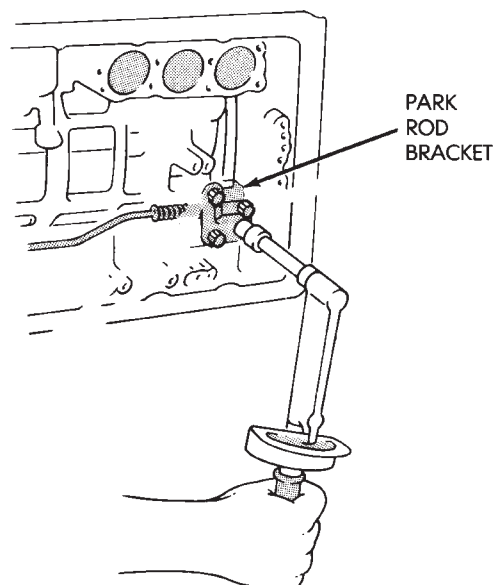
CAUTION: Use only enough air pressure to ease each piston out of the bore. In addition, remove the pistons one at a time and tag the pistons and springs for assembly reference. Do not intermix them.

(3) Remove and discard piston O-ring seals. Then clean pistons and springs with solvent.

(4) Inspect pistons, springs and piston bores. Replace worn damaged pistons. Replace broken, collapsed or distorted springs. Replace case if piston bores are damaged.



J8921-450

Fig. 25 Installing Spacer Sleeve On Sector

J8921-451

Fig. 26 Installing Park Rod Bracket

(5) If small cushion spring in any piston must be replaced, remove spring retainer clip and remove spring from piston (Fig. 28). 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 reseal clip after spring replacement.

(6) Install new O-ring seals on pistons. Lubricate seals and pistons and piston bores with transmission fluid.

(7) Install pistons and springs (Fig. 29).

(8) Install valve body and oil screen.

(9) Apply bead of Loctite 599 to oil pan seal surface and install pan and drain plug.

(10) Fill transmission with Mopar Mercon fluid.

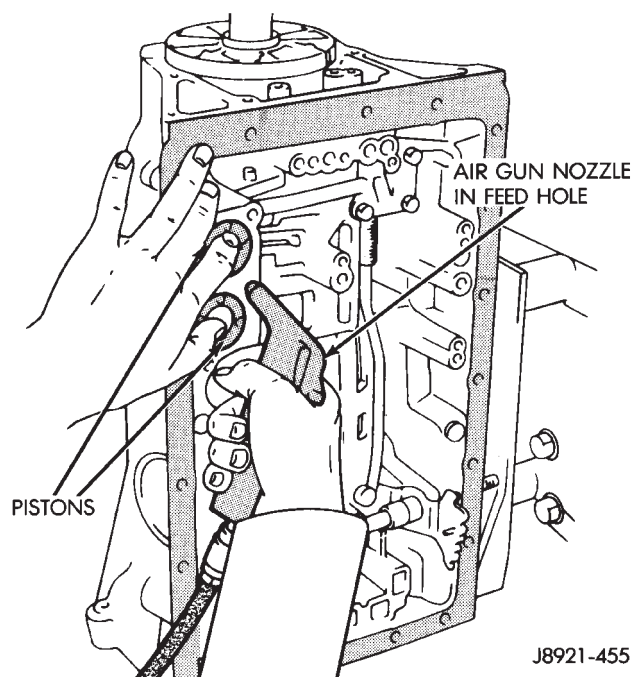


Fig. 27 Accumulator Piston Removal

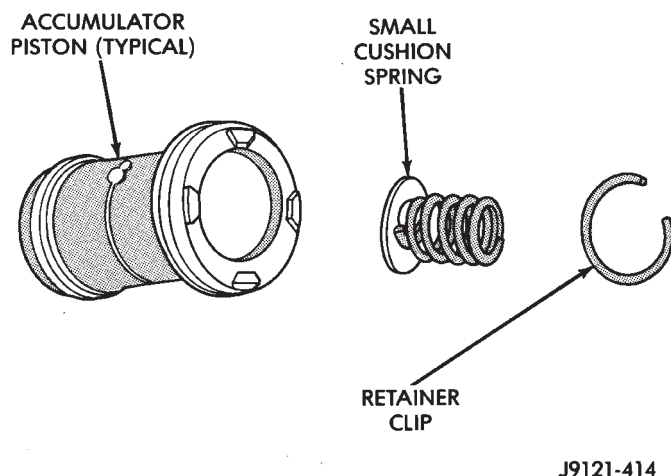
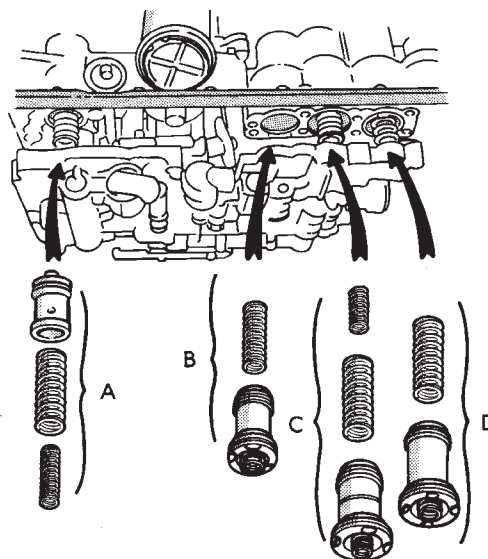


Fig. 28 Small Cushion Spring Retention
SECOND COAST BRAKE SERVO

SERVO OVERHAUL

- (1) Remove valve body as outlined in this section.
- (2) Remove servo piston cover snap ring with snap ring pliers (Fig. 30).
- (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. 31).
- (4) Remove and discard seal and O-rings from cover and piston (Fig. 32). Inspect E-ring, piston, spring and retainer, piston rod and piston spring. Replace worn or damaged parts.
- (5) Install new seals on cover and piston.
- (6) Lubricate servo components with transmission fluid.



- 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

Fig. 29 Accumulator Pistons, Springs And Spacers

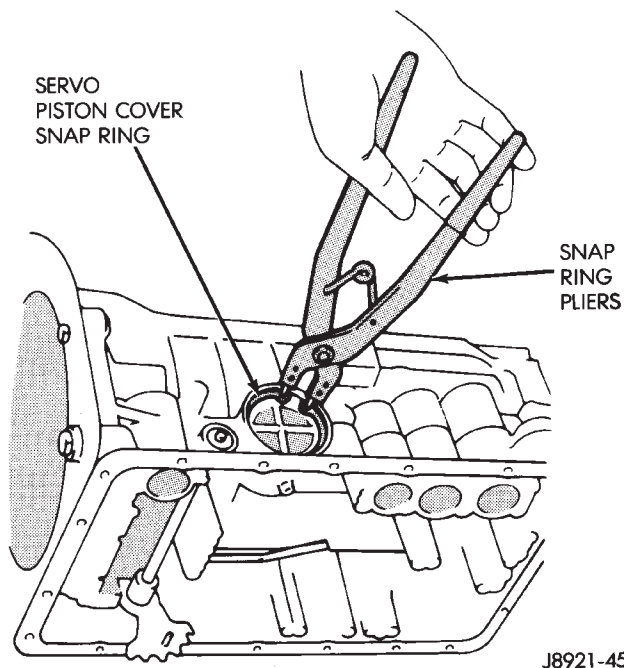


Fig. 30 Removing/Installing Servo Piston Cover Snap Ring

- (7) Assemble and install servo components in case. Be sure servo piston rod is properly engaged in the second coast brake band.

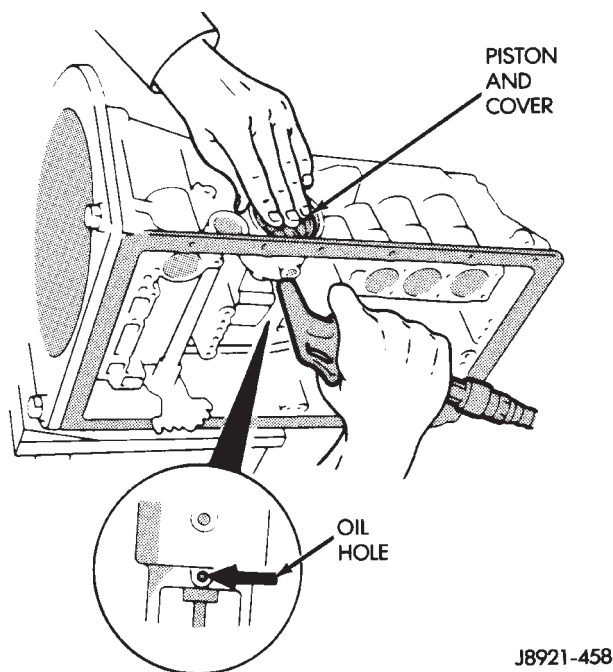


Fig. 31 Removing Servo Cover And Piston

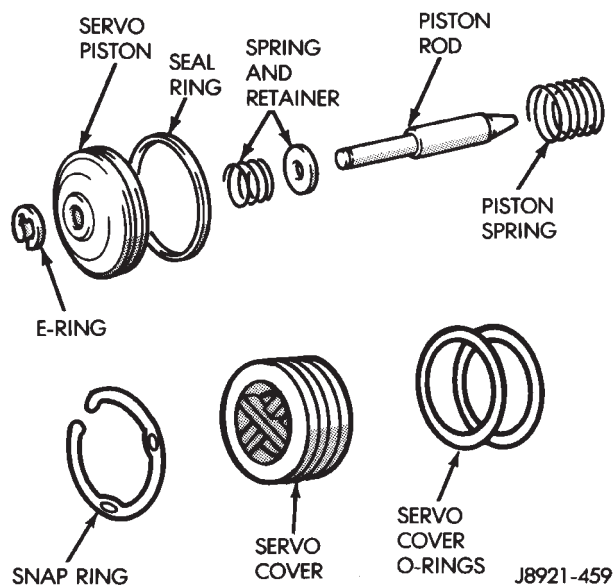


Fig. 32 Second Coast Brake Servo Components

- (8) Compress cover and piston and install cover snap ring.
- (9) Install valve body, oil screen and oil pan.

PARK ROD AND PAWL SERVICE

PARK ROD AND PAWL REMOVAL

- (1) Remove valve body as outlined in this section.
- (2) Remove bolts attaching park rod bracket to case (Fig. 33).
- (3) Remove park rod from manual valve shaft sector (Fig. 34).
- (4) Remove park rod.
- (5) Remove park pawl, pin and spring (Fig. 35).

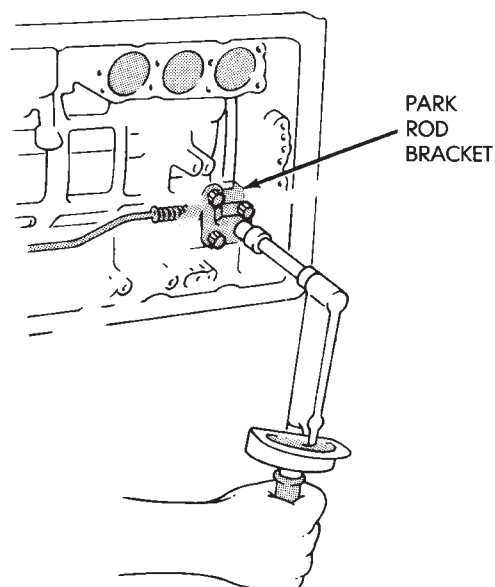


Fig. 33 Removing/Installing Park Rod Bracket

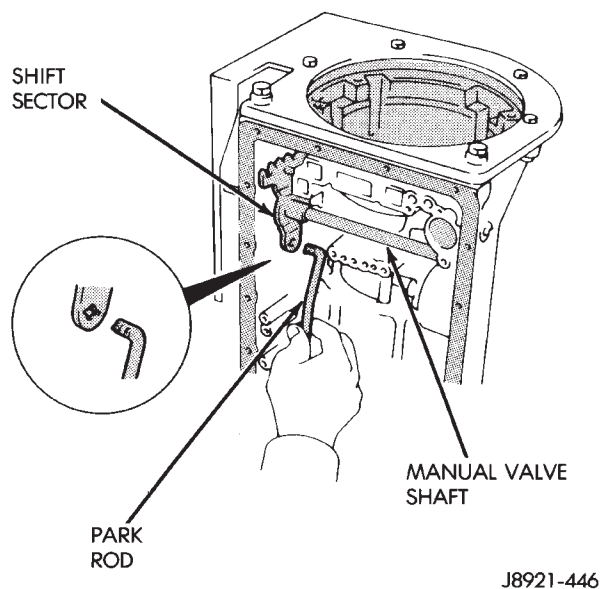


Fig. 34 Removing/Installing Park Rod

- (6) Examine park rod, pawl, pin and spring. Replace any component that is worn or damaged.
- (7) Install pawl in case. Insert pin and install spring. Be sure spring is positioned as shown in Figure 35.
- (8) Install park rod and bracket (Fig. 33). Tighten bracket bolts to 10 N•m (7 ft. lbs.) torque.
- (9) Install valve body, oil screen and oil pan as outlined in this section.

ADAPTER HOUSING SEAL REPLACEMENT

- (1) Raise vehicle.

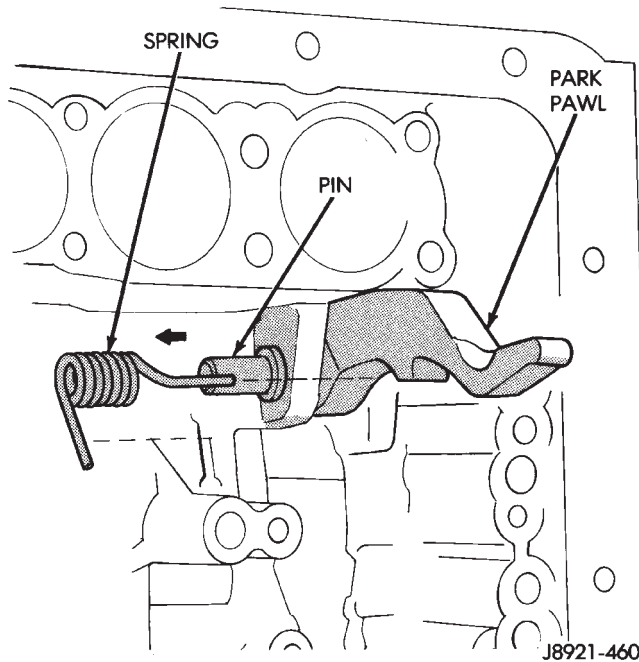


Fig. 35 Removing/Installing Park Pawl, Pin And Spring

(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) Remove dust shield and remove seal from adapter housing (Fig. 36).

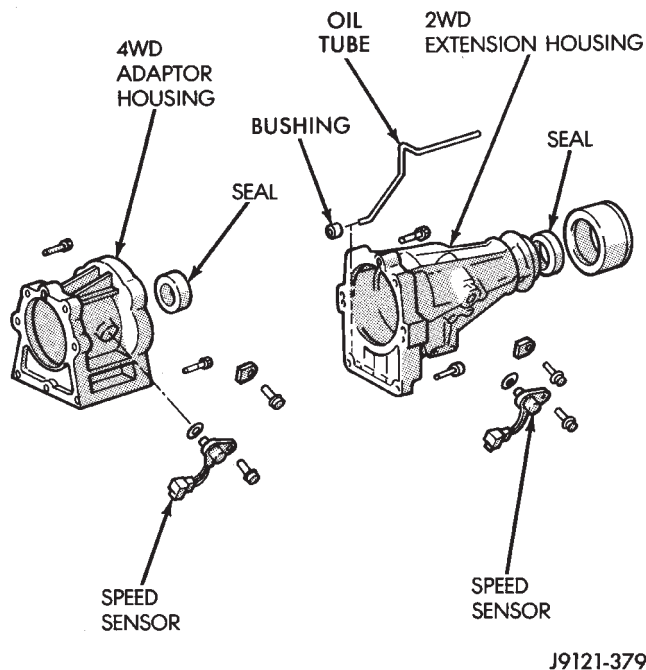


Fig. 36 Adapter Housing Seals

(4) Install new seal with appropriate size seal installer and install dust shield.

(5) Reinstall components removed to gain access to seal.

(6) Top off transmission fluid if necessary.

SPEED SENSOR

SPEED SENSOR TESTING

Test the speed sensor with an ohmmeter. Place the ohmmeter leads on the terminals in the sensor connector (Fig. 37).

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. 37). 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.

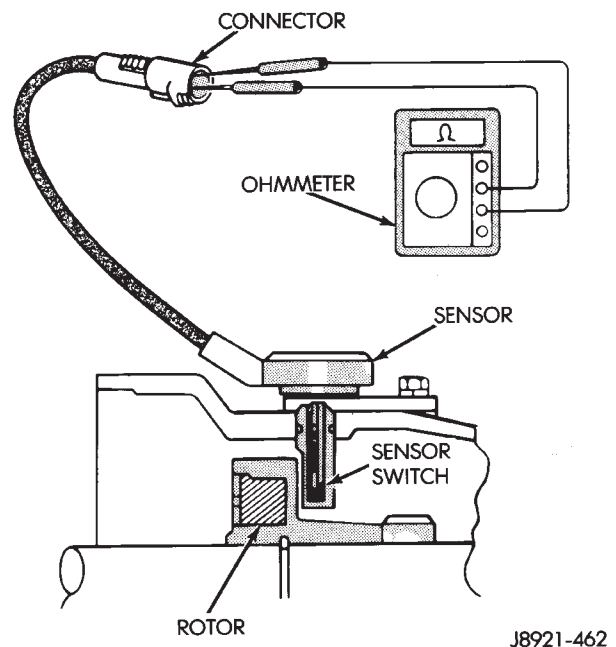


Fig. 37 Speed Sensor Testing

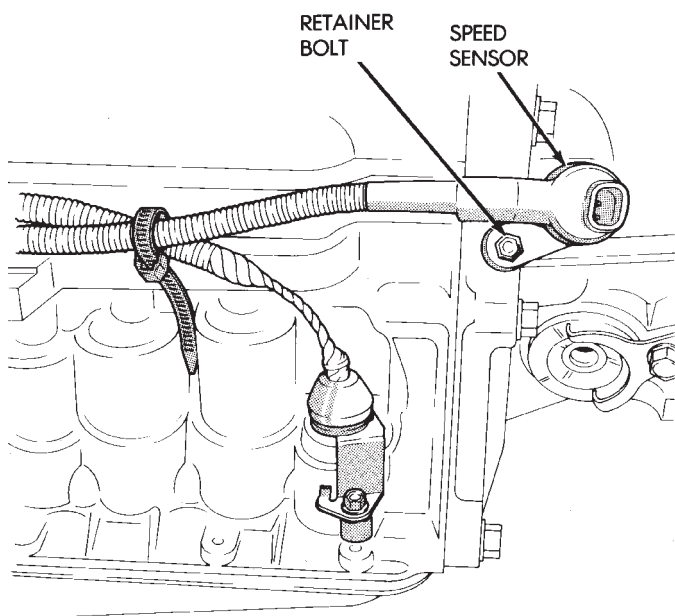
SPEED SENSOR REPLACEMENT

- (1) Disconnect sensor wire harness connector.
- (2) Remove sensor retainer bolt and remove sensor (Fig. 38).
- (3) Remove and discard speed sensor O-ring.
- (4) Install new O-ring on speed sensor and install sensor in transmission case.
- (5) Install sensor bracket and retainer bolt. Tighten bolt to 7.4 N•m (65 in. lbs.) torque.
- (6) Connect sensor wire harness connector.

SPEED SENSOR ROTOR—SPEEDOMETER DRIVE GEAR

ROTOR—DRIVE GEAR REMOVAL

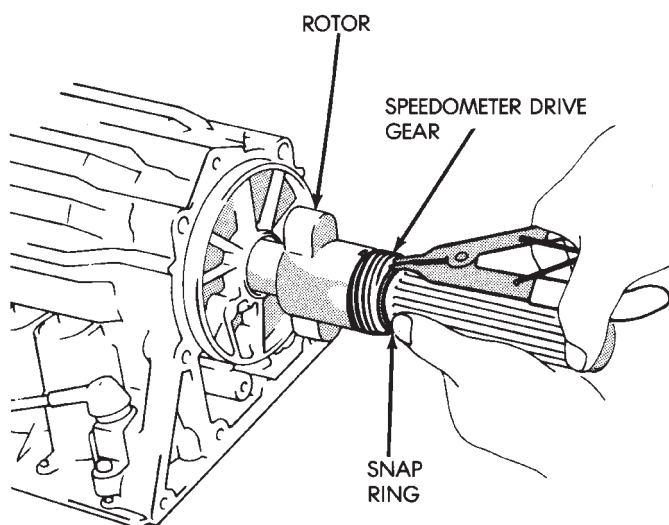
- (1) Raise vehicle.



J8921-463

Fig. 38 Transmission Speed Sensor Removal/Installation

- (2) Remove components necessary to gain access to rotor and drive gear such as propeller shaft, transfer case, crossmember, and shift linkage.
- (3) Disconnect speedometer cable and/or speed sensor.
- (4) Remove adaptor housing.
- (5) Remove speedometer drive gear snap ring (Fig. 39).



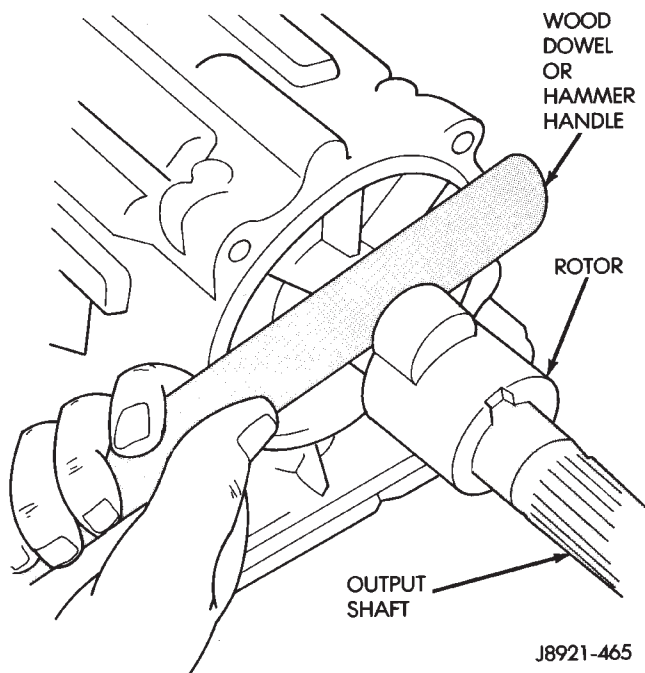
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Fig. 39 Removing/Installation Speedometer Drive Gear

- (6) Remove the speedometer drive gear and spacer (if equipped).

(7) Remove rotor by carefully prying it off output shaft with wood dowel or hammer handle (Fig. 40).

(8) Clean sealing surfaces of transmission case and extension/adaptor housing.



J8921-465

Fig. 40 Removing Speed Sensor Rotor

ROTOR AND DRIVE GEAR INSTALLATION

(1) Install rotor, spacer (if equipped) and drive gear on output shaft. Then install drive gear snap ring (Fig. 39).

(2) Apply bead of Mopar or Loctite 599 sealer, to transmission case sealing surface and install extension/adaptor housing on case.

(3) Tighten adaptor housing bolts to 34 N•m (25 ft. lbs.) torque.

(4) Install components removed to gain access to rotor and drive gear.

THROTTLE POSITION SENSOR (TPS) SERVICE

A separate throttle position sensor is used for automatic transmission applications. The sensor is attached to the base of the throttle body. Refer to Group 14 for TPS service and adjustment.

TRANSMISSION THROTTLE CABLE REPLACEMENT

THROTTLE CABLE REMOVAL

(1) In engine compartment, disconnect cable from throttle linkage. Then compress cable mounting ears and remove cable from engine bracket (Fig. 41).

(2) Raise vehicle.

(3) Remove transmission oil pan.

(4) Disengage cable from throttle valve cam (Fig. 42).

(5) Remove cable bracket bolt and remove cable and bracket from case (Fig. 43).

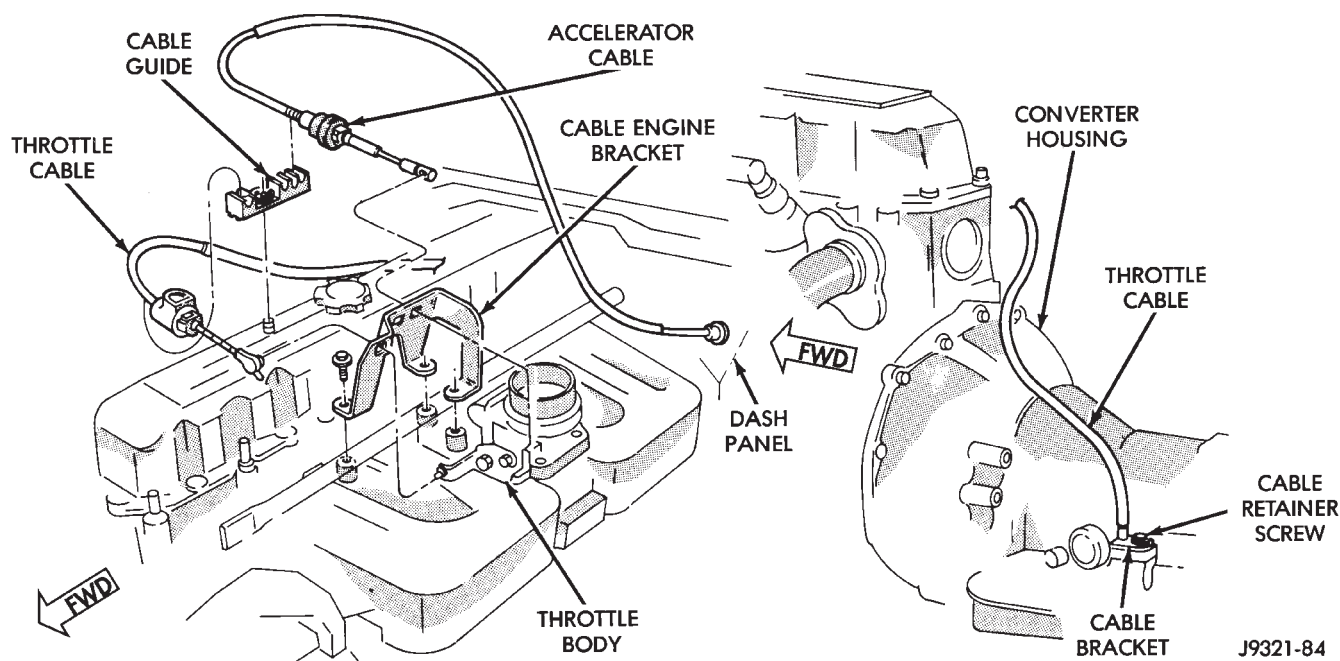


Fig. 41 Transmission Throttle Cable Attachment

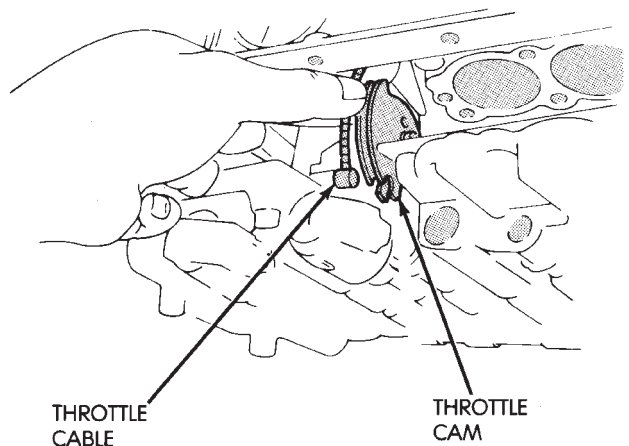


Fig. 42 Removing/Installing Transmission Throttle Cable

(6) Remove and discard cable seal.

THROTTLE CABLE INSTALLATION

- (1) Lubricate and install new seal on cable.
- (2) Insert cable in transmission case.
- (3) Attach cable to throttle cam (Fig. 42).
- (4) Install cable bracket on case and tighten attaching bolt to 10 N•m (7 ft-lbs) torque (Fig. 43).
- (5) Remove old sealer material from oil pan and transmission case. Clean oil pan with solvent and dry it with compressed air.
- (6) Apply bead of Mopar or Loctite 599 sealer to oil pan sealing surface. Sealer bead should be at least 3

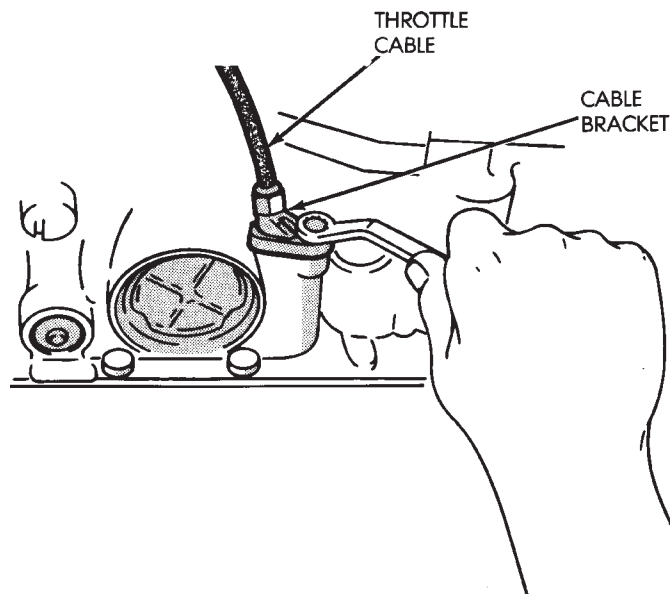


Fig. 43 Removing/Installing Transmission Throttle Cable And Bracket

mm (1/8 in.) wide. Then install pan and tighten pan bolts to 7.4 N•m (65 in. lbs.) torque.

(7) Install new gasket on oil pan drain plug. Install and tighten plug to 20 N•m (15 ft. lbs.) torque.

(8) Connect cable to engine bracket and throttle linkage.

(9) Fill transmission with Mopar Mercon.

(10) Adjust the cable as described in cable adjustment procedure.

TRANSMISSION THROTTLE CABLE ADJUSTMENT

- (1) Shift transmission into Park, shut engine off and raise hood.
- (2) Press cable release button (Fig. 44).
- (3) Push cable conduit back into cable sheath as far as possible (Fig. 45).
- (4) Rotate lever on throttle body to wide open throttle position. Cable will ratchet to correct adjustment point as lever is rotated (Fig. 45).

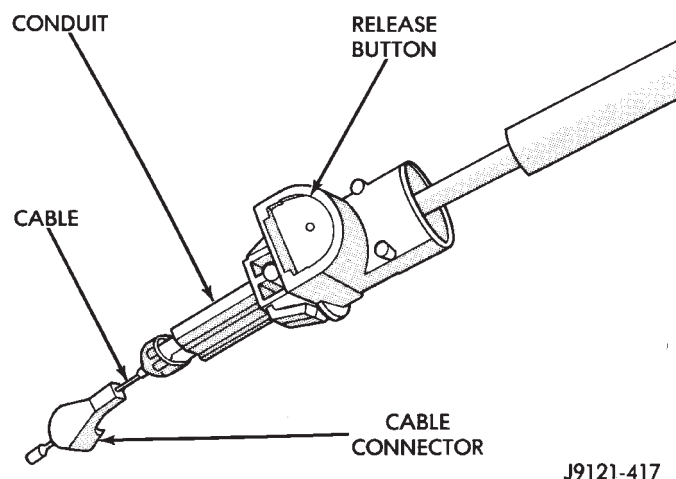


Fig. 44 Throttle Cable Components

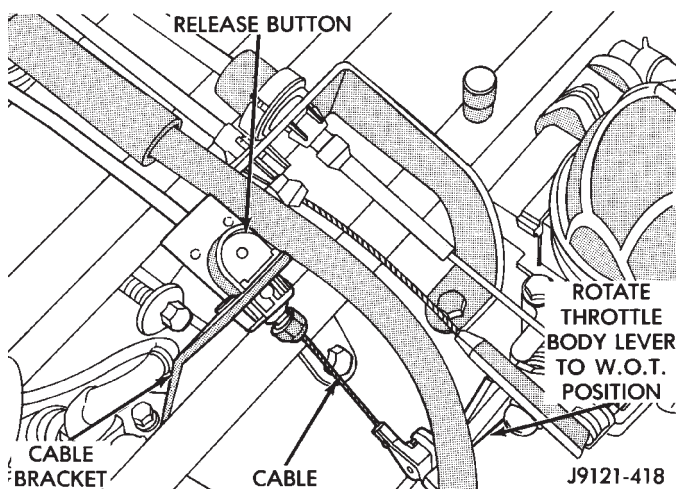


Fig. 45 Throttle Cable Adjustment

SHIFT LEVER ASSEMBLY REMOVAL—WITH FULL CONSOLE

- (1) Disconnect battery negative cable.
- (2) Remove screws at bottom of console storage bin.
- (3) Remove handle from transmission shift lever. Grasp handle and pull up sharply to remove handle from lever.
- (4) Unsnap and remove shift lever bezel (Fig. 46). Bezel has two retainer tabs on each side.
- (5) Remove light bulb from shift lever bezel.
- (6) Remove screws attaching front of console (Fig. 47). Screws are under shift lever bezel and are accessible once bezel has been removed.

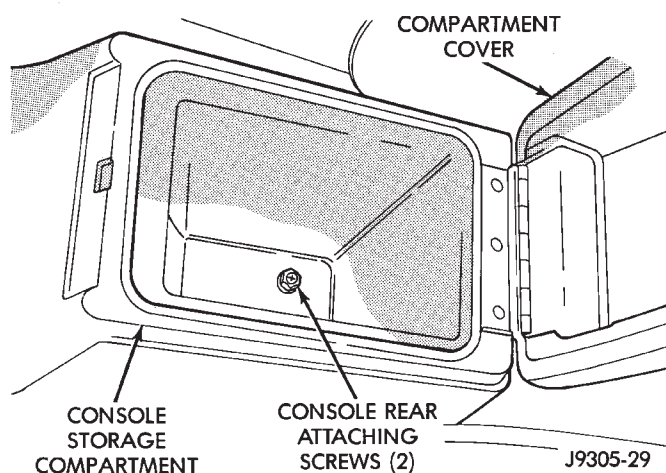


Fig. 46 Full Console Rear Attaching Screw Location

- (7) Remove bezel under parking brake lever.
- (8) Move transmission and transfer case shift levers rearward.

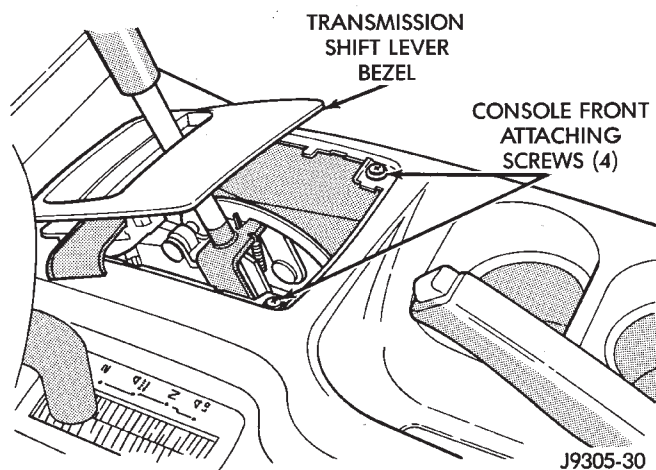
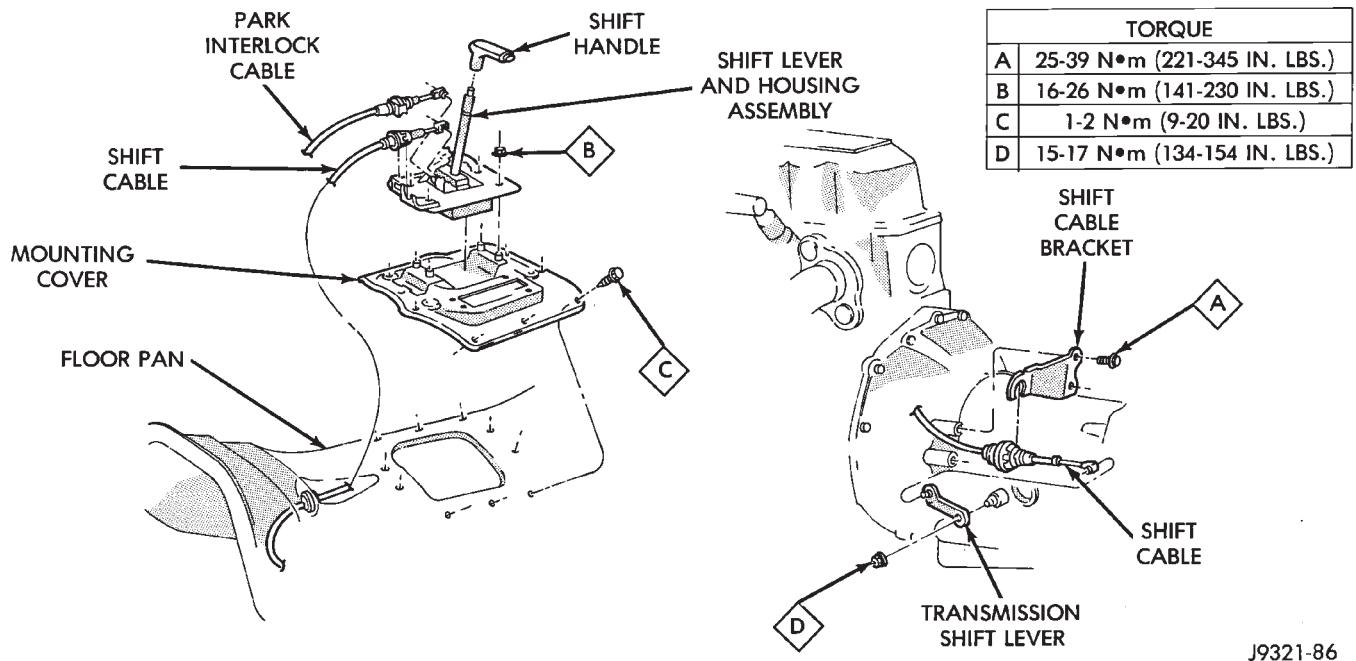


Fig. 47 Full Console Front Attaching Screw Location

- (9) Raise front of console and remove bulb at rear of transfer case shift lever bezel.
- (10) Remove console by lifting it upward and off shift levers.
- (11) Remove console bracket. Remove screws attaching bracket to floorpan mounting cover and remove bracket.
- (12) Remove nuts attaching shift lever assembly to floorpan mounting cover (Fig. 48).
- (13) Lift shift lever assembly upward for access to cables.
- (14) Disengage shift and interlock cables.
- (15) Remove shift lever assembly.



J9321-86

Fig. 48 Automatic Transmission Shift Components**SHIFT LEVER ASSEMBLY INSTALLATION—WITH FULL CONSOLE**

- (1) Attach shift and interlock cables to shift lever assembly.
- (2) Install shift lever assembly on floorpan mounting cover. Tighten lever assembly attaching nuts to 16-26 N•m (141-230 in. lbs.) torque.
- (3) Install console front bracket over shift lever and onto mounting cover. Tighten bracket screws to 2-4 N•m (17-32 in. lbs.) torque.
- (4) Install console over shift levers and onto console brackets.
- (5) Install screws attaching console to brackets at front and rear of console.
- (6) Install bulbs in transmission and transfer case shift lever bezels.
- (7) Install transmission shift lever bezel.
- (8) Install bezel under parking brake lever.
- (9) Align and install shift handle on transmission shift lever.
- (10) Connect battery negative cable.
- (11) Check and adjust transmission throttle cable if necessary.

SHIFT LEVER ASSEMBLY REMOVAL—WITH MINI CONSOLE

- (1) Disconnect battery negative cable.
- (2) Remove transmission shift lever handle. Grasp handle and pull upward sharply to remove it from lever.
- (3) Unsnap and remove shift lever bezel (Fig. 46).
- (4) Remove light bulb from shift lever bezel.
- (5) Remove screws attaching console to bracket and lift console upward and off lever and bracket (Fig. 49).

- (6) Remove screws attaching console bracket to mounting cover and remove bracket (Fig. 49).

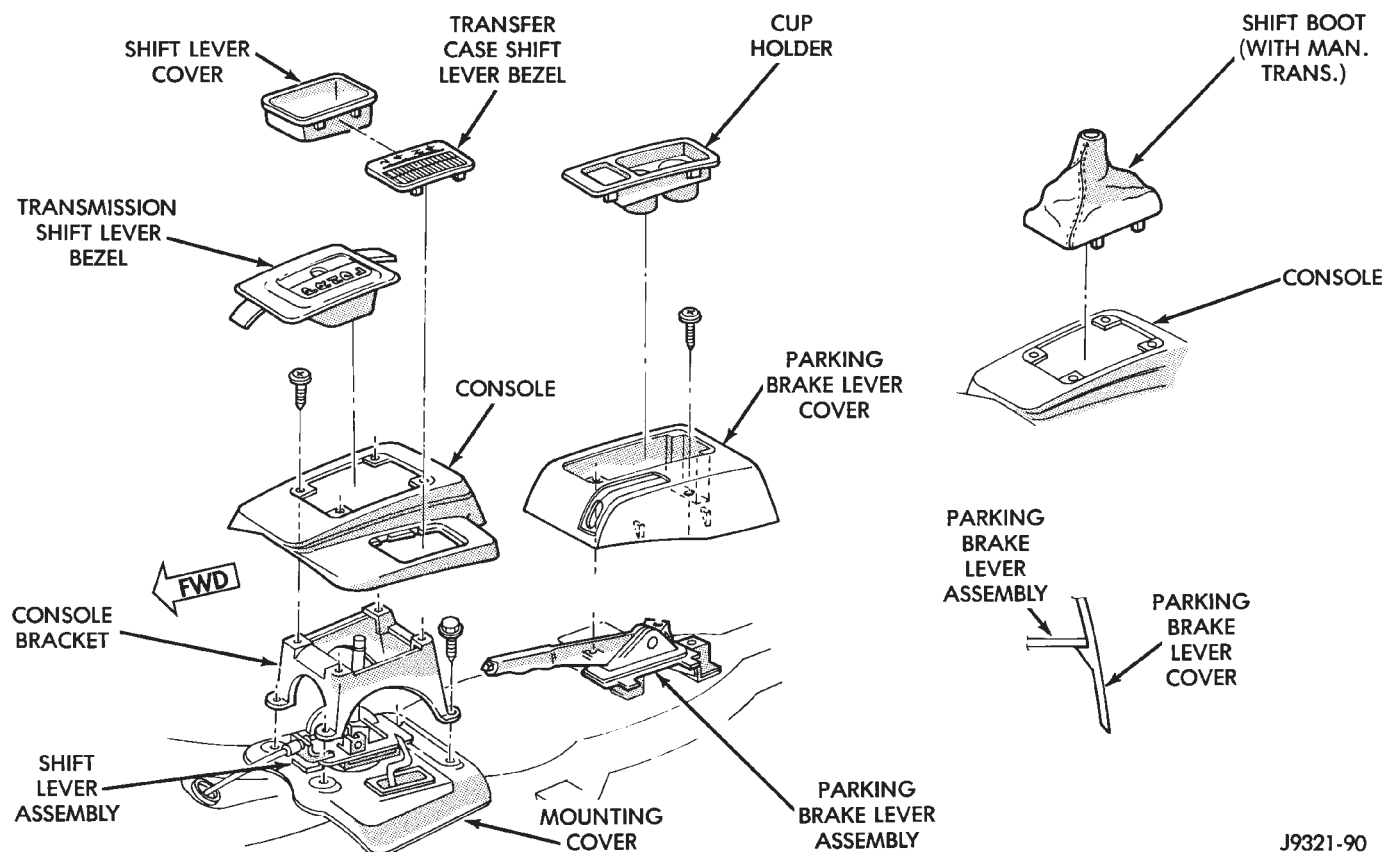
- (7) Remove nuts attaching shift lever assembly to floorpan mounting cover.
- (8) Disconnect shift and interlock cables from shift lever assembly.
- (9) Remove shift lever assembly.

SHIFT LEVER ASSEMBLY INSTALLATION—WITH MINI CONSOLE

- (1) Connect shift and interlock cables to shift lever assembly.
- (2) Install shift lever assembly on floorpan mounting cover. Tighten lever attaching nuts to 16-26 N•m (141-230 in. lbs.) torque.
- (3) Install console bracket on floorpan mounting cover. Tighten bracket screws to 2-4 N•m (17-32 in. lbs.) torque.
- (4) Install console on bracket. Tighten console attaching screws 2-4 N•m (17-32 in. lbs.) torque.
- (5) Install light bulb in shift lever bezel.
- (6) Install shift lever bezel.
- (7) Align and install shift lever handle on lever.
- (8) Connect battery negative cable.
- (9) Check and adjust shift and park interlock cables if necessary.

SHIFT CABLE ADJUSTMENT

- (1) Shift transmission into Park.
- (2) Raise vehicle.



J9321-90

Fig. 49 Mini Console Components

(3) Release cable adjuster clamp to unlock cable (Fig. 50).

(4) Unsnap cable from cable bracket (Fig. 50).

(5) Move transmission shift lever all the way rearward into Park detent. Lever is on manual valve shaft at left side of case.

(6) Verify positive engagement of park lock by attempting to rotate propeller shaft. Shaft will not rotate when park lock is engaged.

(7) Snap cable into cable bracket.

(8) Lock shaft cable by pressing cable adjuster clamp down until it snaps into place.

(9) Check engine starting. Engine should start only in Park and Neutral.

(10) Lower vehicle.

PARK INTERLOCK CABLE ADJUSTMENT

(1) Shift transmission into Park.

(2) Turn ignition switch to Lock position.

(3) Remove shift lever bezel and console screws. Raise bezel and console for access to cable.

(4) Pull cable lock button up to release cable (Fig. 50).

(5) Pull cable forward. Then release cable and press cable lock button down until it snaps in place.

(6) 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 On position.

(c) Press floor shift lever release button or move column lever. Then shift into Neutral. If cable adjustment is correct, ignition switch can not be turned to Lock position. Perform same check with transmission in D range.

(7) 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 COOLER SERVICE

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. 51). The cooler can be flushed when necessary, while mounted

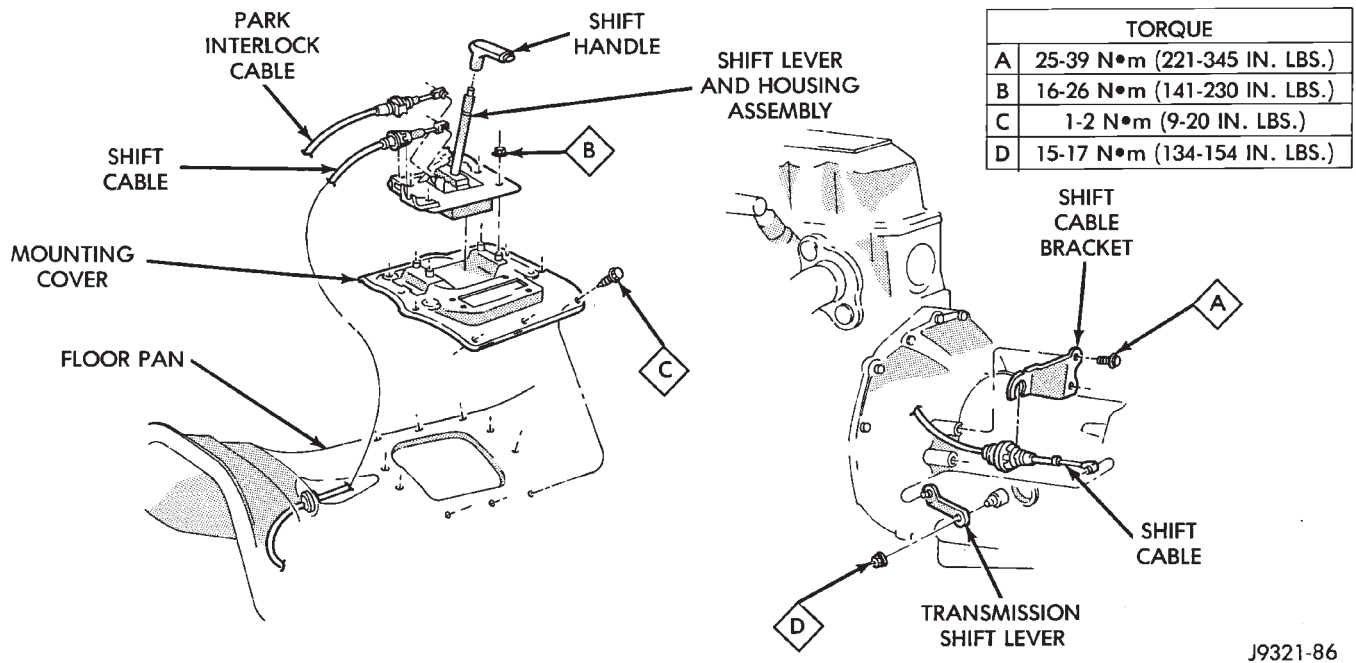


Fig. 50 Shift And Park Interlock Cables

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.

REVERSE FLUSHING MAIN AND AUXILIARY COOLERS AND COOLER LINES

Reverse flushing the cooler and lines will prevent sludge and particles from flowing back into the transmission after repair. The flushing procedure applies to standard (in-radiator) coolers and auxiliary coolers equally.

Pressure equipment is preferred for reverse flushing. However, reverse flushing can be performed using hand operated equipment as described in the following procedure.

(1) Disconnect cooler lines at transmission and at auxiliary cooler. Refer to Figure 51 for cooler line identification.

(2) Position drain pan under cooler line to catch material flushed through coolers and lines.

(3) Reverse flush each cooler using hand operated suction gun filled with mineral spirits. Insert gun

nozzle (or hose) into cooler inlet (return) line. Then force mineral spirits through into line and through cooler.

(4) Continue reverse flushing until fluid exiting inlet (pressure) line is clear and free of debris/residue.

(5) Replace radiator if fluid cannot be pumped through main cooler. Replace auxiliary cooler if leaks are evident, or if fluid cannot be pumped through it.

(6) Clear flushing materials from coolers and lines with short pulses of compressed air. Insert air gun nozzle into cooler inlet (return) line and continue short pulses of air until all fluid is cleared from cooler and lines.

(7) Pump one quart of fresh automatic transmission fluid through cooler and lines before reconnecting cooler lines.

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.

J9321-86

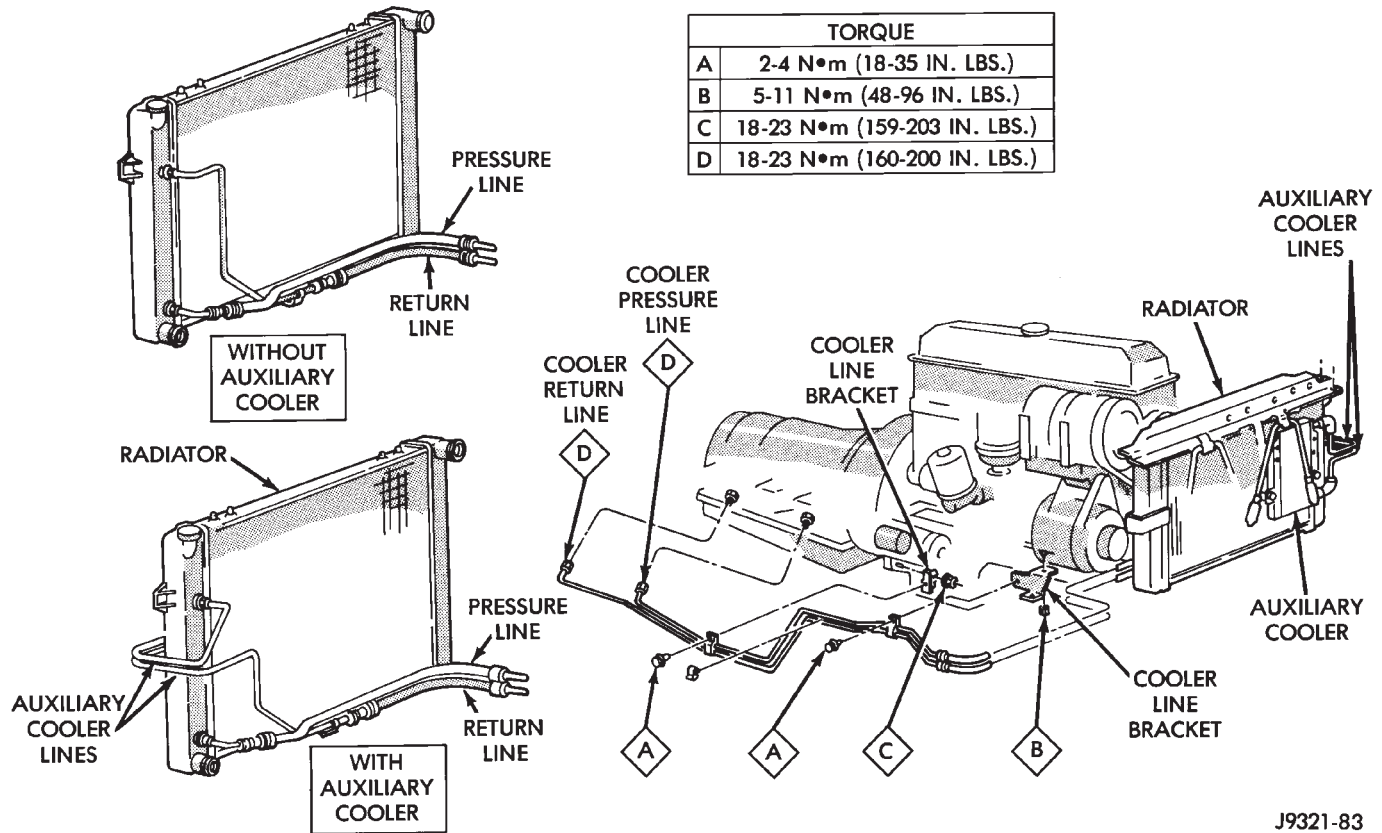
(6) Start and run engine at curb idle speed and immediately note cooler flow. Approximately one quart of fluid should flow into test container in 20 second period.

(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.

TRANSMISSION COOLER LINE FITTINGS

Quick disconnect fittings are used at the transmission cooler line connections. The cooler fittings, seals and guides are serviceable.

Replace the seals and guides whenever the fittings indicate leakage, or will no longer snap securely into place.



J9321-83

Fig. 51 Transmission Auxiliary Cooler Mounting

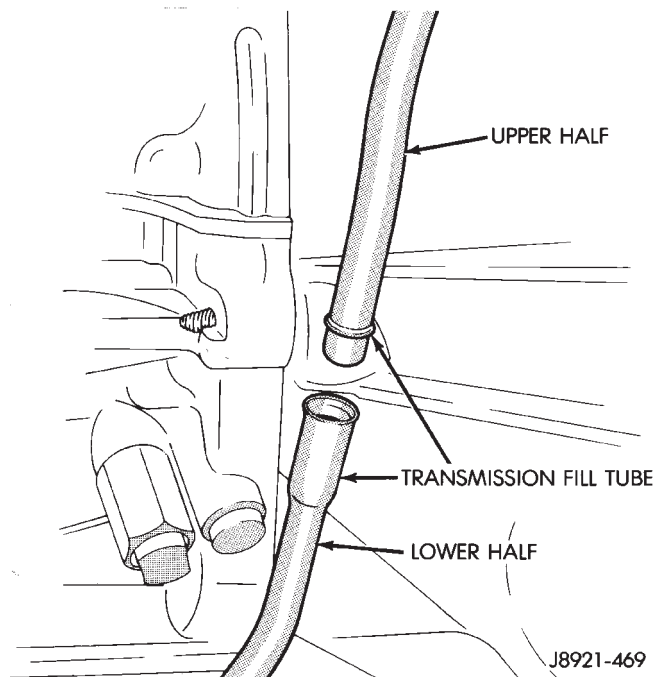
AW-4 TRANSMISSION/CONVERTER REMOVAL AND INSTALLATION

INDEX

	page		page
Oil Pump Seal Replacement	69	Transmission and Torque Converter Installation ...	70
Torque Converter Stator Overrunning Clutch Inspection	69	Transmission and Torque Converter Removal	69

TRANSMISSION AND TORQUE CONVERTER REMOVAL

- (1) Raise vehicle.
- (2) Drain transmission fluid and reinstall oil pan drain plug.
- (3) Remove upper half of transmission fill tube (Fig. 52).

**Fig. 52 Two-Piece Transmission Fill Tube**

- (4) Disconnect cooler lines at transmission. Cooler lines have quick-disconnect fittings. Press fitting release tabs and pull cooler lines and fittings out of case or use Special Tool 7555 to disconnect them.
- (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 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 throttle cable at engine.

- (12) Disconnect necessary vacuum and fluid hoses.
- (13) Remove transfer case from transmission.
- (14) Disconnect and remove crankshaft position sensor.

CAUTION: The crankshaft position sensor can be damaged if the sensor is still in place when the transmission is removed. To avoid damage, remove the sensor before transmission removal.

- (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.

TORQUE CONVERTER STATOR OVERRUNNING CLUTCH INSPECTION

- (1) Insert Rotating Tool 7547 into converter hub and seat tool in one-way clutch (Fig. 53).
- (2) Insert Stopper Tool 7548 in one converter hub notch and into outer race of rotating tool.
- (3) Turn rotating tool clockwise. Converter clutch should rotate freely and smoothly. Less than 2.5 N•m (22 in. lbs.) of torque should be required to rotate clutch in clockwise direction.
- (4) Turn rotating tool in counterclockwise direction. Converter clutch should lock.
- (5) Replace converter if clutch binds or will not lock.

OIL PUMP SEAL REPLACEMENT

- (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.
- (3) Lubricate lip of new seal with Mopar Mercon transmission fluid and install seal in pump with tool 7549 (Fig. 54).

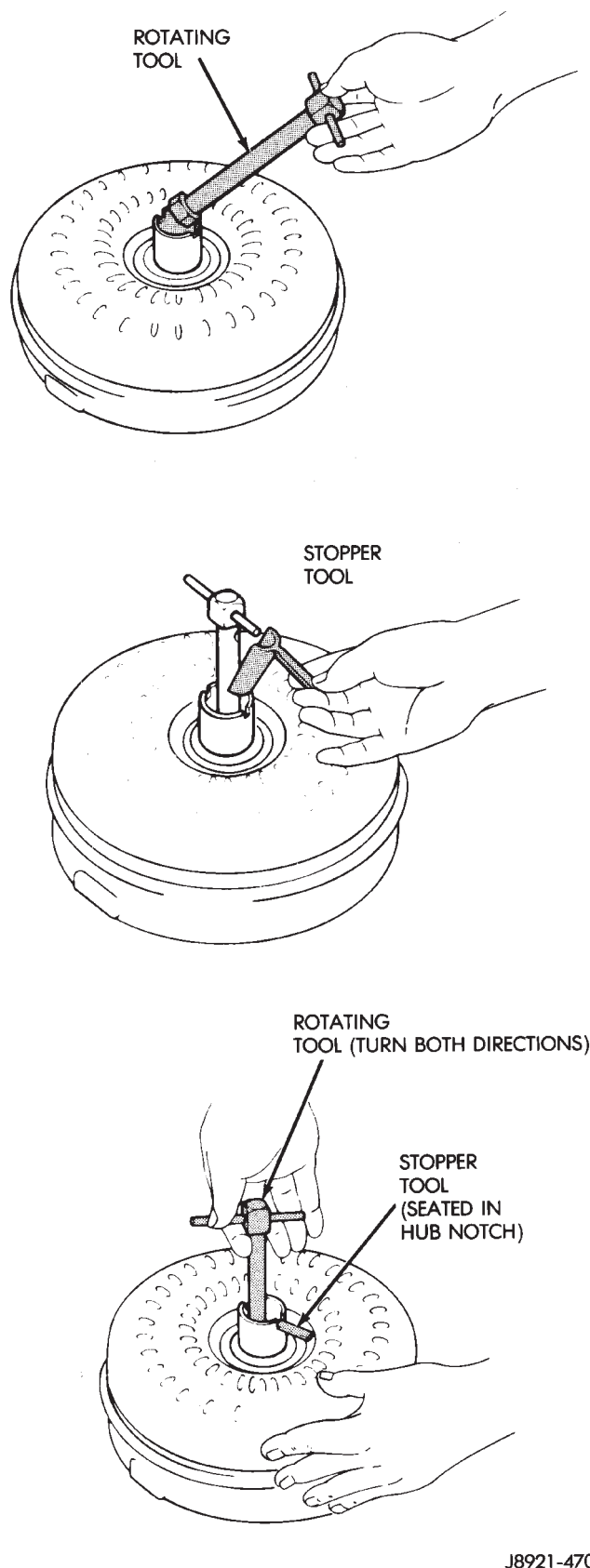


Fig. 53 Checking Operation Of Torque Converter Stator Overrunning Clutch

(4) Lubricate torque converter hub with Mopar Mercon transmission fluid.

- (5) Align and install converter.
- (6) Secure converter with strap or C-clamp until transmission is ready for installation in vehicle.

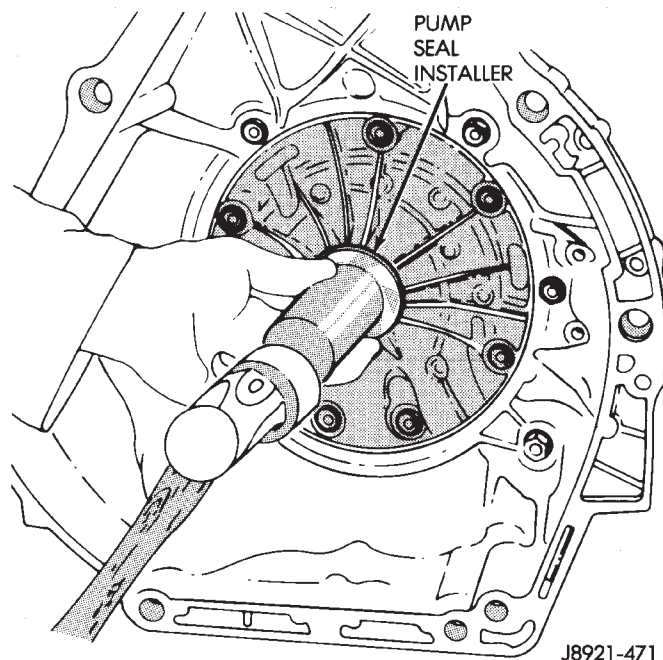


Fig. 54 Installing Oil Pump Seal

TRANSMISSION AND TORQUE CONVERTER INSTALLATION

- (1) Mount transmission on transmission jack. Then secure transmission to jack with safety chains.
- (2) Install torque converter. Be sure converter is fully seated in oil pump drive 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. 55).
- (7) Install converter-to-drive plate bolts.
- (8) Install and connect starter motor.
- (9) Install and connect crankshaft position sensor.
- (10) Install transfer case on transmission. Tighten transfer case attaching nuts to 41 N•m (30 ft. lbs.) torque
- (11) Connect transfer case shift linkage and vacuum hoses.
- (12) Connect exhaust components.
- (13) Install rear mount and crossmember (Fig. 56). Then remove jack used to support transmission assembly.
- (14) Connect speed sensor wire harness to sensor.
- (15) Connect wire harness to park/neutral position switch.

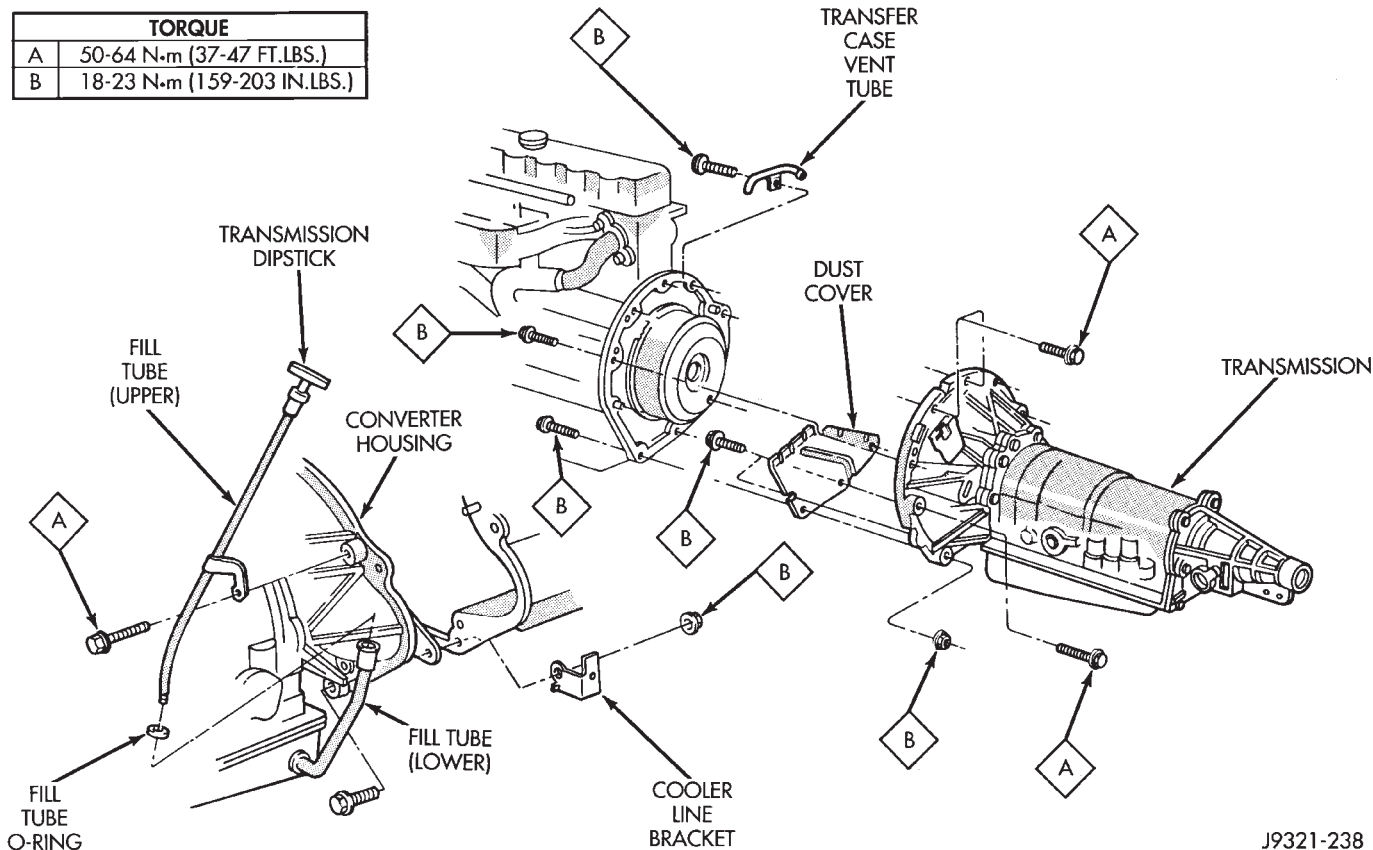
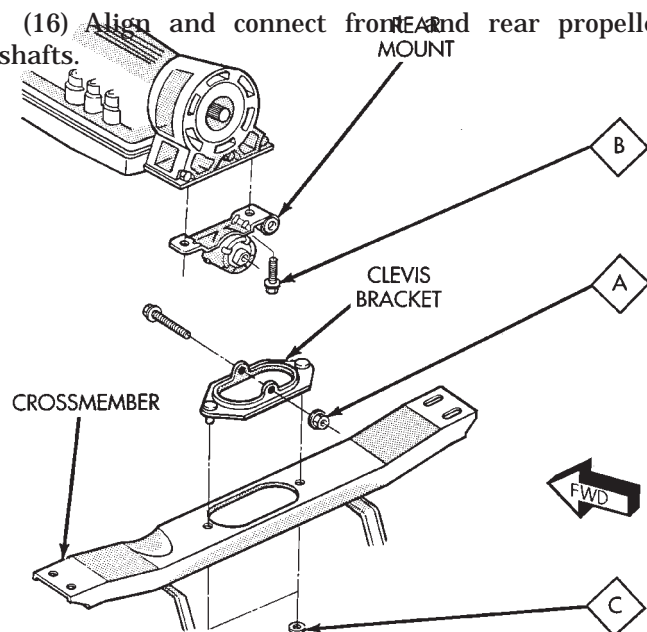


Fig. 55 AW-4 Transmission Attachment

(16) Align and connect front and rear propeller shafts.



ITEM	TORQUE
A	54-75 N·m (40-55 FT.LBS.)
B	60-89 N·m (44-66 FT.LBS.)
C	33-60 N·m (24-44 FT.LBS.)

J9321-241

Fig. 56 AW-4 Transmission Rear Mounting

(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 Mercon automatic transmission fluid.

AW-4 TRANSMISSION OVERHAUL

INDEX

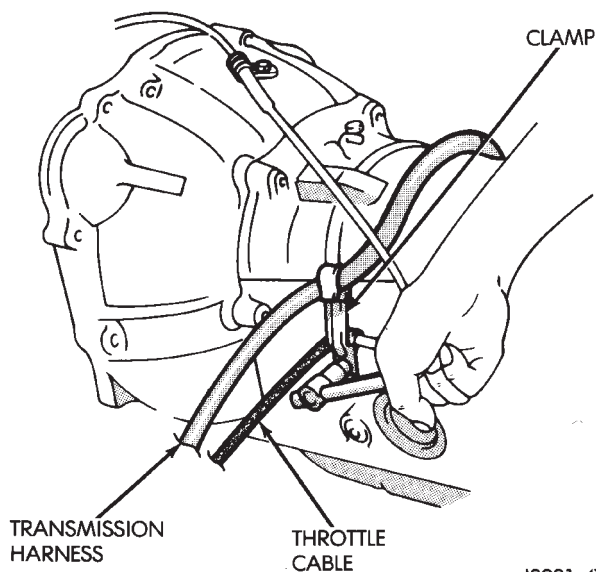
	page		page
Cleaning and Inspection	84	Overdrive Support Overhaul	95
Direct Clutch Overhaul	98	Overhaul Service Tools	72
First-Reverse Brake Piston and Transmission Case Overhaul	116	Rear Planetary, No. 2 One-Way Clutch and Output Shaft Overhaul	113
Forward Clutch Overhaul	102	Second Brake Overhaul	110
Front Planetary Gear Overhaul	106	Sun Gear and No. 1 One-Way Clutch Overhaul ..	108
Manual Valve Shaft Overhaul	85	Transmission Assembly and Adjustment	134
Oil Pump Overhaul	86	Transmission Disassembly	72
Overdrive Planetary Gear and Clutch Overhaul ...	88	Transmission Valve Body Overhaul	119

OVERHAUL SERVICE TOOLS

The special tools needed to overhaul the AW-4 transmission are provided in Tool Kit 6294. However, Pressure Test Port Adapter 7554 is not included in this kit and will have to be ordered separately. The overhaul tool kit and test port adapter are available through the parts division and dealer special tool program. An additional tool recommended for proper overhaul is a high quality dial caliper. Dial calipers are locally available and recommended for the many component measurements required during overhaul.

TRANSMISSION DISASSEMBLY

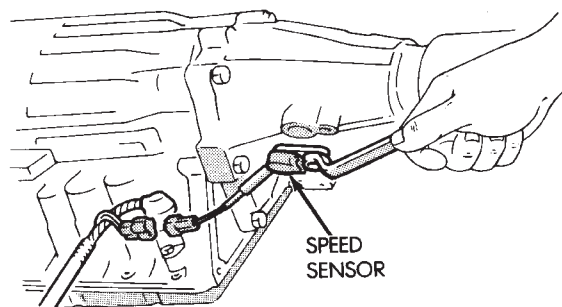
- (1) Remove torque converter.
- (2) Remove lower half of filler tube if not previously removed.
- (3) Remove clamps attaching wire harness and throttle cable (Fig. 1) to transmission.
- (4) Remove shift lever from manual valve shaft at left side of transmission.
- (5) Remove park/neutral position switch.



J8921-474

Fig. 1 Typical Harness And Cable Clamp Attachment

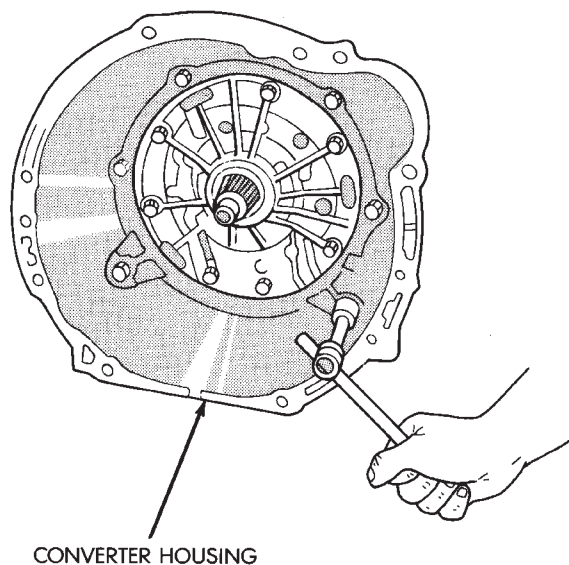
- (6) Remove speed sensor (Fig. 2).



J8921-475

Fig. 2 Speed Sensor Removal

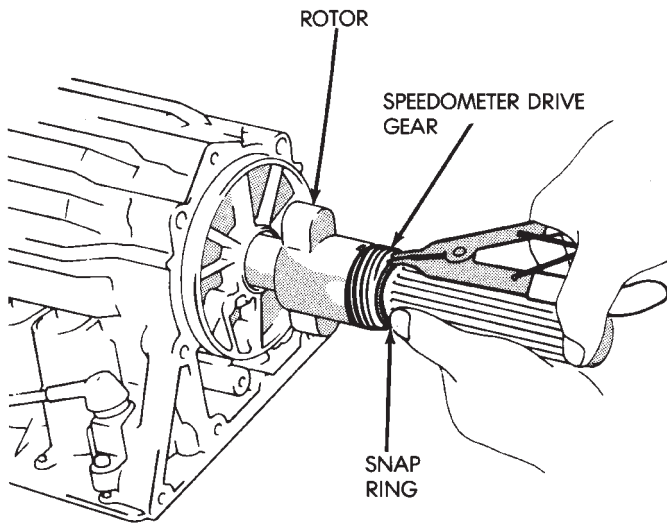
- (7) Remove converter housing bolts and remove housing (Fig. 3) from case.
- (8) Remove adapter housing.



J8921-476

Fig. 3 Removing/Installing Converter Housing

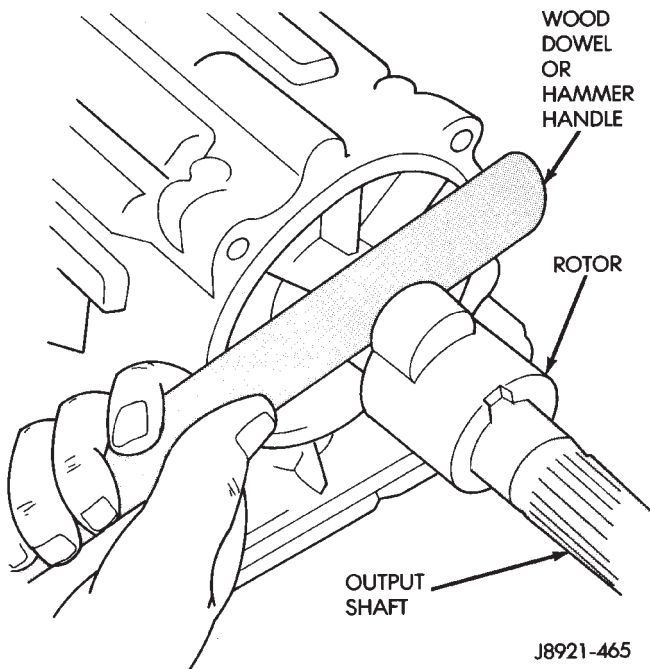
(9) Remove speedometer drive gear snap ring and remove gear and gear spacer if equipped (Fig. 4).



J8921-464

Fig. 4 Removing Speed Sensor And Speedometer Drive Gear

(10) Remove speed sensor rotor and key. Use wood dowel or hammer handle to loosen and remove rotor (Fig. 5).

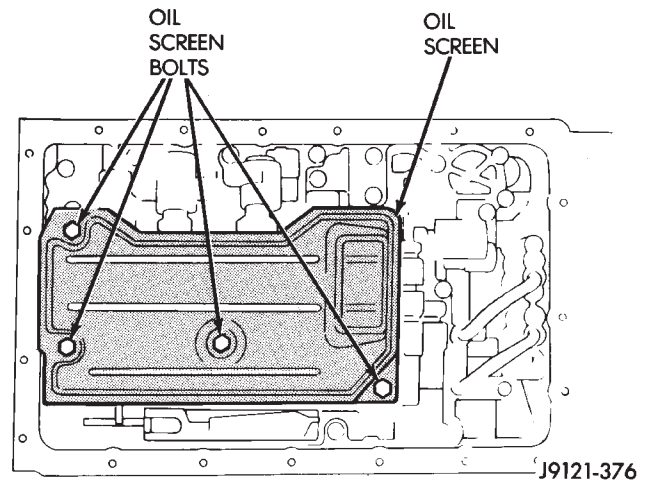


J8921-465

Fig. 5 Removing Transmission Speed Sensor Rotor

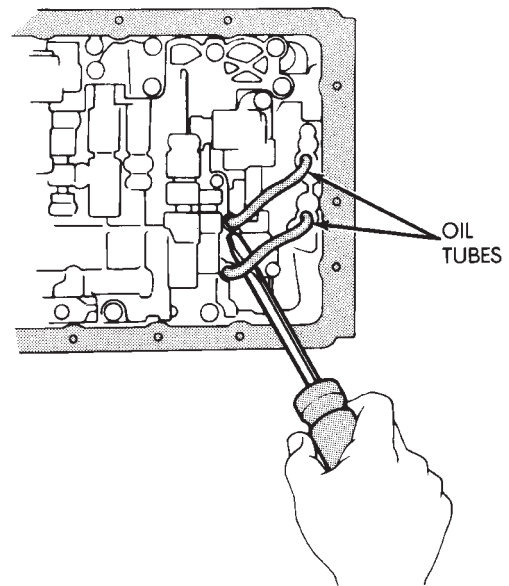
(11) Remove transmission oil pan, oil screen and screen gaskets (Fig. 6). Then mount transmission in holding fixture.

(12) Remove valve body oil feed tubes (Fig. 7).



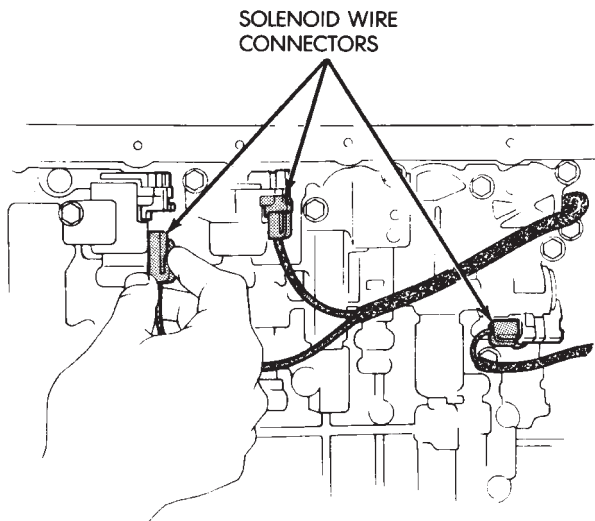
J9121-376

Fig. 6 Removing Oil Screen

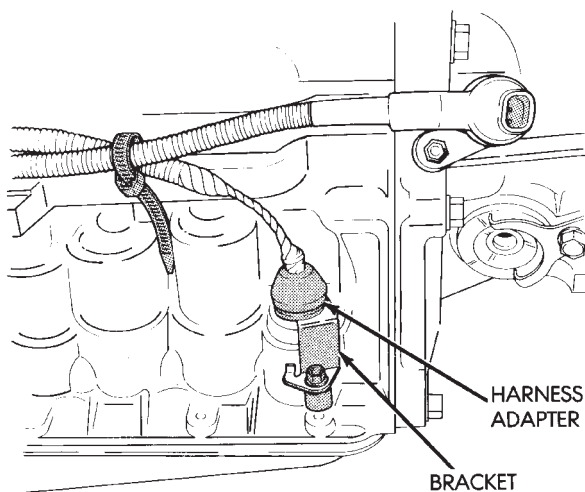


J8921-437

Fig. 7 Removing Valve Body Oil Tubes



J8921-433

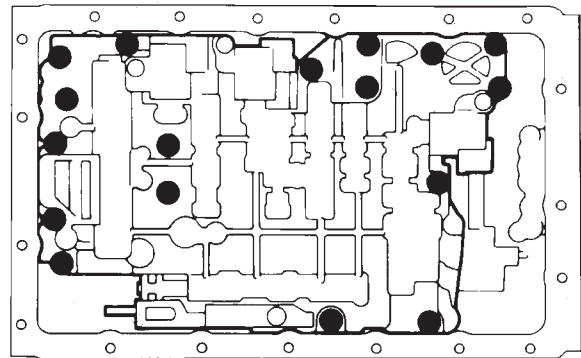
Fig. 8 Solenoid Wire Location

J8921-436

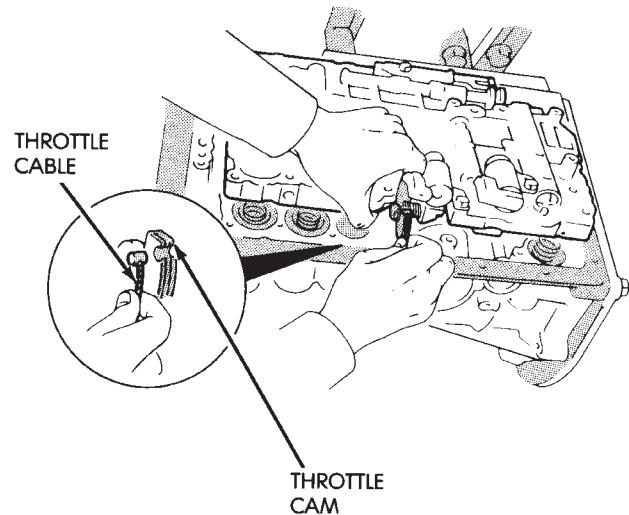
Fig. 9 Removing Bracket And Harness

- (13) Disconnect valve body solenoid wires (Fig. 8).
- (14) Remove harness bracket bolt and remove harness and bracket (Fig. 9).
- (15) Remove valve body bolts (Fig. 10).
- (16) Disconnect throttle cable from throttle cam (Fig. 11).
- (17) Remove valve body from case. Then remove accumulator springs, spacers and check ball and spring (Fig. 12).
- (18) Remove second brake and clutch accumulator pistons with compressed air (Fig. 13). Apply air pressure through feed port and ease the pistons out of the bore.

● = BOLT LOCATIONS

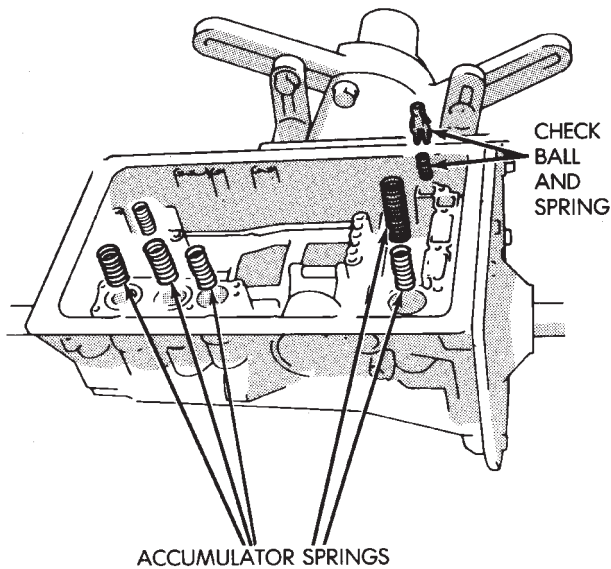


J8921-439

Fig. 10 Valve Body Bolt Locations

J8921-478

Fig. 11 Disconnecting Throttle Cable



J9121-381

Fig. 12 Removing Accumulator Springs, Spacers And Check Ball

(19) Remove overdrive brake accumulator piston with compressed air (Fig. 13).

(20) Remove overdrive clutch accumulator piston with compressed air (Fig. 13).

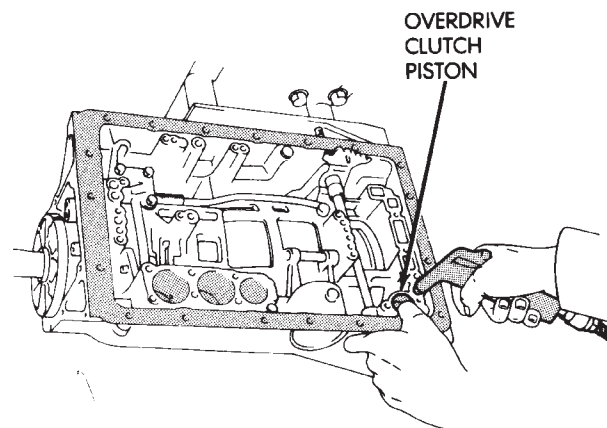
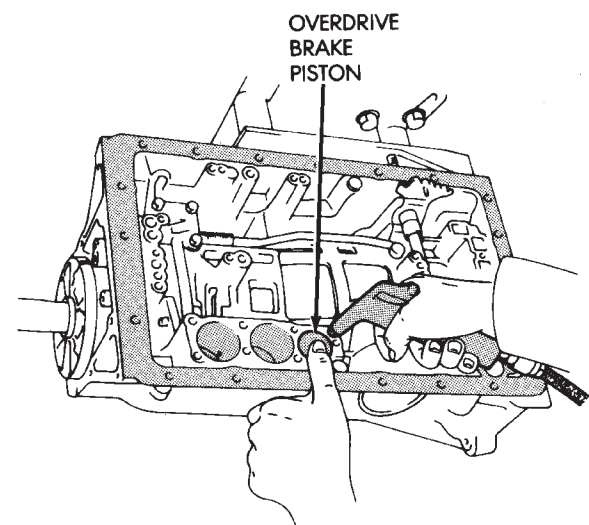
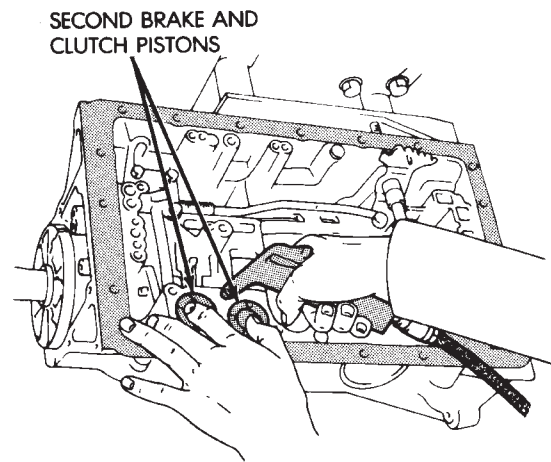
(21) Remove throttle cable.

(22) Remove oil pump bolts and remove pump with bridge-type Puller 7536 (Fig. 14).

(23) Remove race from oil pump (Fig. 15).

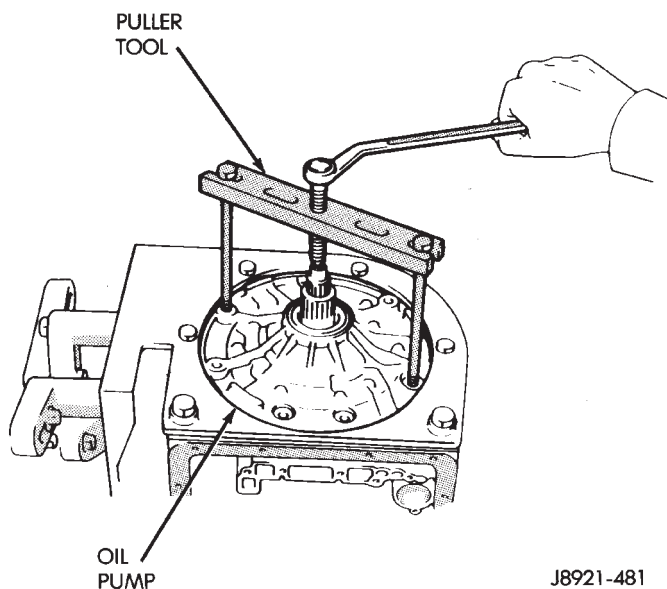
(24) Remove fourth gear overdrive planetary gear and overdrive direct clutch assembly (Fig. 16).

(25) Remove race from fourth gear overdrive planetary (Fig. 17).

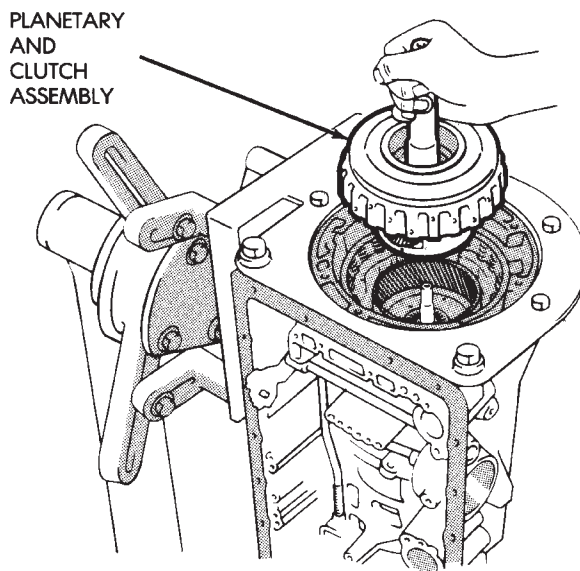


J8921-480

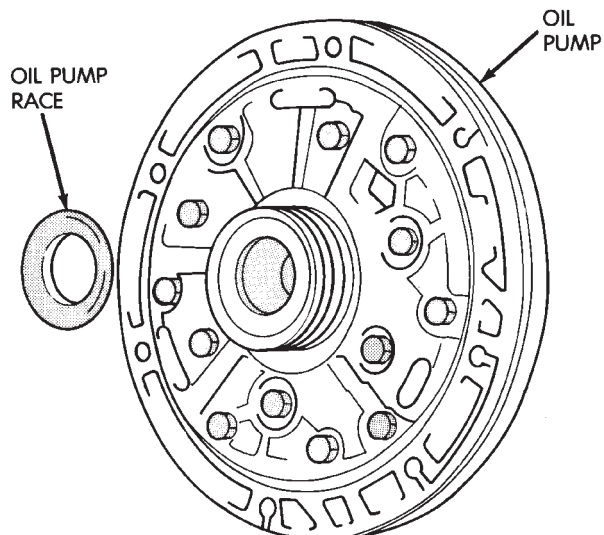
Fig. 13 Removing Accumulator Pistons

**Fig. 14 Oil Pump Removal**

J8921-481



J8921-483

Fig. 16 Removing Fourth Gear Planetary And Direct Clutch Assembly

J8921-482

Fig. 15 Oil Pump Race Removal

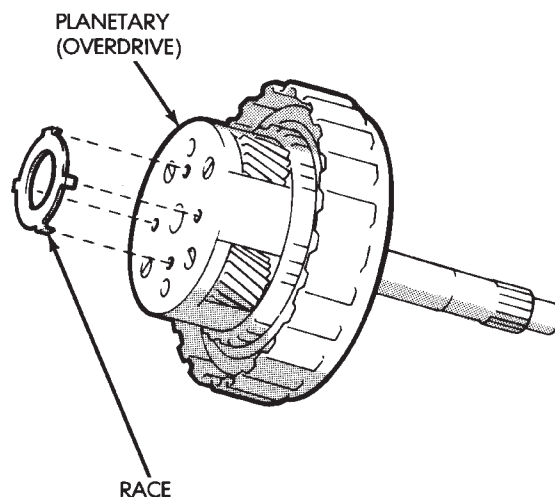
(26) Remove thrust bearing, race and overdrive planetary ring gear (Fig. 18).

(27) Measure stroke length of overdrive brake piston as follows:

(a) Mount dial indicator on case (Fig. 19).

(b) Position Gauge Tool 7546 so it contacts piston (Fig. 19).

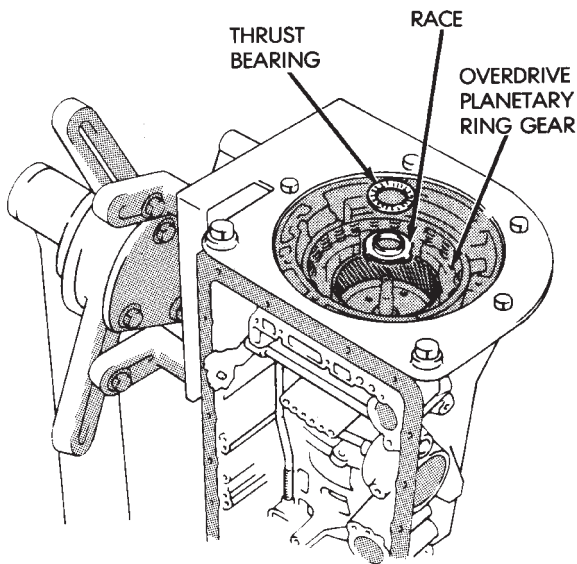
(c) Apply 57-114 psi air pressure through piston apply port and note piston stroke on dial indicator. Stroke length should be 1.40 - 1.70 mm (0.055 - 0.0699 in.).



J8921-484

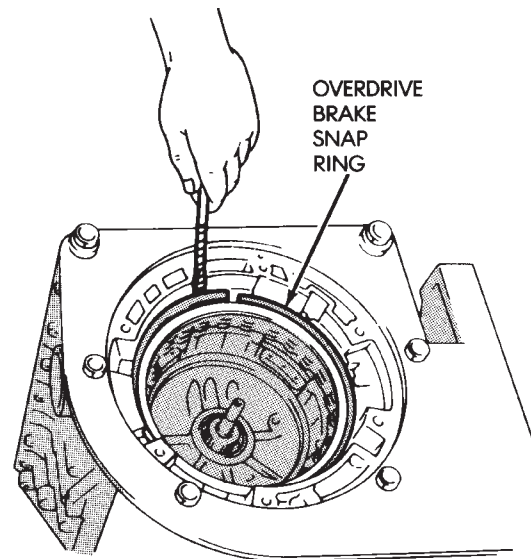
Fig. 17 Fourth Gear Planetary Race Removal

(d) If stroke is not within limits, replace brake pack retainer. Select required retainer from Overdrive Brake Retainer Selection chart in Specifications section.



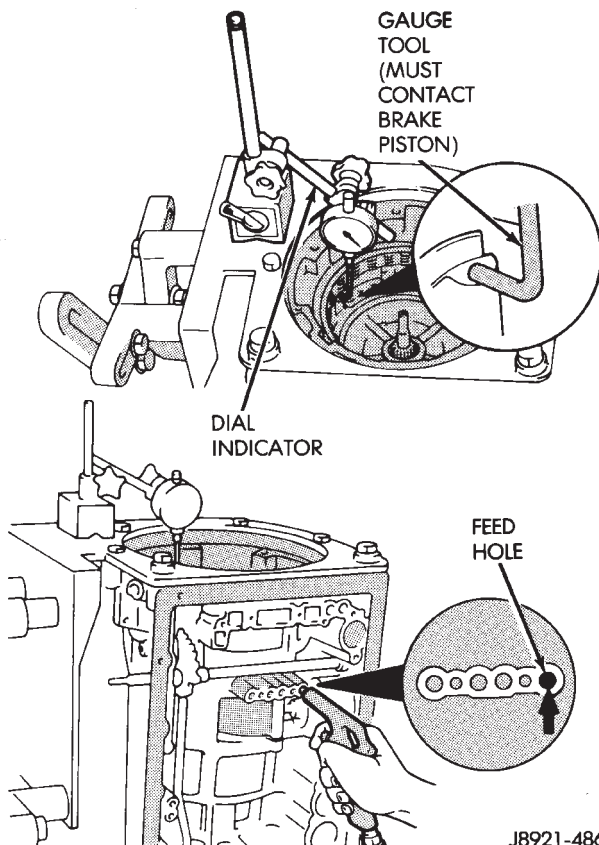
J8921-485

Fig. 18 Removing Bearing, Race And Planetary Ring Gear



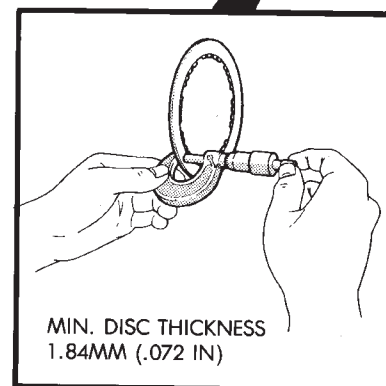
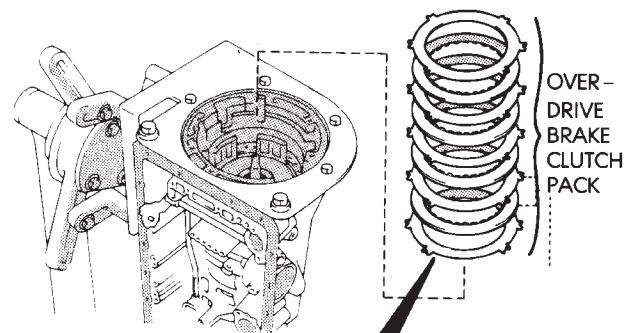
J8921-487

Fig. 20 Removing Overdrive Brake Snap Ring



J8921-486

Fig. 19 Measuring Overdrive Brake Piston Stroke

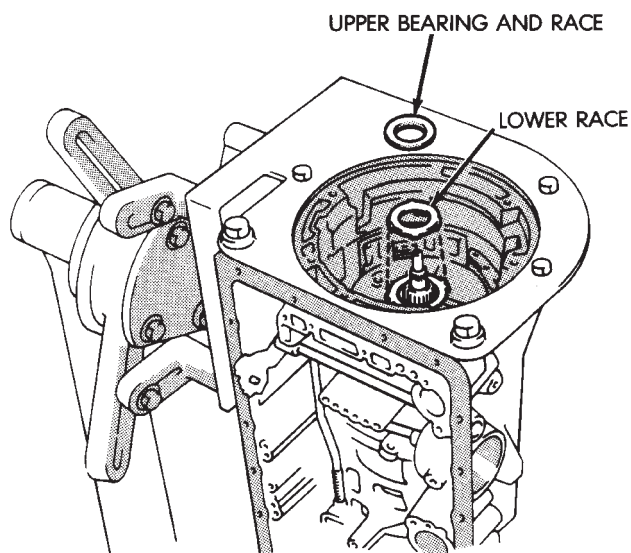


J8921-488

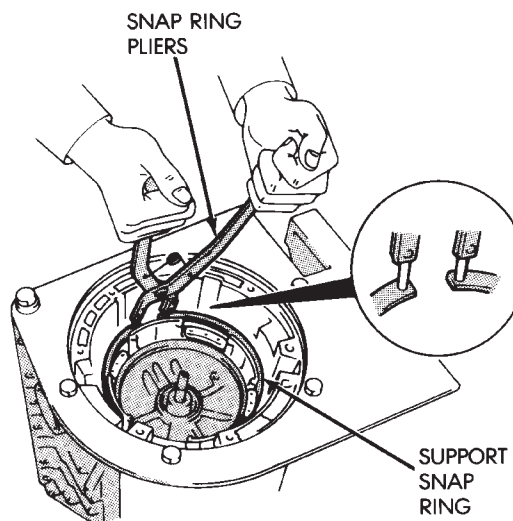
Fig. 21 Removing/Measuring Overdrive Brake Disc Thickness

(28) Remove overdrive brake snap ring (Fig. 20).
 (29) Remove overdrive brake discs and plates (Fig. 21). Then measure disc thickness with a micrometer. Minimum disc thickness is 1.84 mm (0.0724 in.). Replace discs if thickness is less than specified.

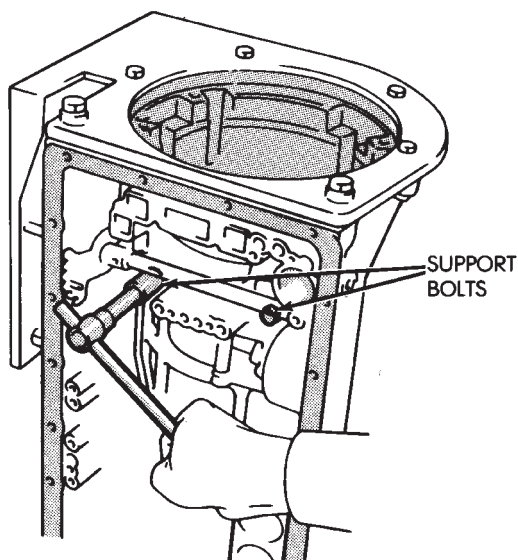
(30) Remove overdrive support lower race and upper bearing and race assembly (Fig. 22).
 (31) Remove overdrive support bolts (Fig. 23).
 (32) Remove overdrive support snap ring with Snap Ring Plier Tool 7540 (Fig. 24).



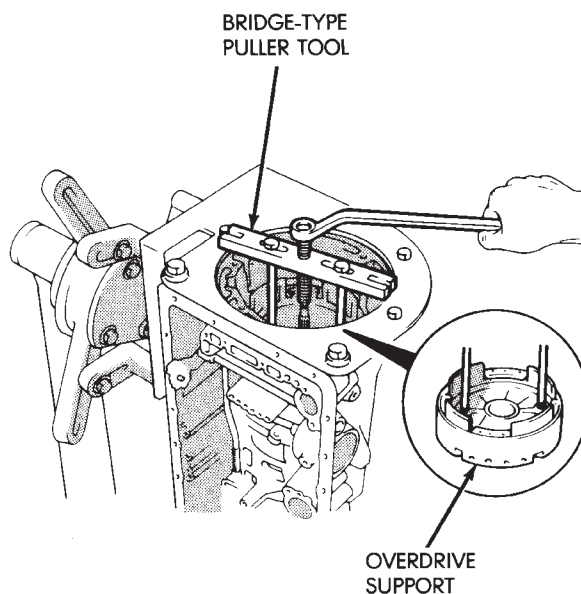
J8921-489

Fig. 22 Overdrive Support Bearing/Race Removal

J8921-491

Fig. 24 Removing/Installing Overdrive Support Snap Ring

J8921-490

Fig. 23 Overdrive Support Bolt Removal

J8921-492

Fig. 25 Removing Overdrive Support

(33) Remove overdrive support (Fig. 25) with bridge-type Puller 7536.

(34) Remove race from hub of overdrive support (Fig. 26).

(35) Measure stroke length of second coast brake piston rod as follows:

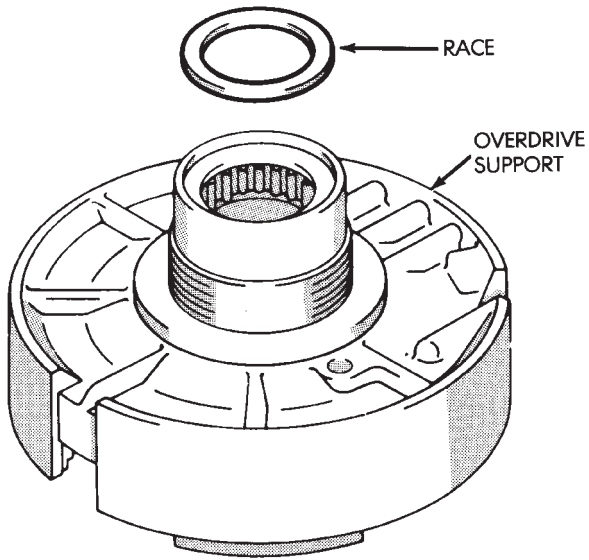
(a) Make reference mark on piston rod (Fig. 27) as shown.

(b) Apply 57-114 psi air pressure through piston feed hole and check stroke length with Gauge Tool 7552 (Fig. 27).

(c) Stroke length should be 1.5 - 3.0 mm (0.059 - 0.118 in.).

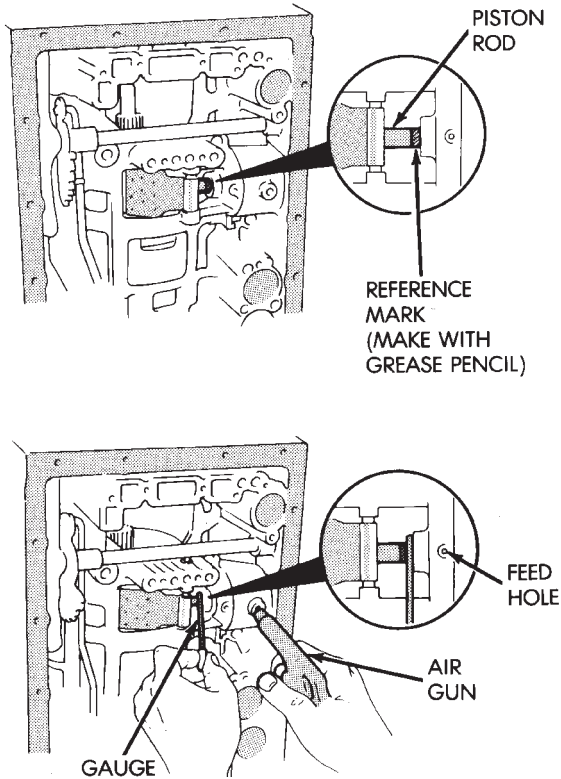
(d) If stroke length is incorrect, install new piston rod and recheck stroke. If stroke is still incorrect, replace second coast brake band.

(e) Replacement piston rods are available in two different lengths which are: 71.4 mm (2.811 in.) and 72.9 mm (2.870 in.).



J8921-493

Fig. 26 Remove Overdrive Support Race

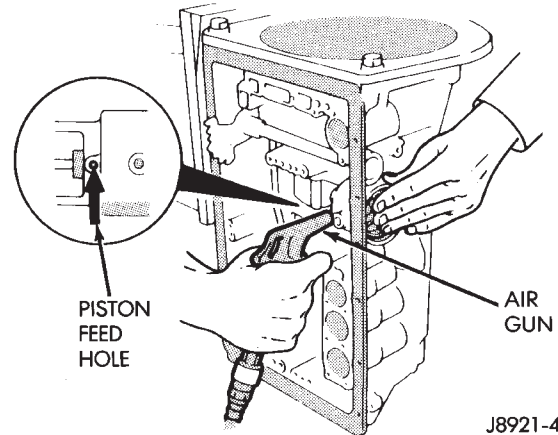
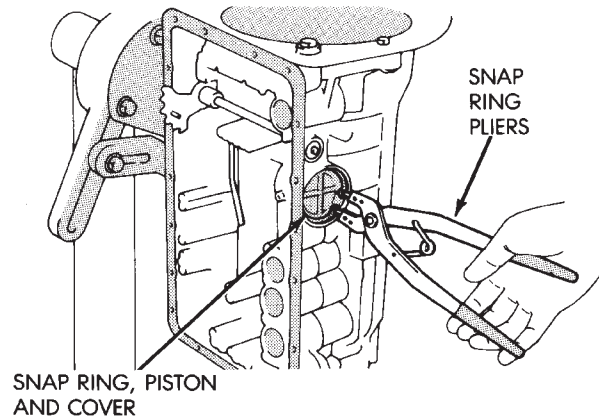


J8921-494

Fig. 27 Measuring Second Coast Brake Piston Rod Stroke

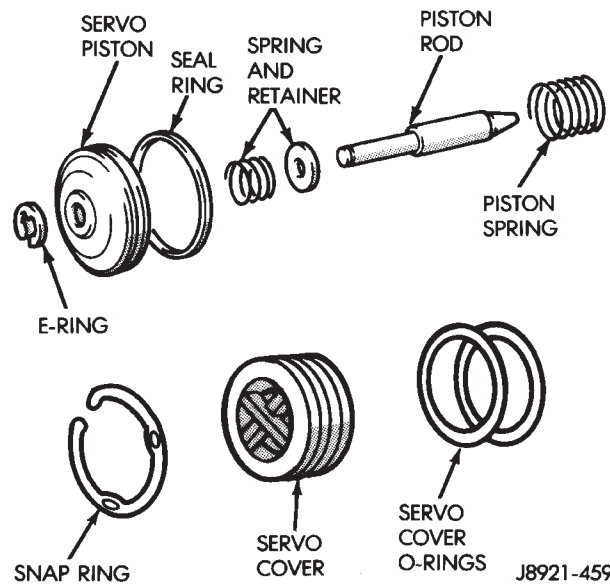
(36) Remove second coast brake piston snap ring with Snap Ring Plier Tool 7540. Then remove piston cover and piston assembly with compressed air applied through piston feed hole (Fig. 28).

(37) Disassemble second coast brake piston (Fig. 29).



J8921-495

Fig. 28 Removing Second Coast Brake Cover And Piston



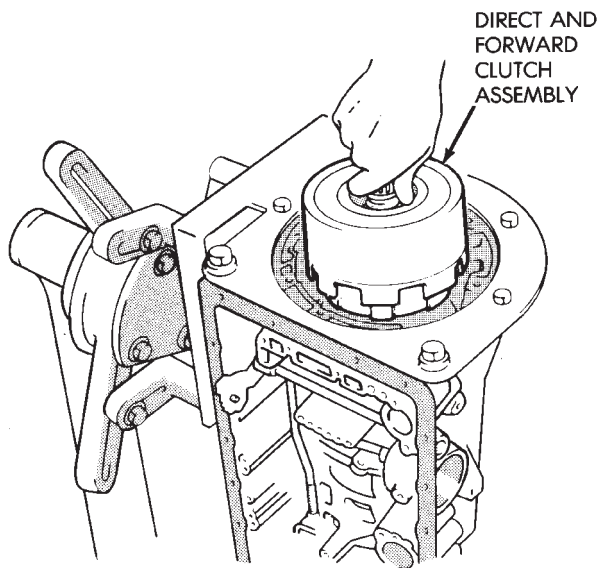
J8921-459

Fig. 29 Second Coast Brake Piston Components

(38) Remove direct and forward clutch assembly (Fig. 30).

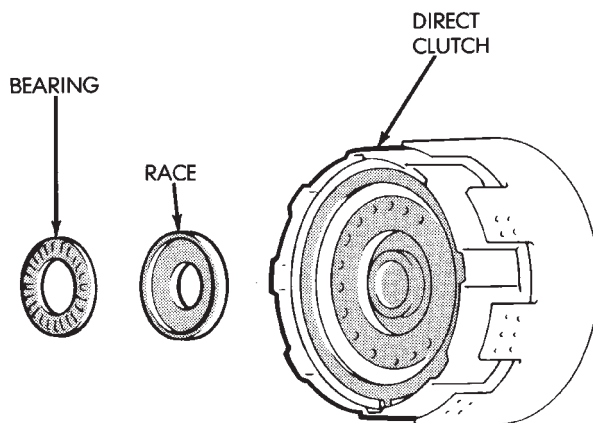
(39) Remove thrust bearing and race from clutch hub (Fig. 31).

(40) Remove second coast brake band E-ring from band pin and remove brake band (Fig. 32).



J8921-496

Fig. 30 Removing Direct And Forward Clutch Assembly



J8921-497

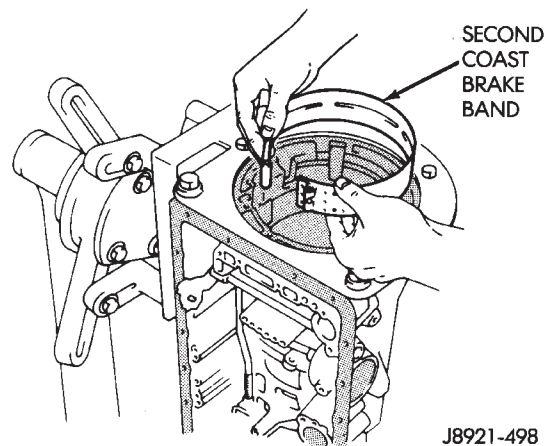
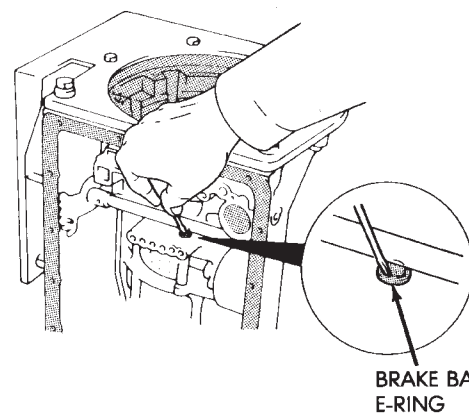
Fig. 31 Remove Bearing And Race From Clutch Hub

(41) Remove front planetary ring gear front bearing race and remove front planetary ring gear (Fig. 33).

(42) Remove thrust bearing and rear race from ring gear (Fig. 34).

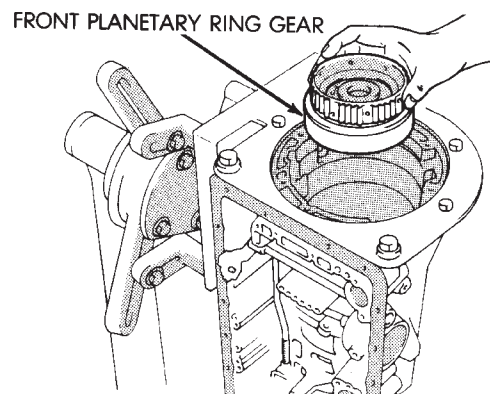
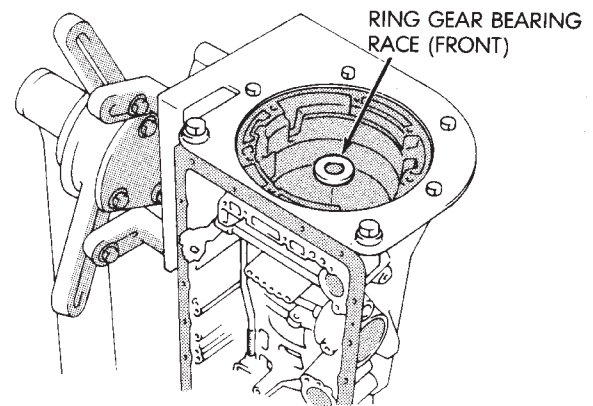
(43) Remove planetary thrust race (Fig. 35).

(44) Relieve load on planetary snap ring as follows: Loosen transmission holding fixture. Turn transmission over and allow output shaft to support transmission weight. Then place wood blocks under shaft to protect splines (Fig. 35).



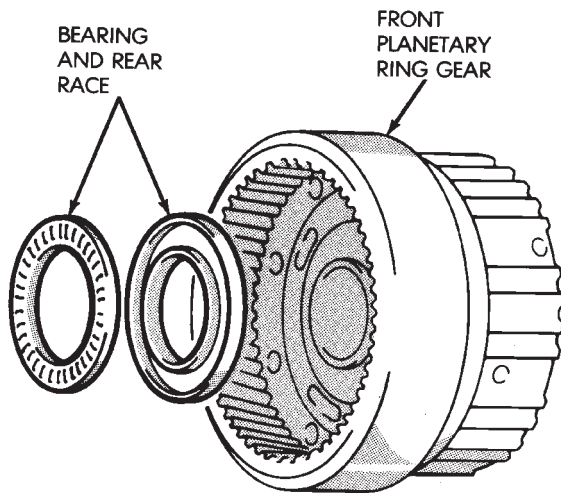
J8921-498

Fig. 32 Removing Second Coast Brake Band



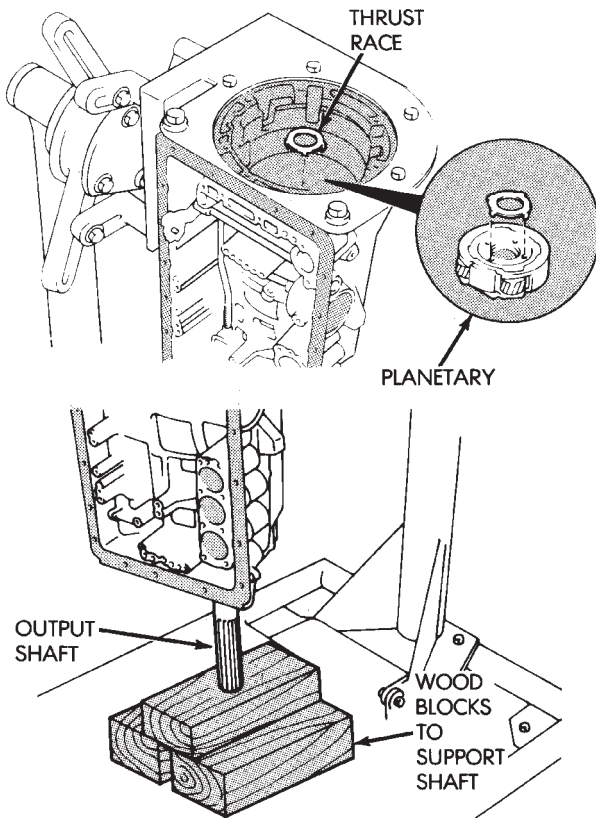
J8921-499

Fig. 33 Removing Front Planetary Ring Gear



J8921-500

Fig. 34 Removing Ring Gear Bearing And Rear Race

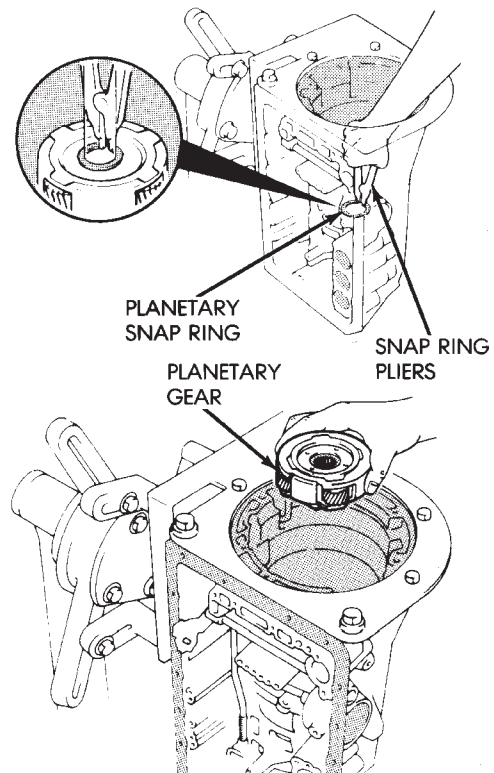


J8921-501

Fig. 35 Relieving Load On Planetary Snap Ring

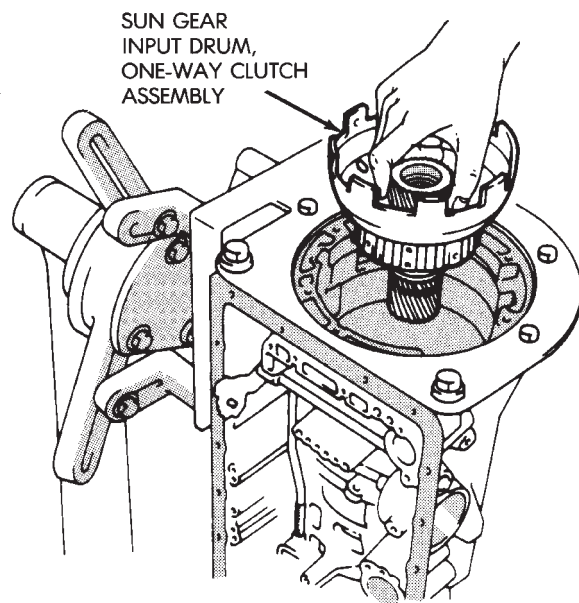
(45) Remove planetary snap ring and remove planetary gear (Fig. 36).

(46) Remove sun gear, input drum and one-way clutch as assembly (Fig. 37).



J8921-502

Fig. 36 Removing Planetary Snap Ring And Gear



J8921-503

Fig. 37 Removing Sun Gear, Input Drum And One-Way Clutch

(47) Measure second brake clutch pack clearance (Fig. 38). Clearance should be 0.62 - 1.98 mm (0.0244 - 0.0780 in.). Replace discs if clearance is not within specifications.

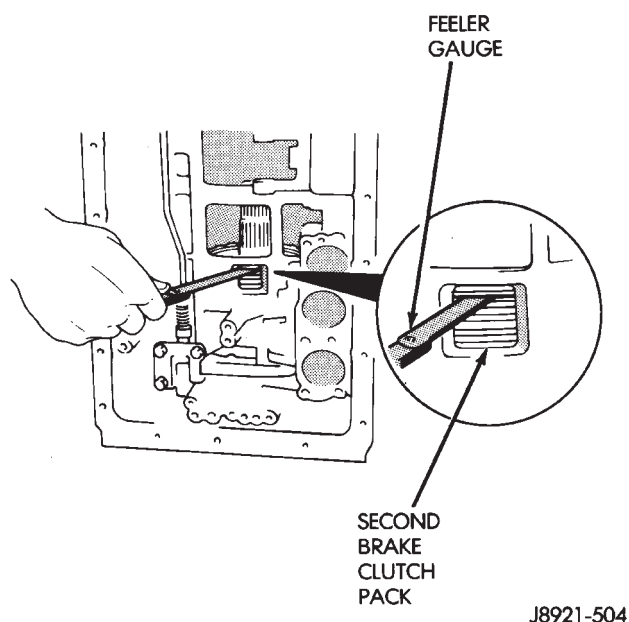


Fig. 38 Checking Second Brake Clutch Pack Clearance

(48) Remove second brake clutch pack snap ring (Fig. 39).

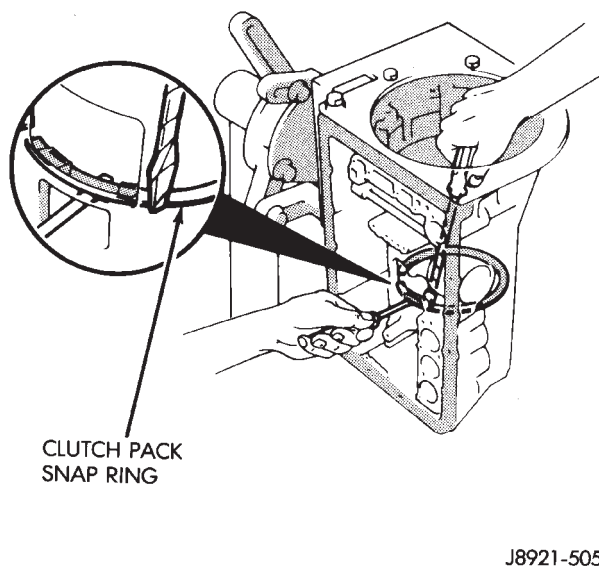


Fig. 39 Removing Second Brake Clutch Pack Snap Ring

(49) Remove second brake clutch pack (Fig. 40). Measure disc thickness with micrometer. Minimum thickness should be 1.84 mm (0.0724 in.). Replace discs if not within specifications.

(50) Remove bolts attaching park rod bracket to case. Then disconnect park rod from manual shaft lever and remove rod and bracket (Fig. 41).

(51) Remove park pawl spring, pin and pawl (Fig. 42).

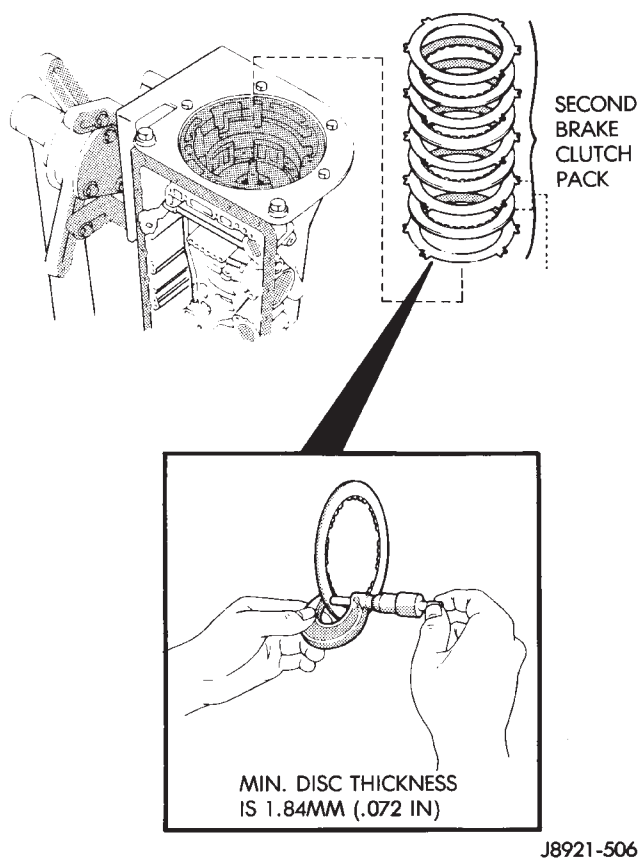


Fig. 40 Remove/Measure Second Brake Clutch Disc Thickness

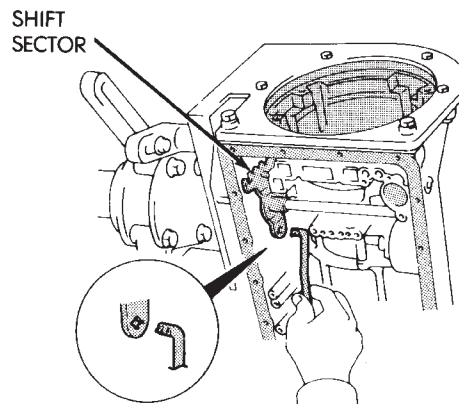
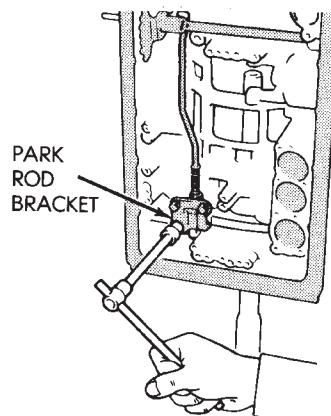


Fig. 41 Removing Park Rod And Bracket

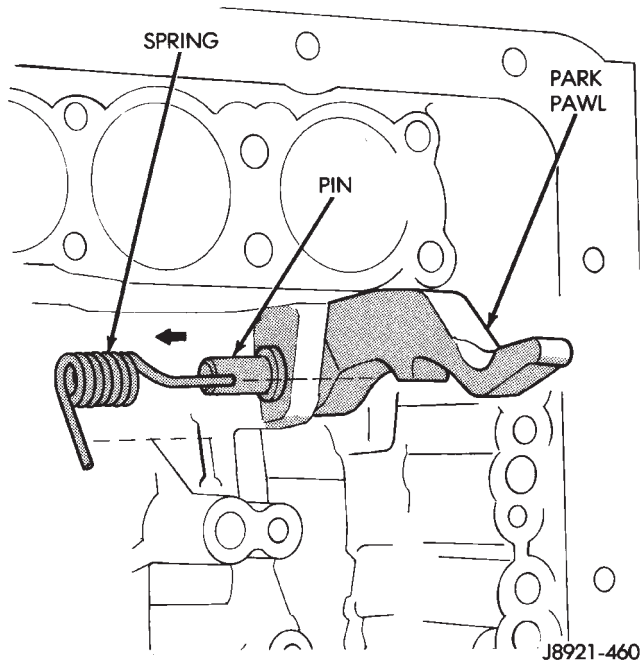


Fig. 42 Removing Park Pawl, Pin And Spring

(52) Measure clearance of first-reverse brake clutch pack (Fig. 43). Clearance should be 0.70 - 1.2 mm (0.028 - 0.047 in.). Replace discs if clearance is not as specified.

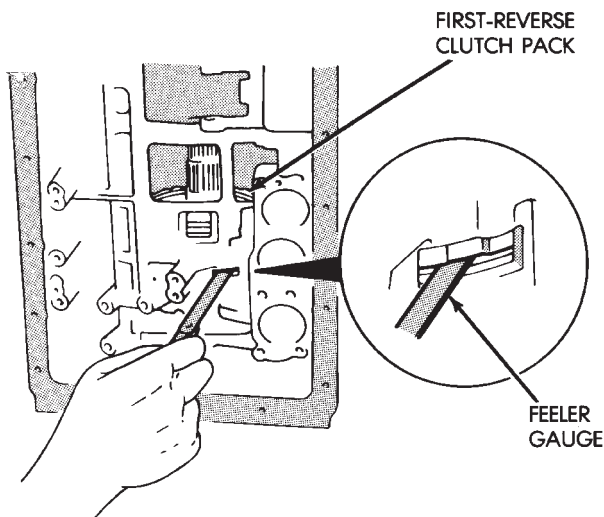


Fig. 43 Checking First-Reverse Brake Clutch Pack Clearance

(53) Remove second brake piston sleeve (Fig. 44). Cover remover tool with tape to avoid damaging case.

(54) Remove rear planetary gear, second brake drum and output shaft as an assembly (Fig. 45).

(55) Remove planetary and brake drum thrust bearing and race assembly (Fig. 46).

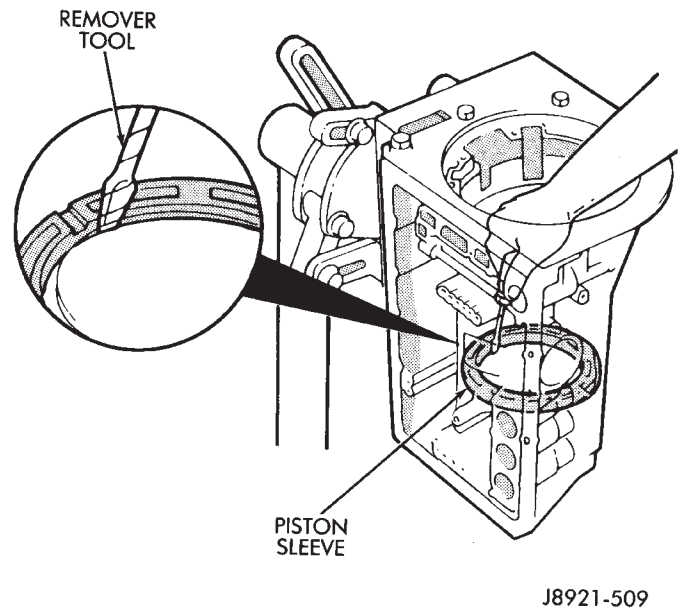


Fig. 44 Removing Second Brake Piston Sleeve

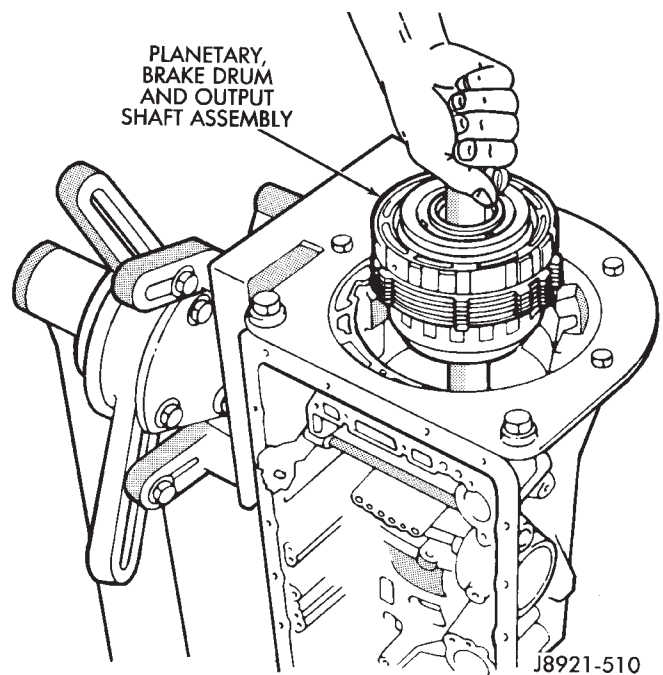
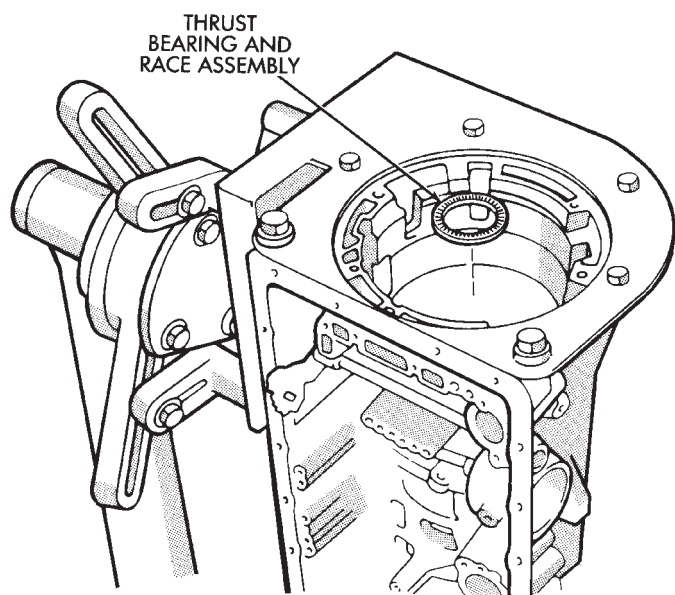


Fig. 45 Removing Rear Planetary, Second Brake Drum And Output Shaft

(56) Remove second brake drum gasket from case with gasket scraper or screwdriver (Fig. 47). Retain tube shaped gasket if condition is OK.

(57) Measure inside diameter of transmission case rear bushing with bore gauge or inside micrometer (Fig. 48). 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.**



J8921-511

Fig. 46 Removing Planetary And Brake Drum Thrust Bearing And Race Assembly

CLEANING AND INSPECTION

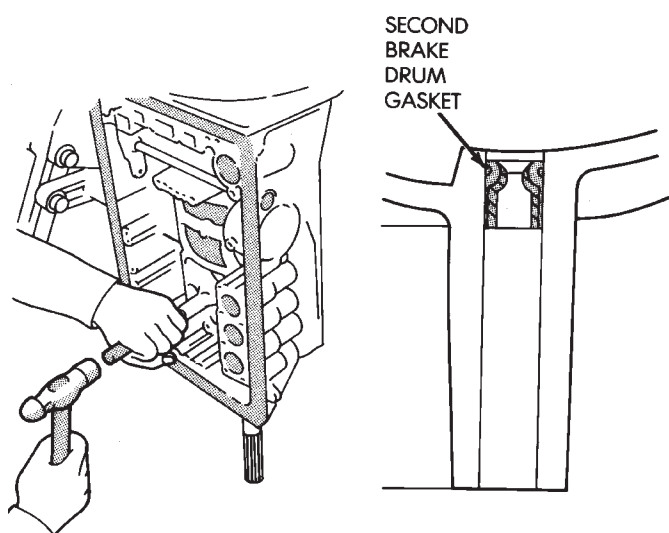
Clean the transmission components with solvent and dry them with compressed air only. Do not use shop towels or rags.

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.

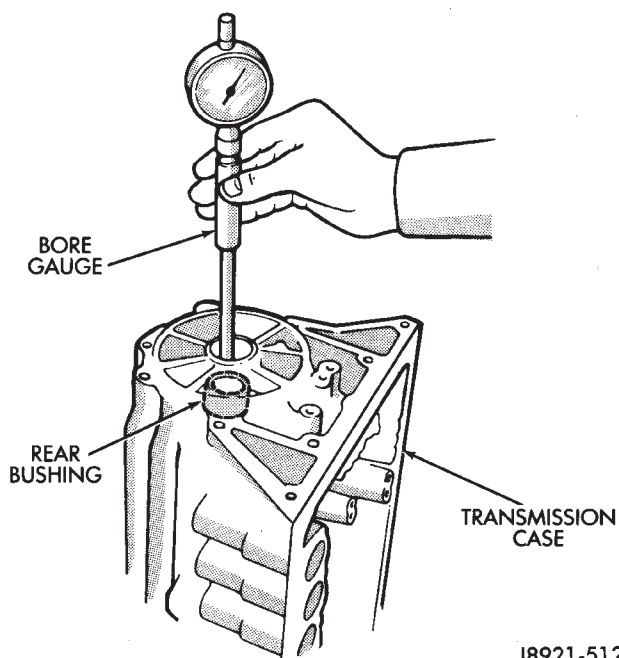
During overhaul assembly operations, lubricate the transmission components with Jeep or Mopar Mercon™ automatic transmission fluid or petroleum jelly as indicated. Petroleum jelly should be used to pre-lubricate thrust bearings, washers and races. It can also be used to hold parts in position during assembly.

Soak replacement clutch and brake pack components in transmission fluid for at least 30 minutes before installation.



J8921-753

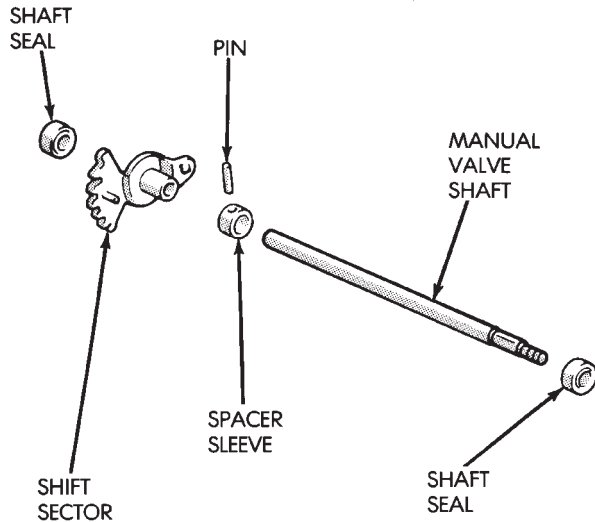
Fig. 47 Removing Brake Drum Gasket



J8921-512

Fig. 48 Checking Rear Bushing Inside Diameter

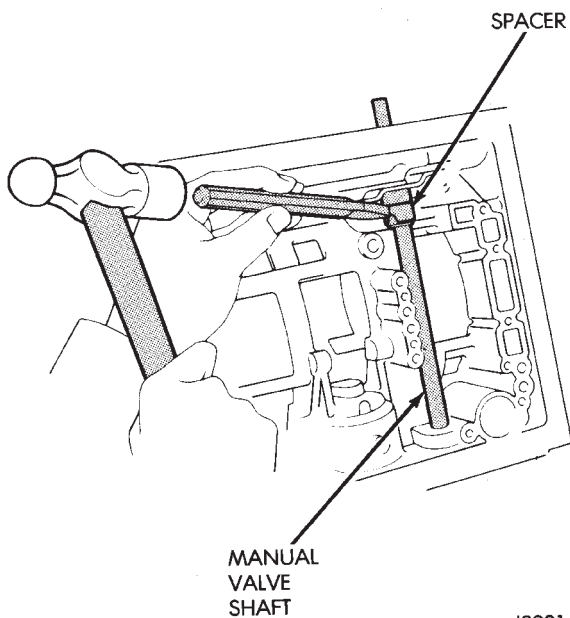
MANUAL VALVE SHAFT OVERHAUL



J8921-444

Fig. 1 Manual Valve Shaft Components

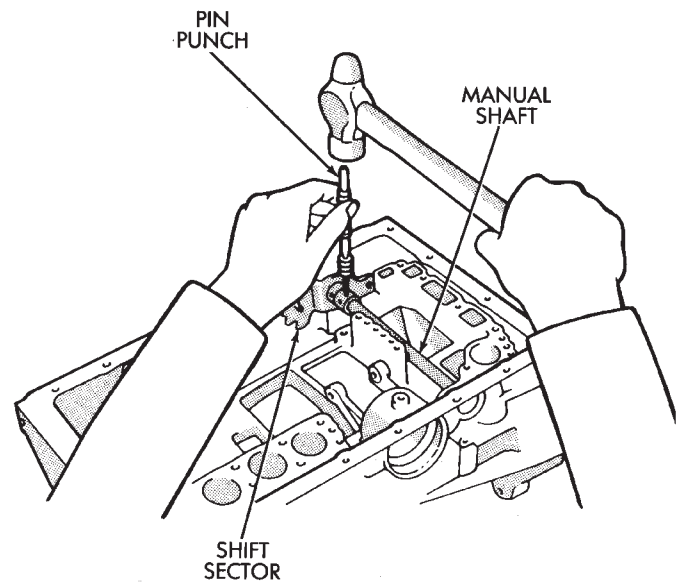
(1) Cut shaft spacer sleeve in half with chisel and remove it from lever and shaft (Fig. 2).



J8921-447

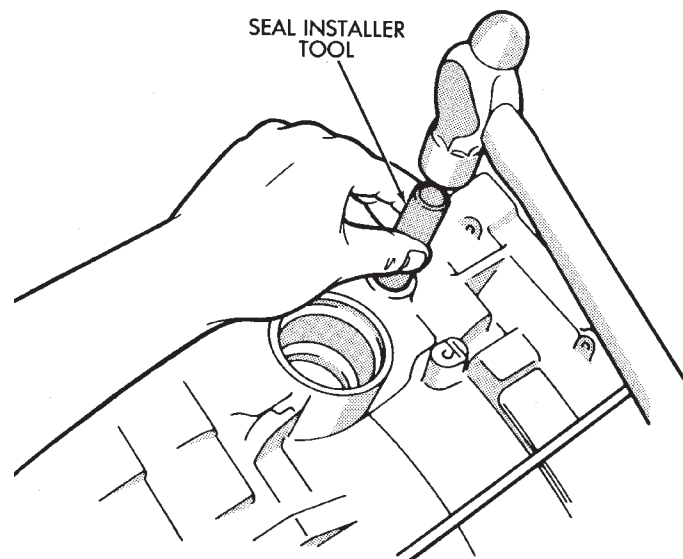
Fig. 2 Cutting Shaft Spacer Sleeve

- (2) Remove shift sector retaining pin with pin punch (Fig. 3).
- (3) Pull shaft out of case and remove manual lever.
- (4) Carefully pry shaft seals from case.
- (5) Lubricate new seals with petroleum jelly and install them in case (Fig. 4).
- (6) Install new spacer sleeve on shift sector (Fig. 5).
- (7) Install sector and sleeve on shaft and install shaft in case.



J8921-513

Fig. 3 Removing/Installing Sector Retaining Pin

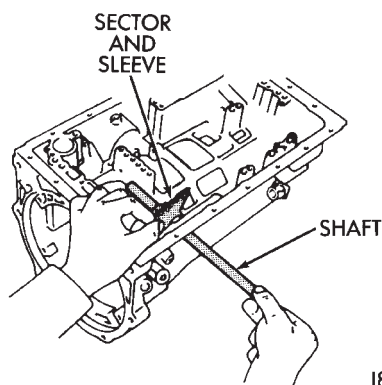
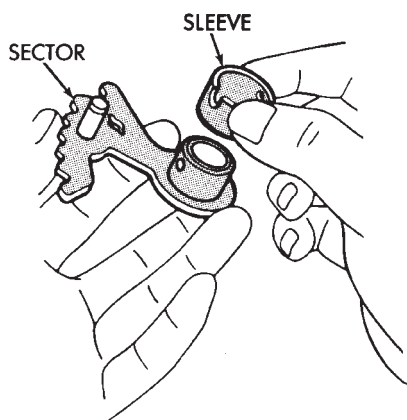


J8921-514

Fig. 4 Installing Manual Shaft Seals

(8) Align sector and sleeve and install new retaining pin.

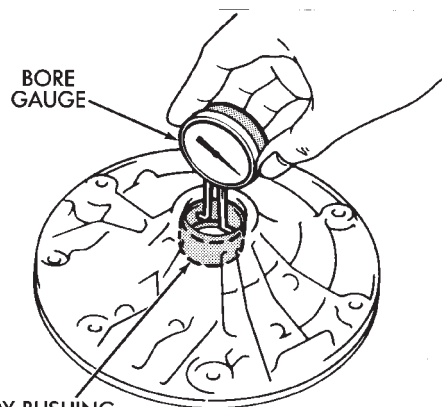
(9) Align notch in sleeve with depression in sector and stake sleeve in two places. Be sure lever and shaft rotate smoothly.



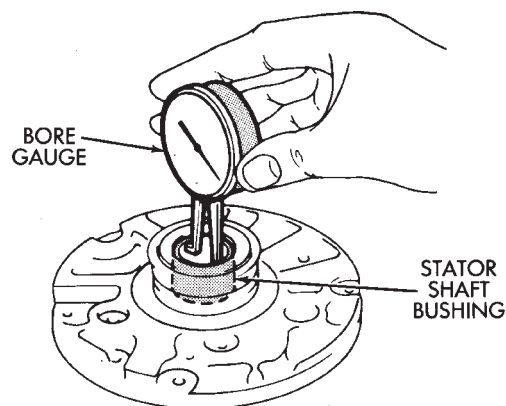
J8921-515

Fig. 5 Installing Manual Shaft And Sector**OIL PUMP OVERHAUL**

- (1) Remove pump body O-ring (Fig. 1).
- (2) Remove pump seal rings (Fig. 1).
- (3) Remove bolts attaching stator shaft to pump body and separate components.
- (4) Remove drive gear and driven gear from pump body (Fig. 1).



PUMP BODY BUSHING

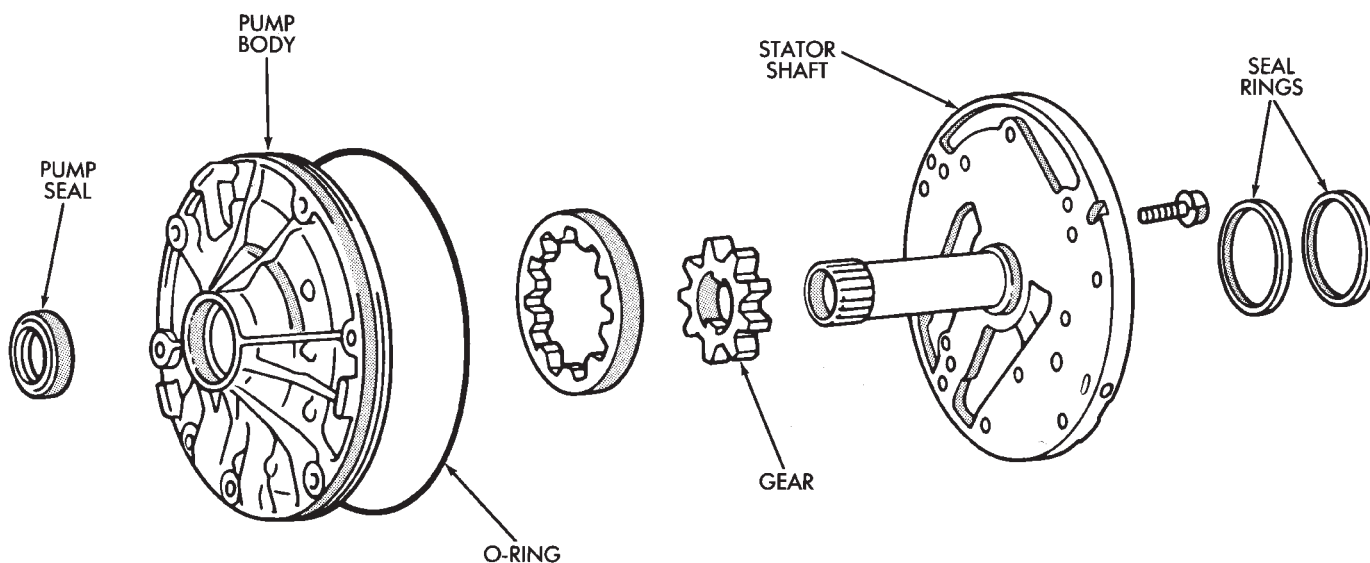
STATOR
SHAFT
BUSHING

J8921-517

Fig. 2 Checking Pump/Stator Shaft Bushings

(5) Measure inside diameter of pump body bushing with bore gauge or inside micrometer (Fig. 2). Diameter should be maximum of 38.19 mm (1.5035 in.). Replace pump body if bushing inside diameter is greater than specified.

(6) Measure inside diameter of stator shaft bushing (Fig. 2). Take measurements at front and rear of bushing. Diameter should be maximum of 21.58 mm

**Fig. 1 Oil Pump Components**

J8921-516

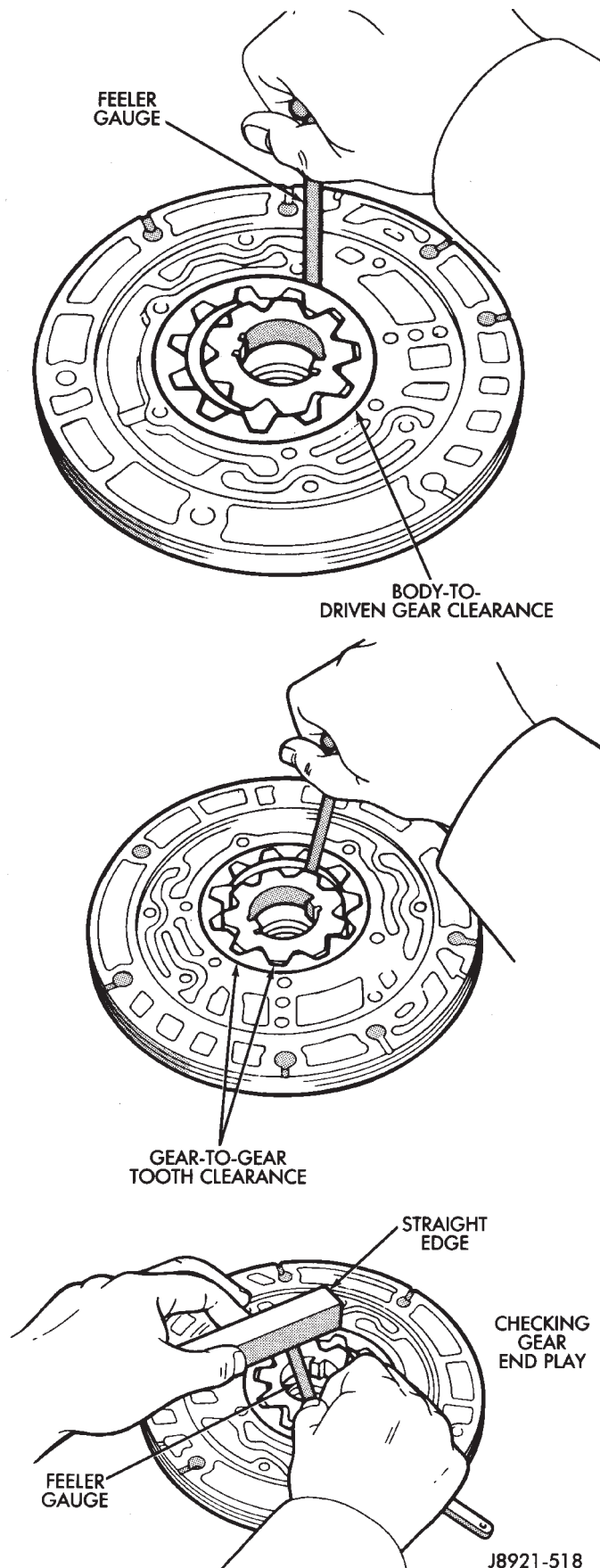
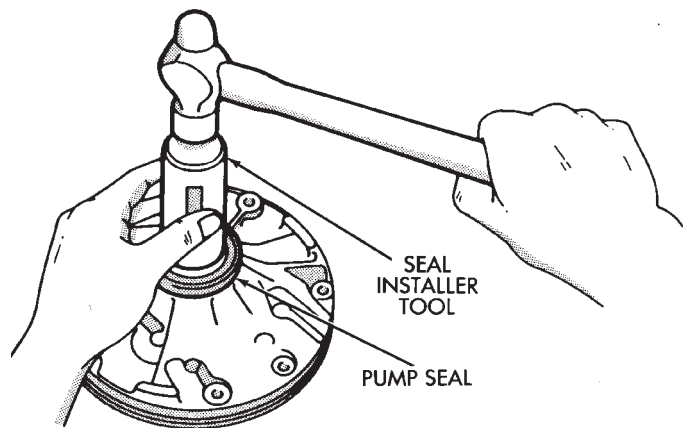


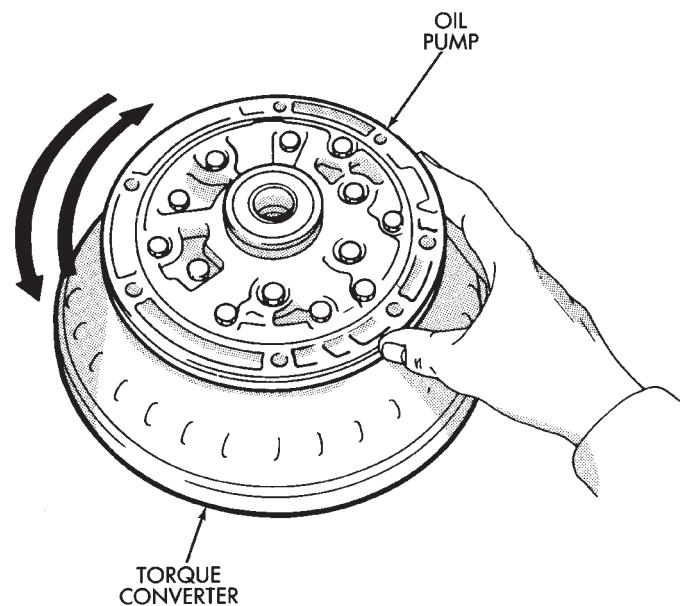
Fig. 3 Checking Pump Gear Clearances

(0.08496 in.) at front and 27.08 mm (1.0661 in.) at rear.



J8921-519

Fig. 4 Installing Pump Seal



J8921-520

Fig. 5 Checking Pump Gear Rotation

Replace stator shaft if bushing diameter is greater than specified.

(7) Measure oil pump clearances (Fig. 3).

- 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).

(8) Replace pump body and gears if any clearance is greater than specified.

(9) Remove old pump seal. Install new seal with Seal Installer 7549 (Fig. 4).

(10) Lubricate and install gears in pump body.

(11) Assemble stator shaft and pump body. Tighten shaft-to-body bolts to 10 N•m (7 ft. lbs.) torque.

(12) Install new O-ring on pump body and new seal rings on stator shaft.

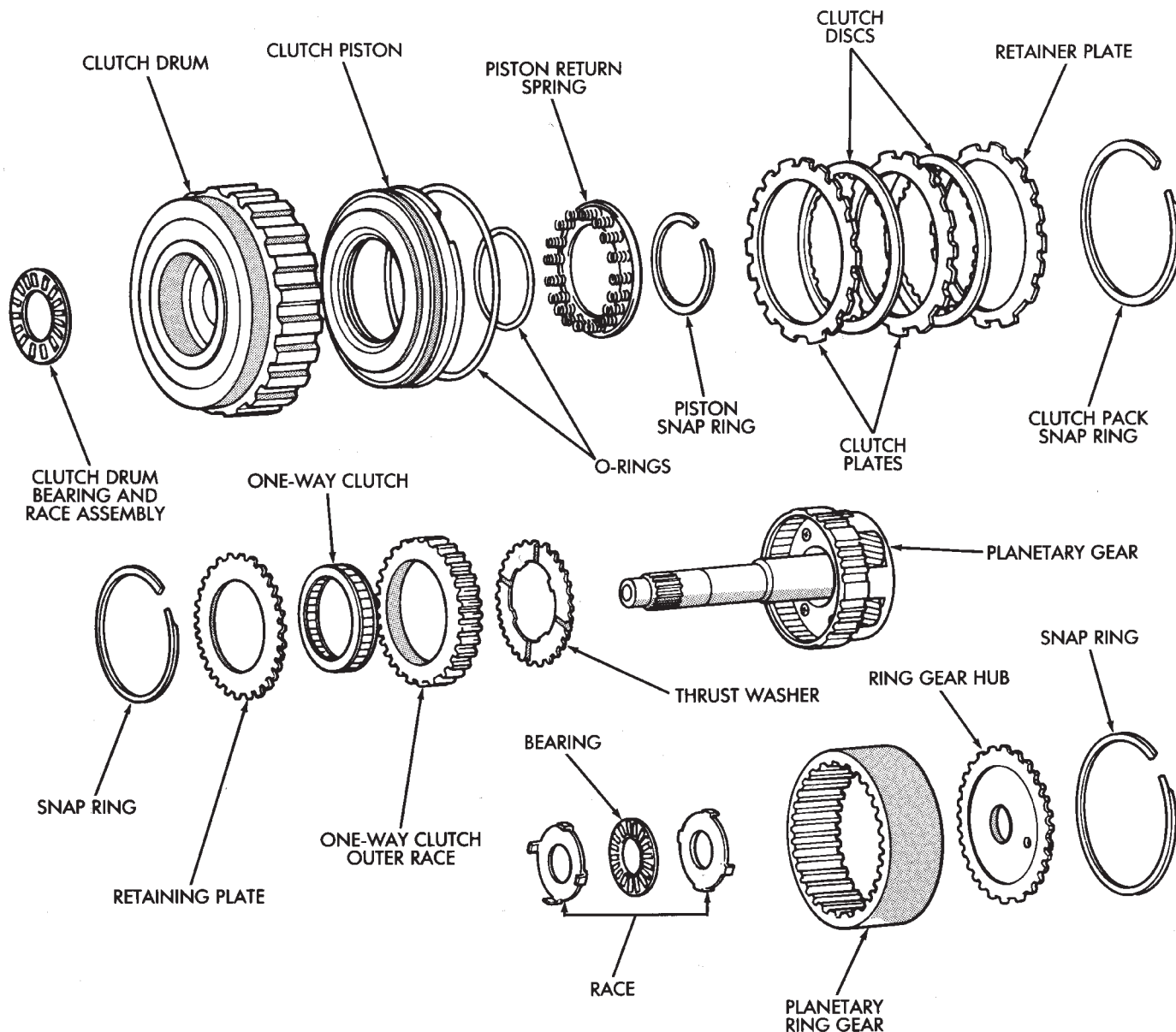
(13) Install pump in torque converter and check pump gear rotation. Gears must rotate smoothly when turned clockwise and counterclockwise.

(14) Lubricate pump O-ring and seal rings with petroleum jelly.

OVERDRIVE PLANETARY GEAR AND CLUTCH OVERHAUL

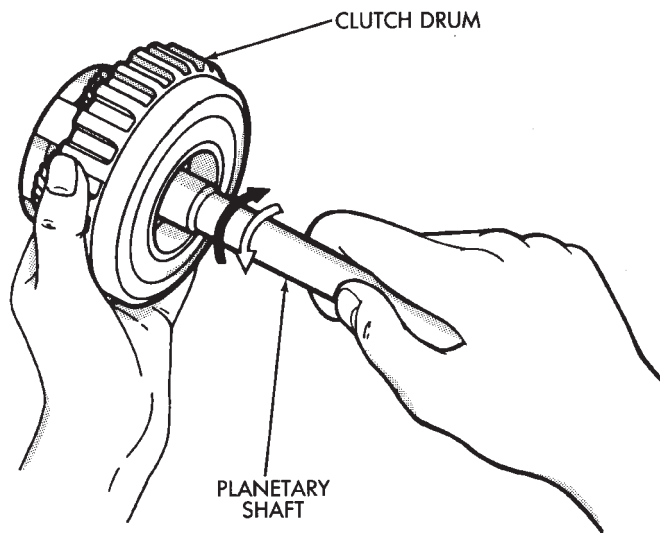
GEAR AND CLUTCH DISASSEMBLY

(1) Check operation of one-way clutch in clutch drum. 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.



J8921-521

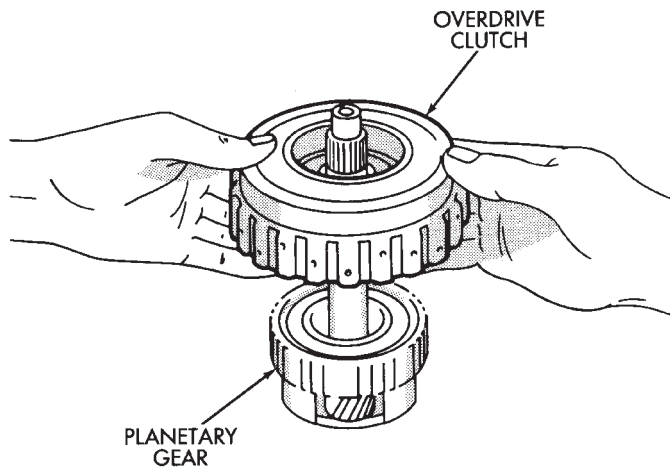
Fig. 1 Overdrive Planetary Gear And Clutch Components



J8921-522

Fig. 2 Checking One-Way Clutch

(2) Remove overdrive clutch from planetary gear (Fig. 3).



J8921-523

Fig. 3 Removing Overdrive Clutch From Gear

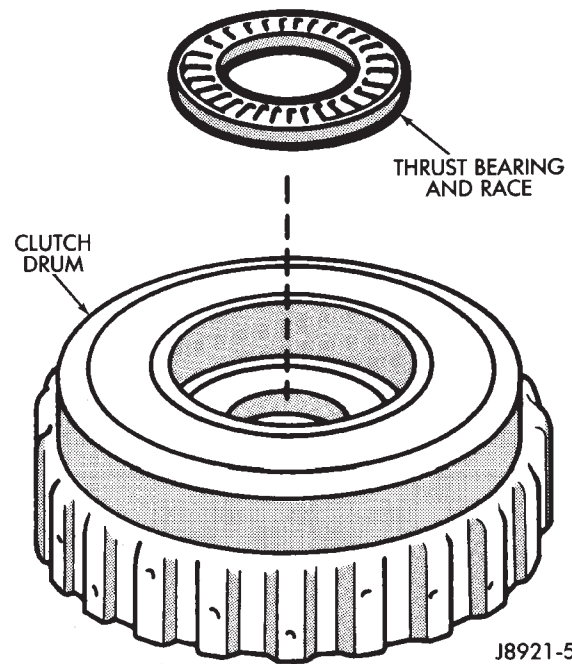
(3) Remove thrust bearing and race assembly from clutch drum (Fig. 4).

(4) Measure stroke length of clutch piston as follows:

(a) Mount oil pump on torque converter. Then mount clutch on oil pump (Fig. 5).

(b) Mount dial indicator on clutch and position indicator stylus on clutch piston (Fig. 6).

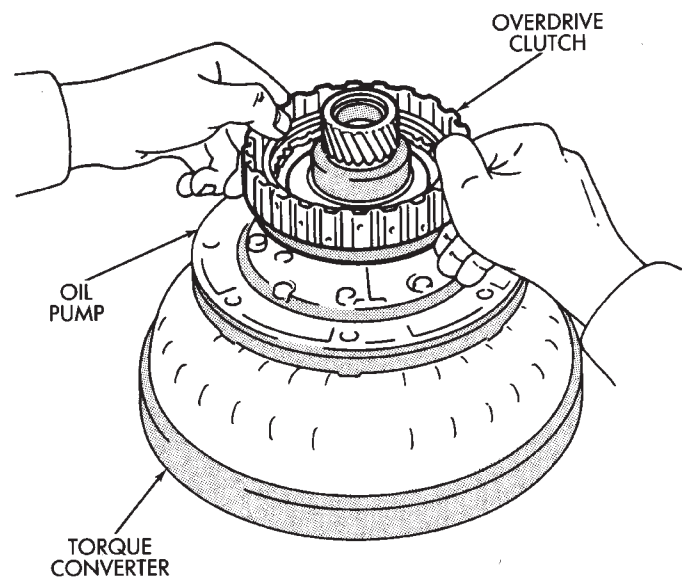
(c) Apply compressed air through clutch feed hole in oil pump and note piston stroke length. Stroke length should be 1.85 - 2.15 mm (0.0728 - 0.0846 in.).



J8921-524

Fig. 4 Removing Clutch Drum Bearing And Race

(5) Replace clutch pack retainer if stroke length is incorrect. Refer to chart in Specifications section for replacement retainer thicknesses.



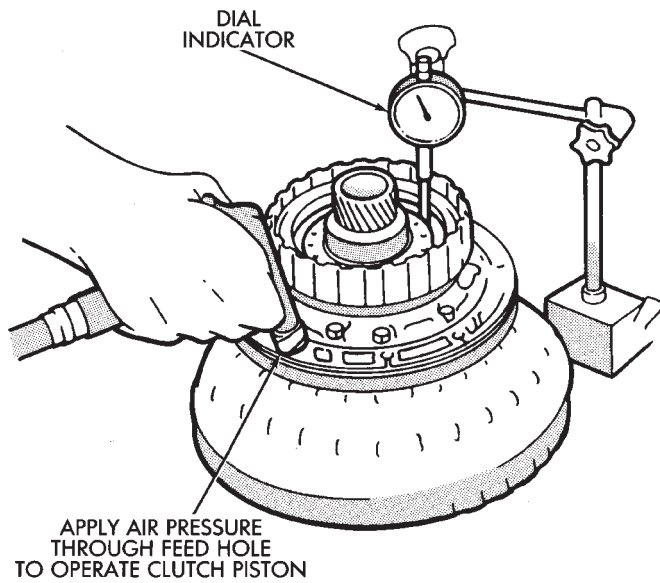
J8921-525

Fig. 5 Assembling Converter, Pump And Clutch For Test

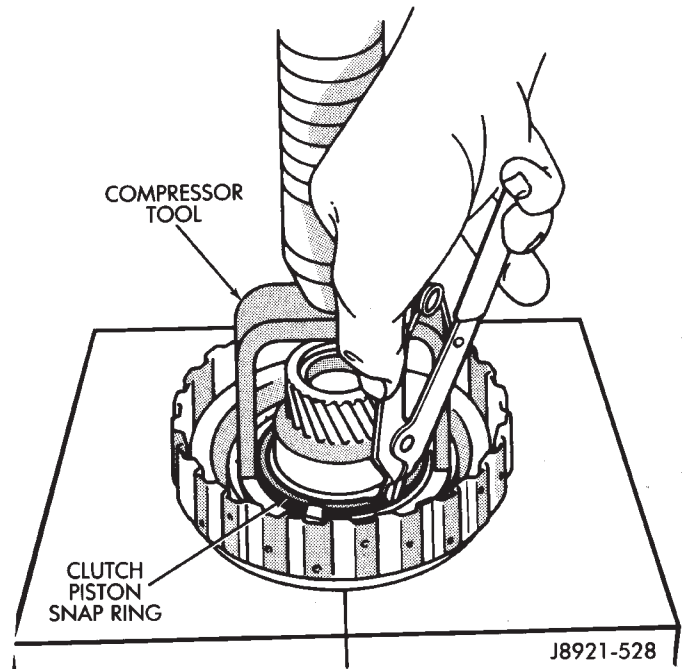
(6) Remove clutch pack snap ring and remove the clutch pack.

(7) Compress piston return spring with Tool 7538 (Fig. 8). Remove snap ring and remove compressor tool.

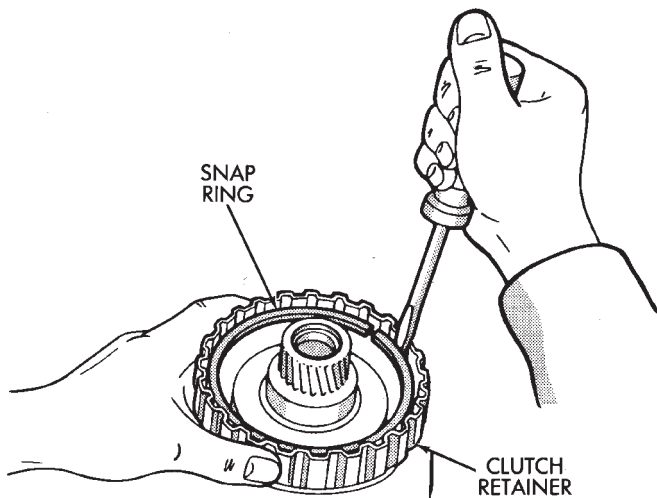
(8) Remove compressor tool and piston return springs.



J8921-526

Fig. 6 Checking Overdrive Clutch Piston Stroke

J8921-528

Fig. 8 Removing Clutch Piston Snap Ring

J8921-527

Fig. 7 Removing Clutch Pack Snap Ring

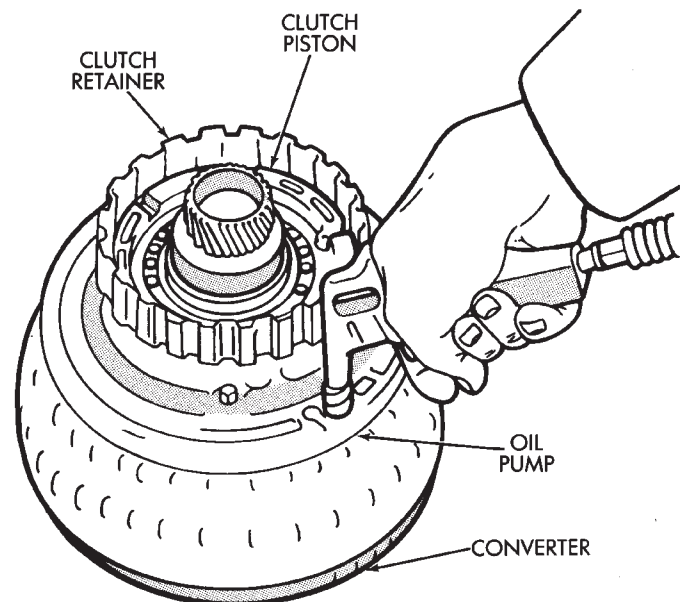
(9) Mount oil pump on converter. Then mount clutch on oil pump (Fig. 9).

(10) Hold clutch piston by hand and apply compressed air through oil pump feed hole to ease piston out (Fig. 9). Apply only enough air pressure to remove piston.

(11) Remove bearing and race from ring gear (Fig. 10).

(12) Remove snap ring from ring gear and remove ring gear hub (Fig. 11).

(13) Remove race from planetary gear (Fig. 12).



J8921-529

Fig. 9 Removing Overdrive Clutch Piston

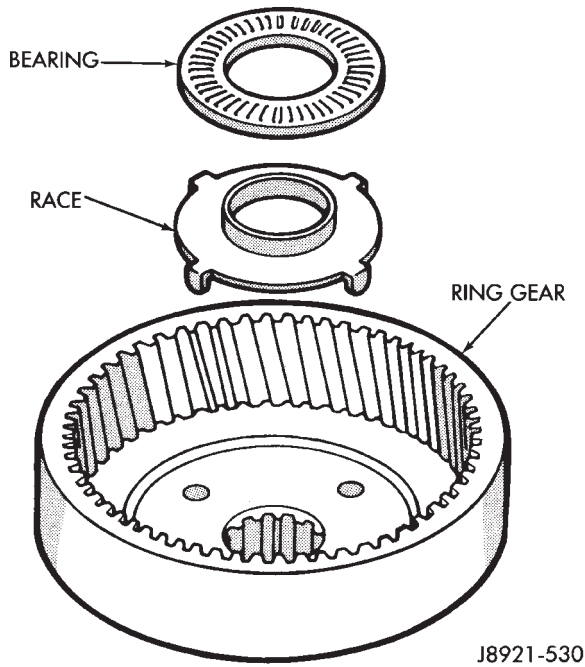


Fig. 10 Removing Ring Gear Bearing And Race

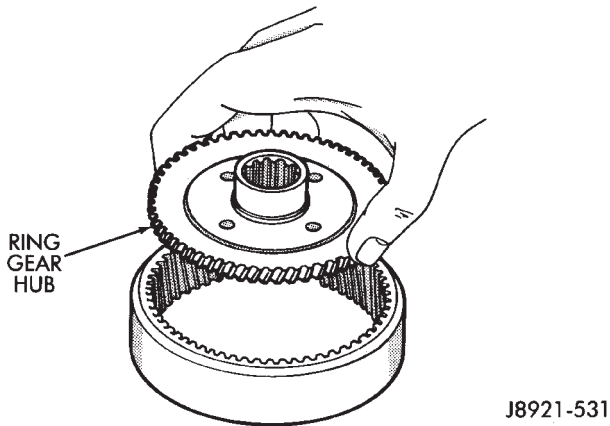
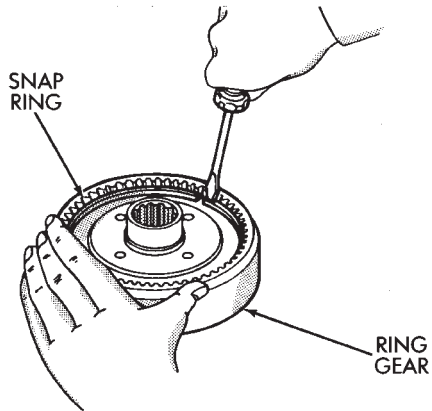


Fig. 11 Removing Ring Gear Hub

(14) Remove snap ring and remove retaining plate (Fig. 13).

(15) Remove one-way clutch and outer race as assembly. Then separate race from clutch (Fig. 14).

(16) Remove thrust washer (Fig. 15).

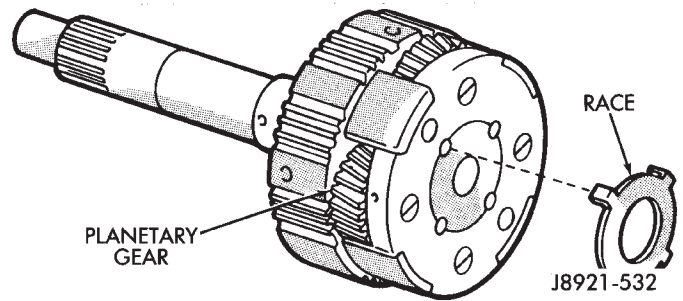


Fig. 12 Remove Planetary Gear Race

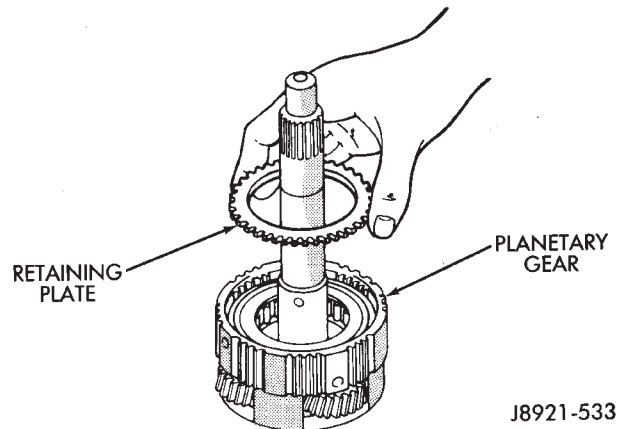
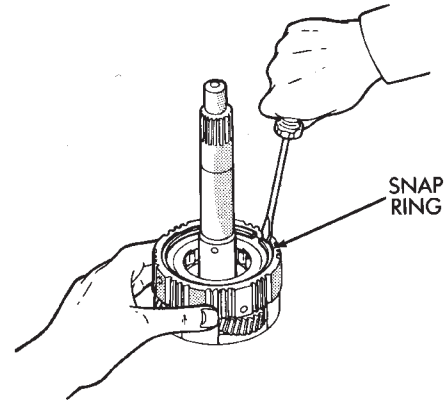


Fig. 13 Removing Snap Ring And Retaining Plate

(17) Measure clutch disc thickness. Minimum allowable thickness is 1.84 mm (0.0724 in.).

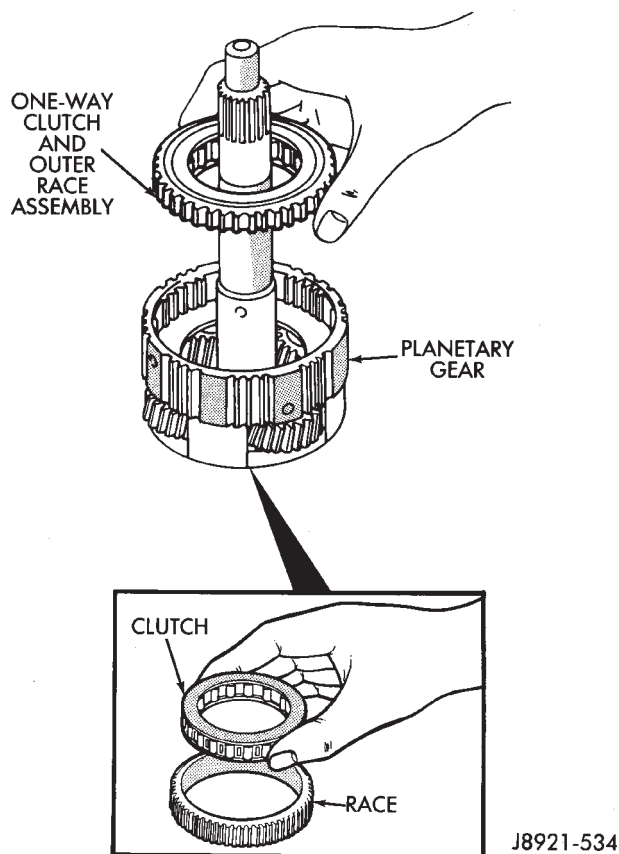


Fig. 14 Removing One-Way Clutch

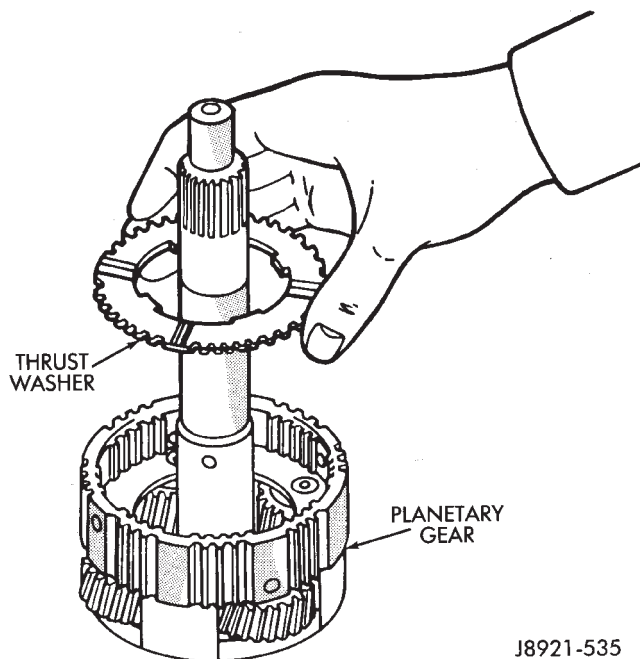


Fig. 15 Removing Planetary Thrust Washer

(18) Measure free length of piston return springs with springs in retainer (Fig. 16). Length should be 16.8 mm (0.661 in.).

(19) Check clutch piston check ball (Fig. 17). Shake piston to see if ball moves freely. Then check ball

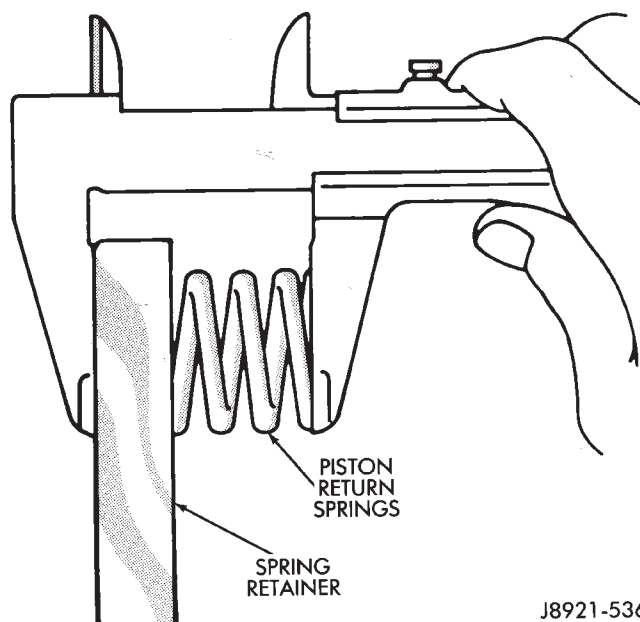


Fig. 16 Checking Piston Return Spring Length

sealing by applying low pressure compressed air to ball inlet as shown. Air should not leak past check ball.

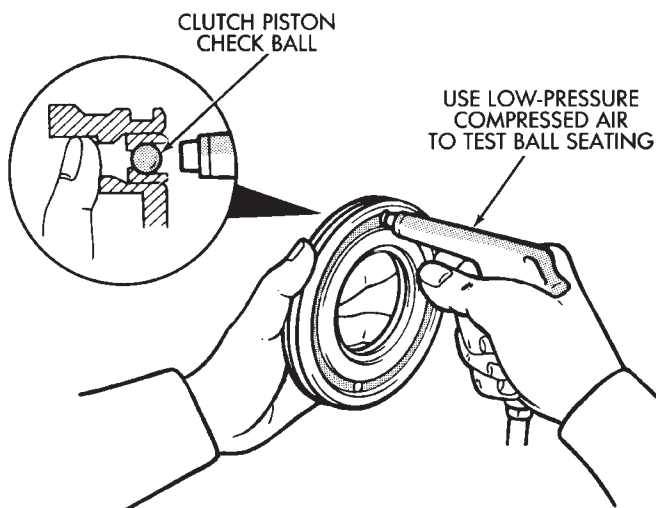


Fig. 17 Testing Clutch Piston Check Ball

(20) Check inside diameter of clutch drum bushings with bore gauge or inside micrometer (Fig. 18). Maximum inside diameter is 27.11 mm (1.0673 in.). Replace drum if bushing inside diameter is greater than specified.

(21) Check inside diameter of planetary gear bushing (Fig. 19). Maximum inside diameter is 11.27 mm (0.4437 in.). Replace planetary gear if bushing inside diameter is greater than specified.

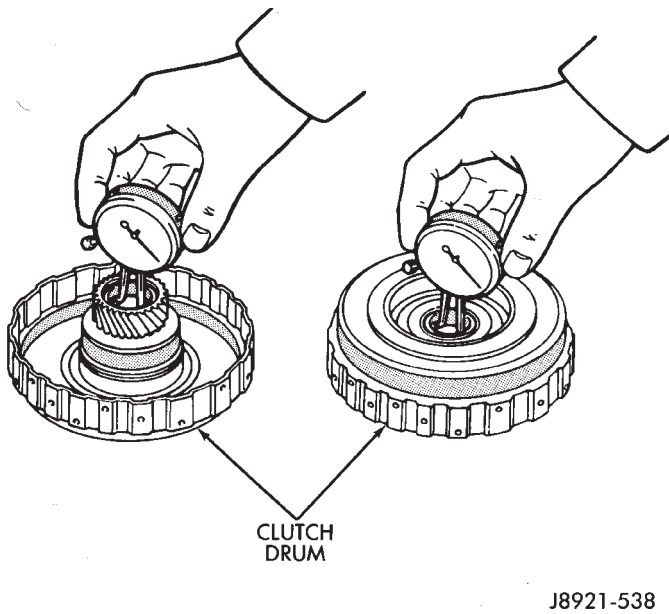


Fig. 18 Checking Clutch Drum Bushings

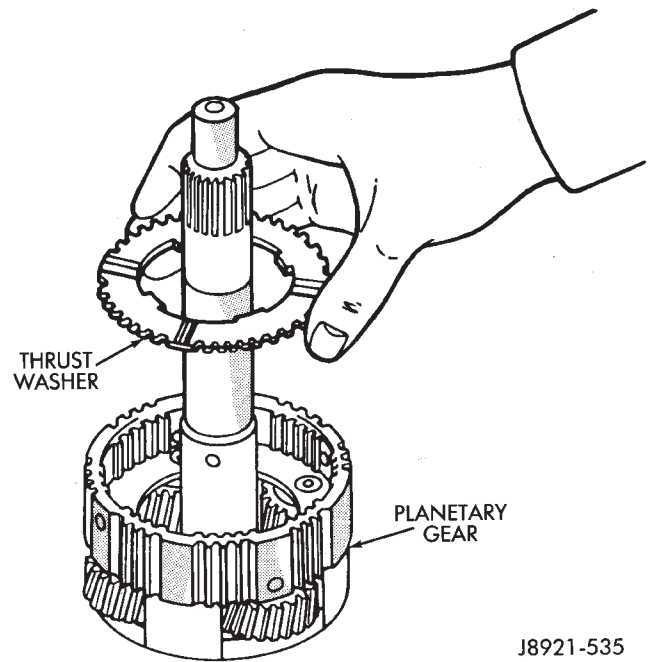


Fig. 20 Planetary Thrust Washer Installation

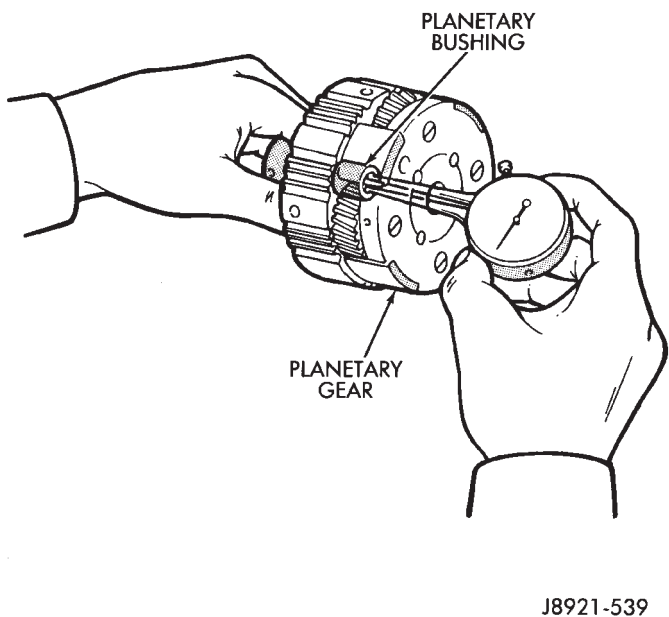


Fig. 19 Checking Planetary Bushing

Assembling Gear And Clutch

- (1) Install thrust washer in planetary gear (Fig. 20). **Grooved side of washer faces up and toward front.**
- (2) Install one-way clutch in race (Fig. 21). Flanged side of clutch must face upward as shown.
- (3) Install assembled one-way clutch and outer race in planetary gear. Be sure flanged side of clutch is facing upward.
- (4) Install clutch pack retaining plate and snap ring in planetary gear.

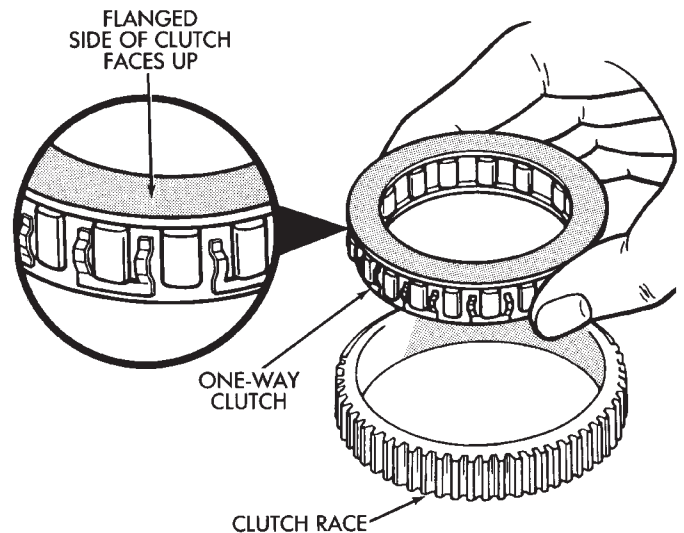


Fig. 21 Assembling One-Way Clutch And Race

- (5) Coat planetary race with petroleum jelly and install it on planetary gear. Outside diameter of race is 41.8 mm (1.646 in.) and 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. 22).
- (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.).

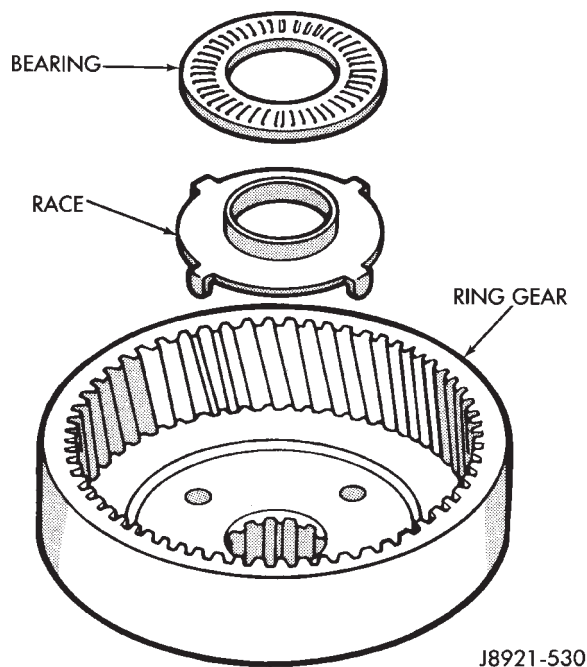


Fig. 22 Install Ring Gear Bearing And Race

(9) Lubricate and install new O-rings on clutch piston. Then install piston in clutch drum.

(10) Install piston return springs in clutch piston (Fig. 23).

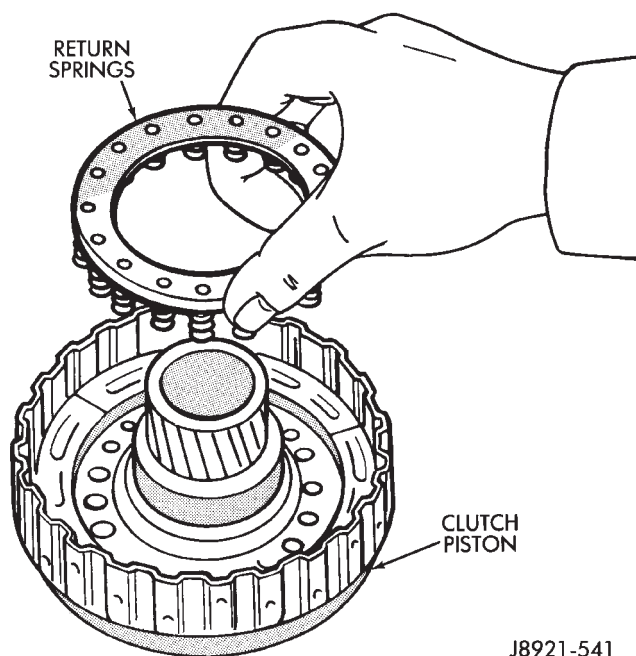


Fig. 23 Installing Piston Return Springs

(11) Install piston snap ring. Compress piston return springs with Tool 7538 and shop press (Fig. 24).

(12) Install clutch pack in drum. Install steel plate first, then a disc (Fig. 25). Continue installation sequence until required number of discs and plates have been installed.

