2001 Dodge RAM 3500 PICKUP

Submodel: | Engine Type:  L6 | Liters:  5.9
Fuel Delivery:  FI | Fuel:  DIESEL

Subarticles

- MANUAL - NV4500 - DISASSEMBLY
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DISASSEMBLY

EXTENSION/ADAPTER HOUSING

1. Raise and support vehicle.
2. Remove rear propeller shaft.
3. Support transmission with a transmission jack.
4. Remove engine rear support. Refer to 9 Engine for procedures.
5. Remove transfer case, if equipped.
6. Remove bolts attaching extension/adapter housing to gear case Extension/Adapter Housing Bolts.

7. Remove extension/adapter housing Extension/Adapter Housing. There is one alignment dowel in the gear case and one in the extension/adapter housing.
Extension/Adapter Housing

1 - GEAR CASE
2 - EXTENSION HOUSING

8. Remove rubber spline seal from end of mainshaft Mainshaft Spline Seal. The seal is used to prevent lubricant loss during shipping and does not have to be replaced if damaged.

Mainshaft Spline Seal

1 - MAINSHAFT
2 - RUBBER SPLINE SEAL

FIFTH GEAR NUT

1. Remove extension/adapter housing.
2. Loosen fifth gear clamp nut clamping screw approximately 1 1/2 turns.
3. Install nut Wrench 6743 on fifth gear nut Fifth Gear Nut.
Fifth Gear Nut

1 - WRENCH 6443/6743
2 - FIFTH GEAR NUT
3 - SCOCKET 6993/6984

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

1. Install splined Socket 6993 4X2 Socket 6984 4X4 to retain mainshaft while removing the fifth gear nut.
2. Install breaker bar in socket wrench Fifth Gear Nut
Important:
Wedge breaker bar handle against workbench. Purpose of socket wrench and breaker bar is to prevent mainshaft from turning while nut is loosened.

1. Remove fifth gear nut, then remove belleville washer from mainshaft.

FIFTH GEAR

1. Remove roll pins that secure countershaft fifth gear shift fork to shift rail with pin punch Fifth Gear Shift Fork Roll Pins. Roll pins are driven out from bottom of fork and not from top.

2. Remove snap ring that secures fifth gear clutch hub and gear on countershaft Countershaft Fifth Gear Clutch Gear Snap Ring.

3. Remove countershaft fifth gear clutch gear and stop ring.
4. Remove fifth gear shift fork and gear assembly. Remove assembly by tapping fork off rail with plastic mallet.
5. Remove fifth gear shift fork from sleeve.
6. Remove sleeve, struts, and strut springs from countershaft fifth gear hub, if necessary.
7. Remove countershaft fifth gear needle bearing assembly Countershaft Fifth Gear Needle Bearing.  

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Countershaft Fifth Gear Needle Bearing

1 - FIFTH GEAR NEEDLE BEARING ASSEMBLY  
2 - COUNTERSHAFT

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8. Remove cone shaped rear bearing thrust washer from end of countershaft Countershaft Rear Bearing Thrust Washer. Note position of washer for assembly reference. Also note that washer bore has notch for locating pin.

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Countershaft Rear Bearing Thrust Washer

1 - THRUST WASHER  
(CONE SHAPED)  
2 - THRUST WASHER PIN

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9. Remove and retain thrust washer locating pin from countershaft.
10. Remove mainshaft overdrive fifth gear with Puller Tool Set 6444.
11. Position first Puller Jaw 6459 or 6820 on gear First Puller Jaw On Mainshaft Fifth (Overdrive) Gear.
1. Assemble Puller Flange 6444-1 and Puller Rods 6444-3 4X2 vehicles or 6444-4 4X4 vehicles. Seating Puller Flange In First Puller.

12. Slide assembled puller flange and rods onto output shaft. Then seat flange in notch of puller jaw. Seating Puller Flange In First Puller.

