

TRANSMISSION AND TRANSFER CASE

CONTENTS

	page		page
AUTOMATIC TRANSMISSION—30/32RH	75	AX5 MANUAL TRANSMISSION	1
AX15 MANUAL TRANSMISSION	38	NV231 TRANSFER CASE	168

AX5 MANUAL TRANSMISSION

INDEX

	page		page	
GENERAL INFORMATION		DISASSEMBLY AND ASSEMBLY		
AX5 MANUAL TRANSMISSION	1	ADAPTER/EXTENSION HOUSING AND FRONT BEARING RETAINER	8	
GEAR RATIOS	2	COUNTERSHAFT	26	
RECOMMENDED LUBRICANT	2	INPUT SHAFT	26	
TRANSMISSION ASSEMBLY INFORMATION	2	OUTPUT SHAFT	28	
TRANSMISSION IDENTIFICATION	1	SEMI-SYNCHRONIZED REVERSE IDLER GEAR	32	
DIAGNOSIS AND TESTING		SHIFT MECHANISM AND GEARTRAIN		15
HARD SHIFTING	3	CLEANING AND INSPECTION		
LOW LUBRICANT LEVEL	2	AX5 MANUAL TRANSMISSION COMPONENTS		33
TRANSMISSION NOISE	4	SPECIFICATIONS		
REMOVAL AND INSTALLATION		TORQUE		35
ADAPTER HOUSING SEAL	7	SPECIAL TOOLS		
EXTENSION HOUSING SEAL	7	AX5		36
FRONT BEARING RETAINER SEAL	6			
TRANSMISSION	4			

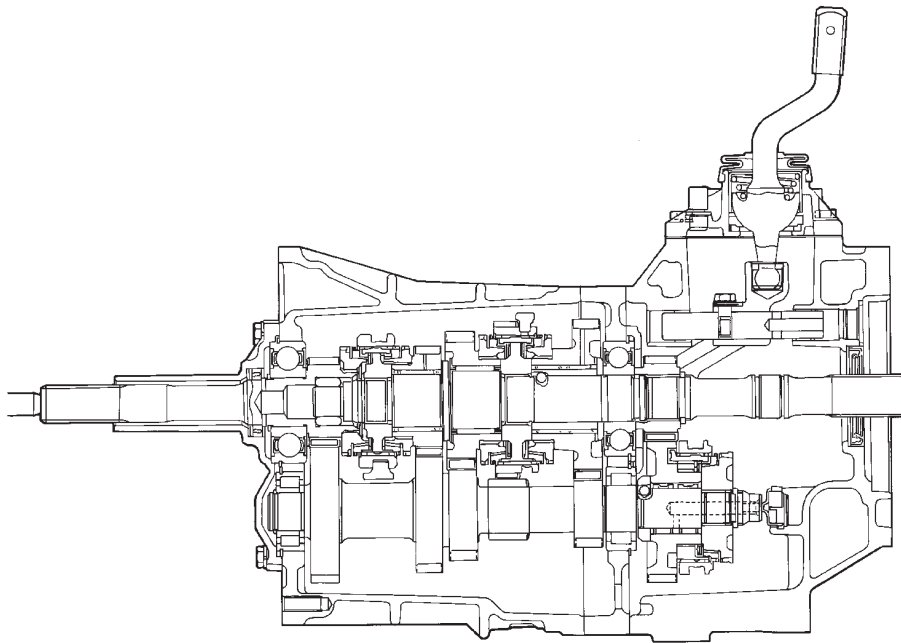
GENERAL INFORMATION

AX5 MANUAL TRANSMISSION

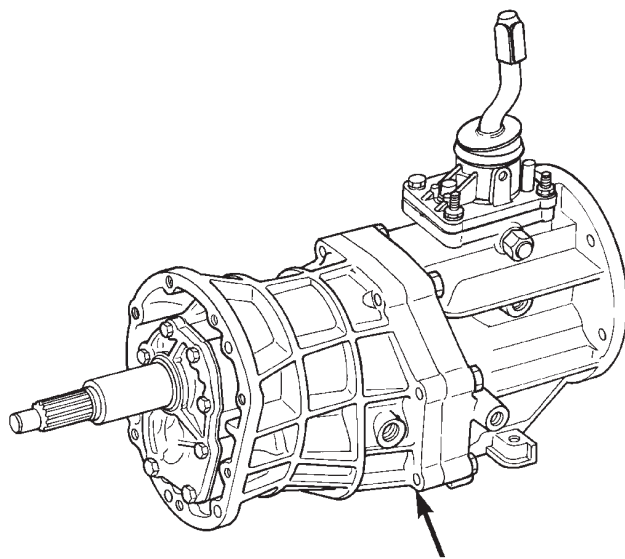
The AX5 is a five speed manual transmission with fifth gear being the overdrive range. An adapter housing is used to attach the transmission to the transfer case on 4-wheel drive applications. A standard style extension housing is used for the 2-wheel drive applications. The shift mechanism is integral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

TRANSMISSION IDENTIFICATION

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

GENERAL INFORMATION (Continued)

80abfee7

Fig. 1 AX5 Manual Transmission

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

80abfee5

Fig. 2 Transmission Identification**GEAR RATIOS**

Gear ratios for the AX5 manual transmission are as follows:

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

RECOMMENDED LUBRICANT

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

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

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

Approximate dry fill lubricant capacity is:

- 3.3 liters (3.49 quarts) for 4-wheel drive applications.
- 3.5 liters (3.70 quarts) for 2-wheel drive applications.

TRANSMISSION ASSEMBLY INFORMATION

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

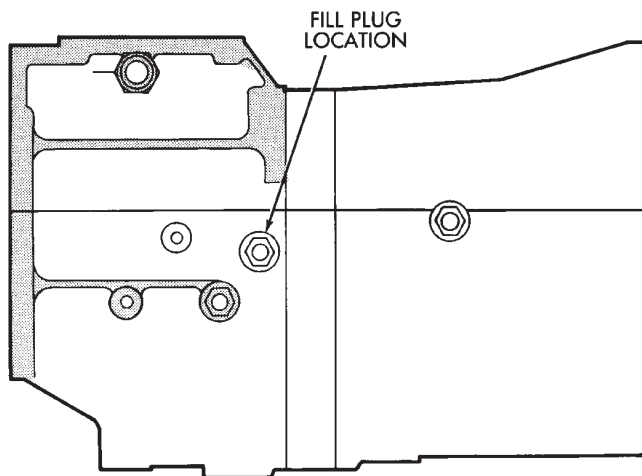
Refer to (Fig. 4) during assembly for AX5 gear assembly identification.

DIAGNOSIS AND TESTING**LOW LUBRICANT LEVEL**

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

Leaks can occur at the mating surfaces of the gear case, intermediate plate and adaptor or extension

DIAGNOSIS AND TESTING (Continued)



J8921-4

Fig. 3 Fill Plug Location

housing, or from the front/rear seals. A suspected leak could also be the result of an overfill condition.

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

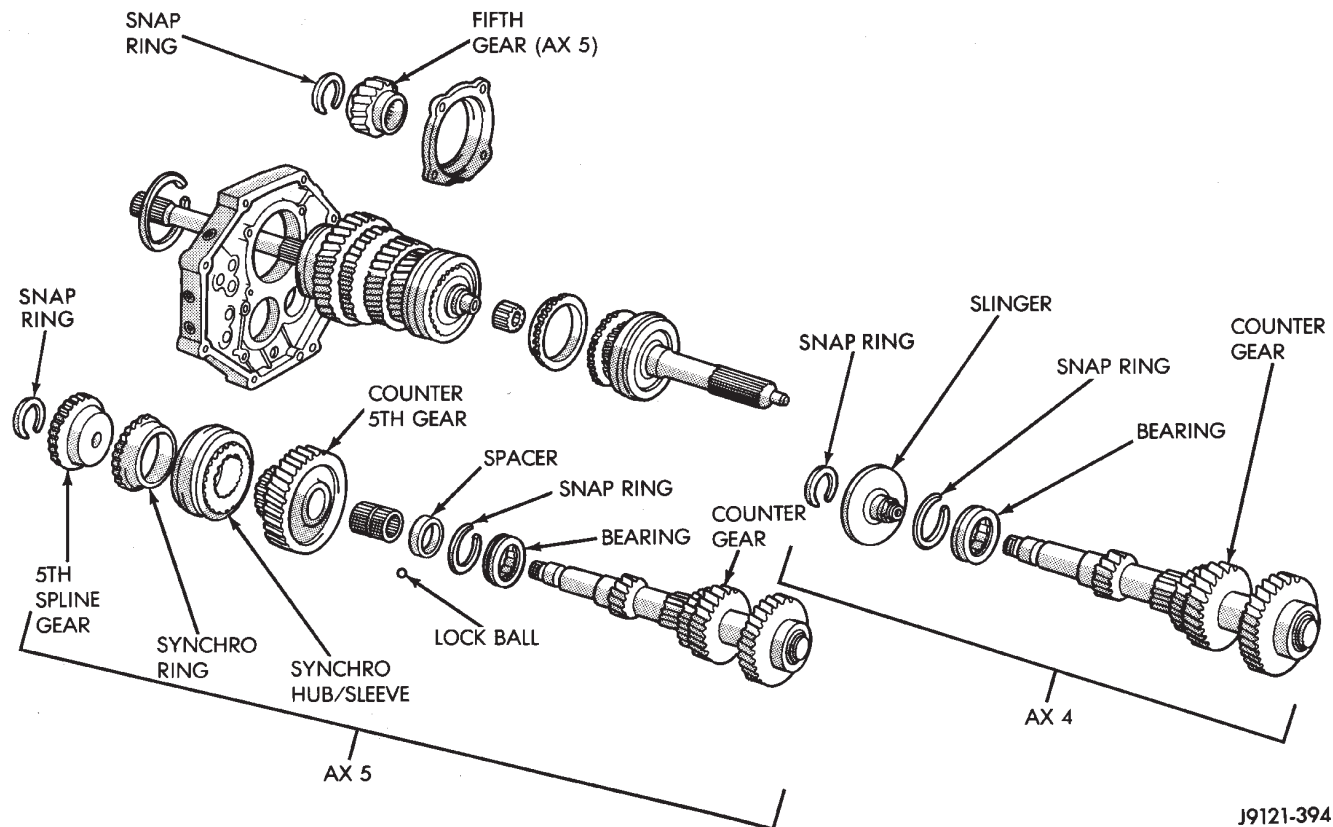
A leak at the front of the transmission will be from either the front bearing retainer or retainer seal. Lubricant may be seen dripping from the clutch housing after extended operation. If the leak is severe, it may also contaminate the clutch disc causing the disc to slip, grab, and/or chatter.

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

HARD SHIFTING

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

Component damage, incorrect clutch adjustment, or a damaged clutch pressure plate or disc are additional probable causes of increased shift effort. Incorrect



J9121-394

Fig. 4 Geartrain Components

DIAGNOSIS AND TESTING (Continued)

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 generate a mild whine that is audible, but generally only at extreme speeds.

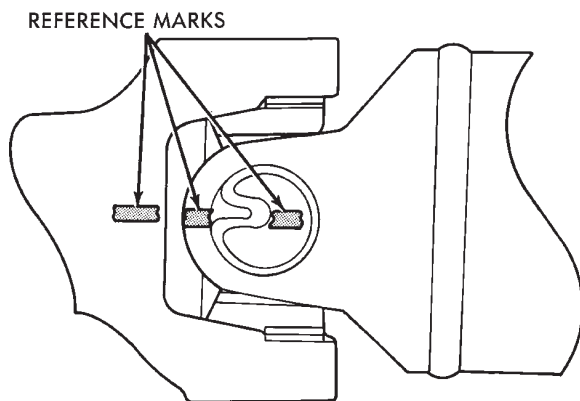
Severe, highly audible transmission noise is generally the initial indicator of a lubricant problem. Insufficient, improper, or contaminated lubricant will promote rapid wear of gears, synchros, shift rails, forks and bearings. The overheating caused by a lubricant problem, can also lead to gear breakage.

REMOVAL AND INSTALLATION

TRANSMISSION

REMOVAL

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



J9316-2

Fig. 5 Marking Propeller Shaft And Axle Yokes

- (7) Mark front propeller shaft, axle, and transfer case yokes for installation alignment, if equipped.
- (8) Remove propeller shaft(s).
- (9) Unclip wire harnesses from transmission and transfer case, if equipped.
- (10) Disconnect transfer case vent hose, if equipped.

(11) Disengage any wire connectors attached to transmission or transfer case, if equipped, components.

(12) Support transfer case, if equipped, with transmission jack.

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

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

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

(16) Remove transfer case, if equipped.

(17) Remove crankshaft position sensor (Fig. 6), (Fig. 7).

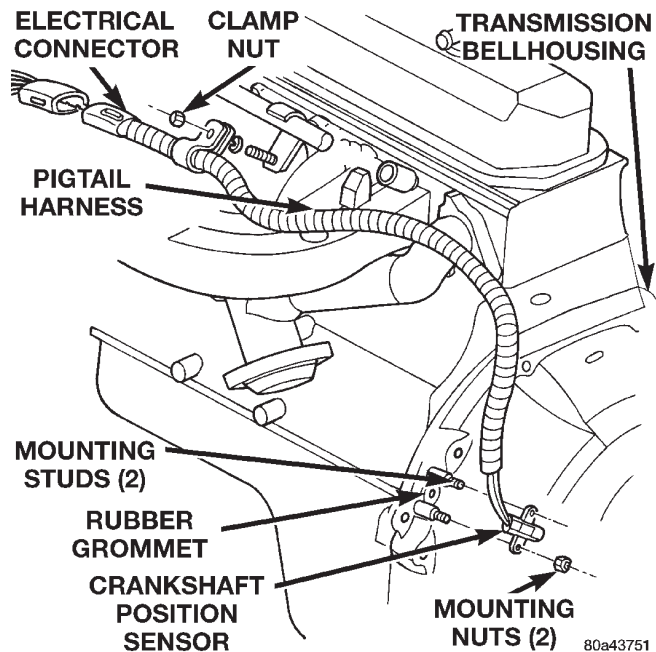


Fig. 6 Crankshaft Position Sensor—2.5L Engine

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

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

(19) Support transmission with transmission jack.

(20) Secure transmission to jack with safety chains.

(21) Disconnect rear cushion and bracket from transmission.

(22) Remove rear crossmember.

(23) Disconnect transmission shift lever as follows:
(a) Lower transmission-transfer case assembly approximately 7–8 cm (3 in.) for access to shift lever.

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

REMOVAL AND INSTALLATION (Continued)

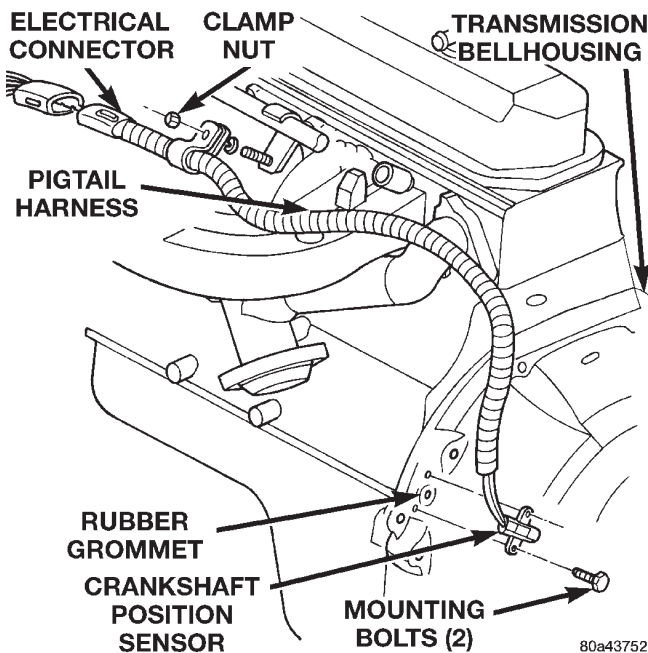


Fig. 7 Crankshaft Position Sensor —4.0L Engine

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

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

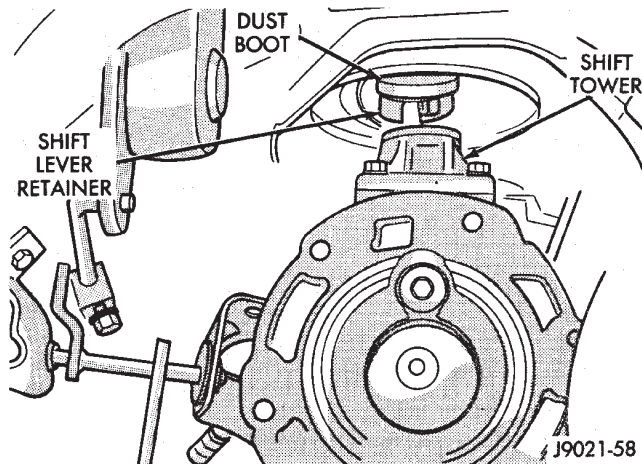


Fig. 8 Removing/Installing Shift Lever

- (24) Remove clutch housing brace rod.
- (25) Remove clutch housing-to-engine bolts.
- (26) Pull transmission jack rearward until input shaft clears clutch. Then slide transmission out from under vehicle.
- (27) Remove clutch release bearing, release fork, and retainer clip.

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

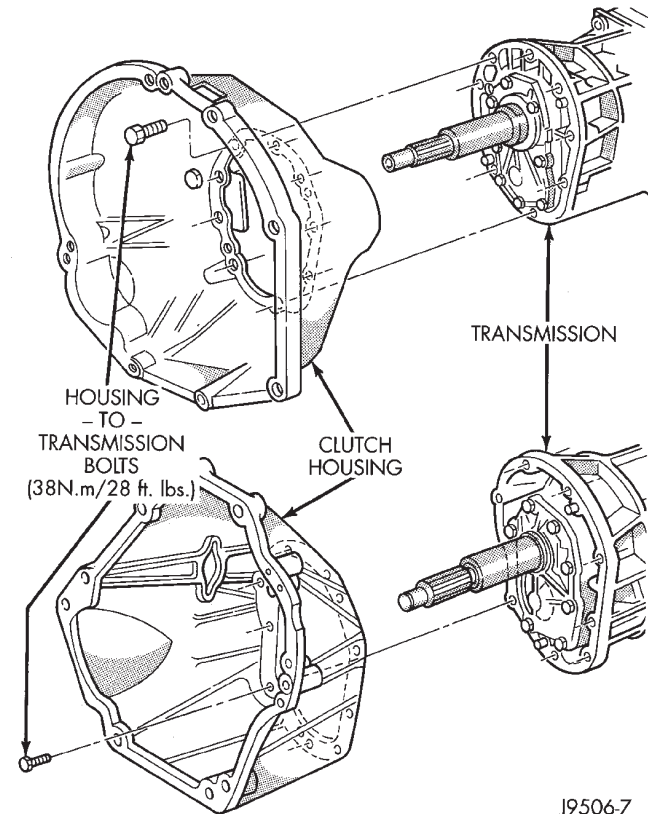


Fig. 9 Clutch Housing

INSTALLATION

- (1) Install clutch housing on transmission. Tighten housing bolts to 37 N·m (27 ft. lbs.) torque.
- (2) Lubricate contact surfaces of release fork pivot ball stud and release fork with high temp grease.
- (3) Install release bearing, fork, and retainer clip.
- (4) Position and secure transmission on transmission jack.
- (5) Lightly lubricate pilot bearing and transmission input shaft splines with Mopar® high temp grease.
- (6) Raise transmission and align transmission input shaft and clutch disc splines. Then slide transmission into place.
- (7) Install and tighten clutch housing-to-engine bolts to 38 N·m (28 ft. lbs.) torque (Fig. 9). **Be sure the housing is properly seated on engine block before tightening bolts.**
- (8) Install clutch housing brace rod.
- (9) Lower transmission approximately 7–8 cm (3 in.) for access to shift tower. Be sure transmission is in first or third gear.
- (10) Reach up and around transmission and insert shift lever in shift tower. Press lever retainer down-

REMOVAL AND INSTALLATION (Continued)

ward and turn it clockwise to lock it in place. Then install lever dust boot on shift tower.

(11) Install rear crossmember. Tighten crossmember-to-frame bolts to 41 N·m (31 ft. lbs.) torque.

(12) Install fasteners to hold rear cushion and bracket to transmission. Then tighten transmission-to-rear support bolts/nuts to 45 N·m (33 ft. lbs.) torque.

(13) Remove support stands from engine and transmission.

(14) Install and connect crankshaft position sensor.

(15) Position transfer case on transmission jack, if equipped.

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

(17) Raise transfer case, if equipped, and align transfer case input shaft to the transmission output shaft.

(18) Slide transfer case forward until case is seated on transmission, if necessary.

(19) Install nuts to attach transfer case to transmission, if equipped. Tighten transfer case-to-transmission nuts to 35 N·m (26 ft. lbs.) torque.

(20) Connect transfer case shift linkage at transfer case, if equipped.

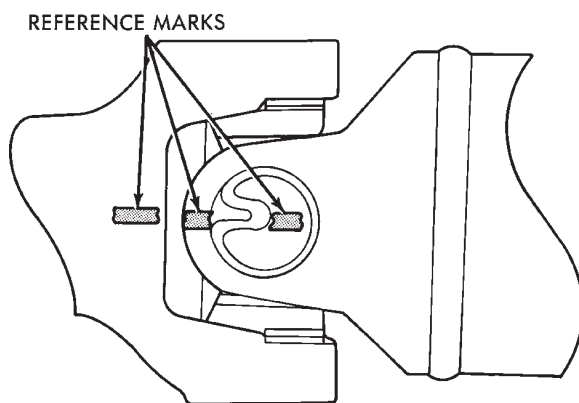
(21) Connect transfer case vent hose, if equipped.

