

MANUAL - NV3550

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MANUAL - NV3550

DESCRIPTION

The NV3550 is a medium-duty, 5-speed, constant mesh, fully synchronized manual transmission. The transmission is available in two and four-wheel drive configurations.

The gear case consists of two aluminum housings and a removable clutch housing. The clutch housing is not an integral part of the transmission.

Roller bearings and needle bearings are used in the transmission. The transmission gears all rotate on caged type needle bearings. Roller bearings are used to support the input, output and counter shafts.

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

The drain plug is located in the bottom of the transmission and fill plug is on the left side.

OPERATION

The driver selects a particular gear by moving the shift lever to the desired gear position. This movement moves the internal transmission shift components to begin the shift sequence. As the shift lever moves the selected shift rail, the shift fork attached to that rail begins to move. The fork is positioned in a groove in the outer circumference of the synchronizer sleeve. As the shift fork moves the synchronizer sleeve, the synchronizer begins to speed-up or slow down the selected gear (depending on whether we are up-shifting or down-shifting). The synchronizer does this by having the synchronizer hub splined to the mainshaft, or the countershaft in some cases, and moving the blocker ring into contact with the gear's

friction cone. As the blocker ring and friction cone come together, the gear speed is brought up or down to the speed of the synchronizer. As the two speeds match, the splines on the inside of the synchronizer sleeve become aligned with the teeth on the blocker ring and the friction cone and eventually will slide over the teeth, locking the gear to the mainshaft, or countershaft, through the synchronizer.

DIAGNOSIS AND TESTING

LOW LUBRICANT LEVEL

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

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

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

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

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

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HARD SHIFTING

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

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

TRANSMISSION NOISE

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

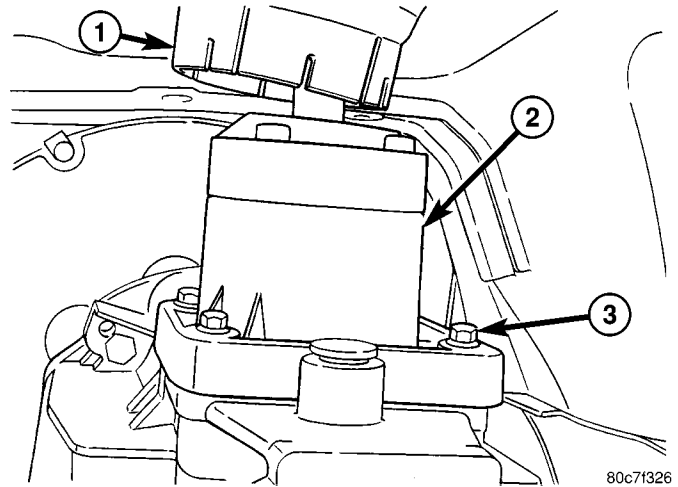
Severe, highly audible transmission noise is generally the initial indicator of a lubricant problem. Insufficient, improper, or contaminated lubricant will promote rapid wear of gears, synchros, shift rails, forks and bearings. The overheating caused by a lubricant problem, can also lead to gear and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

REMOVAL

- (1) Shift transmission into neutral.
- (2) Raise and support the vehicle.
- (3) Remove skid plate if equipped.
- (4) Remove wiring connectors from the transmission.
- (5) Remove propeller shaft/shafts.
- (6) Remove transfer case shift cable, vent hose from and transfer case, if equipped.
- (7) Remove slave cylinder from clutch housing.
- (8) Support engine with jack stand. Position wood block between jack and oil pan to avoid damaging pan.
- (9) Support transmission with a trans jack.
- (10) Remove exhaust hanger from the transmission crossmember.

(11) Remove transmission mount and crossmember.

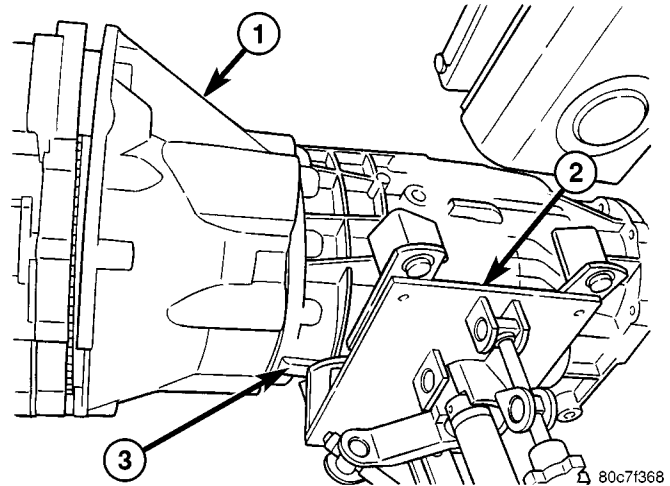
(12) Lower trans jack enough to remove shift tower bolts (Fig. 1).

**Fig. 1 SHIFT TOWER**

- 1 - SHIFT TOWER BOOT
- 2 - SHIFT TOWER
- 3 - SHIFT TOWER BOLT (4)

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

(14) Pull transmission jack rearward (Fig. 2) until input shaft clears clutch.

**Fig. 2 TRANSMISSION ASSEMBLY**

- 1 - CLUTCH HOUSING
- 2 - TRANSMISSION JACK
- 3 - TRANSMISSION

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(15) Remove clutch release bearing, release fork and retainer clip (Fig. 3).

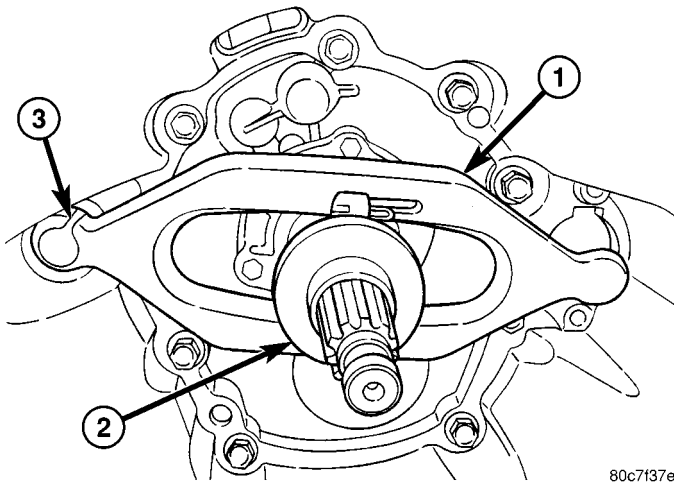


Fig. 3 CLUTCH RELEASE BEARING

- 1 - FORK
- 2 - BEARING
- 3 - CLIP

(16) Remove clutch housing from transmission.

DISASSEMBLY

FRONT HOUSING

- (1) Shift transmission into Neutral.
- (2) Remove drain plug and drain lubricant.
- (3) Inspect drain plug magnet for debris.
- (4) Remove backup light switch located on passenger side of rear housing (Fig. 4).

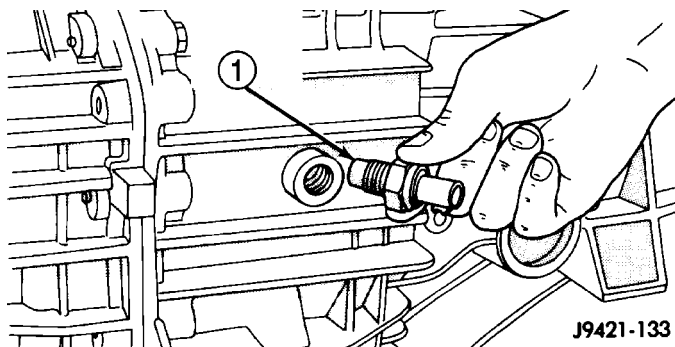


Fig. 4 BACKUP LIGHT SWITCH

- 1 - BACKUP LIGHT SWITCH

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

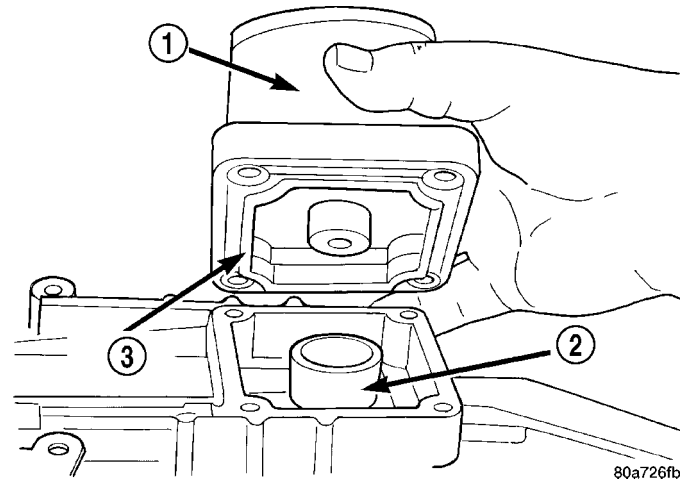


Fig. 5 SHIFT TOWER

- 1 - SHIFT TOWER
- 2 - SHIFT SOCKET
- 3 - SEAL

(6) Remove shift shaft lock bolt (Fig. 6) located just forward of shift tower.

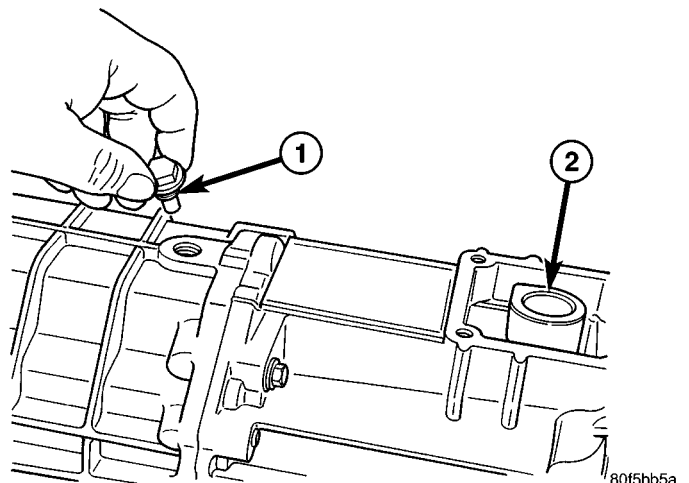


Fig. 6 SHAFT LOCK BOLT

- 1 - SHIFT SHAFT LOCK BOLT
- 2 - SHAFT SOCKET

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(7) Remove shift shaft detent plug with Remover 8117A. Attach the fingers of the remover to the detent plug (Fig. 7). Then push the cup down till it contacts the trans. Tighten the nut (Fig. 8) till it pulls the plug from the trans case.

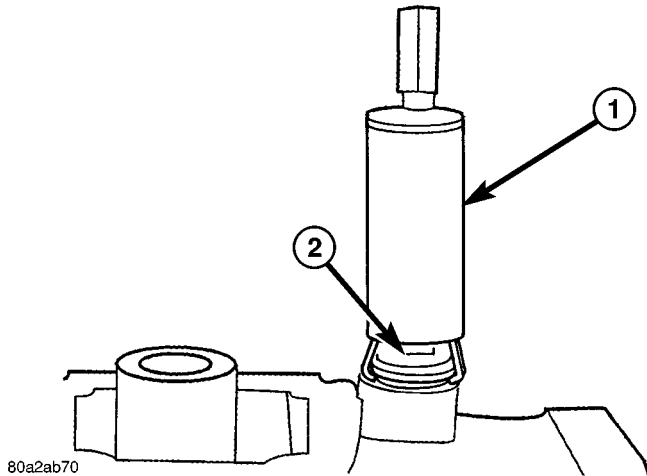


Fig. 7 DETENT PULLER

- 1 - REMOVER
2 - DETENT PLUG

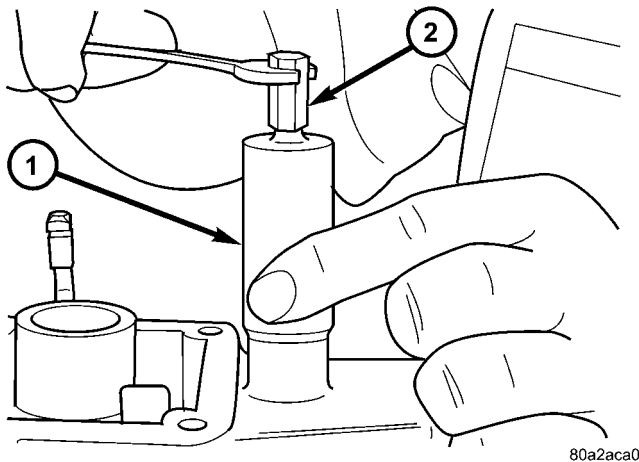


Fig. 8 PULL DETENT PLUG

- 1 - NUT
2 - REMOVER

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

(9) Remove input shaft bearing retainer bolts.

(10) Loosen input shaft bearing retainer by **carefully** lifting the retainer with a pry tool to break sealer bead (Fig. 9).

(11) Remove bearing retainer from input shaft (Fig. 10).

(12) Remove snap ring that secures input shaft in front bearing (Fig. 11).

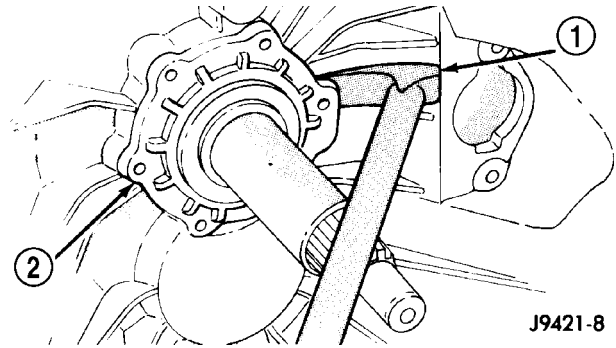


Fig. 9 BEARING RETAINER

- 1 - PRY TOOL
2 - INPUT SHAFT BEARING RETAINER

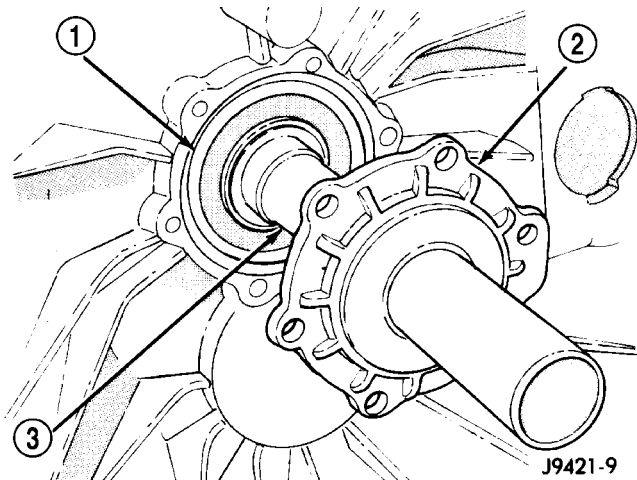


Fig. 10 INPUT SHAFT BEARING RETAINER

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

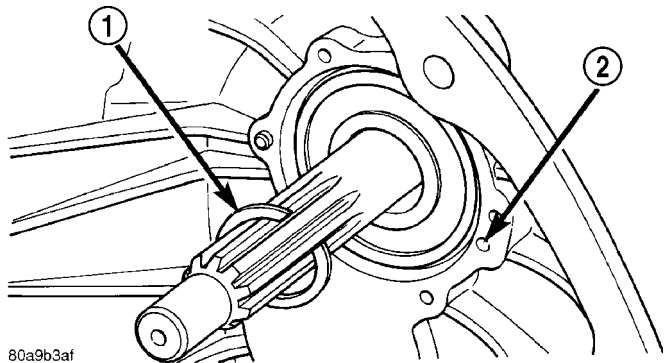
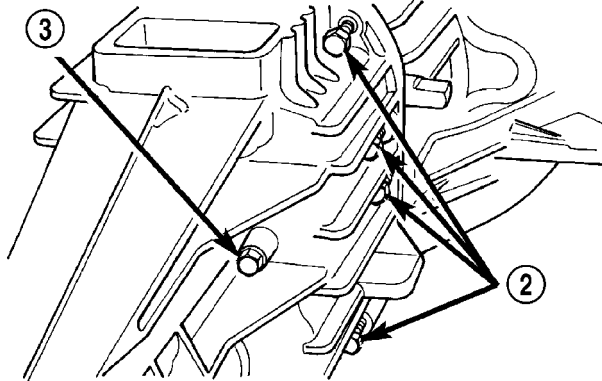
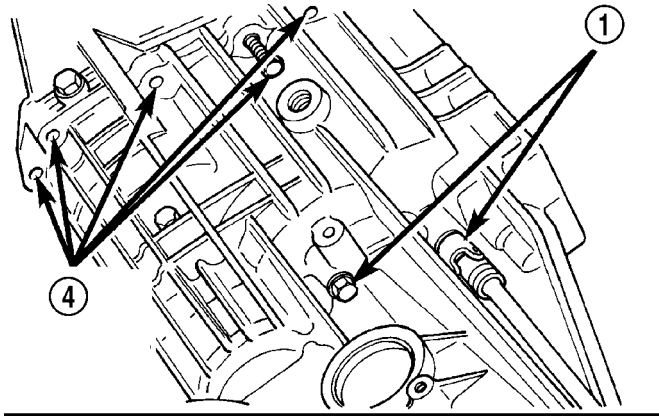


Fig. 11 INPUT SHAFT SNAP RING

- 1 - INPUT SHAFT SNAP RING
2 - OIL FEED

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



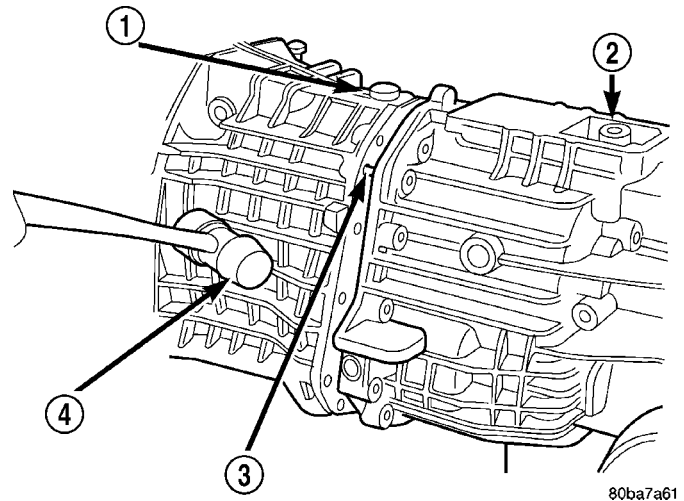
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Fig. 12 HOUSING AND BEARING RETAINER BOLTS

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

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

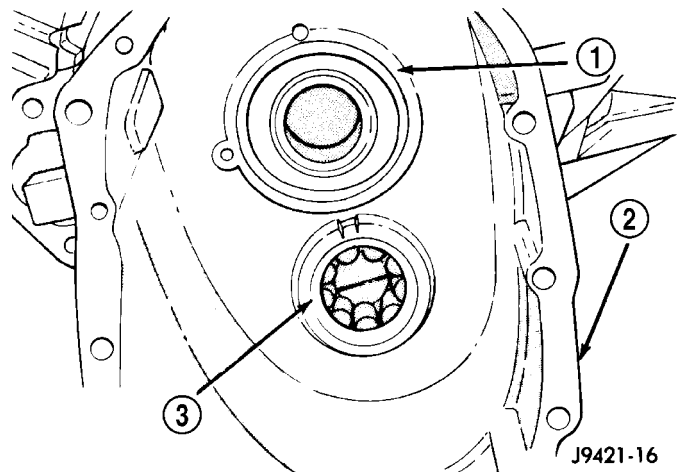
(15) Remove and inspect input shaft bearing and countershaft front bearing race (Fig. 14).



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Fig. 13 FRONT HOUSING

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



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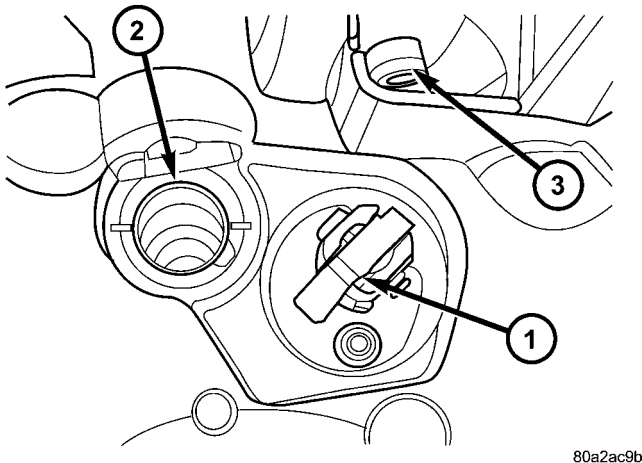
Fig. 14 INPUT SHAFT AND COUNTERSHAFT BEARING RACE

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

MANUAL - NV3550 (Continued)

(16) Remove screw from reverse blocker and remove blocker (Fig. 15) from case.

NOTE: The reverse blocker is used on RHD vehicles only.

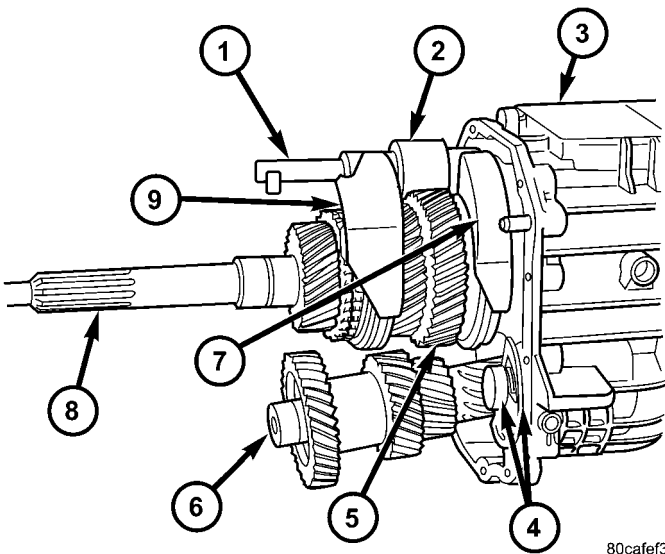


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Fig. 15 REVERSE BLOCKER (RHD)

- 1 - REVERSE BLOCKER
- 2 - SHIFTER SHAFT BUSHING
- 3 - VENT

(17) Note position of input shaft, shift shaft, forks and geartrain components in housing (Fig. 16).



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Fig. 16 GEARTRAIN AND SHIFT COMPONENTS

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

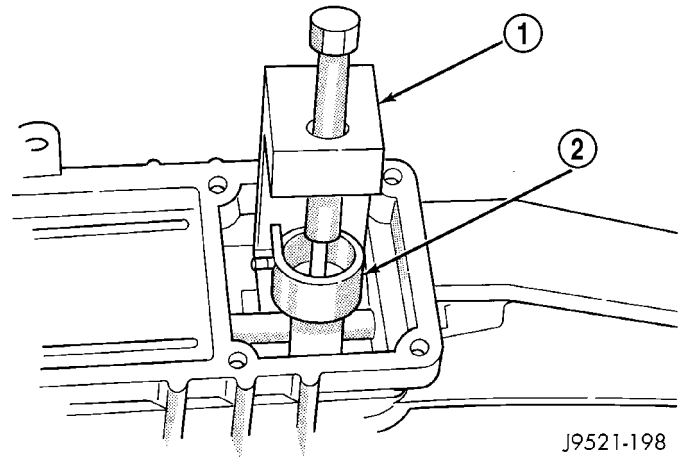
SHIFT/FORK SHAFTS AND REVERSE IDLER SEGMENT

(1) To remove the roll pin that secures the shift socket to the shift shaft, position Remover 6858 on the shift shaft. Center the tool over the roll pin and verify tool legs are firmly seated on the shift socket (Fig. 17).