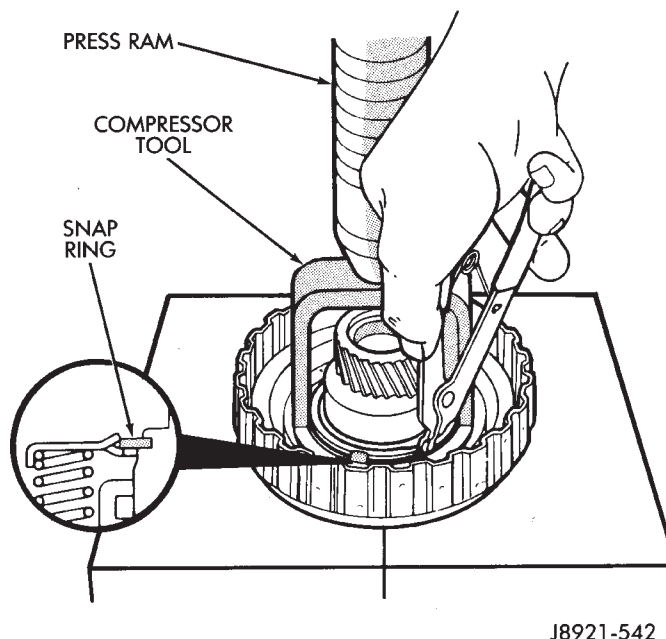


Fig. 24 Installing Clutch Piston Snap Ring

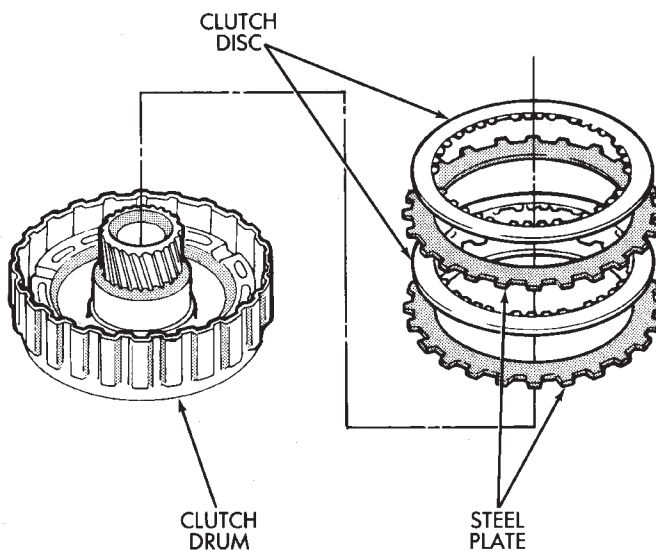
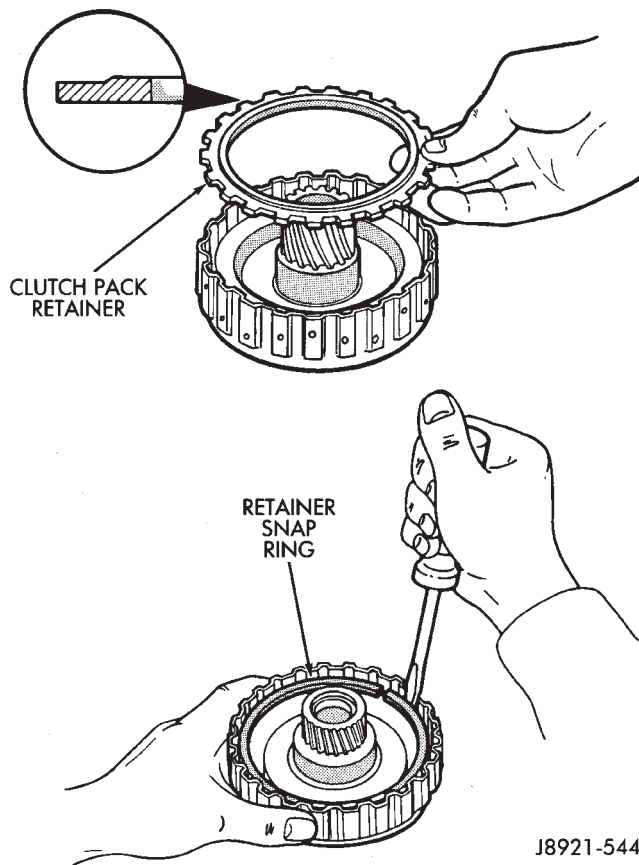


Fig. 25 Installing Clutch Discs And Plates

(13) Install clutch pack retainer with flat side facing downward. Then install retainer snap ring (Fig. 26). Compress springs with suitable tool.

(14) Measure clutch piston stroke length again (refer to procedure outlined in transmission disassembly). If stroke length is incorrect, install new clutch discs or select fit retainer. Retainer thicknesses are outlined in the Specifications section.

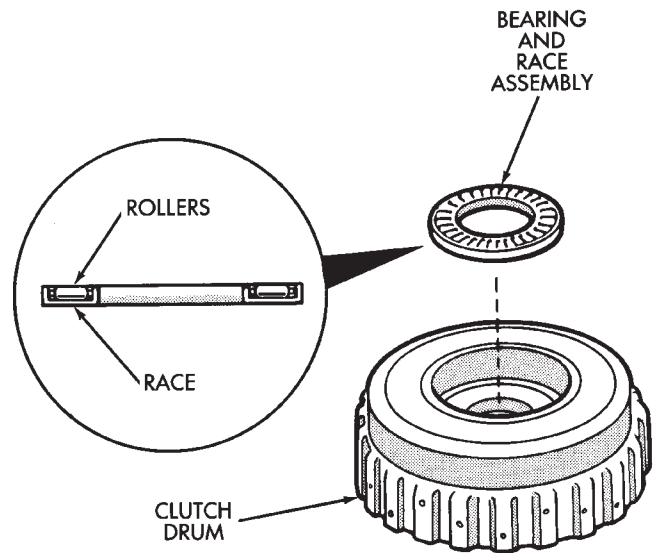
(15) Install clutch drum bearing and race assembly (Fig. 27). Be sure bearing rollers face upward as shown. Outside diameter of assembled bearing and race is 50.2 mm (1.976 in.). Inside diameter is 28.9 mm (1.138 in.).



J8921-544

Fig. 26 Installing Retainer And Snap Ring

- (16) Install clutch on planetary gear.
 (17) Verify one-way clutch operation. Hold drum and turn planetary shaft clockwise and counterclockwise. Shaft should turn clockwise freely but lock when turned counterclockwise.



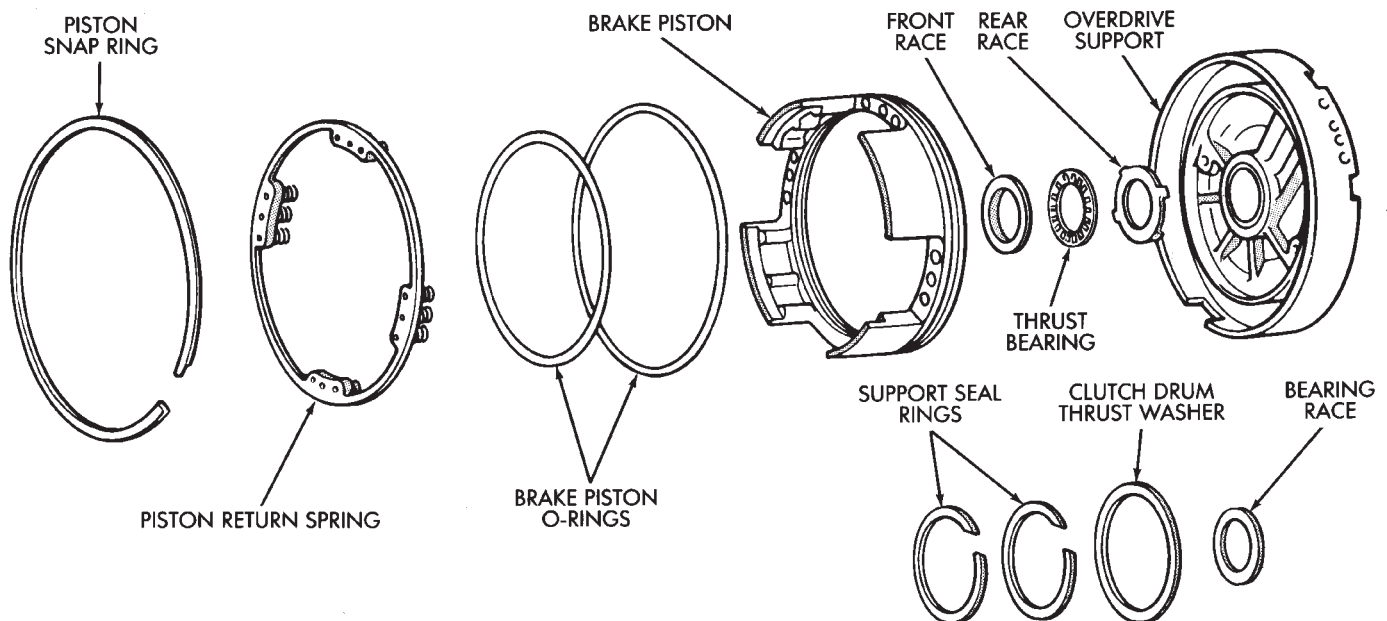
J8921-545

Fig. 27 Installing Clutch Drum Bearing And Race Assembly

OVERDRIVE SUPPORT OVERHAUL

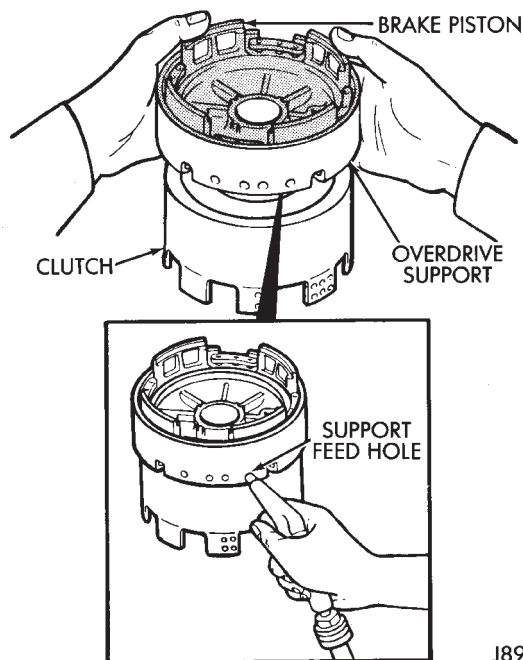
SUPPORT DISASSEMBLY

- (1) Check brake piston operation. Mount support on clutch (Fig. 2).
 (2) Apply compressed air through support feed hole and observe brake piston movement (Fig. 2). Piston should move smoothly and not bind or stick. If operation is incorrect, replace piston and support.



J8921-546

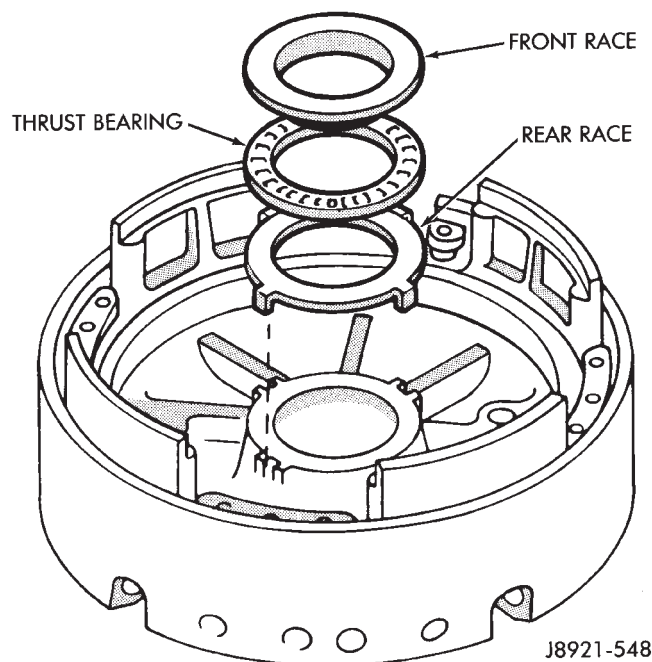
Fig. 1 Overdrive Support Components



J8921-547

Fig. 2 Checking Brake Piston Movement

(3) Remove thrust bearing front race, thrust bearing and rear race (Fig. 3).



J8921-548

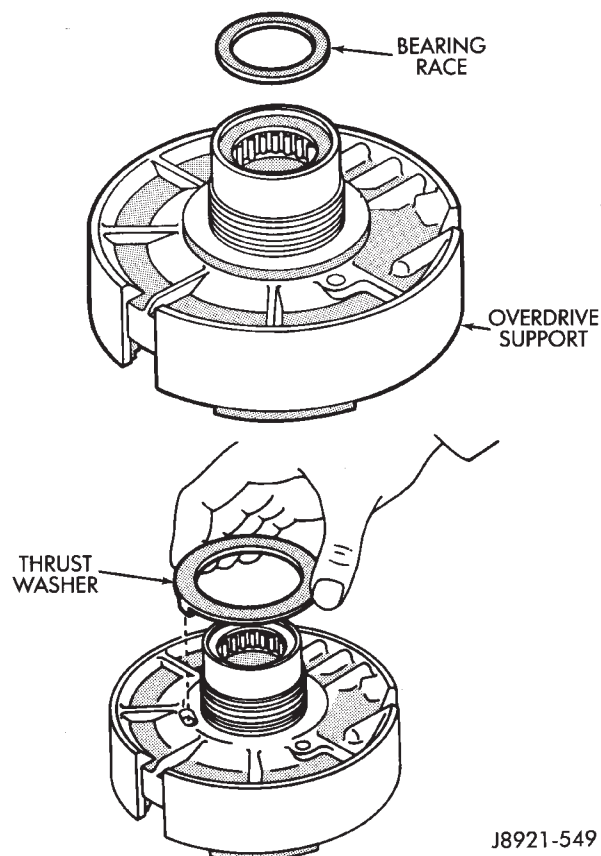
Fig. 3 Removing Support Thrust Bearing And Races

(4) Turn overdrive support over and remove bearing race and clutch drum thrust washer (Fig. 4).

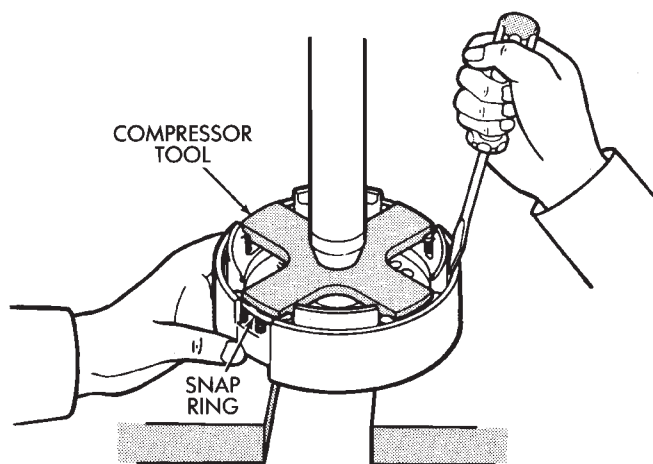
(5) Compress piston return spring with Spring Compressor 7537 and remove piston snap ring (Fig. 5).

(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. 1).



J8921-549

Fig. 4 Removing Clutch Drum Thrust Washer And Race

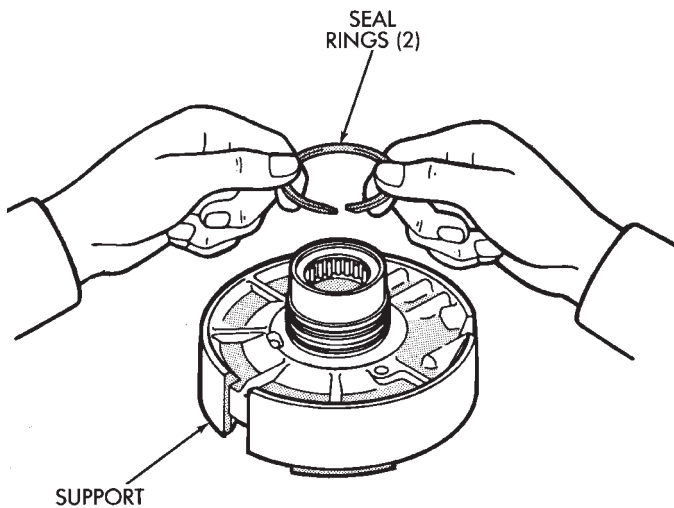
J8921-550

Fig. 5 Removing/Installing Piston Snap Ring

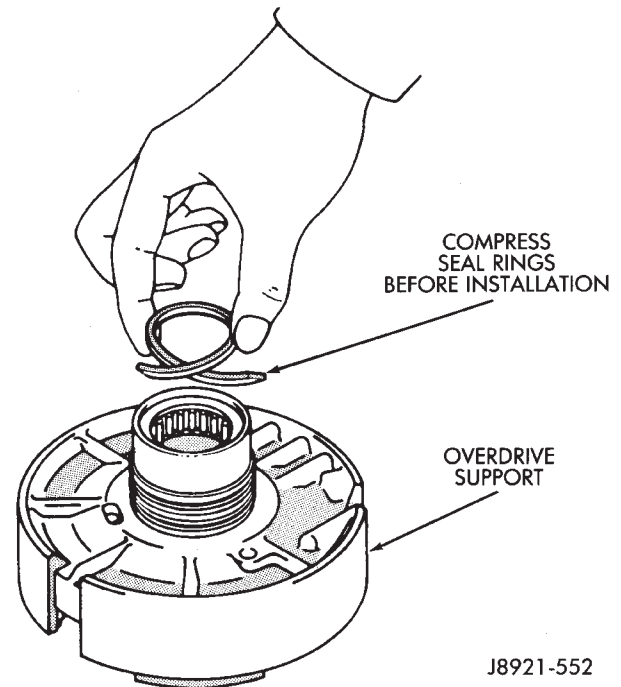
(8) Remove support seal rings (Fig. 6).

(9) Measure free length of piston return springs with springs mounted in retainer (Fig. 7). Length should be 17.23 mm (0.678 in.).

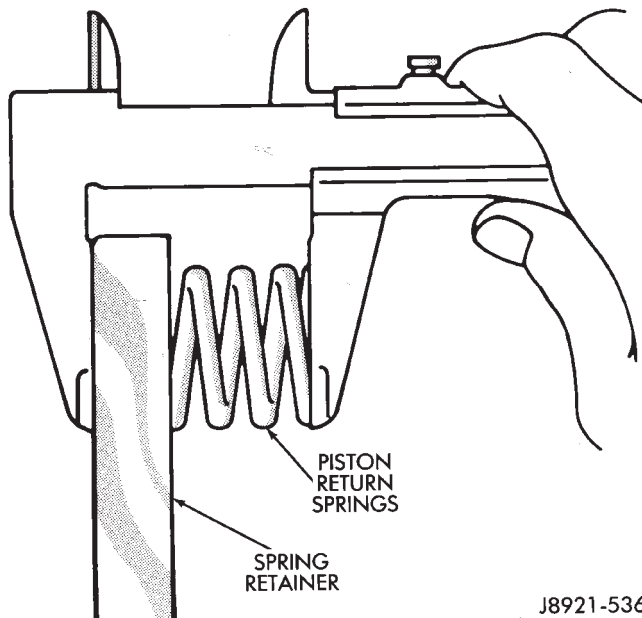
(10) Clean support components and dry them with compressed air.



J8921-551

Fig. 6 Removing Support Seal Rings

J8921-552

Fig. 8 Installing Support Seal Rings

J8921-536

Fig. 7 Checking Piston Return Spring Length

(11) Inspect overdrive support and brake piston. Replace support and piston if either part is worn or damaged.

ASSEMBLING OVERDRIVE SUPPORT

(1) Lubricate new support seal rings. Then compress rings and install them on support (Fig. 8).

(2) Lubricate and install new O-rings on brake piston. Then carefully seat piston in support.

(3) Install return springs on brake piston.

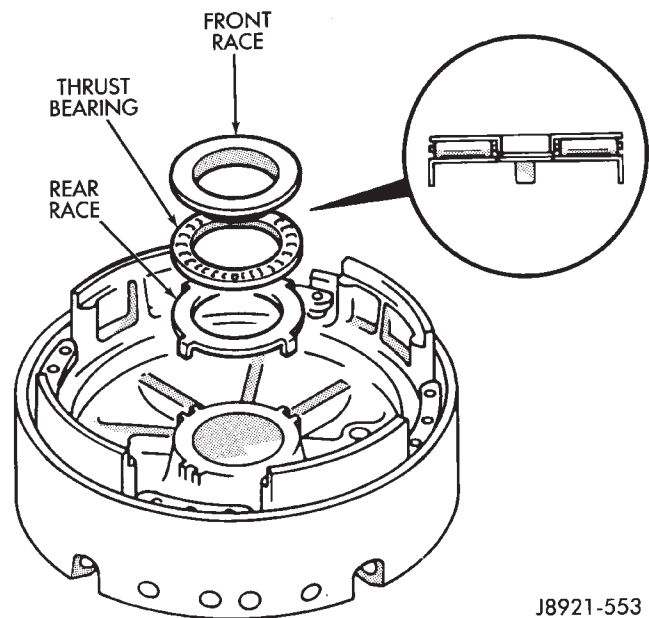
(4) Compress return springs with Spring Compressor 7537 (Fig. 5) and install piston snap ring.

(5) Install support bearing race and clutch drum thrust washer (Fig. 4).

(6) Install thrust bearing and front and rear bearing races. Thrust bearing rollers should face upward as shown (Fig. 9).

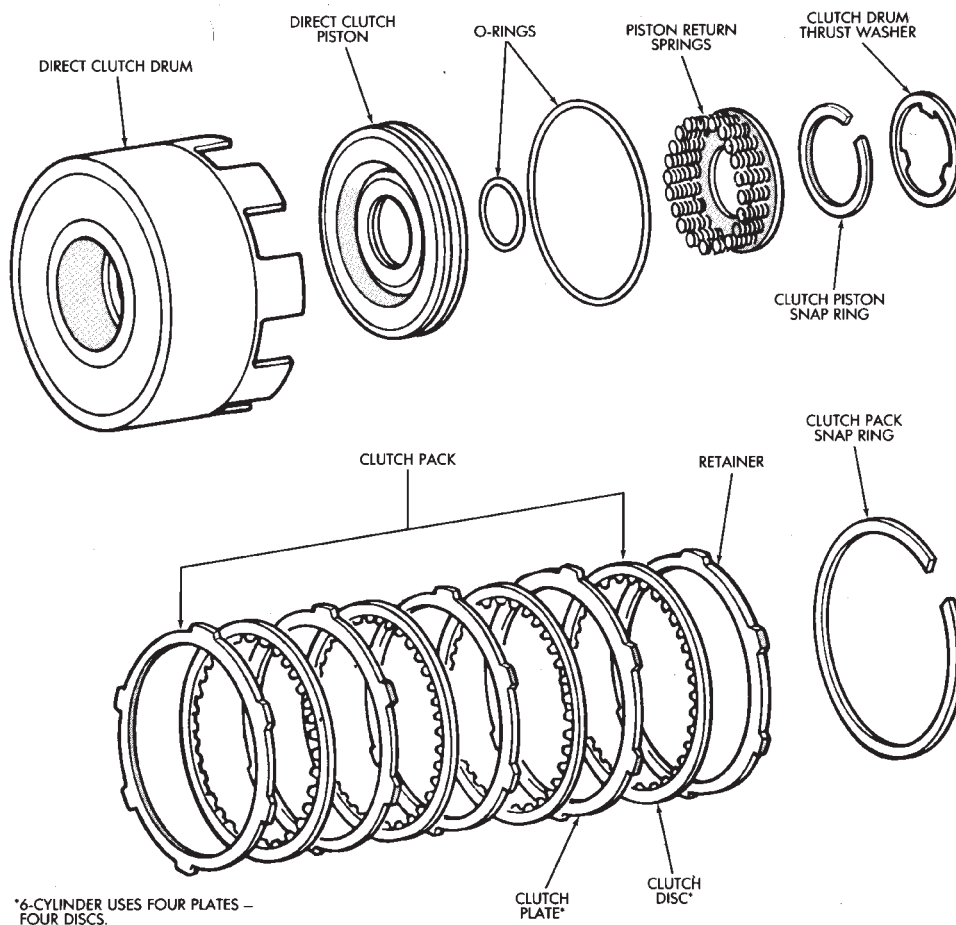
(7) Verify thrust bearing/race sizes (Fig. 9).

- 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.).



J8921-553

Fig. 9 Installing Support Thrust Bearing And Races



J8921-554

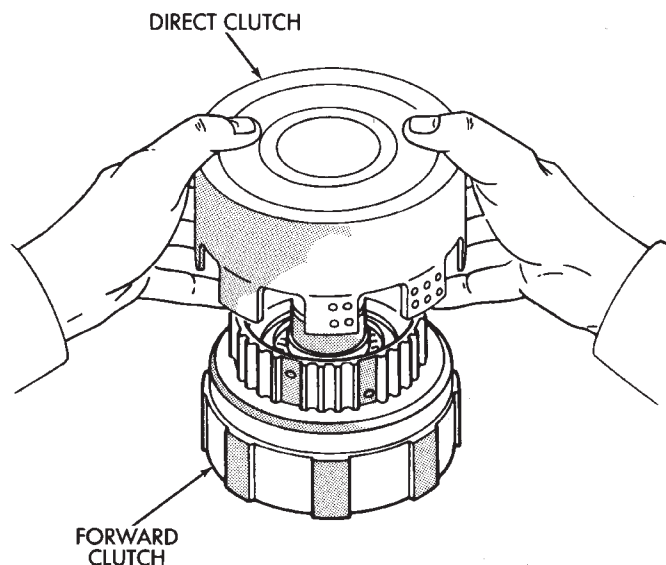
Fig. 1 Direct Clutch Components

(8) Verify brake piston operation. Use same procedure described at beginning of disassembly. Piston should operate smoothly and not bind or stick.

DIRECT CLUTCH OVERHAUL

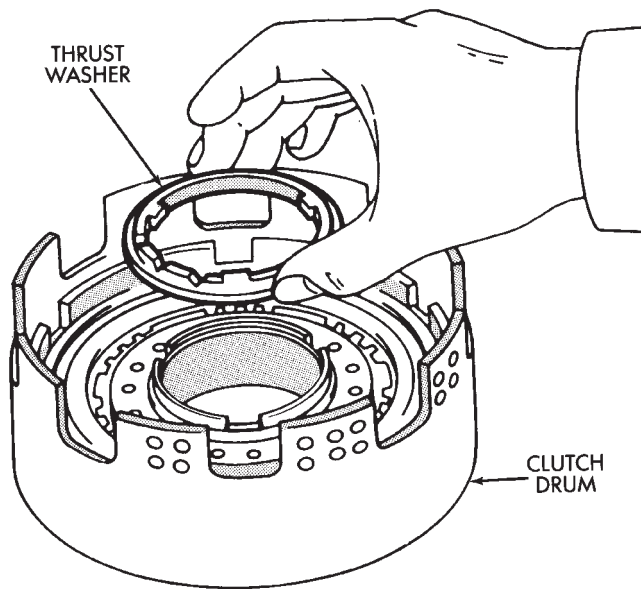
CLUTCH DISASSEMBLY

- (1) Remove direct clutch from forward clutch (Fig. 2).
- (2) Remove clutch drum thrust washer (Fig. 3).
- (3) Check clutch piston stroke length as outlined in following steps.
- (4) Mount direct clutch on overdrive support assembly (Fig. 4).
- (5) Mount dial indicator on clutch and position indicator plunger on clutch piston (Fig. 4).
- (6) Apply 57-114 psi air pressure through feed hole in overdrive support and note piston stroke length (Fig. 5). Check stroke at least twice.



J8921-555

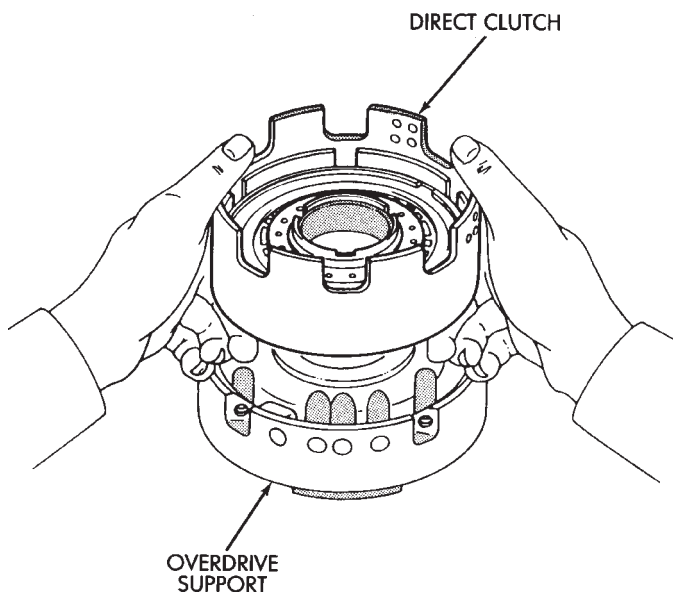
Fig. 2 Separate Direct Clutch From Forward Clutch



J8921-556

Fig. 3 Removing Clutch Drum Thrust Washer

(7) Piston stroke length should be 1.37 mm - 1.67 mm (0.054 - 0.065 in.). If stroke length is incorrect, either the clutch pack retainer or clutch discs will have to be replaced.



J8921-557

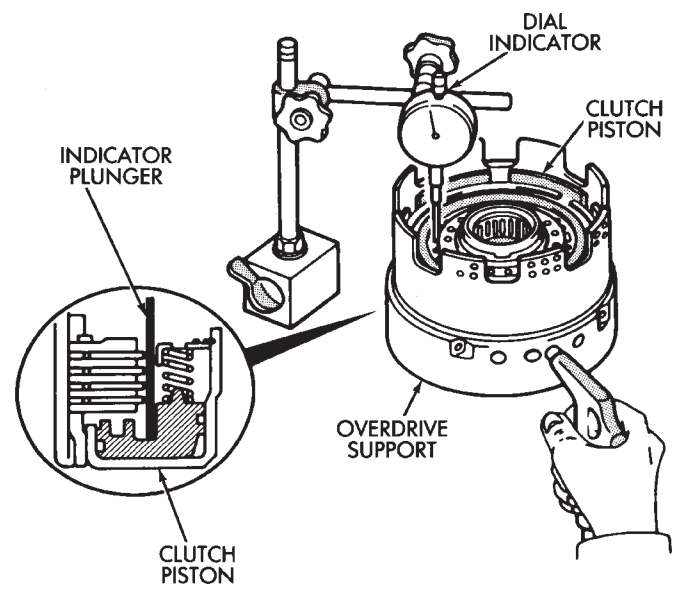
Fig. 4 Mount Direct Clutch On Overdrive Support

(8) Remove clutch pack snap ring and remove retainer and clutch pack from drum (Fig. 6).

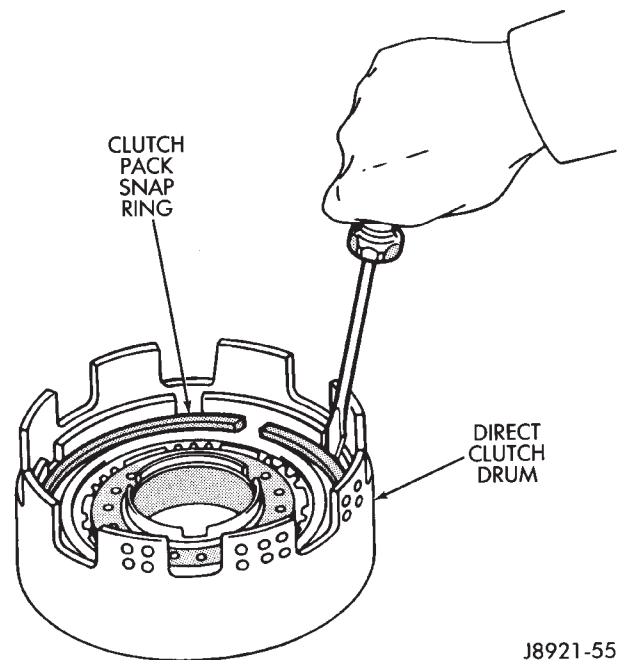
(9) Compress clutch piston return springs with Compressor Tool 7538 and remove clutch piston snap ring (Fig. 7).

(10) Remove compressor tool and return spring.

(11) Remove clutch piston. Remount clutch on overdrive support (Fig. 8). Apply compressed air through



J8921-558

Fig. 5 Checking Direct Clutch Piston Stroke Length

J8921-559

Fig. 6 Removing Clutch Pack Snap Ring

piston feed hole in support to remove piston. Use only enough air to ease piston out.

(12) Remove and discard clutch piston O-rings.

(13) Measure clutch disc thickness. Minimum allowable thickness is 1.84 mm (0.0724 in). Replace discs if below minimum thickness.

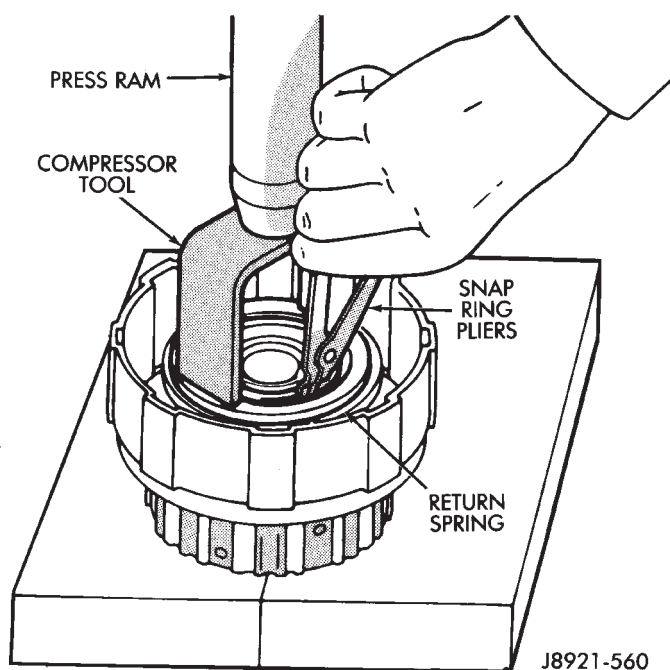


Fig. 7 Removing Piston Return Spring

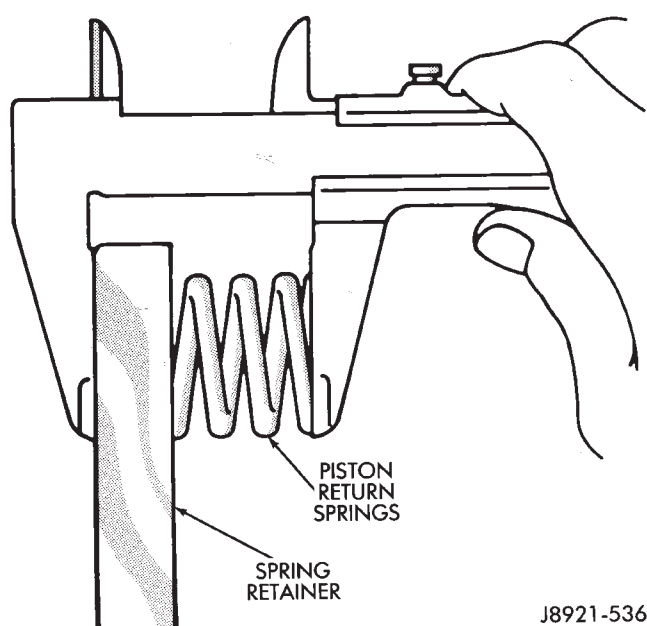


Fig. 9 Checking Piston Return Spring Length

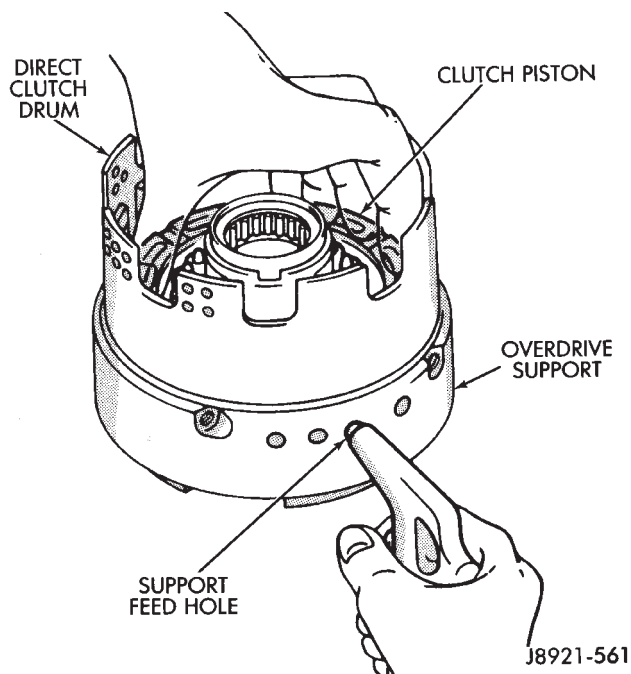


Fig. 8 Removing Direct Clutch Piston

(14) Measure free length of piston return springs with springs in retainer (Fig. 9). Length should be 21.32 mm (0.839 in.). Replace return springs if not within specification.

(15) Check clutch piston check ball (Fig. 10). 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.

(16) Measure inside diameter of clutch drum bushing. Inside diameter should be no more than 53.97

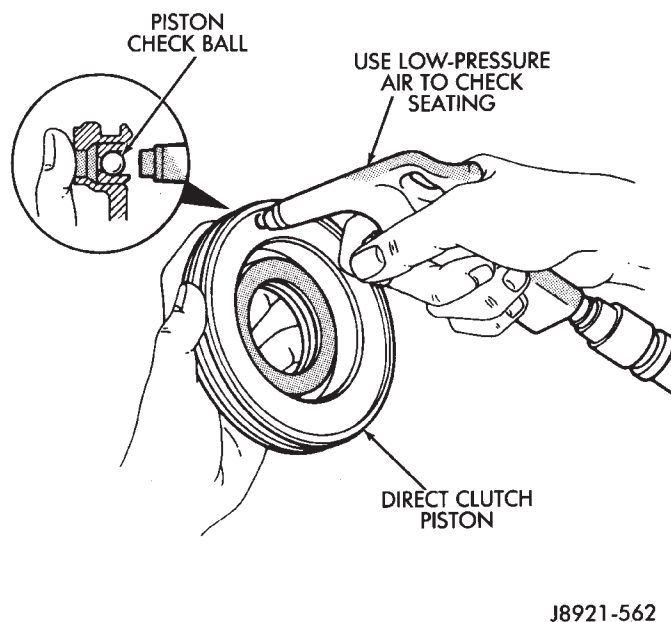


Fig. 10 Testing Piston Check Ball Seating

mm (2.1248 in.). Replace drum if bushing inside diameter is greater than specified.

DIRECT CLUTCH ASSEMBLY

(1) Lubricate and install replacement O-rings on clutch piston.

(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. 7). Be sure snap ring end gap is not aligned with spring retainer tab.

(4) Install clutch discs and plates (Fig. 11). Install plate then disc until all plates and discs are installed. Four plates and discs are required.

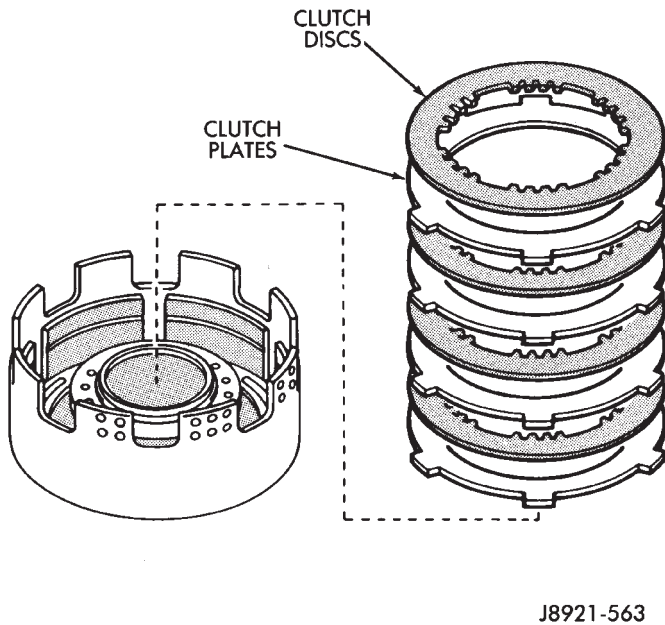


Fig. 11 Installing Direct Clutch Discs And Plates

- (5) Install clutch pack retainer in drum (Fig. 12).
- (6) Install clutch pack snap ring (Fig. 12).

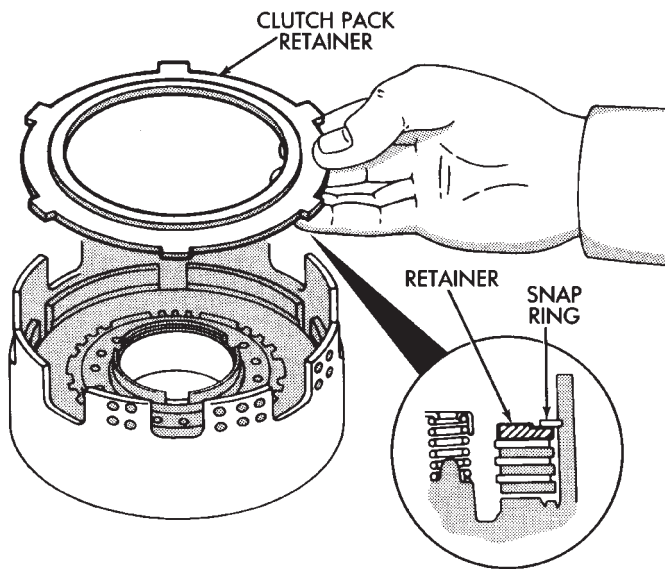


Fig. 12 Install Clutch Pack Retainer

(7) Check snap ring position. If necessary, shift snap ring until end gap is **not** aligned with any notches in clutch drum (Fig. 12).

(8) Check clutch piston stroke length a second time. If length is OK, continue with assembly. If stroke length is incorrect, replace clutch discs or use different thickness clutch pack retainer (Fig. 12). See Specifications section for retainer thicknesses.

(9) Lubricate clutch drum thrust washer with petroleum jelly and install it in drum (Fig. 3).

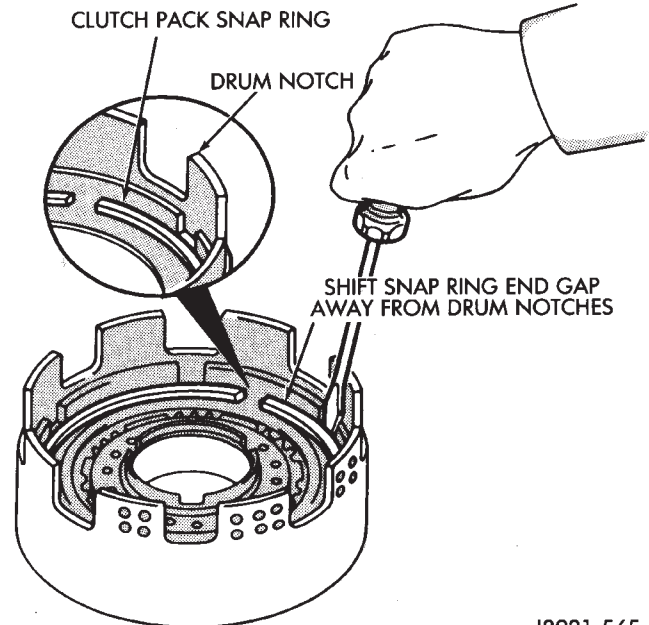


Fig. 13 Adjusting Clutch Pack Snap Ring Position

(10) Mount direct clutch assembly on forward clutch assembly and check assembled height (Fig. 14). Height should be 70.3 to 71.5 mm (2.767 to 2.815 in.).

(11) If assembled height is incorrect, clutches are not seated.

(12) If clutch height is OK, remove direct clutch from forward clutch and proceed to forward clutch overhaul.

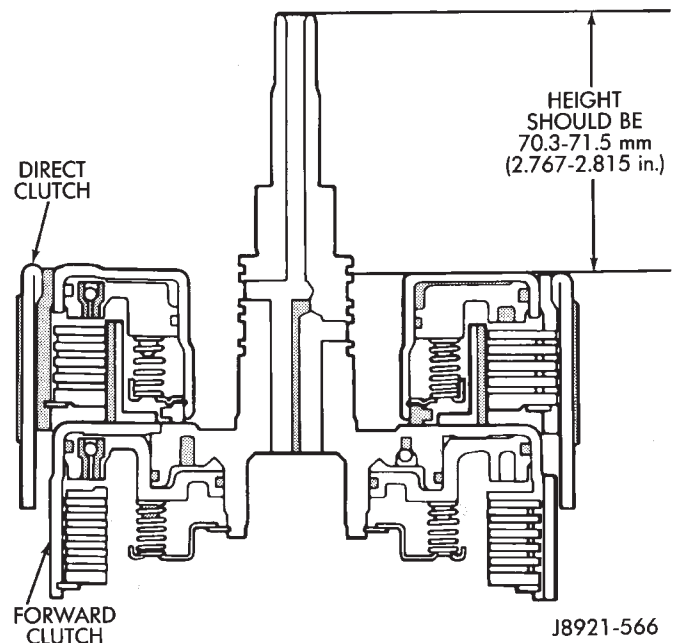
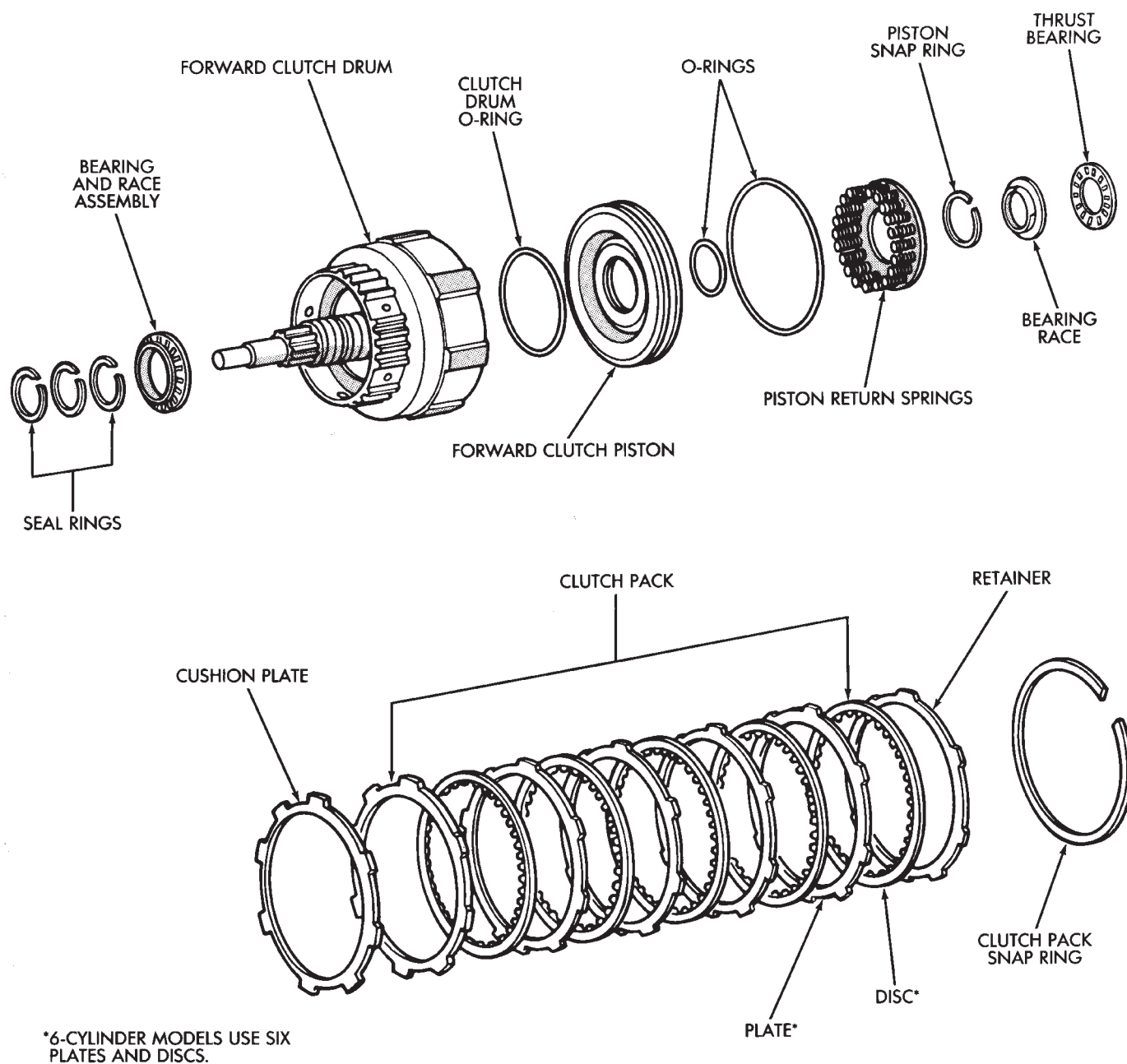


Fig. 14 Checking Direct Clutch Assembled Height



J8921-567

Fig. 1 Forward Clutch Components**FORWARD CLUTCH OVERHAUL****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. 2).
- (3) Remove bearing and race from forward clutch drum (Fig. 2).
- (4) Mount dial indicator on clutch drum. Position dial indicator plunger against clutch piston (Fig. 3).

(5) Apply compressed air through right side feed hole in support and note piston stroke length on dial indicator.

(6) Stroke length should be 3.55 - 3.73 mm (0.1348 - 0.1469 in.).

(7) Replace clutch discs if stroke length is incorrect.

(8) Remove clutch pack snap ring and remove retainer and clutch pack (Fig. 4).

(9) Remove clutch pack cushion plate (Fig. 5).

(10) Compress clutch springs with Tool 7538 and remove piston snap ring.

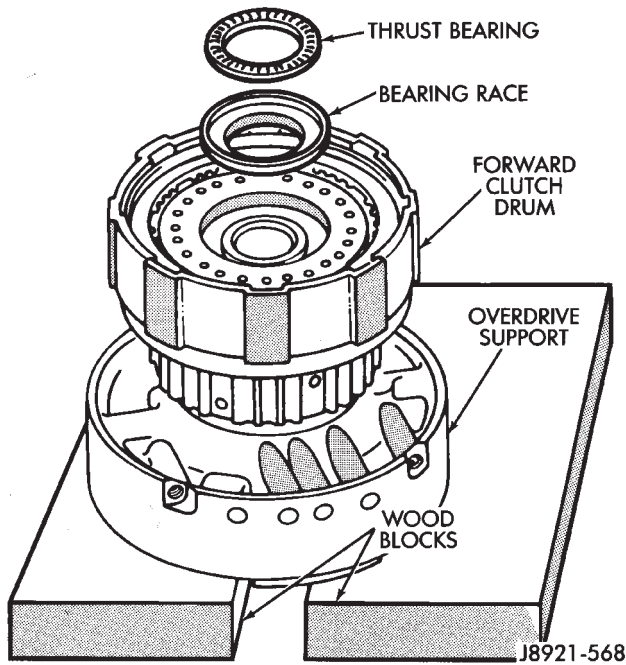


Fig. 2 Positioning Drum And Support On Wood Blocks

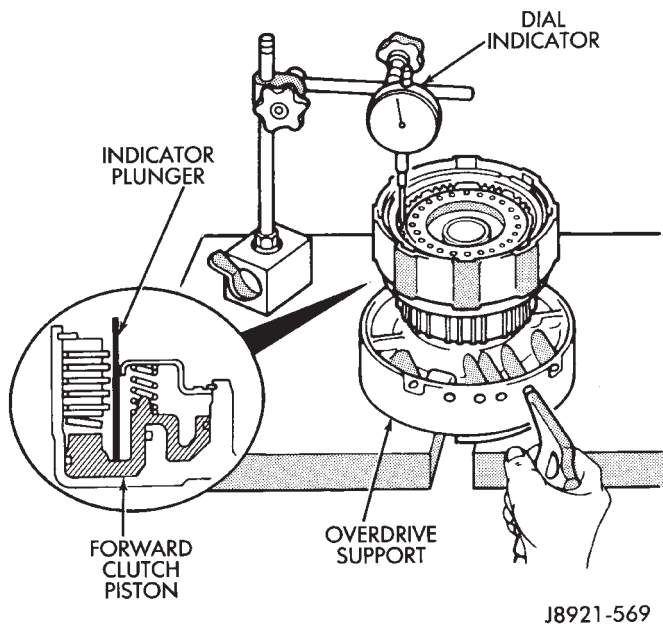


Fig. 3 Checking Forward Clutch Piston Stroke Length

(11) Remove spring compressor tool and piston return springs.

(12) Remount forward clutch drum on overdrive support (Fig. 6).

(13) Remove forward clutch piston. Apply compressed air through feed hole in support to remove piston (Fig. 6). Use only enough air pressure to ease piston out of drum.

(14) Remove and discard clutch piston O-rings.

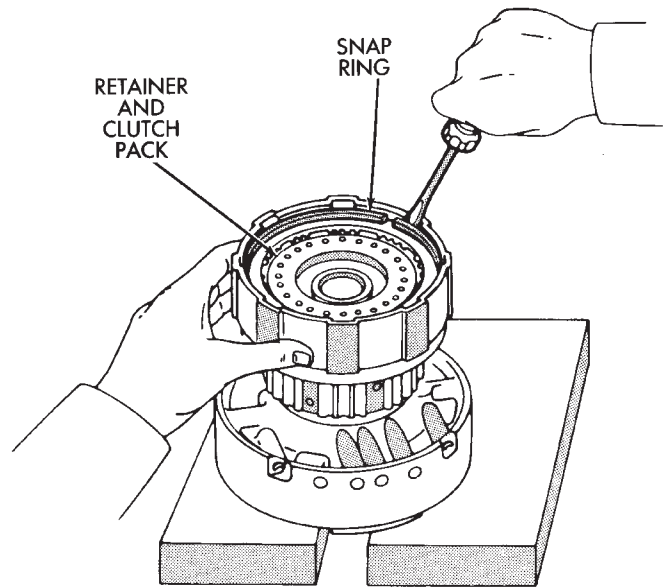


Fig. 4 Removing Retainer And Clutch Pack

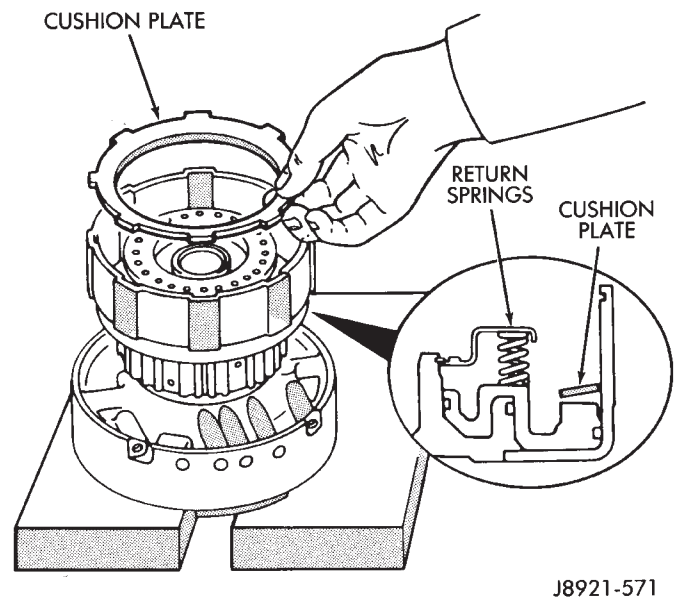


Fig. 5 Removing Cushion Plate

(15) Remove clutch drum O-ring from rear hub of drum.

(16) Remove three seal rings from clutch drum shaft (Fig. 8).

(17) Remove thrust bearing and race assembly from clutch drum (Fig. 9).

(18) Measure clutch disc thickness (Fig. 10). Minimum allowable thickness is 1.51 mm (0.0595 in.).

(19) Measure free length of piston return springs with springs mounted in retainer (Fig. 11). Length should be 19.47 mm (0.767 in.). Replace springs and retainer if length is incorrect.

(20) Inspect clutch piston check ball (Fig. 12). Ball should move freely within piston. Check ball seating

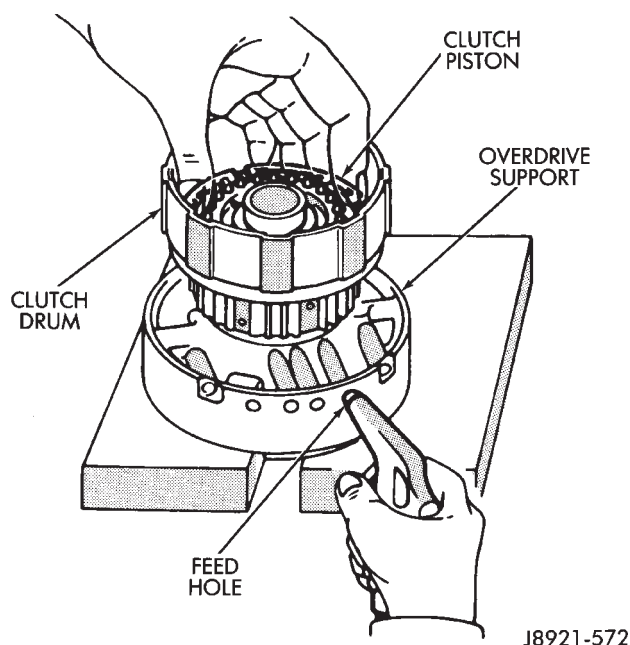


Fig. 6 Removing Forward Clutch Piston

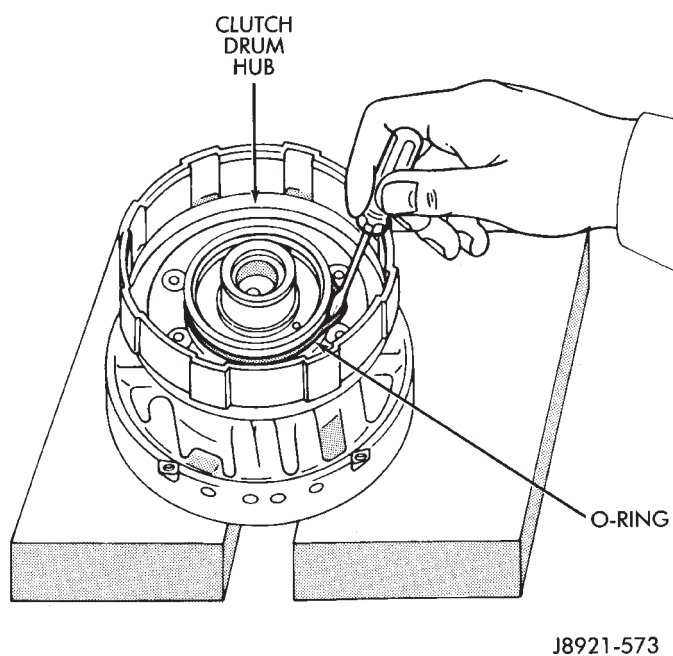


Fig. 7 Removing/Installing Clutch Drum O-Ring

by applying low pressure compressed air to ball feed hole. Ball should seat firmly and not leak air.

(21) 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.

FORWARD CLUTCH ASSEMBLY

(1) Lubricate bearing and race assembly with petroleum jelly and install it in clutch drum (Fig. 13). Race side of assembly faces downward and toward drum. Bearing rollers face up (Fig. 13)

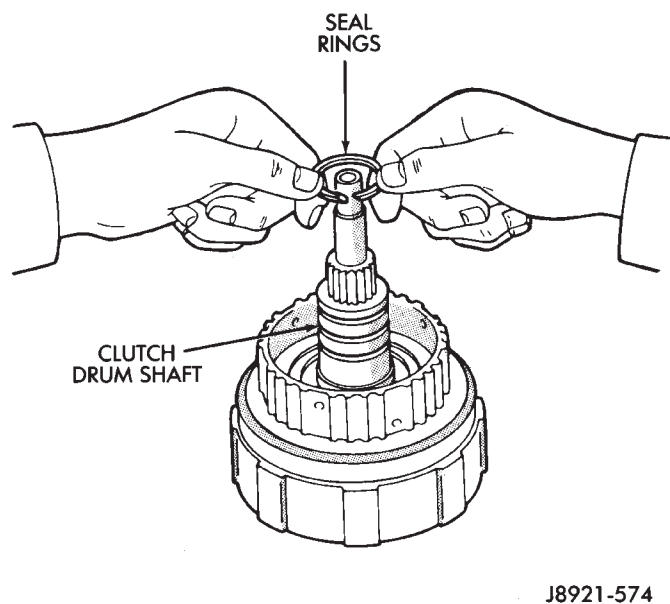


Fig. 8 Removing Clutch Drum Seal Rings

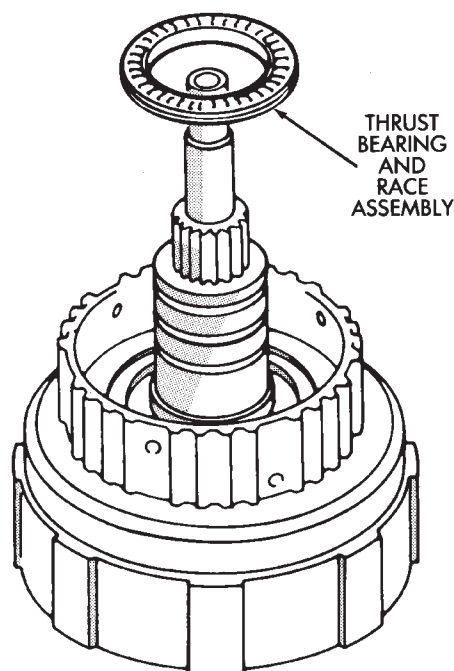


Fig. 9 Removing Clutch Drum Thrust Bearing Assembly

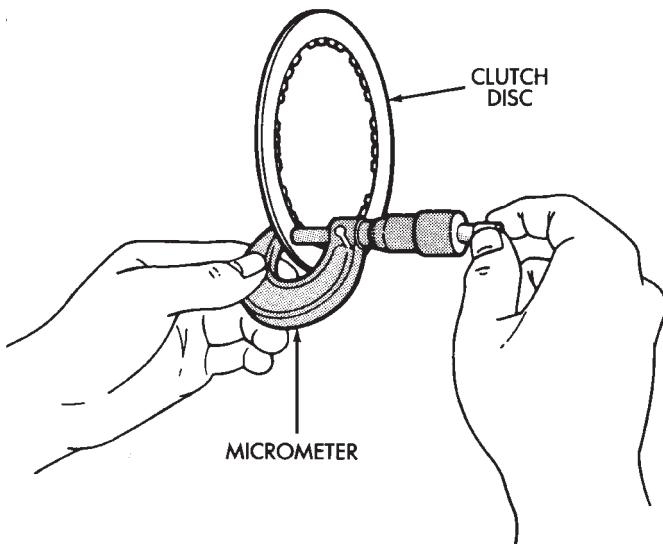
(2) Coat new clutch drum shaft seal rings with petroleum jelly. Before installing drum shaft seal rings, squeeze each ring so ring ends overlap (Fig. 14). This tightens ring making clutch installation easier.

(3) Install seal rings on shaft. Keep rings closed as tightly as possible during installation. Avoid over-spreading them.

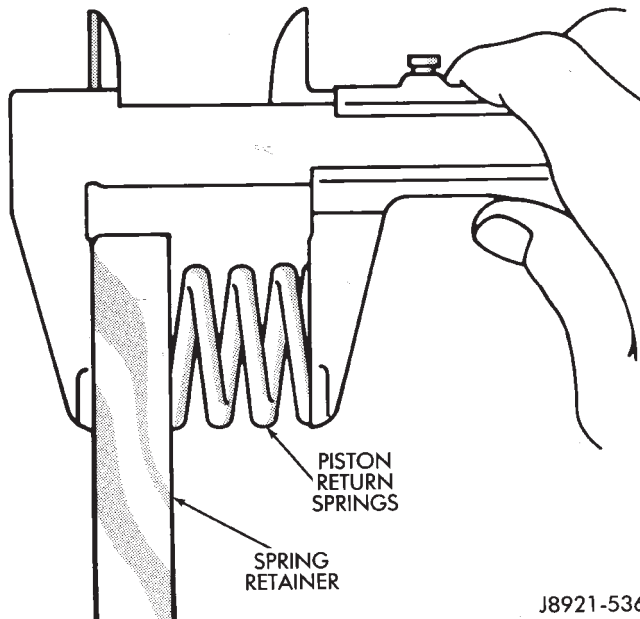
(4) Mount clutch drum on overdrive support.

(5) Lubricate and install new O-ring on clutch drum hub (Fig. 7).

(6) Lubricate and install new O-rings on clutch piston and install piston in drum.



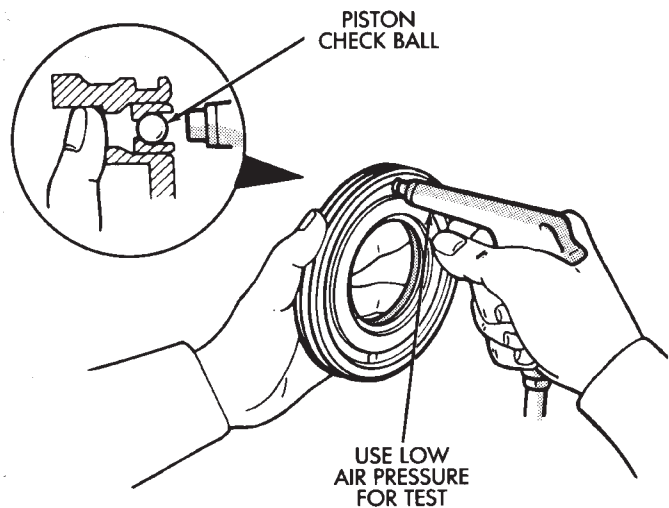
J8921-576

Fig. 10 Measuring Clutch Disc Thickness

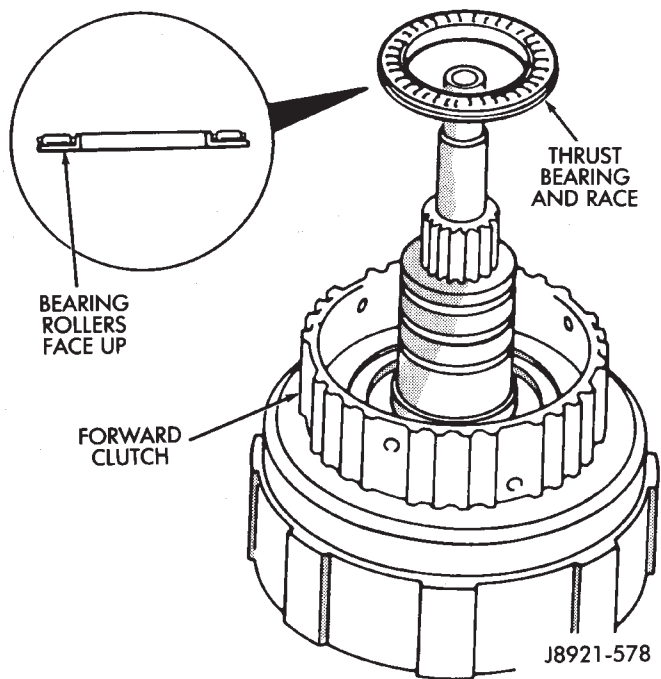
J8921-536

Fig. 11 Checking Return Spring Length

- (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. 5).
- (10) Install clutch discs, plates and retainer (Fig. 15). Install tabbed plate followed by disc until required number of plates and discs are installed. Use six plates and discs.
- (11) Install clutch pack snap ring.



J8921-577

Fig. 12 Testing Piston Check Ball

J8921-578

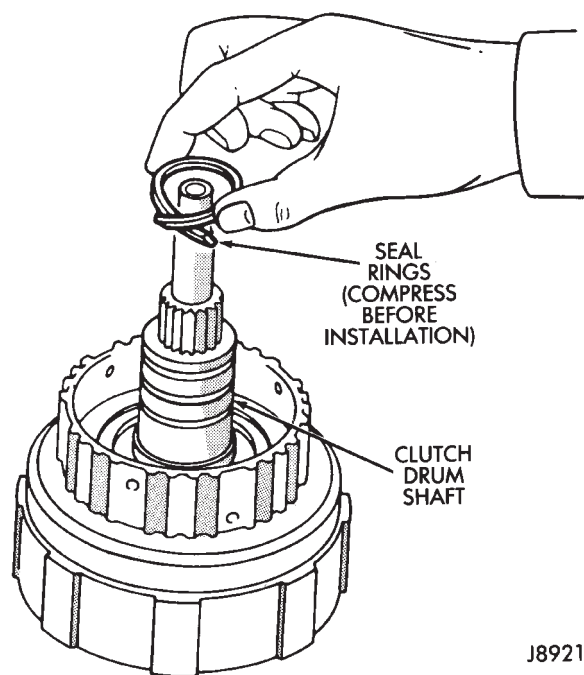
Fig. 13 Installing Thrust Bearing And Race

(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.

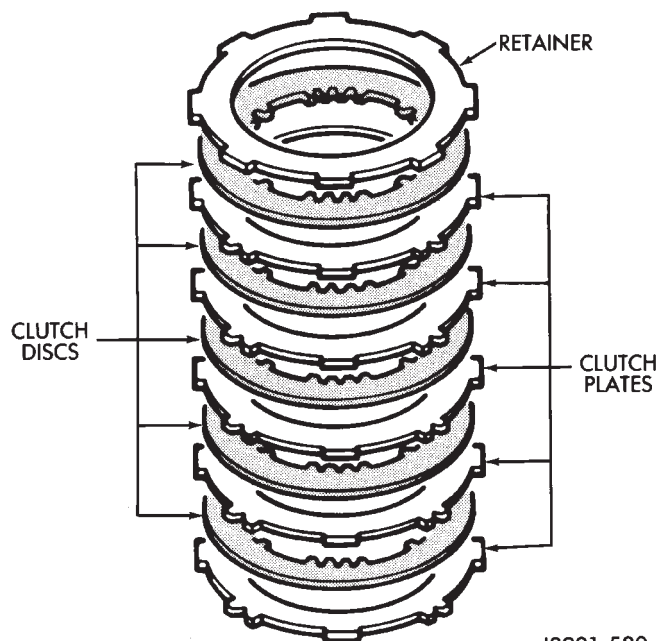
(13) Lubricate race and bearing with petroleum jelly and install them in clutch drum (Fig. 16). Be sure bearing rollers face up and race lip seats in drum as shown.

(14) Verify bearing and race size:

- Outer diameter of bearing is 46.7 mm (1.839 in).
- Outer diameter of race is 48.9 mm (1.925 in).



J8921-579

Fig. 14 Installing Clutch Drum Shaft Seal Rings

J8921-580

Fig. 15 Installing Forward Clutch Discs And Plates

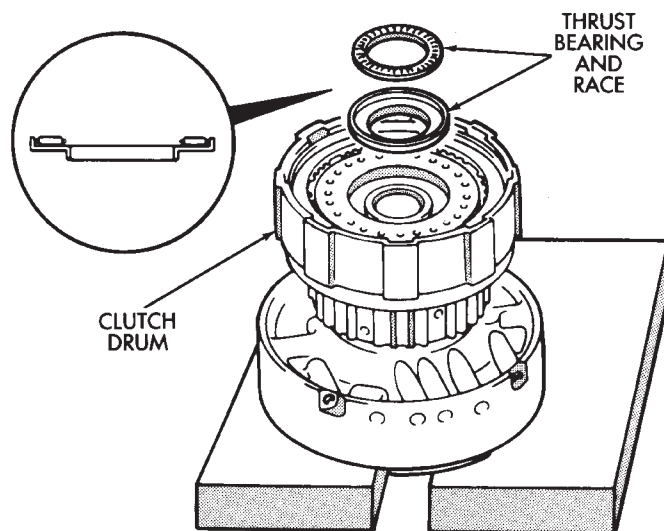
- Inner diameter of bearing and race is 26.0 mm (1.024 in.).

(15) Mount forward clutch on direct clutch and check assembled height (Fig. 17). Height should be 70.3 - 71.5 mm (2.767 - 2.815 in.).

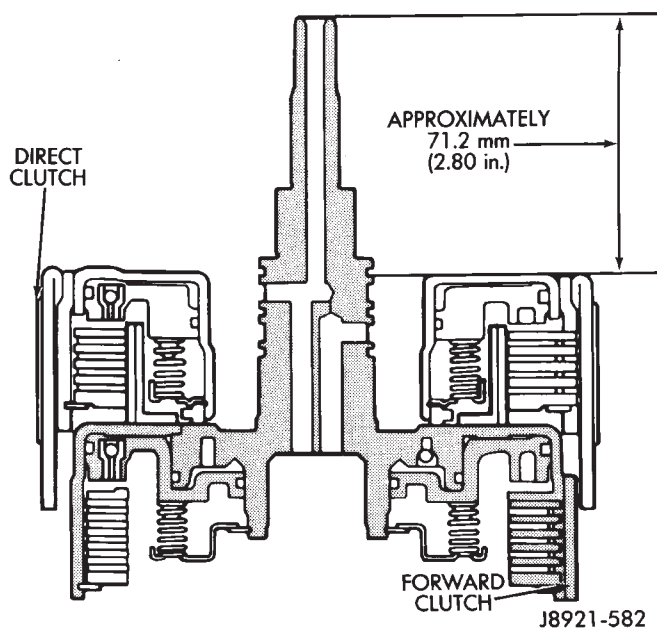
FRONT PLANETARY GEAR OVERHAUL

FRONT PLANETARY DISASSEMBLY

- (1) Remove ring gear from planetary gear (Fig. 1).
- (2) Remove front bearing and the two races from ring gear (Fig. 1).



J8921-581

Fig. 16 Installing Thrust Bearing And Race

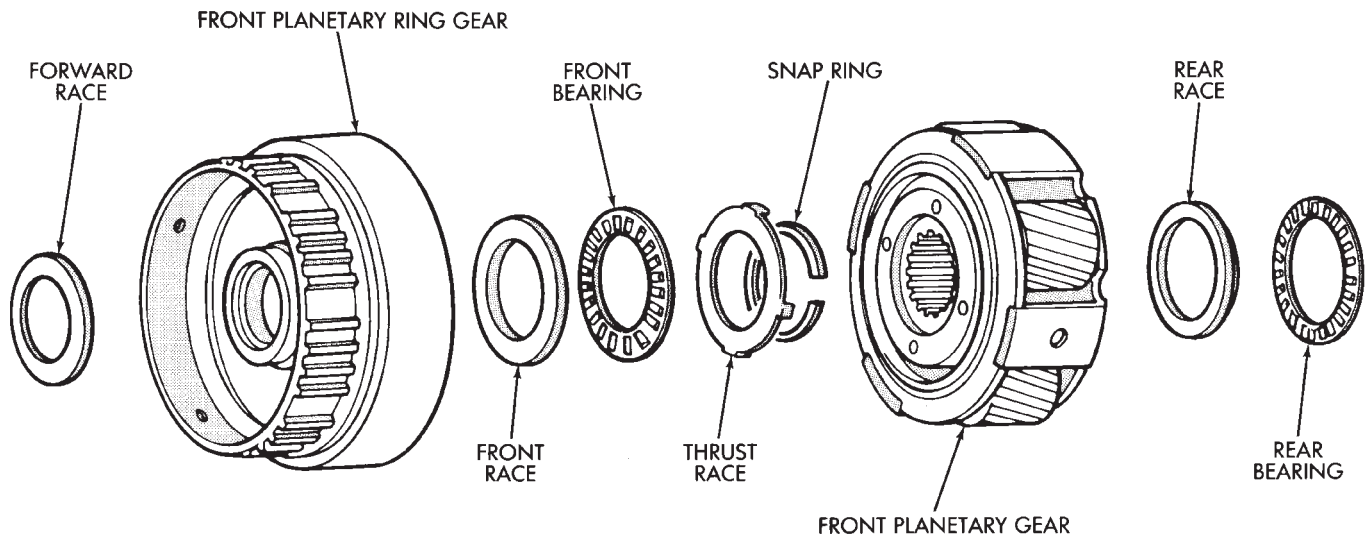
J8921-582

Fig. 17 Checking Forward Clutch Assembled Height

- (3) Remove tabbed thrust race from planetary gear (Fig. 1).
- (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.

FRONT PLANETARY ASSEMBLY

- (1) Lubricate planetary and ring gear bearings and races with petroleum jelly.

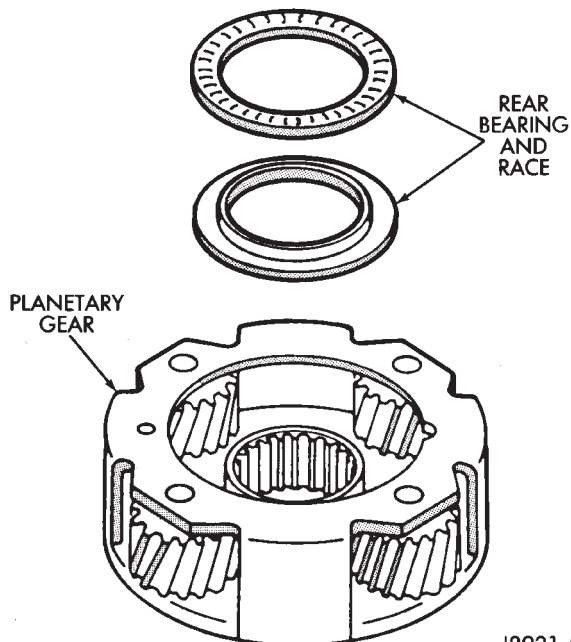


J8921-583

Fig. 1 Front Planetary Gear Components

(2) Identify planetary bearings and races before installation. (Fig. 1). 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.).

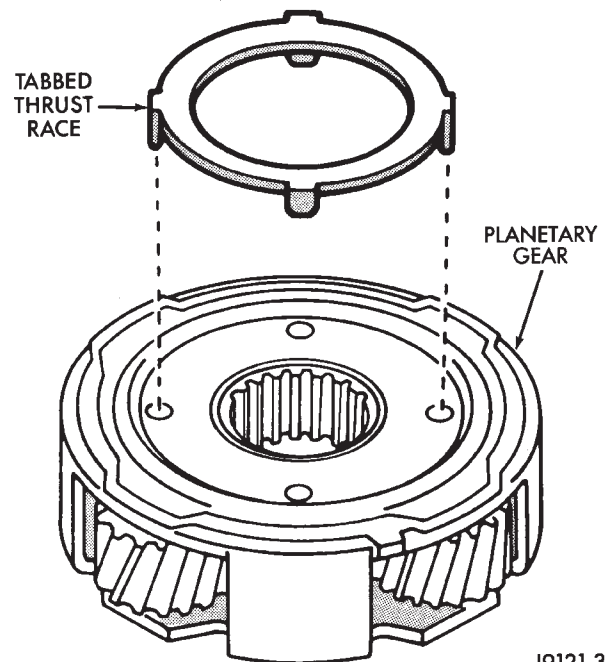


J8921-584

Fig. 2 Installing Front Planetary Rear Bearing and Race

- 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. 2).
- (4) Turn planetary over and install race thrust race (Fig. 3).

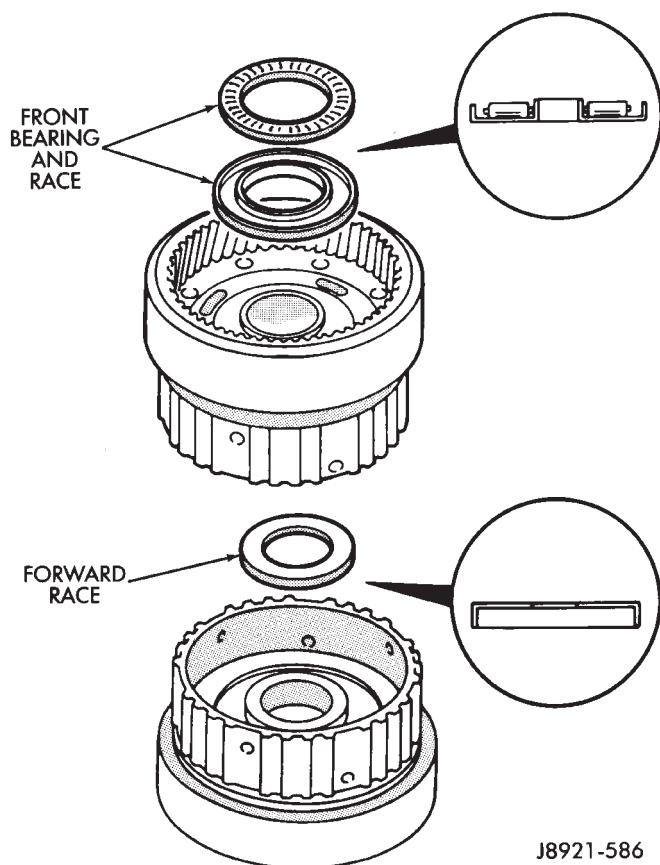


J9121-399

Fig. 3 Installing Front Planetary Thrust Race

- (5) Install front race and bearing and forward race in ring gear (Fig. 4).

- (6) Set planetary gear assembly aside for final assembly.



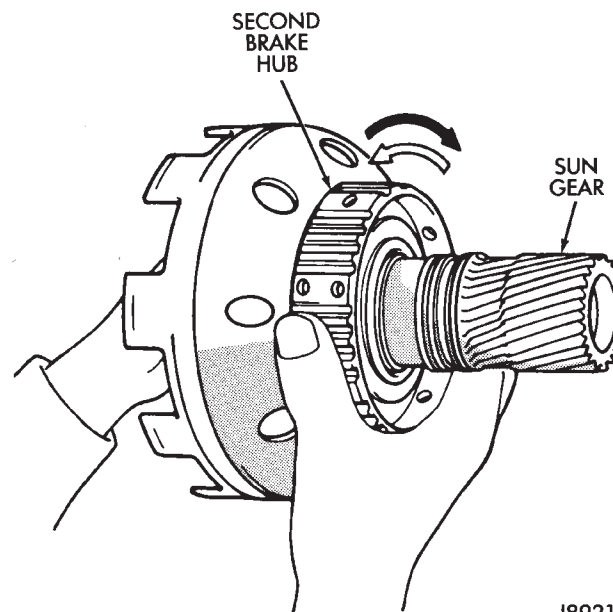
J8921-586

Fig. 4 Installing Front Planetary Front Bearing And Races

SUN GEAR AND NO. 1 ONE-WAY CLUTCH OVERHAUL

SUN GEAR AND CLUTCH DISASSEMBLY

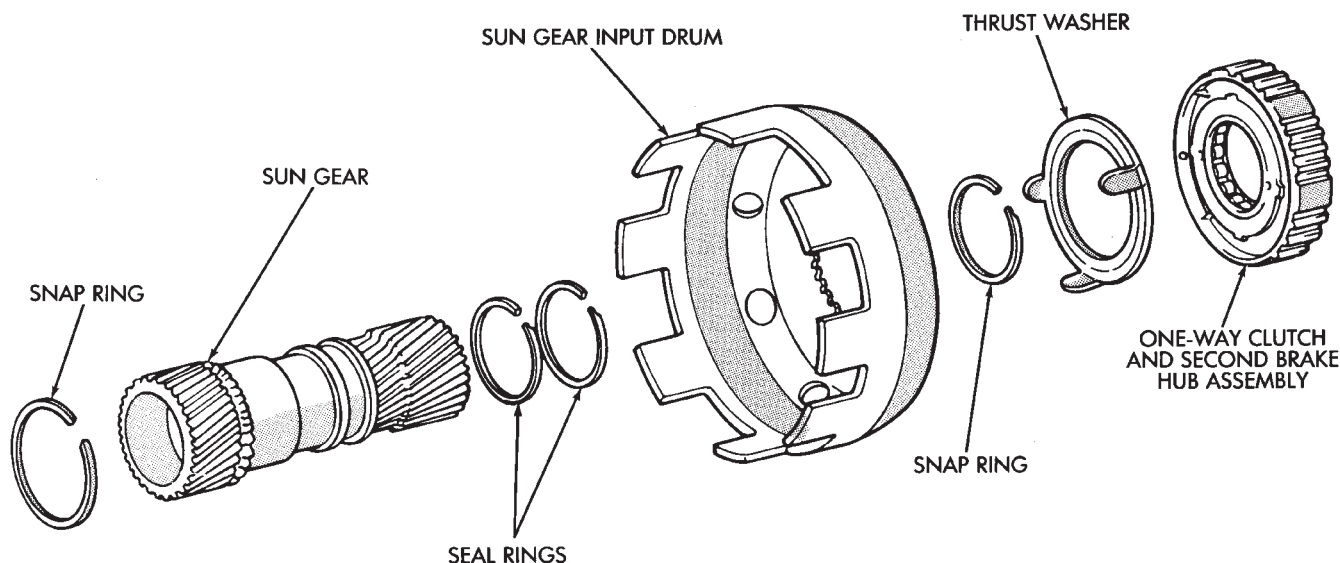
(1) Hold sun gear and turn second brake hub clockwise and counterclockwise (Fig. 2). Hub should rotate freely clockwise but lock when turned counterclockwise. Replace one-way clutch and hub if they do not operate properly.



J8921-588

Fig. 2 Checking One-Way Clutch Operation

- (2) Remove one-way clutch/second brake hub assembly from drum (Fig. 3).
- (3) Remove thrust washer from drum (Fig. 4).
- (4) Remove two seal rings from sun gear (Fig. 5).



J9121-400

Fig. 1 Sun Gear And One-Way Clutch Components

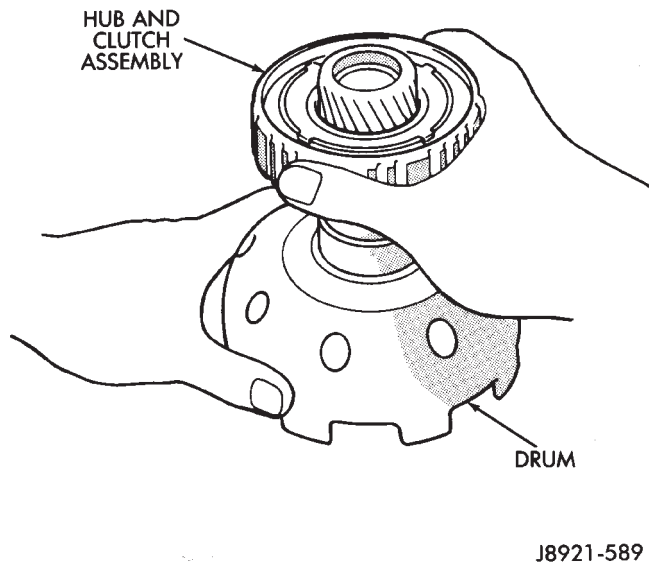


Fig. 3 Removing/Installing Brake Hub And Clutch Assembly

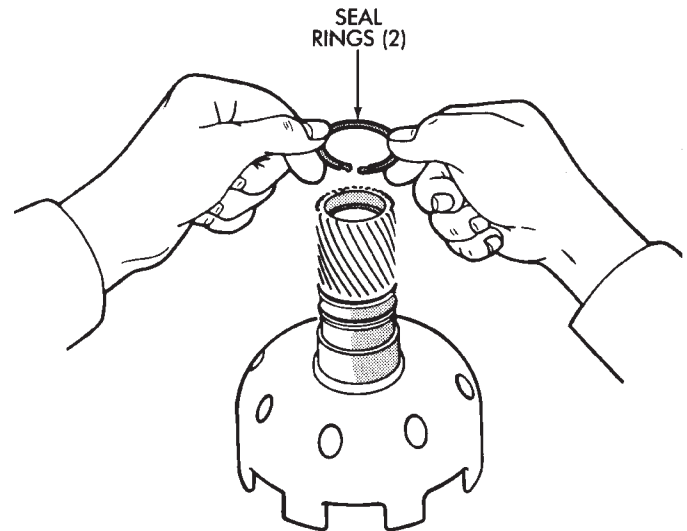


Fig. 5 Removing/Installing Sun Gear Seal Rings

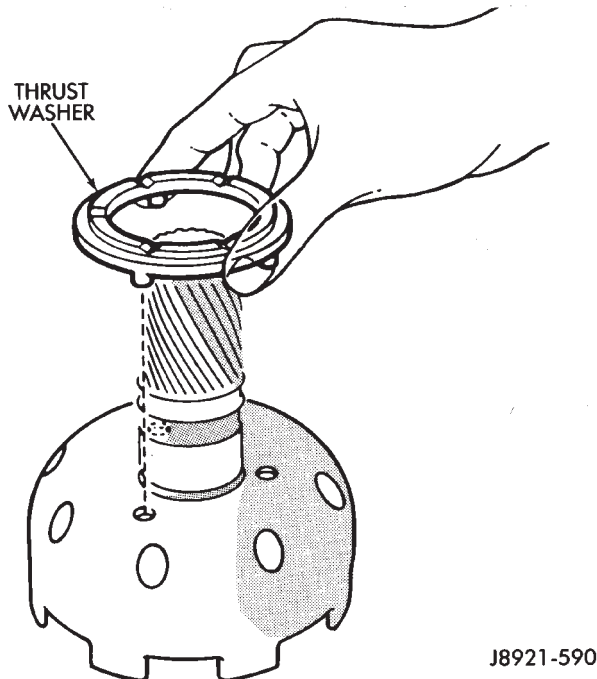


Fig. 4 Removing/Installing Thrust Washer

(5) Support sun gear on wood block (Fig. 6). Then remove first sun gear snap ring and separate drum from gear.

(6) Remove remaining snap ring from sun gear (Fig. 7).

(7) Measure inside diameter of sun gear bushings with bore gauge or inside micrometer (Fig. 8). Maximum allowable diameter is 27.08 mm (1.0661 in.). Replace sun gear if bushing inside diameter is greater than specified.

SUN GEAR AND CLUTCH ASSEMBLY

(1) Install first snap ring on sun gear.

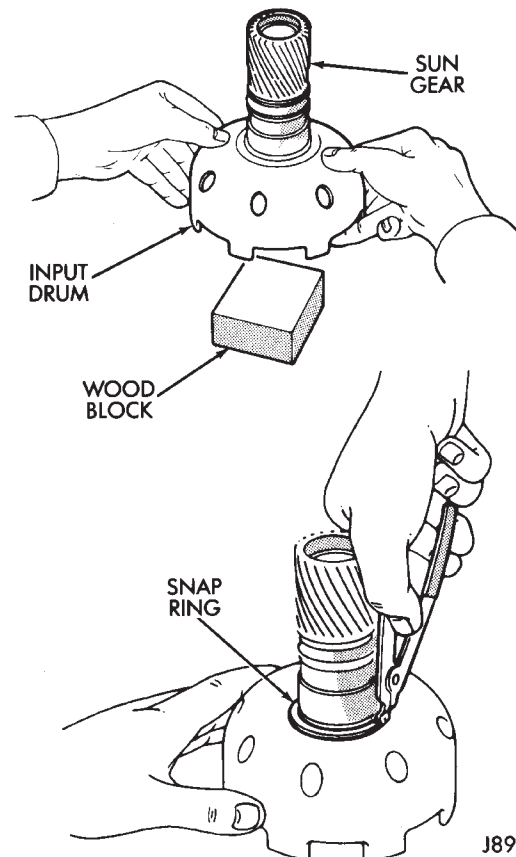
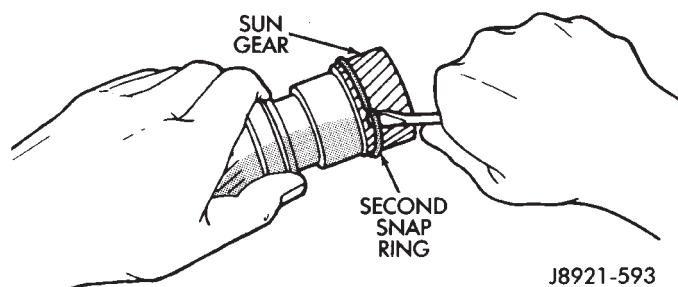


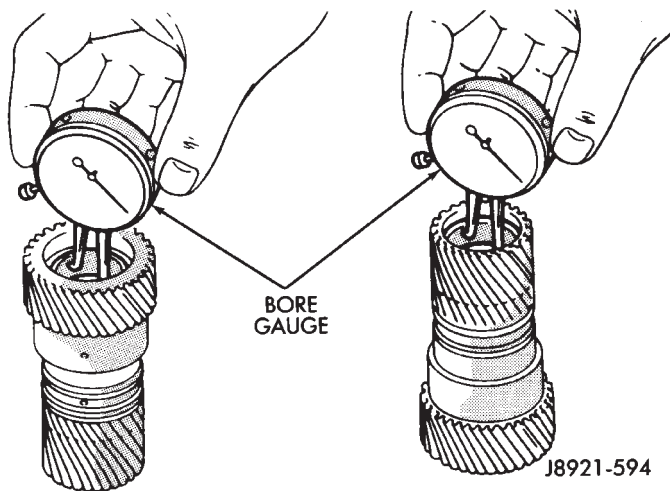
Fig. 6 Removing/Installing Sun Gear

(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.**



J8921-593

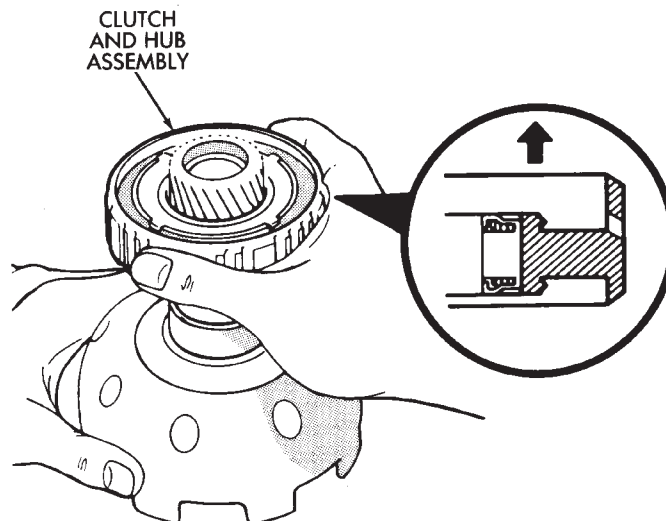
Fig. 7 Removing/Installing Second Snap Ring

J8921-594

Fig. 8 Checking Sun Gear Bushings

(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. 9).



J8921-595

Fig. 9 Installing Clutch And Hub Assembly On Sun Gear

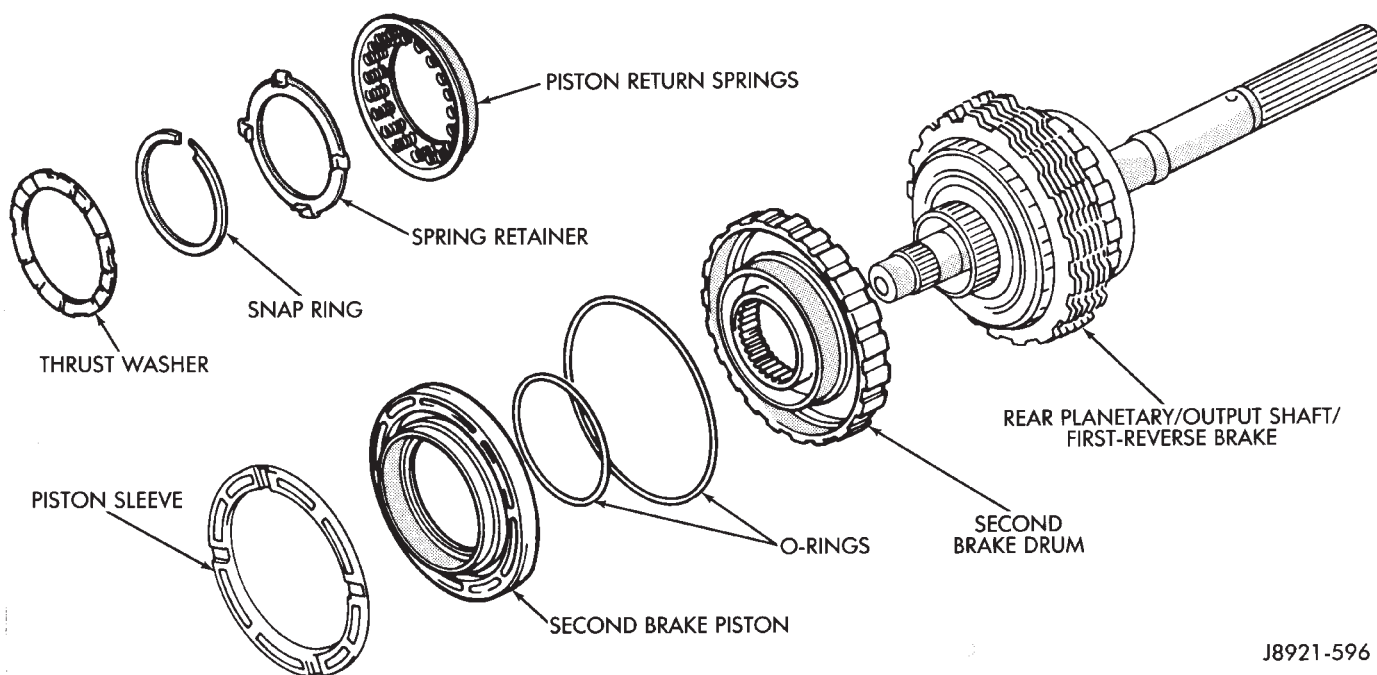
(6) Check one-way clutch operation again (Fig. 2). Hold sun gear and turn second brake hub clockwise and counterclockwise. Hub should turn clockwise freely, but lock when turned counterclockwise.

(7) Set sun gear/clutch assembly aside for final assembly.

SECOND BRAKE OVERHAUL

BRAKE DISASSEMBLY

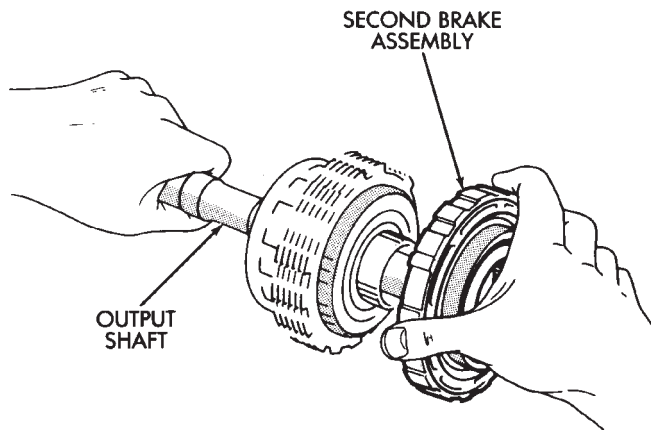
(1) Remove second brake drum from output shaft (Fig. 2).



J8921-596

Fig. 1 Second Brake Components

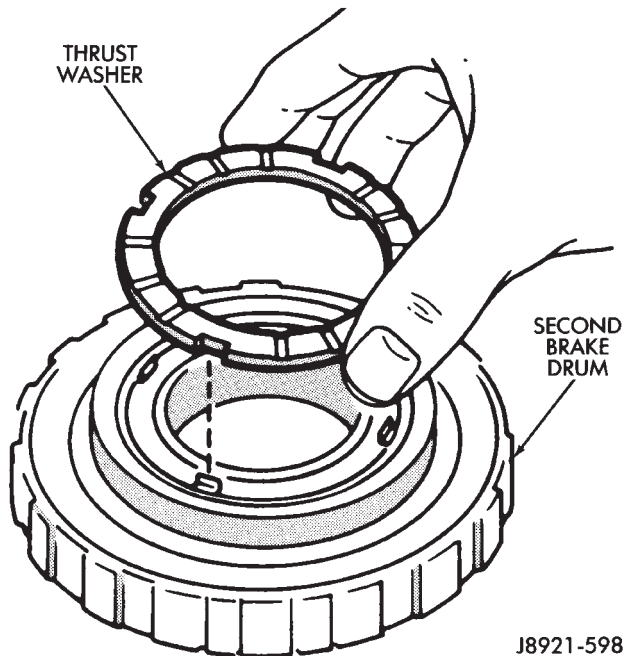
(2) Set output shaft assembly aside for overhaul. Refer to Rear Planetary Gear and Output Shaft Overhaul procedures.



J8921-597

Fig. 2 Removing/Installing Second Brake Assembly

(3) Remove thrust washer from second brake drum (Fig. 3).



J8921-598

Fig. 3 Removing/Installing Second Brake Drum Thrust Washer

(4) Compress piston return springs with shop press and Tool 7538. Then remove piston snap ring (Fig. 4).

(5) Remove compressor tool and remove spring retainer and return springs.

(6) Remove second brake piston and sleeve from drum with compressed air (Fig. 5). Use only enough air pressure to ease piston out of drum.

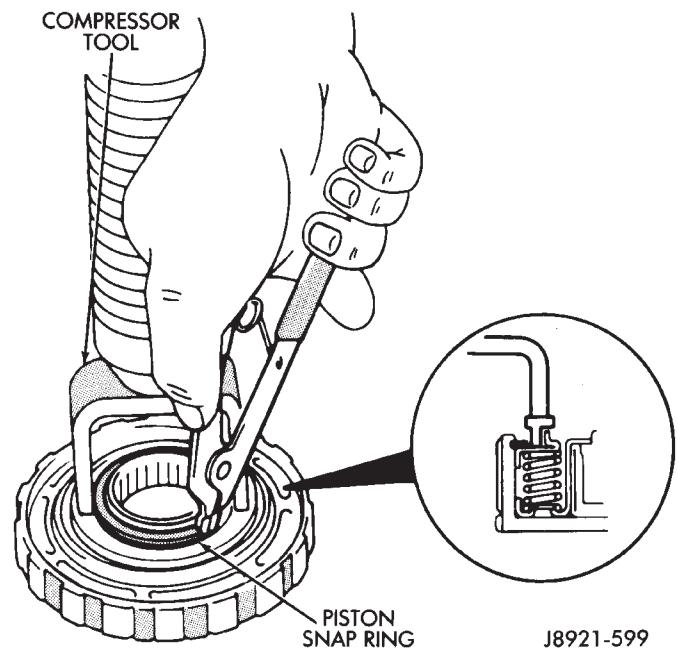


Fig. 4 Removing/Installing Second Brake Piston Snap Ring

(7) Remove and discard brake piston O-rings.

(8) Measure free length of piston return springs with springs mounted in retainer (Fig. 6). Length

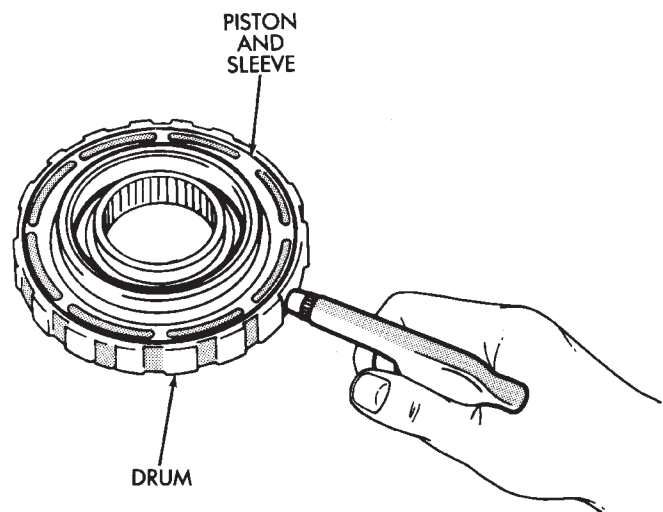
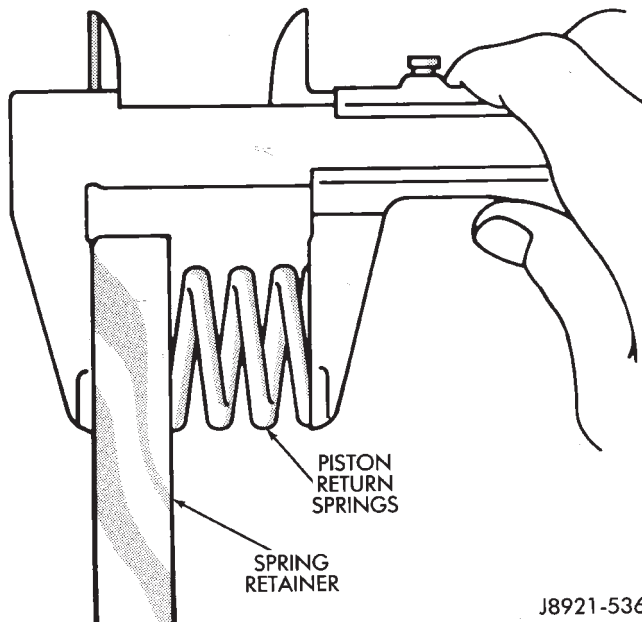


Fig. 5 Removing/Installing Piston And Sleeve

should be approximately 16.05 mm (0.632 in.). Replace return springs if length is less than specified.

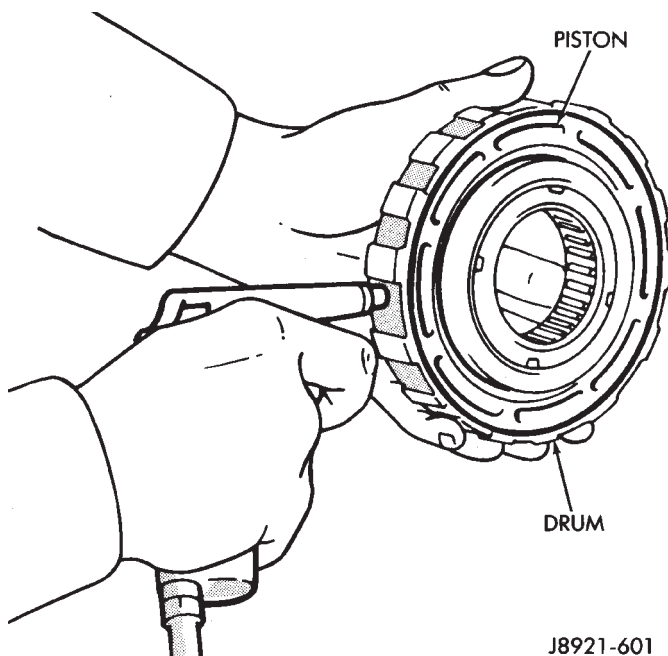


J8921-536

Fig. 6 Measuring Second Brake Piston Return Springs

SECOND BRAKE ASSEMBLY

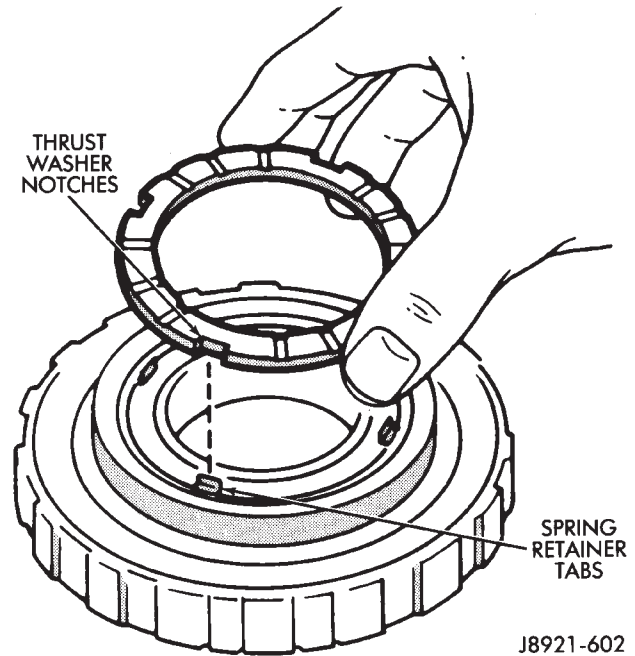
- (1) Lubricate and install new O-rings on brake piston. Then install brake piston in drum.
- (2) Install return springs and retainer on brake piston.
- (3) Compress return springs with shop press and Compressor Tool 7538. Install piston snap ring and remove brake assembly from press.
- (4) Check brake piston operation with low pressure compressed air (Fig. 7). Apply air pressure through feed hole in drum. Piston should move smoothly when applying and releasing air pressure.



J8921-601

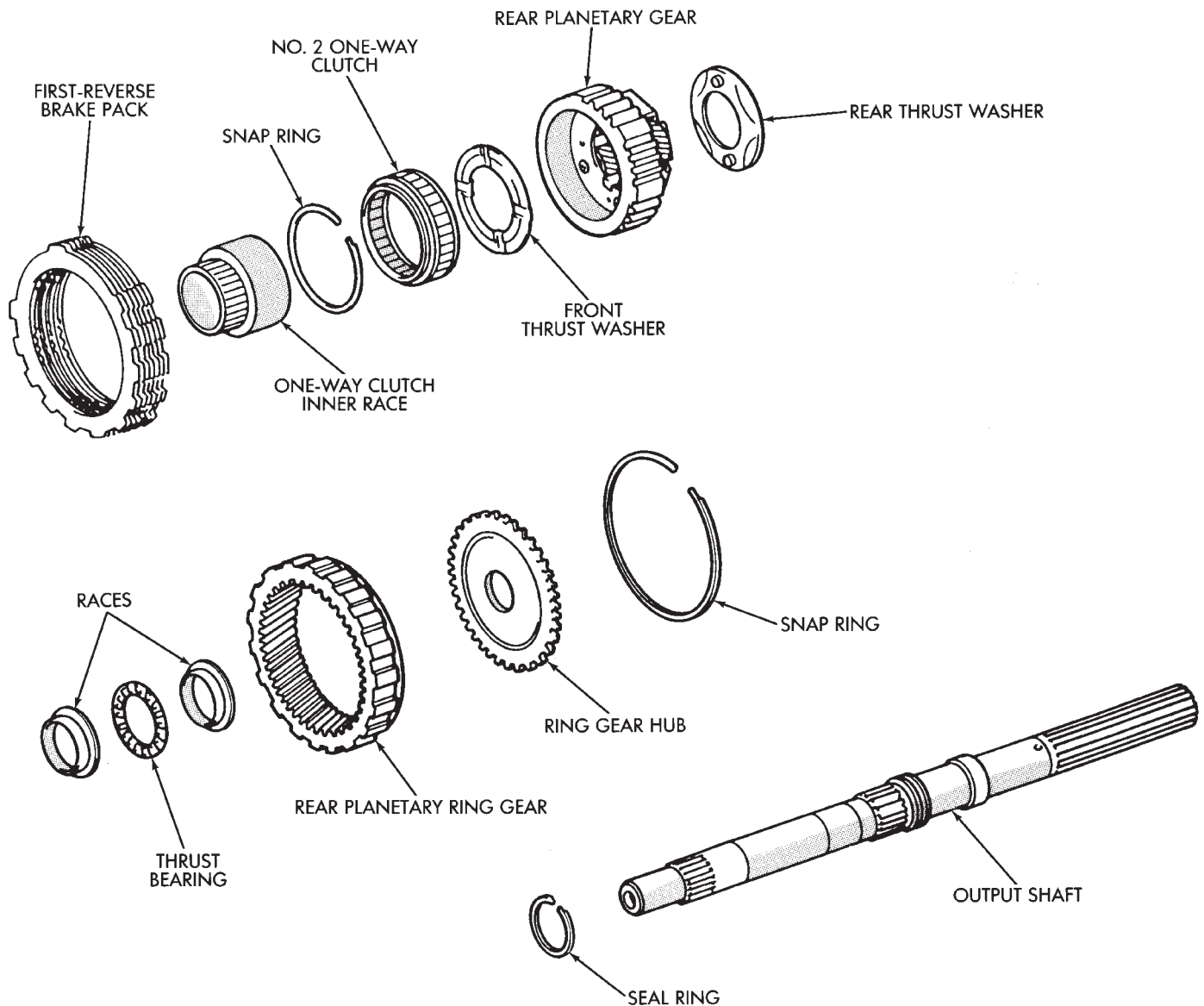
Fig. 7 Checking Second Brake Piston Operation

- (5) Coat thrust washer with petroleum jelly and install it in drum. Be sure washer notches are aligned with tabs on spring retainer (Fig. 8).
- (6) Set brake components aside for final assembly.



J8921-602

Fig. 8 Installing Second Brake Thrust Washer



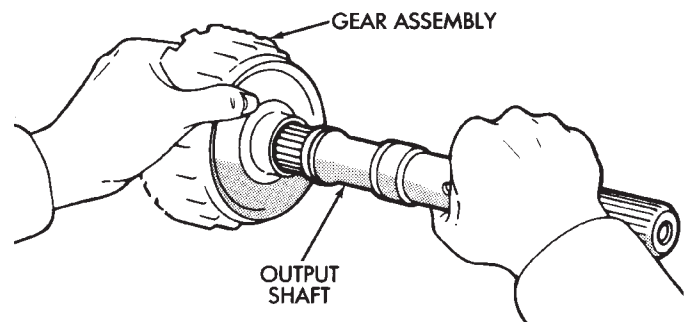
J8921-603

Fig. 1 Rear Planetary, Brake Pack, Clutch And Output Shaft Components

REAR PLANETARY, NO. 2 ONE-WAY CLUTCH AND OUTPUT SHAFT OVERHAUL

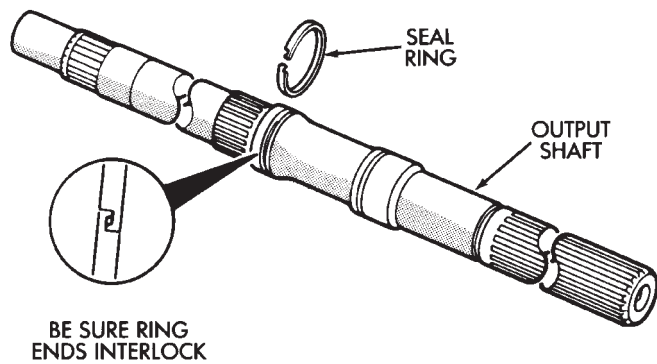
PLANETARY/BRAKE PACK/OUTPUT SHAFT DISASSEMBLY

- (1) Remove output shaft from gear assembly (Fig. 2).
- (2) Remove and discard shaft seal ring (Fig. 4).
- (3) Remove brake pack from planetary gear (Fig. 4).
- (4) 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.
- (5) Remove planetary gear from ring gear (Fig. 5).
- (6) Check No. 2 one-way clutch. Hold planetary gear and turn clutch inner race in both directions. Race should turn freely counterclockwise, but lock when turned clockwise. Replace one-way clutch if necessary.

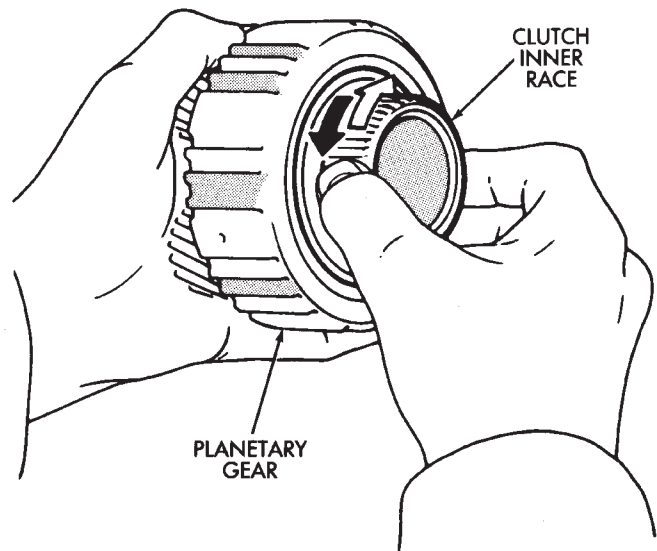


J8921-604

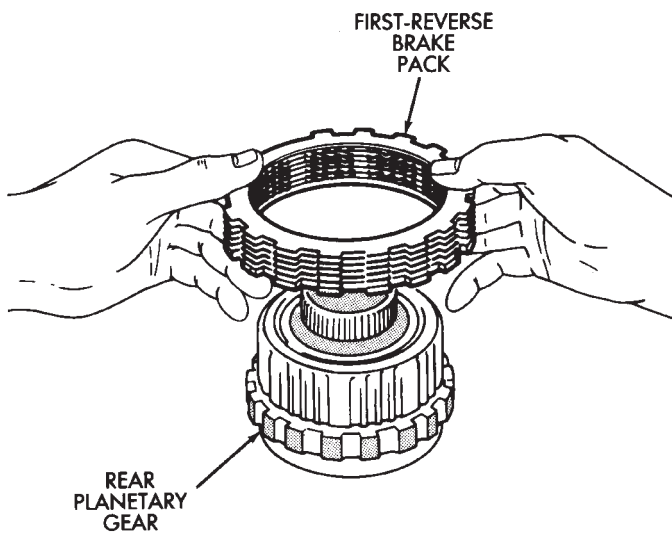
Fig. 2 Removing/Installing Output Shaft



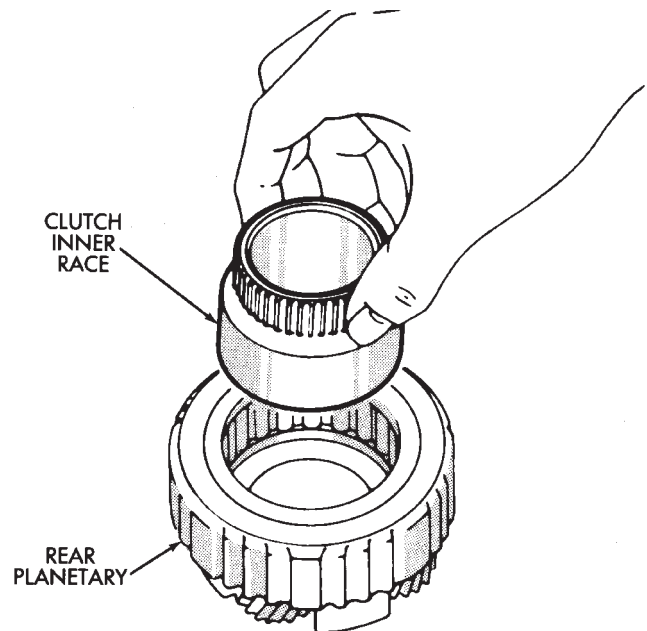
J8921-605

Fig. 3 Removing/Installing Shaft Seal Ring

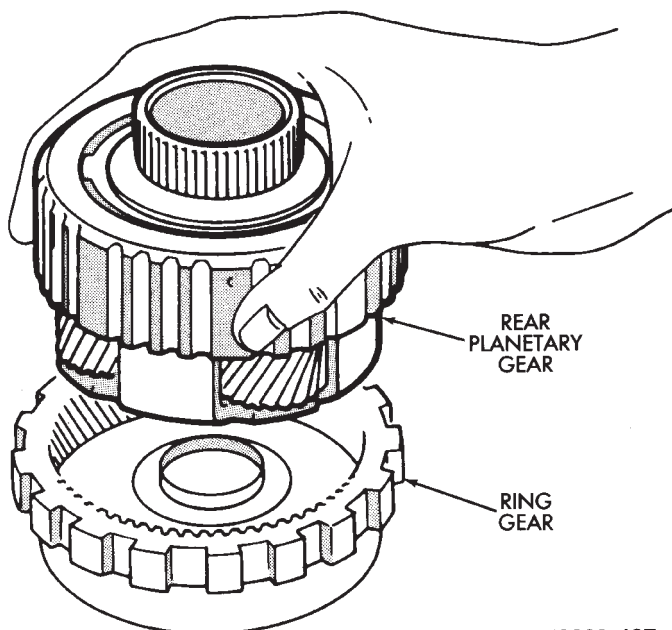
J8921-608

Fig. 6 Checking No. 2 One-Way Clutch Operation

J8921-606

Fig. 4 Removing/Installing First-Reverse Brake Pack

J8921-609

Fig. 7 Removing/Installing Clutch Inner Race

J8921-607

Fig. 5 Removing/Installing Rear Planetary

(7) Remove clutch inner race from planetary gear (Fig. 7).

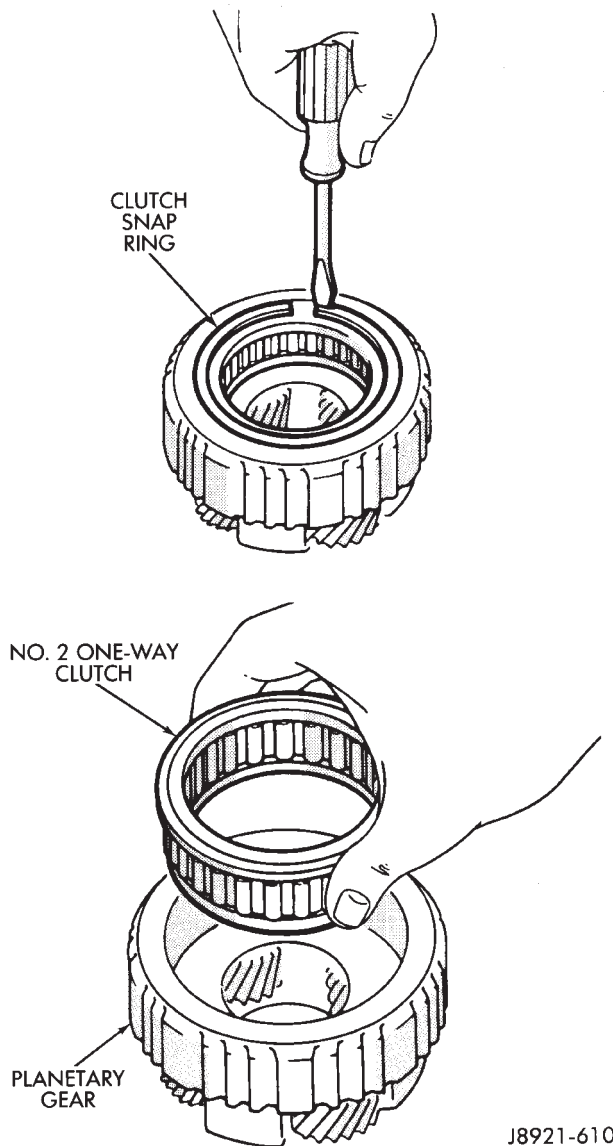
(8) Remove clutch snap ring and remove No. 2 one-way clutch from planetary (Fig. 8).

(9) Remove front and rear thrust washers from planetary gear (Fig. 9).

(10) Remove thrust bearing and washers from ring gear (Fig. 10).

(11) Remove ring gear snap ring and remove ring gear hub (Fig. 11).

(12) Inspect and replace worn or damaged planetary gear components.

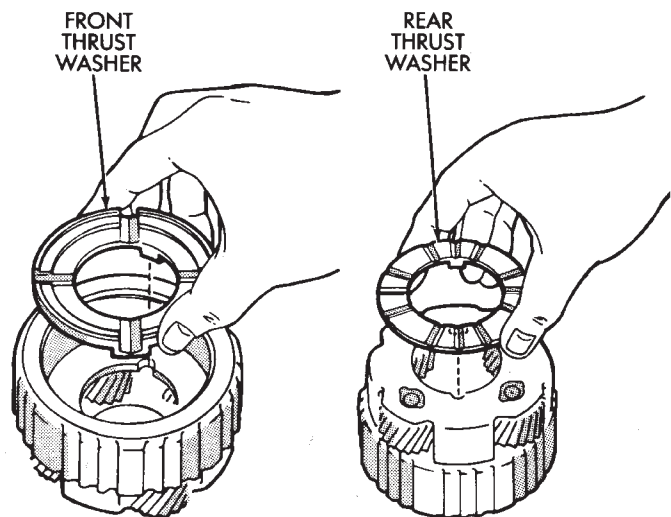


J8921-610

Fig. 8 Removing/Installing One-Way Clutch

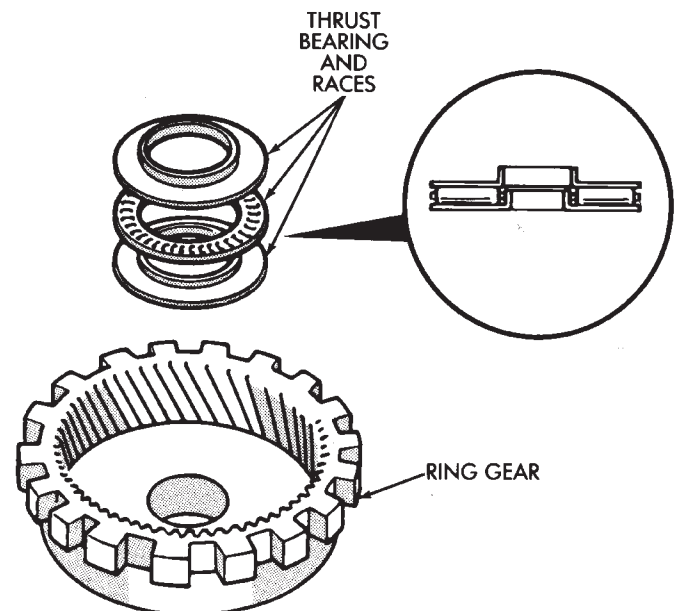
ASSEMBLING REAR PLANETARY, BRAKE PACK, CLUTCH AND SHAFT

- (1) Install hub and snap ring in ring gear (Fig. 11)
- (2) Identify ring gear thrust bearing and races by following dimensions (Fig. 10):
 - 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.).
- (3) Lubricate ring gear thrust bearing and races with petroleum jelly and install them in ring gear (Fig. 10).
- (4) Coat planetary thrust washers with petroleum jelly and install them in gear (Fig. 9).
- (5) Install No. 2 one-way clutch in planetary gear. Be sure flanged side of clutch faces upward (Fig. 12).



J8921-611

Fig. 9 Removing/Installing Rear Planetary Thrust Washers



J8921-612

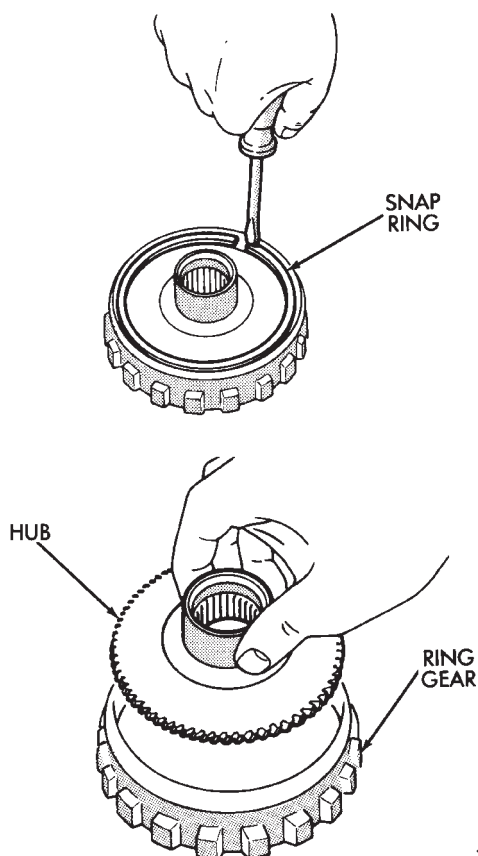
Fig. 10 Removing/Installing Ring Gear Thrust Bearing And Races

(6) Install clutch retaining snap ring and install clutch inner race (Fig. 7). Turn race counterclockwise to ease installation.

(7) Verify one-way clutch operation. Hold gear and turn inner race in both directions. Race should turn freely counterclockwise, but lock when turned clockwise.

(8) Install planetary gear in ring gear.

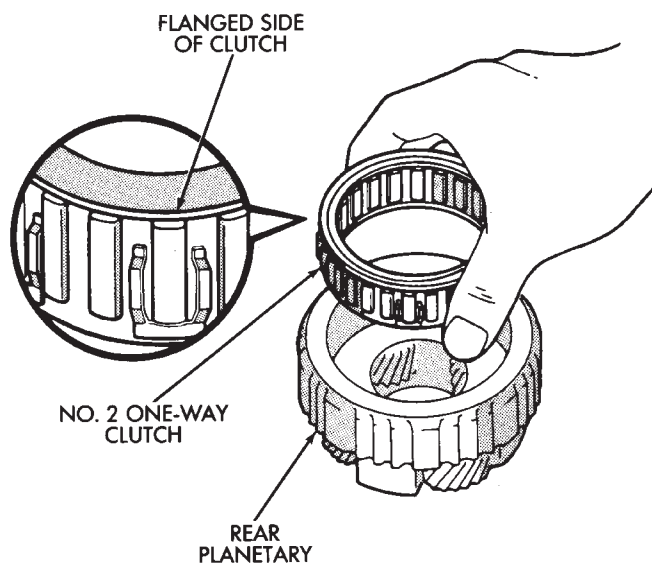
(9) Assemble clutch discs and clutch plates (Fig. 4). Sequence is disc first, then a plate. Use seven discs and plates in a 6-cyl. transmission.



J8921-613

Fig. 11 Removing/Installing Ring Gear Hub

- (10) Install brake pack on planetary gear (Fig. 4).
- (11) Install new seal ring on output shaft (Fig. 3). Be sure ring ends are interlocked as shown.
- (12) Set assembled components aside for final assembly.



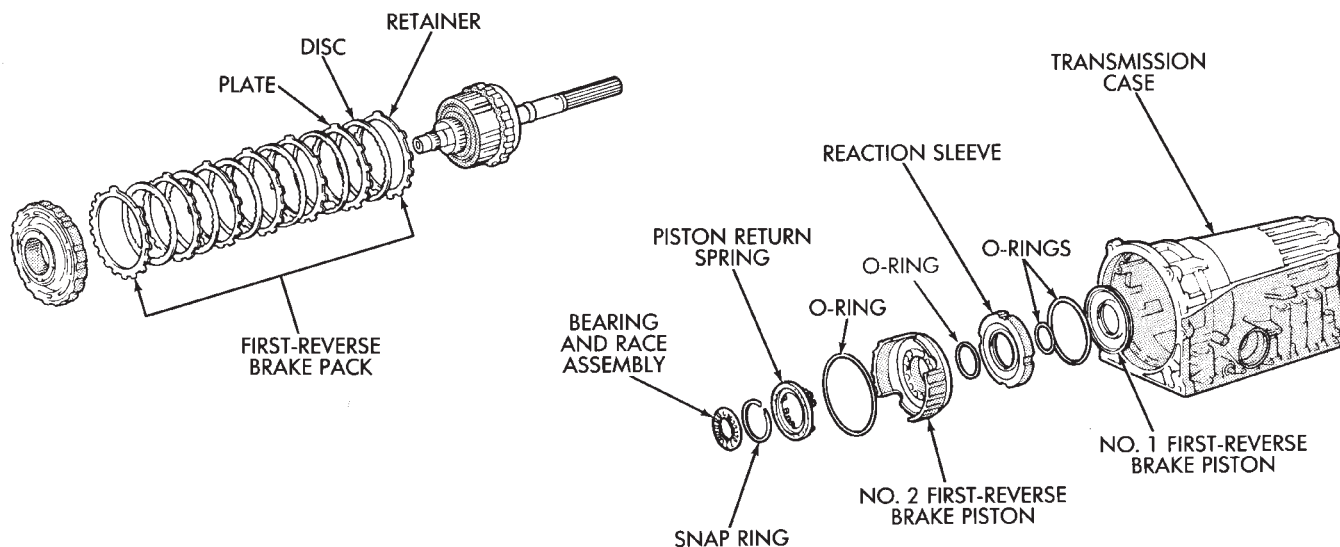
J8921-614

Fig. 12 Installing No. 2 One-Way Clutch

FIRST-REVERSE BRAKE PISTON AND TRANSMISSION CASE OVERHAUL

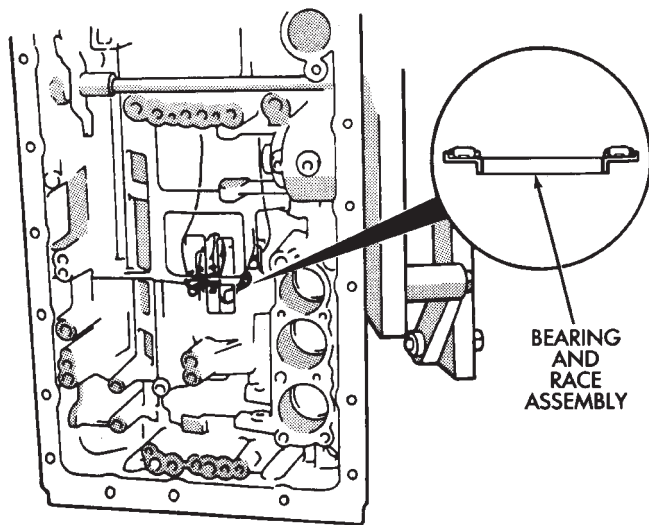
BRAKE DISASSEMBLY AND INSPECTION

- (1) Remove bearing and race assembly from transmission case (Fig. 2).
- (2) Check first/reverse brake piston operation with compressed air (Fig. 3). Piston should move smoothly and not bind or stick. If piston operation is incorrect, case or piston may require replacement.
- (3) Compress piston return springs with Tool 7539 and remove piston snap ring (Fig. 4).
- (4) Remove Tool 7539 and remove piston return springs.
- (5) Remove No. 2 first-reverse brake piston with compressed air. Apply air through same transmission



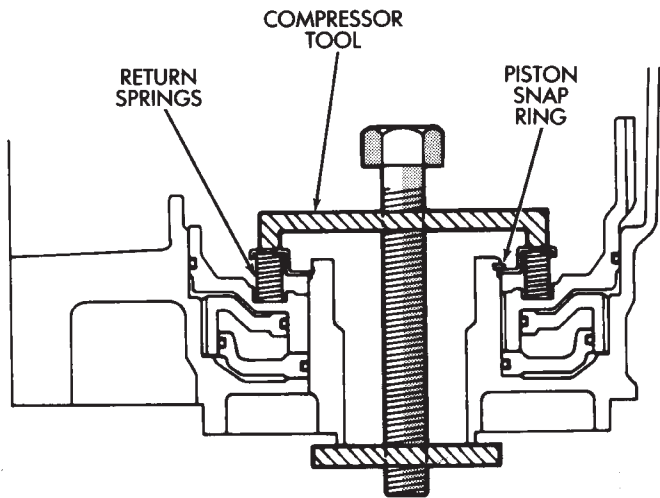
J8921-615

Fig. 1 First-Reverse Brake Pistons And Transmission Case



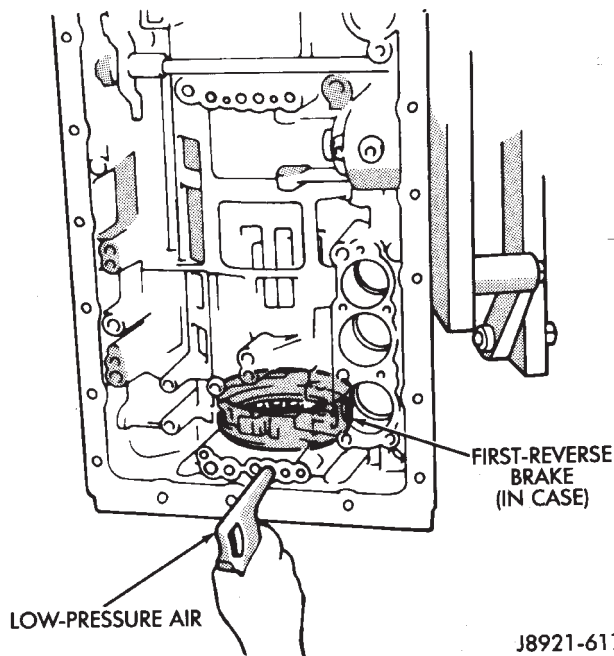
J8921-616

Fig. 2 Removing/Installing Bearing And Race Assembly



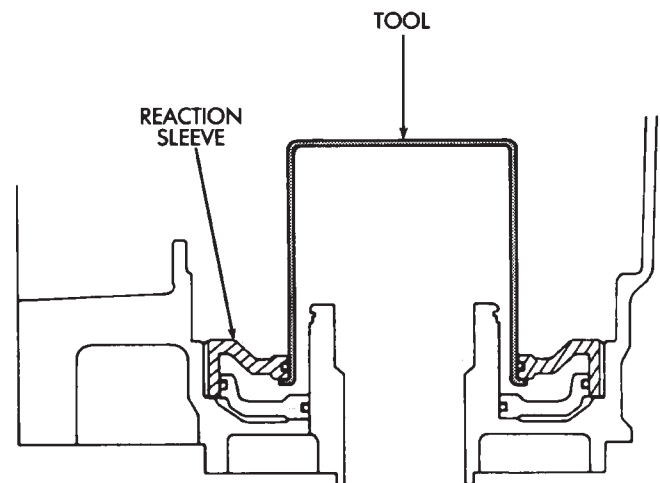
J8921-618

Fig. 4 Removing/Installing Piston Snap Ring



J8921-617

Fig. 3 Checking First-Reverse Brake Piston Operation



J8921-619

Fig. 5 Removing/Installing Reaction Sleeve

feed hole used for checking piston operation.

(6) Remove reaction sleeve with Sleeve Remover Tool 7542 (Fig. 5). Insert tool flanges under sleeve and lift tool and sleeve out of case.

(7) Remove No. 1 first/reverse brake piston with Piston Puller 7543 (Fig. 6). Slip tool under piston and lift tool and piston out of case.

(8) Measure free length of piston return springs with springs mounted in retainer. Length should be minimum of 18.382 mm (0.724 in.). Replace springs if length is less than this.

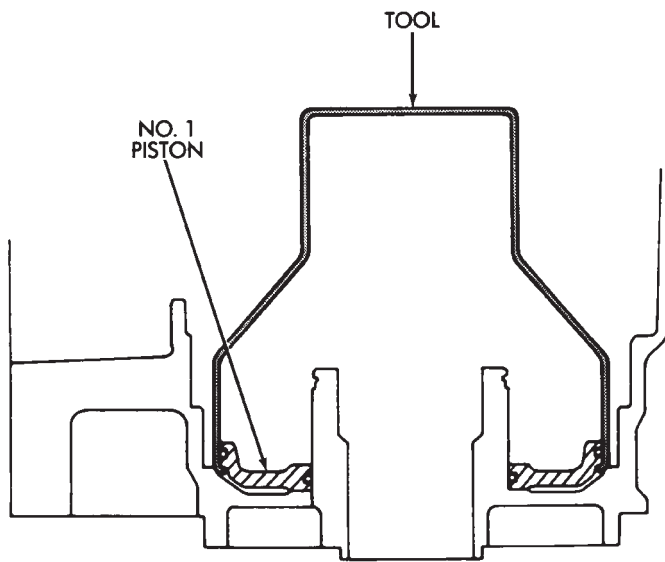
(9) Clean transmission case thoroughly with solvent and dry it with compressed air. Blow compressed air through oil feed passages to remove solvent residue and ensure that passages are clear. Inspect the case for wear or damage. Replace case if necessary.

ASSEMBLING FIRST/REVERSE BRAKE PISTON

(1) Lubricate and install new O-rings on No. 1 first/reverse brake piston and on reaction sleeve (Fig. 7). Then install piston in sleeve.

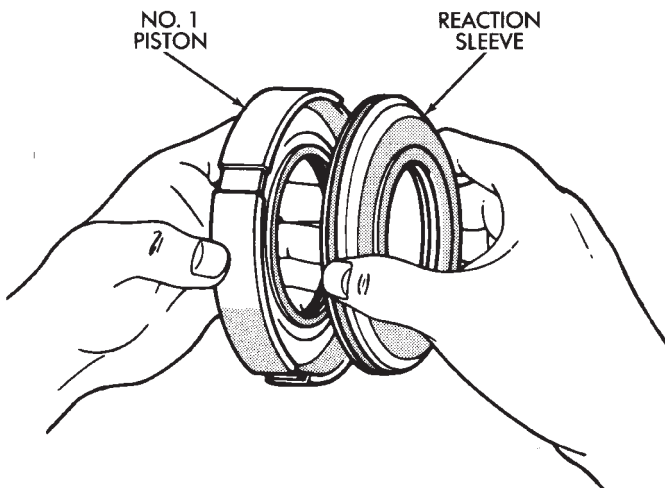
(2) Lubricate and install new O-ring on No. 2 brake piston.

(3) Install assembled No. 1 piston and reaction sleeve on No. 2 piston (Fig. 8).



J8921-620

Fig. 6 Removing/Installing First-Reverse Brake No.1 Piston



J8921-621

Fig. 7 Assembling No. 1 Piston And Sleeve

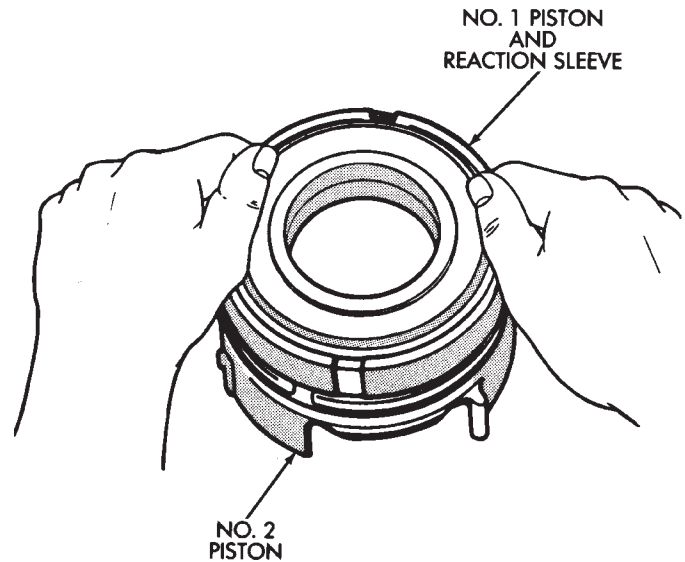
(4) Lubricate and install piston assembly in case (Fig. 9). Align piston and case slots and press piston assembly into case with hand pressure.

(5) Position piston return springs on No. 2 piston.

(6) Compress piston return springs with Tool 7539 and install piston snap ring (Fig. 4). Be sure snap ring end gap is not aligned with any tangs on return spring retainer.

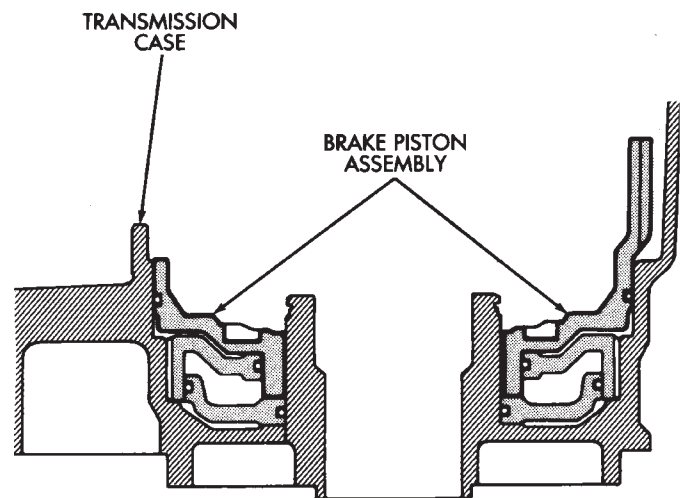
(7) Verify piston operation with compressed air as outlined in disassembly procedure.

(8) Coat bearing and race assembly with petroleum jelly and install it in piston assembly (Fig. 2). Bearing and race assembly outer diameter is 57.7 mm (2.272 in.) and inner diameter is 39.2 mm (1.543 in.).



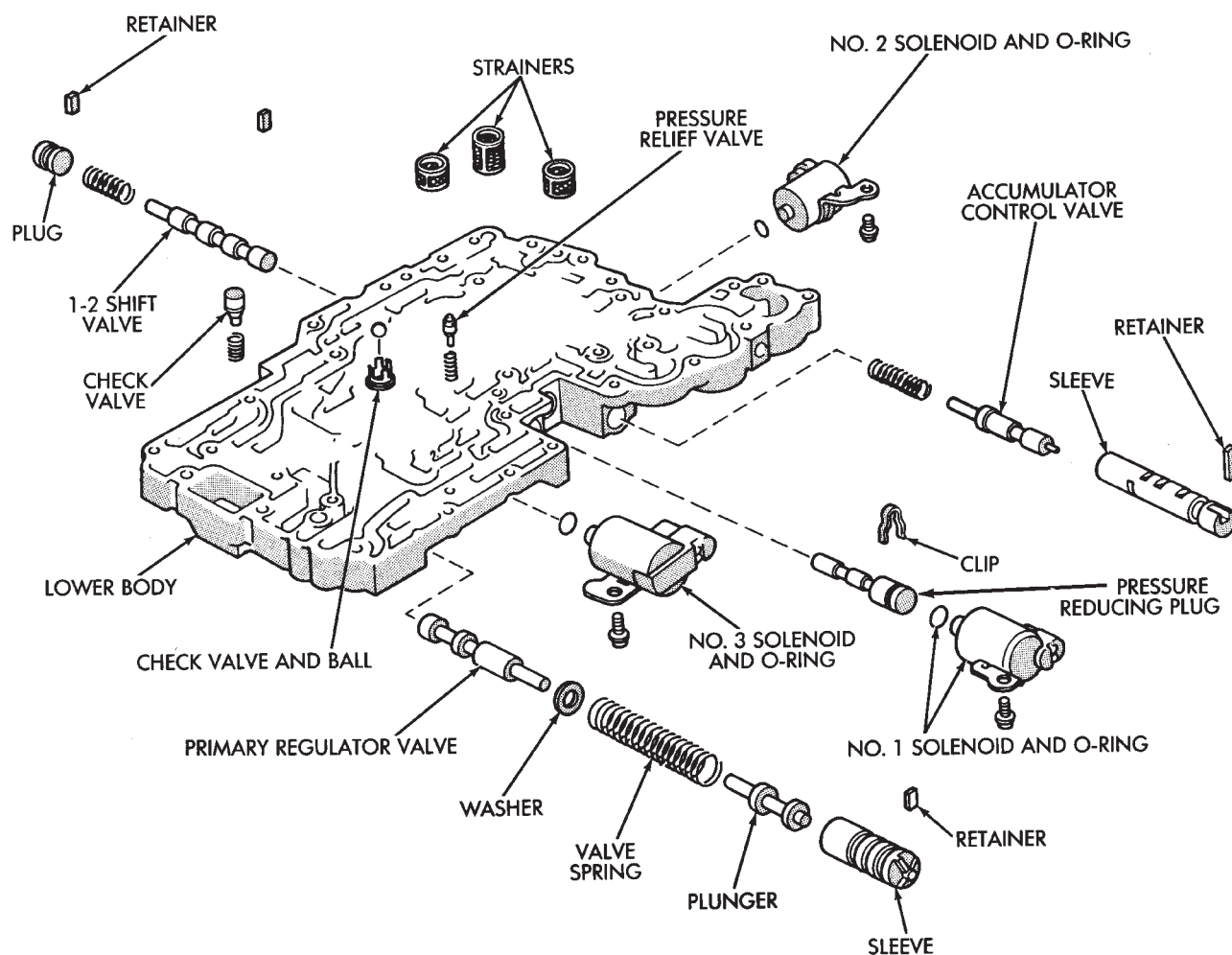
J8921-622

Fig. 8 Assembling First-Reverse Brake Pistons



J8921-623

Fig. 9 Installing First-Reverse Brake Piston Assembly



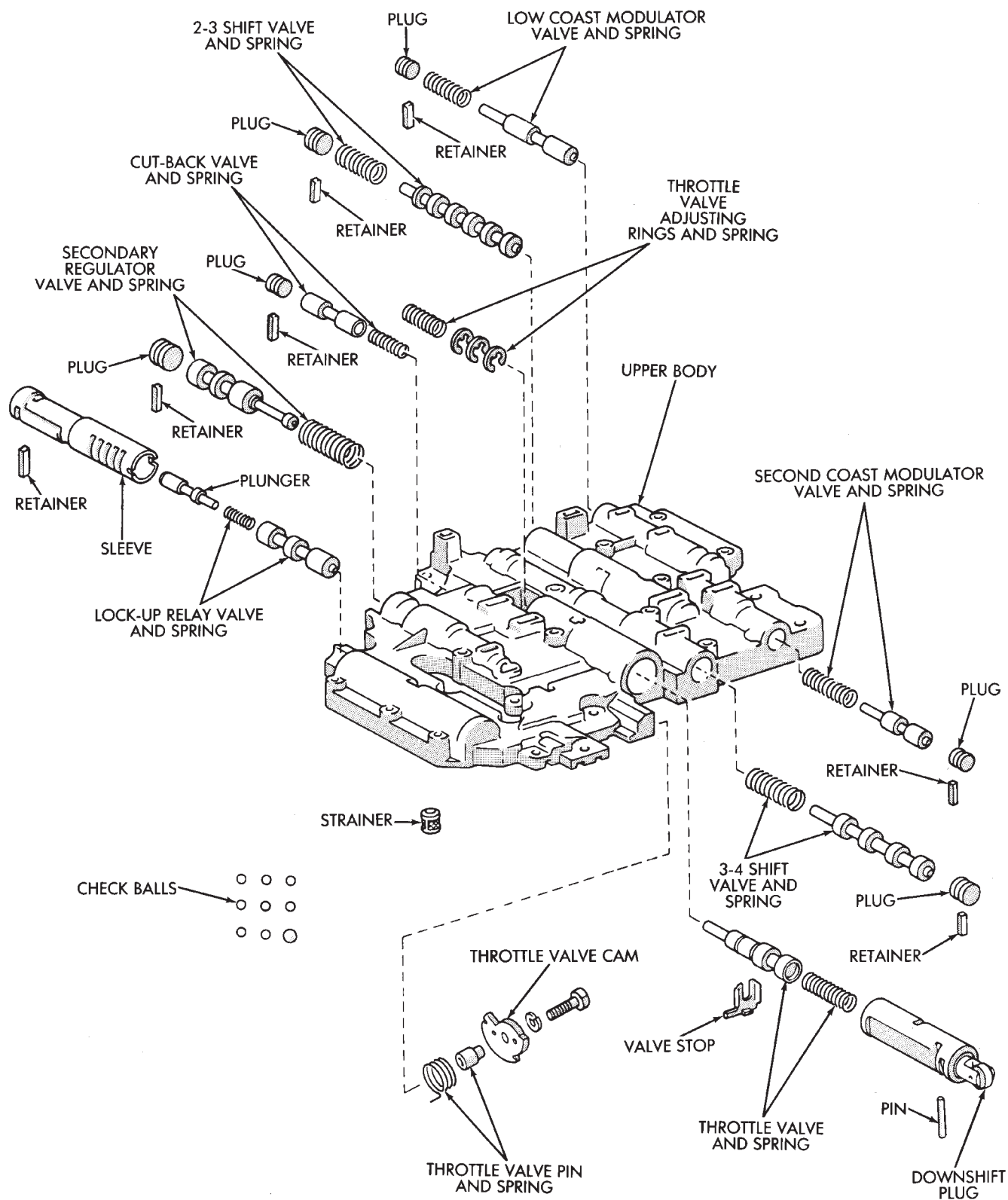
J9121-384

Fig. 1 Lower Body Components

TRANSMISSION VALVE BODY OVERHAUL

The valve body assembly consists of two sections which are the upper body and lower body (Figures 1

and 2). Disassembly, inspection and overhaul procedures for each section are outlined separately. Refer to the appropriate procedure as needed.



J8921-625

Fig. 2 Upper Body Components

REMOVING UPPER BODY FROM LOWER BODY

(1) Remove two-piece detent spring (Fig. 3). Note position of spring sections for assembly reference.

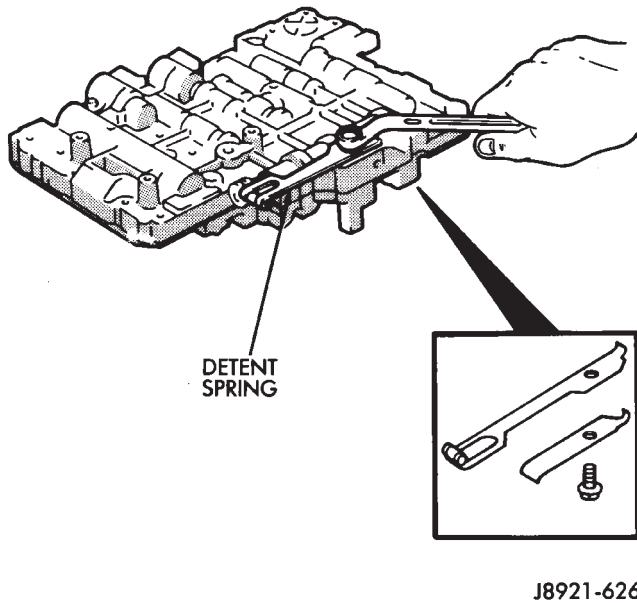


Fig. 3 Removing/Installing Detent Spring

- (2) Remove manual valve from lower body (Fig. 4).
- (3) Remove bolts attaching upper body to lower

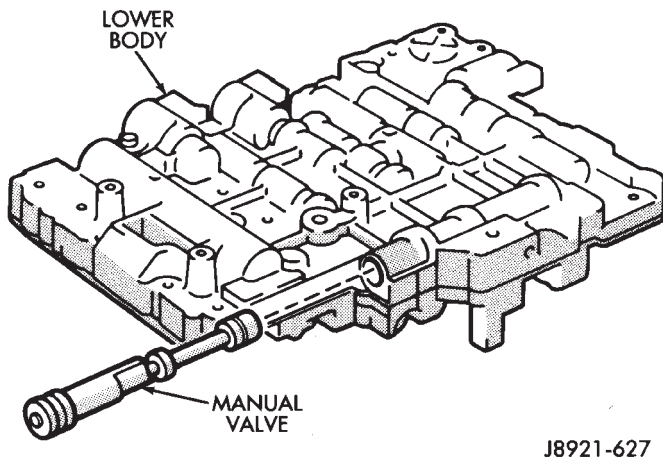


Fig. 4 Removing/Installing Manual Valve

body (Fig. 5).

- (4) Carefully lift and remove upper body, plate and gaskets from lower body (Fig. 6).
- (5) Disassemble and overhaul upper and lower body sections as outlined in following procedures.

LOWER BODY DISASSEMBLY

- (1) Remove check valve and spring, pressure relief valve and spring and ball check and seat from lower body. Note location of each valve for assembly reference (Fig. 1).
- (2) Remove oil strainers (Fig. 2).

● = BOLT LOCATIONS

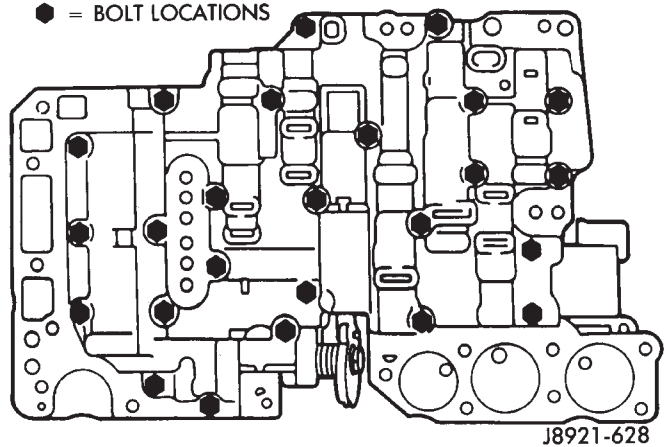


Fig. 5 Valve Body Bolt Locations

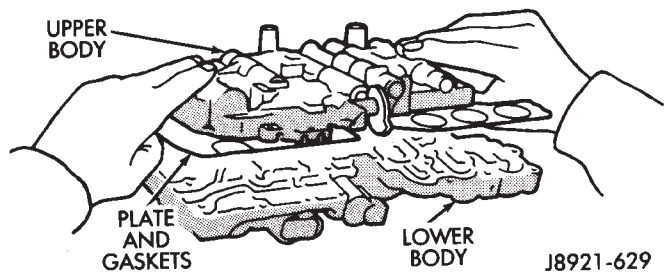


Fig. 6 Upper Body, Plate And Gaskets

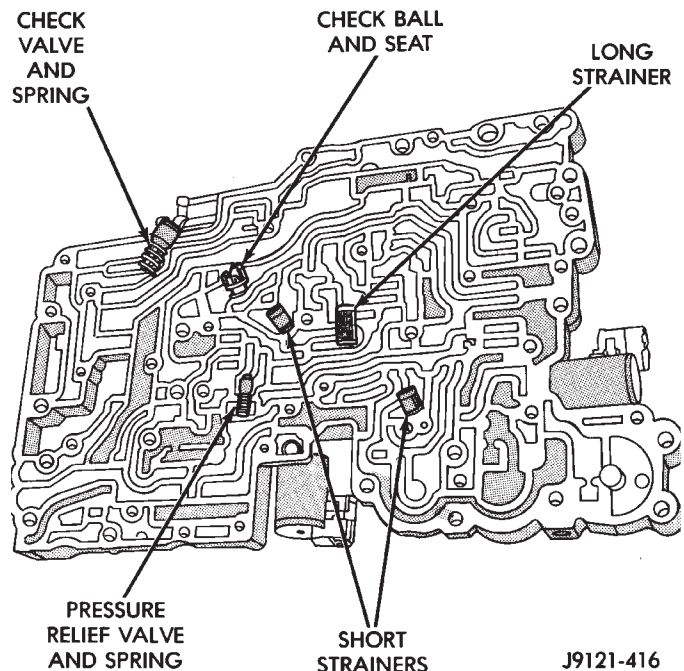


Fig. 1 Lower Body Check Valve And Strainer Location

- (3) Note or mark position of valve retainers and pressure reducing plug clip for assembly reference (Fig. 2). Do not remove the retainers at this time.
- (4) Remove solenoid No. 1, 2 and 3. Discard solenoid O-rings.
- (5) Remove 1-2 shift valve retainer (Fig. 3).

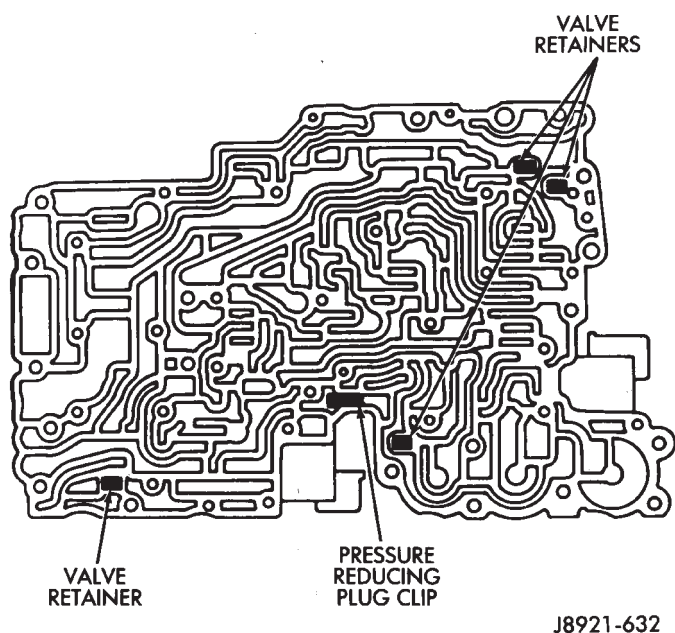


Fig. 2 Valve Retainer And Clip Location

(6) Remove 1-2 shift valve plug, valve spring and valve (Fig. 4).

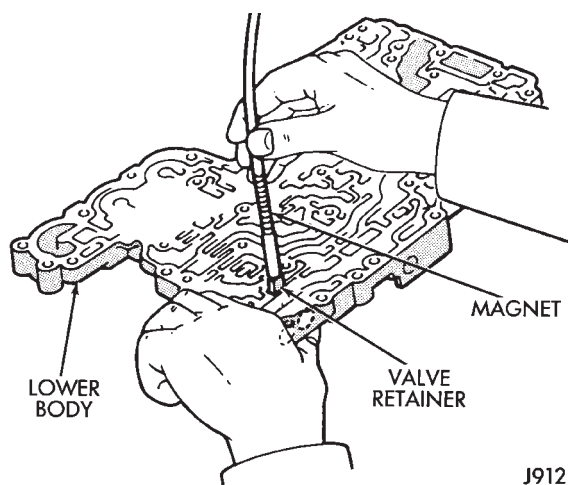


Fig. 3 Removing 1-2 Shift Valve Retainer

(7) Remove primary regulator valve as follows:

WARNING: THE PRIMARY REGULATOR VALVE SLEEVE AND PLUNGER ARE UNDER TENSION FROM THE VALVE SPRING. EXERT COUNTERPRESSURE ON THE SPRING WHILE REMOVING THE VALVE RETAINER TO PREVENT COMPONENTS FROM FLYING OUT.

(a) Note position of valve retainer for assembly reference (Fig. 5). Then press valve sleeve inward with your thumb and remove retainer with magnet.

(b) Slowly release thumb pressure on sleeve and remove sleeve, spring and washer and valve (Fig. 6). Use magnet to remove valve if necessary.

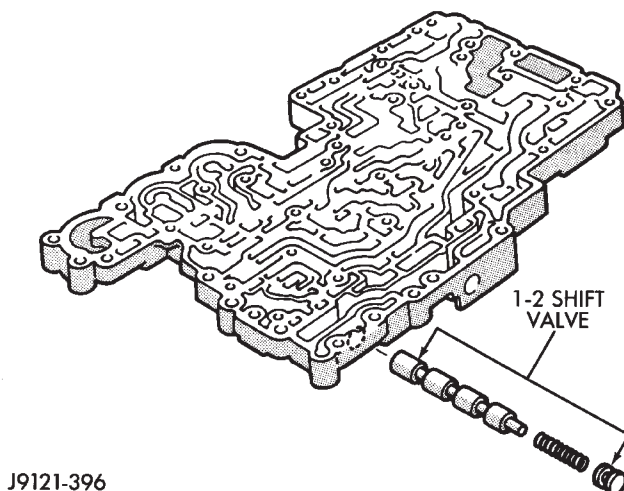


Fig. 4 Removing/Installing 1-2 Shift Valve

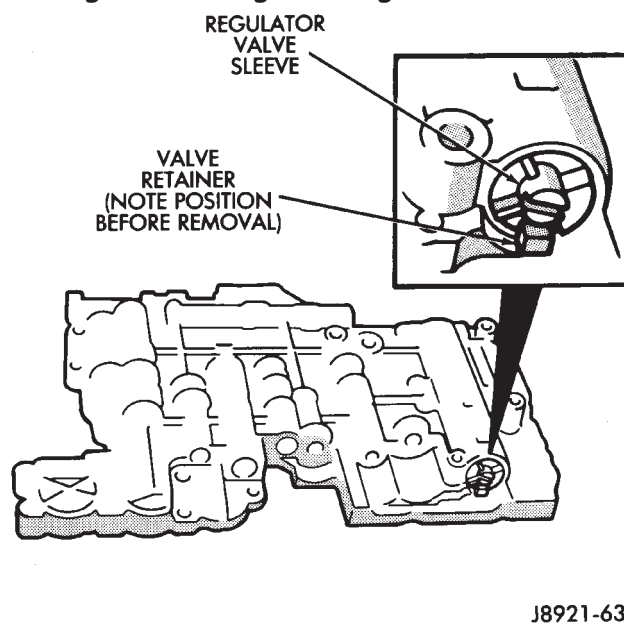


Fig. 5 Regulator Valve Retainer Position

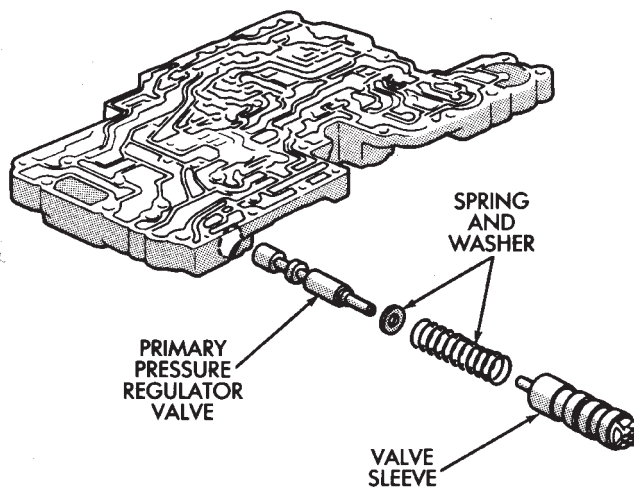
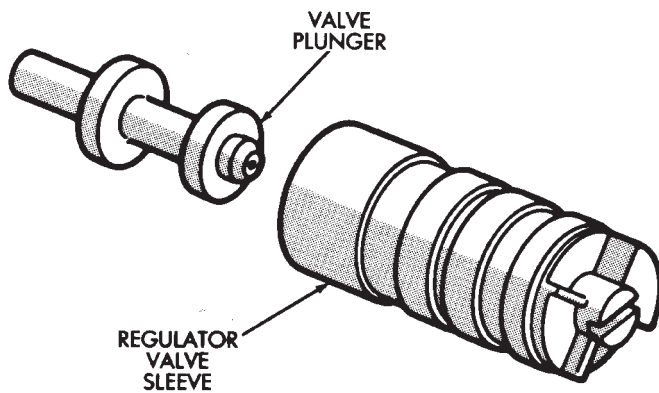


Fig. 6 Removing/Installing Primary Pressure Regulator Valve

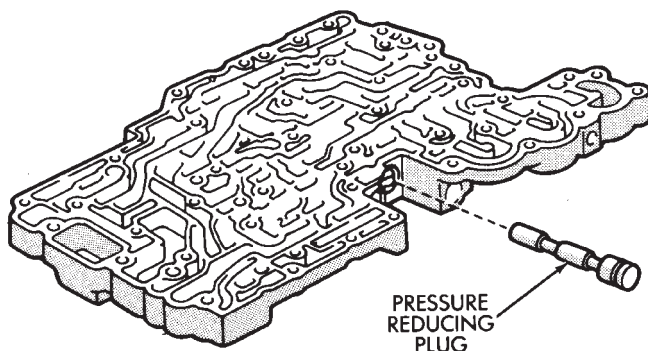
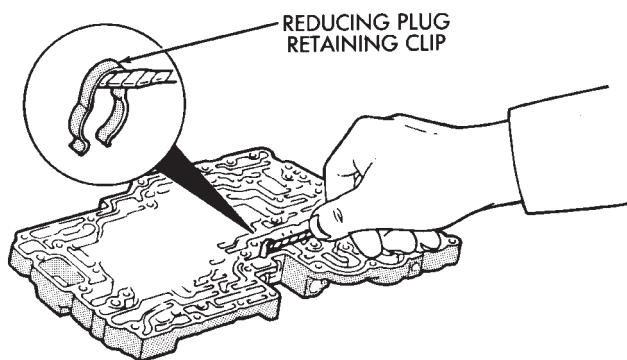
(8) Remove regulator valve plunger from sleeve (Fig. 7).



J8921-637

Fig. 7 Removing/Installing Regulator Valve Plunger

(9) Remove retaining clip and remove pressure reducing plug (Fig. 8). Cover screwdriver blade with tape to avoid scratching valve body surface.



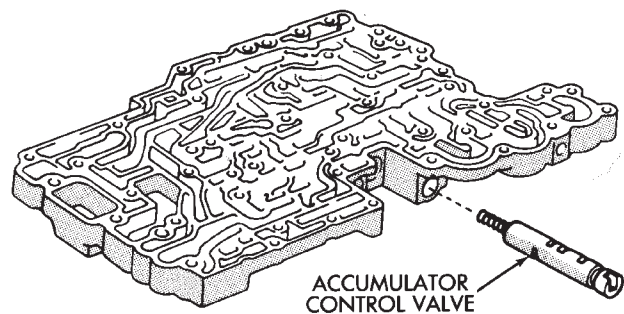
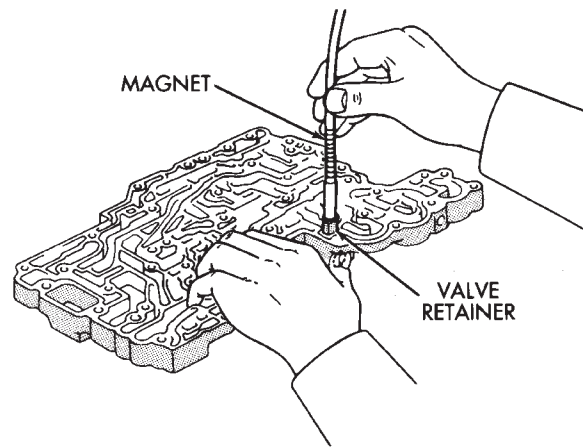
J8921-638

Fig. 8 Removing/Installing Pressure Reducing Plug

(10) Remove accumulator control valve retainer and remove control valve assembly (Fig. 9).

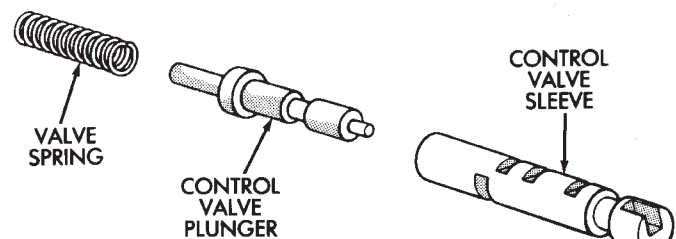
(11) Remove spring and control valve from valve sleeve (Fig. 10).

(12) Clean lower body valve components with solvent and dry them with compressed air only. Do not



J8921-639

Fig. 9 Removing/Installing Accumulator Control Valve Assembly



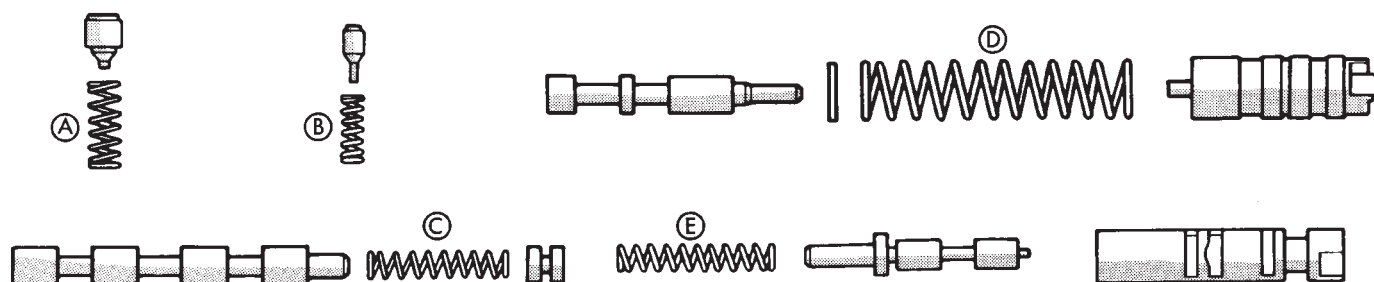
J8921-640

Fig. 10 Accumulator Control Valve Components

use shop towels or rags. Lint or foreign material from towels or rags can interfere with valve operation.

(13) Inspect condition of lower body components. Replace lower body if any bores are scored or corroded. Replace valves, plugs or sleeves that are scored or worn. Replace oil strainers if cut, torn or damaged in any way.

(14) Inspect valve body springs. Replace any spring having rusted, distorted, or collapsed coils. Measure length of each valve body spring. Replace any spring if free length is less than length specified in following chart (Fig. 11).



Spring	Free Length
(A) Check Valve	20.2 mm (0.801 in.)
(B) Pressure Relief Valve	11.2 mm (0.441 in.)
(C) 1-2 Shift Valve	30.8 mm (1.213 in.)
(D) Primary Regulator Valve	62.3 mm (2.453 in.)
(E) Accumulator Control Valve	29.8 mm (1.173 in.)

J9121-383

Fig. 11 Lower Body Valve Spring Dimensions

LOWER BODY ASSEMBLY

(1) Lubricate lower body components with automatic transmission fluid.

(2) Install spring and accumulator control valve in sleeve (Fig. 11). Then install assembled components in lower body (Fig. 9).

(3) Press accumulator control valve assembly into valve bore and install retainer (Fig. 9).

(4) Install pressure reducing plug in plug bore. Then secure plug with retaining clip (Fig. 8).

(5) Install washer on primary regulator valve plunger (Fig. 12).

(6) Install primary regulator valve plunger in valve sleeve (Fig. 7).

(7) Install valve spring and regulator valve sleeve and plunger.

(8) Press regulator valve sleeve into bore and install retainer (Fig. 5 and 6). Be sure retainer is positioned in sleeve lugs as shown.

(9) Install 1-2 shift valve, spring and plug (Fig. 4). Then press valve assembly into bore and install retainer.

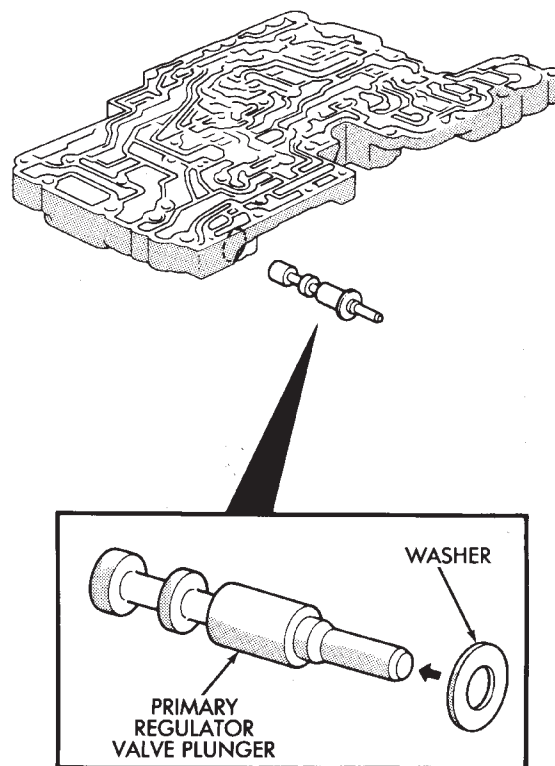
(10) Install replacement O-rings on solenoids and install solenoids on valve body. Tighten solenoid attaching bolts to 10 N•m (7 ft-lbs) torque.

(11) Install oil strainers (Fig. 13). **Identify strainers before installation. The three strainers are all the same diameter but are different lengths. Two strainers are 11.0 mm (0.443 in.) long while one strainer is 19.5 mm (0.76 in.) long (Fig. 14).**

(12) Install check valve and spring (Fig. 13).

(13) Install check ball and seat (Fig. 13).

(14) Install pressure relief valve and spring (Fig. 13).



J8921-642

Fig. 12 Installing Washer On Regulator Valve Plunger

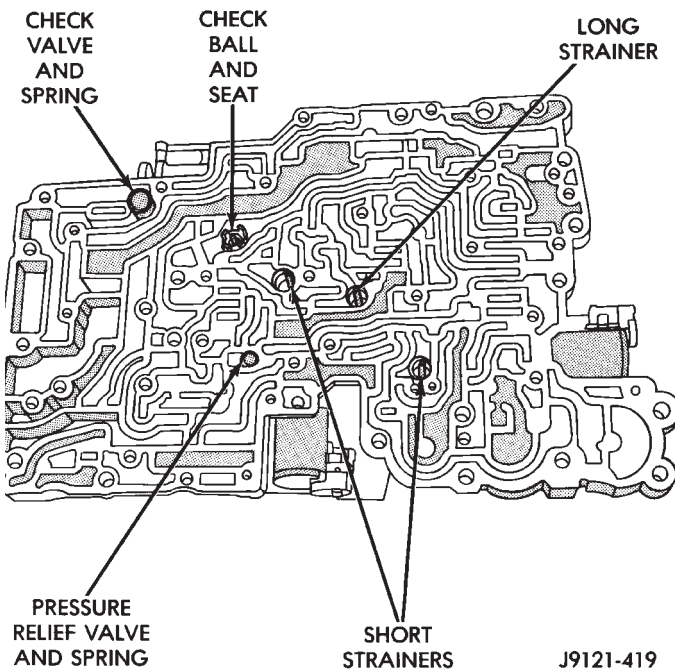
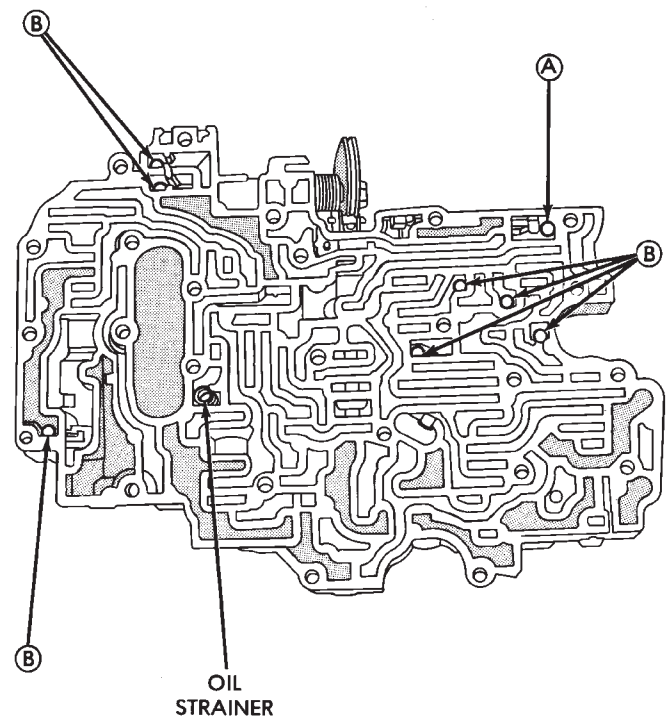


Fig. 13 Oil Strainer And Check Valve Installation

UPPER BODY DISASSEMBLY AND INSPECTION

(1) Remove valve body plate and gaskets (Fig. 1). Discard gaskets.



CHECK BALL	DIAMETER
(A)	6.35 mm (.250 in.)
(B)	5.535 mm (.218 in.)

J9121-415

Fig. 2 Check Ball And Strainer Location/Identification

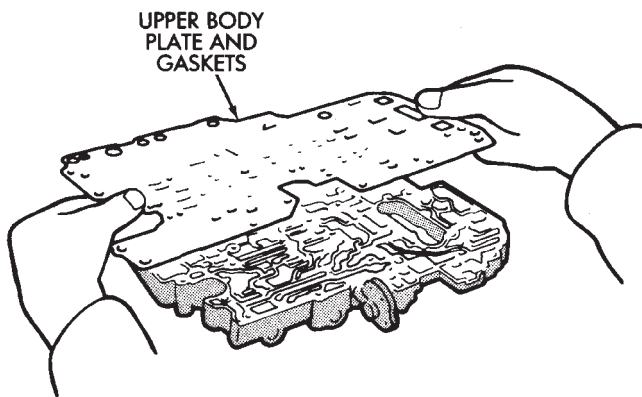


Fig. 1 Removing/Installing Upper Body Plate And Gaskets

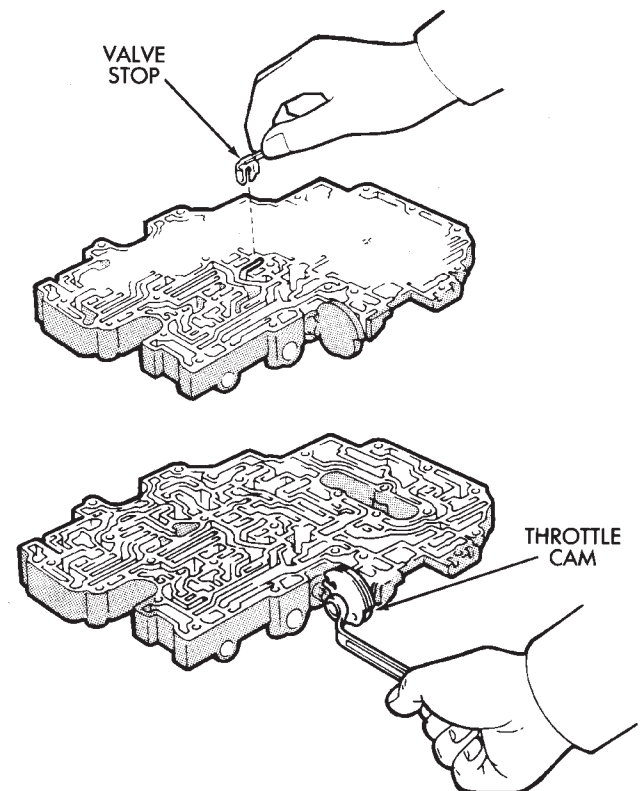
(2) Remove strainer and eight check balls (Fig. 2). Note check ball and strainer position for assembly reference.

(3) Remove valve stop and throttle cam (Fig. 3).

(4) Remove throttle valve pin with magnet and remove downshift plug, valve spring and throttle valve (Fig. 4).

(5) Turn upper body over and remove throttle valve adjusting rings and spring (Fig. 5). Note number of adjusting rings if valve is equipped with them.

(6) Remove 3-4 shift valve retainer with magnet and remove valve plug, spring and 3-4 shift valve (Fig. 6).



J8921-646

Fig. 3 Removing/Installing Valve Stop And Throttle Cam

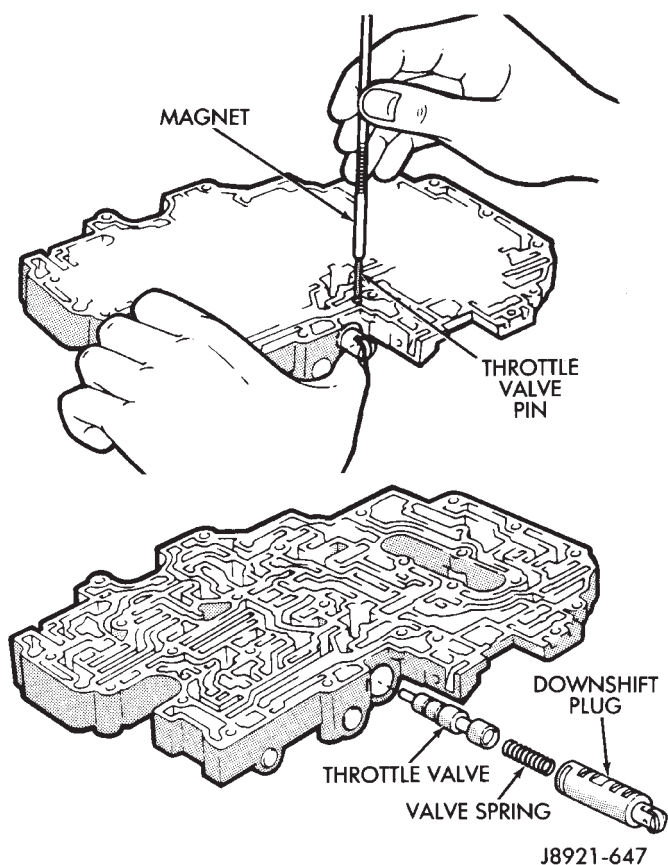


Fig. 4 Removing/Installing Throttle Valve

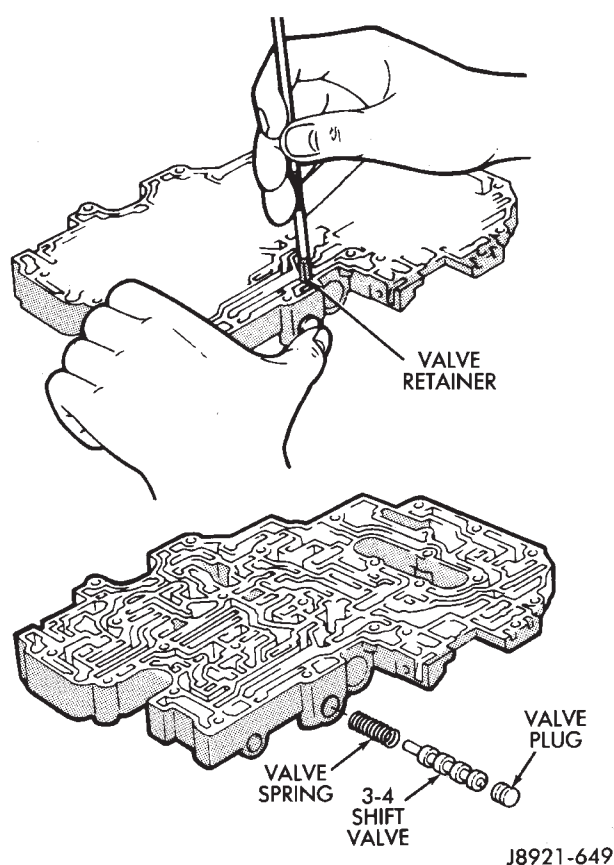


Fig. 6 Removing/Installing 3-4 Shift Valve

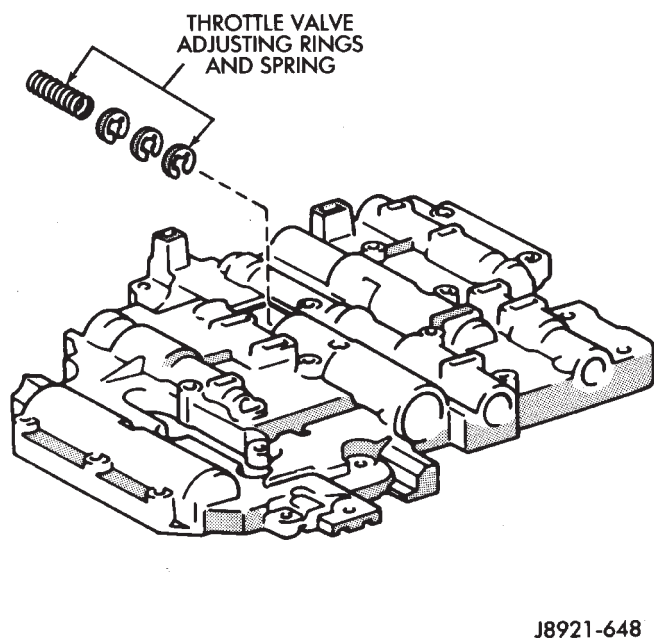


Fig. 5 Throttle Valve Adjusting Ring Location (If Equipped)

(7) Remove second coast modulator valve retainer and remove valve plug, spring and valve.

(8) Remove lock-up relay valve retainer and remove relay valve and sleeve assembly (Fig. 8).

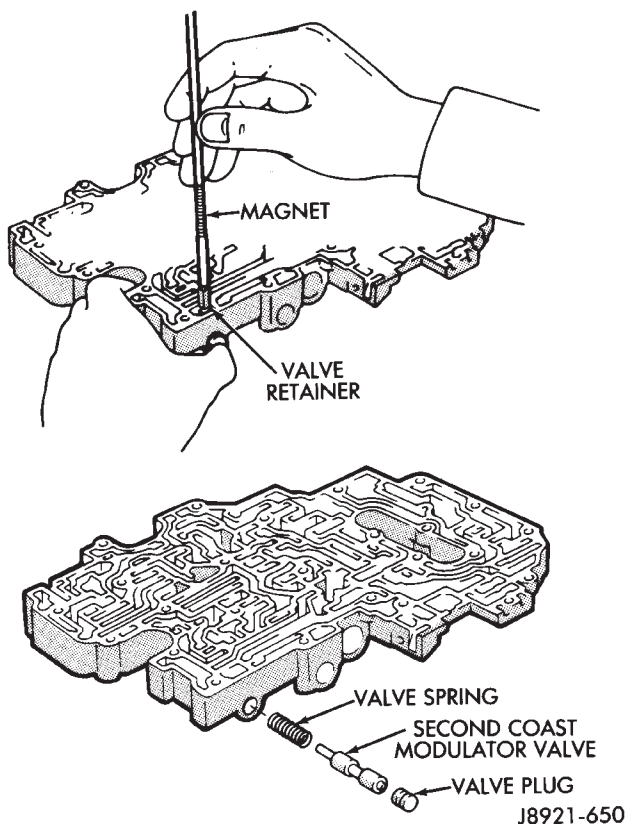
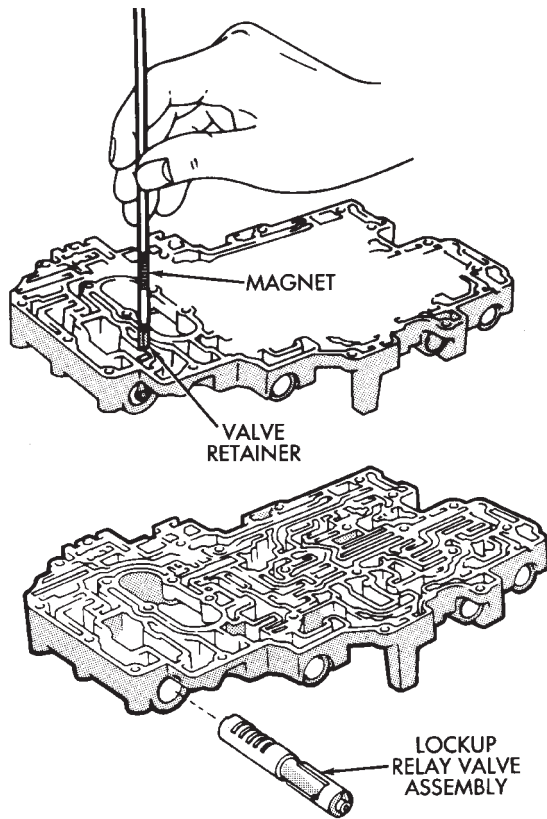
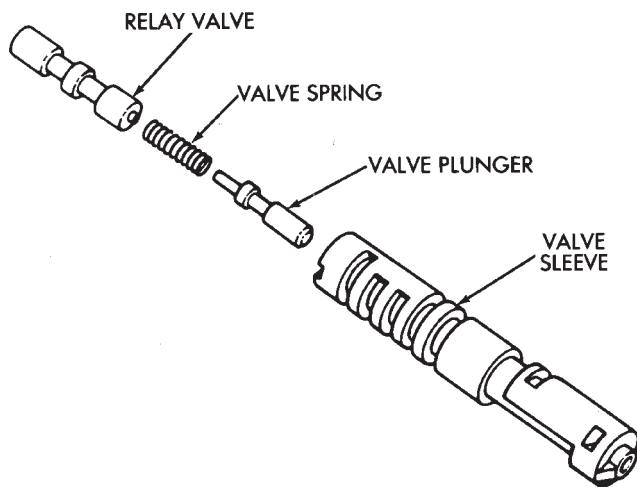


Fig. 7 Removing/Installing Second Coast Modulator Valve



J8921-651

Fig. 8 Removing/Installing Converter Clutch Relay Valve

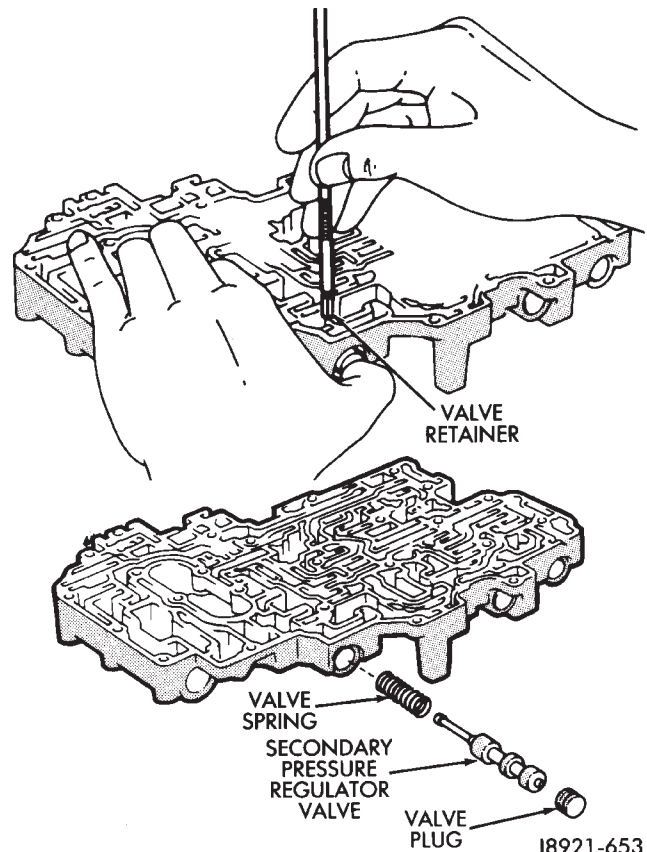


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Fig. 9 Relay Valve Components

(9) Remove relay valve, spring and plunger from valve sleeve (Fig. 9).