15. Slide Retaining Collar 6444-8 over puller jaws to hold them in place. Retaining Collar Over Puller Jaws.
Retaining Collar Over Puller Jaws

1 - JAWS
2 - COLLAR 6444-8

16. Install Puller and Bolt 6444 on puller rods. Then secure puller to rods with retaining nuts. 

Fifth Gear From Mainshaft Splines

1 - COLLAR 6444-8
2 - JAWS 6459 OR 6820
3 - BOLT 6444
4 - WRENCH
5 - MAINSHAFT
6 - PULLER FLANGE 6444-1

17. Tighten puller bolt to remove gear from shaft splines. 

Fifth Gear From Mainshaft Splines
Remove bolts attaching mainshaft rear bearing plate to gear case and remove fifth gear plate end play shims and bearing cup. Mainshaft Fifth Gear Bearing Plate, Bearing Shims, And Rear Bearing Cup.
1. Remove front retainer bolts Front Bearing Retainer. Discard retainer bolts. They should not be reused.

![Front Bearing Retainer diagram](image)

1 - DRIVE GEAR
2 - FRONT BEARING RETAINER

2. Remove retainer by lightly tapping it back and forth with plastic mallet. Then rock retainer back and forth by hand to work it out of gear case.

   **Important:**
   Retainer flange extends into transmission case and is a snug fit.

   1. Remove seal from front retainer Bearing Retainer Seal. Collapse one side of seal then pry it out with pry tool.

   ![Bearing Retainer Seal diagram](image)

   1 - SEAL
   2 - FRONT BEARING RETAINER

   2. To remove front retainer bearing cup, assemble Puller Flange 6444-1 and Puller Rods 6444-4 Puller Rods, Flange And Jaws.
3. Insert Puller Jaws 6453-1 in puller flange. Narrow lip of puller jaws will go under bearing cup.

4. Install Disc C-4487-1 into bearing retainer on heavy duty transmissions for Insert 6453-2 to rest upon.

5. Install assembled tools in front retainer. Be sure puller jaws are seated under bearing cup.
6. Place Insert Tool 6453-2 in center of puller jaws. Insert tool is used to hold puller jaws in place.

7. Install Puller 6444 on puller rods. Then install retaining nuts on puller rods.
1. Tighten puller bolt to draw bearing cup out of retainer Bearing Cup Puller.
DRIVE GEAR

1. Remove drive gear Drive Gear.

2. Remove pilot bearing from drive gear Pilot Bearing.
1 - DRIVE GEAR

2 - MAINSHAFT PILOT BEARING

3. To remove tapered bearing from drive gear, assemble Puller Flange 6444-1 and Puller Rods 6444-6 Front Bearing Puller. Then position first Puller Jaw 6447 on bearing.
<table>
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<td>DRIVE GEAR</td>
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1. Move 1-2 and 3-4 synchro sleeves into neutral.
2. Remove drive gear thrust bearing from forward end of mainshaft Drive Gear Thrust Bearing.
3. Remove fourth gear clutch gear and synchro stop ring from mainshaft Fourth Gear Clutch Gear Stop Ring.
4. Roll gear case onto left side Mainshaft And Geartrain.
5. To remove mainshaft assembly, lift front end of mainshaft slightly. Important:

Handling mainshaft carefully because gears are lose on the mainshaft.

1. Grasp mainshaft rear splines, then turn spline end of mainshaft counterclockwise to rotate shaft and geartrain out of case. Tilt mainshaft outward and removed from case.

**REVERSE IDLER AND COUNTERSHAFT**

1. Remove countershaft rear bearing plate.
1. Remove countershaft end play shim and rear bearing cup Countershaft End Play Shim And Rear Bearing Cup.

2. Remove reverse idler shaft Reverse Idler Shaft.
1. Reverse Idler Shaft

2. Idler Gear Moved Away From Countershaft

3. Idler Gear Moved Away From Countershaft

4. Rotate countershaft outward and push reverse idler gear away from countershaft and toward front of case Idler Gear Moved Away From Countershaft.

5. Remove idler gear Reverse Idler Gear.
Keep reverse idler gear bearings and spacer together for cleaning and inspection. Insert idler shaft through gear and bearings to keep them in place.