(2) Tilt the socket toward the side of the case, to position the roll pin at a slight angle. This will prevent the pin from being trapped between the gear teeth.

(3) Tighten the tool to press the roll pin downward and out of the shift socket (Fig. 17).

NOTE: Press roll pin just enough to clear the shift shaft. Be careful not to push the pin into the geartrain.



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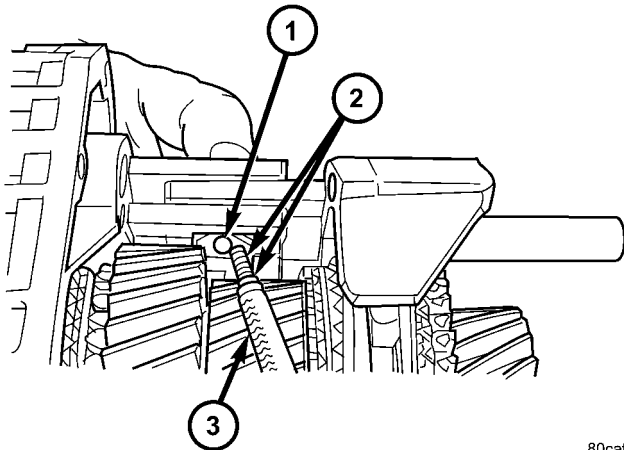
Fig. 17 SHIFT SOCKET ROLL PIN

- 1 - REMOVER
- 2 - SHIFT SOCKET

MANUAL - NV3550 (Continued)

(4) Rotate lever and bushing upward and out of the shift forks and catch detent ball and spring (Fig. 18) as they exit the shaft lever.

NOTE: Place shop towel over shaft to contain detent ball and spring.



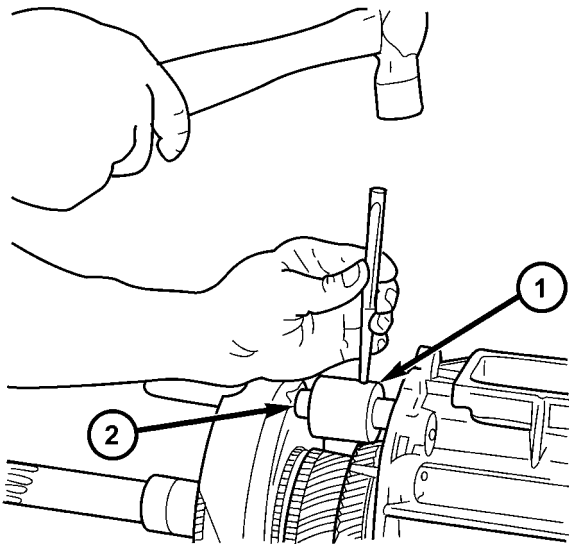
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Fig. 18 DETENT SPRING AND BALL

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

(5) Drive out roll pin that secures shift bushing and lever to shift shaft (Fig. 19) with a hammer and punch.

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

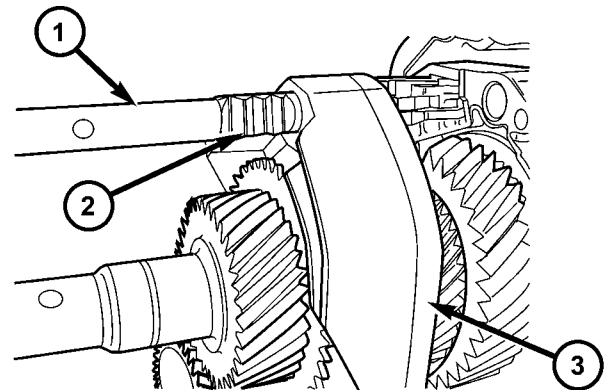


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Fig. 19 SHIFT SHAFT LEVER AND BUSHING ROLL PIN

- 1 - BUSHING AND LEVER
- 2 - SHIFT SHAFT

(6) Pull shift shaft straight (Fig. 20) out of rear housing.

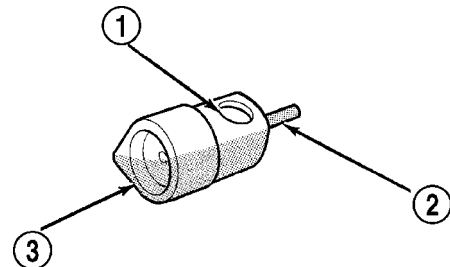


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Fig. 20 SHIFT SHAFT

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

(7) Remove shift socket from rear housing (Fig. 21).



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Fig. 21 SHIFT SOCKET AND ROLL PIN

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

MANUAL - NV3550 (Continued)

(8) Remove lever and bushing (Fig. 22).

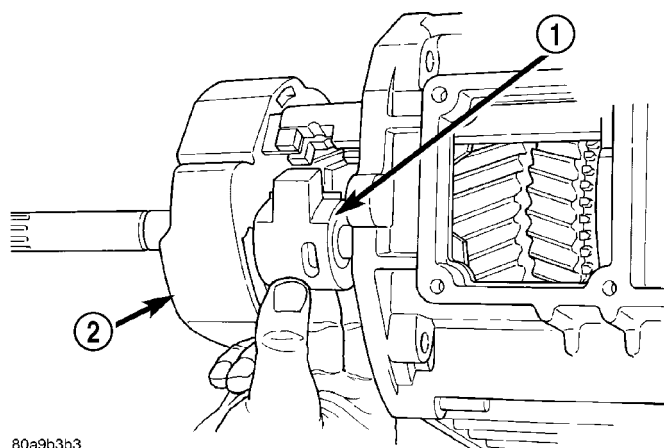


Fig. 22 SHIFT SHAFT LEVER AND BUSHING

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

(9) Rotate 3-4 fork around synchro sleeve until fork clears shift arms on 1-2 and fifth-reverse forks, then remove 3-4 fork (Fig. 23).

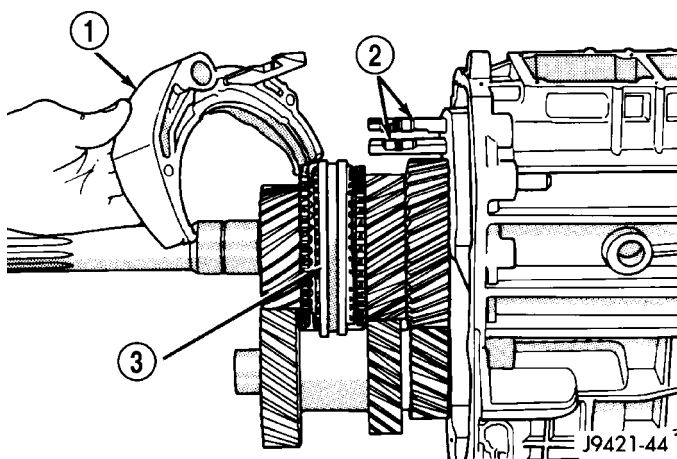


Fig. 23 3-4 SHIFT FORK

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

(10) Remove the reverse idler shaft support bolt and loosen rear reverse idler shaft bolt (Fig. 24).

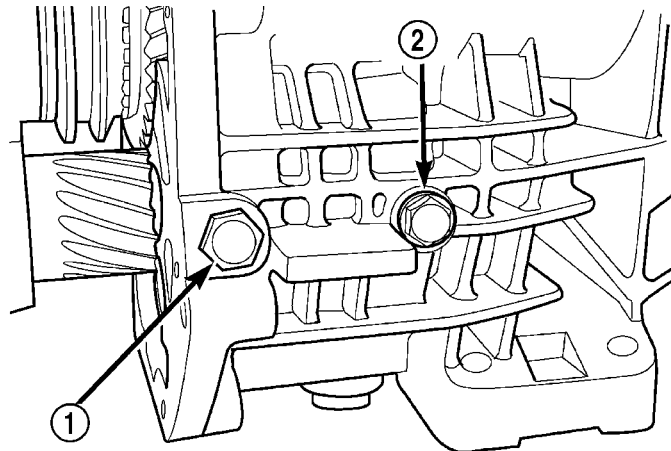


Fig. 24 REVERSE IDLER SHAFT/SUPPORT BOLT

- 1 - SUPPORT BOLT
2 - SHAFT BOLT

(11) Slide reverse idler shaft support (Fig. 25) straight out of housing.

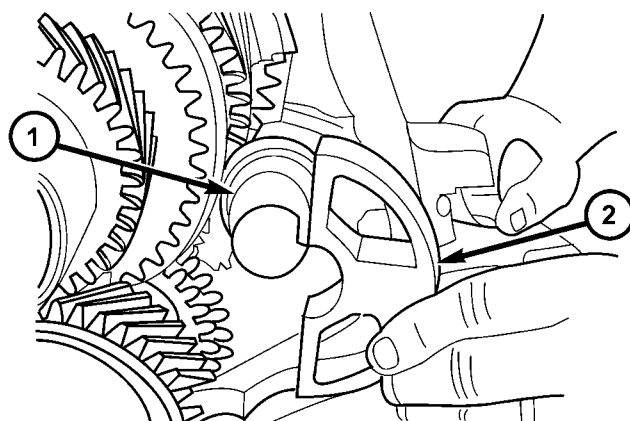


Fig. 25 IDLER SHAFT SUPPORT

- 1 - IDLER SHAFT
2 - IDLER SHAFT SUPPORT

MANUAL - NV3550 (Continued)

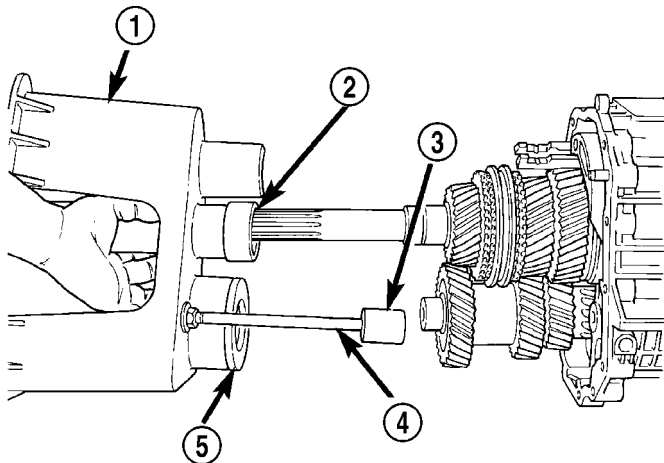
(12) Support geartrain and rear housing on Fixture 6747 as follows:

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

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

(c) Slide fixture tool onto input shaft, countershaft and idler gear (Fig. 26).

(d) Stand geartrain and rear housing upright on fixture (Fig. 27). Have helper hold fixture tool in place while housing and geartrain is being rotated into upright position.



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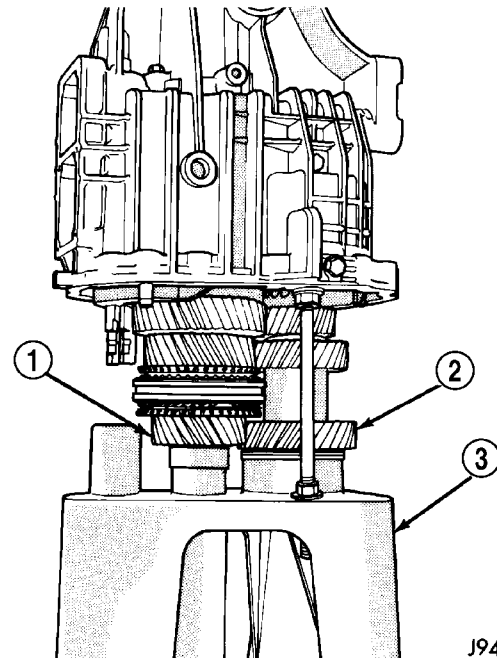
Fig. 26 FIXTURE ASSEMBLY

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

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

REAR HOUSING - 2WD

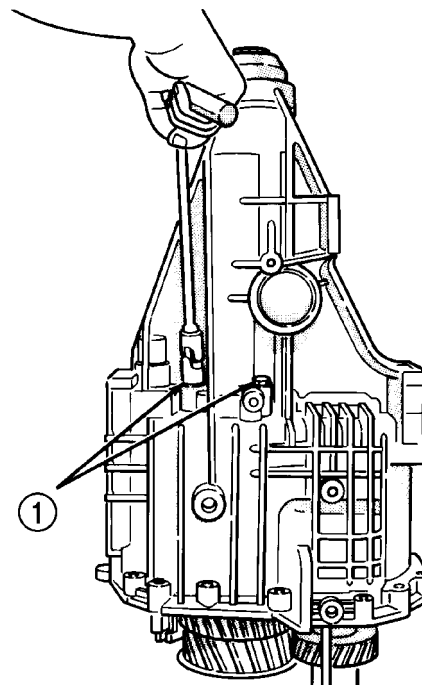
(1) Remove three bolts rear of shift tower, that attach output shaft bearing retainer to rear case (Fig. 28).



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Fig. 27 GEARTRAIN/HOUSING FIXTURE

- 1 - INPUT SHAFT
- 2 - COUNTERSHAFT
- 3 - FIXTURE



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Fig. 28 OUTPUT SHAFT

- 1 - RETAINER BOLTS

MANUAL - NV3550 (Continued)

(2) Tap rear housing upward and off output shaft bearing (Fig. 29).

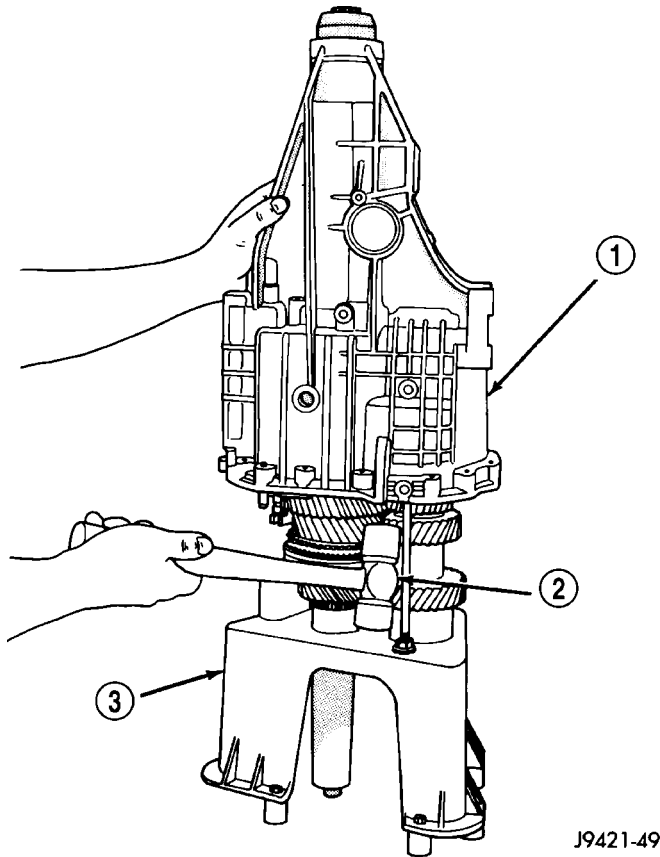


Fig. 29 REAR HOUSING - 2WD

- 1 - REAR HOUSING
- 2 - PLASTIC/RAWHIDE Mallet
- 3 - FIXTURE

(3) Lift rear housing up and off geartrain (Fig. 30).
 (4) Remove countershaft rear bearing from countershaft (Fig. 31).

(5) Examine condition of bearing bore and idler shaft notch in rear housing. Replace housing if damaged.

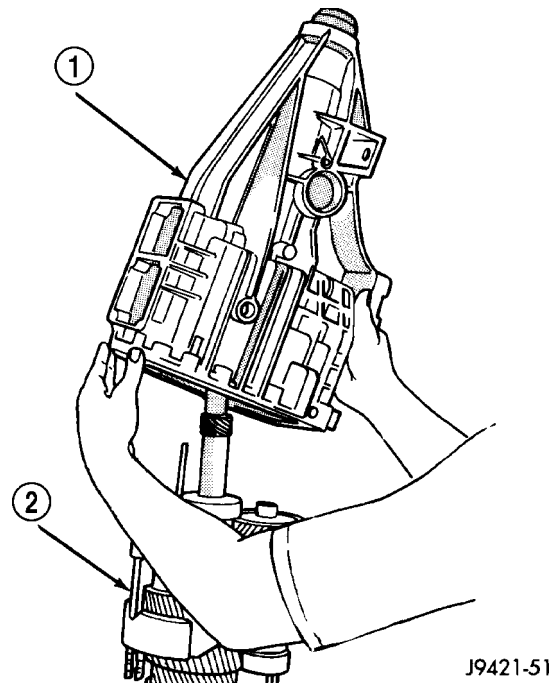


Fig. 30 REAR HOUSING

- 1 - REAR HOUSING
- 2 - SHIFT FORKS AND GEARTRAIN

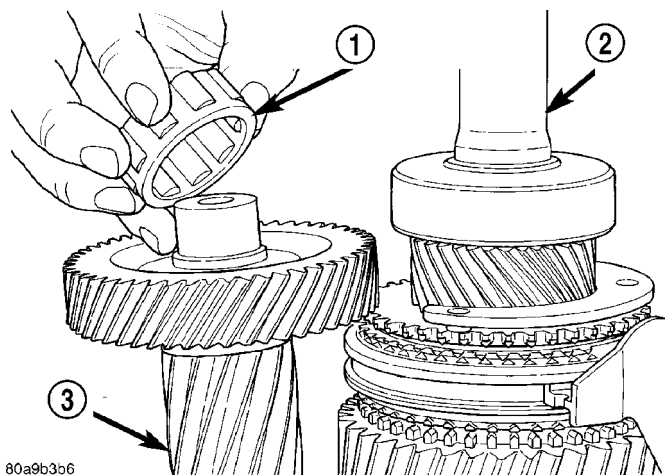
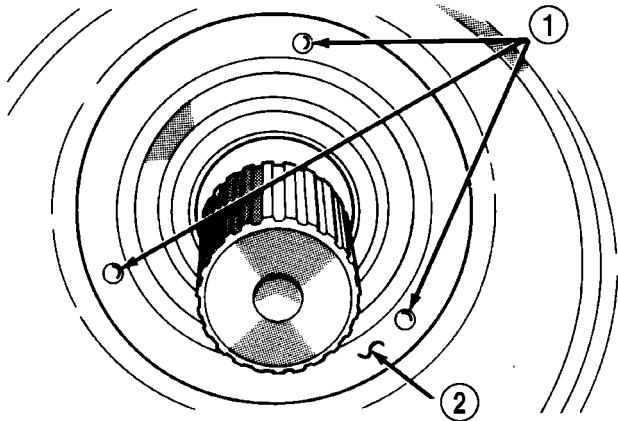


Fig. 31 COUNTERSHAFT REAR BEARING

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

MANUAL - NV3550 (Continued)**REAR ADAPTER HOUSING - 4WD**

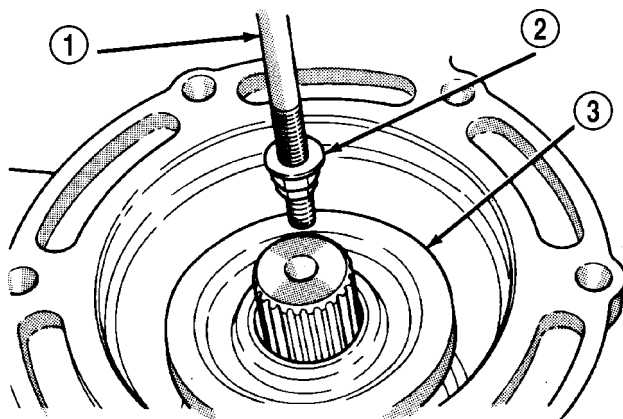
(1) Locate rear seal dimples (Fig. 32). Insert slide hammer mounted screw into one of the seal dimples and remove seal (Fig. 33).



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Fig. 32 SEAL DIMPLES - 4WD

- 1 - DIMPLES
- 2 - SEAL FACE

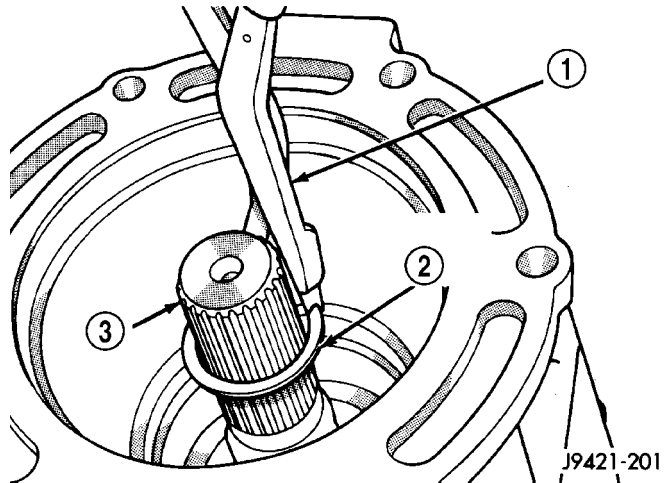


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Fig. 33 REAR SEAL - 4WD

- 1 - SLIDE HAMMER
- 2 - SCREW
- 3 - REAR SEAL

(2) Remove rear bearing snap ring from output shaft with snap ring pliers (Fig. 34).

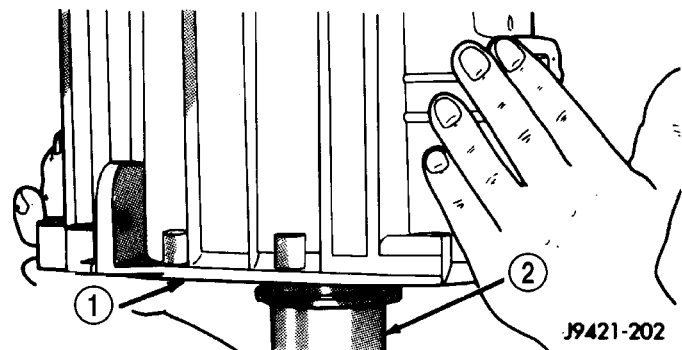


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Fig. 34 REAR BEARING SNAP RING - 4WD

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

(3) Lift rear adapter housing upward and off geartrain (Fig. 35).



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Fig. 35 REAR ADAPTER HOUSING

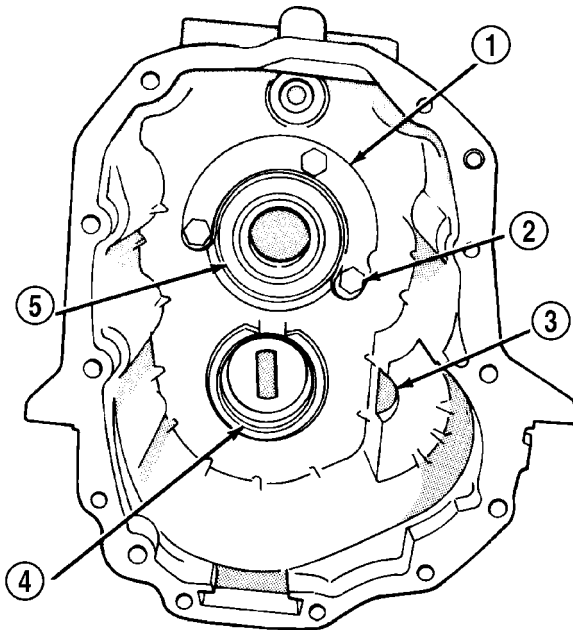
- 1 - REAR ADAPTER HOUSING
- 2 - OUTPUT SHAFT

MANUAL - NV3550 (Continued)

(4) Remove bearing retainer bolts, rear bearing retainer and rear bearing (Fig. 36).