(10) Remove secondary pressure regulator valve retainer and remove plug, regulator valve and spring (Fig. 10).



J8921-653

Fig. 10 Removing/Installing Secondary Pressure Regulator Valve

(11) Remove cut-back valve retainer and remove plug, cut-back valve and spring (Fig. 11).

(12) Remove 2-3 shift valve retainer and remove plug, spring and 2-3 shift valve (Fig. 12).

(13) Remove low coast modulator valve retainer and remove valve plug, spring and low coast modulator valve (Fig. 13).

(14) Clean the upper body components with solvent and dry them with compressed air only. Do not use shop towels or rags. Lint or foreign material from towels or rags can interfere with valve operation.

(15) Inspect condition of the upper body components. Replace the upper body if any of the bores are scored or corroded. Replace any valves, plugs or sleeves if scored or worn. Replace the oil strainer if cut, torn or damaged in any way.

(16) Inspect the valve body springs. Replace any spring having rusted, distorted, or collapsed coils. Measure length of each spring. Replace any spring if free length is less than specified in the chart (Fig. 14).

UPPER BODY ASSEMBLY

(1) Lubricate the valves, springs, plugs, sleeves and the valve bores in the upper body with automatic transmission fluid.

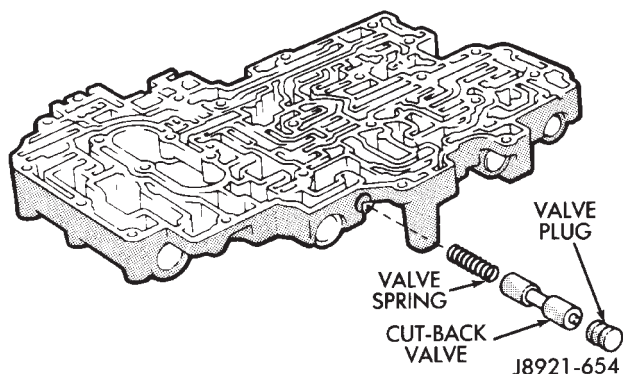
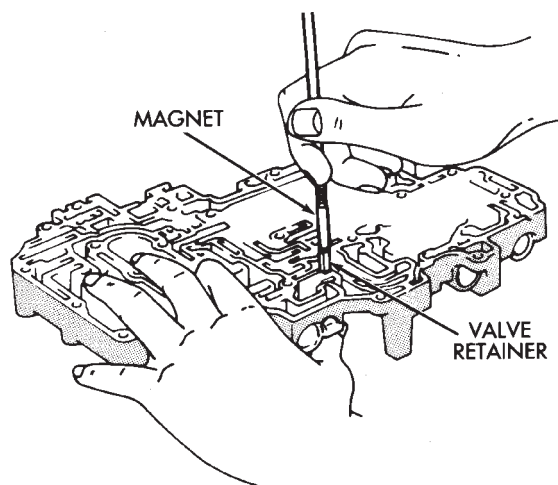


Fig. 11 Removing/Installing Cut-Back Valve

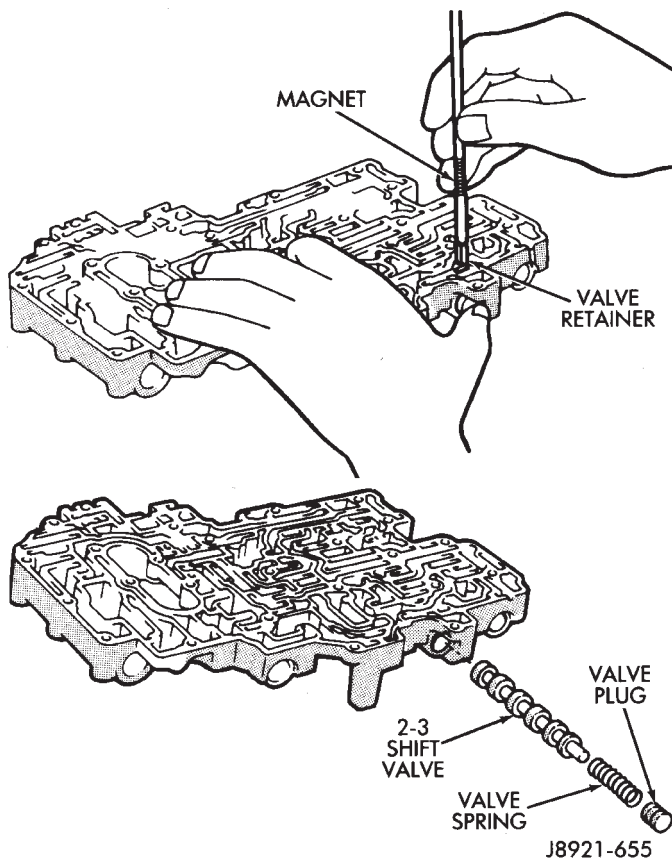


Fig. 12 Removing/Installing 2-3 Shift Valve

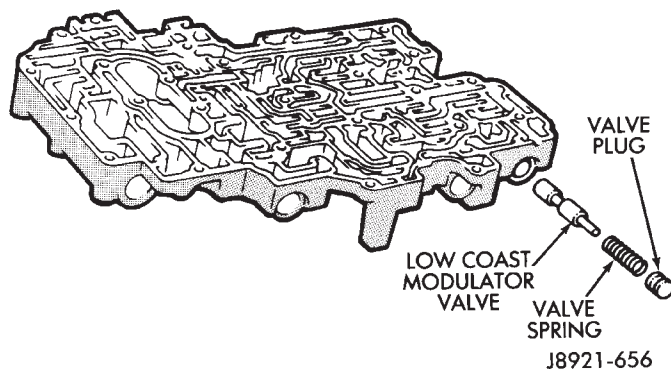
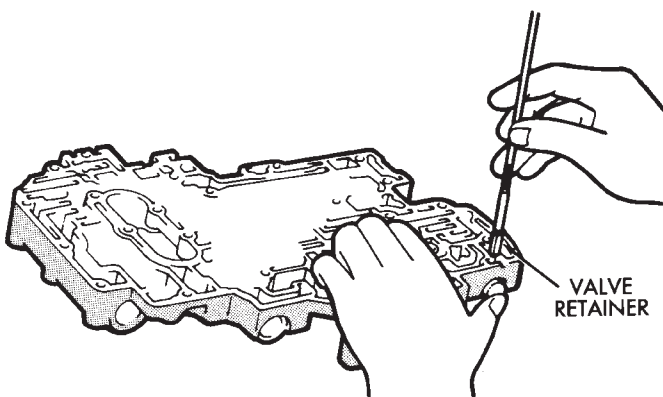


Fig. 13 Removing/Installing Low Coast Modulator Valve

(2) Note position of the valve retainers (A) and stop (B) for assembly reference (Fig. 15).

(3) Install low coast modulator valve, spring and plug in valve bore. Press valve plug inward and install retainer (Fig. 13).

(4) Install 2-3 shift valve, spring and plug in valve bore. Press plug inward and install retainer (Fig. 12).

(5) Install cut-back valve spring, valve and plug (Fig. 11). Press plug inward and install retainer.

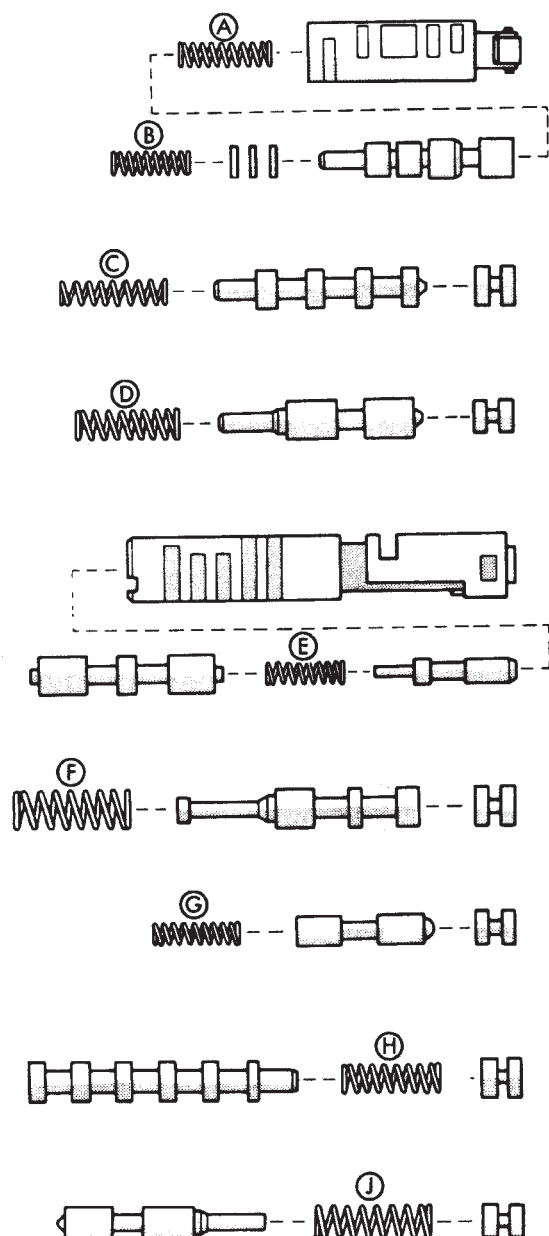
(6) Install secondary regulator valve spring, valve and plug in valve bore. Press plug inward and install retainer (Fig. 10).

(7) Assemble lock-up relay valve. Install spring and plunger in valve sleeve (Fig. 9). Then install assembled valve in sleeve.

(8) Install assembled lock-up relay valve in valve bore and install retainer (Fig. 8).

(9) Install second coast modulator valve, spring and plug in valve bore. Press plug inward and install retainer (Fig. 7).

(10) Install 3-4 shift valve, spring and plug in bore. Press plug inward and install retainer (Fig. 6).



Spring	Free Length
(A) Downshift Plug	27.3 mm (1.074 in.)
(B) Throttle Valve	20.6 mm (0.811 in.)
(C) 3-4 Shift Valve	30.8 mm (1.212 in.)
(D) Second Coast Modulator Valve	25.3 mm (0.996 in.)
(E) Lockup Relay Valve	21.4 mm (0.843 in.)
(F) Second Regulator Valve	30.9 mm (1.217 in.)
(G) Cut-Back Valve	21.8 mm (0.858 in.)
(H) 2-3 Shift Valve	30.8 mm (1.212 in.)
(J) Low Coast Modulator Valve	27.8 mm (1.094 in.)

J8921-657

Fig. 14 Upper Body Spring/Valve Identification

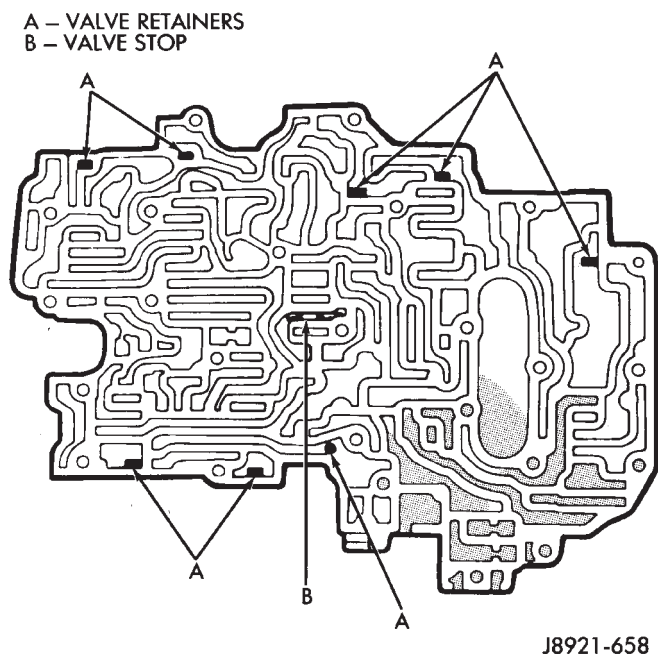


Fig. 15 Valve Retainer And Stop Locations

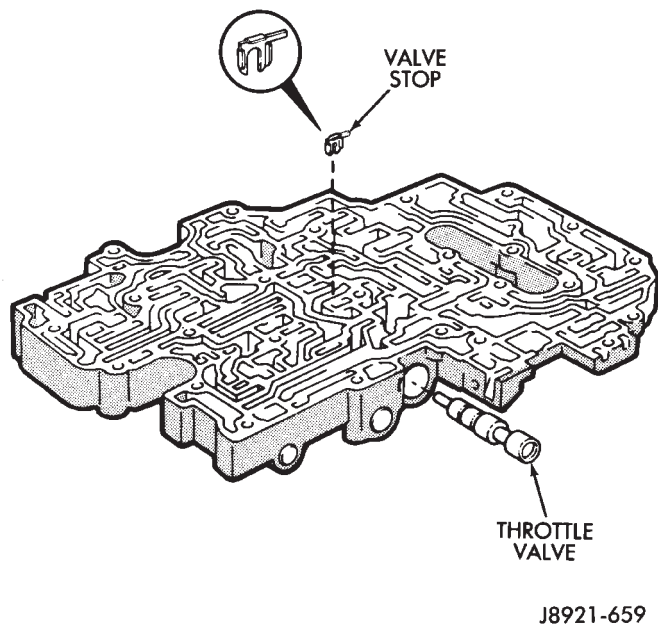


Fig. 16 Installing Throttle Valve And Stop

(11) Install throttle valve in valve bore. Push valve into place and install valve stop (Fig. 16).

(12) On models with adjusting rings, turn upper body over and install adjusting rings (Fig. 17). Be sure to install same number of rings as were removed.

(13) Install throttle valve adjusting spring in bore and onto end of throttle valve (Fig. 18).

(14) Install downshift spring and plug in throttle valve bore. Press plug inward against throttle valve and spring and install retainer pin (Fig. 19).

(15) Install sleeve in throttle cam (Fig. 20).

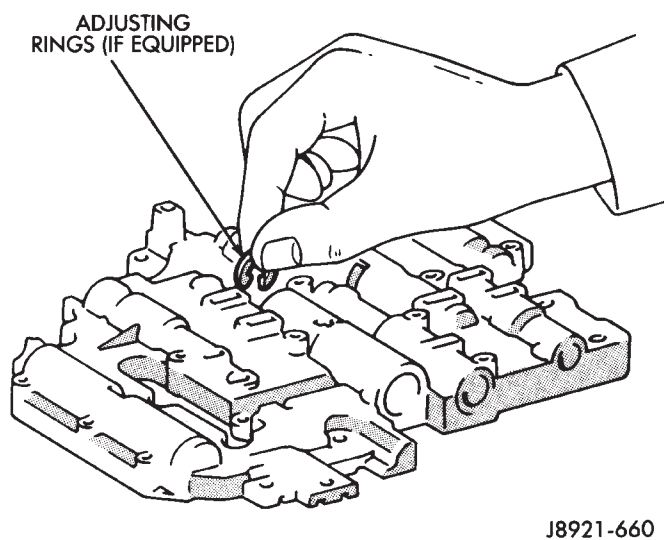


Fig. 17 Install Throttle Valve Adjusting Rings (If Equipped)

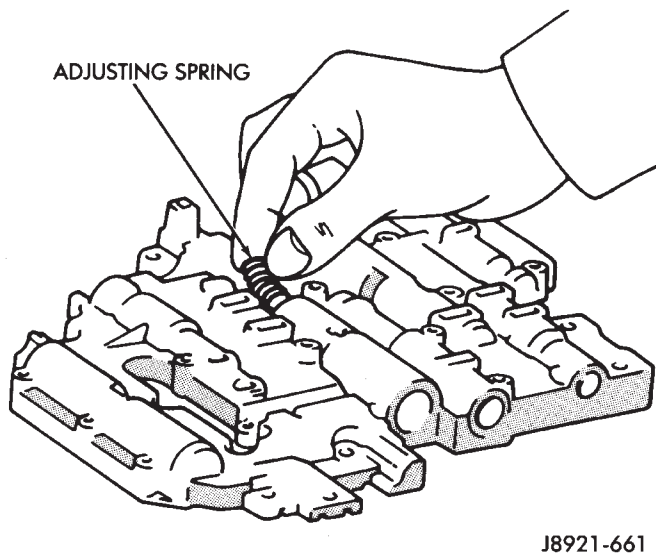


Fig. 18 Installing Throttle Valve Adjusting Spring

(16) Install spring on cam (Fig. 20). Hook curved end of spring through hole in cam as shown.

(17) Mount cam on upper body and install cam attaching bolt and spacer (Fig. 20). Tighten bolt to 10 N•m (7 ft. lbs.) torque.

(18) Be sure straight end of spring is seated in upper body slot as shown (Fig. 20).

(19) Install check balls in upper body (Fig. 2).

(20) Install oil strainer (Fig. 2).

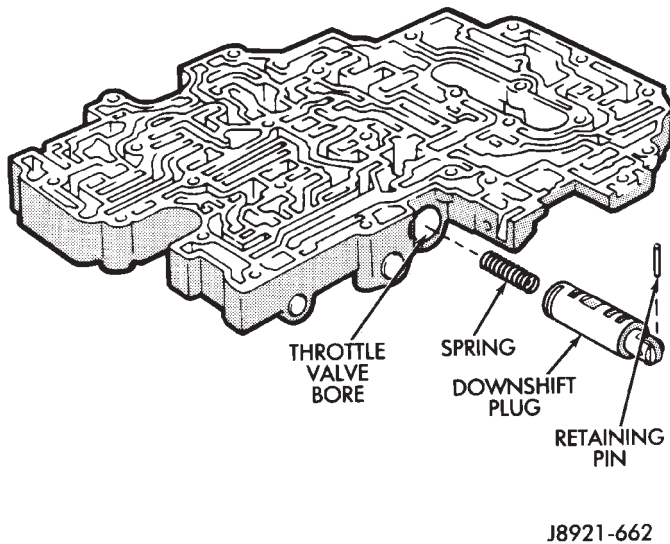


Fig. 19 Installing Downshift Plug

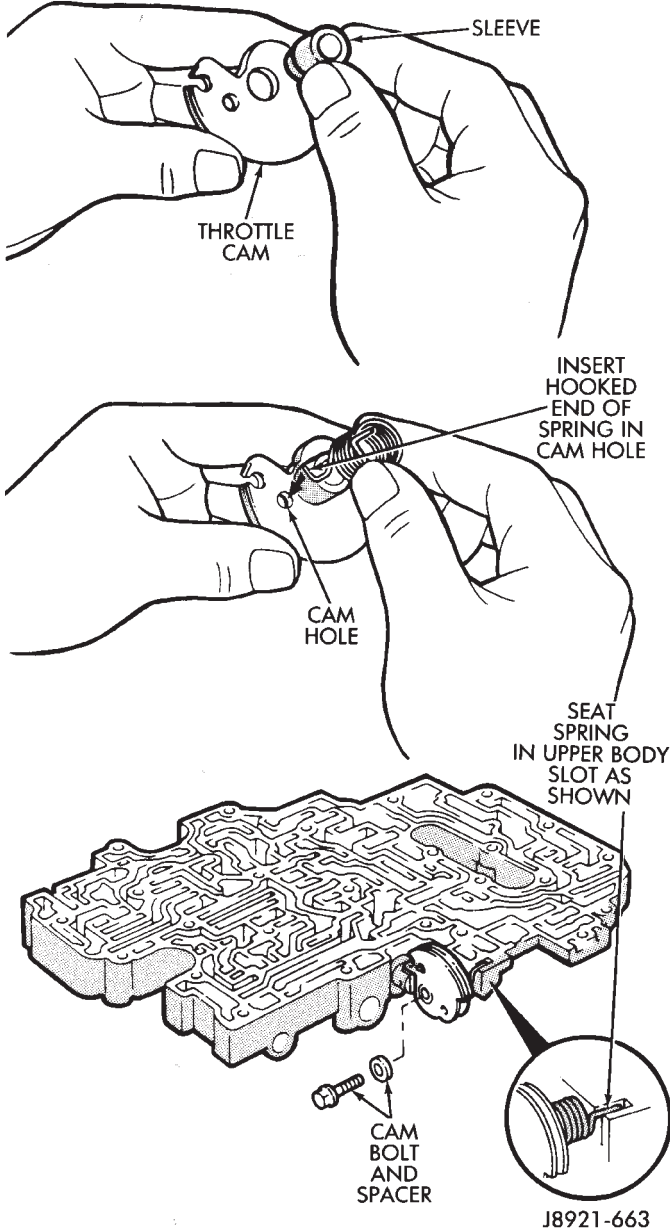


Fig. 20 Installing Throttle Cam

INSTALLING UPPER BODY ON LOWER BODY

If valve body was equipped with gaskets, start at step (1). However, if valve body was NOT equipped with gaskets, start at step (4).

- (1) Position new No. 1 gasket (Fig. 1) on upper body.
- (2) Position valve body plate on No. 1 gasket.
- (3) Position new No. 2 gasket (Fig. 2) on valve body plate and align gaskets and plate using bolt holes as guides.

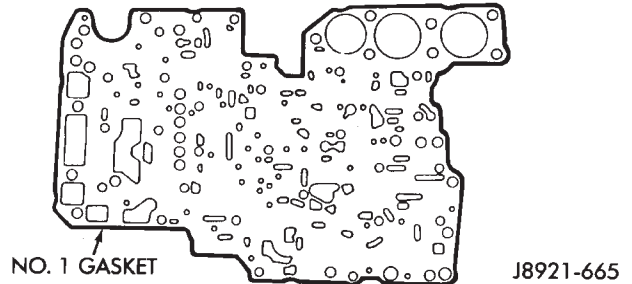


Fig. 1 Valve Body Gasket No. 1

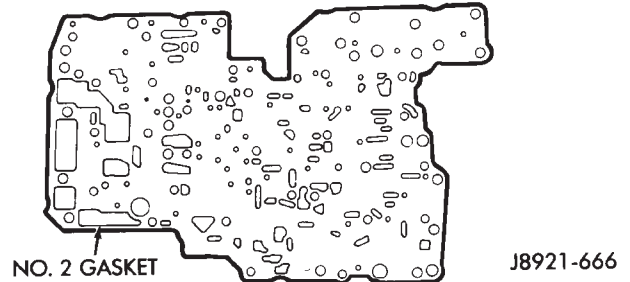


Fig. 2 Valve Body Gasket No. 2

- (4) Install valve body bolts. Three different length bolts are used. Refer to the Figure 3 for bolt locations. Chart symbols indicate bolt location and length in millimeters.

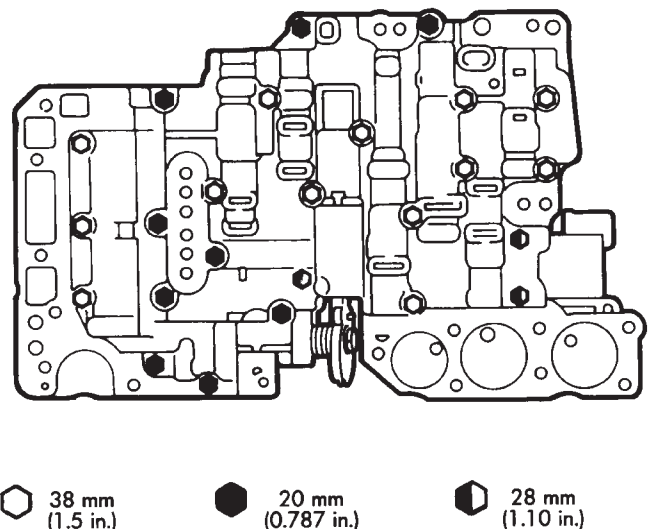


Fig. 3 Valve Body Bolt Location/Size

J8921-667

(5) Tighten valve body bolts to 6.4 N•m (56 in. lbs.) torque.

(6) Install manual valve (Fig. 4).

(7) Install two-piece detent spring (Fig. 5). Tighten spring attaching bolt to 10 N•m (7 ft. lbs.) torque.

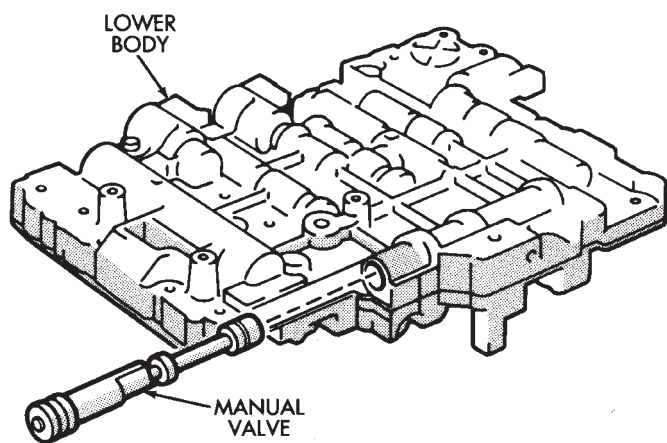


Fig. 4 Installing Manual Valve

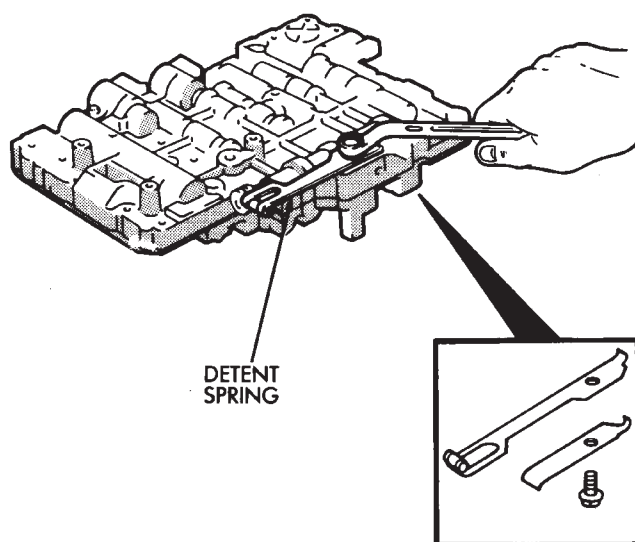
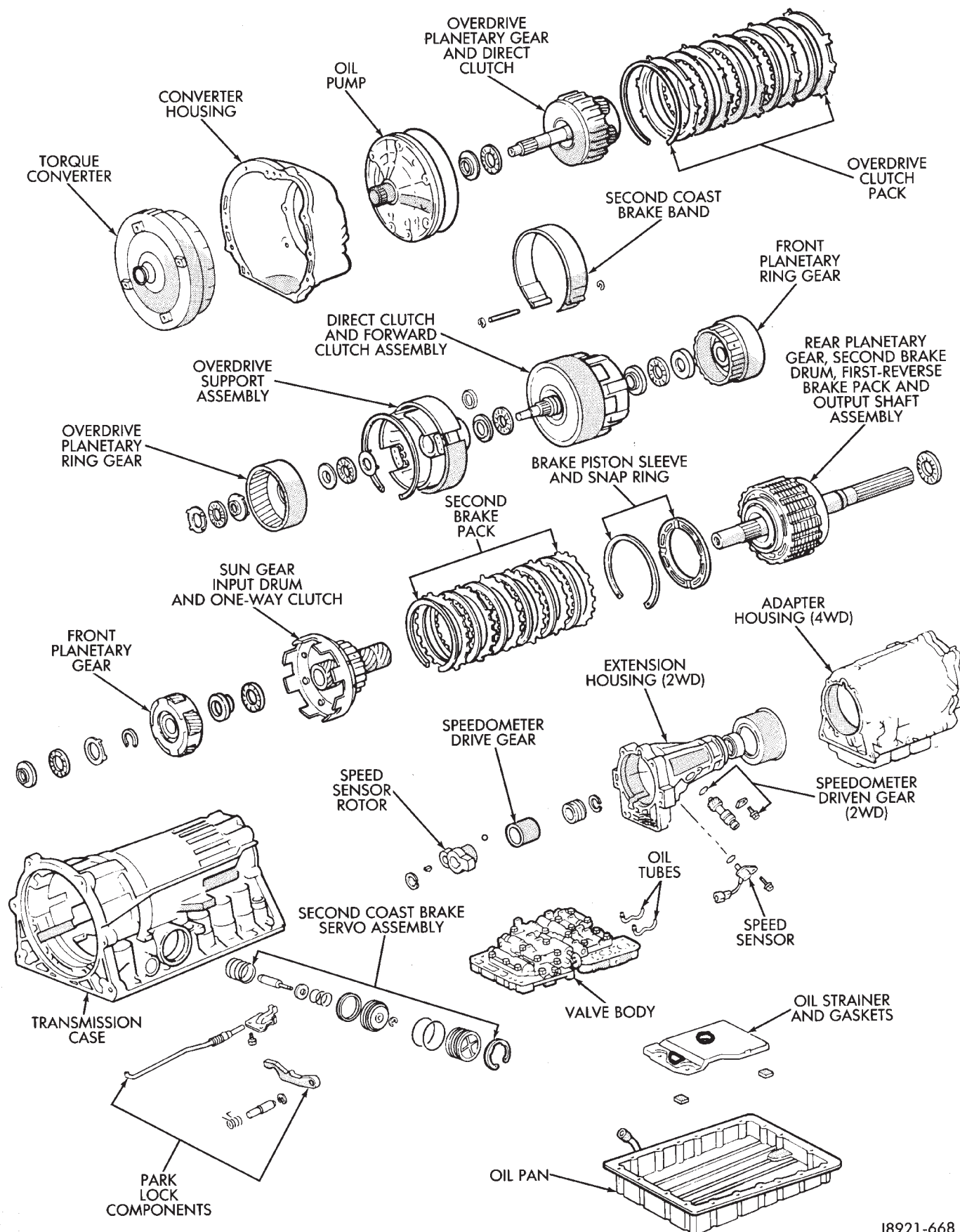
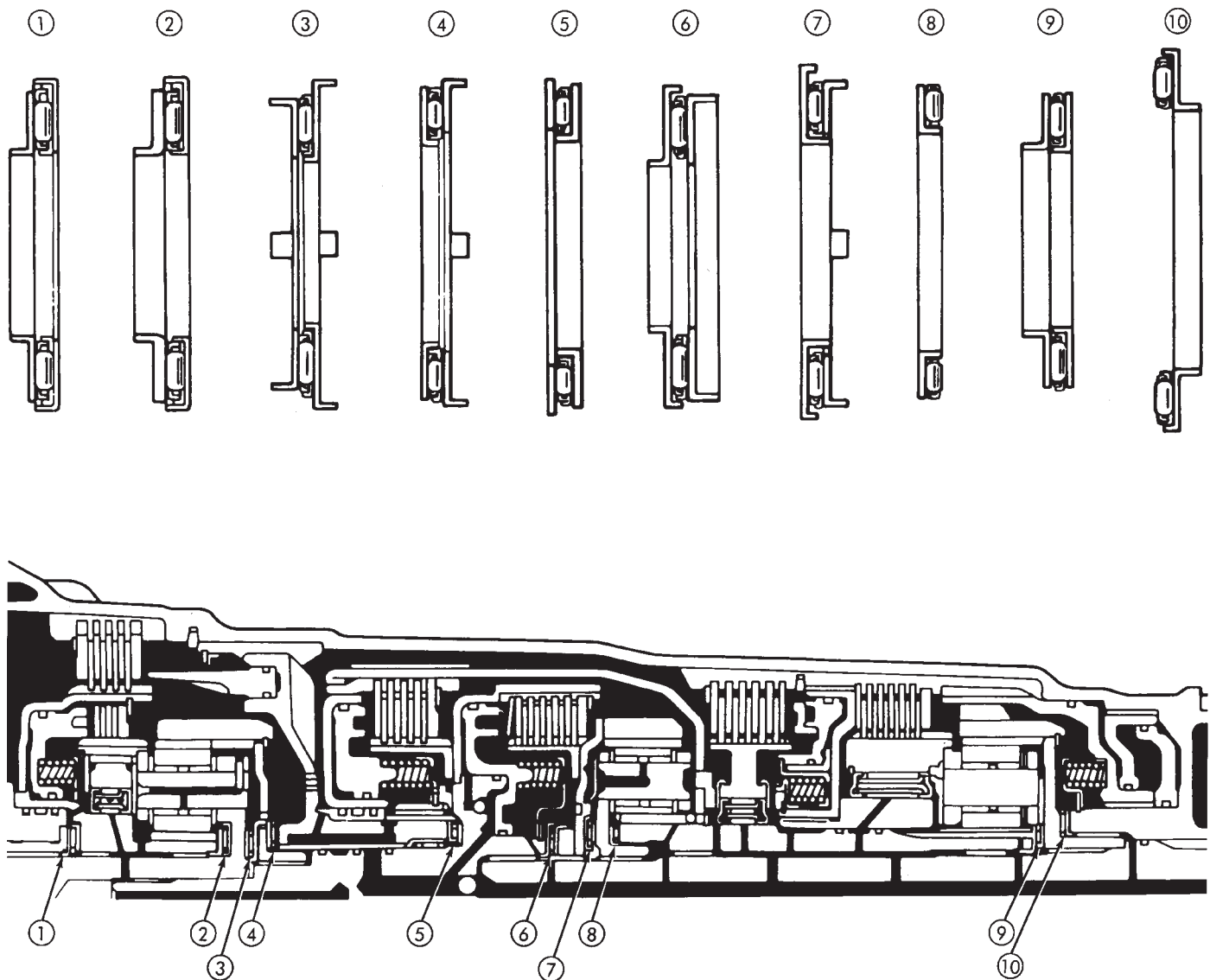


Fig. 5 Installing Detent Spring



J8921-668

Fig. 1 AW-4 Transmission Components



J8921-669

Fig. 2 Thrust Bearing Chart**TRANSMISSION ASSEMBLY AND ADJUSTMENT**

(1) Lubricate components with transmission fluid or petroleum jelly as indicated during reassembly.

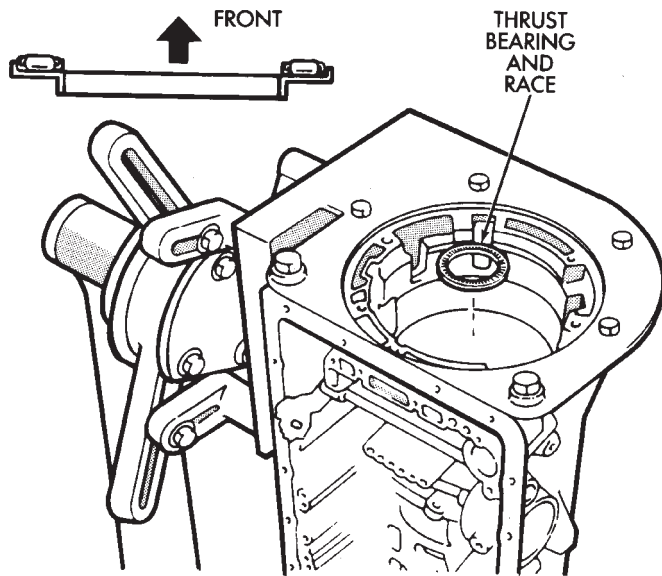
(2) Separate any transmission sub-assemblies that are still temporarily assembled for overhaul testing/checking procedures.

(3) Verify thrust bearing and race installation during assembly. Refer to the Thrust Bearing Chart (Fig. 2) for bearing and race location and correct positioning.

(4) Install rear planetary gear, second brake drum and output shaft as outlined in following steps:

(5) Verify No. 10 thrust bearing and race (Fig. 2). Bearing and race outer diameter is 57.7 mm (2.272 in.) and inside diameter is 39.2 mm (1.543 in.).

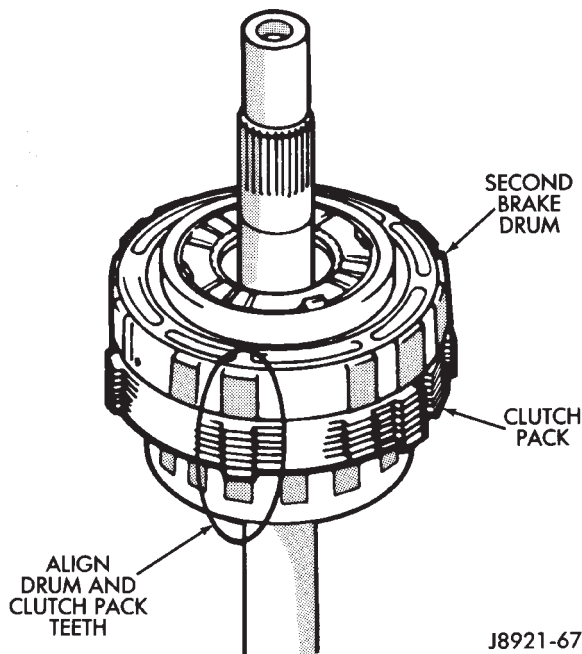
(6) Coat thrust bearing and race assembly with petroleum jelly and install in case (Fig. 3). Race faces down. Bearing rollers face up.



J8921-670

Fig. 3 Installing Thrust Bearing And Race (No. 10)

(7) Align teeth of second brake drum and clutch pack (Fig. 4).

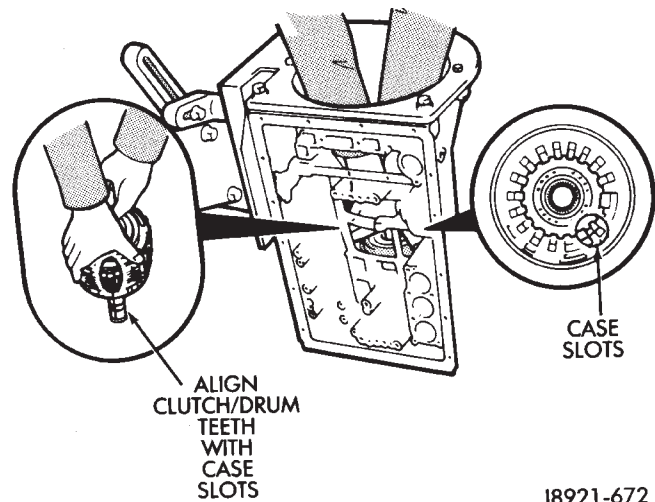


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Fig. 4 Aligning Second Brake Drum And Clutch Pack Teeth

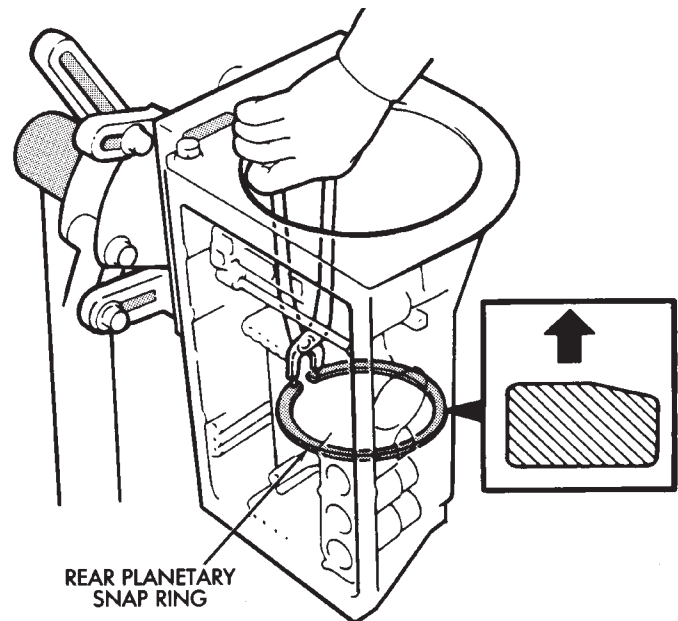
(8) Align rear planetary-output shaft assembly teeth with case slots and install assembly in case (Fig. 5).

(9) Install rear planetary snap ring with snap ring pliers. Chamfered side of snap ring faces up and toward case front (Fig. 6).



J8921-672

Fig. 5 Installing Output Shaft And Rear Planetary Assembly



J8921-673

Fig. 6 Installing Planetary Snap Ring

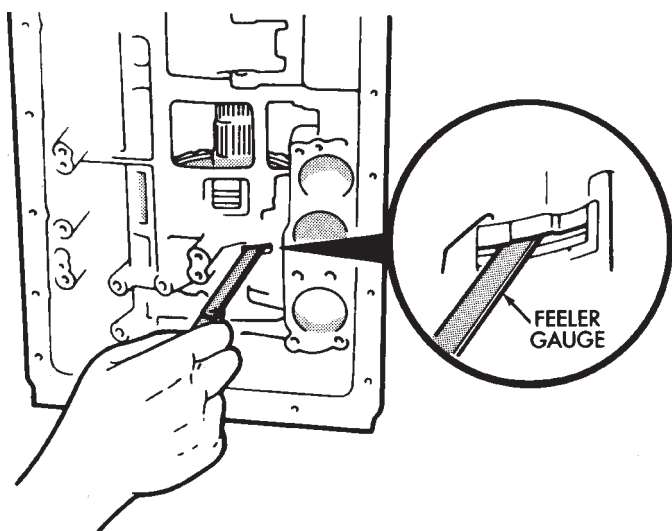
(10) Check first-reverse brake pack clearance with feeler gauge. Clearance should be 0.70 - 1.20 mm (0.028 - 0.047 in.). If clearance is incorrect, planetary assembly, thrust bearing or snap ring is not properly seated in case. Remove and reinstall components if necessary.

(11) Install second brake piston sleeve (Fig. 8). Sleeve lip faces up and toward case front as shown.

(12) Install second brake drum gasket with Installer Tool 7544 (Fig. 9). Gasket depth is 43.7 mm (1.720 in.).

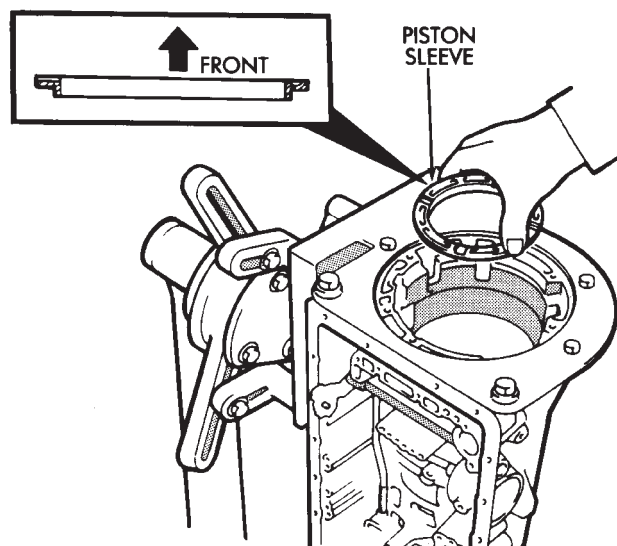
(13) Install park lock pawl, spring and pin (Fig. 10).

(14) Connect park lock rod to manual valve shift sector (Fig. 11).



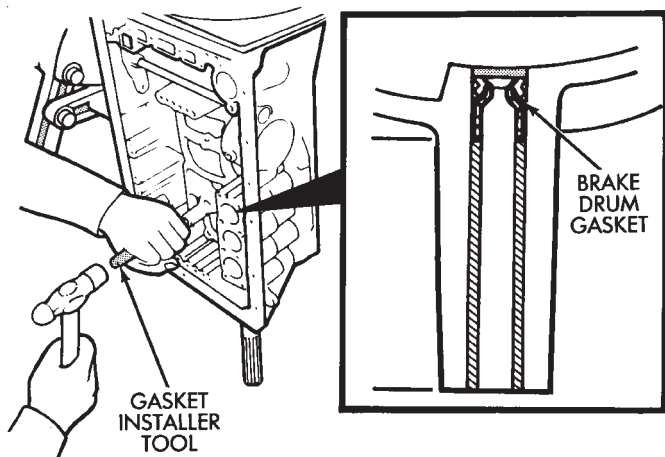
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Fig. 7 Checking First-Reverse Brake Pack Clearance



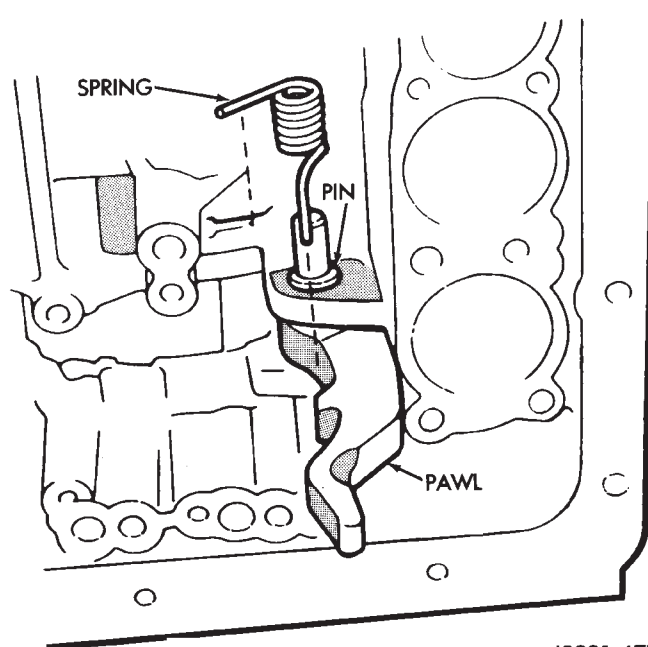
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Fig. 8 Installing Second Brake piston Sleeve



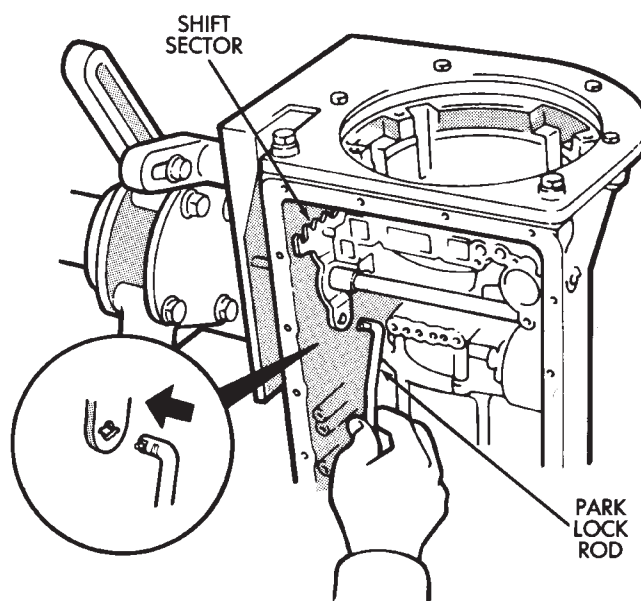
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Fig. 9 Installing Second Brake Drum Gasket



J8921-677

Fig. 10 Installing Park Lock Pin, Spring And Pawl



J8921-678

Fig. 11 Installing Park Lock Rod

(15) Position park lock rod bracket on case and tighten bracket attaching bolts to 10 N•m (7 ft. lbs.) torque (Fig. 12).

(16) Verify park lock operation. Move shift sector to Park position. Park pawl should be firmly engaged (locked) in planetary ring gear (Fig. 13).

(17) Install No. 1 one-way clutch (Fig. 14). Short flanged side of clutch faces up and toward case front.

(18) Install second brake pack (Fig. 15). Install disc then plate. Continue installation sequence until correct number of discs-plates are installed. Use five discs and five plates.

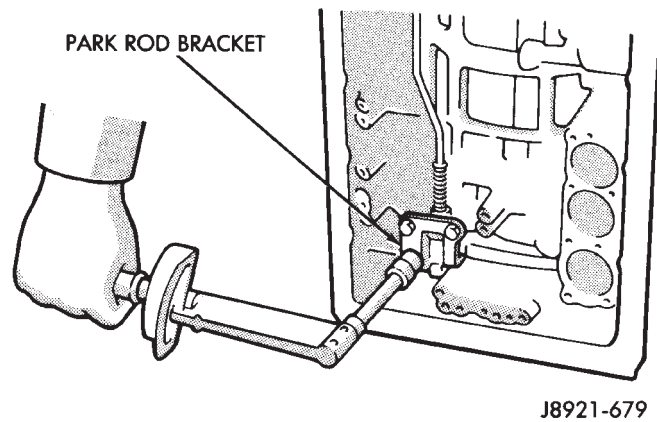


Fig. 12 Installing Park Rod Bracket

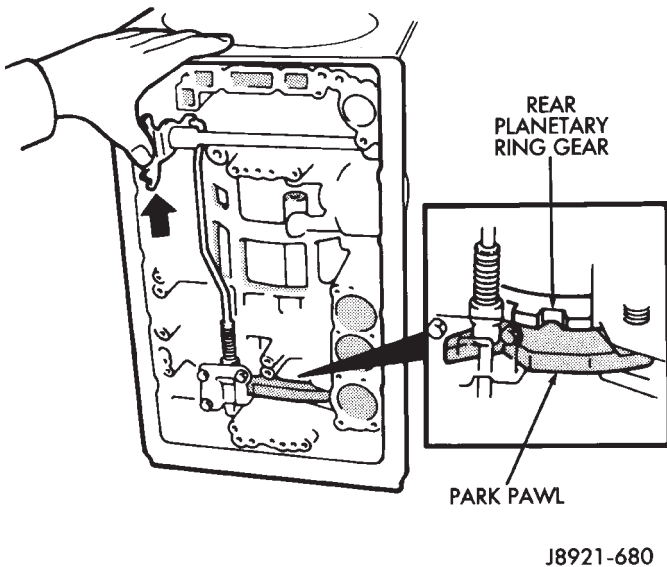


Fig. 13 Checking Park Pawl Engagement

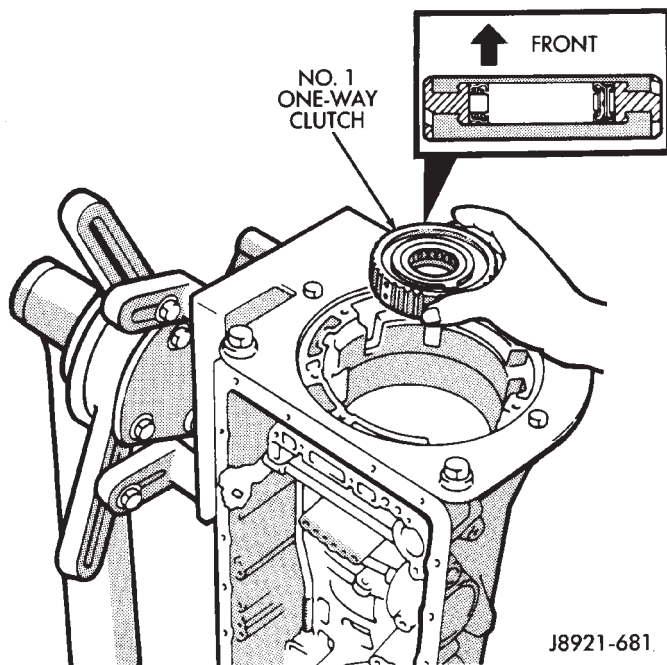


Fig. 14 Installing No. 1 One-Way Clutch

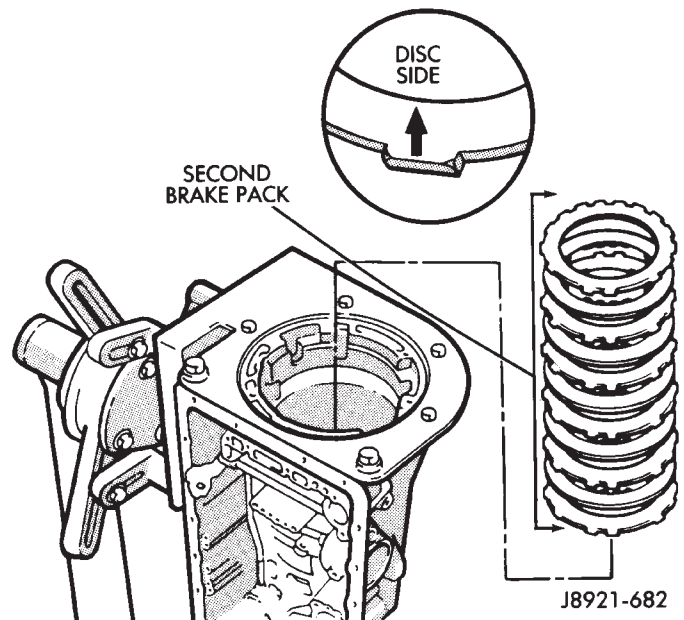


Fig. 15 Installing Second Brake Pack

(19) Install second brake pack retainer with rounded edge of retainer facing disc.

(20) Install second brake pack snap ring.

(21) Check brake pack clearance with feeler gauge (Fig. 16). 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.

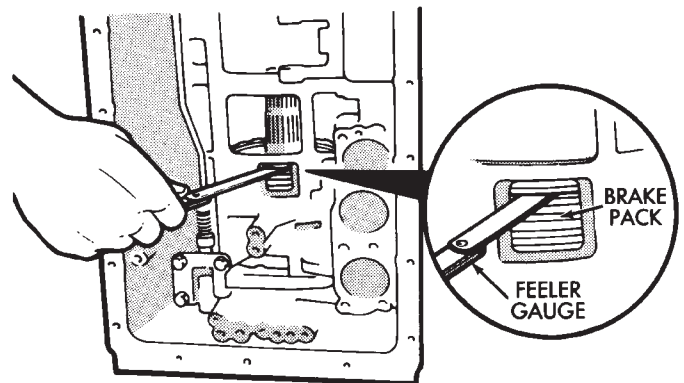


Fig. 16 Checking Second Brake Pack Clearance

(22) Install planetary sun gear and input drum (Fig. 17). Be sure drum thrust washer tabs are seated in drum. Use petroleum jelly to hold thrust washer in position if necessary.

(23) Install front planetary gear on sun gear (Fig. 18).

(24) Support output shaft with wood blocks (Fig. 19).

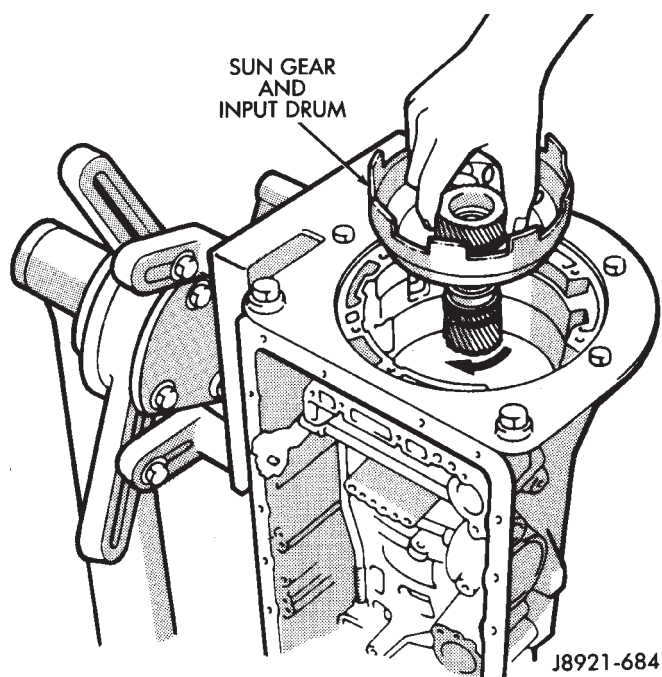


Fig. 17 Installing Sun Gear And Input Drum

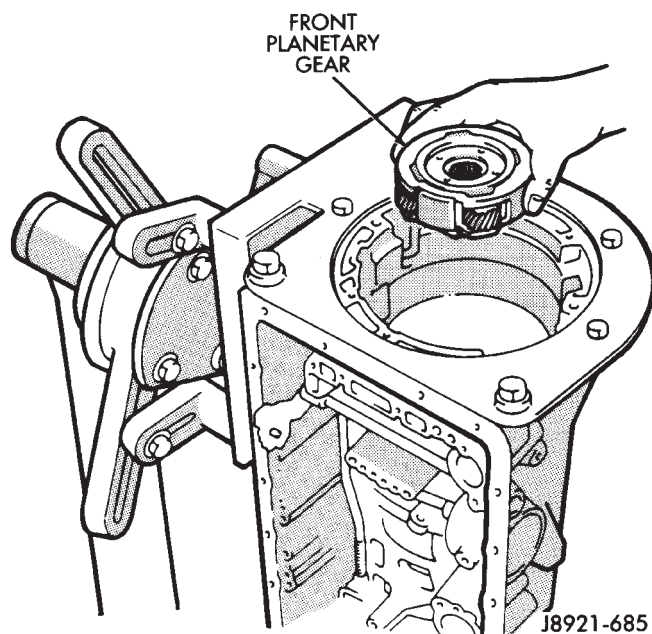


Fig. 18 Installing Front Planetary Gear

(25) Install planetary snap ring on sun gear with snap ring plier tool 7541 (Fig. 20).

(26) Install tabbed thrust race on front planetary gear (Fig. 21). 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.).

(27) Install second coast brake band (Fig. 22).

(28) Install pin in second coast brake band. Then install retaining ring on pin (Fig. 23).

(29) Install thrust bearing and race in forward-direct clutch (Fig. 24). Coat bearing/race with petroleum jelly to hold them in place.

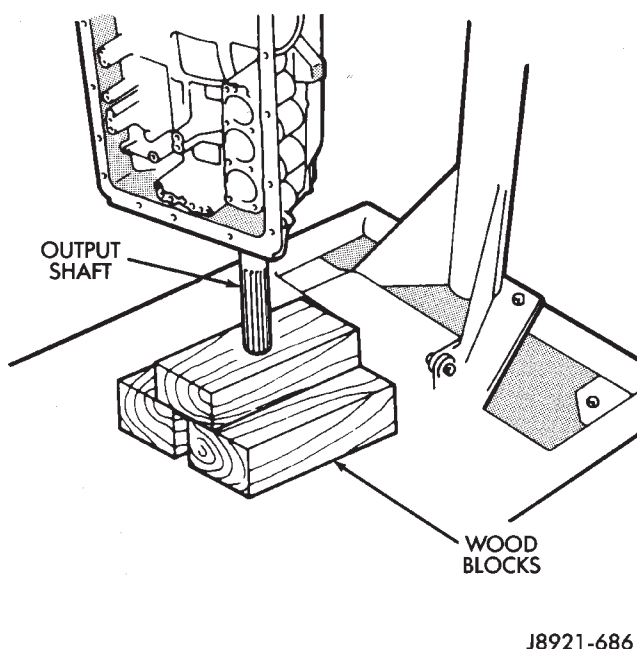


Fig. 19 Supporting Output Shaft

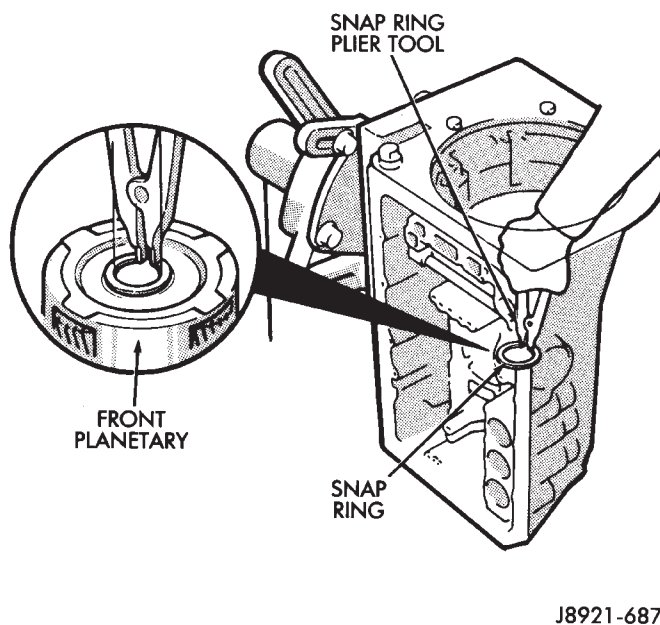


Fig. 20 Installing Front Planetary Snap Ring

(30) 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.).

(31) Coat front planetary ring gear race with petroleum jelly and install it in ring gear (Fig. 25).

(32) Verify ring gear race size. Outer diameter is 47.0 mm (1.850 in.) and inside diameter is 26.5 mm (1.045 in.).

(33) Align forward-direct clutch disc splines with screwdriver (Fig. 26).

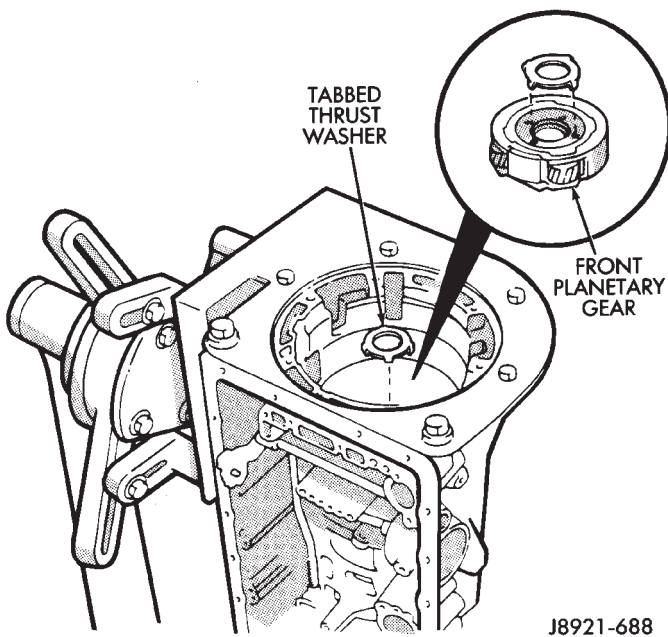


Fig. 21 Installing Planetary Thrust Race

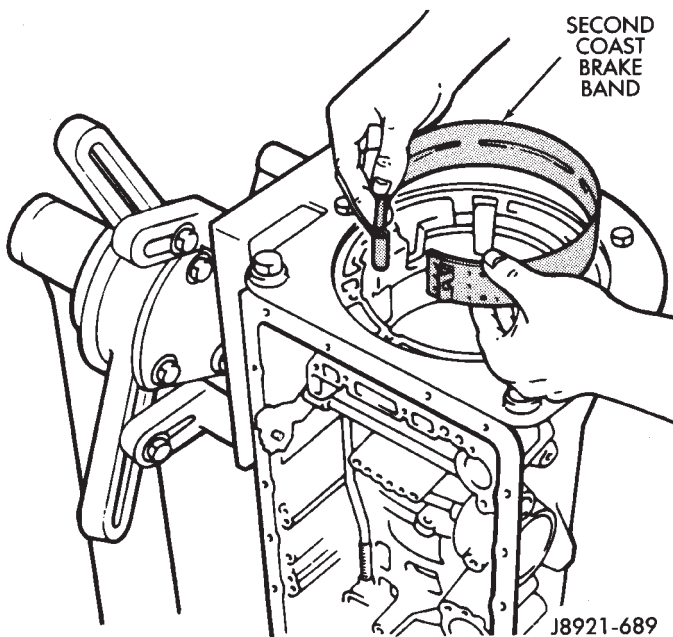


Fig. 22 Installing Second Coast Brake Band

(34) Align and install front planetary ring gear in forward-direct clutch (Fig. 27).

(35) Coat bearing and race with petroleum jelly and install them in ring gear (Fig. 28). Verify bearing/race size.

- Bearing outer diameter is 47.7 mm (1.878 in.) and inside diameter is 32.6 mm (1.283 in.).
- Race outer diameter is 53.6 mm (2.110 in.) and inside diameter is 30.6 mm (1.205 in.).

(36) Rotate front of transmission case downward and install assembled planetary gear/forward-direct clutch (Fig. 29).

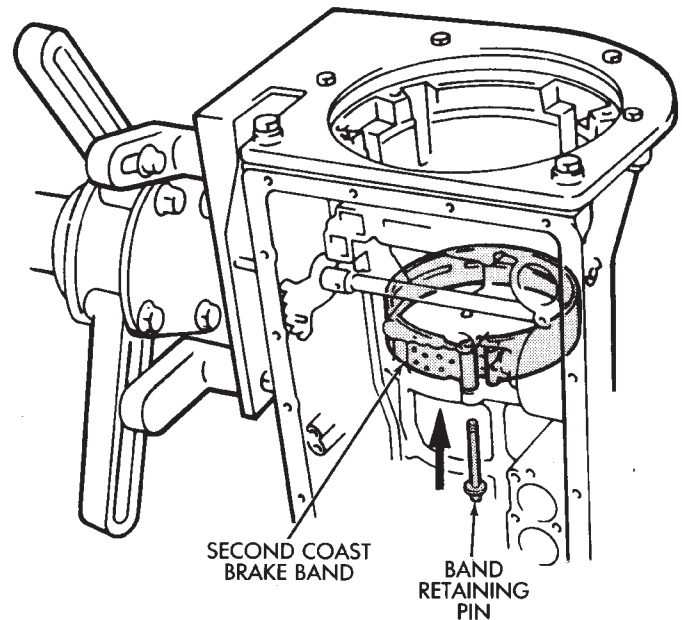


Fig. 23 Installing Second Coast Brake Band Retaining Pin

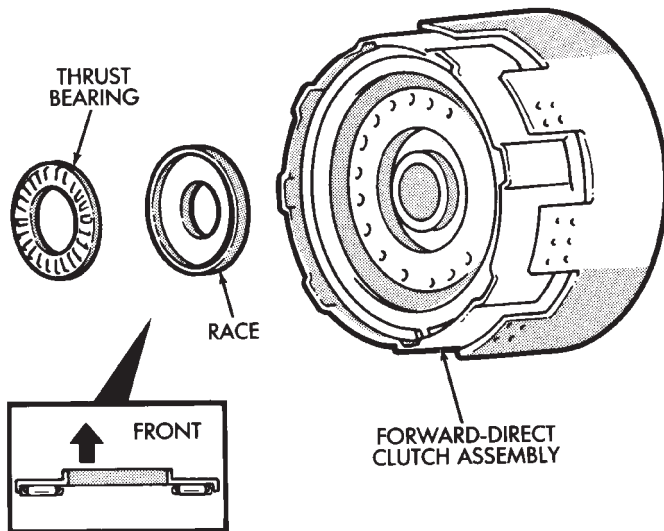
(37) Check clearance between sun gear input drum and direct clutch drum (Fig. 30). Clearance should be 9.8 - 11.8 mm (0.386 - 0.465 in.). If clearance is incorrect, planetary gear/forward-direct clutch assembly is not seated or is improperly assembled. Remove, and correct if necessary.

(38) Coat thrust bearing and race assembly with petroleum jelly and install it on clutch shaft. Bearing faces up and toward case front as shown (Fig. 31). 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.).

(39) Assemble second coast brake piston components (Fig. 32).

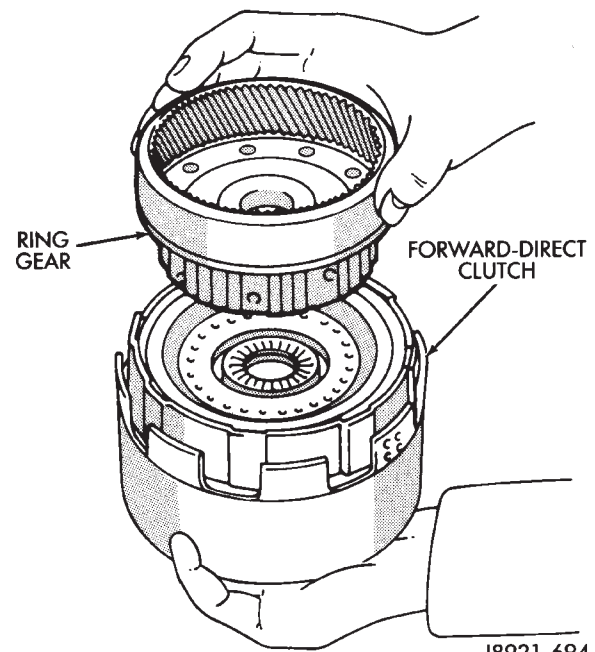
(40) Install assembled second coast brake piston in case.

(41) Install replacement seals on second coast brake piston cover and install cover in case.



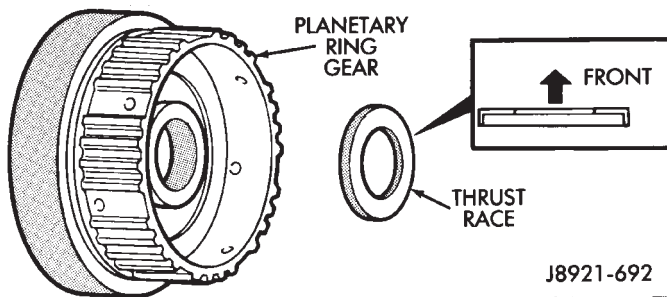
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Fig. 24 Installing Forward-Direct Clutch Thrust Bearing And Race



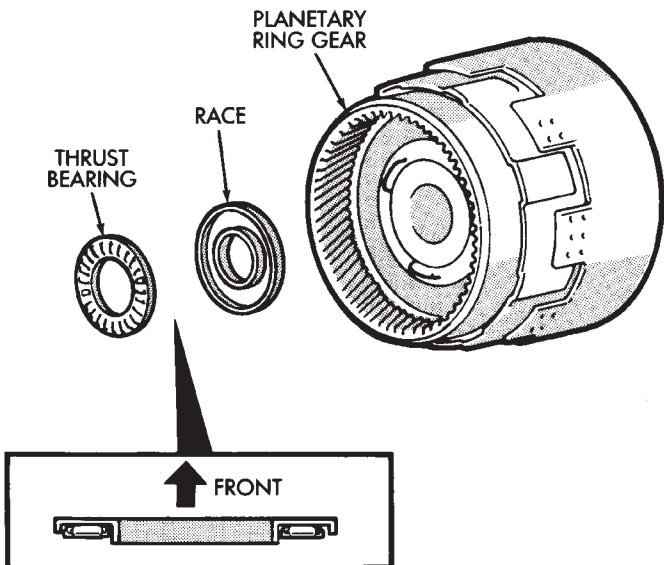
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Fig. 27 Installing Front Planetary Ring Gear



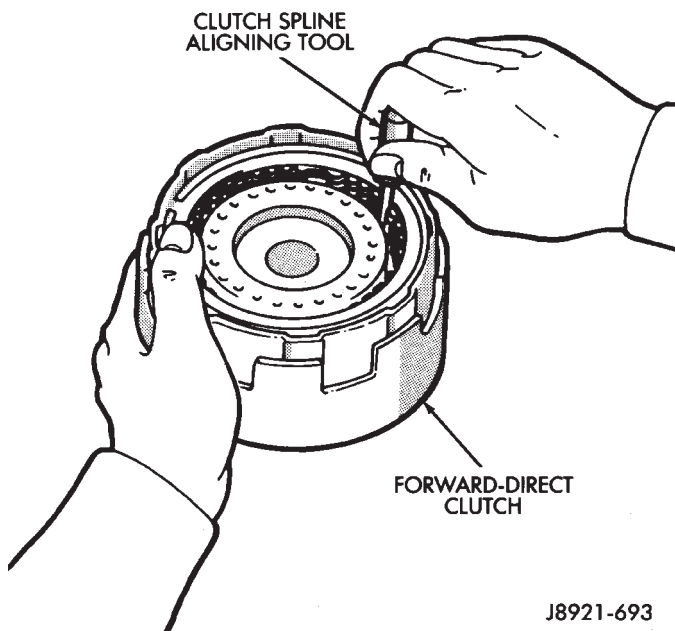
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Fig. 25 Installing Planetary Ring Gear Race



J8921-695

Fig. 28 Installing Ring Gear Bearing And Race



J8921-693

Fig. 26 Aligning Forward-Direct Clutch Splines

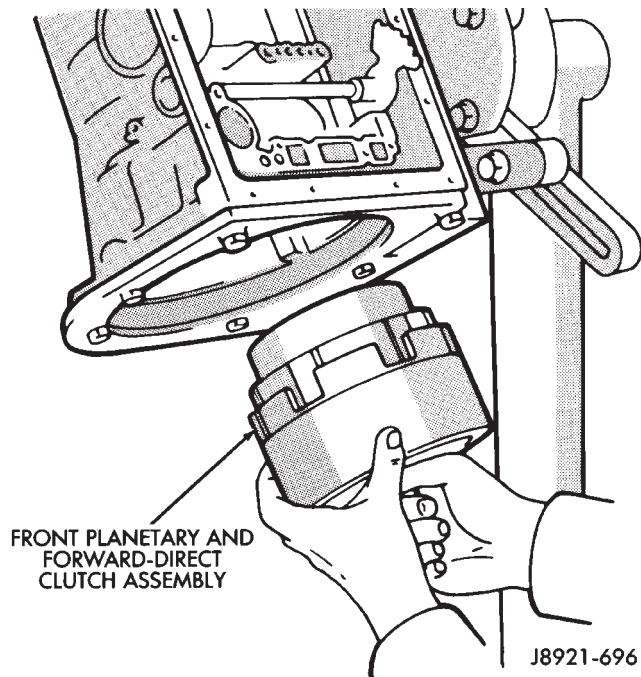


Fig. 29 Installing Front Planetary And Forward-Direct Clutch Assembly

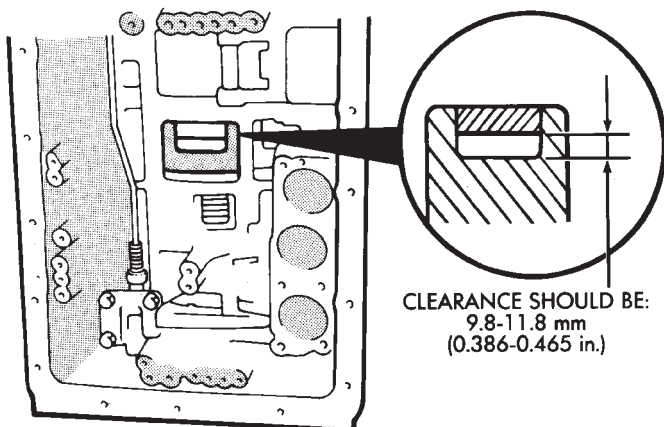


Fig. 30 Checking Input Drum-To-Direct Clutch Drum Clearance

(42) Install second coast brake piston snap ring with snap ring plier tool (Fig. 33).

(43) Check second coast brake piston stroke as follows:

(a) Make reference mark on brake piston rod (Fig. 34).

(b) Apply 57-114 psi air pressure through feed hole (Fig. 34). Alternately apply and release air pressure to operate piston.

(c) Check stroke with Gauge Tool 7552 (Fig. 35).

(d) If stroke length is incorrect, piston, cover or snap ring is not seated. Reassemble and check stroke again if necessary.

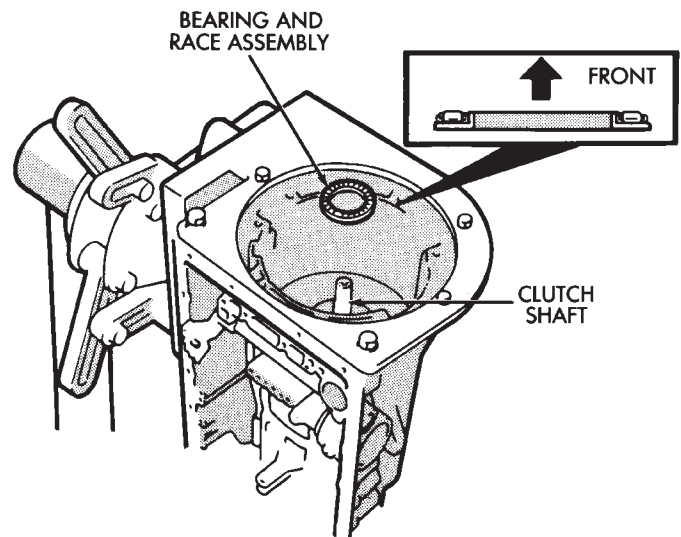


Fig. 31 Installing Clutch Shaft Thrust Bearing And Race Assembly

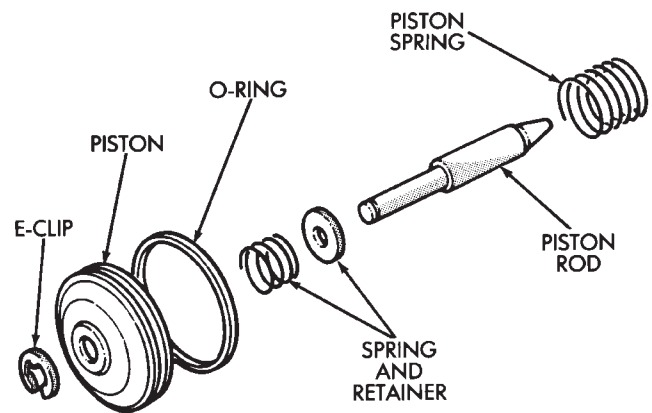


Fig. 32 Assembling Second Coast Brake Piston

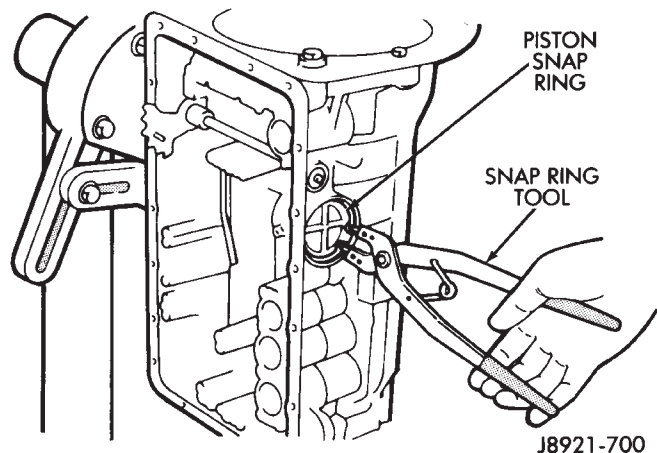
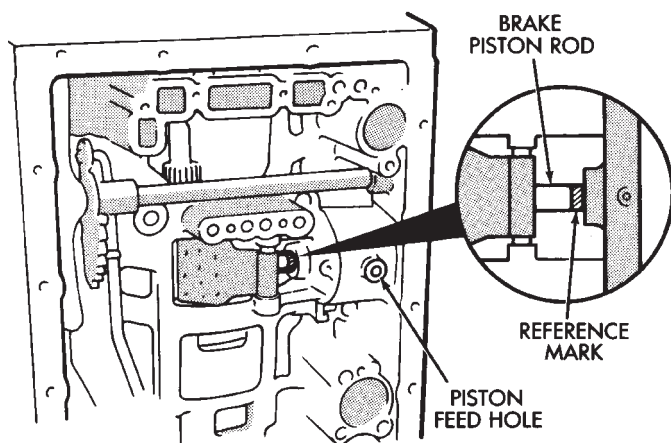


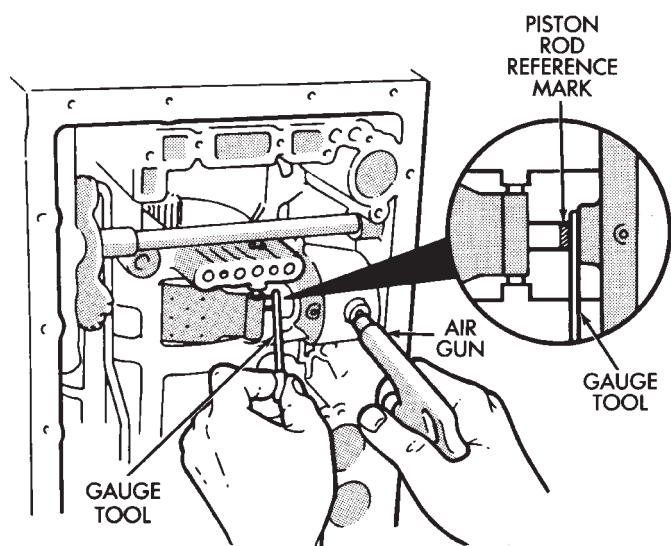
Fig. 33 Installing Second Coast Brake Piston Snap Ring

(44) Coat thrust race and tabbed washer with petroleum jelly and install them on overdrive support



J8921-701

Fig. 34 Marking Brake Piston Rod



J8921-702

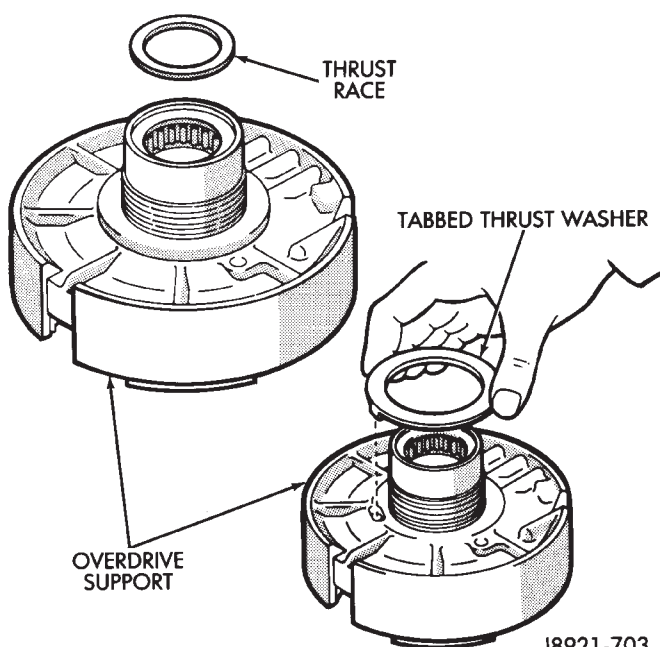
Fig. 35 Checking Second Coast Brake Piston Stroke

(Fig. 36). Verify race size. Race outer diameter is 50.9 mm (2.004 in.) and inside diameter is 36.2 mm (1.426 in.).

(45) Install overdrive support in case. Use two long bolts to help align and guide support into position (Fig. 37).

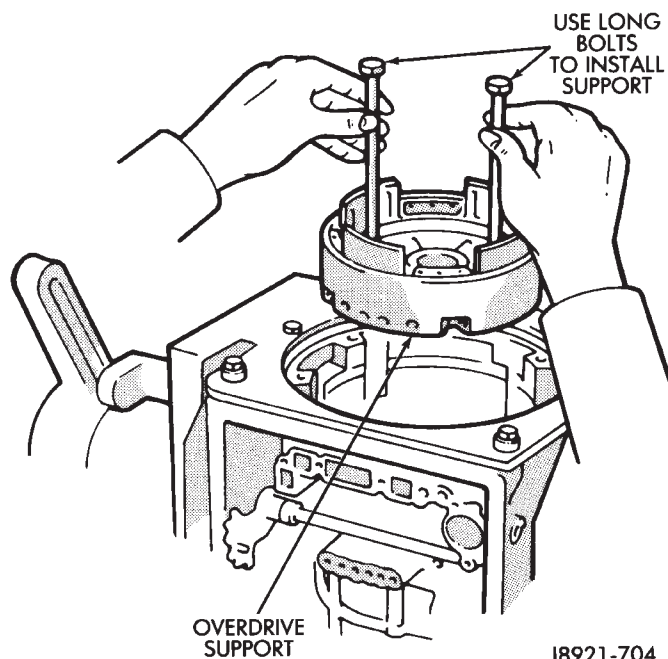
(46) Install overdrive support snap ring with Snap Ring Plier Tool 7540 (Fig. 38). Chamfered side of snap ring faces up and toward case front. **Snap ring ends must be aligned with case opening with ring ends approximately 24 mm (0.94 in.) from centerline of case opening.**

(47) Install and tighten overdrive support bolts to 25 N•m (19 ft-lbs) torque (Fig. 39).



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Fig. 36 Installing Overdrive Support Thrust Race And Washer



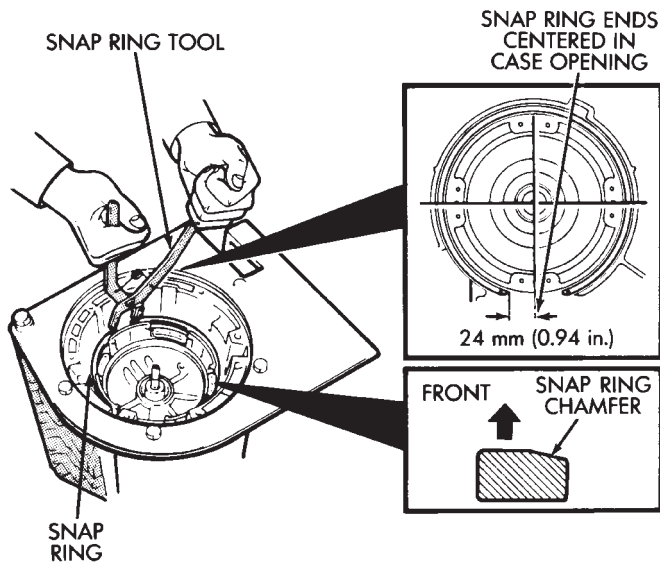
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Fig. 37 Installing Overdrive Support

(48) Check output shaft end play with dial indicator (Fig. 40). End play should be 0.27 - 0.86 mm (0.0106 - 0.0339 in.).

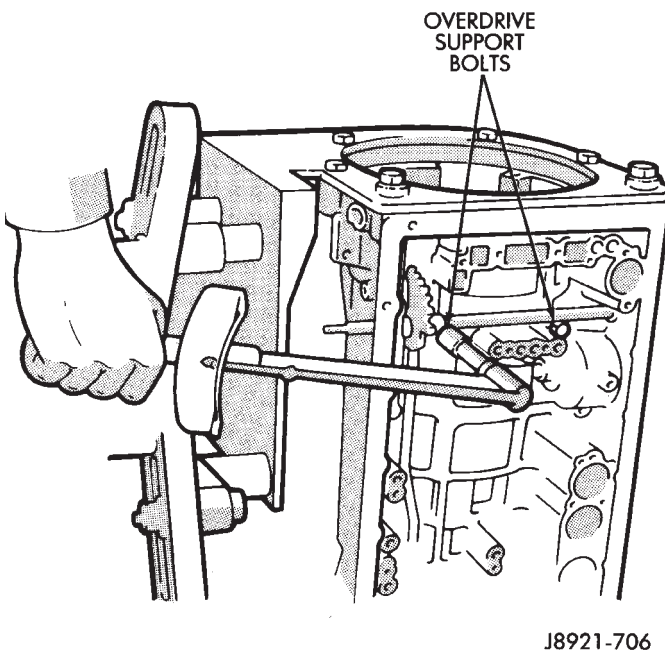
(49) If output shaft end play is incorrect, one or more installed components are not seated. Reassemble as necessary and check end play again.

(50) Install overdrive clutch pack (Fig. 41). Install thickest clutch plate first. Rounded edge of plate faces up. Install first disc followed by another plate until correct number of discs-plates are installed. Install four discs and three plates.



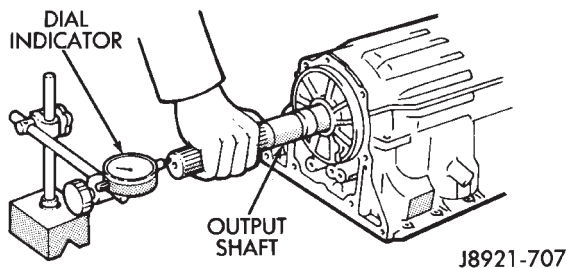
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Fig. 38 Installing Overdrive Support Snap Ring



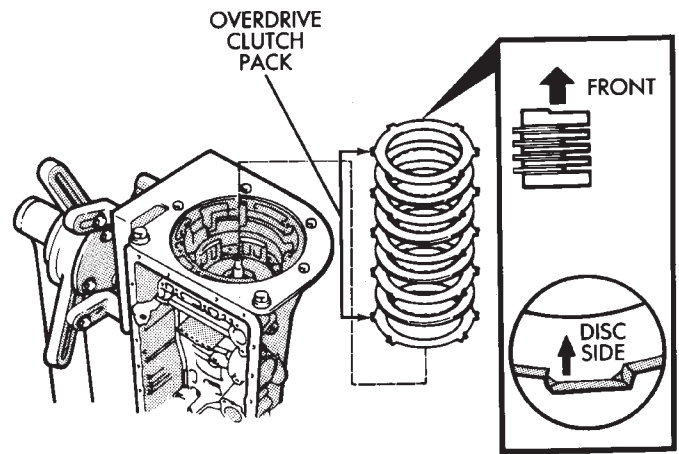
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Fig. 39 Installing Overdrive Support Bolts



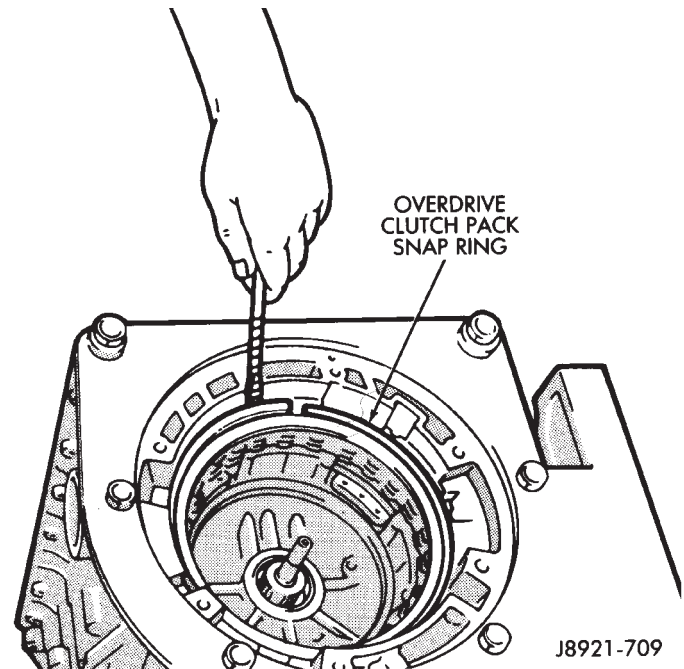
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Fig. 40 Checking Output Shaft End Play



J8921-708

Fig. 41 Install Overdrive Clutch Pack



J8921-709

Fig. 42 installing Overdrive Brake Snap Ring

(51) Install stepped ring retainer plate with flat side facing disc. Then install brake pack snap ring (Fig. 42).

(52) Check overdrive brake piston stroke as follows:

(a) Mount Gauge 7546 in dial indicator and position gauge tool against overdrive brake piston (Fig. 43).

(b) Apply and release overdrive brake piston with compressed air and note piston stroke length on dial indicator. Apply air pressure through feed hole in case (Fig. 44).

(c) Piston stroke length should be 1.40 - 1.70 mm (0.55 - 0.66 in.).

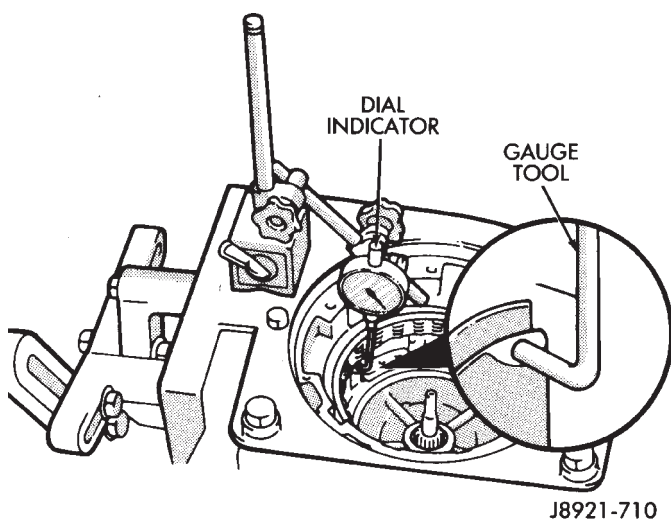


Fig. 43 Positioning Gauge Tool And Dial Indicator

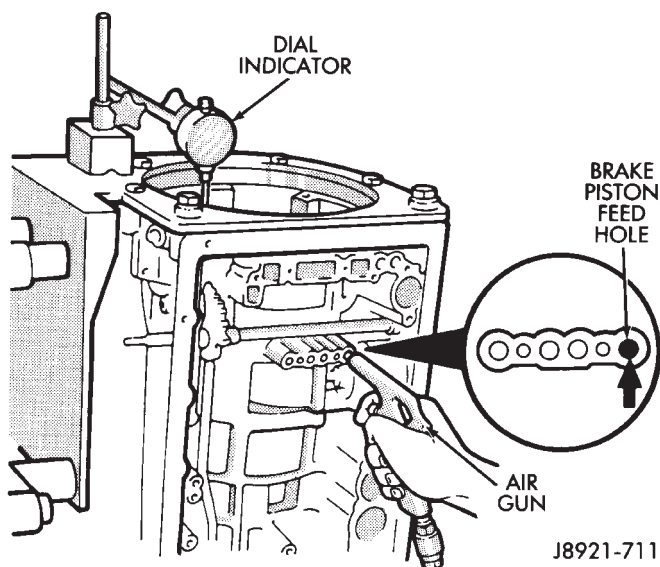


Fig. 44 Checking Overdrive Brake Piston Stroke

(d) If stroke is incorrect, brake pack or piston is installed incorrectly. Check and correct as necessary and measure piston stroke again.

(53) Remove dial indicator and gauge tool.

(54) Remove overdrive brake piston snap ring and remove overdrive clutch pack components.

(55) Coat overdrive lower race, thrust bearing and upper race with petroleum jelly and install them in overdrive support (Fig. 45). Be sure races and bearing are assembled and installed as shown.

(56) 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.).

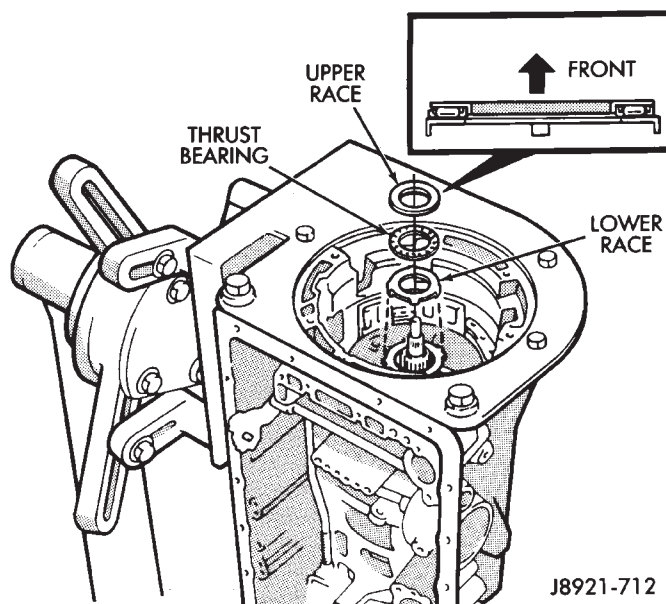


Fig. 45 Installing Overdrive Support Thrust Bearing And Races

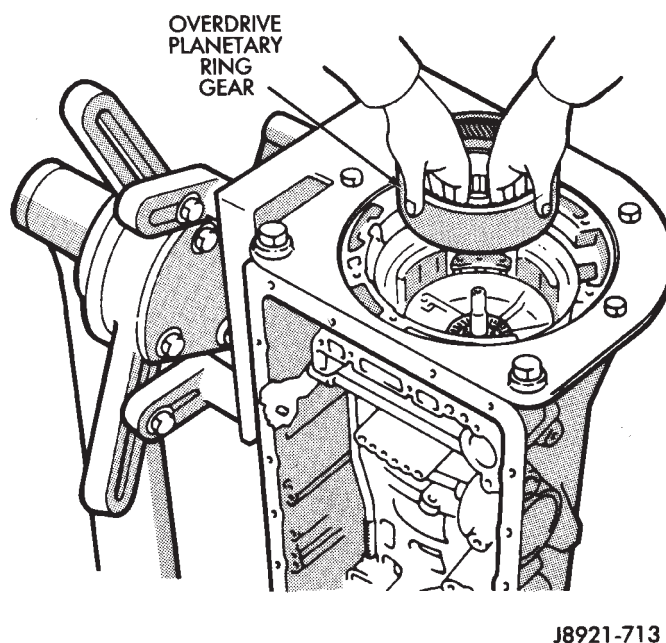


Fig. 46 Installing Overdrive Planetary Ring Gear

(57) Install overdrive planetary ring gear in support (Fig. 46).

(58) Coat ring gear thrust race and thrust bearing assembly with petroleum jelly and install them in gear (Fig. 47).

(59) 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.).

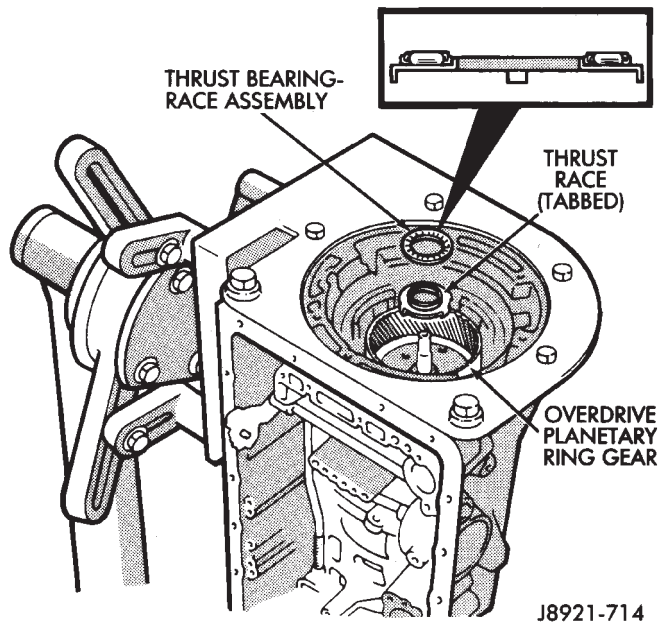


Fig. 47 Installing Ring Gear Thrust Bearing And Race

(60) Coat tabbed thrust race with petroleum jelly and install it on planetary gear (Fig. 48). Race outer diameter is 41.8 mm (1.646 in.) and inside diameter is 27.1 mm (1.067 in.).

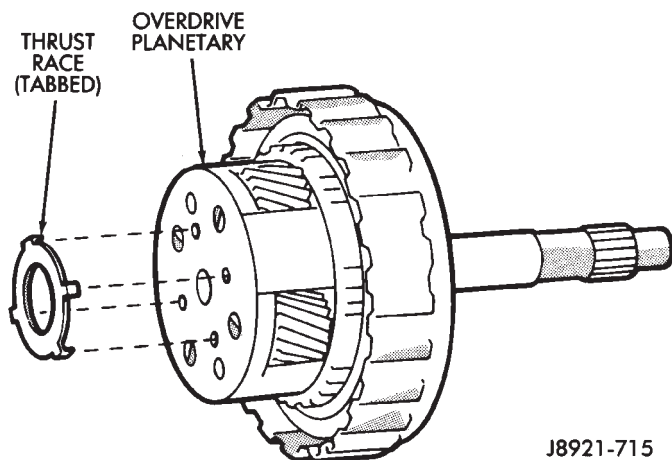


Fig. 48 Installing Planetary thrust Race

(61) Install assembled overdrive planetary gear and clutch (Fig. 49).

(62) Coat thrust bearing and race assembly with petroleum jelly and install it on clutch input shaft (Fig. 50). Bearing and race outer diameter is 50.2 mm (1.976 in.) and inside diameter is 28.9 mm (1.138 in.).

(63) Install overdrive brake pack as follows:

(a) Install 4.0 mm (0.157 in.) thick plate first. Rounded edge of plate must face upward.

(b) Install a disc followed by a plate until the required number of discs and plates are installed. Be sure to install the stepped plate last with the flat side of the plate facing the disc (Fig. 51).

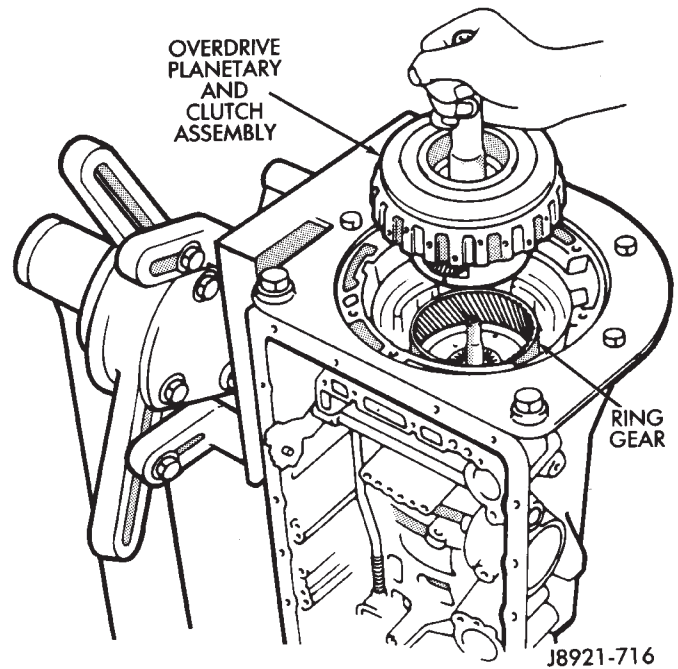


Fig. 49 Installing Overdrive Planetary And Clutch Assembly

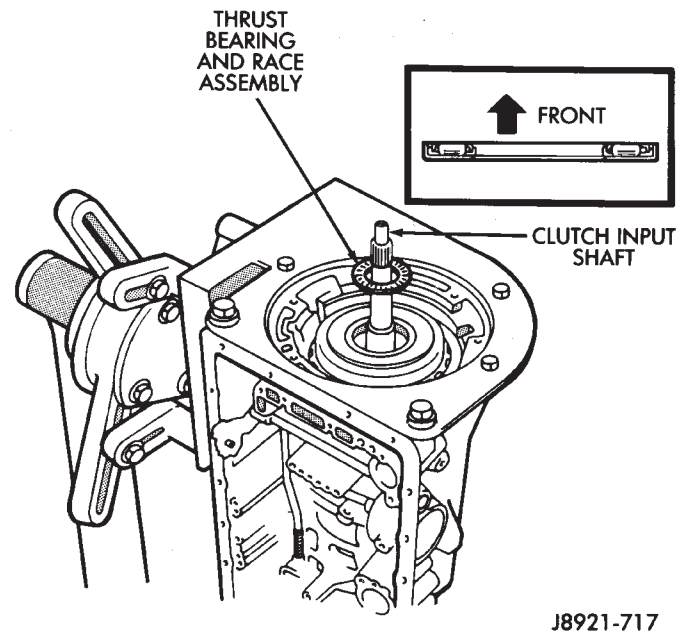
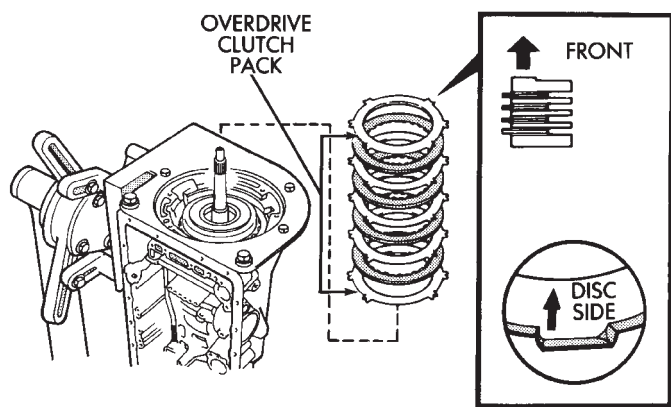


Fig. 50 Installing Input Shaft Thrust Bearing And Race Assembly

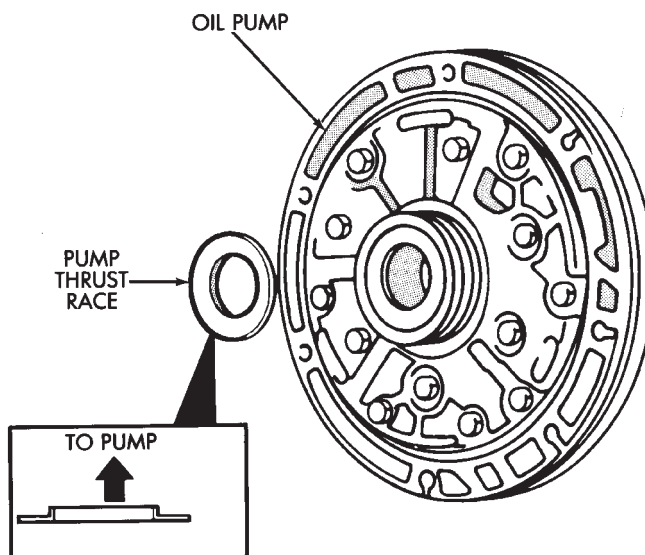
(c) Confirm that four discs and three plates have been installed.

(64) Install clutch pack snap ring (Fig. 52).

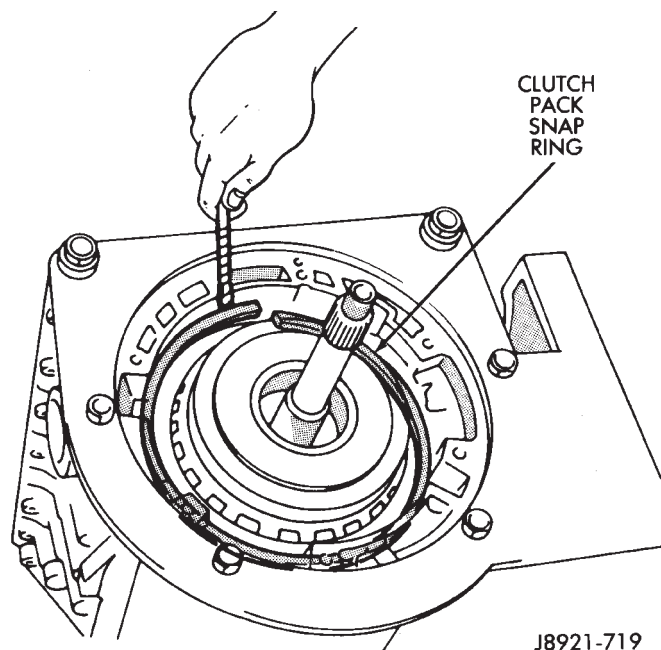
(65) Coat thrust bearing race with petroleum jelly and install it in oil pump (Fig. 53). Bearing race outer diameter is 47.2 mm (1.858 in.) and inside diameter is 28.1 mm (1.106 in.).



J8921-718

Fig. 51 Installing Overdrive Clutch Pack

J8921-720

Fig. 53 Installing Oil Pump Thrust Race

J8921-719

Fig. 52 Installing Clutch Pack Snap Ring

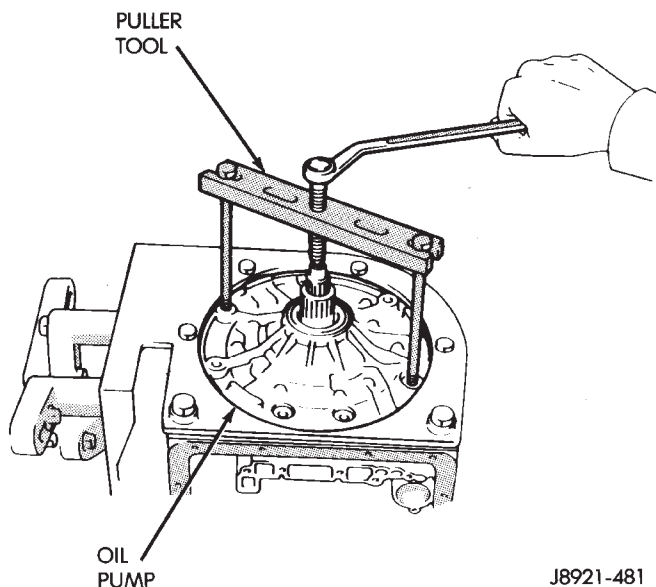
(66) Lubricate and install replacement O-ring on oil pump body.

(67) Install oil pump in case. Align pump and case bolt holes and carefully ease pump into place (Fig. 54).

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.

(68) Tighten oil pump bolts to 22 N•m (16 ft. lbs.) torque.

(69) Verify input shaft rotation. Shaft should rotate smoothly and not bind.



J8921-481

Fig. 54 Installing Oil Pump

(70) Lubricate and install new O-ring on transmission throttle cable adapter and install cable in case (Fig. 55).

(71) Check clutch and brake operation. Operate clutches and brakes with compressed air applied through feed holes in case (Fig. 56). Listen for clutch and brake apply, disassemble transmission and repair fault before proceeding. **It is necessary to block the overdrive clutch accumulator feed hole No. 8 (Fig. 56) in order to check direct clutch operation.**

(72) Lubricate and install new O-rings on accumulator pistons (Fig. 57).

(73) Assemble and install accumulator pistons and springs (Fig. 57).

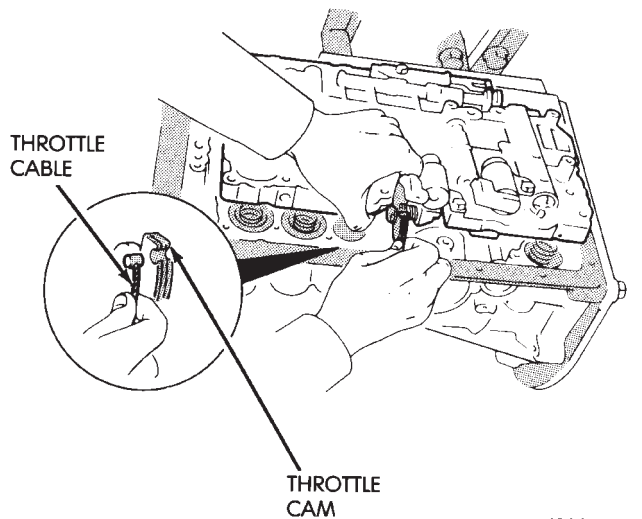
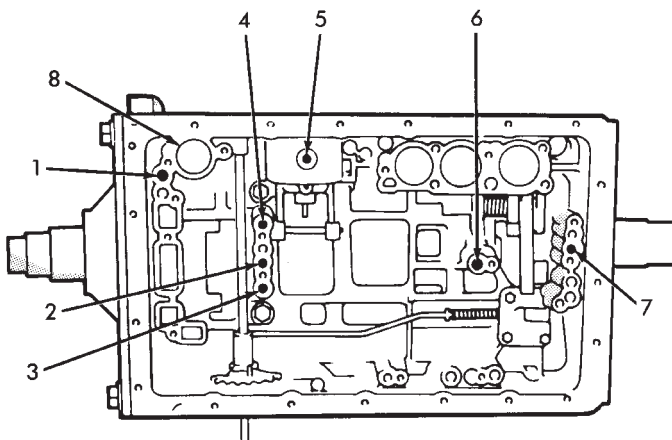


Fig. 55 Installing Transmission Throttle Cable



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. 56 Clutch And Brake Feed Hole Locations

- (74) Install new check ball body and spring (Fig. 58).
- (75) Position valve body on case (Fig. 59).
- (76) Install detent spring (Fig. 59).
- (77) Align manual valve, detent spring and shift sector (Fig. 59).
- (78) Connect transmission throttle cable to throttle valve cam (Fig. 60).
- (79) Install and tighten valve body-to-case bolts to 10 N•m (7 ft. lbs.) torque.

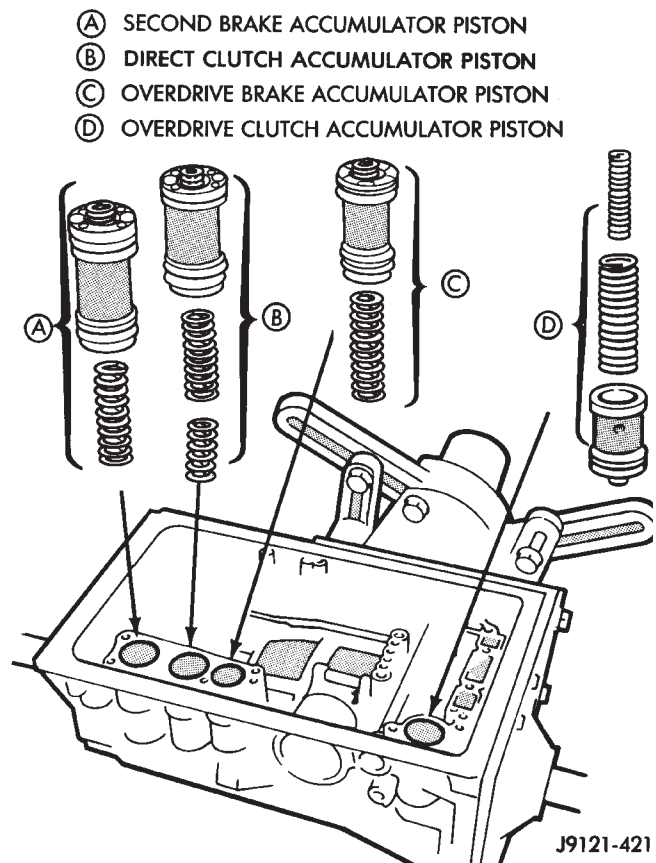


Fig. 57 Accumulator Piston And Spring Installation

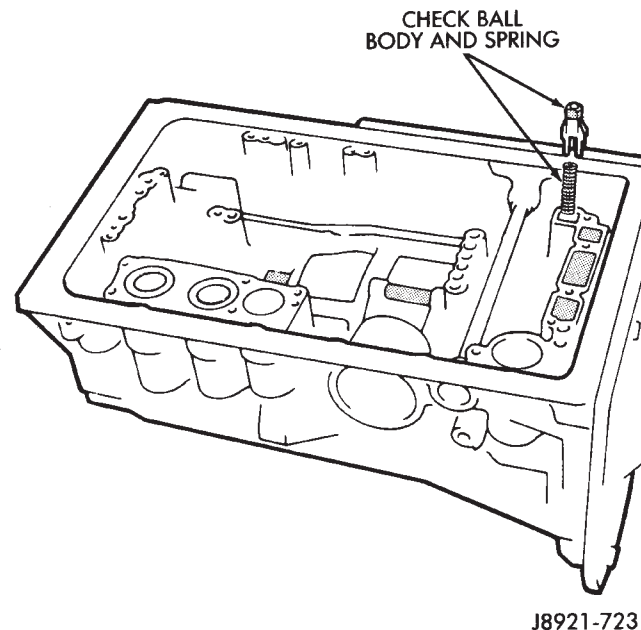


Fig. 58 Installing Check Ball Body And Spring

- (80) Connect valve body solenoid wires to solenoids (Fig. 61).
- (81) Install new O-ring on solenoid harness adapter and secure adapter to case.

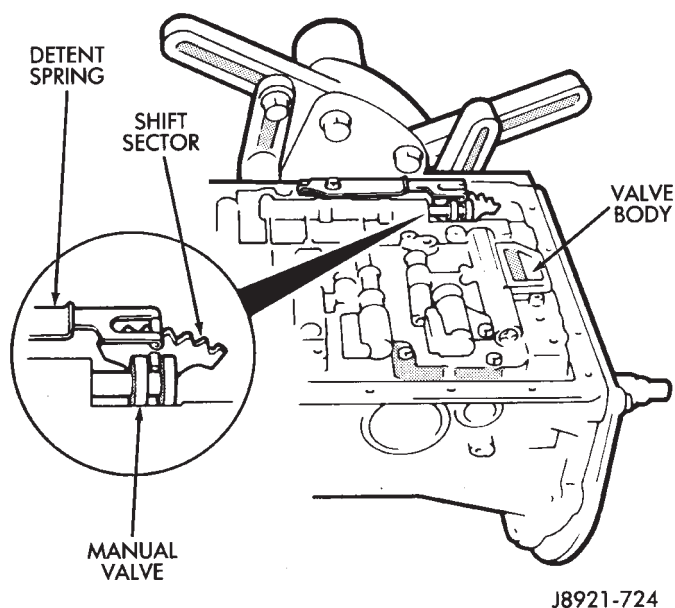


Fig. 59 Aligning Manual Valve, Shift Sector And Detent Spring

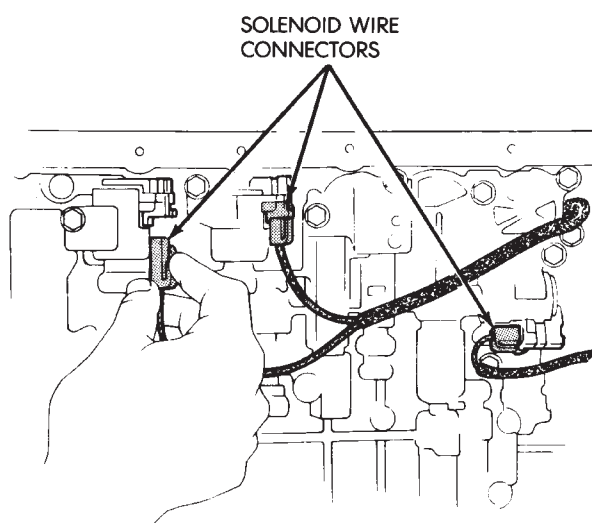


Fig. 61 Connecting Valve Body Solenoid Wires

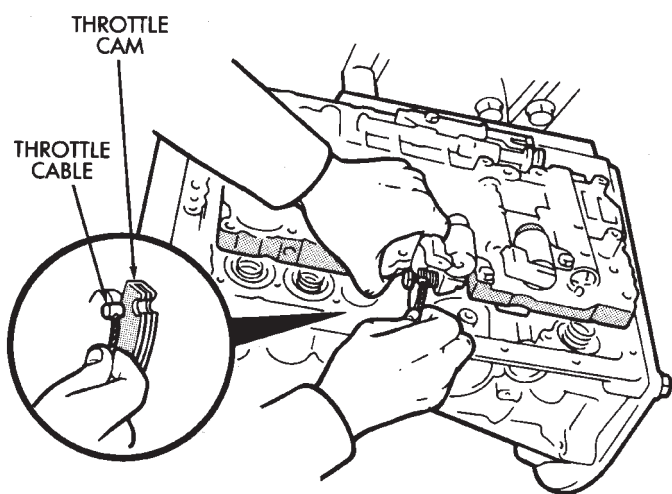


Fig. 60 Connecting Transmission Throttle Cable

(82) Install valve body oil tubes (Fig. 62). Tap tubes into place with a plastic mallet. Be sure the flanged tube ends and straight tube ends are installed as shown.

(83) Install new gaskets on oil screen and install screen on valve body. Tighten screen bolts to 10 N•m (7 ft. lbs.) torque.

(84) Install magnet in oil pan. Be sure magnet does not interfere with valve body oil tubes.

(85) Apply Mopar or Loctite 599 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.

(86) Install transmission speed sensor rotor and key on output shaft (Fig. 63).

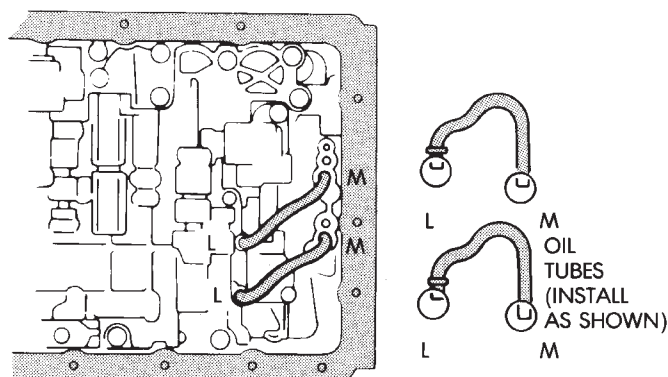


Fig. 62 Installing Valve Body Oil Tubes

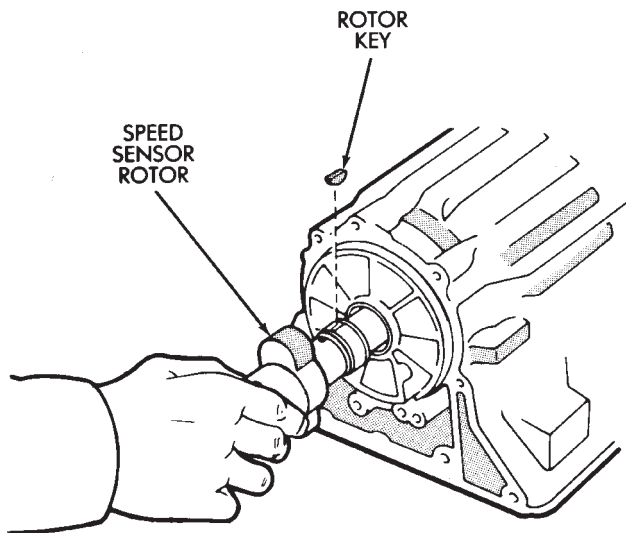
(87) Install spacer and speedometer drive gear on output shaft. Then install retaining snap ring (Fig. 64).

(88) Apply bead of Mopar or Loctite 599 sealer to sealing surface at rear of case (Fig. 65).

(89) Install adapter housing on transmission. Tighten adapter bolts to 34 N•m (25 ft. lbs.) torque.

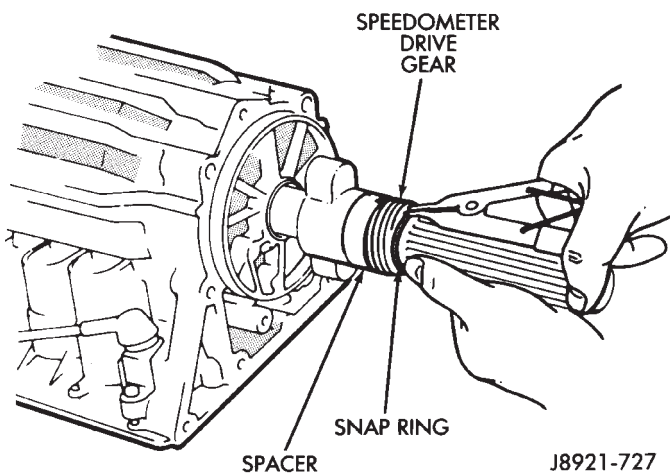
(90) Install transmission speed sensor (Fig. 66). Tighten sensor bolt to 7.4 N•m (65 in. lbs.) torque and connect sensor wire harness connector.

(91) Install converter housing (Fig. 67). Tighten 12 mm diameter housing bolts to 57 N•m (42 ft. lbs.) torque. Tighten 10 mm diameter housing bolts to 34 N•m (25 ft. lbs.) torque.



J8921-726

Fig. 63 Installing Transmission Speed Sensor Rotor And Key



J8921-727

Fig. 64 Installing Spacer And Speedometer Drive Gear

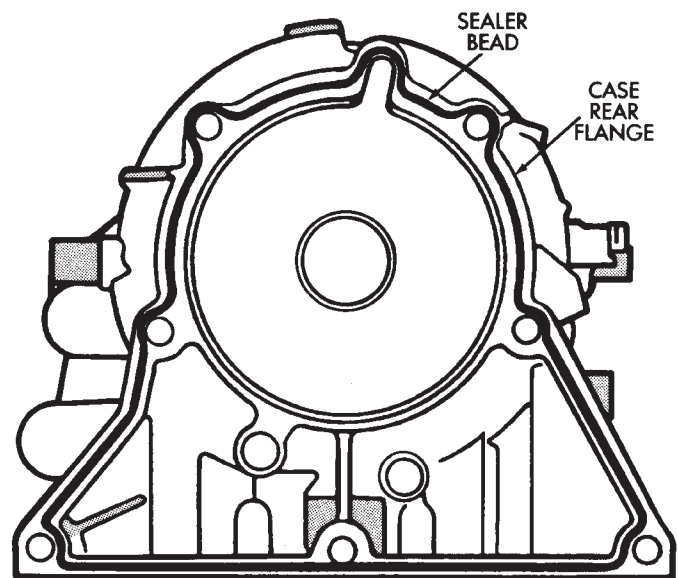
(92) Install transmission shift lever on manual valve shaft. Do not install lever attaching nut at this time.

(93) Move transmission shift lever fully rearward. Then move lever two detent positions forward.

(94) Mount park/neutral position switch on manual valve shaft and tighten switch adjusting bolt just enough to keep switch from moving (Fig. 68).

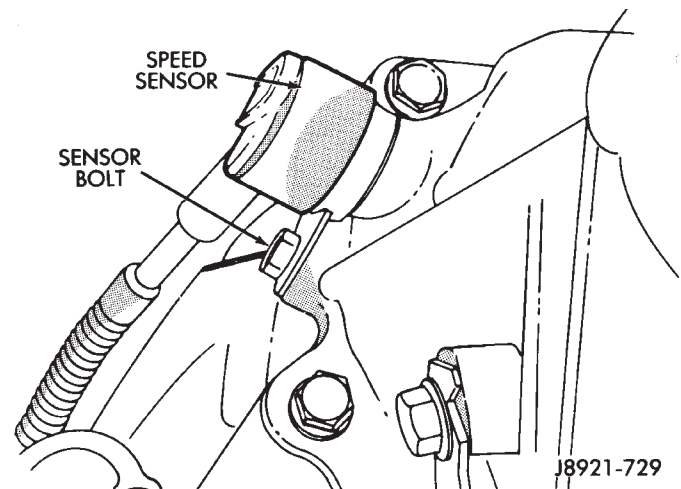
(95) Install park/neutral position switch tabbed washer and retaining nut (Fig. 68). Tighten nut to 6.9 N•m (61 in. lbs.) torque, but do not bend any of the washer tabs against the nut at this time.

(96) Align park/neutral position switch standard line with groove or flat on manual shaft (Fig. 68).



J8921-728

Fig. 65 Applying Sealer To Case Rear Flange



J8921-729

Fig. 66 Installing Transmission Speed Sensor

(97) Tighten park/neutral position switch adjusting bolt to 13 N•m (9 ft. lbs.) torque.

(98) Install transmission shift lever on manual valve shaft. Tighten lever attaching nut to 16 N•m (12 ft. lbs.) torque.

(99) Install retaining clamp for wire harness and throttle cable (Fig. 70).

(100) Install torque converter.

(101) Verify that converter is seated by measuring distance between converter housing flange and one of the converter mounting pads (Fig. 71). Use straight-edge and vernier calipers to measure distance. On 6-cyl. transmissions, distance should be 16.5 mm (0.650 in.).

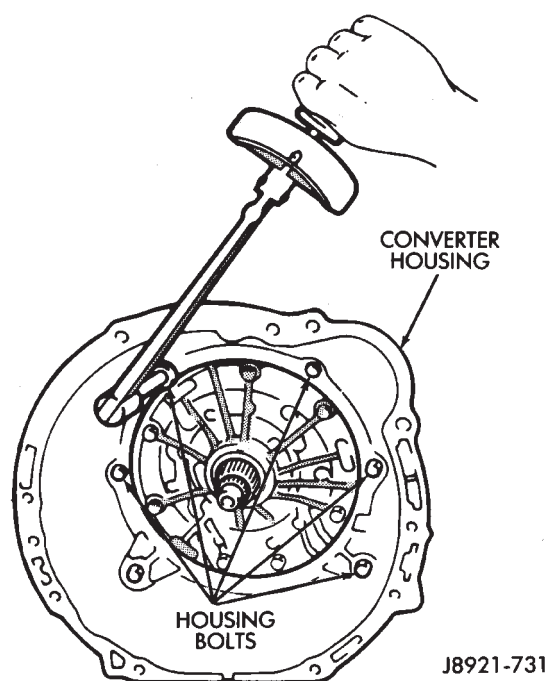


Fig. 67 Installing Converter Housing

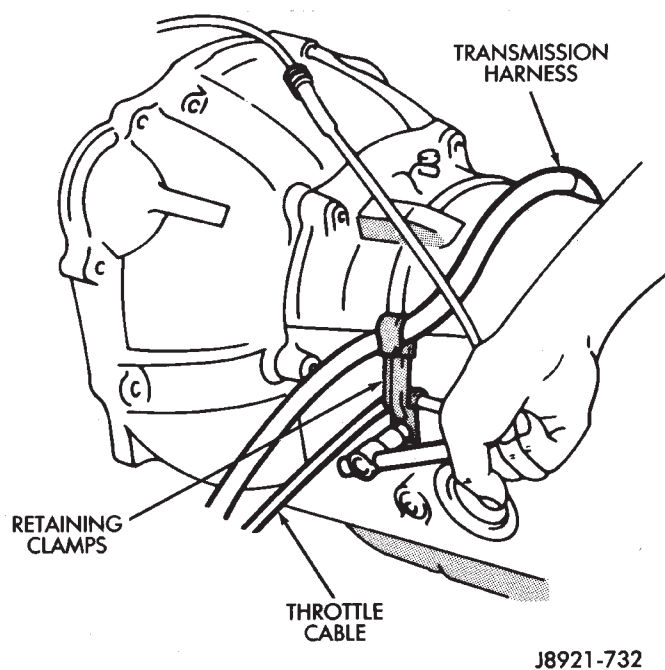


Fig. 70 Installing Cable/Harness Clamps

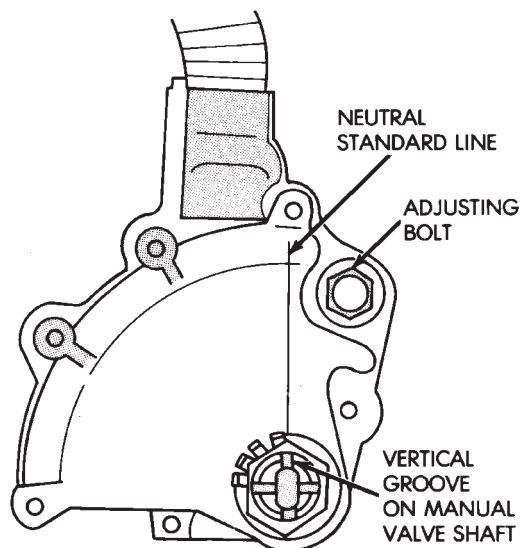


Fig. 68 Park/Neutral Position Switch Installation/ Adjustment

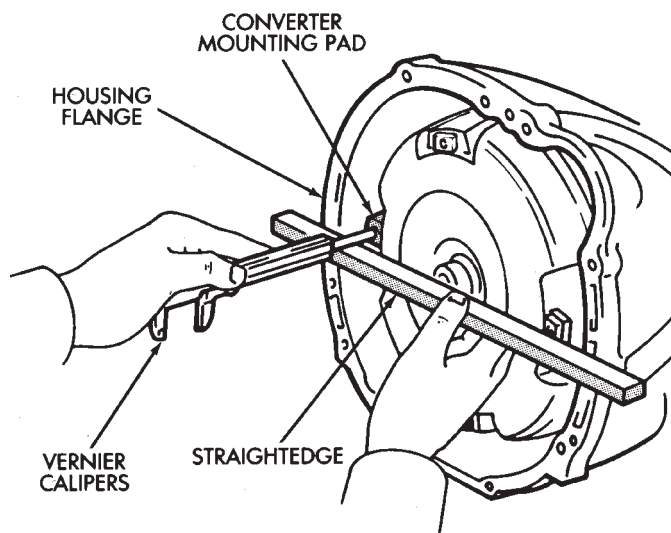


Fig. 71 Checking Converter Installation

46RH AUTOMATIC TRANSMISSION

CONTENTS

	page		page
46RH TRANSMISSION DIAGNOSIS	157	IN-VEHICLE SERVICE—46RH	190
46RH TRANSMISSION/OVERDRIVE REMOVAL AND INSTALLATION	200	OVERDRIVE UNIT OVERHAUL—46RH	253
GENERAL INFORMATION	151	SPECIFICATIONS	345
		TRANSMISSION OVERHAUL—46RH	208

GENERAL INFORMATION

INDEX

	page		page
Fourth Gear Overdrive Components	152	Torque Converter	151
Fourth Gear Overdrive Controls	154	Transmission Description	151
Gear Ratios	151	Transmission Hydraulic Controls	155
Recommended Fluid	154	Transmission Identification	154

TRANSMISSION DESCRIPTION

The Chrysler 46RH is 4-speed automatic transmission. Fourth gear is an overdrive range providing a ratio of 0.69:1. The 46RH is used for 5.2L engine applications.

The 46RH is a dual unit design. The assembly consists of a three speed automatic transmission with an overdrive unit attached at the rear (Figs. 1 and 2). First through third gear ranges are provided by the clutches, bands, overrunning clutch and planetary gear set in the transmission. Fourth gear range is provided by the overdrive unit.

The overdrive unit contains an overdrive clutch, direct clutch, compound planetary gear set and overrunning clutch. The overdrive clutch is applied in fourth gear only. The direct clutch is applied in all ranges except fourth gear.

The governor and park lock assemblies are located inside the overdrive unit. The unit must be removed and disassembled for service access to the park lock and governor components.

Fourth gear is controlled by a manually operated switch in the instrument panel. The switch is in circuit with the overdrive solenoid (on the valve body) and the powertrain control module. In the On position, current flows through the switch to the solenoid for the 3-4 shift sequence. The transmission must be in third gear before a 3-4 upshift will occur.

The overdrive solenoid will not be energized and a 3-4 upshift will not occur when the control switch is in the OFF position.

TORQUE CONVERTER

A three element torque converter is used for all applications. The converter consists of the impeller, stator and turbine. The converter also contains an overrunning clutch and a modulated converter clutch mechanism.

The converter modulated clutch consists of a sliding clutch piston, clutch springs and the clutch disc friction material. The clutch provides optimum torque transfer and economy when engaged.

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 the converter clutch valve and solenoid. Both are located on the transmission valve body. Clutch engagement occurs in drive range at speeds above approximately 30-35 mph.

The clutch provides reduced engine speed and greater fuel economy when engaged. Clutch engagement also provides reduced transmission fluid temperatures.

GEAR RATIOS

46RH forward gear ratios are:

- First gear = 2.45:1
- Second gear = 1.45:1
- Third gear = 1.00:1
- Fourth gear = 0.69:1.

FOURTH GEAR OVERDRIVE COMPONENTS

The 46RH model has three transmission shafts. An intermediate shaft is positioned between the input and output shafts. The output shaft is in the overdrive unit. The intermediate shaft is supported by the overdrive piston retainer and piloted in the output shaft (Fig. 1).

The overdrive piston and retainer are located at the rear of the transmission case. The retainer serves as both the rear support and pressure chamber for the overdrive piston. The intermediate shaft is splined to the overdrive direct clutch sliding hub, planetary assembly and overrunning clutch (Fig. 1).

The governor components and speedometer drive are located on the output shaft in the overdrive unit. Two bearings are used to support the output shaft. A longer park rod assembly is also required.

There are no rotating seal rings or pressurized oil for the direct clutch. The clutch is applied by spring pressure and released by movement of the overdrive clutch piston during the 3-4 upshift.

The governor is operated by fluid pressure supplied through pressure tubes. The tubes are permanently attached to the governor support. Governor fluid pressure is transmitted through the intermediate shaft to the tubes.

Governor pressure and overdrive clutch pressure taps are provided in the transmission case for pressure testing purposes.

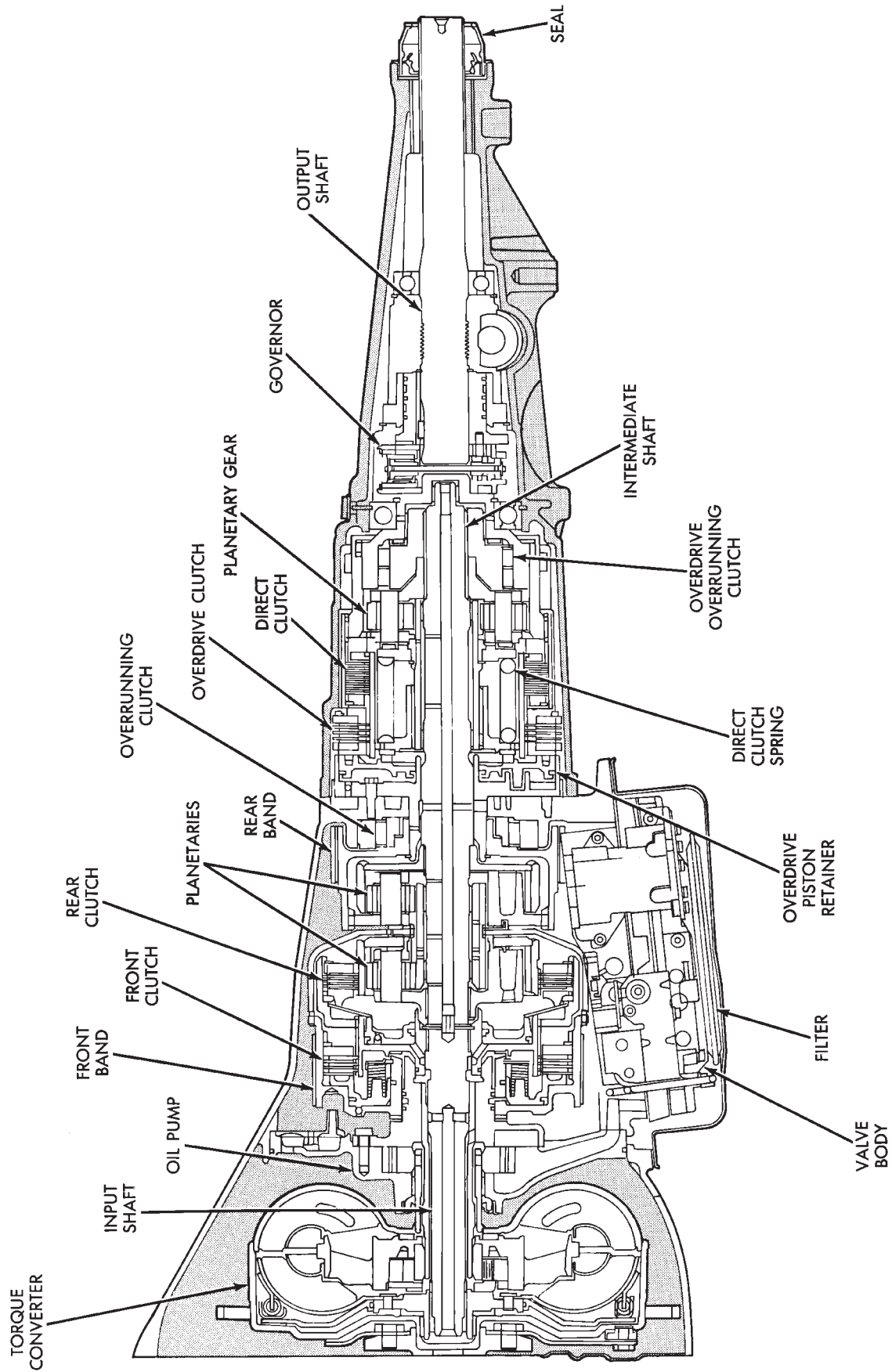
The overdrive unit contains a direct clutch, an overdrive clutch and an overrunning clutch. Fourth gear range is provided by an additional planetary gear set in the overdrive unit.

The direct clutch is applied by spring pressure. A high pressure spring rated at approximately 830 pounds (5530 kPa) tension, holds the clutch in engagement. The sun gear, direct clutch sliding hub and drum are splined to the annulus gear for direct drive. For coasting or reverse gear, power flows only through the direct clutch.

A timing valve disengages the torque converter clutch prior to a 4-3 downshift. The clutch solenoid, engagement valve, and timing valve are actuated in fourth gear range.

The fourth gear shift valves and plugs are located in the valve body lower housing (Fig. 2). The components include:

- a separate housing for the overdrive valves and plugs
- an overdrive solenoid
- a converter clutch solenoid
- a 3-4 shift valve
- a 3-4 timing valve
- a 3-4 accumulator
- a 3-4 shuttle valve
- an overdrive separator plate.



J9321-205

Fig. 1 46RH Transmission And Overdrive Unit

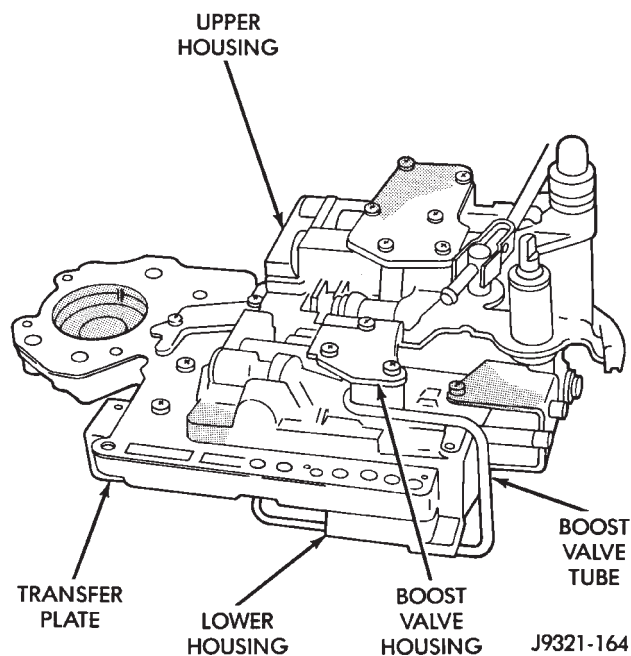


Fig. 2 46RH Valve Body

RECOMMENDED FLUID

The recommended (and preferred) fluid for 46RH transmissions is Mopar ATF Plus, type 7176. Mopar Dexron II fluid can be used for topping off the transmission fluid level during normal maintenance checks. Dexron II can also be used for refill after overhaul if ATF Plus is not readily available.

TRANSMISSION IDENTIFICATION

The transmission part/identification numbers and codes are stamped on the left side of the case just above the oil pan gasket surface (Fig. 3).

The first letter/number group is the assembly part number. The next number group the transmission build date. The last number group is the transmission serial number. Refer to this information when ordering replacement parts.

FOURTH GEAR OVERDRIVE CONTROLS

Shift Sequence

Fourth gear overdrive range is electronically controlled and hydraulically activated. Various sensor inputs are supplied to the powertrain control module to operate the overdrive solenoid on the valve body. The solenoid contains a check ball that opens and closes a vent port in the 3-4 shift valve feed passage.

The overdrive solenoid (and check ball) are not energized in first, second, third or reverse gear. The vent port remains open diverting line pressure from the 2-3 shift valve away from the 3-4 shift valve.

The overdrive switch must be in the On position to transmit signals to the solenoid. A 3-4 upshift occurs only when the overdrive solenoid is energized by an electrical signal from the powertrain control module.

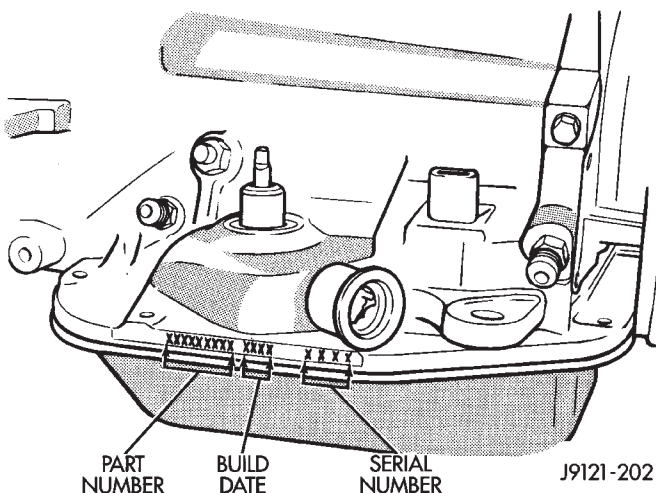


Fig. 3 Transmission Identification Code Location—46RH

The solenoid is energized upon receiving a signal. This causes the check ball to close the vent port. Closing the vent port allows line pressure from the 2-3 shift valve to act directly upon the 3-4 upshift valve.

Line pressure acting on the 3-4 shift valve overcomes valve spring tension moving the valve to the upshift position. This action exposes the feed passages to the 3-4 timing valve, 3-4 shuttle valve, 3-4 accumulator and ultimately to the overdrive piston.

Line pressure through the timing and shuttle valves move the overdrive piston into simultaneous contact with the overdrive clutch and the direct clutch sliding hub.

The overdrive clutch is engaged and the direct clutch is disengaged simultaneously to complete the 3-4 upshift. The boost valve provides increased fluid apply pressure to the overdrive clutch during the 3-4 upshift and during fourth gear operation.

The overdrive piston engages the overdrive clutch by pressing directly against the clutch pressure plate. The overdrive clutch also disengages the direct clutch during 3-4 upshifts. As fluid pressure extends the overdrive piston, the piston contacts the direct clutch hub pressing it rearward. This action compresses the direct clutch spring relieving spring load on the clutch pack. The clutch is disengaged once spring load is relieved.

The 3-4 accumulator cushions overdrive clutch engagement to smooth the transition into fourth gear. The accumulator is charged at the same time as apply pressure acts against the overdrive piston.

Closed throttle 3-4 upshifts occur at approximately 25-28 mph regardless of axle ratio. Closed throttle 4-3 downshifts occur at approximately 25 mph, regardless of axle ratio.

A 3-4 upshift will not occur if throttle opening is greater than approximately 70 percent.

Converter clutch engagement in overdrive fourth gear is controlled by sensor inputs to the powertrain control module. In third gear above 25 mph, sensor inputs to the control module that determine clutch engagement and shift timing are:

- coolant temperature (verifies temperature minimum of 60° F)
- engine speed
- vehicle speed
- throttle position
- manifold vacuum (to MAP sensor)

Gearshift Mechanism

The gear shift mechanism provides six shift positions which are:

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

Manual low (1) position provides first gear only. Overrun braking is also provided in this range. Manual second (2) range provides first and second gear only.

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

The fourth gear upshift occurs automatically when the overdrive control switch is in the ON position. Shift timing is determined by sensor inputs to the powertrain control module.

Overdrive Control Switch

The overdrive control switch is located in the instrument panel. In the On position, automatic shifts into fourth gear overdrive will occur. In the Off position, the switch overrides the powertrain control module preventing a shift to overdrive fourth gear range.

The switch has an indicator light that illuminates when overdrive is turned off. The switch also resets when the ignition key is turned to the OFF position so that the automatic overdrive feature is restored.

The use of fault codes is employed to help diagnose the electronic components that operate the overdrive unit and torque converter clutch.

TRANSMISSION HYDRAULIC CONTROLS

The 46RH hydraulic control system provides fully automatic operation. The system performs five basic functions which are: pressure supply, pressure regulation, flow control, clutch/band application, and lubrication.

PRESSURE REGULATION

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

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

Shift Valve Flow Control

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

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

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

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

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

The 3-4 shift valve, shuttle valve, timing valve and accumulator are only actuated when the overdrive solenoid is energized.

The solenoid contains a check ball that controls a vent port to the 3-4 valve. The check ball either diverts line pressure away from or directly to, the 3-4 shift valve. Energizing the solenoid causes the check ball to close the vent port allowing line pressure to act upon the 3-4 upshift valve.

The 46RH valve body is equipped with a limit valve. The valve determines maximum speed at which a 3-2 part throttle kickdown can be made.

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

The 3-4 shuttle valve uses a combination of throttle and governor pressure to control the rate of overdrive piston apply and release. This is done to maintain shift quality at varying throttle openings.

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

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

The boost valve provides increased fluid apply pressure for converter clutch and overdrive clutch engagement. The valve is connected to the valve body upper and lower housings by a connecting tube.

Converter Clutch Control

The converter clutch valve applies the converter clutch when supplied with line pressure through the converter clutch solenoid. The solenoid is mounted on the valve body and energized by an electrical signal from the powertrain control module. Electronic control of converter clutch operation includes clutch release at closed throttle during warmup and during part throttle acceleration. The boost valve provides additional apply pressure for converter clutch application.

The switch valve directs fluid apply pressure to the converter clutch in one position and releases it in the

opposite position. It also directs oil to the cooling and lube circuits. The switch valve regulates oil pressure to the torque converter by limiting maximum oil pressure to 130 psi.

Clutch/Band Application

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

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 all throttle openings.

The overdrive direct clutch is applied by spring pressure. The direct clutch is applied in all ranges except fourth gear.

The overdrive clutch is applied in fourth gear only. The clutch is applied by the overdrive piston which is actuated by line pressure through the 3-4 shift valve.

46RH TRANSMISSION DIAGNOSIS

INDEX

	page		page
Air Testing Transmission Clutch and Band		General Information	157
Operation	162	Hydraulic Pressure Test	159
Analyzing the Road Test	158	Overdrive Electrical Controls	158
Checking Fluid Level and Condition	157	Preliminary Diagnosis	157
Converter Housing Fluid Leak Diagnosis	162	Road Testing	158
Converter Stall Test	161	Stall Test Analysis	162
Diagnosis Charts	165	Transmission Throttle Cable and Shift Linkage	158

GENERAL INFORMATION

Begin diagnosis by checking the easily accessible items such as fluid level, fluid condition and throttle cable/shift linkage adjustments. A road test will determine if further diagnosis is necessary.

Procedures outlined in this section should be performed in the following sequence to realize the most accurate results:

- (1) Preliminary diagnosis
- (2) Fluid Level and condition
- (3) Leak tests (if fluid level is low)
- (4) Linkage Adjustment
- (5) Overdrive control switch test
- (6) Road test
- (7) Stall test
- (8) Hydraulic pressure test
- (9) Air pressure tests
- (10) Analyze test results and consult diagnosis charts

PRELIMINARY DIAGNOSIS

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

VEHICLE IS DRIVEABLE

- (1) Check fluid level and condition.
- (2) Adjust throttle and gearshift linkage if complaint was based on delayed, erratic, or harsh shifts.
- (3) Road test and note how transmission upshifts, downshifts and engages.
- (4) Perform stall test if complaint is based on sluggish acceleration or if abnormal throttle opening is needed to maintain normal speeds with a properly tuned engine.
- (5) Perform hydraulic pressure test if shift problems were noted during road test.
- (6) Perform air pressure test to check clutch-band operation.

VEHICLE IS DISABLED

- (1) Check fluid level and condition.
- (2) Check for broken, disconnected throttle linkage.

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

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

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

(b) If propeller shafts do 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 shafts do not turn and transmission is not

noisy, perform hydraulic pressure test to determine if problem is a hydraulic or mechanical.

CHECKING FLUID LEVEL AND CONDITION

(1) Place vehicle on level surface. This is important for an accurate reading.

(2) Do not check level until fluid is at normal hot operating temperature of approximately 180°F. This is necessary to avoid false readings which could produce under or over fill condition.

(3) Start and run engine at curb idle speed and apply parking brakes.

(4) Shift transmission through all gear ranges and back to Neutral.

(5) Clean top of filler tube and dipstick to keep dirt out of tube.

(6) Remove dipstick and check fluid level as follows:

(a) Dipstick has three fluid level indicating marks which are a MIN dot mark, an OK mark and a MAX fill arrow mark:

(b) Correct level is to Full, or MAX arrow mark on dipstick. This is correct maximum hot fluid level. Acceptable level is between OK mark and max arrow mark on dipstick.

(c) If level is at, or below MIN level dot on dipstick, add only enough fluid to restore correct level.

Mopar ATF Plus, type 7176 is the preferred fluid. Mopar Dexron II can be used if ATF Plus is not readily available.

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

(7) Check fluid condition. Fluid should be dark to light red in color and free of particles and sludge.

(a) If fluid is discolored or smells burned but transmission operation was OK, flush cooler and lines and change fluid and filter. Then road test again to confirm proper operation.

(b) If fluid is black, dark brown, turned to sludge, contains extensive amount of metal or friction material particles, transmission will probably need overhaul (especially if shift problems were evident during road test).

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, aerating the fluid and causing the same conditions that occur 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.

OVERDRIVE ELECTRICAL CONTROLS

The electrical controls governing the shift into fourth gear consist of the control switch on the instrument panel and the overdrive solenoid on the valve body. The control switch is in circuit with the solenoid and must be in the On position to energize the solenoid. The transmission must also have reached third gear range before the shift to fourth gear will occur.

The control switch, valve body solenoid, case connectors and related wiring can all be tested with a 12 volt test lamp or a volt/ohmmeter. Check continuity of each component when diagnosis indicates this is necessary.

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

TRANSMISSION THROTTLE CABLE AND SHIFT LINKAGE

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

If cable setting is too short, early shifts and slippage between shifts may occur. If the setting is too long, shifts may be delayed and part throttle downshifts may be very sensitive. Refer to the In-Vehicle Service section for adjustment procedure.

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

Proper operation of the park/neutral position switch will provide a quick check of linkage adjustment. Refer to the In-Vehicle Service section for linkage adjustment procedure.

ROAD TESTING

Before road testing, be sure the fluid level and all linkage adjustments have been checked and adjusted if necessary. Observe engine performance during the road test. A poorly tuned engine will not allow an 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 may 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 (Fig. 1) provides a basis for analyzing road test results.

ANALYZING THE ROAD TEST

Refer to the Clutch and Band Application chart (Fig. 1) and note which elements are in use in the various gear ranges.

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

Note that the overdrive clutch is applied only in fourth gear and the overdrive direct clutch and overrunning clutch are applied in all ranges except fourth gear.

For example: If slippage occurs in first gear in D and 2 range but not in 1 range, the transmission overrunning clutch is faulty. Similarly, if slippage occurs in any two forward gears, the rear clutch is slipping.

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

J9221-22

Fig. 1 Clutch And Band Application Chart

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

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

If slippage occurs during the 3-4 shift or only in fourth gear, the overdrive clutch is slipping. Similarly, if the direct clutch were to fail, the transmission would lose both reverse gear and overrun braking in 2 position (manual second gear). If the transmission slips in any other two forward gears, the transmission rear clutch is probably slipping.

If the transmission will not shift to fourth gear, the control switch, overdrive solenoid or related wiring may also be the problem cause.

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

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

Unless a malfunction is obvious, such as no drive in D range first gear, do not disassemble

the transmission. Perform the hydraulic and air pressure tests to help pinpoint the problem 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. Use 100 psi Gauge C-3292 to check pressure at the accumulator, front servo and governor. Use 300 psi Gauge C-3293 to check pressure at the rear servo.

PRESSURE TEST PORT LOCATIONS

There are pressure test ports at the accumulator, front servo, and rear servo. Governor and overdrive clutch pressure test ports are located at the left and right rear sides of the case (Fig. 6).

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

The rear servo and governor pressure ports are at the right rear of the transmission case. The overdrive clutch pressure port is at the left rear of the case (Fig. 2).

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, front servo, and overdrive pressure ports. Test Gauge C-3293 has a 300 psi range and is used at the rear servo port where pressures range from 250 to 290 psi. In cases where two test gauges are required, the 300 psi gauge can be used at any of the other test ports.

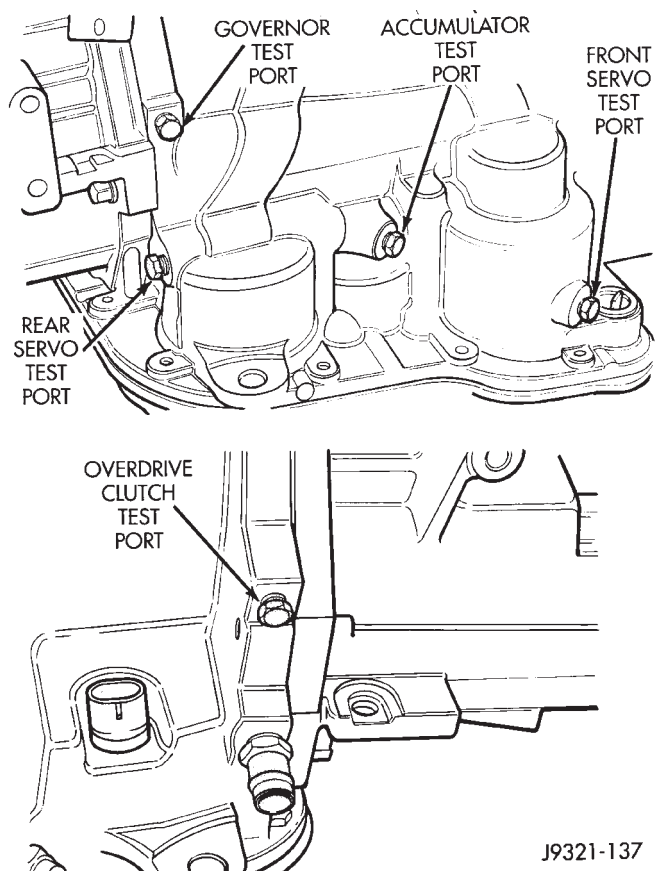


Fig. 2 Pressure Test Port Locations—46RH

HYDRAULIC PRESSURE TEST PROCEDURE

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

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 are required for this test. Gauge C-3292 has a 100 psi range. Gauge C-3293 has a 300 psi range.

- (1) Connect 100 psi Gauge C-3292 to accumulator port.
- (2) Connect 300 psi Gauge C-3293 to rear servo port (Fig. 2).
- (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. 2).
- (2) Start and run engine at 1000 rpm.
- (3) Move shift lever (on valve body) 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 for this test.

- (1) Connect test gauges to accumulator and front servo ports (Fig. 2). Use either test gauge at the two ports.
- (2) Start and run engine at 1600 rpm for this test.
- (3) Move selector lever two detents rearward from full forward position. This is D range.
- (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 for this test.

- (1) Connect 300 psi gauge to rear servo port (Fig. 2).
- (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. 2).

(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 1-1/2 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. Or approximately 1 psi for every 1 mph.

(5) Pressure rise should be smooth and drop back to 0 to 1-1/2 psi when wheels stop rotating.

(6) Compare results of pressure tests with analysis chart (Fig. 3).

Test Six—Transmission In Overdrive Fourth Gear

This test checks line pressure at the overdrive clutch in fourth gear range. Use 300 psi Test Gauge C-3292 for this test.

(1) Raise vehicle and connect test gauge to overdrive clutch pressure port (Fig. 2).

(2) Lower vehicle to enough to allow entry into drivers seat. Leave vehicle wheels approximately one foot off shop floor.

(3) Secure test gauge where it can be viewed from drivers seat.

(4) Verify that overdrive control switch is in ON position.

(5) Start engine and shift into D range.

(6) Increase engine rpm gradually until 3-4 shift occurs and note gauge pressure.

(7) Pressure should be 469-496 kPa (68-72 psi) with closed throttle and increase to 620-827 kPa (90-120 psi) at 1/2 to 3/4 throttle.

CONVERTER STALL TEST

Stall testing involves determining maximum engine rpm obtainable at full throttle with the rear wheels locked and the transmission in D range. This test checks the holding ability of the converter overrunning clutch and both of the transmission clutches. When stall testing is completed, refer to the Stall Speed Specifications chart and Stall Speed Diagnosis guides.

WARNING: NEVER ALLOW ANYONE TO STAND DIRECTLY IN LINE WITH THE VEHICLE FRONT OR REAR DURING A STALL TEST. ALWAYS BLOCK THE

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)
Pressure Low in D Fourth Gear Range	Overdrive clutch piston seal, or check ball problem
Pressure OK in 1, 2 but low in D3 and R	Leakage in front clutch area (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 low in 2	Leakage in servo; broken servo ring or cracked servo piston
Pressure low in all positions	Clogged filter, stuck regulator valve, worn or faulty pump, plugged fluid cooler
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 oil cooler or lines, seal rings leaking, output shaft plugged with debris, worn bushings in pump or clutch retainer
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Fig. 3 Pressure Test Analysis Chart

WHEELS AND APPLY THE SERVICE AND PARKING BRAKES DURING THE TEST.

STALL TEST PROCEDURE

(1) Connect tachometer to engine. Position tachometer so it can be viewed from driver seat.

(2) Check transmission fluid level. Add fluid if necessary.

(3) Start and run engine until transmission fluid reaches normal operating temperature.

(4) Block front wheels.

(5) Fully apply service and parking brakes.

(6) Open throttle completely for no more than five seconds and record maximum engine rpm registered on tachometer.

CAUTION: Stall testing causes a rapid increase in transmission fluid temperature. Do not hold the throttle open any longer than five seconds. 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.

(7) If engine speed exceeds maximum shown in stall speed chart, release accelerator immediately. This indicates that transmission clutch slippage is occurring.

(8) Shift transmission into Neutral. Operate engine for 20 seconds. Stop engine, shift transmission into Park and release brakes.

(9) Stall speeds should be in 1800-2100 rpm range.

STALL TEST ANALYSIS

STALL SPEED TOO HIGH

If the stall speed exceeds specifications by more than 200 rpm, transmission clutch slippage is indicated.

STALL SPEED TOO LOW

Low stall speeds with a properly tuned engine indicate a torque converter overrunning clutch problem. The condition should be confirmed by road testing prior to converter replacement.

The converter overrunning clutch is slipping when: Stall speeds are 250 to 350 rpm below specified minimum and the vehicle operates properly at highway speeds but has poor low speed acceleration.

STALL SPEED NORMAL

If stall speeds are normal but abnormal throttle opening is required to maintain highway speeds, the converter overrunning clutch is seized and the torque converter must 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 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 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 in Figure 4.

FRONT CLUTCH AIR TEST

Place one or two fingers on the clutch housing and apply air pressure through front clutch apply passage (Fig. 8). Piston movement can be felt and a soft thud heard as the clutch applies.

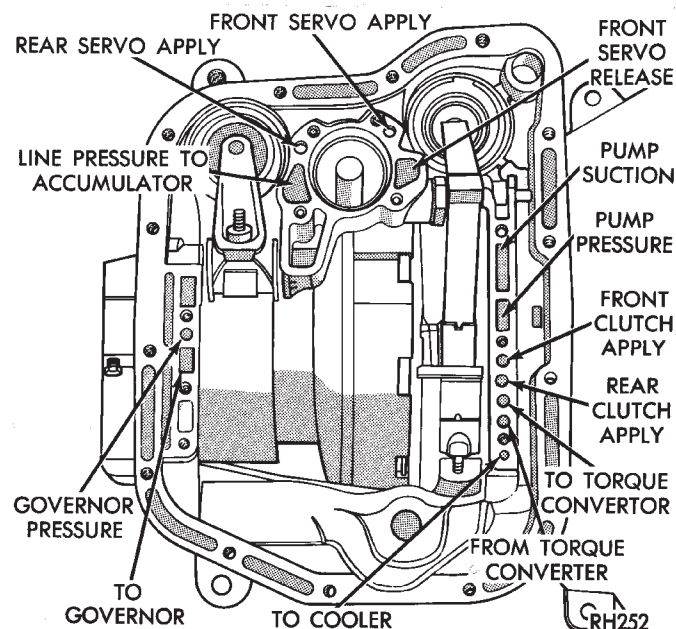


Fig. 4 Air Pressure Test Passages

REAR CLUTCH AIR TEST

Place one or two fingers on the clutch housing and apply air pressure through rear clutch apply passage (Fig. 4). Piston movement can be felt and a soft thud heard as the clutch applies.

FRONT SERVO AIR TEST

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

REAR SERVO AIR TEST

Apply air pressure to the rear servo apply passage. The servo rod should extend and cause the band to tighten around the drum. Spring tension 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. First, it must be verified that a leak condition actually exists. And second, the true source of the leak must be determined.

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 refill 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. 5).

Pump vent or pump attaching bolt leaks are generally deposited on the inside of the converter housing and not on the converter itself (Fig. 5).

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.

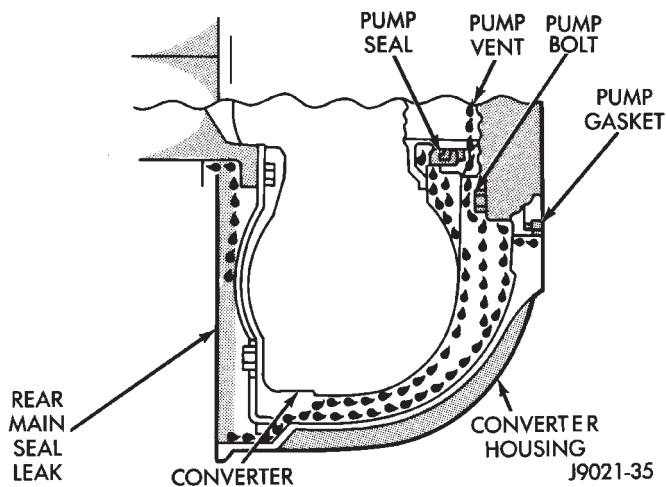


Fig. 5 Converter Housing Leak Paths

LEAK DIAGNOSIS PROCEDURE

- (1) Raise rear of vehicle and allow accumulated fluid to drain out of converter housing.
- (2) Check and adjust transmission fluid level.
- (3) Raise vehicle. Remove converter housing dust cover and wipe as much fluid as possible from converter housing.

(4) Fabricate test probe (Fig. 6). Attach probe to converter housing with a dust shield bolt.

(5) Have a helper run engine at 2500 rpm (with transmission in Neutral) for two minutes; then stop engine.

(6) Inspect test probe and converter housing. If a leak is evident, note color of fluid. Transmission fluid is red. Engine oil ranges in color from brown to green, or to black when oil is dirty.

(7) If probe upper surface is, the converter and seal are not at fault. A path of fluid across probe upper surface indicates a converter or seal leak. Fluid leaking **under** the probe is coming from pump housing area (Fig. 7).

(8) Fluid leaking under the probe could be from: pump seal and/or bushing, pump vent, kickdown lever shaft access plug, pump bolts, or porous spots in pump body or transmission case (Fig. 7).

(9) If porous spots in the transmission case or pump body are the suspected leak source, pressurize transmission as described in Leak Testing With Air Pressure.

TORQUE CONVERTER LEAK POINTS

Possible sources of converter leaks are: (a) leaks at the weld joint around the outside diameter weld and

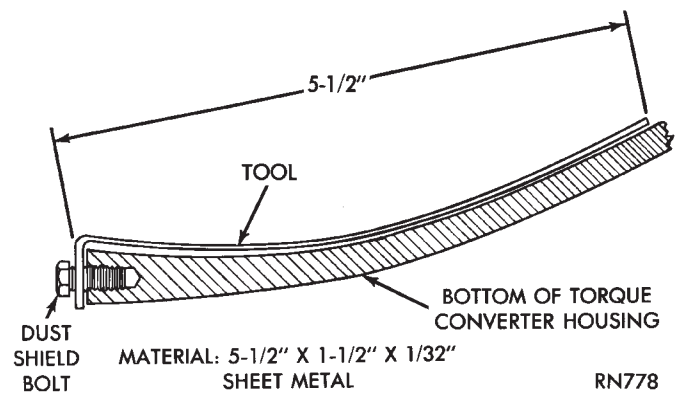


Fig. 6 Leak Test Probe

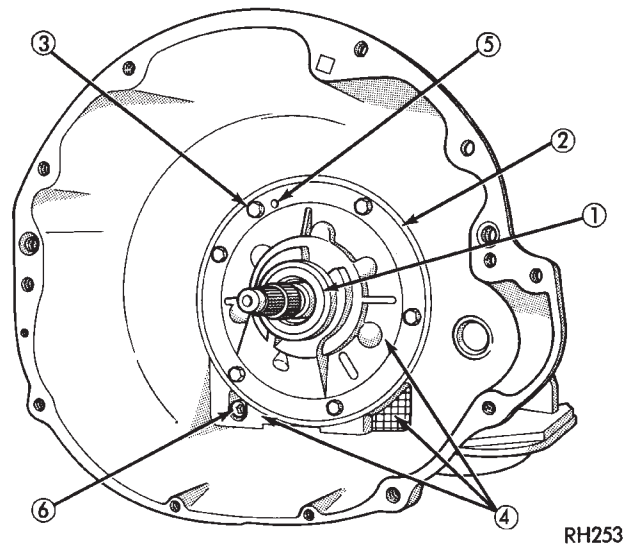


Fig. 7 Pump Area Inspection Points

(b) leaks at the converter hub weld (Fig. 8).

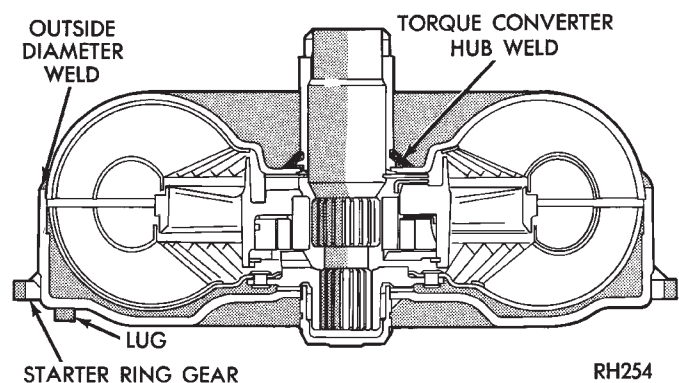


Fig. 8 Converter Potential Leak Points

LEAK TESTING WITH AIR PRESSURE

This test involves closing off all openings and pressurizing the transmission to 8 psi with Air Pump 7700.

A soapy water solution is applied to suspected leak points before and during the pressure test. Leaks will be indicated by the presence of air bubbles coming through the solution.

Some transmission openings such as the fill tube and front cooler line fitting can be closed off with a rubber plug or similar device. Plugs can be secured with wire or duct tape.

The transmission rear output shaft opening is closed off simply by leaving the transfer case bolted in place. However, if the transfer case has been removed, a shipping plug can be used to close off this opening.

The torque converter hub opening in the pump and the pump vent require special tools to close them off. The converter hub seal cap is made from thin wall tube and a 3.17 mm (1/8 in.) thick disc (Fig. 9). A retaining strap is needed to secure the seal cup for testing. The strap can be made from 31.75 mm (1-1/4 in.) wide stock (Fig. 10). The strap attaching hole positions are approximate only. Measure hole position on the converter housing before drilling.

The pump vent tool is made from 6.35 mm (1/4 in.) rod and 4.76 mm (3/16 in.) plate (Fig. 11).

The fabricated tools can all be made from mild steel or aluminum stock.

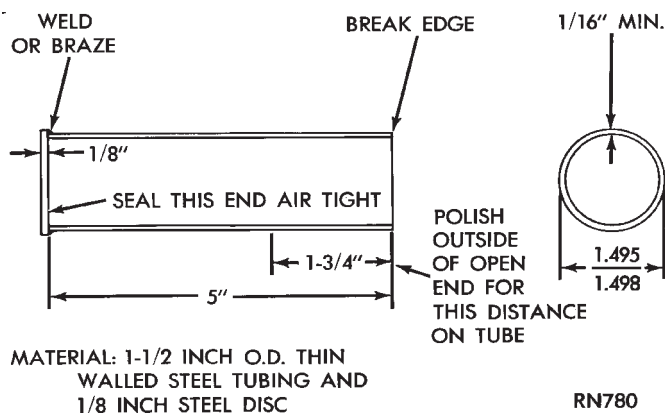


Fig. 9 Converter Hub Seal Cup

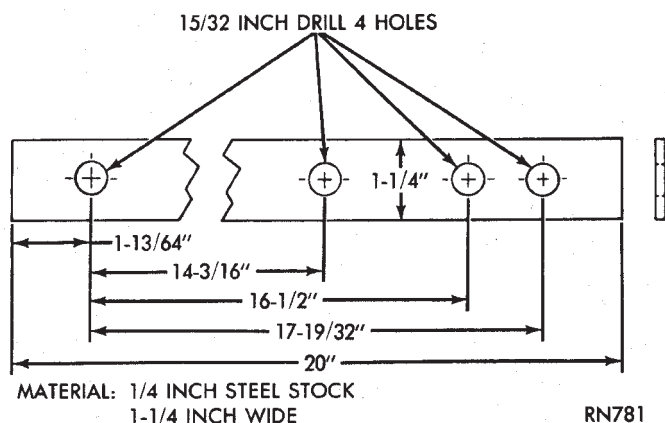


Fig. 10 Seal Cup Retaining Strap

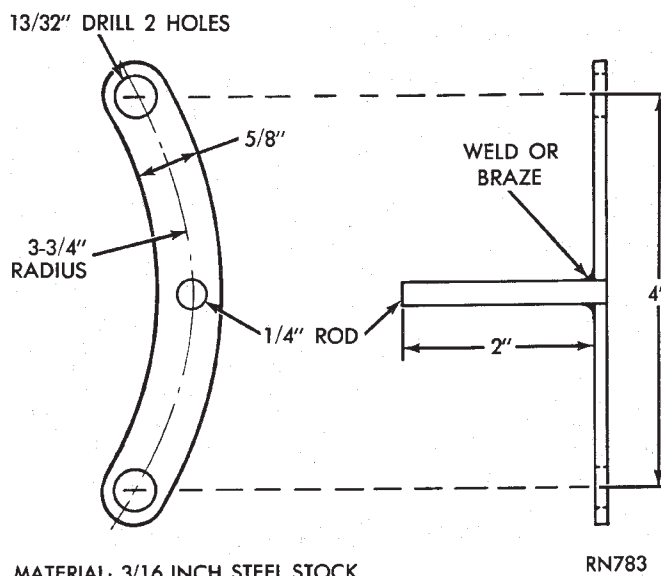


Fig. 11 Pump Vent Plug

AIR PRESSURE LEAK TEST PROCEDURE

(1) Install vent plug, converter hub seal cup and cup retaining strap (Fig. 12).

CAUTION: Be sure the surfaces of the hub seal cup are smooth and free of nicks, scratches, or burrs. Surface irregularities on the cup will damage the pump seal if not removed. Sand and/polish the cup with 400 grit sandpaper or crocus cloth to smooth the surface if necessary.

(2) Close off remaining transmission openings with rubber plugs, or stoppers or similar devices. **Do not close off rear cooler line fitting. Hand operated air pump will be attached to this fitting.**

(3) Attach Air Pump 7700 to rear cooler line fitting. Connect a length of copper tube to fitting. Then attach pump hose to tube with hose clamp (Fig. 13).

(4) Apply a thick soapy water solution to suspected leak areas.

CAUTION: The recommended test pressure is 8 psi. The maximum allowable test pressure is 10 psi. Do not exceed specified pressure.

(5) Pressurize transmission to 8 psi with air pump.

(6) Observe suspected leak areas. Air bubbles appearing in soapy water solution indicate leak points.

(7) Remove test tools and plugs after test completion and make necessary repairs as described in Leak Correction procedure.

CONVERTER HOUSING AREA LEAK CORRECTION

(1) Remove converter.

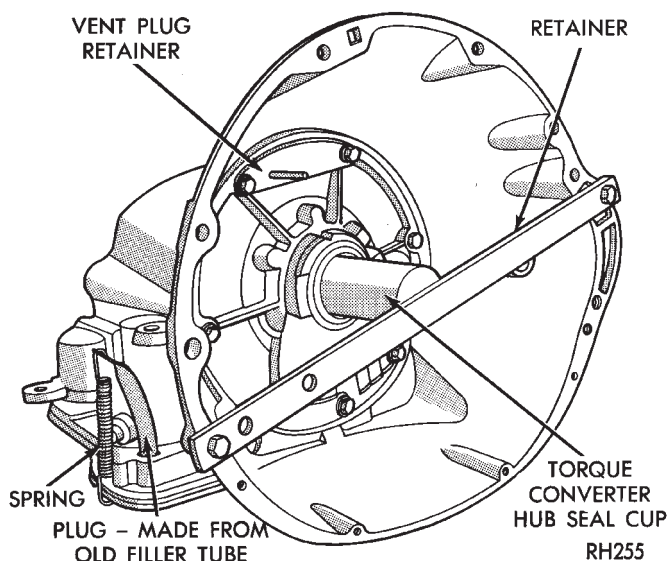


Fig. 12 Vent Plug And Hub Seal Cup Installation

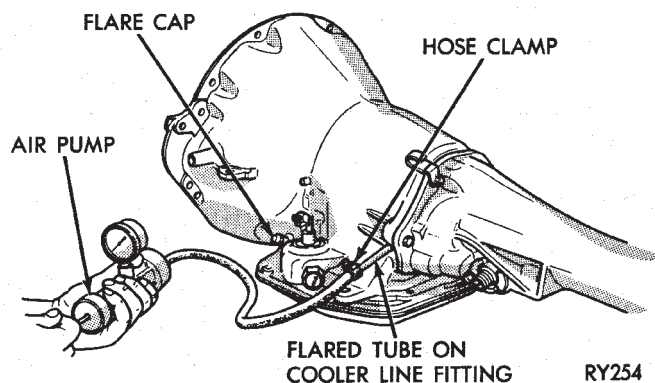


Fig. 13 Pressurizing Transmission

(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 if scoring is severe.

(5) Install new pump seal, O-ring, gasket, bushing. Replace oil pump if cracked, porous or damaged in any way.

(6) Loosen kickdown lever pin access plug three turns. Apply Permatex No. 2 or equivalent 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 torque converter clutch fault conditions.

The hydraulic flow charts 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.