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

8. To remove countershaft rear bearing, assemble Puller Flange 6444-1 and Puller Rods 6444-4Countershaft Rear Bearing.
1 - COLLAR 6444-8
2 - JAWS 6449
3 - PULLER 6444
4 - WRENCH

Important:
Shaft cannot be removed from case until rear bearing has been removed.
1. Position first Puller Jaw 6449 on bearing cone
2. Seat puller flange in notch of puller jaw just installed on bearing cone
3. Install second Puller Jaw 6449 on bearing and in notch of puller flange
4. Slide Retaining Collar 6444-8 over puller jaws to hold them in place

Important:
Retaining collar has small lip on one end and only fits one way over jaws.
1. Install Puller 6444 on puller rods, then secure puller to rods with retaining nuts
2. Tighten puller bolt to remove bearing from shaft. If bearing is exceptionally tight, tap end of puller bolt with copper mallet to help loosen bearing.
3. Remove bearing puller tools then rotate countershaft out of gear case

To Remove countershaft front bearing, assemble Puller Flange 6444-1 and Puller Bolts 6444-4
Countershaft Front Bearing

1. JAWS 6451
2. COLLAR 6444-8
3. PULLER 6444
4. FLANGE 6444-1

5. Position first Puller Jaw 6451 on bearing.
7. Install second Puller Jaw 6451 on bearing and in notch of puller flange.
8. Slide Retaining Collar 6444-8 over puller jaws to hold them in place.

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

1. Install puller bridge and bolt assembly 6444 on puller bolts and install retaining nuts.
2. Tighten puller bolt to remove bearing from shaft. If bearing is exceptionally tight, tap end of puller bolt with mallet to help loosen bearing.
3. Remove bearing puller tools.

GEAR CASE

1. Remove countershaft front bearing cap with mallet or hammer Countershaft Front Bearing Cap.

2. Remove countershaft front bearing cup with Remover 6454 and Handle C-4171 Countershaft Front Bearing Cup.
1. Remove roll pin that secures shift lug on shift rail in case Shift Lug Roll Pin. A small pin punch can be modified by putting a slight bend in it to drive pin completely out of shift rail Shift Lug Roll Pin.
1. Remove drive gear thrust bearing from end of mainshaft, if not previously removed.

2. Remove 3-4 synchro hub, third gear stop ring and third gear as an assembly Third Gear, Stop Ring, And 3-4 Hub.

3. Remove third gear bearing from mainshaft Third Gear Bearing.
4. Remove third gear bearing spacer Snap Ring And Third Gear Bearing Spacer.

5. Remove second gear thrust washer snap ring from mainshaft Snap Ring And Third Gear Bearing Spacer.
Snap Ring And Third Gear Bearing Spacer

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

6. Remove second gear thrust washer Second Gear Thrust Washer. Note that washer is notched for locating pin.

Second Gear Thrust Washer

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

7. Remove thrust washer locating pin Thrust Washer Locating Pin. Use needle nose pliers to remove pin.
8. Remove second gear **Second Gear**.

9. Remove second gear bearing **Second Gear Bearing**.
10. Remove second gear clutch cone snap ring Second Gear Clutch Cone Snap Ring. Snap ring is seated in mainshaft synchro hub groove.

11. Remove second gear clutch cone, synchro clutch ring and synchro stop ring Second Gear Clutch Cone And Ring.
Second Gear Clutch Cone And Ring

1 - 1-2 SLEEVE AND HUB
2 - SYNCHRO STOP RING
3 - CLUTCH RING
4 - SECOND GEAR CLUTCH CONE

12. Remove 1-2 synchro hub snap ring [1-2 Sleeve And Hub Snap Ring].

13. Remove 1-2 synchro sleeve, hub, struts and springs as an assembly [1-2 Synchro Sleeve And Hub]. Note that tapered side of sleeve also goes toward front. Do not disassemble synchro components unless worn or damaged.
14. Remove first gear synchro stop ring and clutch ring First Gear Stop And Clutch Ring.

15. Remove first gear clutch cone front snap ring from mainshaft hub First Gear Clutch Gear Front Snap Ring.
16. Remove first gear clutch cone First Gear Clutch Gear.

17. Remove first gear clutch gear rear snap ring from mainshaft hub First Gear Clutch Gear. Do not remove this snap ring unless mainshaft is to be replaced.

18. To remove mainshaft rear bearing, assemble Puller Flange 6444-1 and Puller Rods 6444-3 for 4X2 or 6444-4 for 4X4 Mainshaft Rear Bearing Puller.
Position the first Puller Jaw 6445 on the bearing cone.