(22) Secure wire harnesses in clips/tie straps on transmission and transfer case, if equipped.

(23) Engage wire connectors attached to all necessary transmission or transfer case, if equipped, components.

(24) Install rear propeller shaft slip yoke to transmission or transfer case, if equipped, output shaft.

(25) Align marks on rear propeller shaft and rear axle yokes (Fig. 10).



J9316-2

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

(26) Install and tighten propeller shaft U-joint clamp bolts to 19 N·m (170 in. lbs.) torque.

(27) Align marks on front propeller shaft, axle, and transfer case yokes, if equipped.

(28) Install and tighten propeller shaft U-joint clamp bolts to 19 N·m (170 in. lbs.) torque.

(29) Install slave cylinder in clutch housing.

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

(31) Fill transmission and transfer case, if equipped, with recommended lubricants. Refer to the Lubricant Recommendation sections of the appropriate component for correct fluid.

(32) Lower vehicle.

FRONT BEARING RETAINER SEAL**REMOVAL**

(1) Remove release bearing and lever from the transmission.

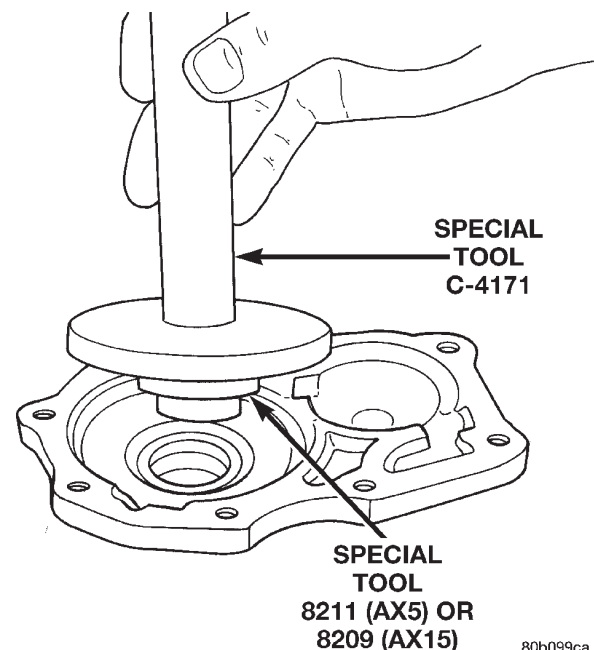
(2) Remove the bolts holding the front bearing retainer to the transmission case.

(3) Remove the front bearing retainer from the transmission case.

(4) Using a suitable pry tool, remove the front bearing retainer seal.

INSTALLATION

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



80b099ca

Fig. 11 Install Front Bearing Retainer Seal

(2) Remove any residual gasket material from the sealing surfaces of the bearing retainer and the transmission case.

(3) Install new front bearing retainer gasket to the front bearing retainer.

(4) Install the front bearing retainer onto the transmission case.

(5) Install the bolts to hold the bearing retainer onto the transmission case.

REMOVAL AND INSTALLATION (Continued)

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

EXTENSION HOUSING SEAL

REMOVAL

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

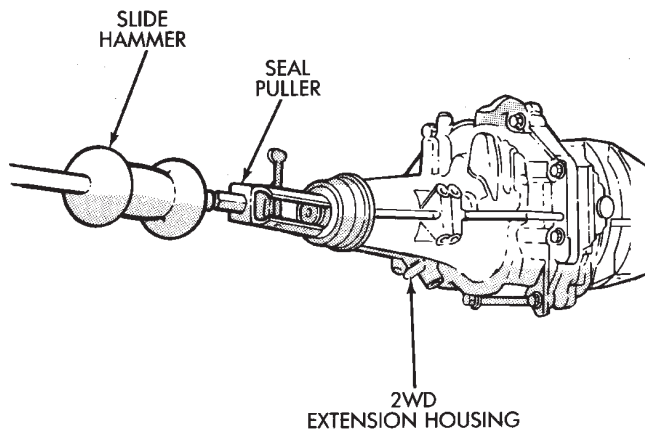


Fig. 12 Remove Extension Housing Seal

INSTALLATION

- (1) Clean seal bore of extension housing of any residual sealer material from original seal.
- (2) Using Tool Handle C-4171 and Seal Installer 8212, install new extension housing seal so that the seal is located 0 ± 0.5 mm (0 ± 0.02 in.) to the face of the extension housing (Fig. 13).

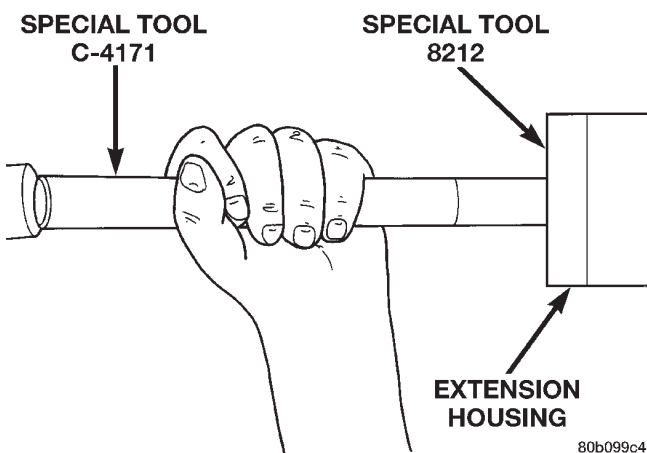


Fig. 13 Install Extension Housing Seal

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

- (5) Lower vehicle.

ADAPTER HOUSING SEAL

REMOVAL

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

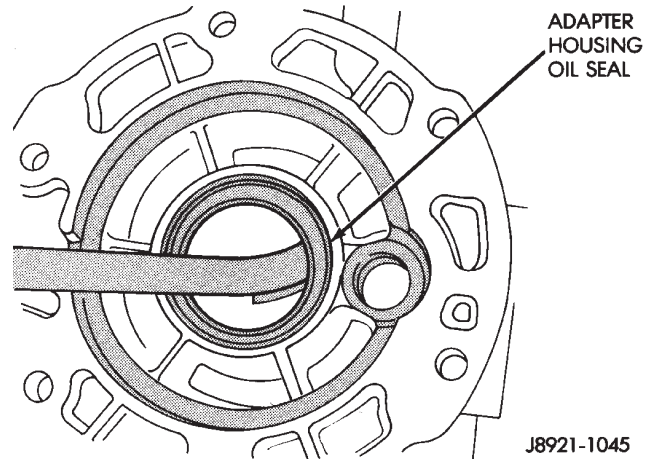


Fig. 14 Remove Adapter Housing Seal

INSTALLATION

- (1) Clean seal bore of adapter housing of any residual sealer material from original seal.
- (2) Using Tool Handle C-4171 and Seal Installer 8208, install new seal so that the seal is located 0 ± 0.2 mm (0 ± 0.008 in.) to the seal bore face of adapter housing (Fig. 15).

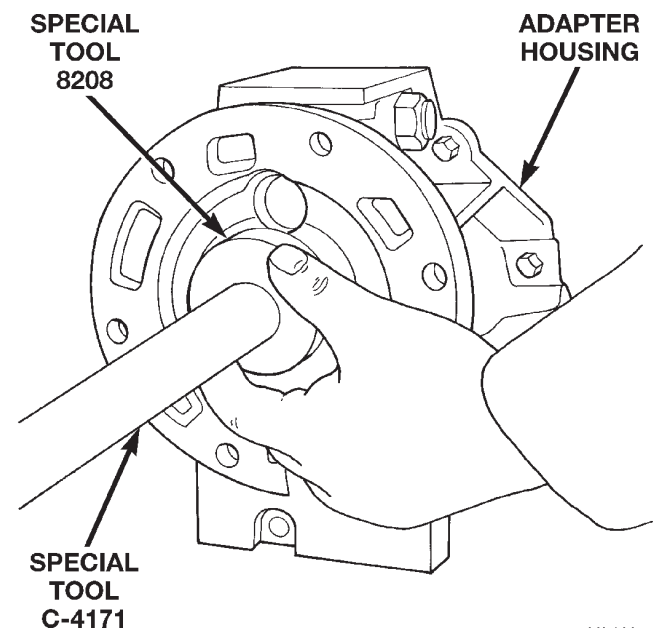


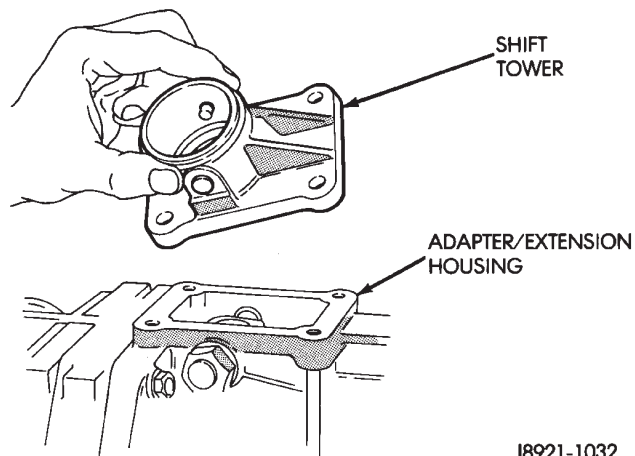
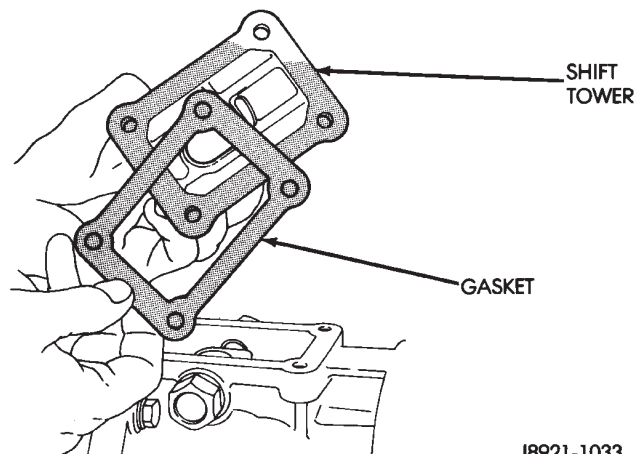
Fig. 15 Install Adapter Housing Seal

REMOVAL AND INSTALLATION (Continued)

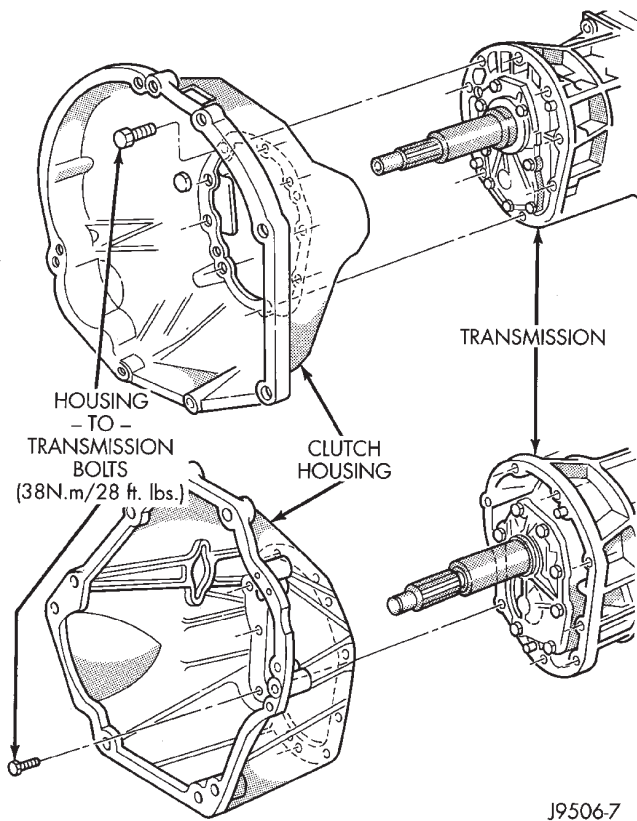
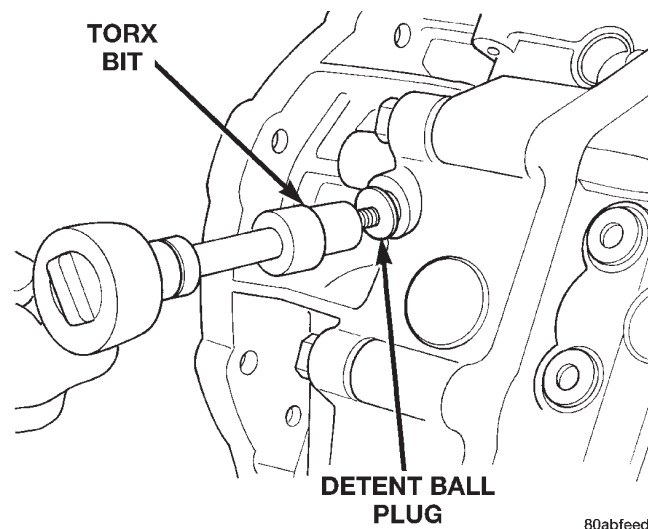
- (3) Install transfer case.
- (4) Check and add fluid to transmission as necessary. Refer to the Recommended Lubricant section for proper fluid requirements.
- (5) Lower vehicle.

DISASSEMBLY AND ASSEMBLY**ADAPTER/EXTENSION HOUSING AND FRONT BEARING RETAINER****DISASSEMBLY**

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

**Fig. 16 Remove Shift Tower****Fig. 17 Remove Shift Tower Gasket**

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

**Fig. 18 Clutch Housing****Fig. 19 Remove Detent Ball Plug**

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

DISASSEMBLY AND ASSEMBLY (Continued)

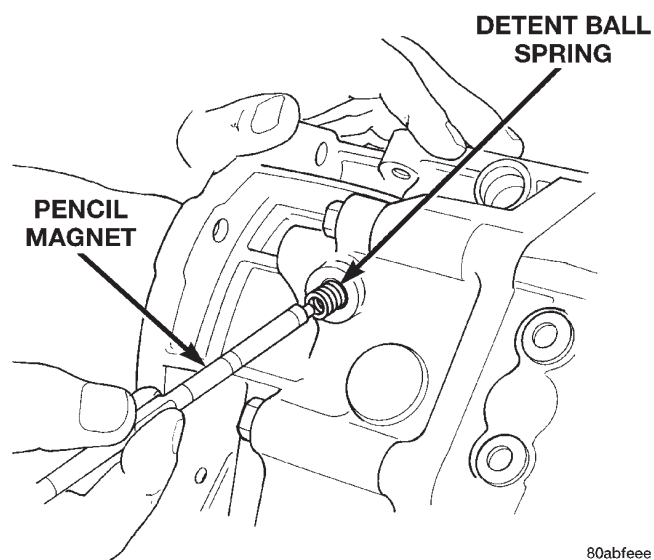


Fig. 20 Remove Detent Spring

80abfeee

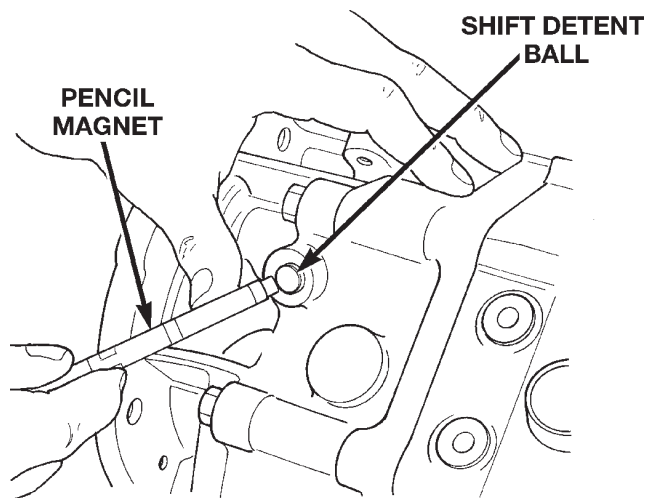


Fig. 21 Remove Detent Ball

80abfeef

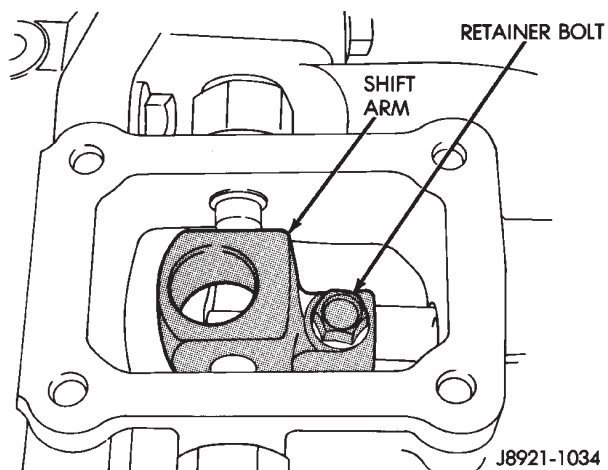


Fig. 22 Shift Arm Retainer Bolt Removal

J8921-1034

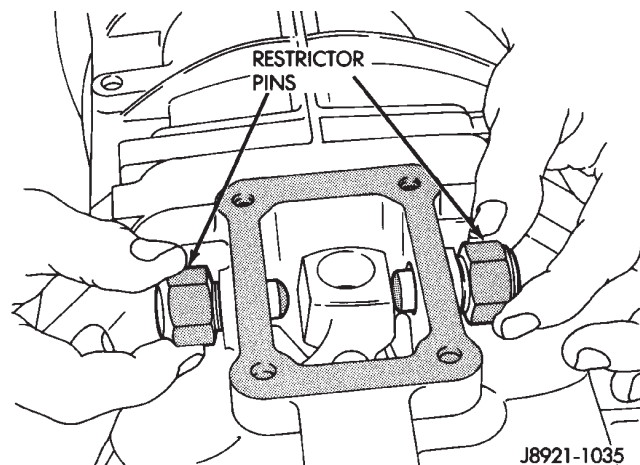


Fig. 23 Shift Arm Restrictor Pins

J8921-1035

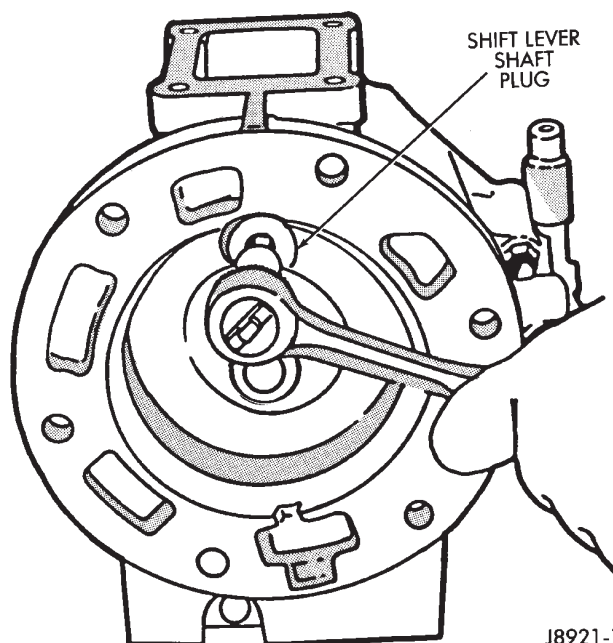


Fig. 24 Removing Shift Lever Shaft Plug

J8921-12

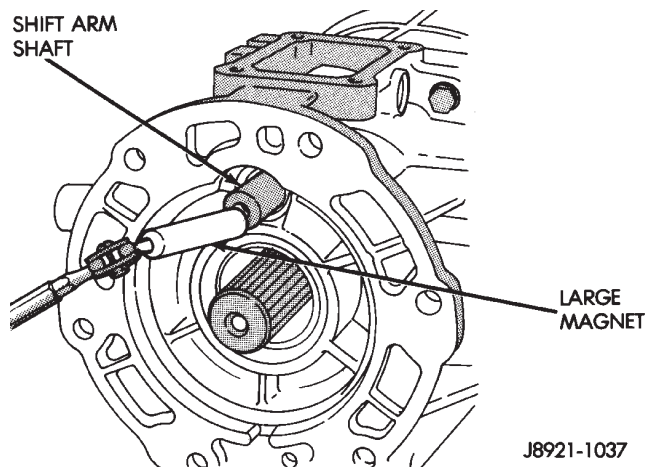
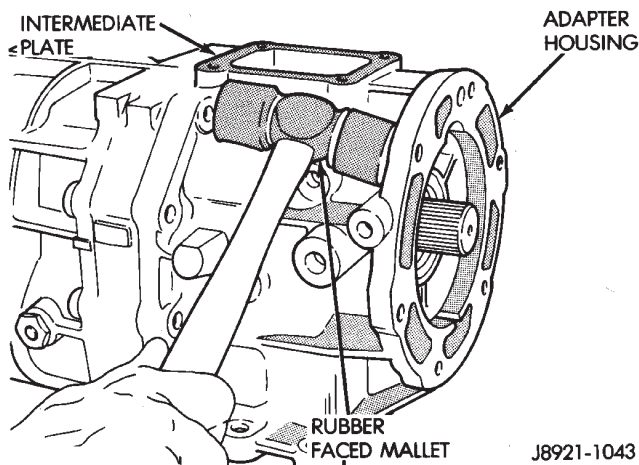
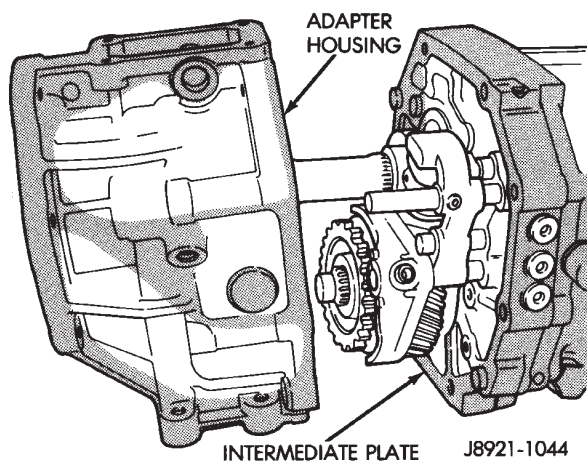