TRANSMISSION DIAGNOSIS

Condition	Possible Cause	Correction
HARSH ENGAGEMENT (FROM NEUTRAL TO DRIVE OR REVERSE) Note: The shift from neutral to reverse is normally quite firm. Hydraulic pressure at the rear servo can approach 300 psi in reverse gear. Do not confuse a firm engagement with a truly harsh engagement	1. Engine idle speed too high 2. Driver "riding" accelerator pedal during shift 3. Throttle cable or linkage misadjusted 4. Band adjustment needed 5. Loose mounting bolts 6. Worn or damaged U-joints 7. Loose axle pinion nut 8. Hydraulic pressure is incorrect 9. Accumulator piston spring, or seal worn or damaged 10. Faulty converter clutch (if equipped) 11. Clutch, band, or planetary component is damaged	1. Check/adjust idle speed 2. Advise owner/operator 3. Adjust cable or linkage; setting is either too long or too short 4. Adjust front/rear bands 5. Check engine, transmission, propeller shaft, crossmember, and axle bolt torque; tighten loose bolts and replace missing bolts 6. Remove propeller shaft and replace U-joints 7. Replace nut and check pinion threads before installing new nut; replace pinion gear if threads are damaged 8. Check pressures; remove, overhaul, or adjust valve body as needed; repair oil pump if necessary 9. Remove valve body and replace piston, seal, or spring as needed 10. Replace converter and flush cooler and lines before installing new converter 11. Remove, disassemble, and repair transmission as necessary
DELAYED ENGAGEMENT (FROM NEUTRAL TO DRIVE OR REVERSE)	1. Engine idle speed too low 2. Low fluid level 3. Gearshift linkage out of adjustment 4. Rear band out of adjustment 5. Valve body filter plugged 6. Oil pump gears worn or damaged or pump body or seal is damaged, allowing pump to take in air, causing fluid aeration 7. Reaction shaft seal rings worn or broken 8. Governor valve stuck or valve shaft is loose or damaged 9. Low hydraulic pressure 10. Clutch, band, or servo damage	1. Adjust idle speed 2. Correct level and check for leaks 3. Adjust cable or linkage and repair linkage if worn or damaged 4. Adjust band 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. Remove transmission and replace oil pump 7. Remove transmission, remove oil pump, and replace seal rings 8. Remove and inspect governor components; replace worn or damaged parts 9. Perform pressure test, remove transmission, and repair as needed 10. Remove and disassemble transmission and repair as necessary

TRANSMISSION DIAGNOSIS

Condition	Possible Cause	Correction
SHIFTS DELAYED OR ERRATIC (SHIFTS ALSO HARSH AT TIMES)	<ol style="list-style-type: none"> 1. Low fluid level 2. Throttle linkage out of adjustment 3. Throttle linkage is binding 4. Gearshift linkage out of adjustment 5. Fluid filter partially clogged 6. Air in fluid due to overfill condition or air leakage into pump suction passages 7. Clutch or servo problem 8. Front band out of adjustment (may cause harsh 1-2 shift) 	<ol style="list-style-type: none"> 1. Correct fluid level and check for leaks 2. Adjust linkage as described in service section 3. Disassemble, clean, and adjust linkage; replace linkage grommets if removed or if worn or cracked 4. Adjust linkage as described in service section 5. Replace filter. If filter and fluid contained clutch material or metal particles, an overhaul may be necessary 6. Drain fluid to correct level if overfilled. If fluid is highly aerated (full of bubbles and foamy), oil pump gasket or seal may have failed, or pump body is porous or cracked 7. Remove valve body and air test clutch, band and servo operation; disassemble and repair transmission as needed 8. Adjust band
NO REVERSE (D RANGES OK)	<ol style="list-style-type: none"> 1. Gearshift linkage is either out of adjustment or damaged 2. Rear band is out of adjustment 3. Valve body malfunction (stuck/damaged manual valve, regulator valve, or check ball) 4. Rear servo or front clutch malfunction 	<ol style="list-style-type: none"> 1. Repair or replace linkage parts as needed 2. Adjust band 3. Remove and service valve body; replace valve body if any valves or valve bores are worn or damaged 4. Remove and disassemble transmission; replace worn, damaged servo and clutch parts as necessary
HAS FIRST-REVERSE ONLY (NO 1-2 OR 2-3 UPSHIFT)	<ol style="list-style-type: none"> 1. Governor valve, shaft, weights, or body damaged 	<ol style="list-style-type: none"> 1. Remove governor assembly and repair as necessary

TRANSMISSION DIAGNOSIS

Condition	Possible Cause	Correction
NO DRIVE RANGE (REVERSE OK)	<ol style="list-style-type: none"> 1. Gearshift linkage either loose, damaged or out of adjustment 2. Low fluid level 3. Valve body malfunction (manual valve or shaft damaged or 1-2 shift valve stuck) 4. Rear clutch failure 5. Transmission overrunning clutch failure 6. Input shaft seal rings worn or damaged 	<ol style="list-style-type: none"> 1. Repair or replace linkage components 2. Correct fluid level and check for leaks 3. Remove and disassemble valve body; replace as assembly if any valves or bores are damaged 4. Remove and disassemble transmission and rear clutch; repair/replace worn, damaged parts as needed 5. Remove and disassemble transmission; replace overrunning clutch 6. Remove and disassemble transmission; replace seal rings and any other worn or damaged parts
NO DRIVE OR REVERSE (VEHICLE WILL NOT MOVE)	<ol style="list-style-type: none"> 1. Low fluid level 2. Gearshift linkage loose, damaged, or misassembled 3. Failure of driveline component, such as U-joint, axle shaft, transfer case component, etc. 4. Low fluid pressure due to worn or damaged oil pump 5. Transmission internal component damaged 6. Valve body malfunction (seized valve, damaged manual lever, valve body screws loose or overtightened causing distortion and bind) 	<ol style="list-style-type: none"> 1. Add fluid and check for leaks if drive is restored 2. Inspect, adjust, and reassemble linkage as needed; replace worn, damaged parts 3. Perform preliminary inspection procedure for vehicle that will not move; refer to procedure in diagnosis section 4. Perform pressure test to confirm low pressure; replace pump body and/or gears if necessary 5. Remove and disassemble transmission; repair or replace failed components as needed 6. Remove, disassemble, 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

TRANSMISSION DIAGNOSIS

Condition	Possible Cause	Correction
MOVES IN 2ND OR 3RD GEAR, ABRUPTLY DOWNSHIFTS TO LOW	<ol style="list-style-type: none"> 1. Governor valve sticking 2. Valve body malfunction 	<ol style="list-style-type: none"> 1. Remove, clean, and inspect; replace faulty parts 2. Remove, clean, and inspect; look for stuck 1-2 valve or governor plug
SLIPS IN LOW GEAR D ONLY, BUT NOT IN 1 POSITION	<ol style="list-style-type: none"> 1. Overrunning clutch faulty, not holding 	<ol style="list-style-type: none"> 1. Replace overrunning clutch
SLIPS IN FORWARD DRIVE RANGES	<ol style="list-style-type: none"> 1. Low fluid level 2. Air in fluid (fluid is foamy, full of bubbles), shifts are spongy, caused by air getting into pump suction passages 3. Gearshift or throttle linkage out of adjustment 4. Low hydraulic pressures due to worn pump, incorrect control pressure adjustments, valve body warpage or malfunction, sticking governor, leaking seal rings, clutch seals leaking, servo leaks, clogged filter, or cooler lines 5. Accumulator piston cracked, spring broken or seal worn 6. Clutch or servo malfunction, leaking seals or worn plates 7. Overrunning clutch worn, not holding (slips in 1 only) 	<ol style="list-style-type: none"> 1. Add fluid and check for leaks 2. Check for bad pump gasket or seals, dirt between pump halves, and loose pump bolts or defective O-ring at filler tube 3. Adjust linkage 4. Perform hydraulic and air pressure tests to determine cause 5. Inspect and repair as necessary 6. Air pressure check clutch-servo operation and repair as required 7. Replace clutch
SLIPS IN REVERSE ONLY	<ol style="list-style-type: none"> 1. Low fluid level 2. Aerated fluid; see Slips in Forward Drive Ranges 3. Gearshift linkage out of adjustment 4. Rear band out of adjustment 5. Hydraulic pressure too low due to worn pump, worn seal rings, clutch or servo seal leakage 6. Worn front clutch, leaking rear servo, or worn rear band 7. Band-linkage binding 	<ol style="list-style-type: none"> 1. Add fluid and check for leaks 2. See Slips in Forward Drive Ranges 3. Adjust linkage 4. Adjust band 5. Perform hydraulic pressure tests to determine cause 6. Air pressure check clutch-servo operation and repair as required 7. Inspect and repair as required

TRANSMISSION DIAGNOSIS

Condition	Possible Cause	Correction
NO KICKDOWN OR NORMAL DOWNSHIFT	<ol style="list-style-type: none"> 1. Incorrect throttle linkage or cable adjustment 2. Incorrect gear shift linkage or cable adjustment 3. Front band out of adjustment 4. Hydraulic pressures too high or too low due to sticking governor, valve body malfunction, or incorrect hydraulic control pressure adjustments 5. Front servo, band, or linkage malfunction 6. Clutch or servo malfunction 	<ol style="list-style-type: none"> 1. Adjust linkage or cable 2. Adjust linkage or cable 3. Adjust band 4. Perform hydraulic pressure tests to determine cause and repair as required. Correct valve body pressure adjustments as required 5. Air pressure test operation and repair as necessary 6. Air pressure test operation and repair as necessary
STUCK IN LOW GEAR (WILL NOT UPSHIFT)	<ol style="list-style-type: none"> 1. Gearshift or throttle linkage or cable out of adjustment 2. Front band out of adjustment 3. Governor valve stuck closed; loose output shaft support or governor housing bolts, worn pump, leaking seal rings, or valve body problem (i.e., stuck 1-2 shift valve or governor plug) 4. Clutch or servo malfunction 	<ol style="list-style-type: none"> 1. Adjust linkage or cable. Repair linkage of worn or damaged. Replace damaged cable. 2. Adjust band 3. Check line and governor pressures to determine cause; correct as required 4. Air pressure check operation of clutches and bands; repair faulty component
NO LOW GEAR (MOVES IN 2ND OR 3RD GEAR ONLY)	<ol style="list-style-type: none"> 1. Governor valve sticking in partially open position 2. Valve body malfunction 3. Front servo piston cocked in bore 4. Front band linkage malfunction 5. Incorrect throttle or gearshift linkage or cable adjustment 	<ol style="list-style-type: none"> 1. Remove governor; clean, inspect, and repair as required 2. Remove, clean, and inspect. Look for sticking 1-2 valve, 2-3 valve, governor plug, or broken springs 3. Inspect servo and repair as required 4. Inspect linkage and look for bind in linkage 5. Adjust linkage or cable

TRANSMISSION DIAGNOSIS

Condition	Possible Cause	Correction
CREEPS IN NEUTRAL	<ol style="list-style-type: none"> 1. Gearshift linkage out of adjustment 2. Valve body malfunction (warped body, cross leakage) 3. Clutch dragging 4. Converter lockup clutch dragging 	<ol style="list-style-type: none"> 1. Adjust linkage 2. Perform hydraulic pressure test to determine cause and repair as required 3. Air pressure check operation of clutches and repair as required 4. Oil pump worn; replace pump
DRAGS OR LOCKS UP	<ol style="list-style-type: none"> 1. Front or rear band out of adjustment 2. Servo band or linkage malfunction (i.e., binding linkage, warped band, servo piston stuck) 3. Dragging clutch (does not release fully) 4. Broken or seized planetary gears 5. Overrunning clutch worn, broken, or seized 	<ol style="list-style-type: none"> 1. Adjust bands 2. Air pressure check servo operation and repair as required 3. Air pressure check clutch operation and repair as required 4. Remove, inspect, and repair as required (look for debris in oil pan) 5. Remove and inspect clutch, repair as required
GROWLING, GRATING, OR SCRAPING NOISES	<ol style="list-style-type: none"> 1. Planetary gear set broken or seized 2. Overrunning clutch worn, seized, or broken 3. Oil pump components scored, binding, or broken 4. Output shaft bearing or bushing damaged 5. Faulty clutch operation 6. Governor support (park gear) binding or seal rings broken 7. Front and rear bands out of adjustment 	<ol style="list-style-type: none"> 1. Check for debris in oil pan and repair as required 2. Inspect and check for debris in oil pan; repair as required 3. Remove, inspect, and repair as required 4. Remove, inspect, and repair as required 5. Perform air pressure check and repair as required 6. Remove, inspect, and repair as required 7. Adjust bands
BUZZING NOISE	<ol style="list-style-type: none"> 1. Low fluid level 2. Air being drawn into pump suction passages 3. Overrunning clutch damaged 4. Valve body misassembled, bolts loose, weak spring, or mispositioned valve or check ball 	<ol style="list-style-type: none"> 1. Add fluid and check for leaks 2. Check pump for porous casting, scores on mating surfaces, and excess rotor clearance; repair as required 3. Replace clutch 4. Remove, disassemble, inspect valve body; reassemble correctly if necessary; replace assembly if valves or springs are damaged

TRANSMISSION DIAGNOSIS

Condition	Possible Cause	Correction
OIL COMES OUT FILLER TUBE	<ol style="list-style-type: none"> 1. Transmission overfilled 2. Breather vent in oil pump blocked 3. Fluid cooler or cooler lines plugged 4. Air in fluid (aerated) 5. Oil filter clogged 6. Rear servo piston or seal failure 7. Valve body switch valve sticking 	<ol style="list-style-type: none"> 1. Drain fluid to correct level; remove neutral switch and drain through switch hole with suction gun 2. Inspect and clear blockage 3. Flush cooler and lines 4. See "Slips In Forward Drive Ranges" 5. Replace filter; determine the reason for clogged condition and repair 6. Check hydraulic pressure at servo in reverse (will register low or fluctuate rapidly) 7. Remove and clean valve
OIL LEAKS (ITEMS LISTED REPRESENT POSSIBLE LEAK POINTS AND SHOULD ALL BE CHECKED)	<ol style="list-style-type: none"> 1. Speedometer adapter 2. Pan gasket 3. Filler tube (where tube enters case) 4. Fluid lines and fittings 5. Valve body manual lever shaft seal 6. Pressure port plug loose 7. Rear bearing access plate 8. Gasket damaged or bolts are loose 9. Adapter/extension gasket damaged 10. Neutral switch 11. Converter housing area 12. Cooler line fittings and hoses 13. Pump seal 14. Torque converter 	<ol style="list-style-type: none"> 1. Replace both adapter seals 2. Tighten pan screws to 150 inch-pounds; if leaks persist, replace gasket; do not overtighten screws 3. Replace O-ring seal 4. Tighten fittings; if leaks persist, replace fittings and lines if necessary 5. Replace shaft seal 6. Tighten to correct torque; replace plug if leak persists 7. Replace gasket 8. Replace bolts or gasket or tighten bolts 9. Replace gasket 10. Replace switch and gasket 11. Check for leaks at seal caused by worn seal or burr on converter hub (cutting seal), worn bushing, missing oil return, oil in front pump housing, or hole plugged. Check for leaks past O-ring seal on pump, or past pump-to-case bolts; pump housing porous, oil coming out vent due to overfill or leak past front band shaft access plug 12. Replace fittings and hoses 13. Replace seal 14. Replace converter

TRANSMISSION DIAGNOSIS

Condition	Possible Cause	Correction
OVERHEAT DURING COMMERCIAL OPERATION OR WHILE TRAILER TOWING (FLUID DARK AND BURNED WITH SOME SLUDGE FORMATION)	<ol style="list-style-type: none"> 1. Vehicle not properly equipped for trailer towing or commercial use 2. Vehicle not equipped with auxiliary fluid cooler 3. Extensive idling time or operation in heavy traffic in hot weather 4. Tow vehicle overloaded (exceeding vehicle tow capacity) 5. Air flow to auxiliary cooler blocked by snow plow, front mounted spare tire, bug screen, or similar item 	<ol style="list-style-type: none"> 1. 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 2. Drain fluid, change filter, and install auxiliary cooler 3. Cut down on idling time; shift into neutral every so often and run engine at 1000 rpm to help circulate fluid through cooler 4. 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 5. Remove or reposition item causing air flow blockage
OVERHEAT DURING NORMAL OPERATION (FLUID DISCOLORED, SMELLS BURNED)	<ol style="list-style-type: none"> 1. Low fluid level 2. Fluid cooler, lines blocked, or cooler cracked (oil in engine coolant) 3. Switch valve sticking 4. Clutch pack clearance incorrect (too tight) 5. Bands too tight 	<ol style="list-style-type: none"> 1. Add fluid and check for leaks 2. Flush cooler and lines and replace radiator if transmission fluid has entered coolant 3. Remove, disassemble, clean valve body 4. Check and correct as required 5. Adjust bands

TRANSMISSION DIAGNOSIS

Condition	Possible Cause	Correction
NO START IN PARK OR NEUTRAL	<ol style="list-style-type: none"> 1. Gearshift linkage out of adjustment 2. Neutral switch wire broken or open 3. Faulty neutral switch 4. Valve body manual lever assembly bent, worn, broken, or not aligned with switch 	<ol style="list-style-type: none"> 1. Adjust linkage 2. Check continuity with test lamp; repair as required 3. Refer to service section for test and replacement procedure 4. Inspect lever assembly and replace if damaged
SLUGGISH ACCELERATION AT LOW SPEEDS OR REQUIRES EXCESSIVE THROTTLE OPENING TO MAINTAIN HIGHWAY SPEEDS	<ol style="list-style-type: none"> 1. Poor engine performance 2. Gearshift or throttle linkage out of adjustment 3. Transmission clutches slipping 4. Overrunning clutch in converter not holding 5. Converter overrunning clutch stuck 	<ol style="list-style-type: none"> 1. Check engine and repair as required 2. Adjust linkage 3. Perform stall test and repair as required 4. Perform stall test and replace converter if clutch has failed 5. Replace converter
FLUID CONTAMINATED (DISCOLORED, FULL OF SLUDGE AND/OR METAL AND FRICTION MATERIAL PARTICULAR)	<ol style="list-style-type: none"> 1. If contamination occurred shortly after overhaul, fluid cooler and lines were not flushed and flow tested. This is especially true when original overhaul was to correct a problem that generated a large amount of debris, such as a gear failure or a clutch pack failure Note: Flushing the cooler and lines is mandatory after a failure of the converter lockup clutch 2. Incorrect fluid used in transmission 3. Main cooler in radiator is cracked, allowing engine coolant to enter transmission 4. Severe overload results in overheat, fluid breakdown, and accelerated wear, especially in high ambient temperatures. Most frequent causes are: <ul style="list-style-type: none"> • Vehicle is not properly equipped for heavy duty service • Tow vehicle and boat or trailer are both overloaded • Trailer or boat are too large for tow vehicle (load exceeds rated capacity of tow vehicle) 	<ol style="list-style-type: none"> 1. If contamination is severe, cooler flushing, converter replacement, and another overhaul may be necessary; particularly so if shift problems were also present 2. If transmission is operating properly, drain fluid, reverse flush cooler and lines, and change fluid and filter. However, if shift problem has developed, converter replacement and transmission overhaul may be required 3. Replace radiator (and cooler) and flush lines. If problem was diagnosed early enough, fluid and filter change may only be necessary. If contamination period was prolonged, overhaul and converter replacement may be required 4. Repair transmission, flush cooler, and lines. Replace converter if necessary. Install auxiliary cooler if needed. Also install HD cooling system if needed. If tow vehicle and unit being towed are both overloaded, the only repair is to reduce the load to rated limits. However, if trailer or boat is too large for tow vehicle, the only option is for the owner to move up to properly-equipped and load-rated tow vehicle

OVERDRIVE DIAGNOSIS

Condition	Possible Cause	Correction
NO 3-4 UPSHIFT	<ol style="list-style-type: none"> 1. Fourth gear overdrive switch (on dash) in OFF position 2. Overdrive circuit fuse blown 3. Fourth gear overdrive switch shorted, open, wires loose 4. Overdrive solenoid or circuit wire loose, shorted, open 5. Solenoid feed orifice in valve body is blocked 6. Fourth gear overdrive solenoid failure 7. Sensor failure (vehicle speed sensor or coolant sensor) 8. Park/neutral switch open or shorted or switch wire to powertrain control module is damaged (loss of park/neutral input) 9. Powertrain control module faulty 10. T.P.S. fault 11. Transmission fluid temperature sensor fault (if equipped) 12. Overdrive piston seal failure 13. Wrong overdrive piston spacer 14. Low hydraulic pressure 15. Set-reset module faulty 	<ol style="list-style-type: none"> 1. Turn control switch to ON position 2. Replace fuse; determine why fuse failed and repair as necessary (i.e., shorts, grounds in circuit) 3. Replace switch if shorted or open and repair loose or damaged wires 4. Check wires/connections with 12V test lamp and voltmeter; repair damaged or loose wires/connections as necessary 5. Remove, disassemble, clean valve body thoroughly 6. Verify solenoid failure with test lamp and replace solenoid 7. Test both sensors with test lamp or volt/ohmmeter and replace faulty sensor 8. Test switch as described in service section and replace if necessary 9. Check with DRB II scan tool and replace if necessary 10. Adjust or replace T.P.S. 11. Replace sensor 12. Replace both seals 13. Remove unit, check end play, and install correct spacer 14. Pressure test transmission to determine cause 15. Replace module (if equipped)
SLIPS IN OVERDRIVE FOURTH GEAR	<ol style="list-style-type: none"> 1. Low fluid level 2. Overdrive piston or seal malfunction 3. Overdrive clutch pack worn 4. 3-4 shift valve, timing valve, or accumulator malfunction 5. Overdrive piston retainer bleed orifice blown out 6. Overdrive unit thrust bearing failure 	<ol style="list-style-type: none"> 1. Add fluid and check for leaks 2. Remove overdrive unit; replace piston seals if worn; replace piston if damaged, if piston retainer is damaged, it will be necessary to remove and disassemble the transmission 3. Remove overdrive unit and rebuild clutch pack 4. Remove and overhaul valve body. Replace accumulator seals. Make sure all valves operate freely in bores, and do not bind or stick. Make sure valve body screws are correctly tightened and separator plates are properly positioned 5. Disassemble transmission, remove retainer, and replace orifice 6. Disassemble overdrive unit and replace thrust bearing (No. 1 thrust bearing is between overdrive piston and clutch hub; No. 2 thrust bearing is between the planetary gear and the direct clutch spring plate; No. 3 thrust bearing is between overrunning clutch hub and output shaft)

OVERDRIVE DIAGNOSIS

Condition	Possible Cause	Correction
DELAYED 3-4 UPSHIFT (SLOW TO ENGAGE)	<ol style="list-style-type: none"> 1. Low fluid level 2. Overdrive solenoid or wiring is faulty 3. Overdrive piston spacer too thin 4. Overdrive clutch pack worn 5. T.P.S. faulty 6. Overdrive clutch bleed orifice plugged 	<ol style="list-style-type: none"> 1. Add fluid and check for leaks 2. Test solenoid and check wiring for loose/corroded connections, or shorts/ground; replace solenoid if faulty and repair wiring if necessary 3. Remove unit; measure end play and select proper spacer 4. Remove unit and rebuild clutch pack 5. Replace T.P.S. 6. Disassemble transmission and replace orifice
3-4 UPSHIFT OCCURS BEFORE COMPLETION OF 2-3 UPSHIFT	<ol style="list-style-type: none"> 1. Overdrive solenoid connector or wiring problem 2. Overdrive solenoid malfunction 3. Coolant temperature or T.P.S. malfunction 4. Valve body malfunction 5. Powertrain control module malfunction 	<ol style="list-style-type: none"> 1. Test connector and wiring for loose connections, shorts, or ground, and repair as needed 2. Replace solenoid 3. Test each sensor for continuity, short, ground, and replace as necessary 4. Remove, disassemble, clean, and inspect valve body components; make sure all valves and plugs slide freely in bores; polish valves with crocus cloth if needed 5. Test with DRB II scan tool and replace controller if faulty

OVERDRIVE DIAGNOSIS

Condition	Possible Cause	Correction
NO 4-3 DOWNSHIFT	<ol style="list-style-type: none"> 1. Circuit wiring and/or connectors shorted 2. Converter clutch solenoid not venting 3. Overdrive solenoid not venting 4. 3-4 shift, shuttle, timing valve, or accumulator malfunction 5. Powertrain control module malfunction 6. T.P.S. malfunction 7. Sensor or sensor wiring problem 	<ol style="list-style-type: none"> 1. Test wiring and connectors, with test lamp and volt/ohmmeter; repair wiring as necessary; replace connectors and/or harnesses as required 2. Remove valve body and replace solenoid if seized or shorted 3. Remove valve body and replace solenoid if seized or shorted 4. Remove valve body; remove and disassemble lower housing and 3-4 accumulator housing; replace seals and clean valves as necessary; be sure all valves slide freely in bores 5. Check operation with DRB II scan tool; replace controller only if faulty 6. Replace T.P.S. 7. Check coolant and transmission temperature sensors, speed sensor, and overdrive control switch
NO 4-3 DOWNSHIFT WHEN CONTROL SWITCH IS TURNED OFF	<ol style="list-style-type: none"> 1. Control switch open-shortcd 2. Overdrive solenoid wiring or connectors faulty 3. Overdrive or converter clutch solenoid not venting 4. Powertrain control module malfunction 	<ol style="list-style-type: none"> 1. Test and replace switch if faulty 2. Check solenoid wiring and connections for shorts/grounds; repair as necessary 3. Test solenoids and replace if seized or shorted 4. Test with DRB II scan tool; replace module if faulty

OVERDRIVE DIAGNOSIS

Condition	Possible Cause	Correction
HARSH 1-2, 2-3, OR 3-2 SHIFTS (A500)	1. Lockup solenoid failure	1. Remove valve body and replace solenoid
TORQUE CONVERTER LOCKS UP IN SECOND AND/OR THIRD GEAR (A500)	1. Lockup solenoid, relay, or wiring problem	1. Test solenoid, relay, and wiring for continuity, shorts, or grounds; replace solenoid and relay if faulty; repair wiring and connectors as necessary
NOISY OPERATION IN FOURTH GEAR ONLY	<ol style="list-style-type: none">1. Overdrive clutch discs, plates, or snap rings damaged2. Overdrive piston or planetary thrust bearing brinnelled, installed wrong, or damaged3. Output shaft bearings brinnelled, scored, damaged4. Planetary gears worn, chipped, damaged5. Overdrive unit overrunning clutch rollers rough, scored, or output bushings are worn	<ol style="list-style-type: none">1. Remove unit and rebuild clutch pack2. Remove and disassemble unit; replace either thrust bearing if damaged3. Remove and disassemble unit; replace either bearing if damaged4. Remove and overhaul overdrive unit5. Remove and overhaul overdrive unit

OVERDRIVE DIAGNOSIS

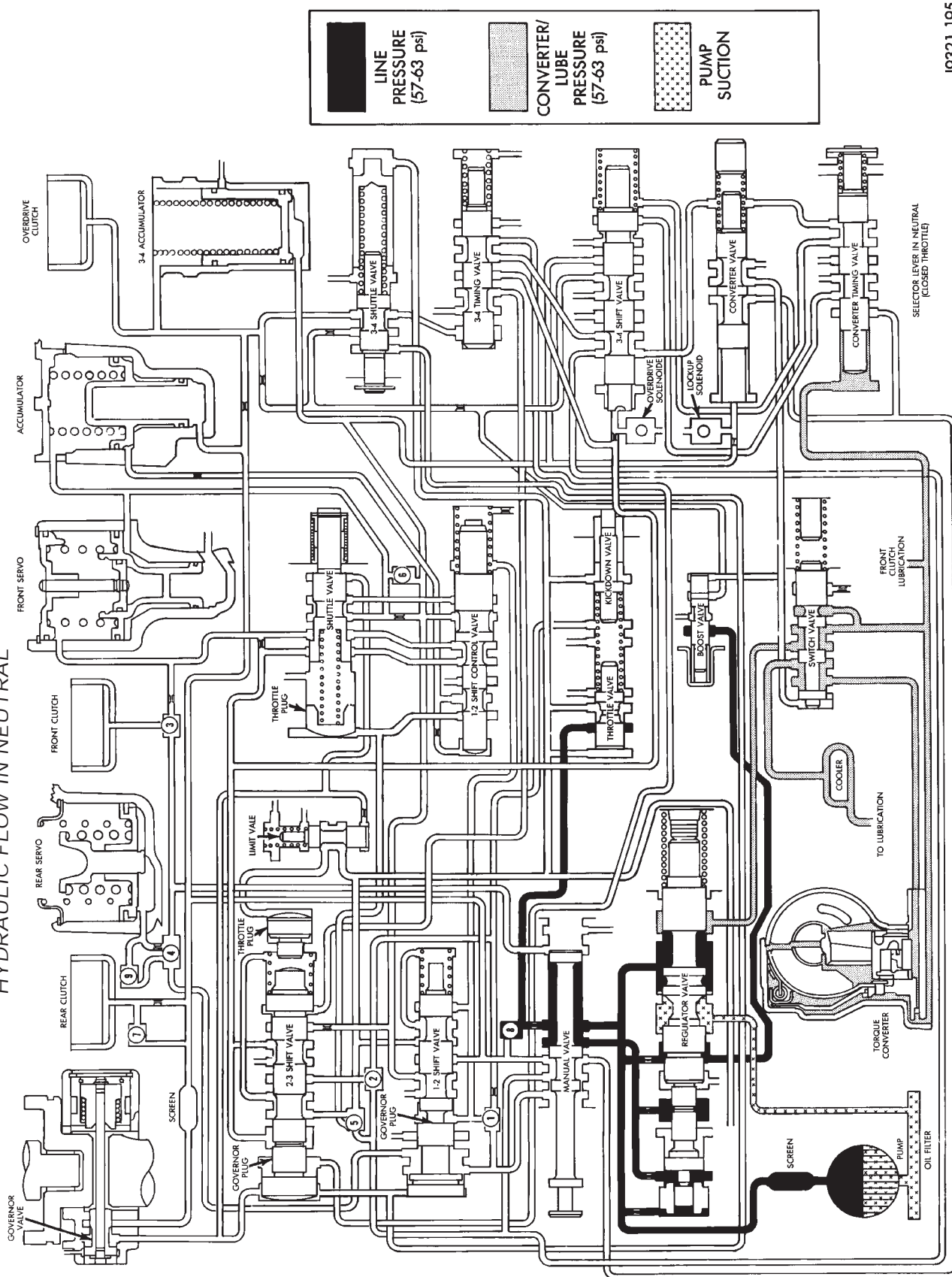
Condition	Possible Cause	Correction
NO REVERSE (OR SLIPS IN REVERSE)	<ol style="list-style-type: none"> 1. Direct clutch spring collapsed or broken 2. Direct clutch pack worn 3. Rear band out of adjustment 4. Front clutch malfunction 5. Overdrive thrust bearing failure 	<ol style="list-style-type: none"> 1. Remove and disassemble unit; check clutch pack and replace spring 2. Disassemble unit and rebuild clutch pack 3. Adjust band 4. Air pressure test clutch operation; remove and rebuild if necessary 5. Disassemble geartrain and replace bearings
NO 1-2 OR 2-3 UPSHIFT (HAS LOW AND REVERSE ONLY)	<ol style="list-style-type: none"> 1. Governor component loose, worn, or damaged 	<ol style="list-style-type: none"> 1. Remove and disassemble unit; replace worn or damaged governor components as needed <p data-bbox="1344 989 1446 1014">J9121-456</p>

TORQUE CONVERTER CLUTCH DIAGNOSIS

POSSIBLE CAUSE

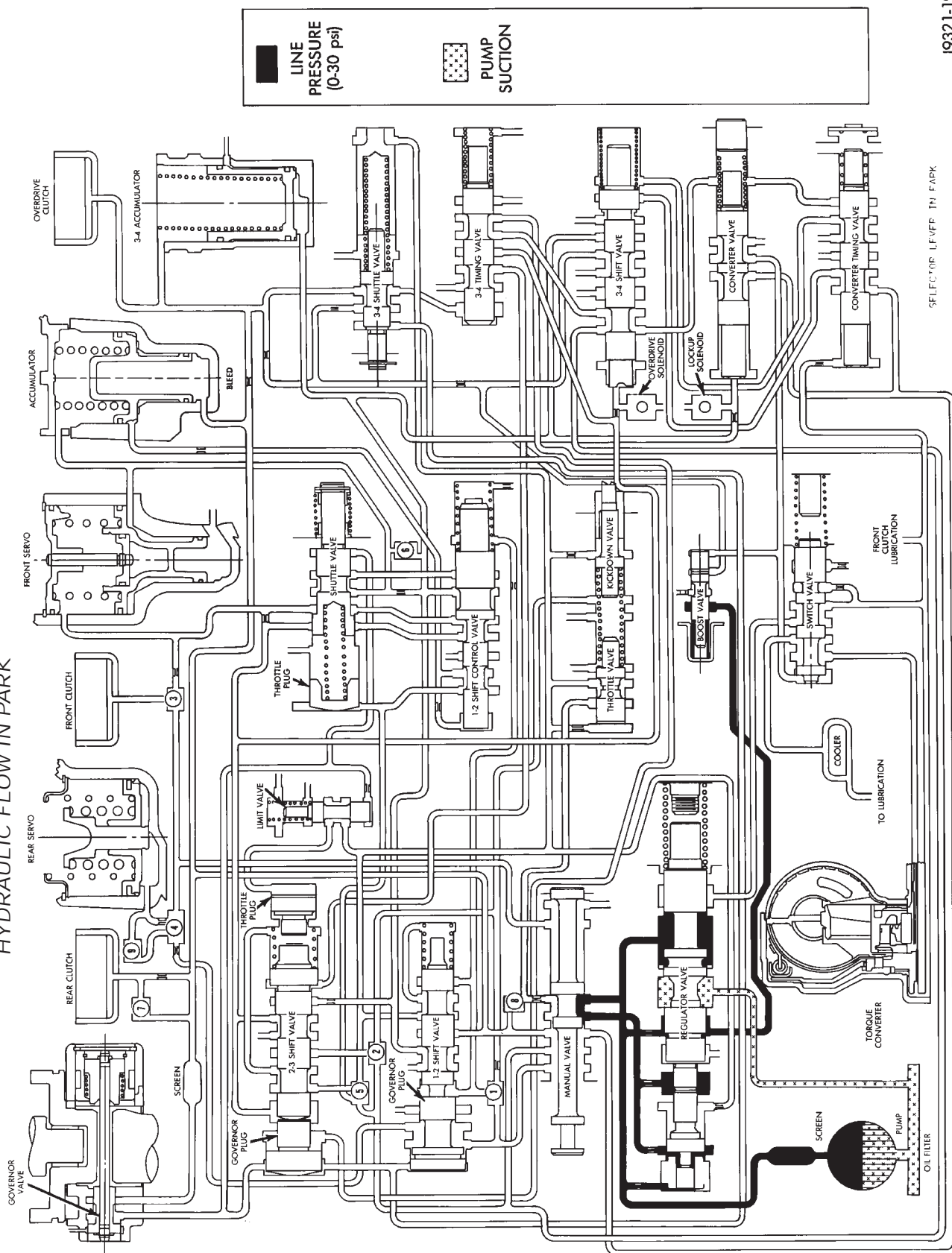
FAULTY OIL PUMP	X			X	X		X				X
STICKING GOVERNOR VALVE	X	X	X								
PLUGGED COOLER, LINES OR FITTINGS					X					X	X
VALVE BODY MALFUNCTION	X	X	X	X	X		X				X
STUCK SWITCH VALVE	X	X	X	X	X					X	
STUCK CONVERTER CLUTCH VALVE	X	X	X								
STUCK CONVERTER CLUTCH SOLENOID	X		X								
SOLENOID WIRING DISCONNECTED	X										
FAILED CONVERTER CLUTCH SOLENOID	X										
FAILED CONVERTER CLUTCH RELAY	X		X								
FAULTY TORQUE CONVERTER:	X					X	X	X			X
OUT OF BALANCE									X		
FAILED CONVERTER CLUTCH	X					X					X
LEAKING TURBINE HUB SEAL	X					X					
ALIGN EXHAUST SYSTEM								X			X
TUNE ENGINE							X	X			X
FAULTY INPUT SHAFT OR SEAL RING	X				X						
THROTTLE CABLE MISADJUSTED								X			X
CONDITION	CONVERTER CLUTCH WILL NOT ENGAGE	CLUTCH WILL NOT DISENGAGE	STAYS ENGAGED AT TOO LOW A SPEED IN 4th GEAR	LOCKS UP OR DRAGS IN LOW OR SECOND	STALLS OR IS SLUGGISH IN REVERSE	CHATTER DURING CLUTCH ENGAGEMENT--(COLD)	VIBRATION OR SHUDDER DURING CLUTCH ENGAGEMENT	VIBRATION AFTER CLUTCH ENGAGEMENT	VIBRATION WHEN "REVVED" IN NEUTRAL	OVERHEATING: OIL COMING OUT OF FILL TUBE OR PUMP SEAL	SHUDDER AFTER CLUTCH ENGAGEMENT

HYDRAULIC FLOW IN NEUTRAL



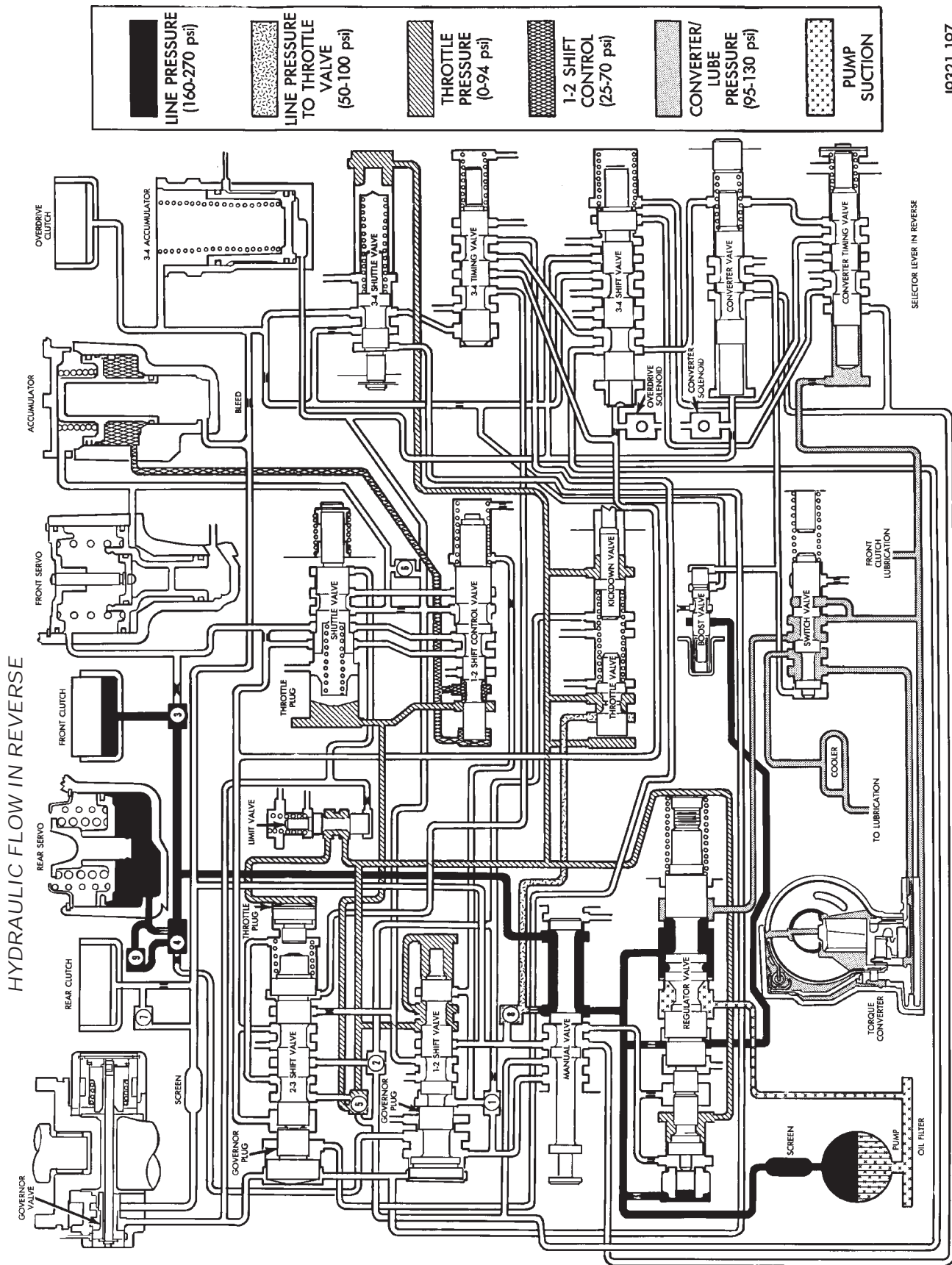
J9321-195

HYDRAULIC FLOW IN PARK



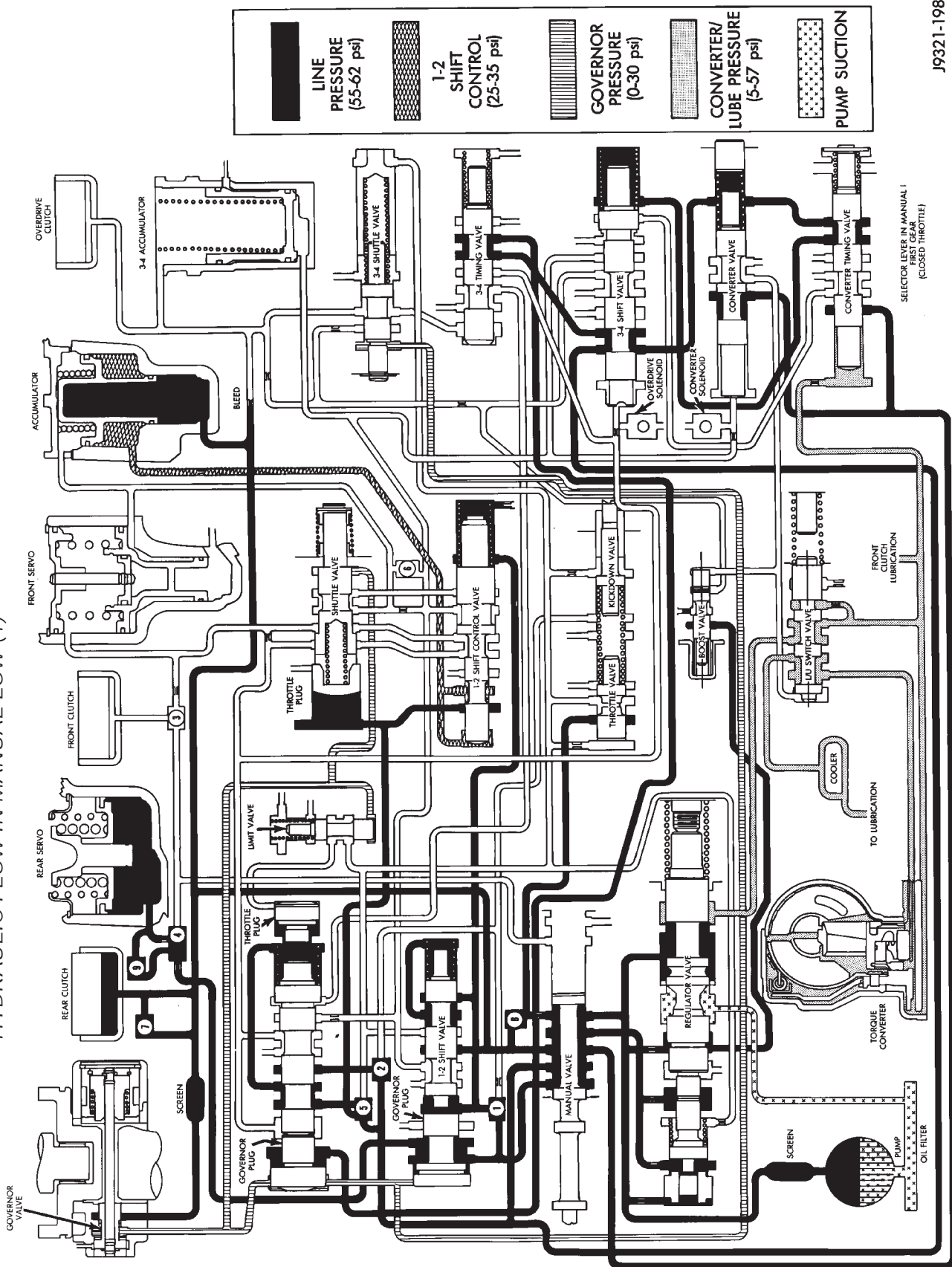
SELECTOR LEVEL IN PARK

J9321-196



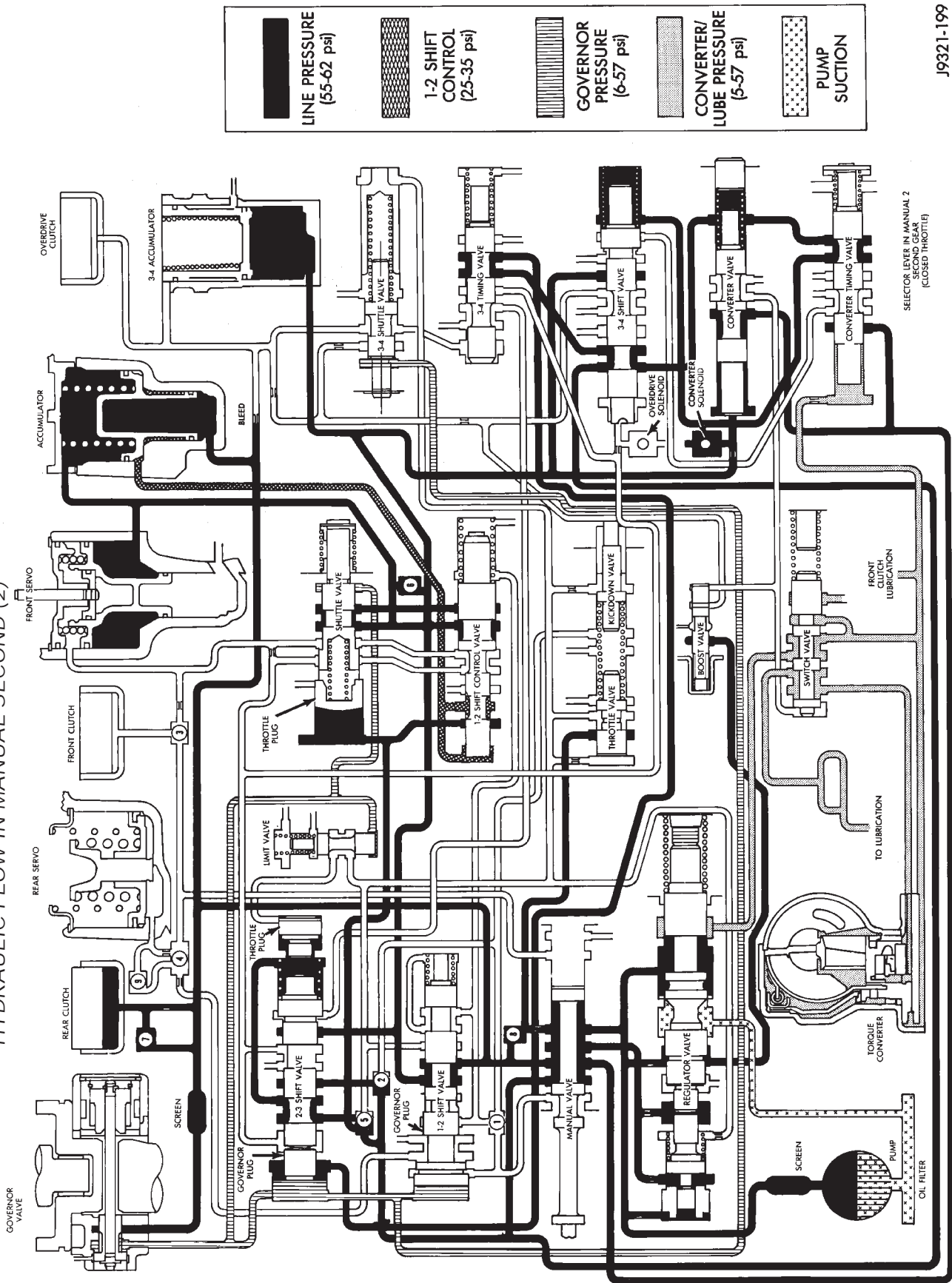
J9321-197

HYDRAULIC FLOW IN MANUAL LOW (1)



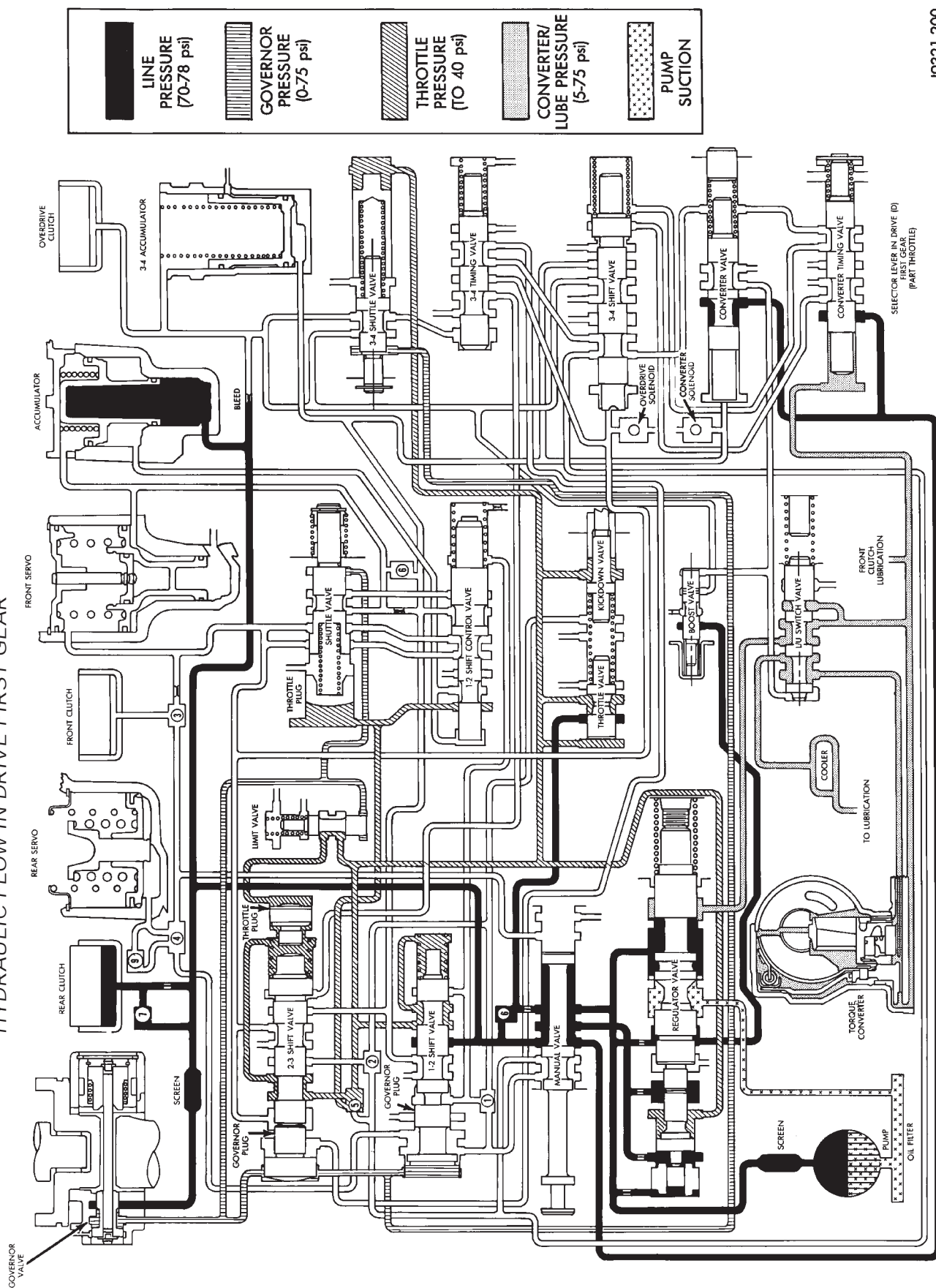
J9321-198

HYDRAULIC FLOW IN MANUAL SECOND (2)



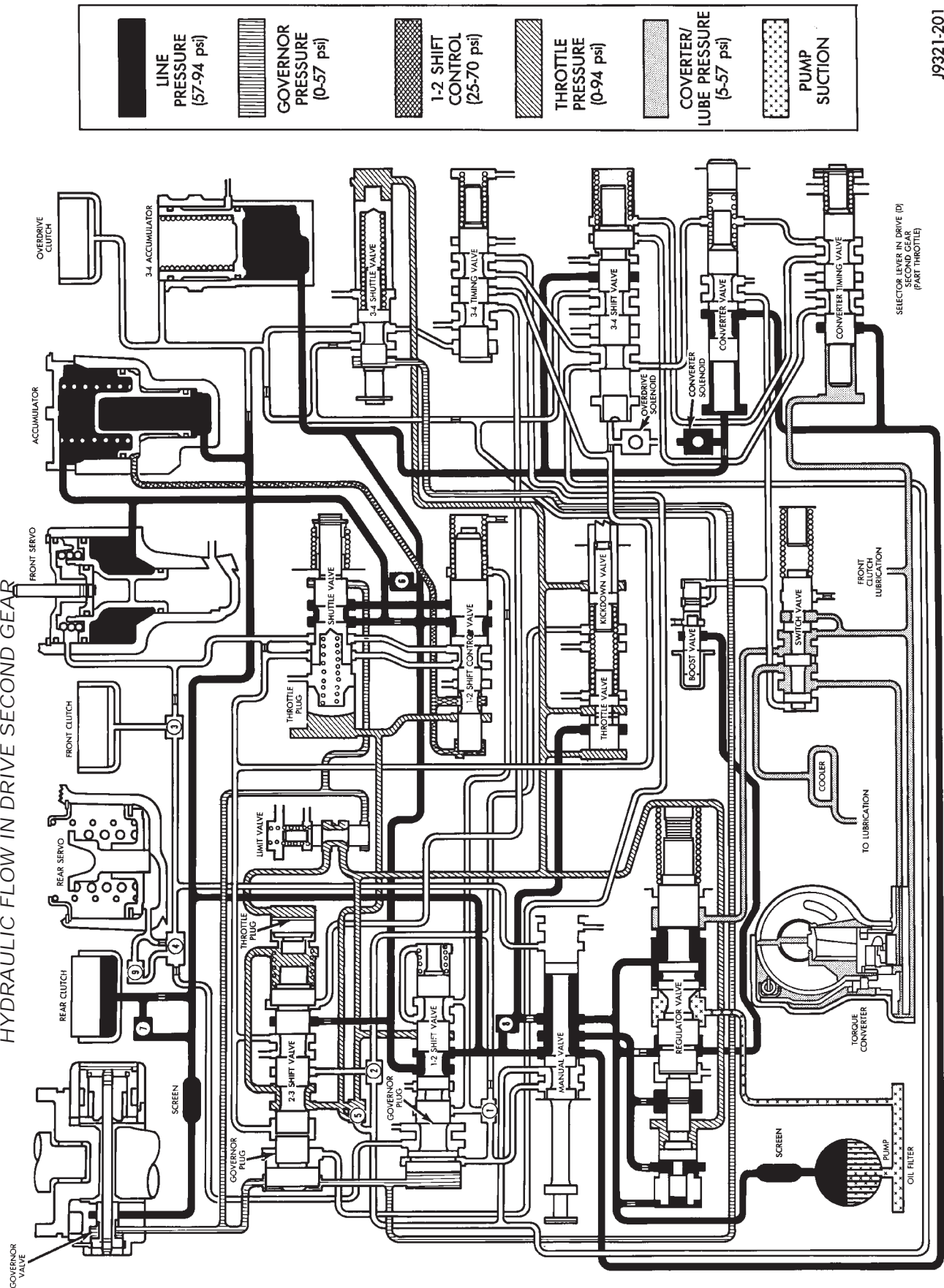
J9321-199

HYDRAULIC FLOW IN DRIVE FIRST GEAR



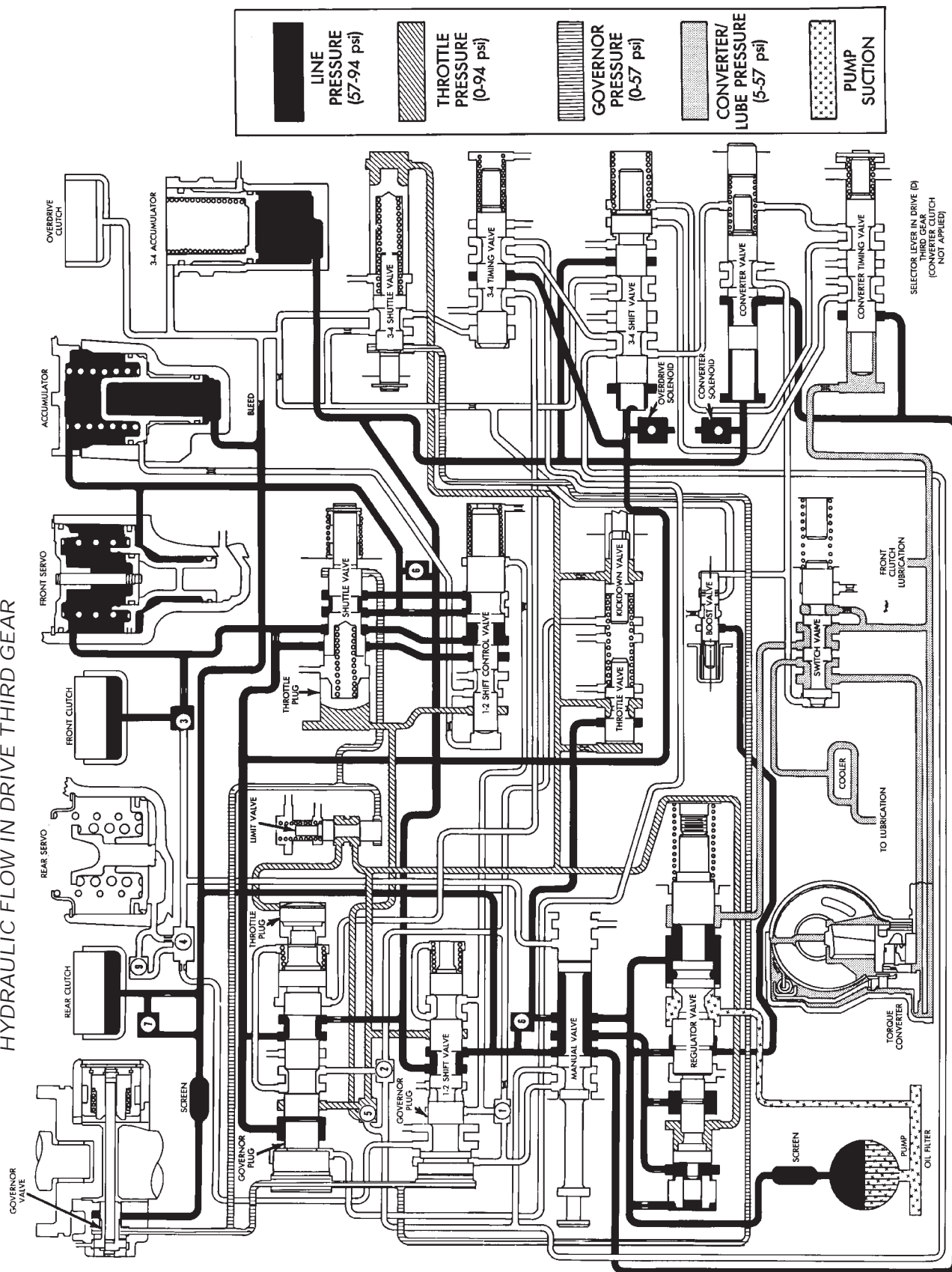
J9321-200

HYDRAULIC FLOW IN DRIVE SECOND GEAR



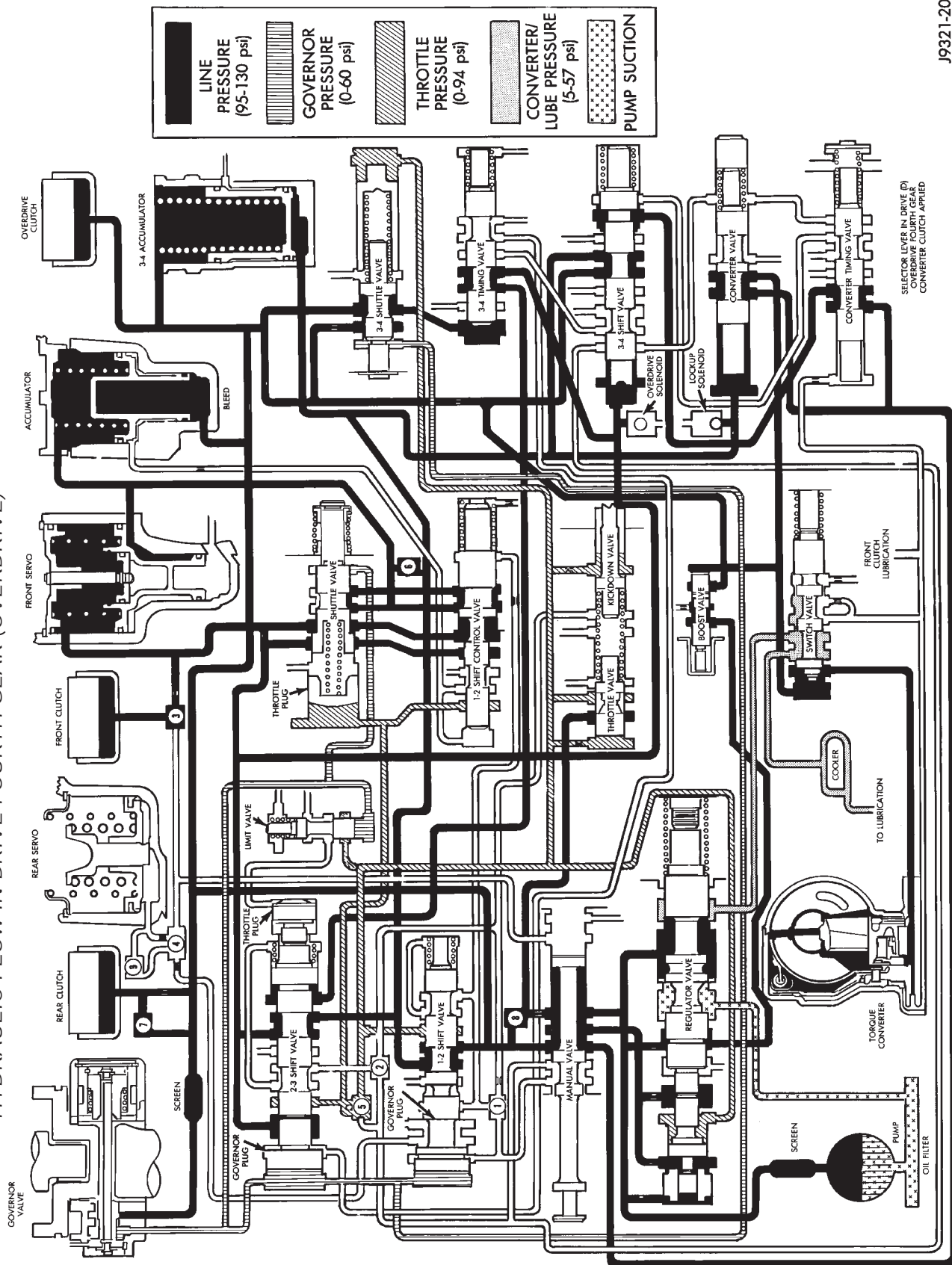
J9321-201

HYDRAULIC FLOW IN DRIVE THIRD GEAR



J9321-202

HYDRAULIC FLOW IN DRIVE FOURTH GEAR (OVERDRIVE)



J9321-203

IN-VEHICLE SERVICE—46RH

INDEX

	page		page
Aluminum Thread Repair	199	Recommended Fluid	190
Fluid and Filter Change	191	Servicing Cooler Line Quick Disconnect Fittings ..	196
Front Band Adjustment	192	Speedometer Service	193
Gearshift Linkage Adjustment	191	Transmission Cooler Testing and Flushing	198
Governor and Park Lock Service	190	Transmission Fluid Level Check	190
Oil Pump Seal	190	Transmission Throttle Cable Adjustment	192
Park/Neutral Position Switch	194	Valve Body Service	195
Rear Band Adjustment	193		

GOVERNOR AND PARK LOCK SERVICE

The governor and park lock components are located within the overdrive unit and cannot be serviced in the vehicle. The overdrive unit must be removed and disassembled for access to the governor and park lock components.

Refer to the sections dealing with transmission/overdrive removal, installation and overhaul sections for overdrive unit repair procedures.

OIL PUMP SEAL

The transmission and torque converter must be removed for access to the oil pump seal. Oil pump seal replacement procedures are described in the Transmission Removal/Installation section.

RECOMMENDED FLUID

Recommended fluid for the 46RH is Mopar ATF Plus, type 7176. Mopar Dexron II fluid can be used for topping off the transmission fluid level during normal maintenance checks. This fluid can also be used for refill after overhaul if ATF Plus is not readily available.

TRANSMISSION FLUID LEVEL CHECK

Transmission fluid level should be checked a minimum of four times per year under normal operation. If the vehicle is used for trailer towing or similar heavy load hauling, check fluid level **and condition** at least once a week.

Fluid level is checked with the engine running at curb idle speed, the transmission in Neutral and the transmission fluid at normal operating temperature (hot).

The 46RH transmission dipstick is on the driver side of the engine compartment at the rear of the engine. The dipstick handle has the universal symbol for a gear imprinted on it for identification.

FLUID LEVEL CHECK PROCEDURE

(1) Transmission fluid must be at normal operating temperature for accurate fluid level check. Drive ve-

hicle if necessary to bring fluid temperature up to normal hot operating temperature of 82°C (180°F).

(2) Position vehicle on level surface. This is extremely important for accurate fluid level check.

(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 and check fluid level as follows:

(a) Dipstick has three fluid level indicating marks which are a MIN dot mark, an OK mark and a MAX fill arrow mark:

(b) Correct level is to MAX arrow mark on dipstick. This is correct maximum hot fluid level. Acceptable level is between OK mark and max arrow mark on dipstick.

(c) If level is at, or below MIN level dot on dipstick, add only enough fluid to restore correct level. Mopar ATF Plus, type 7176 is the preferred fluid. Mopar Dexron II can be used if ATF Plus is not readily available.

CAUTION: Do not overfill the transmission. Overfilling will 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 reduce fluid life significantly.

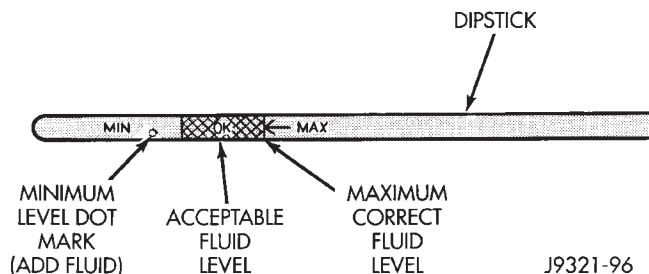


Fig. 1 Fluid Level Marks On Dipstick

FLUID AND FILTER CHANGE

NORMAL CHANGE INTERVAL

The fluid and filter should be changed (and the bands adjusted) at recommended maintenance intervals, or whenever the transmission has been disassembled for any reason.

Refer to the Driveline section in Group O, Lubrication and Maintenance for recommended change intervals. Refer to the fluid/filter replacement and band adjustment procedures in this section.

SEVERE USAGE CHANGE INTERVAL

Under severe usage, the fluid and filter should be changed and the bands adjusted at 12,000 mile (19 000 Km) intervals.

Severe usage is defined as:

- (a) More than half of vehicle operation occurs in heavy city traffic during hot weather (above 90° F).
- (b) Vehicle is used for taxi, police, limousine, or similar commercial operation.
- (c) Vehicle is used for trailer towing or heavy load hauling.

When the factory fluid is drained, refill the transmission with Mopar ATF Plus, type 7176 fluid. Mopar Dexron II can be used when ATF Plus is not readily available.

FLUID/FILTER REPLACEMENT PROCEDURE

- (1) Raise vehicle.
- (2) Remove oil pan and drain fluid.
- (3) Clean oil pan and pan magnet. Then clean remaining gasket material from gasket surface of transmission case.
- (4) Remove fluid filter screws and remove filter.
- (5) Position new filter on valve body and install filter screws. Tighten screws to 4 N•m (35 in. lbs.) torque.
- (6) Position new gasket on oil pan and install pan on transmission. Tighten pan bolts to 150 in. lbs. (17 N•m) torque.
- (7) Lower vehicle and refill transmission with Mopar ATF Plus, type 7176 fluid.

GEARSHIFT LINKAGE ADJUSTMENT

Check linkage 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 LINKAGE ADJUSTMENT

Do not attempt linkage adjustment if any components are worn or damaged. If either linkage rod must be disconnected, the plastic grommet

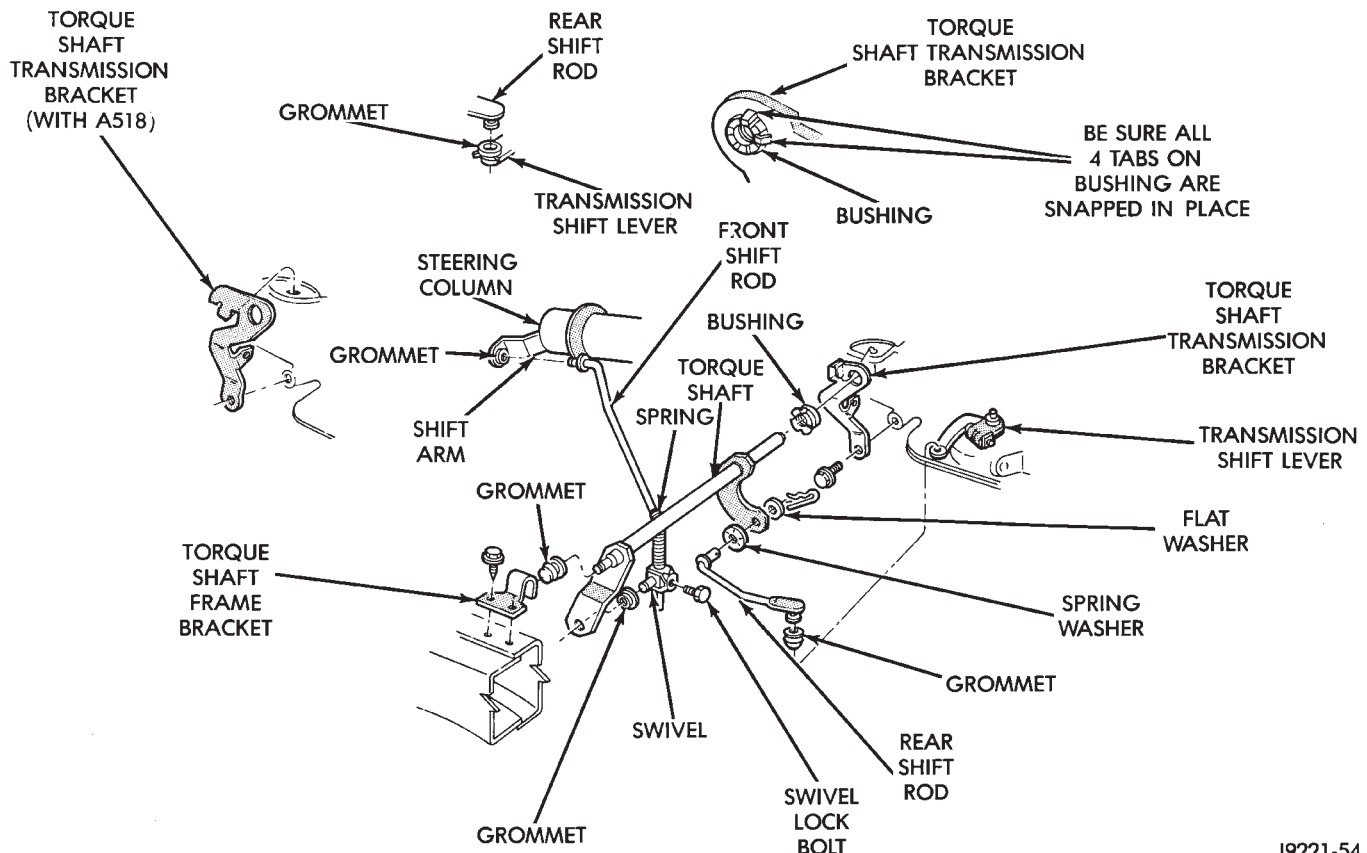


Fig. 2 Column Gearshift Linkage

securing the rod in the lever must be replaced. Disconnect the rod with a pry tool. Pry only where the grommet and rod attach and not on the rod itself. Then cut away the old grommet. Use pliers to snap the new grommet into the lever and to snap the rod into the grommet.

- (1) Shift transmission into Park.
- (2) Raise vehicle.
- (3) Check condition of shift rods, control lever, bushings, washers and torque shaft (Fig. 2). Tighten, repair, or replace worn or damaged parts.
- (4) Loosen lock bolt in rear shift rod adjusting swivel (Fig. 2).
- (5) Slide adjusting swivel off torque shaft arm. Be sure swivel turns freely on rear shift rod.
- (6) Verify that valve body manual lever is in Park detent. Move transmission shift lever fully rearward to check.
- (7) Adjust swivel position on rear shift rod to obtain free pin fit in torque shaft lever (Fig. 2). Then tighten swivel lock bolt to 90 in. lbs. (10 N•m) torque.
- (8) Check adjustment by starting engine in Park and Neutral. Engine should start in these positions only. **If engine starts in any position other than Park or Neutral, adjustment is incorrect or park/neutral position switch is faulty.**

TRANSMISSION THROTTLE CABLE ADJUSTMENT

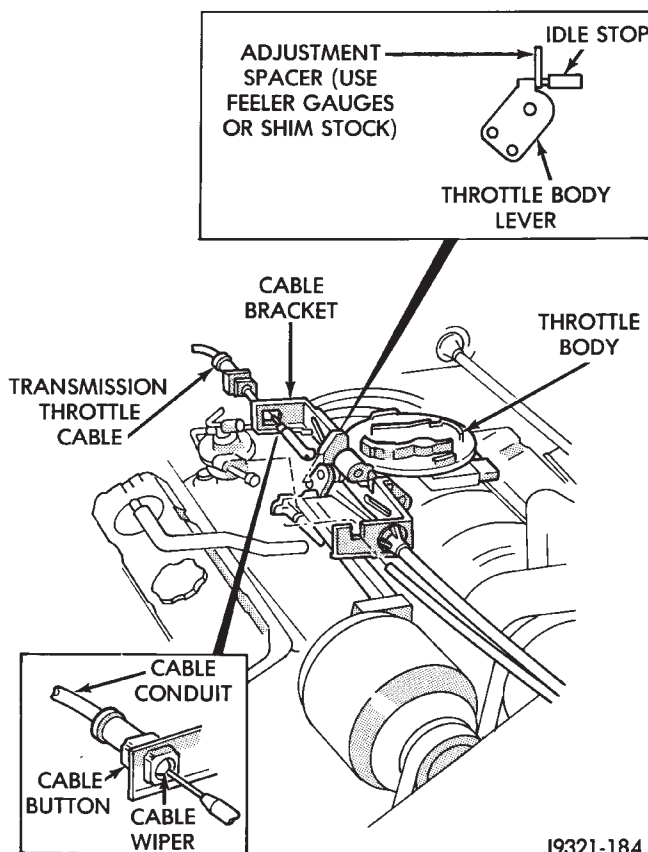
- (1) Turn ignition key to OFF position.
- (2) Remove air cleaner.
- (3) Position 2.8 - 3.0 mm (0.110 - 0.120 in.) thick spacer between idle stop and throttle lever on throttle body. Use appropriate thickness of feeler gauges or shim stock as spacer (Figs. 3 and 4).
- (4) Press cable lock button to release cable (Fig. 3).
- (5) Pull cable conduit toward rear of vehicle until wiper is completely retracted into end of conduit fitting (Fig. 3). Then release cable lock button.
- (6) Raise vehicle for access to transmission throttle valve lever (Fig. 5).
- (7) Rotate throttle valve lever toward front of vehicle until ratcheting sound (from cable) stops.

CAUTION: Do not rotate the throttle valve lever beyond the idle stop. The lever, valve and manual lever shaft will be damaged if rotated too far.

- (8) Remove feeler gauges or shim and check cable adjustment. Throttle valve lever should begin to move at same time lever on MPI throttle body moves off idle position.
- (9) Lower vehicle.
- (10) Install air cleaner.

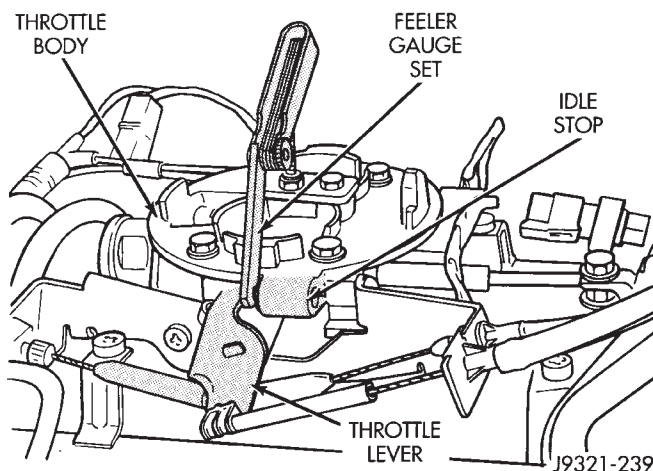
FRONT BAND ADJUSTMENT

The front band adjusting screw is located on the driver side of the transmission case above the manual valve and throttle valve levers.



J9321-184

Fig. 3 Throttle Cable Attachment At Engine



J9321-239

Fig. 4 Positioning Spacer Between Throttle Stop And Lever

ADJUSTMENT PROCEDURE

- (1) Raise vehicle.

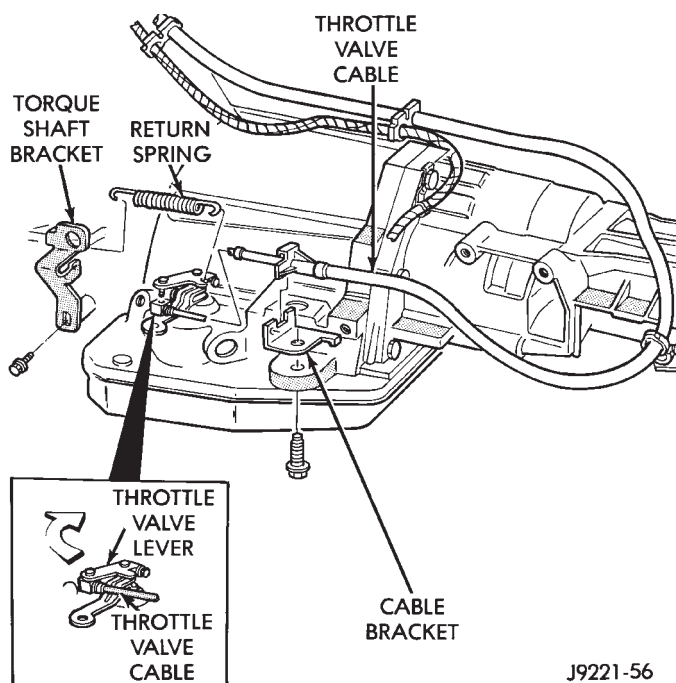


Fig. 5 Throttle Cable Attachment At Transmission

(2) Loosen band adjusting screw locknut. Then back locknut off 4-5 turns. Be sure adjusting screw turns freely in case. Lubricate 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 (Fig. 6).

CAUTION: If Adapter C-3705 is needed to reach the adjusting screw (Fig. 7), tighten the screw to only 5 N•m (47-50 in. lbs.) torque.

- (4) Back off 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.

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. Lubricate screw threads if necessary.
- (4) Tighten adjusting screw to 8 N•m (72 in. lbs.) torque (Fig. 8). Use inch-pound Torque Wrench C-3380-A for adjustment.
- (5) Back off band adjusting screw 2 turns.
- (6) Hold adjusting screw in place and tighten locknut to 34 N•m (25 ft. lbs.) torque.
- (7) Clean oil pan, pan magnet and gasket surface of case. Also inspect and replace fluid filter if necessary.

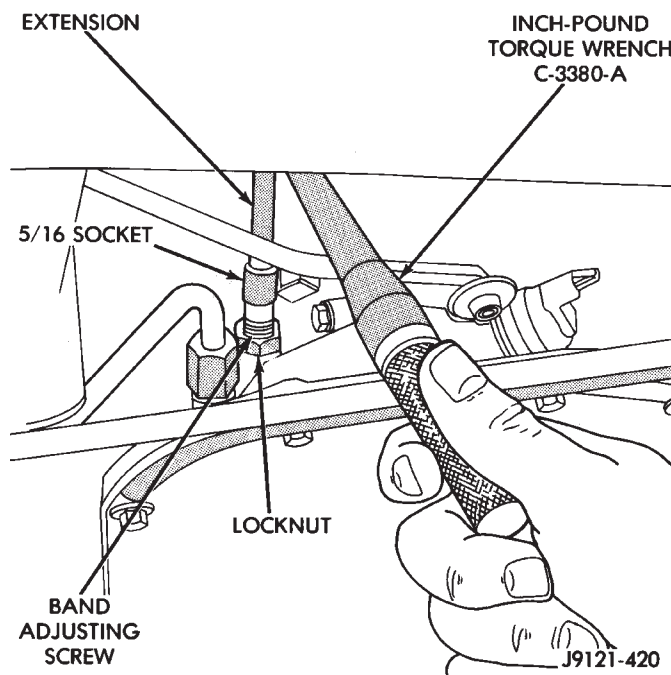


Fig. 6 Front Band Adjustment

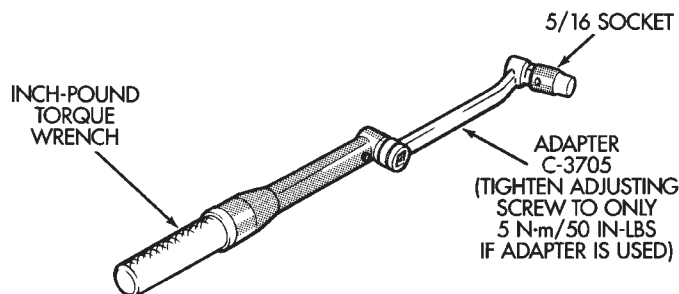


Fig. 7 Using Band Adjustment Adapter Tool C-3705

(8) Position new gasket on oil pan and install pan on transmission. Tighten pan bolts to 17 N•m (150 in. lbs.) torque.

(9) Lower vehicle and refill transmission with recommended fluid.

SPEEDOMETER SERVICE

Rear axle gear ratio and tire size determine pinion gear requirements. If the gear must be replaced, refer to the parts catalogue information for the correct gear.

ADAPTER AND PINION REMOVAL/INSTALLATION

- (1) Raise vehicle.
- (2) Disconnect vehicle speed sensor wires and disconnect speedometer cable, if equipped.
- (3) Remove vehicle speed sensor from speedometer adapter (Fig. 9).

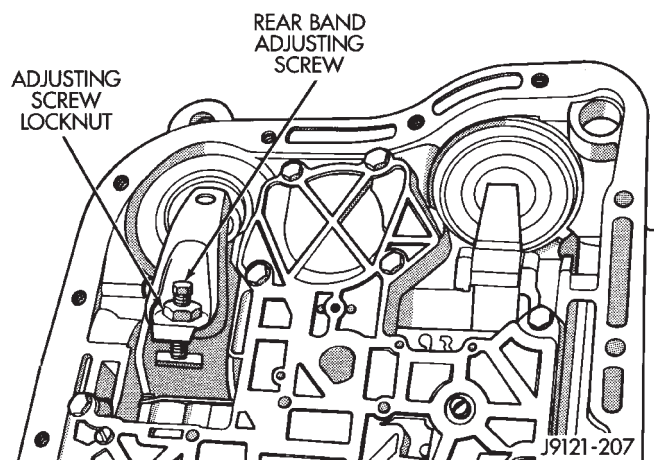


Fig. 8 Rear Band Adjustment Screw Location

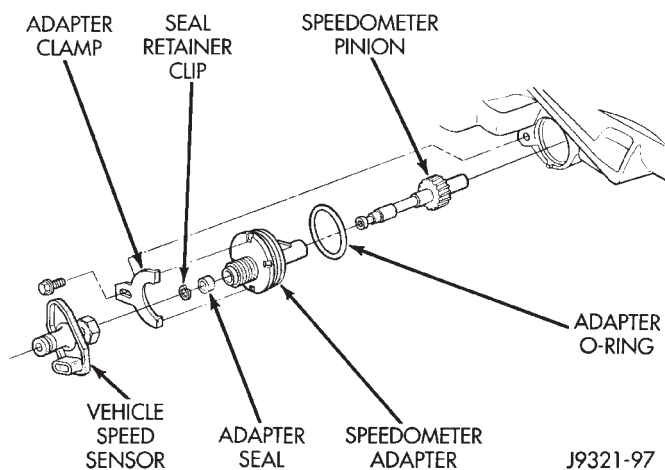


Fig. 9 Speedometer Components

(4) Check speed sensor mounting area in adapter. If transmission fluid is found in this area, adapter oil seal is leaking and will have to be replaced.

(5) Remove bolt and retainer securing pinion gear and adapter in overdrive housing.

(6) Carefully work adapter and gear out of housing.

(7) Replace adapter O-ring if cut, or worn.

(8) Replace adapter oil seal if necessary. Remove old seal and start new one in adapter by hand. Then press seal into adapter with Installer Tool C-4004 until tool bottoms (Fig. 10).

CAUTION: Before installing the pinion and adapter assembly make sure adapter flange and its mating area on extension housing are perfectly clean. Dirt or sand will cause misalignment resulting in speedometer pinion gear damage.

(9) Thoroughly clean adapter flange and adapter mounting surface in the extension housing. These surfaces must be clean for proper adapter alignment and speedometer operation.

(10) Lubricate adapter oil seal and O-ring with transmission fluid.

(11) Count number of teeth on pinion gear before installing pinion in adapter.

(12) Note range index numbers on adapter face (Fig. 11). These numbers correspond to number of teeth on pinion.

(13) Install speedometer adapter in housing.

(14) Rotate adapter until required range numbers are at 6 o'clock position (Fig. 11). Be sure range numbers correspond to number of teeth on driven gear.

(15) Lightly push or tap adapter into housing until seated.

(16) Install adapter retainer. Tighten retainer bolt to 11 N•m (100 in. lbs.) torque.

(17) Install vehicle speed sensor. Tighten sensor coupling nut to 17 N•m (150 in. lbs.) torque and install sensor wires.

(18) Connect speedometer cable to speed sensor if equipped.

(19) Lower vehicle and top off transmission fluid level.

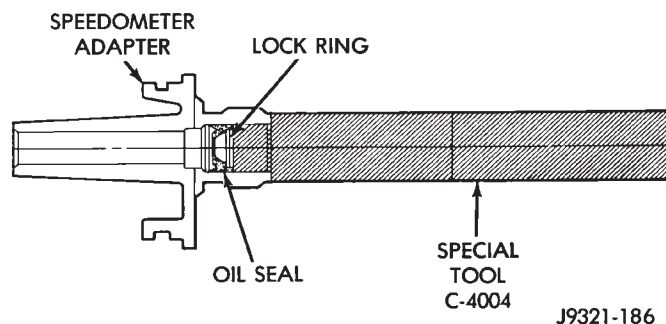


Fig. 10 Replacing Speedometer Adapter Oil Seal

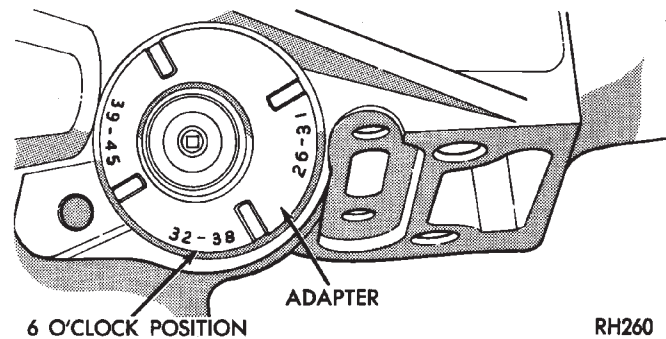


Fig. 11 Indexing Speedometer Adapter

PARK/NEUTRAL POSITION SWITCH

The center terminal of the 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

(1) Verify that gearshift linkage is correctly adjusted before testing. Switch will not operate properly if linkage adjustment is incorrect.

(2) To test switch, remove wiring connector. Then test continuity between center terminal and transmission case. Continuity should exist only when transmission is in Park or Neutral.

(3) Shift transmission into reverse and test continuity at switch outer terminals.

(a) Continuity should exist only when transmission is in Reverse.

(b) Continuity should not exist between outer terminals and case.

PARK/NEUTRAL POSITION SWITCH REPLACEMENT

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

(2) Disconnect switch wires and remove switch from case.

(3) Move shift lever to Park and Neutral positions. Verify that switch operating lever fingers are centered in switch opening in case (Fig. 12).

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

(5) Connect switch wires, lower vehicle and top off transmission fluid level.

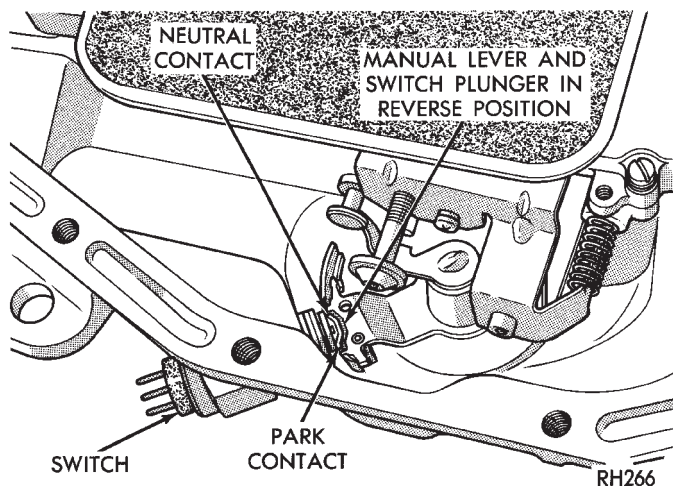


Fig. 12 Park/Neutral Position Switch Contacts

VALVE BODY SERVICE

GENERAL SERVICE INFORMATION

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

The valve body can be disassembled for cleaning and inspection of the individual components. Refer to the procedures in the Transmission Unit Subassembly Overhaul section.

The only replaceable valve body components are:

- manual lever
- manual lever washer, seal, E-clip and shaft seal

- manual lever detent ball
- throttle lever
- fluid filter
- solenoid assembly
- switch valve and spring
- pressure adjusting screw bracket

The remaining valve body components are serviced only as part of a complete valve body assembly.

VALVE BODY REMOVAL

- (1) Shift transmission into Neutral.
- (2) Raise vehicle.
- (3) Remove gearshift and throttle levers from shaft of valve body manual lever.
- (4) Disconnect and remove neutral switch.
- (5) Disconnect valve body overdrive and converter clutch solenoid wires at case connector (Fig. 13).

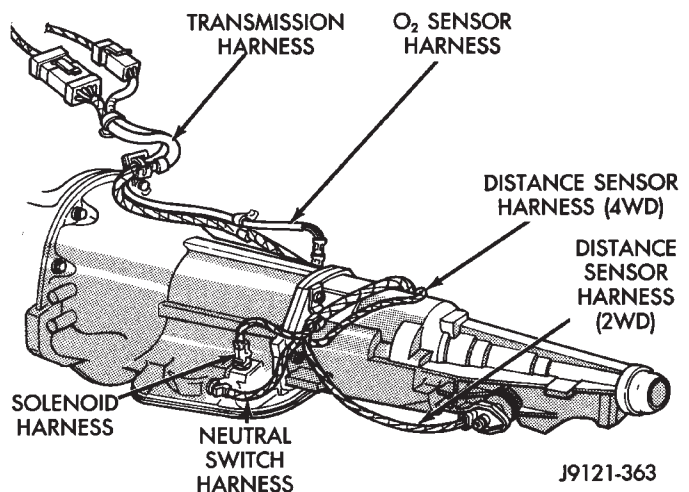


Fig. 13 Transmission Wire Harness Identification

- (6) Position drain pan under transmission oil pan.
- (7) Remove transmission oil pan and gasket.
- (8) Remove fluid filter from valve body.
- (9) Push valve body solenoid wire connector out of case.
- (10) Remove valve body attaching bolts.
- (11) Lower valve body slightly and remove accumulator piston and accumulator inner and outer springs.
- (12) Push manual lever shaft and solenoid case connector out of transmission case. Lower valve body, rotate it away from case, pull park rod out of sprag and remove valve body (Fig. 14).

VALVE BODY INSTALLATION

(1) Verify that park/neutral position switch has NOT been installed in case. Valve body cannot be installed if switch is in place.

(2) Check condition of seals on valve body solenoid case connector (Fig. 14). Replace seals if cut or worn.

(3) Check condition of manual lever shaft seal (in case). Remove seal if lip is cut, or worn. However do not install new seal at this time.

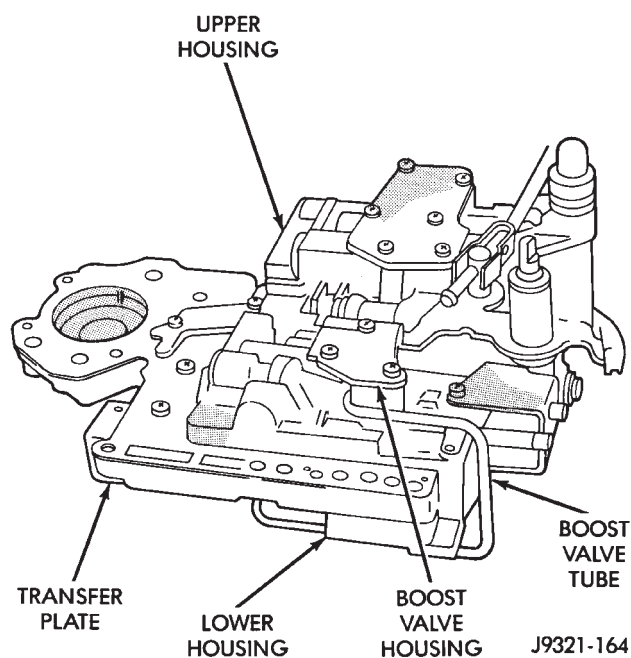


Fig. 14 Valve Body-46RH

(4) Check condition of seals on accumulator piston (Fig. 15). Install new piston seals if necessary.

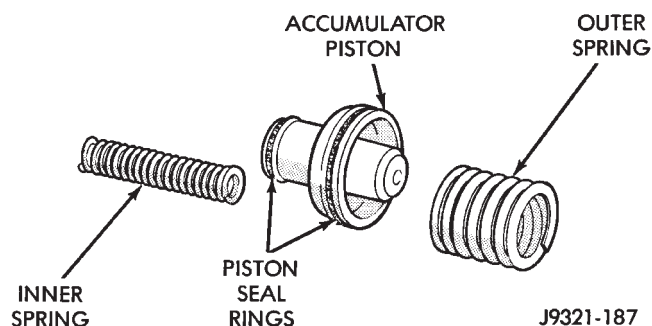


Fig. 15 Accumulator Piston And Springs

(5) Install accumulator inner spring and accumulator piston. A small amount of petroleum jelly can be used to hold piston in bore.

(6) Place valve body manual lever in low (1 position) so ball on park lock rod can be installed in sprag.

(7) Lubricate shaft of manual lever with petroleum jelly. This will ease inserting shaft through seal (in case).

(8) Lubricate seal rings on solenoid case connector with petroleum jelly.

(9) Position accumulator piston outer spring on valve body.

(10) Raise valve body and work end of park lock rod into and through sprag. Use screwdriver to align sprag if necessary.

(11) Align accumulator springs, manual lever shaft and solenoid case connector. Then seat valve body on case and install one or two bolts to hold valve body in place.

(12) Tighten valve body bolts alternately and evenly to 11 N•m (100 in. lbs.) torque.

(13) Install new fluid filter on valve body. Tighten filter screws to 4 N•m (35 in. lbs.) torque.

(14) Install new manual lever shaft seal in case if necessary. Use 15/16 deep well socket to seat seal (Fig. 16).

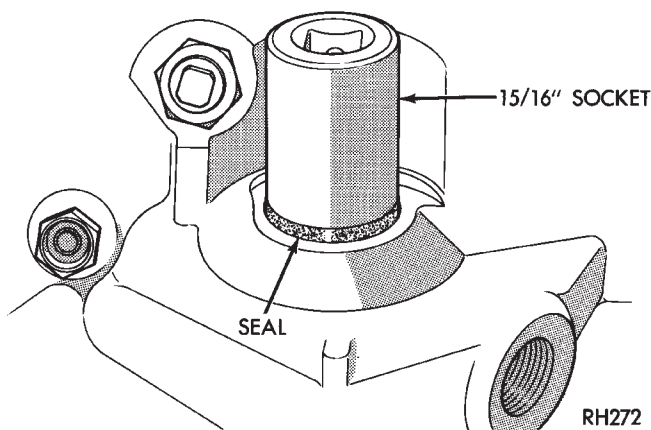


Fig. 16 Installing Manual Lever Shaft Seal

(15) Install and connect park/neutral position switch in case.

(16) Install throttle and gearshift levers on valve body manual lever shaft.

(17) Check and adjust front and rear bands if necessary.

(18) Connect valve body overdrive and converter clutch solenoid wires to case connector.

(19) Install oil pan and new gasket. Tighten pan bolts to 17 N•m (13 ft. lbs.) torque.

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

(21) Check and adjust gearshift and throttle linkage if necessary.

SERVICING COOLER LINE QUICK DISCONNECT FITTINGS

The transmission cooler lines are attached to the transmission and radiator main cooler with quick disconnect fittings (Fig. 17).

The transmission fitting consists of a fitting body, a plastic insert and a wire retainer clip (Fig. 18).

The fitting in the cooler line hose is swedged into the hose. Only the insert and retainer clip are serviceable on this fitting.

A flange on the cooler line serves as the sealing mechanism. The wire retainer clip holds the cooler line in the fitting. The clip fits behind the cooler line flange to hold the line in place. The plastic insert is not a seating or sealing device. The insert is used to indicate when the cooler line is properly seated in the fitting.

The transmission fitting, wire retainer clip and plastic insert are serviceable individually, or as an assembly.

The fittings in the cooler line hoses are serviced as part of the cooler line. Only the retaining clip and insert are serviceable.

The retainer clip is not a reusable part and must be replaced every time the cooler lines are disconnected. In addition, the plastic insert should be replaced if cut, torn, or damaged in any way. A damaged insert could prevent the cooler line from seating properly.

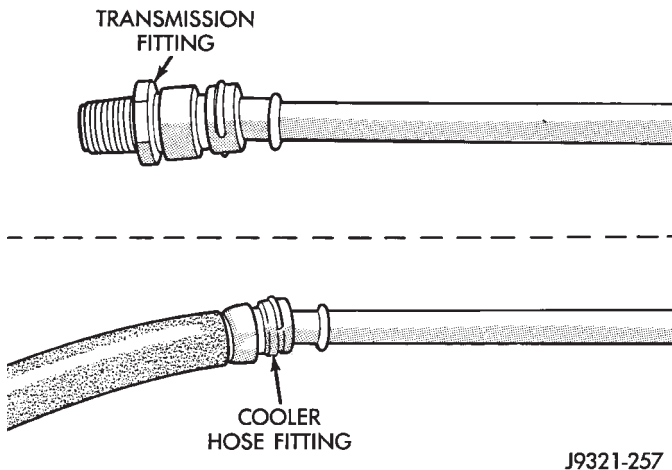
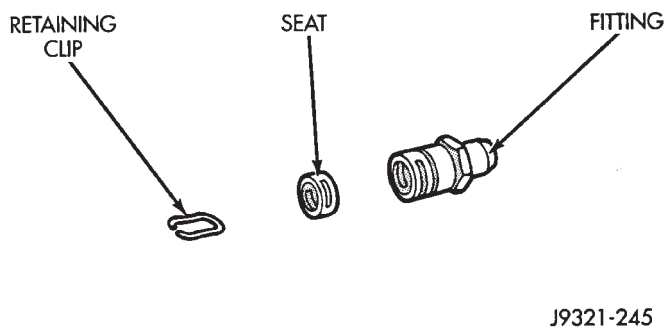


Fig. 17 Quick Disconnect Fittings



**Fig. 18 Quick Disconnect Fitting Components
(Transmission Fitting Shown)**

PROCEDURE FOR DISCONNECTING COOLER LINES

- (1) If cooler lines are to be disconnected at main cooler (in radiator), remove splash shield under radiator for access to fittings.
- (2) Pry wire retainer clips off quick disconnect fittings with small screwdriver (Fig. 19). **Discard clips as they are NOT reusable parts.**
- (3) Pull cooler line out of fitting.
- (4) Remove and retain plastic insert from each fitting.

Quick Disconnect Fitting Inspection

Inspect condition of each plastic insert. Replace any insert that is cut, torn, or damaged in any way.

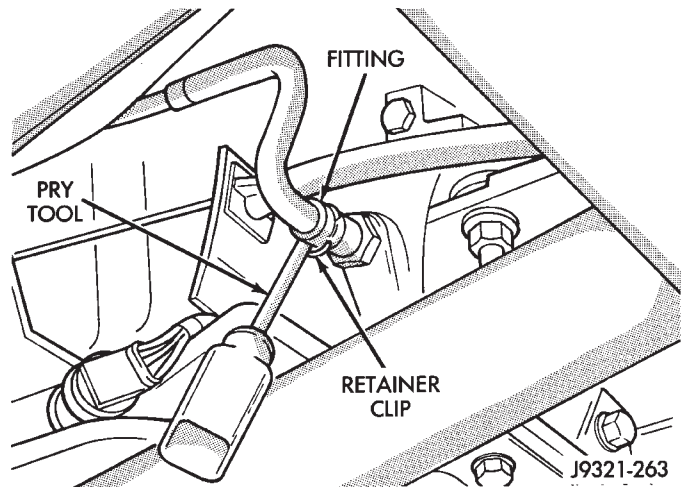


Fig. 19 Removing Retainer Clips From Quick Disconnect Fittings

Replace the transmission fitting as an assembly if the fitting body is damaged. Replace the cooler line as an assembly, if the fitting swaged into the cooler line hose, is damaged.

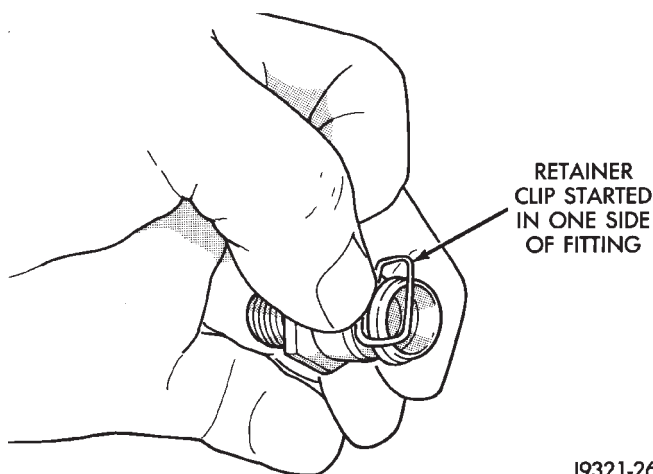
Quick Disconnect Fitting Replacement

The transmission fittings can be disconnected and removed as necessary. Use Loctite 242 on the replacement fitting threads before installation.

The fittings in the cooler line hoses are serviced only as part of the cooler line and hose assembly.

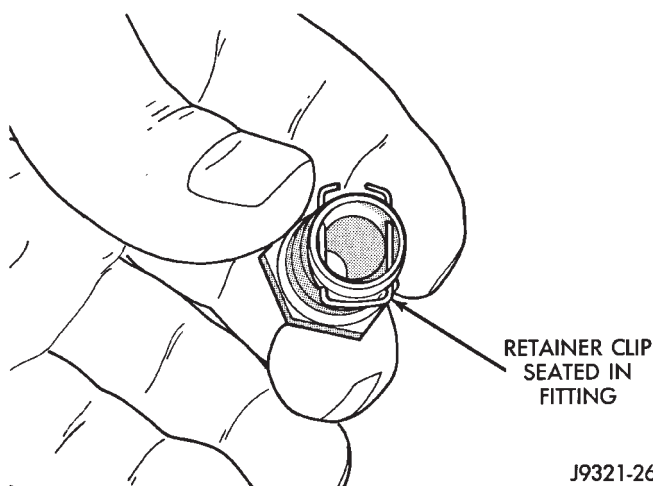
PROCEDURE FOR RECONNECTING COOLER LINES

- (1) Wipe off fittings with lint free cloth or shop towels.
- (2) Install inserts in fittings. Use new inserts if originals were damaged in any way, or if doubt exists about insert condition.
- (3) Install replacement retainer clips on fittings as follows:
 - (a) Start retainer clip in slot on one side of fitting (Fig. 20).
 - (b) Swing retainer clip across and over fitting. Then carefully seat clip in slot on opposite side of fitting (Fig. 21).
- (4) Wipe end of each cooler line clean with lint free cloth, or shop towel.
- (5) Start cooler line into fitting. Then push cooler line inward until wire retainer clip snaps into place behind flange on cooler line.
- (6) **Note position of plastic insert. When cooler line is fully seated, insert will no longer extend beyond end of fitting.**
- (7) Verify that both sides of wire retainer clip are seated **behind** flange on cooler line (Fig. 22).



J9321-264

Fig. 20 Starting New Retainer Clip On Quick Disconnect Fitting



J9321-265

Fig. 21 Seating New Retainer Clip In Quick Disconnect Fitting

CAUTION: The retainer clips secure the cooler lines in the quick disconnect fittings. If the clips become deformed, or distorted, normal fluid pressure could unseat the cooler lines resulting in fluid loss and transmission damage. Be very sure the clips are in good condition and firmly seated behind the cooler line flanges (Fig. 22).

(8) Reinstall splash shield under radiator, if removed.

TRANSMISSION COOLER TESTING AND FLUSHING

If a transmission malfunction contaminates the fluid, the cooler and lines must be reverse flushed thoroughly. Flushing will prevent sludge and particles from flowing back into the transmission after repair. **The flushing procedure applies to standard and auxiliary coolers alike.**

Pressure equipment is preferred for reverse flushing. However, reverse flushing can be performed with hand operated equipment as follows.

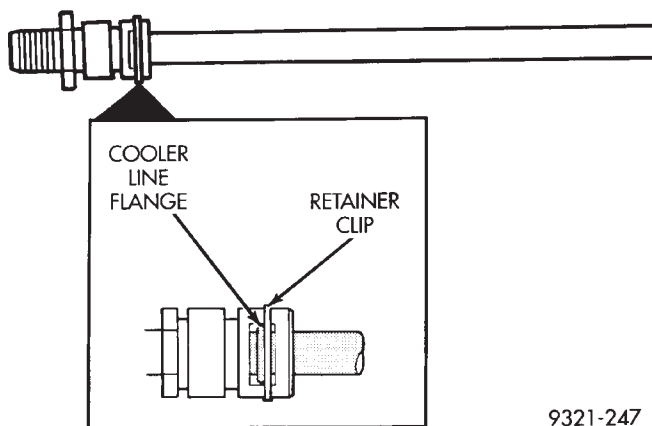


Fig. 22 Verifying Installation Of Cooler Lines In Quick Disconnect Fittings

COOLER REVERSE FLUSHING PROCEDURE

(1) Identify and disconnect cooler pressure and return lines at transmission. Rear line is return line from cooler. Front line is pressure line to cooler (Fig. 23).

(2) Position drain pan under cooler pressure line to catch material flushed through cooler and lines.

(3) Reverse flush cooler using hand operated suction gun filled with mineral spirits. Insert gun nozzle (or hose) into cooler return line. Then force mineral spirits into line and through cooler.

(4) Continue reverse flushing until fluid exiting cooler pressure line is clear and free from debris. **Replace cooler if fluid cannot be pumped through it.**

(5) Clear flushing materials from cooler and lines with short pulses of compressed air. Insert air gun nozzle into cooler return line and continue short air pulses until all fluid is cleared from cooler and lines.

(6) Pump one quart of fresh automatic transmission fluid through cooler and lines before reconnecting lines.

TESTING COOLER FLUID FLOW

Cooler flow is tested by measuring the amount of fluid pumped through the cooler in a specified time by the transmission oil pump.

(1) Disconnect cooler return (rear) line at transmission and place it in one quart test container.

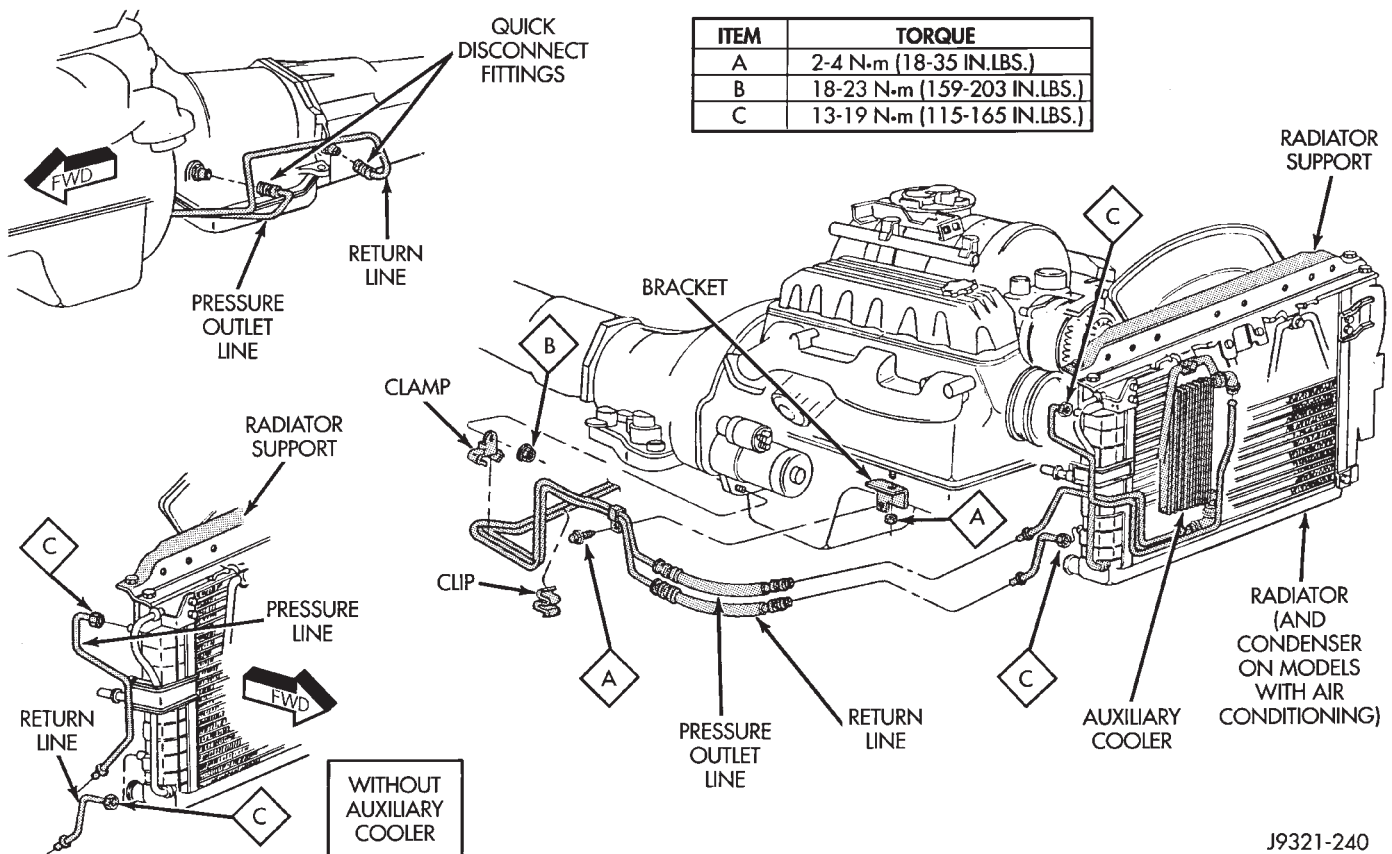
(2) Add extra quart of fluid to transmission.

(3) Use stopwatch to check test time.

(4) Shift into Neutral.

(5) Start and run engine at curb idle speed and note cooler flow. Approximately 1 quart (0.9 liter) of fluid should flow into test container in 20 seconds.

(6) If fluid flow is intermittent, or flows less than one quart in 20 seconds, or fails to allow flow at all, cooler is plugged and should be replaced.



J9321-240

Fig. 23 Transmission Cooler Line Routing And Identification

MAIN COOLER REPLACEMENT

The main transmission cooler is located in the radiator lower tank. The cooler is not a serviceable component. If the cooler is damaged in any way, the radiator will have to be replaced.

AUXILIARY COOLER REPLACEMENT

- (1) Remove grille and air conditioning condenser if equipped.
- (2) Remove screws and U-nuts securing cooler to radiator and support (Fig. 23).
- (3) Tag cooler hoses for installation reference (Fig. 23).
- (4) Position drain pan under cooler hoses.
- (5) Loosen cooler connecting hose clamps and disconnect hoses.
- (6) Remove auxiliary cooler.
- (7) Connect cooler hoses.
- (8) Position cooler on radiator and install cooler attaching U-nuts and screws.

- (9) Tighten cooler hose clamps securely.
- (10) Install grille and air conditioning condenser.
- (11) Check and adjust transmission fluid level.
- (12) If air conditioning condenser lines were disconnected during service, evacuate and recharge system.

ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum transmission case and in the valve body can be repaired with Heli-Coil or similar quality thread inserts. Essentially, repair consists of drilling out the worn or damaged threads, tapping the hole with a special tap and installing the thread insert into the tapped hole. This procedure returns the hole threads to original size. Heli-Coil, or equivalent, tools and inserts are readily available from most automotive parts suppliers. Stainless steel inserts are recommended.

46RH TRANSMISSION/OVERDRIVE REMOVAL AND INSTALLATION

INDEX

	page		page
General Information	200	Torque Converter and Drive Plate Service	201
Oil Pump Seal Replacement	201	Transmission and Converter Installation	202
Overdrive Unit Installation	206	Transmission and Converter Removal	200
Overdrive Unit Removal	205		

GENERAL INFORMATION

The overdrive unit can be removed for service without having to remove the entire transmission assembly. However if the transmission, torque converter, converter driveplate, or oil pump requires service, the complete transmission assembly must be removed for access to these components.

If only the overdrive unit must be removed, refer to the Overdrive Unit Removal/Installation procedures. If the complete transmission assembly must be removed, refer to the Transmission Removal/Installation procedures.

TRANSMISSION AND CONVERTER REMOVAL

- (1) Raise vehicle on hoist.
- (2) If transmission will be disassembled after removal, remove transmission oil pan, drain fluid and reinstall oil pan.
- (3) Remove skid plate, if equipped.
- (4) Mark front and rear propeller shafts and U-joints for alignment reference (Fig. 1).
- (5) Disconnect and remove both propeller shafts.

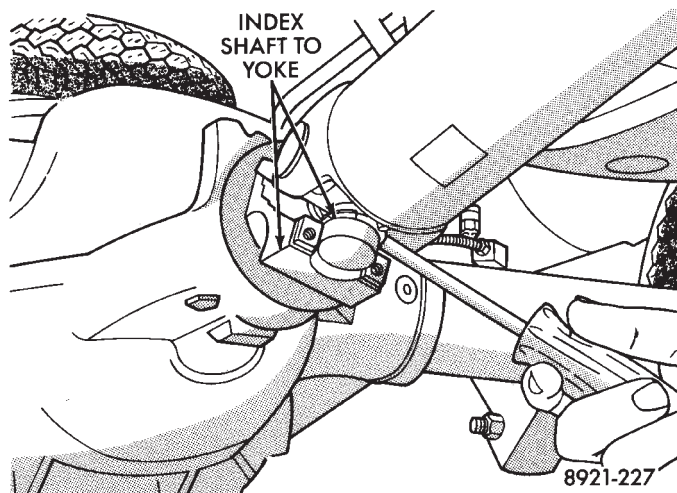


Fig. 1 Marking Propeller Shaft And Yoke For Alignment Reference

- (6) Disconnect vehicle speed sensor wires.
- (7) Disconnect vacuum vent hose at transfer case.

(8) Disconnect transfer case shift linkage at range lever. Then remove linkage bracket bolts and remove linkage and bracket from transfer case. Move linkage aside for clearance.

(9) Remove nuts attaching transfer case to overdrive unit gear case.

(10) Remove transfer case. Support transfer case with transmission jack. Secure transfer case to jack with safety chains. Then move transfer case rearward and off transmission.

(11) Remove transfer case from transmission jack and place transfer case on bench.

(12) Support transmission with transmission jack.

(13) Remove nuts and bolts attaching transmission mount to crossmember.

(14) Remove bolts and nuts attaching crossmember to frame rails.

(15) Rotate crossmember diagonally to clear frame rails and remove crossmember.

(16) Disconnect exhaust pipes at manifold and at converter and/or muffler connections as needed. Then remove Y-pipe from vehicle and move remaining pipes aside for working clearance.

(17) Disconnect and remove crankshaft position sensor. Retain sensor attaching bolts.

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

(18) Disconnect transmission shift linkage at shift lever on transmission.

(19) Remove transmission shift linkage torque shaft assembly from retainers on transmission and frame rail. Move linkage aside for working clearance.

(20) Remove brackets that attach transmission to engine block, if equipped.

(21) Remove dust shield cover from front side of transmission converter housing.

(22) Remove starter motor bolts. Pull starter rearward until clear of housing and position it out of way on nearby component. Starter does not have to be removed from vehicle nor does cable have to be disconnected.

(23) Remove bolts attaching torque converter to drive plate.

(24) Disconnect cooler lines at transmission quick disconnect fittings as follows:

(a) Remove retainer clips securing cooler lines in transmission fittings. Use small flat blade screwdriver to remove clips (Fig. 2). **Discard retainer clips. They are NOT reusable.**

(b) Grasp cooler line and pull it straight out of quick disconnect fitting.

(c) Remove plastic insert from each quick disconnect fitting. Retain inserts as they are reusable if in good condition.

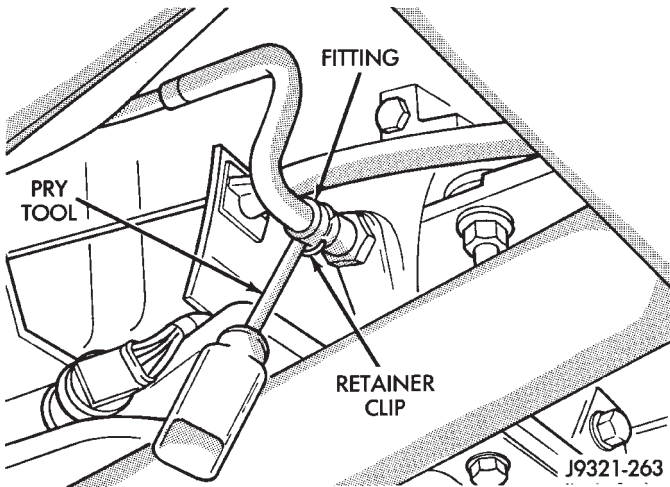


Fig. 2 Disconnecting Transmission Cooler Lines

(25) Disconnect solenoid and park/neutral position switch wires at transmission.

(26) Remove transmission fill tube and dipstick.

(27) Lower transmission for access to converter housing upper bolts.

(28) Remove bolts attaching transmission converter housing to engine. Note that some bolts may be accessible only from front (engine) side of housing.

(29) Move transmission rearward until clear of engine block dowels. On some models, part of hem flange joining vehicle cab and dash panel may interfere with transmission removal. Peen this part of flange over with a mallet if necessary.

(30) Secure torque converter in housing with small C-clamp.

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

(32) Remove C-clamp and remove converter from transmission. Place converter on workbench for inspection or reassembly. Cover converter hub with clean, lint free cloth.

(33) Oil pump, converter and driveplate can now be serviced if necessary. Refer to information in this section.

OIL PUMP SEAL REPLACEMENT

The pump oil seal can be replaced without removing the pump and reaction shaft support assembly from the transmission case.

Seal Removal

Remove the seal with Special Tool C-3861 (Fig. 3). To use the remover tool, First start the tool into the seal by hand. Next, thread the tool into the seal as far as it will go. Use a wrench on the tool hex to turn the tool. Continue tightening until all the tool threads firmly grip the metal part of the seal. Then tighten the tool puller screw to withdraw the seal from the pump body.

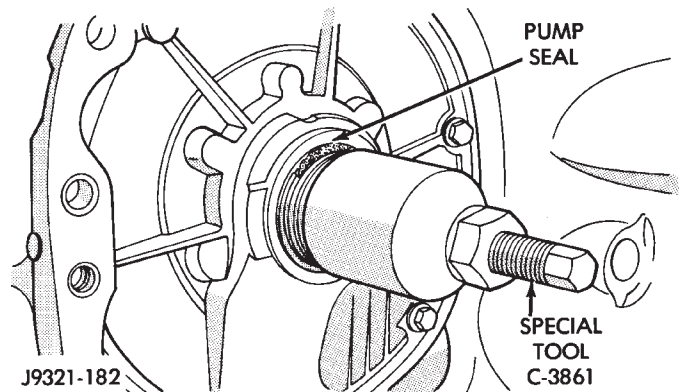


Fig. 3 Oil Pump Seal Removal—46RH

Seal Installation

Use Installer Tool C-3860-A (Fig. 4). To use the tool, place the seal in the pump opening with the seal lip facing inward. Then tap the seal into place with the installer tool. Tool Handle C-4171 may be used with the installer tool if desired.

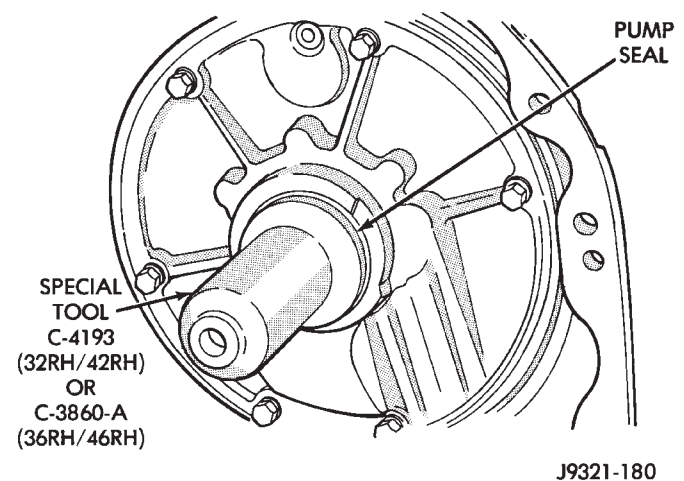


Fig. 4 Oil Pump Seal Installation—46RH

TORQUE CONVERTER AND DRIVE PLATE SERVICE

After the transmission has been removed, the drive plate and torque converter can be replaced or removed for service access.

The torque converter is not a serviceable part. If the converter is contaminated by a transmission malfunction, or damaged in any way, it must be replaced as an assembly. **Do not attempt to flush a converter contaminated by metal or clutch facing particles. Flushing will not remove these contaminants.**

Inspect the driveplate. Replace the driveplate if the hub is cracked, or the plate is bent or damaged in any way. Use new bolts to secure the driveplate to the crankshaft and use Mopar Lock N' Seal, or Loctite 242 on the bolt threads before installation.

TRANSMISSION AND CONVERTER INSTALLATION

CAUTION: The transmission cooler and lines must be flushed if repair was to correct a problem that generated sludge, metal particles, or clutch friction material. The torque converter should also be replaced when contaminated by a malfunction. The transmission, fluid and converter will all be contaminated again if residue/debris is not flushed from the cooler and lines beforehand.

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

(2) Check torque converter hub for sharp edges burrs, scratches, or nicks. Polish hub with crocus cloth or 400 grit paper if necessary. Hub must be smooth to avoid damaging pump seal.

(3) Lubricate converter pilot hub, drive hub and pump seal lip with Mopar ATF Plus or Dexron II transmission fluid.

(4) Align and install converter in oil pump. Verify that converter is fully seated. Use straight edge and steel ruler to check seating (Fig. 5). Surface of converter lugs should be 12.7 mm (1/2 in.) to rear of straight edge when converter is fully seated.

(5) Temporarily secure converter with C-clamp attached to housing or with metal strap attached across converter housing.

(6) Check condition of converter driveplate. Replace driveplate if cracked, distorted or damaged.

(7) Verify that transmission dowel pins are seated in engine block and protrude far enough to hold transmission in alignment.

(8) Move transmission under vehicle and position it at rear of engine. Remove C-clamp or strap used to secure converter in housing.

(9) Align transmission with engine dowels and align converter with driveplate. Offset holes in driveplate are next to 1/8 inch hole in inner circle of plate (Fig. 6).

(10) Move transmission forward until seated on engine block dowels. Then install one or two transmission attaching bolts to hold transmission in place (Fig. 7).

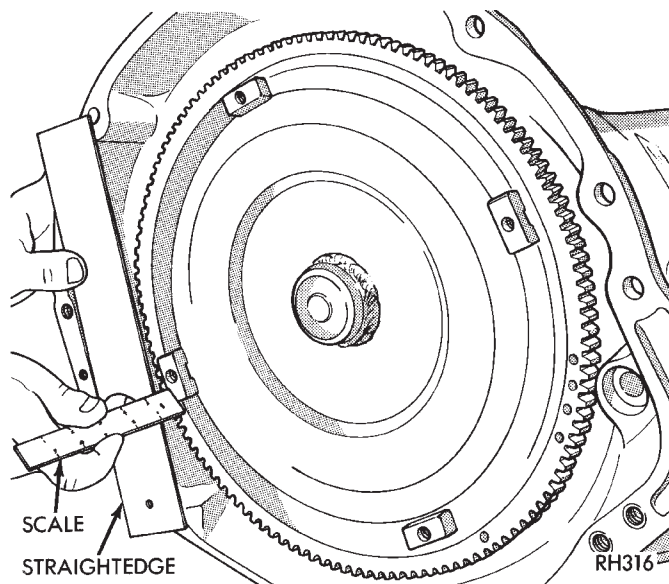


Fig. 5 Checking Torque Converter Seating

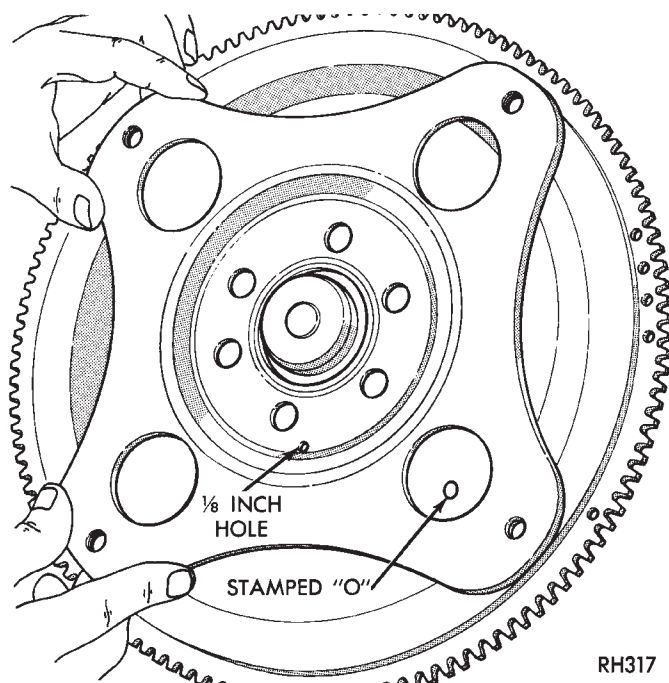


Fig. 6 Torque Converter And Driveplate Markings

CAUTION: It is essential that correct length bolts be used to attach the converter to the driveplate. Bolts that are too long will damage the modulated clutch surfaces in the converter. If new bolts are required, use the bolts specified in this procedure and in the parts catalogue only.

(11) Verify converter bolt length. Bolt measurement is from bottom (underside) of bolt head to end of bolt threads.

- On 9.5 in., 3-lug converter, bolts should be 11.7 mm (0.46 in.) long.

ITEM	TORQUE
A	3-6 N•m (30-50 IN.LBS.)
B	27-54 N•m (20-40 FT.LBS.)
C	47-88 N•m (35-65 FT.LBS.)
D	9-14 N•m (80-120 IN.LBS.)

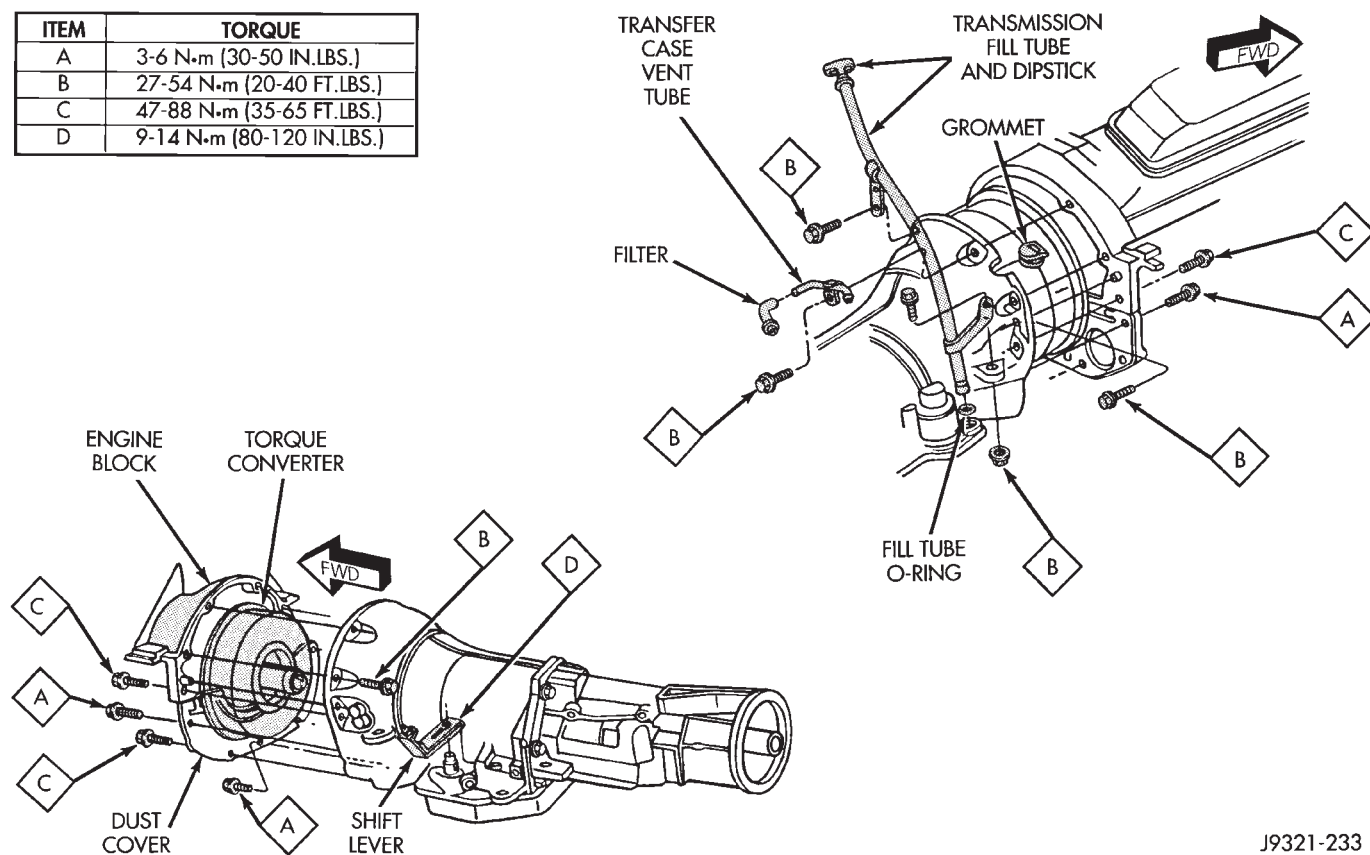


Fig. 7 Transmission And Fill Tube Mounting

- On 9.5 in., 4-lug converter, bolts should be 13.2 mm (0.52 in.) long.
- On 10.0 in., 4-lug converter, bolts should be 13.2 mm (0.52 in.) long.
- On 10.75 in., 4-lug converter, bolts should be 11.2 mm (0.44 in.) long.

(12) Install torque converter bolts. Tighten bolts as follows:

- On models with 9.5 in., 3-lug converter, tighten bolts to 54 N•m (40 ft. lbs.).
- On models with 9.5 in., 4-lug converter, tighten bolts to 74 N•m (55 ft. lbs.).
- On models with 10.0 in., 4-lug converter, tighten bolts to 74 N•m (55 ft. lbs.).
- On models with 10.75 in., 4-lug converter, tighten bolts to 31 N•m (270 in. lbs.).

(13) Install and tighten remaining transmission attaching bolts (Fig. 6).

(14) Install dust cover on transmission converter housing. Two small vise grip pliers can be used to hold and align cover during installation.

(15) Install starter motor.

(16) Install strut brackets that secure transmission to engine block and front axle.

(17) Install and connect crankshaft position sensor. Be sure sensor grommet is securely in place.

(18) Install transmission fill tube. Install new O-ring seal on tube before installation (Fig. 7).

(19) position wire harnesses in clips on transmission and transfer case.

(20) Connect exhaust Y-pipe to engine exhaust manifolds.

(21) Install shift linkage torque bracket.

(22) Connect shift linkage to transmission.

(23) Connect solenoid and park/neutral position switch wires.

(24) Install crossmember on frame rails. Place crossmember at 45° angle to rails. Insert crossmember between rails and rotate crossmember into place.

(25) Install bolts/nuts attaching transmission to rear mount (Fig. 8).

(26) Install bolts/nuts attaching crossmember to frame rails.

(27) Remove transmission jack.

(28) Install transfer case (Fig. 9). Align and position transfer case with transmission jack or with aid of helper. Tilt case upward and work into position on transmission mounting studs.

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

(30) Install damper on transfer case rear retainer if removed. Tighten damper nuts to 54 N•m (40 ft. lbs.) torque.

(31) Install and connect transfer case shift linkage.

(32) Connect transmission cooler lines to quick disconnect fittings as follows:

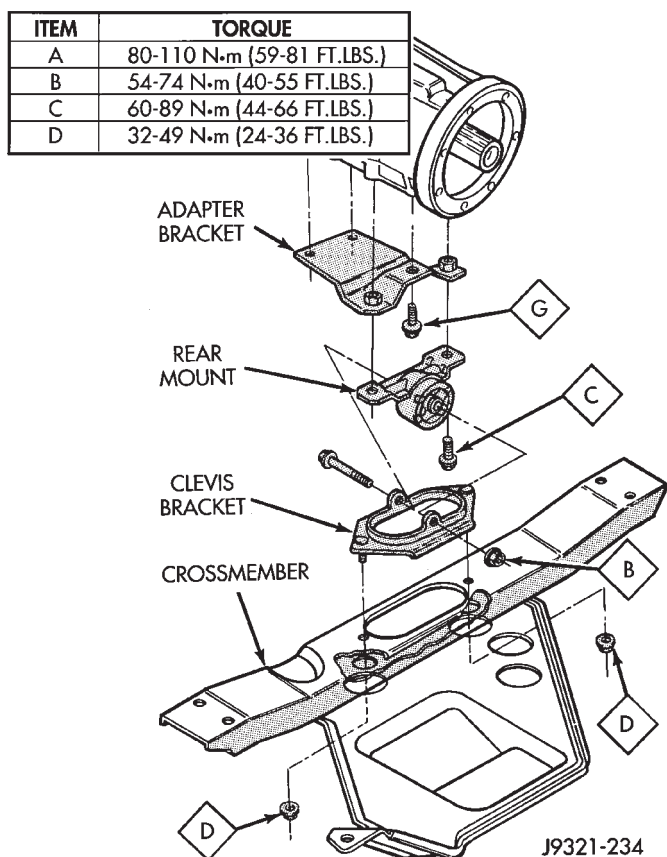


Fig. 8 Transmission Rear Mount Components

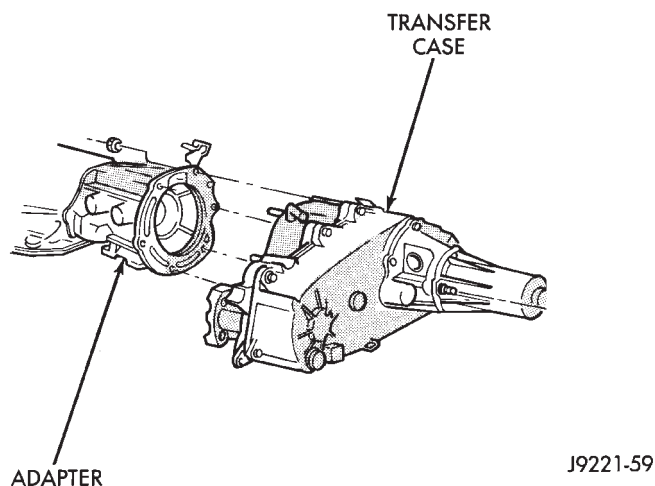


Fig. 9 Transfer Case Mounting

(a) Wipe end of each cooler line clean with lint free cloth, or shop towel.

(b) Install plastic inserts in fittings. **Replace inserts if cut, or torn. Do not reuse them if damaged. A damaged insert will prevent cooler line from seating properly.**

(c) Install NEW retainer clip on each quick disconnect fitting. First, start clip in slot at one side of fitting (Fig. 10). Then swing clip over fitting and carefully seat it in slot at opposite side of fitting (Fig. 11).

(d) Start cooler line into fitting. Then push cooler line inward until wire retainer clip snaps into place behind flange on cooler line.

(e) Verify that both sides of wire retainer clip are seated **behind** flange on cooler line (Fig. 12).

CAUTION: Be sure the cooler lines are fully seated in the fittings. Also be sure the wire retainer clips are properly seated behind each cooler line flange. Fluid pressure will force the cooler line out of the fitting if the retainer clips are improperly seated.

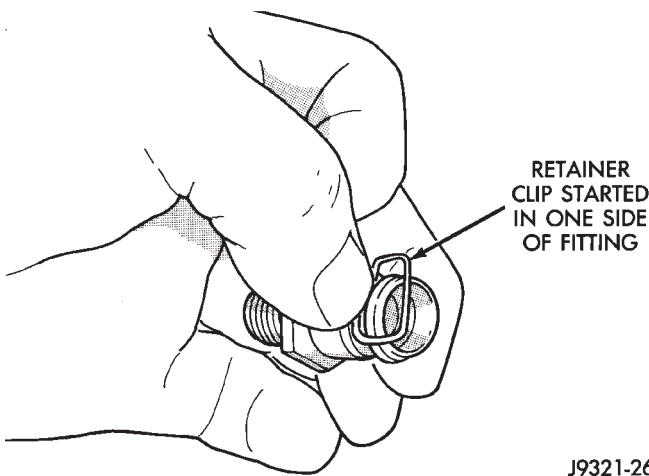
(33) Connect speed sensor wires. If vehicle is also equipped with speedometer cable, connect cable to sensor.

(34) Align and install remaining exhaust components. Tighten all clamp and bracket bolts and nuts securely. Be sure exhaust components are clear of all chassis and driveline components.

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

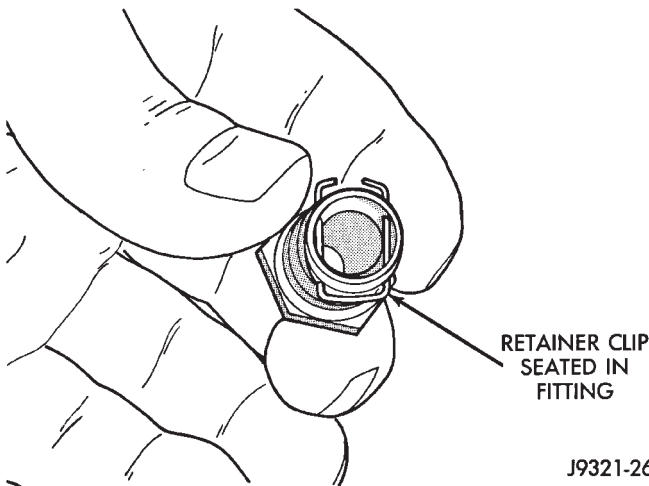
(36) Verify that all linkage components, hoses and electrical wires have been connected.

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



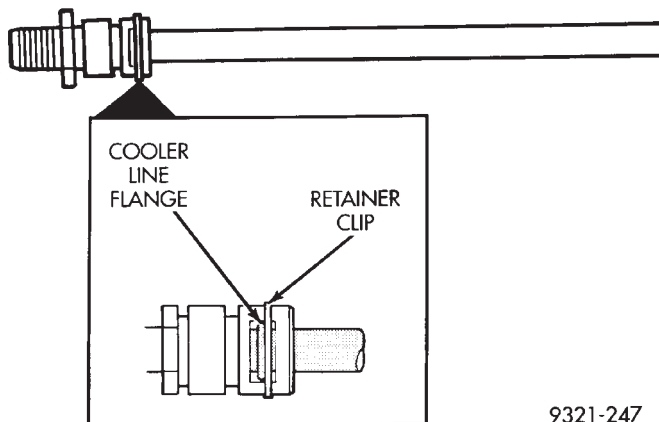
J9321-264

Fig. 10 Starting New Retainer Clip On Quick Disconnect Fitting



J9321-265

Fig. 11 Seating New Retainer Clip In Quick Disconnect Fitting



9321-247

Fig. 12 Verifying Installation Of Cooler Lines In Quick Disconnect Fittings

- (38) Install transfer case skid plate, if equipped.
- (39) Lower vehicle.

(40) Refill transmission with Mopar ATF Plus, type 7176 fluid. Mopar Dexron II can be used if ATF Plus is not readily available.

(41) Check and adjust engine oil level as necessary.

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

(43) Check and adjust transmission throttle cable if necessary.

OVERDRIVE UNIT REMOVAL

- (1) Disconnect battery negative cable.
- (2) Raise vehicle on hoist.
- (3) Remove transfer case skid plate, if equipped.
- (4) Mark front and rear propeller shafts and U-joints for alignment reference (Fig. 10).
- (5) Disconnect and remove both propeller shafts.
- (6) Disconnect vehicle speed sensor wires.
- (7) Disconnect vacuum switch hoses at transfer case, if equipped.
- (8) Disconnect transfer case shift linkage at transfer case range lever. Then remove linkage bracket bolts and remove linkage and bracket from transfer case. Move linkage aside for clearance.
- (9) Remove nuts attaching transfer case to overdrive unit.
- (10) Remove transfer case. Support transfer case with transmission jack (secure transfer case to jack with safety chains). Then move transfer case rearward and off overdrive case.
- (11) Remove transfer case from jack and position it on bench.
- (12) Support transmission with adjustable jack stand. Position wood block between jack and transmission case.
- (13) Remove nuts and bolts attaching transmission mount to center crossmember.
- (14) Remove nuts and bolts attaching crossmember to frame rails.
- (15) Rotate crossmember diagonally to clear frame rails and remove crossmember.
- (16) Support overdrive unit with transmission jack.
- (17) Remove bolts attaching overdrive unit to transmission (Fig. 13).

CAUTION: The overdrive unit must be fully supported during removal. This is necessary to prevent damaging the intermediate shaft. Do not allow the shaft to support the entire weight of the overdrive unit.

(18) Carefully slide overdrive unit off intermediate shaft. Do not tilt overdrive unit during removal. Keep it as level as possible.

- (a) If overdrive unit does not require service, **immediately insert Alignment Tool 6227-2 in splines of planetary gear and overrunning**

clutch (Fig. 14). If misalignment occurs, overdrive unit will have to be disassembled in order to realign splines.

(b) If overdrive unit requires service, refer to Overdrive Unit Overhaul procedures.

(19) Remove and retain bearing and select fit spacer. These parts may remain on overdrive piston, rear of transmission case, sliding hub, or intermediate shaft during removal.

(20) Place several clean shop towels on a bench. Then position unit on towels to absorb spilled fluid.

(21) Position overdrive unit over drain pan and tilt unit to drain residual fluid from case. Examine fluid for clutch material or metal fragments. If fluid contains these items, overhaul will be necessary.

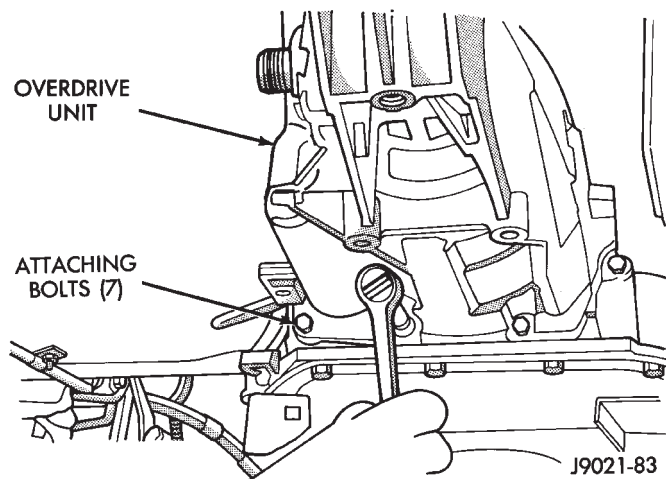


Fig. 13 Removing/Installing Overdrive Unit Attaching Bolts

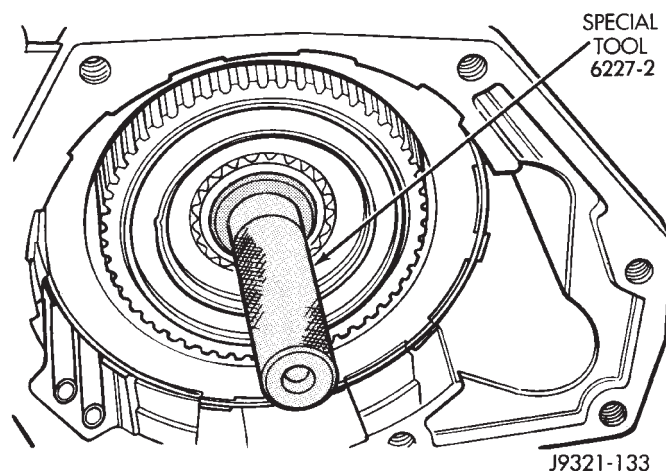


Fig. 14 Overdrive Spline Alignment Tool Installation

OVERDRIVE UNIT INSTALLATION
 (1) Be sure Alignment Tool 6227-2 is still fully seated in splines of overdrive planetary gear and overrunning clutch. If misalignment occurs, overdrive will have to be disassembled in order to realign splines.

(2) If original case gasket is in good condition, pro-

ceed to step (6). If overdrive piston retainer was not removed during service and original case gasket is not reusable, prepare new gasket as described in steps (3) through (5).

(3) Cut out old case gasket around piston retainer with razor knife.

(4) Use old gasket as template and trim new gasket to fit (Fig. 15).

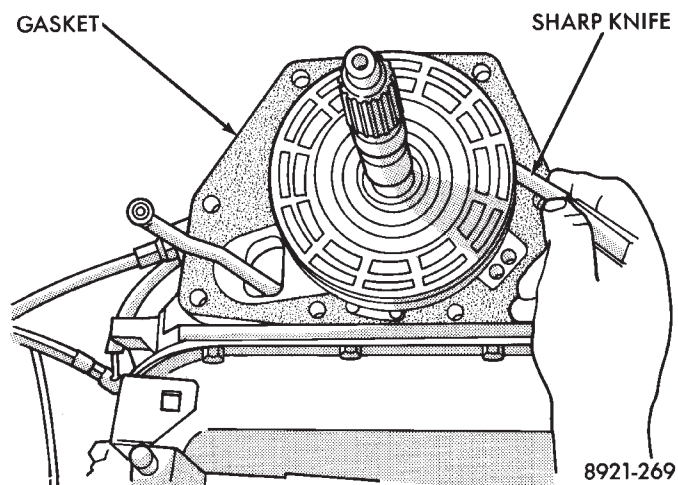


Fig. 15 Trimming Replacement Overdrive Case Gasket

(5) Position new gasket over piston retainer and on transmission case. Use petroleum jelly to hold gasket in place if necessary. **Do not use any type of sealer to secure gasket. Use petroleum jelly only.**

(6) Install selective spacer on intermediate shaft, if removed. Spacer goes in groove just rearward of shaft rear splines (Fig. 16).

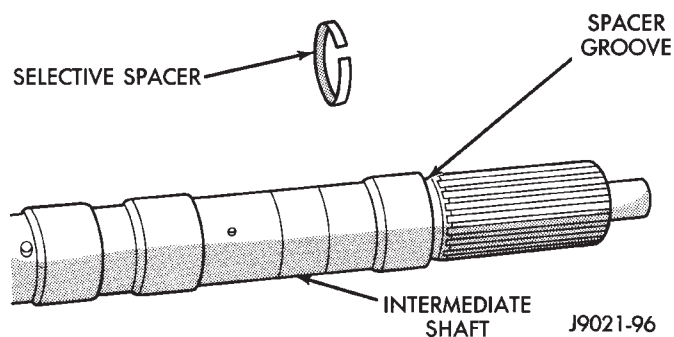


Fig. 16 Intermediate Shaft Selective Spacer Location

(7) Install overdrive piston in retainer, if removed. Lubricate piston seals with Ru-Glyde, Door-Eze or petroleum jelly to ease installation. Be sure piston locating lugs are aligned in piston retainer.

(8) Install thrust bearing in overdrive clutch hub. Use liberal quantity of petroleum jelly to hold bearing in position.

CAUTION: Be sure the shoulder on the inside diameter of the bearing is facing forward.

(9) Install thrust plate in overdrive piston hub (Fig. 17). Use liberal amount of petroleum jelly to hold thrust plate in position.

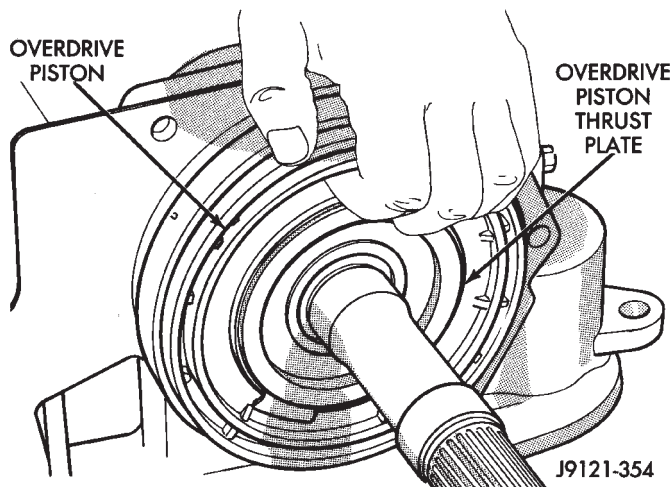


Fig. 17 Installing Overdrive Piston Thrust Plate

(10) Verify that splines in overdrive planetary gear and overrunning clutch hub are aligned with Tool 6227-2 (Fig. 13). **Overdrive unit cannot be fully installed if splines have rotated out of alignment. If misaligned has occurred, overdrive will have to be disassembled in order to realign splines.**

(11) Install overdrive unit as follows:

(a) Raise overdrive unit and carefully slide it straight onto intermediate shaft. **Avoid tilting overdrive unit during installation as planetary gear and overrunning clutch splines could rotate out of alignment. If misalignment**

occurs, overdrive will have to be disassembled in order to realign splines.

(b) Align and insert park rod into park pawl reaction plug.

(c) Align governor tubes in boss on overdrive piston retainer.

(d) Work overdrive unit forward on intermediate shaft until seated against transmission case. If unit will not seat fully, turn output shaft slightly with socket to align intermediate shaft and overdrive splines.

(12) Apply Mopar Lock N' Seal or Loctite 242 to threads of overdrive attaching bolts.

(13) Install and tighten overdrive unit attaching bolts to 34 N•m (25 ft. lbs.).

(14) Install transfer case. Tighten attaching nuts to 41 N•m (30 ft. lbs.) torque.

(15) Connect transmission and transfer case shift linkage.

(16) Install crossmember and rear mount.

(17) Connect all necessary electrical wires.

(18) Align and connect propeller shafts. Tighten U-joint clamp bolts to 19 N•m (170 in. lbs.) torque.

(19) Check and adjust fluid level in transfer case. Use Mopar ATF Plus, or Dexron II to top off fluid level if necessary.

(20) Install skid plate, if equipped.

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

(22) Lower vehicle.

(23) Check and adjust transmission fluid level. Use Mopar ATF Plus, type 7176 fluid. Mopar Dexron II can be used if ATF Plus is not readily available.

TRANSMISSION OVERHAUL—46RH

INDEX

	page		page
Accumulator Overhaul	218	Rear Clutch Overhaul	225
Front Clutch Overhaul	223	Rear Servo and Band Overhaul	219
Front Servo and Band Overhaul	219	Transmission Assembly	244
Oil Pump and Reaction Shaft Support Overhaul	220	Transmission Case Cleaning and Inspection	216
Overdrive Piston and Retainer Service	216	Transmission Disassembly	208
Overhaul Service Information	215	Valve Body Cleaning and Inspection	237
Overrunning Clutch Overhaul	216	Valve Body Service and Adjustment	231
Planetary Geartrain Overhaul	227		

TRANSMISSION DISASSEMBLY

- (1) Remove torque converter, if not previously removed.
- (2) Clean transmission exterior with steam gun or solvent. Wear safety goggles while cleaning transmission.
- (3) Remove shift and throttle levers from shaft of valve body manual lever.
- (4) Remove bolts attaching overdrive unit to transmission case (Fig. 1).

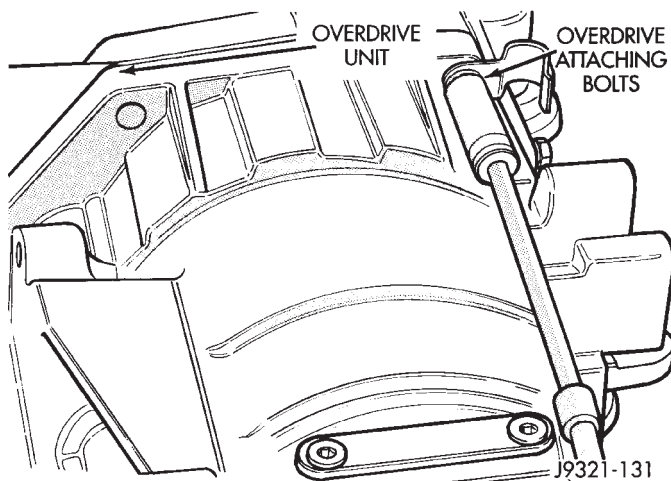


Fig. 1 Removing Overdrive Unit Attaching Bolts

- (5) Loosen overdrive unit. Use pry tool to start overdrive unit off intermediate shaft and transmission case. Position pry tool between flange on overdrive case and transmission rear servo boss (Fig. 2).
- (6) Work overdrive unit rearward and off transmission intermediate shaft (Fig. 3).

(a) If overdrive unit does not require service, insert Alignment Tool 6227-2 in overdrive unit overrunning clutch and planetary gear to maintain spline alignment (Fig. 4). **If clutch and gear splines rotate out of alignment, overdrive unit will have to be disassembled in order to re-align splines.**

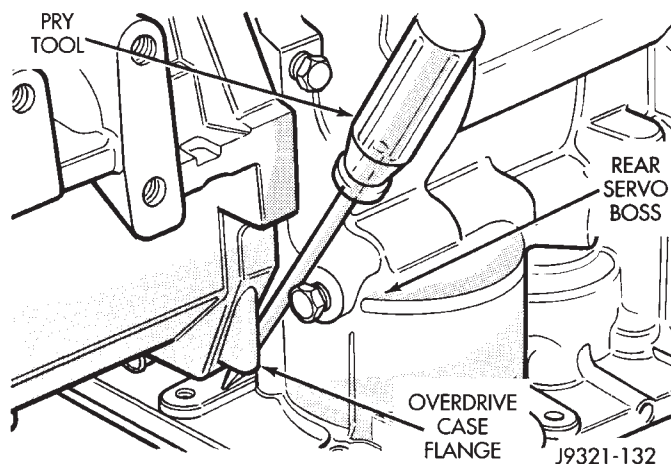


Fig. 2 Loosening Overdrive Unit From Transmission

- (b) If overdrive unit does requires service, refer to Overdrive unit Overhaul section.

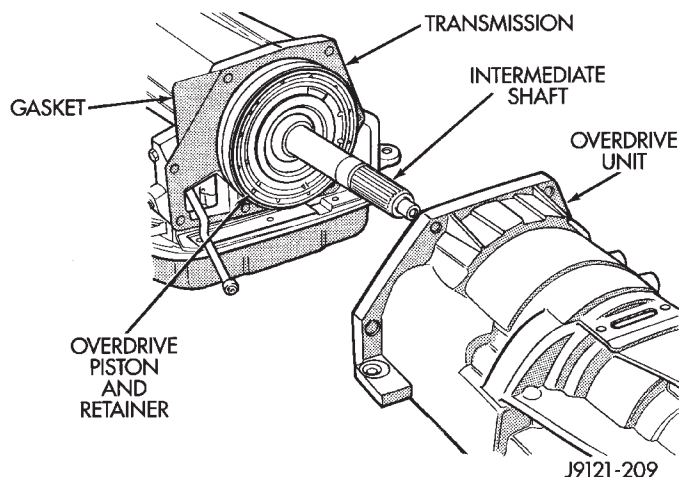


Fig. 3 Removing Overdrive Unit From Transmission—46RH

- (7) Remove thrust plate from overdrive piston (Fig. 5).
- (8) Remove overdrive piston from retainer (Fig. 6).
- (9) Remove overdrive piston thrust bearing (Fig. 7).
- (10) Mount transmission unit on Repair Stand C-3750-B, or support transmission with wood blocks.

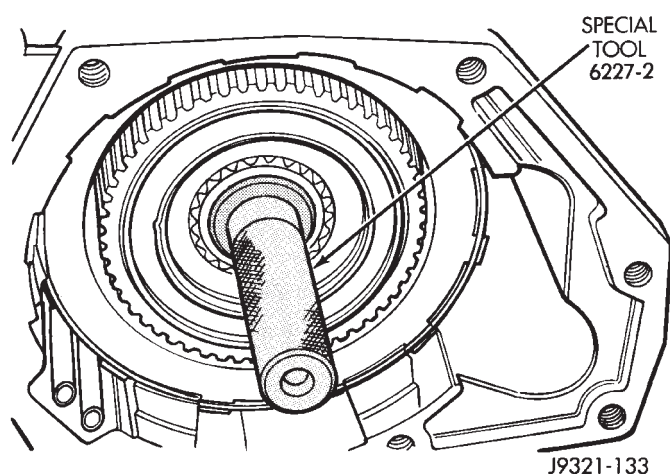


Fig. 4 Overdrive Spline Alignment Tool Installation

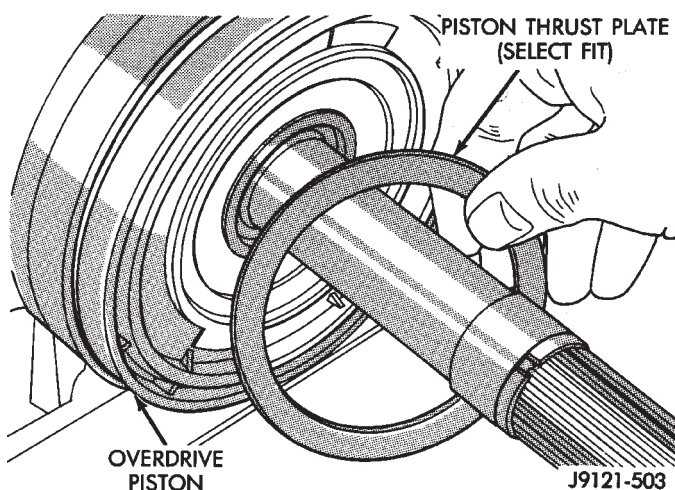


Fig. 5 Removing Overdrive Piston Thrust Plate—46RH

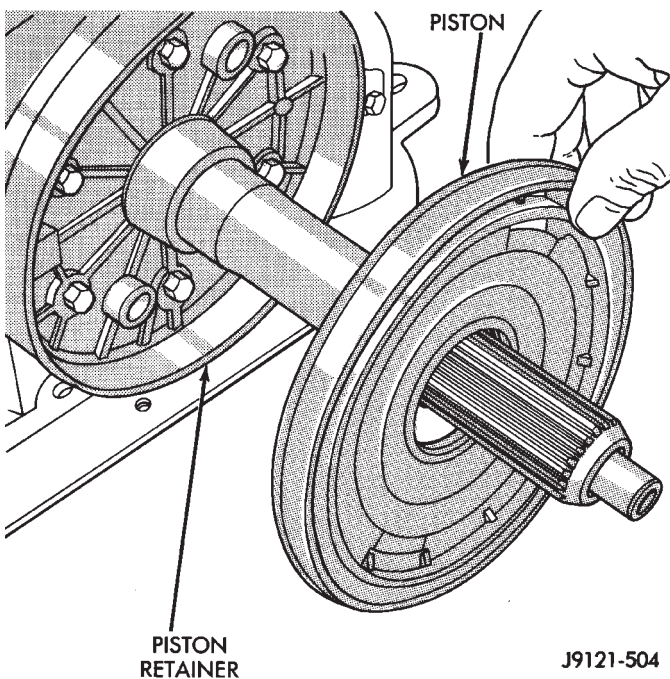


Fig. 6 Removing Overdrive Piston—46RH

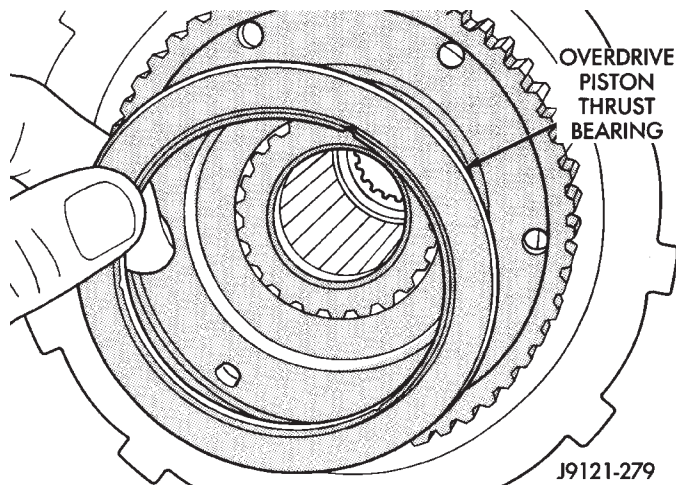


Fig. 7 Removing/Installing Overdrive Piston Thrust Bearing

(11) Remove pump oil seal with Special Tool C-3861 (Fig. 8). Be sure to tighten tool threads completely into seal before using puller bolt to withdraw seal.

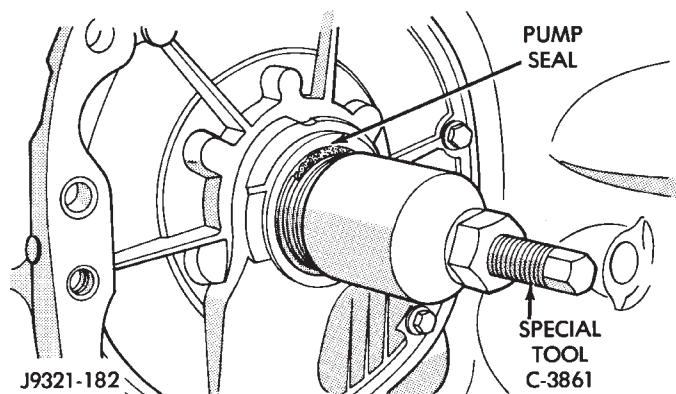


Fig. 8 Removing Pump Oil Seal—46RH

(12) Remove oil pan bolts and remove pan (Fig. 9) and gasket (Fig. 10). Oil pan magnet can be removed or left in pan as needed (Fig. 11). Exercise care when removing pan to avoid distorting or bending pan flange.

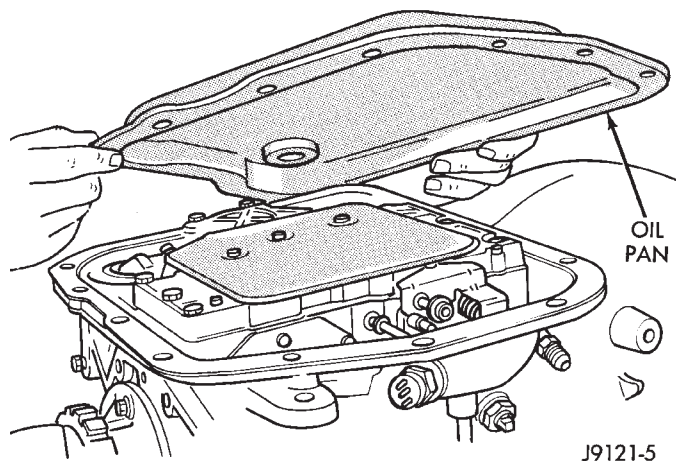


Fig. 9 Removing/Installing Oil Pan—46RH

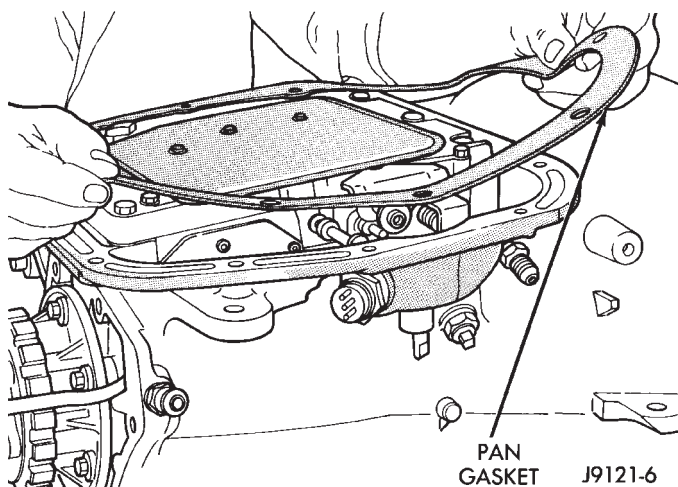


Fig. 10 Removing/Installing Pan Gasket—46RH

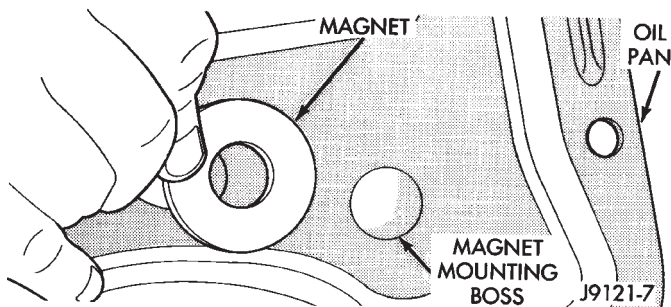


Fig. 11 Oil Pan Magnet Location—46RH

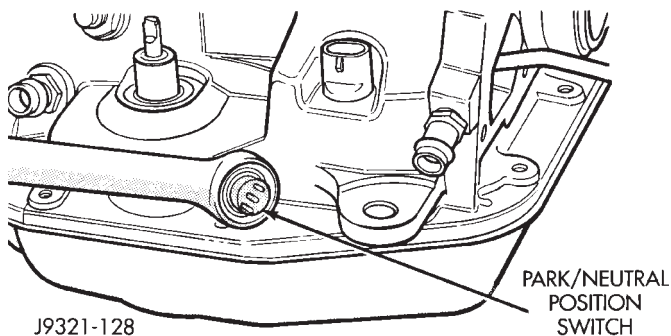


Fig. 12 Park/Neutral Position Switch Removal/Installation

(13) Remove park/neutral position switch (Fig. 12). If switch gasket is in good condition, retain gasket and keep it with switch.

(14) Remove fluid filter attaching screws and remove filter (Fig. 13). Keep filter screws separate. They are longer than valve body screws.

(15) Remove hex head valve body attaching bolts (Fig. 14). A total of 10 hex head bolts are used to secure valve body to case.

(16) Lift valve body upward. Push solenoid connector and manual lever shaft out of case. Then raise valve body, guide park rod out of case and remove valve body (Fig. 15). **Do not use boost valve tube to lift valve body.** Set valve body aside for disassembly, cleaning and inspection.

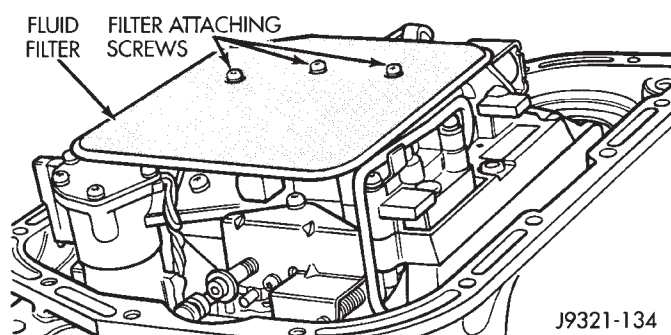


Fig. 13 Fluid Filter Removal/Installation—46RH

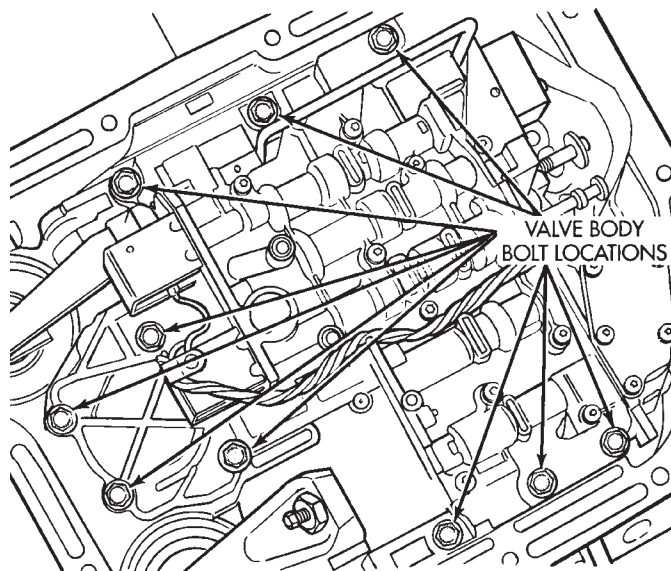


Fig. 14 Valve Body Bolt Locations—46RH

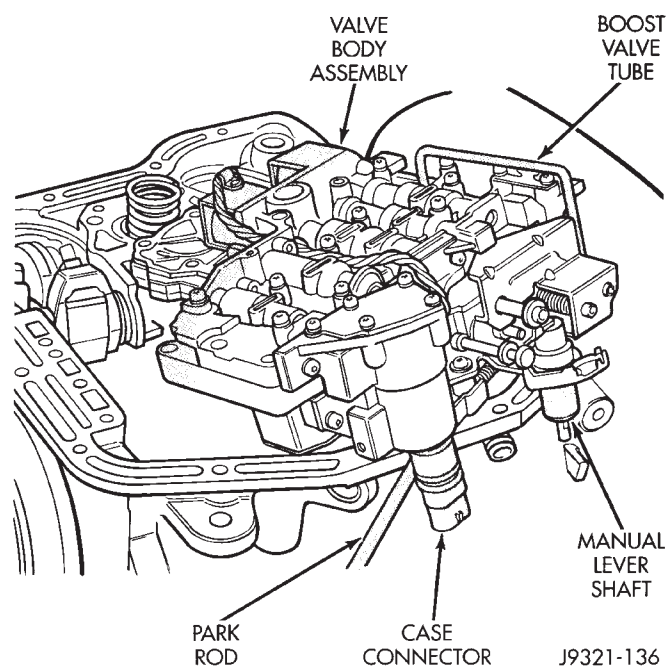


Fig. 15 Valve Body Removal—46RH

(17) Remove accumulator outer spring, piston and inner spring (Fig. 16). Note position of piston and springs for assembly reference. Remove and discard piston seals if worn or cut.

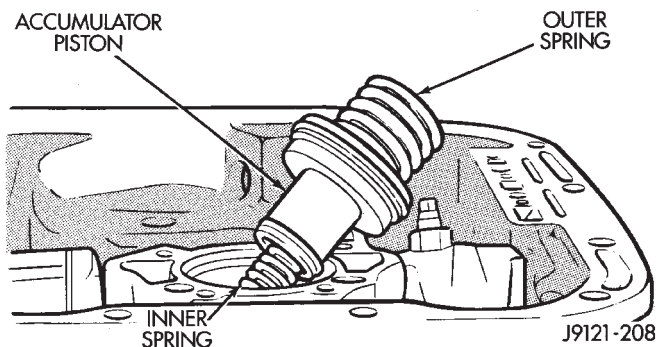


Fig. 16 Accumulator Component Removal—46RH

(18) Remove front band lever pin access plug (Fig. 17). Use square end of 1/4 in. drive extension to remove plug as shown.

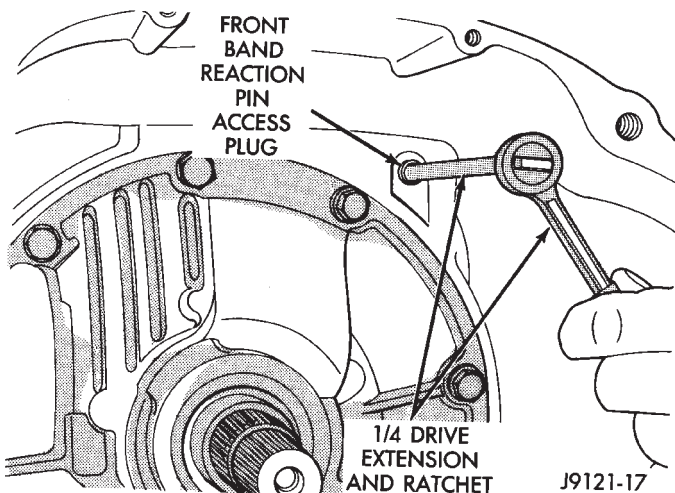


Fig. 17 Removing/Installing Front Band Lever Pin Access Plug—46RH

(19) Remove oil pump and reaction shaft support assembly as follows:

(a) Tighten front band adjusting screw until band is tight around front clutch retainer (Fig. 18). This will

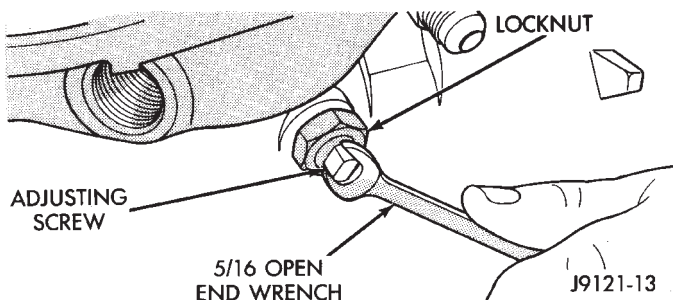


Fig. 18 Tightening Front Band To Hold Front Clutch In Place—46RH

prevent retainer from coming out with pump and possibly damaging clutch or pump components.

(b) Remove oil pump bolts.

(c) Thread Slide Hammer Tools C-3752 into threaded holes in flange of oil pump housing (Fig. 19).

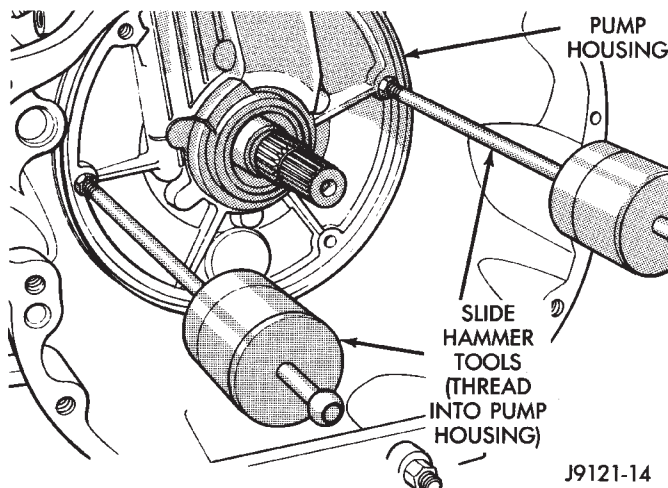


Fig. 19 Installing Oil Pump Remover Tools—46RH

(d) Remove oil pump and reaction shaft support by bumping slide hammers outward alternately to pull pump from case (Fig. 20).

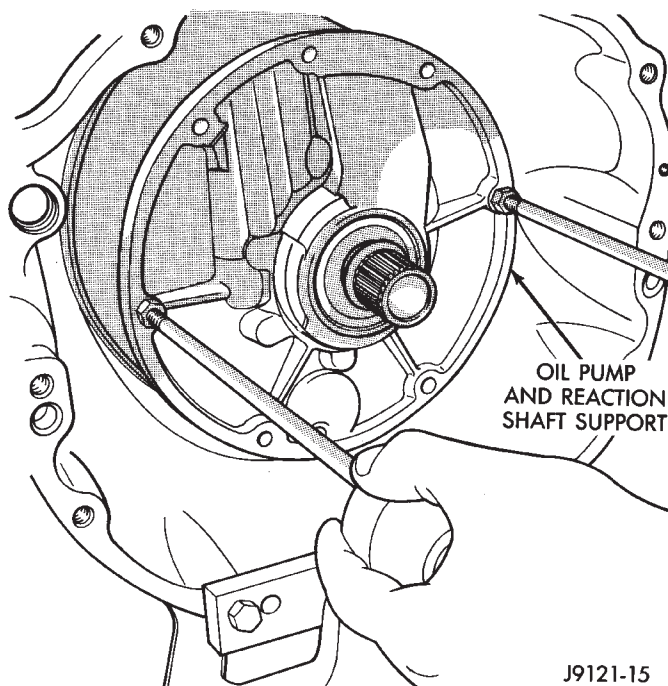


Fig. 20 Oil Pump Removal—46RH

(20) Remove oil pump gasket (Fig. 21). Note gasket position in case for assembly reference.

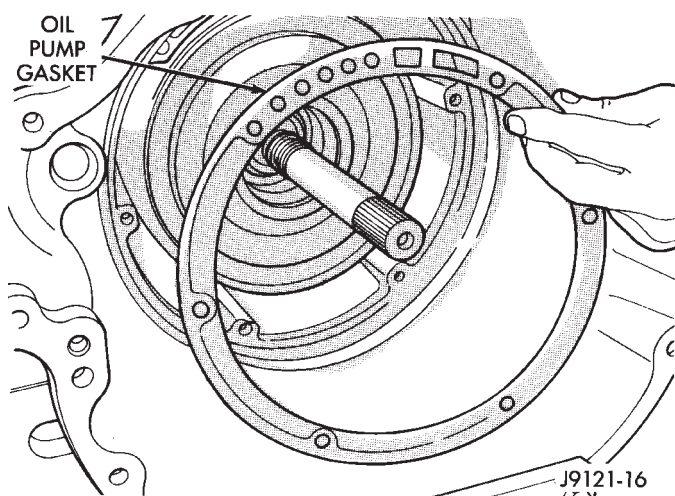


Fig. 21 Removing Oil Pump Gasket—46RH

(21) Loosen front band adjusting screw until band is completely loose.

(22) Remove front band strut and anchor (Fig. 22).

(23) Squeeze front band together slightly and slide band over front clutch retainer and out of case (Fig. 23).

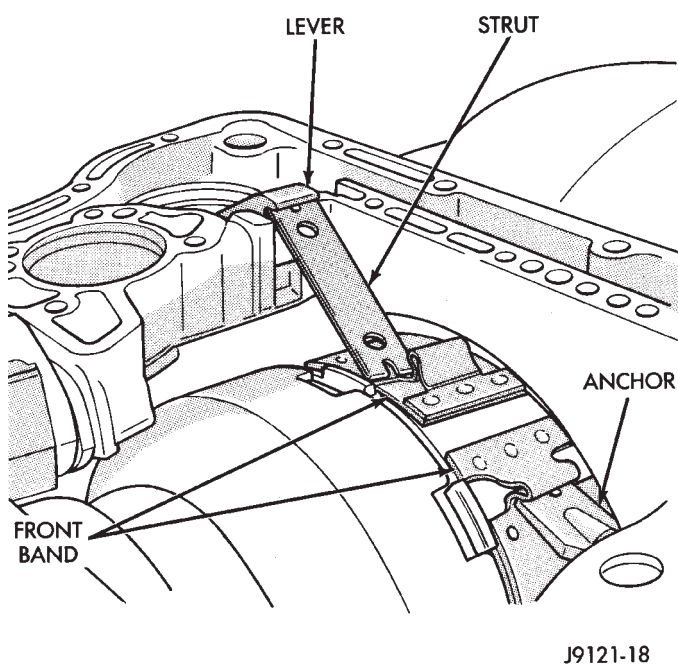


Fig. 22 Front Band Linkage—46RH

(24) Remove front and rear clutch assemblies as a unit (Fig. 24). Set assemblies aside for disassembly and inspection after removal.

(25) Remove front band reaction pin and lever. Start pin through lever and out of case bore with drift or punch. Then use pencil magnet to withdraw pin completely (Fig. 25).

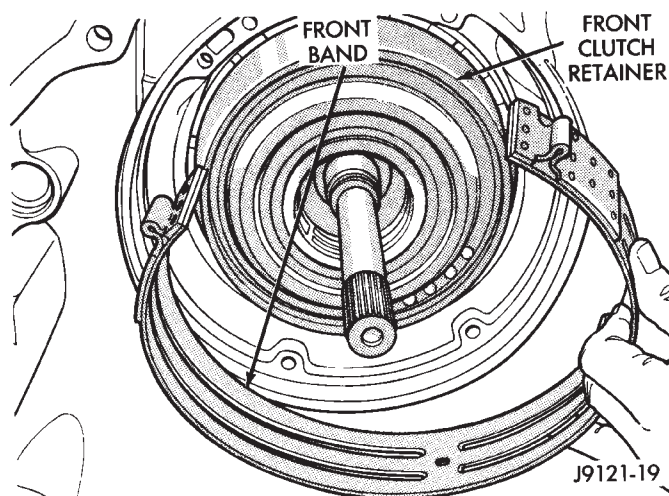


Fig. 23 Front Band Removal—46RH

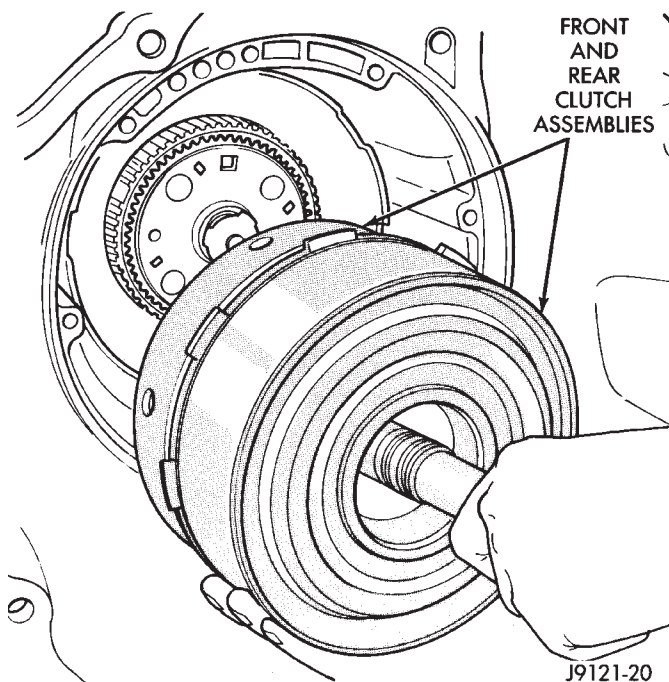


Fig. 24 Removing/Installing Front And Rear Clutch Assemblies—46RH

(26) Remove intermediate shaft thrust washer. Triangular shaped washer will either be on shaft pilot hub or in rear clutch retainer (Fig. 26).

(27) Remove thrust plate from intermediate shaft hub (Fig. 27).

(28) Remove intermediate shaft-planetary geartrain assembly (Fig. 28). Set assembly aside for disassembly and inspection later in procedure.

(29) Loosen rear band adjusting screw 3-4 turns.

(30) Remove snap ring that retains low-reverse drum on overdrive piston retainer hub (Fig. 29).

(31) Slide low-reverse drum off piston retainer hub and out of rear band (Fig. 30).

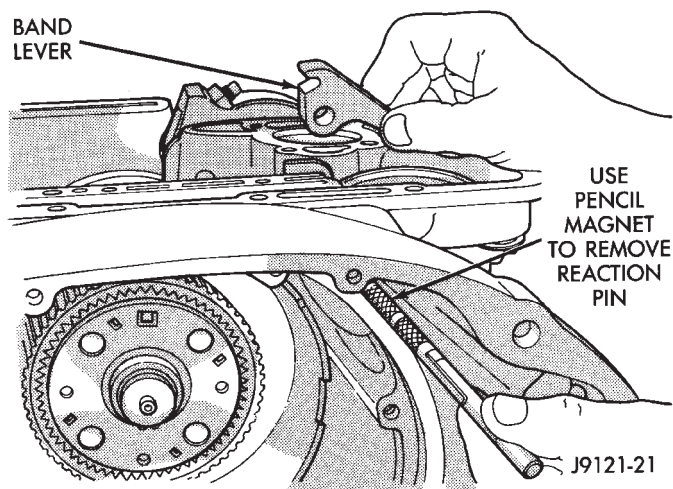


Fig. 25 Removing Front Band Lever And Pin—46RH

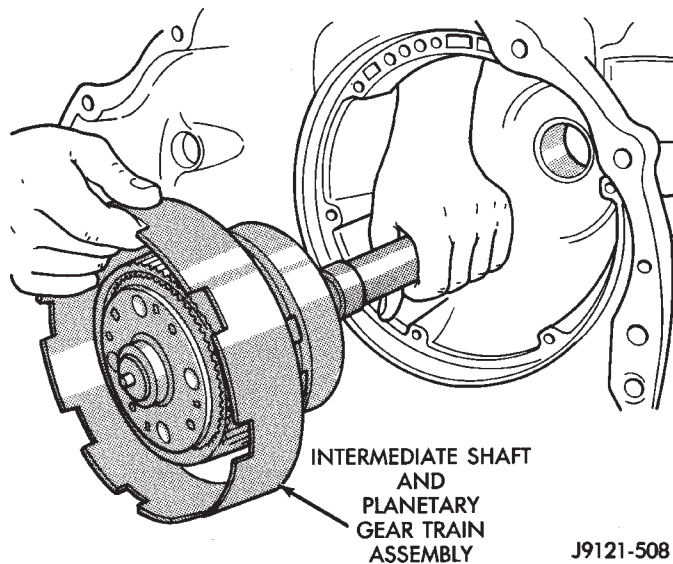


Fig. 28 Removing Intermediate Shaft And Planetary Geartrain Assembly—46RH

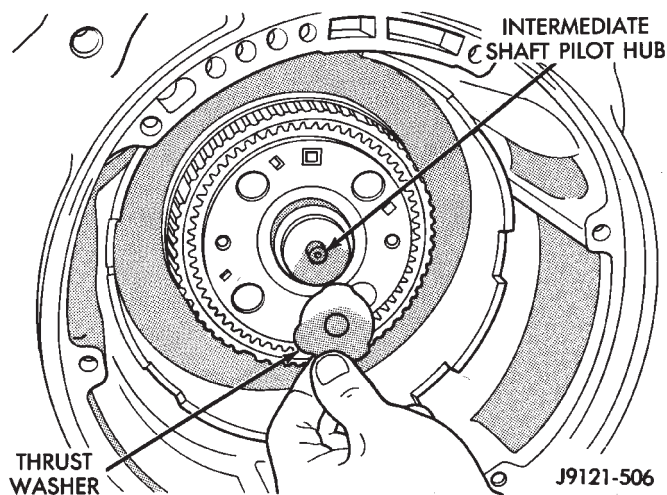


Fig. 26 Removing Intermediate Shaft Thrust Washer—46RH

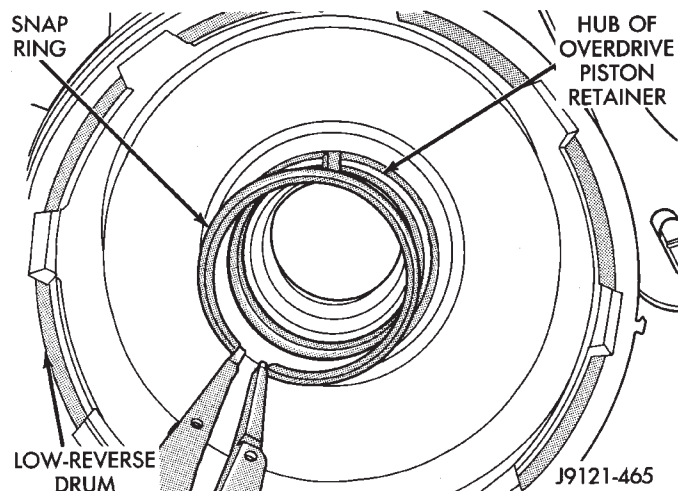


Fig. 29 Removing/Installing Low-Reverse Drum Snap Ring—46RH

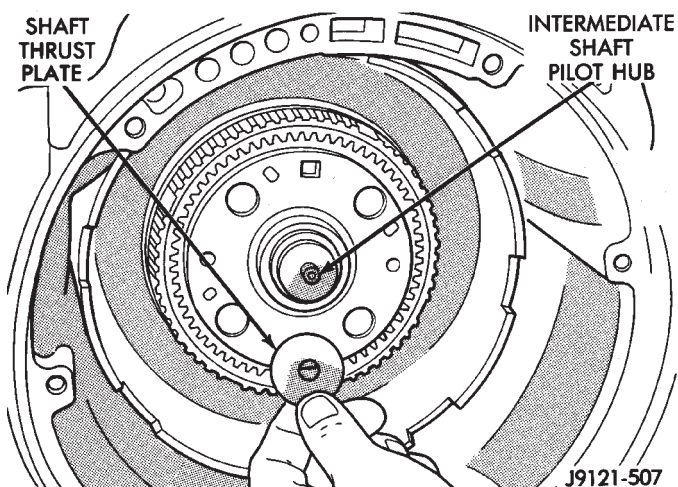


Fig. 27 Removing Intermediate Shaft Thrust Plate—46RH

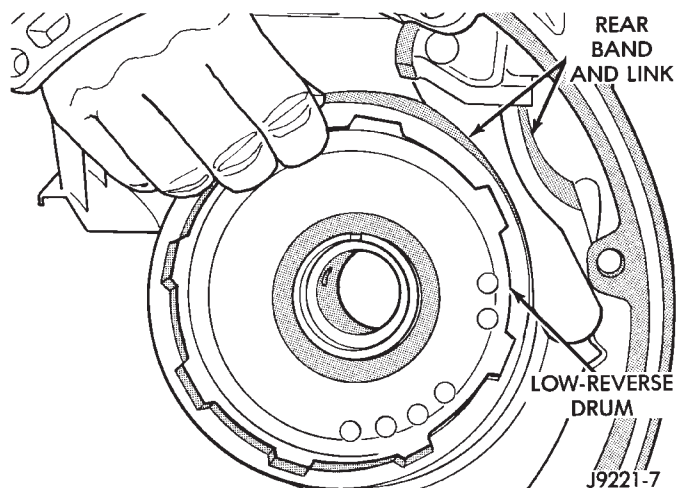


Fig. 30 Removing/Installing Low-Reverse Drum—46RH

(32) Note that overrunning clutch race will remain on splines of low-reverse drum after removal (Fig. 31). **The race is a permanent press fit on the hub splines. Do not attempt to remove the race.**

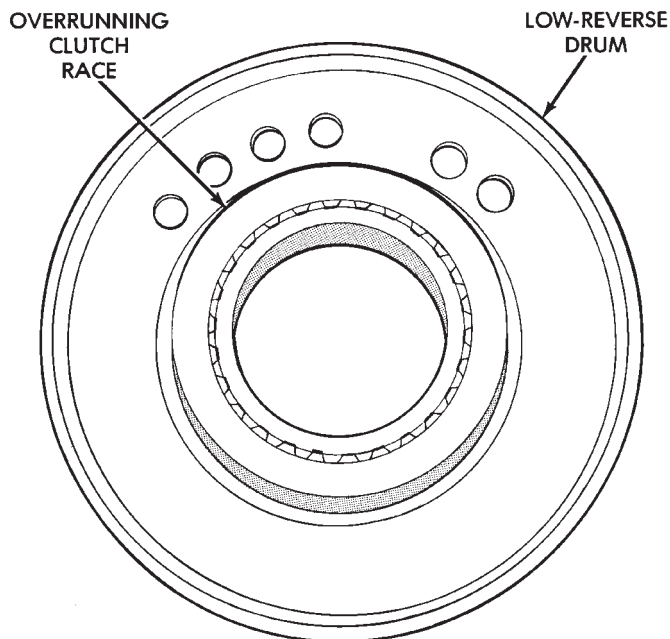


Fig. 31 Overrunning Clutch Race Position—46RH

(33) Remove overrunning clutch assembly (Fig. 32). Assembly can be removed without displacing rollers and springs if care is exercised. Note position of rollers and springs for assembly reference.

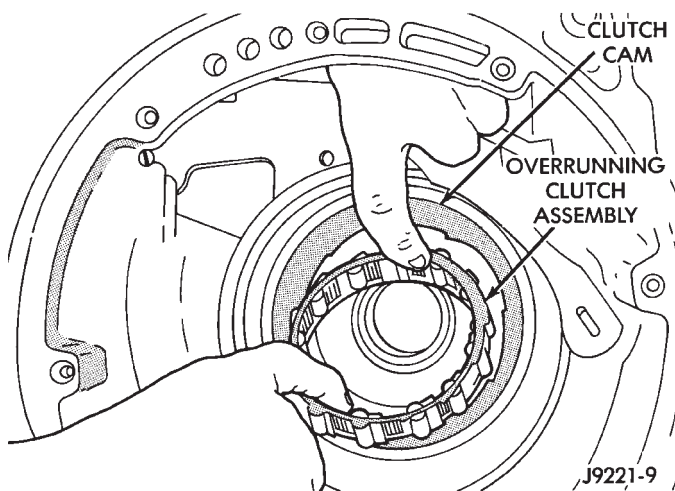


Fig. 32 Removing/Installing Overrunning Clutch—46RH

(34) Remove rear band adjusting lever, reaction lever and reaction pin (Fig. 33).

(35) Remove strut from rear band. Keep strut with levers and pin for cleaning, inspection and assembly reference.

(36) Remove rear band and link (Fig. 34).

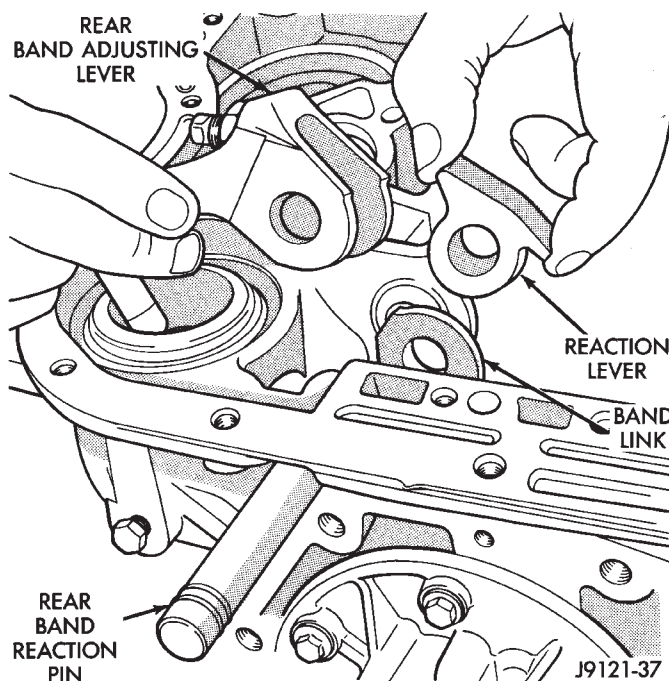


Fig. 33 Removing Rear Band Levers And Reaction Pin—46RH

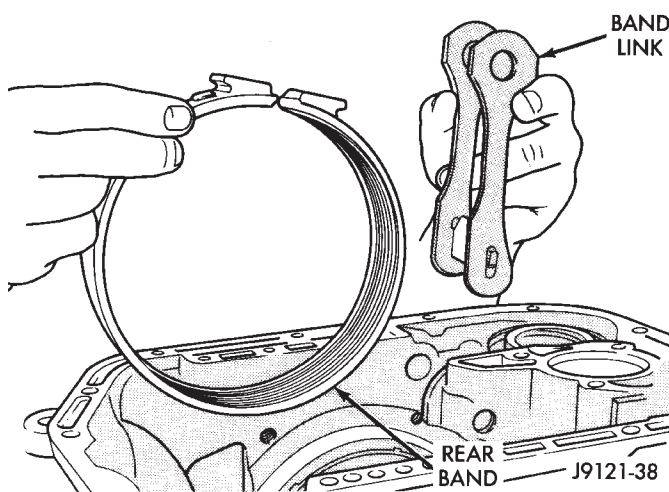


Fig. 34 Removing Rear Band And Link—46RH

(37) Compress front servo rod guide with C-clamp and Tool C-4470, or Valve Spring Compressor C-3422-B (Fig. 35). Compress guide only enough to permit snap ring removal (about 1/8 in.).

(38) Remove servo piston snap ring (Fig. 35). Unseat one end of ring. Then carefully work removal tool around back of ring until free of ring groove. **Exercise caution when removing snap ring. Servo bore can be scratched or nicked if care is not exercised.**

(39) Remove tools and remove servo piston and spring.

(40) Compress rear servo piston with C-clamp and Tool C-4470, or Valve Spring Compressor C-3422-B

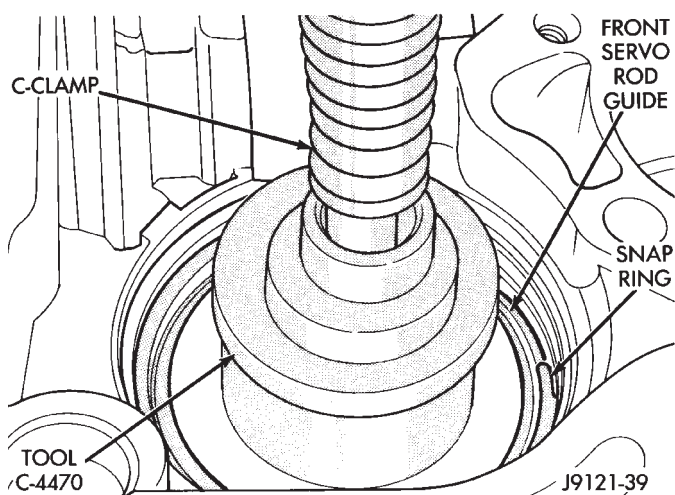


Fig. 35 Removing Front Servo Retaining Snap Ring—46RH

(Fig. 36). Compress servo spring retainer only enough to permit snap ring removal.

(41) Remove servo piston snap ring (Fig. 36). Start one end of ring out of bore. Then carefully work removal tool around back of snap ring until free of ring groove. **Exercise caution when removing snap ring. Servo bore can be scratched or nicked if care is not exercised.**

(42) Remove tools and remove rear servo retainer, spring and piston assembly.

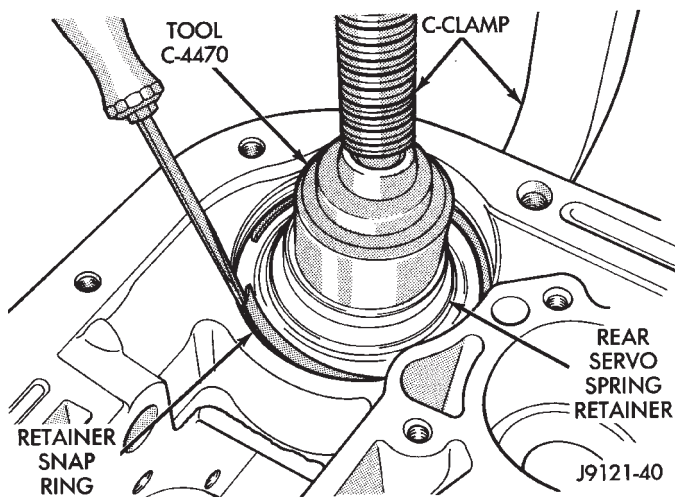


Fig. 36 Removing Rear Servo Retaining Snap Ring—46RH

(43) Remove overdrive piston retainer bolts and remove retainer from case (Fig. 37).

(44) Remove gasket from rear of case after removing piston retainer.

OVERHAUL SERVICE INFORMATION

Inspect all the transmission bushings during overhaul. Bushing condition is important as worn, scored bushings contribute to low pressures, clutch slip and

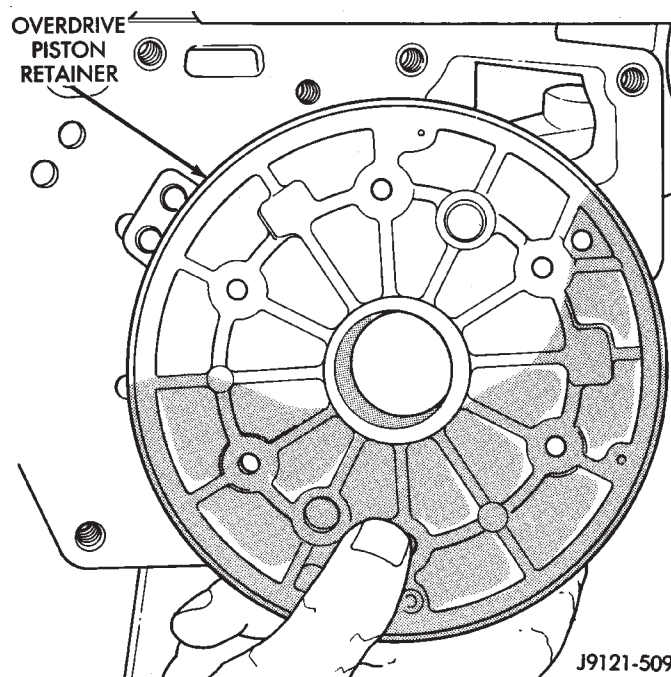


Fig. 37 Removing Overdrive Piston Retainer—46RH

accelerated wear of other components. However, do not replace bushings as a matter of course. Replace bushings only when worn, scored, 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 Set C-3887-B.

Pre-sized service bushings are available for replacement purposes. Only the sun gear bushings are not serviced. Low cost of the sun gear assembly makes it easier to simply replace the gear and bushings as an assembly.

Heli-Coil inserts are recommended for repairing damaged, stripped or worn threads in aluminum parts. These inserts are available from most automotive jobbers. 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, Type 7176 transmission fluid during assembly. Use Ru-Glyde, petroleum jelly, or Door Eze to prelubricate seals, O-rings, and thrust washers. Petroleum jelly can also be used to hold parts in place during reassembly.

TRANSMISSION CASE CLEANING AND INSPECTION

Clean the case in a solvent tank. Flush the case bores and fluid passages thoroughly with solvent. Dry the case and all fluid passages with compressed air. Be sure all solvent is removed from the case and that all fluid passages are clear.

Do not use shop towels or rags to dry the case (or any other transmission component) unless they are made from lint-free materials. Lint will stick to component surfaces and circulate throughout the transmission after assembly. A sufficient quantity of lint can block fluid passages and interfere with valve body operation.

Inspect the case for cracks, porous spots, worn servo bores, or damaged threads. Damaged threads can be repaired with Helicoil thread inserts. 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.

Check condition of the quick disconnect cooler line fittings in the transmission case. Replace the fitting as an assembly if the fitting body is damaged. Replace the plastic inserts if damaged, or distorted. **Do not reuse the wire retainer clips. Install new clips if the originals are removed for any reason.**

If the quick disconnect fittings are removed from the case, apply Mopar Lock N' Seal, or Loctite 242 to the fitting threads before installation. Recommended set-to tightening torque for the fittings is 27 N•m (20 ft. lbs.).

OVERDRIVE PISTON AND RETAINER SERVICE

Remove and discard the piston seals.

Clean the piston and retainer in parts cleaning solvent. Do not use any type of caustic materials for cleaning. Such materials may etch the surfaces causing damage.

Inspect the piston and retainer carefully. Replace either part if cracked, porous or damaged in any way. Check condition of the locating lugs on the piston. Be sure the lugs are in good condition and are not worn, chipped or broken.

Inspect the check ball in the piston (Fig. 38). Be sure the ball is secure and is not partially dislodged, or loose. Replace the piston if doubt exists about piston or check ball condition.

Check the governor feed tube boss in the retainer. Be sure the boss is in good condition and is not damaged in any way.

OVERRUNNING CLUTCH OVERHAUL

Inspect condition of the clutch cam, cage-type retainer, rollers, springs and clutch race.