NOTE: If needed push or tap bearing out of the housing with a hammer.

(5) Inspect condition of bearing bore, countershaft rear bearing race and idler shaft notch in rear housing. Replace housing if race, bore or notch are worn or damaged.



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Fig. 36 REAR ADAPTER HOUSING COMPONENTS

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

GEARTRAIN FROM FIXTURE

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

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

(3) Slide countershaft out of fixture tool.

(4) On 2WD remove output shaft bearing retainer from rear surface of fifth gear (retainer will drop onto gear after bolts are removed).

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

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

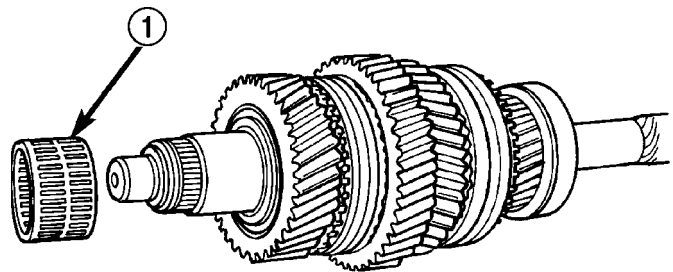
OUTPUT SHAFT

NOTE: The synchronizer hubs and sleeves are different and must not be intermixed. Remove each synchronizer unit as an assembly to avoid intermixing parts. Reference mark or tag each synchro hub and sleeve for correct assembly.

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

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

(3) Remove third gear needle bearing (Fig. 37).

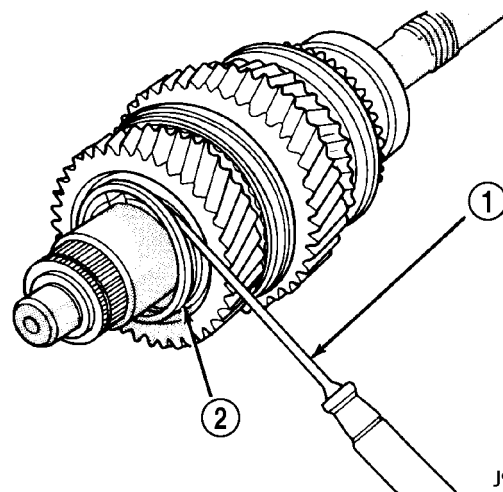


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Fig. 37 THIRD GEAR NEEDLE BEARING

- 1 - THIRD GEAR NEEDLE BEARING

(4) Remove retaining ring that secures two-piece thrust washer on shaft (Fig. 38) with a small pry tool.



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Fig. 38 THRUST WASHER

- 1 - PRY TOOL
- 2 - THRUST WASHER RETAINING RING

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(5) Remove two-piece thrust washer (Fig. 39).

NOTE: Record location of washer locating lugs in shaft notches for installation reference.

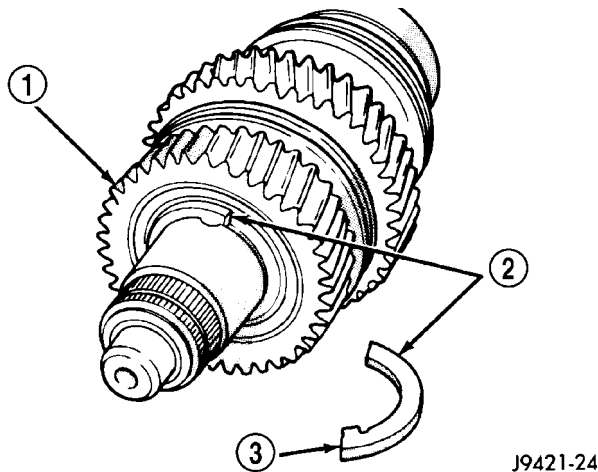


Fig. 39 TWO-PIECE THRUST WASHER

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

(6) Remove second gear and needle bearing (Fig. 40).

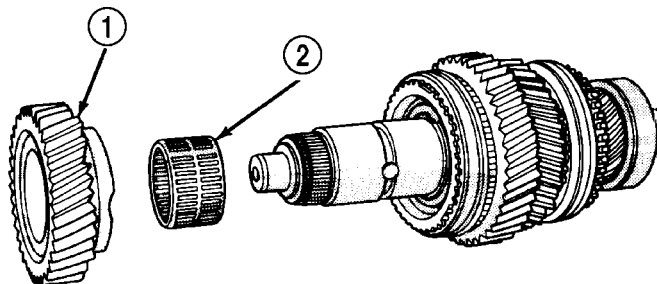


Fig. 40 SECOND GEAR AND NEEDLE BEARING

- 1 - SECOND GEAR
- 2 - SECOND GEAR NEEDLE BEARING

(7) Remove second gear synchro ring, synchro friction cone and synchro cone (Fig. 41).

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

(9) Remove 1-2 synchro hub, sleeve and first gear from output shaft with a press and Bearing Splitter 1130 (Fig. 42). Position splitter between first and reverse gears.

(10) Remove first gear needle bearing (Fig. 43).

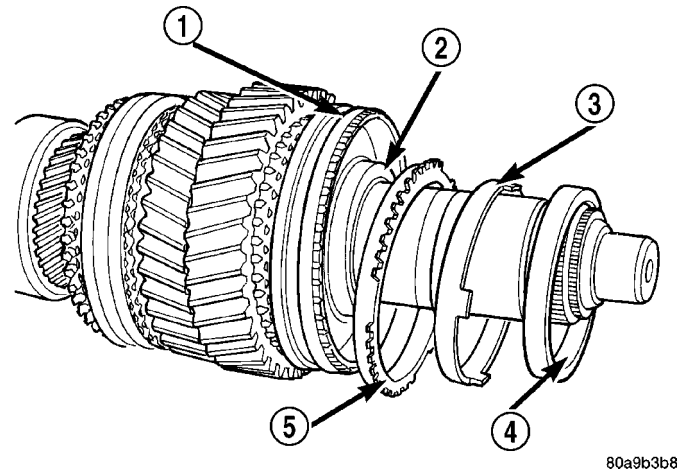


Fig. 41 SECOND GEAR SYNCHRO RING AND CONES

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

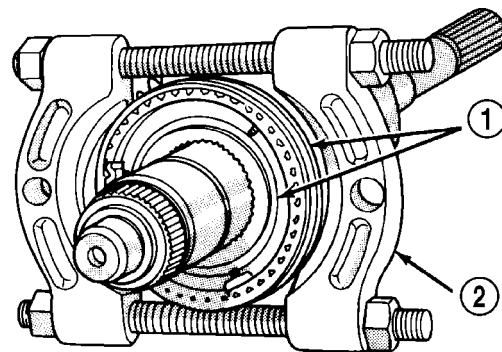


Fig. 42 HUB SLEEVE AND 1-2 SYNCHRO

- 1 - 1-2 SYNCHRO HUB AND SLEEVE
- 2 - BEARING SPITTER

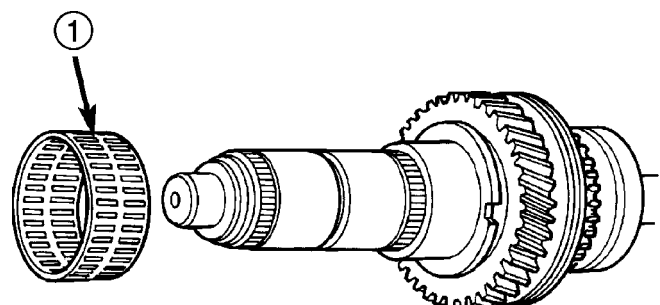
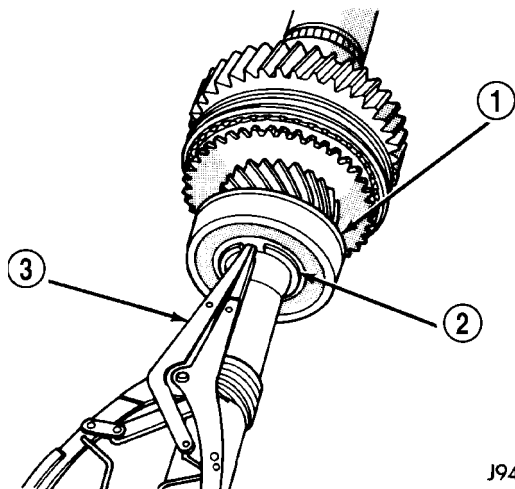


Fig. 43 FIRST GEAR NEEDLE BEARING

- 1 - FIRST GEAR NEEDLE BEARING

MANUAL - NV3550 (Continued)

(11) Remove output shaft bearing snap ring (Fig. 44).



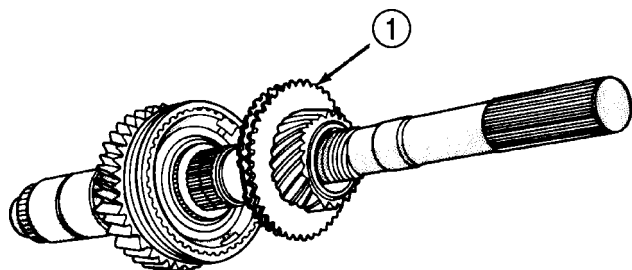
J9421-29

Fig. 44 OUTPUT SHAFT BEARING SNAP RING

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

(12) Remove output shaft bearing on 2-wheel drive models.

(13) Remove fifth gear (Fig. 45).

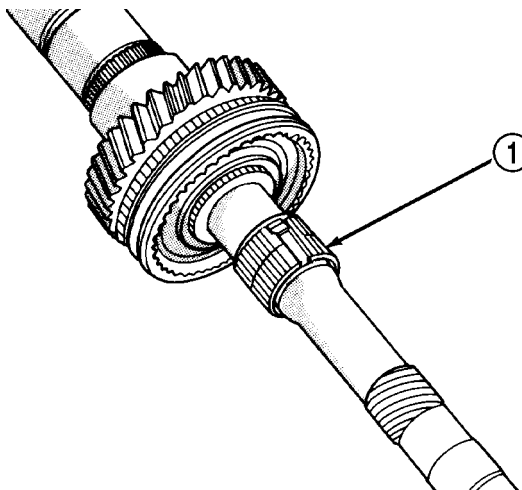


J9421-31

Fig. 45 FIFTH GEAR

- 1 - FIFTH GEAR AND SYNCHRO RING

(14) Remove fifth gear needle bearing by spreading it apart just enough to clear shoulder on output shaft (Fig. 46).

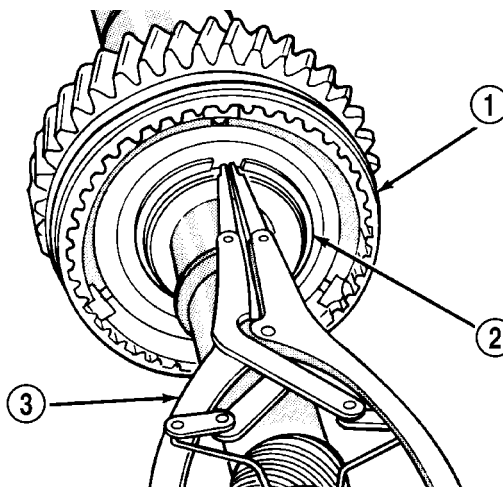


J9421-32

Fig. 46 FIFTH GEAR NEEDLE BEARING

- 1 - FIFTH GEAR NEEDLE BEARING

(15) Remove fifth-reverse synchro hub snap ring (Fig. 47).

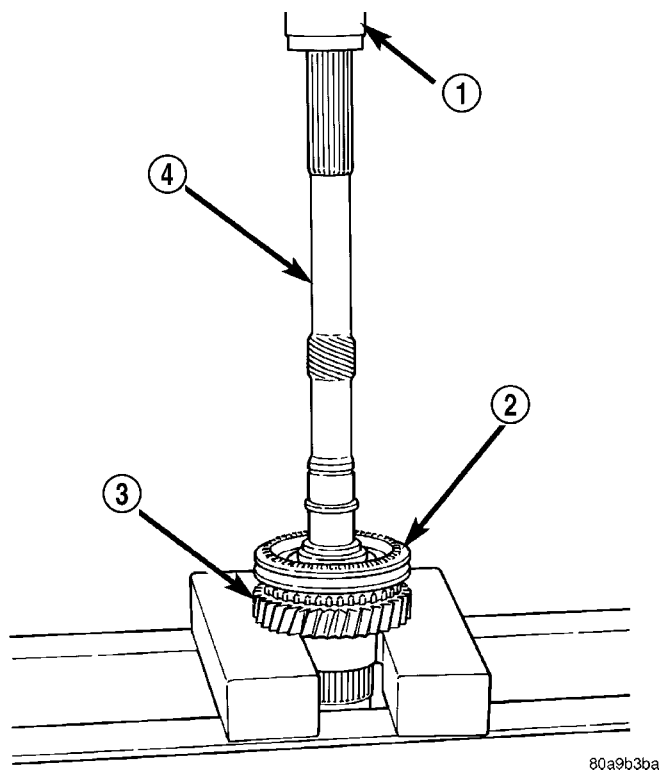


J9421-33

Fig. 47 FIFTH-REVERSE SYNCHRO HUB SNAP RING

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

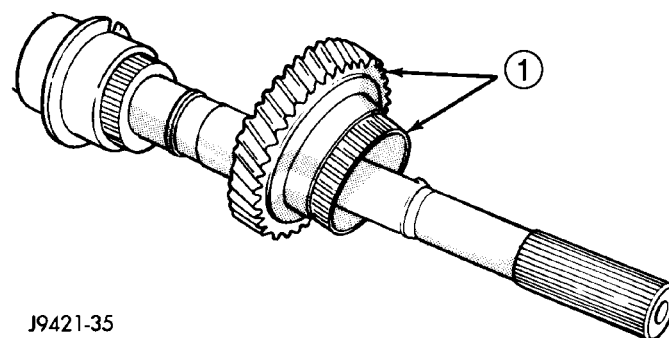
MANUAL - NV3550 (Continued)

**Fig. 48 FIFTH-REVERSE SYNCHRO HUB AND SLEEVE**

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

(16) Remove fifth-reverse synchro hub and sleeve with a press (Fig. 48).

(17) Remove reverse gear and needle bearing (Fig. 49).



J9421-35

Fig. 49 REVERSE GEAR AND NEEDLE BEARING

1 - REVERSE GEAR AND NEEDLE BEARING

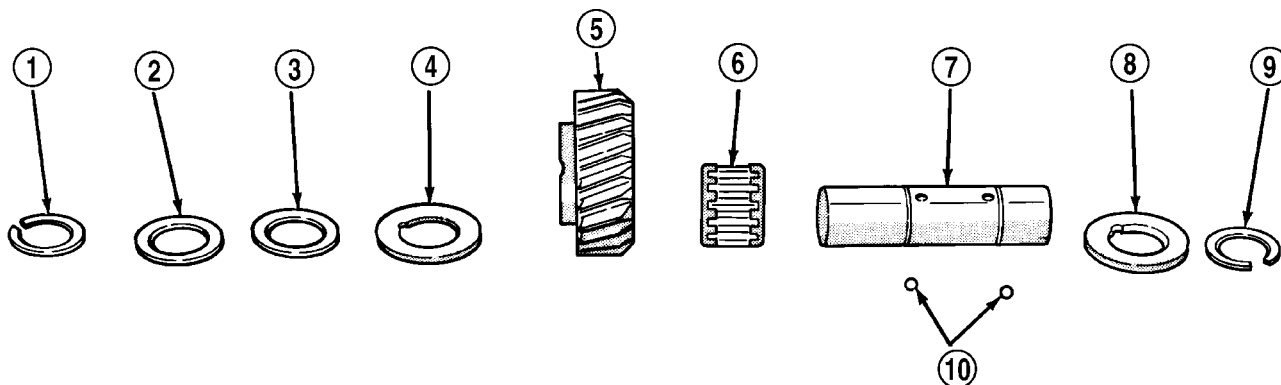
REVERSE IDLER

- (1) Remove idler gear snap rings (Fig. 50).
- (2) Remove thrust washer, wave washer, thrust plate and idler gear from shaft.
- (3) Remove idler gear needle bearing from shaft.

CLEANING

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

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

**Fig. 50 REVERSE IDLER COMPONENTS**

- 1 - SNAP RING
- 2 - FLAT WASHER
- 3 - WAVE WASHER
- 4 - THRUST WASHER
- 5 - REVERSE IDLER GEAR

- 6 - IDLER GEAR BEARING
- 7 - IDLER SHAFT
- 8 - THRUST WASHER
- 9 - SNAP RING
- 10 - THRUST WASHER LOCKBALLS

J9421-53

MANUAL - NV3550 (Continued)

INSPECTION

NOTE: Minor nicks on surfaces can be smoothed off with 320/420 grit emery cloth and final polished with oil coated crocus cloth.

SHIFT LEVER ASSEMBLY

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

SHIFT SHAFT AND FORKS

Inspect the shift fork interlock arms and synchro sleeve contact surfaces (Fig. 51). Replace any fork exhibiting wear or damage in these areas. Do not attempt to salvage shift forks.

Check condition of the shift shaft detent plunger and spring. The plunger should be smooth and free of nicks, or scores. The plunger spring should be straight and not collapsed, or distorted. Replace the plunger and spring if in doubt about condition. Check condition of detent plunger bushings. Replace if damaged.

Inspect the shift shaft, shift shaft bushing and bearing, the shaft lever, and the lever bushing that fits over the lever. Replace the shaft if bent, cracked,

or severely scored. Replace the shift shaft bushing or bearing if damaged.

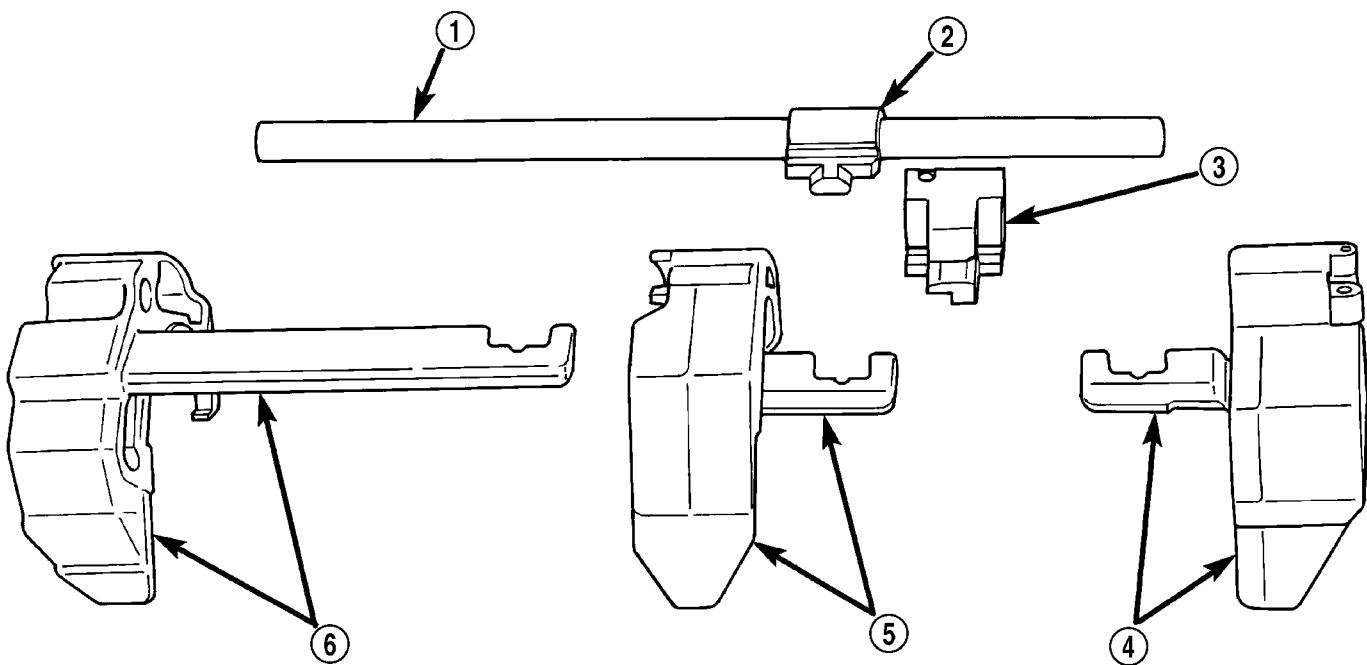
Replace the shaft lever and bushing if either part is deformed, or worn. Do not attempt to salvage these parts as shift fork binding will occur. Replace the roll pin that secures the lever to the shaft.

FRONT/REAR HOUSINGS AND BEARING RETAINERS

Inspect the housings carefully. Look for cracks, stripped threads, scored mating surfaces, damaged bearing bores, or worn dowel pin holes. Minor nicks on mating surfaces can be dressed off with a fine file, or emery cloth.

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

Inspect the input shaft bearing retainer. Be sure the release bearing slide surface of the retainer is in good condition. Replace the retainer seal if necessary.



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Fig. 51 Shift Forks And Shaft

1 - SHIFT SHAFT
2 - SHAFT LEVER
3 - SHAFT LEVER BUSHING

4 - 3-4 SHIFT FORK
5 - 1-2 SHIFT FORK
6 - FIFTH-REVERSE SHIFT FORK

MANUAL - NV3550 (Continued)

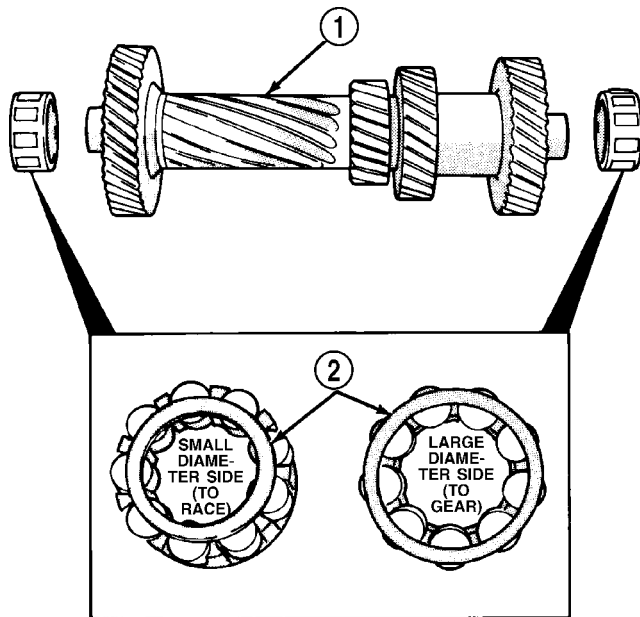
Inspect the output shaft bearing retainer. Be sure the U-shaped retainer is flat and free of distortion. Replace the retainer if the threads are damaged, or if the retainer is bent, or cracked.

COUNTERSHAFT BEARINGS AND RACES

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

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

The countershaft bearings can be installed backwards if care is not exercised. The bearing roller cage is a different diameter on each side. Be sure the bearing is installed so the large diameter side of the cage is facing the countershaft gear (Fig. 52). The small diameter side goes in the bearing race.



J9421-55

Fig. 52 Countershaft Bearings

- 1 - COUNTERSHAFT
2 - BEARING CAGE

REVERSE IDLER COMPONENTS

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

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

Shift Socket

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

Output Shaft And Geartrain

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

Inspect the shaft splines and bearings surfaces. Replace the shaft if the splines are damaged or bearing surfaces are deeply scored, worn, or brinnelled.

ASSEMBLY

CAUTION: Transmission shift components must be in the Neutral position during assembly, to prevent damage to synchros and shift components during housing installation.