Fig. 25 Remove Shifter Shaft

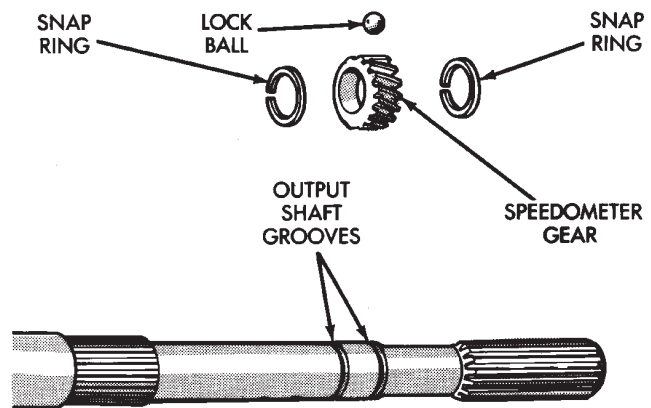
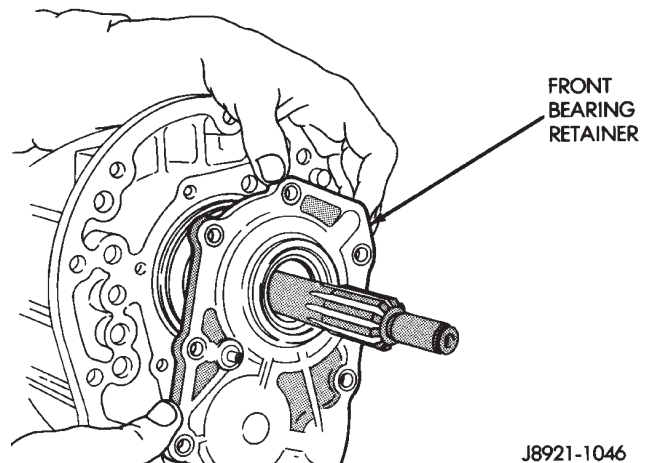
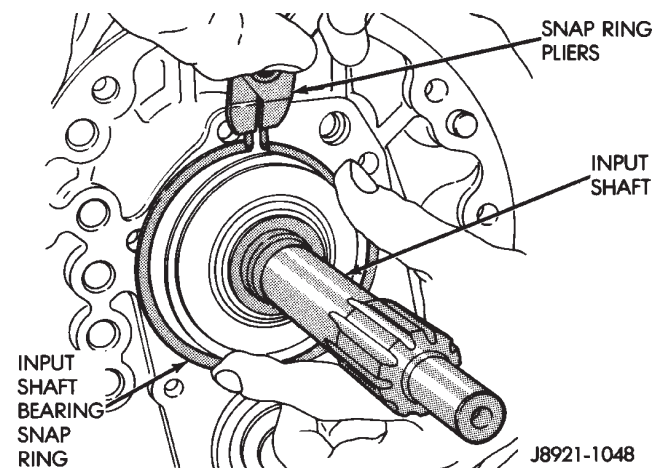
J8921-1037

DISASSEMBLY AND ASSEMBLY (Continued)

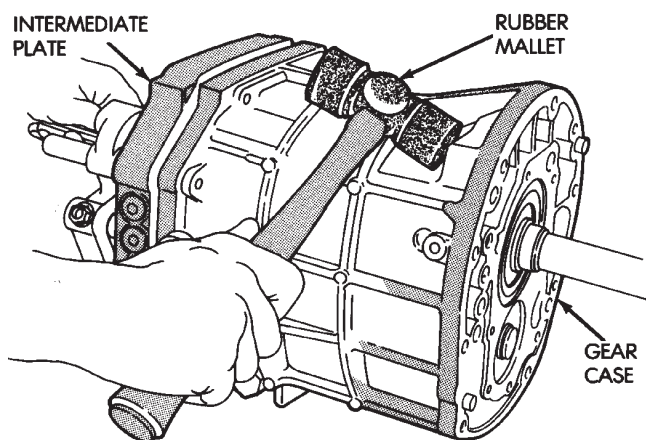
- (15) Remove adapter/extension housing bolts.
- (16) Loosen adapter/extension housing by tapping it loose with plastic mallet (Fig. 26).
- (17) Remove adapter/extension housing (Fig. 27).

**Fig. 26 Loosen Adapter/Extension Housing****Fig. 27 Remove Adapter/Extension Housing—Typical**

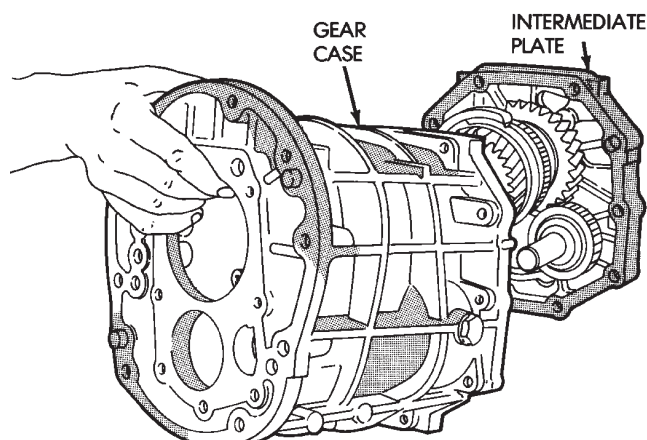
- (18) On 4x2 transmissions;
 - (a) Remove speedometer gear retaining snap-ring from output shaft.
 - (b) Remove speedometer gear from output shaft and remove speedometer gear lock ball from output shaft.
 - (c) Remove speedometer drive gear locating snap-ring (Fig. 28).
- (19) Remove the bolts holding the front bearing retainer to the transmission case.
- (20) Remove the bearing retainer from transmission case (Fig. 29).
- (21) Remove input shaft bearing snap-ring (Fig. 30).
- (22) Remove countershaft front bearing snap-ring.
- (23) Separate intermediate plate and transmission case by tapping them loose with plastic mallet (Fig. 31).
- (24) Separate the intermediate plate from the transmission case (Fig. 32).

**Fig. 28 Speedometer Drive Gear Assembly****Fig. 29 Remove Front Bearing Retainer****Fig. 30 Remove Input Shaft Bearing Snap-ring****ASSEMBLY**

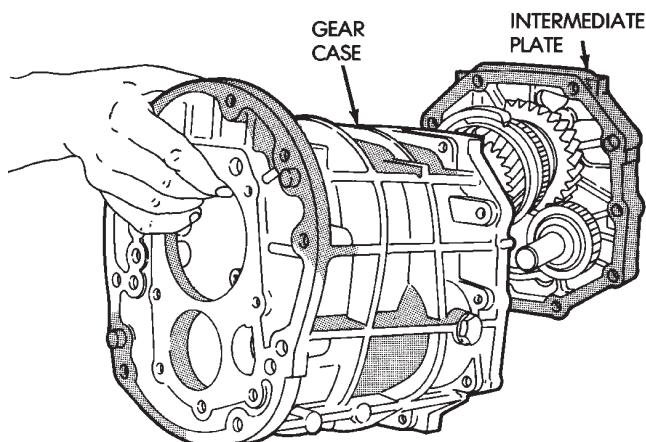
- (1) Remove any residual sealer from transmission case, intermediate plate, and adapter/extension housing.
- (2) Apply a 1/8 to 3/16 inch wide bead of Threebond® Liquid Gasket TB1281, P/N 83504038, as shown, making sure to keep sealer bead to inside of bolt holes (Fig. 33).

DISASSEMBLY AND ASSEMBLY (Continued)

J8921-1050

Fig. 31 Separate Intermediate Plate and Transmission Case

J8921-1051

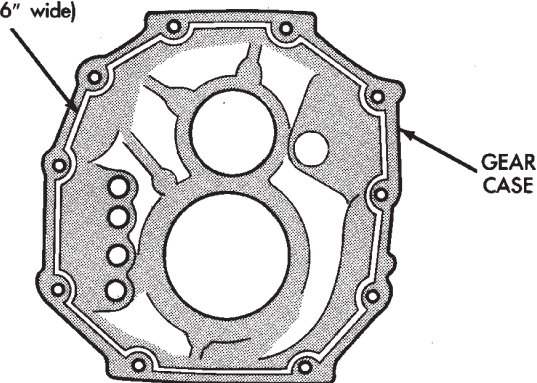
Fig. 34 Install Transmission Gear Case to the Intermediate Plate

J8921-1051

Fig. 32 Remove Intermediate Plate from Transmission Case

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

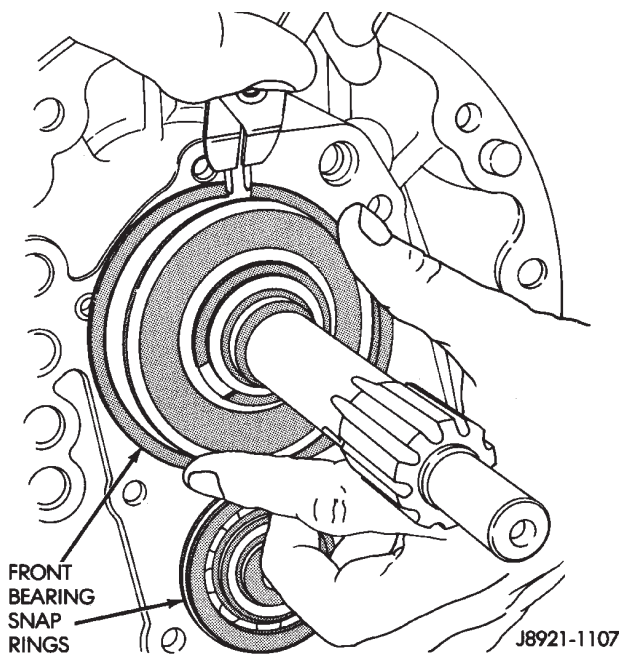
SEALER BEAD
(1/8" - 3/16" wide)



J8921-1118

Fig. 33 Apply Sealer to Transmission Gear Case

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



J8921-1107

Fig. 35 Install Front Bearing Snap-rings

DISASSEMBLY AND ASSEMBLY (Continued)

(5) Install front bearing retainer gasket to front bearing retainer.

(6) Install the front bearing retainer (Fig. 36) and tighten bolts to 17 N·m (12 ft. lbs.).

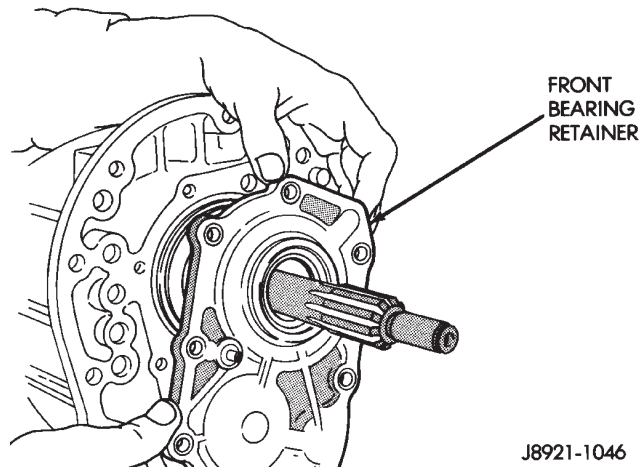


Fig. 36 Install Front Bearing Retainer

(7) On 4x2 transmissions;

(a) Install speedometer drive gear locating snap-ring (Fig. 37).

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

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

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

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

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

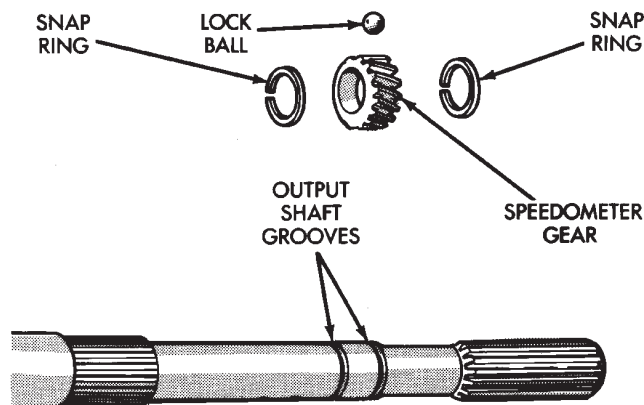


Fig. 37 Speedometer Drive Gear Assembly

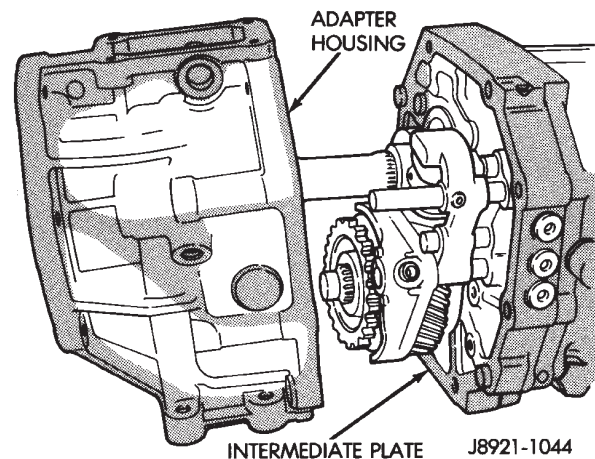


Fig. 38 Install Adapter/Extension Housing—Typical

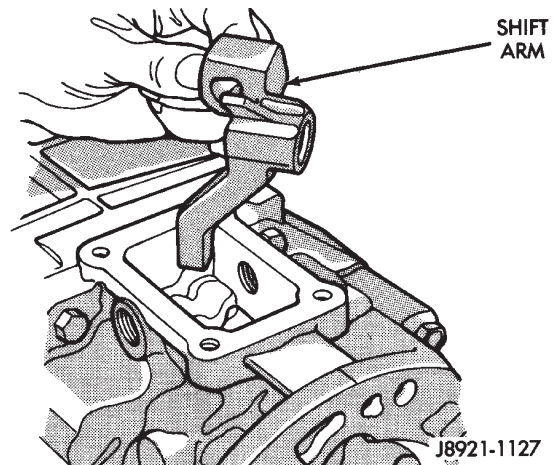


Fig. 39 Position Shift Arm in Adapter or Extension Housing

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

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

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

DISASSEMBLY AND ASSEMBLY (Continued)

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

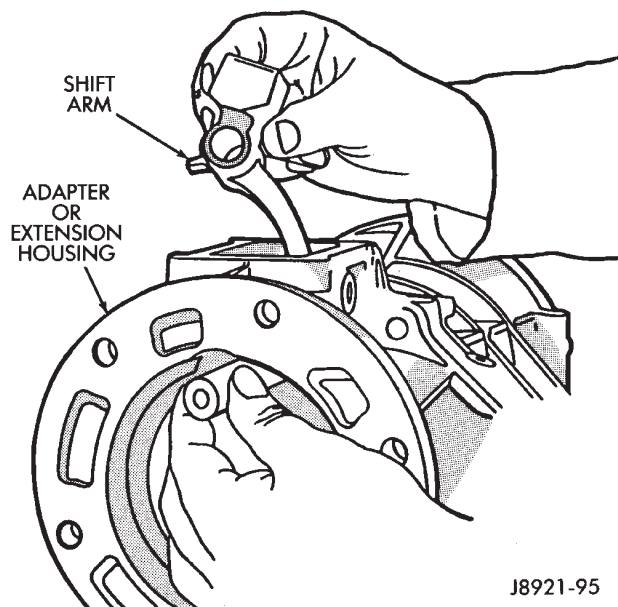


Fig. 40 Install Shifter Arm Shaft

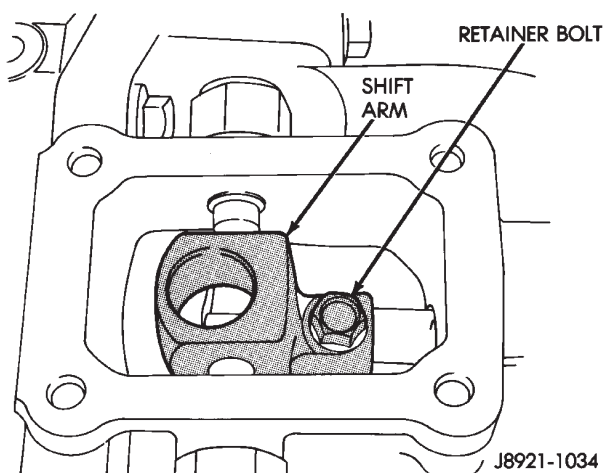


Fig. 41 Install Shift Arm Retainer Bolt

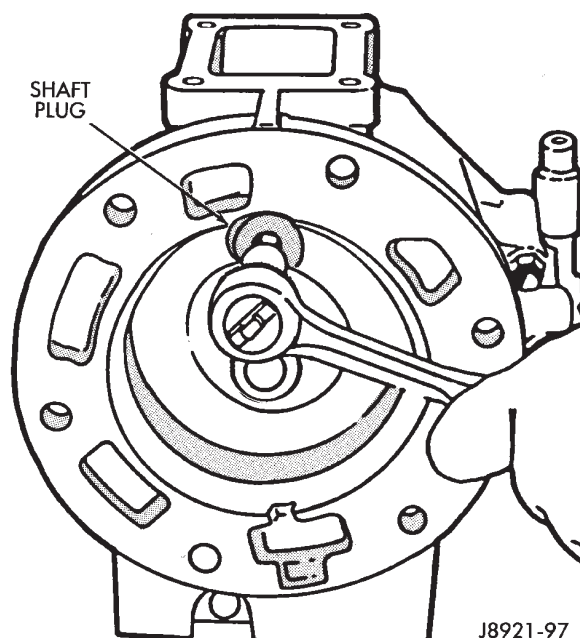


Fig. 42 Shifter Arm Shaft Plug Installation

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

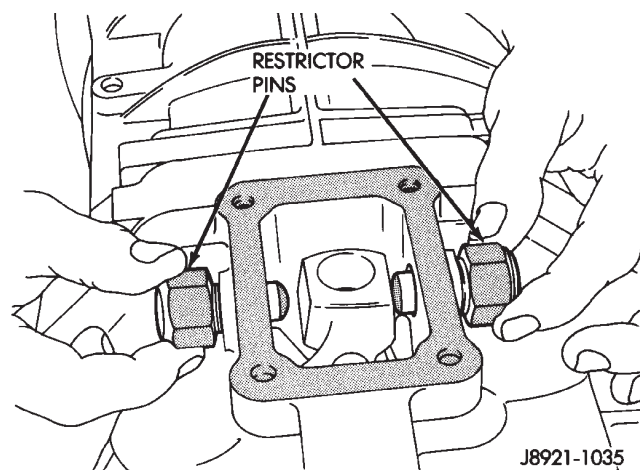


Fig. 43 Install Shifter Restrictor Pins

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

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

DISASSEMBLY AND ASSEMBLY (Continued)

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

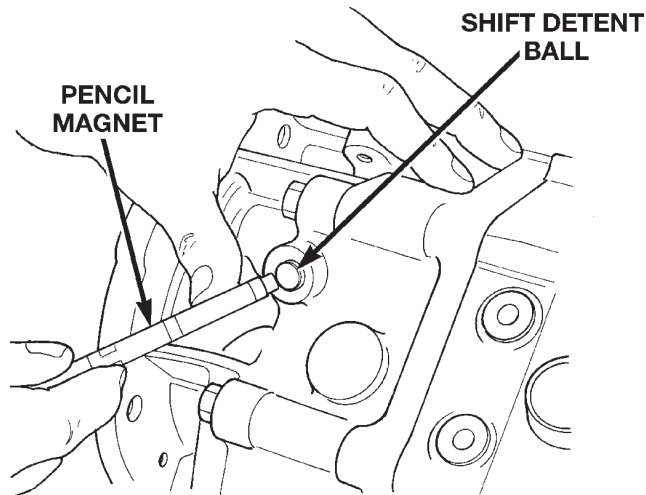
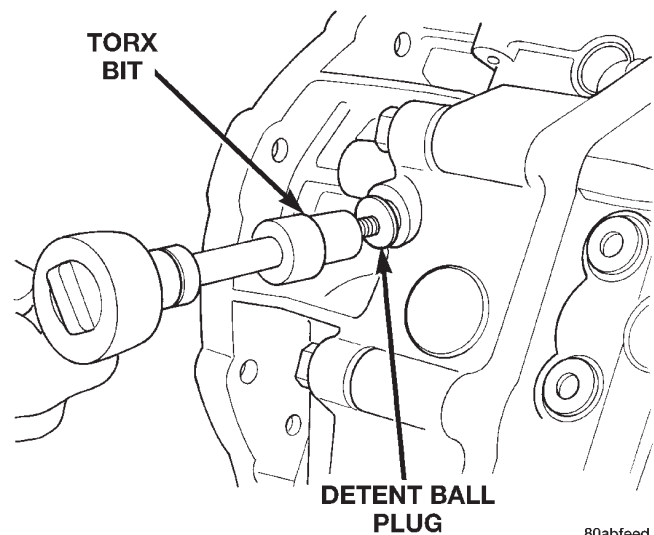


Fig. 44 Install Detent Ball

80abfeef



80abfeed

Fig. 46 Install Detent Ball Plug

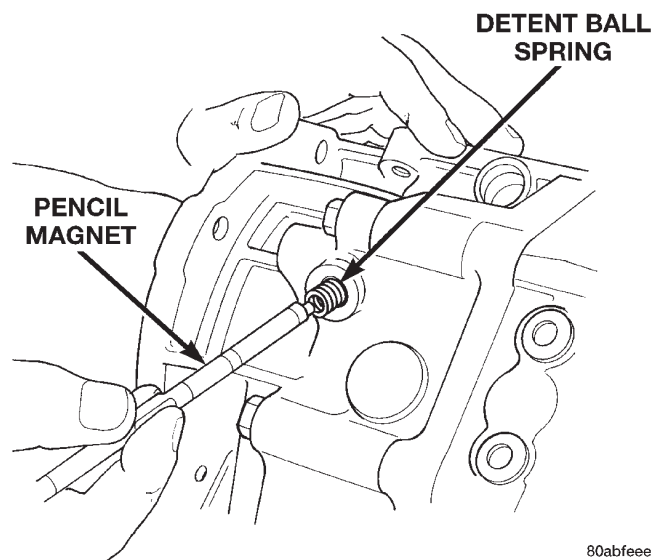
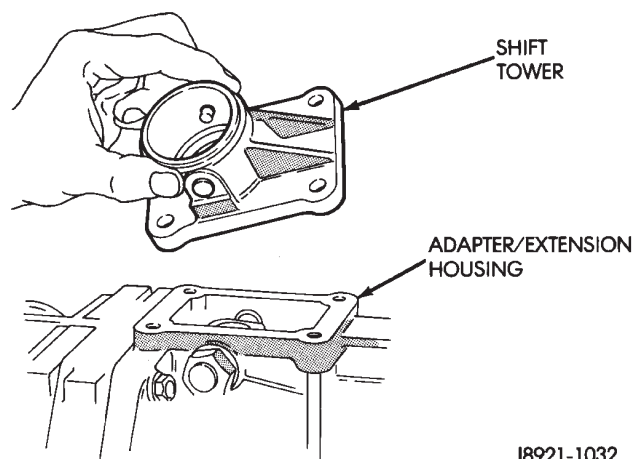


Fig. 45 Install Detent Spring

80abfeee



J8921-1032

Fig. 47 Install Shift Tower

(19) Install shift tower gasket onto shift tower.