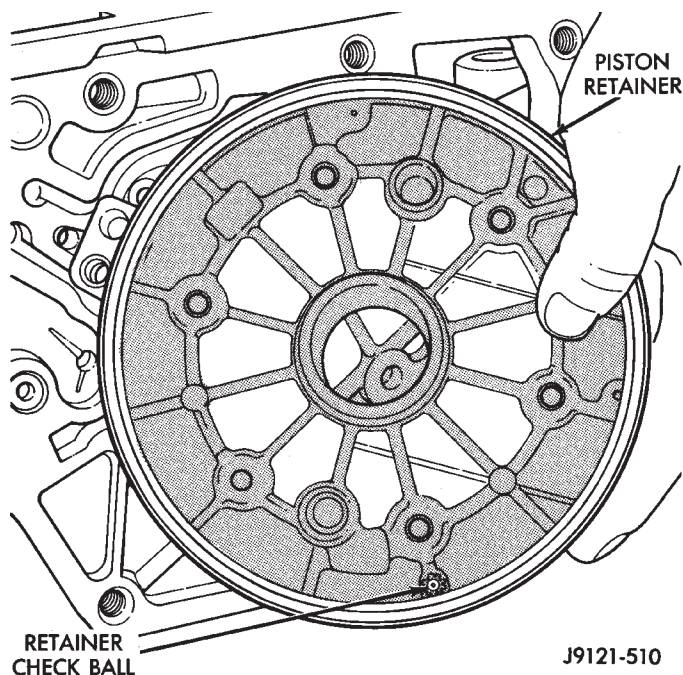


Fig. 38 Overdrive Piston—46RH

Replace the clutch cam if worn or damaged. Also check fit of the cam in the transmission case. If the cam is loose, the case may be worn, or cracked.

The clutch race is permanently pressed onto the low-reverse drum hub. If either the drum or race are worn or damaged, replace the drum and race as an assembly. Check fit of the race on the low-reverse drum hub splines. Replace the drum and race as an assembly if the race is loose on the hub splines.

Examine the overrunning clutch assembly carefully. Replace assembly if the rollers, springs, or cage-type retainer are worn, or damaged.

If the clutch cam requires replacement, install a new cam as described in the following procedure.

OVERRUNNING CLUTCH CAM REPLACEMENT

- (1) Remove clutch cam setscrew (Fig. 39).
- (2) Tap old cam and spring retainer out of case with pin punch. Insert punch through bolt holes at rear of case (Fig. 40). Alternate position of punch to avoid cocking cam during removal.
- (3) Clean clutch cam bore and case. Be sure to remove all chips/shavings generated during cam removal.
- (4) Install rear support in case. Align support with reference marks made at disassembly.
- (5) Align and start new clutch cam and spring retainer in case. Be sure serrations on cam and in case are aligned (Fig. 41). Then tap cam into case just enough to hold it in place.
- (6) **Verify that cam is correctly positioned before proceeding any further. Narrow ends of cam ramps should be to left when cam is viewed from front end of case (Fig. 41).**

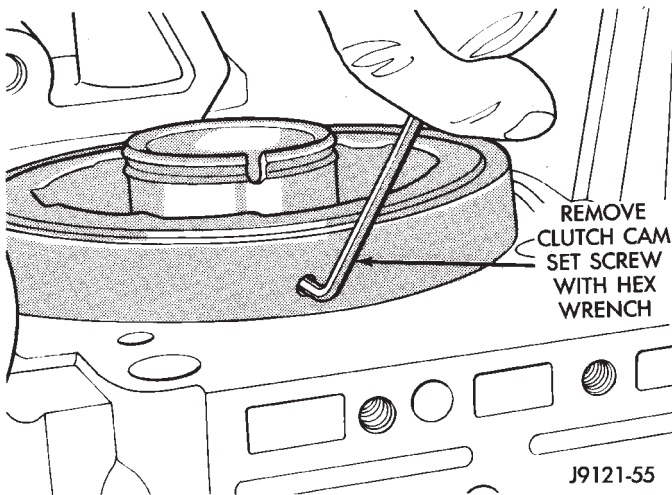


Fig. 39 Removing/Installing Clutch Cam Setscrew—46RH

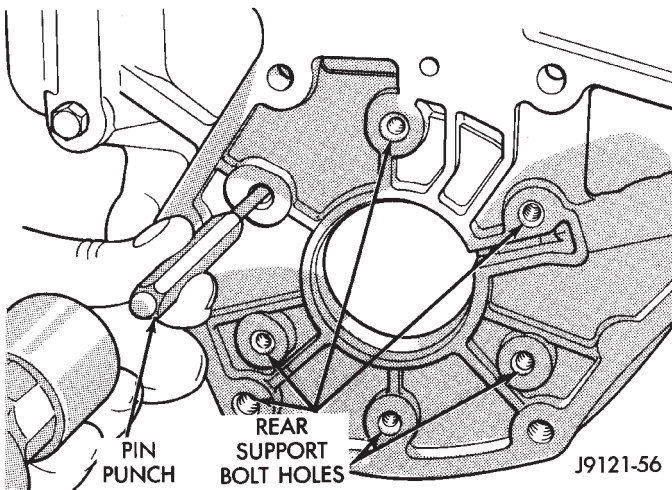


Fig. 40 Removing Overrunning Clutch Cam—46RH

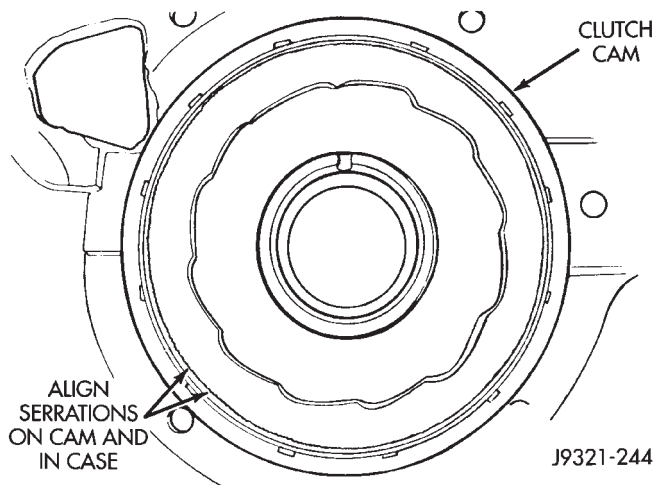


Fig. 41 Positioning Replacement Clutch Cam And Spring Retainer—46RH

(7) Insert Adapter Tool SP-5124 into piston retainer (Fig. 42).

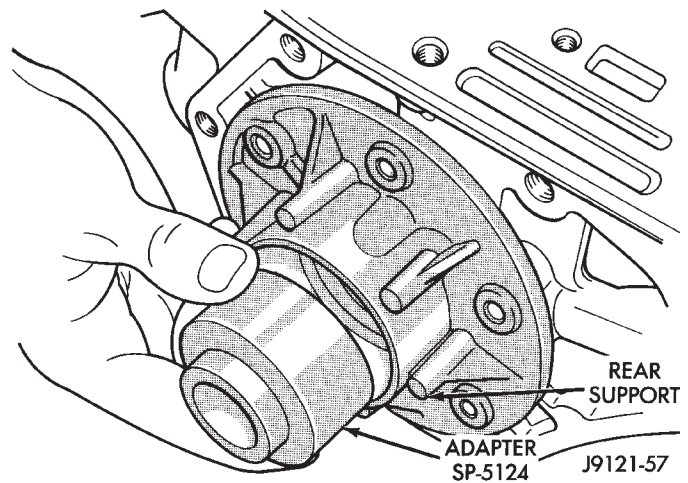


Fig. 42 Positioning Adapter Tool In Rear Support Or Overdrive Piston Retainer—46RH

(8) Assemble Puller Bolt SP-3701 and Press Plate SP-3583-A (Fig. 43).

(9) Install assembled puller plate and bolt (Fig. 44). Insert bolt through cam, case and adapter tool. Be sure plate is seated squarely on cam.

(10) Hold puller plate and bolt in place and install puller nut SP 3701 on puller bolt (Fig. 45).

(11) Tighten puller nut to draw clutch cam into case (Fig. 45). **Be sure cam is drawn into case evenly and does not become cocked.**

(12) Install clutch cam setscrew (Fig. 39).

(13) Remove clutch cam installer tools and piston retainer.

(14) **Stake case in 12 places around clutch cam to help secure cam in case. Use blunt punch or chisel to stake case.**

(15) Clean case and cam thoroughly. Be sure any chips/shavings generated during cam installation are removed from case.

INSTALLING OVERRUNNING CLUTCH ASSEMBLY

(1) Lubricate overdrive piston retainer hub, clutch race, clutch cam, and overrunning clutch rollers with transmission fluid.

(2) If any overrunning clutch rollers or springs came out of retainer, reinstall them as follows: Install and seat spring in retainer first. Then insert roller between spring and retainer stop as shown (Fig. 46). Verify that each roller and spring are fully seated before proceeding.

(3) Install and seat clutch assembly in cam (Fig. 47). **The retainer is a one-way fit in the cam. The flanged side of the retainer should be facing out-**

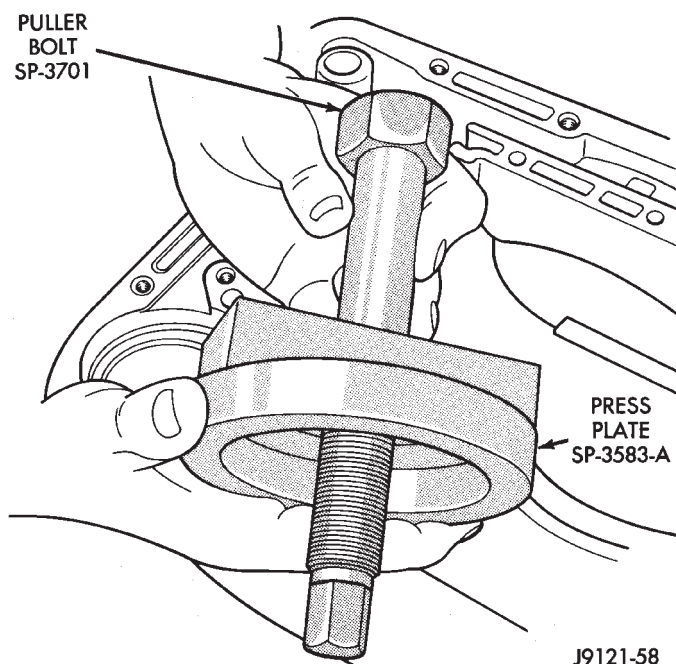


Fig. 43 Assembling Clutch Cam Puller Bolt And Press Plate

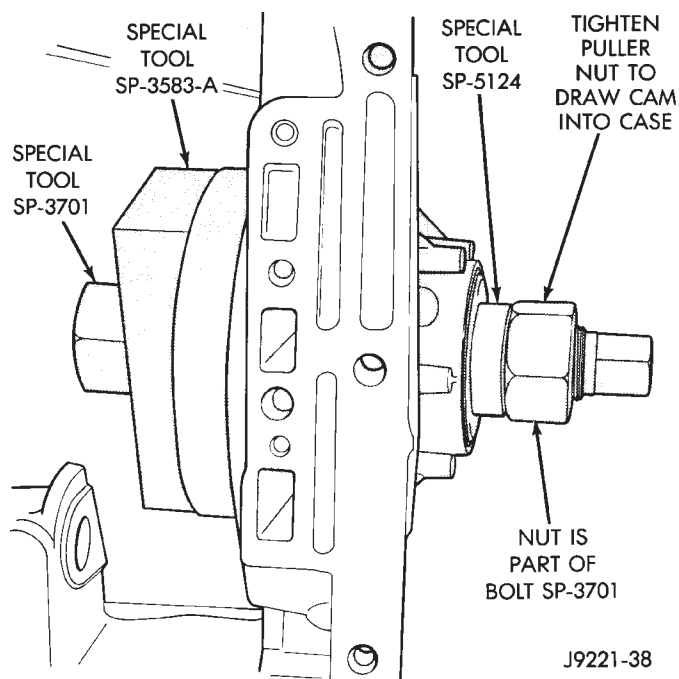


Fig. 45 Installing Overrunning Clutch Cam—46RH

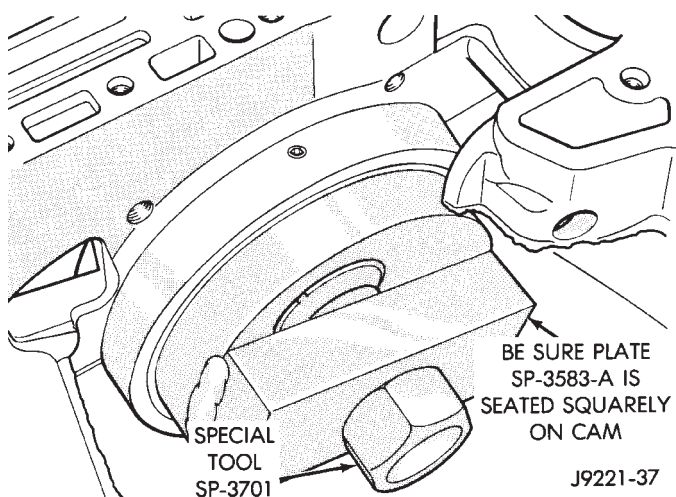


Fig. 44 Positioning Puller Plate On Clutch Cam

ward. The retainer and rollers will slip easily into the cam when properly positioned.

(4) Install low-reverse drum. Tilt drum slightly and carefully engage clutch race (on drum hub) in overrunning clutch rollers. Raise drum to level position. Then rotate the drum in clockwise direction until fully seated.

(5) Check overrunning clutch operation. Low-reverse drum should rotate freely in clockwise direction and lock in counterclockwise direction.

(6) Align and reinstall overdrive piston retainer. Tighten retainer bolts to 11 N•m (95 in. lbs.) torque.

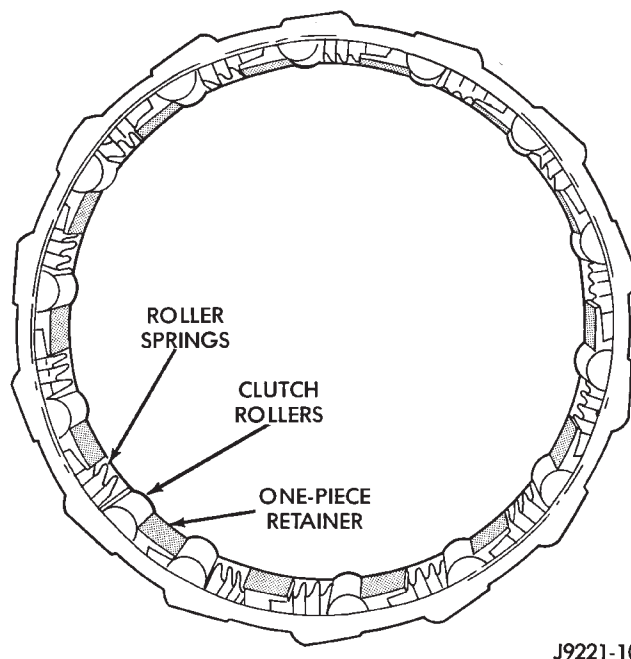


Fig. 46 Clutch Roller, Spring And Retainer Assembly—46RH

ACCUMULATOR OVERHAUL

Inspect the accumulator piston and seal rings (Fig. 48). Replace the seal rings if worn or cut. Replace the piston if chipped or cracked.

Check condition of the accumulator inner and outer springs (Fig. 48). Replace the springs if the coils are cracked, distorted or collapsed.

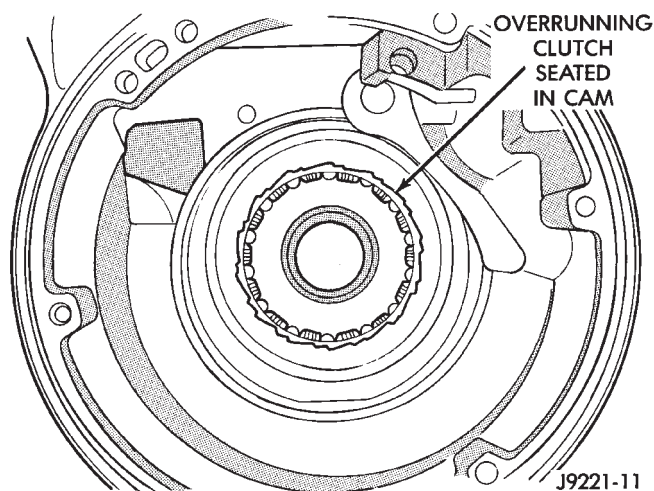


Fig. 47 Overrunning Clutch Seated In Cam

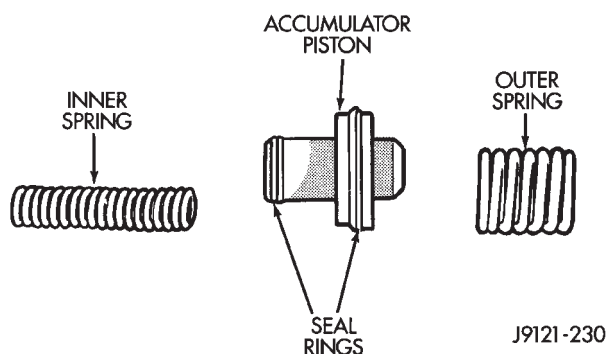


Fig. 48 Accumulator Components—46RH

FRONT SERVO AND BAND OVERHAUL

Clean the servo piston components with solvent and dry them with compressed air. Wipe the band clean with lint free shop towels.

Replace the front band if distorted, lining is burned, flaking off, or worn to the point where the grooves in the lining material are no longer visible.

Inspect the servo components. Replace the springs if collapsed, distorted or broken. Replace the guide, rod and piston if cracked, bent, or worn. Discard the servo snap ring if distorted or warped.

Check the servo piston bore for wear. If the bore is severely scored, or damaged, it will be necessary to replace the case.

Replace any servo component if in doubt about its condition. Do not reuse suspect parts.

FRONT SERVO PISTON OVERHAUL (FIG. 49)

- (1) Remove seal ring from rod guide.
- (2) Remove small snap ring from servo piston rod. Then remove piston rod, spring and washer from piston.
- (3) Remove and discard servo component O-ring and seal rings.
- (4) Lubricate new O-ring and seal rings with petroleum jelly and install them on piston, guide and rod.

- (5) Install rod in piston. Install spring and washer on rod. Compress spring and install snap ring.
- (6) Set servo components aside for installation during transmission reassembly.

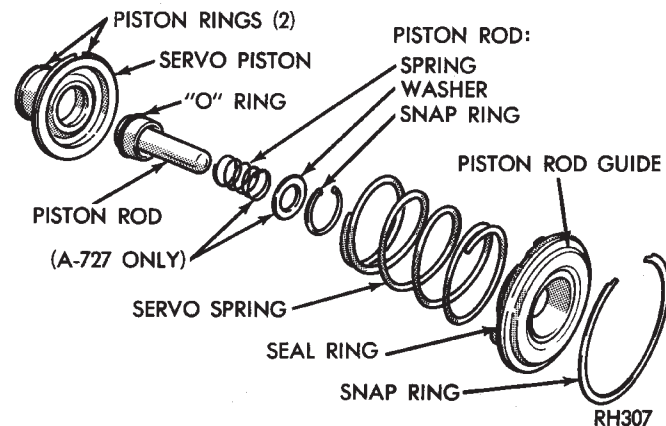


Fig. 49 Front Servo Components—46RH

REAR SERVO AND BAND OVERHAUL

Clean the servo components with solvent and dry them with compressed air. Inspect the servo components. Replace the spring if collapsed, distorted or broken. Replace the plug and piston if cracked, bent, or worn. Discard the servo snap ring if distorted or warped.

Check rear band condition. Replace the band if distorted, the lining is burned or flaking off, or the lining is worn (grooves no longer visible at any point on the lining material). If doubt exists about the condition of any servo component, replace it. Do not reuse suspect parts.

REAR SERVO PISTON OVERHAUL (FIG. 50)

- (1) Remove small snap ring and remove plug and spring from servo piston.
- (2) Remove and discard servo piston seal ring.
- (3) Lubricate piston and guide seals with petroleum jelly. Lubricate other servo parts with Mopar ATF Plus transmission fluid.
- (4) Install new seal ring on servo piston.
- (5) Assemble piston, plug, spring and snap ring.
- (6) Lubricate piston seal lip with petroleum jelly.
- (7) Set servo components aside for assembly installation.

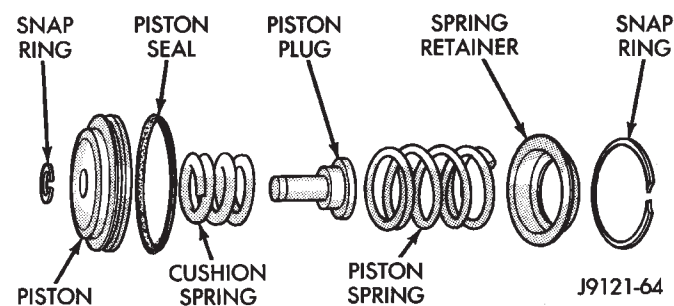


Fig. 50 Rear Servo Components—46RH

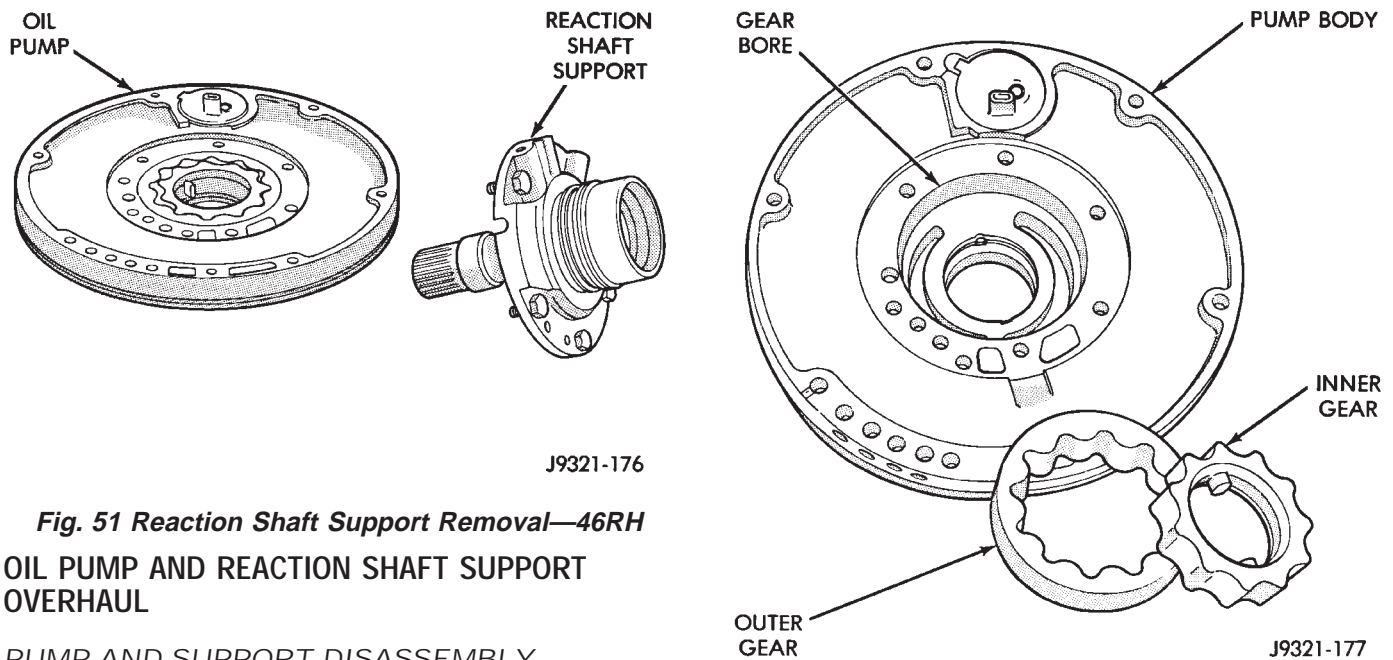


Fig. 51 Reaction Shaft Support Removal—46RH

OIL PUMP AND REACTION SHAFT SUPPORT OVERHAUL

PUMP AND SUPPORT DISASSEMBLY

- (1) Mark position of support in oil pump body for assembly alignment reference. Use scribe or paint to make alignment marks.
- (2) Place pump body on two wood blocks.
- (3) Remove reaction shaft support bolts and separate support from pump body (Fig. 51).
- (4) Remove pump inner and outer gears (Fig. 52).

Fig. 52 Pump Gear Removal—46RH

- (5) Remove O-ring seal from pump body (Fig. 53). Discard seal after removal.
- (6) Remove oil pump seal with Remover Tool C-3981. Discard seal after removal.

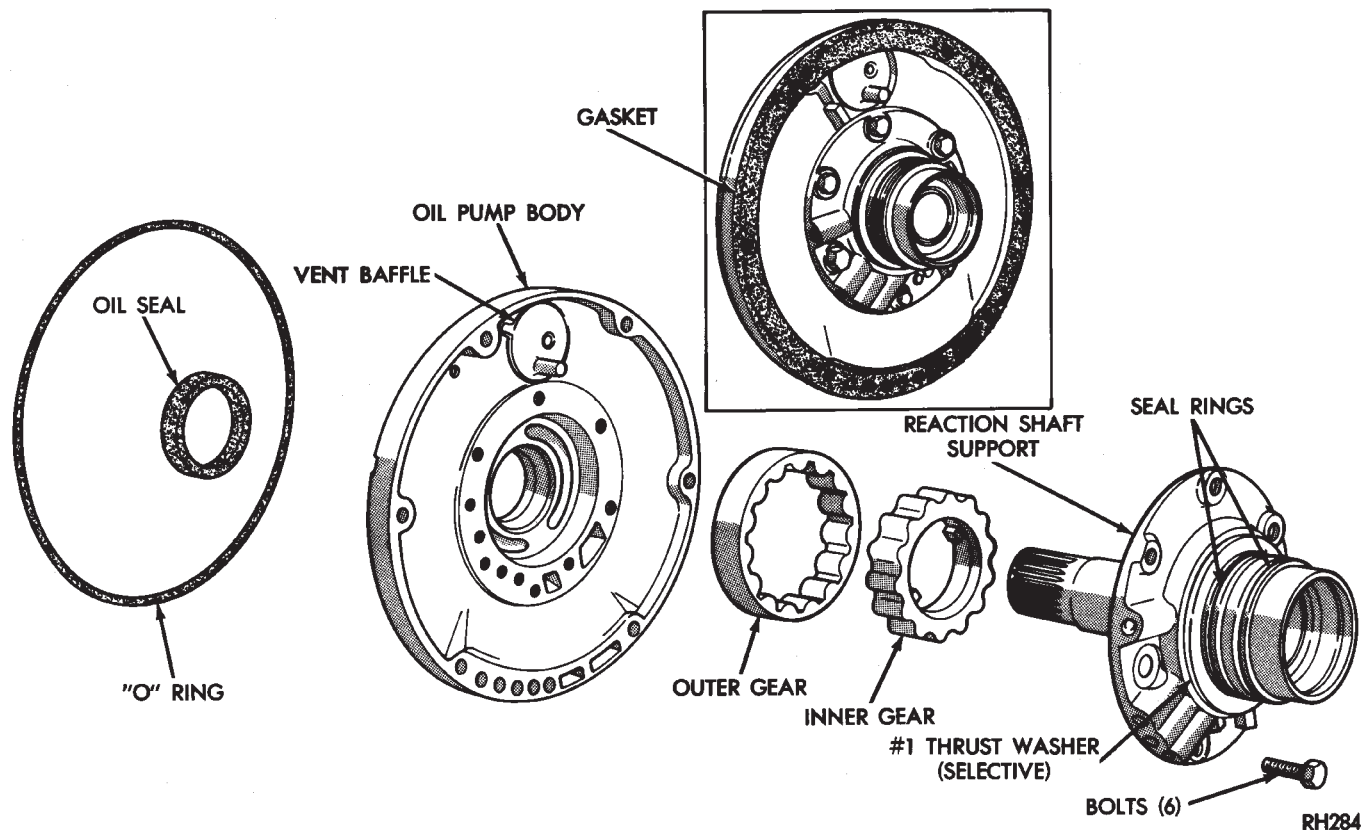


Fig. 53 Oil Pump And Reaction Shaft Components—46RH

INSPECTING PUMP AND SUPPORT

Clean pump and support components with solvent and dry them with compressed air.

Check condition of the seal rings and thrust washer on the reaction shaft support. The seal rings do not need to be replaced unless cracked, severely worn, or no longer hooked together.

Inspect the pump and support components. Replace the pump or support if the seal ring grooves or machined surfaces are worn, scored, pitted, or damaged. Replace the pump gears if pitted, worn chipped, or damaged.

Check the pump vent (Fig. 54). The vent must be secure. Replace the pump body if the vent is cracked, broken, or loose.

Inspect the pump bushing (Fig. 54). 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.

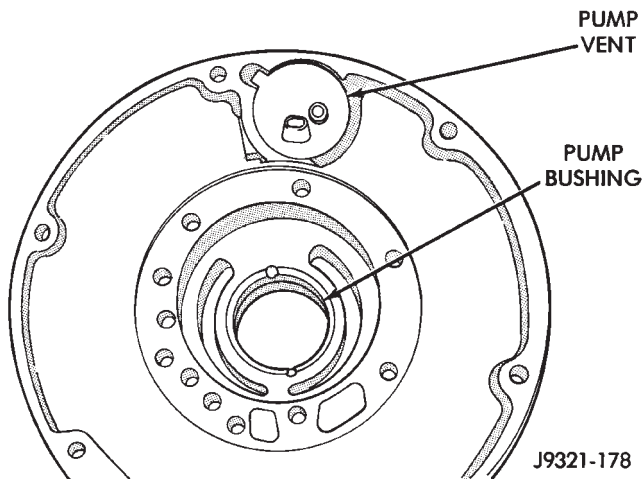


Fig. 54 Pump Vent And Bushing Location

Install the gears in the pump body and measure end clearance with a feeler gauge and straightedge (Fig. 55). Clearance should be 0.89 to 1.90 mm (0.0035 to 0.0075 in.).

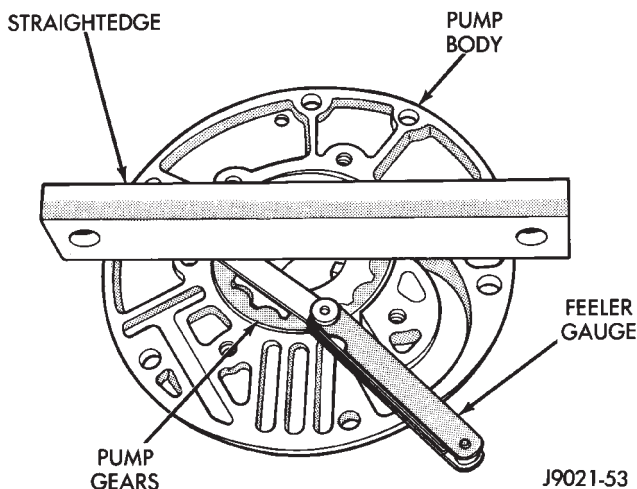


Fig. 55 Checking Pump Gear End Clearance

Measure side clearances with feeler gauge (Fig. 56). Clearance between gear teeth and between outer gear and pump body should be 0.89 to 1.90 mm (0.0035 to 0.0075 in.).

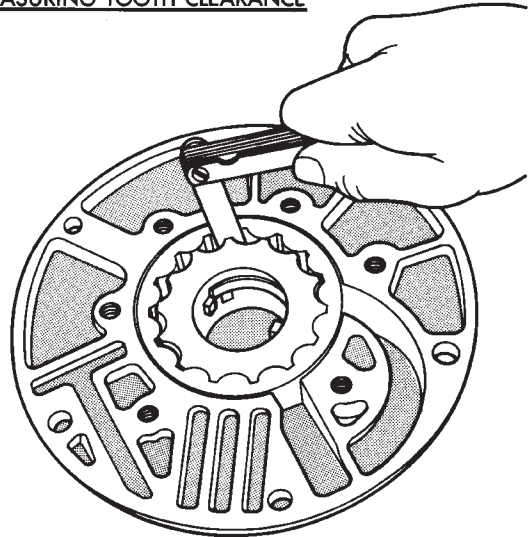
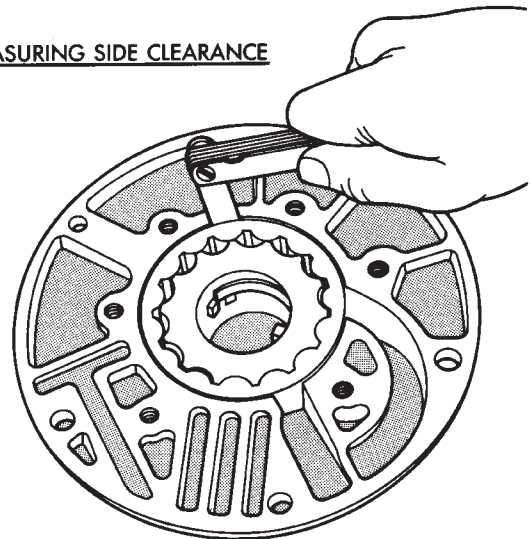
MEASURING TOOTH CLEARANCE**MEASURING SIDE CLEARANCE**

Fig. 56 Checking Pump Gear Side Clearances

OIL PUMP BUSHING REPLACEMENT (FIG. 57)

- (1) Position pump housing on clean, smooth surface with gear cavity facing down.
- (2) Remove bushing with Tool Handle C-4171 and Bushing Remover SP-3550.
- (3) Assemble Tool Handle C-4171 and Bushing Installer SP-5118.
- (4) Place bushing on installer tool and start bushing into shaft.
- (5) Tap bushing into place until Installer Tool SP-5118 bottoms in pump cavity. Keep tool and bushing

square with bore. Do not allow bushing to become cocked during installation.

(6) Stake pump bushing in two places with blunt punch. Remove burrs from stake points with knife blade (Fig. 58).

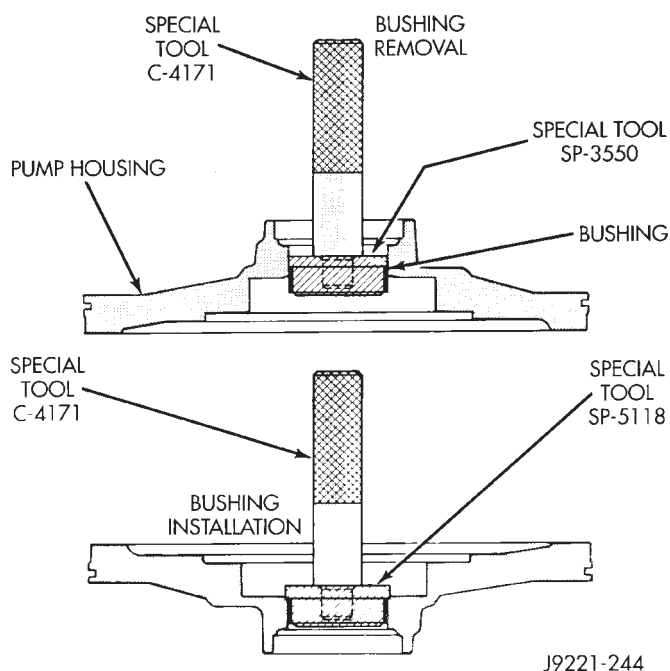


Fig. 57 Replacing Oil Pump Bushing

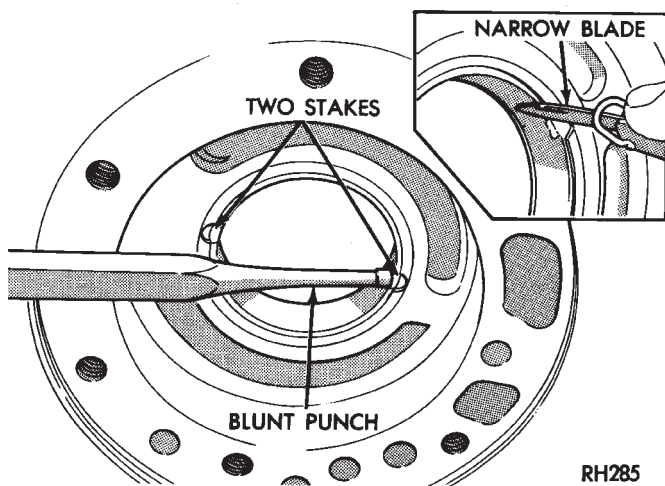


Fig. 58 Staking-Deburring Oil Pump Bushing

REPLACING REACTION SHAFT SUPPORT BUSHING (FIG. 59)

(1) Assemble Cup Tool SP-3633, Nut SP-1191 and Bushing Remover SP-5301.

(2) Hold cup tool firmly against reaction shaft. Thread remover tool into bushing as far as possible by hand.

(3) Using wrench, thread remover tool an additional 3-4 turns into bushing to firmly engage tool.

(4) Tighten tool hex nut against cup tool to pull bushing from shaft. Clean all chips from shaft and support after bushing removal.

(5) Place reaction shaft support upright on a clean, smooth surface.

(6) Assemble Bushing Installer Tools C-4171 and SP-5302. Then slide new bushing onto installer tool.

(7) Start bushing in shaft. Tap bushing into shaft until installer tool bottoms against support flange.

(8) Clean reaction shaft support thoroughly after bushing replacement (to remove any chips).

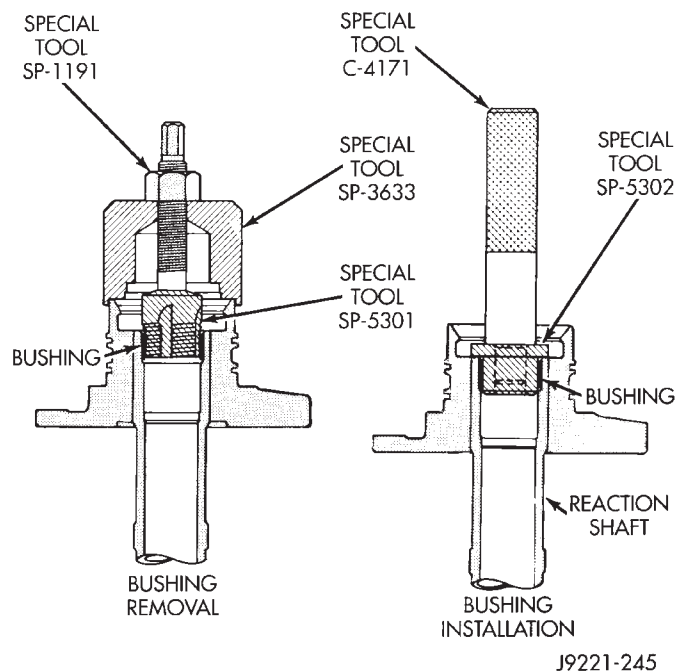


Fig. 59 Reaction Shaft Bushing Replacement—46RH

ASSEMBLING OIL PUMP AND REACTION SHAFT SUPPORT

(1) Lubricate pump gears with transmission fluid and install them in pump body.

(2) Install thrust washer on reaction shaft support hub. Lubricate washer with petroleum jelly or transmission fluid before installation.

(3) If reaction shaft seal rings are being replaced, install new seal rings on support hub. Lubricate seal rings with transmission fluid or petroleum jelly after installation. Squeeze each ring until ring ends are securely hooked together.

CAUTION: The reaction shaft support seal rings will break if overspread, or twisted. If new rings are being installed, spread them only enough for installation. Also be very sure the ring ends are securely hooked together after installation. Otherwise, the rings will either prevent pump installation, or break during installation.

(4) Align and install reaction shaft support on pump body.

(5) Install bolts attaching reaction shaft support to pump. Tighten bolts to 20 N•m (175 in. lbs.) torque.

(6) Install new pump seal with Seal Installer C-3860-A (Fig. 60). Use hammer or mallet to tap seal into place.

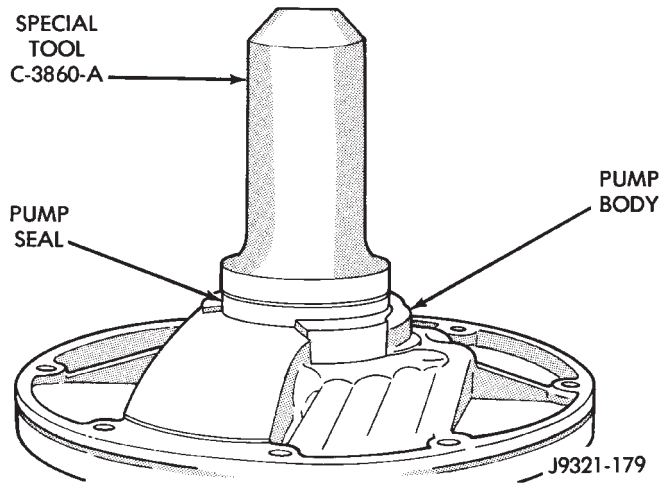


Fig. 60 Oil Pump Seal Installation—46RH

(7) Install new O-ring on pump body. Lubricate oil seal and O-ring with petroleum jelly.

(8) Set pump assembly aside for installation during transmission assembly.

FRONT CLUTCH OVERHAUL

FRONT CLUTCH DISASSEMBLY

(1) Remove waved snap ring and remove reaction plate, clutch plates and clutch discs (Fig. 61). **Note number of plates and discs in clutch pack for**

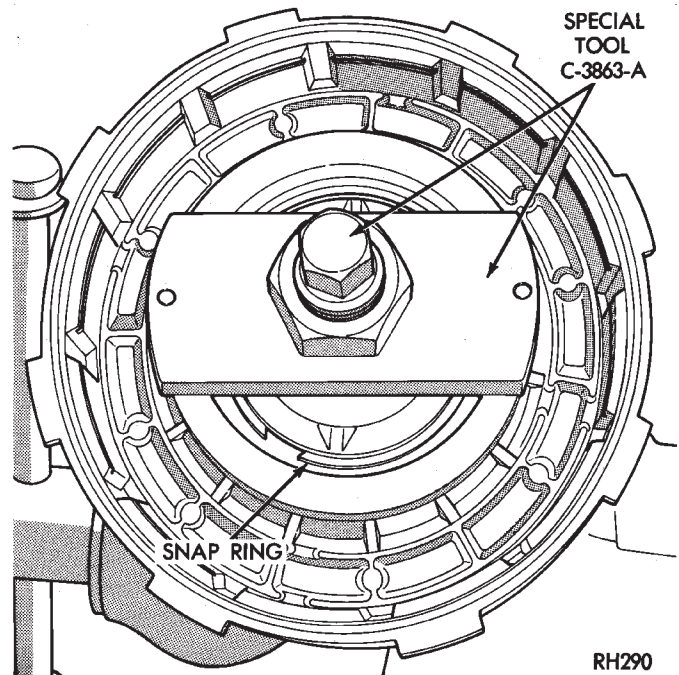


Fig. 62 Removing Front Clutch Spring Retainer Snap Ring

assembly reference. Some models have 3 discs, while others may have 4 discs.

(2) Compress clutch piston retainer and piston springs with Compressor Tool C-3863-A (Fig. 62).

(3) Remove retainer snap ring and remove compressor tool.

(4) Remove clutch piston springs. **Note number and position of piston springs for assembly reference.**

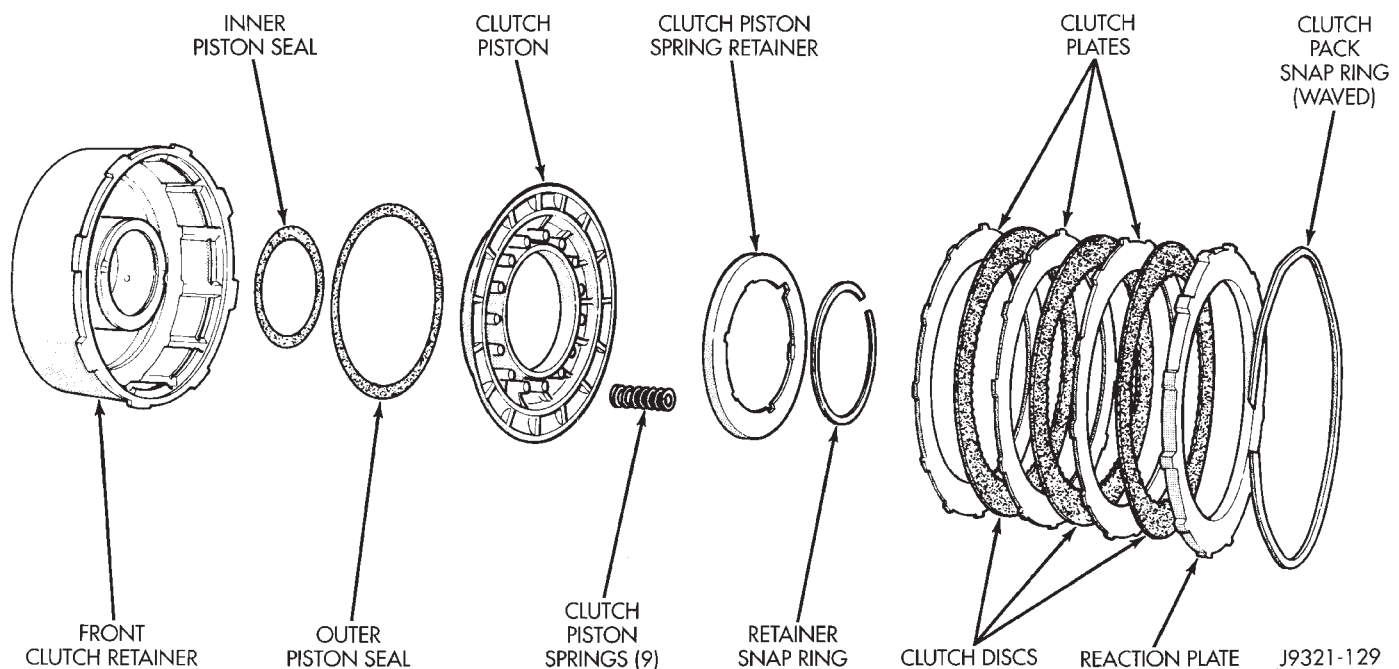


Fig. 61 46RH Front Clutch Components (3-Disc Clutch Shown)

(5) Remove clutch piston from retainer with a twisting motion.

(6) Remove and discard clutch piston inner and outer seals.

FRONT CLUTCH INSPECTION

Clean and inspect the front clutch components. Replace the clutch discs if warped, worn, scored, burned or charred, the lugs are damaged, or if the facing is flaking off. Replace the steel plates and reaction plate if heavily scored, warped, or broken. Be sure the driving lugs on the discs and plate are also in good condition. The lugs must not be bent, cracked or damaged in any way.

Replace the piston springs and spring retainer if either are distorted, warped or broken.

Check the lug grooves in the clutch piston retainer. The steel plates should slide freely in the slots. Replace the piston retainer if the grooves are worn or damaged. Also check action of the check ball in the piston retainer. The ball must move freely and not stick.

Replace the retainer bushing if worn, scored, or there is any doubt about bushing condition.

Inspect the piston and retainer seal surfaces for nicks or scratches. Minor scratches can be removed with crocus cloth. However, replace the piston and/or retainer if the seal surfaces are seriously scored.

Check the clutch piston check ball. The ball should be securely in place. Replace the piston if the ball is missing, or seized.

FRONT CLUTCH RETAINER BUSHING REPLACEMENT (FIG. 63)

(1) Assemble Tool Handle C-4171 and Bushing Remover SP-3629.

(2) Insert remover tool in bushing and drive bushing straight out of clutch retainer.

(3) Mount Bushing Installer SP-5511 on tool handle.

(4) Slide new bushing onto installer tool and start bushing into retainer.

(5) Tap new bushing into place until installer tool bottoms against clutch retainer.

(6) Remove installer tools and clean retainer thoroughly.

ASSEMBLING FRONT CLUTCH

(1) Soak clutch discs in transmission fluid. Lubricate remaining clutch components with transmission fluid. Retainer bushing can be lubricated with petroleum jelly if desired.

(2) Install new inner and outer seals on clutch piston. Be sure seal lips face interior of retainer.

(3) Lubricate new inner and outer piston seals with Ru-Glyde, or Door Eze.

(4) Install clutch piston in retainer. Use twisting motion to seat piston in retainer. **Do not force pis-**

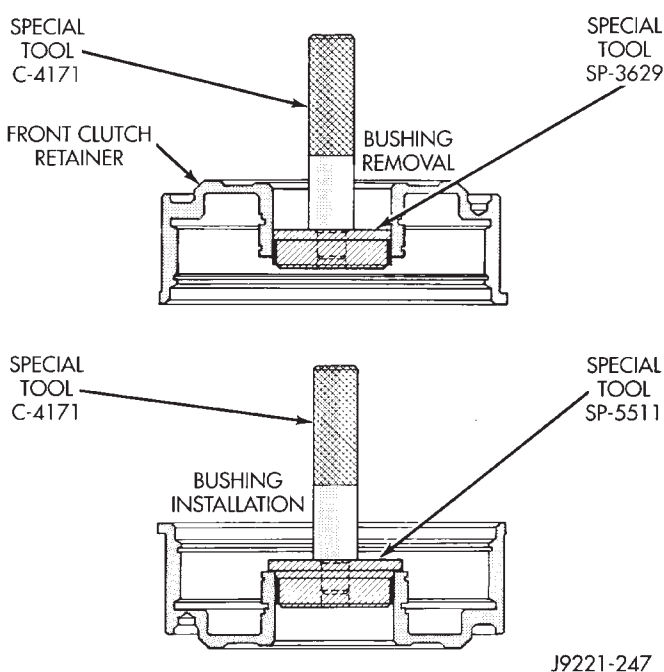


Fig. 63 Front Clutch Retainer Bushing Replacement—46RH

ton straight in. This could fold seals over causing leakage and clutch slip.

(5) Install and position clutch piston springs as shown in Figure 64.

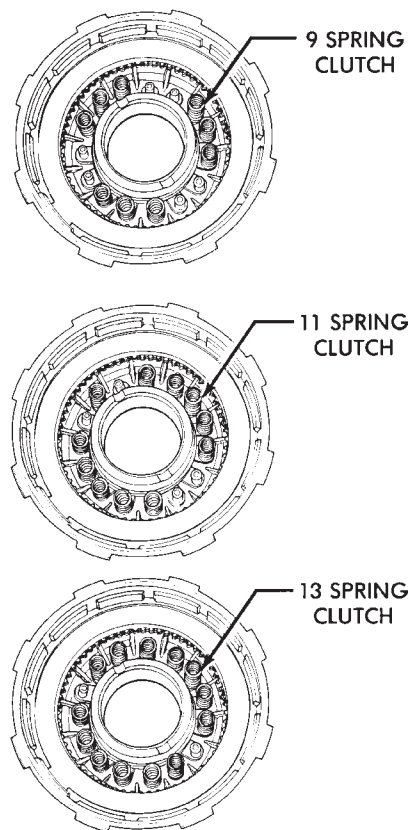


Fig. 64 Front Clutch Spring Location

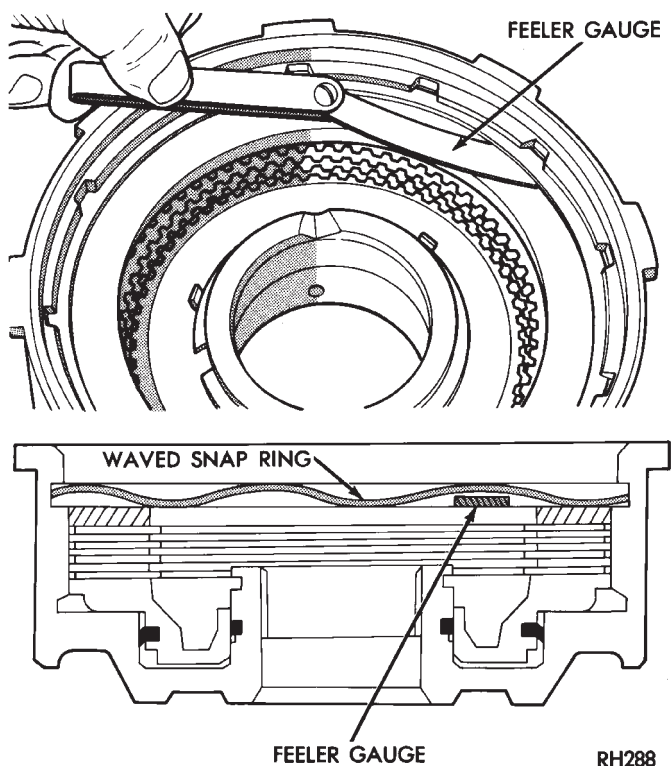


Fig. 65 Measuring Front Clutch Pack Clearance

- (6) Install spring retainer on top of piston springs.
- (7) Compress spring retainer and piston springs with Compressor Tool C-3863-A.
- (8) Install spring retainer snap ring and remove compressor tool.
- (9) Install clutch plates and discs. Install steel plate followed by clutch disc until all plates and discs are installed. **Install same number of discs and**

plates as removed during disassembly. Some models require 3 plates and discs. Others require 4 plates and discs.

(10) Install reaction plate and waved snap ring.

(11) Check clutch pack clearance with feeler gauge as follows (Fig. 65):

- On 3 disc clutch, clearance between waved spring and pressure plate should be 1.78 - 3.28 mm (0.070 - 0.129 in.).
- On 4 disc clutch, clearance between waved spring and pressure plate should be 2.08 to 3.83 mm (0.082 to 0.151 in.).
- **If clearance is incorrect, clutch plates, clutch discs, snap ring and pressure plate will have to be changed. Clutch pack waved snap ring is not select fit.**

REAR CLUTCH OVERHAUL

REAR CLUTCH DISASSEMBLY (FIG. 66)

- (1) Remove clutch pack select fit snap ring.
- (2) Remove reaction plate and remove clutch plates and discs.
- (3) Remove pressure plate, wave spring, spacer ring and piston spring from clutch retainer.
- (4) Remove clutch piston from piston retainer with a twisting motion.
- (5) Remove input shaft thrust washer, if washer remained in piston retainer hub during removal.
- (6) Remove seals from clutch piston. Discard seals after removal.

REAR CLUTCH INSPECTION

Clean the clutch components with solvent and dry them with compressed air.

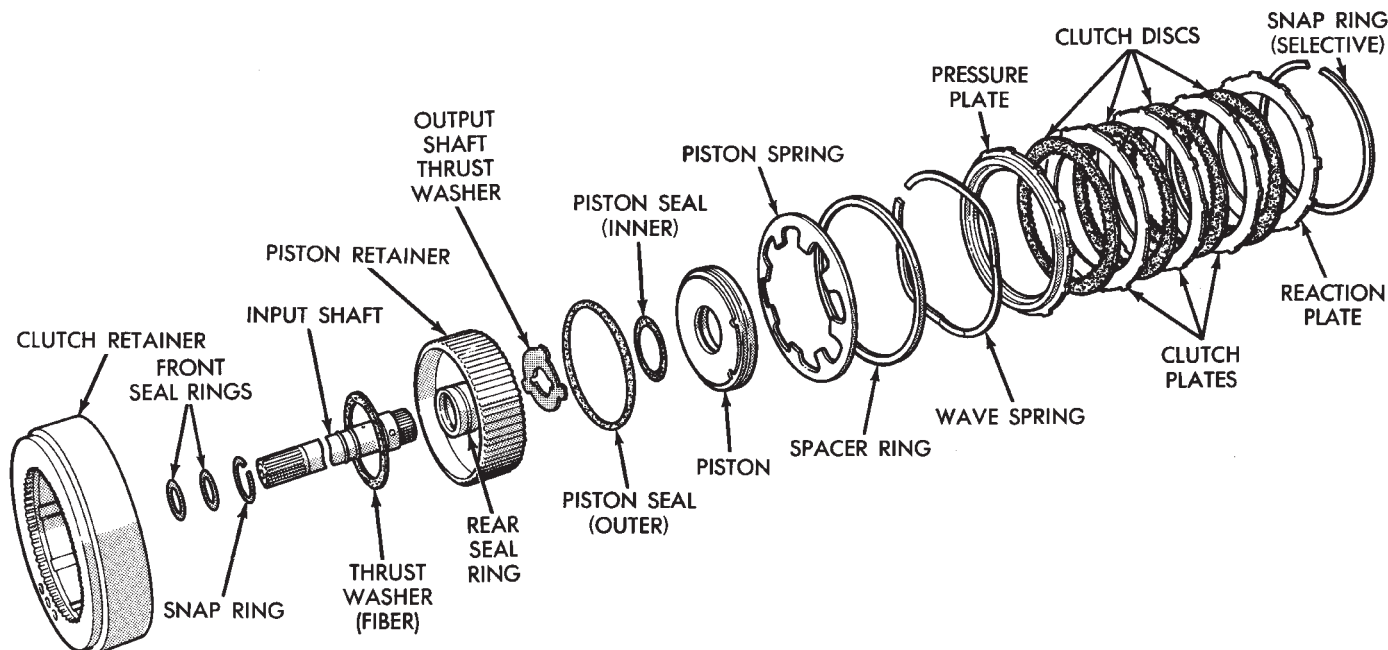


Fig. 66 Rear Clutch Components—46RH

Check condition of the input shaft seal rings. It is not necessary to remove or replace rings unless they are broken, cracked, or no longer securely hooked together.

Inspect the input shaft splines and machined surfaces. Very minor nicks or scratches can be smoothed off with crocus cloth. Replace the shaft if the splines are damaged, or any of the machined surfaces are severely scored.

Replace the clutch discs if warped, worn, scored, burned/charred, the lugs are damaged, or if the facing is flaking off.

Replace the steel plates and the pressure plate if heavily scored, warped, or broken. Be sure the driving lugs on the discs and plates are also in good condition. The lugs must not be bent, cracked or damaged in any way.

Replace the piston spring and wave spring if either part is distorted, warped or broken.

Check the lug grooves in the clutch retainer. The steel plates should slide freely in the slots. Replace the retainer if the grooves are worn or damaged. Also check action of the retainer check ball. The ball must move freely and not stick.

Inspect the piston and retainer seal surfaces for nicks or scratches. Minor scratches can be removed with crocus cloth. However, replace the piston and/or retainer if the seal surfaces are seriously damaged.

Check thrust washer condition. Washer thickness should be 1.55 to 1.60 mm (0.061 to 0.063 in.). Replace the washer if worn or damaged.

Check condition of the two seal rings on the input shaft and the single seal ring on the piston retainer hub. Replace the seal rings only if severely worn, cracked, or if they can no longer be hooked together.

INPUT SHAFT REPLACEMENT

If the input shaft must be replaced, first remove the retaining ring that secures the shaft in the piston retainer hub. Then press the old shaft out of the retainer with a shop press.

Lubricate the splines of the new shaft with petroleum jelly or transmission fluid. Then align the shaft in the piston retainer and carefully press it into place. Do not allow the shaft to become cocked during installation. The retainer can be cracked if misalignment occurs.

Install the shaft retaining ring after pressing the shaft into place. Be sure the ring is fully seated before proceeding with clutch assembly.

REAR CLUTCH ASSEMBLY

(1) Soak clutch discs in transmission fluid. Lubricate remaining clutch components with transmission fluid. Clutch retainer bushing can be lubricated with petroleum jelly if desired.

(2) Install new seals on clutch piston. Lubricate piston seals with Ru-Glyde or petroleum jelly to ease installation. Be sure seal lips face input shaft.

(3) Install clutch piston in piston retainer. Use twisting motion to seat piston in retainer. **Do not push piston straight in. This could distort seals causing leakage and clutch slip.**

(4) Assemble piston retainer and clutch retainer.

(5) Support clutch retainer with wood blocks, or insert input shaft through predrilled, appropriate diameter hole in workbench. Clutch pack components are easier to install if both retainers are properly supported.

(6) Install piston spring in clutch retainer. Concave side of spring faces upward and away from clutch piston. Convex side faces downward toward piston.

(7) Install spacer ring on top of piston spring.

(8) Install wave spring on top of spacer ring. Then seat wave spring in retainer groove. **If wave spring will not seat properly, spacer ring has probably shifted over and into wave spring groove in retainer. Use small screwdriver to realign spacer ring if necessary.**

(9) Install inner pressure plate in clutch retainer.

(10) Install first clutch disc followed by steel plate until all discs and plates are installed.

(11) Install reaction plate on top of last clutch disc.

(12) Install selective snap ring to secure clutch pack in retainer.

(13) Install new seal rings on input shaft if necessary (Fig. 67). Be very sure ring ends are all securely hooked together before proceeding.

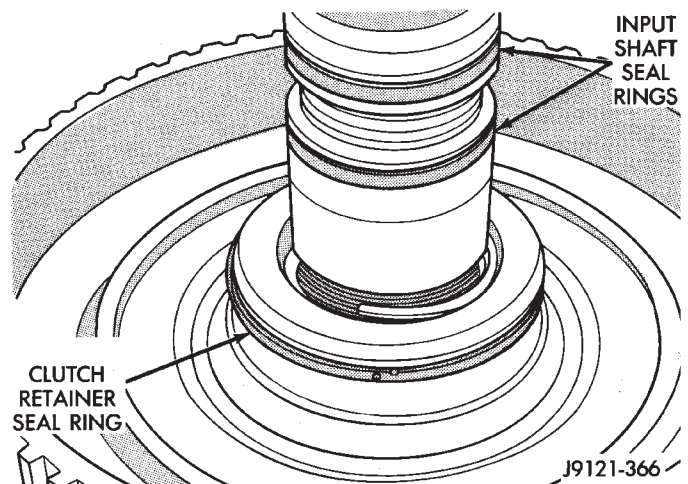


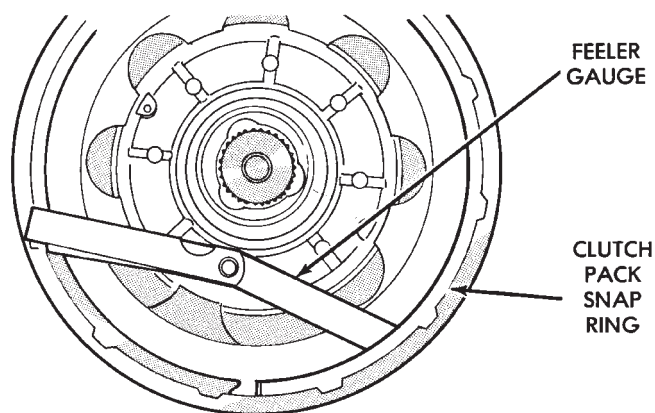
Fig. 67 Input Shaft Seal Ring Locations

(14) Check clutch pack clearance with feeler gauge (Fig. 68). Clearance should be 0.63 to 1.14 mm (0.025 to 0.045 in.).

(15) If clutch pack clearance is incorrect, clutch pack snap ring, reaction plate, or clutch pack may have to be replaced.

(16) Install thrust washer on piston retainer hub

(Fig. 66). Use petroleum jelly to hold thrust washer in place.

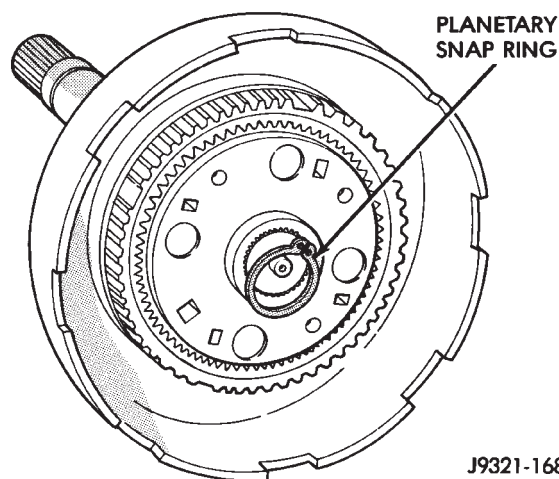


J9321-167

Fig. 68 Measuring Rear Clutch Pack Clearance
PLANETARY GEARTRAIN OVERHAUL

PLANETARY GEARTRAIN DISASSEMBLY

(1) Remove planetary snap ring from intermediate shaft (Fig. 69). Retain snap ring if in good condition. It is reusable.



J9321-168

Fig. 69 Removing Planetary Snap Ring—46RH

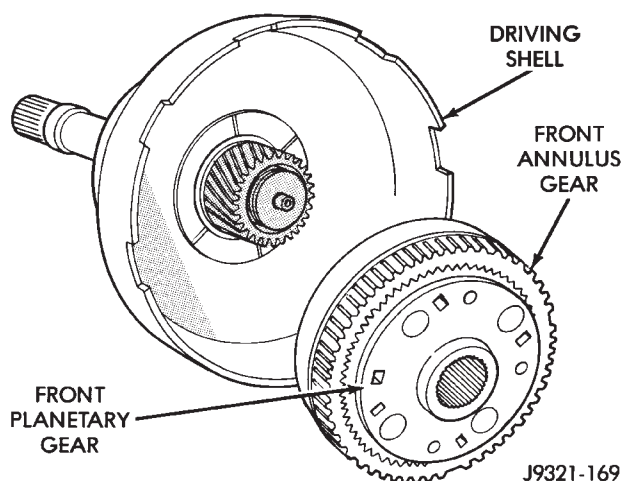
(2) Remove front planetary gear and front annulus gear as assembly (Fig. 70).

(3) Remove front planetary gear and thrust washer from front annulus gear (Fig. 71). Note thrust washer position for assembly reference.

(4) Remove tabbed thrust washer from driving shell (Fig. 72). Note washer position for assembly reference.

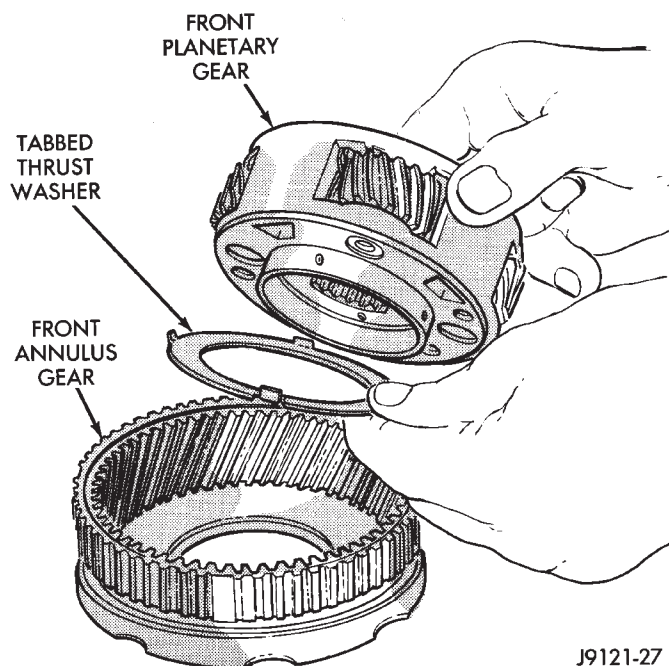
(5) Remove sun gear and driving shell as assembly (Fig. 73).

(6) Remove tabbed thrust washer from rear planetary gear (Fig. 74). Note washer position on gear for assembly reference.



J9321-169

Fig. 70 Removing Front Planetary And Annulus Gears—46RH



J9121-27

Fig. 71 Disassembling Front Planetary And Annulus Gears—46RH

(7) Remove rear planetary gear and rear annulus gear from intermediate shaft (Fig. 75).

(8) Remove thrust plate from rear annulus gear (Fig. 76).

Intermediate Shaft And Geartrain Inspection

Clean the intermediate shaft and planetary components (Fig. 77) in parts cleaning solvent and dry them with compressed air.

Inspect the planetary gear sets and annulus gears. The pinion gears, pinion shafts, pinion washers and shaft retaining pins are all serviceable and can be replaced if worn or damaged. However, if a pinion carrier is damaged, the entire planetary gear set must be replaced as an assembly.

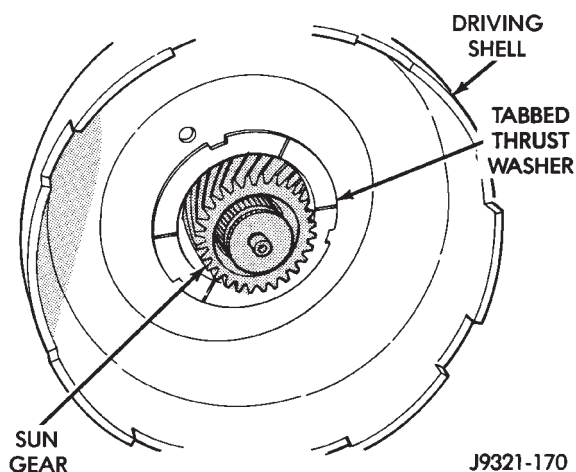


Fig. 72 Driving Shell Thrust Washer Removal—46RH

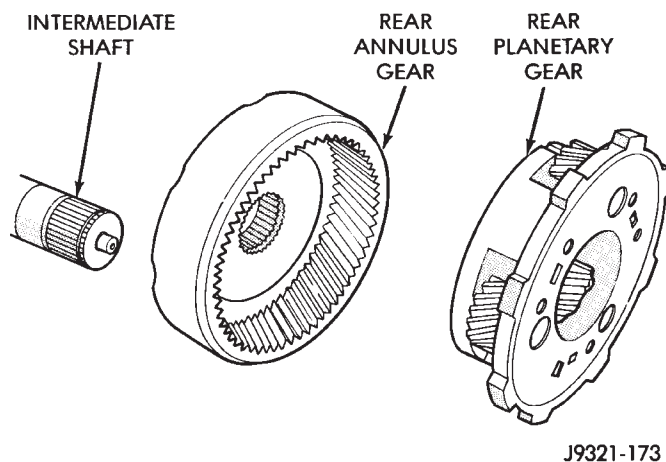


Fig. 75 Rear Planetary And Annulus Gear Removal—46RH

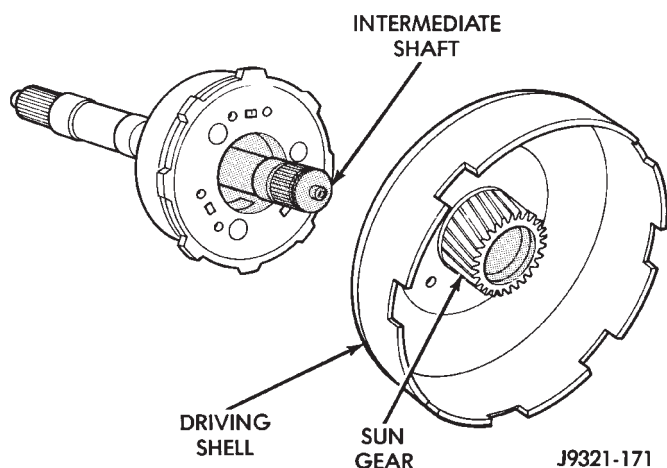


Fig. 73 Sun Gear And Driving Shell Assembly Removal—46RH

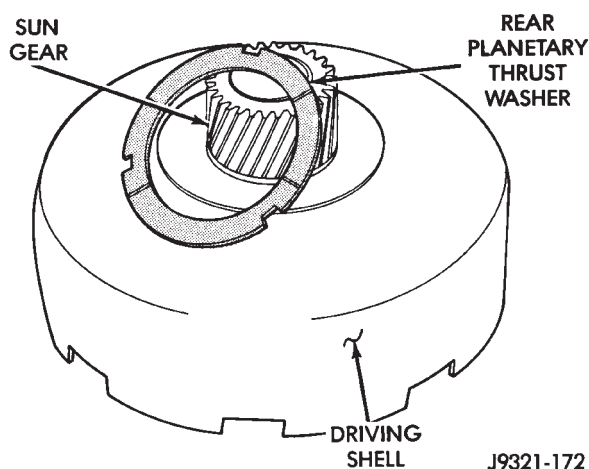


Fig. 74 Rear Planetary Thrust Washer Removal—46RH

Replace the annulus gears if the teeth are chipped, broken, or worn, or the gear is cracked. Replace the planetary thrust plates and the tabbed thrust washers if cracked, scored or worn.

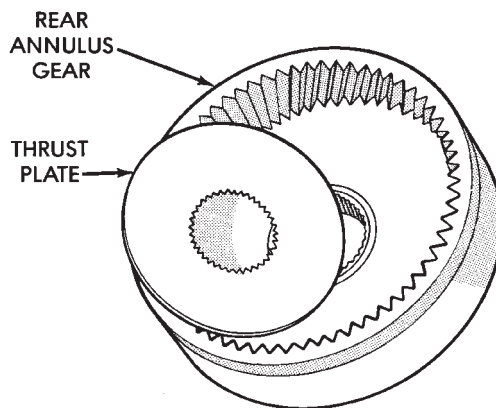


Fig. 76 Rear Annulus Thrust Plate Removal—46RH

Inspect the machined surfaces of the intermediate shaft. Be sure the oil passages are open and clear. Replace the shaft if scored, pitted, or damaged.

Inspect the sun gear and driving shell (Fig. 77). 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.

PLANETARY GEARTRAIN ASSEMBLY AND ADJUSTMENT

(1) Lubricate sun gear and planetary gears with transmission fluid during assembly. Use petroleum jelly to lubricate output shaft bushing surfaces, thrust washers and thrust plates.

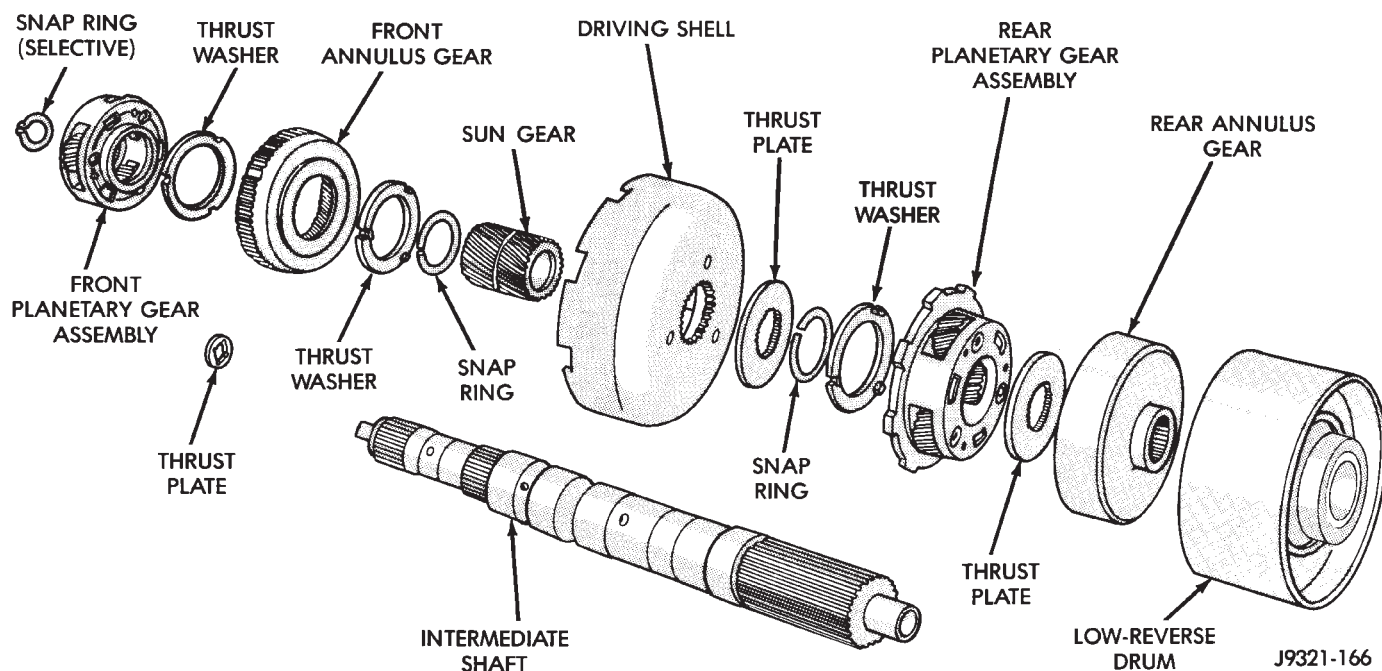


Fig. 77 Planetary Geartrain Components—46RH

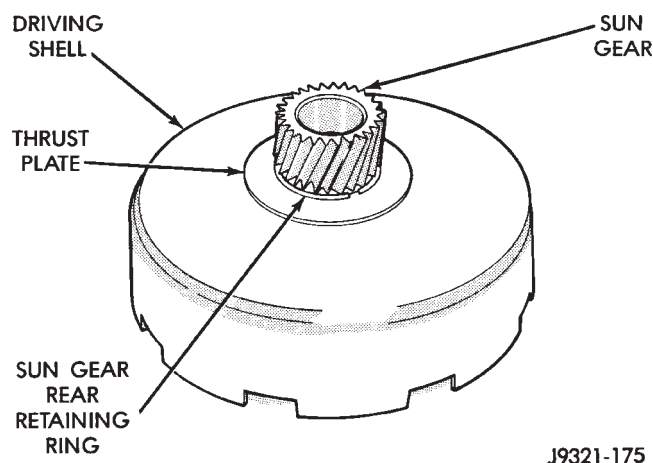


Fig. 78 Sun Gear Installation—46RH

(2) Install front snap ring on sun gear and install gear in driving shell. Then install thrust plate over sun gear and against rear side of driving shell (Fig. 78). Install rear snap ring to secure sun gear and thrust plate in driving shell.

(3) Install rear annulus gear on intermediate shaft (Fig. 79).

(4) Install thrust plate in annulus gear (Fig. 80). Be sure plate is seated on shaft splines and against gear.

(5) Install rear planetary gear in rear annulus gear (Fig. 81). Be sure planetary carrier is seated against annulus gear.

(6) Install tabbed thrust washer on front face of rear planetary gear (Fig. 82). Seat washer tabs in matching slots in face of gear carrier. Use extra petroleum jelly to hold washer in place if desired.

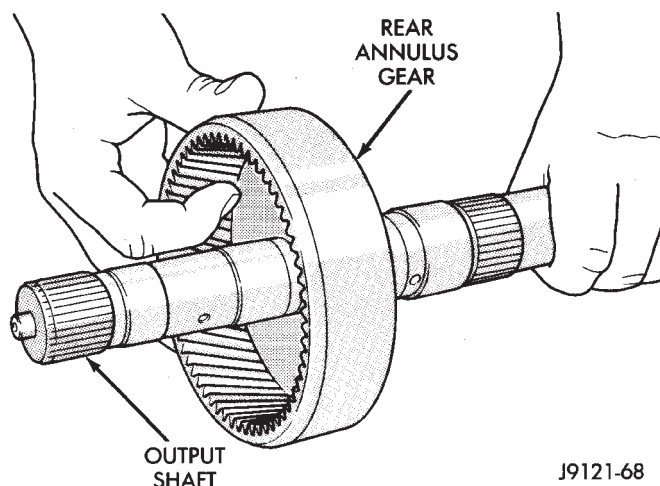


Fig. 79 Installing Rear Annulus Gear On Intermediate Shaft—46RH

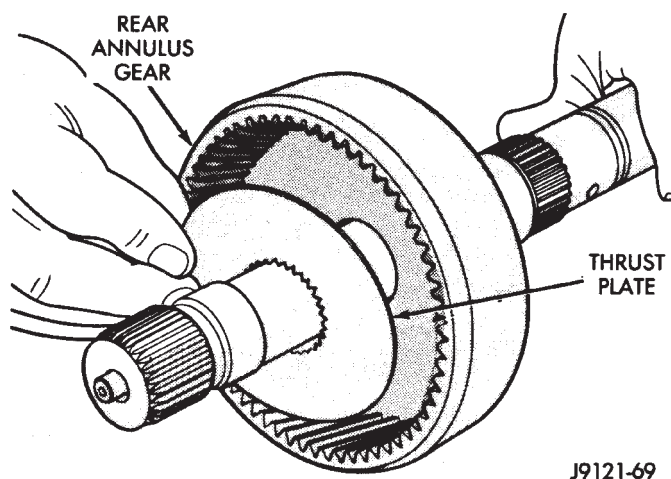


Fig. 80 Installing Rear Annulus Thrust Plate—46RH

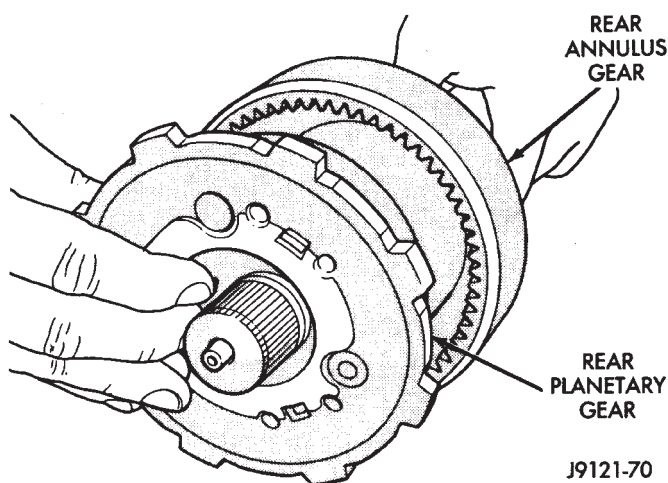


Fig. 81 Installing Rear Planetary Gear—46RH

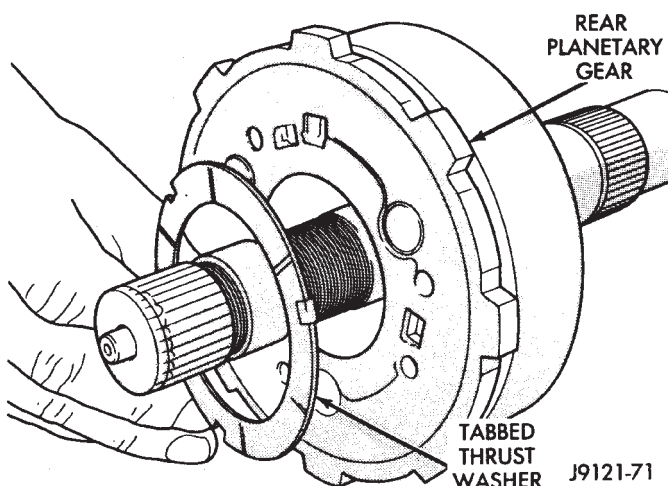


Fig. 82 Installing Rear Planetary Thrust Washer—46RH

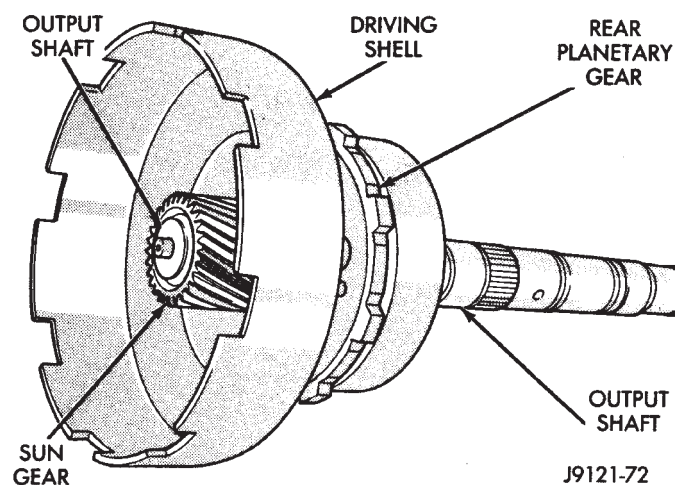


Fig. 83 Installing Sun Gear And Driving Shell—46RH

(7) Lubricate sun gear bushings with petroleum jelly or transmission fluid.

(8) Install sun gear and driving shell on output shaft (Fig. 83). Seat shell against rear planetary gear. Verify that thrust washer on planetary gear was not

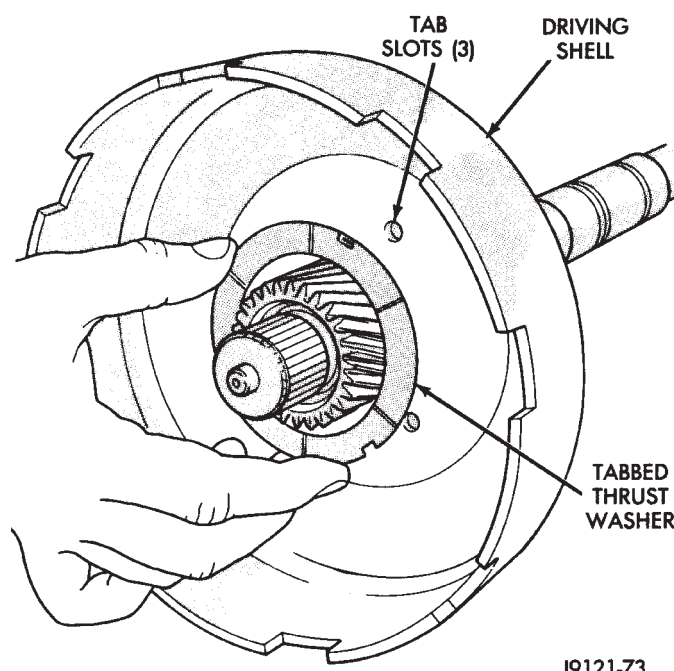


Fig. 84 Installing Driving Shell Thrust Washer—46RH

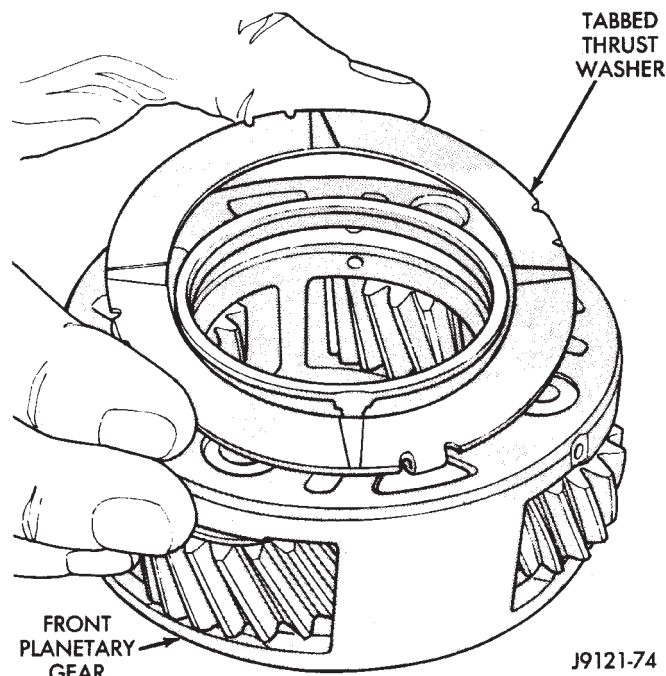


Fig. 85 Installing Thrust Washer On Front Planetary Gear—46RH

displaced during installation.

(9) Install tabbed thrust washer in driving shell (Fig. 84). be sure washer tabs are seated in tab slots of driving shell. Use extra petroleum jelly to hold washer in place if desired.

(10) Install tabbed thrust washer on front planetary gear (Fig. 85). Seat washer tabs in matching slots in face of gear carrier. Use extra petroleum jelly to hold washer in place if desired.

(11) Install front annulus gear over and onto front planetary gear (Fig. 86). Be sure gears are fully meshed and seated.

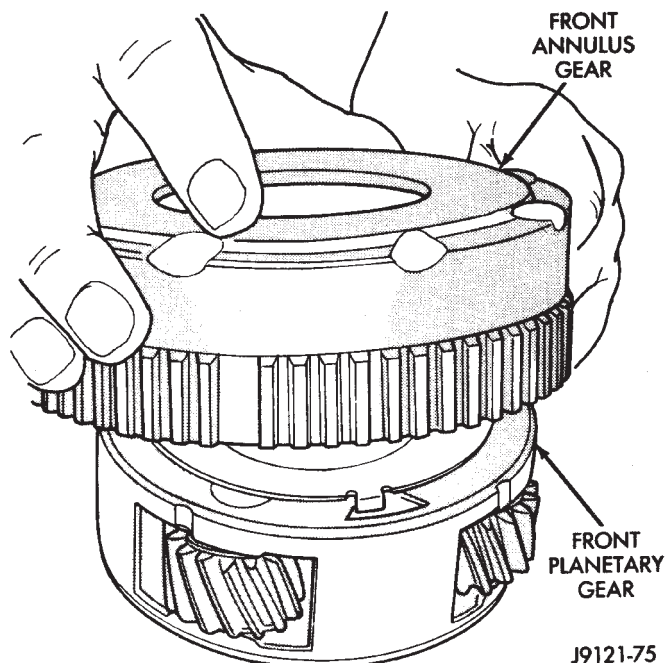


Fig. 86 Assembling Front Planetary And Annulus Gears—46RH

(12) Install front planetary and annulus gear assembly (Fig. 87). Hold gears together and slide them onto shaft. Be sure planetary pinions are seated on sun gear and that planetary carrier is seated on output shaft.

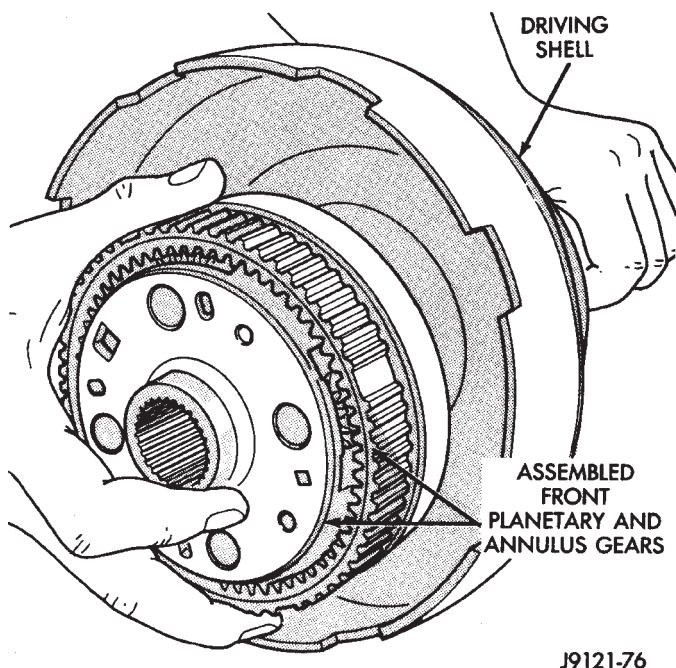


Fig. 87 Installing Front Planetary And Annulus Gear Assembly—46RH

(13) Place geartrain in upright position. Rotate gears to be sure all components are seated and properly assembled. Snap ring groove at forward end of output shaft will be completely exposed when components are assembled correctly.

(14) Install planetary snap ring in groove at end of output shaft (Fig. 88).

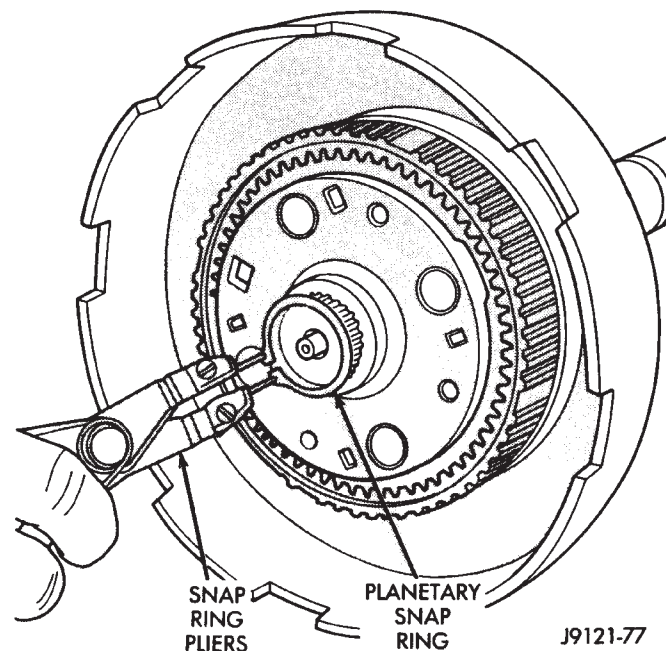


Fig. 88 Installing Planetary Snap Ring—46RH

(15) Turn planetary geartrain over. Position wood block under front end of output shaft and support geartrain on shaft. Be sure all geartrain parts have moved forward against planetary snap ring. This is important for accurate end play check.

(16) Check planetary geartrain end play with feeler gauge (Fig. 89). Insert gauge between rear annulus gear and shoulder on output shaft as shown. End play should be 0.15 to 1.22 mm (0.006 to 0.048 in.).

(17) If end play is incorrect, install thinner/thicker planetary snap ring as needed.

VALVE BODY SERVICE AND ADJUSTMENT

VALVE BODY MAIN COMPONENT DISASSEMBLY

CAUTION: Do not clamp any valve body component in a vise. This practice can damage the component resulting in unsatisfactory operation after assembly and installation. Remove valves, plugs and springs with a pencil magnet. Do not use pliers to remove any of the valves, plugs or springs and do not force any of the components out or into place. The valves and valve body housings will be damaged if force is used. Tag or mark the valve body springs for reference as they are removed. Do not allow them to become intermixed.

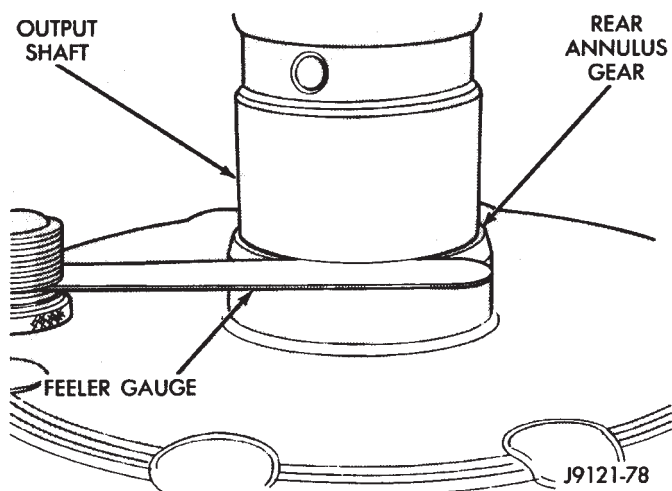


Fig. 89 Checking Planetary Geartrain End Play

- (1) Remove boost valve cover (Fig. 90).
- (2) Remove boost valve retainer, valve spring and boost valve (Fig. 91).

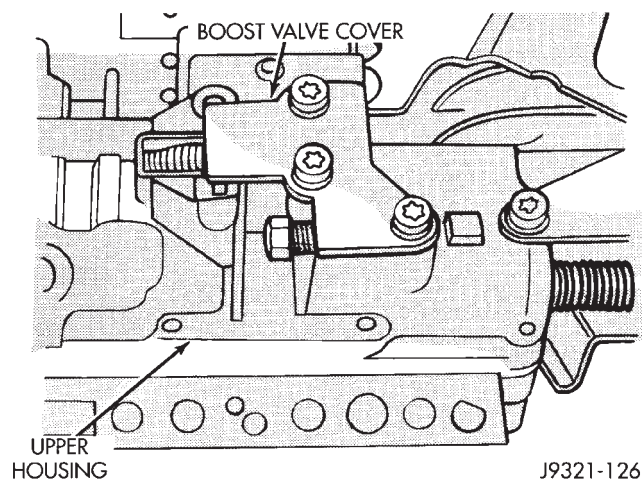


Fig. 90 Boost Valve Cover Location—46RH

- (3) Secure detent ball and spring with Retainer Tool 6583 (Fig. 92).
- (4) Remove E-clip that secures throttle lever in manual lever (Fig. 93).
- (5) Lift and rotate manual lever far enough to clear detent housing.
- (6) Remove retaining tool and remove detent ball and spring (Fig. 94).
- (7) Remove washer at top of manual lever shaft. Then lift manual lever and park rod assembly upward and out of valve body (Fig. 95).
- (8) Remove throttle lever from valve body housing (Fig. 96).
- (9) Remove park rod E-clip and separate rod from manual lever (Fig. 97).
- (10) Remove screws attaching pressure adjusting screw bracket to valve body and transfer plate. Hold bracket firmly against spring tension while removing last screw.

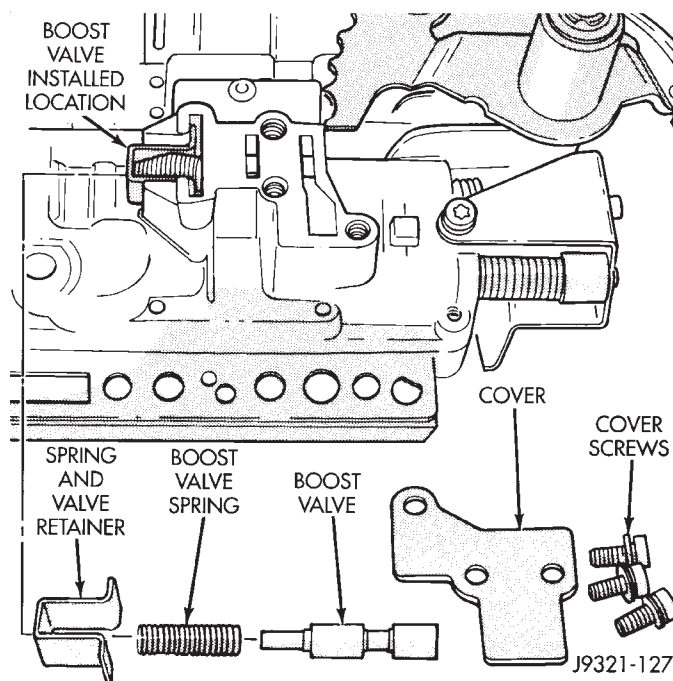


Fig. 91 Boost Valve Components—46RH

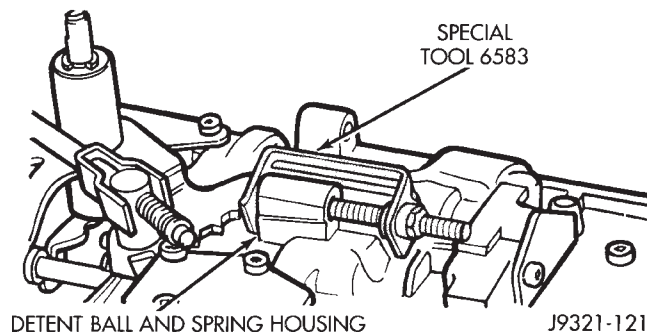


Fig. 92 Securing Detent Ball And Spring

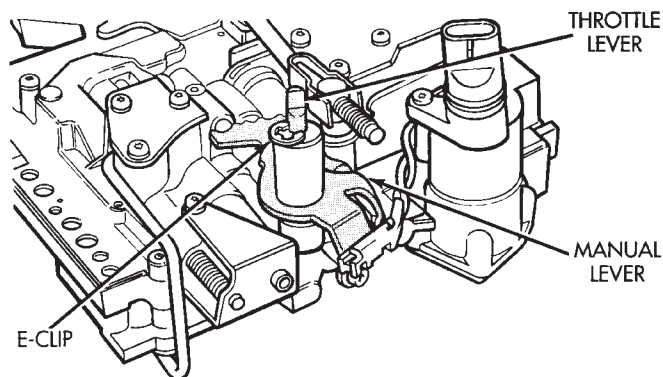


Fig. 93 Removing Throttle Lever E-Clip—46RH

- (11) Remove adjusting screw bracket, line pressure adjusting screw, pressure regulator spring and switch valve spring (Fig. 98). **Do not remove throttle**

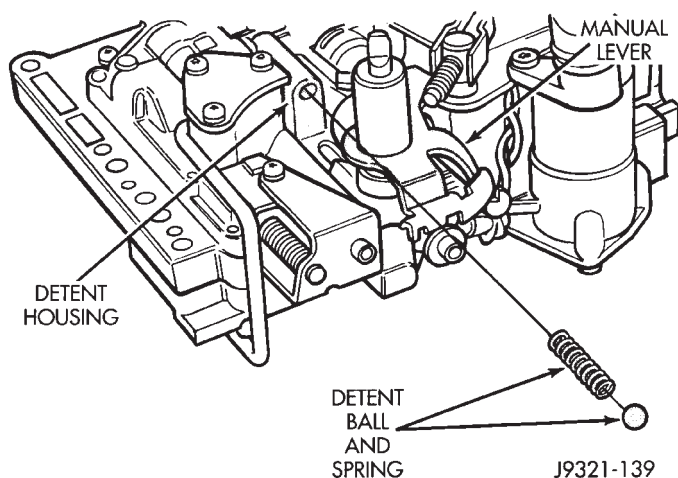


Fig. 94 Detent Ball And Spring Removal

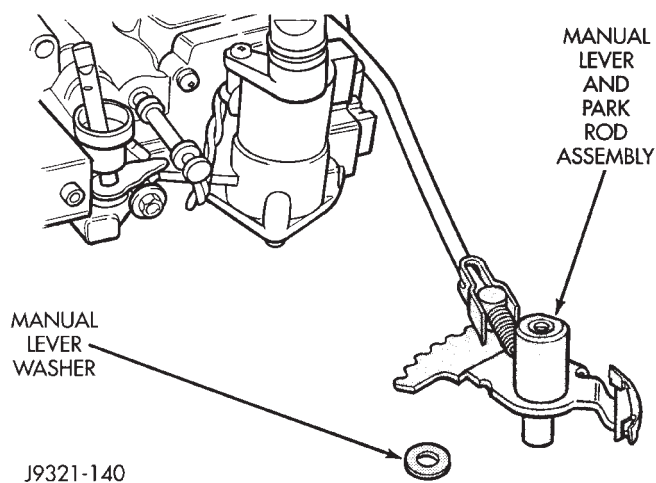


Fig. 95 Manual Lever Removal—46RH

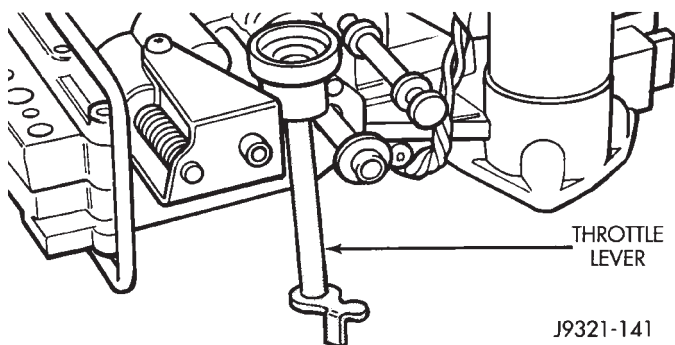


Fig. 96 Throttle Lever Removal—46RH

pressure adjusting screw from bracket and do not disturb adjusting screw settings during removal.

(12) Remove solenoid connector from 3-4 accumulator housing (Fig. 99). **Note that connector is attached to housing with shoulder-type screw. Keep this screw with accumulator housing to avoid losing it.**

(13) Note routing of solenoid wires for assembly reference (Fig. 100).

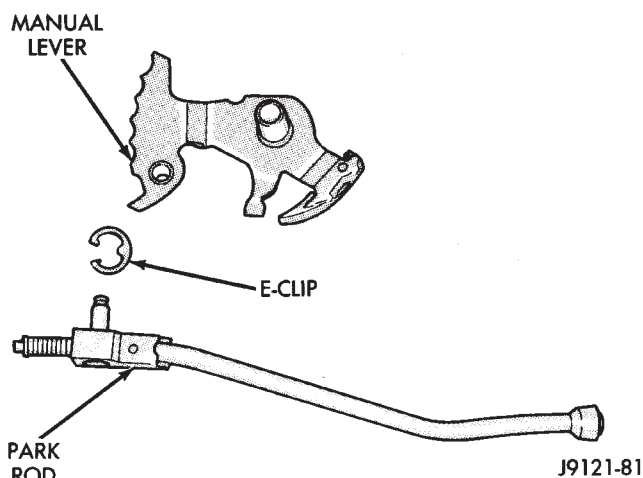


Fig. 97 Park Rod Removal—46RH

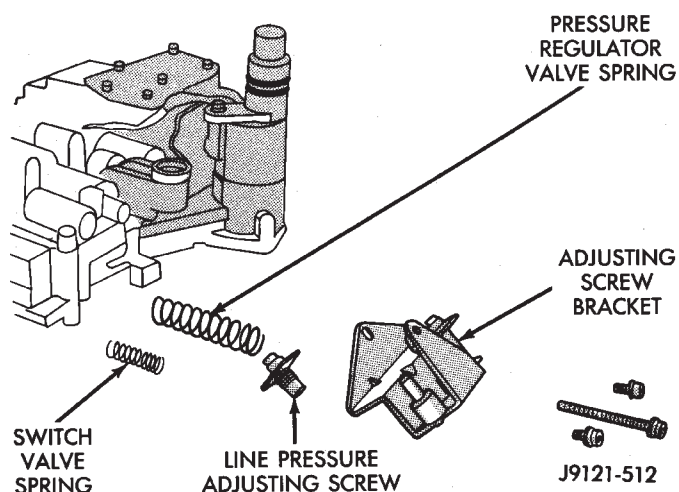


Fig. 98 Adjusting Screw Bracket And Spring Removal—46RH

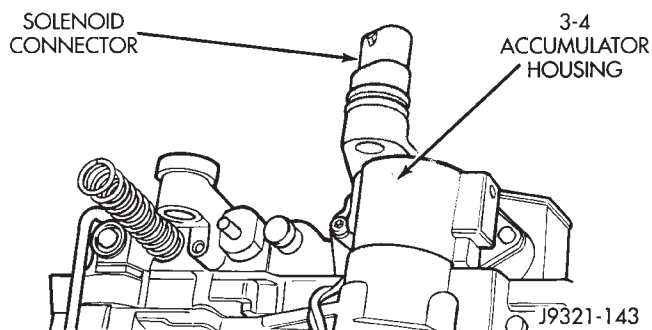


Fig. 99 Solenoid Connector Position—46RH

(14) Remove screws attaching solenoid assembly to valve body lower housing and remove solenoid and connector assembly (Fig. 101).

(15) Remove 3-4 accumulator housing attaching screws and remove housing from valve body (Fig. 102).

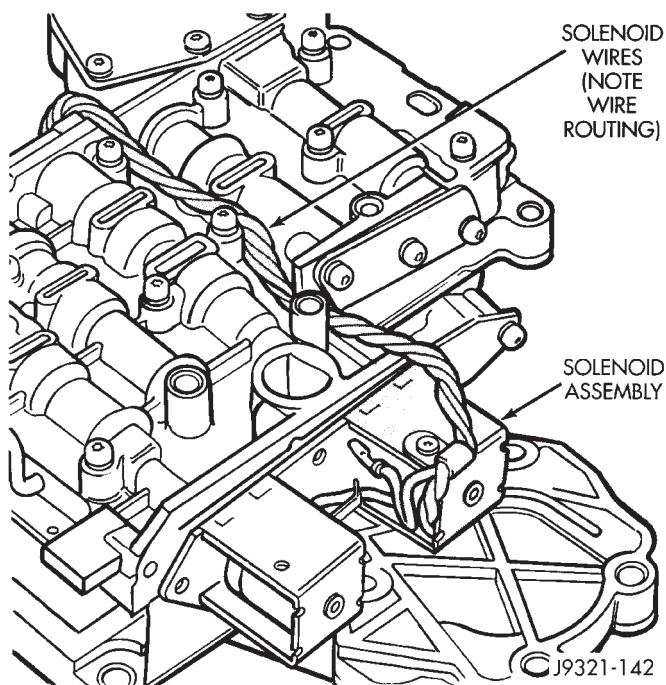


Fig. 100 Solenoid Wire Routing—46RH

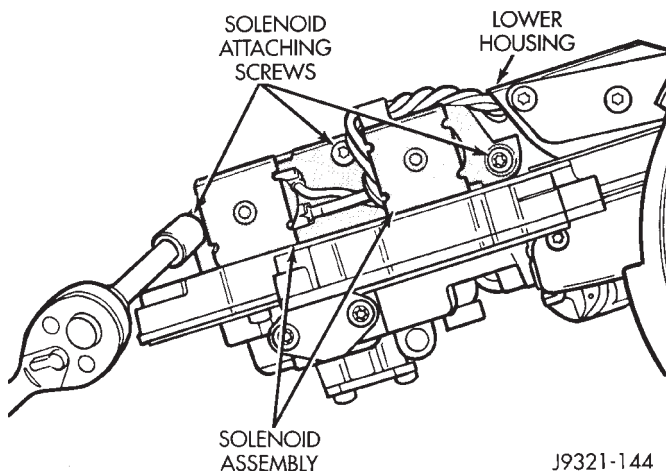


Fig. 101 Solenoid Assembly Removal—46RH

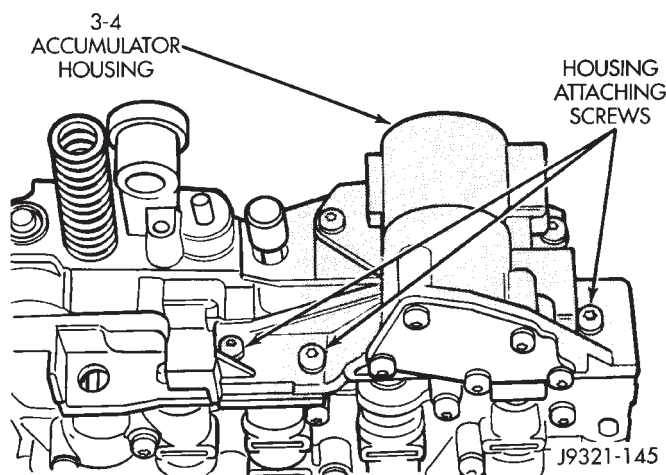


Fig. 102 Removing 3-4 Accumulator Housing

(16) Remove following parts from valve body lower housing: 3-4 shift valve and spring; pressure regulator valve spring; clutch valve; clutch valve spring; and clutch valve plug (Fig. 103).

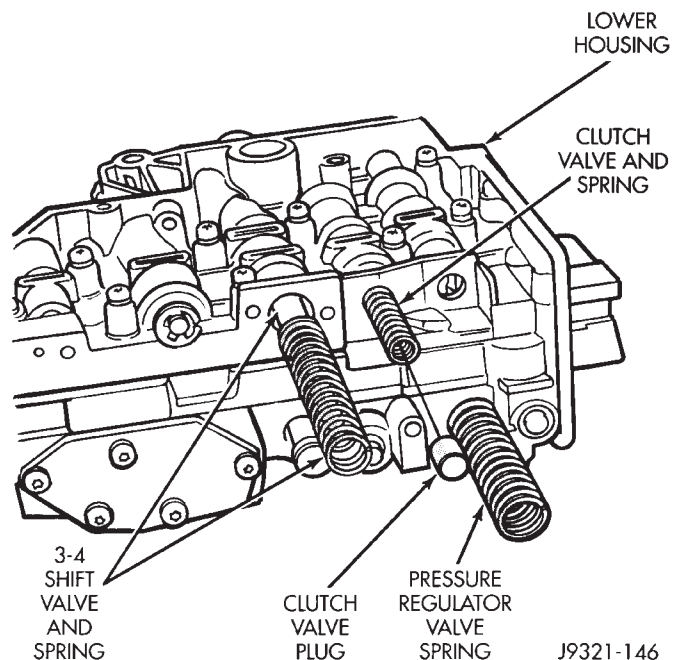


Fig. 103 Clutch Valve And 3-4 Shift Valve Locations—46RH

(17) Remove boost valve connecting tube (Fig. 104). Disengage tube from upper housing port first. Then rock opposite end of tube back and forth to work it out of lower housing.

CAUTION: Do not use tools to loosen or pry the connecting tube out of the valve body housings. Loosen and remove the tube by hand only.

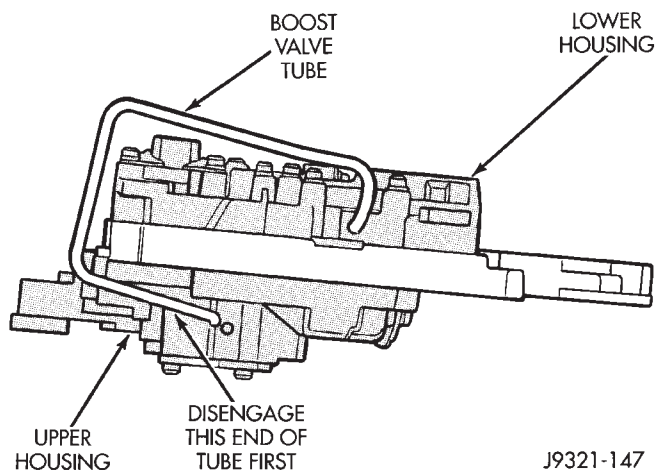


Fig. 104 Boost Valve Tube Removal—46RH

(18) Turn valve body over so valve lower housing is facing upward (Fig. 105). In this position, check

balls in upper housing will remain in place and not fall out when lower housing and transfer plate are removed.

(19) Remove screws attaching valve body lower housing to upper housing and transfer plate (Fig. 105). **Note position of boost valve tube brace for assembly reference.**

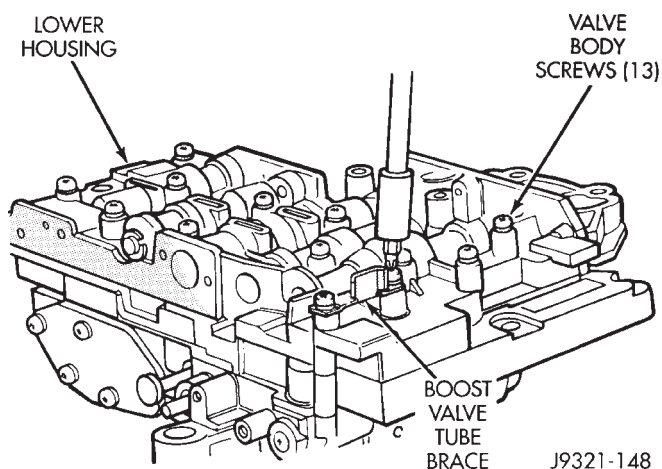


Fig. 105 Valve Body Screw And Tube Brace Location—46RH

(20) Remove lower housing and overdrive separator plate from transfer plate (Fig. 106).

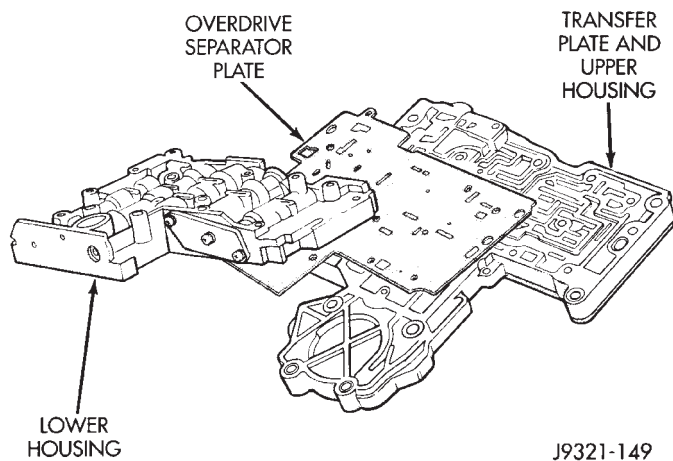


Fig. 106 Lower Housing Removal—46RH

(21) Remove transfer plate from upper housing (Fig. 107).

(22) Turn transfer plate over so upper housing separator plate is facing upward (Fig. 108).

(23) Remove brace plate from lower housing separator plate and transfer plate (Fig. 108).

(24) Remove upper housing separator plate from transfer plate (Fig. 109). Note position of filter in separator plate for assembly reference.

(25) Remove rear clutch check ball from transfer plate. **Note check ball location for assembly reference before removing it (Fig. 110).**

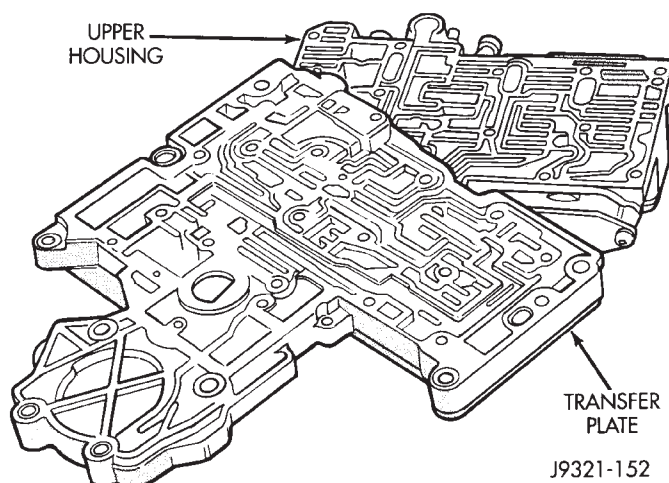


Fig. 107 Removing Transfer Plate From Upper Housing—46RH

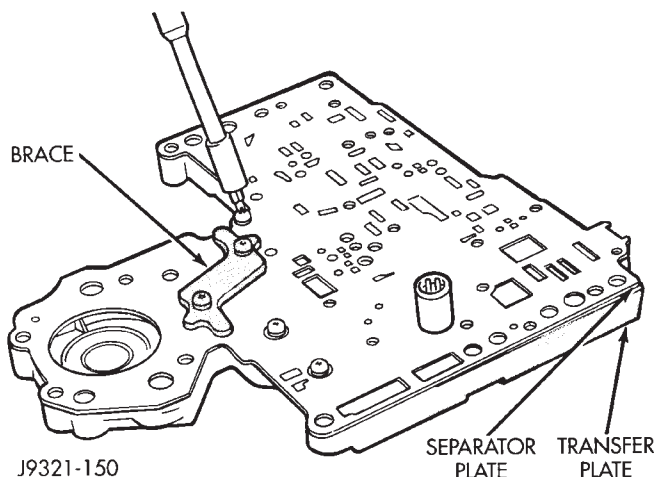


Fig. 108 Brace Plate Removal—46RH

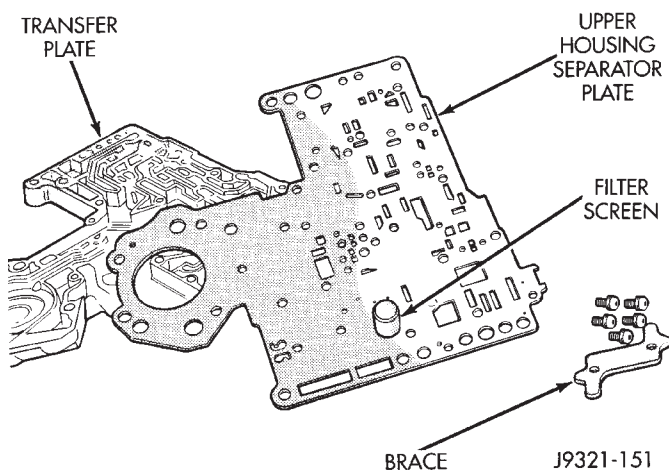


Fig. 109 Upper Housing Separator Plate Removal—RH

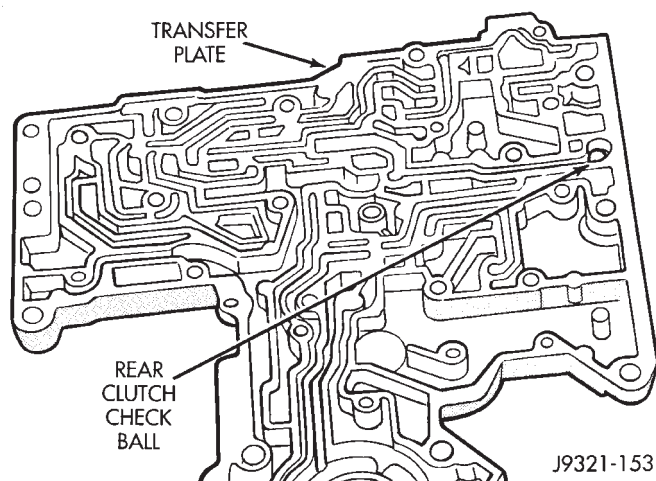


Fig. 110 Rear Clutch Check Ball Location—46RH

VALVE BODY UPPER HOUSING DISASSEMBLY

(1) Note location of check balls in valve body upper housing (Fig. 111). Then remove one large and six smaller diameter check balls with magnet (total of 7 check balls are used).

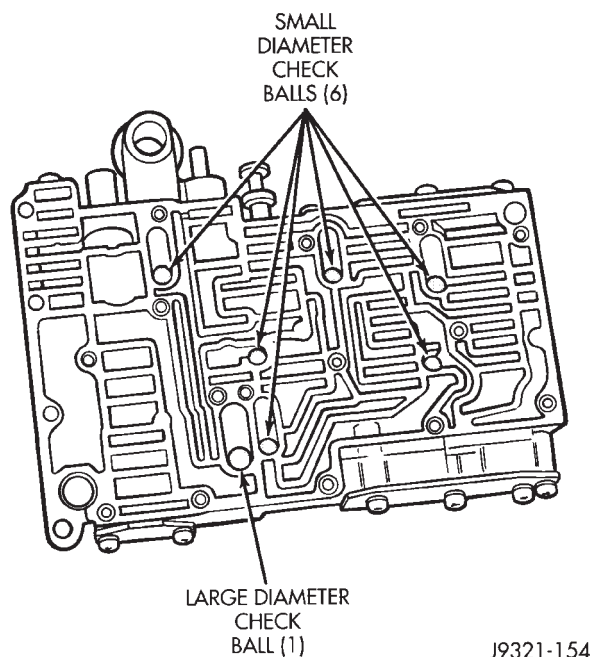


Fig. 111 Valve Body Check Ball Locations—46RH

(2) Remove E-clip that secure shuttle valve secondary spring on valve stem (Fig. 112).

(3) Remove governor plug and shuttle valve covers (Fig. 113).

(4) Remove throttle plug, primary spring, shuttle valve, secondary spring, and spring guides (Fig. 113).

(5) Remove boost valve retainer, spring and valve if not previously removed.

(6) Turn upper housing over and remove switch valve, regulator valve and spring, and manual valve (Fig. 114).

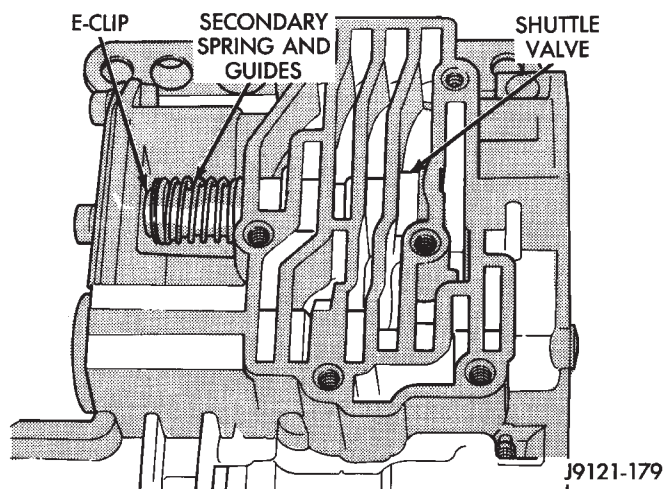


Fig. 112 Shuttle Valve E-Clip And Secondary Spring Location

(7) Remove kickdown detent, kickdown valve, and throttle valve and spring (Fig. 114).

(8) Remove throttle plug and 1-2 and 2-3 governor plugs (Fig. 114). Also remove shuttle valve primary spring if not removed in prior step.

(9) Turn upper housing around and remove limit valve and shift valve covers (Fig. 115).

(10) Remove limit valve housing. Then remove retainer, spring, limit valve, and 2-3 throttle plug from limit valve housing (Fig. 115).

(11) Remove 1-2 shift control valve and spring (Fig. 115).

(12) Remove 1-2 shift valve and spring (Fig. 115).

(13) Remove 2-3 shift valve and spring from valve body (Fig. 115).

(14) Remove pressure plug cover (Fig. 115).

(15) Remove line pressure plug, sleeve, throttle pressure plug and spring (Fig. 115).

VALVE BODY LOWER HOUSING DISASSEMBLY (FIG. 116)

(1) Remove timing valve cover.

(2) Remove 3-4 timing valve and spring.

(3) Remove 3-4 shuttle valve E-clip and remove shuttle valve spring and plug.

(4) Remove 3-4 shift valve and spring.

(5) Remove converter clutch valve, spring and plug.

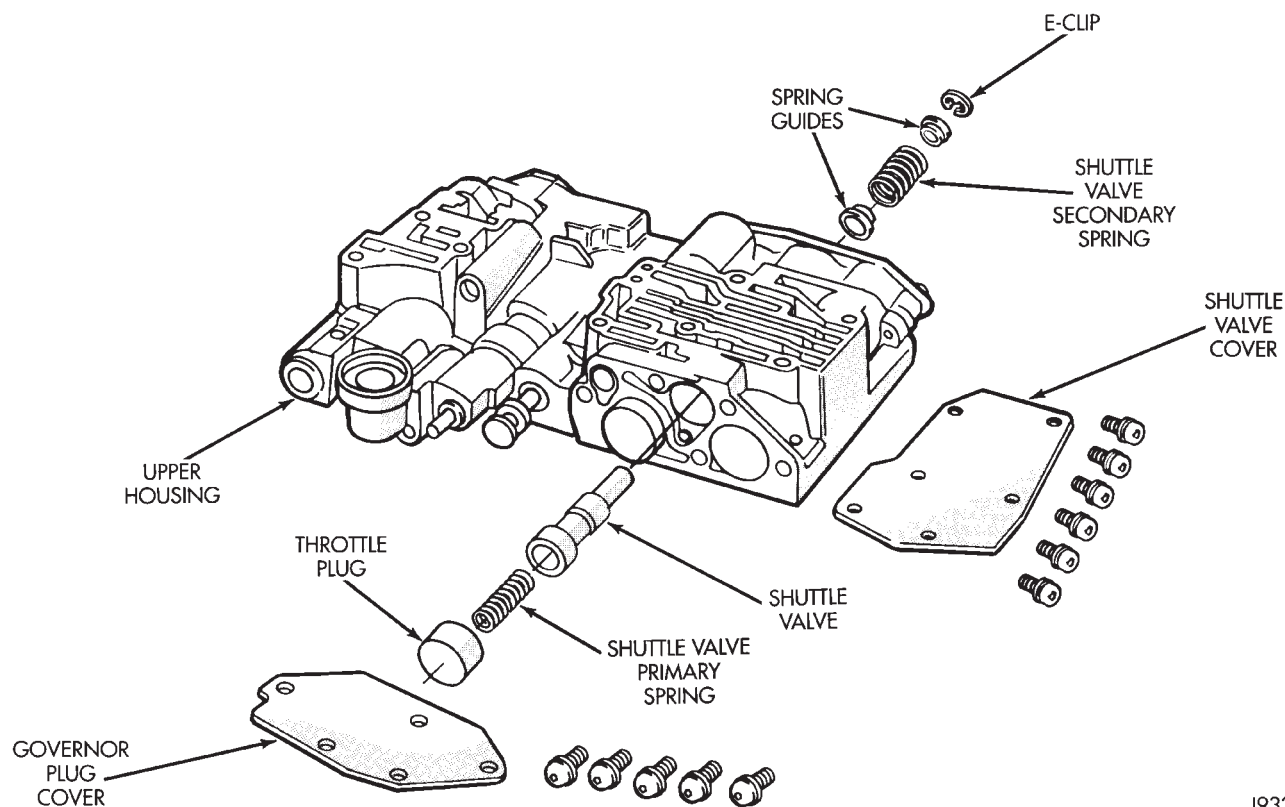
(6) Remove converter clutch timing valve, retainer and valve spring.

3-4 ACCUMULATOR HOUSING DISASSEMBLY (FIG. 117)

(1) Remove end plate from housing.

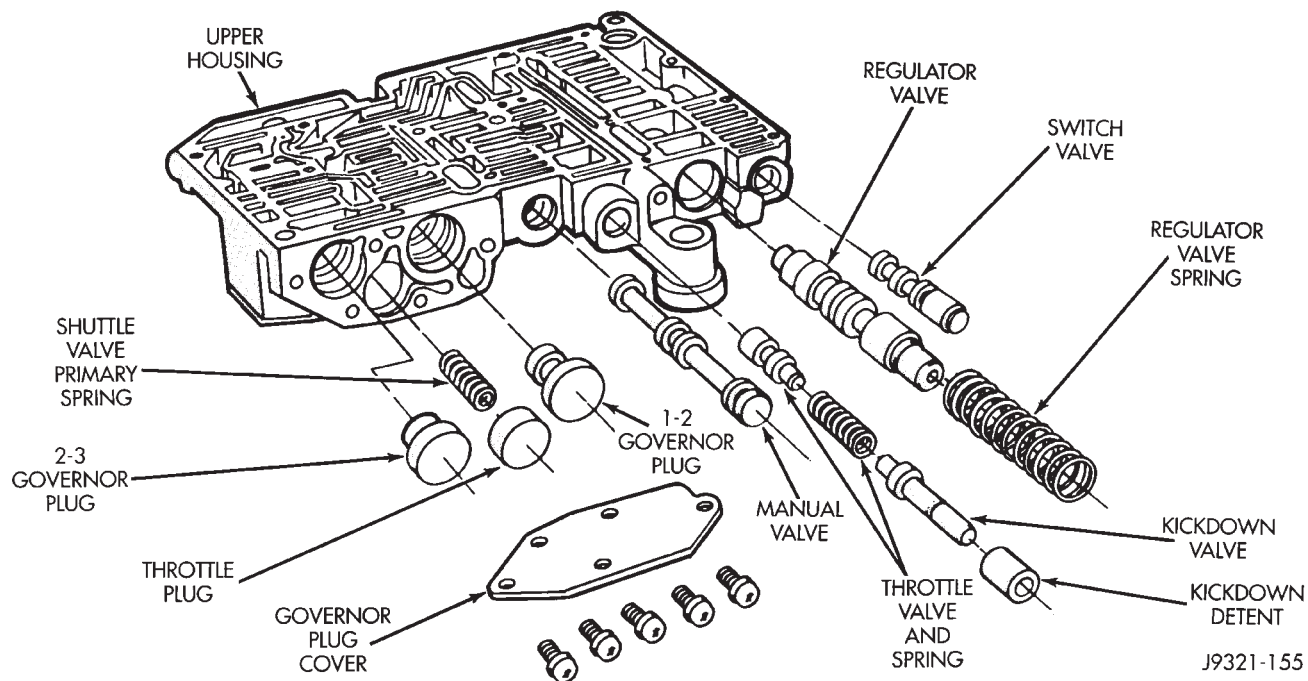
(2) Remove piston spring.

(3) Remove piston. Remove and discard piston seals.



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Fig. 113 Shuttle And Boost Valve Components—46RH



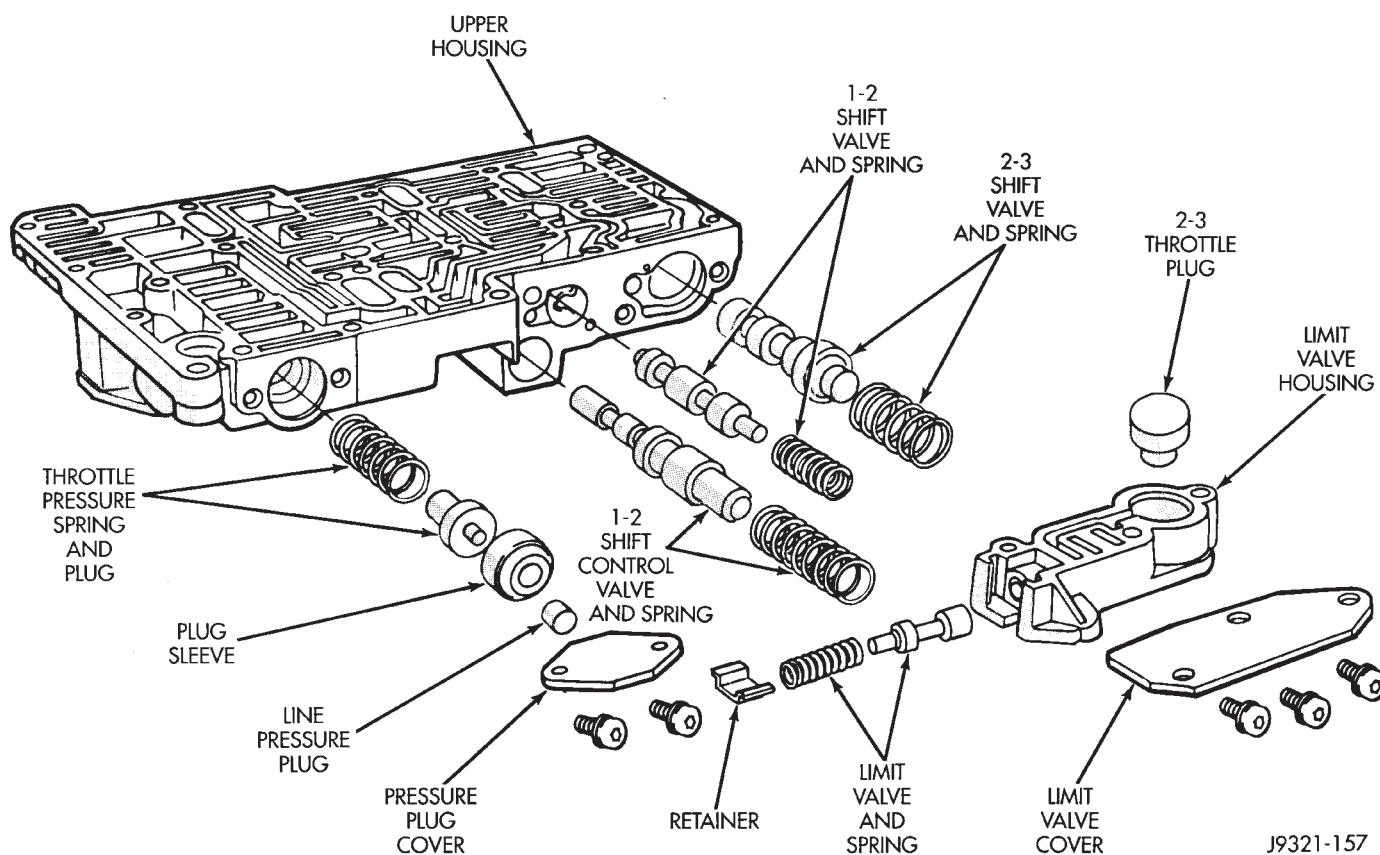
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Fig. 114 Control Valve Locations—46RH Upper Housing

VALVE BODY CLEANING AND INSPECTION

The only serviceable valve body components are:

- solenoid and connector assembly
- solenoid gasket
- park rod and E-clip
- switch valve and spring
- pressure adjusting screw bracket
- throttle valve lever manual lever



J9321-157

Fig. 115 Shift Valves And Pressure Plugs—46RH Upper Housing

- manual shaft seal, washer, and E-clip
- fluid filter
- detent ball and spring

The remaining valve body components are serviced only as part of a complete valve body assembly.

Clean the valve body components with a standard parts cleaning solution only. Do not use gasoline, kerosene, or any type of caustic solution.

Dry the parts with compressed air. Make sure all passages are clean and free from obstructions. **Do not use rags or shop towels to dry or wipe off valve body components. Lint from these materials will stick to the valve body components. Lint will interfere with valve operation and may clog filters and fluid passages.**

Inspect the throttle and manual valve levers and shafts. Do not attempt to straighten a bent shaft or correct a loose lever. Replace these components if worn, bent, loose or damaged in any way.

Inspect all of the valve body mating surfaces for scratches, nicks, burrs, or distortion. Use a straight-edge to check surface flatness. Minor scratches may be removed with crocus cloth using only very light pressure.

Minor distortion of a valve body mating surface may be corrected by smoothing the surface with a sheet of crocus cloth. Position the crocus cloth on a surface plate, sheet of plate glass or equally flat sur-

face. If distortion is severe or any surfaces are heavily scored, the valve body will have to be replaced.

CAUTION: Many of the valves and plugs, such as the throttle valve, shuttle valve plug, 1-2 shift valve and 1-2 governor plug, are made of coated aluminum (Fig. 118). Aluminum components are 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. This practice could 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. Minor surface scratches on steel valves or plugs can be removed with crocus cloth but **do not round off the edges of the valve or plug lands**. Maintaining sharpness of these edges is vitally important. The edges prevent foreign matter from lodging between the valves and plugs and the bore.

Inspect all the valve and plug bores in the valve body. Use a penlight to view the bore interiors. Replace the valve body if any bores are distorted or

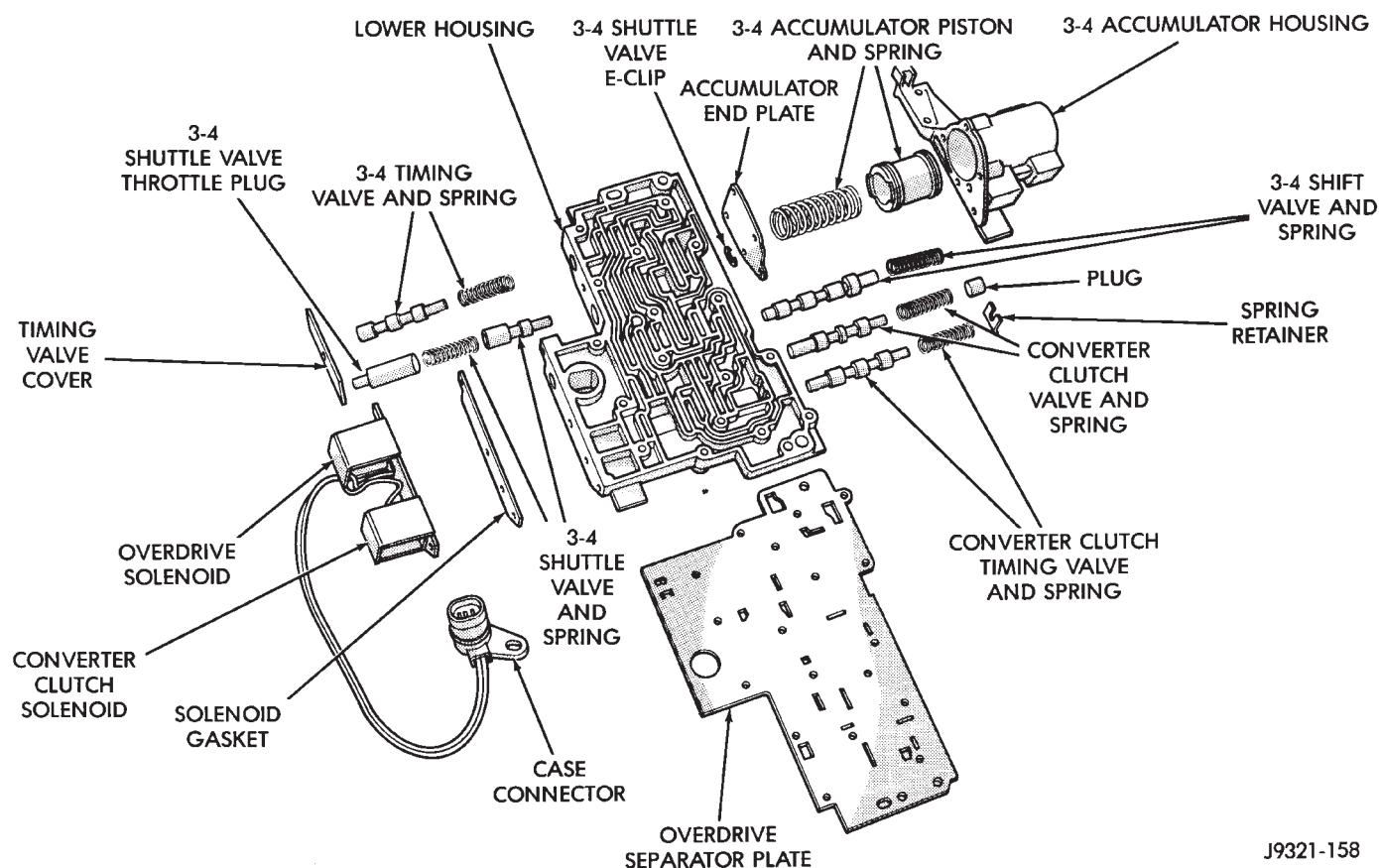


Fig. 116 Shift Valves And Springs—46RH Lower Housing

scored. Inspect all of the valve body springs. The springs must be free of distortion, warpage or broken coils.

Check the two separator plates for distortion or damage of any kind. Inspect the upper housing, lower housing, 3-4 accumulator housing, and transfer plate carefully. Be sure all fluid passages are clean and clear. Check condition of the upper housing and transfer plate check balls as well. The check balls and ball seats must not be worn or damaged.

Trial fit each valve and plug in its bore to check freedom of operation. When clean and dry, the valves and plugs should drop freely into the bores.

Valve body bores do not change dimensionally with use. If the valve body functioned correctly when new, it will continue to operate properly after cleaning and inspection. It should not be necessary to replace a valve body assembly unless it is damaged in handling.

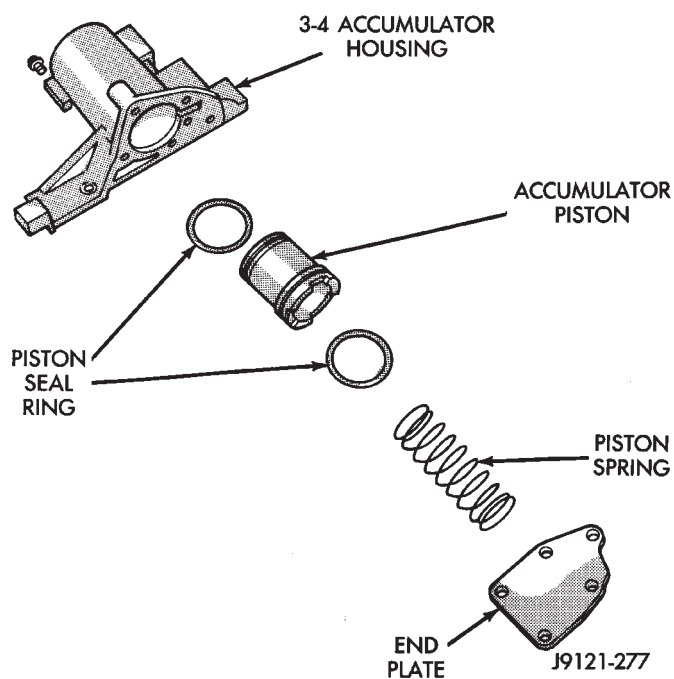


Fig. 117 3-4 Accumulator Housing Components—46RH

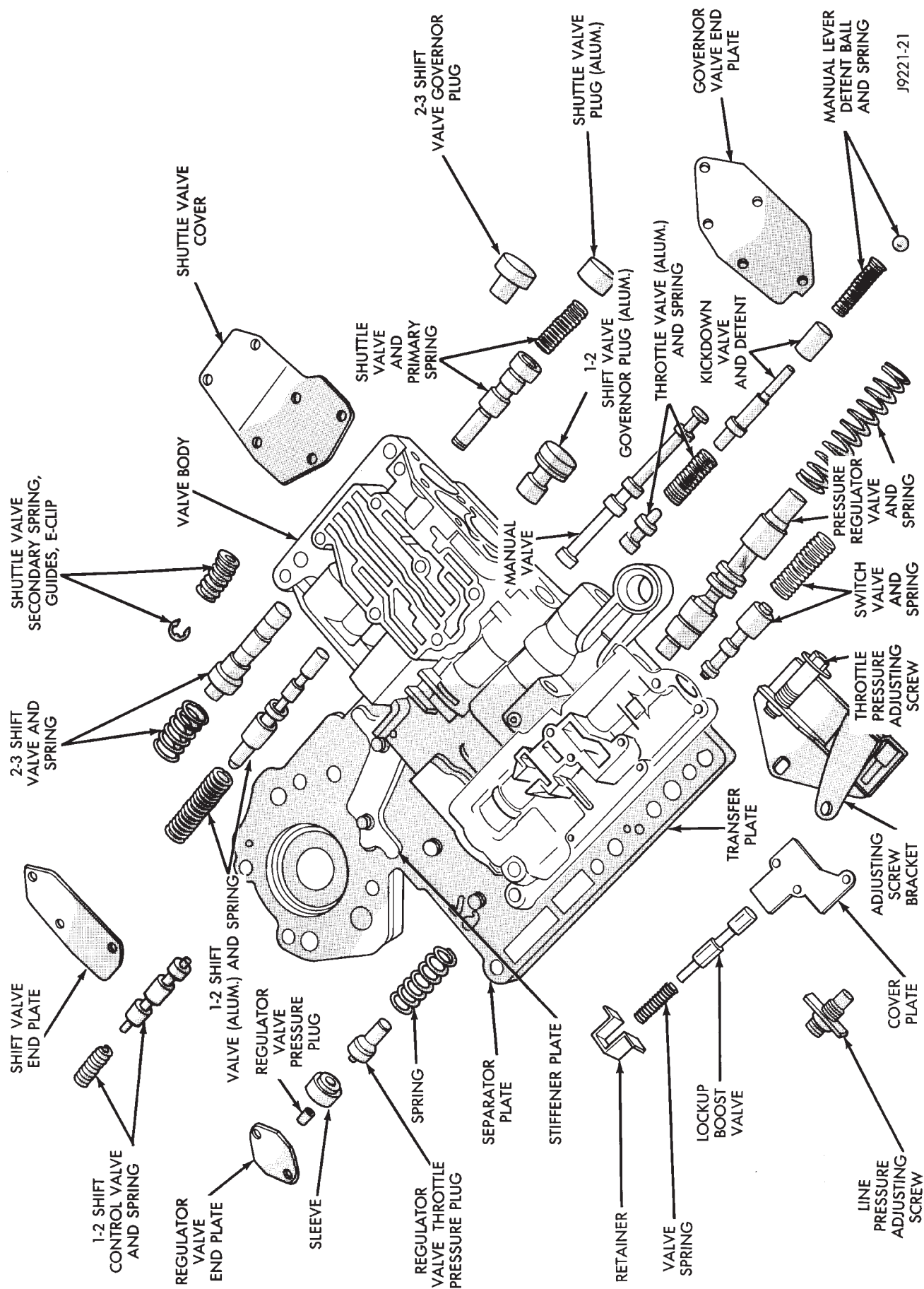


Fig. 118 Upper Housing Components—46RH Valve Body (Alum. Indicates Aluminum Part)

VALVE BODY REASSEMBLY

CAUTION: Do not force valves or plugs into place during reassembly. If the valve body bores, valves and plugs are free of distortion or burrs, the valve body components should all slide into place easily. In addition, do not overtighten the transfer plate and valve body screws during reassembly. Overtightening can distort the housings resulting in valve sticking, cross leakage and unsatisfactory operation. Tighten valve body screws to recommended torque only.

Lower Housing Assembly (Fig. 116)

- (1) Lubricate valves, springs, and the housing valve and plug bores with Mopar ATF Plus, or Dexron II® transmission fluid.
- (2) Install 3-4 timing valve spring and valve in lower housing.
- (3) Install 3-4 shuttle valve in lower housing. Press valve inward and install E-clip on end of valve to secure it in housing.
- (4) Install 3-4 shuttle valve spring and throttle plug in housing.
- (5) Install timing valve end plate. Tighten end plate screws to 4 N•m (35 in. lbs.) torque.
- (6) Install 3-4 shift valve and spring.
- (7) Install converter clutch valve, spring and plug.
- (8) Install converter clutch timing valve and spring.

3-4 Accumulator Assembly (Fig. 117)

- (1) Lubricate accumulator piston, seals and housing piston bore with ATF Plus, or Dexron II®.
- (2) Install new seal rings on accumulator piston.
- (3) Install piston and spring in housing.
- (4) Install end plate on housing.

Transfer Plate Assembly

- (1) Install rear clutch check ball in transfer plate (Fig. 110).
- (2) Install filter screen in upper housing separator plate (Fig. 109).
- (3) Align and position upper housing separator plate on transfer plate (Fig. 109).
- (4) Install brace plate (Fig. 108). Tighten brace attaching screws to 4 N•m (35 in. lbs.) torque.
- (5) Install remaining separator plate attaching screws. Tighten screws to 4 N•m (35 in. lbs.) torque.

Assembling Upper And Lower Housings

- (1) Position upper housing so internal passages and check ball seats are facing upward. Then install check balls in housing (Fig. 111). Seven check balls are used. The single large check ball is approximately 8.7 mm (11/32 in.) diameter. The remaining 6 check balls are approximately 6.3 mm (1/4 in.) in diameter.

- (2) Position transfer plate assembly on upper housing (Fig. 119).
- (3) Position lower housing separator plate on transfer plate (Fig. 119).

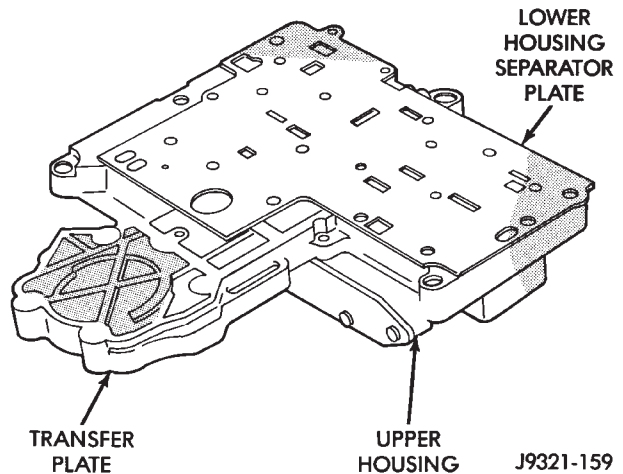


Fig. 119 Lower Housing Separator Plate Installation—46RH

- (4) Install lower housing on assembled transfer plate and upper housing (Fig. 120).
- (5) Install and start valve body screws by hand. Then tighten screws evenly to 4 N•m (35 in. lbs.) torque. Start at center and work out to sides when tightening screws.

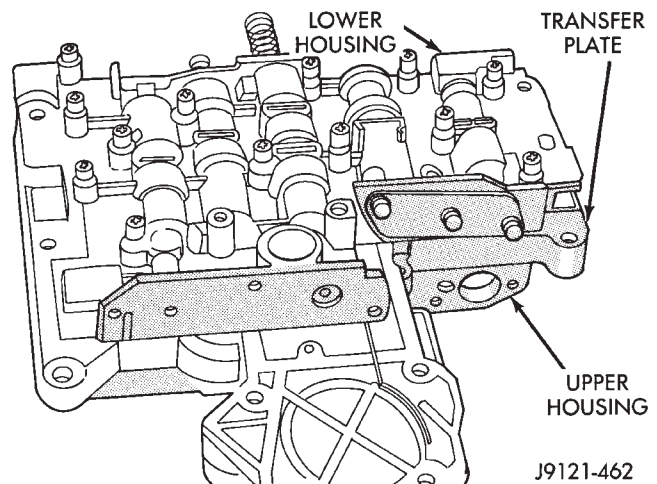


Fig. 120 Assembling Valve Body Upper And Lower Housings—46RH

Upper Housing Valve And Plug Installation (Figs. 114, 115, 118)

- (1) Lubricate valves, plugs, springs with Mopar ATF Plus transmission fluid.
- (2) Assemble regulator valve line pressure plug, sleeve, throttle plug and spring. Insert assembly in

upper housing and install cover plate. Tighten cover plate screws to 4 N•m (35 in. lbs.) torque.

- (3) Install 1-2 and 2-3 shift valves and springs.
- (4) Install 1-2 shift control valve and spring.
- (5) Install shift valve cover plate.
- (6) Install shuttle valve as follows:
 - (a) Insert plastic guides in shuttle valve secondary spring and install spring on end of valve.
 - (b) Hold shuttle valve in place.
 - (c) Compress secondary spring and install E-clip in groove at end of shuttle valve.
 - (d) Verify that spring and E-clip are properly seated before proceeding.
- (7) Install shuttle valve cover plate. Tighten cover plate screws to 4 N•m (35 in. lbs.) torque.
- (8) Install 1-2 and 2-3 valve governor plugs in valve body.
- (9) Install shuttle valve primary spring and throttle plug.
- (10) Align and install governor plug cover. Tighten cover screws to 4 N•m (35 in. lbs.) torque.
- (11) Install manual valve.
- (12) Install throttle valve and spring.
- (13) Install kickdown valve and detent.
- (14) Install regulator valve.
- (15) Install switch valve.

Boost Valve Tube Installation

- (1) Position valve body assembly so lower housing is facing upward (Fig. 121).
- (2) Lubricate tube ends and housing ports with transmission fluid or petroleum jelly.
- (3) Position tube behind tube brace (Fig. 121).
- (4) Start tube in lower housing port first. Then swing tube downward and work opposite end of tube into upper housing port (Fig. 121).
- (5) Seat each end of tube in housings.

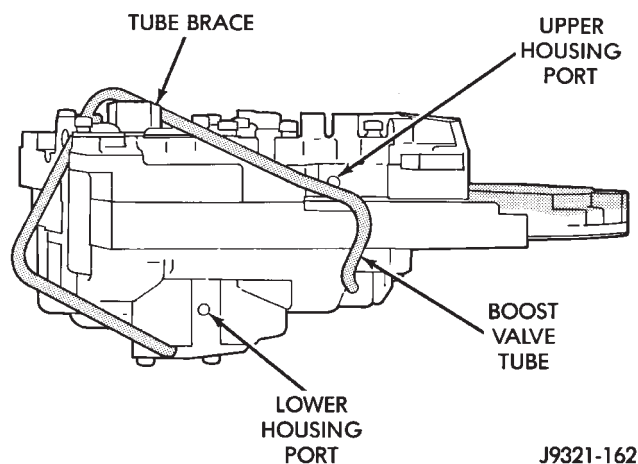


Fig. 121 Boost Valve Tube Installation—46RH

3-4 Accumulator Installation

- (1) Position converter clutch valve and 3-4 shift valve springs in housing (Fig. 122).

- (2) Loosely attach accumulator housing with right-side screw (Fig. 122). Install only one screw at this time as accumulator must be free to pivot upward for ease of installation.

- (3) Position plug on end of converter clutch valve spring. Then compress and hold springs and plug in place with fingers of one hand.

- (4) Swing accumulator housing upward over valve springs and plug.

- (5) Hold accumulator housing firmly in place and install remaining two attaching screws. Be sure springs and clutch valve plug are properly seated (Fig. 123).

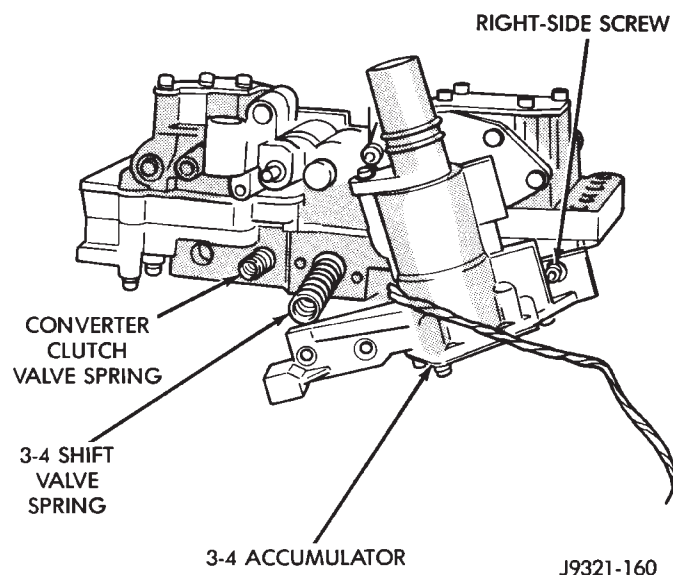


Fig. 122 Installing Converter Clutch And 3-4 Shift Valve Springs—46RH

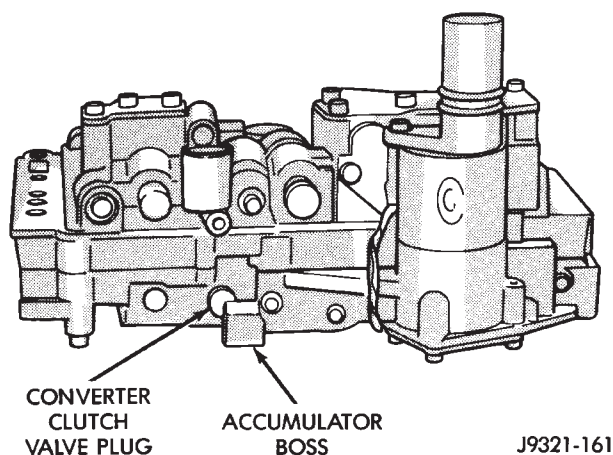


Fig. 123 Seating 3-4 Accumulator On Lower Housing—46RH

- (6) Attach solenoid case connector to 3-4 accumulator with shoulder-type screw. Connector has small locating tang that fits in dimple at top of accumulator housing (Fig. 124). Seat tang in dimple before tightening connector screw.

(7) Install solenoid assembly and gasket. Tighten solenoid attaching screws to 8 N•m (72 in. lbs.) torque.

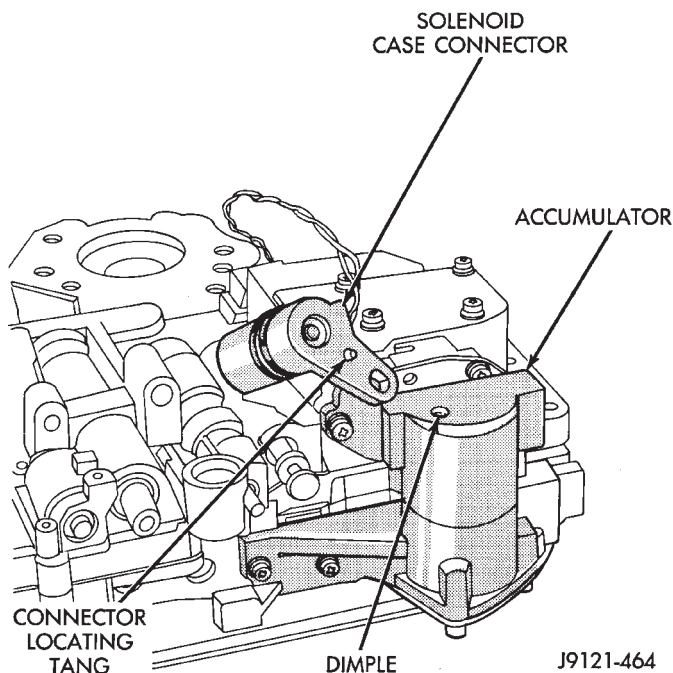


Fig. 124 Solenoid Connector Installation—46RH

(8) Verify that solenoid wires are properly routed (Fig. 125). **Solenoid wires must be clear of rear band lever, manual lever and park rod.**

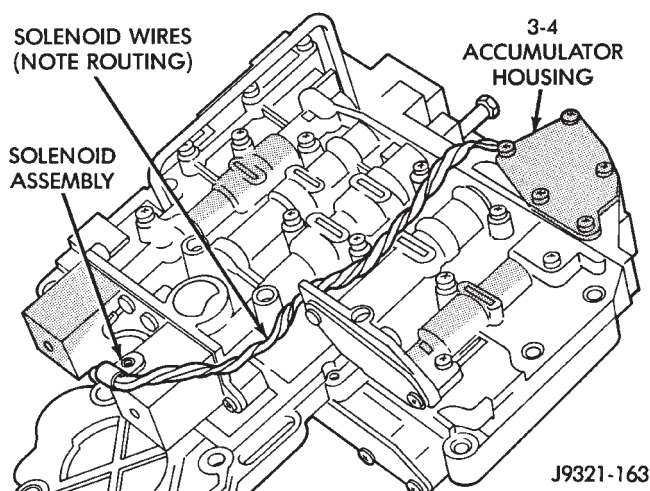


Fig. 125 Solenoid Wire Routing—46RH

Valve Body Final Assembly And Adjustment

- (1) Insert manual lever detent spring in upper housing.
- (2) Position line pressure adjusting screw in adjusting screw bracket.
- (3) Install spring on end of line pressure regulator valve.
- (4) Install switch valve spring on tang at end of adjusting screw bracket.

(5) Position adjusting screw bracket on valve body. Align valve springs and press bracket into place. Install short, upper bracket screws first and long bottom screw last. Verify that valve springs and bracket are properly aligned. Then tighten all three bracket screws to 4 N•m (35 in. lbs.) torque.

(6) Install throttle lever in upper housing. Then install manual lever over throttle lever and start manual lever into housing.

(7) Position detent ball on end of spring. Then hold detent ball and spring in detent housing with Retainer Tool 6583 (Fig. 92).

(8) Align manual lever with detent ball and manual valve. Hold throttle lever upward. Then press down on manual lever until fully seated. Remove detent ball retainer tool after lever is seated.

(9) Then Install manual lever seal, washer and E-clip.

(10) Lubricate solenoid case connector O-rings and shaft of manual lever with light coat of petroleum jelly.

(11) Verify that throttle lever is aligned with end of kickdown valve stem and that manual lever arm is engaged in manual valve (Fig. 126).

(12) Install boost valve, valve spring, retainer and cover plate. Tighten cover plate screws to 4 N•m (35 in. lbs.) torque.

(13) Obtain new fluid filter for valve body but do not install filter at this time.

(14) If line pressure and/or throttle pressure adjustment screw settings were not disturbed, continue with overhaul or reassembly. However, if adjustment screw settings **were** moved or changed, readjust as described in Valve Body Control Pressure Adjustment procedure.

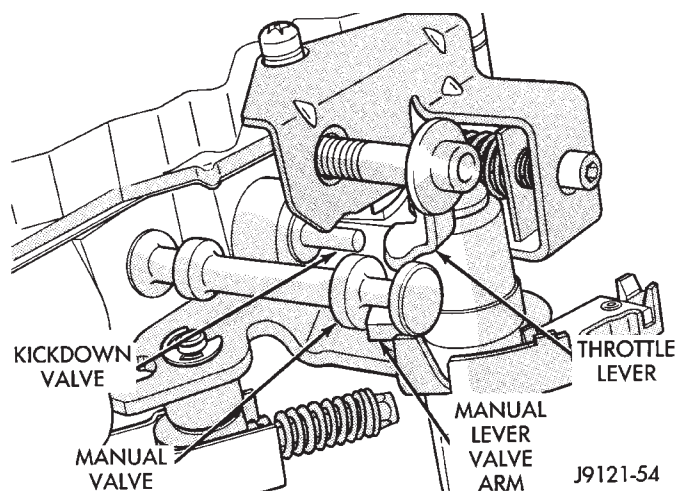


Fig. 126 Manual And Throttle Lever Alignment

VALVE BODY CONTROL PRESSURE ADJUSTMENTS

There are two control pressure adjustments on the valve body which are, line pressure and throttle pressure.

Line and throttle pressures are interdependent because each affects shift quality and timing. As a result, both adjustments must be performed properly and in the correct sequence. Adjust line pressure first and throttle pressure last.

Line Pressure Adjustment

Measure distance from the valve body to the inner edge of the adjusting screw with an accurate steel scale (Fig. 127).

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.

The 33.4 mm (1-5/16 in.) setting is an approximate setting. Manufacturing tolerances may make it necessary to vary from this dimension to obtain desired pressure.

One complete turn of the adjusting screw changes line pressure approximately 1-2/3 psi (9 kPa).

Turning the adjusting screw counterclockwise increases pressure while turning the screw clockwise decreases pressure.

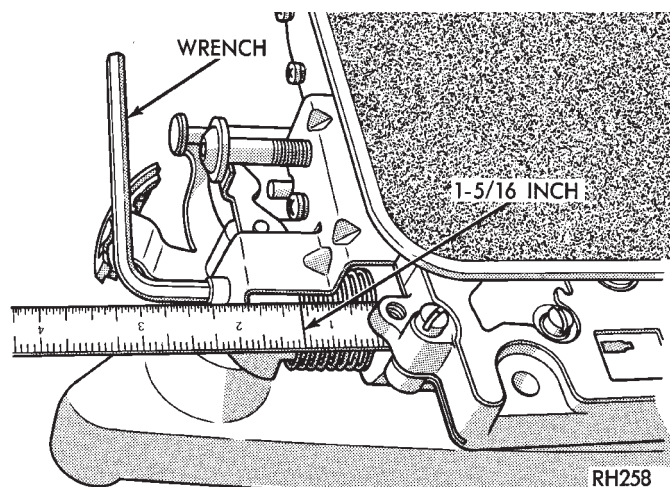


Fig. 127 Line Pressure Adjustment

Throttle Pressure Adjustment

Insert Gauge Tool C-3763 between the throttle lever cam and the kickdown valve stem (Fig. 128).

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.

The kickdown valve spring must be fully compressed and the kickdown valve completely bottomed to obtain correct adjustment.

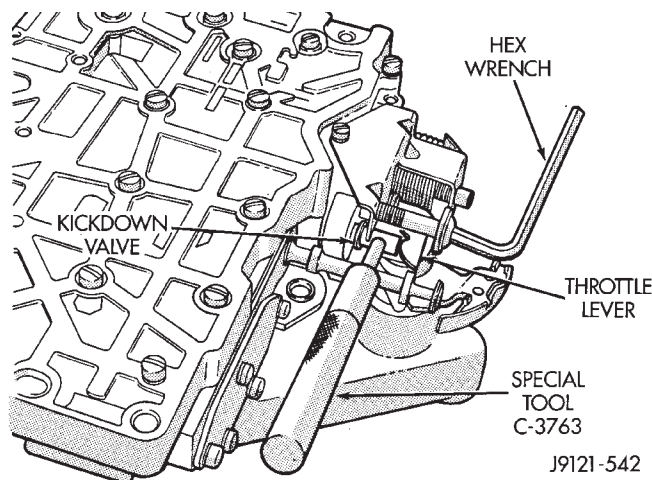


Fig. 128 Throttle Pressure Adjustment

TRANSMISSION ASSEMBLY

Assembly Tips

Do not allow dirt, grease, or foreign material to enter the case or transmission components during assembly. Keep the transmission case and components clean. Also make sure the tools and workbench area used for reassembly operations are equally clean.

Shop towels used for wiping off tools and your hands must be made from **lint free** materials. Lint will stick to transmission parts and could interfere with valve operation or even restrict fluid passages.

Lubricate transmission clutch and gear components with Mopar ATF Plus or Dexron II™ during reassembly. Soak clutch discs in transmission fluid before installation.

Use Ru-Glyde, Door-Eze, or petroleum jelly on seals and O-rings to ease installation. Petroleum jelly can also be used to hold thrust washers and plates in position during assembly operations. However, **do not** use chassis grease, bearing grease, white grease, or similar lubricants on any part. These types of lubricants can eventually block or restrict fluid passages and valve operation. Use petroleum jelly only.

Do not force parts into place. The transmission components and sub-assemblies are easily installed by hand when properly aligned. If a part seems difficult to install, it is either misaligned or incorrectly assembled. Verify that thrust washers, thrust plates and seal rings are correctly positioned. These parts will prevent proper assembly is mispositioned (or "left out" by accident).

The planetary geartrain, front/rear clutch assemblies and oil pump are all much easier to install when the transmission case is upright or as close to this position as possible. Either tilt the case upward with wood blocks, or cut a hole in the bench large enough for the output shaft and rear support. Then

lower the shaft and support into the hole and support the rear of the case directly on the bench.

TRANSMISSION ASSEMBLY PROCEDURE

(1) Lubricate rear servo piston seal with petroleum jelly, or Door Eze. Lubricate servo bore in case with transmission fluid.

(2) Install rear servo piston in case. Position piston at slight angle to bore and insert piston with twisting motion (Fig. 129).

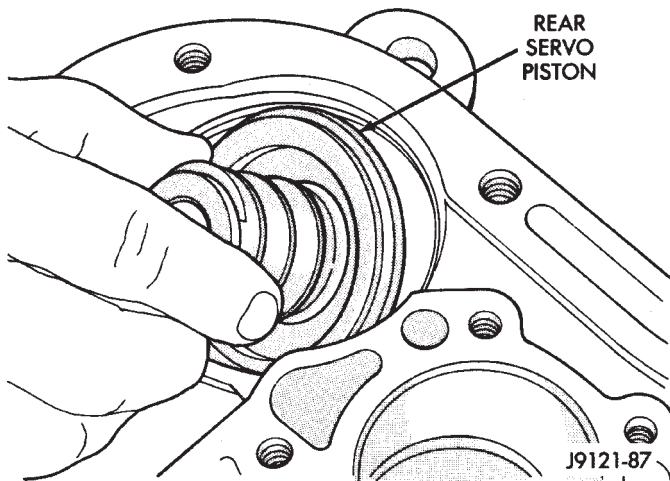


Fig. 129 Installing Rear Servo Piston—46RH

(3) Install rear servo spring and retainer in case bore (Fig. 130). Be sure spring is seated on piston.

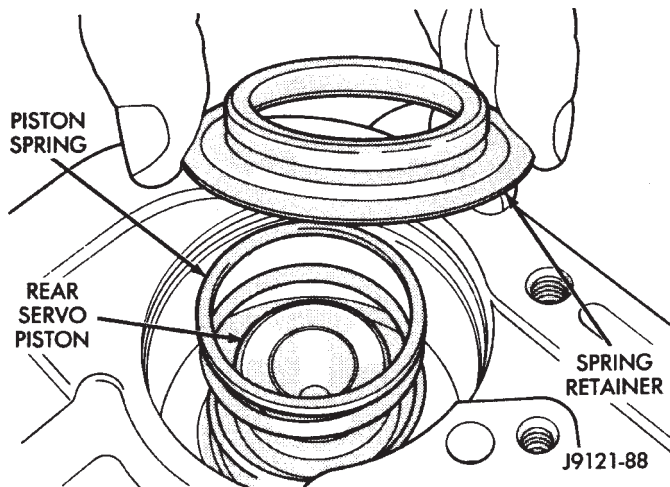


Fig. 130 Installing Rear Servo Piston Spring And Retainer—46RH

(4) Compress rear servo piston with C-clamp or Valve Spring Compressor C-3422-B and install servo piston snap ring (Fig. 131).

(5) Install new gasket at rear of transmission case. Use petroleum jelly to hold gasket in place. **Be sure to align governor feed holes in gasket with feed passages in case (Fig. 132). Install gasket before**

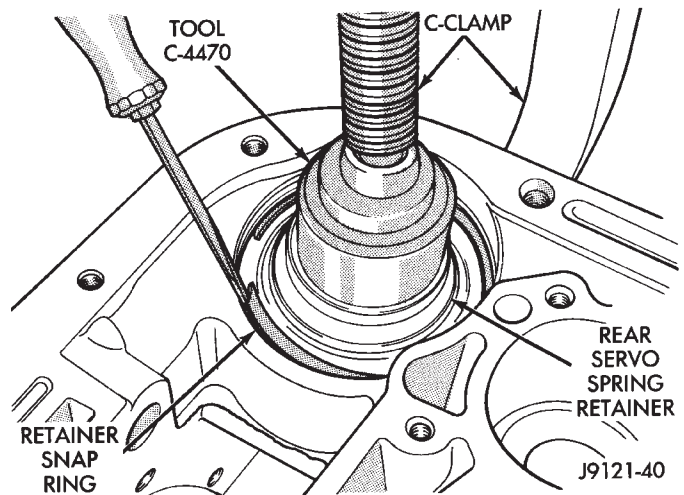


Fig. 131 Installing Rear Servo Snap Ring—46RH
overdrive piston retainer. Center hole in gasket is smaller than retainer and cannot be installed over retainer.

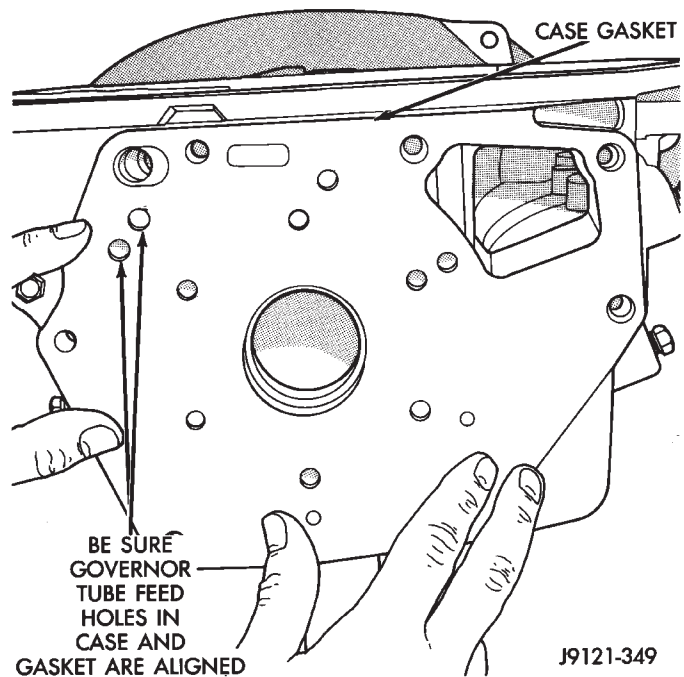


Fig. 132 Installing Case Gasket—46RH

(6) Install overdrive piston retainer. Be sure governor tube bores in retainer are aligned with governor feed passages in gasket and case (Fig. 133). Install and tighten retainer bolts to 17 N•m (13 ft. lbs.) torque.

(7) Install overrunning clutch components if not yet installed. Refer to Overrunning Clutch Overhaul in this section if necessary.

(8) Position rear band and link in case (Fig. 134). **Be sure notched side of link faces away from band.**

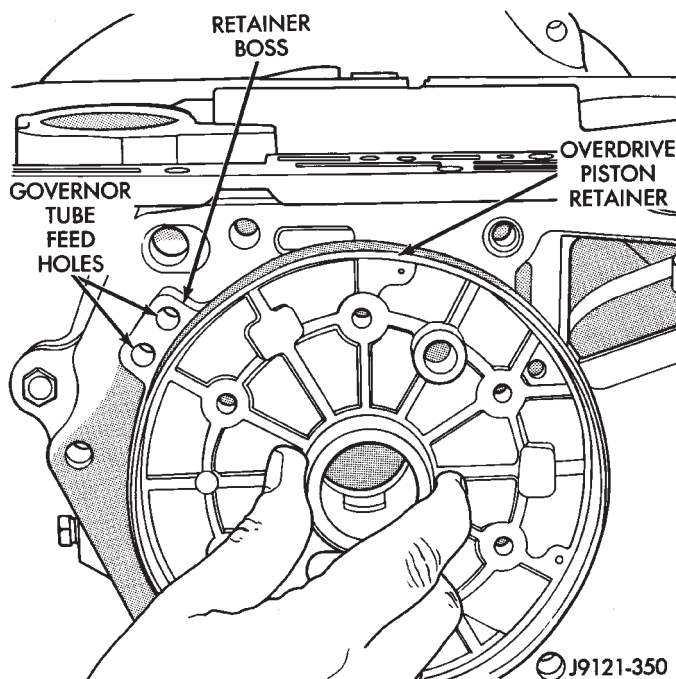


Fig. 133 Installing Overdrive Piston Retainer—46RH

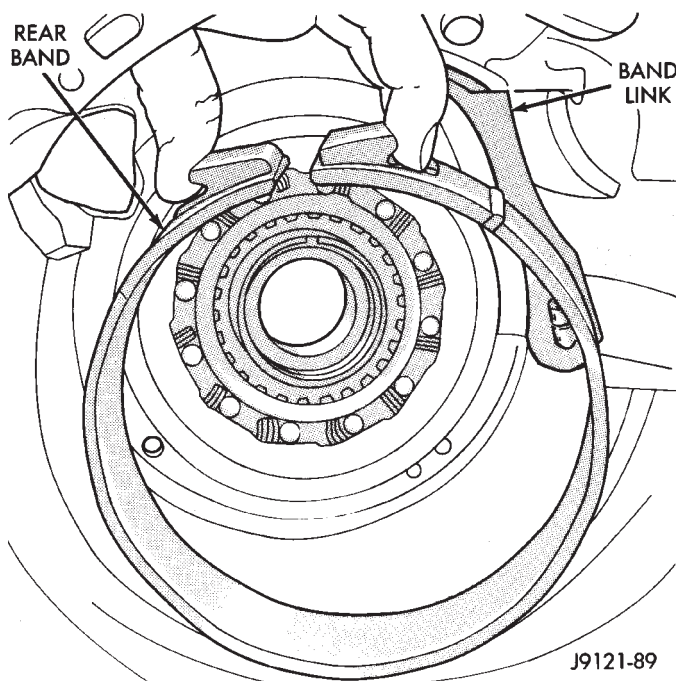


Fig. 134 Installing Rear Band And Link—46RH

(9) Install low-reverse drum (Fig. 135). Slide drum through rear band, onto rear support hub and into engagement with overrunning clutch race.

(10) Install snap ring that secures low-reverse drum to rear support hub (Fig. 136).

(11) Insert band reaction pin part way case and band link (Fig. 137).

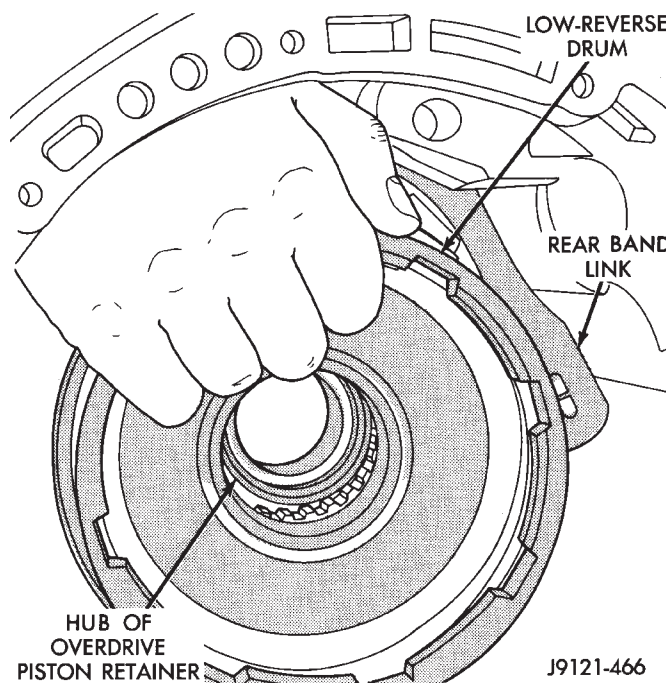


Fig. 135 Installing Low-Reverse Drum—46RH

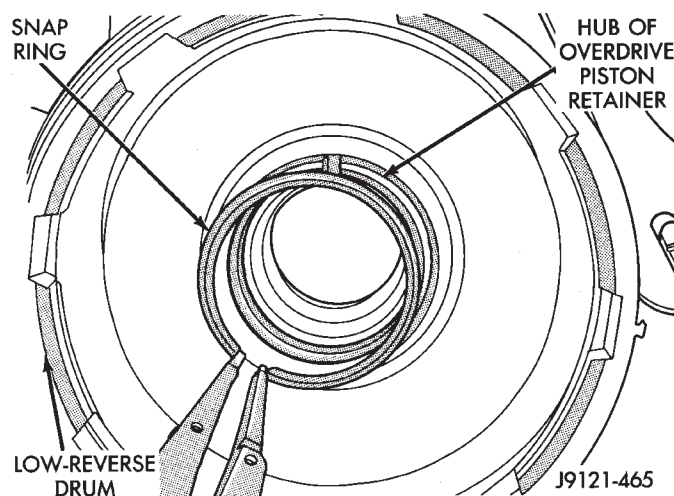


Fig. 136 Installing Low-Reverse Drum Snap Ring—46RH

(12) Install rear band adjusting lever, strut and reaction lever (Fig. 138). Be sure levers and strut are aligned and engaged before seating band reaction pin in case.

(13) Lubricate front servo piston components and servo bore in case with transmission fluid.

(14) Install front servo piston in bore. Carefully work small, suitable tool around piston ring to press it back into groove and ease installation (Fig. 139). Rotate piston into bore at same time. Rock piston slightly to ease piston ring past snap ring groove and into bore.

(15) Bottom front servo piston in bore and install servo spring.

(16) Install front servo piston rod guide as follows:

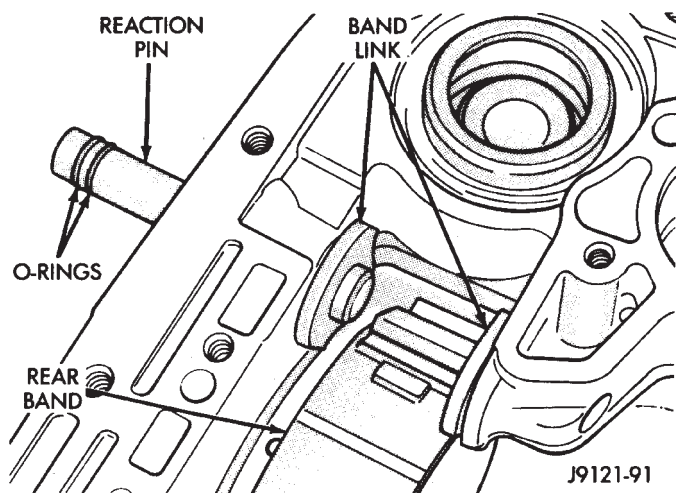


Fig. 137 Installing Rear Band Reaction Pin—46RH

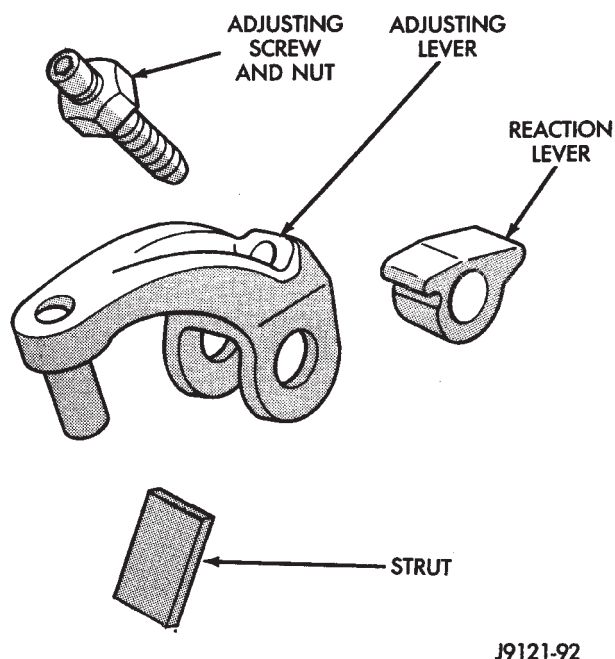


Fig. 138 Rear Band Levers And Strut—46RH

(a) Place Tool SP-5560 (or similar size tool) on guide and position C-clamp on tool and case (Fig. 140).

(b) Slowly compress rod guide while simultaneously easing seal ring into bore with suitable tool. (17) Install rod guide snap ring (Fig. 140).

(18) Position front band lever in case and over servo rod guide. Then install front band lever pin in case and slide it through lever.

(19) Coat threads of front band lever pin access plug with sealer and install it in case. Tighten plug to 17 N•m (13 ft. lbs.) torque.

(20) Install assembled output shaft and planetary gear components (Fig. 141). **Support shaft care-**

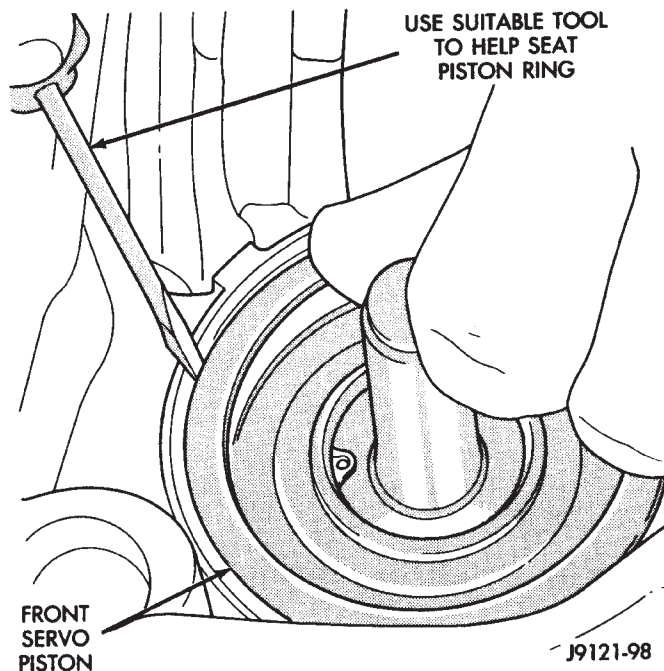


Fig. 139 Installing Front Servo Piston—46RH

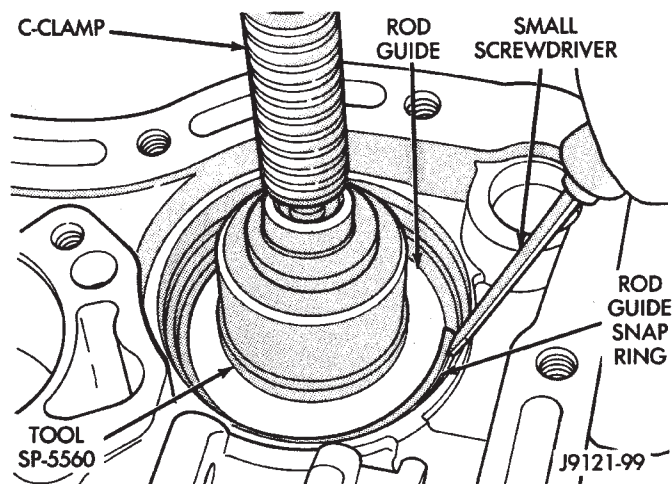


Fig. 140 Installing Front Servo Rod Guide And Snap Ring—46RH

fully during installation. Do not allow shaft bearing/bushing surfaces to become nicked or scratched.

(21) Lubricate intermediate shaft thrust plate with petroleum jelly and install plate on shaft pilot hub (Fig. 142).

(22) Check input shaft front seal rings, fiber thrust washer and rear seal ring (Fig. 143). Be ends of rear seal ring are hooked together and diagonal cut ends of front seal rings are firmly seated against each other as shown. Lubricate seal rings with petroleum jelly after checking them.

(23) Assemble front and rear clutches (Fig. 144). Align lugs on front clutch discs. Mount front clutch

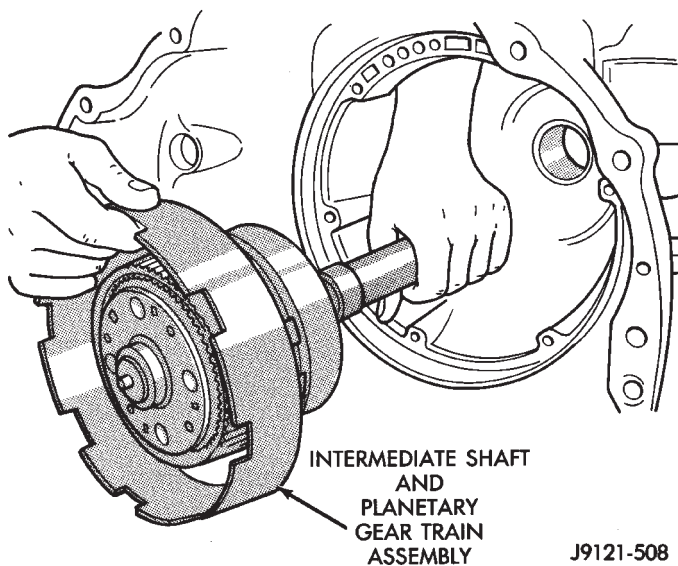


Fig. 141 Installing Intermediate Shaft And Planetary Geartrain—46RH

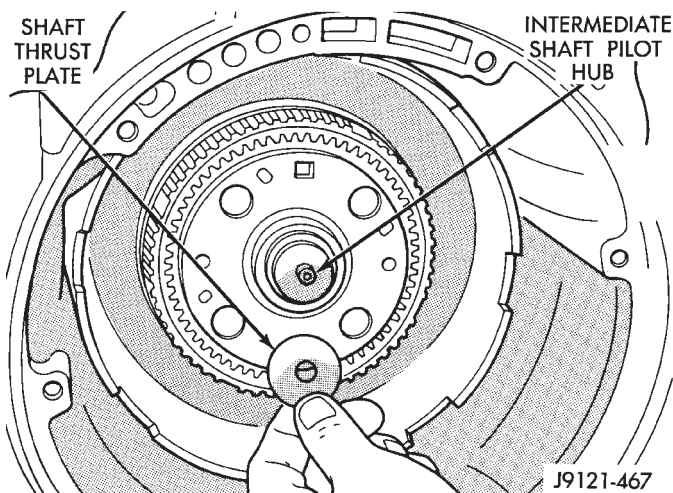


Fig. 142 Installing Intermediate Shaft Thrust Plate—46RH

on rear clutch. Turn front clutch retainer back and forth until front clutch discs are fully seated on rear clutch splined hub.

(24) Install intermediate shaft thrust washer in hub of rear clutch retainer (Fig. 145). Use petroleum jelly to hold washer in place. Position washer so grooves are facing outward. **Washer only fits one way in clutch retainer hub.**

(25) Place transmission case in upright position, or place blocks under front end of transmission repair stand to tilt case rearward. This makes it easier to install front/rear clutch assembly.

(26) Align discs in rear clutch. Then install and engage assembly in front planetary and driving shell (Fig. 146). Turn clutch retainers back and forth until both clutches are seated.

(27) Slide front band over front clutch retainer and install front band strut and anchor (Fig. 147).

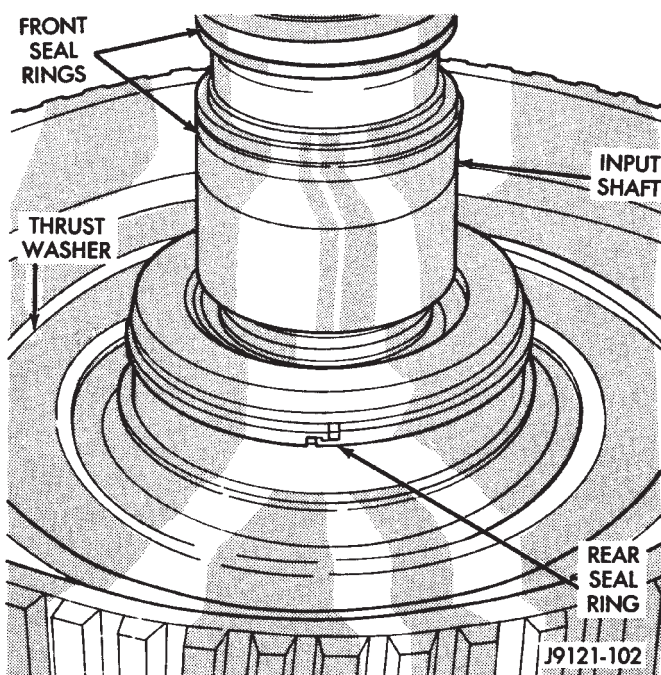


Fig. 143 Input Shaft Seal Ring And Thrust Washer Installation—46RH

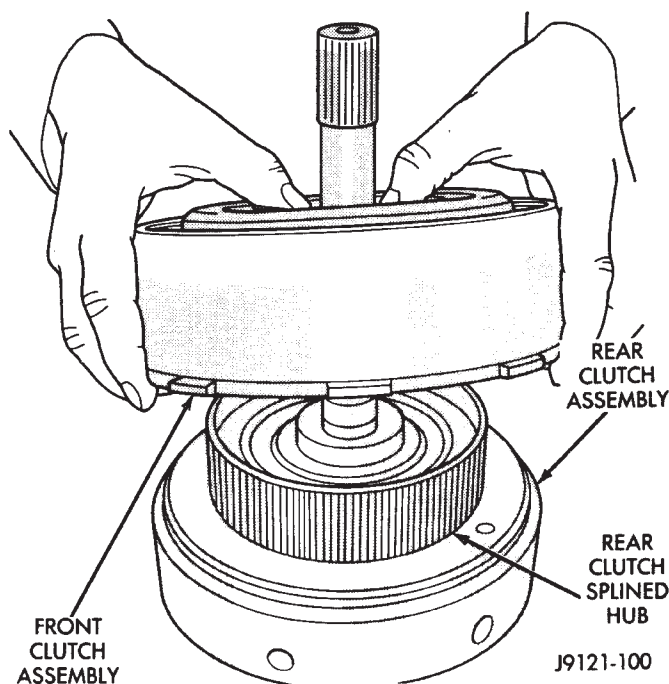


Fig. 144 Assembling Front And Rear Clutches—46RH

(28) Tighten front band adjusting screw until band is tight on clutch retainer. Verify that front/rear clutch assembly is still properly seated **before** tightening band.