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

SYNCHRONIZER

NOTE: Assemble synchro springs, struts and detent balls one at a time.

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

(2) Install the first spring in the hub. Then install a strut over the spring and verify the spring is seated in the spring bore in the strut.

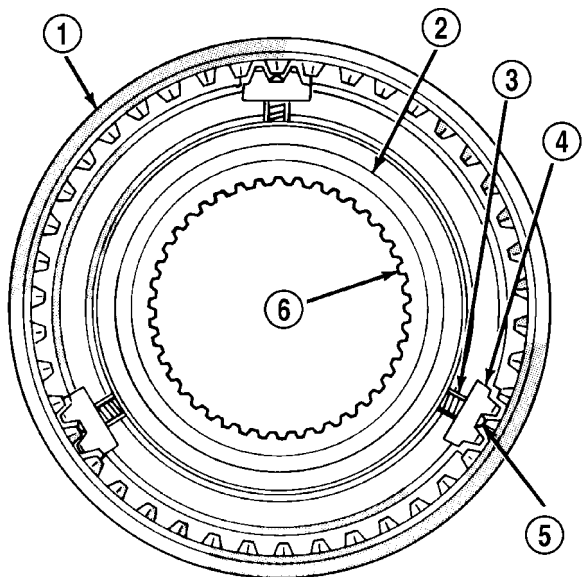
MANUAL - NV3550 (Continued)

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

(4) Place the detent ball in the top of the strut. Then carefully work the sleeve over the ball to hold it in place. With a small flat blade screwdriver, press the ball into place while moving the sleeve over it.

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

(6) Verify synchro springs, struts and detent balls are all in place (Fig. 53).



J9421-57

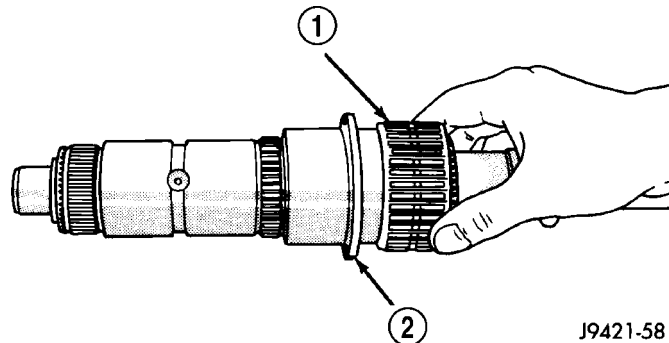
Fig. 53 SYNCHRONIZER COMPONENTS

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

OUTPUT SHAFT

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

(1) Install reverse gear needle bearing, against the shoulder of the output shaft (Fig. 54).

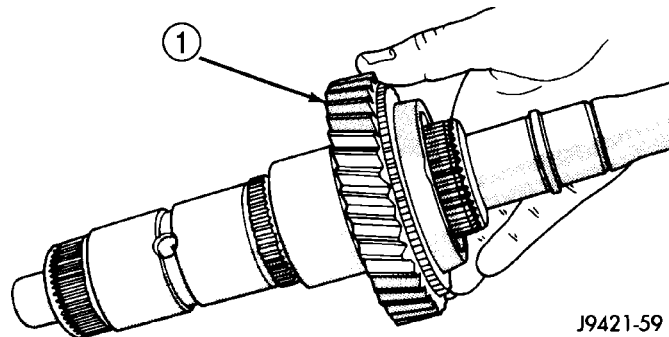


J9421-58

Fig. 54 REVERSE GEAR BEARING

- 1 - REVERSE GEAR BEARING
- 2 - SHOULDER

(2) Install reverse gear over needle bearing (Fig. 55).

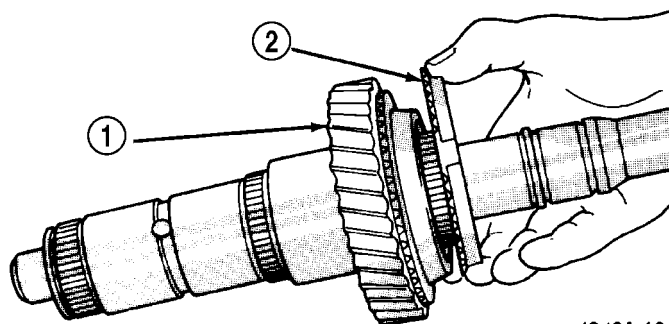


J9421-59

Fig. 55 REVERSE GEAR

- 1 - REVERSE GEAR

(3) Install brass synchro ring on reverse gear (Fig. 56).



J9421-60

Fig. 56 REVERSE SYNCHRO

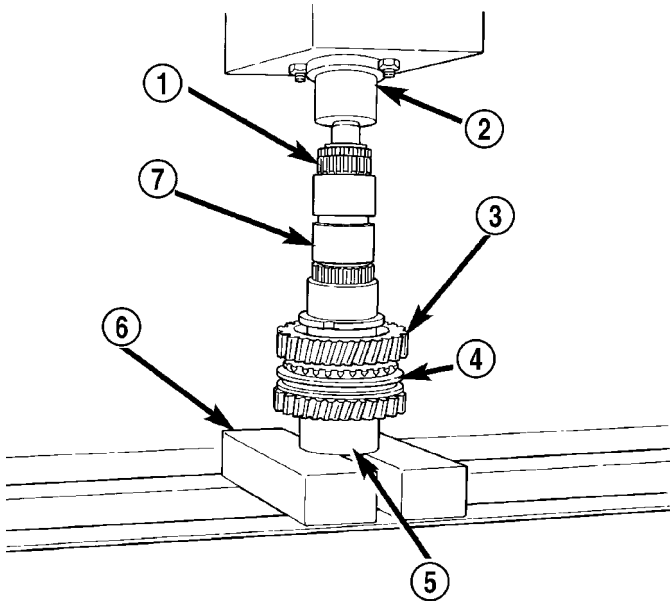
- 1 - REVERSE GEAR
- 2 - SYNCHRO RING

MANUAL - NV3550 (Continued)

(4) Assemble fifth-reverse synchro hub, sleeve, struts, springs and detent balls, if not previously done.

NOTE: The side of the hub with the shoulder around the hub bore and tapered side of the sleeve, faces the front of the shaft.

(5) Align fifth-reverse synchro assembly on output shaft splines. Seat synchro onto the shaft with Cup 6310-1 and a press (Fig. 57).



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Fig. 57 FIFTH-REVERSE SYNCHRO ASSEMBLY

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

(6) Install **new** fifth-reverse hub snap ring (Fig. 58) and verify the snap ring is seated.

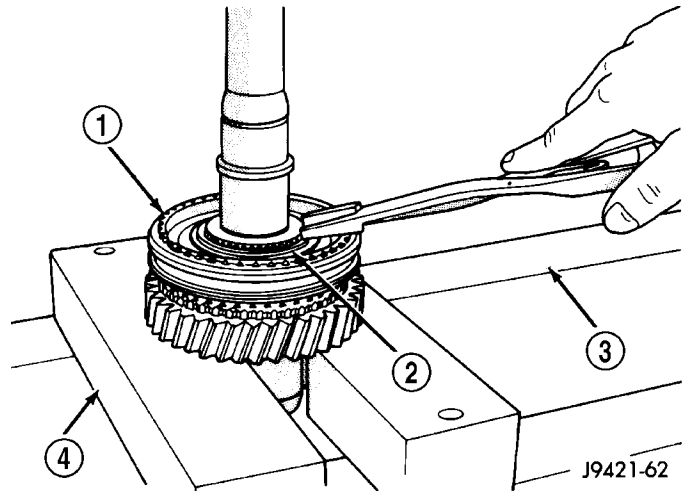


Fig. 58 FIFTH/REVERSE SYNCHRO HUB SNAP RING

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

(7) Install fifth gear synchro ring in synchro hub and sleeve (Fig. 59).

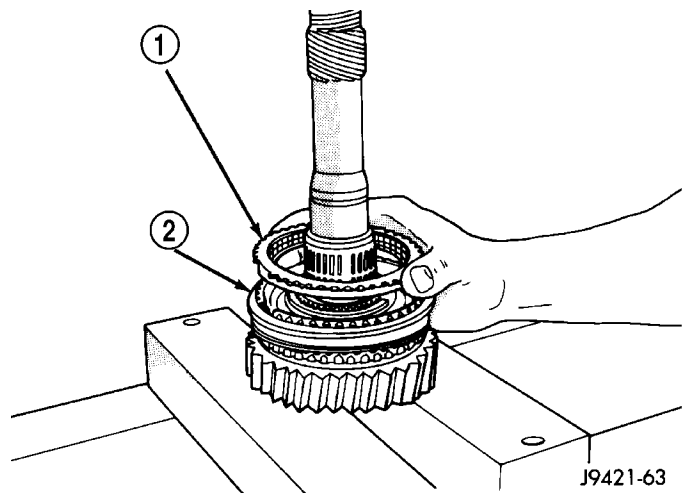


Fig. 59 FIFTH GEAR SYNCHRO RING

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

MANUAL - NV3550 (Continued)

(8) Install fifth gear bearing by spreading bearing, just enough to clear shoulder on the output shaft (Fig. 60). Verify bearing is properly seated.

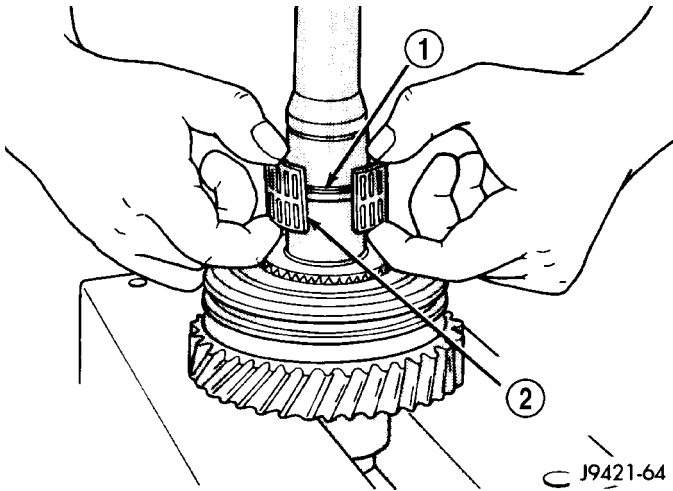


Fig. 60 FIFTH GEAR BEARING

- 1 - SHAFT SHOULDER
- 2 - FIFTH GEAR BEARING

(9) Install fifth gear on shaft and onto bearing (Fig. 61).

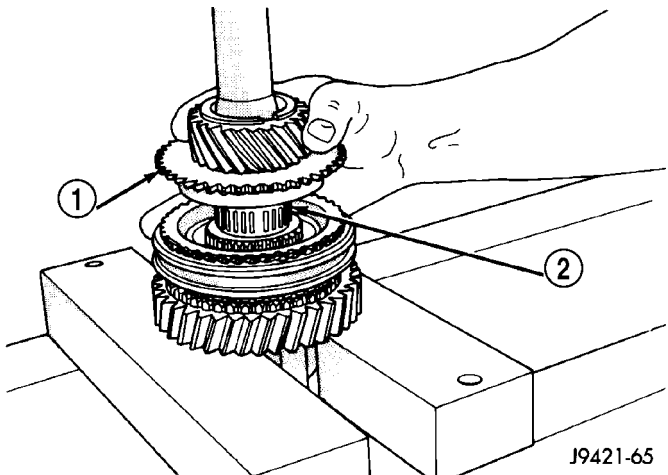


Fig. 61 FIFTH GEAR

- 1 - FIFTH GEAR
- 2 - BEARING

(10) Invert output shaft and set shaft in Cup 6310-1 so fifth gear is seated on the tool (Fig. 62).

(11) Install first gear bearing on output shaft (Fig. 62). Verify bearing is seated on shaft shoulder and is properly joined.

(12) Install first gear on shaft and over bearing with bearing synchro cone facing up (Fig. 63).

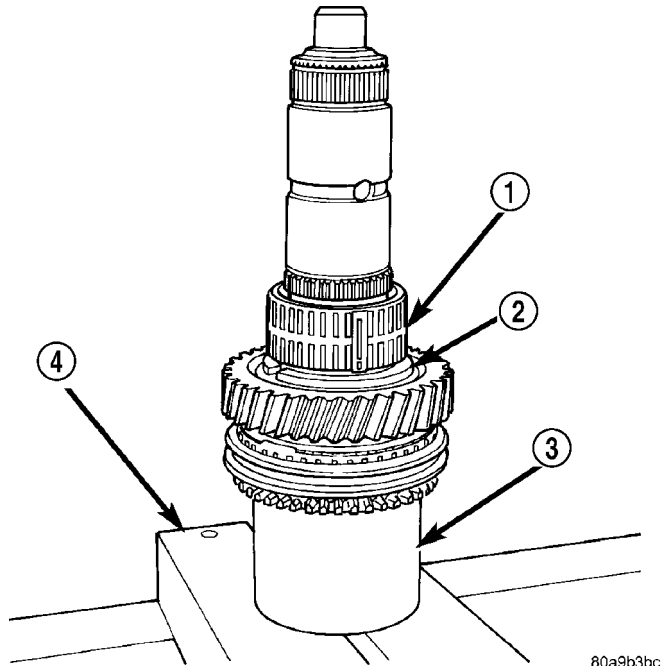


Fig. 62 FIRST GEAR BEARING

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

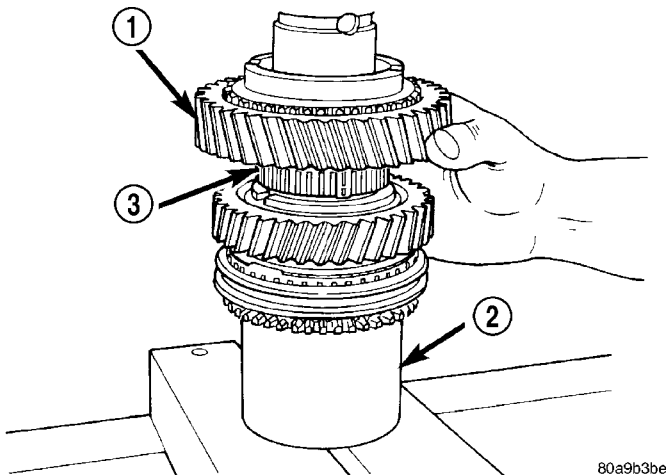
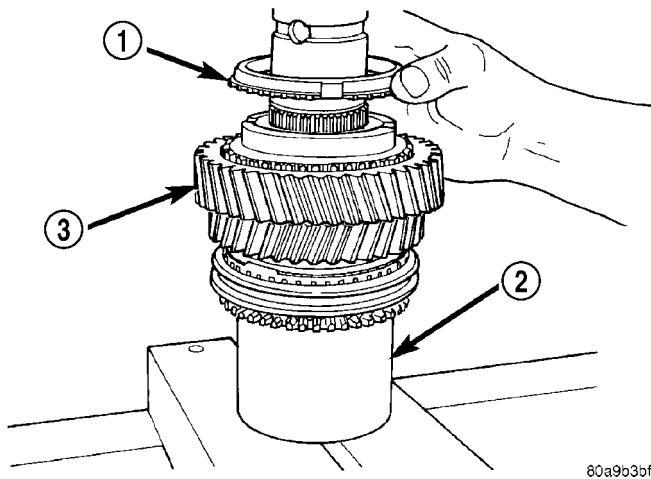


Fig. 63 FIRST GEAR

- 1 - FIRST GEAR
- 2 - CUP
- 3 - BEARING

MANUAL - NV3550 (Continued)

(13) Install first gear synchro ring (Fig. 64).



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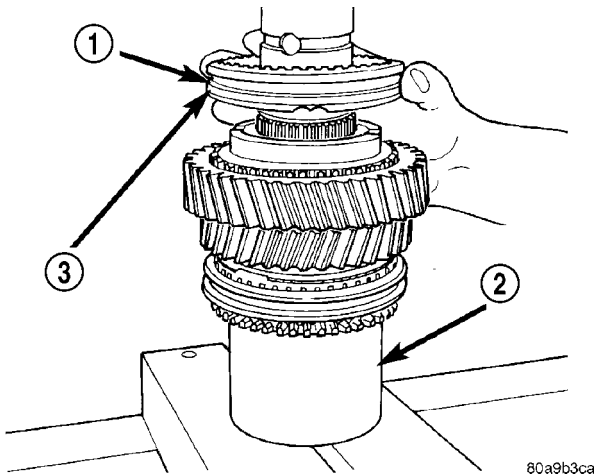
Fig. 64 FIRST GEAR SYNCHRO RING

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

(14) Assemble 1-2 synchro hub sleeve, springs, struts and detent balls.

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

(15) Align 1-2 synchro assembly on the shaft (Fig. 65).



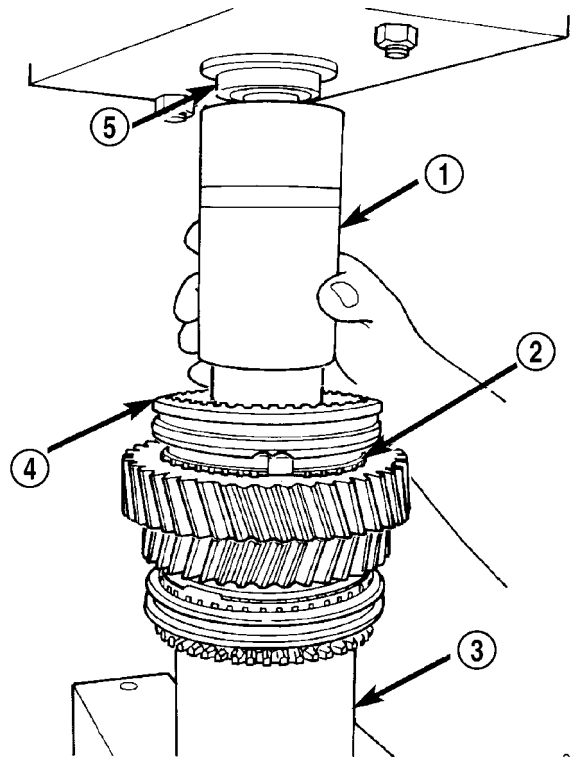
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Fig. 65 STARTING 1-2 SYNCHRO

- 1 - 1-2 SYNCHRO ASSEMBLY
- 2 - CUP
- 3 - FIRST GEAR SIDE OF SYNCHRO SLEEVE

(16) Press 1-2 synchro onto output shaft using suitable size pipe tool and shop press (Fig. 66).

CAUTION: Ensure synchro ring and sleeve is aligned as hub is being pressed onto the shaft. The synchro ring can crack if not aligned.



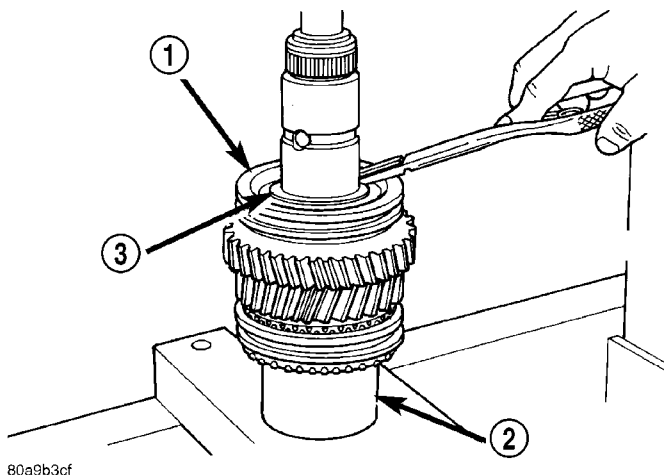
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Fig. 66 PRESS 1-2 SYNCHRO

- 1 - SUITABLE SIZE PIPE
- 2 - SYNCHRO RING
- 3 - SPECIAL TOOL
- 4 - 1-2 SYNCHRO ASSEMBLY
- 5 - PRESS RAM

(17) Install interm ring.

(18) Install **new** 1-2 synchro hub snap ring (Fig. 67) and verify the snap ring is seated.



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Fig. 67 1-2 SYNCHRO HUB SNAP RING

- 1 - 1-2 SYNCHRO
- 2 - CUP
- 3 - SYNCHRO SNAP RING

MANUAL - NV3550 (Continued)

(19) Install second gear synchro ring in 1-2 synchro hub and sleeve (Fig. 68). Verify synchro ring is properly seated.

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

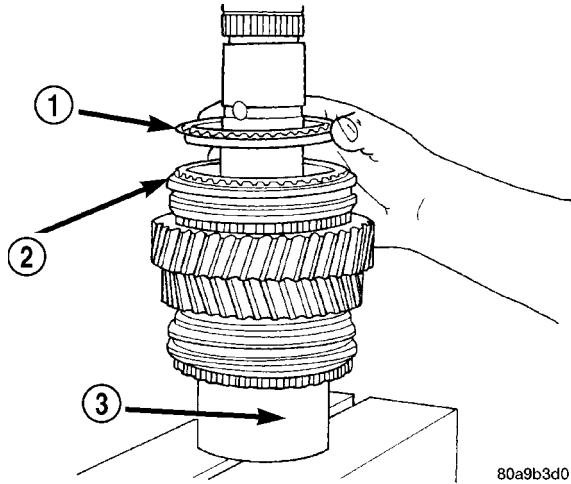


Fig. 68 SECOND GEAR SYNCHRO RING

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

(21) Install second gear needle bearing on shaft (Fig. 69).

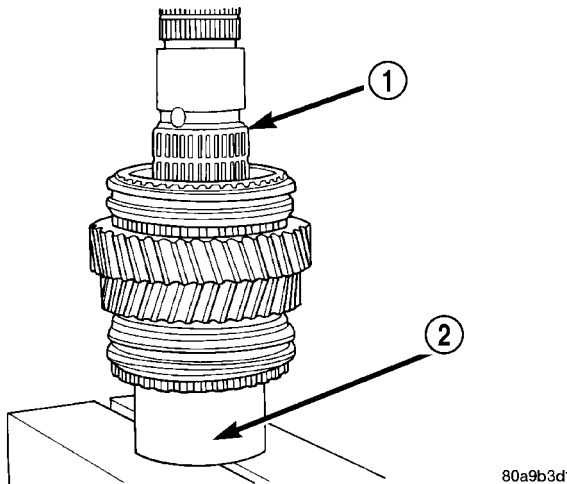


Fig. 69 SECOND GEAR BEARING

- 1 - SECOND GEAR BEARING
- 2 - CUP

(22) Install second gear onto shaft and bearing (Fig. 70). Verify second gear is fully seated on synchro components.

(23) Install two-piece thrust washer (Fig. 71). Ensure washer halves are seated in shaft groove and washer lugs are seated in shaft lug bores.

NOTE: Verify i.d. grooves and markings noted during removal are facing the correct direction.