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

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

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

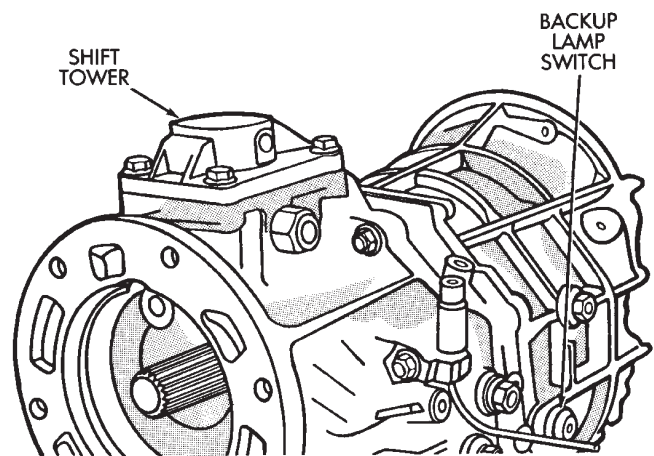
(23) Install new metal o-ring onto the backup lamp switch.

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

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

(26) Install vehicle speed sensor, if necessary.

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

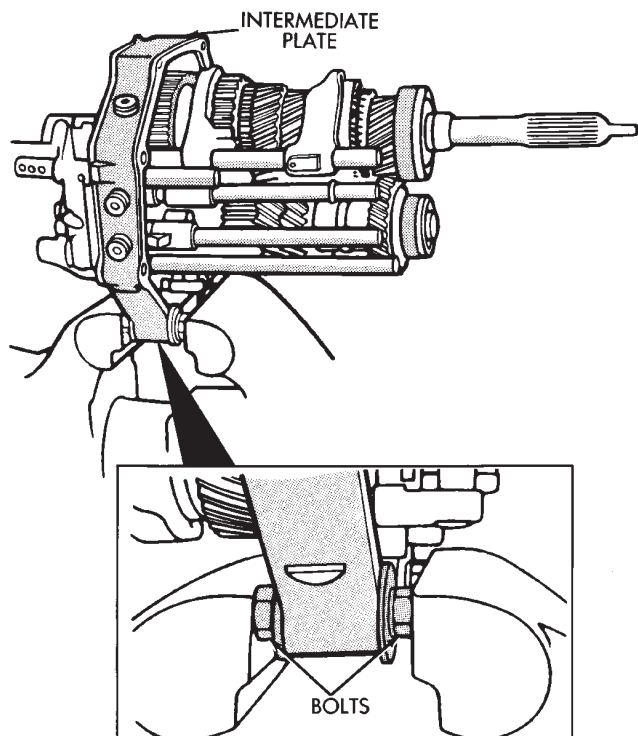


J8921-100

Fig. 48 Install Backup Lamp Switch

DISASSEMBLY AND ASSEMBLY (Continued)**SHIFT MECHANISM AND GEARTRAIN****DISASSEMBLY**

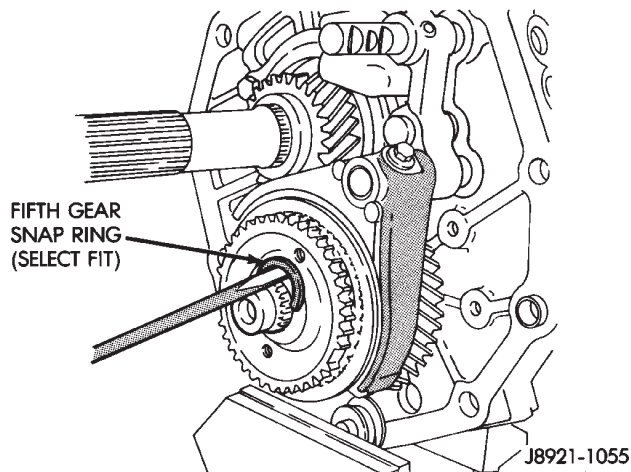
(1) Install suitable bolts and washers in intermediate plate (Fig. 49). Then clamp plate and gear assembly in vise. Use enough washers to prevent bolts from touching. Also be sure vise jaws are clamped on bolt heads.



J8921-15

Fig. 49 Positioning Intermediate Plate In Vise

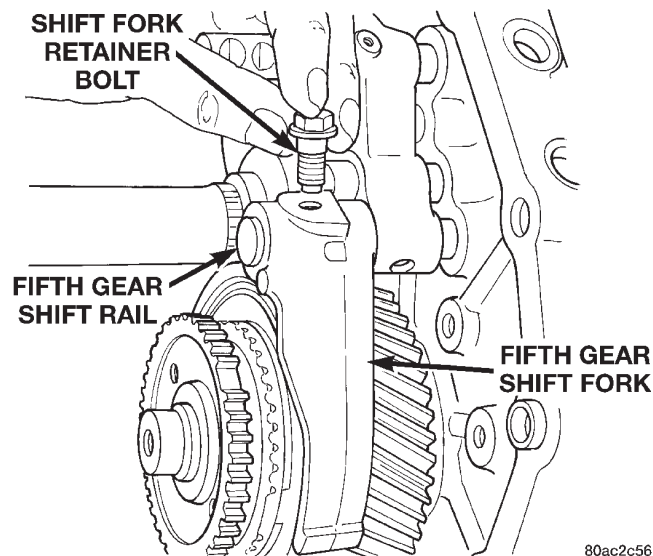
(2) Remove countershaft fifth gear retaining snap-ring (Fig. 50).



J8921-1055

Fig. 50 Remove Fifth Gear Snap-ring

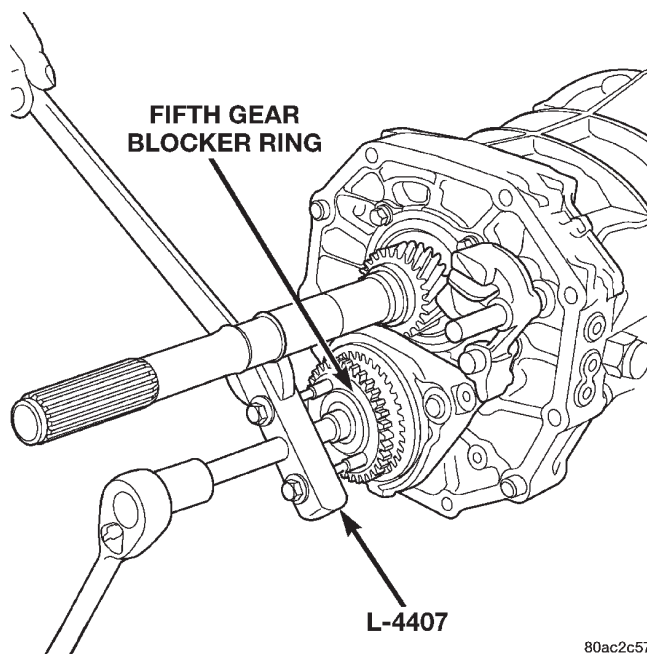
(3) Remove bolt holding fifth gear shift fork to shift rail (Fig. 51).



80ac2c56

Fig. 51 Remove Shift Fork Retainer Bolt

(4) Remove fifth gear blocker ring from countershaft assembly with Puller L-4407 (Fig. 52).

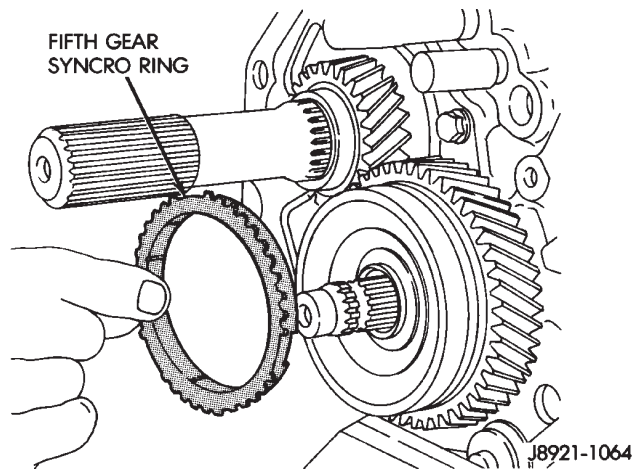
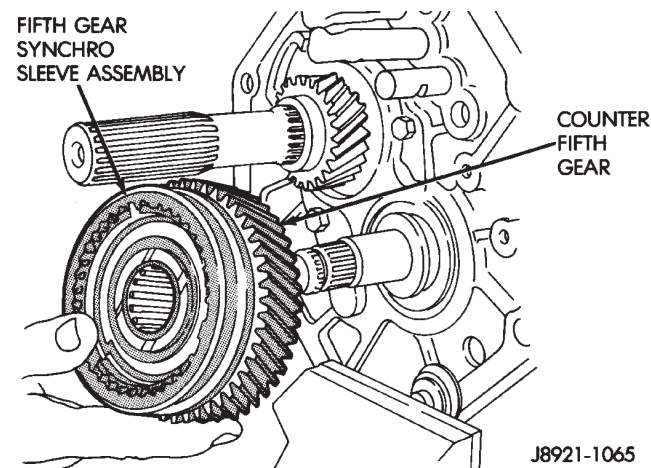


80ac2c57

Fig. 52 Remove Fifth Gear Blocker Ring

DISASSEMBLY AND ASSEMBLY (Continued)

- (5) Remove fifth gear synchro ring (Fig. 53).
- (6) Remove the countershaft fifth gear assembly from countershaft (Fig. 54).

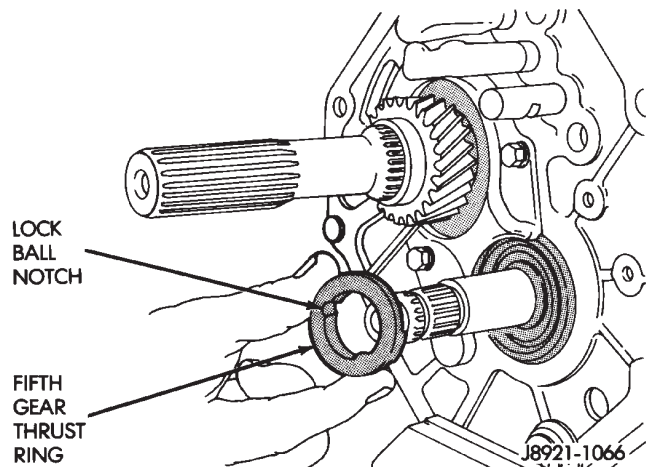
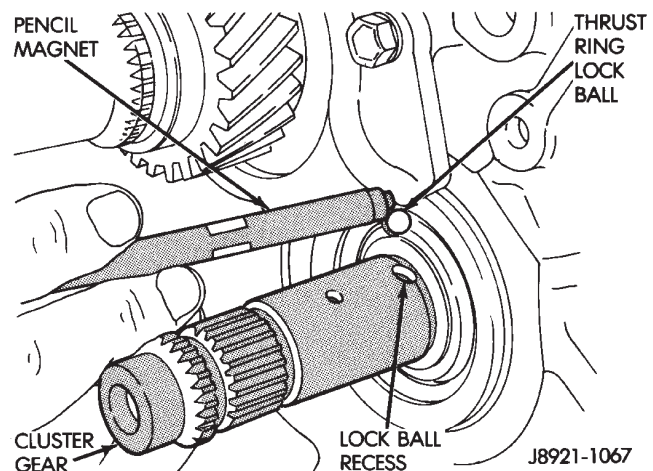
**Fig. 53 Remove Fifth Gear Synchro Ring****Fig. 54 Remove Fifth Gear and Synchro Assembly**

- (7) Remove fifth gear thrust ring from countershaft (Fig. 55).
- (8) Remove fifth gear thrust ring lock ball from countershaft (Fig. 56).

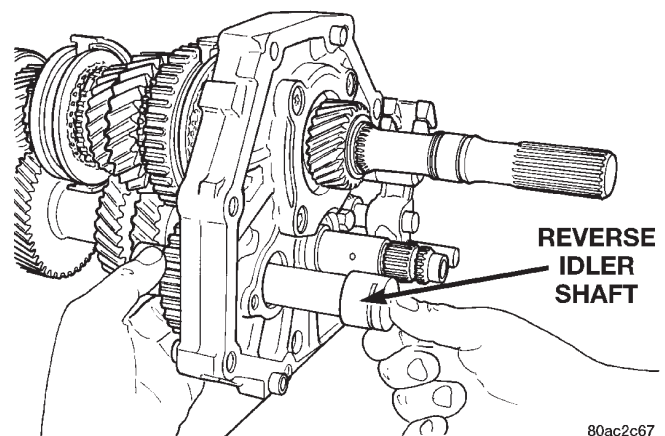
NOTE: There are many lock balls, check balls, interlock balls, and interlock pins used in various places in the transmission. Whenever a pin or ball is removed, it should be identified in such a way that it can be reinstalled in the same location from which it was removed.

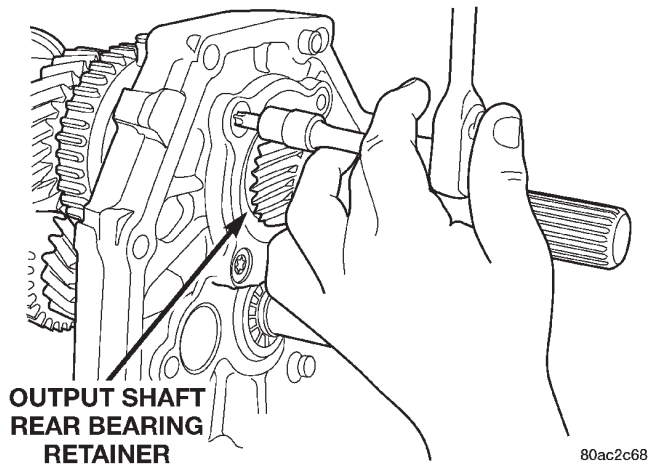
- (9) Remove bolt holding reverse idler gear shaft lock plate to the intermediate plate.
- (10) Remove reverse idler gear shaft and reverse idler gear assembly (Fig. 57).

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

**Fig. 55 Remove Fifth Gear Thrust Ring****Fig. 56 Remove Fifth Gear Thrust Ring Lock Ball**

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

**Fig. 57 Remove Reverse Idler Shaft**

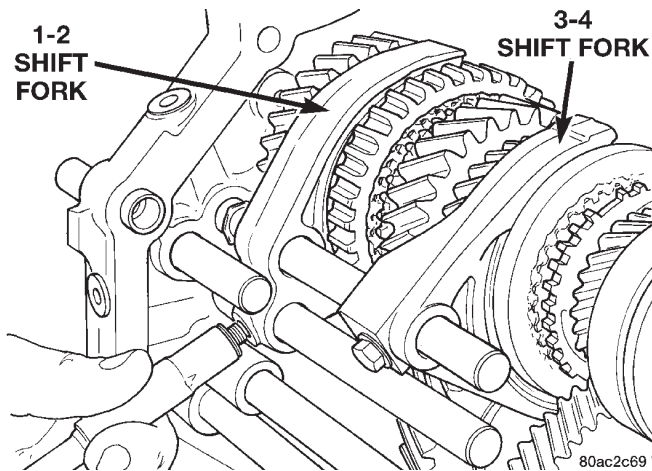
DISASSEMBLY AND ASSEMBLY (Continued)

80ac2c68

Fig. 58 Remove Output Shaft Rear Bearing Retainer

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

(13) Remove bolts holding reverse shift arm bracket to intermediate plate (Fig. 60).



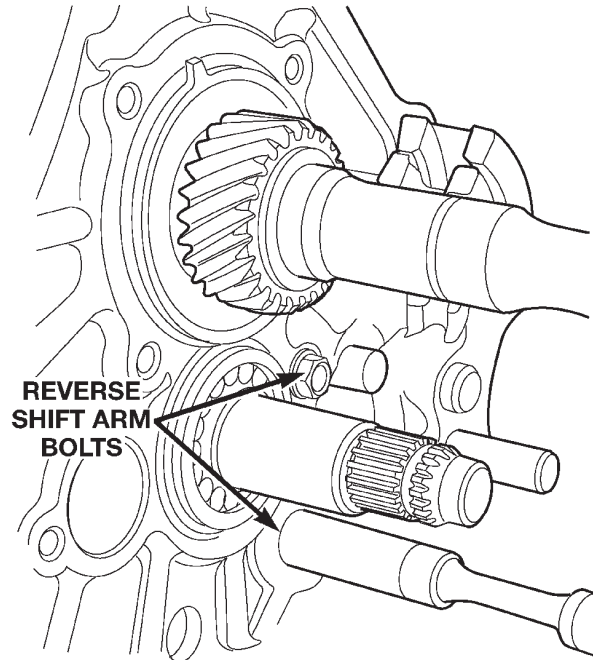
80ac2c69

Fig. 59 Remove Shift Fork To Shift Rail Bolts

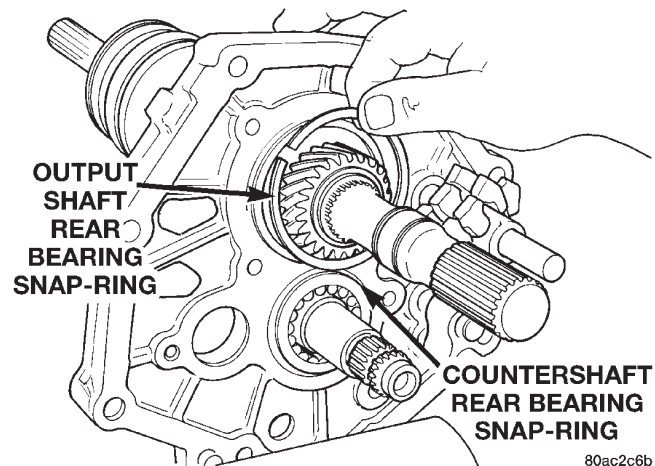
(14) Remove snap-ring holding output shaft rear bearing into the intermediate plate (Fig. 61).

(15) Remove countershaft rear bearing snap-ring.

(16) With aid of an assistant, support the mainshaft and countershaft. Tap on the rear of the mainshaft and countershaft with a suitable plastic mallet. This will release the countershaft from the countershaft rear bearing and the mainshaft rear bearing from the intermediate plate. The countershaft will release from the countershaft bearing first and can be removed by moving the countershaft rearward and downward (Fig. 62).



80ac2c6a

Fig. 60 Remove Reverse Shift Arm Bracket Bolts

80ac2c6b

Fig. 61 Remove Output Shaft Rear Bearing Snap-ring

DISASSEMBLY AND ASSEMBLY (Continued)

(17) Remove the mainshaft by moving the mainshaft forward until the mainshaft rear bearing is clear of the intermediate plate and then rotating the mainshaft downward out of the shift forks (Fig. 63).