(29) Install oil pump Pilot Studs C-3288-B in case (Fig. 148).

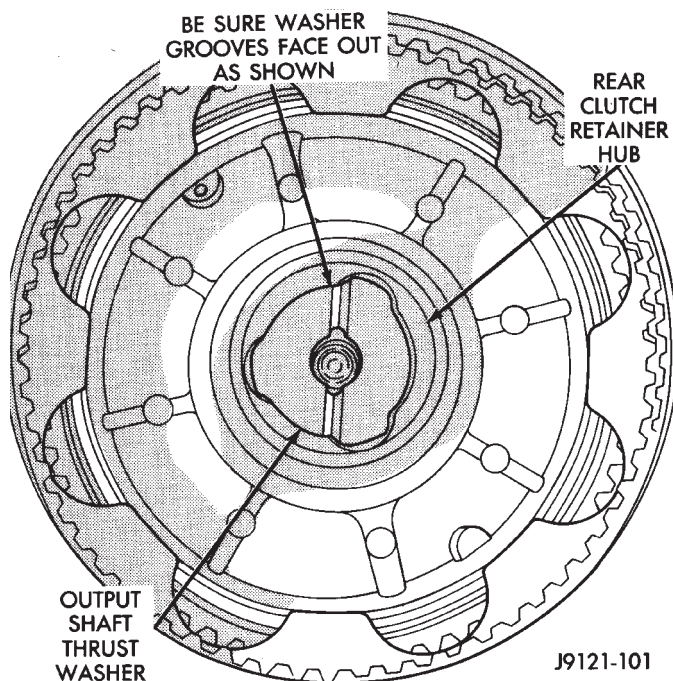


Fig. 145 Installing Intermediate Shaft Thrust Washer—46RH

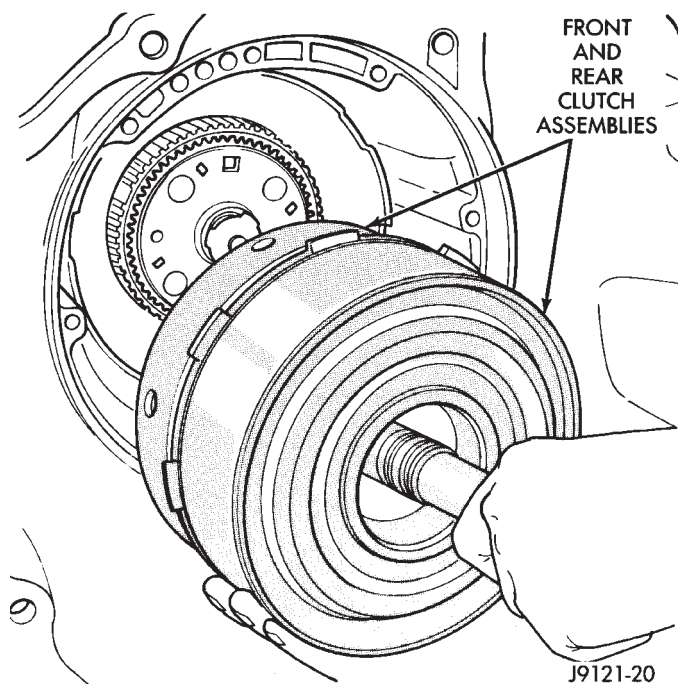


Fig. 146 Installing Front/Rear Clutch Assemblies—46RH

(30) Install new oil pump gasket on pilot studs and seat it in case. Be sure gasket is properly aligned with fluid passages in case (Fig. 148).

(31) Check seal rings on reaction shaft support. Be sure rings are hooked together correctly. Also be sure fiber thrust washer is in position (Fig. 149). Use petroleum jelly to hold washer in place if necessary.

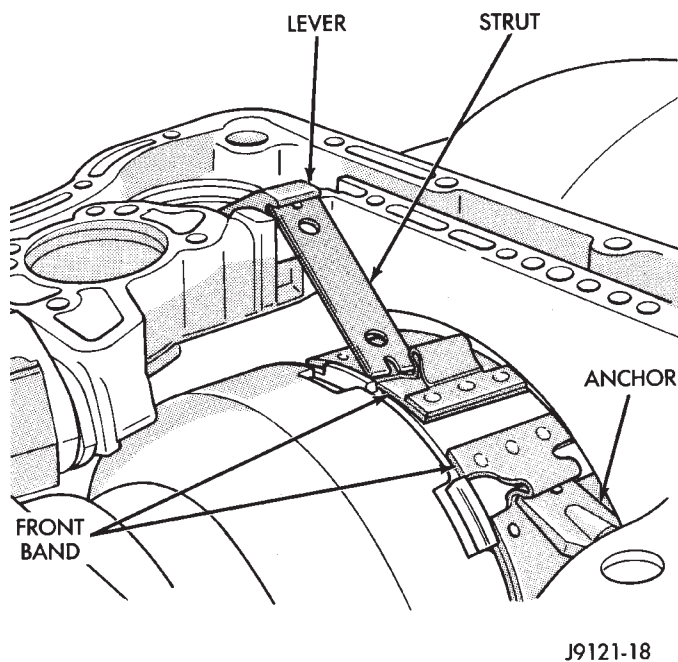


Fig. 147 Front Band And Linkage Installation—46RH

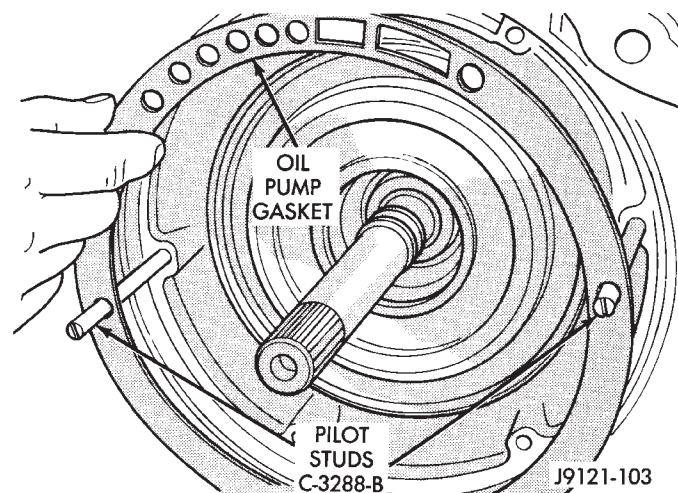


Fig. 148 Installing Oil Pump Gasket And Pilot Studs—46RH

(32) Lubricate oil pump seals with petroleum jelly or transmission fluid.

(33) Mount oil pump on pilot studs and slide pump into case opening (Fig. 150). **Work pump into case by hand. Do not use a mallet or similar tools to seat pump.**

(34) Remove pilot studs and install oil pump bolts. Tighten pump bolts alternately and evenly to fully seat pump in case. Then final-tighten pump bolts to 20 N•m (15 ft. lbs.) torque.

(35) Verify correct assembly. Rotate input and output shafts and check for bind. If bind exists, components are either misassembled, or not seated. Disassemble and correct as necessary before proceeding.

(36) Check input shaft end play as follows:

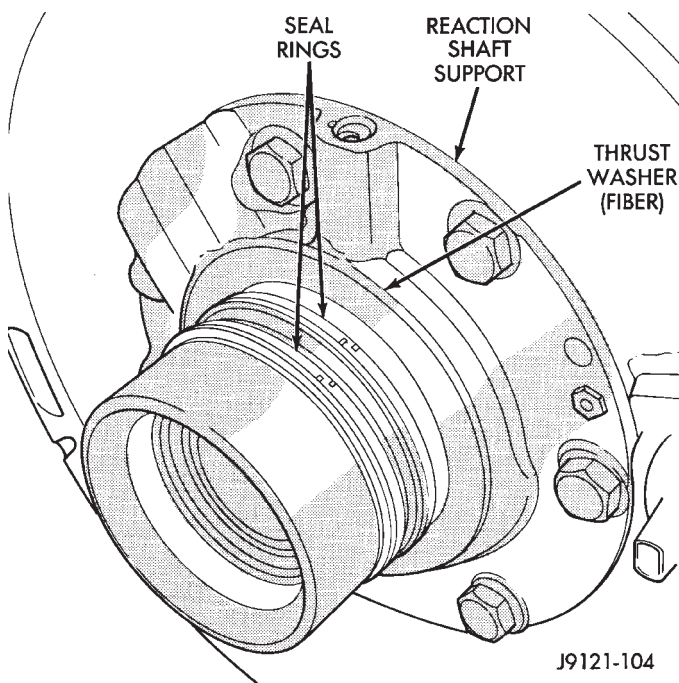


Fig. 149 Reaction Shaft Seal Ring And Thrust Washer Installation—46RH

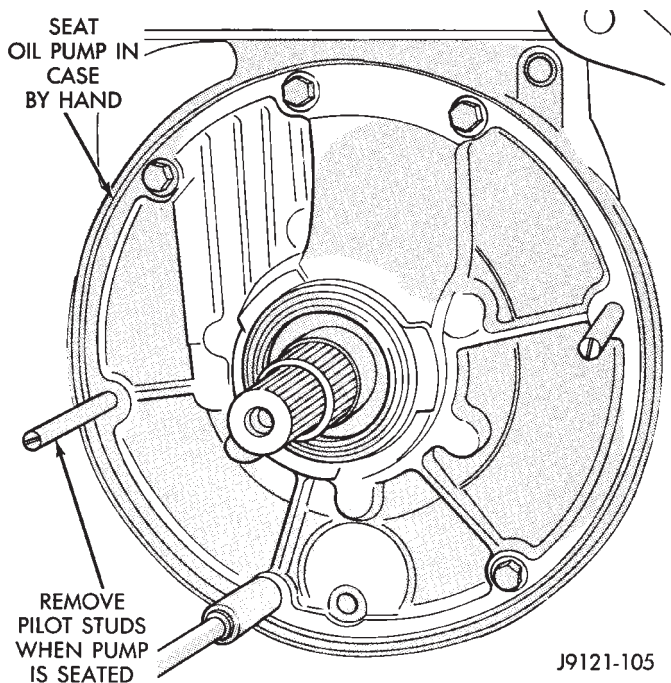


Fig. 150 Oil Pump Installation—46RH

(a) Attach dial indicator to converter housing (Fig. 151). Position indicator plunger against input shaft and zero indicator.

(b) Move input shaft in and out and record reading.

(c) End play should be 0.86 - 2.13 mm (0.034 - 0.084 in.).

(d) If end play is incorrect, change output shaft thrust washer, thrust plate, or front clutch thrust washer.

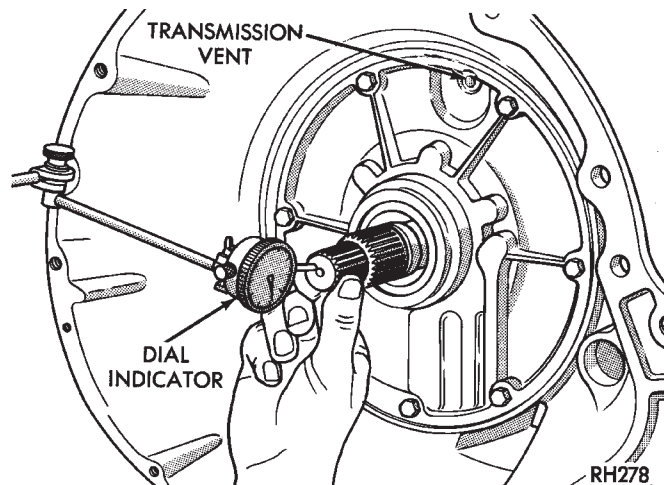


Fig. 151 Checking Input Shaft End Play

(37) Install new seals on overdrive piston. Then lubricate seals with transmission fluid, Ru-Glyde, Door-Eze or petroleum jelly.

(38) Install overdrive piston in retainer. **Align locating lugs on piston in locating bores in retainer** (Fig. 152). Use thin plastic strip or feeler gauge to help guide piston outer seal into retainer.

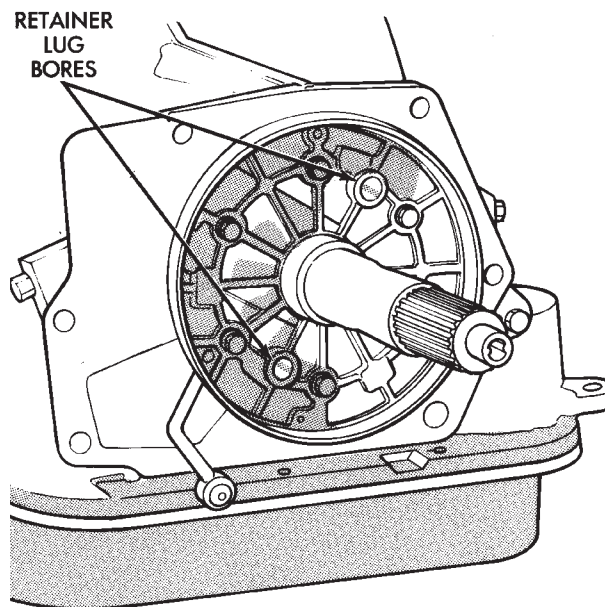


Fig. 152 Overdrive Piston Alignment

(39) Install spacer on intermediate shaft, if not previously installed.

(40) Install overdrive piston thrust plate (Fig. 153). Use liberal quantity of petroleum jelly to hold thrust plate in position on piston.

(41) Install overdrive piston thrust bearing in direct clutch hub (Fig. 154). Use liberal quantity of petroleum jelly to hold thrust bearing in place. **Note that one side of bearing has dark coated surface. This surface faces overdrive piston. Also be sure raised shoulder on inside diameter of bearing faces forward as well.**

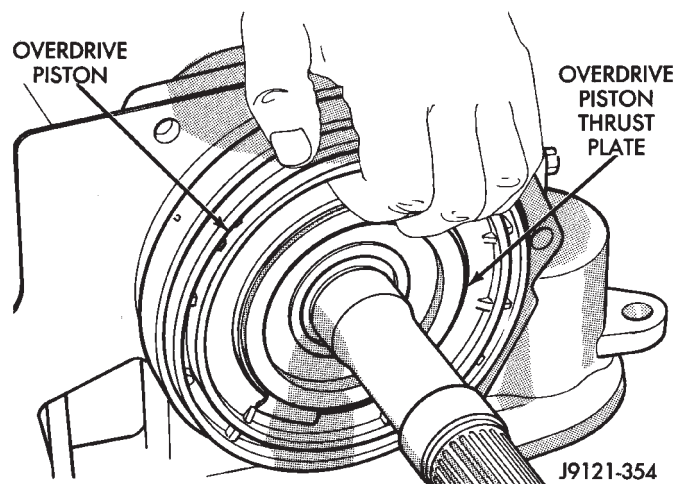


Fig. 153 Installing Overdrive Piston Thrust Plate

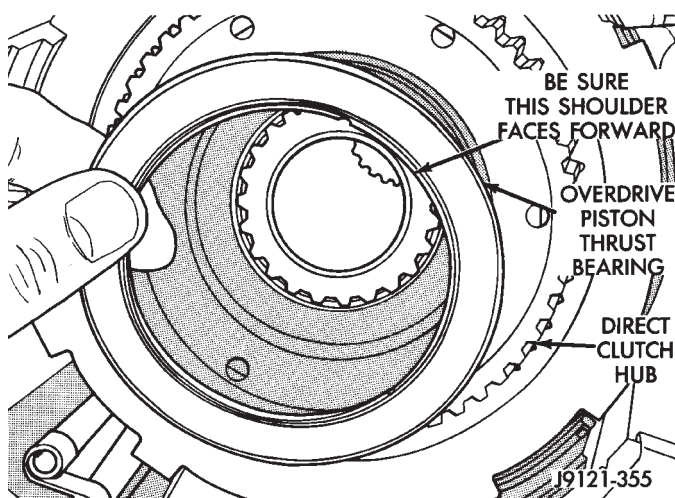


Fig. 154 Installing Overdrive Piston Thrust Bearing

(42) Apply small amount of petroleum jelly to pilot hub of intermediate shaft.

(43) Verify alignment of splines in overdrive unit planetary gear and overrunning clutch. Be sure Alignment Tool 6227-2 is fully seated (Fig. 155). **If planetary gear and overrunning clutch splines become misaligned, overdrive unit cannot be fully installed on intermediate shaft. Overdrive unit will have to be disassembled in order to realign splines.**

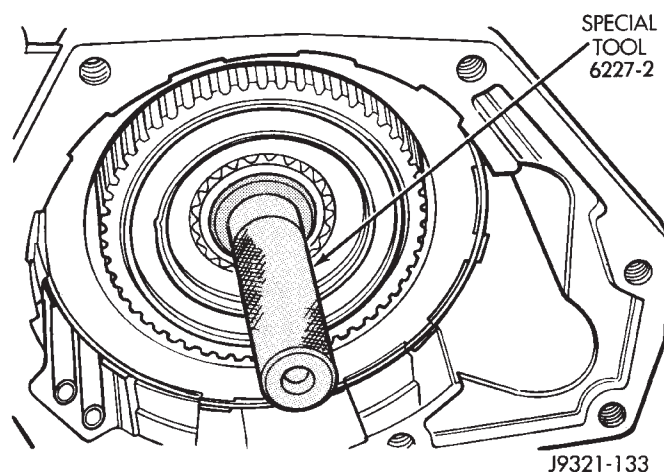


Fig. 155 Checking Alignment Of Overdrive Planetary Gear And Overrunning Clutch Splines—46RH

(44) Carefully withdraw alignment tool from overdrive unit.

(45) Lubricate intermediate shaft splines and bushing surfaces with transmission fluid or petroleum jelly.

(46) Install overdrive unit. Be sure governor tubes are aligned with feed holes in piston retainer boss. Intermediate shaft is snug fit in overdrive planetary gear and overrunning clutch. If overdrive unit will not seat fully, rotate overdrive output shaft slightly to align splines and try again.

(47) Apply 1-2 drops of Mopar thread adhesive (or Loctite 242) to overdrive unit attaching bolts. Then install and tighten bolts to 34 N•m (25 ft. lbs.) torque.

(48) Install accumulator inner spring, piston and outer spring (Fig. 156).

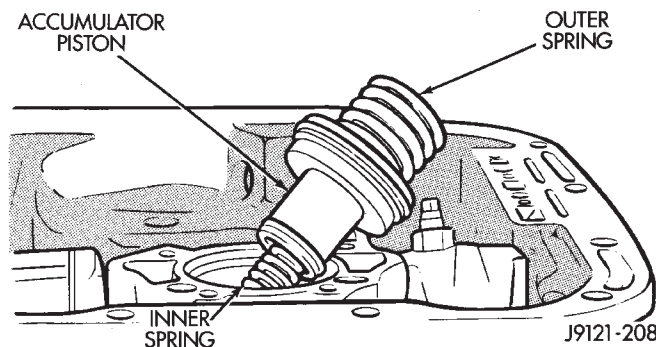


Fig. 156 Installing Accumulator Piston And Springs

(49) Verify that park/neutral position switch has **not** been installed in case. Valve body can not be installed if switch is in position.

(50) Install valve body as follows:

(a) Start park rod into park pawl. If rod will not slide past park pawl, pawl is engaged in park gear. Rotate overdrive output shaft with socket to free pawl and allow rod to engage.

(b) Align and seat valve body on case. Be sure manual lever shaft and overdrive connector are fully seated in case.

(c) Install and start all valve body attaching bolts by hand. Then tighten bolts evenly, in a diagonal pattern to 12 N•m (105 in. lbs.) torque. **Do not overtighten valve body bolts. This could result in distortion and cross leakage after installation.**

(51) Install new filter on valve body. Tighten filter screws to 4 N•m (35 in. lbs.).

(52) Install seal on park/neutral position switch (Fig. 157). Then install and tighten switch to 34 N•m (25 ft. lbs.).

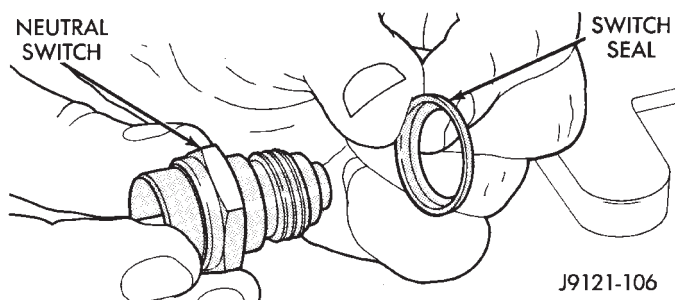


Fig. 157 Park/Neutral Position Switch Seal Position

(53) Adjust front and rear bands as follows:

(a) Loosen locknut on each band adjusting screw 4-5 turns.

(b) Tighten both adjusting screws to 8 N•m (72 in. lbs.).

(c) Back off front band adjusting screw 2-1/2 turns.

(d) Back off rear band adjusting screw 2 turns.

(e) Hold each adjusting screw in position and tighten locknuts to 34 N•m (25 ft. lbs.) torque.

(54) Install magnet in oil pan. Magnet goes on small protrusion at corner of pan.

(55) Position new oil pan gasket on case and install oil pan. Tighten pan bolts to 17 N•m (13 ft. lbs.).

(56) Install new valve body manual shaft seal in case (Fig. 158). Lubricate seal lip and manual shaft with petroleum jelly. Start seal over shaft and into case. Seat seal with 15/16 inch, deep well socket.

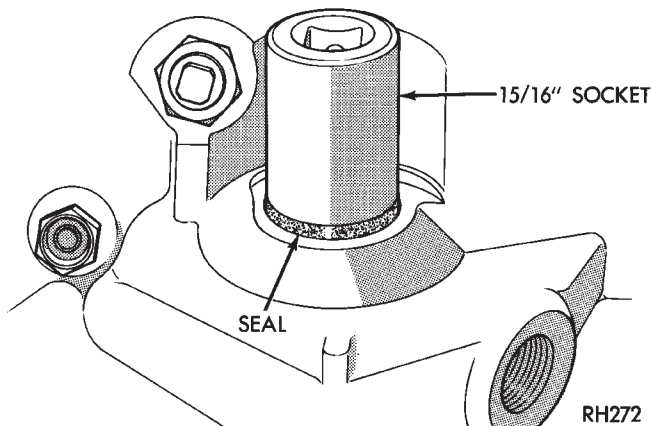


Fig. 158 Installing Manual Lever Shaft Seal

(57) Install throttle valve and shift selector levers on valve body manual lever shaft.

(58) Cap or cover transmission openings (cooler line fittings, filler tube bore, etc.) to prevent dirt entry.

(59) Install torque converter. Use C-clamp or metal strap to hold converter in place for installation.

(60) Mount transmission on jack for installation in vehicle.

(61) Apply dielectric grease to terminal pins of solenoid case connector and neutral switch.

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 could be a repeat failure and shop comeback.

OVERDRIVE UNIT OVERHAUL—46RH

INDEX

	page		page
Overdrive Component Cleaning and Inspection . . .	259	Overdrive Unit Assembly and Adjustment	267
Overdrive Geartrain Assembly	262	Overdrive Unit Disassembly	253
Overdrive Geartrain Disassembly	255		

OVERDRIVE UNIT DISASSEMBLY

(1) Remove overdrive piston thrust plate (Fig. 1). Retain thrust plate. It is a select fit part and may possibly be reused.

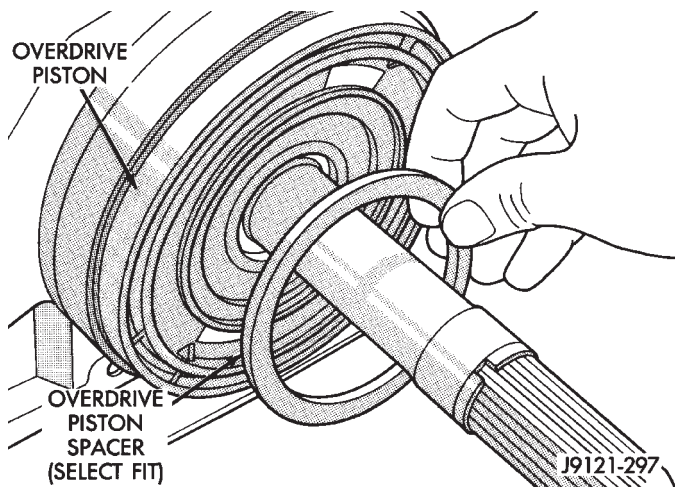


Fig. 1 Overdrive Piston Thrust Plate Removal/Installation

(2) Remove intermediate shaft spacer (Fig. 2). Retain spacer. It is a select fit part and may possibly be reused.

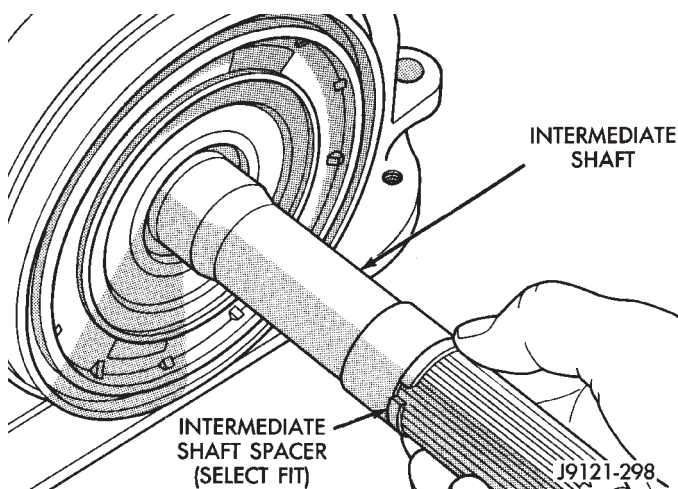


Fig. 2 Intermediate Shaft Spacer Location

(3) Remove overdrive piston from retainer (Fig. 3).

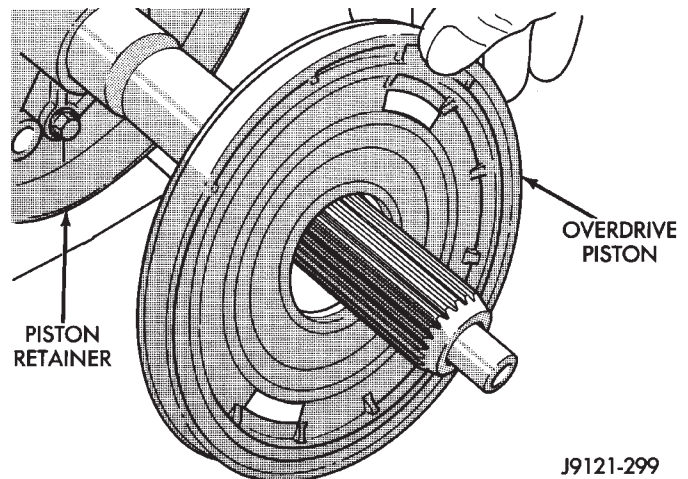


Fig. 3 Removing Overdrive Piston

(4) Remove overdrive piston thrust bearing from direct clutch hub (Fig. 4).

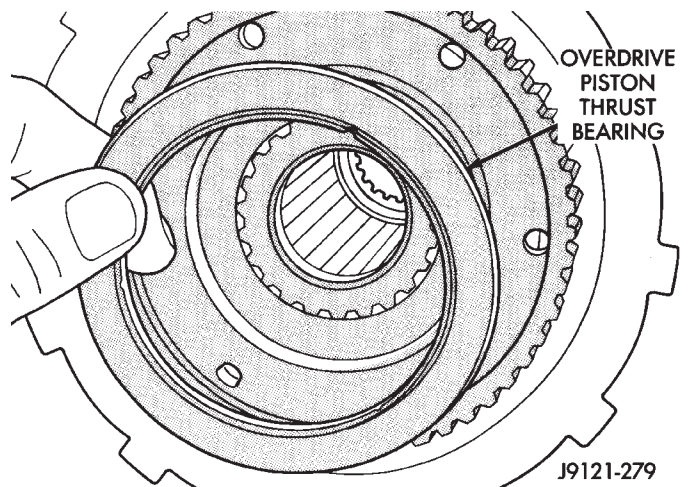


Fig. 4 Removing Overdrive Piston Thrust Bearing

(5) Remove overdrive clutch pack retaining ring (Fig. 5).

(6) Remove overdrive clutch pack (Fig. 6). Note that thickest plate is positioned at rear of clutch pack.

(7) Remove overdrive clutch wave spring (Fig. 7).

(8) Remove overdrive clutch reaction snap ring (Fig. 8). Note that snap ring is located in same groove as wave spring.

(9) Remove access cover and gasket from case (Fig. 9). Cover provides access to output shaft front bearing locating ring.

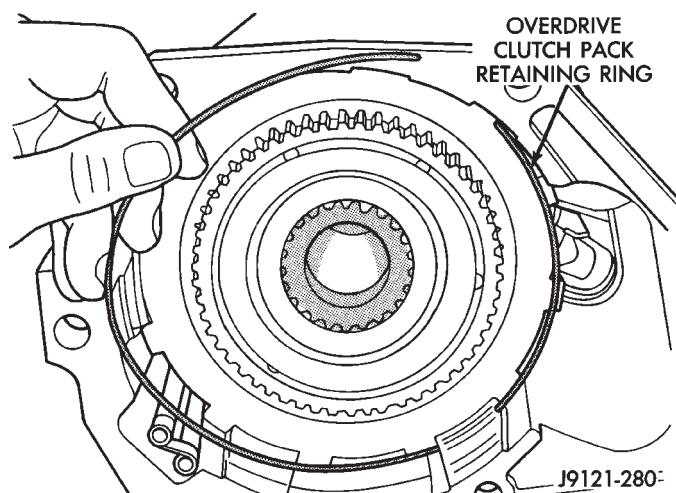


Fig. 5 Removing/Installing Overdrive Clutch Pack Retaining Ring

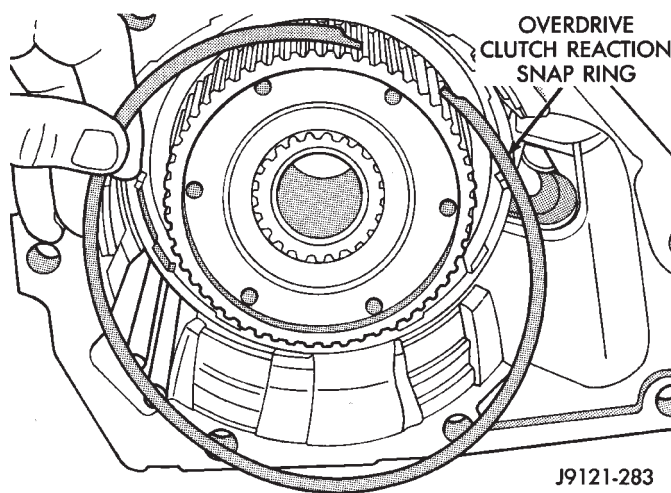


Fig. 8 Removing Overdrive Clutch Reaction Snap Ring

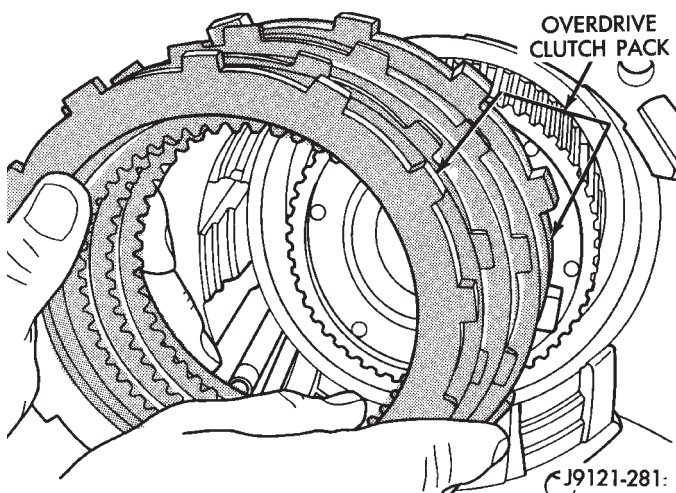


Fig. 6 Overdrive Clutch Pack Removal

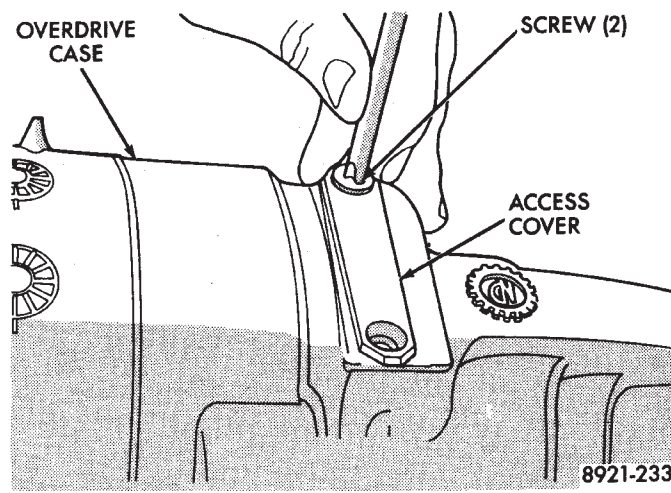


Fig. 9 Removing/Installing Locating Ring Access Cover

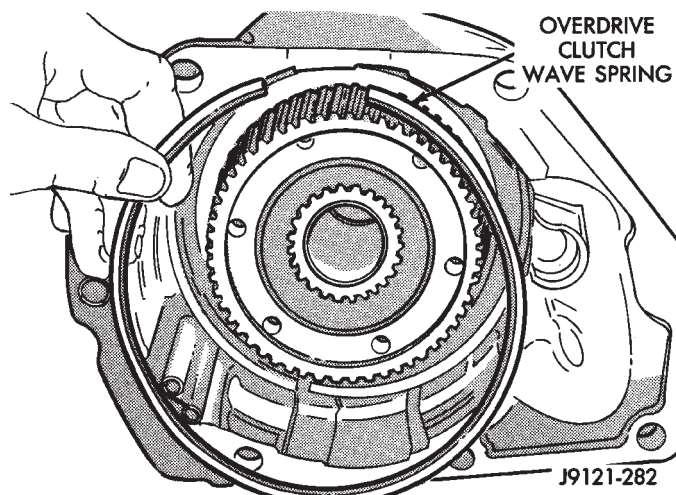


Fig. 7 Removing/Installing Overdrive Clutch Wave Spring

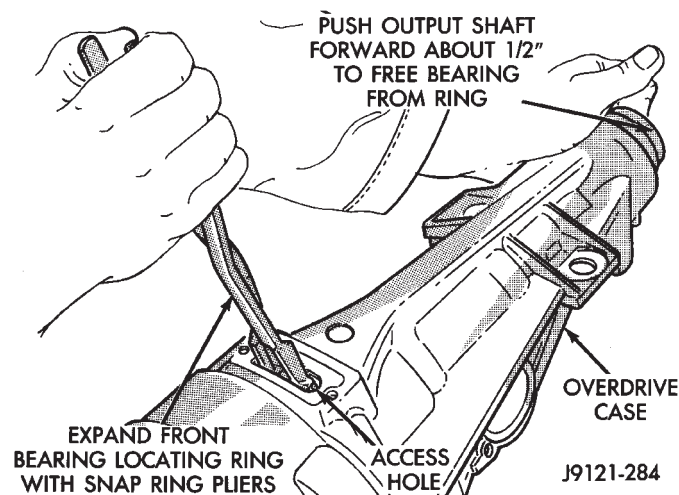


Fig. 10 Releasing Shaft Front Bearing From Locating Ring

(10) Expand output shaft bearing snap ring with snap ring pliers and push output shaft forward to release shaft front bearing from locating ring (Fig.

10).

- (11) Remove geartrain assembly from housing (Fig. 11). Set geartrain aside.

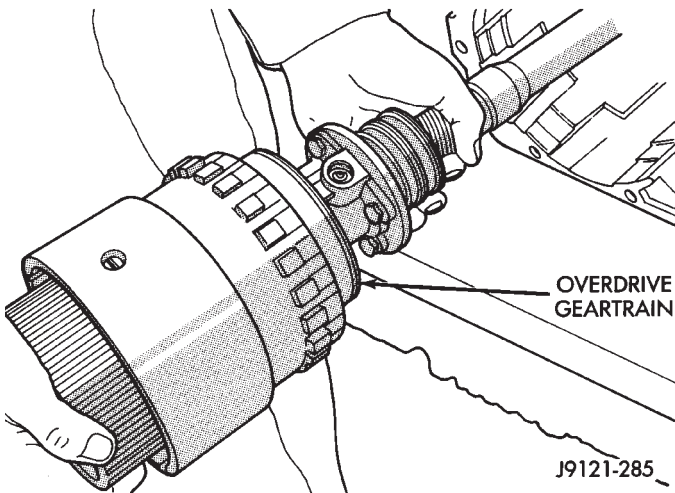


Fig. 11 Removing Overdrive Geartrain

- (12) Remove output shaft front bearing locating ring and governor support snap ring (Fig. 12).

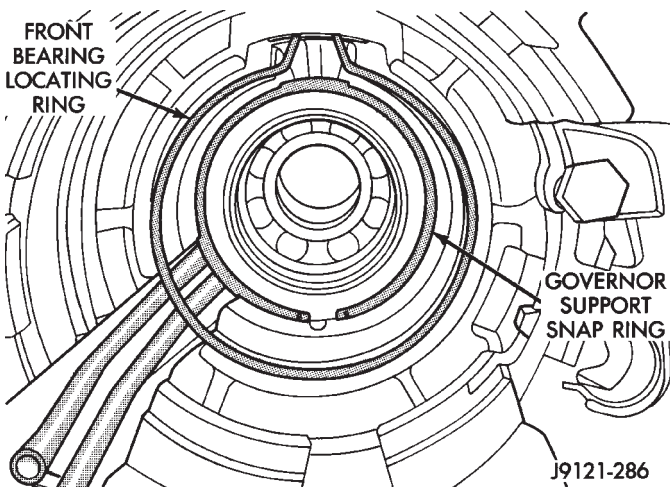


Fig. 12 Front Bearing Locating Ring And Governor Support Snap Ring Location

- (13) Remove governor support and tube assembly from case (Fig. 13).

- (14) Remove park pawl retaining bolt and reaction plug snap ring (Fig. 14). Compress snap ring only enough to remove it. Snap ring can be distorted if overcompressed.

- (15) Remove park pawl shaft, park pawl, pawl spring and reaction plug (Fig. 14).

- (16) Remove output shaft rear bearing snap ring (Fig. 15). Remove snap ring with long jaw internal type snap ring pliers. Or, rotate snap ring until one end is adjacent to notch in case. Then unseat ring with long flat blade screwdriver.

- (17) Remove rear bearing by tapping overdrive case on wood block to dislodge bearing.

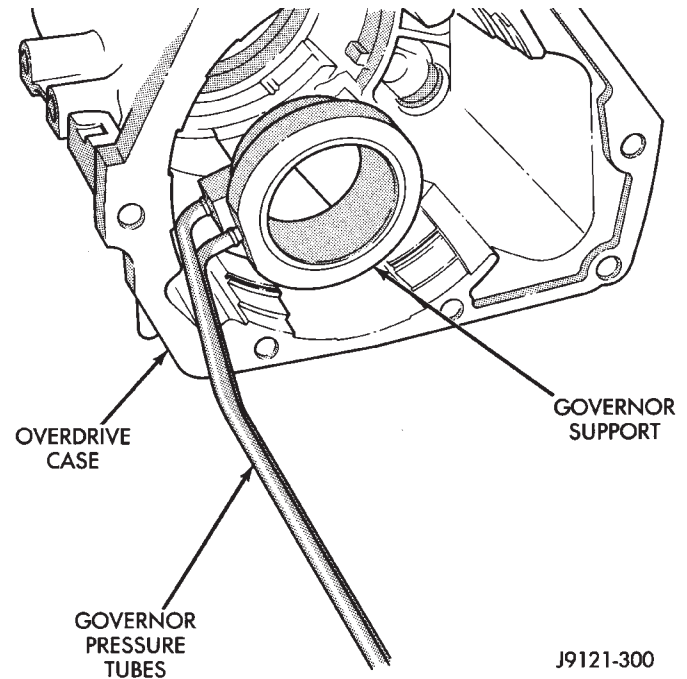


Fig. 13 Removing Governor Support And Tube Assembly

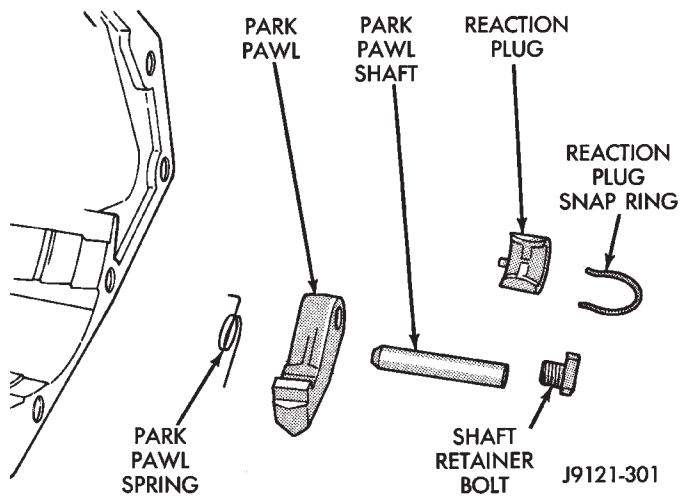


Fig. 14 Park Lock Component Removal

OVERDRIVE GEARTRAIN DISASSEMBLY

- (1) Remove E-clip from one end of governor valve shaft and remove shaft and valve (Fig. 16).
- (2) Remove governor snap ring (fig. 17).
- (3) Remove governor body and drive as assembly (Fig. 18).
- (4) Remove governor drive key (Fig. 19).
- (5) Remove output shaft front bearing snap ring (Fig. 20).

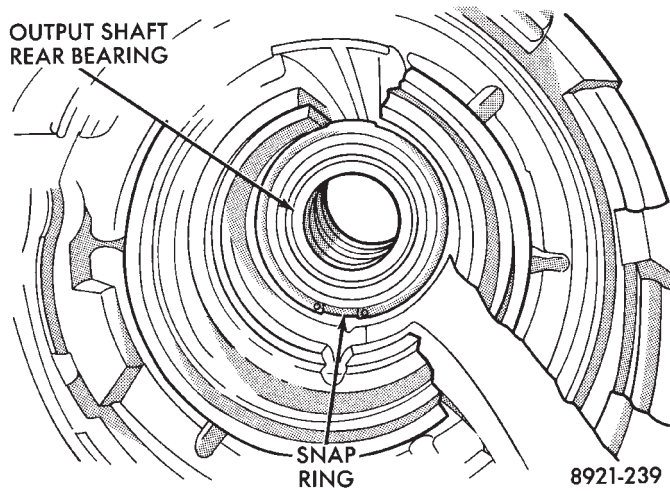


Fig. 15 Output Shaft Rear Bearing And Snap Ring Location

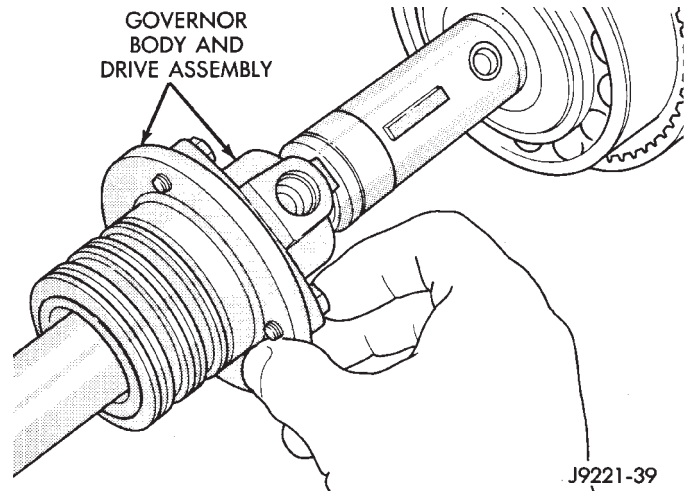


Fig. 18 Removing/Installing Governor Body And Drive Assembly

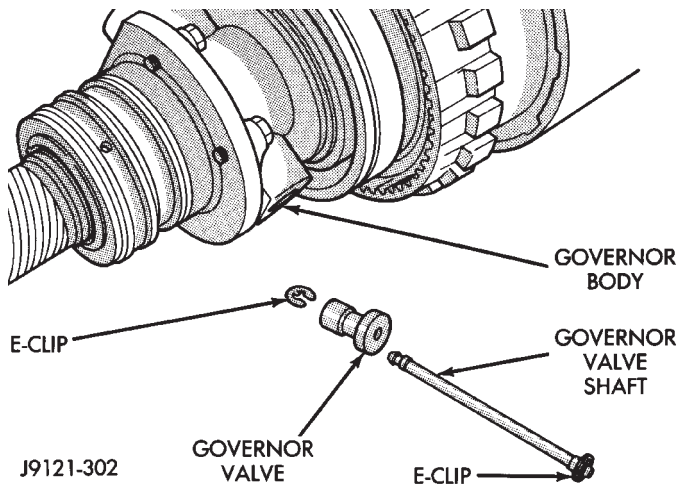


Fig. 16 Governor Valve And Shaft Removal/Installation

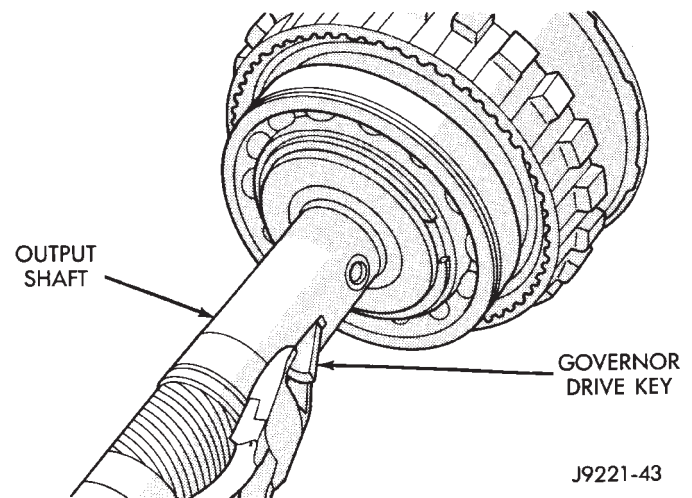


Fig. 19 Removing Governor Drive Key

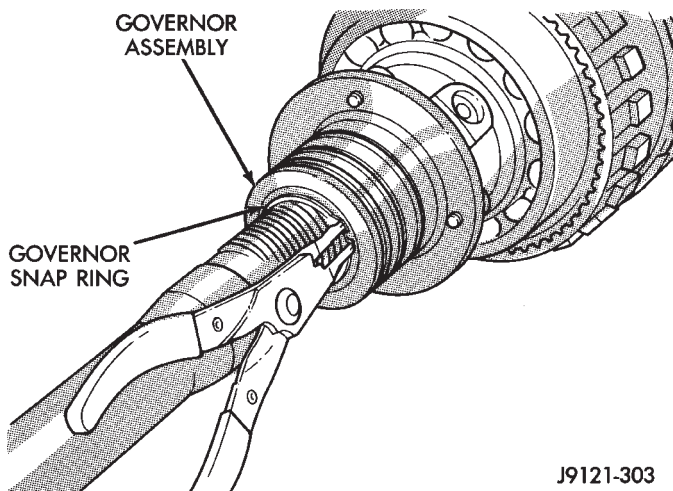


Fig. 17 Removing/Installing Governor Snap Ring

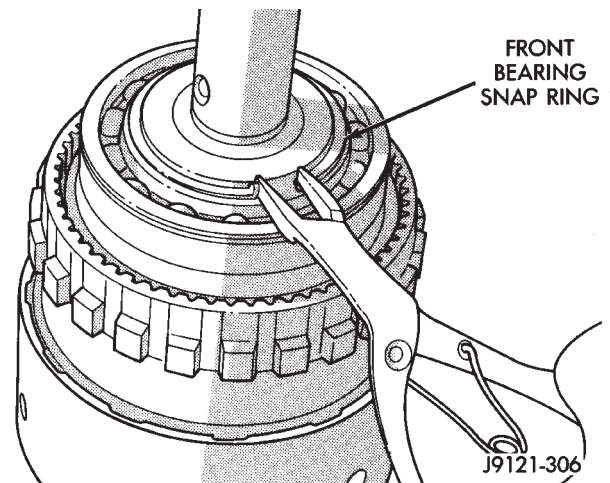


Fig. 20 Removing/Installing Front Bearing Snap Ring

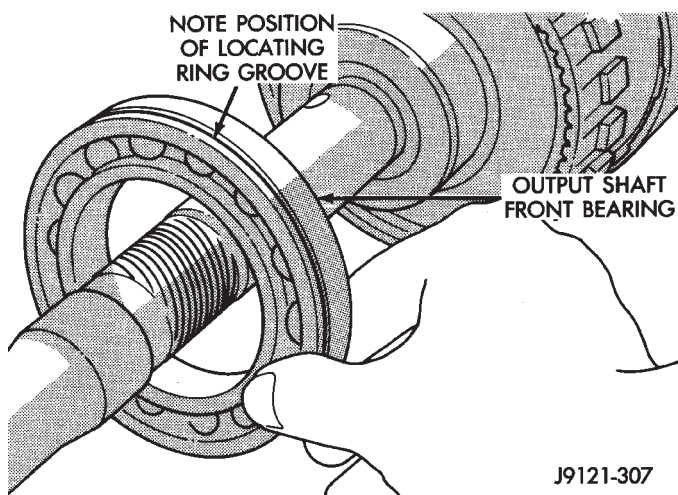


Fig. 21 Removing/Installing Output Shaft Front Bearing

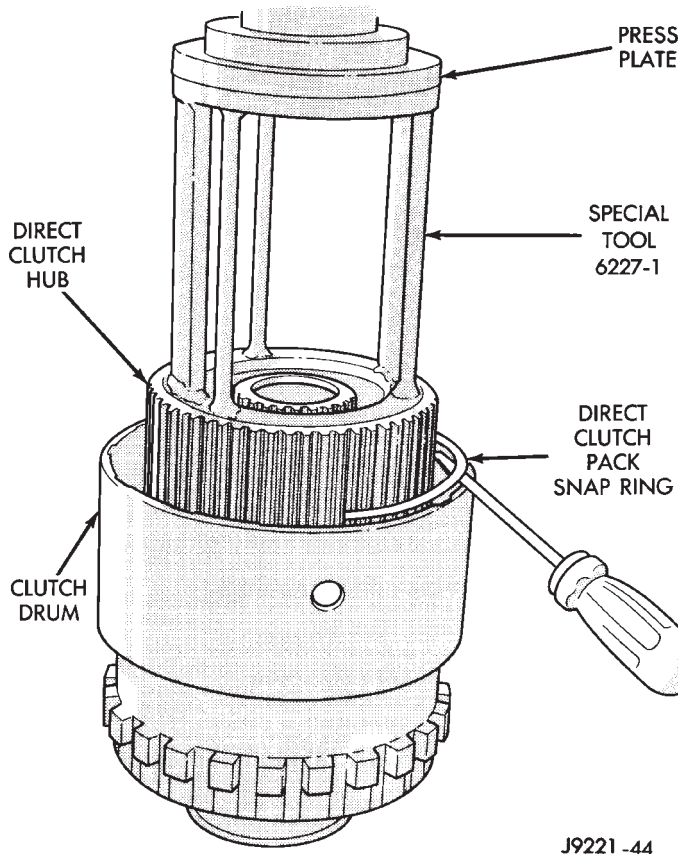


Fig. 22 Removing Direct Clutch Pack Snap Ring

(6) Remove front bearing from output shaft (Fig. 21).

WARNING: THE NEXT STEP IN GEARTRAIN DISASSEMBLY INVOLVES COMPRESSING THE DIRECT CLUTCH SPRING. IT IS EXTREMELY IMPORTANT THAT PROPER EQUIPMENT BE USED TO COMPRESS THE SPRING AS SPRING FORCE IS APPROXIMATELY 800 POUNDS. USE SPRING COMPRESSOR TOOL 6227-1

AND A HYDRAULIC SHOP PRESS WITH A MINIMUM RAM TRAVEL OF 5-6 INCHES. THE PRESS MUST ALSO HAVE A BED THAT CAN BE ADJUSTED UP OR DOWN AS REQUIRED. RELEASE CLUTCH SPRING TENSION SLOWLY AND COMPLETELY TO AVOID PERSONAL INJURY.

(7) Mount geartrain in shop press

(8) Position Compressor Tool 6227-1 on clutch hub (Fig. 22). Support output shaft flange with steel press plates as shown and center assembly under press ram.

(9) Use Bushing Tool MB990891 (or similar size tool) at top of Tool 6227-1 to help distribute load and provide needed extra press length.

(10) Apply press pressure slowly. Compress hub and spring far enough to expose clutch hub retaining ring and relieve spring pressure on clutch pack snap ring (Fig. 22).

(11) Remove direct clutch pack snap ring first (Fig. 22).

(12) Remove direct clutch hub retaining ring (Fig. 23).

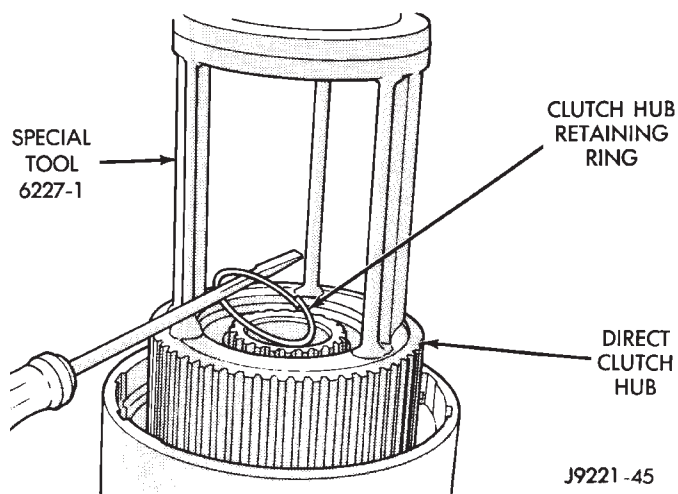


Fig. 23 Removing Direct Clutch Hub Retaining Ring

(13) Release press load on clutch spring **slowly and completely**. Remove press tools and geartrain.

(14) Remove direct clutch pack from hub (Fig. 24).

(15) Remove direct clutch hub and spring (Fig. 25).

(16) Remove sun gear and spring plate, planetary thrust bearing and planetary gear (Fig. 26).

(17) Remove overrunning clutch assembly with expanding type snap ring pliers (Fig. 27). Insert pliers into clutch hub. Expand pliers to grip hub splines and remove clutch with counterclockwise, twisting motion.

(18) Remove thrust bearing from overrunning clutch hub (Fig. 28).

(19) Remove overrunning clutch from hub (Fig. 28).

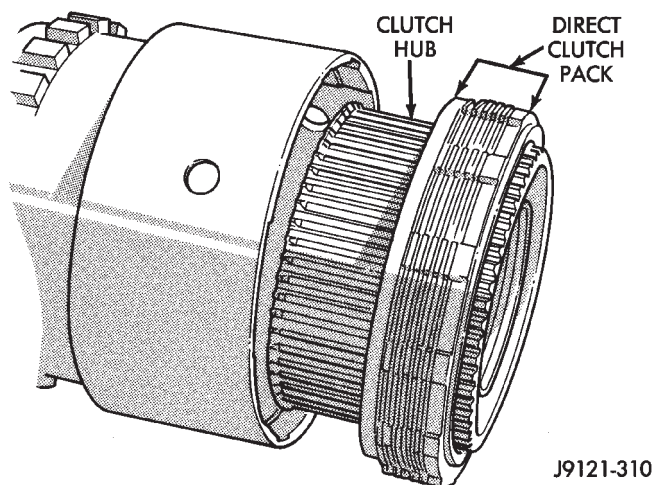


Fig. 24 Direct Clutch Pack Removal

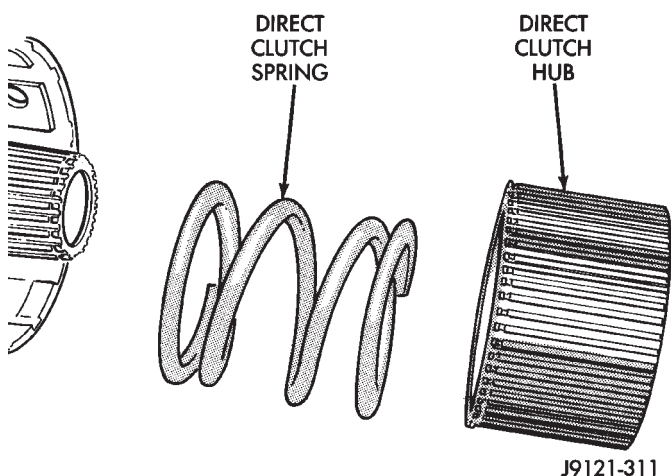


Fig. 25 Direct Clutch Hub And Spring Removal

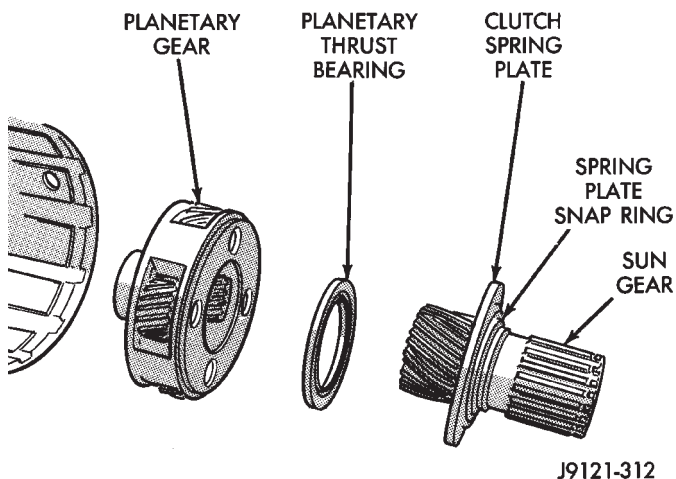


Fig. 26 Removing Sun Gear/Thrust Bearing/Planetary Gear

(20) Mark position of annulus gear and direct clutch drum for assembly alignment reference (Fig. 29). Use small center punch or scribe to make alignment marks.

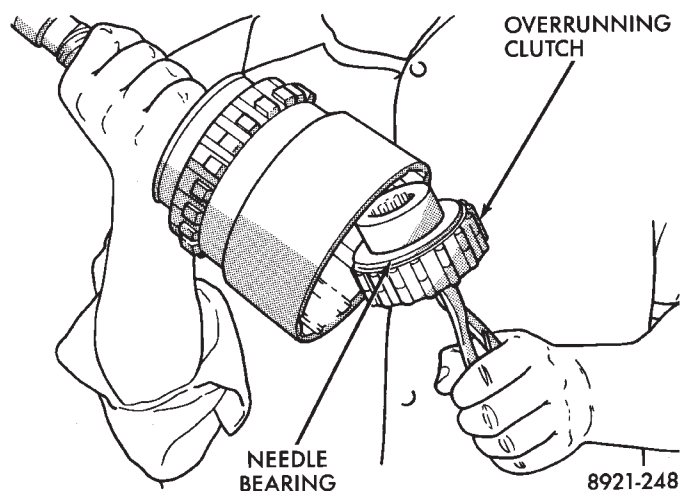


Fig. 27 Removing Overrunning Clutch Assembly

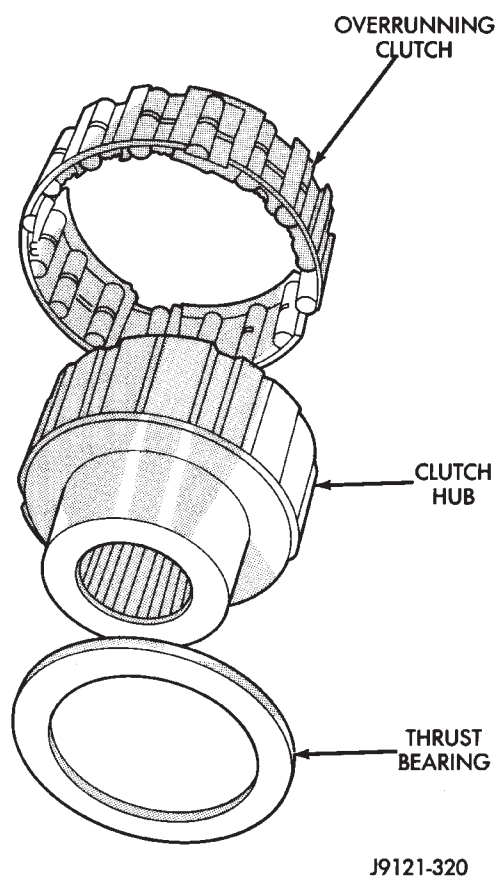


Fig. 28 Overrunning Clutch Components

(21) Remove direct clutch drum rear retaining ring (Fig. 30).

(22) Remove direct clutch drum outer retaining ring (Fig. 31).

(23) Mark annulus gear and output shaft for assembly alignment reference (Fig. 32).

(24) Remove annulus gear from output shaft (Fig. 33). Use rawhide or plastic mallet to tap gear off shaft.

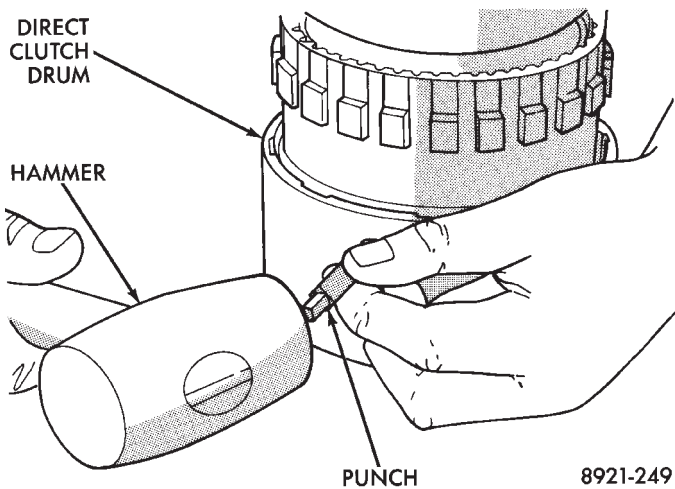


Fig. 29 Marking Direct Clutch Drum And Annulus Gear For Assembly Alignment

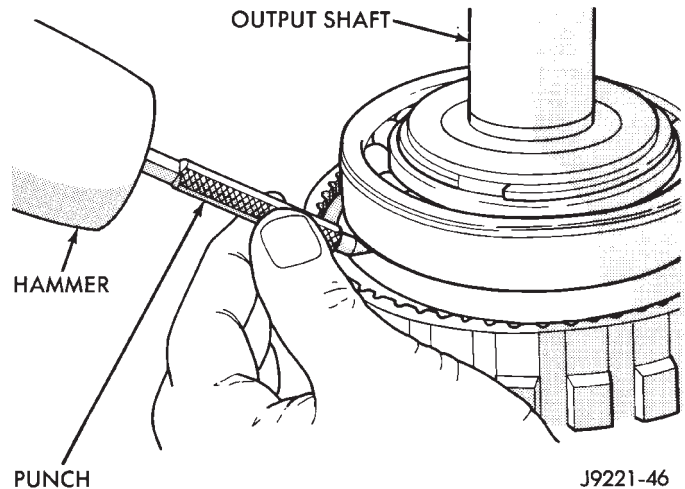


Fig. 32 Marking Annulus Gear And Output Shaft For Assembly Alignment

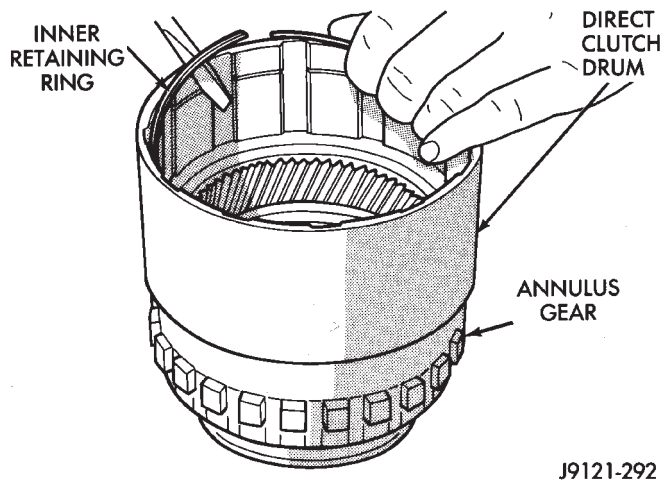


Fig. 30 Removing Clutch Drum Inner Retaining Ring

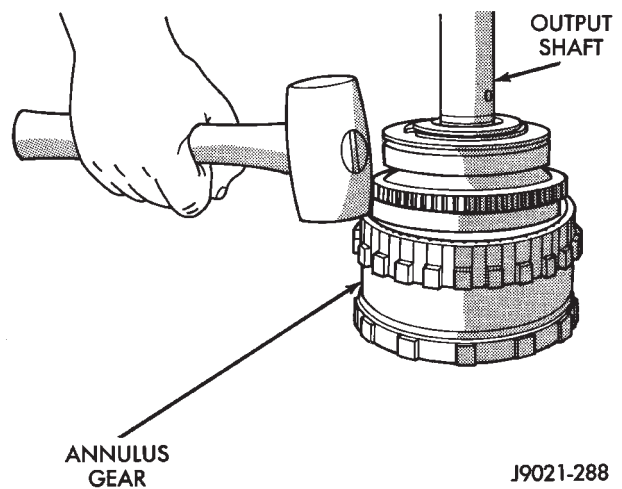


Fig. 33 Removing Annulus Gear

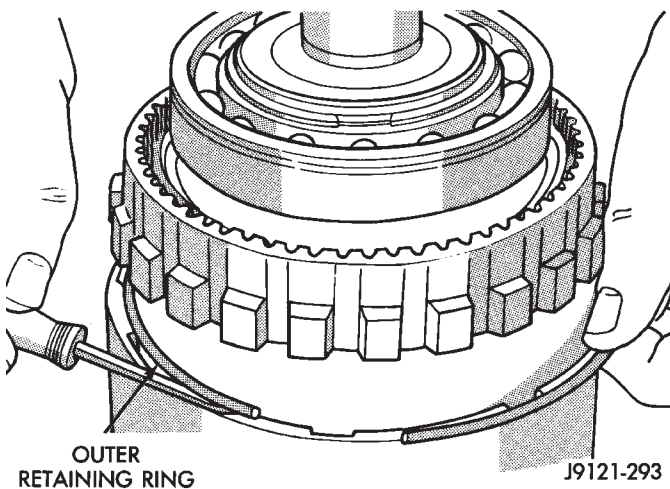


Fig. 31 Removing Clutch Drum Outer Retaining Ring

(25) Remove output shaft front bearing if not previously removed.

OVERDRIVE COMPONENT CLEANING AND INSPECTION

Clean the geartrain (Fig. 34) and case components (Fig. 35) with solvent. Dry all parts except the bearings with compressed air. Allow bearings to air dry.

Do not use shop towels for wiping parts dry unless the towels are made from a lint-free material. A sufficient quantity of lint (from shop towels, cloths, rags, etc.) could plug the transmission filter and fluid passages.

Discard the old case gasket and seals. Do not attempt to salvage these parts. They are not reusable. Replace any of the overdrive unit snap rings if distorted or damaged.

Minor nicks or scratches on components can be smoothed with crocus cloth. However, do not attempt to reduce severe scoring on any components with abrasive materials. Replace severely scored components; do not try to salvage them.

Check condition of the park lock components and the overdrive case (Fig. 36).

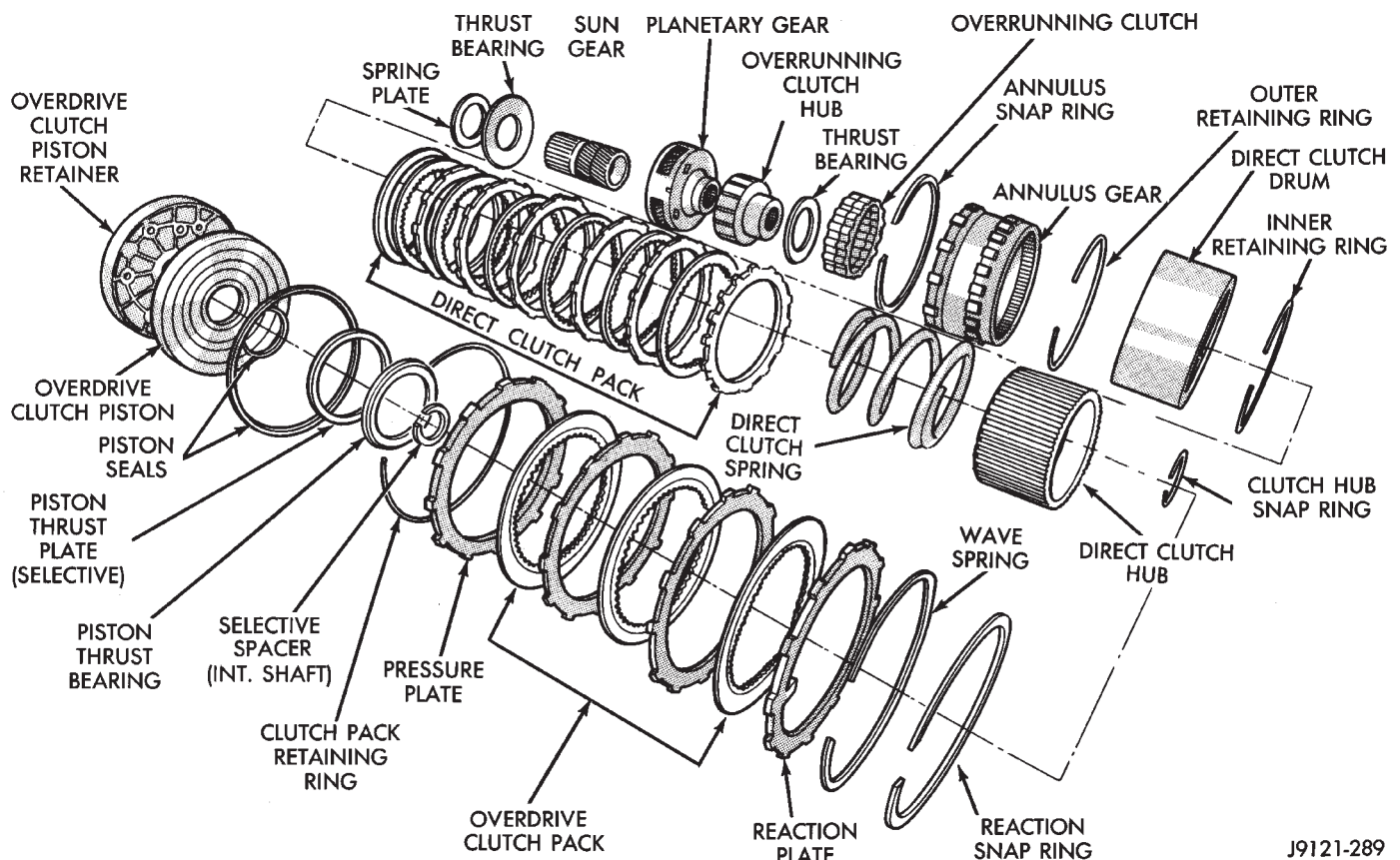


Fig. 34 Overdrive Geartrain Components

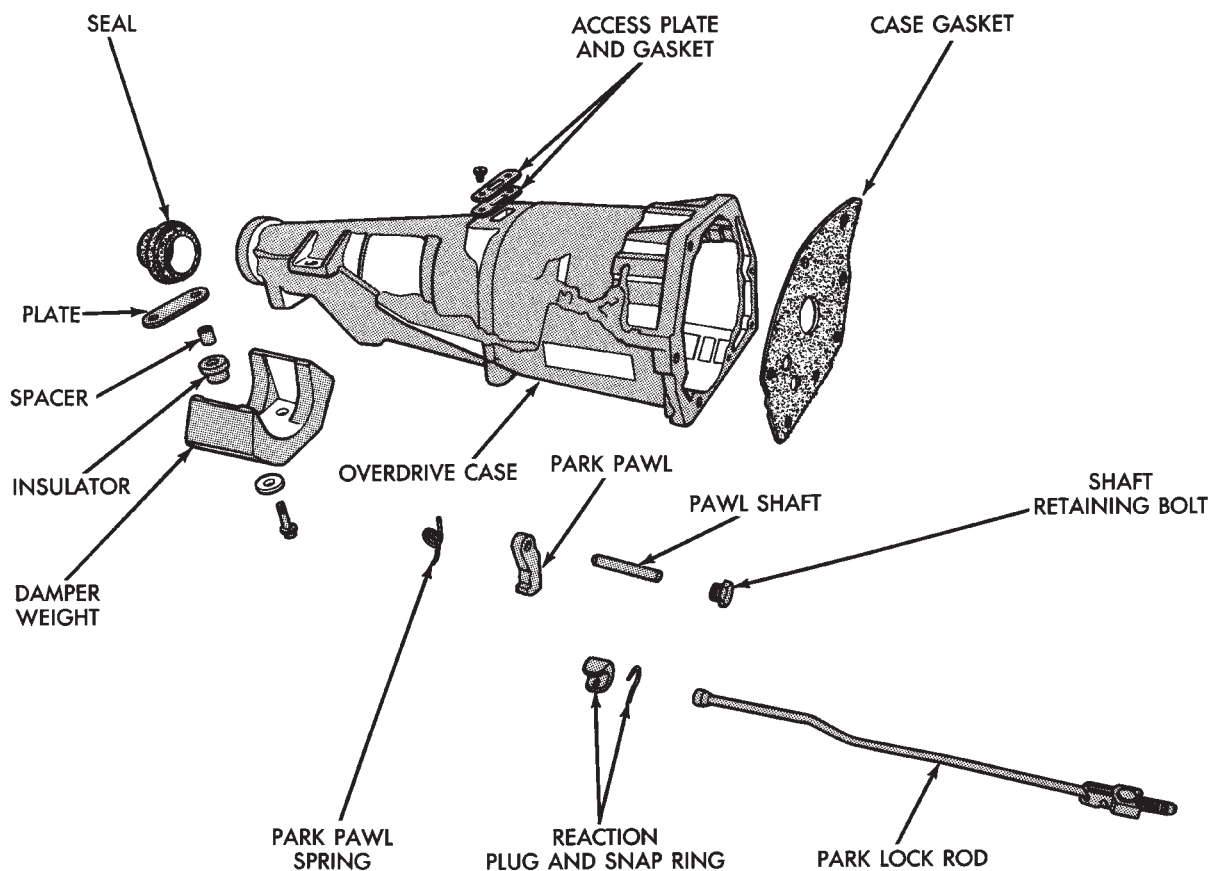


Fig. 35 Overdrive Case And Park Lock Components

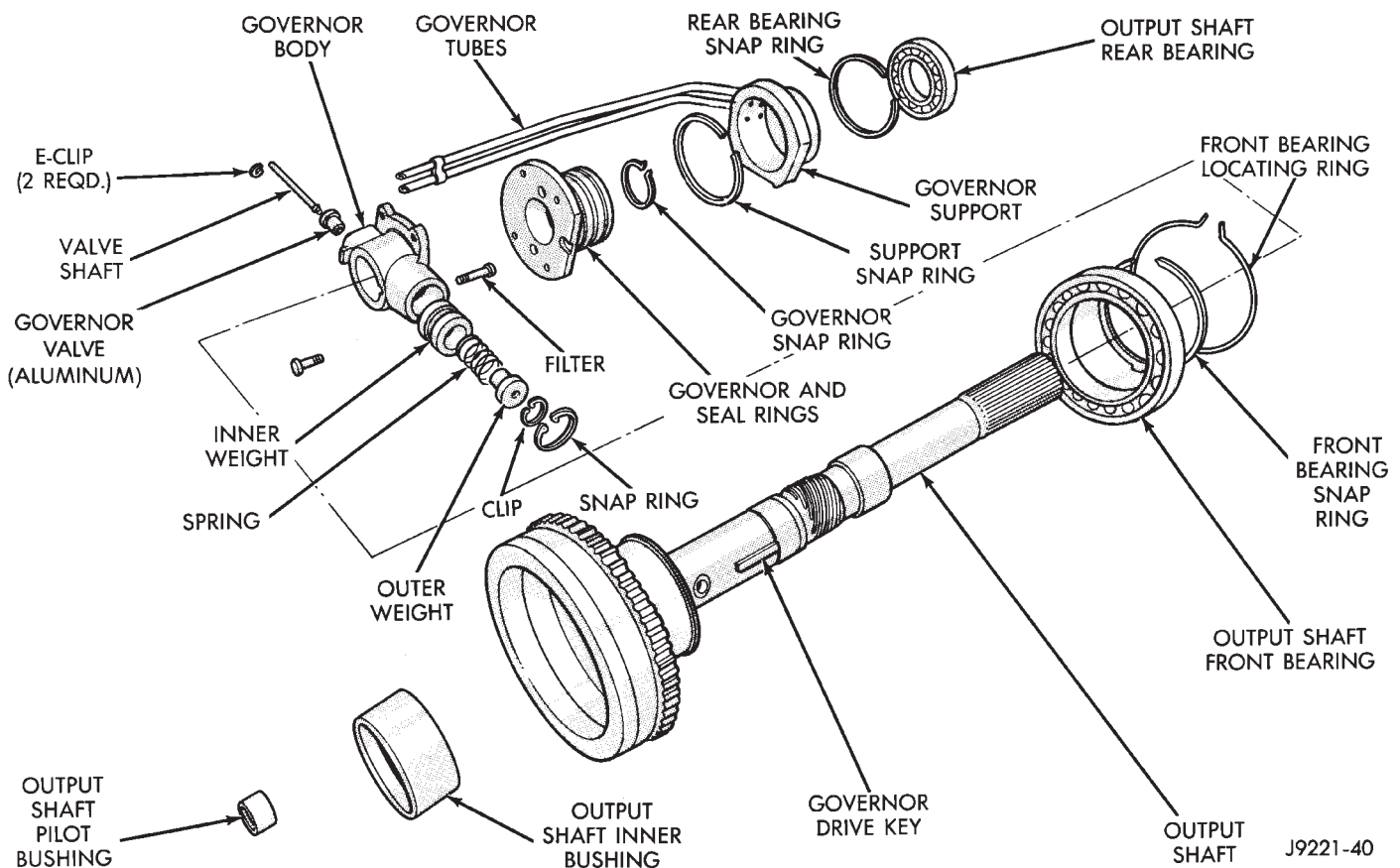


Fig. 36 Output Shaft And Governor Components

Replace the case if cracked, scored, or damaged. Replace the park lock pawl, plug, or spring if worn or damaged. Be sure the bullet at the end of the park lock rod is in good condition. Replace the rod if the bullet is worn or the rod itself is bent or distorted. Do not attempt to straighten the rod.

Check the bushings in the overdrive case. Replace the bushings if severely scored or worn. Also replace the case seal if loose, distorted, or damaged.

Examine the overdrive and direct clutch discs and plates (Fig. 34). Replace the discs if the facing is worn, severely scored, or burned and flaking off. Replace the clutch plates if worn, heavily scored, or cracked. Check the lugs on the clutch plates for wear. The plates should slide freely in the drum. Replace the plates or drum if binding occurs.

Check condition of the annulus gear, direct clutch hub, clutch drum and clutch spring (Fig. 34). Replace the gear, hub and drum if worn or damaged. Replace the spring if collapsed, distorted, or cracked.

Be sure the splines and lugs on the gear, drum and hub are in good condition. The clutch plates and discs should slide freely in these components.

Inspect the thrust bearings and spring plate (Fig. 34). Replace the plate if worn or scored. Replace the bearings if rough, noisy, brinelled, or worn.

Inspect the planetary gear assembly and the sun gear and bushings (Fig. 34). If either the sun gear or

the bushings are damaged, replace the gear and bushings as an assembly. The gear and bushings are not serviced separately.

The planetary carrier and pinions must be in good condition. Also be sure the pinion pins are secure and in good condition. Replace the carrier if worn or damaged.

Inspect the overrunning clutch and race. The race surface should be smooth and free of scores. Replace the overrunning clutch assembly or the race if either assembly is worn or damaged in any way.

Inspect the output shaft and governor components (Fig. 36). Replace the shaft pilot bushing and inner bushing if damaged. Replace either shaft bearing if rough or noisy. Replace the bearing snap rings if distorted or cracked.

Check the machined surfaces on the output shaft. These surfaces should be clean and smooth. Very minor nicks or scratches can be smoothed with crocus cloth. Replace the shaft if worn, scored or damaged in any way.

Check condition of the governor components. Replace the governor drive seal rings if damaged. Be sure the drive ring grooves are in good condition. Check operation of the governor valve, weights and shaft. The valves and weights should slide freely in the governor body (Fig. 36).

There are two governor component changes in 1992/93 overdrive units that affect service. The first involves the governor valve which is now made of aluminum. The second involves the output shaft which has a spotface for governor valve end clearance. The new aluminum valve is not interchangeable. It must only be used with an output shaft that has the spotface for valve end clearance.

Inspect the governor support and the two oil pressure tubes (Fig. 36). **The tubes are an integral part of the support. Do not attempt to remove them.**

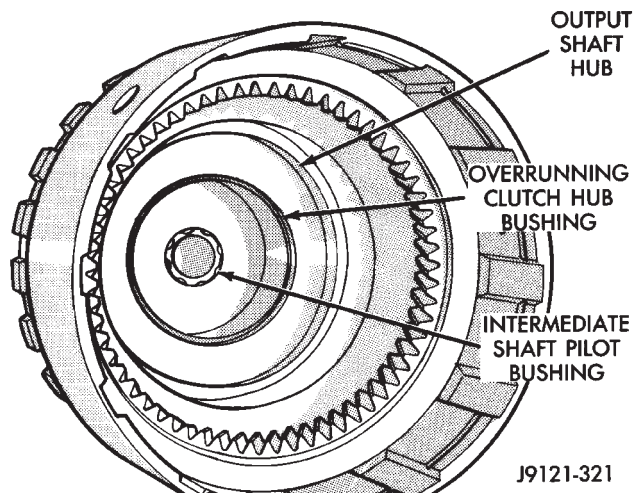
The oil tubes must not be pinched, kinked, collapsed, or distorted. Blow them out with compressed air to be sure they are clear. The tubes are designed to be a slip fit in the piston retainer boss. Do not modify the tube ends in an effort to make them fit tighter.

Replace the governor support and the oil tubes as an assembly if either component is damaged.

Check condition of the governor valve and weight snap rings. Replace any snap ring that appears bent or distorted. Replace any snap ring if its condition is doubtful.

Inspect the output shaft bushings (Fig. 37). The small bushing is the intermediate shaft pilot bushing. The large bushing is the overrunning clutch hub bushing. Replace either bushing if scored, pitted, cracked, or worn.

The bushings can be removed with "blind hole puller tools" such as Snap-On set CG40CB for small bushings and set CG46 for large bushings. New bushings can be installed with tools from an all purpose installer kit such as the Snap-On A257 bushing driver set.



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Fig. 37 Output Shaft Bushing Location

OVERDRIVE GEARTRAIN ASSEMBLY

(1) Lubricate geartrain components with Mopar ATF Plus or Dexron II™ transmission fluid.

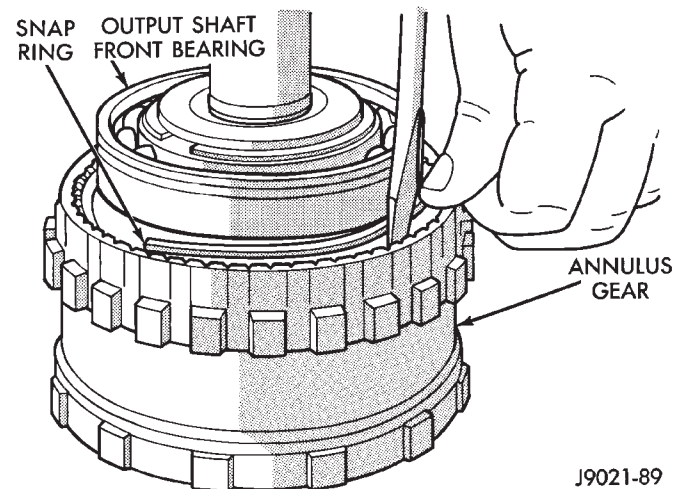
(2) Soak direct and overdrive clutch discs in transmission fluid before installation.

(3) Install new pilot bushing and clutch hub bushing in output shaft if necessary (Fig. 37). Lubricate new (or old) bushings with petroleum jelly.

(4) Install front bearing and bearing snap ring on output shaft (Fig. 38)

(5) Align and install annulus gear on output shaft (Fig. 38).

(6) Install annulus snap ring (Fig. 38).



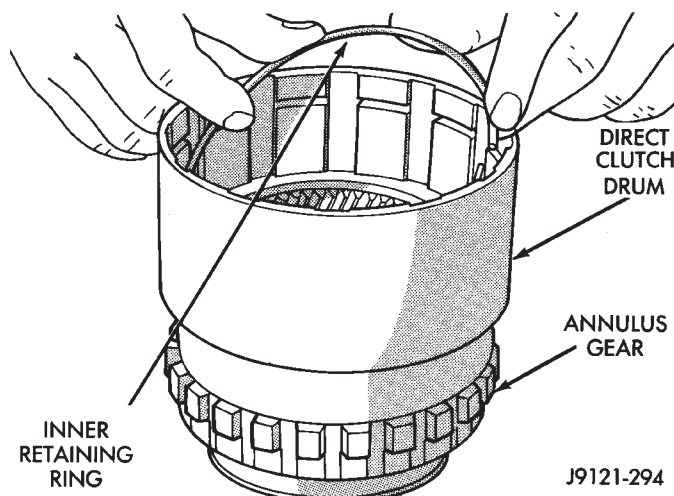
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Fig. 38 Installing Annulus Gear And Snap Ring

(7) Align and install clutch drum on annulus gear (Fig. 39). Be sure drum is engaged in annulus gear lugs.

(8) Install clutch drum outer retaining ring (Fig. 31).

(9) Slide clutch drum forward and install inner retaining ring (Fig. 39).



J9121-294

Fig. 39 Installing Clutch Drum Inner Retaining Ring

(10) Install overrunning clutch on hub (Fig. 40). **Note that clutch only fits one way. Shoulder on clutch should seat in small recess at edge of hub.**

(11) Install thrust bearing on overrunning clutch hub (Fig. 41). Use generous amount of petroleum jelly to hold bearing in place for installation. **Bearing fits one way only. Be sure bearing is seated squarely against hub. Reinstall bearing if it does not seat squarely.**

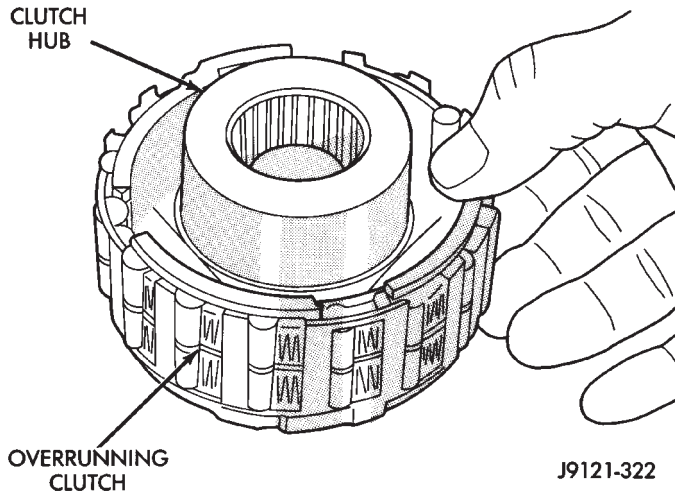


Fig. 40 Assembling Overrunning Clutch And Hub

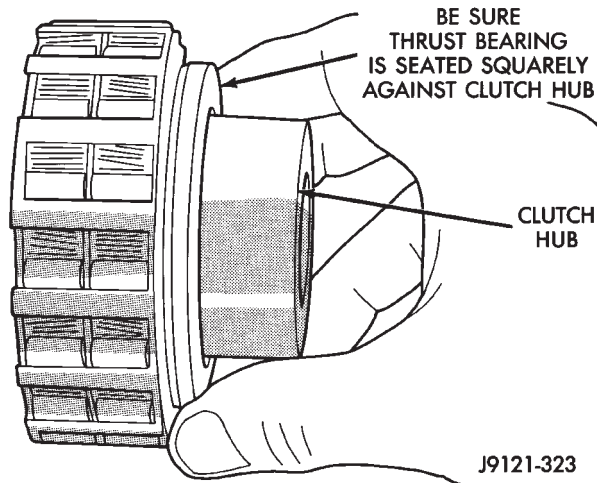


Fig. 41 Installing Overrunning Clutch Thrust Bearing

(12) Install overrunning clutch (Fig. 42). Insert snap ring pliers in hub splines. Expand pliers to grip hub. Then install assembly with counterclockwise, twisting motion.

(13) Install planetary gear in annulus gear (Fig. 43). **Be sure planetary pinions are fully seated in annulus gear before proceeding.**

(14) Install direct clutch spring plate on sun gear. Shoulder side of plate should face outward and toward front. Then secure plate to sun gear with snap ring (Fig. 44).

(15) Coat planetary thrust bearing and bearing contact surface of spring plate with generous amount of petroleum jelly. This will help hold bearing in place during installation.

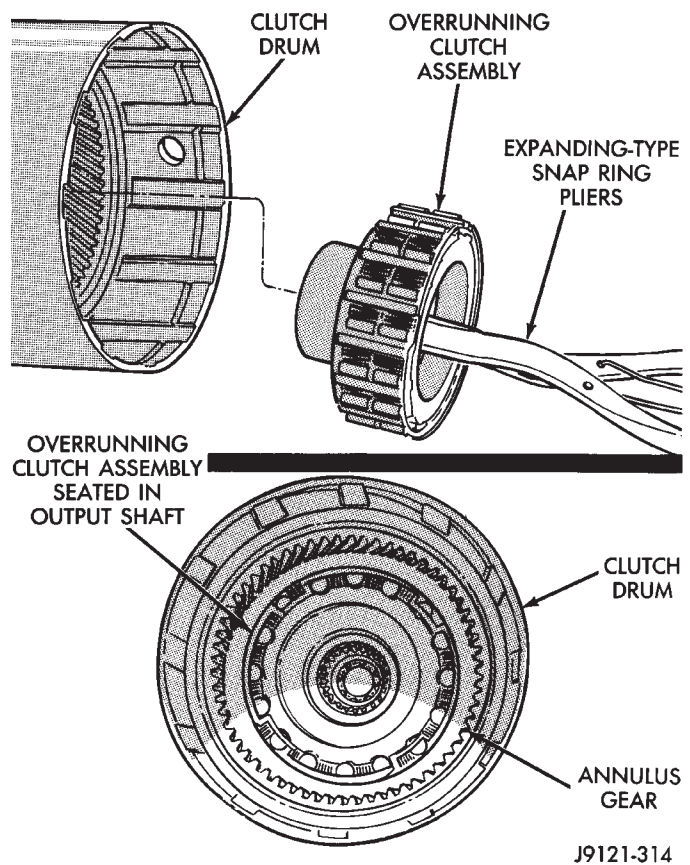


Fig. 42 Installing Overrunning Clutch

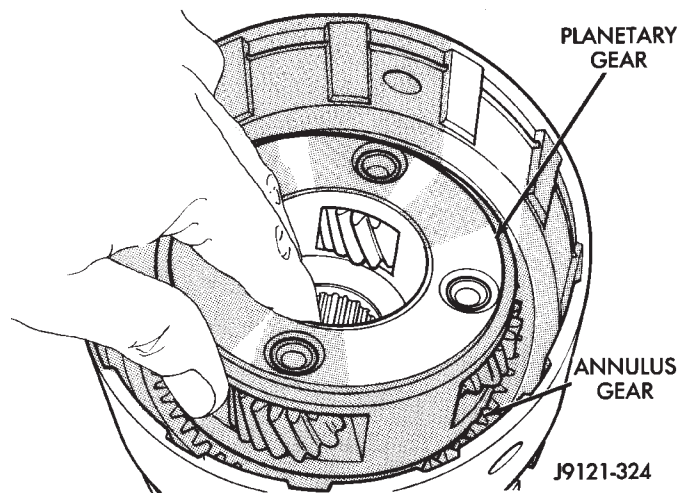


Fig. 43 Installing Planetary Gear

(16) Install planetary thrust bearing on sun gear (Fig. 45). Slide bearing onto gear and seat it against spring plate as shown. **Bearing fits one way only. If it does not seat squarely against spring plate, remove and reposition bearing.**

(17) Install assembled sun gear, spring plate and thrust bearing (Fig. 46). Be sure sun gear and thrust bearing are fully seated before proceeding.

(18) Align splines in hubs of planetary gear and overrunning clutch with Alignment tool 6227-2 (Fig.

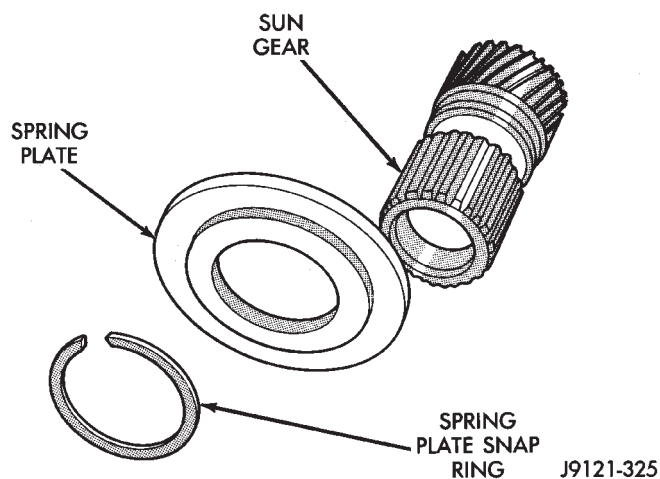


Fig. 44 Sun Gear And Spring Plate Assembly

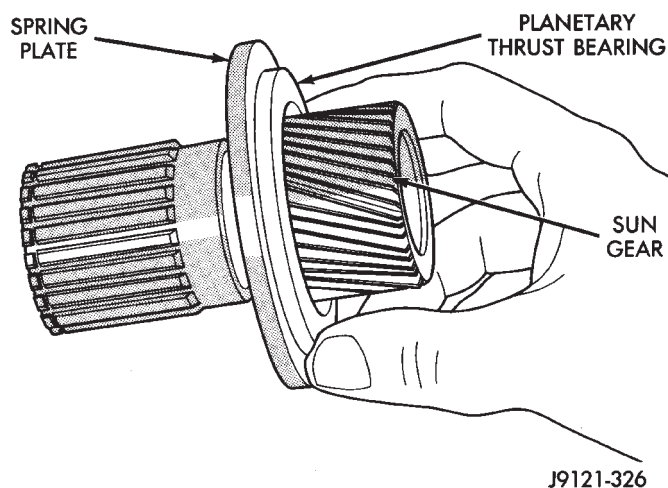


Fig. 45 Installing Planetary Thrust Bearing

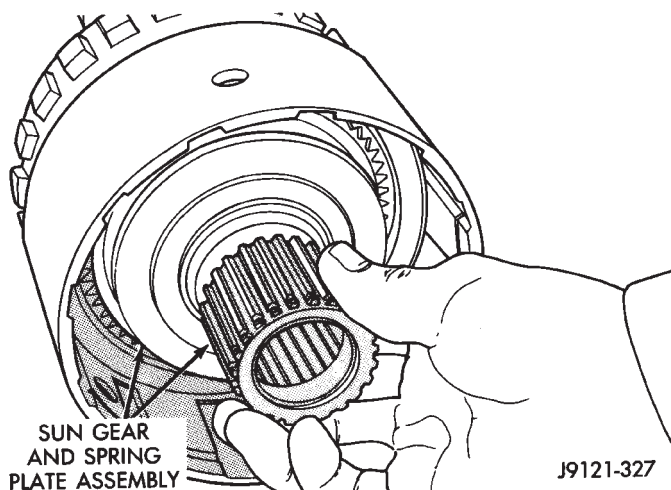


Fig. 46 Sun Gear Installation

47). Insert tool through sun gear and into splines of both hubs. Be sure alignment tool is fully seated before proceeding.

(19) Install direct clutch spring. Be sure spring is properly seated on spring plate (Fig. 47).

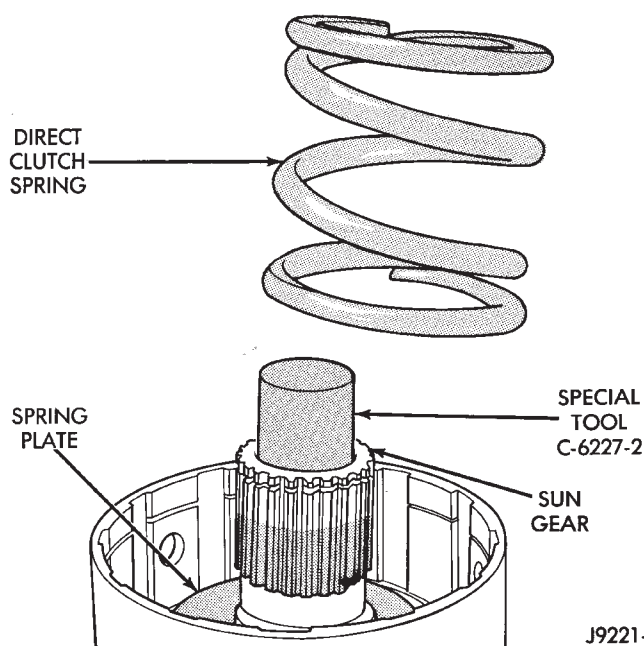


Fig. 47 Installing Direct Clutch Spring

(20) Assemble direct clutch pack for installation on hub (Fig. 48).

(21) Install direct clutch reaction plate on clutch hub. **Note that one side of reaction plate is counterbored. Be sure this side faces rearward. Splines at rear of hub are raised slightly. Counterbore in plate fits over raised splines. Plate should be flush with this end of hub (Fig. 49).**

(22) Install remainder of direct clutch components as follows:

(a) Install first clutch disc on reaction plate followed by a steel plate.

(b) Install remaining discs and plates alternately until required number of discs and plates are installed.

(c) Check direct clutch pack. 8 discs and 7 steel plates are required (Fig. 48).

(d) Last clutch pack item installed is clutch pressure plate. Be sure plate is installed with shoulder side of plate facing upward (Fig. 50).

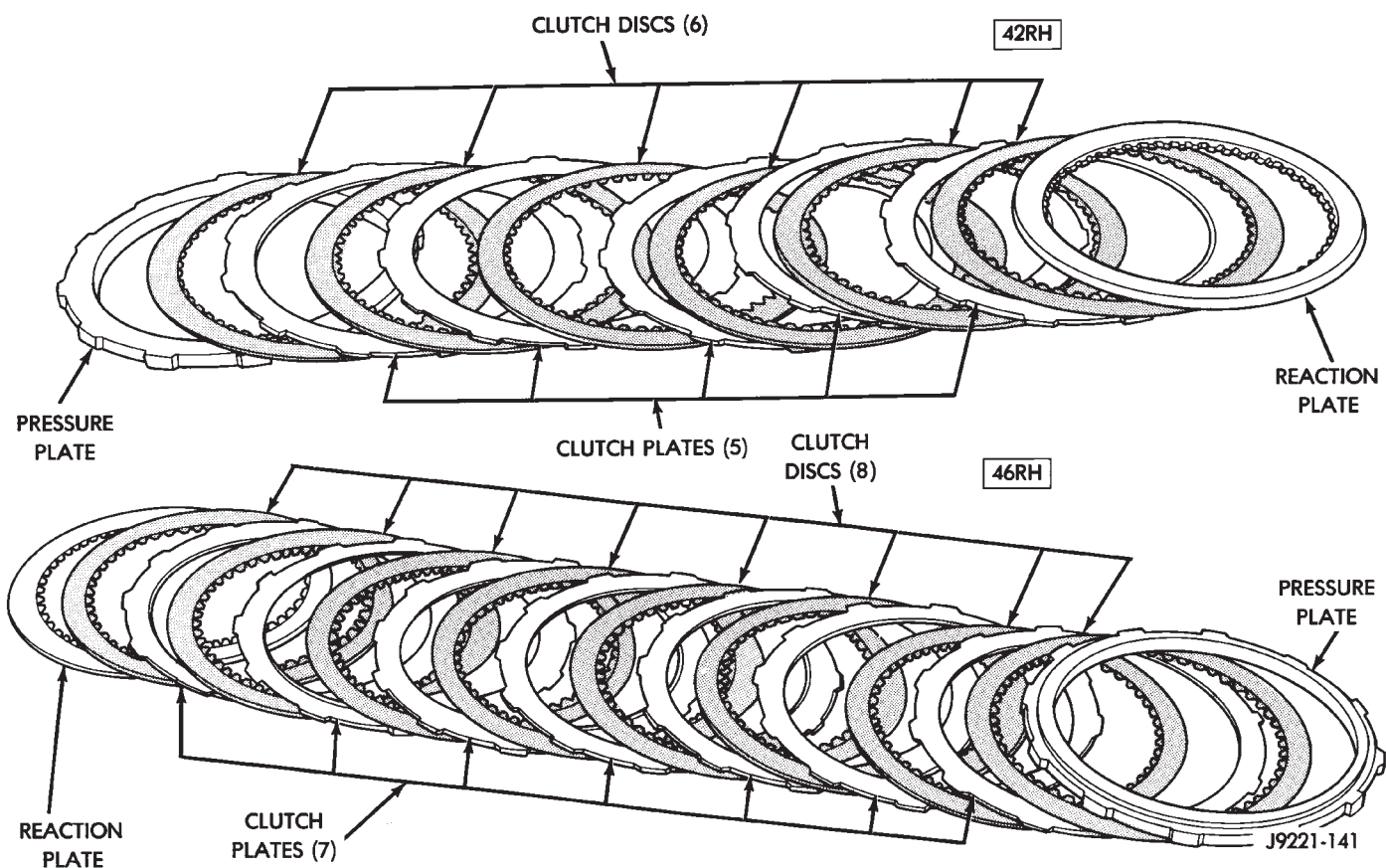


Fig. 48 Direct Clutch Pack Components

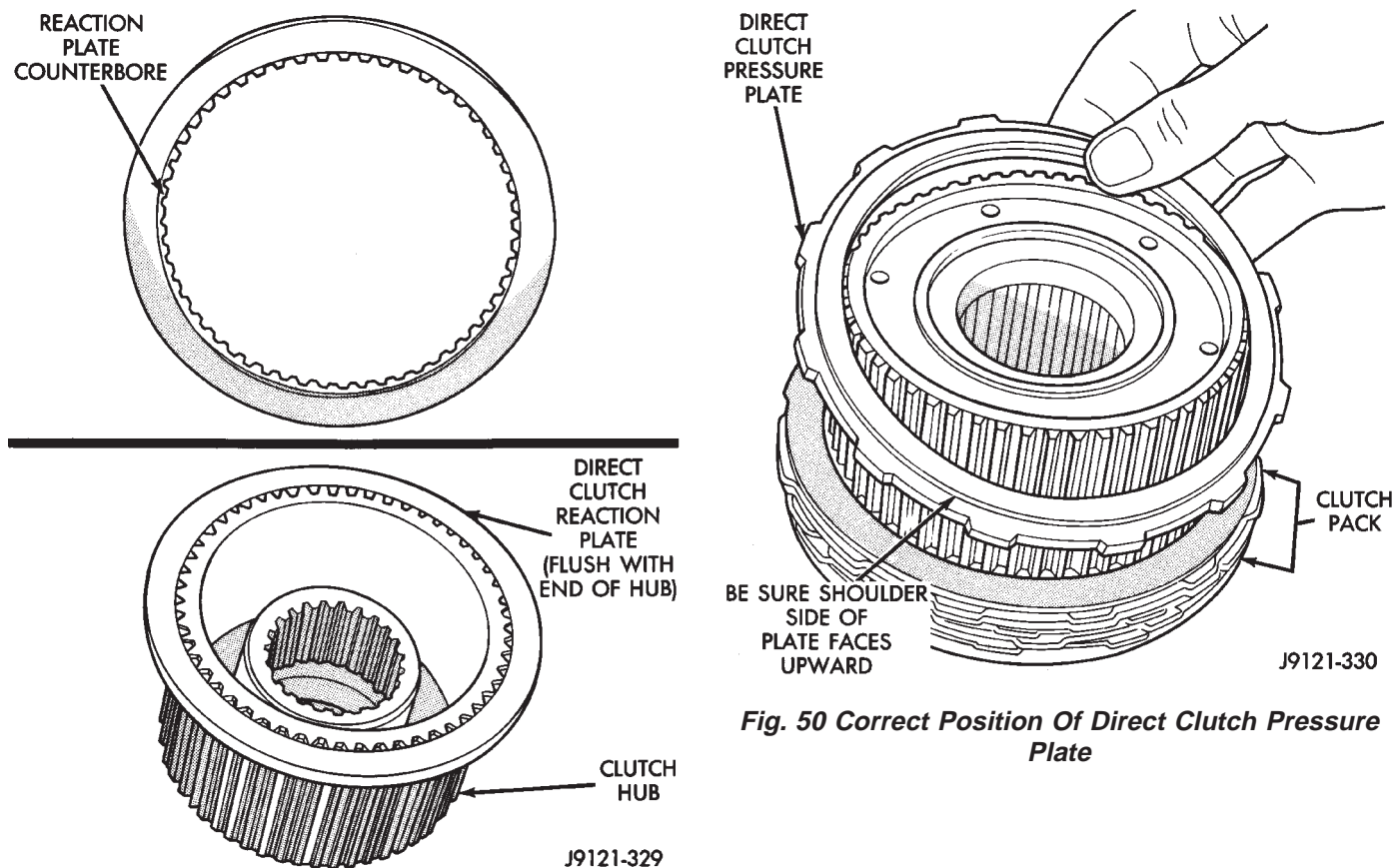


Fig. 50 Correct Position Of Direct Clutch Pressure Plate

Fig. 49 Correct Position Of Direct Clutch Reaction Plate

(23) Install clutch hub and clutch pack on direct clutch spring (Fig. 51).

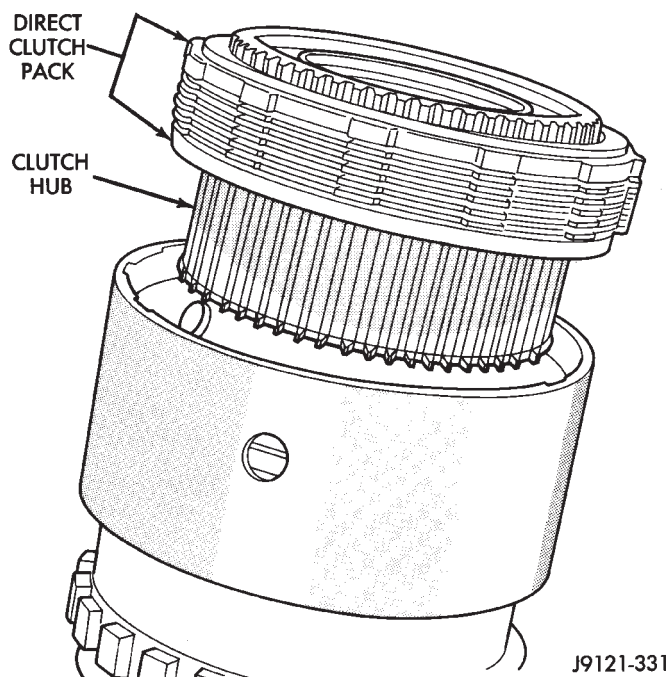


Fig. 51 Installing Assembled Direct Clutch Pack And Hub

(24) Mount geartrain assembly in shop press (Fig. 52).

WARNING: THE NEXT STEP IN GEARTRAIN ASSEMBLY INVOLVES COMPRESSING THE DIRECT CLUTCH HUB AND SPRING. IT IS EXTREMELY IMPORTANT THAT PROPER EQUIPMENT BE USED TO COMPRESS THE SPRING AS SPRING FORCE IS APPROXIMATELY 830 POUNDS. USE SPRING COMPRESSOR TOOL C-6227-1 AND A HYDRAULIC-TYPE SHOP PRESS WITH A MINIMUM RAM TRAVEL OF 5-6 INCHES. THE PRESS MUST ALSO HAVE A BED THAT CAN BE ADJUSTED UP OR DOWN AS REQUIRED. RELEASE CLUTCH SPRING TENSION SLOWLY AND COMPLETELY TO AVOID PERSONAL INJURY.

(25) Position Compressor Tool 6227-2 on clutch hub (Fig. 52).

(26) Position Tool MB990891 or similar size tool on top of compressor tool (Fig. 52). Similar size tool should have minimum outside diameter of 3-1/2 inch, minimum wall thickness of 1/4 inch and be approximately 4 inches long.

(27) Slide direct clutch pack upwards on hub (Fig. 52). Slide pack upward and set it partially on edge of hub and compressor tool as shown in Figure 52.

(28) Slowly compress clutch hub and spring (Fig. 53). Compress spring and hub only enough to expose ring grooves for clutch pack snap ring and clutch hub retaining ring.

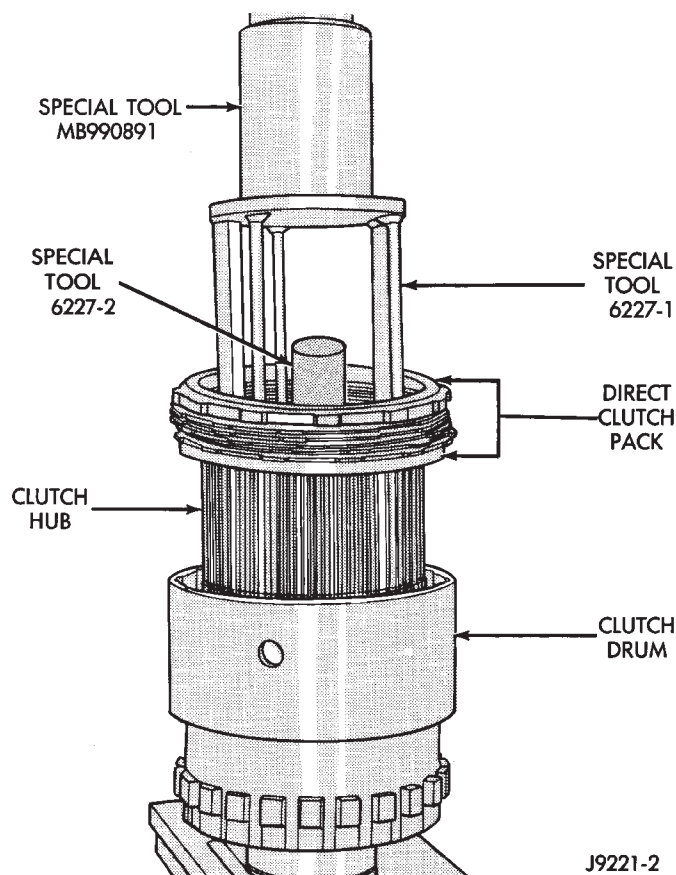


Fig. 52 Mounting Geartrain Assembly In Shop Press

(29) Realign clutch pack on hub and seat clutch discs and plates in clutch drum (Fig. 53).

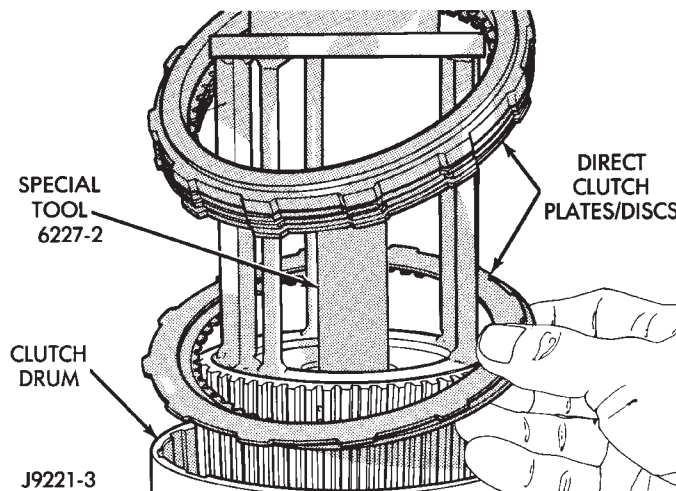


Fig. 53 Seating Clutch Pack In Drum

(30) Install direct clutch pack snap ring (Fig. 54). **Be very sure snap ring is fully seated in clutch drum ring groove.**

(31) Install clutch hub retaining ring (Fig. 55). **Be very sure retaining ring is fully seated in sun gear ring groove.**

(32) Slowly release press ram, remove compressor tools and remove geartrain assembly.

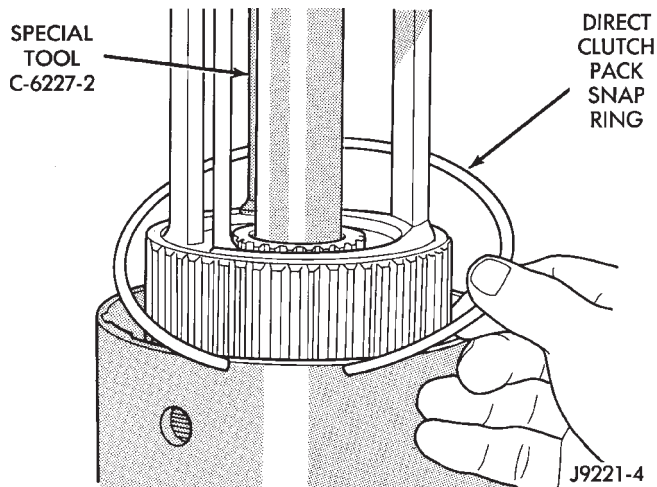


Fig. 54 Installing Direct Clutch Pack Snap Ring

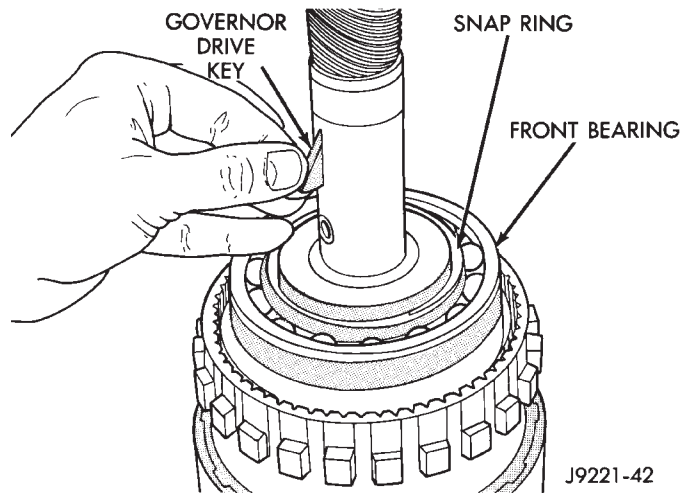


Fig. 56 Front Bearing And Drive Key Installation

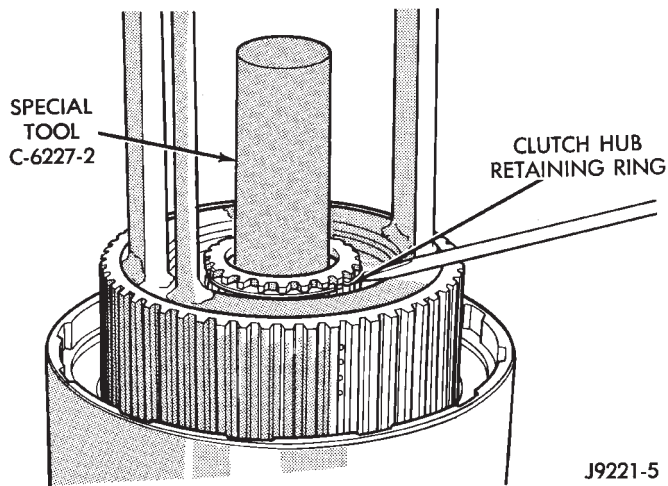


Fig. 55 Installing Clutch Hub Retaining Ring

OVERDRIVE UNIT ASSEMBLY AND ADJUSTMENT

(1) Install front bearing and snap ring on output shaft (Fig. 56). **Be sure locating ring groove in bearing is toward rear of shaft.**

(2) Install governor drive key in output shaft (Fig. 56).

(3) Install new seal rings on governor drive. Be sure ring ends are securely interlocked before proceeding (Fig. 57).

(4) Assemble governor drive and body. Be sure filter is properly seated and positioned in governor body before tightening attaching bolts.

(5) Assemble governor inner and outer weights and spring. Then install weight assembly in governor body (Fig. 58). Be sure all retaining snap rings are securely seated.

(6) Install governor assembly on output shaft (Fig. 59). Be sure drive key is fully engaged drive slot and is not displaced during installation.

(7) Align shaft holes in governor body and output shaft and install governor valve and shaft (Fig. 16).

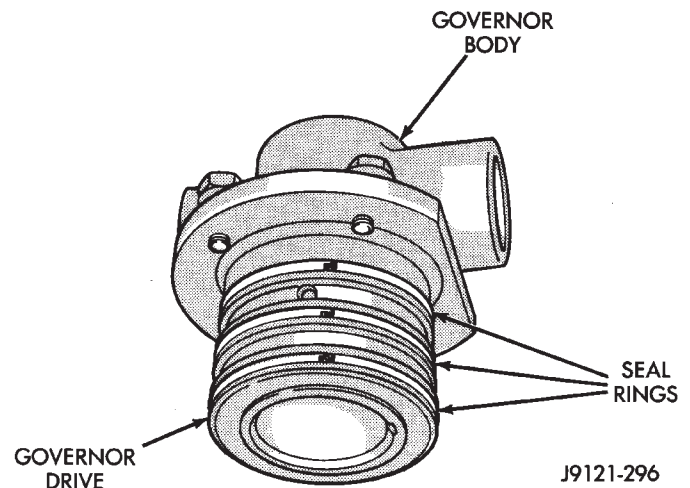


Fig. 57 Governor Drive Seal Rings

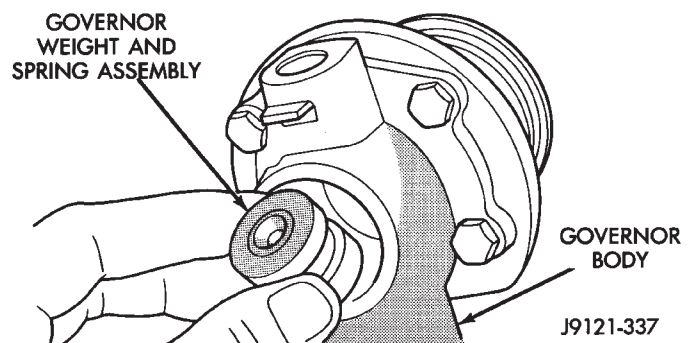


Fig. 58 Installing Governor Weight Assembly

Be very sure that E-clip retainer at each end of governor valve shaft is securely engaged.

(8) Install governor snap ring (Fig. 17).

(9) Install output shaft rear bearing in case and install bearing snap ring. Be sure snap ring is fully seated.

(10) Position park pawl and spring in case and install park pawl shaft (Fig. 14). Verify that spring end is hooked to pawl and straight end of spring

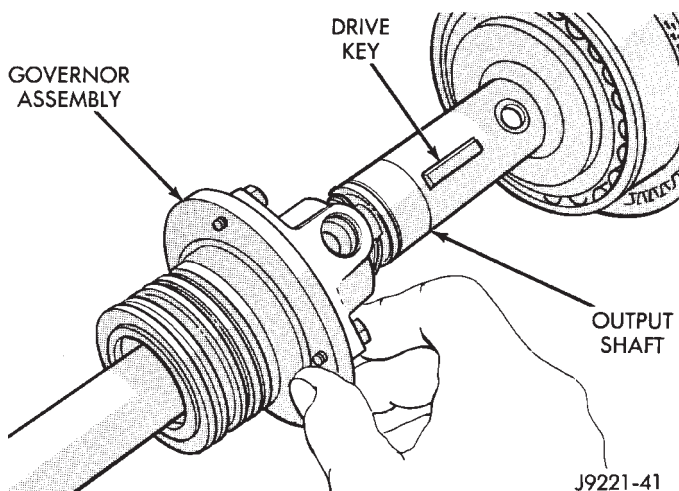


Fig. 59 Installing Governor Assembly

(11) Install pawl shaft retaining bolt. Tighten bolt to 27 N•m (20 ft. lbs.) torque.

(12) Install park lock reaction plug. **Note that plug has locating pin at rear (Fig. 60). Be sure pin is seated in hole in case before installing snap ring.**

(13) Install reaction plug snap ring (Fig. 61). **Compress snap ring only enough for installation; do not distort it.**

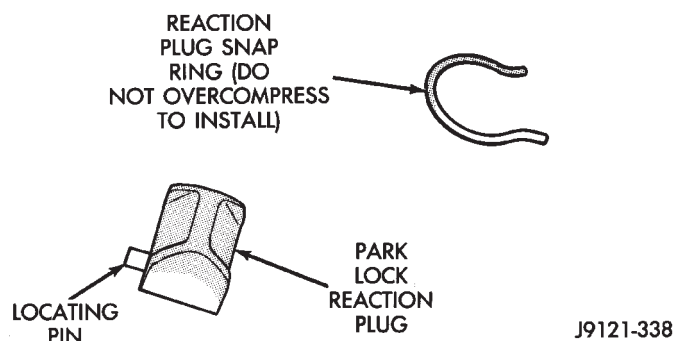


Fig. 60 Reaction Plug Locating Pin And Snap Ring

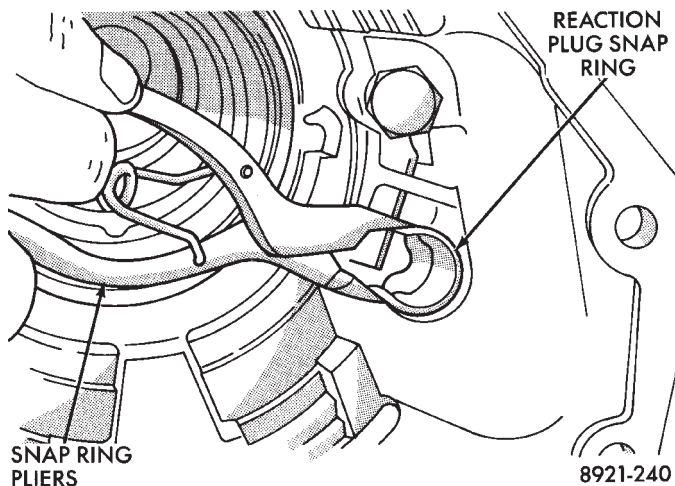


Fig. 61 Reaction Plug And Snap Ring Installation

(14) Install alignment clip on governor tubes (Fig. 62). Slide clip up against shoulder on each tube.

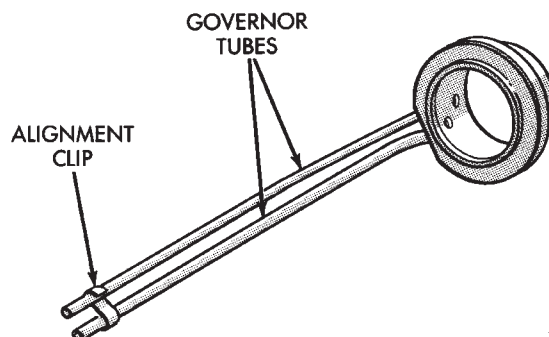


Fig. 62 Positioning Governor Tube Alignment Clip

(15) Install governor support and pressure tubes in case (Fig. 63).

(16) Install governor support snap ring (Fig. 64).

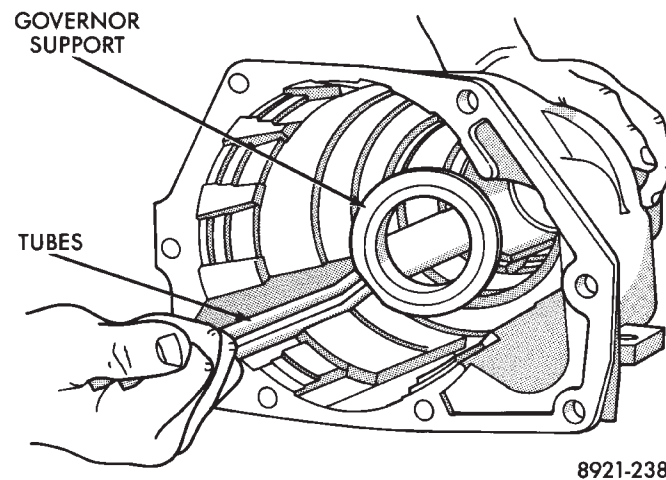


Fig. 63 Installing Governor Support And Pressure Tubes

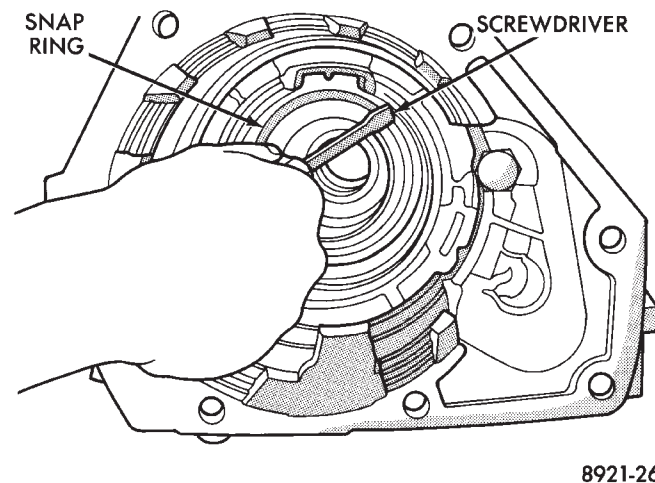


Fig. 64 Installing Governor Support Snap Ring

(17) Install output shaft front bearing locating ring in case (Fig. 65).

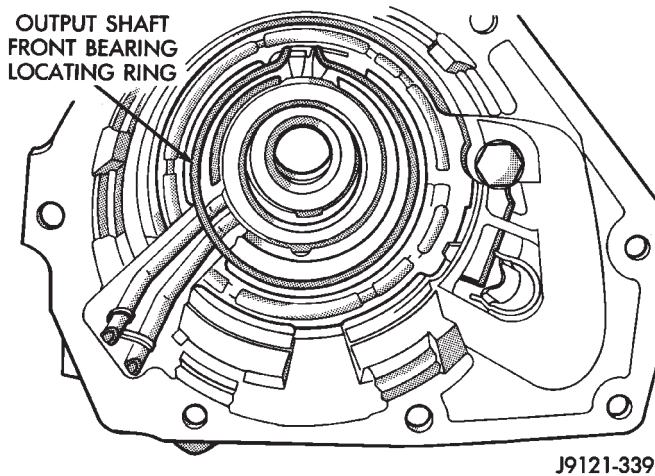


Fig. 65 Front Bearing Locating Ring Installation

(18) Support geartrain on Tool 6227-1 (Fig. 66). Be sure tool is securely seated in clutch hub.

(19) Install overdrive unit case over geartrain (Fig. 66).

(20) Expand front bearing locating ring with snap ring pliers. Then slide case downward until locating ring locks in bearing groove and release snap ring.

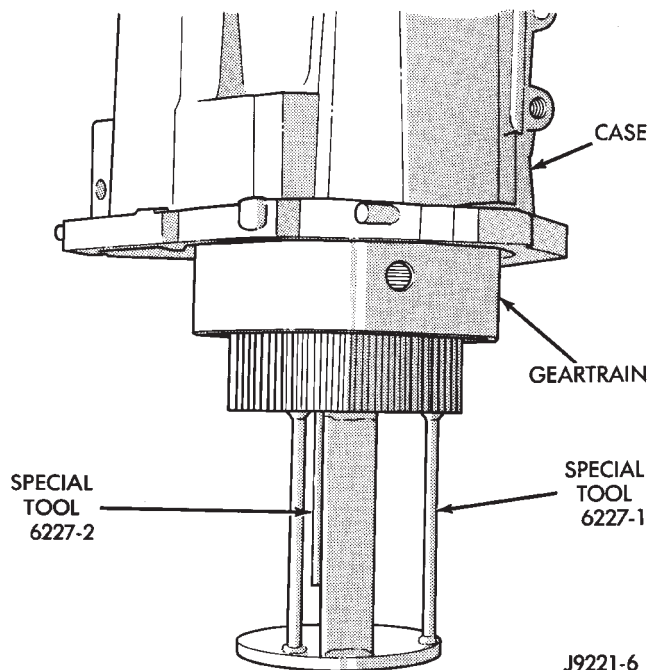


Fig. 66 Installing Overdrive Case On Geartrain

(21) Install locating ring access plate and gasket in overdrive unit case (Fig. 9).

(22) Install overdrive clutch components as follows:

(a) Install reaction ring first. Reaction ring is flat with notched ends (Fig. 67).

(b) Install wave spring on top of reaction ring. **Reaction ring and wave ring both fit in same ring groove.** Use screwdriver to seat each ring securely in groove.

(c) Install reaction plate (Fig. 68).

(d) Install first clutch disc followed by first clutch plate.

(e) Install remaining clutch discs and plates in same order.

(f) Verify clutch pack. 4 clutch discs, 3 steel plates, 1 reaction plate and 1 pressure plate are required.

(g) Install clutch pack pressure plate (Fig. 68).

(h) Install clutch pack wire-type retaining ring (Fig. 67).

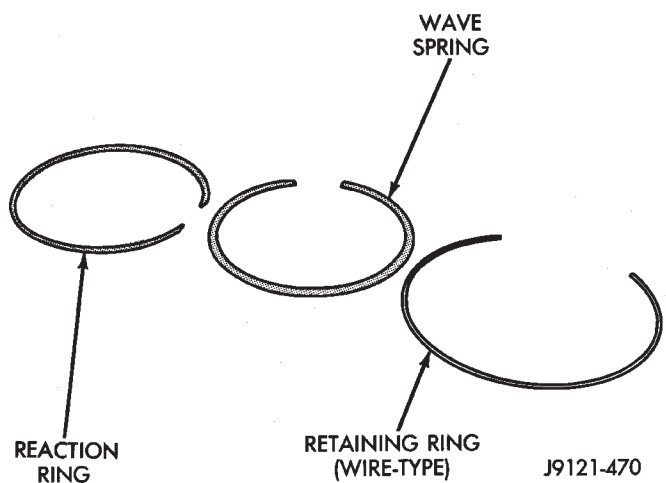


Fig. 67 Overdrive Clutch Ring Identification

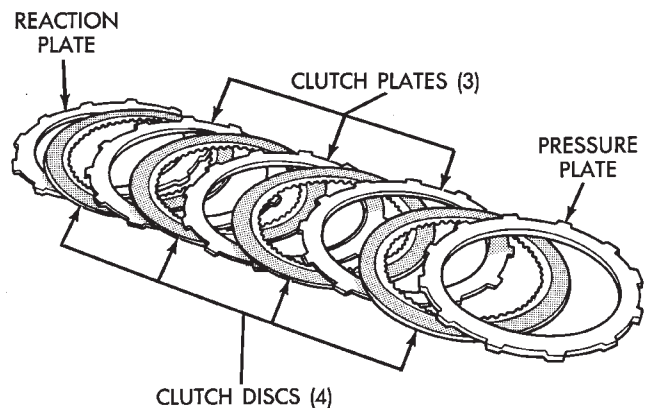


Fig. 68 Overdrive Clutch Pack Components

(23) Place overdrive unit in vertical position and mount unit in vise or in workbench with appropriate size mounting hole cut into it. Be sure unit is facing upward for access to direct clutch hub.

(24) Determine correct thickness **intermediate shaft spacer** as follows:

(a) Insert Special Tool 6312 through sun gear, planetary gear and into pilot bushing in output shaft. Be sure tool bottoms against planetary shoulder.

(b) Position Gauge Tool 6311 across face of overdrive case (Fig. 69). Then position Dial Caliper C-4962 over gauge tool.

(c) Extend sliding scale of dial caliper downward through gauge tool slot until scale contacts end of Gauge Alignment Tool 6312. Lock scale in place. Remove dial caliper tool and note distance measured (Fig. 69).

(d) Select proper thickness end play spacer from spacer chart based on distance measured (Fig. 70).

(e) Remove Gauge Alignment Tool 6312.

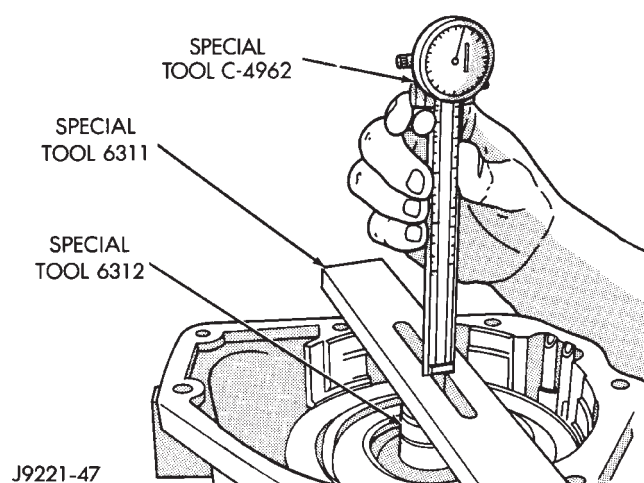


Fig. 69 Shaft End Play Measurement

End Play Measurement (Inches)	Spacer Thickness (Inches)
.7336 - .7505	.158 - .159
.7506 - .7675	.175 - .176
.7676 - .7855	.193 - .194
.7856 - .8011	.211 - .212

J9121-341

Fig. 70 Intermediate Shaft End Play Spacer Selection

(25) Determine correct thickness **overdrive piston thrust plate** as follows:

(a) Position Gauge Tool 6311 across face of overdrive case. Then position Dial Caliper C-4962 over gauge tool (Fig. 71).

(b) Measure distance to clutch hub thrust bearing seat at four points 90° apart. Then average measurements by adding them and dividing by 4.

(c) Select and install required thrust plate from information in thrust plate chart (Fig. 72).

(26) Leave Alignment Tool 6227-2 in place. Tool will keep planetary and clutch hub splines in alignment until overdrive unit is ready for installation on transmission.

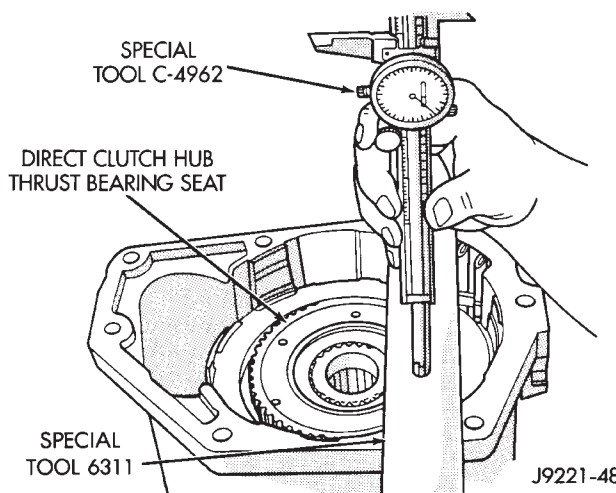


Fig. 71 Overdrive Piston Thrust Plate Measurement

End Play Measurement (Inches)	Spacer Thickness (Inches)
1.7500 - 1.7649	.108 - .110
1.7650 - 1.7799	.123 - .125
1.7800 - 1.7949	.138 - .140
1.7950 - 1.8099	.153 - .155
1.8100 - 1.8249	.168 - .170
1.8250 - 1.8399	.183 - .185
1.8400 - 1.8549	.198 - .200
1.8550 - 1.8699	.213 - .215
1.8700 - 1.8849	.228 - .230
1.8850 - 1.8999	.243 - .245

J9121-342

Fig. 72 Overdrive Piston Thrust Plate Selection

NP231 TRANSFER CASE

INDEX

	page		page
General Information	271	Transfer Case Identification	272
Shift Linkage Adjustment	272	Transfer Case Installation	272
Transfer Case Cleaning and Inspection	280	Transfer Case Lubricant	272
Transfer Case Disassembly and Overhaul	275	Transfer Case Removal	272

GENERAL INFORMATION

The NP231 is a part-time transfer case with a low range reduction gear system (Fig. 1). The NP231 has three operating ranges plus a Neutral position. A low range system provides a reduction ratio for increased low speed torque capability.

Two versions of the NP231 are used. One version retains the synchronizer components used in previous models. A newly introduced version is not equipped with synchro components.

OPERATING RANGES

NP231 operating ranges are: 2-wheel drive high; 4-wheel drive high and 4-wheel drive low (Fig. 2).

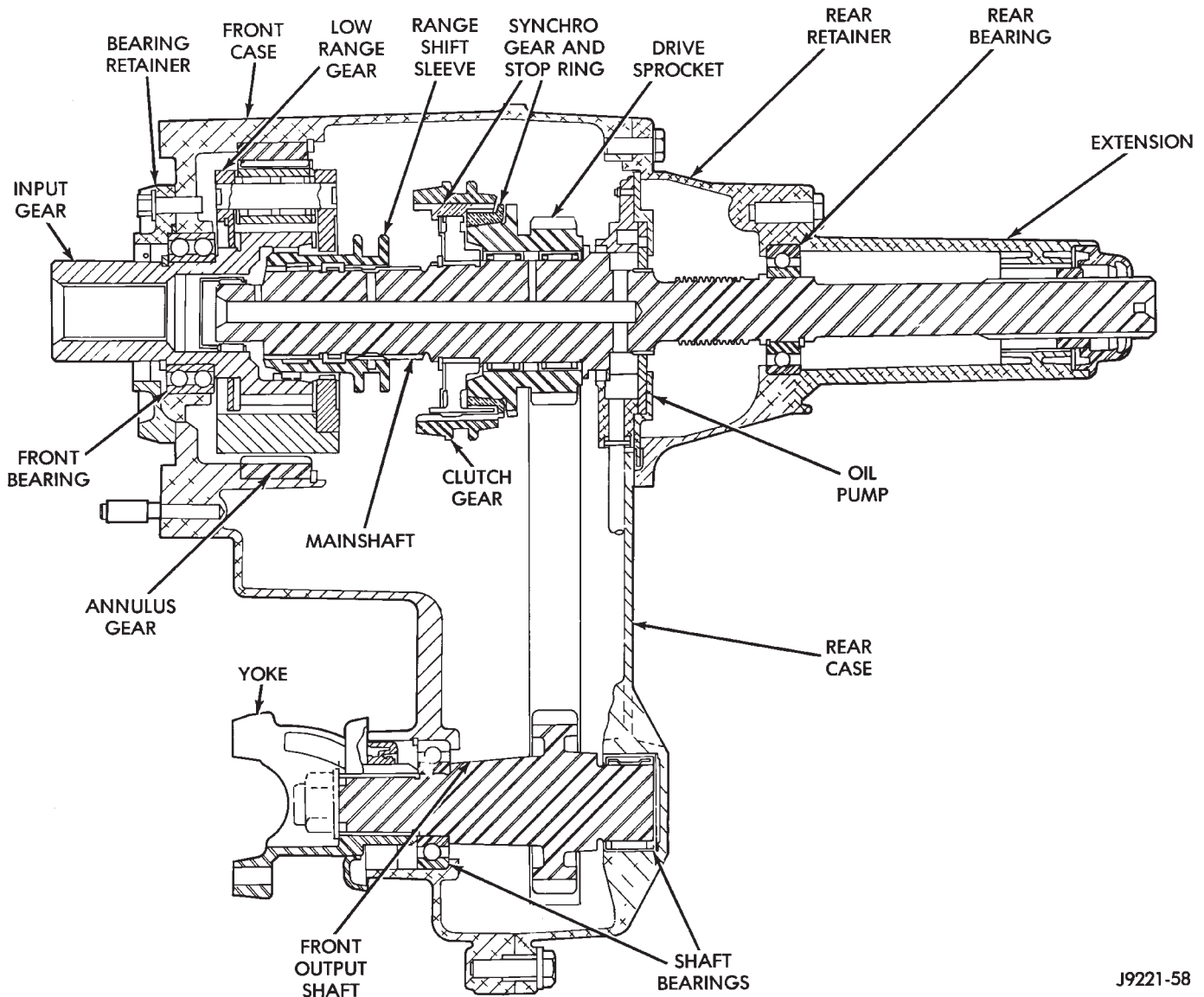


Fig. 1 NP231 Transfer Case

The NP231 is a part-time transfer case. The 4-wheel drive ranges are undifferentiated and should only be used on unpaved or low traction surfaces only.

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 (Fig. 2). Range positions are marked on the shifter bezel cover plate. A front axle disconnect mechanism is only used on certain models.

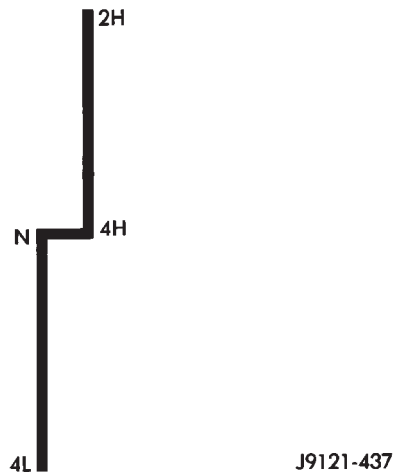


Fig. 2 NP231 Shift Pattern

TRANSFER CASE IDENTIFICATION

A circular ID tag is attached to the rear case of each NP231 transfer case (Fig. 3). 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. For example, a serial number of 12-10-91 would represent December 10, 1991.

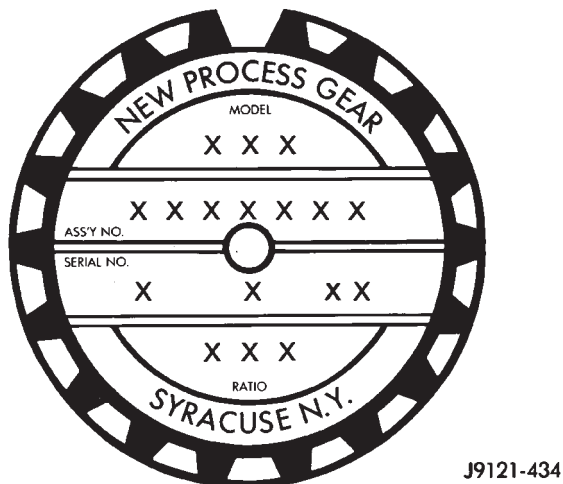


Fig. 3 Transfer Case Identification Tag

TRANSFER CASE LUBRICANT

Recommended Lubricant And Capacity

Use Mopar ATF Plus, type 7176, or Dexron II automatic transmission fluid in the NP231 transfer case. Approximate refill capacity is 1.54 liters (1.6 qts.).

Fill Level

The correct fill level is to the bottom edge of the fill plug hole. The vehicle must be level in order to ensure an accurate fluid level check.

SHIFT LINKAGE ADJUSTMENT

- (1) Shift transfer case into Neutral position.
- (2) Raise vehicle on hoist.
- (3) Loosen lock bolt in selector rod trunnion (Figs. 4 and 5).
- (4) Verify that transfer case shift lever (Figs. 4 and 5) is in neutral position.
- (5) Move trunnion on selector rod forward, or rearward as necessary. Then tighten trunnion lock bolt to 8-14 N•m (72-120 in. lbs.) torque.
- (6) Lower vehicle and check transfer case shifting.
- (7) Verify that transfer case is fully engaged in 2H, 4H and 4L positions. Readjust linkage if necessary.

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) Place support stand under transmission.
- (6) Remove rear crossmember.
- (7) Disconnect front/rear propeller shafts at transfer case.
- (8) Disconnect speed sensor and remove speedometer adapter and sensor if necessary.
- (9) Disconnect transfer case shift lever from shift lever rod.
- (10) Disconnect vent hose and electrical connectors.
- (11) Support transfer case with transmission jack.
- (12) Remove bolts attaching transfer case to transmission.
- (13) Secure transfer case to jack with chains.
- (14) Pull transfer case and jack rearward to disengage transfer case.
- (15) Remove transfer case from under vehicle.

TRANSFER CASE INSTALLATION

- (1) Mount transfer case on a transmission jack. Secure transfer case to jack with chains.
- (2) Position transfer case under vehicle.
- (3) Align transfer case and transmission shafts and install transfer case on transmission (Fig. 6).

NP231 SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
TRANSFER CASE DIFFICULT TO SHIFT OR WILL NOT SHIFT INTO DESIRED RANGE	(1) Vehicle speed too great to permit shifting. (2) If vehicle was operated for extended period in 4H mode on dry paved surface, driveline torque load may cause difficulty. (3) Transfer case external shift linkage binding. (4) Insufficient or incorrect lubricant. (5) Internal components binding, worn or damaged.	(1) Stop vehicle and shift into desired range. Or reduce speed to 3-4 km/h (2-3 mph) before attempting to shift. (2) Stop vehicle, shift transmission to Neutral, shift transfer case to 2H mode and operate vehicle in 2H on dry paved surfaces. (3) Lubricate, repair or replace linkage bushings or tighten loose components as necessary. (4) Drain and refill to edge of fill hole with DEXRON II® or MOPAR-MERCON® Automatic Transmission Fluid. (5) Disassemble unit and replace worn or damaged components as necessary.
TRANSFER CASE NOISY IN ALL DRIVE MODES	(1) Insufficient or incorrect lubricant.	(1) Drain and refill to edge of fill hole with DEXRON II® or MOPAR-MERCON® Automatic Transmission Fluid. Check for leaks and repair if necessary. Note: If unit is still noisy after drain and refill, disassembly and inspection may be required to locate source of noise.
NOISY IN – OR JUMPS OUT OF – FOUR WHEEL DRIVE LOW RANGE	(1) Transfer case not completely engaged in 4L position. (2) Shift linkage out of adjustment. (3) Shift linkage loose or binding. (4) Range fork damaged, inserts worn, or fork is binding on shift rail. (5) Low range gear worn or damaged.	(1) Stop vehicle, shift transfer case to Neutral, then shift back into 4L position. (2) Adjust linkage. (3) Tighten, lubricate or repair linkage as necessary. (4) Disassemble unit and repair as necessary. (5) Disassemble and repair as necessary.
LUBRICANT LEAKING FROM OUTPUT SHAFT SEALS OR FROM VENT	(1) Transfer case overfilled. (2) Vent closed or restricted. (3) Output shaft seals damaged or installed incorrectly.	(1) Drain to correct level. (2) Clear or replace vent if necessary. (3) Replace seals. Be sure seal lip faces interior of case when installed. Also be sure yoke seal surfaces are not scored or nicked. Remove scores and nicks with fine sandpaper or replace yoke(s) if necessary.
ABNORMAL TIRE WEAR	(1) Extended operation on dry hard surface (paved) roads in 4H range.	(1) Operate in 2H on hard surface (paved) roads.

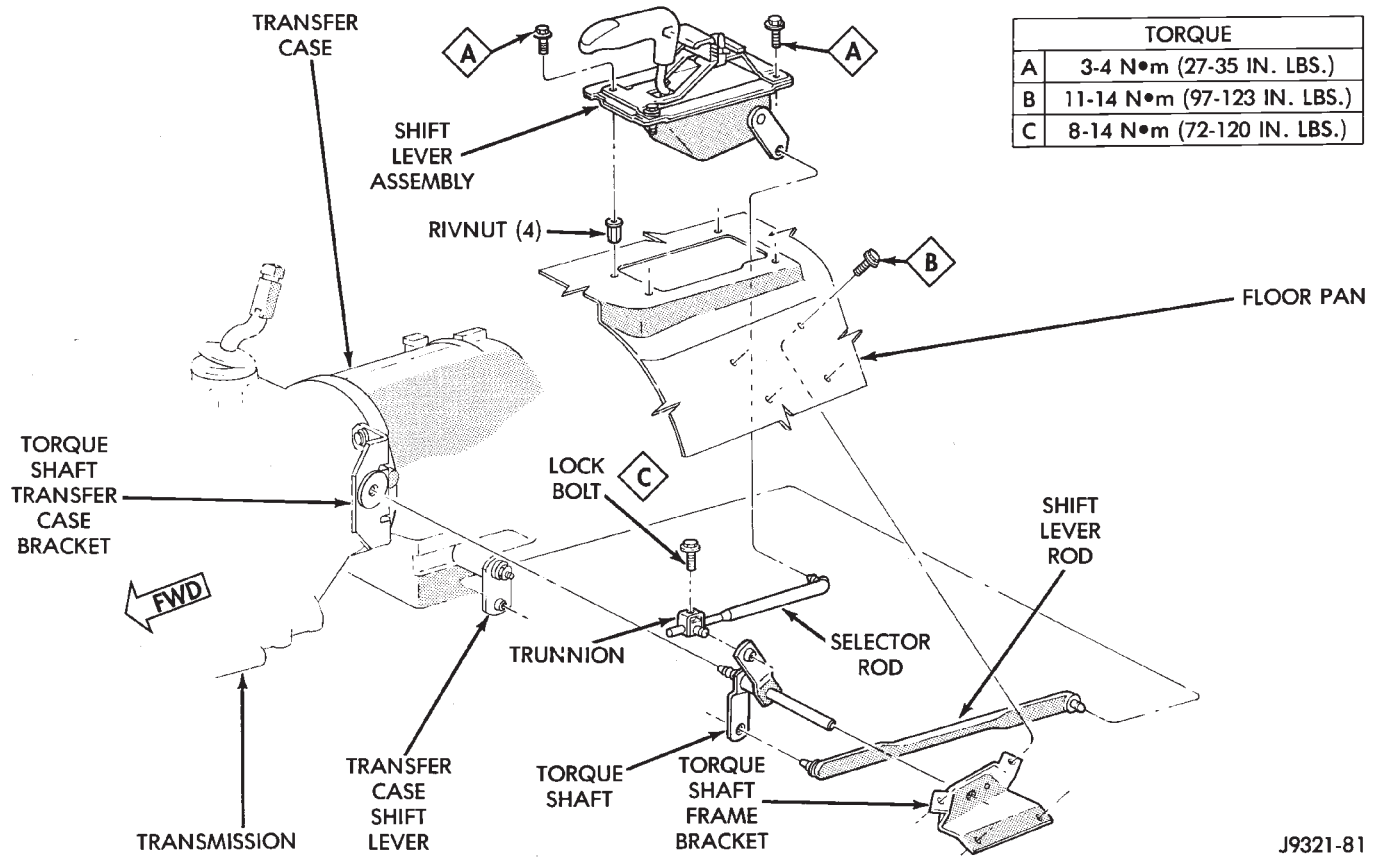


Fig. 4 Transfer Case Shift Linkage (Manual Transmission)

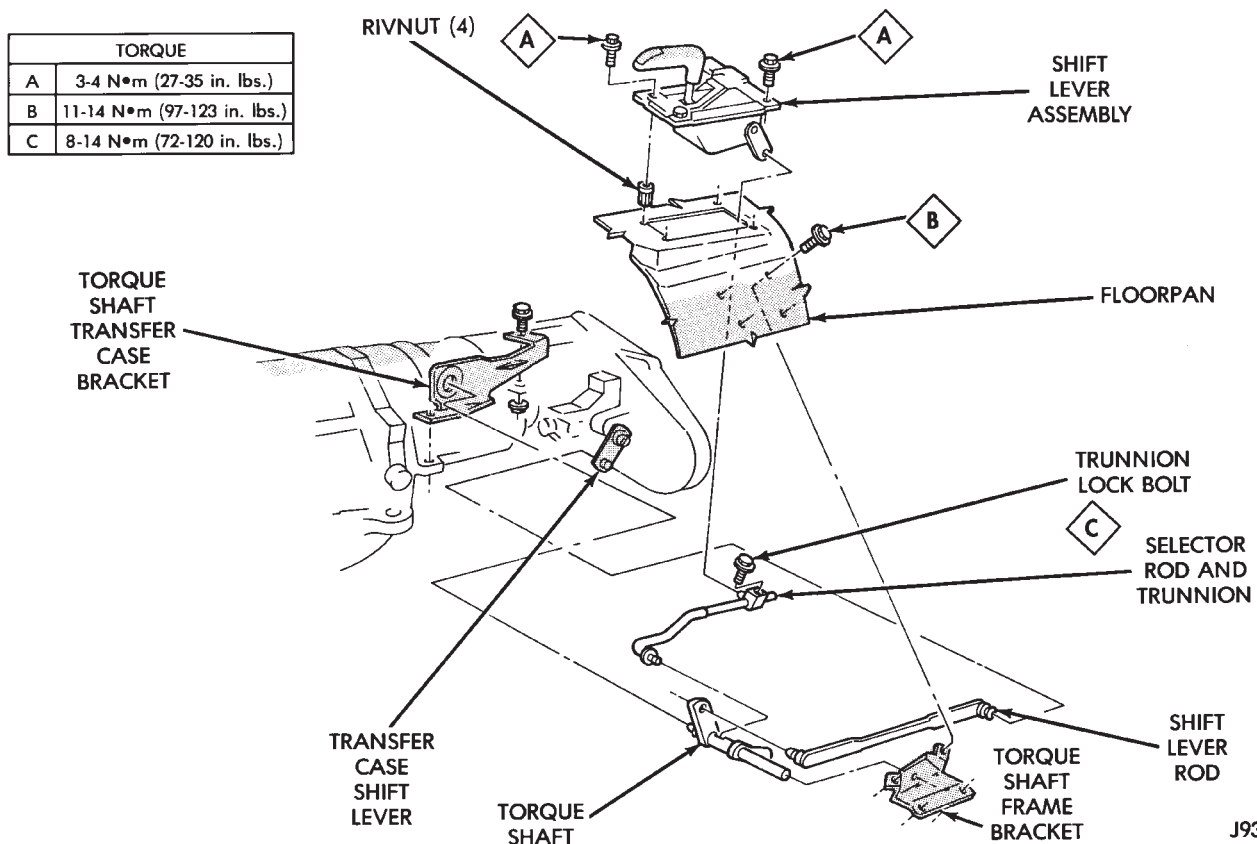


Fig. 5 Transfer Case Shift Linkage (Automatic Transmission)

(4) Install and tighten transfer case attaching nuts to 35 N•m (26 ft. lbs.) torque (Fig. 6).

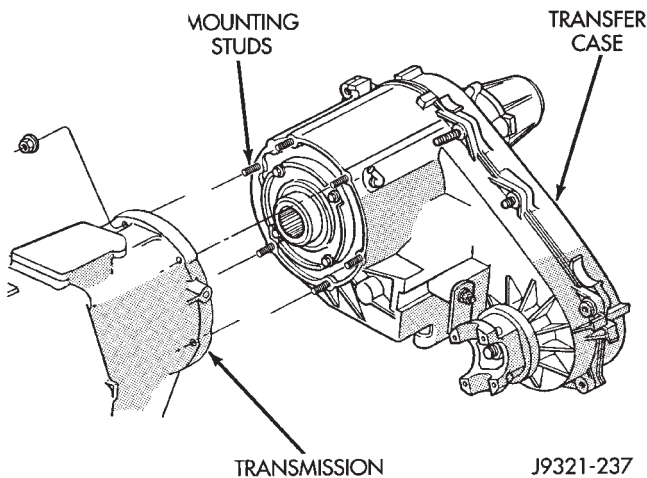


Fig. 6 Transfer Case Attachment

(5) Install speedometer adapter if removed during service (Fig. 7). Then index adapter and install speed sensor in adapter. Refer to In-Vehicle Service section.

(6) Connect electrical wires to speed sensor.

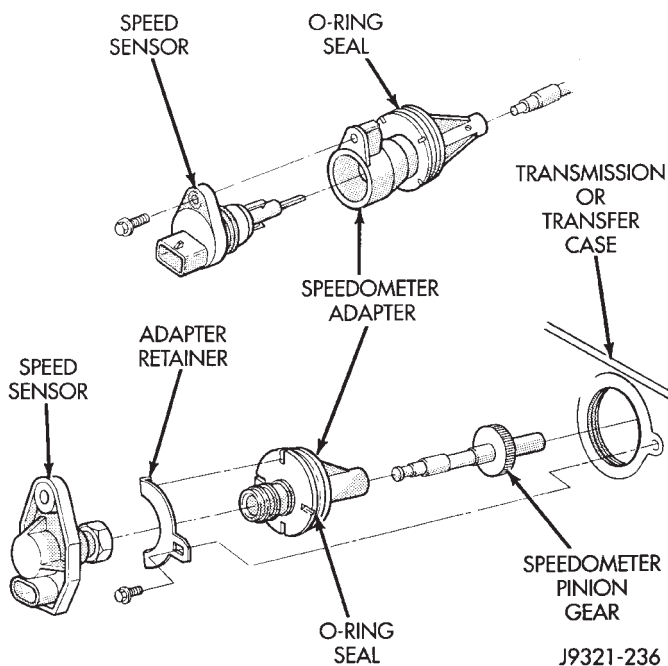


Fig. 7 Speedometer Components

(7) Connect vent hose to transfer case vent (Fig. 8).

(8) Align and connect propeller shafts. Tighten shaft attaching bolts to 19 N•m (170 in. lbs.) torque.

(9) Fill transfer case with Mopar Dexron II automatic transmission fluid.

(10) Install rear crossmember if removed. Tighten crossmember bolts to 41 N•m (30 ft. lbs.) torque.

(11) Remove transmission jack and transmission support stand.

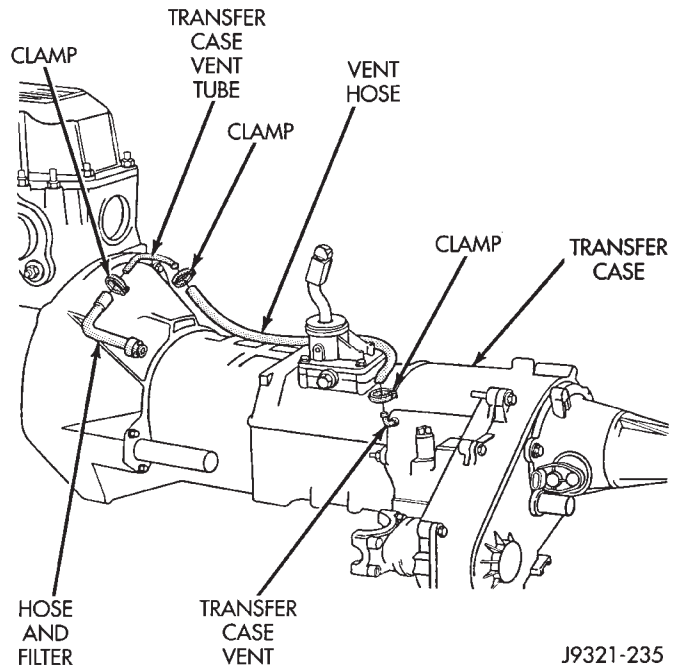


Fig. 8 Transfer Case Vent Hose Routing

(12) Connect transfer case shift lever to shift lever rod.

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

(14) Lower vehicle.

TRANSFER CASE DISASSEMBLY AND OVERHAUL

Two versions of the NP231 are used in current models. One version retains the synchronizer components used in previous years. A newly introduced version does not have synchro components. The non-synchro version does not have a synchro gear, struts, spring and stop ring. During overhaul, note which version is being serviced and order needed parts accordingly.

(1) Remove fill and drain plugs.

(2) Remove front yoke. Discard yoke seal washer and nut. They should not be reused.

(3) Move transfer case range lever rearward to 4L position.

(4) Remove extension housing attaching bolts.

(5) Tap extension housing in clockwise direction to break sealer bead and remove housing (Fig. 1).

CAUTION: To avoid damaging the sealing surfaces of the extension housing and rear retainer, do not pry or wedge the housing off the retainer.

(6) Remove rear bearing snap ring (Fig. 2).

(7) Remove rear retainer attaching bolts.

(8) Remove rear retainer. Position screwdriver under each tab on retainer housing (Fig. 3). Then carefully pry retainer upward and off rear case.

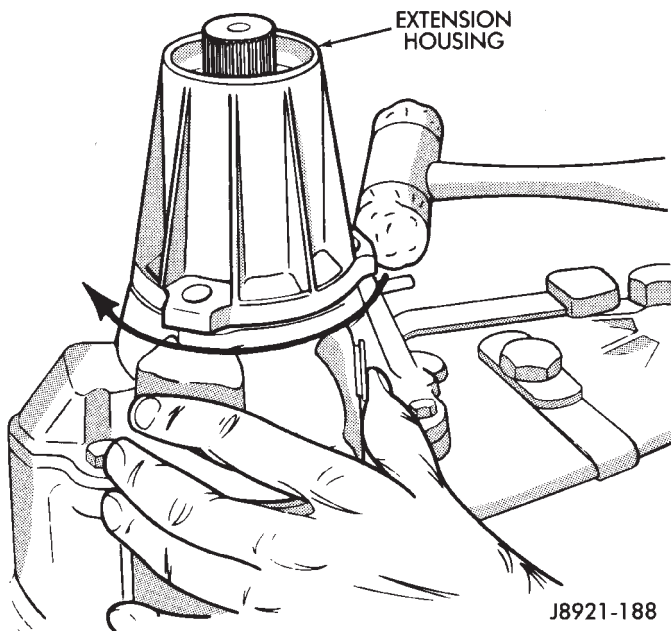


Fig. 1 Extension Housing Removal

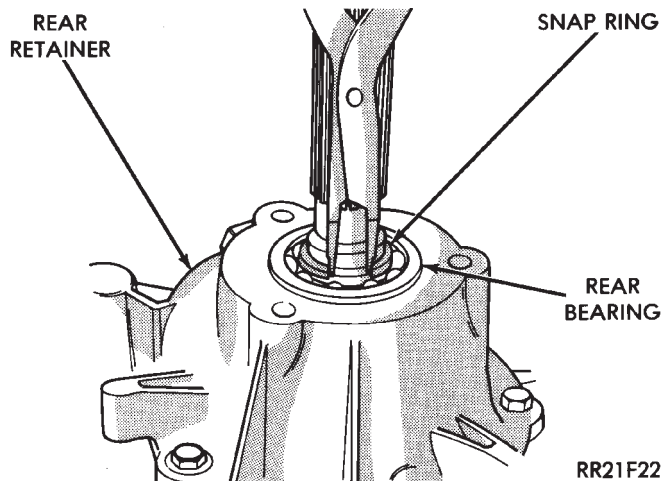


Fig. 2 Rear Bearing Snap Ring Removal

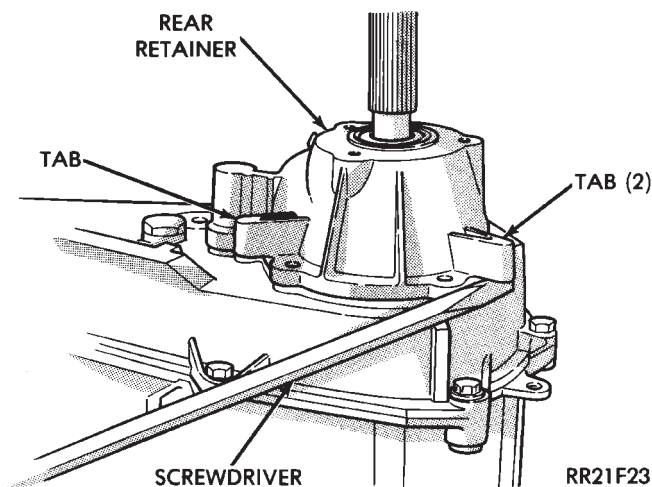


Fig. 3 Rear Retainer Removal

CAUTION: Do not pry against the sealing surfaces of the retainer or rear case. The surfaces could be damaged.

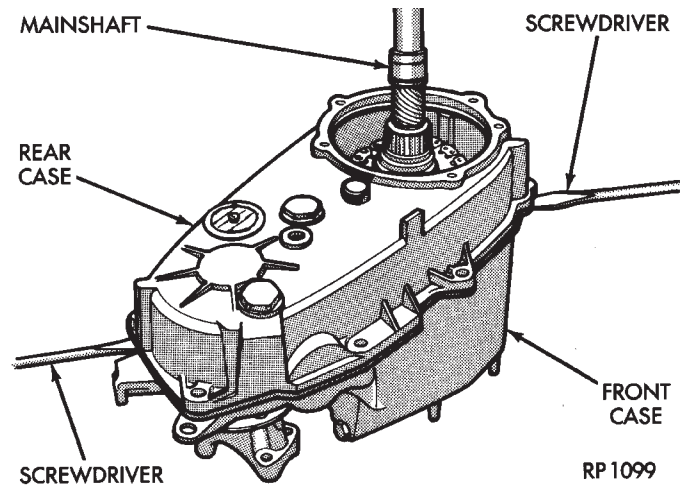


Fig. 4 Loosening Rear Case

(9) Remove bolts attaching rear case to front case. Retain bolts and washers.

(10) Separate rear case from front case (Fig. 4) Insert screwdrivers into slots cast in case ends. Then gently pry upward to break sealer bead and loosen rear case.

CAUTION: Do not pry against the sealing surfaces of the retainer or rear case. The surfaces could be damaged.

(11) Remove oil pump and rear case as an assembly (Fig. 5).

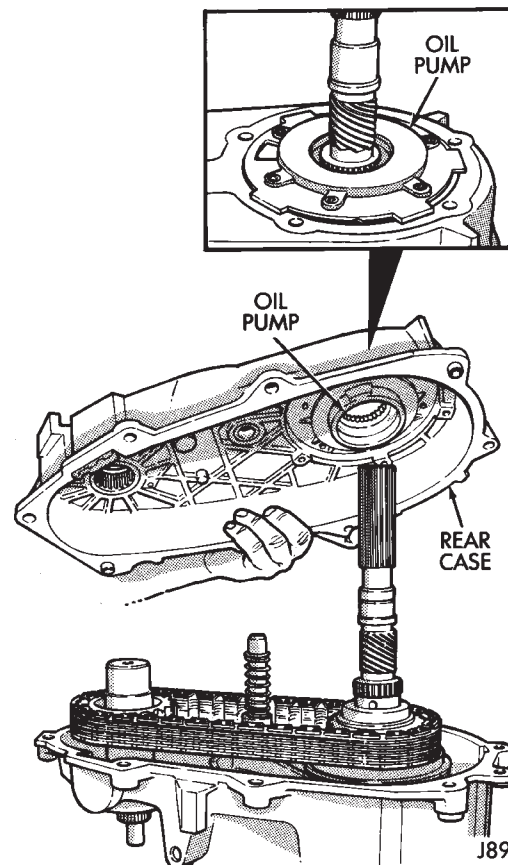


Fig. 5 Rear Case And Oil Pump Removal

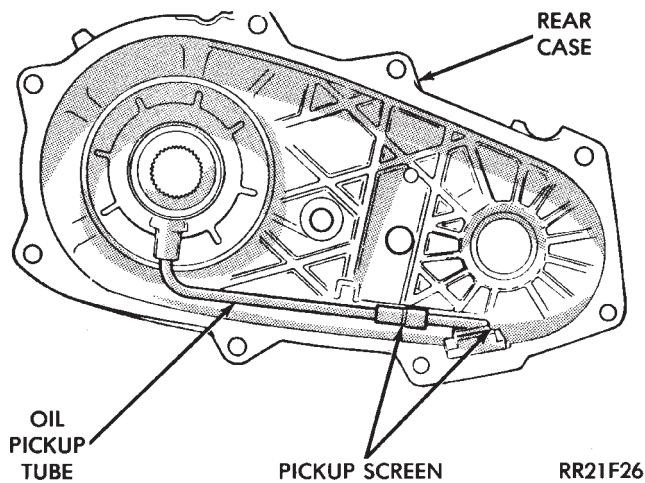


Fig. 6 Removing Oil Screen And Pickup Tube 16

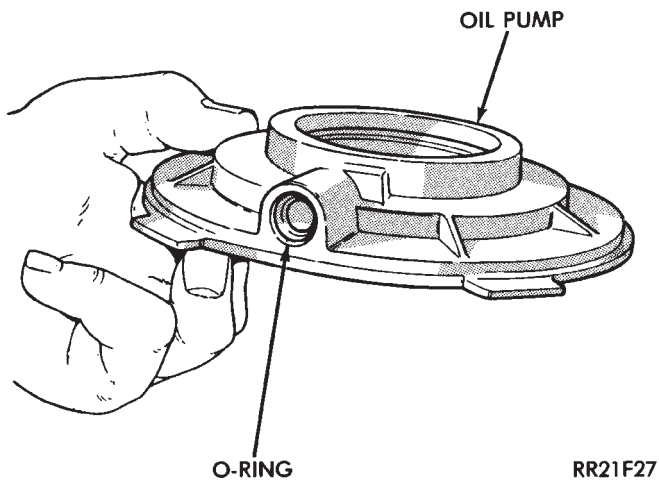


Fig. 7 Pickup Tube O-Ring Location

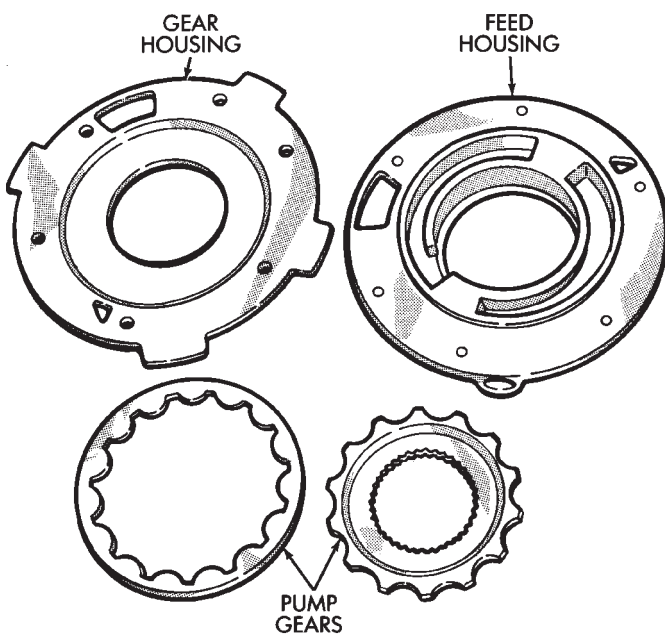


Fig. 8 Oil Pump Components

(12) Slide oil screen out of case pocket. Disconnect screen from pickup tube and remove screen (Fig. 6).

(13) Remove pickup tube from oil pump (Fig. 6).

(14) Remove oil pump from rear case.

(15) Remove pickup tube O-ring from oil pump (Fig. 7).

(16) **The oil pump can be disassembled for cleaning and inspection as described in steps (17 and (18). However, the pump parts are not serviceable separately. If any pump component is worn, or damaged, the pump must be replaced as an assembly.**

(17) If oil pump will be disassembled for inspection, mark position of oil pump housings for reference (Fig. 8). Remove screws that attach two halves of the pump. Then remove feed housing from gear housing (Fig. 8).

(18) Mark position of pump gears and remove them from housing (Fig. 8).

(19) Remove mode spring (Fig. 9).

(20) Tap front output shaft upward with a rawhide mallet to free it from shaft bearing.

(21) Remove front output shaft and drive chain as assembly (Fig. 10).

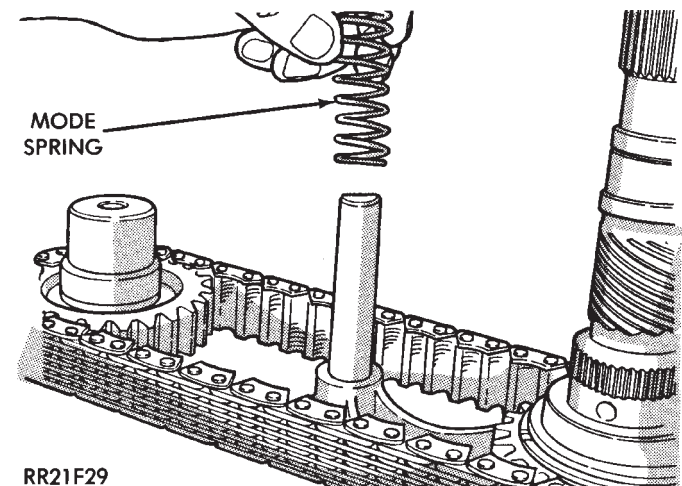


Fig. 9 Mode Spring Removal

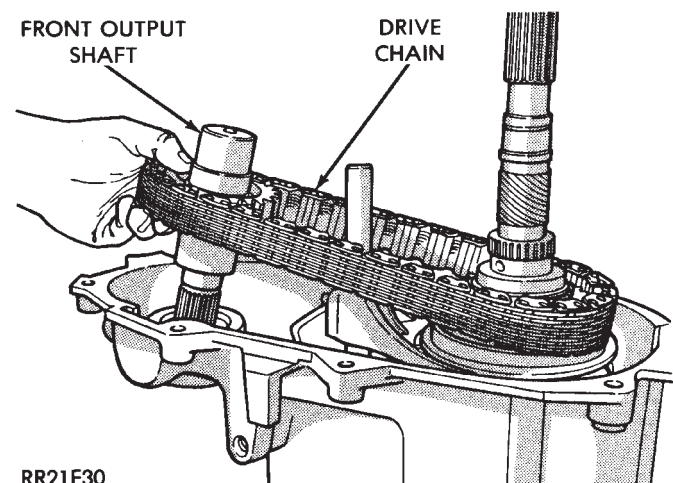


Fig. 10 Front Output Shaft And Drive Chain Removal

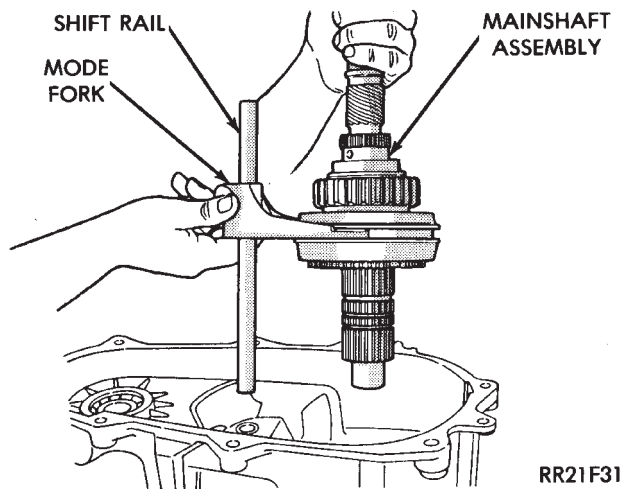


Fig. 11 Removing Mainshaft, Mode Fork And Shift Rail

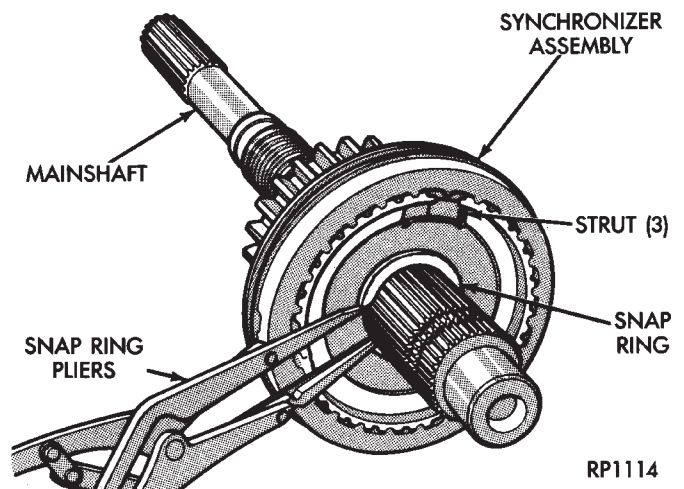


Fig. 13 Synchro Hub Snap Ring Removal/Installation

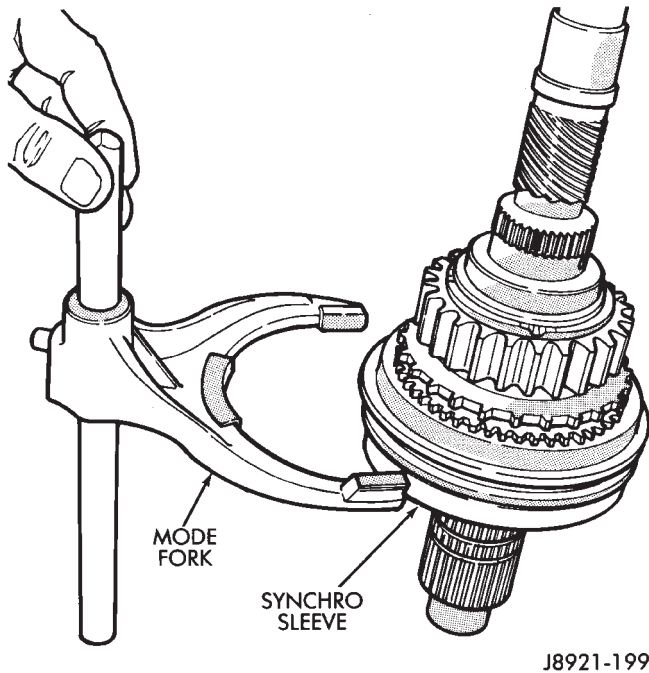


Fig. 12 Removing Mode Fork From Sleeve

(22) Remove mainshaft, mode fork and shift rail as assembly (Fig. 11).

(23) Remove mode fork and shift rail from synchro sleeve (Fig. 12).

(24) Remove synchro hub snap ring (Fig. 13).

(25) Remove synchro sleeve, hub and struts (Fig. 14).

(26) Remove synchro hub and stop ring (Fig. 15).

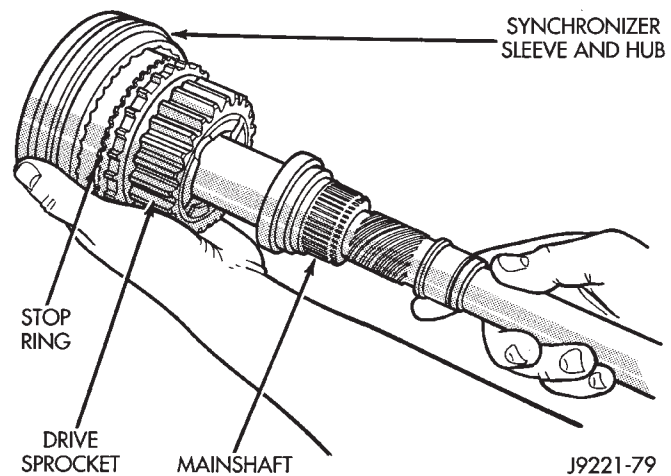


Fig. 14 Removing Synchro Sleeve, Hub And Struts

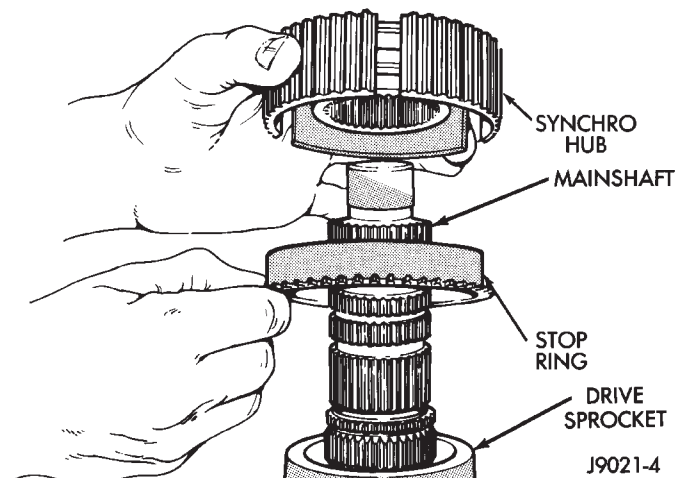
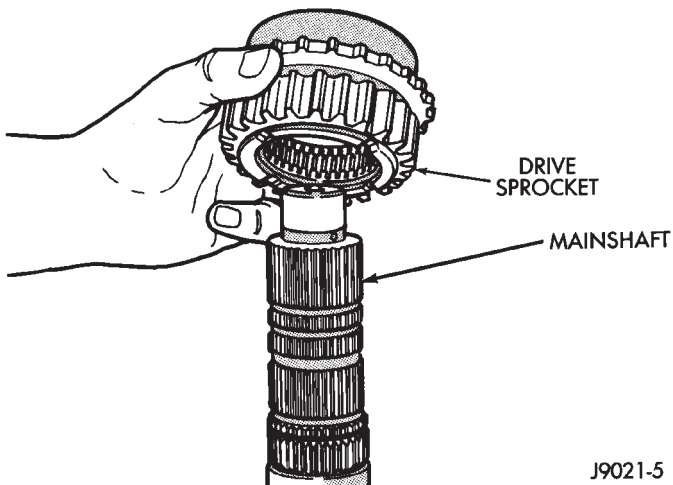
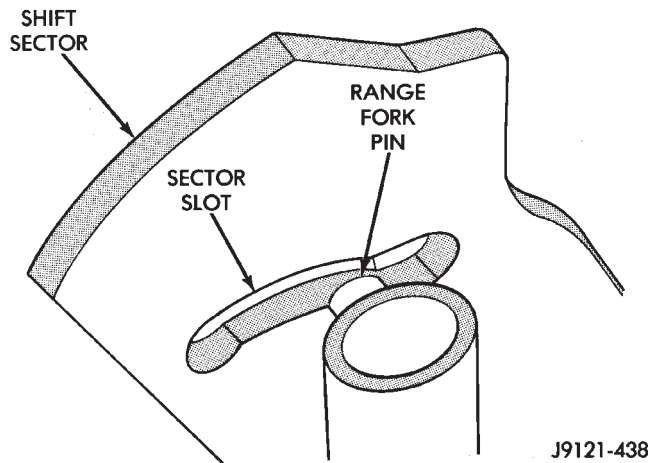


Fig. 15 Removing Synchro Hub And Stop Ring



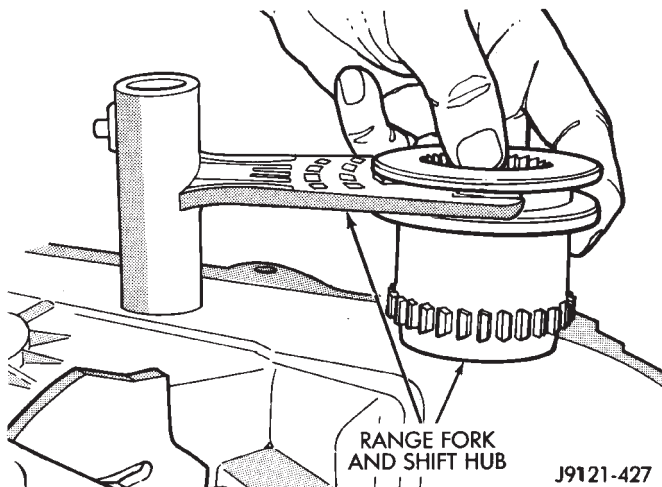
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Fig. 16 Drive Sprocket Removal/Installation



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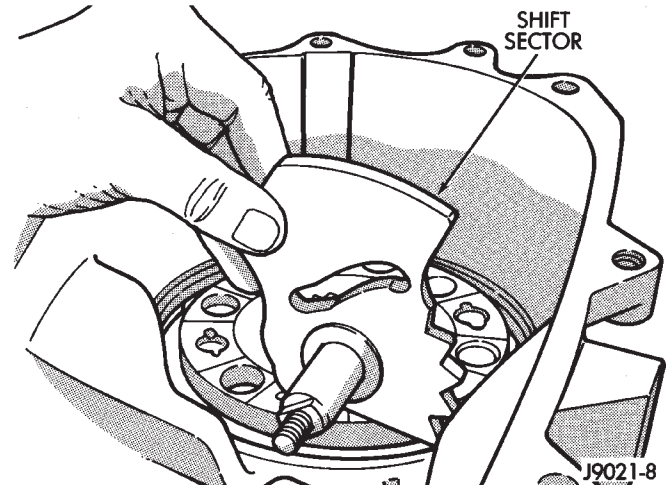
Fig. 17 Disengaging Range Fork



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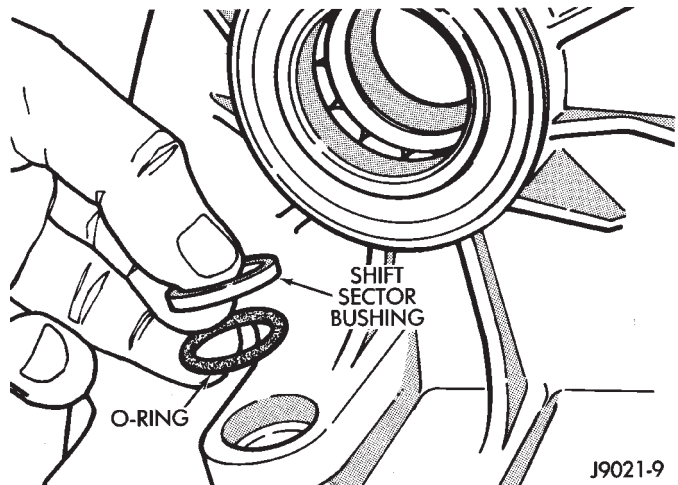
Fig. 18 Range Fork And Hub Removal/Installation

- (27) Remove drive sprocket (Fig. 16).
- (28) Slide range fork pin out of shift sector (Fig. 17).
- (29) Remove range fork and shift hub (Fig. 18).
- (30) Remove range lever from sector shaft.
- (31) Remove shift sector (Fig. 19).



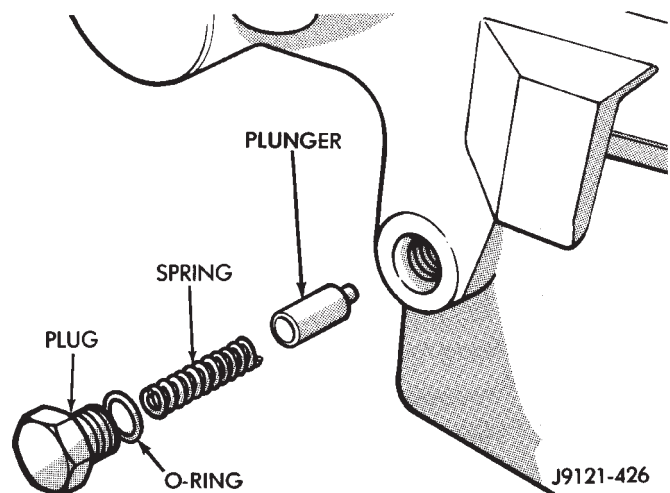
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Fig. 19 Shift Sector Removal/Installation



J9021-9

Fig. 20 Removing/Installing Sector Shaft Bushing And O-Ring



J9121-426

Fig. 21 Detent Component Removal

- (32) Remove sector shaft bushing and O-ring (Fig. 20).
- (33) Remove shift detent plunger, spring and plug (Fig. 21). Remove O-ring from plug after removal.

(34) Turn front case over and remove front bearing retainer bolts (Fig. 22).

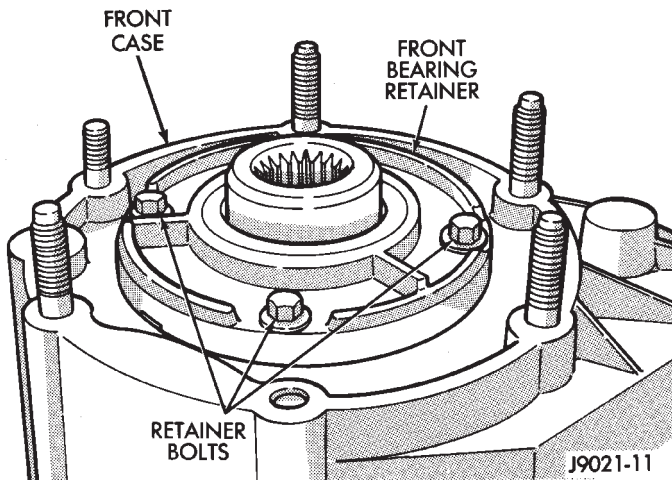


Fig. 22 Front Bearing Retainer Bolt Locations

(35) Remove front bearing retainer. Position screwdrivers in retainer slots and lift upward to loosen and remove retainer (Fig. 23).

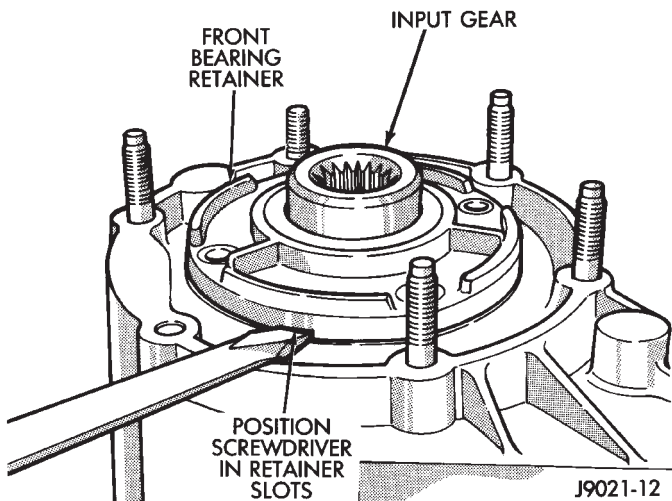


Fig. 23 Removing Front Bearing Retainer

- (36) Remove input gear snap ring (Fig. 24).
- (37) Press input and low range gear assembly out of input gear bearing with shop press (Fig. 25).
- (38) Remove low range gear snap ring (Fig. 26).
- (39) Remove retainer, thrust washers and input gear from low range gear (Fig. 27).
- (40) Remove oil seals from rear retainer, rear extension housing, oil pump feed housing and case halves.
- (41) Remove magnet from front case.
- (42) Remove the speedometer driven gear, seals and adapter.