Seat Puller Flange 6444-1 in notch of first puller jaw.

Install the second Puller Jaw 6445 on the bearing cone and puller flange.

Install Puller 6444 on the puller rods and secure with nuts.

Hold hex portion of Puller 6444 a wrench Mainshaft Rear Bearing and tighten screw.
2. Remove bearing puller tools and rear mainshaft bearing from output shaft.

25. Remove reverse gear thrust washer **Reverse Gear Thrust Washer**.

26. Remove reverse gear and synchro components as assembly **Reverse Gear, Bearing, And Stop Ring**. Do not disassemble synchro components unless they are damaged. If synchro sleeve or struts require service, mark position of sleeve on hub before removal. Correct sleeve position is important as sleeve can be installed backwards causing shift problems.
27. Remove reverse gear bearing assembly from mainshaft Reverse Gear, Bearing, And Stop Ring.

![Reverse Gear, Bearing, And Stop Ring](reverse_gear_bearing_and_stop_ring.png)

28. Remove reverse gear bearing spacer from mainshaft Reverse Gear Bearing Spacer And First Gear Snap Ring.

![Reverse Gear Bearing Spacer And First Gear Snap Ring](reverse_gear_bearing_spacer_and_first_gear_snap_ring.png)

29. Remove reverse clutch gear snap ring Reverse Gear Bearing Spacer And First Gear Snap Ring. Tension of this snap ring is considerable. Heavy duty snap ring pliers will be required to spread the ring far enough to remove it.
1. CLUTCH GEAR SNAP RING
2. REVERSE GEAR BEARING SPACER

30. Remove reverse clutch gear Reverse Clutch Gear.

31. Remove first gear from bearing and mainshaft First Gear.
32. Remove first gear bearing from mainshaft First Gear Bearing.

ASSEMBLY

Important:
Gaskets are not used in the NV4500 transmission. Use Mopar® Silicone Sealer or equivalent on all gear case and extension housing sealing surfaces.

COUNTERSHAFT AND REVERSE IDLER GEAR

1. Install countershaft front bearing cup in case with Handle C-4171 and Installer 6061-1.
2. Install front bearing on countershaft with Installer C-4340 Countershaft Front Bearing.
3. Lubricate countershaft front bearing cup and cone with petroleum jelly.
4. Position gear case on end with rear of case facing up Countershaft In Gear Case.

5. Install countershaft in gear case Countershaft In Gear Case.
1. Lubricate reverse idler gear bearings with petroleum jelly and install first bearing and second bearing Idler Gear Front Thrust Washer.

2. Install idler gear front thrust washer on boss in gear case Idler Gear Front Thrust Washer. Coat thrust washer with liberal quantity of petroleum jelly to hold it in place.
1. Position idler gear front thrust washer on boss.

3. Install reverse idler gear in case idler gear.

1. Rear thrust washer
2. Reverse idler gear
3. Front thrust washer

4. Install idler gear rear thrust washer between idler gear and case boss idler gear.
1 - REAR THRUST WASHER
2 - REVERSE IDLER GEAR
3 - FRONT THRUST WASHER
5. Align idler gear bearings and thrust washers with a drift.

6. Install reverse idler shaft with notched end of shaft facing countershaft [Reverse Idler Shaft].

7. Lift countershaft upward and position wood block between front of shaft and case [Supporting Countershaft With Wood Block].

8. Install rear bearing cone on countershaft with Installer C-4040 [Countershaft Rear Bearing].
9. Remove wood block from under countershaft and lower countershaft front bearing into front bearing cup.
10. Lubricate countershaft rear bearing cup and cone with petroleum jelly.
11. Install countershaft rear bearing cup in gear case and over rear bearing Countershaft Rear Bearing Cup. Tap cup into place with plastic mallet if necessary.
12. Install countershaft rear bearing plate Countershaft Rear Bearing Plate.
1. Apply Mopar® silicone adhesive/sealer to flange and lip of new cap. Install new front bearing cap in gear case Countershaft Front Bearing Cap with Handle C-4171 and Installer C-3972-A.