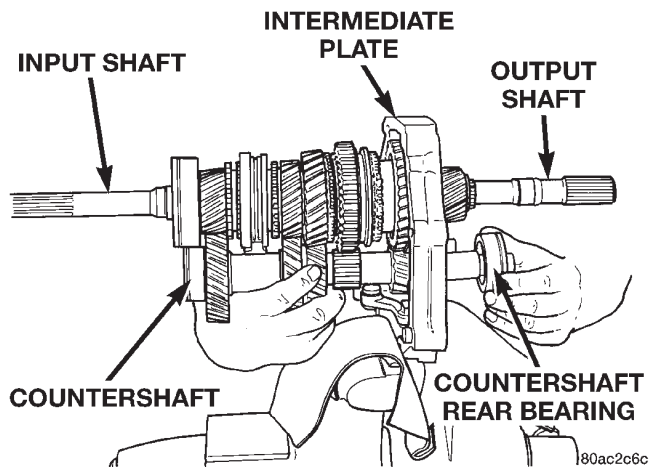


Fig. 62 Remove Countershaft and Countershaft Rear Bearing

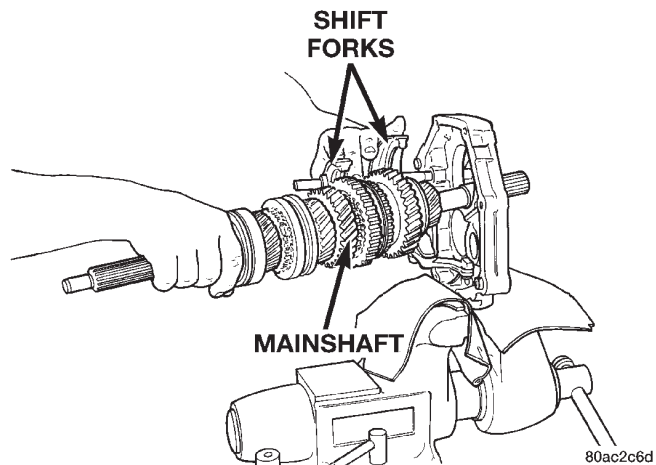


Fig. 63 Remove Mainshaft

(18) Remove the 3-4 shift fork from the 3-4 shift rail (Fig. 64).

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

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

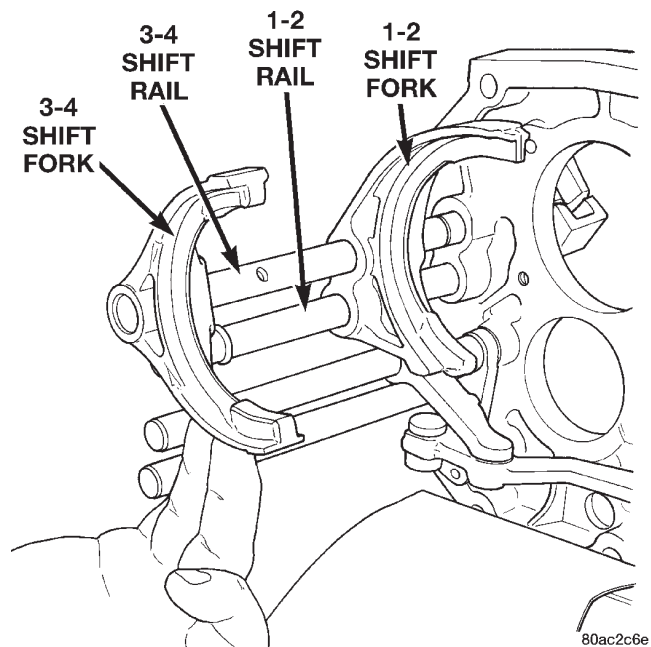


Fig. 64 Remove 3-4 Shift Fork

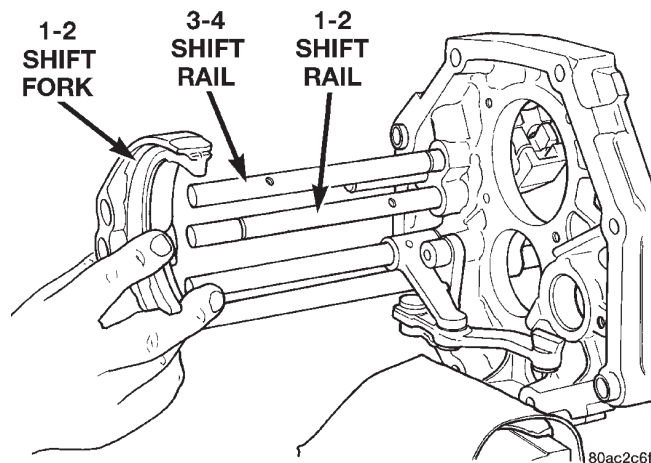
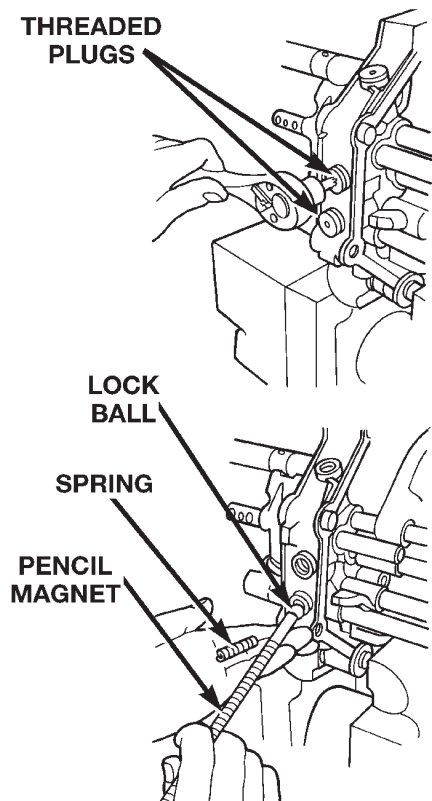


Fig. 65 Remove 1-2 Shift Fork

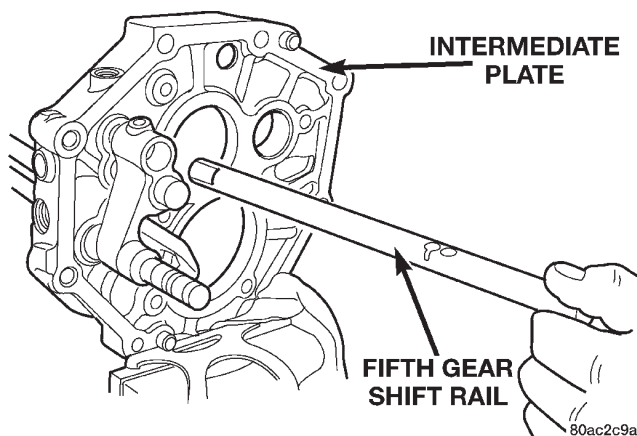
(21) Remove threaded plugs from intermediate plate. Then remove lock ball and spring from plug holes with pencil magnet (Fig. 66). Note that the bottom spring is shorter in length than the other two springs.

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

DISASSEMBLY AND ASSEMBLY (Continued)**Fig. 66 Remove Lock Ball And Spring**

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

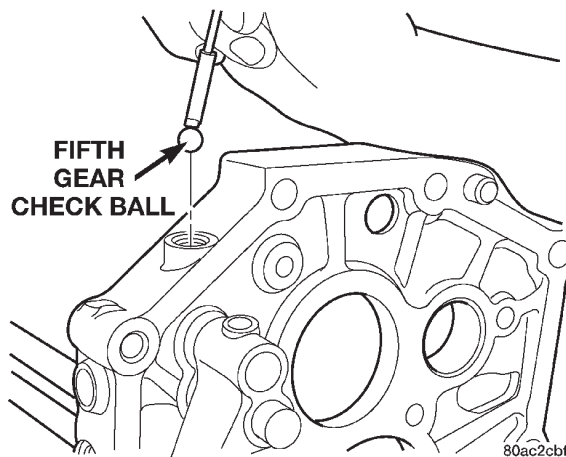
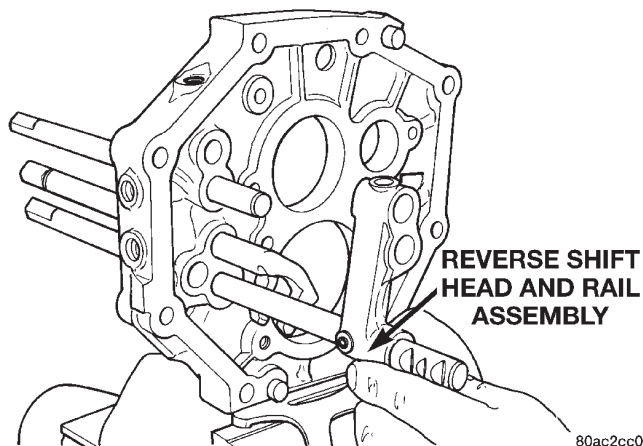
(23) Remove fifth gear shift rail (Fig. 67).

**Fig. 67 Remove Fifth Gear Shift Rail**

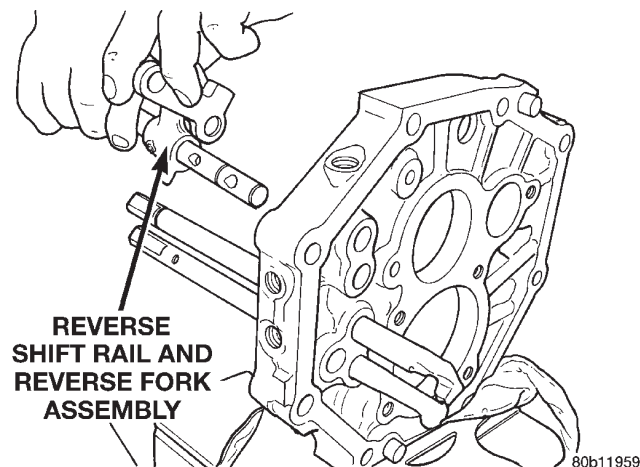
(24) Remove fifth gear check ball (Fig. 68) and interlock pin.

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

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

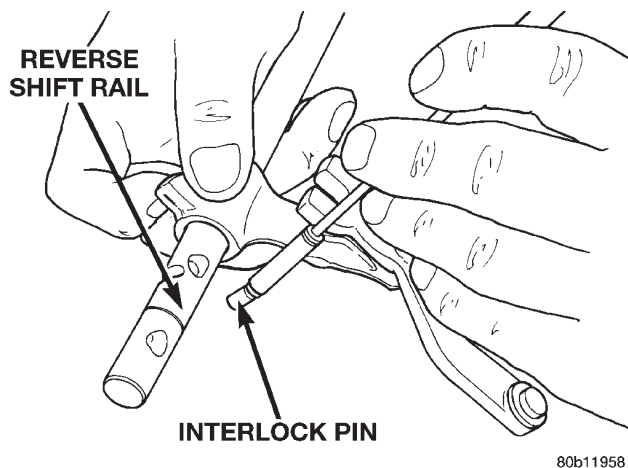
**Fig. 68 Remove Fifth Gear Check Ball****Fig. 69 Remove Reverse Shift Head And Rail Assembly**

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

**Fig. 70 Remove Reverse Shift Rail**

DISASSEMBLY AND ASSEMBLY (Continued)

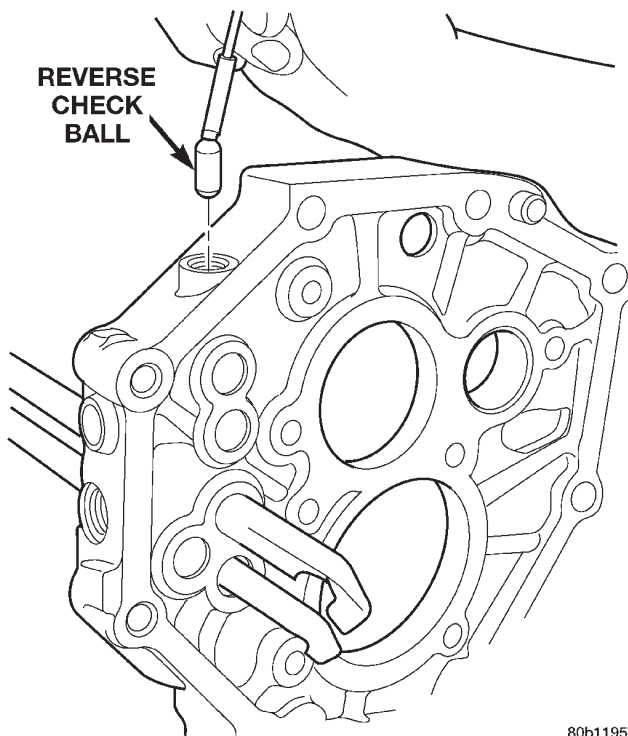
(28) Remove interlock pin from reverse shift rail (Fig. 71).



80b11958

Fig. 71 Remove Interlock Pin From Reverse Shift Rail

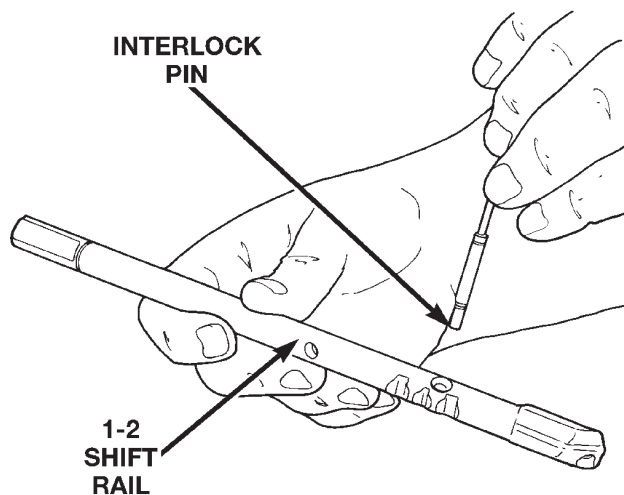
(29) Remove reverse elongated check ball (Fig. 72).



80b11957

Fig. 72 Remove Reverse Check Ball

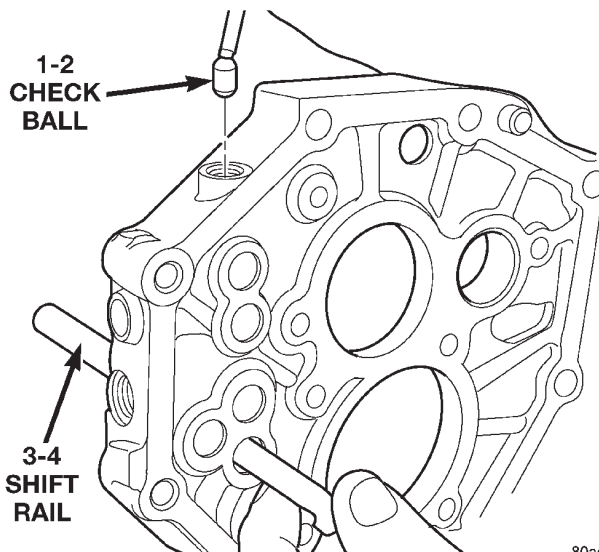
(30) Remove snap-ring on 3-4 shift rail.
 (31) Remove 1-2 shift rail from intermediate plate.
 (32) Remove interlock pin from 1-2 shift rail (Fig. 73).



80ac6997

Fig. 73 Remove 1-2 Shift Rail Interlock Pin

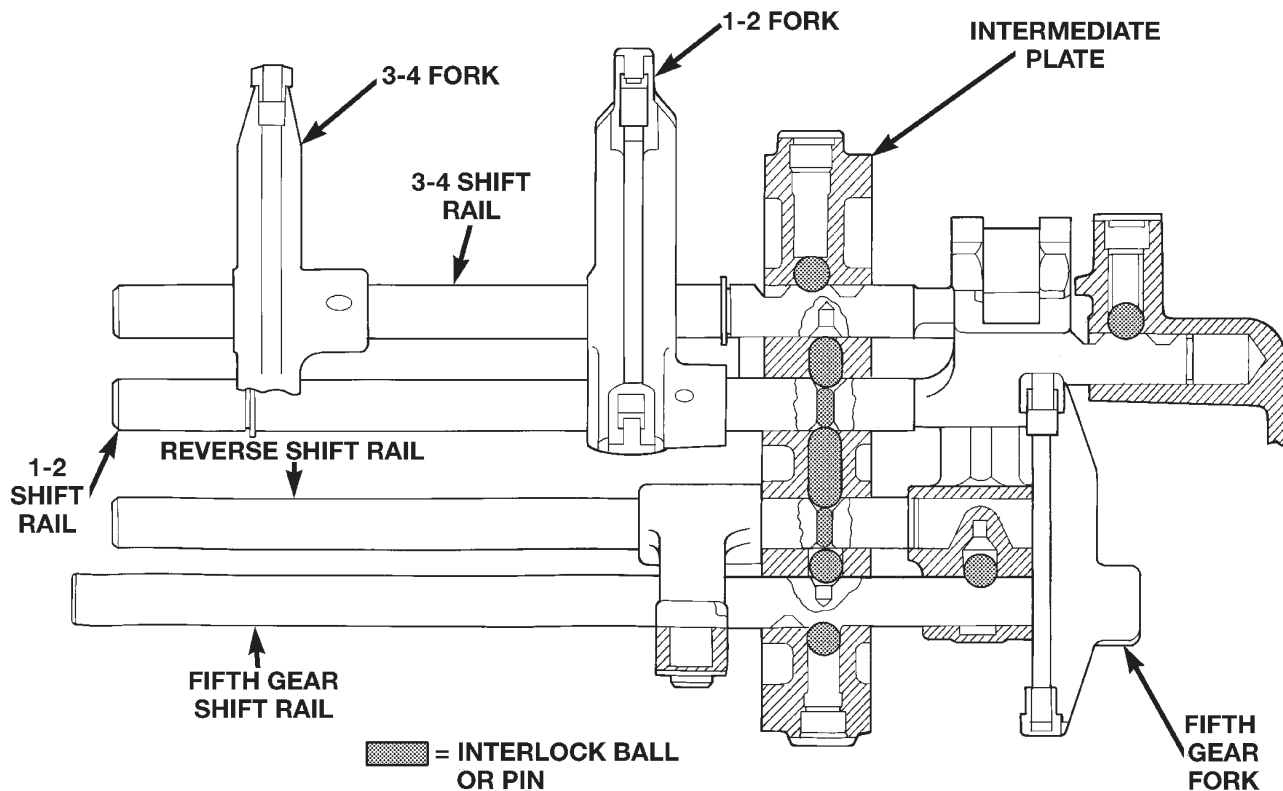
(33) Remove 1-2 shift rail elongated check ball from intermediate plate (Fig. 74).
 (34) Remove 3-4 shift rail from intermediate plate.



80ac6998

Fig. 74 Remove 1-2 Check Ball

DISASSEMBLY AND ASSEMBLY (Continued)



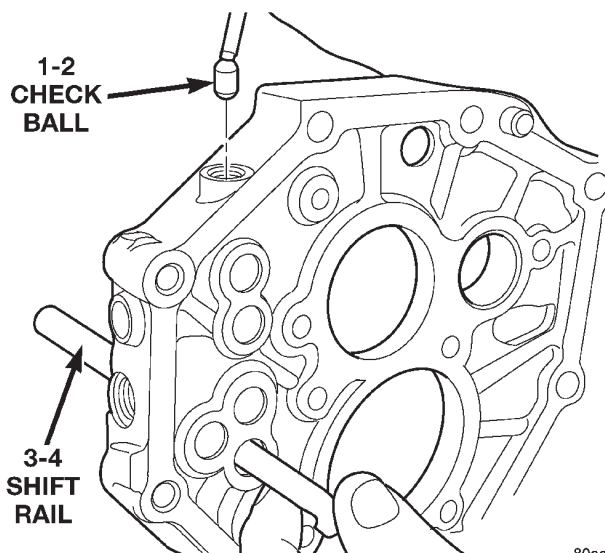
80b11956

Fig. 75 Shift Rail Components

ASSEMBLY

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

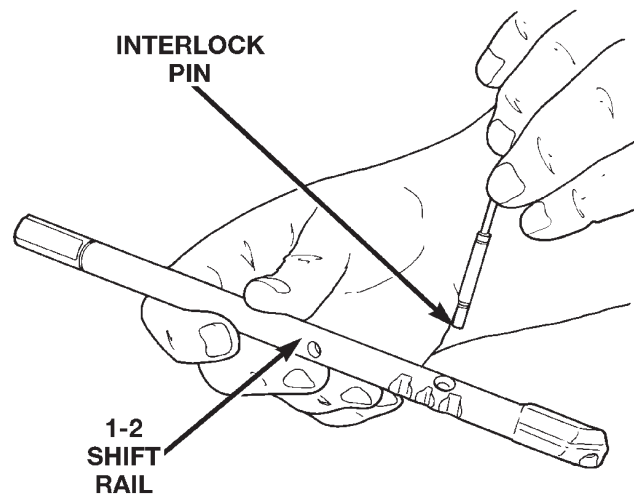
- (1) Install the 3-4 shift rail into the intermediate plate.
- (2) Install the 1-2 elongated check ball into the intermediate plate (Fig. 76).