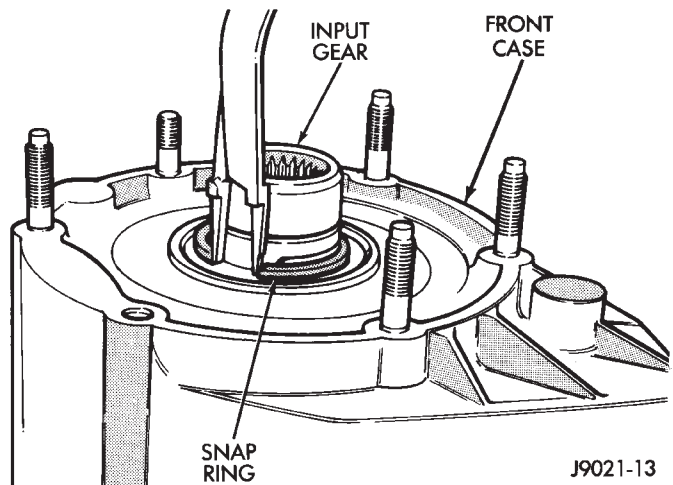


Fig. 24 Removing Input Gear Snap Ring

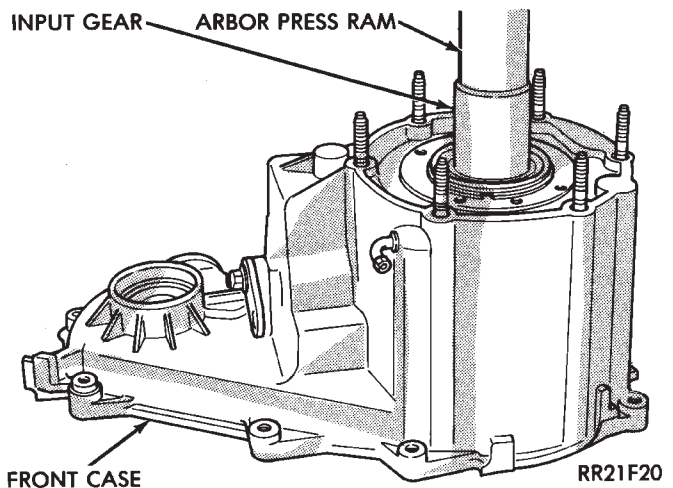


Fig. 25 Removing Input And Low Range Gear Assembly

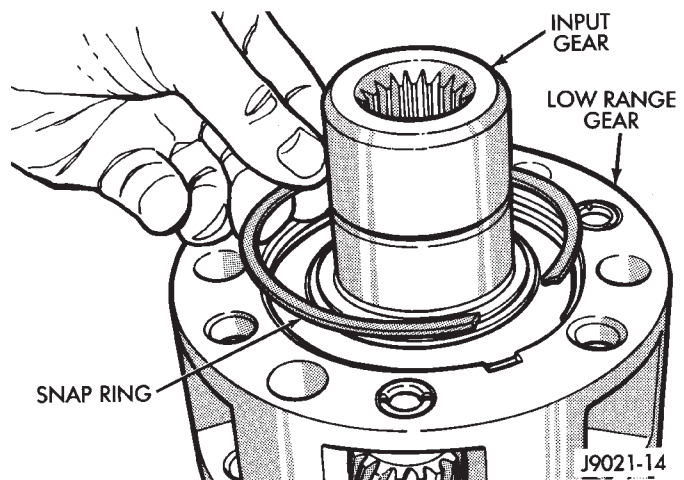


Fig. 26 Removing Low Range Gear Snap Ring

TRANSFER CASE CLEANING AND INSPECTION

Clean the transfer case components thoroughly with solvent. Remove all traces of sealer from the case and retainer seal surfaces.

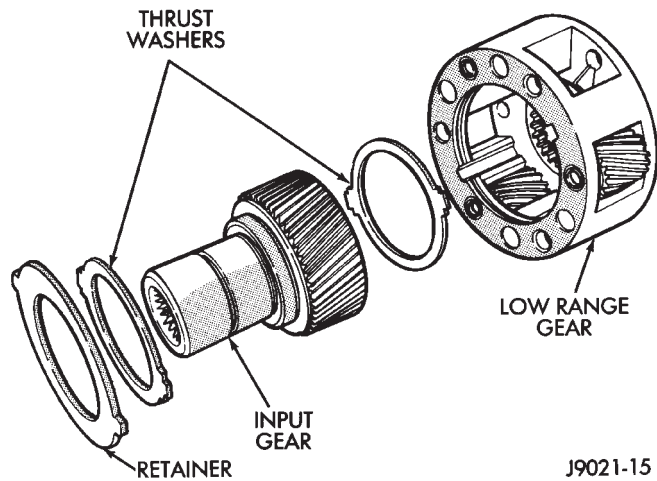


Fig. 27 Input And Low Range Gear Components

Clean the oil pickup screen with solvent and dry it with compressed air. Also use compressed air to remove solvent residue from all oil feed passages and channels.

Inspect the low range annulus gear (Fig. 28). **If the gear is damaged, replace the gear and front case as an assembly. Do not attempt to remove the gear.**

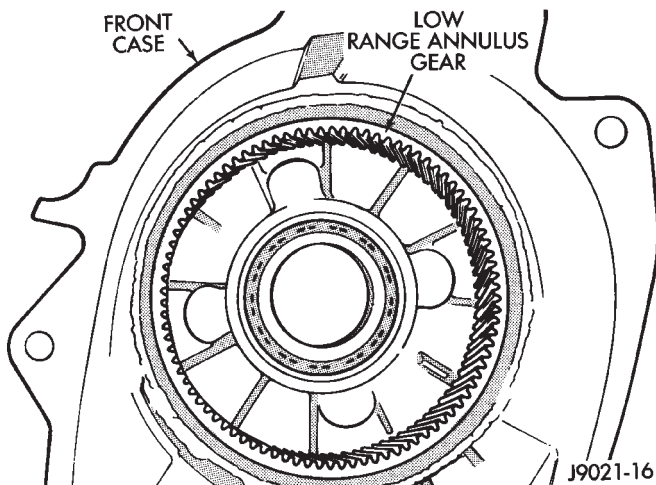


Fig. 28 Inspect Low Range Annulus Gear

Inspect the case halves, extension housing and retainers for cracks, porosity, or damaged sealing surfaces. Inspect the shafts, gears, chain and shift components for wear or damage. Replace the oil pump as an assembly if any pump part is worn or damaged.

Inspect all of the transfer case bearings for wear, roughness, pitting, or galling. Replace worn or damaged bearings as outlined in the assembly section.

TRANSFER CASE ASSEMBLY

CAUTION: The bearing bores in various transfer case components contain oil feed holes. Be sure replacement bearings do not block these feed holes.

(1) Lubricate components with automatic transmission fluid (or petroleum jelly where indicated) during assembly.

(2) Remove front output shaft seal from front case.

(3) Remove front output shaft bearing snap ring (Fig. 29).

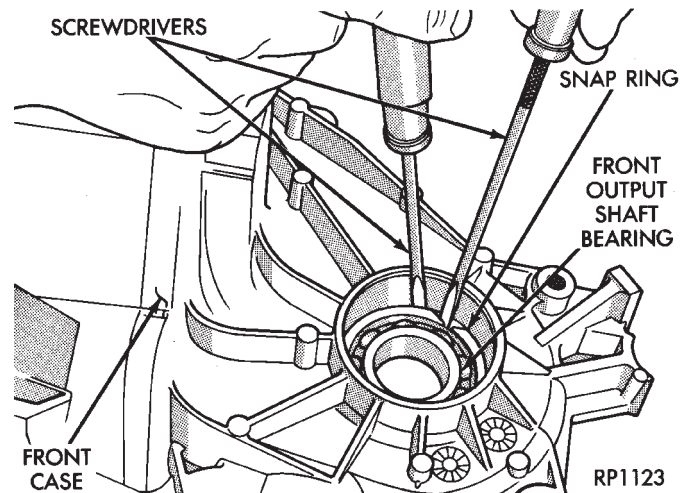


Fig. 29 Removing/Installing Front Output Shaft Bearing Snap Ring

(4) Tap old front output shaft bearing out of front case with plastic mallet. Install new bearing with Tool Handle C-4171 and Installer Tool 5064 (Fig. 30).

(5) Secure front output shaft bearing in front case with a new snap ring (Fig. 29).

(6) Install new front output shaft seal in front case.

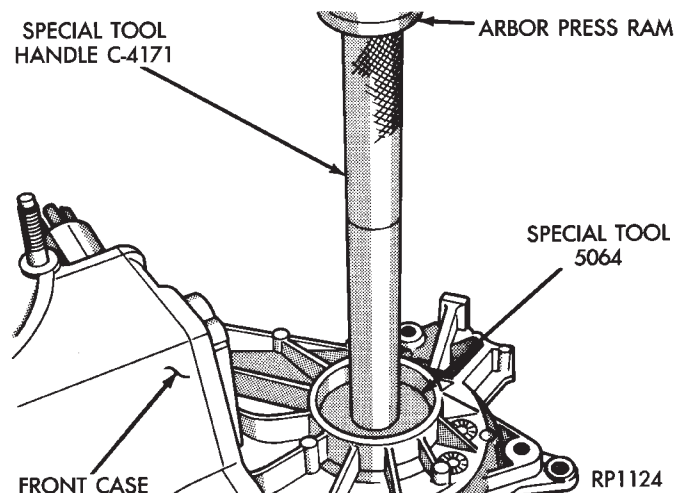


Fig. 30 Installing Output Shaft Front Bearing

(7) Press input gear bearing from the front case with Tool Handle C-4171 and Installer Tool C-4210 (Fig. 31). Then turn front case over.

(8) Install snap ring on new input gear bearing and start bearing in case.

(9) Carefully press input gear bearing into case until bearing snap ring seats against case (Fig. 32).

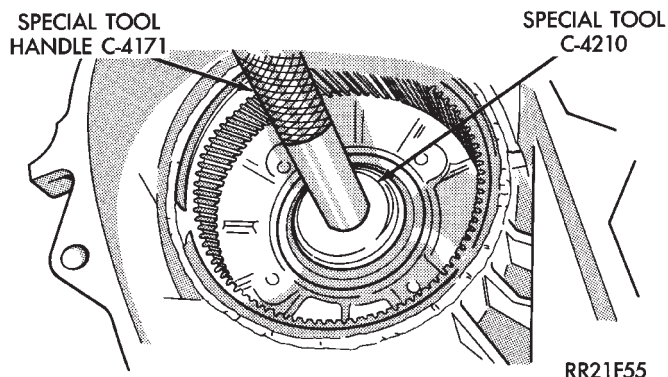


Fig. 31 Removing Input Gear Bearing

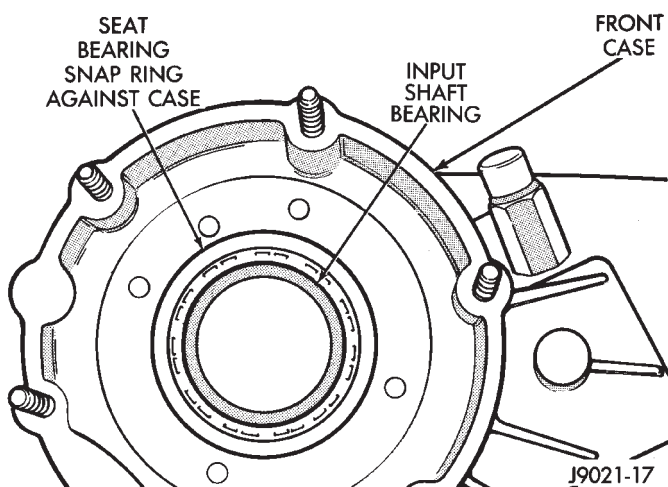


Fig. 32 Input Gear Bearing Installation

(10) Remove mainshaft pilot bearing from input gear with Tool MD-998346 and two suitable size open end wrenches (Fig. 33).

(11) Install new pilot bearing in input gear with shop press, Tool Handle C-4171 and Installer 5065 (Fig. 34).

(12) Assemble low range gear, input gear thrust washers, input gear and input gear retainer (Fig. 35).

(13) Install input gear snap ring (Fig. 36).

(14) Lubricate input gear with automatic transmission fluid.

(15) Start input gear in front bearing.

(16) Press input gear into front bearing (Fig. 36).

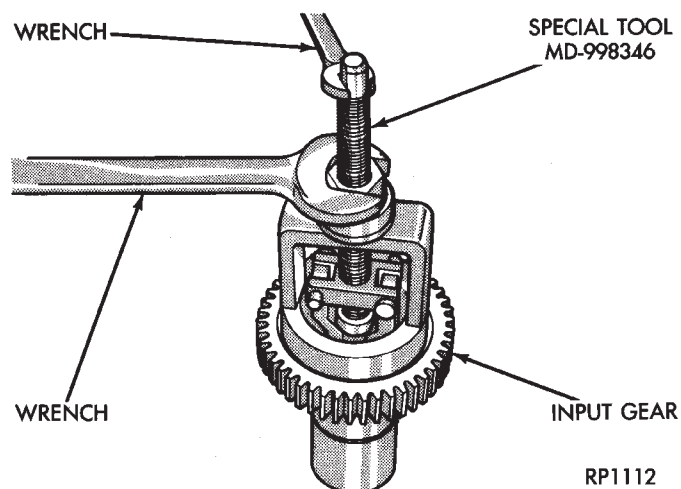


Fig. 33 Removing Mainshaft Pilot Bearing From Input Gear

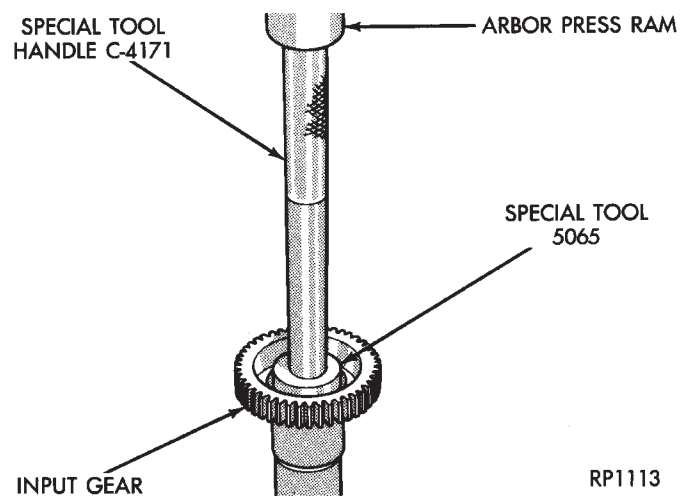


Fig. 34 Installing Mainshaft Pilot Bearing In Input Gear

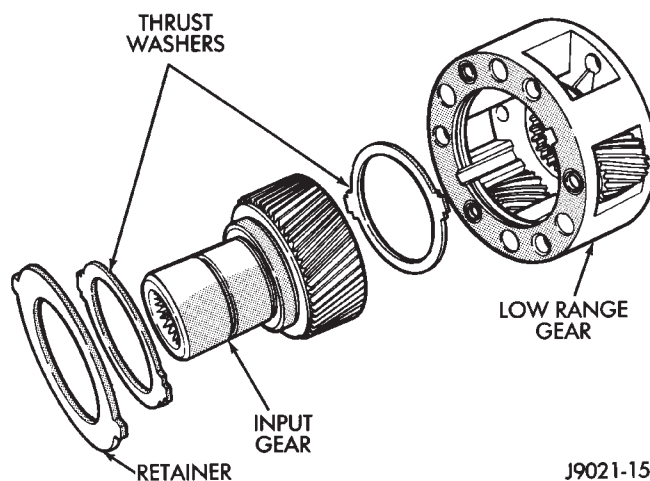


Fig. 35 Input And Low Range Gear Assembly

CAUTION: Use a proper size tool to press the input gear into the front bearing. An incorrect tool could push the input gear pilot bearing too far into the gear bore (Fig. 36). Also, do not press against the end surfaces of the low range gear. The gear case and thrust washers could be damaged.

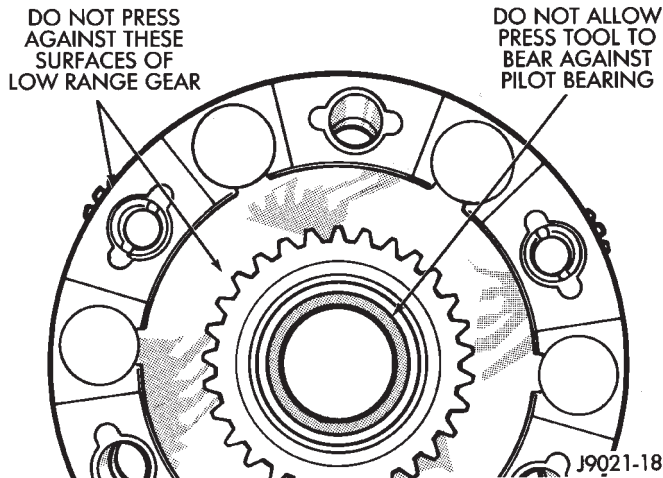


Fig. 36 Input And Low Range Gear Installation

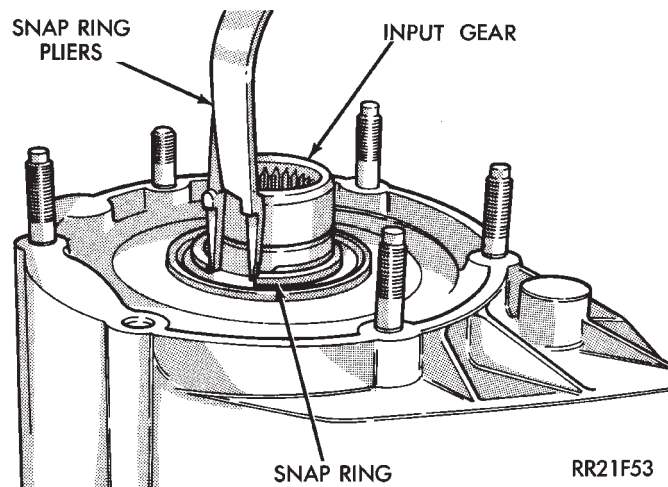


Fig. 37 Installing Input Gear Snap Ring

- (17) Install input gear snap ring (Fig. 37).
- (18) Install new oil seal in front bearing retainer.
- (19) Apply 3 mm (1/8 in.) wide bead of Mopar silicone sealer to front bearing retainer seal surface (Fig. 38).
- (20) Install front bearing retainer on front case (Fig. 22). Tighten retainer bolts to 21 N•m (16 ft. lbs.) torque.
- (21) Install new sector shaft O-ring and bushing (Fig. 39).
- (22) Install shift sector in the case (Fig. 40).
- (23) Install range lever and lever attaching nut on shift sector. Tighten attaching nut to 30 N•m (22 ft. lbs.) torque.
- (24) Install detent plunger, spring and plug (Fig. 41). Tighten plug to 20 N•m (15 ft. lbs.) torque.

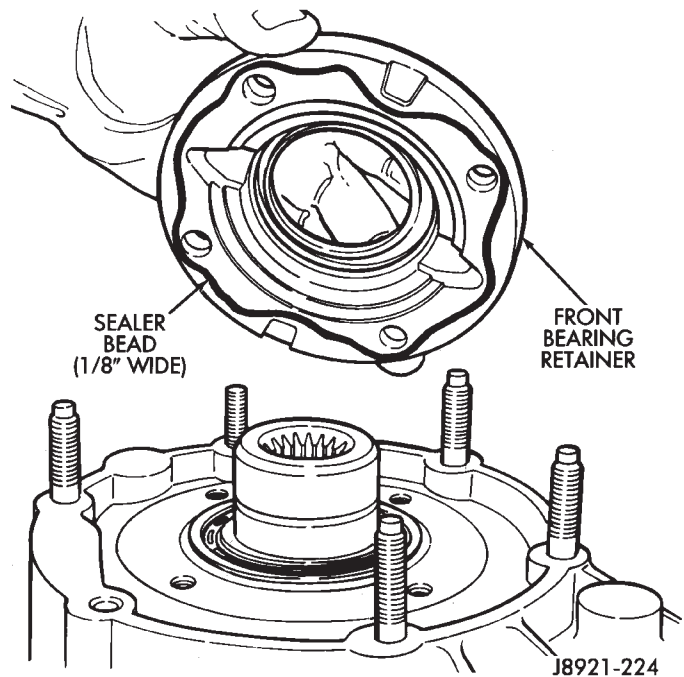


Fig. 38 Applying Sealer To Front Bearing Retainer

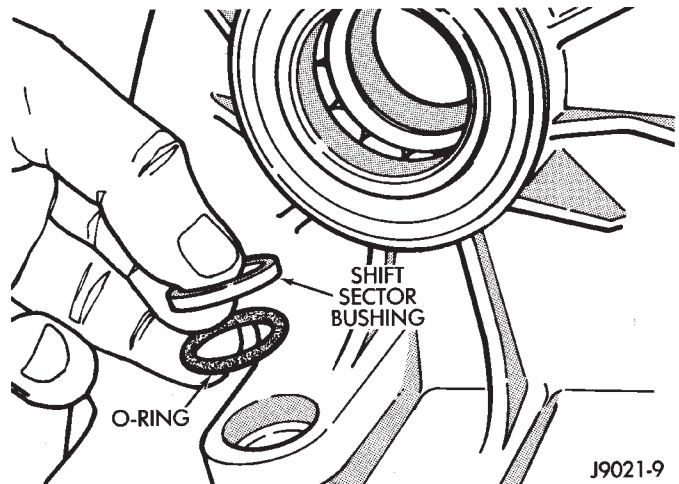


Fig. 39 Installing Sector O-Ring And Bushing

- (25) Inspect range fork pads (Fig. 42). Be sure pads are secure and in position.
- (26) Assemble range fork and shift hub (Fig. 43).
- (27) Engage range fork pin in sector slot (Fig. 44).
- (28) If drive sprocket bearings are to be replaced, remove and install them as follows:
 - (a) Press both bearings out of sprocket simultaneously with Remover Tool C-4667, or 5066 and Tool Handle C-4171 (Fig. 45).
 - (b) Before installing new bearings, refer to Figure 46 and note correct bearing position in sprocket. Bearings must also be installed in proper sequence. Install front bearing first and rear bearing last.

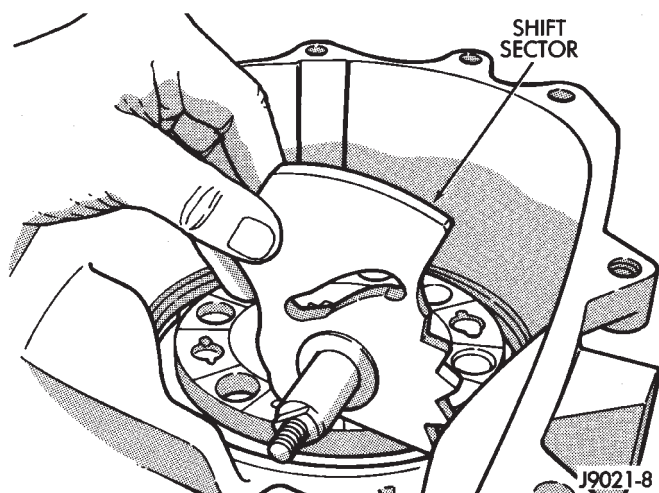


Fig. 40 Installing Shift Sector

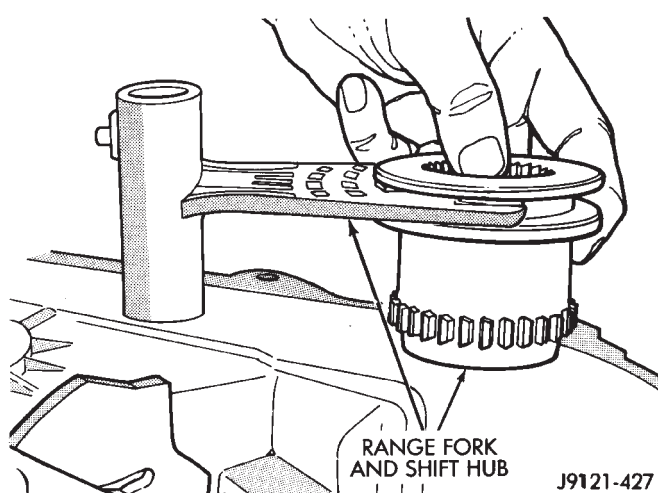


Fig. 43 Assembling Range Fork And Shift Hub

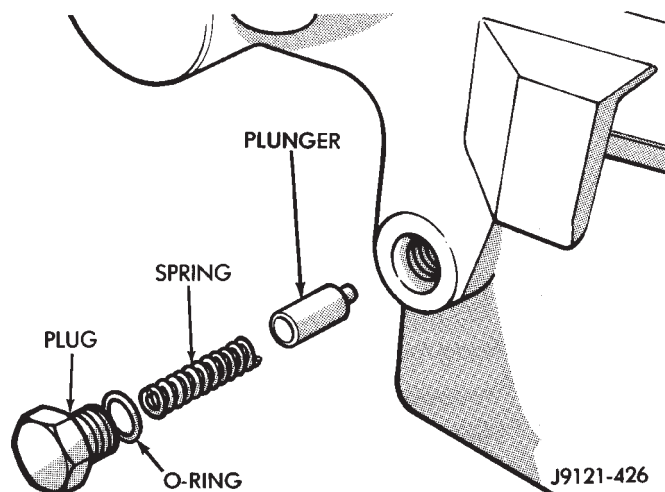


Fig. 41 Installing Detent Plunger-Spring-Plug

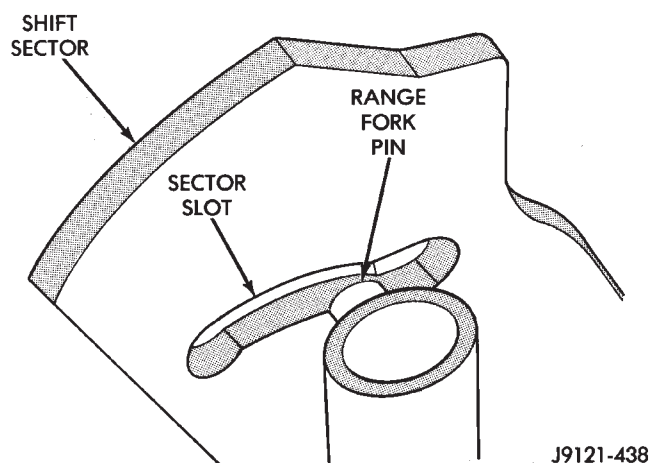


Fig. 44 Seating Range Fork In Sector

(c) Install new **front** bearing first. Press bearing flush with edge of sprocket bore (Fig. 47).

(d) Install new **rear** bearing (Fig. 48). Press bearing in until it is 4.6 mm (3/16 in.) below edge of bore as shown in Figure 46.

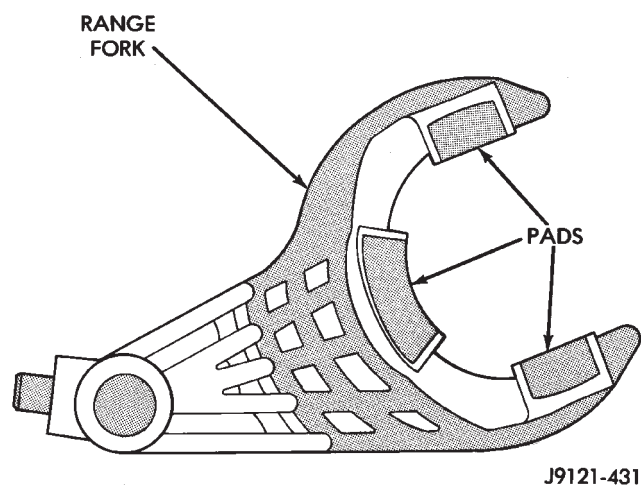


Fig. 42 Range Fork Pads

CAUTION: Do not press the bearings any farther into the sprocket than indicated in Figure 46. The bearings could block the mainshaft oil feed hole if pressed too deeply into the sprocket.

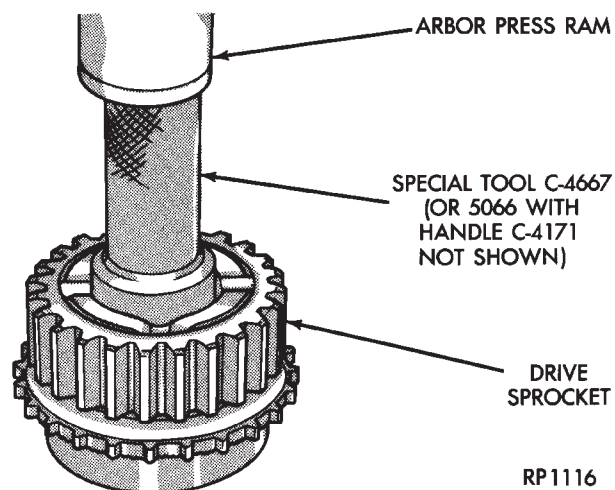
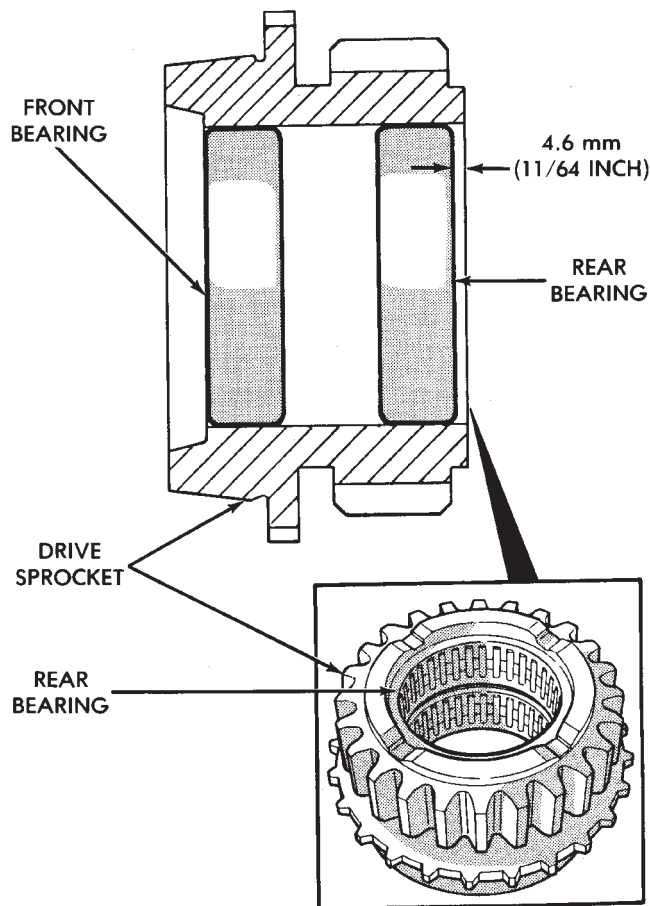


Fig. 45 Removing Drive Sprocket Bearings



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Fig. 46 Correct Position Of Bearings In Sprocket

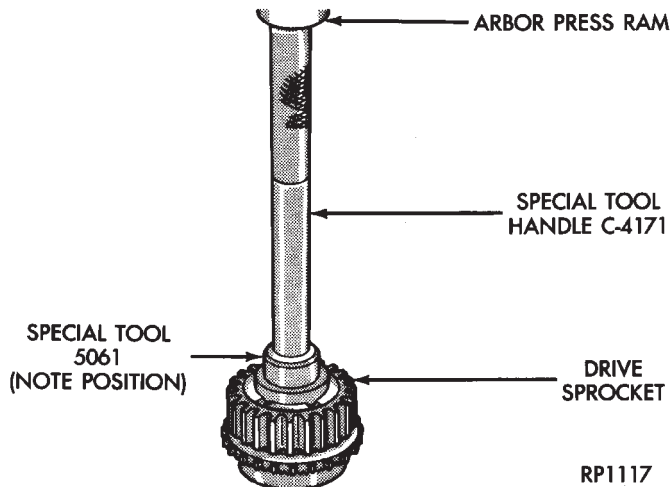


Fig. 47 Installing Drive Sprocket Front Bearing

(29) Install spring and three struts in synchro hub (Fig. 49).

(30) Lubricate drive sprocket bearings, stop ring and synchro hub with automatic transmission fluid.

(31) Install sprocket, stop ring and synchro hub on mainshaft (Fig. 50). **Be sure to seat hub struts on stop ring lugs.**

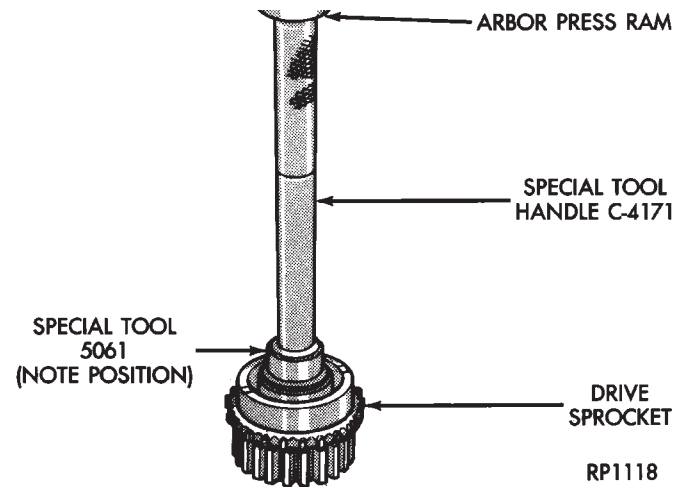


Fig. 48 Installing Drive Sprocket Rear Bearing

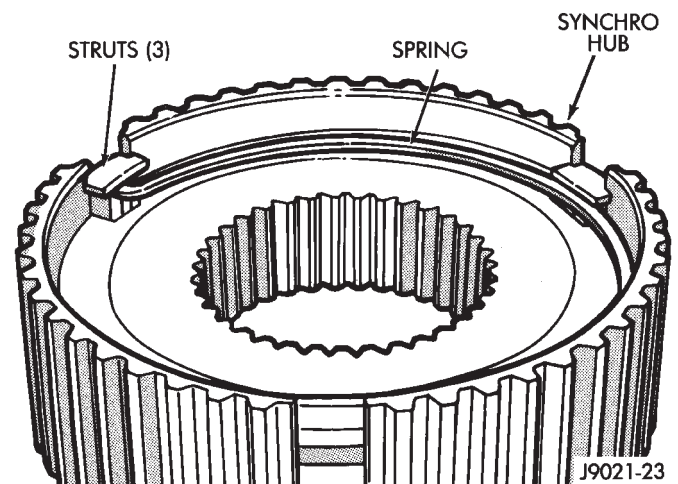
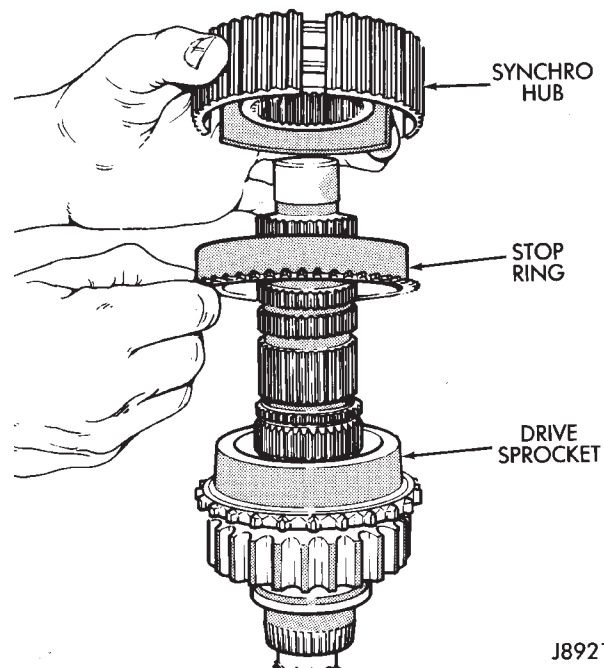


Fig. 49 Installing Synchro Hub Spring And Struts



J8921-232

Fig. 50 Drive Sprocket, Stop Ring And Synchro Hub Installation

(32) Install new synchro hub snap ring (Fig. 51).

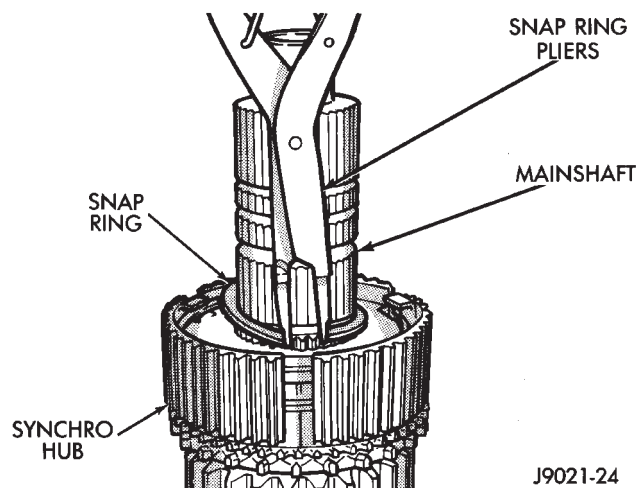


Fig. 51 Installing Synchro Hub Snap Ring

(33) Install sleeve on synchro hub. Be sure sleeve is installed with beveled spline ends facing stop ring.

(34) Install new pads on mode fork and install shift rail in fork.

(35) Engage mode fork in synchro sleeve (Fig. 52).

(36) Install mode fork-mainshaft assembly in case (Fig. 52). Be sure the mode fork rail is seated in both range fork bushings.

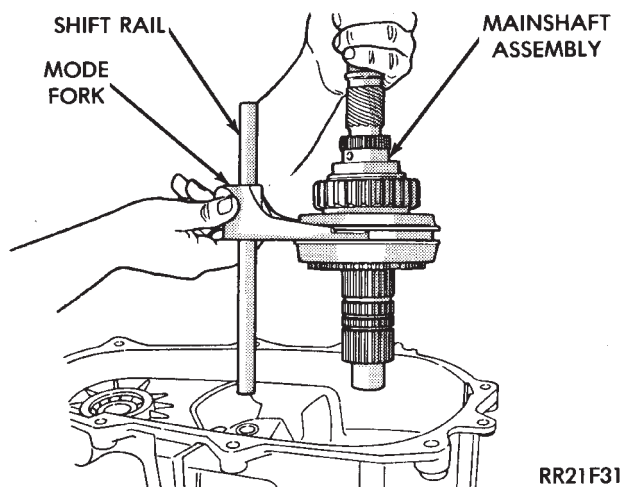


Fig. 52 Installing Mainshaft And Mode Fork Assembly

(37) Assemble and install output shaft and drive chain (Fig. 53). Lift mainshaft slightly to ease chain and shaft installation.

(38) Install mode spring on shift rail (Fig. 54).

(39) If front output shaft rear bearing is to be replaced, install new bearing as follows:

(a) Remove bearing from rear case with Bearing Remover MD-998346 and two suitable size wrenches (Fig. 55).

(b) Seat new bearing in rear case with Tool Handle C-4171 and Bearing Installer 5063 (Fig. 56).

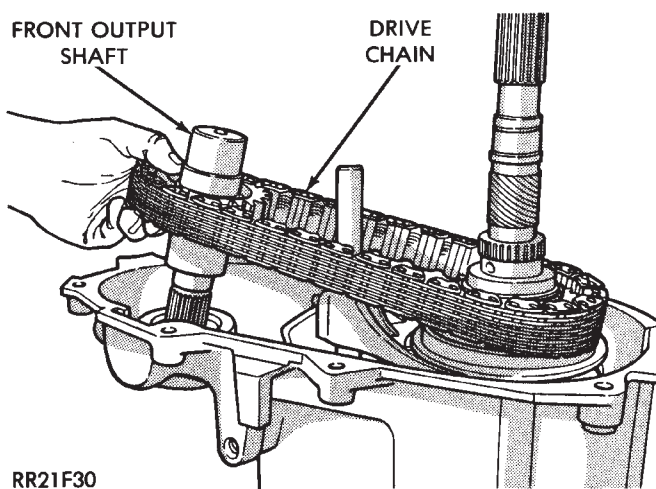


Fig. 53 Drive Chain And Front Output Shaft Installation

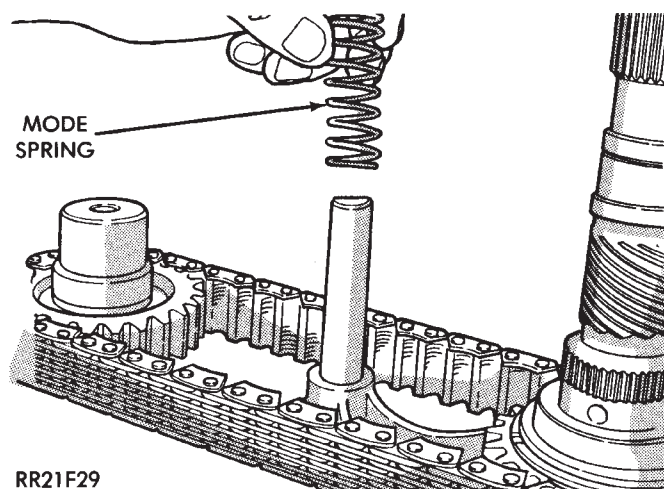


Fig. 54 Installing Mode Spring

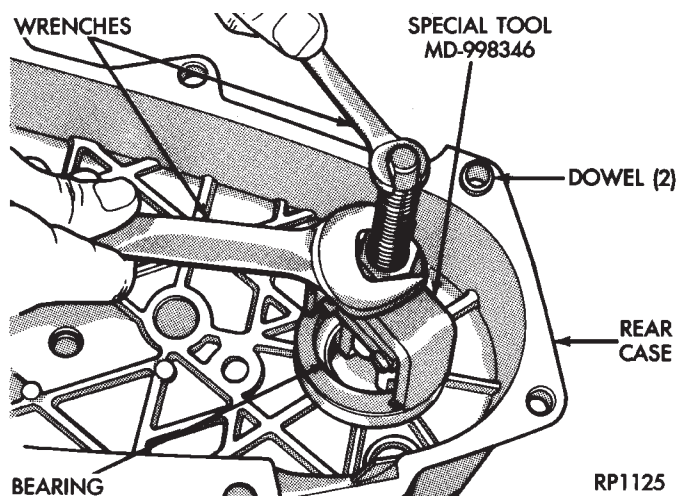


Fig. 55 Removing Front Output Shaft Rear Bearing

(40) Install new seal in oil pump feed housing (Fig. 57).

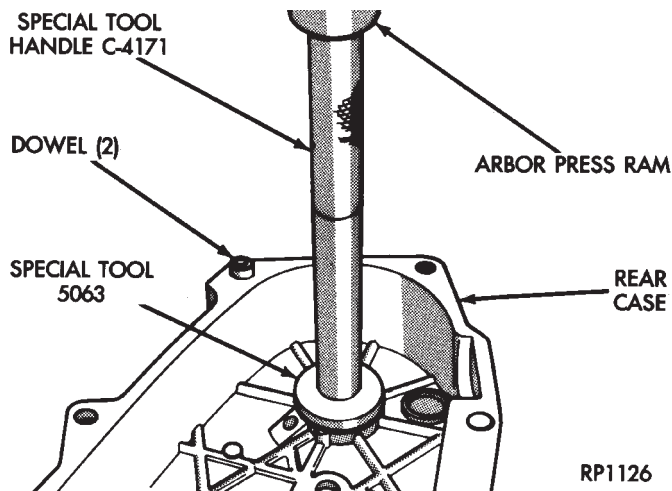


Fig. 56 Installing Front Output Shaft Rear Bearing

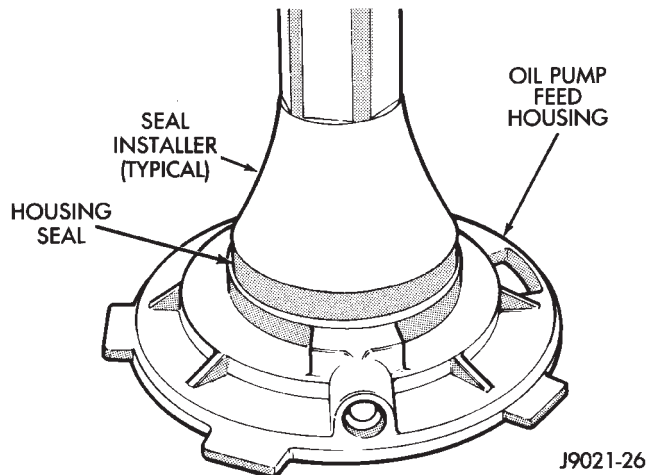


Fig. 57 Installing Oil Pump Feed Housing Seal

(41) If new oil pump is being installed, proceed to step (43). If original pump was only disassembled for cleaning and inspection, proceed to step (42).

(42) Assemble oil pump. Lubricate and install two gears in gear housing. Align and install feed housing on gear housing (Fig. 58). Install and tighten oil pump screws to 2 N•m (14 in. lbs.) torque.

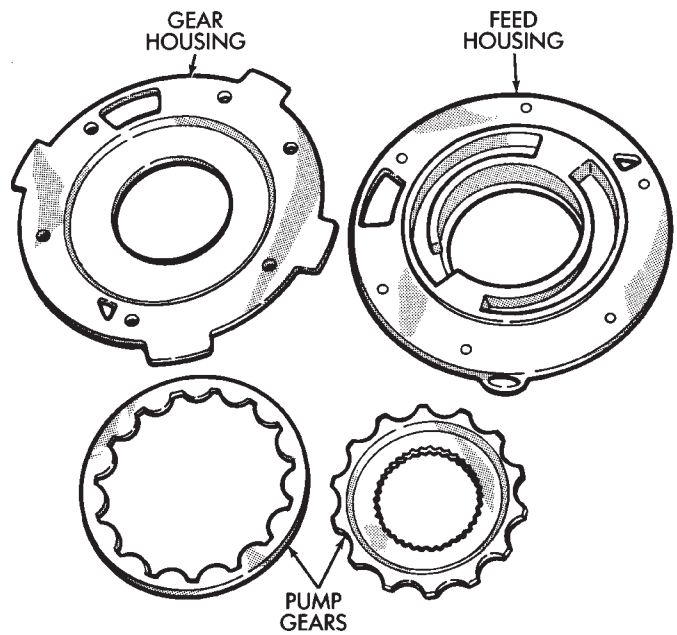
(43) Install new pickup tube O-ring in oil pump (Fig. 59).

(44) Insert oil pickup tube in oil pump. Then attach oil screen and connecting hose to pickup tube (Fig. 60).

(45) Install assembled oil pump, pickup tube and screen in rear case. Be sure screen is seated in case slot as shown (Fig. 60).

(46) Install magnet in front case.

(47) Apply 3 mm (1/8 in.) wide bead of Mopar gasket maker, silicone adhesive sealer, or Loctite 518 to seal surface of front case.



J8921-195

Fig. 58 Oil Pump Components

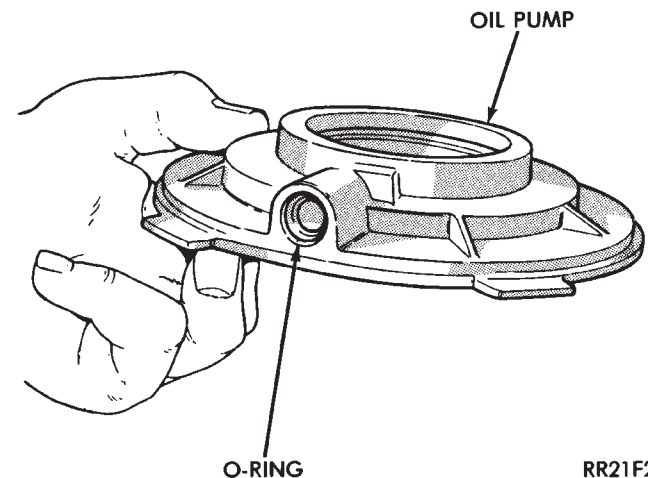


Fig. 59 Pickup Tube O-Ring Installation

(48) Align and install rear case on front case (Fig. 61). Be sure case locating dowels are in place and that mainshaft splines are engaged in oil pump inner gear.

(49) Install and tighten front case-to-rear case attaching bolts to 41 N•m (30 ft. lbs.) torque. **Be sure to install a washer under each bolt used at case dowel locations.**

(50) Install mainshaft rear bearing in rear retainer (Fig. 62). Tap old bearing out of retainer with hammer and brass drift. Then install new bearing with Tool Handle C-4171 and Installer 5064.

(51) Apply 3 mm (1/8 in.) wide bead of Mopar Gasket Maker, silicone adhesive sealer, or Loctite 518 to flange surface of rear retainer.

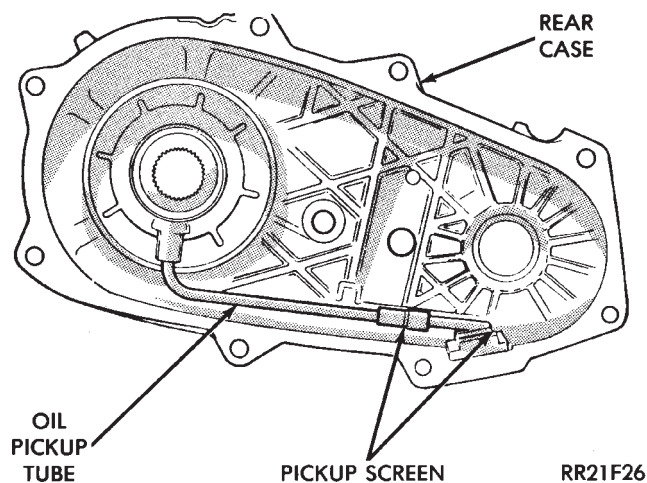


Fig. 60 Pickup Tube, Oil Screen And Pump Installation

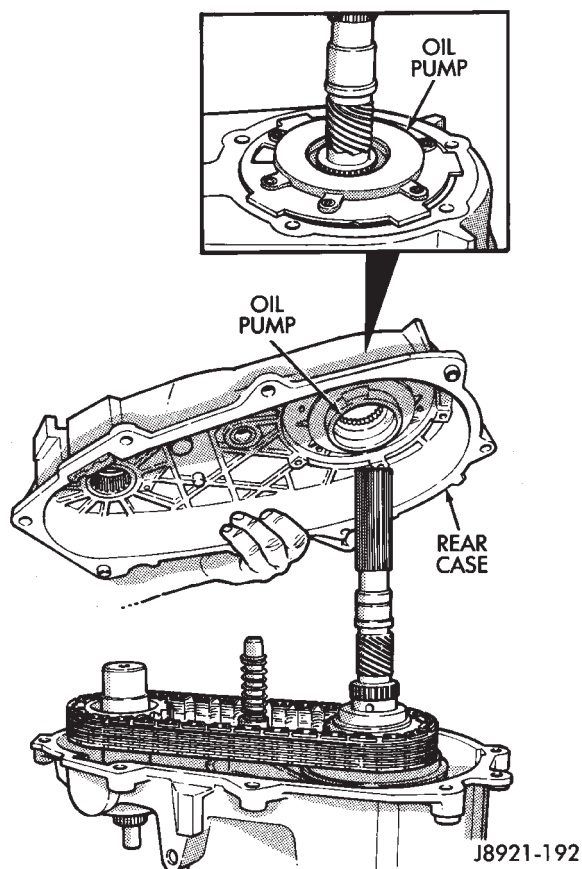


Fig. 61 Installing Rear Case On Front Case

(52) Install locating dowel in rear retainer and install retainer on case. Tighten retainer bolts to 24 N•m (18 ft. lbs.) torque.

(53) Install new rear bearing snap ring (Fig. 63). Lift mainshaft slightly to seat snap ring in shaft groove.

(54) Remove extension housing seal if not removed previously.

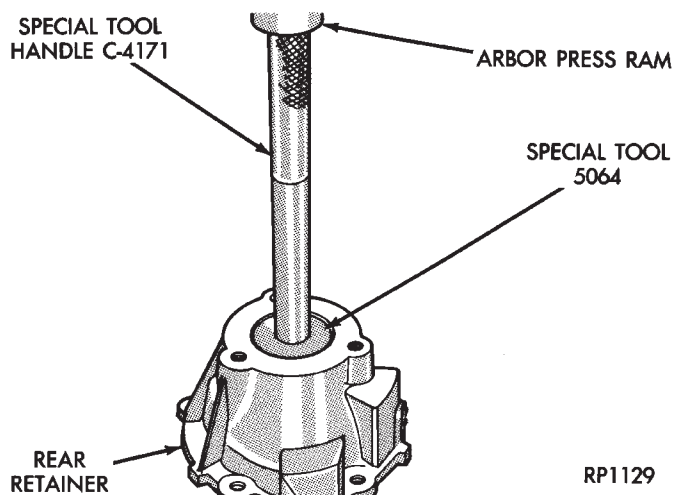


Fig. 62 Installing Mainshaft Rear Bearing In Rear Retainer

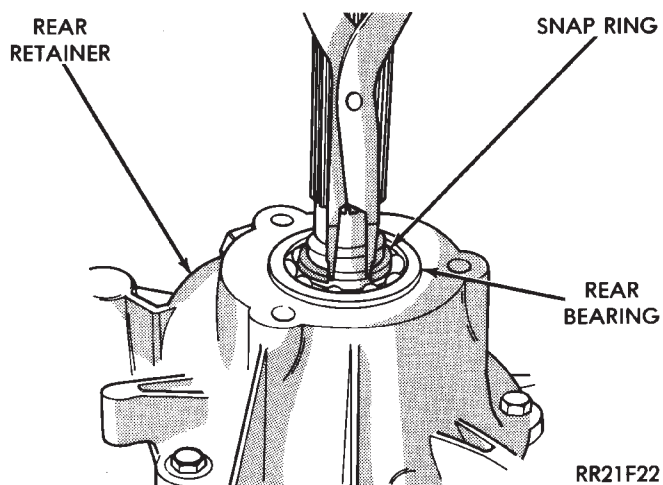


Fig. 63 Installing Rear Bearing Snap Ring

(55) Remove extension housing bushing with Bushing Installer Tools C-4171 and C-4338-A (Fig. 64).

(56) Install new extension housing bushing with Installer Tools C-4171 and 5066 (Fig. 65).

(57) Install new seal in extension housing.

(58) Apply 3 mm (1/8 in.) wide bead of Mopar gasket maker, silicone adhesive sealer, or Loctite 518 to mounting surface of extension housing.

(59) Install extension housing on case and tighten housing bolts to 41 N•m (30 ft. lbs.) torque.

(60) Install front yoke. Secure yoke with replacement seal washer and nut. Tighten nut to 149 N•m (110 ft. lbs.) torque.

(61) Install replacement gasket on vacuum switch and install switch in case.

(62) Install tighten drain plug to 47 N•m (35 ft. lbs.) torque.

(63) Install vacuum switch in case. Tighten switch to 47 N•m (35 ft. lbs.) torque.

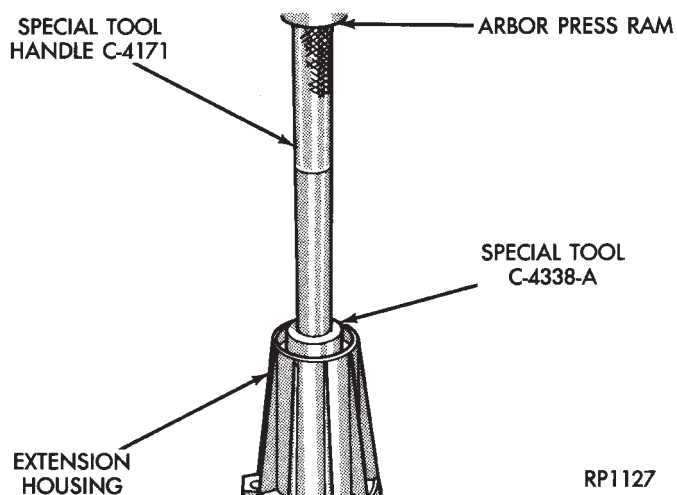


Fig. 64 Removing Extension Housing Bushing

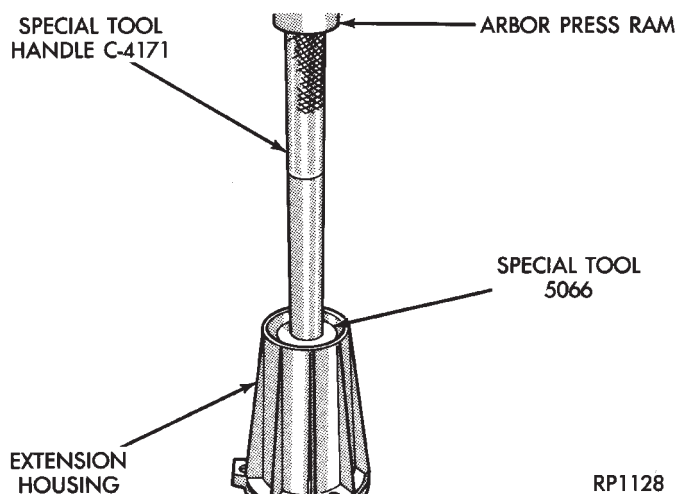


Fig. 65 Installing Extension Housing Bushing

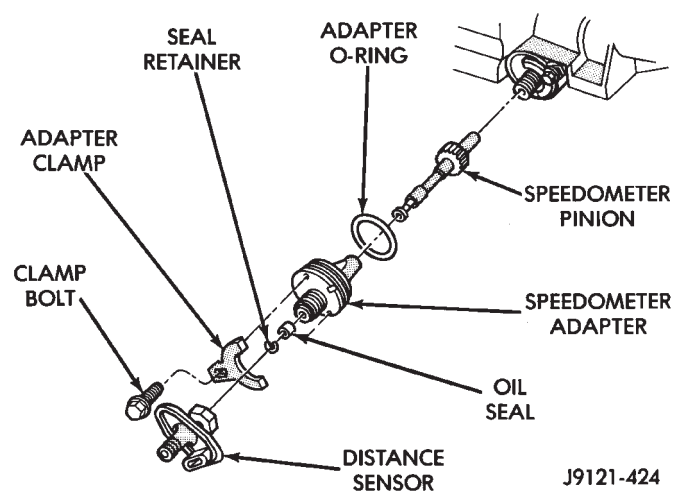
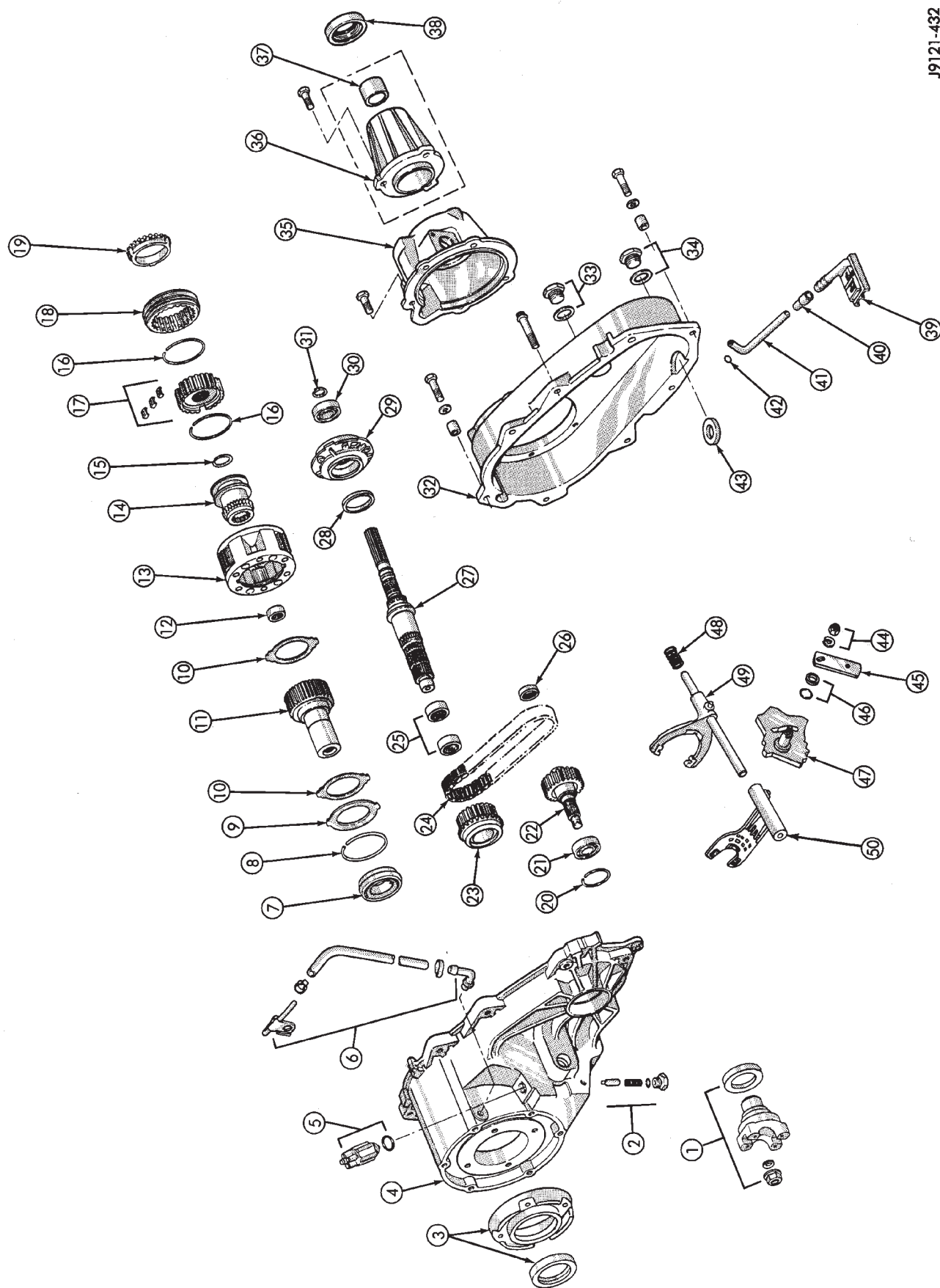


Fig. 66 Speedometer Components

- (64) Install speedometer gear and adapter (Fig. 66).
- (65) Fill transfer case with Mopar ATF Plus, or Dexron II transmission fluid after installation.
- (66) Install and tighten fill plug to 41 N•m (35 ft. lbs.) torque.



J9121-432

NP231 TRANSFER CASE

LEGEND FOR NP231 TRANSFER CASE

1. Front Yoke, Nut, Seal Washer, and Oil Seal	18. Synchro Sleeve*	35. Rear Retainer
2. Shift Detent Plug, Spring and Pin	19. Stop Ring*	36. Extension Housing
3. Front Retainer and Seal	20. Snap Ring	37. Bushing
4. Front Case	21. Output Shaft Front Bearing	38. Oil Seal
5. Vacuum Switch and Seal	22. Front Output Shaft	39. Oil Pickup Screen
6. Vent Assembly	23. Drive Sprocket	40. Tube Connector
7. Input Gear Bearing and Snap Ring	24. Drive Chain	41. Oil Pickup Tube
8. Low Range Gear Snap Ring	25. Drive Sprocket Bearings	42. Pickup Tube O-Ring
9. Input Gear Retainer	26. Output Shaft Rear Bearing	43. Magnet
10. Low Range Gear Thrust Washers	27. Mainshaft	44. Range Lever Nut and Washer
11. Input Gear	28. Oil Seal	45. Range Lever
12. Input Gear Pilot Bearing	29. Oil Pump Assembly	46. Sector O-Ring and Seal
13. Low Range Gear	30. Mainshaft Rear Bearing	47. Sector
14. Range Fork Shift Hub	31. Snap Ring	48. Mode Spring
15. Synchro Hub Snap Ring*	32. Rear Case	49. Mode Fork
16. Synchro Hub Springs*	33. Fill Plug and Gasket	50. Range Fork
17. Synchro Hub and Struts*	34. Drain Plug and Gasket	

*Synchro equipped models only.

J9221-76

NP242 TRANSFER CASE

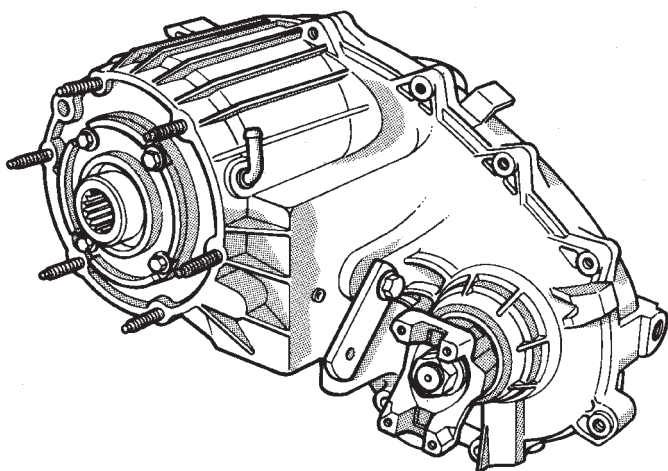
INDEX

	page		page
Cleaning and Inspection	305	Transfer Case Fill Level	293
General Information	292	Transfer Case Identification	292
Shift Linkage Adjustment	293	Transfer Case Installation	293
Transfer Case Assembly	305	Transfer Case Lubricant	292
Transfer Case Disassembly and Overhaul	296	Transfer Case Removal	293

GENERAL INFORMATION

The NP242 is a full and part time transfer case with four operating ranges (Fig. 1). The NP242 provides both 2-wheel drive and full time 4-wheel drive operation.

The differential has a locking mechanism for undifferentiated 4-wheel drive in high and low ranges. A low range gear reduction system provides increased low speed torque capability.



J8921-243

Fig. 1 NP242 Transfer Case

OPERATING RANGES

The NP242 transfer case operating ranges are: 2-wheel drive, part-time 4-wheel drive, full time 4-wheel drive and 4-wheel drive low.

The full time 4-wheel drive range is fully differentiated and can be used at any time.

The part time 4-wheel drive high and low ranges are not differentiated. They are for off road use only.

The low range reduction gear system is operative in 4-low range only. Low range reduction ratio is 2.72:1.

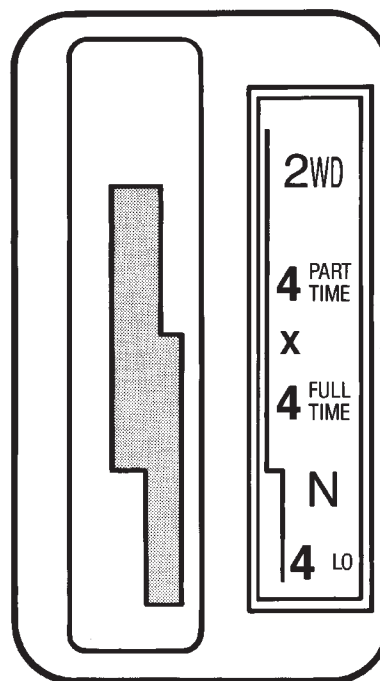
Two-wheel drive and full time 4-wheel drive ranges are for normal operation. The part time, 4-wheel drive high and low ranges are for off road operation, or when the vehicle is driven on surfaces covered by snow, ice or similar low traction elements.

SHIFT MECHANISM

Transfer case 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. Range positions are marked on the shifter bezel plate (Fig. 2).

TRANSFER CASE IDENTIFICATION

A circular I.D. tag is attached to the rear case of



J9021-113

Fig. 2 NP242 Shift Pattern

each NP242 transfer case (Fig. 3). The tag provides the transfer case model number, assembly number, serial number and low range ratio.

The transfer case serial number also represents the date of build. For example, a serial number of 12-5-92 would represent December 5, 1992.

TRANSFER CASE LUBRICANT

Mopar ATF Plus, Type 7176, or Dexron II automatic transmission fluid can be used in the NP242 transfer case.

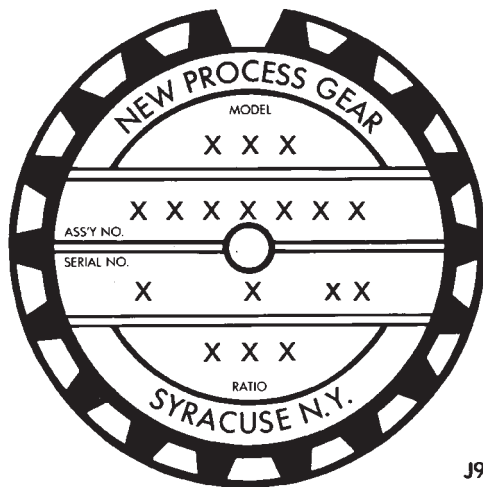


Fig. 3 Transfer Case I.D. Tag

Lubricant capacity of the Model 242 transfer case is 1.4 liters (1.45 qts.).

TRANSFER CASE FILL LEVEL

Correct fill level for the NP242 transfer case is to the bottom edge of the fill plug hole.

SHIFT LINKAGE ADJUSTMENT

- (1) Move transfer case shift lever into Neutral position.
- (2) Raise vehicle on hoist that will allow all four wheels to rotate freely.
- (3) Loosen trunnion lock bolt (Figs. 4 and 5). Loosen bolt enough so selector rod slides freely in trunnion.
- (4) Verify that shift lever on transfer case is in centered in Neutral position.
- (5) Tighten trunnion lock bolt to 8-14 N•m (72-120 in. lbs.) torque.
- (6) Lower vehicle enough for entry into driver's seat but keep all wheels off shop floor.
- (7) Verify correct linkage adjustment. Start engine, shift transmission into gear and shift transfer case into all ranges. Be sure transfer case is fully engaged in high and low range. Readjust linkage if necessary.
- (8) Shut engine off and lower vehicle completely.

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) Place support stand under transmission.
- (6) Remove rear crossmember.
- (7) Disconnect front/rear propeller shafts at transfer case.
- (8) Disconnect speed sensor and remove speedometer adapter and sensor if necessary.
- (9) Disconnect transfer case shift lever from shift lever rod.
- (10) Disconnect vent hose and electrical connectors.
- (11) Support transfer case with transmission jack.
- (12) Remove bolts attaching transfer case to transmission.
- (13) Secure transfer case to jack with chains.
- (14) Pull transfer case and jack rearward to disengage transfer case.
- (15) Remove transfer case from under vehicle.

TRANSFER CASE INSTALLATION

- (1) Mount transfer case on a transmission jack. Secure transfer case to jack with chains.
- (2) Position transfer case under vehicle.
- (3) Align transfer case and transmission shafts and install transfer case on transmission (Fig. 6).
- (4) Install and tighten transfer case attaching nuts to 35 N•m (26 ft. lbs.) torque (Fig. 6).
- (5) Install speedometer adapter if removed during service (Fig. 7). Then index adapter and install speed sensor in adapter. Refer to In-Vehicle Service section.
- (6) Connect electrical wires to speed sensor.
- (7) Connect vent hose to transfer case vent (Fig. 8).
- (8) Align and connect propeller shafts. Tighten shaft attaching bolts to 19 N•m (170 in. lbs.) torque.
- (9) Fill transfer case with Mopar ATF Plus, or Dexron II automatic transmission fluid.
- (10) Install rear crossmember if removed. Tighten crossmember bolts to 41 N•m (30 ft. lbs.) torque.
- (11) Remove transmission jack and transmission support stand.
- (12) Connect transfer case shift lever to shift lever rod.
- (13) Check and adjust transfer case shift linkage if necessary.
- (14) Lower vehicle.

NP242 SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
TRANSFER CASE DIFFICULT TO SHIFT OR WILL NOT SHIFT INTO DESIRED RANGE	(1) Transfer case external shift linkage binding. (2) Insufficient or incorrect lubricant. (3) Internal components binding, worn or damaged.	(1) Lubricate, repair or replace linkage, or tighten loose components as necessary. (2) Drain and refill to edge of fill hole with DEXRON II® or MOPAR-MERCON® Automatic Transmission Fluid. (3) Disassemble unit and replace worn or damaged components as necessary.
TRANSFER CASE NOISY IN ALL DRIVE POSITIONS	(1) Insufficient or incorrect lubricant.	(1) Drain and refill to edge of fill hole with DEXRON II® or MOPAR-MERCON® Automatic Transmission Fluid. Check for leaks and repair if necessary Note: If unit is still noisy after drain and refill, disassembly and inspection may be required to locate source of noise.
LUBRICANT LEAKING FROM OUTPUT SHAFT SEALS OR FROM VENT	(1) Transfer case overfilled. (2) Vent closed or restricted. (3) Output shaft seals damaged or installed incorrectly.	(1) Drain to correct level. (2) Clear or replace vent if necessary. (3) Replace seals. Be sure seal lip faces interior of case when installed. Also be sure yoke seal surfaces are not scored or nicked. Remove scores and nicks with fine sandpaper or replace yoke(s) if necessary.
TRANSFER CASE WILL NOT SHIFT THROUGH 4 X 4 PART-TIME RANGE (Light Remains On).	(1) Incomplete shift due to drivetrain torque load. (2) Incorrect tire pressure(s). (3) Excessive tire wear. (4) Excessive vehicle loading.	(1) Driver must momentarily release the accelerator pedal to complete the shift. (2) Inflate all tires equally to correct pressure. (3) Switch tires — Install the two tires with the most wear (one on the front axle and one on the rear axle). (4) Check vehicle loading — Do not exceed the vehicle's GVW.

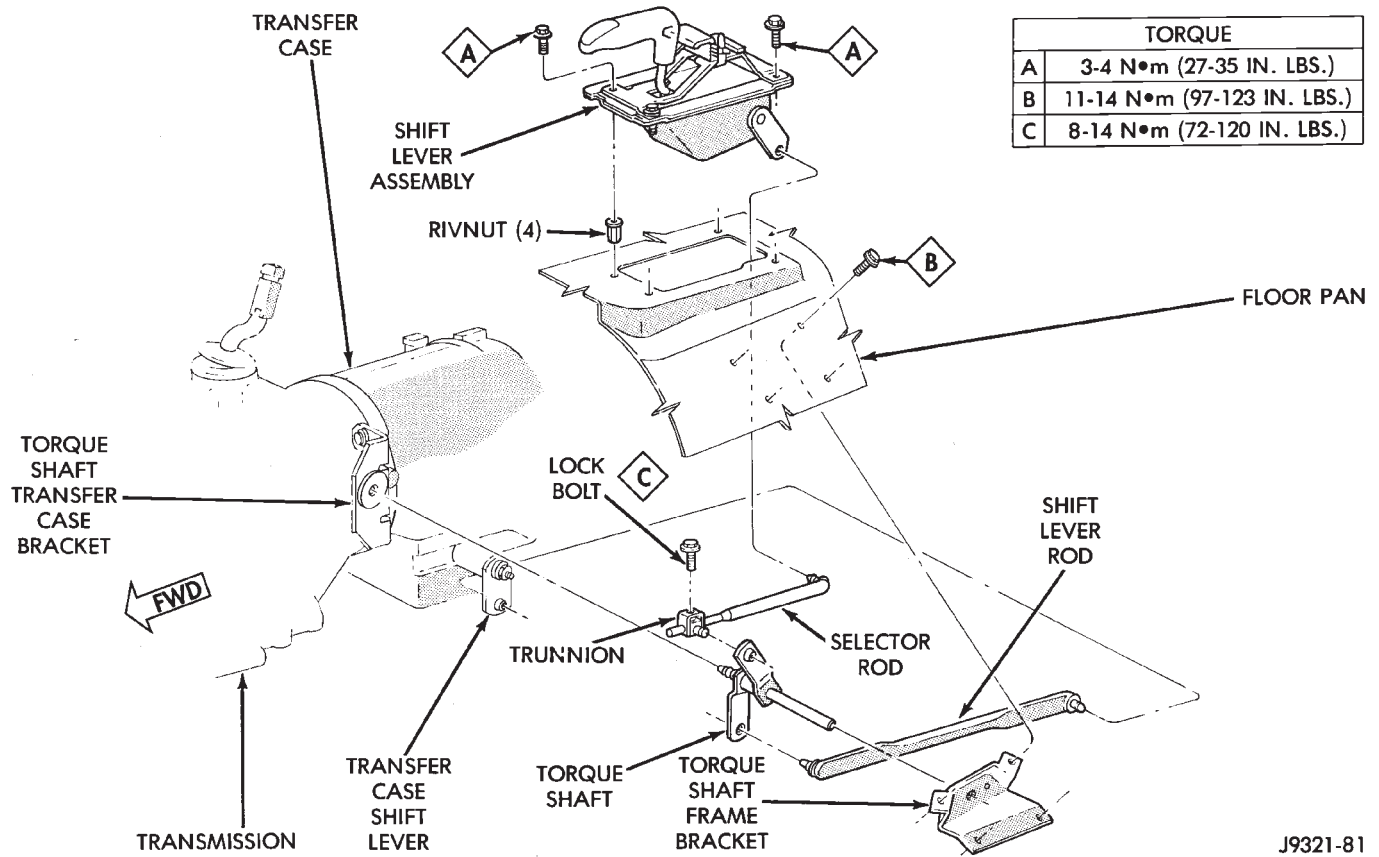


Fig. 4 Transfer Case Shift Linkage (Manual Transmission)

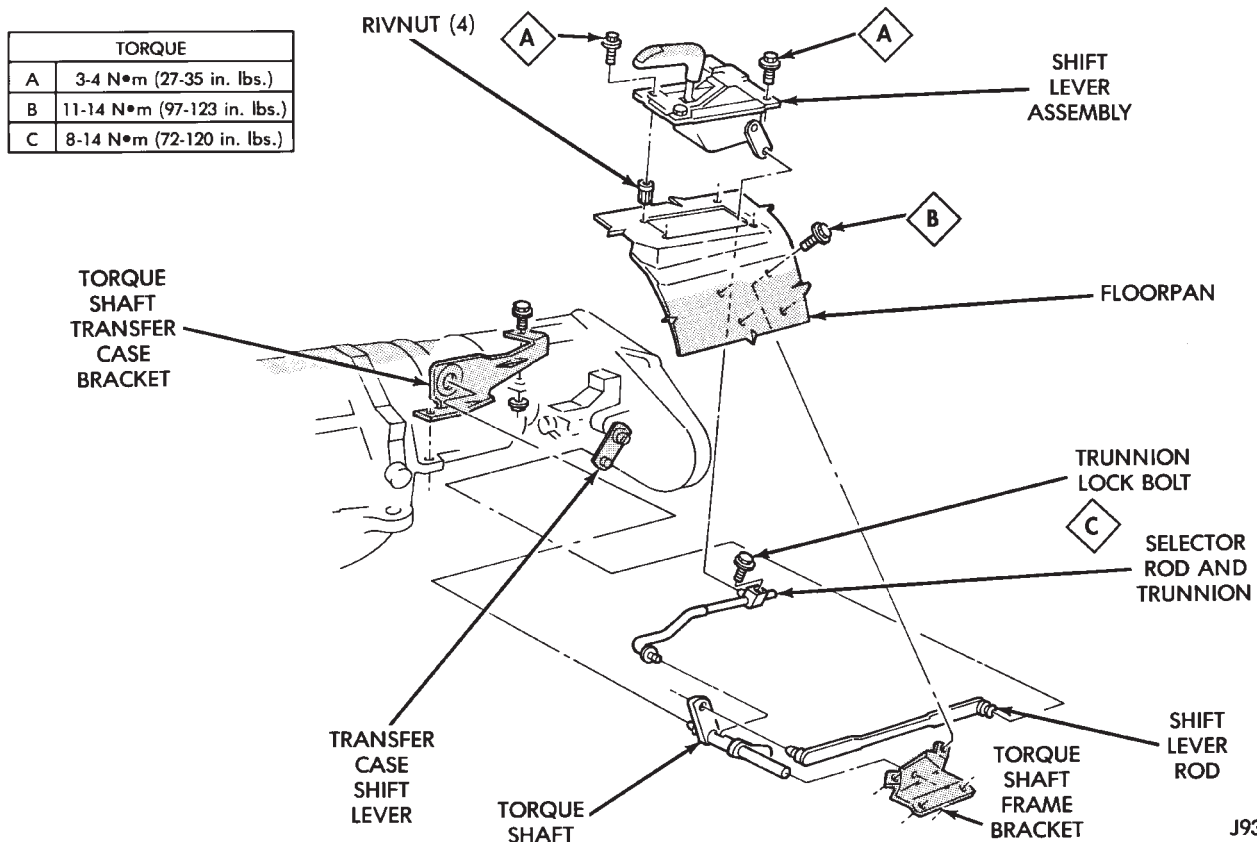
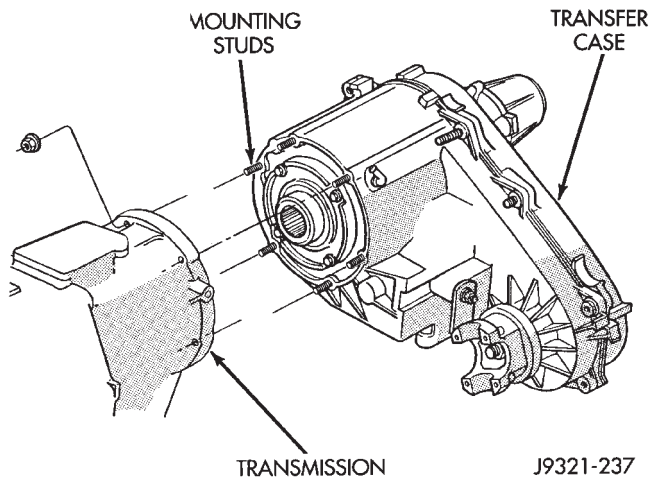
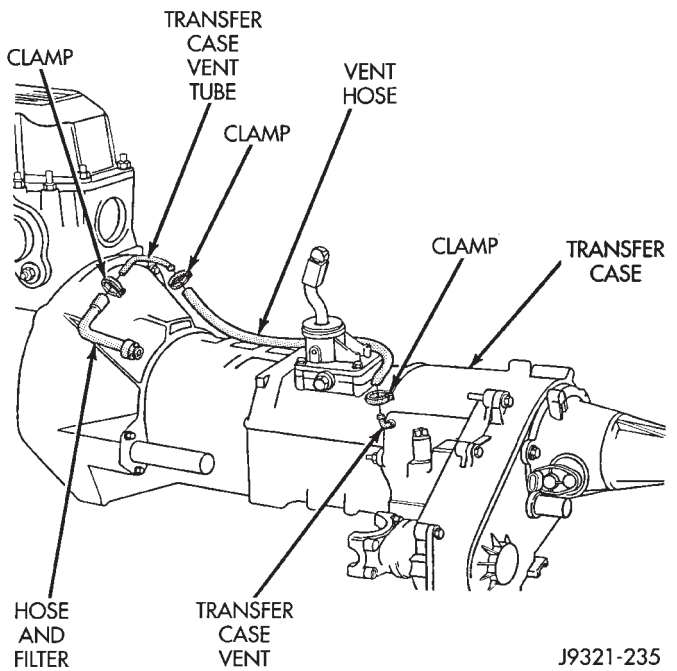
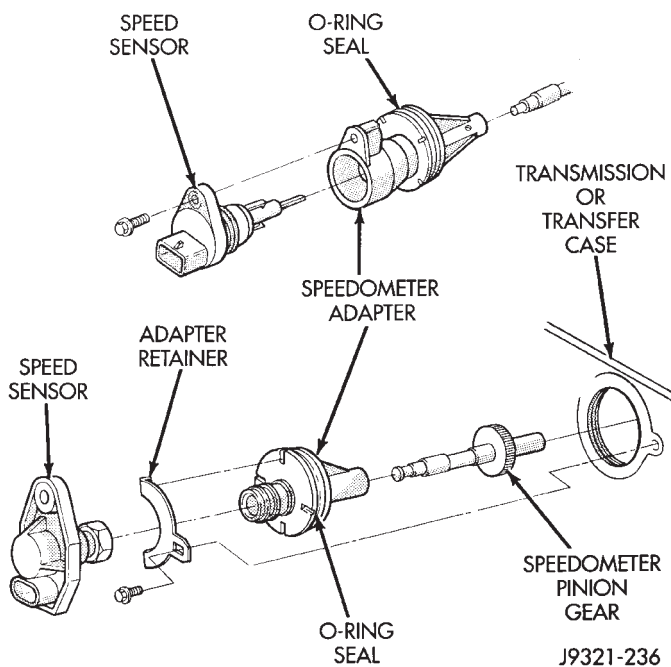
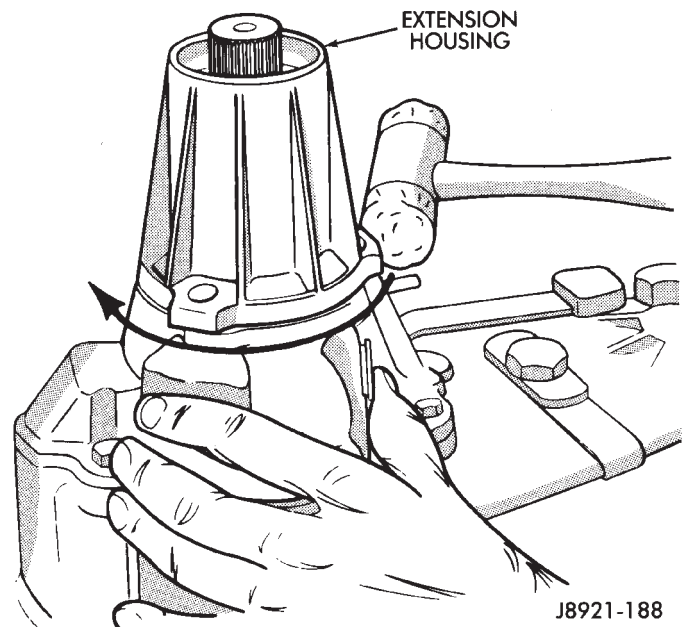


Fig. 5 Transfer Case Shift Linkage (Automatic Transmission)

**Fig. 6 Transfer Case Attachment****Fig. 8 Transfer Case Vent Hose Routing****TRANSFER CASE DISASSEMBLY AND OVERHAUL**

- (1) Remove fill and drain plugs.
- (2) Remove front yoke. Discard yoke seal washer and nut.
- (3) Move range lever rearward to 4L position.
- (4) Remove extension housing attaching bolts.
- (5) Tap extension housing in a clockwise direction to break sealer bead and remove housing (Fig. 1).

**Fig. 7 Speedometer Components****Fig. 1 Extension Housing Removal**

CAUTION: To avoid damaging the sealing surfaces of the extension housing and rear retainer, do not attempt to pry or wedge the housing off the retainer.

(6) Remove rear bearing snap ring from mainshaft (Fig. 2). Discard snap ring.

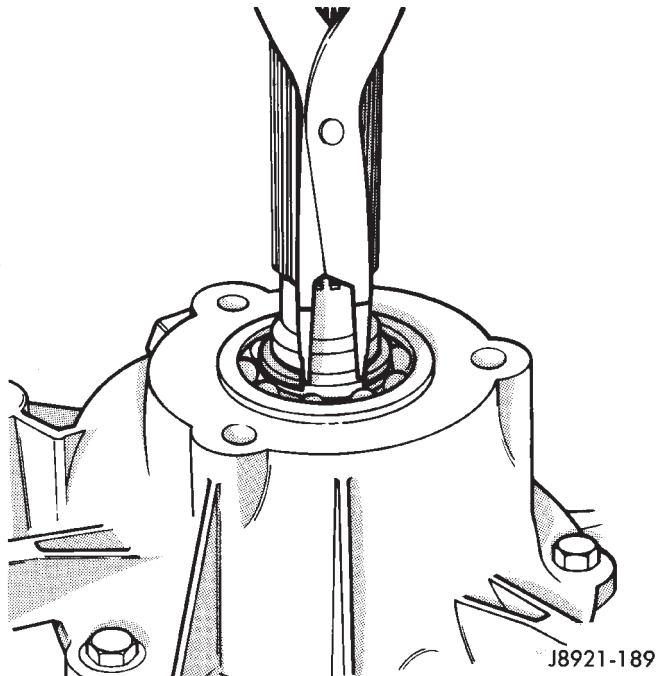


Fig. 2 Removing Rear Bearing Snap Ring

(7) Remove rear retainer attaching bolts.

(8) Loosen rear retainer (Fig. 3). Position long screwdriver under each tab at ends of retainer housing and pry retainer upward.

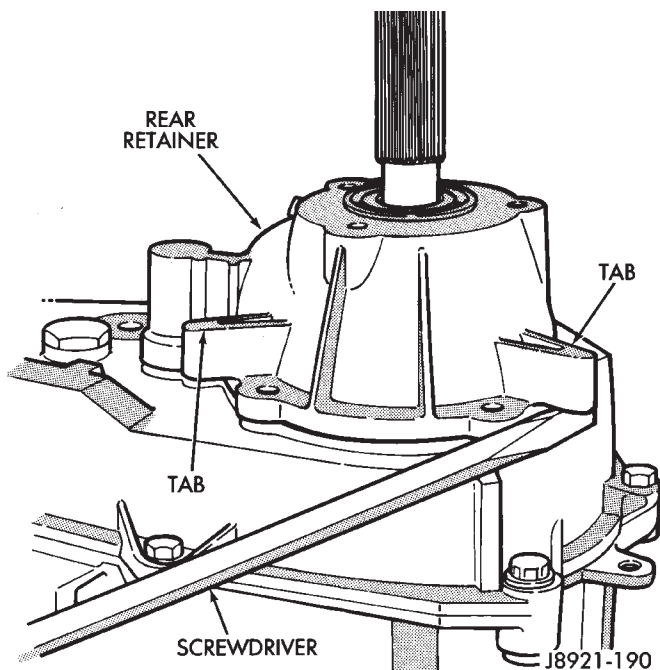


Fig. 3 Loosening Rear Retainer

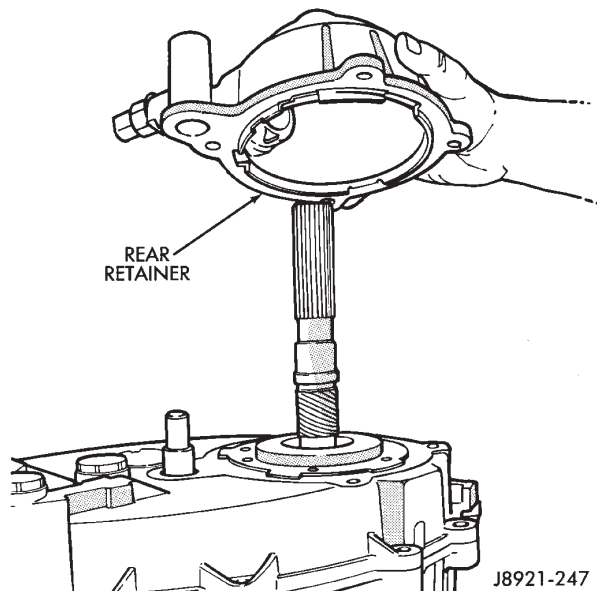


Fig. 4 Removing Rear Retainer

CAUTION: Do not pry against the sealing surfaces of the retainer or rear case. The surfaces could be damaged.

(9) Lift rear retainer up and off case and mainshaft (Fig. 4).

(10) Remove bolts attaching rear case to front case. Retain bolts and the washers.

(11) Loosen rear case with two screwdrivers (Fig. 5). Insert screwdrivers into slots cast in case ends. Then gently pry upward to break sealer bead.

CAUTION: Do not pry against the sealing surfaces of the front case or rear case. The surfaces could be damaged.

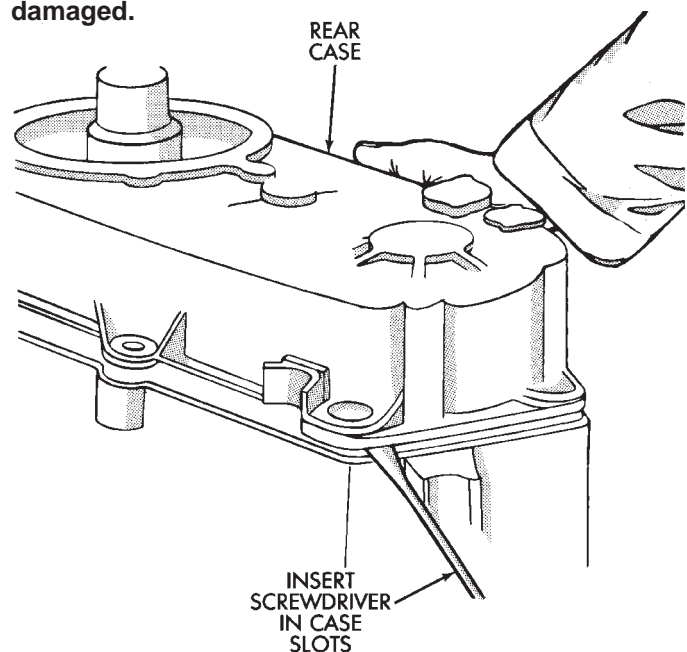


Fig. 5 Loosening Rear Case

(12) Remove rear case and oil pump as assembly (Fig. 6).

(13) Slide oil screen (Fig. 7) out of case pocket.

(14) Remove oil pump, pickup tube and oil screen from rear case (Fig. 8).

(15) Remove pickup tube and screen from pump.

(16) Remove pickup tube O-ring from oil pump (Fig. 9).

(17) Remove and discard oil pump seal.

(18) The oil pump can be disassembled for cleaning and inspection as described in step (19). **However, pump parts are not serviceable separately. If any pump component is worn, or damaged, pump must be replaced as an assembly.**

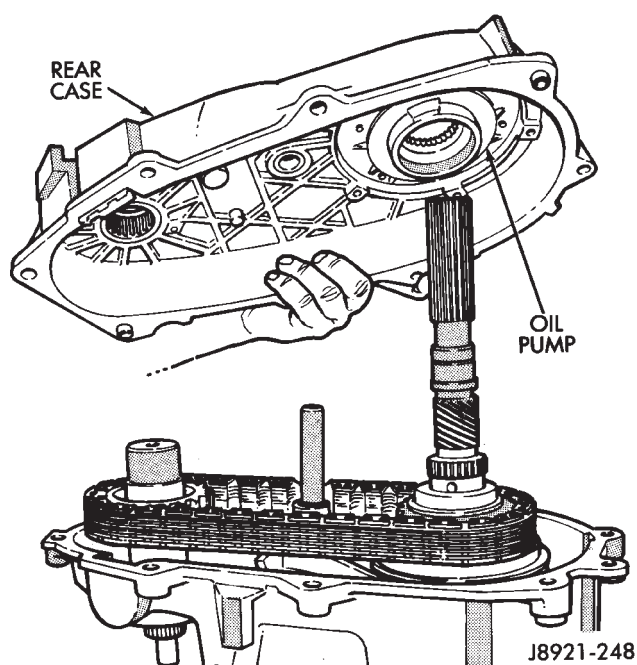


Fig. 6 Removing Rear Case And Oil Pump

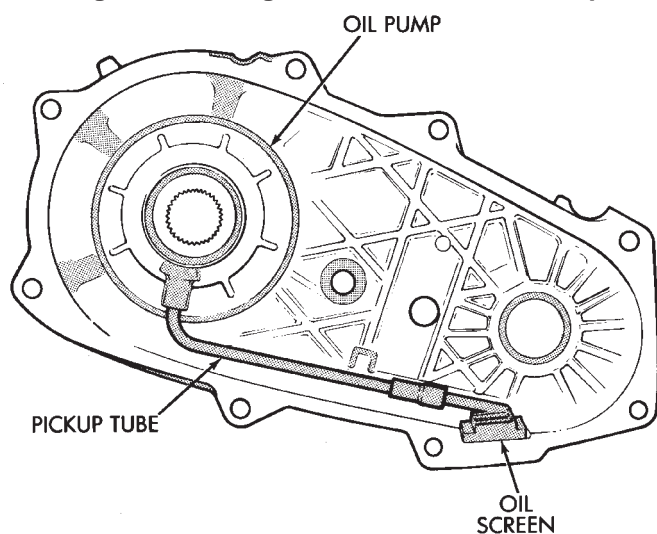


Fig. 7 Unseating Oil Screen

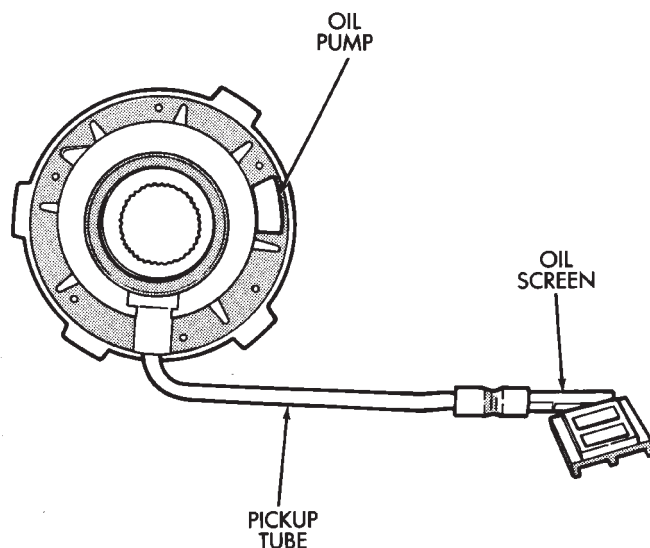


Fig. 8 Removing Oil Pump, Pickup Tube And Screen

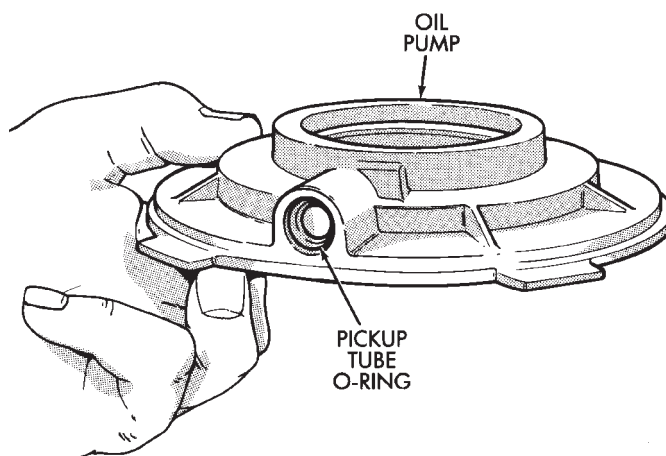
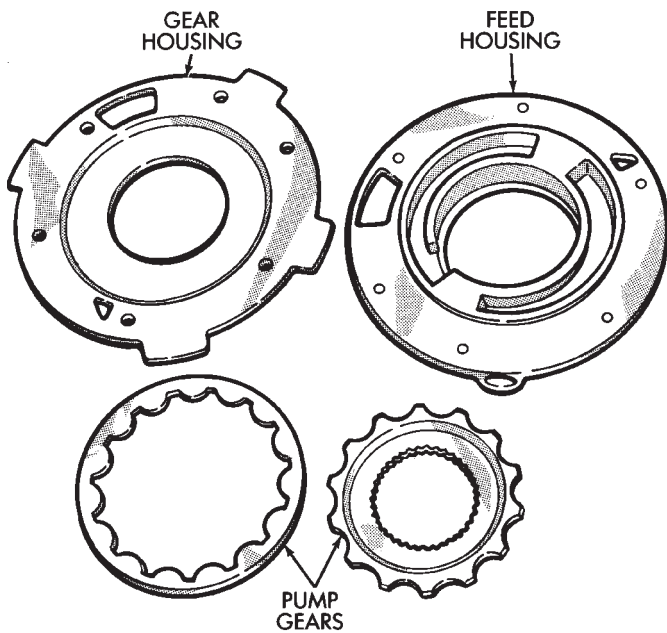


Fig. 9 Removing/Installing Pickup Tube O-Ring

(19) If oil pump will be disassembled for inspection, mark position of oil pump housings for reference (Fig. 10). Remove screws that attach two halves of the pump. Remove feed housing from gear housing. Then mark position of pump gears and remove them from housing (Fig. 10).

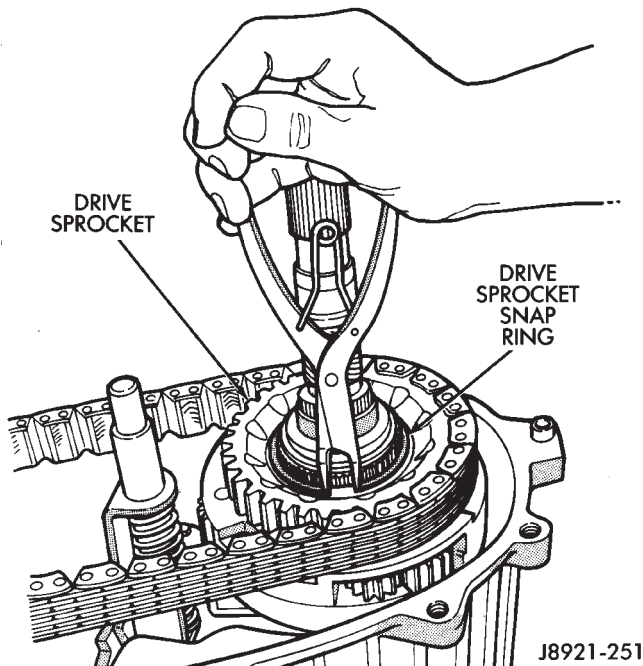
(20) Remove magnet from front case.



J8921-195

Fig. 10 Oil Pump Components

(21) Remove drive sprocket snap ring (Fig. 11).

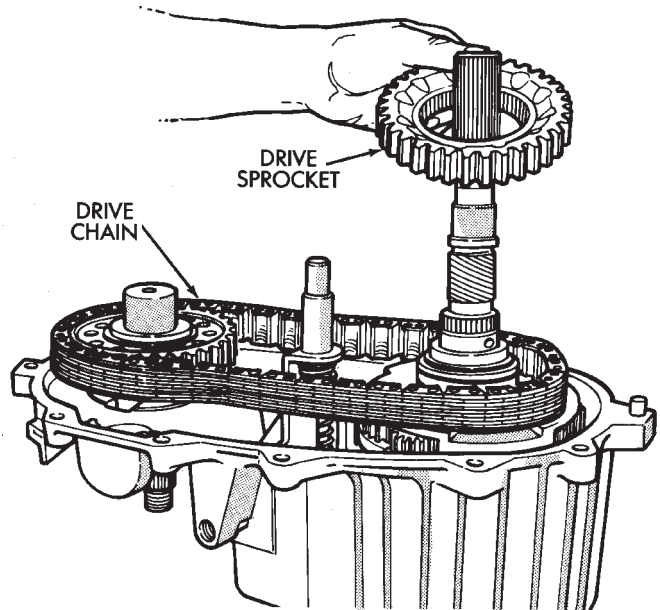


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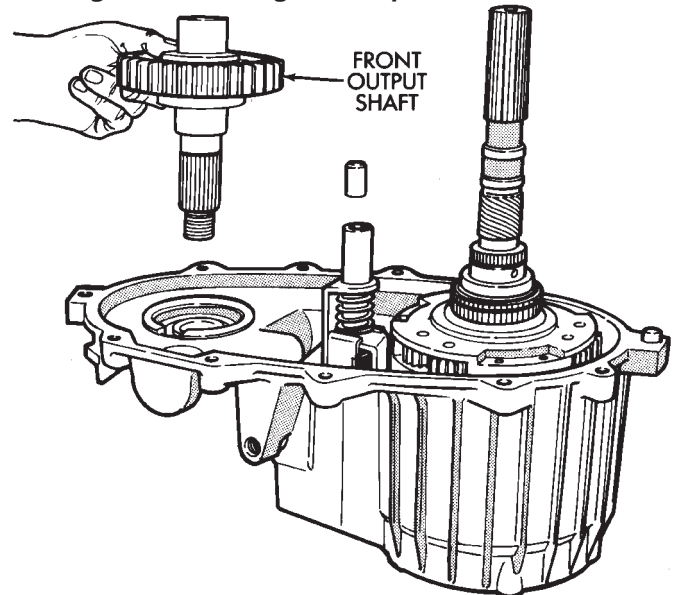
Fig. 11 Removing Drive Sprocket Snap Ring

- (22) Remove drive sprocket and chain (Fig. 12).
 (23) Remove front output shaft (Fig. 13).
 (24) Remove transfer case shift lever nut and lever.
 (25) Remove shift detent plug, spring and pin (Fig. 14).

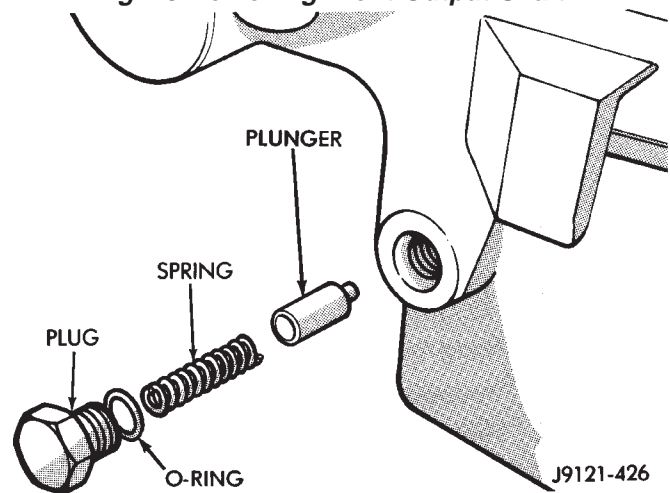
14)



J8921-252

Fig. 12 Removing Drive Sprocket And Chain

J8921-253

Fig. 13 Removing Front Output Shaft

J9121-426

Fig. 14 Removing Detent Components

(26) Remove seal plug from low range fork lockpin access hole. Then move shift sector to align low range fork lockpin with access hole (Fig. 15).

(27) Remove range fork lockpin with size #1 easy-out. Grip easy-out tool with locking pliers and remove pin with counterclockwise, twist and pull motion (Fig. 15).

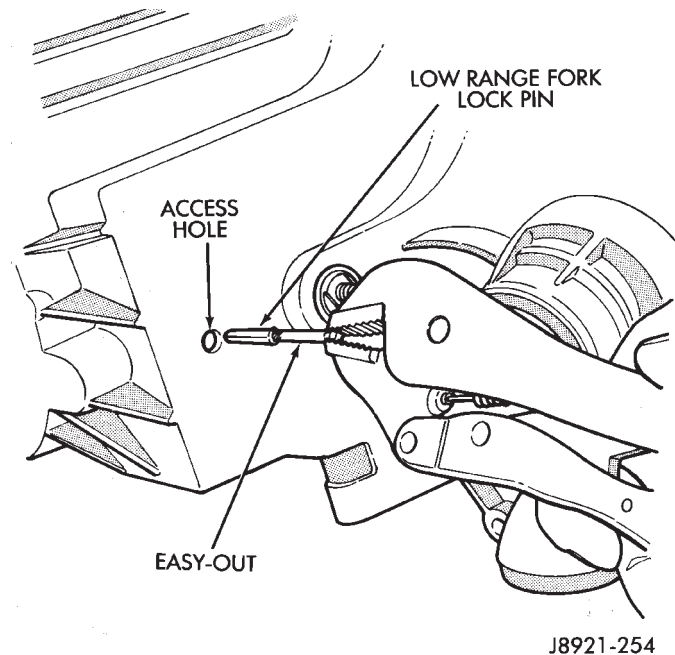


Fig. 15 Removing Low Range Fork Lockpin

(28) Remove shift rail by pulling it straight up and out of fork (Fig. 16).

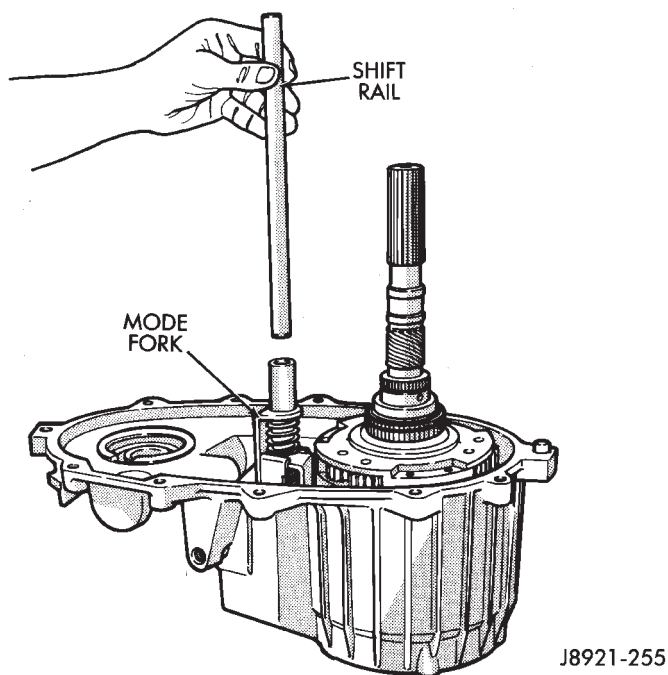


Fig. 16 Removing Shift Rail

(29) Remove mode fork and mainshaft as assembly (Fig. 17).

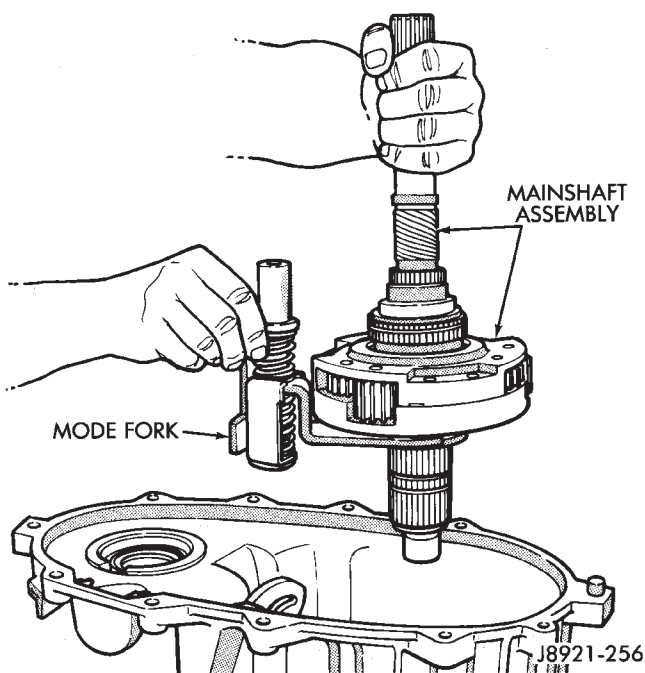


Fig. 17 Removing Mode Fork And Mainshaft

(30) Remove mode shift sleeve and mode fork assembly from mainshaft (Fig. 18). Note position of mode sleeve in fork and remove sleeve.

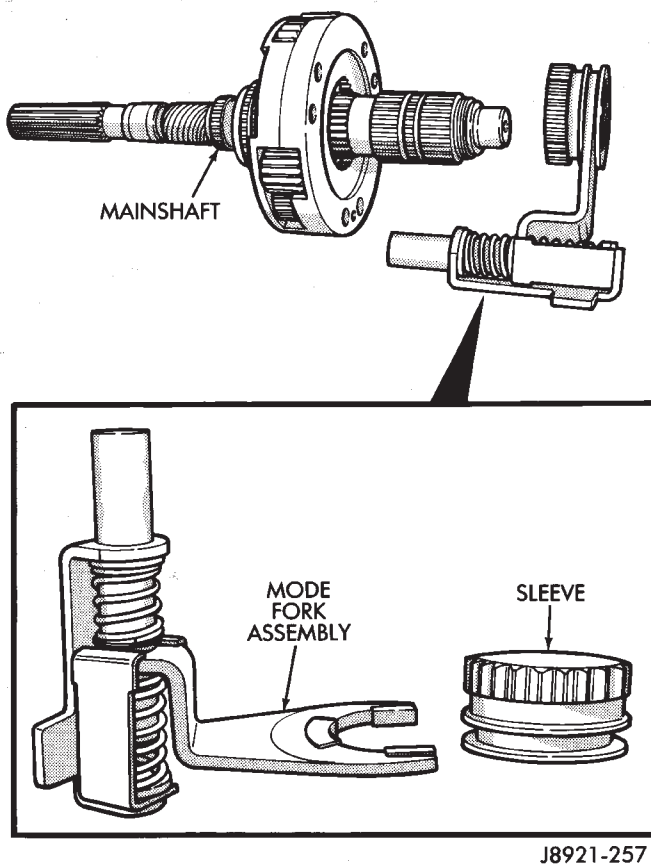


Fig. 18 Removing Mode Fork And Sleeve

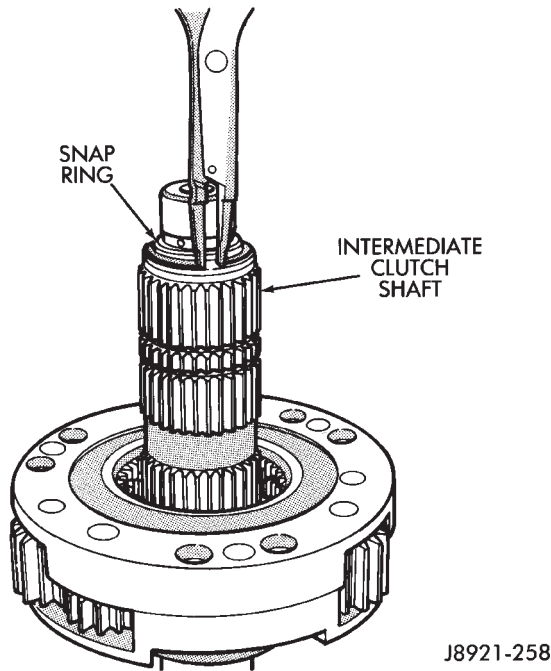


Fig. 19 Removing Intermediate Clutch Shaft Snap Ring

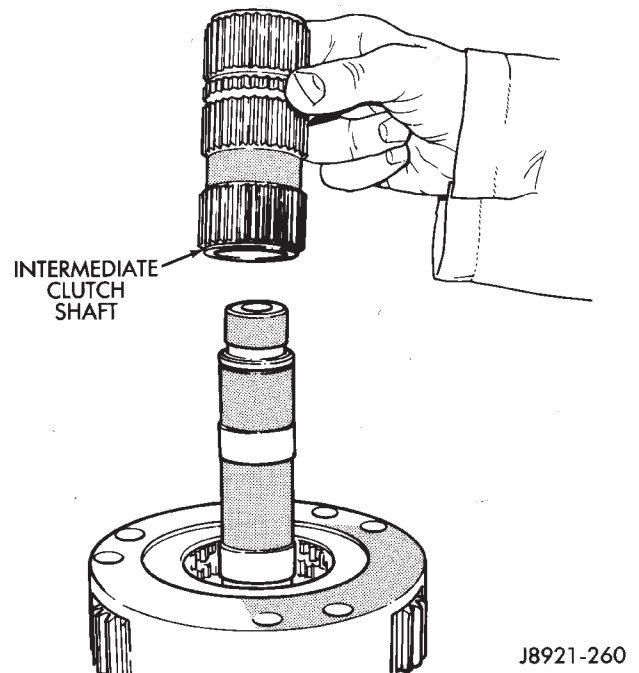


Fig. 21 Removing Intermediate Clutch Shaft

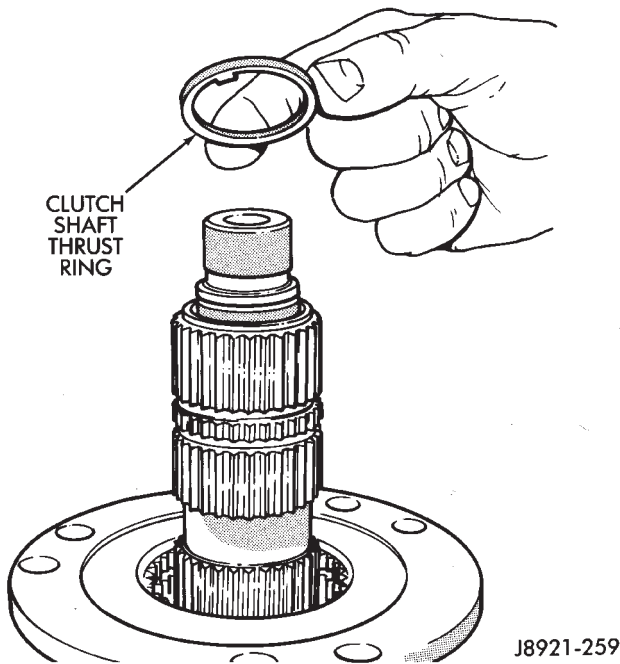


Fig. 20 Removing Clutch Shaft Thrust Ring

(31) Remove intermediate clutch shaft snap ring (Fig. 19).

(32) Remove clutch shaft thrust ring (Fig. 20).

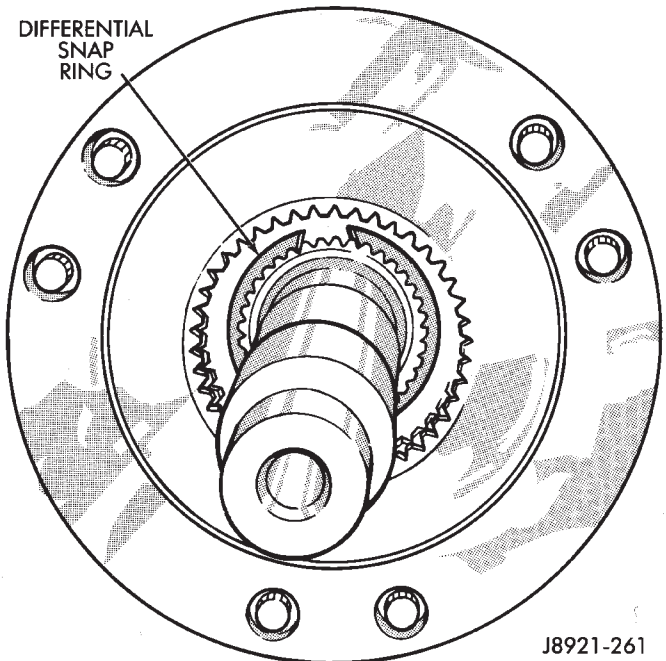
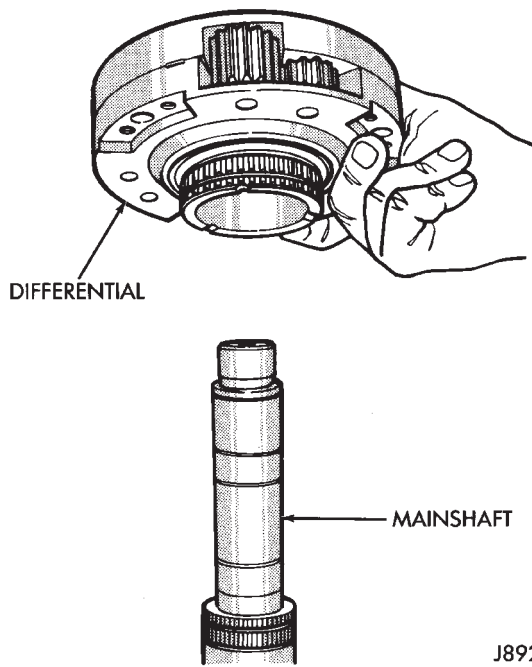


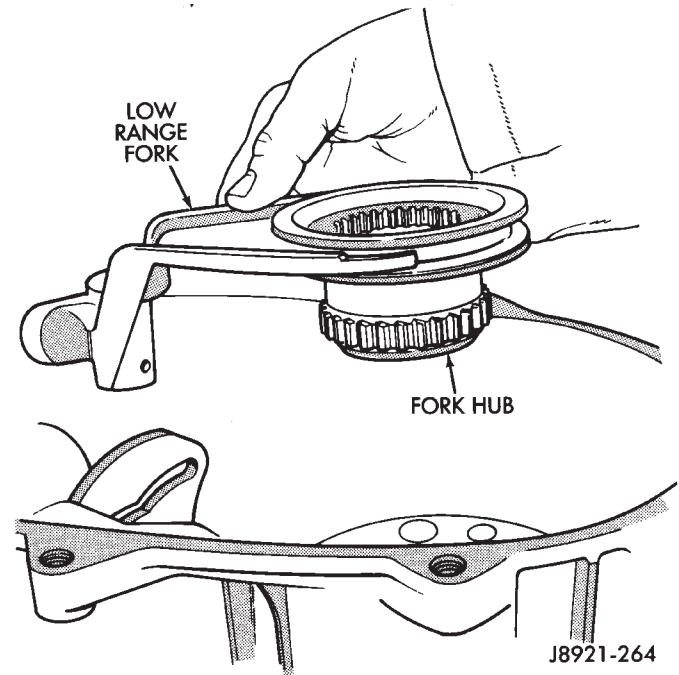
Fig. 22 Removing Differential Snap Ring

(33) Remove intermediate clutch shaft (Fig. 21).

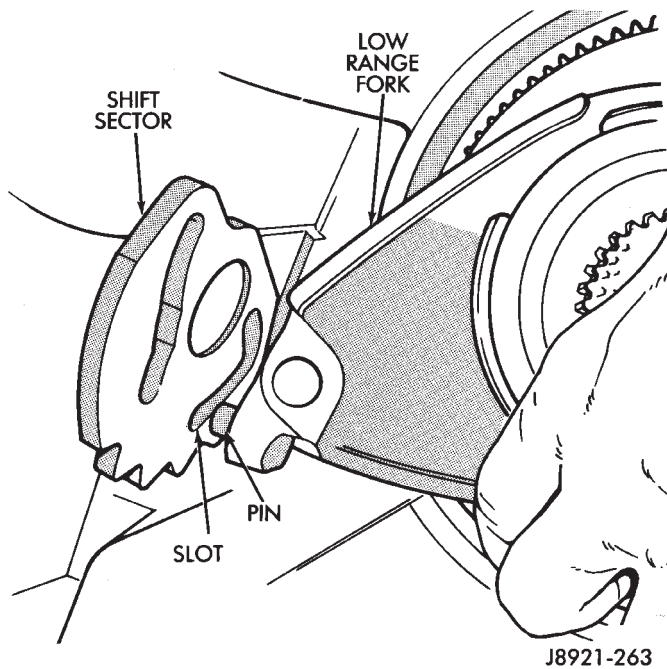
(34) Remove differential snap ring (Fig. 22).



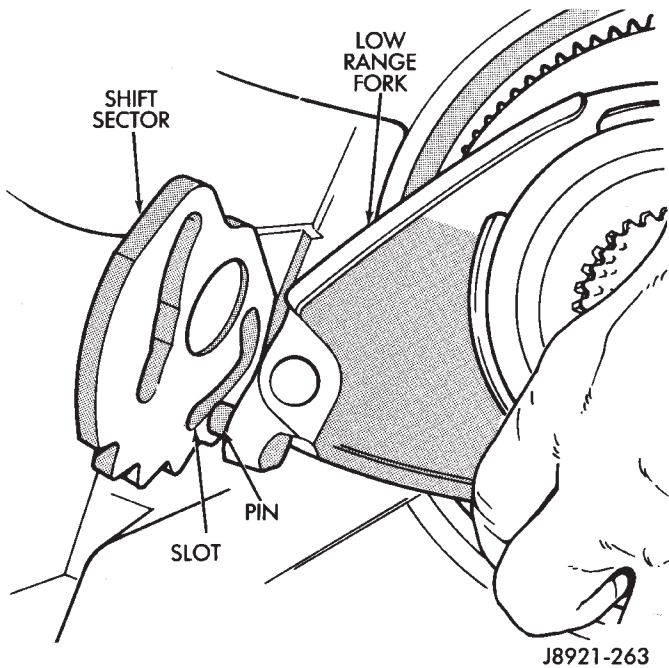
J8921-262

Fig. 23 Differential Removal

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Fig. 25 Removing Low Range Fork And Hub

J8921-263

Fig. 24 Disengage Low Range Fork

J8921-263

Fig. 26 Shift Sector Position

- (35) Remove differential (Fig. 23).
- (36) Remove differential needle bearings and both needle bearing thrust washers from mainshaft.
- (37) Slide low range fork pin out of shift sector slot (Fig. 24)

- (38) Remove low range fork and hub (Fig. 25).
- (39) Remove the shift sector (Fig. 26).

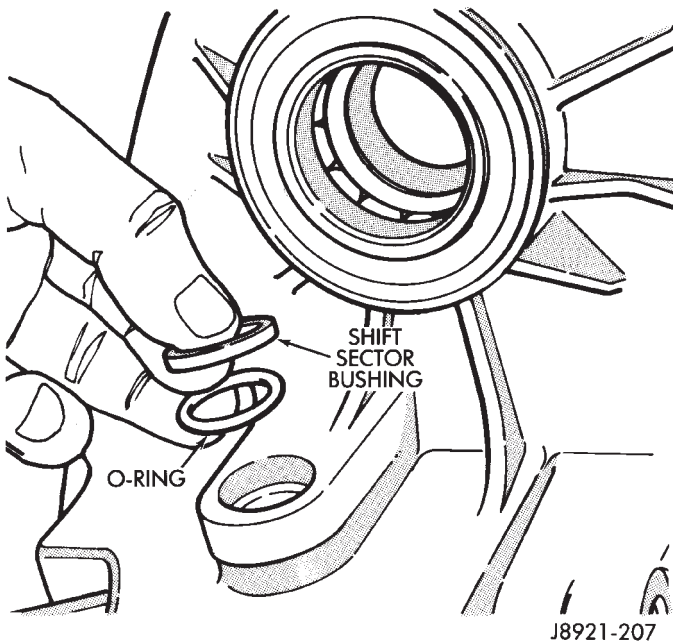


Fig. 27 Removing Sector Bushing And O-Ring

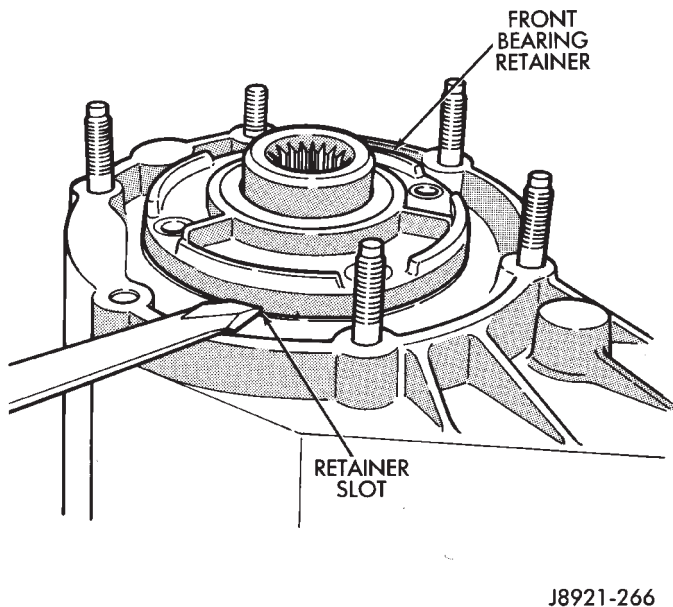


Fig. 28 Removing Front Bearing Retainer

(40) Remove shift sector bushing and O-ring (Fig. 27).

(41) Remove front bearing retainer bolts.

(42) Remove front bearing retainer. Carefully pry retainer loose with screwdriver (Fig. 28). Position screwdriver in slots cast into retainer.

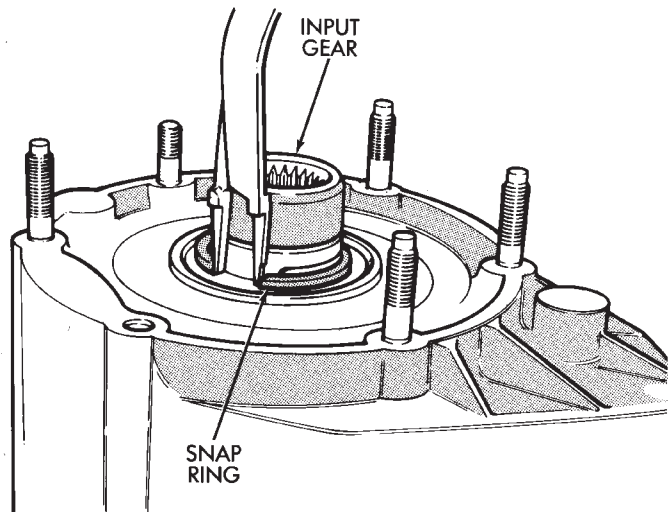


Fig. 29 Removing Input Gear Snap Ring

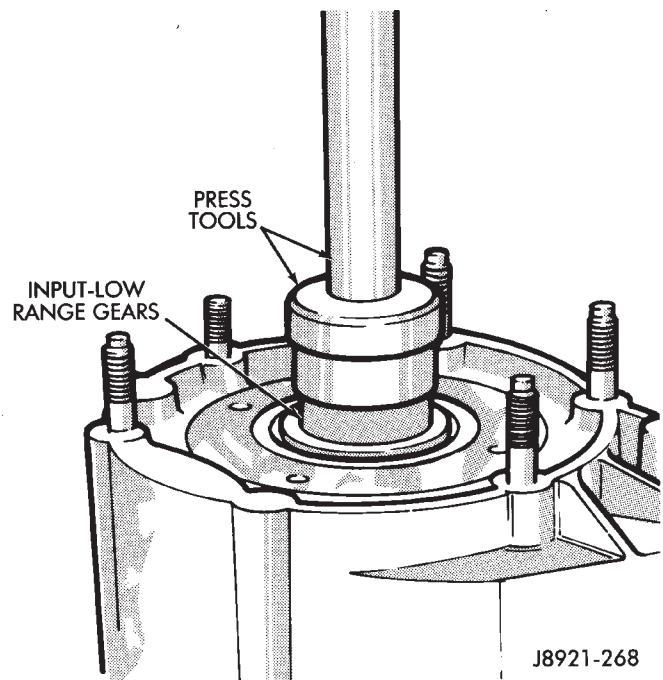


Fig. 30 Removing Input And Low Range Gears

(43) Remove input gear snap ring (Fig. 29).

(44) Press input and low range gears out of input gear bearing and case (Fig. 30). Use suitable size driver tool to press gears out of bearing and case.

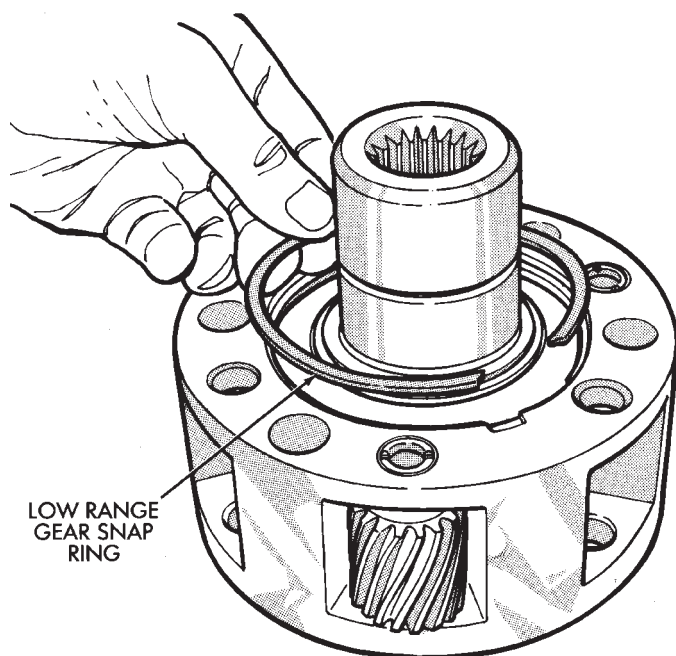


Fig. 31 Removing/Installing Low Range Gear Snap Ring

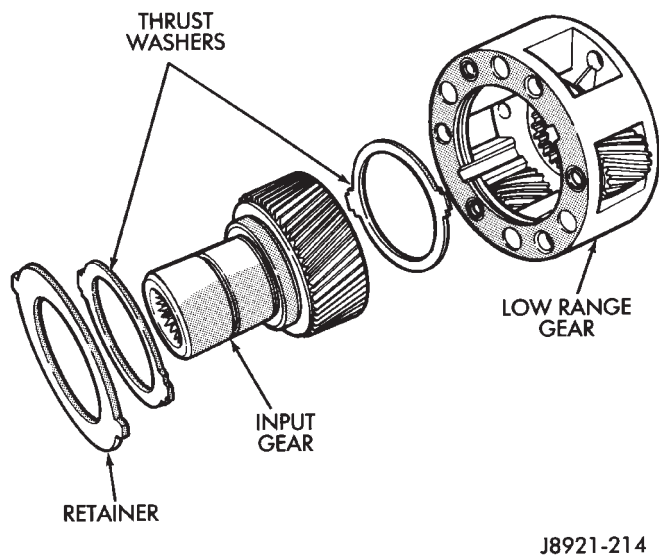


Fig. 32 Low Range Gear Disassembly

- (45) Remove low range gear snap ring (Fig. 31).
 (46) Remove input gear retainer, thrust washers and input gear from low range gear (Fig. 32).
 (47) Inspect low range annulus gear (Fig. 33). **The gear is not a serviceable component. If damaged, replace gear and front case as an assembly.**

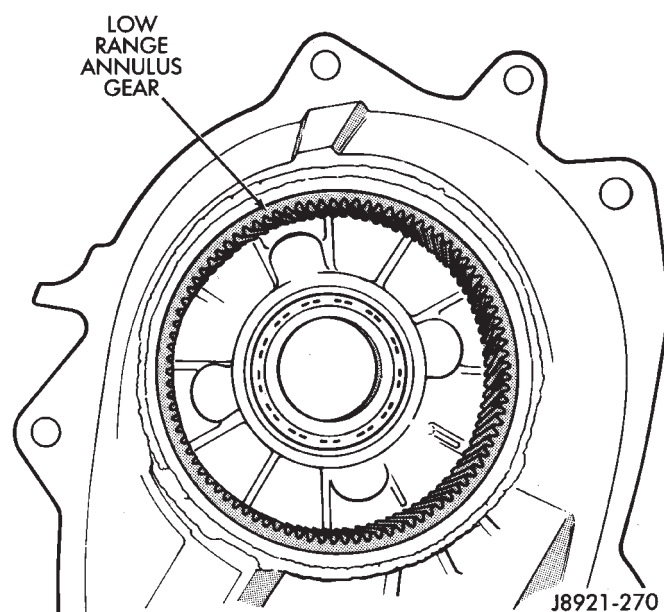


Fig. 33 Inspecting Low Range Annulus Gear

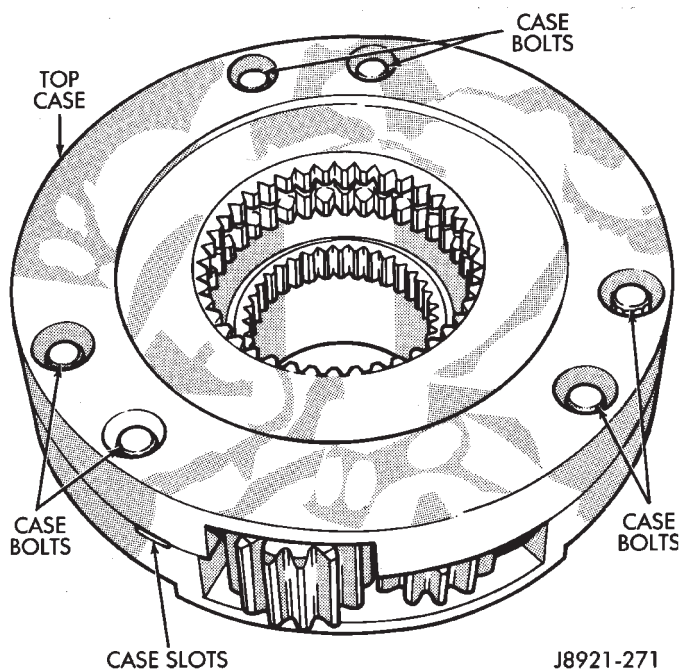


Fig. 34 Separating Differential Case Halves

- (48) Remove oil seals from the rear retainer, extension housing, oil pump and case halves.
 (49) Mark differential case halves for reference.
 (50) Remove differential case bolts and separate top case from bottom case. Use slots in case halves to pry them apart (Fig. 34).

(51) Remove thrust washers and planet gears from case pins (Fig. 35).

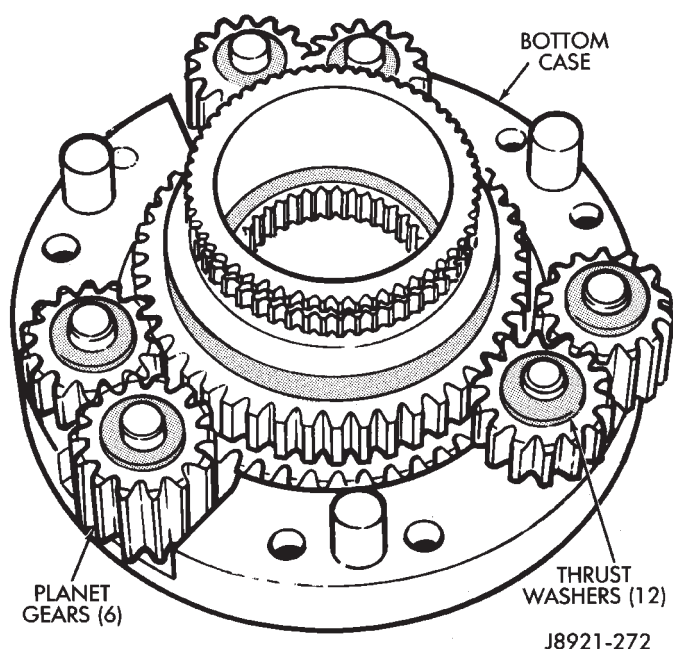


Fig. 35 Removing Planet Gears And Thrust Washers

(52) Remove mainshaft and sprocket gears from bottom case (Fig. 36). Note gear position for reference before separating them.

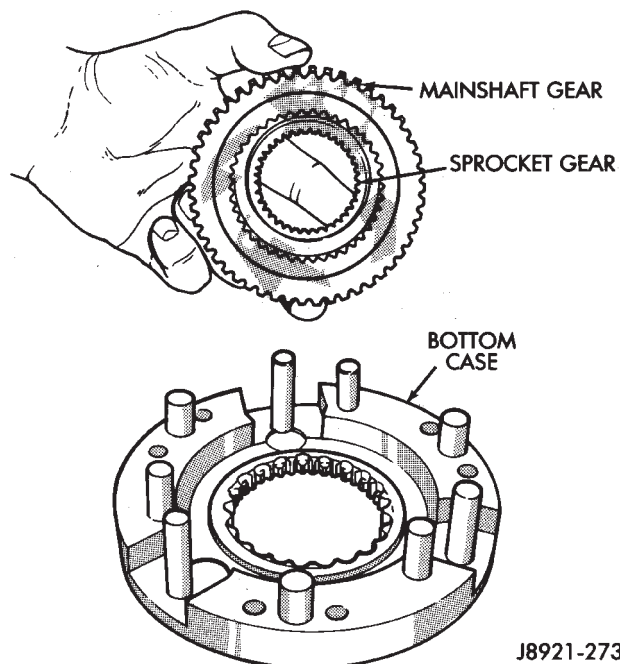


Fig. 36 Removing Mainshaft And Sprocket Gears
CLEANING AND INSPECTION

Clean the transfer case components thoroughly with solvent. Remove all traces of sealer from the case and retainer seal surfaces.

Clean the oil pickup screen with solvent and dry it with compressed air. Also use compressed air to re-

move solvent residue from all oil feed passages and channels.

Inspect the differential gears, thrust washers and case halves. Replace the mainshaft gear if the gear teeth or the brass ring on the underside of the gear are damaged. Replace the differential as an assembly if the gears, case halves, or the pins in the lower case half are damaged.

Inspect the case halves, extension housing and retainers for cracks, porosity, or damaged sealing surfaces. Inspect the shafts, gears, chain and shift components for wear or damage.

Inspect all of the transfer case bearings for wear, roughness, pitting, or galling. Replace worn or damaged bearings as outlined in the assembly section.

TRANSFER CASE ASSEMBLY

(1) Lubricate the 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. Be sure replacement bearings do not block these feed holes.

(2) Remove front output shaft, front bearing snap ring (Fig. 37).

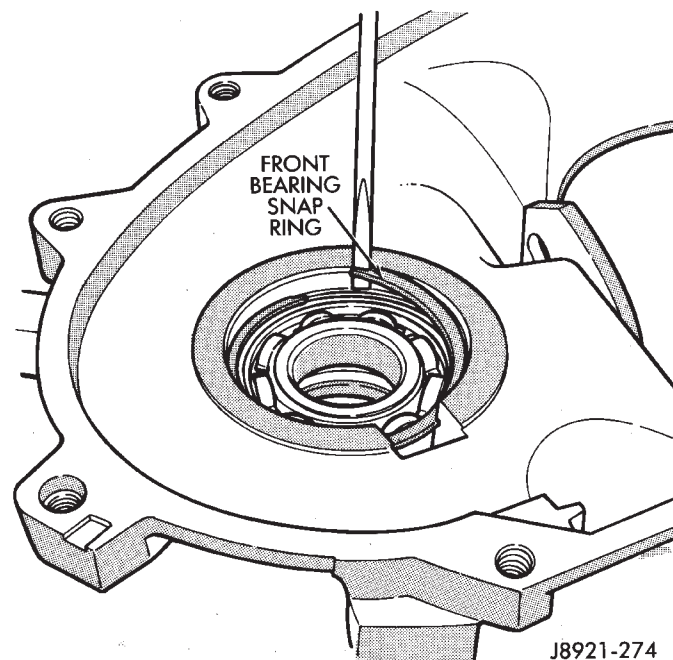


Fig. 37 Removing/Installing Front Output Shaft
Front Bearing Snap Ring

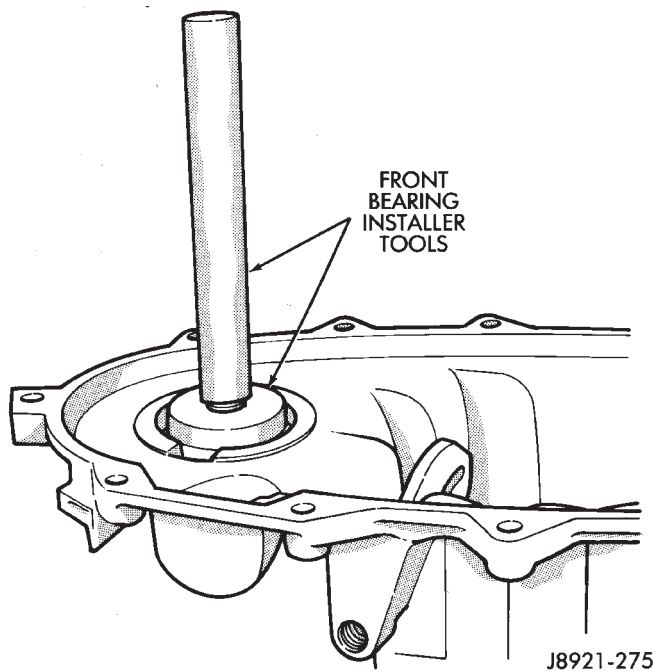


Fig. 38 Replacing Output Shaft Front Bearing

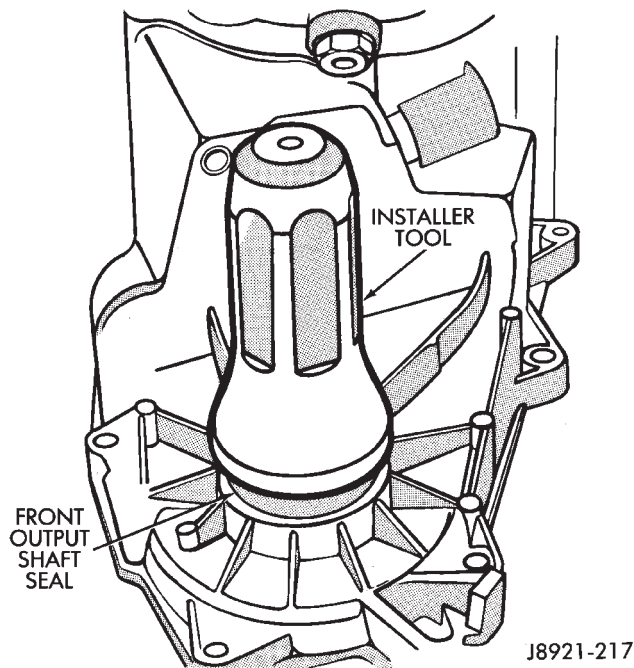


Fig. 39 Installing Front Output Shaft Seal

(3) Remove old bearing and install new bearing with driver handle and installer tool (Fig. 38).

(4) Install front bearing snap ring (Fig. 37).

(5) Install new front output shaft oil seal (Fig. 39). Use suitable size installer tool to replace seal.

(6) Press input gear bearing out of front case with Special Tools C-4210, C-4171 and shop press (Fig. 40).

(7) Install snap ring on new input gear bearing.

(8) Install new input gear bearing with shop press and wood block. Install bearing far enough to seat snap ring against case (Fig. 41).

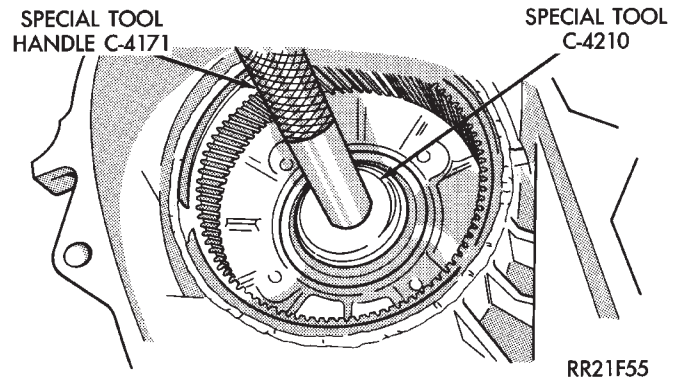


Fig. 40 Removing Input Gear Bearing

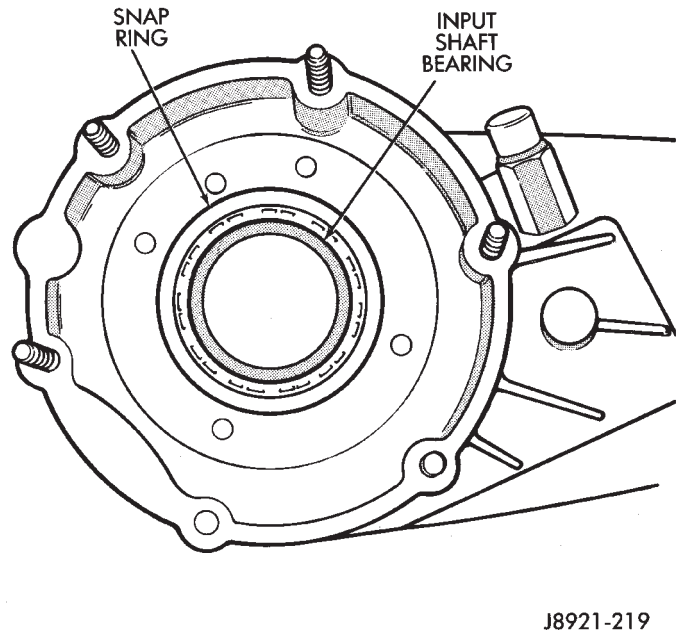


Fig. 41 Seating Input Gear Bearing

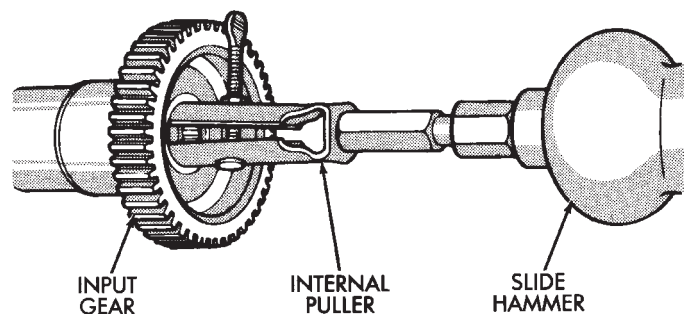
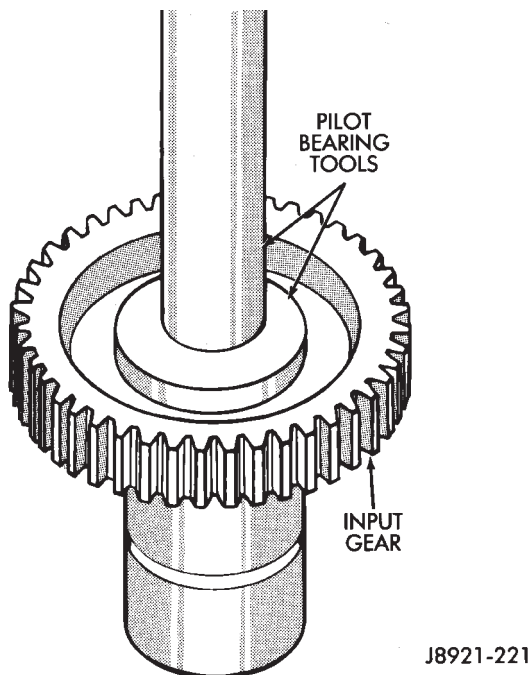


Fig. 42 Removing Input Gear Pilot Bearing

(9) Remove mainshaft pilot bearing from input gear with slide hammer and suitable size internal puller (Fig. 42).

(10) Install new pilot bearing with suitable size installer tool (Fig. 43).

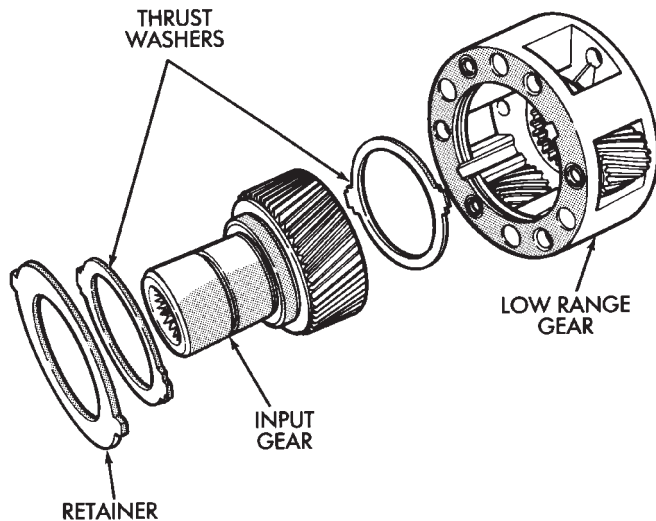


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Fig. 43 Installing Input Gear Pilot Bearing

(11) Assemble low range gear, input gear thrust washers, input gear and input gear retainer (Fig. 44).

(12) Install low range gear snap ring (Fig. 45).



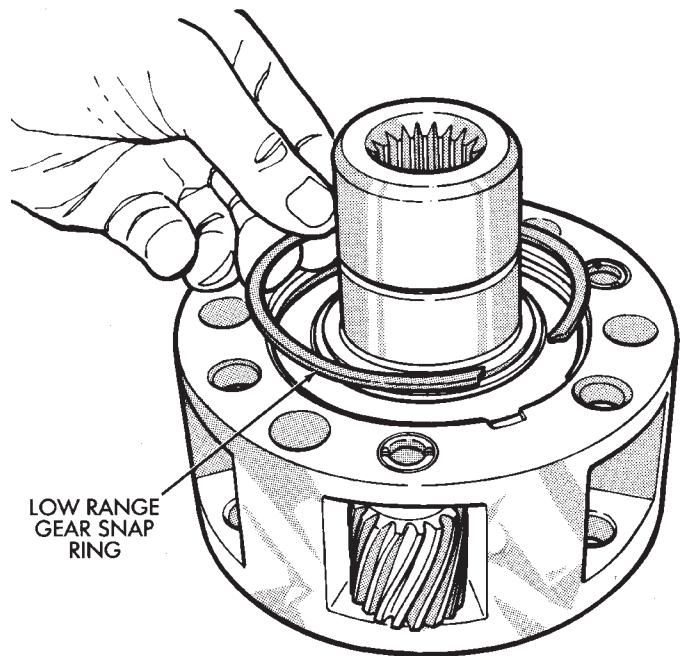
J8921-214

Fig. 44 Low Range And Input Gear Assembly

(13) Lubricate input gear and low range gears with automatic transmission fluid.

(14) Start the input gear shaft into the front case bearing.

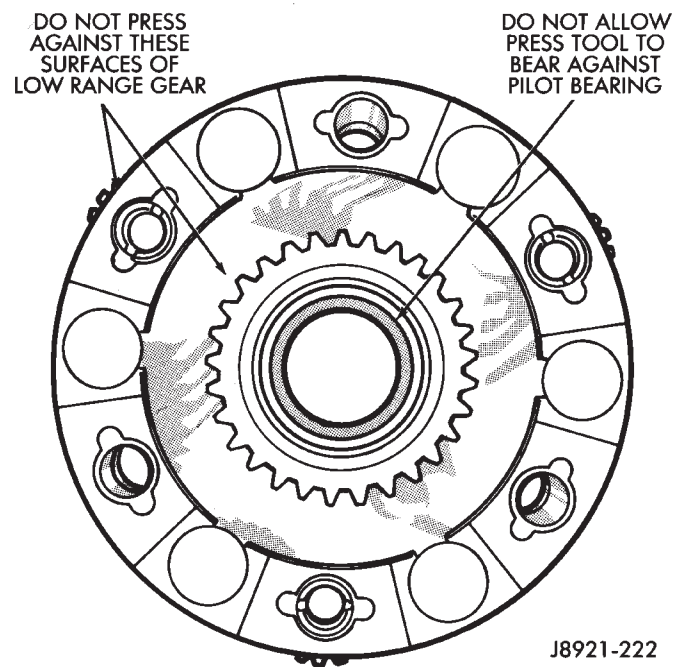
(15) Press the input gear shaft into the front bearing.



J8921-269

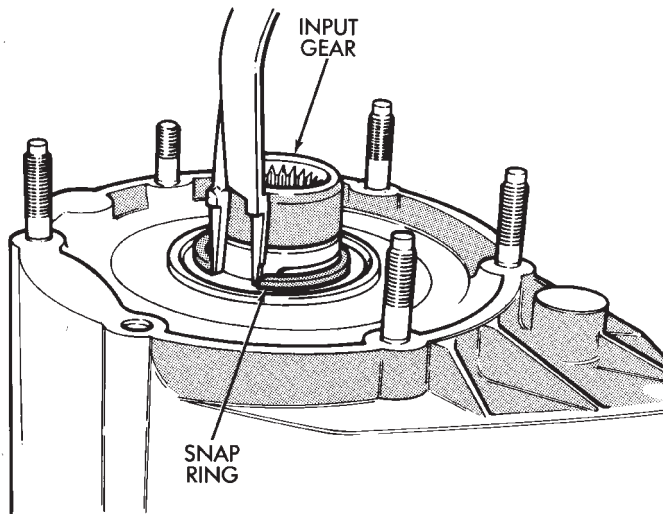
Fig. 45 Installing Low Range Gear Snap Ring

CAUTION: Be sure the input gear installer tool is the proper size. The wrong size tool could push the input gear pilot bearing too far into the gear bore (Fig. 46). Also, do not press against the end surfaces of the low range gear. The gear case and thrust washers could be damaged.

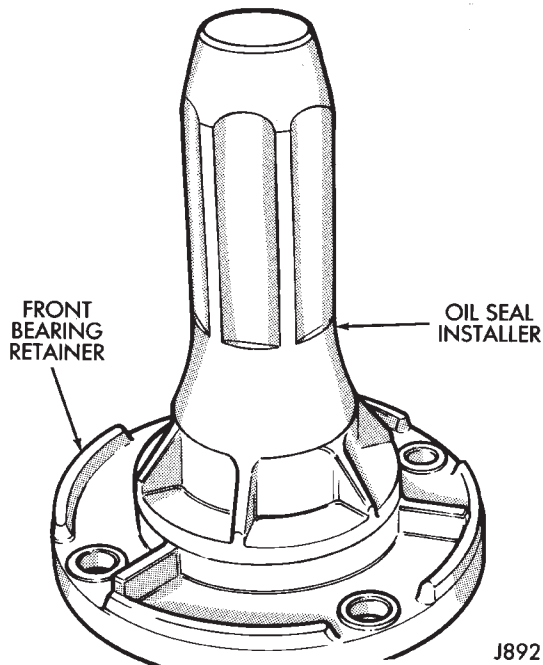


J8921-222

Fig. 46 Input Gear Installation



J8921-267

Fig. 47 Installing Input Gear Snap Ring

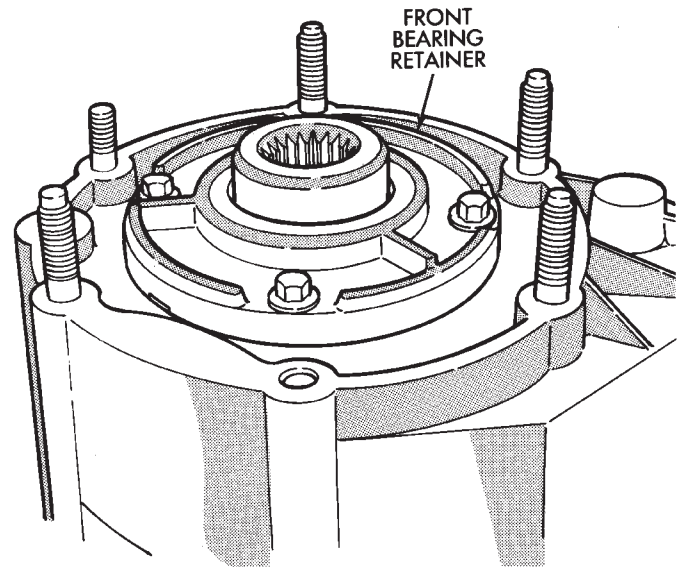
J8921-223

Fig. 48 Install Front Bearing Retainer Seal

- (16) Install new input gear snap ring (Fig. 47).
 (17) Install new seal in front bearing retainer (Fig. 48).
 (18) Apply 3 mm (1/8 in.) wide bead of Mopar gasket maker, silicone adhesive sealer, or Loctite 518 to seal surface of front bearing retainer.

(19) Install front bearing retainer (Fig. 49). Tighten the retainer bolts to 16 ft. lbs. (21 N•m) torque.

(20) Install new sector shaft O-ring and bushing

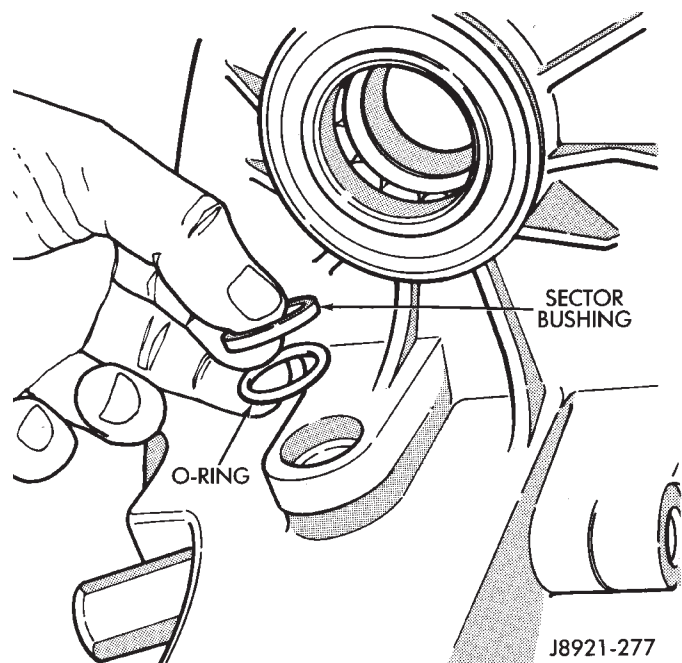


J8921-276

Fig. 49 Installing Front Bearing Retainer

(Fig. 50).

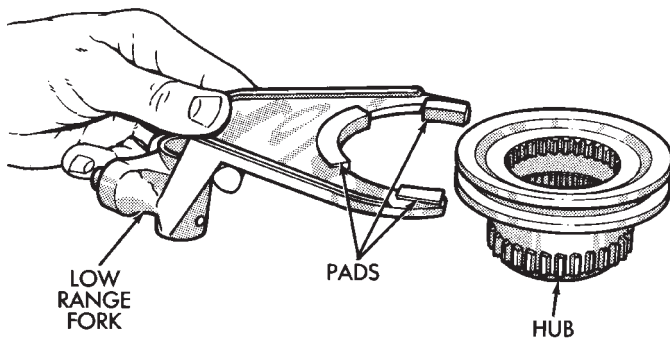
(21) Install shift sector in case.



J8921-277

Fig. 50 Installing Sector O-Ring And Bushing

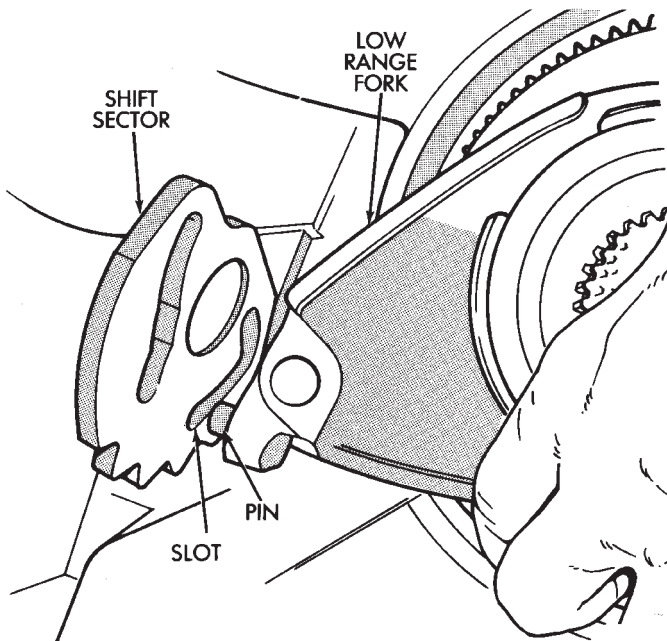
- (22) Install new pads in low range fork (Fig. 51).
 (23) Assemble low range fork and hub (Fig. 51).



J8921-278

Fig. 51 Assembling Low Range Fork And Hub

- (24) Position low range fork and hub in case. Be sure low range fork pin is engaged in shift sector slot (Fig. 52).

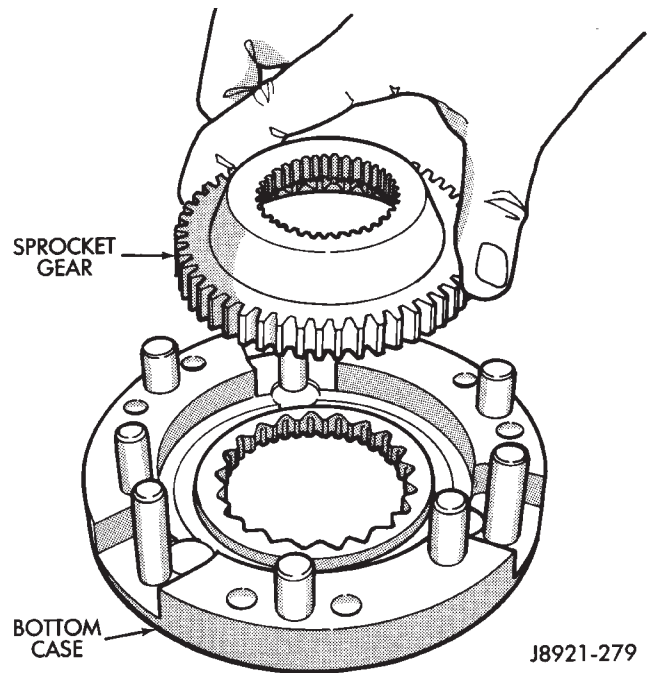


J8921-263

Fig. 52 Positioning Low Range Fork

- (25) Lubricate differential components with automatic transmission fluid.

- (26) Install sprocket gear in differential bottom case (Fig. 53).

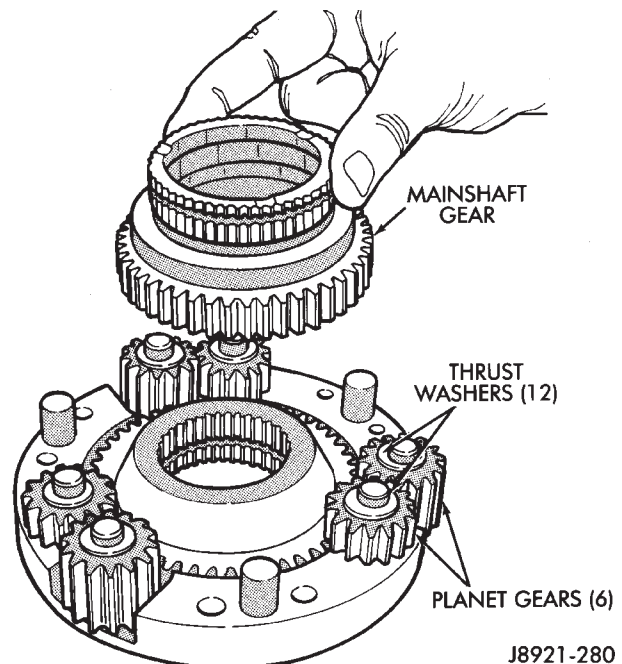


J8921-279

Fig. 53 Installing Differential Sprocket Gear

- (27) Install differential planet gears and new thrust washers (Fig. 54). **Be sure thrust washers are installed at top and bottom of each planet gear.**

- (28) Install differential mainshaft gear (Fig. 54).



J8921-280

Fig. 54 Installing Mainshaft And Planet Gears

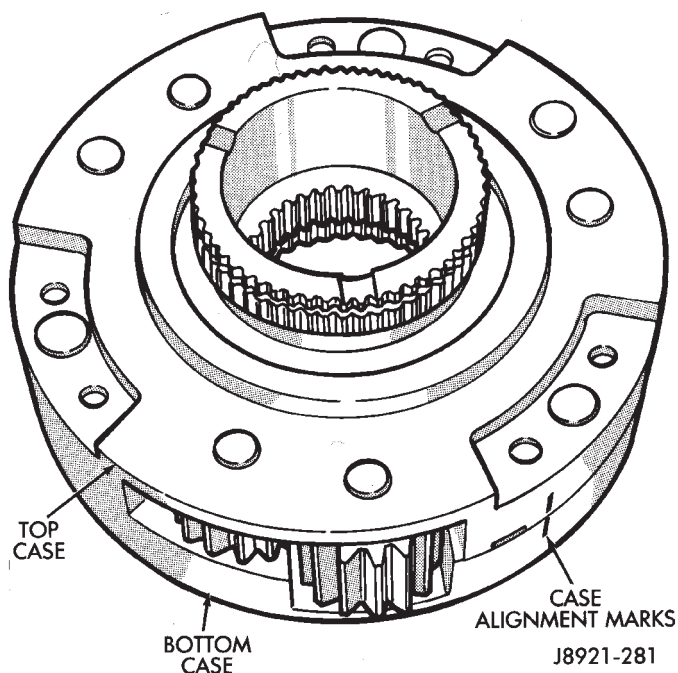


Fig. 55 Differential Case Assembly

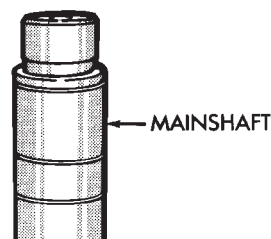
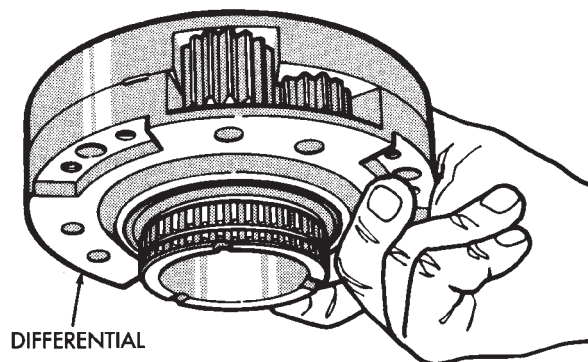


Fig. 57 Differential Installation

(33) Install remaining bearing spacer on mainshaft (Fig. 56). Do not displace any bearings while installing spacer.

(34) Install differential (Fig. 57). **Do not displace mainshaft bearings when installing differential.**

(35) Install the differential snap ring (Fig. 58).

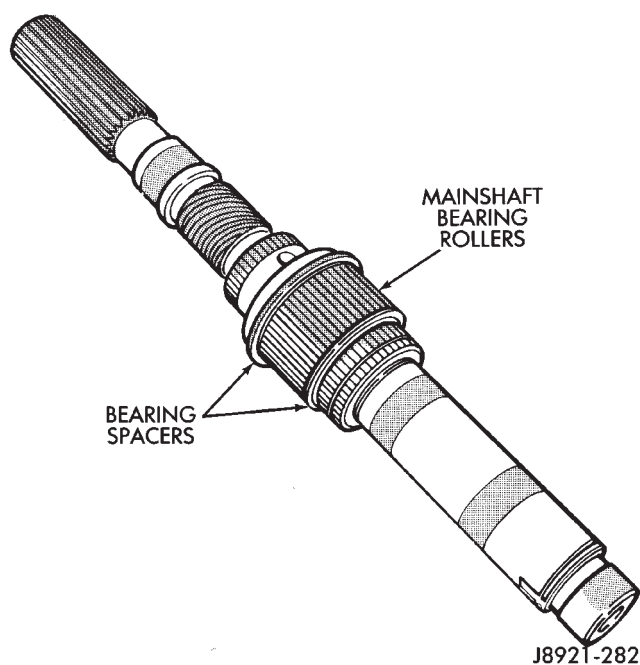


Fig. 56 Installing Mainshaft Bearing Rollers and Spacers

(29) Align and position differential top case on bottom case (Fig. 55). Align using scribe marks made at disassembly.

(30) Install and tighten differential case bolts.

(31) Install first mainshaft bearing spacer on mainshaft (Fig. 56).

(32) Install bearing rollers on mainshaft (Fig. 56). **Coat bearing rollers with generous quantity of petroleum jelly to hold them in place.**

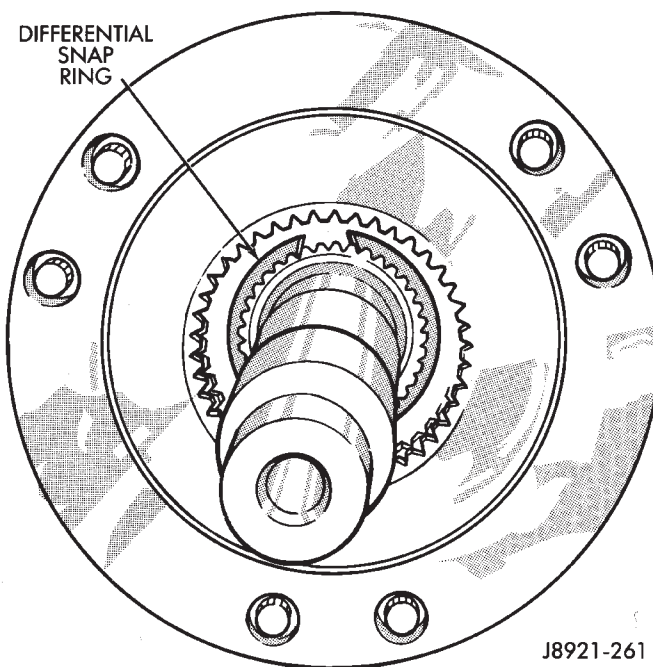


Fig. 58 Installing Differential Snap Ring

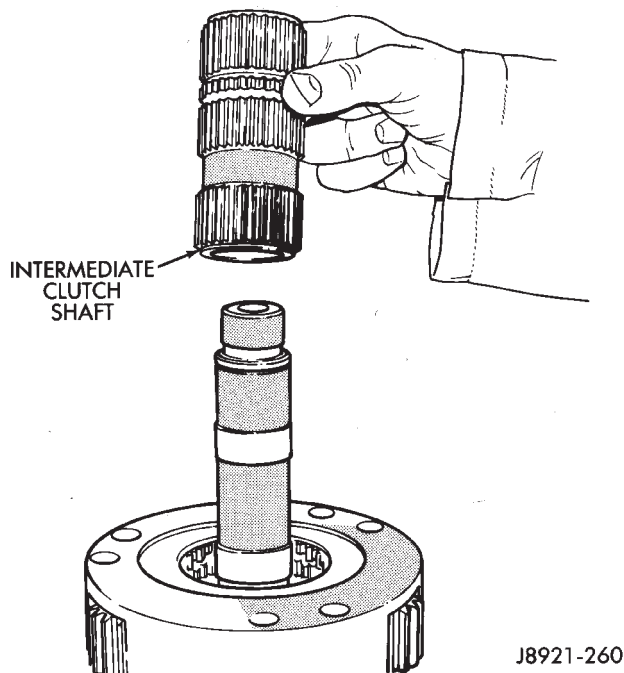


Fig. 59 Installing Intermediate Clutch Shaft

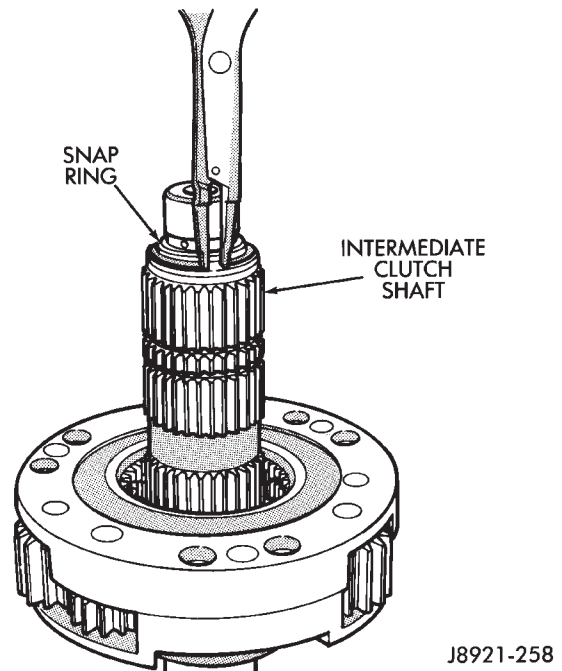


Fig. 61 Installing Clutch Shaft Snap Ring

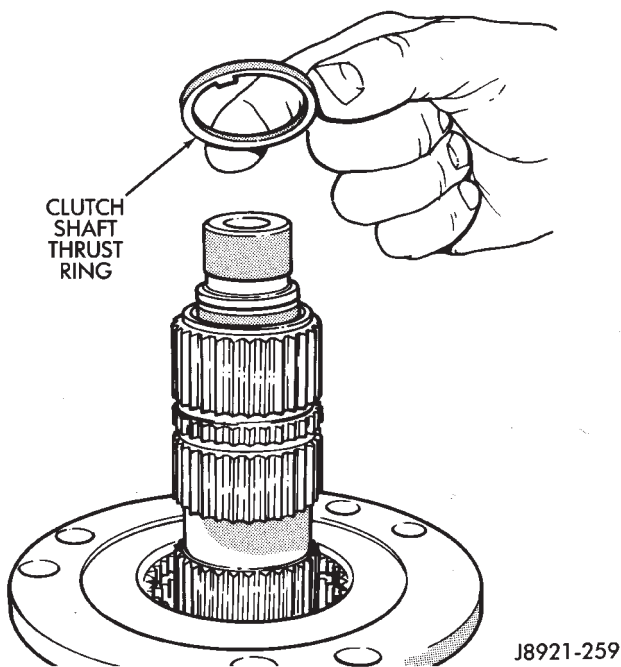


Fig. 60 Installing Clutch Shaft Thrust Washer

- (36) Install the intermediate clutch shaft (Fig. 59).
 (37) Install clutch shaft thrust washer (Fig. 60).

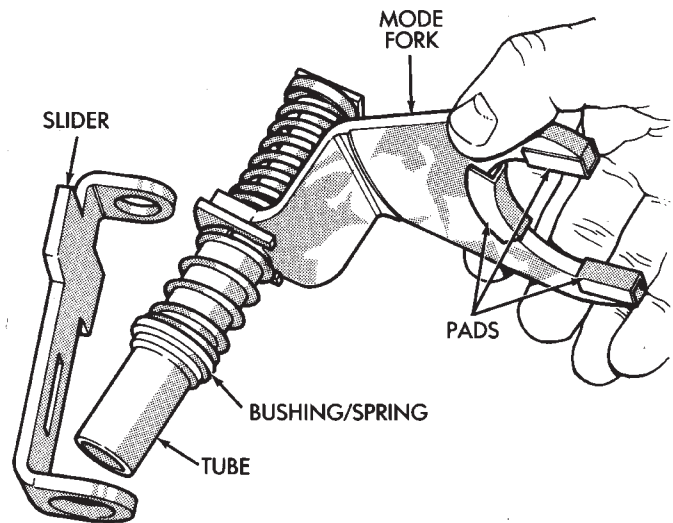
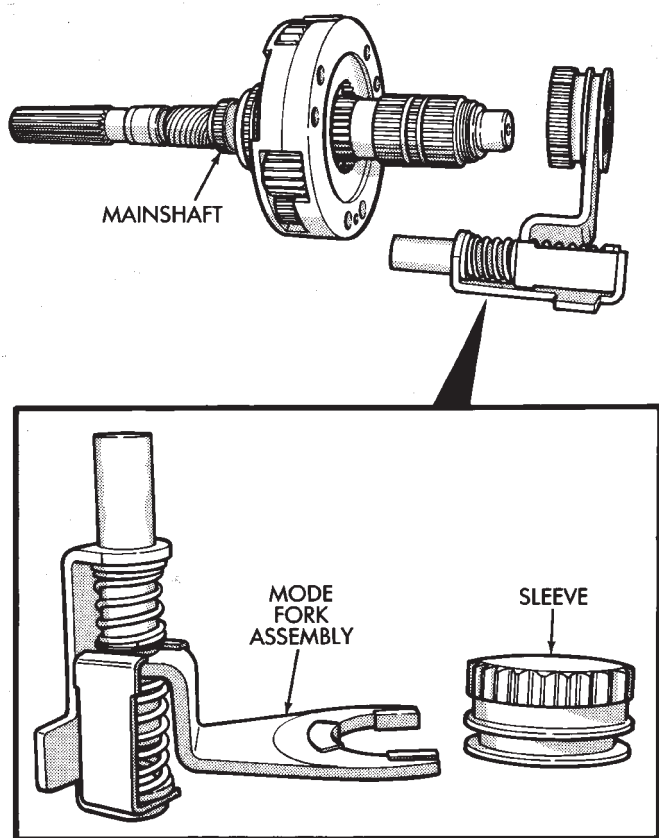


Fig. 62 Mode Fork Components

- (38) Install clutch shaft snap ring (Fig. 61).
 (39) Inspect mode fork assembly (Fig. 62). Replace pads and bushing if necessary. Replace fork tube if bushings inside tube are worn or damaged. Also check springs and slider bracket (Fig. 62). Replace worn, damaged components.



J8921-257

Fig. 63 Installing Mode Fork And Sleeve

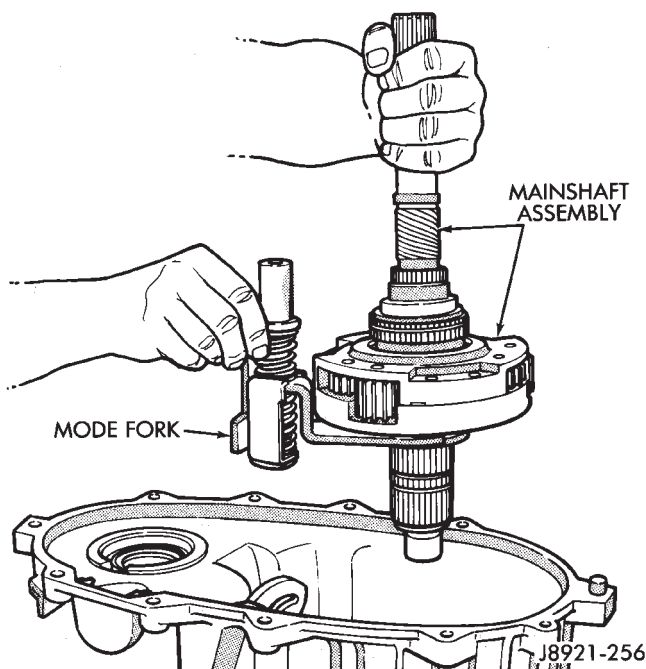


Fig. 64 Installing Mainshaft And Mode Fork

(40) Install mode sleeve in mode fork (Fig. 63). Then install assembled sleeve and fork on mainshaft. Be sure mode sleeve splines are engaged in differential splines.

(41) Install mode fork and mainshaft assembly in case (Fig. 64). Rotate mainshaft slightly to engage shaft with low range gears.

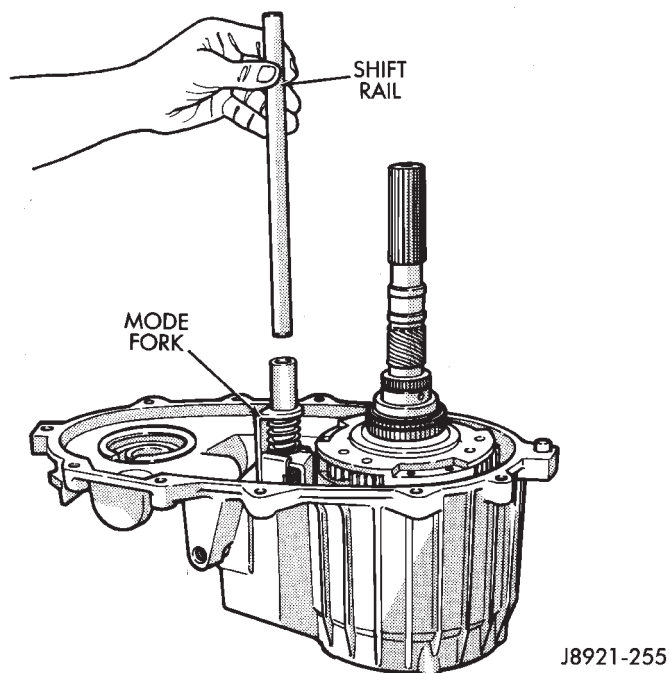


Fig. 65 Installing Shift Rail

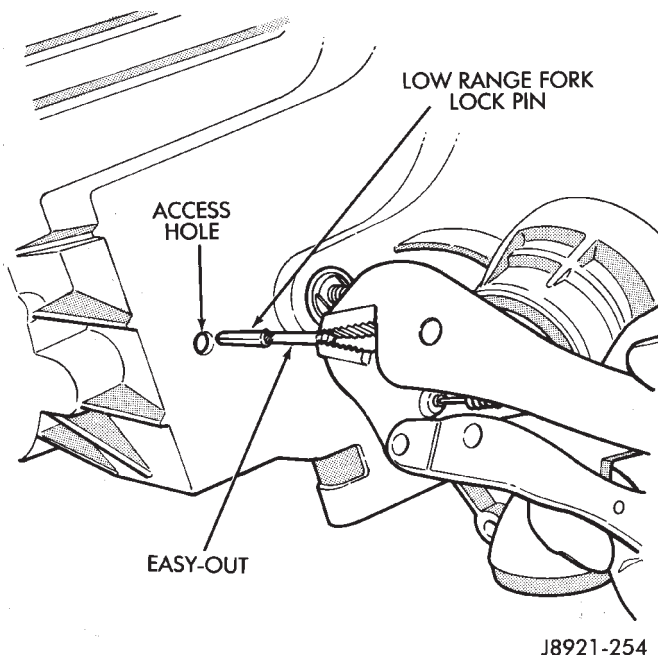


Fig. 66 Installing Low Range Fork Lockpin

(42) Rotate mode fork pin into shift sector slot.

(43) Install shift rail (Fig. 65). **Be sure rail is seated in both shift forks.**

(44) Rotate shift sector to align lockpin hole in low range fork with access hole in case.

(45) Insert an easy-out in range fork lockpin to hold it securely for installation (Fig. 66). **Lockpin is slightly tapered on one end. Insert tapered end into fork and rail.**

(46) Insert lockpin through access hole and into shift fork (Fig. 66). Then remove easy-out and seat pin with pin punch.

- (47) Install plug in lockpin access hole.
- (48) Install transfer case shift lever and attaching nut. Tighten nut to 30 N•m (22 ft. lbs.) torque.
- (49) Install detent plunger, detent spring and detent plug in the case (Fig. 67).

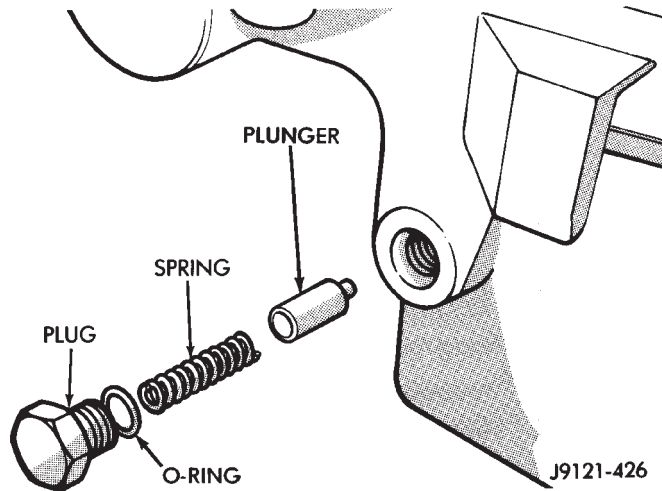


Fig. 67 Installing Detent Pin, Spring And Plug

- (50) Install front output shaft (Fig. 68).
- (51) Install drive chain (Fig. 68). Engage chain with front output shaft sprocket teeth.
- (52) Install drive sprocket (Fig. 68).
- (53) Engage drive sprocket teeth with chain. Then engage sprocket splines with mainshaft splines.

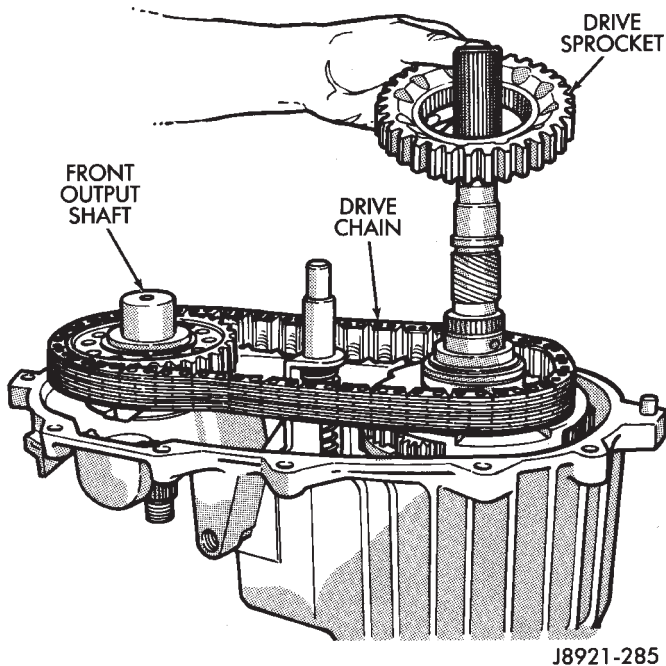


Fig. 68 Installing Drive Chain And Sprocket

- (54) Install drive sprocket snap ring (Fig. 69).

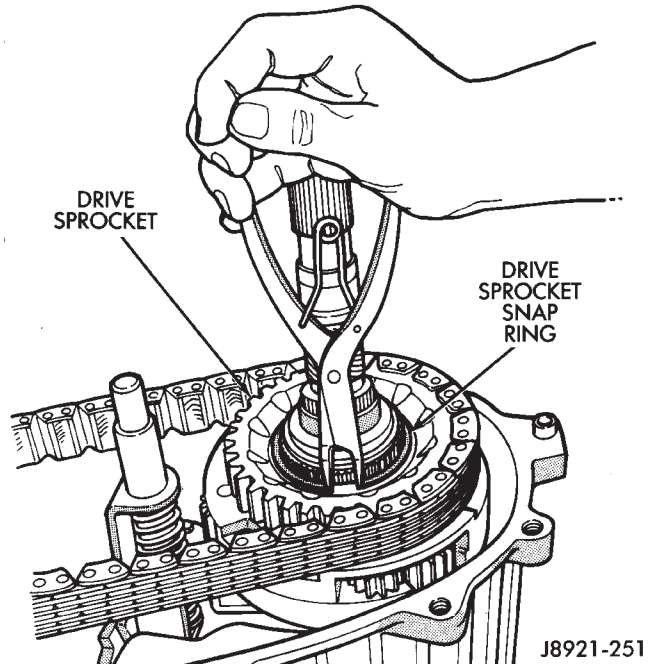


Fig. 69 Installing Drive Sprocket Snap Ring

- (55) Replace front output shaft rear bearing. Remove bearing with internal puller and slide hammer (Fig. 70). Install new bearing with bearing driver tools (Fig. 70). Lubricate bearing after installation.

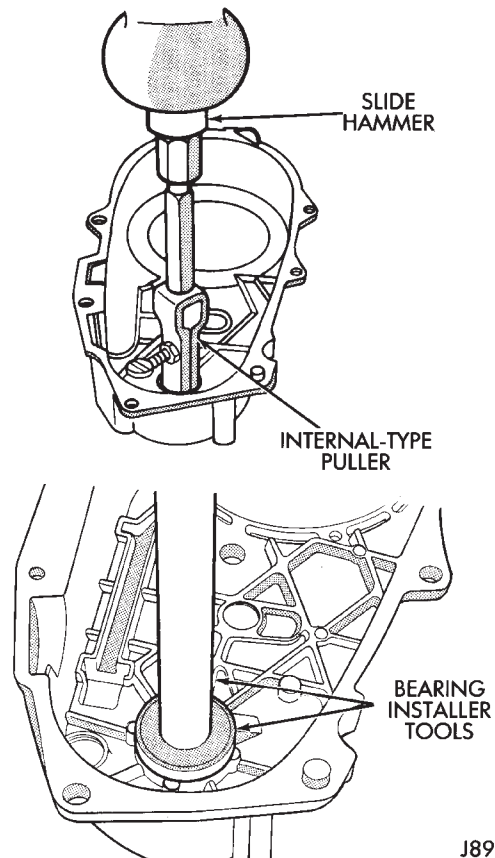
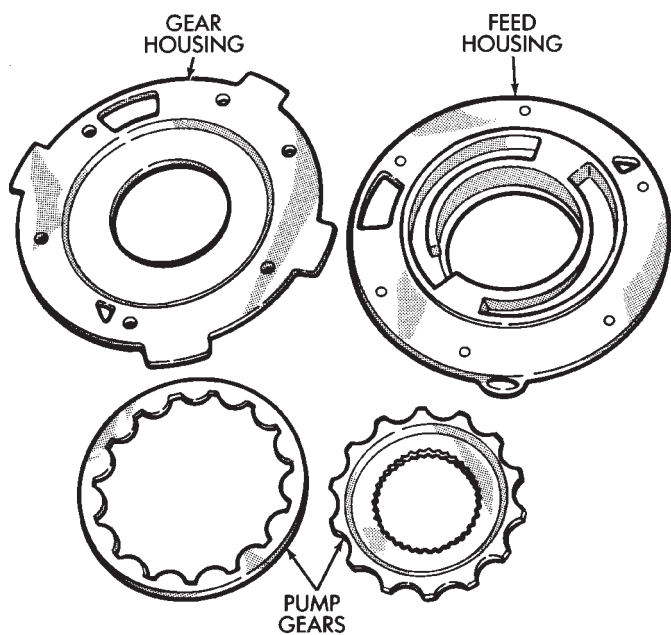
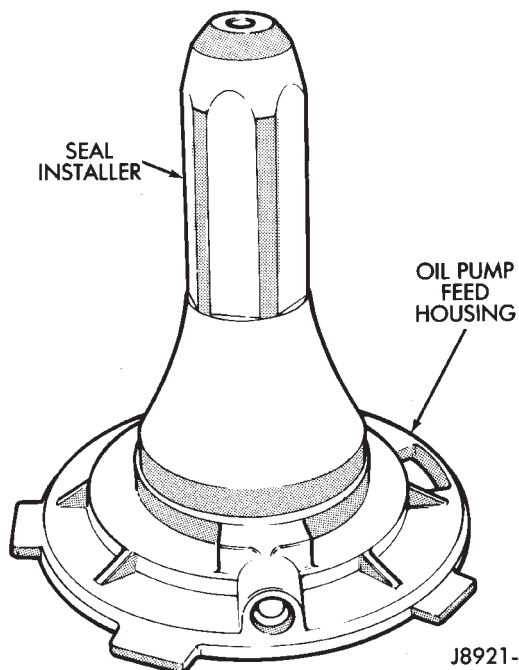


Fig. 70 Installing Front Output Shaft Rear Bearing



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Fig. 71 Oil Pump Assembly

J8921-235

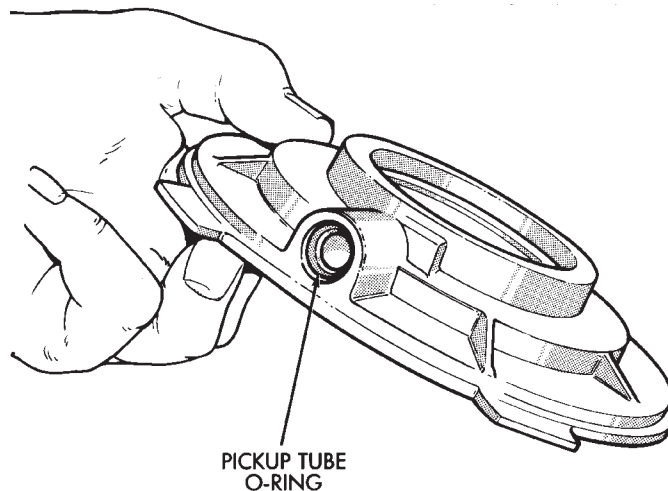
Fig. 72 Installing Oil Pump seal

(56) Assemble oil pump (Fig. 71). Replace any pump components that are worn or damaged.