COUNTERSHAFT END PLAY

1. Rotate countershaft 4-5 times to seat bearings.
2. Mount dial indicator on case. Then position indicator plunger on end of countershaft and zero dial indicator Measuring Countershaft End Play.
Measuring Countershaft End Play

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

3. Raise countershaft with screwdriver and note end play reading on dial indicator. End play should be 0.051 - 0.15 mm (0.002 - 0.006 in.).
4. Remove countershaft rear bearing plate.
5. Install an end play shim that will provide minimum countershaft end play. Position shim on rear bearing cup Countershaft End Play Shim.

Countershaft End Play Shim

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

6. Install countershaft rear bearing plate Countershaft Rear Bearing Plate.
Countershaft Rear Bearing Plate

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

Important:
Verify plate is seated in reverse idler shaft notch and end play shims are still in position before installing bolts.

1. Apply 1-2 drops Mopar® Loc N' Seal or equivalent to threads of rear bearing plate bolts. Then install and tighten bearing plate bolts to 23 N·m (200 in. lbs.).

SHIFT LUG AND RAIL

1. Lubricate shift lug and rail with Castrol® Syntorq.
2. Insert shift lug rail part way into case.
3. Install shift lug on rail.
4. Position shift rail so roll pin notches are toward outside of case Shift Lug And Rail.

Shift Lug And Rail

1 - NOTCHES (FOR 5TH GEAR SHIFT FORK ROLL PINS)
2 - LUG RAIL
3 - ROLL PIN HOLE
4. Install roll pin that secures lug to rail Shift Lug And Rail

5. Install first snap ring in rear most groove of mainshaft hub First Gear Bearing and Snap Ring. This snap ring locates first gear clutch gear on shaft.

MAINSHAFT AND GEARTRAIN

Caution:
The reverse, 1-2 and 3-4 synchro components can be assembled and installed incorrectly. Follow assembly procedures for component identification and location. Lubricate mainshaft bearing surfaces and all bearing assemblies with Castrol Syntorq or with petroleum jelly.

1. Install first snap ring in rear most groove of mainshaft hub First Gear Bearing and Snap Ring. This snap ring locates first gear clutch gear on shaft.
Important:
Four of these snap rings are used to secure various components on the mainshaft 1-2 synchro hub. The snap rings are all the same size and are interchangeable.

1. Install first gear clutch cone on mainshaft 1-2 synchro hub with recessed side of cone facing front. Verify cone is seated against snap ring on hub.

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

3. Support mainshaft in upright position to install remaining gears, snap rings and synchro components. Shaft can be supported in gear case or hole can be cut in workbench to support shaft.

4. If 1-2 synchro hub and sleeve were disassembled for service, reassemble hub, sleeve, struts and springs as follows:
   1. Align and install sleeve on hub. Rotate sleeve until it slides onto hub. Sleeve only fits one way and will easily slide onto hub when long slot in sleeve, aligns with long shoulder on hub.

FIRST GEAR CLUTCH CONE

MAINSHAFT 1-2 SYNCHRO HUB

FIRST GEAR CLUTCH CONE SNAP RING

MAINSHAFT 1-2 SYNCHRO HUB

CLUTCH CONE SNAP RING

1-2 SYNCHRO SLEEVE ON HUB
1. **Align Wide Slot in Sleeve with Wide Spline of Hub**

2. - **1-2 Sleeve and Hub**

   Place wood blocks under hub that will raise hub about 3.5 cm (1.375 in.) above surface of workbench. Then allow sleeve to drop down on hub 1-2 Synchro Struts And Springs.

3. **1-2 Synchro Sleeve On Hub**

   - Align Wide Slot in Sleeve with Wide Spline of Hub
   - 1-2 Sleeve and Hub

4. **1-2 Synchro Struts And Springs**

   - Wood Blocks
   - Hub
   - Sleeve
   - Struts And Springs (4 Each)

   Install springs and struts in hub 1-2 Synchro Struts And Springs. Use lots of petroleum jelly to hold them in place. Then compress struts with your fingers and move sleeve upward until struts are started in sleeve. Verify that struts are engaged in sleeve before proceeding.
1-2 Synchro Struts And Springs

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

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

5. Install first gear stop ring in 1-2 synchro hub and sleeve. Verify stop ring is seated and engaged in hub and sleeve.

6. Install 1-2 synchro assembly and stop ring on mainshaft with the taper on the sleeve facing forward.
1. Install snap ring that secures 1-2 synchro on mainshaft hub 1-2 Synchro Snap Ring. Verify snap ring is seated in groove in mainshaft hub.