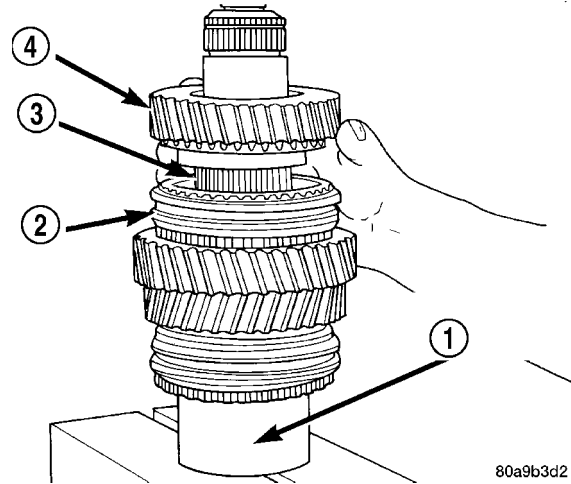


Fig. 70 SECOND GEAR

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

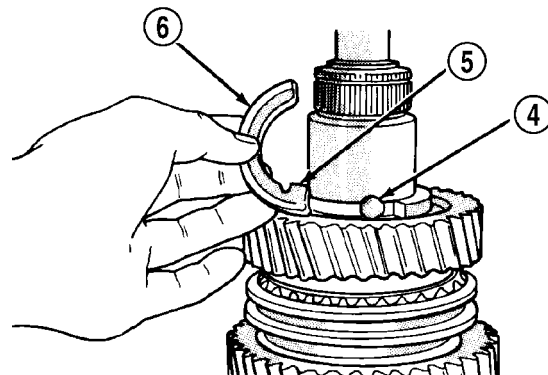
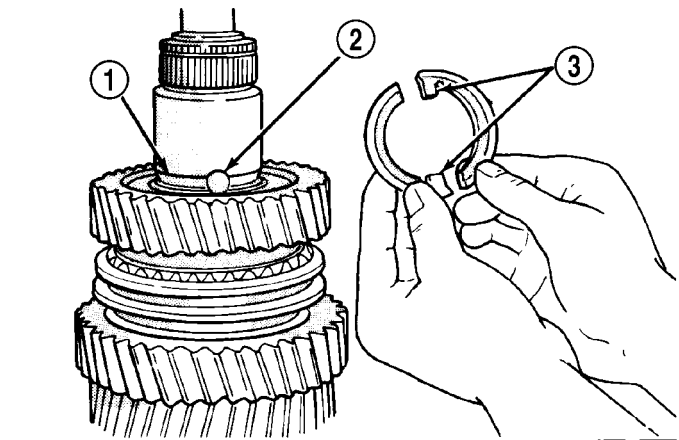
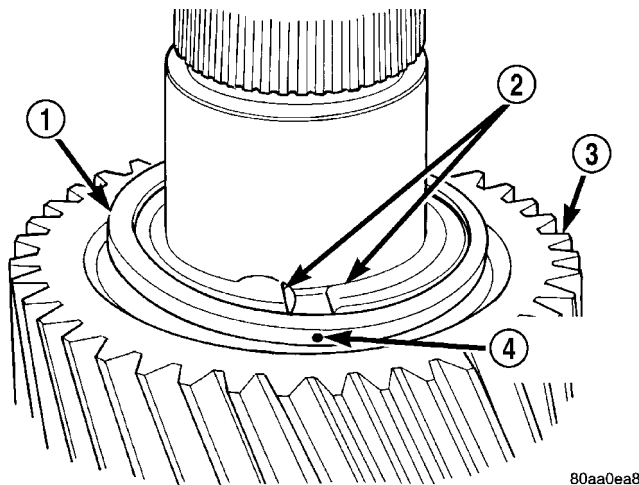


Fig. 71 TWO-PIECE THRUST WASHER

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

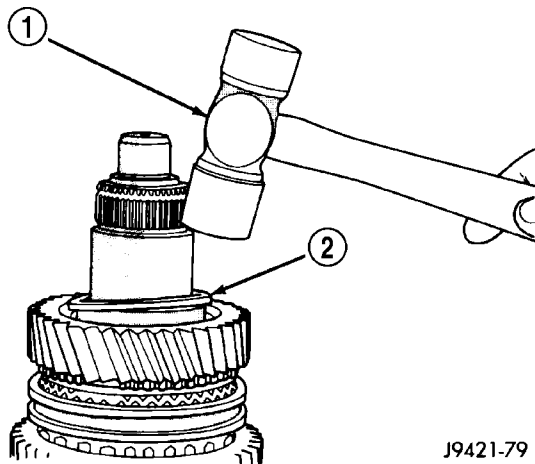
MANUAL - NV3550 (Continued)

(24) Start retaining ring around two-piece thrust washer (Fig. 72). Ensure locating dimple is between the thrust washer halves.

**Fig. 72 RETAINING RING**

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

(25) Seat thrust washer retaining ring with plastic mallet (Fig. 73).

**Fig. 73 THRUST RETAINER**

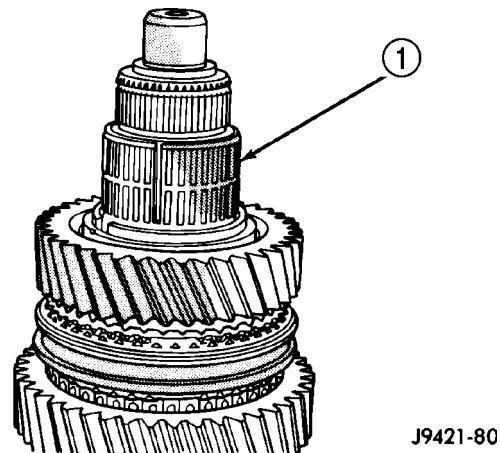
- 1 - PLASTIC MALLET
- 2 - THRUST WASHER RETAINING RING

(26) Install third gear needle bearing on shaft (Fig. 74).

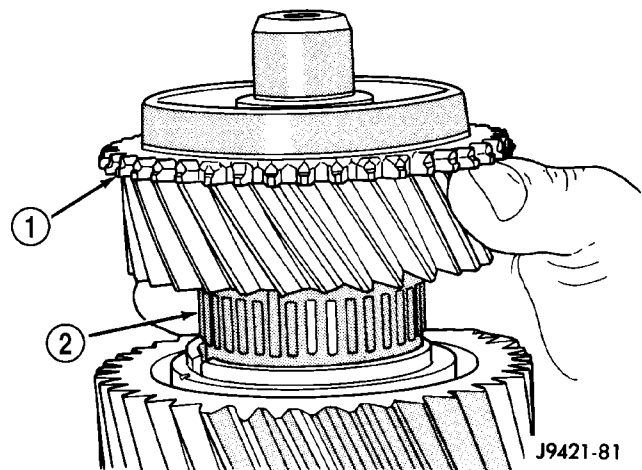
(27) Install third gear on shaft and bearing (Fig. 75).

(28) Install third speed synchro ring on third gear (Fig. 76).

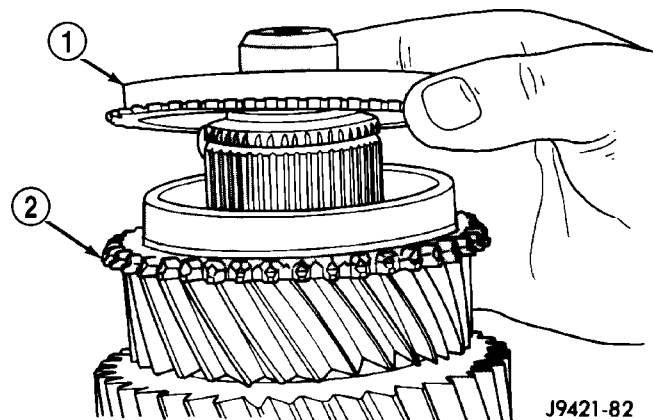
(29) Assemble 3-4 synchro hub, sleeve, springs, struts and detent balls.

**Fig. 74 THIRD GEAR BEARING**

- 1 - THIRD GEAR BEARING

**Fig. 75 THIRD GEAR**

- 1 - THIRD GEAR
- 2 - BEARING

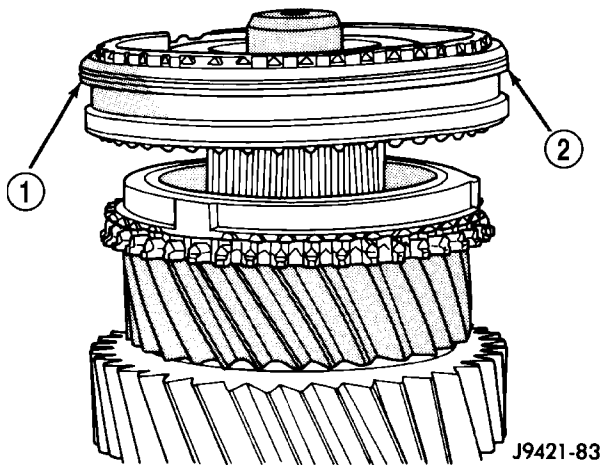
**Fig. 76 THIRD SPEED SYNCHRO RING**

- 1 - THIRD SPEED SYNCHRO RING
- 2 - THIRD GEAR

MANUAL - NV3550 (Continued)

(30) Align 3-4 synchro hub on output shaft splines by hand (Fig. 77).

CAUTION: One side of the sleeve has grooves in it. This side of sleeve must face the front of the shaft.



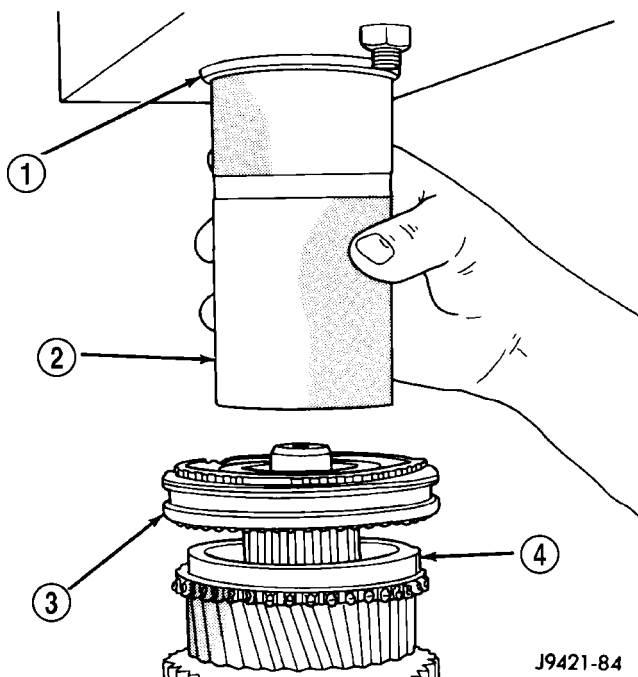
J9421-83

Fig. 77 3-4 SYNCHRO HUB ON OUTPUT SHAFT

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

(31) Press 3-4 synchro assembly onto output shaft with shop press and suitable size pipe tool (Fig. 78).

NOTE: Place the pipe on hub as close to output shaft as possible without contacting the shaft splines.

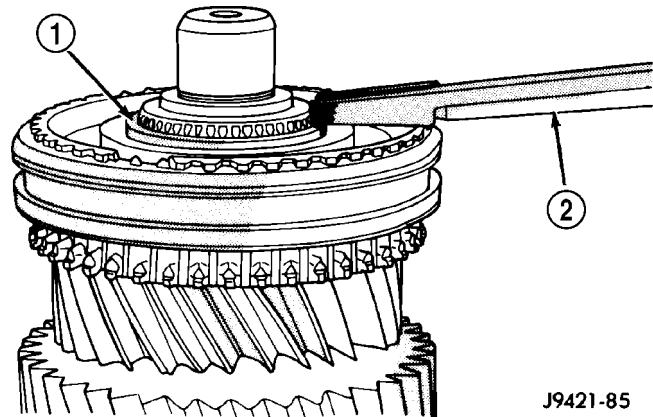


J9421-84

Fig. 78 PRESS 3-4 SYNCHRO ON OUTPUT SHAF

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

(32) Install **new** 3-4 synchro hub snap ring (Fig. 79) and verify snap ring is seated.



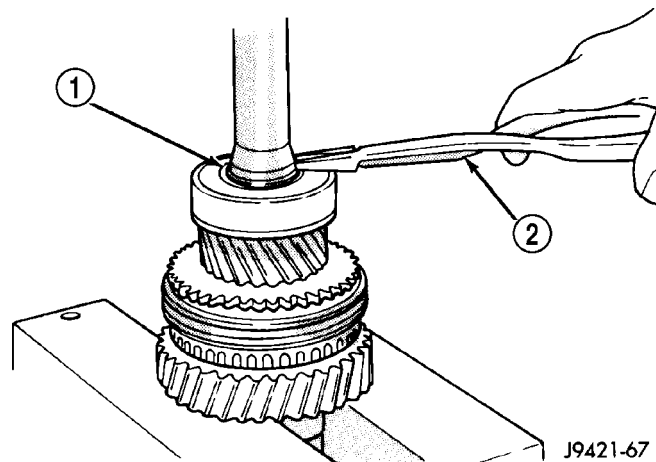
J9421-85

Fig. 79 3-4 SYNCHRO HUB SNAP RING

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

(33) Install output shaft bearing.

(34) Install output shaft bearing snap ring, spreading it just enough to install it (Fig. 80). Verify snap ring is seated in shaft groove.

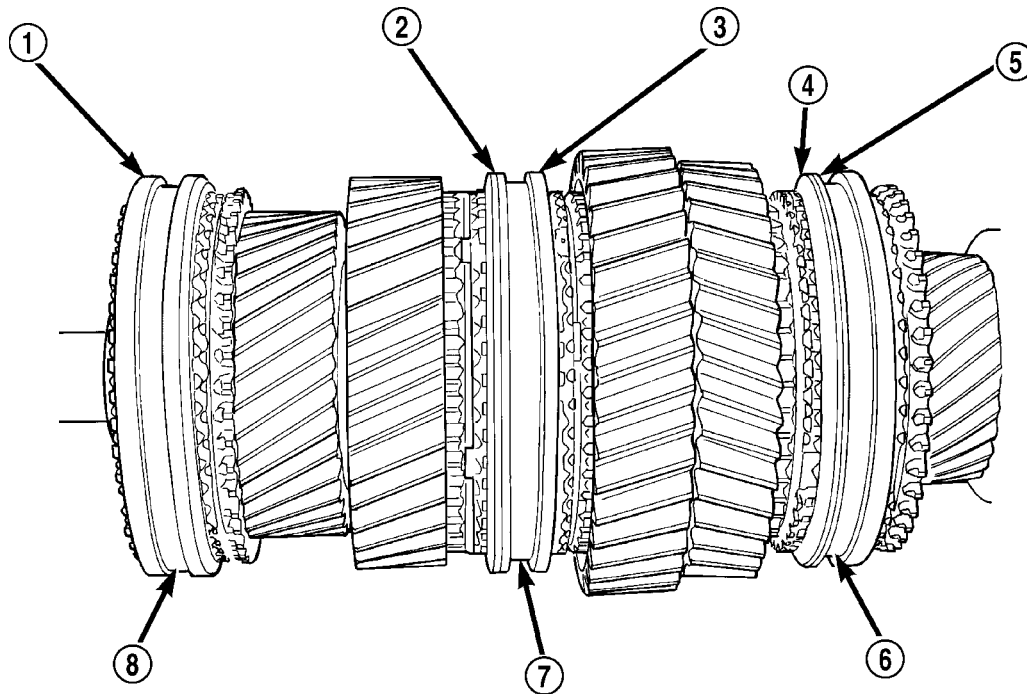


J9421-67

Fig. 80 OUTPUT SHAFT BEARING

- 1 - BEARING SNAP RING
2 - SNAP RING PLIERS

MANUAL - NV3550 (Continued)



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Fig. 81 SYNCHRO SLEEVE LOCATIONS

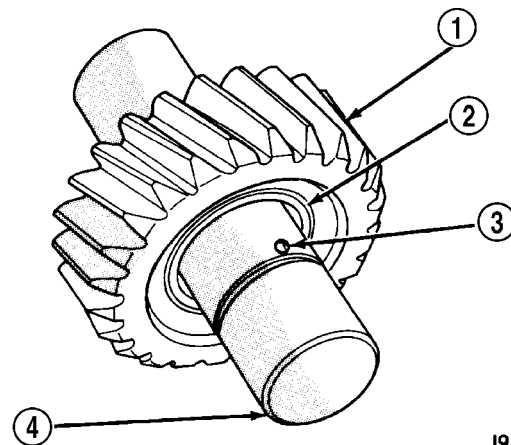
- 1 - DOUBLE GROOVE FORWARD
- 2 - GROOVE FORWARD
- 3 - FIRST GEAR SIDE MARKING TOWARD FIRST GEAR
- 4 - TAPER FORWARD

- 5 - GROOVE FORWARD
- 6 - 5TH-REV SYNCHRO SLEEVE
- 7 - 1-2 SYNCHRO SLEEVE
- 8 - 3-4 SYNCHRO SLEEVE

(35) Verify position of synchro sleeves before proceeding with assembly operations (Fig. 81). Grooved side of 3-4 sleeve should be facing forward. First gear side of 1-2 sleeve should be facing first gear. Tapered side of fifth-reverse sleeve should be facing forward.

REVERSE IDLER ASSEMBLY

- (1) Lubricate idler components with gear lube.
- (2) Slide idler gear bearing on shaft (Fig. 82). Bearing fits either way on shaft.
- (3) Slide gear onto shaft with recess to the rear (Fig. 82).
- (4) Place first lock ball in dimple at rear end of idler shaft (Fig. 82). Hold ball in place with petroleum jelly.



J9421-87

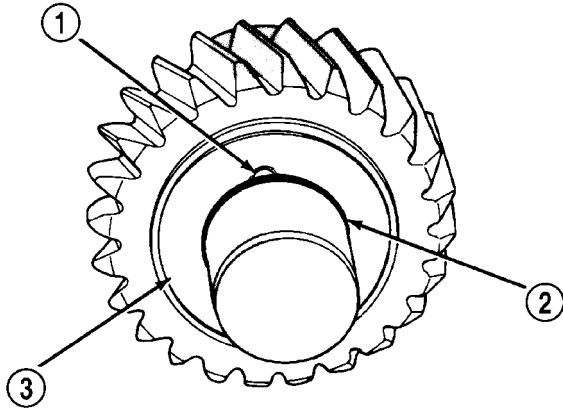
Fig. 82 IDLER GEAR AND BEARING

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

MANUAL - NV3550 (Continued)

(5) Slide rear thrust washer onto shaft and over lock ball (Fig. 83).

(6) Install snap ring in groove at rear of shaft (Fig. 83).



J9421-89

Fig. 83 IDLER GEAR REAR THRUST WASHER

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

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

(8) Install front thrust washer on shaft and slide washer up against gear and over lock ball (Fig. 84).

(9) Install wave washer, flat washer and remaining snap ring on idler shaft (Fig. 84). Verify snap ring is seated.

SHIFT SHAFT AND BUSHINGS/BEARINGS

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

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

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

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

(5) The bushing is correctly installed if the bushing is flush with the transmission case.

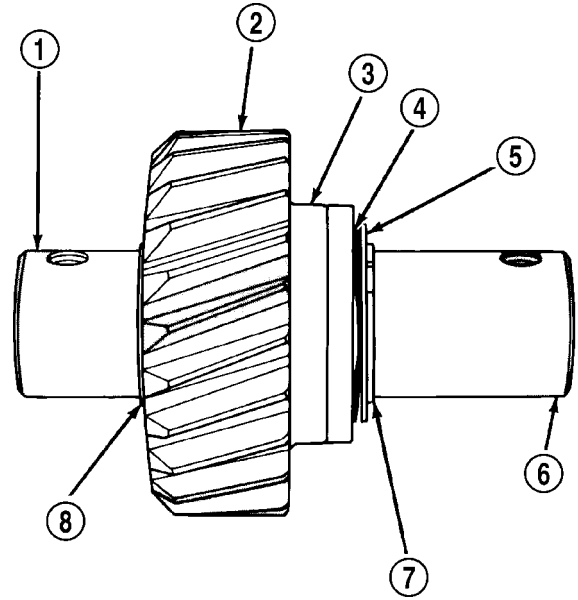
(6) To replace the bearing locate a bolt that will thread into the bearing without great effort.

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

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

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

(10) The bearing is correctly installed if the bearing is flush with the transmission case.



J9421-90

Fig. 84 IDLER GEAR AND SHAFT ASSEMBLY

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

DETENT PLUNGER BUSHING

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

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

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

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

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

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

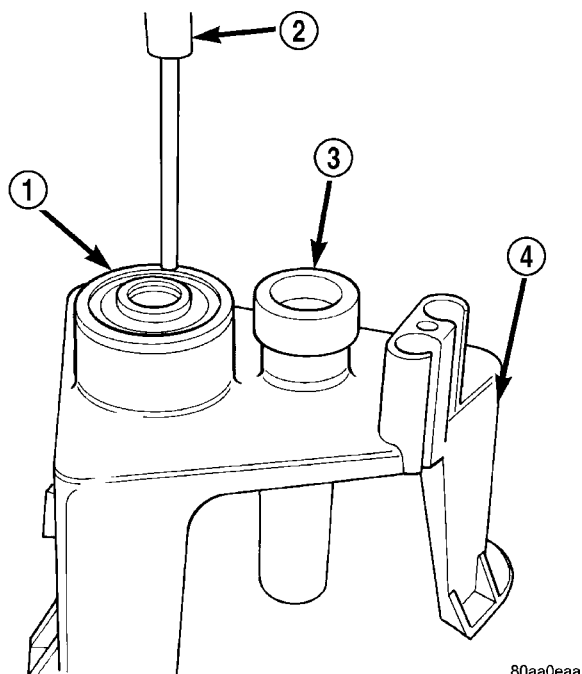
(6) Install a new detent plunger bushing on the short end of Installer 8118.

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

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

MANUAL - NV3550 (Continued)**GEARTRAIN ASSEMBLY**

(1) Install Adapter 6747-1A on input shaft hub of Fixture 6747 (Fig. 85).

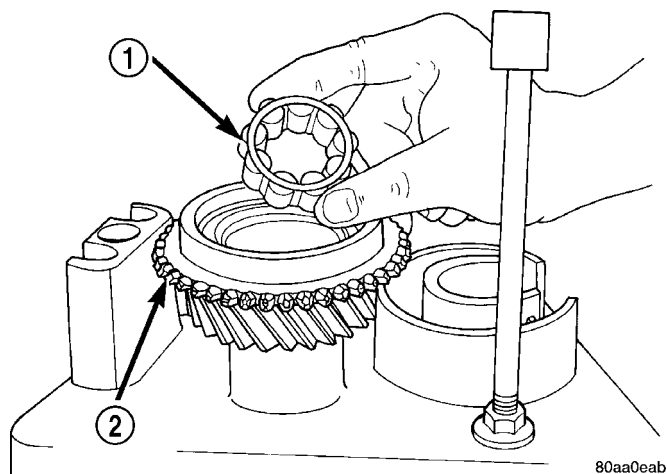
**Fig. 85 ASSEMBLY FIXTURE**

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

(2) Install input shaft in fixture and make sure Adapter 6747-1A is positioned under shaft as shown (Fig. 86).

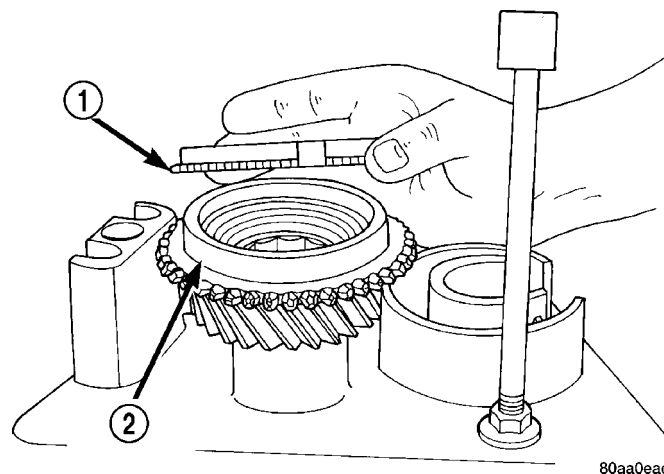
(3) Install pilot bearing in input shaft (Fig. 86).