80ac6998

Fig. 76 Install 1-2 Check Ball

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

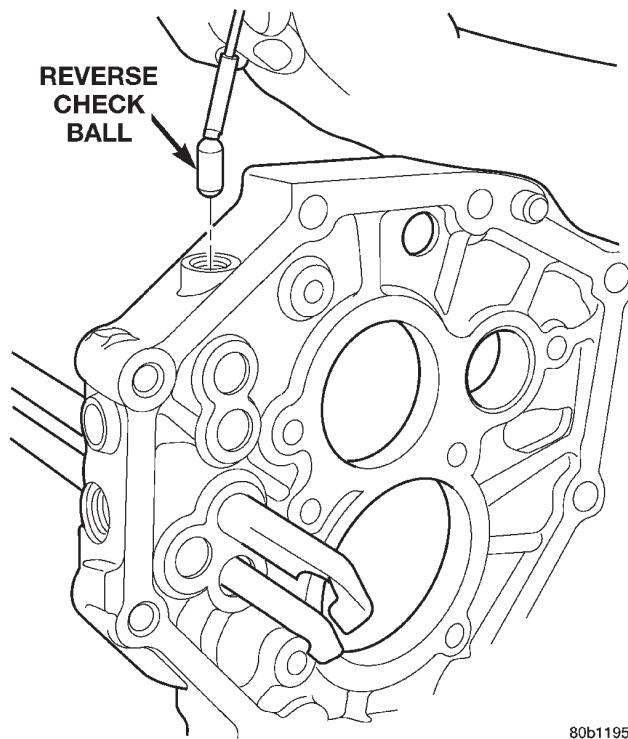


80ac6997

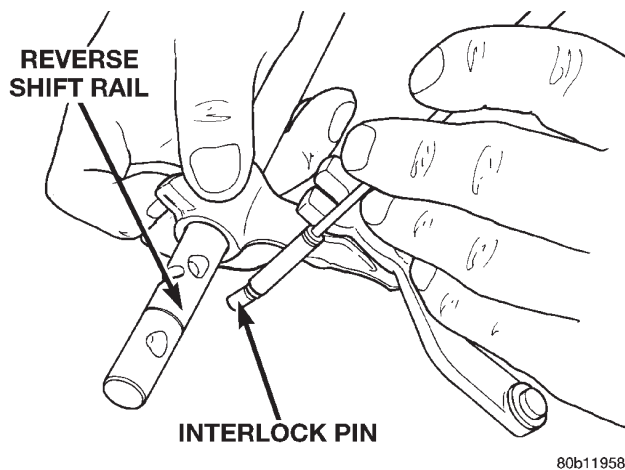
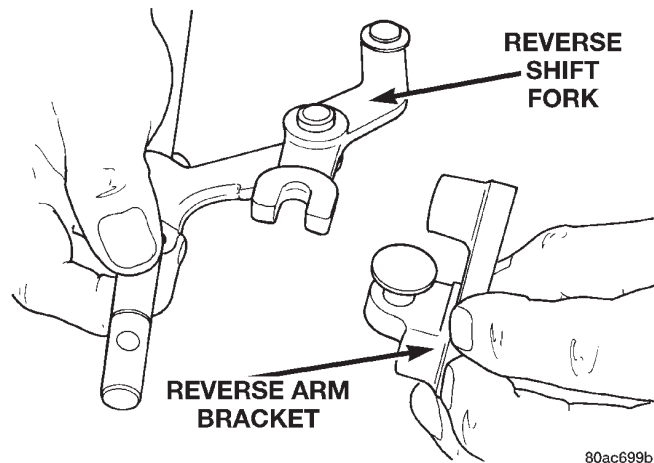
Fig. 77 Install 1-2 Shift Rail Interlock Pin

DISASSEMBLY AND ASSEMBLY (Continued)

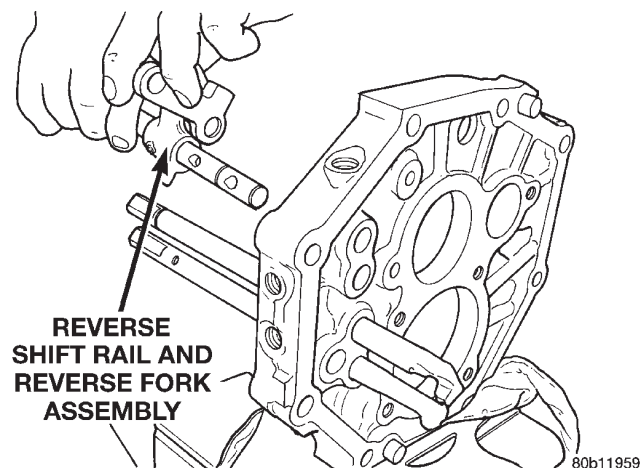
- (5) Install snap-ring onto 3-4 shift rail.
 (6) Install the reverse check ball into the intermediate plate (Fig. 78).

**Fig. 78 Install Reverse Check Ball**

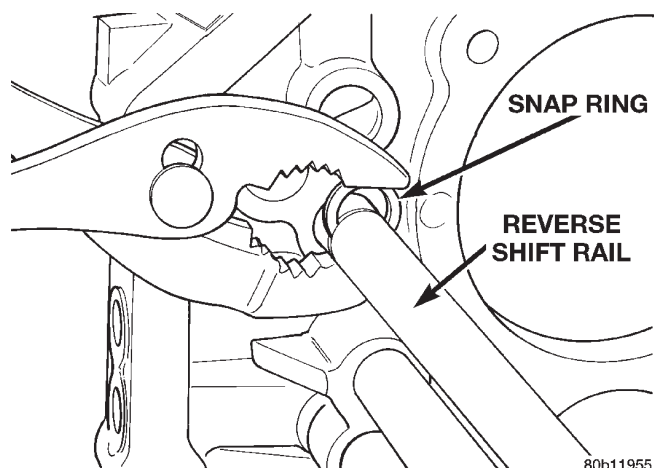
- (7) Install the interlock pin into the reverse shift rail (Fig. 79).
 (8) Assemble the reverse arm bracket to the reverse fork (Fig. 80).

**Fig. 79 Install Reverse Interlock Pin****Fig. 80 Install Reverse Arm Bracket to Fork**

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

**Fig. 81 Install Reverse Shift Rail**

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

**Fig. 82 Install Reverse Snap-ring**

DISASSEMBLY AND ASSEMBLY (Continued)

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

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

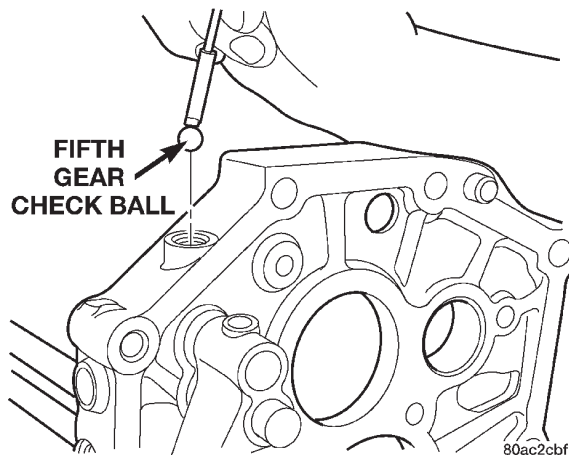


Fig. 83 Install Fifth Gear Check Ball

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

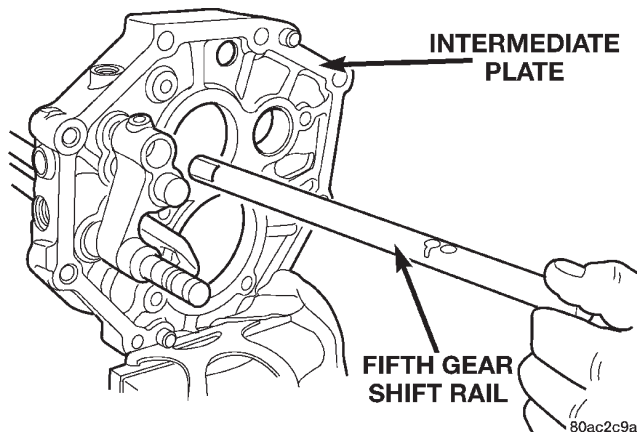


Fig. 84 Install Fifth Gear Shift Rail

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

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

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

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

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

(19) Install the snap-ring onto the 1-2 shift rail.

(20) Install the 3-4 shift fork onto the 3-4 shift rail (Fig. 86).

(21) Install mainshaft into the intermediate plate by guiding the output shaft through opening in intermediate plate until the shift forks are aligned with

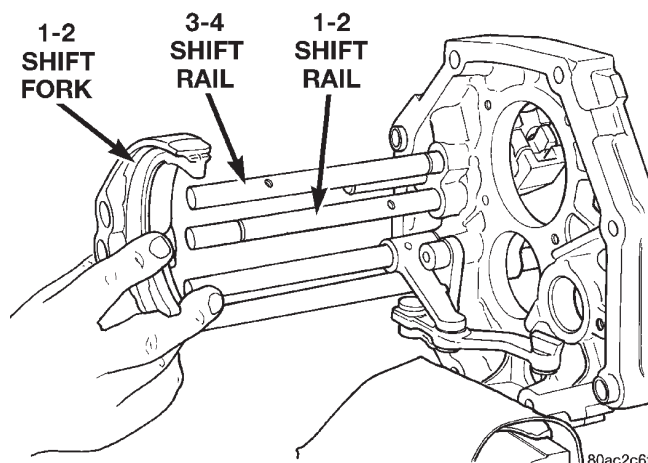


Fig. 85 Install 1-2 Shift Fork

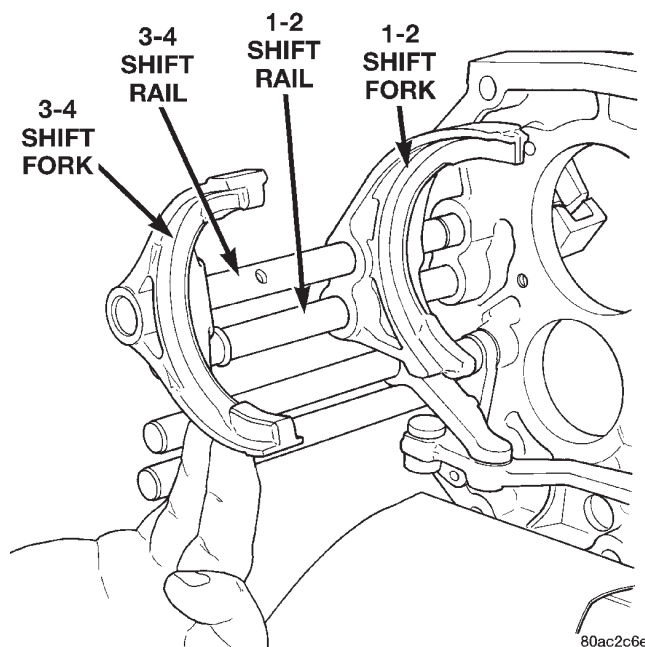


Fig. 86 Install 3-4 Shift Fork

the appropriate synchronizer sleeves. The mainshaft rear bearing will be started in the intermediate plate but not fully driven in at this point.

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

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

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

DISASSEMBLY AND ASSEMBLY (Continued)

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

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

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

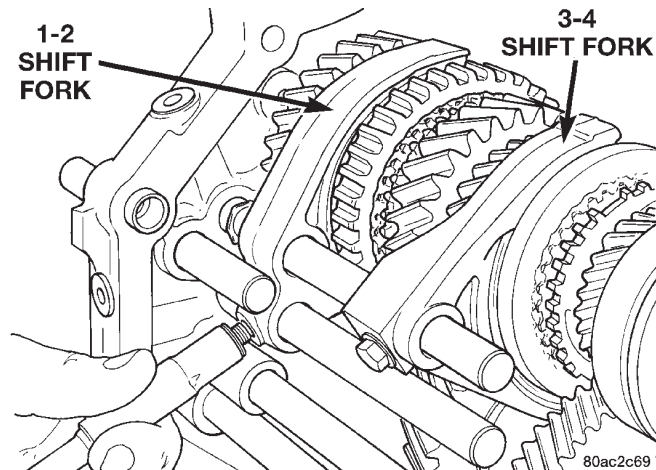


Fig. 87 Install Shift Fork Bolts

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

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

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

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

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

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

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

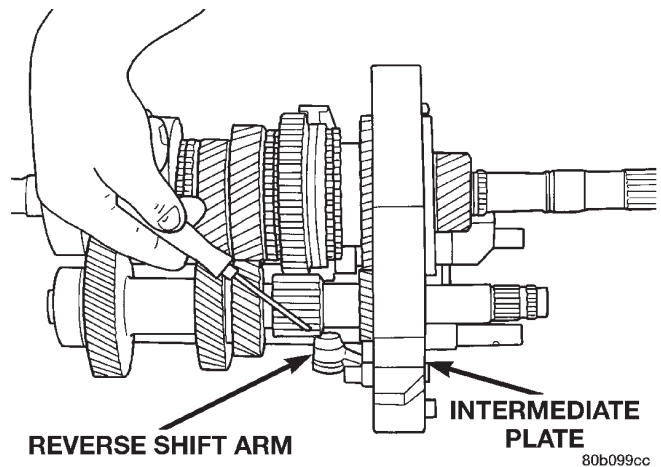


Fig. 88 Reverse Shift Arm Position

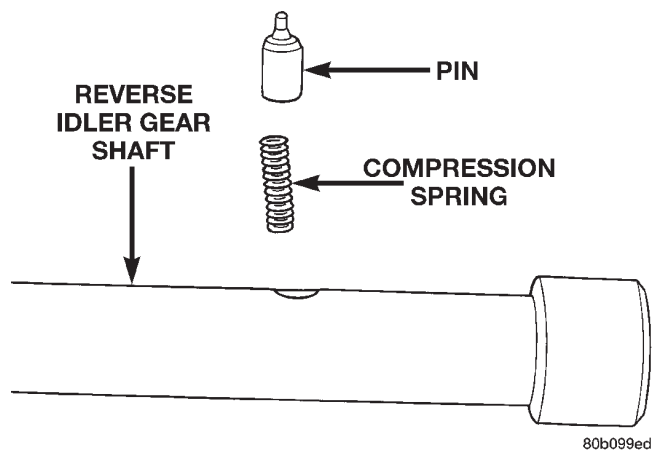


Fig. 89 Install Compression Spring And Pin

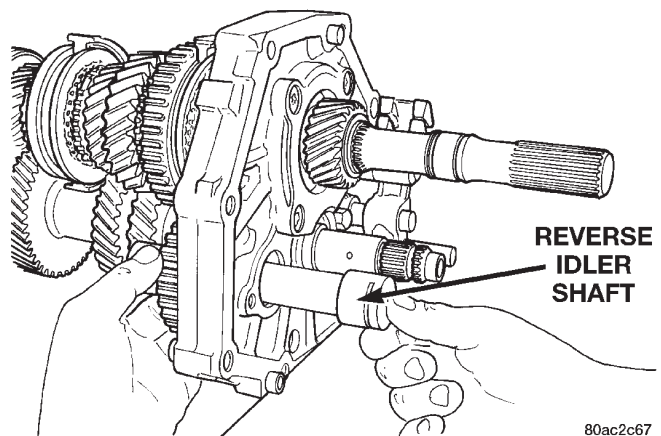


Fig. 90 Install Reverse Idler Shaft

DISASSEMBLY AND ASSEMBLY (Continued)

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

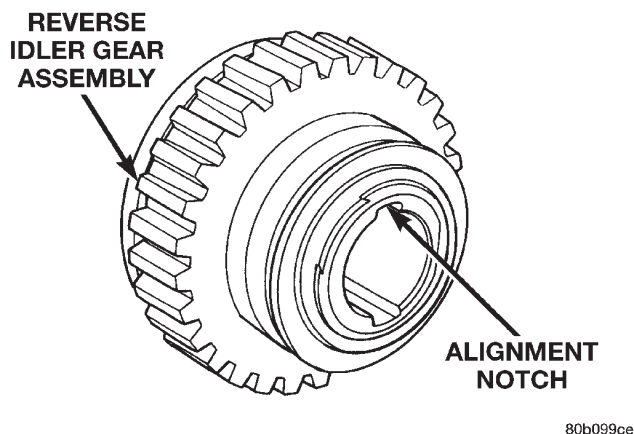


Fig. 91 Align Idler Shaft Pin

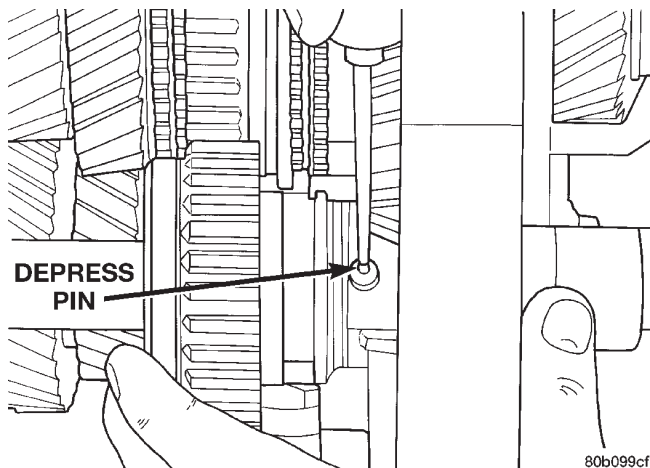


Fig. 92 Depress Pin In Reverse Idler Gear Shaft

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

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

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

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

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

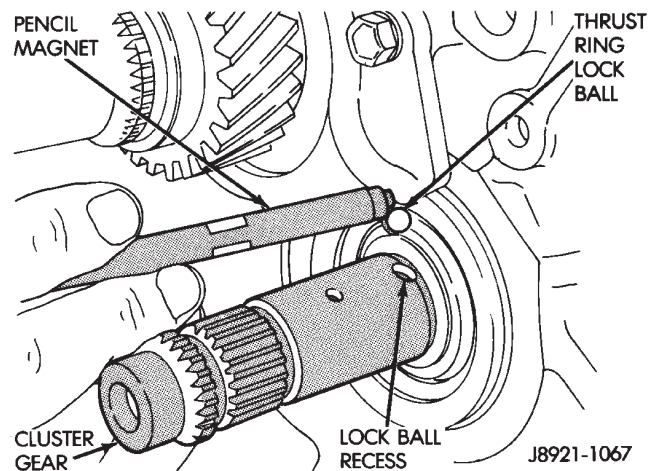


Fig. 93 Install Fifth Gear Thrust Ring Lock Ball

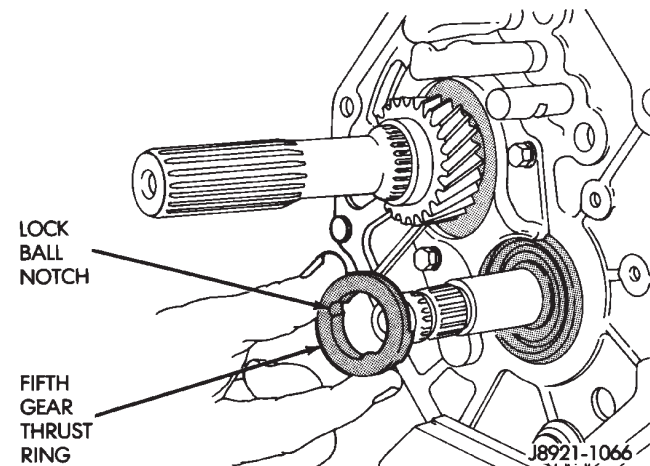


Fig. 94 Install Fifth Gear Thrust Ring

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

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

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

(44) Install the fifth gear synchro ring.

DISASSEMBLY AND ASSEMBLY (Continued)

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

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

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

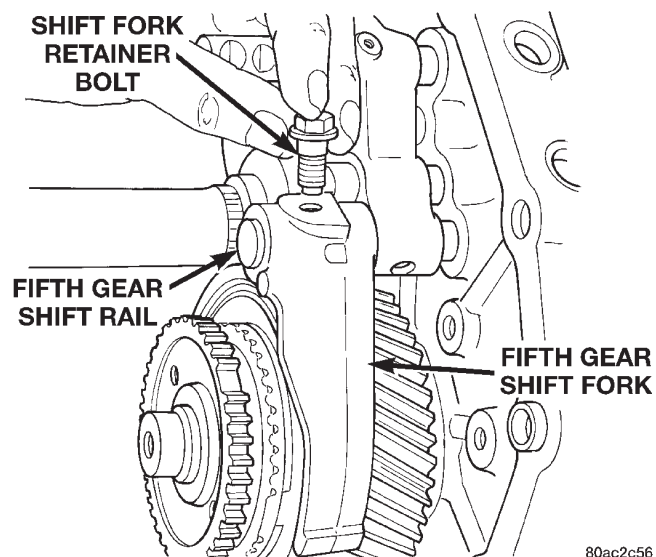


Fig. 95 Install Fifth Gear Retainer Bolt

(48) Measure countershaft fifth gear thrust clearance.

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

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

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

COUNTERSHAFT**DISASSEMBLY**

(1) Remove select fit snap-ring holding the countershaft front bearing onto the countershaft (Fig. 96).

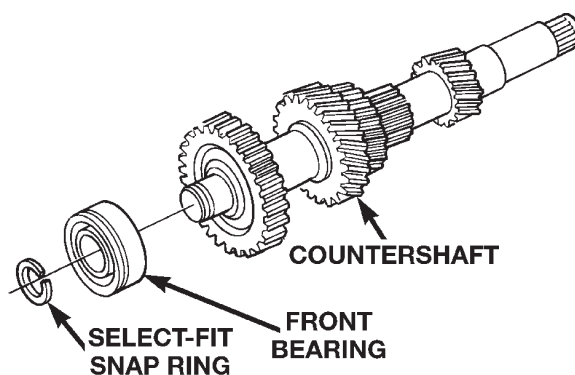
(2) Using Bearing Splitter P-334, a suitable spacer on center of countershaft, and a shop press, remove the countershaft front bearing from the countershaft.

ASSEMBLY

(1) Remove any nicks or burrs on countershaft hub with fine emery or crocus cloth.

(2) Position countershaft front bearing on end of countershaft.

(3) Using Special Tool 8109 and a shop press, press bearing onto countershaft.



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

80ac6a0a

Fig. 96 Countershaft Front Bearing Snap-ring

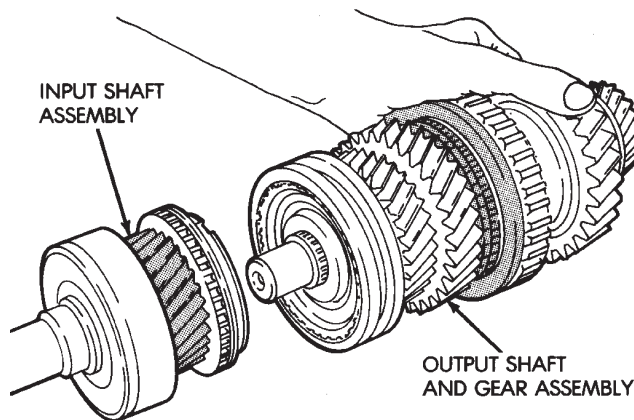
(4) Select the thickest snap-ring that will fit into the snap-ring groove of the countershaft (Fig. 96).