8. Assemble second gear clutch cone, clutch ring and stop ring Second Gear Clutch Cone, Clutch Ring And Stop Ring.
Install assembled second gear clutch cone and rings on mainshaft and in 1-2 synchro hub.

1. Install snap ring that secures second gear clutch cone on mainshaft.

Use narrow blade screwdriver to work snap ring into hub groove as shown. Verify snap ring is seated in mainshaft groove.
Important:
If snap ring will not fit in groove, clutch cone is slightly misaligned.

1. Install second gear bearing on mainshaft. 

2. Install second gear on mainshaft and bearing. Rotate gear until tabs of second gear clutch ring are seated in tab slots in gear.
1. SECOND GEAR
2. CLUTCH RING TABS
3. TAB SLOTS (IN GEAR)

3. Install thrust washer pin in shaft Thrust Washer Pin.

4. Install second gear thrust washer. Verify washer is seated on gear and pin Second Gear Thrust Washer.
Install second gear thrust washer snap ring. Verify snap ring is seated in mainshaft groove.

Install third gear bearing spacer on shaft and seat it against thrust washer snap ring.
Snap Ring And Third

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

Install third gear bearing on mainshaft Third Gear Bearing. Bearing should be flush with mainshaft hub.

Important:
If bearing is not flush with hub, the bearing spacer or snap ring was not installed.

1. Install third gear over bearing and onto mainshaft Third Gear.
1. Install synchro stop ring on third gear. Verify stop ring is seated on cone taper.

2. If 3-4 synchro was disassembled for service, reassemble synchro components as follows:

   1. Align and install synchro sleeve on hub. Front side of hub has a narrow groove machined in it.
2. Insert all three synchro struts in slots machined in sleeve and hub Synchro Assembly (3-4).

3. Install and seat synchro springs Synchro Assembly (3-4). Use flat blade or Phillips screwdriver to compress springs and seat them in struts and hub as shown.
4. Start 3-4 synchro assembly on mainshaft with the hub groove and sleeve groove both facing forward. Tap assembly onto shaft splines until hub is about 3 mm (0.125 in.) away from third gear stop ring. Then align stop ring with synchro sleeve and hub and seat synchro assembly with Installer C-4040

5. Verify 3-4 synchro hub is seated on shaft with approximately 3 mm (0.125 in.) of shaft spline visible.

Important:
If hub is not seated, stop ring lugs are misaligned. Rotate ring until lugs are engaged in 3-4 hub slots.

1. Verify that second and third gear rotate freely at this point. If not, determine the cause and correct.
2. Invert mainshaft in case or bench.
3. Install first gear bearing on mainshaft.
4. Install first gear on shaft with clutch hub side of gear facing the front of shaft. Verify tabs on clutch ring are aligned and seated in first gear hub.

Important:
1-2 synchro hub will not seat properly if clutch ring tabs are misaligned.

1. Install reverse clutch gear on first gear. Verify gear is seated on shaft splines.
1. Install reverse clutch gear snap ring with heavy duty snap ring pliers. Verify snap ring is seated in groove.

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

1. Install stop ring on clutch cone. Verify stop ring is seated on cone taper.
2. Install reverse gear bearing spacer on mainshaft and seat against reverse clutch gear snap ring Reverse Gear Bearing And Spacer.

3. Install reverse gear bearing on mainshaft Reverse Gear Bearing And Spacer.
1 - REVERSE GEAR BEARING
2 - BEARING SPACER
3 - FIRST GEAR
If reverse gear sleeve and struts were disassembled for service, reassemble sleeve, struts and springs as follows:

**Caution:**

The reverse sleeve will fit either way on the hub. Verify tapered side of the sleeve faces rearward.

1. Position sleeve on hub so tapered side of sleeve faces rearward. Reverse Gear Synchro Assembly.

2. Rotate sleeve to align teeth on sleeve and hub. Sleeve will slide easily into place on hub when properly aligned.

3. Install springs in gear hub Reverse Gear Synchro Assembly. Use petroleum jelly to hold springs in place if desired.
1. Compress first spring with flat blade screwdriver and slide strut into position in hub slot. Then work spring into seat in strut with small hooked tool or screwdriver.