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

**Fig. 86 PILOT BEARING AND INPUT SHAFT**

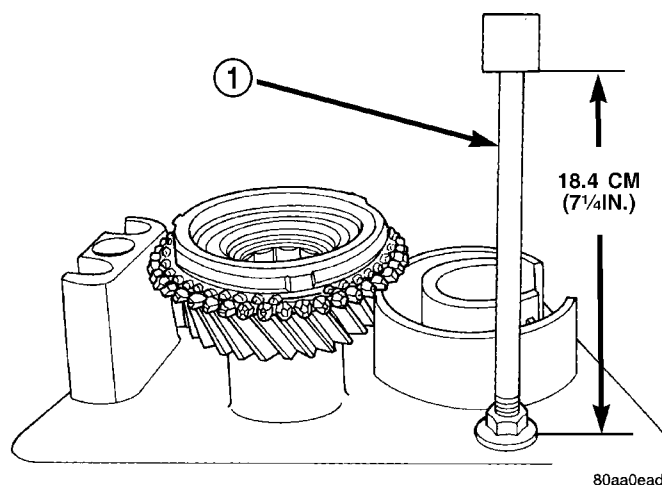
- 1 - PILOT BEARING
2 - INPUT SHAFT

(4) Install fourth gear synchro ring on input shaft (Fig. 87).

**Fig. 87 FOURTH GEAR SYNCHRO**

- 1 - FOURTH GEAR SYNCHRO RING
2 - INPUT SHAFT

(5) Adjust height of idler gear pedestal on assembly fixture (Fig. 88). Start with a basic height of 18.4 cm (7-1/4 in.). Final adjustment can be made after gear is positioned on pedestal.

**Fig. 88 IDLER PEDESTAL BASIC HEIGHT**

- 1 - REVERSE IDLER PEDESTAL

MANUAL - NV3550 (Continued)

(6) Install assembled output shaft and geartrain in input shaft (Fig. 89). Carefully rotate output shaft until the 3-4 synchro ring seats in synchro hub and sleeve.

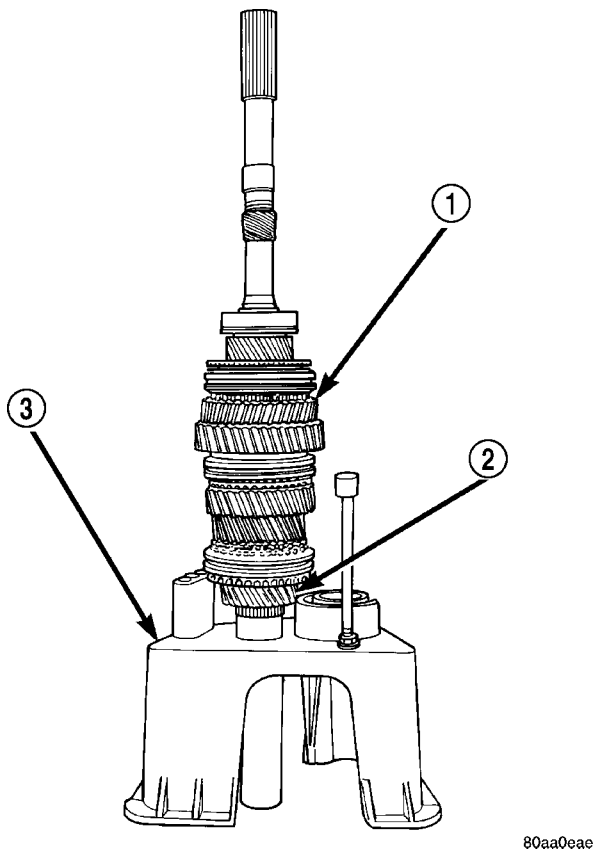


Fig. 89 OUTPUT SHAFT AND GEARTRAIN

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

(7) Install Adapter 6747-2A on front bearing hub of countershaft. The adapter has a shoulder on one side that goes towards the countershaft.

(8) Slide countershaft (and adapter) into fixture slot. Verify countershaft and output shaft gears are meshed with the mainshaft gears (Fig. 90).

(9) Check alignment of countershaft and output shaft gear teeth. Note gears may not align perfectly. A difference in height of 1.57 to 3.18 mm (1/16 to 1/8 in.) will probably exist. This difference will not interfere with assembly.

(10) Position reverse idler in support cup of assembly fixture (Fig. 91). Ensure idler gear is properly meshed and aligned with shaft gear teeth and bolt holes are facing out and not toward geartrain. Adjust pedestal up or down if necessary and verify that short end of idler shaft is facing up as shown.

(11) On 2-wheel drive transmission, thread one Alignment Pin 8120 in center or passenger side hole

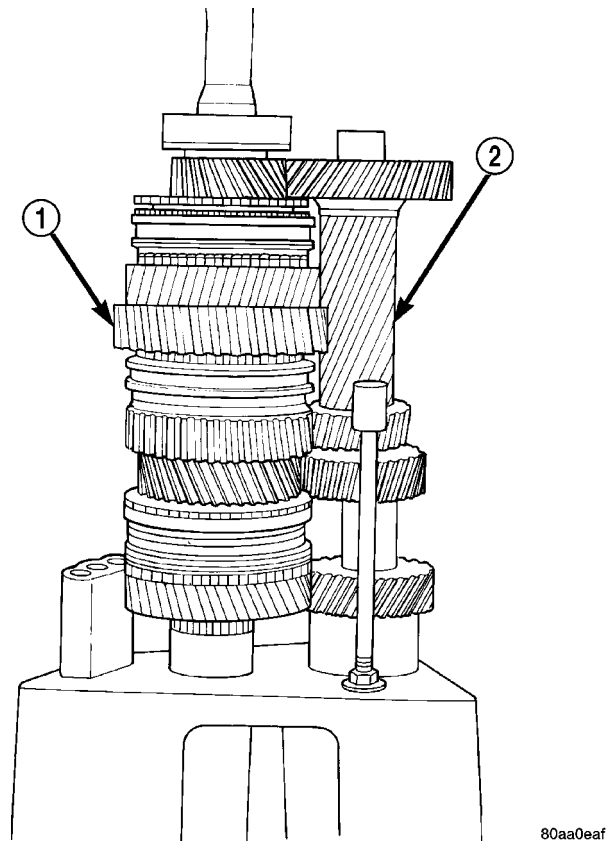


Fig. 90 COUNTERSHAFT ON FIXTURE

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

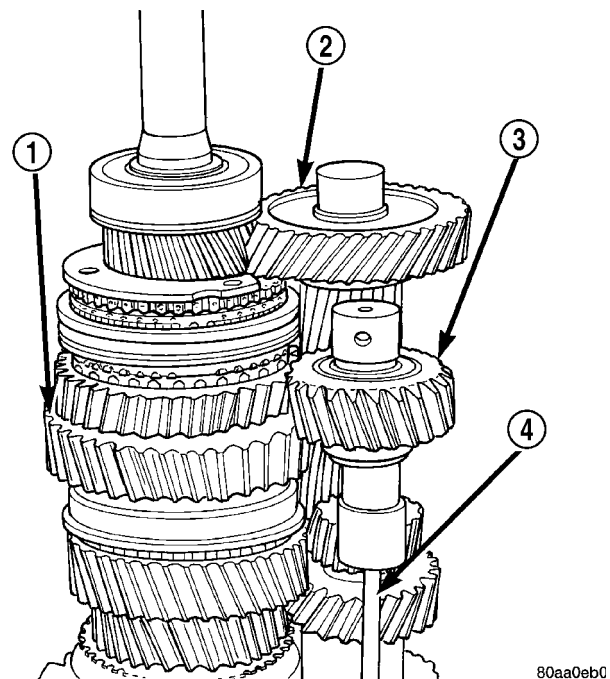


Fig. 91 REVERSE IDLER ASSEMBLY POSITION

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

MANUAL - NV3550 (Continued)

of output shaft bearing retainer. Then position retainer on fifth gear as shown (Fig. 92).

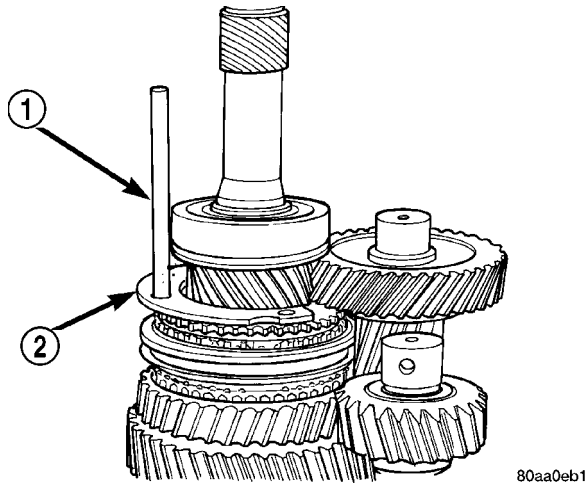


Fig. 92 POSITIONING OUTPUT SHAFT BEARING

- 1 - ALIGNMENT PIN
2 - OUTPUT SHAFT BEARING RETAINER

(12) Assemble 1-2 and fifth reverse-shift forks (Fig. 93). Arm of fifth-reverse fork goes through slot in 1-2 fork.

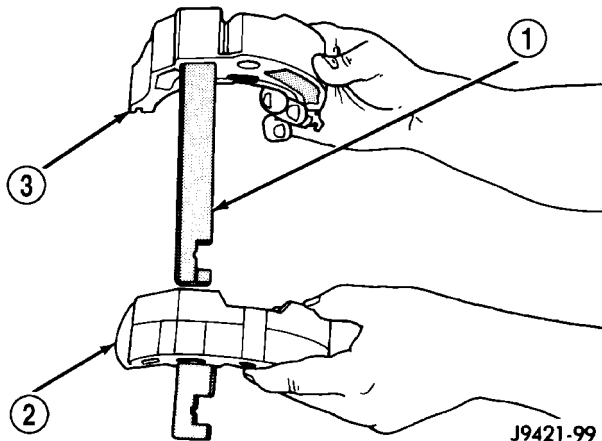


Fig. 93 1-2 AND FIFTH-REVERSE

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

(13) Install assembled shift forks in synchro sleeves (Fig. 94). Verify forks are properly seated in sleeves.

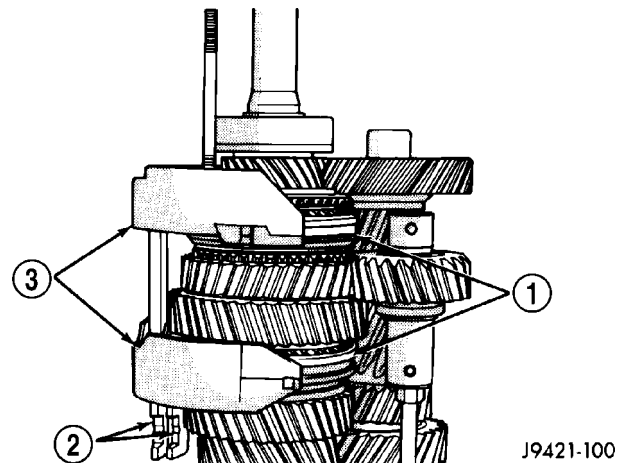


Fig. 94 SHIFT FORKS IN SYNCHRO

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

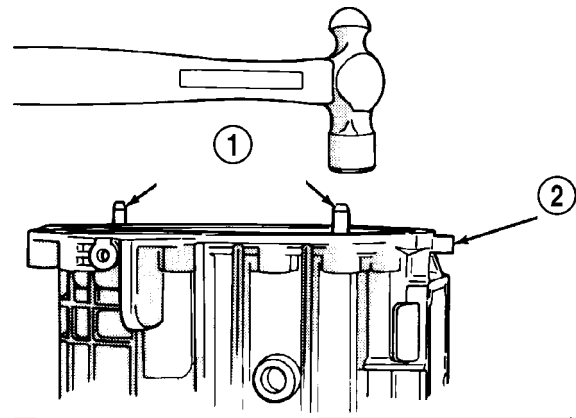


Fig. 95 REAR HOUSING DOWELS

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

REAR HOUSING - 2WD

(1) Drive adapter housing alignment dowels back into housing until dowels are flush with mounting surface (Fig. 95).

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

MANUAL - NV3550 (Continued)

(3) Install countershaft rear bearing in bearing race (Fig. 96).

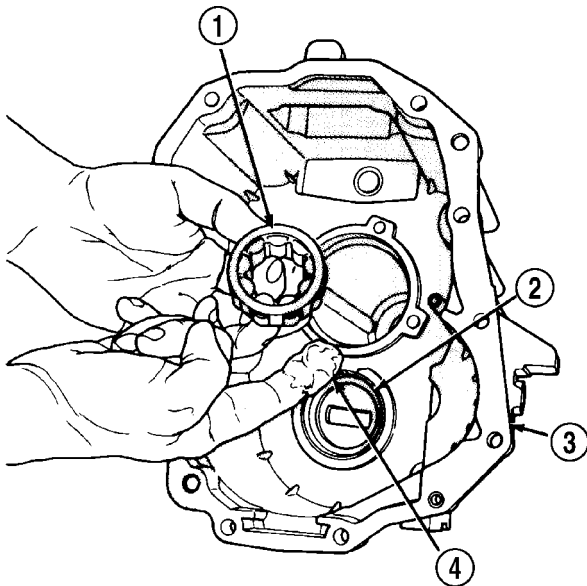


Fig. 96 COUNTERSHAFT REAR BEARING

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

CAUTION: Large diameter side of the roller retainer must face the countershaft and small diameter side must face the race and housing (Fig. 97).

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

(5) Apply light coat of petroleum jelly to shift shaft bushing/bearing in rear housing (Fig. 97).

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

(7) Install rear housing onto geartrain (Fig. 98). Verify bearing retainer pilot stud is in correct bolt hole in the housing and countershaft and output shaft bearings are aligned in housing and on countershaft. If necessary lift upward on countershaft slightly to ensure that the countershaft rear bearing engages to the countershaft before the rear output shaft bearing engages the housing.

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

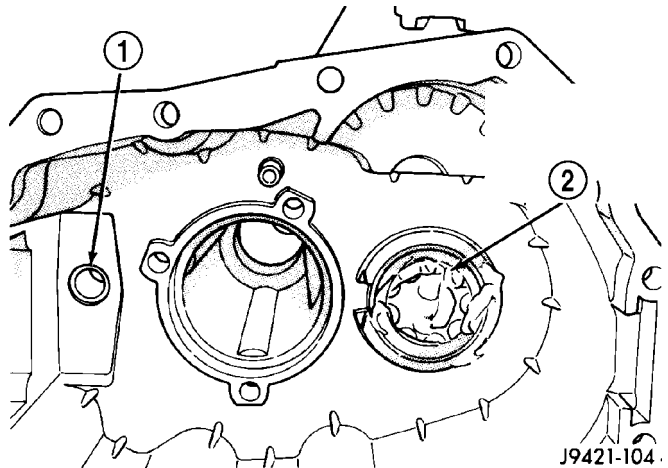


Fig. 97 COUNTERSHAFT REAR BEARING SEATED

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

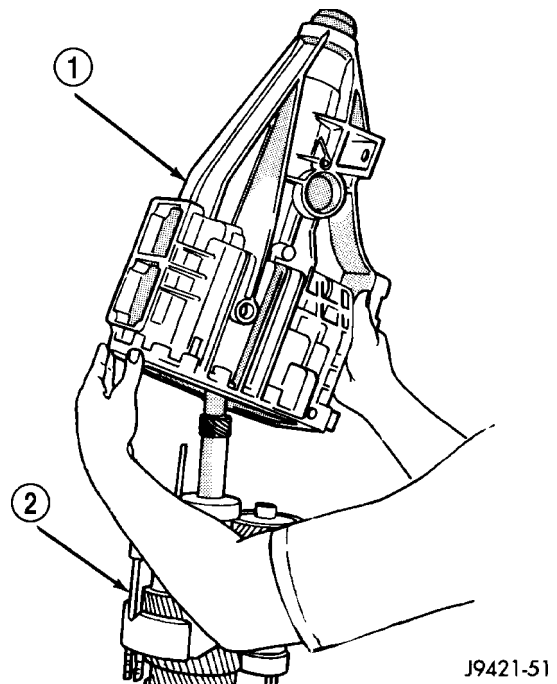


Fig. 98 REAR HOUSING - 2WD

- 1 - REAR HOUSING
- 2 - SHIFT FORKS AND GEARTRAIN

MANUAL - NV3550 (Continued)

(9) Apply Mopar Gasket Maker or equivalent to housing bolt threads, bolt shanks and under bolt heads (Fig. 99).

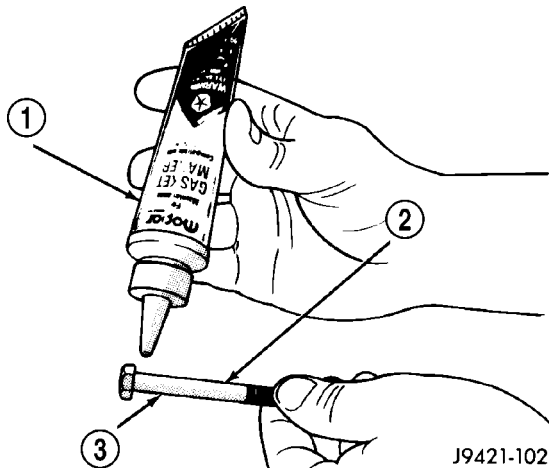


Fig. 99 SEAL RETAINING BOLTS

- 1 - MOPAR GASKET MAKER (OR LOCTITE 518)
- 2 - RETAINER AND HOUSING BOLTS
- 3 - APPLY SEALER TO UNDERSIDE OF BOLT HEAD, SHANK AND THREADS

(10) Start first two bolts in retainer (Fig. 100). It may be necessary to move retainer rearward (with pilot stud) in order to start bolts in retainer.

(11) Remove Alignment Pin 8120 and install last retainer bolt (Fig. 100).

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

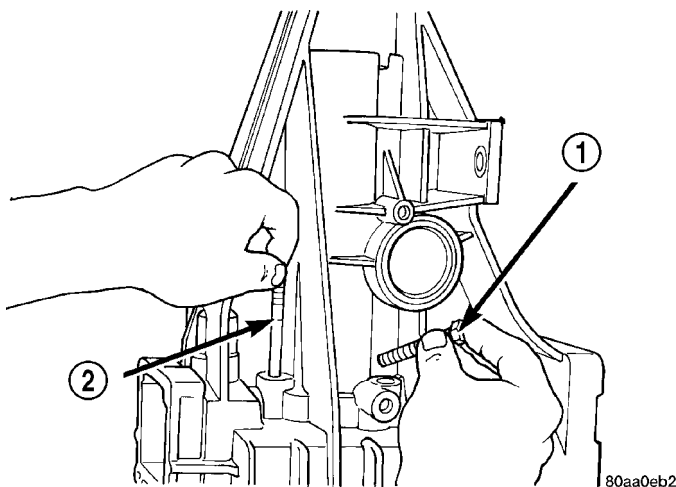


Fig. 100 PILOT STUD AND RETAINER BOLTS - 2WD

- 1 - BEARING RETAINER BOLT
- 2 - ALIGNMENT PIN

ADAPTER HOUSING - 4WD

(1) Install rear bearing in adapter housing, by tapping it into place with a wood hammer handle or wood dowel.

(2) Position rear bearing retainer in adapter housing (Fig. 101).

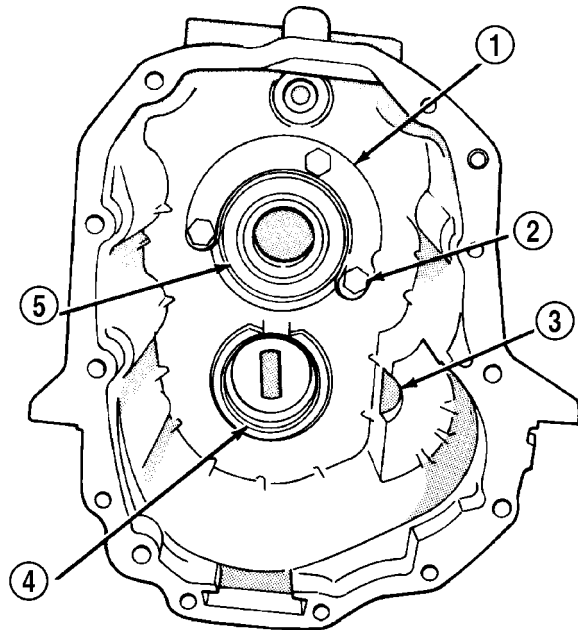


Fig. 101 ADAPTER HOUSING - 4WD

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

(3) Apply Mopar Gasket Maker or equivalent to threads, bolt shanks and under hex heads of bearing retainer bolts (Fig. 99).

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

(5) Install countershaft rear bearing in bearing race (Fig. 97).

CAUTION: The large diameter side of the roller retainer must face the countershaft and the small diameter side must face the race and housing (Fig. 97).

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

(7) Apply light coat of petroleum jelly to shift shaft bushing/bearing in adapter housing (Fig. 97).

(8) Install adapter housing on geartrain.

MANUAL - NV3550 (Continued)

(9) Install rear bearing snap ring on output shaft (Fig. 102).

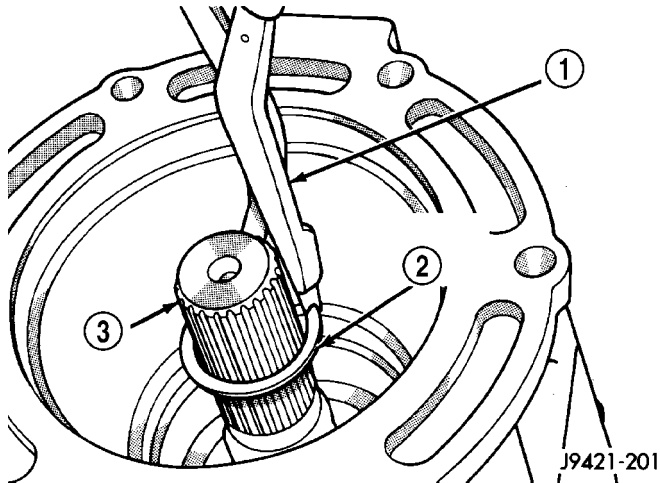


Fig. 102 REAR BEARING SNAP RING - 4WD

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

(10) Lubricate lip of new rear seal (Fig. 103) with Mopar Door Ease or transmission fluid.

(11) Install **new** rear seal in adapter housing bore with Installer C-3860-A. Verify seal is seated in housing bore (Fig. 103).

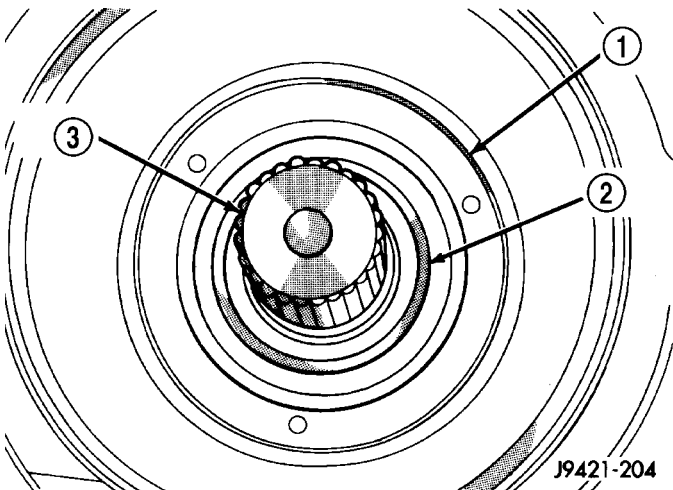


Fig. 103 REAR SEAL

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

SHIFT SHAFT, SHAFT LEVER AND BUSHING AND SHIFT SOCKET

CAUTION: Transmission synchros must be in the Neutral position, to prevent damage to the housings, shift forks and gears during installation of the two housings.