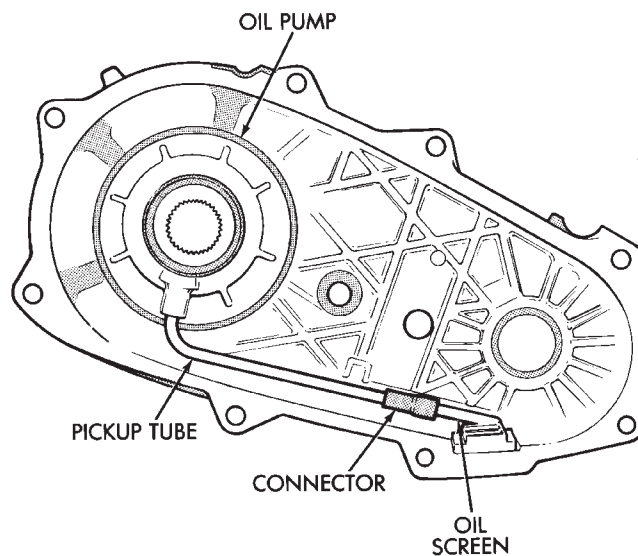
(57) Install new seal in oil pump feed housing (Fig. 72).

(58) Install new pickup tube O-ring in oil pump (Fig. 73).

(59) 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. 74). Be sure screen is seated in case slot as shown.



J8921-286

Fig. 73 Installing Pickup Tube O-Ring

J8921-287

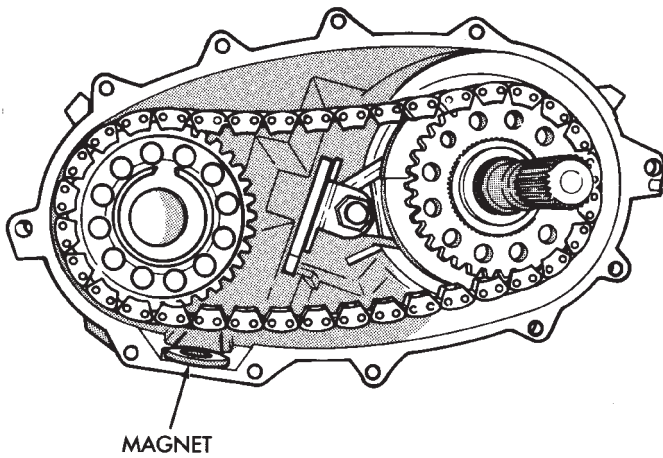
Fig. 74 Installing Oil Screen And Pickup Tube

(60) Install magnet in front case pocket (Fig. 75).

(61) Apply 3 mm (1/8 in.) wide bead of Mopar gasket maker, silicone adhesive sealer, or Loctite 518 to seal surface of front case.

(62) Align and install rear case on front case. Be sure case locating dowels are in place and that main-shaft splines are engaged in oil pump inner gear.

(63) Install and tighten the front case-to-rear case bolts to 41 N•m (30 ft. lbs.) torque. **Be sure to install a washer under each of the bolts used at the case dowel locations.**

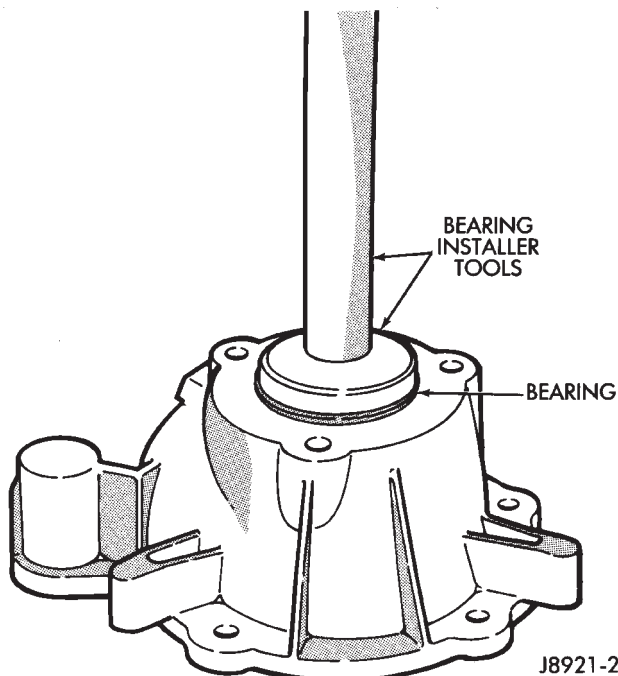


J8921-288

Fig. 75 Installing Case Magnet

(64) Tap rear retainer bearing out of retainer with hammer and brass drift.

(65) Install new bearing in rear retainer with driver tools (Fig. 76).



J8921-289

Fig. 76 Installing Rear Bearing In Retainer

(66) Apply 3 mm (1/8 in.) wide bead of Mopar gasket maker, silicone adhesive sealer, or Loctite 518 to seal surface of rear retainer.

(67) Install locating dowel in rear retainer (if removed) and install the retainer on the case. Tighten the retainer bolts to 41 N•m (30 ft. lbs.) torque.

(68) Install new rear bearing snap ring (Fig. 77). Lift mainshaft slightly to seat the snap ring if necessary.

(69) Remove extension housing seal if not removed previously.

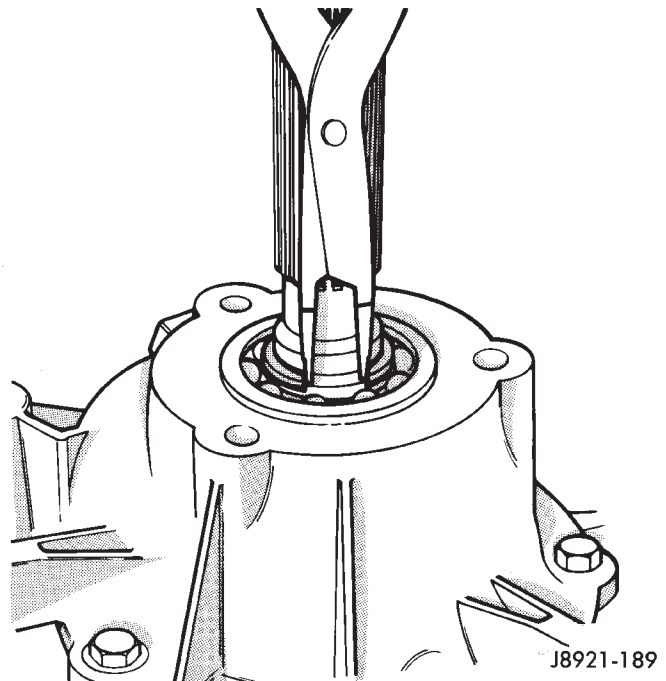
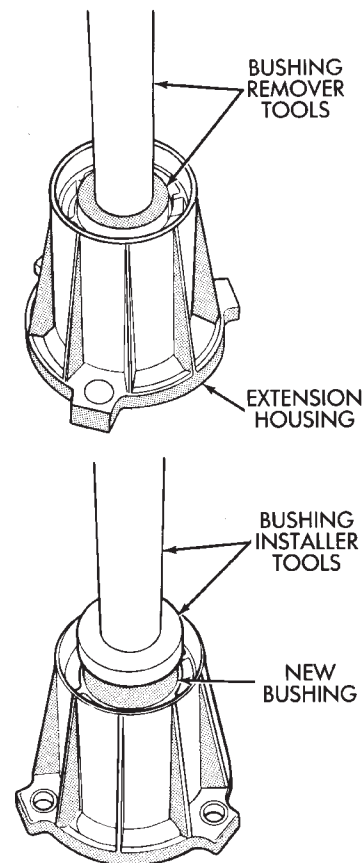


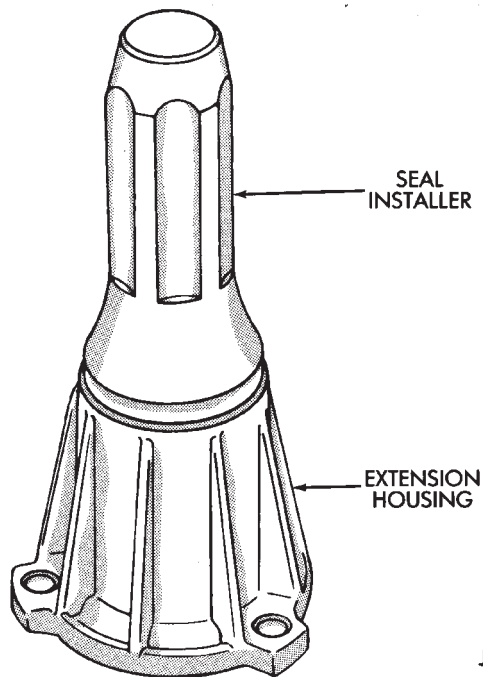
Fig. 77 Installing Rear Bearing Snap Ring

(70) Replace extension housing bushing with driver tools (Fig. 78).



J8921-237

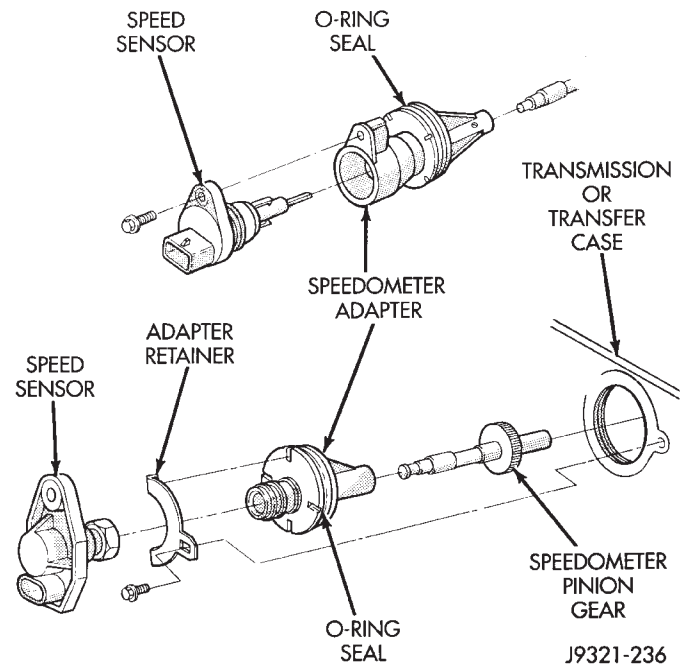
Fig. 78 Replacing Extension Housing Bushing



J8921-238

Fig. 79 Replacing Extension Housing Seal

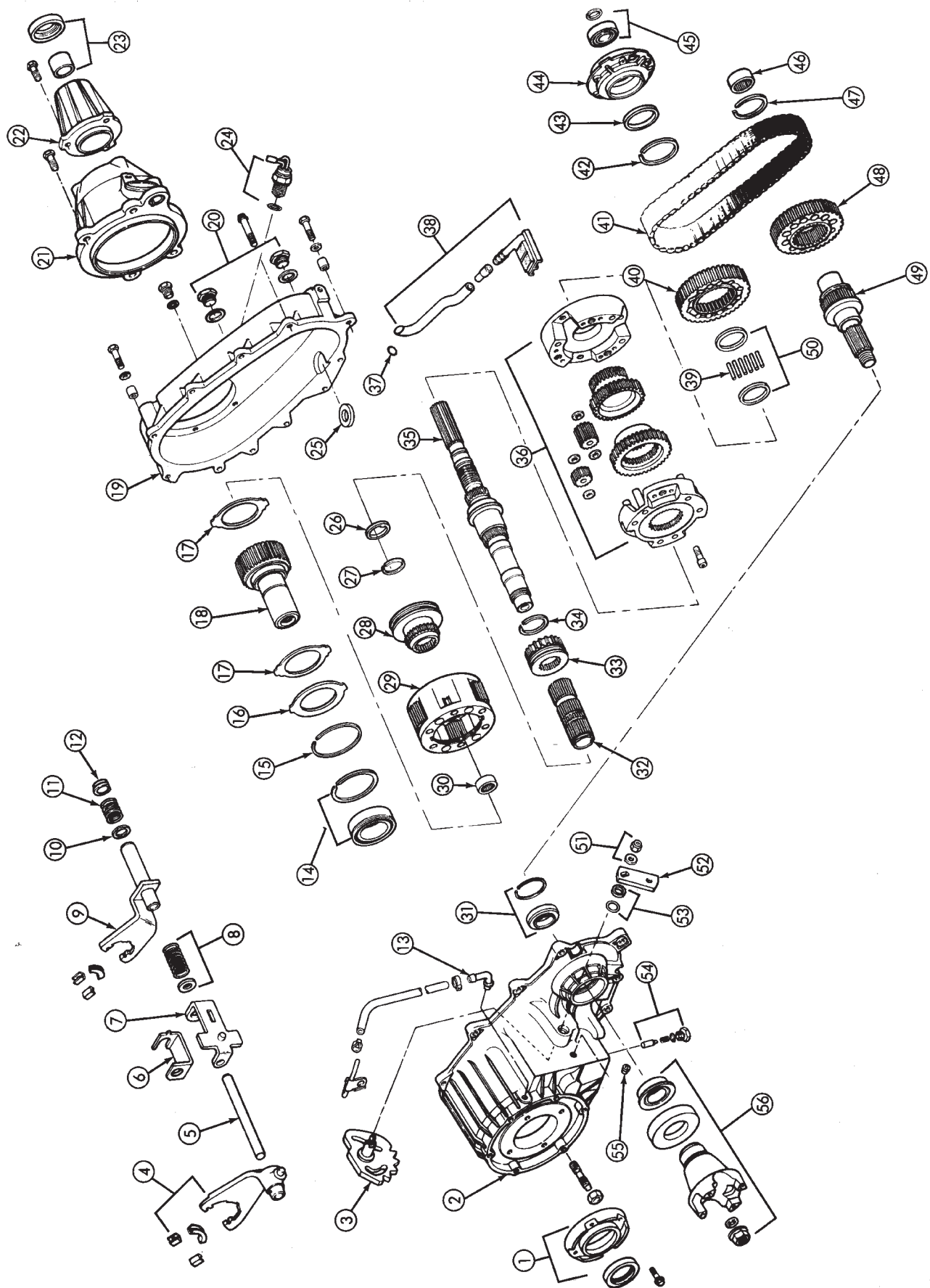
- (71) Install new extension housing oil seal (Fig. 79).
- (72) Apply 3 mm (1/8 in.) wide bead of Mopar gasket maker, silicone adhesive sealer, or Loctite 518 to seal surface of extension housing.
- (73) Install extension housing on case. Tighten housing bolts to 41 N•m (30 ft. lbs.) torque.
- (74) Install front yoke. Secure yoke with new seal washer and nut. Tighten nut to 149 N•m (110 ft. lbs.) torque.
- (75) Install new gasket on indicator switch and install switch in case. Tighten switch to 27 N•m (20 ft. lbs.) torque.



J9321-236

Fig. 80 Speedometer Components

- (76) Install speedometer components (Fig. 80).
- (77) Install and tighten drain plug to 47 N•m (35 ft. lbs.) torque.
- (78) After installing transfer case, refill with recommended transmission fluid.
- (79) Tighten fill plug to 47 N•m (35 ft. lbs.) torque.
- (80) Adjust transfer case shift linkage.



J8921-290

NP242 TRANSFER CASE

LEGEND FOR NP242 TRANSFER CASE

1 FRONT BEARING RETAINER AND SEAL	20 DRAIN/FILL PLUGS	38 OIL PUMP PICKUP TUBE AND SCREEN
2 FRONT CASE	21 REAR BEARING RETAINER	39 MAINSHAFT BEARING ROLLERS
3 SHIFT SECTOR	22 EXTENSION HOUSING	40 DRIVE SPROCKET
4 LOW RANGE FORK AND INSERTS	23 BUSHING AND OIL SEAL	41 DRIVE CHAIN
5 SHIFT RAIL	24 VACUUM SWITCH	42 SNAP RING
6 SHIFT BRACKET	25 MAGNET	43 OIL PUMP SEAL
7 SLIDER BRACKET	26 THRUST RING	44 OIL PUMP
8 BUSHING AND SPRING	27 SNAP RING	45 REAR BEARING AND SNAP RING
9 MODE FORK AND INSERTS	28 SHIFT SLEEVE	46 FRONT OUTPUT SHAFT REAR BEARING
10 BUSHING	29 LOW RANGE GEAR	47 SNAP RING
11 FORK SPRING	30 PILOT BUSHING	48 DRIVEN SPROCKET
12 BUSHING	(INPUT GEAR/MAINSHAFT)	49 FRONT OUTPUT SHAFT
13 VENT TUBE ASSEMBLY	31 FRONT OUTPUT SHAFT FRONT	50 MAINSHAFT BEARING SPACERS
14 INPUT GEAR BEARING AND	BEARING AND SNAP RING	51 SHIFT LEVER WASHER AND NUT
SNAP RING	32 INTERMEDIATE CLUTCH SHAFT	52 SHIFT LEVER
15 LOW RANGE GEAR SNAP RING	33 SHIFT SLEEVE	53 SECTOR O-RING AND SEAL
16 RETAINER, LOW RANGE GEAR	34 SNAP RING	54 DETENT PIN, SPRING AND PLUG
17 THRUST WASHER, LOW RANGE GEAR	35 MAINSHAFT	55 SEAL PLUG
18 INPUT GEAR	36 DIFFERENTIAL ASSEMBLY	56 FRONT YOKE NUT, SEAL WASHER,
19 REAR CASE	37 OIL PUMP TUBE O-RING	YOKE, SLINGER AND OIL SEAL

J8921-291

NP249 TRANSFER CASE

INDEX

	page		page
Component Cleaning and Inspection	331	Transfer Case Disassembly and Overhaul	323
General Information	319	Transfer Case Identification	320
Recommended Lubricant	320	Transfer Case Installation	322
Shift Linkage Adjustment	320	Transfer Case Removal	322
Transfer Case Assembly and Adjustment	335		

GENERAL INFORMATION

The NP249 is an all the time, transfer case with two operating ranges and a neutral position (Fig. 1). Operating ranges are 4-high and 4-low. The 4-low range is used for extra pulling power in off road situations.

Engine torque is distributed to the front and rear axles through a differential and viscous coupling in the transfer case. The NP249 is also equipped with a low range gear reduction system for increased low speed and off road torque capability.

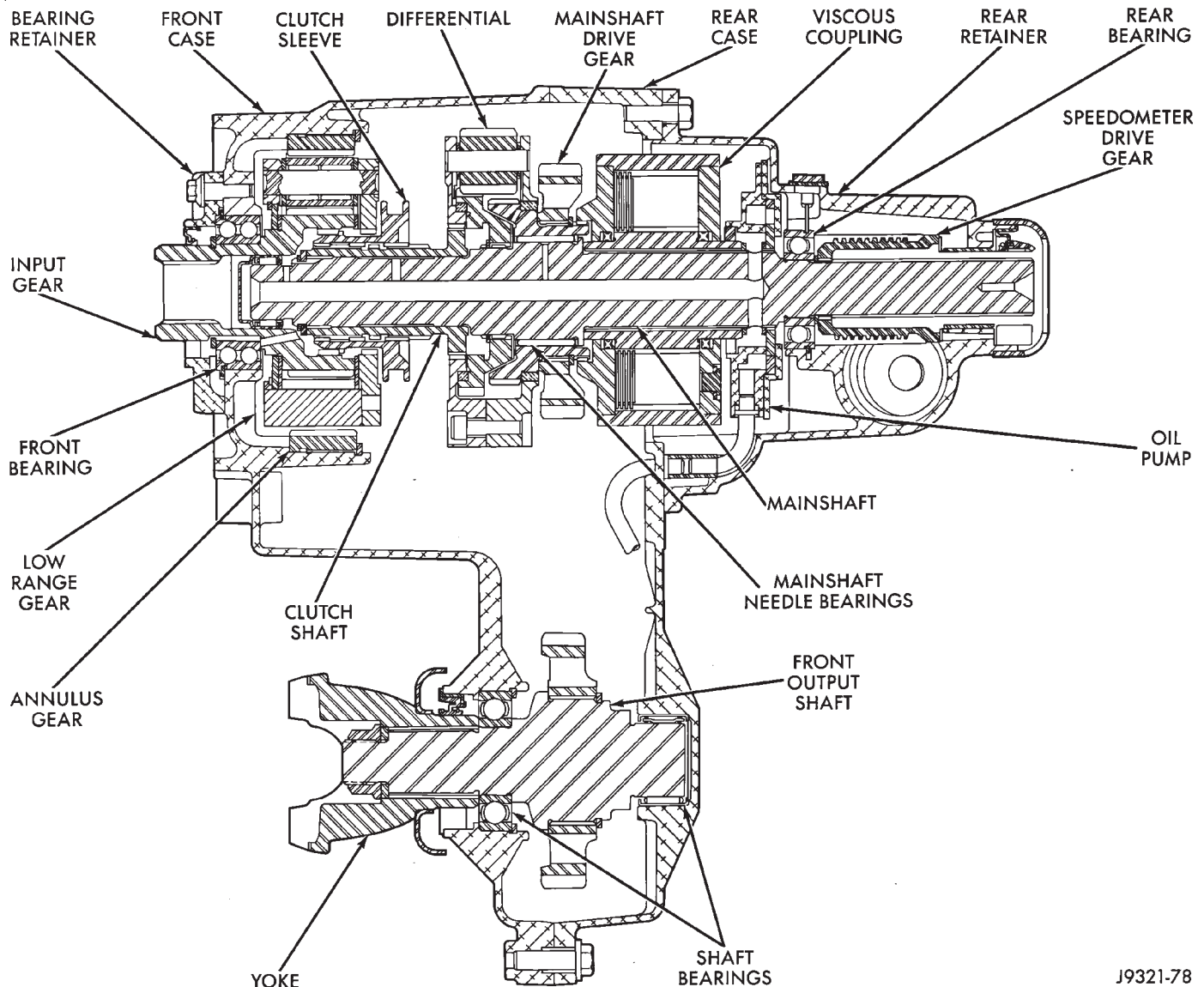
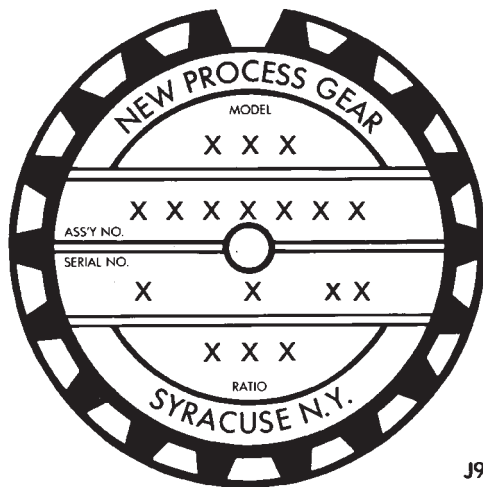


Fig. 1 NP249 Transfer Case

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J9121-434

Fig. 2 Transfer Case I.D. Tag

SHIFT MECHANISM

Transfer case 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. Range positions are marked on the shifter bezel plate.

TRANSFER CASE IDENTIFICATION

A circular I.D. tag is attached to the rear case of each NP249 transfer case (Fig. 2). The tag provides

the transfer case model number, assembly number, serial number and low range ratio.

The transfer case serial number also represents the date of build. For example, a serial number of 10-5-91 would represent October 5, 1991.

RECOMMENDED LUBRICANT

Mopar Dexron II®, or ATF Plus, type 7176 automatic transmission fluid are the recommended lubricants for the NP249 transfer case.

Fluid refill capacity is approximately 1.18 liters (2.50 pints). Correct fill level is to the bottom edge of the fill plug hole.

SHIFT LINKAGE ADJUSTMENT

- (1) Shift transfer case into Neutral position.
- (2) Raise vehicle on hoist that will allow all four wheels to rotate freely.
- (3) Loosen trunnion lock bolt (Figs. 3 and 4). Loosen bolt enough so selector rod slides freely in trunnion.
- (4) Verify that shift lever on transfer case is in centered in Neutral position.
- (5) Tighten trunnion lock bolt to 11-20 N•m (96-180 in. lbs.) torque.
- (6) Lower vehicle enough for entry into driver's seat but keep all wheels off shop floor.

NP249 SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
TRANSFER CASE DIFFICULT TO SHIFT OR WILL NOT SHIFT INTO DESIRED RANGE	(1) Transfer case external shift linkage binding. (2) Insufficient or incorrect lubricant. (3) Internal components binding, worn or damaged.	(1) Lubricate, repair or replace linkage, or tighten loose components as necessary. (2) Drain and refill to edge of fill hole with MOPAR DEXRON II® or ATF Plus, Type 7176 Automatic Transmission Fluid. (3) Disassemble unit and replace worn or damaged components as necessary.
TRANSFER CASE NOISY IN ALL DRIVE POSITIONS	(1) Insufficient or incorrect lubricant.	(1) Drain and refill to edge of fill hole with MOPAR DEXRON II® or ATF Plus, Type 7176 Automatic Transmission Fluid. Check for leaks and repair if necessary. Note: If unit is still noisy after drain and refill, disassembly and inspection may be required to locate source of noise.
LUBRICANT LEAKING FROM OUTPUT SHAFT SEALS OR FROM VENT	(1) Transfer case overfilled. (2) Vent closed or restricted. (3) Output shaft seals damaged or installed incorrectly.	(1) Drain to correct level. (2) Clear or replace vent if necessary. (3) Replace seals. Be sure seal lip faces interior of case when installed. Also be sure yoke seal surfaces are not scored or nicked. Remove scores and nicks with fine sandpaper or replace yoke(s) if necessary.

J9221-50

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.)

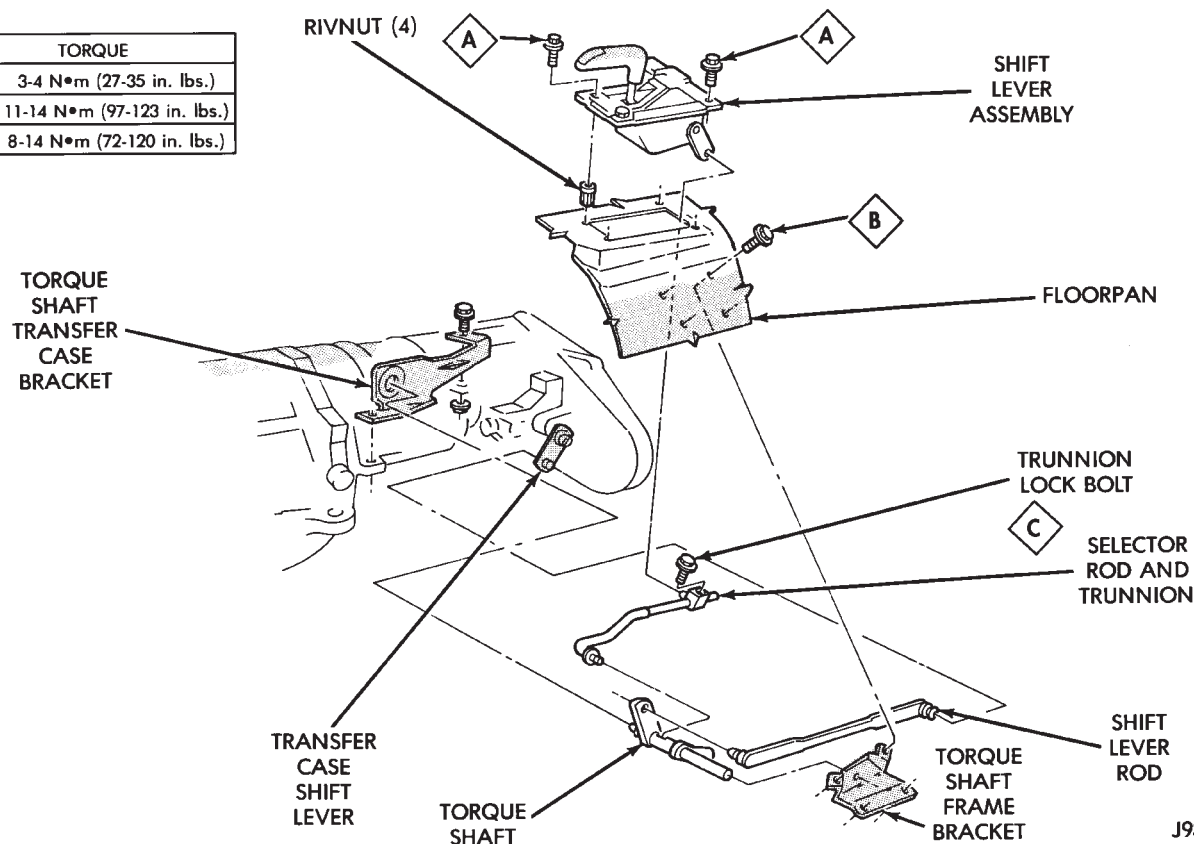


Fig. 3 Transfer Case Shift Linkage (Automatic Transmission)

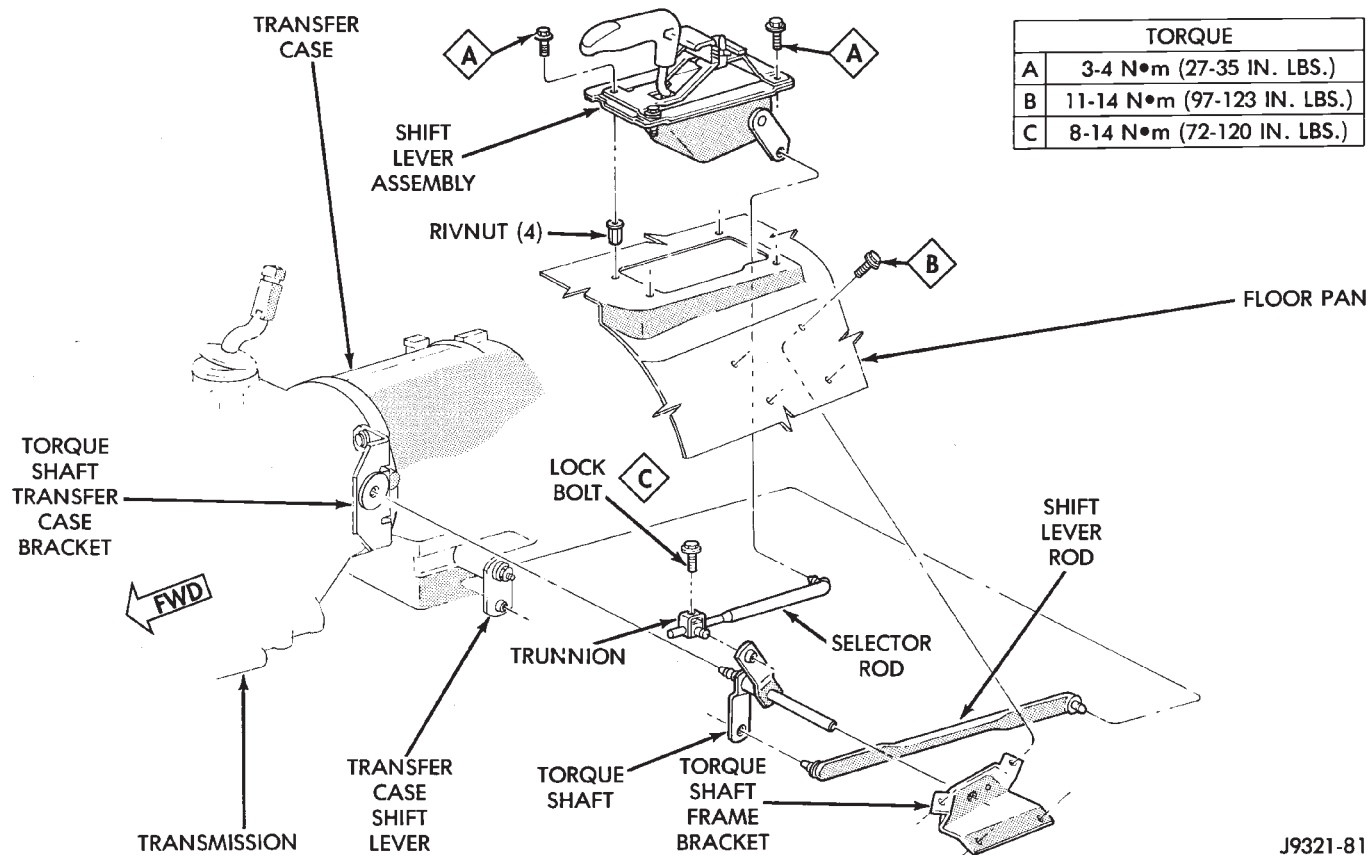


Fig. 4 Transfer Case Shift Linkage (Manual Transmission)

(7) Verify correct linkage adjustment. Start engine, shift transmission into gear and shift transfer case into all ranges. Be sure transfer case is fully engaged in high and low range. Readjust linkage if necessary.

(8) Shut engine off and lower vehicle completely.

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) Place support stand under transmission.
- (6) Remove rear crossmember.
- (7) Disconnect front/rear propeller shafts at transfer case.
- (8) Disconnect speed sensor and remove speedometer adapter and sensor if necessary.
- (9) Disconnect transfer case shift lever from shift lever rod.
- (10) Disconnect vent hose and electrical connectors.
- (11) Support transfer case with transmission jack.
- (12) Remove bolts attaching transfer case to transmission.
- (13) Secure transfer case to jack with chains.
- (14) Pull transfer case and jack rearward to disengage transfer case.
- (15) Remove transfer case from under vehicle.

TRANSFER CASE INSTALLATION

- (1) Mount transfer case on a transmission jack. Secure transfer case to jack with chains.
- (2) Position transfer case under vehicle.
- (3) Align transfer case and transmission shafts and install transfer case on transmission (Fig. 5).
- (4) Install and tighten transfer case attaching nuts to 35 N•m (26 ft. lbs.) torque (Fig. 5).
- (5) Install speedometer adapter if removed during

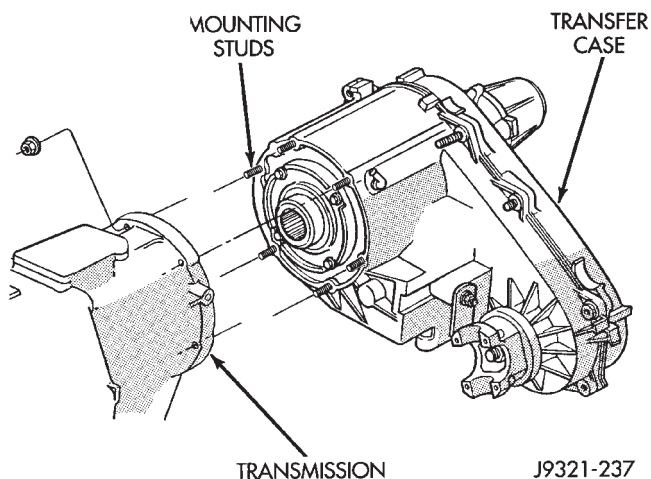


Fig. 5 Transfer Case Attachment

service (Fig. 6). Then index adapter and install speed

sensor in adapter. Refer to adapter indexing procedure in In-Vehicle Service section.

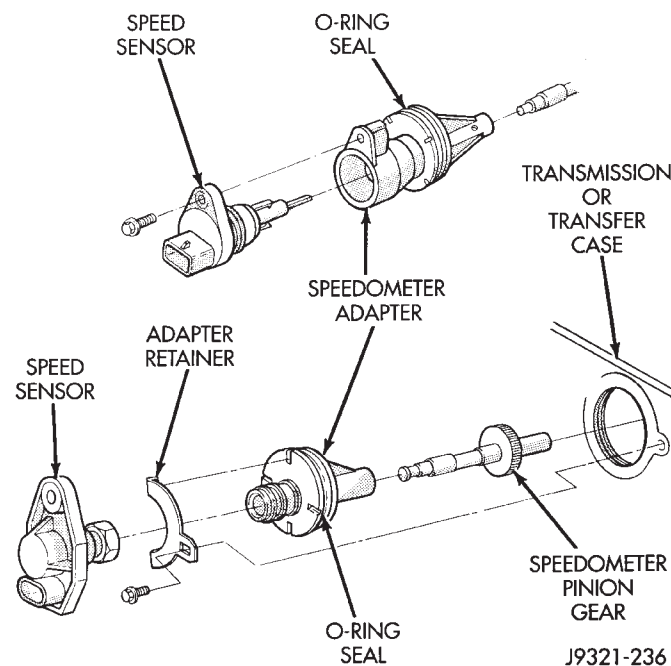


Fig. 6 Speedometer Components

- (6) Connect electrical wires to speed sensor.
- (7) Connect vent hose to transfer case vent (Fig. 7).
- (8) Align and connect propeller shafts. Tighten

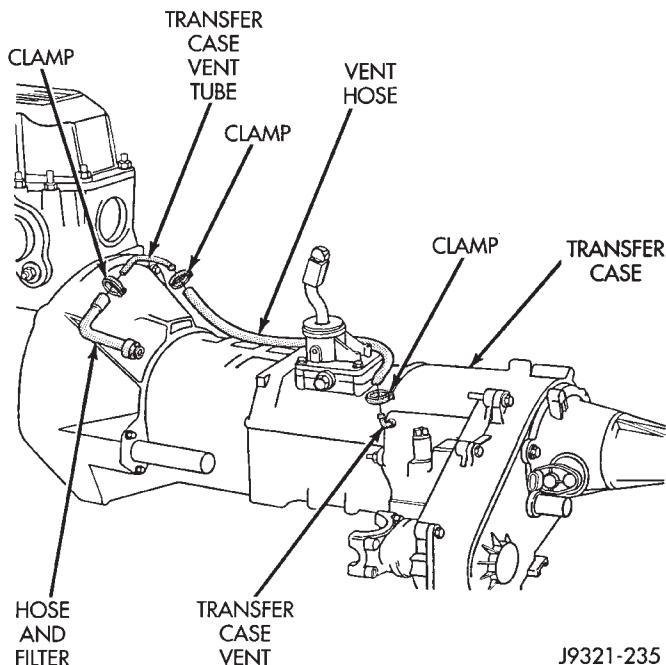


Fig. 7 Transfer Case Vent Hose Routing

shaft attaching bolts to 19 N•m (170 in. lbs.) torque.

(9) Fill transfer case with Mopar Dexron II, or ATF Plus automatic transmission fluid.

(10) Install rear crossmember if removed. Tighten crossmember bolts to 41 N•m (30 ft. lbs.) torque.

- (11) Remove transmission jack and transmission support stand.
- (12) Connect transfer case shift lever to shift lever rod.
- (13) Check and adjust transfer case shift linkage if necessary.
- (14) Lower vehicle.

TRANSFER CASE DISASSEMBLY AND OVERHAUL

TRANSFER CASE DISASSEMBLY

- (1) Position transfer case on shallow drain pan. Remove drain plug and drain lubricant.
- (2) Remove front yoke nut and remove yoke (Fig. 1).
- (3) Remove yoke seal washer from front output shaft (Fig. 2).

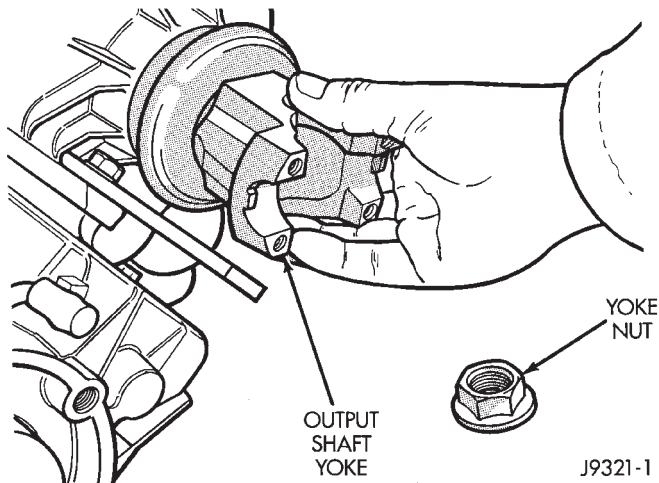


Fig. 1 Removing Front Output Shaft Yoke

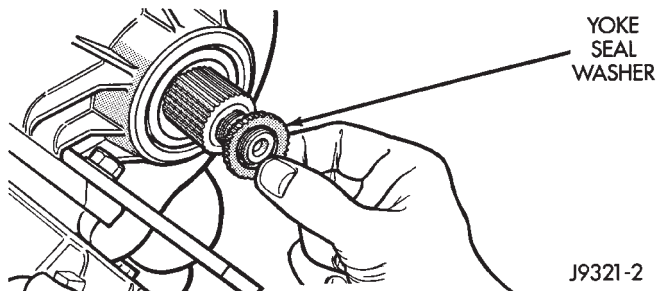


Fig. 2 Removing Yoke Seal Washer

- (4) Remove rear retainer bolts (Fig. 3).
- (5) Remove rear bearing locating ring access cover screws, cover and gasket (Fig. 4).
- (6) Loosen rear retainer with pry tool to break sealer bead. Pry only against retainer boss as shown (Fig. 5).

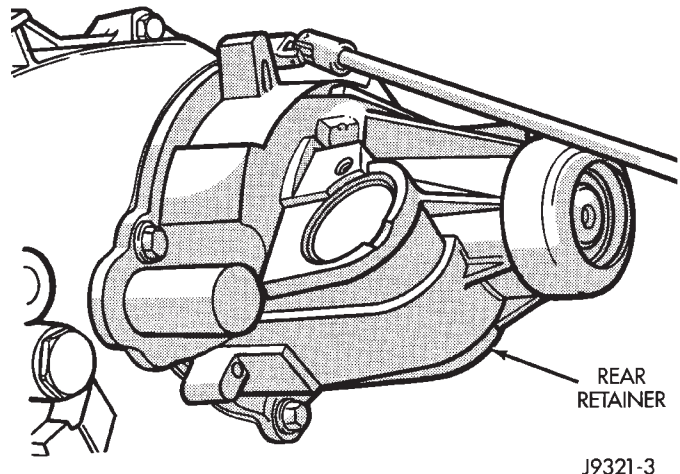


Fig. 3 Removing Rear Retainer Bolts

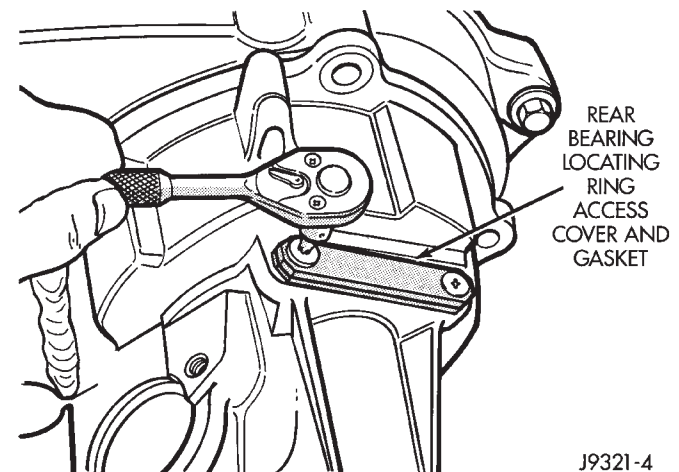


Fig. 4 Removing Locating Ring Access Cover And Gasket

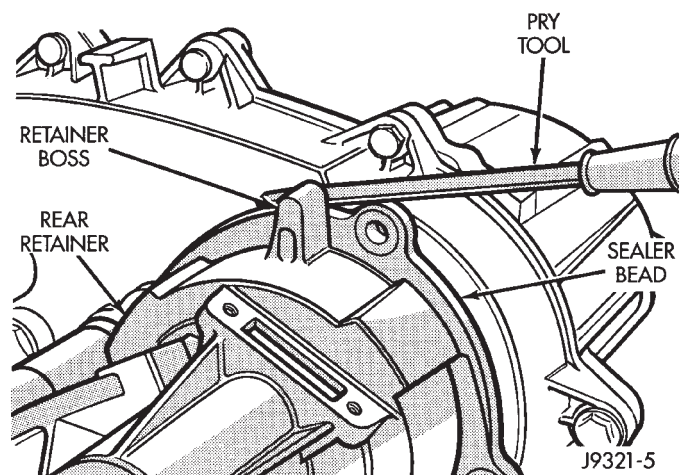


Fig. 5 Loosening Rear Retainer

- (7) Remove rear retainer as follows: Spread rear bearing locating ring with snap ring pliers (Fig. 6). Then slide retainer off mainshaft and rear bearing (Fig. 7).

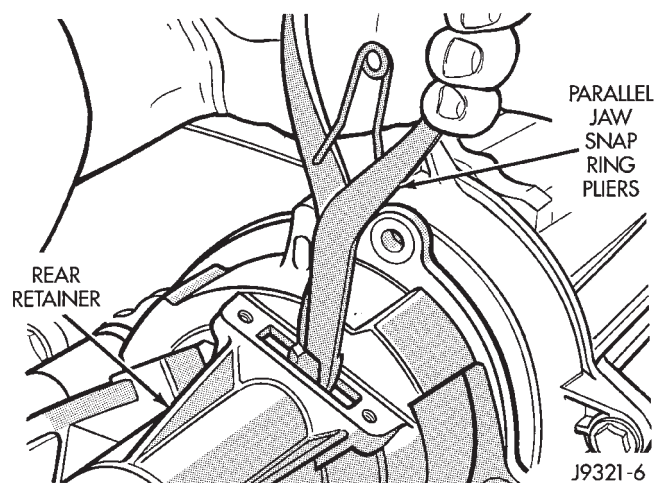


Fig. 6 Disengaging Rear Bearing Locating Ring

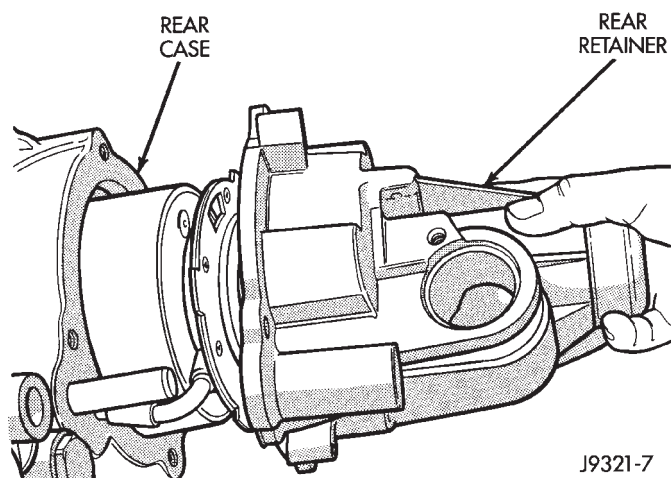


Fig. 7 Removing Rear Retainer

- (8) Remove speedometer drive gear (Fig. 8).
- (9) Remove rear bearing snap ring (Fig. 9).

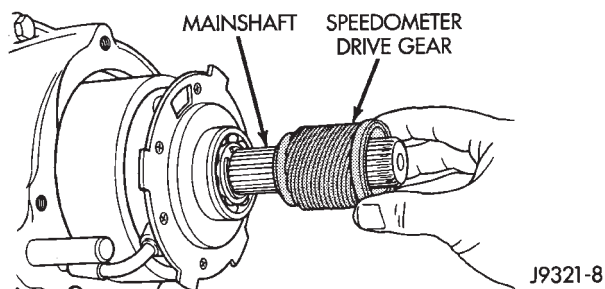


Fig. 8 Removing Speedometer Drive Gear

- (10) Remove rear bearing (Fig. 10). Note position of bearing locating ring groove for assembly reference.

- (11) Disengage oil pickup tube from oil pump and remove pump assembly (Fig. 11).

- (12) Mount transfer case on wood blocks so rear case is facing upward (Fig. 12).

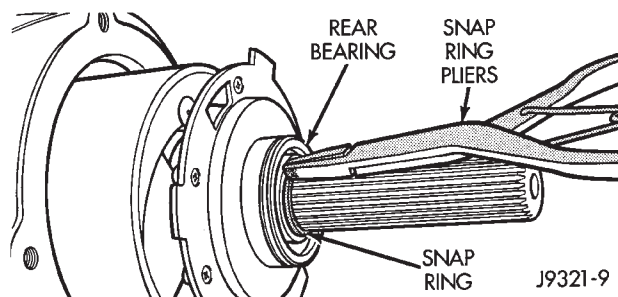


Fig. 9 Removing Rear Bearing Snap Ring

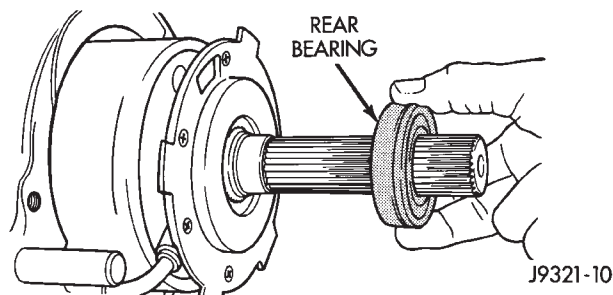


Fig. 10 Removing Rear Bearing

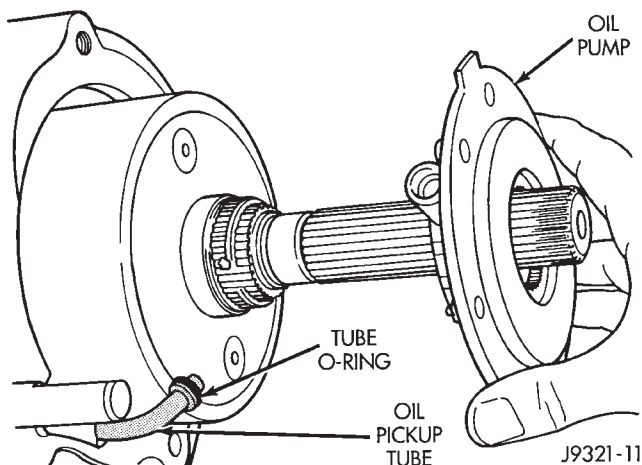
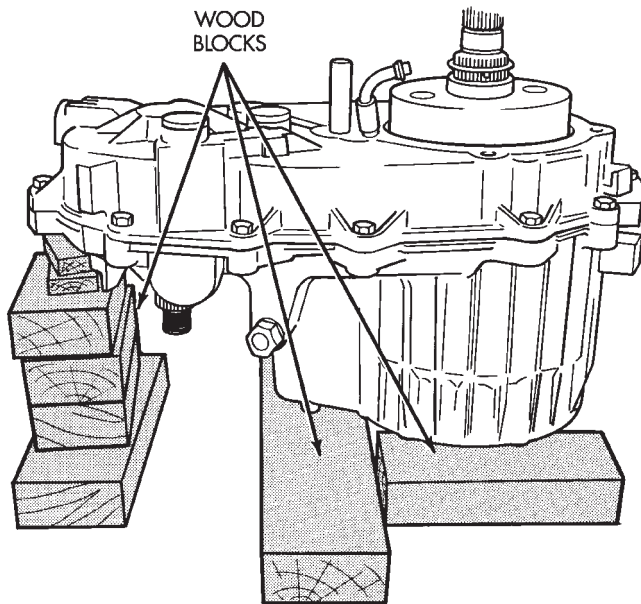


Fig. 11 Removing Oil Pump

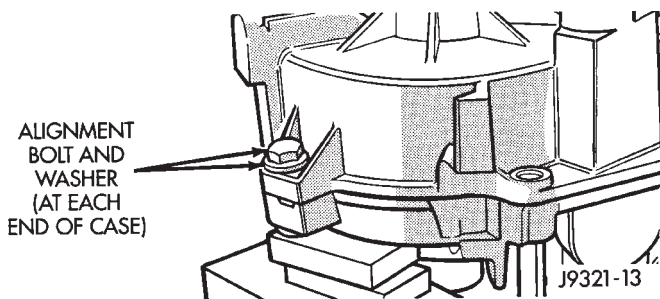
- (13) Remove bolts attaching rear case to front case. Note that two end bolts are only ones that require washers (Fig. 13). These bolts serve as case-to-case alignment bolts.

- (14) Loosen rear case with flat blade screwdriver to break sealer bead. Insert screwdriver blade only into notches provided at each end of case (Fig. 14).



J9321-12

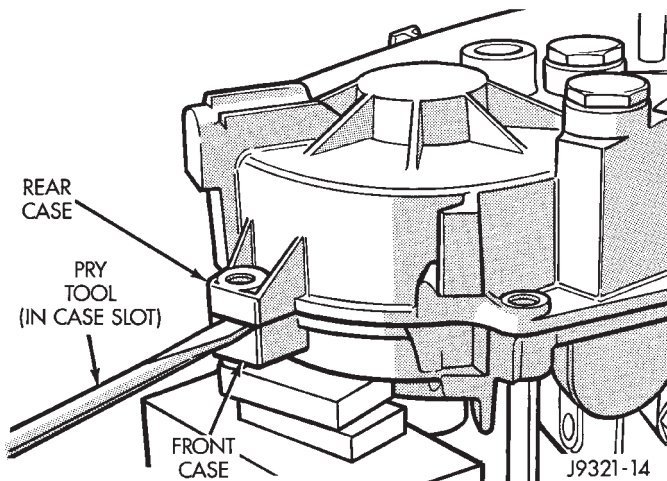
Fig. 12 Supporting Transfer Case On Wood Blocks



J9321-13

Fig. 13 Rear Case Alignment Bolt Locations

(15) Remove rear case (Fig. 15).



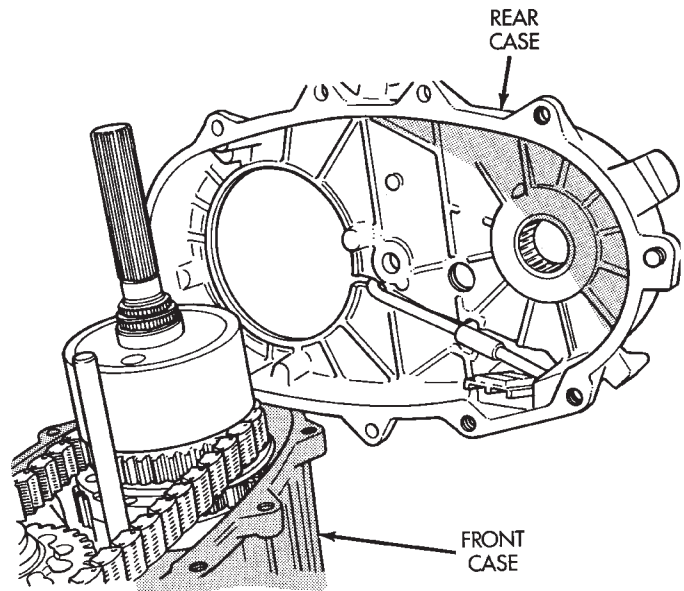
J9321-14

Fig. 14 Loosening Rear Case

(16) Remove oil pickup tube from rear case (Fig. 16).

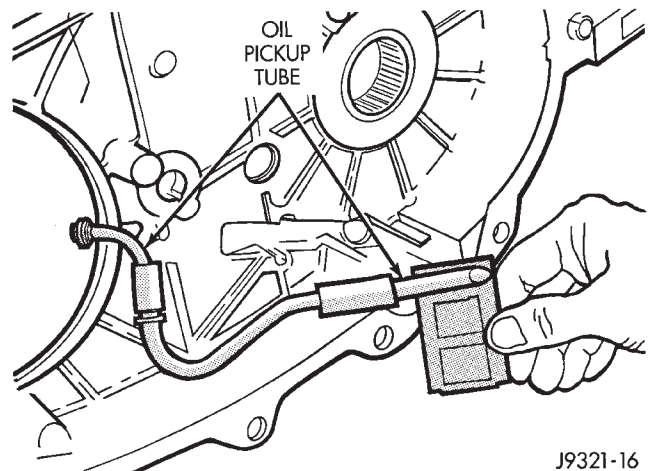
(17) Remove oil pump locating snap ring and viscous coupling snap ring from mainshaft (Fig. 17).

(18) Remove viscous coupling from mainshaft (Fig. 18).



J9321-15

Fig. 15 Rear Case Removal



J9321-16

Fig. 16 Removing Oil Pickup Tube

(19) Remove drive gear snap ring (Fig. 19).

(20) Disengage drive gear (Fig. 20). Pry gear upward and off mainshaft as shown.

(21) Remove front output shaft, drive chain and drive gear as assembly (Fig. 21).

(22) Remove detent plug, plug O-ring, detent spring and detent plunger (Fig. 22).

(23) Remove mainshaft and differential assembly (Fig. 23).

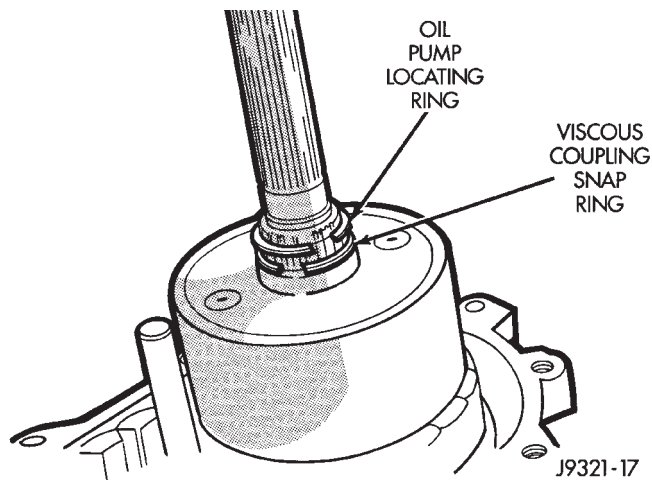


Fig. 17 Oil Pump And Viscous Coupling Snap Ring Locations

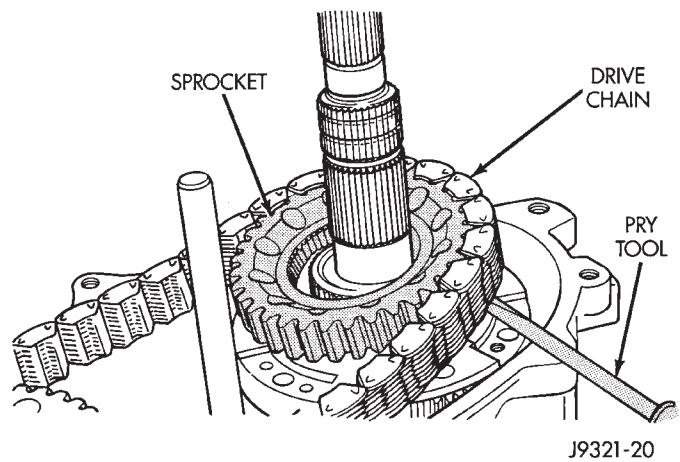


Fig. 20 Disengaging Mainshaft Drive Gear

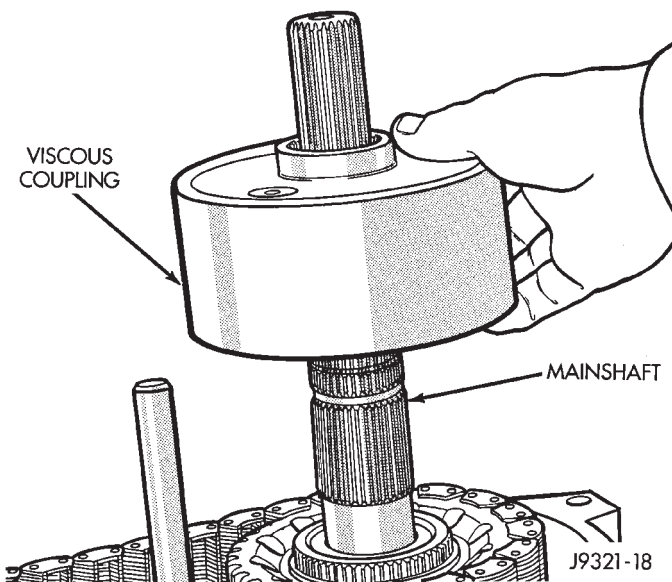


Fig. 18 Viscous Coupling Removal

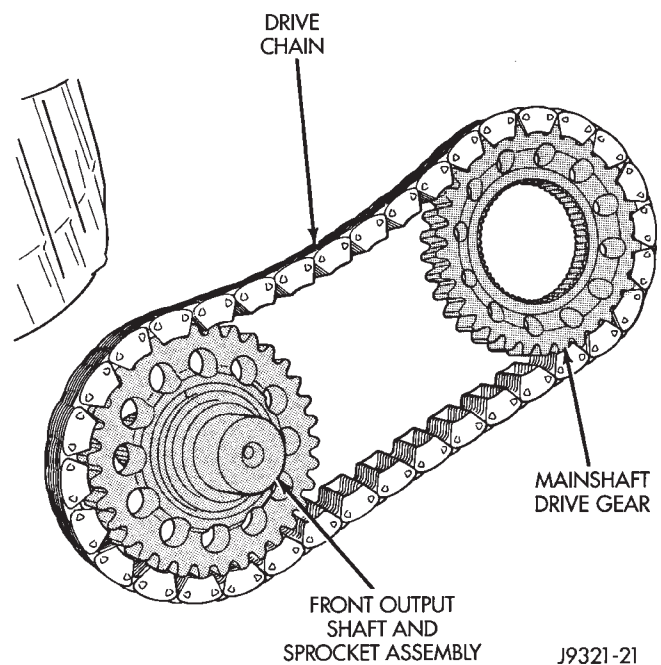


Fig. 21 Front Output Shaft, Drive Gear And Chain Removal

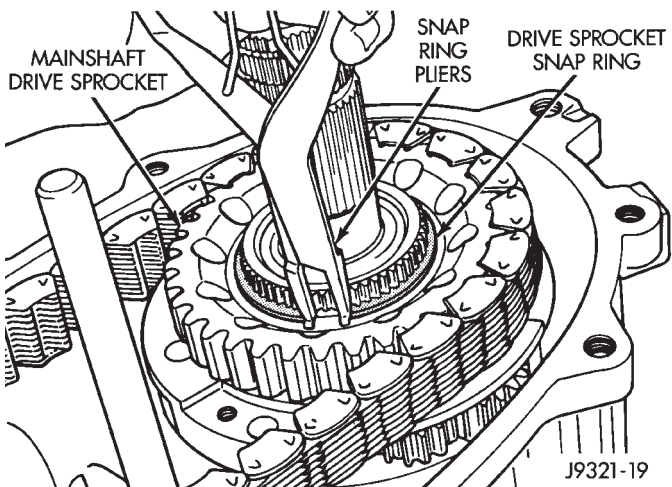


Fig. 19 Removing Drive Gear Snap Ring

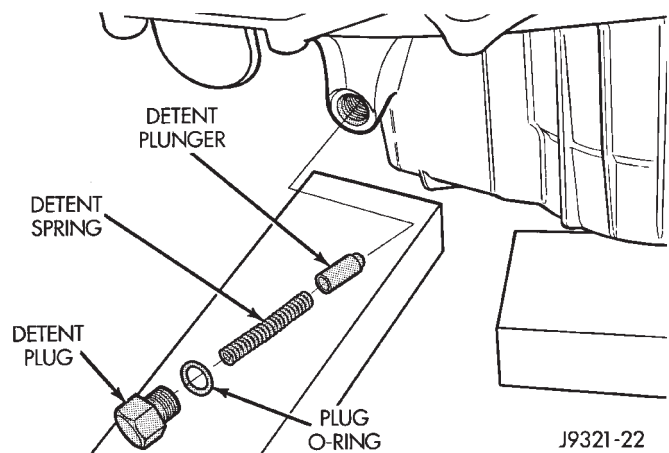


Fig. 22 Detent Plug, Spring And Plunger Removal

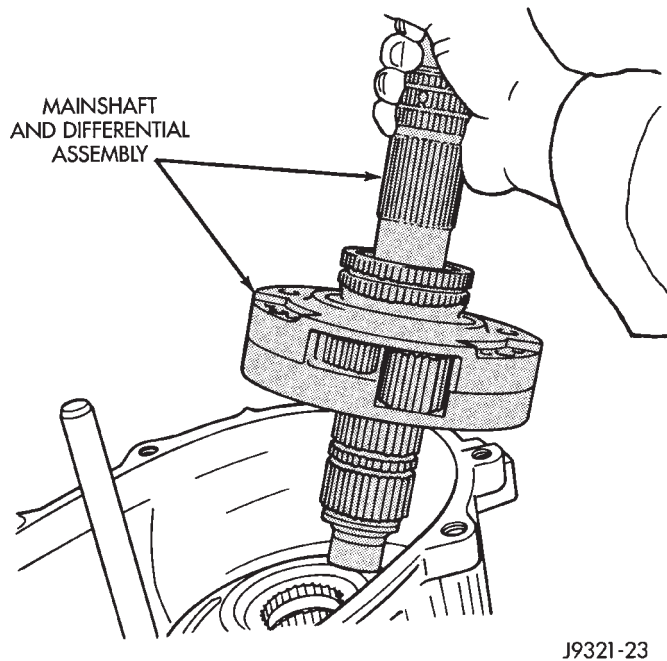


Fig. 23 Removing Mainshaft And Differential Assembly

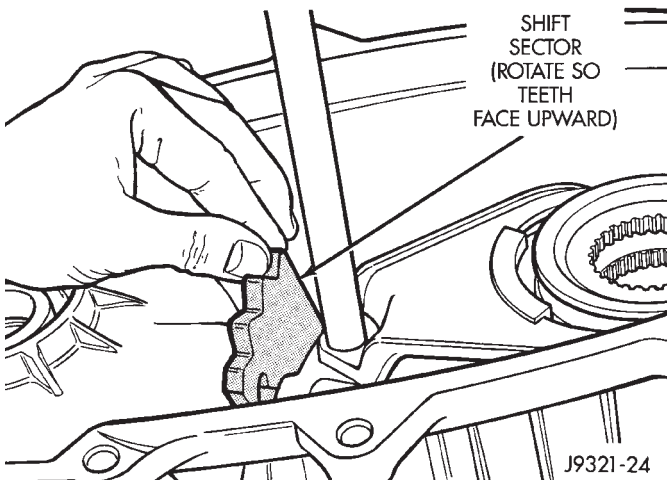


Fig. 24 Rotating Shift Sector

(24) Rotate shift sector so sector teeth face upward (Fig. 24).

(25) Remove range fork, rail and clutch sleeve as assembly (Fig. 25). Lift shift rail upward, rotate fork out of shift sector and remove assembly.

(26) Turn front case on side so front bearing retainer is accessible.

(27) Remove front bearing retainer bolts (Fig. 26).

(28) Remove front bearing retainer as follows: Loosen retainer with flat blade screwdriver to break sealer bead. Then remove retainer from case and gear. **To avoid damaging case and retainer, position screwdriver blade only in slots provided in retainer (Fig. 27).**

(29) Remove snap ring that retains input gear shaft in front bearing (Fig. 28).

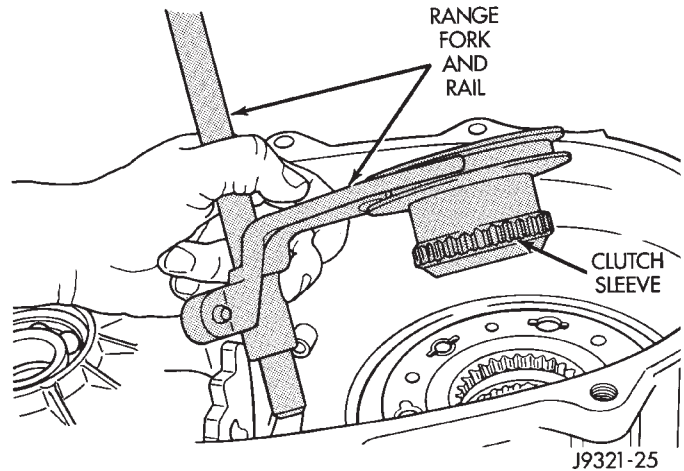


Fig. 25 Removing Range Fork And Clutch Sleeve

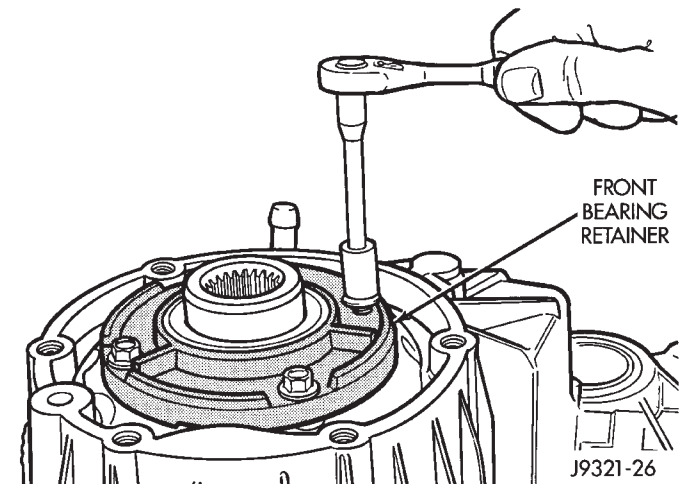


Fig. 26 Removing Front Bearing Retainer Bolts

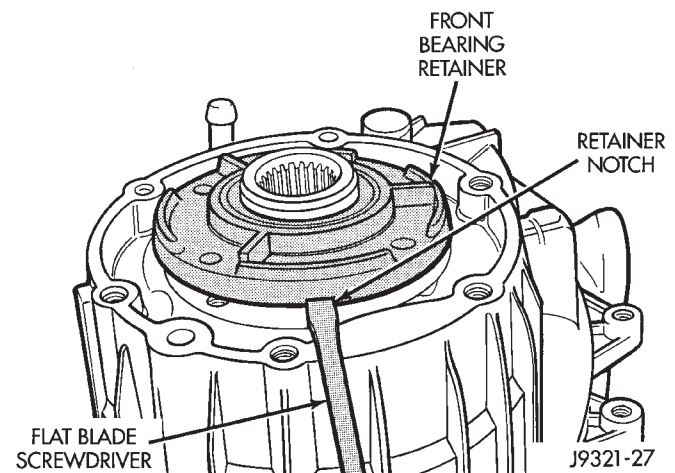


Fig. 27 Removing Front Bearing Retainer

(30) Remove input and low range gear assembly (Fig. 29).

(31) Remove range lever locknut and remove lever and washer from shift sector shaft (Fig. 30).

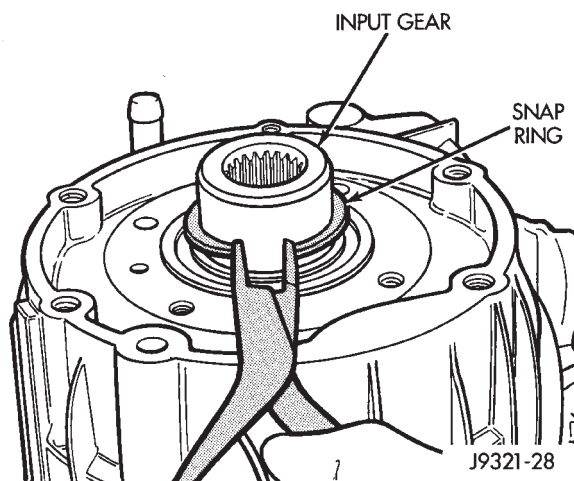


Fig. 28 Removing Input Gear Snap Ring

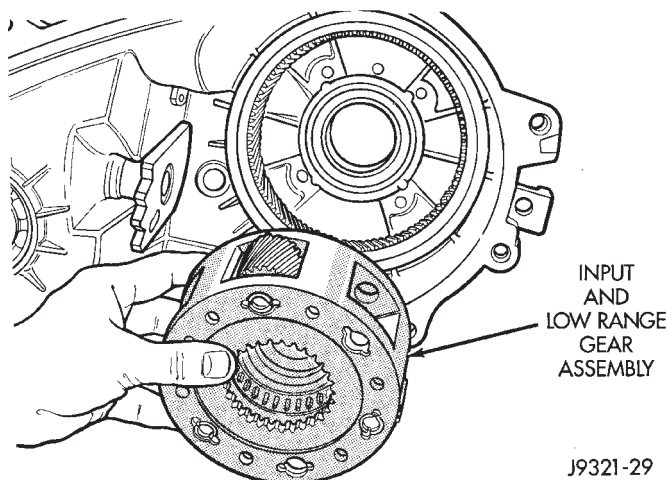


Fig. 29 Removing Input And Low Range Gear Assembly

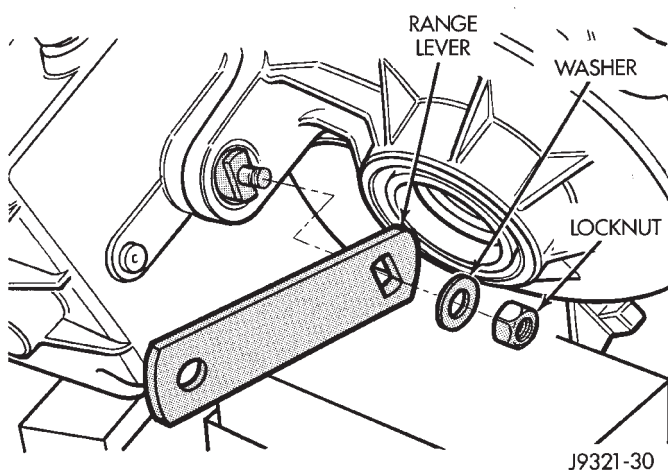


Fig. 30 Range Lever Removal

(32) Remove shift sector. Rotate and tilt sector as needed to remove it (Fig. 31).

(33) Remove magnet from case.

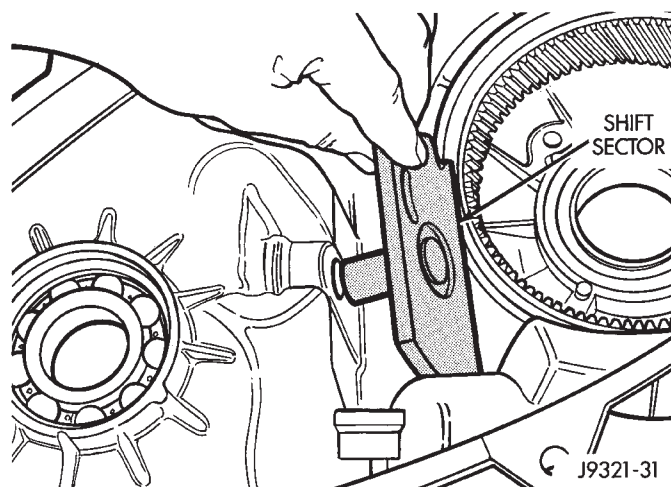


Fig. 31 Removing Shift Sector

INPUT AND LOW RANGE GEAR DISASSEMBLY

(1) Remove snap ring that retains input gear in low range gear (Fig. 32).

(2) Remove retainer (Fig. 33).

(3) Remove front tabbed thrust washer (Fig. 34).

(3) Remove input gear (Fig. 35).

(4) Remove rear tabbed thrust washer from low range gear (Fig. 36).

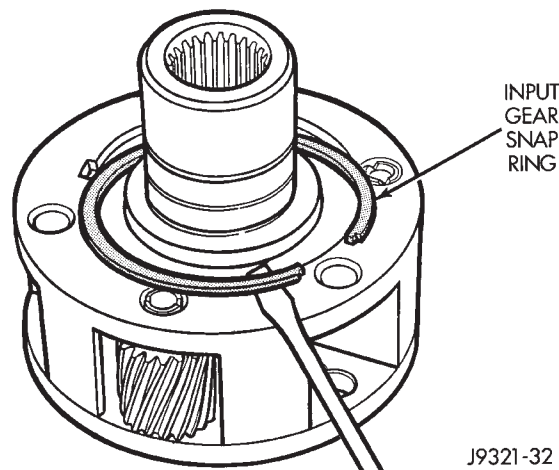


Fig. 32 Removing Input Gear Snap Ring

MAINSHAFT AND DIFFERENTIAL DISASSEMBLY

(1) Remove clutch shaft snap ring (Fig. 37).

(2) Remove thrust ring (Fig. 38).

(3) Slide clutch shaft off mainshaft (Fig. 39).

(4) Disengage snap ring that retains differential on mainshaft (Fig. 40). Work snap ring upward until clear of gear teeth and ring groove.

(5) Retrieve snap ring from shaft and interior of differential with pencil magnet (Fig. 41).

(6) Position drain pan or shop towels under differential and mainshaft. Pan or towels will help catch and retain mainshaft needle bearings when differential is removed from shaft.

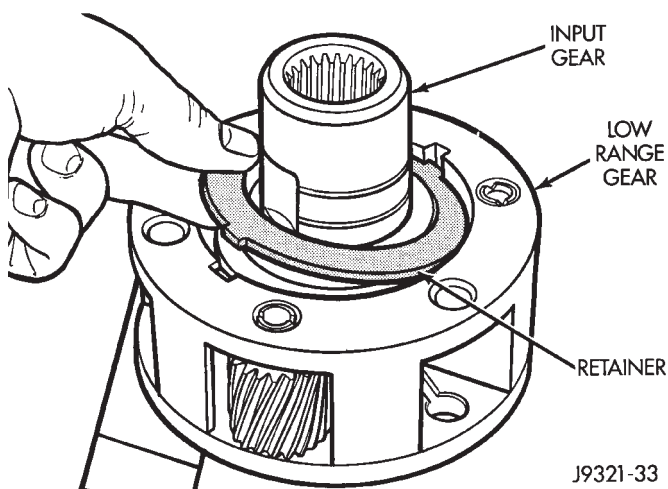


Fig. 33 Removing Input Gear Retainer

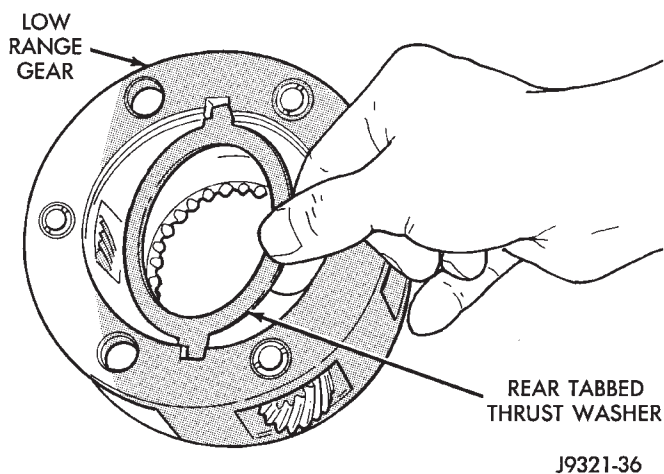


Fig. 36 Removing rear Tabbed Thrust Washer

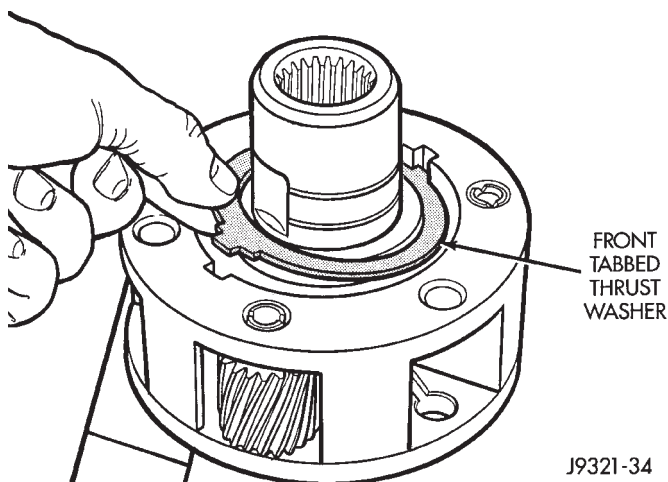


Fig. 34 Removing Front Tabbed Thrust Washer

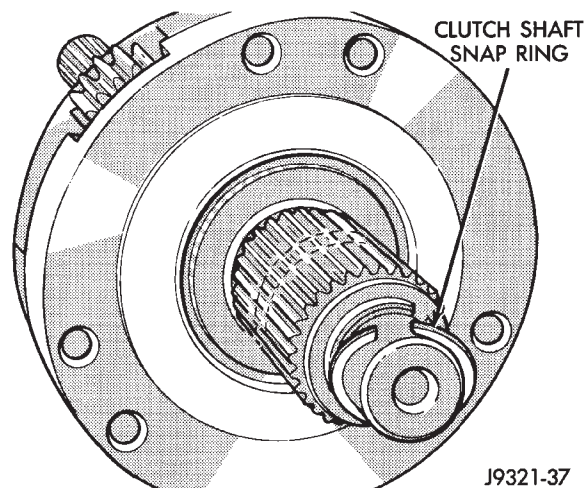


Fig. 37 Removing Clutch Shaft Snap Ring

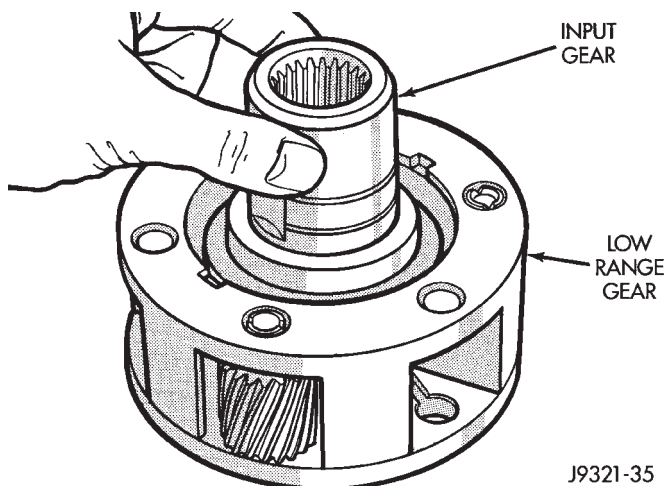


Fig. 35 Removing Input Gear

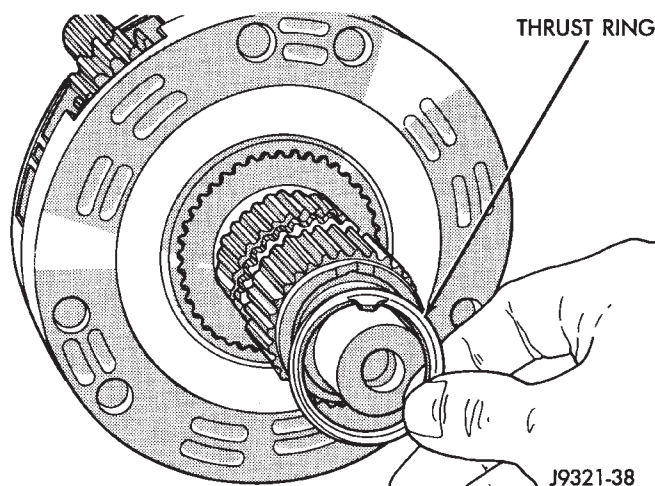


Fig. 38 Removing Thrust Ring

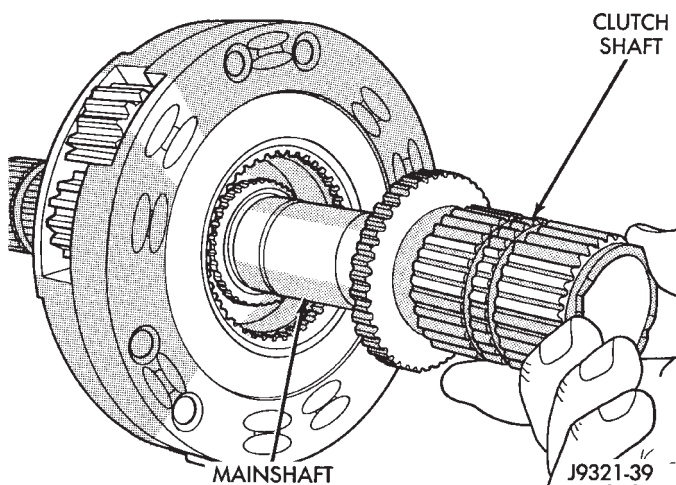


Fig. 39 Removing Clutch Shaft

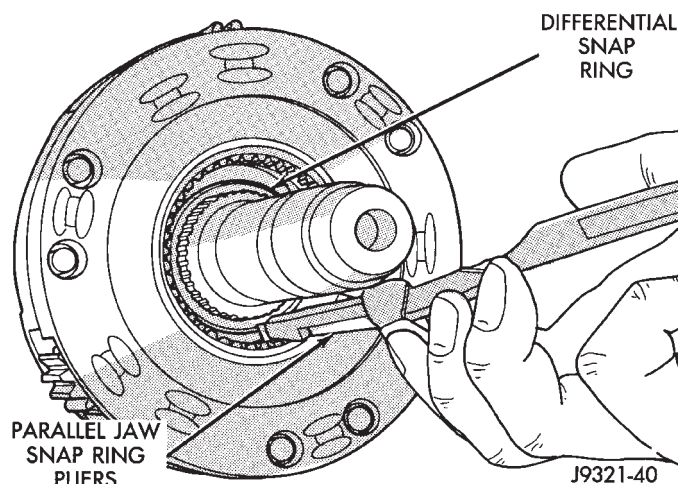


Fig. 40 Disengaging Differential Snap Ring

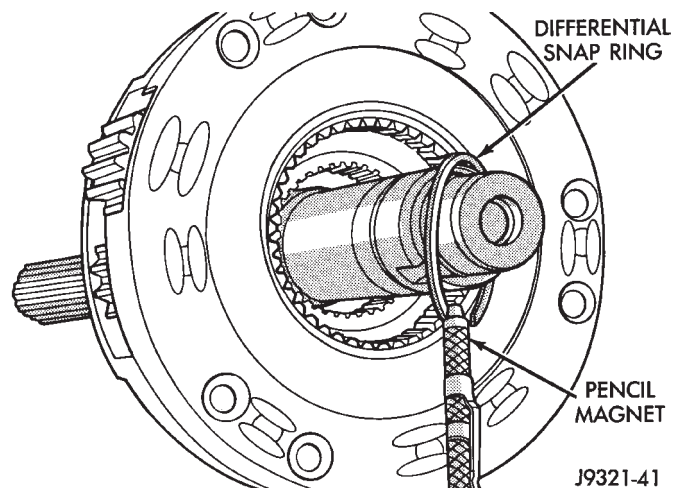


Fig. 41 Removing Differential Snap Ring

- (7) Slide differential off mainshaft (Fig. 42).
- (8) Remove needle bearings and spacers from mainshaft (Fig. 43), or from interior of mainshaft

gear. There should be 53 bearings and two spacers. Store bearings and spacers in clean cup or jar to avoid losing them.

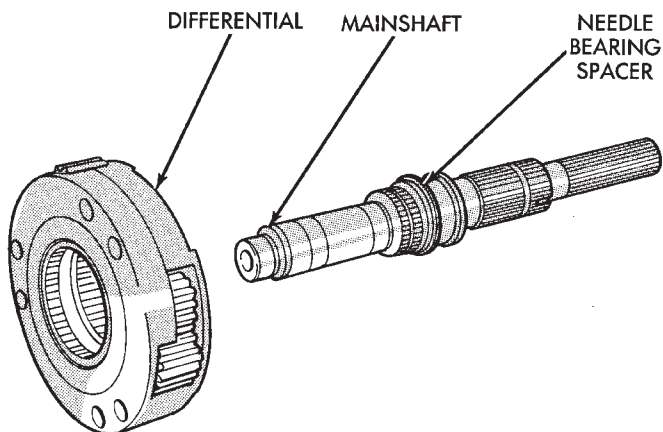


Fig. 42 Removing Differential From Mainshaft

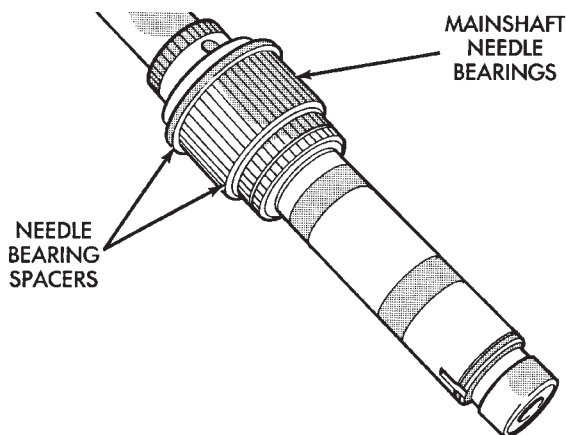


Fig. 43 Mainshaft Needle Bearing And Spacer Position

DIFFERENTIAL DISASSEMBLY

- (1) Mark differential carriers with center punch or paint mark for assembly reference (Fig. 44).
- (2) Remove differential bolts (Fig. 45). Use thin wall, 12 point socket to remove bolts.

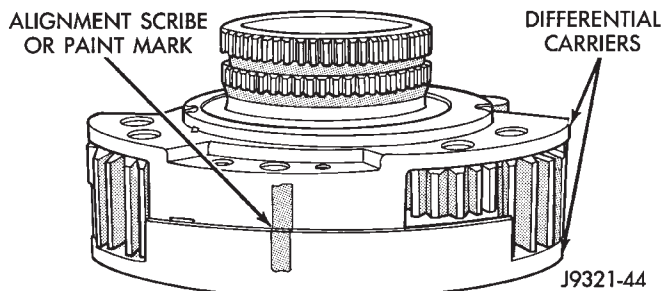
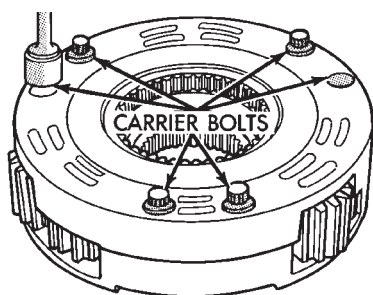


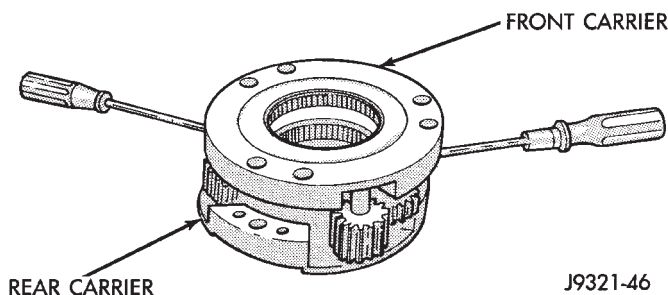
Fig. 44 Marking Differential Carriers



J9321-45

Fig. 45 Removing Differential Bolts

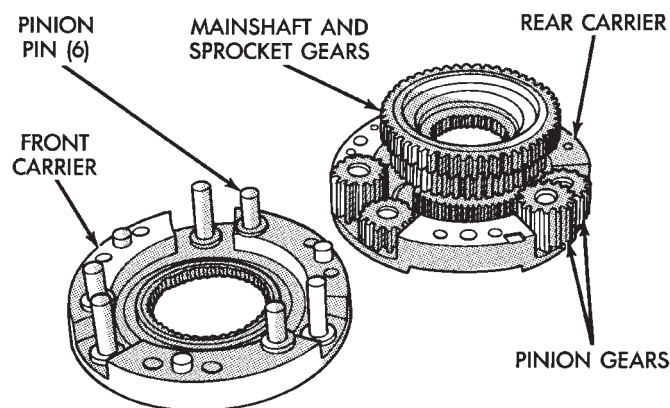
(3) Separate differential carriers (Fig. 46). Use two flat blade screwdrivers inserted in carrier slots to separate.



J9321-46

Fig. 46 Separating Differential Carriers

(4) Remove pinion gears and thrust washers (Fig. 47). Three short and three long gears are used. Also note that a thrust washer is used at each end of every pinion gear.



J9321-47

Fig. 47 Pinion Gear Positions

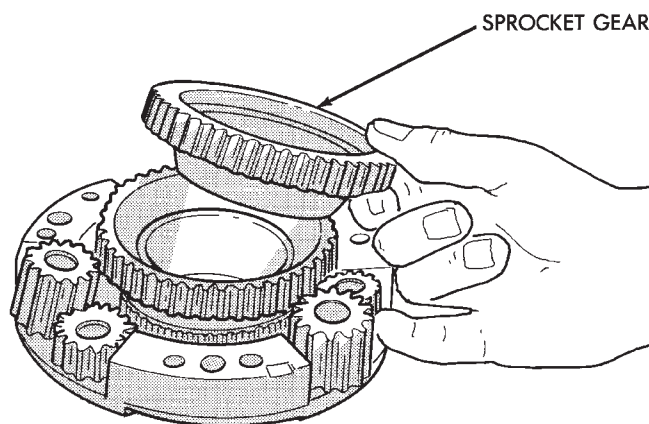
(5) Remove sprocket gear (Fig. 48).

(6) Remove mainshaft gear (Fig. 49).

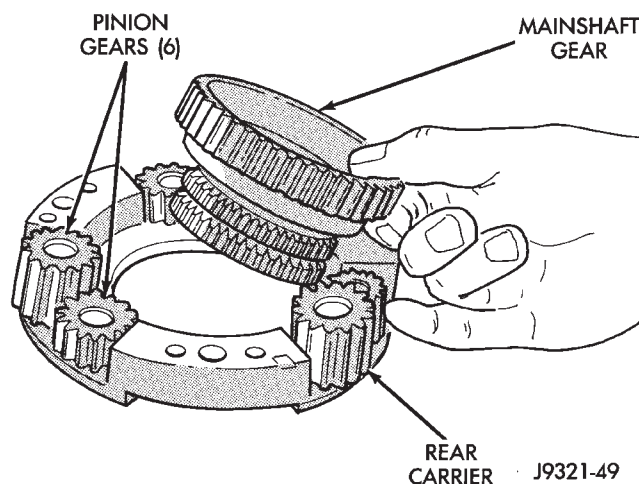
COMPONENT CLEANING AND INSPECTION

Clean the transfer case components with parts cleaning solvent. Flush the oil passages in the cases and drivetrain components with solvent. This will help remove dirt and particles from these passages.

Dry the transfer case components with compressed air or allow them to air dry on clean shop towels.



J9321-48

Fig. 48 Removing Sprocket Gear

J9321-49

Fig. 49 Removing Mainshaft Gear

Apply compressed air through all oil passages in the cases and gear components to clear them of any residue.

Mainshaft And Differential

Examine the mainshaft and differential components carefully for evidence of wear or damage.

Replace the thrust washers and pinion gears if worn or damaged.

Replace the differential case halves as an assembly if either case is worn or damaged, or if the gear teeth in the rear half are damaged.

Replace the mainshaft and sprocket gears if the teeth or gear bores are worn or damaged.

Replace the mainshaft bearings if worn, flat spotted, brinnelled, or damaged in any way.

Replace the mainshaft if it exhibits wear or damage to the bearing surfaces, splines or gear teeth.

Input And Low Range Gears

Inspect the low range gear pinions and pinion pins. Replace the low range gear if any of the pins or pinions are worn or damaged.

Inspect the thrust washers, retainer and snap ring. Replace the snap ring if bent, or distorted. Replace the thrust washers and retainer if worn, cracked or damaged in any way.

Examine the input gear carefully. Be sure the gear teeth and bearing surfaces are in good condition. Replace the gear if wear or damage is evident.

Check the input gear pilot bearing. Rotate the bearing and check for roughness or noise. Also check bearing position in the bore. The bearing should be recessed approximately 2.5 mm (0.100 in.) below the top edge of the bore. The bearing should not be seated at the bottom of the bore. Replace the bearing if worn, or roughness is evident. Replace both the gear and bearing if the bearing is a loose fit in the bore.

Gear Cases And Extension

Examine both case halves and the extension carefully. Replace the extension or either case half if wear, cracks, or other damage is evident.

Check condition of the low range annulus gear and the shift rail bushing in the front case (Fig. 50). The low range annulus gear is not a serviceable part. Replace the gear and case as an assembly if the gear is loose, worn, or damaged. The shift rail bushing is a serviceable part and can be replaced if necessary.

Check the bushing in the rear extension. Replace the bushing if worn or scored. A shop press and

Examine condition of the shift rail bushing in the front case. If the bushing is worn or damaged, it can be removed with a blind hole type puller. A replacement bushing can be installed with a suitable size driver. Recess the bushing slightly below the edge of the bore but do not seat it all the into the case.

Geartrain

The differential pinion gears and thrust washers are serviceable components and can be replaced if worn or damaged. The differential cases are also serviceable but must be replaced as a set if either case is damaged.

Inspect the mainshaft splines, gear teeth and bearing surfaces carefully for evidence of wear, or damage. Replace the shaft if necessary. do not attempt to salvage it if damaged.

The shift rail and range fork are an assembly. Replace both parts if either is damaged. However, the nylon pads in the fork can be replaced if worn, or cracked.

Inspect the transfer case snap rings closely. Do not attempt to salvage a distorted snap ring by straightening or reshaping it. Replace any snap ring that is distorted, or worn.

Inspect the low range gear, input gear and the gear thrust washers retainer, and snap ring. The low range gear is serviced as an assembly only. Replace the gear if the case or pinions are damaged.

During inspection, also make sure the seal surface of the input gear is in good condition. Minor nicks on this surface can be reduced with crocus cloth. However, replace the gear if the seal surface is severely scored or worn.

The speedometer gear should be replaced if worn, cracked, or if the small spline teeth are worn.

Oil Pump And Viscous Coupling

The oil pump and viscous coupling are not serviceable components. Replace the coupling as an assembly if it is leaking or damaged. Replace the oil pump as an assembly if the gear teeth are worn, or if the pump has become damaged.

Bearings And Seals

The transfer case seals should be replaced during overhaul. Use new seals in the input gear bearing retainer, front case and rear extension. Also replace the yoke seal washer and the detent plug O-ring.

Check condition of each transfer case bearing. Replace any bearing exhibiting signs of roughness, wear, or damage.

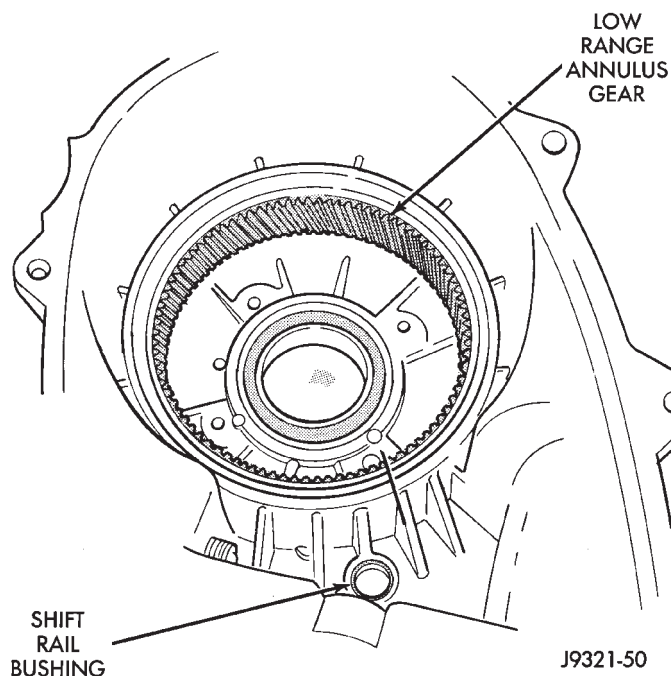


Fig. 50 Low Range Annulus Gear Location

universal type bushing driver set can be used for replacement purposes.

Examine the sealing surfaces of both case halves and the extension. Small burrs, or scratches on these surfaces can be reduced with crocus cloth or a fine tooth file.

Bearing and seal replacement is described in the Transfer Case Bearing And Seal Replacement procedures.

TRANSFER CASE BEARING AND SEAL REPLACEMENT

Replacing Output Shaft Front Bearing And Seal

Remove the seal from the front case with a pry tool (Fig. 51). Then remove the snap ring that retains the front bearing in the front case (Fig. 52).

Use a rawhide mallet or drift to remove the old bearing and install the new. Then reinstall the bearing snap ring.

The new seal can be installed with any suitable size seal installer, or carefully tapped into place with a mallet.

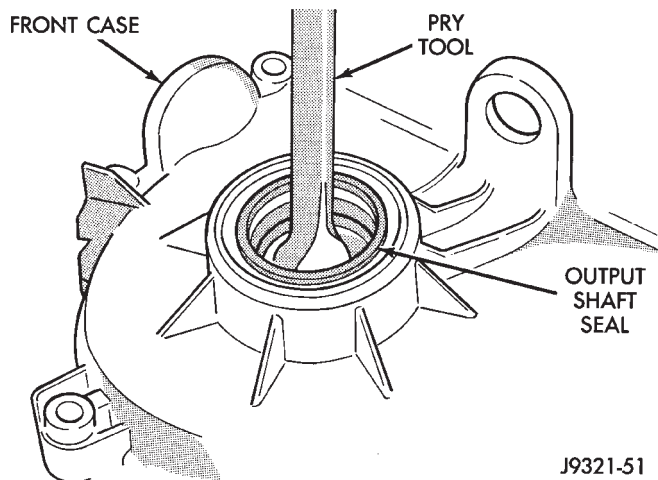


Fig. 51 Removing Output Shaft Seal

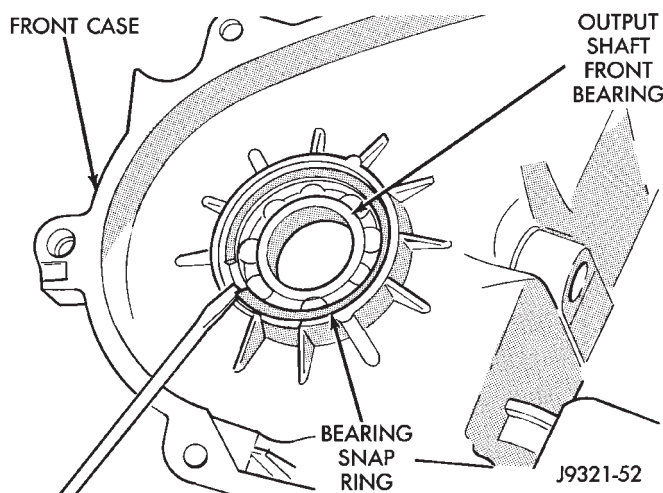


Fig. 52 Removing Output Shaft Front Bearing Snap Ring

Replacing Front Output Shaft Rear Bearing

Remove the shaft rear bearing from the rear case with Puller 7794A and Slide Hammer 7420 with Adapter 7420-8 (Fig. 53).

Install the new bearing with Tool Handle C-4171 and Bearing Installer 7823 (Fig. 54). **The bearing bore is chamfered at the top. Install the bearing so it is flush with the lower edge of this chamfer (Fig. 55).**

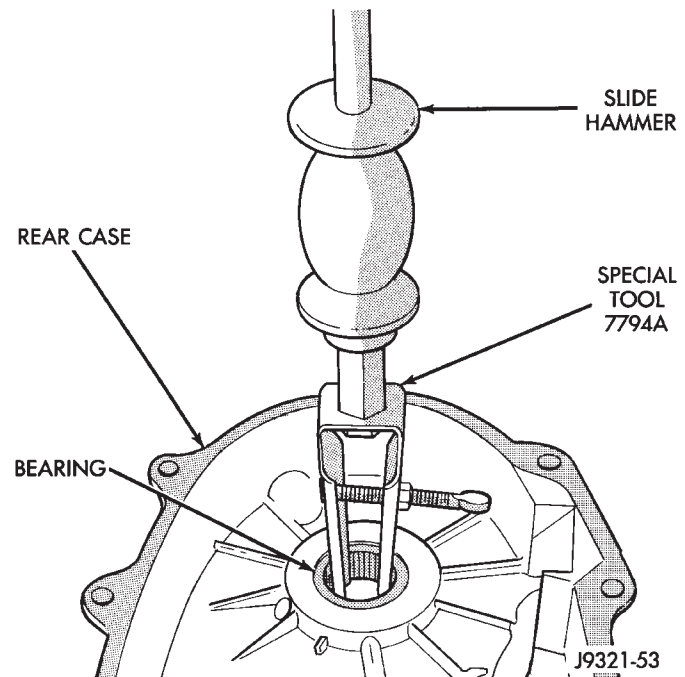


Fig. 53 Removing Front Output Shaft Rear Bearing

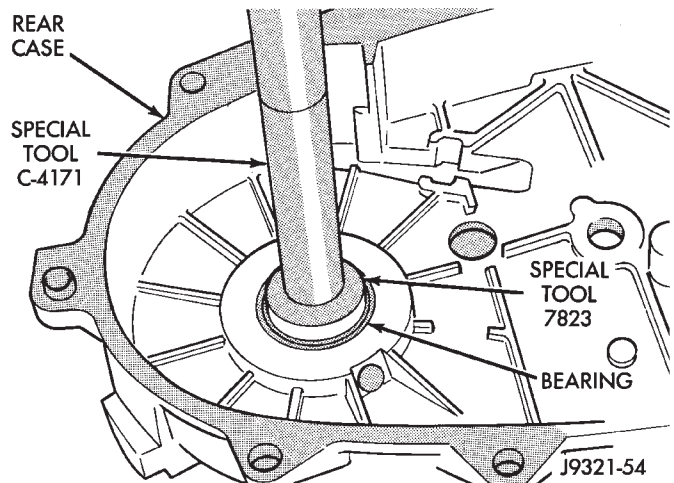


Fig. 54 Installing Front Output Shaft Rear Bearing

Replacing Front Bearing

Although the same tools are used to remove and install the bearing, the bearing is removed from different directions. Replace the bearing only as described to avoid damaging the front case.

(1) Remove old bearing with Tool Handle C-4171 and Bearing Driver 7823 (Fig. 56). Drive bearing out from case interior as shown.

(2) Install locating ring on new bearing, if necessary (Fig. 57).

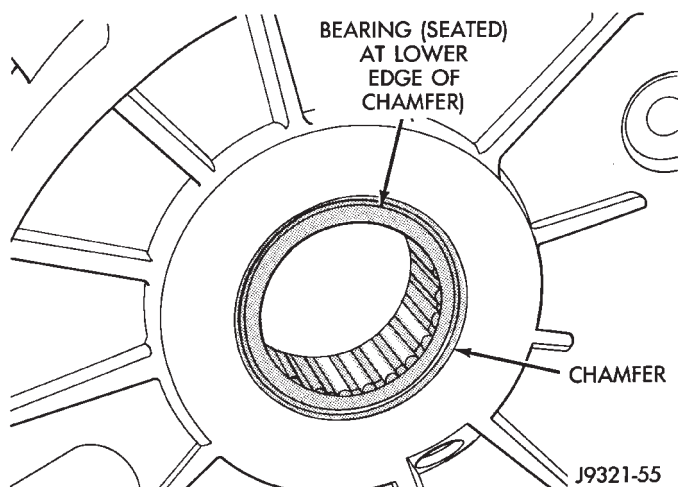


Fig. 55 Rear Bearing Installation Depth

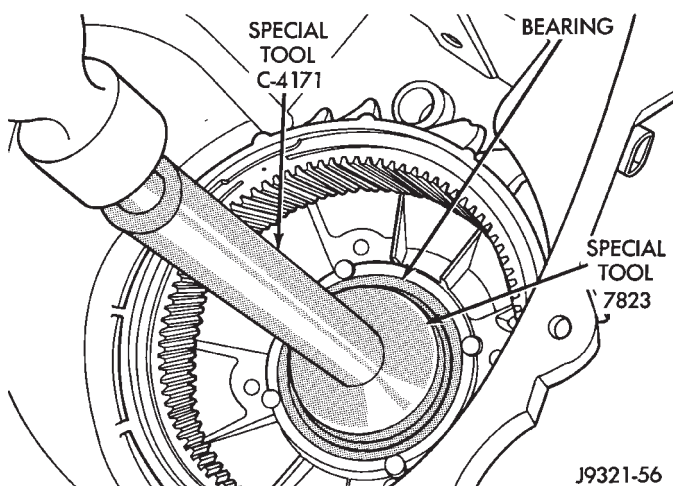


Fig. 56 Removing Front Bearing

(3) Position case so forward end is facing upward (Fig. 57).

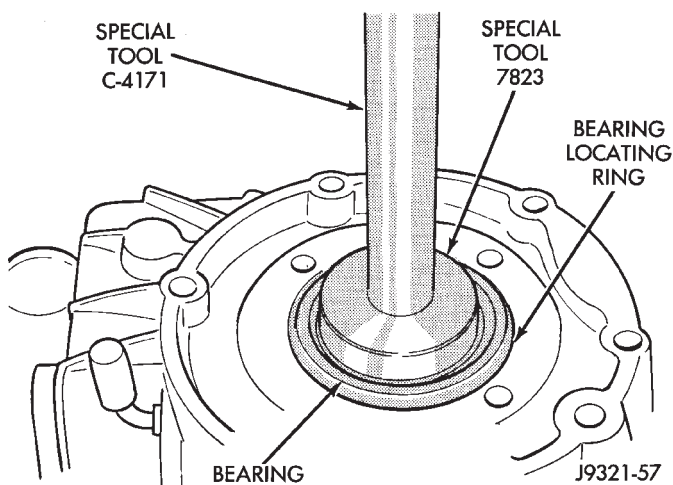


Fig. 57 Installing Front Bearing

(4) Install bearing with Tools C-4171 and 7823 (Fig. 59). Bearing locating ring should be fully seated against case surface.

Replacing Front Bearing Retainer Seal

Remove the old seal with a drift or pry bar. Then install the new seal with Tool 7884 (Fig. 58).

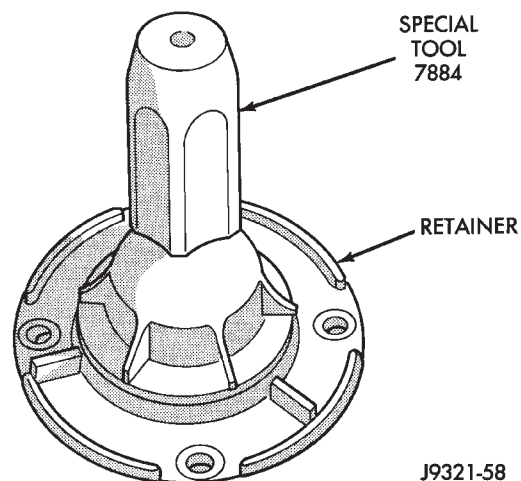


Fig. 58 Installing Seal In Front Bearing Retainer

Replacing Input Gear Pilot Bearing

The old bearing can be removed with an internal-type puller and slide hammer as shown (Fig. 59). Or, the bearing can be removed with a two-jaw blind hole puller similar to the type used to remove a clutch pilot bushing.

The new bearing can be installed with tools similar to Driver Handle 8015 and Installer 7886 (Fig. 60).

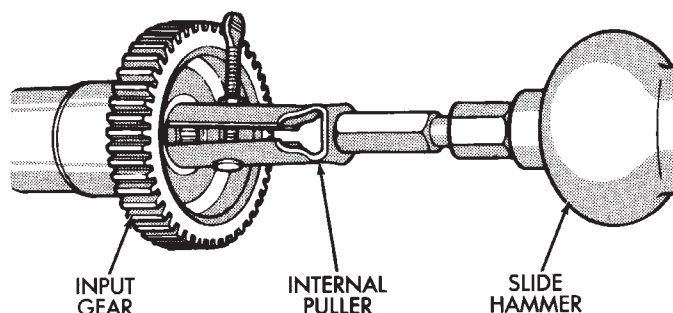


Fig. 59 Removing Input Gear Pilot Bearing

Replacing Rear Retainer Seal And Bushing

The rear retainer seal and bushing are serviceable parts. Both components are accessible once the retainer dust cap has been removed (Fig. 61).

Use a large pair of channel-lock pliers, or blunt punch to remove the dust cap. If a punch is used, work around the entire cap edge to remove it evenly from the retainer.

Remove the seal with a pry bar, drift, or punch. Then use a suitable size installer tool to position the seal in the retainer. The bushing can be replaced

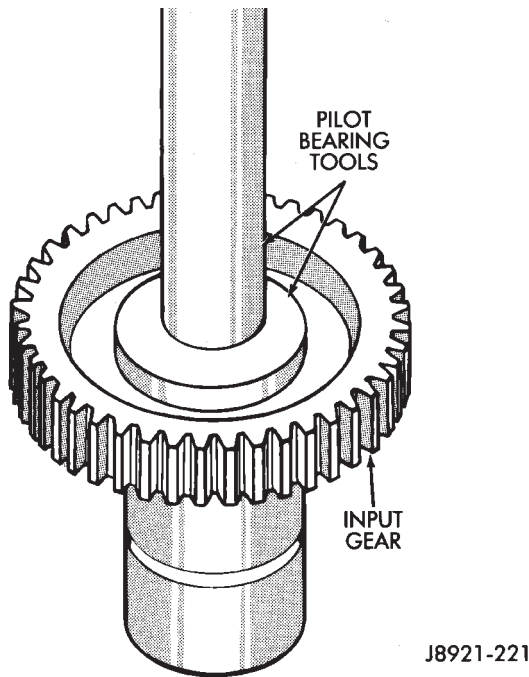


Fig. 60 Installing Input Gear Pilot Bearing

with a universal type bushing driver set once the seal has been removed from the retainer.

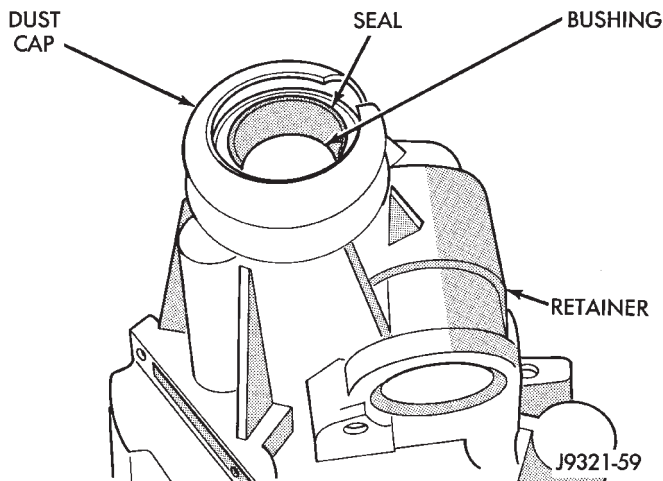


Fig. 61 Rear Retainer Cap, Bushing And Seal Position

TRANSFER CASE ASSEMBLY AND ADJUSTMENT

Lubricate the transfer case components with the Mopar ATF Plus, Type 7176, Dexron II fluid during assembly operations.

Use petroleum jelly to prelubricate and hold main-shaft needle roller bearings and spacers in place. Petroleum jelly can also be used to lubricate seals, bushings and bearings during assembly.

Gaskets are **not** used in the NP249 transfer case. Instead, the mating surfaces of the case halves, retainer and extension are sealed with Mopar Gasket Maker, silicone adhesive/sealer, or Loctite 518.

PREPARING FRONT CASE FOR ASSEMBLY

(1) Support front case on wood blocks. Position case so sector shaft bore and input gear bearing are accessible.

(2) Lubricate sector shaft, shaft O-ring and shaft bore (in case) with petroleum jelly.

(3) Install sector in case (Fig. 62).

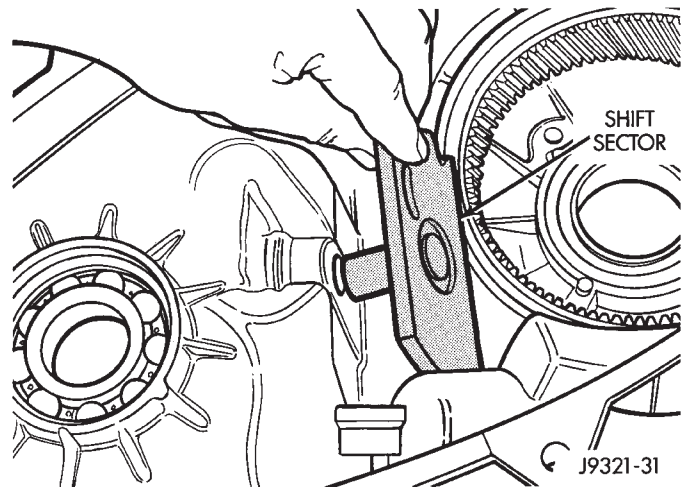


Fig. 62 Installing Shift Sector

(4) Lubricate shift rail bushing with light coat of petroleum jelly, or transmission fluid. **Do not over-lubricate bushing. Excess lubricant will flow into bottom of bushing bore and prevent shift rail from fully seating; this can also make it difficult to seat rear case on front case.**

(5) Lubricate bearings and seals in front case with recommended lubricant.

(6) Install magnet in case.

INPUT—LOW RANGE GEAR ASSEMBLY AND INSTALLATION

(1) Lubricate gears and thrust washers (Fig. 63) with recommended transmission fluid.

(2) Install first thrust washer in low range gear (Figs. 36 and 63). Be sure washer tabs are properly aligned in gear notches.

(3) Install input gear in low range gear (Fig. 35). Be sure input gear is fully seated.

(4) Install remaining thrust washer in low range gear and on top of input gear (Fig. 34). Be sure washer tabs are properly aligned in gear notches.

(5) Install retainer on input gear and install snap ring.

(6) Align and install low range-input gear assembly in front case (Fig. 64). Be sure low range gear pinions are engaged in annulus gear and that input gear shaft is fully seated in front bearing.

(7) Install snap ring on input gear shaft to secure gear in bearing and case (Fig. 65).

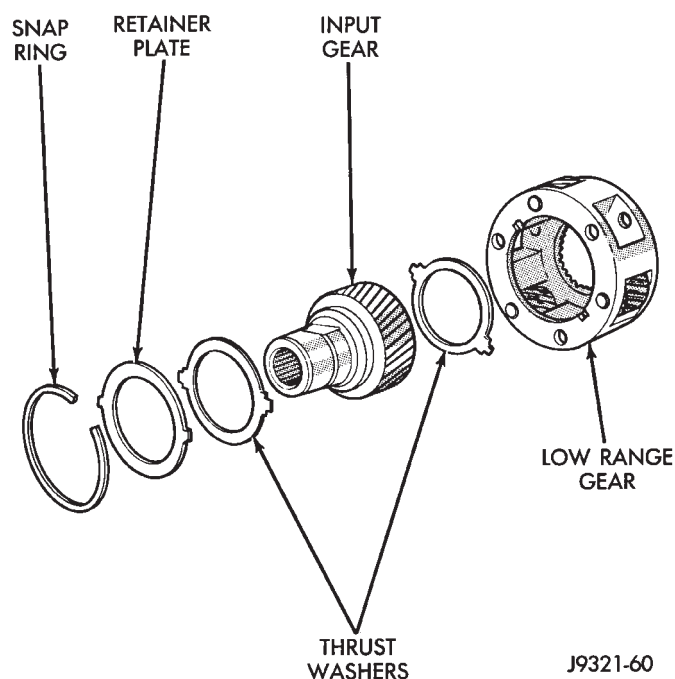


Fig. 63 Input/Low Range Gear Components

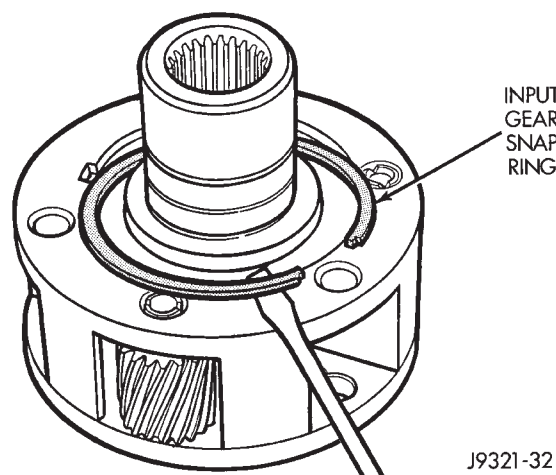


Fig. 65 Input Gear Snap Ring Installation

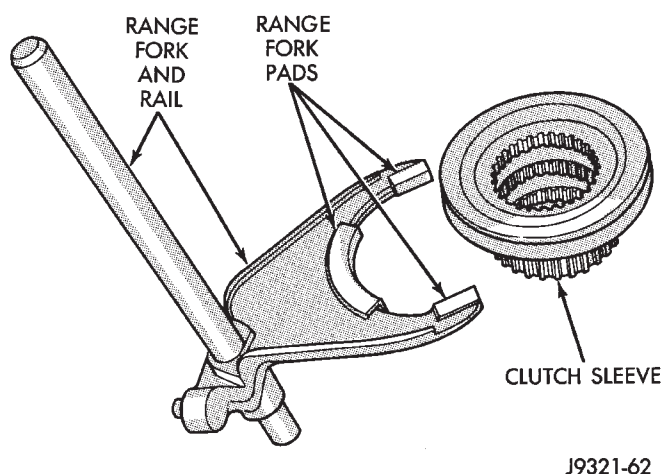


Fig. 66 Assembling Range Fork And Clutch Sleeve

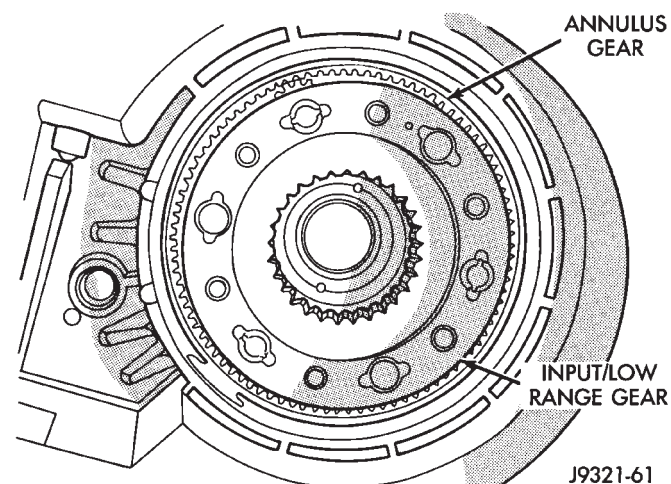


Fig. 64 Input/Low Range Gear Installation

RANGE FORK/CLUTCH SLEEVE ASSEMBLY AND INSTALLATION

- (1) Install new pads on range fork (Fig. 66).
- (2) Lubricate range fork pads with light coat of petroleum jelly.
- (3) Install clutch sleeve in range fork (Fig. 66).
- (4) Install assembled range fork and clutch sleeve (Fig. 67). Insert range fork pin in sector. Then rotate sector and seat clutch gear in low range gear.
- (5) Verify that range fork rail is seated in case bushing and that clutch sleeve is properly engaged in low range gear.

DETENT INSTALLATION

- (1) Rotate sector to Neutral position.
- (2) Install new O-ring on detent plug (Fig. 68).

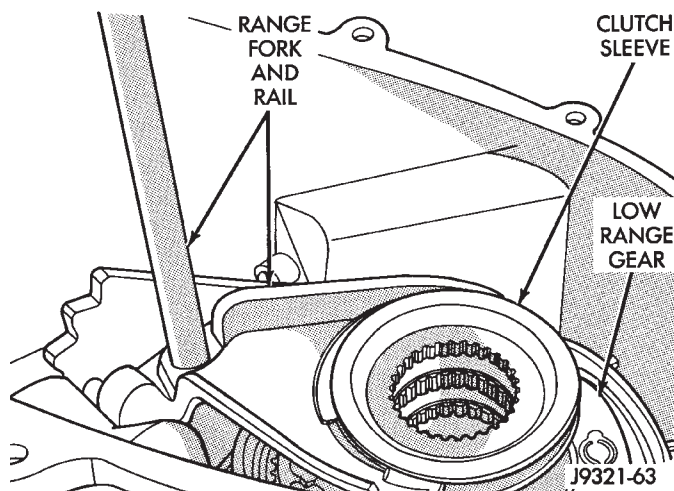


Fig. 67 Range Fork And Clutch Sleeve Installation

- (3) Lubricate detent plunger with transmission fluid or light coat of petroleum jelly.
- (4) Install detent plunger, spring and plug (Fig. 68).

(5) Verify that plunger is properly engaged in sector.

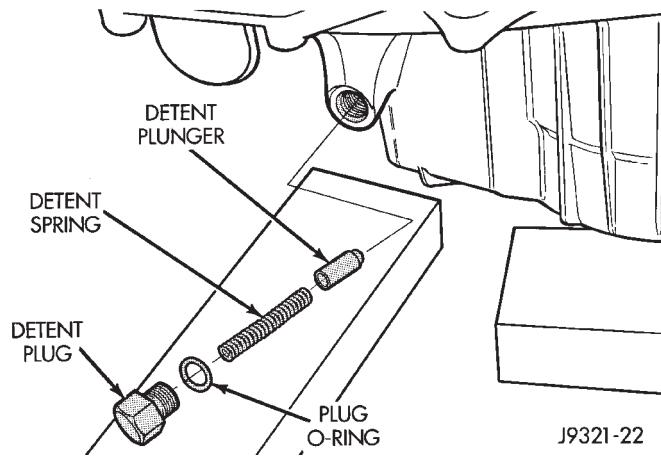


Fig. 68 Shift Detent Components

MAINSHAFT—DIFFERENTIAL ASSEMBLY AND INSTALLATION

(1) Lubricate pins on front carrier (Fig. 69) with transmission fluid or petroleum jelly.

(2) Install first set of thrust washers on front carrier pins (Fig. 69).

(3) Install sprocket gear in front carrier (Fig. 69).

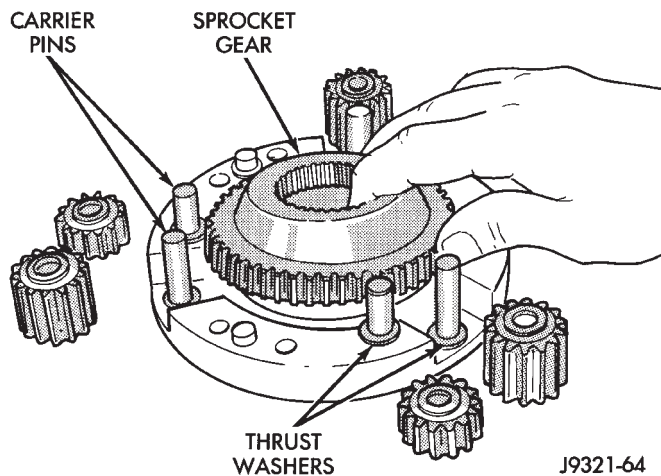


Fig. 69 Sprocket Gear And Thrust Washer Installation

(4) Install mainshaft gear in sprocket gear (Fig. 70).

(5) Install pinion gears on carrier pins (Fig. 71). Be sure short and long gears are installed on correct pins.

(6) Install remaining set of thrust washers on carrier pins and on top of pinion gears (Fig. 71).

(7) Install differential front carrier on rear carrier. Align carriers with paint mark made at disassembly (Fig. 72).

(8) Install and tighten differential carrier bolts to 17-27 N•m (150-240 in. lbs.) torque.

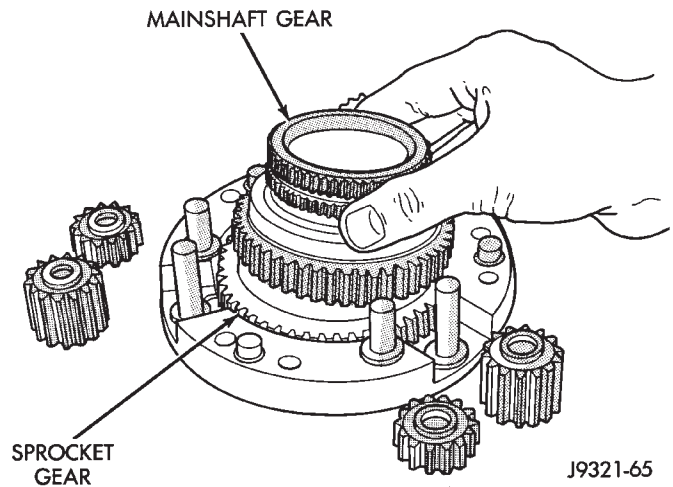


Fig. 70 Installing Mainshaft Gear

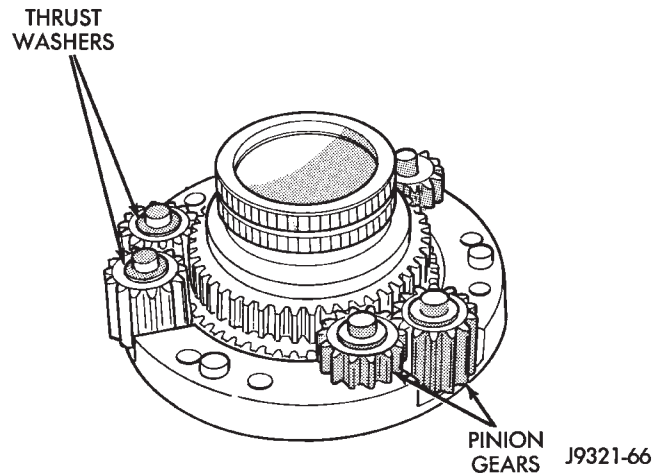


Fig. 71 Pinion Gear And Thrust Washer Installation

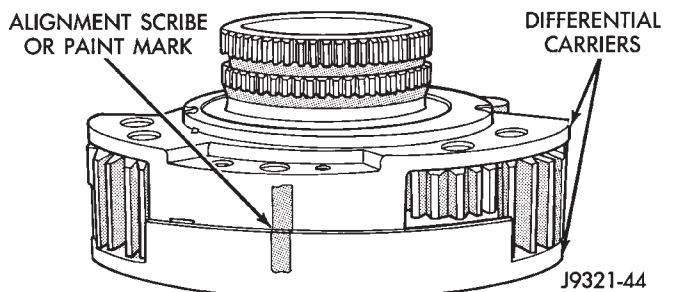


Fig. 72 Differential Carrier Alignment And Assembly

(9) Install first needle bearing spacer in bore of mainshaft gear (Fig. 73).

(10) Install remaining needle bearing spacer on mainshaft (Fig. 74). Seat spacer against shaft flange.

(11) Apply liberal quantity of petroleum jelly to needle bearings and to bore of mainshaft gear (Fig. 74). Petroleum jelly will prelubricate and hold bearings in place during assembly.

(12) Install mainshaft needle bearings in bore of mainshaft gear (Fig. 74). A total of 53 bearings are required.

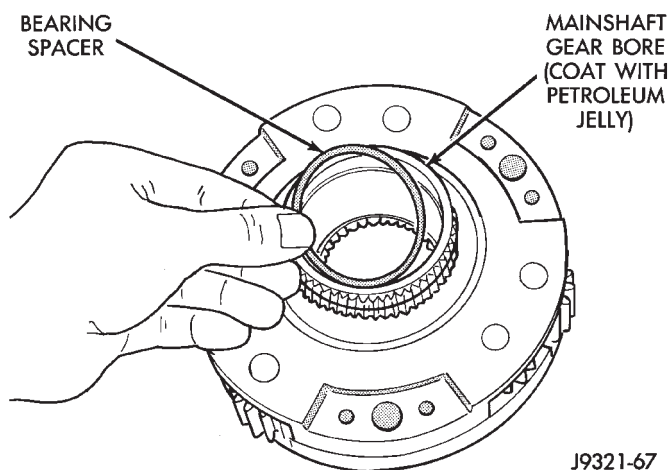


Fig. 73 Installing Bearing Spacer In Mainshaft Gear

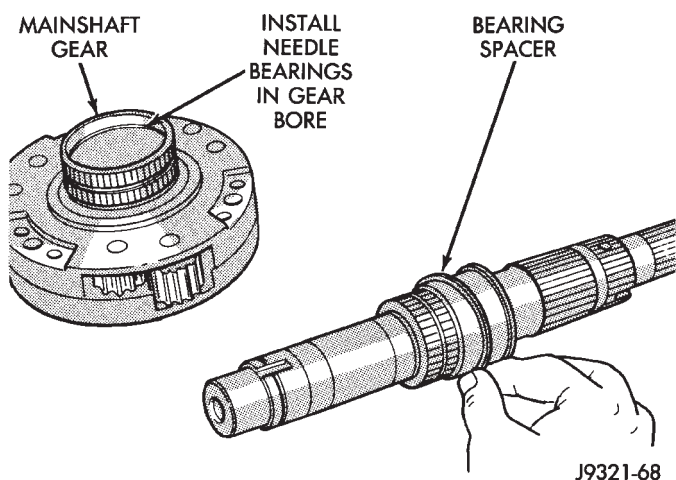


Fig. 74 Installing Bearing Spacer And Needle Bearings

(13) Install mainshaft in differential (Fig. 75). Rotate shaft to verify that bearings were not displaced during assembly. Also be sure that shaft is fully seated in differential.

(14) Install mainshaft snap ring (Fig. 76).

(15) Install clutch shaft (Fig. 77).

(16) Install thrust ring on end of mainshaft (Fig. 78). Be sure notch on ring seats in notch in shaft.

(17) Install clutch shaft snap ring (Fig. 79). Be sure snap ring is fully seated in ring groove.

(18) Install assembled mainshaft and differential in low range gear and clutch gears (Fig. 80).

DRIVE CHAIN—OUTPUT SHAFT—SPROCKET INSTALLATION

(1) Lubricate front output shaft-sprocket assembly, drive chain and drive sprocket with transmission fluid.

(2) Assemble drive chain, drive sprocket and front output shaft (Fig. 81).

(3) Start drive sprocket on mainshaft.

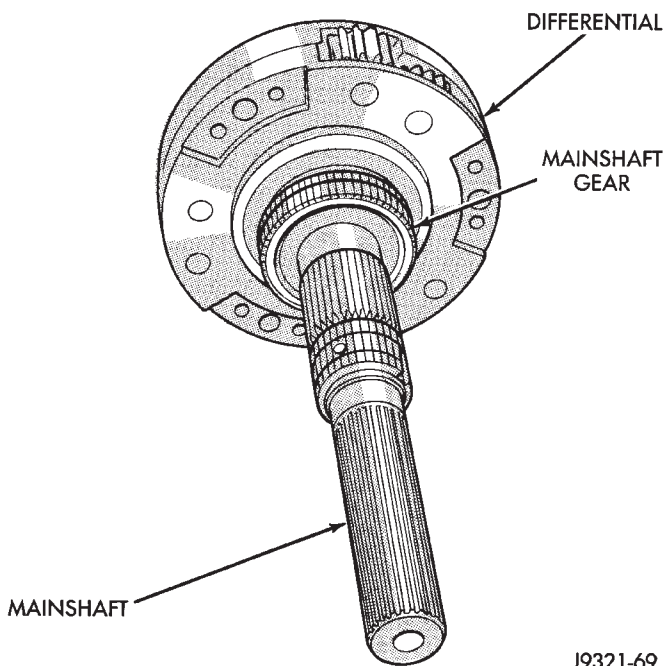


Fig. 75 Installing Mainshaft In Differential

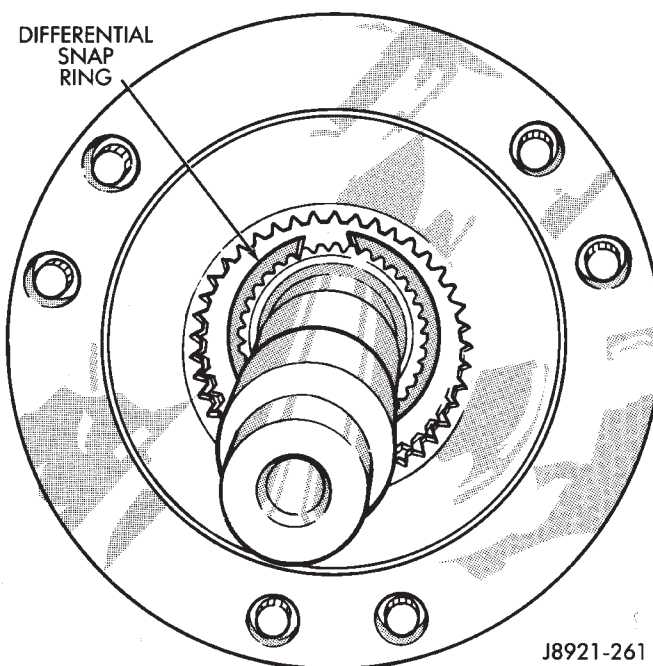


Fig. 76 Differential Snap Ring Installation

(4) Guide front shaft into bearing and drive sprocket onto mainshaft drive gear (Fig. 81).

(5) Install drive sprocket snap ring (Fig. 82).

VISCOUS COUPLING INSTALLATION

(1) Lubricate mainshaft splines with transmission fluid.

(2) Install coupling on mainshaft (Fig. 83).

(3) Install coupling retaining snap ring first (Fig. 83). Be sure snap ring is fully seated before proceeding.

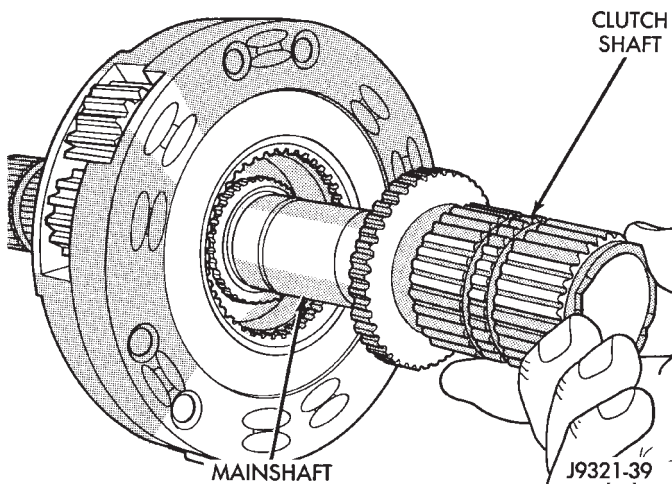


Fig. 77 Installing Clutch Shaft

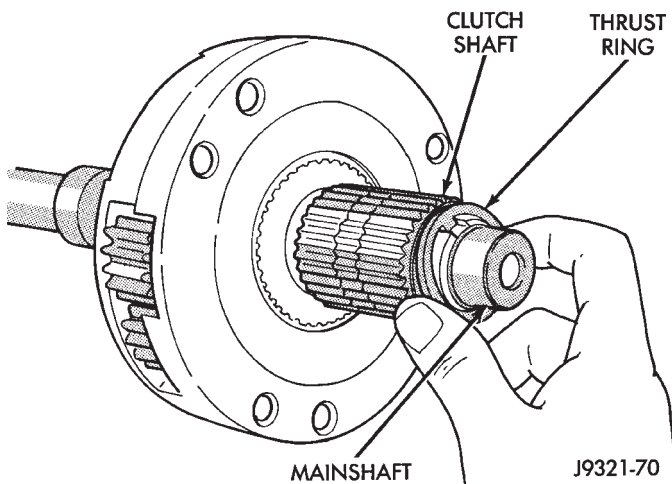


Fig. 78 Installing Clutch Shaft Thrust Ring

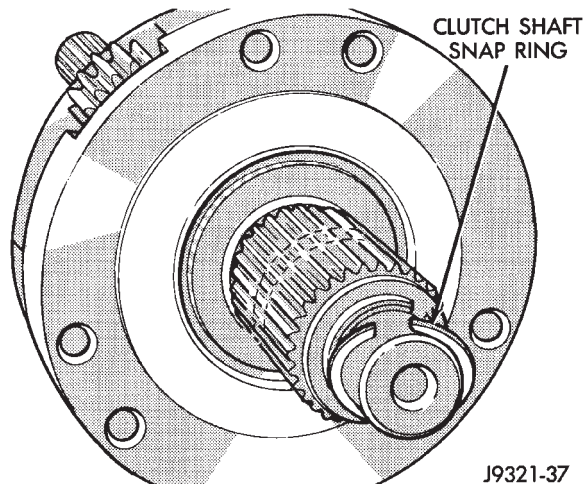


Fig. 79 Installing Clutch Shaft Snap Ring

(4) Install oil pump locating snap ring on mainshaft (Fig. 83).

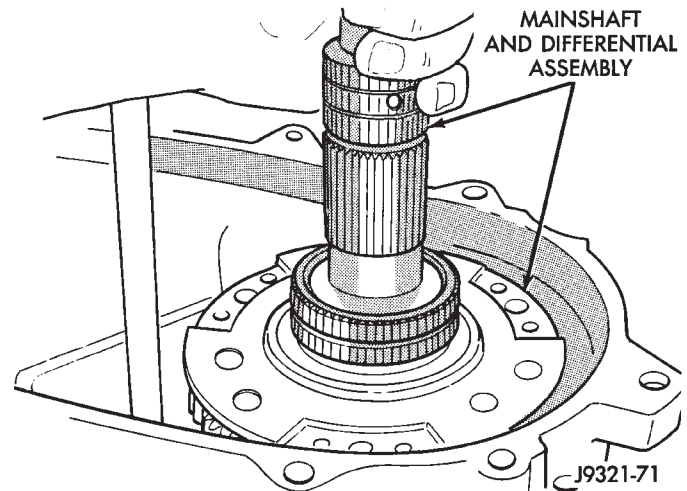


Fig. 80 Installing Mainshaft And Differential Assembly

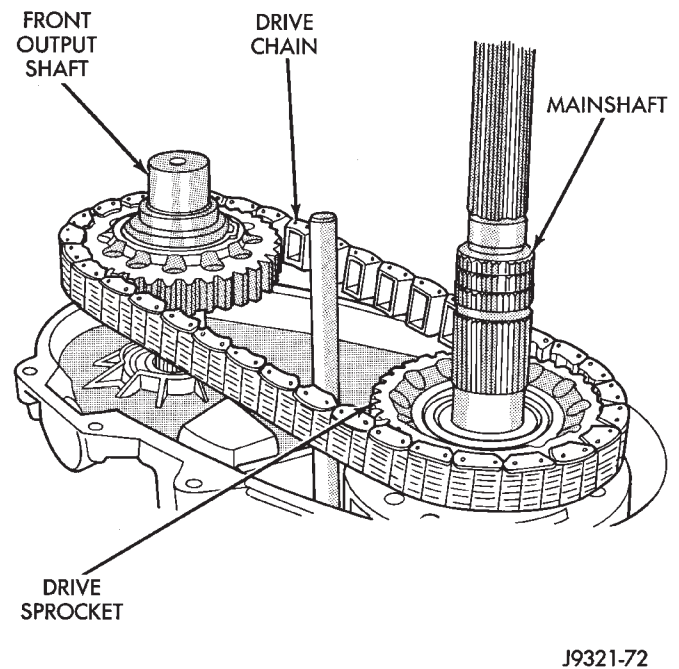


Fig. 81 Installing Drive Chain, Front Output Shaft And Drive Sprocket

REAR CASE INSTALLATION

- (1) Clean sealing flanges of front case and rear case with a wax and grease remover.
- (2) Install new O-ring on flanged end of oil pickup tube.
- (3) Install oil pickup tube in rear case. Be sure tube is seated in case notch as shown (Fig. 84).
- (4) Apply 3 mm (1/8 in.) wide bead of Mopar silicone adhesive sealer to mating flange of front case. Work sealer bead around bolt holes as shown (Fig. 85).
- (5) Align and install rear case on front case (Fig. 86).

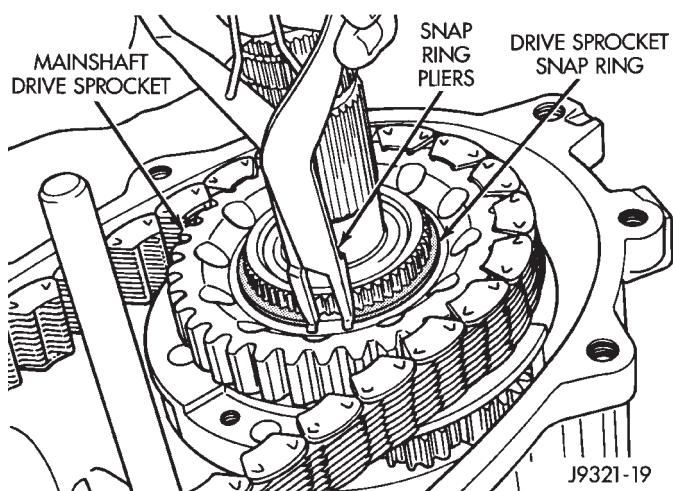


Fig. 82 Installing Drive Sprocket Snap Ring

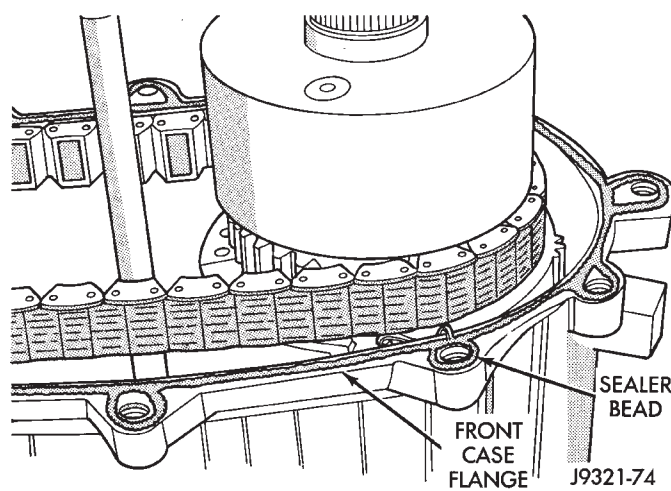


Fig. 85 Applying Sealer To Front Case Flange

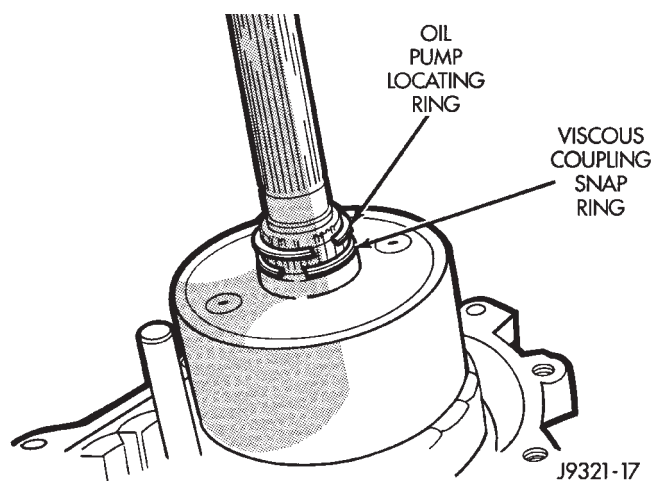


Fig. 83 Viscous Coupling And Oil Pump Ring Installation

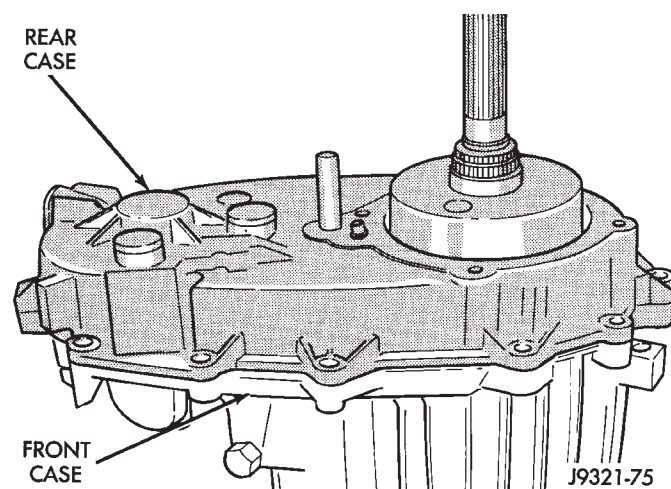


Fig. 86 Rear Case Installation

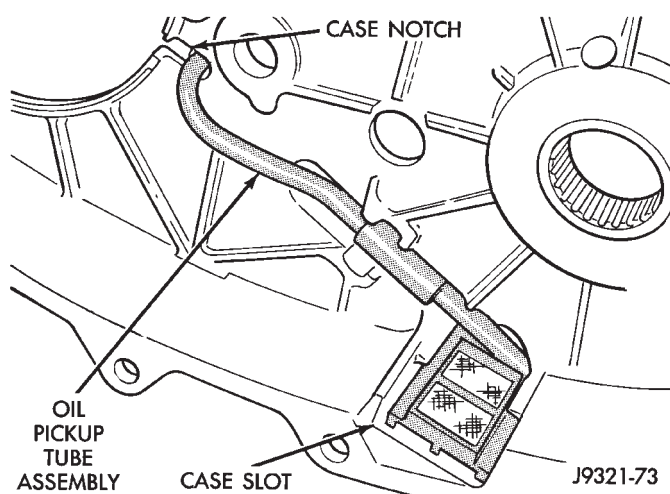


Fig. 84 Oil Pickup Tube Installation

(6) Verify that oil pickup tube is still seated in case notch and tube end is pointed toward mainshaft (Fig. 87).

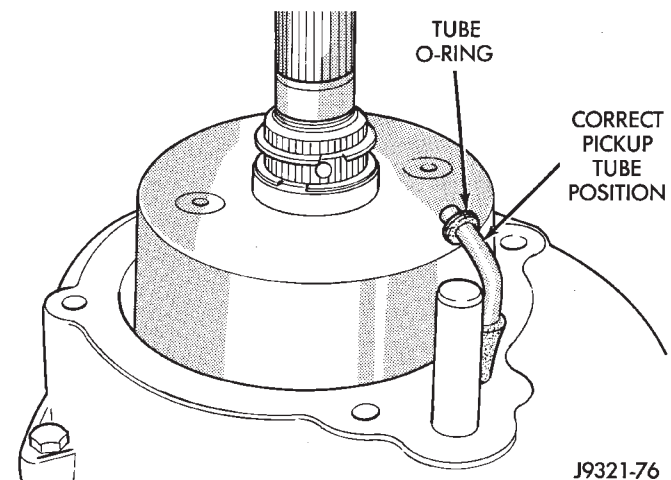


Fig. 87 Checking Position Of Oil Pickup Tube

(7) Install case attaching bolts. Alignment bolts at each end of case are only ones requiring washers (Fig. 88).

(8) Tighten case bolts to 27-34 N•m (20-25 ft. lbs.) torque.

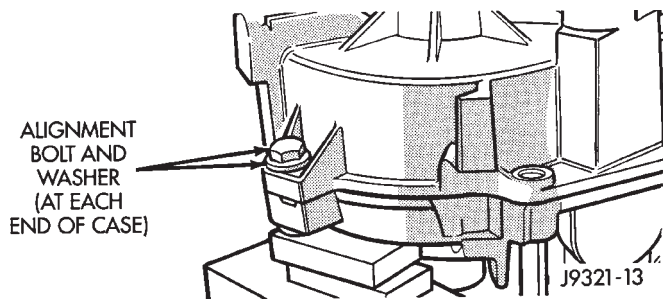


Fig. 88 Alignment Bolt Location

OIL PUMP—REAR BEARING—REAR RETAINER INSTALLATION

- (1) Install oil pump (Fig. 89).

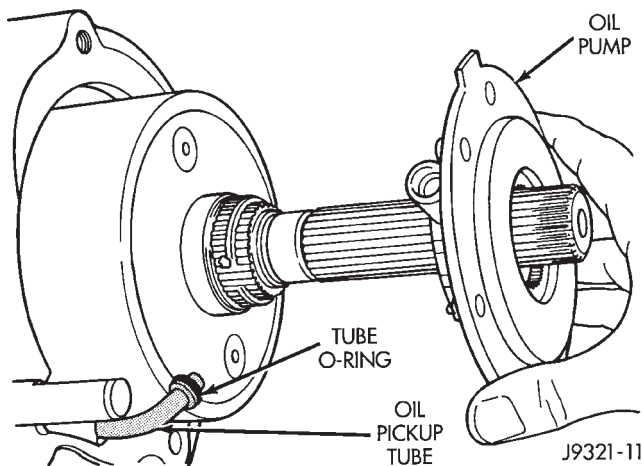


Fig. 89 Installing Oil Pump

- (2) Insert oil pickup tube in pump (Fig. 90).
 (3) Install rear bearing on mainshaft (Fig. 90). Locating ring groove in bearing goes toward end of mainshaft.

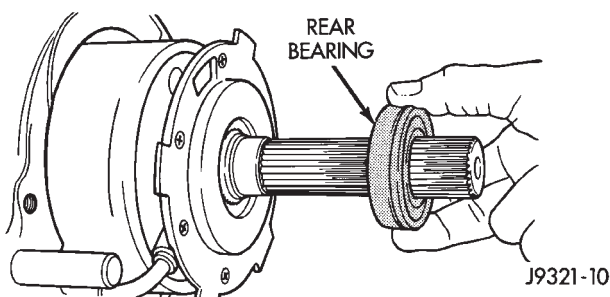


Fig. 90 Rear Bearing Installation

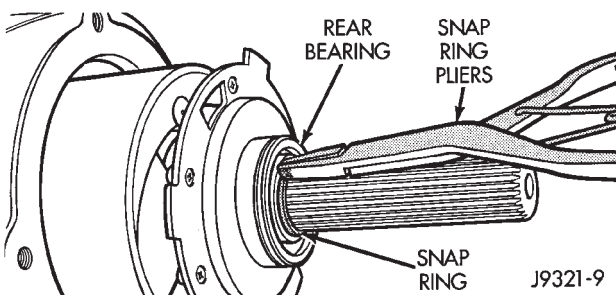


Fig. 91 Rear Bearing Snap Ring Installation

- (4) Install rear bearing retaining snap ring (Fig. 91).
 (5) Install speedometer drive gear (Fig. 92).

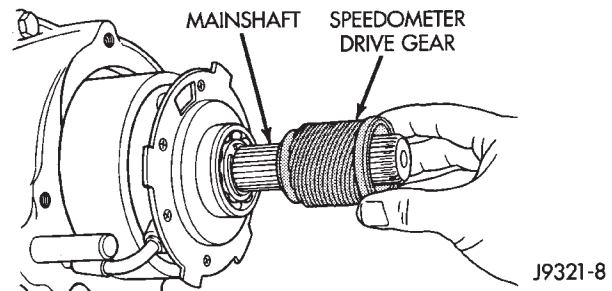


Fig. 92 Installing Speedometer Drive Gear

- (6) Install rear bearing locating ring in rear retainer, if ring was removed during overhaul.
 (7) Apply 3 mm (1/8 in.) wide bead of Mopar silicone adhesive sealer to mating surface of rear retainer. Allow sealer to set-up slightly before proceeding.
 (8) Slide rear retainer onto mainshaft (Fig. 93).

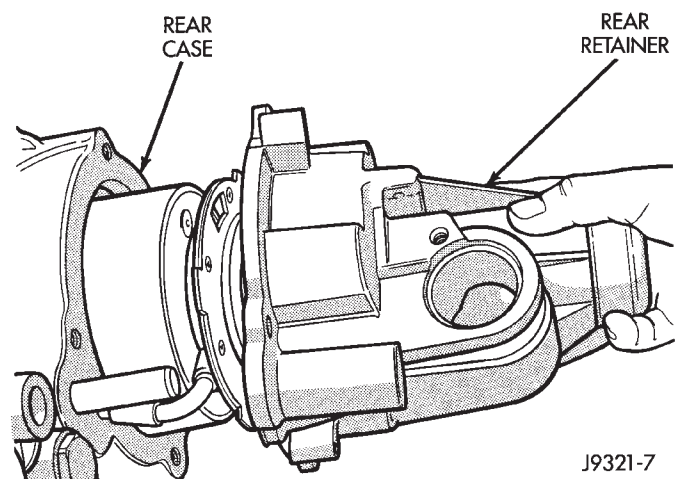


Fig. 93 Rear Retainer Installation

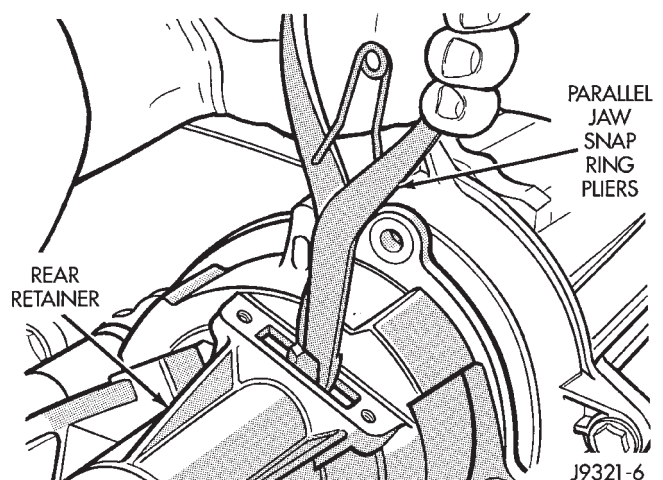


Fig. 94 Engaging Rear Bearing Locating Ring

(9) Spread rear bearing locating ring and slide rear retainer into place on rear case (Fig. 94).

(10) Install and tighten rear retainer bolts to 27-34 N•m (20-25 ft. lbs.).

(11) Install locating ring access cover and gasket (Fig. 95). Tighten plate attaching screws to 10 N•m (85 in. lbs.) torque.

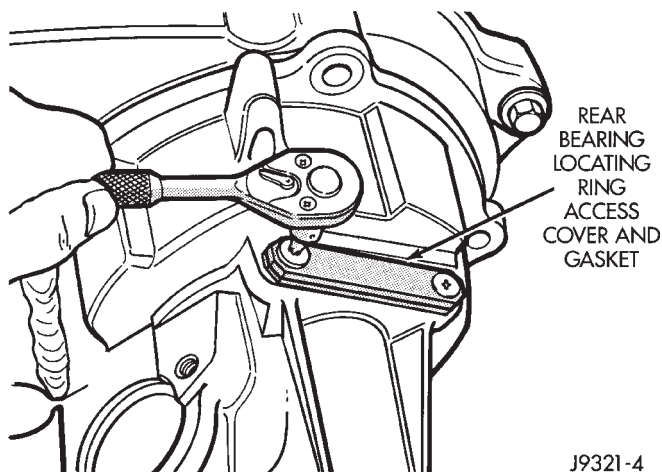


Fig. 95 Installing Locating Ring Access Cover And Gasket

FRONT BEARING RETAINER, YOKE AND RANGE LEVER INSTALLATION

(1) Apply 3 mm (1/8 in.) wide bead of Mopar silicone adhesive sealer to mating surface of front bearing retainer. Allow sealer to set-up slightly before installing retainer.

(2) Install front bearing retainer (Fig. 96). Tighten retainer bolts to 16-24 N•m (12-18 ft. lbs.) torque.

(3) Install new seal washer on front output shaft (Fig. 97).

(4) Install yoke and new yoke nut on front output shaft (Fig. 98).

(5) 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.

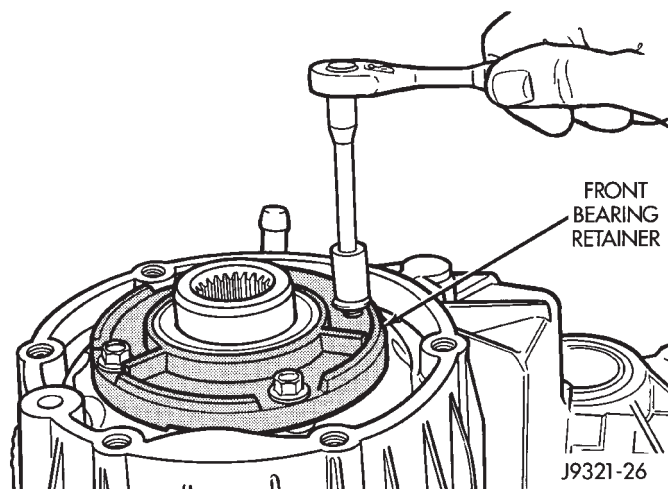


Fig. 96 Installing Front Bearing Retainer

(6) Install range lever, washer and locknut on sector shaft (Fig. 99). Tighten locknut to 27-34 N•m (20-25 ft. lbs.) torque.

(7) Install drain plug. Tighten plug and switch to 41-54 N•m (30-40 ft. lbs.) torque.

(8) Install and tighten indicator switch to 20-34 N•m (15-25 ft. lbs.) torque.

(9) Level transfer case and fill it with Mopar ATF Plus, Type 7176, or Dexron II transmission fluid. Correct fill level is to bottom edge of fill plug hole.

(10) Install and tighten fill plug to 41-54 N•m (30-40 ft. lbs.) torque.

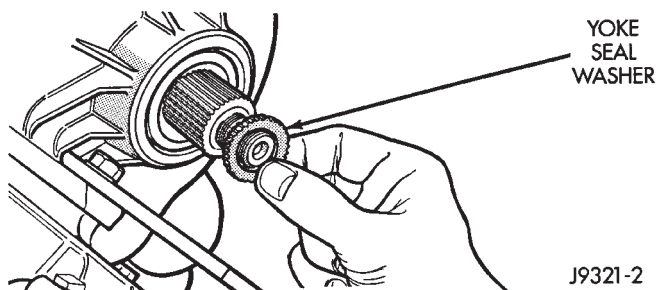


Fig. 97 Installing Yoke Seal Washer

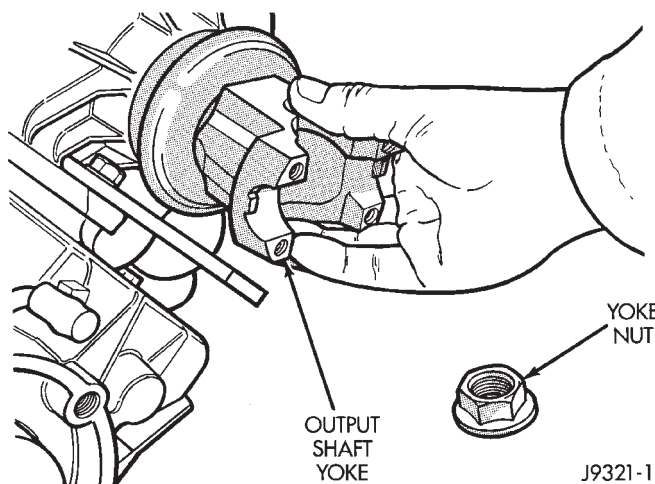


Fig. 98 Installing Output Shaft Yoke

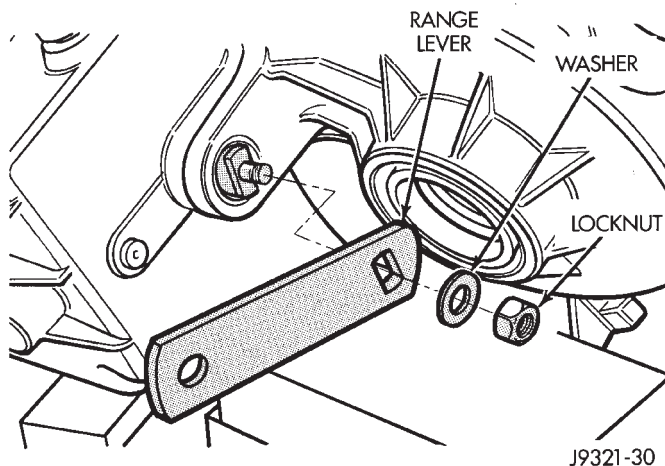
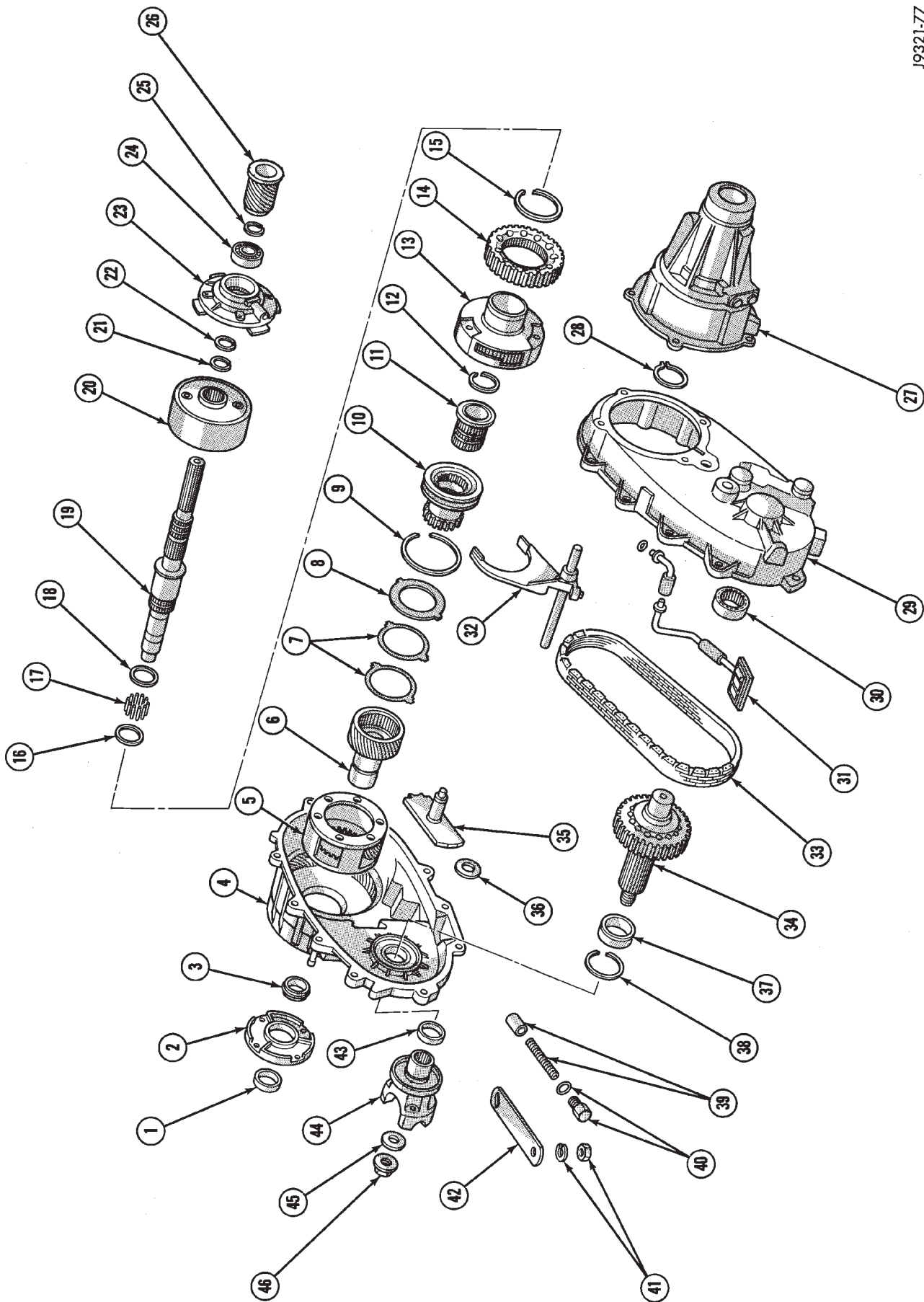


Fig. 99 Range Lever Installation



NP249 TRANSFER CASE

LEGEND FOR NP249 TRANSFER CASE

- | | |
|--|--|
| 1. Oil Seal | 25. Rear Bearing Snap Ring |
| 2. Front Bearing Retainer | 26. Speedometer Drive Gear |
| 3. Mainshaft Front Bearing and Locating Ring | 27. Rear Retainer Assembly (includes retainer cap, oil seal, bushing, access cover and gasket) |
| 4. Front Case (includes low range annulus gear and shift rail bushing) | 28. Rear Bearing Locating Ring |
| 5. Low Range Gear | 29. Front Case |
| 6. Input Gear | 30. Front Output Shaft Rear Bearing |
| 7. Tabbed Thrust Washer (2) | 31. Oil Pickup Tube Assembly (includes connecting hoses, pickup screen, tubes and O-ring) |
| 8. Retainer Plate | 32. Range Fork and Shift Rail Assembly (includes range fork pads) |
| 9. Input Gear Snap Ring | 33. Drive Chain |
| 10. Clutch Sleeve | 34. Front Output Shaft |
| 11. Clutch Shaft | 35. Shift Sector |
| 12. Differential Snap Ring | 36. Case Magnet |
| 13. Differential Assembly | 37. Front Output Shaft Front Bearing |
| 14. Mainshaft Drive Gear | 38. Bearing Snap Ring |
| 15. Drive Gear Snap Ring | 39. Detent Plunger and Spring |
| 16. Mainshaft Bearing Spacer | 40. Detent Plug and O-Ring |
| 17. Mainshaft Needle Bearings (53) | 41. Range Lever Locknut and Washer |
| 18. Mainshaft Bearing Spacer | 42. Range Lever |
| 19. Mainshaft | 43. Oil Seal (Front Output Shaft Front Bearing) |
| 20. Viscous Coupling | 44. Output Shaft Yoke |
| 21. Viscous Coupling Snap Ring | 45. Yoke Seal Washer |
| 22. Oil Pump Locating Snap Ring | 46. Yoke Nut |
| 23. Oil Pump | |
| 24. Mainshaft Rear Bearing | |

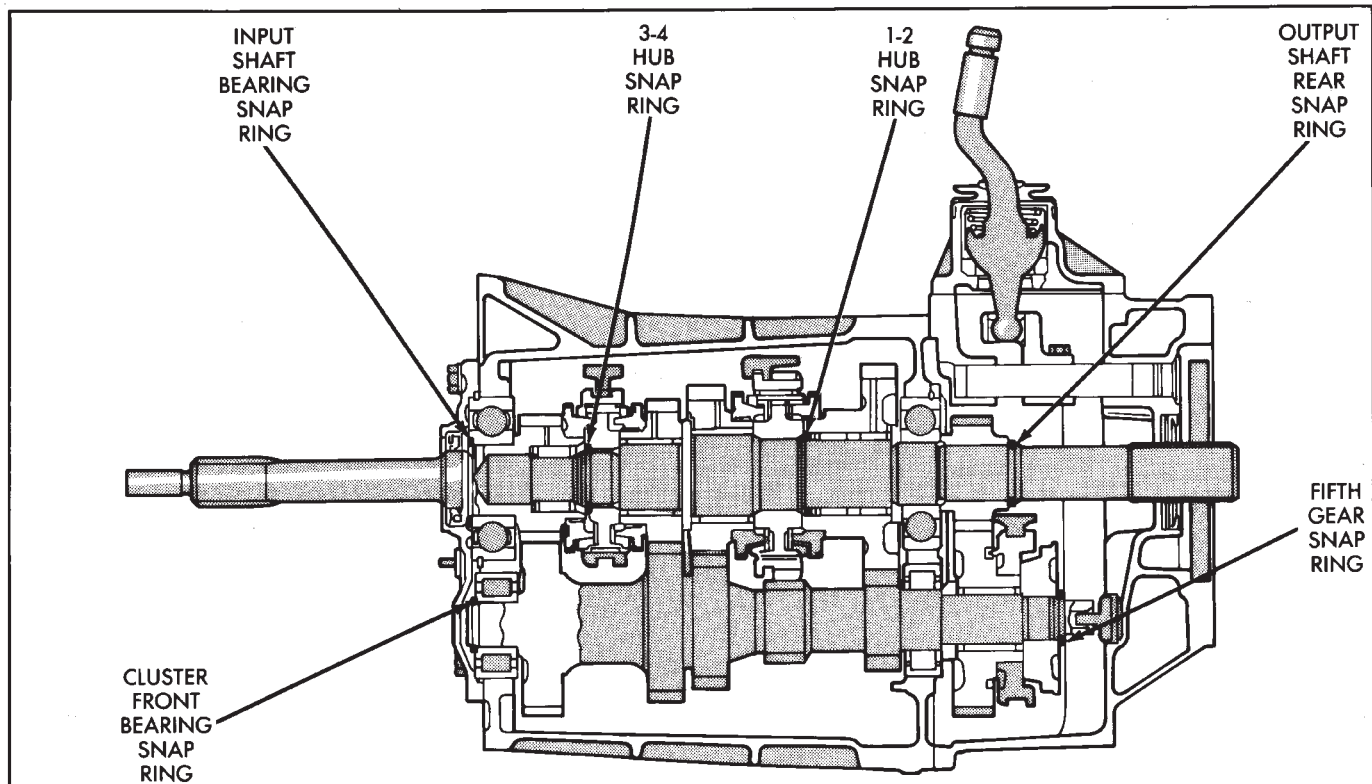
SPECIFICATIONS

TORQUE SPECIFICATIONS—AX-15

Description	Torque
Access Plugs	19 N•m (14 ft. lbs.)
Adapter Housing Bolts	37 N•m (27 ft. lbs.)
Backup Light Switch	37 N•m (27 ft. lbs.)
Drain and Fill Plugs	37 N•m (27 ft. lbs.)
Front Bearing Retainer Bolts	17 N•m (12 ft. lbs.)
Interlock and Detent Ball Plugs	19 N•m (14 ft. lbs.)
Propeller Shaft Clamp Screws	16-23 N•m (140-200 in. lbs.)
Rear Mount-To-Transmission Bolts	33-60 N•m (24-44 ft. lbs.)
Rear Mount Clevis Bolt/Nut	54-75 N•m (40-55 ft. lbs.)
Rear Mount-To- Crossmember Nuts	33-49 N•m (24-36 ft. lbs.)
Restrictor Pins	19 N•m (14 ft. lbs.)
Reverse Shift Arm Bracket Bolts	18 N•m (13 ft. lbs.)
Shift Arm Set Screw	38 N•m (28 ft. lbs.)
Shift Fork Set Screws	20 N•m (15 ft. lbs.)
Shift Knob Nut	20-34 N•m (15-25 ft. lbs.)
Shift Lever Floor Cover Screws	2-3 N•m (17-30 in. lbs.)
Shift Tower Bolts	18 N•m (13 ft. lbs.)
Transfer Case Mounting Nuts	30-41 N•m (22-30 ft. lbs.)

J9321-89

SELECTIVE SNAP RING CHART—AX-15



<p>I.D. MARK</p> <p>INPUT SHAFT BEARING SNAP RING</p> <table> <tr><th></th><th>THICKNESS</th></tr> <tr><td>A</td><td>2.10-2.15 mm</td></tr> <tr><td>B</td><td>2.15-2.20 mm</td></tr> <tr><td>C</td><td>2.20-2.25 mm</td></tr> <tr><td>D</td><td>2.25-2.30 mm</td></tr> <tr><td>E</td><td>2.30-2.35 mm</td></tr> <tr><td>F</td><td>2.35-2.40 mm</td></tr> <tr><td>G</td><td>2.40-2.45 mm</td></tr> </table>		THICKNESS	A	2.10-2.15 mm	B	2.15-2.20 mm	C	2.20-2.25 mm	D	2.25-2.30 mm	E	2.30-2.35 mm	F	2.35-2.40 mm	G	2.40-2.45 mm	<p>I.D. MARK</p> <p>1-2 HUB SNAP RING</p> <table> <tr><th></th><th>THICKNESS</th></tr> <tr><td>B</td><td>2.35-2.40 mm</td></tr> <tr><td>C</td><td>2.40-2.45 mm</td></tr> <tr><td>D</td><td>2.45-2.50 mm</td></tr> <tr><td>E</td><td>2.50-2.55 mm</td></tr> <tr><td>F</td><td>2.55-2.60 mm</td></tr> <tr><td>G</td><td>2.60-2.65 mm</td></tr> </table>		THICKNESS	B	2.35-2.40 mm	C	2.40-2.45 mm	D	2.45-2.50 mm	E	2.50-2.55 mm	F	2.55-2.60 mm	G	2.60-2.65 mm								
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<p>I.D. MARK</p> <p>CLUSTER FRONT BEARING SNAP RING</p> <table> <tr><th></th><th>THICKNESS</th></tr> <tr><td>A</td><td>2.00-2.05 mm</td></tr> <tr><td>B</td><td>2.05-2.10 mm</td></tr> <tr><td>C</td><td>2.10-2.15 mm</td></tr> <tr><td>D</td><td>2.15-2.20 mm</td></tr> <tr><td>E</td><td>2.20-2.25 mm</td></tr> </table>		THICKNESS	A	2.00-2.05 mm	B	2.05-2.10 mm	C	2.10-2.15 mm	D	2.15-2.20 mm	E	2.20-2.25 mm	<p>I.D. MARK</p> <p>OUTPUT SHAFT REAR SNAP RING</p> <table> <tr><th></th><th>THICKNESS</th></tr> <tr><td>A</td><td>2.75-2.80 mm</td></tr> <tr><td>B</td><td>2.80-2.85 mm</td></tr> <tr><td>C</td><td>2.85-2.90 mm</td></tr> <tr><td>D</td><td>2.90-2.95 mm</td></tr> <tr><td>E</td><td>2.95-3.00 mm</td></tr> <tr><td>F</td><td>3.00-3.05 mm</td></tr> <tr><td>G</td><td>3.05-3.10 mm</td></tr> <tr><td>H</td><td>3.10-3.15 mm</td></tr> <tr><td>I</td><td>3.15-3.20 mm</td></tr> <tr><td>J</td><td>3.20-3.25 mm</td></tr> <tr><td>K</td><td>3.25-3.30 mm</td></tr> <tr><td>L</td><td>3.30-3.35 mm</td></tr> </table>		THICKNESS	A	2.75-2.80 mm	B	2.80-2.85 mm	C	2.85-2.90 mm	D	2.90-2.95 mm	E	2.95-3.00 mm	F	3.00-3.05 mm	G	3.05-3.10 mm	H	3.10-3.15 mm	I	3.15-3.20 mm	J	3.20-3.25 mm	K	3.25-3.30 mm	L	3.30-3.35 mm
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GENERAL SPECIFICATIONS—AW-4

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.)

OIL PUMP WEAR LIMITS—AW-4

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

CLUTCH DISC AND PLATE THICKNESS—AW-4

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.)

J9121-402

BUSHING AND PISTON CLEARANCE—AW-4

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.)

RETAINER AND PISTON SPECIFICATIONS—AW-4

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

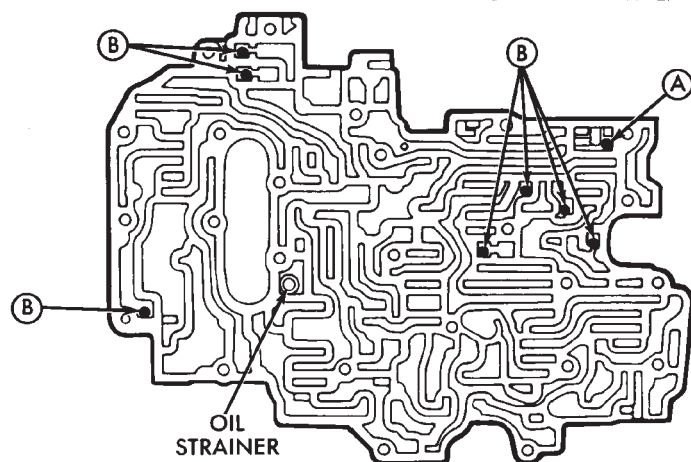
Retainer No.	Thickness	Retainer No.	Thickness
42	4.0 mm (.157 in.)	61	3.0 mm (.118 in.)
44	3.8 mm (.149 in.)	62	3.6 mm (.142 in.)
45	3.4 mm (.134 in.)	63	4.2 mm (.165 in.)
60	3.2 mm (.126 in.)	64	4.4 mm (.173 in.)

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.)

VALVE BODY CHECK BALL DIMENSIONS—AW-4

Check Ball	Diameter
(A) Rubber Ball	6.35 mm (0.250 in.)
(B) Rubber Ball	5.535 mm (.218 in.)



J9121-405

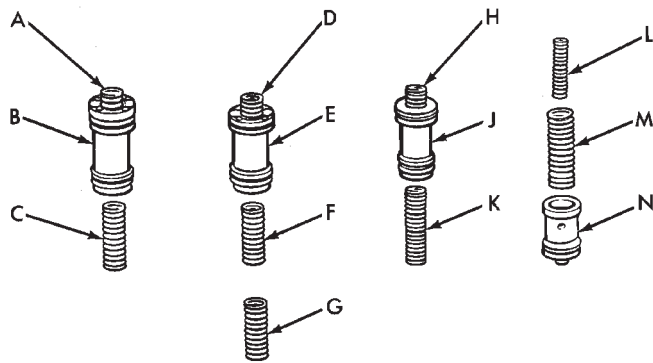
CLUTCH/BRAKE PACK REQUIREMENTS—AW-4

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

J9121-406

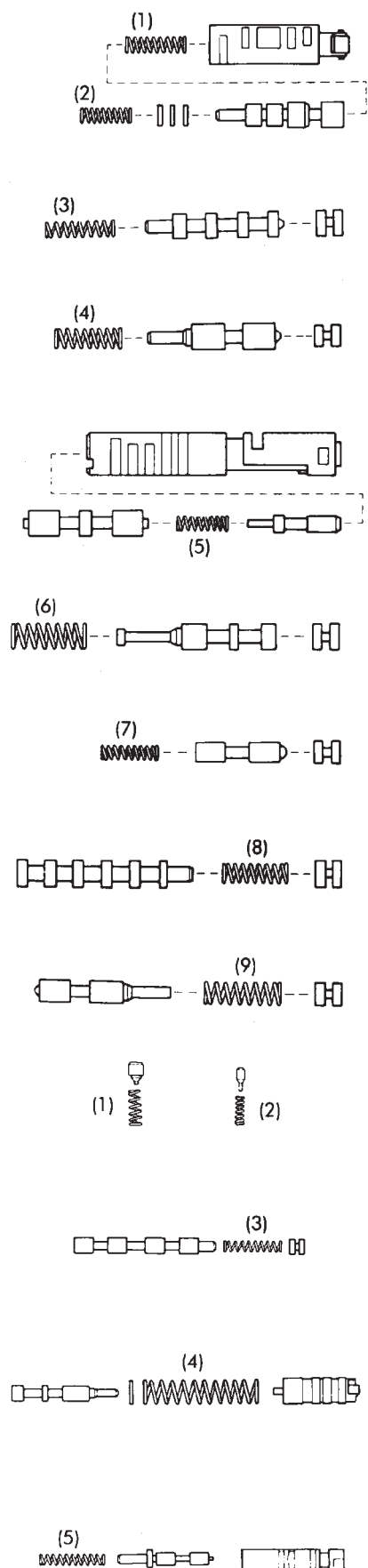
ACCUMULATOR COMPONENT
IDENTIFICATION—AW-4

	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.)



J9121-407

VALVE AND SPRING IDENTIFICATION—AW-4



Spring	Free Length
(1) Downshift Plug	27.3 mm (1.074 in.)
(2) Throttle Valve	20.6 mm (.811 in.)
(3) 3-4 Shift Valve	30.8 mm (1.212 in.)
(4) Second Coast Modulator Valve	25.3 mm (.996 in.)
(5) Lockup Relay Valve	21.4 mm (.843 in.)
(6) Secondary Regulator Valve	30.9 mm (1.217 in.)
(7) Cut-Back Valve	21.8 mm (.858 in.)
(8) 2-3 Shift Valve	30.8 mm (1.212 in.)
(9) Low Coast Modulator Valve	27.8 mm (1.094 in.)

Spring	Spring Length
(1) Check Valve	20.2 mm (.797 in.)
(2) Pressure Relief Valve	11.2 mm (.441 in.)
(3) 1-2 Shift Valve	30.8 mm (1.213 in.)
(4) Primary Regulator Valve	62.3 mm (2.453 in.)
(5) Accumulator Control Valve	29.8 mm (1.173 in.)

TORQUE SPECIFICATIONS—AW-4

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.)		

J9321-88

GENERAL SPECIFICATIONS—46RH

TRANSMISSION MODEL	46RH
Oil Pump Clearances (all)	0.089-0.190 mm (0.0035-0.0075 in)
Planetary End Play	0.15-1.22 mm (0.006-0.048 in)
Input Shaft End Play	0.86-2.13 mm (0.034-0.084 in)
Clutch Pack Clearance:	
Front Clutch – 3 Disc	1.78-3.28 mm (0.070-0.129 in)
Front Clutch – 4 Disc	2.08-3.83 mm (0.082-0.151 in)
Rear Clutch – 4 Disc	0.64-1.14 mm (0.025-0.045 in)
Clutch Disc Usage:	
Front Clutch	3/4
Rear Clutch	4
Overdrive Clutch	4
Direct Clutch	8
Front Clutch Spring Usage	9
Band Adjustments:	
(backed off from 72 in. lbs.)	
Front Band	2½ Turns
Rear Band	2 Turns
Recommended Fluid (all)	MOPAR ATF Plus, Type 7176

J9321-229

PRESSURE TEST SPECIFICATIONS—46RH

Overdrive Clutch	Fourth Gear Only	Pressure should be 469-496 kPa (68-72 psi) with closed throttle and increase to 620-896 kPa (90-130 psi) at 1/2 to 3/4 throttle.
Line Pressure (at accumulator)	Closed Throttle 1000 rpm and above	372-414 kPa (54-60 psi) 648 kPa (94 psi)
Front Servo	Third Gear Only	No more than 21 kPa (3 psi) lower than line pressure.
Rear Servo	1 Range R Range	No more than 21 kPa (3 psi) lower than line pressure. 1103 kPa (160 psi) at idle, builds to 1862 kPa (270 psi) at 1600 rpm.
Governor	D Range Closed Throttle	Pressure should respond smoothly to changes in mph and return to 0-7 kPa (0-1½ psi) when stopped with transmission in D, 1, 2. Pressure above 7 kPa (1½ psi) at standstill will prevent transmission from downshifting.

J9321-192

SPACER/THRUST PLATE/SNAP RING SPECIFICATIONS—46RH

	46RH
Front Clutch Thrust Washer (on reaction shaft support hub)	0.061 in. 0.084 in. 0.102 in.
Rear Clutch Thrust Washer (on clutch retainer)	0.061 in.
Intermediate Shaft Thrust Plate (on shaft pilot hub)	0.060-.063 in.
Output Shaft Thrust Washer (in rear clutch hub)	0.052-.054 in. 0.068-.070 in. 0.083-.085 in.
Rear Clutch Pack Snap Ring	0.060 in. 0.074 in.
Planetary Geartrain Snap Ring (at front end of intermediate shaft)	0.055-.059 in. 0.062-.066 in.
Overdrive Piston Thrust Plate	Thrust plate and spacer are select fit components. Refer to "Overdrive Unit Assembly and Adjust- ment."
Intermediate Shaft Spacer	

J9321-230

TORQUE SPECIFICATIONS—46RH

DESCRIPTION	TORQUE
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Converter Bolts:	
10.0 in., 4-lug converter . . .	74 N·m (55 ft. lbs.)
10.75 in., 4-lug converter . .	31 N·m (270 in. lbs.)
Crossmember Bolts/Nuts	68 N·m (50 ft. lbs.)
Driveplate Bolts	75 N·m (55 ft. lbs.)
Front Band Reaction	
Pin Access Plug	17 N·m (13 ft. lbs.)
Front Band Adjusting	
Screw Locknut	34 N·m (25 ft. lbs.)
Park/Neutral Position Switch . .	34 N·m (25 ft. lbs.)
Oil Pan Bolt	17 N·m (13 ft. lbs.)
Oil Pump Bolt	20 N·m (15 ft. lbs.)
Overrunning Clutch Cam	
Bolts	17 N·m (150 in. lbs.)
Overdrive-to-Transmission	
Case Bolts	34 N·m (25 ft. lbs.)

DESCRIPTION	TORQUE
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Overdrive Piston Retainer	
Bolts	17 N·m (150 in. lbs.)
Pressure Test Port Plugs	14 N·m (10 ft. lbs.)
Propeller Shaft Clamp Bolts . .	19 N·m (170 in. lbs.)
Reaction Shaft Support Bolts . .	20 N·m (15 ft. lbs.)
Rear Band Adjusting Screw	
Locknut	41 N·m (30 ft. lbs.)
Solenoid Wiring Connector	
Screw	17 N·m (13 ft. lbs.)
Solenoid-to-Transfer Plate	
Screw	4 N·m (35 in. lbs.)
Speedometer Adapter Bolt . . .	11 N·m (8 ft. lbs.)
Valve Body and Oil Filter	
Screws	4 N·m (35 in. lbs.)
Valve Body-to-Case Bolts	12 N·m (100 in. lbs.)

J9321-231

TORQUE SPECIFICATIONS—NP231/NP242

Description	Torque
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Detent Plug	16-24 N·m (12-18 ft. lbs.)
Differential Case Bolt	17-27 N·m (150-240 in. lbs.)
Drain/Fill Plugs	40-54 N·m (30-40 ft. lbs.)
Extension Housing Bolt	35-46 N·m (26-34 ft. lbs.)
Front Bearing Retainer Bolt	16-27 N·m (12-20 ft. lbs.)
Front Case-To-Rear	
Case Bolt	35-46 N·m (26-34 ft. lbs.)
Front Yoke Nut	122-176 N·m (90-130 ft. lbs.)
Oil Pump Screw	1.4-1.8 N·m (12-15 in. lbs.)
Range Lever Nut	27-34 N·m (20-25 ft. lbs.)
Rear Retainer Bolt	35-46 N·m (26-34 ft. lbs.)
Transfer Case Mounting Nuts	35-47 N·m (26-35 ft. lbs.)
U-Joint Clamp Bolts	19 N·m (170 in. lbs.)
Vacuum Switch	20-34 N·m (15-25 ft. lbs.)

J9321-95

TORQUE SPECIFICATIONS—NP249

DESCRIPTION	TORQUE
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Crossmember Bolts	41-47 N·m (30-35 ft. lbs.)
Detent Plug	16-24 N·m (12-18 ft. lbs.)
Differential Carrier Bolts	17-27 N·m (150-240 in. lbs.)
Drain and Fill Plugs	41-54 N·m (30-40 ft. lbs.)
Electrical Switch	20-34 N·m (15-25 ft. lbs.)
Front Bearing Retainer Bolts	16-24 N·m (12-18 ft. lbs.)
Front Case-to-Rear Case Bolts	27-34 N·m (20-25 ft. lbs.)
Output Shaft Yoke Nut	122-176 N·m (90-130 ft. lbs.)
Rear Retainer Bolts	27-34 N·m (20-25 ft. lbs.)
Shift Lever Locknut	27-34 N·m (20-25 ft. lbs.)
Shift Rod Trunnion Bolt	11-20 N·m (96-180 in. lbs.)
Transfer Case Mounting Stud Nuts . . .	33-41 N·m (24-30 ft. lbs.)
U-Joint Clamp Bolts	16-22 N·m (12-16 ft. lbs.)

J9321-79