5. Install reverse gear and synchro assembly on mainshaft Reverse Gear. Rotate assembly until stop ring lugs engage in hub slots and gear drops into seated position.
6. Install reverse gear thrust washer **Reverse Gear Thrust Washer**.

![Diagram of Reverse Gear Thrust Washer](image1)

**Reverse Gear Thrust Washer**

1 - THRUST WASHER
2 - REVERSE GEAR

7. Install rear bearing on mainshaft with Installer 6446. Seat bearing on output shaft and against thrust washer **Mainshaft Rear Bearing**.

![Diagram of Mainshaft Rear Bearing](image2)

**Mainshaft Rear Bearing**

1 - INSTALLER 6446
2 - MAINSHAFT REAR BEARING

8. Install fourth gear stop ring in 3-4 synchro sleeve **Fourth Gear Stop Ring**.

![Diagram of Fourth Gear Stop Ring](image3)

**Fourth Gear Stop Ring**
Fourth gear Stop Ring

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

9. Install fourth gear clutch gear in stop ring Fourth gear Clutch Gear.

10. Roll gear case onto its left side.
11. Grip mainshaft at pilot bearing hub and just behind reverse gear. Then lift assembly and guide rear of shaft through bearing bore at rear of case.
12. Continue holding front of shaft but switch grip at rear to shaft output splines. Lift mainshaft assembly slightly, align gears and seat assembly in case.
13. Set transmission case upright Mainshaft And Geartrain In Case.

14. Install drive gear thrust bearing on mainshaft Drive Gear Thrust Bearing. Use plenty of petroleum jelly to hold bearing in place.
15. Check alignment and mesh of mainshaft gears. If gears are not aligned, roll case on side and realign shaft and gears in case.

**DRIVE GEAR AND RETAINER**

1. Install bearing on drive gear with Installer 6448 [Front Bearing On Drive Gear](#).

2. Lubricate pilot bearing with petroleum jelly and install it in drive gear bore.

3. Install drive gear on mainshaft. Work gear rearward until mainshaft hub is seated in pilot bearing.

4. Install bearing cup in front retainer with Handle C-4171 and Installer C-4308 [Front Bearing Cup In Retainer](#).
1. Install new oil seal in front bearing retainer with Installer 6052 Bearing Retainer Oil Seal. Use one or two wood blocks to support retainer as shown. Lubricate seal lip with petroleum jelly after installation.

2. Clean contact surfaces of gear case and front bearing retainer with a wax and grease remover.

3. Apply Mopar® Silicone Sealer or equivalent to flange surface of front bearing retainer Location Of Front Retainer Lube Channel.
Install front bearing retainer over drive gear and start it into case.

9. Start front bearing retainer in gear case. Verify retainer lube channel is at the top-center (12 O'clock) position.

10. Align front bearing retainer bolt holes and tap retainer into place with plastic mallet. Install new retainer bolts and tighten to 30 N-m (22 ft. lbs.).
Front Bearing Retainer

1 - DRIVE GEAR
2 - FRONT BEARING RETAINER

Important:
Never reuse the old bolts.

MAINSHAFT END PLAY

1. Install mainshaft rear bearing cup in case and over bearing. Tap bearing cup into place with plastic mallet.
2. Install rear bearing plate to hold mainshaft and rear bearing in position Rear Bearing Plate.

Rear Bearing Plate

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

Important:
Do not install any end play shims at this time.
3. Tighten rear bearing plate bolts securely.
4. Place gear case in upright position on bench. Either cut hole in bench to accept drive gear and front retainer or use C-clamps to secure transmission on bench.

Important:
Do not leave transmission unsupported.

1. Install Extension Rod 8161 into a suitable threaded hole in rear of case.
2. Mount dial indicator on extension rod and position indicator plunger against end of mainshaft.
3. Move mainshaft forward to remove all play then zero dial indicator.
5. End play should be 0.051-0.15 mm (0.002-0.006 in.). Select fit shims are available to adjust end play. If end play adjustment is required, remove bearing plate and install necessary shim.
6. Reinstall rear bearing plate with oil hole in bearing plate at the top Rear Bearing Plate.