(1) Install 3-4 shift fork in synchro sleeve (Fig. 104). Verify groove in fork arm is aligned with grooves in 1-2 and fifth-reverse fork arms as shown.

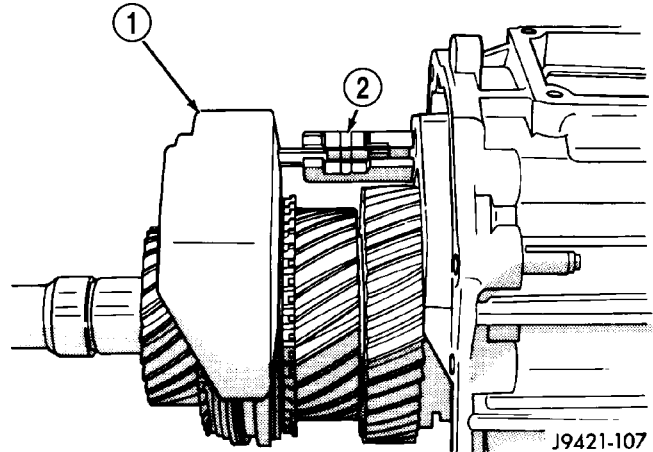


Fig. 104 3-4 SHIFT FORK

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

(2) Slide the end of shift shaft with shaft detent notches through 3-4 shift fork.

(3) Assemble shift shaft shift lever and bushing (Fig. 105). The slot in bushing must face up and roll pin hole for lever must be aligned with hole in shaft.

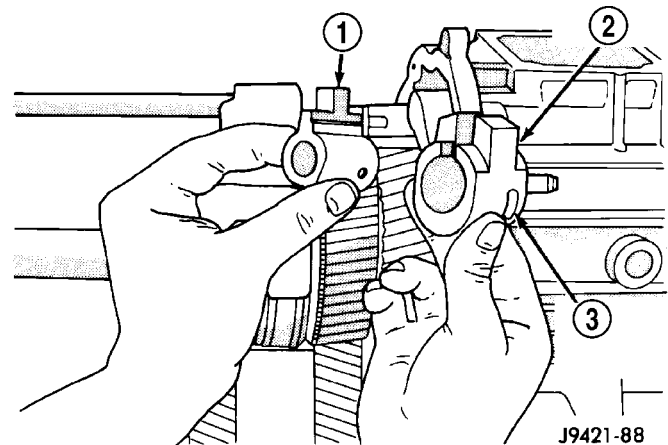


Fig. 105 LEVER AND BUSHING

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

MANUAL - NV3550 (Continued)

(4) Install assembled lever and bushing on shift shaft (Fig. 106).

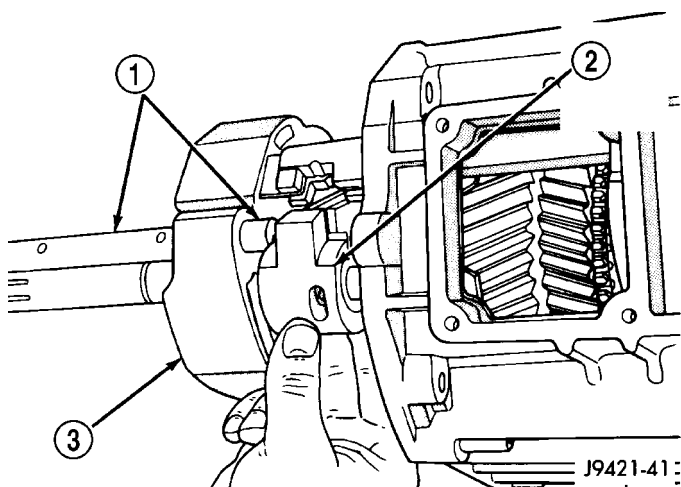


Fig. 106 LEVER AND BUSHING ASSEMBLY

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

(5) Slide shift shaft through forks (Fig. 107) and into shift lever opening in rear housing (Fig. 108).

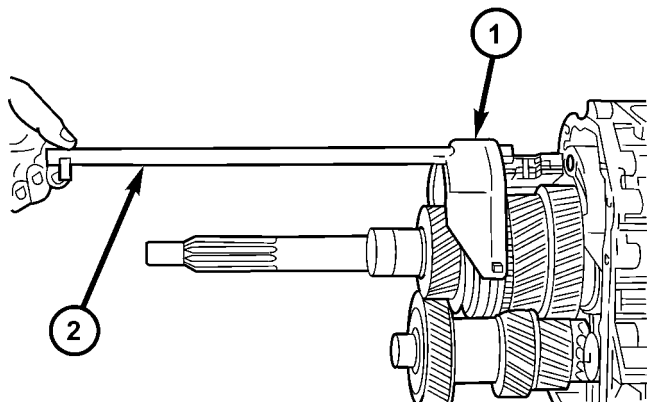


Fig. 107 SHIFT SHAFT

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

(6) Align shift socket with shaft and slide shaft through socket and into shift shaft bearing in rear housing (Fig. 109).

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

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

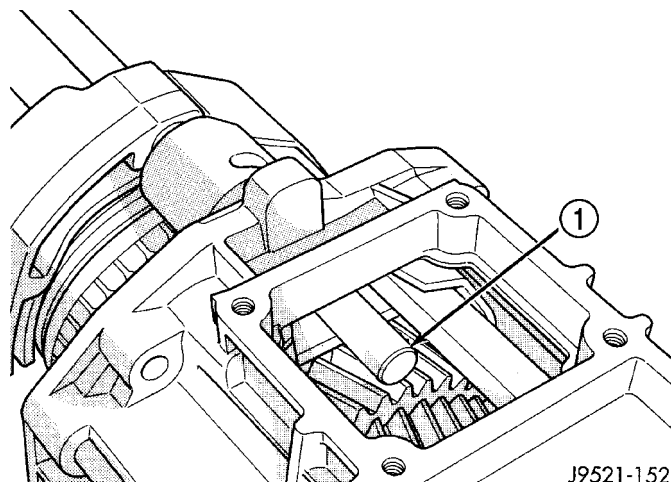


Fig. 108 SHAFT IN LEVER OPENING

- 1 - SHIFT SHAFT

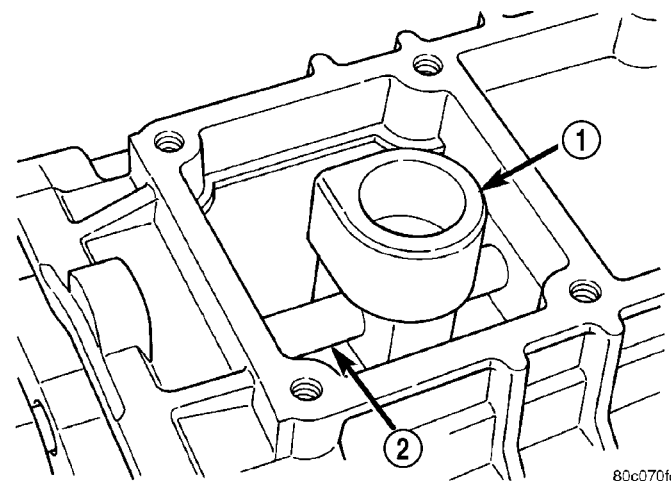
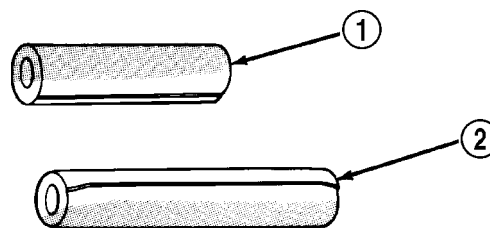


Fig. 109 SHIFT SOCKET

- 1 - SHIFT SOCKET
- 2 - SHIFT SHAFT

(8) Select correct new roll pin for shift shaft lever (Fig. 110). Shift lever roll pin is approximately 22 mm (7/8 in.) long. Shift socket roll pin is approximately 33 mm (1-1/4 in.) long.



J9421-86

Fig. 110 ROLL PIN IDENTIFICATION

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

MANUAL - NV3550 (Continued)

(9) Align roll pin holes in shift shaft, lever and bushing. Then start roll pin into shaft lever by hand (Fig. 111).

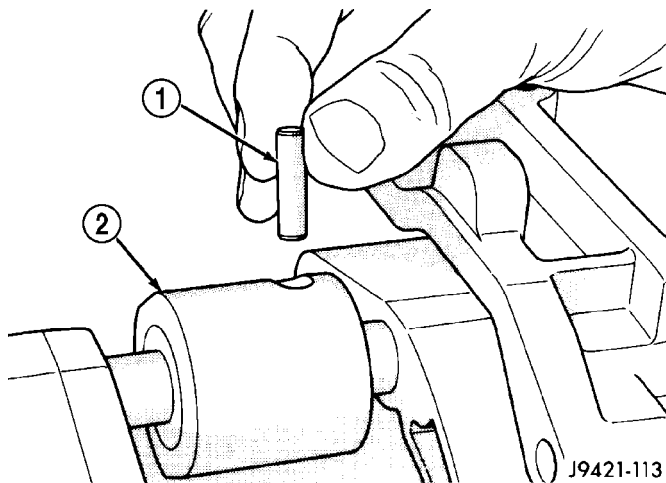


Fig. 111 ROLL PIN IN SHIFT SHAFT

- 1 - SHAFT LEVER ROLL PIN (7/8 inch)
- 2 - LEVER AND BUSHING

(10) Seat shaft lever roll pin with pin punch (Fig. 112).

CAUTION: The shaft lever roll pin must be flush with the surface of the lever or lever bushing will bind on the roll pin.

(11) Verify lock pin slot in lever bushing is positioned as shown (Fig. 112).

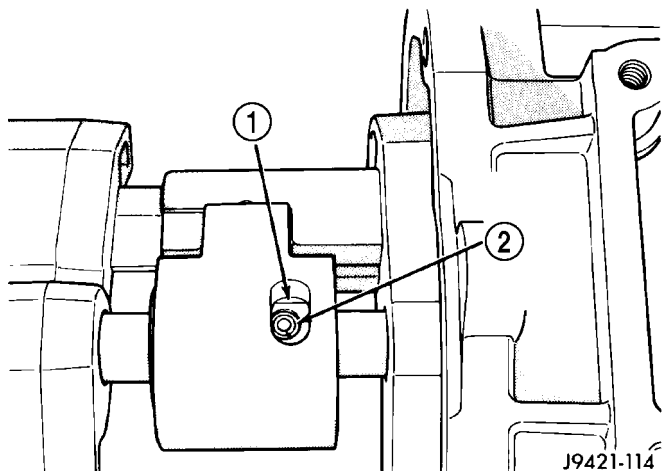


Fig. 112 SHIFT SHAFT LEVER ROLL

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

(12) Align roll pin holes in shift socket and shift shaft. Then start roll pin into shift shaft by hand (Fig. 113).

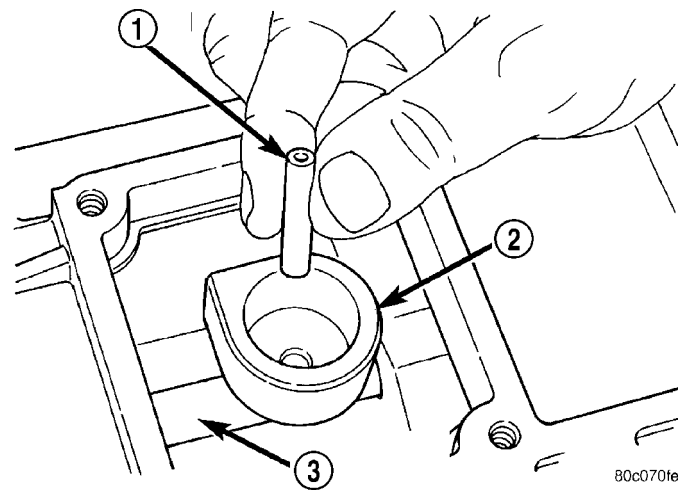


Fig. 113 ROLL PIN IN SHIFT SOCKET

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

(13) Seat roll pin flush in shift socket with pin punch (Fig. 114).

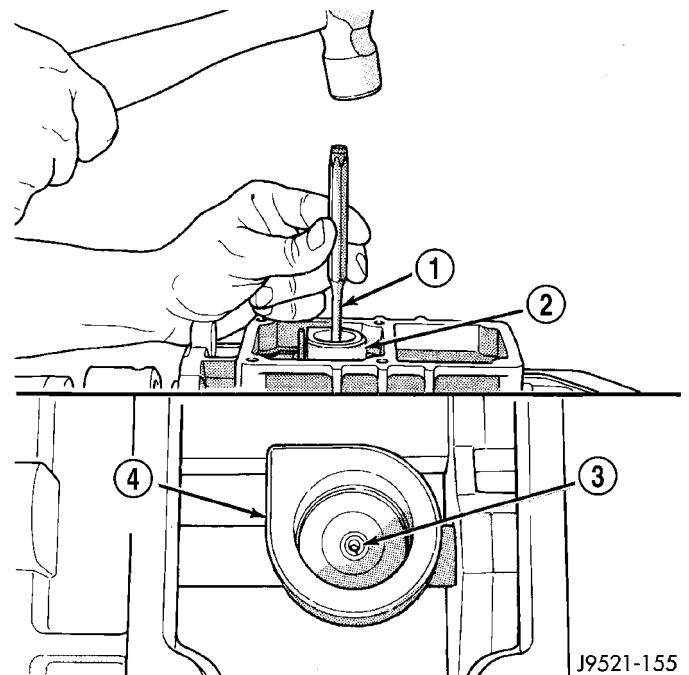
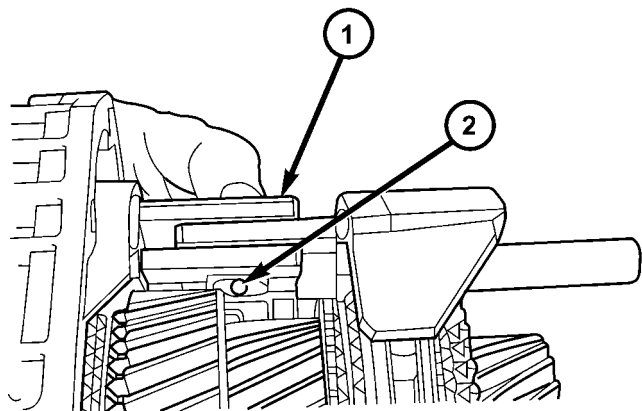


Fig. 114 SEATING SHIFT SOCKET ROLL PIN

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

MANUAL - NV3550 (Continued)

(14) Verify notches in shift fork arms are aligned (Fig. 115). Realign arms if necessary.



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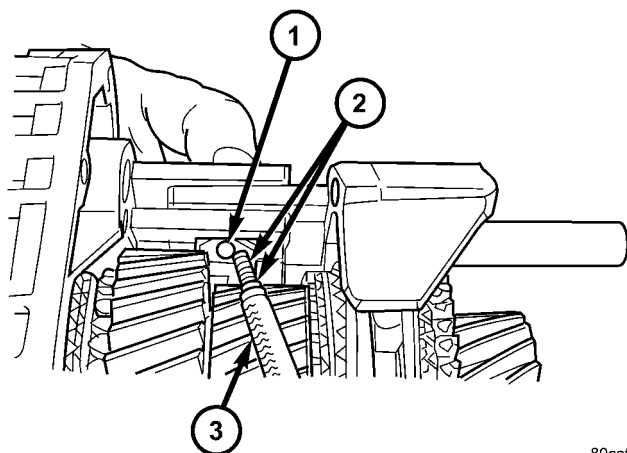
Fig. 115 SHIFT LEVER POSITION

- 1 - SHIFT FORK ARMS
- 2 - DETENT BORE

(15) Rotate shift lever and bushing downward to expose detent bore (Fig. 115) in the lever.

(16) Install detent spring then the ball into the detent bore (Fig. 116) and hold the ball in the lever. Then rotate the lever upward into the fork arm notches.

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



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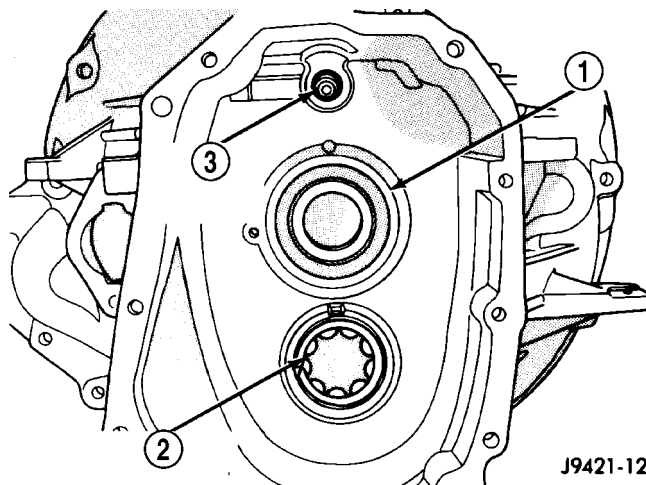
Fig. 116 DETENT SPRING AND BALL

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

FRONT HOUSING AND INPUT SHAFT BEARING RETAINER

(1) Install reverse blocker, retainer and retainer bolt in front housing.

(2) Install input shaft bearing in front housing (Fig. 117). Install snap ring and use plastic mallet to seat bearing. Bearing goes in from front side of housing only.



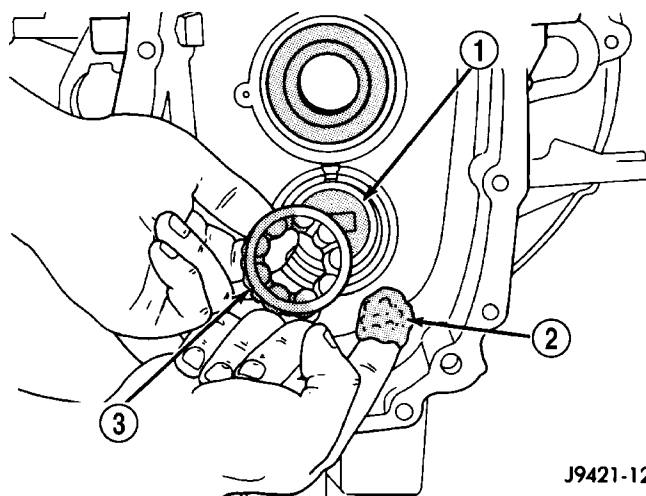
J9421-122

Fig. 117 INPUT SHAFT AND COUNTERSHAFT FRONT BEARING

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

(3) Apply liberal quantity of petroleum jelly to countershaft front bearing. Then insert bearing in front housing race (Fig. 117). Large diameter side of bearing cage goes toward countershaft (Fig. 118). Small diameter side goes toward bearing race in housing.

(4) Reach into countershaft front bearing with finger, and push each bearing roller outward against race. Then apply extra petroleum jelly to hold rollers in place. This avoids having rollers becoming displaced during housing installation.



J9421-121

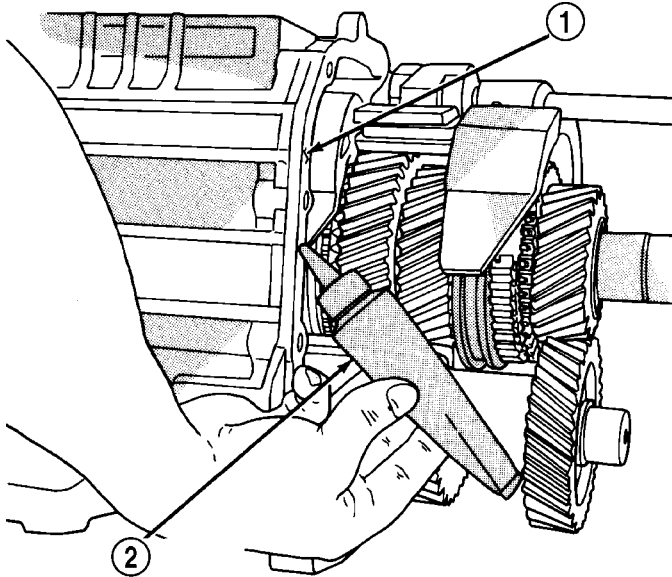
Fig. 118 COUNTERSHAFT FRONT BEARING

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

MANUAL - NV3550 (Continued)

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

(6) Apply 1/8 in. wide bead of Mopar Gasket Maker or equivalent to mating surfaces of front and rear housings (Fig. 119).



J9421-123

Fig. 119 SEAL FRONT/REAR HOUSINGS

- 1 - HOUSING FLANGE SURFACE
2 - MOPAR GASKET MAKER (OR LOCTITE 518)

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

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

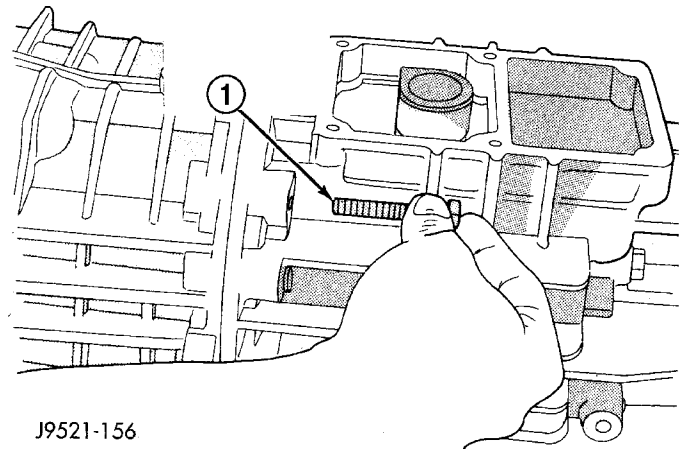
CAUTION: If the front housing will not seat on the rear housing, either the shift components are not in Neutral, or one or more components are misaligned. Do not force the front housing into place. This will result in damaged components.

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

(10) Place transmission in horizontal position.

(11) Apply Mopar Gasket Maker or equivalent to housing attaching bolts. Apply sealer material sealer to underside of bolt heads and to bolt shanks and threads (Fig. 120).

(12) Install and start housing attaching bolts by hand (Fig. 120). Then tighten bolts to 34 N·m (25 ft. lbs.).



J9521-156

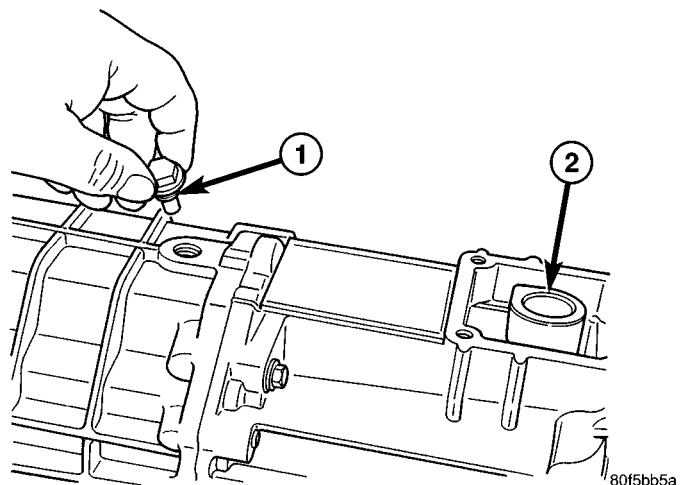
Fig. 120 HOUSING BOLTS

- 1 - HOUSING ATTACHING BOLTS

(13) Install shift shaft bushing lock bolt (Fig. 121). Apply Mopar Gasket Maker or equivalent to bolt threads, shank and underside of bolt head before installation.