(5) Install snap-ring to hold countershaft front bearing onto countershaft.

INPUT SHAFT**DISASSEMBLY**

(1) Verify that the 3–4 synchronizer is in the neutral position.

(2) Separate input shaft from output shaft (Fig. 97). Note that the output shaft pilot bearing is an uncaged roller type bearing.



J8921-1089

Fig. 97 Separate Input and Output Shafts

DISASSEMBLY AND ASSEMBLY (Continued)

(3) Remove the output shaft pilot bearing rollers from the input shaft and the output shaft.

(4) Remove the fourth gear synchronizer ring from the input shaft (Fig. 98).

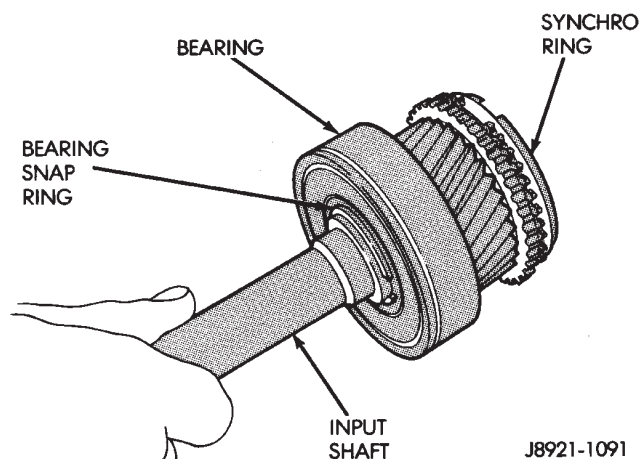


Fig. 98 Input Shaft Components

(5) Remove the select fit snap-ring holding the input shaft bearing onto the input shaft.

(6) Using Bearing Splitter P-334 and a shop press, remove the bearing from the input shaft.

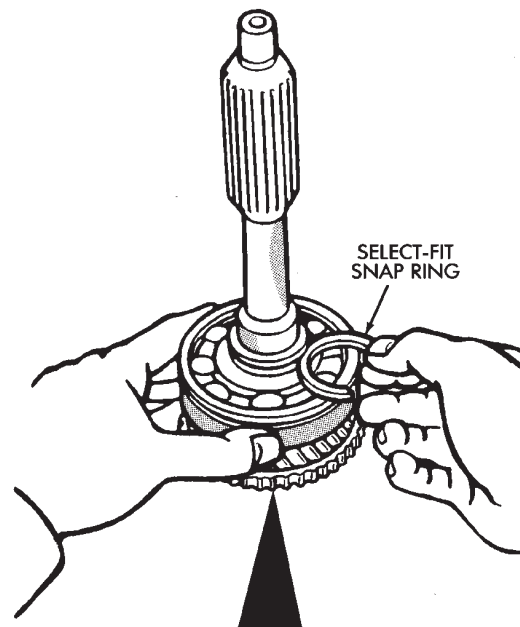
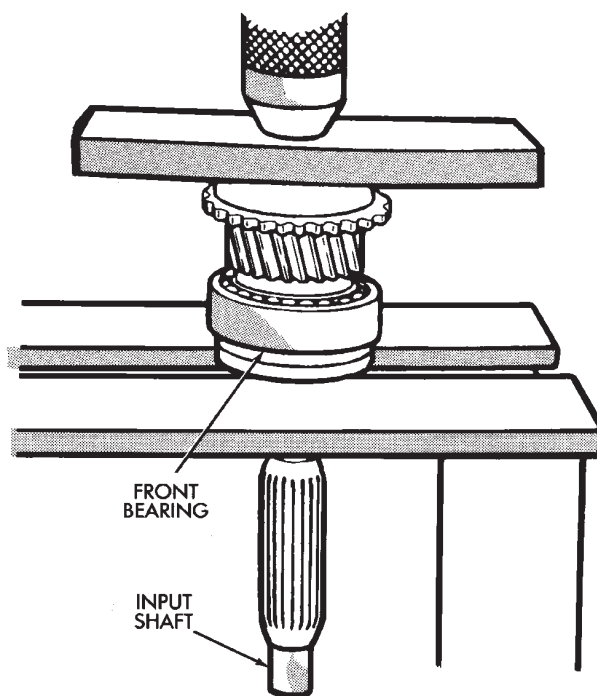
ASSEMBLY

(1) Position input shaft bearing onto input shaft.

(2) Using Driver L-4507, drive bearing onto input shaft.

(3) Select the thickest snap-ring that will fit into the snap-ring groove of the input shaft (Fig. 99).

(4) Lubricate output shaft pilot bearing bore of input shaft with petroleum jelly.



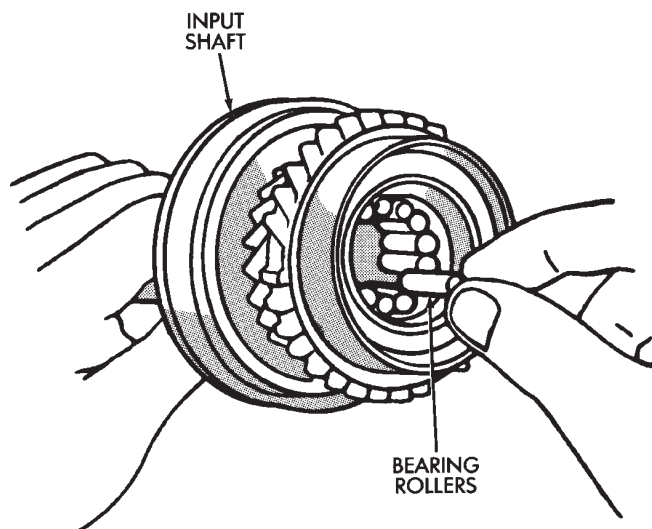
I.D. Mark	Snap Ring Thickness mm (in.)
0	2.05-2.10 (0.0807-0.0827)
1	2.10-2.15 (0.0827-0.0846)
2	2.15-2.20 (0.0846-0.0866)
3	2.20-2.25 (0.0866-0.0886)
4	2.25-2.30 (0.0886-0.0906)
5	2.30-2.35 (0.0906-0.0925)

J8921-50

Fig. 99 Select Input Shaft Bearing Snap-ring

DISASSEMBLY AND ASSEMBLY (Continued)

(5) Install output shaft pilot bearing rollers in input shaft bore (Fig. 100). Ensure to use sufficient petroleum jelly to hold rollers in position.



J8921-64

Fig. 100 Install Output Shaft Pilot Bearing Rollers

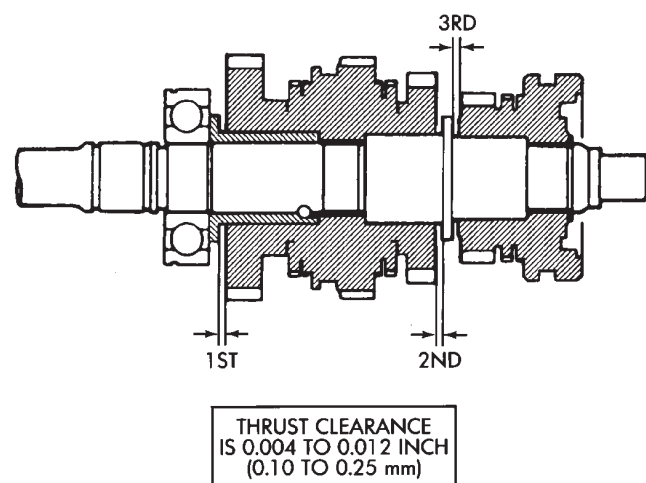
(6) Install the fourth gear synchronizer ring onto the input shaft.

(7) Install input shaft to output shaft. Use care when mating the two shafts not to displace any output shaft pilot bearing rollers.

OUTPUT SHAFT**DISASSEMBLY**

(1) Remove input shaft and output shaft pilot bearing rollers from output shaft.

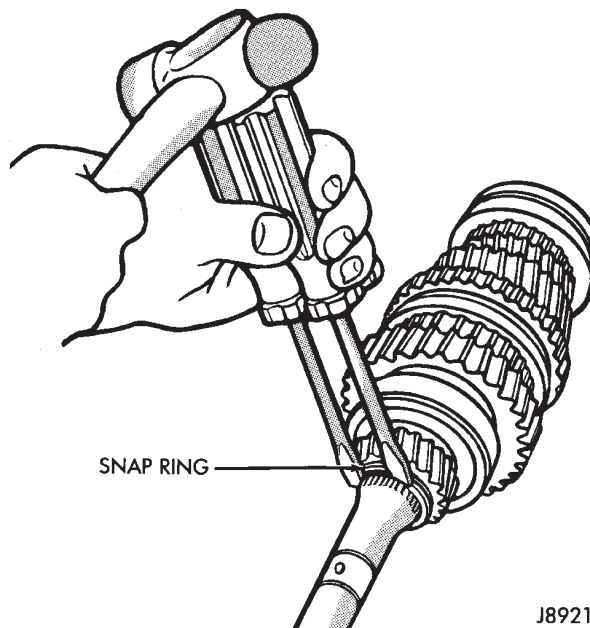
(2) Measure and note thrust clearance of output shaft gears (Fig. 101). Clearance should be 0.10 – 0.25 mm (0.004 – 0.010 in.).



J8921-36

Fig. 101 Check Output Shaft Gear Thrust Clearance

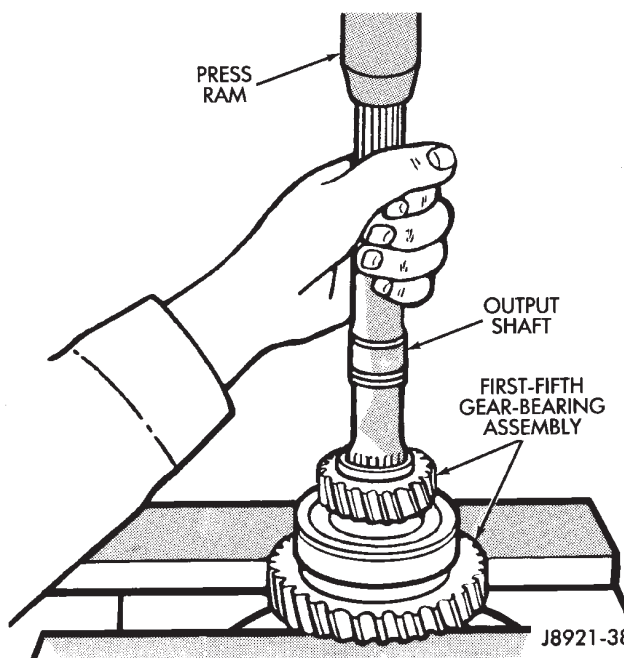
(3) Remove output shaft fifth gear snap ring with two screwdrivers (Fig. 102).



J8921-37

Fig. 102 Remove Fifth Gear Snap-ring

(4) Using Bearing Splitter P-334 or suitable press plates positioned under first gear, press fifth gear, rear bearing, first gear, and first gear bearing inner race off output shaft (Fig. 103).



J8921-38

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

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

DISASSEMBLY AND ASSEMBLY (Continued)

(6) Remove first gear bearing inner race lock ball with pencil magnet (Fig. 104).

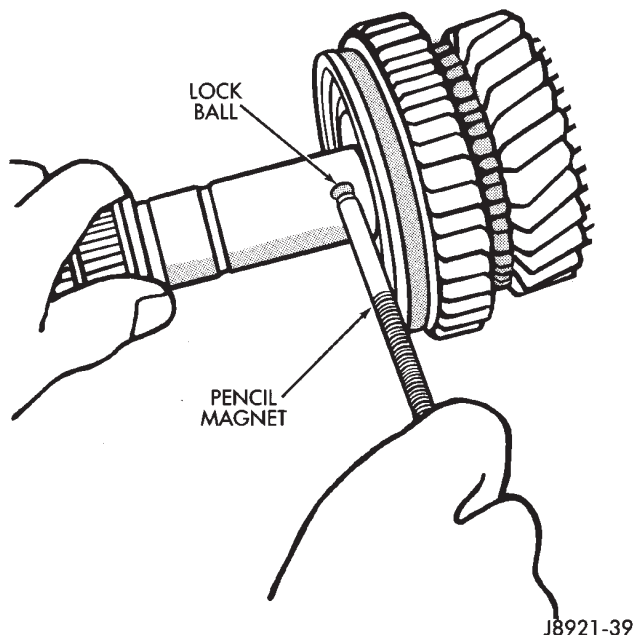


Fig. 104 Remove First Gear Bearing Inner Race Lock Ball

(7) Remove first gear synchronizer ring.

(8) Using Bearing Splitter P-334 or suitable press plates positioned under second gear, press 1-2 synchronizer, reverse gear, and second gear from output shaft (Fig. 105).

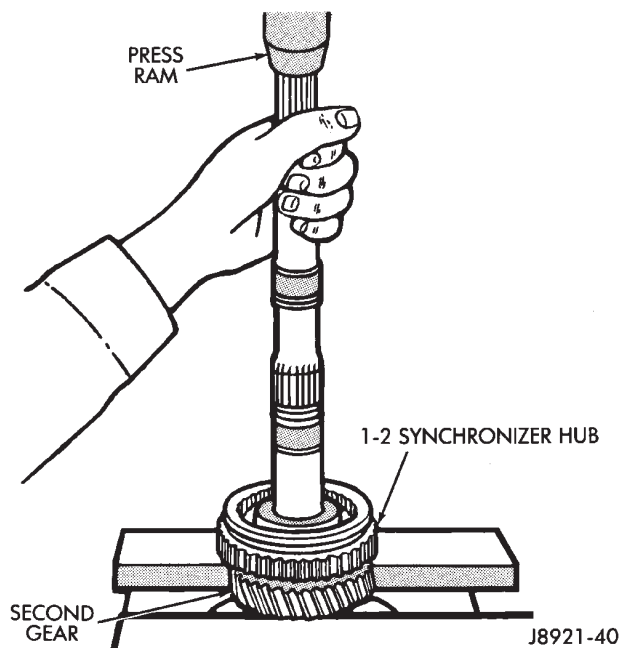


Fig. 105 Remove Second Gear, Reverse Gear, And 1-2 Synchronizer

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

(10) Remove select fit snap-ring holding the 3-4 synchronizer onto the output shaft (Fig. 106).

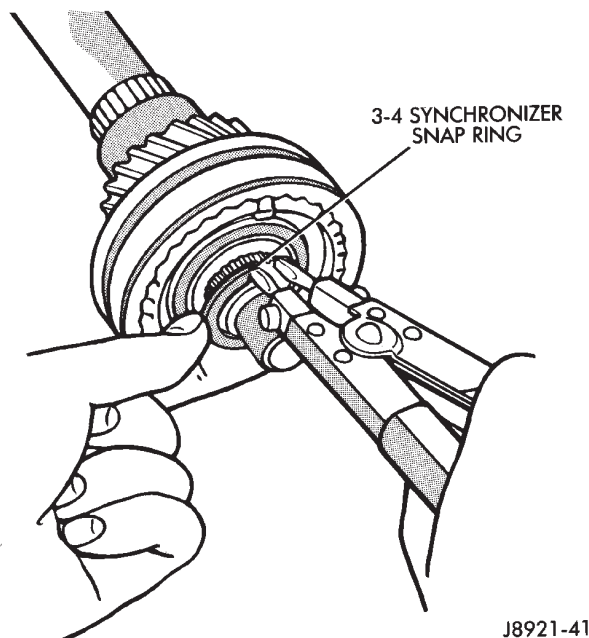


Fig. 106 Remove 3-4 Synchronizer Snap Ring

(11) Using Bearing Splitter P-334 or suitable press plates positioned under third gear, press the 3-4 synchronizer and third gear from output shaft (Fig. 107).

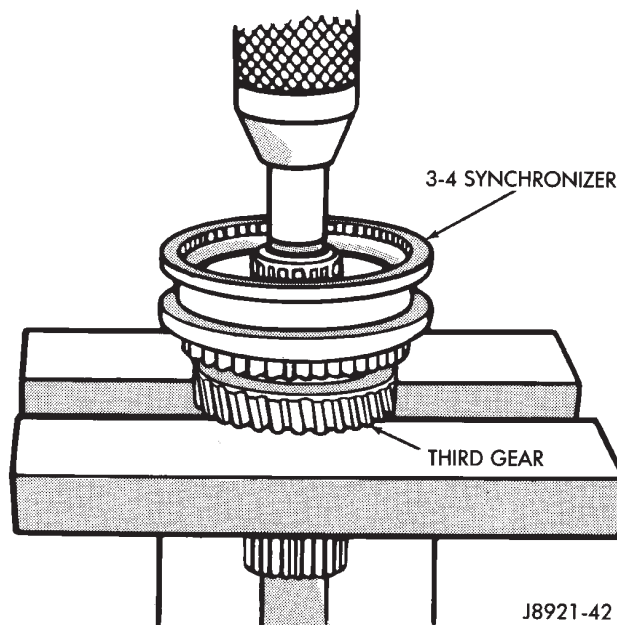


Fig. 107 Remove 3-4 Synchronizer And Third Gear

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

ASSEMBLY

(1) Lubricate transmission components with specified gear lubricant.

DISASSEMBLY AND ASSEMBLY (Continued)

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

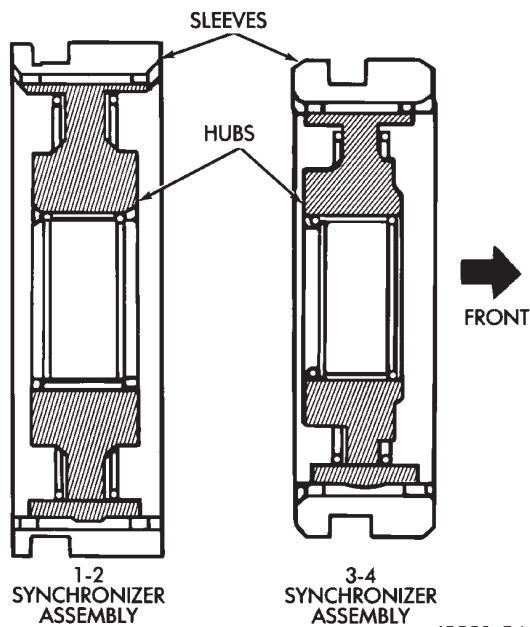


Fig. 108 Synchronizer Identification

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

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

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

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

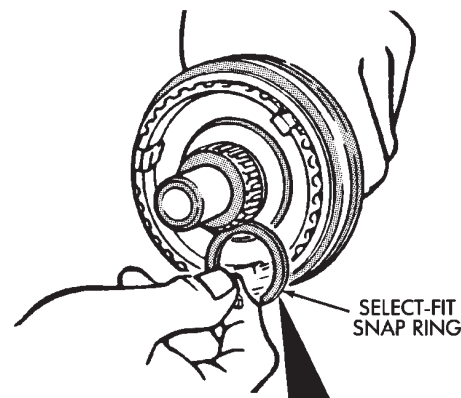
(7) Using Adapter 6747-1A and a shop press, press the 3-4 synchronizer onto the output shaft.

(8) Select the thickest snap-ring that will fit into the snap-ring groove of the output shaft (Fig. 109).

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

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

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



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

Fig. 109 Select 3-4 Synchronizer Snap-ring

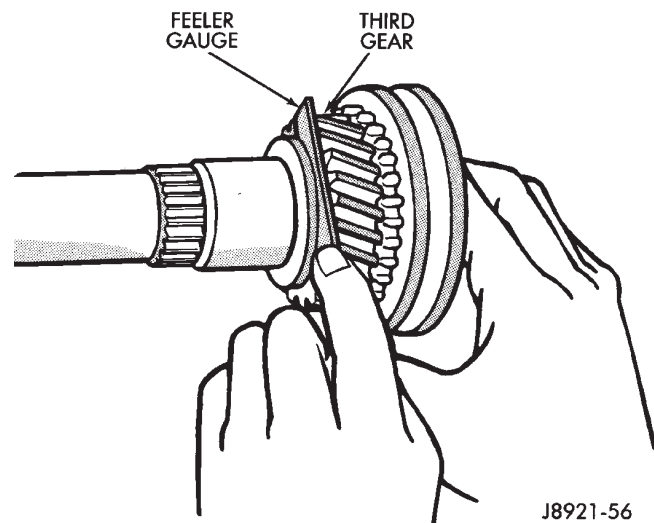


Fig. 110 Check Third Gear Clearance

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

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

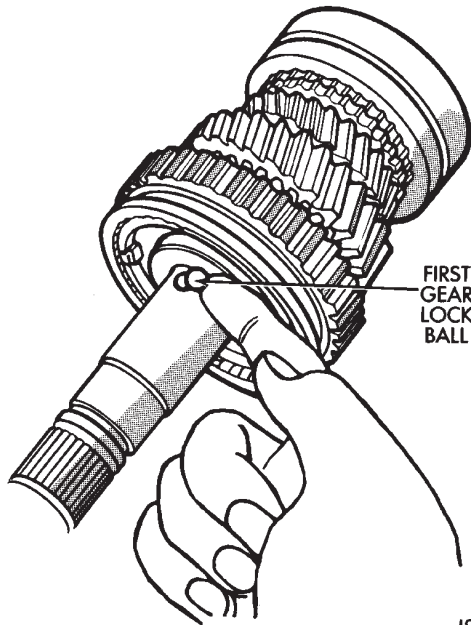
(14) Position 1-2 synchronizer assembly onto splines of output shaft.