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

8. Install mainshaft fifth gear with Installer 6446 Mainshaft Fifth Gear. Gear is seated when it contacts rear bearing.

COUNTERSHAFT FIFTH GEAR SYNCHRO

1. Install thrust washer pin in countershaft Fifth Gear Thrust Washer Pin.
1. Install thrust washer on countershaft. Turn washer until pin engages in washer notch Fifth Gear Thrust Washer.

**Important:**
The flat side of washer faces the rear and cone side faces the front.

1. Lubricate and install fifth gear bearing on countershaft Countershaft Fifth Gear Bearing.
1 - COUNTERSHAFT
2 - FIFTH GEAR NEEDLE BEARING
2. Install synchro sleeve on hub of countershaft fifth gear with tapered side of sleeve facing front and the flat side facing rear. 

*Synchro Sleeve On Countershft Fifth*

1. Gear Hub
2. Synchro Sleeve
3. Countershaft Fifth Gear

3. Install shift fork in synchro sleeve. 

*Fifth Gear Shift Fork In Synchro Sleeve*

1. Synchro Sleeve
2. Shift Fork

4. Install assembled fifth gear, synchro sleeve and shift fork. 

*Countershaft Fifth Gear, Shift Fork And Synchro Sleeve* Align fork with shift lug rail and align gear with bearings and countershaft. Start components onto shaft and rail, then tap gear and fork into place with plastic or rawhide mallet.
Countershaft Fifth Gear, Shift Fork And Synchro Sleeve

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

5. Install fifth gear synchro struts and springs Fifth Gear Synchro Struts And Springs.

6. Assemble and install fifth synchro clutch gear and stop ring in fifth gear hub Fifth Synchro Clutch Gear And Stop Ring. Verify parts are seated in fifth gear hub.

7. Install clutch gear snap ring Fifth Synchro Clutch Snap Ring.
Align roll pin holes in shift fork with notches in shift lug rail. Then install roll pins from top side of fork. Countershaft Fifth Gear, Shift Fork And Synchro Sleeve.

Important:
Roll pins only fit one way due to small shoulder at one end of each pin.

**FIFTH GEAR NUT**

1. Install belleville washer onto the mainshaft.
2. Install fifth gear nut over the mainshaft.
3. Tighten the clamp bolt until the gap in the clamp nut assembly is closed.
4. Back the clamp bolt off one full turn.
5. Place 10-15 drops of Loctite™ 272 onto the mainshaft threads where the fifth gear nut will be engaged.
6. Install fifth gear nut on mainshaft Fifth Gear Nut.
There are two splined sockets available to retain the mainshaft while installing the fifth gear nut.

- 4x2 mainshafts Socket 6993
- 4x4 mainshafts Socket 6984

7. Tighten fifth gear nut as much as possible with Nut Wrench 6743, long handle ratchet, breaker bar and applicable socket wrench. Lock mainshaft gears by shifting all synchro sleeves into engaged position.

8. Tighten fifth gear nut with Nut Wrench 6743 and high capacity torque wrench. Tighten nut to 366-380 N·m (270-280 ft. lbs.). Have helper hold transmission steady if necessary.

9. Torque the fifth gear clamp nut clamping bolt to 13.5 N·m (10 ft. lbs.).

10. Unlock the mainshaft gears by shifting all synchro sleeves out of the engaged position.
EXTENSION/ADAPTER HOUSING

1. Clean mating surfaces of extension/adapter housing and gear case with a wax and grease remover.
2. Check alignment dowels in gear case and housing or adapter. Be sure dowels are in position and seated.
3. Apply Mopar® Silicone Sealer or equivalent to gear case and housing mating surfaces.
4. Align and install extension/adapter housing on gear case Extension/Adapter Housing.

5. Apply Mopar® Lock N' Seal or equivalent to threads of extension/adapter housing bolts.
6. Install and tighten housing bolts to 54 N·m (40 ft. lbs.).
7. Install transfer case, if equipped.
8. Install engine rear support. Refer to 9 Engine for procedures.
9. Install propeller shaft(s).
10. Remove transmission support stand and lower vehicle.