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

CAUTION: If the lock bolt cannot be fully installed, do not try to force it into place. Either the shift shaft is not in Neutral or the shaft bushing (or lever) is misaligned.



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Fig. 121 SHAFT LOCK BOLT

- 1 - SHIFT SHAFT LOCK BOLT
2 - SHAFT SOCKET

(14) Lubricate then install shift shaft detent plunger in housing bore. Lubricate plunger with Valvoline Dura Blend® semi-synthetic/synthetic grease or equivalent.

MANUAL - NV3550 (Continued)

NOTE: Verify plunger is fully seated in detent notch in shift shaft.

- (15) Install detent spring inside plunger.
- (16) Install plug on detent spring and compress spring. Then drive detent plug into transmission case until plug seats.
- (17) Install backup light switch (Fig. 122).

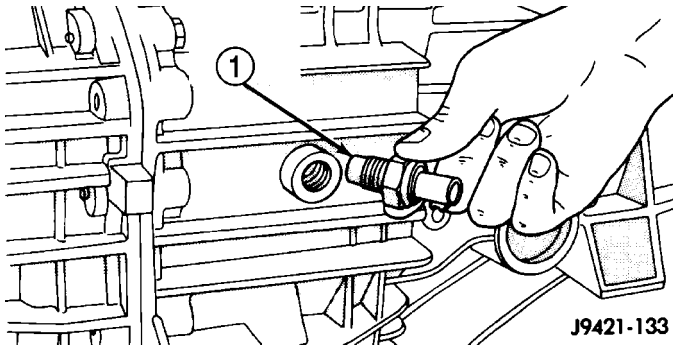


Fig. 122 BACKUP LIGHT SWITCH

1 - BACKUP LIGHT SWITCH

- (18) Install input shaft snap ring (Fig. 123).

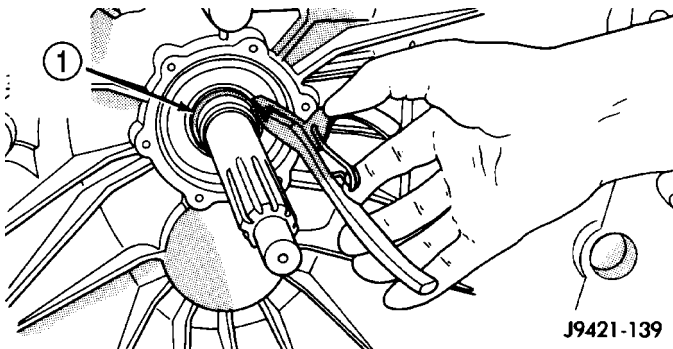


Fig. 123 SHAFT SNAP RING - TYPICAL

1 - INPUT SHAFT SNAP RING

- (19) Install **new** oil seal in front bearing retainer with Installer 6448 (Fig. 124).

- (20) Apply bead of Mopar silicone sealer or equivalent to flange surface of front bearing retainer (Fig. 125).

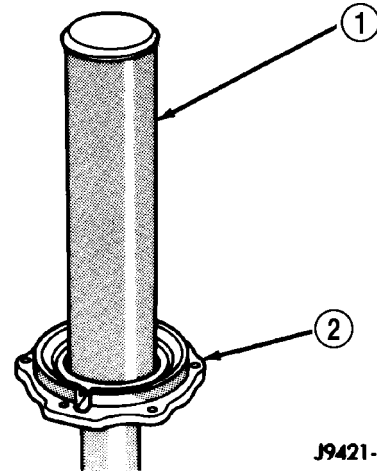


Fig. 124 OIL SEAL IN FRONT BEARING RETAINER

1 - INSTALLER
2 - FRONT BEARING RETAINER

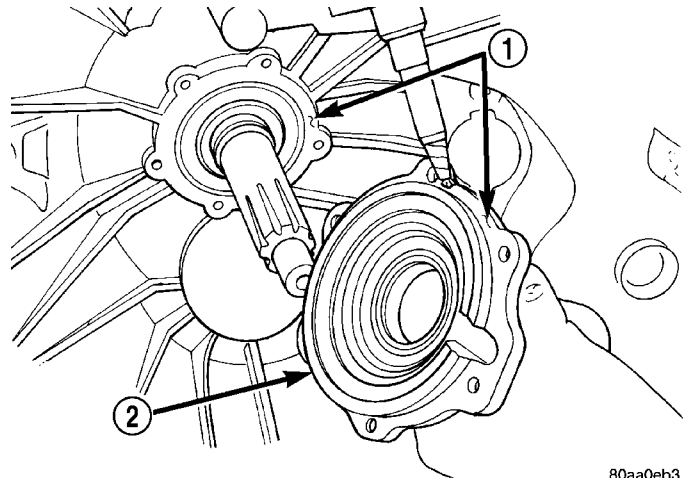


Fig. 125 SEAL BEARING RETAINER AND HOUSING

1 - APPLY SEALER BEAD
2 - INPUT SHAFT BEARING RETAINER

MANUAL - NV3550 (Continued)

(21) Align and install front bearing retainer over input shaft and onto housing mounting surface (Fig. 126). Although retainer is one-way fit on housing, be sure bolt holes are aligned before seating retainer.

CAUTION: Do not allow sealer to get into the oil feed hole in the transmission case or bearing retainer.

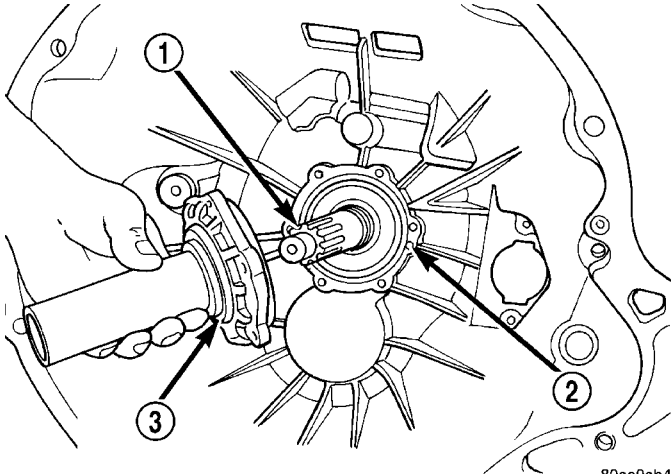


Fig. 126 INPUT SHAFT BEARING RETAINER

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

(22) Install and tighten bearing retainer bolts to 7-10 N·m (5-7 ft. lbs.) (Fig. 127).

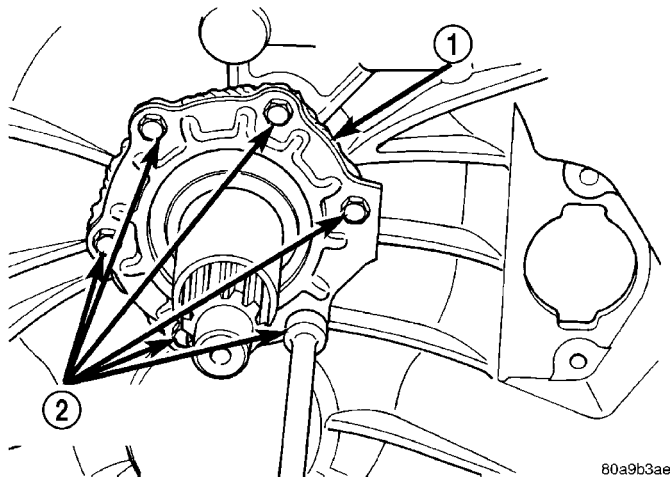


Fig. 127 BEARING RETAINER BOLTS

- 1 - RETAINER
- 2 - RETAINER BOLTS

SHIFT TOWER AND LEVER

- (1) Apply petroleum jelly to ball end of shift lever and interior of shift socket.
- (2) Shift the transmission into third gear.
- (3) Align and install shift tower and lever assembly (Fig. 128). Be sure shift ball is seated in socket

and the offset in the tower is toward the passenger side of the vehicle before installing tower bolts.

(4) Install shift tower bolts (Fig. 129). Tighten bolts to 8.5 N·m (75.2 in. lbs.).

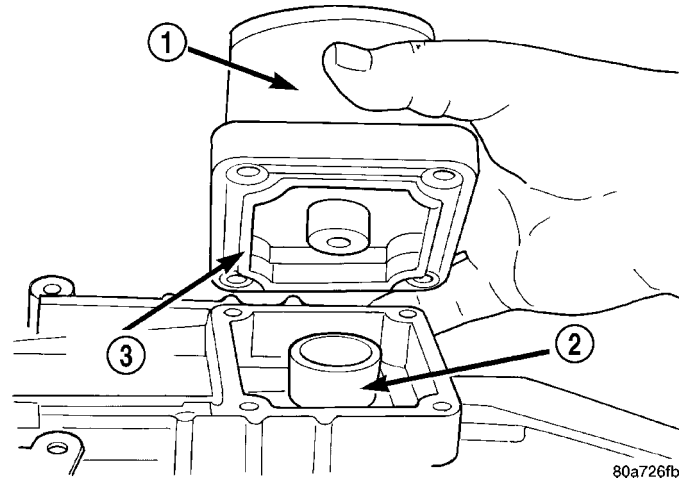


Fig. 128 SHIFT TOWER

- 1 - SHIFT TOWER
- 2 - SHIFT SOCKET
- 3 - SEAL

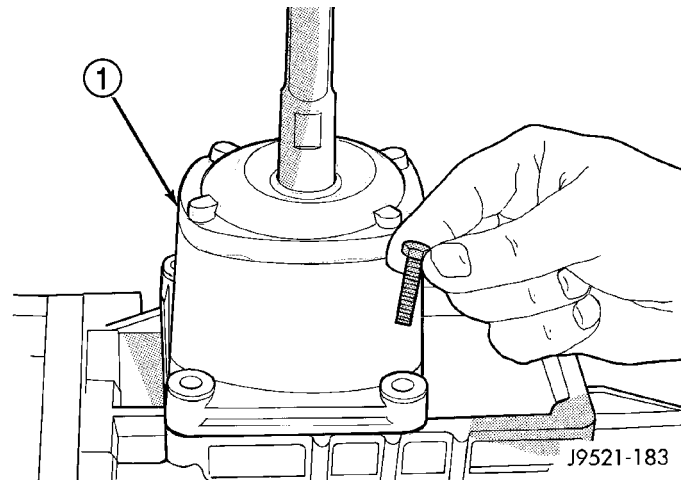


Fig. 129 SHIFT TOWER BOLTS

- 1 - SHIFT TOWER AND LEVER ASSEMBLY

(5) Fill transmission to bottom edge of fill plug hole with Mopar Transmission Lubricant.

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

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

INSTALLATION

- (1) Install clutch housing on transmission and tighten housing bolts to 46 N·m (34 ft. lbs.).
- (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.

MANUAL - NV3550 (Continued)

(4) Position and secure transmission on transmission jack.

(5) Lightly lubricate the 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 clutch housing-to-engine bolts and tighten to 58 N·m (43 ft.lbs.).

NOTE: Be sure the housing is properly seated on engine block before tightening bolts.

(8) Install shift tower and bolts. Tighten bolts to 7-10 N·m (5-7 ft.lbs.).

(9) Install rear crossmember and tighten crossmember bolts to 41 N·m (31 ft. lbs.).

(10) Install transmission mount bolts and to 54 N·m (40 ft. lbs.).

(11) Install exhaust bracket to crossmember.

(12) Remove support stands from engine and transmission.

(13) Install transfer case, shift cable and vent hose if equipped.

(14) Install wire connectors to transmission/transfer case.

(15) Install propeller shaft/shafts.

(16) Install slave cylinder in clutch housing.

(17) Fill transmission and transfer case if equipped, with recommended lubricants.

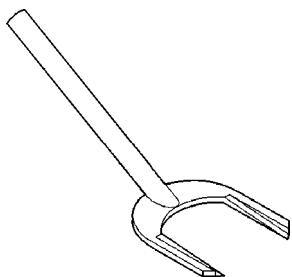
(18) Install skid plate if equipped.

SPECIFICATIONS*TORQUE SPECIFICATIONS*

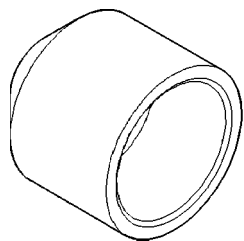
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Clutch Housing To Trans Bolts	46	34	-
Clutch Housing To Engine Bolts	68	50	-
Trans Mount Bolts	47	35	-
Crossmember Frame Bolts	61-75	44-55	-
Crossmember To Insulator Nuts	54-61	40-45	-
Drain/Fill Plug	9-27	14-20	-
Front To Rear Housing Bolts	30-35	22-26	-
Front Bearing Retainer Bolts	7-10	5-7	62-88
Idler Shaft Bolts	19-25	14-18	-
Rear Bearing Retainer Bolts	30-35	22-26	-
Shift Tower Bolts	7-10	5-7	62-88
Slave Cylinder Nuts	23	17	-

MANUAL - NV3550 (Continued)

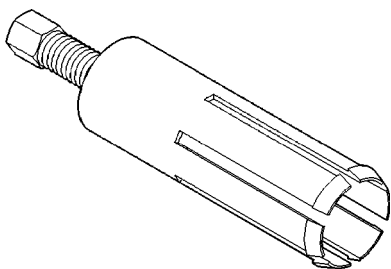
SPECIAL TOOLS



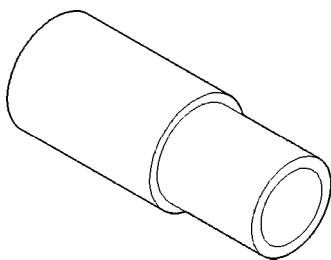
REMOVER C-3985-B



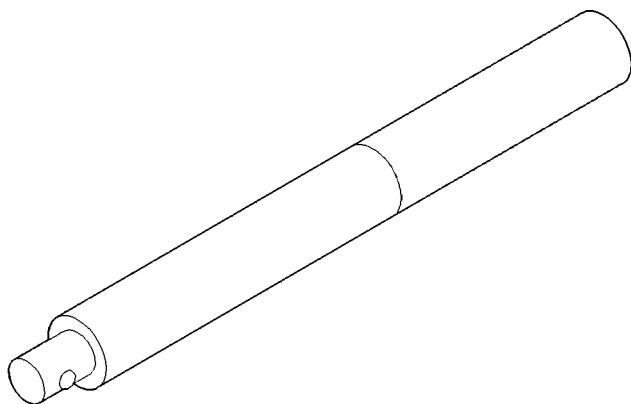
INSTALLER C-3972-A



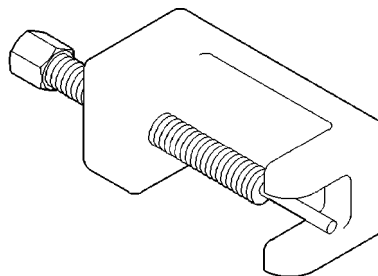
BUSHING REMOVER 6957



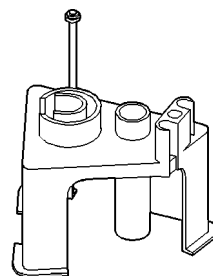
BUSHING INSTALLER 6951



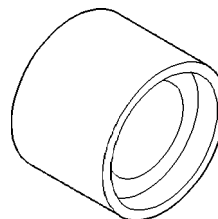
HANDLE C-4171



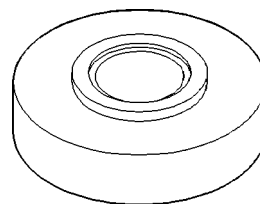
REMOVER/INSTALLER 6858



FIXTURE 6747

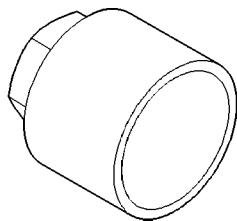


ADAPTER 6747-1A

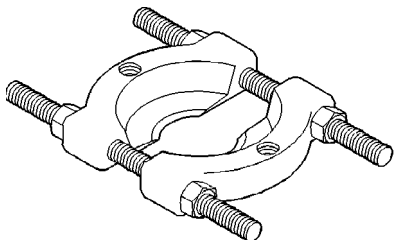


Adapter 6747-2A

MANUAL - NV3550 (Continued)

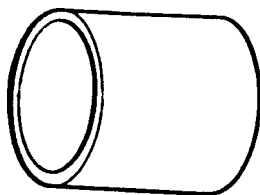


CUP 8115

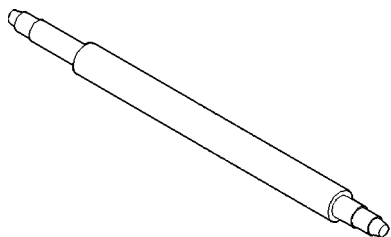


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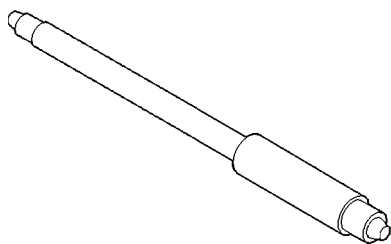
SPLITTER BEARING 1130



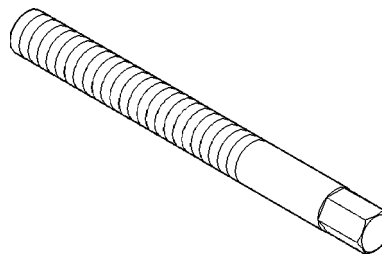
TUBE 6310-1



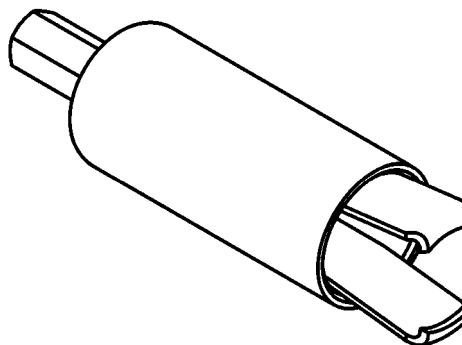
INSTALLER 8118



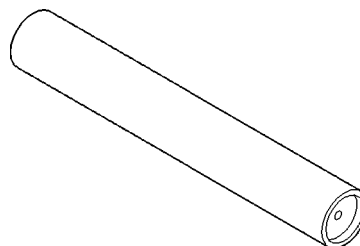
REMOVER/INSTALLER 8119



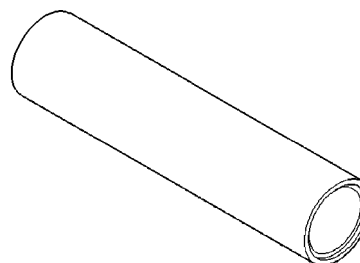
PIN ALIGNMENT 8120



REMOVER 8117A



INSTALLER 8123

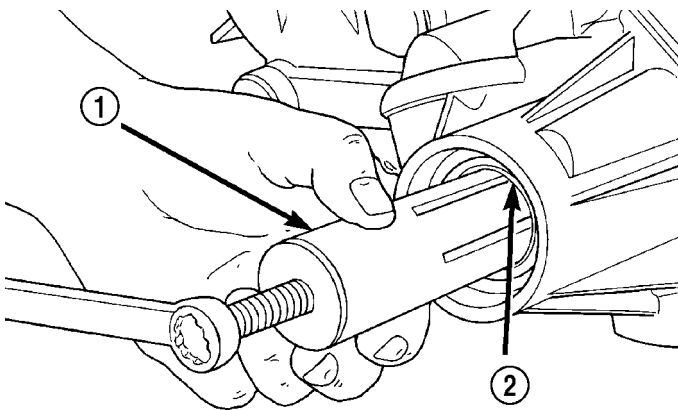


INSTALLER BEARING 6448

EXTENSION HOUSING BUSHING

REMOVAL

- (1) Raise and support vehicle.
- (2) Mark reference lines on the propeller shaft and remove the shaft.
- (3) Remove housing yoke seal.
- (4) Insert Remover 6957 into rear housing and tighten tool to bushing and remove bushing (Fig. 130).



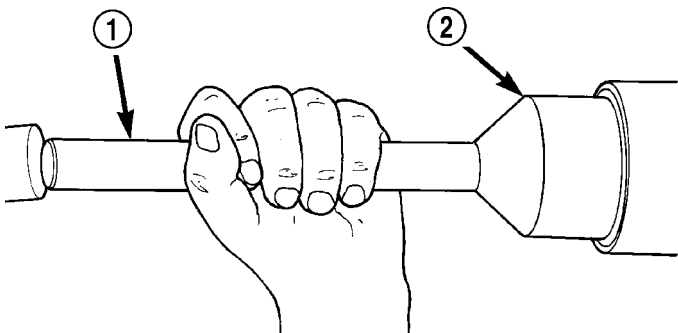
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Fig. 130 Bushing Removal - Typical

- 1 - REMOVER
- 2 - EXTENSION HOUSING BUSHING

INSTALLATION

- (1) Align bushing oil hole with oil slot in rear housing.
- (2) Tap bushing into place with Installer 6951 and Handle C-4171.
- (3) Install new oil seal in housing using Installer C-3972-A (Fig. 131).



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Fig. 131 Rear Housing Seal

- 1 - HANDLE
- 2 - INSTALLER

- (4) Install propeller shaft with reference marks aligned.
- (5) Remove support and lower vehicle.
- (6) Check transmission fluid level.

EXTENSION HOUSING SEAL

REMOVAL

- (1) Raise and support vehicle.
- (2) Mark propeller shaft and axle yoke for alignment reference.
- (3) Disconnect and remove propeller shaft.
- (4) Remove old seal with Remover C-3985-B (Fig. 132) from transmission housing.

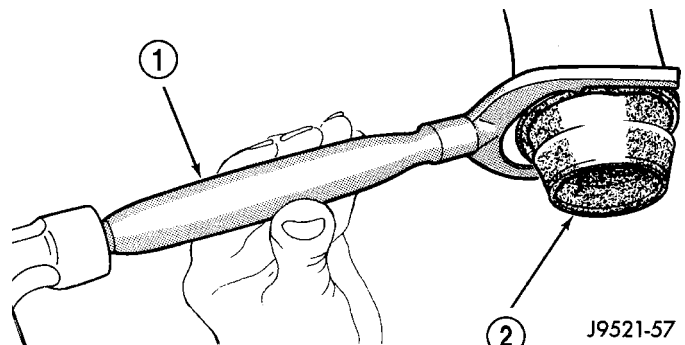


Fig. 132 YOKE SEAL

J9521-57

- 1 - REMOVER
- 2 - SEAL

INSTALLATION

- (1) Place seal in position on transmission housing.
- (2) Drive new seal into transmission housing with Installer C-3972-A and Handle C-4171 (Fig. 133).
- (3) Carefully guide propeller shaft slip yoke into housing and onto output shaft splines.
- (4) Install propeller shaft with reference marks aligned.

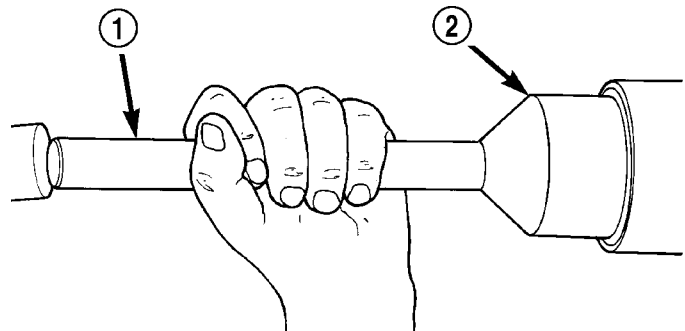


Fig. 133 Yoke Seal Installer

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- 1 - HANDLE
- 2 - INSTALLER

- (5) Remove support and lower vehicle.
- (6) Check transmission fluid level.