DISASSEMBLY AND ASSEMBLY (Continued)

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

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

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



J8921-58

Fig. 111 Install First Gear Bearing Inner Race Lock Ball

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

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

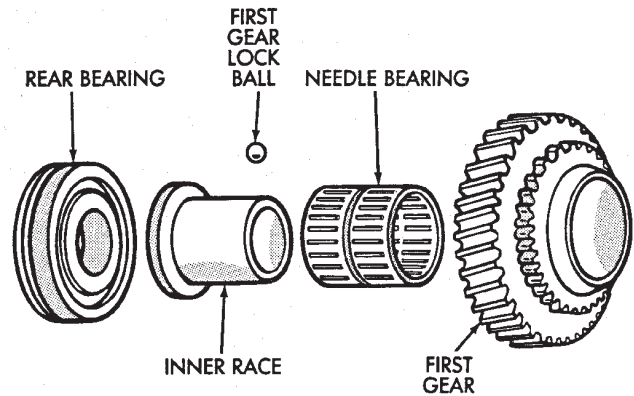
(20) Install first gear bearing inner race onto output shaft and inside first gear bearing. Rotate bearing race until race installs over lock ball.

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

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

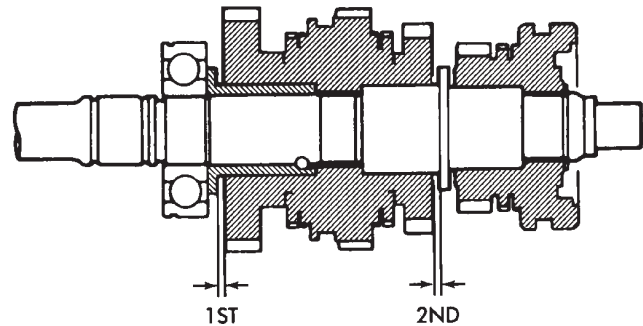
(23) Install snap-ring onto output shaft rear bearing outer race.

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



J8921-59

Fig. 112 First Gear Components



STANDARD CLEARANCE
0.004-0.010 INCH
(0.10-0.25 mm)

J8921-61

Fig. 113 Check First-Second Gear Thrust Clearance

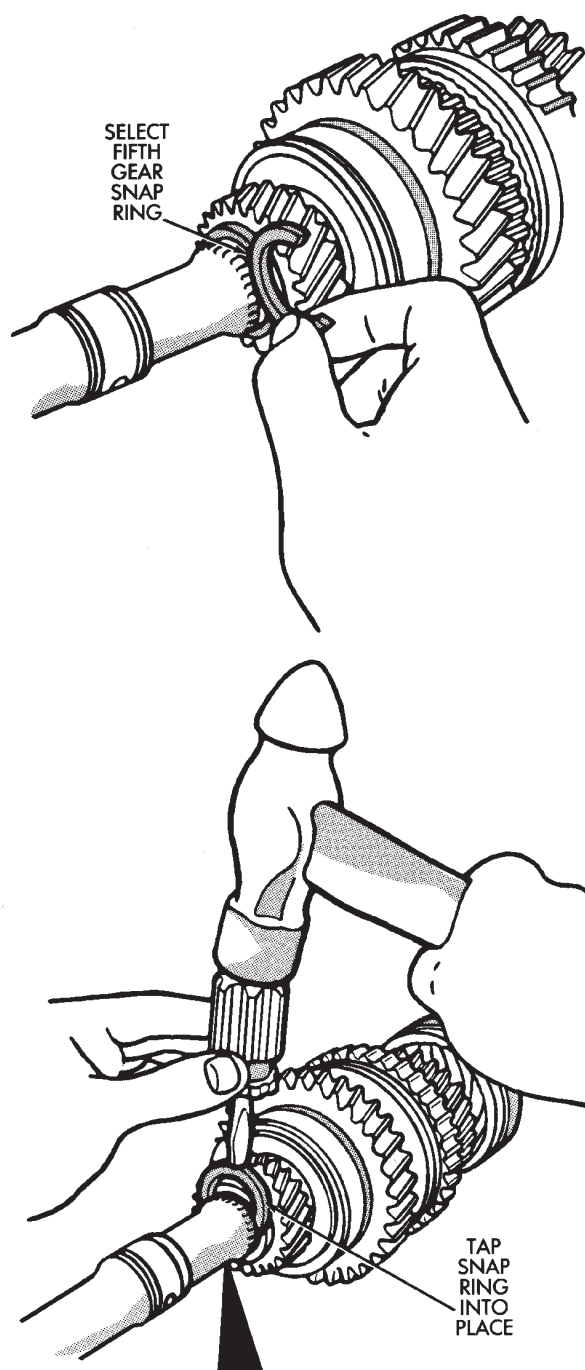
(25) Position fifth gear onto output shaft with the gear's short shoulder toward the rear of shaft. Ensure that the gear and output shaft splines are aligned.

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

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

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

DISASSEMBLY AND ASSEMBLY (Continued)



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

J8921-63

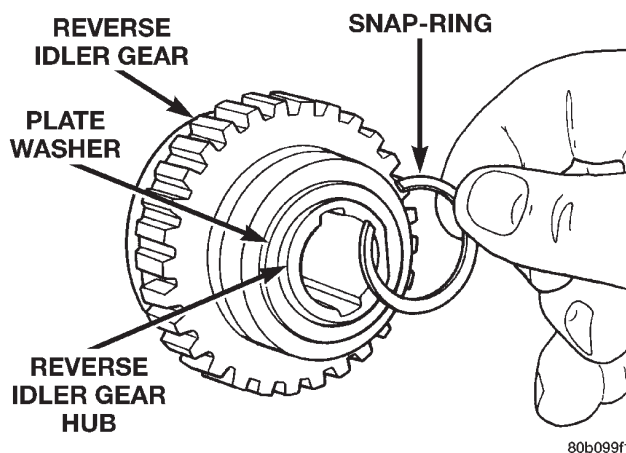
Fig. 114 Select/Install Fifth Gear Snap Ring

SEMI-SYNCHRONIZED REVERSE IDLER GEAR

DISASSEMBLY

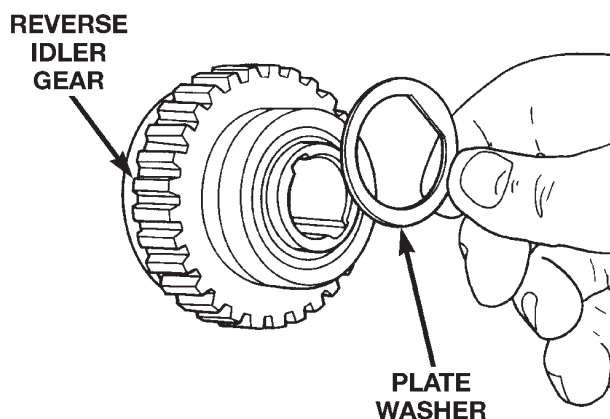
(1) Remove snap-ring holding the reverse idler gear onto the reverse idler gear hub/race (Fig. 115).

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



80b099f1

Fig. 115 Remove Reverse Idler Gear Snap-ring



80b099f2

Fig. 116 Remove Reverse Idler Gear Plate Washer

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

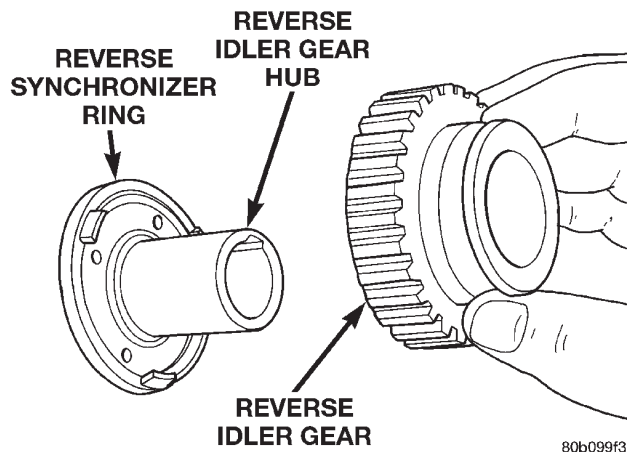
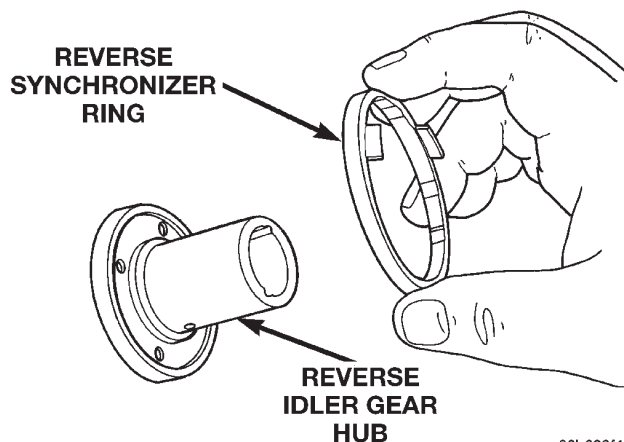
(4) Remove the reverse idler gear synchronizer ring from the reverse idler gear hub/race (Fig. 118).

ASSEMBLY

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

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

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

DISASSEMBLY AND ASSEMBLY (Continued)**Fig. 117 Remove Reverse Idler Gear****Fig. 118 Remove Reverse Idler Gear Synchronizer Ring**

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

CLEANING AND INSPECTION**AX5 MANUAL TRANSMISSION COMPONENTS****GENERAL INFORMATION**

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

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

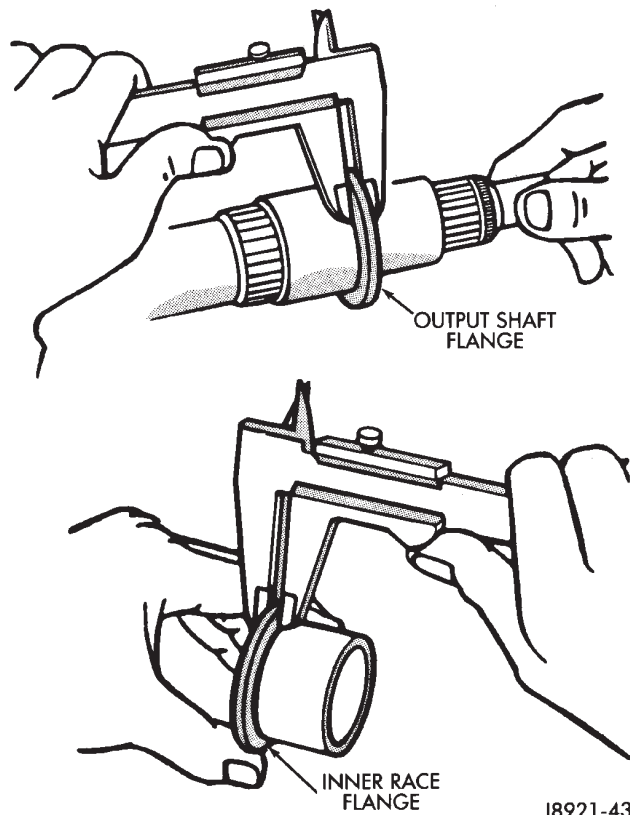
GEAR CASE, ADAPTER/EXTENSION HOUSING, INTERMEDIATE PLATE

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

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

OUTPUT SHAFT

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

**Fig. 119 Check Shaft And Bearing Race Flange Thickness**

- Minimum thickness for shaft flange is 4.80 mm (0.189 in.)

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

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

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

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

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

CLEANING AND INSPECTION (Continued)

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

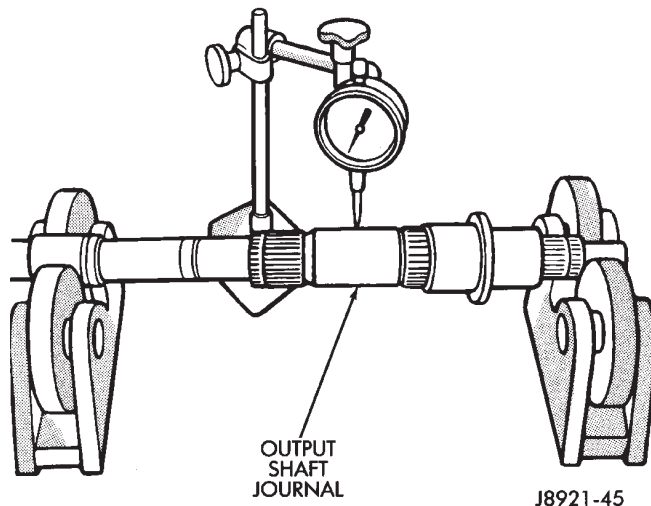


Fig. 120 Check Output Shaft Runout

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

COUNTERSHAFT

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

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

GEAR AND SYNCHRONIZER

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

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

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

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

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

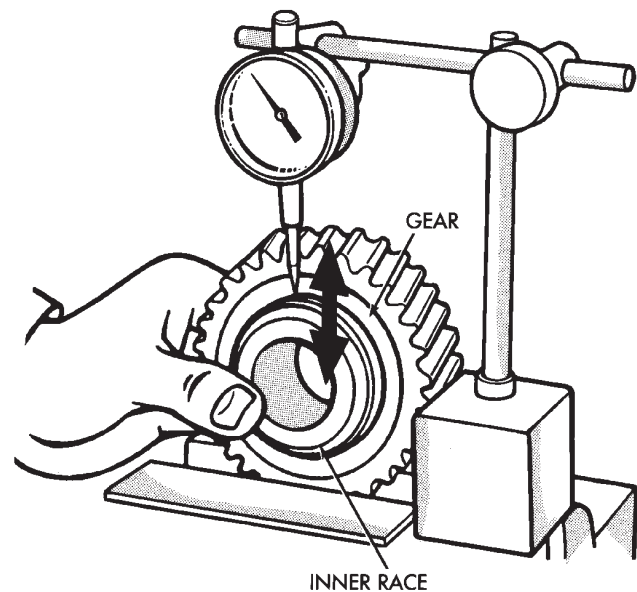


Fig. 121 Check Gear-To-Race Clearance

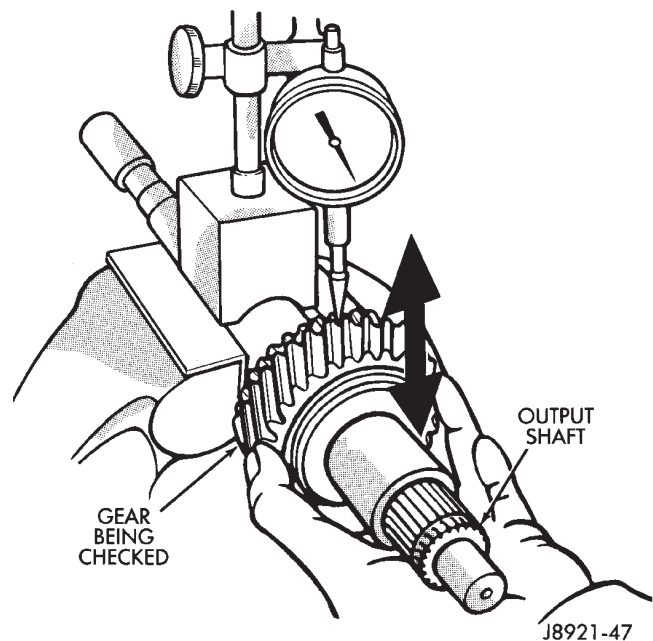
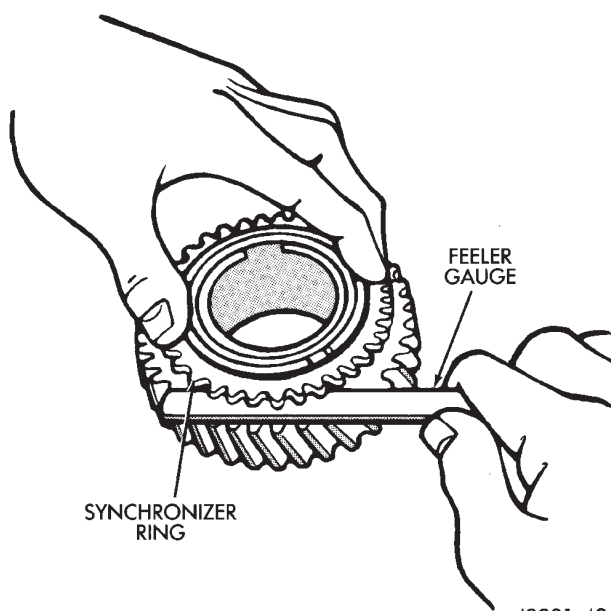
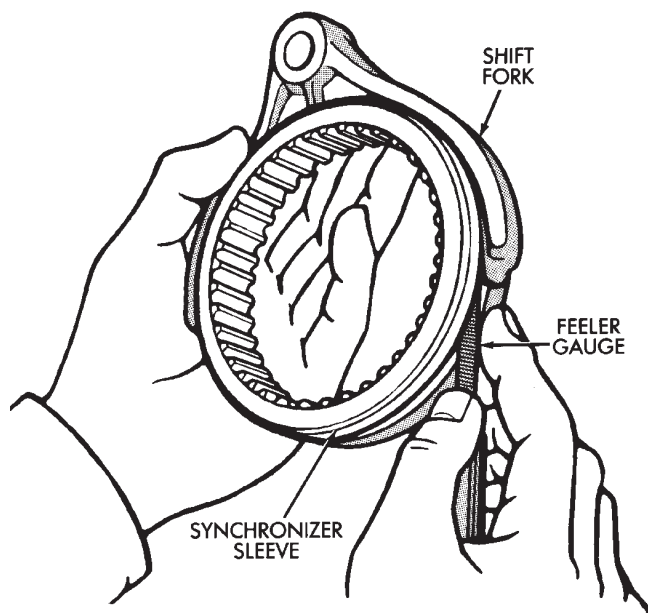


Fig. 122 Check Gear-To-Shaft Oil Clearance

CLEANING AND INSPECTION (Continued)

J8921-48

Fig. 123 Check Synchronizer Ring Wear

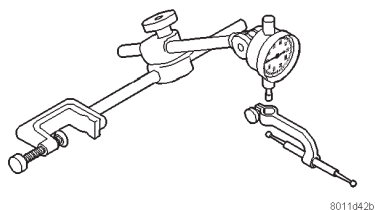
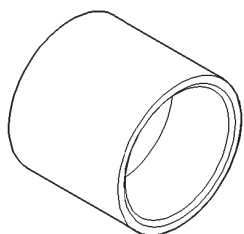
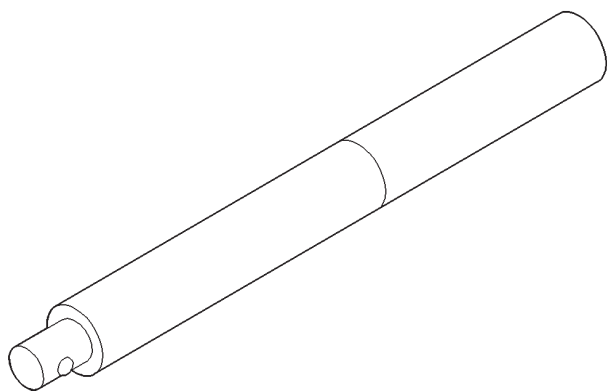
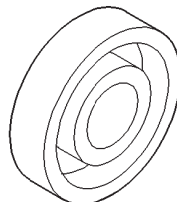
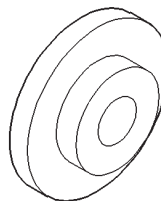
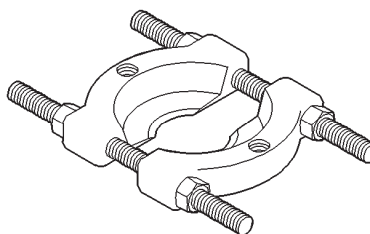
J8921-49

Fig. 124 Check Fork-To-Hub Clearance**SPECIFICATIONS****TORQUE**

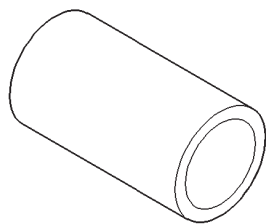
DESCRIPTION	TORQUE
Plugs, Access	19 N·m (14 ft.lbs.)
Bolts, Adapter Housing	34 N·m (25 ft.lbs.)
Switch, Back-up Light.	44 N·m (32.5 ft.lbs.)
Plugs, Drain and Fill	44 N·m (32.5 ft.lbs.)
Bolts, Front Bearing Retainer	17 N·m (12 ft.lbs.)
Plugs, Interlock and Detent.	19 N·m (14 ft.lbs.)
Screws, Propeller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

SPECIAL TOOLS

AX5

***C-3339 Dial Indicator Set******C-3995-A Installer, Extension Housing Seal******C-4171 Handle, Universal Tool******8211 Installer, Seal******8212 Installer, Seal******8208 Installer, Seal******P-334 Splitter, Bearing***

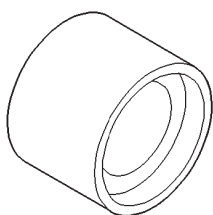
SPECIAL TOOLS (Continued)



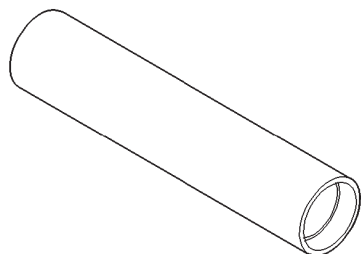
8109 Cup, Installer



L-4507 Tube, Driver



6747-1A Adapter, Fixture



MD-998805 Installer, Seal